ENGINE CONTROL SYSTEM

SECTION EC

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Alphabetical & P No. Index for DTC

NGEC0001

ALPHABETICAL INDEX FOR DTC

NGEC0001S01

Items (CONSULT-II screen terms)	DTC*4 CONSULT-II GST*2	Reference page
Unable to access ECM	—	EC-119
*COOLAN T SEN/CIRC	P0125	EC-187
ABSL PRES SEN/CIRC	P0105	EC-160
AIR TEMP SEN/CIRC	P0110	EC-162
CKP SENSOR (COG)	P1336	EC-446
CKP SEN/CIRCUIT	P0335	EC-313
CLOSED LOOP-B1	P1148	EC-444
CLOSED TP SW/CIRC	P0510	EC-433
CMP SEN/CIRCUIT	P0340	EC-319
COOLANT T SEN/CIRC	P0115	EC-168
CYL 1 MISFIRE	P0301	EC-300
CYL 2 MISFIRE	P0302	EC-300
CYL 3 MISFIRE	P0303	EC-300
CYL 4 MISFIRE	P0304	EC-300
ECM	P0605	EC-440
EGR SYSTEM	P0400	EC-327
EGR SYSTEM	P1402	EC-465
EGR TEMP SEN/CIRC	P1401	EC-459
EGRC SOLENOID/V	P1400	EC-452
EGRC-BPT VALVE	P0402	EC-339
EVAP GROSS LEAK	P0455	EC-400
EVAP PURG FLOW/MON	P1447	EC-509
EVAP SMALL LEAK	P0440	EC-352
EVAP SMALL LEAK	P1440	EC-474
EVAP SYS PRES SEN	P0450	EC-385
EVAP VERY SML LEAK	P1441	EC-476
FUEL LEVEL SENSOR	P0461	EC-417
FUEL LEVL SEN/CIRC	P0464	EC-215
FUEL LEV SEN SLOSH	P0460	EC-413
FUEL LEVL SEN/CIRC	P1464	EC-527
FUEL SYS LEAN/BK1	P0171	EC-280
FUEL SYS RICH/BK1	P0172	EC-287
FUEL TEMP SEN/CIRC	P0180	EC-294
HO2S1 (B1)	P0130	EC-192

Items (CONSULT-II screen terms)	DTC*4 CONSULT-II GST*2	Reference page
HO2S1 (B1)	P0131	EC-200
HO2S1 (B1)	P0132	EC-207
HO2S1 (B1)	P0133	EC-214
HO2S1 (B1)	P0134	EC-225
HO2S1 HTR (B1)	P0135	EC-232
HO2S2 (B1)	P0137	EC-237
HO2S2 (B1)	P0138	EC-247
HO2S2 (B1)	P0139	EC-257
HO2S2 (B1)	P0140	EC-267
HO2S2 HTR (B1)	P0141	EC-275
IACV/AAC VLV/CIRC	P0505	EC-427
KNOCK SEN/CIRC-B1	P0325	EC-309
MAF SEN/CIRCUIT*2	P0100	EC-150
MULTI CYL MISFIRE	P0300	EC-300
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**—**
OVERHEAT	—	EC-554
P-N POS SW/CIRCUIT	P1706	EC-548
PURG VOLUME CONT/V	P0443	EC-369
PURG VOLUME CONT/V	P1444	EC-491
THERMSTAT FNCTN	P1126	EC-442
THRTL POS SEN/CIRC*2	P0120	EC-173
TW CATALYST SYS-B1	P0420	EC-347
VC CUT/V BYPASS/V	P1491	EC-537
VC/V BYPASS/V	P1490	EC-530
VEH SPEED SEN/CIRC*3	P0500	EC-423
VENT CONTROL VALVE	P0446	EC-377
VENT CONTROL VALVE	P1446	EC-503
VENT CONTROL VALVE	P1448	EC-519

*1: These numbers are prescribed by SAE J2012.

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

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

*4: 1st trip DTC No. is the same as DTC No.

P NO. INDEX FOR DTC

NGEC0001S02

DTC*4 CONSULT-II GST*1	Items (CONSULT-II screen terms)	Reference page
—	Unable to access ECM	EC-119
P0000	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	**—**
P0100	MAF SEN/CIRCUIT*2	EC-150
P0105	ABSL PRES SEN/CIRC	EC-160
P0110	AIR TEMP SEN/CIRC	EC-162
P0115	COOLANT T SEN/CIRC	EC-168
P0120	THRTL POS SEN/CIRC*2	EC-173
P0125	*COOLAN T SEN/CIRC	EC-187
P0130	HO2S1 (B1)	EC-192
P0131	HO2S1 (B1)	EC-200
P0132	HO2S1 (B1)	EC-207
P0133	HO2S1 (B1)	EC-214
P0134	HO2S1 (B1)	EC-225
P0135	HO2S1 HTR (B1)	EC-232
P0137	HO2S2 (B1)	EC-237
P0138	HO2S2 (B1)	EC-247
P0139	HO2S2 (B1)	EC-257
P0140	HO2S2 (B1)	EC-267
P0141	HO2S2 HTR (B1)	EC-275
P0171	FUEL SYS LEAN/BK1	EC-280
P0172	FUEL SYS RICH/BK1	EC-287
P0180	FUEL TEMP SEN/CIRC	EC-294
P0300	MULTI CYL MISFIRE	EC-300
P0301	CYL 1 MISFIRE	EC-300
P0302	CYL 2 MISFIRE	EC-300
P0303	CYL 3 MISFIRE	EC-300
P0304	CYL 4 MISFIRE	EC-300
P0325	KNOCK SEN/CIRC-B1	EC-309
P0335	CKP SEN/CIRCUIT	EC-313
P0340	CMP SEN/CIRCUIT	EC-319
P0400	EGR SYSTEM	EC-327
P0402	EGRC-BPT VALVE	EC-339
P0420	TW CATALYST SYS-B1	EC-347
P0440	EVAP SMALL LEAK	EC-352
P0443	PURG VOLUME CONT/V	EC-369

DTC*4 CONSULT-II GST*1	Items (CONSULT-II screen terms)	Reference page
P0446	VENT CONTROL VALVE	EC-377
P0450	EVAP SYS PRES SEN	EC-385
P0455	EVAP GROSS LEAK	EC-400
P0460	FUEL LEV SEN SLOSH	EC-413
P0461	FUEL LEVEL SENSOR	EC-417
P0464	FUEL LEVL SEN/CIRC	EC-419
P0500	VEH SPEED SEN/CIRC*3	EC-423
P0505	IACV/AAC VLV/CIRC	EC-427
P0510	CLOSED TP SW/CIRC	EC-433
P0605	ECM	EC-440
P1126	THERMSTAT FNCTN	EC-442
P1148	CLOSED LOOP-B1	EC-444
P1336	CKP SENSOR (COG)	EC-446
P1400	EGRC SOLENOID/V	EC-452
P1401	EGR TEMP SEN/CIRC	EC-459
P1402	EGR SYSTEM	EC-465
P1440	EVAP SMALL LEAK	EC-474
P1441	EVAP VERY SML LEAK	EC-476
P1444	PURG VOLUME CONT/V	EC-491
P1446	VENT CONTROL VALVE	EC-503
P1447	EVAP PURG FLOW/MON	EC-509
P1448	VENT CONTROL VALVE	EC-519
P1464	FUEL LEVL SEN/CIRC	EC-527
P1490	VC/V BYPASS/V	EC-530
P1491	VC CUT/V BYPASS/V	EC-537
P1706	P-N POS SW/CIRCUIT	EC-548
—	OVERHEAT	EC-554

*1: These numbers are prescribed by SAE J2012.

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

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

*4: 1st trip DTC No. is the same as DTC No.

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

NGEC0002

The Supplemental Restraint System “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.

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

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses (except “SEAT BELT PRE-TENSIONER” connector) can be identified with yellow harness connector (and with yellow harness protector or yellow insulation tape before the harness connectors).**

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

NGEC0003

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 “Description”, “HARNESS CONNECTOR”, *EL-5*.
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EGR system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission Control Module) before returning the vehicle to the customer.**

Engine Fuel & Emission Control System

NGEC0004

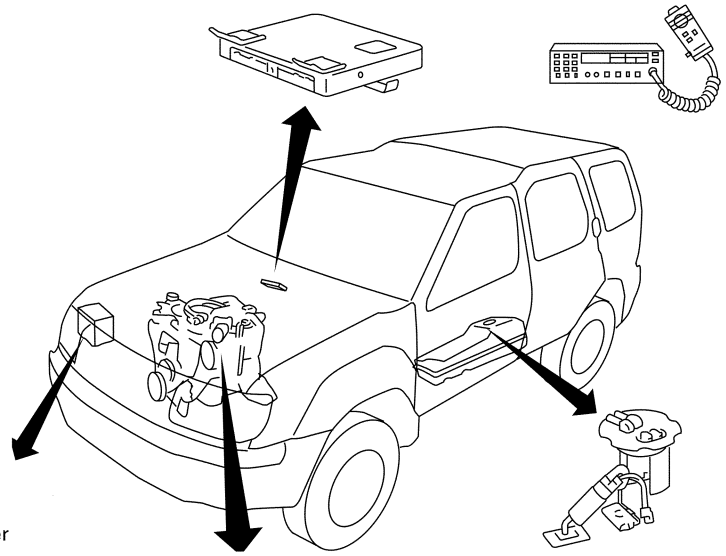
WIRELESS EQUIPMENT

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

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

ECM

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



BATTERY

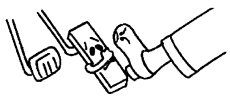
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.

WHEN STARTING

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

ECM PARTS HANDLING

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



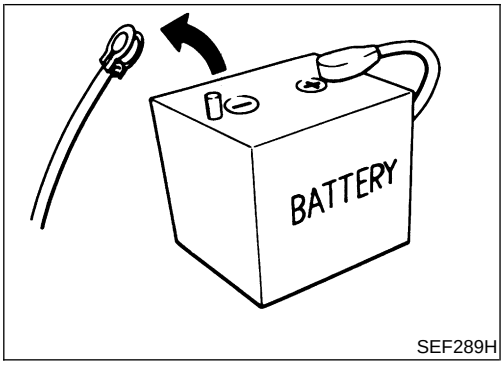
FUEL PUMP

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

ECM HARNESS HANDLING

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

AEC045B

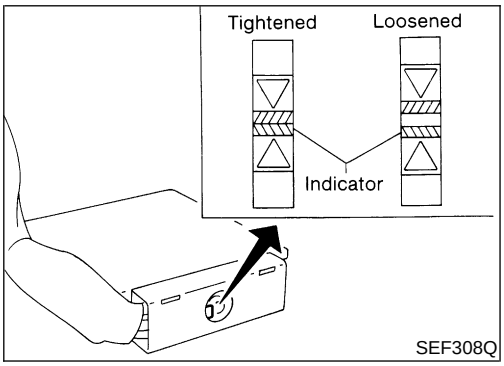


SEF289H

Precautions

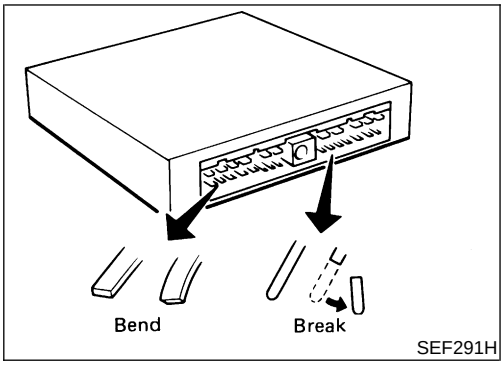
NGEC0005

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



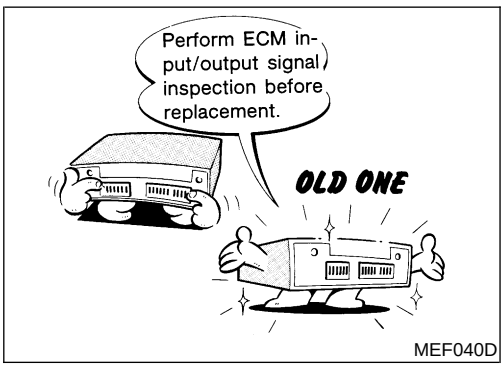
SEF308Q

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



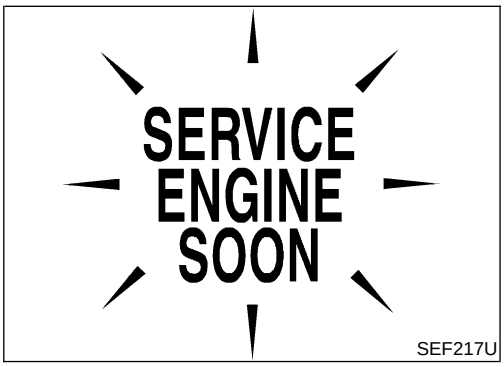
SEF291H

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



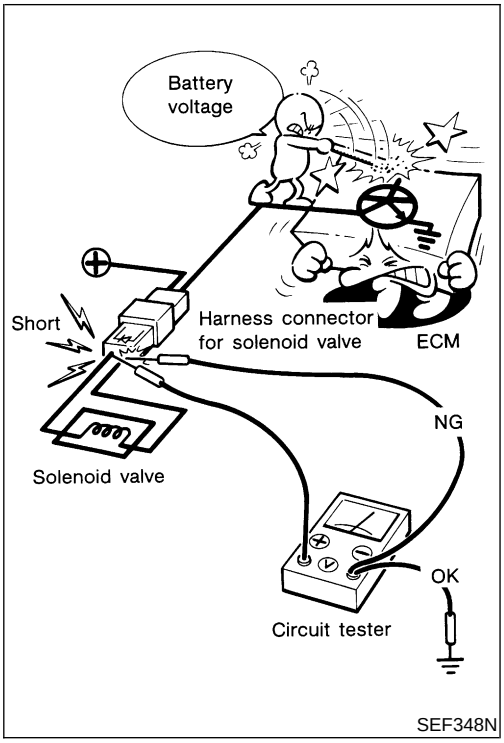
MEF040D

- **Before replacing ECM, perform Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-129.**



SEF217U

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



- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.**

Wiring Diagrams and Trouble Diagnosis

NGEC0006

When you read Wiring diagrams, refer to the following:

- "HOW TO READ WIRING DIAGRAMS", ***GI-10***.
- "POWER SUPPLY ROUTING", ***EL-9***.

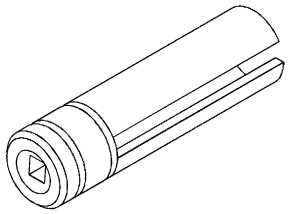
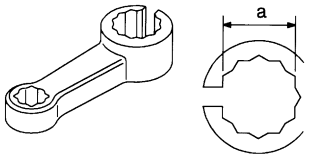
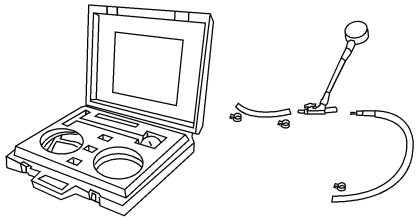
When you perform trouble diagnosis, refer to the following:

- "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES" in ***GI-33***.
- "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", ***GI-22***.

Special Service Tools

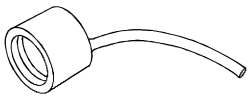
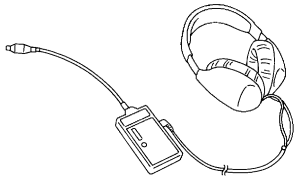
NGEC0007

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

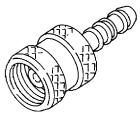
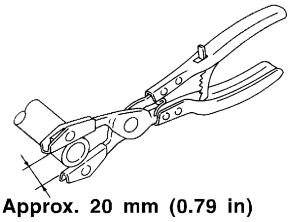
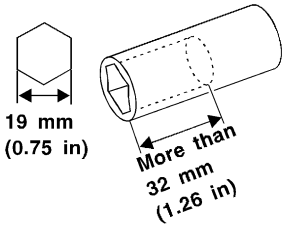
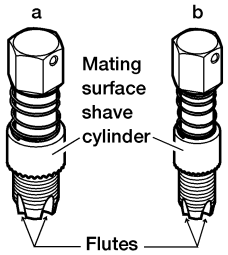
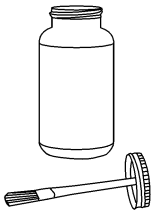
Tool number (Kent-Moore No.) Tool name	Description	
KV10117100 (J36471-A) Heated oxygen sensor wrench	 NT379	Loosening or tightening front heated oxygen sensor with 22 mm (0.87 in) hexagon nut
KV10114400 (J-38365) Heated oxygen sensor wrench	 NT636	Loosening or tightening rear heated oxygen sensor **a: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

Commercial Service Tools

NGEC0008

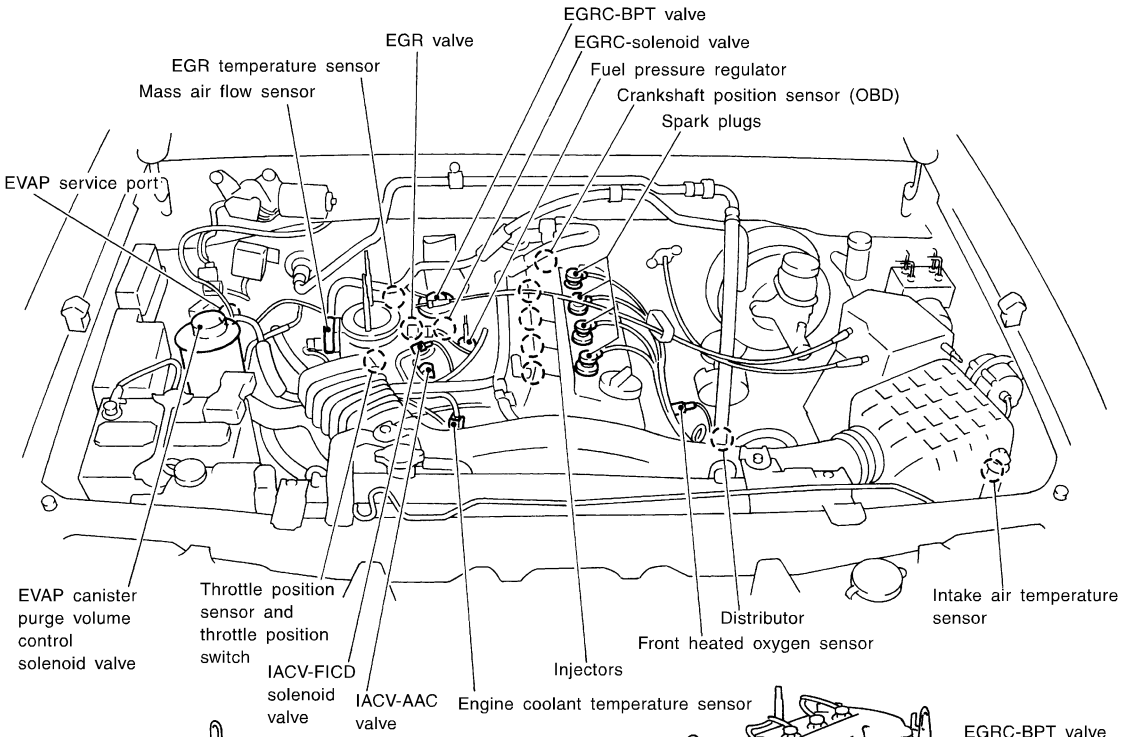
Tool name	Description	
Fuel filler cap adapter	 NT653	Checking fuel tank vacuum relief valve opening pressure
Leak detector (J41416)	 NT703	Locating the EVAP leak

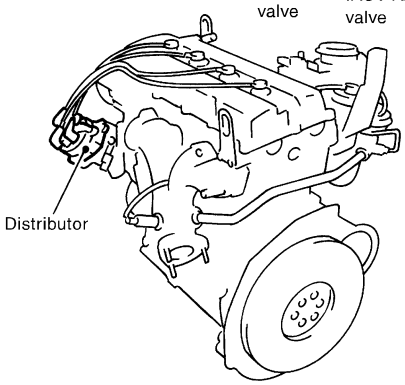
Commercial Service Tools (Cont'd)

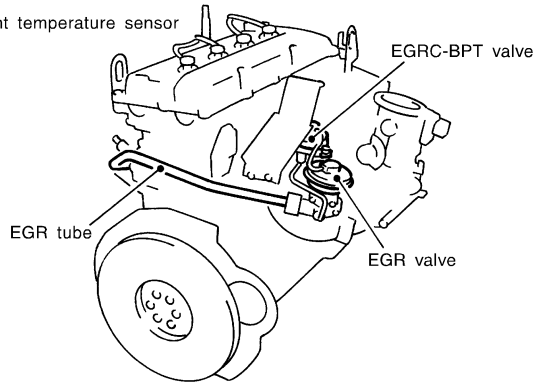
Tool name	Description	
EVAP service port adapter (J41413-OBD)	 NT704	Applying positive pressure through EVAP service port
Hose clipper (—)	 NT720	Clamping the EVAP purge hose between the fuel tank and EVAP canister applied to DTC P1440 [EVAP control system (Small leak — Positive pressure)]
Socket wrench	 NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner (J-43897-18) (J-43897-12)	 AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown in "Commercial Service tools". a: J-43897-18 18 mm diameter, for Zirconia Oxygen Sensor b: J-43897-12 12 mm diameter, for Titania Oxygen Sensor
Anti-seize lubricant (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)	 AEM489	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

Engine Control Component Parts Location

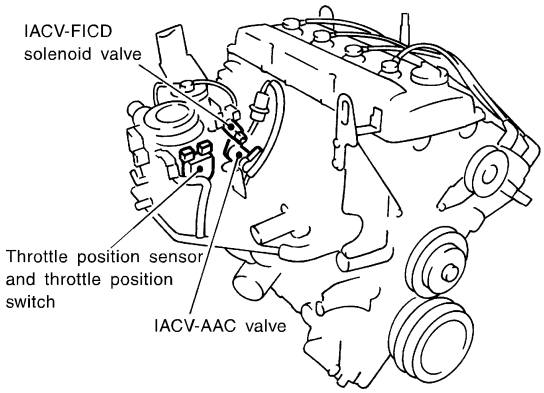
NGEC0009

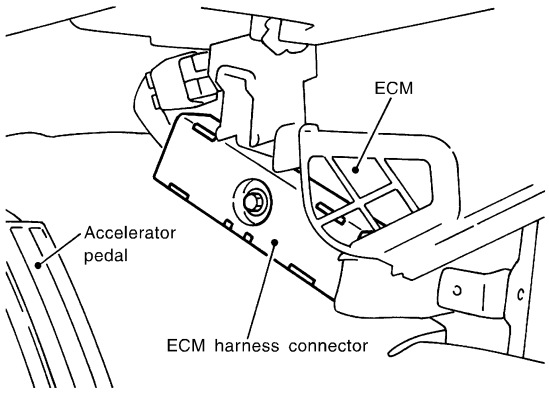




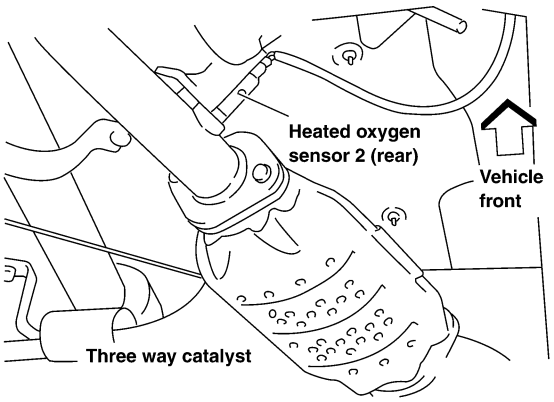


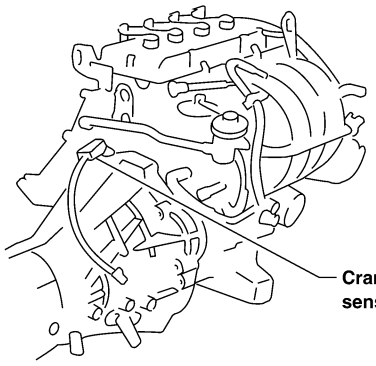
Driver side





SEF711Z

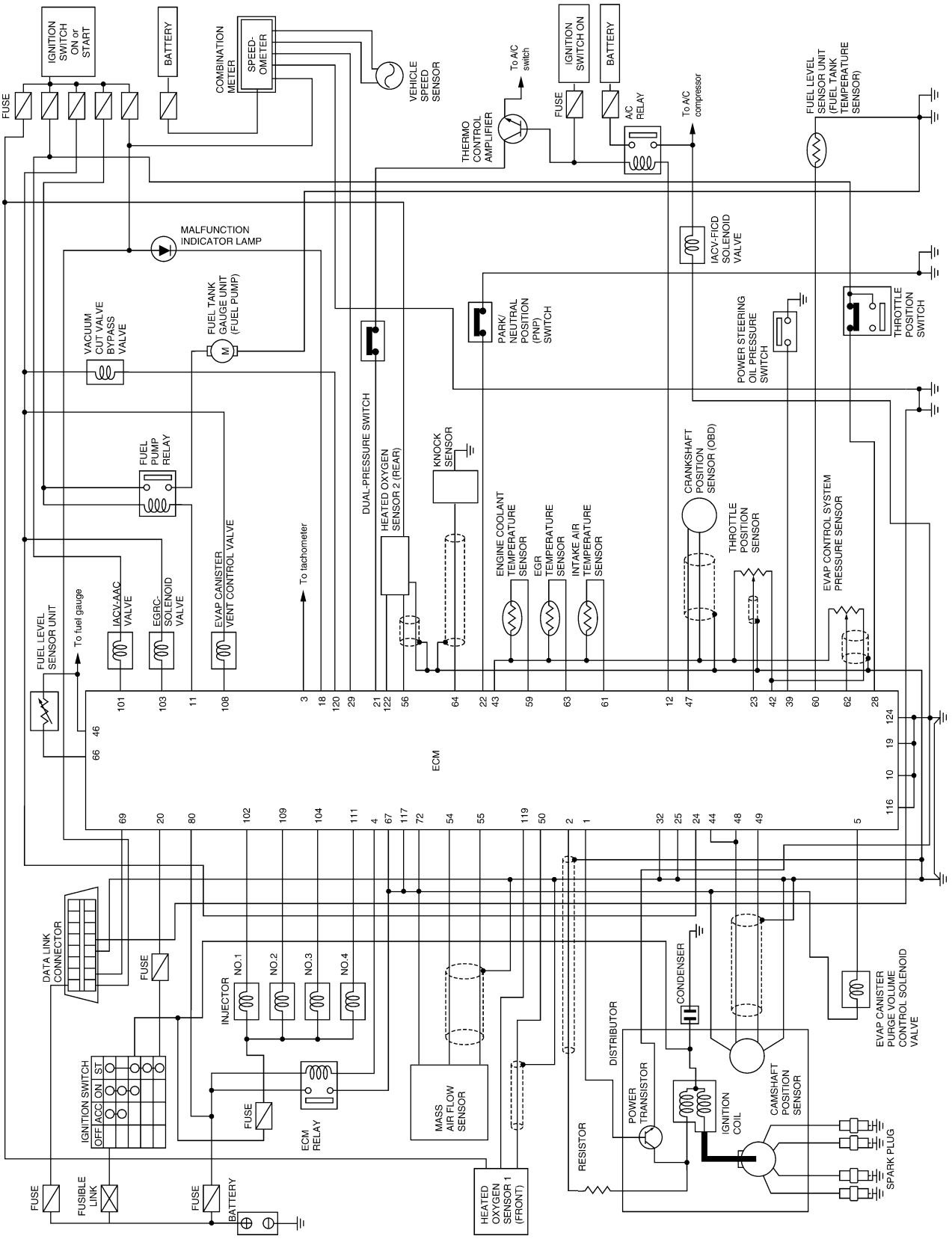

Heated oxygen sensor 2 (rear)
Vehicle front
Three way catalyst


Crankshaft position sensor (OBD)

WEC550

Circuit Diagram

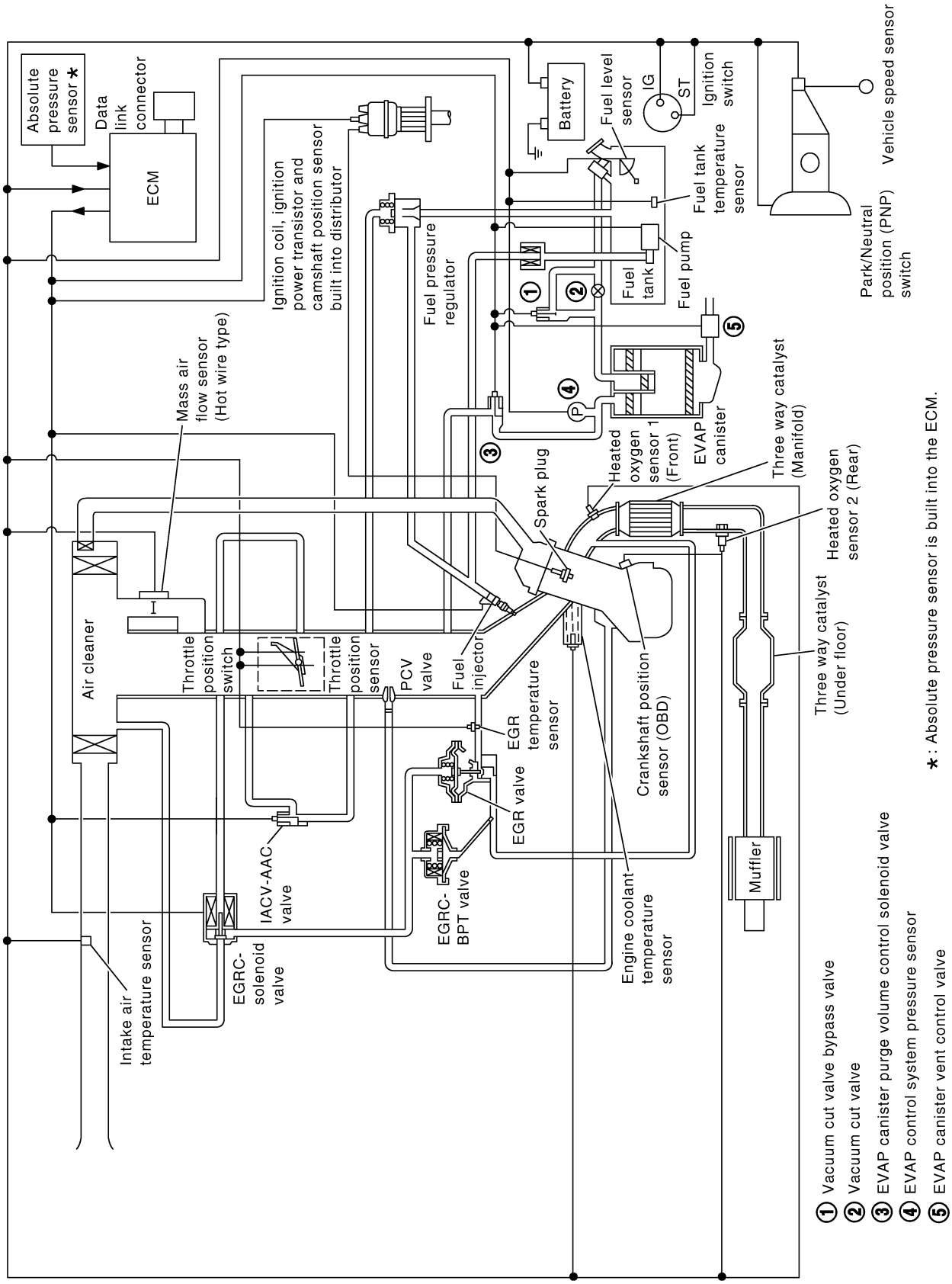
NGEC0010



WEC123A

System Diagram

NGEC0011

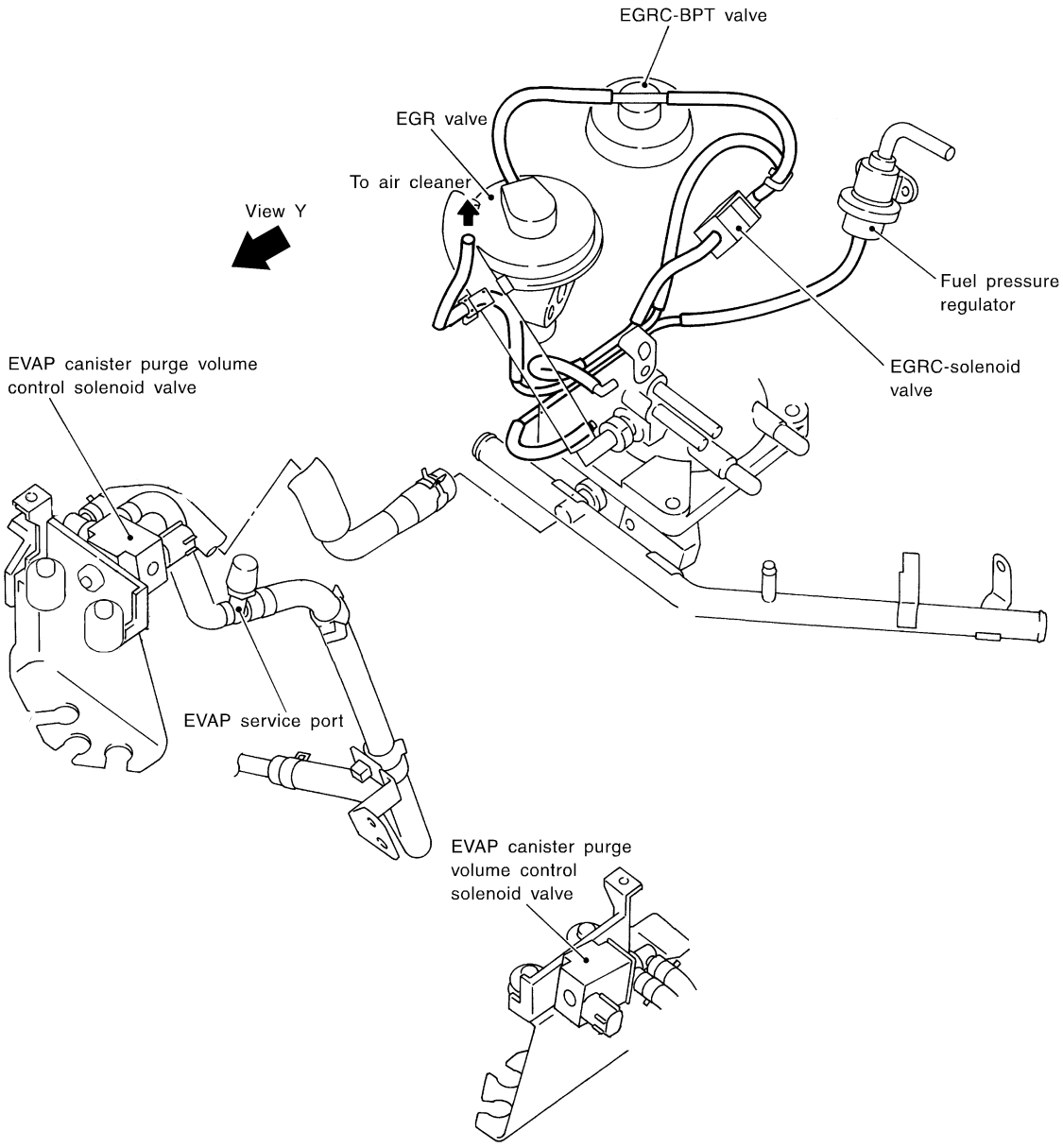


SEF697Z

Vacuum Hose Drawing

NGEC0012

Refer to “System Diagram” on EC-26 for vacuum control system.



View Y

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

WEC551

System Chart

NGEC0013

Input (Sensor)	ECM Function	Output (Actuator)
• Camshaft position sensor • 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 (OBD) • EVAP control system pressure sensor*1 • Fuel tank temperature sensor • Battery voltage • Power steering oil pressure switch • Vehicle speed sensor • Intake air temperature sensor • Heated oxygen sensor 2 (rear)*2 • Closed throttle position switch*3	Fuel injection & mixture ratio control	Injectors
	Distributor ignition system	Power transistor
	Idle air control system	IACV-AAC valve and IACV-FICD solenoid valve
	Fuel pump control	Fuel pump relay
	Heated oxygen sensor 1 (front) monitor & on board diagnostic system	Malfunction indicator lamp (On the instrument panel)
	EGR control	EGRC-solenoid valve
	Heated oxygen sensors 1, 2 (front and rear) heater control	Heated oxygen sensor heater
	EVAP canister purge flow control	• EVAP canister purge volume control valve • EVAP canister purge control solenoid valve
	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: Under normal conditions, this sensor is not for engine control operation.
*3: This switch will operate in place of the throttle position sensor to control EVAP parts if the sensor malfunctions.

Multiport Fuel Injection (MFI) System

DESCRIPTION

Input/Output Signal Chart

NGEC0014

NGEC0014S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed and piston position	Fuel injection & mixture ratio control	Injector
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
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		
Battery	Battery voltage		
Power steering oil pressure switch	Power steering operation		
Heated oxygen sensor 2 (rear)*	Density of oxygen in exhaust gas		

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

Basic Multiport Fuel Injection System

NGEC0014S02

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

NGEC0014S03

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

<Fuel increase>

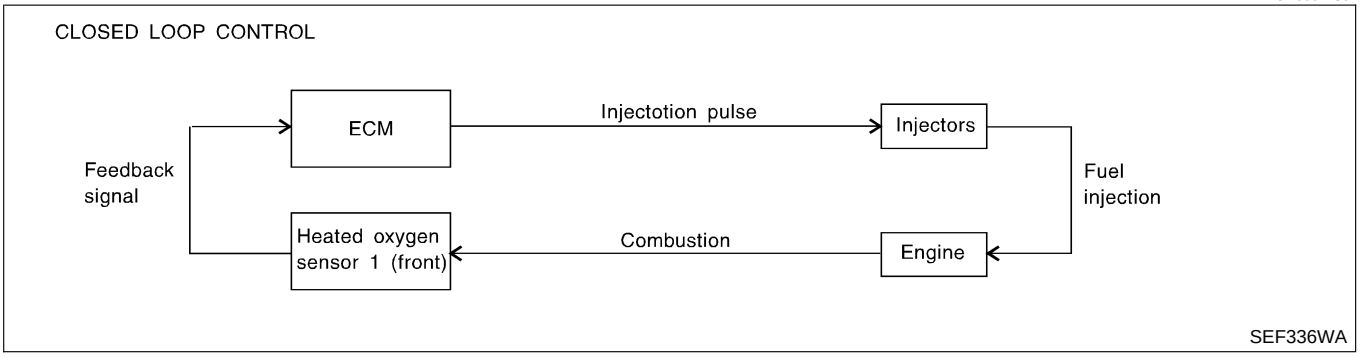
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

Mixture Ratio Feedback Control (Closed loop control)

NGEC0014S04



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst can then better reduce CO, HC and NOx emissions. This system uses a front heated oxygen sensor in the exhaust manifold to monitor if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the heated oxygen sensor 1 (front), refer to EC-192. 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

NGEC0014S05

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

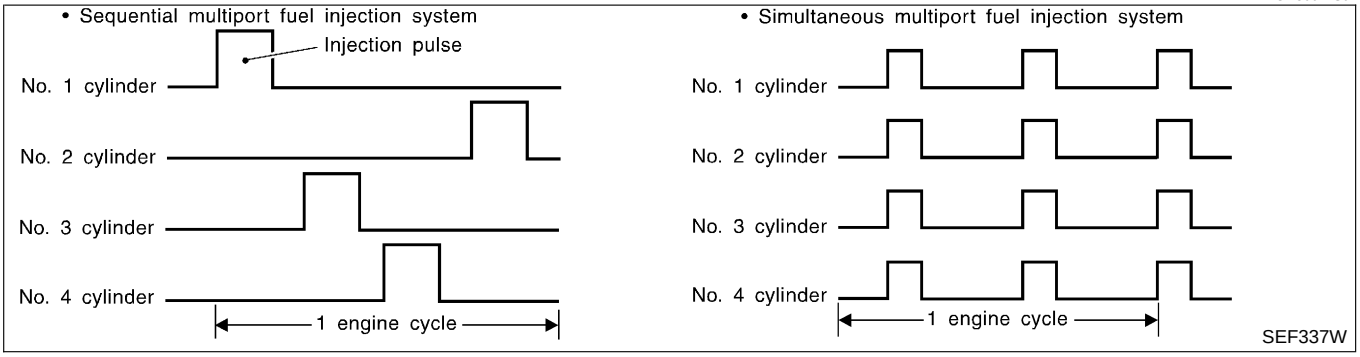
Mixture Ratio Self-learning Control

NGEC0014S06

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 front heated oxygen sensor indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.
"Long term fuel trim" is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

Fuel Injection Timing

NGEC0014S07



Two types of systems are used.

Sequential Multiport Fuel Injection System

NGEC0014S0701

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

NGEC0014S0702

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

NGEC0014S08

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

Distributor Ignition (DI) System

DESCRIPTION

NGEC0015

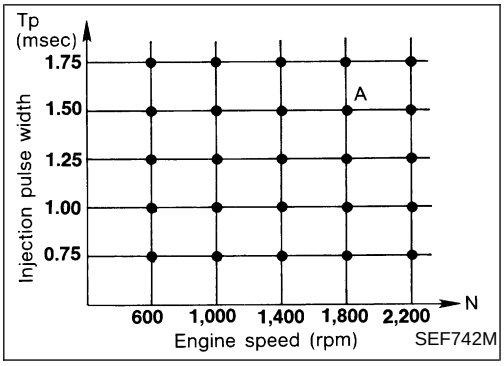
Input/Output Signal Chart

NGEC0015S01

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

System Description

NGEC0015S02



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

Input/Output Signal Chart

=NGEC0016

NGEC0016S01

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner “ON” signal	Air conditioner cut control	Air conditioner relay
Throttle position sensor	Throttle valve opening angle		
Camshaft position sensor	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Vehicle speed sensor	Vehicle speed		
Power steering oil pressure switch	Power steering operation		

System Description

NGEC0016S02

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.
- When the engine coolant temperature becomes excessively high.
- When operating power steering and air conditioner during low engine speed or when fully releasing accelerator pedal.
- When engine speed is excessively low.

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

DESCRIPTION

Input/Output Signal Chart

NGEC0017

NGEC0017S01

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		
Camshaft position sensor	Engine speed		

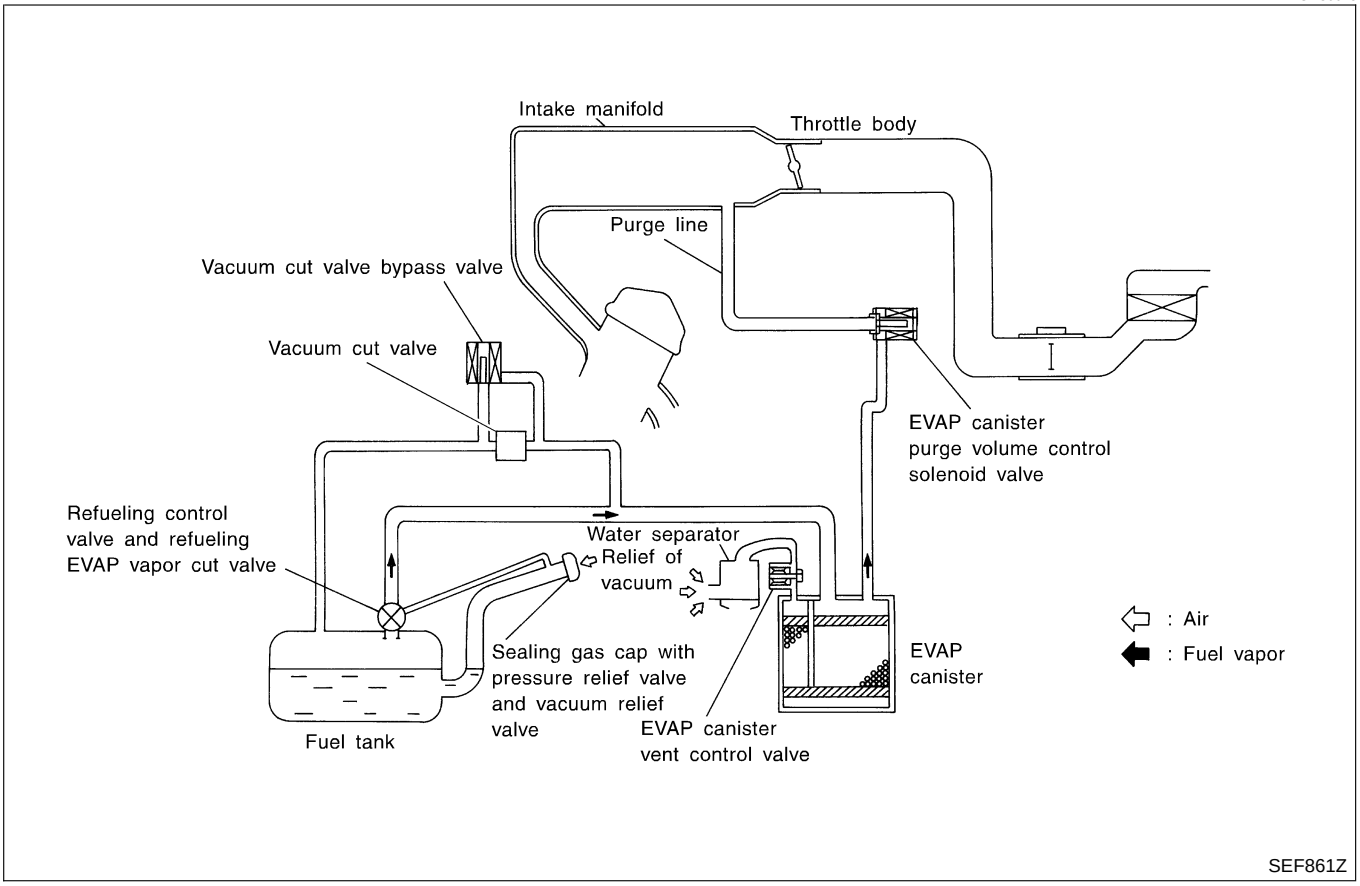
If the engine speed is above 3,000 rpm with no load, (for example, in Neutral and engine speed over 3,000 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 1,500 rpm, then fuel cut is cancelled.

NOTE:
This function is different from deceleration control listed under “Multiport Fuel Injection (MFI) System”, EC-29.

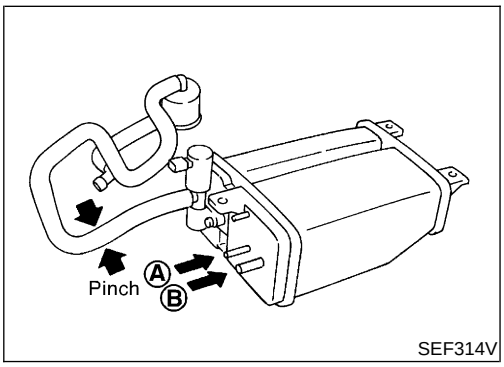
Evaporative Emission System

DESCRIPTION

=NGEC0018



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



INSPECTION

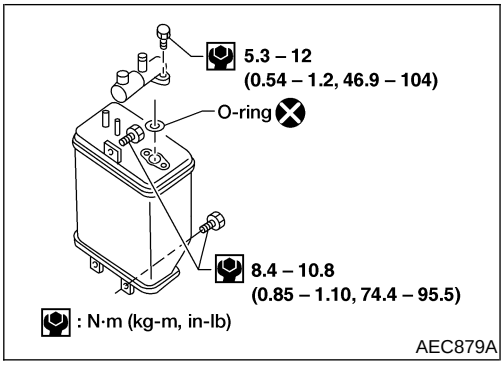
NGEC0019

EVAP Canister

NGEC0019S01

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**.

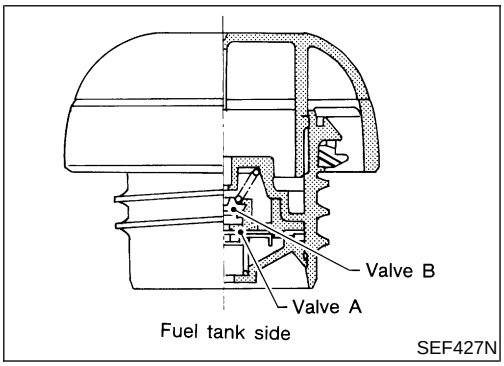


Tightening Torque

NGEC0019S02

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)

NGEC0019S03

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

Pressure:

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

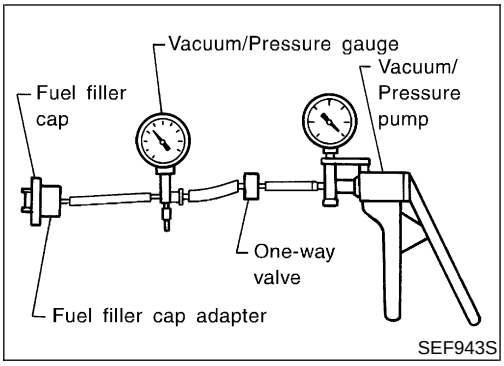
Vacuum:

−6.0 to −3.5 kPa (−0.061 to −0.036 kg/cm^2, −0.87 to −0.51 psi)

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

CAUTION:

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



Vacuum Cut Valve and Vacuum Cut Valve Bypass Valve

NGEC0019S05

Refer to EC-537.

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve

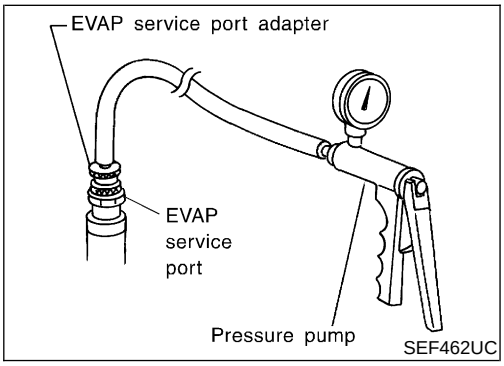
NGEC0019S06

Refer to EC-491.

Fuel Tank Temperature Sensor

NGEC0019S08

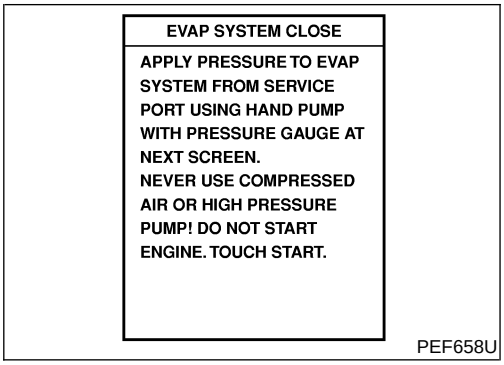
Refer to EC-294.



EVAP Service Port

NGEC0019S09

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.



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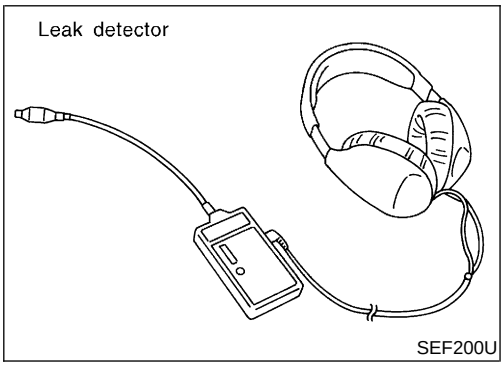
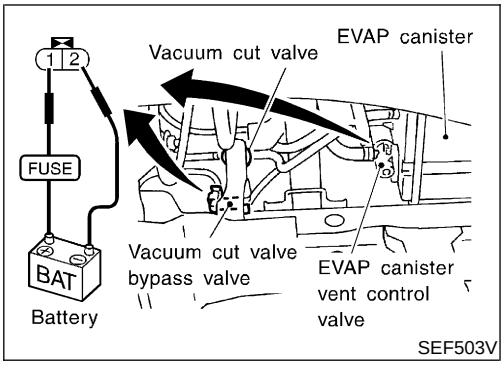


SEF200U



SEF503V

How to Detect Fuel Vapor Leakage

NGEC0019S10

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-37.

Without CONSULT-II

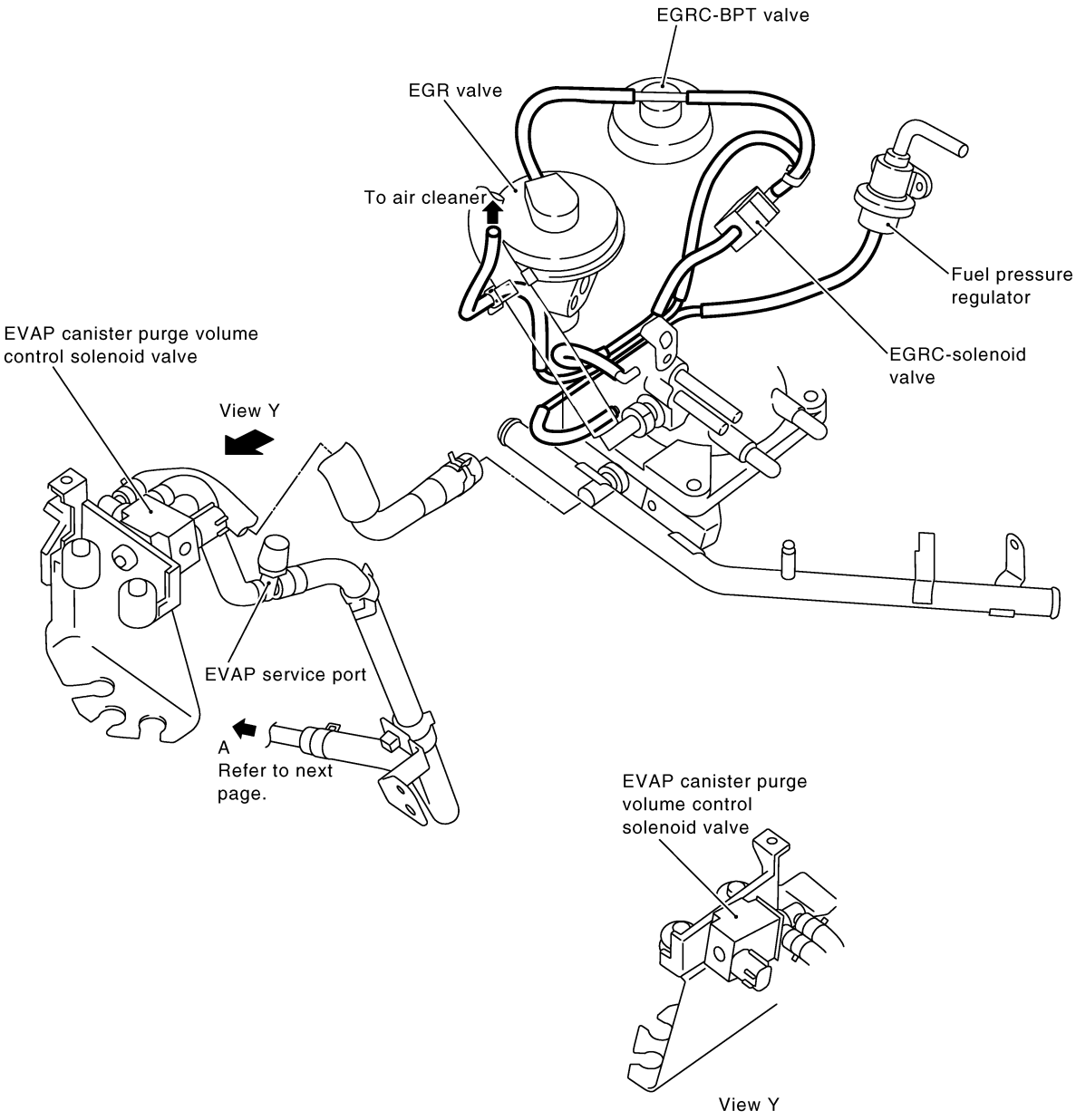
1) Attach the EVAP service port adapter securely to the EVAP service port and pressure pump with pressure gauge to the EVAP service port.
2) Apply battery voltage to between the terminals of both EVAP canister vent control valve and vacuum cut valve bypass valve to make a closed EVAP system.
3) To locate 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-37.

EVAPORATIVE EMISSION LINE DRAWING

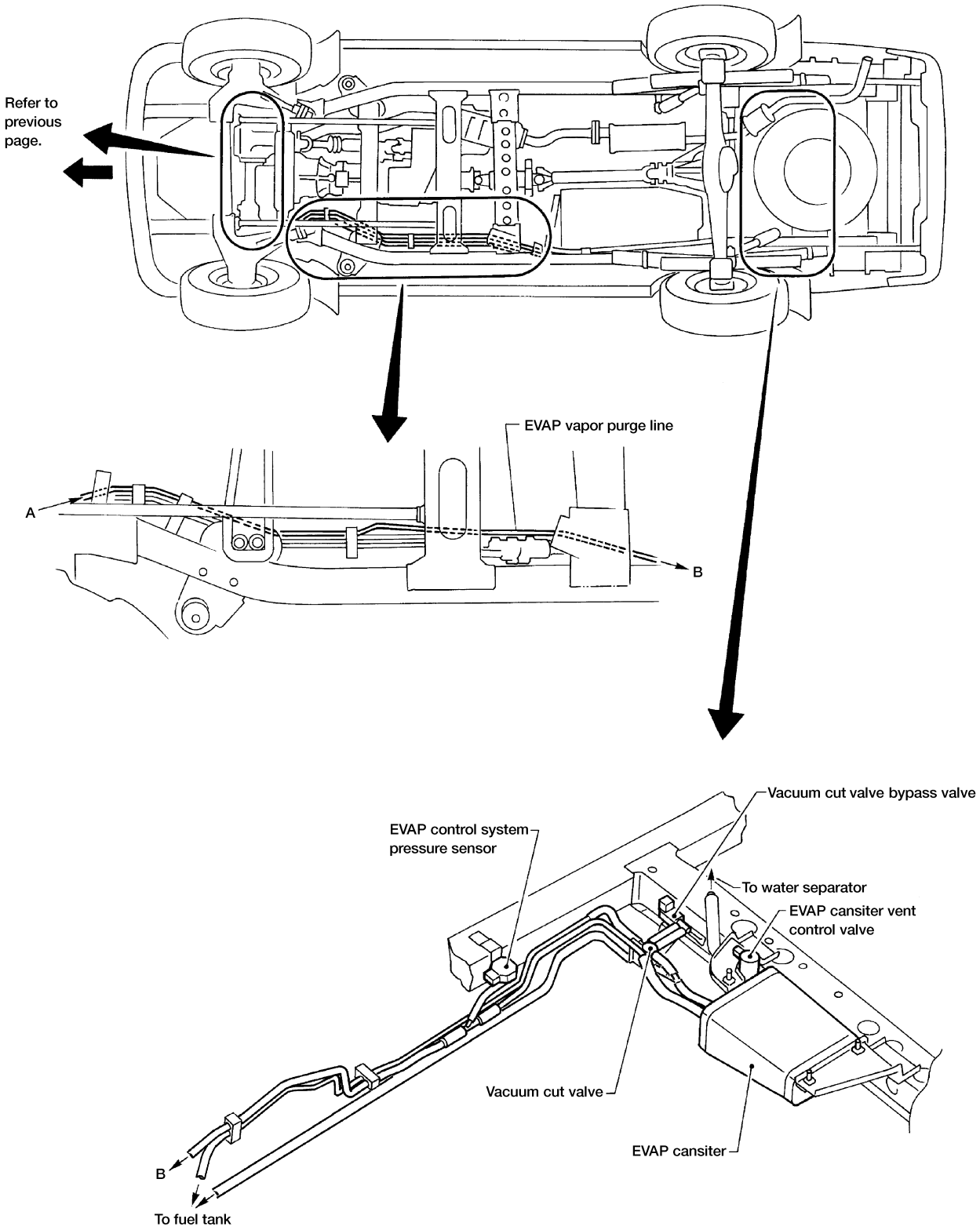
=NGEC0020

NOTE:

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



SEF712Z


Refer to previous page.
EVAP vapor purge line
A
B
Vacuum cut valve bypass valve
EVAP control system pressure sensor
To water separator
EVAP cansiter vent control valve
Vacuum cut valve
EVAP cansiter
B
To fuel tank

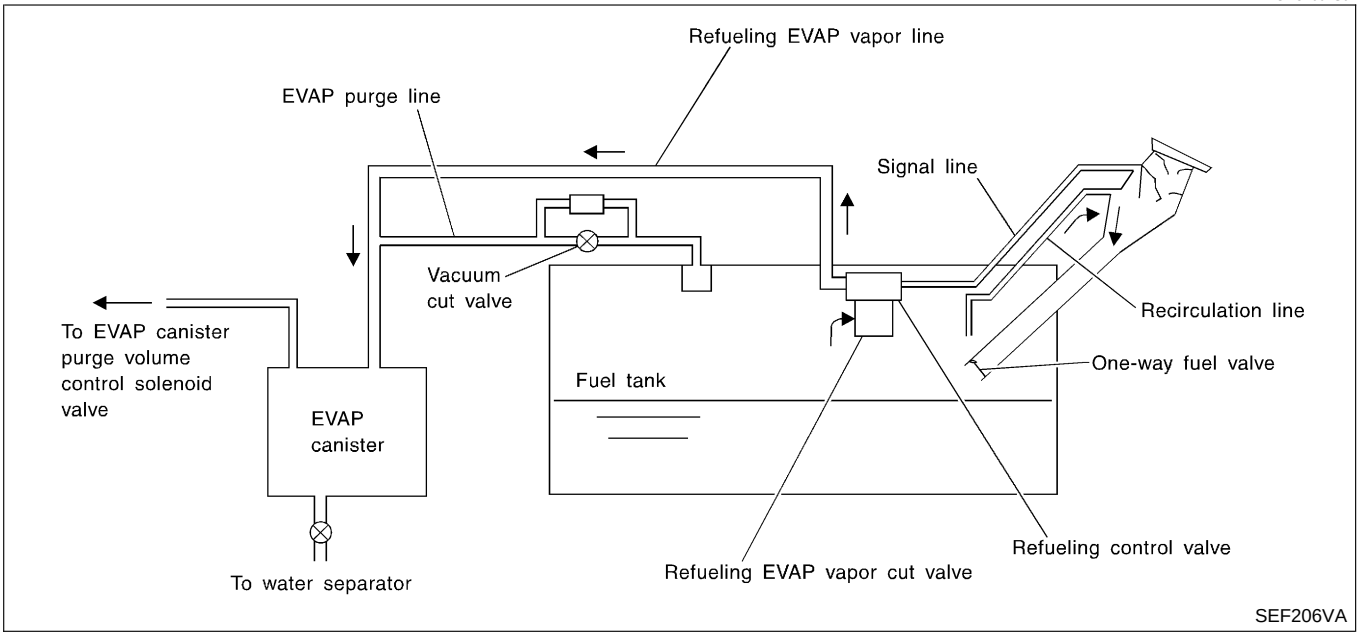
WEC555

On Board Refueling Vapor Recovery (ORVR)

NGEC1002

SYSTEM DESCRIPTION

NGEC1002S01



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-51.
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.**

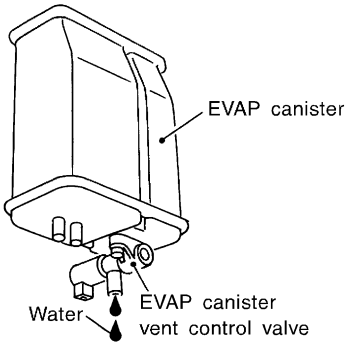
DIAGNOSTIC PROCEDURE

NGEC1002S02

Symptom: Fuel Odor from EVAP Canister Is Strong.

NGEC1002S0201

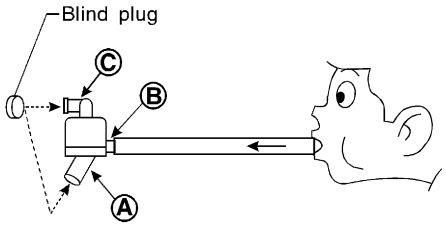
1	CHECK EVAP CANISTER
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Weigh the EVAP canister with EVAP canister vent control valve attached. The weight should be less than 1.8 kg (4.0 lb).	
OK or NG	
OK ▶	GO TO 2.
NG ▶	GO TO 3.

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

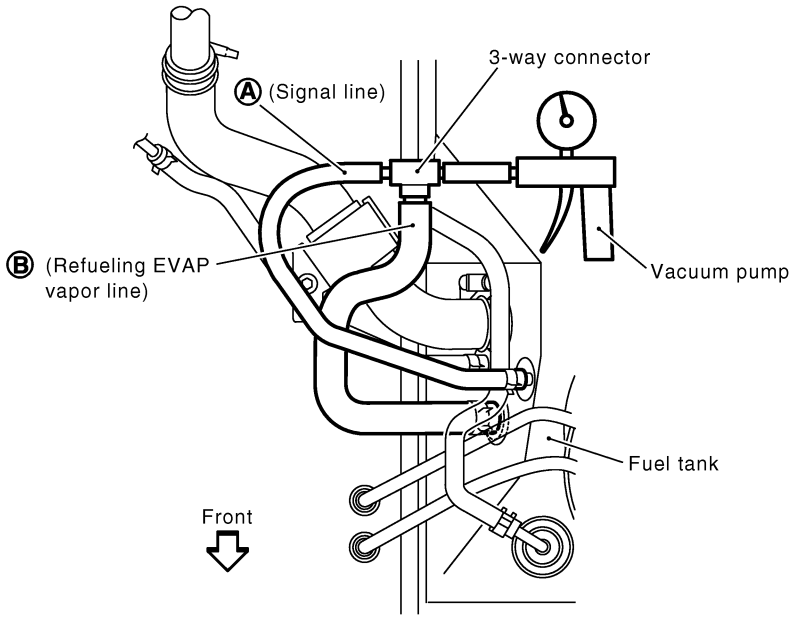
With CONSULT-II

1. Remove fuel tank. Refer to ***FE-4***, "FUEL SYSTEM.
2. Drain fuel from the tank as follows:

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

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

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



SEF707Z

OK or NG

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

7	CHECK REFUELING EVAP VAPOR CUT VALVE

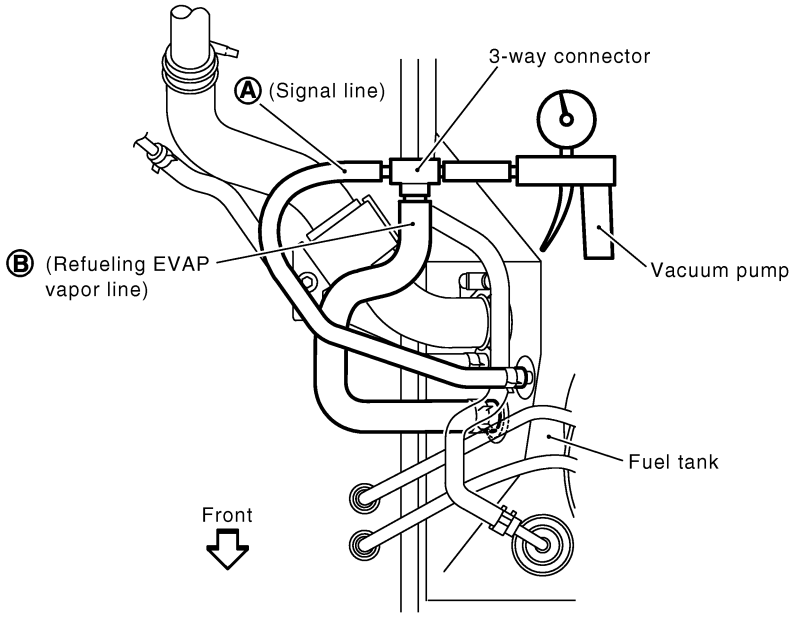
Without CONSULT-II

1. Remove fuel tank. Refer to ***FE-4***, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:

a. Remove fuel gauge retainer.
b. Drain fuel from the tank using a hand pump into a fuel container.

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

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



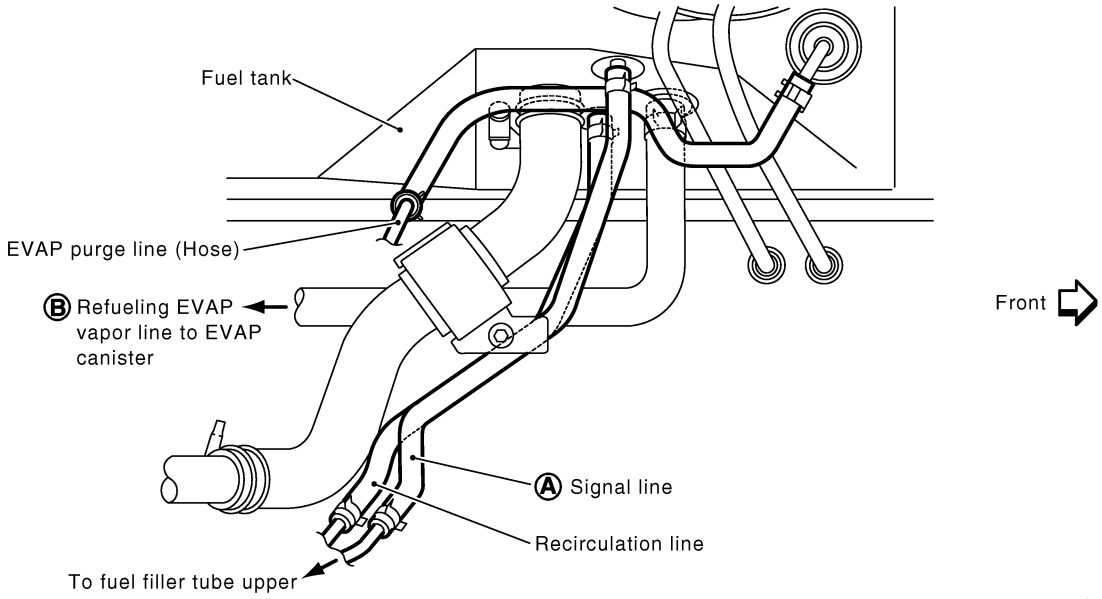
SEF707Z

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.



SEF706Z

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.

NGEC1002S0202

1	CHECK EVAP CANISTER

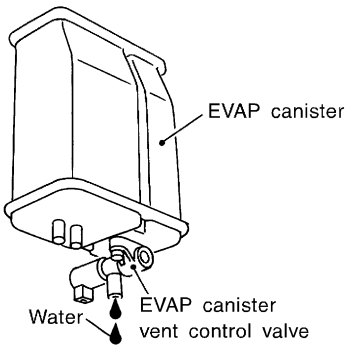
1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Weigh the EVAP canister with EVAP canister vent control valve attached.
   The weight should be less than 1.8 kg (4.0 lb).

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.

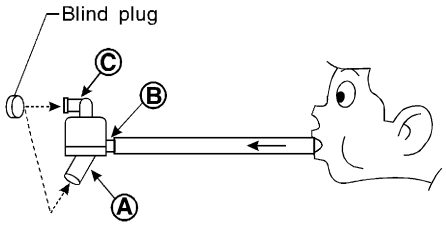
3	REPLACE EVAP CANISTER

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.

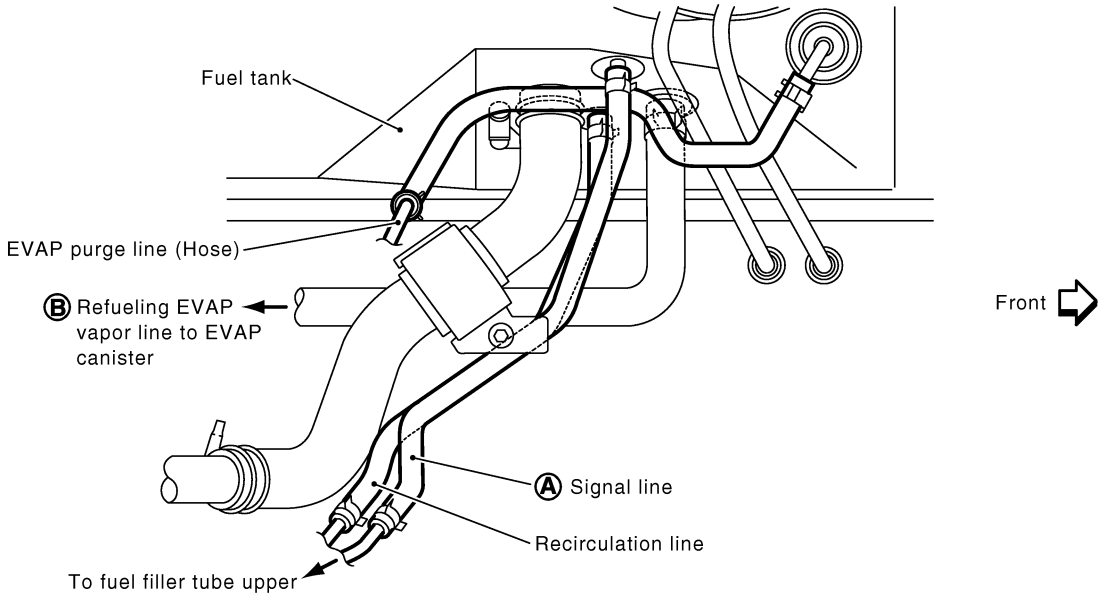
	▶	Repair or replace EVAP hose.

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.



SEF706Z

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

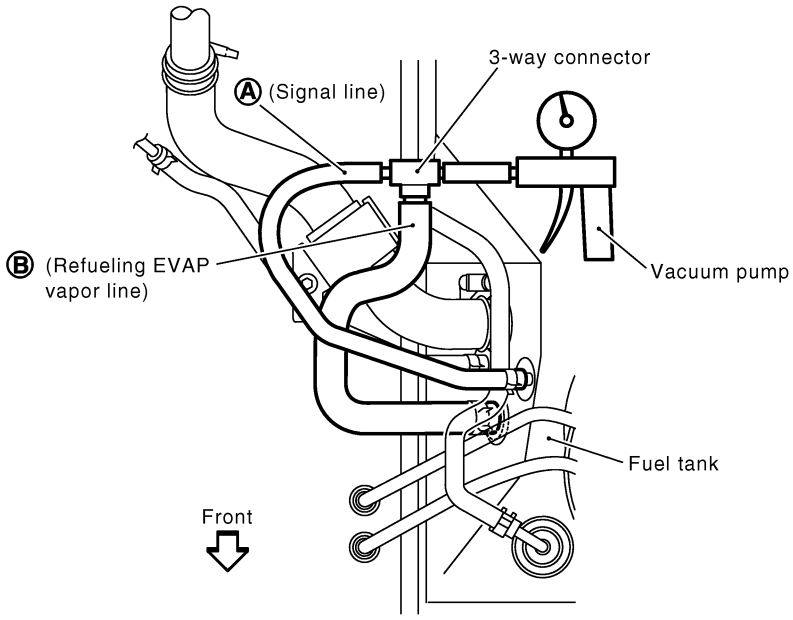
With CONSULT-II

1. Remove fuel tank. Refer to ***FE-4***, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:

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

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

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



SEF707Z

OK or NG

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

10	CHECK REFUELING EVAP VAPOR CUT VALVE

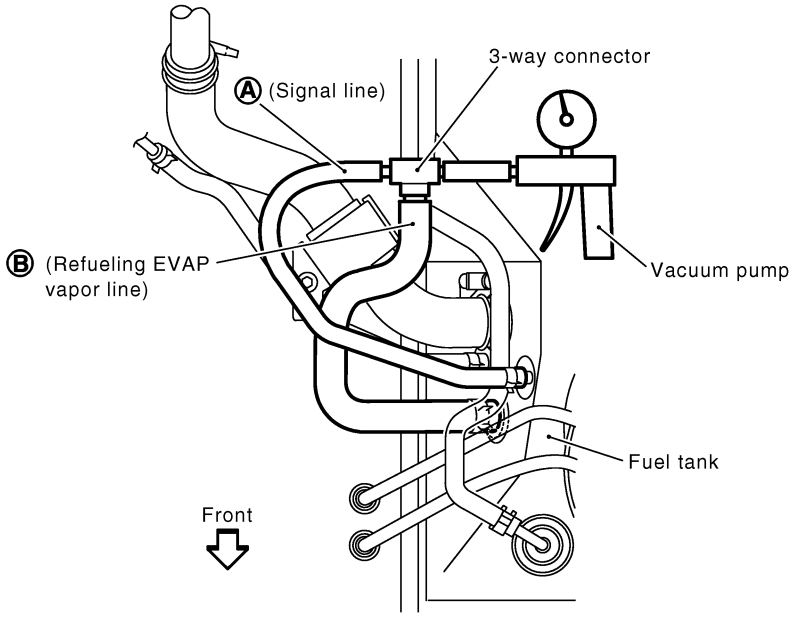
Without CONSULT-II

1. Remove fuel tank. Refer to ***FE-4***, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:

a. Remove fuel gauge retainer.
b. Drain fuel from the tank using a hand pump into a fuel container.

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

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



SEF707Z

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

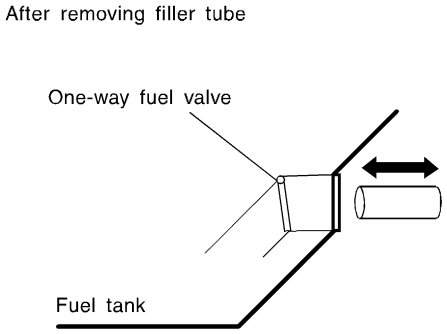
Check one-way valve for clogging.

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.

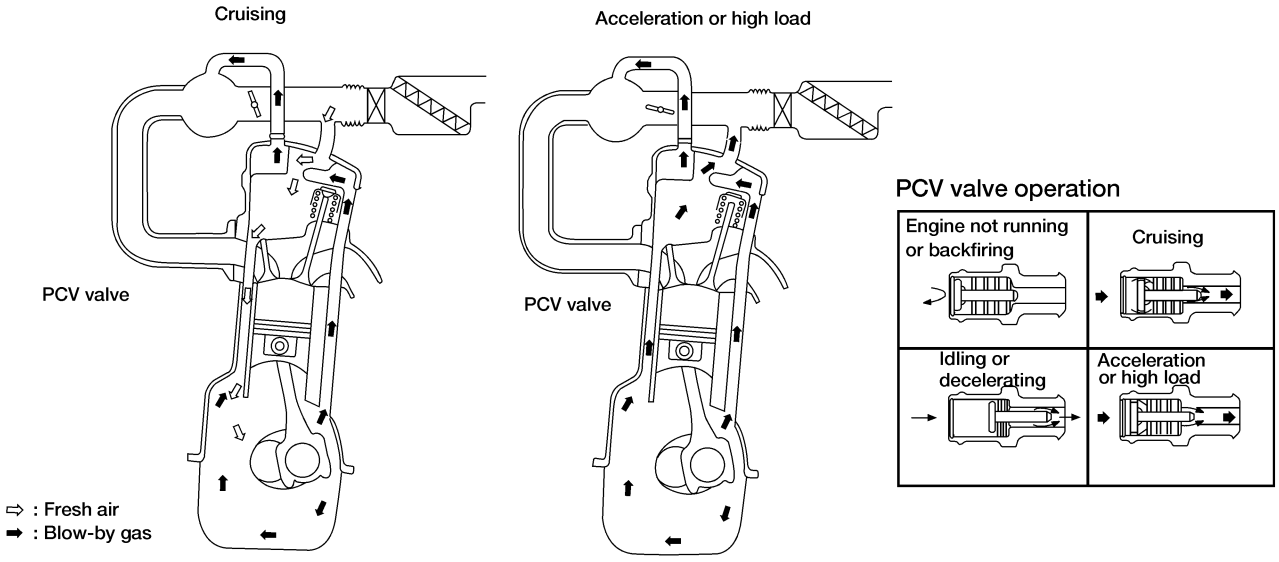
OK or NG

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

Positive Crankcase Ventilation

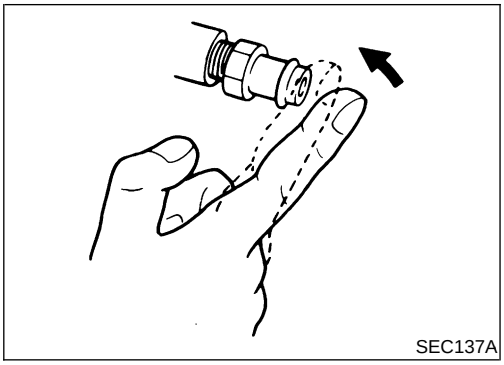
DESCRIPTION

NGEC0022



AEC042B

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

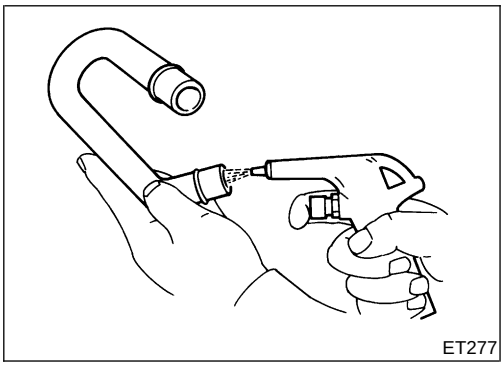
INSPECTION

NGEC0023

PCV (Positive Crankcase Ventilation) Valve

NGEC0023S01

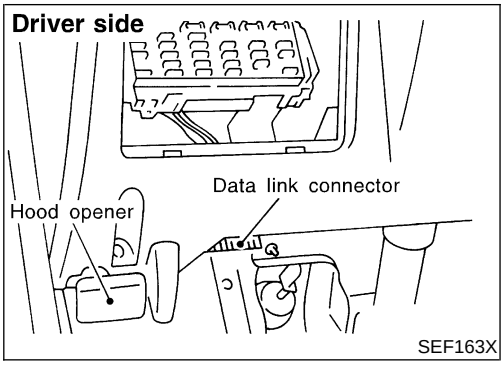
With engine running at idle, remove PCV valve from breather separator. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over the valve inlet.


ET277

Ventilation Hose

NGEC0023S02

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

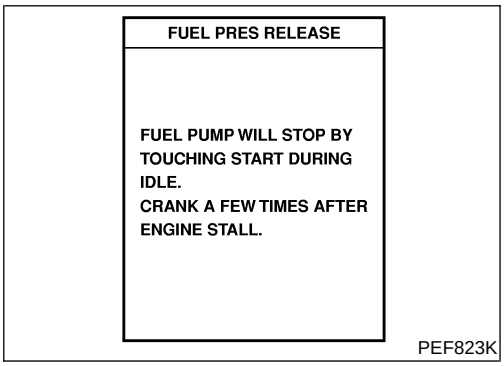
NGEC0024

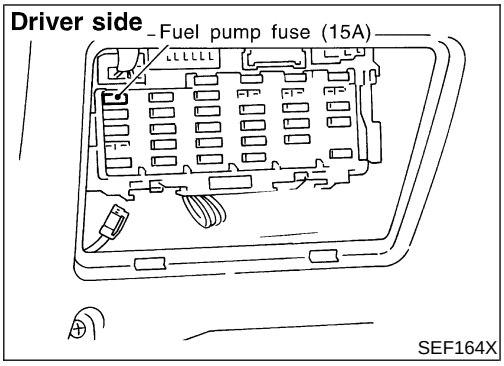
Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

WITH CONSULT-II

NGEC0024S01

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

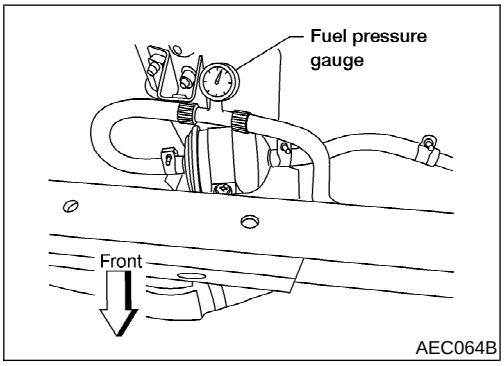
NGEC0024S02

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

NGEC0025

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



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

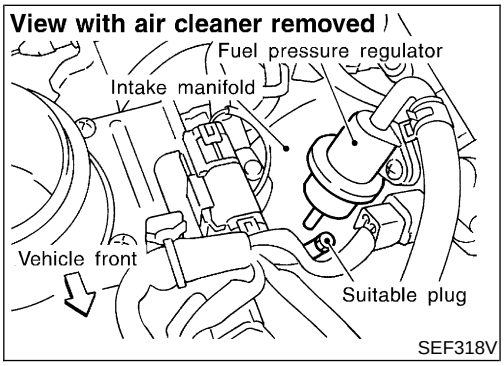
At idle speed:

With vacuum hose connected

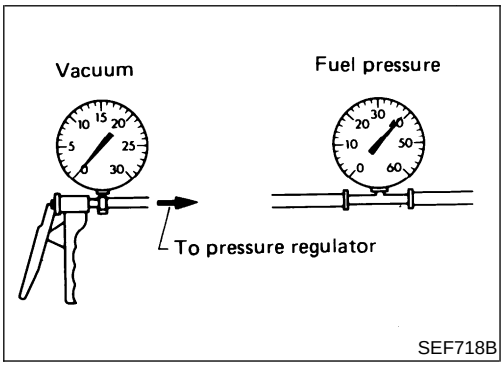
Approximately 235 kPa (2.4 kg/cm^2, 34 psi)

With vacuum hose disconnected

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



If results are unsatisfactory, perform Fuel Pressure Regulator Check, EC-52.

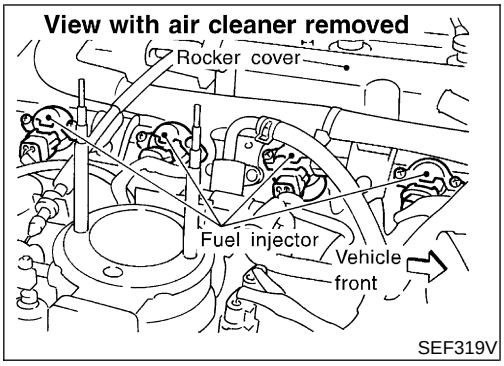


Fuel Pressure Regulator Check

NGEC0026

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

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



Injector

REMOVAL AND INSTALLATION

NGEC0027

1. Release fuel pressure to zero.
2. Remove injector tube assembly with injectors from intake manifold.
3. Remove injectors from injector tube assembly.

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

4. Install injector to fuel tube assembly.

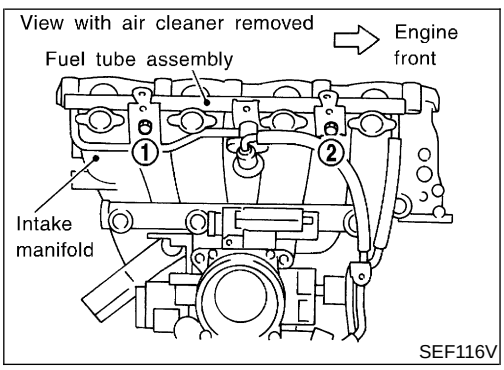
a. Clean exterior of injector tail piece.
b. Use new O-rings.

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

5. Install injectors with fuel tube assembly to intake manifold.
   Tighten in numerical order shown in the figure.

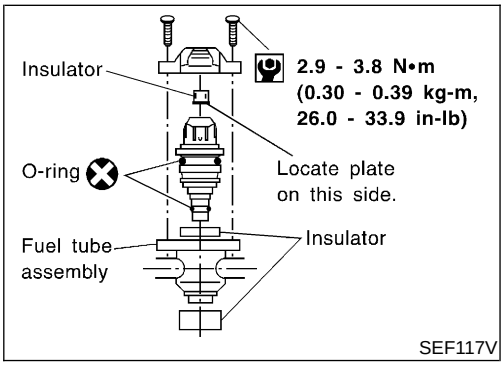
a. First, tighten all bolts to 9.3 to 10.8 N·m (0.95 to 1.1 kg-m, 6.9 to 8.0 ft-lb).
b. Then, tighten all bolts to 21 to 26 N·m (2.1 to 2.7 kg-m, 15 to 20 ft-lb).

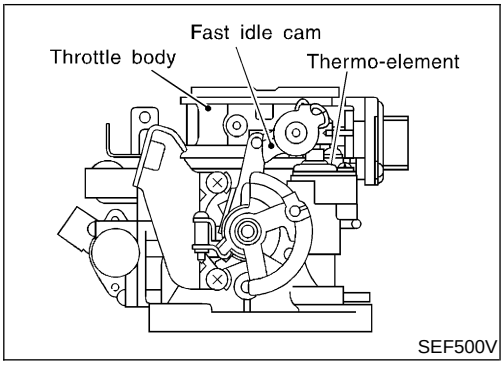
6. Install fuel hoses to fuel tube assembly.
7. Reinstall any parts removed in reverse order of removal.



CAUTION:

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





Fast Idle Cam (FIC)

COMPONENT DESCRIPTION

NGEC0502

The FIC is installed on the throttle body to maintain adequate engine speed while the engine is cold. It is operated by a volumetric change in wax located inside the thermo-element. The thermo-element is operated by engine coolant temperature.
For inspection refer to “TROUBLE DIAGNOSIS-BASIC INSPECTION”, “Basic Inspection”, EC-104.

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

NGEC0028

NGEC0028S01

PREPARATION

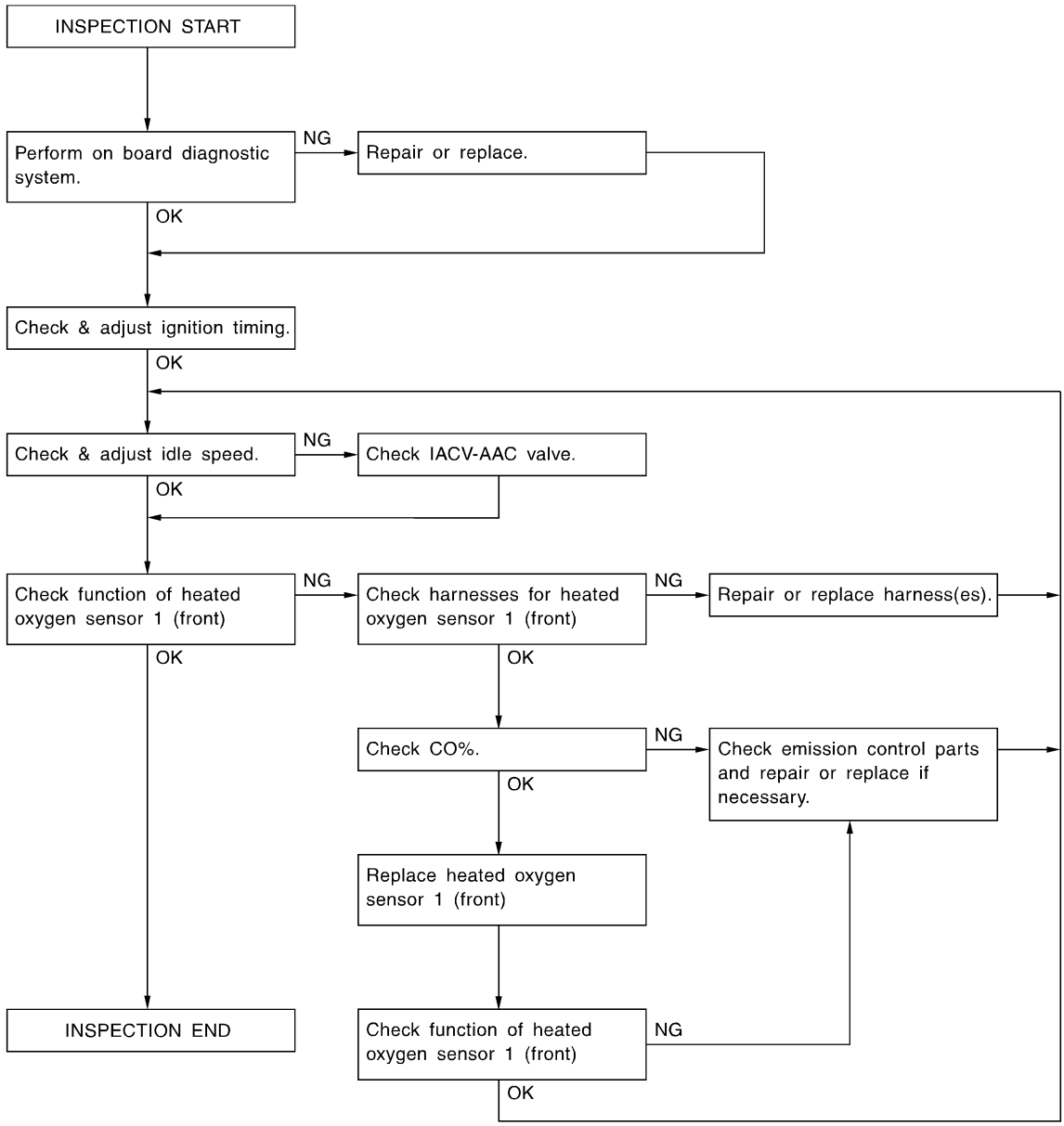
- **Make sure that the following parts are in good order.**

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

- **On models equipped with air conditioner, checks should be carried out while the air conditioner is “OFF”.**
- **When measuring “CO” percentage, insert probe more than 40 cm (15.7 in) into tail pipe.**
- **Turn off headlamps, heater blower, rear window defogger.**
- **Keep front wheels pointed straight ahead.**

Overall Inspection Sequence

NGEC0028S0101



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.

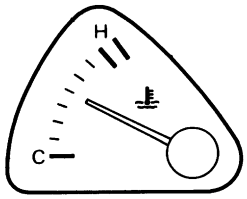
INSPECTION PROCEDURE

=NGEC0028S02

1	INSPECTION START

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

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



SEF810K

3. Open engine hood and run engine at about 2,000 rpm for about 2 minutes under no-load.
4. Make sure that no DTC is displayed with CONSULT-II or GST.

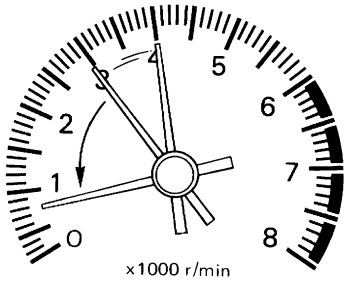
OK or NG

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

2 CHECK IGNITION TIMING

With CONSULT-II

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



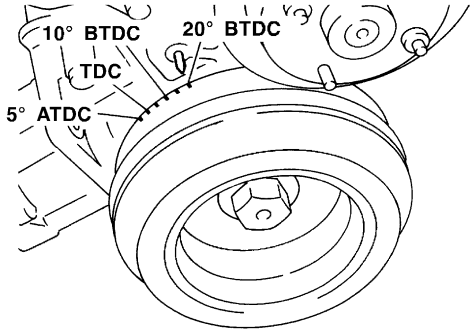
SEF978U

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

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



SEF320V

MT: 20°±2° BTDC

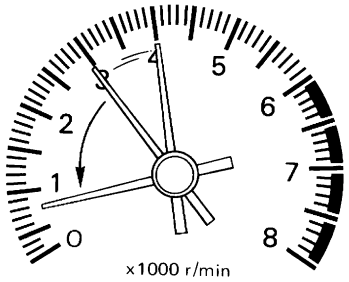
OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

3	CHECK IGNITION TIMING

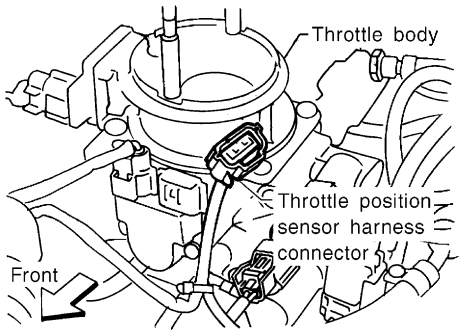
Without CONSULT-II

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



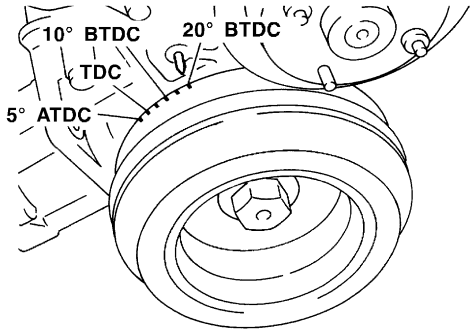
SEF978U

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



SEF265S

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



SEF320V

MT: 20°±2° BTDC

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

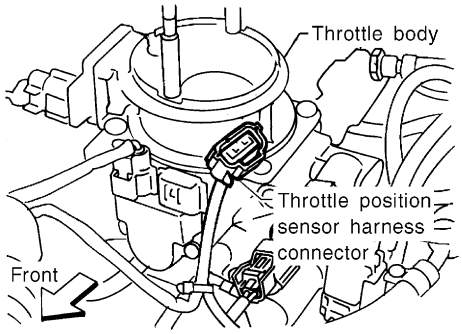
4	ADJUST IGNITION TIMING

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.



SEF265S

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

5	CHECK BASE IDLE SPEED

With CONSULT-II

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

IGNITION TIMING ADJ	
CONDITION SETTING	
IGN/T FEEDBACK	HOLD
MONITOR	
ENG SPEED	XXX rpm
IGN TIMING	XXX BTDC
CLSD THL POS	ON

SEF713Z

MT: 750±50 rpm

Without CONSULT-II

1. Check idle speed.

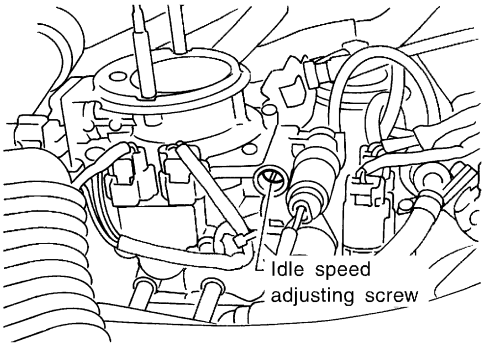
MT: 750±50 rpm

OK or NG

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

6	ADJUST BASE IDLE SPEED

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



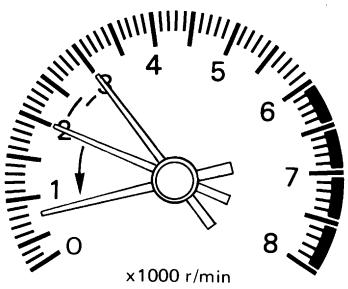
SEF240SA

MT: 750±50 rpm

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

7	CHECK TARGET IDLE SPEED

With CONSULT-II
1. Touch "BACK" on CONSULT-II.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.



SEF602K

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

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

MT: 800±50 rpm

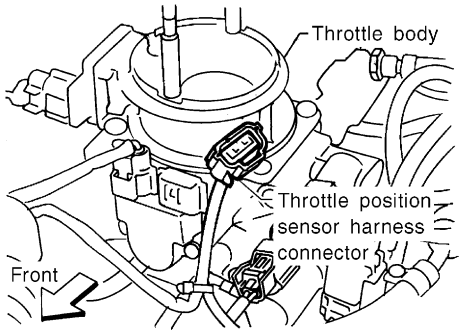
OK or NG

OK ▶	GO TO 10.
NG ▶	GO TO 9.

8	CHECK TARGET IDLE SPEED

Without CONSULT-II

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



SEF265S

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

MT: 800±50 rpm

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART

Check the following.

1. Check IACV-AAC valve and replace if necessary. Refer to EC-427.
2. Check IACV-AAC valve harness and repair if necessary. Refer to EC-427.
3. Check ECM function by substituting another known good ECM.
   (ECM may be the cause of a problem, but this is rarely the case.)

	▶	GO TO 10.

10	CHECK HEATED OXYGEN SENSOR 1 (FRONT) SIGNAL

With CONSULT-II

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

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

SEF820Y

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

Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Set voltmeter probe between ECM terminal 50 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

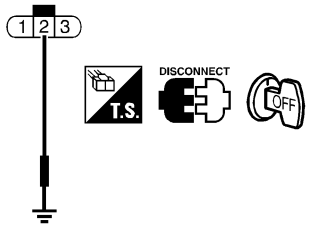
OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 11.

11 CHECK HEATED OXYGEN SENSOR 1 (FRONT) HARNESS

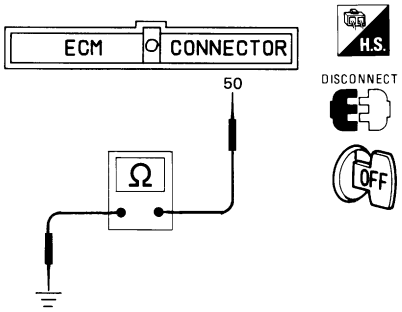
1. Turn off engine and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect heated oxygen sensor 1 (front) harness connector.
4. Then connect harness connector terminal for heated oxygen sensor 1 (front) to ground with a jumper wire.

Heated oxygen sensor 1 (front) harness connector



SEF508VA

5. Check for continuity between terminal 50 of ECM harness connector and body ground.



SEF250P

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

OK or NG

OK	▶	1. Connect ECM harness connector to ECM. 2. Connect battery ground cable. 3. GO TO 13.
NG	▶	1. Repair or replace harness. 2. GO TO 12.

12	PREPARATION FOR IDLE SPEED ADJUSTING

With CONSULT-II

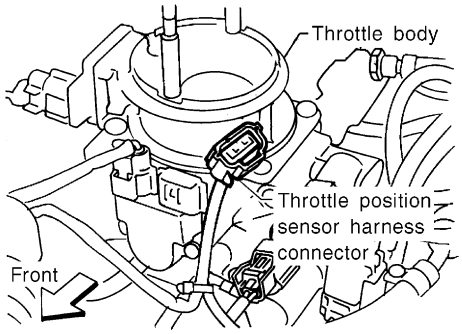
1. Select "IGNITION TIMING ADJ" in "WORK SUPPORT" mode.
2. Touch "START".

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

Without CONSULT-II

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



SEF265S

2. Start engine.

▶	GO TO 6.

13 **PREPARATION FOR "CO" % CHECK**

With CONSULT-II

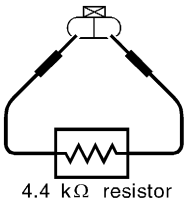
1. Select "ENGINE COOLANT TEMP" in "ACTIVE TEST" mode.
2. Set "COOLANT TEMP" to 5°C (41°F) by touching "Qu" and "Qd" and "UP", "DOWN".

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

SEF172Y

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

Engine coolant temperature sensor harness connector



4.4 kΩ resistor

SEF053RA

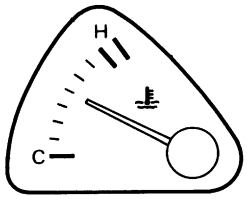
4. Connect battery ground cable.

▶ GO TO 14.

14	CHECK "CO" %

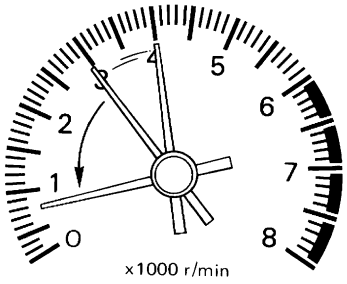
Without CONSULT-II

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



SEF810K

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



SEF978U

3. Check "CO"%.
   Idle CO: 2.9 - 10.8% and engine runs smoothly.
4. **With CONSULT-II**
   After checking CO%, touch "BACK".
5. **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 15.
NG	▶	GO TO 16.

15	CHECK HEATED OXYGEN SENSOR 1 (FRONT) SIGNAL

With CONSULT-II

1. Replace heated oxygen sensor 1 (front).
2. See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode.
3. Maintain engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.). Check that the monitor fluctuates between "LEAN" and "RICH" more than five times during 10 seconds.
   1 cycle: RICH → LEAN → RICH
   2 cycles: RICH → LEAN → RICH → LEAN → RICH

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 50 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 12.
NG	▶	GO TO 16.

16	DETECT MALFUNCTIONING PART

1. Connect heated oxygen sensor 1 (front) harness connector to heated oxygen sensor 1 (front).
2. Check fuel pressure regulator. Refer to EC-52.
3. Check mass air flow sensor and its circuit.
   Refer to EC-150.
4. Check injector and its circuit.
   Refer to EC-567.
   Clean or replace if necessary.
5. Check engine coolant temperature sensor and its circuit. Refer to EC-168, 187.
6. Check ECM function by substituting another known-good ECM.
   (ECM may be the cause of a problem, but this is rarely the case.)

	▶	GO TO 12.

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

Introduction

NGEC0029

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

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

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

X: Applicable —: Not applicable

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

*1: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.
*2: 1st trip DTCs for self-diagnoses concerning SRT items cannot be shown on the GST display.
*3: In diagnostic test mode II (Self-diagnostic results)

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-119.)

Two Trip Detection Logic

NGEC0030

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				
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-119.)	—	X	—	—	X*1	—	X*1	—
Except above	—	—	—	X	—	X	X	—

*1: Except “ECM”

Emission-related Diagnostic Information

NGEC0031

DTC AND 1ST TRIP DTC

NGEC0031S01

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed. If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.
Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”. Refer to EC-79.
For malfunctions in which 1st trip DTCs are displayed, refer to EC-77. 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 page EC-102. 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

NGEC0031S0101

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, Mode II and GST do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal.**
  CONSULT-II can identify malfunction status as shown below. Therefore, using CONSULT-II (if available) is recommended.

A sample of CONSULT-II display for 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

NGEC0031S02

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed and absolute pressure sensor at the moment a malfunction is detected.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data.

The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-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-89.
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". Refer to EC-79.

SYSTEM READINESS TEST (SRT) CODE

NGEC0031S03

System Readiness Test (SRT) code is specified in Mode 1 of SAE J1979.
As part of enhanced emissions test for Inspection and Maintenance (I/M), certain states require that 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 "incomplete", use the information in this service manual to set the SRT to "complete".
In most cases, the ECM will automatically complete its self-diagnosis cycle during normal usage and the SRT status will indicate "complete" for each application system. Once set as "complete", the SRT status remains "complete" 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 and the SRT will indicate "incomplete" for these items.

NOTE:
The SRT will also indicate "incomplete" 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 "complete" for all test items, the inspector will continue with the emissions test. However, if the SRT indicates "incomplete" 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 "complete" for all test items. Therefore, it is important to check SRT ("complete") and DTC (No DTCs) before the inspection.

This service manual contains the service procedure and support information to perform a comprehensive road test that enables the ECM to complete the SRT.

SRT Item

NGEC0031S0308

Self-diagnosis result		Example				
		Diagnosis	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF
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	"complete"	"complete"	"complete"	"complete"
	Case 2	P0400	OK (1)	– (1)	– (1)	– (1)
		P0402	– (0)	– (0)	OK (1)	– (1)
		P1402	OK (1)	OK (2)	– (2)	– (2)
		SRT of EGR	"incomplete"	"incomplete"	"complete"	"complete"
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	"incomplete"	"incomplete"	"incomplete"	"complete"

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

SRT Set Timing

NGEC0031S0310

SRT is set as "complete" after self-diagnosis has been performed one or more times. Completion of SRT will occur if the result is OK or NG. The set timing is different between them and is shown in the following table. When all SRT related self-diagnoses showed OK results in a same cycle (Ignition OFF – ON – OFF), the SRT will indicate "complete".

→ Case 1 above

When all SRT related self-diagnoses show OK results through several different cycles, the SRT will indicate "complete" 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 "complete".

→ Case 3 above

The previous table shows that the minimum number of cycles for setting SRT as "incomplete" is one (1) for each self-diagnosis (Case 1 and 2) or two (2) for one self-diagnosis (Case 3). However, in preparation for the State emissions inspection, it is unnecessary of each self-diagnosis to be executed twice (Case 3) because of the following reasons;

- The SRT will indicate "complete" at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires "complete" of the SRT only with OK self-diagnosis result.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to "complete" 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 "incomplete".

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

How to Display SRT Code

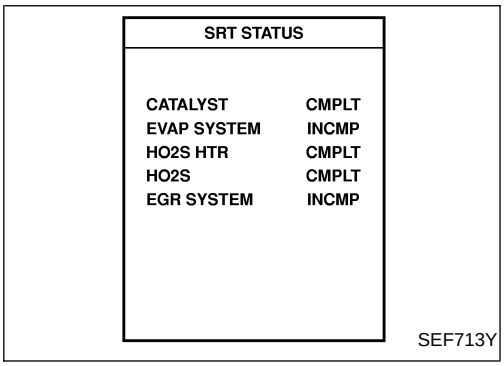
NGEC0031S0301

1. **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.

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

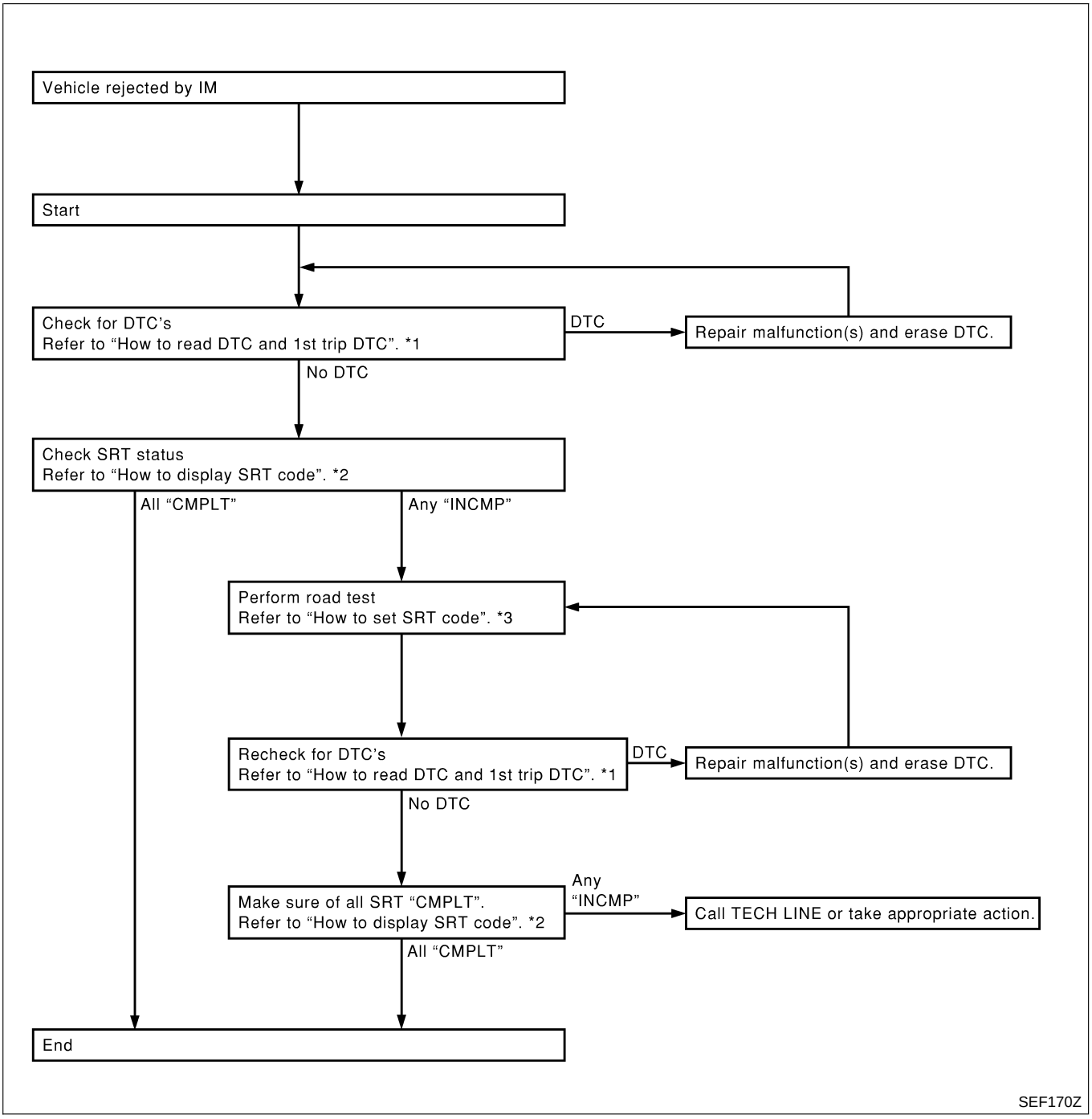
A sample of CONSULT-II display for SRT code is shown below.
"INCMP" means the self-diagnosis is incomplete and SRT is not set. "CMPLT" means the self-diagnosis is complete and SRT is set.



SRT Service Procedure

=NGEC0031S0311

If a vehicle has been rejected for the State emissions inspection due to one or more SRT items indicating "incomplete", review the following flowchart diagnostic sequence.



*1 EC-68 *2 EC-70 *3 EC-73

How to Set SRT Code

=NGEC0031S0302

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-70.

Without CONSULT-II

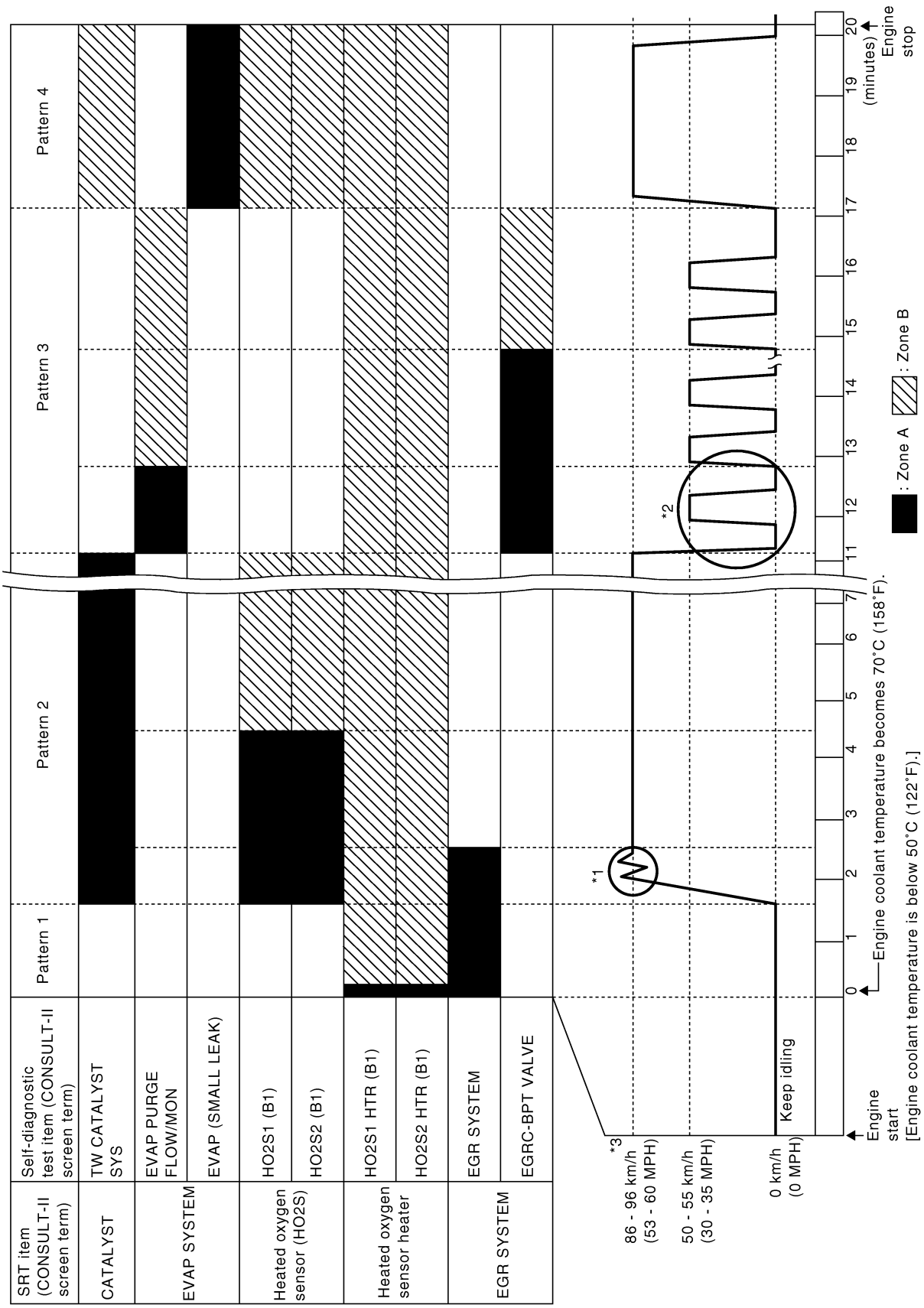
The most efficient driving pattern in which SRT codes can be properly set is explained on EC-74. The driving pattern should be performed one or more times to set all SRT codes.

Driving Pattern

NGEC0031S0303

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

Driving pattern



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- 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 59 and ground 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 59 and ground is lower than 1.4V).**
- **The engine is started at the tank fuel temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 60 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.

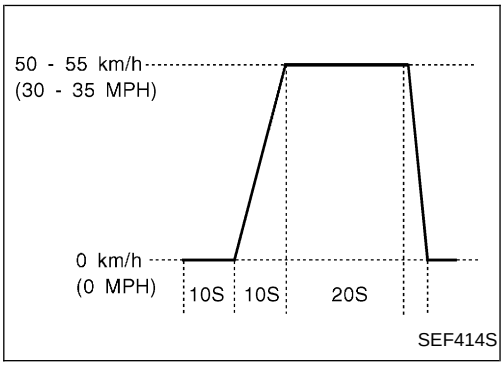
Pattern 4:

- 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)	CRUISE shift point km/h (MPH)	km/h (MPH)
1st to 2nd	24 (15)	24 (15)	24 (15)
2nd to 3rd	40 (25)	29 (18)	40 (25)
3rd to 4th	58 (36)	48 (30)	64 (40)
4th to 5th	64 (40)	63 (39)	72 (45)

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

NGEC0031S04

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

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

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

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

X: Applicable —: Not applicable

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
CATALYST	Three way catalyst function	01H	01H	Max.	X
		02H	81H	Min.	X
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Max.	X
	EVAP control system purge flow monitoring	06H	83H	Min.	X
O2 SENSOR	Heated oxygen sensor 1 heater (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 heater (rear)	19H	86H	Min.	X
		1AH	86H	Min.	X
		1BH	06H	Max.	X
		1CH	06H	Max.	X
O2 SENSOR HEATER	Heated oxygen sensor 1 heater (front)	29H	08H	Max.	X
		2AH	88H	Min.	X
	Heated oxygen sensor 2 heater (rear)	2DH	0AH	Max.	X
		2EH	8AH	Min.	X

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
EGR SYSTEM	EGR function	31H	8CH	Min.	X
		32H	8CH	Min.	X
		33H	8CH	Min.	X
		34H	8CH	Min.	X
		35H	0CH	Max.	X
	EGRC-BPT valve function	36H	0CH	Max.	X
		37H	8CH	Min.	X

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

NGEC0031S05

X: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*3 CONSULT-II GST*1	SRT code	Test value/Test limit (GST only)	1st trip DTC*3	Reference page
NO SELF DIAGNOSTIC FAILURE INDICATED	**P0000**	—	—	—	—
MAF SEN/CIRCUIT	P0100	—	—	X	EC-150
ABSL PRES SEN/CIRC	P0105	—	—	X	EC-160
AIR TEMP SEN/CIRC	P0110	—	—	X	EC-162
COOLANT T SEN/CIRC	P0115	—	—	X	EC-168
THRTL POS SEN/CIRC	P0120	—	—	X	EC-173
*COOLAN T SEN/CIRC	P0125	—	—	X	EC-187
HO2S1 (B1)	P0130	X	X	X*2	EC-192
HO2S1 (B1)	P0131	X	X	X*2	EC-200
HO2S1 (B1)	P0132	X	X	X*2	EC-207
HO2S1 (B1)	P0133	X	X	X*2	EC-214
HO2S1 (B1)	P0134	X	X	X*2	EC-225
HO2S1 HTR (B1)	P0135	X	X	X*2	EC-232
HO2S2 (B1)	P0137	X	X	X*2	EC-237
HO2S2 (B1)	P0138	X	X	X*2	EC-247
HO2S2 (B1)	P0139	X	X	X*2	EC-257
HO2S2 (B1)	P0140	X	X	X*2	EC-267
HO2S2 HTR (B1)	P0141	X	X	X*2	EC-275
FUEL SYS LEAN/BK1	P0171	—	—	X	EC-280
FUEL SYS RICH/BK1	P0172	—	—	X	EC-287
FUEL TEMP SEN/CIRC	P0180	—	—	X	EC-294
MULTI CYL MISFIRE	P0300	—	—	X	EC-300
CYL 1 MISFIRE	P0301	—	—	X	EC-300
CYL 2 MISFIRE	P0302	—	—	X	EC-300
CYL 3 MISFIRE	P0303	—	—	X	EC-300

Emission-related Diagnostic Information (Cont'd)

Items (CONSULT-II screen terms)	DTC*3 CONSULT-II GST*1	SRT code	Test value/Test limit (GST only)	1st trip DTC*3	Reference page
CYL 4 MISFIRE	P0304	—	—	X	EC-300
KNOCK SEN/CIRC-B1	P0325	—	—	—	EC-309
CKP SEN/CIRCUIT	P0335	—	—	X	EC-313
CMP SEN/CIRCUIT	P0340	—	—	X	EC-319
EGR SYSTEM	P0400	X	X	X*2	EC-327
EGRC-BPT VALVE	P0402	X	X	X*2	EC-339
TW CATALYST SYS-B1	P0420	X	X	X*2	EC-347
EVAP SMALL LEAK	P0440	X	X	X*2	EC-352
PURG VOLUME CONT/V	P0443	—	—	X	EC-369
VENT CONTROL VALVE	P0446	—	—	X	EC-377
EVAP SYS PRES SEN	P0450	—	—	X	EC-385
EVAP GROSS LEAK	P0455	X	X	X*2	EC-400
FUEL LEV SEN SLOSH	P0460	—	—	X	EC-413
FUEL LEVEL SENSOR	P0461	—	—	X	EC-417
FUEL LEVL SEN/CIRC	P0464	—	—	X	EC-419
VEH SPEED SEN/CIRC	P0500	—	—	X	EC-423
IACV/AAC VLV/CIRC	P0505	—	—	X	EC-427
CLOSED TP SW/CIRC	P0510	—	—	X	EC-433
ECM	P0605	—	—	X	EC-440
THERMSTAT FNCTN	P1126	—	—	X	EC-442
CLOSED LOOP-B1	P1148	—	—	—	EC-444
CKP SENSOR (COG)	P1336	—	—	X	EC-446
EGRC SOLENOID/V	P1400	—	—	X	EC-452
EGR TEMP SEN/CIRC	P1401	—	—	X	EC-459
EGR SYSTEM	P1402	X	X	X*2	EC-465
EVAP SMALL LEAK	P1440	X	X	X*2	EC-474
EVAP VERY SML LEAK	P1441	X*4	X	X*2	EC-476
PURG VOLUME CONT/V	P1444	—	—	X	EC-491
VENT CONTROL VALVE	P1446	—	—	X	EC-503
EVAP PURG FLOW/MON	P1447	X	X	X*2	EC-509
VENT CONTROL VALVE	P1448	—	—	X	EC-519
FUEL LEVEL SEN/CIRC	P1464	—	—	X	EC-527
VC/V BYPASS/V	P1490	—	—	X	EC-530
VC CUT/V BYPASS/V	P1491	—	—	X	EC-537
P-N POS SW/CIRCUIT	P1706	—	—	X	EC-548

*1: These numbers are prescribed by SAE J2012.

*2: These are not displayed with GST.

*3: 1st trip DTC No. is the same as DTC No.
*4: SRT code will not be set if the self-diag result is NG.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

NGEC0031S06

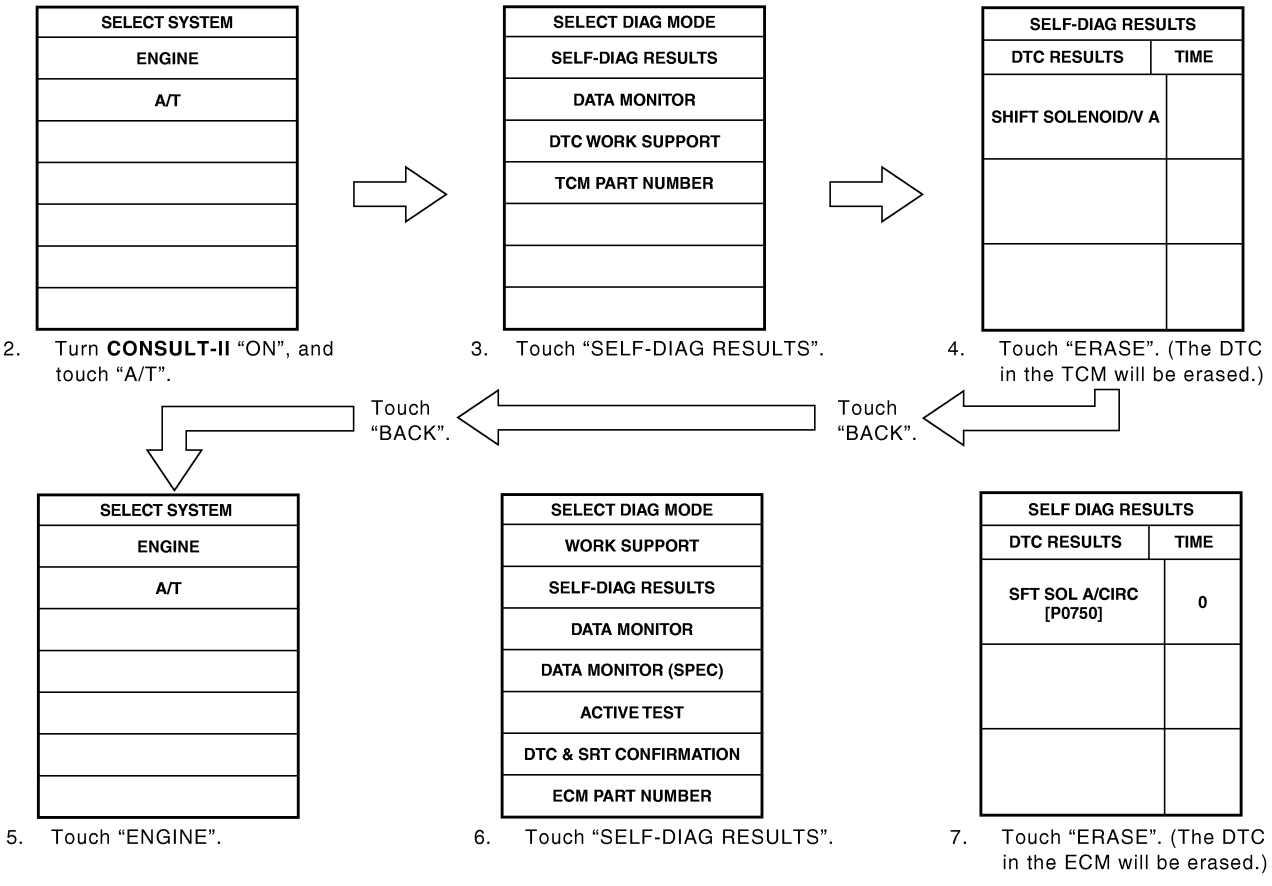
How to Erase DTC (With CONSULT-II)

NGEC0031S0601

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

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 5 seconds and then turn it "ON" (engine stopped) again.



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

How to Erase DTC (With GST)

NGEC0031S0602

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

NOTE:

- **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

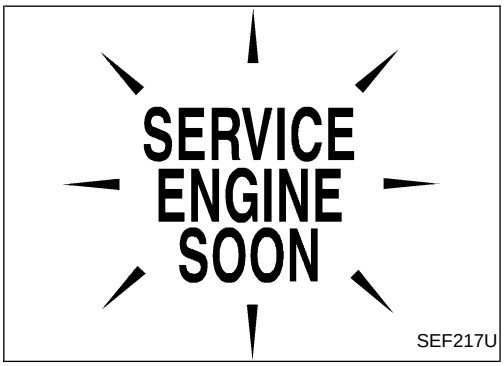
3) Freeze frame data
4) 1st trip freeze frame data
5) System readiness test (SRT) codes
6) Test values
7) Others

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.

Malfunction Indicator Lamp (MIL)

DESCRIPTION

NGEC0032



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 "WARNING LAMPS", ***EL-89*** or see EC-594.

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

NGEC0032S01

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

NGEC0032S03

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to ***EL-89***, "WARNING LAMPS" or see EC-594.

Diagnostic Test Mode I — Malfunction Warning

NGEC0032S04

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

OBD System Operation Chart

NGEC0033

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

NGEC0033S01

- 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-67.
- 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

NGEC0033S02

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-83.

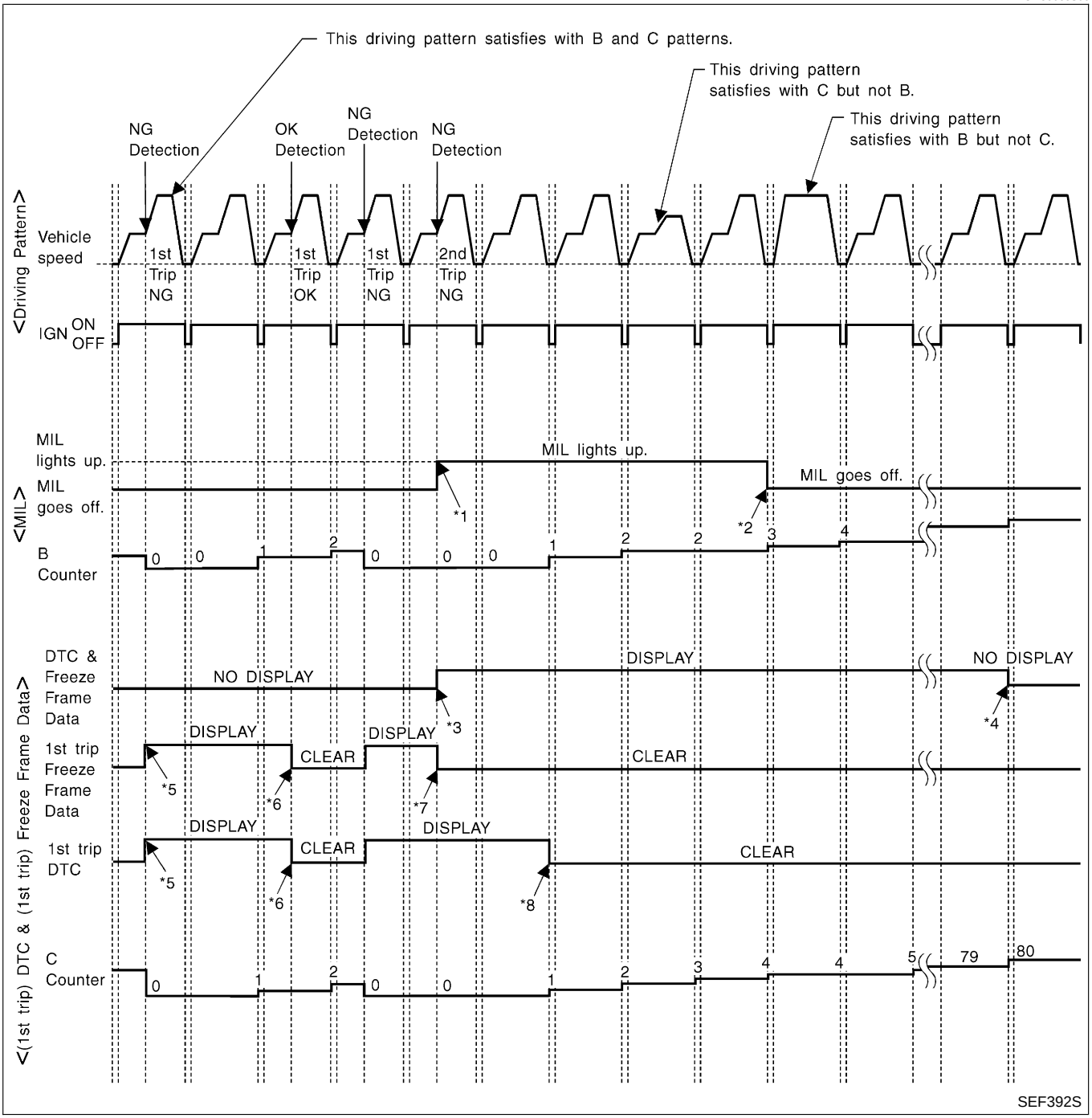
For details about patterns "A" and "B" under "Other", see EC-85.

*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"

NGEC0033S03



*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"

NGEC0033S04

Driving Pattern B

NGEC0033S0401

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

NGEC0033S0402

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:

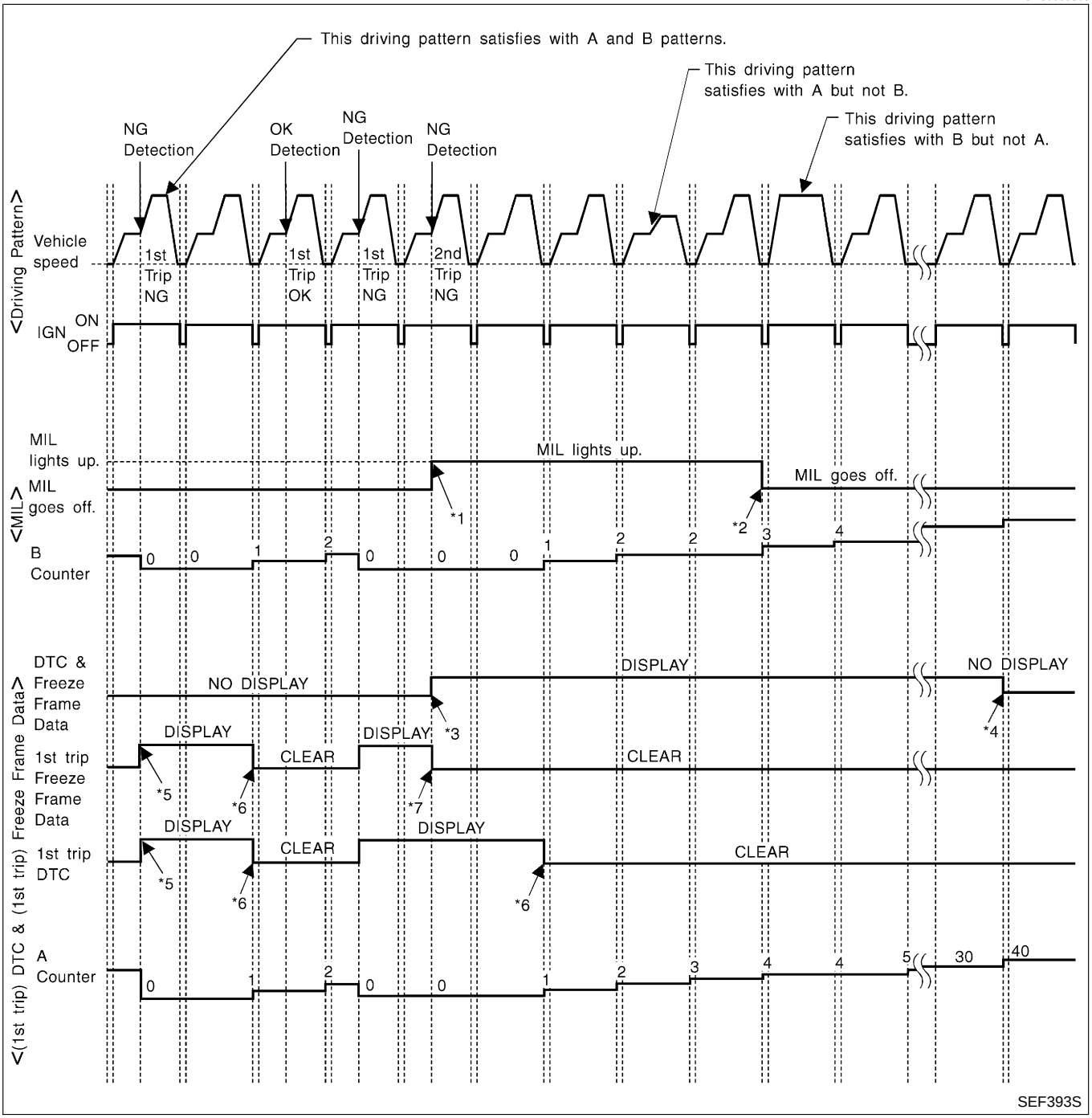
- When the freeze frame data shows lower than 70°C (158°F), "T" should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), "T" should be higher than or equal to 70°C (158°F).

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"

NGEC0033S05



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

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

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

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

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

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

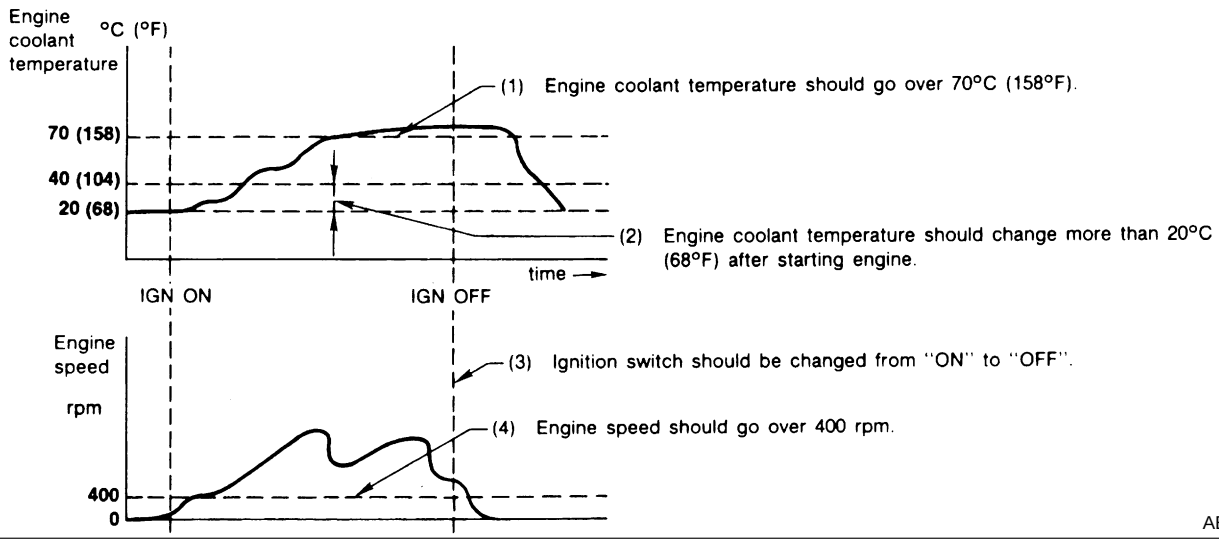
*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

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

NGEC0033S06

Driving Pattern A

NGEC0033S0601



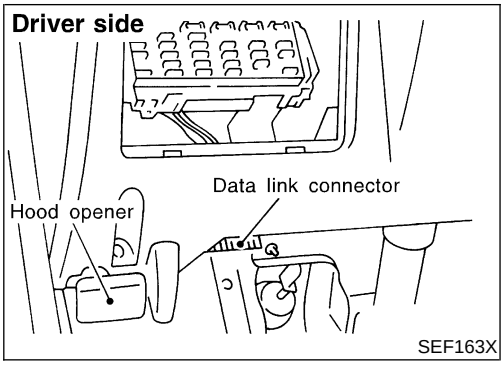
- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

Driving Pattern B

NGEC0033S0602

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").



SEF163X

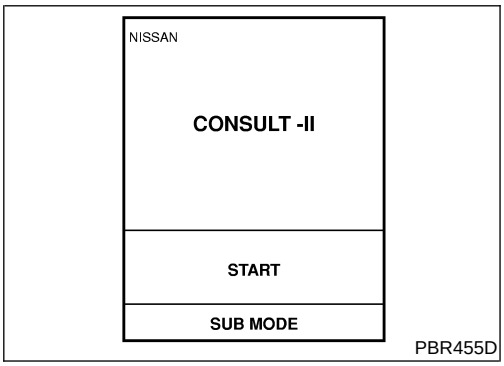
CONSULT-II

=NGEC0034

CONSULT-II INSPECTION PROCEDURE

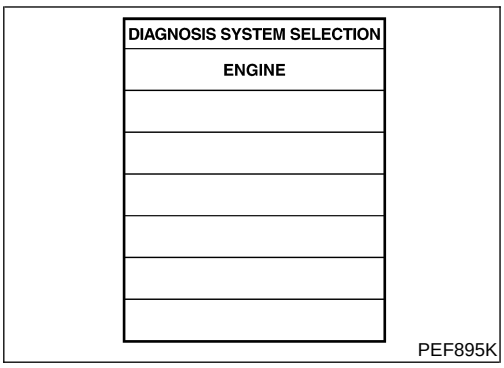
NGEC0034S01

1. Turn ignition switch OFF.
2. Connect “CONSULT-II” to data link connector which is located behind the fuse box cover.



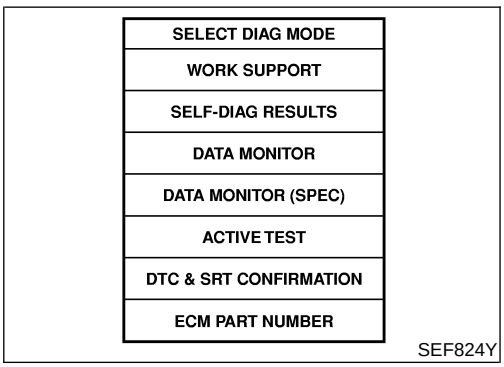
PBR455D

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



PEF895K

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

NGEC0034S02

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	INPUT	Camshaft position sensor		X	X	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	X			
		Fuel tank temperature sensor		X		X	X	X		
		EVAP control system pressure sensor		X		X	X			
		Absolute pressure sensor		X	X	X	X			
		EGR temperature sensor		X		X	X			
		Intake air temperature sensor		X		X	X			
		Crankshaft position sensor (OBD)		X						
		Knock sensor		X						
		Fuel level sensor		X		X	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			
		Air conditioner pressure switch				X	X			
		Battery voltage				X	X			
		Ambient air temperature switch				X	X			

CONSULT-II (Cont'd)

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		X	X	X		
		IACV-AAC valve	X	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		
		EGRC-solenoid valve		X		X	X	X		
		Heated oxygen sensor 1 heater (front)		X		X	X		X	
		Heated oxygen sensor 2 heater (rear)		X		X	X		X	
		Torque converter clutch solenoid valve		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-68.

FUNCTION

NGEC0034S03

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 the 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 confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
ECM part number	ECM part numbers can be read.

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

1) Diagnostic trouble codes
2) 1st trip diagnostic trouble codes

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

WORK SUPPORT MODE

NGEC0034S04

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 CRANKSHAFT POSITION SENSOR.	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
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. ● BATTERY VOLTAGE IS SUFFICIENT. ● IGN SW "ON" ● ENGINE NOT RUNNING ● AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). ● NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM ● TANK FUEL TEMP. IS MORE THAN 0°C (32°F). ● WITHIN 10 MINUTES AFTER STARTING "EVAP SYSTEM CLOSE" WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE CONDITIONS ABOVE, CONSULT-II WILL DISCONTINUE AND DISPLAY INSTRUCTIONS. **NOTE:** **WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", EVEN WHEN USING A CHARGED BATTERY.**	When detecting EVAP vapor leak point of EVAP system
TARGET IDLE RPM ADJ	● IDLE CONDITION	When setting target idle speed

SELF DIAGNOSTIC MODE

NGEC0034S05

DTC and 1st Trip DTC

NGEC0034S0501

Regarding items of "DTC and 1st trip DTC", refer to "TROUBLE DIAGNOSIS — INDEX", EC-13.

Freeze Frame Data and 1st Trip Freeze Frame Data

NGEC0034S0502

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	● Engine Control component part/control system has a trouble code, it is displayed as "PXXXX". [Refer to "Alphabetical & P No. Index for DTC" (EC-13).]

CONSULT-II (Cont'd)

Freeze frame data item*	Description
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.

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

DATA MONITOR MODE

NGEC0034S06

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.	● Accuracy becomes poor if engine speed drops below the idle rpm. ● If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS 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 [%]			● Indicates the mean value of the air-fuel ratio feedback correction factor per cycle.	● When the engine is stopped, a certain value is indicated. ● This data also includes the data for the air-fuel ratio learning control.
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.

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
HO2S1 (B1) [V]	○	○	• The signal voltage of the heated oxygen sensor 1 (front) is displayed.	
HO2S2 (B1) [V]	○	○	• The signal voltage of the heated oxygen sensor 2 (rear) is displayed.	
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.
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.
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 fuel tank 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 absolute pressure sensor is displayed.	
FULL 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.	

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
AIR COND SIG [ON/OFF]	○	○	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioning signal.	
P/N POSI SW [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the PNP switch signal.	
PW/ST SIGNAL [ON/OFF]	○	○	• Indicates [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure switch signal.	
IGNITION SW [ON/OFF]	○		• Indicates [ON/OFF] condition from ignition switch.	
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.	
CAL/LD VALUE [%]			• "Calculated load value" indicates the value of the current airflow divided by peak airflow.	
ABSOL TH·P/S [%]			• "Absolute throttle position sensor" indicates the throttle opening computed by ECM according to the signal voltage of the throttle position sensor.	
MASS AIRFLOW [g·m/s]			• Indicates the mass airflow computed by ECM according to the signal voltage of the mass air flow sensor.	
IACV-AAC/V [%]		○	• 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 value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
AIR COND RLY [ON/OFF]			• Indicates the air conditioner relay control condition determined by ECM according to the input signals.	
EGRC SOL/V [ON/OFF] (FLOW/CUT)			• Indicates the control condition of the EGRC-solenoid valve determined by ECM according to the input signals. • ON ... EGR valve is operational OFF ... EGR valve operation is cut-off	
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	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
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	
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.	
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.

CONSULT-II (Cont'd)

DATA MONITOR (SPEC) MODE

=NGEC0034S11

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.

NOTE:

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

ACTIVE TEST MODE

NGEC0034S07

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. • Air conditioner 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
ENG COOLANT TEMP	• Engine: Return to the original trouble condition • Change the engine coolant temperature indication 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
EGRC SOLENOID VALVE	• Ignition switch: ON • Turn EGRC-solenoid valve "ON" and "OFF" using CONSULT-II and listen to operating sound.	EGRC-solenoid valve makes an operating sound.	• Harness and connector • EGRC-solenoid valve

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
PURG VOL CONT/V	● Engine: After warming up, run engine at 1,500 rpm. ● Change the EVAP canister purge volume control valve opening step using CONSULT-II.	Engine speed changes according to the opening step.	● Harness and connector ● EVAP canister purge volume control 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" using 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" using CONSULT-II and listen to operating sound.	Solenoid valve makes an operating sound.	● Harness and connector ● Solenoid valve

DTC & SRT CONFIRMATION MODE

=NGEC0034S08

SRT STATUS Mode

NGEC0034S0801

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-69.

SRT Work Support Mode

NGEC0034S0803

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

DTC Work Support Mode

NGEC0034S0802

TEST MODE	TEST ITEM	CONDITION	REFERENCE PAGE
EVAPORATIVE SYSTEM	EVAP SML LEAK P0440	Refer to corresponding trouble diagnosis for DTC.	EC-352
	EVAP SML LEAK P1440		EC-474
	EVAP V/S LEAK P1441		EC-476
	PURG VOL CN/V P1444		EC-491
	PURGE FLOW P1447		EC-509
	VC CUT/V BP/V P1491		EC-537
	PURG CN/V & S/V P1493		EC-369
HEATED OXYGEN SENSOR 1 (FRONT)	HO2S1 (B1) P0130		EC-192
	HO2S1 (B1) P0131		EC-200
	HO2S1 (B1) P0132		EC-207
	HO2S1 (B1) P0133		EC-214
HEATED OXYGEN SENSOR 2 (REAR)	HO2S2 (B1) P0137		EC-237
	HO2S2 (B1) P0138		EC-247
	HO2S2 (B1) P0139		EC-257
EGR SYSTEM	EGR SYSTEM P0400		EC-327
	EGRC-BPT/VLV P0402		EC-339
	EGR SYSTEM P1402		EC-465

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

NGEC0034S10

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 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.

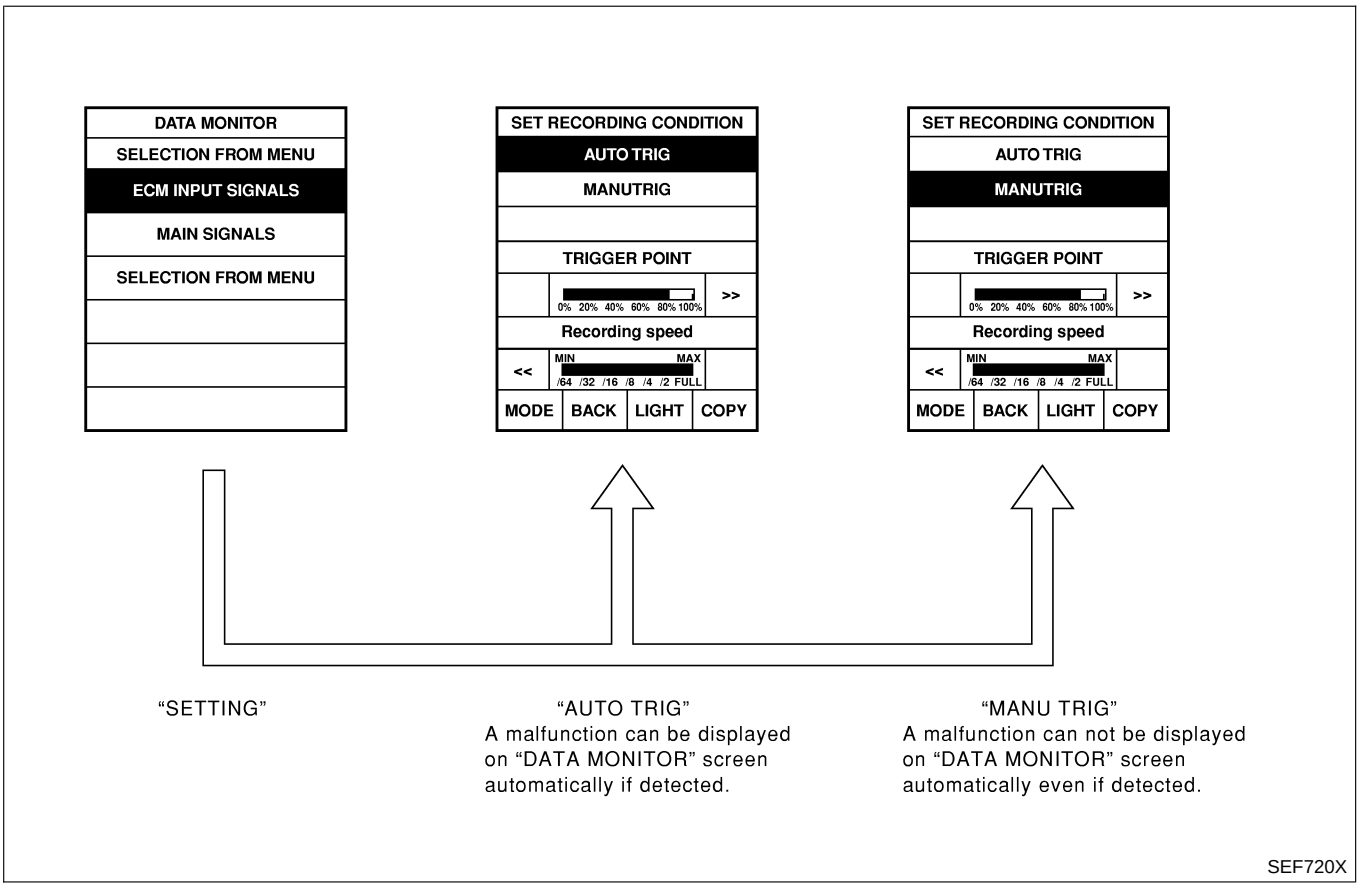
Use these triggers as follows:

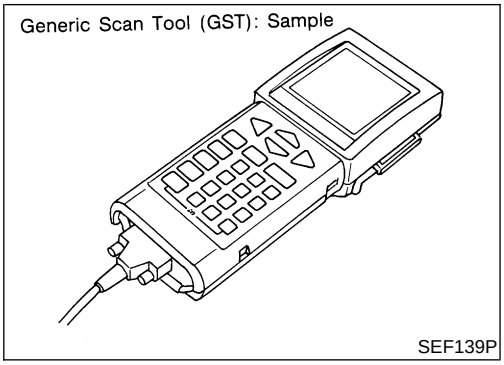
1) "AUTO TRIG"

- While trying to detect the DTC/1st trip DTC by performing the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE", be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.
- While narrowing down the possible causes, CONSULT-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 "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE", the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to "Incident Simulation Tests" in "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", ***GI-23***.

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.





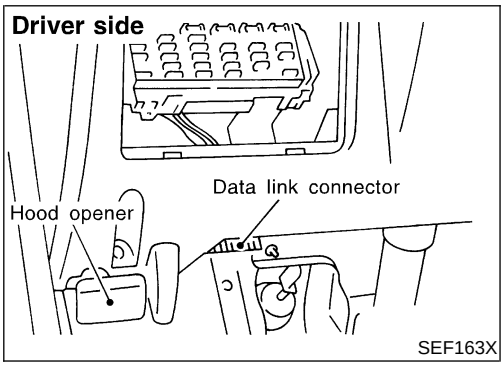
Generic Scan Tool (GST)

NGEC0035

DESCRIPTION

NGEC0035S01

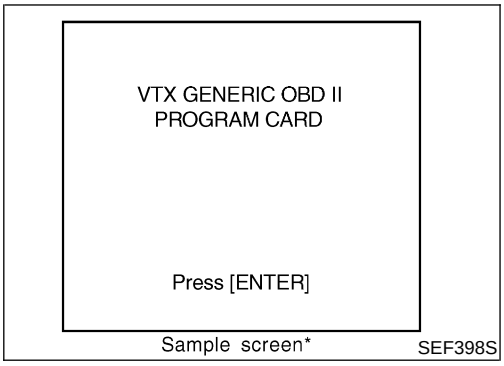
Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 8 different functions explained on the next page.
ISO9141 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.



GST INSPECTION PROCEDURE

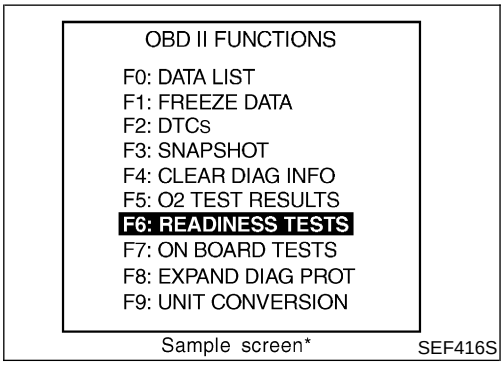
NGEC0035S02

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.)



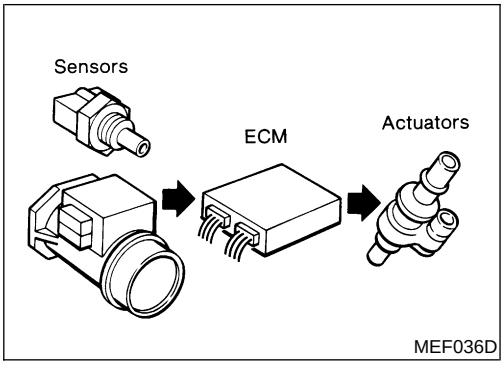
5. Perform each diagnostic mode according to each service procedure.

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

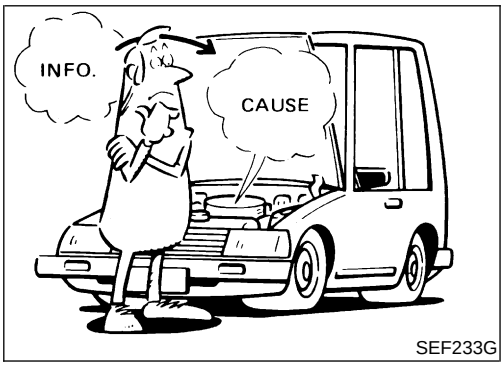
FUNCTION

NGEC0035S03

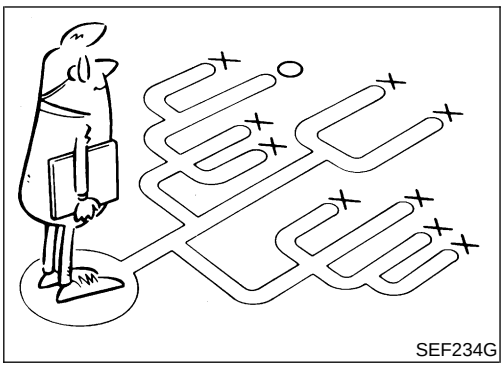
Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-89).]
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	—	—
MODE 9	(CALIBRATION ID)	This mode is to enable the off-board to request vehicle specific information such as Vehicle Identification Number (VIN) and Calibration ID.



MEF036D



SEF233G


SEF234G

KEY POINTS

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

SEF907L

Introduction

NGEC0036

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-102.

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

NGEC0036S01

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

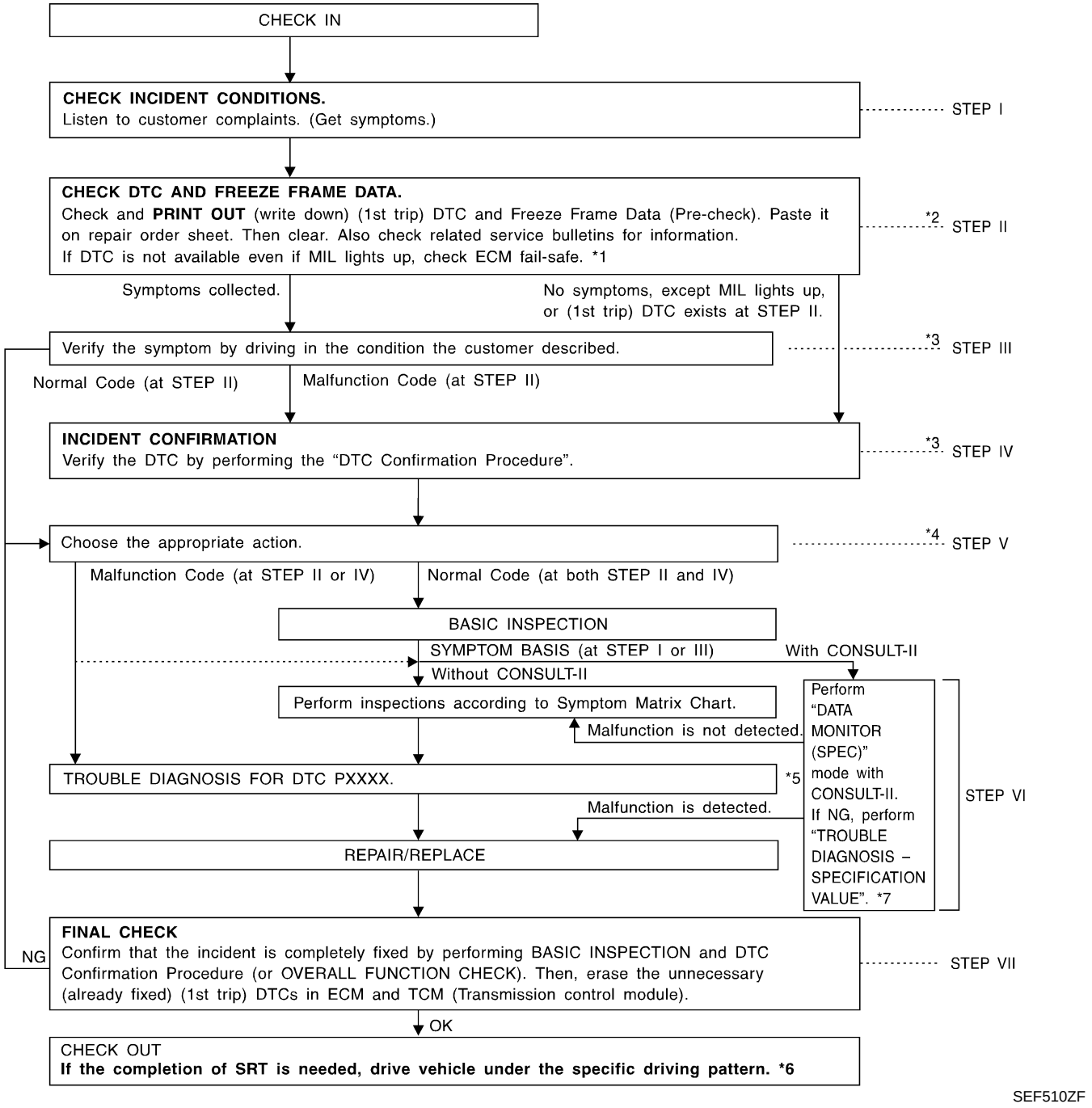
NGEC0036S0101

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

NGEC0037



SEF510ZF

*1: If the incident cannot be duplicated, refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-142.

*2: If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to “TROUBLE DIAGNOSIS FOR POWER SUPPLY”, EC-143.

*3: If time data of “SELF-DIAG RESULTS” is other than “0” or “1t” refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT”, EC-142.

*4: If the malfunctioning part cannot be found, refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-142.

*5: EC-119

*6: EC-74

*7: EC-138

DESCRIPTION FOR WORK FLOW

NGEC0037S01

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-101.
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-79.) 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-120.) 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 section.) If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) Diagnostic Trouble Code by driving in (or performing) the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-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 section.) In case the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" is not available, perform the "OVERALL FUNCTION CHECK" instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The "NG" result of the "OVERALL FUNCTION CHECK" is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-104.) If CONSULT-II is available, perform "DATA MONITOR (SPEC)" mode with CONSULT-II and proceed to the "TROUBLE DIAGNOSIS — SPECIFICATION VALUE", EC-138. (If malfunction is detected, proceed to "REPAIR/REPLACE".) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-120.)
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-129. 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 "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", "Circuit Inspection", ***GI-25***. Repair or replace the malfunction parts.
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" and confirm the normal code [Diagnostic trouble code No. P0000 or 0505] is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM. (Refer to EC-79.)

Basic Inspection

NGEC0038

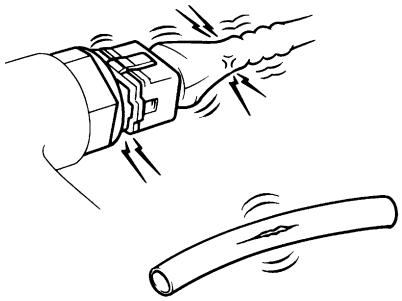
Precaution:
Perform Basic Inspection without electrical or mechanical loads applied;

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

1	INSPECTION START

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

- Harness connectors for improper connections
- Vacuum hoses for splits, kinks, or improper connections
- Wiring for improper connections, pinches, or cuts

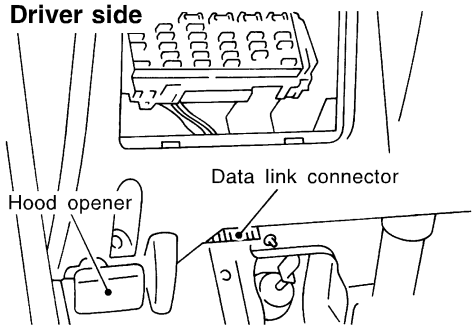


SEF142I

With CONSULT-II	▶	GO TO 2.
With GST	▶	GO TO 4.
No tools	▶	GO TO 5.

2	CONNECT CONSULT-II TO THE VEHICLE

Connect “CONSULT-II” to the data link connector and select “ENGINE” from the menu. Refer to EC-86.



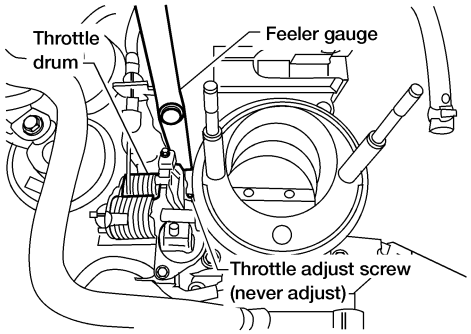
SEF163X

	▶	GO TO 3.

3	CHECK FI CAM FUNCTION

With CONSULT-II

1. Adjust accelerator wire. Refer to "Adjust Accelerator Wire", ***FE-3***.
2. Warm up engine to 75°C (167°F).
3. Stop engine and wait at least 5 seconds, then turn ignition switch ON.
4. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
5. When the engine coolant temp is 75 to 85°C (167 to 185°F), confirm the clearance is less than 0.05mm (0.002in), between stopper and throttle drum as shown in the figure.



AEC871A

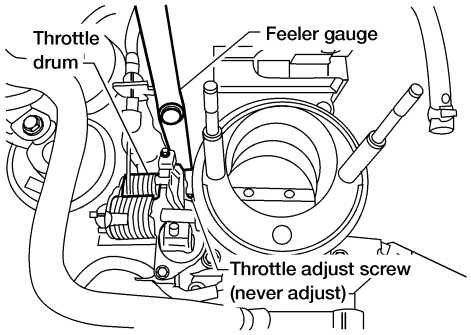
OK or NG

OK	▶	GO TO 6.
NG	▶	1. Replace throttle body assembly. Refer to "OUTER COMPONENT PARTS", ***EM-68***. 2. GO TO 6.

4	CHECK FI CAM FUNCTION

With GST

1. Adjust accelerator wire. Refer to "Adjust Accelerator Wire", ***FE-3***.
2. Warm up engine to 75°C (167°F).
3. Stop engine and wait at least 10 seconds, then turn ignition switch ON.
4. Select "MODE 1" with GST.
5. When the engine coolant temp is 75 to 85°C (167 to 185°F), confirm the clearance is less than 0.05mm (0.002in), between stopper and throttle drum as shown in the figure.



AEC871A

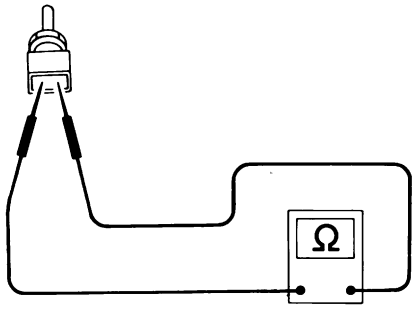
OK or NG

OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 14.
NG	▶	1. Replace throttle body assembly. Refer to "OUTER COMPONENT PARTS", ***EM-68***. 2. With CONSULT-II: GO TO 6. Without CONSULT-II: GO TO 14.

5	CHECK FI CAM FUNCTION

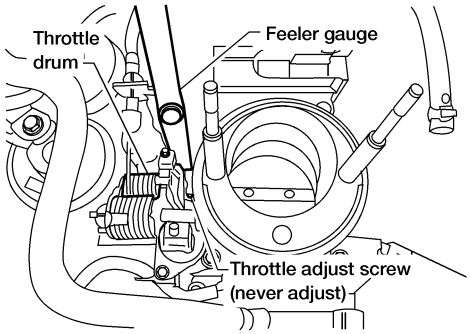
No Tools

1. Adjust accelerator wire. Refer to "Adjust Accelerator Wire", ***FE-3***.
2. Disconnect engine coolant temperature sensor harness connector and check resistance as shown in the figure.



SEF536H

3. Warm up engine until the resistance of coolant temperature sensor is 0.26 to 0.39 kΩ.
4. Turn ignition switch OFF.
5. When engine coolant temperature is 75 to 85°C (167 to 185°F), with the voltage between 1.10 to 1.36V, make sure that the clearance is less than 0.05 mm (0.002 in), between stopper and throttle adjusting screw as shown in figure.



AEC871A

OK or NG

OK	▶	GO TO 14.
NG	▶	1. Replace throttle body assembly. Refer to "OUTER COMPONENT PARTS", ***EM-68***. 2. GO TO 14.

6	CHECK IGNITION TIMING

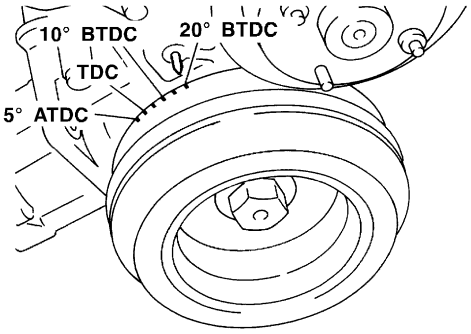
With CONSULT-II

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

4. Check ignition timing at idle using timing light.



SEF320V

Ignition timing:
MT: 20°±2° BTDC

OK or NG

OK	▶	GO TO 7.
NG	▶	1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-53. 2. GO TO 7.

7	CHECK BASE IDLE SPEED

With CONSULT-II

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

IACV-AAC/V ADJ	
ADJ MONITOR	
ENG SPEED	700 rpm
CONDITION SETTING	
IACV-ACC/V	FIXED
MONITOR	
COOLAN TEMP/S	XXX°C
CLSD THL POS	XXX N

SEF714Z

2. Check idle speed.
   MT: 750±50 rpm

OK or NG

OK	▶	GO TO 8.
NG	▶	1. Adjust base idle speed by turning idle speed adjusting screw. Refer to "Idle Speed/ Ignition Timing/Idle Mixture Ratio Adjustment", EC-53. 2. GO TO 8.

8	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION (CHECK THROTTLE POSITION SENSOR IDLE POSITION)

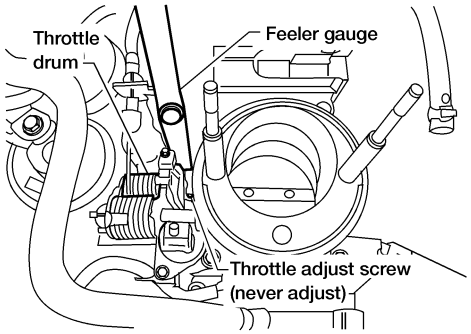
With CONSULT-II

NOTE:

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

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

- Insert a 0.1 mm (0.004 in) and 0.3 mm (0.012 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure and check the signal.



AEC871A

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
CLSD THL/P SW	ON

SEF197Y

"CLSD THL/P SW" signal should remain "ON" while inserting 0.1 mm (0.004 in) feeler gauge.
"CLSD THL/P SW" signal should remain "OFF" while inserting 0.3 mm (0.012 in) feeler gauge.

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 9.

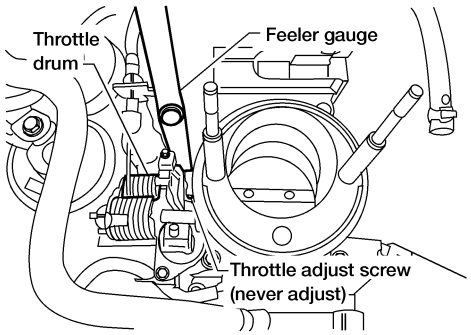
9	ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-1

With CONSULT-II

NOTE:

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

1. Warm engine up to normal operating temperature.
2. Check FI cam. Refer to procedure 3.
3. Stop engine.
4. Loosen throttle position sensor fixing bolts.
5. Turn ignition switch ON.
6. Select "CLSD THL/P SW" in "DATA MONITOR" mode.
7. Insert a 0.1 mm (0.004 in) feeler gauge between throttle adjust screw and throttle drum as shown in the figure.



AEC871A

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

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
CLSD THL/P SW	ON

SEF197Y

"CLSD THL/P SW" signal should remain "OFF" when the throttle valve is closed.
If it is impossible to adjust closed throttle position switch, replace throttle position sensor.

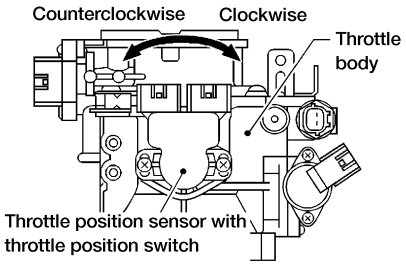
OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

10	ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-2

With CONSULT-II

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



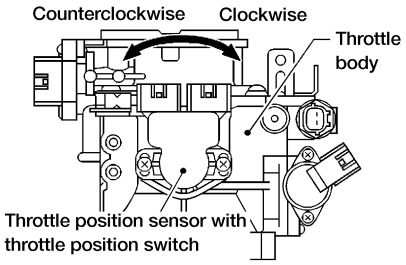
AEC872A

▶	GO TO 11.

11	ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-3

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" when tightening sensor body fixing bolts.**



AEC872A

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 0.1 mm (0.004 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge.
4. Make sure two or three times that the signal remains "OFF" when the throttle valve is closed.
5. Tighten throttle position sensor.
6. Check "CLSD THL/P SW" signal again.
   The signal remains "OFF" while closing throttle valve.

OK or NG

OK	▶	1. Remove 0.3 mm (0.012 in) feeler gauge. 2. GO TO 12.
NG	▶	GO TO 9.

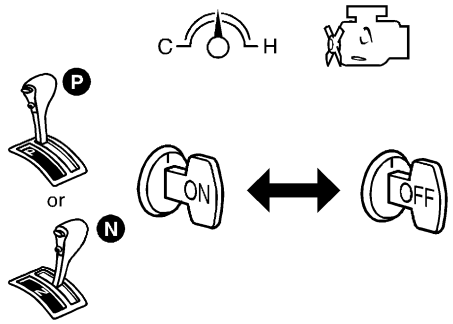
12	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

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



SEF864V

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

DATA MONITOR	
MONITORING	NO DTC
CLSD THL/P SW	ON

SEF715Z

	▶	GO TO 13.

13	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.

MT: 800±50 rpm

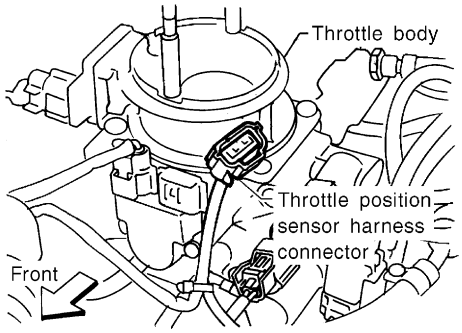
OK or NG

OK	▶	**INSPECTION END**
NG	▶	Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-53. Inspection end after adjust idle speed.

14	CHECK IGNITION TIMING

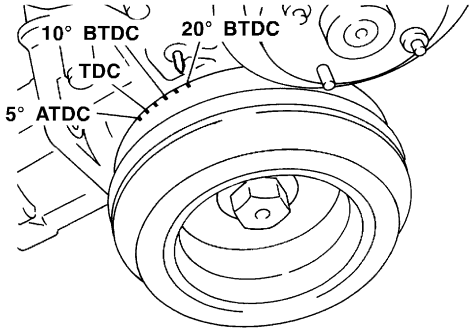
Without CONSULT-II

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



SEF265S

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



SEF320V

Ignition timing:
MT: 20°±2° BTDC

OK or NG

OK	▶	GO TO 15.
NG	▶	1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-53. 2. GO TO 15.

15	CHECK BASE IDLE SPEED

Without CONSULT-II

Make sure that engine speed falls to the following speed.

M/T: 750±50 rpm

OK or NG

OK	▶	GO TO 16.
NG	▶	1. Adjust base idle speed by turning idle speed adjusting screw. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-53. 2. GO TO 16.

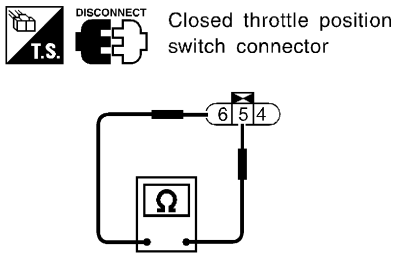
16	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION (CHECK THROTTLE POSITION SENSOR IDLE POSITION)

Without CONSULT-II

NOTE:

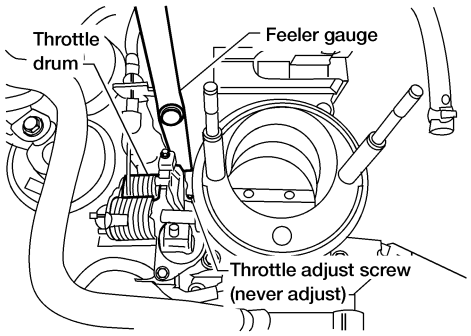
Always check ignition timing and base idle speed before performing the following.

1. Warm up engine to normal operating temperature.
2. Check FI cam. Refer to procedure 5.
3. Stop engine.
4. Disconnect closed throttle position switch harness connector .
5. Connect the tester probe to closed throttle position switch terminals 5 and 6.
6. Check harness continuity under the following conditions.



SEF862V

- Insert the 0.1 mm (0.004 in) and 0.3 mm (0.012 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure.



AEC871A

"Continuity should exist" while inserting 0.1 mm (0.004 in) feeler gauge.
"Continuity should not exist" while inserting 0.3 mm (0.012 in) feeler gauge.

OK or NG

OK	▶	GO TO 20.
NG	▶	GO TO 17.

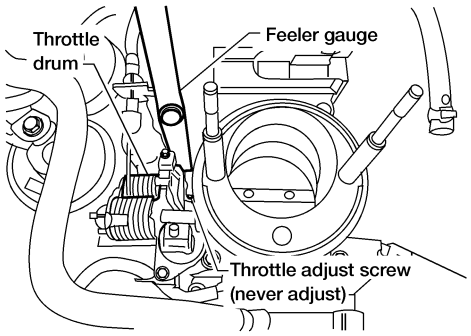
17	ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-1

Without CONSULT-II

NOTE:

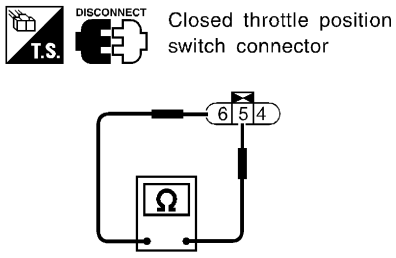
- **Never adjust throttle adjust screw (TAS).**
- **Do not touch throttle drum when checking "continuity".**
  Doing so may cause an incorrect adjustment.

1. Warm engine up to normal operating temperature.
2. Check FI cam. Refer to procedure 5.
3. Stop engine.
4. Loosen throttle position sensor fixing bolts.
5. Disconnect closed throttle position sensor harness connector.
6. Insert 0.1 mm (0.004 in) feeler gauge between the throttle adjust screw and throttle drum as shown in the figure.



AEC871A

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



SEF862V

The continuity should not exist while closing the throttle position sensor body.
If it is impossible to adjust closed throttle position switch, replace throttle position sensor.

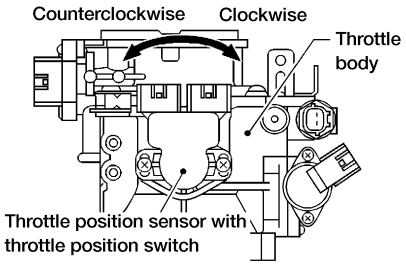
OK or NG

OK	▶	GO TO 19.
NG	▶	GO TO 18.

18	ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-2

Without CONSULT-II

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



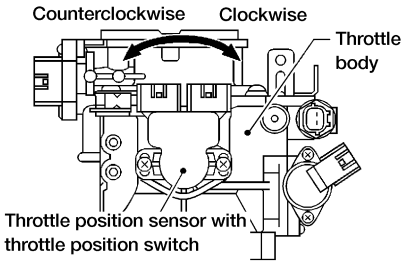
AEC872A

	▶	GO TO 19.

19	ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-3

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 tighten sensor body fixing bolts.**



AEC872A

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 0.1 mm (0.004 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge.
4. Make sure two or three times that continuity does not exist when the throttle valve is closed.
5. Tighten throttle position sensor.
6. Check the continuity again.
   Continuity does not exist while closing the throttle valve.

OK or NG

OK	▶	GO TO 20.
NG	▶	GO TO 17.

20	REINSTALLATION

Without CONSULT-II

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

	▶	GO TO 21.

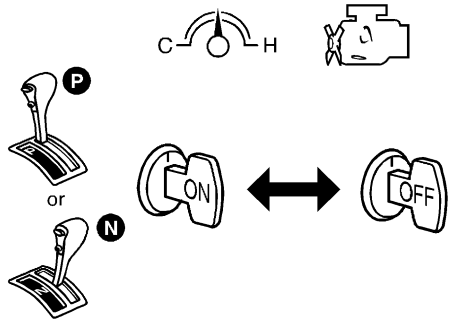
21	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

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



SEF864V

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

▶	GO TO 22.

22	CHECK TARGET IDLE SPEED

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

MT: 800±50 rpm

OK or NG

OK	▶	GO TO 23.
NG	▶	1. Adjust target idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-53. 2. GO TO 23.

23	ERASE UNNECESSARY DTC

After this inspection, unnecessary DTC No. might be displayed.
Erase the stored memory in ECM and TCM.
Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", (EC-79) .

▶	**INSPECTION END**

DTC Inspection Priority Chart

NGEC0039

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 • P0460, P0461, P0464, P1464 Fuel level sensor • P0500 Vehicle speed sensor • P0605 ECM • P1126 Thermostat function • P1400 EGRC-solenoid valve • P1706 Park/neutral position switch
2	• P0105 Absolute pressure sensor • P0130 - P0134 Heated oxygen sensor 1 (front) • P0135 Heated oxygen sensor 1 heater (front) • P0137 - P0140 Heated oxygen sensor 2 (rear) • P0141 Heated oxygen sensor 2 heater (rear) • P0335, P1336 Crankshaft position sensor (OBD) • 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 • P1401 EGR temperature sensor • P1447 EVAP control system purge flow monitoring • P1490, P1491 Vacuum cut valve bypass valve • P1775 TORQUE CONVERTER CLUTCH SOLENOID VALVE (CIRCUIT) • P1776 TORQUE CONVERTER CLUTCH SOLENOID VALVE (CIRCUIT)
3	• P0172, P0171 Fuel injection system function • P0300 - P0304 Misfire • P0400, P1402 EGR function • P0402 EGRC-BPT valve function • P0420 Three way catalyst function • P0440, P1440 EVAP control system (SMALL LEAK) • P0455 EVAP control system (GROSS LEAK) • P1441 EVAP control system (VERY SMALL LEAK) • P0505 IACV-AAC valve • P1148 Closed loop control

Fail-safe Chart

=NGEC0040

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. / CONSULT-II GST	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.	
P0110	Intake air temperature sensor	The ECM functions on the assumption that the intake air temperature is 25°C (77°F).	
P0115	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch to 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 to 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
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

NGEC0041

SYSTEM — ENGINE CONTROL SYSTEM

NGEC0041S01

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-576
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-52
	Injector circuit	1	1	2	3	2		2	2			2			EC-568
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-34
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-49
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-53
	IACV-AAC valve circuit	1	1	2	3	3	2	2	2	2		2		2	EC-427
	IACV-FICD solenoid valve circuit	2	2	3	3	3	3	3	3	3		3			EC-589
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-53
	Ignition circuit	1	1	2	2	2		2	2			2			EC-559
EGR	EGRC-solenoid valve circuit		2	2	3	3						3			EC-452
	EGR system	2	1	2	3	3	3	2	2	3		3			EC-327, 339, 465
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3		2	EC-143
Air conditioner circuit		2	2	3	3	3	3	3	3	3		3		2	***HA-11***

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 circuit	2	2	3	3	3		3	3			3			EC-319
Mass air flow sensor circuit	1	1	2	2	2		2	2			2			EC-150
Heated oxygen sensor 1 (front) circuit		1	2	3	2		2	2			2			EC-192, 200
Engine coolant temperature sensor circuit	1	1	2	3	2	3	2	2	3		2			EC-168, 187
Throttle position sensor circuit		1	2		2	2	2	2	2		2			EC-173
Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-104
Vehicle speed sensor circuit		2	3		3						3			EC-423
Knock sensor circuit			2								3			EC-309
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-440, 119
Start signal circuit	2													EC-573
PNP switch circuit			3		3		3	3			3			EC-548
Power steering oil pressure switch circuit		2					3	3						EC-585

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

Symptom Matrix Chart (Cont'd)

SYSTEM — ENGINE MECHANICAL & OTHER

NGEC0041S03

		SYMPTOM													
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												***FE-4***
	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-3***
	Air leakage from intake manifold/Collector/Gasket														—
Crank-ing	Battery	1	1	1		1		1	1					1	***SC-2***
	Alternator circuit														
	Starter circuit	3										1			
	Flywheel	6													***EM-52***
	PNP switch	4													—

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-29***, ***EM-44***
	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-18***, ***EM-29***
	Camshaft														
	Intake valve												3		
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/ Muffler/Gasket	5	5	5	5	5		5	5			5			***FE-9***
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/ Oil filter/Oil gallery	5	5	5	5	5		5	5			5			***MA-20***, ***LC-6***
	Oil level (Low)/Filthy oil														
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			***LC-11***
	Thermostat									5					
	Water pump														
	Water gallery														
	Coolant level (low)/ Contaminated coolant														***MA-17***

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

CONSULT-II Reference Value in Data Monitor Mode

NGEC0042

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	0.9 - 1.8V
		2,500 rpm	1.9 - 2.3V
B/FUEL SCHDL	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: “N” • No-load	Idle	0.8 - 1.2 msec
		2,000 rpm	0.8 - 1.2 msec
A/F ALPHA-B1	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	50 - 159%
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 ⟷ Approx. 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 ⟷ Approx. 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 • Ignition switch: ON (Engine stopped)	Throttle valve fully closed	0.2 - 0.8V
		Throttle valve fully opened	3.5 - 4.5V
EGR TEMP SEN	• Engine: After warming up		Less than 4.5V
EVAP SYS PRES	• Ignition switch: ON		Approx. 3.4V
ABSOL PRES/SE	• Ignition switch: ON • Engine: For 5 seconds after stating engine		Approx. 4.4V
	• Engine: More than 5 seconds after starting engine (After warming up)		Approx. 1.2V
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF
CLSD THL/P SW	• Engine: After warming up • Ignition switch: ON (Engine stopped)	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
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON
INJ PULSE-B1	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	2.5 - 3.3 msec
		2,000 rpm	2.4 - 3.2 msec
IGN TIMING	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	Approx. 20° 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	9.5 - 34.0%
		2,500 rpm	13.9 - 24.9%
ABSOL TH·P/S	• Engine: After warming up, engine stopped • Ignition switch: ON	Throttle valve: fully closed	0.0%
		Throttle valve: fully opened	Approx. 80%
MASS AIRFLOW	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	0.9 - 5.8 g·m/s
		2,500 rpm	7.5 - 13.2 g·m/s
IACV-AAC/V	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	Approx. 30%
		2,000 rpm	—
PURG VOL C/V	• Engine: After warming up • Air conditioner switch: OFF • No-load	Idle	0%
		2,000 rpm (More than 200 seconds after starting engine)	—
AIR COND RLY	• Air conditioner switch: OFF → ON		OFF → ON
EGRC SOL/V	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	ON (Cut)
		Engine speed: Revving engine from idle to 3,000 rpm quickly.	OFF (Flow)
FUEL PUMP RLY	• Ignition switch is turned to ON (Operates for 5 seconds) • Engine running and cranking		ON
	• Except as shown above		OFF
VC/V BYPASS/V	• Ignition switch: ON		OFF
VENT CONT/V	• Ignition switch: ON		OFF

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

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1)	• Engine speed: Below 3,000 rpm (All models) For 6 seconds after engine speed exceeds 3,000 rpm (4WD models only)	ON
	• Engine speed: Above 3,000 rpm (2WD models) More than 6 seconds after engine speed exceeds 3,000 rpm (4WD models)	OFF
HO2S2 HTR (B1)	• Engine speed: Idle after driving 2 minutes at 70 km/h (43 MPH) or more	ON
	• Ignition switch: ON (Engine stopped)	OFF

Major Sensor Reference Graph in Data Monitor Mode

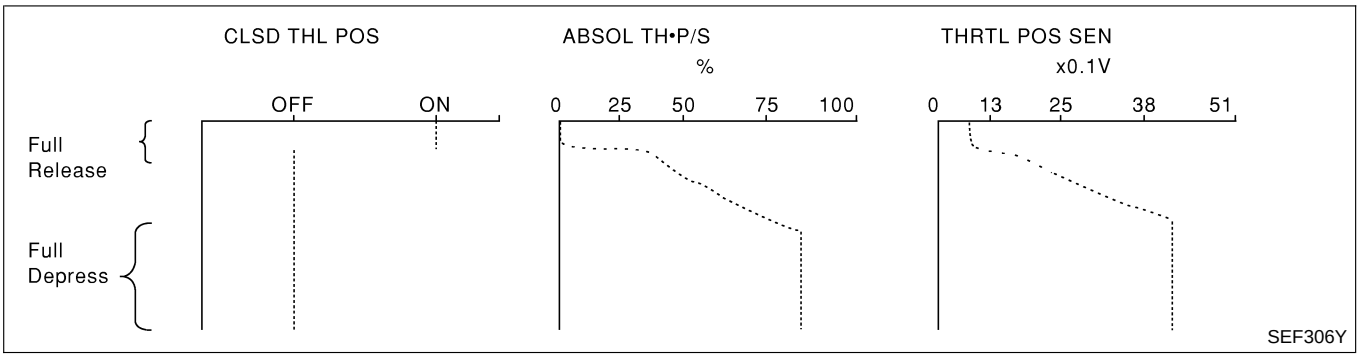
NGEC0043

The following are the major sensor reference graphs in "DATA MONITOR" mode.
(Select "MANU TRIG" in "DATA MONITOR" with CONSULT-II. "Trigger Point" is set to 100%, "Recording Speed" is set to MAX..)

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

NGEC0043S01

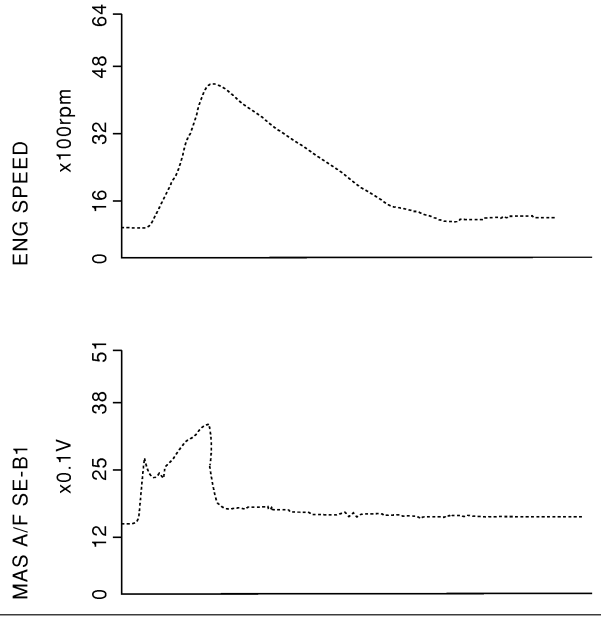
Below is the data for "THRTL POS SEN", "ABSOL TH·P/S" and "CLSD THL POS" when depressing the accelerator pedal with the ignition switch ON.
The signal of "THRTL POS SEN" and "ABSOL TH·P/S" should rise gradually without any intermittent drop or rise after "CLSD THL POS" is changed from "ON" to "OFF".



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

NGEC0043S02

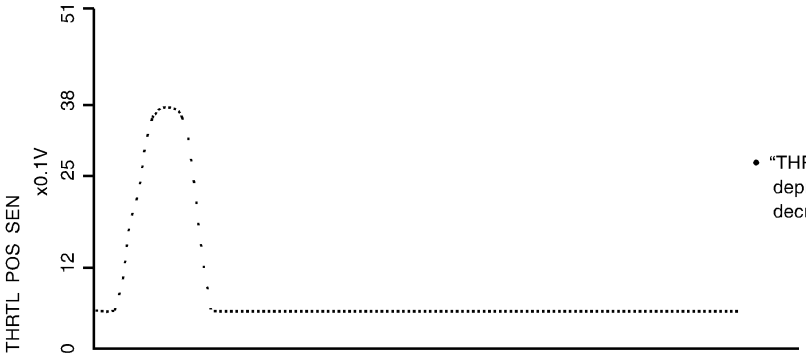
Below is the data for "ENG SPEED", "MAS A/F SE-B1", "THRTL POS SEN", "HO2S2 (B1)", "HO2S1 (B1)" and "INJ PULSE-B1" when revving engine quickly up to 4,800 rpm under no load after warming up engine to normal operating temperature.
Each value is for reference, the exact value may vary.



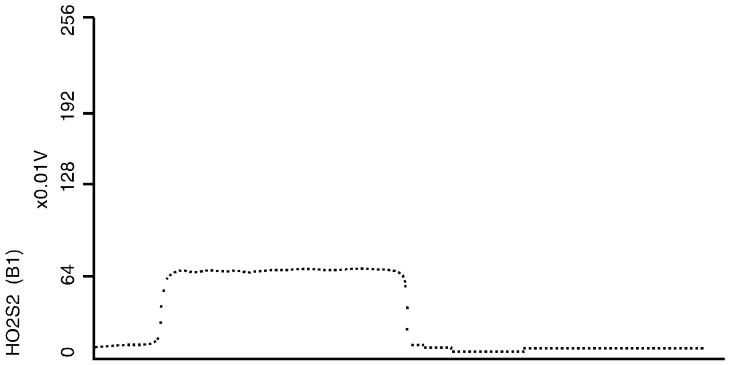
- "ENG SPEED" should increase gradually while depressing the accelerator pedal and should decrease gradually after releasing the pedal without any intemittent drop or rise.

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

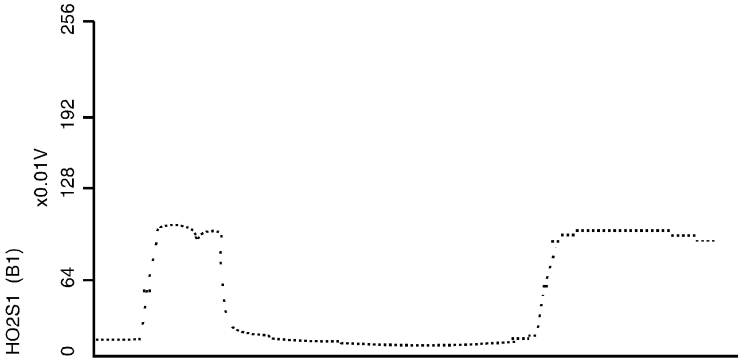
SEF241Y



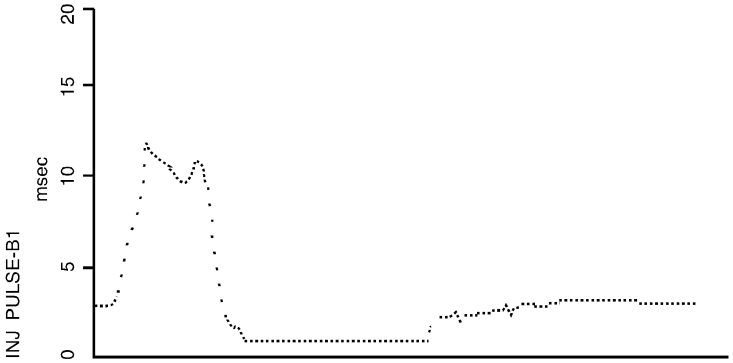
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



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

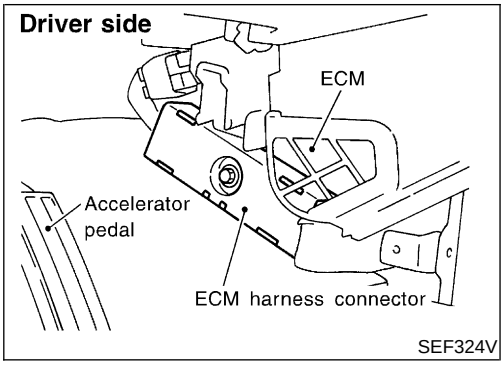


- "HO2S1 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.

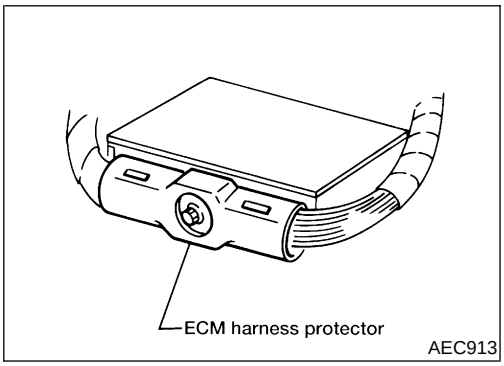


- "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

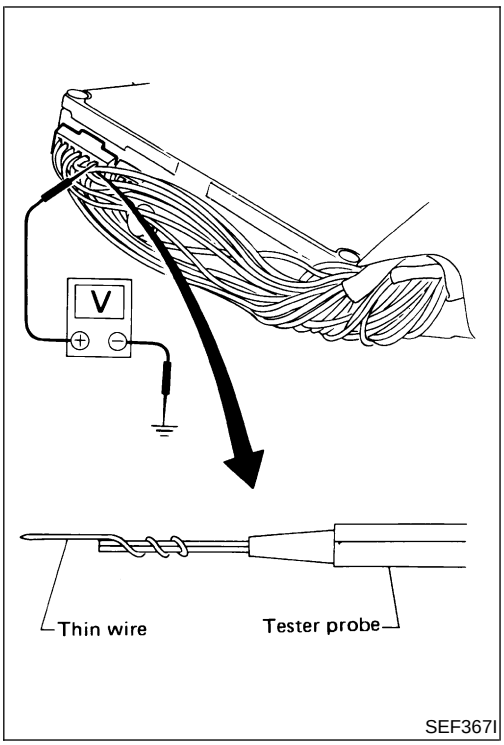
SEF242YA



SEF324V



AEC913



SEF367I

ECM Terminals and Reference Value

NGEC0044

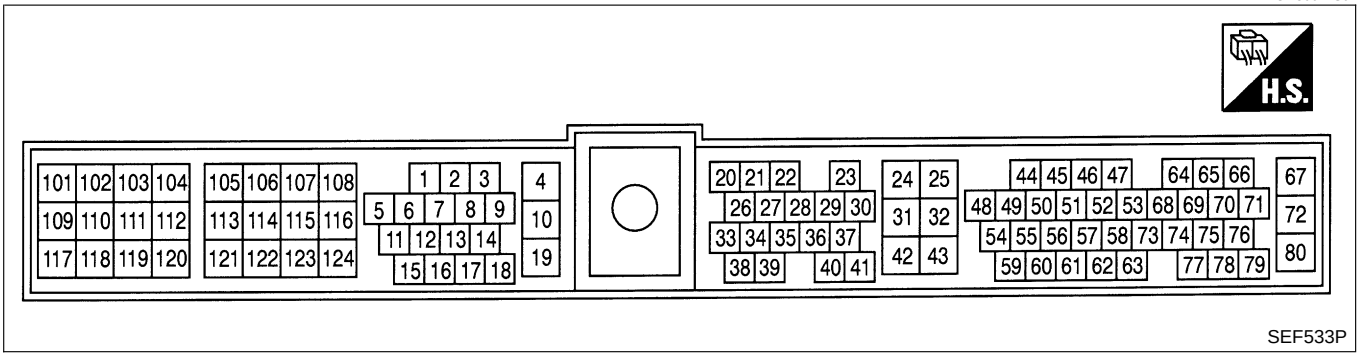
PREPARATION

NGEC0044S01

1. ECM is located behind the instrument lower cover. For this inspection:
   - Remove instrument lower cover.
2. Remove ECM harness protector.
3. Perform all voltage measurements with the connector connected. Extend tester probe as shown to perform tests easily.
   - Open harness securing clip to make testing easier.
   - Use extreme care not to touch 2 pins at one time.
   - Data is for comparison and may not be exact.

ECM HARNESS CONNECTOR TERMINAL LAYOUT

NGEC0044S02



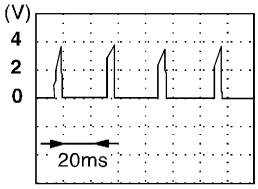
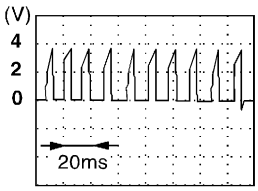
ECM INSPECTION TABLE

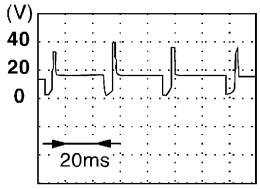
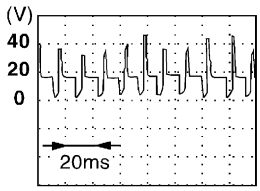
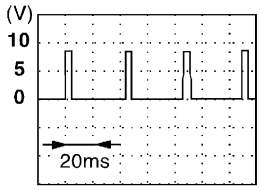
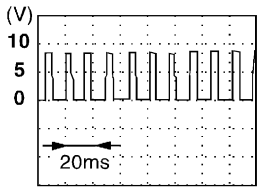
NGEC0044S03

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

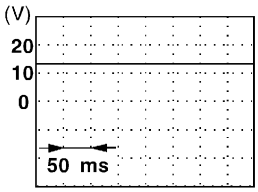
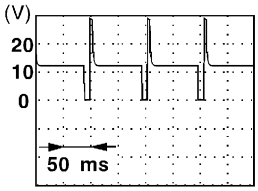
CAUTION:

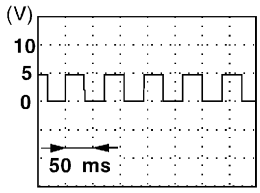
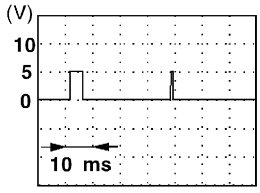
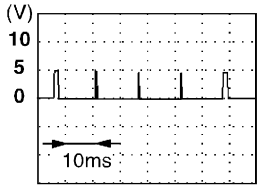
Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/W	Ignition signal	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 0.5V 
			[Engine is running] ● Engine speed is 2,000 rpm	0.2 - 1.0V 

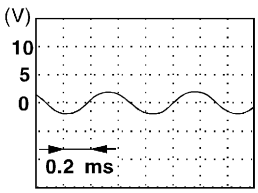
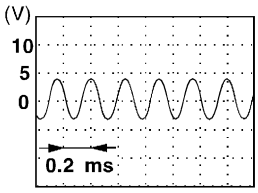
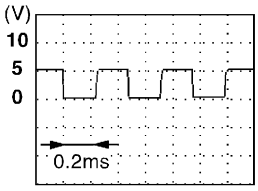
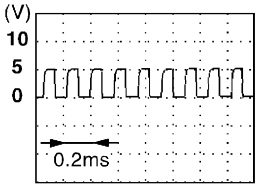
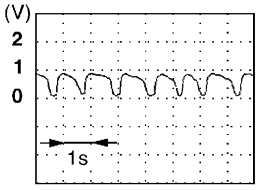
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	B	Ignition check	**[Engine is running]** ● **Warm-up condition** ● Idle speed	12 - 14V 
			[Engine is running] ● Engine speed is 2,000 rpm	12 - 13V 
3	P/L	Tachometer	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 1V 
			[Engine is running] ● Engine speed is 2,000 rpm	0.5 - 2V 
4	LG/R	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1V
			[Ignition switch OFF] ● More than a few seconds 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)
5	R/Y	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V) 
			[Engine is running] ● Engine speed is 2,000 rpm (More than 200 seconds after starting engine)	12 - 13V 
10	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
11	W/R	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)
12	P	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower switch are ON* *: Any mode except "OFF", ambient air temperature above 10°C (50°F).	Approximately 0V
			[Engine is running] ● A/C switch is OFF	BATTERY VOLTAGE (11 - 14V)
18	R/W	Malfunction indicator lamp	**[Ignition switch ON]**	0 - 1V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
19	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
20	L/OR	Start signal	**[Ignition switch ON]**	Approximately 0V
			[Ignition switch START]	BATTERY VOLTAGE (11 - 14V)
21	G/R	Air conditioner dual-pressure switch	**[Engine is running]** ● Both air conditioner switch and blower switch are ON (Compressor operates)	Approximately 0V
			[Engine is running] ● Air conditioner switch is OFF	BATTERY VOLTAGE (11 - 14V)
22	L/B	Park/neutral position (PNP) switch	**[Ignition switch ON]** ● Gear position is "N" or "P"	Approximately 0V
			[Ignition switch ON] ● Except the above gear position	Approximately 5V

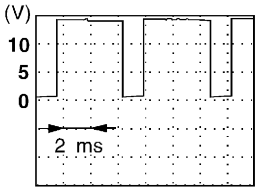
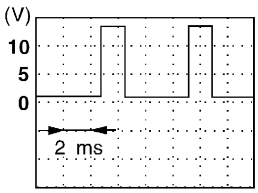
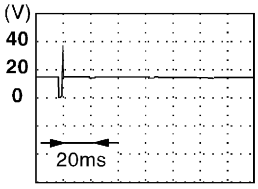
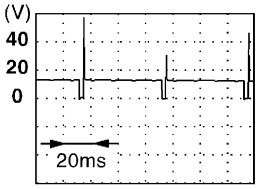
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	L	Throttle position sensor	**[Ignition switch ON]** ● **Warm-up condition** ● Accelerator pedal fully released	0.2 - 0.8V
			[Ignition switch ON] ● Accelerator pedal fully depressed	3.5 - 4.5V
24	W/G	Ignition switch	**[Ignition switch OFF]**	0V
			[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
25	B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
28	BR/W	Throttle position switch (Closed position)	**[Ignition switch ON]** ● **Warm-up condition** ● Accelerator pedal released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON] ● Accelerator pedal depressed	Approximately 0V
29	G/B	Vehicle speed sensor	**[Engine is running]** ● Lift up the vehicle ● In 2nd gear position ● 40 km/h (25 MPH)	1 - 4V 
32	B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
39	GY/R	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is fully turned	Approximately 0V
			[Engine is running] ● Steering wheel is not turned	Approximately 5V
42	BR	Sensors' power supply	**[Ignition switch ON]**	Approximately 5V
43	B/W	Sensors' ground	**[Engine is running]** ● Idle speed	Approximately 0V
44	PU	Camshaft position sensor (Reference signal)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.2 - 0.5V 
			[Engine is running] ● Engine speed is 2,000 rpm	0 - 0.5V 

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	B/R	Absolute pressure sensor	**[Ignition switch ON]** ● Engine is not running **[Engine is running]** ● For 5 seconds after starting engine	Approximately 4.4V
			[Engine is running] ● **Warm-up condition** ● More than 5 seconds after starting engine	Approximately 1.2V
46	OR/B	Fuel level sensor	**[Ignition switch ON]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
47	L	Crankshaft position sensor (OBD)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V 
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 0V 
49	LG	Camshaft position sensor (Position signal)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.6V 
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2.5 - 2.6V 
50	B	Heated oxygen sensor 1 (front)	**[Engine is running]** ● After warning up to normal operating temperature and engine speed is 2,000 rpm.	0 - Approximately 1.0V 

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	R	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.9 - 1.8V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm	1.8 - 2.3V
55	G	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
56	OR	Heated oxygen sensor 2 (rear)	**[Engine is running]** ● After warming up to normal operating temperature and revving engine from idle to 3,000 rpm quickly	0 - Approximately 1.0V
59	LG/R	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature
60	Y/B	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel temperature
61	PU/R	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature
62	Y	EVAP control system pressure sensor	**[Ignition switch ON]**	Approximately 3.4V
63	G/OR	EGR temperature sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Less than 4.5V
			[Engine is running] ● **Warm-up condition** ● EGR system is operating	0 - 1.5V
64	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.4V
66	B	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V
67	B/P	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P			
69	LG/R	Data link connector	**[Ignition switch ON]** ● CONSULT-II or GST is disconnected.	Approximately 2V
80	SB	Power supply (Back-up)	**[Ignition switch OFF]**	BATTERY VOLTAGE (11 - 14V)

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	OR/L	IACV-AAC valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	10.5 - 11.5V 
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	1 - 13V 
102	W/B	Injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V) 
104	W/R	Injector No. 3		
109	W/L	Injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V) 
111	W/PU	Injector No. 4		
103	G/W	EGRC-solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 1V
			[Engine is running] ● **Warm-up condition** ● Revving engine from idle to 3,000 rpm quickly	BATTERY VOLTAGE (11 - 14V)
108	R/G	EVAP canister vent control valve	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
116	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
119	BR/Y	Heated oxygen sensor heater 1 (front)	**[Engine is running]** ● Engine speed is below 3,000 rpm. (All models)	Approximately 0.4V
			[Engine is running] ● Engine speed is above 3,000 rpm. (2WD models) ● More than 6 seconds after engine speed exceeds 3,000 rpm (4WD models)	BATTERY VOLTAGE (11 - 14V)
120	P/B	Vacuum cut valve bypass valve	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
122	R/B	Heated oxygen sensor heater 2 (rear)	**[Engine is running]** ● Idle speed after driving 2 minutes at 70 km/h (43 MPH) or more	Approximately 0.4V
			[Ignition switch ON] ● Engine is not running	BATTERY VOLTAGE (11 - 14V)
124	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

Description

NGEC1003

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/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)

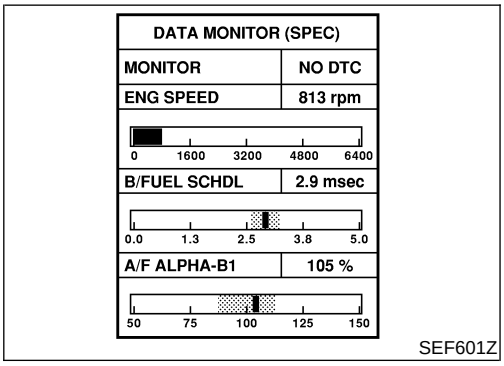
Testing Condition

NGEC1004

- Vehicle driven distance: More than 5,000 km (3,100 miles)
- Barometric pressure: 101.3 kPa (760.0 mmHg, 29.92 inHg)±3 kPa (22.5 mmHg, 0.89 inHg)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up*1
- Electrical load: Not applied*2
- Engine speed: Idle

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

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



Inspection Procedure

NGEC1005

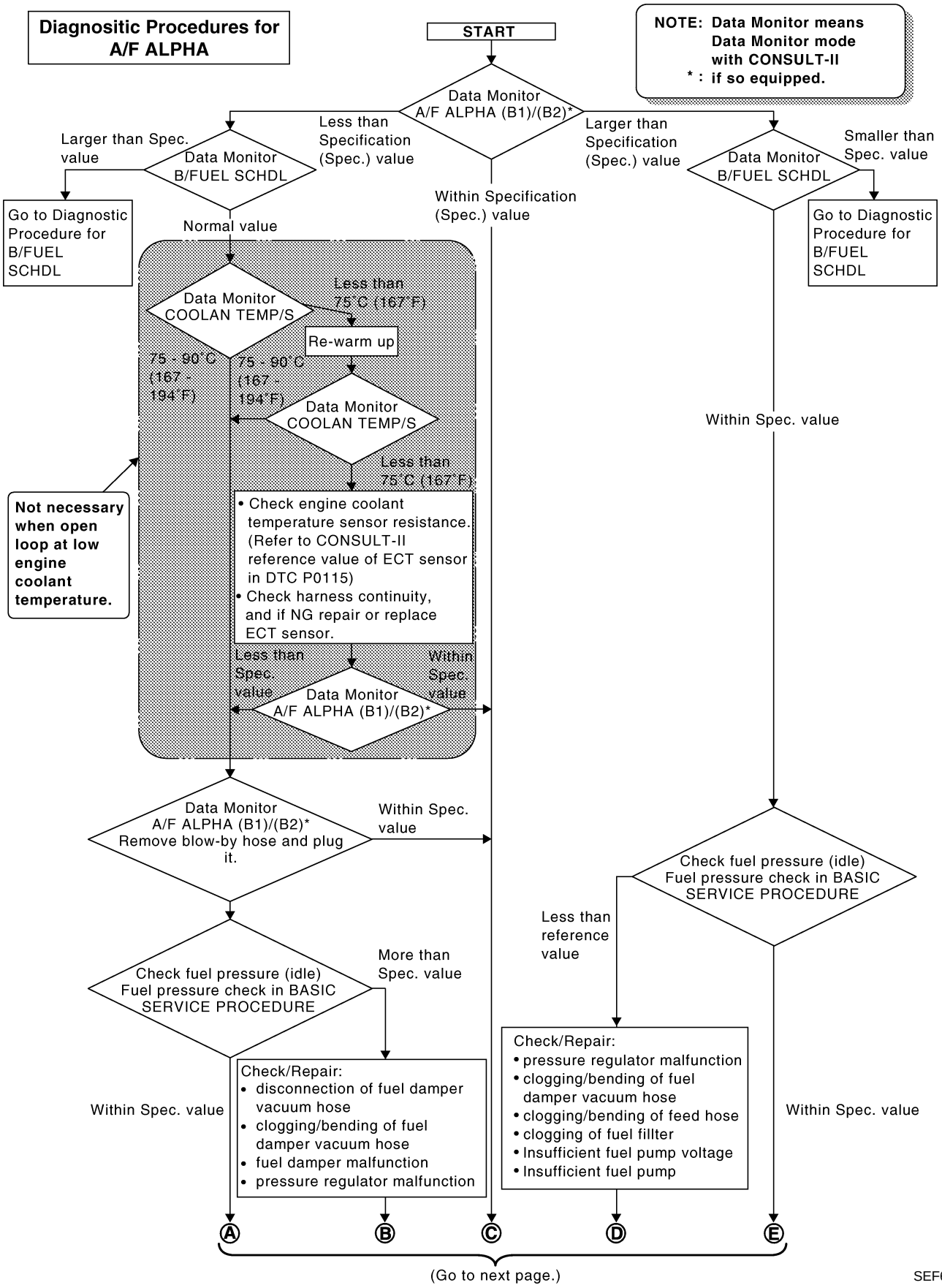
NOTE:

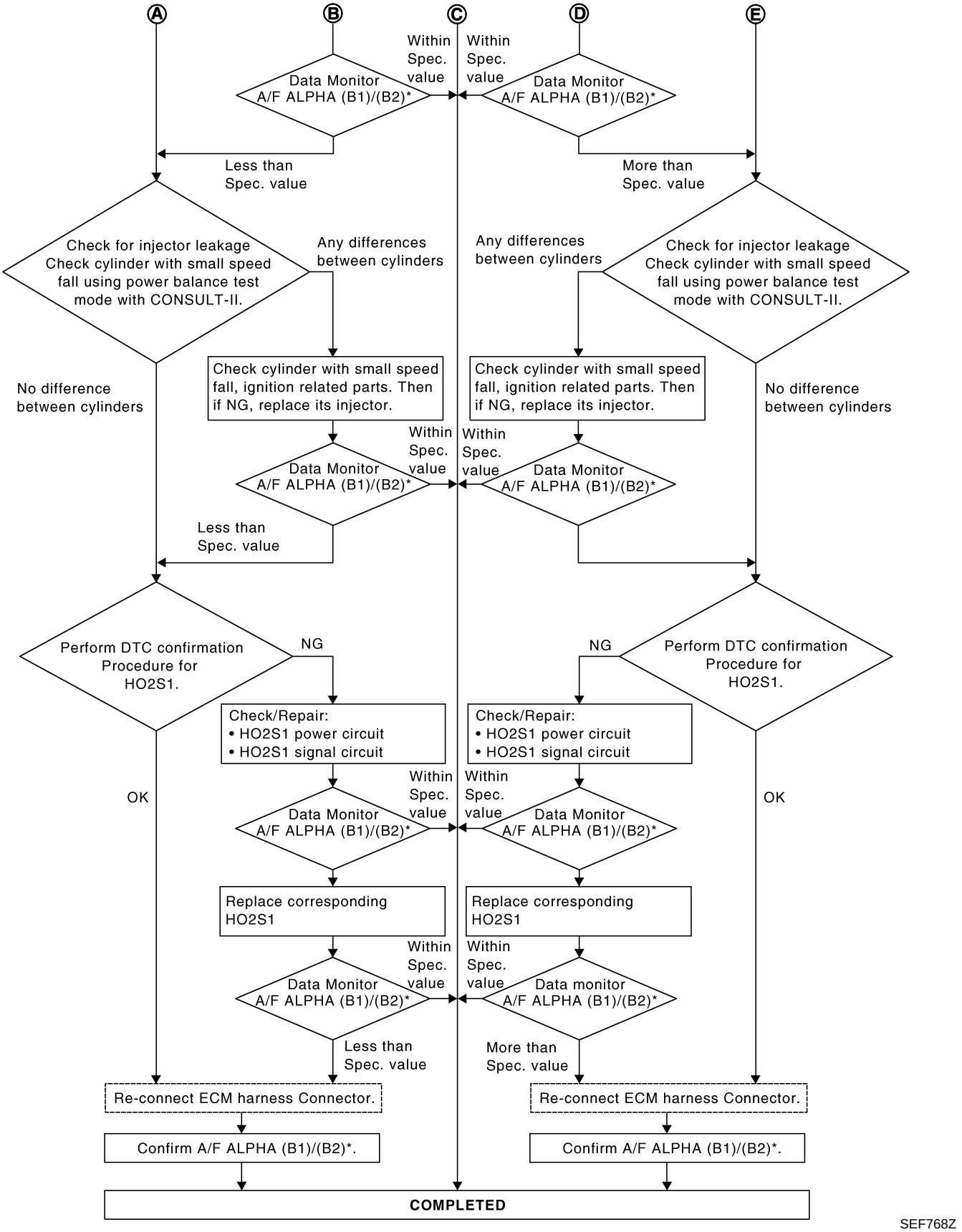
Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

1. Perform “Basic Inspection”, EC-104.
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”, EC-139.

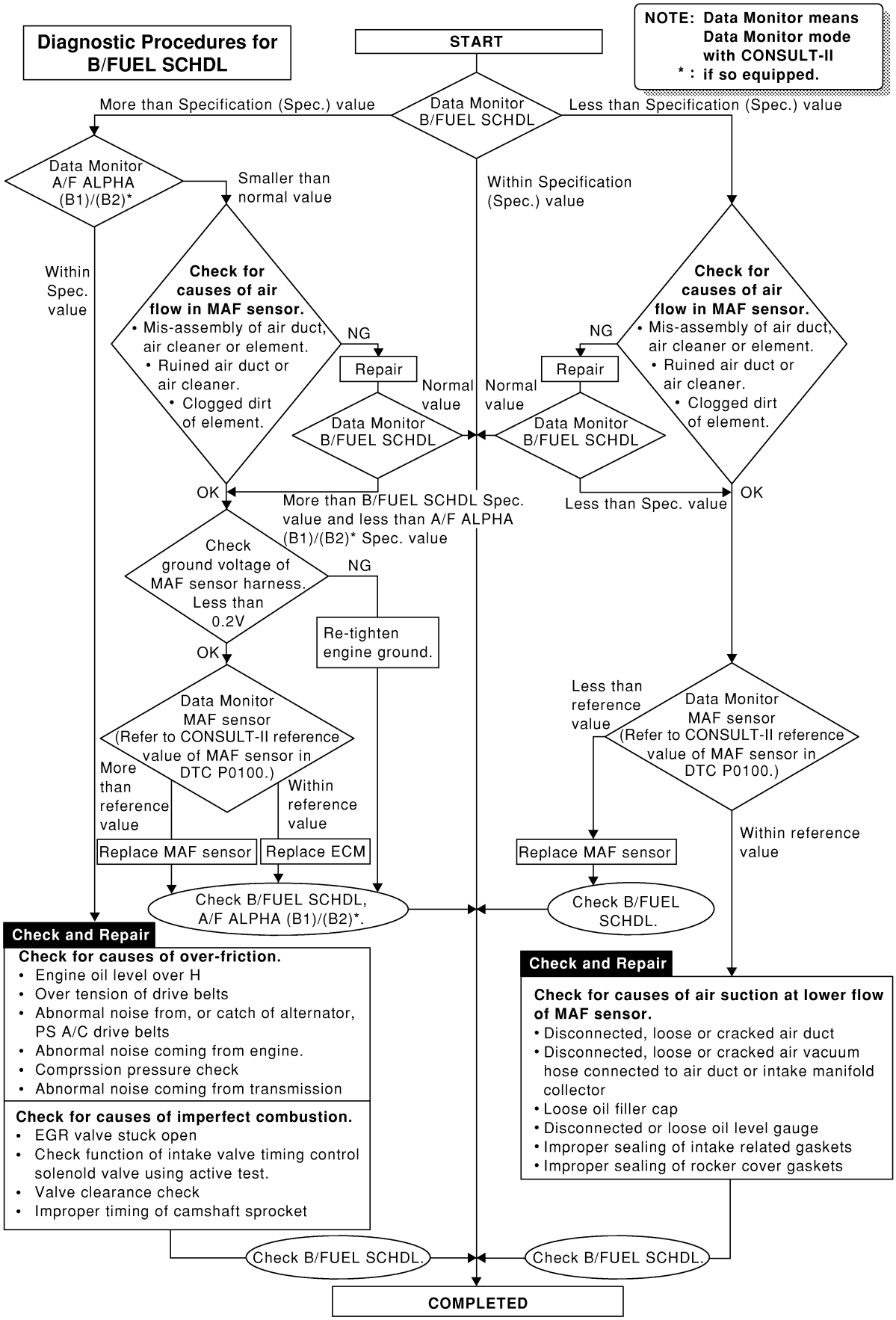
Diagnostic Procedure

NGEC1006




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

SEF768Z


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

NGEC0045

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

NGEC0045S01

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

NGEC0046

1	INSPECTION START
Erase (1st trip) DTCs. Refer to "HOW TO ERASE EMISSION-RELATED INFORMATION", EC-79.	
▶	GO TO 2.

2	CHECK GROUND TERMINALS
Check ground terminals for corroding or loose connection. Refer to "Circuit Inspection", "GROUND INSPECTION", ***GI-28***.	
OK or NG	
OK ▶	GO TO 3.
NG ▶	Repair or replace.

3	SEARCH FOR ELECTRICAL INCIDENT
Perform "Incident Simulation Tests", ***GI-23***.	
OK or NG	
OK ▶	GO TO 4.
NG ▶	Repair or replace.

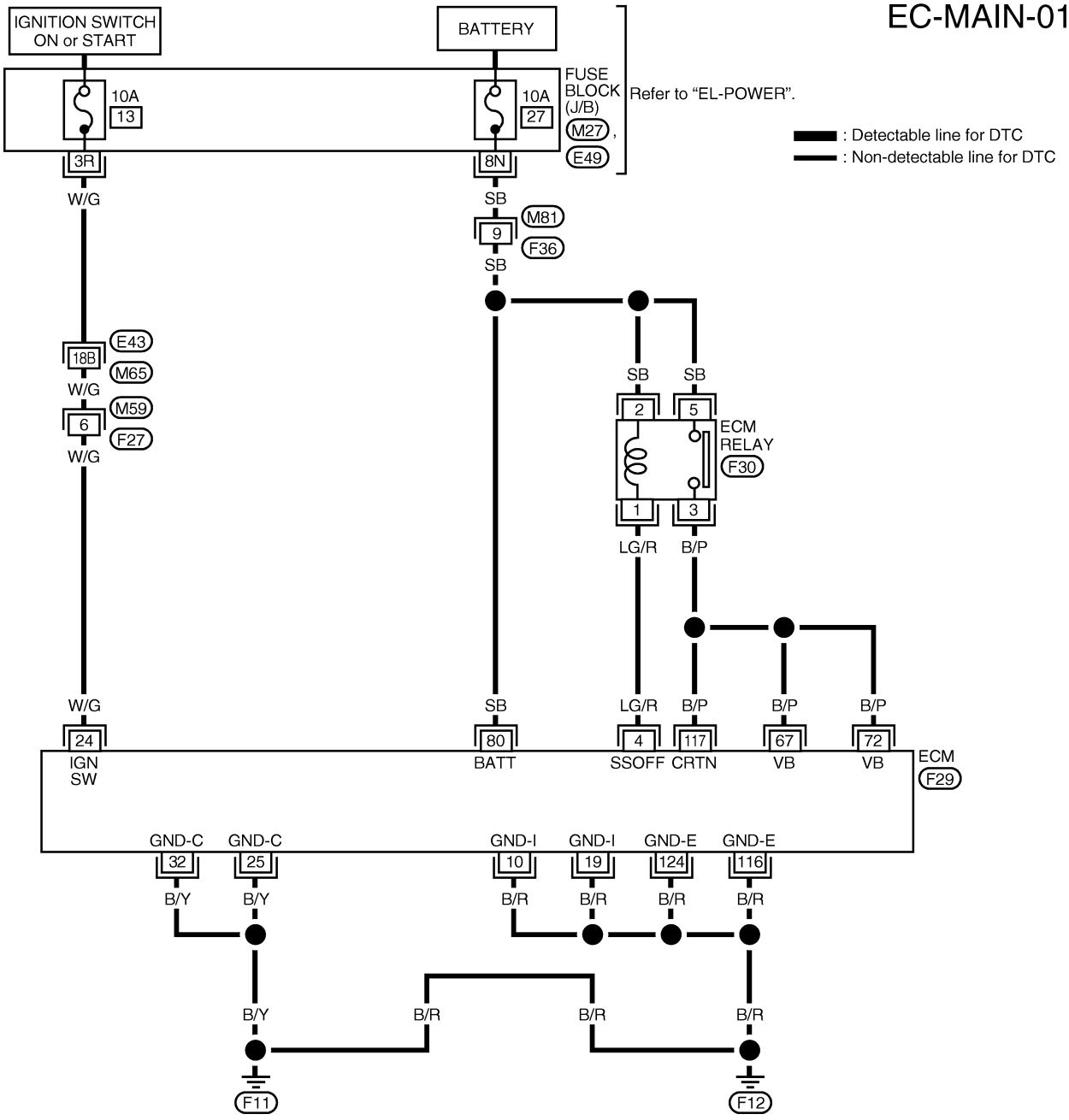
4	CHECK CONNECTOR TERMINALS
Refer to "How to Check Enlarged Contact Spring of Terminal", ***GI-20***.	
OK or NG	
OK ▶	**INSPECTION END**
NG ▶	Repair or replace connector.

Main Power Supply and Ground Circuit

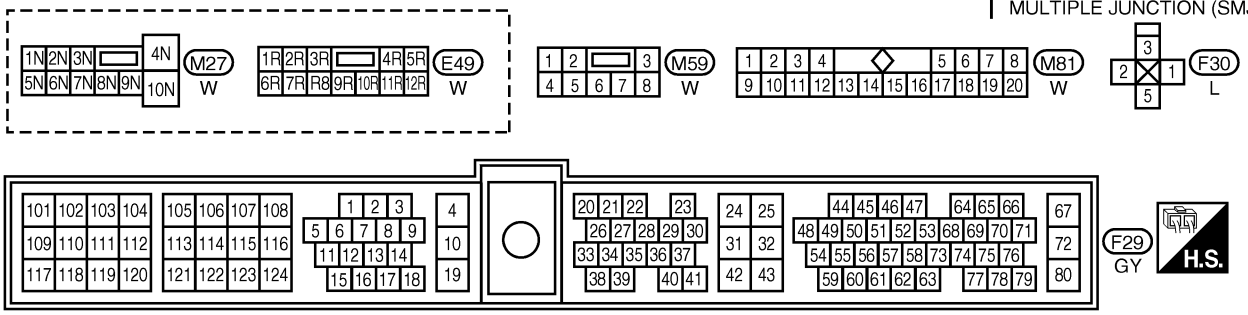
WIRING DIAGRAM

NGEC0047

EC-MAIN-01



Refer to the following.
M65, E43 - SUPER MULTIPLE JUNCTION (SMJ)



AEC980A

ECM TERMINALS AND REFERENCE VALUE

NGEC0048

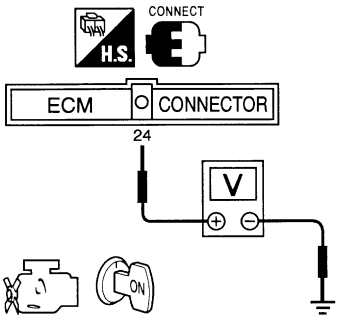
Specification data are reference values and are measured between each terminal and 32 (ECM ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	LG/R	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
10	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
19	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
24	W/G	Ignition switch	**[Ignition switch OFF]**	0V
			[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
25	B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
32	B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground (Probe this terminal with (−) tester probe when measuring)
67	B/P	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P			
80	SB	Power supply (Back-up)	**[Ignition switch OFF]**	BATTERY VOLTAGE (11 - 14V)
116	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
124	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

DIAGNOSTIC PROCEDURE

=NGEC0049

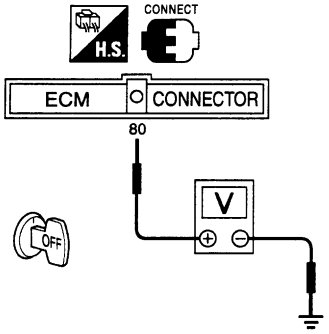
1	INSPECTION START
Start engine. Is engine running? **Yes or No**	
Yes ▶	GO TO 4.
No ▶	GO TO 2.

2	CHECK POWER SUPPLY-I
1. Turn ignition switch OFF and then ON. 2. Check voltage between ECM terminal 24 and ground with CONSULT-II or tester.	
 SEF600P	
Voltage: Battery voltage **OK or NG**	
OK ▶	GO TO 14.
NG ▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M65, E43 ● Harness connectors M59, F27 ● 10A fuse ● Harness for open or short between ECM and ignition switch	
▶	Repair harness or connectors.

4	CHECK POWER SUPPLY-II

1. Stop engine.
2. Check voltage between ECM harness connector F29 terminal 80 and ground with CONSULT-II or tester.



MEC698B

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

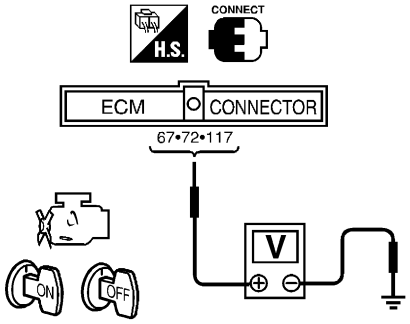
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F27, M59
- 10A fuse
- Harness for open or short between ECM and fuse

	▶	Repair harness or connectors.

6	CHECK POWER SUPPLY-III

1. Turn ignition switch ON and then OFF.
2. Check voltage between ECM harness connector F29 terminals 67, 72, 117 and ground with CONSULT-II or tester.



SEF121V

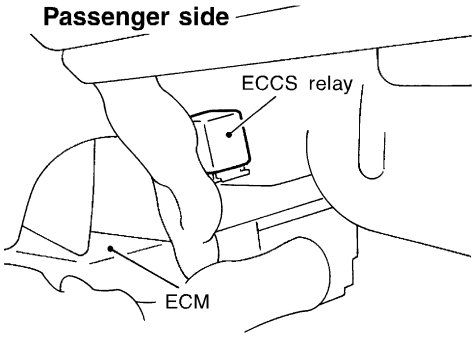
Voltage:
After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0V.

OK or NG

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

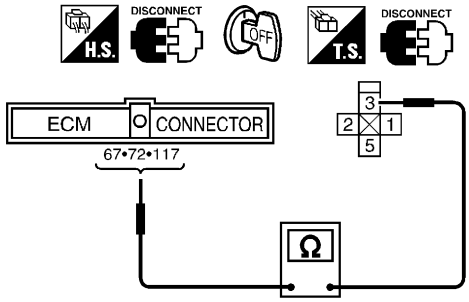
7	CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM

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



SEF323V

3. Check harness continuity between ECM harness connector F29 terminals 67, 72, 117 and relay harness connector F30 terminal 3.



SEF122V

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.

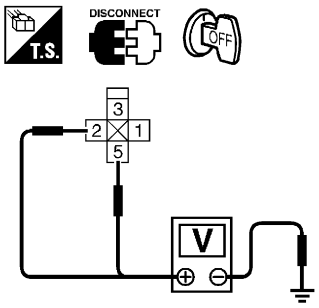
8	DETECT MALFUNCTIONING PART

Check 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 2, 5 and ground with CONSULT-II or tester.



SEF120V

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

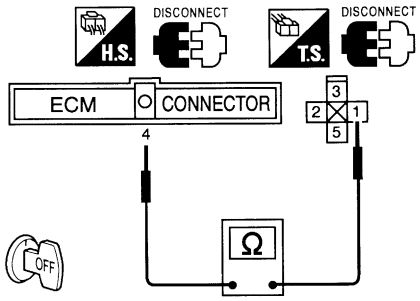
10	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F27, M59
- 10A fuse
- 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 harness connector F29 terminal 4 and relay harness connector F30 terminal 1.



SEF605P

Continuity should exist.

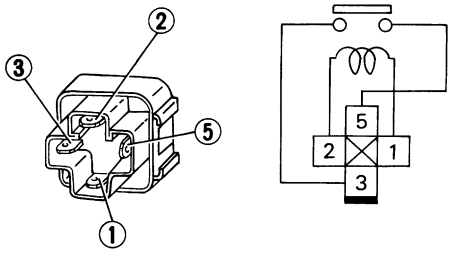
2. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 12.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

12	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.



SEF511P

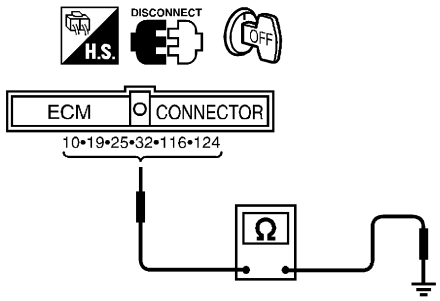
12V (1 - 2) applied: Continuity exists.
No voltage applied: No continuity

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace ECM relay.

13	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM harness connector F29 terminals 10, 19, 25, 32, 116, 124 and engine ground.



SEF119V

Continuity should exist.

4. Also check harness for short to power.

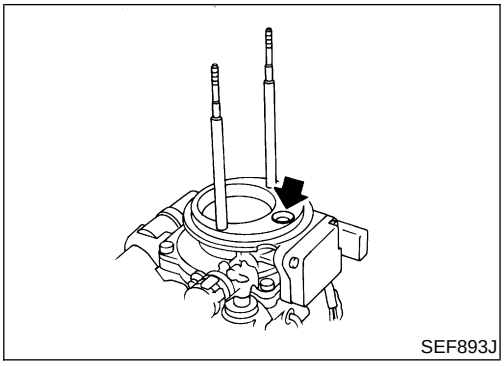
OK or NG

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

14	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.

▶ **INSPECTION END**


SEF893J

Component Description

NGEC0050

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

NGEC0051

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS AIR/FL SE	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: “N” • No-load	Idle	0.9 - 1.8V
		2,500 rpm	1.9 - 2.3V
CAL/LD VALUE	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: “N” • No-load	Idle	9.5 - 34.0%
		2,500 rpm	13.9 - 24.9%
MASS AIRFLOW	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: “N” • No-load	Idle	0.9 - 5.8 g·m/s
		2,500 rpm	7.5 - 13.2 g·m/s

ECM Terminals and Reference Value

NGEC0052

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)
54	R	Mass air flow sensor	**[Engine is running]** • **Warm-up condition** • Idle speed	0.9 - 1.8V
			[Engine is running] • **Warm-up condition** • Engine speed is 2,500 rpm	1.9 - 2.3V
55	G	Mass air flow sensor ground	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

On Board Diagnosis Logic

NGEC0053

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.	

*: 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

NGEC0054

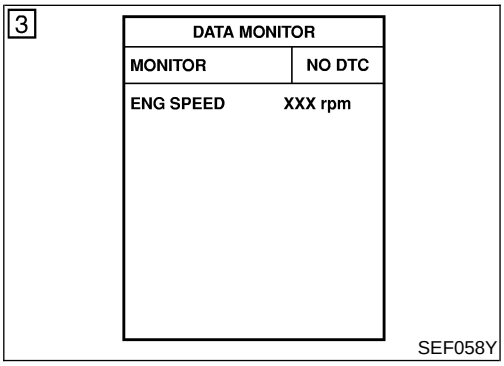
Perform "PROCEDURE FOR MALFUNCTION A" first. If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B". If there is no problem on "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE FOR MALFUNCTION C". If there is no problem on "PROCEDURE FOR MALFUNCTION C", perform "PROCEDURE FOR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

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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



PROCEDURE FOR MALFUNCTION A

NGEC0054S01

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-155.

With GST

Follow the procedure "With CONSULT-II".

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B

NGEC0054S02

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-155.

With GST

Follow the procedure "With CONSULT-II".

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

NGEC0054S03

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.

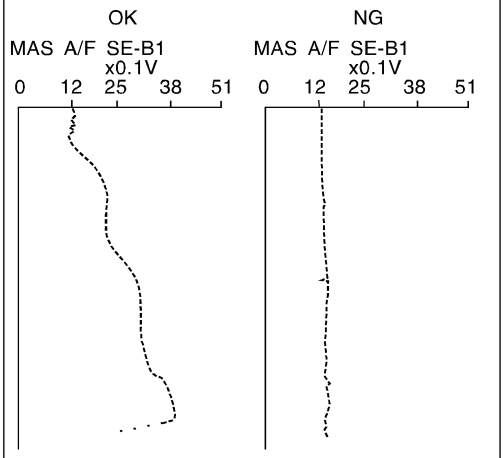
With CONSULT-II

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-155.

With GST

Follow the procedure "With CONSULT-II".

6



SEF243Y

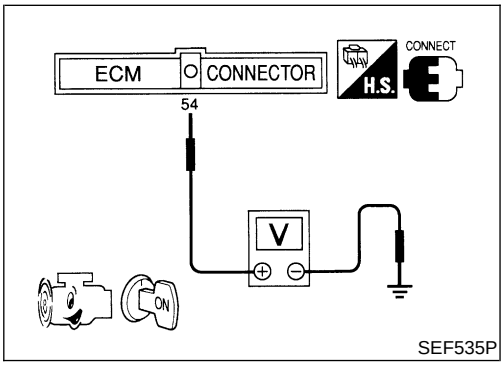
7

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

SEF175Y

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

SEF534P



SEF535P

PROCEDURE FOR MALFUNCTION D

NGEC0054S04

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-155.
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-155.
   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-155.

Overall Function Check

NGEC0055

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

NGEC0055S01

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-155.

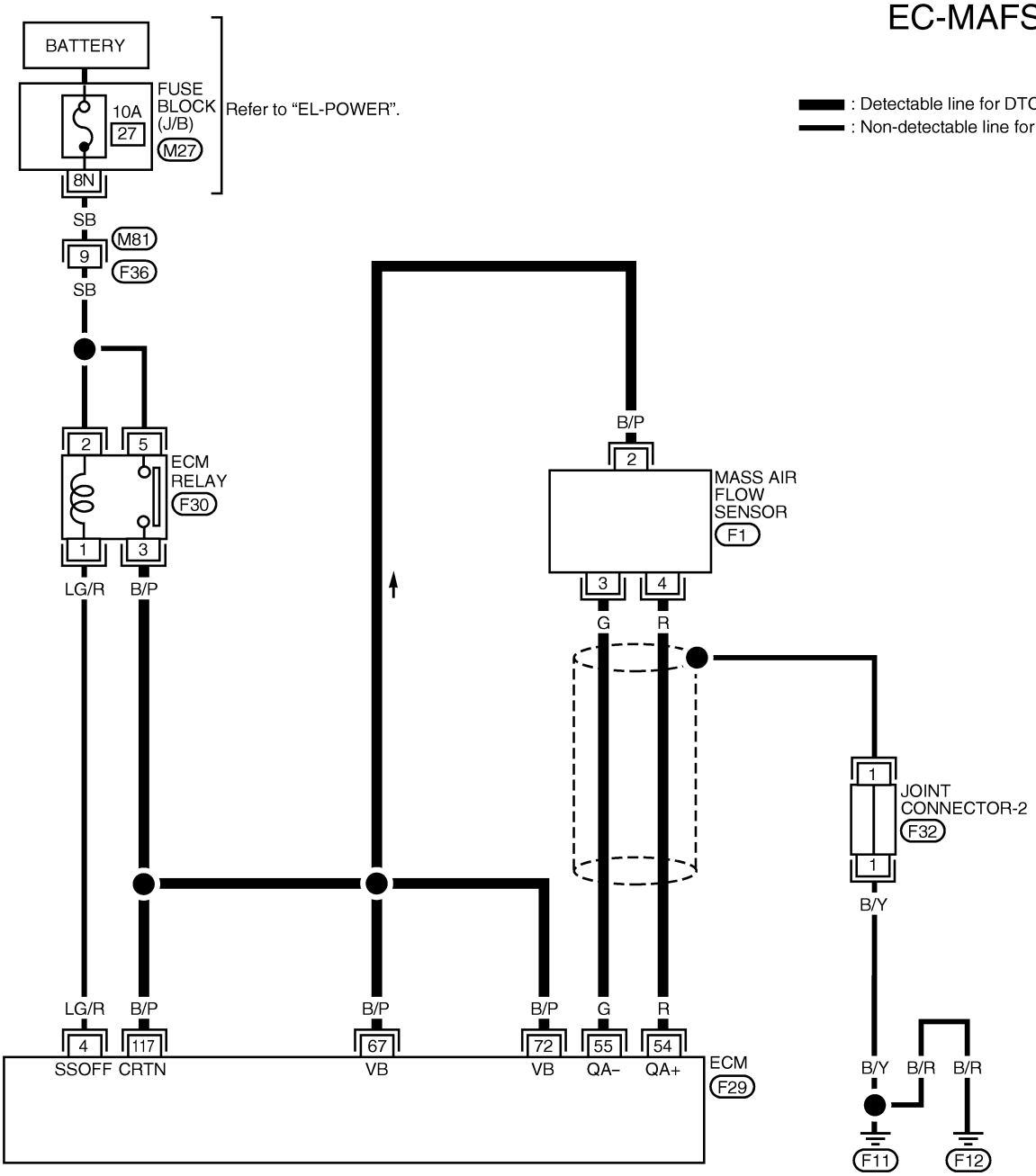
No Tools

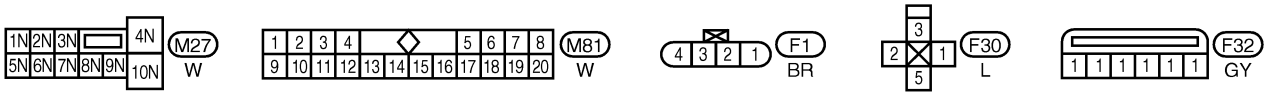
1) Turn ignition switch ON.
2) Start engine and warm it up to normal operating temperature.
3) Check the voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.
4) Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.
5) If NG, go to "Diagnostic Procedure", EC-155.

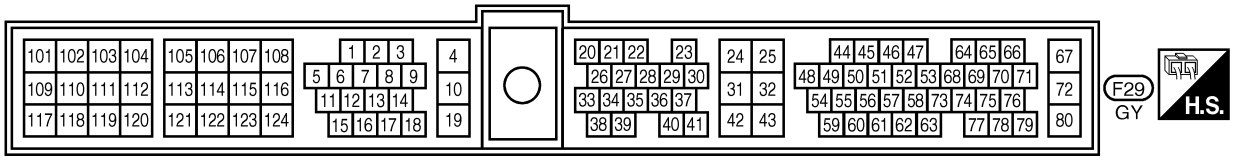
Wiring Diagram

NGEC0056

EC-MAFS-01







AEC981A

Diagnostic Procedure

NGEC0057

1	INSPECTION START

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

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

MTBL0063

Type I or Type II

Type I	▶	GO TO 3.
Type II	▶	GO TO 2.

2	CHECK INTAKE SYSTEM

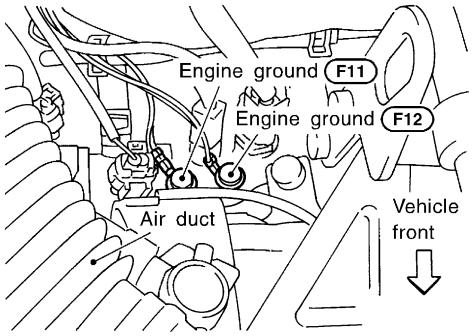
Check the followings for connection.
- Air duct
- Air cleaner
- Vacuum hoses
- Intake air passage between air duct to collector

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.



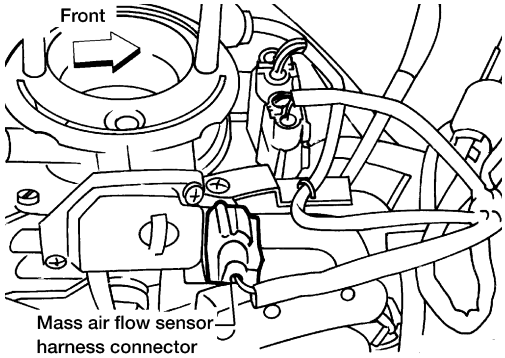
SEF325V

	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

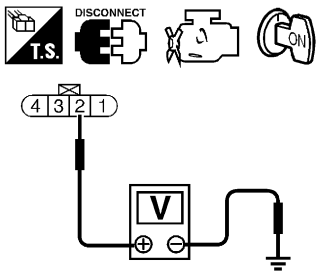
4	CHECK POWER SUPPLY

1. Disconnect Mass air flow sensor harness connector.



AEC131A

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



SEF126V

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

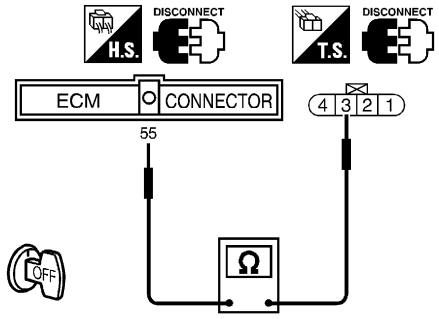
5	DETECT MALFUNCTIONING PART

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

	▶	Repair harness or connectors.

6	CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between Mass air flow sensor terminal 3 and ECM terminal 55. Refer to EC-154.



SEF124V

Continuity should exist.

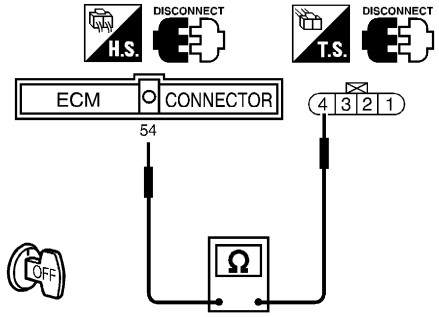
4. Also check harness for short to power.

OK or NG

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

7	CHECK INPUT SIGNAL CIRCUIT

1. Check harness continuity between terminal 4 and ECM terminal 54.



SEF125V

Continuity should exist.

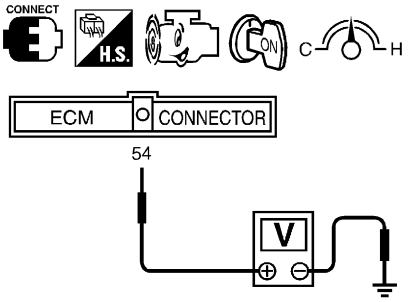
2. Also check harness for short to ground and short to power.

OK or NG

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

8	CHECK MASS AIR FLOW SENSOR

1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.



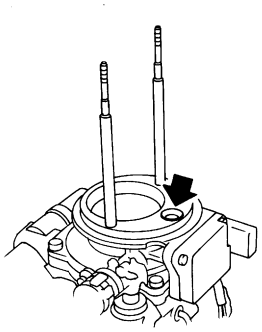
SEF326V

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.9 - 2.3
Idle to about 4,000 rpm*	1.3 - 1.7 to Approx. 3.0

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

MTBL0326

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 wire for damage or dust.



SEF893J

OK or NG

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

9	CHECK SHIELD CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect joint connector-2.
3. Check the following.
- Continuity between joint connector-1 terminal 1 and ground
- Joint connector-2
  (Refer to "HARNESS LAYOUT", ***EL-254***.)
  Continuity should exist.
4. Also check harness for short to power.

OK or NG

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

10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	INSPECTION END

Component Description

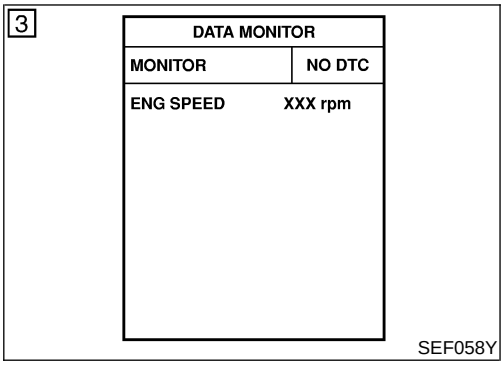
NGEC1007

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

On Board Diagnosis Logic

NGEC1008

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0105	An excessively low or high voltage from the sensor is sent to the micro computer.	• ECM



DTC Confirmation Procedure

NGEC1009

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

With CONSULT-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-161.

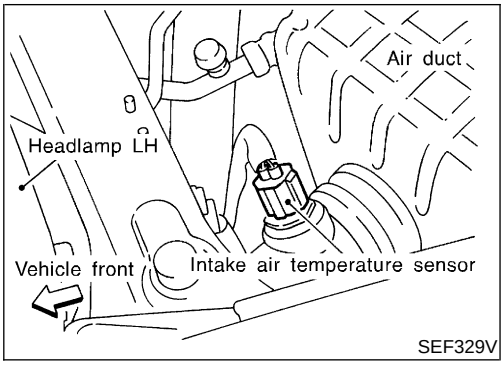
With GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

NGEC1011

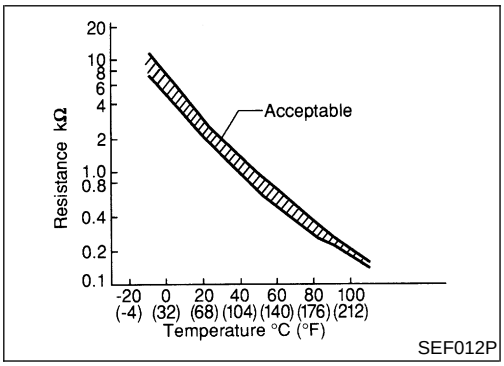
1	INSPECTION START	
With CONSULT-II 1. Turn ignition switch ON. 2. Select “SELF DIAG RESULTS” mode with CONSULT-II. 3. Touch “ERASE”. 4. Perform “DTC Confirmation Procedure”. See previous page. 5. Is the 1st trip DTC P0105 displayed again?		
With GST 1. Turn ignition switch ON. 2. Select MODE 4 with GST. 3. Touch “ERASE”. 4. Perform “DTC Confirmation Procedure”. See previous page. 5. Is the 1st trip DTC P0105 displayed again?		
Yes or No		
Yes	▶	Replace ECM.
No	▶	**INSPECTION END**



Component Description

NGEC0066

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 61 (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

NGEC0067

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.	

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

DTC Confirmation Procedure

=NGEC0068

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

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

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NGEC0068S01

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-165.

With GST

Follow the procedure "With CONSULT-II".

5

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

SEF176Y

PROCEDURE FOR MALFUNCTION B

NGEC0068S02

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 (43 MPH) for 100 consecutive seconds.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-165.

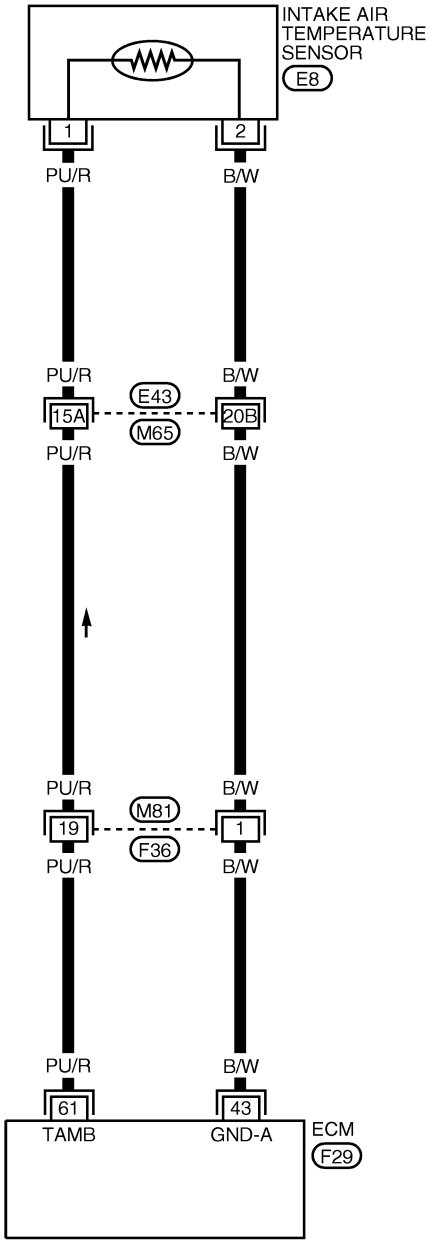
With GST

Follow the procedure "With CONSULT-II".

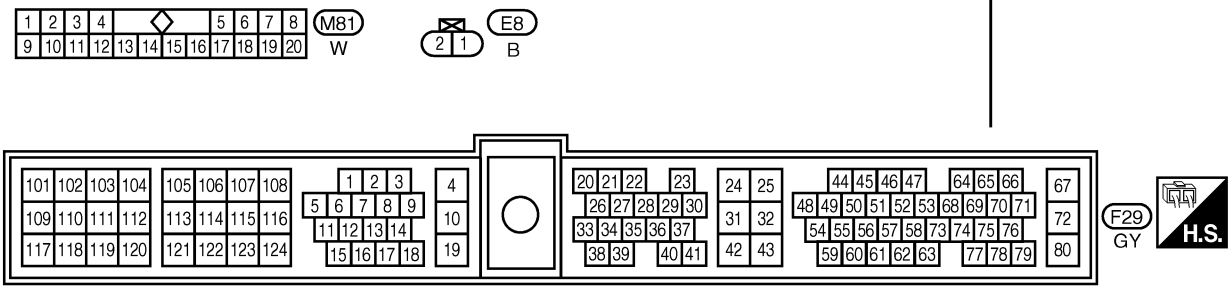
Wiring Diagram

NGEC0069

EC-IATS-01



Refer to the following.
M65 , E43 - SUPER MULTIPLE JUNCTION (SMJ)



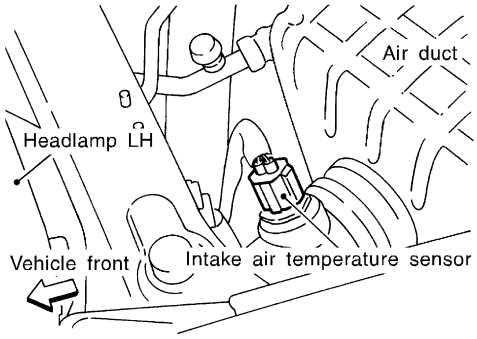
AEC983A

Diagnostic Procedure

NGEC0070

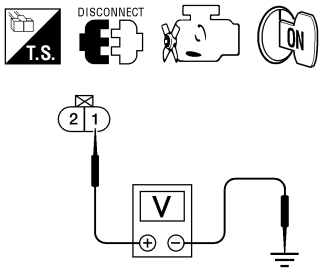
1	CHECK POWER SUPPLY

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



SEF329V

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



AEC570A

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

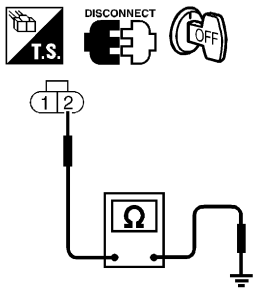
Check the following.
- Harness connectors E43, M65
- Harness connectors M58, F28
- Harness connectors M59, F27
- Harness for open or short between ECM and intake air temperature sensor

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

3	CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check harness continuity between intake air temperature sensor terminal 2 and engine ground. Refer to the wiring diagram.



SEF102S

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

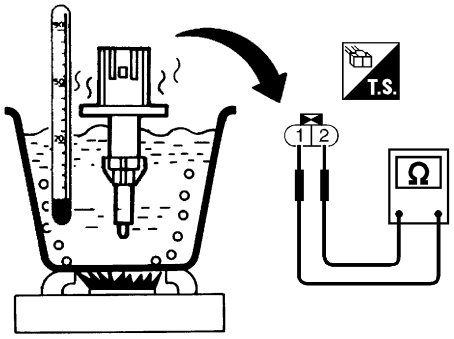
4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E43, M65
- Harness connectors M58, F28
- Harness connectors M59, F27
- 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

Check resistance as shown in the figure.



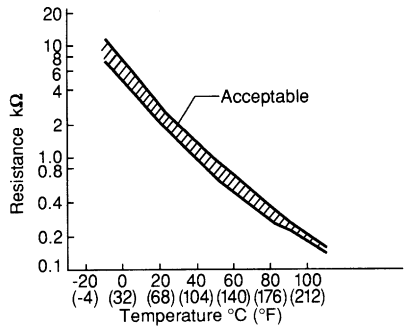
SEF205W

<Reference data>

EGR coolant temperature °C (°F)	Voltage* V	Resistance k Ω
–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 ⑲ (Engine coolant temperature sensor) and ECM terminal ㉜ (ECM ground).

MTBL0327

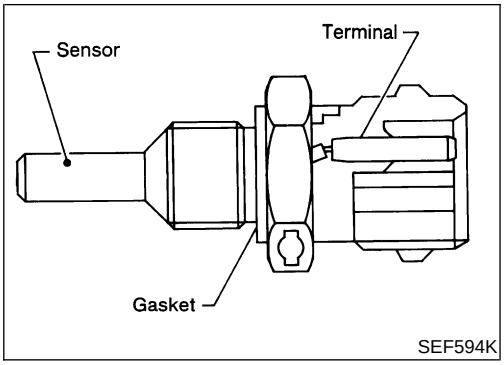


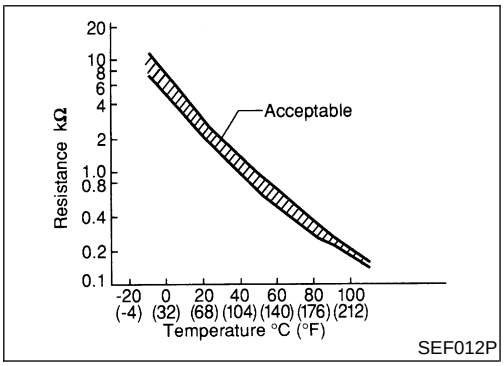
SEF012P

OK or NG

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

6	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**





Component Description

NGEC0072

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 59 (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

NGEC0073

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

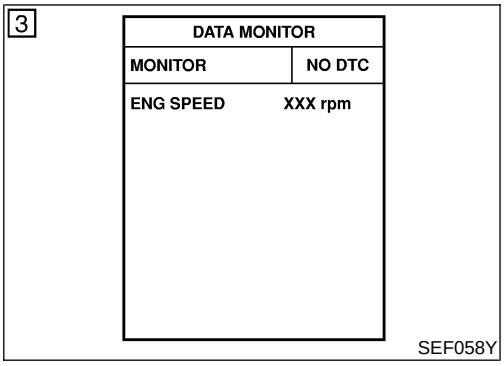
On Board Diagnosis Logic

NGEC0074

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 to 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 to 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)



DTC Confirmation Procedure

NGEC0075

NOTE:

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

With CONSULT-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-171.

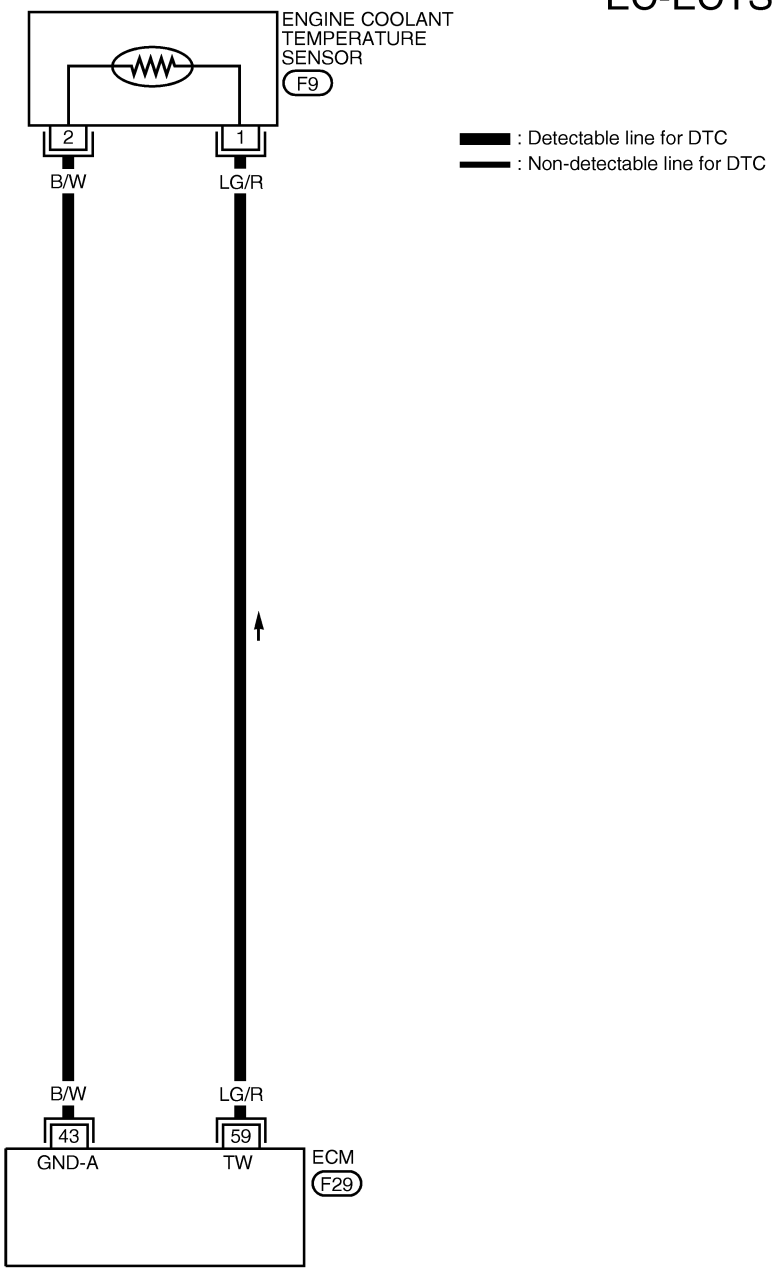
With GST

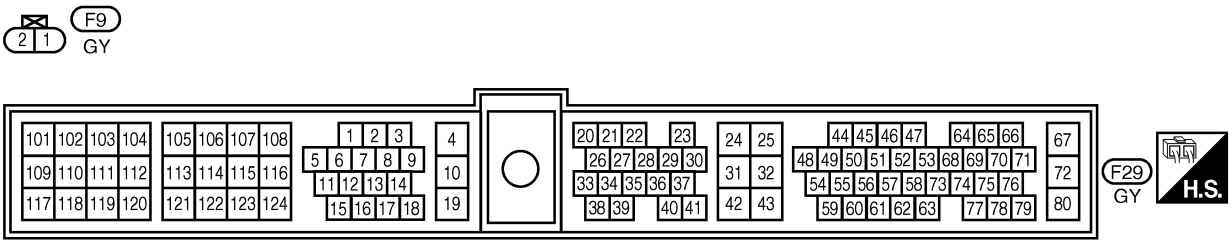
Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC0076

EC-ECTS-01





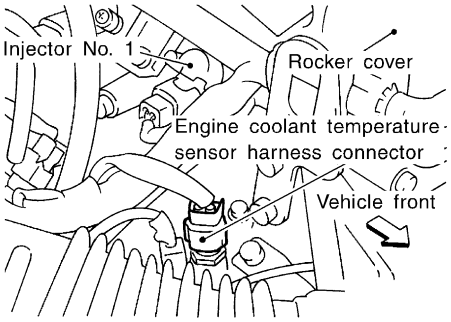
AEC984A

Diagnostic Procedure

NGEC0077

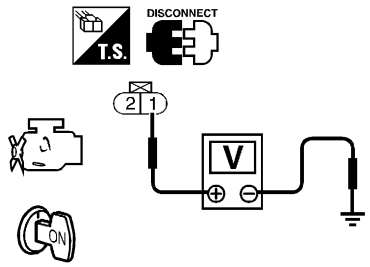
1	CHECK POWER SUPPLY

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



SEF330V

3. Turn ignition switch ON.
4. Check voltage between engine coolant temperature sensor terminal 1 and ground with CONSULT-II or tester.



SEF206W

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

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

	▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check harness continuity between engine coolant temperature sensor terminal 2 and engine ground. Refer to ***EL-140***.
   Continuity should exist.
3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

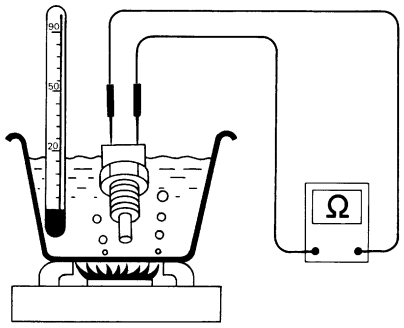
Check the harness for open or short between ECM and engine coolant temperature sensor.

	▶	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

Check resistance as shown in the figure.

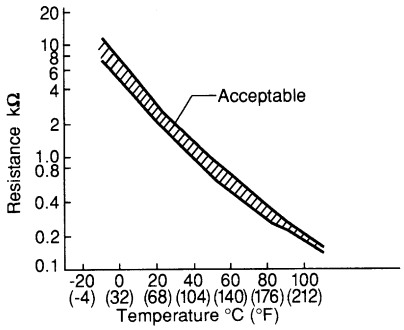


SEF152P

<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

MTBL0285



SEF012P

OK or NG

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

6	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**

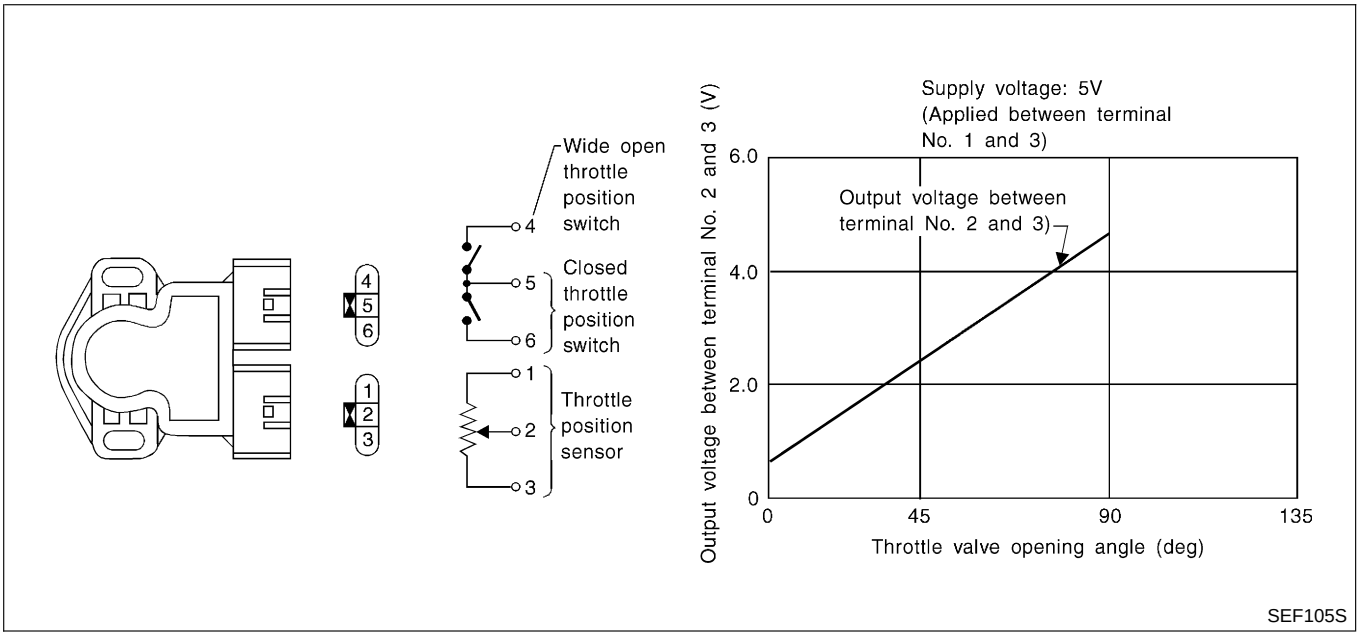
Component Description

NGEC0079

NOTE:
If DTC P0120 (0403) is displayed with DTC P0510 (0203), first perform trouble diagnosis for DTC P0510, EC-433.

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

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



CONSULT-II Reference Value in Data Monitor Mode

NGEC0080

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL POS SEN	• Ignition switch: ON (Engine stopped) • Engine: After warming up	Throttle valve: fully closed	0.2 - 0.8V
		Throttle valve: fully opened	3.5 - 4.5V
ABSOL TH·P/S	• Ignition switch: ON (Engine stopped) • Engine: After warming up	Throttle valve: fully closed	0.0%
		Throttle valve: fully opened	Approx. 80%

ECM Terminals and Reference Value

=NGEC0081

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)
23	L	Throttle position sensor	**[Ignition switch ON]** ● **Warm-up condition** ● Accelerator pedal fully released	0.2 - 0.8V
			[Ignition switch ON] ● Accelerator pedal fully depressed	3.5 - 4.5V
42	BR	Sensors' power supply	**[Ignition switch ON]**	Approximately 5V
43	B/W	Sensors' ground	**[Engine is running]** ● Idle speed	Approximately 0V

On Board Diagnosis Logic

NGEC0082

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

=NGEC0083

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

NOTE:

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

PROCEDURE FOR MALFUNCTION A

NGEC0083S01

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-179.

With GST

Follow the procedure "With CONSULT-II".

No Tools

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

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

2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON and perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-179.

DTC Confirmation Procedure (Cont'd)

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B

NGEC0083S02

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 1,100 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,100 rpm.

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-179.

With GST

Follow the procedure "With CONSULT-II".

6

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

SEF177Y

PROCEDURE FOR MALFUNCTION C

NGEC0083S03

CAUTION:

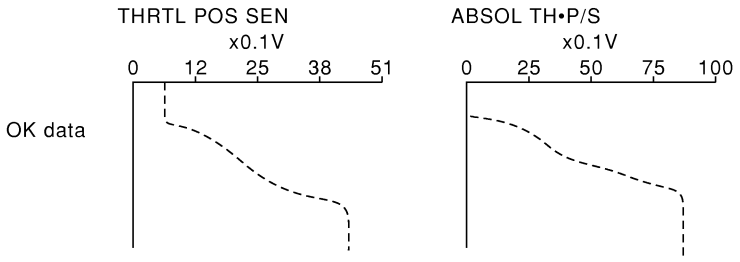
Always drive vehicle at a safe speed.

With CONSULT-II

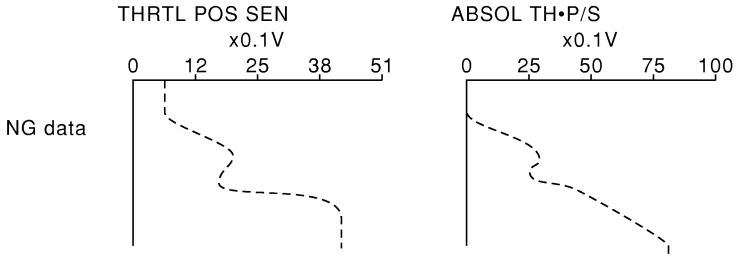
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON.
4) Select "MANU TRIG" in "DATA MONITOR" mode with CONSULT-II.
5) Select "THRTL POS SEN" and "ABSOL TH·P/S" in "DATA MONITOR" mode with CONSULT-II.
6) Press 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-179.
  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

9

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

SEF178Y

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

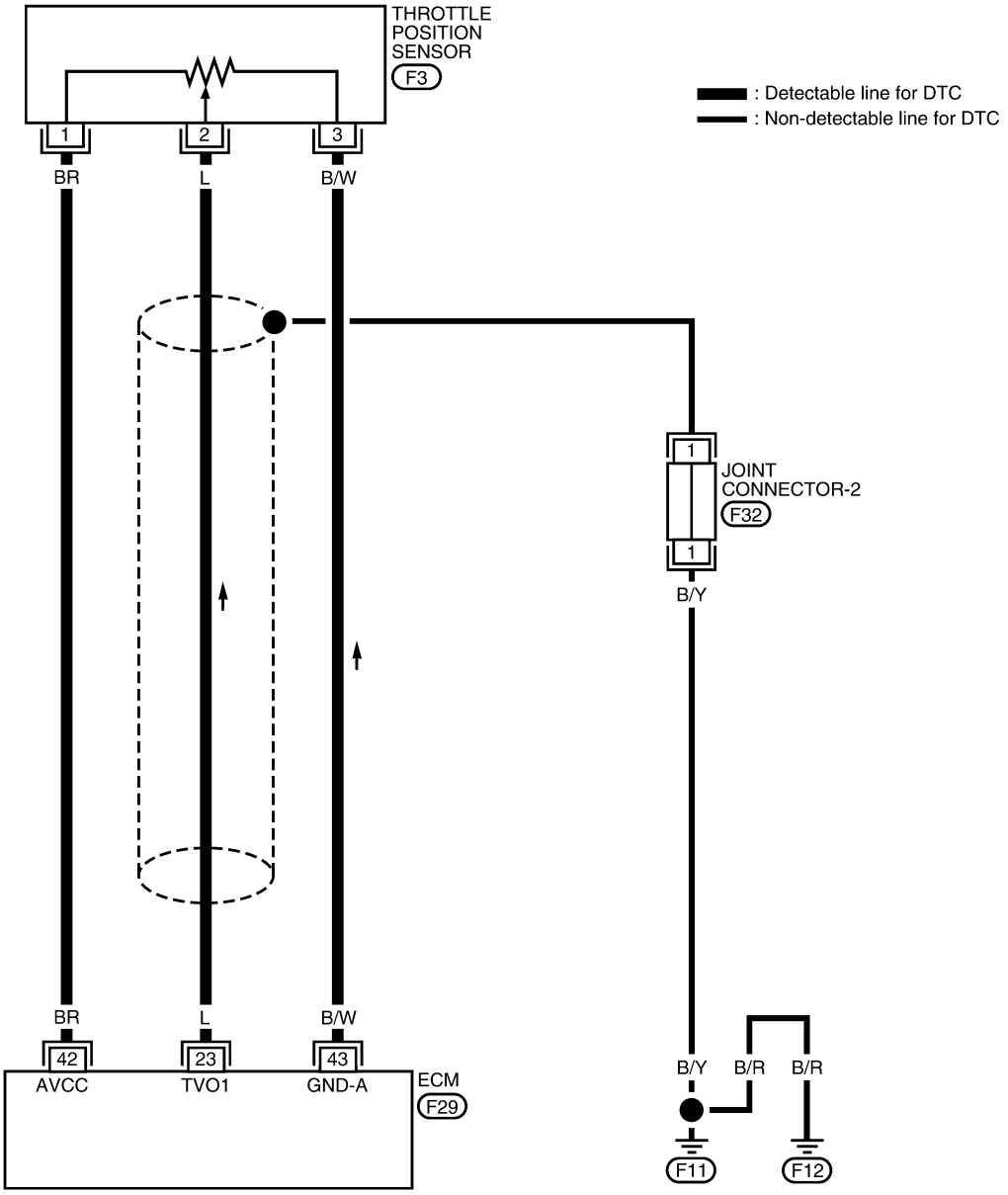
10) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-179.

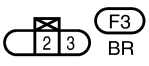
With GST
Follow the procedure "With CONSULT-II".

Wiring Diagram

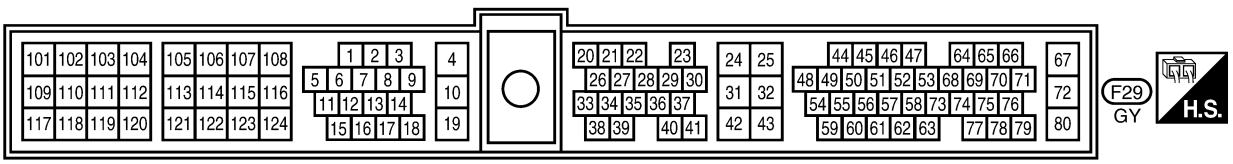
NGEC0084

EC-TPS-01





1



LEC474

Diagnostic Procedure

NGEC0085

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

1. Check the following items. Refer to “Basic Inspection”, EC-104.

Items	Specifications
Ignition timing	20° ± 2° BTDC
Base idle speed	750 ± 50 rpm (in “P” or “N” position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF
Target idle speed	800 ± 50 rpm (in “P” or “N” position)

MTBL0328

OK or NG

OK	▶	GO TO 3.

3 CHECK INTAKE SYSTEM

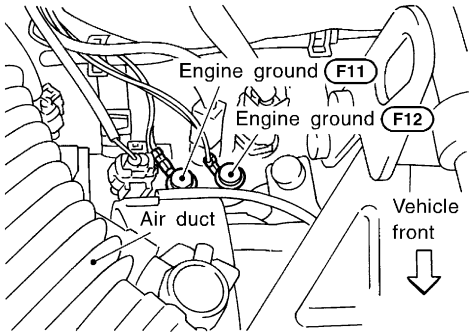
Check the following for connection.
- Air duct
- Air cleaner
- Vacuum hoses
- Intake air passage between air duct to intake manifold collector

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.

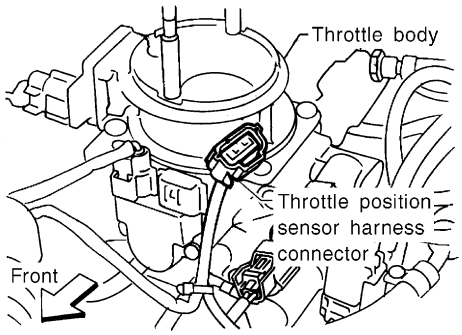


SEF325V

	▶	GO TO 5.

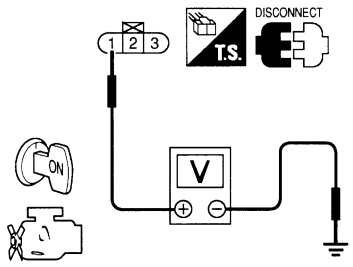
5	CHECK POWER SUPPLY

1. Disconnect throttle position sensor harness connector.



SEF265S

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



SEF564P

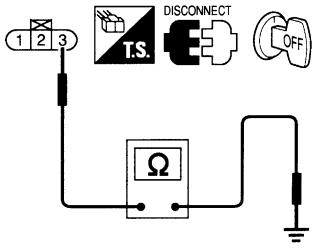
Voltage: Approximately 5V

OK or NG

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

6	CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check harness continuity between throttle position sensor terminal 3 and engine ground. Refer to the wiring diagram.



SEF565P

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

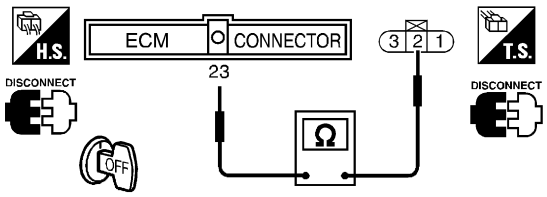
7	DETECT MALFUNCTIONING PART

Check 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.

8	CHECK INPUT SIGNAL CIRCUIT

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



SEF211W

Continuity should exist.

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

OK or NG

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

Diagnostic Procedure (Cont'd)

9	CHECK THROTTLE POSITION SENSOR

With CONSULT-II

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

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

SEF179Y

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)

MTBL0579

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-104.

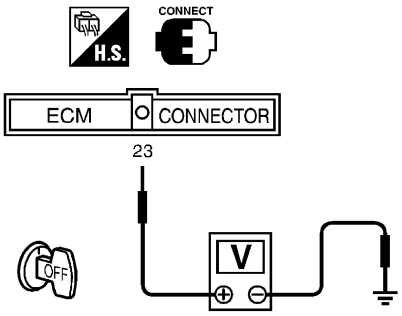
OK or NG

OK (Type B in step 1)	▶	GO TO 11.
OK (Type A or C in step 1)	▶	GO TO 14.
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-104.

10	CHECK THROTTLE POSITION SENSOR

Without CONSULT-II

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



SEF767W

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)

MTBL0579

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-104.

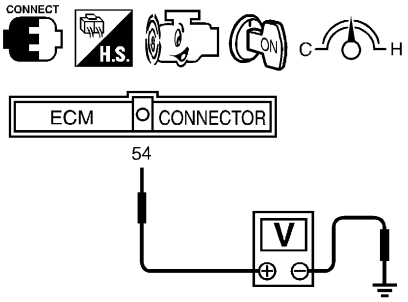
OK or NG

OK (Type B in step 1)	▶	GO TO 11.
OK (Type A or C in step 1)	▶	GO TO 14.
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-104.

Diagnostic Procedure (Cont'd)

11 CHECK MASS AIR FLOW SENSOR

1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.



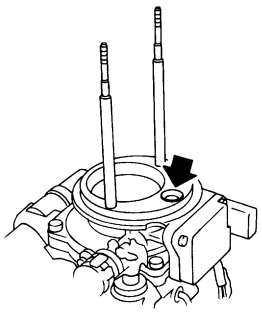
SEF326V

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.9 - 2.3
Idle to about 4,000 rpm*	1.3 - 1.7 to Approx. 3.0

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

MTBL0326

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 wire for damage or dust.



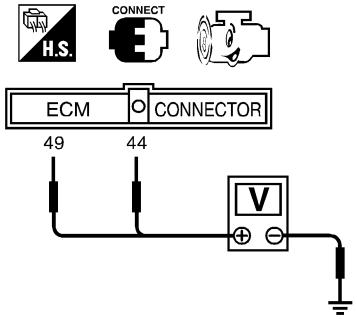
SEF893J

OK or NG

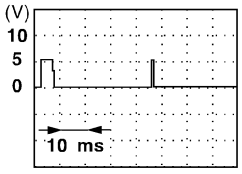
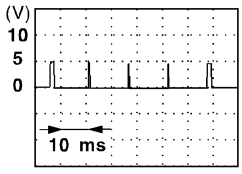
OK	▶	GO TO 12.
NG	▶	Replace mass air flow sensor.

12	CHECK CAMSHAFT POSITION SENSOR

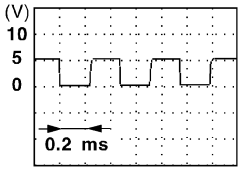
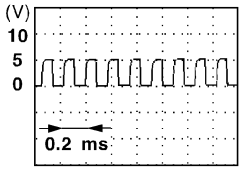
1. Start engine and warm it up to normal operating temperature.
2. Check voltage between ECM terminals 49 and engine ground, ECM terminal 44 and engine ground.



Terminal 44 and engine ground

Condition	Idle	2,000 rpm
Voltage	0.2 - 0.5V	0 - 0.5V
Pulse signal		

Terminal 49 and engine ground

Condition	Idle	2,000 rpm
Voltage	Approximately 2.6V	Approximately 2.5 - 2.6V
Pulse signal		

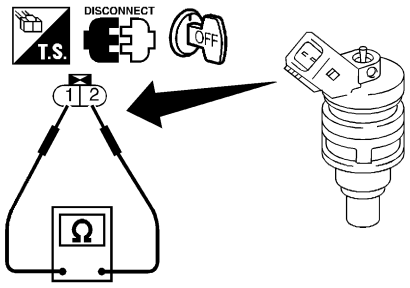
SEF868Z

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace distributor assembly with camshaft position sensor.

13	CHECK FUEL INJECTOR

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



SEF273W

Resistance: 10 - 14Ω [at 25°C (77°F)]

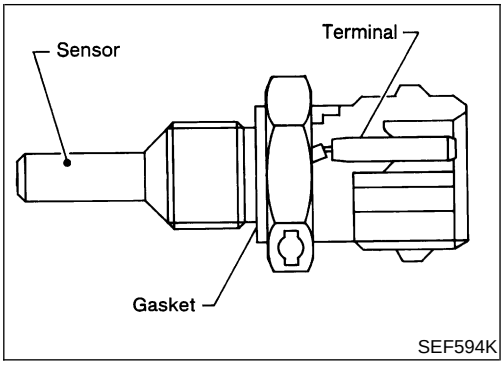
OK or NG

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

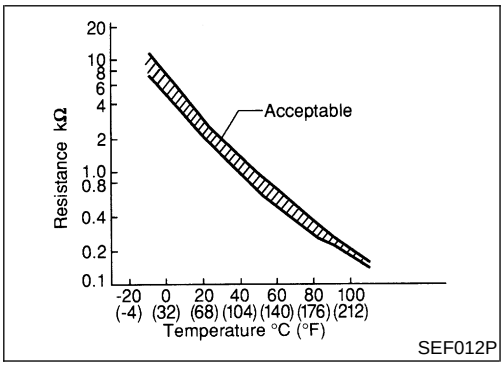
Diagnostic Procedure (Cont'd)

14	CHECK SHIELD CIRCUIT	
1. Turn ignition switch OFF. 2. Remove joint connector-1. 3. Check the following. ● Continuity between joint connector-1 terminal 1 and ground ● Joint connector-1 (Refer to "HARNESS LAYOUT", ***EL-245***.) **Continuity should exist.** 4. Also check harness for short to power. 5. Then reconnect joint connector.		
OK or NG		
OK	▶	GO TO 15.
NG	▶	Repair open circuit or short to power in harness or connectors.

15	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**



SEF594K



SEF012P

Component Description

NGEC0087

NOTE:

If DTC P0125 (0908) is displayed with P0115 (0103), first perform trouble diagnosis for DTC P0115, EC-168.

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 59 (Engine coolant temperature sensor) and ground.

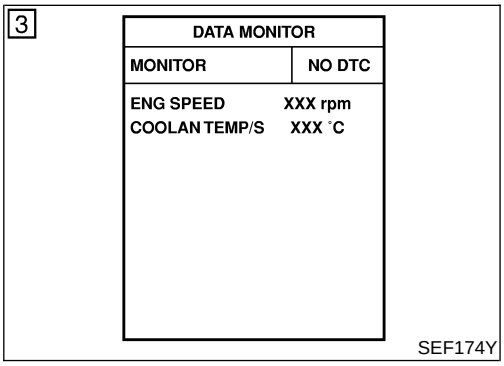
CAUTION:

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.

On Board Diagnosis Logic

NGEC0089

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



SEF174Y

DTC Confirmation Procedure

NGEC0090

CAUTION:

Be careful not to overheat engine.

NOTE:

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

With CONSULT-II

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

3) 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.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-190.

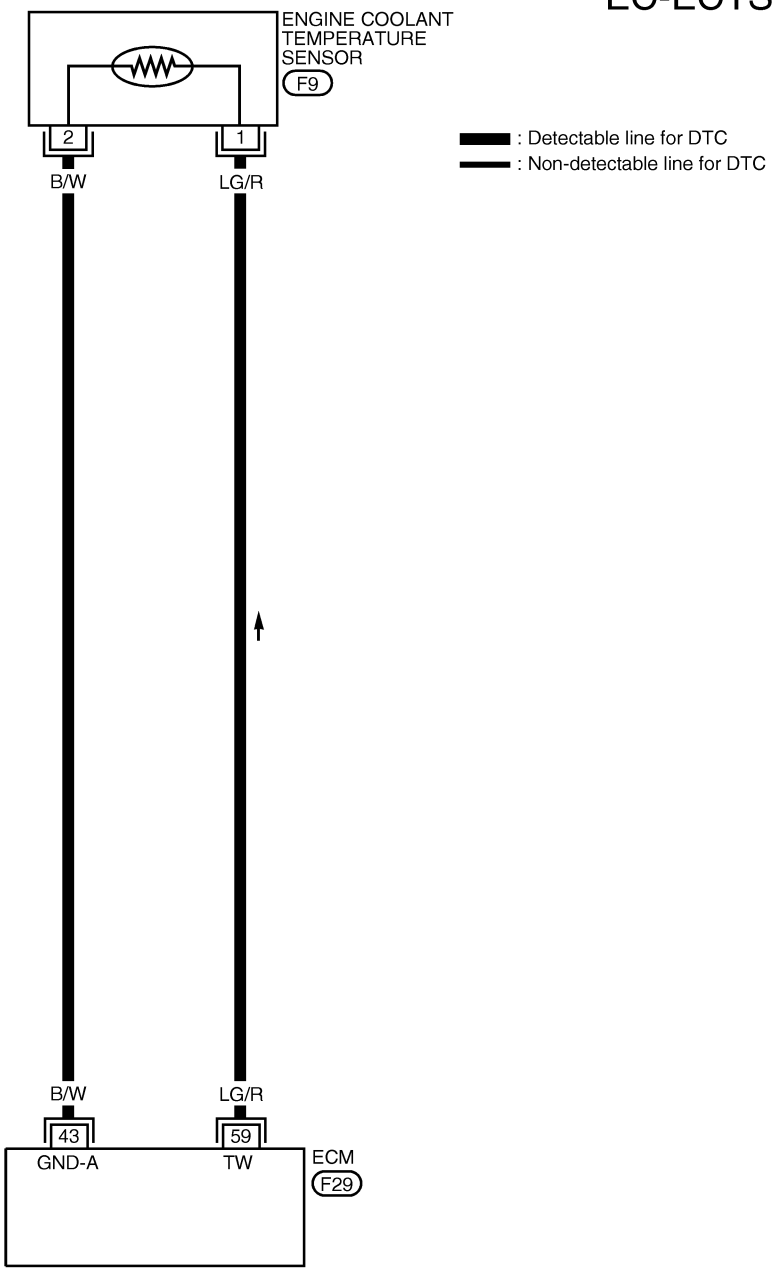
With GST

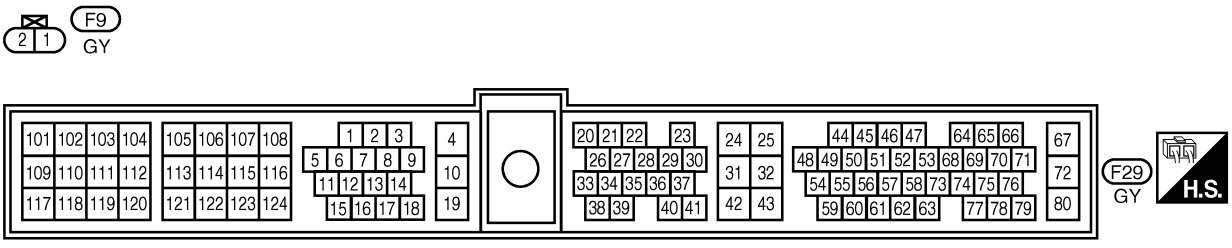
Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC0091

EC-ECTS-01





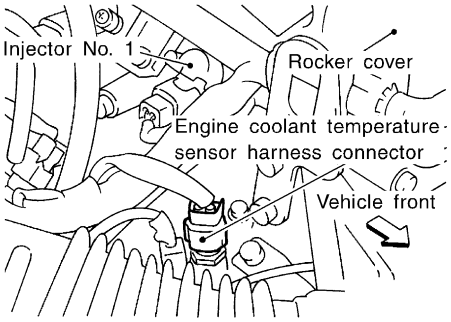
AEC984A

Diagnostic Procedure

NGEC0092

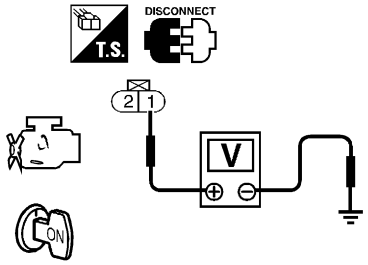
1	CHECK POWER SUPPLY

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



SEF330V

3. Turn ignition switch ON.
4. Check voltage between coolant temperature sensor connector F9 terminal 1 and ground with CONSULT-II or tester.



SEF206W

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

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

	▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check harness continuity between engine coolant temperature sensor connector F9 terminal 2 and engine ground. Refer to the wiring diagram.
   Continuity should exist.
3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

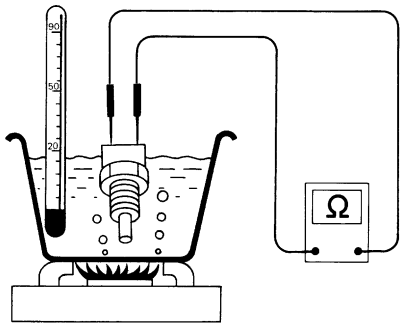
4	DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM and 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

Check resistance as shown in the figure.

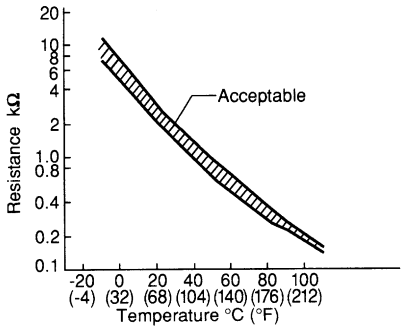


SEF152P

<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

MTBL0285



SEF012P

OK or NG

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

6	CHECK THERMOSTAT OPERATION

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

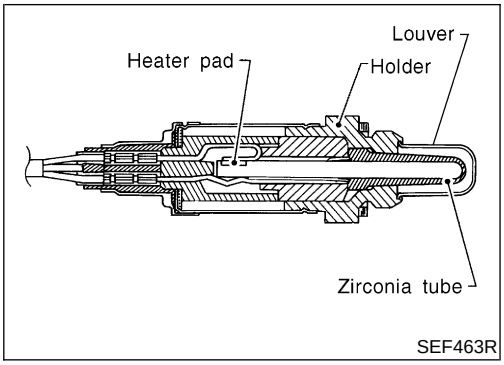
OK or NG

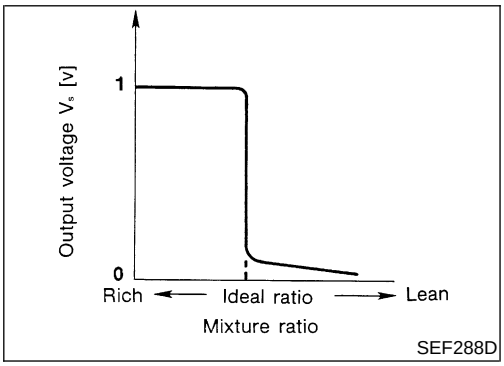
OK	▶	GO TO 7.
NG	▶	Repair or replace thermostat. Refer to "Thermostat", "ENGINE COOLING SYSTEM", ***LC-13***.

7	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.

▶ **INSPECTION END**





Component Description

NGEC0094

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

NGEC0095

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.

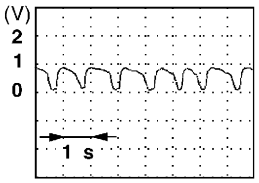
ECM Terminals and Reference Value

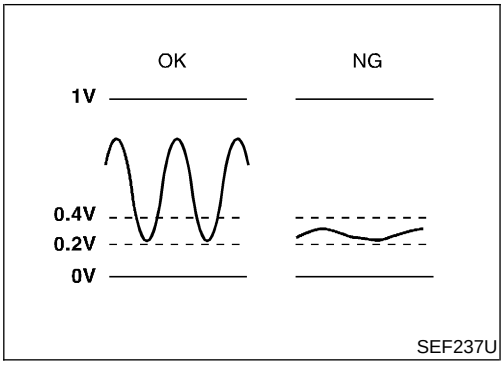
NGEC0096

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)
50	B	Heated oxygen sensor 1 (front)	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF008W

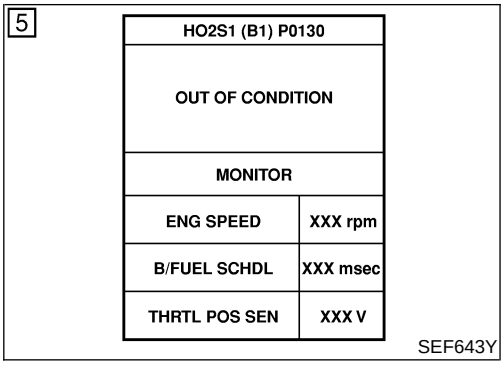


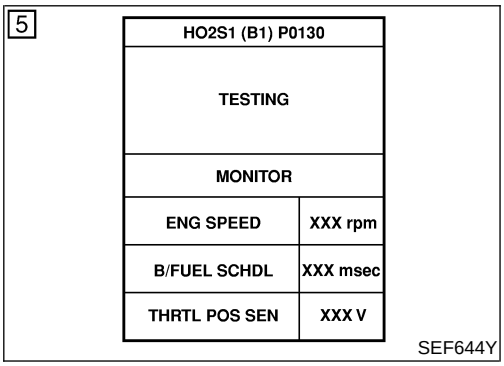
On Board Diagnosis Logic

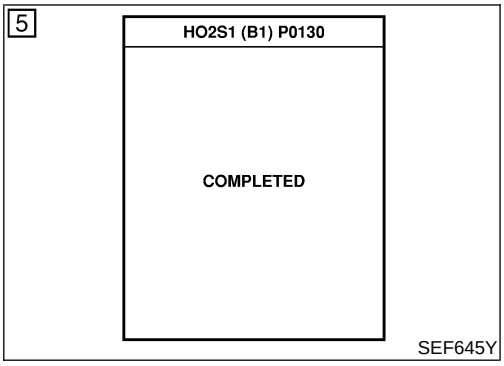
NGEC0097

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

=NGEC0098

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

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

With CONSULT-II

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

NOTE:

Never raise engine speed above 3,000 rpm after this step. If the engine speed limit is exceeded, return to step 4.

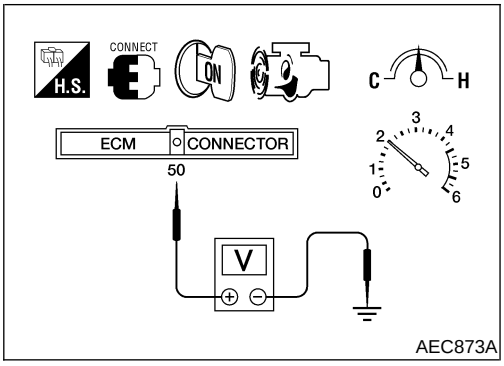
5) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 10 to 60 seconds.)

ENG SPEED	1,400 - 4,000 rpm
Vehicle speed	64 - 130 km/h (40 - 81 MPH)
B/FUEL SCHDL	3.5 - 17 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-197.

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



Overall Function Check

=NGEC0099

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.

Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 [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.

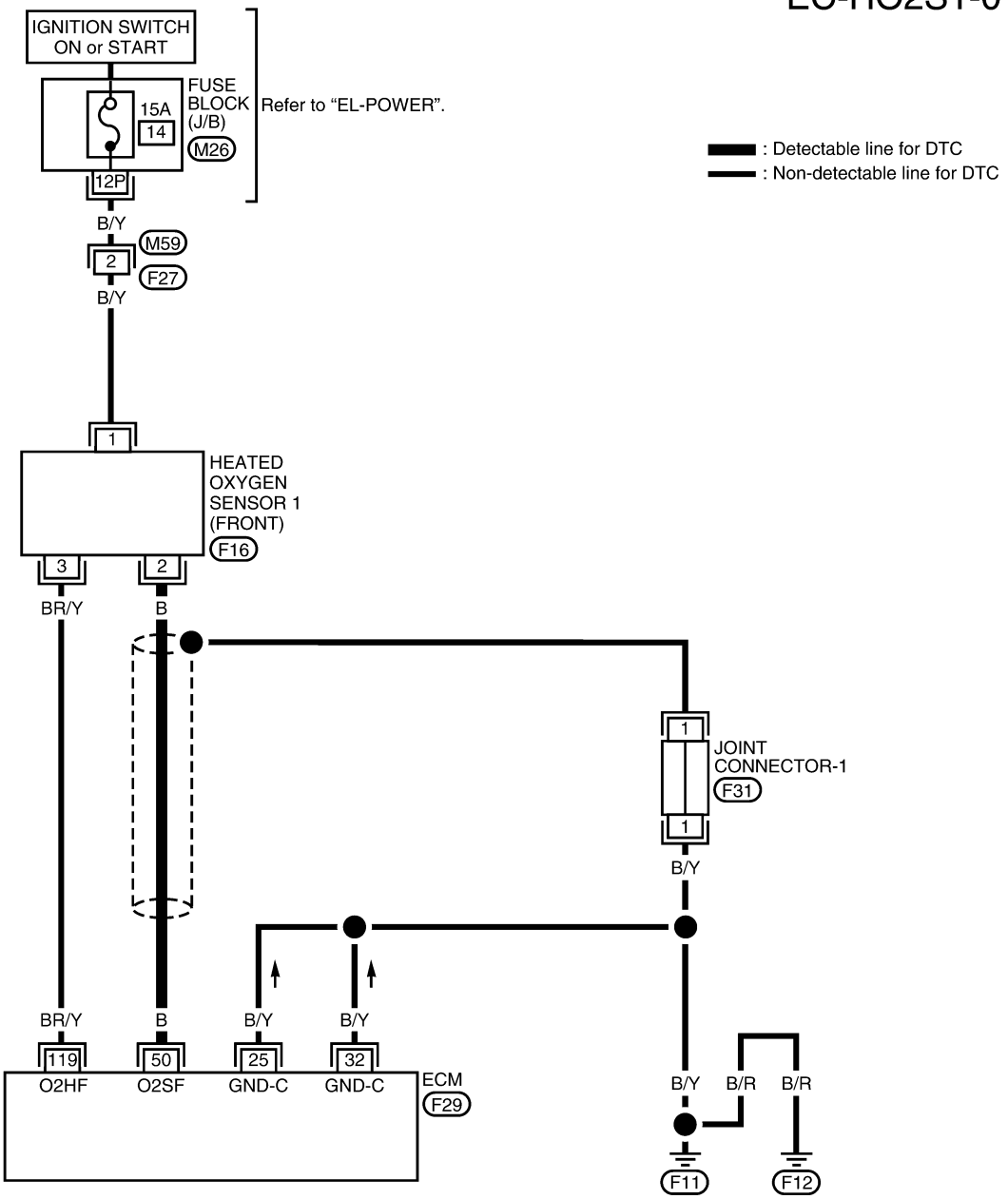
- The voltage does not remain in the range of 0.2 - 0.4V.

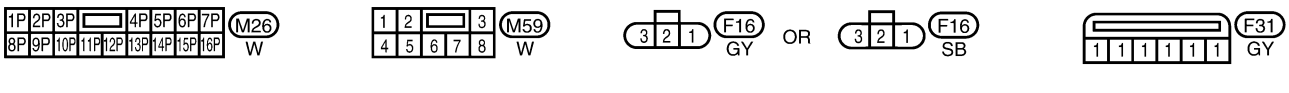
4) If NG, go to “Diagnostic Procedure”, EC-197.

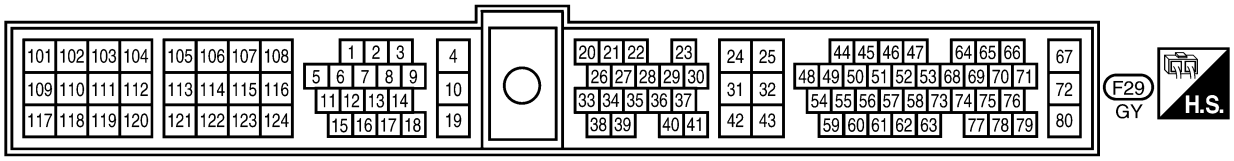
Wiring Diagram

NGEC0100

EC-HO2S1-01







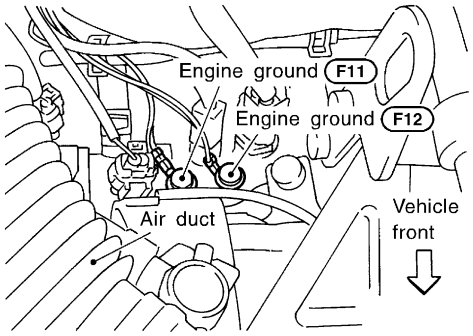
WEC936

Diagnostic Procedure

NGEC0101

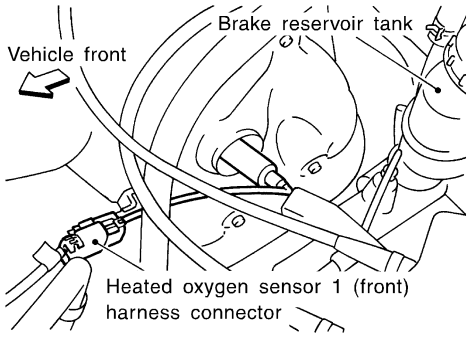
1	INSPECTION START

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



SEF325V

3. Disconnect heated oxygen sensor 1 (front) harness connector.

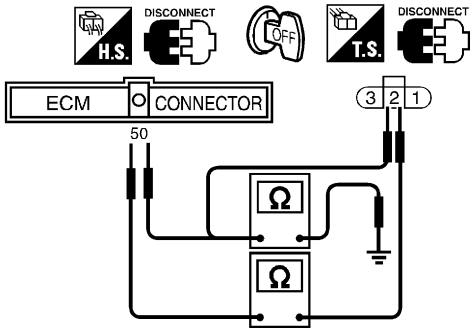


SEF331VA

▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM harness connector F29 terminal 50 and terminal 2.



SEF141V

Continuity should exist.

3. Check harness continuity between ECM harness connector F29 terminal 50 (or terminal 2) and ground.

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

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

3	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode, and the trigger point is adjusted to 100%.
3. Select "HO2S1 (B1)" AND "HO2S1 MNTR (B1)" in Item Selection.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "START" on CONSULT-II screen.

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

6. 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:

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

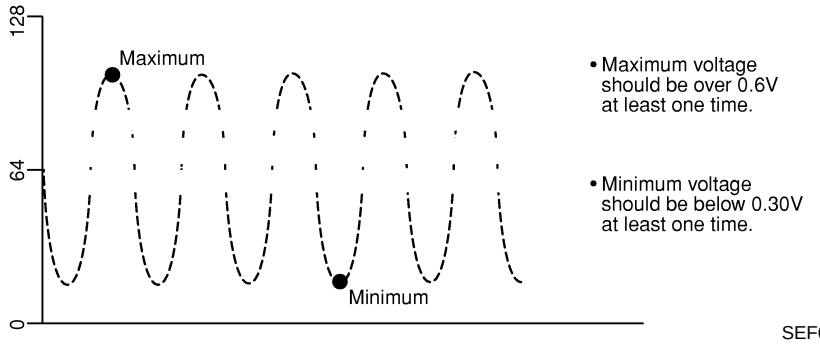
R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

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.

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



SEF648Y

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.**

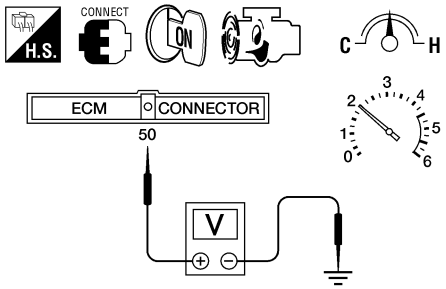
OK or NG

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

4	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground.



AEC873A

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.**

OK or NG

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

5	CHECK SHIELD CIRCUIT

1. Turn ignition switch OFF.
2. Remove joint connector-1.
3. Check the following.

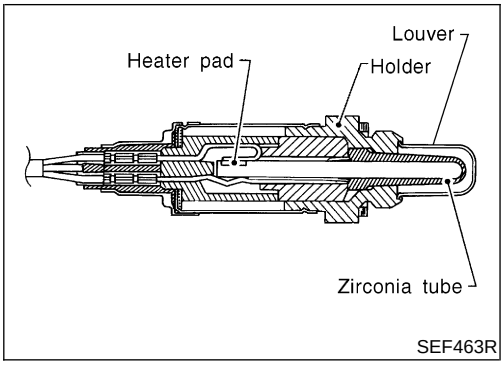
- Continuity between joint connector-1 terminal 1 and ground
- Joint connector-1
  (Refer to "HARNESS LAYOUT", ***EL-254***.)
  Continuity should exist.

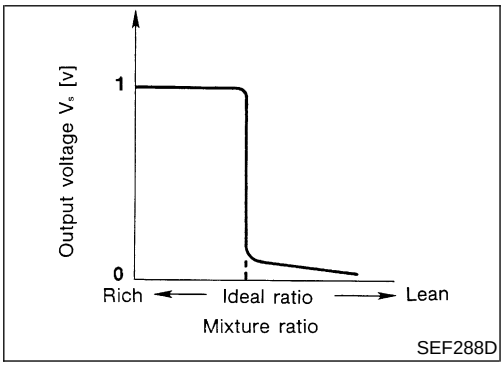
4. Also check harness for short to power.
5. Then reconnect joint connector.

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair open circuit, short to power in harness or connectors.

6	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**





Component Description

NGEC0103

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

NGEC0104

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.

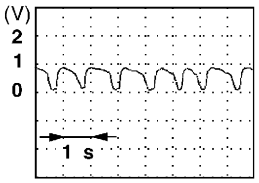
ECM Terminals and Reference Value

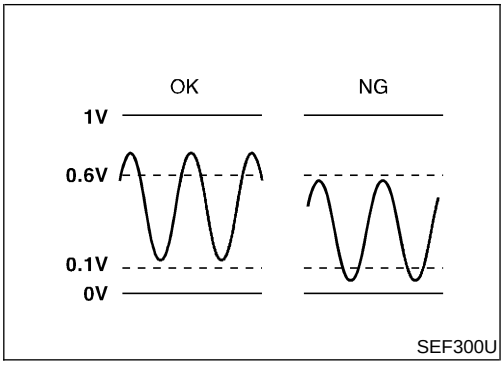
NGEC0105

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)
50	B	Heated oxygen sensor 1 (front)	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF008W



SEF300U

On Board Diagnosis Logic

NGEC0106

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 heater (front) • Fuel pressure • Injectors • Intake air leaks

6

HO2S1 (B1) P0131	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

SEF649Y

6

HO2S1 (B1) P0131	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

SEF650Y

6

HO2S1 (B1) P0131
COMPLETED

SEF651Y

DTC Confirmation Procedure

NGEC0107

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

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

With CONSULT-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) P0131” of “HO2S1 (front)” in “DTC WORK SUPPORT” mode with CONSULT-II.
4) Touch “START”.
5) Start engine and let it idle for at least 3.0 minutes.

NOTE:

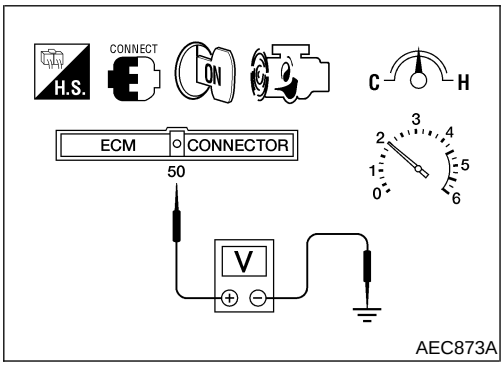
Never raise engine speed above 3,000 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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

ENG SPEED	1,200 - 3,150 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	3.5 - 15 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-202.



Overall Function Check

NGEC0108

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.

Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 [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.

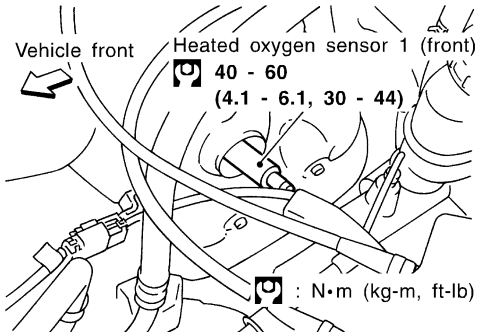
4) If NG, go to "Diagnostic Procedure", EC-202.

Diagnostic Procedure

NGEC0109

1	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)

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



SEF332VA

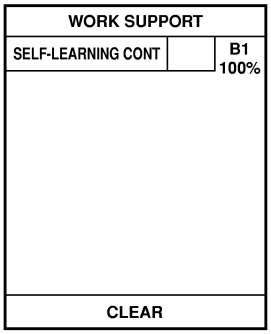
Tightening torque:
40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

▶	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".

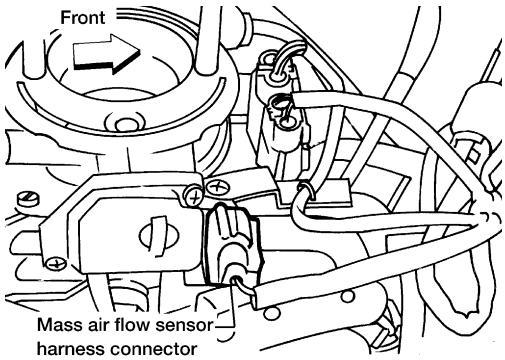


SEF215Z

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



AEC131A

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-79.
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?

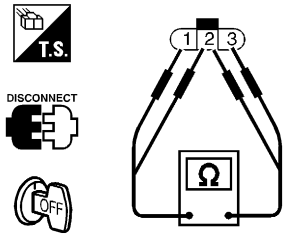
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171. Refer to EC-280.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)

Check resistance between terminals 3 and 1.



SEF220W

Resistance: 2.3 - 4.3 Ω at 25°C (77°F)

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

Continuity should not exist.

CAUTION:

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

OK or NG

OK (With CONSULT-II)	▶	GO TO 4.
OK (Without CONSULT-II)	▶	GO TO 5.
NG	▶	Replace heated oxygen sensor 1 (front).

4	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode, and the trigger point is adjusted to 100%.
3. Select "HO2S1 (B1)" AND "HO2S1 MNTR (B1)" in Item Selection.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "START" on CONSULT-II screen.

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

6. 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:

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

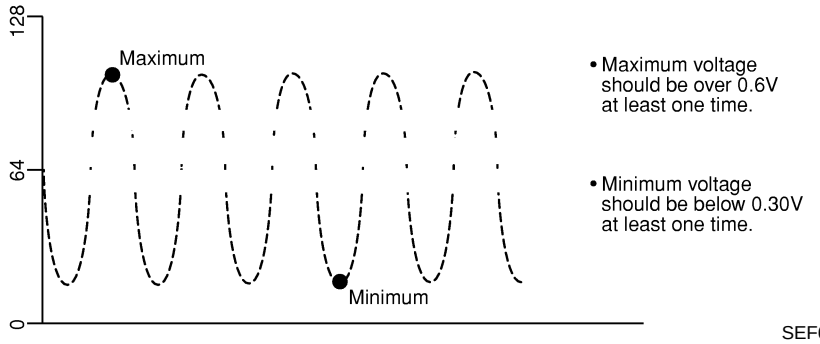
R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

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.

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



SEF648Y

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.**

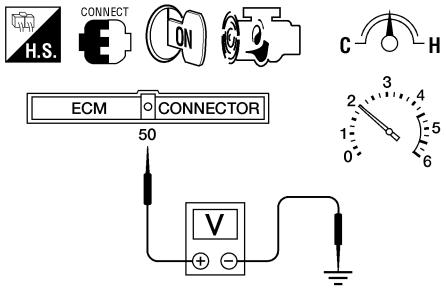
OK or NG

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

5	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground.



AEC873A

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.**

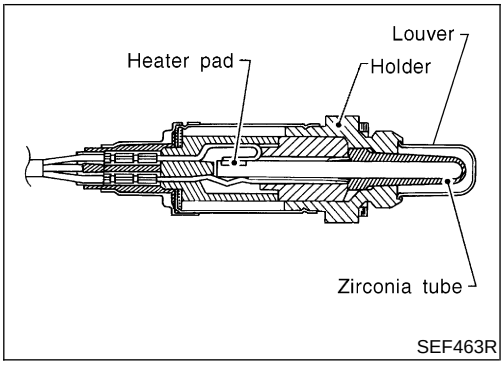
OK or NG

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

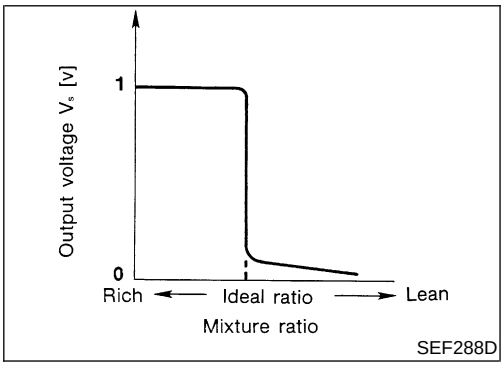
6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.
Refer to "Wiring Diagram", EC-196, for circuit.

	▶	**INSPECTION END**



SEF463R



SEF288D

Component Description

NGEC0111

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

NGEC0112

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.

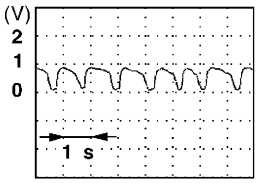
ECM Terminals and Reference Value

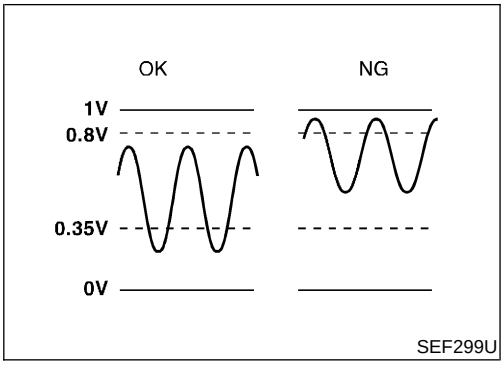
NGEC0113

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)
50	B	Heated oxygen sensor 1 (front)	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF008W



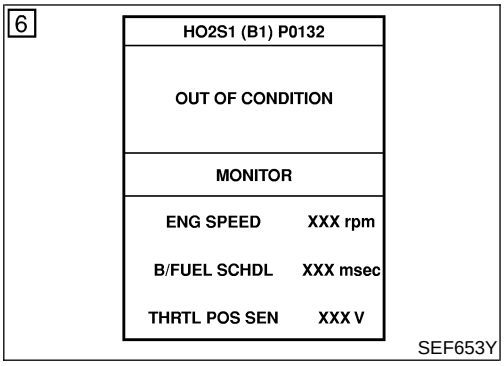
SEF299U

On Board Diagnosis Logic

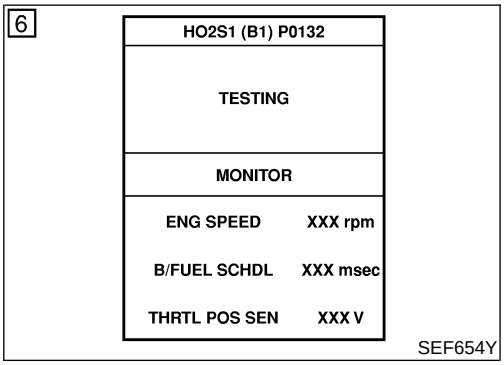
NGEC0114

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.

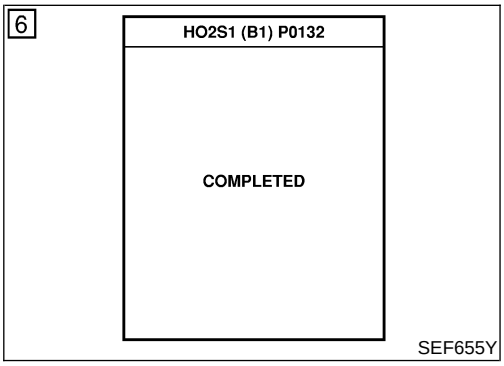
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0132	• The maximum and minimum voltages from the sensor are beyond the specified voltages.	• Heated oxygen sensor 1 (front) • Heated oxygen sensor 1 heater (front) • Fuel pressure • Injectors



SEF653Y



SEF654Y



SEF655Y

DTC Confirmation Procedure

NGEC0115

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

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

With CONSULT-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 (front) P0132” of “HO2S1 (front)” in “DTC WORK SUPPORT” mode with CONSULT-II.
4) Touch “START”.
5) Start engine and let it idle for at least 3.0 minutes.

NOTE:

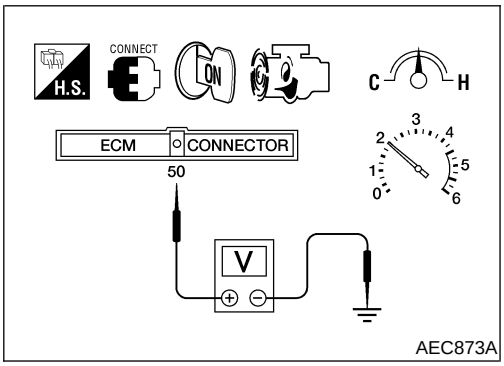
Never raise engine speed above 3,000 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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

ENG SPEED	1,200 - 3,150 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	3.5 - 15 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-209.



Overall Function Check

NGEC0116

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

Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and ECM 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.

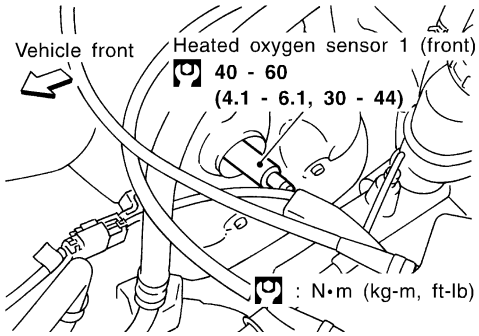
4) If NG, go to "Diagnostic Procedure", EC-209.

Diagnostic Procedure

NGEC0117

1	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)

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



SEF332VA

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

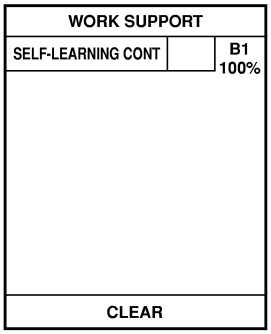
▶	GO TO 2.

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".

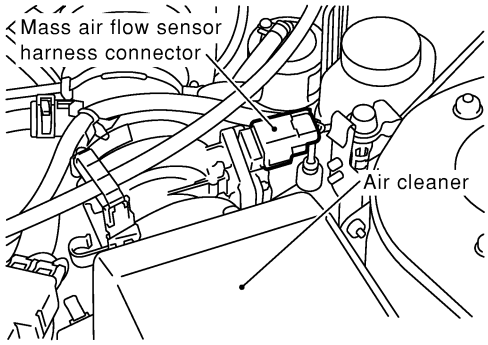


SEF215Z

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



SEF293W

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-79.
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 P0172. Refer to EC-287.
No	▶	GO TO 3.

3	CHECK HARNESS CONNECTOR

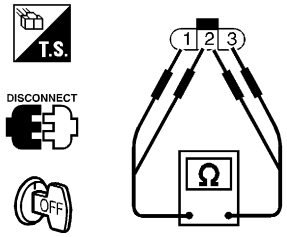
1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 (front) harness connector.
3. Check harness connector for water.
   Water should not exit.

OK or NG

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

4	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)

Check resistance between terminals 3 and 1.



SEF220W

Resistance: 2.3 - 4.3 Ω at 25°C (77°F)

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

Continuity should not exist.

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.**

OK or NG

OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Replace heated oxygen sensor 1 (front).

5	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode, and the trigger point is adjusted to 100%.
3. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)" in item selection.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.

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

SEF646Y

6. 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:

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

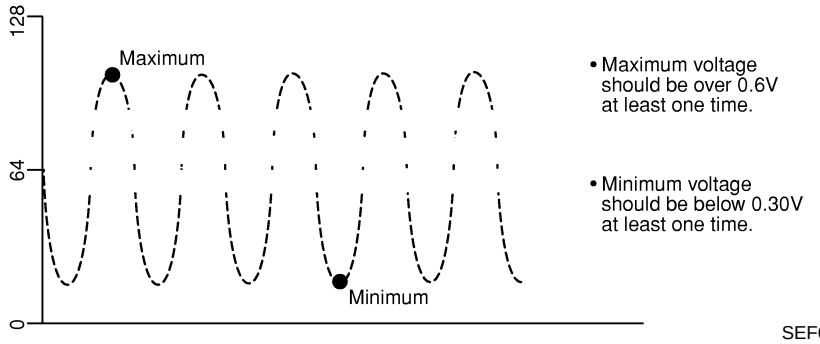
R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

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.

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



SEF648Y

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.**

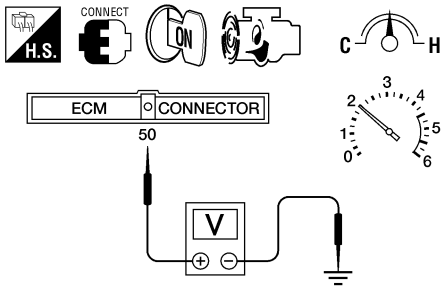
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace heated oxygen sensor 1 (front).

6	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground.



AEC873A

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.**

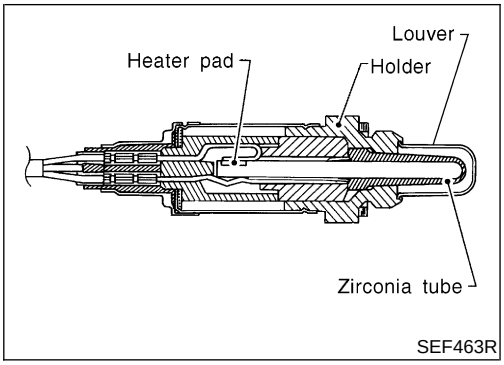
OK or NG

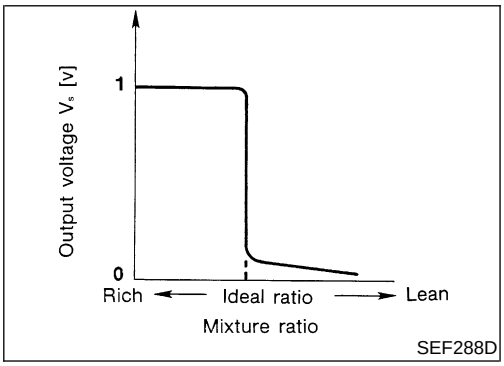
OK	▶	GO TO 7.
NG	▶	Replace heated oxygen sensor 1 (front).

7	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.
Refer to "Wiring Diagram", EC-196, for circuit.

	▶	**INSPECTION END**





Component Description

NGEC0119

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

NGEC0120

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.

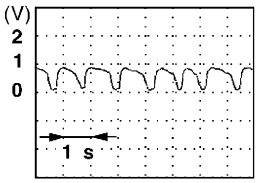
ECM Terminals and Reference Value

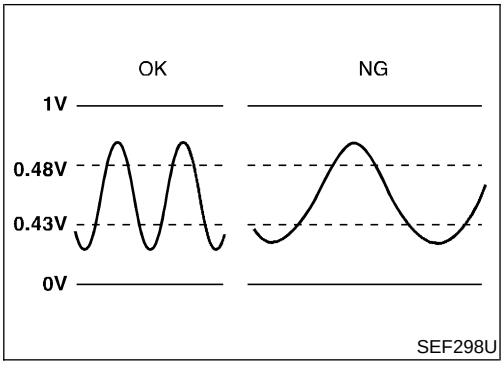
NGEC0121

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)
50	B	Heated oxygen sensor 1 (front)	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF008W

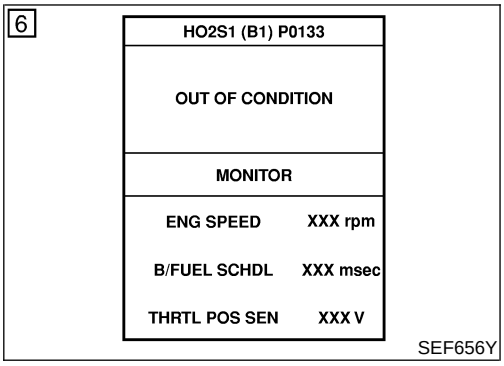


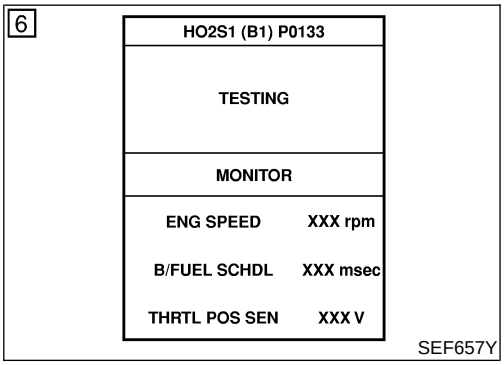
On Board Diagnosis Logic

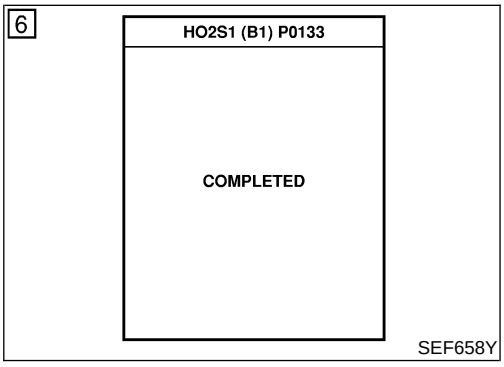
NGEC0122

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 heater (front) • Fuel pressure • Injectors • Intake air leaks • Exhaust gas leaks • PCV • Mass air flow sensor







DTC Confirmation Procedure

NGEC0123

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

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

With CONSULT-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) P0133" of "HO2S1 (front)" in "DTC WORK SUPPORT" mode with CONSULT-II.
4) Touch "START".
5) Start engine and let it idle for at least 3.0 minutes.

NOTE:

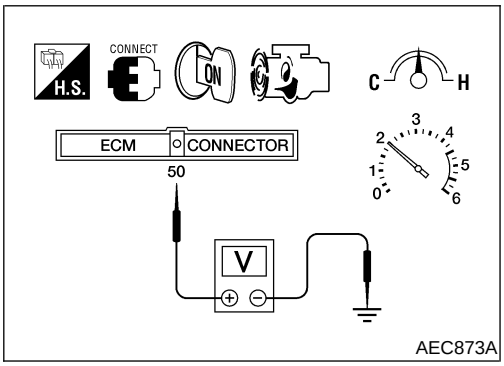
Never raise engine speed above 3,000 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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	1,750 - 3,750 rpm
Vehicle speed	More than 80 km/h (50 MPH)
B/FUEL SCHDL	3.5 - 15.5 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-218.



Overall Function Check

NGEC0124

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 50 [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.

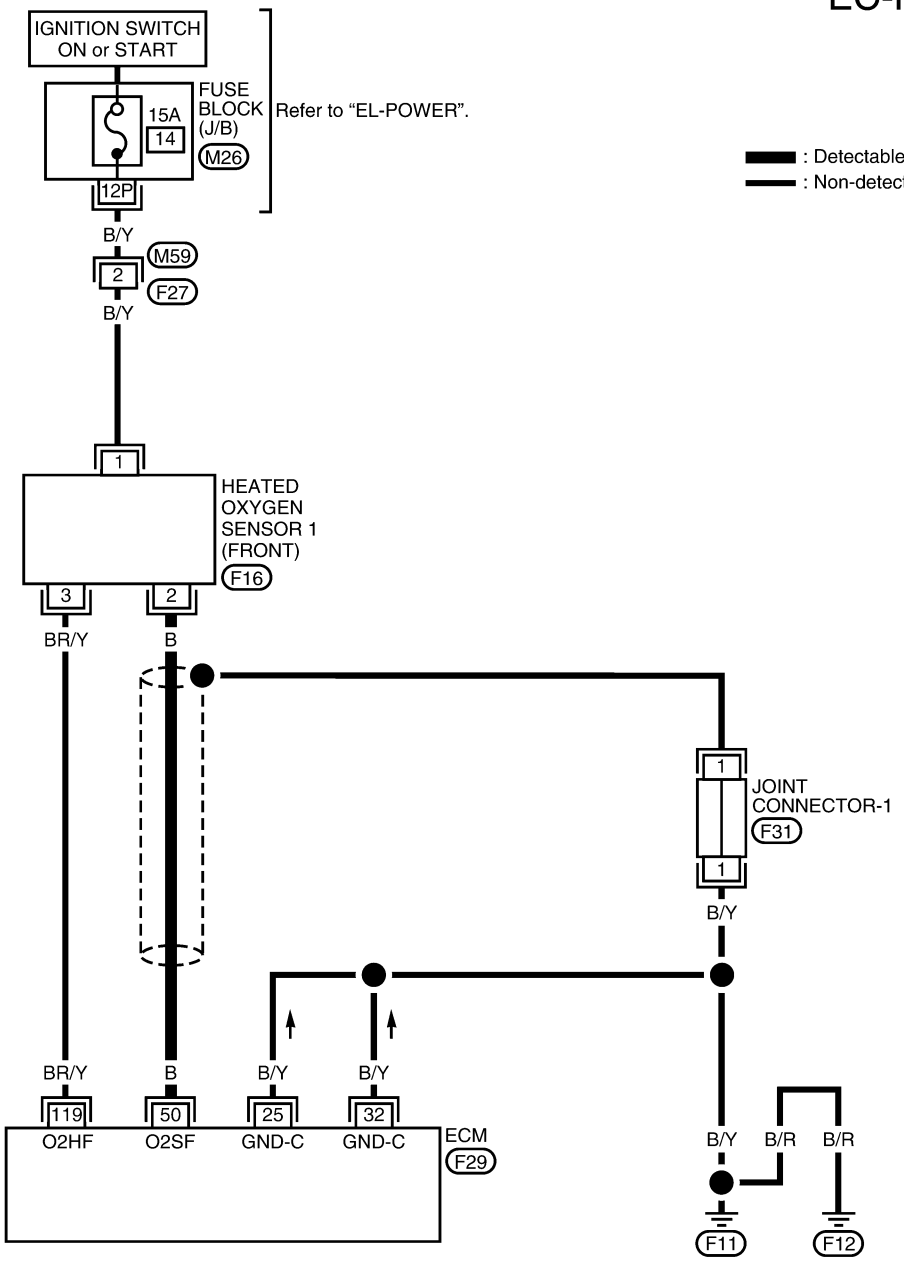
- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times within 10 seconds.
  1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
  2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

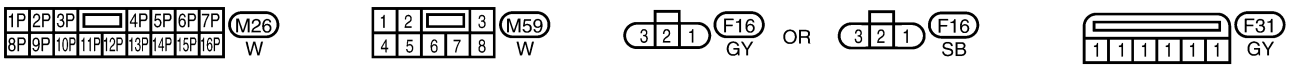
4) If NG, go to "Diagnostic Procedure", EC-218.

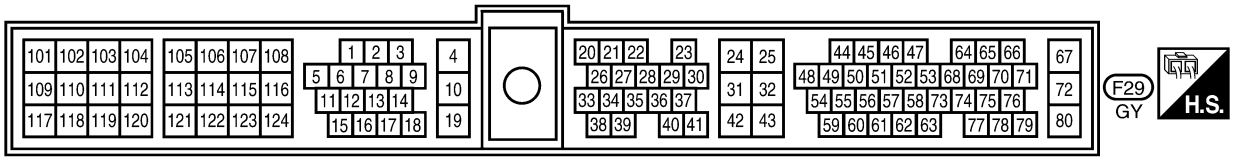
Wiring Diagram

NGEC0125

EC-HO2S1-01







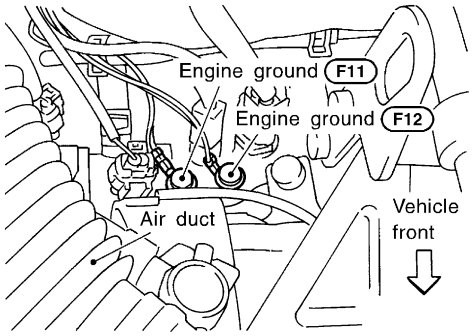
WEC936

Diagnostic Procedure

NGEC0126

1	RETIGHTEN GROUND SCREWS

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

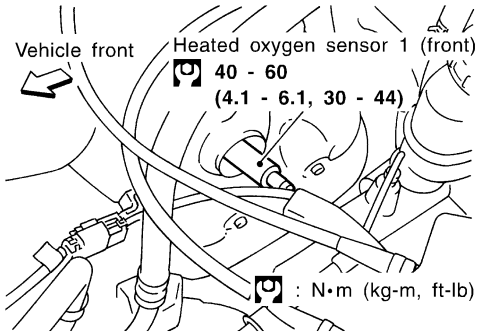


SEF325V

▶ GO TO 2.

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)

Loosen and retighten heated oxygen sensor 1 (front).



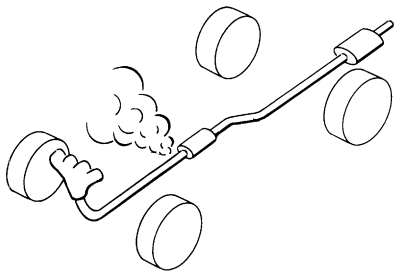
SEF332VA

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

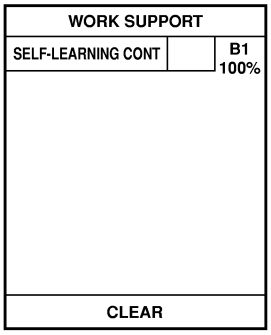
OK	▶	GO TO 4.
NG	▶	Repair or replace.

4	CHECK FOR INTAKE AIR LEAK	
Listen for an intake air leak between the mass air flow sensor and the intake manifold.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Repair or replace.

5	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

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

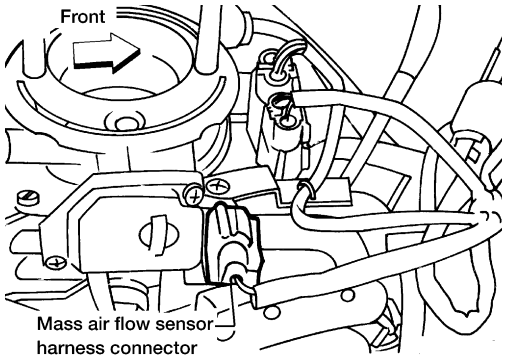


SEF215Z

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.



AEC131A

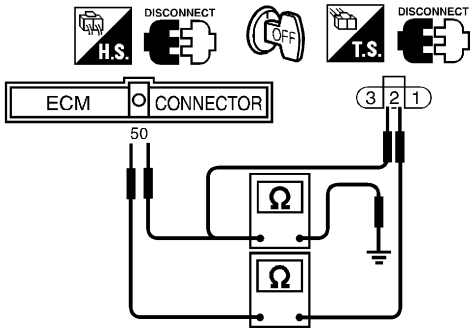
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-79.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle 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-280, 287.
No	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

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 50 and terminal 2.



SEF141V

Continuity should exist.

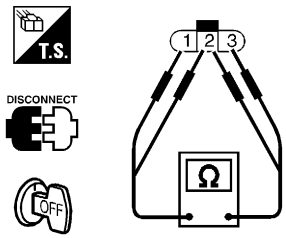
3. Check harness continuity between ECM terminal 50 (or terminal 2) and ground.
Continuity should not exist.
4. Also check harness for short to power.

OK or NG

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

7	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)

Check resistance between terminals 3 and 1.



SEF220W

Resistance: 2.3 - 4.3 Ω at 25°C (77°F)

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

Continuity should not exist.

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.**

OK or NG

OK (With CONSULT-II)	▶	GO TO 8.
OK (Without CONSULT-II)	▶	GO TO 9.
NG	▶	Replace heated oxygen sensor 1 (front).

8	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode, and the trigger point is adjusted to 100%.
3. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)" in item selection.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "START" on CONSULT-II screen.

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

6. 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:

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

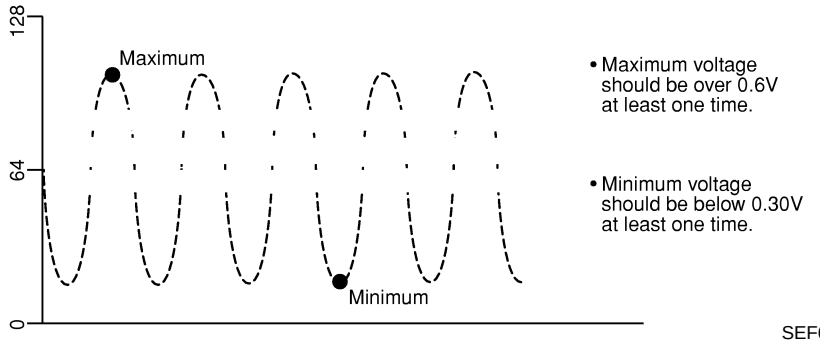
R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

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.

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



SEF648Y

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.**

OK or NG

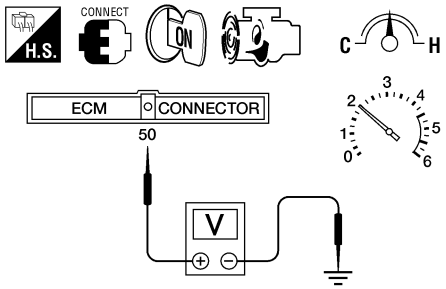
OK	▶	GO TO 10.
NG	▶	Replace heated oxygen sensor 1 (front).

Diagnostic Procedure (Cont'd)

9	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground.



AEC873A

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:

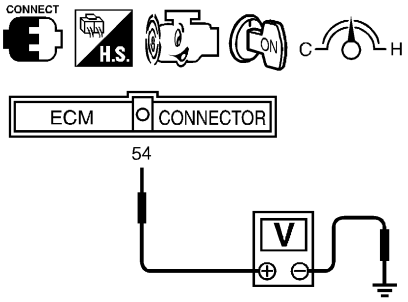
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12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

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace heated oxygen sensor 1 (front).

10 **CHECK MASS AIR FLOW SENSOR**

1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.



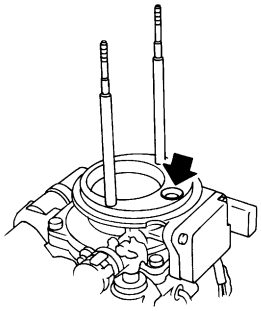
SEF326V

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.9 - 2.3
Idle to about 4,000 rpm*	1.3 - 1.7 to Approx. 3.0

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

MTBL0326

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 wire for damage or dust.



SEF893J

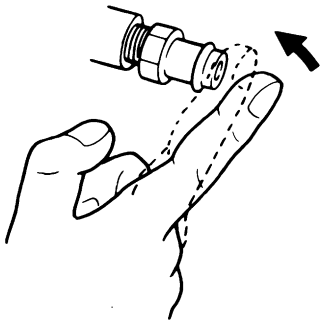
OK or NG

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

Diagnostic Procedure (Cont'd)

11	CHECK PCV VALVE

1. With engine running at idle, remove PCV valve from breather separator.
2. 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.



SEC137A

OK or NG

OK	▶	GO TO 12.
NG	▶	Repair or replace PCV valve.

12	CHECK SHIELD CIRCUIT

1. Turn ignition switch OFF.
2. Remove joint connector-1.
3. Check the following.

- Continuity between joint connector-1 terminal 1 and ground
- Joint connector-1

(Refer to "HARNESS LAYOUT", ***EL-254***.)

Continuity should exist.

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

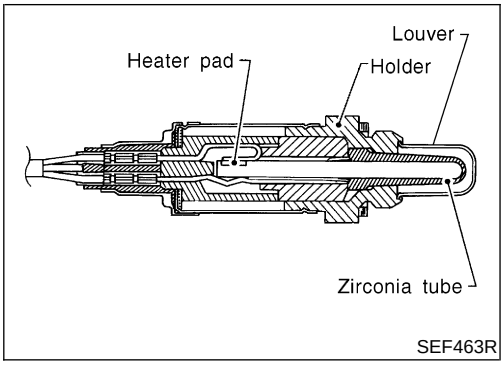
OK or NG

OK	▶	GO TO 13.
NG	▶	Repair open circuit, short to power in harness or connectors.

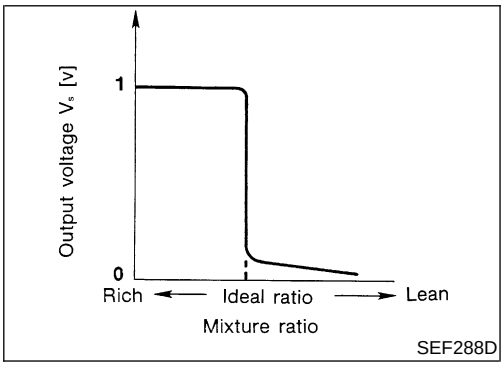
13	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.

▶ **INSPECTION END**



SEF463R



SEF288D

Component Description

NGEC0128

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

NGEC0129

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.

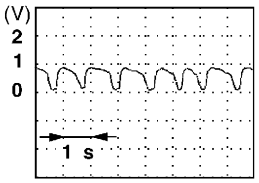
ECM Terminals and Reference Value

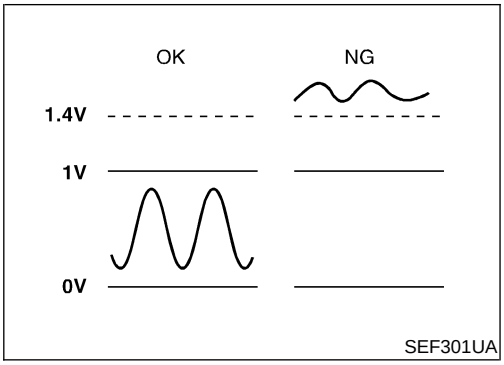
NGEC0130

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)
50	B	Heated oxygen sensor 1 (front)	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF008W

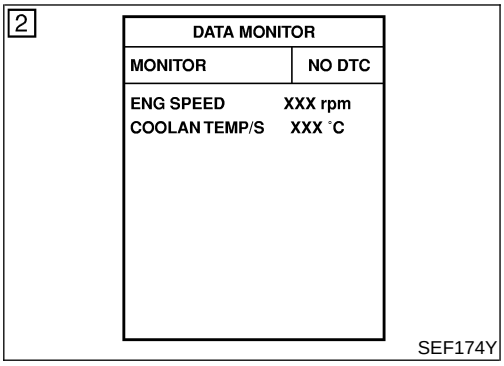


On Board Diagnosis Logic

NGEC0131

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)



DTC Confirmation Procedure

NGEC0132

NOTE:

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

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON.
4) Select “DATA MONITOR” mode with CONSULT-II.
5) Restart engine and let it idle for 35 seconds.
6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-228.

With GST

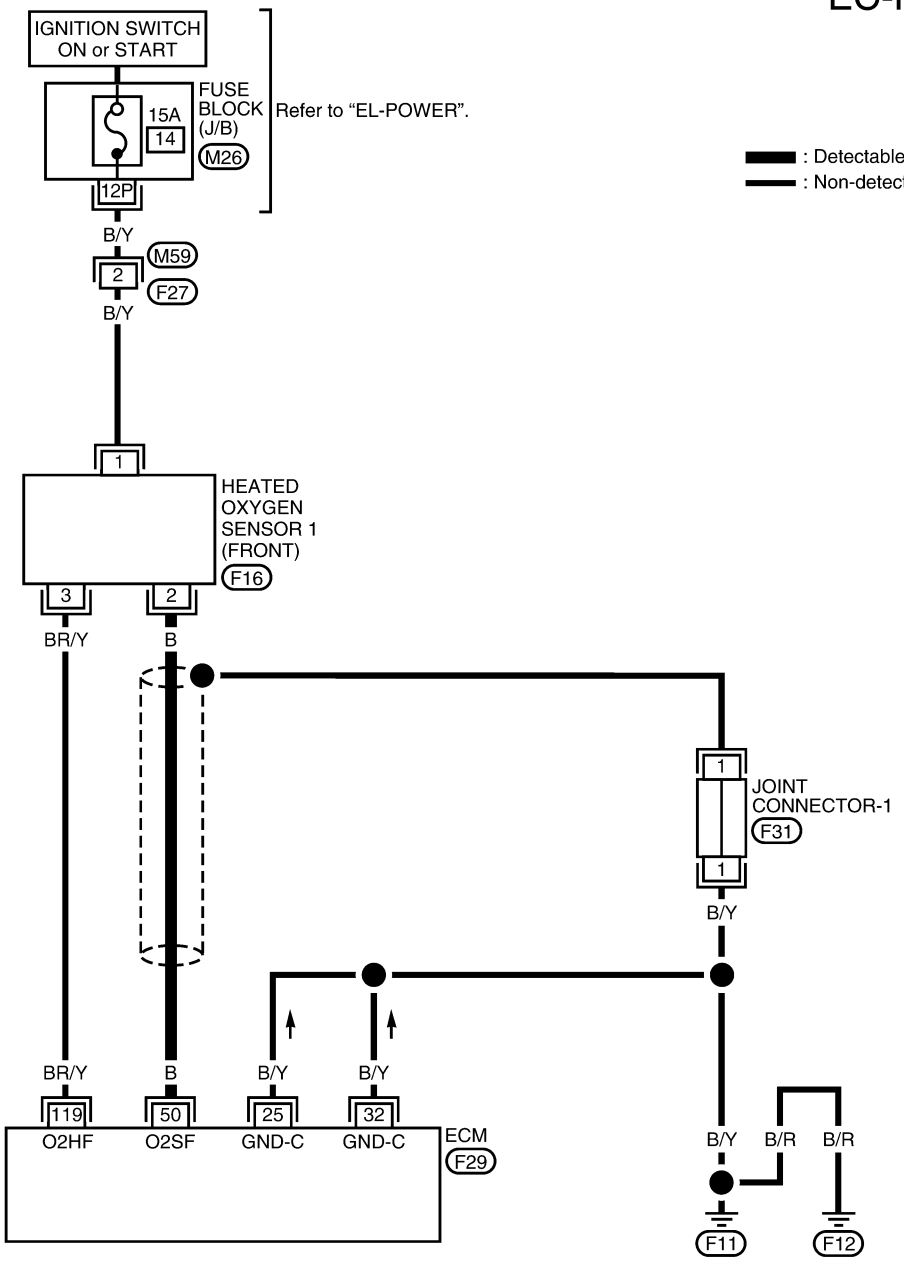
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Restart engine and let it idle for 35 seconds.
4) Turn ignition switch OFF and wait at least 5 seconds.
5) Restart engine and let it idle for 35 seconds.
6) Select “MODE 3” with GST.
7) If DTC is detected, go to “Diagnostic Procedure”, EC-228.

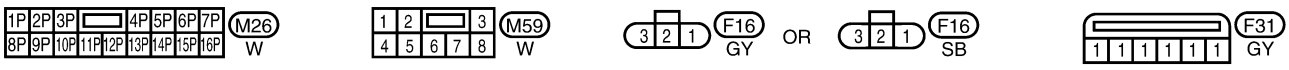
- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II or ECM (Diagnostic Test Mode II) because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II or ECM (Diagnostic Test Mode II) is recommended.**

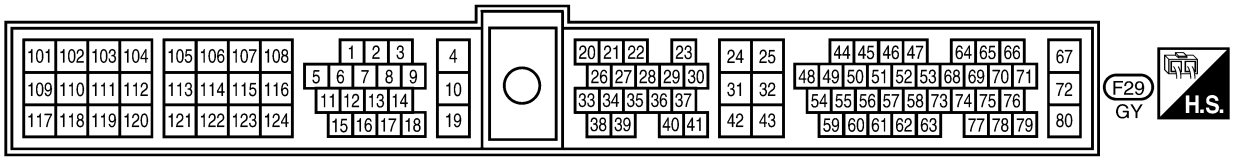
Wiring Diagram

NGEC0133

EC-HO2S1-01







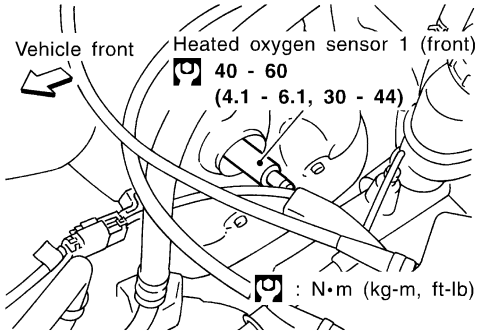
WEC936

Diagnostic Procedure

NGEC0134

1	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)

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



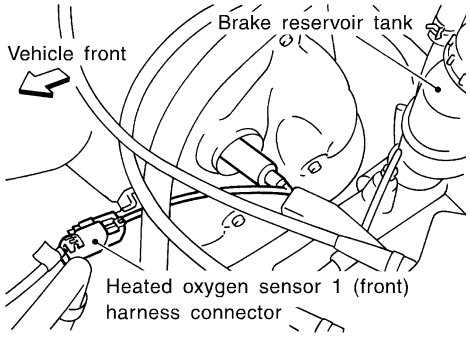
SEF332VA

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

	▶	GO TO 2.

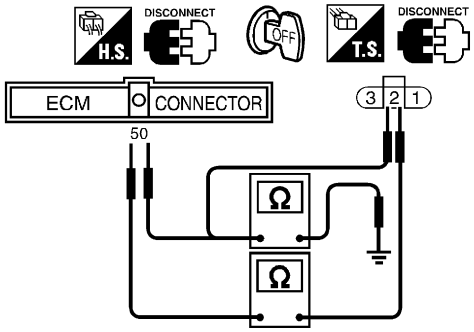
2	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect heated oxygen sensor 1 (front) harness connector and ECM harness connector.



SEF331VA

2. Check harness continuity between ECM terminal 50 and terminal 2.



SEF141V

Continuity should exist.

3. Check harness continuity between ECM terminal 50 (or terminal 2) and ground.
Continuity should not exist.
4. Also check harness for short to power.

OK or NG

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

3	CHECK HARNESS CONNECTOR	
Check heated oxygen sensor 1 (front) harness connector for water. **Water should not exist.**		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 4.
OK (Without CONSULT-II)	▶	GO TO 5.
NG	▶	Repair or replace harness connector.

4	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode, and the trigger point is adjusted to 100%.
3. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)" in item selection.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "START" on CONSULT-II screen.

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

6. 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:

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

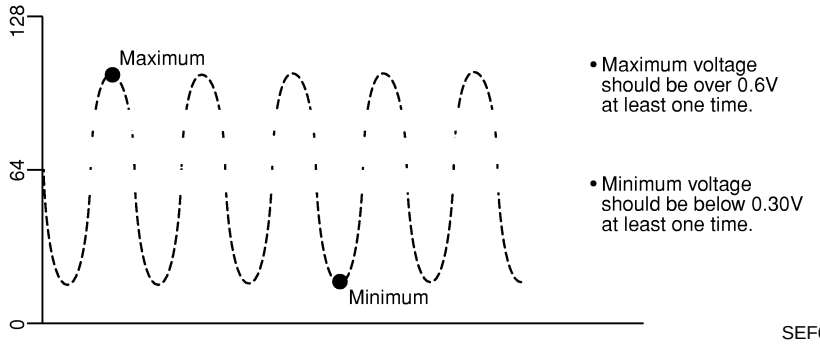
R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

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.

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

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.**

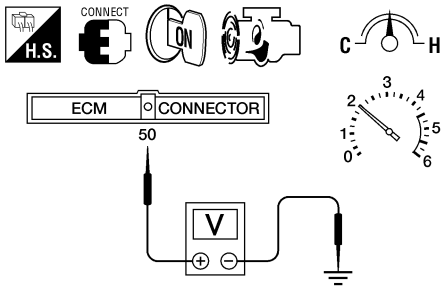
OK or NG

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

5	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground.



AEC873A

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.**

OK or NG

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

6	CHECK SHIELD CIRCUIT

1. Turn ignition switch OFF.
2. Remove joint connector-1.
3. Check the following.

- Continuity between joint connector-1 terminal 1 and ground
- Joint connector-1
  (Refer to "HARNESS LAYOUT", ***EL-254***.)
  Continuity should exist.

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

OK or NG

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

7	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.

▶ **INSPECTION END**

Description

NGEC0136

SYSTEM DESCRIPTION

NGEC0136S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Heated oxygen sensor 1 heater (front) control	Heated oxygen sensor 1 heater (front)

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

OPERATION

NGEC0136S02

Engine speed	Heated oxygen sensor 1 heater (front)
Above 3,000 rpm	OFF
Below 3,000 rpm	ON

CONSULT-II Reference Value in Data Monitor Mode

NGEC0137

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1)	• Engine speed: Below 3,000 rpm	ON
	• Engine speed: Above 3,000 rpm	OFF

ECM Terminals and Reference Value

NGEC0138

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)
119	BR/Y	Heated oxygen sensor 1 heater (front)	**[Engine is running]** • Engine speed is below 3,000 rpm.	Approximately 0.4V
			[Engine is running] • Engine speed is above 3,000 rpm.	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0139

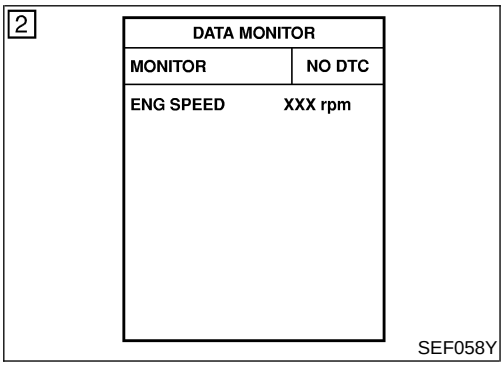
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0135	• The current amperage in the heated oxygen sensor 1 heater (front) circuit is out of the normal range. [An improper voltage drop signal is sent to ECM through the heated oxygen sensor 1 heater (front).]	• Harness or connectors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

DTC Confirmation Procedure

NGEC0140

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

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



With CONSULT-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-235.

With GST

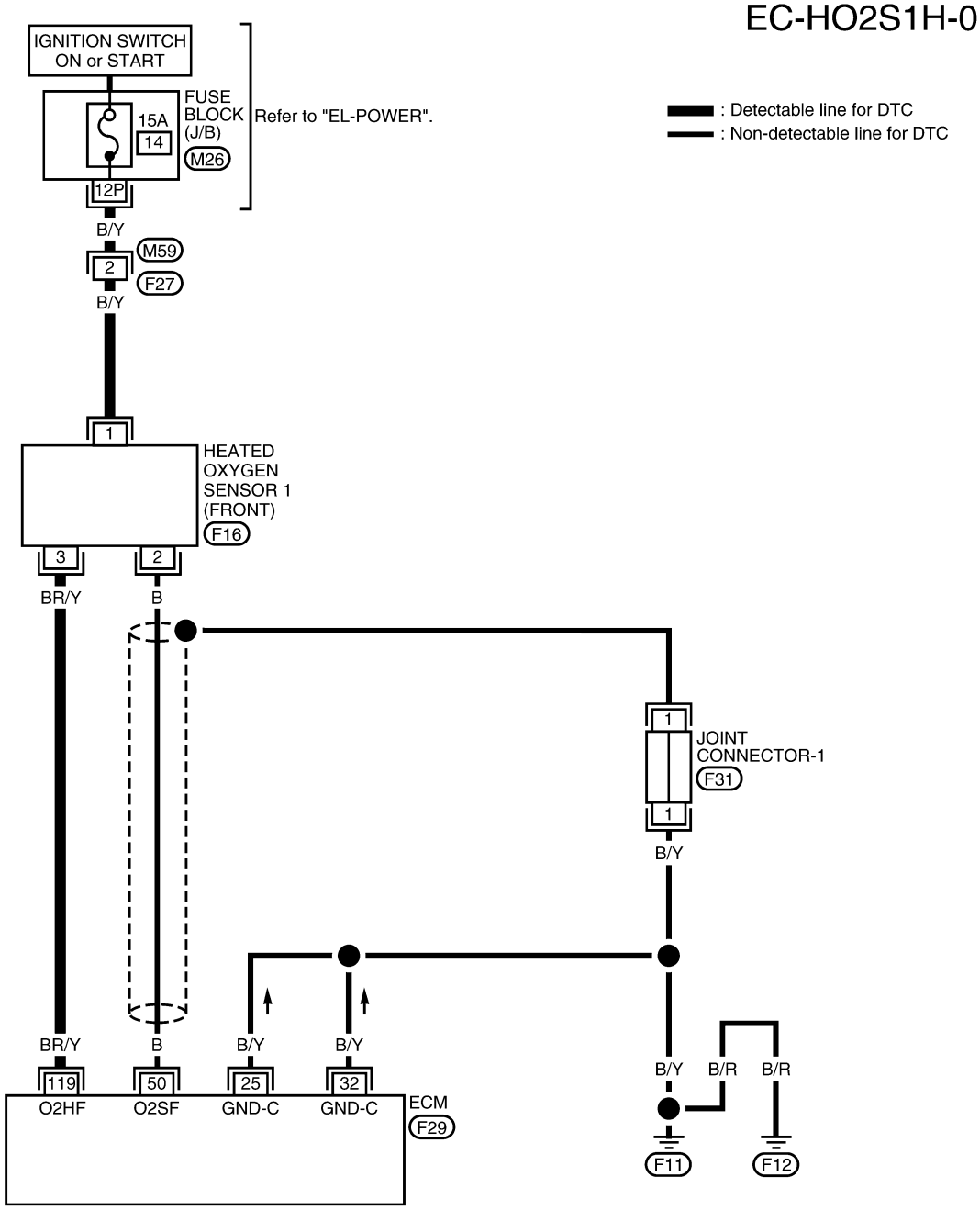
1) Start engine and run it for at least 6 seconds at idle speed.
2) Turn ignition switch OFF and wait least 6 seconds at idle speed.
3) Select “MODE 3” with GST.
4) If DTC is detected, go to “Diagnostic Procedure”, EC-235.

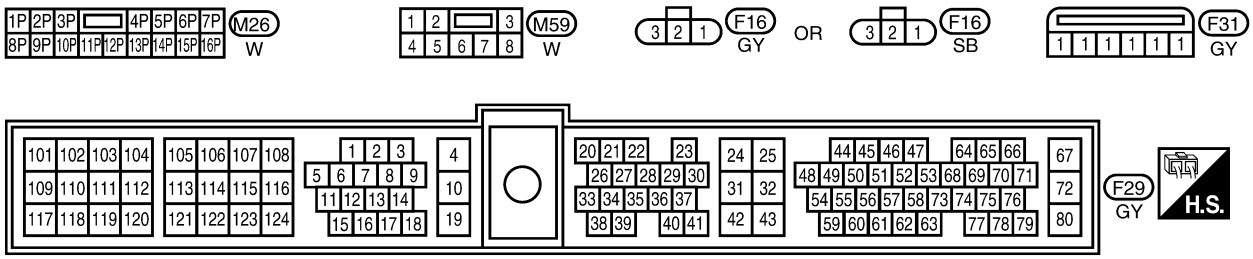
- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II or ECM (Diagnostic Test Mode II) because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II or ECM (Diagnostic Test Mode II) is recommended.**

Wiring Diagram

NGEC0141

EC-HO2S1H-01





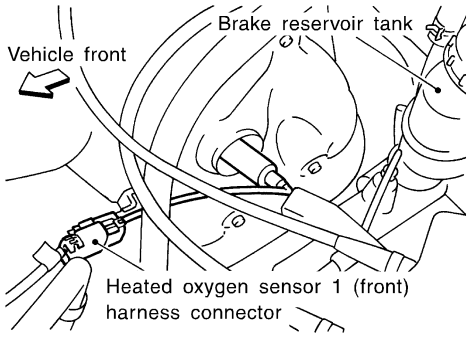
WEC937

Diagnostic Procedure

NGEC0142

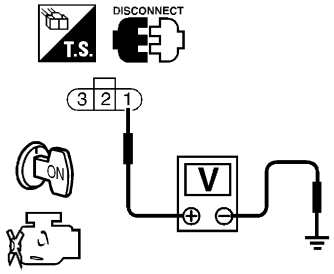
1	CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 (front) harness connector.



SEF331VA

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



SEF213W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M59, F27
- 15A fuse
- Harness for open or short between heated oxygen sensor 1 (front) and 15A fuse

	▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between heated oxygen sensor 1 (front) terminal 3 and ECM terminal 119. Refer to the wiring diagram.
   Continuity should exist.
4. Also check harness for short to ground or short to power.

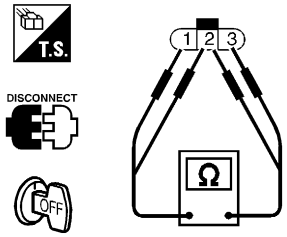
OK or NG

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 HEATER (FRONT)

Check resistance between terminals 3 and 1.



SEF220W

Resistance: 2.3 - 4.3 Ω at 25°C (77°F)

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

Continuity should not exist.

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.**

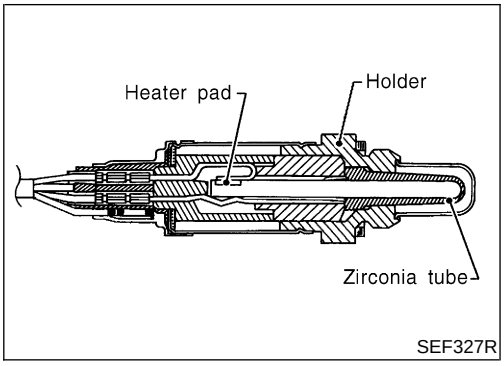
OK or NG

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

5	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.

▶ **INSPECTION END**



Component Description

NGEC0144

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

NGEC0145

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

ECM Terminals and Reference Value

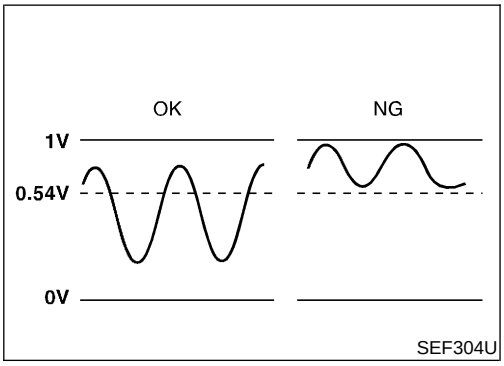
NGEC0146

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)
56	OR	Heated oxygen sensor 2 (rear)	**[Engine is running]** ● After warming up to normal operating temperature and revving engine from idle to 3,000 rpm quickly	0 - Approximately 1.0V

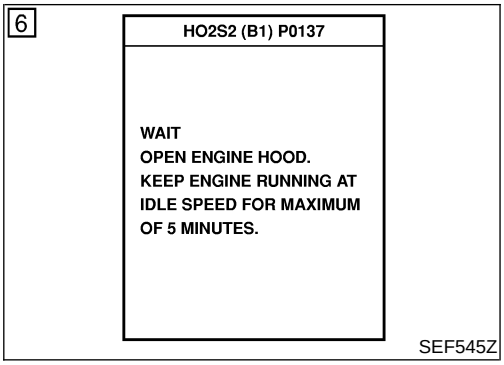


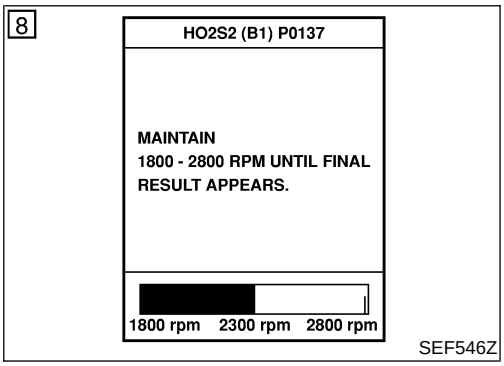
On Board Diagnosis Logic

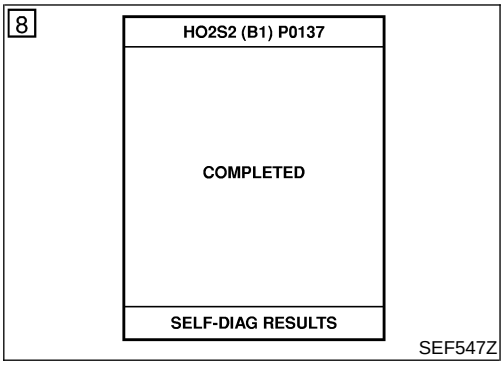
NGEC0147

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, 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

NGEC0148

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

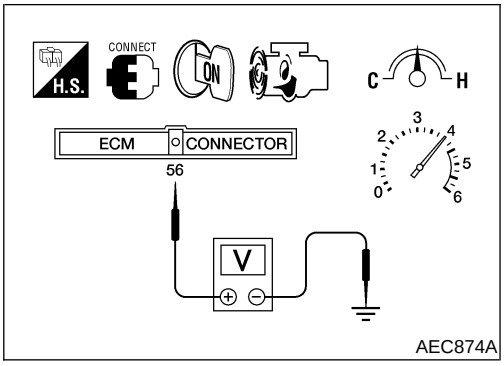
TESTING CONDITION:

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 5 seconds.
3) Turn ignition switch ON.
4) Select "DATA MONITOR" mode with CONSULT-II.
5) Make sure the "COOLANT TEMP/S" is more then 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 instructions of CONSULT-II.
8) Make sure the "OK" is displayed after touching "SELF-DIAG RESULTS".
   If NG is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-241.
   If "CAN NOT BE DIAGNOSED" is displayed, perform the following.

a) Stop engine and cool down "COOLANT TEMP/SE" to less then 70°C (158°F).
b) Turn ignition switch ON
c) Select "DATA MONITOR" mode with CONSULT-II.
d) Start engine.
e) Perform from step 6) again when the "COOLANT TEMP/S" reach to 70°C (158°F).



Overall Function Check

=NGEC0149

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.

CAUTION:

Always drive vehicle at a safe speed.

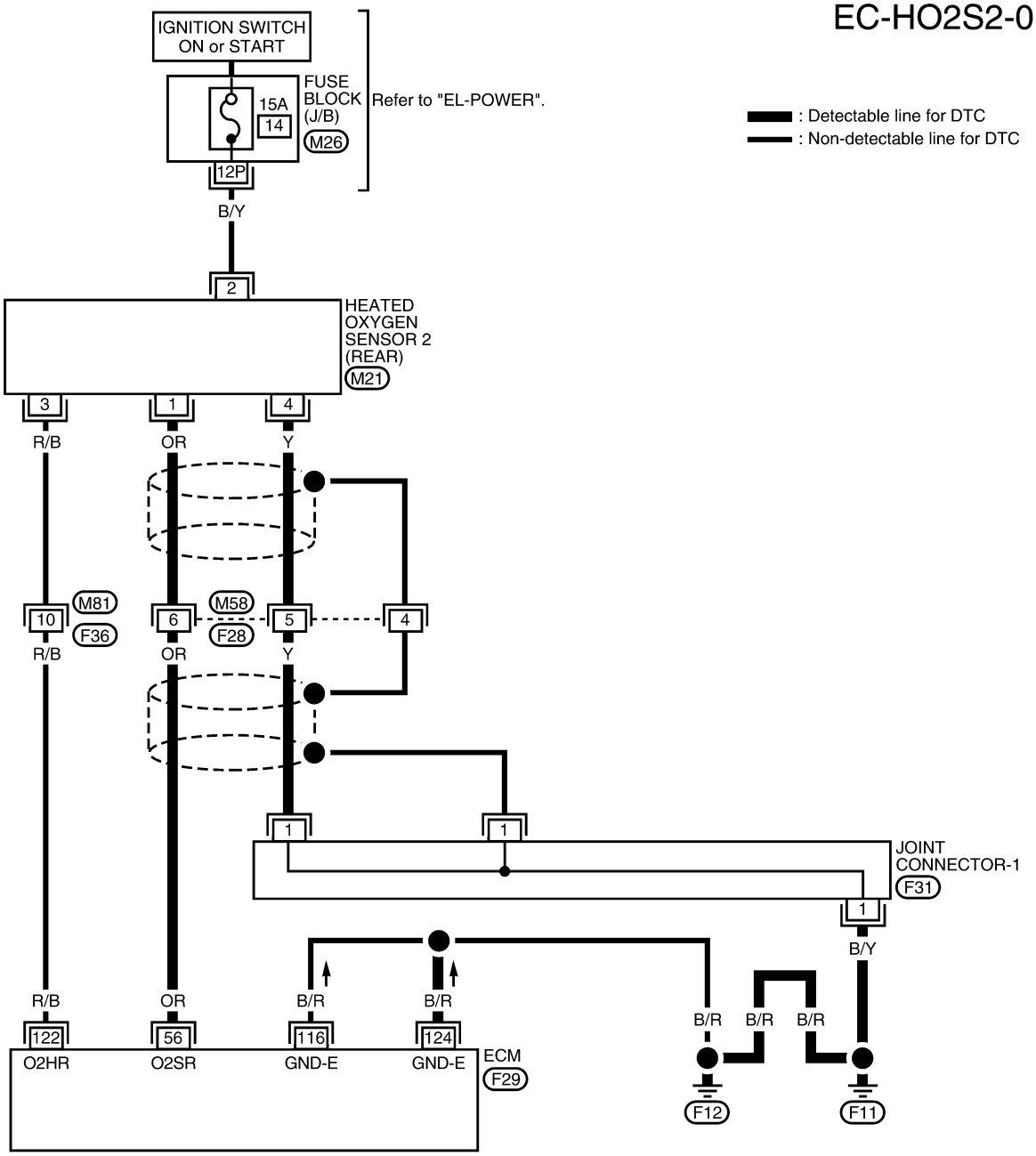
Without CONSULT-II

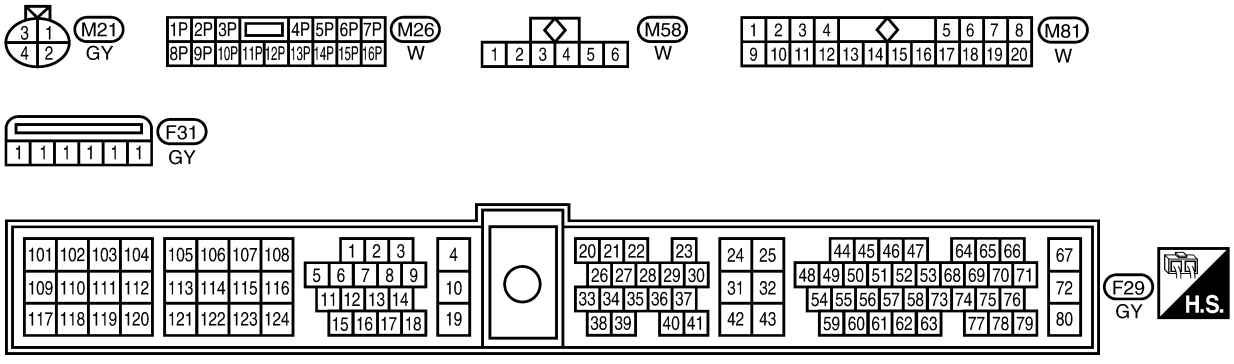
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 56 [Heated oxygen sensor 2 (rear) signal] and ECM ground.
4) Check the voltage when revving engine up to 4,000 rpm under 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 idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
   The voltage should be below 0.54V at least once during this procedure.
6) If NG, go to “Diagnostic Procedure”, EC-241.

Wiring Diagram

NGEC0150

EC-HO2S2-01





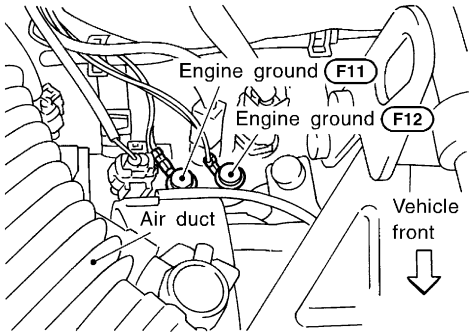
LEC477

Diagnostic Procedure

NGEC0151

1	RETIGHTEN GROUND SCREWS

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



SEF325V

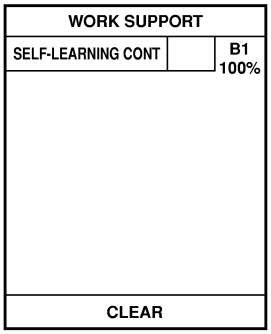
▶	GO TO 2.

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".

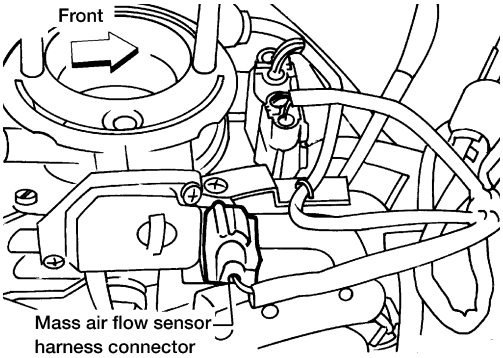


SEF215Z

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



AEC131A

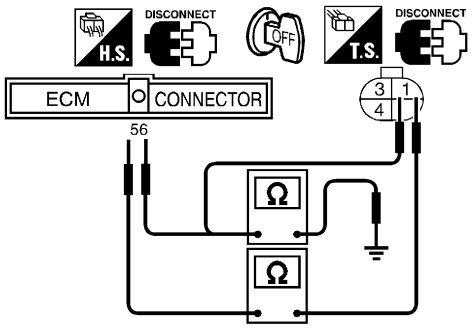
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-79.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle 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 P0172. Refer to EC-287.
No	▶	GO TO 3.

3	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 (rear) harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal 56 and terminal 1.



SEF157V

Continuity should exist.

4. Check harness continuity between ECM terminal 56 (or terminal 1) and ground.
   Continuity should not exist.
5. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M59, F27
- Harness for open or short between heated oxygen sensor 2 (rear) and ECM

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

5	CHECK GROUND CIRCUIT

1. Check harness continuity between heated oxygen sensor 2 (rear) terminal 4 and engine ground. Refer to "Wiring Diagram", EC-240.
   Continuity should exist.
2. Also check harness for short to power.

OK or NG

OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	GO TO 4.

6	CHECK HEATED OXYGEN SENSOR 2 (REAR)

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%.

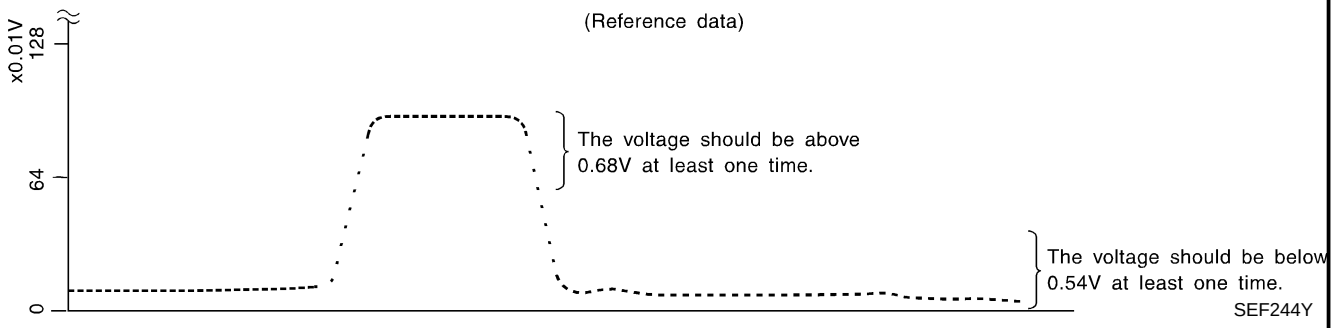
ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

"HO2S2 (B1)" should be above 0.56V 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.**



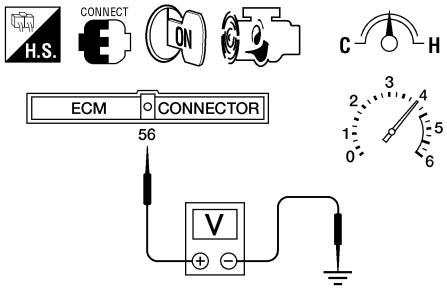
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace heated oxygen sensor 2 (rear).

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)

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 56 [Heated oxygen sensor 2 (rear) signal] and ECM ground.



AEC874A

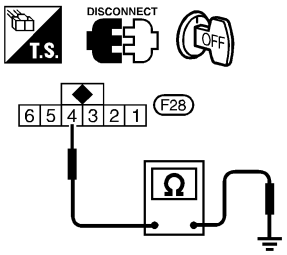
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.56V at least once.
   If the voltage is above 0.56V at step 4, step 5 is not necessary.
5. Check the voltage when revving up to 5,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
   The voltage should be 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.**

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace heated oxygen sensor 2 (rear).

8	CHECK SHIELD CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect harness connectors F28.
3. Check harness continuity between harness connector F28 terminal 4 and ground.



SEF698Z

Continuity should exist.

4. Also check harness for short to power.
5. Then reconnect harness connectors.

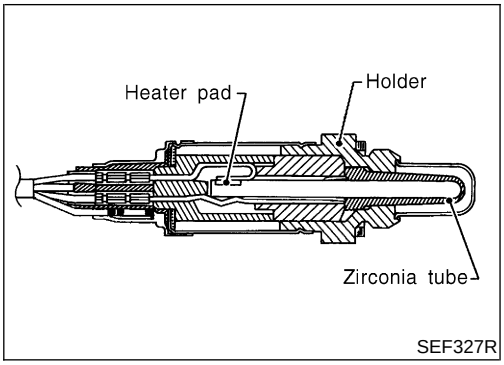
OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

Diagnostic Procedure (Cont'd)

9	DETECT MALFUNCTIONING PART
Check the following. ● Joint connector-1 (Refer to "HARNESS LAYOUT", ***EL-254***.) ● Harness for open or short between harness connector F28 and engine ground	
▶	Repair open circuit, short to ground or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**



Component Description

NGEC0153

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

NGEC0154

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

ECM Terminals and Reference Value

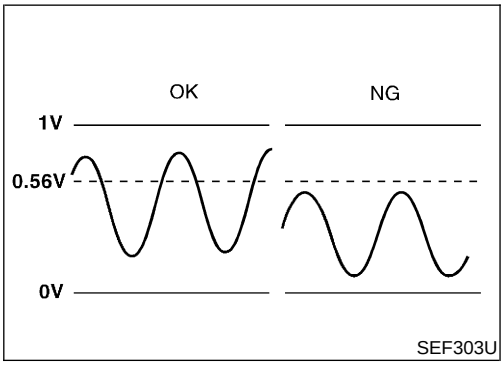
NGEC0155

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)
56	OR	Heated oxygen sensor 2 (rear)	**[Engine is running]** • After warming up to normal operating temperature and revving engine from idle to 3,000 rpm quickly	0 - Approximately 1.0V

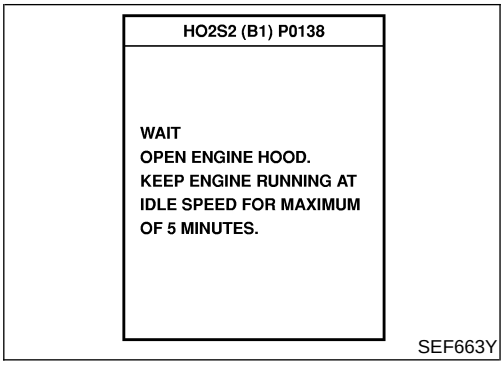


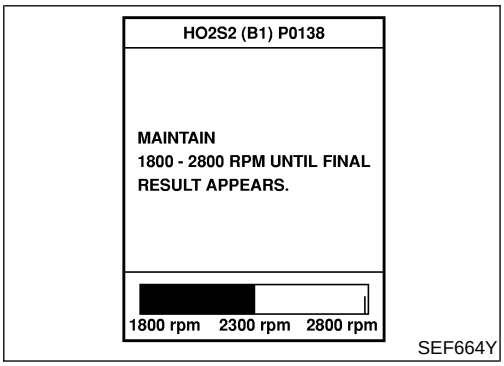
On Board Diagnosis Logic

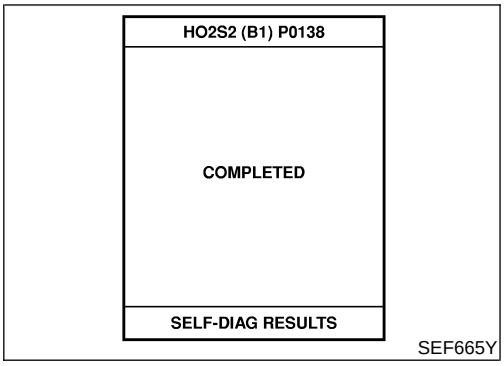
NGEC0156

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

NGEC0157

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

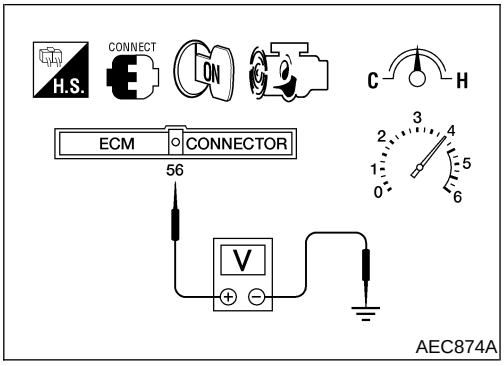
TESTING CONDITION:

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 5 seconds.
3) Turn ignition switch ON.
4) Select "DATA MONITOR" mode with CONSULT-II.
5) Make sure the "COOLANT TEMP/S" is more then 70°C (158°F).
6) Select "HO2S1 (B1) P0138", of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
7) Start engine and follow the instructions of CONSULT-II.
8) Make sure the "OK" is displayed after touching "SELF-DIAG RESULTS".
   If NG is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-251.
   If "CAN NOT BE DIAGNOSED" is displayed, perform the following.

a) Stop engine and cool down "COOLANT TEMP/SE" to less then 70°C (158°F).
b) Turn ignition switch ON.
c) Select "DATA MONITOR" mode with CONSULT-II.
d) Start engine.
e) Perform from step 6) again when the "COOLANT TEMP/S" reach to 70°C (158°F).



Overall Function Check

=NGEC0158

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.

CAUTION:

Always drive vehicle at a safe speed.

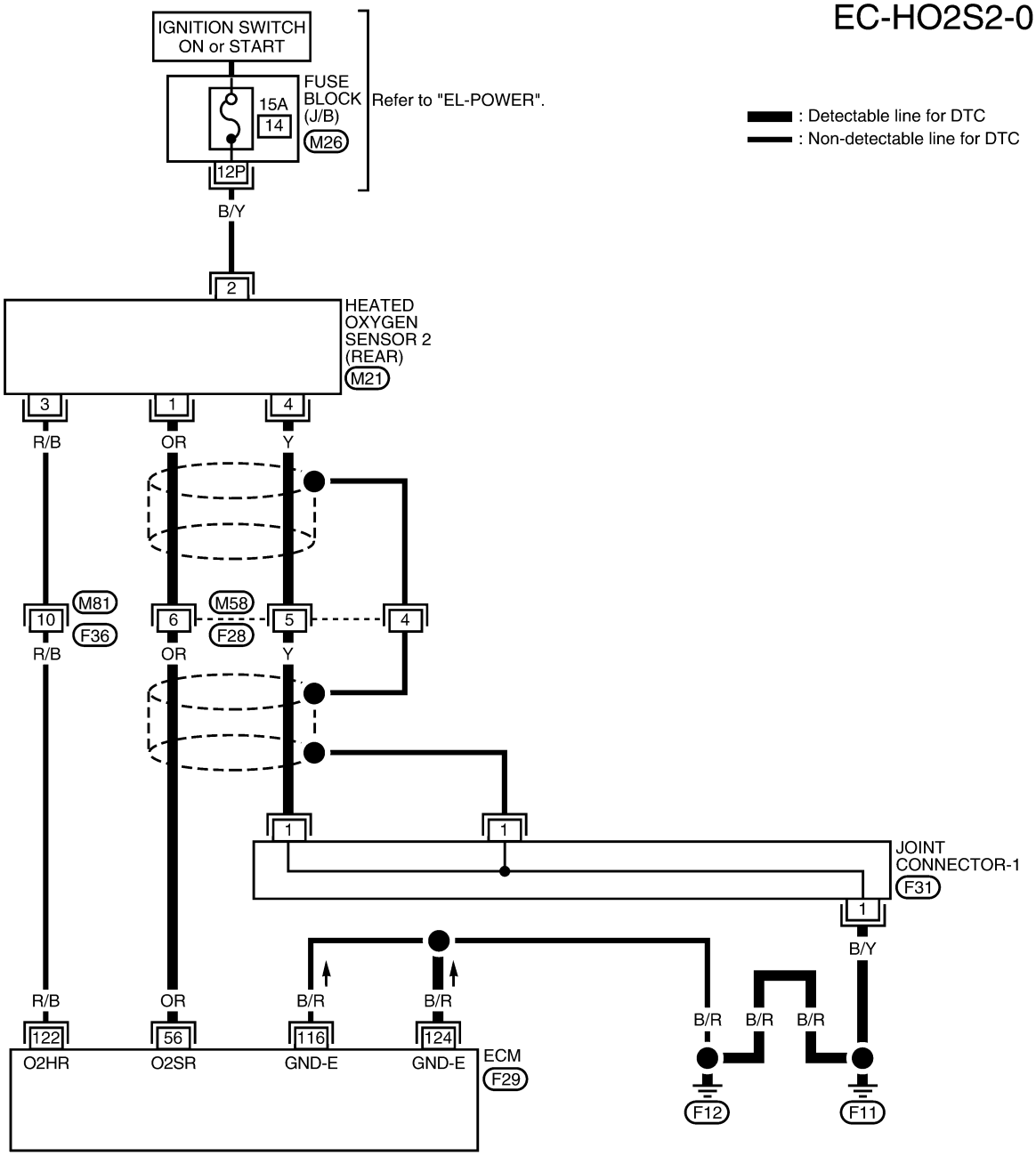
Without CONSULT-II

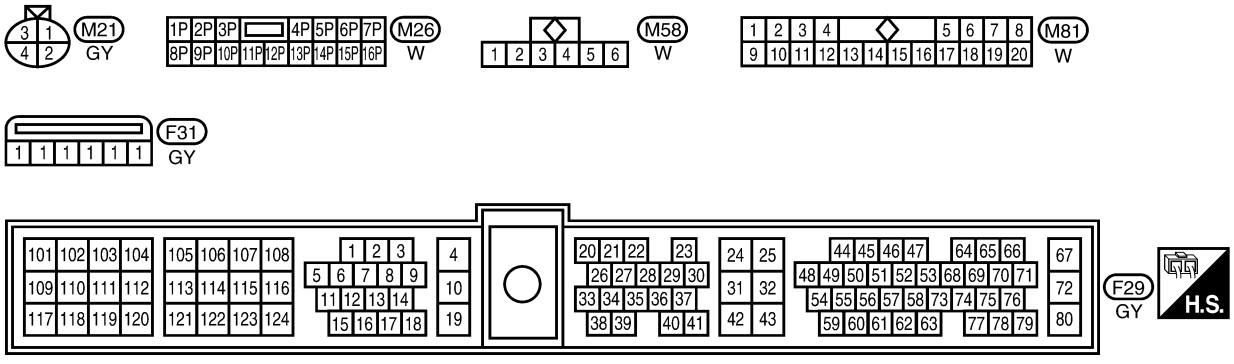
1) Start engine and drive vehicle at a speed of 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 56 [Heated oxygen sensor 2 (rear) signal] and ECM ground.
4) Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.56V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position .
   The voltage should be above 0.56V at least once during this procedure.
6) If NG, go to “Diagnostic Procedure”, EC-251.

Wiring Diagram

NGEC0159

EC-HO2S2-01





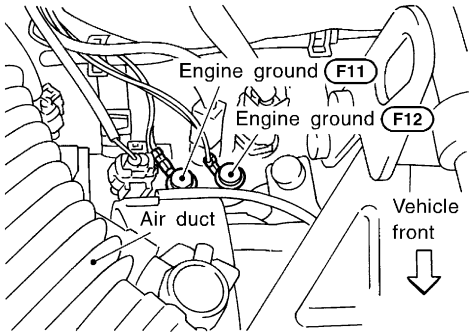
LEC477

Diagnostic Procedure

NGEC0160

1	RETIGHTEN GROUND SCREWS

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



SEF325V

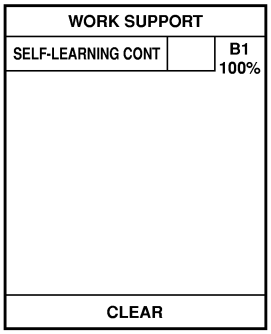
▶	GO TO 2.

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".

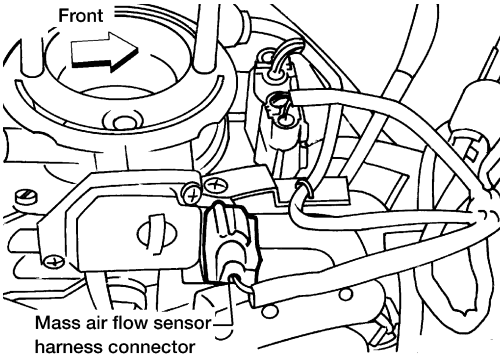


SEF215Z

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.



AEC131A

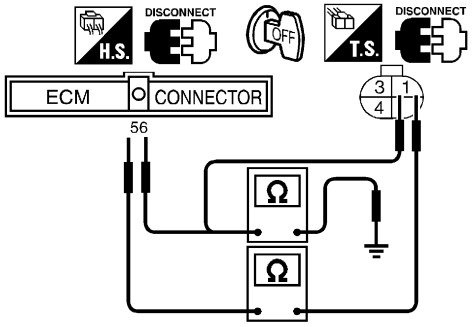
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-79.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle 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. Refer to EC-280.
No	▶	GO TO 3.

3	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect heated oxygen sensor 2 (rear) harness connector and ECM harness connector.
2. Check harness continuity between ECM harness connector F29 terminal 56 and terminal 1.



SEF157V

Continuity should exist.

3. Check harness continuity between ECM terminal 56 (or terminal 1) and ground.
Continuity should not exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M59, F27
- Harness for open or short between ECM and heated oxygen sensor 2 (rear)

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

5	CHECK GROUND CIRCUIT

1. Check harness continuity between heated oxygen sensor 2 (rear) connector M21 terminal 4 and engine ground. Refer to :Wiring Diagram", EC-250.
Continuity should exist.
2. Also check harness for short to power.

OK or NG

OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Repair open circuit or short to power in harness or connectors.

6	CHECK HEATED OXYGEN SENSOR 2 (REAR)

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%.

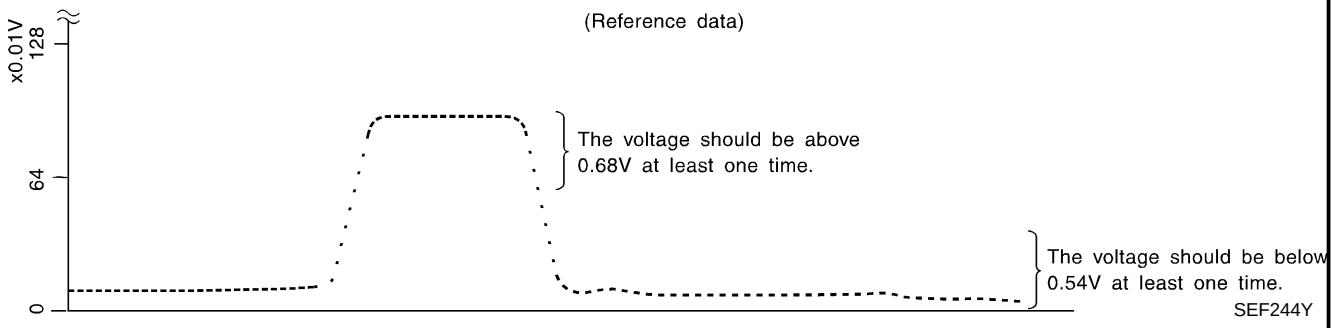
ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

"HO2S2 (B1)" should be above 0.56V 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.**



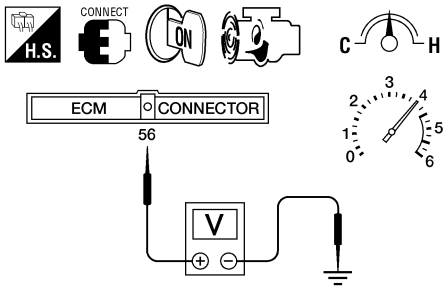
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace heated oxygen sensor 2 (rear).

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)

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 56 [Heated oxygen sensor 2 (rear) signal] and ECM ground.



AEC874A

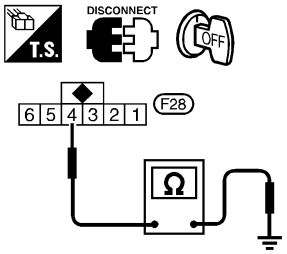
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.56V at least once.
   If the voltage is above 0.56V at step 4, step 5 is not necessary.
5. Check the voltage when revving up to 5,000 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 "O/D" 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.**

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace heated oxygen sensor 2 (rear).

8	CHECK SHIELD CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect harness connectors F28.
3. Check harness continuity between harness connector F28 terminal 4 and ground.



SEF698Z

Continuity should exist.

4. Also check harness for short to power.
5. Then reconnect harness connectors.

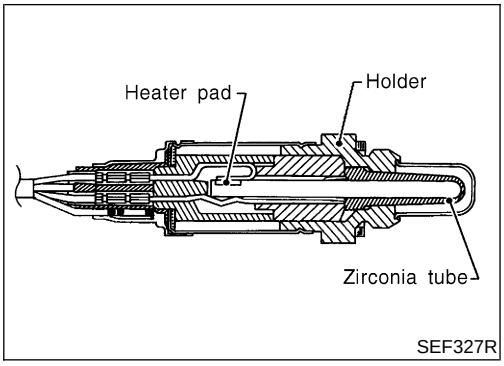
OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

Diagnostic Procedure (Cont'd)

9	DETECT MALFUNCTIONING PART
Check the following. ● Joint connector-1 (Refer to "HARNESS LAYOUT", ***EL-244***.) ● Harness for open or short between harness connector F28 and engine ground	
▶	Repair open circuit, short to ground or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**



Component Description

NGEC0162

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

NGEC0163

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

ECM Terminals and Reference Value

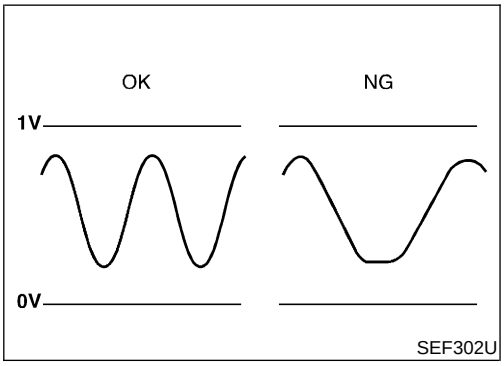
NGEC0164

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)
56	OR	Heated oxygen sensor 2 (rear)	**[Engine is running]** ● After warming up to normal operating temperature and revving engine from idle to 3,000 rpm	0 - Approximately 1.0V

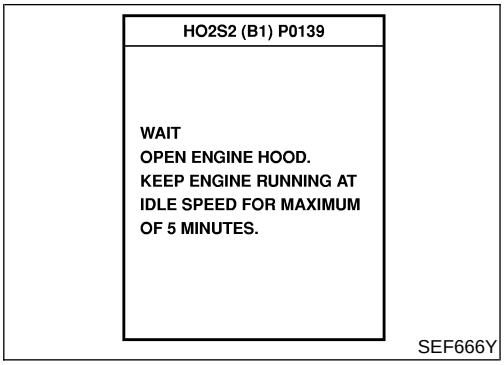


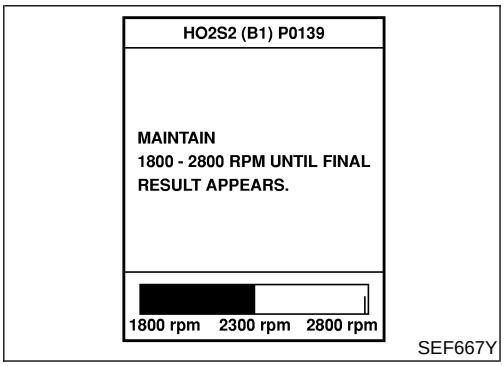
On Board Diagnosis Logic

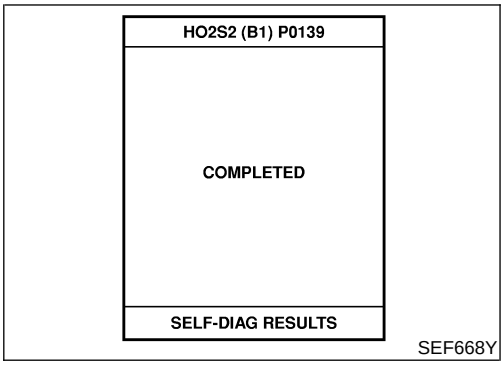
NGEC0165

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

NGEC0166

NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

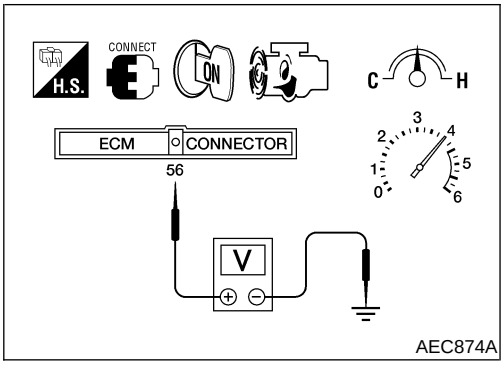
TESTING CONDITION:

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 5 seconds.
3) Turn ignition switch ON.
4) Select "DATA MONITOR" mode with CONSULT-II.
5) Make sure the "COOLANT TEMP/S" is more then 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 instructions of CONSULT-II.
8) Make sure the "OK" is displayed after touching "SELF-DIAG RESULTS".
   If NG is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-261.
   If "CAN NOT BE DIAGNOSED" is displayed, perform the following.

a) Stop engine and cool down "COOLANT TEMP/SE" to less then 70°C (158°F).
b) Turn ignition switch ON
c) Select "DATA MONITOR" mode with CONSULT-II.
d) Start engine.
e) Perform from step 6) again when the "COOLANT TEMP/S" reach to 70°C (158°F).



Overall Function Check

=NGEC0167

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.

CAUTION:

Always drive vehicle at a safe speed.

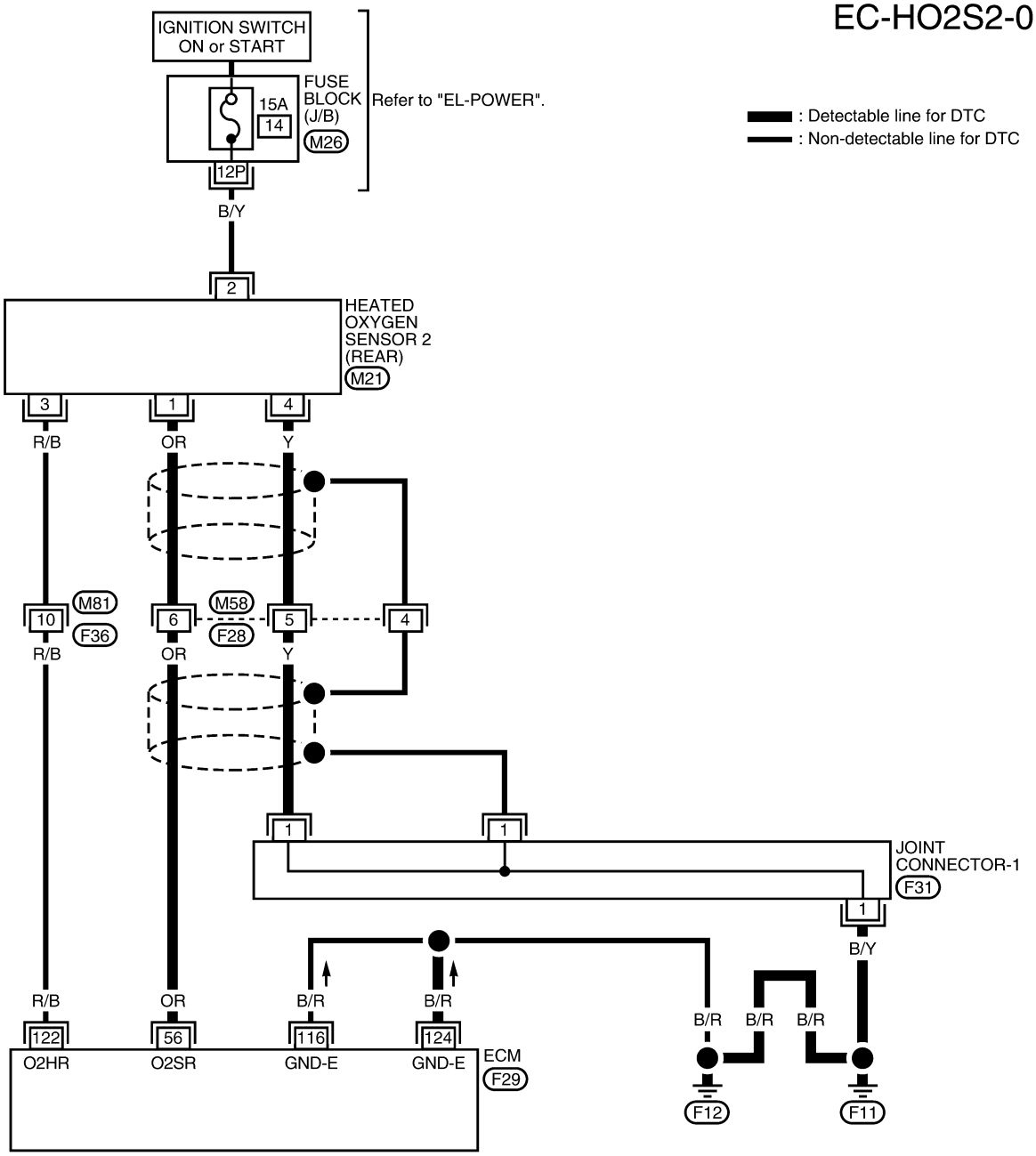
Without CONSULT-II

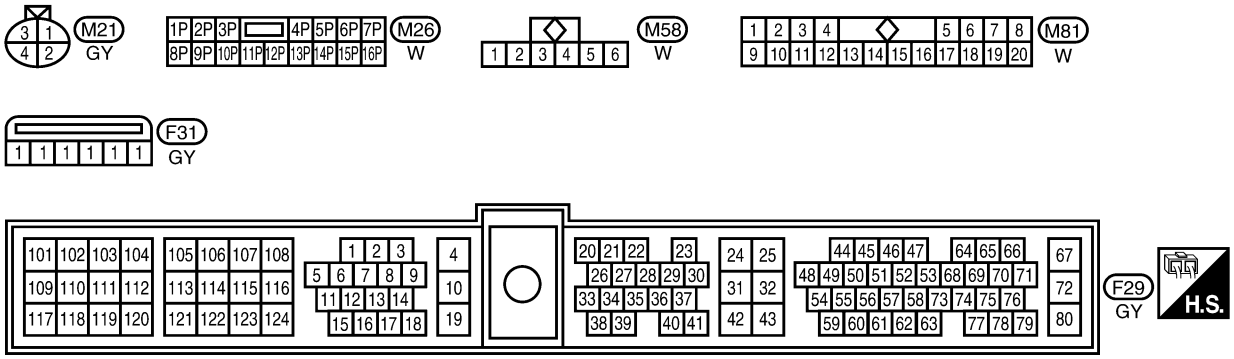
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 56 [Heated oxygen sensor 2 (rear) signal] and engine ground.
4) Check the voltage when revving up to 4,000 rpm under 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 idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
   The voltage should change at more than 0.06V for 1 second during this procedure.
6) If NG, go to “Diagnostic Procedure”, EC-261.

Wiring Diagram

NGEC0168

EC-HO2S2-01





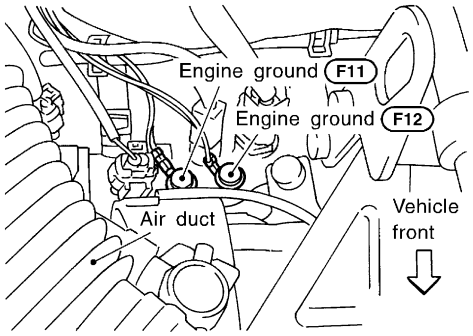
LEC477

Diagnostic Procedure

NGEC0169

1	RETIGHTEN GROUND SCREWS

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



SEF325V

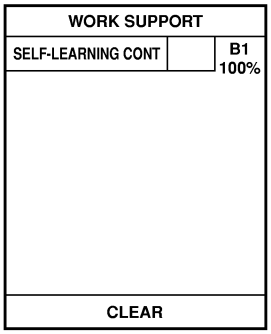
▶	GO TO 2.

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".

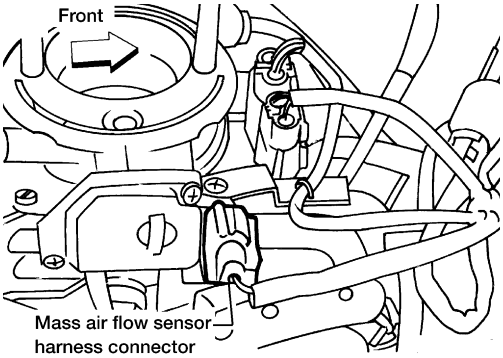


SEF215Z

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



AEC131A

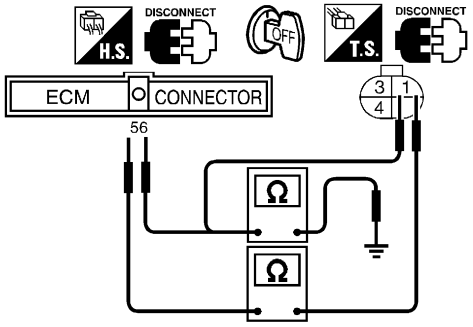
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-79.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle 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 or P0172. Refer to EC-280 or EC-287.
No	▶	GO TO 3.

3	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect heated oxygen sensor 2 (rear) harness connector and ECM harness connector.
2. Check harness continuity between ECM terminal 56 and terminal 1.



SEF157V

Continuity should exist.

3. Check harness continuity between ECM terminal 56 (or terminal 1) and ground.
Continuity should not exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M59, F27
- Harness for open or short between heated oxygen sensor 2 (rear) and ECM

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

5	CHECK GROUND CIRCUIT

1. Check harness continuity between heated oxygen sensor 2 (rear) terminal 4 and engine ground. Refer to the wiring diagram.
Continuity should exist.
2. Also check harness for short to power.

OK or NG

OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	GO TO 4.

6	CHECK HEATED OXYGEN SENSOR 2 (REAR)

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%.

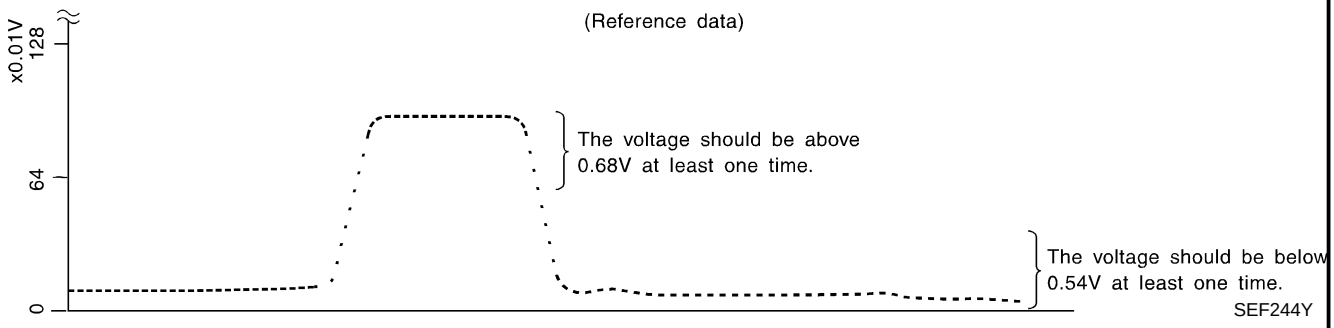
ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

"HO2S2 (B1)" should be above 0.56V 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.**



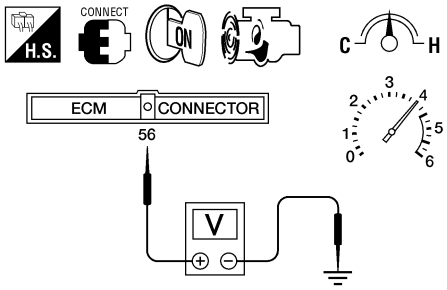
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace heated oxygen sensor 2 (rear).

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)

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 56 [Heated oxygen sensor 2 (rear) signal] and engine ground.



AEC874A

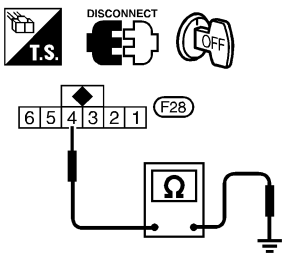
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.56V at least once.
   If the voltage is above 0.56V at step 4, step 5 is not necessary.
5. Check the voltage when revving up to 5,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
   The voltage should be 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.**

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace heated oxygen sensor 2 (rear).

8	CHECK SHIELD CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect harness connectors F28.
3. Check harness continuity between harness connector F28 terminal 4 and ground.



SEF698Z

Continuity should exist.

4. Also check harness for short to power.
5. Then reconnect harness connectors.

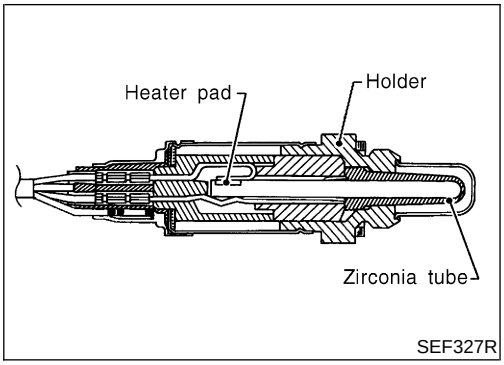
OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

Diagnostic Procedure (Cont'd)

9	DETECT MALFUNCTIONING PART
Check the following. ● Joint connector-1 (Refer to "HARNESS LAYOUT", ***EL-254***.) ● Harness for open or short between harness connector F28 and engine ground	
▶	Repair open circuit, short to ground or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**



Component Description

NGEC0171

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

NGEC0172

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

ECM Terminals and Reference Value

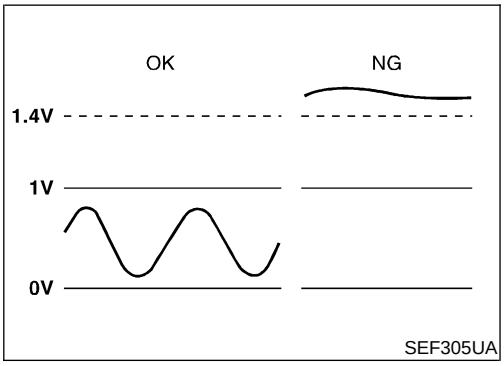
NGEC0173

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)
56	OR	Heated oxygen sensor 2 (rear)	**[Engine is running]** ● After warming up to normal operating temperature and revving engine from idle to 3,000 rpm	0 - Approximately 1.0V

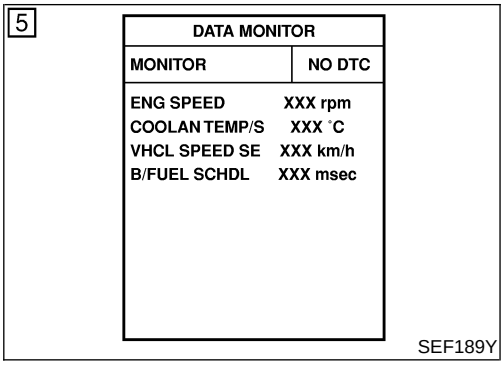


On Board Diagnosis Logic

NGEC0174

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

NGEC0175

NOTE:

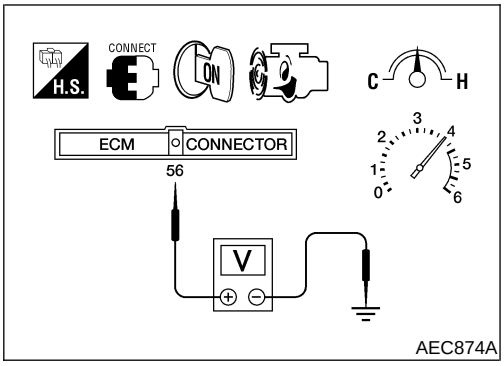
If “DTC Confirmation Procedure ” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-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) Maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	1,100 - 3,600 rpm
VHCL SPEED SE	32 - 120 km/h (20 - 75 MPH)
B/FUEL SCHDL	3.5 - 15.5 msec
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	Suitable position

4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-270.



Overall Function Check

NGEC0176

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.

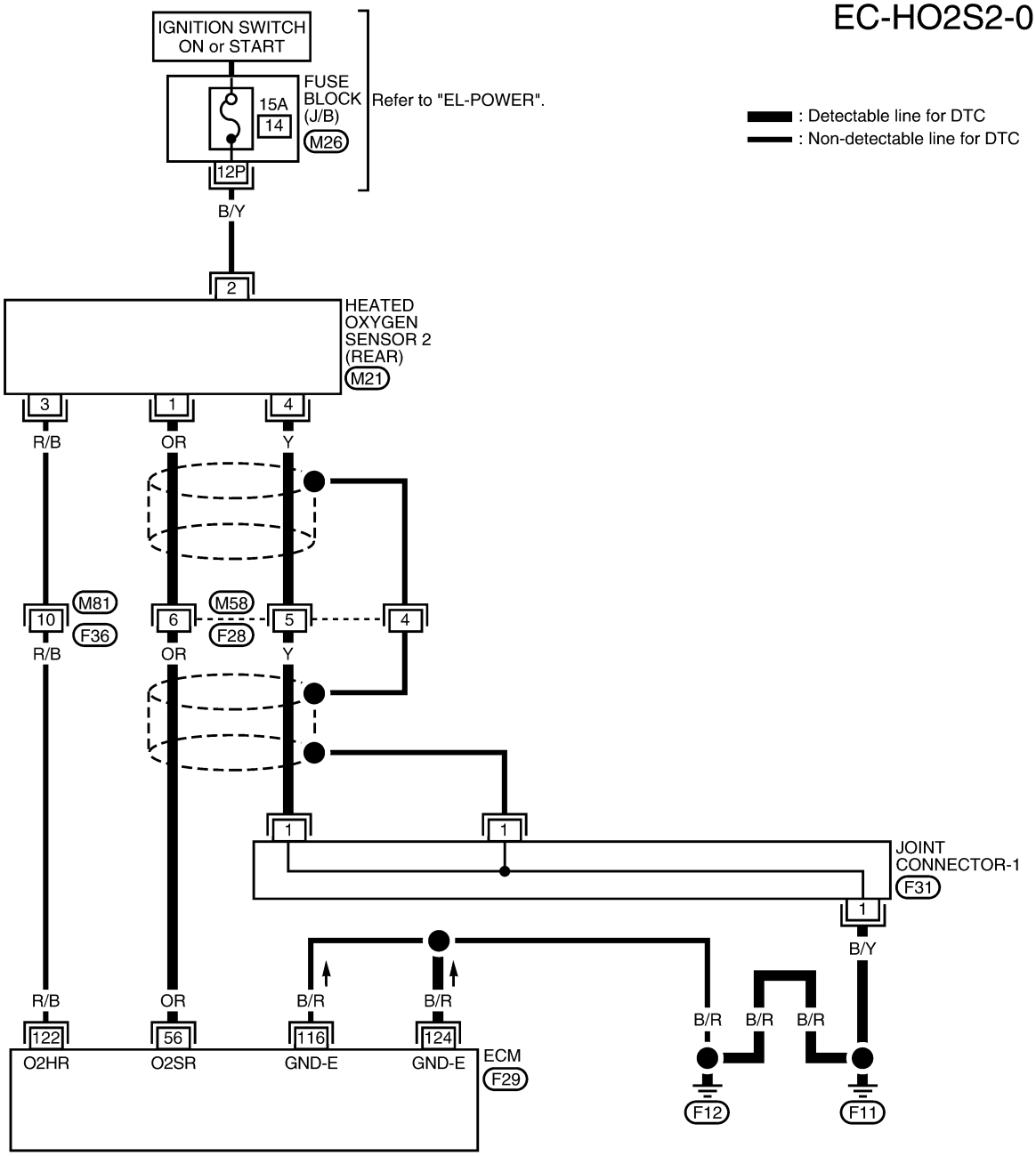
Without CONSULT-II

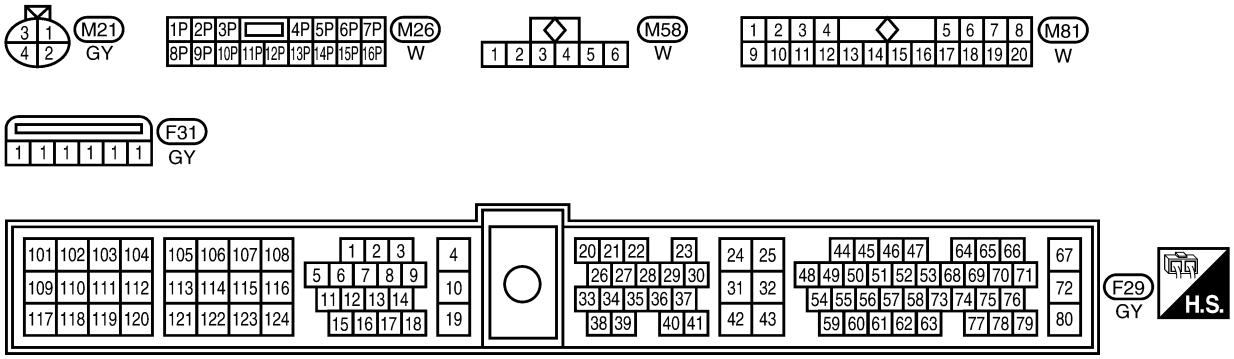
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminals 56 [Heated oxygen sensor 2 (rear) signal] and ECM ground.
4) Check the voltage after revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 1.4V during this procedure.
5) If NG, go to “Diagnostic Procedure”, EC-270.

Wiring Diagram

NGEC0177

EC-HO2S2-01





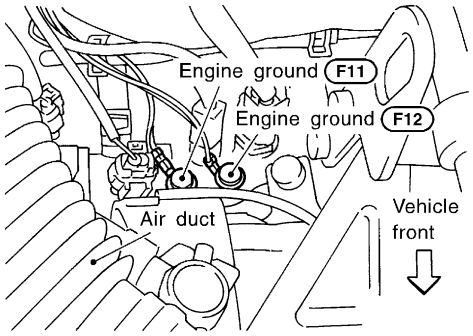
LEC477

Diagnostic Procedure

NGEC0178

1	RETIGHTEN GROUND SCREWS

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

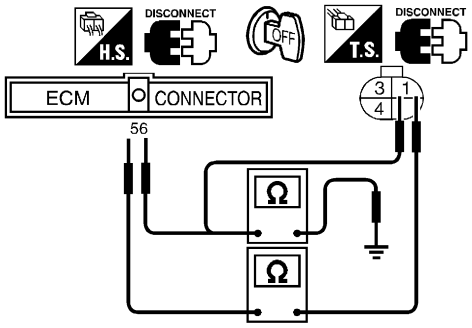


SEF325V

▶ GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect heated oxygen sensor 2 (rear) harness connector and ECM harness connector.
2. Check harness continuity between ECM terminal 56 and terminal 1.



SEF157V

Continuity should exist.

3. Check harness continuity between ECM terminal 56 (or terminal 1) and ground.

Continuity should not exist.

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

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between heated oxygen sensor 2 (rear) and ECM

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

4	CHECK GROUND CIRCUIT	
1. Check harness continuity between heated oxygen sensor 2 (rear) terminal 4 and engine ground. Refer to "Wiring Diagram", EC-269. **Continuity should exist.** 2. Also check harness for short to power. **OK or NG**		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

5	CHECK HARNESS CONNECTOR	
Check heated oxygen sensor 2 (rear) harness connector for water. **Water should not exist.** **OK or NG**		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Repair or replace harness connector.

6	CHECK HEATED OXYGEN SENSOR 2 (REAR)

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%.

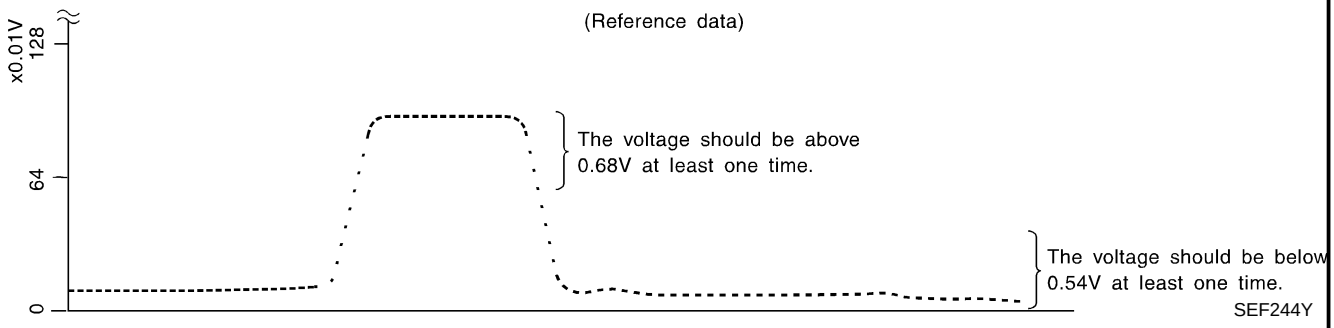
ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

"HO2S2 (B1)" should be above 0.56V 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.**



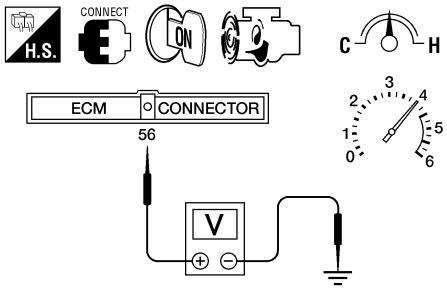
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace heated oxygen sensor 2 (rear).

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)

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 56 [Heated oxygen sensor 2 (rear) signal] and ECM ground.



AEC874A

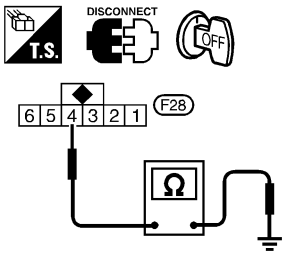
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.56V at least once.
   If the voltage is above 0.56V at step 4, step 5 is not necessary.
5. Check the voltage when revving up to 5,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
   The voltage should be 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.**

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace heated oxygen sensor 2 (rear).

8	CHECK SHIELD CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect harness connectors F28.
3. Check harness continuity between harness connector F28 terminal 4 and ground.



SEF698Z

Continuity should exist.

4. Also check harness for short to power.
5. Then reconnect harness connectors.

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

Diagnostic Procedure (Cont'd)

9	DETECT MALFUNCTIONING PART
Check the following. ● Joint connector-1 (Refer to "HARNESS LAYOUT", ***EL-254***.) ● Harness for open or short between harness connector F28 and engine ground	
▶	Repair open circuit, short to ground or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**

Description

NGEC0180

SYSTEM DESCRIPTION

NGEC0180S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Heated oxygen sensor 2 heater (rear) control	Heated oxygen sensor 2 heater (rear)

The ECM performs ON/OFF control of the heated oxygen sensor 2 (rear) heater corresponding to the engine speed.

OPERATION

NGEC0180S02

Engine condition	Heated oxygen sensor 2 heater (rear)
Ignition switch ON Engine stopped	OFF
Engine is running.	ON

CONSULT-II Reference Value in Data Monitor Mode

NGEC0181

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1)	• Engine speed: Idle [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]	ON
	• Ignition switch ON (Engine stopped)	OFF

ECM Terminals and Reference Value

NGEC0182

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)
122	R/B	Heated oxygen sensor 2 heater (rear)	**[Engine is running]** • After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more	Approximately 0.4V
			[Ignition switch "ON"] • Engine stopped	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0183

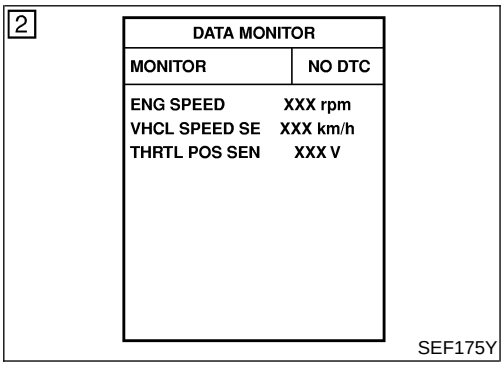
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0141	• The current amperage in the heated oxygen sensor 2 heater (rear) circuit is out of the normal range. [An improper voltage drop signal is sent to ECM through the heated oxygen sensor 2 heater (rear).]	• Harness or connectors [The heated oxygen sensor 2 heater (rear) circuit is open or shorted.] • Heated oxygen sensor 2 heater (rear)

DTC Confirmation Procedure

NGEC0184

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

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is in between 10.5V 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) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-278.

With GST

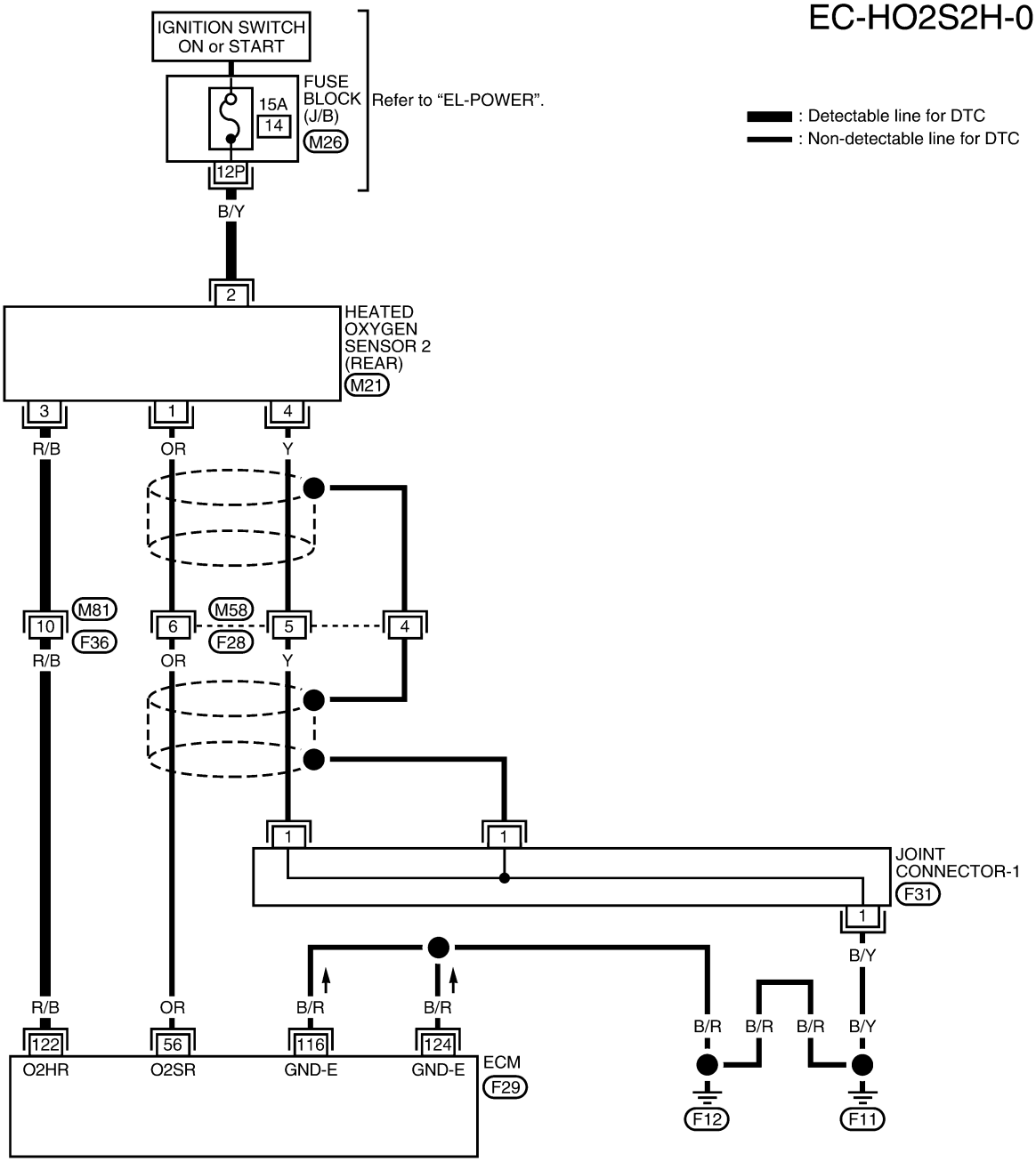
1) Start engine.
2) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3) Stop vehicle and let engine idle for at least 6 seconds.
4) Turn ignition switch OFF and wait at least 10 seconds.
5) Start engine.
6) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes
7) Stop vehicle and let engine idle for at least 6 seconds.
8) Select “MODE 3” with GST.
9) If DTC is detected, go to “Diagnostic Procedure”, EC-278.

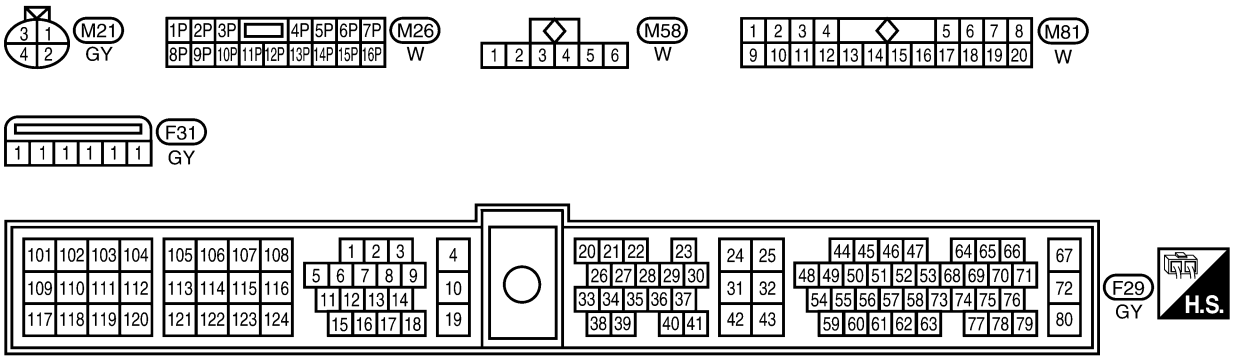
When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II or ECM (Diagnostic Test Mode II) because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II or ECM (Diagnostic Test Mode II) is recommended.

Wiring Diagram

NGEC0185

EC-HO2S2H-01





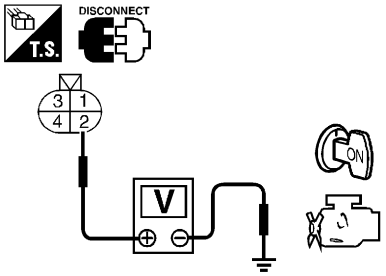
LEC478

Diagnostic Procedure

NGEC0186

1	CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 (rear) harness connector.
3. Turn ignition switch ON.
4. Check voltage between terminal 2 and ground.



SEF218W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- 15A fuse
- Harness for open or short between heated oxygen sensor 2 (rear) and 15A fuse

	▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between heated oxygen sensor 2 (rear) terminal 3 and ECM terminal 122. Refer to the wiring diagram.
   Continuity should exist.
4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

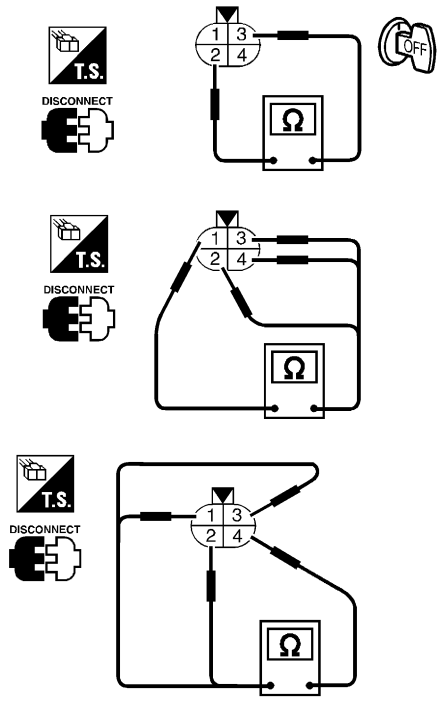
Check the following.
- Harness connectors M58, F28
- Harness for open or short between heated oxygen sensor 2 (rear) heater and ECM

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

5	CHECK HEATED OXYGEN SENSOR 2 HEATER (REAR)

Check the following.

1. Check resistance between terminals 2 and 3.



SEF221W

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	

MTBL0330

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.**

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-142.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NGEC0188

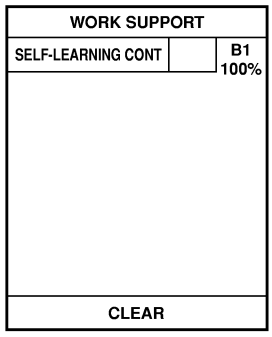
With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1 (front). The ECM calculates the necessary compensation to correct the offset between the actual 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

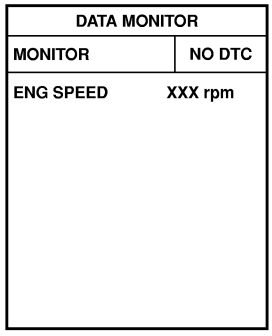
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0171	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	• Intake air leaks • Heated oxygen sensor 1 (front) • Injectors • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor

4

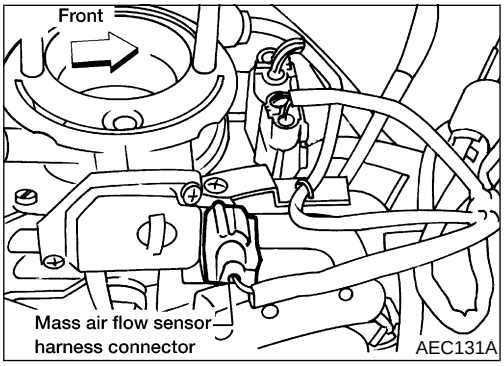


SEF215Z

6



SEF058Y



AEC131A

DTC Confirmation Procedure

NGEC0189

NOTE:

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

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON and select “SELF-LEARN CONTROL” in “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-283.
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-283. If engine does not start, visually check for exhaust and intake air leak.

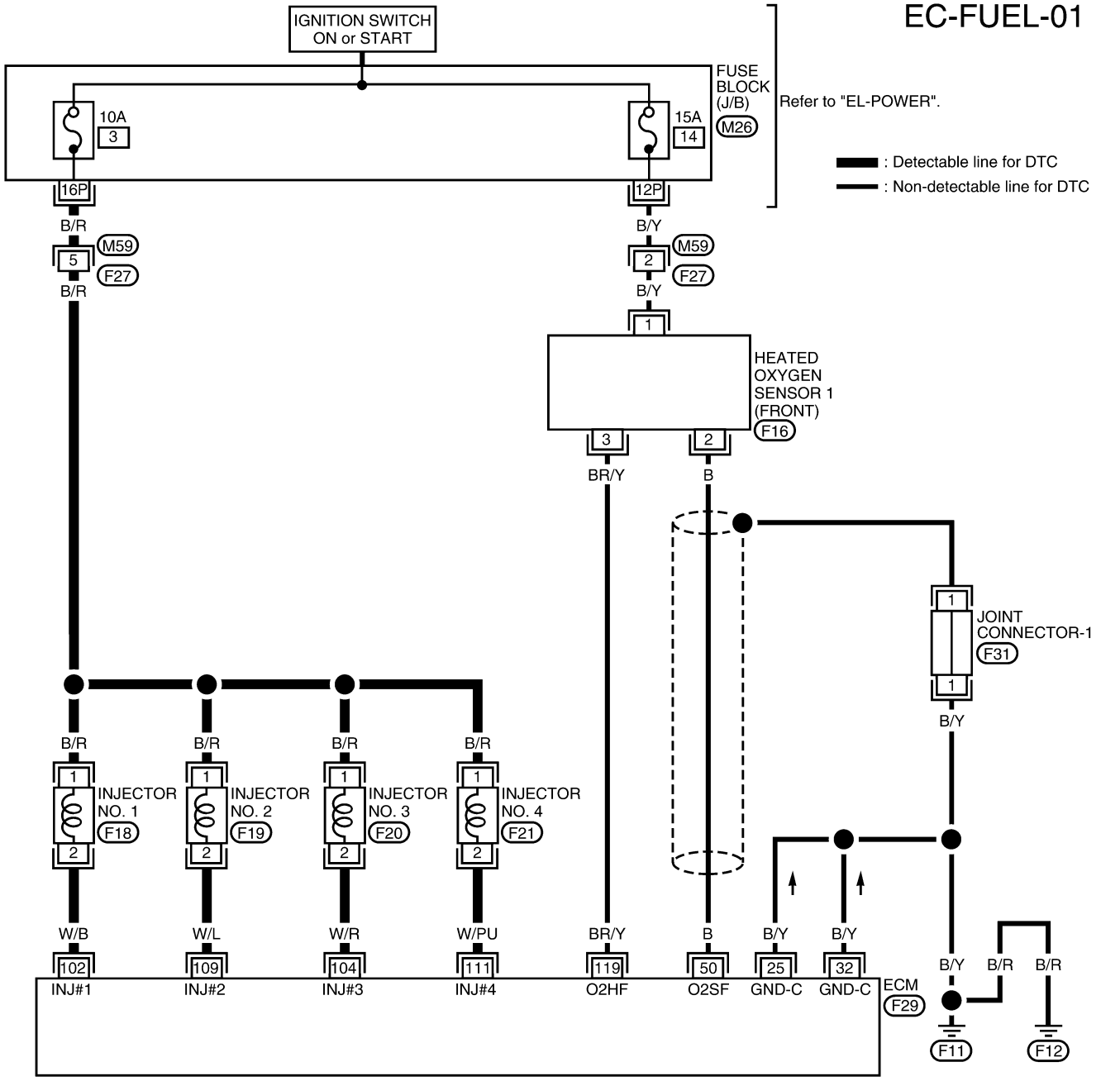
With GST

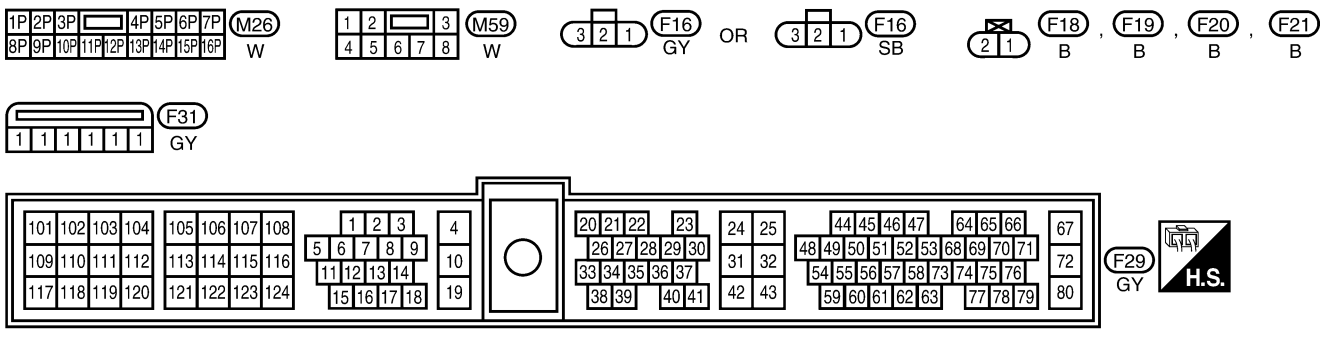
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Select “MODE 7” with GST. Make sure 1st trip DTC P0100 is detected.
6) Select “MODE 4” with GST and erase the 1st trip DTC P0100.

7) Start engine again and run it for at least 10 minutes at idle speed.
8) Select "MODE 7" with GST. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-283.
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-283. If engine does not start, visually check for exhaust and intake air leak.

Wiring Diagram

NGEC0190

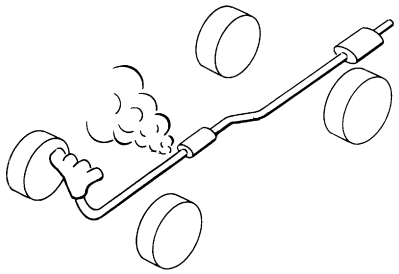




WEC938

Diagnostic Procedure

NGEC0191

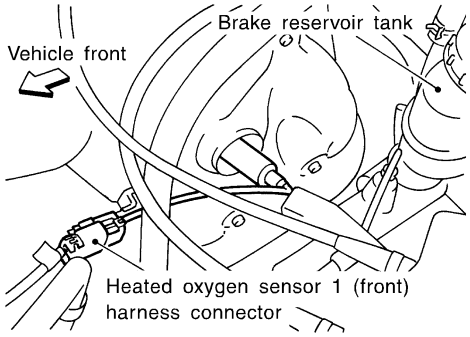
1	CHECK EXHAUST AIR LEAK	
1. Start engine and run it at idle. 2. Listen for an exhaust air leak before three way catalyst.  SEF099P **OK or NG**		
OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK FOR INTAKE AIR LEAK	
Listen for an intake air leak between the mass air flow sensor and the intake manifold. **OK or NG**		
OK	▶	GO TO 3.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

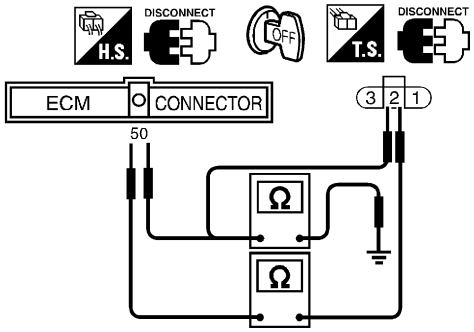
3	CHECK HEATED OXYGEN SENSOR 1 (FRONT) CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 (front) harness connector and ECM harness connector.



SEF331VA

3. Check harness continuity between ECM terminal 50 and terminal 2.



SEF141V

Continuity should exist.

4. Check harness continuity between ECM terminal 50 (or terminal 2) and ground.
   Continuity should not exist.
5. Also check harness for short to ground and short to power.

OK or NG

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

4	CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-51.
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-576.
- Fuel pressure regulator Refer to EC-52.
- Fuel lines Refer to "ENGINE MAINTENANCE", ***MA-19***.
- Fuel filter for clogging

	▶	Repair or replace.

6	CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II.
   at idling: 0.9 - 5.8 g·m/sec
   at 2,500 rpm: 7.5 - 13.2 g·m/sec

With GST

1. Start engine and warm it up to normal operating temperature.
2. Check mass air flow sensor signal in MODE 1 with GST.
   at idling: 0.9 - 5.8 g·m/sec
   at 2,500 rpm: 7.5 - 13.2 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-150.

7	CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Install all parts removed.
2. Start engine.
3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

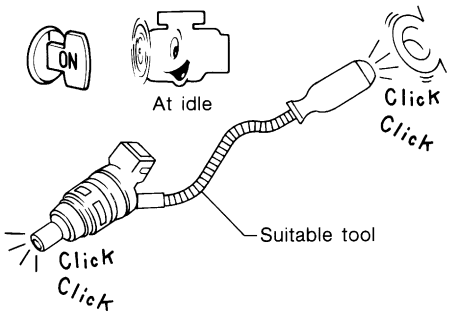
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

4. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-II

1. Install all parts removed.
2. Start engine.
3. Listen to each injector operating sound.



MEC703B

Clicking noise should be heard.

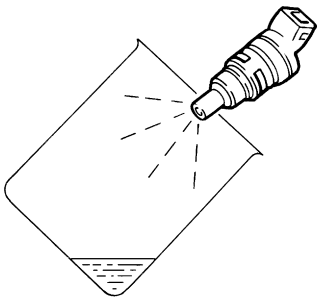
OK or NG

OK	▶	GO TO 8.
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-568.

Diagnostic Procedure (Cont'd)

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-52. 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 coil harness connectors. 2. Place pans or saucers under each injector. 3. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.	



SEF595Q

Fuel should be sprayed evenly for each cylinder.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace injectors from which fuel does not spray out. Always replace O-ring with new one.

10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NGEC0192

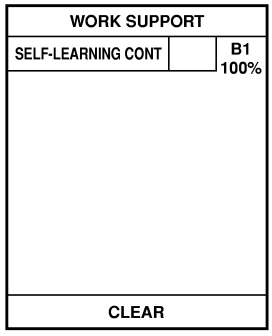
With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1 (front). The ECM calculates the necessary compensation to correct the offset between the actual 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

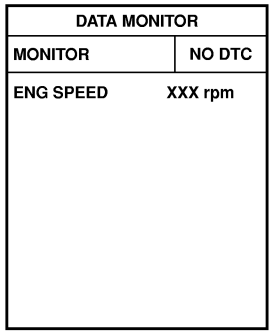
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0172	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	• Heated oxygen sensor 1 (front) • Injectors • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor

4

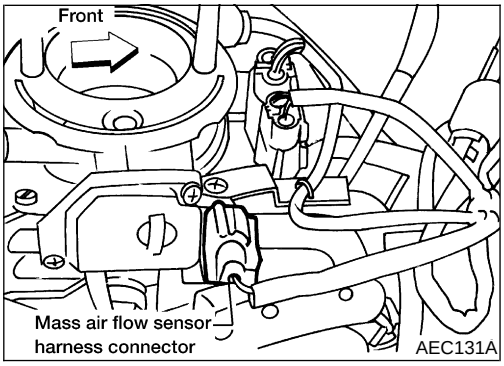


SEF215Z

6



SEF058Y



AEC131A

DTC Confirmation Procedure

NGEC0193

NOTE:

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

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON and select "SELF-LEARN CONTROL" in "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-290.
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-290. If engine does not start, remove ignition plugs and check for fouling, etc.

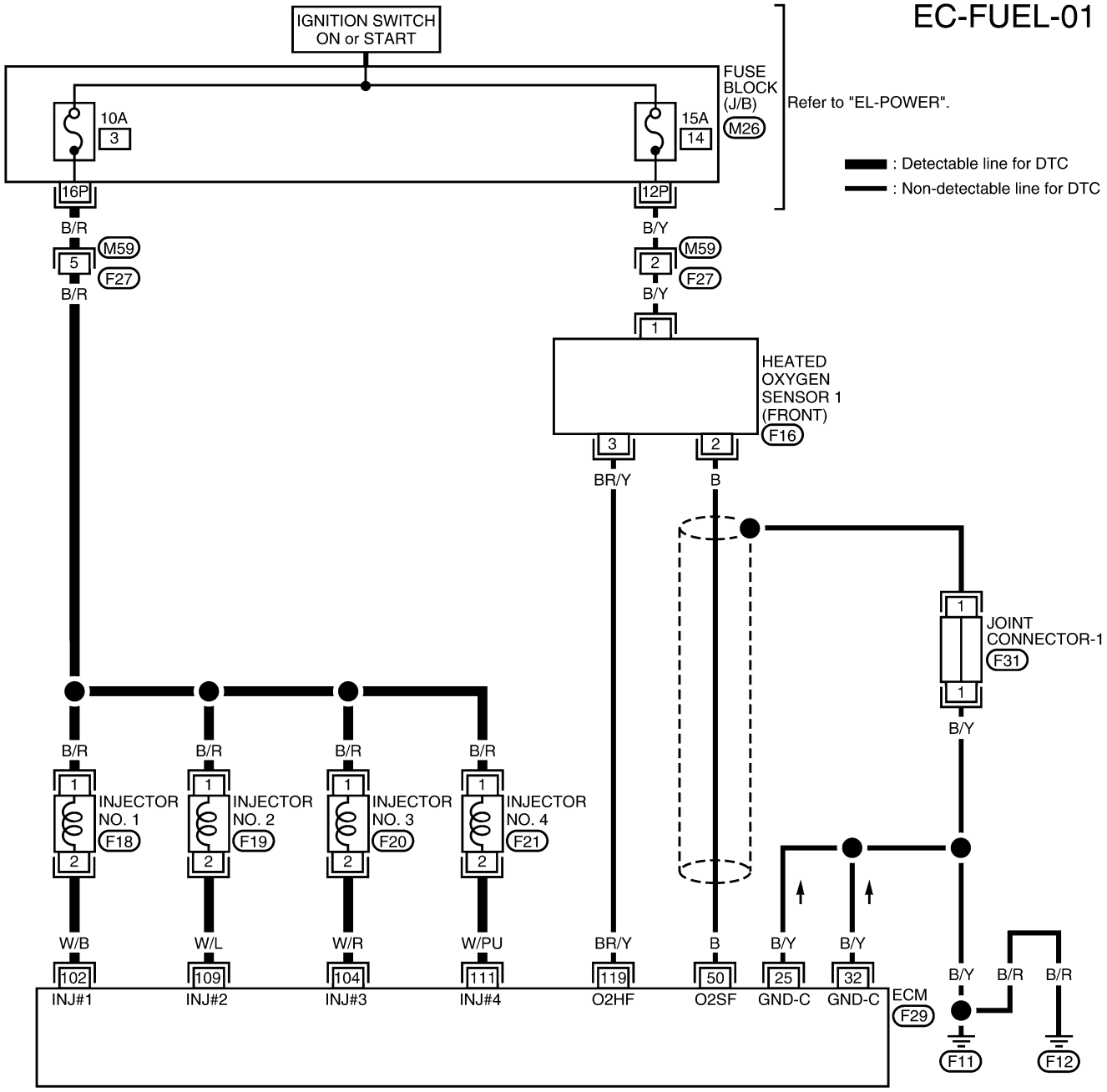
With GST

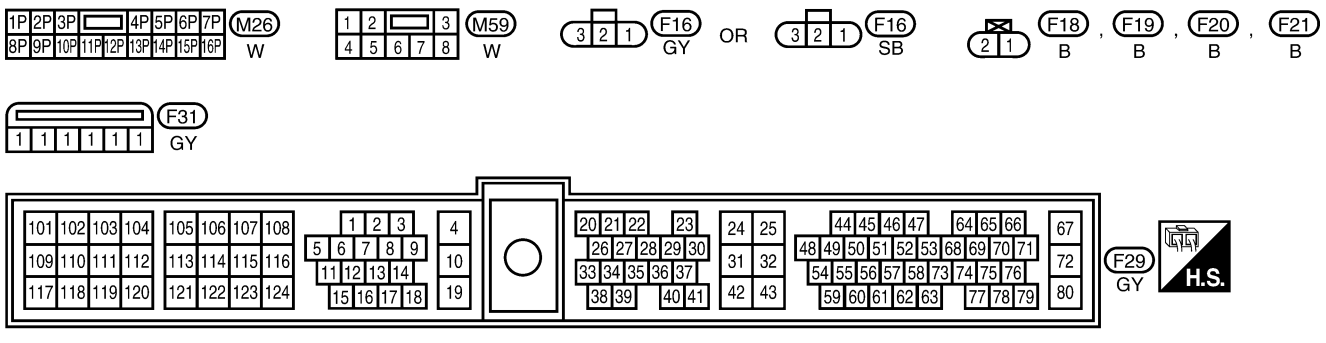
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Select "MODE 7" with GST. Make sure 1st trip DTC P0100 is detected.
6) Select "MODE 4" with GST and erase the 1st trip DTC P0100.

7) Start engine again and run it for at least 10 minutes at idle speed.
8) Select "MODE 7" with GST. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-290.
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-290. If engine does not start, remove ignition plugs and check for fouling, etc.

Wiring Diagram

NGEC0194





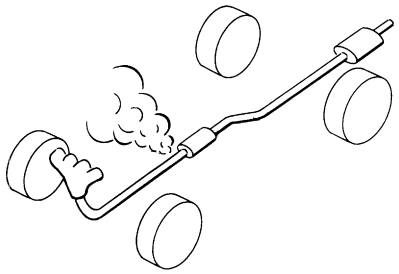
WEC938

Diagnostic Procedure

NGEC0195

1	CHECK FOR EXHAUST AIR LEAK

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



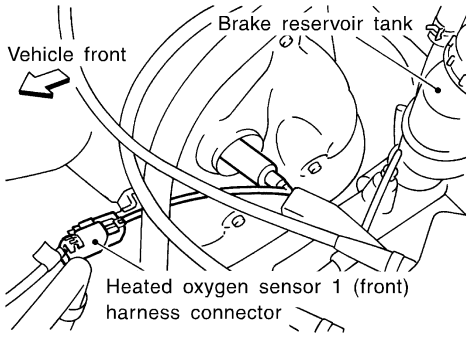
SEF099P

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace.

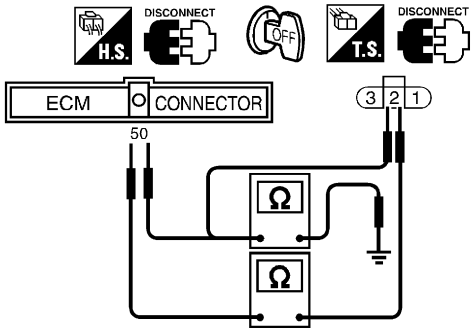
2	CHECK HEATED OXYGEN SENSOR 1 (FRONT) CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 (front) harness connector and ECM harness connector.



SEF331VA

3. Check harness continuity between ECM terminal 50 and terminal 2.



SEF141V

Continuity should exist.

4. Check harness continuity between ECM terminal 50 (or terminal 2) and ground.

Continuity should not exist.

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

OK or NG

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

3	CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-51.
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-576.)
- Fuel pressure regulator (Refer to EC-52.)

	▶	Repair or replace.

5	CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II.

at idling: 0.9 - 5.8 g·m/sec

at 2,500 rpm: 7.5 - 13.2 g·m/sec

With GST

1. Start engine and warm it up to normal operating temperature.
2. Check mass air flow sensor signal in MODE 1 with GST.

at idling: 0.9 - 5.8 g·m/sec

at 2,500 rpm: 7.5 - 13.2 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-155.

Diagnostic Procedure (Cont'd)

6	CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Install all parts removed.
2. Start engine.
3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

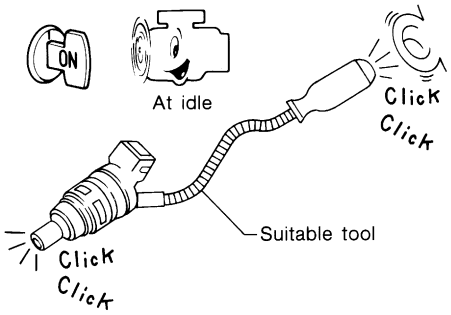
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

4. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-II

1. Install all parts removed.
2. Start engine.
3. Listen to each injector operating sound.



MEC703B

Clicking noise should be heard.

OK or NG

OK	▶	GO TO 7.
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-568.

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-52.
   Keep fuel hose and all injectors connected to injector gallery.

	▶	GO TO 8.

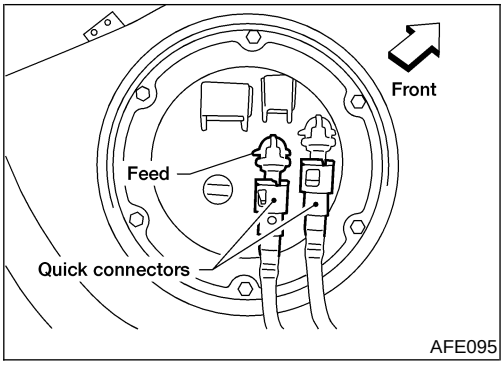
8	CHECK INJECTOR

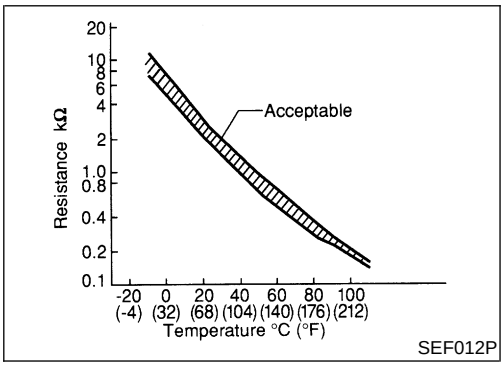
1. Disconnect all injector harness connectors.
2. Disconnect all ignition coil harness connectors.
3. Prepare pans or saucers under each injectors.
4. Crank engine for about 3 seconds.
   Make sure fuel does not drip from injector.

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-142.	
▶	INSPECTION END





Component Description

NGEC0196

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 60 (Fuel tank temperature sensor) and ground.

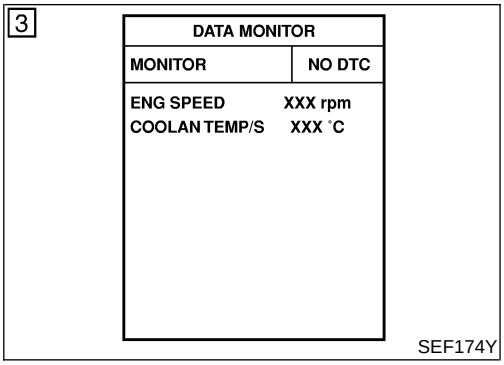
CAUTION:

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

NGEC0197

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

=NGEC0198

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

With CONSULT-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-297.
   If the result is OK, go to following step.

NOTE:
If "COOLAN TEMP/S" is already less than 60°C (140°F) before step 4), the result will be OK. If "COOLAN TEMP/S" is above 60°C (140°F), go to the 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-297.

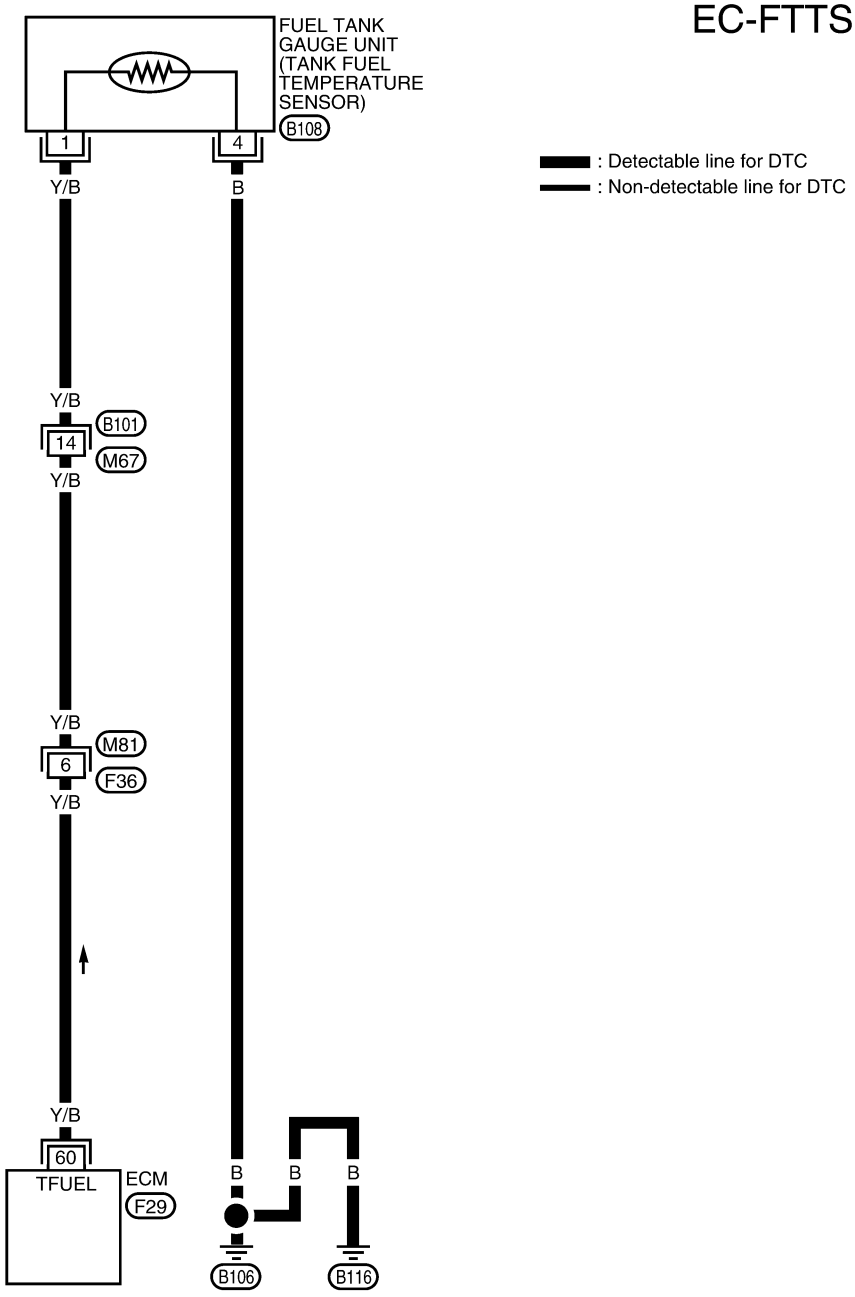
With GST

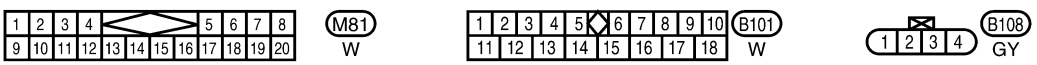
Follow the procedure "With CONSULT-II".

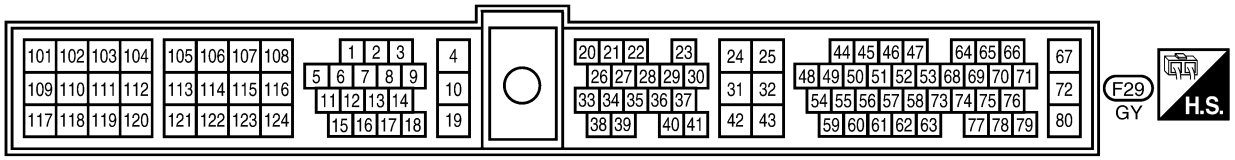
Wiring Diagram

NGEC0199

EC-FTTS-01







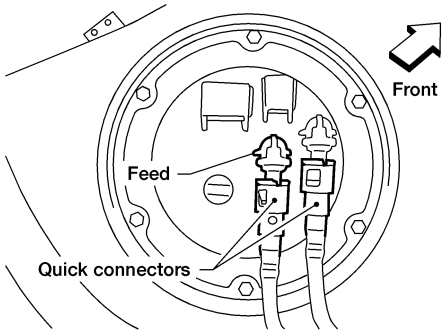
LEC480

Diagnostic Procedure

NGEC0200

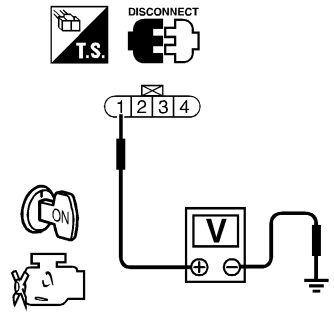
1	CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit harness connector.



AFE095

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



SEF708Z

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

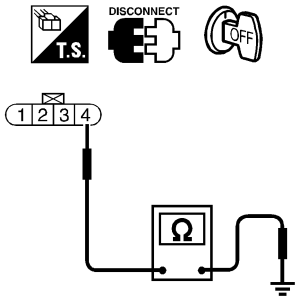
Check the following.
- Harness connectors B101, M67
- Harness connectors M81, F36
- Harness for open or short between ECM and fuel tank temperature sensor

	▶	Repair harness or connector.

Diagnostic Procedure (Cont'd)

3	CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check harness continuity between terminal 4 and body ground.



SEF709Z

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

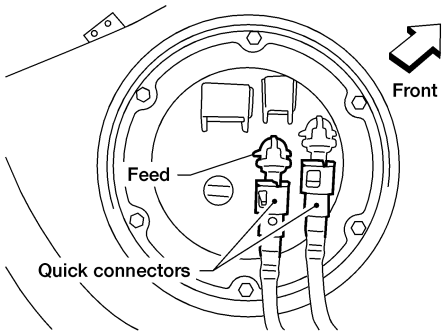
4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B101, M67
- Harness for open or short between ECM and body ground

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

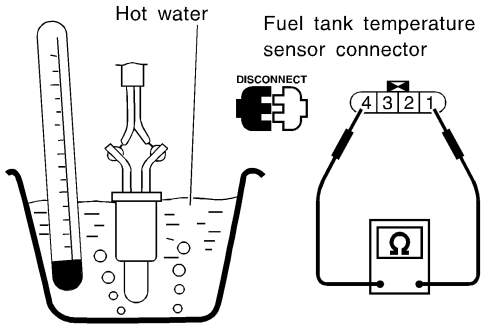
5	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.



AFE095

2. Check resistance by heating with hot water or heat gun as shown in the figure.



SEF710Z

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

MTBL0291

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace fuel tank temperature sensor.

6	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NGEC0202

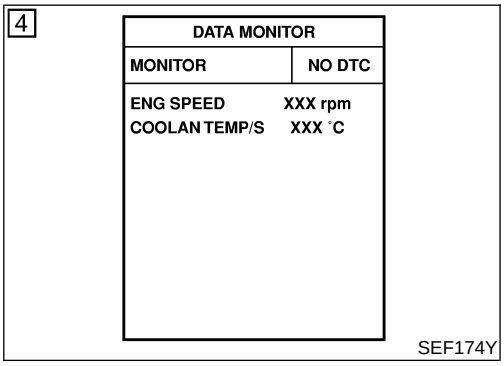
When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the CKP sensor signal to vary, the ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (OBD)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.
   If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0300	• Multiple cylinders misfire.	• Improper spark plug • Insufficient compression • Incorrect fuel pressure • EGR valve • The injector circuit is open or shorted • Injectors • Intake air leak • The ignition secondary circuit is open or shorted • Lack of fuel • Flywheel • Heated oxygen sensor 1 (front) • Incorrect distributor rotor
P0301	• No. 1 cylinder misfires.	
P0302	• No. 2 cylinder misfires.	
P0303	• No. 3 cylinder misfires.	
P0304	• No. 4 cylinder misfires.	



DTC Confirmation Procedure

NGEC0203

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

With CONSULT-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 5 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-301.

With GST

Follow the procedure “With CONSULT-II”.

Diagnostic Procedure

NGEC0204

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-465. **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.

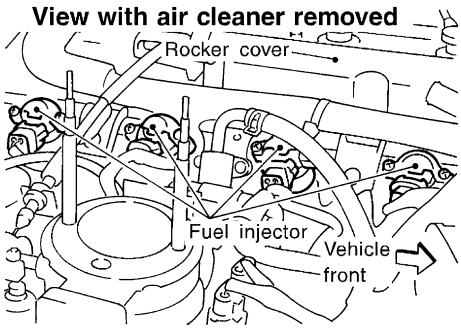
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

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?



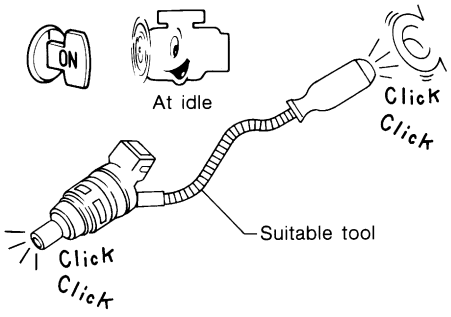
SEF319V

Yes or No

Yes	▶	GO TO 5.
No	▶	GO TO 8.

5	CHECK INJECTOR

Does each injector make an operating sound at idle?



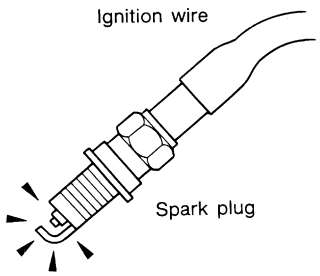
MEC703B

Yes or No

Yes	▶	GO TO 6.
No	▶	Check injector(s) and circuit(s). Refer to EC-568.

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.



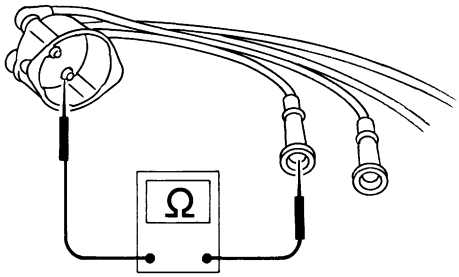
SEF282G

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	CHECK IGNITION WIRES

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.



SEF174P

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.

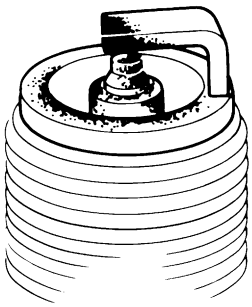
OK or NG

OK	▶	Check distributor rotor head for incorrect parts. Check ignition coil, power transistor and their circuits. Refer to EC-559.
NG	▶	Replace.

Diagnostic Procedure (Cont'd)

8	CHECK SPARK PLUGS

Remove the spark plugs and check for fouling, etc.



SEF156I

OK or NG

OK	▶	GO TO 9.
NG	▶	Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to "ENGINE MAINTENANCE", ***MA-16***.

9	CHECK COMPRESSION PRESSURE

Refer to ***EM-15***.

- Check compression pressure.

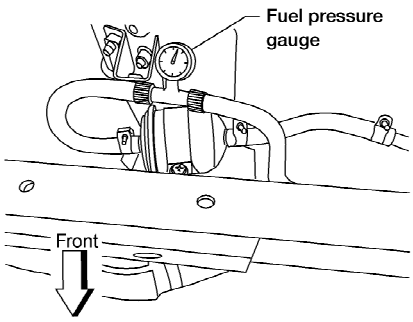
Standard:
1,226 kPa (12.5 kg/cm^2, 178 psi)/300 rpm
Minimum:
1,030 kPa (10.5 kg/cm^2, 149 psi)/300 rpm
Difference between each cylinder:
98 kPa (1.0 kg/cm^2, 14 psi)/300 rpm

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-51.
3. Install fuel pressure gauge and check fuel pressure.



AEC064B

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-576. ● Fuel pressure regulator Refer to EC-52. ● Fuel lines Refer to "ENGINE MAINTENANCE", ***MA-19***. ● Fuel filter for clogging	
▶	Repair or replace.

12	CHECK IGNITION TIMING

1. Check the following items. Refer to "Basic Inspection", EC-104.

Items	Specifications
Ignition timing	20° ± 2° BTDC
Base idle speed	750 ± 50 rpm (in "P" or "N" position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF
Target idle speed	800 ± 50 rpm (in "P" or "N" position)

MTBL0328

OK or NG

OK (With CONSULT-II)	▶	GO TO 13.
OK (Without CONSULT-II)	▶	GO TO 14.
NG	▶	Adjust ignition timing.

13	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode, and the trigger point is adjusted to 100%.
3. Select "HO2S1 (B1)" and "HO2S1 MNTR (B1)" in item selection.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "START" on CONSULT-II screen.

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

6. 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:

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

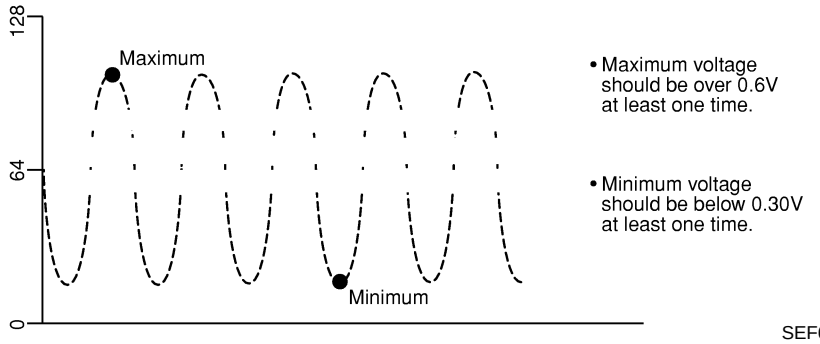
R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

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.

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



SEF648Y

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.**

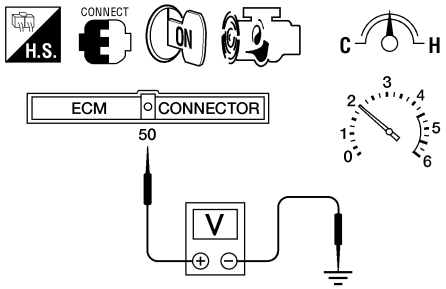
OK or NG

OK	▶	GO TO 15.
NG	▶	Replace heated oxygen sensor 1 (front).

14	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and ECM ground.



AEC873A

3. Check the following with engine speed held at 2,000 rpm constant under no load.

- Malfunction indicator lamp goes on more than five times within 10 seconds in Diagnostic Test Mode II [HEATED OXYGEN SENSOR 1 MONITOR].
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

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

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace heated oxygen sensor 1 (front).

15	CHECK MASS AIR FLOW SENSOR

With CONSULT-II

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

at idling: 0.9 - 5.8 g·m/sec
at 2,500 rpm: 7.5 - 13.2 g·m/sec

With GST

Check mass air flow sensor signal in MODE 1 with GST.

at idling: 0.9 - 5.8 g·m/sec
at 2,500 rpm: 7.5 - 13.2 g·m/sec

OK or NG

OK	▶	GO TO 17.
NG	▶	GO TO 16.

16	CHECK CONNECTORS

Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds.
Refer to EC-150.

OK or NG

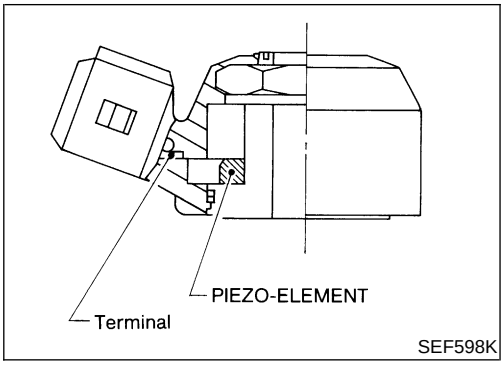
NG	▶	Repair or replace it.

Diagnostic Procedure (Cont'd)

17	CHECK SYMPTOM MATRIX CHART	
Check items on the rough idle symptom in "Symptom Matrix Chart", EC-120.		
OK or NG		
OK	▶	GO TO 18.
NG	▶	Repair or replace.

18	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-79.		
	▶	GO TO 19.

19	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.		
	▶	**INSPECTION END**



Component Description

NGEC0206

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

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

ECM Terminals and Reference Value

NGEC0207

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

CAUTION:

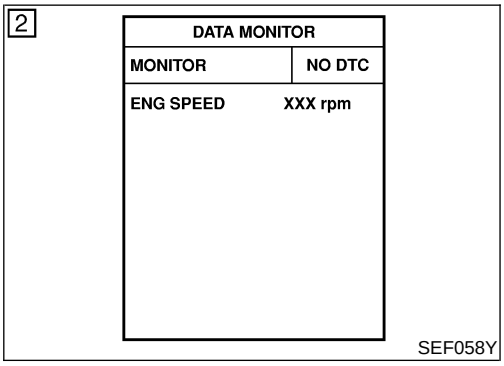
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
64	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.4V

On Board Diagnosis Logic

NGEC0208

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

NGEC0209

NOTE:

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

TESTING CONDITION:

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

With CONSULT-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-311.

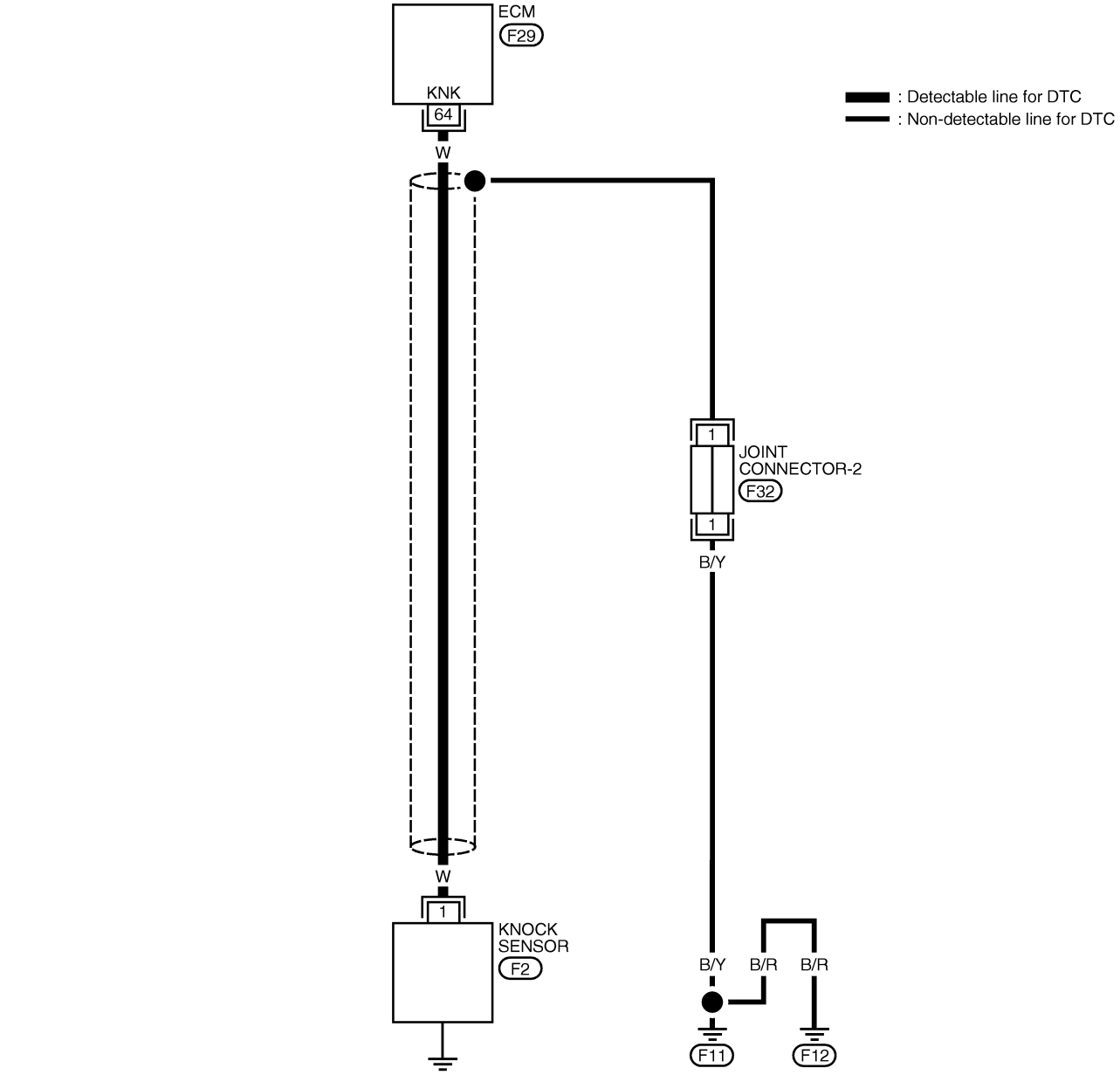
With GST

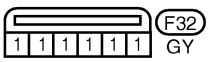
Follow the procedure "With CONSULT-II".

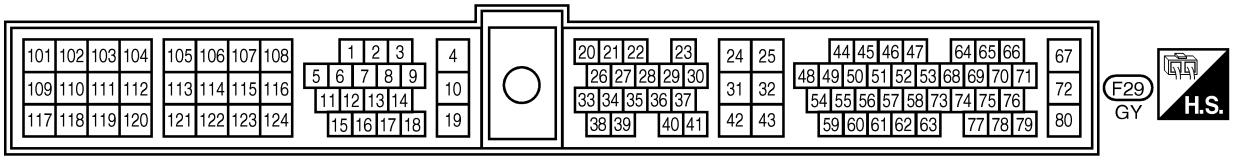
Wiring Diagram

NGEC0210

EC-KS-01







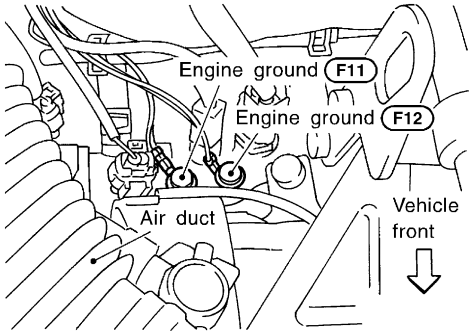
AEC992A

Diagnostic Procedure

NGEC0211

1	RETIGHTEN GROUND SCREWS

Loosen and retighten engine ground screws.

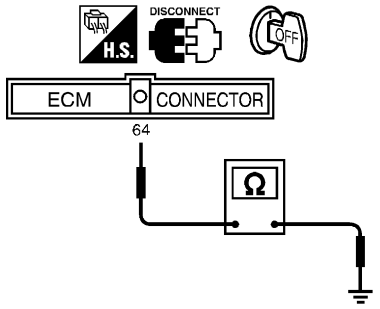


SEF325V

▶ GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 64 and ground.



SEF173V

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

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

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 ECM.

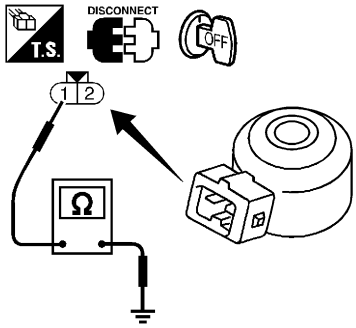
OK or NG

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 KNOCK SENSOR

Use an ohmmeter which can measure more than 10 MΩ.
1. Disconnect knock sensor harness connector.
2. Check resistance between terminal 1 and ground.



SEF174V

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

CAUTION:

Discard any knock sensors that have been dropped or physically damaged. Use only new ones.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace knock sensor.

5	CHECK SHIELD CIRCUIT

1. Turn ignition switch OFF.
2. Remove joint connector-1.
3. Check the following. Refer to the wiring diagram.
- Continuity between joint connector-1 terminal 2 and ground
- Joint connector-1 (Refer to "HARNESS LAYOUT", ***EL-254***.)

Continuity should exist.

4. Also check harness for short to power.
5. Then reconnect harness connectors.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

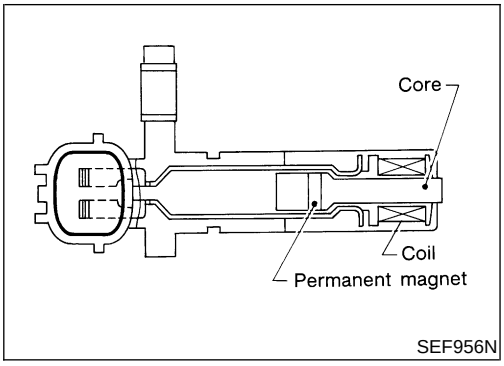
Check the joint connector-2. (Refer to "HARNESS LAYOUT", ***EL-254***.)

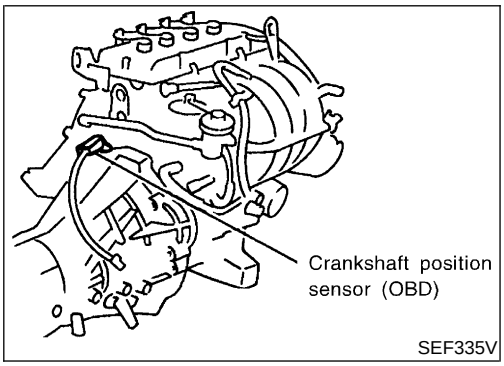
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.

	▶	**INSPECTION END**





Component Description

NGEC0213

The crankshaft position sensor (OBD) is located on the transaxle housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet, core and coil.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.
This sensor is not directly used to control the engine system. It is used only for the on board diagnosis.

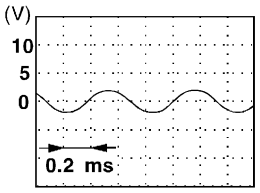
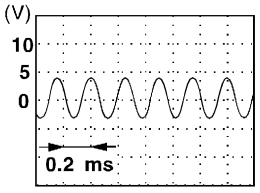
ECM Terminals and Reference Value

NGEC0214

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

CAUTION:

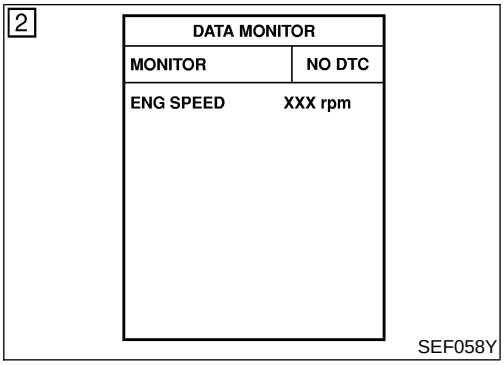
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
47	L	Crankshaft position sensor (OBD)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	
			[Engine is running] ● Engine speed is 2,000 rpm	

On Board Diagnosis Logic

NGEC0215

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0335	● The proper pulse signal from the crankshaft position sensor (OBD) is not sent to ECM while the engine is running at the specified engine speed.	● Harness or connectors (The crankshaft position sensor (OBD) circuit is open.) ● Crankshaft position sensor (OBD) ● Dead battery



DTC Confirmation Procedure

NGEC0216

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

With CONSULT-II

1) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine and run it for at least 15 seconds at idle speed.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-316.

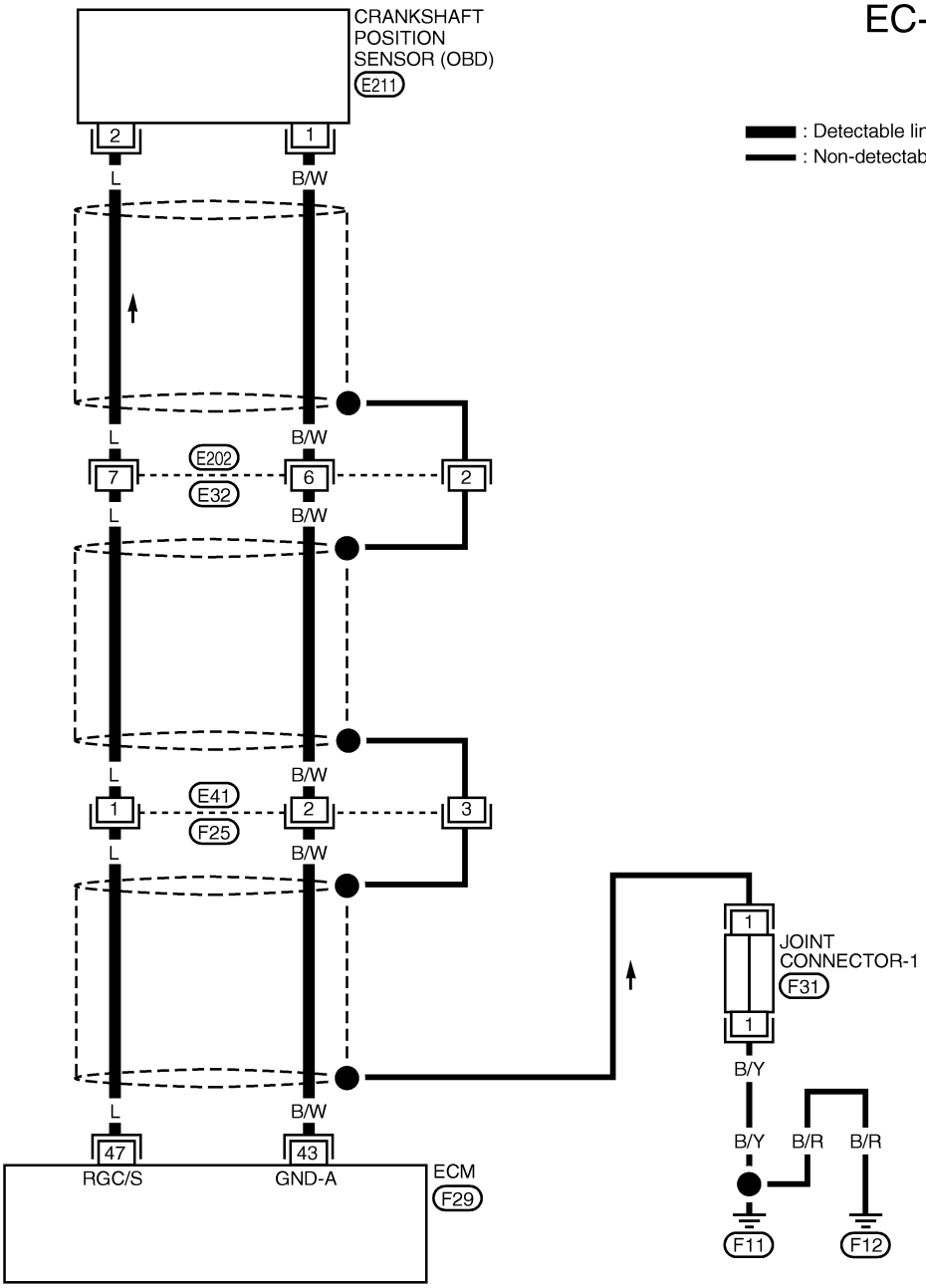
With GST

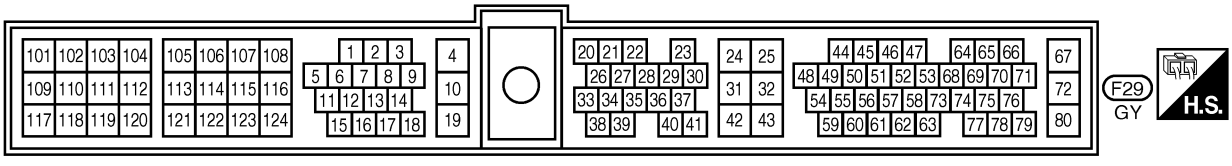
Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0217

EC-CKPS-01





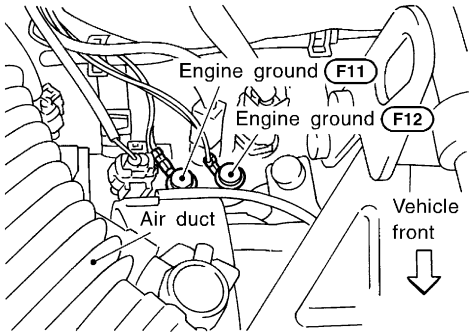
AEC993A

Diagnostic Procedure

NGEC0218

1	RETIGHTEN GROUND SCREWS

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

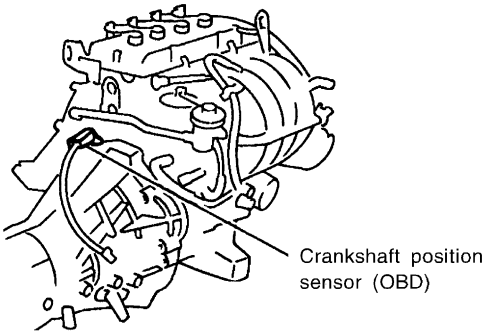


SEF325V

▶ GO TO 2.

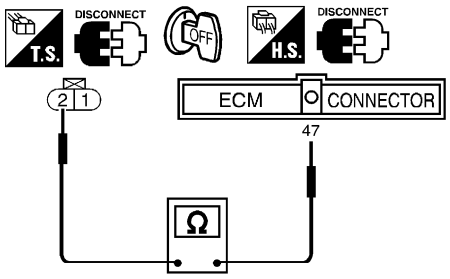
2	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.



SEF335V

2. Check continuity between ECM terminal 47 and terminal 2.



SEF175V

Continuity should exist.

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

OK or NG

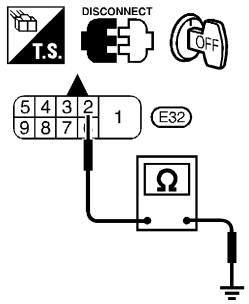
OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E202, E32 ● Harness connectors E41, F25 ● Harness for open or short between crankshaft position sensor (OBD) and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK GROUND CIRCUIT
1. Reconnect ECM harness connector. 2. Check harness continuity between crankshaft position sensor (OBD) terminal 1 and engine ground. Refer to the wiring diagram. **Continuity should exist.** 3. Also check harness for short to power. **OK or NG**	
OK ▶	GO TO 6.
NG ▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E202, E32 ● Harness connectors E41, F25 ● Harness for open or short between crankshaft position sensor (OBD) and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK SHIELD CIRCUIT
1. Turn ignition switch OFF. 2. Disconnect harness connector E32. 3. Check harness continuity between harness connector E32 terminal 2 and ground.	



SEF177V

Continuity should exist.

4. Also check harness for short to power.
5. Then reconnect harness connectors.

OK or NG

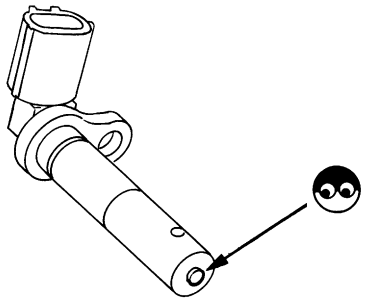
OK ▶	GO TO 8.
NG ▶	GO TO 7.

Diagnostic Procedure (Cont'd)

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E41, F25 ● Joint connector-1 (Refer to "HARNESS LAYOUT", ***EL-254***.) ● Harness for open or short between harness connector E32 and Engine ground	
▶	Repair open circuit or short to power in harness or connectors.

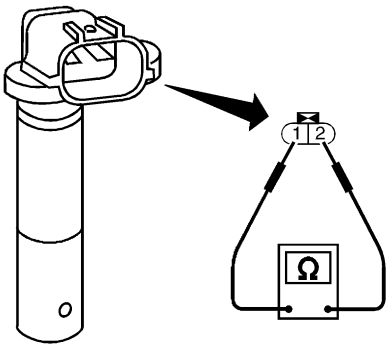
8	CHECK CRANKSHAFT POSITION SENSOR (OBD)

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



SEF960N

5. Check resistance as shown in the figure.



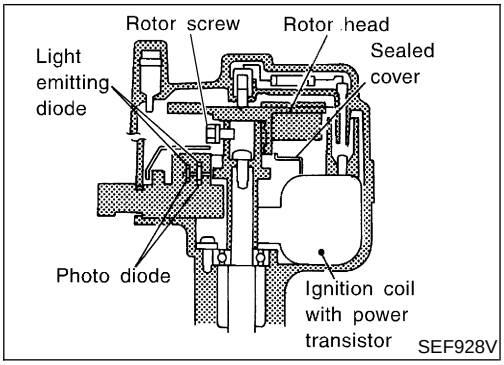
SEF231W

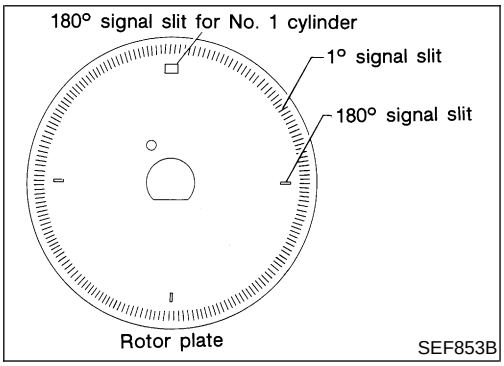
Resistance: Approximately 512 - 632Ω [at 20°C (68°F)]

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace crankshaft position sensor (OBD).

9	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**





Component Description

NGEC0220

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

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

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

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

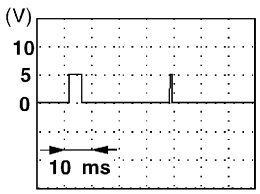
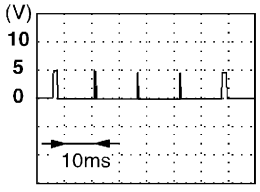
ECM Terminals and Reference Value

NGEC0221

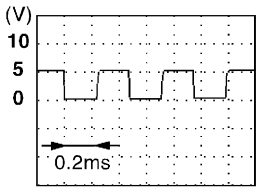
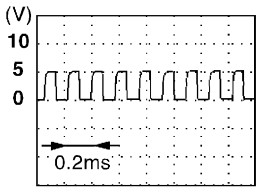
Specification data are reference values and are measured between each terminal and ground.

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)
4	LG/R	ECCS relay (Self shut-off)	**[Engine is running]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
44	PU	Camshaft position sensor (Reference signal)	**[Engine is running]** (Warm-up condition) ● Idle speed	0.2 - 0.5V 
48	PU		**[Engine is running]** ● Engine speed is 2,000 rpm	0 - 0.5V 

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	LG	Camshaft position sensor (Position signal)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.6V 
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2.5 - 2.6V 
67	B/P	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0222

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0340	A)	Either 1° or 180° signal is not sent to ECM for the first few seconds during engine cranking.	● Harness or connectors (The camshaft position sensor circuit is open or shorted.) ● Camshaft position sensor ● Starter motor (Refer to EL section.) ● Starting system circuit (Refer to EL section.) ● Dead (Weak) battery
	B)	Either 1° or 180° signal is not sent to ECM often enough while the engine speed is higher than the specified engine speed.	
	C)	The relation between 1° and 180° signal is not in the normal range during the specified engine speed.	

DTC Confirmation Procedure

=NGEC0223

Perform "Procedure for malfunction A" first. If DTC cannot be confirmed, perform "Procedure for malfunction B and C".

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

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

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NGEC0223S01

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-323.

With GST

Follow the procedure "With CONSULT-II".

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B AND C

NGEC0223S02

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-323.

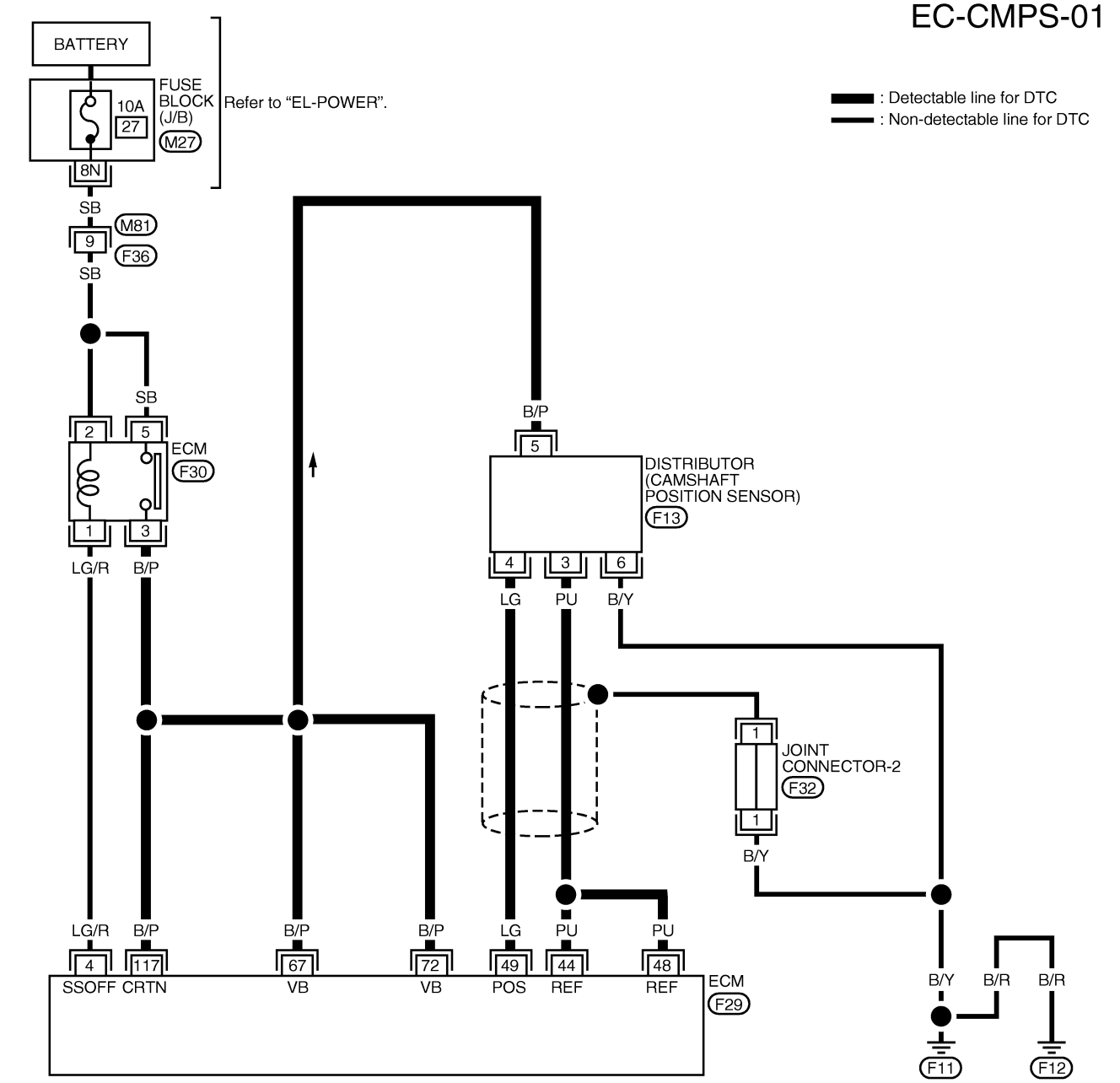
With GST

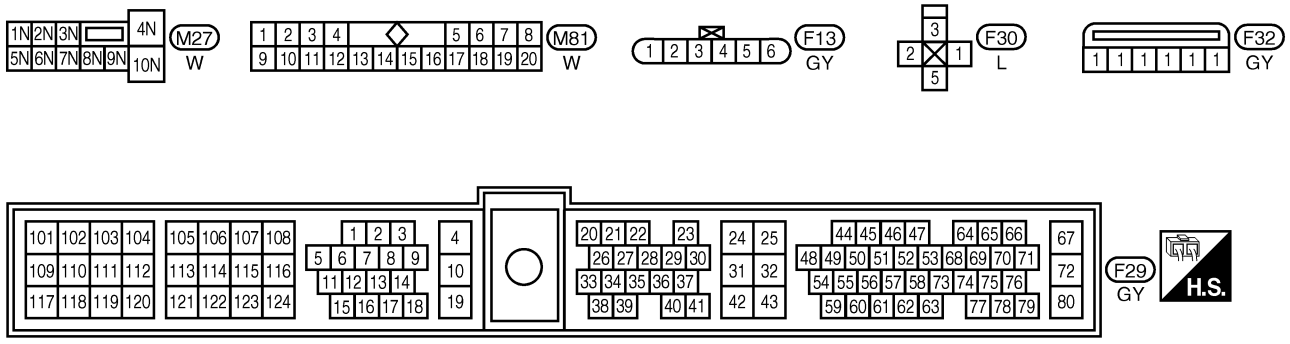
Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC0224

EC-CMPS-01



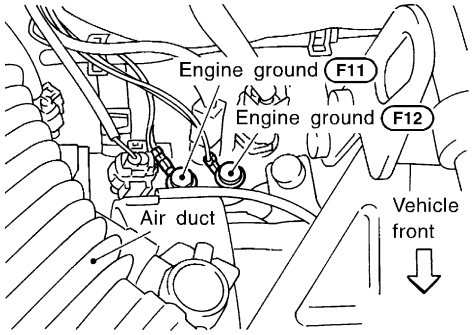


AEC994A

Diagnostic Procedure

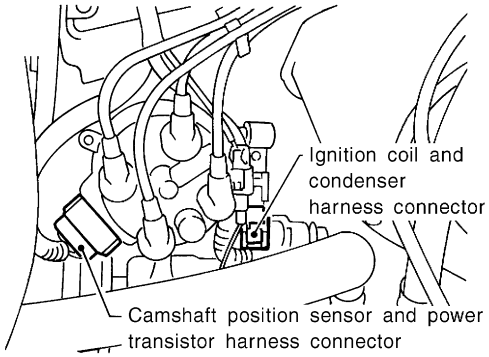
NGEC0225

1	CHECK STARTING SYSTEM	
Does the engine turn over? (Does the starter motor operate?) **Yes or No**		
Yes	▶	GO TO 2.
No	▶	Check starting system. (Refer to EL section.)

2	RETIGHTEN GROUND SCREWS	
1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.  SEF325V		
	▶	GO TO 3.

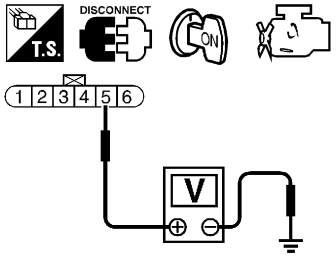
3	CHECK POWER SUPPLY

1. Disconnect camshaft position sensor harness connector.



SEF128S

2. Turn ignition switch ON.
3. Check voltage between terminal 5 and ground with CONSULT-II or tester.



SEF040S

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

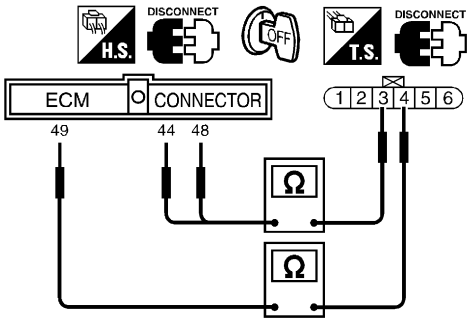
4	DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between camshaft position sensor and ECM relay
- Harness for open or short between camshaft position sensor and ECM

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

5	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between sensor terminal 4 and ECM terminal 49, sensor terminal 3 and ECM terminals 44, 48.



SEF178V

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 (camshaft position sensor) terminal 6 and engine ground. Refer to the wiring diagram.
   Continuity should exist.
3. Also check harness for short to power.

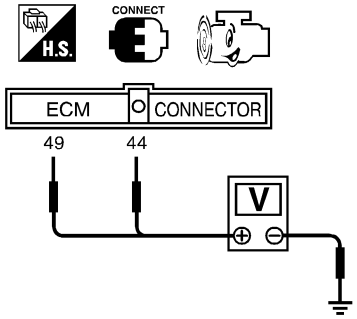
OK or NG

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

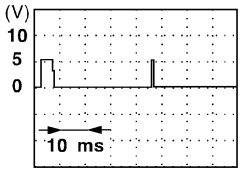
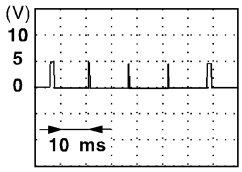
Diagnostic Procedure (Cont'd)

7	CHECK CAMSHAFT POSITION SENSOR

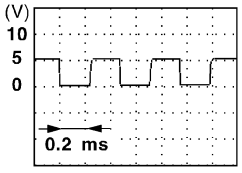
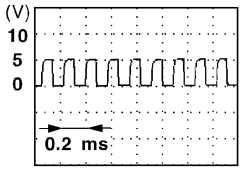
1. Start engine and warm it up to normal operating temperature.
2. Check voltage between ECM terminal 49 and engine ground, ECM terminal 44 and engine ground.



Terminal 44 and engine ground

Condition	Idle	2,000 rpm
Voltage	0.2 - 0.5V	0 - 0.5V
Pulse signal		

Terminal 49 and engine ground

Condition	Idle	2,000 rpm
Voltage	Approximately 2.6V	Approximately 2.5 - 2.6V
Pulse signal		

SEF868Z

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace camshaft position sensor.

8	CHECK SHIELD CIRCUIT

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

- Continuity between joint connector-1 terminal 2 and ground
- Joint connector-1

(Refer to "HARNESS LAYOUT", ***EL-254***.)

Continuity should exist.

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

OK or NG

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

9	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**

Description

SYSTEM DESCRIPTION

NGEC0227

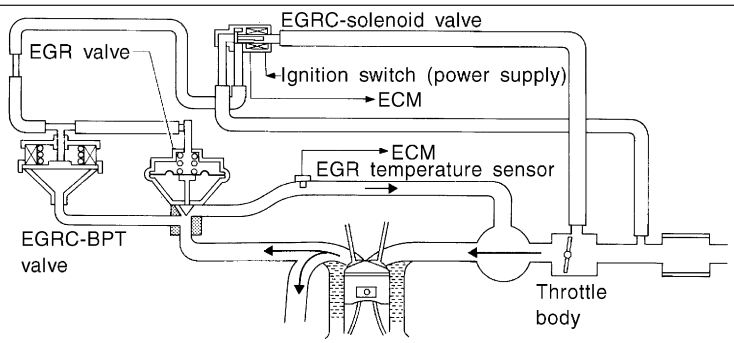
NGEC0227S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EGR control	EGRC-solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Intake air temperature sensor	Intake air temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Vehicle speed sensor	Vehicle speed		

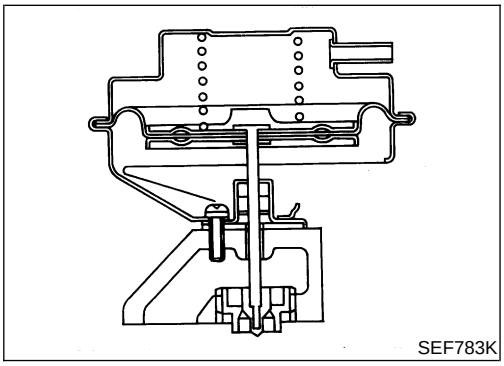
This system cuts and controls vacuum applied to the EGR valve to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM and the EGRC-solenoid valve. When the ECM detects any of the following conditions, current flows through the solenoid valve is cut. This causes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

- Low engine coolant temperature
- Engine starting
- High-speed engine operation
- Engine idling
- Excessively high engine coolant temperature
- Mass air flow sensor malfunction
- Low intake air temperature

EGR and vacuum



SEF641Q



SEF783K

COMPONENT DESCRIPTION

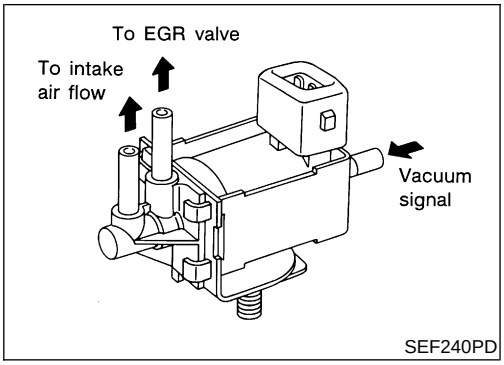
NGEC0227S02

Exhaust Gas Recirculation (EGR) Valve

NGEC0227S0201

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

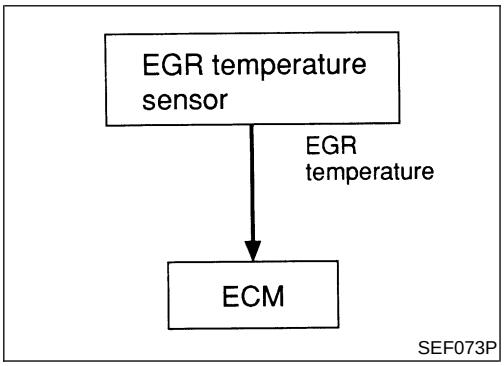
Description (Cont'd)



EGRC-Solenoid Valve

NGEC0227S0202

The EGRC-solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. The vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve.
When the ECM sends an OFF signal, a plunger will then move to cut the vacuum signal from the intake manifold collector to the EGR valve.

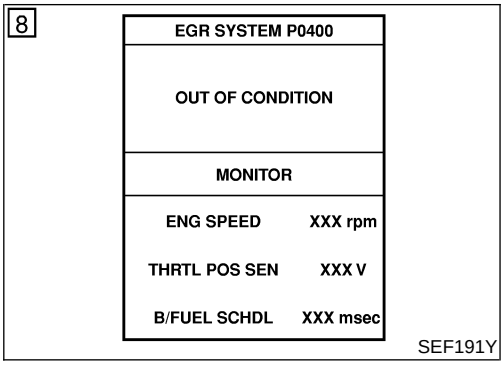


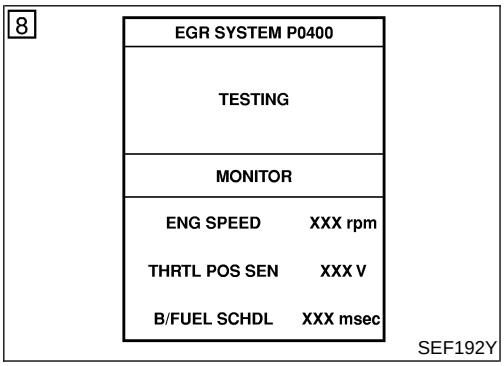
On Board Diagnosis Logic

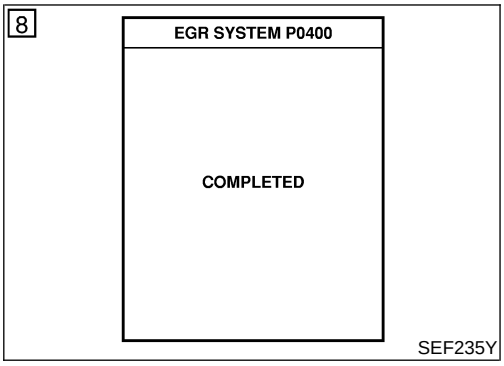
NGEC0228

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

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0400	• No EGR flow is detected under conditions that call for EGR.	• EGR valve stuck closed • EGRC-BPT valve • Vacuum hose • EGRC-solenoid valve • EGR passage • EGR temperature sensor • Exhaust gas leaks







DTC Confirmation Procedure

NGEC0229

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:

For best results, perform the test at a temperature above 5°C (41°F).

With CONSULT-II

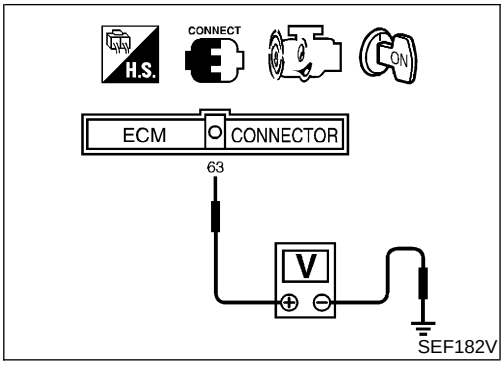
1) Turn ignition switch ON.
2) Check "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II and confirm it is within the range listed below.

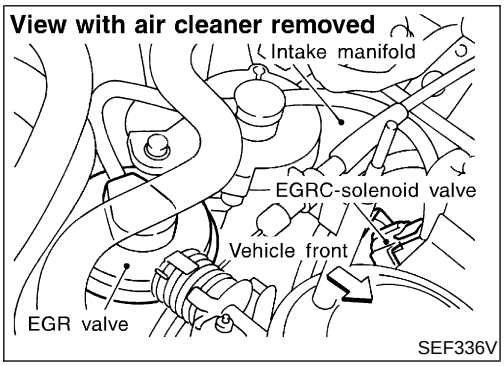
   COOLAN TEMP/S: Less than 40°C (104°F)

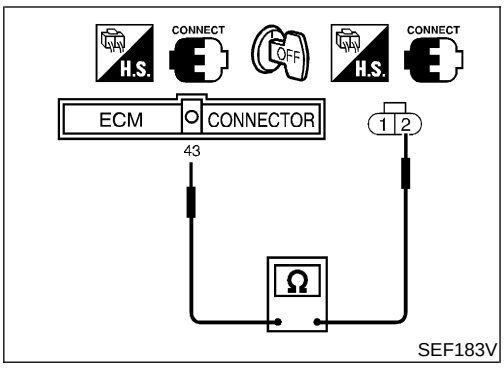
   If the value is out of range, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to lower the coolant temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.
3) Start engine and let it idle monitoring "COOLAN TEMP/S" value. When the "COOLAN TEMP/S" value reaches 70°C (158°F), immediately go to the next step.
4) Select "EGR SYSTEM P0400" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
5) Touch "START".
6) Accelerate vehicle to a speed of 40 km/h (25 MPH) once and then stop vehicle with engine running.
   If "COMPLETED" appears on CONSULT-II screen, go to step 9.
   If "COMPLETED" does not appear on CONSULT-II screen, go to the following step.
7) Check the output voltage of "THRTL POS SEN" (at closed throttle position) and note it.
8) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions until "TESTING" changes to "COMPLETED". (It will take approximately 30 seconds or more.)

ENG SPEED	2,000 - 2,800 rpm
Vehicle speed	10 km/h (6 MPH) or more
B/FUEL SCHDL	7 - 10 msec
THRTL POS SEN	(X + 0.23) − (X + 0.74) V X = Voltage value measured at step 7
Selector lever	Suitable position

   If "TESTING" is not displayed after 5 minutes, retry from step 2.
9) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-332.







Overall Function Check

NGEC0230

Use this procedure to check the overall EGR function. 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 EGR valve lifting when revving engine from 2,000 rpm to 4,000 rpm quickly under no load using the following methods.

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

EGR valve should lift up and down without sticking.

If NG, go to "Diagnostic Procedure", EC-332.

3) Check voltage between ECM terminal 63 (EGR temperature sensor signal) and ground at idle speed.

Less than 4.5V should exist.

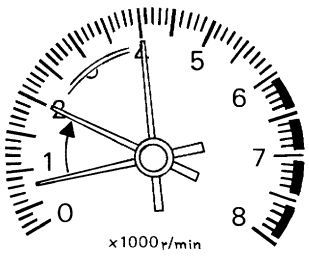
If NG, go to next step.

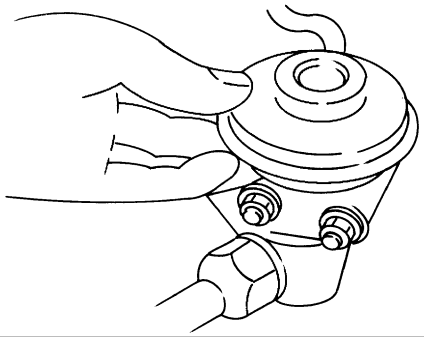
4) Turn ignition switch OFF.
5) Check harness continuity between EGR temperature sensor harness connector terminal 2 and ECM terminal 43 (ECM ground).

Continuity should exist.

6) Check "EGR TEMPERATURE SENSOR". Refer to "CHECK EGR TEMPERATURE SENSOR" in "Diagnostic Procedure".

Overall function check





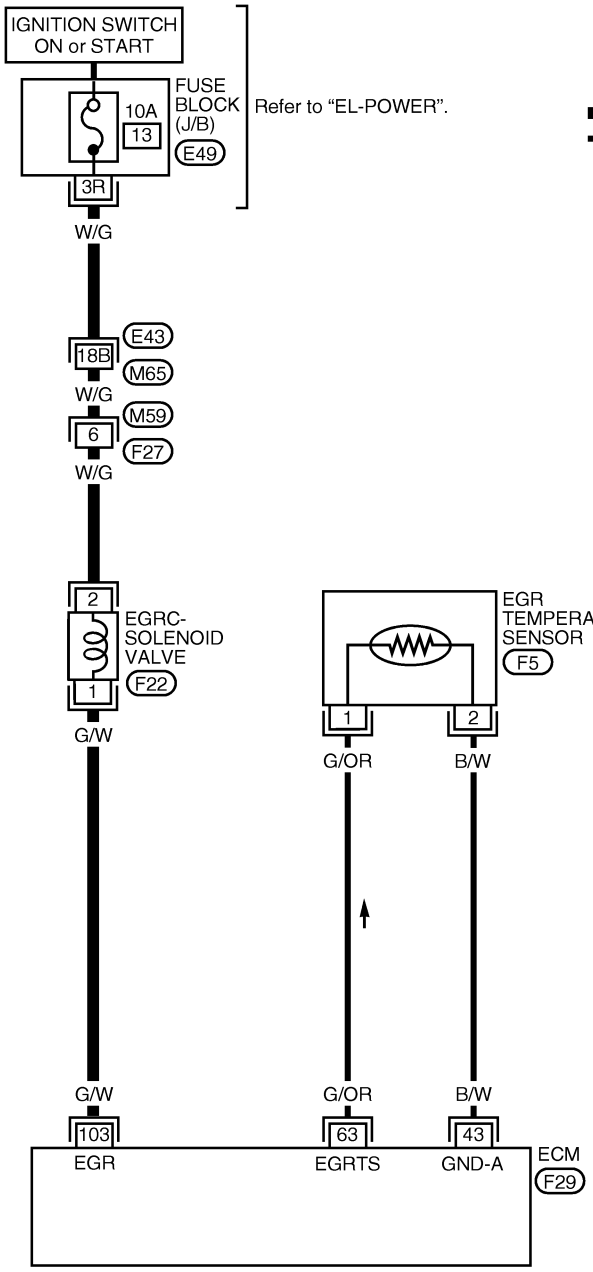
Check the EGR valve lifting when revving engine from 2,000 rpm up to 4,000 rpm.

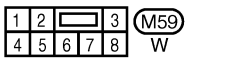
SEF642Q

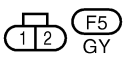
Wiring Diagram

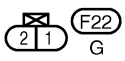
NGEC0231

EC-EGRC1-01

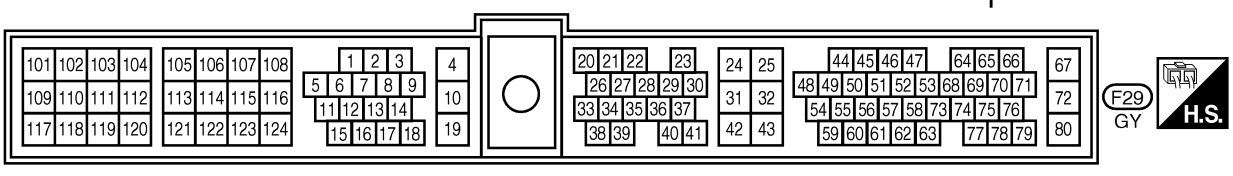








Refer to the following.
M65 , E43 - SUPER MULTIPLE JUNCTION (SMJ)



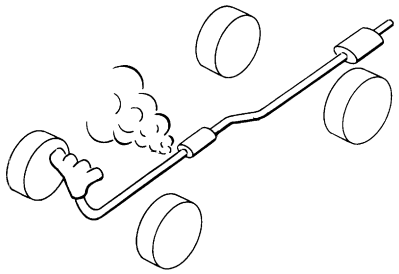
AEC995A

Diagnostic Procedure

NGEC0232

1	CHECK EXHAUST SYSTEM

1. Start engine.
2. Check exhaust pipes and muffler for leaks.



SEF099P

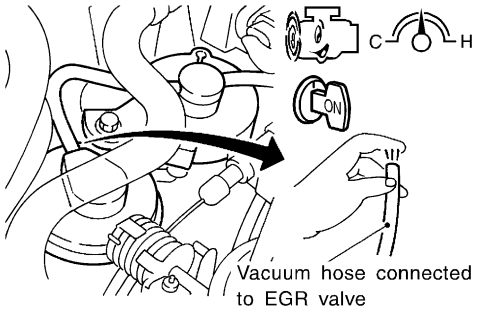
OK or NG

OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Repair or replace exhaust system.

2	CHECK VACUUM SOURCE TO EGR VALVE

With CONSULT-II

1. Warm engine up to normal operating temperature.
2. Disconnect vacuum hose to EGR valve.
3. Check for vacuum existence at idle.



SEF337V

Vacuum should not exist at idle.

4. Select "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT-II and turn the solenoid valve ON.
5. Check for vacuum existence when revving engine from 2,000 rpm up to 4,000 rpm.

ACTIVE TEST	
EGRC SOL/V	ON
(EGR)	CUT
MONITOR	
ENG SPEED	XXX rpm

SEF716Z

Vacuum should exist when revving engine.

OK or NG

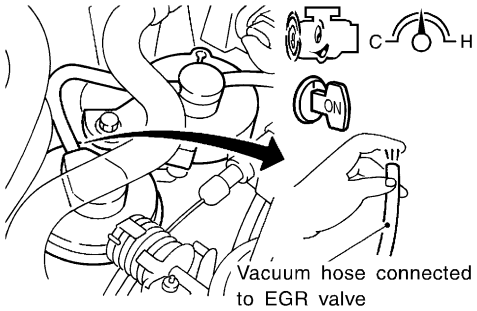
OK	▶	GO TO 4.
NG	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

3	CHECK VACUUM SOURCE TO EGR VALVE

Without CONSULT-II

1. Warm engine up to normal operating temperature.
2. Disconnect vacuum hose to EGR valve.
3. Check for vacuum existence at idle.



SEF337V

Vacuum should not exist at idle.

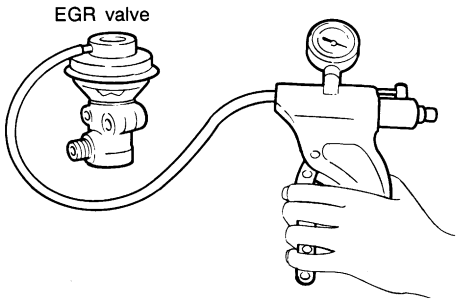
4. Disconnect EGRC-solenoid valve harness connector. (The 1st trip DTC for EGRC-solenoid valve will be displayed, but ignore it.)
5. Check for vacuum existence when revving engine from 2,000 rpm up to 4,000 rpm.
   Vacuum should exist when revving engine.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 5.

4	CHECK EGR VALVE

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



MEF137D

EGR valve spring should lift.

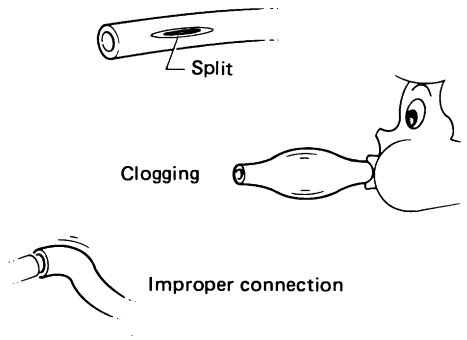
- Check for sticking.

OK or NG

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

5	CHECK VACUUM HOSE

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



SEF109L

OK or NG

OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Repair or replace vacuum hose.

6	CHECK EGRC-SOLENOID VALVE OPERATION

With CONSULT-II

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

ACTIVE TEST	
EGRC SOL/V	ON
(EGR)	CUT
MONITOR	
ENG SPEED	XXX rpm

SEF716Z

Clicking noise should be heard.

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace EGRC-solenoid valve or repair circuit.

7	CHECK EGRC-SOLENOID VALVE OPERATION

Without CONSULT-II

Check operating sound of the solenoid valve when disconnecting and reconnecting EGRC-solenoid valve harness connector. (The DTC or the 1st trip DTC for the EGRC-solenoid valve will be displayed, however, ignore it.)

Clicking noise should be heard.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	DETECT MALFUNCTION PART

Check the following.
- Harness connectors E43, M65
- Harness connectors M59, F27
- 10A fuse
- Harness for open or short between fuse block and EGRC-solenoid valve
- Harness for open or short between ECM and EGRC-solenoid valve

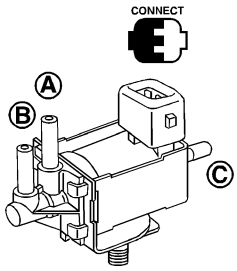
▶ Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK EGRC-SOLENOID VALVE

With CONSULT-II

Check air passage continuity.

Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.



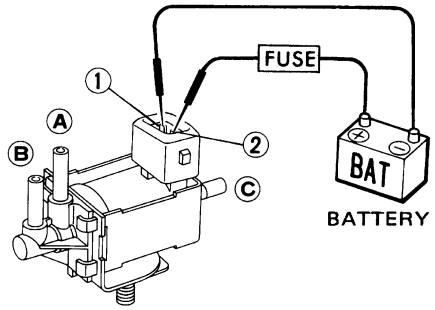
ACTIVE TEST	
EGRC SOL/V	ON
(EGR)	CUT
MONITOR	
ENG SPEED	XXX rpm

Condition EGRC SOLENOID VALVE	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
ON	Yes	No
OFF	No	Yes

SEF717Z

Without CONSULT-II

Check air passage continuity shown in the figure.



AEC919

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

MTBL0283

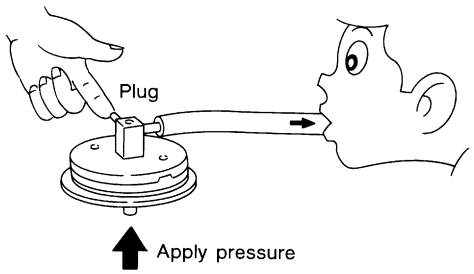
If NG or operation takes more than 1 second, replace solenoid valve.

OK or NG

OK	▶	GO TO 10.
NG	▶	If NG or operation takes more than 1 second, replace solenoid valve.

10	CHECK EGRC-BPT VALVE

1. Plug one of two ports of EGRC-BPT valve.
2. Vacuum from the other port and check for leakage while applying a pressure above 0.981 kPa (100 mmH_2O, 3.94 inH_2O) from under EGRC-BPT valve.



SEF083P

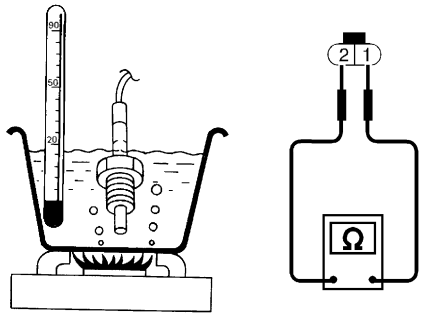
3. If a leakage is noted, replace the valve.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EGRC-BPT valve.

11	CHECK EGR TEMPERATURE SENSOR

Check resistance change and resistance value.

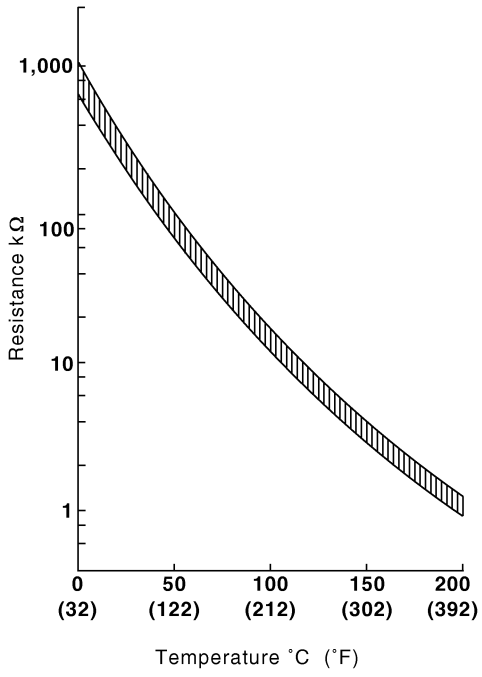


SEF643Q

<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

MTBL0549



SEF068XB

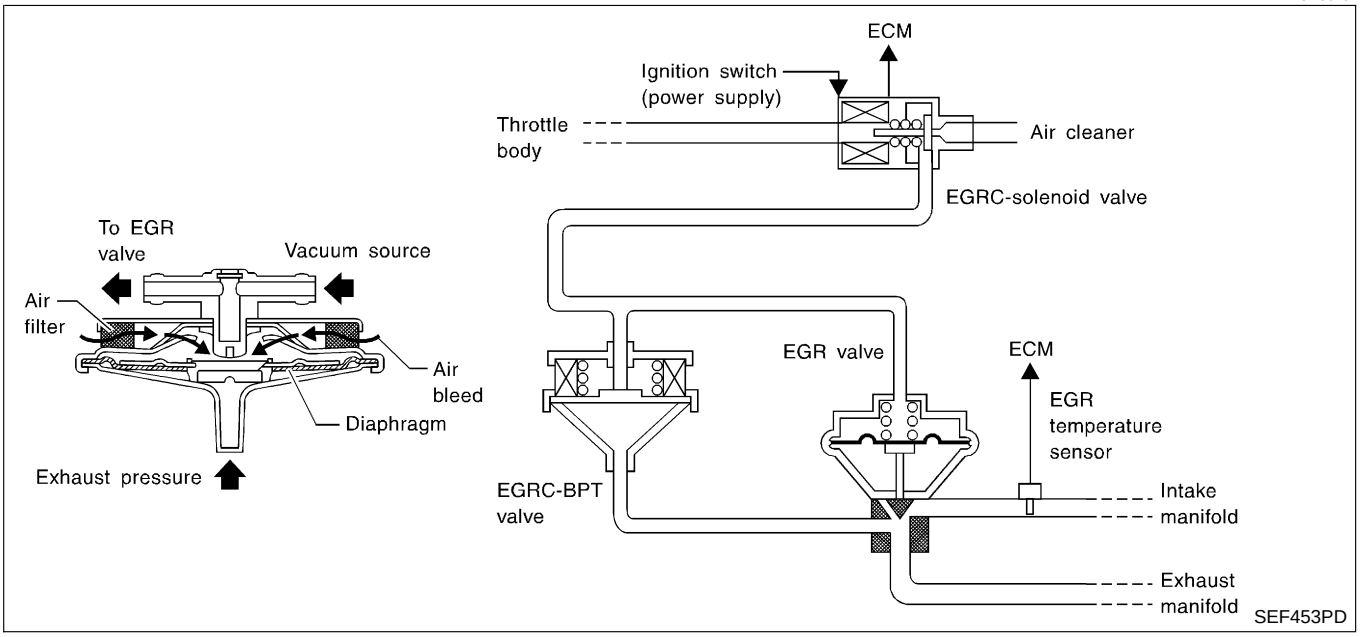
OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EGR temperature sensor.

12	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**

Description

NGEC0234



SYSTEM DESCRIPTION

NGEC0234S01

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

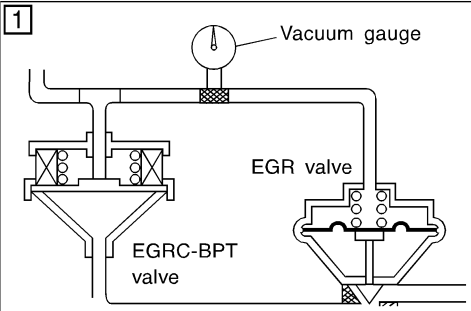
On Board Diagnosis Logic

NGEC0235

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

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0402	• The EGRC-BPT valve does not operate properly.	• EGRC-BPT valve • EGR valve • Loose or disconnected rubber tube • Blocked rubber tube • Camshaft position sensor • Blocked exhaust system • Orifice • Mass air flow sensor • EGRC-solenoid valve

1



SEF930VA

8

EGRC-BPT VLV P0402	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

0% 20% 40% 60% 80% 100%

SEF718Z

8

EGRC-BPT VLV P0402	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

0% 20% 40% 60% 80% 100%

SEF719Z

8

PURG FLOW P0402
COMPLETED

SEF720Z

11

EGRC-BPT VLV P0402
INCREASE ENGINE SPEED AND MAINTAIN BETWEEN 2400 TO 3200 RPM. TOUCH NEXT.

2400 2800 3200

SEF384X

DTC Confirmation Procedure

NGEC0236

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

- **Always perform at a temperature above 5°C (41°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

With CONSULT-II

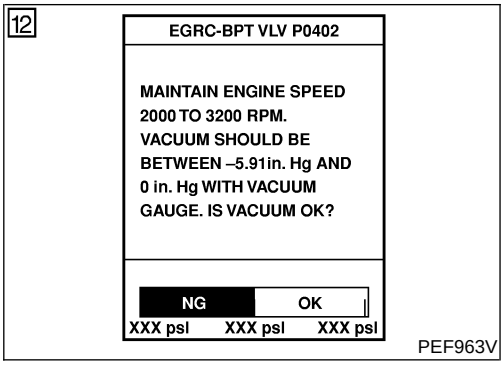
1) Install vacuum gauge between EGRC-BPT valve and EGR valve as shown in the illustration.
2) Start engine and warm it up to normal operating temperature.
3) Stop engine and wait at least 5 seconds.
4) Turn ignition switch ON and select "EGRC-BPT/V P0402" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
5) Start engine and let it idle.
6) Touch "START".
7) Check the output voltage of "THRTL POS SEN" (at closed throttle position) and note it.
8) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen and the bar chart may increase. Maintain the conditions many times until "COMPLETED" appears.

Selector lever	Suitable position
ENG SPEED	1,400 - 2.000 rpm
Vehicle speed	30 - 100 km/h (19 - 62 MPH)
B/FUEL SCHDL	5 - 7.5 msec
THRTL POS SEN	(X-(X+0.88) V X = Voltage value measured at step 7

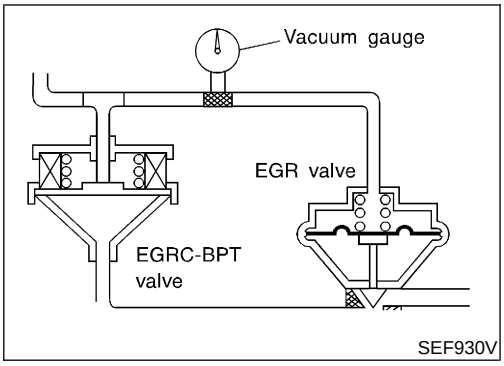
NOTE:

- **The bar chart on CONSULT-II screen indicates the status of this test. However, the test may be finished before the bar chart becomes full scale.**
- **If the bar chart indication does not continue to progress, completely release accelerator pedal once and try to meet the conditions again.**
- **If "TESTING" does not appear on CONSULT-II screen, retry from step 2.**

9) If CONSULT-II instructs to carry out "Overall Function Check", go to next step. If "NG" is displayed, refer to "Diagnostic Procedure", EC-342.
10) Open engine hood.
11) Raise engine speed to 2,400 to 3,200 rpm under no-load and hold it. Then touch "NEXT" on CONSULT-II screen.



12) Check vacuum gauge while keeping engine speed at 2,400 to 3,200 rpm.
Vacuum should be 0 to −20 kPa (0 to −150 mmHg, 0 to −5.91 inHg).
If NG, go to "Diagnostic Procedure", EC-342.
If OK, touch "YES" on the CONSULT-II screen.
13) Check the EGR valve lifting when revving from 2,000 rpm to 4,000 rpm quickly under no load.
EGR valve should lift up, and go down without sticking when the engine is returned to idle.
If NG, check EGR valve.
If OK, touch "YES" or the CONSULT-II screen.
14) Check the rubber tube between intake manifold collector, EGRC-solenoid valve, EGR valve and EGRC-BPT valve for cracks, blockages or twisting.
If NG, repair or replace.
If OK, touch "YES" on the CONSULT-II screen.



Overall Function Check

NGEC0237

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

Without CONSULT-II

1) Install vacuum gauge between EGRC-BPT valve and EGR valve as shown in the illustration.
2) Lift up vehicle.
3) Start engine and shift to 1st gear position.
4) Check vacuum gauge while keeping engine speed at 2,400 to 3,200 rpm.
Vacuum should be 0 to −20 kPa (0 to −150 mmHg, 0 to −5.91 inHg).
If NG, go to "Diagnostic Procedure", EC-342.
If OK, go to next step.
5) Check the EGR valve lifting when revving from 2,000 rpm to 4,000 rpm quickly under no load.
EGR valve should lift up, and go down without sticking when the engine is returned to idle.
6) Check rubber tube between intake manifold collector, EGRC-solenoid valve, EGR valve and EGRC-BPT valve for misconnection, cracks or blockages.
7) If NG, go to "Diagnostic Procedure", EC-342.

Diagnostic Procedure

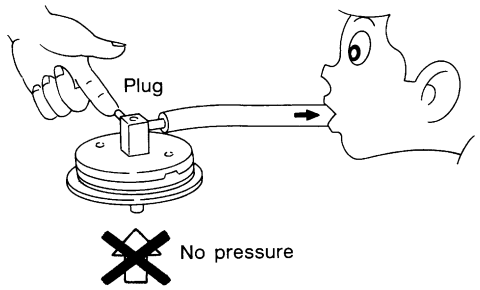
=NGEC0238

1	CHECK HOSE	
Check vacuum hose for clogging and improper connection.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace vacuum hose.

2	CHECK EXHAUST SYSTEM	
Check exhaust system for collapse.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace exhaust system.

3	CHECK ORIFICE	
Check if orifice is installed in vacuum hose between EGRC-BPT valve and EGRC-solenoid valve.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Replace vacuum hose.

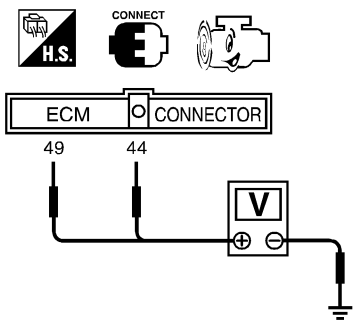
4	CHECK EGRC-BPT VALVE	
1. Plug one of two ports of EGRC-BPT valve. 2. Vacuum from the other port and check leakage without applying any pressure from under EGR-BPT valve. **Leakage should exist.**		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace EGRC-BPT valve.



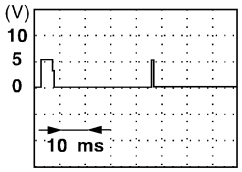
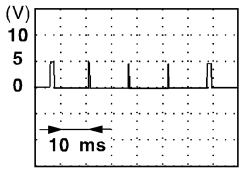
SEF172P

5	CHECK CAMSHAFT POSITION SENSOR

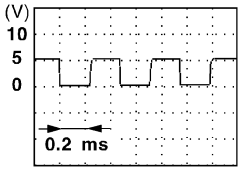
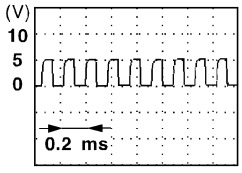
1. Start engine and warm it up to normal operating temperature.
2. Check voltage between ECM terminals 49 and engine ground ECM terminal 44 and engine ground.



Terminal 44 and engine ground

Condition	Idle	2,000 rpm
Voltage	0.2 - 0.5V	0 - 0.5V
Pulse signal		

Terminal 49 and engine ground

Condition	Idle	2,000 rpm
Voltage	Approximately 2.6V	Approximately 2.5 - 2.6V
Pulse signal		

SEF868Z

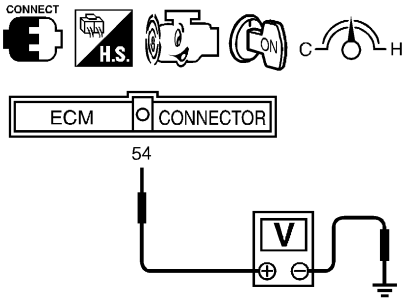
OK or NG

OK	▶	GO TO 6.
NG	▶	Replace camshaft position sensor.

Diagnostic Procedure (Cont'd)

6 CHECK MASS AIR FLOW SENSOR

1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.



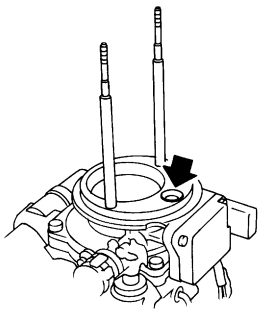
SEF326V

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.9 - 2.3
Idle to about 4,000 rpm*	1.3 - 1.7 to Approx. 3.0

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

MTBL0326

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 wire for damage or dust.



SEF893J

OK or NG

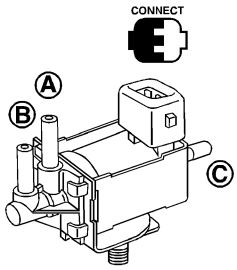
OK	▶	GO TO 7.
NG	▶	Replace mass air flow sensor.

7 **CHECK EGRC-SOLENOID VALVE**

With CONSULT-II

Check air passage continuity.

Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.



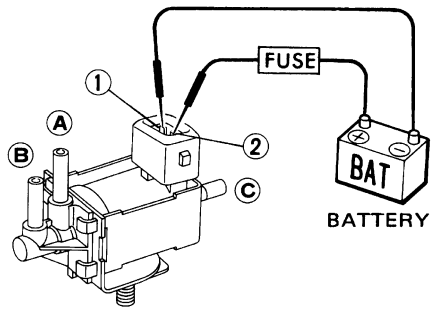
ACTIVE TEST	
EGRC SOL/V	ON
(EGR)	CUT
MONITOR	
ENG SPEED	XXX rpm

Condition EGRC SOLENOID VALVE	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
ON	Yes	No
OFF	No	Yes

SEF717Z

Without CONSULT-II

Check air passage continuity shown in the figure.



AEC919

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

MTBL0283

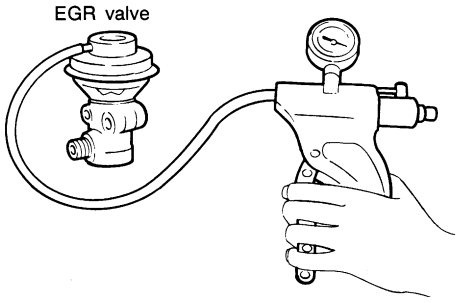
If NG or operation takes more than 1 second, replace solenoid valve.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EGRC-solenoid valve.

8	CHECK EGR VALVE

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



MEF137D

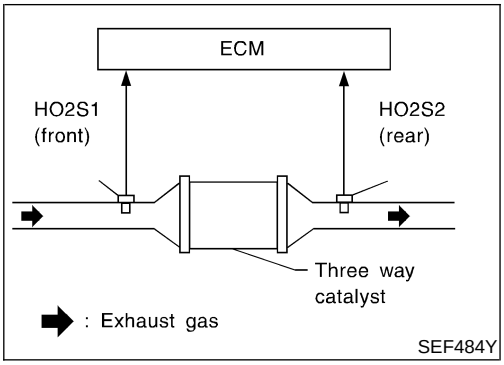
EGR valve spring should lift.

- Check for sticking.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EGR valve.

9	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**



On Board Diagnosis Logic

NGEC1042

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.
*: Warm-up three way catalyst (For California)

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0420 0702	• Three way catalyst does not operate properly. • Three way catalyst does not have enough oxygen storage capacity.	• Three way catalyst* • Exhaust tube • Intake air leaks • Injectors • Injector leaks • Spark plug • Improper ignition timing

*: Warm-up three way catalyst (For California)

3

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

7

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

NGEC1043

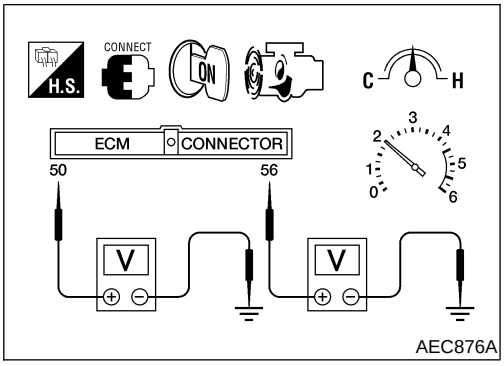
NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- **Open engine hood before conducting following procedure.**
- **Do not hold engine speed more than specified minutes below.**

With CONSULT-II

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 2,500 to 3,500 rpm and hold it for 3 consecutive minutes then release then 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 2,000 to 3,000 rpm and hold it until "INCMP" of "CATALYST" changes to "CMPLT". (It will take maximum of approximately 5 minute.)
7) Select "SELF-DIAG RESULTS" mode with CONSULT-II.
   If the 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-283. If not "COMPLT" stop engine and cool down "COOLANT TEMP/SE" to less than 70°C (158°F) and then retest from step 1).



Overall Function Check

NGEC0242

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

Without CONSULT-II

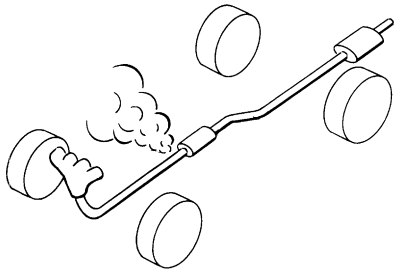
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeters probes between ECM terminals 50 [Heated oxygen sensor 1 (front) signal], 56 [Heated oxygen sensor 2 (rear) signal] and engine ground.
4) Keep engine speed at 2,000 rpm constant under no load.
5) Make sure that the voltage switching frequency (high & low) between ECM terminal 56 and engine ground is much less than that of ECM terminal 50 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 50 does not switch periodically more than 5 times within 10 seconds at step 4, perform trouble diagnosis for DTC P0133 first. (See EC-192.)

Diagnostic Procedure

=NGEC0243

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 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	
1. Check the following items. Refer to “Basic Inspection”, EC-104.		

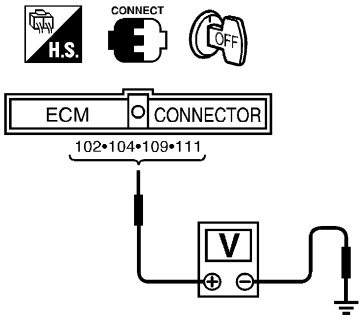
Items	Specifications
Ignition timing	20° ± 2° BTDC
Base idle speed	750 ± 50 rpm (in “P” or “N” position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF
Target idle speed	800 ± 50 rpm (in “P” or “N” position)

MTBL0328

OK or NG		
OK	▶	GO TO 5.
NG	▶	Adjust ignition timing.

5	CHECK INJECTORS

1. Refer to Wiring Diagram for Injectors, EC-568.
2. Stop engine and then turn ignition switch ON.
3. Check voltage between ECM terminals 102, 104, 109 and 111 and ground with CONSULT-II or tester.



SEF189V

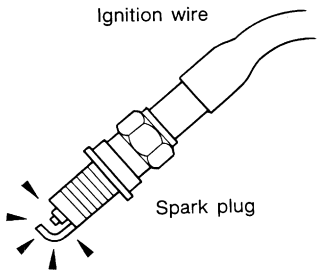
Battery voltage should exist.

OK or NG

OK	▶	GO TO 6.
NG	▶	Perform "Diagnostic Procedure" INJECTOR, EC-569.

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.



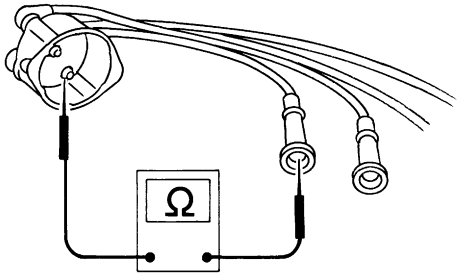
SEF282G

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	CHECK IGNITION WIRES

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.



SEF174P

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.

OK or NG

OK	▶	Check ignition coil, power transistor and their circuits. Refer to EC-559.
NG	▶	Replace.

8	CHECK INJECTOR

1. Turn ignition switch OFF.
2. Remove injector assembly. Refer to EC-52.
   Keep fuel hose and all injectors connected to injector gallery.
3. Disconnect camshaft position sensor harness connector.
4. Turn ignition switch ON.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip.)	▶	GO TO 9.
NG (Drips.)	▶	Replace the injector(s) from which fuel is dripping.

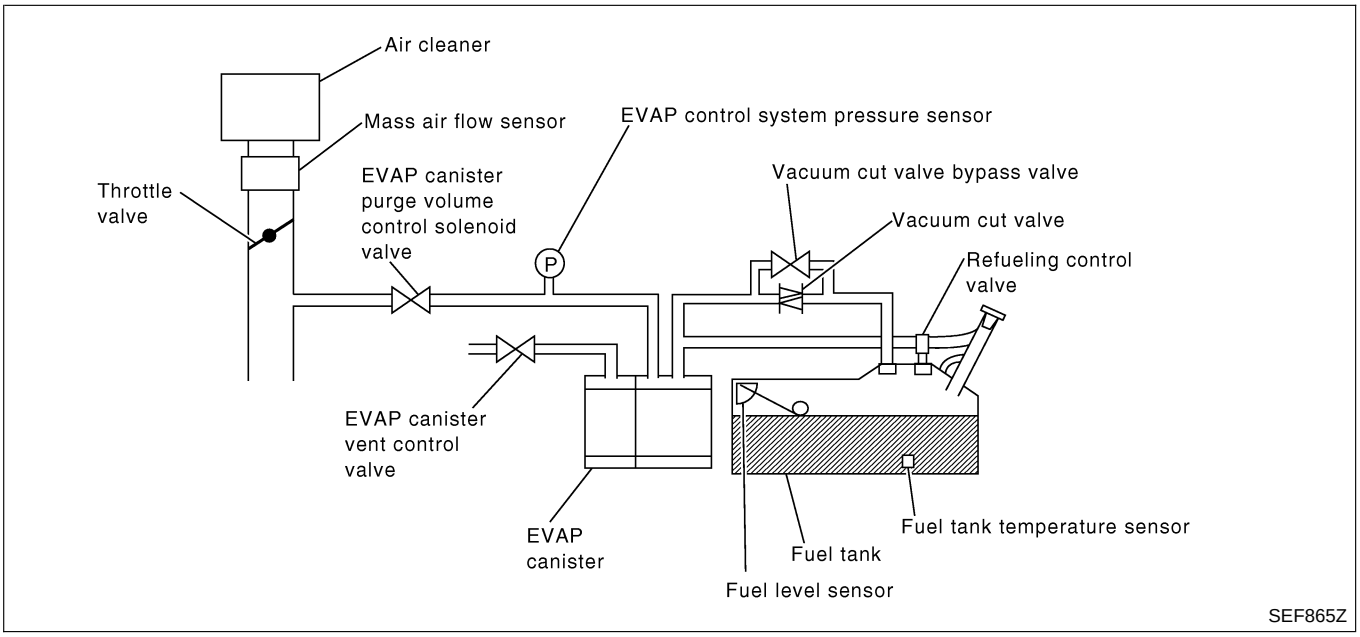
9	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.		
Trouble is fixed.	▶	**INSPECTION END**
Trouble is not fixed.	▶	Replace three way catalyst.

On Board Diagnosis Logic

NGEC0244

NOTE:
If DTC P0440 OR P1440 is displayed with DTC P1448, perform trouble diagnosis for DTC P1448 first. (See EC-519.)

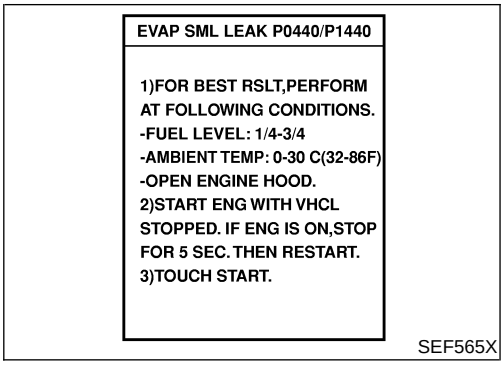
This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.
If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve under the following “Vacuum test” conditions.
The vacuum cut valve 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.

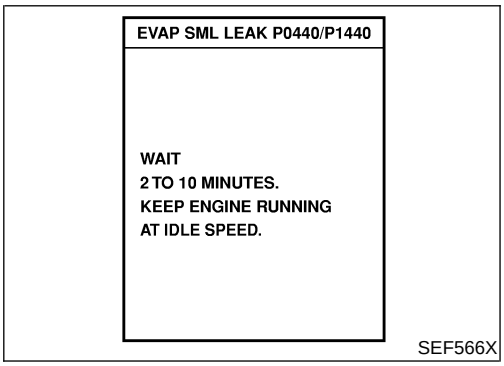


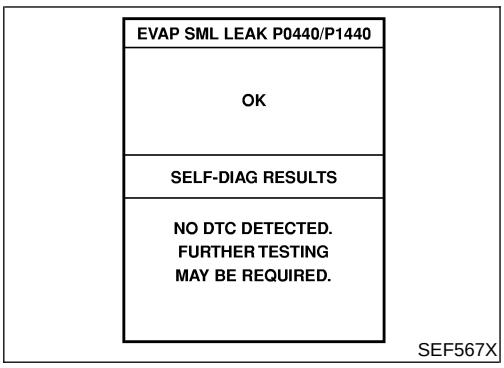
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0440	• EVAP control system has a leak. • EVAP control system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel filler cap remains open or fails to close. • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent. • Blocked or bent rubber tube to EVAP control system pressure sensor • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge volume control solenoid valve and the circuit • Absolute pressure sensor • Fuel tank temperature sensor • O-ring of EVAP canister vent control valve is missing or damaged. • Water separator • EVAP canister is saturated with water. • EVAP control system pressure sensor • Fuel level sensor and the circuit • Refueling control valve • ORVR system leaks

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**







DTC Confirmation Procedure

NGEC0245

NOTE:

- **If DTC P0440 or P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. Refer to EC-519.**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

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).**
- **It is better that the fuel level is low.**

1) Turn ignition switch ON.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
4) Check that the following conditions are met.

COOLAN TEMP/S	0 - 70°C (32 - 158°F)
INT/A TEMP SE	0 - 60°C (32 - 140°F)

5) Select "EVAP SML LEAK P0440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II. Follow the instruction displayed.

NOTE:

- **If the engine cannot be maintained within the range on CONSULT-II screen, go to "Basic Inspection", EC-104.**

6) Make sure that "OK" is displayed.
If "NG" is displayed, refer to "Diagnostic Procedure", EC-356.

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

With GST

1) Start engine.
2) Drive vehicle according to "Driving pattern", EC-74.

NOTE:

Be sure to read the explanation of "Driving pattern" on EC-74 before driving vehicle.

3) Stop vehicle.
4) Select "MODE 1" with GST.

- If SRT of EVAP system is not set yet, go to the following step.
- If SRT of EVAP system is set, the result will be OK.

5) Turn ignition switch OFF and wait at least 5 seconds.
6) Start engine.
It is not necessary to cool engine down before driving.
7) Drive vehicle again according to the "Driving pattern", EC-74.
8) Stop vehicle.
9) Select "MODE 3" with GST.

- If P1447 is displayed on the screen, go to "Diagnostic Procedure", EC-511.
- If P0440 is displayed on the screen, go to "Diagnostic Procedure", EC-356.

- If P1440 is displayed on the screen, go to "Diagnostic Procedure", EC-474.
- If P0440, P1440 and P1447 are not displayed on the screen, go to the following step.

10) Select "MODE 1" with GST.

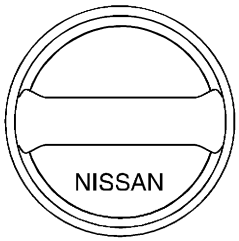
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 5.

Diagnostic Procedure

=NGEC0246

1	CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.



SEF915U

OK or NG

OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

2	CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly rotating the cap clockwise.

OK or NG

OK	▶	GO TO 3.
NG	▶	● Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. ● Retighten until ratcheting sound is heard.

3	CHECK FUEL FILLER CAP FUNCTION

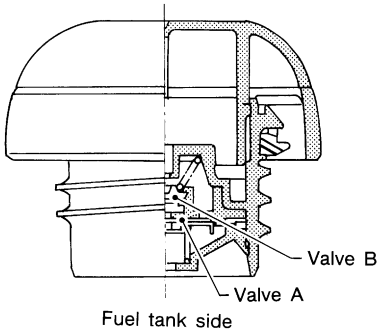
Check for air releasing sound while opening the fuel filler cap.

OK or NG

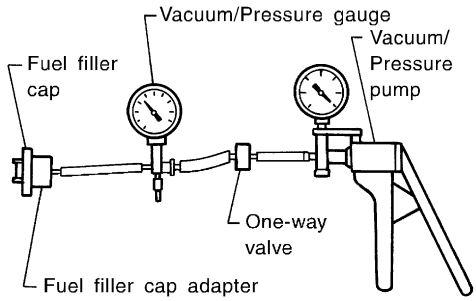
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)

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



SEF427N



SEF943S

Pressure:
16.0 - 20.0 kPa (0.163 - 0.204 kg/cm^2, 2.32 - 2.90 psi)
Vacuum:
−6.0 to −3.5 kPa (−0.061 to −0.036 kg/cm^2, −0.87 to −0.51 psi)

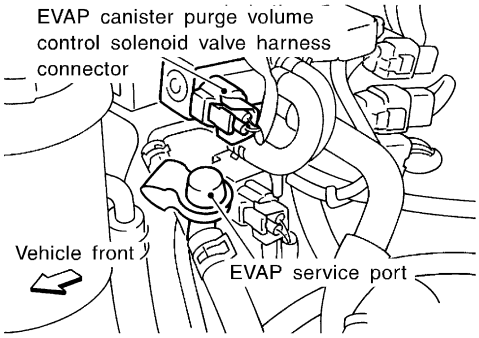
CAUTION:
Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

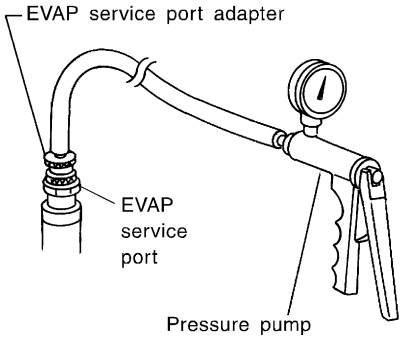
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5	INSTALL PRESSURE PUMP

1. Install the EVAP service port adapter and the pressure pump securely to EVAP service port.



SEF339V



SEF462UE

NOTE:

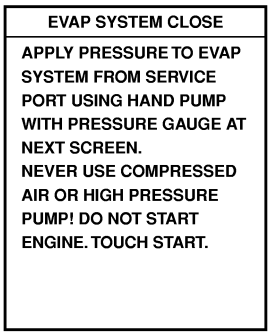
- **Improper installation of service port may cause leaking.**

Models with CONSULT-II ▶	GO TO 6.
Models without CONSULT-II ▶	GO TO 7.

6	CHECK FOR EVAP LEAK

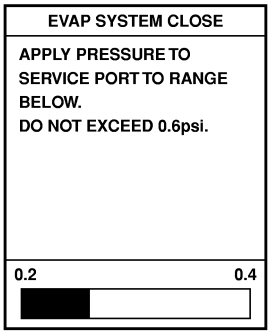
With CONSULT-II

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.



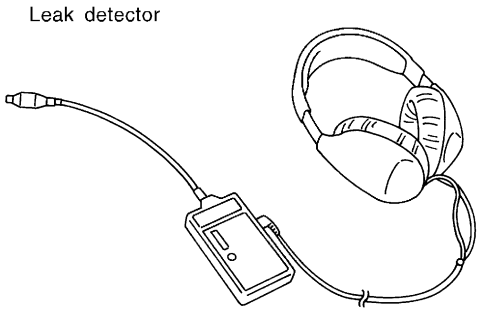
PEF658U

3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of bar graph.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**



PEF917U

4. Using EVAP leak detector, locate the leak portion. For the leak detector, refer to instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-37.



SEF200U

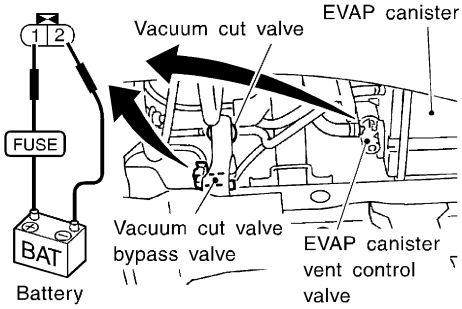
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

7	CHECK FOR EVAP LEAK

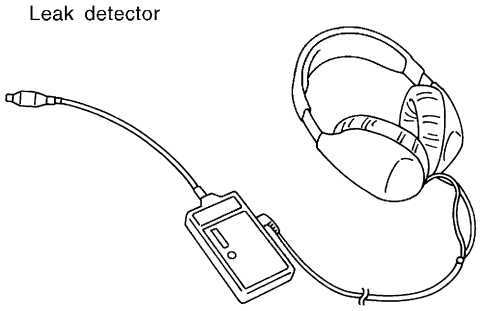
Without CONSULT-II

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.)



SEF503V

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12 volts until the end of test.) Shown in the above figure.
4. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg).
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**
5. Using EVAP leak detector, locate the leak. For the leak detector, refer to instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-37.



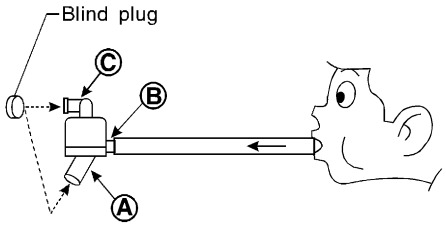
SEF200U

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.

- **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

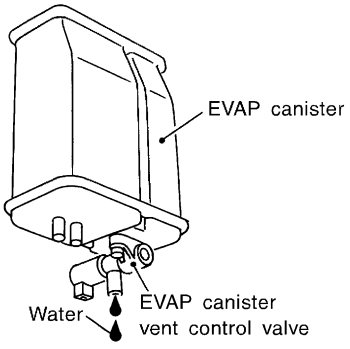
Refer to "DTC Confirmation Procedure", EC-378.

OK or NG

OK	▶	GO TO 10.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connectors.

10	CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

Yes or No

Yes	▶	GO TO 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 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. 1. Visually check the EVAP canister for damage. 2. Check hose connection between EVAP canister and water separator for clogging and poor connection.	
▶	Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

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.

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

4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%.
5. Check vacuum hose for vacuum.
   Vacuum should exist.

OK or NG

OK ▶	GO TO 17.
NG ▶	GO TO 15.

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

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 60 seconds.
5. Check vacuum hose for vacuum.
   Vacuum should exist.

OK or NG

OK ▶	GO TO 17.
NG ▶	GO TO 15.

15	CHECK VACUUM HOSE
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-27.	
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.
   If OK, inspection end. If NG, go to following step.

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

3. Check air passage continuity.

Condition PURG VOL CONT/V value	Air passage continuity between **A** and **B**
100.0%	Yes
0.0%	No

MTBL0302

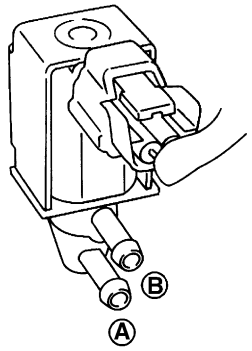
OK or NG

OK ▶	GO TO 18.
NG ▶	Replace EVAP canister purge volume control solenoid valve.

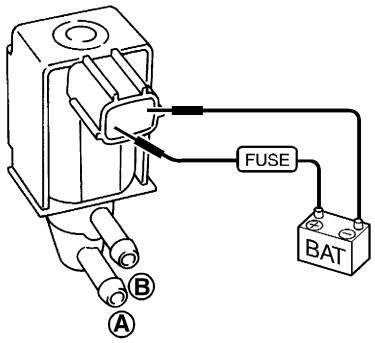
17	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Without CONSULT-II

Check air passage continuity.



SEF660U



SEF661U

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

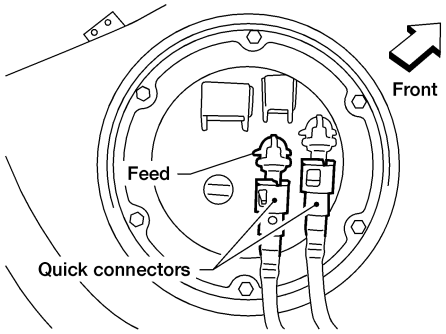
MTBL0303

OK or NG

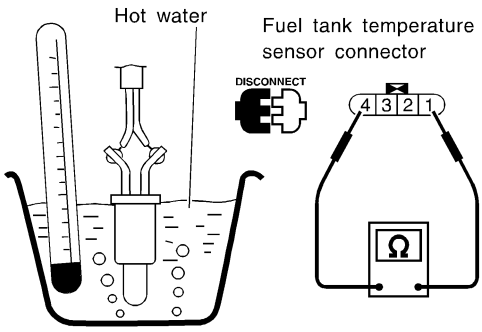
OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

18	CHECK FUEL TANK TEMPERATURE SENSOR

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



AFE095



SEF710Z

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

MTBL0291

OK or NG

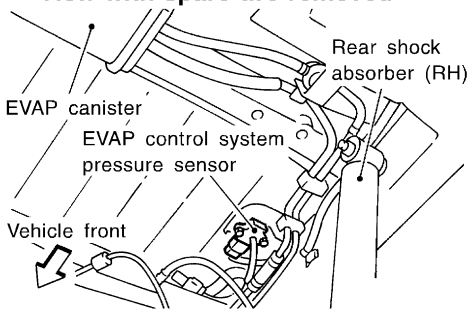
OK	▶	GO TO 19.
NG	▶	Replace fuel tank temperature sensor.

Diagnostic Procedure (Cont'd)

19	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

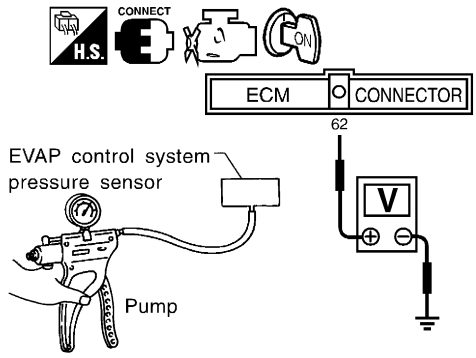
1. Remove EVAP control system pressure sensor with its harness connector connected.

View with spare tire removed



SEF341V

2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
4. Check output voltage between ECM terminal 62 and engine ground.



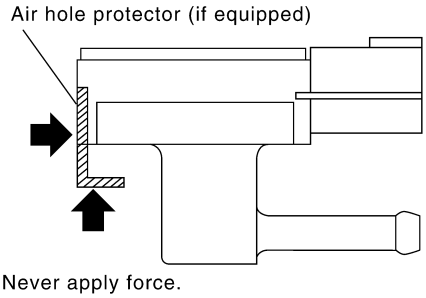
SEF198V

Pressure (Relative to atomospheric 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

MTBL0295

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.**



SEF799W

- **Never apply force to the air hole protector of the sensor, if equipped.**
- **Discard any EVAP control system pressure sensor which has been dropped from 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 20.
NG	▶	Replace EVAP control system pressure sensor.

20	CHECK EVAP PURGE LINE	
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-37.		
OK or NG		
OK	▶	GO TO 21.
NG	▶	Repair or reconnect the hose.

21	CLEAN EVAP PURGE LINE	
Clean EVAP purge line (pipe and rubber tube) using air blower.		
	▶	GO TO 22.

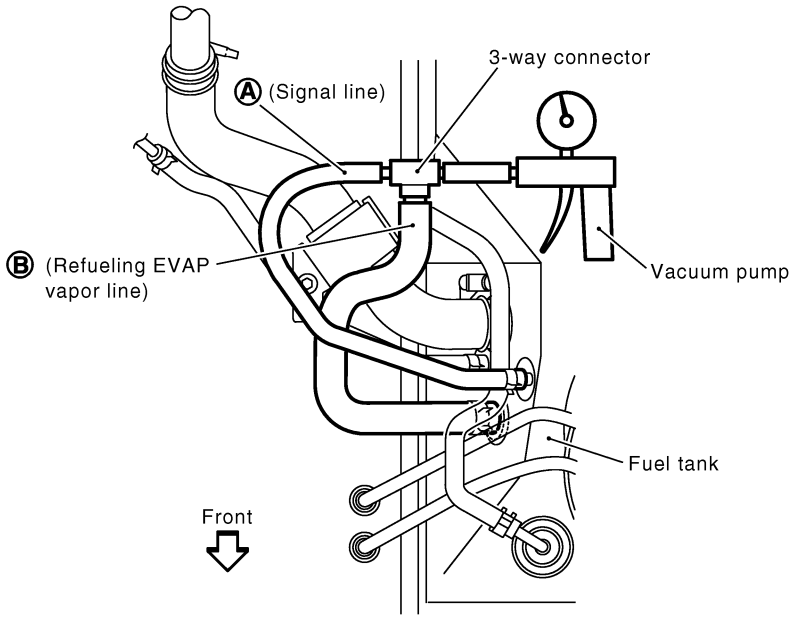
22	CHECK REFUELING EVAP VAPOR LINE	
Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to "ON BOARD REFUELING VAPOR RECOVERY (ORVR)", EC-39.		
OK or NG		
OK	▶	GO TO 23.
NG	▶	Repair or replace hoses and tubes.

23	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 24.
NG	▶	Repair or replace hoses, tubes or filler neck tube.

Diagnostic Procedure (Cont'd)

24	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.



SEF707Z

OK or NG

OK	▶	GO TO 25.
NG	▶	Replace refueling control valve with fuel tank.

25	CHECK FUEL LEVEL SENSOR

1. Remove fuel level sensor assembly. Refer to ***FE-4***.
2. Refer to "FUEL LEVEL SENSOR CHECK", ***EL-87***

OK or NG

OK	▶	GO TO 26.
NG	▶	Replace fuel level sensor.

26	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.

▶ **INSPECTION END**

Description

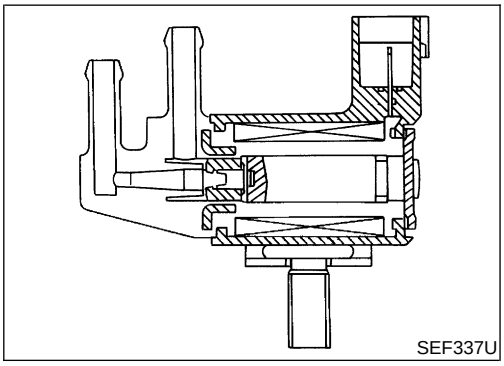
NGEC0248

SYSTEM DESCRIPTION

NGEC0248S01

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 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

NGEC0248S02

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

NGEC0249

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	—

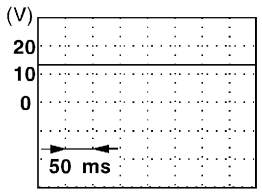
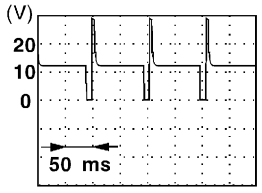
ECM Terminals and Reference Value

NGEC0250

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

CAUTION:

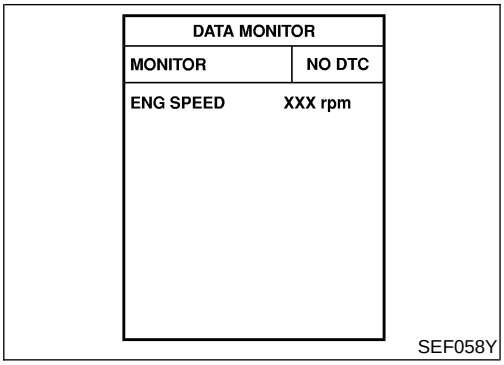
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	LG/R	ECCS relay (Self-shutoff)	**[Engine is running]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V) 
			[Engine is running] ● Engine speed is 2,000 rpm (More than 200 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V) 
67	B/P	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0251

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0443	An improper voltage signal is sent to ECM through the valve.	● Harness or connectors (The valve circuit is open or shorted.) ● EVAP canister purge volume control solenoid valve



DTC Confirmation Procedure

=NGEC0252

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

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

With CONSULT-II

1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and let it idle for at least 30 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-373

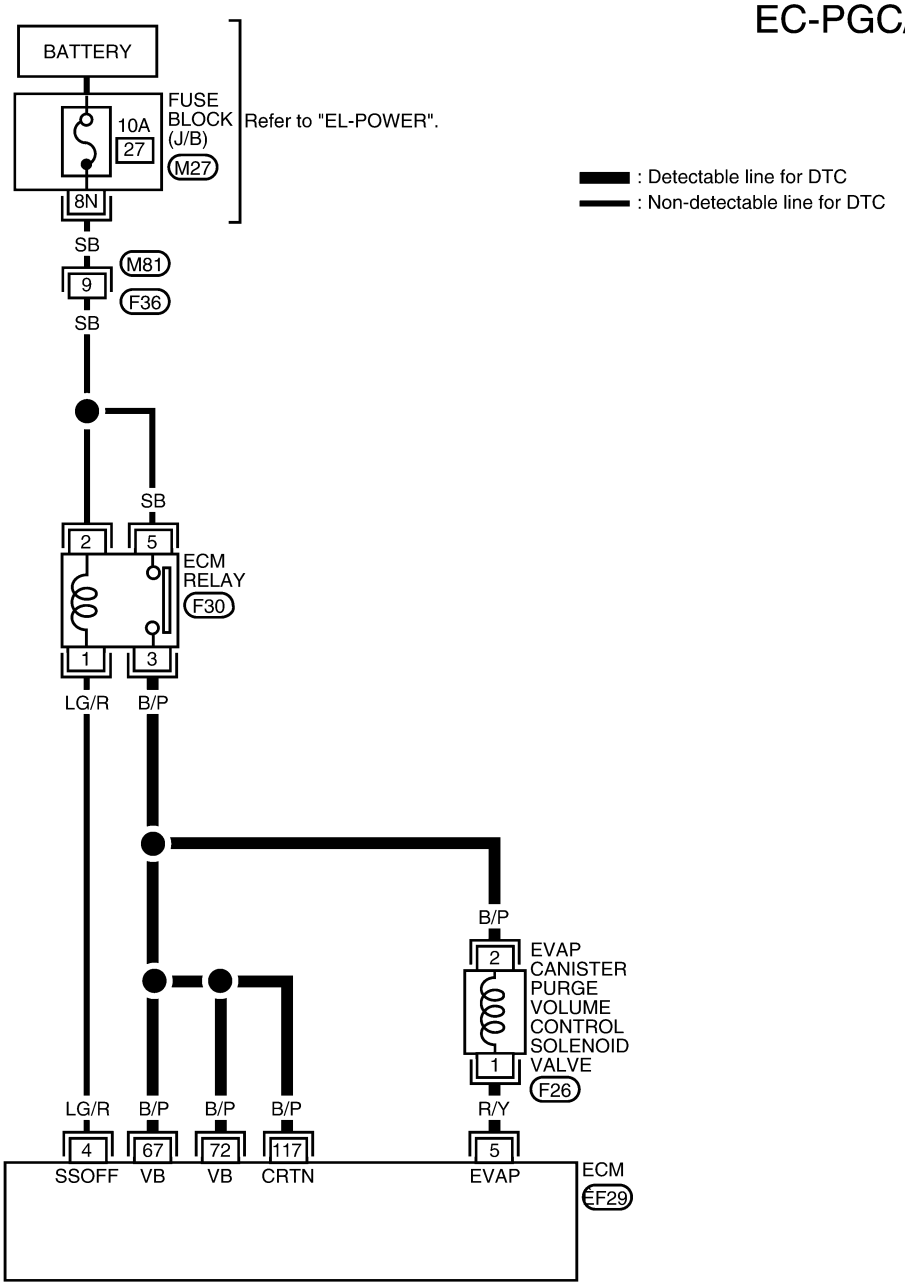
With GST

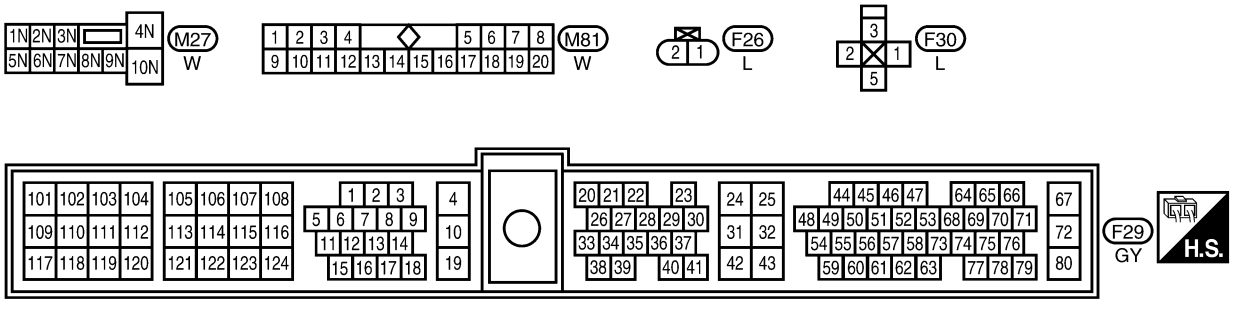
Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0253

EC-PGC/V-01





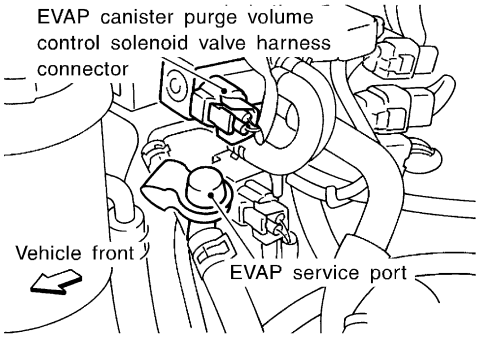
LEC484

Diagnostic Procedure

NGEC0254

1	CHECK POWER SUPPLY

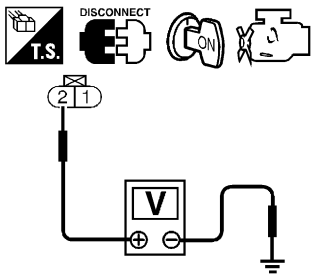
1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.



SEF339V

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

Voltage: Battery voltage



SEF192V

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.

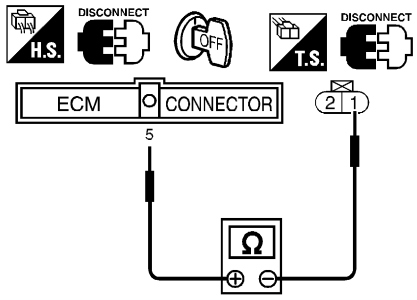
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

3	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 5 and terminal 1.
   Continuity should exist.



SEF193V

If OK, 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 or short to power in harness or connectors.

5	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.
   If OK, inspection end. If NG, go to following step.

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

3. Check air passage continuity.

Condition PURG VOL CONT/V value	Air passage continuity between **A** and **B**
100.0%	Yes
0.0%	No

MTBL0302

OK or NG

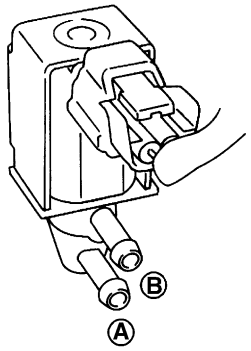
OK	▶	GO TO 7.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

Diagnostic Procedure (Cont'd)

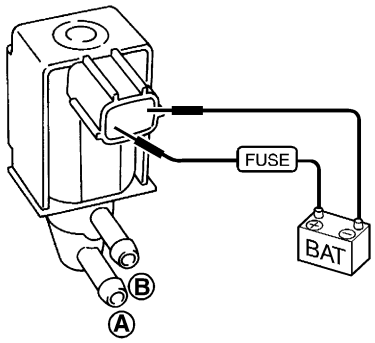
6	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Without CONSULT-II

Check air passage continuity.



SEF660U



SEF661U

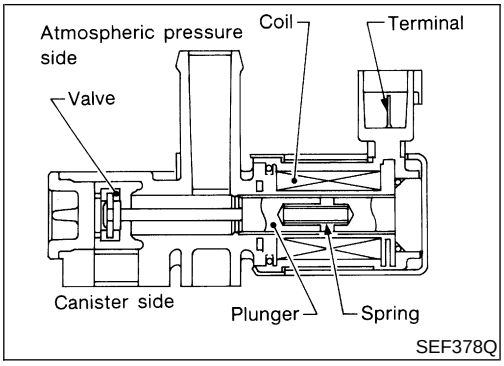
Condition	Air passage continuity between **A** and **B**
12V direct current supply between terminals	Yes
No supply	No

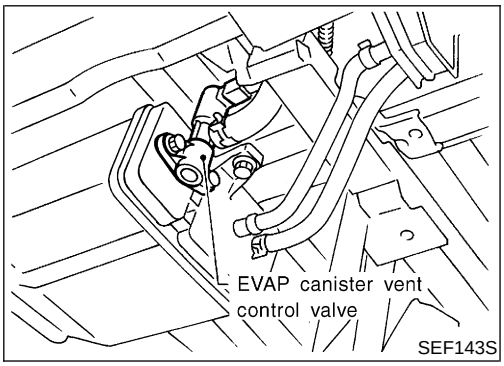
MTBL0303

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-142.	
▶	**INSPECTION END**





Component Description

NGEC0256

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid (the EVAP canister vent control valve) responds to signals from the ECM.
When the ECM sends an ON signal, the coil in the solenoid valve is energized.
A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0257

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NGEC0258

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

CAUTION:

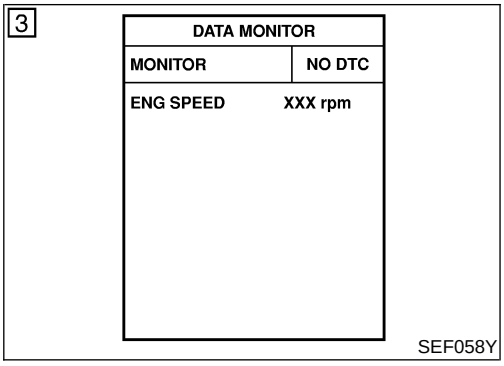
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0259

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0446	• An improper voltage signal is sent to ECM through EVAP canister vent control valve.	• Harness or connectors (EVAP canister vent control valve circuit is open or shorted.) • EVAP canister vent control valve



DTC Confirmation Procedure

NGEC0260

NOTE:

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

TESTING CONDITION:

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

With CONSULT-II

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-380.

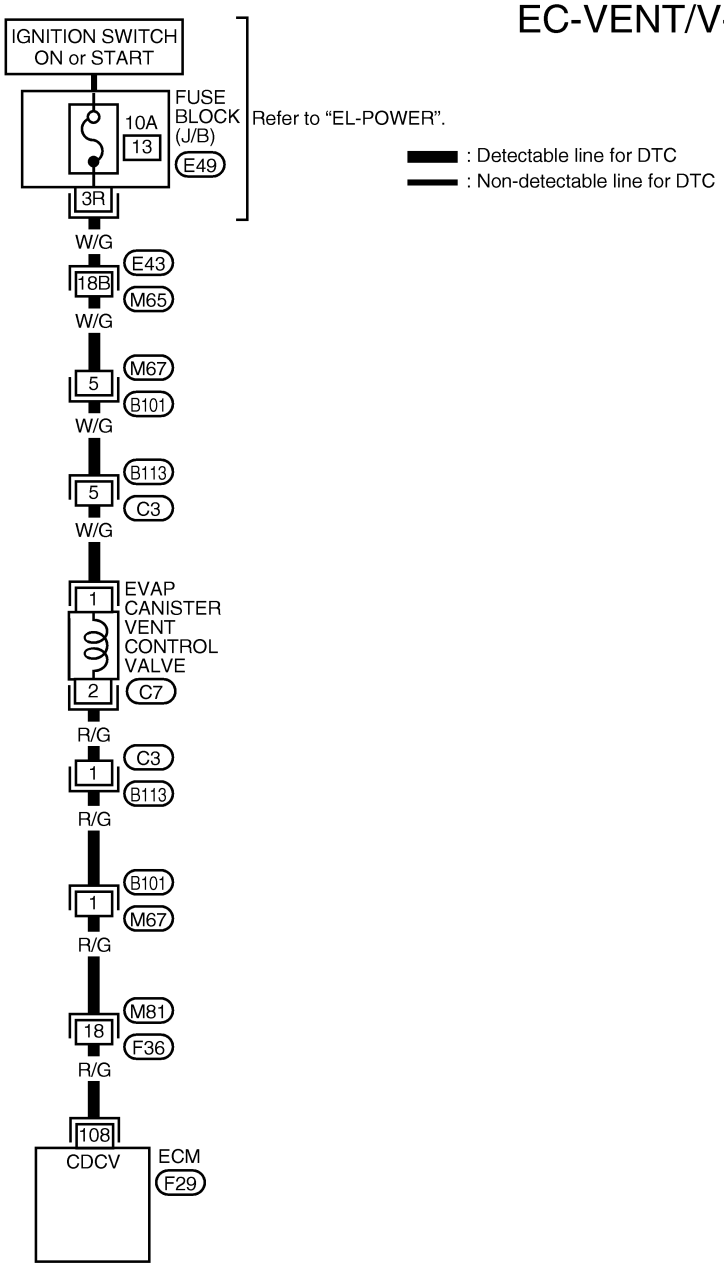
With GST

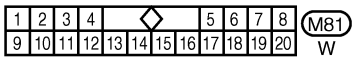
Follow the procedure “With CONSULT-II”.

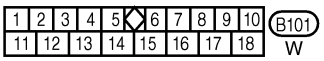
Wiring Diagram

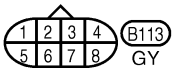
NGEC0261

EC-VENT/V-01

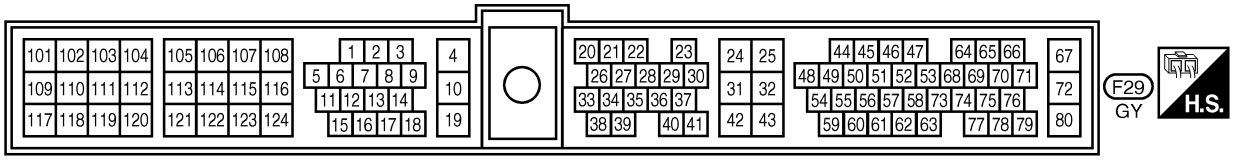








Refer to the following.
M65 , E43 - SUPER MULTIPLE JUNCTION (SMJ)



AEC997A

Diagnostic Procedure

NGEC0262

1	INSPECTION START
Do you have CONSULT-II?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

1. Turn ignition switch ON.
2. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.

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

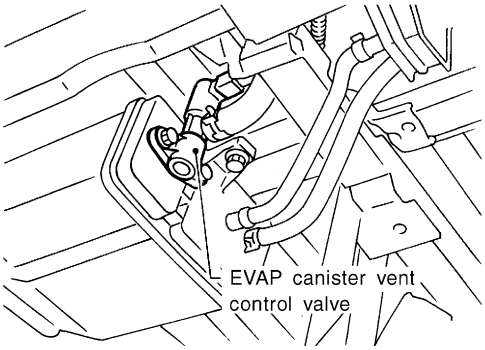
SEF802Y

3. Make sure that ratcheting sound is heard from the vent control valve.

OK or NG	
OK ▶	GO TO 7.
NG ▶	GO TO 3.

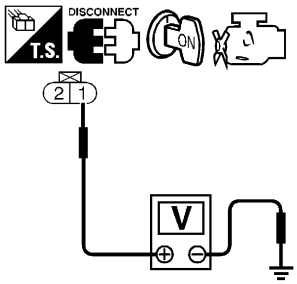
3	CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EVAP canister vent control valve harness connector.



SEF143S

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



SEF240W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

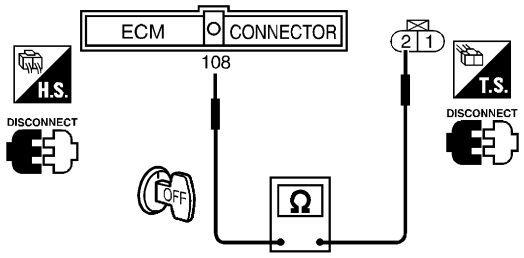
Check the following.
- Harness connectors E43, M65
- Harness connectors M67, B101
- Harness connectors B113, C3
- 10A fuse
- Harness for open or short between EVAP canister vent control valve and 10A fuse

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

5	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and terminal 2.



SEF241W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B101, M67
- Harness connectors M81, F36
- Harness connectors B113, C3
- Harness for open or short between EVAP canister vent control valve and ECM

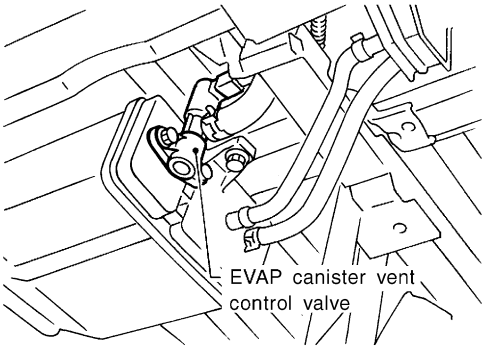
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

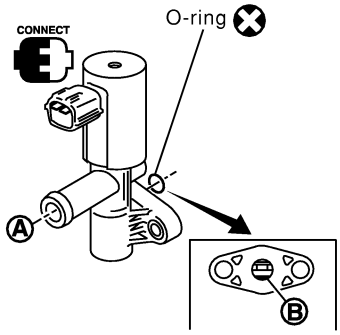
With CONSULT-II

Check air passage continuity.

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



SEF143S



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

If NG, clean valve using air blower or replace as necessary.

If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.

OK or NG

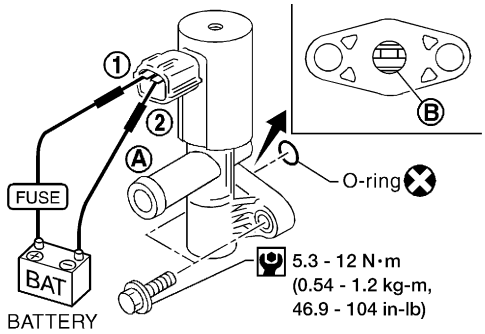
OK	▶	GO TO 9.
NG	▶	Replace EVAP canister vent control valve and O-ring.

Diagnostic Procedure (Cont'd)

8	CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

Without CONSULT-II

Check air passage continuity under the following conditions.



AEC783A

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

MTBL0297

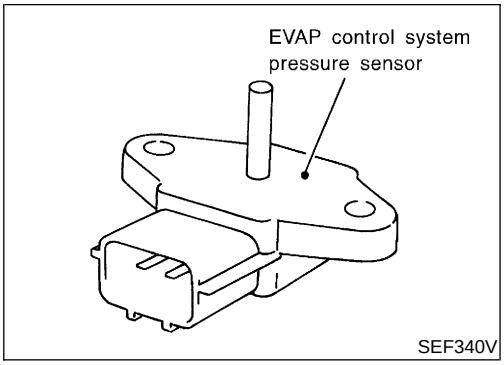
If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

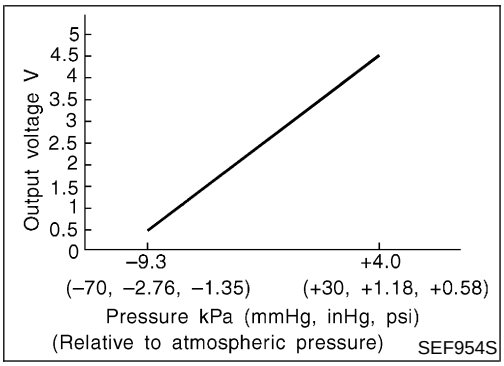
If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EVAP canister vent control valve and O-ring.

9	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**





Component Description

NGEC0264

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

NGEC0265

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	Approx. 3.4V

ECM Terminals and Reference Value

NGEC0266

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

CAUTION:

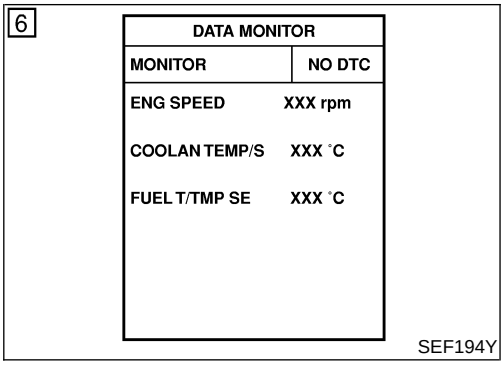
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	BR	Sensors' power supply	**[Ignition switch ON]**	Approximately 5V
43	B/W	Sensors' ground	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
62	Y	EVAP control system pressure sensor	**[Ignition switch ON]**	Approximately 3.4V

On Board Diagnosis Logic

NGEC0267

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0450	• An improper voltage signal from EVAP control system pressure sensor is sent to ECM.	• Harness or connectors (The EVAP control system pressure sensor circuit is open or shorted.) • Rubber hose to EVAP control system pressure is clogged, vent, kinked, disconnected or improper connection. • EVAP control system pressure sensor • EVAP canister vent control valve • EVAP canister purge volume control solenoid valve • EVAP canister • Rubber hose from EVAP canister vent control valve to water separator



DTC Confirmation Procedure

=NGEC0268

NOTE:

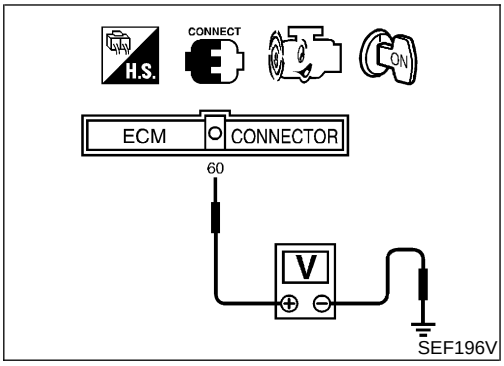
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- **Always perform test at a temperature above 5°C (41°F).**
- **Before performing the following procedure, confirm battery voltage is more than 11V at idle.**

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON.
4) Select "DATA MONITOR" mode with CONSULT-II.
5) Make sure that "TANK F/TEMP SE" is more than 0°C (32°F).
6) Start engine and wait at least 20 seconds.
7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-389.



With GST

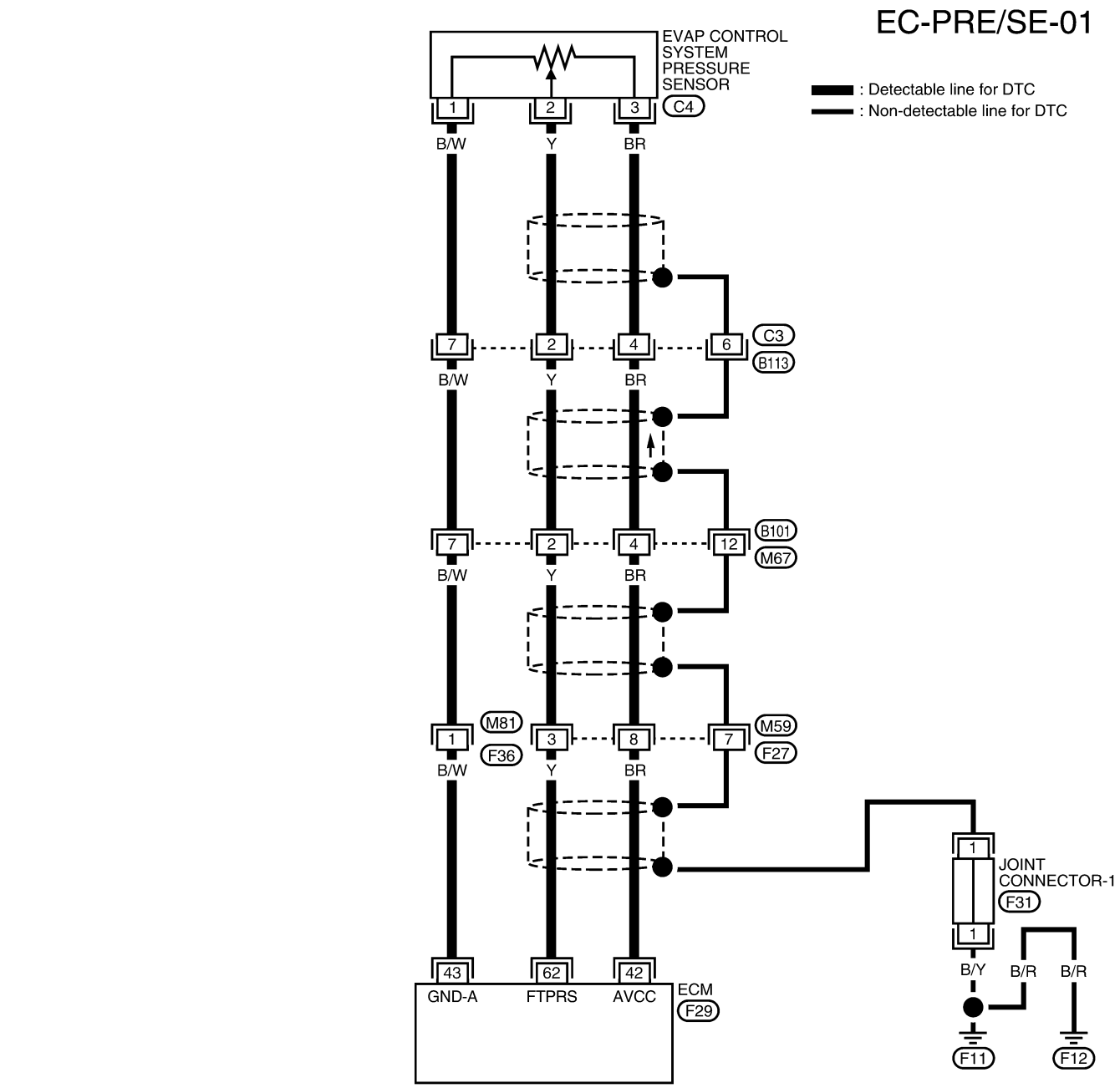
1) Start engine and warm it up to normal operating temperature.
2) Check that voltage between ECM terminal 60 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3) Turn ignition switch OFF and wait at least 5 seconds.
4) Start engine and wait at least 11 seconds.
5) Select "MODE 7" with GST.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-389.

No Tools

1) Start engine and warm it up to normal operating temperature.
2) Check that voltage between ECM terminal 60 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3) Turn ignition switch OFF and wait at least 5 seconds.
4) Start engine and wait at least 11 seconds.
5) Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
6) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-389.

Wiring Diagram

NGEC0269



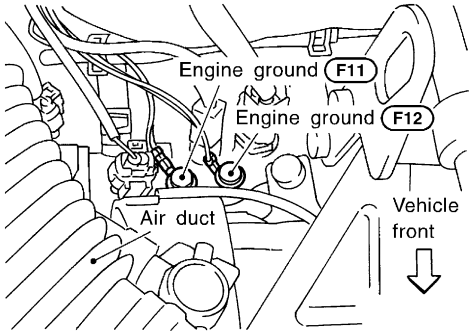
LEC485

Diagnostic Procedure

NGEC0270

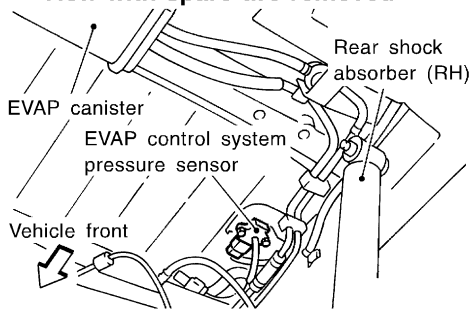
1	CHECK RUBBER TUBE CONNECTED TO THE SENSOR	
Check rubber tube connected to the sensor for clogging, vent, kink, disconnection or improper connection.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Reconnect, repair or replace.

2	RETIGHTEN GROUND SCREWS	
1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.		
	▶	GO TO 3.



SEF325V

3	CHECK HARNESS CONNECTOR	
1. Disconnect EVAP control system pressure sensor harness connector.		
View with spare tire removed		
2. Check sensor harness connector for water. **Water should not exist.**		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace harness connector.

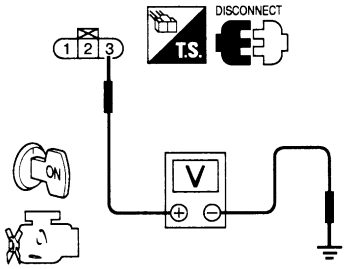


SEF341V

Diagnostic Procedure (Cont'd)

4	CHECK POWER SUPPLY

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



SEF410Q

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

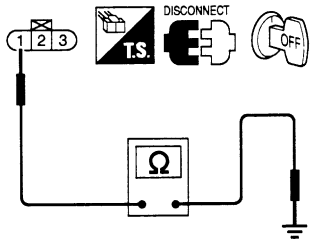
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors C3, B113
- Harness connectors B101, M67
- Harness connectors M59, F27
- Harness connectors M81, F36
- Harness for open or short between EVAP control system pressure sensor and ECM

	▶	Repair harness or connectors.

6	CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check harness continuity between EVAP control system pressure sensor terminal 1 and engine ground.



SEF411Q

Continuity should exist.

3. Also check harness for short to power.

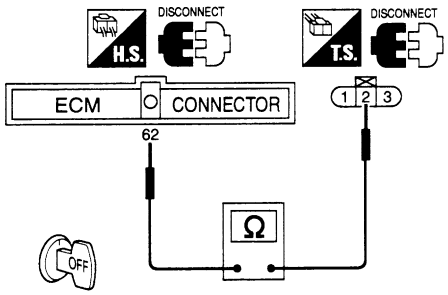
OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors C3, B113 ● Harness connectors B101, M67 ● Harness connectors M59, F27 ● Harness connectors M81, F36 ● 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 INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 62 and terminal 2.



SEF412Q

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 C3, B113 ● Harness connectors B101, M67 ● Harness connectors M59, F27 ● Harness connectors M81, F36 ● 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.

Diagnostic Procedure (Cont'd)

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. Check air passage continuity.
   If OK, inspection end. If NG, go to following step.

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

3. Check air passage continuity.

Condition PURG VOL CONT/V value	Air passage continuity between **A** and **B**
100.0%	Yes
0.0%	No

MTBL0302

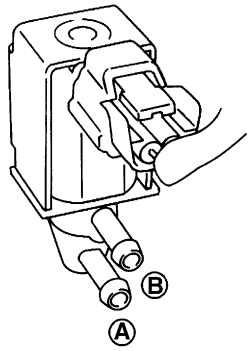
OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

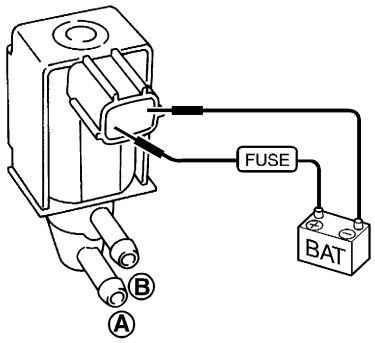
11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Without CONSULT-II

Check air passage continuity.



SEF660U



SEF661U

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

MTBL0303

OK or NG

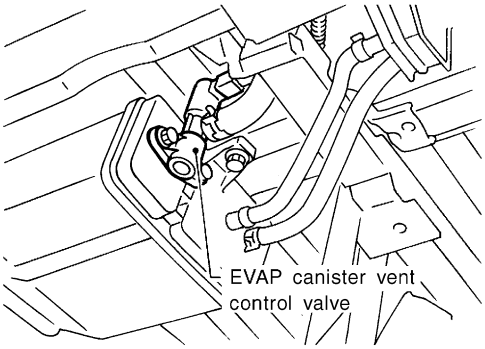
OK	▶	GO TO 13.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

12	CHECK EVAP CANISTER VENT CONTROL VALVE

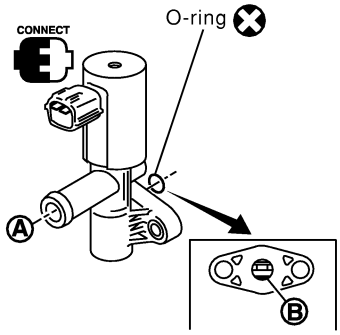
With CONSULT-II

Check air passage continuity.

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



SEF143S



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

If NG, clean valve using air blower or replace as necessary.

If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.

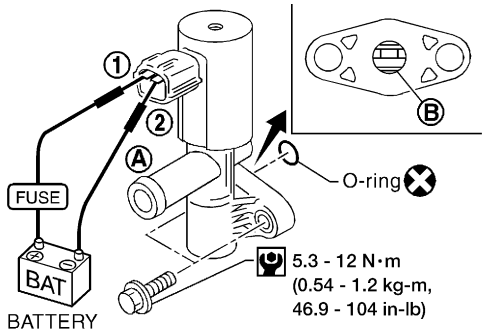
OK or NG

OK	▶	GO TO 14.
NG	▶	Replace EVAP canister vent control valve.

13	CHECK EVAP CANISTER VENT CONTROL VALVE

Without CONSULT-II

Check air passage continuity under the following conditions.



AEC783A

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

MTBL0297

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.

OK or NG

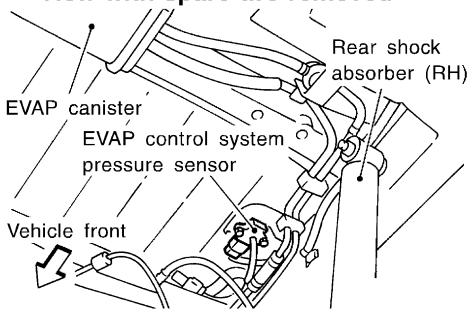
OK	▶	GO TO 14.
NG	▶	Replace EVAP canister vent control valve.

Diagnostic Procedure (Cont'd)

14	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

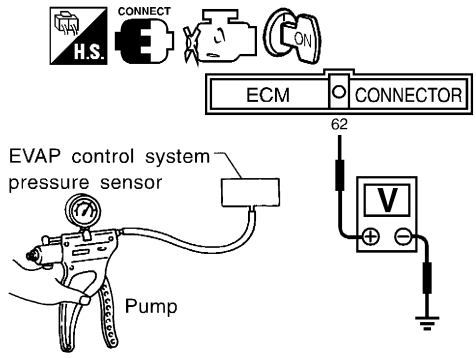
1. Remove EVAP control system pressure sensor with its harness connector connected.

View with spare tire removed



SEF341V

2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
4. Check output voltage between ECM terminal 62 and engine ground.



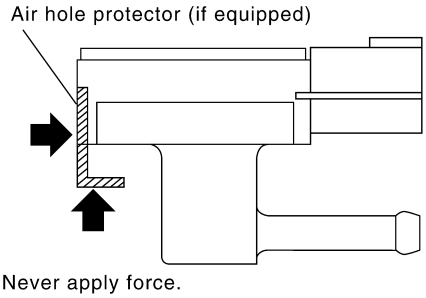
SEF198V

Pressure (Relative to atomospheric 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

MTBL0295

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.**



SEF799W

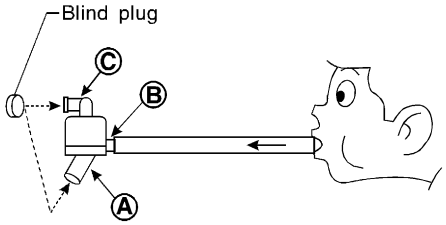
- **Never apply force to the air hole protector of the sensor, if equipped.**
- **Discard any EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace EVAP control system pressure sensor.

15	CHECK RUBBER TUBE FOR CLOGGING

Check obstructed water separator and rubber tube to EVAP canister vent control valve and clean the rubber tube using air blower.
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.

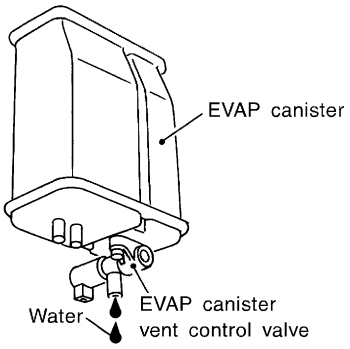
- **Do not disassemble water separator.**

OK or NG

OK	▶	GO TO 16.
NG	▶	Clean, repair or replace rubber tube and/or water separator.

16	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 17.
No	▶	GO TO 19.

17	CHECK EVAP CANISTER

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

OK or NG

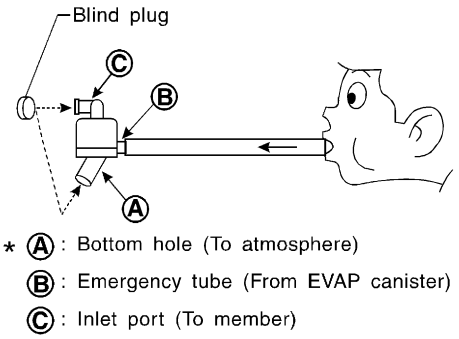
OK	▶	GO TO 19.
NG	▶	GO TO 18.

Diagnostic Procedure (Cont'd)

18	DETECT MALFUNCTIONING PART

Check the following.
1. Visually check the EVAP canister for damage.
2. Check hose connection between EVAP canister and water separator for clogging and poor connection.
3. Check water separator.

a. Check visually for insect nests in the water separator air inlet.
b. Check visually for cracks or flaws in the appearance.
c. Check visually for cracks or flaws in the hose.
d. 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)

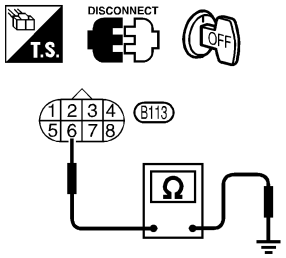
SEF829T

e. In case of NG in items 2 - 4, replace the parts.
- **Do not disassemble water separator.**

▶	Repair hose or replace EVAP canister or water separator.

19	CHECK SHIELD CIRCUIT

1. Turn ignition switch OFF.
2. Reconnect disconnected harness connectors.
3. Disconnect harness connectors B113.
4. Check harness continuity between harness connector B113 terminal 6 and ground.



SEF699Z

Continuity should exist.

5. Also check harness for short to power.
6. Then reconnect harness connectors.

OK or NG

OK	▶	GO TO 21.
NG	▶	GO TO 20.

20	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M59, F27
- Joint connector-1 (Refer to "HARNESS LAYOUT", ***EL-254***.)
- Harness for open or short between harness connector M67 and engine ground

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

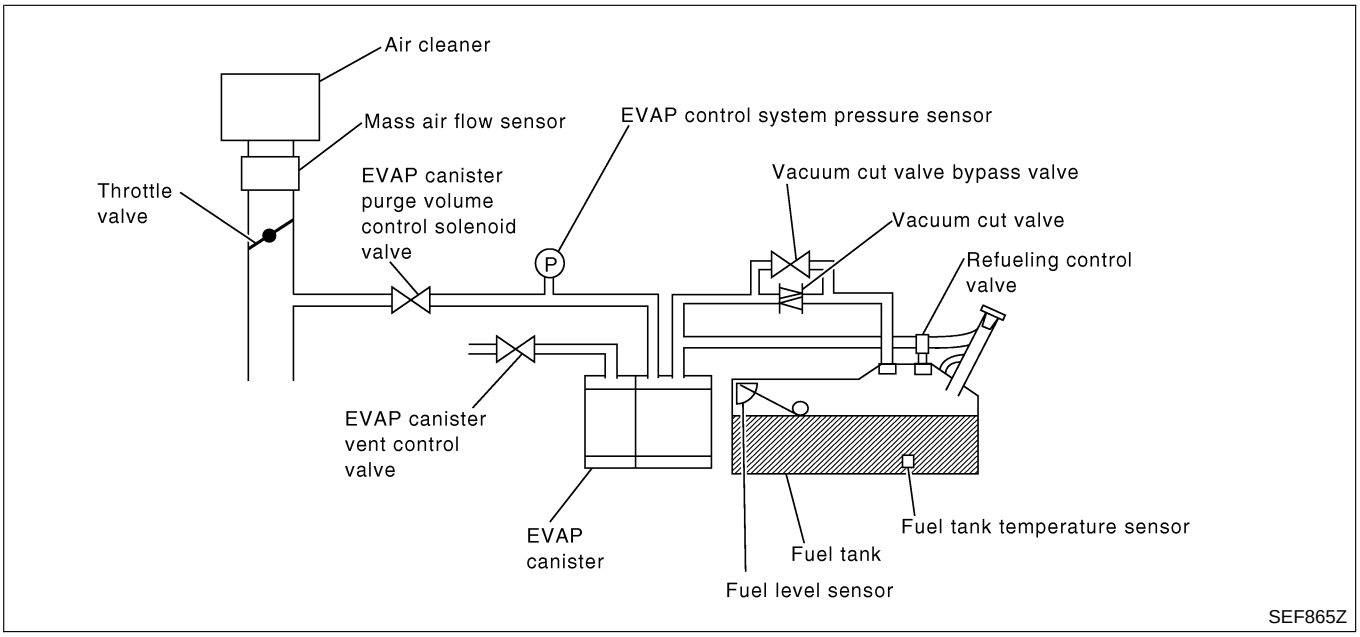
21	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	INSPECTION END

On Board Diagnosis Logic

NGEC0951

NOTE:
If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-510.)

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 a very large leak, such as fuel filler cap fell off, EVAP control system does not operate properly.

CAUTION:

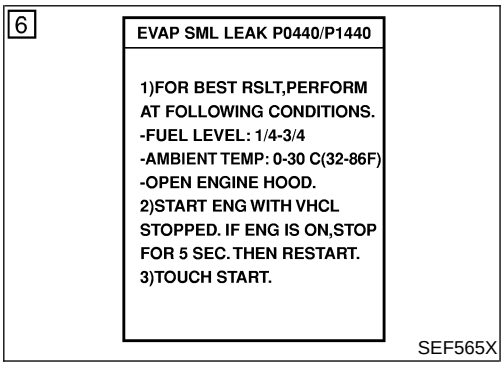
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

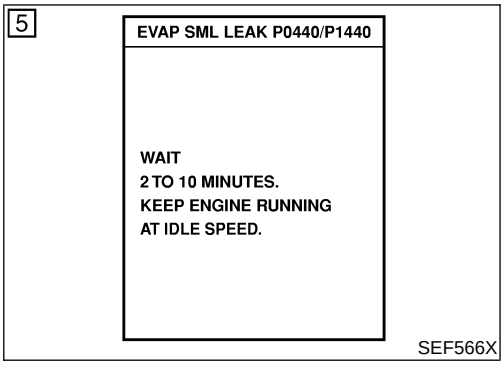
POSSIBLE CAUSE

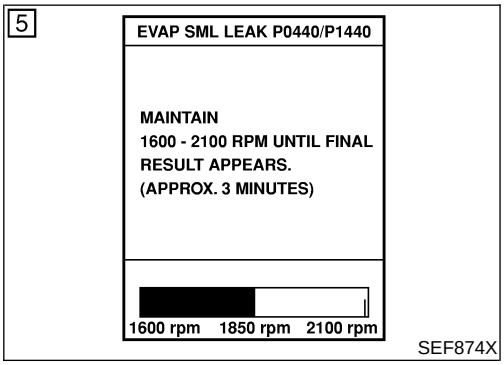
NGEC0951S01

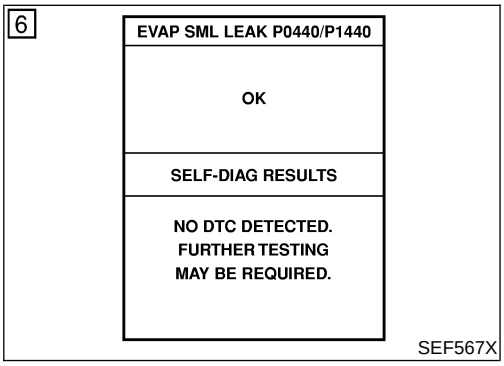
- Fuel filler cap remains open or fails to close.
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister 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

NGEC0952

CAUTION:

Never remove fuel filter cap during the DTC confirmation procedure.

NOTE:

- **If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-520.)**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**

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.**
- **It is better that the fuel level is low.**

With CONSULT-II

1) Tighten fuel filter cap securely until ratcheting sound is heard.
2) Turn ignition switch ON.
3) Turn ignition switch OFF and wait at least 5 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" 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-104.

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-402.
   If P0440 is displayed, perform "Diagnostic Procedure" for DTC P0440.

With GST

DTC Confirmation Procedure (Cont'd)

NOTE:

- Be sure to read the explanation of "Driving Pattern" on EC-74 before driving vehicle.
- It is better that the fuel level is low.

1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-74.
3) Stop vehicle.
4) Select "MODE 1" with GST.

- If SRT of EVAP system is not set yet, go to the following step.
- If SRT of EVAP system is set, the result will be OK.

5) Turn ignition switch "OFF" and wait at least 5 seconds.
6) Start engine.
   It is not necessary to cool engine down before driving.
7) Drive vehicle again according to the "Driving Pattern", EC-74.
8) Stop vehicle.
9) Select "MODE 3" with GST.

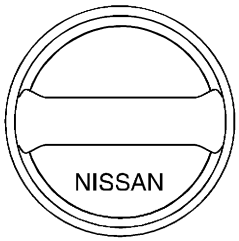
- If P0455 is displayed on the screen, go to "Diagnostic Procedure", EC-402.
- If P0440 is displayed on the screen, go to "Diagnostic Procedure", EC-356.
- If P1440 is displayed on the screen, go to "Diagnostic Procedure", EC-474.
- If P1447 is displayed on the screen, go to "Diagnostic Procedure", EC-511.
- 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

NGEC0953

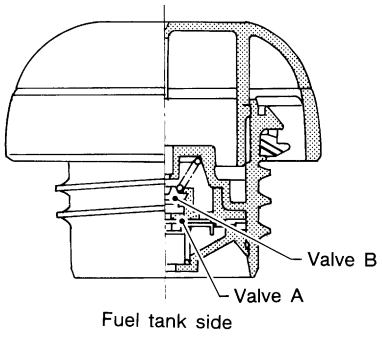
1	CHECK FUEL FILLER CAP DESIGN	
1. Turn ignition switch OFF. 2. Check for genuine NISSAN fuel filler cap design.  SEF915U **OK or NG**		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

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.

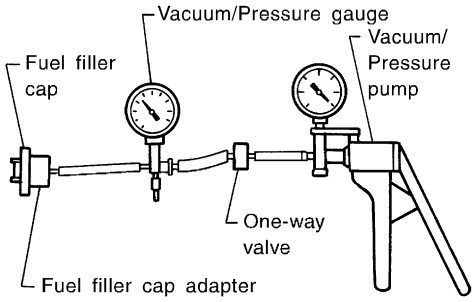
3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	GO TO 4.

4 CHECK FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)

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



SEF427N



SEF943S

Pressure:
16.0 - 20.0 kPa (0.163 - 0.204 kg/cm^2, 2.32 - 2.90 psi)
Vacuum:
−6.0 to −3.5 kPa (−0.061 to −0.036 kg/cm^2, −0.87 to −0.51 psi)

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.

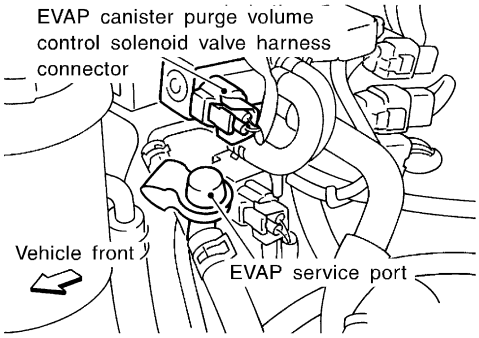
5	CHECK EVAP PURGE LINE	
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection or disconnection. Refer to "Evaporative Emission System", EC-34.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Repair or reconnect the hose.

6	CLEAN EVAP PURGE LINE	
Clean EVAP purge line (pipe and rubber tube) using air blower.		
	▶	GO TO 7.

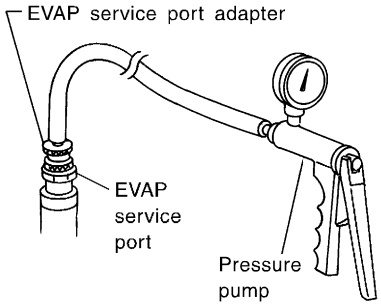
7	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT	
Refer to "DTC Confirmation Procedure", EC-378.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

8 INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



SEF339V



SEF916U

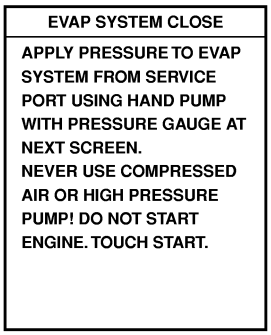
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II	▶	GO TO 9.
Models without CONSULT-II	▶	GO TO 10.

9	CHECK FOR EVAP LEAK

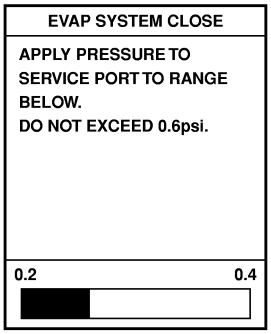
With CONSULT-II

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.



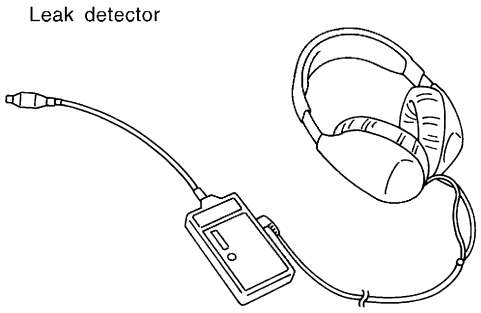
PEF658U

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-37.



SEF200U

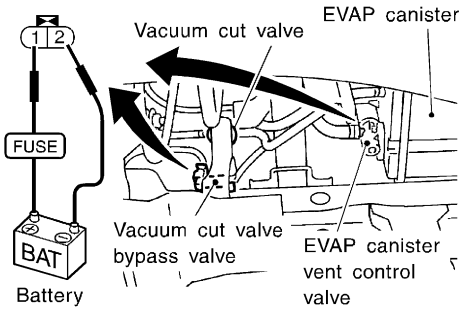
OK or NG

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

10	CHECK FOR EVAP LEAK

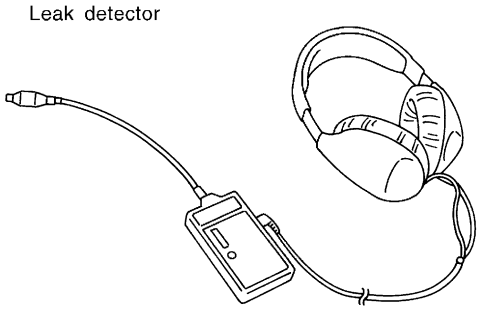
Without CONSULT-II

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



SEF503V

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-37.



SEF200U

OK or NG

OK	▶	GO TO 12.
NG	▶	Repair or replace.

11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II
1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
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 14.
NG	▶	GO TO 13.

13	CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-27.

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

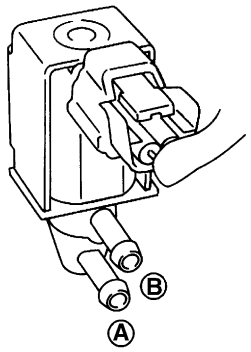
1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

SEF801Y

If OK, inspection end. If NG, go to following step.

3. Check air passage continuity.



SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

MTBL0241

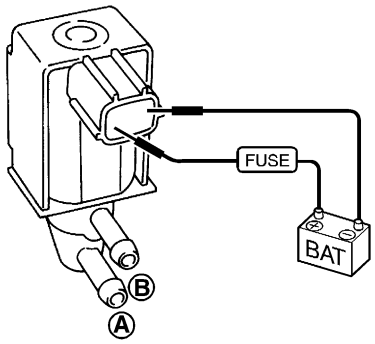
OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

15	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Without CONSULT-II

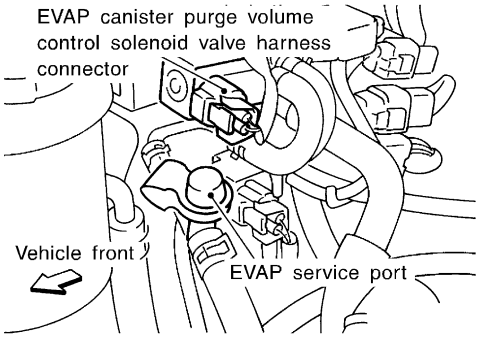
Check air passage continuity.



SEF661U

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

MTBL0242



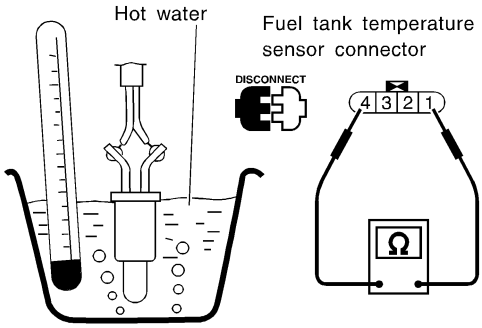
SEF339V

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

16	CHECK FUEL TANK TEMPERATURE SENSOR

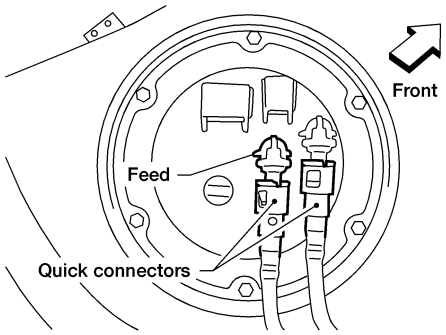
Check resistance by heating with hot water or heat gun as shown in the figure.



SEF710Z

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

MTBL0234



AFE095

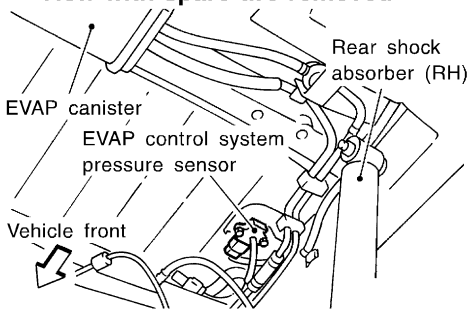
OK or NG

OK	▶	GO TO 17.
NG	▶	Replace fuel tank temperature sensor, ***FE-4***.

17	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

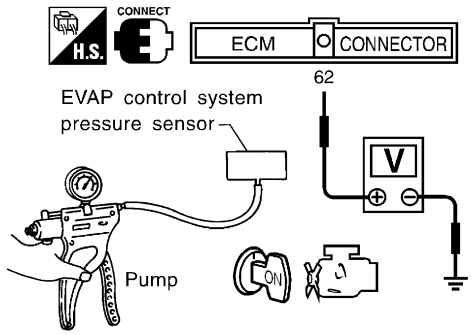
1. Remove EVAP control system pressure sensor with its harness connector connected.

View with spare tire removed



SEF341V

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.
5. Check input voltage between ECM terminal 62 and ground.



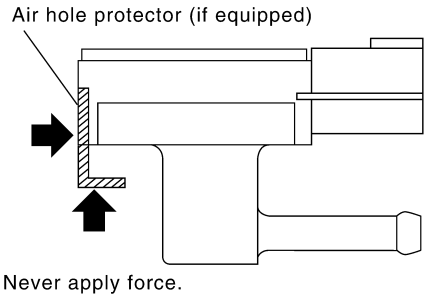
SEF894U

Pressure (Relative to atmosphericpressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
–9.3 kPa (–70 mmHg, –2.76 inHg)	0.4 - 0.6

MTBL0246

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.**

CAUTION:
- **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

- **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.**

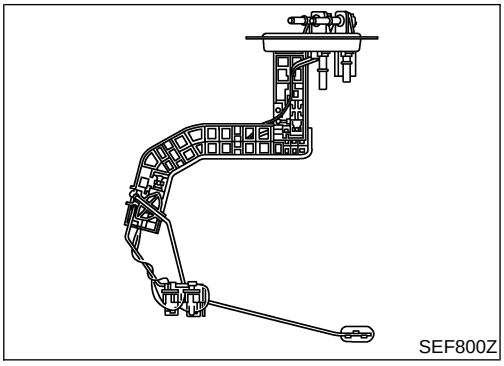
OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP control system pressure sensor.

Diagnostic Procedure (Cont'd)

18	CHECK FUEL LEVEL SENSOR	
1. Remove fuel level sensor assembly. Refer to ***FE-5***. 2. Refer to "FUEL LEVEL SENSOR UNIT CHECK", ***EL-87***.		
OK or NG		
OK	▶	GO TO 19.
NG	▶	Replace fuel level sensor.

19	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**


SEF800Z

Component Description

NGEC1012

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

NGEC1013

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

NGEC1014

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

3

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

DTC Confirmation Procedure

NGEC1015

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

NGEC1015S01

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-415.

WITH GST

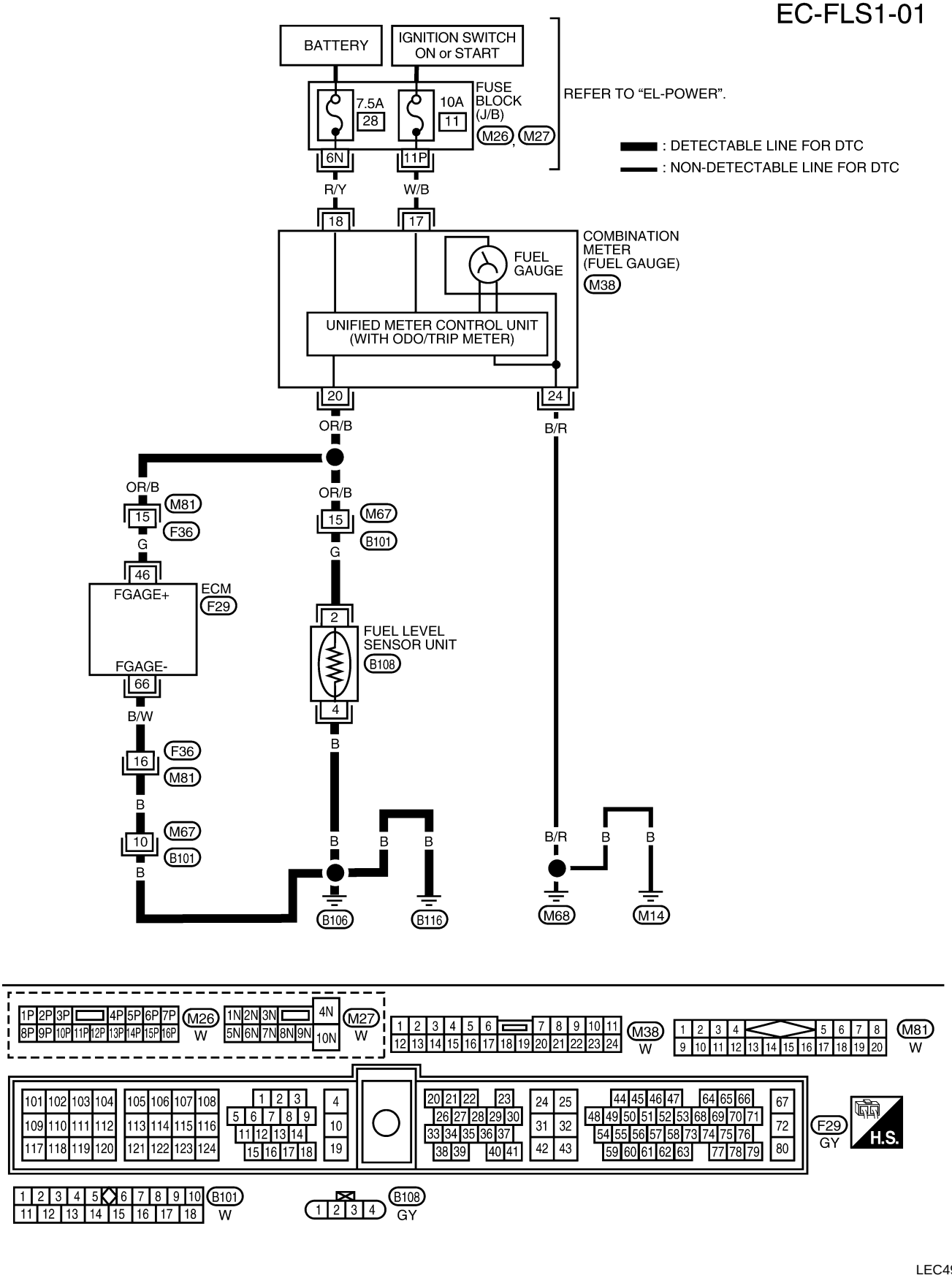
NGEC1015S02

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NGEC1016

EC-FLS1-01



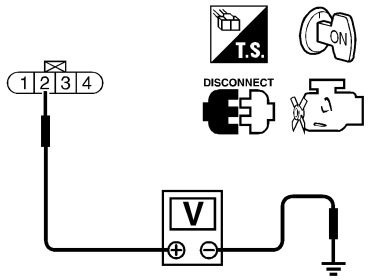
LEC490

Diagnostic Procedure

=NGEC1017

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor until harness connector.
3. Turn ignition switch “ON”.
4. Check voltage between fuel level sensor unit and fuel pump terminal 2 and ground with CONSULT-II or a tester.



Voltage: Battery voltage

SEF702ZA

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M67, B101
- Harness for open or short between combination meter and fuel level sensor until and fuel pump

	▶	Repair or replace harness or connectors.

3	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit terminal 4 and body ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit 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 46 and fuel level sensor unit terminal 2, ECM terminal 66 and fuel level sensor unit terminal 4. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to power.

OK or NG

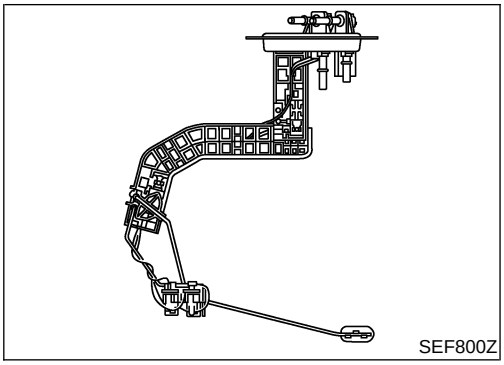
OK	▶	GO TO 6.
NG	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M81, F36 ● Harness connectors M67, B101 ● Harness connectors F36, M81 ● Harness connectors M67, B101 ● 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-87***, "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-142.	
▶	**INSPECTION END**


SEF800Z

Component Description

=NGEC1018

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

NGEC1019

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

NGEC1020

- Harness or connectors
  (The level sensor circuit is open or shorted.)
- Fuel level sensor

Overall Function Check

NGEC1021

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 Tank".

TESTING CONDITION:

Before starting overall function check, preparation of draining fuel and refilling fuel is required.

7

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

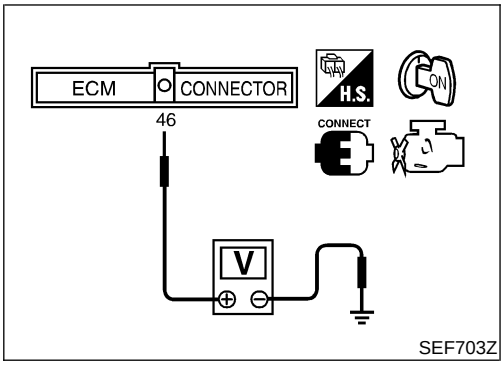
NGEC1021S01

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-50.
3) Remove the fuel feed hose on the fuel level sensor unit.
4) Connect a spare fuel hose where the fuel feed hose was removed.

5) Turn ignition switch "OFF" and wait at least 10 seconds then turn "ON".
6) Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT-II.
7) Check "FUEL LEVEL SE" output voltage and note it.
8) Select "FUEL PUMP" in "ACTIVE TEST" mode with CONSULT-II.
9) Touch "ON" and drain fuel approximately 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-87***, "FUEL LEVEL SENSOR UNIT CHECK".

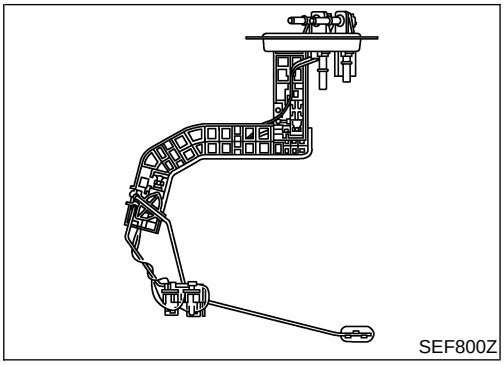


WITH GST

NGEC1021S02

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-50.
3) Remove the fuel feed hose on the fuel level sensor unit.
4) Connect a spare fuel hose where the fuel feed hose was removed.
5) Turn ignition switch "OFF".
6) Set voltmeters probe between ECM terminal 46 (fuel level sensor signal) and ground.
7) Turn ignition switch "ON".
8) Check voltage between ECM terminal 46 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 46 and ground changes more than 0.03V during step 8 - 10.
If NG, check component of fuel level sensor, refer to ***EL-87***, "FUEL LEVEL SENSOR UNIT CHECK".


SEF800Z

Component Description

NGEC1022

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

NGEC1023

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

NGEC1024

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

DTC Confirmation Procedure

NGEC1025

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

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch “ON”.

2

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

NGEC1025S01

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-421.

WITH GST

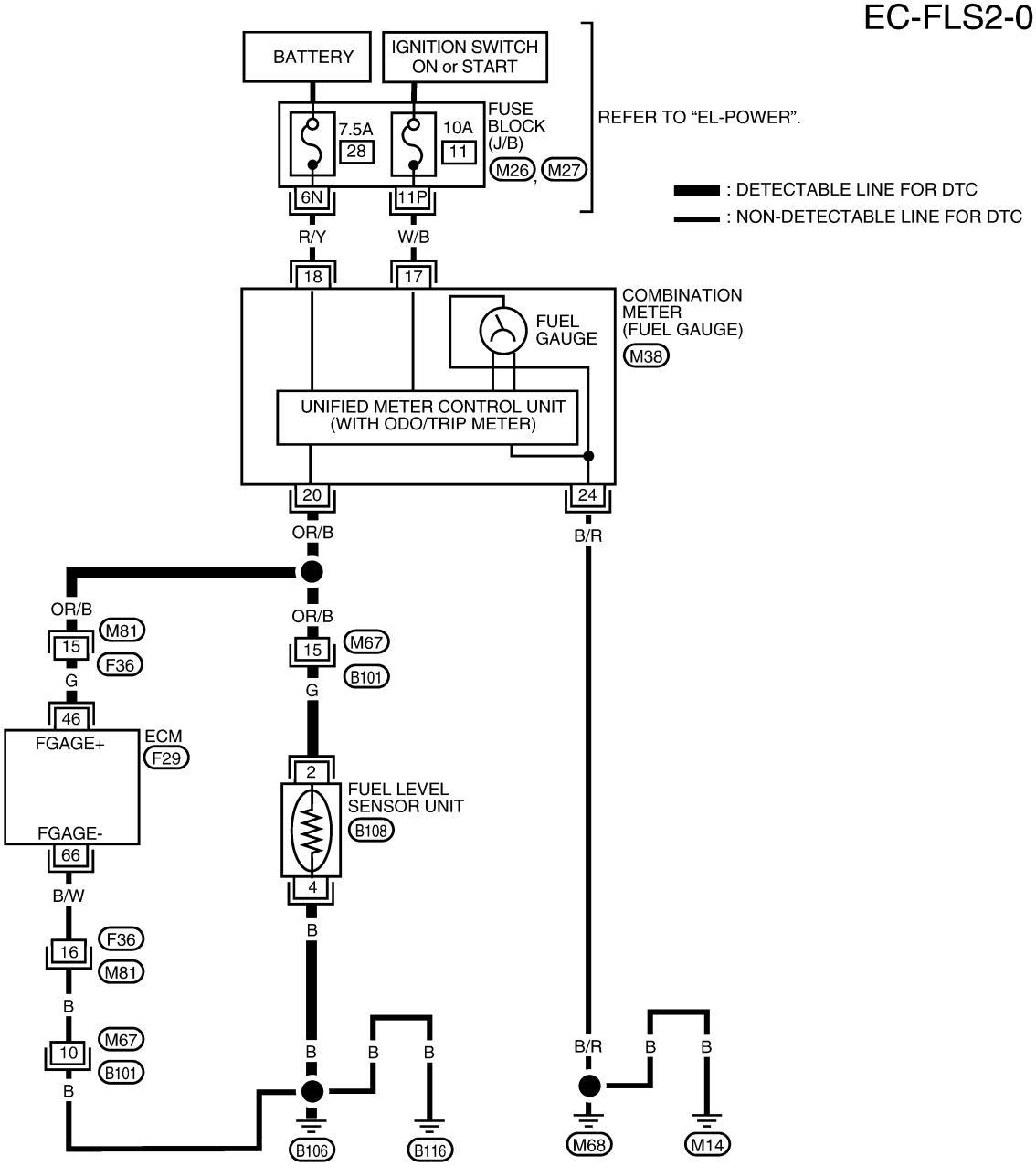
NGEC1025S02

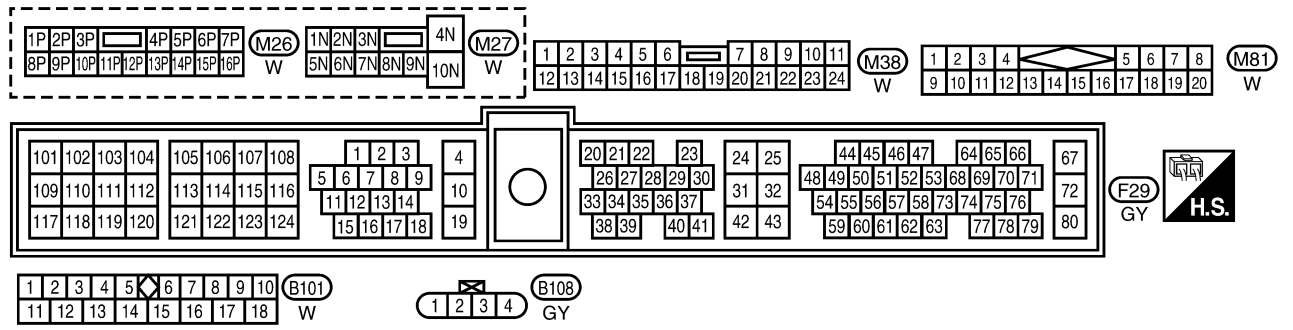
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NGEC1026

EC-FLS2-01





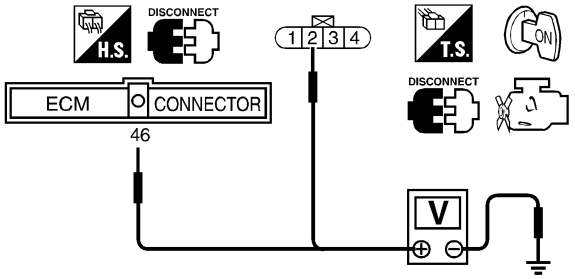
LEC491

Diagnostic Procedure

=NGEC1027

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor until harness connector.
3. Turn ignition switch “ON”.
4. Check voltage between fuel level sensor unit terminal 2 and ground, ECM terminal 46 and ground with CONSULT-II or tester.



Voltage: Battery voltage

SEF704ZA

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M67, B101 and M81, F36
- Harness for open or short between combination meter and fuel level sensor until

	▶	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 4 and body ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit 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 46 and fuel level sensor unit terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to power.

OK or NG

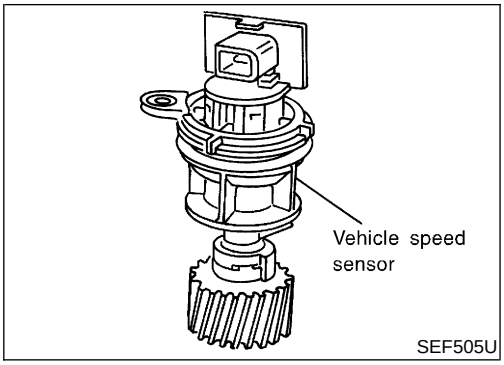
OK	▶	GO TO 6.
NG	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M81, F36 ● Harness connectors M67, B101 ● Harness for open or short between ECM and fuel level sensor	
▶	Repair open circuit or short to power in harness on connectors.

6	CHECK FUEL LEVEL SENSOR
Refer to ***EL-87***, "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-142.	
▶	**INSPECTION END**



Component Description

NGEC0272

The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM.

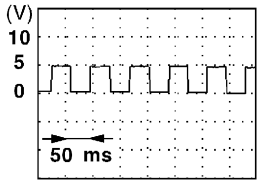
ECM Terminals and Reference Value

NGEC0273

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)
29	G/B	Vehicle speed sensor	**[Engine is running]** ● Lift up the vehicle ● In 2nd gear position ● Vehicle speed is 40 km/h (25 MPH)	1 - 4V  SEF003W

On Board Diagnosis Logic

NGEC0274

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

NGEC0275

CAUTION:

Always drive vehicle at a safe speed.

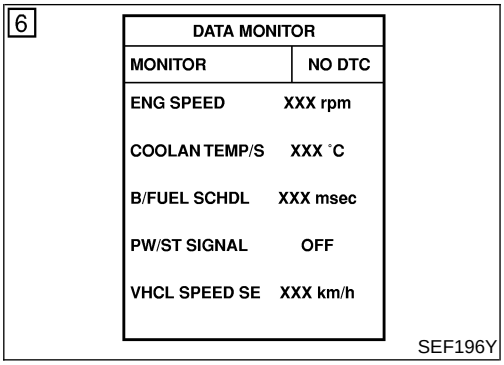
NOTE:

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

TESTING CONDITION:

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

DTC Confirmation Procedure (Cont'd)

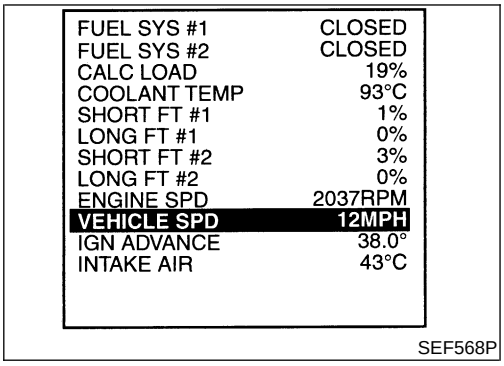


With CONSULT-II

1) Start engine
2) Read vehicle speed sensor signal 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-426.
   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 - 6,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	7 - 15msec
Selector lever	Suitable position
PW/ST SIGNAL	OFF

7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-426.



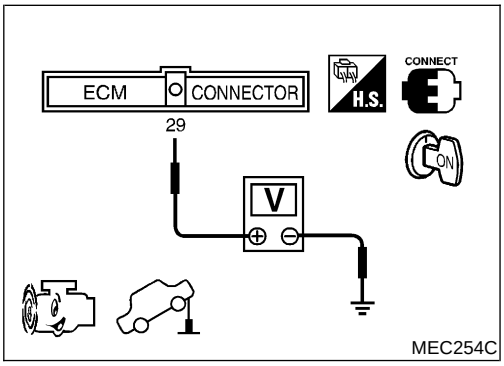
Overall Function Check

NGEC0276

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-426.



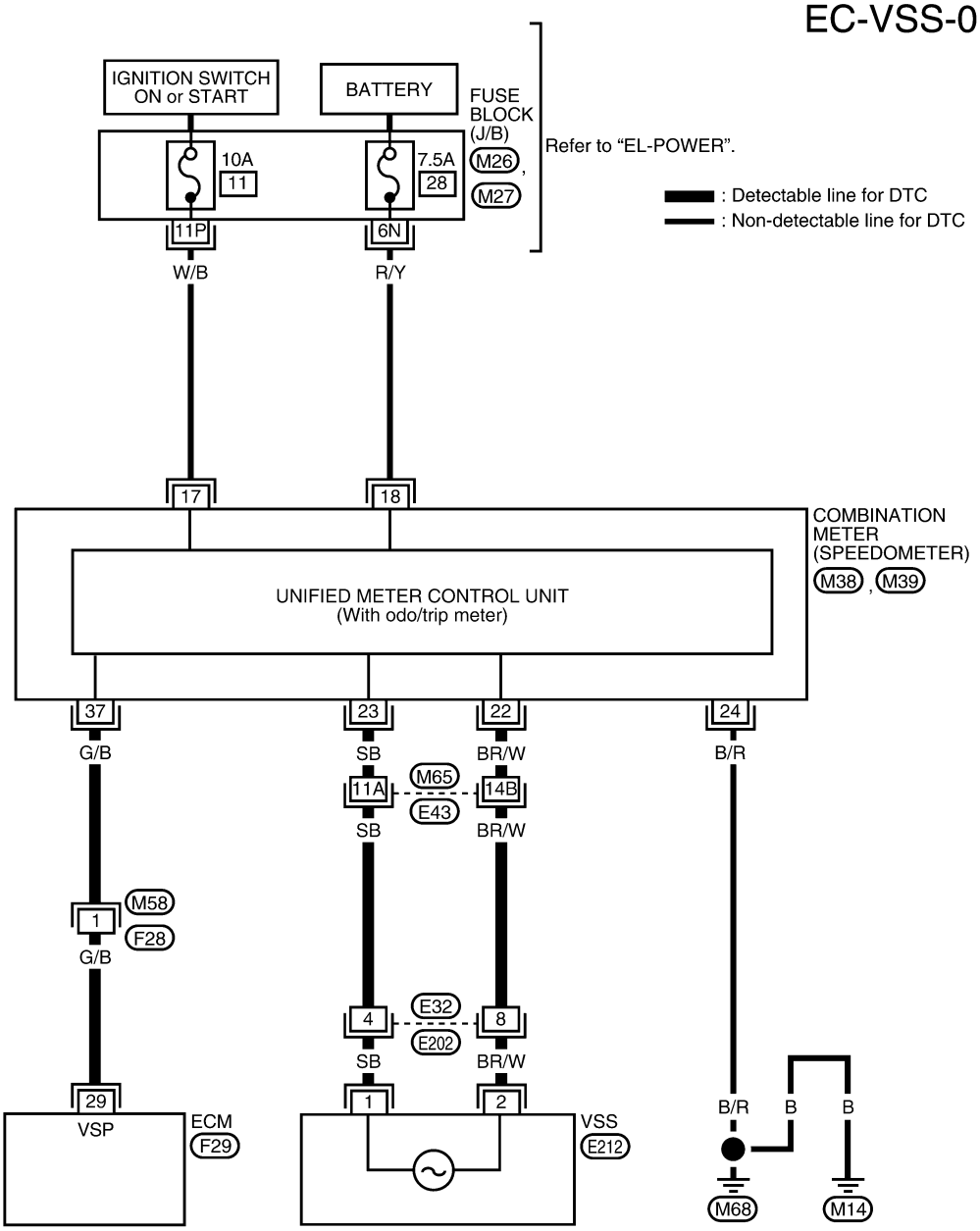
No Tools

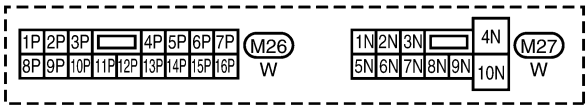
1) Lift up drive wheels.
2) Start engine.
3) Read the voltage signal between ECM terminal 29 (Vehicle speed sensor signal) and ground with oscilloscope.
4) Verify that the oscilloscope screen shows the signal wave as shown at "ECM Terminals and Reference Value", EC-423.
5) If NG, go to "Diagnostic Procedure", EC-426.

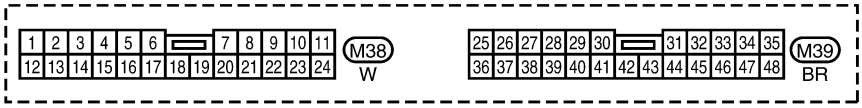
Wiring Diagram

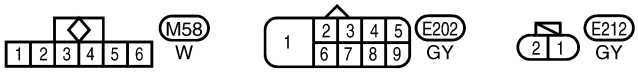
NGEC0277

EC-VSS-01









Refer to the following.
M65, E43 - SUPER MULTIPLE JUNCTION (SMJ)
F29 - ELECTRICAL UNITS

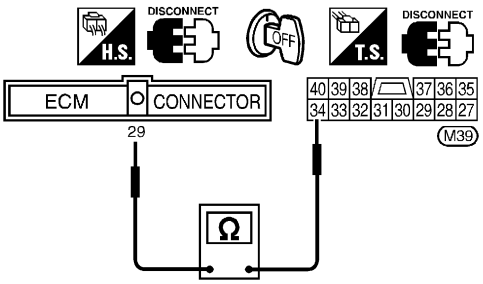
LEC486

Diagnostic Procedure

NGEC0278

1	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and combination meter harness connector M39.
3. Check harness continuity between ECM terminal 29 and meter terminal 37.



SEF200V

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, F28
- Harness for open or short between ECM and combination meter

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

3	CHECK SPEEDOMETER FUNCTION

Make sure that speedometer functions properly.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E43, M65
- Harness connectors E32, E202
- Harness for open or short between combination meter and vehicle speed sensor

	▶	Repair harness or connectors. Check vehicle speed sensor and its circuit. Refer to ***EL-84***.

5	CHECK INTERMITTENT INCIDENT

Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-142.

	▶	**INSPECTION END**

Description

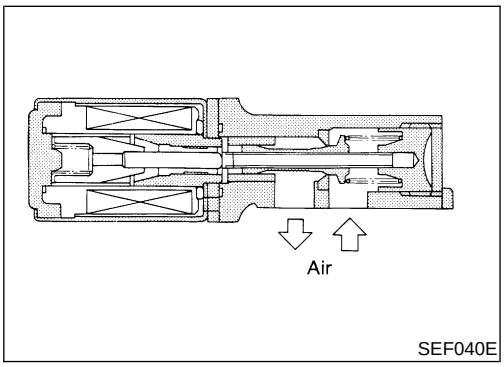
SYSTEM DESCRIPTION

NGEC0279

NGEC0279S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	ECM	IACV-AAC valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
PNP switch	Park/Neutral position		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Battery	Battery voltage		
Vehicle speed sensor	Vehicle speed		
Absolute pressure sensor	Ambient barometric pressure		
Intake air temperature sensor	Intake air temperature		

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which bypasses the throttle valve via IACV-AAC valve. The IACV-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the ON/OFF time of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner, power steering and cooling fan operation).



SEF040E

COMPONENT DESCRIPTION

NGEC0279S02

The IAC valve-AAC valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of air that will flow through the valve. The more air that flows through the valve, the higher the idle speed.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0280

MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: “N” • No-load	Idle	Approx. 30%
		2,000 rpm	—

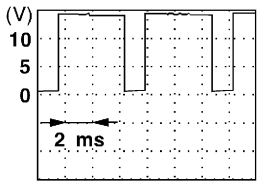
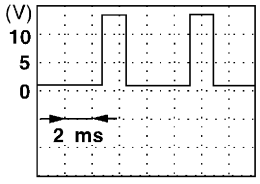
ECM Terminals and Reference Value

NGEC0281

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)
101	OR/L	IACV-AAC valve	**[Engine is running]** • **Warm-up condition** • Idle speed	10.5 - 11.5V  SEF015W
			[Engine is running] • **Warm-up condition** • Engine speed is 2,000 rpm	1 - 13V  SEF016W

On Board Diagnosis Logic

NGEC0282

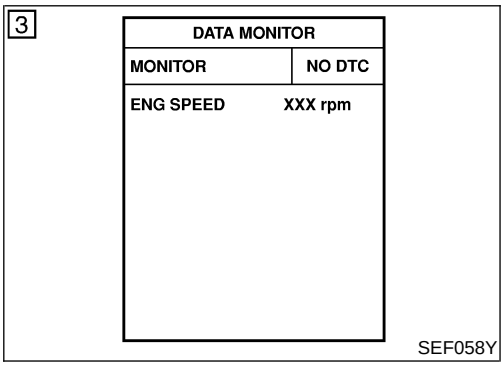
DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P0505	A)	The IACV-AAC valve does not operate properly.	• Harness or connectors (The IACV-AAC valve circuit is open.) • IACV-AAC valve
	B)	The IACV-AAC valve does not operate properly.	• Harness or connectors (The IACV-AAC valve circuit is shorted.) • IACV-AAC valve

DTC Confirmation Procedure

=NGEC0283

NOTE:

- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
- **Perform "Procedure for malfunction A" first. If DTC cannot be confirmed, perform "Procedure for malfunction B".**



PROCEDURE FOR MALFUNCTION A

NGEC0283S01

TESTING CONDITION:

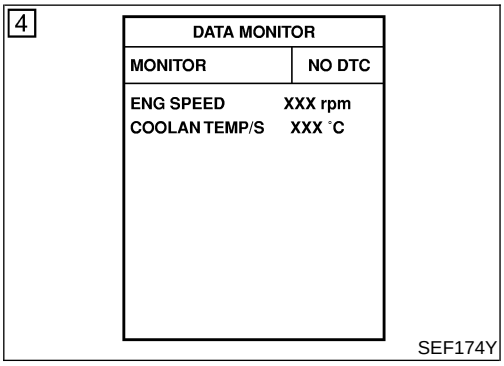
Before performing the following procedure, confirm battery voltage is more than 10.5V with ignition switch ON.

With CONSULT-II

1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and run it at idle at least 2 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-431.

With GST

Follow the procedure "With CONSULT-II".



PROCEDURE FOR MALFUNCTION B

NGEC0283S02

TESTING CONDITION:

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

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON again and select "DATA MONITOR" mode with CONSULT-II.
4) Start engine and run it for at least 6 minute at idle speed.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-431.

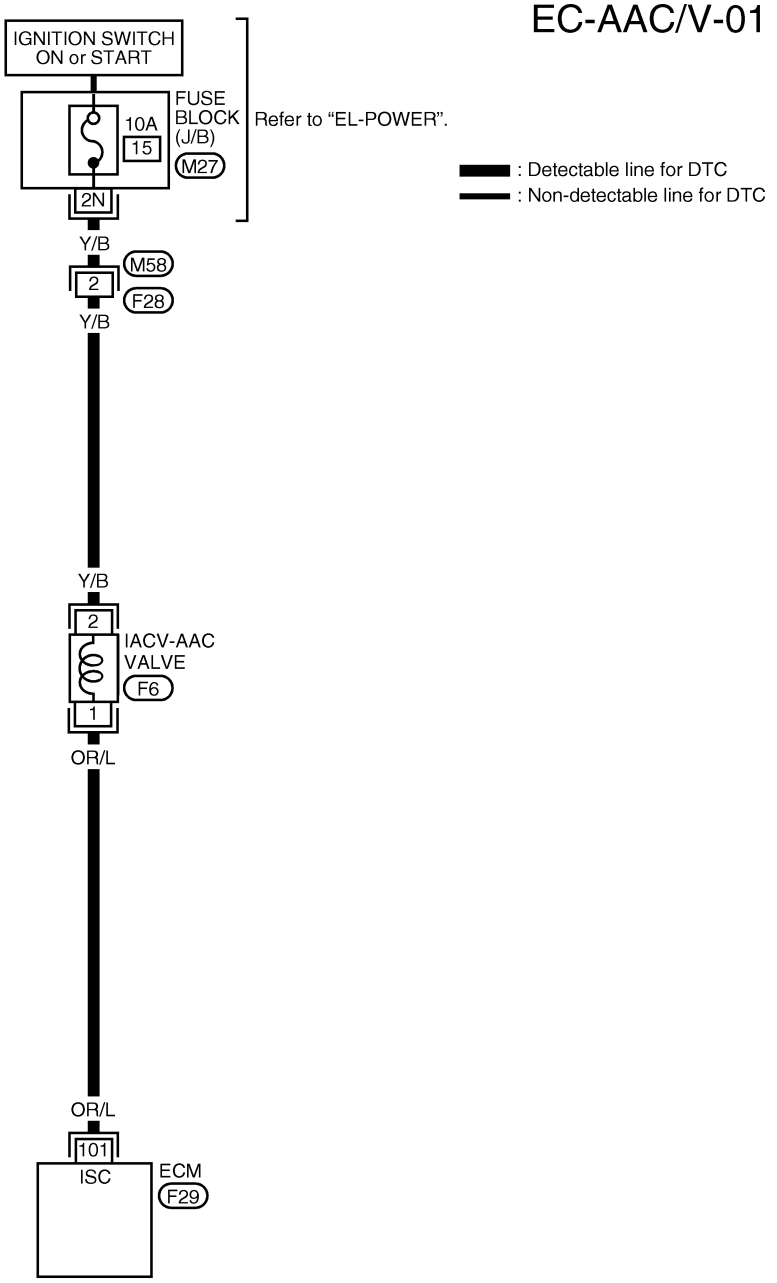
With GST

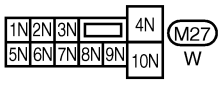
Follow the procedure "With CONSULT-II".

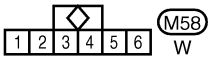
Wiring Diagram

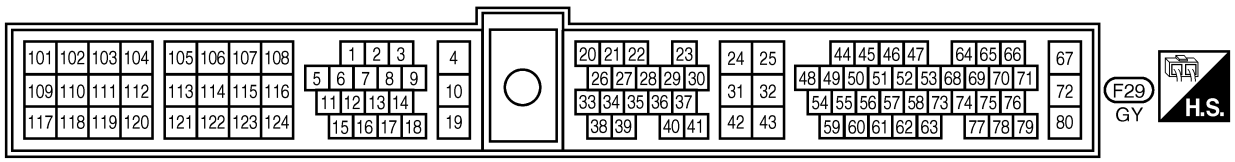
NGEC0284

EC-AAC/V-01









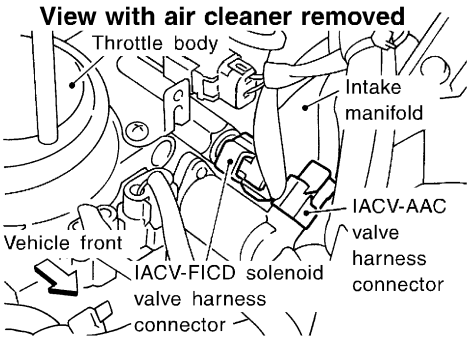
AEC001B

Diagnostic Procedure

NGEC0285

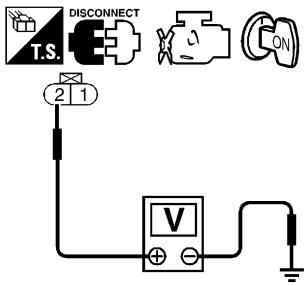
1	CHECK POWER SUPPLY

1. Stop engine.
2. Disconnect IACV-AAC valve harness connector.



SEF342V

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



SEF247W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

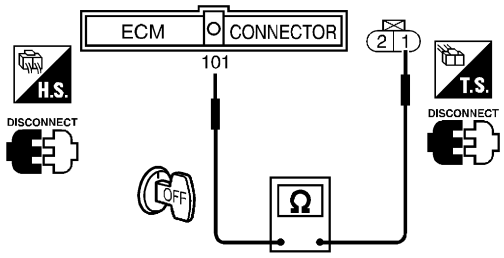
Check the following.
- Harness connectors M58, F28
- 10A fuse
- Harness for open or short between IACV-AAC valve harness connector and 10A fuse

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

3	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 101 and terminal 1.



SEF248W

Continuity should exist.

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

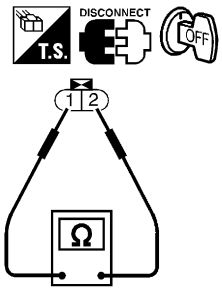
OK or NG

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

4	CHECK IACV-AAC VALVE

Disconnect IACV-AAC valve harness connector.

- Check IACV-AAC valve resistance.



SEF249W

Resistance: Approximately 10 Ω [at 25°C (77°F)]

- Check plunger for seizing or sticking.
- Check for broken spring.

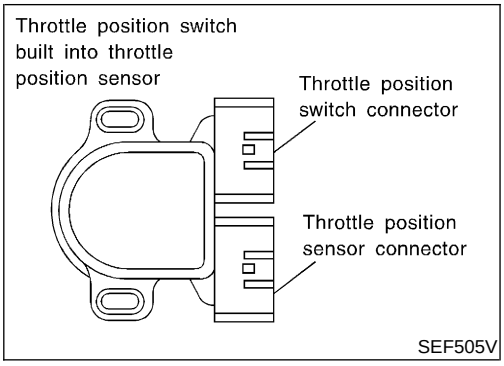
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace IACV-AAC valve.

5	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.

▶ **INSPECTION END**



Component Description

NGEC0287

A closed throttle position switch and wide open throttle position switch are built into the throttle position sensor unit. The wide open throttle position switch is used only for A/T control.

When the throttle valve is in the closed position, the closed throttle position switch sends a voltage signal to the ECM. The ECM only uses this signal to open or close the EVAP canister purge control valve when the throttle position sensor is malfunctioning.

ECM Terminals and Reference Value

NGEC0288

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)
28	BR/W	Throttle position switch (Closed position)	**[Ignition switch ON]** ● **Warm-up condition** ● Accelerator pedal released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON] ● Accelerator pedal depressed	Approximately 0V

On Board Diagnosis Logic

NGEC0289

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

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

=NGEC0290

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Select "CLSD THL/P SW" in "DATA MONITOR" mode with CONSULT-II and check the value under the following conditions.

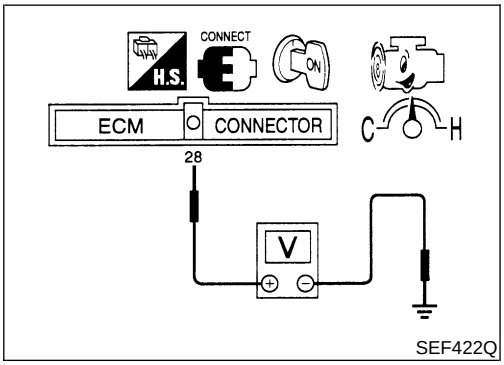
Condition	Voltage
At idle	ON
At 2,000 rpm	OFF

If the result is NG, go to "Diagnostic Procedure", EC-436.
If OK, go to following step.

3) Select "DATA MONITOR" mode with CONSULT-II.
4) Drive the vehicle for at least 5 consecutive seconds under the following condition.

THRTL POS SEN	More than 2.5V
VHCL SPEED SE	More than 4 km/h (2 MPH)
Selector lever	Suitable position
Driving pattern	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-436.



SEF422Q

Overall Function Check

NGEC0291

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 28 (Closed throttle position switch signal) and ground under the following conditions.

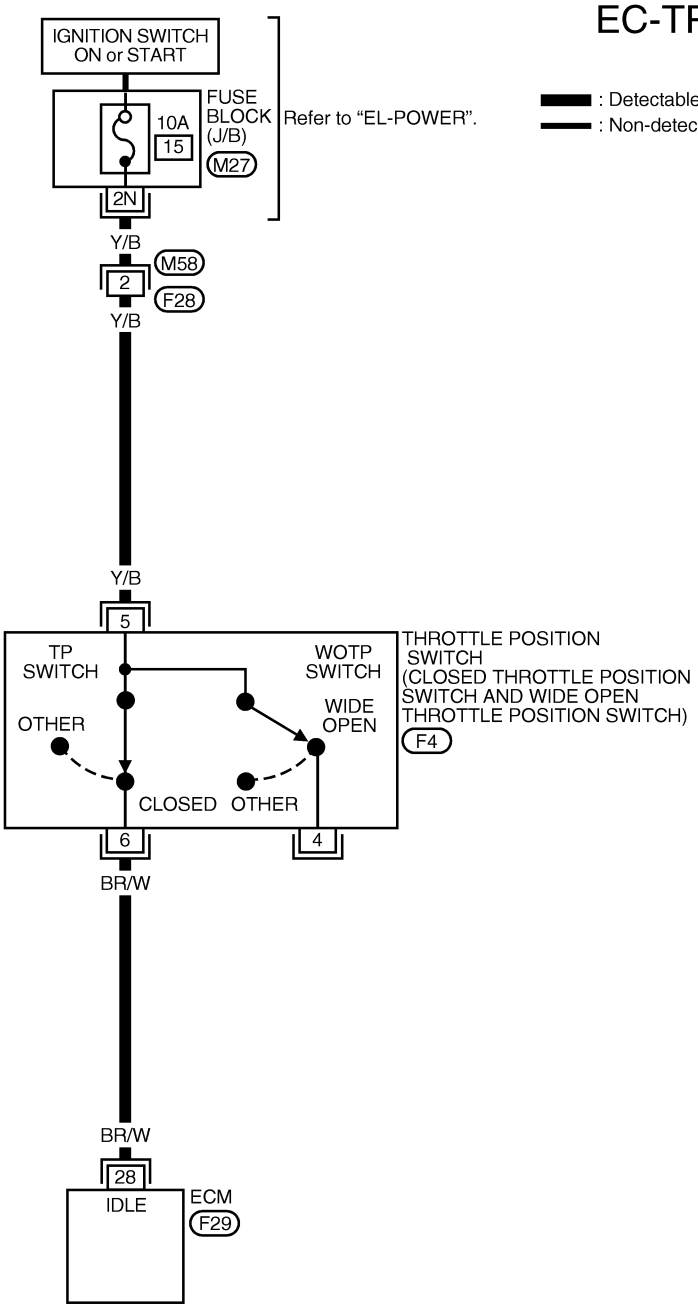
Condition	Voltage
At idle	Battery voltage
At 2,000 rpm	Approximately 0 - 1V

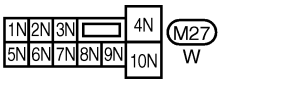
3) If NG, go to "Diagnostic Procedure", EC-436.

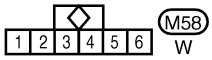
Wiring Diagram

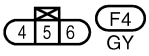
NGEC0292

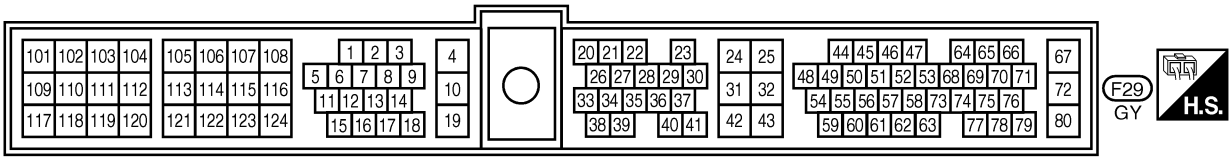
EC-TP/SW-01











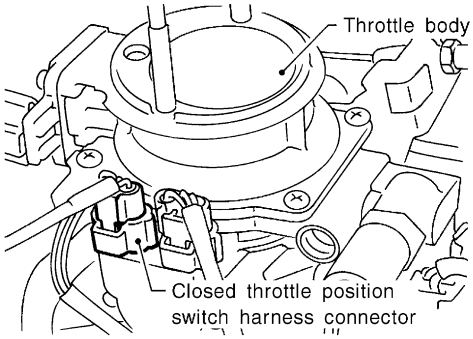
AEC002B

Diagnostic Procedure

NGEC0293

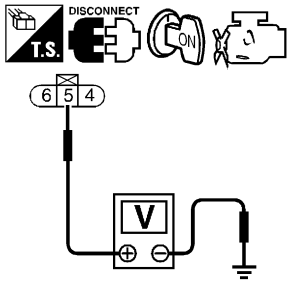
1	CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect throttle position switch harness connector.



SEF158S

3. Turn ignition switch ON.
4. Check voltage between terminal 5 and engine ground with CONSULT-II or tester.



SEF250W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

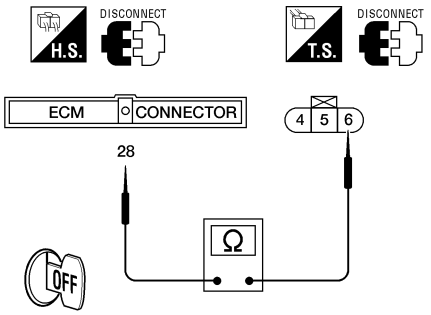
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M58, F28
- 10A fuse
- Harness for open or short between throttle position switch and 10A fuse

	▶	Repair harness or connectors.

3	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 28 and terminal 6.



AEC571A

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 throttle position switch and ECM.

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

5	ADJUST THROTTLE POSITION SWITCH IDLE POSITION

1. Check the following items. Refer to "Basic Inspection", EC-104.

Items	Specifications
Ignition timing	20° ± 2° BTDC
Base idle speed	750 ± 50 rpm (in "P" or "N" position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF
Target idle speed	800 ± 50 rpm (in "P" or "N" position)

MTBL0328

	▶	GO TO 6.

6 CHECK CLOSED THROTTLE POSITION SWITCH

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and turn ignition switch ON.
3. Select "DATA MONITOR" mode with CONSULT-II.
4. Check indication of "CLSD THL/P SW" under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
CLSD THL/P SW	ON

Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely open	OFF

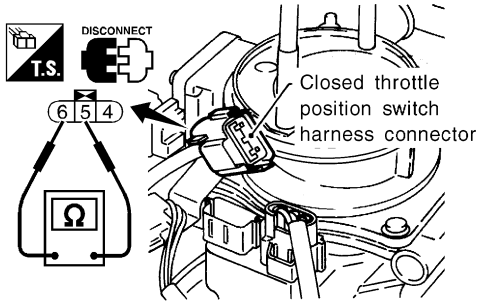
SEF721Z

NOTE:
Measurement must be made with closed throttle position switch installed in vehicle.
If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-104.

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

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect throttle position switch harness connector.
4. Check continuity between terminals 5 and 6 under the following conditions.



SEF159S

Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

MTBL0299

NOTE:
Continuity measurement must be made with closed throttle position switch installed in vehicle.
If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-104.

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

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace throttle position switch.

7	CHECK THROTTLE POSITION SENSOR

With CONSULT-II

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

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

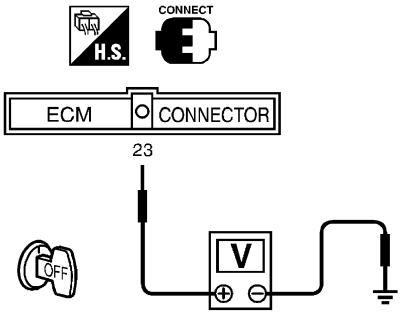
SEF198Y

NOTE:
Voltage measurement must be made with throttle position sensor installed in vehicle.
If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-104.

5. 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 and turn ignition switch ON.
3. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground under the following conditions.



SEF767W

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)

MTBL0329

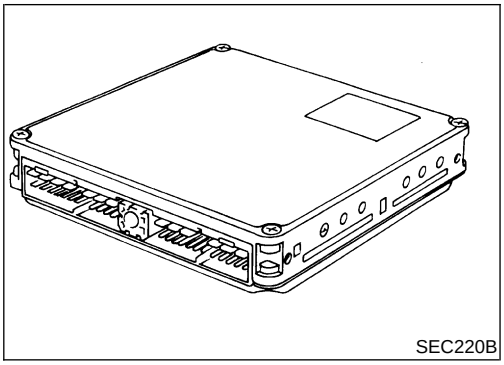
NOTE:
Voltage measurement must be made with throttle position sensor installed in vehicle.
If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-104.

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

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace throttle position sensor.

8	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**



SEC220B

Component Description

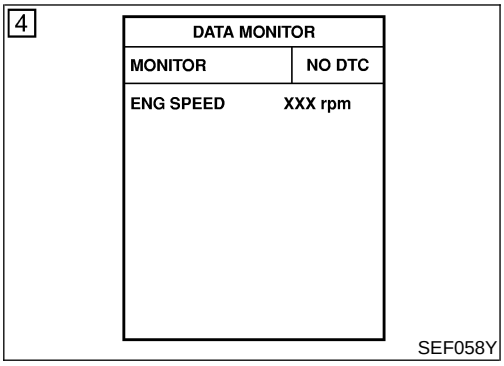
NGEC0295

The ECM consists of a microcomputer, diagnostic test mode selector, and connectors for signal input and output and for power supply. The ECM controls the engine.

On Board Diagnosis Logic

NGEC0296

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0605	• ECM calculation function is malfunctioning.	• ECM



SEF058Y

DTC Confirmation Procedure

NGEC0297

NOTE:

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

With CONSULT-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-441.

With GST

Follow the procedure “With CONSULT-II”.

Diagnostic Procedure

NGEC0298

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 previous page. 5. Is the 1st trip DTC P0605 displayed again?		
With GST 1. Turn ignition switch ON. 2. Select MODE 4 with GST. 3. Touch “ERASE”. 4. Perform “DTC Confirmation Procedure”. See previous page. 5. Is the 1st trip DTC P0605 displayed again?		
Yes or No		
Yes	▶	Replace ECM.
No	▶	**INSPECTION END**

On Board Diagnosis Logic

NGEC1028

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

NGEC1029

- Thermostat function
- Leakage from sealing portion of thermostat
- Engine coolant temperature sensor

DTC Confirmation Procedure

NGEC1030

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

TESTING CONDITION:

- **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

NGEC1030S01

1) Replace thermostat with new one. Refer to ***LC-30***, "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-443.

WITH GST

NGEC1030S02

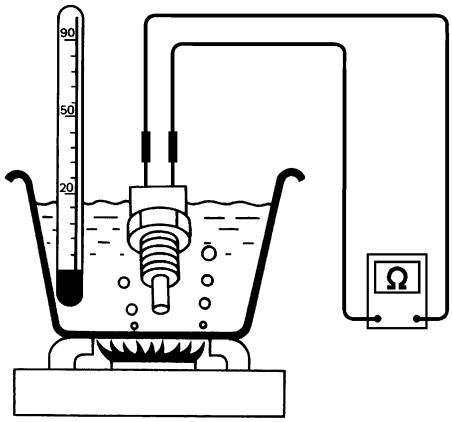
1) Follow the procedure "WITH CONSULT-II" above.

Diagnostic Procedure

NGEC1031

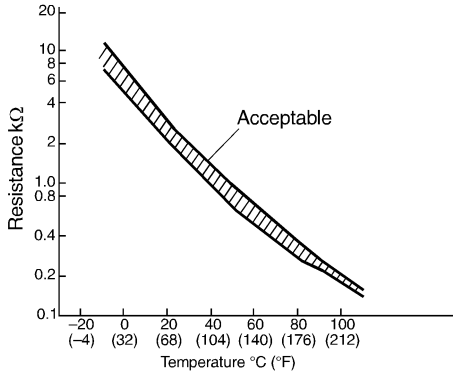
1	CHECK ENGINE COOLANT TEMPERATURE SENSOR

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

NGEC0307

★ 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 heater (front)

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

NGEC0308

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

- **Never raise engine speed above 3,000 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.**

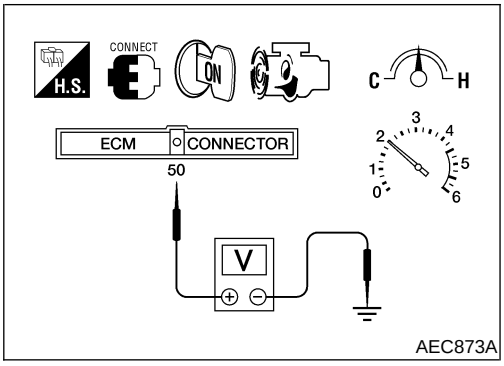
With CONSULT-II

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-445.
If the result is OK, perform the following step.
4) Let engine idle at least 3 minutes.
5) Maintain the following condition at least 50 consecutive seconds.

B/FUEL SCHDL	4 msec or more
ENG SPEED	1,800 - 3,000 rpm
Selector lever	Suitable position
VHCL SPEED SE	More than 70 km/h (43 MPH)

During this test, P0130 DTC may be displayed on CONSULT-II screen.

6) If DTC is detected, go to "Diagnostic Procedure", EC-445.



Overall Function Check

NGEC0309

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

Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 [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.

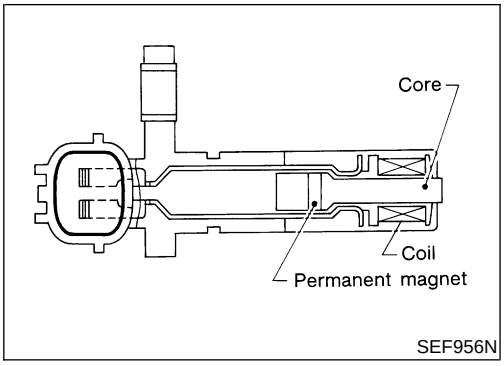
- The voltage should go above 0.70V at least once.
- The voltage should go below 0.21V at least once.

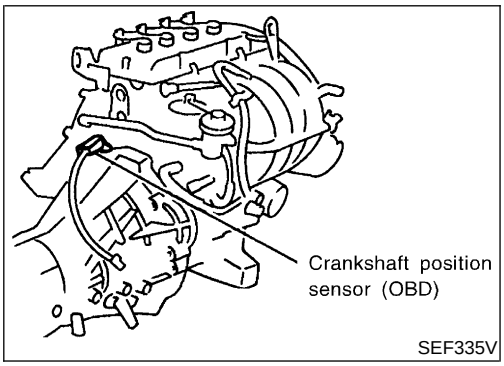
4) If NG, go to “Diagnostic Procedure”, EC-445.

Diagnostic Procedure

NGEC0310

Refer to “Diagnostic Procedure” for DTC P0133, EC-218.





Component Description

NGEC0327

The crankshaft position sensor (OBD) is located on the transmission housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet, core and coil.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.
This sensor is not used to control the engine system.
It is used only for the on board diagnosis.

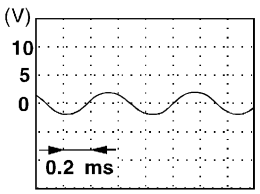
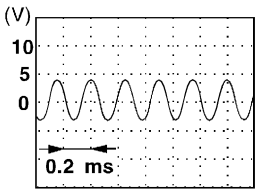
ECM Terminals and Reference Value

NGEC0328

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

CAUTION:

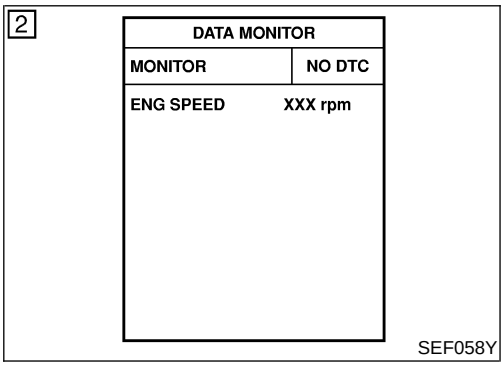
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
43	B/W	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
53	L	Crankshaft position sensor (OBD)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approx. 0V 
			[Engine is running] ● Engine speed is 2,000 rpm	Approx. 0V 

On Board Diagnosis Logic

NGEC0329

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 (OBD) • Drive plate/Flywheel



DTC Confirmation Procedure

NGEC0330

NOTE:

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

With CONSULT-II

1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2) Start engine and run it for at least 2 minutes at idle speed.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-449.

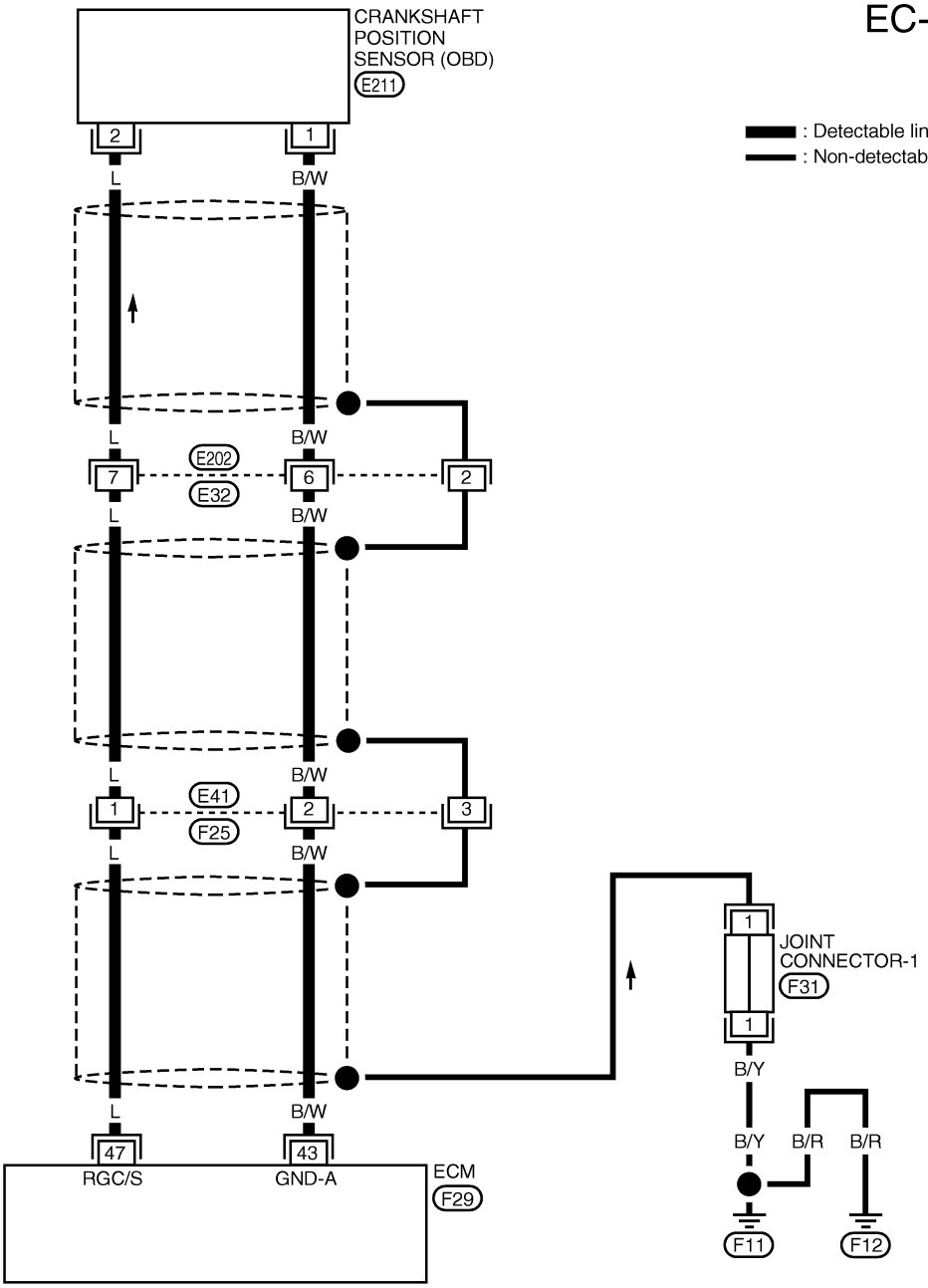
With GST

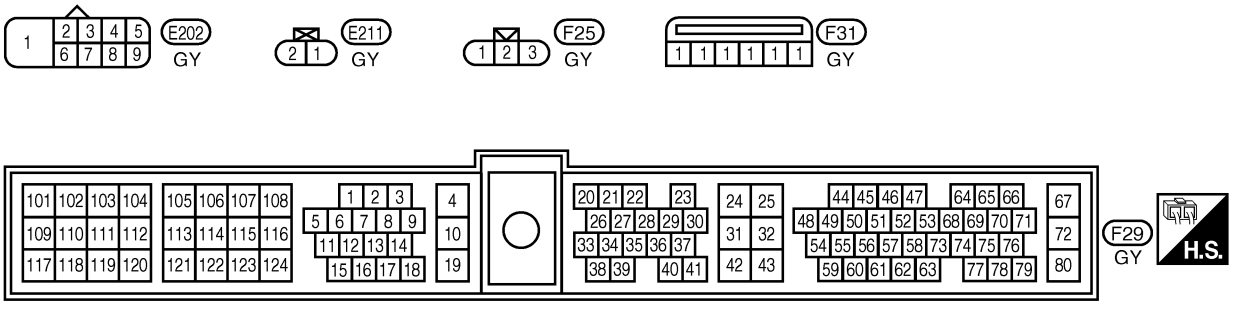
Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC0331

EC-CKPS-01





AEC993A

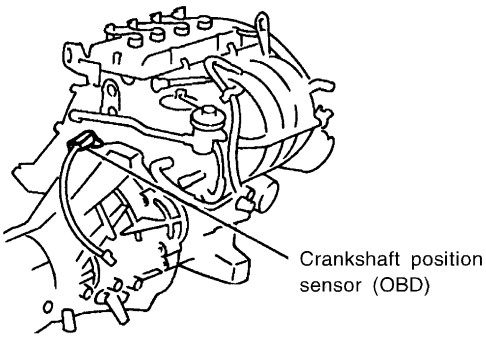
Diagnostic Procedure

NGEC0332

1	RETIGHTEN GROUND SCREWS
1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.	
▶	GO TO 2.

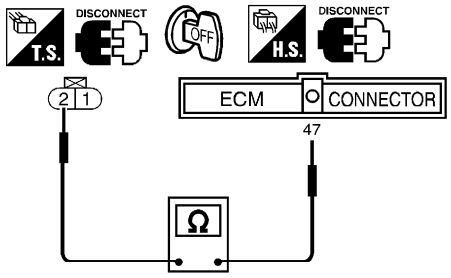
2	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.



SEF335V

2. Check continuity between ECM terminal 47 and terminal 2.



SEF175V

Continuity should exist.

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

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E202, E32 ● Harness connectors E41, F25 ● Harness for open or short between crankshaft position sensor (OBD) and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

4	CHECK GROUND CIRCUIT

1. Reconnect ECM harness connectors.
2. Check harness continuity between crankshaft position sensor (OBD) terminal 1 and engine ground. Refer to the wiring diagram.
   Continuity should exist.
3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

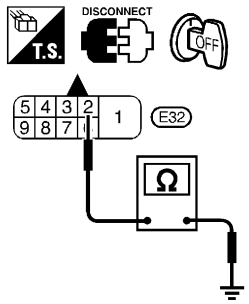
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E202, E32
- Harness connectors E41, F25
- Harness for open or short between crankshaft position sensor (OBD) and ECM

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

6	CHECK SHIELD CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect harness connectors E32.
3. Check harness continuity between harness connector E32 terminal 2 and ground.



SEF552V

Continuity should exist

4. Also check harness for short to power.
5. Then reconnect harness connectors.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E41, F25
- Joint connector-1 (Refer to "HARNESS LAYOUT", ***EL-254***.)
- Harness for open or short between harness connector E32 and engine ground

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

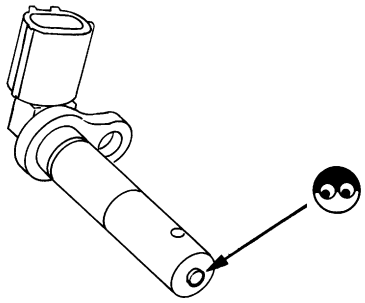
8	CHECK IMPROPER INSTALLATION

Loosen and retighten the fixing bolt of the crankshaft position sensor (OBD). Then retest.

Trouble is not fixed.	▶	GO TO 9.

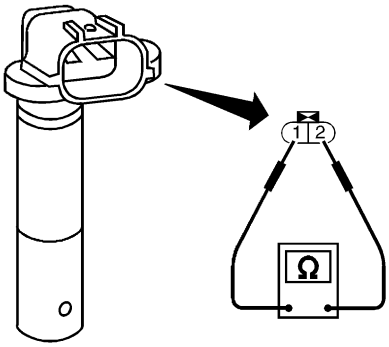
9	CHECK CRANKSHAFT POSITION SENSOR (OBD)

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



SEF960N

5. Check resistance as shown in the figure.



SEF231W

Resistance: Approximately 512 - 632Ω [at 20°C (68°F)]

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace crankshaft position sensor (OBD).

10	CHECK GEAR TOOTH

Visually check for chipping flywheel or drive plate gear tooth (cog).

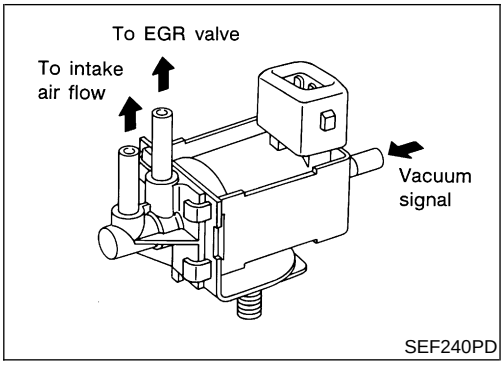
OK or NG

OK	▶	GO TO 11.
NG	▶	Replace the flywheel or drive plate.

11	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.

▶ **INSPECTION END**



Component Description

NGEC0334

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

CONSULT-II Reference Value in Data Monitor Mode

NGEC0335

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGRC SOL/V	• Engine: After warming up • Air conditioner switch: “OFF” • Shift lever: “N” (A/T models) • No-load	Idle	ON
		Rev engine up from idle to 3,000 rpm quickly.	OFF

ECM Terminals and Reference Value

NGEC0336

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

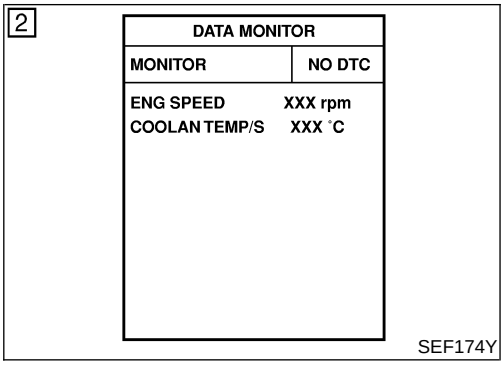
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than ECM terminals, such as the ground.

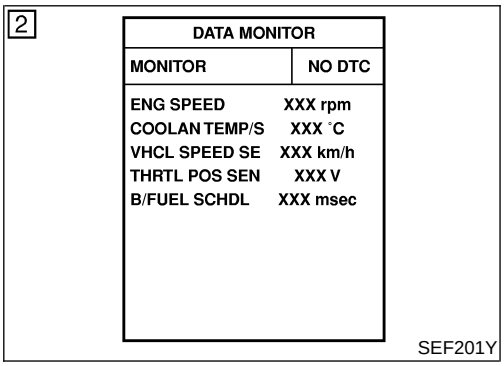
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
103	G/W	EGRC-solenoid valve	**[Engine is running]** • **Warm-up condition** • Idle speed	0 - 1V
			[Engine is running] • **Warm-up condition** • M/T models: Lift up drive wheels and shift to 1st gear position. • Rev engine up from 2,000 to 4,000 rpm.	BATTERY VOLTAGE (11 - 14V)

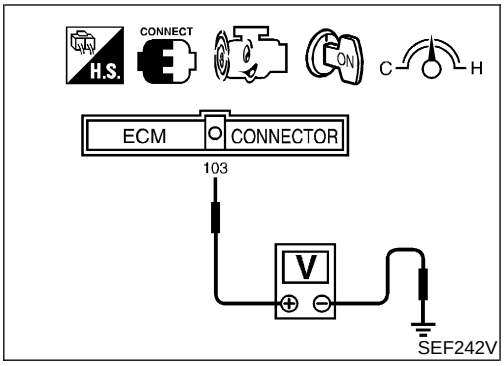
On Board Diagnosis Logic

NGEC0337

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1400	• The improper voltage signal is sent to ECM through EGRC-solenoid valve.	• Harness or connectors (The EGRC-solenoid valve circuit is open or shorted.) • EGRC-solenoid valve







DTC Confirmation Procedure

NGEC0338

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

TESTING CONDITION:
Always perform at a temperature above 0°C (32°F).

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	Less than 3,000 rpm
B/FUEL SCHDL	Less than 12.6 msec
VHCL SPEED SE	Suitable speed

4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-455.

With GST

- Follow the procedure with "CONSULT-II".

Overall Function Check

NGEC0521

Use this procedure to check the overall function of the EGR temperature sensor. 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 103 and ground at idle.

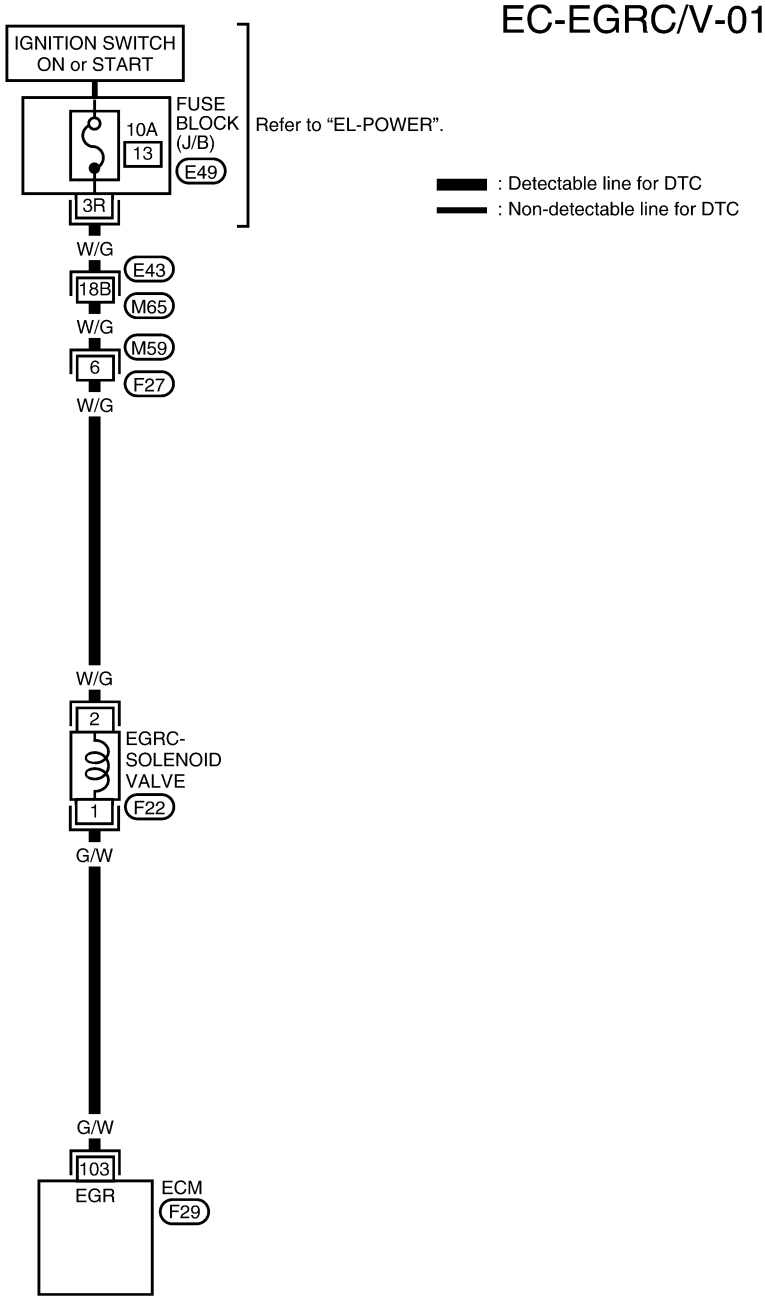
   Voltage: 0 - 1V

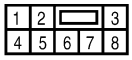
3) Check that the voltage changes to battery voltage and returns to 0 - 1V when revving the engine from idle to 3,000 rpm quickly.
4) If NG, go to "DIAGNOSTIC PROCEDURE", EC-455.

Wiring Diagram

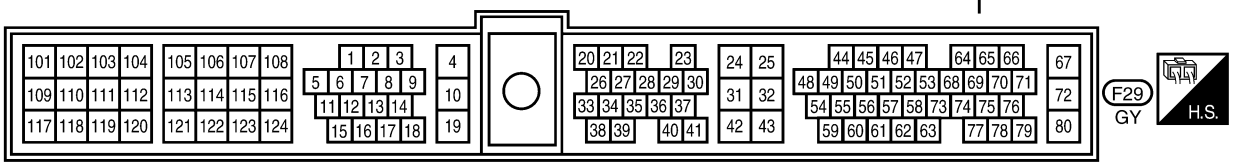
NGEC0339

EC-EGRC/V-01





Refer to the following.
M65 , E43 - SUPER MULTIPLE JUNCTION (SMJ)



LEC487

Diagnostic Procedure

NGEC0340

1	CHECK EGRC-SOLENOID VALVE

With CONSULT-II

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

ACTIVE TEST	
EGRC SOL/V	ON
(EGR)	CUT
MONITOR	
ENG SPEED	XXX rpm

SEF716Z

Without CONSULT-II

1. Start engine and rev engine up to 3,000 rpm quickly.
2. When disconnecting and reconnecting the EGRC-solenoid valve harness connector, make sure that the EGRC-solenoid valve makes operating sound. (The DTC or the 1st trip DTC for the EGRC-solenoid valve will be displayed, however, ignore it.)

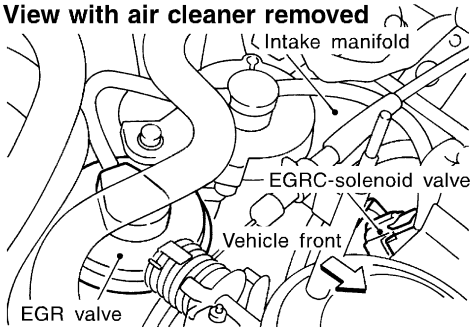
OK or NG

OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	GO TO 2.

Diagnostic Procedure (Cont'd)

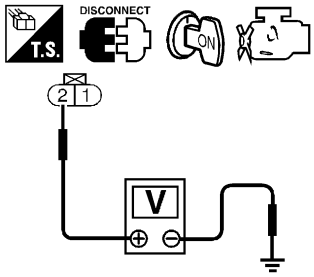
2	CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EGRC-solenoid valve harness connector.



SEF336V

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



SEF192V

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

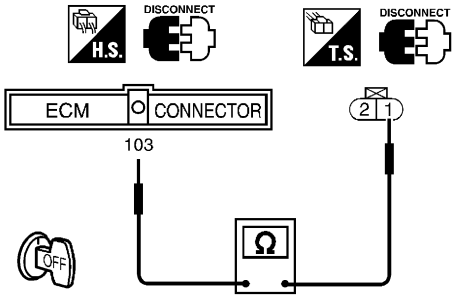
3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E43, M65
- Harness connectors M59, F27
- 10A fuse
- Harness for open or short between EGRC-solenoid valve and 10A 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 ECM terminal 103 and terminal 1.



SEF243V

Continuity should exist.

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

OK or NG

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

5	DETECT MALFUNCTIONING PART

Check the harness for open or short between EGRC-solenoid valve and ECM.

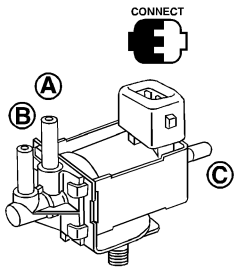
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK EGRC-SOLENOID VALVE

With CONSULT-II

Check air passage continuity.

Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.



ACTIVE TEST	
EGRC SOL/V	ON
(EGR)	CUT
MONITOR	
ENG SPEED	XXX rpm

Condition EGRC SOLENOID VALVE	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
ON	Yes	No
OFF	No	Yes

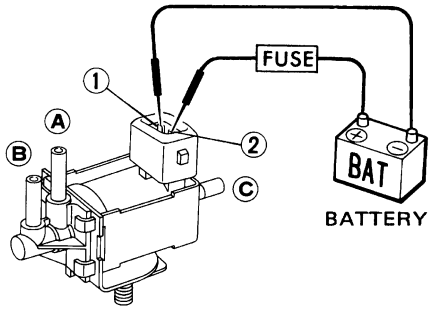
SEF717Z

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EGRC-solenoid valve.

7	CHECK EGRC-SOLENOID VALVE

Without CONSULT-II
Check air passage continuity shown in the figure.



AEC919

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

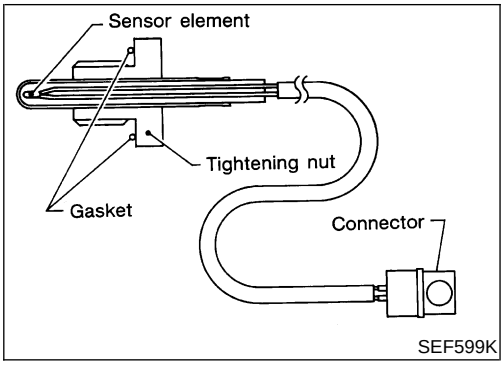
MTBL0283

If NG or operation takes more than 1 second, replace solenoid valve.

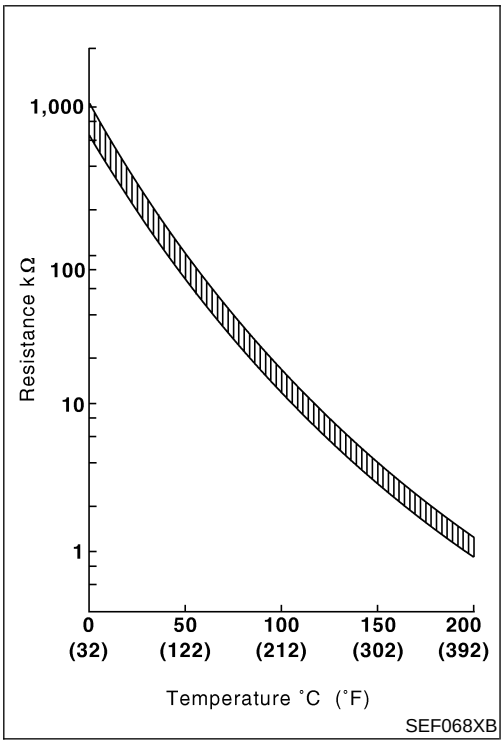
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EGRC-solenoid valve.

8	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**



SEF599K



SEF068XB

Component Description

NGEC0342

The EGR temperature sensor detects temperature changes in the EGR passageway. When the EGR valve opens, hot exhaust gases flow, and the temperature in the passageway changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases. This sensor is not used to control the engine system.
It is used only for the on board diagnosis.

<Reference data>

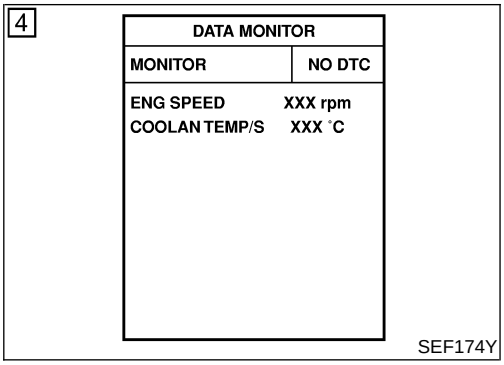
EGR temperature °C (°F)	Voltage* V	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

*: These data are reference values and are measured between ECM terminal 63 (EGR temperature sensor) and ground.
When EGR system is operating.
Voltage: 0 - 1.5V

On Board Diagnosis Logic

NGEC0343

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P1401	A)	An excessively low voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is low.	• Harness or connectors (The EGR temperature sensor circuit is shorted.) • EGR temperature sensor • Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve
	B)	An excessively high voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is high.	• Harness or connectors (The EGR temperature sensor circuit is open.) • EGR temperature sensor • Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve



DTC Confirmation Procedure

NGEC0344

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

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

PROCEDURE FOR MALFUNCTION A

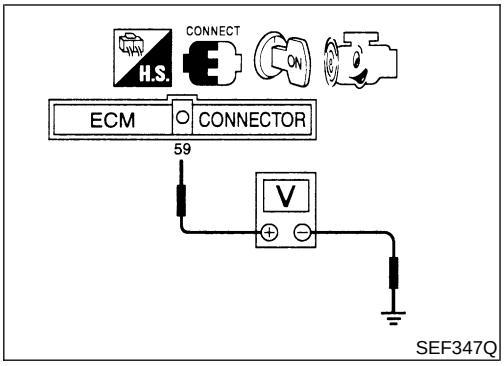
NGEC0344S01

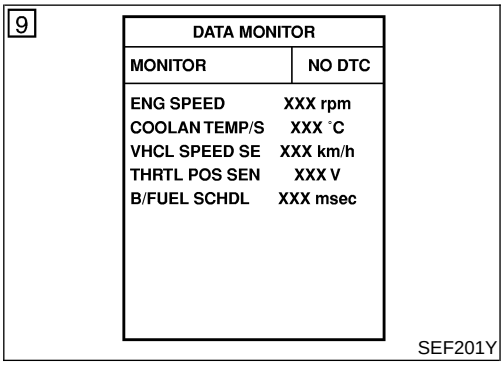
With CONSULT-II

1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Verify that engine coolant temperature 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-463.

With GST

- Follow the procedure "With CONSULT-II".





PROCEDURE FOR MALFUNCTION B

NGEC0344S02

CAUTION:
Always drive vehicle at a safe speed.

TESTING CONDITION:
Always perform the test at a temperature above 5°C (41°F).

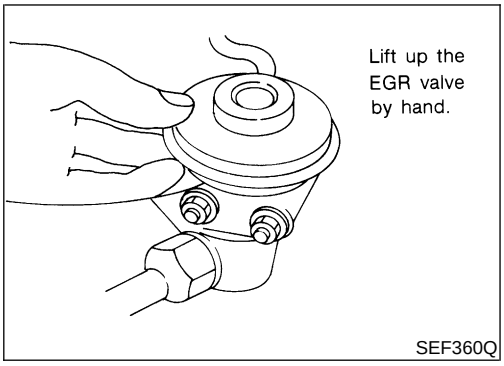
With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Run engine at idle for at least 2 minutes.
3) Confirm that EGR valve is not lifting.
   If the result is NG, perform trouble diagnosis for DTC P1402. Refer to EC-465.
4) Select "DATA MONITOR" mode with CONSULT-II.
5) Read "EGR TEMP SEN" at about 1,500 rpm while holding the EGR valve in full open position by hand.
   Voltage should decrease to less than 1.0V.
   If the result is NG, go to "Diagnostic Procedure", EC-463.
   If the result is OK, go to following step.
6) Turn ignition switch OFF and wait at least 5 seconds.
7) Turn ignition switch ON.
8) Check the output voltage of "THRTL POS SEN" (at closed throttle position) and note it.
9) Start engine.

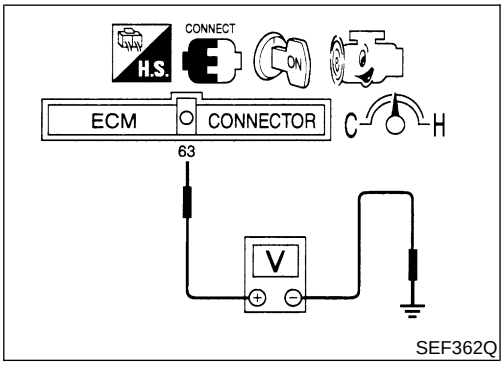
10) Maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	2,000 - 2,800 rpm
VHCL SPEED SE	10 km/h (6 MPH) or more
B/FUEL SCHDL	7 - 10.5 msec
THRTL POS SEN	(X + 0.23) − (X + 0.74) V X = Voltage value measured at step 7
Selector lever	Suitable position

11) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-463.



SEF360Q



SEF362Q

Overall Function Check

NGEC0345

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

PROCEDURE FOR MALFUNCTION B

NGEC0345S01

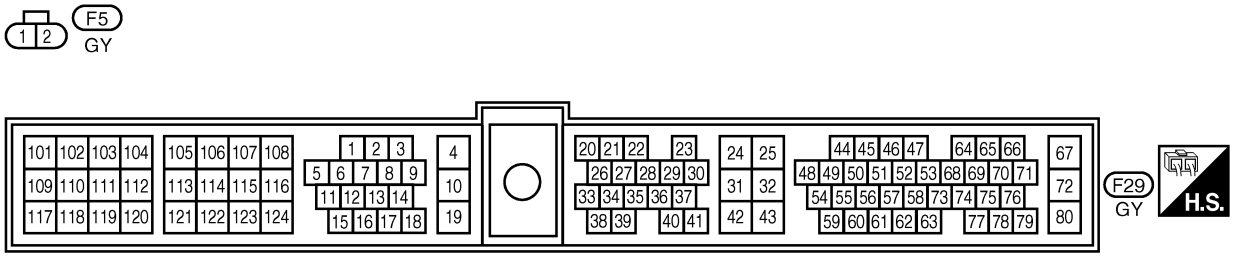
Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Run engine at idle for at least 2 minutes.
3) Confirm that EGR valve is not lifting. If NG, perform trouble diagnosis for DTC P1402. Refer to EC-466.
4) Check voltage between ECM terminal 63 (EGR temperature sensor signal) and ground at about 1,500 rpm with EGR valve lifted up to the full position by hand.
   Voltage should decrease to less than 1.0V.
5) If NG, go to "Diagnostic Procedure", EC-463.
   If OK, perform trouble diagnoses for DTC P0400 and P1400. Refer to EC-327, 452.

Wiring Diagram

NGEC0346

EC-EGR/TS-01



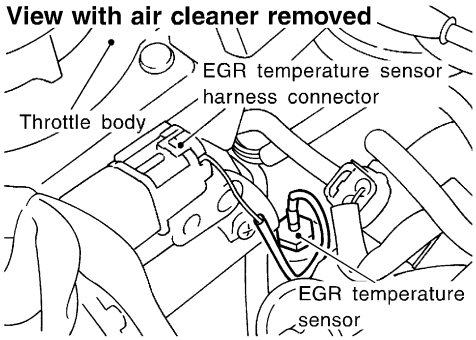
AEC006B

Diagnostic Procedure

NGEC0347

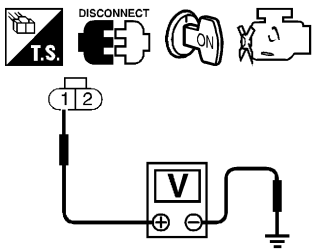
1	CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EGR temperature sensor harness connector.



SEF345V

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



SEF263W

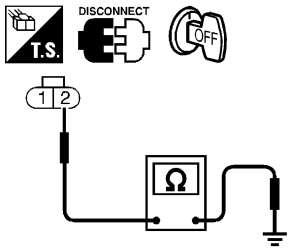
Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair harness or connectors.

2	CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check harness continuity between EGR temperature sensor terminal 2 and engine ground. Refer to the wiring diagram.



SEF264W

Continuity should exist.

3. Also check harness for short to power.

OK or NG

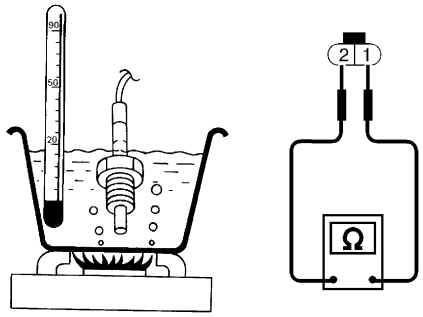
OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the harness for open or short between EGR temperature sensor and ECM.		
	▶	Repair open circuit or short to ground or short to power in harness or connector.

4	CHECK EGR TEMPERATURE SENSOR

Check resistance change and resistance value.

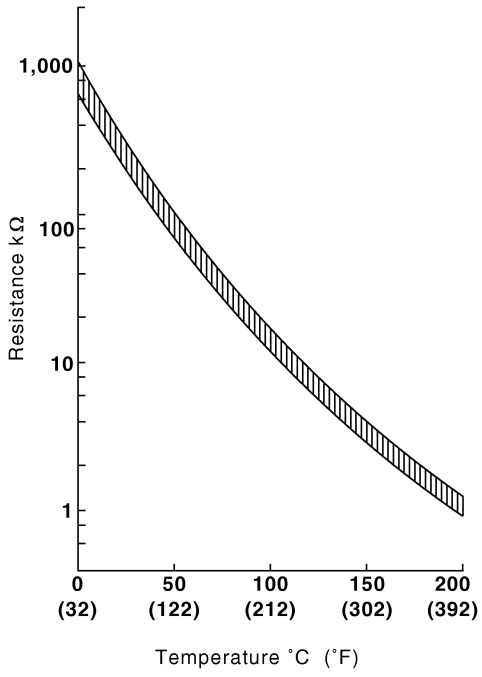


SEF643Q

<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

MTBL0549



SEF068XB

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace EGR temperature sensor.

5	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**

Description

NGEC0349

SYSTEM DESCRIPTION

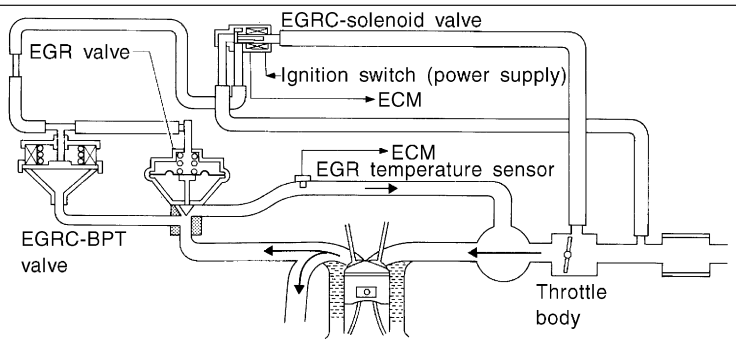
NGEC0349S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EGR control	EGRC-solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		

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

- Low engine coolant temperature
- Engine starting
- High-speed engine operation
- Engine idling
- Excessively high engine coolant temperature
- Mass air flow sensor malfunction

EGR and vacuum



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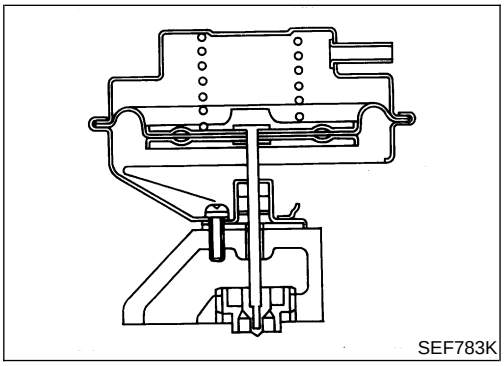


SEF783K

COMPONENT DESCRIPTION

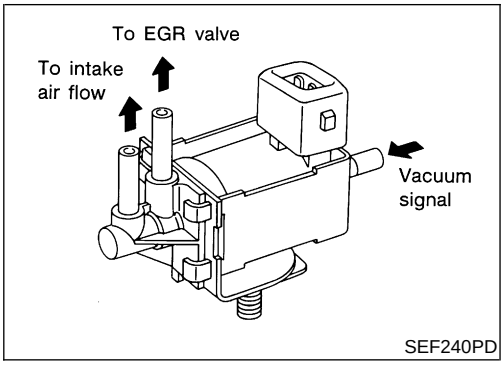
NGEC0349S02

Exhaust Gas Recirculation (EGR) Valve

NGEC0349S0201

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

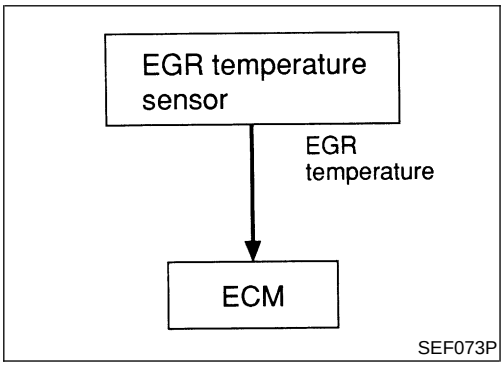
Description (Cont'd)



EGRC-solenoid Valve

NGEC0349S0202

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



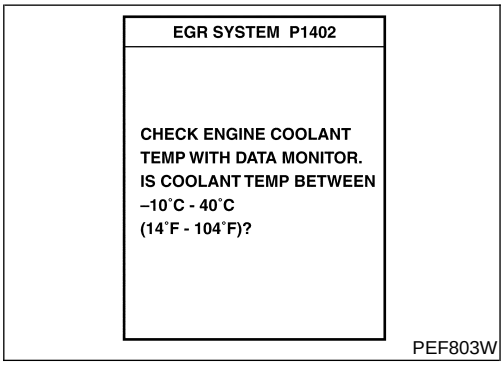
On Board Diagnosis Logic

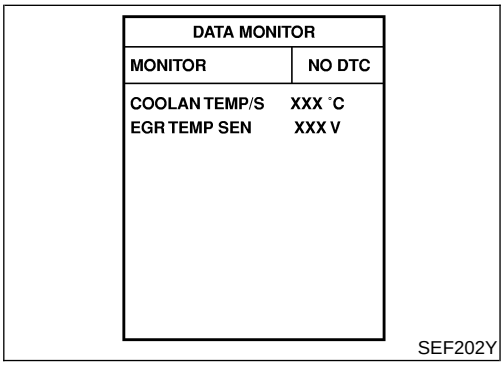
NGEC0350

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

NOTE:
Diagnosis for this DTC will occur when engine coolant temperature is approx. 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 40°C (104°F) when starting DTC confirmation procedure.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1402	• EGR flow is detected under conditions that do not call for EGR.	• EGRC-solenoid valve • EGR valve leaking or stuck open • EGR temperature sensor • EGRC-BPT valve





DTC Confirmation Procedure

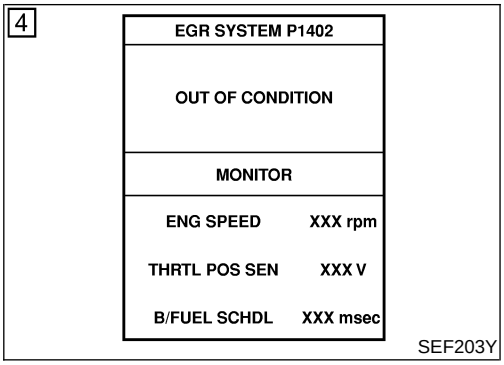
NGEC0351

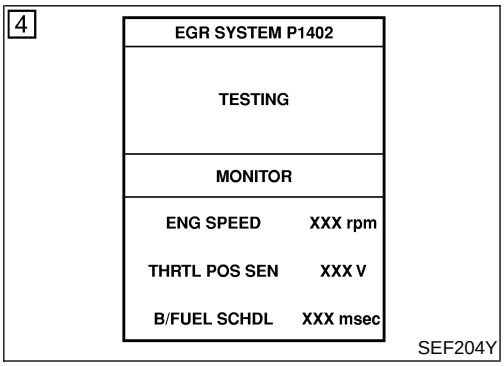
NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

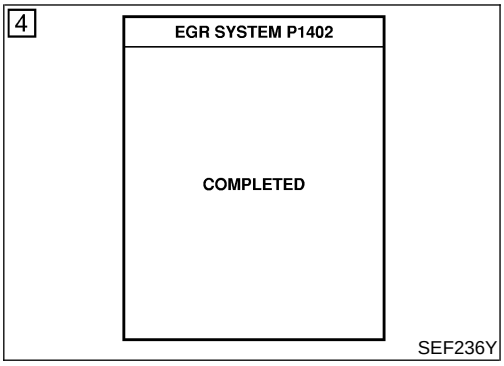
TESTING CONDITION:

- **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 60°C (14 to 140°F)*
  EGR TEMP SEN: Less than 3.7V
  If the values are out of the ranges indicated above, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to reduce the engine coolant or EGR temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.

*: Although CONSULT-II screen displays "−10 to 40°C (14 to 104°F)" as a range of engine coolant temperature, ignore it.







With CONSULT-II

1) Turn ignition switch OFF and wait at least 5 seconds, then turn ignition switch ON.
2) Select "EGR SYSTEM P1402" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
3) Touch "START". Follow instruction of CONSULT-II.
4) Start engine and let it idle until "TESTING" on CONSULT-II screen is turned to "COMPLETED". (It will take 60 seconds or more.)
   If "TESTING" is not displayed after 5 minutes, turn ignition "OFF" and cool the engine coolant temperature to the range of −10 to 40°C (14 to 104°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-469.

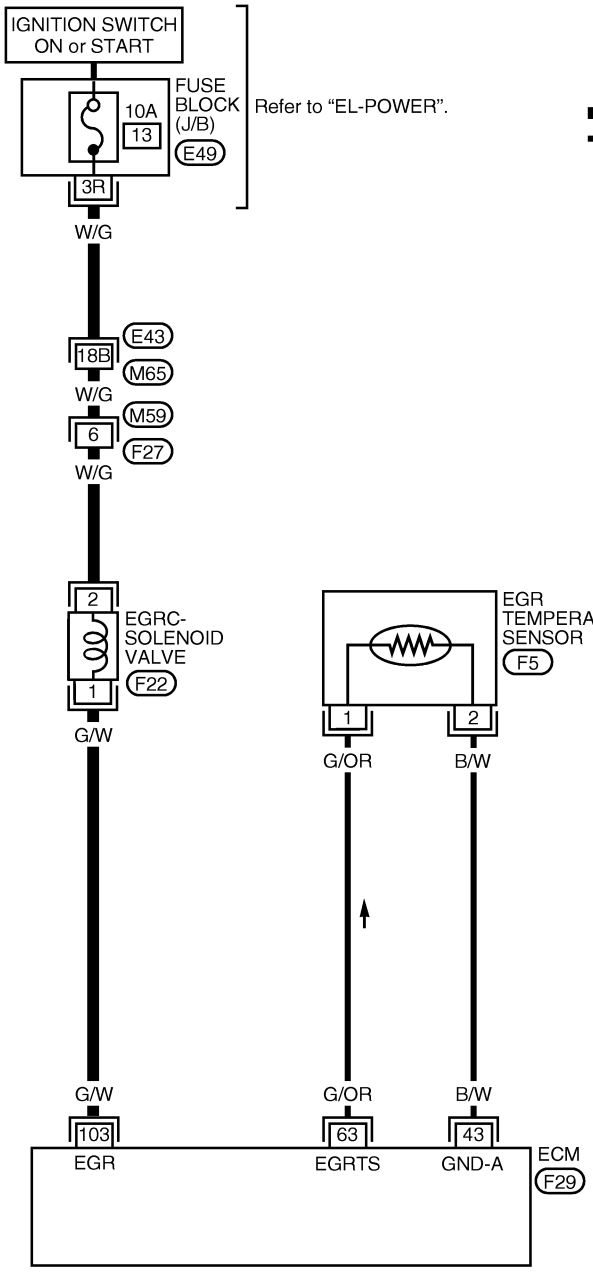
With GST

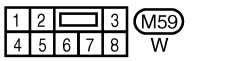
1) Turn ignition switch ON and select "MODE 1" with GST.
2) Check that engine coolant temperature is within the range of −10 to 35°C (14 to 95°F).
3) Check that voltage between ECM terminal 63 (EGR temperature sensor signal) and ground is less than 4.8V.
4) Start engine and let it idle for at least 60 seconds.
5) Stop engine.
6) Perform from step 1 to 4.
7) Select "MODE 3" with GST.
8) If DTC is detected, go to "Diagnostic Procedure", EC-469.

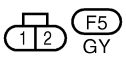
Wiring Diagram

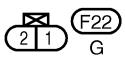
NGEC0352

EC-EGRC1-01

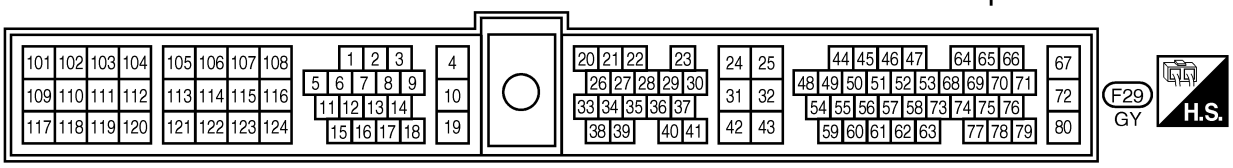








Refer to the following.
M65 , E43 - SUPER MULTIPLE JUNCTION (SMJ)



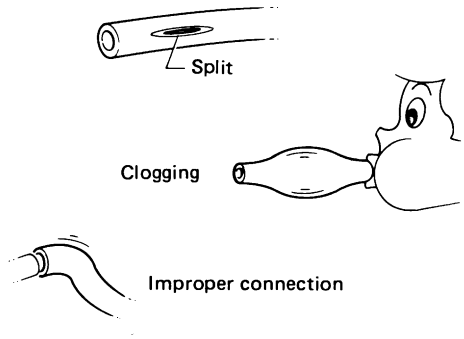
AEC995A

Diagnostic Procedure

NGEC0353

1	CHECK VACUUM HOSE

Check vacuum hose for clogging, cracks or improper connection.
Refer to “Vacuum Hose Drawing”, EC-27.



SEF109L

OK or NG

OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Repair or replace vacuum hose.

2	CHECK EGRC-SOLENOID VALVE CIRCUIT

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

ACTIVE TEST	
EGRC SOL/V	ON
(EGR)	CUT
MONITOR	
ENG SPEED	XXX rpm

SEF716Z

Clicking noise should be heard.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

3	CHECK EGRC-SOLENOID VALVE CIRCUIT

Without CONSULT-II
1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check operating sound of the solenoid valve when disconnecting and reconnecting EGRC-solenoid valve harness connector. (The DTC or the 1st trip DTC for the EGRC-solenoid valve will be displayed, however, ignore it.)

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

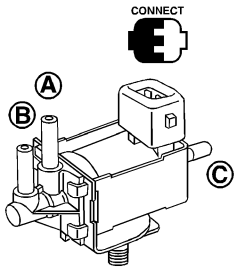
4	DETECT MALFUNCTIONING PART	
Check the following. ● Harness connectors E43, M65 ● Harness connectors M59, F27 ● 10A fuse ● Harness for open or short between fuse block and EGRC-solenoid valve ● Harness for open or short between ECM and EGRC-solenoid valve		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to power in harness or connector.

5	CHECK EGRC-SOLENOID VALVE	

With CONSULT-II

Check air passage continuity.

Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.



ACTIVE TEST	
EGRC SOL/V	ON
(EGR)	CUT
MONITOR	
ENG SPEED	XXX rpm

Condition EGRC SOLENOID VALVE	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
ON	Yes	No
OFF	No	Yes

SEF717Z

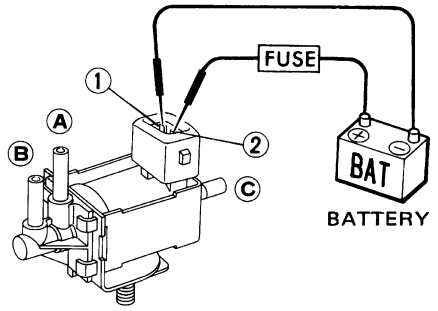
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EGRC-solenoid valve.

6	CHECK EGRC-SOLENOID VALVE

Without CONSULT-II

Check air passage continuity shown in the figure.



AEC919

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

MTBL0283

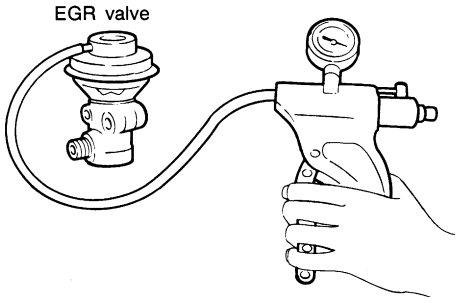
If NG or operation takes more than 1 second, replace solenoid valve.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EGRC-solenoid valve.

7	CHECK EGR VALVE

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



MEF137D

EGR valve spring should lift.

- Check for sticking.

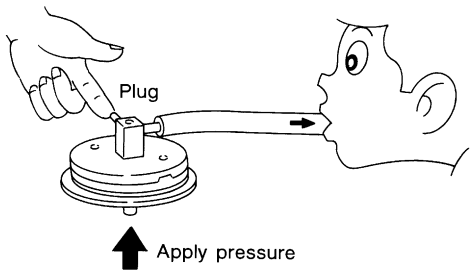
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EGR valve.

Diagnostic Procedure (Cont'd)

8	CHECK EGRC-BPT VALVE

1. Plug one of two ports of EGRC-BPT valve.
2. Vacuum from the other port and check for leakage while applying a pressure above 0.981 kPa (100 mmH_2O, 3.94 inH_2O) from under EGRC-BPT valve.



SEF083P

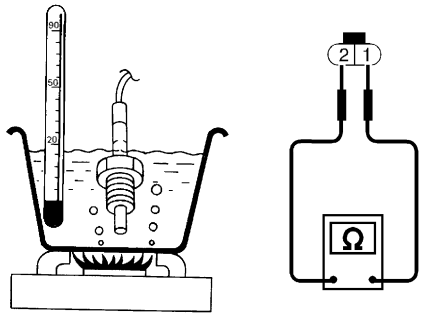
3. If a leakage is noted, replace the valve.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EGRC-BPT valve.

9	CHECK EGR TEMPERATURE SENSOR

Check resistance change and resistance value.

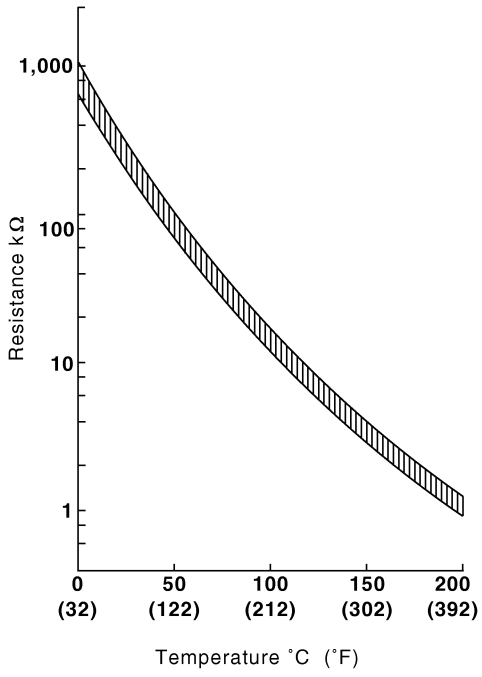


SEF643Q

<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

MTBL0549



SEF068XB

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EGR temperature sensor.

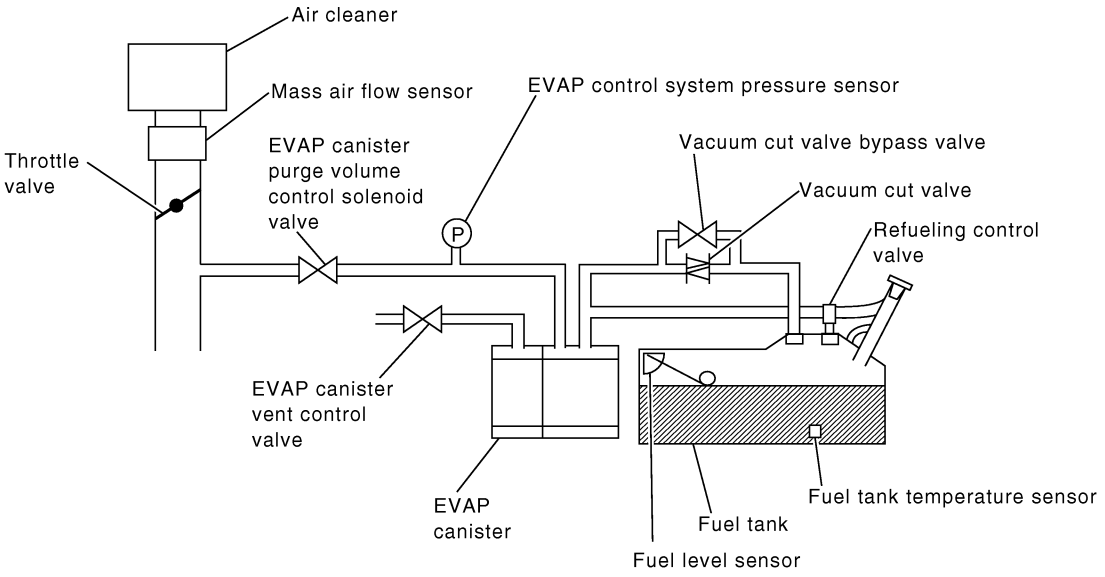
10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NGEC1044

NOTE:
If DTC P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-519.)

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

NGEC1045

- 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
- 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

NGEC1046

Refer to "P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK) (NEGATIVE PRESSURE)", EC-477.

Diagnostic Procedure

NGEC1047

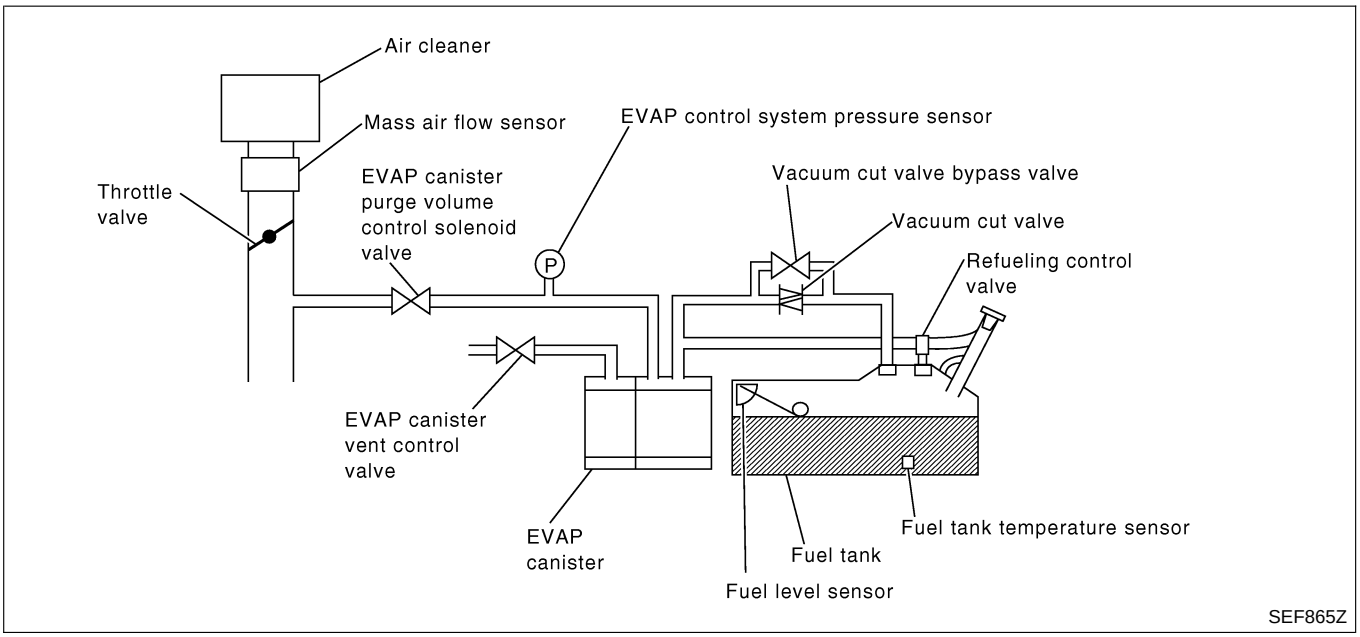
Refer to "P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK) (NEGATIVE PRESSURE)", EC-479.

On Board Diagnosis Logic

NGEC1032

This diagnosis detects very small leaks in the EVAP line between the fuel tank and the EVAP canister purge volume control solenoid valve using intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.

If the ECM judges a leak equivalent to a very small leak, the very small leak DTC P1441 will be detected. If the ECM judges a leak equivalent to a small leak, the EVAP small leak DTC P0440 will be detected. Correspondingly, if the ECM judges there is no leak, the diagnosis result is OK.



Malfunction is detected when EVAP control system has a very small leak, EVAP control system does not operate properly.

CAUTION:

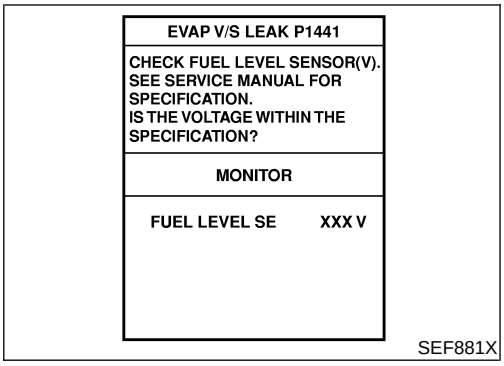
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

Possible Cause

NGEC1033

- 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
- 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
- Fuel level sensor and the circuit



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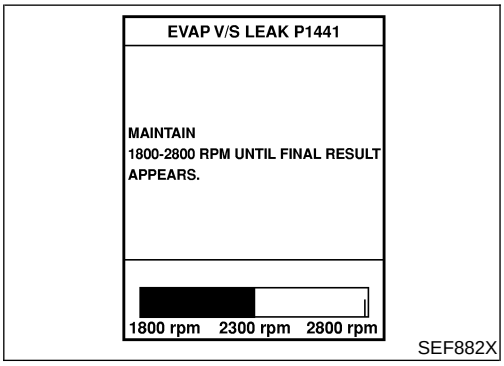

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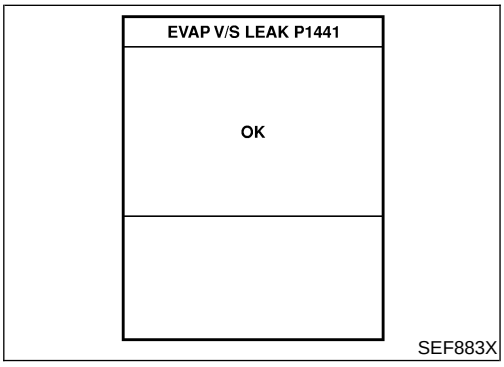


SEF883X

DTC Confirmation Procedure

NGEC1034

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 5 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 condition is 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: 1.08 - 0.2V
   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 5 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-479.

NOTE:

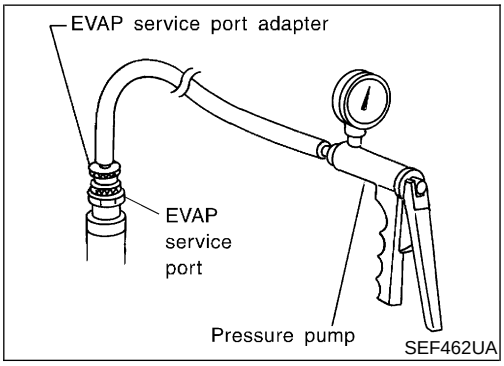
- **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to "Basic inspection", EC-104.**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**

OVERALL FUNCTION CHECK

NGEC1034S01

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-479.

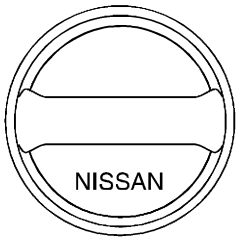
NOTE:
For more information, refer to GST instruction manual.

Diagnostic Procedure

NGEC1035

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

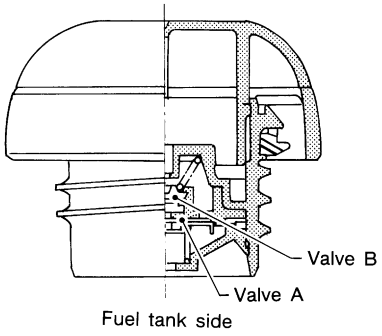
Check for air releasing sound while opening the fuel filler cap.

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.



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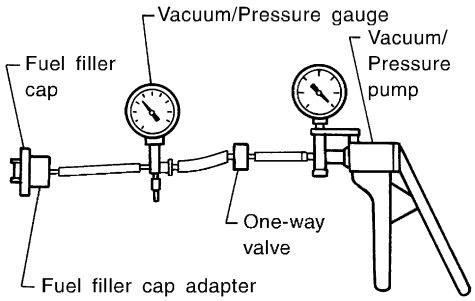


SEF943S

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

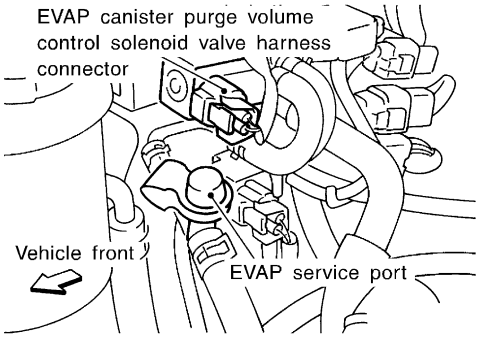
CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

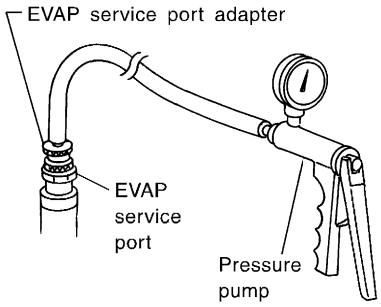
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



SEF339V



SEF916U

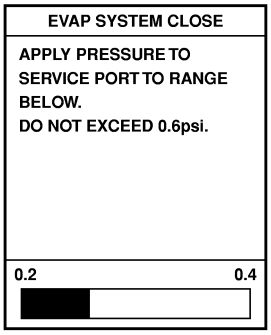
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ▶	GO TO 6.
Models without CONSULT-II ▶	GO TO 7.

6	CHECK FOR EVAP LEAK

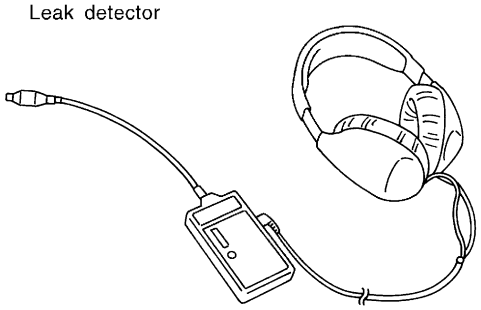
With CONSULT-II

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-37.



SEF200U

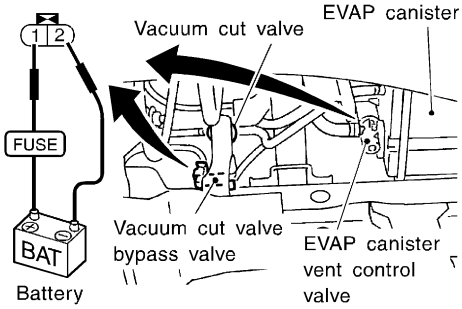
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

7	CHECK FOR EVAP LEAK

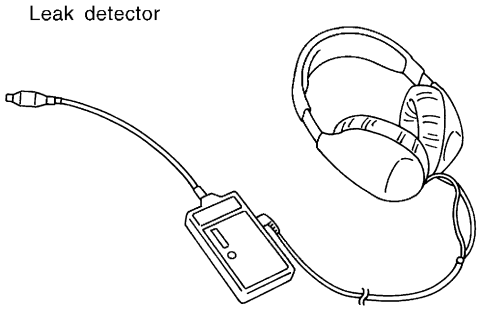
Without CONSULT-II

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.)



SEF503V

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)
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-37.



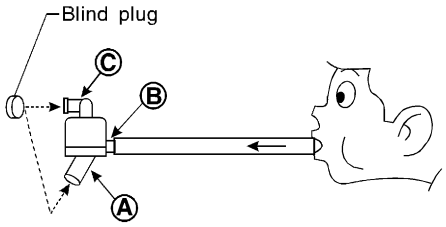
SEF200U

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

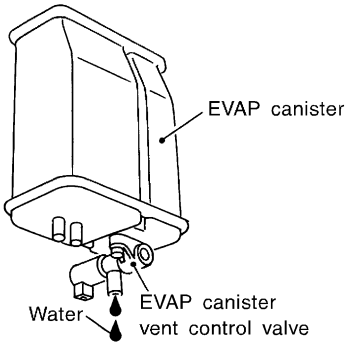
Refer to "DTC Confirmation Procedure", EC-332.

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	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

Vacuum should exist.

SEF984Y

OK or NG

OK ▶	GO TO 16.
NG ▶	GO TO 15.

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK ▶	GO TO 17.
NG ▶	GO TO 15.

Diagnostic Procedure (Cont'd)

15	CHECK VACUUM HOSE
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-27.	
OK or NG	
OK (With CONSULT-II) ▶	GO TO 16.
OK (Without CONSULT-II) ▶	GO TO 17.
NG ▶	Repair or reconnect the hose.

16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

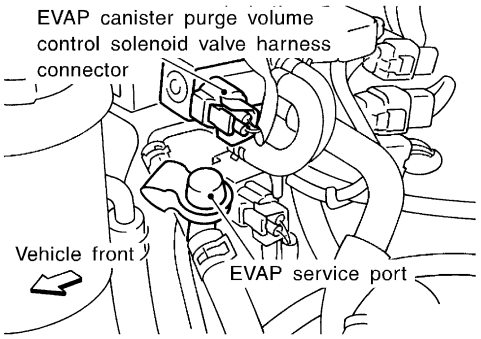
OK or NG

OK ▶	GO TO 18.
NG ▶	GO TO 17.

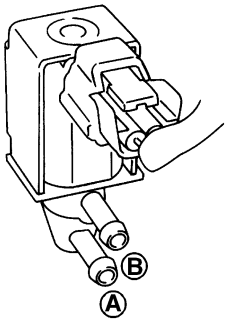
17	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF339V

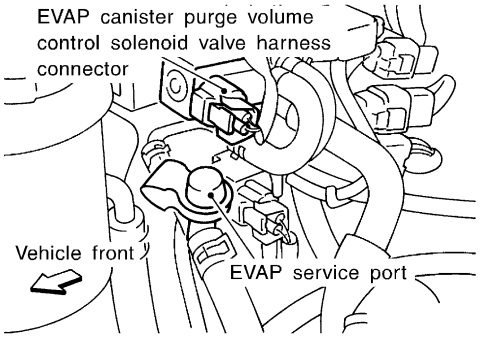


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

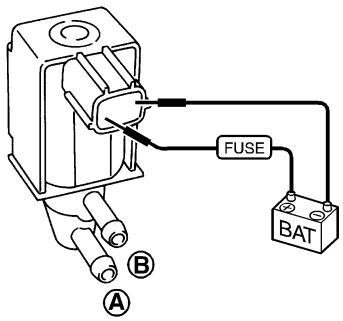
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF339V



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

SEF335X

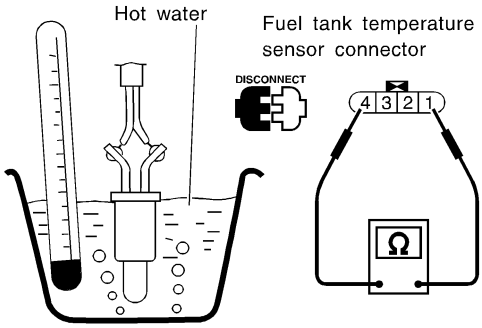
OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

Diagnostic Procedure (Cont'd)

18	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 4 by heating with hot water or heat gun as shown in the figure.



SEF710Z

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

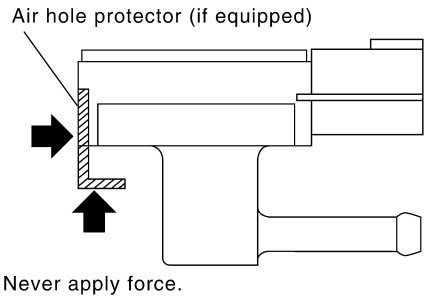
MTBL0291

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace fuel level sensor unit.

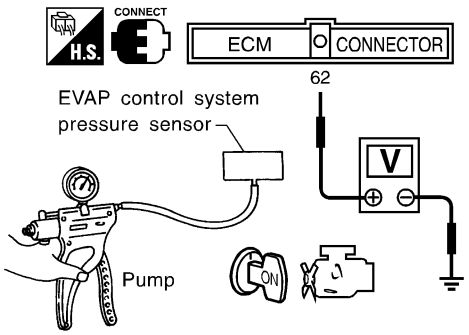
19	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 62 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

SEF705Z

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 20.
NG	▶	Replace EVAP control system pressure sensor.

20	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-34.

OK or NG

OK	▶	GO TO 21.
NG	▶	Repair or reconnect the hose.

21	CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

▶ GO TO 22.

Diagnostic Procedure (Cont'd)

22	CHECK FUEL LEVEL SENSOR	
Refer to ***EL-87***, "Fuel Level Sensor Unit Check".		
OK or NG		
OK	▶	GO TO 23.
NG	▶	Replace fuel level sensor unit.

23	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**

Description

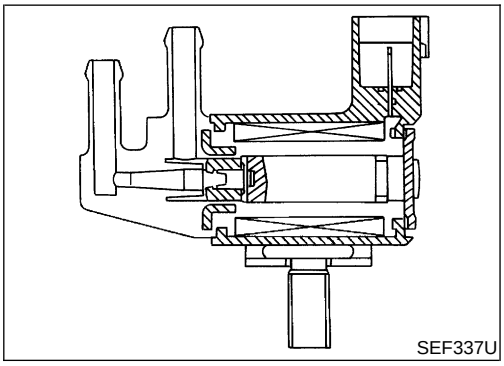
SYSTEM DESCRIPTION

NGEC0359

NGEC0359S01

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 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

NGEC0359S02

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

NGEC0360

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 (200 seconds after starting engine)	—

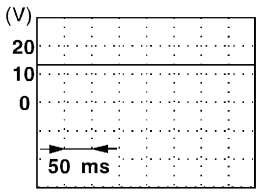
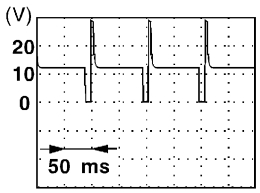
ECM Terminals and Reference Value

NGEC0361

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)
4	LG/R	ECCS relay (Self-shut-off)	**[Engine is running]** **[Ignition switch "OFF"]** ● For a few seconds after turning ignition switch "OFF"	0 - 1V
			[Ignition switch "OFF"] ● A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V) 
			[Engine is running] ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V) 
67	B/P	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0362

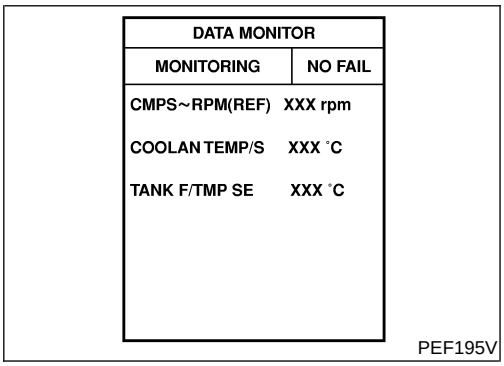
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1444	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	● EVAP control system pressure sensor ● EVAP canister purge volume 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

=NGEC0363

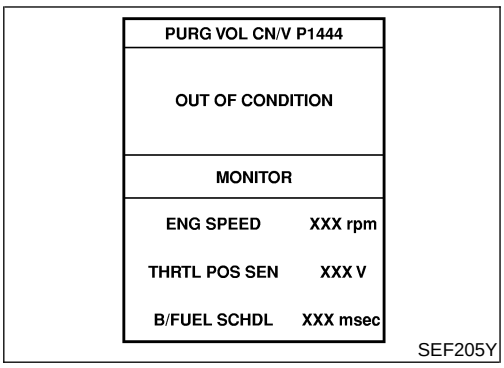
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.



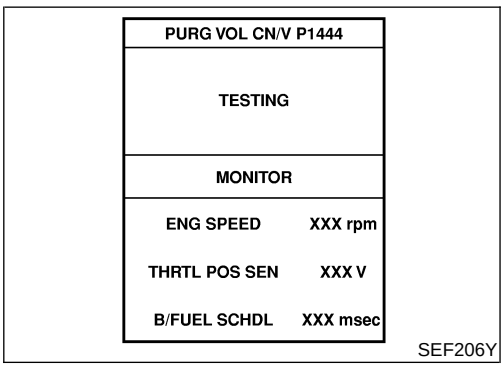
With CONSULT-II

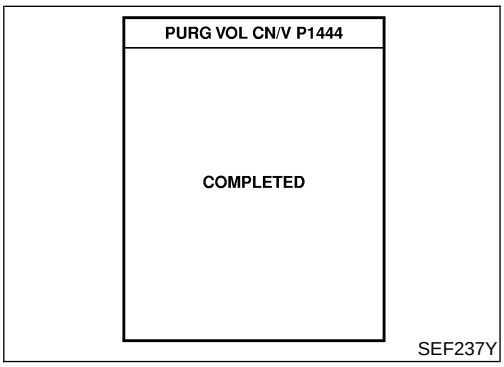
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON.
4) Select “DATA MONITOR” mode with CONSULT-II.
5) Check that TANK F/TEMP SE is 0°C (32°F) or more.
6) Select “PURG VOL C/V P1444” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
7) Touch “START”.
8) Start engine and let it idle until “TESTING” on CONSULT-II changes to “COMPLETED”. (It will take for at least 10 seconds.)
   If “TESTING” is not displayed after 5 minutes, retry from step 2.
9) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-495.



With GST

Follow the procedure “With CONSULT-II”.

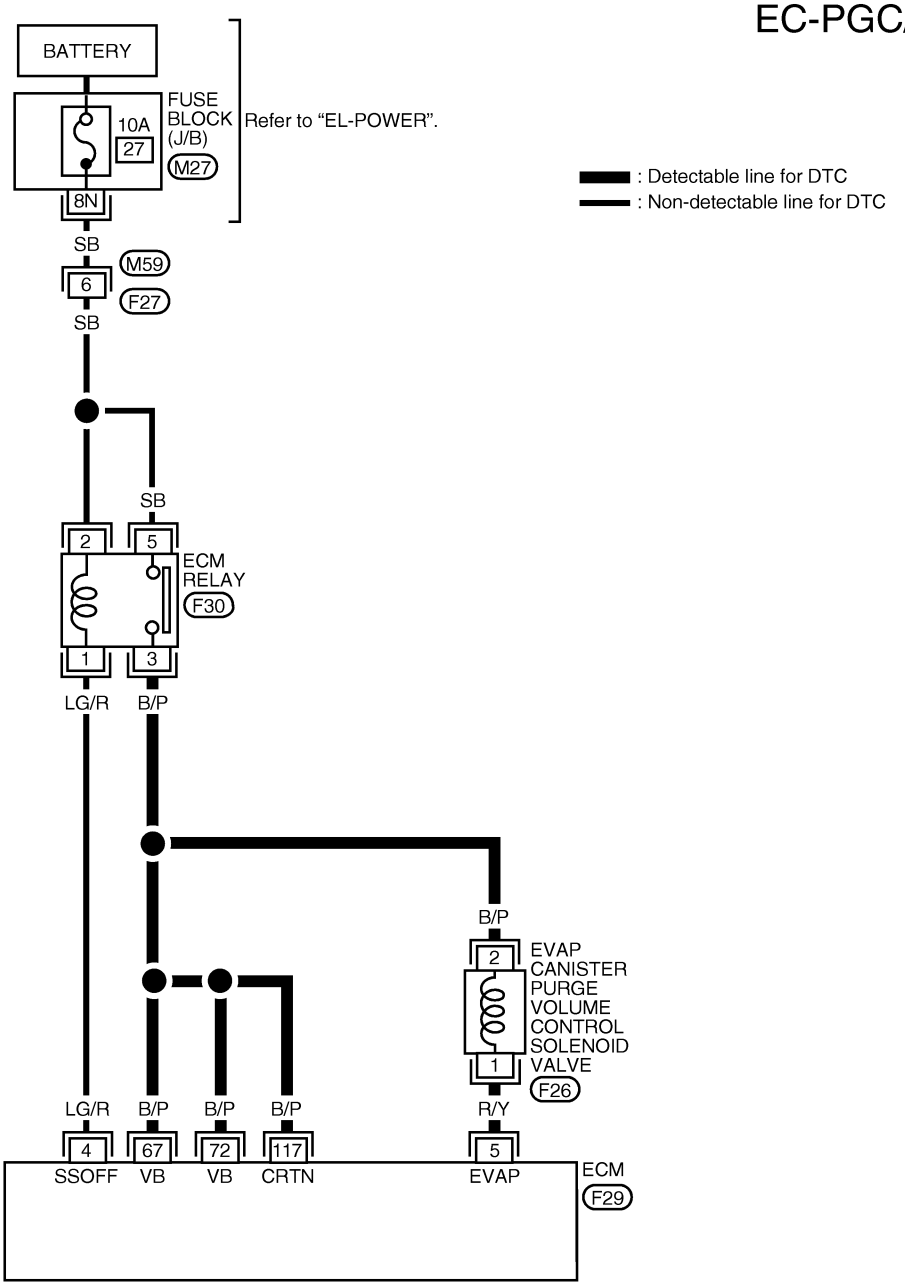


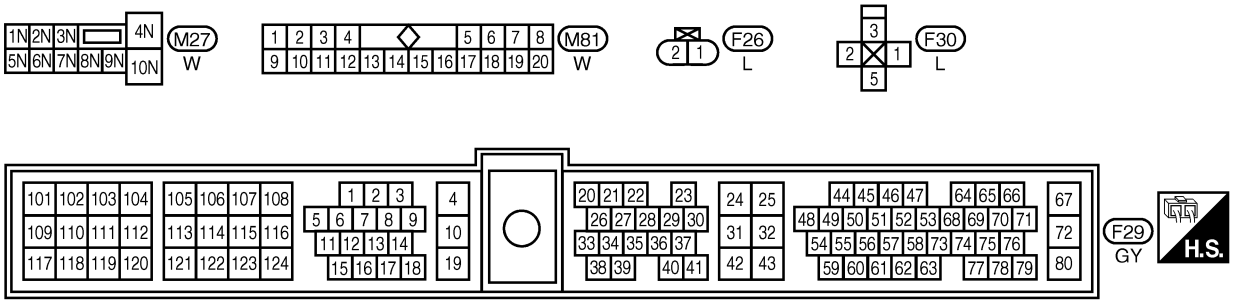


Wiring Diagram

NGEC0504

EC-PGC/V-01



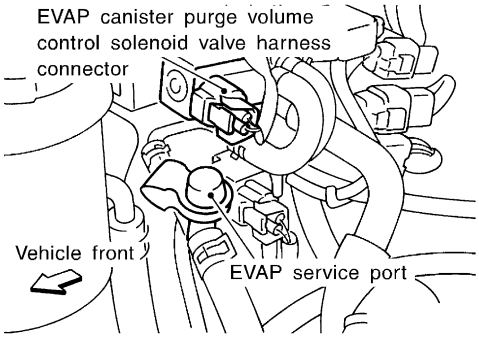


Diagnostic Procedure

=NGEC0364

1	CHECK POWER SUPPLY

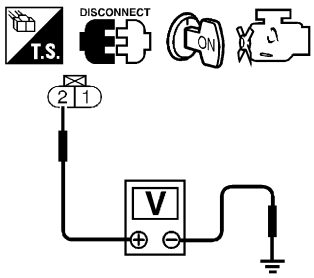
1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.



SEF339V

3. Turn ignition switch ON.
4. Check voltage between terminal 2 and engine ground with CONSULT-II or tester.

Voltage: Battery voltage



SEF192V

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.

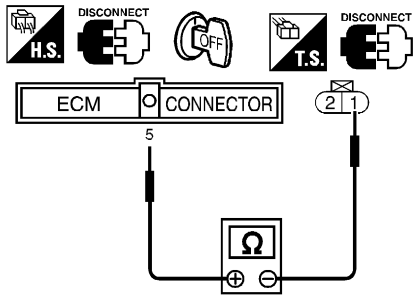
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

3	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 5 and terminal 1.
   Continuity should exist.



SEF193V

If OK, check harness for short to ground and short to power.

OK or NG

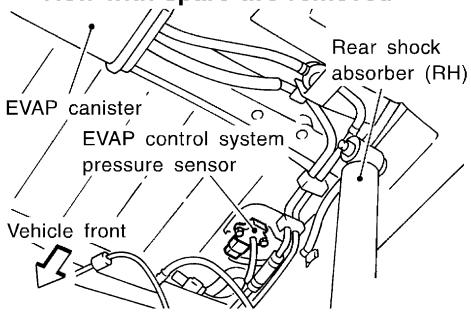
OK	▶	GO TO 5.
NG	▶	GO TO 4.

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

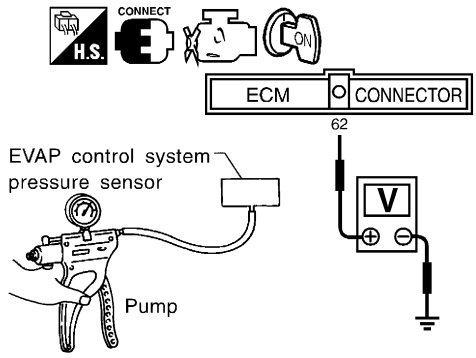
1. Remove EVAP control system pressure sensor with its harness connector connected.

View with spare tire removed



SEF341V

2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
4. Check output voltage between ECM terminal 62 and engine ground.



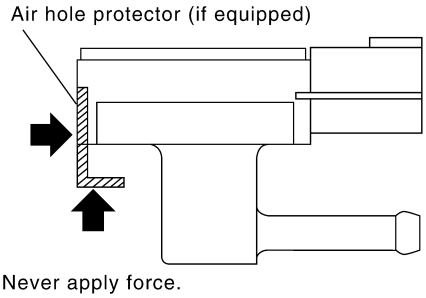
SEF198V

Pressure (Relative to atomospheric 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

MTBL0295

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.**



SEF799W

- **Never apply force to the air hole protector of the sensor, if equipped.**
- **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 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Replace EVAP control system pressure sensor.

Diagnostic Procedure (Cont'd)

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. Check air passage continuity.
   If OK, inspection end. If NG, go to following step.

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

3. Check air passage continuity.

Condition PURG VOL CONT/V value	Air passage continuity between **A** and **B**
100.0%	Yes
0.0%	No

MTBL0302

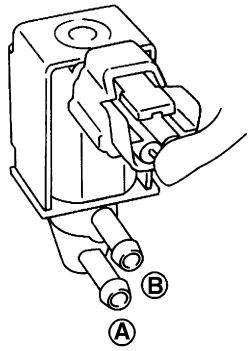
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

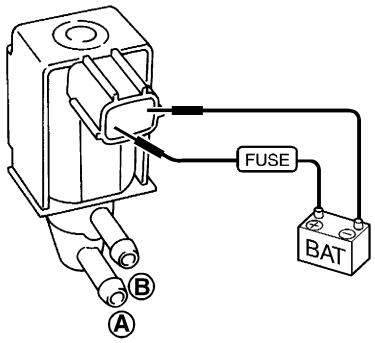
7	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Without CONSULT-II

Check air passage continuity.



SEF660U



SEF661U

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

MTBL0303

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

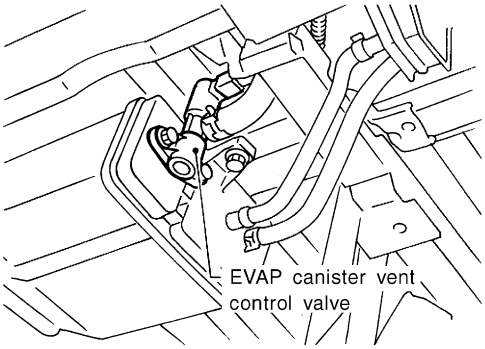
Diagnostic Procedure (Cont'd)

8	CHECK EVAP CANISTER VENT CONTROL VALVE

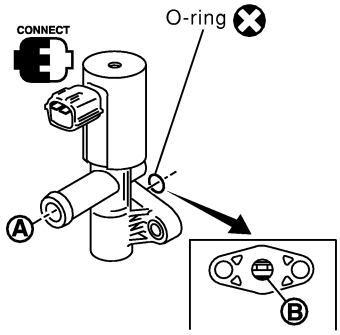
With CONSULT-II

Check air passage continuity.

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



SEF143S



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

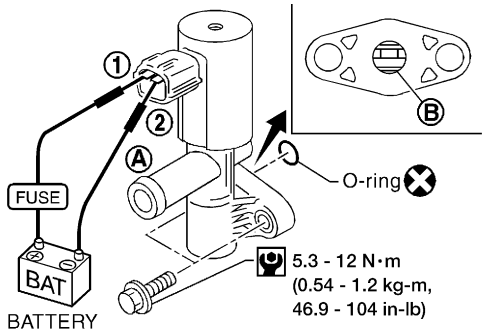
OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP canister vent control valve.

9	CHECK EVAP CANISTER VENT CONTROL VALVE

Without CONSULT-II

Check air passage continuity shown in the figure.



AEC783A

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

MTBL0297

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.

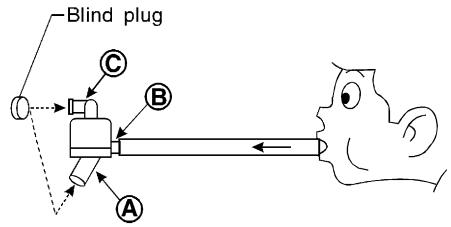
OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP canister vent control valve.

10	CHECK RUBBER TUBE

Check for obstructed water separator and rubber tube connected to EVAP canister vent control valve and clean the rubber tube using air blower. 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.

- **Do not disassemble water separator.**

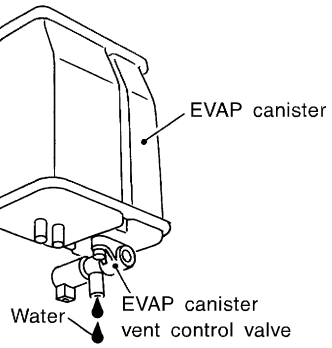
OK or NG

OK	▶	GO TO 11.
NG	▶	Clean, repair or replace rubber tube and/or water separator.

Diagnostic Procedure (Cont'd)

11	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 12.
No	▶	GO TO 14.

12	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 14.
NG	▶	GO TO 13.

13	DETECT MALFUNCTIONING PART

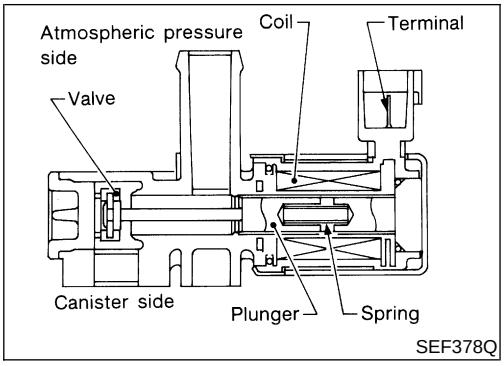
Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

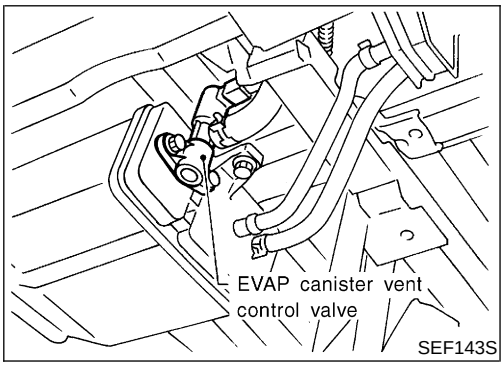
	▶	Repair hose or replace EVAP canister.

14	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.

	▶	**INSPECTION END**





Component Description

NGEC0366

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid (the EVAP canister vent control valve) responds to signals from the ECM.
When the ECM sends an ON signal, the coil in the solenoid valve is energized.
A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0367

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NGEC0368

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

CAUTION:

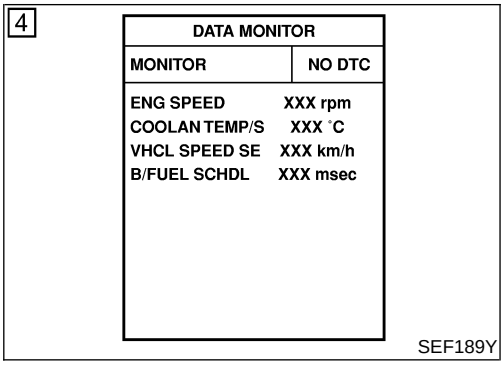
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

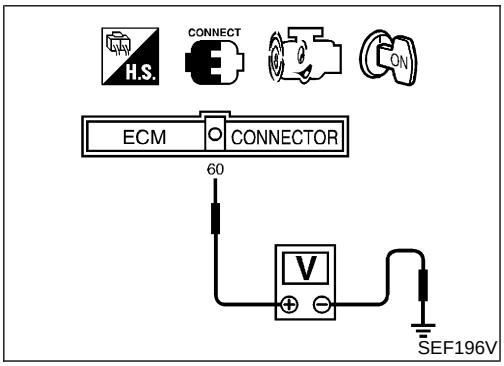
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0369

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1446	• EVAP canister vent control valve remains closed under specified driving conditions.	• EVAP canister vent control valve • EVAP control system pressure sensor and the circuit • Blocked rubber tube to EVAP canister vent control valve • Water separator • EVAP canister is saturated with water.





DTC Confirmation Procedure

NGEC0370

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

Always perform at a temperature above 0°C (32°F).

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON.
4) Select “DATA MONITOR” mode with CONSULT-II.
5) Check that TANK F/TMP SE is 0°C (32°F) or more.
6) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for a maximum of 15 minutes.
7) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE” on EC-505.

NOTE:

If a malfunction exists, NG result may be displayed quicker.

With GST

1) Start engine and warm it up to normal operating temperature.
2) Check that voltage between ECM terminal 60 (fuel tank temperature sensor signal) and ground is less than 4.2V.
3) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for 15 minutes.
4) Select “MODE 7” with GST.
5) If 1st trip DTC is detected, go to “DIAGNOSTIC PROCEDURE” on EC-505.

Diagnostic Procedure

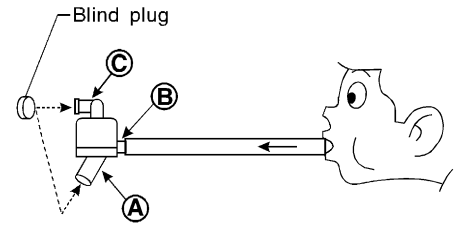
=NGEC0371

1	CHECK RUBBER TUBE FOR CLOGGING

Check obstructed water separator and rubber tube to EVAP canister vent control valve and clean the rubber tube using air blower.

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.

- **Do not disassemble water separator.**

OK or NG

OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Clean, repair or replace rubber tube and/or water separator.

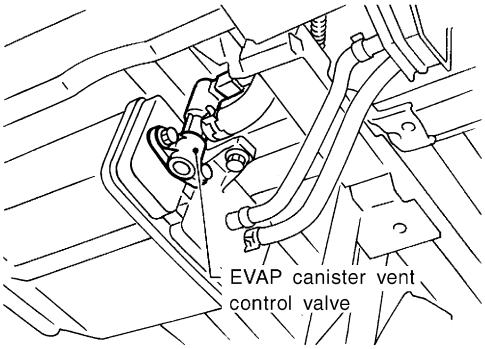
Diagnostic Procedure (Cont'd)

2	CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

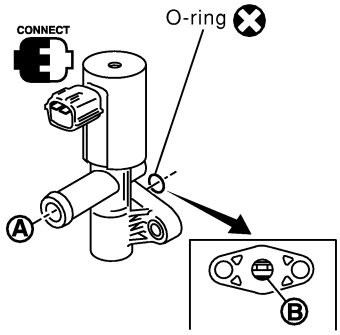
With CONSULT-II

Check air passage continuity.

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



SEF143S



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

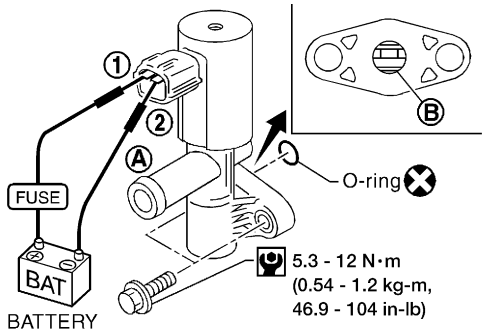
OK or NG

OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve and O-ring.

3	CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

Without CONSULT-II

Check air passage continuity shown in the figure.



AEC783A

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

MTBL0297

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

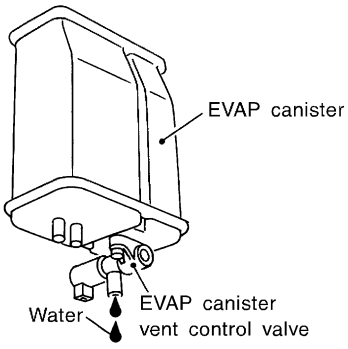
If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve and O-ring.

4	CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

Yes or No

Yes	▶	GO TO 5.
No	▶	GO TO 7.

5	CHECK EVAP CANISTER

Weigh the EVAP canister with EVAP canister vent control valve attached.

The weight should be less than 1.8 kg (4.0 lb).

OK or NG

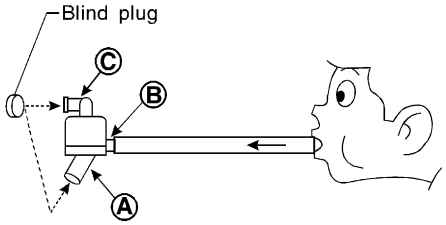
OK	▶	GO TO 7.
NG	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART

Check the following.
1. Visually check the EVAP canister for damage.
2. Check hose connection between EVAP canister and water separator for clogging and poor connection.
3. Check water separator.

a. Check visually for insect nests in the water separator air inlet.
b. Check visually for cracks or flaws in the appearance.
c. Check visually for cracks or flaws in the hose.
d. 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

e. In case of NG in items 2 - 4, replace the parts.
- **Do not disassemble water separator.**

▶	Repair hose or replace EVAP canister or water separator.

7	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK	▶	GO TO 8.
NG	▶	Install hose properly or replace it.

8	CHECK HARNESS CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check harness connector for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EVAP control system pressure sensor.

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR AND CIRCUIT

Refer to "DTC Confirmation Procedure", EC-387.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor and repair or replace harness and connector.

10	CHECK INTERMITTENT INCIDENT

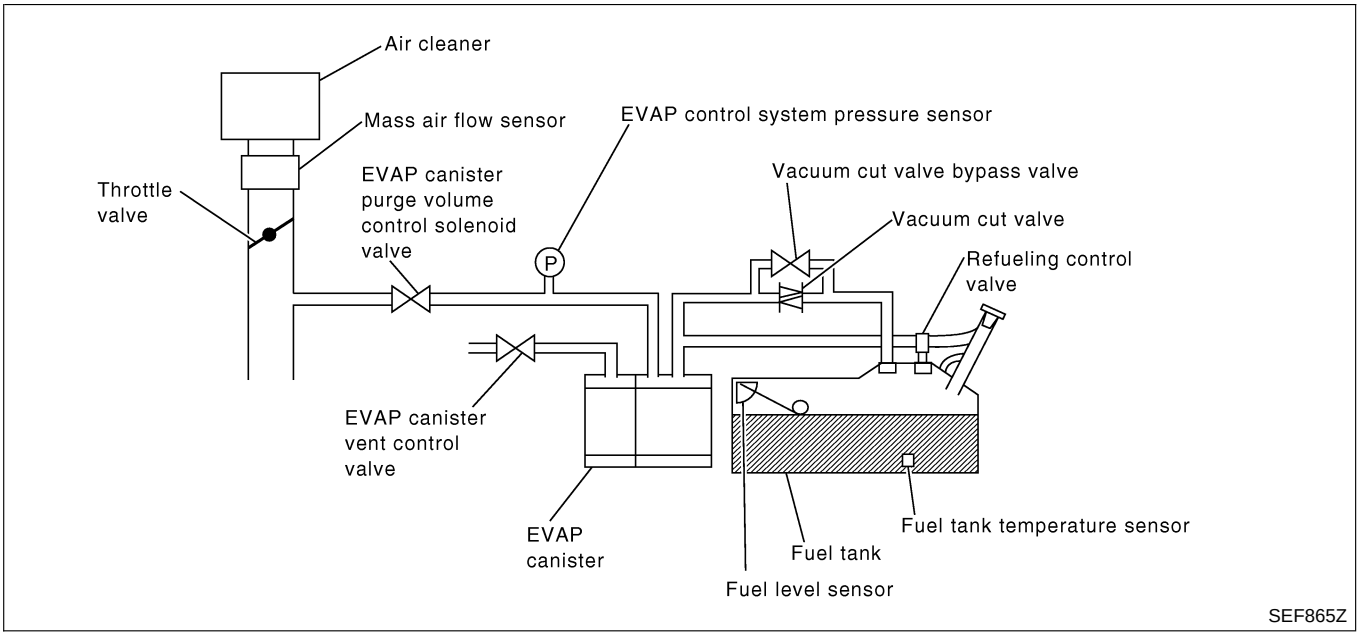
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.

▶	**INSPECTION END**

System Description

NGEC0373

NOTE:
If both DTC P0510 and P1447 are displayed, perform trouble diagnosis for "DTC P0510" first. (See EC-433.)



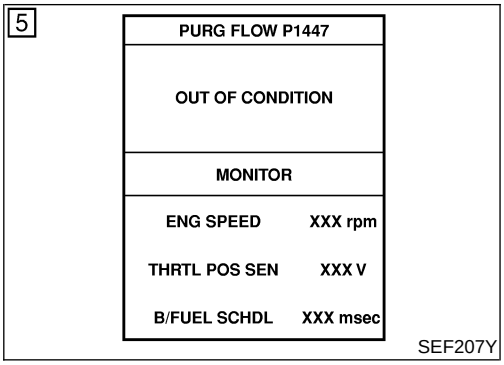
In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

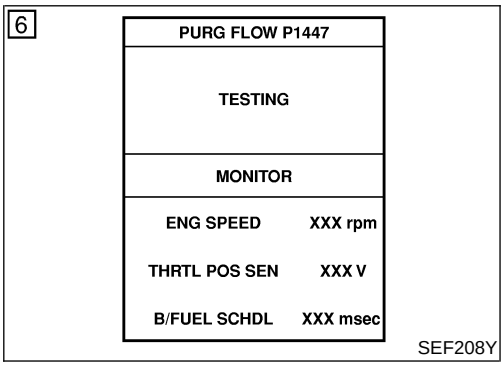
On Board Diagnosis Logic

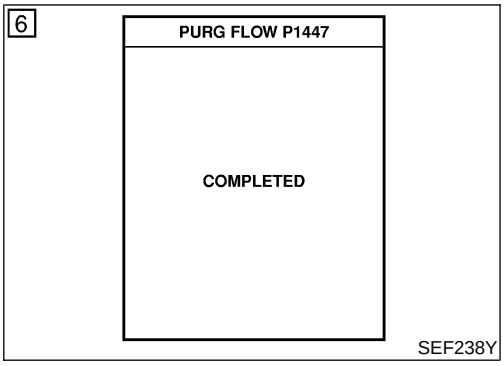
NGEC0374

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1447	• EVAP control system does not operate properly. • EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	• EVAP canister purge volume control 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 • Closed throttle position switch • Blocked purge port • EVAP canister vent control valve







DTC Confirmation Procedure

NGEC0375

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

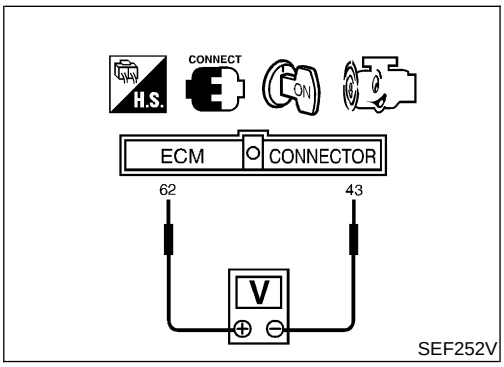
- **For best results perform test at a temperature of 5°C (41°F) or more.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Start engine and let it idle for at least 60 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 30 seconds.)

Selector lever	Suitable position
Vehicle speed	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,750 rpm
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".



Overall Function Check

NGEC0376

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.

Without CONSULT-II

1) Lift up drive wheels.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch OFF, wait at least 5 seconds.
4) Start engine and wait at least 60 seconds.
5) Set voltmeter probes to ECM terminals 62 (EVAP control system pressure sensor signal) and 43 (ground).

6) Check EVAP control system pressure sensor value at idle speed 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 "Neutral" or "Reverse"

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.

Diagnostic Procedure

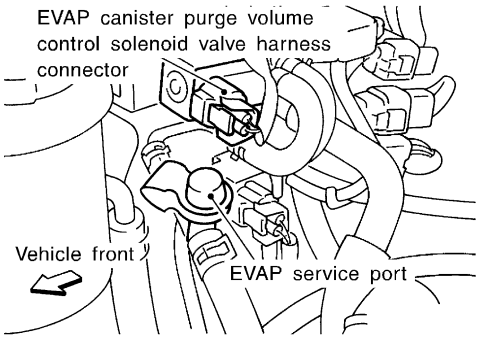
NGEC0377

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.



SEF339V

2. Start engine and let it idle.
3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II.

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

4. Rev engine up to 2,000 rpm.
5. Touch "Qd" and "Qu" on CONSULT-II screen to adjust "PURG VOL CONT/V" opening.
   100.0%: Vacuum should exist.
   0.0%: Vacuum should not exist.

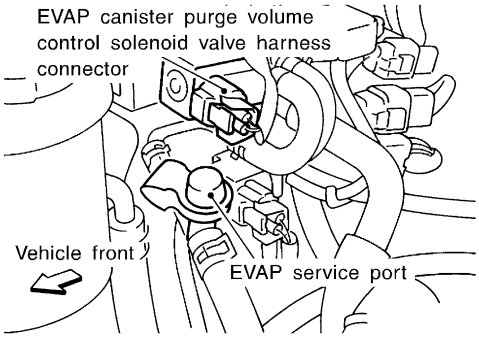
OK or NG

OK	▶	GO TO 8.
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.



SEF339V

4. Start engine and let it idle for at least 60 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 8.
NG	▶	GO TO 4.

4	CHECK EVAP PURGE LINE

Check EVAP purge line for improper connection or disconnection.
Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-37.

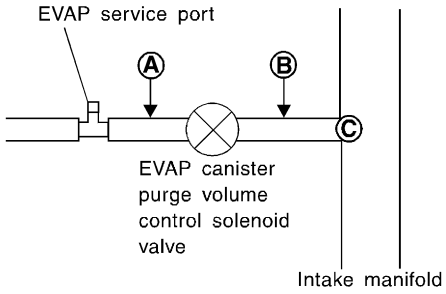
OK or NG

OK	▶	GO TO 5.
NG	▶	Repair it.

Diagnostic Procedure (Cont'd)

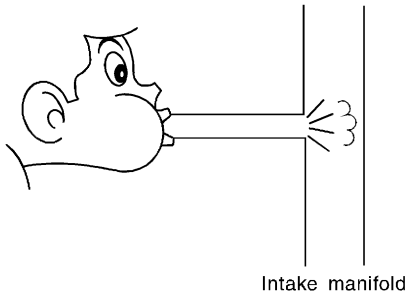
5	CHECK EVAP PURGE HOSE AND PURGE PORT

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.
   If OK, inspection end. If NG, go to following step.
3. Check air passage continuity.

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

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

SEF723Z

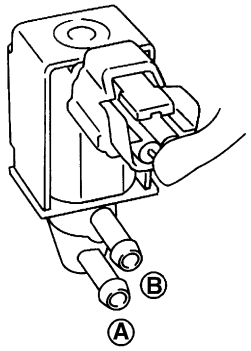
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

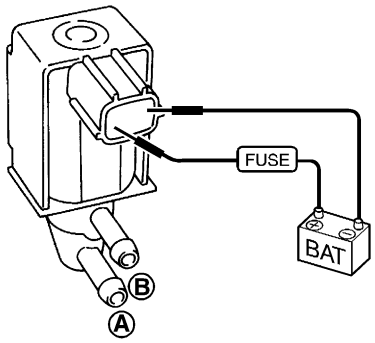
7	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

⊗ **Without CONSULT-II**

Check air passage continuity.



SEF660U



SEF661U

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

MTBL0303

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.

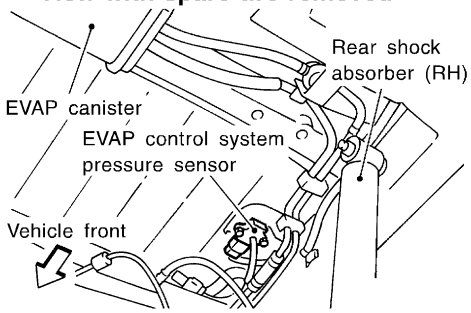
OK or NG

OK	▶	GO TO 9.
NG	▶	Repair it.

9	CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.

View with spare tire removed



SEF341V

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 AND CIRCUIT

Refer to "DTC Confirmation Procedure" for DTC P0450, EC-387.

OK or NG

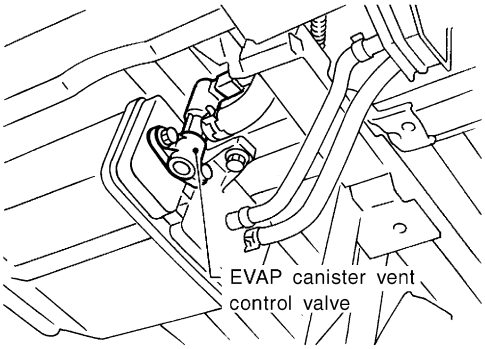
OK (With CONSULT-II)	▶	GO TO 11.
OK (Without CONSULT-II)	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

11	CHECK EVAP CANISTER VENT CONTROL VALVE

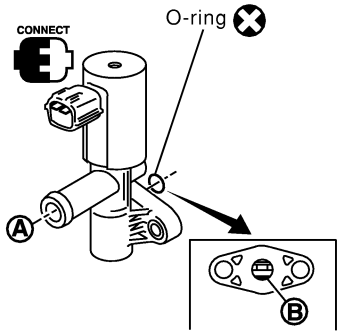
With CONSULT-II

Check air passage continuity.

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



SEF143S



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

OK or NG

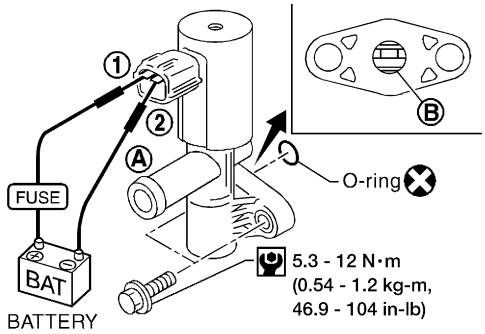
OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

Diagnostic Procedure (Cont'd)

12	CHECK EVAP CANISTER VENT CONTROL VALVE

Without CONSULT-II

Check air passage continuity shown in the figure.



AEC783A

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

MTBL0297

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

13	CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-37.

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace it.

14	CLEAN EVAP PURGE LINE

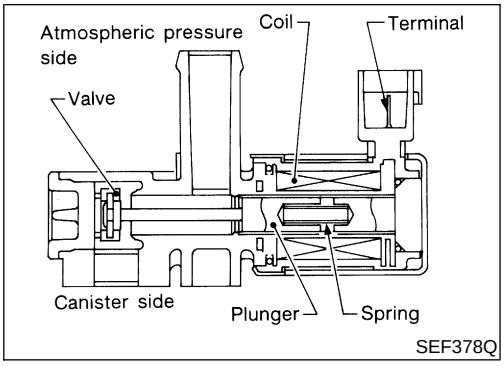
Clean EVAP purge line (pipe and rubber tube) using air blower.

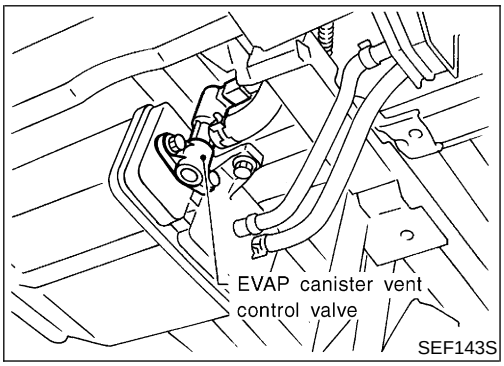
▶	GO TO 15.

15	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.

▶	**INSPECTION END**





Component Description

NGEC0379

NOTE:
If DTC P1448 is displayed with P0440 or P1440, perform trouble diagnosis for DTC P1448 first.

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid (the EVAP canister vent control valve) responds to signals from the ECM.
When the ECM sends an ON signal, the coil in the solenoid valve is energized.
A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System (Small Leak)" diagnosis.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0380

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NGEC0381

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)
108	R/G	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

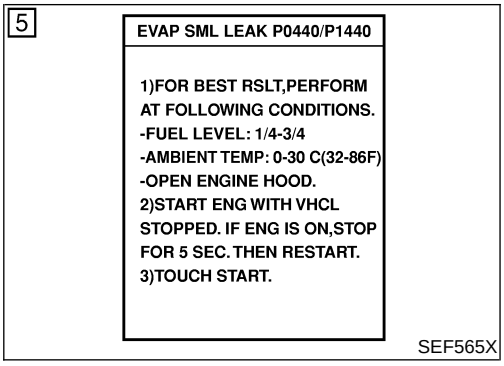
NGEC0382

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1448	• EVAP canister vent control valve remains opened under specified driving conditions.	• EVAP canister vent control valve • EVAP control system pressure sensor • Blocked rubber tube to EVAP canister vent control valve • Water separator • EVAP canister is saturated with water. • Vacuum cut valve

5

EVAP SML LEAK P0440/P1440

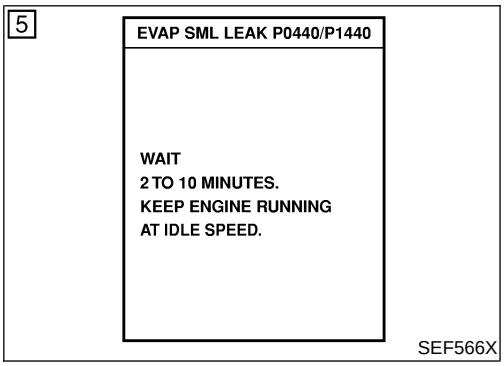
1)FOR BEST RSLT,PERFORM AT FOLLOWING CONDITIONS.
-FUEL LEVEL: 1/4-3/4
-AMBIENT TEMP: 0-30 C(32-86F)
-OPEN ENGINE HOOD.
2)START ENG WITH VHCL STOPPED. IF ENG IS ON,STOP FOR 5 SEC. THEN RESTART.
3)TOUCH START.



5

EVAP SML LEAK P0440/P1440

WAIT
2 TO 10 MINUTES.
KEEP ENGINE RUNNING
AT IDLE SPEED.



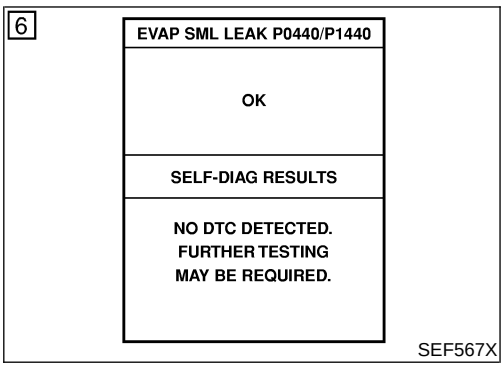
6

EVAP SML LEAK P0440/P1440

OK

SELF-DIAG RESULTS

NO DTC DETECTED.
FURTHER TESTING
MAY BE REQUIRED.



DTC Confirmation Procedure

NGEC0383

NOTE:

- **If DTC P1448 is displayed with P0440 or P1440, perform trouble diagnosis for DTC P1448 first.**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

With CONSULT-II

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is less than 3/4 full and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**
- **It is better that the fuel level is low.**

1) Turn ignition switch ON.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
4) Check that the following conditions are met.

COOLAN TEMP/S	0 - 70°C (32 - 158°F)
INT/A TEMP SE	0 - 60°C (32 - 140°F)

5) Select "EVAP SML LEAK P0440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II. Follow the instruction displayed.

NOTE:

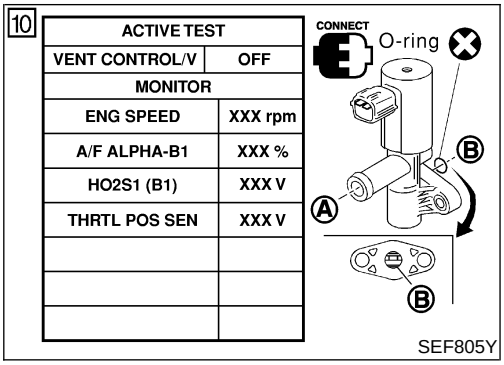
- **If the CONSULT-II screen shown at left is displayed, stop the engine and stabilize the vehicle temperature at 25°C (77°F) or cooler. After "TANK F/TMP SE" becomes less than 30°C (86°F), retest. (Use a fan to reduce the stabilization time.)**
- **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to "Basic Inspection", EC-104.**
- **The engine idle portion of this test (See illustration at left.) will take approximately 5 minutes.**

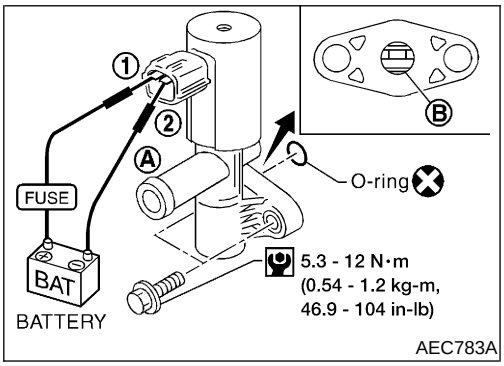
6) Make sure that "OK" is displayed.
If "NG" is displayed, go to following step.

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 of the following.

Condition	Air passage continuity between **A** and **B**
Touching "ON"	No
Touching "OFF"	Yes

If the result is NG, go to "Diagnostic Procedure", EC-521.
If the result is OK, go to "Diagnostic Procedure" for DTC P0440, EC-356.

Overall Function Check

NGEC0384

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

Without CONSULT-II

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-521.
If the result is OK, perform trouble diagnosis for DTC P0440. Refer to EC-352.

Diagnostic Procedure

NGEC0385

1	**CHECK RUBBER TUBE**	
1. Turn ignition switch OFF. 2. Check disconnection or obstruction of rubber tube connected to EVAP canister vent control valve.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Repair or clean rubber tube.

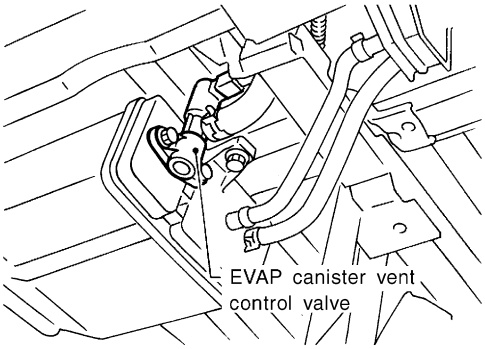
Diagnostic Procedure (Cont'd)

2	CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

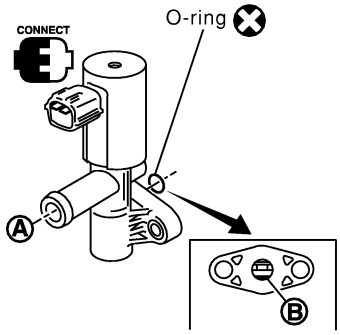
With CONSULT-II

Check air passage continuity.

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



SEF143S



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

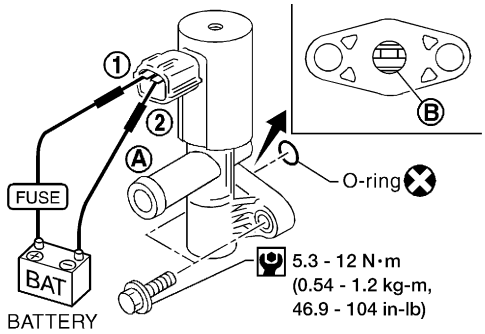
OK or NG

OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve and O-ring.

3	CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

Without CONSULT-II

Check air passage continuity shown in the figure.



AEC783A

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

MTBL0297

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

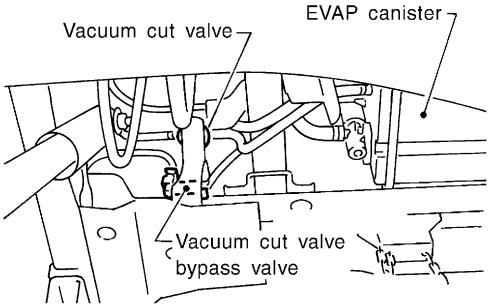
If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.

OK or NG

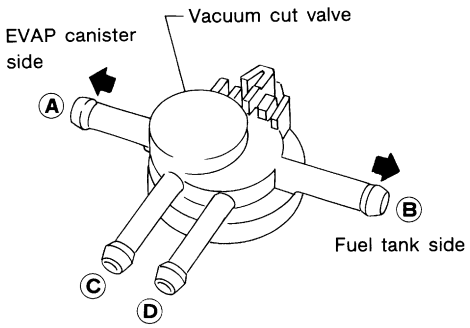
OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve and O-ring.

4	CHECK VACUUM CUT VALVE

Check vacuum cut valve as follows:



SEF186S



SEF379Q

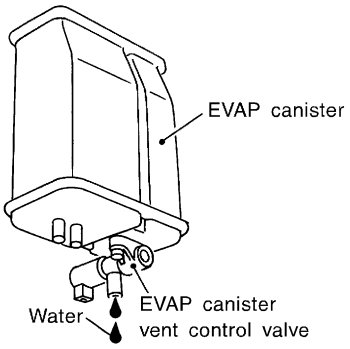
1. Plug port **C** and **D** with fingers.
2. Apply vacuum to port **A** and check that there is no suction from port **B**.
3. Apply vacuum to port **B** and check that there is suction from port **A**.
4. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
5. Open port **C** and **D**.
6. Blow air in port **A** check that air flows freely out of port **C**.
7. Blow air in port **B** check that air flows freely out of port **D**.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace vacuum cut valve.

5	CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with the vent control valve attached.
2. Check if water will drain from the EVAP canister.

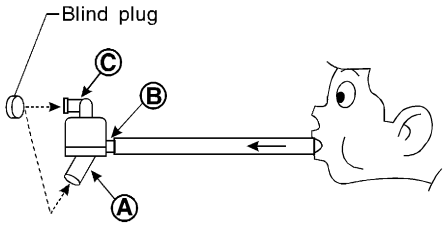


SEF596U

Yes or No

Yes	▶	GO TO 8.
No	▶	GO TO 6.

6	CHECK EVAP CANISTER	
Weigh the EVAP canister with EVAP canister vent control valve attached. **The weight should be less than 1.8 kg (4.0lb).** **OK or NG**		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
Check the following. 1. Visually check the EVAP canister for damage. 2. Check hose connection between EVAP canister and water separator for clogging and poor connection. 3. Check water separator. a. Check visually for insect nests in the water separator air inlet. b. Check visually for cracks or flaws in the appearance. c. Check visually for cracks or flaws in the hose. d. 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 e. In case of NG in items 2 - 4, replace the parts. ● **Do not disassemble water separator.**		
	▶	Repair hose or replace EVAP canister or water separator.

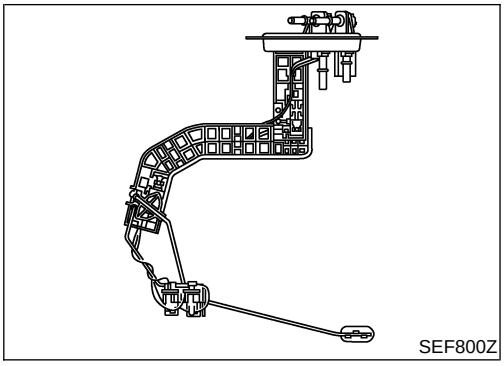
8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor. **OK or NG**		
OK	▶	GO TO 9.
NG	▶	Install hose property or replace it.

9	CHECK HARNESS CONNECTOR	
1. Disconnect EVAP control system pressure sensor harness connector. 2. Check harness connector for water. **Water should not exist.** **OK or NG**		
OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

Diagnostic Procedure (Cont'd)

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	
Perform "DTC Confirmation Procedure", EC-387.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor and repair or replace harness and connector.

11	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.		
	▶	**INSPECTION END**


SEF800Z

Component Description

NGEC1036

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

NGEC1037

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

NGEC1038

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)

DTC Confirmation Procedure

NGEC1039

NOTE:

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

3

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

NGEC1039S01

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-529.

WITH GST

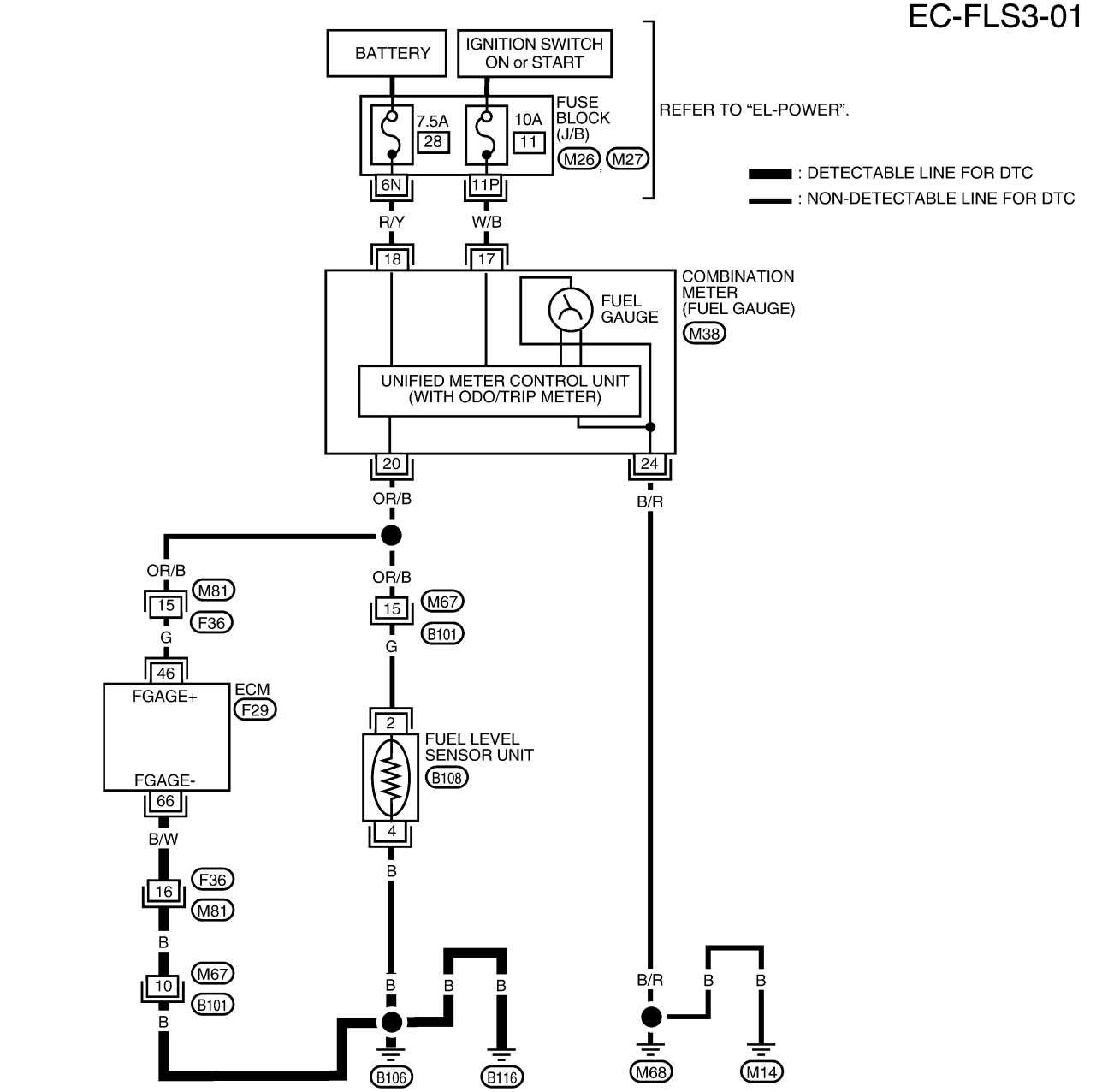
NGEC1039S02

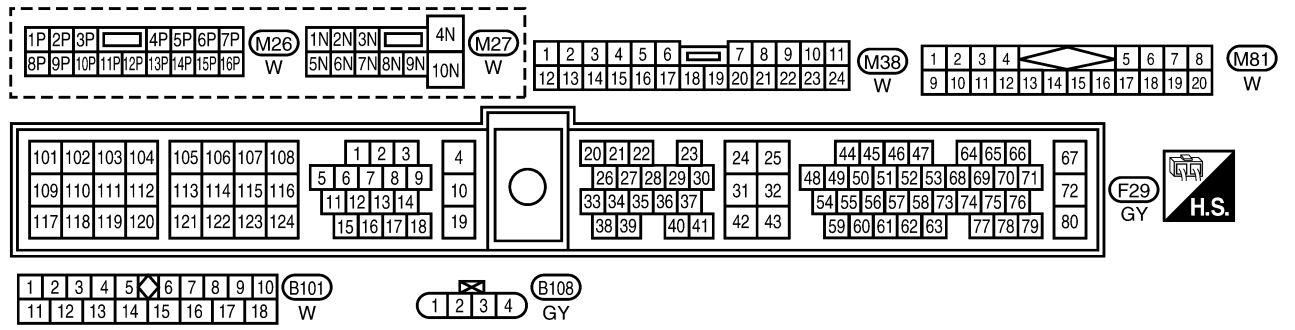
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NGEC1040

EC-FLS3-01





LEC492

Diagnostic Procedure

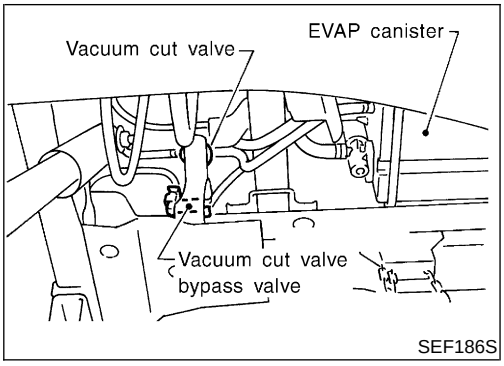
=NGEC1041

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 66 and body ground. Refer to Wiring Diagram. **Continuity should exist.** 4. Also check harness for short to power. **OK or NG**	
OK ▶	GO TO 3.
NG ▶	GO TO 2.

2	DETECT MALFUNCTIONING PART
1. Check the following. ● Harness connectors F36, M81 ● Harness connectors M67, B101 ● Harness for open and short between ECM and body ground	
▶	Replace open circuit or short to power in harness or connectors.

3	CHECK FUEL LEVEL SENSOR
Refer to ***EL-87***, “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-142 **OK or NG**	
▶	**INSPECTION END**



Description

NGEC0387

COMPONENT DESCRIPTION

NGEC0387S01

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.

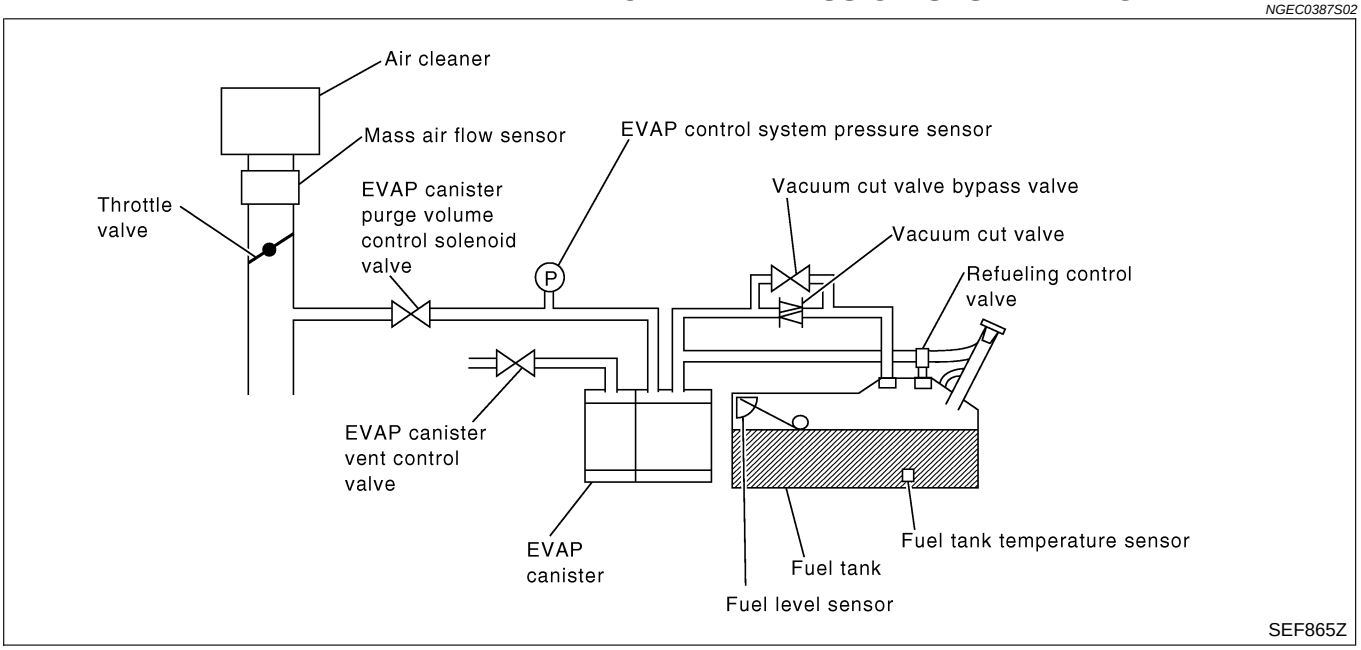
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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

NGEC0387S02



CONSULT-II Reference Value in Data Monitor Mode

NGEC0388

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NGEC0389

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)
120	P/B	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0390

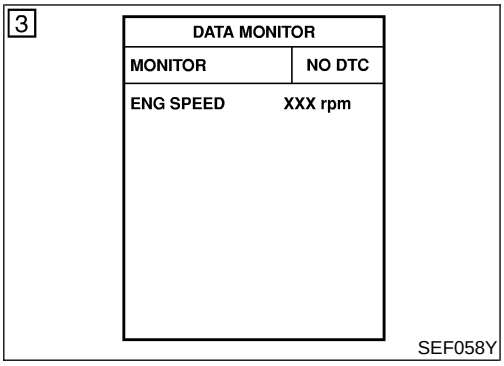
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1490	• An improper voltage signal is sent to ECM through vacuum cut valve bypass valve.	• Harness or connectors (The vacuum cut valve bypass valve circuit is open or shorted.) • Vacuum cut valve bypass valve

DTC Confirmation Procedure

NGEC0391

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

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



With CONSULT-II

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-533.

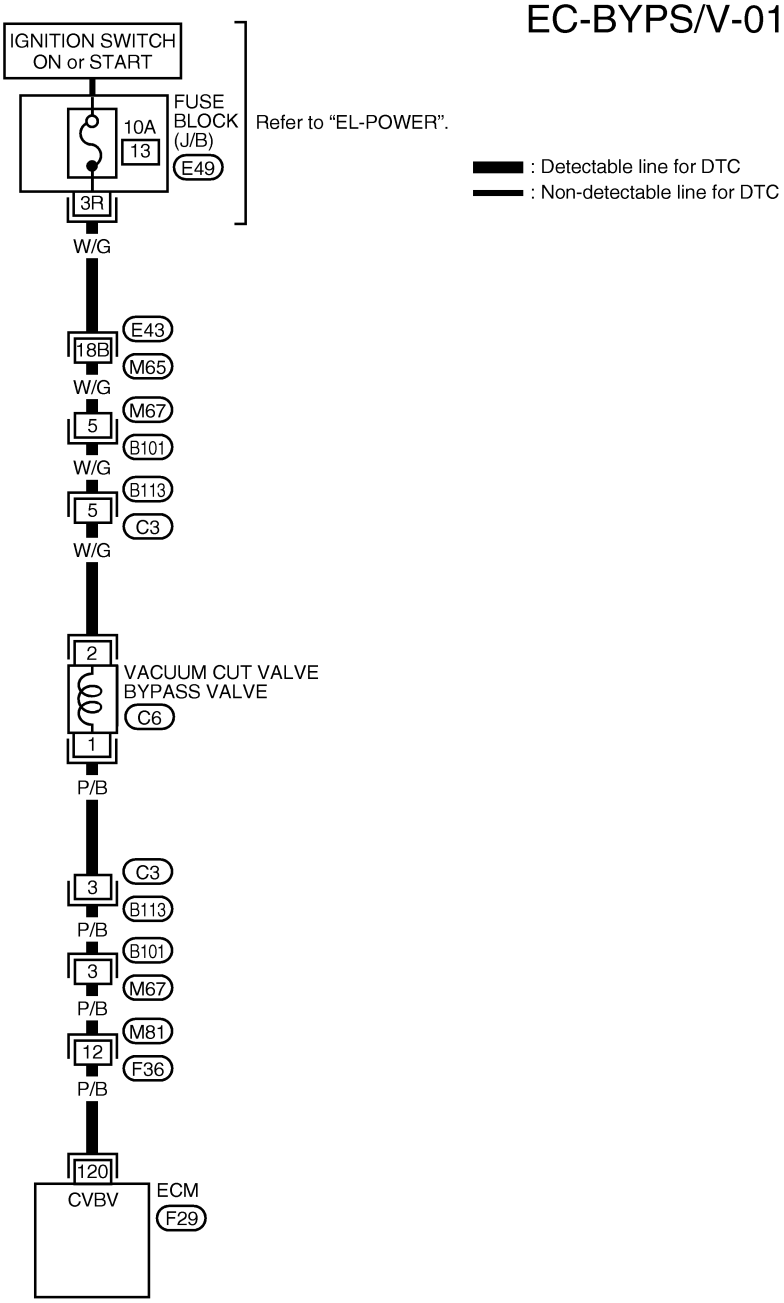
With GST

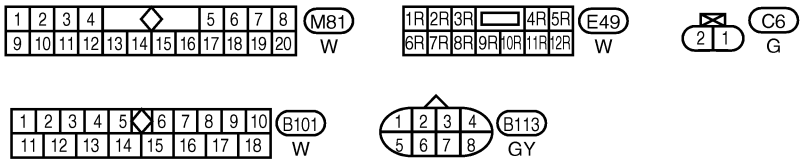
Follow the procedure “With CONSULT-II”.

Wiring Diagram

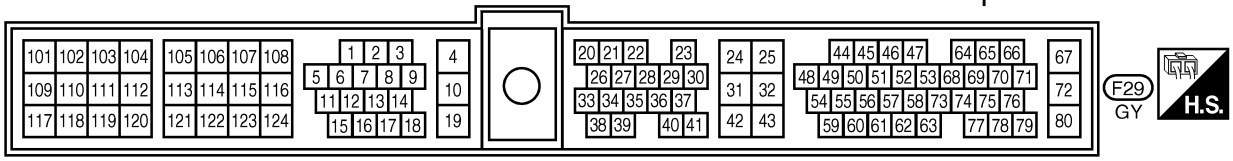
NGEC0392

EC-BYPS/V-01





Refer to the following.
M65 , E43 - SUPER MULTIPLE JUNCTION (SMJ)



AEC007B

Diagnostic Procedure

NGEC0393

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

1. Turn ignition switch ON.
2. Perform “VC/V BYPASS/V” in “ACTIVE TEST” mode.

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

3. Make sure that clicking sound is heard from the vacuum cut valve bypass valve.

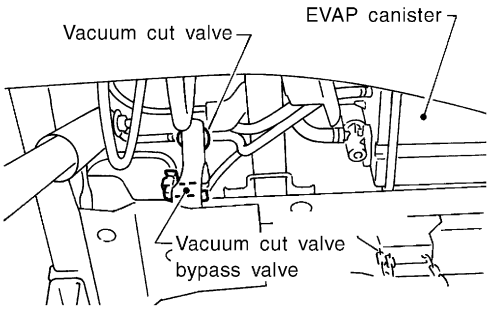
OK or NG

OK ▶	GO TO 7.
NG ▶	GO TO 3.

Diagnostic Procedure (Cont'd)

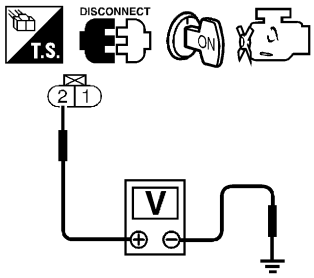
3	CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect vacuum cut valve bypass valve harness connector.



SEF186S

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



SEF192V

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

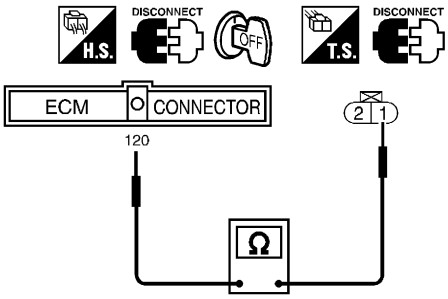
4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E43, M65
- Harness connectors M67, B101
- Harness connectors B113, C3
- 10A fuse
- Harness for open or short between vacuum cut valve bypass valve and 10A fuse

	▶	Repair harness or connectors.

5	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 120 and terminal 1.



SEF253V

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 E43, M65
- Harness connectors M67, B101
- Harness connectors B113, C3
- 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.

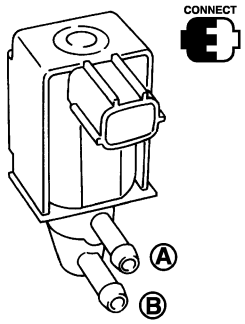
Diagnostic Procedure (Cont'd)

7	CHECK VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

Check air passage continuity.

Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.



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

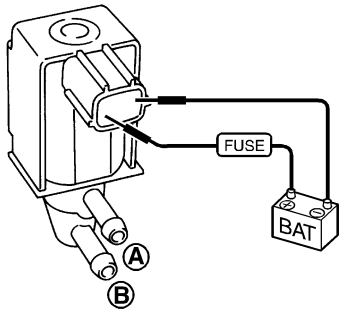
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF807Y

Without CONSULT-II

Check air passage continuity shown in the figure.



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.

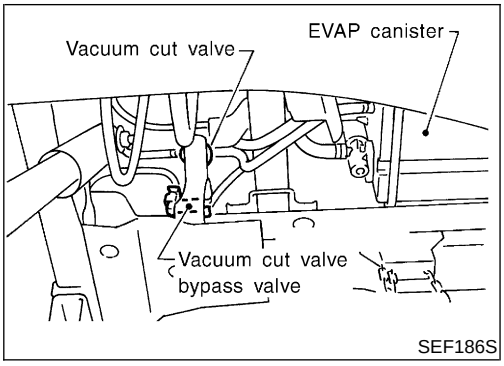
SEF557Y

If NG or operation takes more than 1 second, replace vacuum cut valve bypass valve.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace vacuum cut valve bypass valve.

8	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**



Description

NGEC0395

COMPONENT DESCRIPTION

NGEC0395S01

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.

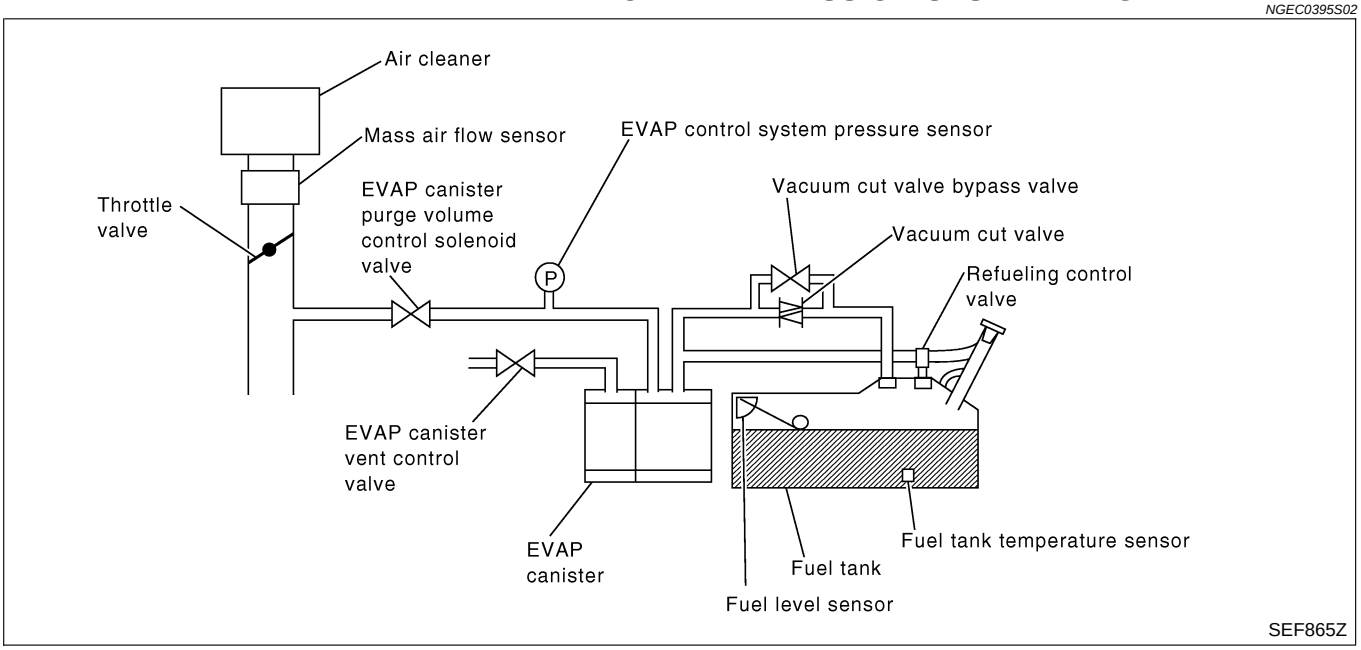
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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

NGEC0395S02



CONSULT-II Reference Value in Data Monitor Mode

NGEC0396

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NGEC0397

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)
120	P/B	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0398

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1491	Vacuum cut valve bypass valve does not operate properly.	• Vacuum cut valve bypass valve • Vacuum cut valve • Bypass hoses for clogging • EVAP control system pressure sensor • EVAP canister vent control valve • Hose between fuel tank and vacuum cut valve clogged • Hose between vacuum cut valve and EVAP canister clogged • EVAP canister • EVAP purge port of fuel tank for clogging

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

NGEC0399

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

- **Always perform test at a temperature of 5 to 30°C (41 to 86°F).**
- **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.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

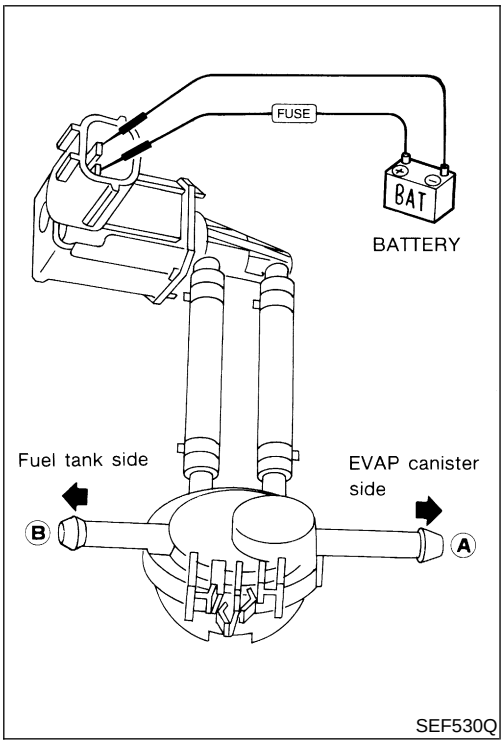
With CONSULT-II

1) Turn ignition switch ON.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch OFF and wait at least 5 seconds.
4) Start engine and let it idle for at least 60 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	More than 1,000 rpm
Selector lever	Suitable position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
B/FUEL SCHDL	Less than 10 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".



Overall Function Check

NGEC0400

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.

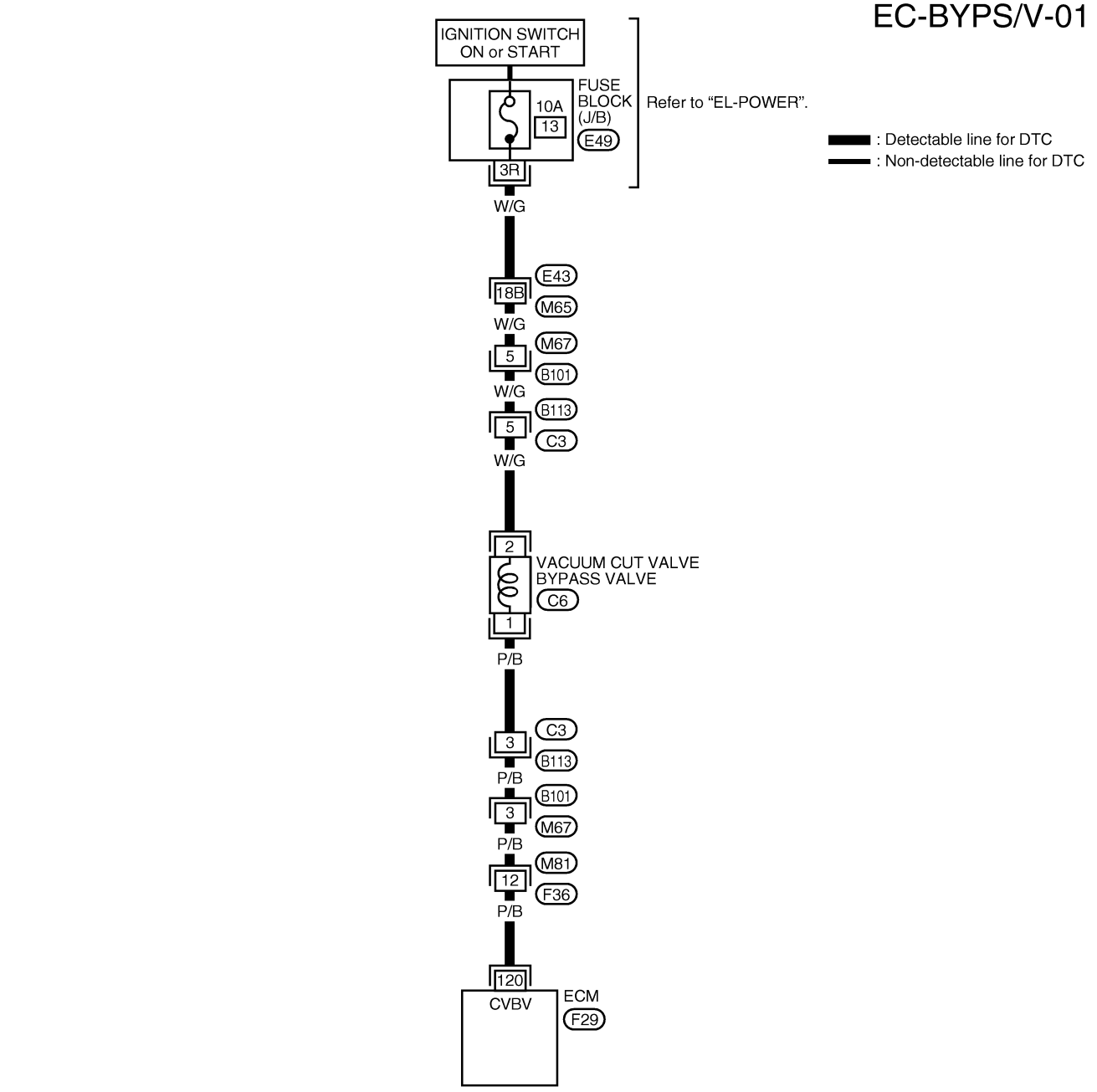
Without CONSULT-II

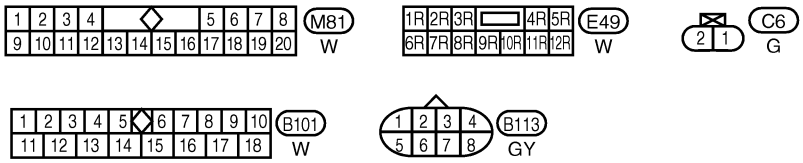
1. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
2. Apply vacuum to port **A** and check that there is no suction from port **B**.
3. Apply vacuum to port **B** and check that there is suction from port **A**.
4. Blow air in port **B** and check that there is a resistance 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" on EC-541.

Wiring Diagram

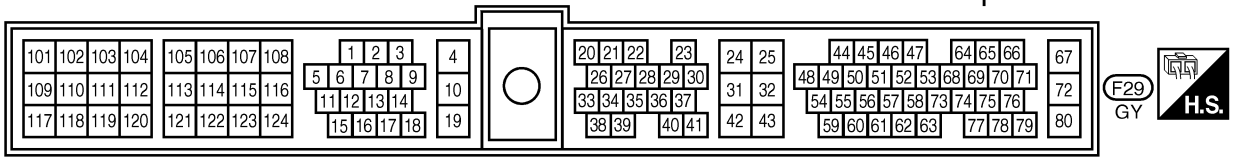
NGEC0505

EC-BYPS/V-01





Refer to the following.
M65 , E43 - SUPER MULTIPLE JUNCTION (SMJ)



AEC007B

Diagnostic Procedure

NGEC0401

1	INSPECTION START

Do you have CONSULT-II?

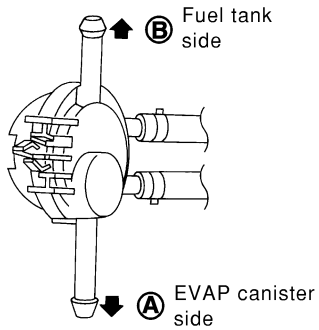
Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK COMPONENT

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

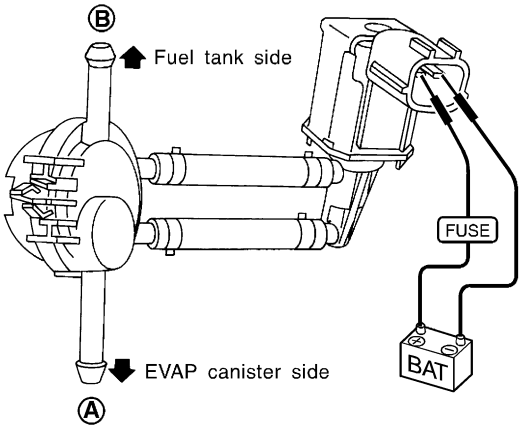
OK	▶	GO TO 4.
NG	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

3	CHECK COMPONENT

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 5.

4	CHECK EVAP PURGE LINE

1. Check EVAP purge line between EVAP canister and fuel tank for clogging or disconnection.
2. Check EVAP purge port of fuel tank for clogging.
3. Check EVAP canister. Refer to EC-34.

OK or NG

OK	▶	GO TO 8.
NG (Step 1)	▶	Repair it.
NG (Step 2)	▶	Clean EVAP purge port.
NG (Step 3)	▶	Replace EVAP canister.

5	CHECK BYPASS HOSE

Check bypass hoses for clogging.

OK or NG

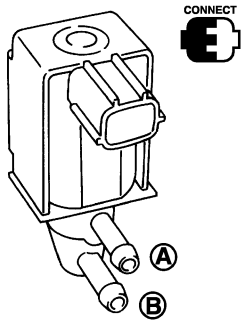
OK	▶	GO TO 6.
NG	▶	Repair or replace hoses.

6 CHECK VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

Check air passage continuity.

Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.



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

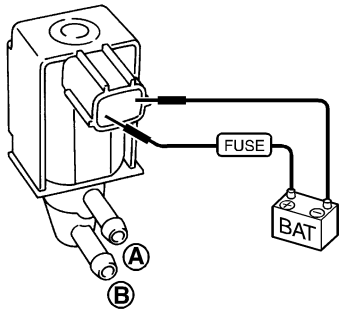
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF807Y

Without CONSULT-II

Check air passage continuity shown in the figure.



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

If NG or operation takes more than 1 second, replace vacuum cut valve bypass valve.

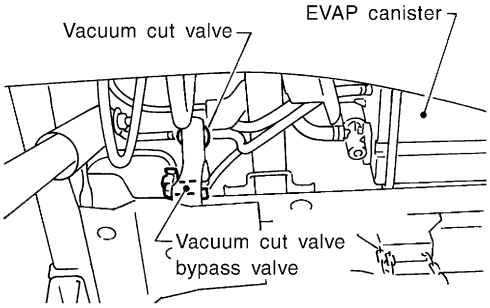
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace vacuum cut valve bypass valve.

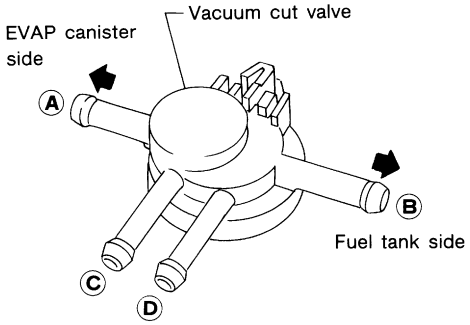
Diagnostic Procedure (Cont'd)

7	CHECK VACUUM CUT VALVE

Check vacuum cut valve as follows:



SEF186S



SEF379Q

1. Plug port **C** and **D** with fingers.
2. Apply vacuum to port **A** and check that there is no suction from port **B**.
3. Apply vacuum to port **B** and check that there is suction from port **A**.
4. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
5. Open port **C** and **D**.
6. Blow air in port **A** check that air flows freely out of port **C**.
7. Blow air in port **B** check that air flows freely out of port **D**.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace vacuum cut valve.

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

1. Turn ignition switch OFF.
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

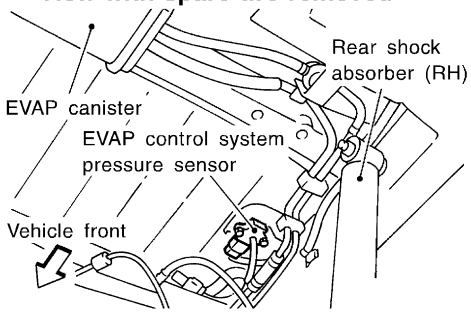
OK or NG

OK	▶	GO TO 9.
NG	▶	Repair it

9	CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.

View with spare tire removed



SEF341V

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 COMPONENT AND CIRCUIT

(EVAP control system pressure sensor)
Refer to "DTC Confirmation Procedure" for DTC P0450, EC-387.

OK or NG

OK (With CONSULT-II)	▶	GO TO 11.
OK (Without CONSULT-II)	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

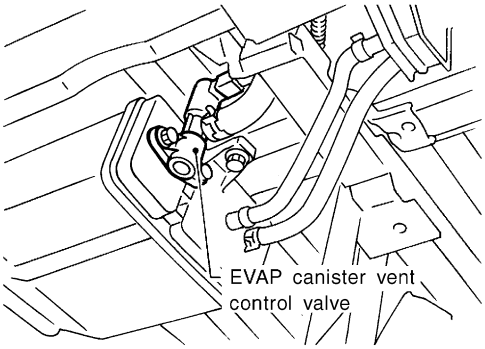
Diagnostic Procedure (Cont'd)

11	CHECK EVAP CANISTER VENT CONTROL VALVE

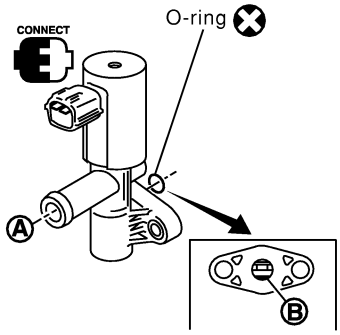
With CONSULT-II

Check air passage continuity.

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



SEF143S



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

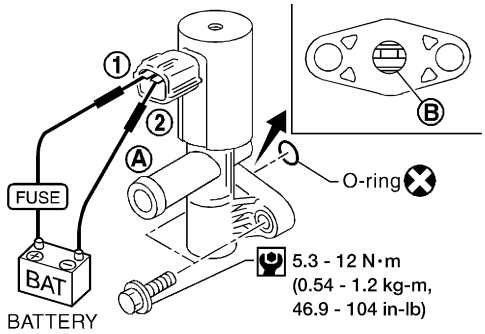
OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

12	CHECK EVAP CANISTER VENT CONTROL VALVE

Without CONSULT-II

Check air passage continuity shown in the figure.



AEC783A

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

MTBL0297

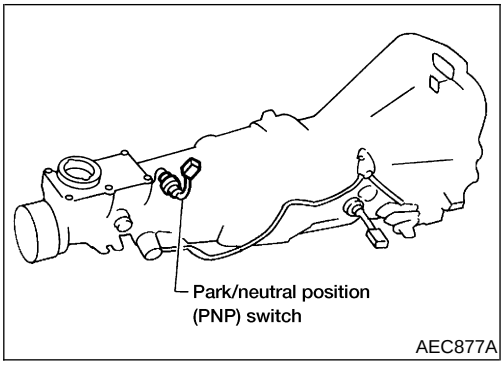
If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

13	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**



Component Description

NGEC0424

When the gear position is “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

NGEC0425

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	• Ignition switch: ON	Shift lever: “N”	ON
		Except above	OFF

ECM Terminals and Reference Value

NGEC0426

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)
22	L/B	PNP switch	**[Ignition switch “ON”]** • Gear position is “Neutral position”	Approximately 0V
			[Ignition switch “ON”] • Except the above gear position	Approximately 5V

On Board Diagnosis Logic

NGEC0427

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

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

=NGEC0428

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

With CONSULT-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.

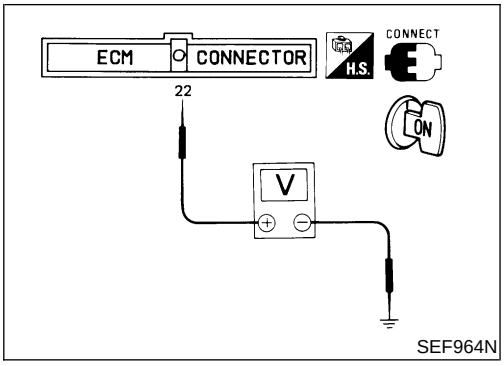
Position (Selector lever)	Known good signal
"N"	ON
Except the above position	OFF

If NG, go to "Diagnostic Procedure", EC-552.
If OK, go to following step.

3) Select "DATA MONITOR" mode with CONSULT-II.
4) Start engine and warm it up to normal operating temperature.
5) Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,400 - 4,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.5 - 17 msec
VHCL SPEED SE	More than 64 km/h (40 MPH)
Selector lever	Suitable position

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-552.



Overall Function Check

=NGEC0429

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 22 (PNP switch signal) and body ground under the following conditions.

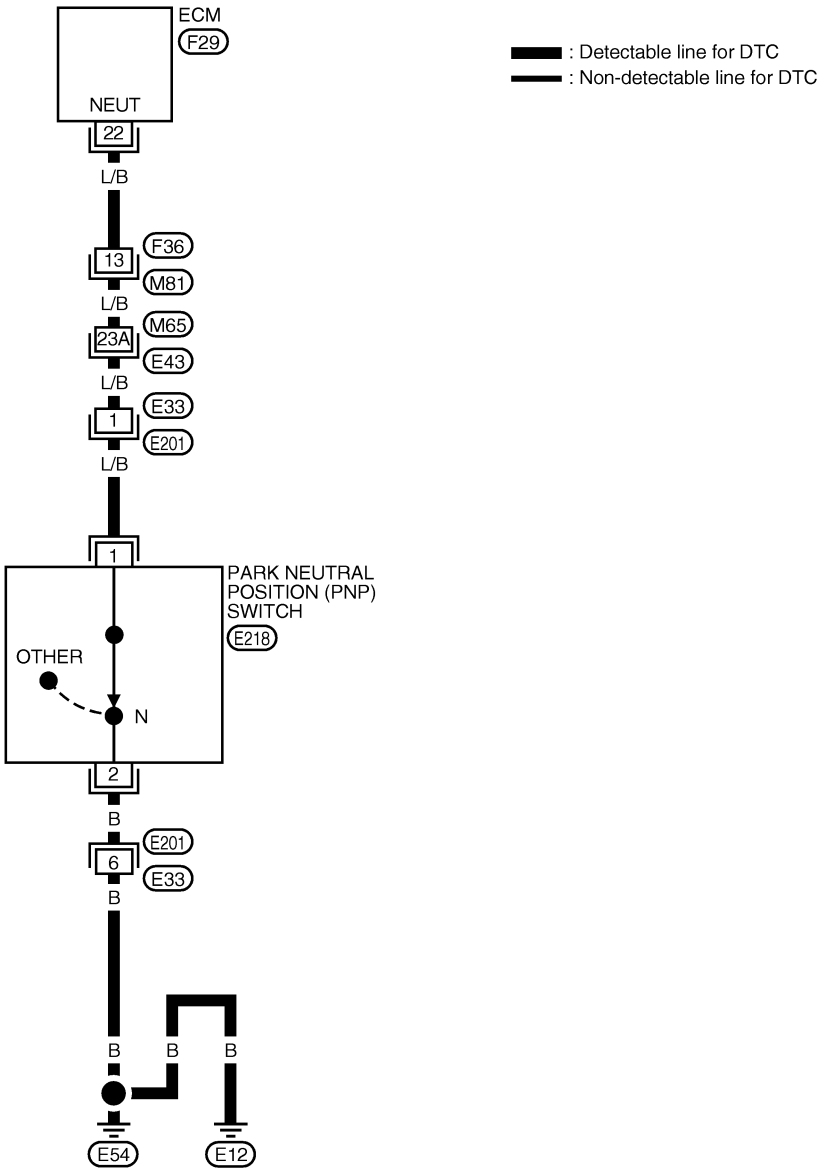
Condition (Gear position)	Voltage (V) (Known-good data)
"N" position	Approx. 0
Except the above position	Approx. 5

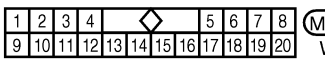
3) If NG, go to "Diagnostic Procedure", EC-552.

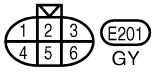
Wiring Diagram

NGEC0430

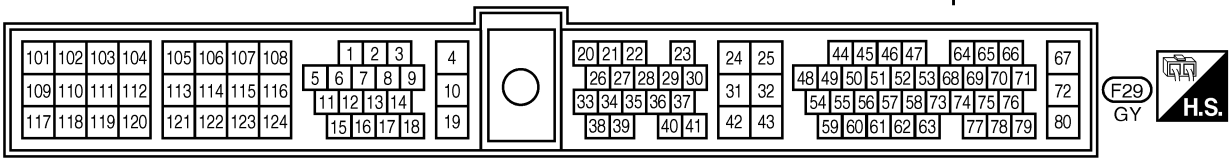
EC-PNP/SW-01







Refer to the following.
(M65) (E43) - SUPER MULTIPLE JUNCTION (SMJ)



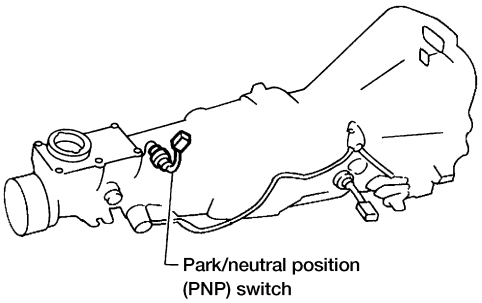
AEC008B

Diagnostic Procedure For M/T Models

NGEC0431

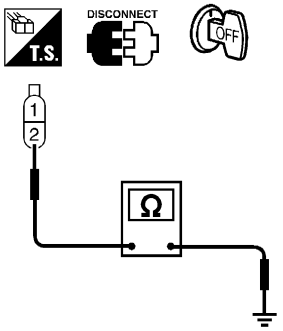
1	CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect PNP switch harness connector.



AEC877A

3. Check harness continuity between terminal 2 and body ground.



SEF218V

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

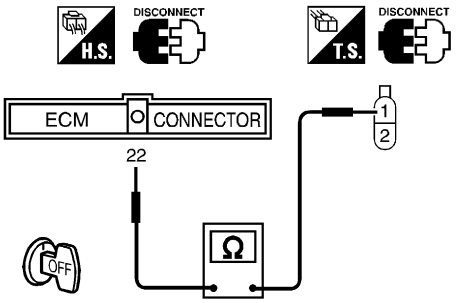
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E33, E201
- Harness for open or short between PNP switch and body ground

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

3	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 22 and terminal 1.



SEF219V

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 F36, M81
- Harness connectors M65, E43
- Harness connectors E33, E201
- Harness for open or short between ECM and PNP switch

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

5	CHECK PNP SWITCH

Refer to ***MT-8***.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace PNP switch.

6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.

	▶	**INSPECTION END**

On Board Diagnosis Logic

NGEC0488

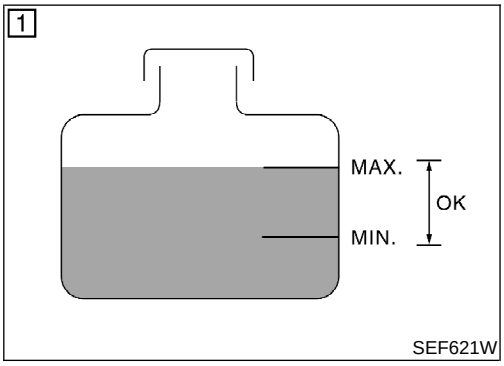
If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
OVERHEAT	• Engine coolant temperature reaches an abnormally high temperature.	• Harness or connectors (The cooling fan circuit is open or shorted.) • Cooling fan • Radiator hose • Radiator • Radiator cap • Water pump • Thermostat For more information, refer to “MAIN 12 CAUSES OF OVERHEATING”, EC-558.

CAUTION:

When a malfunction is indicated, be sure to replace the coolant following the procedure in the MA section (“Changing Engine Coolant”, “ENGINE MAINTENANCE”). Also, replace the engine oil.

1) **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA section (“Anti-freeze Coolant Mixture Ratio”, “RECOMMENDED FLUIDS AND LUBRICANTS”).**
2) **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**



Overall Function Check

NGEC0489

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-555.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to “Diagnostic Procedure”, EC-555.

Diagnostic Procedure

NGEC0491

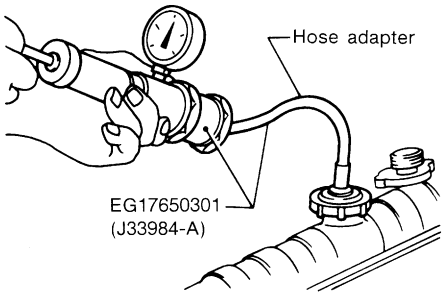
1	CHECK COOLING SYSTEM FOR LEAK

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

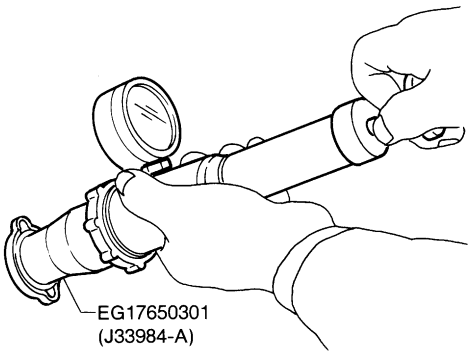
Pressure should not drop.

OK or NG

OK	▶	GO TO 2.
NG	▶	**Check the following for leak.** ● Hose ● Radiator ● Water pump Refer to LC section (“Water Pump”).

2	CHECK RADIATOR CAP

Apply pressure to cap with a tester.



SLC755A

Radiator cap relief pressure:

78 - 98 kPa (0.8 - 1.0 kg/cm^2, 11 - 14 psi)

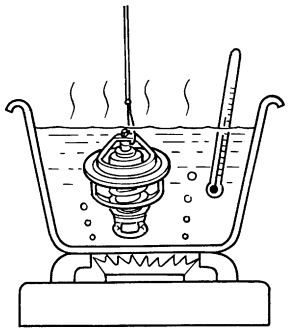
OK or NG

OK	▶	GO TO 3.
NG	▶	Replace radiator cap.

Diagnostic Procedure (Cont'd)

3	CHECK THERMOSTAT

1. Check valve seating condition at normal room temperatures.
   It should seat tightly.
2. Check valve opening temperature and valve lift.



SLC343

Valve opening temperature:
76.5°C (170°F) [standard]
Valve lift:
More than 8 mm/90°C (0.31 in/194°F)

3. Check if valve is closed at 5°C (9°F) below valve opening temperature.

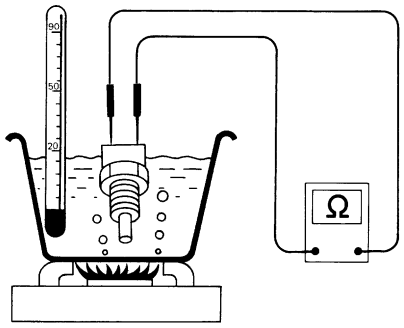
For details, refer to LC section ("Thermostat").

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace thermostat

4	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.

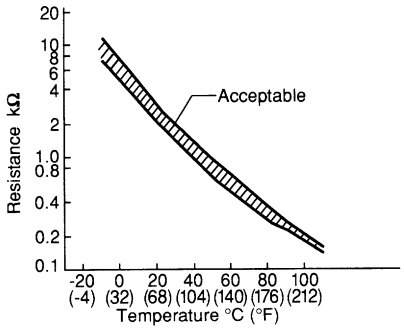


SEF152P

<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

MTBL0285



SEF012P

OK or NG

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

5	CHECK MAIN 12 CAUSES
If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-558.	
▶	**INSPECTION END**

Perform FINAL CHECK by the following procedure after repair is completed.

1. Warm up engine. Run the vehicle for at least 20 minutes. Pay attention to engine coolant temperature gauge on the instrument panel. If the reading shows an abnormally high temperature, another part may be malfunctioning.
2. Stop vehicle and let engine idle. Check the intake and exhaust systems for leaks by listening for noise or visually inspecting the components.
3. Allow engine to cool and visually check for oil and coolant leaks. Then, perform "OVERALL FUNCTION CHECK".

Main 11 Causes of Overheating

NGEC0492

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	See “RECOMMENDED FLUIDS AND LUBRICANTS” in MA section.
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See “Changing Engine Coolant”, “ENGINE MAINTENANCE” in MA section.
	4	• Radiator cap	• Pressure tester	78 - 98 kPa (0.8 - 1.0 kg/cm^2, 11 - 14 psi) 59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	See “System Check”, “ENGINE COOLING SYSTEM” in LC section.
ON*2	5	• Coolant leaks	• Visual	No leaks	See “System Check”, “ENGINE COOLING SYSTEM” in LC section.
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See “Thermostat” and “Radiator”, “ENGINE COOLING SYSTEM” in LC section.
OFF	7	• Combustion gas leak	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	8	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	See “Changing Engine Coolant”, “ENGINE MAINTENANCE” in MA section.
OFF*4	9	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See “ENGINE MAINTENANCE” in MA section.
OFF	10	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See “Inspection”, “CYLINDER HEAD” in EM section.
	11	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See “Inspection”, “CYLINDER BLOCK” in EM section.

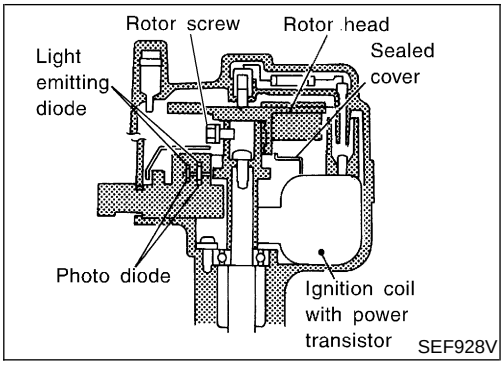
*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to “OVERHEATING CAUSE ANALYSIS” in LC section.



Component Description

NGEC0319

IGNITION COIL & POWER TRANSISTOR

NGEC0319S01

The ignition signal from the ECM is sent to the power transistor. The power transistor switches the ignition coil primary circuit on and off. 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.

NOTE:
The rotor screw which secures the distributor rotor head to the distributor shaft must be tightened properly.

: 3.3 - 3.9 N·m (0.34 - 0.40 kg-m, 29.5 - 34.7 in-lb)

CONSULT-II Reference Value in Data Monitor Mode

NGEC0320

MONITOR ITEM	CONDITION		SPECIFICATION
IGN TIMING	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: “N” • No-load	Idle	Approx. 20° BTDC
		2,000 rpm	More than 25° BTDC

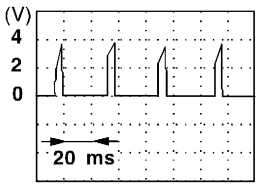
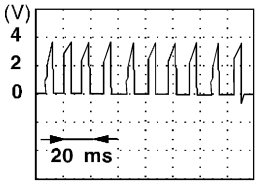
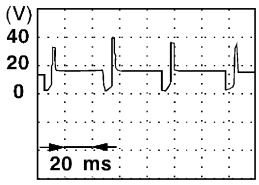
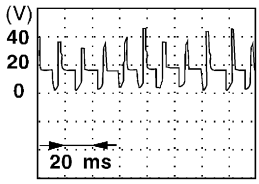
ECM Terminals and Reference Value

=NGEC0321

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

CAUTION:

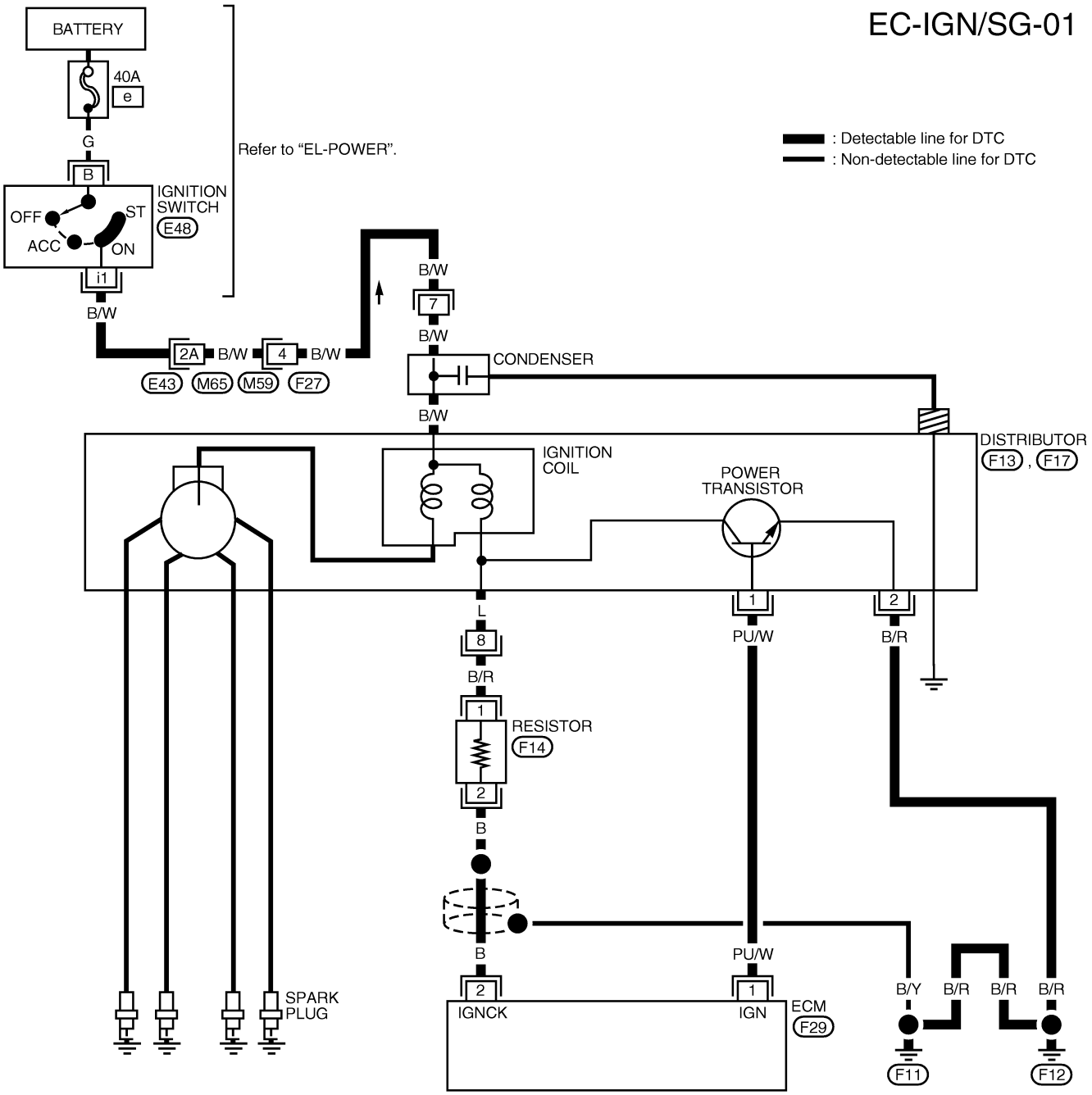
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

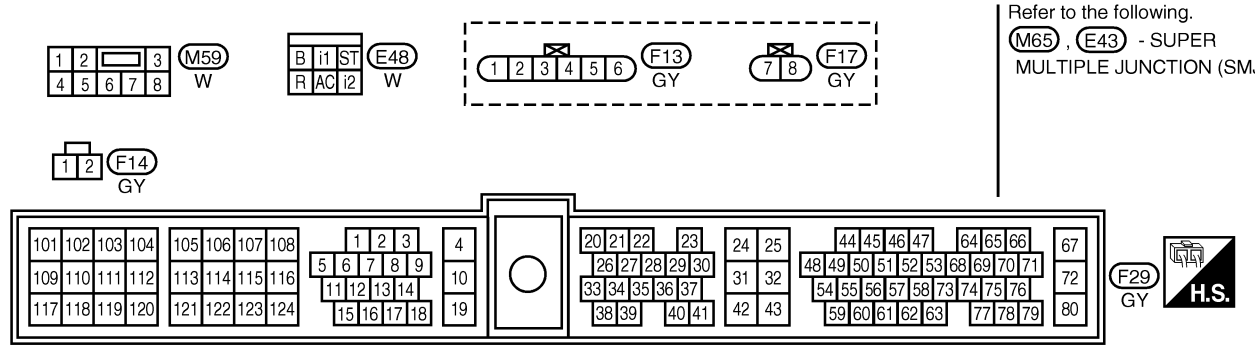
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/W	Ignition signal	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 0.5V  SEF996V
			[Engine is running] ● Engine speed is 2,000 rpm	0.2 - 1.0V  SEF997V
2	B	Ignition check	**[Engine is running]** ● **Warm-up condition** ● Idle speed	12 - 14V  SEF998V
			[Engine is running] ● Engine speed is 2,000 rpm	12 - 13V  SEF999V

Wiring Diagram

NGEC0324

EC-IGN/SG-01





Refer to the following.
M65 , E43 - SUPER MULTIPLE JUNCTION (SMJ)

AEC004B

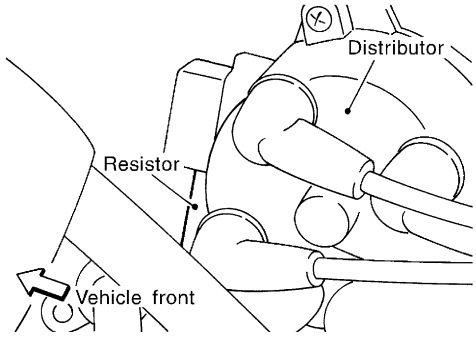
Diagnostic Procedure

NGEC0325

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.

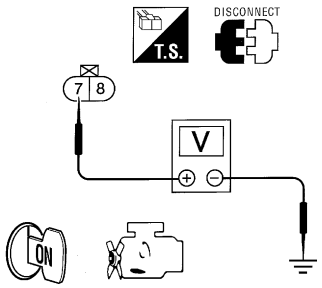
2	CHECK POWER SUPPLY	

1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.



SEF344V

3. Turn ignition switch ON.
4. Check voltage between terminal 7 and ground with CONSULT-II or tester.



AEC698

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART	
Check the following. ● Harness connectors E43, M65 ● Harness connectors M59, F27 ● Harness for open or short between ignition coil and ignition switch		
	▶	Repair harness or connectors.

4	CHECK GROUND CIRCUIT

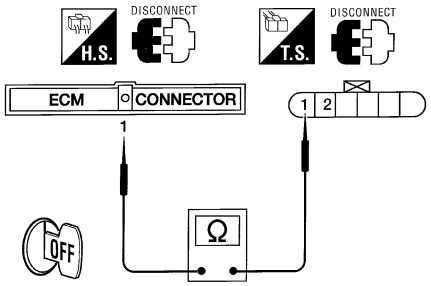
1. Turn ignition switch OFF.
2. Disconnect power transistor harness connector.
3. Check harness continuity between power transistor terminal 2 and engine ground. Refer to the wiring diagram.
   Continuity should exist.
4. Also check harness for short to power.

OK or NG

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

5	CHECK INPUT SIGNAL CIRCUIT

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



AEC700

Continuity should exist.

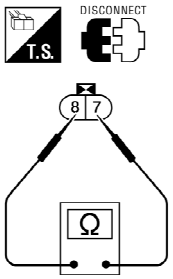
3. Also check harness for short to ground and short to power.

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

1. Disconnect ignition coil harness connector.
2. Remove distributor cap.
3. Check resistance as shown in the figure.



AEC150A

Terminal	Resistance [at 25°C (77°F)]
7 - 8	Less than 1Ω
7 - 9	7 - 13Ω

MTBL0300

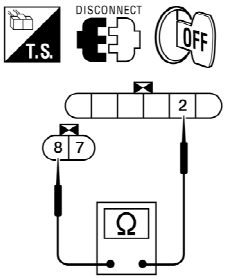
If NG, replace distributor assembly as a unit.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace distributor assembly as a unit.

7	CHECK POWER TRANSISTOR

1. Disconnect camshaft position sensor & power transistor harness connector and ignition coil harness connector.
2. Check power transistor resistance between terminals 2 and 8.



AEC151A

Terminals	Resistance	Result
2 and 8	Except 0Ω	OK
	0Ω	NG

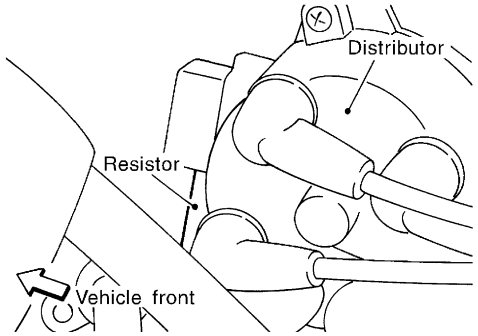
MTBL0301

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace distributor assembly.

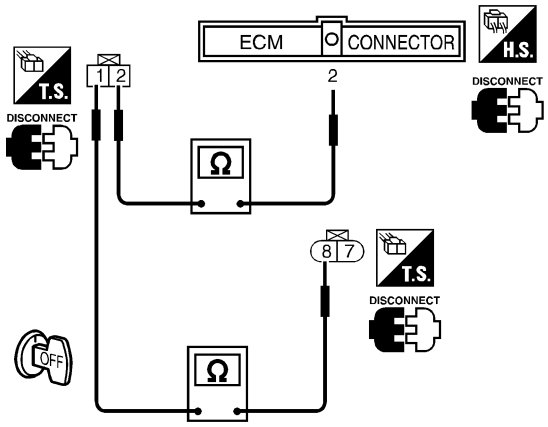
8	CHECK INPUT SIGNAL CIRCUIT

1. Stop engine.
2. Disconnect ignition coil harness connector.
3. Strip tape covering resistor.
4. Disconnect resistor harness connector.



SEF344V

5. Disconnect ECM harness connector.
6. Check harness continuity between ignition coil terminal 8 and resistor terminal 1, resistor terminal 2 and ECM terminal 2.



SEF179X

Continuity should exist.

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

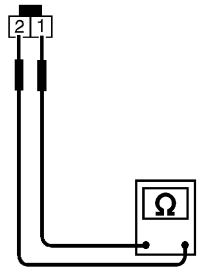
OK or NG

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

Diagnostic Procedure (Cont'd)

9	CHECK RESISTOR

1. Disconnect resistor harness connector.
2. Check resistance between terminals 1 and 2.



SEF240V

Resistance: Approximately 2.2 kΩ [at 25°C (77°F)]

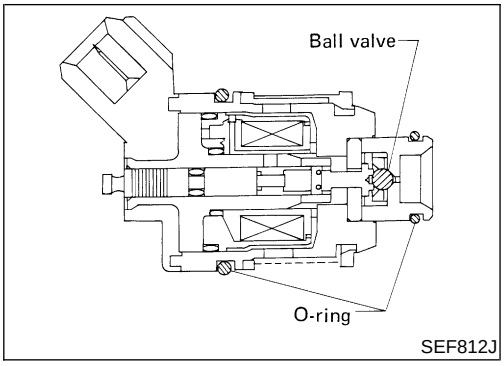
OK or NG

OK	▶	GO TO 10.
NG	▶	Replace resistor.

10	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.

▶ **INSPECTION END**



Component Description

NGEC0435

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 ball 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.

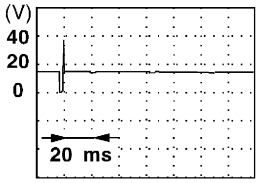
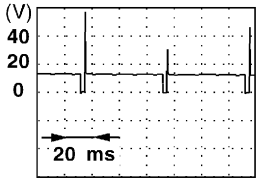
ECM Terminals and Reference Value

NGEC0437

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

CAUTION:

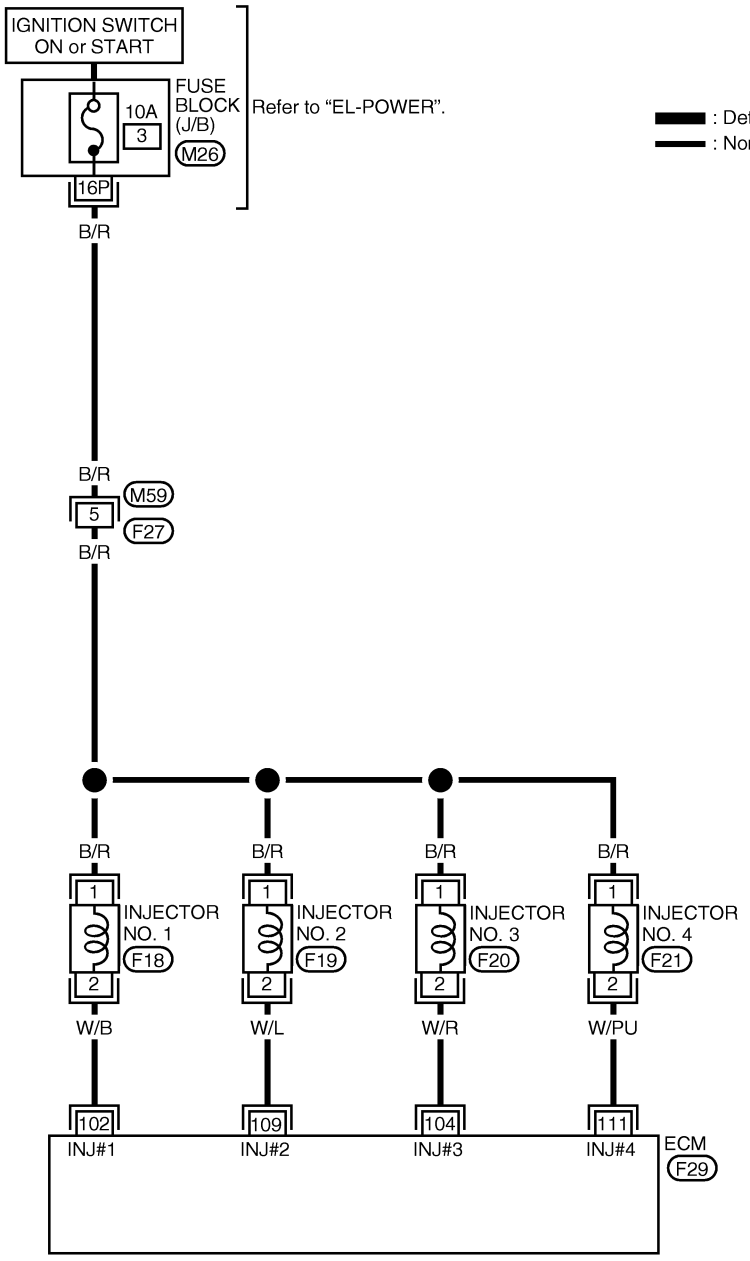
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

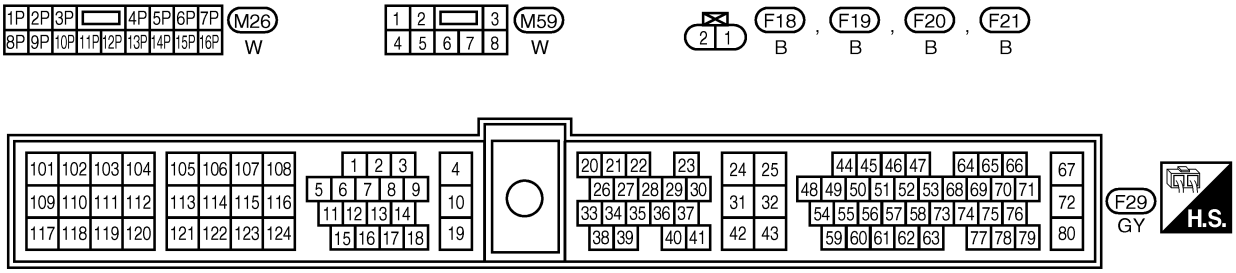
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102 104 109 111	W/B W/R W/L W/PU	Injector No. 1 Injector No. 3 Injector No. 2 Injector No. 4	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF011W
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF012W

Wiring Diagram

NGEC0434

EC-INJECT-01





AEC009B

Diagnostic Procedure

NGEC0438

1	CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.

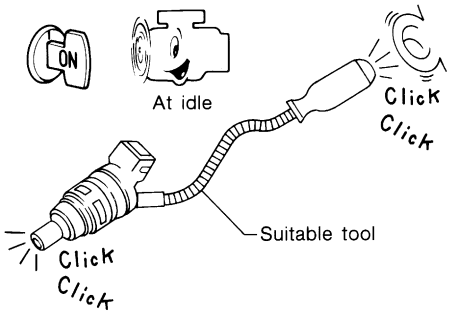
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

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

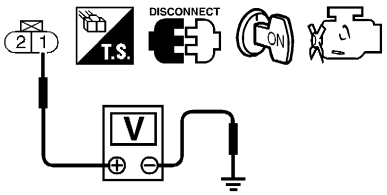
Clicking noise should be heard.

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 terminal 1 and ground with CONSULT-II or tester.



SEF271W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

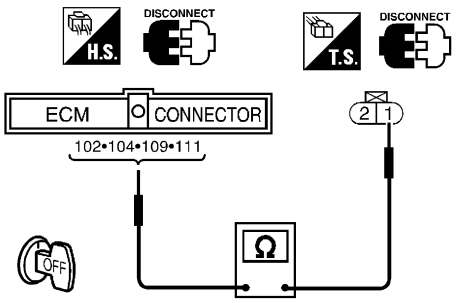
3	DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse
- Harness connectors F27, M59
- 10A fuse
- 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 1 and ECM terminals 102, 104, 109, 111.



SEF223V

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.

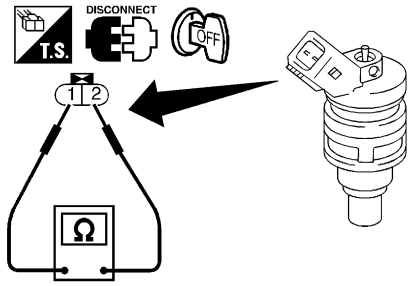
5	DETECT MALFUNCTIONING PART

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.



SEF273W

Resistance: 7.3 - 9.9Ω [at 25°C (77°F)]

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace injector.

7	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**

CONSULT-II Reference Value in Data Monitor Mode

NGEC0441

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

ECM Terminals and Reference Value

NGEC0442

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

CAUTION:

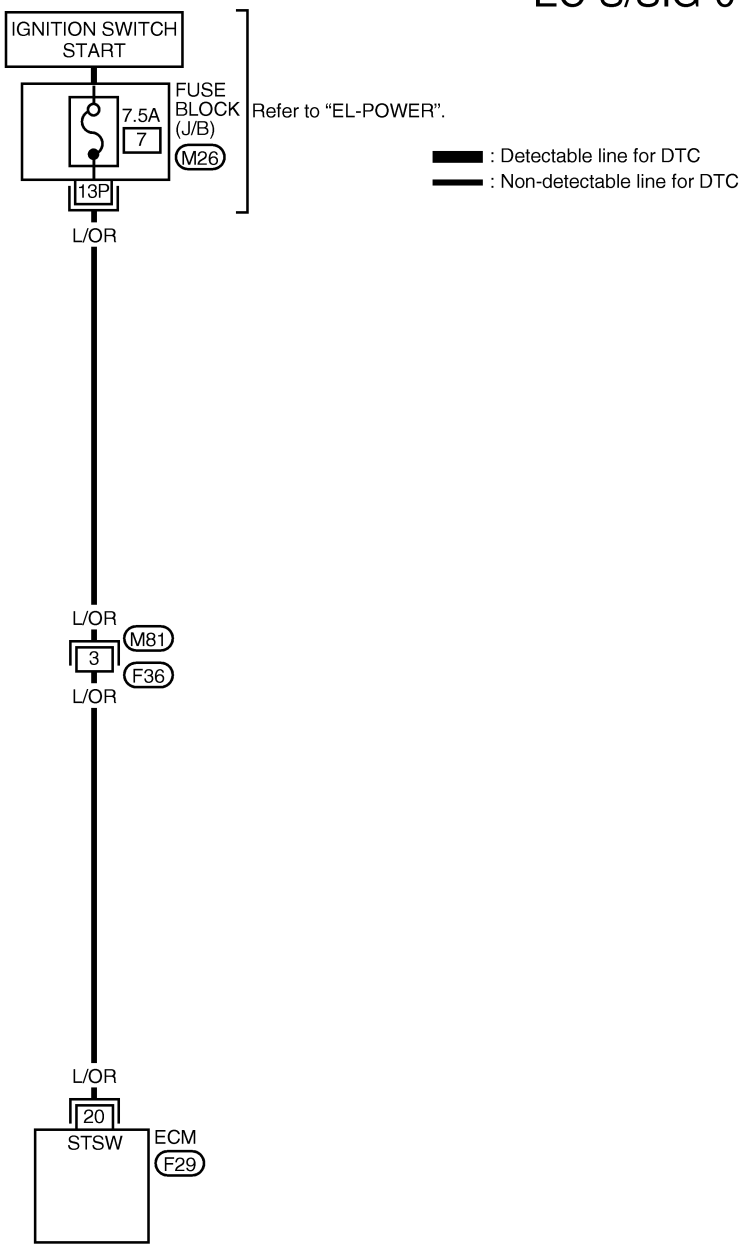
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

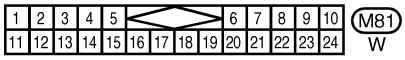
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	L/OR	Start signal	**[Ignition switch "ON"]**	Approximately 0V
			[Ignition switch "START"]	BATTERY VOLTAGE (11 - 14V)

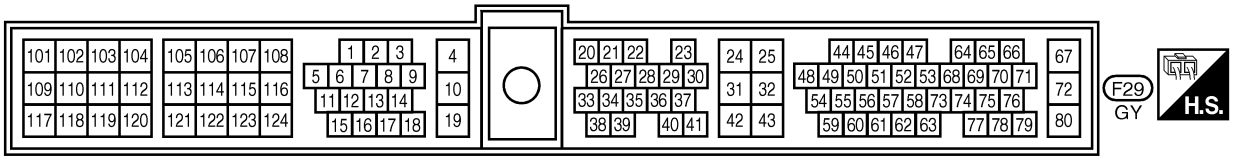
Wiring Diagram

NGEC0440

EC-S/SIG-01







AEC975A

Diagnostic Procedure

=NGEC0443

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

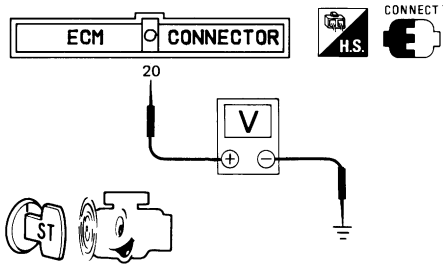
OK or NG

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 20 and ground under the following conditions.



SEF109P

Condition	Voltage
Ignition switch “START”	Battery voltage
Except above	Approximately 0V

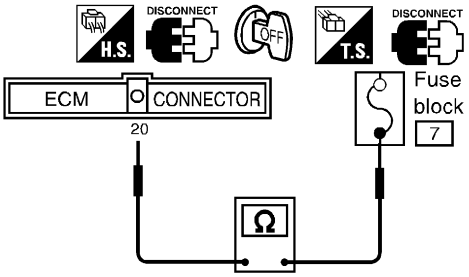
MTBL0143

OK or NG

OK ▶	**INSPECTION END**
NG ▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
Check the 7.5A fuse.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace 7.5A fuse.

5	CHECK INPUT SIGNAL CIRCUIT	
1. Turn ignition switch OFF. 2. Disconnect ECM harness connector and 7.5A fuse. 3. Check harness continuity between ECM terminal 20 and fuse block.		



SEF224V

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 M81, F36 ● Harness for open or short between ECM and fuse block		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.		
	▶	**INSPECTION END**

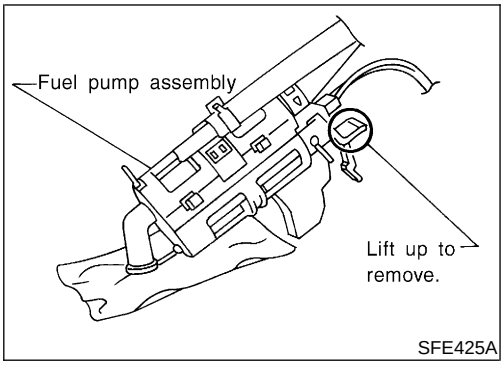
System Description

NGEC0444

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	ECM	Fuel pump relay
Ignition switch	Start signal		

The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. If the ECM receives a 180° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to perform. If the 180° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 5 seconds.
Engine running and cranking	Operates.
Except as shown above	Stops.



Component Description

NGEC0501

The fuel pump with a fuel damper is an in-tank type (the pump and damper are located in the fuel tank).

CONSULT-II Reference Value in Data Monitor Mode

NGEC0445

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	• Ignition switch is turned to ON (Operates for 5 seconds) • Engine running and cranking	ON
	• Except as shown above	OFF

ECM Terminals and Reference Value

=NGEC0446

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

CAUTION:

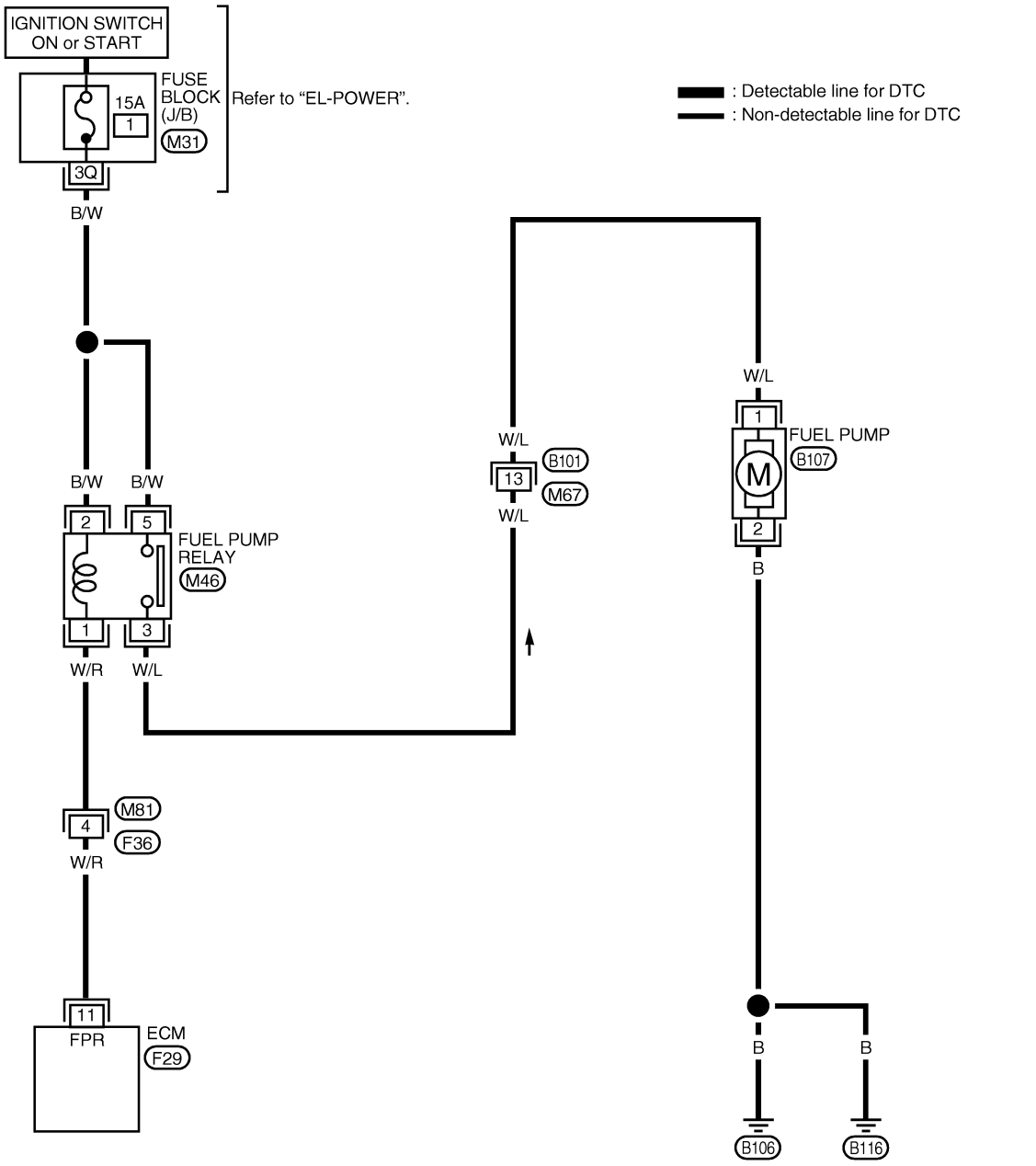
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

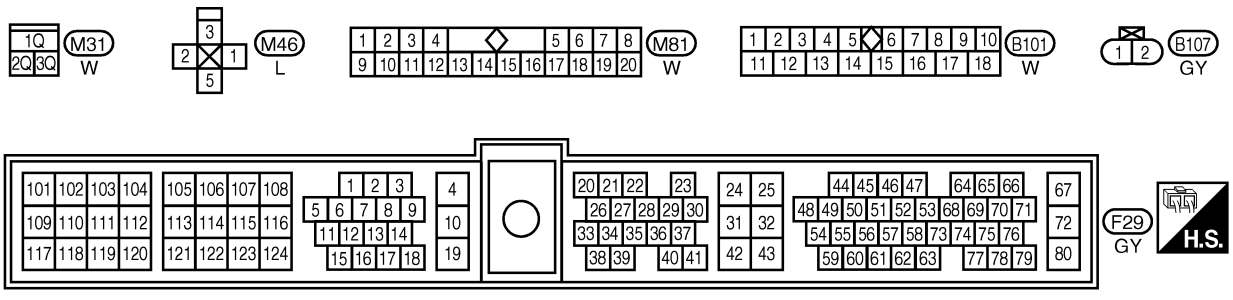
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	W/R	Fuel pump relay	**[Ignition switch "ON"]** ● For 5 seconds after turning ignition switch "ON" **[Engine is running]**	0 - 1V
			[Ignition switch "ON"] ● More than 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

Wiring Diagram

NGEC0447

EC-F/PUMP-01





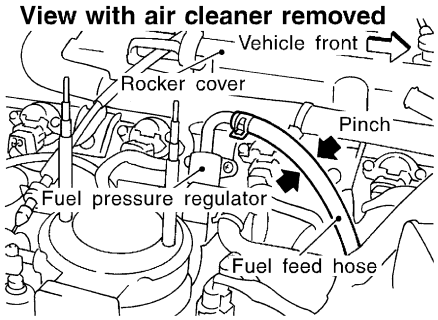
AEC011B

Diagnostic Procedure

NGEC0448

1	CHECK OVERALL FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with two fingers.



SEF348V

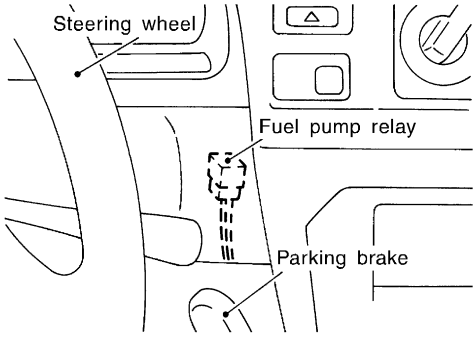
Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned "ON".

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

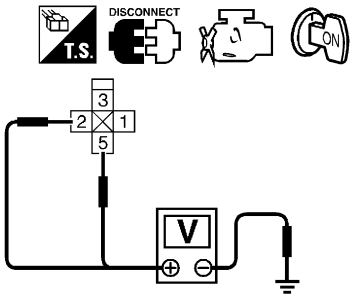
2	CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect fuel pump relay.



SEF349V

3. Turn ignition switch ON.
4. Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.



SEF225V

Voltage: Battery voltage

OK or NG

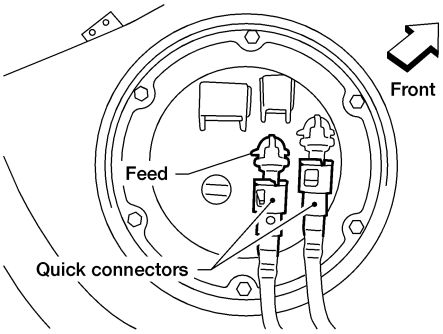
OK	▶	GO TO 4.
NG	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	DETECT MALFUNCTIONING PART
Check the following. ● 15A fuse ● Harness for open or short between fuse and fuel pump relay	
▶	Repair harness or connectors.

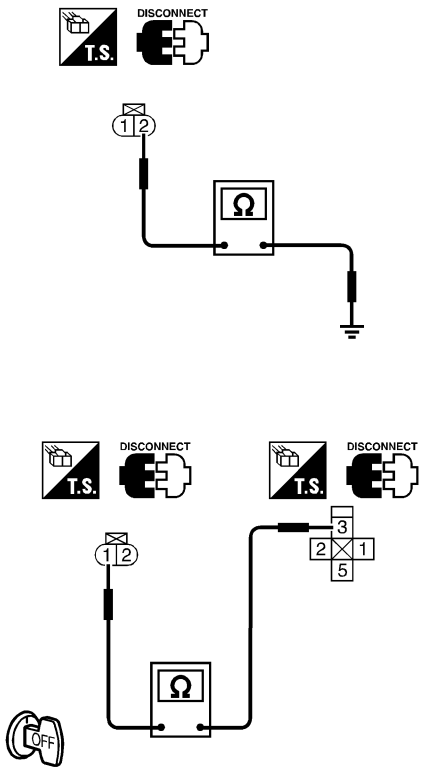
4	CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuel pump harness connector.



AFE095

3. Check harness continuity between terminal 2 and body ground, terminal 1 and fuel pump relay connector terminal 3.



SEF700Z

Continuity should exist.

4. Also check harness for short to power.

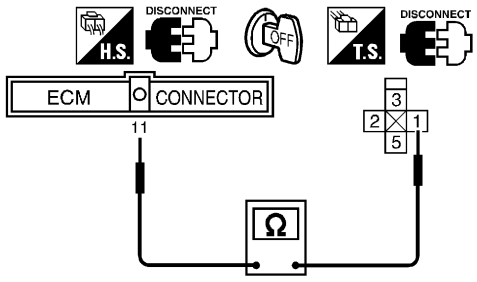
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B101, M67 ● 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 power in harness or connectors.

6	CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 11 and fuel pump relay connector terminal 1.



SEF227V

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 F36, M81 ● Harness for open or short between ECM and fuel pump relay	
NG ▶	Repair open circuit or short to power in harness or connectors.

8	CHECK FUEL PUMP RELAY

With CONSULT-II

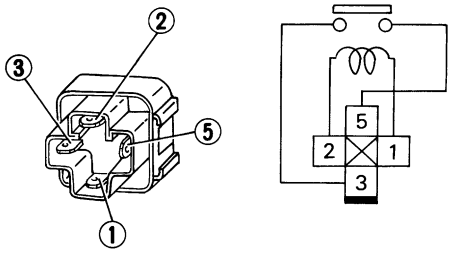
1. Reconnect fuel pump relay, fuel pump harness connector and ECM harness connector.
2. Turn ignition switch ON.
3. Turn fuel pump relay "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound.

ACTIVE TEST	
FUEL PUMP RELAY	ON
MONITOR	
ENG SPEED	XXX rpm

SEF724Z

Without CONSULT-II

Check continuity between terminals 3 and 5.



SEF511P

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

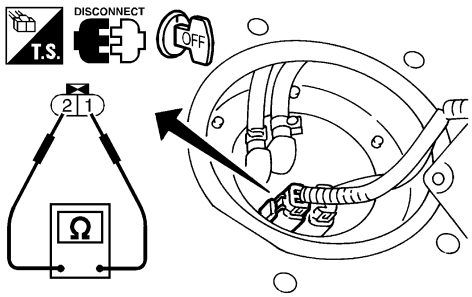
MTBL0306

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace fuel pump relay.

9	CHECK FUEL PUMP

1. Disconnect fuel pump harness connector.



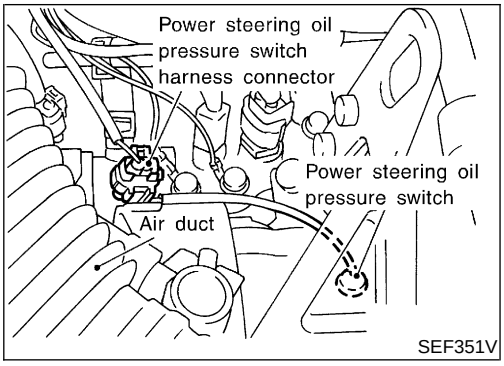
SEF701Z

2. Check resistance between terminals 1 and 2.
   Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace fuel pump.

10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.	
▶	**INSPECTION END**



Component Description

NGEC0451

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

NGEC0452

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is fully turned	ON

ECM Terminals and Reference Value

NGEC0453

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

CAUTION:

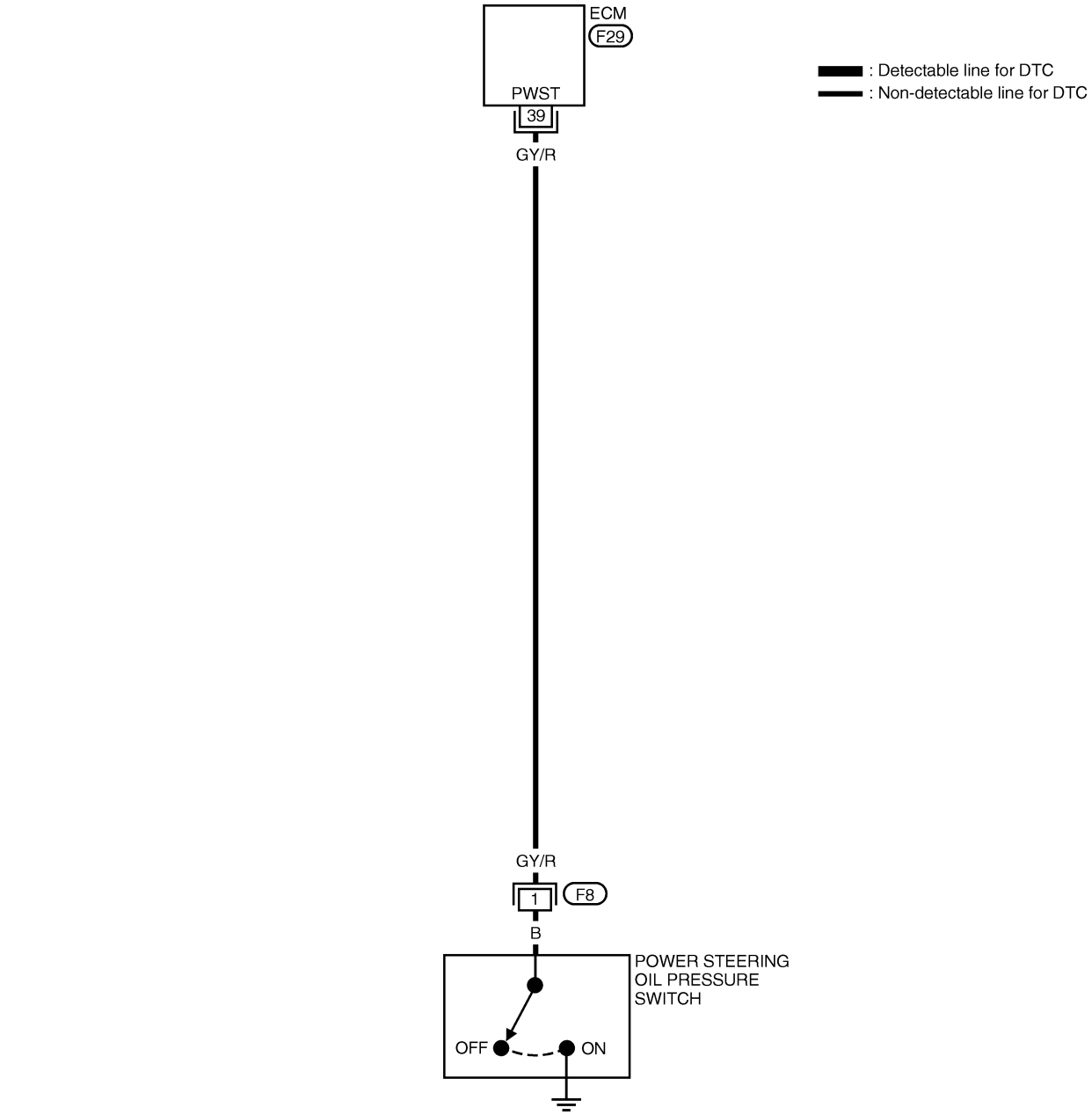
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

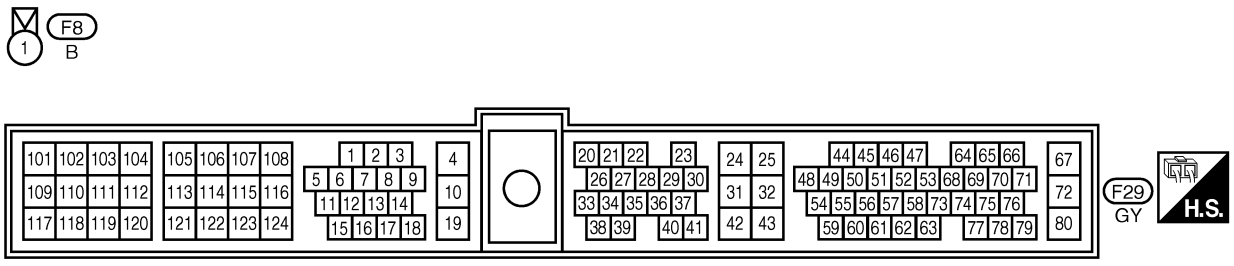
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
39	GY/R	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is fully turned	Approximately 0V
			[Engine is running] ● Steering wheel is not turned	Approximately 5V

Wiring Diagram

NGEC0450

EC-PST/SW-01





AEC012B

Diagnostic Procedure

=NGEC0454

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

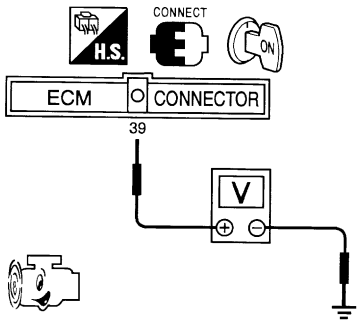
OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

3	CHECK OVERALL FUNCTION

Without CONSULT-II

1. Start engine.
2. Check voltage between ECM terminal 39 and ground under the following conditions.



SEF662P

Condition	Voltage
When steering wheel is turned quickly	Approximately 0V
Except above	Approximately 5V

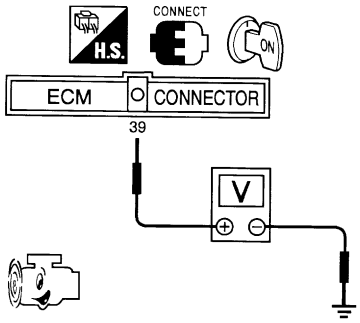
MTBL0142

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

4	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 39 and terminal 1.



SEF662P

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.

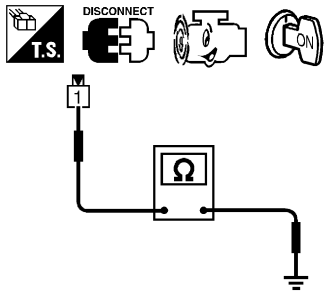
5	DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM 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

1. Disconnect power steering oil pressure switch harness connector then start engine.
2. Check continuity between terminals 1 and ground.



SEF230V

Conditions	Continuity
Steering wheel is being turned	Yes
Steering wheel is not being turned	No

MTBL0307

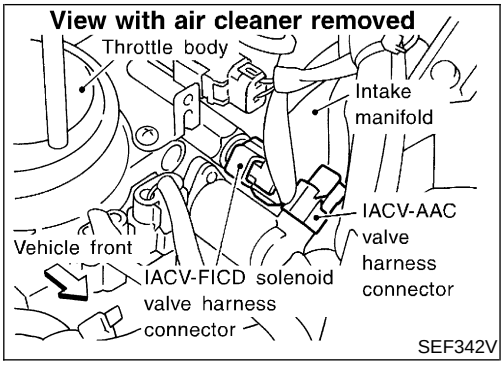
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace power steering oil pressure switch.

7	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.

	▶	**INSPECTION END**



Component Description

NGEC0462

When the air conditioner is on, the IAC valve-FICD solenoid valve supplies additional air to adjust to the increased load.

ECM Terminals and Reference Value

NGEC0463

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.

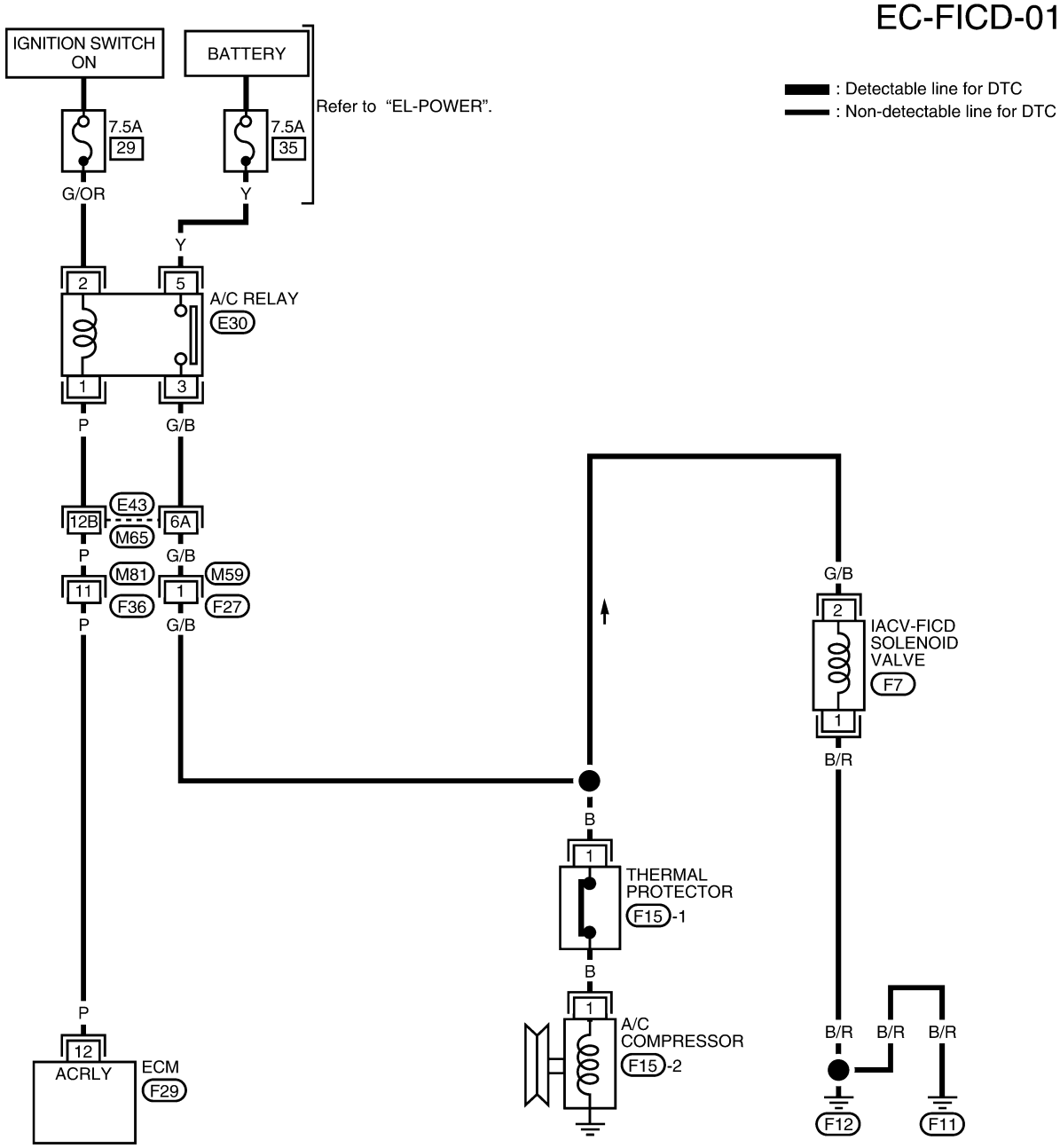
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12	P	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower switch are ON★	Approximately 0V
			[Engine is running] ● A/C switch is OFF	BATTERY VOLTAGE (11 - 14V)
21	G/R	Air conditioner dual-pressure switch	**[Engine is running]** ● Both air conditioner switch and blower switch are ON (Compressor operates)	Approximately 0V
			[Engine is running] ● Air conditioner switch is OFF	BATTERY VOLTAGE (11 - 14V)

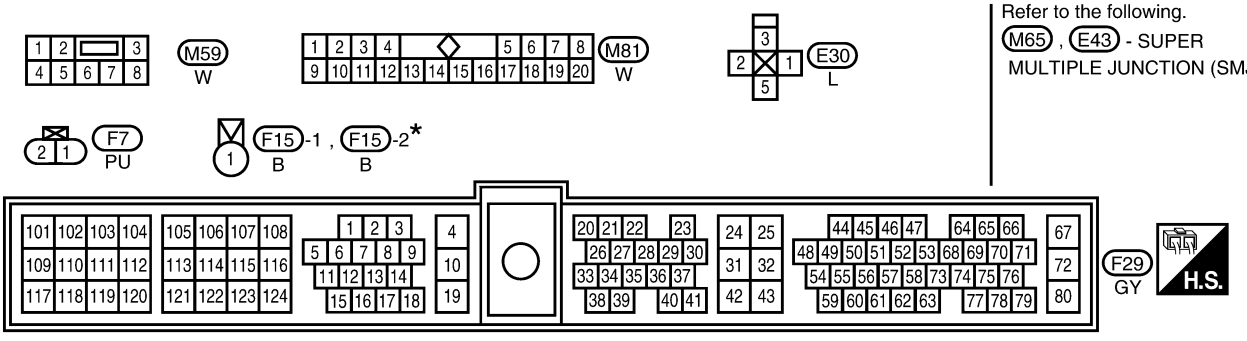
★ Ambient air temperature above 10°C (50°F) and in any mode except OFF.

Wiring Diagram

NGEC0461

EC-FICD-01





Refer to the following.
M65 , E43 - SUPER MULTIPLE JUNCTION (SMJ)

* : This connector is not shown in "HARNESS LAYOUT" of EL section.

LEC488

Diagnostic Procedure

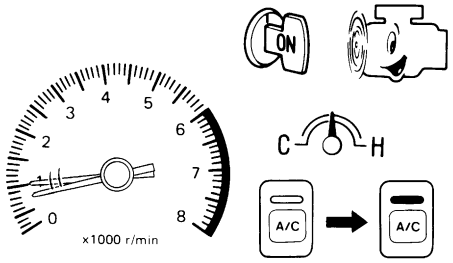
=NGEC0464

1	CHECK OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

   800±50 rpm

   If NG, adjust idle speed.
3. Push air conditioner switch ON and turn fan switch to 4-speed.
4. Recheck idle speed.



MEF634E

875 rpm or more

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

2	CHECK AIR CONDITIONER FUNCTION

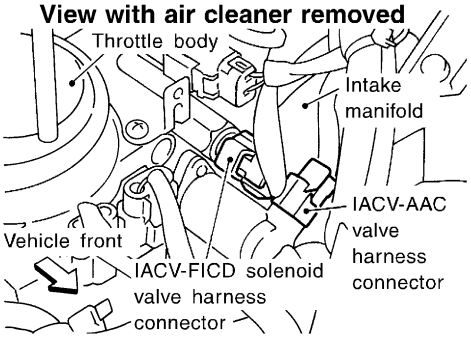
Check if air conditioner compressor functions normally.

OK or NG

OK	▶	GO TO 3.
NG	▶	Refer to “Symptom Table” in “TROUBLE DIAGNOSIS”, ***HA-27***.

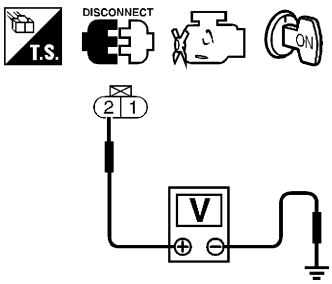
3	CHECK POWER SUPPLY

1. Stop engine.
2. Disconnect IACV-FICD solenoid valve harness connector.



SEF342V

3. Start engine, then push A/C switch ON and turn fan switch to 4-speed.
4. Check voltage between terminal 2 and ground with CONSULT-II or tester.



SEF133V

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

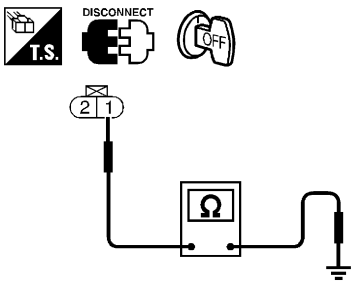
4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E43, M65
- Harness connectors M81, F36
- Harness connector M59, F27
- Harness for open or short between IACV-FICD solenoid valve harness connector and air conditioner relay

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

5	CHECK GROUND CIRCUIT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect ambient air temperature switch harness connector.
4. Check harness continuity between solenoid valve terminal 1 and body ground.



SEF134V

Continuity should exist.

5. Also check harness for short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

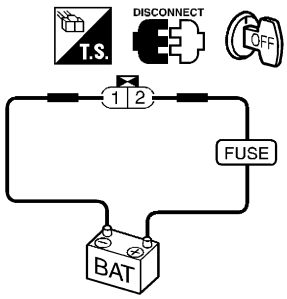
6	DETECT MALFUNCTIONING PART

Check the harness for open or short between IACV-FICD solenoid valve and body ground.

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

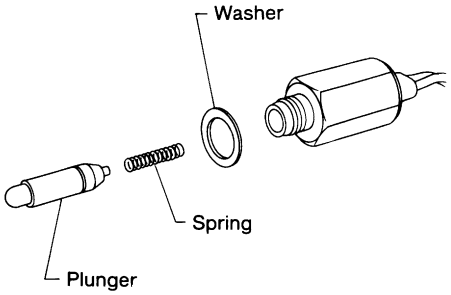
7	CHECK IACV-FICD SOLENOID VALVE

Disconnect IACV-FICD solenoid valve harness connector.



SEF231V

- Check for clicking sound when applying 12V direct current to terminals.
- Check plunger for seizing or sticking.
- Check for broken spring.



SEF097K

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace IACV-FICD solenoid valve.

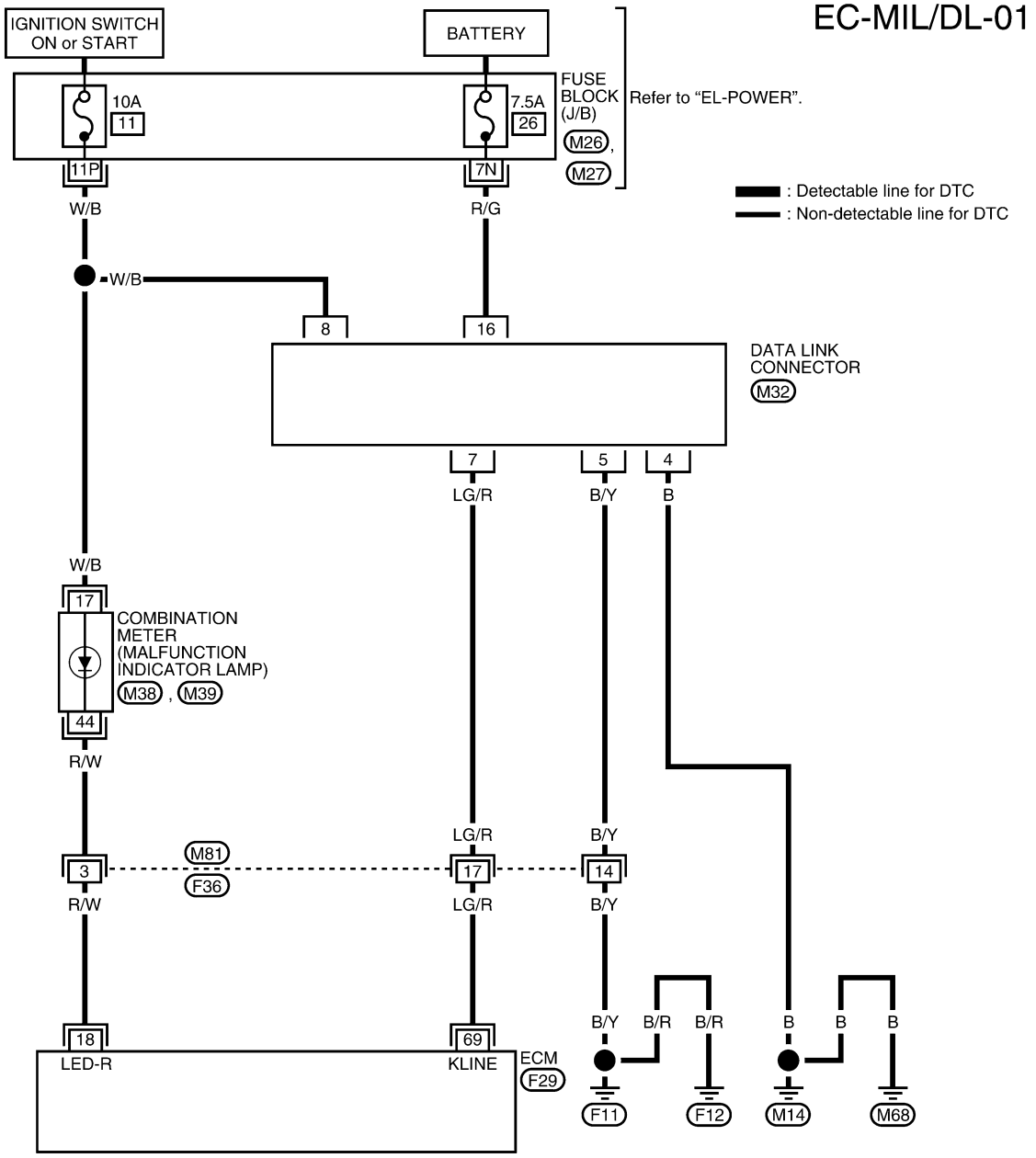
8	CHECK INTERMITTENT INCIDENT

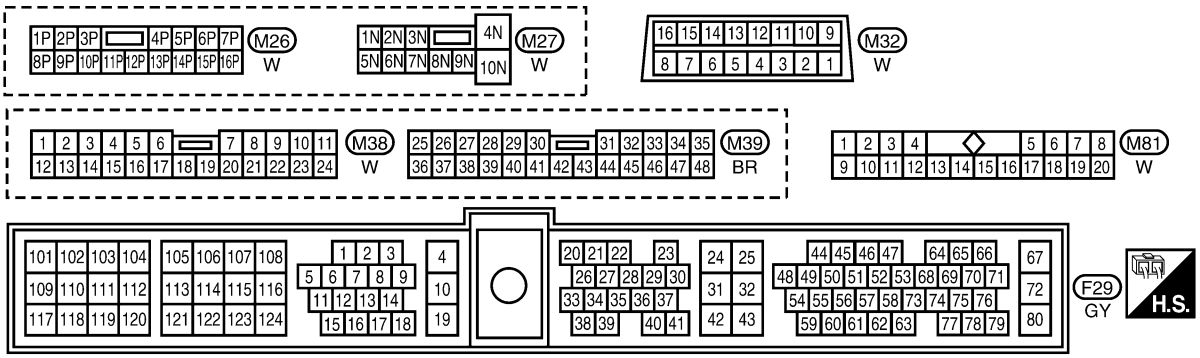
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-142.

▶ **INSPECTION END**

Wiring Diagram

NGEC0466





WEC124A

Fuel Pressure Regulator

NGEC0467

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

NGEC0468

Base idle speed*1 rpm	No-load*4 (in “P” or “N” position)	750±50
Target idle speed*2 rpm	No-load*4 (in “P” or “N” position)	800±50
Air conditioner: ON rpm	In “P” or “N” position	875 or more
Ignition timing*1	In “P” or “N” position	20°±2° BTDC

*1: Throttle position sensor harness connector disconnected or using CONSULT-II “WORK SUPPORT” mode
*2: Throttle position sensor harness connector connected
*3: Throttle position sensor harness connector disconnected
*4: Under the following conditions:

- Air conditioner switch: OFF
- Electrical load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Coil

NGEC0469

Primary voltage V	Battery voltage 12
Primary resistance [at 20°C (68°F)] Ω	Approximately 1.0
Secondary resistance [at 20°C (68°F)] kΩ	Approximately 10

Mass Air Flow Sensor

NGEC0470

Supply voltage V	Battery voltage (11 - 14)
Output voltage V	0.9 - 1.8*
Mass air flow (Using CONSULT-II or GST) g·m/sec	0.9 - 5.8 at idle* 7.5 - 13.2 at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and idling under no-load.

Engine Coolant Temperature Sensor

NGEC0471

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

NGEC0472

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

NGEC0473

Resistance [at 25°C (77°F)] Ω	0.2 - 5.0

IACV-AAC Valve

NGEC0474

Resistance [at 25°C (77°F)] Ω	Approximately 10.0

Injector

NGEC0475

Resistance [at 25°C (77°F)] Ω	7.3 - 9.9

Resistor

NGEC0476

Resistance [at 25°C (77°F)] kΩ	Approximately 2.2

Throttle Position Sensor

NGEC0477

Throttle valve conditions	Voltage (at normal operating temp., engine off, ignition switch on)
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

Heated Oxygen Sensor 1 Heater (Front)

NGEC0478

Resistance [at 25°C (77°F)] Ω	2.3 - 4.3

Calculated Load Value

NGEC0479

	Calculated load value % (Using CONSULT-II or GST)
At idle	9.5 - 34.0%
At 2,500 rpm	13.9 - 24.9%

Intake Air Temperature Sensor

NGEC0480

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

Heated Oxygen Sensor 2 Heater (Rear)

NGEC0483

Resistance [at 25°C (77°F)] Ω	2.3 - 4.3

Crankshaft Position Sensor (OBD)

NGEC0484

Resistance [at 20°C (68°F)] Ω	512 - 632

Fuel Tank Temperature Sensor

NGEC0485

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

Alphabetical & P No. Index for DTC

NGEC0522

ALPHABETICAL INDEX FOR DTC

NGEC0522S01

Items (CONSULT-II screen terms)	DTC*1	Reference page
Unable to access ECM	—	EC-709
ABSL PRES SEN	P0105	EC-748
AIR TEMP SEN/CIRC	P0110	EC-750
A/T 1ST GR FNCTN	P0731	***AT-119***
A/T 2ND GR FNCTN	P0732	***AT-125***
A/T 3RD GR FNCTN	P0733	***AT-131***
A/T 4TH GR FNCTN	P0734	***AT-137***
A/T COMM LINE	P0600*4	EC-1040
A/T DIAG COMM LINE	P1605	EC-1150
A/T TCC S/V FNCTN	P0744	***AT-151***
ATF TEMP SEN/CIRC	P0710	***AT-104***
CAM POS SEN/CIRC	P0340	EC-946
CLOSED LOOP-B1	P1148	EC-1049
CLOSED LOOP-B2	P1168	EC-1049
CLOSED TP SW/CIRC	P0510	EC-1033
COOLANT T SEN/CIRC*2	P0115	EC-755
*COOLANT T SEN/CIRC	P0125	EC-773
CPS/CIRC (OBD) COG	P1336	EC-1068
CPS/CIRCUIT (OBD)	P0335	EC-940
CYL 1 MISFIRE	P0301	EC-927
CYL 2 MISFIRE	P0302	EC-927
CYL 3 MISFIRE	P0303	EC-927
CYL 4 MISFIRE	P0304	EC-927
CYL 5 MISFIRE	P0305	EC-927
CYL 6 MISFIRE	P0306	EC-927
ECM	P0605	EC-1045
ENGINE SPEED SIG	P0725	***AT-115***
ENG OVER TEMP	P0217	EC-906
ENG OVER TEMP	P1217*4	EC-1051
EVAP GROSS LEAK	P0455	EC-997
EVAP PURG FLOW/MON	P1447	EC-1111
EVAP SYS PRES SEN	P0450	EC-986
EVAP SMALL LEAK	P0440	EC-958
EVAP VERY SMALL LEAK	P1441	EC-1077
FUEL LEVL SEN/CIRC	P0464	EC-1018

Items (CONSULT-II screen terms)	DTC*1	Reference page
FUEL LEVL SEN/CIRC	P1464	EC-1131
FUEL LEVEL SENSOR	P0461	EC-1016
FUEL LV SE (SLOSH)	P0460	EC-1011
FUEL SYS LEAN/BK1	P0171	EC-884
FUEL SYS LEAN/BK2	P0174	EC-884
FUEL SYS RICH/BK1	P0172	EC-893
FUEL SYS RICH/BK2	P0175	EC-893
FUEL TEMP SEN/CIRC	P0180	EC-901
HO2S1 HTR (B1)	P0135	EC-829
HO2S1 HTR (B2)	P0155	EC-829
HO2S1 (B1)	P0130	EC-778
HO2S1 (B1)	P0131	EC-789
HO2S1 (B1)	P0132	EC-798
HO2S1 (B1)	P0133	EC-807
HO2S1 (B1)	P0134	EC-821
HO2S1 (B2)	P0150	EC-778
HO2S1 (B2)	P0151	EC-789
HO2S1 (B2)	P0152	EC-798
HO2S1 (B2)	P0153	EC-807
HO2S1 (B2)	P0154	EC-821
HO2S2 (B1)	P0137	EC-836
HO2S2 (B1)	P0138	EC-846
HO2S2 (B1)	P0139	EC-856
HO2S2 (B1)	P0140	EC-866
HO2S2 (B2)	P0157	EC-836
HO2S2 (B2)	P0158	EC-846
HO2S2 (B2)	P0159	EC-856
HO2S2 (B2)	P0160	EC-866
HO2S2 HTR (B1)	P0141	EC-876
HO2S2 HTR (B2)	P0161	EC-876
IACV/AAC VLV/CIRC	P0505	EC-1027
KNOCK SENSOR	P0325*4	EC-936
L/PRES SOL/CIRC	P0745	***AT-158***
MAF SEN/CIRCUIT*2	P0100	EC-739
MULTI CYL MISFIRE	P0300	EC-927
NO SELF DIAGNOSTIC FAILURE INDICATED	**P0000**	**—**
O/R CLTCH S/CIRC	P1760	***AT-182***

Items (CONSULT-II screen terms)	DTC*1	Reference page
P-N POS SW/CIRCUIT	P0705	EC-1153
PNP SW/CIRC	P0705	***AT-98***
PURG VOLUME CONT/V	P0443	EC-973
PURG VOLUME CONT/V	P1444	EC-1092
SFT SOL A/CIRC*2	P0750	***AT-163***
SFT SOL B/CIRC*2	P0755	***AT-168***
TCC SOLENOID/CIRC	P0740	***AT-146***
THERMOSTAT FNCTN	P1126	EC-1047
TP SEN/CIRC A/T*2	P1705	***AT-173***
TRTL POS SEN/CIRC*2	P0120	EC-760
TW CATALYST SYS-B1	P0420	EC-953
TW CATALYST SYS-B2	P0430	EC-953
VC CUT/V BYPASS/V	P1491	EC-1141
VC/V BYPASS/V	P1490	EC-1135
VEH SPEED SEN/CIRC*3	P0500	EC-1023
VEH SPD SEN/CIRC*3	P0720	***AT-110***
VENT CONTROL VALVE	P0446	EC-980
VENT CONTROL VALVE	P1446	EC-1104
VENT CONTROL VALVE	P1448	EC-1123

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

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

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

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

NOTE:

Regarding D22 models, "-B1" and "BK1" indicate right bank and "-B2" and "BK2" indicate left bank.

P NO. INDEX FOR DTC

=NGEC0522S02

DTC*1	Items (CONSULT-II screen terms)	Reference page
—	Unable to access ECM	EC-709
P0000	**NO SELF DIAGNOSTIC FAILURE INDICATED**	**—**
P0100	MAF SEN/CIRCUIT*2	EC-739
P0105	ABSL PRES SEN/CIRC	EC-748
P0110	AIR TEMP SEN/CIRC	EC-750
P0115	COOLANT T SEN/CIRC*2	EC-755
P0120	THRTL POS SEN/CIRC*2	EC-760
P0125	*COOLANT T SEN/CIRC	EC-773
P0130	HO2S1 (B1)	EC-778
P0131	HO2S1 (B1)	EC-789
P0132	HO2S1 (B1)	EC-798
P0133	HO2S1 (B1)	EC-807
P0134	HO2S1 (B1)	EC-821
P0135	HO2S1 HTR (B1)	EC-829
P0137	HO2S2 (B1)	EC-836
P0138	HO2S2 (B1)	EC-846
P0139	HO2S2 (B1)	EC-856
P0140	HO2S2 (B1)	EC-866
P0141	HO2S2 HTR (B1)	EC-876
P0150	HO2S1 (B2)	EC-778
P0151	HO2S1 (B2)	EC-789
P0152	HO2S1 (B2)	EC-798
P0153	HO2S1 (B2)	EC-807
P0154	HO2S1 (B2)	EC-821
P0155	HO2S1 HTR (B2)	EC-829
P0157	HO2S2 (B2)	EC-836
P0158	HO2S2 (B2)	EC-846
P0159	HO2S2 (B2)	EC-856
P0160	HO2S2 (B2)	EC-866
P0161	HO2S2 HTR (B2)	EC-876
P0171	FUEL SYS LEAN/BK1	EC-884
P0172	FUEL SYS RICH/BK1	EC-893
P0174	FUEL SYS LEAN/BK2	EC-884
P0175	FUEL SYS RICH/BK2	EC-893
P0180	FUEL TEMP SEN/CIRC	EC-901
P0217	ENG OVER TEMP	EC-906

DTC*1	Items (CONSULT-II screen terms)	Reference page
P0300	MULTI CYL MISFIRE	EC-927
P0301	CYL 1 MISFIRE	EC-927
P0302	CYL 2 MISFIRE	EC-927
P0303	CYL 3 MISFIRE	EC-927
P0304	CYL 4 MISFIRE	EC-927
P0305	CYL 5 MISFIRE	EC-927
P0306	CYL 6 MISFIRE	EC-927
P0325*4	KNOCK SENSOR	EC-936
P0335	CPS/CIRCUIT (OBD)	EC-940
P0340	CAM POS SEN/CIRC	EC-946
P0420	TW CATALYST SYS-B1	EC-953
P0430	TW CATALYST SYS-B2	EC-953
P0440	EVAP SMALL LEAK	EC-958
P0443	PURG VOLUME CONT/V	EC-973
P0455	EVAP GROSS LEAK	EC-997
P0446	VENT CONTROL VALVE	EC-980
P0450	EVAP SYS PRES SEN	EC-986
P0455	EVAP GROSS LEAK	EC-997
P0460	FUEL LV SE (SLOSH)	EC-1077
P0461	FUEL LEVEL SENSOR	EC-1016
P0464	FUEL LEVEL SEN/CIRC	EC-1018
P0500	VEH SPEED SEN/CIRC*4	EC-1023
P0505	IACV/AAC VLV/CIRC	EC-1027
P0510	CLOSED TP SW/CIRC	EC-1033
P0600*4	A/T COMM LINE	EC-1040
P0605	ECM	EC-1045
P0705	PNP SW/CIRC	***AT-98***
P0710	ATF TEMP SEN/CIRC	***AT-104***
P0720	VEH SPD SEN/CIRC A/T*4	***AT-110***
P0725	ENGINE SPEED SIG	***AT-115***
P0731	A/T 1ST GR FNCTN	***AT-119***
P0732	A/T 2ND GR FNCTN	***AT-125***
P0733	A/T 3RD GR FNCTN	***AT-131***
P0734	A/T 4TH GR FNCTN	***AT-137***
P0740	TCC SOLENOID/CIRC	***AT-146***
P0744	A/T TCC S/V FNCTN	***AT-151***
P0745	L/PRESS SOL/CIRC	***AT-158***

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

DTC*1	Items (CONSULT-II screen terms)	Reference page
P0750	SFT SOL A/CIRC*2	***AT-163***
P0755	SFT SOL B/CIRC*2	***AT-168***
P1126	THERMOSTAT FNCTN	EC-1047
P1148	CLOSED LOOP-B1	EC-1049
P1168	CLOSED LOOP-B2	EC-1049
P1217*4	ENG OVER TEMP	EC-1051
P1336	CPS/CIRC (OBD) COG	EC-1068
P1441	EVAP VERY SMALL LEAK	EC-1077
P1444	PURG VOLUME CONT/V	EC-1092
P1446	VENT CONTROL VALVE	EC-1104
P1447	EVAP PURG FLOW/MON	EC-1111
P1448	VENT CONTROL VALVE	EC-1123
P1464	FUEL LEVL SEN/CIRC	EC-1131
P1490	VC/V BYPASS/V	EC-1135
P1491	VC CUT/V BYPASS/V	EC-1141
P1605	A/T DIAG COMM LINE	EC-1150
P1705	TP SEN/CIRC A/T*2	***AT-173***
P1706	P-N POS SW/CIRCUIT	EC-1153
P1760	O/R CLUTCH SOL/CIRC	***AT-182***

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

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

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

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

NOTE:

Regarding D22 models, "-B1" and "BK1" indicate right bank and "-B2" and "BK2" indicate left bank.

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

NGEC0523

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 Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, a crash zone sensor (4WD models), warning lamp, wiring harness and spiral cable.
Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. 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 (except “SEAT BELT PRE-TENSIONER”) covered with yellow insulation 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

NGEC0524

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

CAUTION:

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

Engine Fuel & Emission Control System

NGEC0525

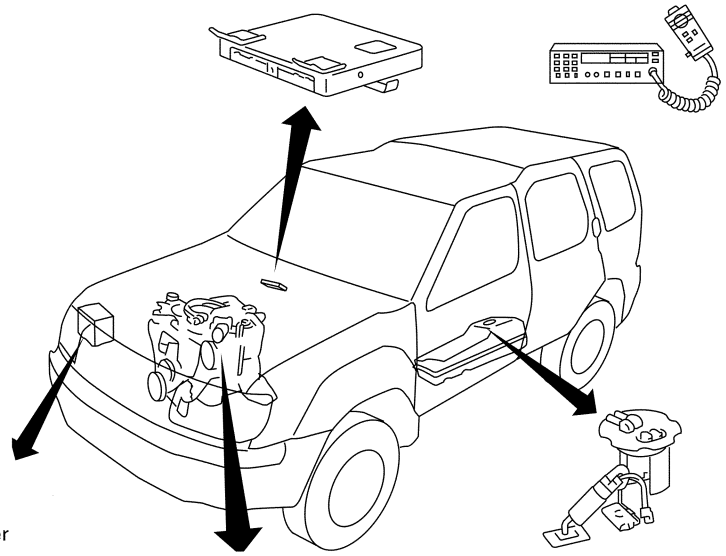
WIRELESS EQUIPMENT

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

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

ECM

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



BATTERY

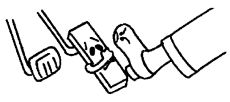
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.

WHEN STARTING

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

ECM PARTS HANDLING

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



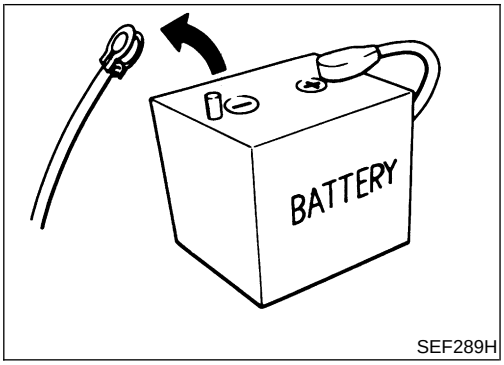
FUEL PUMP

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

ECM HARNESS HANDLING

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

AEC045B

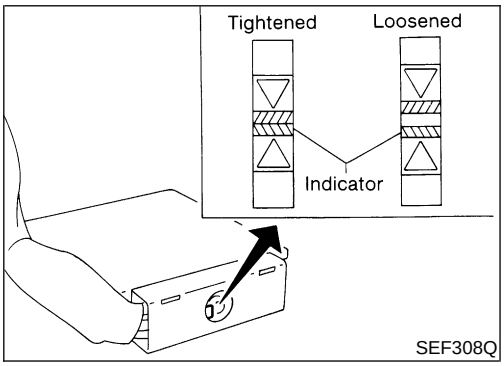


SEF289H

Precautions

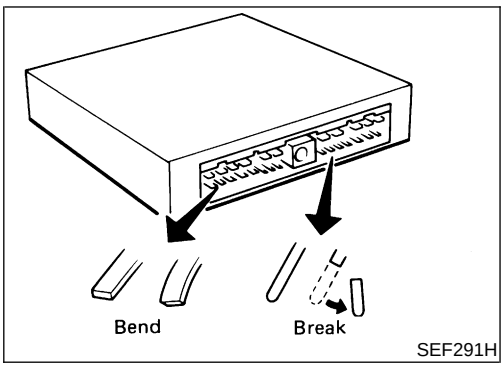
NGEC0526

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



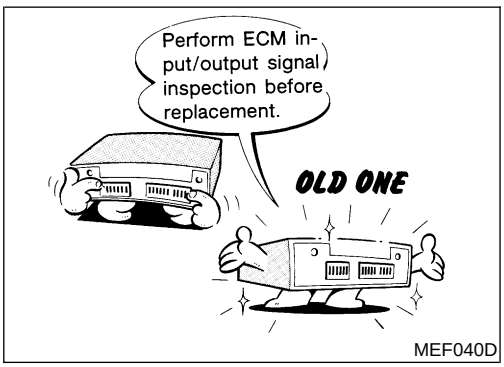
SEF308Q

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



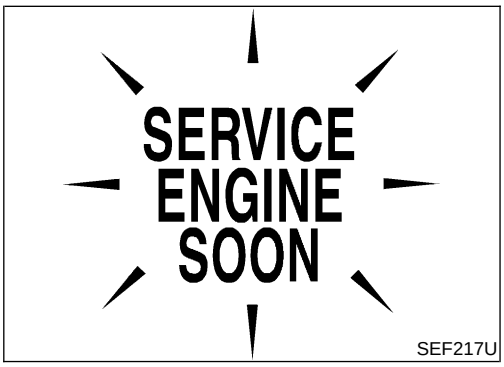
SEF291H

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



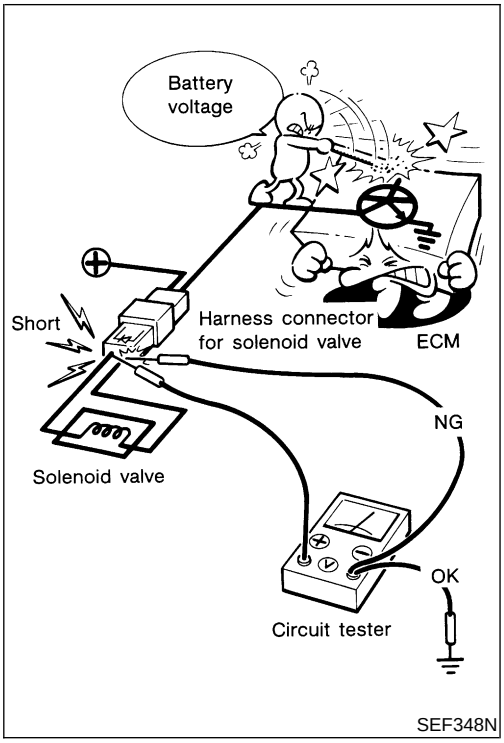
MEF040D

- **Before replacing ECM, perform “ECM Terminals and Reference Value” inspection and make sure ECM functions properly. Refer to EC-719.**

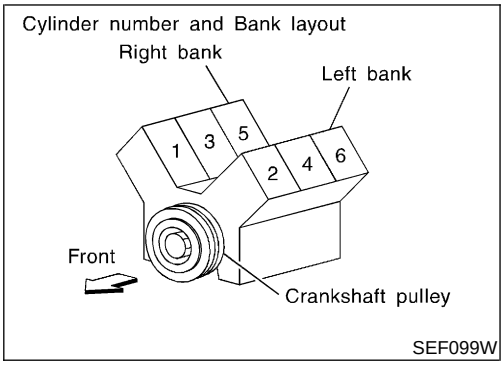


SEF217U

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



- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.**



- **Regarding model D22, "-B1" indicates the right bank and "-B2" indicates the left bank as shown in the figure.**

Wiring Diagrams and Trouble Diagnosis

NGEC0527

When you read Wiring diagrams, refer to the following:

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

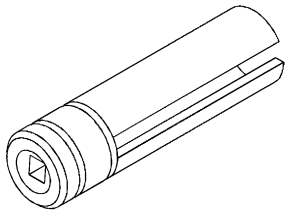
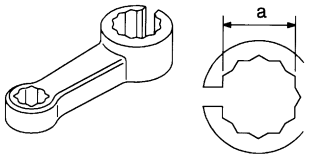
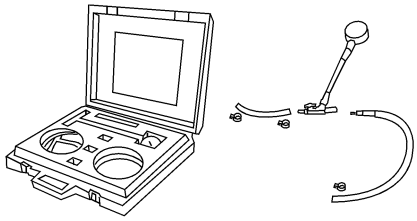
When you perform trouble diagnosis, refer to the following:

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

Special Service Tools

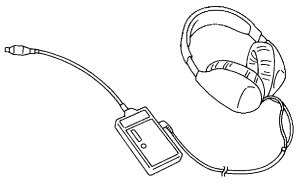
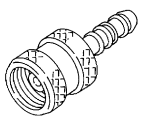
NGEC0528

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

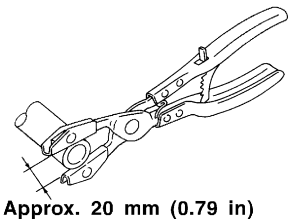
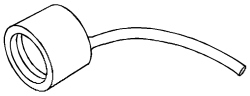
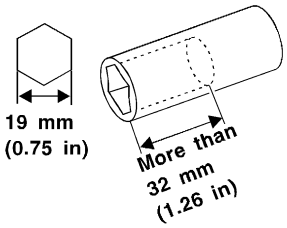
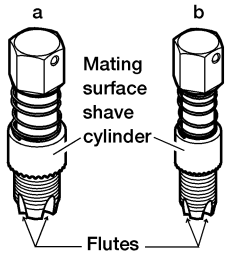
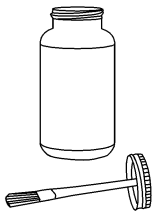
Tool number (Kent-Moore No.) Tool name	Description	
KV10117100 (J36471-A) Heated oxygen sensor wrench	 NT379	Loosening or tightening front heated oxygen sensor with 22 mm (0.87 in) hexagon nut
KV10114400 (J-38365) Heated oxygen sensor wrench	 NT636	Loosening or tightening rear heated oxygen sensor **a: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

Commercial Service Tools

NGEC0529

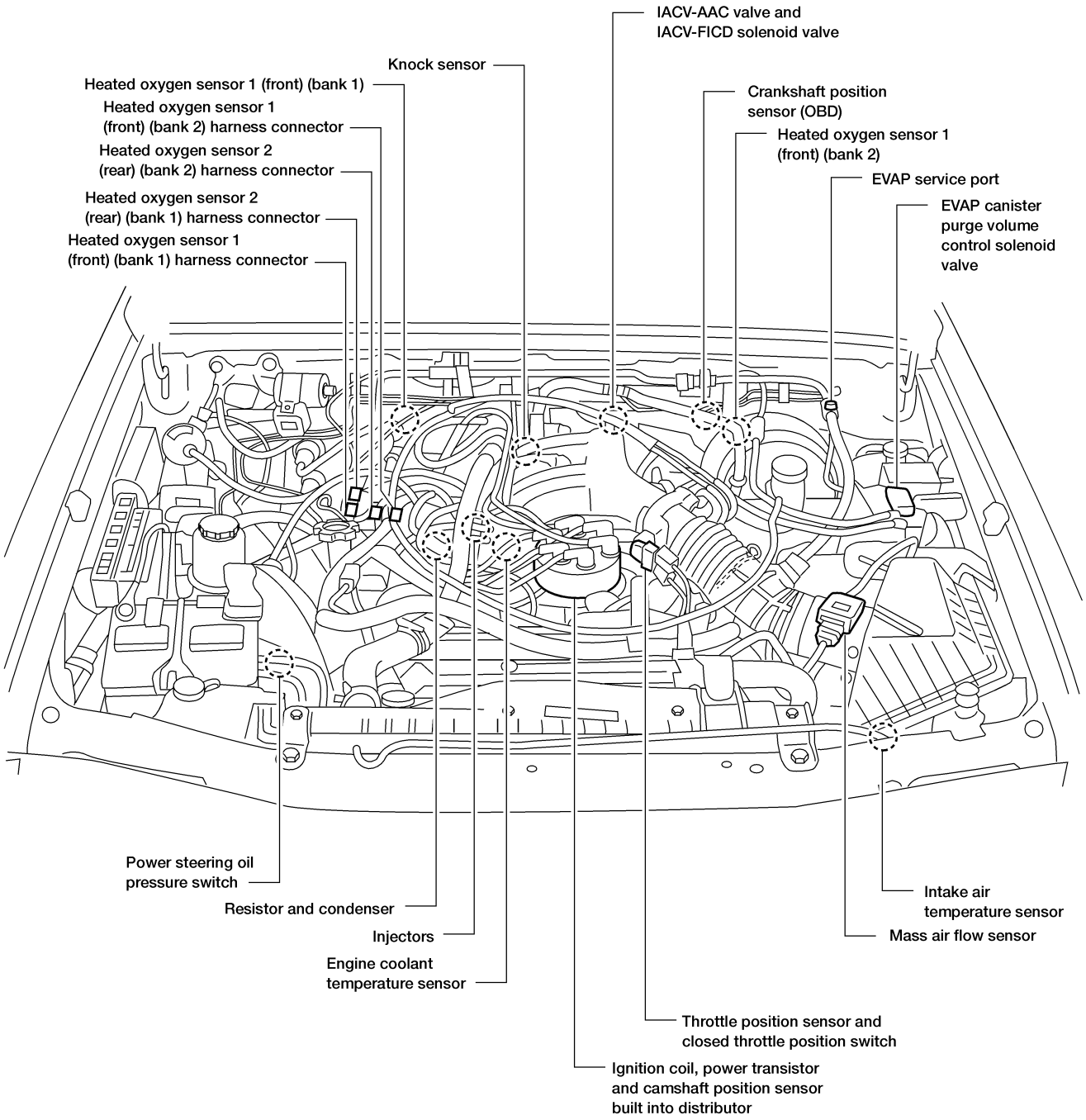
Tool name (Kent-Moore No.)	Description	
Leak detector (J41416)	 NT703	Locating the EVAP leak
EVAP service port adapter (J41413-OBD)	 NT704	Applying positive pressure through EVAP service port

Commercial Service Tools (Cont'd)

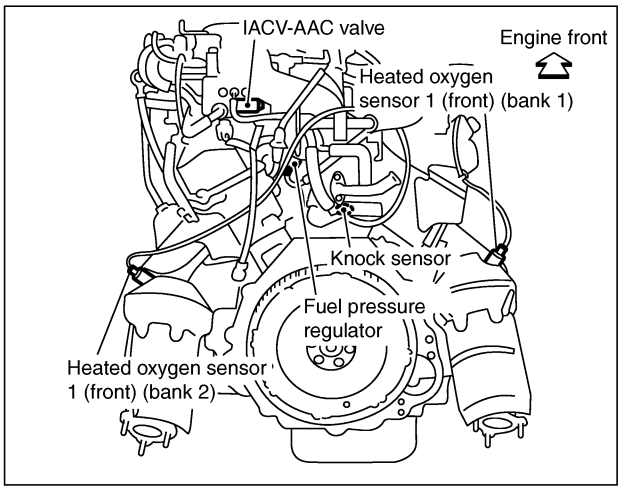
Tool name (Kent-Moore No.)	Description	
Hose clipper	 NT720	Clamping the EVAP purge hose between the fuel tank and EVAP canister applied to DTC P1440 [EVAP control system (small leak-positive pressure)]
Fuel filler cap adapter	 NT653	Checking fuel tank vacuum relief valve opening pressure
Socket wrench	 NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner (J-43897-18) (J-43897-12)	 AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown in "Commercial Service Tools". a: J-43897-18 18 mm diameter, for Zirconia Oxygen Sensor b: J-43897-12 12 mm diameter, for Titania Oxygen Sensor
Anti-seize lubricant (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)	 AEM489	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

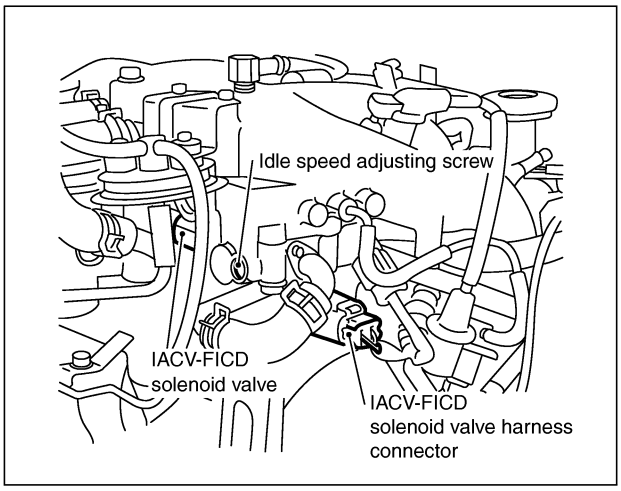
Engine Control Component Parts Location

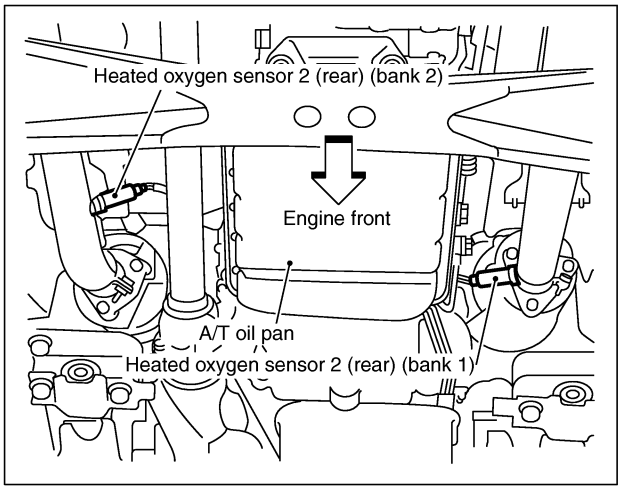
NGEC0530

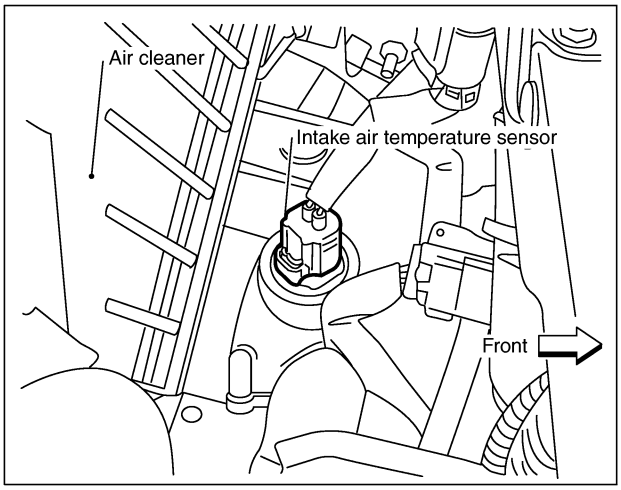


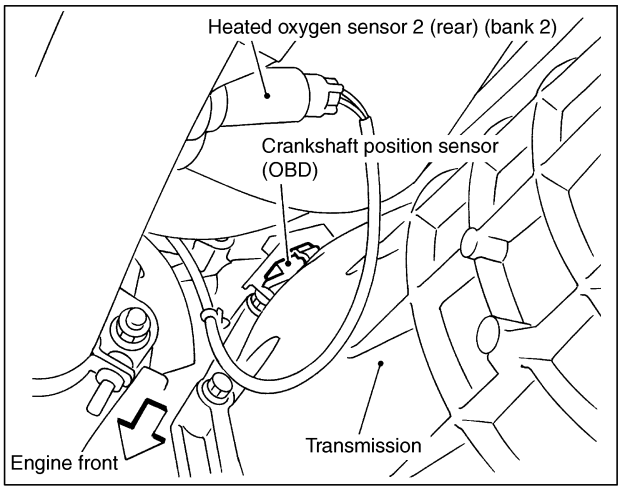
WEC544


IACV-AAC valve
Engine front
Heated oxygen sensor 1 (front) (bank 1)
Knock sensor
Fuel pressure regulator
Heated oxygen sensor 1 (front) (bank 2)


Idle speed adjusting screw
IACV-FICD solenoid valve
IACV-FICD solenoid valve harness connector


Heated oxygen sensor 2 (rear) (bank 2)
Engine front
A/T oil pan
Heated oxygen sensor 2 (rear) (bank 1)

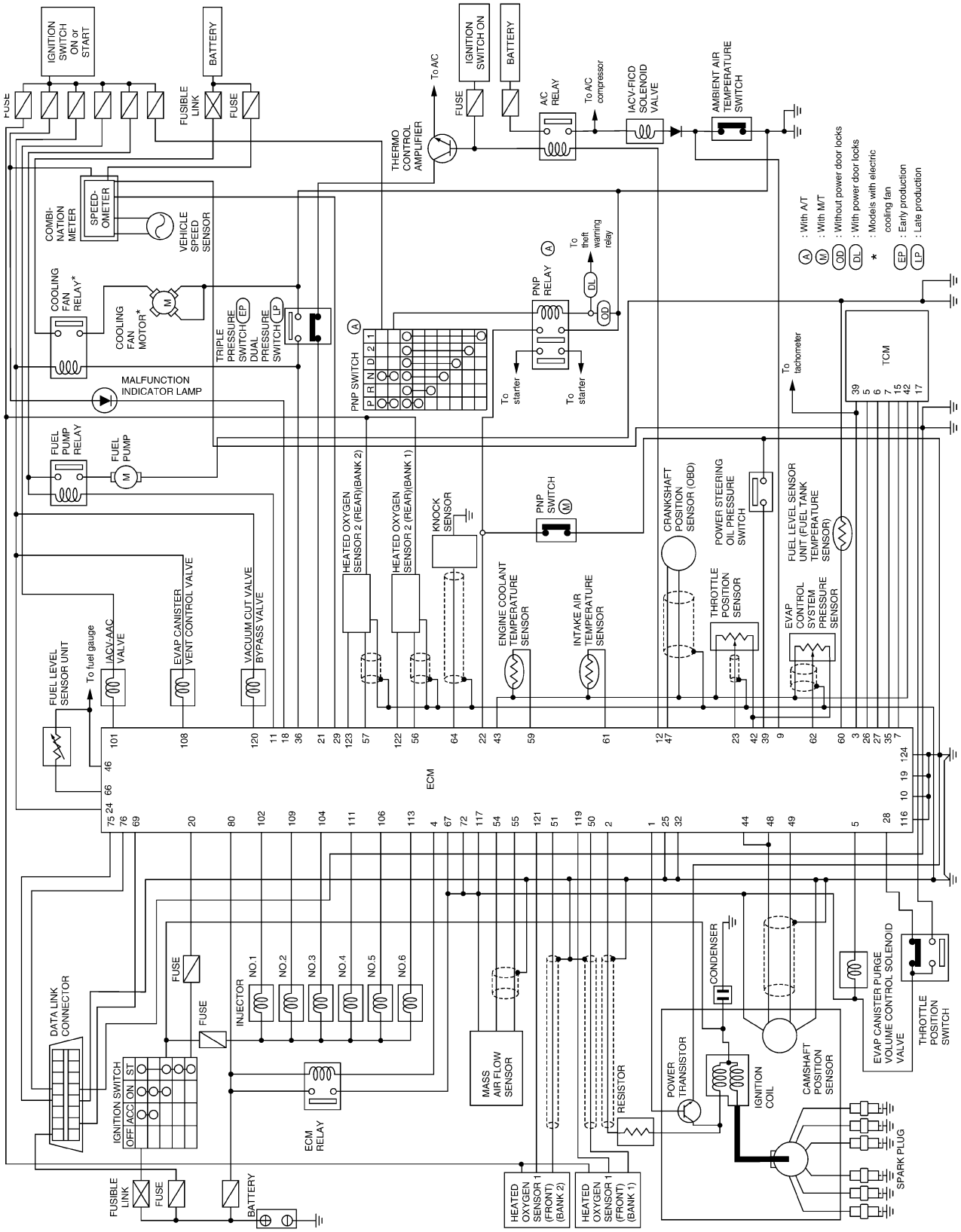

Air cleaner
Intake air temperature sensor
Front


Heated oxygen sensor 2 (rear) (bank 2)
Crankshaft position sensor (OBD)
Transmission
Engine front

SEF792Z

Circuit Diagram

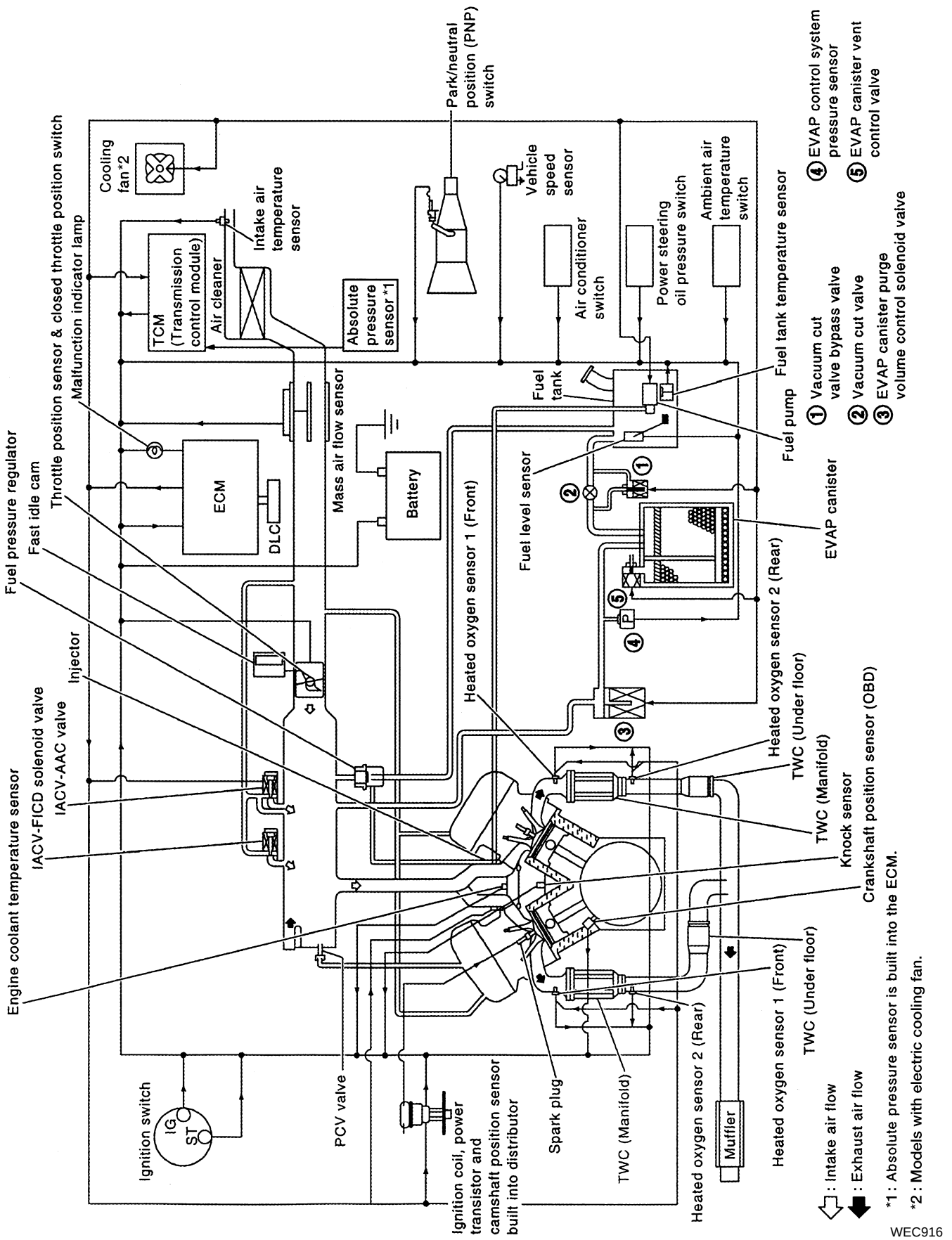
NGEC0531



WEC125A

System Diagram

NGEC0532

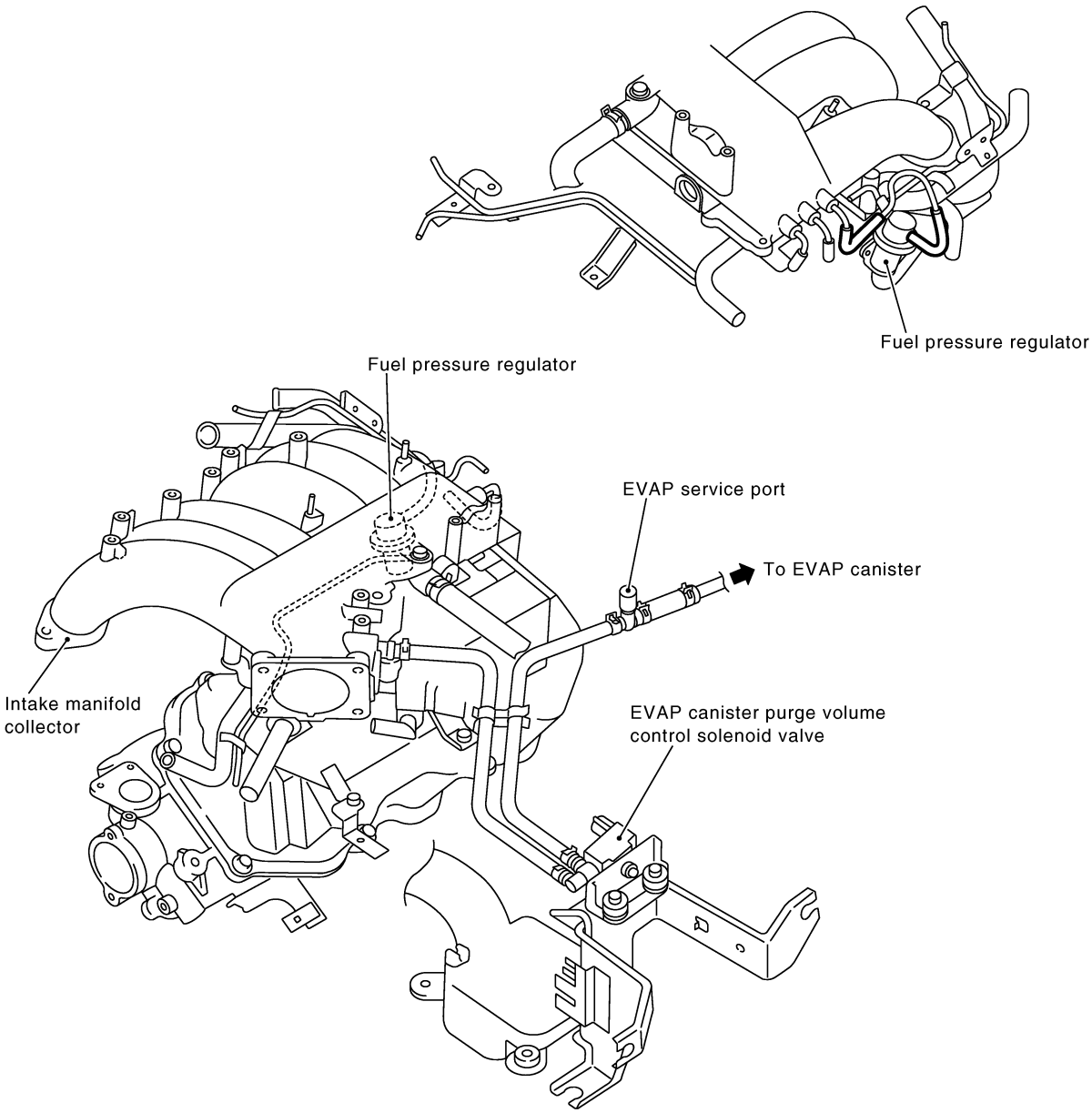


WEC916

Vacuum Hose Drawing

NGEC0533

Refer to “System Diagram”, EC-612 for Vacuum Control System.



SEF794Z

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

System Chart

NGEC0534

Input (Sensor)	ECM Function	Output (Actuator)
• Camshaft position sensor • Mass air flow sensor • Engine coolant temperature sensor • Heated oxygen sensor 1 (front) • Ignition switch • Throttle position sensor • Closed throttle position switch *4 • Park/neutral position (PNP) switch • Air conditioner switch • Knock sensor • Intake air temperature sensor • Absolute pressure sensor (Built into ECM) • EVAP control system pressure sensor *1 • Battery voltage • Power steering oil pressure switch • Vehicle speed sensor • Fuel tank temperature sensor *1 • Crankshaft position sensor (OBD) *1 • Rear heated oxygen sensor *3 • TCM (Transmission control module) *2 • Ambient air temperature switch	Fuel injection & mixture ratio control	Injectors
	Distributor ignition system	Power transistor
	Idle air control system	IACV-AAC valve and IACV-FICD solenoid valve
	Fuel pump control	Fuel pump relay
	On board diagnostic system	MIL (On the instrument panel)
	Heated oxygen sensor 1 heater (front) control	Heated oxygen sensor 1 heater (front)
	Heated oxygen sensor 2 heater (rear) control	Heated oxygen sensor 2 heater (rear)
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Air conditioning cut control	Air conditioner relay
	Cooling fan control*5	Cooling fan relays*5
	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: This sensor is not used to control the engine system under normal conditions.
*4: This switch will operate in place of the throttle position sensor to control EVAP parts if the sensor malfunctions.
*5: Models with electric cooling fan.

Multiport Fuel Injection (MFI) System

DESCRIPTION

Input/Output Signal Chart

NGEC0535

NGEC0535S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed and piston position	Fuel injection & mixture ratio control	Injectors
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		
Park/neutral position (PNP) switch	Gear position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Air conditioner switch	Air conditioner operation		
Knock sensor	Engine knocking condition		
Battery	Battery voltage		
Absolute pressure sensor (Built into ECM)	Ambient air barometric pressure		
Power steering oil pressure switch	Power steering operation		
Heated oxygen sensor 2 (rear)*	Density of oxygen in exhaust gas		

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

Basic Multiport Fuel Injection System

NGEC0535S02

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

NGEC0535S03

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

<Fuel increase>

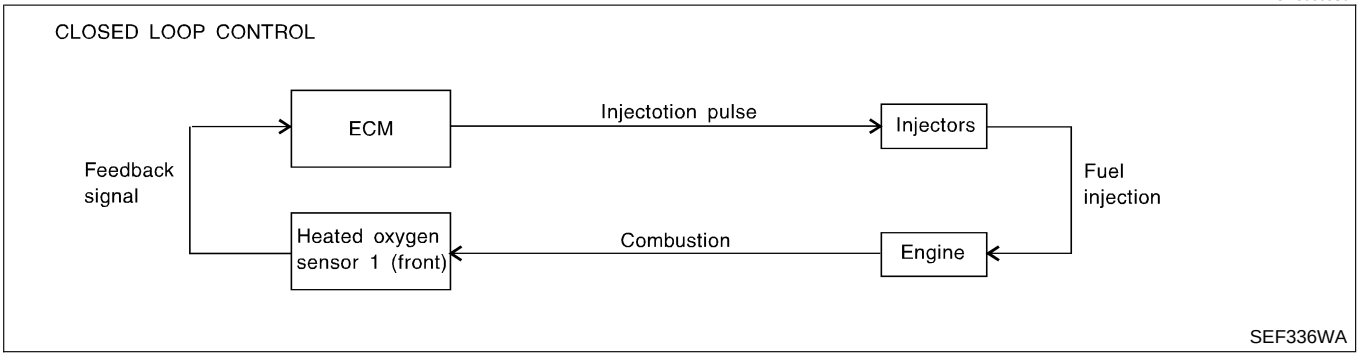
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from “N” to “D”
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

Mixture Ratio Feedback Control (Closed loop control)

NGEC0535S04



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The warm-up three way catalyst can then better reduce CO, HC and NOx emissions. This system uses a 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-778. 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 warm-up 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

NGEC0535S05

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

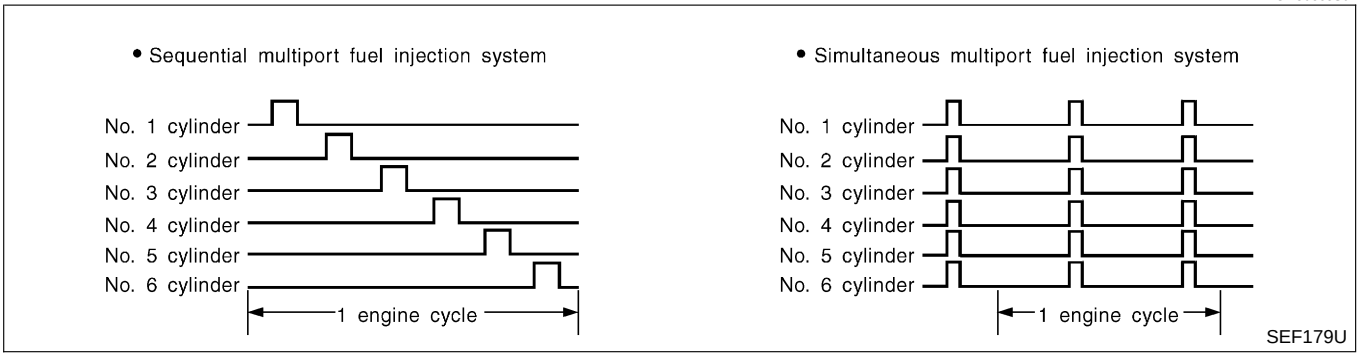
Mixture Ratio Self-learning Control

NGEC0535S06

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

NGEC0535S07



Two types of systems are used.

Sequential Multiport Fuel Injection System

NGEC0535S0701

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

NGEC0535S0702

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

Fuel Shut-off

NGEC0535S08

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

Distributor Ignition (DI) System

DESCRIPTION

NGEC0536

Input/Output Signal Chart

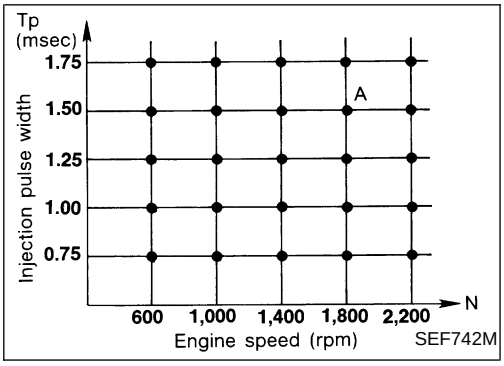
NGEC0536S01

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

Distributor Ignition (DI) System (Cont'd)

System Description

NGEC0536S02



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

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

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

Air Conditioning Cut Control

DESCRIPTION

NGEC0537

Input/Output Signal Chart

NGEC0537S01

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

System Description

NGEC0537S02

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

NGEC0538

Input/Output Signal Chart

NGEC0538S01

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

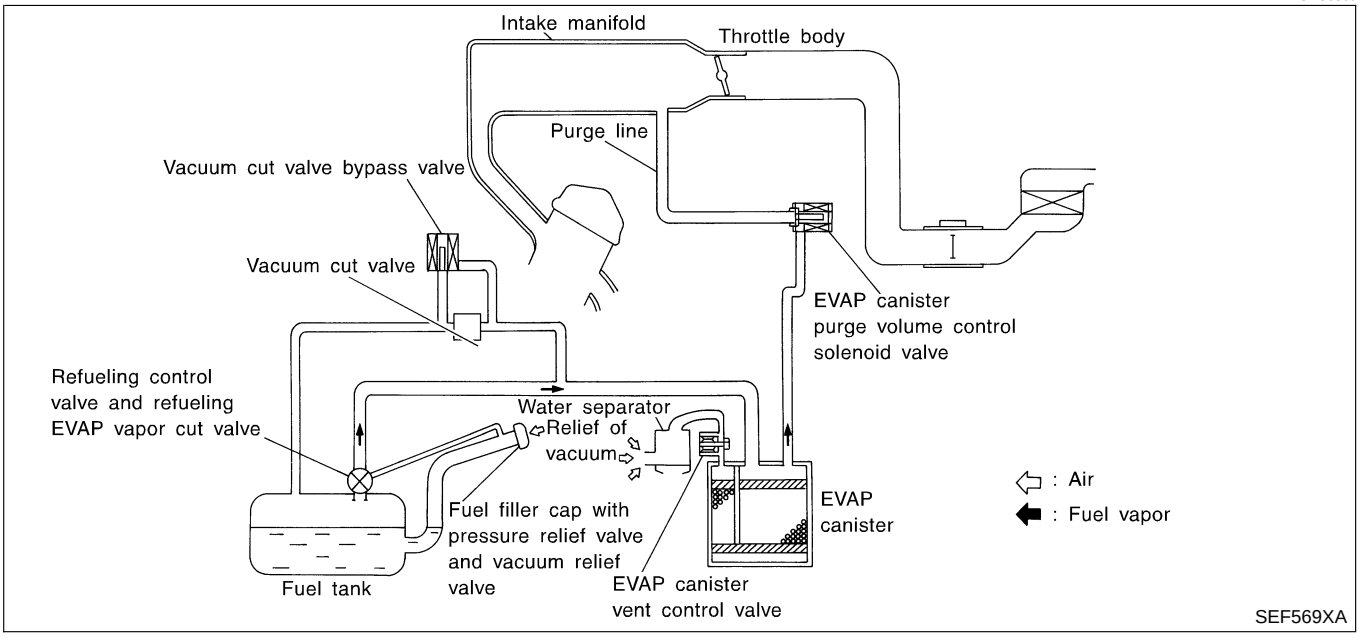
If the engine speed is above 2,500 rpm with no load (for example, in neutral and engine speed over 2,500 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 2,000 rpm, then fuel cut is cancelled.

NOTE:
This function is different from deceleration control listed under “Multiport Fuel Injection (MFI) System”, EC-615.

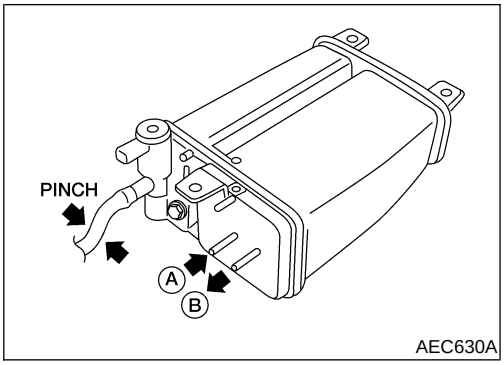
Evaporative Emission System

DESCRIPTION

NGEC0539



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



AEC630A

INSPECTION

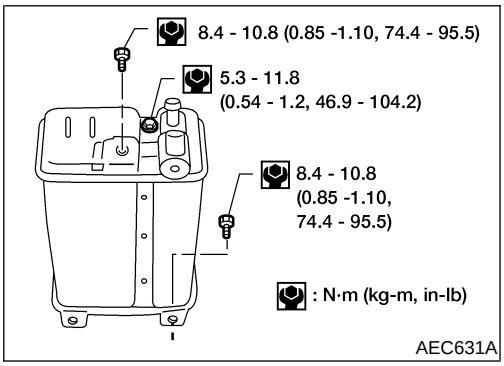
NGEC0540

EVAP Canister

NGEC0540S01

Check EVAP canister as follows:

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



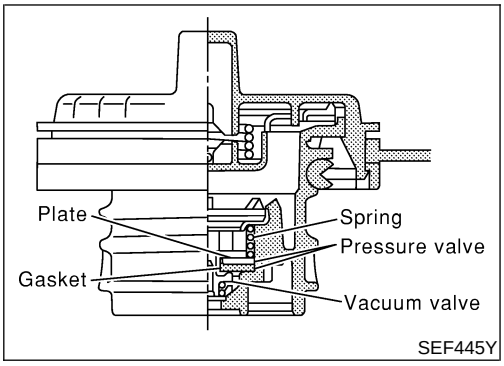
AEC631A

Tightening Torque

NGEC0540S02

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)

NGEC0540S03

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

Pressure:

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

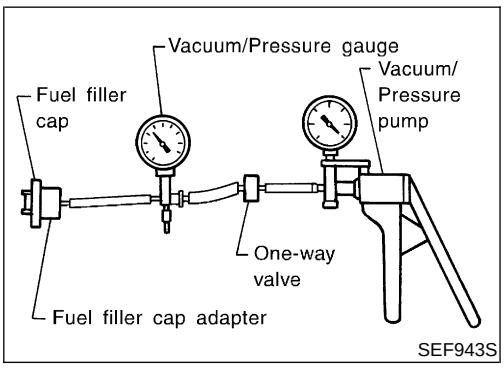
Vacuum:

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

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

CAUTION:

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



SEF943S

Vacuum Cut Valve and Vacuum Cut Valve Bypass Valve

NGEC0540S04

Refer to EC-1141.

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve

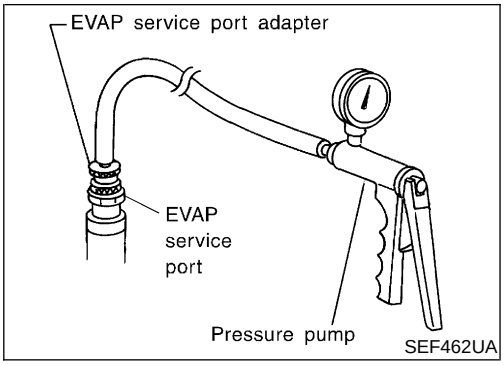
NGEC0540S05

Refer to EC-973.

Tank Fuel Temperature Sensor

NGEC0540S06

Refer to EC-901.

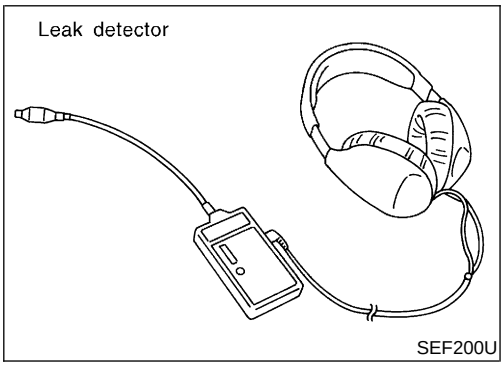


SEF462UA

Evap Service Port

NGEC0540S07

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



SEF200U

How to Detect Fuel Vapor Leakage

NGEC0540S08

CAUTION:

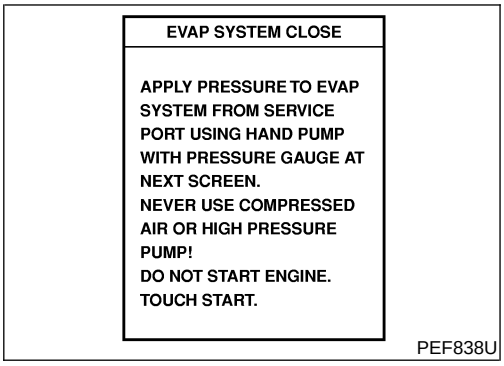
- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in EVAP system.**

NOTE:

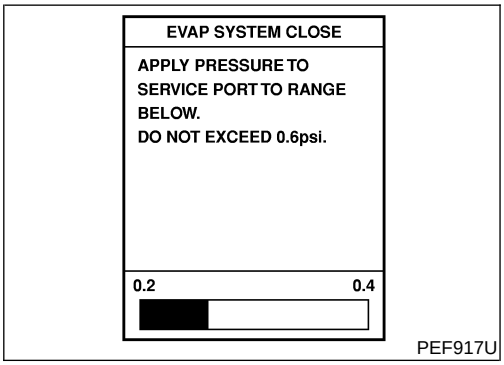
- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

With CONSULT-II

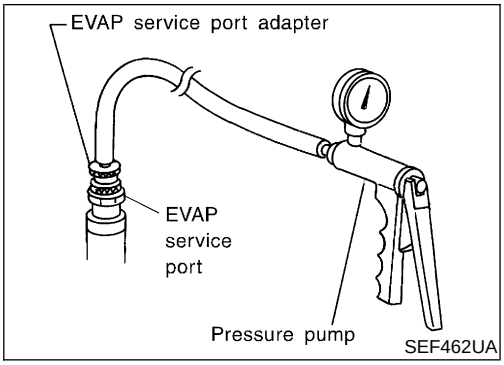
1) Attach the EVAP service port adapter securely to the EVAP service port.
2) Also attach the pressure pump and hose to the EVAP service port adapter.
3) Turn ignition switch ON.
4) Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT MODE" with CONSULT-II.
5) Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
6) Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
7) Remove EVAP service port adapter and hose with pressure pump.
8) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-623.

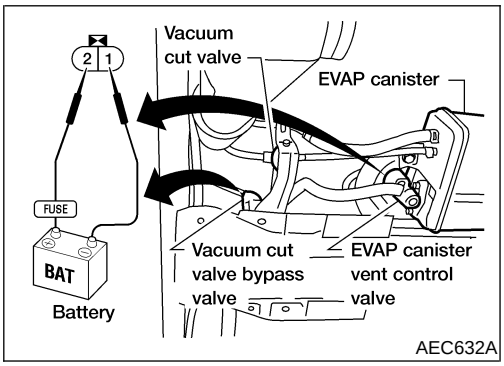


PEF838U



PEF917U



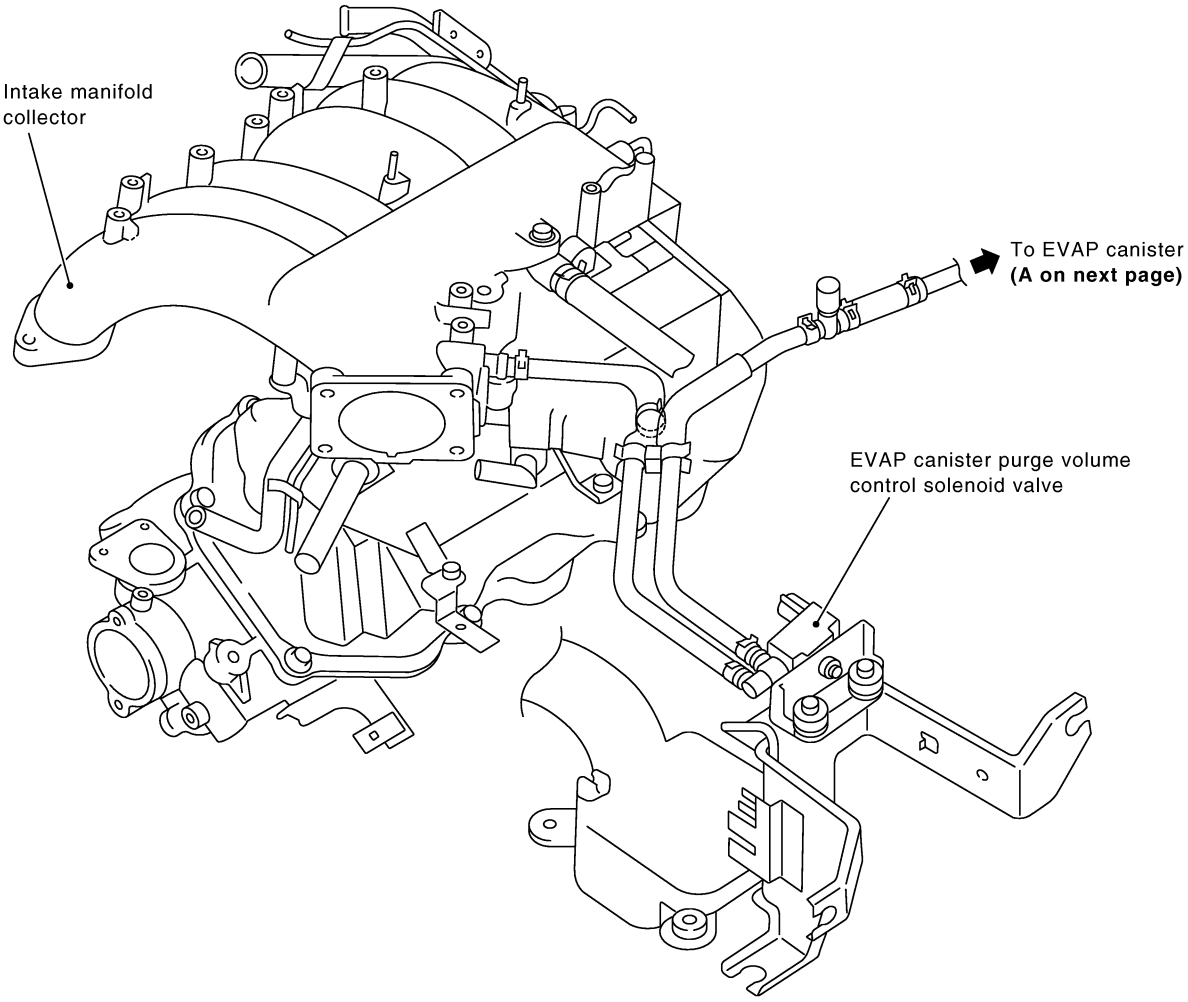


Without CONSULT-II

1) Attach the EVAP service port adapter securely to the EVAP service port.
2) Also attach the pressure pump with pressure gauge to the EVAP service port adapter.
3) Apply battery voltage to between the terminals of both EVAP canister vent control valve and vacuum cut valve bypass valve to make a closed EVAP system.
4) To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm^2, 0.2 to 0.4 psi).
5) Remove EVAP service port adapter and hose with pressure pump.
6) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-623.

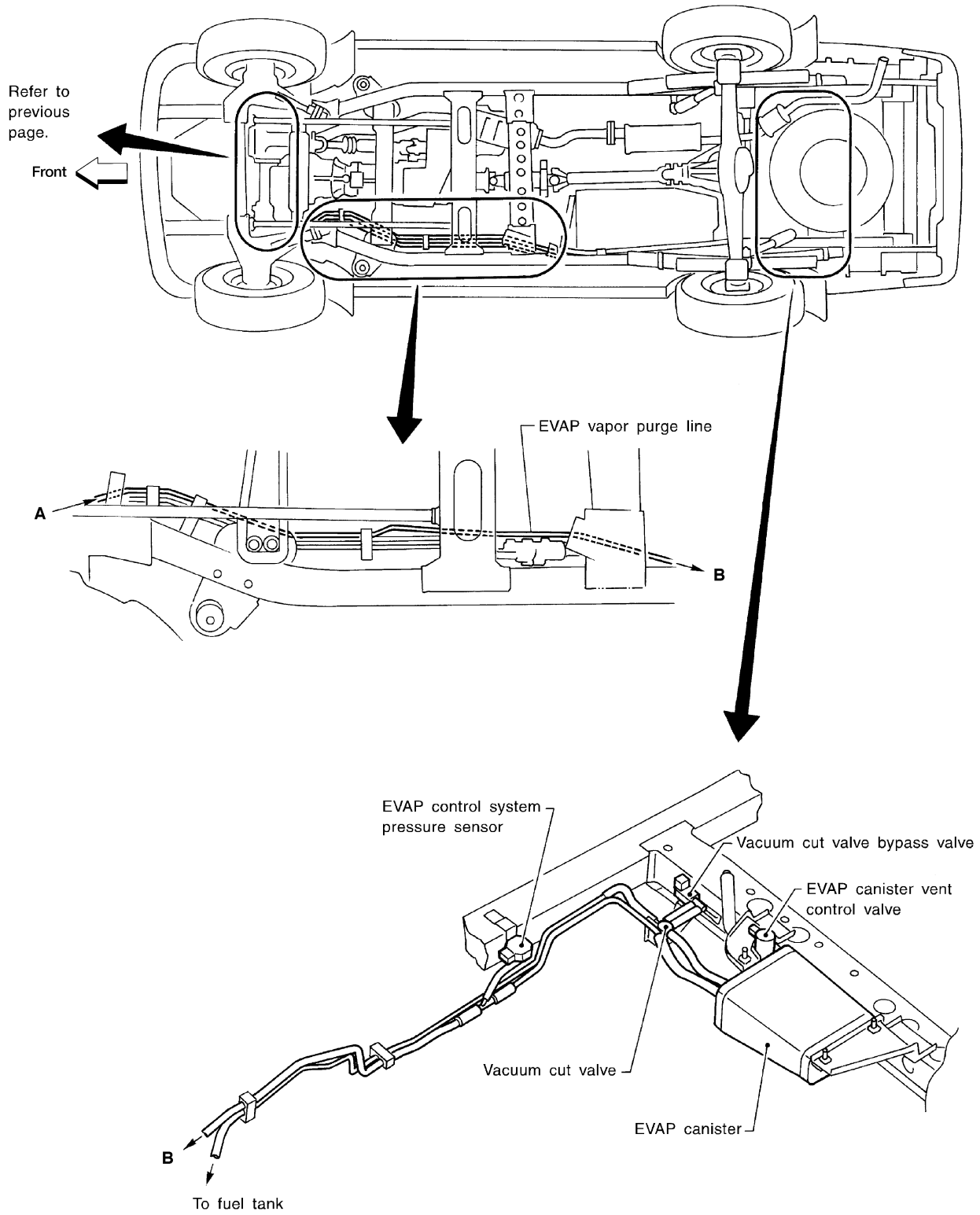
EVAPORATIVE EMISSION LINE DRAWING

NGEC0541



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

SEF795Z


Refer to previous page.
Front
EVAP vapor purge line
A
B
EVAP control system pressure sensor
Vacuum cut valve bypass valve
EVAP canister vent control valve
Vacuum cut valve
EVAP canister
B
To fuel tank

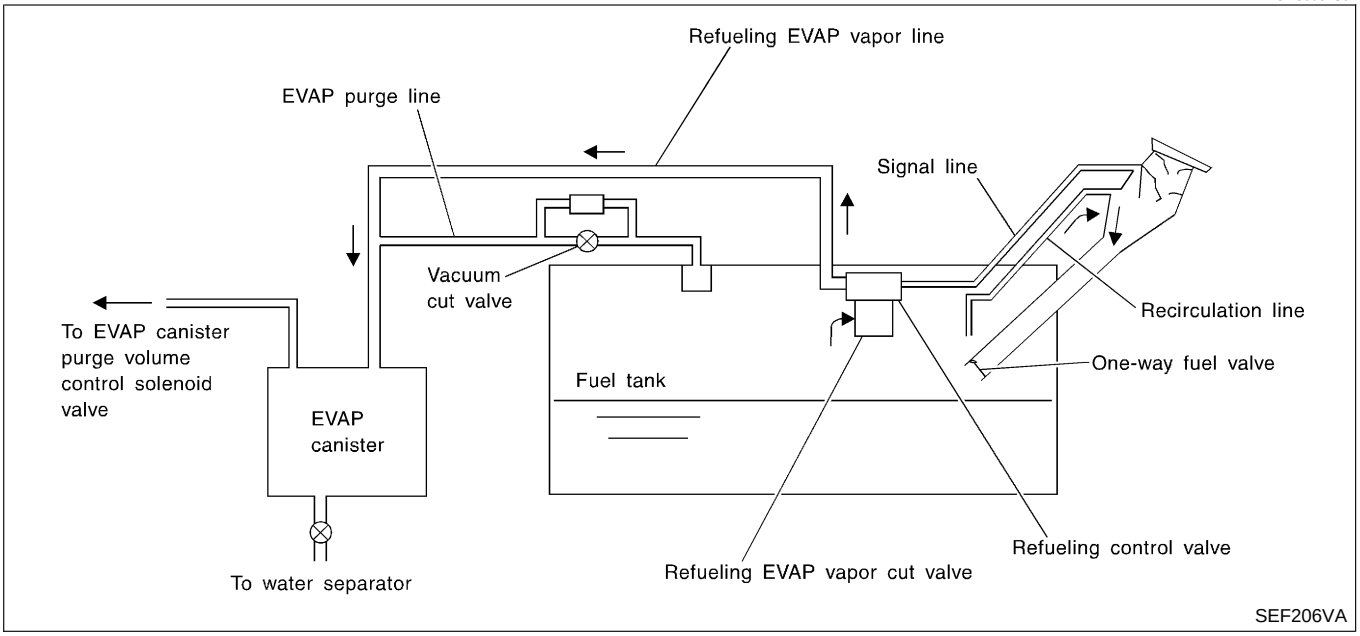
AEC886A

On Board Refueling Vapor Recovery (ORVR)

NGEC0957

SYSTEM DESCRIPTION

NGEC0957S01



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-637.
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

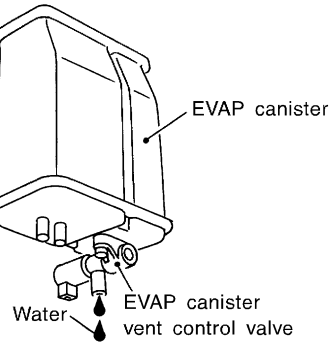
NGEC0957S02

Symptom: Fuel Odor from EVAP Canister Is Strong.

NGEC0957S0201

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?	



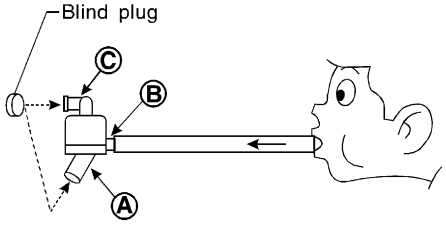
SEF596U

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

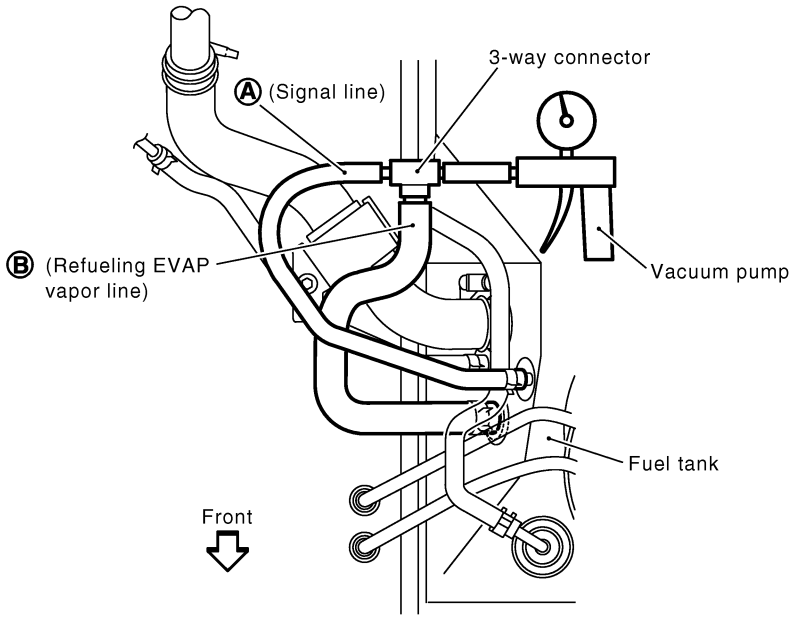
With CONSULT-II

1. Remove fuel tank. Refer to ***FE-4***, "FUEL SYSTEM.
2. Drain fuel from the tank as follows:

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

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

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



SEF707Z

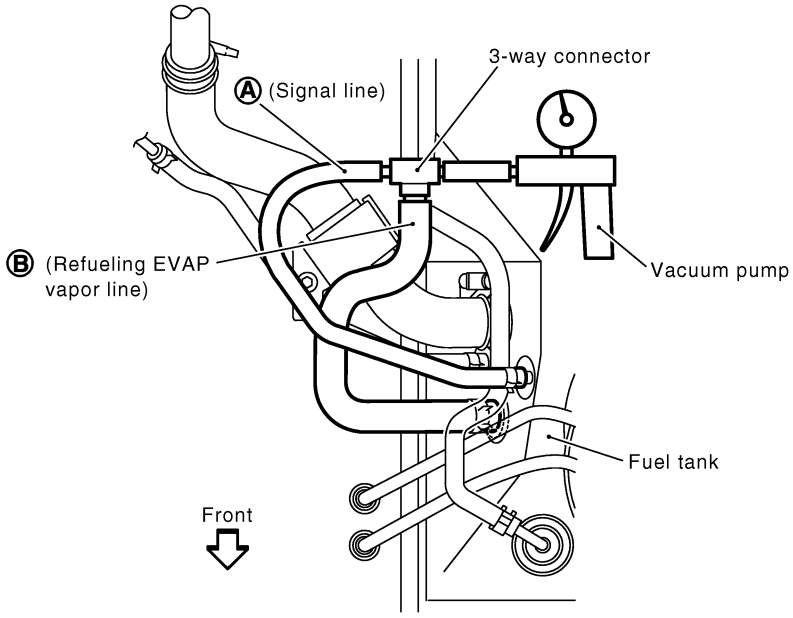
OK or NG

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



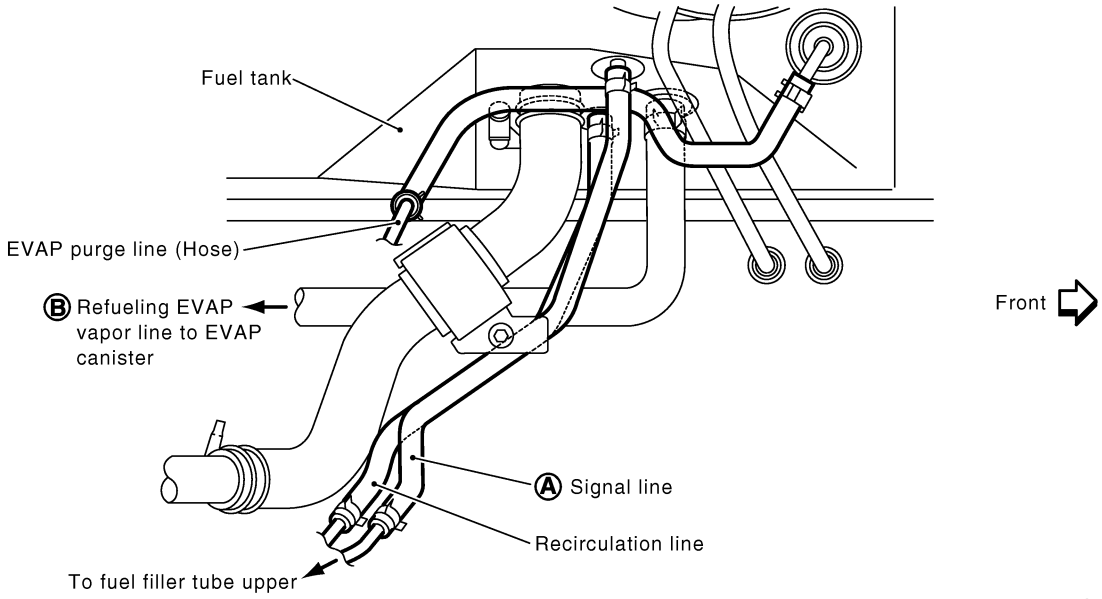
SEF707Z

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.



SEF706Z

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.

NGEC0957S0202

1	CHECK EVAP CANISTER

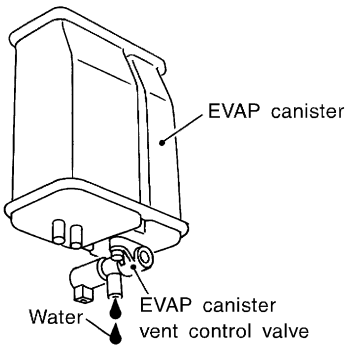
1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Weigh the EVAP canister with EVAP canister vent control valve attached.
   The weight should be less than 1.8 kg (4.0 lb).

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.

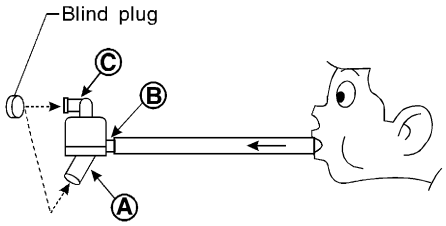
3	REPLACE EVAP CANISTER

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.

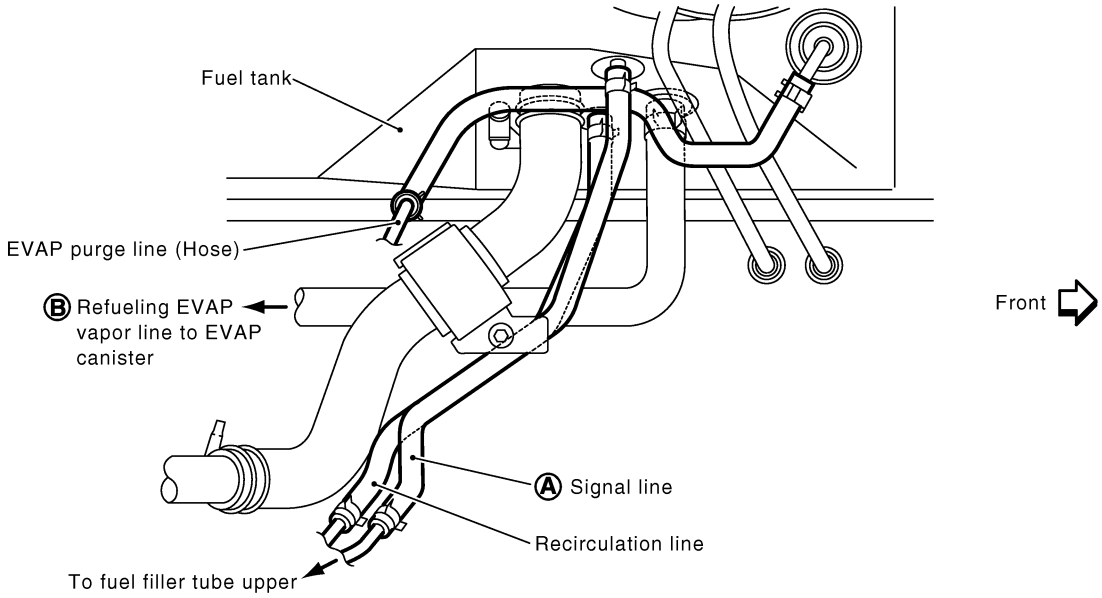
	▶	Repair or replace EVAP hose.

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.



SEF706Z

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

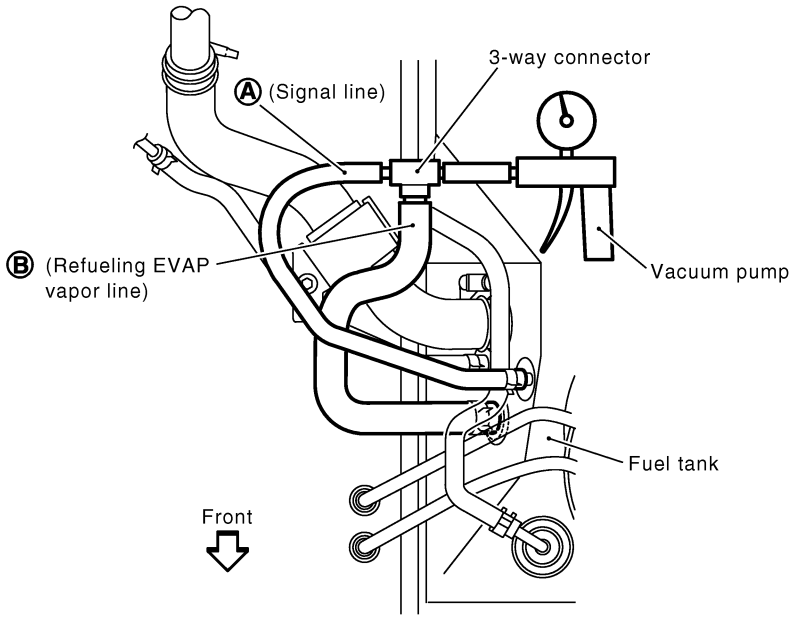
With CONSULT-II

1. Remove fuel tank. Refer to ***FE-4***, "FUEL SYSTEM".
2. Drain fuel from the tank as follows:

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

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

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



SEF707Z

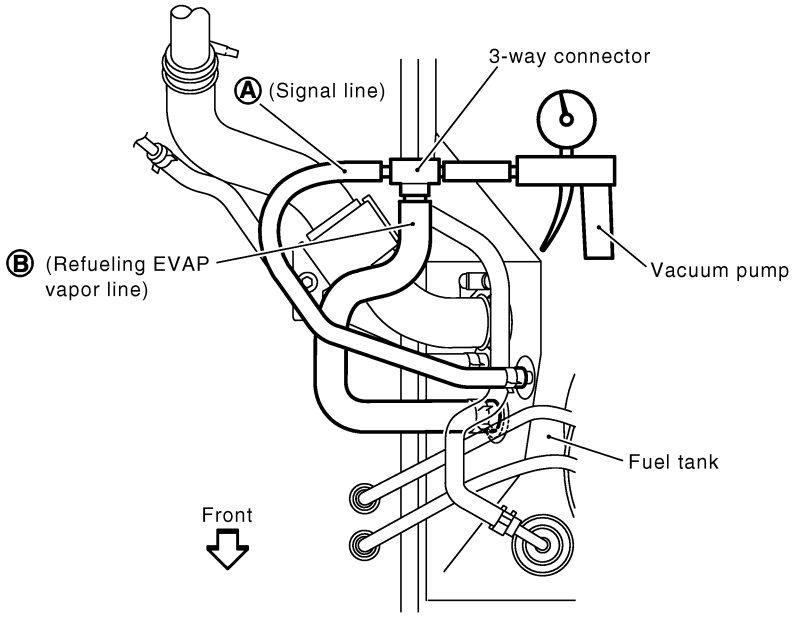
OK or NG

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



SEF707Z

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

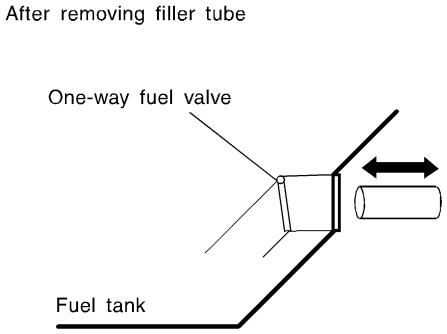
Check one-way valve for clogging.

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.

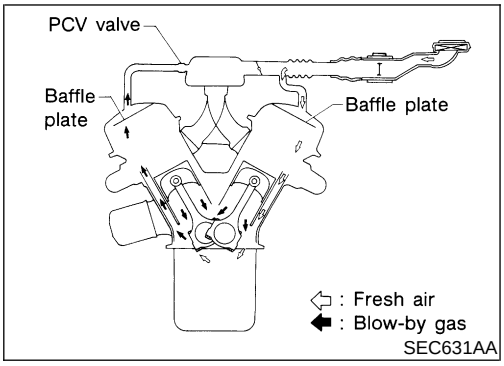


SEF665U

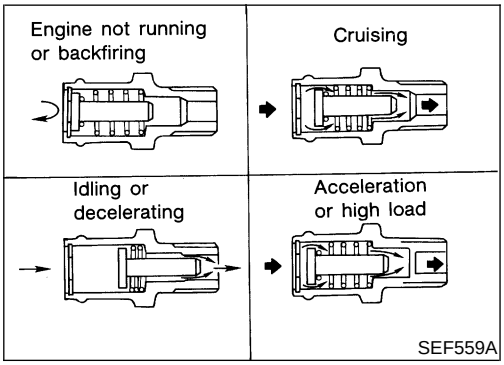
Do not drop any material into the tank.

OK or NG

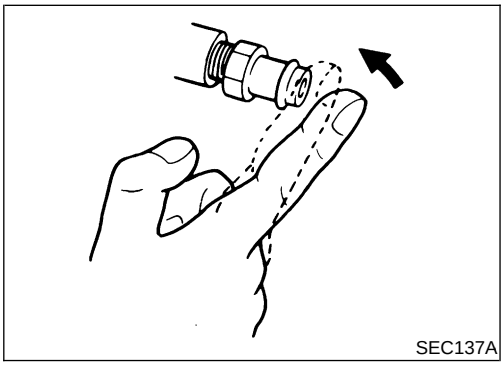
OK	▶	**INSPECTION END**
NG	▶	Replace fuel filler tube or replace one-way fuel valve with fuel tank.



SEC631AA



SEF559A



SEC137A

Positive Crankcase Ventilation

DESCRIPTION

NGEC0542

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

INSPECTION

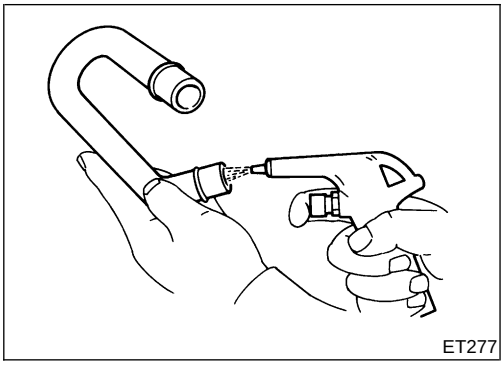
NGEC0543

PCV (Positive Crankcase Ventilation) Valve

NGEC0543S01

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

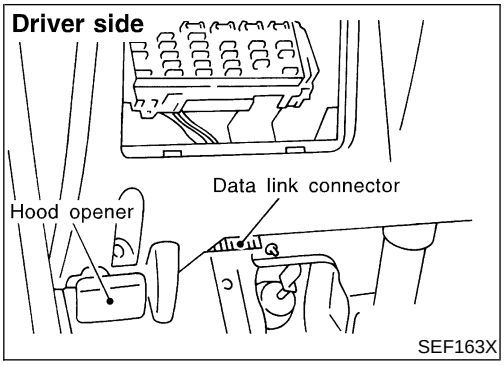
Positive Crankcase Ventilation (Cont'd)


ET277

PCV Valve Ventilation Hose

NGEC0543S02

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

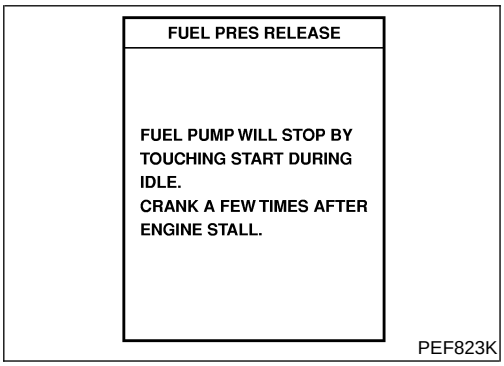
NGEC0544

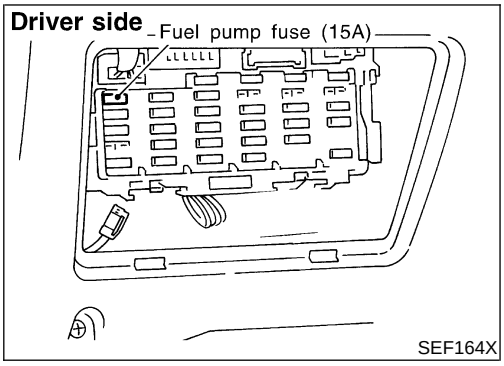
Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

WITH CONSULT-II

NGEC0544S01

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





WITHOUT CONSULT-II

NGEC0544S02

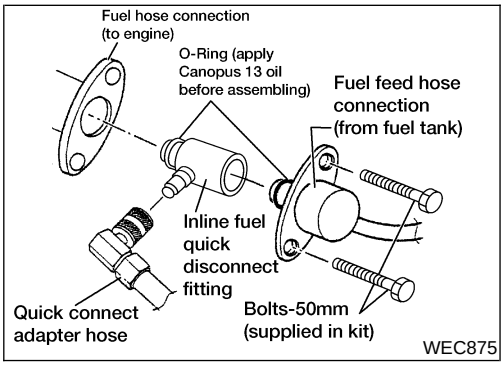
1. Remove fuel pump fuse located in fuse box.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.

Fuel Pressure Check

NGEC0545

- **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. Install the inline fuel quick disconnect fitting between the connection of the fuel feed hose (from tank) and the fuel hose (to engine).



3. Connect the fuel pressure test gauge (quick connect adapter hose) to the quick disconnect fitting.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

At idling:

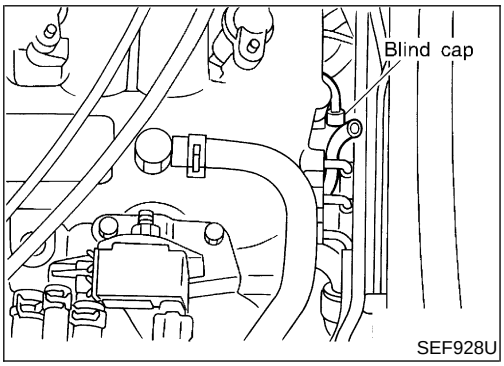
With vacuum hose connected

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

With vacuum hose disconnected

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

If results are unsatisfactory, perform Fuel Pressure Regulator Check.

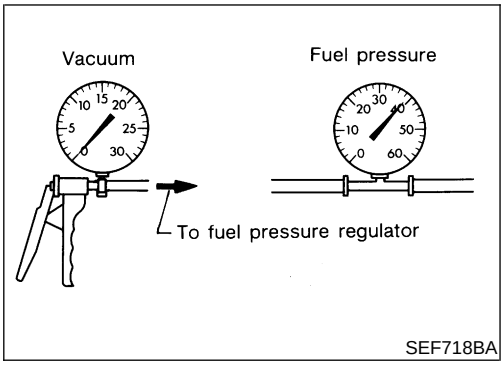


SEF928U

Fuel Pressure Regulator Check

NGEC0546

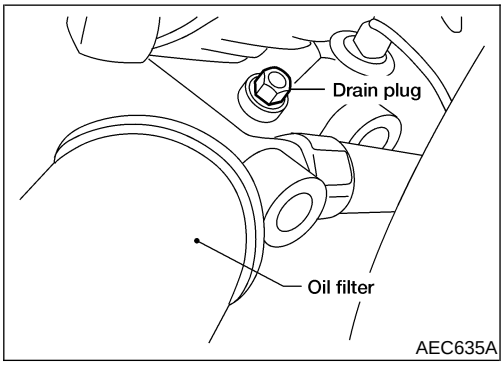
1. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
2. Plug intake manifold with a blind cap.
3. Connect variable vacuum source to fuel pressure regulator.



SEF718BA

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.



AEC635A

Injector

REMOVAL AND INSTALLATION

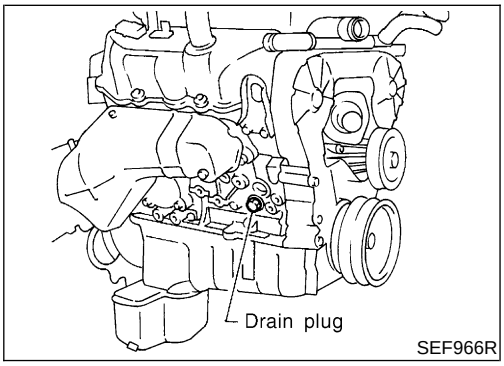
NGEC0547

1. Release fuel pressure to zero. Refer to EC-637.
2. Drain coolant by removing drain plugs from both sides of cylinder block.
3. Separate ASCD and accelerator control wire from intake manifold collector.
4. Remove intake manifold collector from engine.
   The following parts should be disconnected or removed.

a. Harness connectors for
- IACV-AAC valve
- IACV-FICD solenoid valve
- Throttle position sensor and closed throttle position switch assembly
- Ground harness

b. PCV valve ventilation hoses
c. Vacuum hoses for
- Brake booster
- Fuel pressure regulator

d. Air hoses from
- Air duct



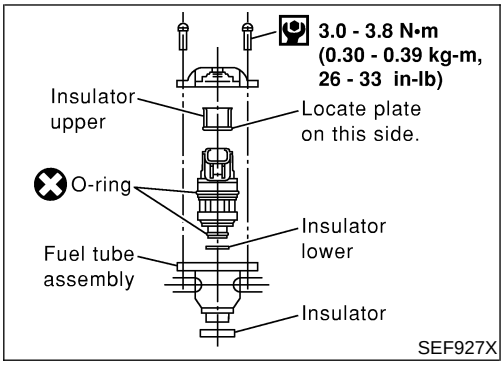
SEF966R

- IACV-AAC valve

e. Water hoses for
- Throttle body
- Air relief plug

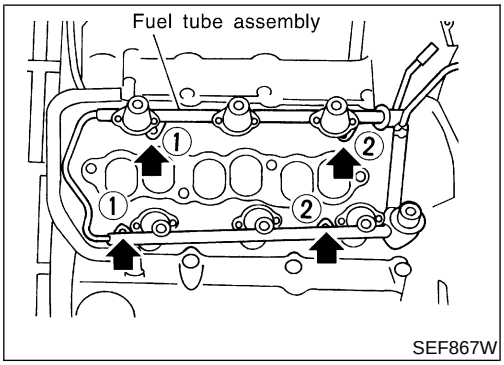
f. EVAP canister purge hose

5. Remove injector fuel tube assembly.
The following parts should be disconnected or removed.
- Vacuum hose for fuel pressure regulator
- Fuel feed and return hose
- All injectors harness connectors
- **Push injector tail piece.**
- **Do not pull on connector.**
- **Do not extract injector by pinching.**



6. Push out any malfunctioning injector from injector fuel tube.
7. Replace or clean injector as necessary.
- **Always replace O-rings with new ones.**
- **Lubricate O-rings with engine oil.**

8. Install injector to injector fuel tube assembly.



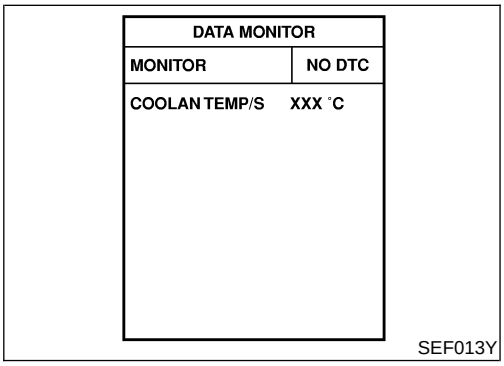
9. Install injectors with fuel tube assembly to intake manifold.
Tighten in numerical order shown in the figure.

a. First, tighten all bolts to 4.9 to 6.0 N·m (0.5 to 0.61 kg-m, 3.6 to 4.4 ft-lb).

b. Then, tighten all bolts to 10.8 to 14.7 N·m (1.1 to 1.5 kg-m, 8 to 11 ft-lb).

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

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



Fast Idle Cam (FIC)

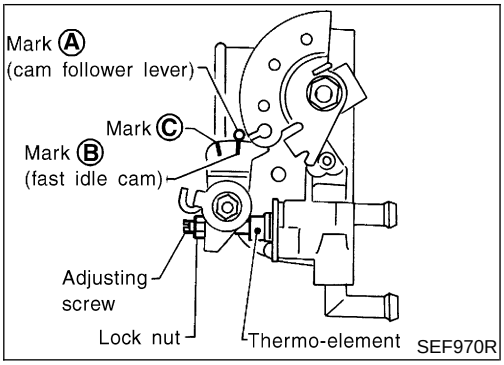
INSPECTION AND ADJUSTMENT

NGEC0548

With CONSULT-II

NGEC0548S01

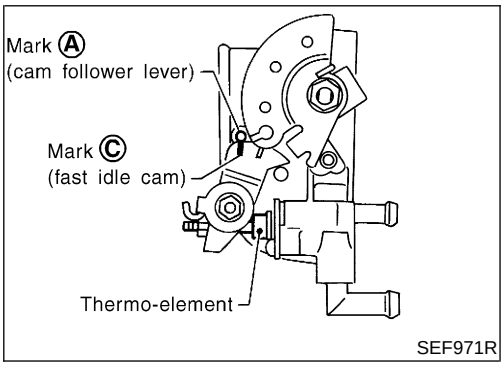
1. Turn ignition switch ON.
2. See "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
3. When engine coolant temperature is 20 to 30°C (68 to 86°F), make sure that the center of mark **A** is aligned with mark **B** as shown in the figure.



- If NG, adjust by turning adjusting screw.

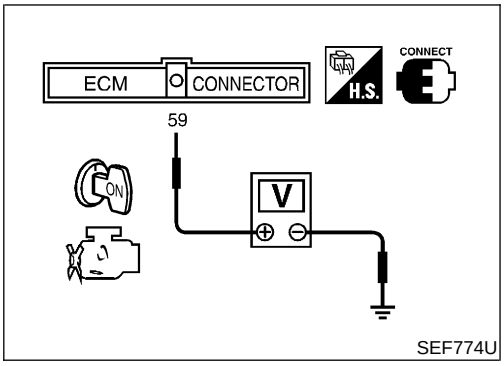
  Lock nut:

  : 0.98 - 1.96 N·m (10 - 20 kg-cm, 8.7 - 17.4 in-lb)



4. Start engine and warm it up.
5. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.

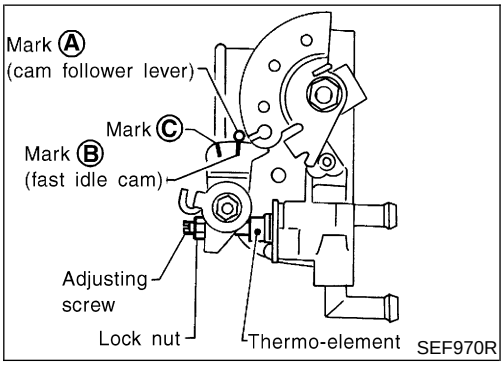
- The center of mark **A** is aligned with mark **C**.
- The cam follower lever's roller is not touching the fast idle cam.
- If NG, replace thermo-element and perform the above inspection and adjustment again.



Without CONSULT-II

NGEC0548S02

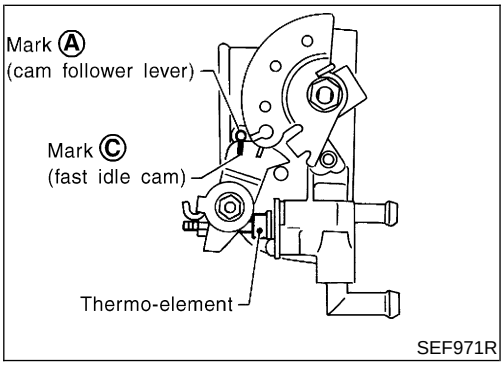
1. Turn ignition switch ON.
2. Check voltage between ECM terminal 59 (Engine coolant temperature sensor signal) and ground.
3. When the voltage is between 3.12 to 3.52V, make sure that the center of mark **A** is aligned with mark **B** as shown in the figure.



- If NG, adjust by turning adjusting screw.

  Lock nut:

  : 0.98 - 1.96 N·m (10 - 20 kg-cm, 8.7 - 17.4 in-lb)



4. Start engine and warm it up.
5. When the voltage is between 1.10 to 1.36V, check the following.

- The center of mark **A** is aligned with mark **C**.
- The cam follower lever's roller is not touching the fast idle cam.
- If NG, replace thermo-element and perform the above inspection and adjustment again.

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

NGEC0549

NGEC0549S01

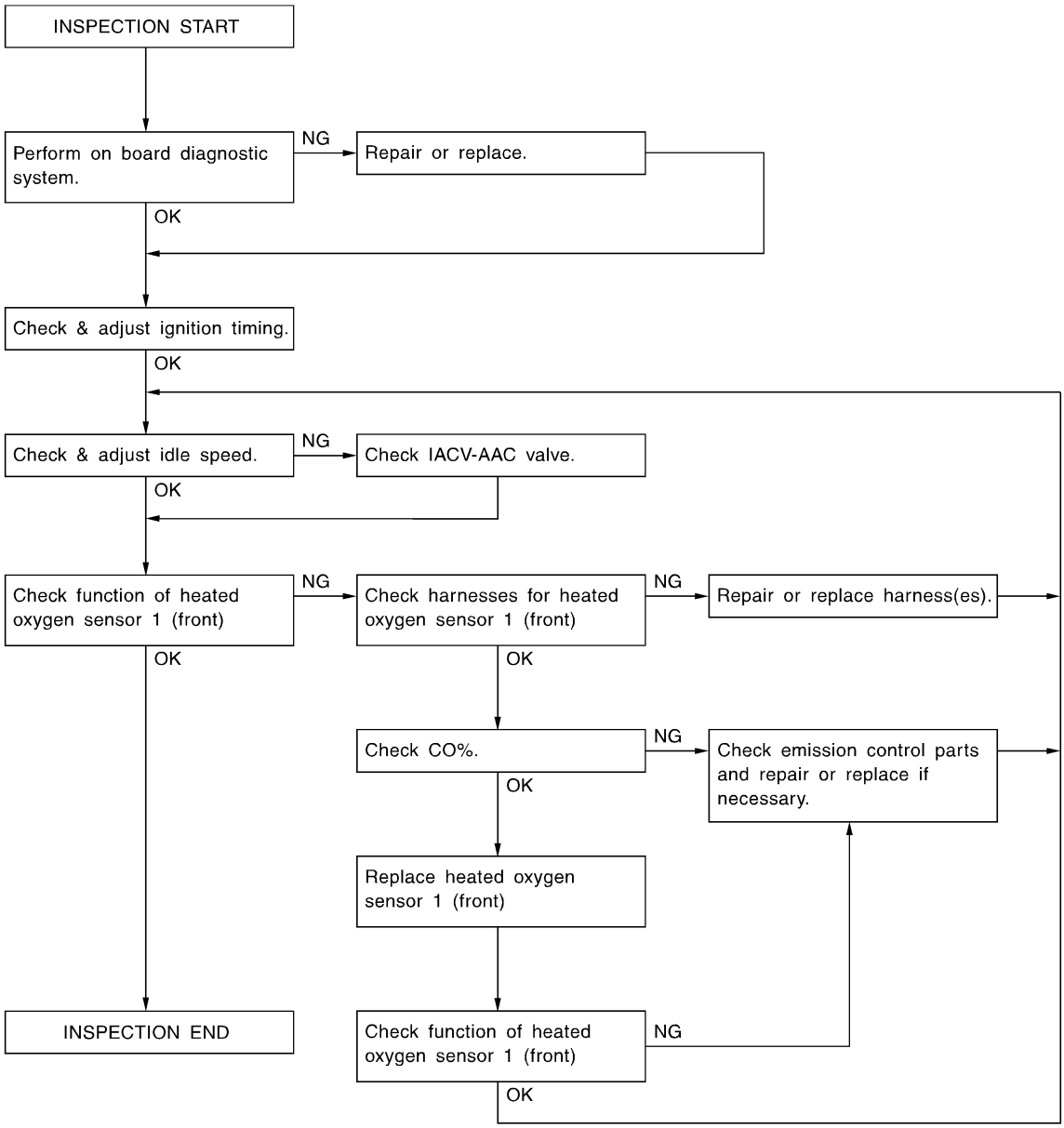
PREPARATION

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

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

Overall Inspection Sequence

NGEC0549S0101



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.

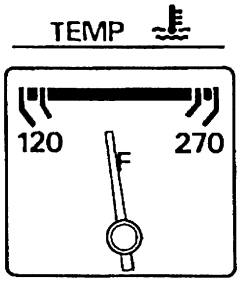
INSPECTION PROCEDURE

=NGEC0549S02

1	INSPECTION START

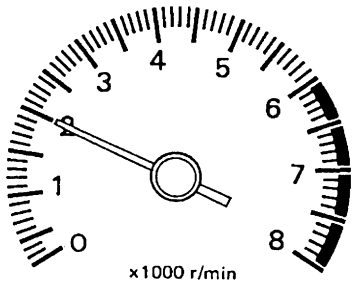
1. Visually check the following:
- Air cleaner clogging
- Hoses and ducts for leaks
- Electrical connectors
- Gasket
- Throttle valve and throttle position sensor operation

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



SEF976U

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



SEF977U

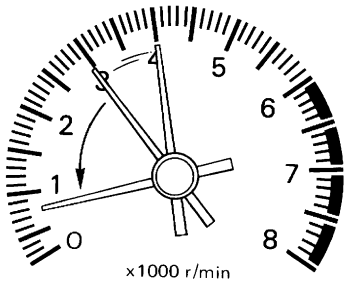
4. Make sure that no DTC is displayed with CONSULT-II or GST.

OK or NG

OK	▶	GO TO 2.
NG	▶	1. Repair or replace components as necessary. 2. GO TO 2.

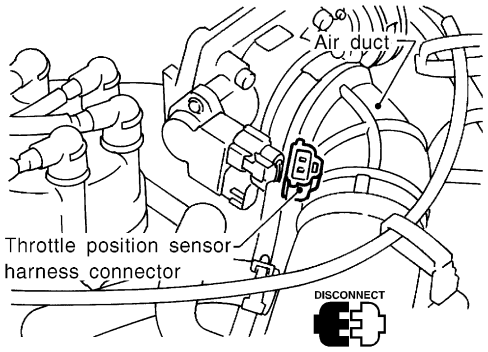
2 CHECK IGNITION TIMING

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.



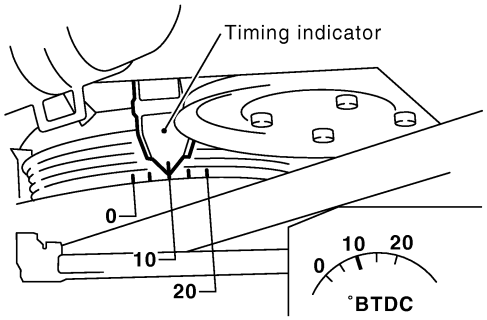
SEF978U

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



SEF975R

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.



SEF927Z

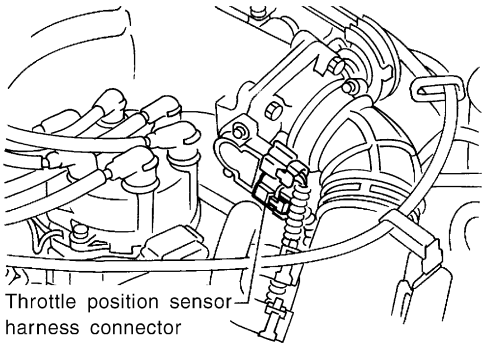
10°±2° BTDC (in "P" or "N" position)

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	ADJUST IGNITION TIMING

1. Adjust ignition timing by turning distributor after loosening securing bolts.
2. Turn off engine and connect throttle position sensor harness connector to throttle position sensor.



SEF972R

▶ GO TO 2.

4	CHECK BASE IDLE SPEED

With CONSULT-II

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

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

700±50 rpm (in "P" or "N" position)

Without CONSULT-II

1. Check idle speed.

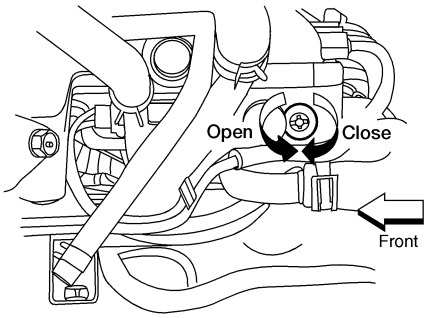
700±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	ADJUST BASE IDLE SPEED

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



LEC513

700±50 rpm (in "P" or "N" position)

▶	GO TO 6.

6	CHECK TARGET IDLE SPEED

With CONSULT-II

1. Turn off engine and connect throttle position sensor harness connector.
2. Start and rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run at idle speed.
3. Read idle speed in "DATA MONITOR" mode with CONSULT-II.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

750±50 rpm (in "P" or "N" position)

Without CONSULT-II

1. Turn off engine and connect throttle position sensor harness connector.
2. Start and rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run at idle speed.
3. Check idle speed.

750±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 7.

7	DETECT MALFUNCTIONING PART
Check the following. 1. Check IACV-AAC valve and replace if necessary. Refer to EC-1027. 2. Check IACV-AAC valve harness and repair if necessary. Refer to EC-1027. 3. 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 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 2) SIGNAL

With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. See "HO2S1 MNTR (B2)" in "DATA MONITOR" mode.
3. Running engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.

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

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

SEF945Y

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 2) SIGNAL

Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Set voltmeter probe between ECM terminal 62 and ground.
3. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

OK or NG

OK ▶	GO TO 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 2) SIGNAL

With CONSULT-II

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

Without CONSULT-II

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

OK or NG

OK (With CONSULT-II)	▶	GO TO 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-638.
2. Check mass air flow sensor and its circuit. Refer to EC-739.
3. Check injector and its circuit. Refer to EC-1169.
   Clean or replace if necessary.
4. Check engine coolant temperature sensor and its circuit. Refer to EC-773.
5. Check ECM function by substituting another known good ECM.
   (ECM may be the cause of a problem, but this is rarely the case.)

	▶	GO TO 2.

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

With CONSULT-II

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

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

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

SEF945Y

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 1) SIGNAL

Without CONSULT-II

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

OK or NG

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

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

With CONSULT-II

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

Without CONSULT-II

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

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 15.

15	DETECT MALFUNCTIONING PART

Check the following.

1. Check fuel pressure regulator. Refer to EC-638.
2. Check mass air flow sensor and its circuit. Refer to EC-739.
3. Check injector and its circuit. Refer to EC-1169.
   Clean or replace if necessary.
4. Check engine coolant temperature sensor and its circuit. Refer to EC-773.
5. Check ECM function by substituting another known good ECM.
   (ECM may be the cause of a problem, but this is rarely the case.)

	▶	GO TO 2.

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

1. Turn off engine and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect heated oxygen sensor 1 (front) (bank 1) harness connector.
4. Check harness continuity between ECM terminal 50 and heated oxygen sensor 1 (front) (bank 1) harness connector.
   Continuity should exist.

OK or NG

OK	▶	1. Connect ECM harness connector. 2. GO TO 18.
NG	▶	1. Repair or replace harness. 2. GO TO 8. (With CONSULT-II) GO TO 9. (Without CONSULT-II)

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

1. Turn off engine and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect heated oxygen sensor 1 (front) (bank 2) harness connector.
4. Check harness continuity between ECM terminal 51 and heated oxygen sensor 1 (front) (bank 2) harness connector.
   Continuity should exist.

OK or NG

OK	▶	1. Connect ECM harness connector. 2. GO TO 18.
NG	▶	1. Repair or replace harness. 2. GO TO 8. (With CONSULT-II) GO TO 9. (Without CONSULT-II)

18	PREPARATION FOR "CO" % CHECK

With CONSULT-II

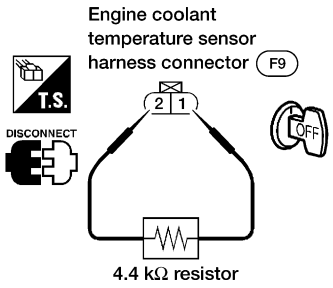
1. Select "COOLANT TEMP" in "ACTIVE TEST" mode.
2. Set "COOLANT TEMP" to 5°C (41°F) by touching "DWN" and "Qd".

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

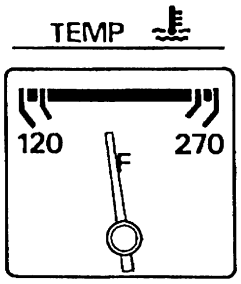


AEC036B

	▶	GO TO 19.

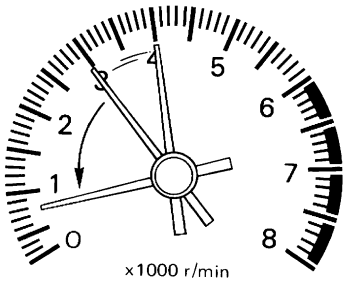
19	CHECK "CO" %

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: 1.5 - 9.5%
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	▶	1. Replace front heated oxygen sensor LH. 2. GO TO 10.
NG	▶	GO TO 20.

20	DETECT MALFUNCTIONING PART

Check the following.
1. Connect front heated oxygen sensor harness connectors to front heated oxygen sensors.
2. Check fuel pressure regulator. Refer to EC-638.
3. Check mass air flow sensor and its circuit. Refer to EC-739.
4. Check injector and its circuit. Refer to EC-1169.
   Clean or replace if necessary.
5. Check engine coolant temperature sensor and its circuit. Refer to EC-773.
6. Check ECM function by substituting another known good ECM.
   (ECM may be the cause of a problem, but this is rarely the case.)

	▶	GO TO 2.

Introduction

NGEC0550

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-709.)

Two Trip Detection Logic

NGEC0551

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not light up at this stage. <1st trip>
If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL lights up. The MIL lights up at the same time when the DTC is stored. <2nd trip> The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

X: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Coolant overtemperature enrichment protection — DTC: P0217	—	X	—	—	X	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	X	—	—	—	—	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	—	—	X	—	—	X	—	—
Closed loop control — DTC: P1148, P1168	—	X	—	—	X	—	X	—
Fail-safe items (Refer to EC-709.)	—	X	—	—	X*1	—	X*1	—
Except above	—	—	—	X	—	X	X	—

*1: Except “ECM”

Emission-related Diagnostic Information

NGEC0552

DTC AND 1ST TRIP DTC

NGEC0552S01

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-666.

For malfunctions in which 1st trip DTCs are displayed, refer to EC-663. 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-692. 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

NGEC0552S0101

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.

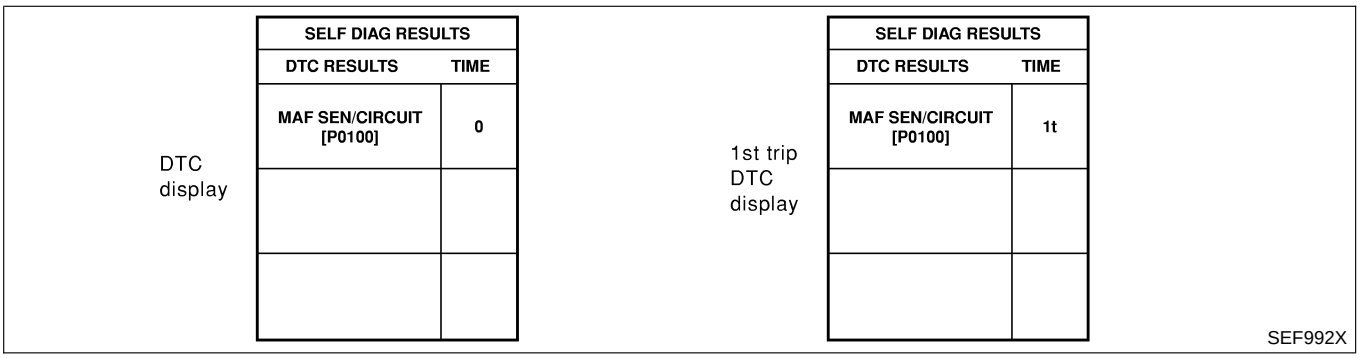
(CONSULT-II also displays the malfunctioning component or system.)

- **1st trip DTC No. is the same as DTC No.**
- **Output of a DTC indicates a malfunction. However, GST do 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]”.



FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

NGEC0552S02

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-679.
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0306 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.
Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-666.

SYSTEM READINESS TEST (SRT) CODE

NGEC0552S03

System Readiness Test (SRT) code is specified in Mode 1 of SAE J1979.
As part of enhanced emissions test for Inspection and Maintenance (I/M), certain states require that 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 and 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

=NGEC0552S0314

The following table 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
	3	EVAP control system purge flow monitoring	P1447
O2 SENSOR	3	Heated oxygen sensor 1 (front) (circuit)	P0130, P0150
		Heated oxygen sensor 1 (front) (lean shift monitoring)	P0131, P0151
		Heated oxygen sensor 1 (front) (rich shift monitoring)	P0132, P0152
		Heated oxygen sensor 1 (front) (response monitoring)	P0133, P0153
		Heated oxygen sensor 1 (front) (high voltage)	P0134, P0154
		Heated oxygen sensor 2 (rear) (min. voltage monitoring)	P0137, P0157
		Heated oxygen sensor 2 (rear) (max. voltage monitoring)	P0138, P0158
		Heated oxygen sensor 2 (rear) (response monitoring)	P0139, P0159
		Heated oxygen sensor 2 (rear) (high voltage)	P0140, P0160
O2 SEN HEATER	3	Heated oxygen sensor 1 heater (front)	P0135, P0155
		Heated oxygen sensor 2 heater (rear)	P0141, P0161

*: 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

NGEC0552S0301

SRT is set as "CMPLT" after self-diagnosis has been performed one or more times. Completion of SRT will occur if the result is OK or NG. The set timing is different between them and is shown in the following table.

Self-diagnosis result		Example				
		Diagnosis	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF
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 OK.
–: Self-diagnosis is not carried out.

When all SRT related self-diagnoses showed OK results in a same cycle (Ignition OFF – ON – OFF), the SRT will indicate "CMPLT".
→ Case 1 above
When all SRT related self-diagnoses show 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 previous table shows that the minimum number of cycles for setting SRT as "INCMP" is one (1) for each self-diagnosis (Case 1 and 2) or two (2) for one self-diagnosis (Case 3). However, in preparation for the State emissions inspection, it is unnecessary of each self-diagnosis to be executed twice (Case 3) because of the following reasons;

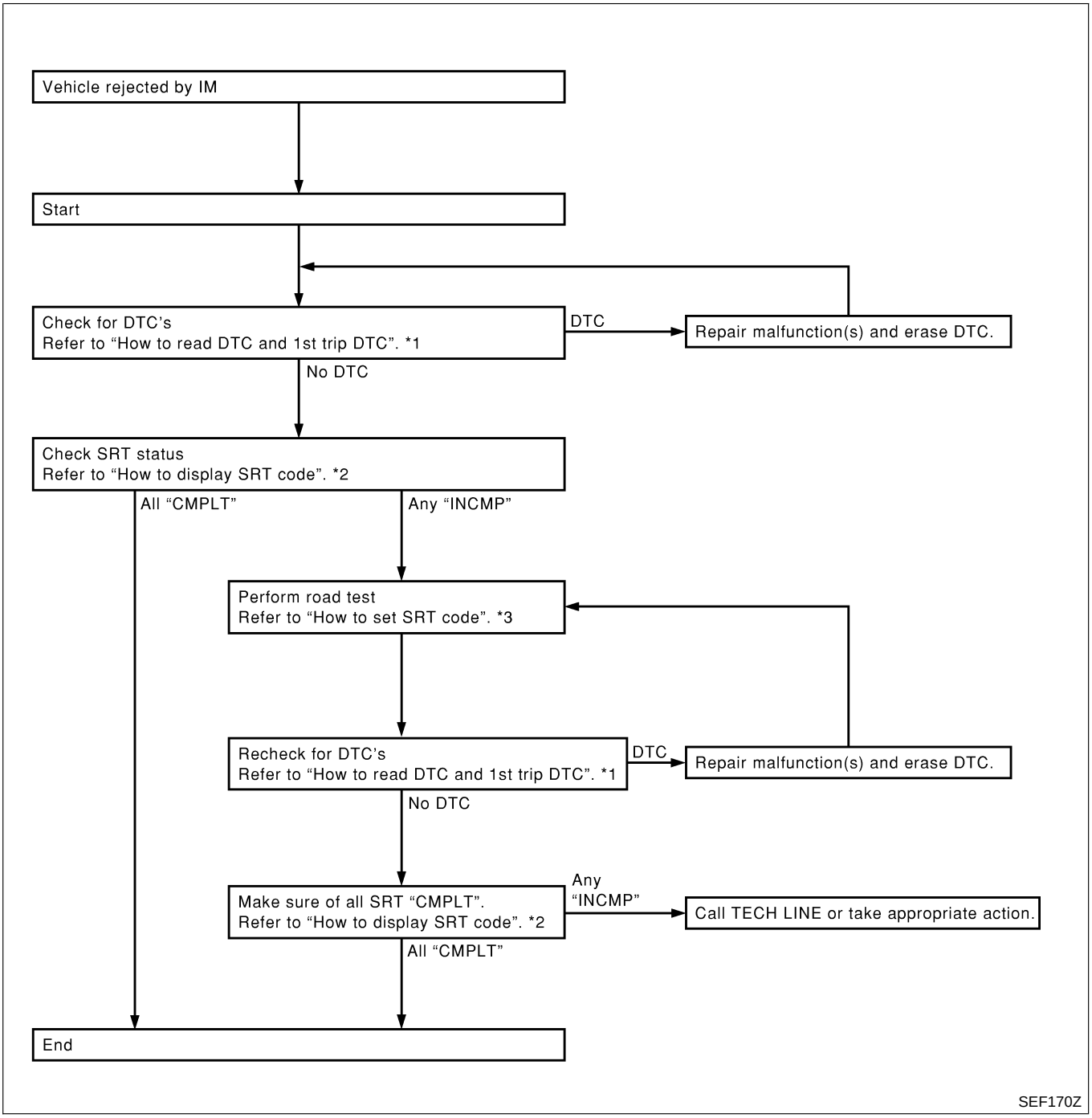
- The SRT will indicate "CMPLT" at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires "CMPLT" of the SRT only with OK self-diagnosis result.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to "CMPLT" of SRT, the self-diagnosis memory 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

NGEC0552S0302

If a vehicle has been rejected for the State emissions inspection due to one or more SRT items indicating "INCMP", review the following flowchart diagnostic sequence on the next page.



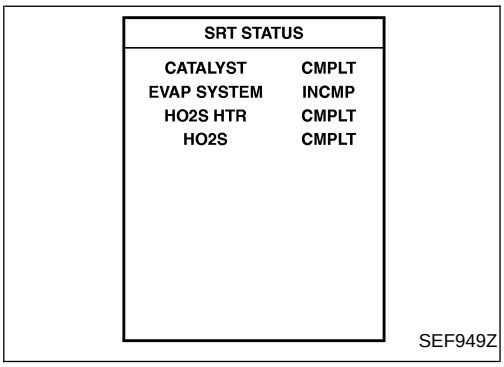
*1 EC-654 *2 EC-658 *3 EC-659

How to Display SRT Code

NGEC0552S0303

1. **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.
2. **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

NGEC0552S0304

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

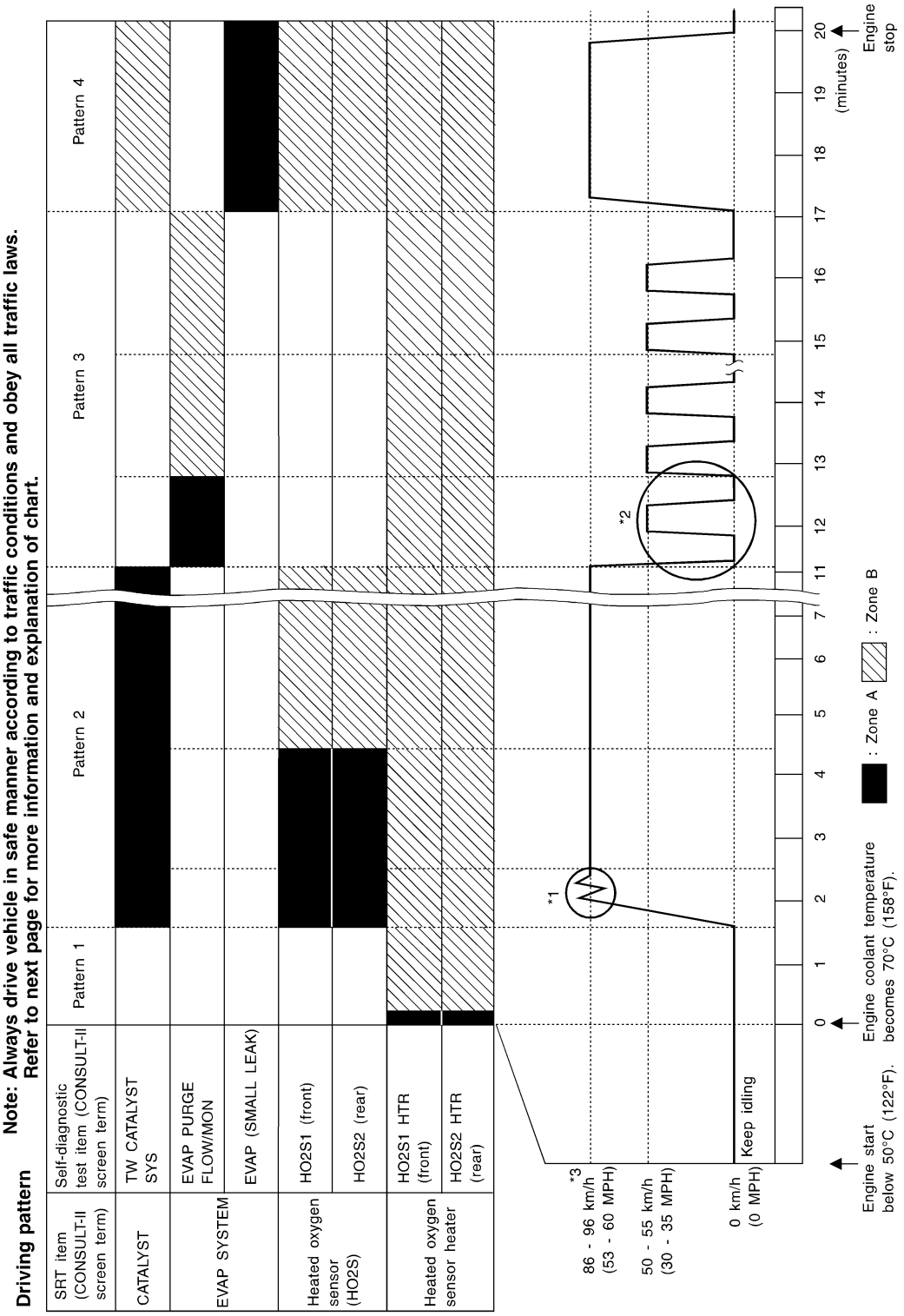
Perform corresponding DTC confirmation procedure one by one based on "Performance Priority" in the table on EC-654.

Without CONSULT-II

The most efficient driving pattern in which SRT codes can be properly set is explained on EC-660. The driving pattern should be performed one or more times to set all SRT codes.

Driving Pattern

NGEC0552S0305



SEF947Y

- 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 terminal 59 and ground 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 terminal 59 and ground is lower than 1.4V).**
- **The engine is started at the tank fuel temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 60 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:

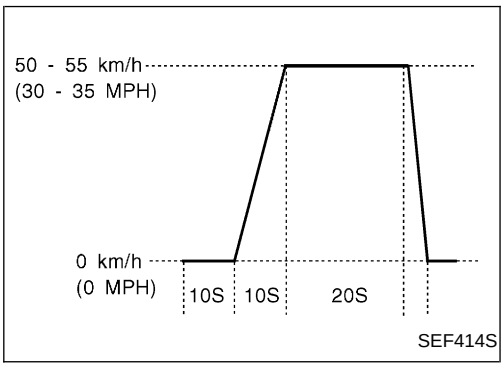
- The driving pattern outlined in *2 must be repeated at least 3 times.

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: Checking the vehicle speed with CONSULT-II or 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)	CRUISE shift point km/h (MPH)	km/h (MPH)
1st to 2nd	24 (15)	24 (15)	24 (15)
2nd to 3rd	40 (25)	29 (18)	40 (25)
3rd to 4th	58 (36)	48 (30)	64 (40)
4th to 5th	64 (40)	63 (39)	72 (45)

Suggested Maximum Speed in Each Gear

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

Gear	km/h (MPH) 2WD (AUTO mode)
1st	50 (30)
2nd	95 (60)

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

NGEC0552S04

The following is the information specified in Mode 6 of SAE J1979.
The test value is a parameter used to determine whether a system/circuit diagnostic test is "OK" or "NG" while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.
Items for which these data (test value and test limit) are displayed are the same as SRT code items (30 test items).
These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

X: Applicable —: Not applicable

SRT item	Self-diagnostic test item	Test value (GST display)		Test limit	Application
		TID	CID		
CATALYST	Three way catalyst function (Right bank)	01H	01H	Max.	X
	Three way catalyst function (Left bank)	03H	02H	Max.	X
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Max.	X
	EVAP control system purge flow monitoring	06H	83H	Min.	X

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

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

NGEC0552S05

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 SELF DIAGNOSTIC FAILURE INDICATED	**P0000**	—	—	—	—
MAF SEN/CIRCUIT	P0100	—	—	X	EC-739
ABSL PRES SEN/CIRC	P0105	—	—	X	EC-748
AIR TEMP SEN/CIRC	P0110	—	—	X	EC-750
COOLANT T SEN/CIRC	P0115	—	—	X	EC-755
THRTL POS SEN/CIRC	P0120	—	—	X	EC-760

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
*COOLAN T SEN/CIRC	P0125	—	—	X	EC-773
HO2S1 (B1)	P0130	X	X	X*2	EC-778
HO2S1 (B1)	P0131	X	X	X*2	EC-789
HO2S1 (B1)	P0132	X	X	X*2	EC-798
HO2S1 (B1)	P0133	X	X	X*2	EC-807
HO2S1 (B1)	P0134	X	X	X*2	EC-821
HO2S1 HTR (B1)	P0135	X	X	X*2	EC-829
HO2S2 (B1)	P0137	X	X	X*2	EC-836
HO2S2 (B1)	P0138	X	X	X*2	EC-846
HO2S2 (B1)	P0139	X	X	X*2	EC-856
HO2S2 (B1)	P0140	X	X	X*2	EC-866
HO2S2 HTR (B1)	P0141	X	X	X*2	EC-876
HO2S1 (B2)	P0150	X	X	X*2	EC-778
HO2S1 (B2)	P0151	X	X	X*2	EC-789
HO2S1 (B2)	P0152	X	X	X*2	EC-798
HO2S1 (B2)	P0153	X	X	X*2	EC-807
HO2S1 (B2)	P0154	X	X	X*2	EC-821
HO2S1 HTR (B2)	P0155	X	X	X*2	EC-829
HO2S2 (B2)	P0157	X	X	X*2	EC-836
HO2S2 (B2)	P0158	X	X	X*2	EC-846
HO2S2 (B2)	P0159	X	X	X*2	EC-856
HO2S2 (B2)	P0160	X	X	X*2	EC-866
HO2S2 HTR (B2)	P0161	X	X	X*2	EC-876
FUEL SYS LEAN/BK1	P0171	—	—	X	EC-884
FUEL SYS RICH/BK1	P0172	—	—	X	EC-893
FUEL SYS LEAN/BK2	P0174	—	—	X	EC-884
FUEL SYS RICH/BK2	P0175	—	—	X	EC-893
FUEL TEMP SEN/CIRC	P0180	—	—	X	EC-901
ENG OVER TEMP	P0217	—	—	X	EC-906
MULTI CYL MISFIRE	P0300	—	—	X	EC-927
CYL 1 MISFIRE	P0301	—	—	X	EC-927
CYL 2 MISFIRE	P0302	—	—	X	EC-927
CYL 3 MISFIRE	P0303	—	—	X	EC-927
CYL 4 MISFIRE	P0304	—	—	X	EC-927
CYL 5 MISFIRE	P0305	—	—	X	EC-927
CYL 6 MISFIRE	P0306	—	—	X	EC-927
KNOCK SEN/CIRC	P0325	—	—	—	EC-936

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
CPS/CIRCUIT (OBD)	P0335	—	—	X	EC-940
CAM POS SEN/CIRC	P0340	—	—	X	EC-946
TW CATALYST SYS-B1	P0420	X	X	X*2	EC-953
TW CATALYST SYS-B2	P0430	X	X	X*2	EC-953
EVAP SMALL LEAK	P0440	X	X	X*2	EC-958
PURG VOLUME CONT/V	P0443	—	—	X	EC-973
VENT CONTROL VALVE	P0446	—	—	X	EC-980
EVAP SYS PRES SEN	P0450	—	—	X	EC-986
EVAP GROSS LEAK	P0455	X	X	X	EC-997
VEH SPEED SEN/CIRC	P0500	—	—	X	EC-1023
IACV/AAC VLV/CIRC	P0505	—	—	X	EC-1027
CLOSED TP SW/CIRC	P0510	—	—	X	EC-1033
A/T COMM LINE	P0600	—	—	—	EC-1040
ECM	P0605	—	—	X	EC-1045
PNP SW/CIRC	P0705	—	—	X	***AT-98***
ATF TEMP SEN/CIRC	P0710	—	—	X	***AT-104***
VEH SPD SEN/CIR AT	P0720	—	—	X	***AT-110***
ENGINE SPEED SIG	P0725	—	—	X	***AT-115***
A/T 1ST GR FNCTN	P0731	—	—	X	***AT-119***
A/T 2ND GR FNCTN	P0732	—	—	X	***AT-125***
A/T 3RD GR FNCTN	P0733	—	—	X	***AT-131***
A/T 4TH GR FNCTN	P0734	—	—	X	***AT-137***
TCC SOLENOID/CIRC	P0740	—	—	X	***AT-146***
A/T TCC S/V FNCTN	P0744	—	—	X	***AT-151***
L/PRESS SOL/CIRC	P0745	—	—	X	***AT-158***
SFT SOL A/CIRC	P0750	—	—	X	***AT-163***
SFT SOL B/CIRC	P0755	—	—	X	***AT-168***
CLOSED LOOP-B1	P1148	—	—	X	EC-1049
CLOSED LOOP-B2	P1168	—	—	X	EC-1049
ENG OVER TEMP	P1217	—	—	X	EC-1051
CPS/CIRC (OBD) COG	P1336	—	—	X	EC-1068
EVAP VERY SMALL LEAK	P1441	X	X	X*2	EC-1077
PURG VOLUME CONT/V	P1444	—	—	X	EC-1092
VENT CONTROL VALVE	P1446	—	—	X	EC-1104
EVAP PURG FLOW/MON	P1447	X	X	X*2	EC-1111
VENT CONTROL VALVE	P1448	—	—	X	EC-1123
VC/V BYPASS/V	P1490	—	—	X	EC-1135

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
VC CUT/V BYPASS/V	P1491	—	—	X	EC-1141
A/T DIAG COMM LINE	P1605	—	—	X	EC-1150
TP SEN/CIRC A/T	P1705	—	—	X	***AT-173***
P-N POS SW/CIRCUIT	P1706	—	—	X	EC-1153
O/R CLTCH SOL/CIRC	P1760	—	—	X	***AT-182***

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

*2: These are not displayed with GST.

NOTE:

Regarding D22 models, "-B1" and "BK1" indicate right bank and "-B2" and "BK2" indicate left bank.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

NGEC0552S06

How to Erase DTC (With CONSULT-II)

NGEC0552S0601

NOTE:

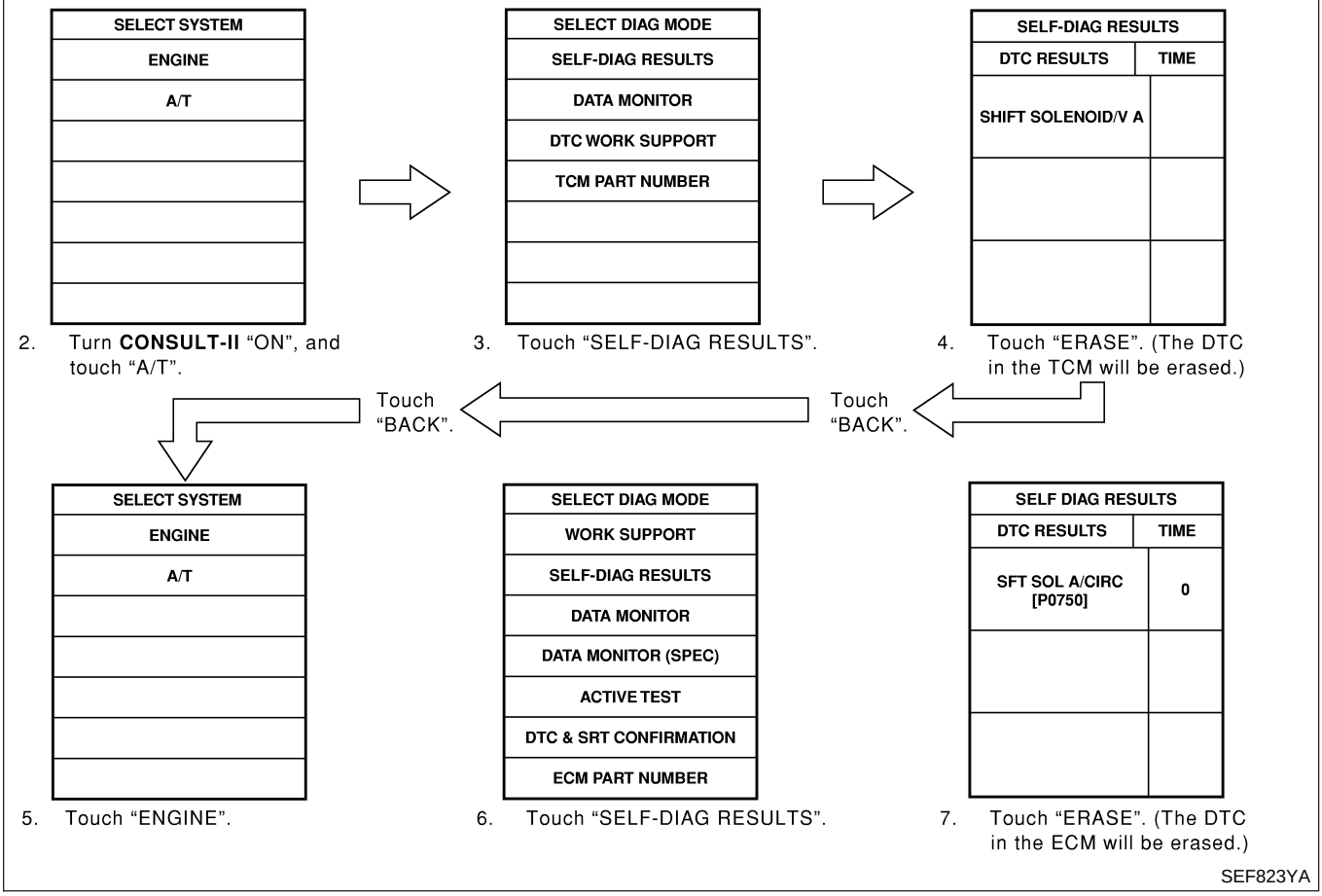
If the DTC is not for A/T related items (see EC-597), skip steps 2 through 4.

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



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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)

NGEC0552S0602

NOTE:

If the DTC is not for A/T related items (see EC-597), skip step 2.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON (engine stopped) again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-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.**
- **Erasing the emission-related diagnostic information using CONSULT-II or GST is easier and quicker than switching the mode selector on the ECM.**
- **The following data are cleared when the ECM memory is erased.**

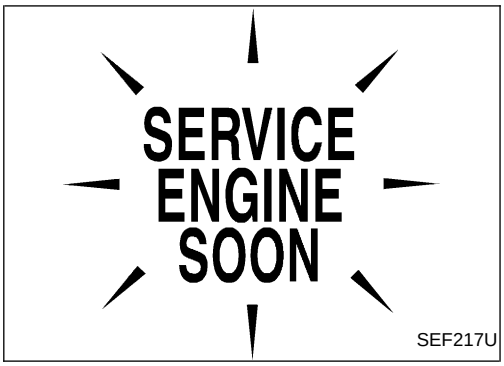
1) Diagnostic trouble codes
2) 1st trip diagnostic trouble codes
3) Freeze frame data
4) 1st trip freeze frame data
5) System readiness test (SRT) codes
6) Test values
7) Others

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

Malfunction Indicator Lamp (MIL)

DESCRIPTION

NGEC0553



The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
- If the MIL does not light up, refer to EL section (“WARNING LAMPS”) or see EC-1195.

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

=NGEC0553S01

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. (See EC-1195.)
	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

NGEC0553S03

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to "WARNING LAMPS", ***EL-89*** or see EC-1195.

Diagnostic Test Mode I — Malfunction Warning

NGEC0553S04

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

OBD System Operation Chart

NGEC0554

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

NGEC0554S01

- 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-653.
- 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

NGEC0554S02

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

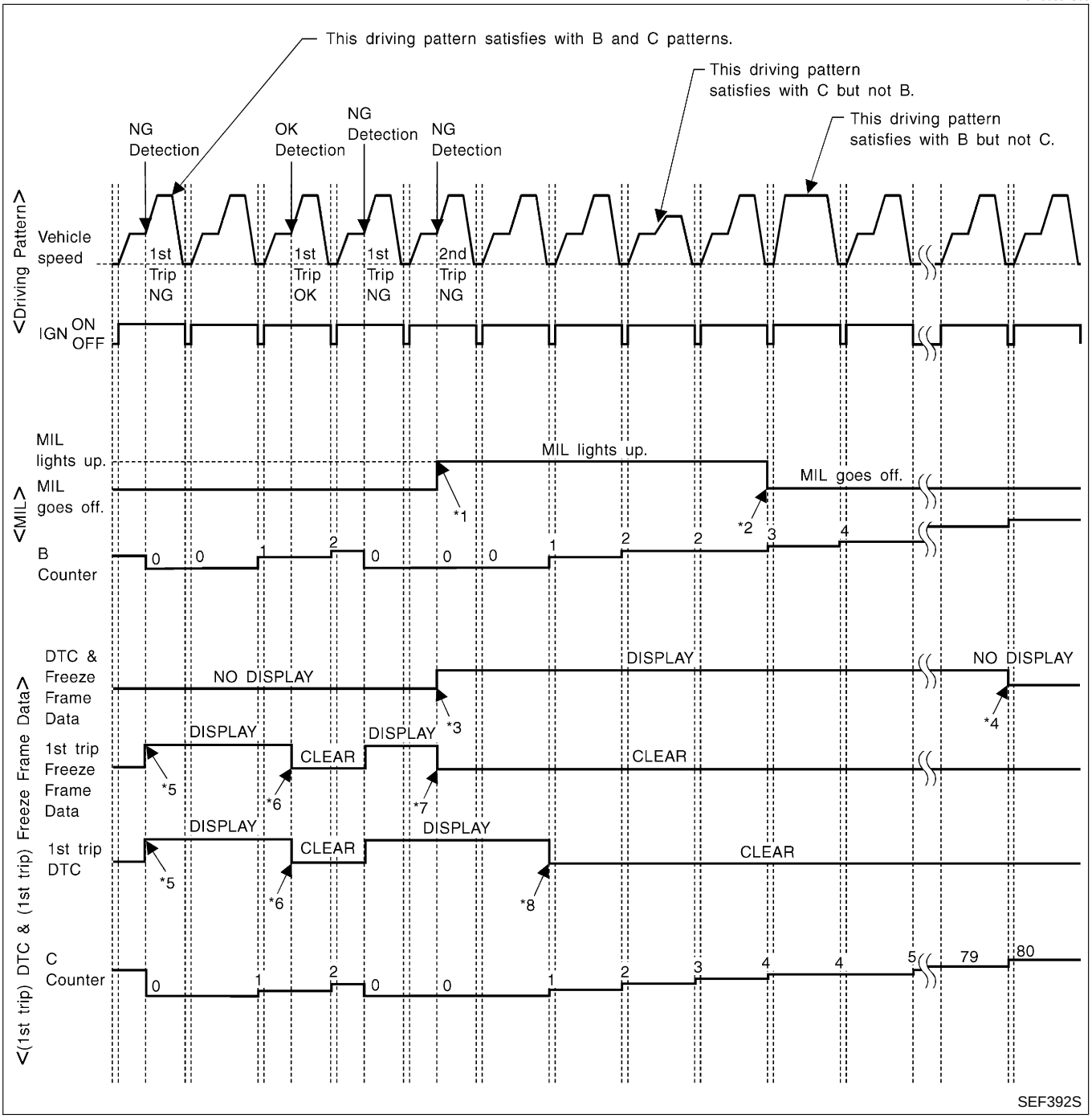
OBD System Operation Chart (Cont'd)

Items	Fuel Injection System	Misfire	Other
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

For details about patterns "B" and "C" under "Fuel Injection System" and "Misfire", see EC-672.
For details about patterns "A" and "B" under "Other", see EC-674.
*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"

=NGEC0554S03



*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"

NGEC0554S04

<Driving Pattern B>

NGEC0554S0401

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>

NGEC0554S0402

Driving pattern C means the vehicle operation as follows:

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

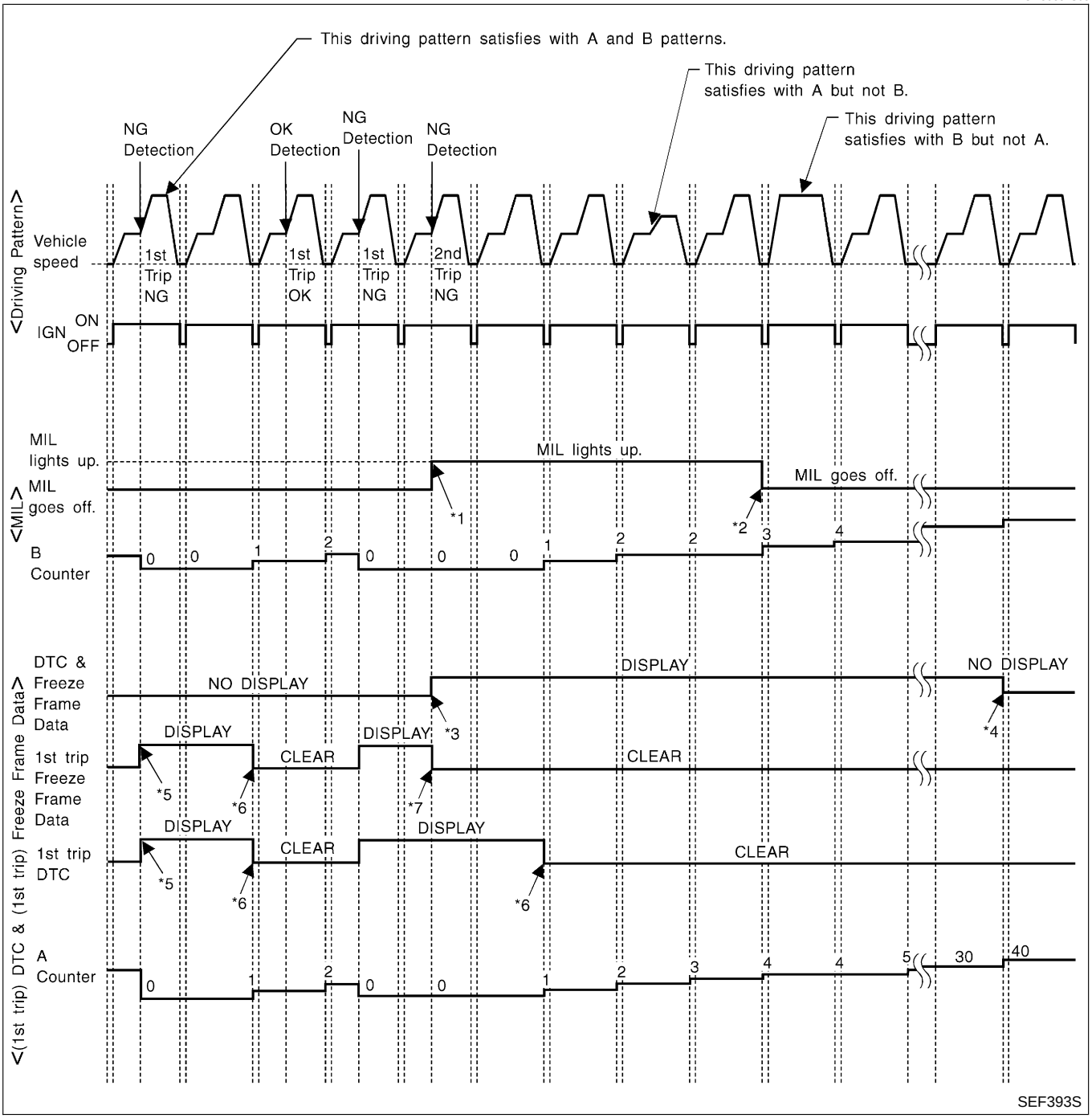
- When the freeze frame data shows lower than 70°C (158°F), "T" should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), "T" should be higher than or equal to 70°C (158°F).

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

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

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

NGEC0554S05



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

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

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

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

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

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

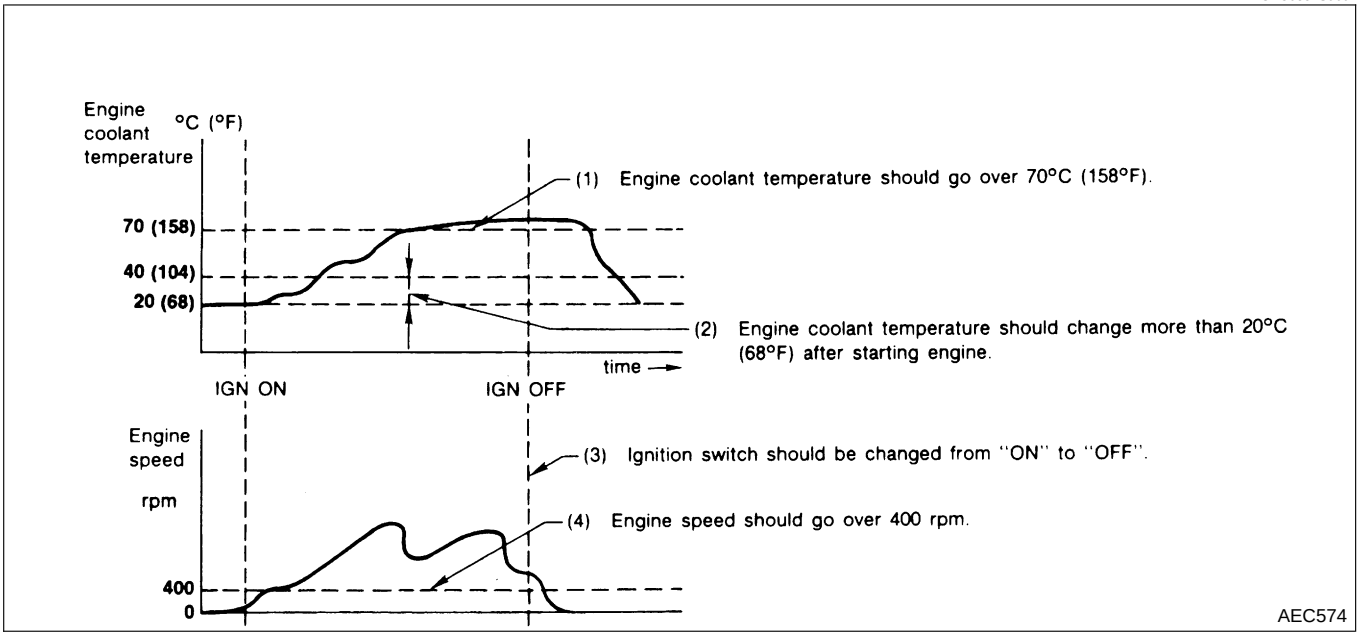
*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

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

NGEC0554S06

<Driving Pattern A>

NGEC0554S0601



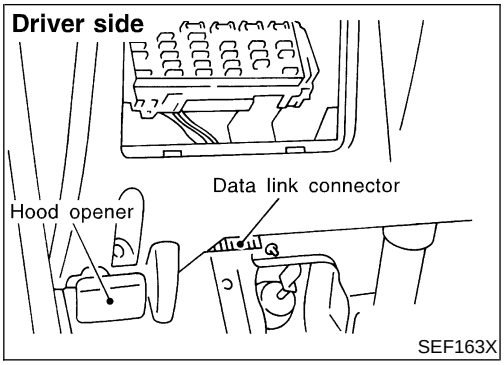
- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

<Driving Pattern B>

NGEC0554S0602

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").



SEF163X

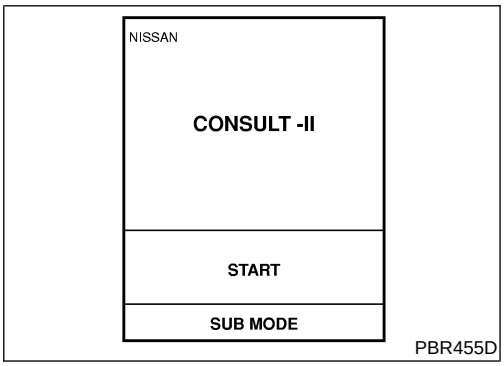
CONSULT-II

=NGEC0555

CONSULT-II INSPECTION PROCEDURE

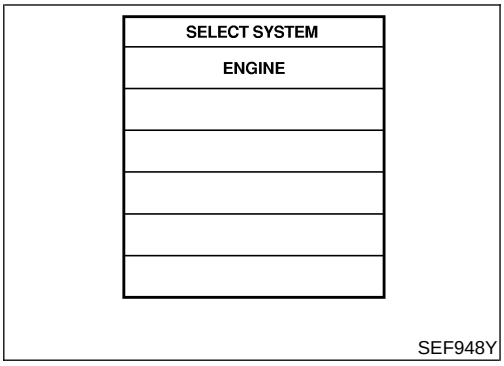
NGEC0555S01

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.



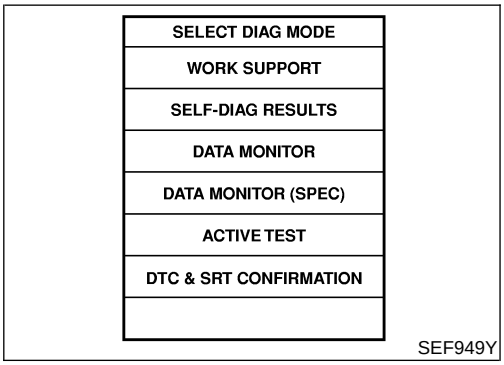
PBR455D

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



SEF948Y

5. Touch “ENGINE”.



SEF949Y

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

NGEC0555S02

		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		X	X	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			
		Intake air temperature sensor		X		X	X			
		Crankshaft position sensor (OBD)		X			X			
		Knock sensor		X			X			
		Ignition switch (start signal)				X	X			
		Closed throttle position switch		X		X	X			
		Closed throttle position switch (throttle position sensor signal)				X	X			
		Air conditioner switch				X	X			
		Park/neutral position (PNP) switch		X		X	X			
		Power steering oil pressure switch				X	X			
		Battery voltage				X	X			
		Ambient air temperature switch				X	X			

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	X		
		IACV-AAC valve	X	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*3		X		X	X	X		
		Heated oxygen sensor 1 heater (front)		X		X	X		X	
		Heated oxygen sensor 2 heater (rear)		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-654.

*3: Models with electric cooling fan.

CONSULT-II (Cont'd)

FUNCTION

=NGEC0555S03

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 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

NGEC0555S04

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
TARGET IGNITION TIMING ADJ	• IDLE CONDITION	When adjusting target ignition timing After adjustment, confirm target ignition timing with a timing light by turning the distributor.
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
SELF-LEARNING CONT	• THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clean the coefficient of self-learning control valve

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 ● FUEL TANK 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	SET ENGINE SPEED AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS. ● ENGINE WARMED UP ● NO-LOAD	When adjusting initial ignition timing and idle speed

SELF-DIAGNOSTIC MODE

NGEC0555S05

DTC and 1st Trip DTC

NGEC0555S0501

Regarding items of "DTC and 1st trip DTC", refer to "TROUBLE DIAGNOSIS — INDEX" (See EC-597.)

Freeze Frame Data and 1st Trip Freeze Frame Data

NGEC0555S0502

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-597.)
FUEL SYS-B1 *2	● "Fuel injection system status" at the moment a malfunction is detected is displayed. ● One mode in the following is displayed. "MODE 2": Open loop due to detected system malfunction "MODE 3": Open loop due to driving conditions (power enrichment, deceleration enrichment) "MODE 4": Closed loop - using oxygen sensor(s) as feedback for fuel control "MODE 5": Open loop - has not yet satisfied condition to go to closed loop
FUEL SYS-B2 *2	
CAL/LD VALUE [%]	● The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	● The engine coolant temperature at the moment a malfunction is detected is displayed.
S-FUEL TRIM-B1 [%]	● "Short-term fuel trim" at the moment a malfunction is detected is displayed. ● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
S-FUEL TRIM-B2 [%]	
L-FUEL TRIM-B1 [%]	● "Long-term fuel trim" at the moment a malfunction is detected is displayed. ● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
L-FUEL TRIM-B2 [%]	
ENGINE SPEED [rpm]	● The engine speed at the moment a malfunction is detected is displayed.
VHCL SPEED [km/h] or [mph]	● The vehicle speed at the moment a malfunction is detected is displayed.

CONSULT-II (Cont'd)

Freeze frame data item *1	Description
ABSOL PRESS [kPa] or [kg/cm^2] or [psi]	● The absolute pressure 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 D22 model, "-B1" indicates right bank and "-B2" indicates left bank.

DATA MONITOR MODE

=NGEC0555S06

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	○		• Indicates the engine speed computed from the REF signal (120° signal) of the camshaft position sensor.	
MAS AIR/FL SE [V]	○	○	• The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a certain value is indicated.
COOLAN TEMP/S [°C] or [°F]	○	○	• The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	• When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
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 ECM is displayed.	
THRTL POS SEN [V]	○	○	• The throttle position sensor signal voltage is displayed.	
TANK F/TMP SE [°C] or [°F]	○		• The fuel temperature judged from the fuel tank 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.	
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.	

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.	
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.	
AMB TEMP SW [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the ambient air temperature switch signal.	
IGNITION SW [ON/OFF]	○		• Indicates [ON/OFF] condition from ignition switch.	
INJ PULSE-B2 [msec]		○	• Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
INJ PULSE-B1 [msec]				
B/FUEL SCHDL [msec]		○	• "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
IGN TIMING [BTDC]		○	• Indicates the ignition timing computed by ECM according to the input signals.	• When the engine is stopped, a certain value is indicated.
IACV-AAC/V [%]		○	• Indicates the IACV-AAC valve control value computed by ECM according to the input signals.	
PURG VOL C/V [%]		○	• Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
A/F ALPHA-B2 [%]			• The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B1 [%]				
AIR COND RLY [ON/OFF]			• The air conditioner relay control condition (determined by ECM according to the input signal) is indicated.	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
FUEL PUMP RLY [ON/OFF]			• Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
COOLING FAN* [ON/OFF]			• Indicates the control condition of the cooling fan (determined by ECM according to the input signal). ON ... Operation OFF ... Stop	
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	
HO2S1 HTR (B1) [ON/OFF]			• Indicates [ON/OFF] condition of front heated oxygen sensor heater determined by ECM according to the input signals.	
HO2S1 HTR (B1) [ON/OFF]				
HO2S2 HTR (B1) [ON/OFF]			• Indicates [ON/OFF] condition of rear heated oxygen sensor heater determined by ECM according to the input signals.	
HO2S2 HTR (B2) [ON/OFF]				
VC/V BYPASS/V [ON/OFF]			• The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated. • ON ... Open OFF ... Closed	
CAL/LD VALUE [%]			• "Calculated load value" indicates the value of the current airflow divided by peak airflow.	
ABSOL TH·P/S [%]			• "Absolute throttle position sensor" indicates the throttle opening 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.	
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.
- Regarding D22 model, "-B1" indicates right bank and "-B2" indicates left bank.

*: Models with electric cooling fan.

CONSULT-II (Cont'd)

DATA MONITOR (SPEC) MODE

NGEC0555S11

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
MAS A/F SE-B1 [V]	○	○	• The signal voltage of the mass air flow sensor specification is displayed.	• When the 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 the engine is running, specification range is indicated.
A/F ALPHA-B1 [%]		○	• Indicates the mean value of the air-fuel ratio feedback correction factor per cycle.	• When the engine is running, specification range is indicated. • This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]		○		

NOTE:

- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
- Regarding D22 model, "B1" indicates bank 1 and "B2" indicates bank 2.

ACTIVE TEST MODE

NGEC0555S07

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
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
COOLING FAN*	• Ignition switch: ON • Turn the cooling fan "ON" and "OFF" using CONSULT-II.	Cooling fan moves and stops.	• Harness and connector • Cooling fan motor • Cooling fan relay
FUEL PUMP RELAY	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay "ON" and "OFF" using CONSULT-II and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connector • Fuel pump relay

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
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

*: Models with electric cooling fan.

DTC CONFIRMATION MODE

NGEC0555S08

SRT STATUS Mode

NGEC0555S0801

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-655.

SRT WORK SUPPORT Mode

NGEC0555S0803

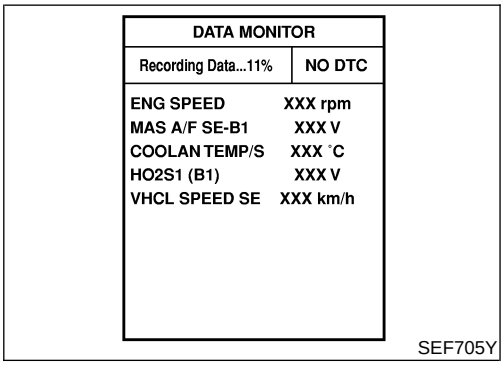
SRT status and some of the data monitor item can be read.

CONSULT-II (Cont'd)

DTC Work Support Mode

NGEC0555S0802

Test mode	Test item	Condition	Reference page
EVAPORATIVE SYSTEM	EVAP SML LEAK P0440	Refer to corresponding trouble diagnosis for DTC.	EC-958
	EVAP VERY SML LEAK P1441		EC-1077
	PURG VOL CN/V P1444		EC-1092
	PURGE FLOW P1447		EC-1111
	VC CUT/V BP/V P1491		EC-1141
HEATED OXYGEN SENSOR 1 (FRONT)	HO2S1 (B1) P0130		EC-778
	HO2S1 (B1) P0131		EC-789
	HO2S1 (B1) P0132		EC-798
	HO2S1 (B1) P0133		EC-807
	HO2S1 (B2) P0150		EC-778
	HO2S1 (B2) P0151		EC-789
	HO2S1 (B2) P0152		EC-798
	HO2S1 (B2) P0153		EC-807
HEATED OXYGEN SENSOR 2 (REAR)	HO2S2 (B1) P0137		EC-836
	HO2S2 (B1) P0138		EC-846
	HO2S2 (B1) P0139		EC-856
	HO2S2 (B2) P0157		EC-836
	HO2S2 (B2) P0158		EC-846
	HO2S2 (B2) P0159		EC-856



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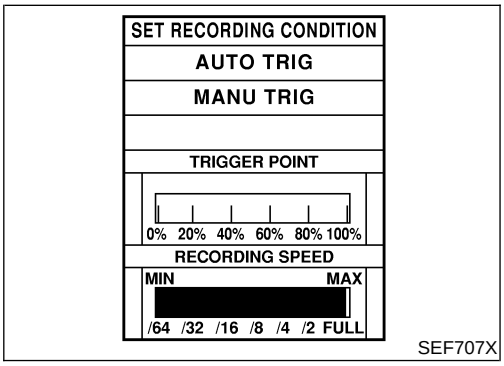


SEF707X

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

NGEC0555S09

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.

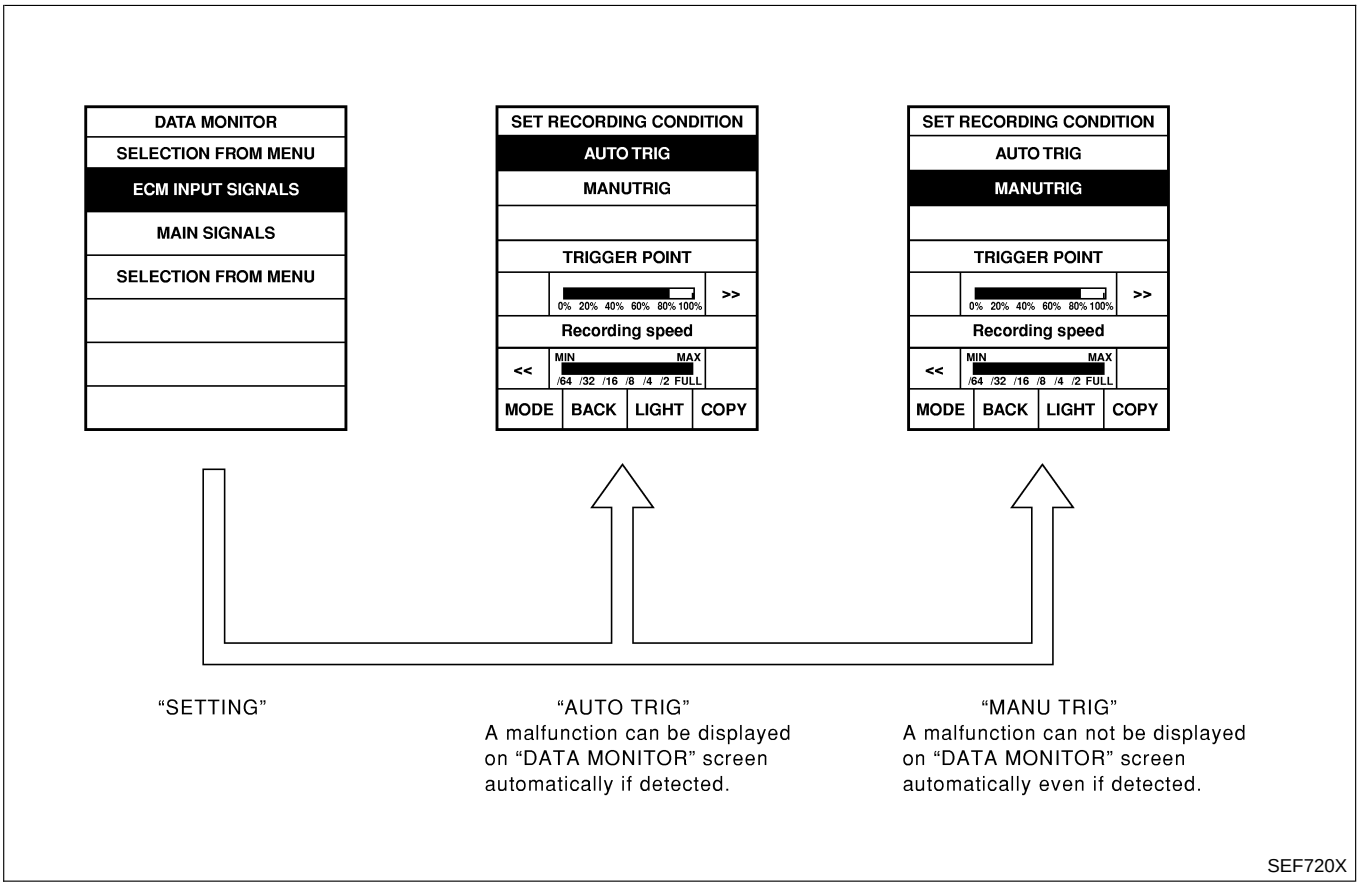
Use these triggers as follows:

1) "AUTO TRIG"

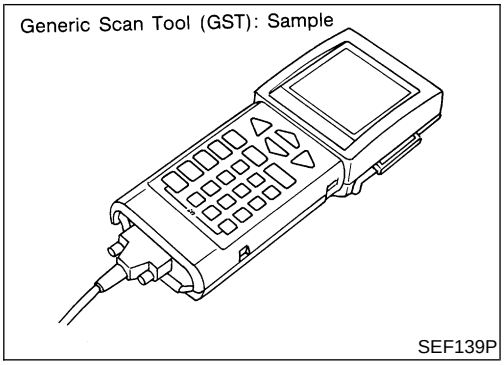
- While trying to detect the DTC/1st trip DTC by performing the "DTC Confirmation Procedure", be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.
- While narrowing down the possible causes, CONSULT-II should be set in "DATA MONITOR (AUTO 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 "Incident Simulation Tests" in "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", ***GI-23***.

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.



SEF720X



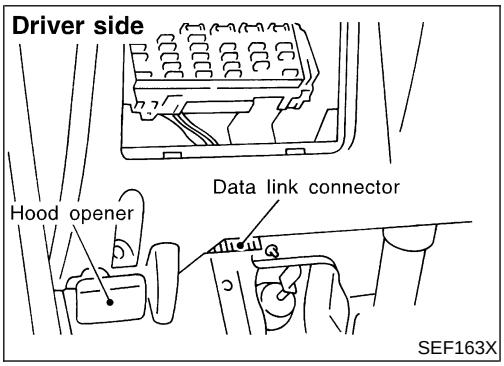
Generic Scan Tool (GST)

=NGEC0556

DESCRIPTION

NGEC0556S01

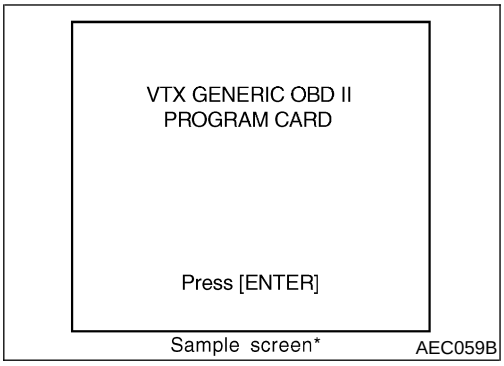
Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 7 different functions explained on the next page.
ISO9141 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.



GST INSPECTION PROCEDURE

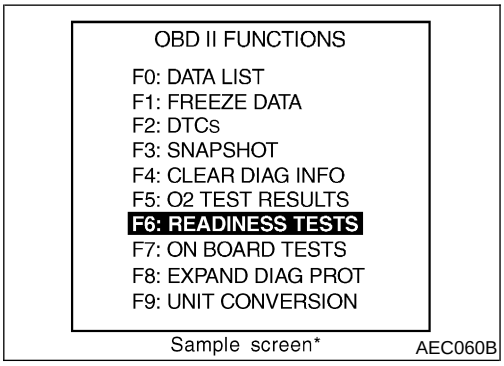
NGEC0556S02

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.)



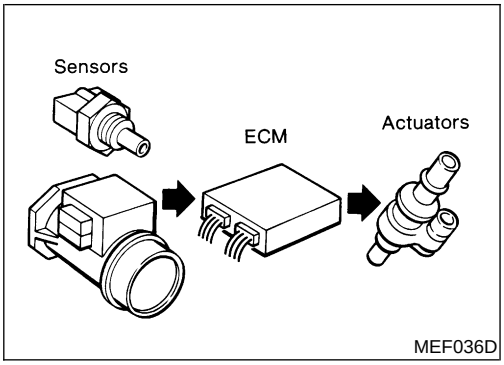
5. Perform each diagnostic mode according to each service procedure.

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

FUNCTION

NGEC0556S03

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-679).]
MODE 3	DTCs	This mode gains access to emission-related power train trouble codes which were stored by ECM.
MODE 4	CLEAR DIAG INFO	This mode can clear all emission-related diagnostic information. This includes: ● Clear number of diagnostic trouble codes (MODE 1) ● Clear diagnostic trouble codes (MODE 3) ● Clear trouble code for freeze frame data (MODE 1) ● Clear freeze frame data (MODE 2) ● Reset status of system monitoring test (MODE 1) ● Clear on board monitoring test results (MODE 6 and 7)
MODE 6	(ON BOARD TESTS)	This mode accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
MODE 7	(ON BOARD TESTS)	This mode enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
MODE 8	—	This mode can close EVAP system in ignition switch "ON" position (Engine stopped). When this mode is performed, the following parts can be opened or closed. ● EVAP canister vent control valve open ● Vacuum cut valve bypass valve closed In the following conditions, this mode cannot function. ● Low ambient temperature ● Low battery voltage ● Engine running ● Ignition switch OFF ● Low fuel temperature ● Too much pressure is applied to EVAP system
MODE 9	CALIBRATION ID	This mode is to enable the off-board to request vehicle specific vehicle information such as Vehicle Identification Number (VIN) and calibration IDs.



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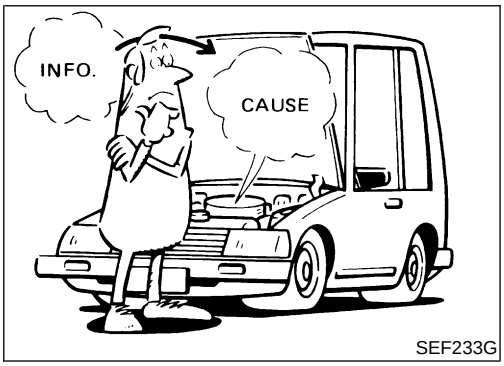

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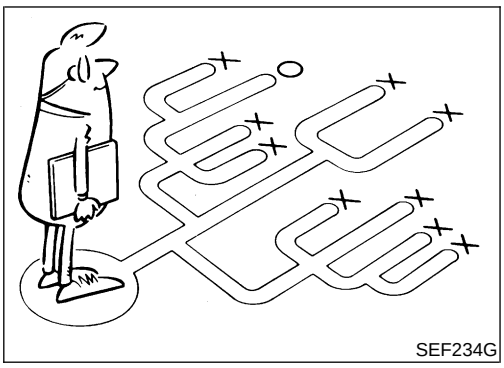

SEF234G

KEY POINTS

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

SEF907L

Introduction

NGEC0557

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-692.

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

NGEC0557S01

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

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

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

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

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

Worksheet Sample

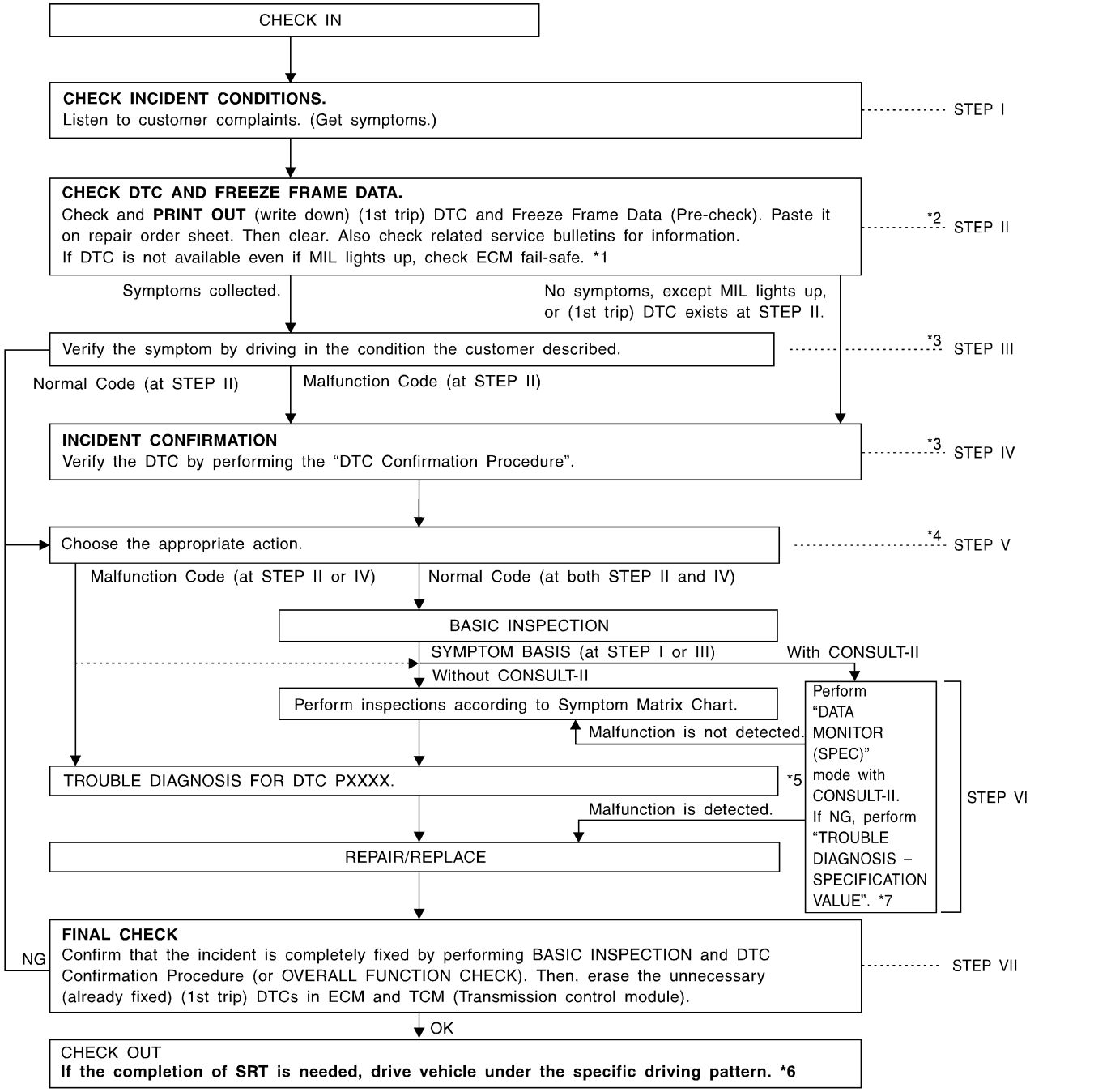
NGEC0557S0101

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

NGEC0558



SEF510ZF

*1 EC-709

*2 If time data of "SELF-DIAG RESULTS" is other than "0" or "[1t]", perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.

*3 If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.

*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-733.

*5 If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.

*6 EC-660

*7 EC-728

DESCRIPTION FOR WORK FLOW

NGEC0558S01

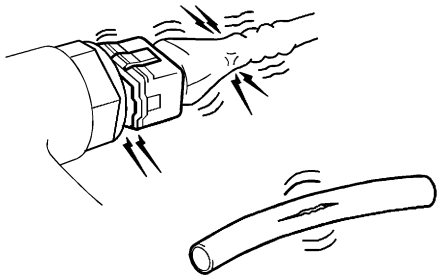
STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-691.
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II or GST) the (1st trip) DTC and the (1st trip) freeze frame data, then erase the DTC and the data. (Refer to EC-666.) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732. 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-710.) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The "DIAGNOSTIC WORK SHEET" and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732. If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) DTC by driving in (or performing) the "DTC Confirmation Procedure". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II or GST. During the (1st trip) DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732. In case the "DTC Confirmation Procedure" is not available, perform the "Overall Function Check" instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The "NG" result of the "Overall Function Check" is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-694.) If CONSULT-II is available, perform "DATA MONITOR (SPEC)" mode with CONSULT-II and proceed to the "TROUBLE DIAGNOSIS — SPECIFICATION VALUE", EC-728. (If malfunction is detected, proceed to "REPAIR REPLACE".) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-710.)
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-714, EC-719. 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 "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", "Circuit Inspection", ***GI-25***. Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.
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-666.)

Basic Inspection

NGEC0559

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

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

1	INSPECTION START	
1. Check service records for any recent repairs that may indicate a related problem, or the current need for scheduled maintenance. 2. Open engine hood and check the following: ● Harness connectors for improper connections ● Vacuum hoses for splits, kinks, or improper connections ● Wiring for improper connections, pinches, or cuts  SEF983U		
Models with CONSULT-II	▶	GO TO 2.
Models with GST	▶	GO TO 2.
Models with No Tools	▶	GO TO 16.

2	CONNECT CONSULT-II OR GST TO THE VEHICLE	
With CONSULT-II Connect “CONSULT-II” to the data link connector for CONSULT-II and select “ENGINE” from the menu. Refer to EC-675.		
With GST Connect “GST” to the data link connector for GST. Refer to EC-688.		
Models with CONSULT-II	▶	GO TO 3.
Models with GST	▶	GO TO 15.

3	CHECK FI CAM FUNCTION

With CONSULT-II

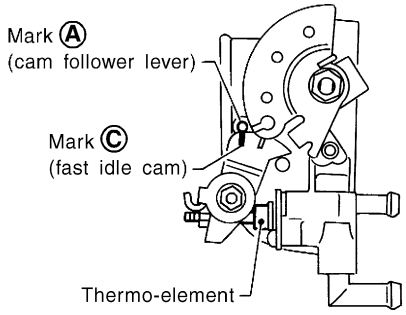
1. Turn ignition switch ON.
2. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
3. Start engine and warm it up.

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C

SEF013Y

4. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.

- The center of mark **A** is aligned with mark **C**.
- The cam follower lever's roller is not touching the fast idle cam.



SEF971R

OK or NG

OK	▶	GO TO 4.
NG	▶	1. Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-639. 2. GO TO 4.

4	CHECK IGNITION TIMING

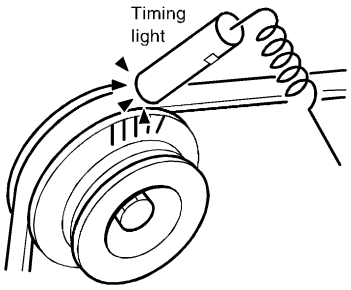
With CONSULT-II

1. Warm up engine to normal operating temperature.
2. Select "TARGET IDLE RPM ADJ" in "WORK SUPPORT" mode and touch "START".

TARGET IDLE RPM ADJ
SET ENGINE RPM AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITION. -ENG WARMED UP ENOUGH -NO LOAD

SEC019C

3. Check ignition timing at idle using a timing light.



SEF984U

Ignition timing: 10°±2° BTDC

OK or NG

OK	▶	GO TO 5.
NG	▶	1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-641. 2. GO TO 5.

5	CHECK BASE IDLE SPEED

With CONSULT-II

1. Select "TARGET IDLE RPM ADJ" in "WORK SUPPORT" mode and touch "START".

TARGET IDLE RPM ADJ
SET ENGINE RPM AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITION. -ENG WARMED UP ENOUGH -NO LOAD

SEC019C

2. Check idle speed.

700±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 6.
NG	▶	1. Adjust engine speed by turning idle speed adjusting screw. Refer to "Idle Speed/ Ignition Timing/Idle Mixture Ratio Adjustment", EC-641. 2. GO TO 6.

6	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-I

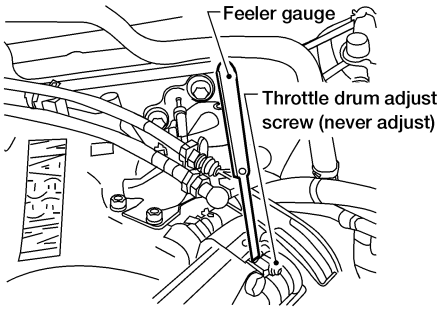
With CONSULT-II
NOTE:
Always check ignition timing and base idle speed before performing the following.
1. Warm up engine to normal operating temperature.
2. Check FI cam, refer to procedure 3.
3. Stop engine.

▶	GO TO 7.

7	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

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

- Insert a 0.2 mm (0.008 in) and 0.4 mm (0.016 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure and check the signal.



LEC517

DATA MONITOR	
MONITOR	NO DTC
CLSD THL/P SW	ON

SEF173Y

"CLSD THL/P SW" signal should remain "ON" while inserting 0.2 mm (0.008 in) feeler gauge.
"CLSD THL/P SW" signal should remain "OFF" while inserting 0.4 mm (0.016 in) feeler gauge.

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 8.

8	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION

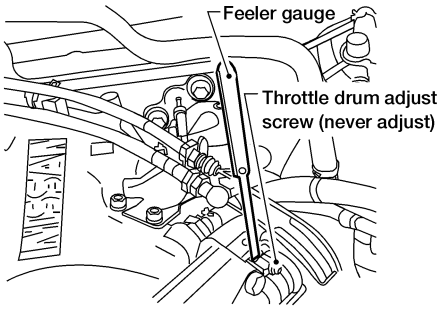
With CONSULT-II
NOTE:
- **Never adjust throttle adjust screw (TAS).**
- **Do not touch throttle drum when checking "CLSD THL/P SW" signal, doing so may cause an incorrect adjustment.**

1. Warm up engine to normal operating temperature.
2. Check FI cam. Refer to procedure 3.
3. Stop engine.
4. Loosen throttle position sensor fixing bolts.

▶	GO TO 9.

9	ADJUSTMENT CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

1. Turn ignition switch ON.
2. Select "CLSD THL/P SW" in "DATA MONITOR" mode.
3. Insert 0.3 mm (0.012 in) feeler gauge between throttle adjust screw and throttle drum as shown in the figure.



LEC517

4. Open throttle valve and then close.
5. Check "CLSD THL/P SW" signal.

DATA MONITOR	
MONITOR	NO DTC
CLSD THL/P SW	OFF

SEF305Y

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

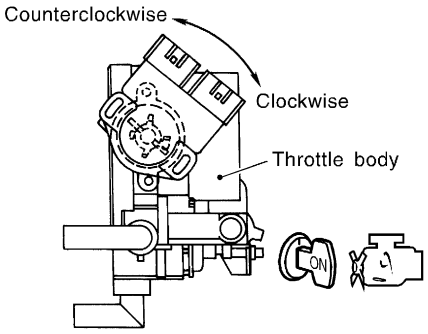
OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 8.

10	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-III

With CONSULT-II

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



SEF689W

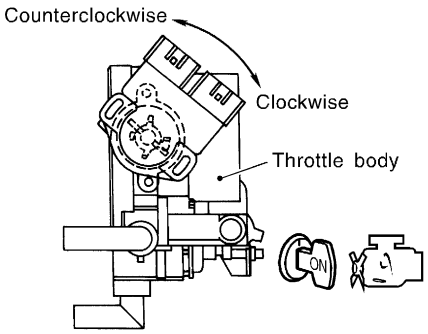
	▶	GO TO 11.

11	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-IV

With CONSULT-II

1. Remove 0.3 mm (0.012 in) feeler gauge then insert 0.2 mm (0.008 in) feeler gauge.
2. Temporarily tighten sensor body fixing bolts as follows.

- **Gradually move the sensor body counterclockwise and stop it when "CLSD THL/P SW" signal switches from "OFF" to "ON", then temporarily tighten sensor body fixing bolts.**



SEF689W

3. Make sure two or three times that the signal is "ON" when the throttle valve is closed and "OFF" when it is opened.
4. Remove 0.2 mm (0.008 in) feeler gauge then insert 0.4 mm (0.016 in) feeler gauge.
5. Make sure two or three times that the signal remains "OFF" when the throttle valve is closed.
6. Tighten throttle position sensor.
7. Check the "CLSD THL/P SW" signal again.
   The signal remains "OFF" while closing throttle valve.

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 8.

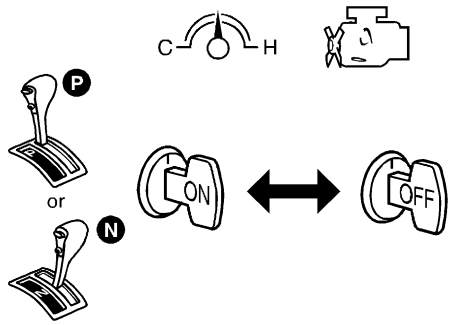
12	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

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. Remove feeler gauge.
2. Start engine.
3. Warm up engine to normal operating temperature.
4. Select "CLSD THL POS" in "DATA MONITOR" mode.
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 5 seconds.
8. Repeat steps 5 and 6 until "CLSD THL POS" signal changes to "ON".

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
CLSD THL/P SW	ON

SEF197Y

	▶	GO TO 13.

13	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.

750±50 rpm (in "P" or "N" position)

OK or NG

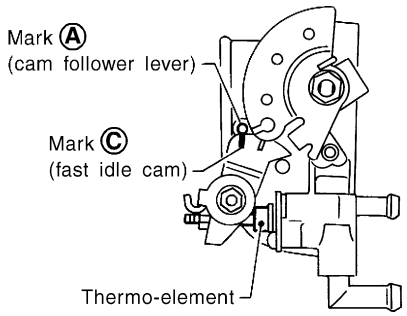
OK	▶	**INSPECTION END**
NG	▶	Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-641.

14	CHECK FI CAM FUNCTION

With GST

1. Turn ignition switch ON.
2. Select "MODE 1" with GST.
3. Start engine and warm it up.
4. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.

- The center of mark **A** is aligned with mark **C**.
- The cam follower lever's roller is not touching the fast idle cam.



SEF971R

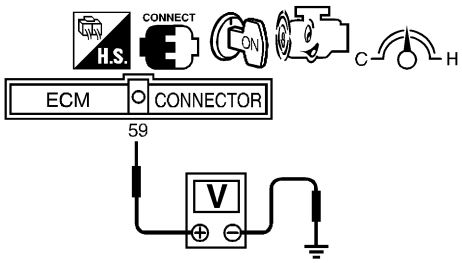
OK or NG

OK	▶	GO TO 16.
NG	▶	1. Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-639. 2. GO TO 16.

15	CHECK FI CAM FUNCTION

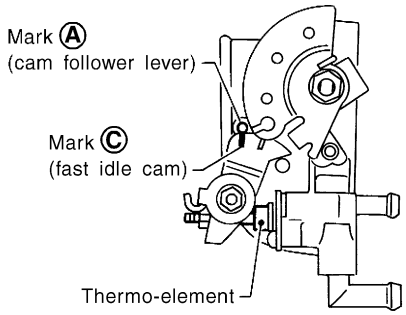
No Tools

1. Set the voltmeter between ECM terminal 59 (Engine coolant temperature sensor signal) and ground.
2. Start engine and warm it up.



SEF119W

3. When the voltage is between 1.10 to 1.36V, check the following.
- The center of mark **A** is aligned with mark **C**.
- The cam follower lever's roller is not touching the fast idle cam.



SEF971R

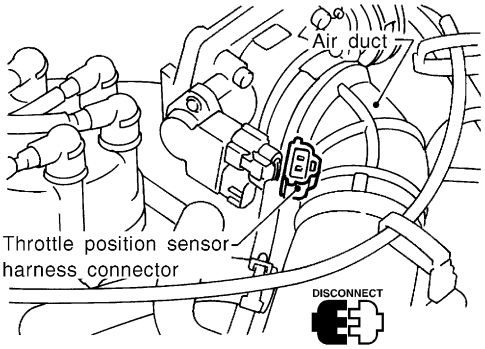
OK or NG

OK	▶	GO TO 16.
NG	▶	1. Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-639. 2. GO TO 16.

16	CHECK IGNITION TIMING

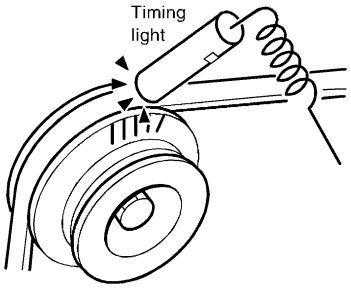
Without CONSULT-II

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



SEF975R

3. Start engine.
4. Check ignition timing at idle using a timing light.



SEF984U

Ignition timing: 10°±2° BTDC

OK or NG

OK	▶	GO TO 17.
NG	▶	1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/ Idle Mixture Ratio Adjustment", EC-641. 2. GO TO 17.

17	CHECK BASE IDLE SPEED

Without CONSULT-II

Does engine speed fall to the following speed?

700±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 18.
NG	▶	1. Adjust engine speed by turning idle speed adjusting screw. Refer to "Idle Speed/ Ignition Timing/ Idle Mixture Ratio Adjustment", EC-641. 2. GO TO 18.

18	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION

Without CONSULT-II

NOTE:

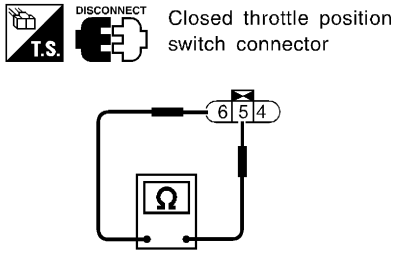
Always check ignition timing and base idle speed before performing the following.

1. Warm up engine to normal operating temperature.
2. Check FI cam, refer to procedure 12 or 13.
3. Stop engine.

	▶	GO TO 19.

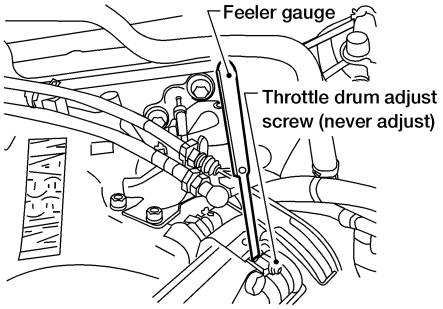
19	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-I

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



SEF862V

- Insert the 0.2 mm (0.008 in) and 0.4 mm (0.016 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure.



LEC517

"Continuity should exist" while inserting 0.2 mm (0.008 in) feeler gauge.
"Continuity should not exist" while inserting 0.4 mm (0.016 in) feeler gauge.

OK or NG

OK	▶	GO TO 24.
NG	▶	GO TO 20.

20	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION

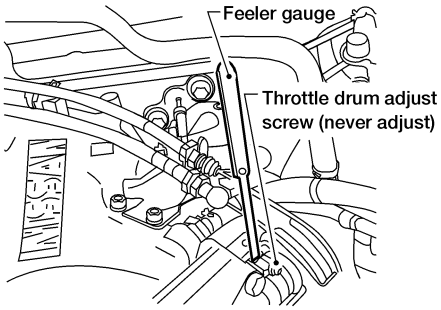
Without CONSULT-II
NOTE:
- **Never adjust throttle adjust screw (TAS).**
- **Do not touch throttle drum when checking "continuity", doing so may cause an incorrect adjustment.**

1. Warm up engine to normal operating temperature.
2. Check FI cam. Refer to procedure 12 or 13.
3. Stop engine.
4. Loosen throttle position sensor fixing bolts.

	▶	GO TO 21.

21	ADJUSTMENT CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

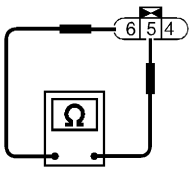
1. Disconnect closed throttle position switch harness connector.
2. Insert 0.3 mm (0.012 in) feeler gauge between the throttle adjust screw and throttle drum as shown in the figure.



LEC517

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

Closed throttle position switch connector



SEF862V

Continuity should not exist while closing the throttle position sensor.

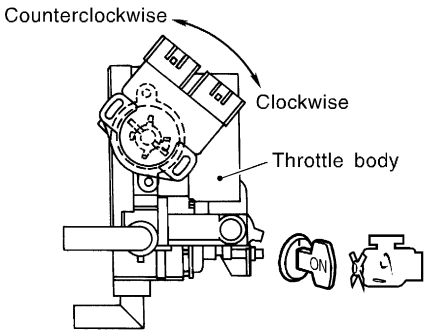
OK or NG

OK	▶	GO TO 23.
NG	▶	GO TO 22.

22	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-III

Without CONSULT-II

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



SEF689W

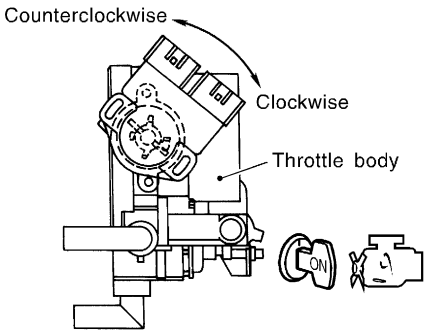
	▶	GO TO 23.

23	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-IV

Without CONSULT-II

1. Remove 0.3 mm (0.012 in) feeler gauge then insert 0.2 mm (0.008 in) feeler gauge.
2. Temporarily tighten sensor body fixing bolts as follows.

- **Gradually move the sensor body counterclockwise and stop it when the continuity comes to exist, then temporarily tighten sensor body fixing bolts.**



SEF689W

3. 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.
4. Remove 0.2 mm (0.008 in) feeler gauge then insert 0.4 mm (0.016 in) feeler gauge.
5. Make sure two or three times that the continuity does not exist when the throttle valve is closed.
6. Tighten throttle position sensor.
7. Check the continuity again.

Continuity does not exist while closing the throttle valve.

OK or NG

OK	▶	GO TO 24.
NG	▶	GO TO 20.

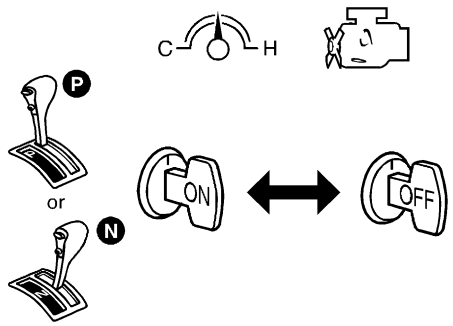
24	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

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



SEF864V

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

	▶	GO TO 25.

25	REINSTALLATION
⊗ **Without CONSULT-II** 1. Reconnect throttle position sensor harness connector and closed throttle position switch harness connector. 2. Start engine and rev it (2,000 to 3,000 rpm) two or three times under no-load and then run engine at idle speed.	
▶	GO TO 26.

26	CHECK TARGET IDLE SPEED
⊗ **Without CONSULT-II** 1. Start engine and warm it up to normal operating temperature. 2. Check idle speed. **750±50 rpm (in "P" or "N" position)**	
OK or NG	
OK ▶	GO TO 27.
NG ▶	1. Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-641. 2. GO TO 27.

27	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-666 and "HOW TO ERASE DTC", ***AT-35***.	
▶	**INSPECTION END**

DTC Inspection Priority Chart

NGEC0560

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 (OBD) • P0340 Camshaft position sensor • P0460 P0461 P1464 Fuel level sensor • P0500 Vehicle speed sensor • P0600 A/T communication line • P0605 ECM • P1605 A/T diagnosis communication line • P1706 Park/Neutral position (PNP) switch
2	• P0105 Absolute pressure sensor (0803) • 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 Engine coolant overtemperature enrichment protection • P0443 P1444 EVAP canister purge volume control solenoid valve • P0446 P1446 P1448 EVAP canister vent control valve • P0450 EVAP control system pressure sensor • P0510 Closed throttle position switch • P0705-P0755 P1705 P1760 A/T related sensors, solenoid valves and switches • P1441 EVAP control system (VERY SMALL LEAK) • P1447 EVAP control system purge flow monitoring • P1490 P1491 Vacuum cut valve bypass valve
3	• P0171 P0172 P0174 P0175 Fuel injection system function • P0306 - P0300 Misfire • P0420 P0430 Three way catalyst function • P0440 EVAP control system (SMALL LEAK) • P0455 EVAP control system (GROSS LEAK) • P0505 IACV-AAC valve • P0731-P0734 P0744 A/T function • P1148 P1168 Closed loop control

Fail-safe Chart

=NGEC0561

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. / CONSULT-II GST	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
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 value
		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

NGEC0562

SYSTEM — BASIC ENGINE CONTROL SYSTEM

NGEC0562S01

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		3	2			3		1	EC-1177
	Injector circuit							2							EC-1169
	Fuel pressure regulator system	4	4	4	4	4	4	4	3	3		4			EC-638
	Evaporative emission system														EC-619
Air	Positive crankcase ventilation system												1		EC-635
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-641
	IACV-AAC valve circuit	2	1	3	3	3	2	2	2	2		3		1	EC-1027
	IACV-FICD solenoid valve circuit		2				3	3							EC-1190
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-641
	Ignition circuit	1	1	2	2	2		2	2			2			EC-1162
Main power supply and ground circuit		1	2	3	3	3		3	2		1	3		1	EC-733
Air conditioner circuit		2					3			2					***HA-11***

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 circuit	1	1	2	2	2		2	2			2			EC-946
Mass air flow sensor circuit				3										EC-739
Heated oxygen sensor 1 (front) circuit														EC-778
Engine coolant temperature sensor circuit	1	2	3		3	3			2		3			EC-755, 773
Throttle position sensor circuit		1	2		2	2					2			EC-760
Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-694
Vehicle speed sensor circuit		2	3		3						3			EC-1023
Knock sensor circuit				3										EC-936
ECM	2	2				3	3	2	2	1				EC-1045, 709
Start signal circuit	1													EC-1174
Park/neutral position (PNP) switch circuit			3		3		3	2			3			EC-1153
Power steering oil pressure switch circuit		2												EC-1185

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

Symptom Matrix Chart (Cont'd)

SYSTEM — ENGINE MECHANICAL & OTHER

NGEC0562S02

		SYMPTOM													Reference section
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												***FE-4***
	Fuel piping			5	5	5		5	4			5			—
	Vapor lock														
	Valve deposit	5		5	5	5		5	4			5			
	Poor fuel (Heavy weight gasoline, Low octane)														
Air	Air duct	5	5	5	5	5	5	5	4	4		5			
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor — throttle body)														
	Throttle body, Throttle wire														***FE-3***
	Air leakage from intake manifold/ Collector/Gasket														—
Cranking	Battery	1	1	1		1		1	1			1		1	***SC-4***
	Generator circuit														
	Starter circuit														
	Park/neutral position (PNP) switch														***AT-98***
	Drive plate/Flywheel	6													***EM-111***

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

(continued on next page)

		SYMPTOM													Reference section
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Engine	Cylinder head	5	5	5	5	5		5	5			5			***EM-77***, ***EM-88*** and ***EM-104***
	Cylinder head gasket										2		2		
	Cylinder block	6	6	6	6	6		6	6			6	3		
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain	6	6	6	6	6		6	6			6			
	Camshaft														
	Intake valve												2		
	Exhaust valve														
	Hydraulic lash adjuster														
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	6	6	6	6	6		6	6			6			***FE-9***
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	6	6	6	6	6		6	6			6	2		***MA-29***, ***EM-72*** and ***LC-20***
	Oil level (Low/Filthy) oil														***MA-29***
Cooling	Radiator/Hose/Radiator filler cap	6	6	6	6	6		6	6		2	6			
	Thermostat						5			5					***LC-26***
	Water pump														
	Water gallery														
	Cooling fan						5			5					
	Coolant level (low)/Contaminated coolant														***MA-26***

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

CONSULT-II Reference Value in Data Monitor Mode

NGEC0563

Remarks:

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

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

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

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT-II value.		Almost the same speed as the CONSULT-II value.
MAS AIR/FL SE	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: “N” • No-load	Idle	1.0 - 1.7V
		2,500 rpm	1.7 - 2.3V
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 ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.
HO2S2 (B1) HO2S2 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ⟷ RICH
VHCL SPEED SE	• Turn drive wheels and compare speedometer indication with the CONSULT-II value		Almost the same speed as the CONSULT-II value
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V
THRTL POS SEN	• Engine: After warming up, idle the engine	Throttle valve: fully closed (a)	0.15 - 0.85V
	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: Partially open	Between (a) and (b)
		Throttle valve: fully opened (b)	3.5 - 4.7V
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS CLSD THL/P SW	• Engine: After warming up, idle the engine	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	• Ignition switch: ON	Shift lever: “P” or “N”	ON
		Except above	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned	ON

MONITOR ITEM	CONDITION		SPECIFICATION
AMB TEMP SW	• Ignition switch: ON • Compare ambient air temperature with the following:	Below 19°C (66°F)	OFF
		Above 25°C (77°F)	ON
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON
INJ PULSE-B2 INJ PULSE-B1	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	2.4 - 3.7 msec
		2,000 rpm	1.9 - 3.3 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 - 1.4 msec
IGN TIMING	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	15° BTDC
		2,000 rpm	More than 25° BTDC
IACV-AAC/V	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	10 - 20%
		2,000 rpm	—
PURG VOL C/V	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	0 %
		2,000 rpm	—
A/F ALPHA-B2 A/F ALPHA-B1	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	54 - 155%
EVAP SYS PRES	• Ignition switch: ON		Approx. 3.4V
AIR COND RLY	• Air conditioner switch: OFF → ON		OFF → ON
FUEL PUMP RLY	• Ignition switch is turned to ON (Operates for 5 seconds) • Engine running and cranking		ON
	Except as shown above		OFF
COOLING FAN*	• After warming up engine, idle the engine. • Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is 95°C (203°F) or more	ON
VENT CONT/V	• Ignition switch: ON		OFF
HO2S1 HTR (B1) HO2S1 HTR (B2)	• Engine speed: Below 3,200 rpm		ON
	• Engine speed: Above 3,200 rpm		OFF
HO2S2 HTR (B1) HO2S2 HTR (B2)	• Ignition switch: ON (Engine stopped) • Engine speed: Above 3,200 rpm		OFF
	• Engine speed: Below 3,200 rpm [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]		ON
VC/V BYPASS/V	Ignition switch: ON		OFF
CAL/LD VALUE	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	18.5 - 26.0%
		2,500 rpm	18.0 - 21.0%

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

MONITOR ITEM	CONDITION		SPECIFICATION
ABSOL TH·P/S	• Engine: After warming up • Ignition switch: ON • More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump.	Throttle valve: fully closed	0.0%
	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	Approx. 80%
MASS AIRFLOW	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	3.3 - 4.8 g·m/s
		2,500 rpm	12.0 - 14.9 g·m/s
ABSOL PRES/SE	• Ignition switch: ON (Engine stopped)		Approx. 4.4V
	• Engine speed: Idle	For 5 seconds after starting engine	Approx. 4.4V
		More than 5 seconds after starting engine	Approx. 1.3V

*: Models with electric cooling fan.

Major Sensor Reference Graph in Data Monitor Mode

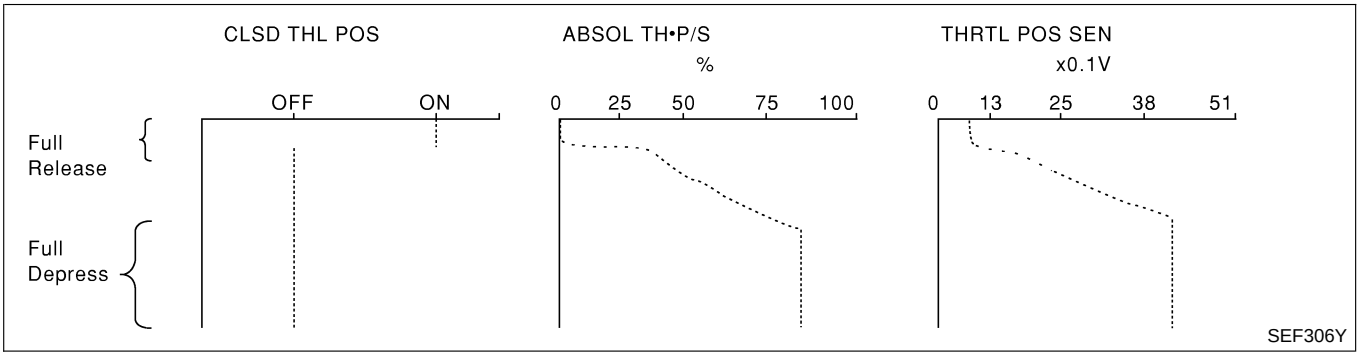
NGEC0564

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

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

NGEC0564S01

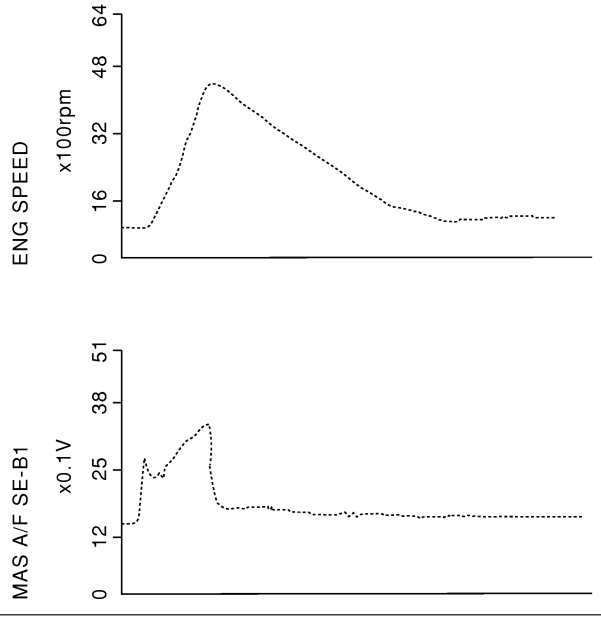
Below is the data for "THRTL POS SEN", "ABSOL TH·P/S" and "CLSD THL POS" when depressing the accelerator pedal with the ignition switch ON.
The signal of "THRTL POS SEN" and "ABSOL TH·P/S" should rise gradually without any intermittent drop or rise after "CLSD THL POS" is changed from "ON" to "OFF".



ENG SPEED, MAS AIR/FL SE, THRTL POS SEN, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

NGEC0564S02

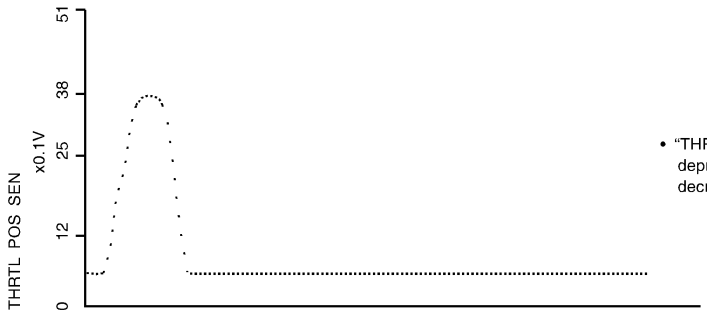
Below is the data for "ENG SPEED", "MAS AIR/FL SE", "THRTL POS SEN", "HO2S2 (B1)", "HO2S1 (B1)" and "INJ PULSE-B1" when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.
Each value is for reference, the exact value may vary.



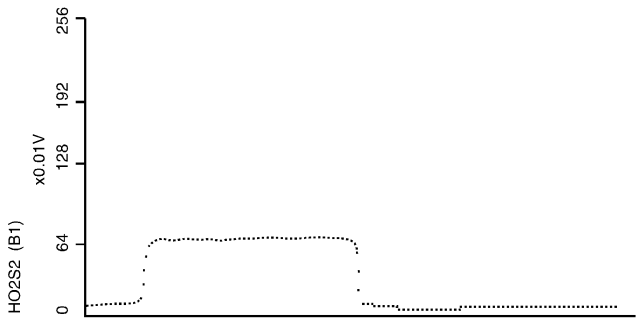
- "ENG SPEED" should increase gradually while depressing the accelerator pedal and should decrease gradually after releasing the pedal without any intemittent drop or rise.

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

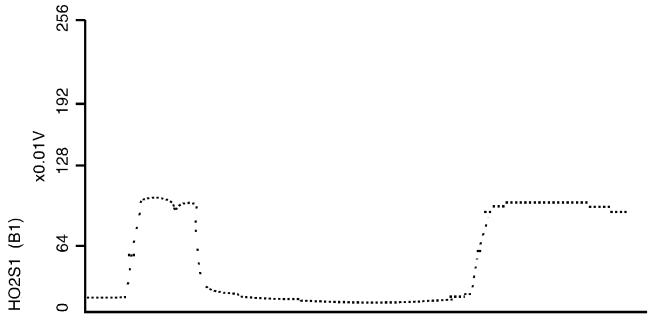
SEF241Y



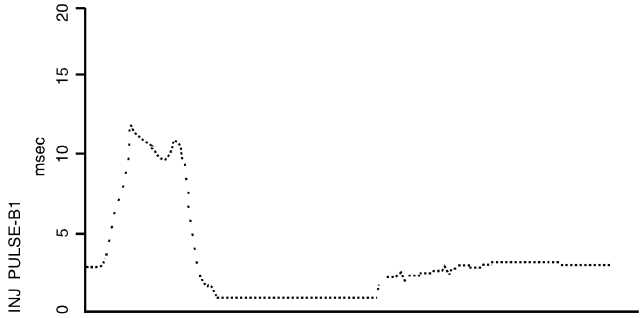
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



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

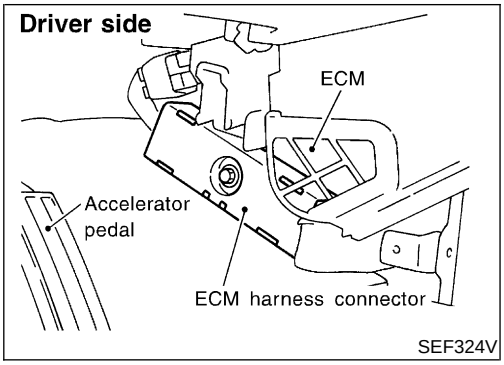


- "HO2S1 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.

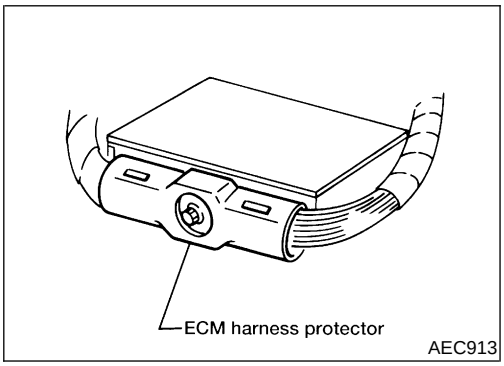


- "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

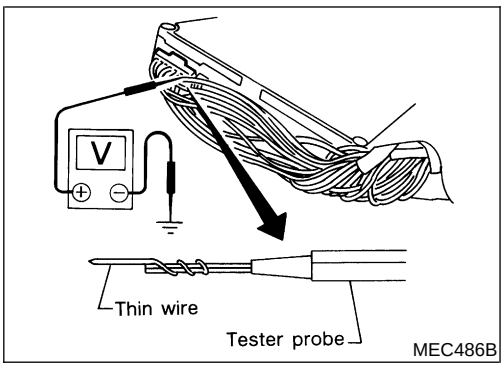
SEF242YD



SEF324V



AEC913



MEC486B

ECM Terminals and Reference Value

NGEC0565

PREPARATION

NGEC0565S01

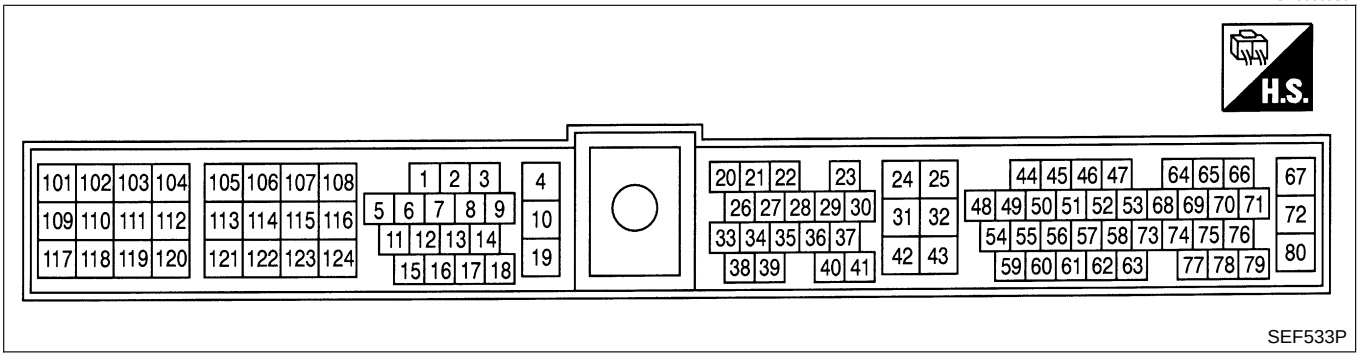
1. ECM is located behind the instrument lower cover. For this inspection:
- Remove instrument lower cover.

2. Remove ECM harness protector.

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

ECM HARNESS CONNECTOR TERMINAL LAYOUT

NGEC0565S02



SEF533P

ECM INSPECTION TABLE

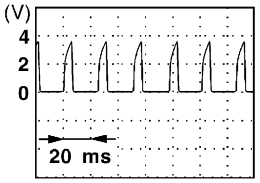
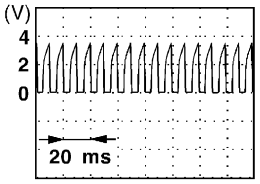
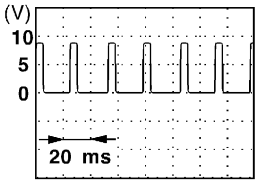
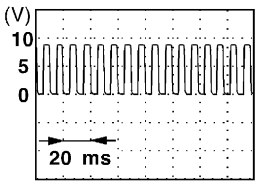
NGEC0565S03

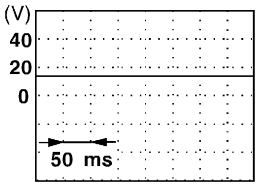
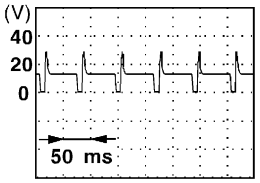
Specification data are reference values and are measured between each terminal and ground.

CAUTION:

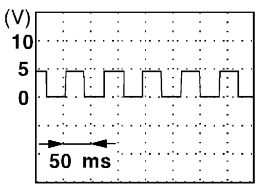
Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

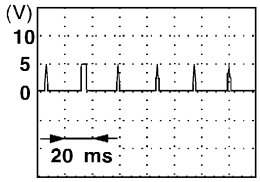
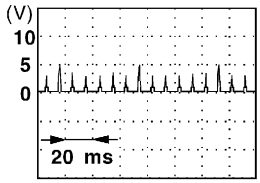
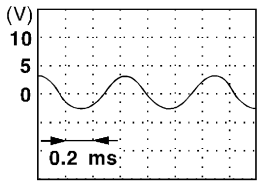
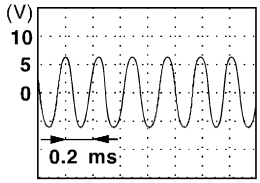
ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/W	Ignition signal	**[Engine is running]** ● Idle speed	Approximately 0.7V  SEF988U
			[Engine is running] ● Engine speed is 2,000 rpm	1.1 - 1.5V  SEF989U
3	R/L	Tachometer	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1 - 2V  SEF992U
			[Engine is running] ● Engine speed is 2,000 rpm	3 - 5V  SEF993U
4	OR/B	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)

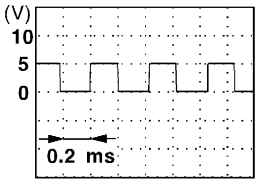
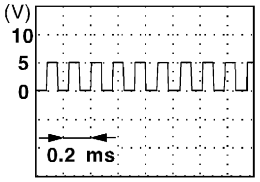
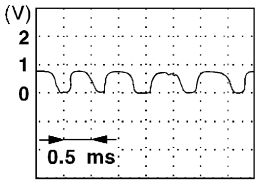
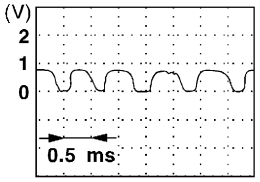
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	R/Y	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF994U
			[Engine is running] ● Engine speed is 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)  SEF995U
7	Y/G	A/T check signal	**[Ignition switch ON]** **[Engine is running]**	0 - 3.0V
9	B/Y	Ambient air temperature switch	**[Engine is running]** ● Idle speed ● Ambient air temperature is above 25°C (77°F) ● Air conditioner is operating	0V
			[Engine is running] ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is not operating	Approximately 5V
10	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
11	W/R	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)
12	P	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower switch are ON*1	0 - 1V
			[Engine is running] ● A/C switch is OFF	BATTERY VOLTAGE (11 - 14V)
18	R/W	Malfunction indicator lamp	**[Ignition switch ON]**	0 - 1V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
19	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

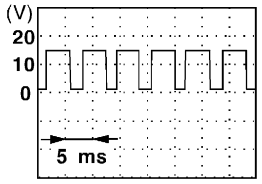
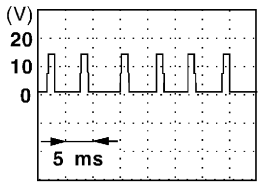
ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	L/OR	Start signal	**[Ignition switch ON]**	Approximately 0V
			[Ignition switch START]	9 - 12V
21	G/R	Air conditioner switch	**[Engine is running]** ● Both A/C switch and blower switch are ON (Compressor operates)*1	Approximately 0V
			[Engine is running] ● A/C switch is OFF	BATTERY VOLTAGE (11 - 14V)
22	L/B	Park/neutral position (PNP) switch	**[Ignition switch ON]** ● Gear position is "N" or "P"	Approximately 0V
			[Ignition switch ON] ● Except the above gear position	Approximately 5V
23	L	Throttle position sensor	**[Engine is running]** ● **Warm-up condition** ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump. ● Accelerator pedal fully released	0.15 - 0.85V
			[Ignition switch ON] ● Accelerator pedal fully depressed	3.5 - 4.7V
24	W/L	Ignition switch	**[Ignition switch OFF]**	0V
			[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
25	B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
26	PU/W	A/T signal No. 1	**[Ignition switch ON]** **[Engine is running]** ● Idle speed	6 - 8V
27	P/B	A/T signal No. 2	**[Ignition switch ON]** **[Engine is running]** ● Idle speed	6 - 8V
28	BR/W	Throttle position switch (Closed position)	**[Engine is running]** ● **Warm-up condition** ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump. ● Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON] ● Accelerator pedal depressed	Approximately 0V
29	G/B	Vehicle speed sensor	**[Engine is running]** ● Lift up the vehicle. ● In 2nd gear position ● Vehicle speed is 40 km/h (25 MPH)	2 - 3V  SEF996U
32	B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground (Probe this terminal with (−) tester probe when measuring)

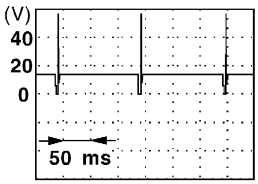
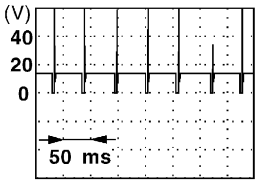
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	G/R	A/T signal No. 3	**[Ignition switch ON]**	0V
36	LG/R	Cooling fan relay*2	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan is operating	0 - 1V
39	GY/R	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is being turned	Approximately 0V
			[Engine is running] ● Steering wheel is not being turned	Approximately 5V
42	B/W	Sensors' power supply	**[Ignition switch ON]**	Approximately 5V
43	BR	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
44	PU	Camshaft position sensor (Reference signal)	**[Engine is running]** ● Idle speed	0.3 - 0.5V  SEF997U
			[Engine is running] ● Engine speed is 2,000 rpm	0.3 - 0.5V  SEF998U
46	P/B	Fuel level sensor	**[Ignition switch ON]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
47	L	Crankshaft position sensor (OBD)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1 - 2V (AC range)  SEF690W
			[Engine is running] ● Engine speed is 2,000 rpm	3 - 4V (AC range)  SEF691W

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	LG	Camshaft position sensor (Position signal)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.5V  SEF999U
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2.5V  SEF001V
50	B	Heated oxygen sensor 1 (front) (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V
51	G	Heated oxygen sensor 1 (front) (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V
54	R	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 1.7V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm	1.7 - 2.3V
55	G	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
56	OR	Heated oxygen sensor 2 (rear) (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (rear) (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V
59	LG/R	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
60	Y/B	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel temperature
61	PU/R	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
62	Y	EVAP control system pressure sensor	**[Ignition switch ON]**	Approximately 3.4V
64	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
66	B	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V
67	B/P	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
69	LG/R	Data link connector for GST	**[Engine is running]** ● Idle speed (GST is disconnected)	6 - 10V
72	B/P	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
75	Y/R	Data link connector for CONSULT-II	**[Engine is running]** ● Idle speed (Connect CONSULT-II and turned on.)	0 - 4V
76	GY/L			3 - 9V
80	SB	Power supply (Back-up)	**[Ignition switch OFF]**	BATTERY VOLTAGE (11 - 14V)
101	OR/L	IACV-AAC valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	8 - 11V  SEF005V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 3,000 rpm	7 - 10V  SEF692W

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102 104 106 109 111 113	W/B W/R W/G W/L W/PU W	Injector No. 1 Injector No. 3 Injector No. 5 Injector No. 2 Injector No. 4 Injector No. 6	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF007V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF008V
108	R/G	EVAP canister vent control valve	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
116	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
119	BR/Y	Heated oxygen sensor 1 heater (front) (bank 1)	**[Engine is running]** ● Engine speed is below 3,200 rpm	Approximately 0.4V
			[Engine is running] ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
120	P/B	Vacuum cut valve bypass valve	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
121	BR	Heated oxygen sensor 1 heater (front) (bank 2)	**[Engine is running]** ● Engine speed is below 3,200 rpm	Approximately 0.4V
			[Engine is running] ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
122	R/B	Heated oxygen sensor 2 heater (rear) (bank 1)	**[Engine is running]** ● Engine speed is below 3,200 rpm ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more.	Approximately 0.4V
			[Ignition switch ON] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
123	R/Y	Heated oxygen sensor 2 heater (rear) (bank 2)	**[Engine is running]** ● Engine speed is below 3,200 rpm ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more.	Approximately 0.4V
			[Ignition switch ON] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
124	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

*1: Any mode except OFF, ambient air temperature is above 25°C (77°F).
*2: Models with electric cooling fan.

Description

NGEC0958

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/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)

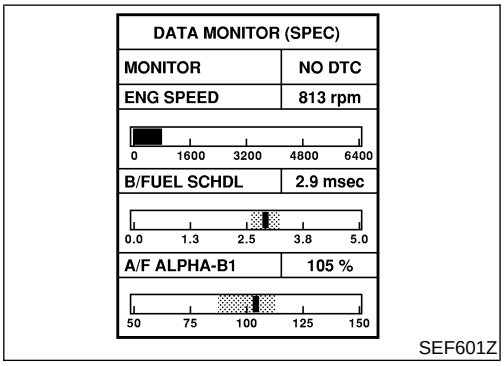
Testing Condition

NGEC0959

- Vehicle driven distance: More than 5,000 km (3,100 miles)
- Barometric pressure: 101.3 kPa (760.0 mmHg, 29.92 inHg)±3 kPa (22.5 mmHg, 0.89 inHg)
- 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 models, after the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates less than 0.9V. For M/T models, drive vehicle for 5 minutes after the engine is warmed up to normal operating temperature.

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



Inspection Procedure

NGEC0960

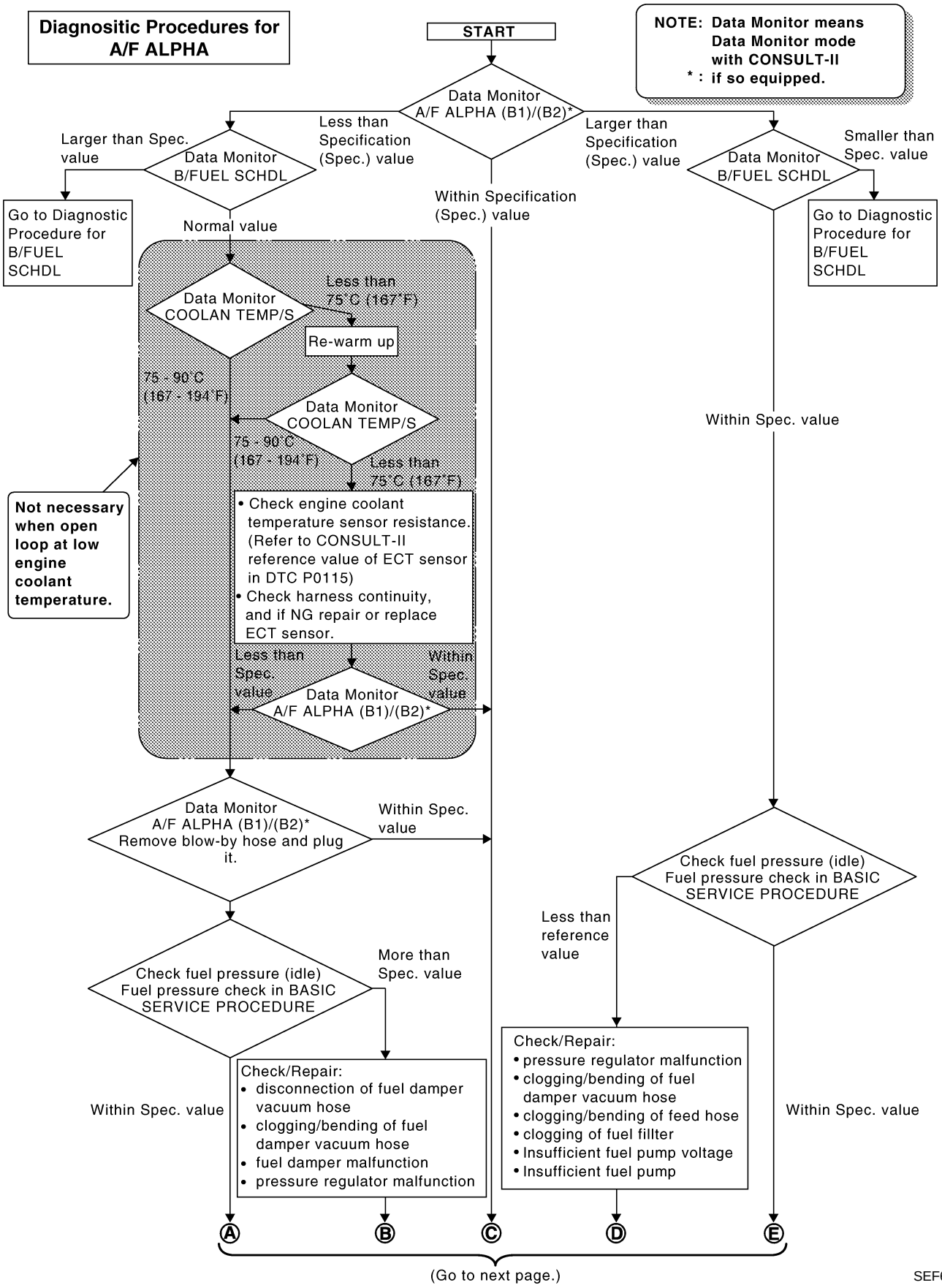
NOTE:

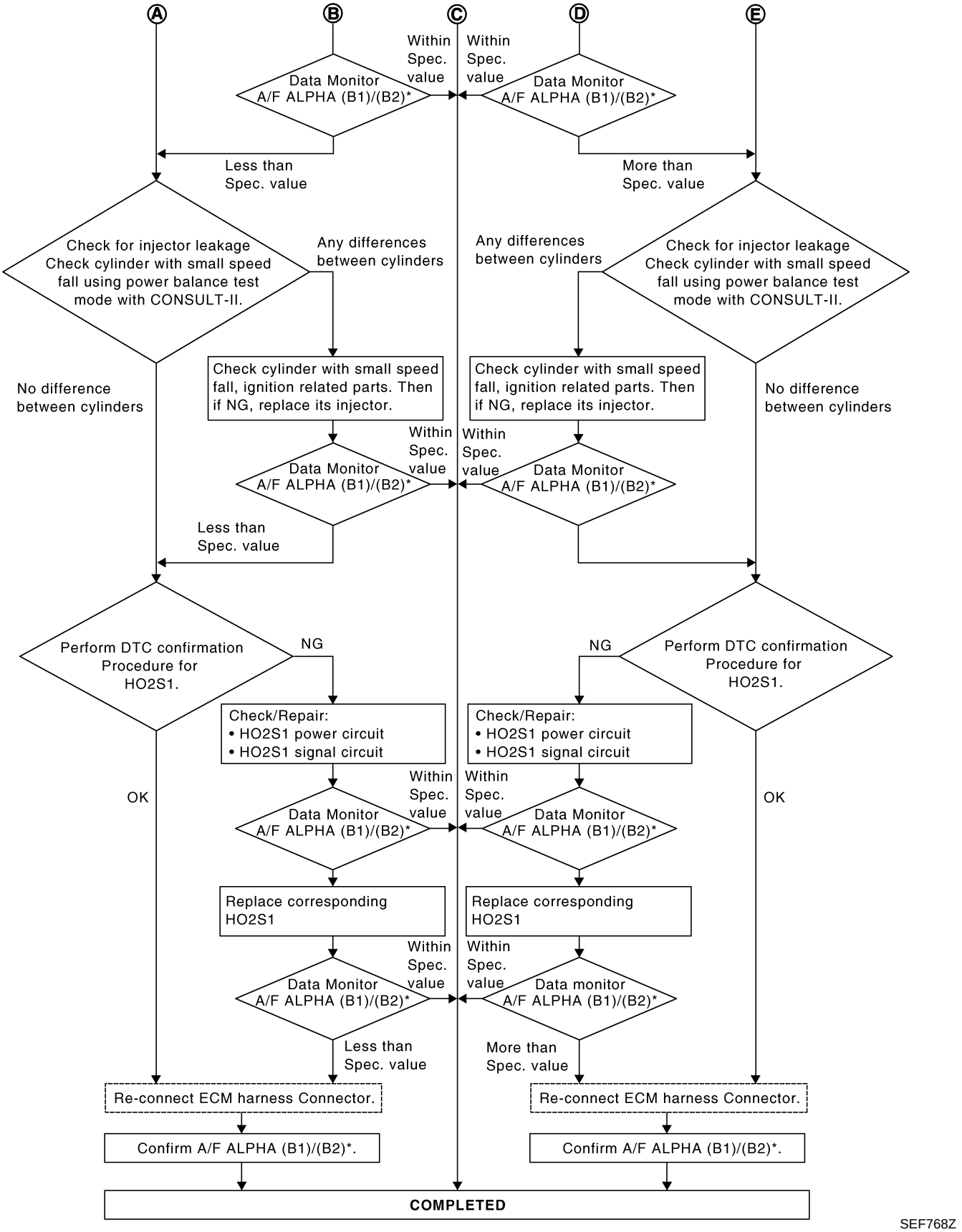
Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

1. Perform “Basic Inspection”, EC-694.
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”, EC-729.

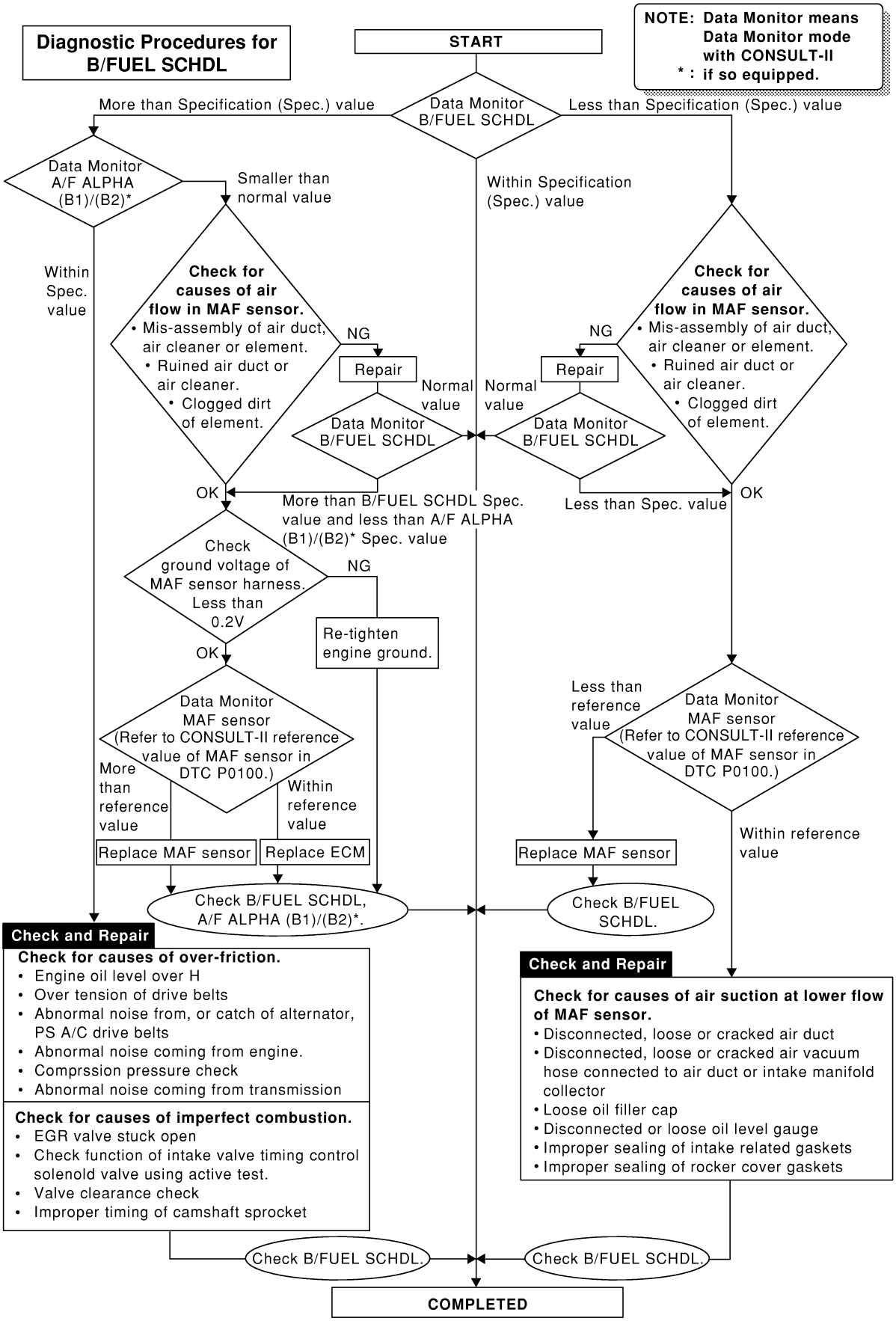
Diagnostic Procedure

NGEC0961




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

SEF768Z


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

NGEC0566

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

COMMON I/I REPORT SITUATIONS

NGEC0566S01

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

Diagnostic Procedure

NGEC0567

1	INSPECTION START
Erase (1st trip) DTCs. Refer to "HOW TO ERASE EMISSION — RELATED INFORMATION", EC-666.	
▶	GO TO 2.

2	CHECK GROUND TERMINALS
Check ground terminals for corroding or loose connection. Refer to "Circuit Inspection", "GROUND INSPECTION", ***GI-28***.	
OK or NG	
OK ▶	GO TO 3.
NG ▶	Repair or replace.

3	SEARCH FOR ELECTRICAL INCIDENT
Perform "Incident Simulation Tests", ***GI-23***.	
OK or NG	
OK ▶	GO TO 4.
NG ▶	Repair or replace.

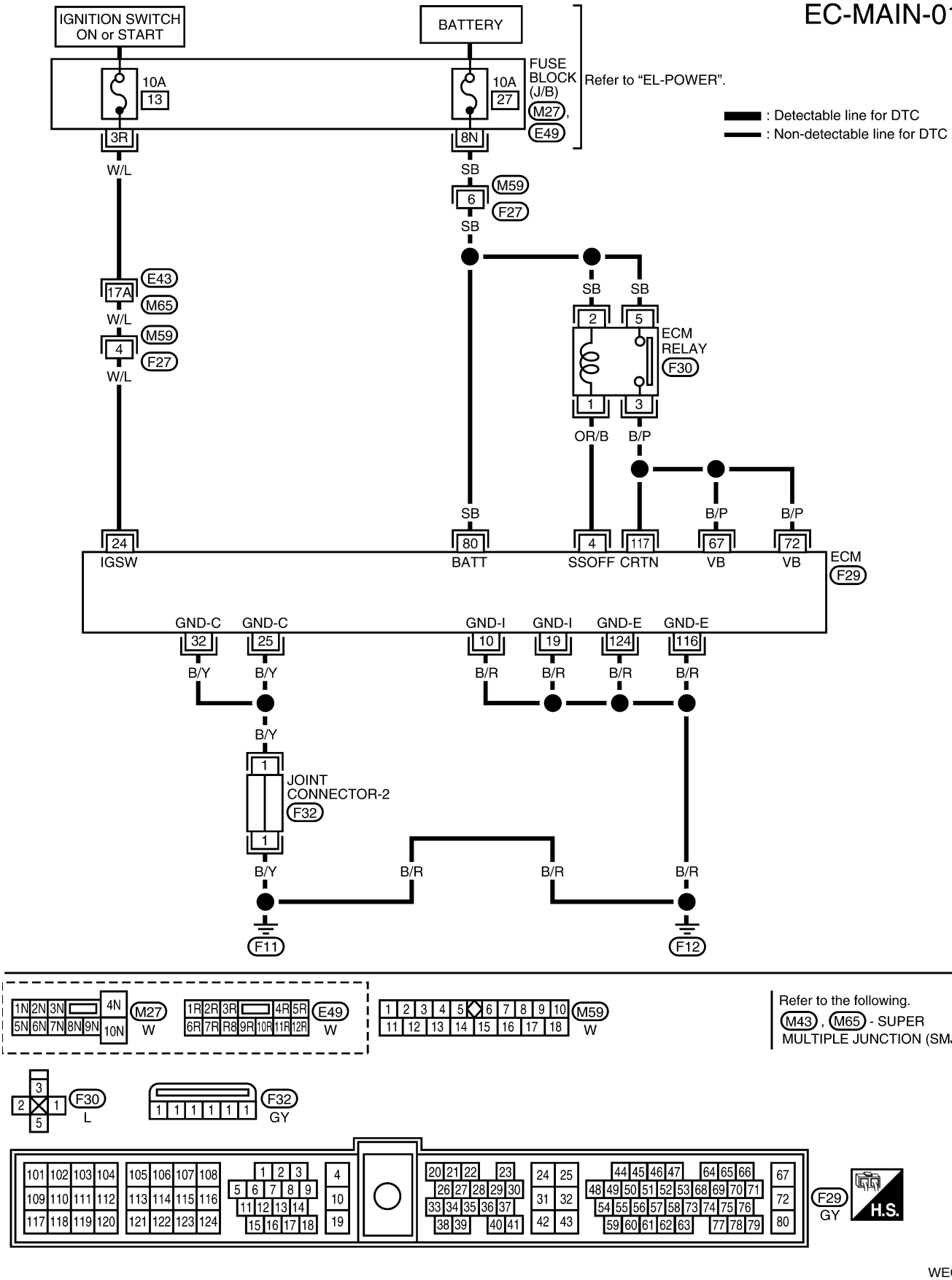
4	CHECK CONNECTOR TERMINALS
Refer to "How to Check Enlarged Contact Spring of Terminal", ***GI-20***.	
OK or NG	
OK ▶	**INSPECTION END**
NG ▶	Repair or replace connector.

Main Power Supply and Ground Circuit

WIRING DIAGRAM

NGEC0568

EC-MAIN-01



WEC932

ECM TERMINALS AND REFERENCE VALUE

NGEC0569

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self-shutoff)	**[Engine is running]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
10	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
19	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
24	W/L	Ignition switch	**[Ignition switch OFF]**	0V
			[Ignition switch ON]	BATTERY VOLTAGE (11 - 14V)
25	B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
32	B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground (Probe this terminal with (−) tester probe when measuring)
67	B/P	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P			
80	SB	Power supply (Back-up)	**[Ignition switch OFF]**	BATTERY VOLTAGE (11 - 14V)
116	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
124	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

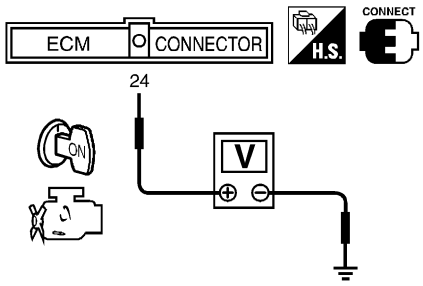
DIAGNOSTIC PROCEDURE

NGEC0570

1	INSPECTION START	
Start engine. **Is engine running?**		
	Yes or No	
Yes	▶	GO TO 6.
No	▶	GO TO 2.

2	CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF and then ON.
2. Check voltage between ECM terminal 24 and ground with CONSULT-II or tester.



SEF674U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E74, M82
- Harness connectors M59, F27
- Fuse block (J/B) connector E49
- 10A fuse
- Harness for open or short between ECM and fuse

	▶	Repair harness or connectors.

4	CHECK ECM GROUND CIRCUIT-I FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 10, 19, 25, 32, 116, 124 and engine ground.
   Refer to WIRING DIAGRAM.
   Continuity should exist.
4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 5.

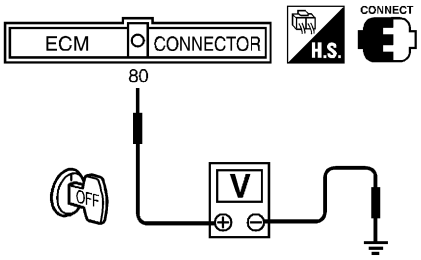
5	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-2
- Harness for open between ECM and engine ground

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

6	CHECK ECM POWER SUPPLY CIRCUIT-II

1. Stop engine.
2. Check voltage between ECM terminal 80 and ground with CONSULT-II or tester.



SEF678U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

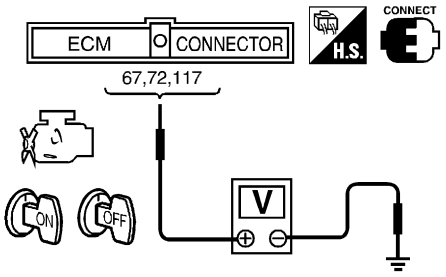
7	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M59, F27
- Fuse block (J/B) connector M27
- 10A fuse
- Harness for open or short between ECM and fuse

	▶	Repair harness or connectors.

8	CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch ON and then OFF.
2. Check voltage between ECM terminals 67, 72, 117 and ground with CONSULT-II or tester.



SEF679U

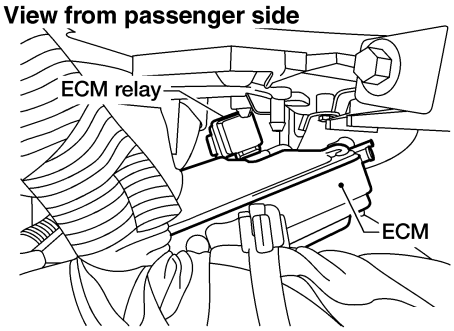
Voltage:
After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0V.

OK or NG

OK	▶	GO TO 14.
NG (Battery voltage does not exist.)	▶	GO TO 9.
NG (Battery voltage exists for more than a few seconds.)	▶	GO TO 13.

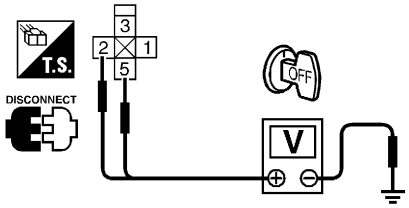
9	CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Disconnect ECM relay.



AEC927A

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



SEF625W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

10	DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between ECM relay and harness connector F27

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

11	CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 4 and ECM relay 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 12.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

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

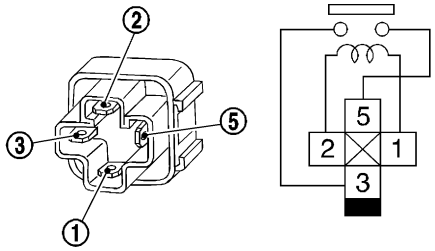
1. Check harness continuity between ECM terminals 67, 72, 117 and ECM relay terminal 3.
   Refer to WIRING DIAGRAM.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 13.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

13	CHECK ECM RELAY

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



SEF039W

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

OK or NG

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

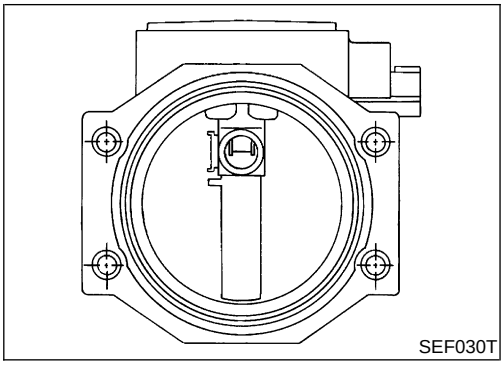
14	CHECK ECM GROUND CIRCUIT-II FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 10, 19, 25, 32, 116, 124 and engine ground.
   Refer to WIRING DIAGRAM.
   Continuity should exist.
4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 5.

15	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**


SEF030T

Component Description

NGEC0571

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

NGEC0572

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS AIR/FL SE	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: “N” • No-load	Idle	1.0 - 1.7V
		2,500 rpm	1.7 - 2.3V
CAL/LD VALUE	ditto	Idle	18.5 - 26.0%
		2,500 rpm	18.0 - 21.0%
MASS AIRFLOW	ditto	Idle	3.3 - 4.8 g·m/s
		2,500 rpm	12.0 - 14.9 g·m/s

ECM Terminals and Reference Value

NGEC0573

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	R	Mass air flow sensor	**[Engine is running]** • **Warm-up condition** • Idle speed	1.0 - 1.7V
			[Engine is running] • **Warm-up condition** • Engine speed is 2,500 rpm	1.7 - 2.3V
55	G	Mass air flow sensor ground	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

On Board Diagnosis Logic

NGEC0574

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

POSSIBLE CAUSE

NGEC0574S01

Malfunction A or C

NGEC0574S0101

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

Malfunction B or D

NGEC0574S0102

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

FAIL-SAFE MODE

NGEC0574S02

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

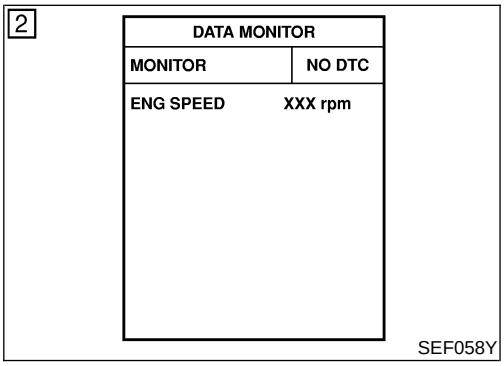
Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

DTC Confirmation Procedure

NGEC0575

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

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



PROCEDURE FOR MALFUNCTION A

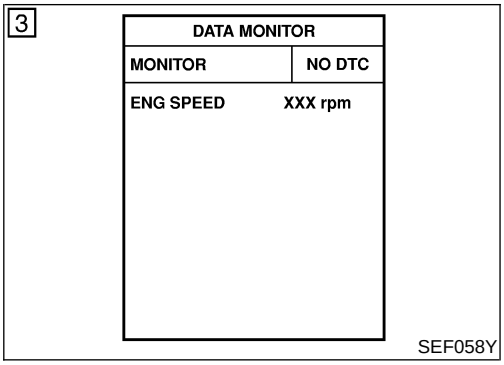
NGEC0575S01

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-744.

With GST

Follow the procedure "With CONSULT-II".



PROCEDURE FOR MALFUNCTION B

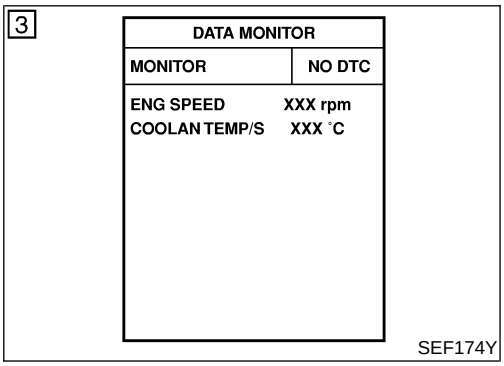
NGEC0575S02

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-744.

With GST

Follow the procedure "With CONSULT-II".



PROCEDURE FOR MALFUNCTION C

NGEC0575S03

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.

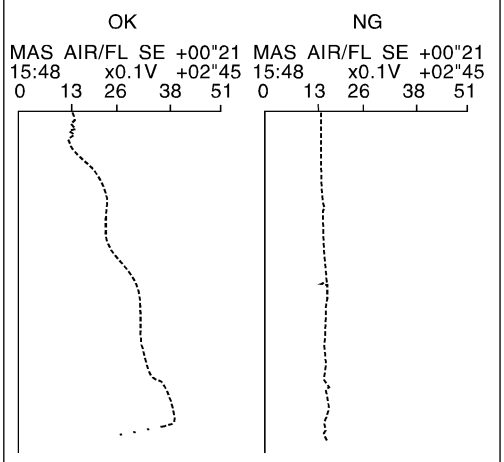
With CONSULT-II

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-744.

With GST

Follow the procedure "With CONSULT-II".

6



SEF998NA

7

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

SEF175Y

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

SEF534P

PROCEDURE FOR MALFUNCTION D

NGEC0575S04

CAUTION:

Always drive vehicle at a safe speed.

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-744.**
3) Select "DATA MONITOR" mode with CONSULT-II.
4) Check the voltage of MAS AIR/FL SE with "DATA MONITOR".
5) Increases engine speed to about 4,000 rpm.
6) Monitor the linear voltage rise in response to engine speed increases.
   If NG, go to "Diagnostic Procedure", EC-744.
   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-744.

Overall Function Check

NGEC0576

PROCEDURE FOR MALFUNCTION D

NGEC0576S01

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

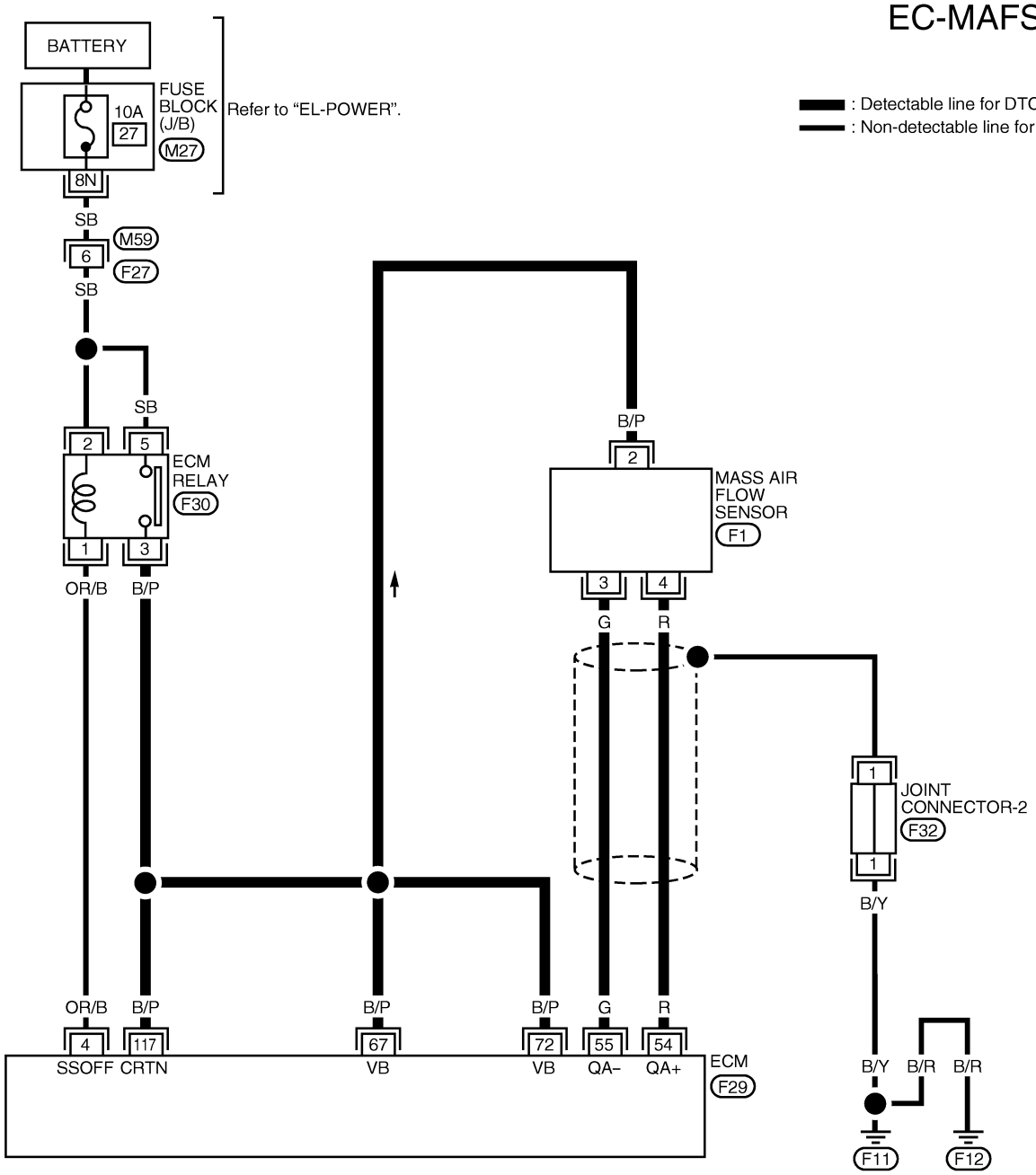
With GST

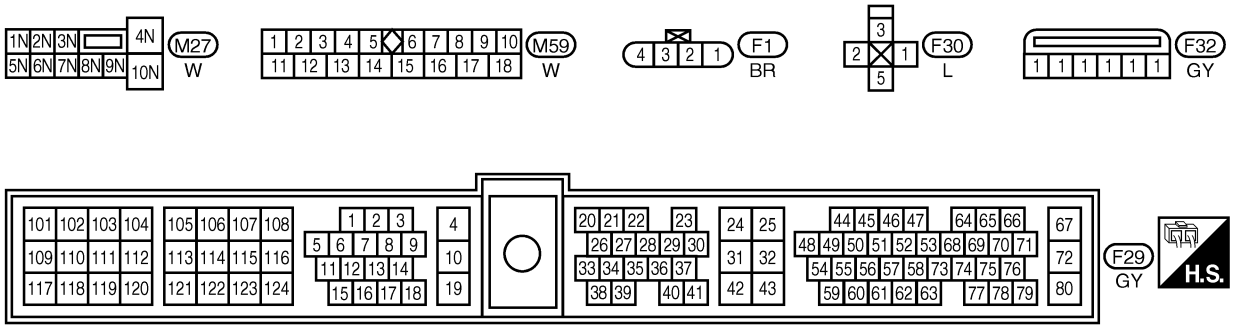
1) Start engine and warm it up to normal operating temperature.
2) Select "MODE 1" with GST.
3) Check the mass air flow sensor signal with "MODE 1".
4) Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.
5) If NG, go to "Diagnostic Procedure", EC-744.

Wiring Diagram

NGEC0577

EC-MAFS-01





AEC939A

Diagnostic Procedure

NGEC0578

1	INSPECTION START

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

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

MTBL0063

Type I or Type II

Type I	▶	GO TO 3.
Type II	▶	GO TO 2.

2	CHECK INTAKE SYSTEM

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

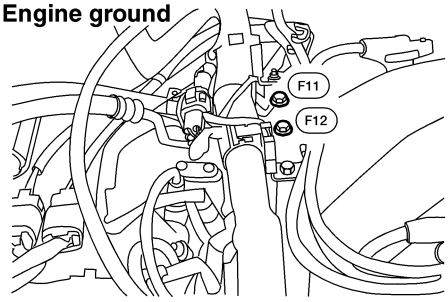
OK or NG

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

3	RETIGHTEN GROUND SCREWS

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

Engine ground

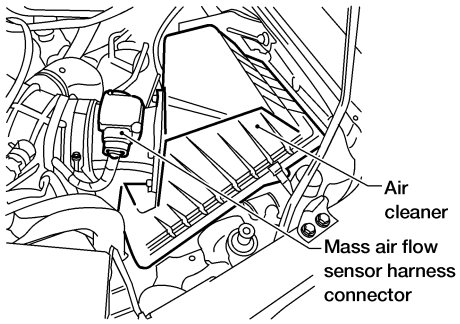


LEC518

	▶	GO TO 4.

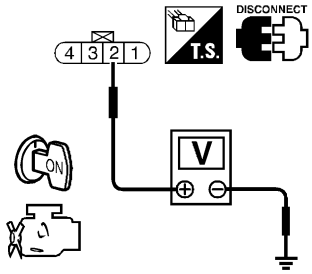
4	CHECK MAFS POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor harness connector.



AEC641A

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



SEF627W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

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

	▶	Repair harness or connectors.

6	CHECK MAFS GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAFS terminal 3 and ECM terminal 55.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to power.

OK or NG

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

Diagnostic Procedure (Cont'd)

7	CHECK MAFS INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

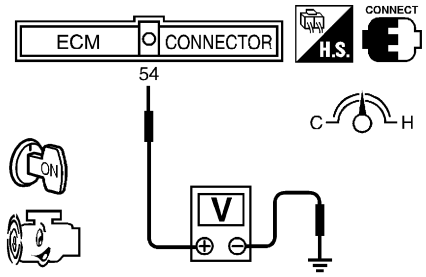
1. Check harness continuity between MAFS terminal 4 and ECM terminal 54.
   Refer to Wiring Diagram.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG

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

8	CHECK MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.

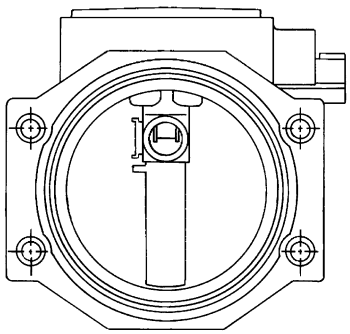


SEF747U

Condition	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.)	1.7 - 2.3
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

MTBL0227

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



SEF030T

OK or NG

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

9	CHECK MAFS SHIELD CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF. 2. Disconnect joint connector-2. 3. Check the following. ● Continuity between joint connector terminal 1 and ground Refer to Wiring Diagram. ● Joint connector (Refer to "HARNESS LAYOUT") **Continuity should exist.** 4. Also check harness for short to power. 5. Then reconnect joint connector-2. **OK or NG**		
OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**

Component Description

NGEC0579

The absolute pressure sensor is built into ECM. The sensor detects ambient barometric pressure and sends the voltage signal to the microcomputer.

On Board Diagnosis Logic

NGEC0580

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

POSSIBLE CAUSE

NGEC0580S01

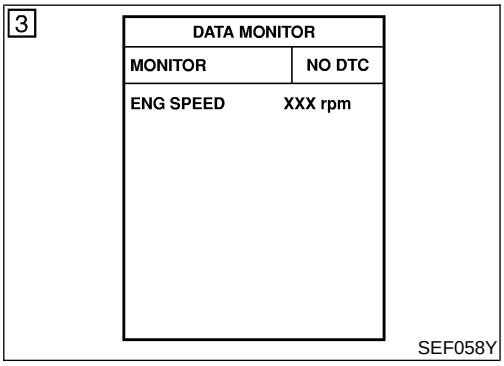
- ECM

DTC Confirmation Procedure

NGEC0581

NOTE:

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



With CONSULT-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-749.

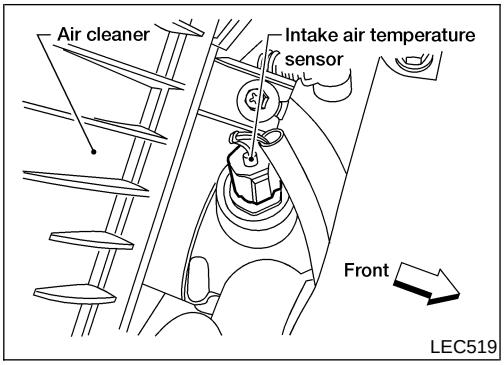
With GST

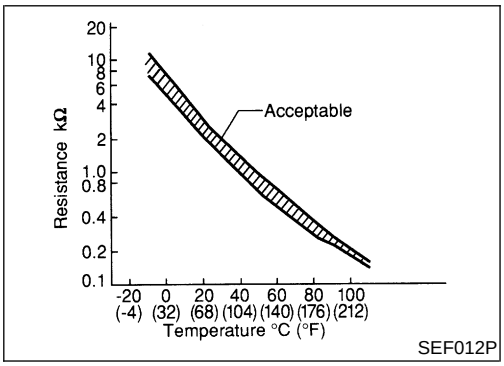
Follow the procedure “With CONSULT-II”.

Diagnostic Procedure

NGEC0962

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-748. 5. Is the 1st trip DTC P0105 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-748. 5. Is the 1st trip DTC P0105 displayed again?		
Yes or No		
Yes	▶	Replace ECM.
No	▶	**INSPECTION END**





Component Description

NGEC0585

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 61 (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 the ECM terminals, such as the ground.

On Board Diagnosis Logic

NGEC0586

Malfunction is detected when

(Malfunction A) an excessively low or high voltage from the sensor is sent to ECM,

(Malfunction B) rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.

POSSIBLE CAUSE

NGEC0586S01

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

DTC Confirmation Procedure

NGEC0587

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

NOTE:

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

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

NGEC0587S01

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-753.

With GST

Follow the procedure "With CONSULT-II".

PROCEDURE FOR MALFUNCTION B

NGEC0587S02

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 at more than 70 km/h (43 MPH) for 100 consecutive seconds.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-753.

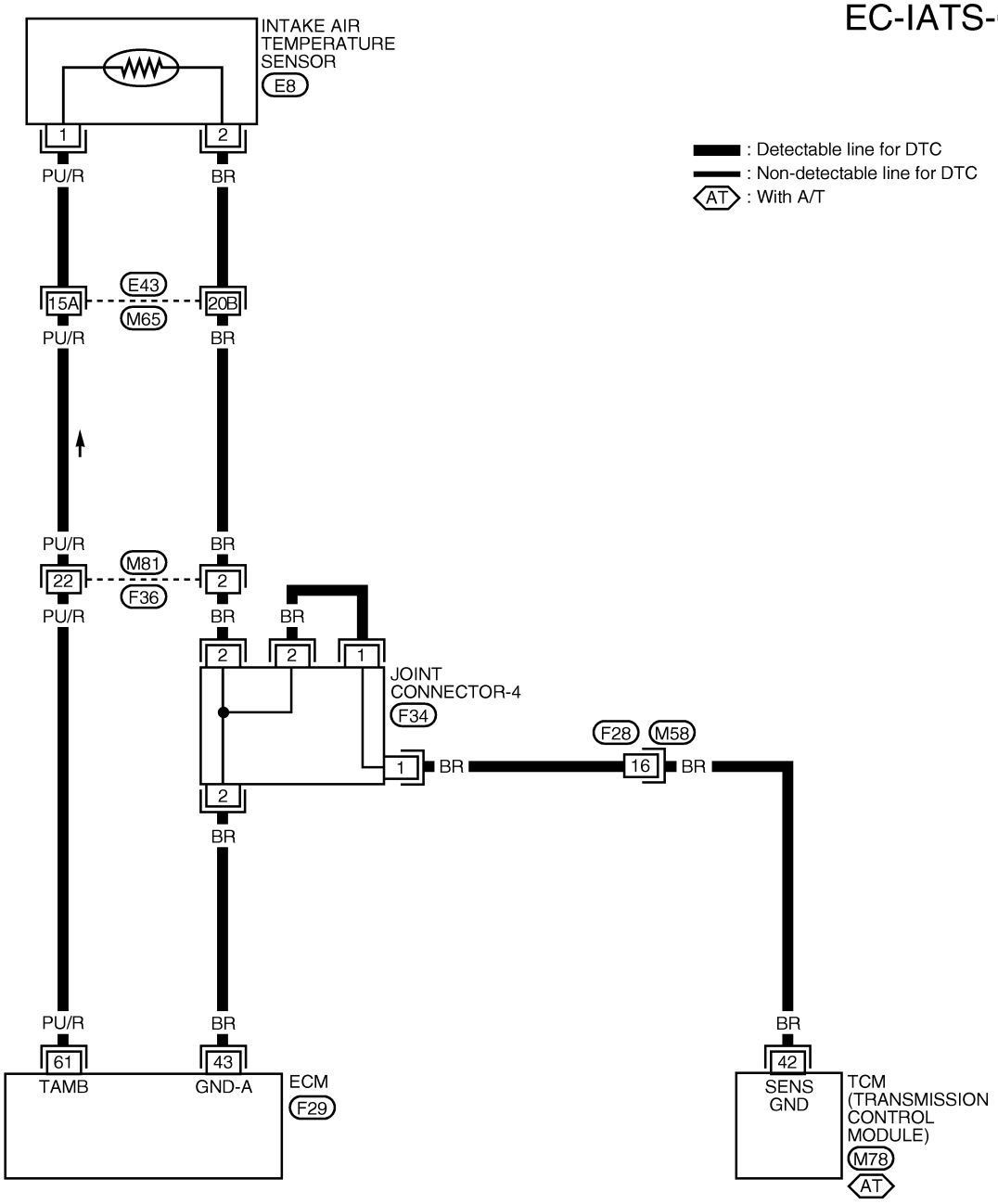
With GST

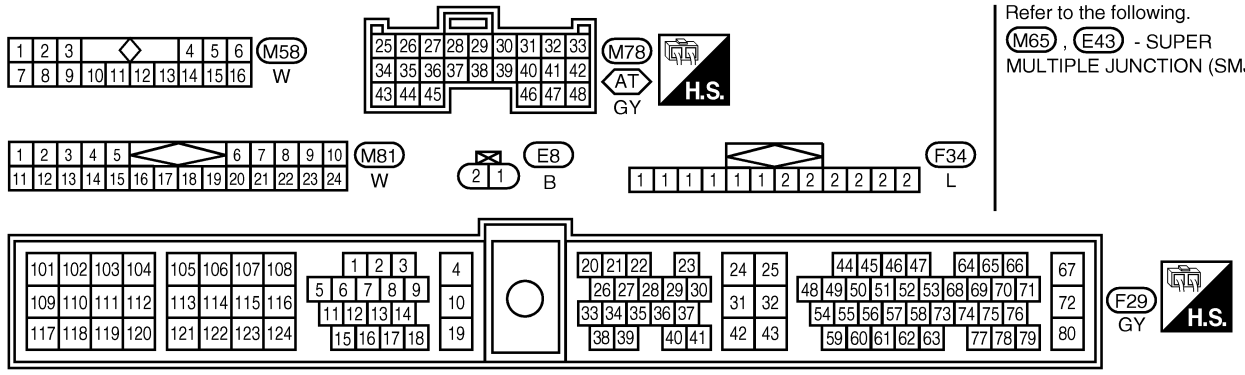
Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC0588

EC-IATS-01





Refer to the following.
M65 , E43 - SUPER MULTIPLE JUNCTION (SMJ)

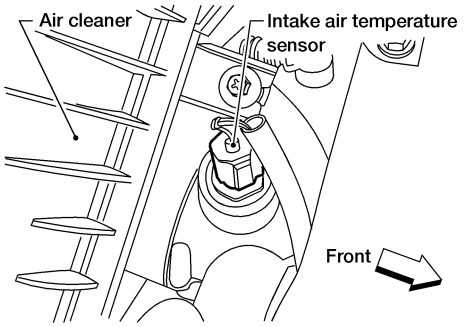
AEC941A

Diagnostic Procedure

NGEC0589

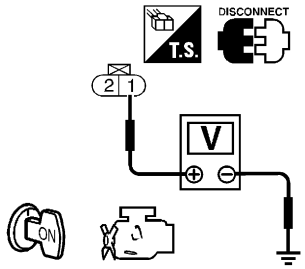
1	CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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



LEC519

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



SEF203W

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E43, M65
- Harness connectors M81, F36
- Harness for open or short between ECM and intake air temperature sensor

	▶	Repair harness or connectors.

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

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

OK or NG

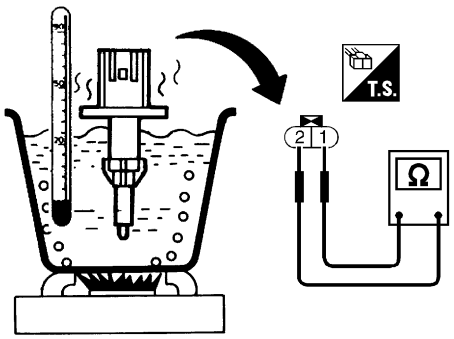
OK	▶	GO TO 5.
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E43, M65 ● Harness connectors M81, F36 ● Harness connectors F28, M58 ● Joint connector-4 ● Harness for open or short between ECM and intake air temperature sensor ● Harness for open or short between TCM (Transmission Control Module) and intake air temperature sensor	
▶	Repair open circuit or short to power in harness or connectors.

5	CHECK INTAKE AIR TEMPERATURE SENSOR

Check resistance as shown in the figure.

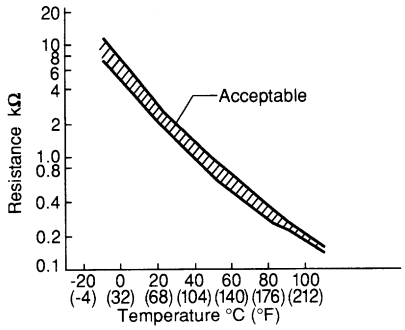


SEF947Q

<Reference data>

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

MTBL0228

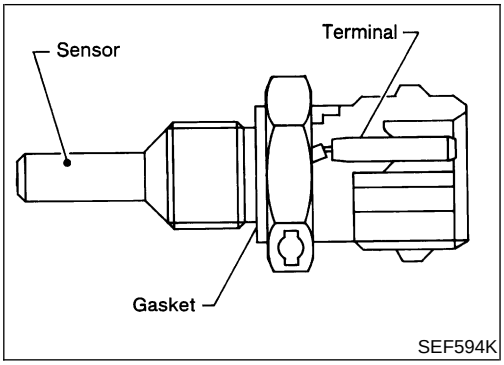


SEF012P

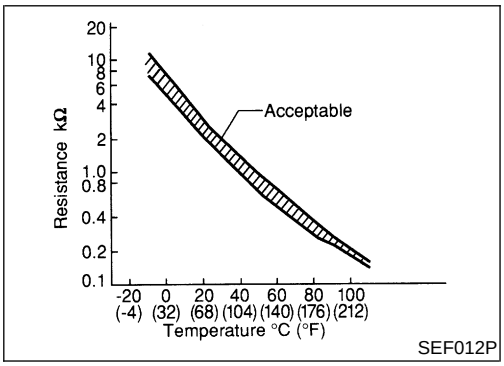
OK or NG

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

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**



SEF594K



SEF012P

Component Description

NGEC0590

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 59 (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 the ECM terminals, such as the ground.

On Board Diagnosis Logic

NGEC0591

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

POSSIBLE CAUSE

NGEC0591S01

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

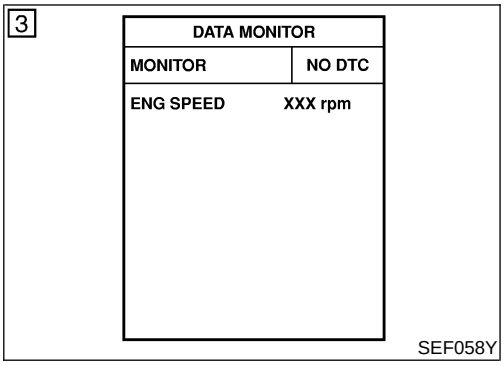
FAIL-SAFE MODE

NGEC0591S02

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)



DTC Confirmation Procedure

NGEC0592

NOTE:

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

With CONSULT-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-758.

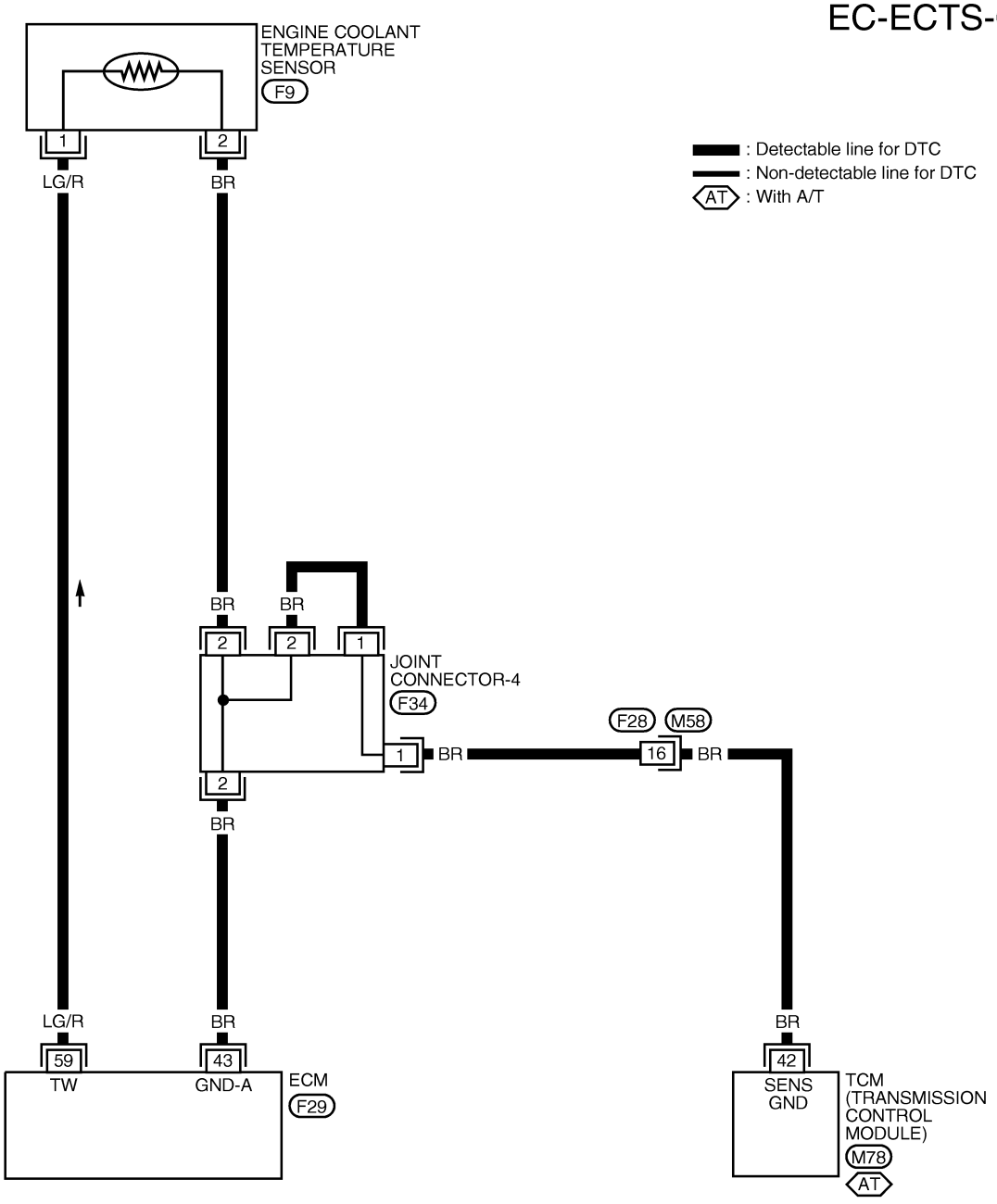
With GST

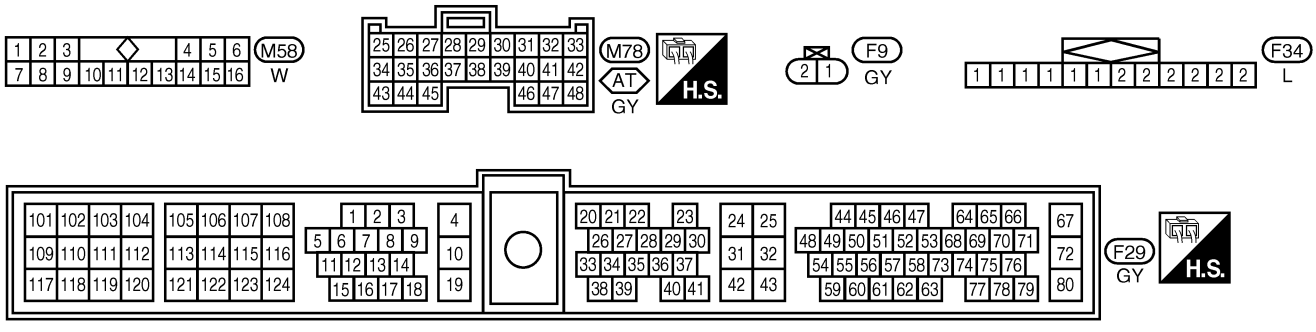
Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC0593

EC-ECTS-01





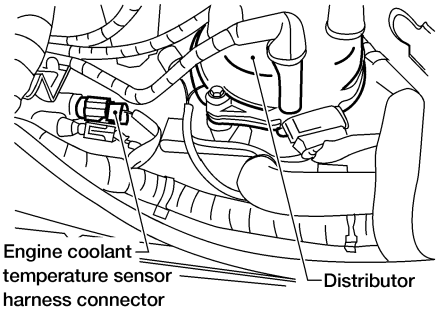
AEC942A

Diagnostic Procedure

NGEC0594

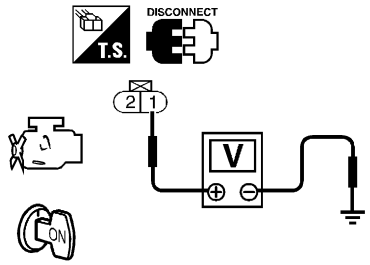
1	CHECK ECTS POWER SUPPLY CIRCUIT

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



AEC643A

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



SEF206W

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

2	CHECK ECTS GROUND CIRCUIT FOR OPEN AND SHORT

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

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

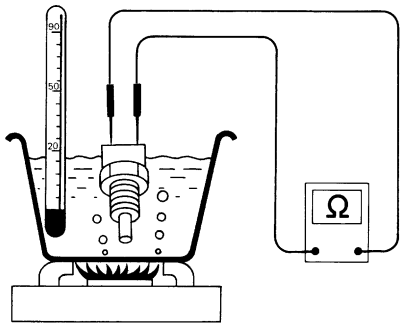
3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F28, M58
- Joint connector-4
- Harness for open or short between ECM and engine coolant temperature sensor
- Harness for open or short between TCM (Transmission Control Module) and engine coolant temperature sensor

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

4	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.

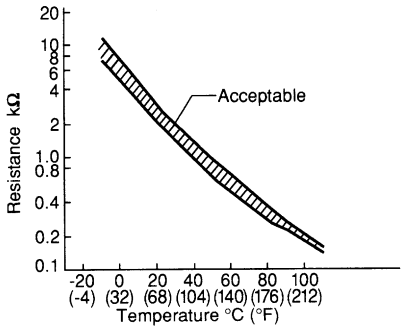


SEF152P

<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

MTBL0229



SEF012P

OK or NG

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

5	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**

Description

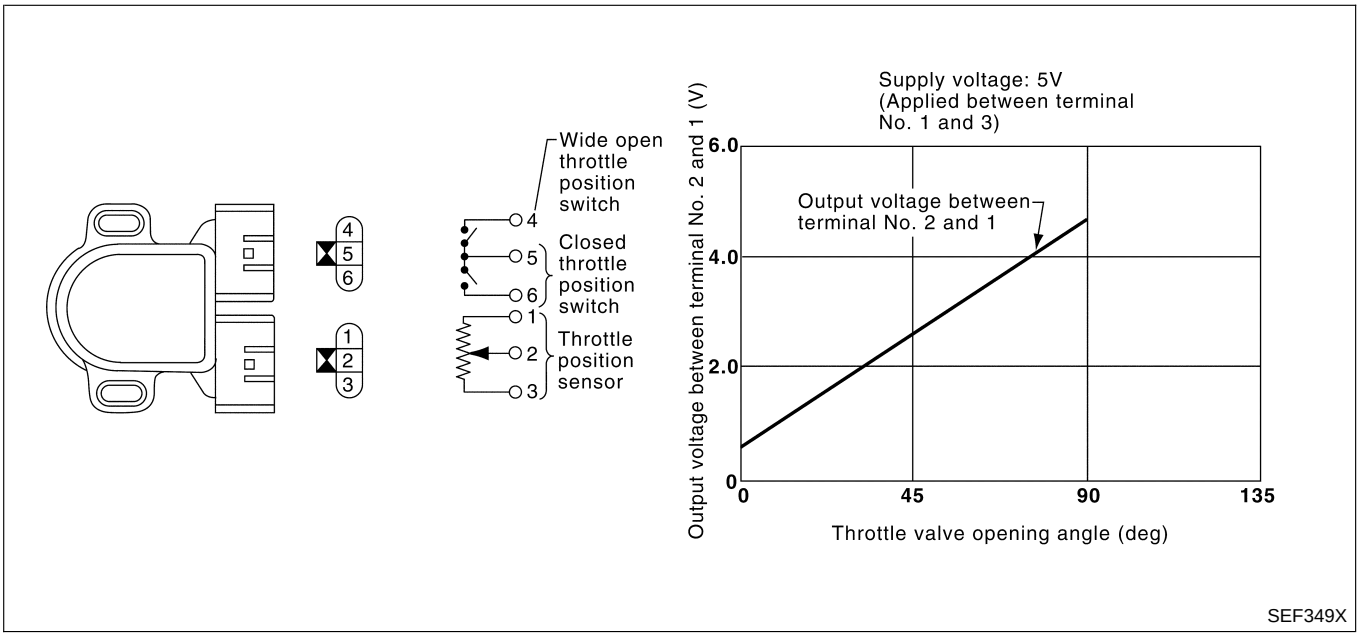
NGEC0595

NOTE:
If DTC P0120 (0403) is displayed with DTC P0510 (0203), first perform the trouble diagnosis for DTC P0510. Refer to EC-1033.

COMPONENT DESCRIPTION

NGEC0595S01

The throttle position sensor responds to the accelerator pedal movement. This sensor is a kind of potentiometer which transforms the throttle position into output voltage, and emits the voltage signal to the ECM. In addition, the sensor detects the opening and closing speed of the throttle valve and feeds the voltage signal to the ECM.
Idle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This sensor controls engine operation such as fuel cut. On the other hand, the “Wide open and closed throttle position switch”, which is built into the throttle position sensor unit, is not used for engine control.



CONSULT-II Reference Value in Data Monitor Mode

NGEC0596

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL POS SEN	• Engine: After warming up, idle the engine	Throttle valve: fully closed (a)	0.15 - 0.85V
	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: Partially open	Between (a) and (b)
		Throttle valve: fully opened (b)	3.5 - 4.7V
ABSOL TH·P/S	• Engine: After warming up • Ignition switch: ON • More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump.	Throttle valve: fully closed	0.0%
	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	Approx. 80%

ECM Terminals and Reference Value

=NGEC0597

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	L	Throttle position sensor	**[Engine is running]** ● **Warm-up condition** ● Accelerator pedal fully released	0.15 - 0.85V
			[Ignition switch ON] ● Accelerator pedal fully depressed	3.5 - 4.7V
42	B/W	Sensors' power supply	**[Ignition switch ON]**	Approximately 5V
43	BR	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

On Board Diagnosis Logic

NGEC0598

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

POSSIBLE CAUSE

NGEC0598S01

Malfunction A

NGEC0598S0101

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

Malfunction B

NGEC0598S0102

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

Malfunction C

NGEC0598S0103

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

FAIL-SAFE MODE

NGEC0598S02

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

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

DTC Confirmation Procedure

NGEC0599

NOTE:

- **Perform "PROCEDURE FOR MALFUNCTION A" first. If the 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".**
  If there is no problem on "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE FOR MALFUNCTION C".
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

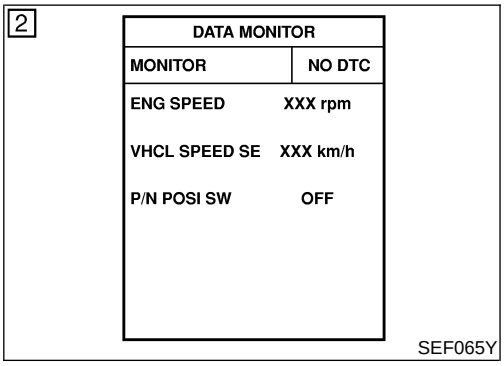
NGEC0599S01

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

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



With CONSULT-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.

Vehicle speed	More than 5 km/h (3 MPH)
Selector lever	Suitable position except "P" or "N" position

3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-766.

With GST

Follow the procedure "With CONSULT-II".

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B

NGEC0599S02

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"
Brake pedal	Depressed
Vehicle speed	0 km/h (0 MPH)

4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-766.

With GST

Follow the procedure "With CONSULT-II".

6

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

SEF177Y

PROCEDURE FOR MALFUNCTION C

NGEC0599S03

CAUTION:

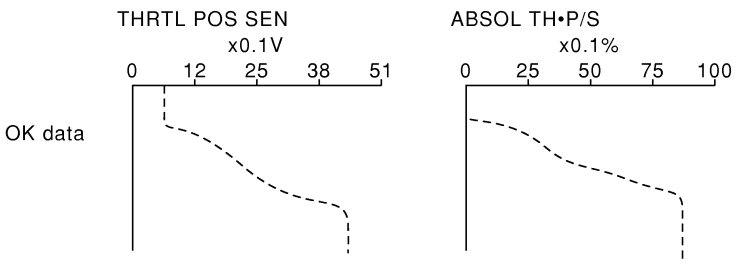
Always drive vehicle at a safe speed.

With CONSULT-II

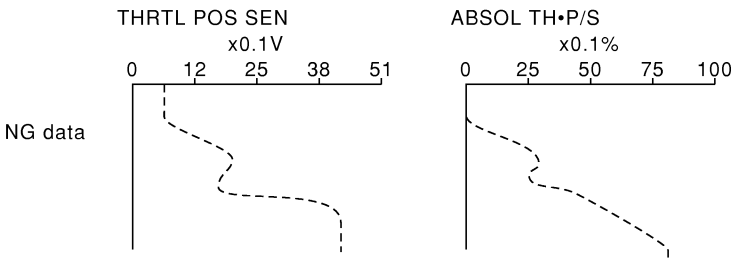
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON.
4) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II.
5) Select "THRTL POS SEN" and "ABSOL TH·P/S" in "DATA MONITOR" mode with CONSULT-II.
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-766.
  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

9

DATA MONITOR	
MONITORING	NO DTC
ENG SPEED	XXX rpm
MAS AIR/FL SE	XXX V
COOLAN TEMP/S	XXX ˚C
IACV-AAC/V	XXX %

SEF805Z

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

CMPS·RPM (REF)	More than 2,000 rpm
MAS AIR/FL SE	More than 3V
COOLAN TEMP/S	More than 70°C (158°F)
IACV-AAC/V	Less than 80%
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

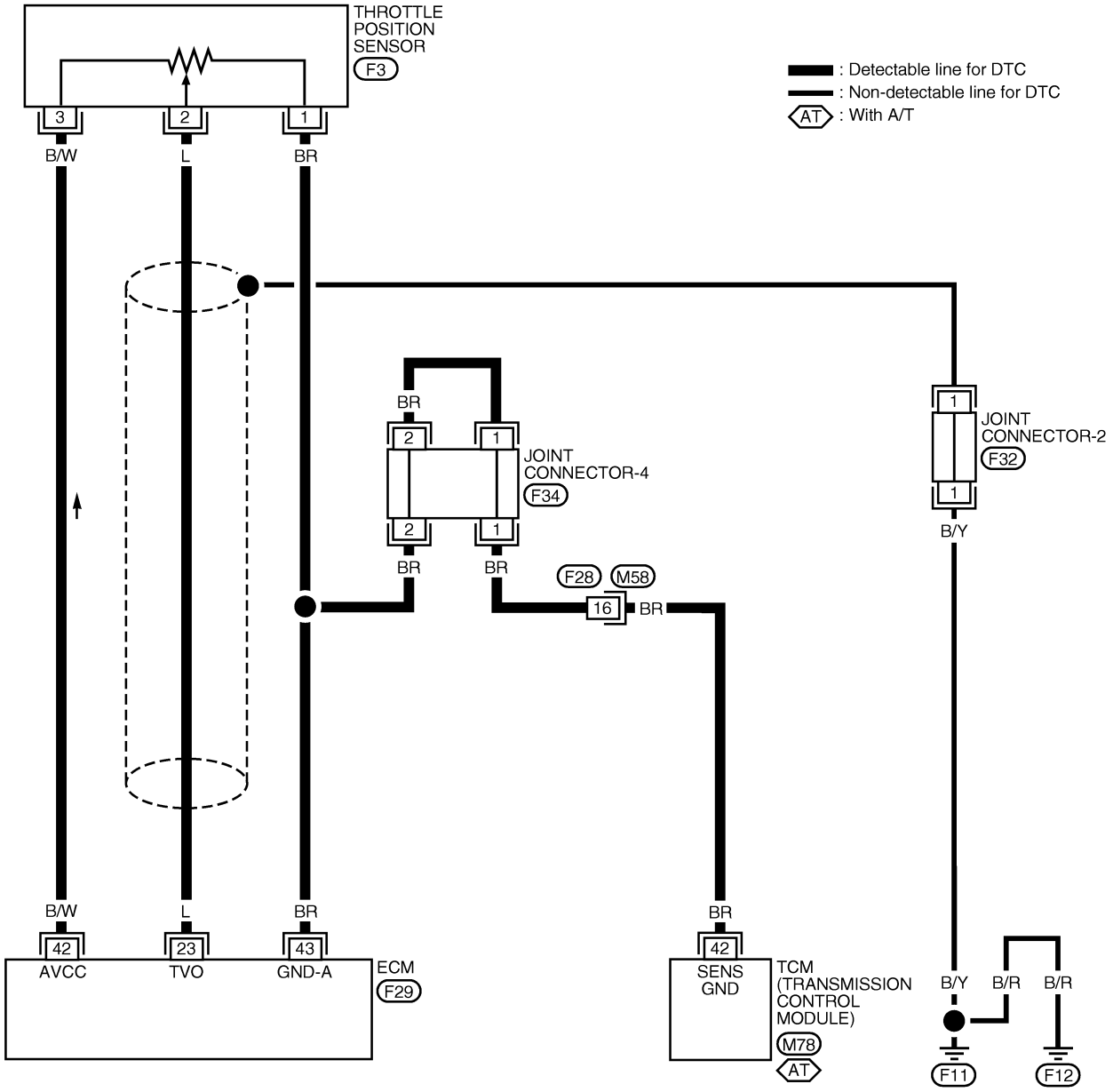
10) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-766.

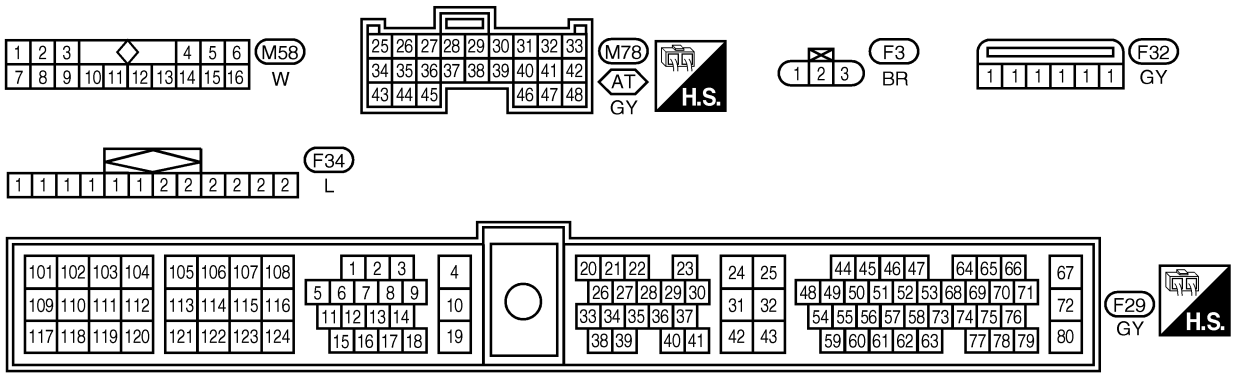
With GST
Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC0600

EC-TPS-01





AEC943A

Diagnostic Procedure

NGEC0601

1	INSPECTION START

Which malfunction A, B or C is duplicated?

MALFUNCTION	Type
A	A
B	B
C	C

MTBL0066

Type A, B or C

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

2	ADJUST THROTTLE POSITION SENSOR

Check the following items. Refer to “Basic Inspection”, EC-694.

Items	Specifications
Ignition timing	10° ± 2° BTDC
Base idle speed	700 ± 50 rpm (in “P” or “N” position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	750 ± 50 rpm (in “P” or “N” position)

MTBL0576

	▶	GO TO 3.

3	CHECK INTAKE SYSTEM.

1. Turn ignition switch OFF.
2. Check the following for connection.

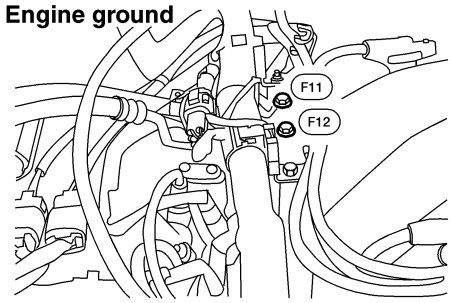
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold collector

OK or NG

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

4	RETIGHTEN GROUND SCREWS

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

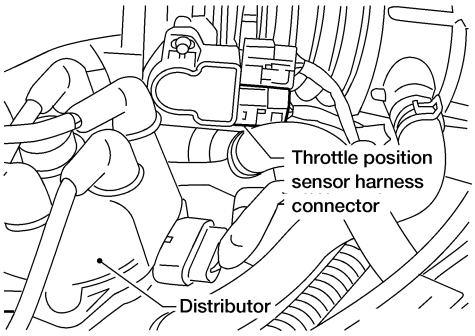


LEC518

	▶	GO TO 5.

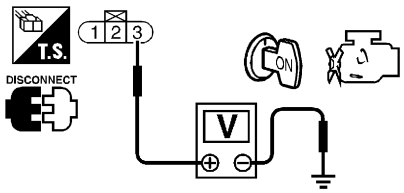
5	CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect throttle position sensor harness connector.



AEC638A

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



SEF630W

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

6	CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F28, M58
- Joint connector-4
- Harness for open or short between ECM and throttle position sensor
- Harness for open or short between TCM (Transmission Control Module) and throttle position sensor

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

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

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 23 and sensor terminal 2.
   Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

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

9	CHECK THROTTLE POSITION SENSOR

With CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Turn ignition switch ON.
4. Select "DATA MONITOR" mode with CONSULT-II.
5. Check voltage of "THRTL POS SEN" under the following conditions.
   Voltage measurement must be made with throttle position sensor installed in vehicle.

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

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

SEF062Y

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 11.

10	CHECK THROTTLE POSITION SENSOR

⊗ **Without CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Turn ignition switch ON.
4. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground.
   Voltage measurement must be made with throttle position sensor installed in vehicle.

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

MTBL0231

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 11.

11	ADJUST CLOSED THROTTLE POSITION SWITCH

Adjust closed throttle position switch. Refer to "Basic Inspection", EC-694.

Items	Specifications
Ignition timing	10° ± 2° BTDC
Base idle speed	700 ± 50 rpm (in "P" or "N" position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	750 ± 50 rpm (in "P" or "N" position)

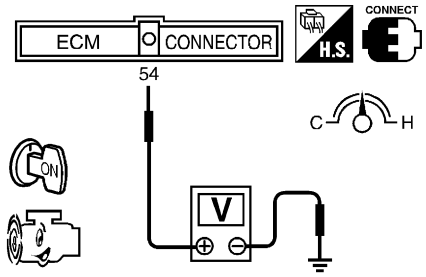
MTBL0576

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-694.

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 ECM terminal 54 (Mass air flow sensor signal) and ground.

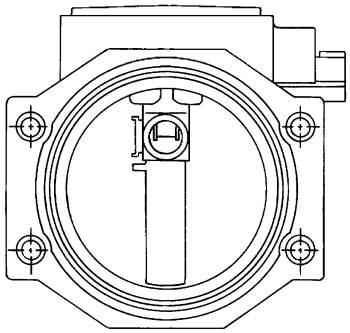


SEF747U

Condition	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.)	1.7 - 2.3
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

MTBL0227

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



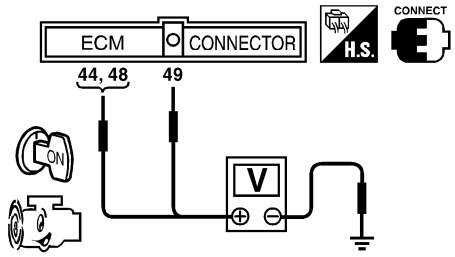
SEF030T

OK or NG

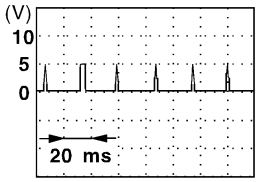
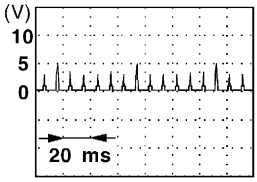
OK	▶	GO TO 13.
NG	▶	Replace mass air flow sensor.

13	CHECK CAMSHAFT POSITION SENSOR

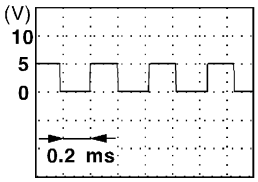
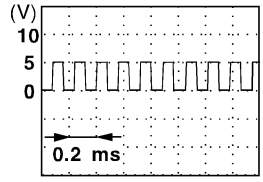
1. Install any parts removed.
2. Start engine.
3. Check voltage between ECM terminals 44, 48 and ground, ECM terminal 49 and ground with DC range.



Terminal 44 or 48 and engine ground

Condition	Idle	2,000 rpm
Voltage	0.3 - 0.5V	0.3 - 0.5V
Pulse signal		

Terminal 49 and engine ground

Condition	Idle	2,000 rpm
Voltage	Approximately 2.5V	Approximately 2.5V
Pulse signal		

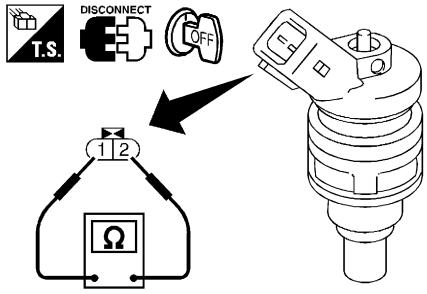
AEC072B

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace distributor assembly with camshaft position sensor.

14	CHECK FUEL INJECTOR

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



SEF625V

Resistance: 10 - 14Ω [at 25°C (77°F)]

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace fuel injector.

Diagnostic Procedure (Cont'd)

15	CHECK THROTTLE POSITION SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

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

- Continuity between joint connector terminal 1 and ground
- Joint connector

(Refer to ***EL-244***, "HARNESS LAYOUT".)

Continuity should exist.

4. Also check harness for short to power.
5. Then reconnect joint connector-2.

OK or NG

OK	▶	GO TO 16.
NG	▶	Repair open circuit or short to power in harness or connectors.

16	CHECK INTERMITTENT INCIDENT

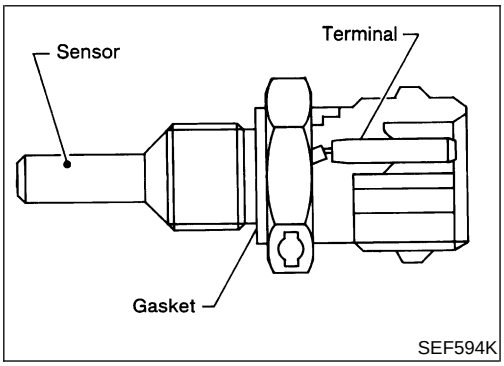
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.

▶ **INSPECTION END**

Description

NGEC0602

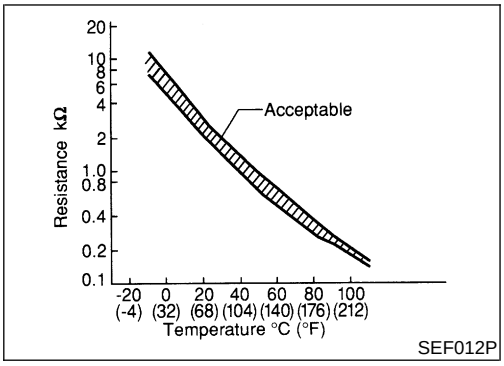
NOTE:
If DTC P0125 (0908) is displayed with P0115 (0103), first perform the trouble diagnosis for DTC P0115. Refer to EC-755.



COMPONENT DESCRIPTION

NGEC0602S01

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



<Reference data>

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

*: These data are reference values and are measured between ECM terminal 59 (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 the ECM terminals, such as the ground.

On Board Diagnosis Logic

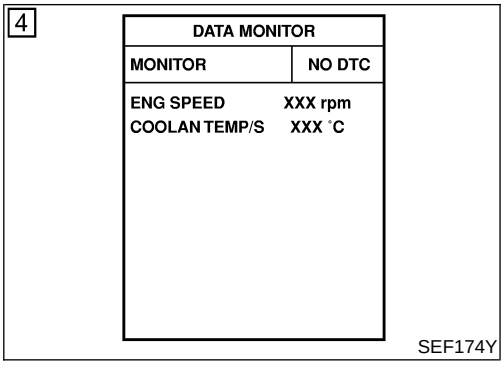
NGEC0603

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

POSSIBLE CAUSE

NGEC0603S01

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



DTC Confirmation Procedure

=NGEC0604

CAUTION:

Be careful not to overheat engine.

NOTE:

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

With CONSULT-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-776.

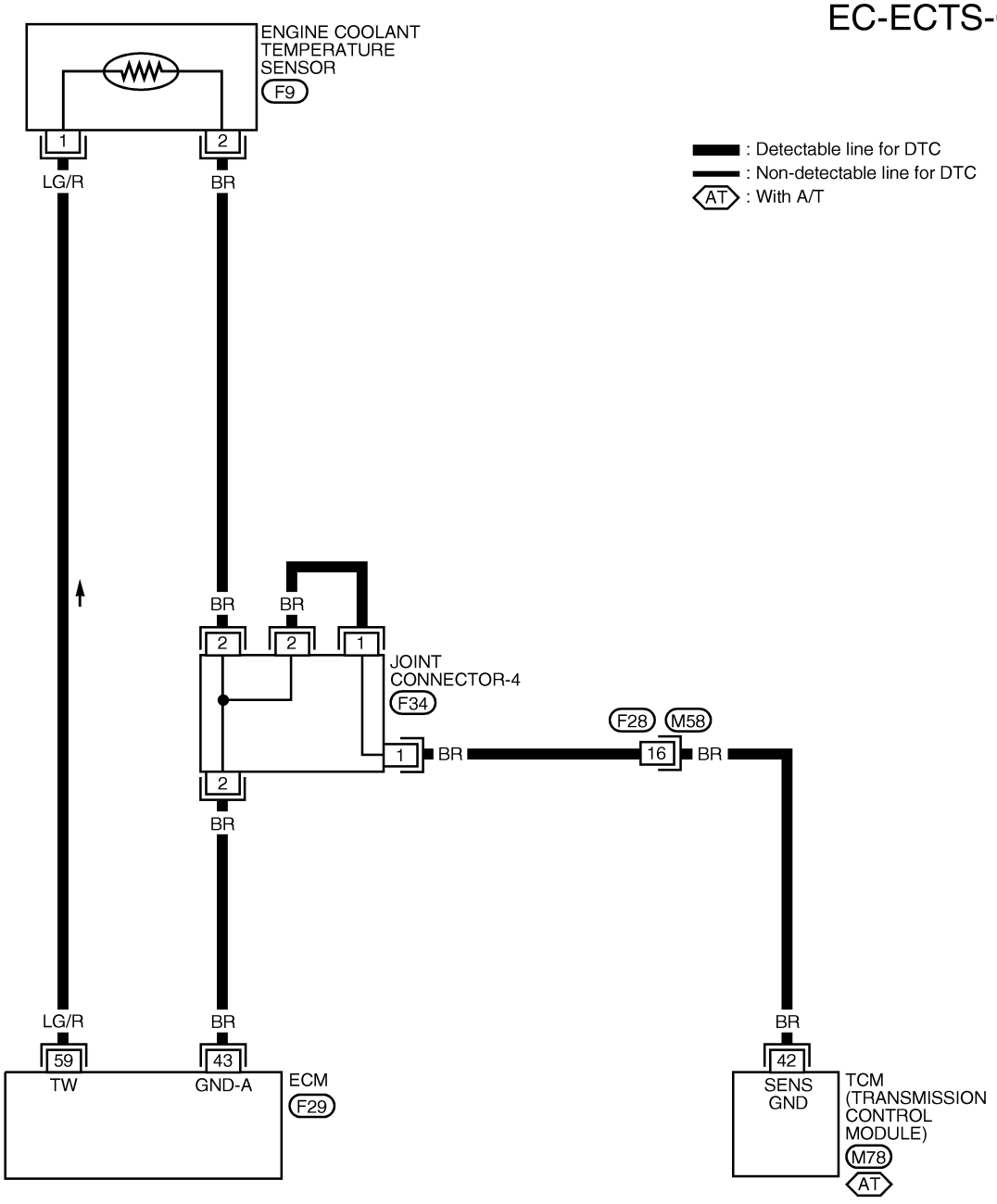
With GST

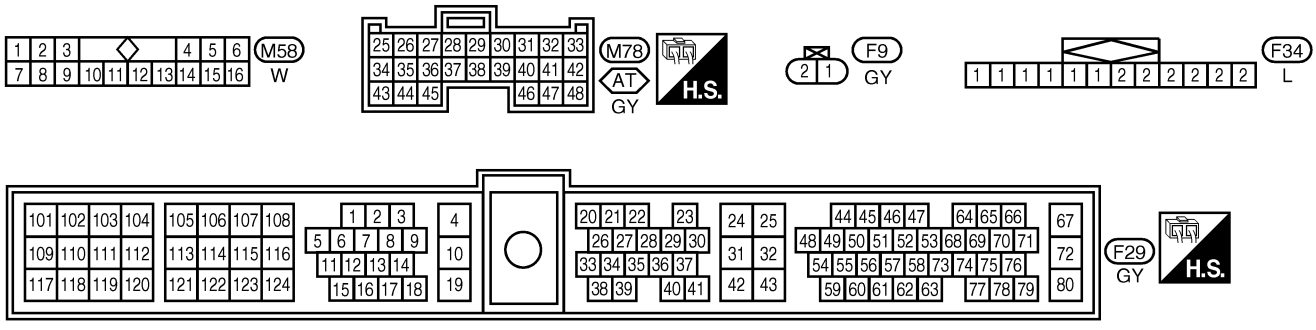
Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0605

EC-ECTS-01





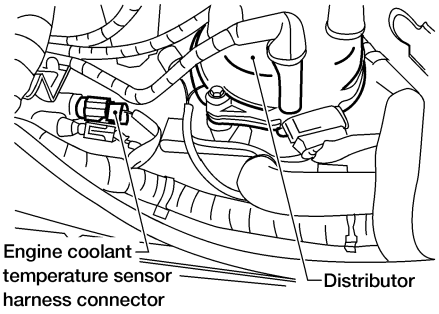
AEC942A

Diagnostic Procedure

NGEC0606

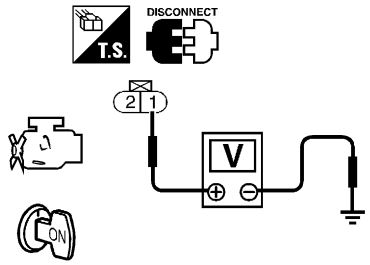
1	CHECK ECTS POWER SUPPLY CIRCUIT

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



AEC643A

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



SEF206W

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

2	CHECK ECTS GROUND CIRCUIT FOR OPEN AND SHORT

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

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

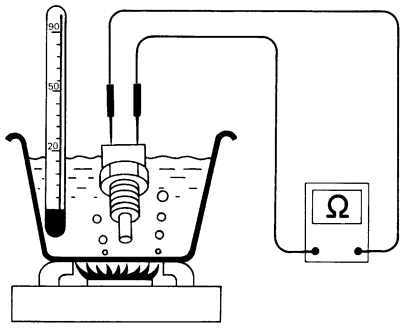
3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F28, M58
- Joint connector-4
- Harness for open or short between ECM and engine coolant temperature sensor
- Harness for open or short between TCM (Transmission Control Module) and engine coolant temperature sensor

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

4	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.

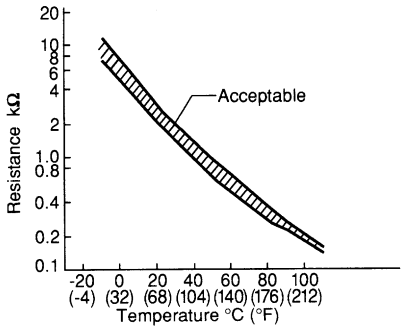


SEF152P

<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

MTBL0229



SEF012P

OK or NG

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

5	CHECK THERMOSTAT OPERATION

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

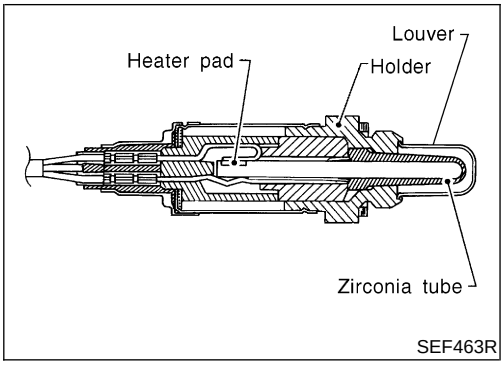
OK or NG

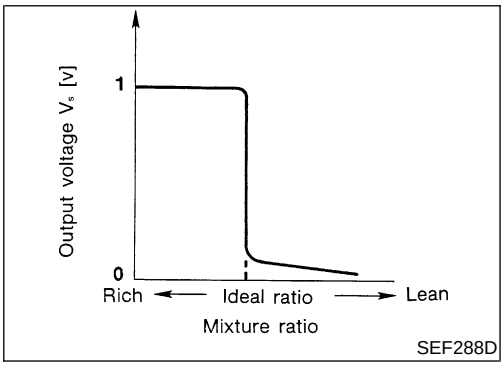
OK	▶	GO TO 6.
NG	▶	Repair or replace thermostat. Refer to "Thermostat", " ENGINE COOLING SYSTEM", ***LC-13***.

6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.

▶ **INSPECTION END**





Component Description

NGEC0607

The heated oxygen sensor 1 (front) is placed into the front tube. 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

NGEC0608

Specification data are reference values.

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

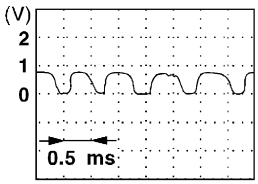
ECM Terminals and Reference Value

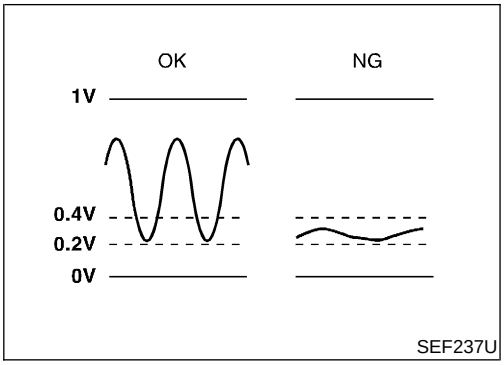
NGEC0609

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (front) (bank 1)	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V
51	G	Heated oxygen sensor 1 (front) (bank 2)		



On Board Diagnosis Logic

NGEC0610

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.
Malfunction is detected when the voltage from the sensor is constantly approx. 0.3V.

POSSIBLE CAUSE

NGEC0610S01

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Heated oxygen sensor 1 (front)

5

HO2S1 (B1) P0130	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEF332Z

5

HO2S1 (B1) P0130	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEF333Z

5

HO2S1 (B1) P0130
COMPLETED

SEF645Y

DTC Confirmation Procedure

=NGEC0611

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

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

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Select "HO2S1 (B1)/(B2) P0130/P0150" 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.

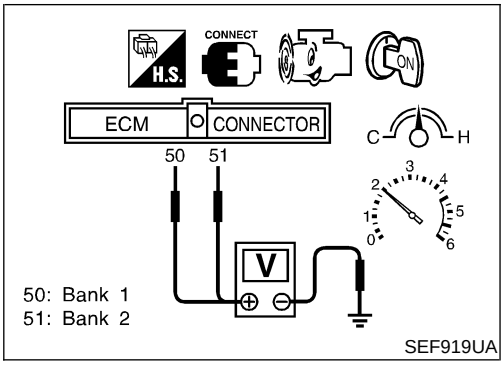
5) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 10 to 60 seconds.)

ENG SPEED	1,800 - 3,100 rpm
Vehicle speed	More than 65 km/h (40 MPH)
B/FUEL SCHDL	2.8 - 13 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-784.

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



Overall Function Check

=NGEC0612

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.

Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 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-784.

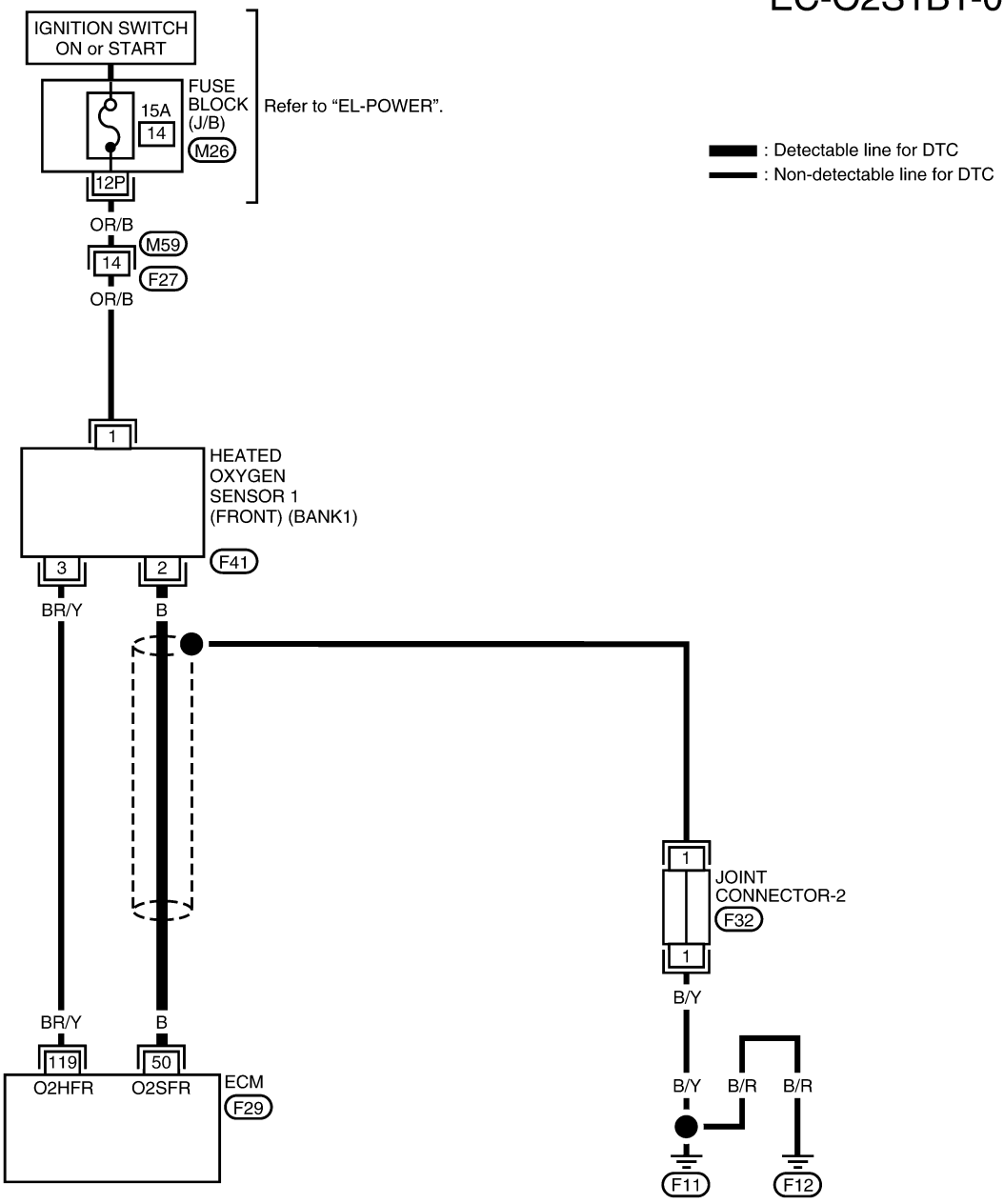
Wiring Diagram

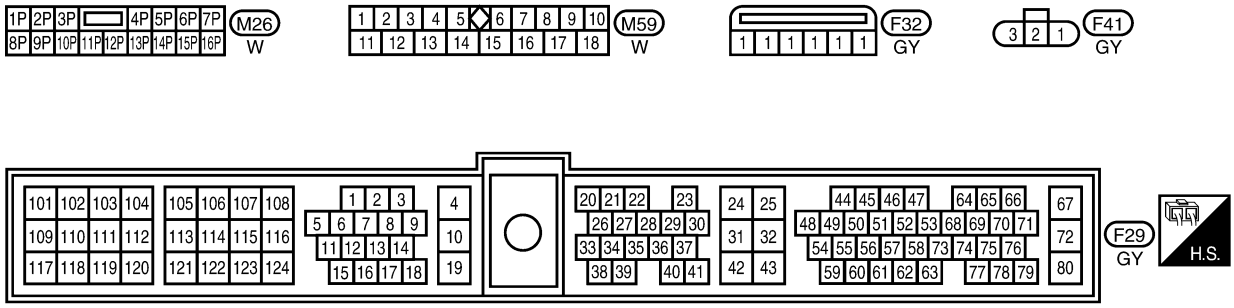
NGEC0613

RIGHT BANK

NGEC0613S01

EC-O2S1B1-01



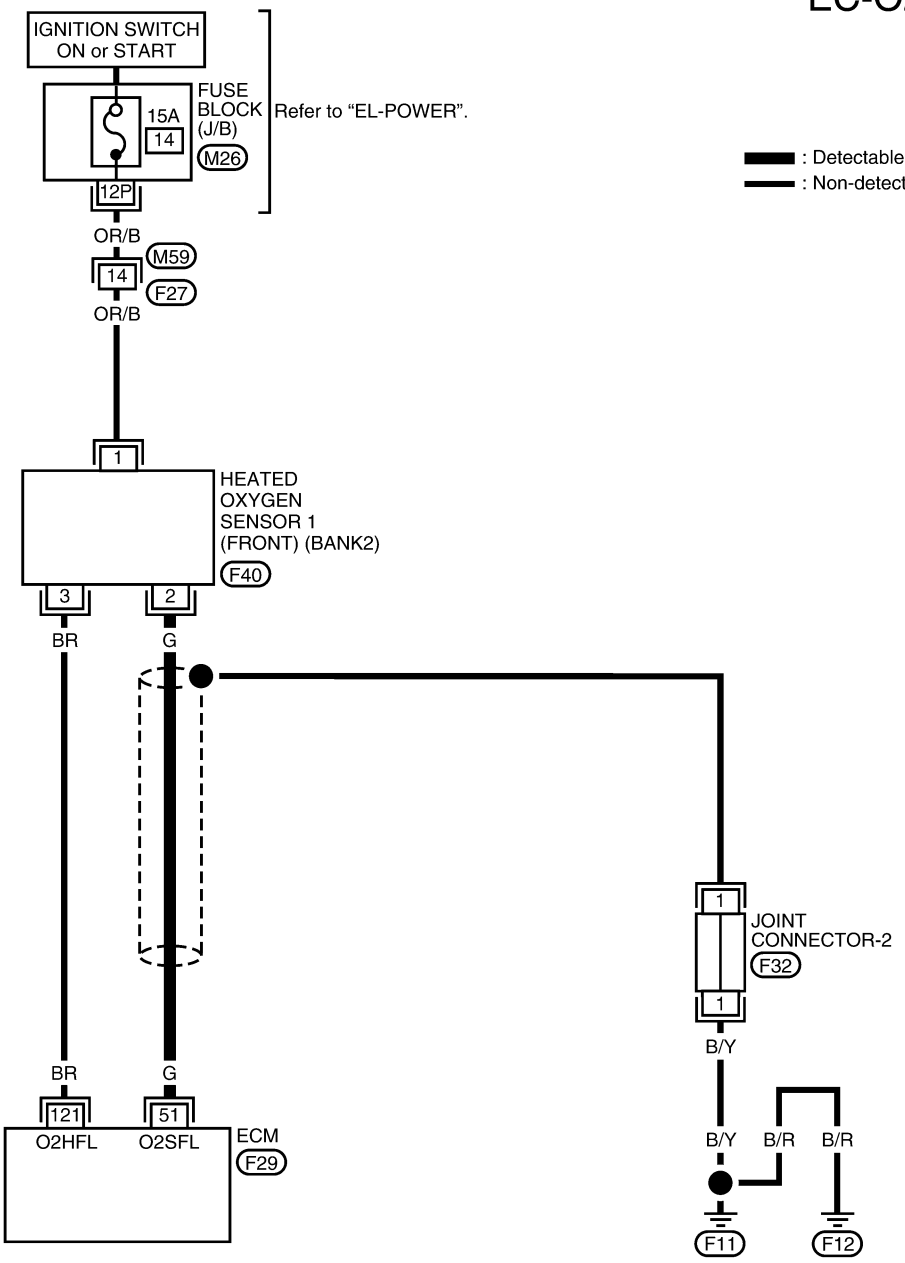


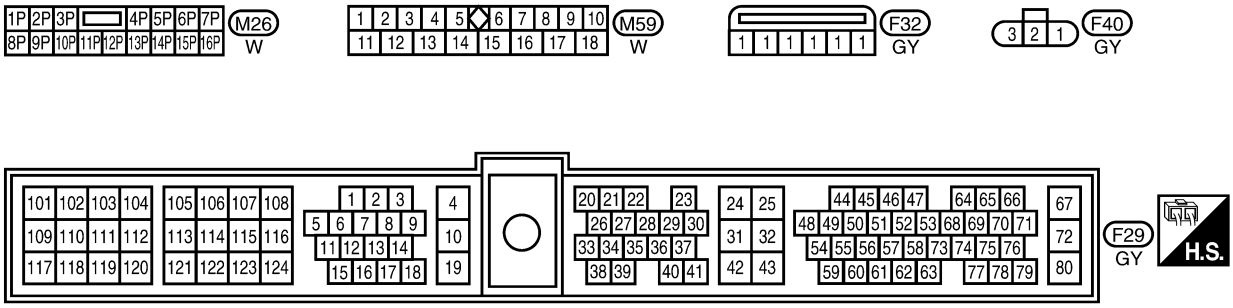
LEC493

LEFT BANK

NGEC0613S02

EC-O2S1B2-01





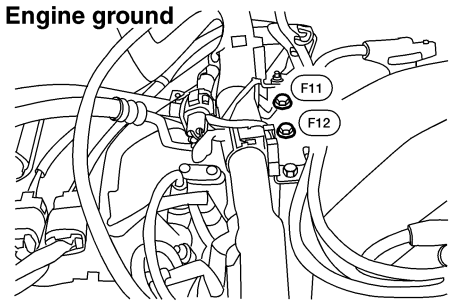
LEC494

Diagnostic Procedure

NGEC0614

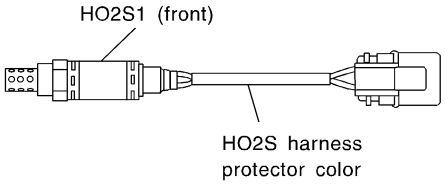
1	INSPECTION START

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



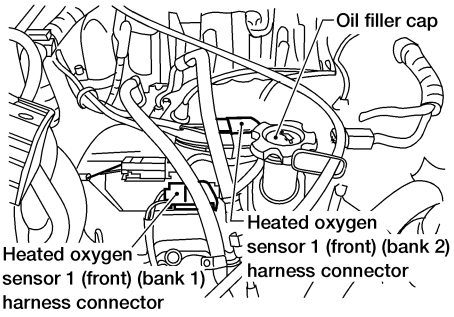
LEC518

3. Make sure HO2S 1 (front) harness protector color, and disconnect corresponding heated oxygen sensor 1 (front) harness connector.



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

SEF505Y



WEC545

▶	GO TO 2.

2 **CHECK HO2S 1 (FRONT) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0130	50	2	Bank 1 (Right)
P0150	51	2	Bank 2 (Left)

SEF803Z

Continuity should exist.

3. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0130	50 or 2	Ground	Bank 1 (Right)
P0150	51 or 2	Ground	Bank 2 (Left)

SEF816Z

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

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

Diagnostic Procedure (Cont'd)

3	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "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.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

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.

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

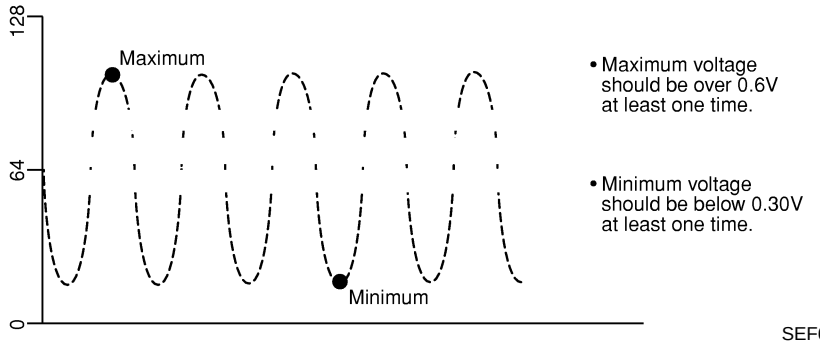
R means HO2S1 MNTR (B1)/(B2) indicates RICH

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

SEF647Y

- "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.

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



SEF648Y

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.**

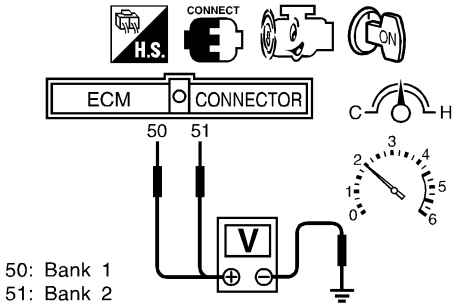
OK or NG

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

4	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

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

SEF796Z

CAUTION:

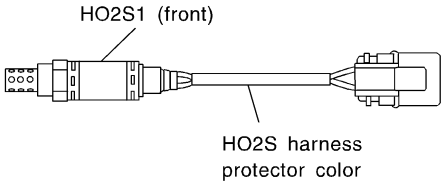
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)

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



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

SEF505Y

CAUTION:

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

	▶	Replace malfunctioning heated oxygen sensor 1 (front).

Diagnostic Procedure (Cont'd)

6	CHECK HO2S 1 (FRONT) SHIELD CIRCUIT FOR OPEN AND SHORT

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

- Continuity between joint connector terminal 1 and ground
- Joint connector

(Refer to "HARNESS LAYOUT", ***EL-9***.)

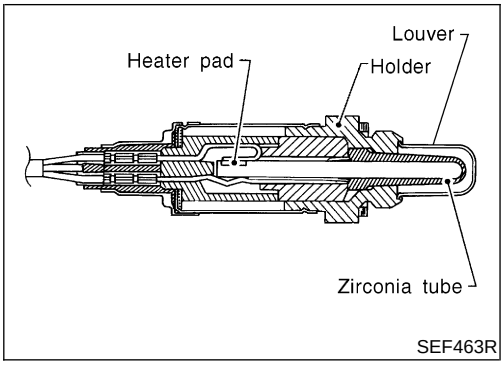
Continuity should exist.

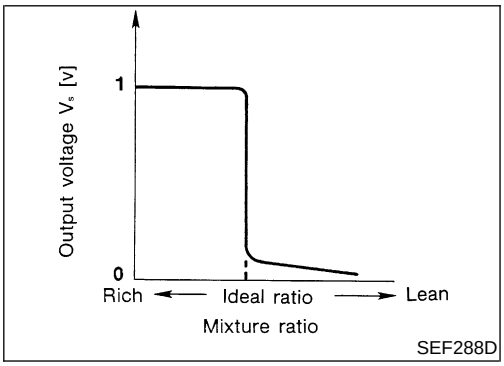
4. Also check harness for short to power.
5. Then reconnect joint connector-2.

OK or NG

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

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**





Component Description

NGEC0615

The heated oxygen sensor 1 (front) is placed into the front tube. 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

NGEC0616

Specification data are reference values.

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

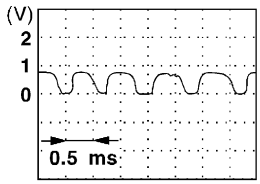
ECM Terminals and Reference Value

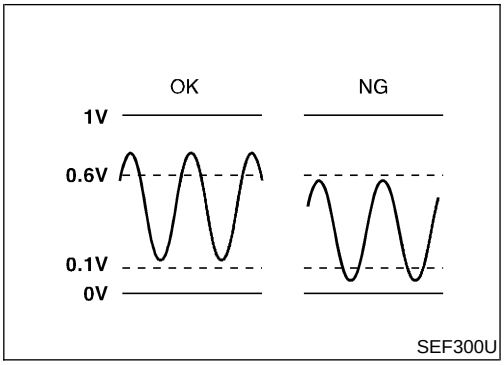
NGEC0617

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor (bank 1)	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V
51	G	Heated oxygen sensor (bank 2)		



On Board Diagnosis Logic

NGEC0618

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.

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

POSSIBLE CAUSE

NGEC0618S01

- Heated oxygen sensor 1 (front)
- Heated oxygen sensor 1 heater (front)
- Fuel pressure
- Injectors
- Intake air leaks

DTC Confirmation Procedure

=NGEC0619

CAUTION:

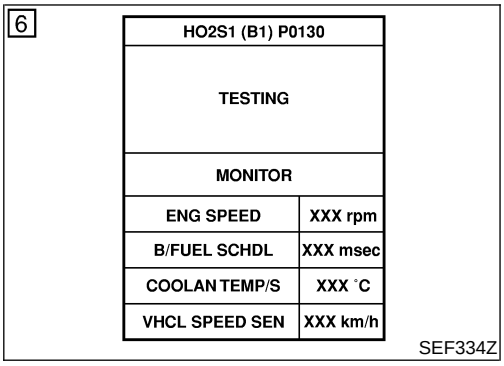
Always drive vehicle at a safe speed.

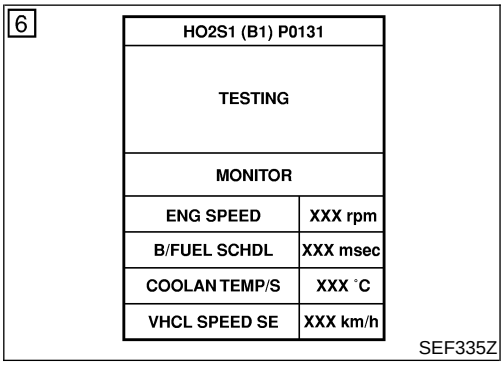
NOTE:

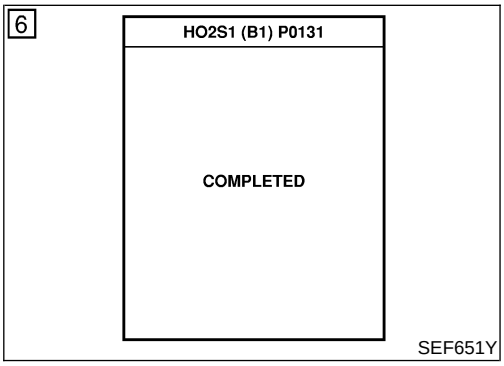
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- **Always perform at a temperature above −10°C (14°F).**
- **Before performing 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" 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:

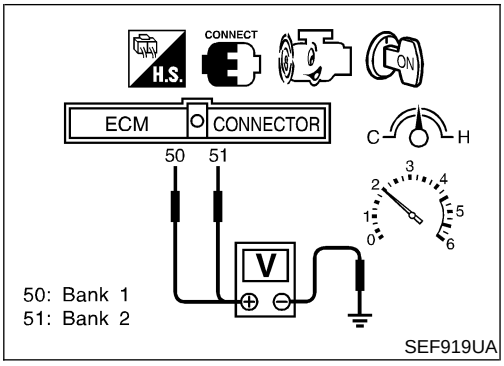
Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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	1,200 - 3,100 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	2.8 - 11 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-792.



Overall Function Check

NGEC0620

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.

Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
3) Check one of the following with engine speed held at 2,000 rpm constant under no load.

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

4) If NG, go to “Diagnostic Procedure”, EC-792.

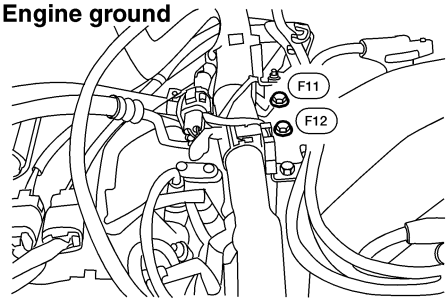
Diagnostic Procedure

NGEC0621

1	RETIGHTEN GROUND SCREWS

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

Engine ground



LEC518

▶	GO TO 2.

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)

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

Tightening torque:

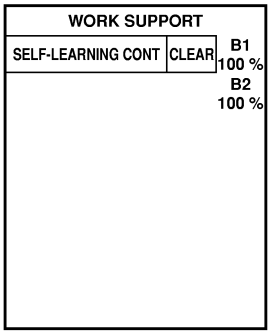
40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

▶	GO TO 3.

3	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".



SEF968Y

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

Without CONSULT-II

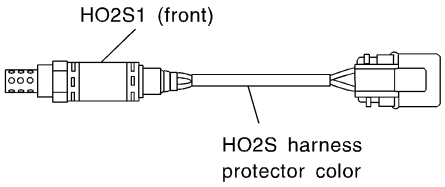
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-666.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-884.
No	▶	GO TO 4.

4	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)

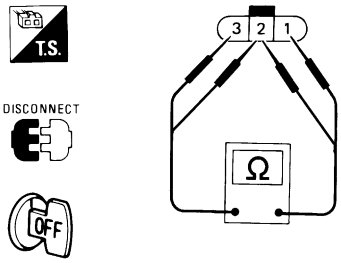
1. Stop engine.
2. Check heated oxygen sensor 1 (front) harness protector color.



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

SEF505Y

3. Check resistance between HO2S1 (front) terminals 3 and 1.



AEC158A

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

4. Check continuity between HO2S1 (front) terminals 2 and 1, 3 and 2.

Continuity should not exist.

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.**

OK or NG

OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Replace malfunctioning heated oxygen sensor 1 (front).

5	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "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.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

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.

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

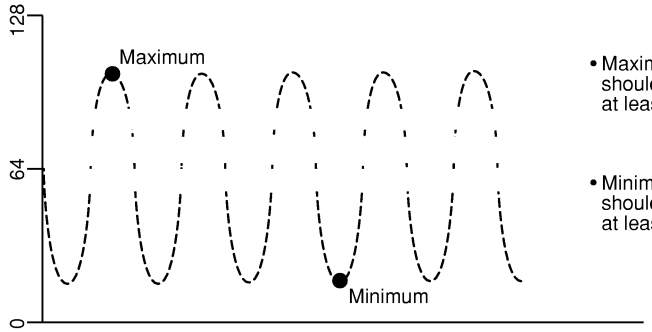
R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "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.

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



SEF648Y

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.**

OK or NG

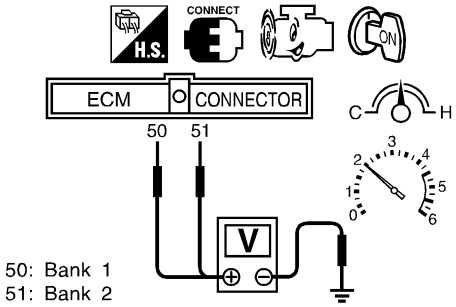
OK	▶	GO TO 7.
NG	▶	Replace malfunctioning heated oxygen sensor 1 (front).

Diagnostic Procedure (Cont'd)

6	CHECK FRONT HEATED OXYGEN SENSOR 1 (FRONT)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

SEF796Z

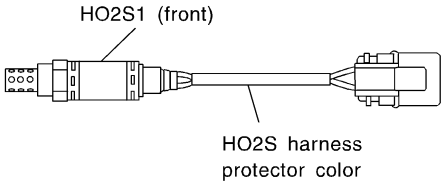
CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 (front) harness protector color.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

CAUTION:
Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning heated oxygen sensor 1 (front).

8	CHECK HO2S1 (FRONT) SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect joint connector.
3. For circuit, refer to "DTC P0130, P0150 HEATED OXYGEN SENSOR 1 (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)", EC-778.
4. Check the following.

- Continuity between joint connector terminal 1 and ground
- Joint connector
  (Refer to ***EL-244***, "HARNESS LAYOUT".)

Continuity should exist.

5. Also check harness for short to power.
6. Then reconnect joint connector.

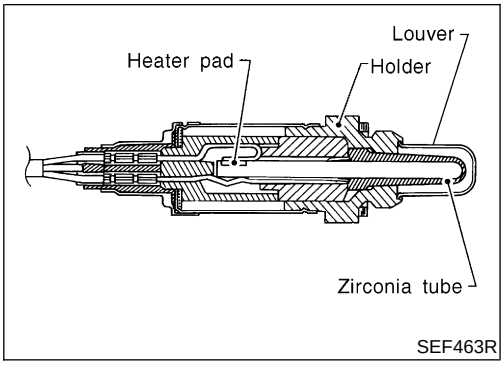
OK or NG

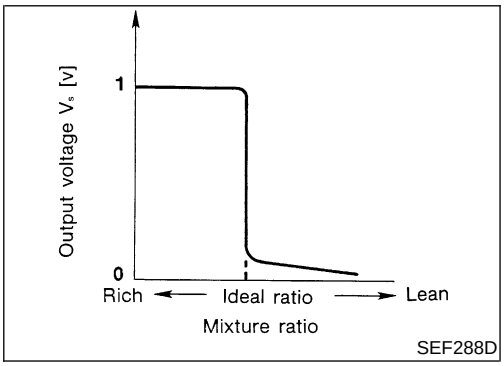
OK	▶	GO TO 9.
NG	▶	Repair open circuit or short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.
For circuit, refer to "DTC P0130, P0150 HEATED OXYGEN SENSOR (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)", EC-778.

	▶	**INSPECTION END**





Component Description

NGEC0622

The heated oxygen sensor 1 (front) is placed into the front tube. 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

NGEC0623

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

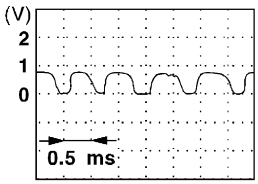
ECM Terminals and Reference Value

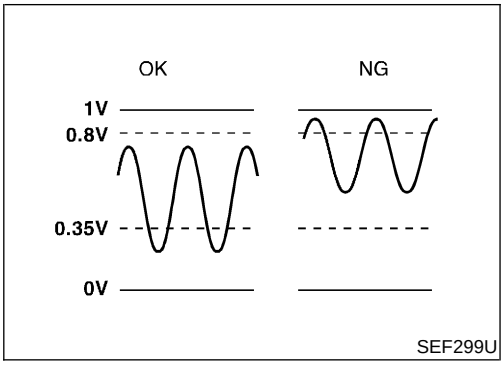
NGEC0624

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (front) (Bank 1)	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V
51	G	Heated oxygen sensor 1 (front) (Bank 2)		



On Board Diagnosis Logic

NGEC0625

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.

Malfunction is detected when the maximum and minimum voltages from the sensor are beyond the specified voltages.

POSSIBLE CAUSE

NGEC0625S01

- Heated oxygen sensor 1 (front)
- Fuel pressure
- Injectors
- Heated oxygen sensor 1 heater (front)

DTC Confirmation Procedure

=NGEC0626

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- **Always perform at a temperature above −10°C (14°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

6

HO2S1 (B1) P0132	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF336Z

6

HO2S1 (B1) P0132	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

SEF337Z

6

HO2S1 (B1) P0132
COMPLETED

SEF655Y

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) P0132/ P0152” 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:

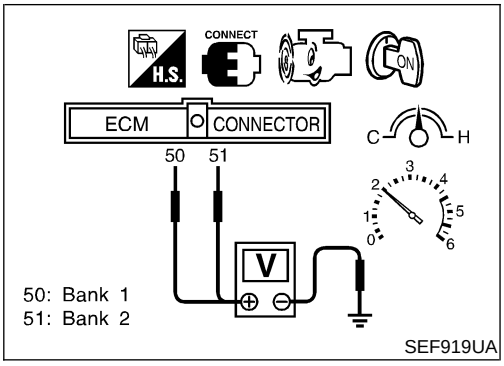
Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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.)

END SPEED	1,200 - 3,100 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	2.8 - 11 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-801.



Overall Function Check

NGEC0627

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.

Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
3) Check one of the following with engine speed held at 2,000 rpm constant under no load.

- The maximum voltage is below 0.8V at least one time.
- The minimum voltage is below 0.35V at least one time.

4) If NG, go to “Diagnostic Procedure”, EC-801.

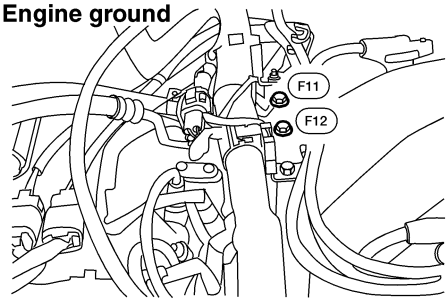
Diagnostic Procedure

NGEC0628

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

Engine ground



LEC518

▶	GO TO 2.

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)

Loosen and retighten corresponding heated oxygen sensor 1 (front).

Tightening torque:
40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

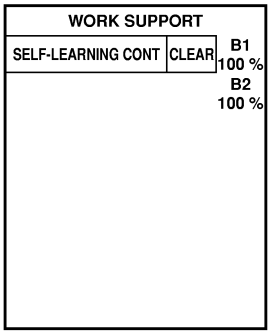
▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".



SEF968Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

Without CONSULT-II

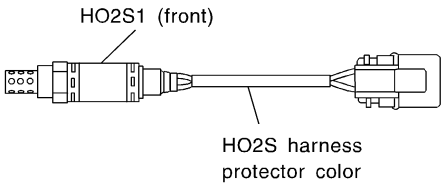
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-666.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-893.
No	▶	GO TO 4.

4	CHECK HO2S 1 (FRONT) CONNECTOR FOR WATER

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 (front) harness protector color.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

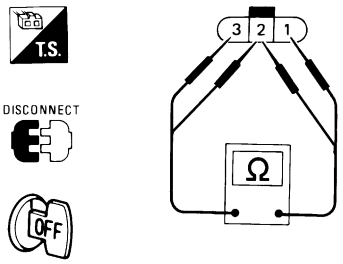
3. Disconnect heated oxygen sensor 1 (front) harness connector.
4. Check connectors for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair or replace harness or connectors.

5	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)

Check resistance between HO2S1 (front) terminals 3 and 1.



AEC158A

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

Check continuity between HO2S1 (front) terminals 2 and 1, 3 and 2.

Continuity should not exist.

CAUTION:

Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	GO TO 8.

6	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "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.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

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.

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

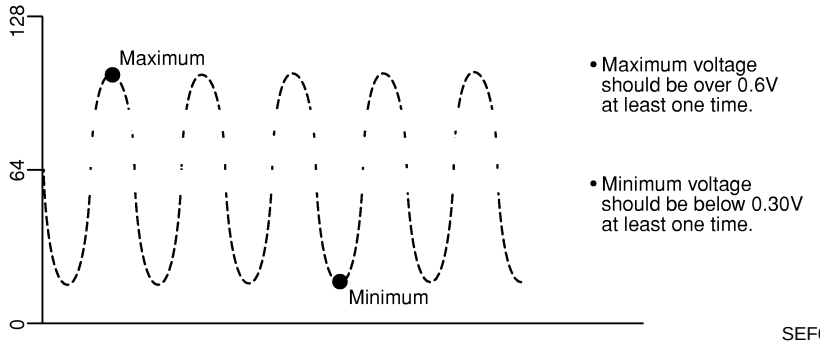
R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "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.

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



SEF648Y

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.**

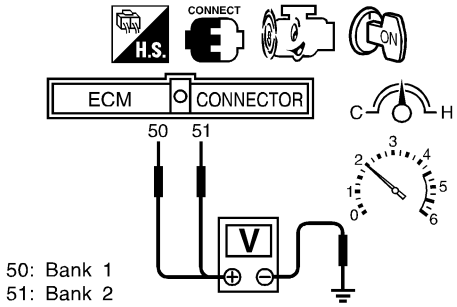
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

7	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



50: Bank 1
51: Bank 2

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

SEF796Z

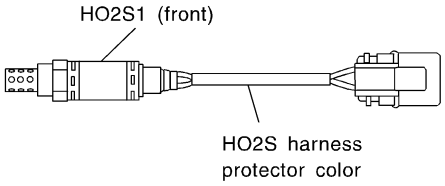
CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 8.

8	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 (front) harness protector color.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

CAUTION:
Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning heated oxygen sensor 1 (front).

Diagnostic Procedure (Cont'd)

9	CHECK HO2S1 (FRONT) SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect joint connector.
   For circuit, refer to "DTC P0130, P0150 FRONT HEATED OXYGEN SENSOR (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)", EC-778.
3. Check the following.

- Continuity between joint connector terminal 1 and ground
- Joint connector

(Refer to ***EL-244***, "HARNESS LAYOUT".)

Continuity should exist.

4. Also check harness for short to power.
5. Then reconnect joint connector.

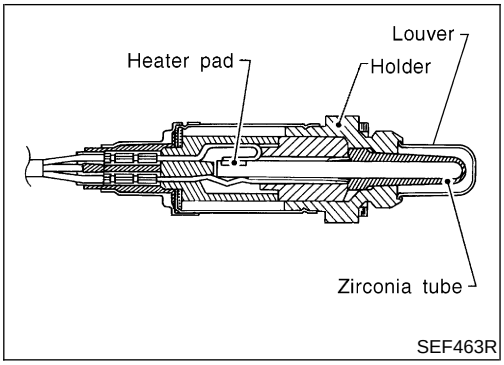
OK or NG

OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to power in harness or connectors.

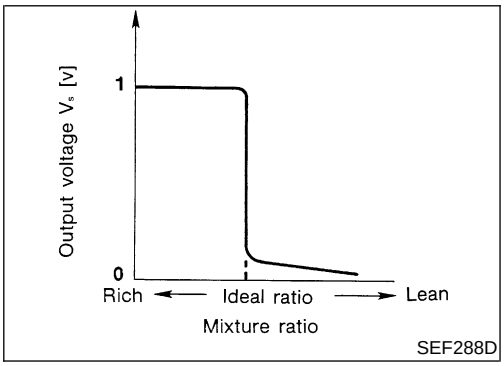
10	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.
For circuit, refer to "DTC P0130, P0150 FRONT HEATED OXYGEN SENSOR (FRONT) (BANK 1)/(BANK 2) (CIRCUIT)", EC-778.

	▶	**INSPECTION END**



SEF463R



SEF288D

Component Description

NGEC0629

The heated oxygen sensor 1 (front) is placed into the front tube. 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

NGEC0630

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

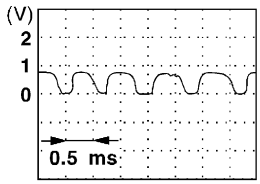
ECM Terminals and Reference Value

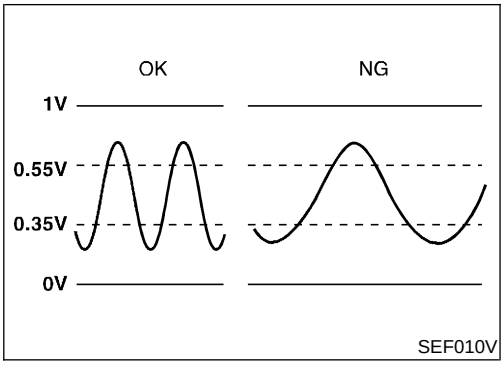
NGEC0631

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (front) (Bank 1)	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V
51	G	Heated oxygen sensor 1 (front) (Bank 2)		



On Board Diagnosis Logic

NGEC0632

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.
Malfunction is detected when the response of the voltage signal from the sensor takes more than the specified time.

POSSIBLE CAUSE

NGEC0632S01

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Heated oxygen sensor 1 (front)
- Heated oxygen sensor 1 heater (front)
- Fuel pressure
- Injectors
- Intake air leaks
- Exhaust gas leaks
- PCV valve
- Mass air flow sensor

DTC Confirmation Procedure

NGEC0633

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- **Always perform at a temperature above −10°C (14°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

6

HO2S1 (B1) P0133	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEF338Z

6

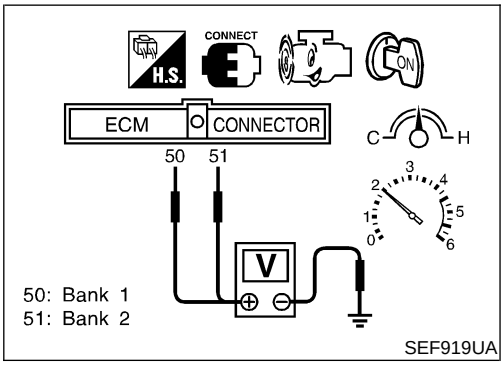
HO2S1 (B1) P0133	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SEN	XXX km/h

SEF339Z

6

HO2S1 (B1) P0133
COMPLETED

SEF658Y



SEF919UA

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) P0133/ P0153" 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 40 to 50 seconds.)

ENG SPEED	1,800 - 3,300 rpm
Vehicle speed	More than 80 km/h (50 MPH)
B/FUEL SCHDL	2.8 - 13 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-812.

Overall Function Check

NGEC0634

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.

Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
  1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
  2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

4) If NG, go to "Diagnostic Procedure", EC-812.

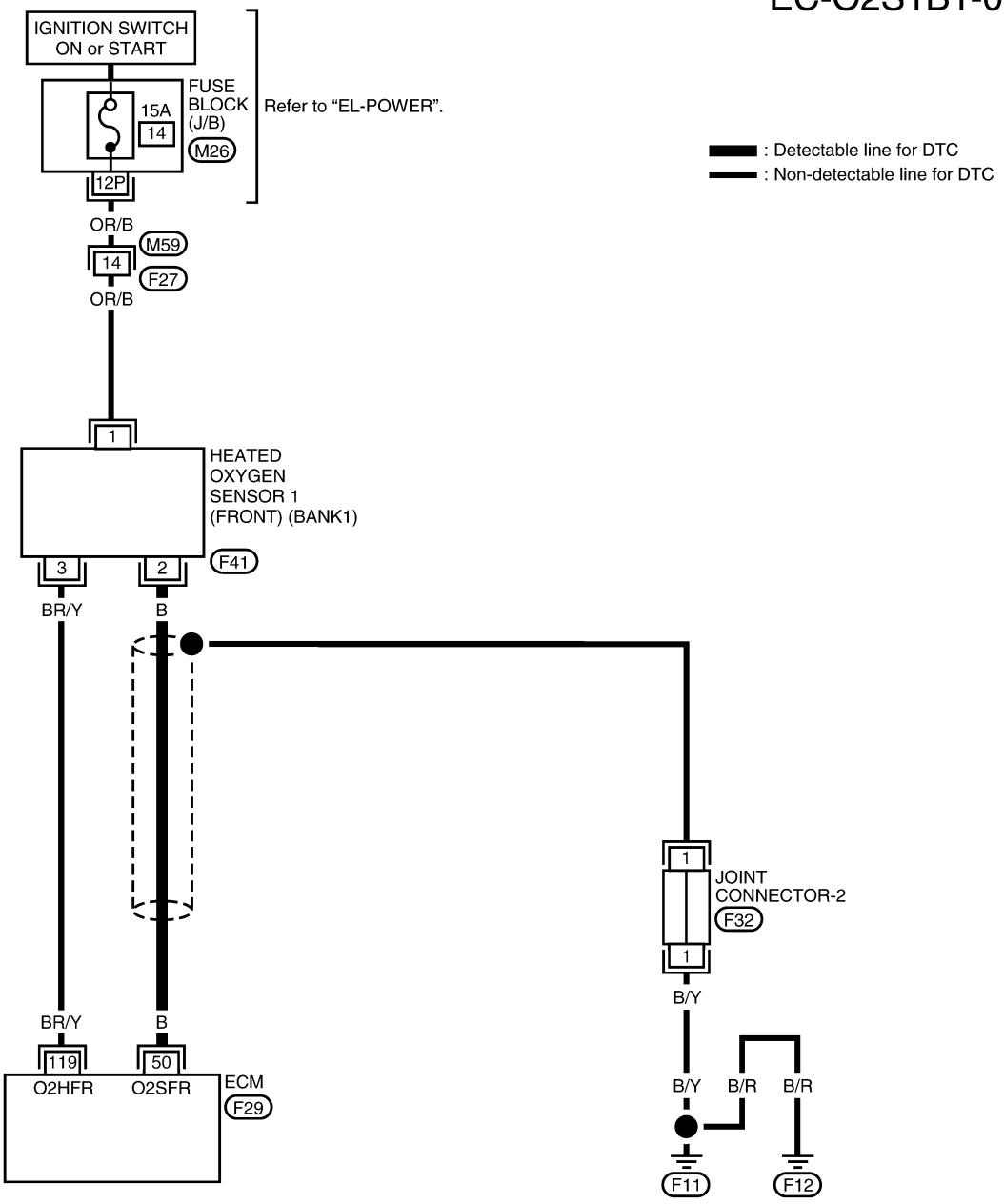
Wiring Diagram

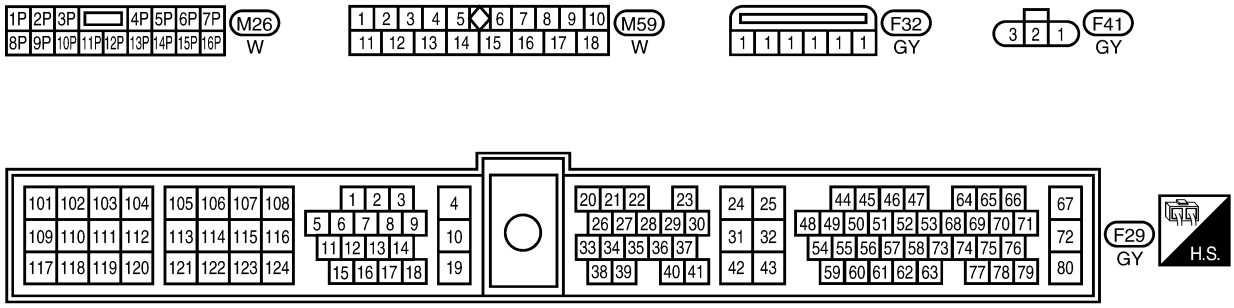
NGEC0635

RIGHT BANK

NGEC0635S01

EC-O2S1B1-01



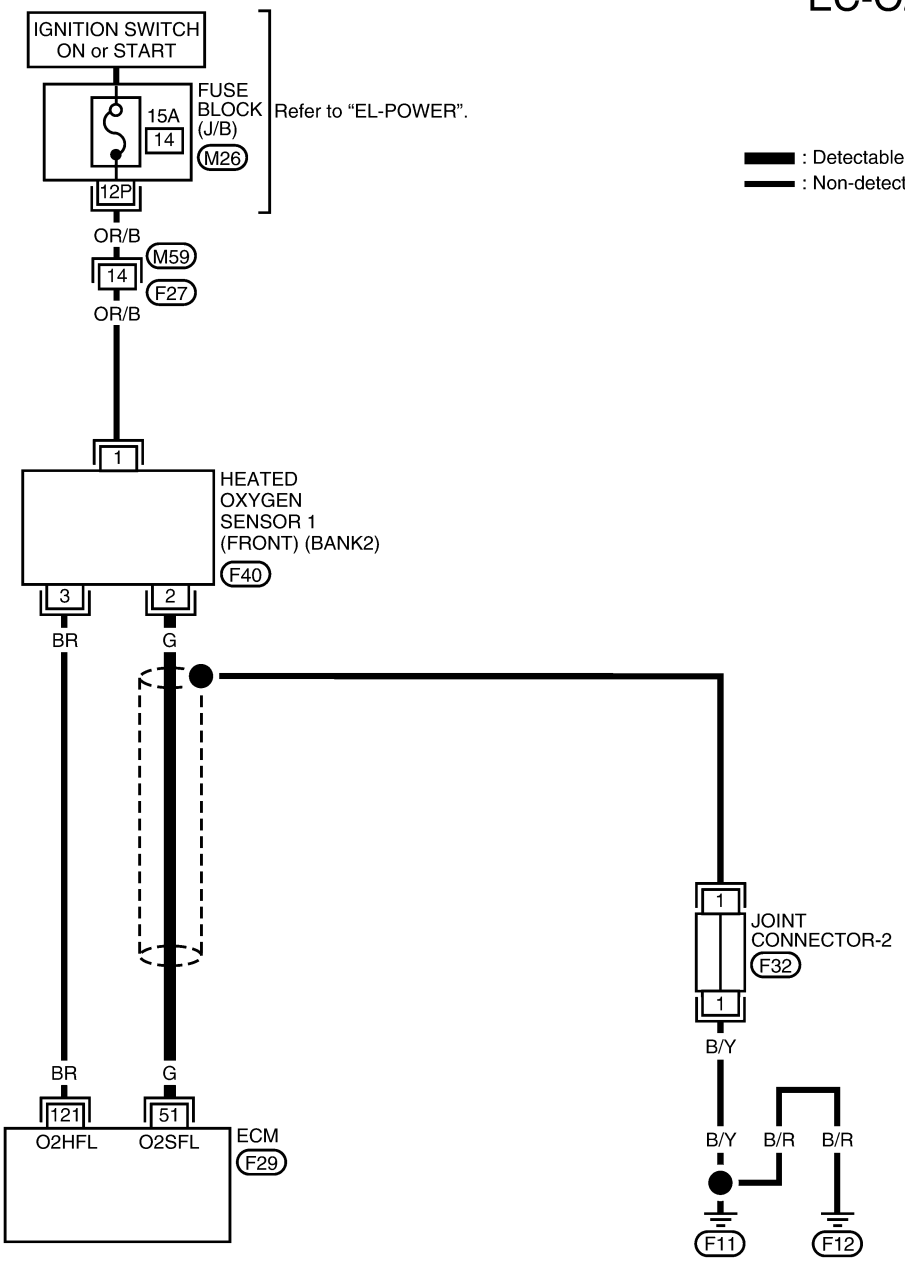


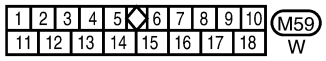
LEC493

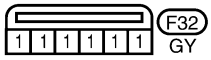
LEFT BANK

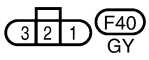
NGEC0635S02

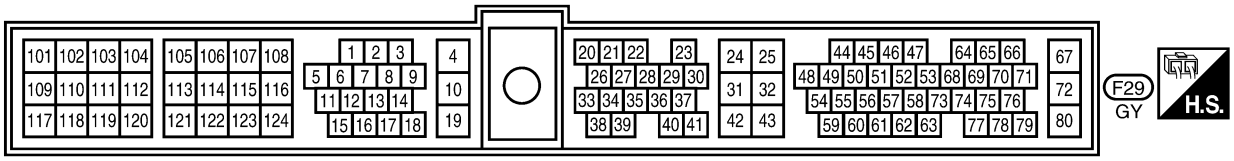
EC-O2S1B2-01











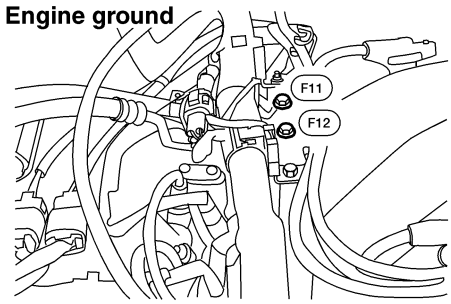
LEC494

Diagnostic Procedure

NGEC0636

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.



LEC518

	▶	GO TO 2.

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)

Loosen and retighten corresponding heated oxygen sensor 1 (front).

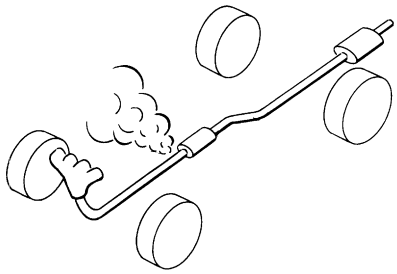
Tightening torque:

40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

	▶	GO TO 3.

3	CHECK FOR EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before three way catalyst.



SEF099P

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace.

4	CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

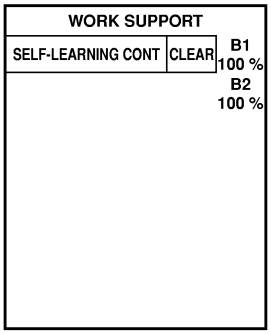
OK or NG

OK	▶	GO TO 5.
NG	▶	Repair or replace.

5	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".



SEF968Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-666.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?

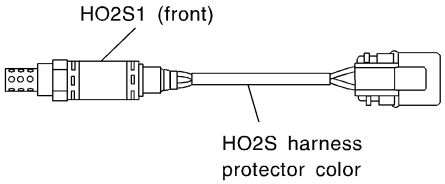
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-884, 893.
No	▶	GO TO 6.

6	CHECK HO2S1 (FRONT) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Diagnostic Procedure (Cont'd)

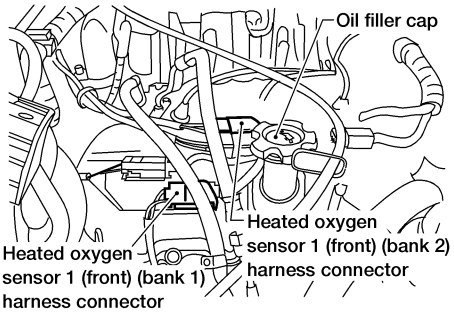
1. Turn ignition switch OFF.
2. Check heated oxygen sensor 1 (front) harness protector.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

3. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.



WEC545

4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0133	50	2	Bank 1 (Right)
P0153	51	2	Bank 2 (Left)

SEF817Z

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0133	50 or 2	Ground	Bank 1 (Right)
P0153	51 or 2	Ground	Bank 2 (Left)

SEF818Z

Continuity should not exist.

7. Also check harness for short to power.

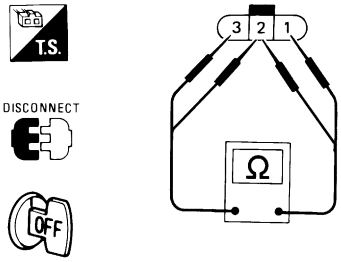
OK or NG

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 HEATER (FRONT)

Check resistance between HO2S1 (front) terminals 3 and 1.



AEC158A

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

Check continuity between HO2S1 (front) terminals 2 and 1, 3 and 2.

Continuity should not exist.

CAUTION:

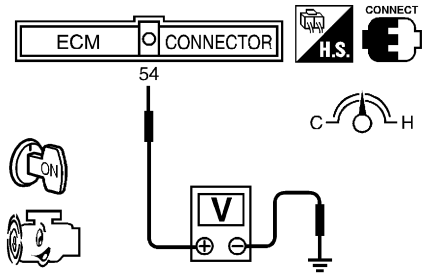
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 12.

8	CHECK MASS AIR FLOW SENSOR

1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.

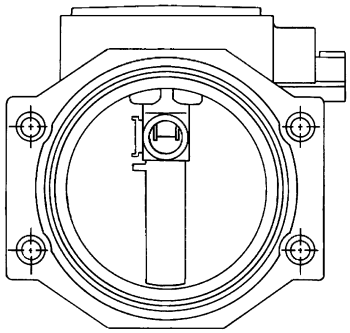


SEF747U

Condition	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.)	1.7 - 2.3
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

MTBL0227

4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Then repeat above check.
5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.



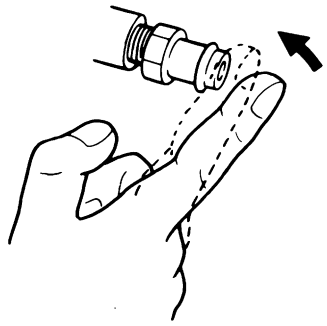
SEF030T

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace mass air flow sensor.

9	CHECK PCV VALVE

With engine running at idle, remove PCV valve ventilation hose from PCV valve; make sure that a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.



SEC137A

OK or NG

OK (With CONSULT-II)	▶	GO TO 10.
OK (Without CONSULT-II)	▶	GO TO 11.
NG	▶	Replace PCV valve.

10	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "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.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

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.

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

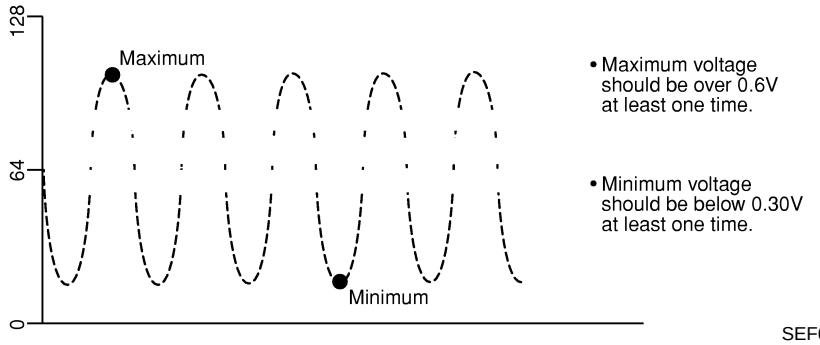
R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "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.

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



SEF648Y

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.**

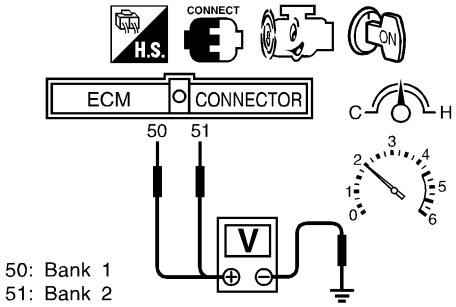
OK or NG

OK	▶	GO TO 12.
NG	▶	Replace malfunctioning heated oxygen sensor 1 (front).

11	CHECK FRONT HEATED OXYGEN SENSOR 1 (FRONT)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



50: Bank 1
51: Bank 2

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

SEF796Z

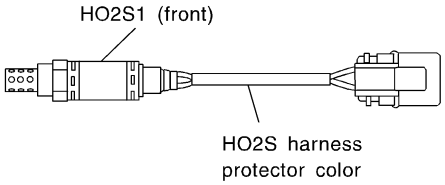
CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 13.
NG	▶	GO TO 12.

12	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 (front) harness protector color.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

CAUTION:
Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning heated oxygen sensor 1 (front).

Diagnostic Procedure (Cont'd)

13	CHECK HO2S1 (FRONT) SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect joint connector.
3. Check the following.

- Continuity between joint connector terminal 1 and ground
- Joint connector

(Refer to "HARNESS LAYOUT", ***EL-9***.)

Continuity should exist.

4. Also check harness for short to power.
5. Then reconnect joint connector.

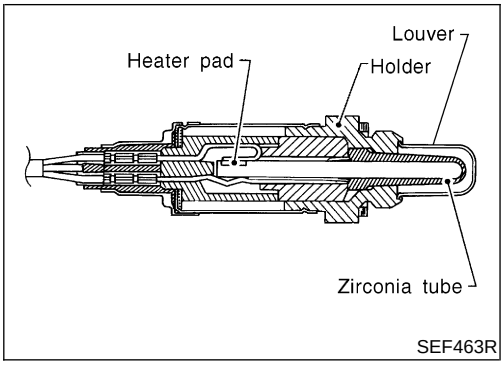
OK or NG

OK	▶	GO TO 14.
NG	▶	Repair open circuit or short to power in harness or connectors.

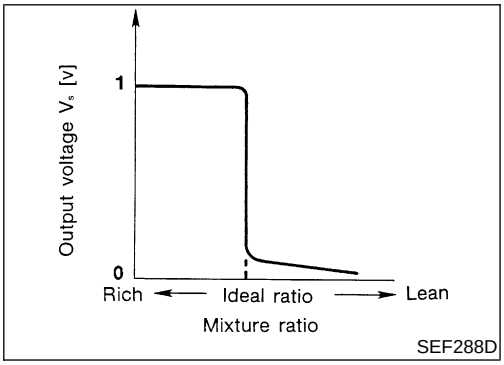
14	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.

▶ **INSPECTION END**



SEF463R



SEF288D

Component Description

NGEC0637

The heated oxygen sensor 1 (front) is placed into the front tube. 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

NGEC0638

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1) HO2S1 (B2)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

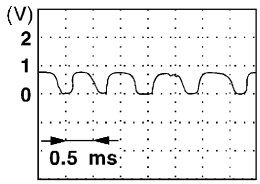
ECM Terminals and Reference Value

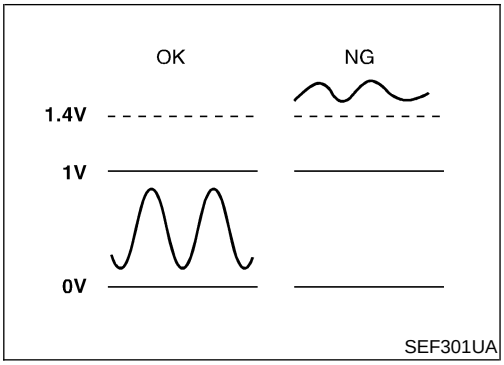
NGEC0639

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (front) (Bank 1)	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V
51	G	Heated oxygen sensor 1 (front) (Bank 2)		



SEF301UA

5

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX ˚C

SEF174Y

On Board Diagnosis Logic

NGEC0640

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 (front) output is not inordinately high.
Malfunction is detected when an excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

NGEC0640S01

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Heated oxygen sensor 1 (front)

DTC Confirmation Procedure

NGEC0641

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON.
4) Select “DATA MONITOR” mode with CONSULT-II.
5) Restart engine and let it idle for 25 seconds.
6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-825.

With GST

Follow the procedure “With CONSULT-II”.

- **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.**

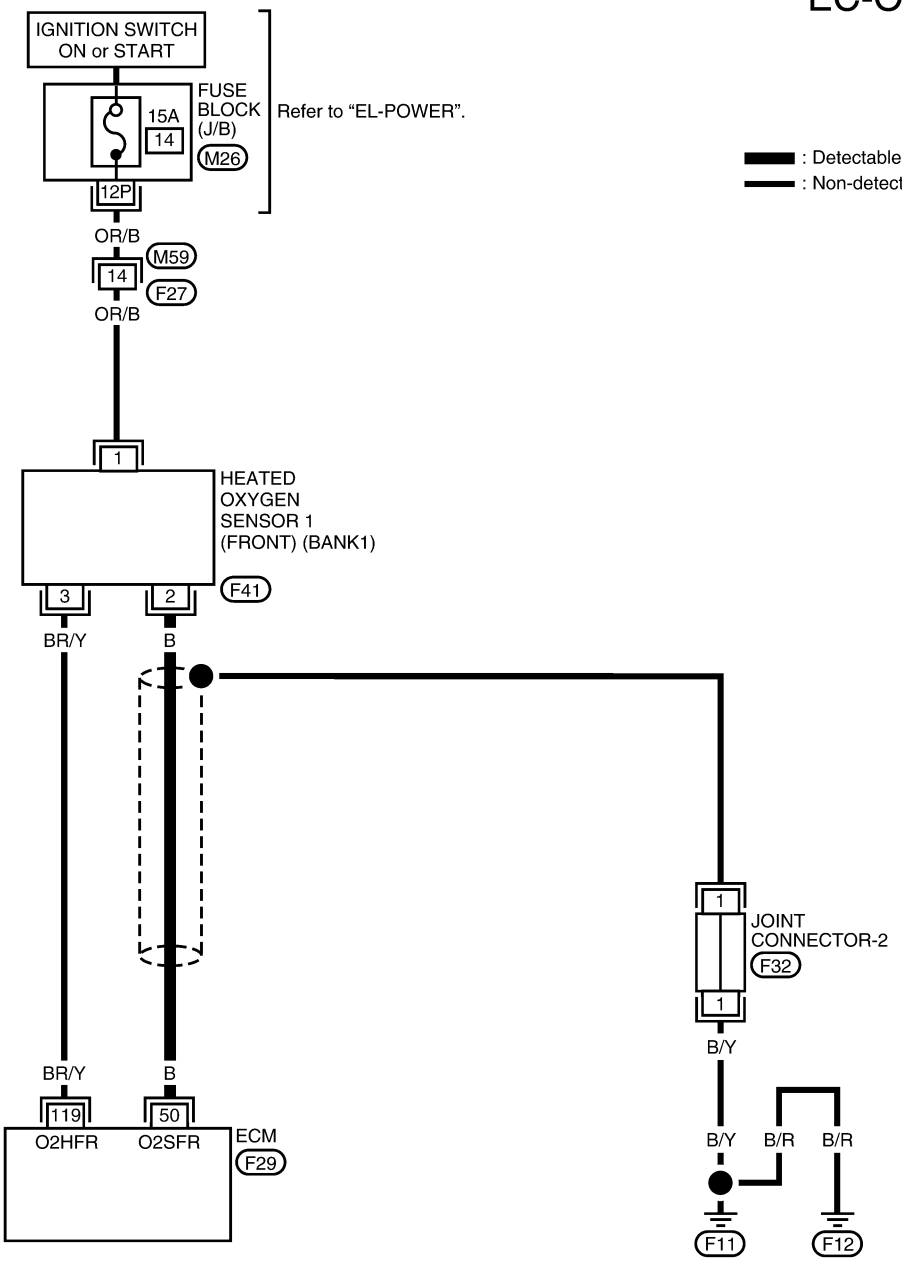
Wiring Diagram

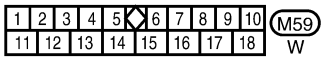
NGEC0642

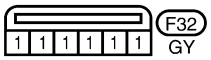
RIGHT BANK

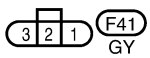
NGEC0642S01

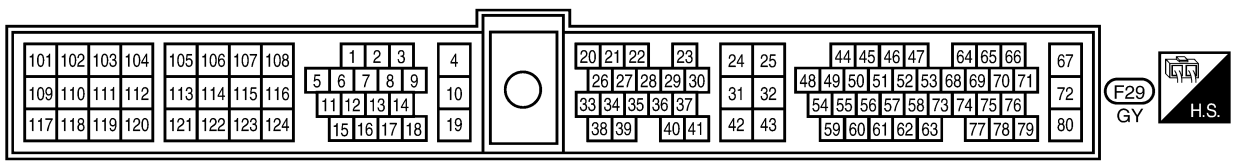
EC-O2S1B1-01











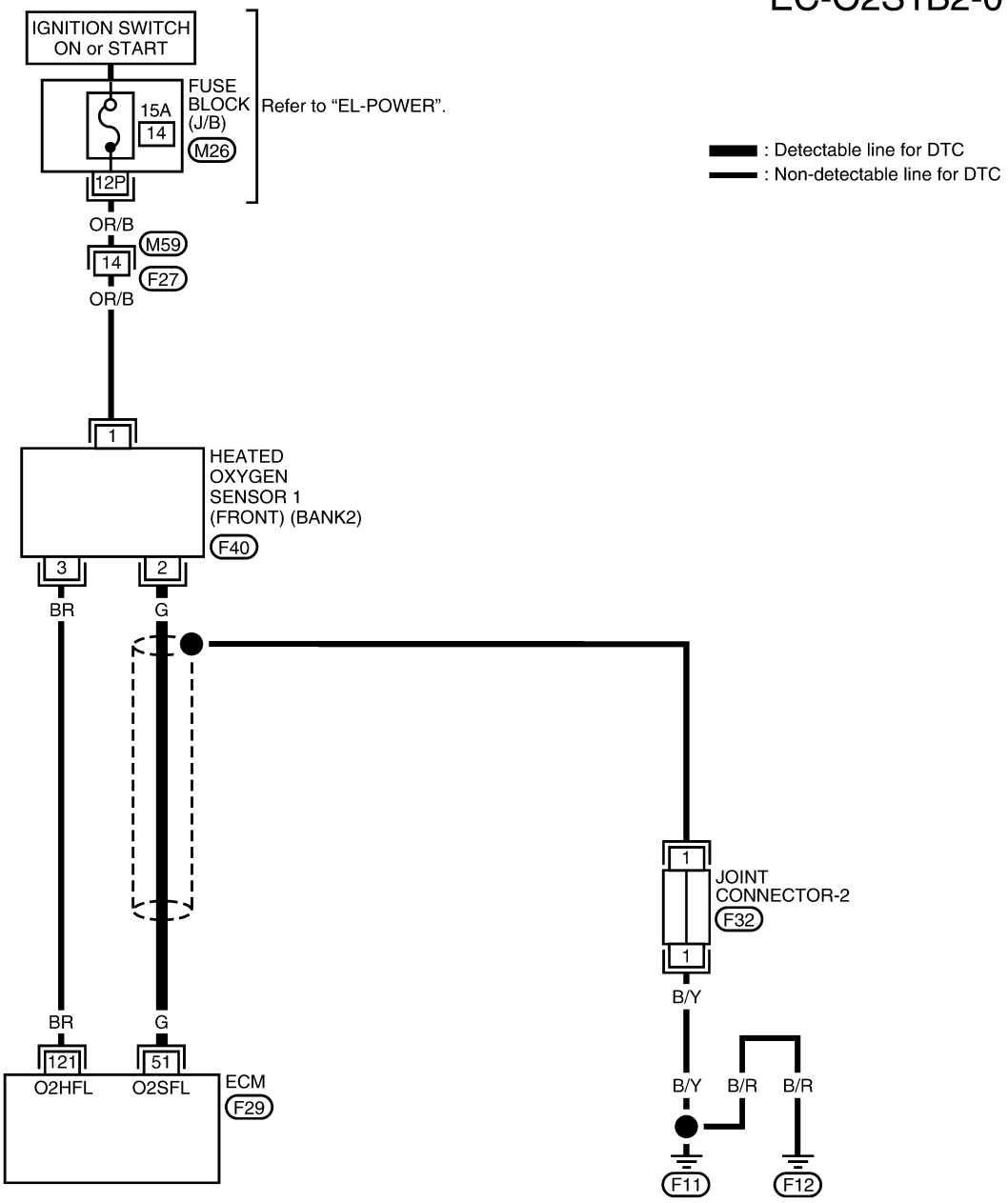
LEC493

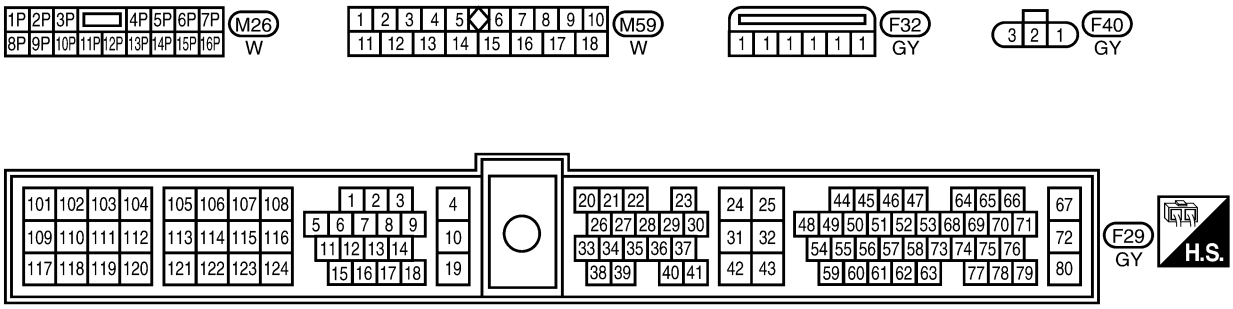
Wiring Diagram (Cont'd)

LEFT BANK

NGEC0642S02

EC-O2S1B2-01





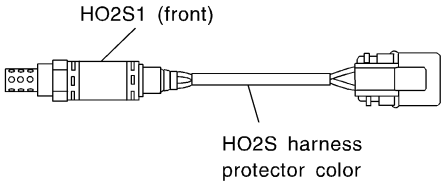
LEC494

Diagnostic Procedure

NGEC0643

1	INSPECTION START

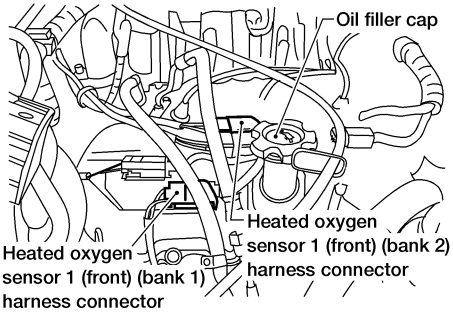
1. Turn ignition switch OFF.
2. Check heated oxygen sensor 1 (front) harness protector.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

3. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.



WEC545

▶ GO TO 2.

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)

1. Loosen and retighten 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.

Diagnostic Procedure (Cont'd)

3	CHECK HO2S1 (FRONT) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal and HO2S1 (front) terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0134	50	2	Bank 1 (Right)
P0154	51	2	Bank 2 (Left)

SEF819Z

Continuity should exist.

3. Check harness continuity between ECM terminal or HO2S1 (front) terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0134	50 or 2	Ground	Bank 1 (Right)
P0154	51 or 2	Ground	Bank 2 (Left)

SEF820Z

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK FRONT HO2S1 (FRONT) CONNECTOR FOR WATER

1. Disconnect heated oxygen sensor 1 (front) harness connector.
2. Check connectors for water.

Water should not exist.

OK or NG

OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair or replace harness or connectors.

5	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "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.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

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 left:

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

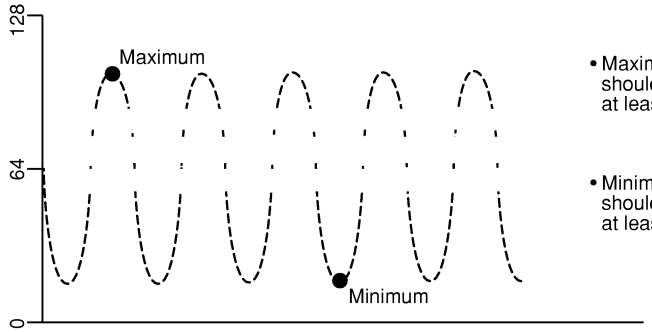
R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "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.

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



SEF648Y

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.**

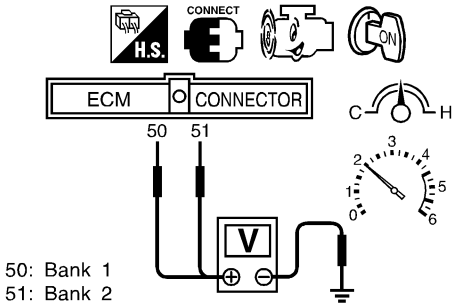
OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

6	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

SEF796Z

CAUTION:

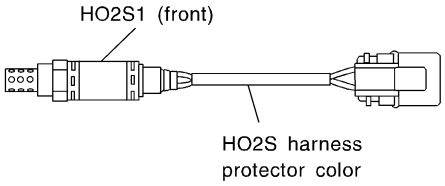
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 (front) harness protector color.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

CAUTION:

Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning heated oxygen sensor 1 (front).

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
	▶ **INSPECTION END**

Description

NGEC0644

SYSTEM DESCRIPTION

NGEC0644S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Heated oxygen sensor 1 heater (front) control	Heated oxygen sensor 1 heaters (front)

The ECM performs ON/OFF control of the heated oxygen sensor 1 heaters (front) corresponding to the engine speed.

OPERATION

NGEC0644S02

Engine speed rpm	Heated oxygen sensor 1 heaters (front)
Above 3,200	OFF
Below 3,200	ON

CONSULT-II Reference Value in Data Monitor Mode

NGEC0645

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1) HO2S1 HTR (B2)	• Engine speed: Below 3,200 rpm	ON
	• Engine speed: Above 3,200 rpm	OFF

ECM Terminals and Reference Value

NGEC0646

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
119	BR/Y	Heated oxygen sensor 1 heater (front) (bank 1)	**[Engine is running]** • Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Engine speed is below 3,200 rpm	Approximately 0.4V
121	BR	Heated oxygen sensor 1 heater (front) (bank 2)	**[Engine is running]** • Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • Engine speed is below 3,200 rpm	Approximately 0.4V

On Board Diagnosis Logic

NGEC0647

Malfunction is detected when 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 ECM through the heated oxygen sensor 1 heater (front).]

POSSIBLE CAUSE

NGEC0647S01

- Harness or connectors
  [The heated oxygen sensor 1 heater (front) circuit is open or shorted.]
- Heated oxygen sensor 1 heater (front)

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NGEC0648

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

With CONSULT-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-833.

With GST

1) Start engine and run it for at least 6 seconds at idle speed.
2) Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
3) Start engine and run it for at 6 seconds at idle speed.
4) Select “MODE 3” with GST.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-833.

- **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.**

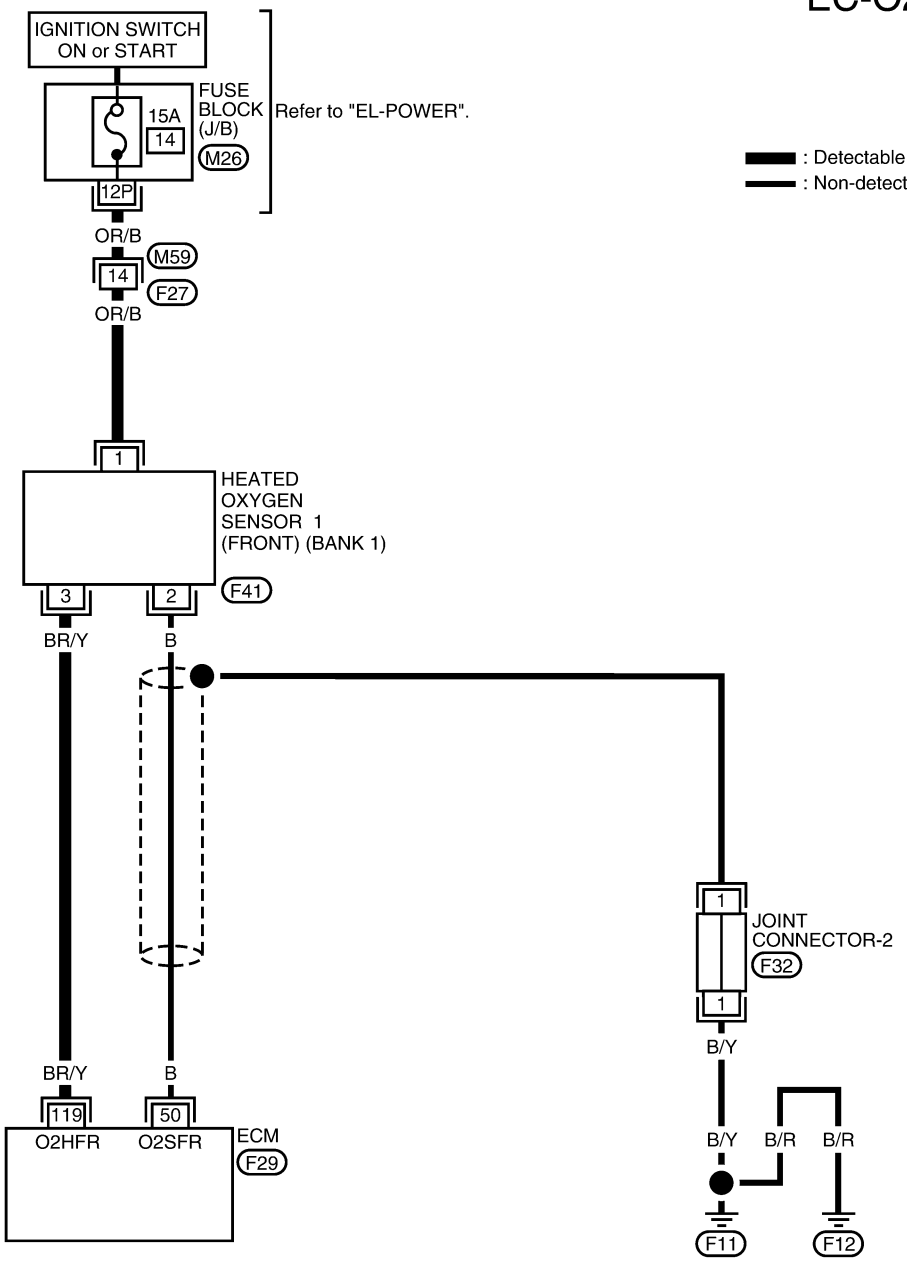
Wiring Diagram

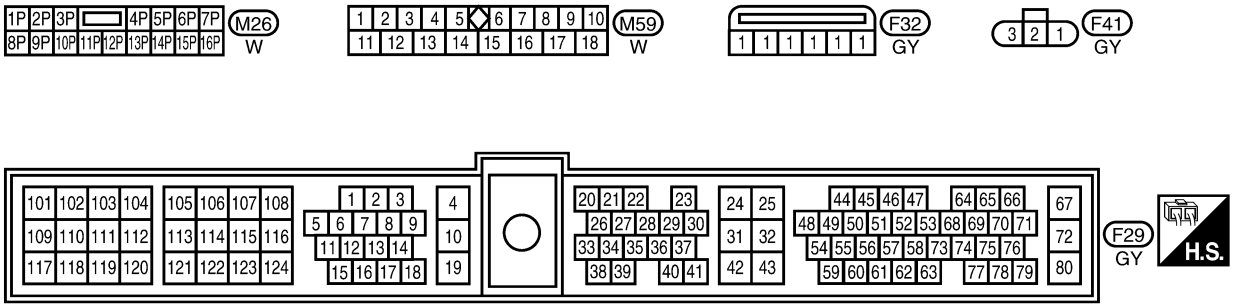
NGEC0649

RIGHT BANK

NGEC0649S01

EC-O2H1B1-01





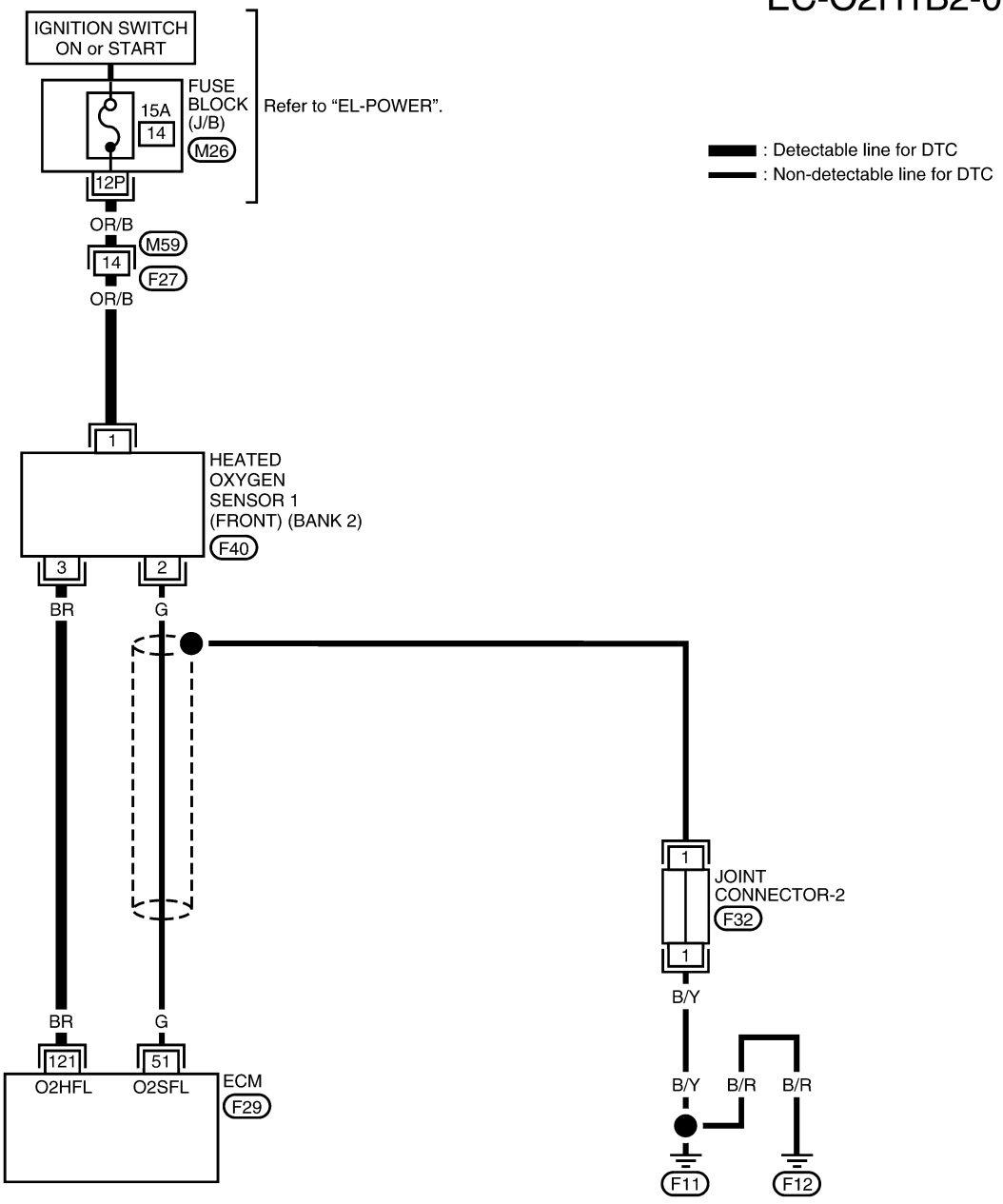
LEC495

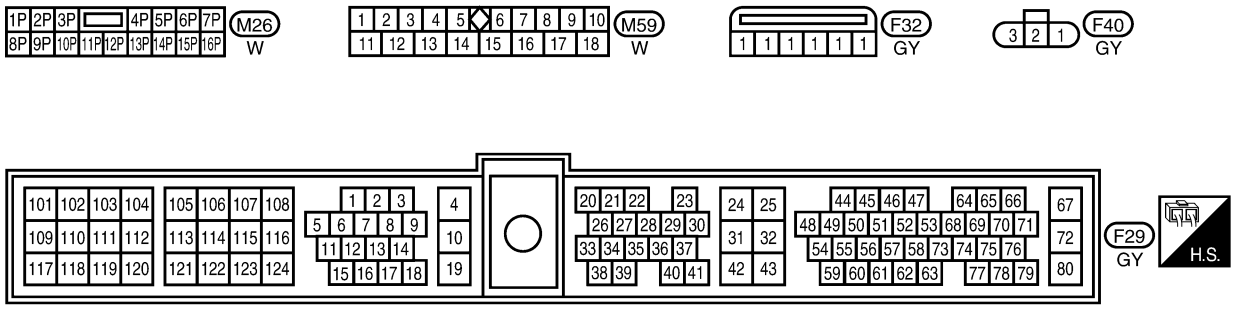
Wiring Diagram (Cont'd)

LEFT BANK

NGEC0649S02

EC-O2H1B2-01





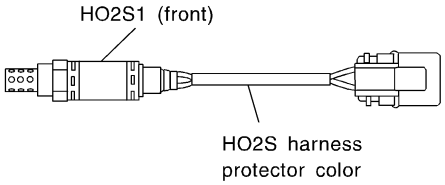
LEC496

Diagnostic Procedure

NGEC0650

1	CHECK HO2S1 (FRONT) POWER SUPPLY CIRCUIT

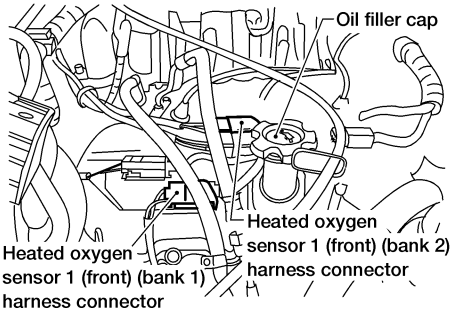
1. Turn ignition switch OFF.
2. Check heated oxygen sensor 1 (front) harness protector.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

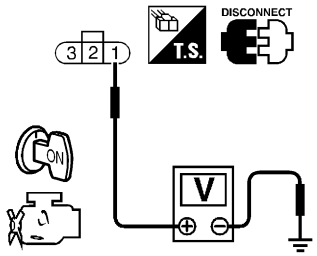
SEF505Y

3. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.



WEC545

4. Turn ignition switch ON.
5. Check voltage between HO2S1 (front) terminal 1 and ground with CONSULT-II or tester.



SEF633W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M59, F27
- Fuse block (J/B) connector M26
- 10A fuse
- Harness for open or short between heated oxygen sensor 1 (front) and fuse

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

3	CHECK HO2S1 HEATER (FRONT) OUTPUT CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal and HO2S1 (front) terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0135	119	3	Bank 1 (Right)
P0155	121	3	Bank 2 (Left)

SEF821Z

Continuity should exist.

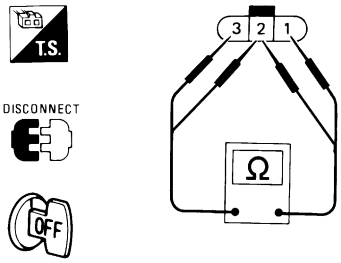
4. Also check harness for short to ground and short to power.

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 (FRONT)

Check resistance between HO2S1 (front) terminals 3 and 1.



AEC158A

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

Check continuity between HO2S1 (front) terminals 2 and 1, 3 and 2.

Continuity should not exist.

CAUTION:

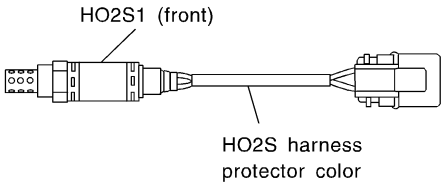
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	REPLACE HEATED OXYGEN SENSOR 1 (FRONT)

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 (front) harness protector color.



HO2S1 (front) (bank 1): Black
HO2S1 (front) (bank 2): Blue

SEF505Y

CAUTION:

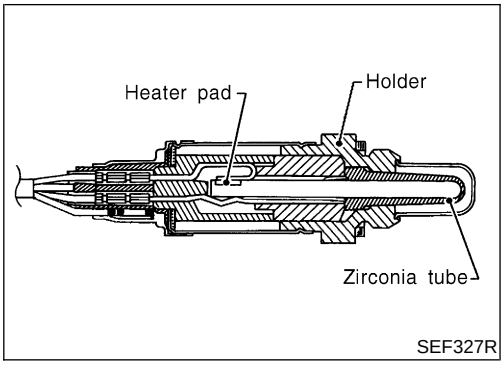
Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

▶	Replace malfunctioning heated oxygen sensor 1 (front).

6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.

▶	INSPECTION END



Component Description

NGEC0651

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.
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

NGEC0652

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ⟷ RICH

ECM Terminals and Reference Value

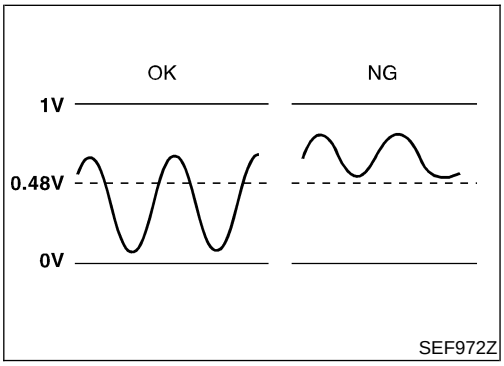
NGEC0653

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (rear) (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (rear) (bank 2)		



On Board Diagnosis Logic

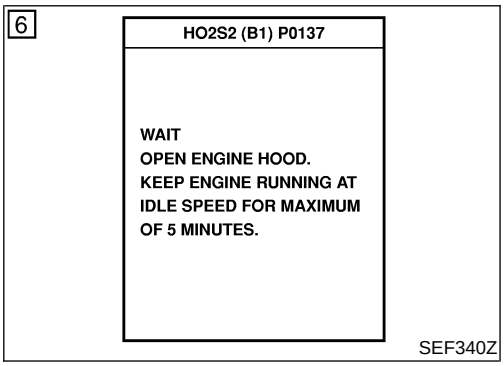
NGEC0654

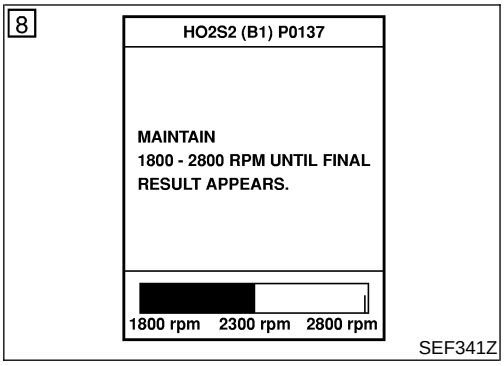
The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.
Malfunction is detected when the minimum voltage from the sensor is not reached to the specified voltage.

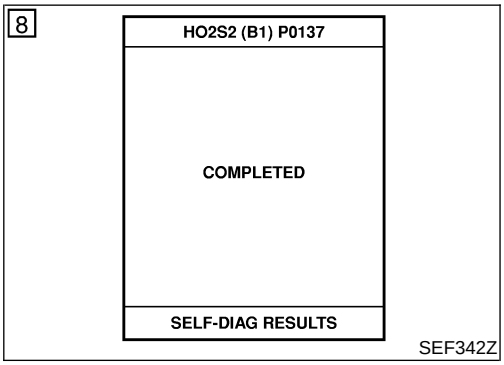
POSSIBLE CAUSE

NGEC0654S01

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Heated oxygen sensor 2 (rear)
- Fuel pressure
- Injectors







DTC Confirmation Procedure

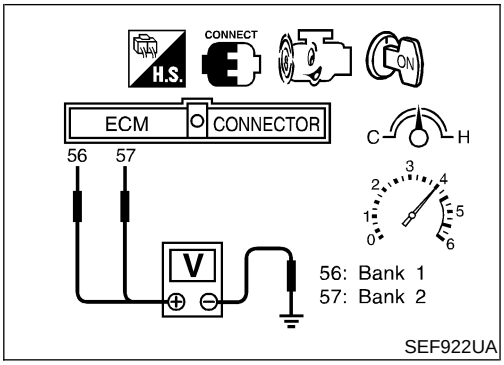
NGEC0655

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 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 5 seconds.
3) Turn ignition switch ON.
4) Select "DATA MONITOR" mode with CONSULT-II.
5) Make sure that "COOLANT TEMP/S" is more than 70°C (158°F).
6) Select "HO2S2 (B1)/(B2) P0137/P0157" of "HO2S2" in DTC WORK SUPPORT" mode with CONSULT.
7) Start engine and follow the instructions of CONSULT-II.
8) Make sure that "OK" is displayed after touching "SELF_DIAG RESULTS".
   If NG is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-841.
   If "CAN NOT BE DIAGNOSED" is displayed, perform the following.

a) Stop engine and cool down "COOLANT TEMP/SE" to less than 70°C (158°F).
b) Turn ignition switch ON.
c) Select "DATA MONITOR" mode with CONSULT-II.
d) Start engine.
e) Perform from step 6) again when the "COOLANT TEMP/S" reaches to 70°C (158°F)



Overall Function Check

=NGEC0656

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.

CAUTION:

Always drive vehicle at a safe speed.

Without CONSULT-II

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)
   The voltage should be below 0.48V 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 “O/D” OFF (A/T).
   The voltage should be below 0.48V at least once during this procedure.
6) If NG, go to “Diagnostic Procedure”, EC-841.

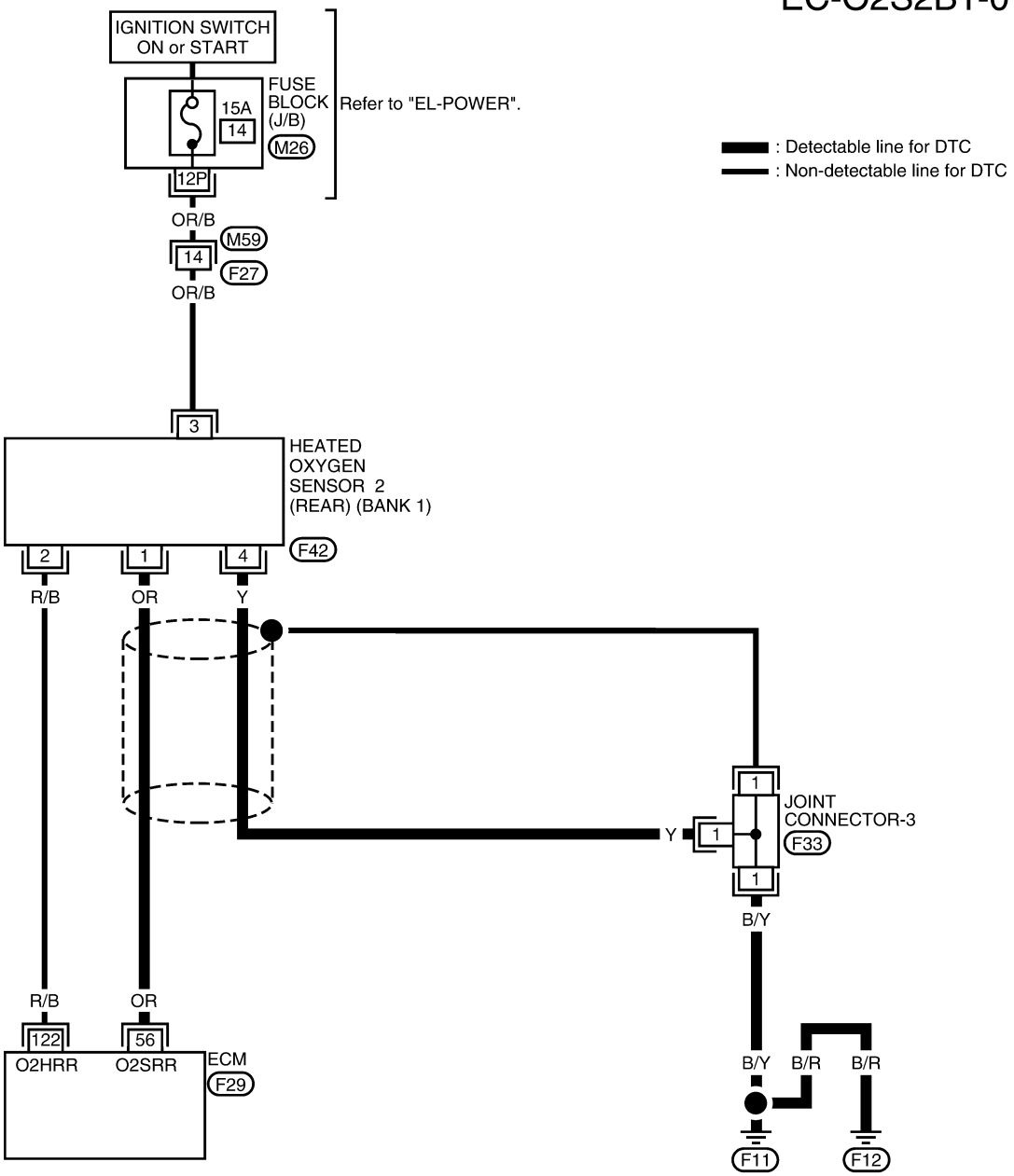
Wiring Diagram

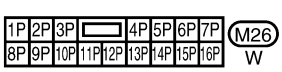
NGEC0657

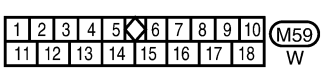
RIGHT BANK

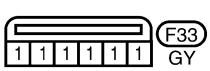
NGEC0657S01

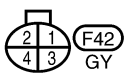
EC-O2S2B1-01

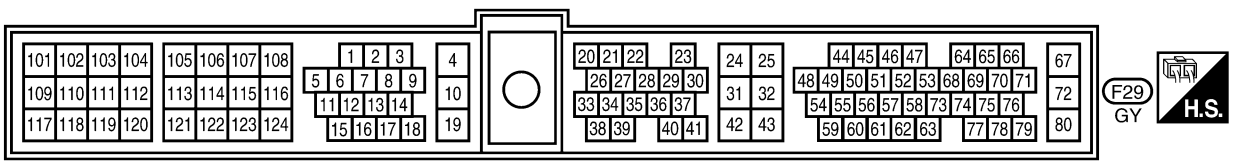












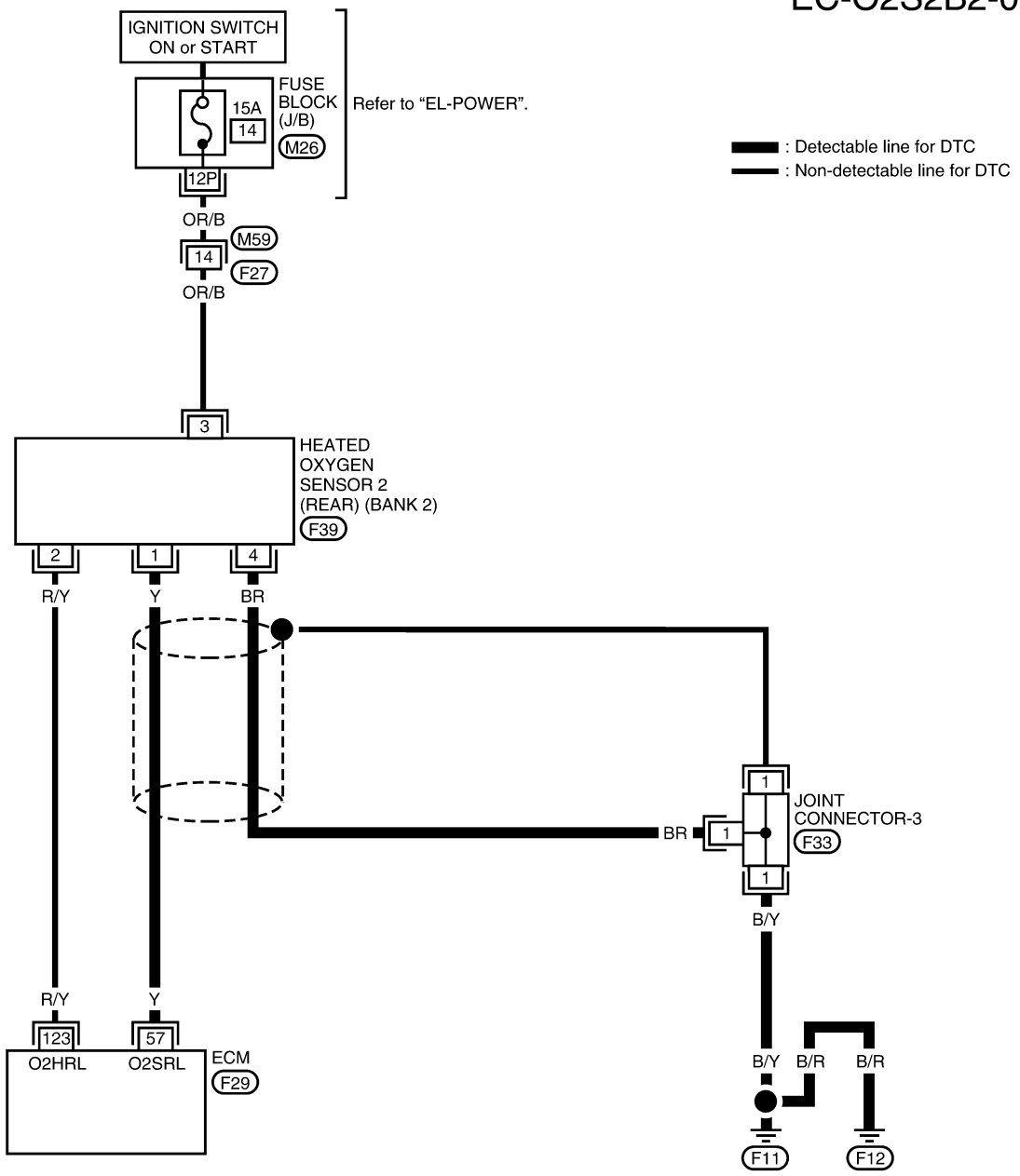
LEC497

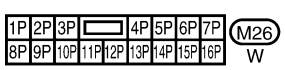
Wiring Diagram (Cont'd)

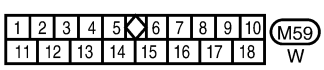
LEFT BANK

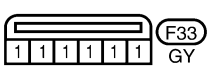
NGEC0657S02

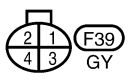
EC-O2S2B2-01

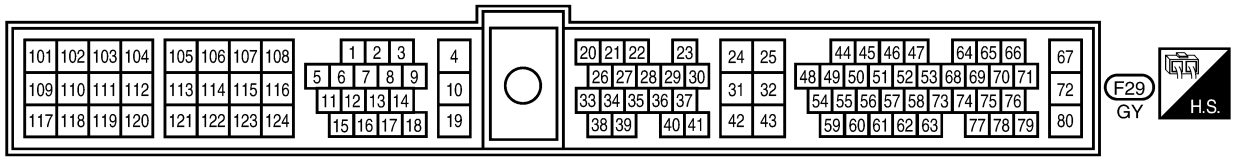












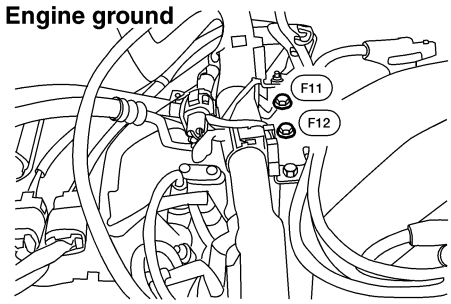
LEC498

Diagnostic Procedure

NGEC0658

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.



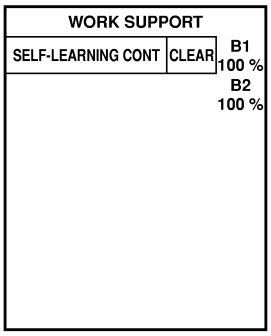
LEC518

▶ 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”.



SEF968Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

Without CONSULT-II

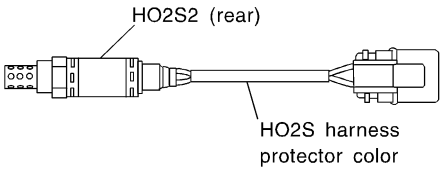
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-666.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 or P0175 detected?
   Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-894.
No	▶	GO TO 3.

3	CHECK HO2S2 (REAR) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

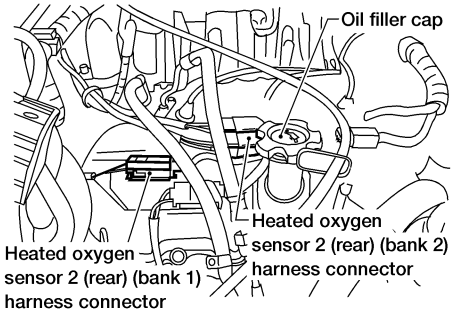
1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

3. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.



WEC546

4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S2 (rear) terminal as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0137	56	1	Bank 1 (Right)
P0157	57	1	Bank 2 (Left)

SEF822Z

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S2 (rear) terminal and ground as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0137	56 or 1	Ground	Bank 1 (Right)
P0157	57 or 1	Ground	Bank 2 (Left)

SEF823Z

Continuity should not exist.

7. Also check harness for short to power.

OK or NG

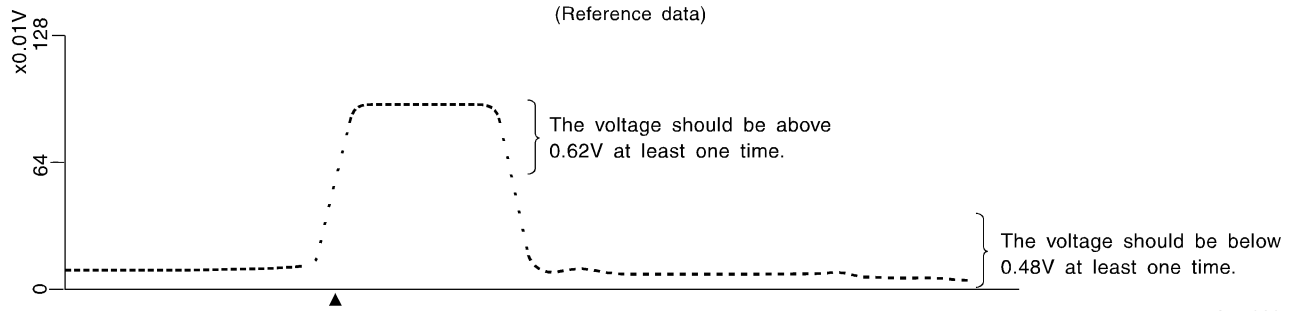
OK	▶	GO TO 4.

NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK HO2S GROUND CIRCUIT FOR OPEN AND SHORT	
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 power.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
Check the following. ● Joint connector-3 ● Harness for open between heated oxygen sensor 2 (rear) and engine ground.		
	▶	Repair open circuit or short to power in harness or connectors.

6	CHECK HEATED OXYGEN SENSOR 2 (REAR)	
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%.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	GO TO 8.



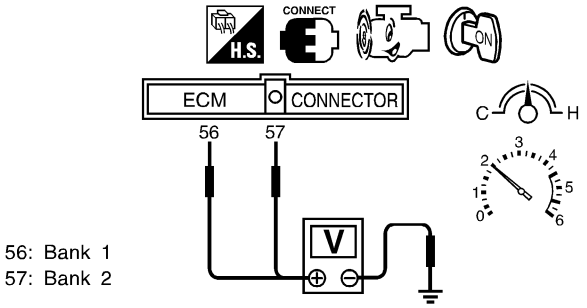
"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%.
"HO2S2 (B1)/(B2)" should be below 0.48V at least once when the "FUEL INJECTION" is −25%.
CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)

Without CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
4. Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)



56: Bank 1
57: Bank 2

The voltage should be above 0.62V at least once during this procedure.

SEF797ZB

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 "O/D" OFF (A/T).
   The voltage should be below 0.48V at least once during this procedure.

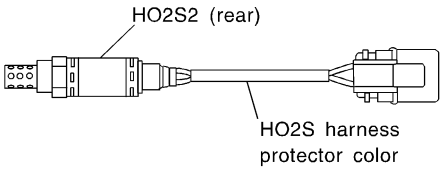
CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	REPLACE HEATED OXYGEN SENSOR 2 (REAR)

1. Stop vehicle and turn ignition switch OFF.
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

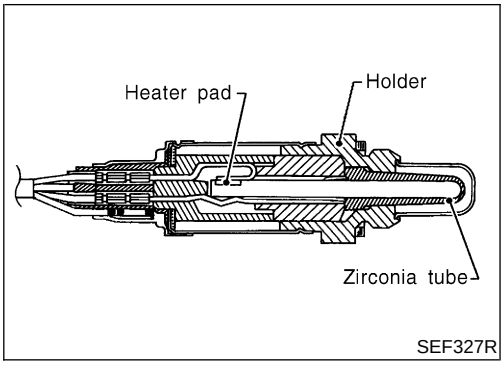
SEF372Z

CAUTION:
Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning heated oxygen sensor 2 (rear).

9	CHECK HO2S2 (REAR) SHIELD CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF. 2. Disconnect joint connector-3. 3. Check the following. ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to ***EL-244***, "HARNESS LAYOUT".) **Continuity should exist.** 4. Also check harness for short to power. 5. Then reconnect joint connector-3.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**



Component Description

NGEC0659

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.
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

NGEC0660

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ⟷ RICH

ECM Terminals and Reference Value

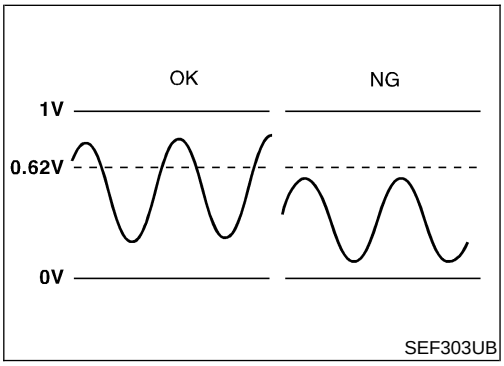
NGEC0661

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (rear) (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (rear) (bank 2)		



On Board Diagnosis Logic

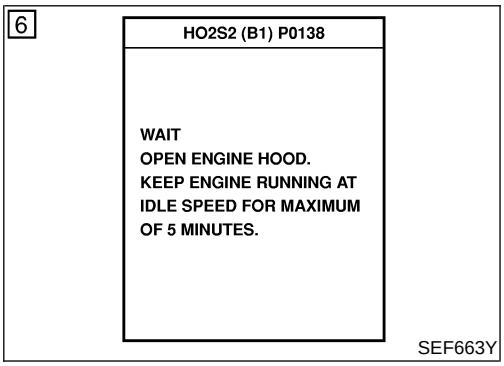
NGEC0662

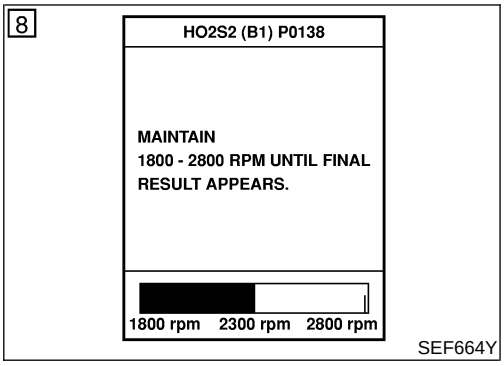
The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.
Malfunction is detected when the maximum voltage from the sensor is not reached to the specified voltage.

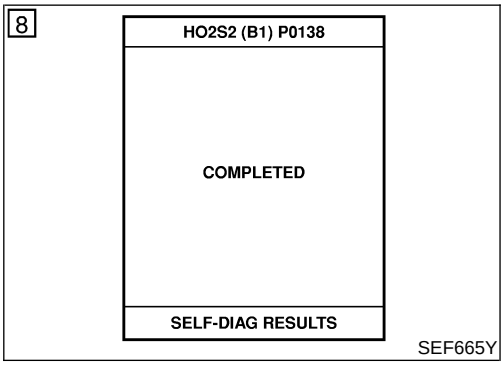
POSSIBLE CAUSE

NGEC0662S01

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Heated oxygen sensor 2 (rear)
- Fuel pressure
- Injectors
- Intake air leaks







DTC Confirmation Procedure

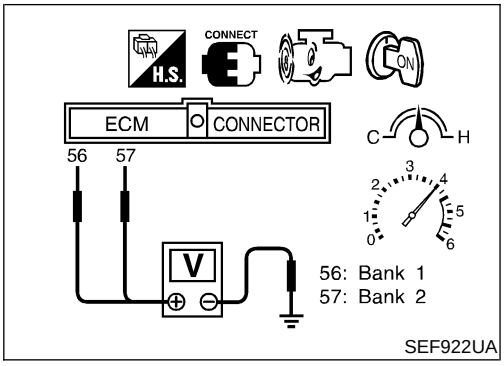
NGEC0663

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 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 5 seconds.
3) Turn ignition switch ON.
4) Select "DATA MONITOR" mode with CONSULT-II.
5) Make sure that "COOLANT TEMP/S" is more than 70°C (158°F).
6) Select "HO2S2 (B1)/(B2), P0138/P0158" of "HO2S2" in DTC WORK SUPPORT" mode with CONSULT-II.
7) Start engine and follow the instructions of CONSULT-II.
8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
   If NG is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-851.
   If "CAN NOT BE DIAGNOSED" is displayed, perform the following.

a) Stop engine and cool down "COOLANT TEMP/SE" to less than 70°C (158°F).
b) Turn ignition switch ON.
c) Select "DATA MONITOR" mode with CONSULT-II.
d) Start engine.
e) Perform from step 6) again when the "COOLANT TEMP/S" reaches to 70°C (158°F)



Overall Function Check

=NGEC0664

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.

CAUTION:

Always drive vehicle at a safe speed.

Without CONSULT-II

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)
   The voltage should be above 0.62V 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 “O/D” OFF (A/T).
   The voltage should be above 0.62V at least once during this procedure.
6) If NG, go to “Diagnostic Procedure”, EC-851.

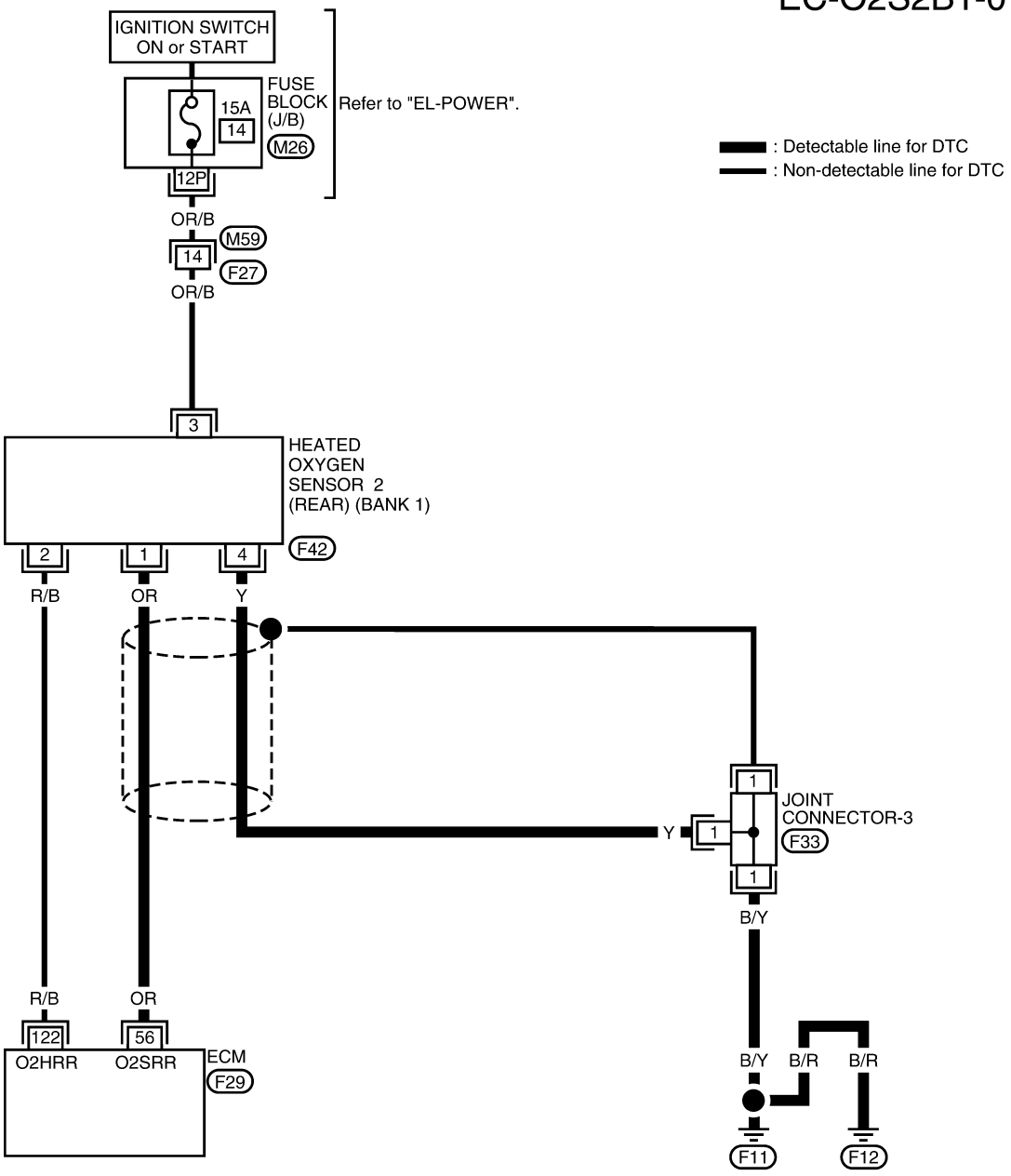
Wiring Diagram

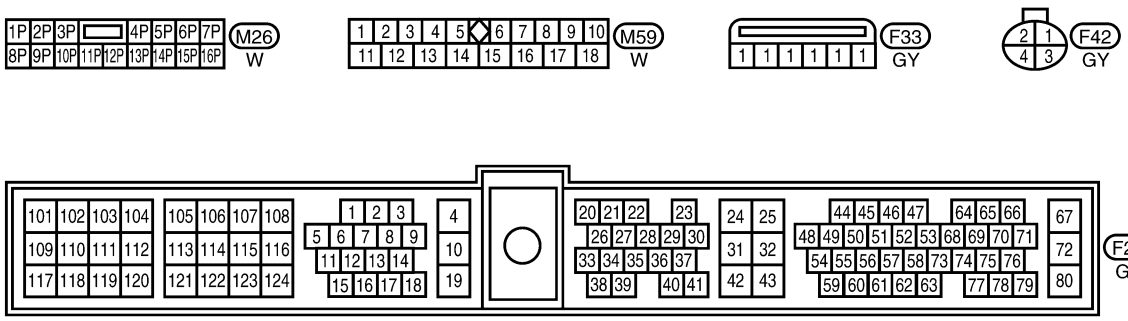
NGEC0665

RIGHT BANK

NGEC0665S01

EC-O2S2B1-01





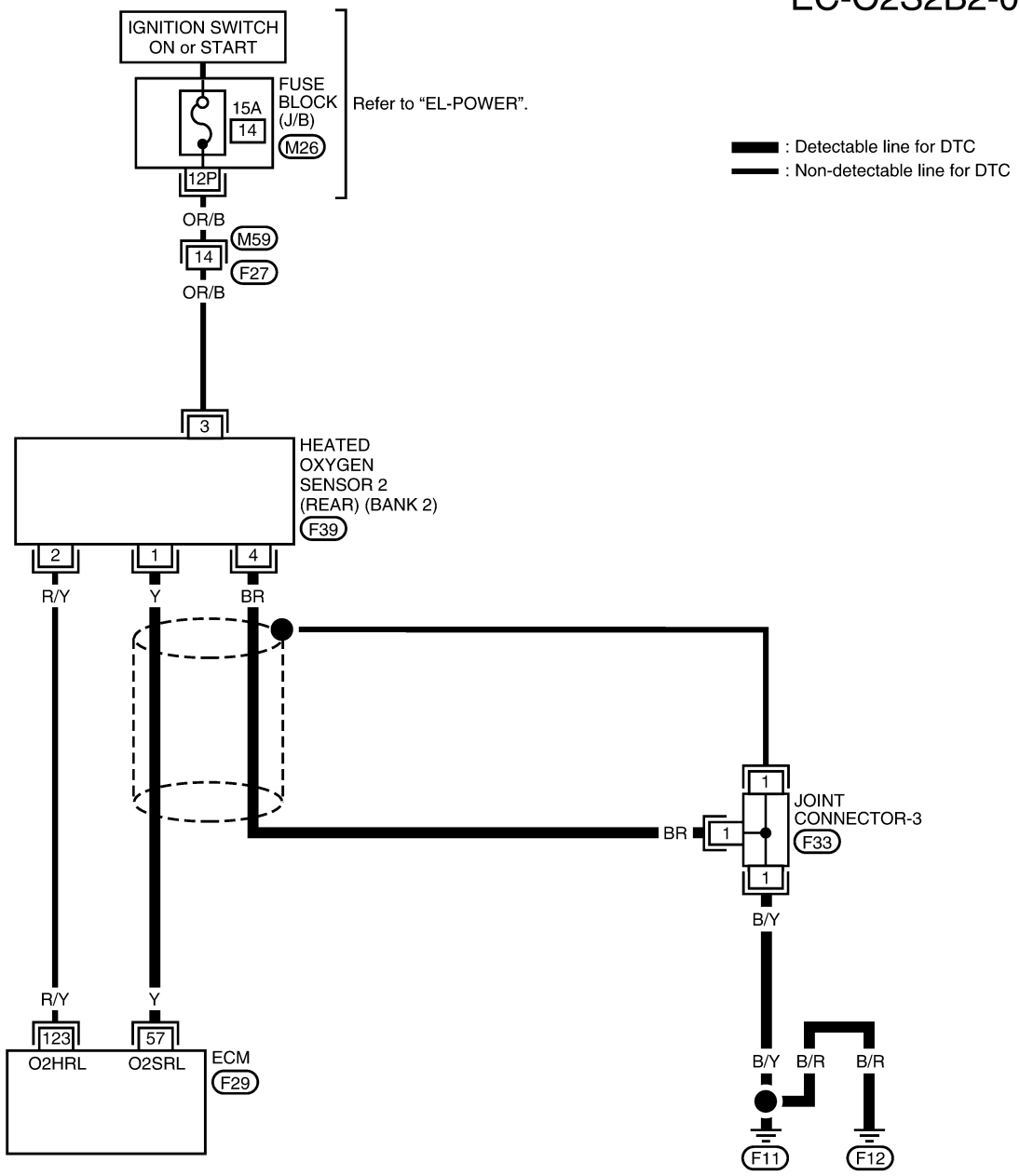
LEC497

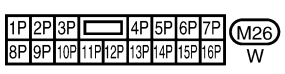
Wiring Diagram (Cont'd)

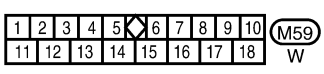
LEFT BANK

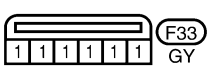
NGEC0665S02

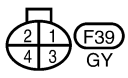
EC-O2S2B2-01

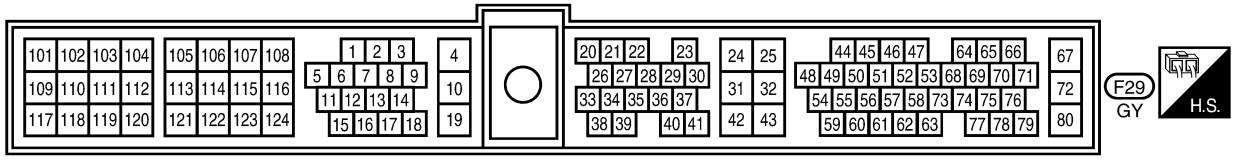












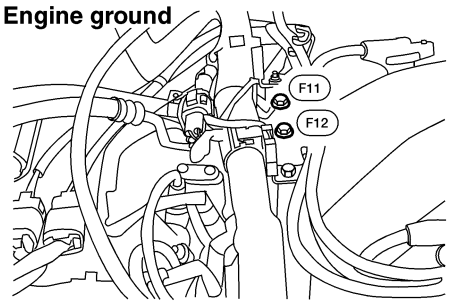
LEC498

Diagnostic Procedure

NGEC0666

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.



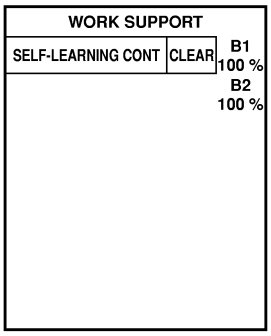
LEC518

▶ 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”.



SEF968Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-666.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0174 detected?
   Is it difficult to start engine?

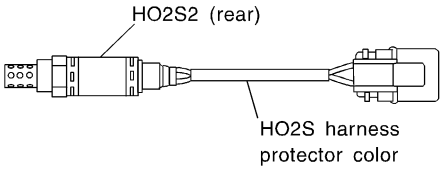
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-885.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3 **CHECK HO2S2 (REAR) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

3. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.
4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S2 (rear) terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	56	1	Bank 1 (Right)
P0158	57	1	Bank 2 (Left)

SEF824Z

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S2 (rear) terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0138	56 or 1	Ground	Bank 1 (Right)
P0158	57 or 1	Ground	Bank 2 (Left)

SEF825Z

Continuity should not exist.

7. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK HO2S2 (REAR) GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 terminal 4 and engine ground.
   Refer to Wiring Diagram.
   Continuity should exist.
2. Also check harness for short to power.

OK or NG

OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	GO TO 5.

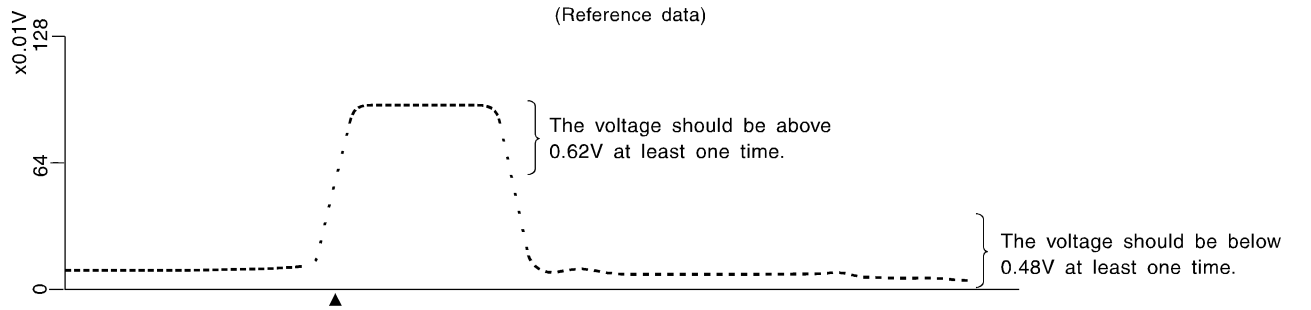
5	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-3
- Harness for open between heated oxygen sensor 2 (rear) and engine ground.

	▶	Repair open circuit or short to power in harness or connectors.

6	CHECK HEATED OXYGEN SENSOR 2 (REAR)

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%.



SEF989RD

"HO2S2 (B1)/(B2)" should be above 0.62V at least once when the "FUEL INJECTION" is +25%.
"HO2S2 (B1)/(B2)" should be below 0.48V 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.**

OK or NG

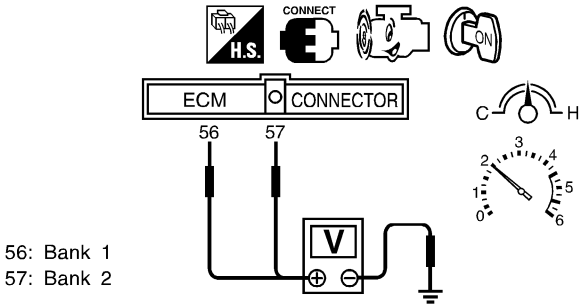
OK	▶	GO TO 9.
NG	▶	GO TO 8.

Diagnostic Procedure (Cont'd)

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)

Without CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
4. Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)



56: Bank 1
57: Bank 2

The voltage should be above 0.62V at least once during this procedure.

SEF797ZB

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 "O/D" OFF (A/T).
   The voltage should be below 0.48V at least once during this procedure.

CAUTION:

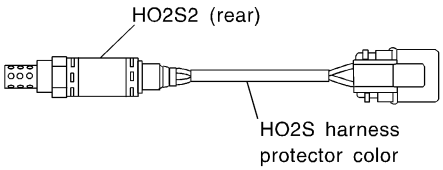
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	REPLACE HEATED OXYGEN SENSOR 2 (REAR)

1. Stop vehicle and turn ignitioin switch OFF.
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

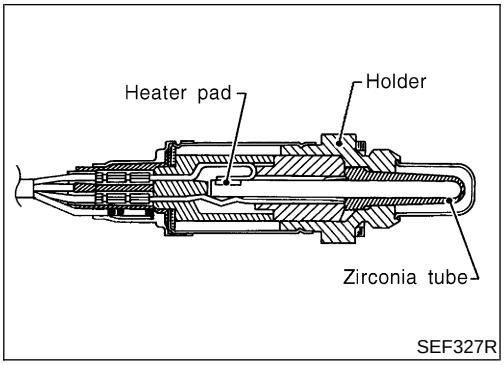
CAUTION:

Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning heated oxygen sensor 2 (rear).

9	CHECK HO2S2 (REAR) SHIELD CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF. 2. Disconnect joint connector. 3. Check the following. ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to "HARNESS LAYOUT", ***EL-9***.) **Continuity should exist.** 4. Also check harness for short to power. 5. Then reconnect joint connector.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.		
	▶	**INSPECTION END**



Component Description

NGEC0667

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.
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

NGEC0668

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ⟷ RICH

ECM Terminals and Reference Value

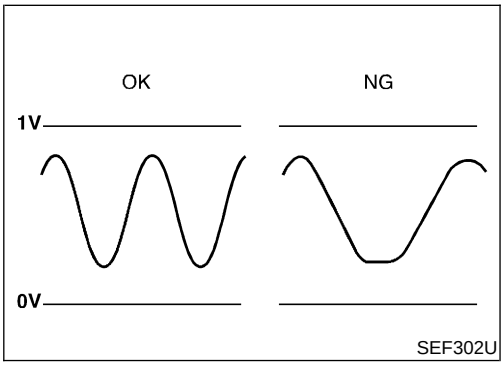
NGEC0669

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (rear) (bank 1)	**[Engine is running]** ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (rear) (bank 2)		



On Board Diagnosis Logic

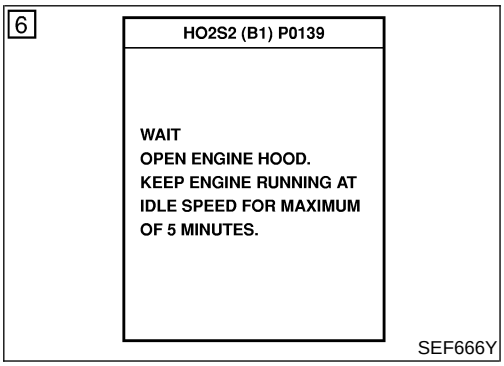
NGEC0670

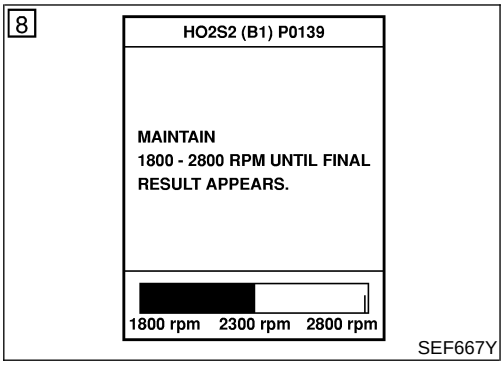
The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.
Malfunction is detected when it takes more time for the sensor to respond between rich and lean than the specified time.

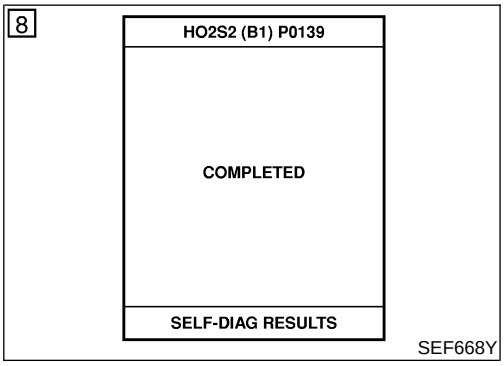
POSSIBLE CAUSE

NGEC0670S01

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Heated oxygen sensor 2 (rear)
- Fuel pressure
- Injectors
- Intake air leaks







DTC Confirmation Procedure

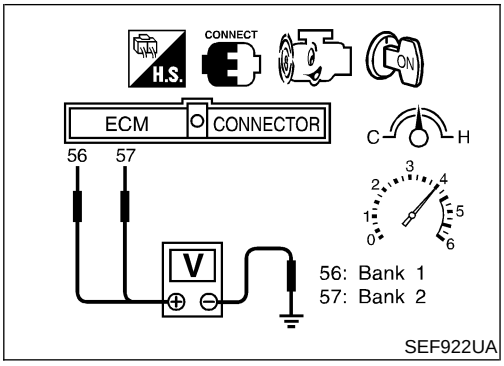
NGEC0671

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 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 5 seconds.
3) Turn ignition switch ON.
4) Select "DATA MONITOR" mode with CONSULT-II.
5) Make sure that "COOLANT TEMP/S" is more than 70°C (158°F).
6) Select "HO2S2 (B1)/(B2) P0139/P0159" of "HO2S2" in DTC WORK SUPPORT" mode with CONSULT-II.
7) Start engine and follow the instructions of CONSULT-II.
8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
   If NG is displayed, refer to "DIAGNOSTIC PROCEDURE", EC-861.
   If "CAN NOT BE DIAGNOSED" is displayed, perform the following.

a) Stop engine and cool down "COOLANT TEMP/SE" to less than 70°C (158°F).
b) Turn ignition switch ON.
c) Select "DATA MONITOR" mode with CONSULT-II.
d) Start engine.
e) Perform from step 6) again when the "COOLANT TEMP/S" reaches to 70°C (158°F)



Overall Function Check

=NGEC0672

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.

CAUTION:

Always drive vehicle at a safe speed.

Without CONSULT-II

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)
   The voltage should change at more than 0.06V for 1 second during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), “D” position with “O/D” 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-861.

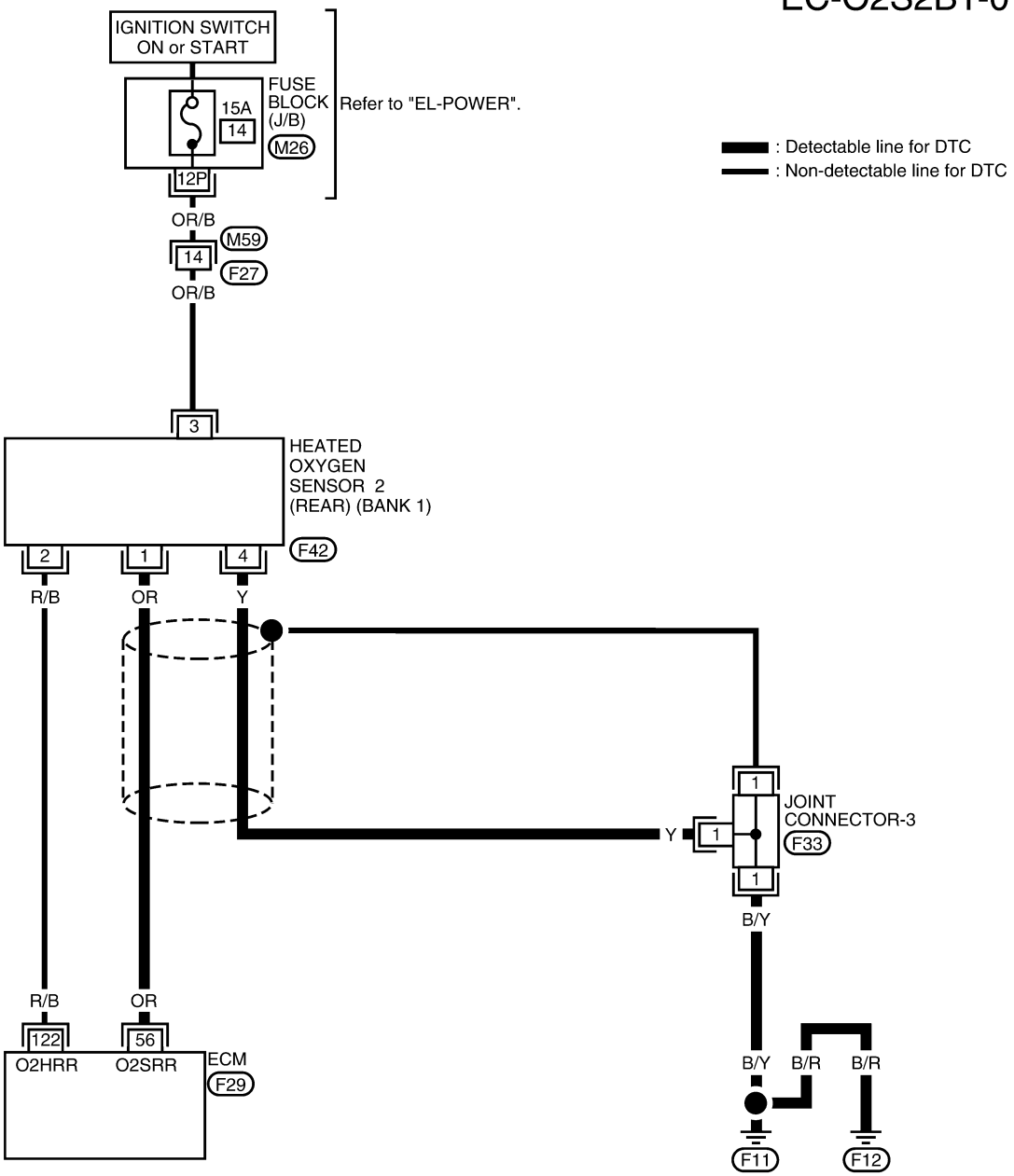
Wiring Diagram

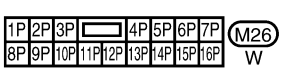
NGEC0673

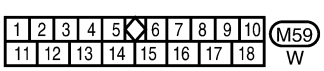
RIGHT BANK

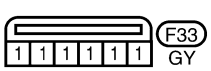
NGEC0673S01

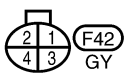
EC-O2S2B1-01

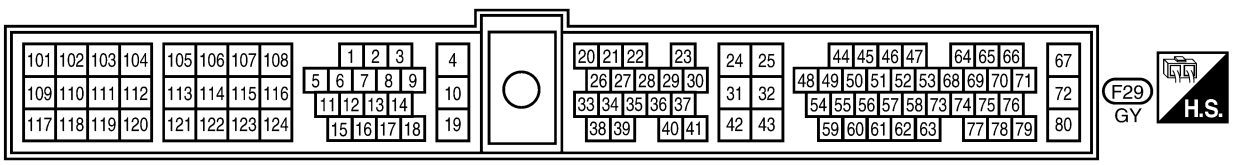












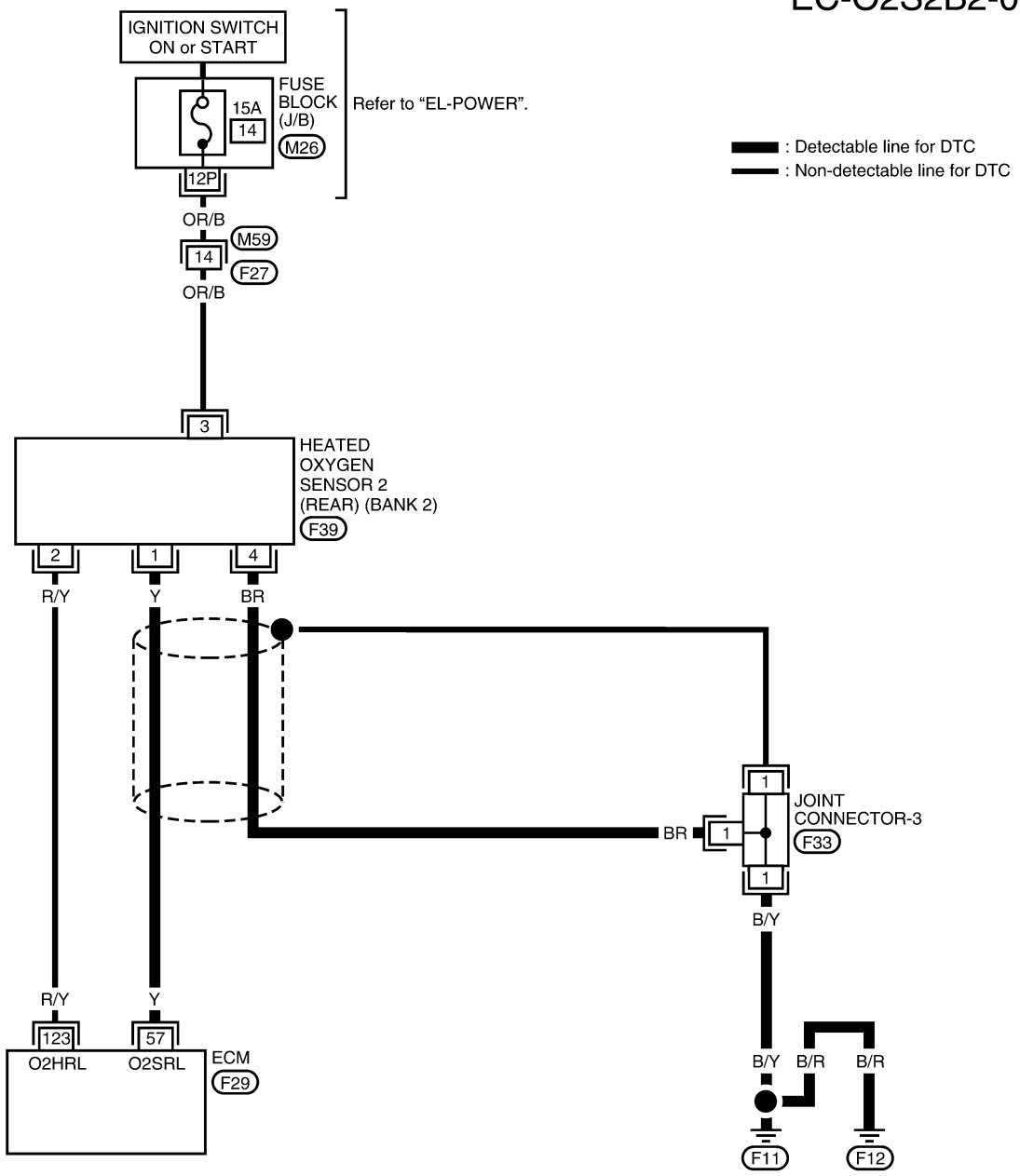
LEC497

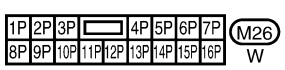
Wiring Diagram (Cont'd)

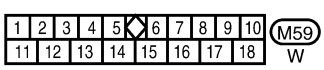
LEFT BANK

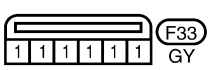
NGEC0673S02

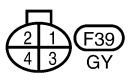
EC-O2S2B2-01

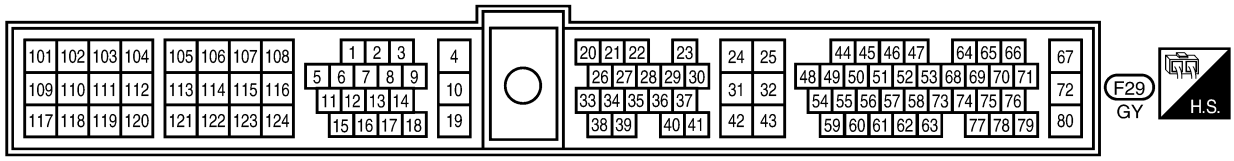












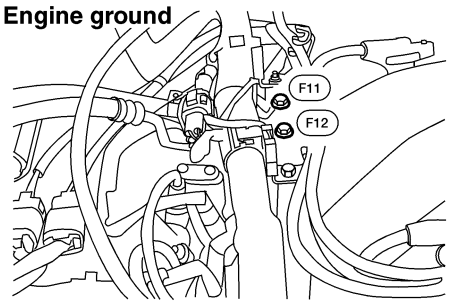
LEC498

Diagnostic Procedure

NGEC0674

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.



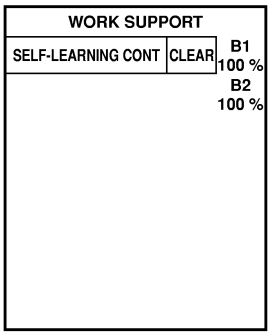
LEC518

▶ 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”.



SEF968Y

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?

Without CONSULT-II

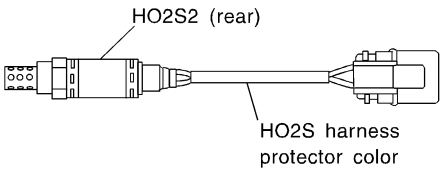
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-666.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-884, 893.
No	▶	GO TO 3.

3 **CHECK HO2S2 (REAR) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

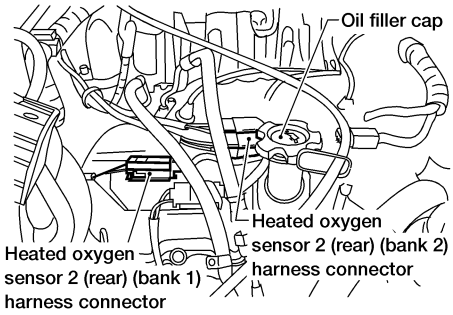
1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

3. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.



WEC546

4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal and HO2S2 (rear) terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0139	56	1	Bank 1 (Right)
P0159	57	1	Bank 2 (Left)

SEF826Z

Continuity should exist.

6. Check harness continuity between ECM terminal or HO2S2 (rear) terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0139	56 or 1	Ground	Bank 1 (Right)
P0159	57 or 1	Ground	Bank 2 (Left)

SEF827Z

Continuity should not exist.

7. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4 CHECK HO2S2 (REAR) GROUND CIRCUIT FOR OPEN AND SHORT

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 power.

OK or NG

OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	GO TO 5.

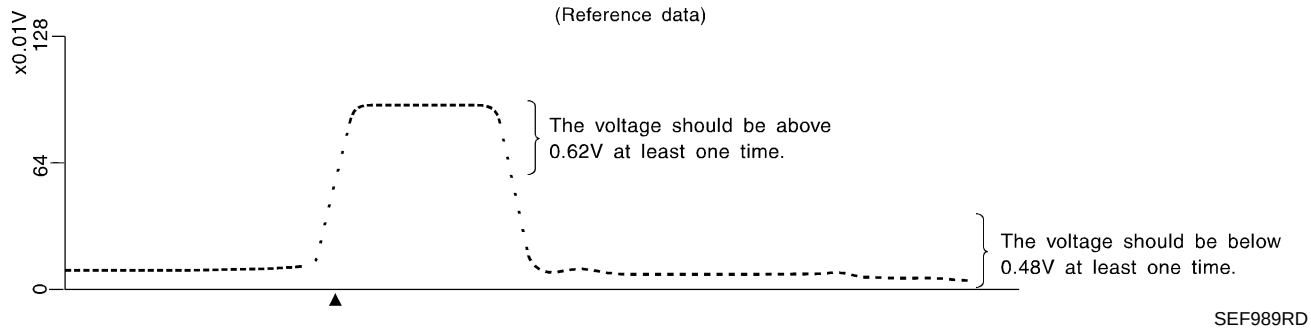
5 DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-3
- Harness for open between heated oxygen sensor 2 (rear) and engine ground.

	▶	Repair open circuit or short to power in harness or connectors.

6 CHECK HEATED OXYGEN SENSOR 2 (REAR)

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 0.62V at least once when the "FUEL INJECTION" is +25%.
"HO2S2 (B1)/(B2)" should be below 0.48V at least once when the "FUEL INJECTION" is −25%.

CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

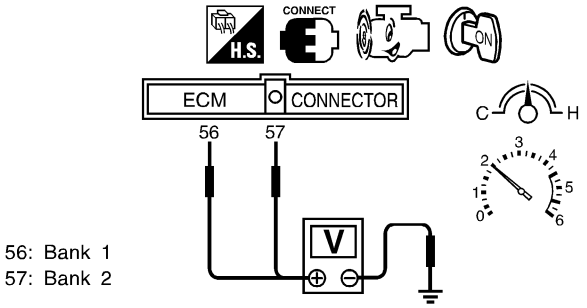
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)

Without CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
4. Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)



56: Bank 1
57: Bank 2

The voltage should be above 0.62V at least once during this procedure.

SEF797ZB

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 "O/D" OFF (A/T).
   The voltage should be below 0.48V at least once during this procedure.

CAUTION:

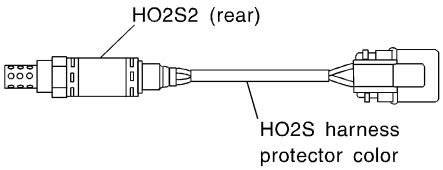
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	REPLACE HEATED OXYGEN SENSOR 2 (REAR)

1. Stop vehicle and turn ignitioin switch OFF.
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

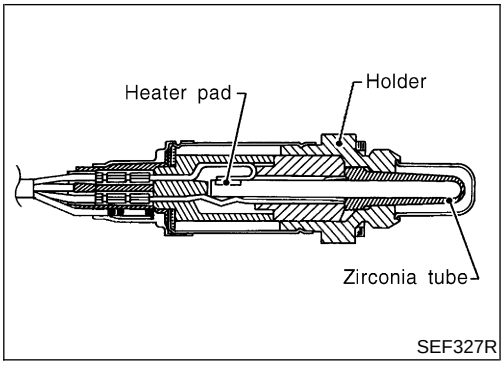
CAUTION:

Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning heated oxygen sensor 2 (rear).

9	CHECK HO2S2 (REAR) SHIELD CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF. 2. Disconnect joint connector. 3. Check the following. ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to "HARNESS LAYOUT", ***EL-9***.) **Continuity should exist.** 4. Also check harness for short to power. 5. Then reconnect joint connector.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**



Component Description

NGEC0675

The heated oxygen sensor 2 (rear), after three way catalyst, monitors the oxygen level in the exhaust gas on each bank.
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

NGEC0676

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ⟷ RICH

ECM Terminals and Reference Value

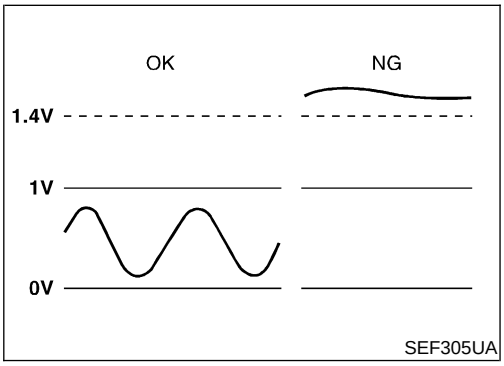
NGEC0677

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (rear) (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (rear) (bank 2)		



On Board Diagnosis Logic

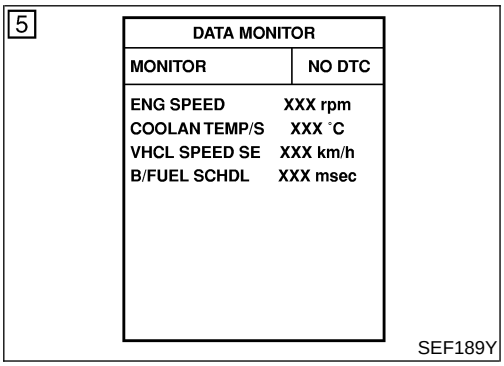
NGEC0678

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 voltage is unusually high during the various driving condition such as fuel-cut.
Malfunction is detected when an excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

NGEC0678S01

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Heated oxygen sensor 2 (rear)



DTC Confirmation Procedure

NGEC0679

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

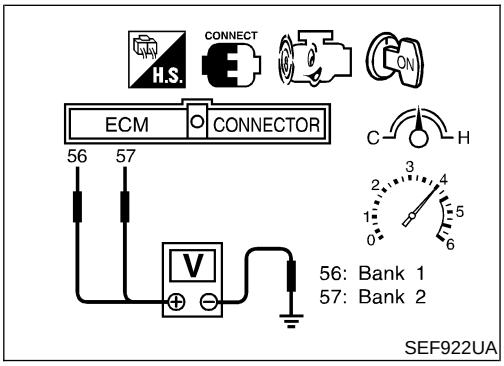
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-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	Less than 3,600 rpm
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-871.



Overall Function Check

NGEC0680

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 terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
4) Check the voltage when racing up to 4,000 rpm under no load

at least 10 times.
(depress and release accelerator pedal as soon as possible)
The voltage should be below 1.4V during this procedure.

5) If NG, go to "Diagnostic Procedure", EC-871.

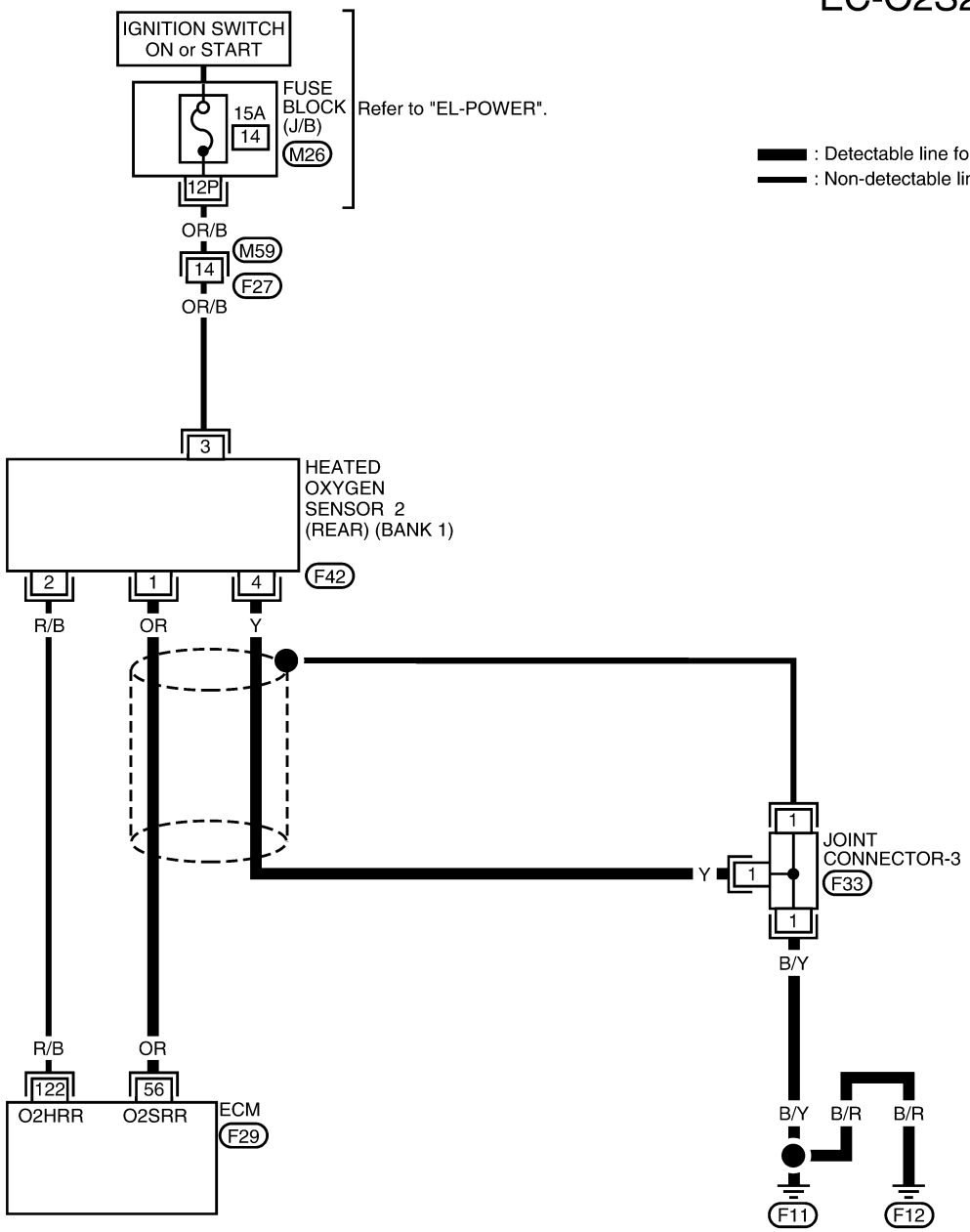
Wiring Diagram

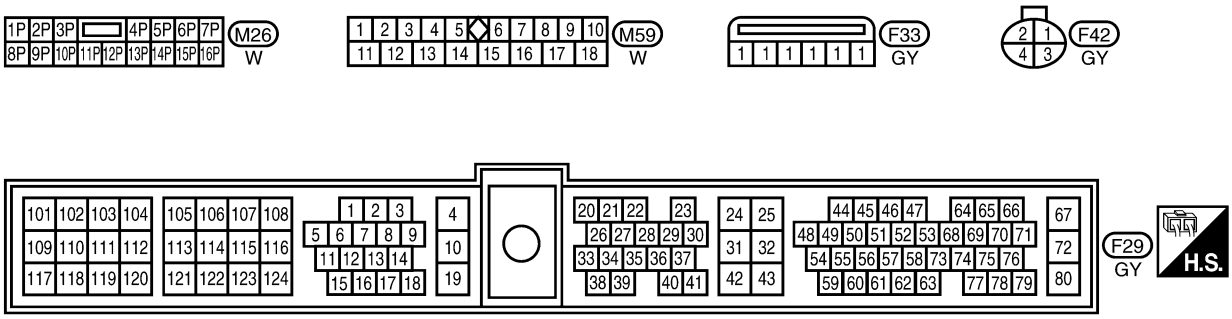
NGEC0681

RIGHT BANK

NGEC0681S01

EC-O2S2B1-01





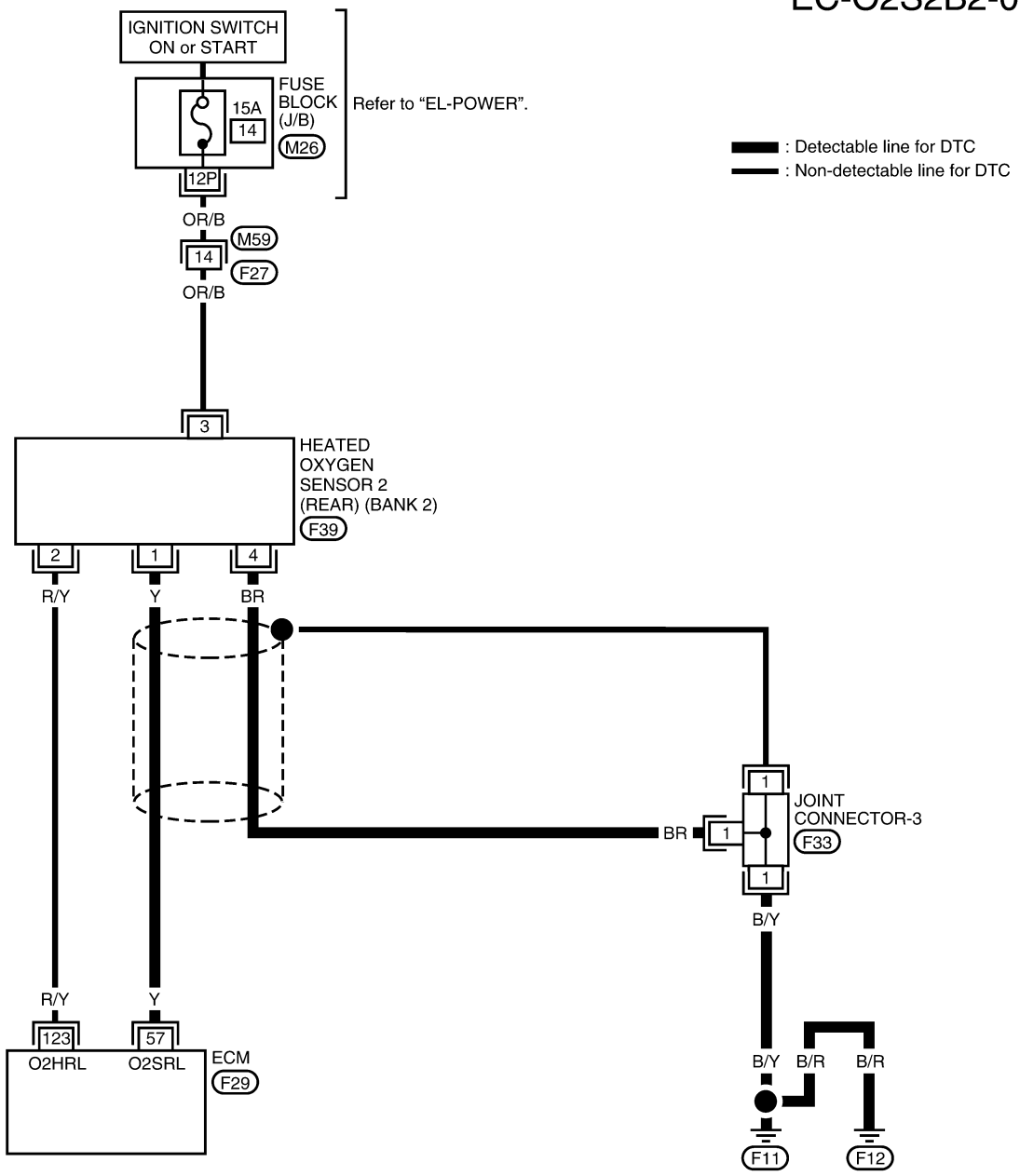
LEC497

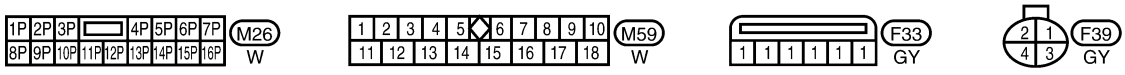
Wiring Diagram (Cont'd)

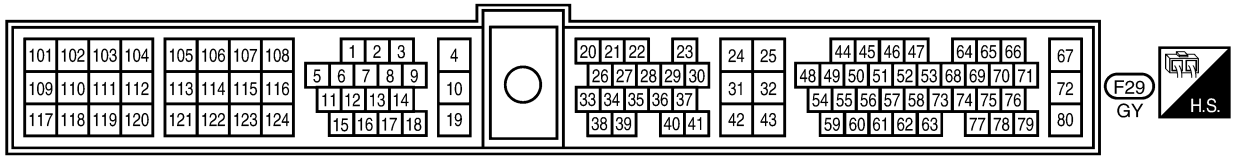
LEFT BANK

NGEC0681S02

EC-O2S2B2-01







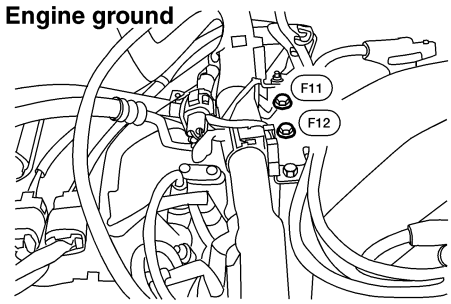
LEC498

Diagnostic Procedure

NGEC0682

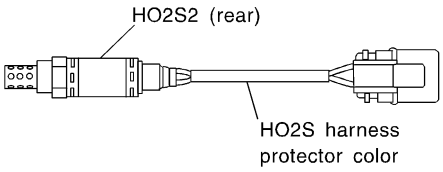
1	INSPECTION START

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.



LEC518

3. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

4. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.
5. Disconnect ECM harness connector.

▶	GO TO 2.

Diagnostic Procedure (Cont'd)

2	CHECK HO2S2 (REAR) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0140	56	1	Bank 1 (Right)
P0160	57	1	Bank 2 (Left)

SEF828Z

Continuity should exist.

2. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0140	56 or 1	Ground	Bank 1 (Right)
P0160	57 or 1	Ground	Bank 2 (Left)

SEF829Z

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK HO2S2 (REAR) GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 terminal 4 and engine ground. Refer to Wiring Diagram.
   Continuity should exist.
2. Also check harness for short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-3
- Harness for open between heated oxygen sensor 2 (rear) and engine ground.

	▶	Repair open circuit or short to power in harness or connectors.

5	CHECK HO2S2 (REAR) CONNECTORS FOR WATER

Check heated oxygen sensor 2 (rear) connector and harness connector for water.
Water should not exist.

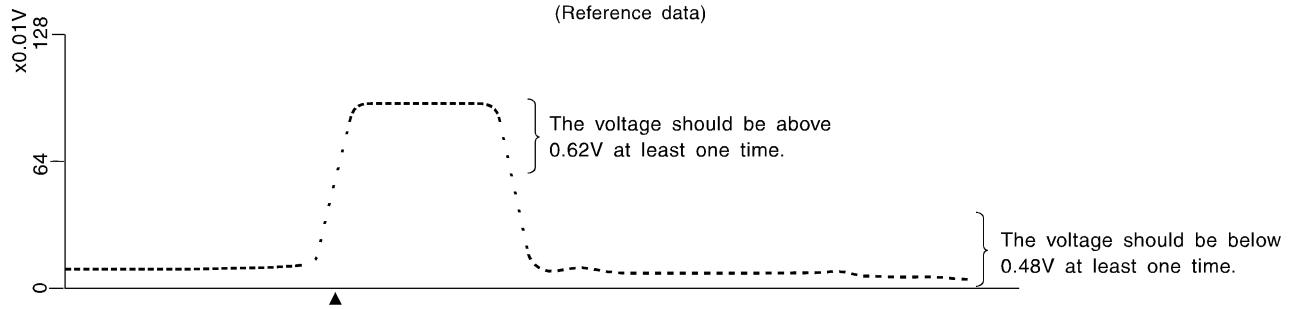
OK or NG

OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Repair or replace harness or connectors.

6	CHECK HEATED OXYGEN SENSOR 2 (REAR)

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 0.62V at least once when the "FUEL INJECTION" is +25%.
"HO2S2 (B1)/(B2)" should be below 0.48V at least once when the "FUEL INJECTION" is −25%.

CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

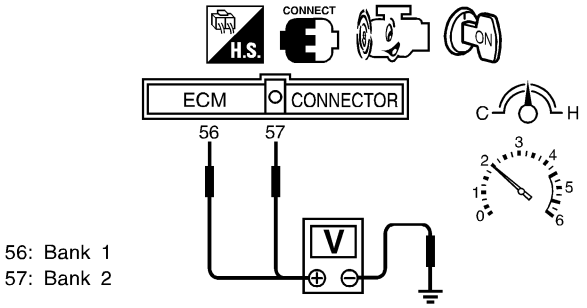
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)

Without CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Set voltmeter probes between ECM terminal 56 (bank 1 signal) or 57 (bank 2 signal) and engine ground.
4. Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)



56: Bank 1
57: Bank 2

The voltage should be above 0.62V at least once during this procedure.

SEF797ZB

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 "O/D" OFF (A/T).
   The voltage should be below 0.48V at least once during this procedure.

CAUTION:

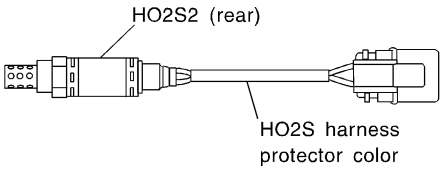
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	REPLACE HEATED OXYGEN SENSOR 2 (REAR)

1. Stop vehicle and turn ignitioin switch OFF.
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

CAUTION:

Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

	▶	Replace malfunctioning heated oxygen sensor 2 (rear).

9	CHECK HO2S2 (REAR) SHIELD CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF. 2. Disconnect joint connector. 3. Check the following. ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to ***EL-244***, "HARNESS LAYOUT".) **Continuity should exist.** 4. Also check harness for short to power. 5. Then reconnect joint connector. **OK or NG**		
OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**

Description

NGEC0683

SYSTEM DESCRIPTION

NGEC0683S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Heated oxygen sensor 2 heater (rear) control	Heated oxygen sensor 2 heaters (rear)

The ECM performs ON/OFF control of the heated oxygen sensor 2 heaters (rear) corresponding to the engine speed.

OPERATION

NGEC0683S02

Engine speed rpm	Heated oxygen sensor 2 heaters (rear)
Above 3,200	OFF
Below 3,200	ON

CONSULT-II Reference Value in Data Monitor Mode

NGEC0684

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1) HO2S2 HTR (B2)	● Ignition switch: ON (Engine stopped) ● Engine is running above 3,200 rpm.	OFF
	● Engine is running below 3,200 rpm after driving for 2 minutes at a speed of 70 km/h (43 MPH) or more.	ON

ECM Terminals and Reference Value

NGEC0685

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
122	R/B	Heated oxygen sensor 2 heater (rear) (bank 1)	**[Ignition switch "ON"]** ● Engine stopped **[Engine is running]** ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is below 3,200 rpm ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more	Approximately 0.4V
123	R/Y	Heated oxygen sensor 2 heater (rear) (bank 2)	**[Ignition switch "ON"]** ● Engine stopped **[Engine is running]** ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is below 3,200 rpm ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more	Approximately 0.4V

On Board Diagnosis Logic

NGEC0686

Malfunction is detected when 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).]

POSSIBLE CAUSE

NGEC0686S01

- Harness or connectors
  (The heated oxygen sensor 2 heater (rear) circuit is open or shorted.)
- Heated oxygen sensor 2 heater (rear)

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NGEC0687

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

With CONSULT-II

1) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine.
3) Drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
4) Stop vehicle and let engine idle for at least 6 seconds.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-880.

With GST

Follow the procedure “With CONSULT-II”.

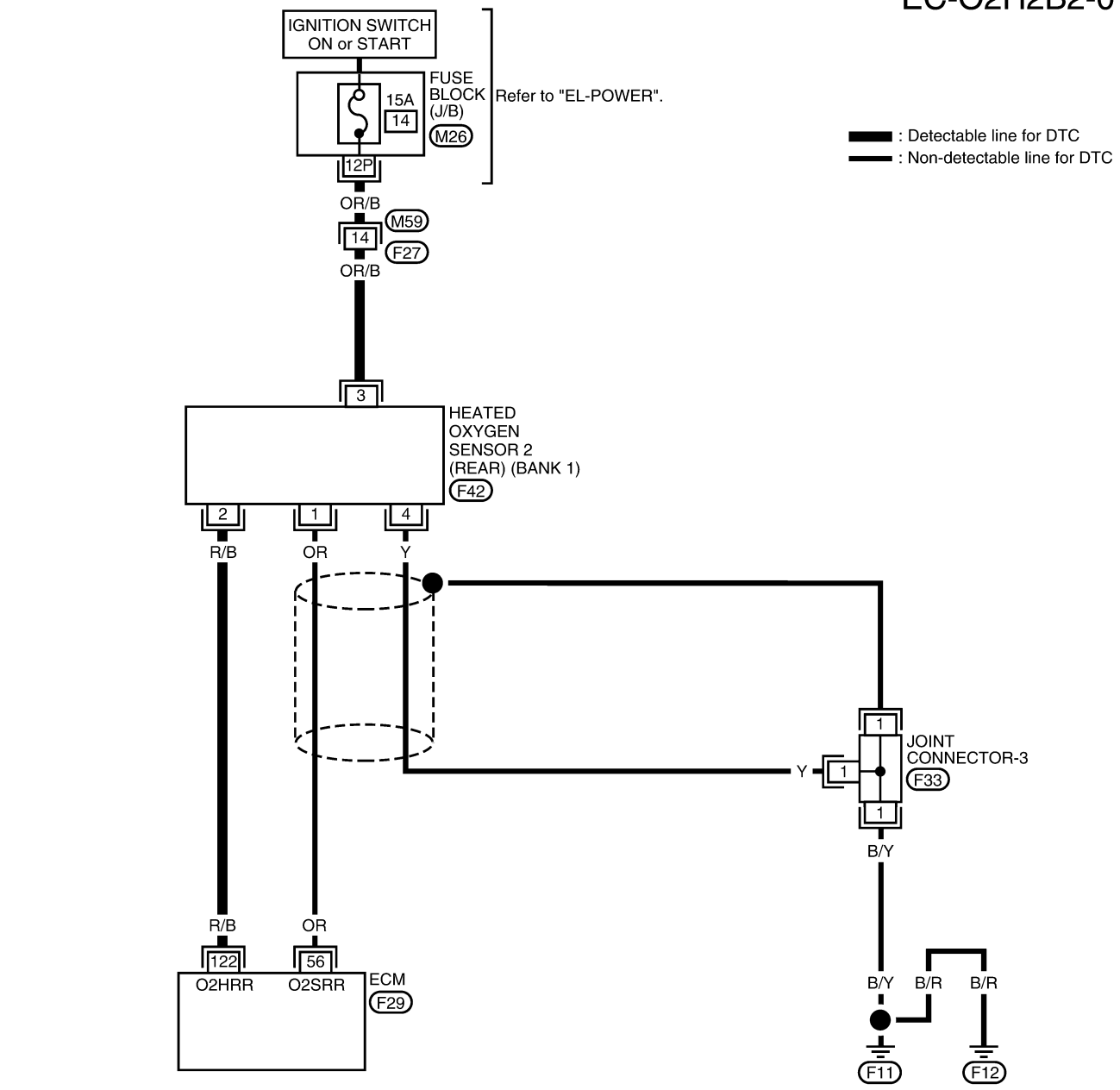
Wiring Diagram

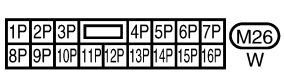
NGEC0688

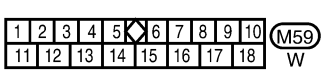
RIGHT BANK

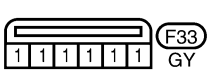
NGEC0688S01

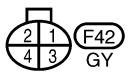
EC-O2H2B2-01

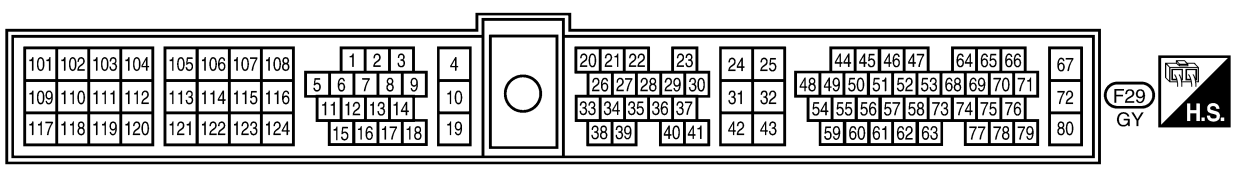










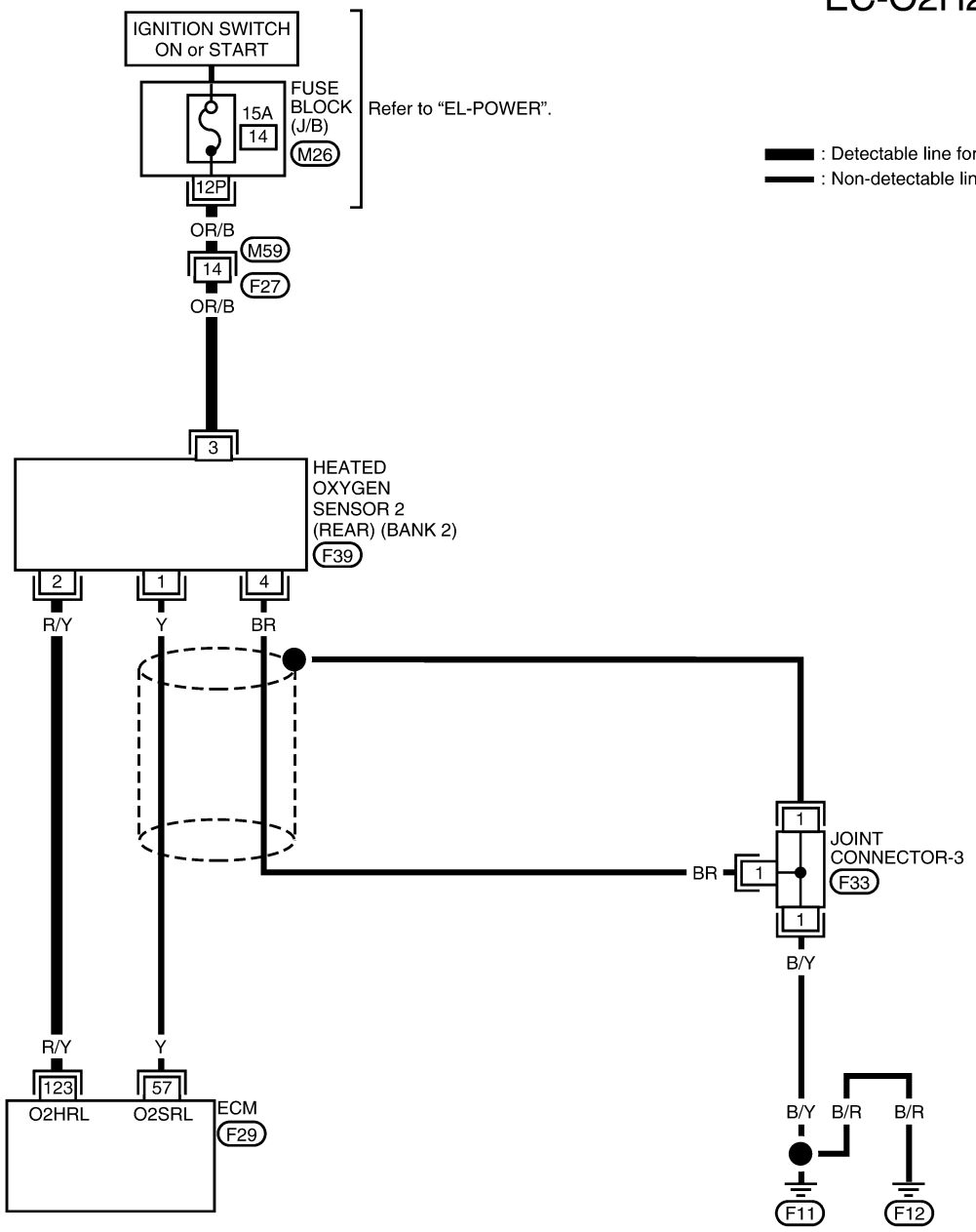


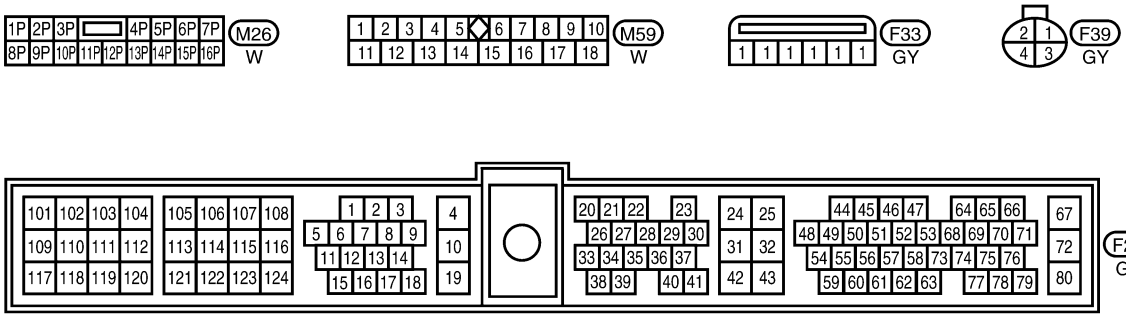
LEC499

LEFT BANK

NGEC0688S02

EC-O2H2B2-01





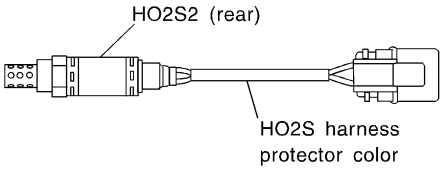
LEC500

Diagnostic Procedure

NGEC0689

1	CHECK HO2S2 (REAR) POWER SUPPLY CIRCUIT

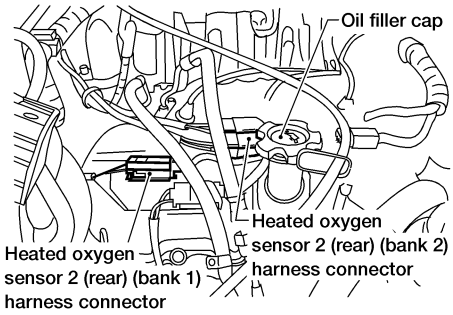
1. Turn ignition switch “OFF”.
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

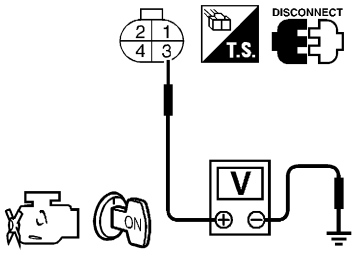
SEF372Z

3. Disconnect corresponding heated oxygen sensor 2 (rear) harness connector.



WEC546

4. Turn ignition switch ON.
5. Check voltage between HO2S2 terminal 3 and ground.



SEF637W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M59, F27
- Fuse block (J/B) connector M26
- 10A fuse
- Harness for open or short between heated oxygen sensor 2 (rear) and fuse

	▶	Repair harness or connectors.

3	CHECK HO2S2 HEATER (REAR) OUTPUT CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal and HO2S2 (rear) terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0141	122	2	Bank 1 (Right)
P0161	123	2	Bank 2 (Left)

SEF830Z

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.
- Joint connector-3
- Harness for open or short between heated oxygen sensor 2 (rear) and engine ground.

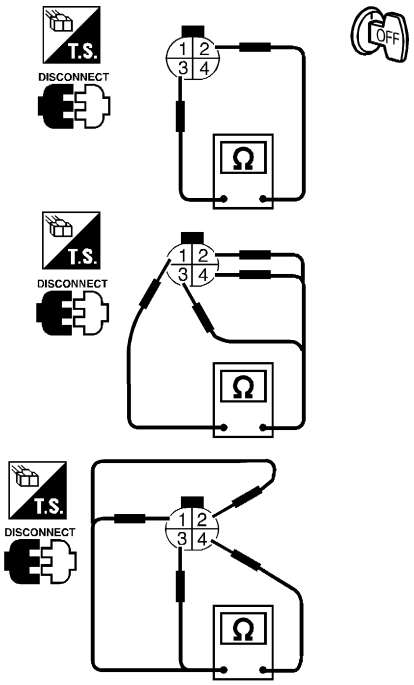
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

5	CHECK HEATED OXYGEN SENSOR 2 HEATER (REAR)

Check the following.

1. Check resistance between HO2S2 (rear) terminals 2 and 3.



SEF716W

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	

MTBL0233

CAUTION:

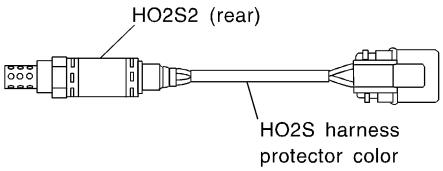
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	REPLACE HEATED OXYGEN SENSOR 2 (REAR)

Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

CAUTION:
Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

▶	Replace malfunctioning heated oxygen sensor 2 (rear).

7	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.

▶	INSPECTION END

On Board Diagnosis Logic

NGEC0690

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 sensors 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 light up the MIL (2 trip detection logic).

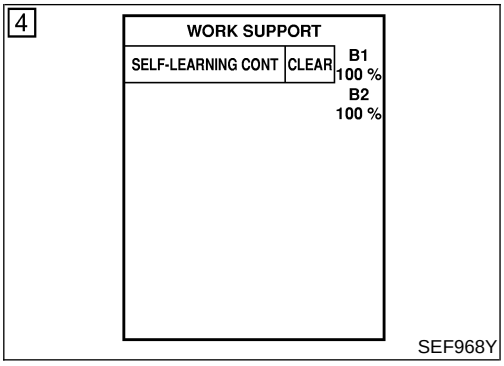
Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensors 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

Malfunction is detected when fuel injection system does not operate properly, the amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)

POSSIBLE CAUSE

NGEC0690S01

- Intake air leaks
- Heated oxygen sensor 1 (front)
- Injectors
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Mass air flow sensor



DTC Confirmation Procedure

=NGEC0691

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON and select "SELF-LEARN CONTROL" in "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 or P0174 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-888.
7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-888. If engine does not start, check exhaust and intake air leak visually.

With GST

Follow the procedure "With CONSULT-II".

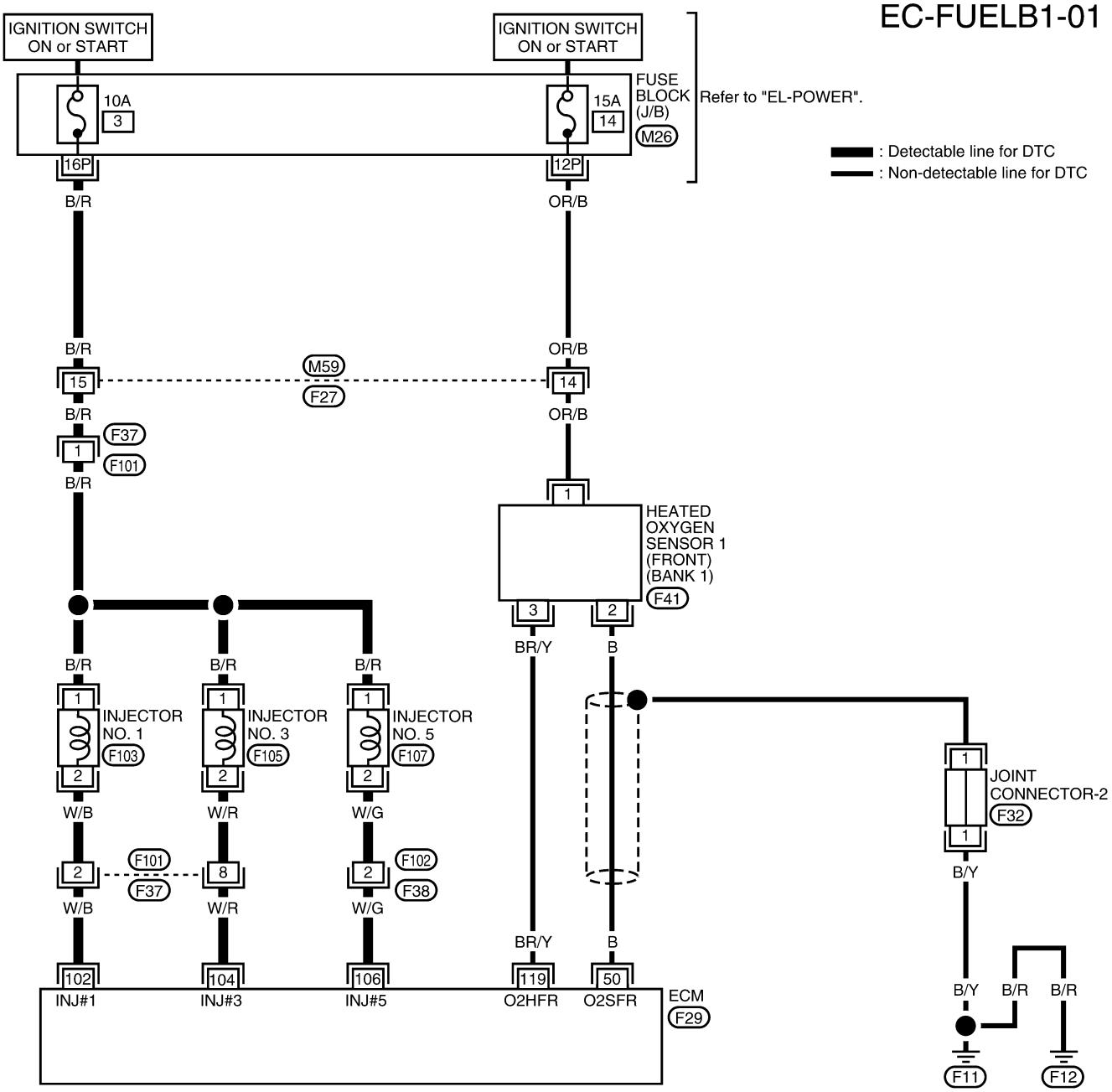
Wiring Diagram

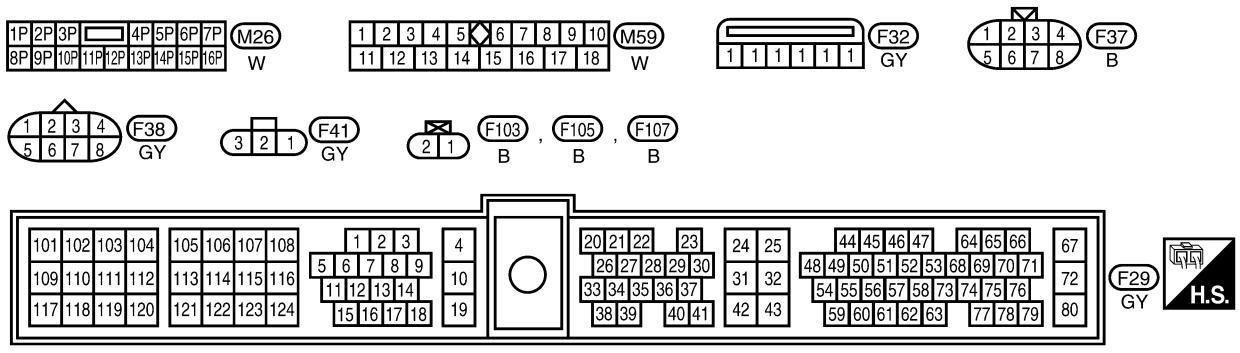
NGEC0692

RIGHT BANK

NGEC0692S01

EC-FUELB1-01



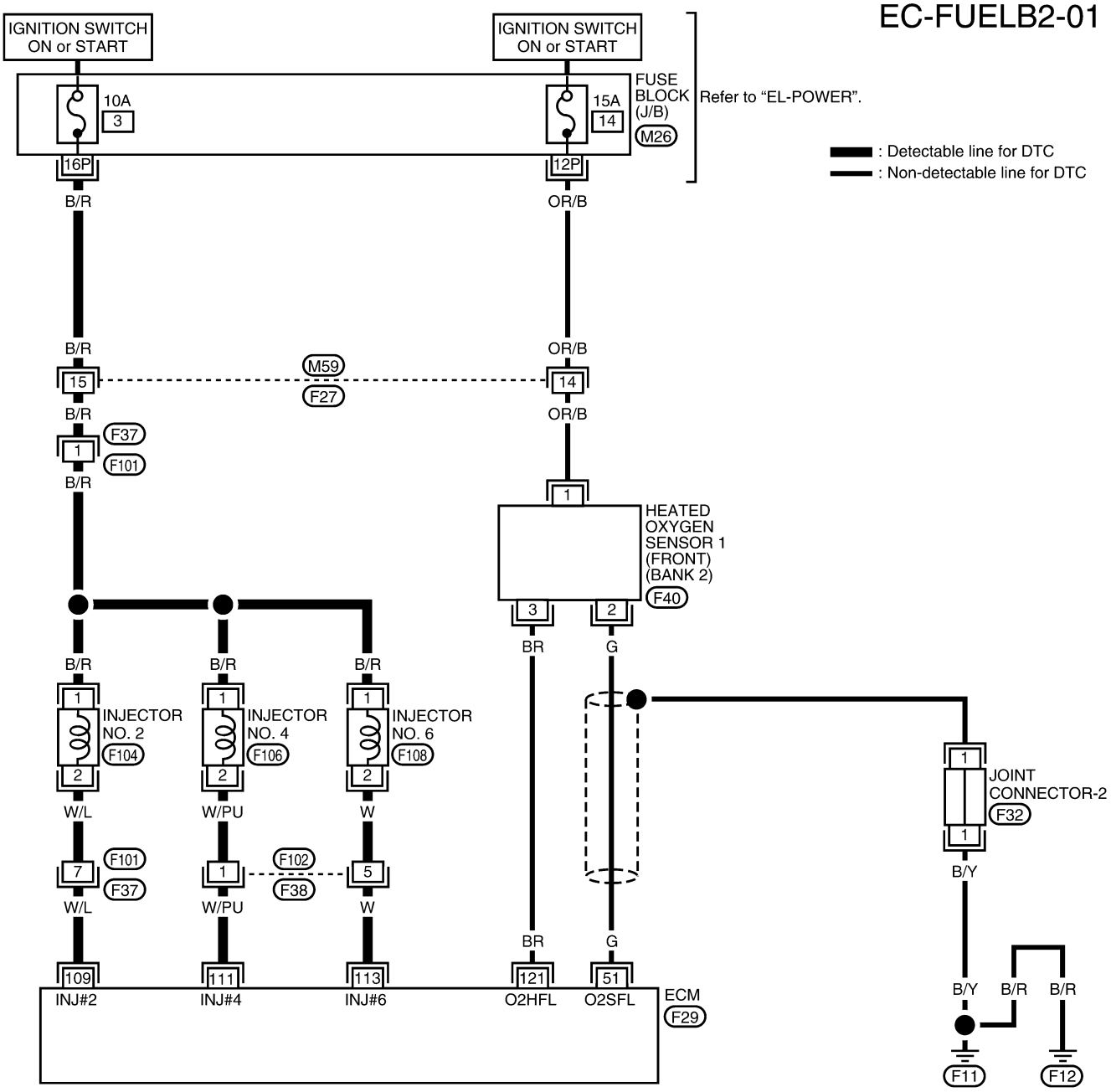


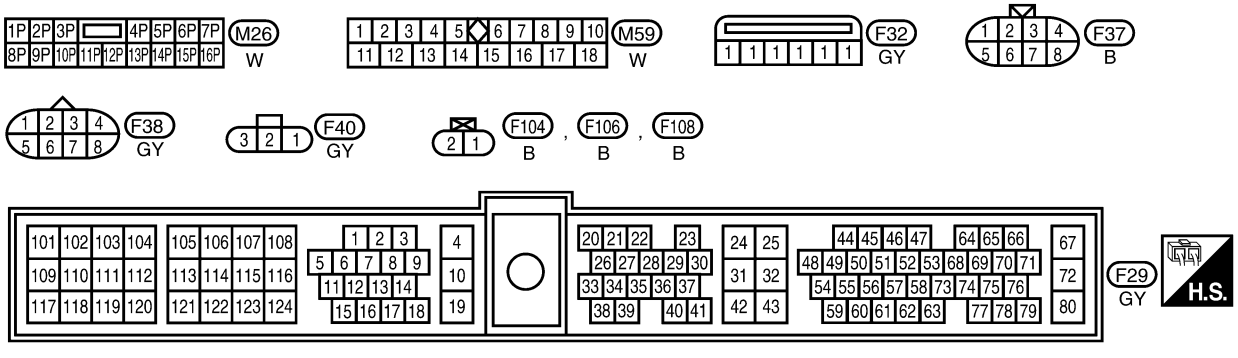
LEC501

LEFT BANK

NGEC0692S02

EC-FUELB2-01





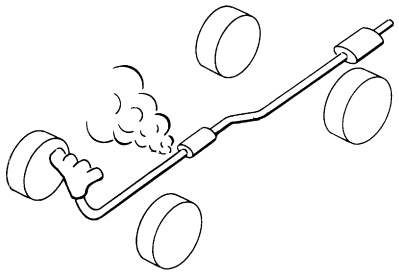
LEC502

Diagnostic Procedure

NGEC0693

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 FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and HO2S1 (front) terminal as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0171	50	2	Bank 1 (Right)
P0174	51	2	Bank 2 (Left)

SEF831Z

Continuity should exist.

5. Check harness continuity between ECM terminal or HO2S1 (front) terminal and ground as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0171	50 or 2	Ground	Bank 1 (Right)
P0174	51 or 2	Ground	Bank 2 (Left)

SEF832Z

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-637.
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.

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART
Check the following. ● Fuel pump and circuit (Refer to EC-1177.) ● Fuel pressure regulator (Refer to EC-638.) ● Fuel lines (Refer to "ENGINE MAINTENANCE", ***MA-28***.) ● Fuel filter for clogging	
▶	Repair or replace.

6	CHECK MASS AIR FLOW SENSOR
With CONSULT-II 1. Install all parts removed. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. **3.3 - 4.8 g·m/sec: at idling** **12.0 - 14.9 g·m/sec: at 2,500 rpm**	
With GST 1. Install all parts removed. 2. Check mass air flow sensor signal in MODE 1 with GST. **3.3 - 4.8 g·m/sec: at idling** **12.0 - 14.9 g·m/sec: at 2,500 rpm**	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-739.

7	CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

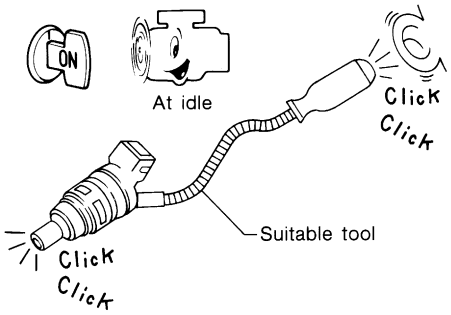
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX %

SEF981Z

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.

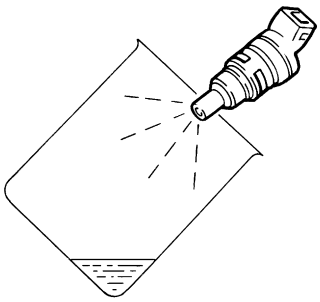
OK or NG

OK	▶	GO TO 8.
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-1169.

Diagnostic Procedure (Cont'd)

8	CHECK INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch OFF.
3. Disconnect injector harness connectors on left bank (for DTC P0171), right bank (for DTC P0174).
4. Remove injector gallery assembly. Refer to EC-638.
   Keep fuel hose and all injectors connected to injector gallery.
   The injector harness connectors on right bank (for DTC P0171), left bank (for DTC P0174) should remain connected.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each injector.
7. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.



SEF595Q

Fuel should be sprayed evenly for each injector.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace injectors from which fuel does not spray out. Always replace O-ring with new ones.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NGEC0694

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 sensors 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 light up the MIL (2 trip detection logic).

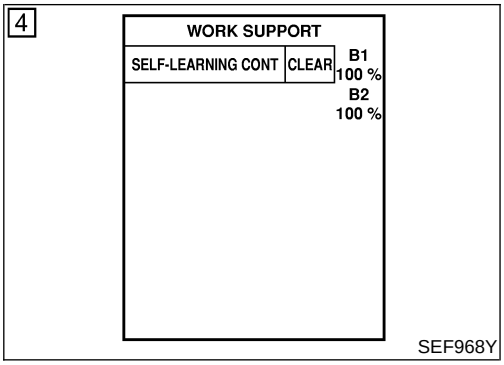
Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensors 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

Malfunction is detected when fuel injection system does not operate properly, the amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)

POSSIBLE CAUSE

NGEC0694S01

- Heated oxygen sensor 1 (front)
- Injectors
- Exhaust gas leaks
- Incorrect fuel pressure
- Mass air flow sensor



DTC Confirmation Procedure

=NGEC0695

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON and select “SELF-LEARN CONTROL” in “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, P0175 should be detected at this stage, if a malfunction exists. If so, go to “Diagnostic Procedure”, EC-897.
7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8) Crank engine while depressing accelerator pedal.
   If engine starts, go to “Diagnostic Procedure”, EC-897. If engine does not start, remove ignition plugs and check for fouling, etc.

With GST

Follow the procedure “With CONSULT-II”.

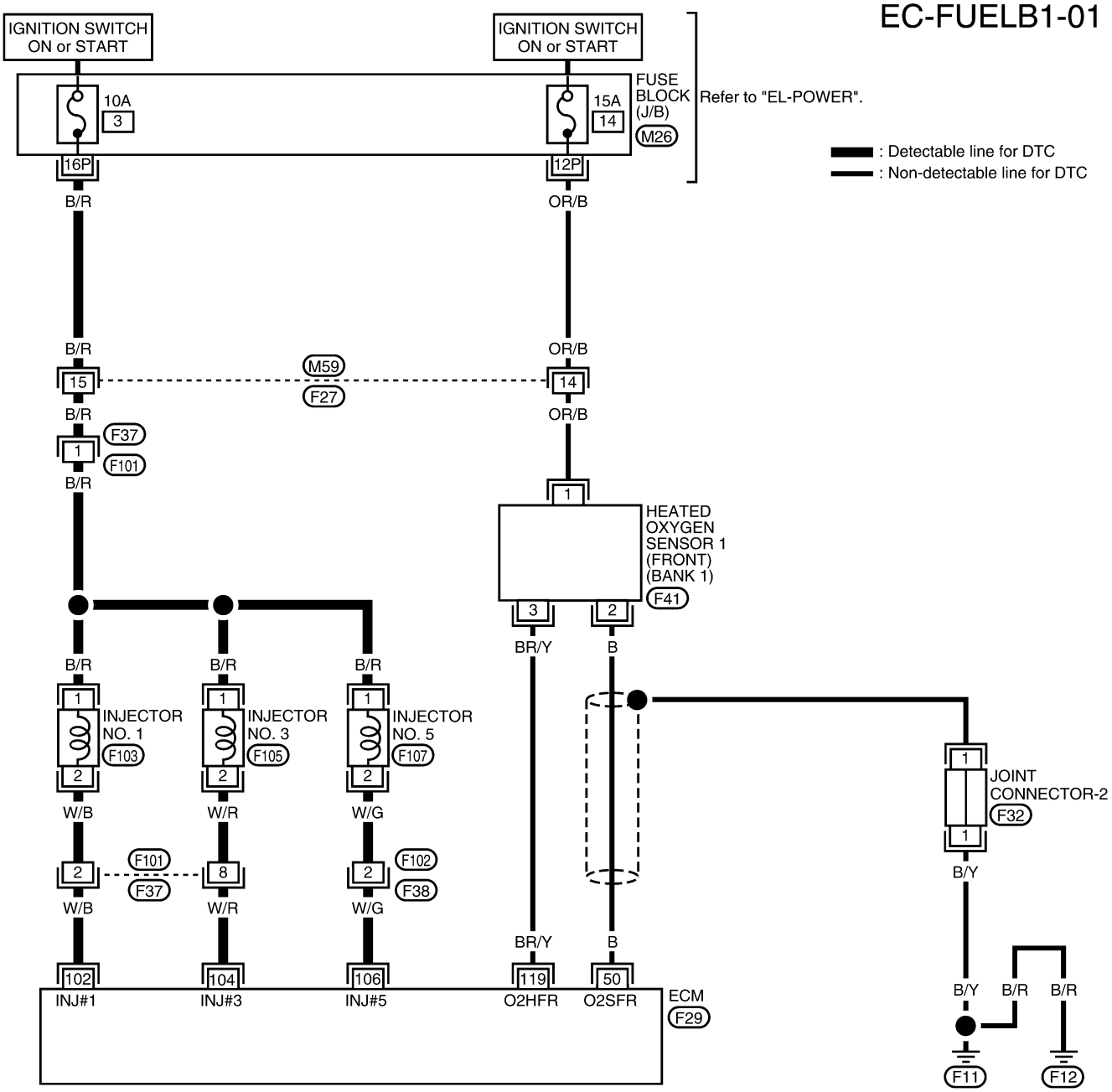
Wiring Diagram

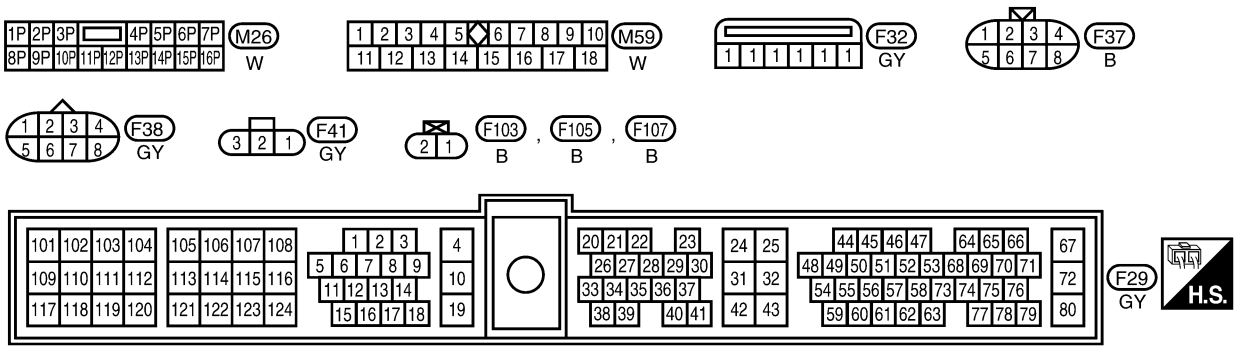
NGEC0696

RIGHT BANK

NGEC0696S01

EC-FUELB1-01



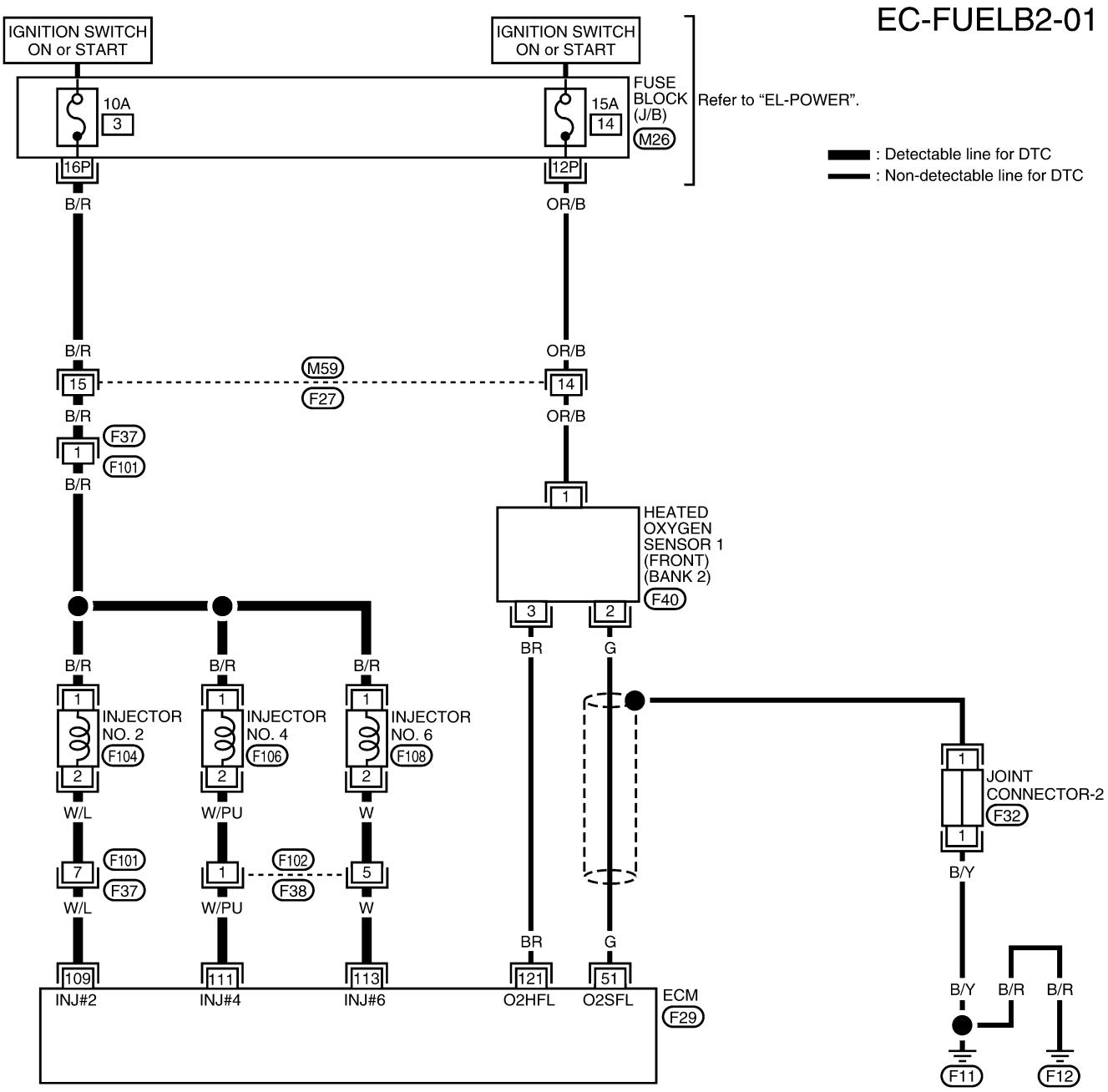


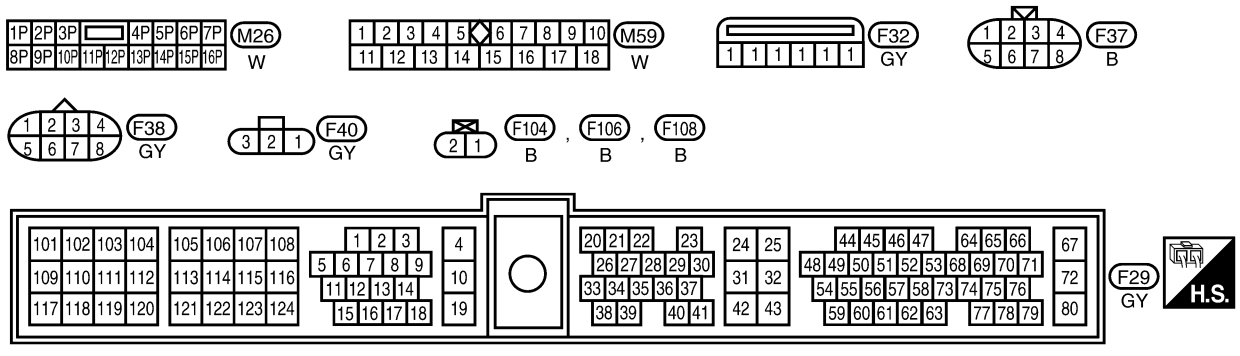
LEC501

Wiring Diagram (Cont'd)

LEFT BANK

NGEC0696S02





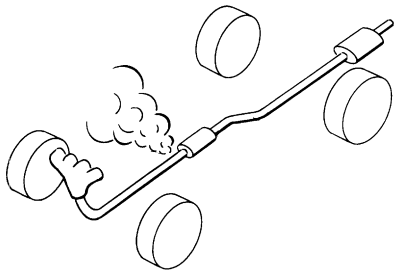
LEC502

Diagnostic Procedure

NGEC0697

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.

Diagnostic Procedure (Cont'd)

3	CHECK HEATED OXYGEN SENSOR 1 (FRONT) CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect corresponding heated oxygen sensor 1 (front) harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and HO2S1 (front) terminal as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0172	50	2	Bank 1 (Right)
P0175	51	2	Bank 2 (Left)

SEF833Z

Continuity should exist.

5. Check harness continuity between ECM terminal or HO2S1 (front) terminal and ground as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0172	50 or 2	Ground	Bank 1 (Right)
P0175	51 or 2	Ground	Bank 2 (Left)

SEF834Z

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-637.
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-1177.) ● Fuel pressure regulator (Refer to EC-638.)		
	▶	Repair or replace.

6	CHECK MASS AIR FLOW SENSOR	
With CONSULT-II 1. Install all parts removed. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. **3.3 - 4.8 g·m/sec: at idling** **12.0 - 14.9 g·m/sec: at 2,500 rpm**		
With GST 1. Install all parts removed. 2. Check mass air flow sensor signal in MODE 1 with GST. **3.3 - 4.8 g·m/sec: at idling** **12.0 - 14.9 g·m/sec: at 2,500 rpm**		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-739.

7	CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

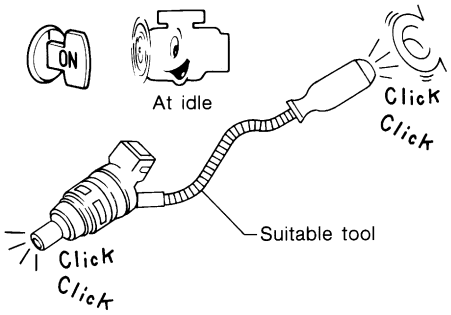
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX %

SEF981Z

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-1169.

8	CHECK INJECTOR

1. Remove injector assembly. Refer to EC-638.
   Keep fuel hose and all injectors connected to injector gallery.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect injector harness connectors left bank (for DTC P0172), right bank (for P0175).
   The injector harness connectors on right bank (for P0172), left bank (for P0175) should remain connected.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each injectors.
6. Crank engine for about 3 seconds.
   Make sure fuel does not drip from injector.

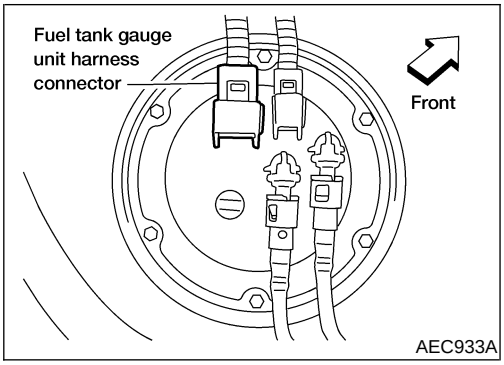
OK or NG

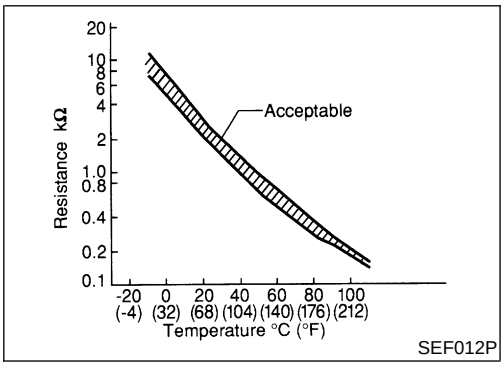
OK (Does not drip)	▶	GO TO 9.
NG (Drips)	▶	Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

9	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.

▶ **INSPECTION END**





Component Description

NGEC0698

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 60 (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 the ECM terminals, such as the ground.

On Board Diagnosis Logic

NGEC0699

Malfunction is detected when an excessively high or low voltage is sent to ECM, rationally incorrect voltage is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.

POSSIBLE CAUSE

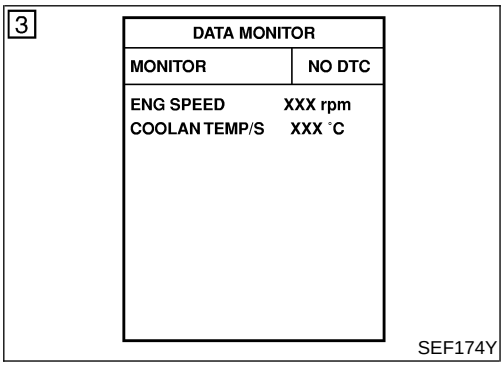
NGEC0699S01

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Fuel tank temperature sensor

DTC Confirmation Procedure

=NGEC0700

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.



With CONSULT-II

1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Wait at least 10 seconds.
   If the result is NG, go to “Diagnostic Procedure”, EC-904.
   If the result is OK, go to following step.
4) Check “COOLAN TEMP/S” value.
   If “COOLAN TEMP/S” is less than 60°C (140°F), the result will be OK.
   If “COOLAN TEMP/S” is above 60°C (140°F), go to the following step.
5) Cool engine down until “COOLAN TEMP/S” is less than 60°C (140°F).
6) Wait at least 10 seconds.
7) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-904.

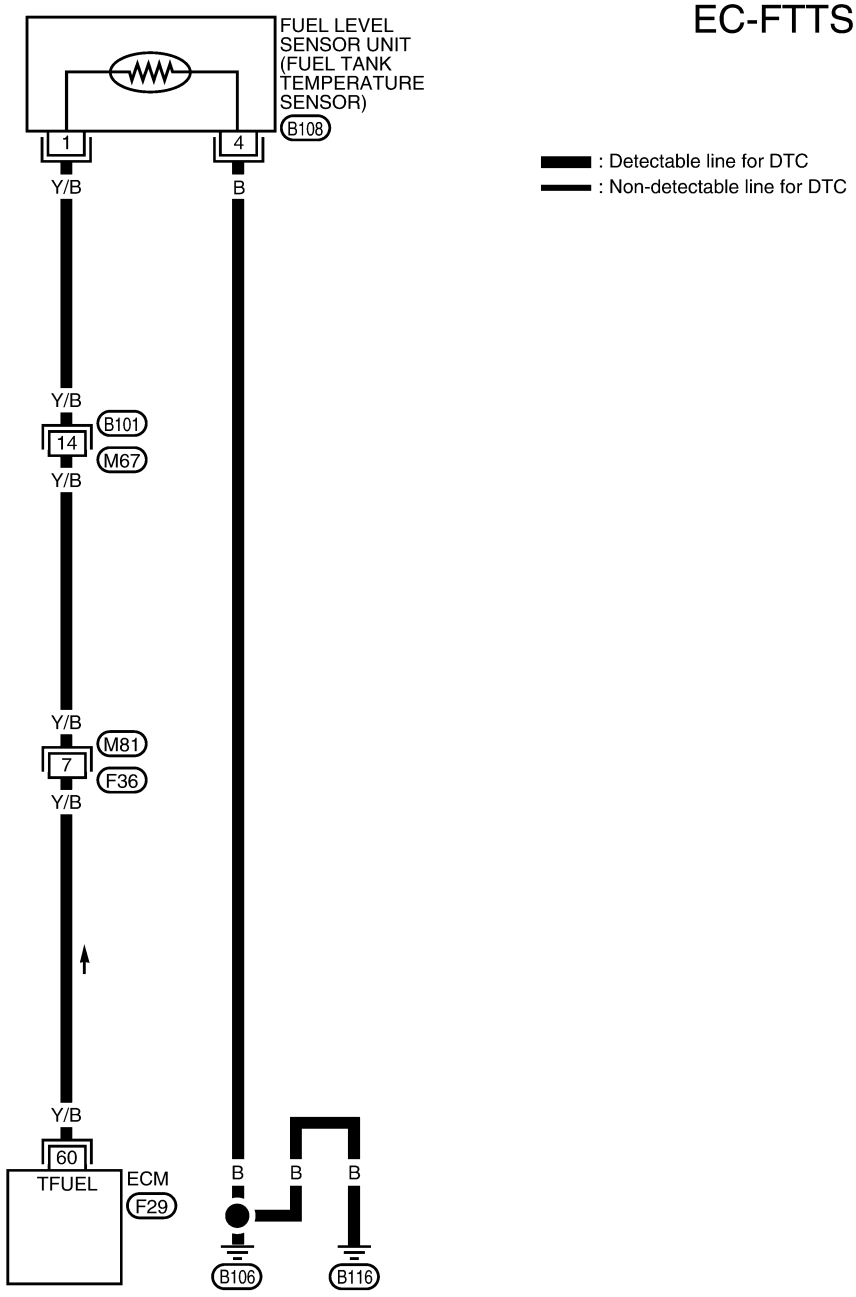
With GST

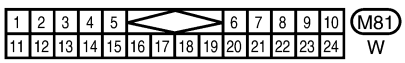
Follow the procedure “With CONSULT-II”.

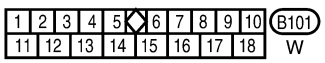
Wiring Diagram

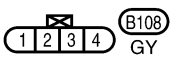
NGEC0701

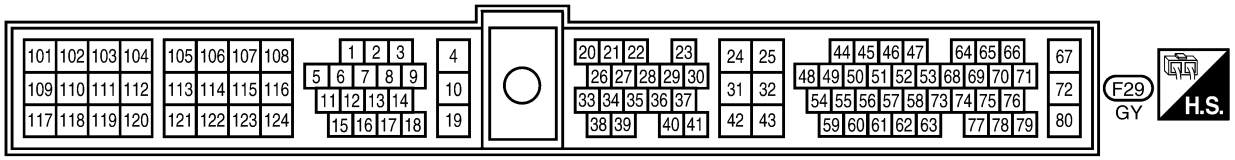
EC-FTTS-01











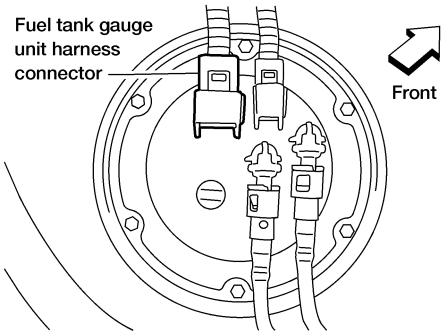
LEC503

Diagnostic Procedure

NGEC0702

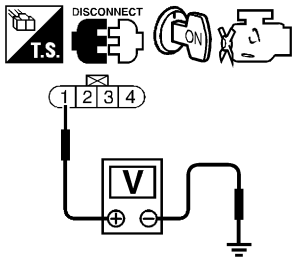
1	CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel tank gauge unit harness connector.



AEC933A

3. Turn ignition switch ON.
4. Check voltage between terminal 1 and ground with CONSULT-II or tester.



SEF639W

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B101, M67
- Harness connectors M81, F36
- Harness for open or short between ECM and fuel tank temperature sensor

	▶	Repair harness or connector.

3	CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between sensor terminal 4 and body ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

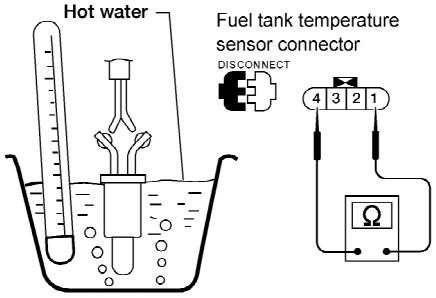
4	DETECT MALFUNCTIONING PART

Check harness for open between fuel tank temperature sensor and body ground.

	▶	Repair open circuit or short to power in harness or connectors.

5	CHECK FUEL TANK TEMPERATURE SENSOR

Check resistance by heating with hot water or heat gun as shown in the figure.



AEC052B

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

MTBL0234

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace fuel tank temperature sensor.

6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.

▶ **INSPECTION END**

System Description

NGEC0963

COOLING FAN CONTROL

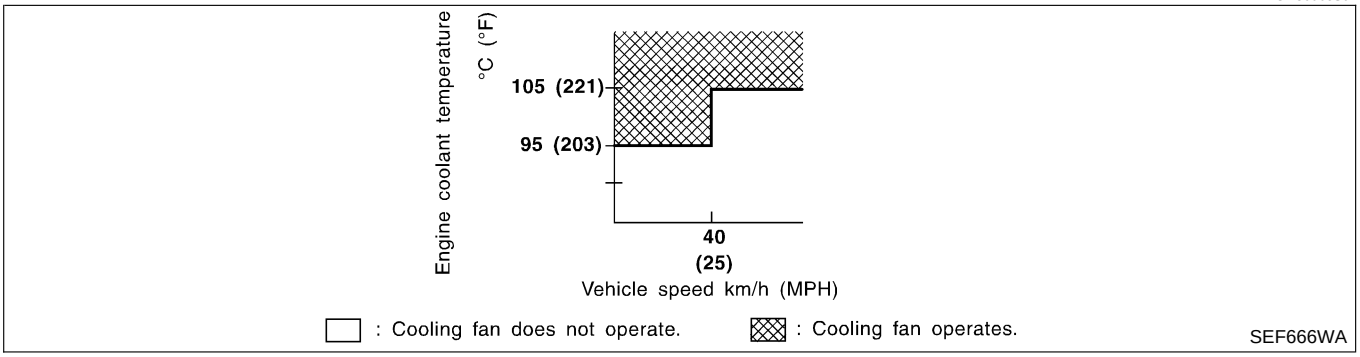
NGEC0963S01

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		
Ignition switch	Start signal		
Camshaft position sensor	Engine speed		

The ECM controls the cooling fan corresponding to the signals sent from the vehicle speed and engine coolant temperature. The control system has 2-step control [ON/OFF].

OPERATION

NGEC0963S02



CONSULT-II Reference Value in Data Monitor Mode

NGEC0964

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
COOLING FAN	• Engine: Idling, after warming up • Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less.	OFF
		Engine coolant temperature is 95°C (203°F) or more.	ON

On Board Diagnosis Logic

NGEC0965

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

NGEC0966

- 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-919.

Overall Function Check

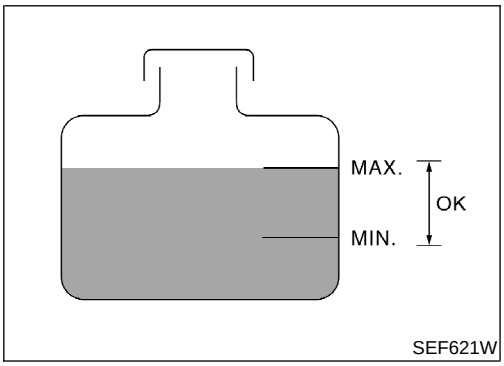
=NGEC0704

Use this procedure to check the overall function of the engine coolant over temperature 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

NGEC0704S01

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 the radiator is below the proper range, skip following steps and go to “Diagnostic Procedure”, EC-912.
- If the coolant mixture ratio is out of range between 45 to 55%, replace the coolant. Refer to “Changing Engine Coolant”, ***MA-26***.

a) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to “Anti-freeze Coolant Mixture Ratio”, ***MA-15***.

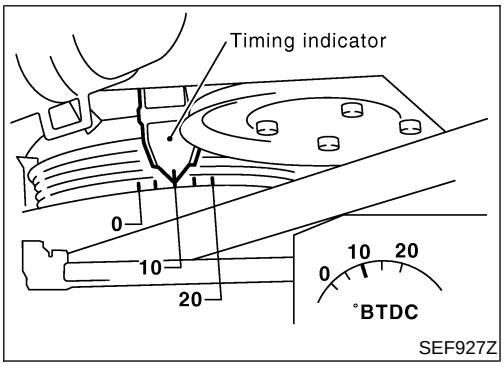
b) After refilling coolant, run engine to ensure that no water-flow noise is emitted. After checking or replacing coolant, go to step 3) below.

2. Confirm whether customer filled the engine coolant or not. If customer filled the engine coolant, skip following steps and go to “Diagnostic Procedure”, EC-912.
3. Turn ignition switch ON.
4. Perform “COOLANT TEMP” in “ACTIVE TEST” mode with CONSULT-II.

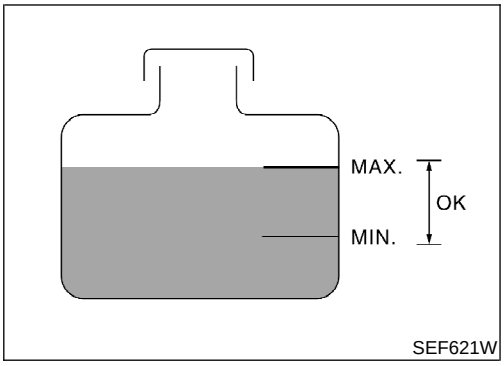
- Set “COOLANT TEMP” to 95°C (203°F) and make sure that cooling fan operates. If NG, go to “Diagnostic Procedure”, EC-912. After repair, go to next step.

5. Check for blocked coolant passage.
   Warm up engine to normal operating temperature, then grasp upper and lower radiator hoses and make sure that coolant flows.
   If NG, go to step 6 of “Diagnostic Procedure”, EC-912. After repair, go to next step.
   Be extremely careful not to touch any moving or adjacent parts.
6. Check radiator for blocked air passage
   Check for blocked condenser or radiator (condenser or radiator fins damaged, condenser or radiator clogged), after market fog lamps ...etc. Check for condenser or radiator fin damage, shroud damage, vehicle front end for clogging of debris or insects ...etc.
   Check for improper fitting of front end cover, damaged radiator grille or bumper, vehicle frontal area damaged by collision but not repaired.
   If NG, take appropriate action and then go to next step.
7. Check ECT sensor for proper operation. Refer to step 7 of

"Diagnostic Procedure", EC-912. If NG, replace ECT sensor and go to next step.



8. Check ignition timing. Refer to "Basic Inspection", EC-694. Make sure that ignition timing is 10° ± 2° at 700 ± 50 rpm. If NG, adjust ignition timing and then recheck.



⊗ WITHOUT CONSULT-II

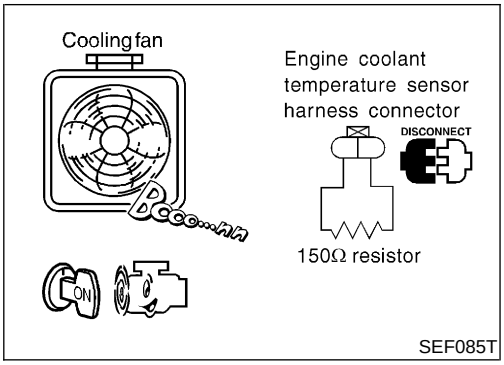
NGEC0704S02

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, skip the following steps and go to step 3 of "Diagnostic Procedure", EC-912.
- If the coolant mixture ratio is out of range between 45 to 55%, replace the coolant. Refer to "Changing Engine Coolant", ***MA-26***.

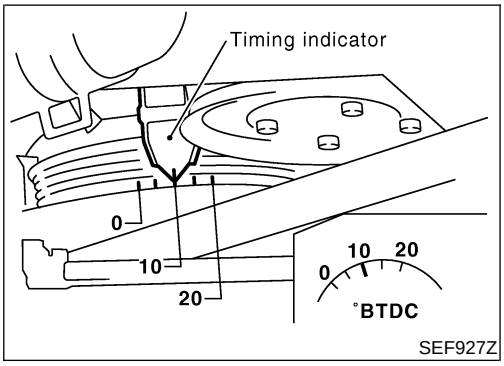
a) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to "Anti-freeze Coolant Mixture Ratio", ***MA-15***.

b) After refilling coolant, run engine to ensure that no water-flow noise is emitted. After checking or replacing coolant, go to step 3) below.

2. Confirm whether customer filled the engine coolant or not. If customer filled engine coolant, skip following steps and go to "Diagnostic Procedure", EC-912.
3. Turn ignition switch OFF.
4. Disconnect engine coolant temperature sensor harness connector.



5. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
6. Start engine and make sure that cooling fan operates.
   Be careful not to overheat engine.
   If NG, go to step 9 of "Diagnostic Procedure", EC-912. After repair, go to next step.
7. Check for blocked coolant passage.
   Warm up engine to normal operating temperature, then grasp upper and lower radiator hoses and make sure that coolant flows.
   If NG, go to step 6 of "Diagnostic Procedure", EC-912. After repair, go to next step.
   Be extremely careful not to touch any moving or adjacent parts.
8. Check radiator for blocked air passage
   Check for blocked condenser or radiator (condenser or radiator fins damaged, condenser or radiator clogged), after market fog lamps,...etc. Check for condenser or radiator fin damage, shroud damage, vehicle front end for clogging of debris or insects ...etc.
   Check for improper fitting of front end cover, damaged radiator grille or bumper, vehicle frontal area damaged by collision but not repaired.
   If NG, take appropriate action and then go to next step.
9. Check ECT sensor for proper operation. Refer to step 6 of "Diagnostic Procedure", EC-912. If NG, replace ECT sensor and go to next step.

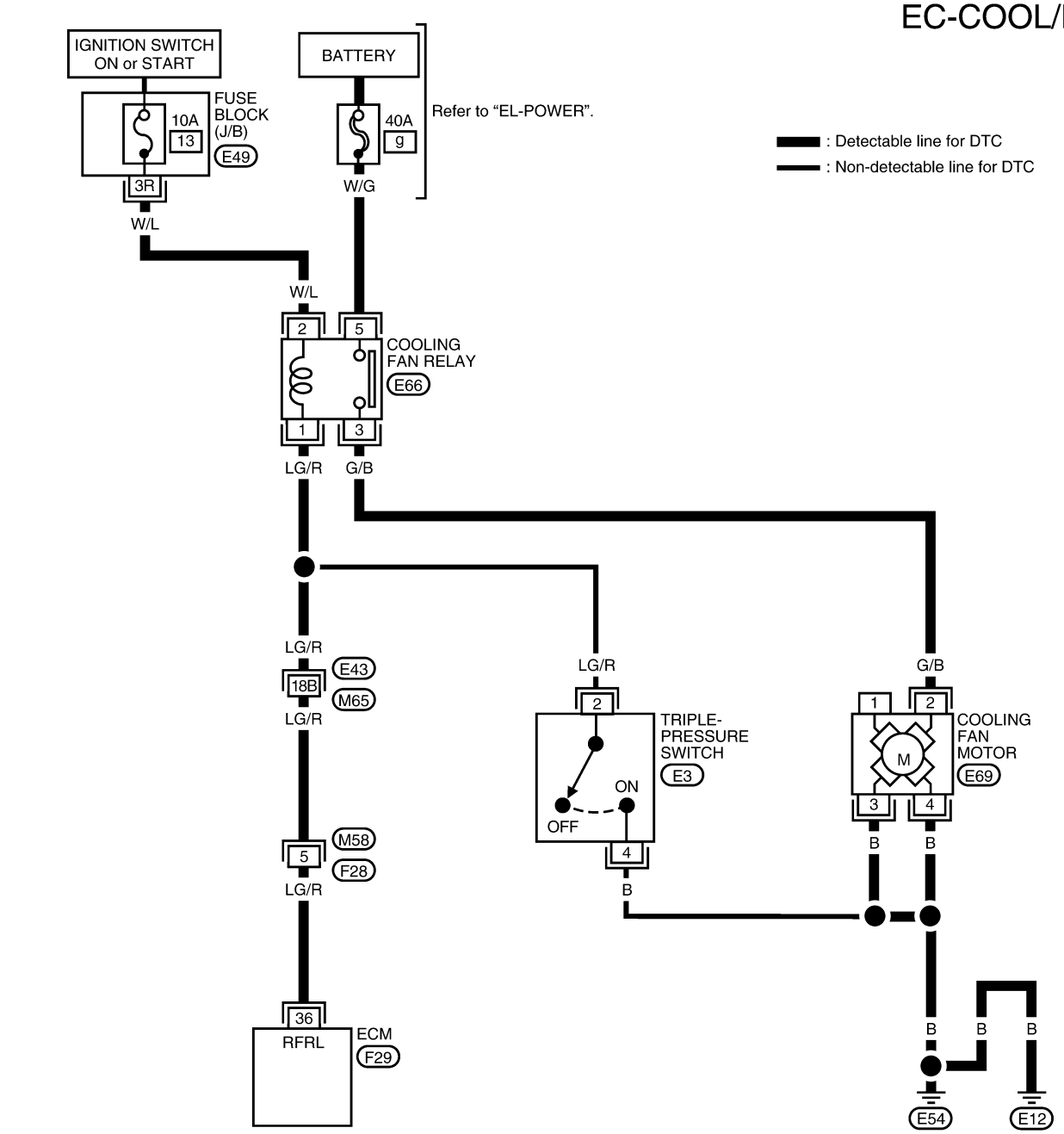


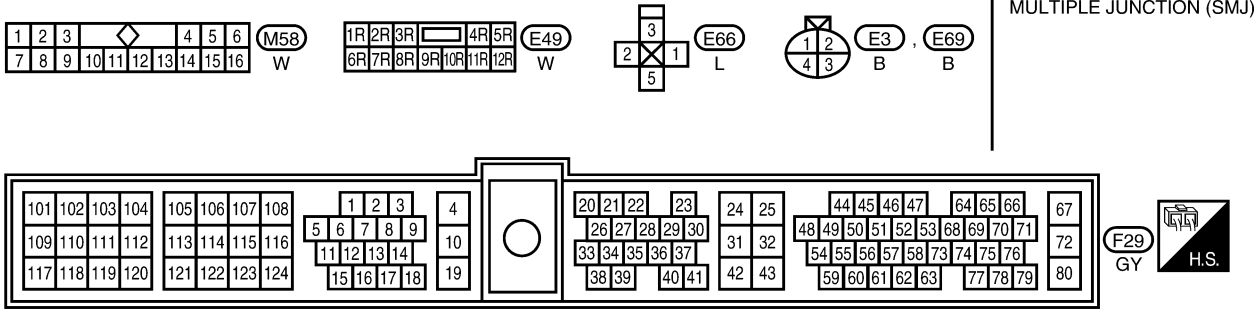
10. Check ignition timing. Refer to "Basic Inspection", EC-694.
    Make sure that ignition timing is 10° ± 2° at 700 ± 50 rpm.
    If NG, adjust ignition timing and then recheck.

Wiring Diagram

NGEC0705

EC-COOL/F-01





LEC504

Diagnostic Procedure

NGEC0706

1	INSPECTION START
Do you have CONSULT-II?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK COOLING FAN OPERATION

With CONSULT-II

1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF376X

Does cooling fan rotate?

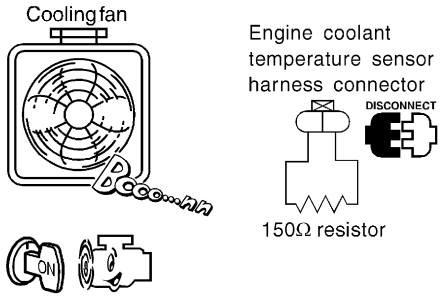
Yes or No

Yes ▶	GO TO 4.
No ▶	GO TO 9.

3	CHECK COOLING FAN OPERATION

Without CONSULT-II

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.
3. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
4. Start engine and make sure that cooling fan operates.



SEF085T

OK or NG

OK ▶	GO TO 4.
NG ▶	GO TO 9.

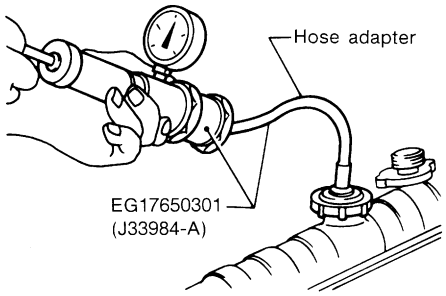
4	CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

CAUTION:

Higher than the specified pressure may cause radiator damage.

Testing pressure: 157 kPa (1.6 kg/cm^2, 23 psi)



SLC754A

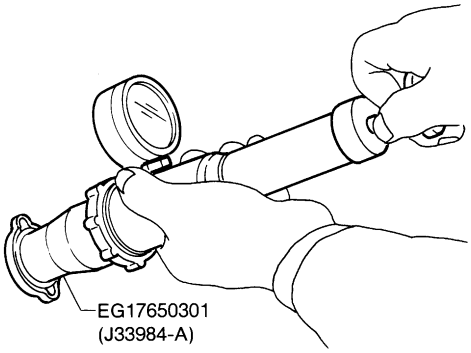
Pressure should not drop.

OK or NG

OK	▶	GO TO 5.
NG	▶	**Check the following for leak:** ● Hose ● Radiator ● Water pump Refer to "Water Pump", ***LC-12***.

5	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)

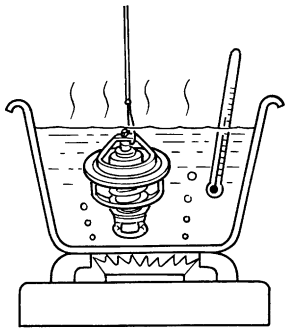
OK or NG

OK	▶	GO TO 6.
NG	▶	Replace radiator cap.

Diagnostic Procedure (Cont'd)

6	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:
82°C (180°F) [standard]
Valve lift:
More than 10 mm/95°C (0.31 in/203°F)

3. Check if valve is closed at 5°C (9°F) below valve opening temperature.

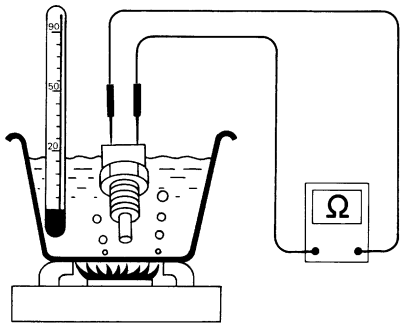
For details, refer to "Thermostat", ***LC-13***.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace thermostat.

7	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.

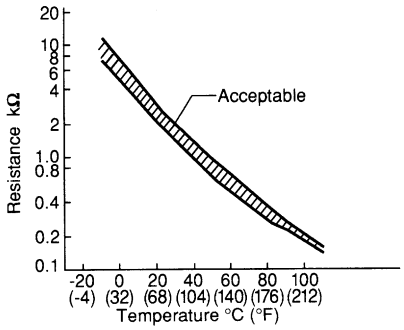


SEF152P

<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

MTBL0229



SEF012P

OK or NG

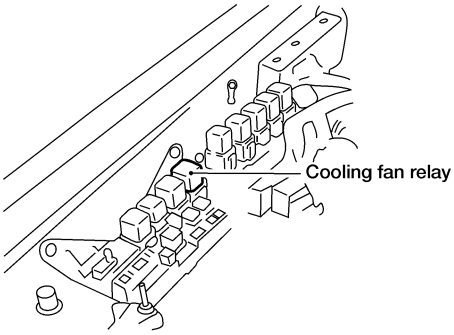
OK	▶	GO TO 8.
NG	▶	Replace engine coolant temperature sensor.

8	CHECK MAIN 12 CAUSES
If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-919.	
▶	**INSPECTION END**

Diagnostic Procedure (Cont'd)

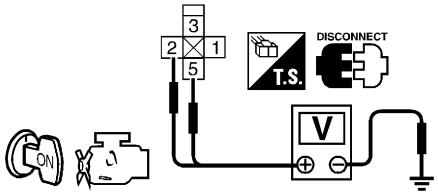
9	CHECK COOLING FAN RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay.



AEC932A

3. Turn ignition switch ON.
4. Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.



SEF667W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

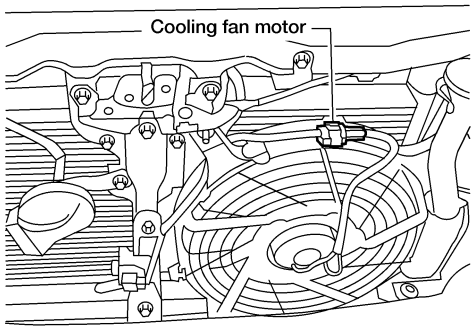
10	DETECT MALFUNCTIONING PART

Check the following.
- Fuse block (J/B) connector E49
- 10A fuse
- 40A fusible link
- Harness for open or short between cooling fan relay and fuse
- Harness for open or short between cooling fan relay and battery

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

11	CHECK COOLING FAN MOTOR POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor harness connector.



AEC931A

3. Check harness continuity between relay terminal 3 and motor terminal 2, motor terminals 3, 4 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 12.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

12	CHECK COOLING FAN RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 36 and relay 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 14.
NG	▶	GO TO 13.

13	DETECT MALFUNCTIONING PART

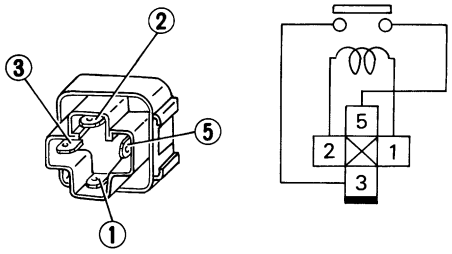
Check the following.
- Harness connectors E43, M65
- Harness connectors M58, F28
- Harness for open or short between cooling fan relay and ECM

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

14	CHECK COOLING FAN RELAY

Check continuity between terminals 3 and 5.



SEF511P

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

MTBL0252

OK or NG

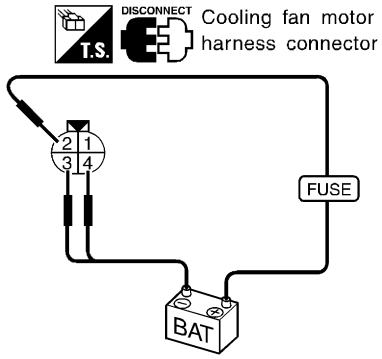
OK	▶	GO TO 15.
NG	▶	Replace cooling fan relay.

15	CHECK COOLING FAN MOTOR

1. Disconnect cooling fan motor harness connector.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Terminals	
	(+)	(–)
Cooling fan motor	2	3, 4

MTBL0253



SEF670W

Cooling fan motor should operate.

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace cooling fan motor.

16	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.

▶ **INSPECTION END**

Main 12 Causes of Overheating

NGEC0707

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	See “RECOMMENDED FLUIDS AND LUBRICANTS” in ***MA-13***.
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See “Changing Engine Coolant”, “ENGINE MAINTENANCE” in ***MA-26***.
	4	• Radiator cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	See “System Check”, “ENGINE COOLING SYSTEM” in ***LC-11***.
ON*2	5	• Coolant leaks	• Visual	No leaks	See “System Check”, “ENGINE COOLING SYSTEM” in ***LC-11***.
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See “Thermostat” and “Radiator”, “ENGINE COOLING SYSTEM” in ***LC-13***, ***LC-14***.
ON*1	7	• Cooling fan	• CONSULT-II	Operating	See “TROUBLE DIAGNOSIS FOR OVERHEAT” (EC-1051).
OFF	8	• Combustion gas leak	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	See “Changing Engine Coolant”, “ENGINE MAINTENANCE” in ***MA-26***.
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See “ENGINE MAINTENANCE” in ***MA-26***.
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See “Inspection”, “CYLINDER HEAD” in ***EM-88***.
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See “Inspection”, “CYLINDER BLOCK” in ***EM-104***.

*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.
*4: After 60 minutes of cool down time.
For more information, refer to “OVERHEATING CAUSE ANALYSIS”, ***LC-34***.

On Board Diagnosis Logic

NGEC1052

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

NGEC1053

- Cooling fan (Crankshaft driven)
- 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-926.

Overall Function Check

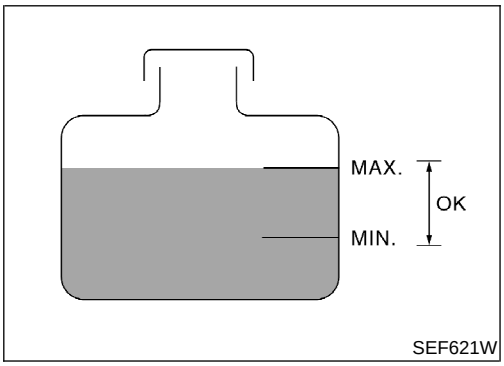
=NGEC1054

Use this procedure to check the overall function of the engine coolant over temperature 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.



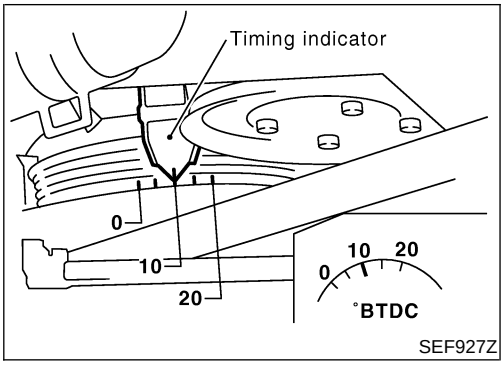
WITH CONSULT-II

NGEC1054S01

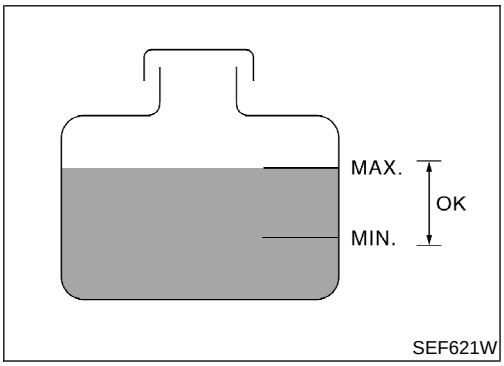
1. Check the coolant level and mixture ratio (Using coolant tester) in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level and mixture ratio.
   - If the coolant level in the reservoir and/or the radiator is below the proper range, skip following steps and go to “Diagnostic Procedure”, EC-923.
   - If the coolant mixture ratio is out of range between 45 to 55%, replace the coolant. Refer to ***MA-26***, “Changing Engine Coolant”.

   a) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to ***MA-15***, “Anti-freeze Coolant Mixture Ratio”.

   b) After refilling coolant, run engine to ensure that no water-flow noise is emitted. After checking or replacing coolant, go to step 3) below.
2. Confirm whether customer filled the engine coolant or not. If customer filled the engine coolant, skip following steps and go to “Diagnostic Procedure”, EC-923.
3. Start engine and make sure that cooling fan (crankshaft driven) operates. If NG, go to “Diagnostic Procedure”, EC-923. After repair, go to next step.
4. Check for blocked coolant passage.
   Warm up engine to normal operating temperature, then grasp upper and lower radiator hoses and make sure that coolant flows.
   If NG, go to step 4 of “Diagnostic Procedure”, EC-923. After repair, go to next step.
   Be extremely careful not to touch any moving or adjacent parts.
5. Check radiator for blocked air passage
   Check for blocked condenser or radiator (condenser or radiator fins damaged, condenser or radiator clogged), after market fog lamps ...etc. Check for condenser or radiator fin damage, shroud damage, vehicle front end for clogging of debris or insects ...etc.
   Check for improper fitting of front end cover, damaged radiator grille or bumper, vehicle frontal area damaged by collision but not repaired.
   If NG, take appropriate action and then go to next step.
6. Check ECT sensor for proper operation. Refer to step 5 of “Diagnostic Procedure”, EC-923. If NG, replace ECT sensor and go to next step.



SEF927Z



SEF621W

7. Check ignition timing. Refer to "Basic Inspection", EC-694. Make sure that ignition timing is 10° ± 2° at 700 ± 50 rpm. If NG, adjust ignition timing and then recheck.

⊗ WITHOUT CONSULT-II

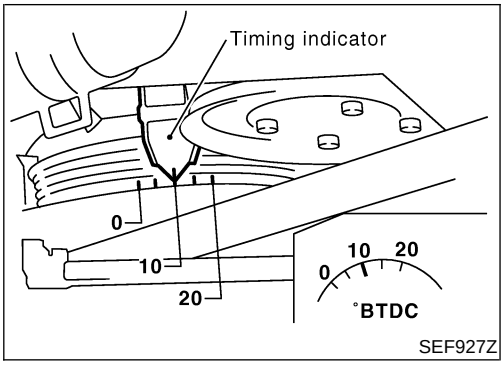
NGEC1054S02

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, skip the following steps and go to step 3 of "Diagnostic Procedure", EC-923.
- If the coolant mixture ratio is out of range between 45 to 55%, replace the coolant. Refer to ***MA-26***, "Changing Engine Coolant".

a) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to ***MA-15***, "Anti-freeze Coolant Mixture Ratio".

b) After refilling coolant, run engine to ensure that no water-flow noise is emitted. After checking or replacing coolant, go to step 3) below.

2. Confirm whether customer filled the engine coolant or not. If customer filled engine coolant, skip following steps and go to "Diagnostic Procedure", EC-923.
3. Start engine and make sure that cooling fan (crankshaft driven) operates.
   Be careful not to overheat engine.
   If NG, go to step 9 of "Diagnostic Procedure", EC-923. After repair, go to next step.
4. Check for blocked coolant passage.
   Warm up engine to normal operating temperature, then grasp upper and lower radiator hoses and make sure that coolant flows.
   If NG, go to step 4 of "Diagnostic Procedure", EC-923. After repair, go to next step.
   Be extremely careful not to touch any moving or adjacent parts.
5. Check radiator for blocked air passage
   Check for blocked condenser or radiator (condenser or radiator fins damaged, condenser or radiator clogged), after market fog lamps,...etc. Check for condenser or radiator fin damage, shroud damage, vehicle front end for clogging of debris or insects ...etc.
   Check for improper fitting of front end cover, damaged radiator grille or bumper, vehicle frontal area damaged by collision but not repaired.
   If NG, take appropriate action and then go to next step.
6. Check ECT sensor for proper operation. Refer to step 5 of "Diagnostic Procedure", EC-923. If NG, replace ECT sensor and go to next step.



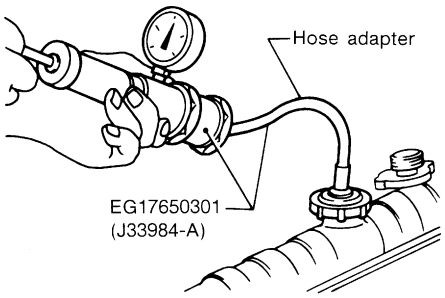
7. Check ignition timing. Refer to "Basic Inspection", EC-694.
Make sure that ignition timing is 10° ± 2° at 700 ± 50 rpm.
If NG, adjust ignition timing and then recheck.

Diagnostic Procedure

NGEC1055

1	CHECK COOLING FAN (CRANKSHAFT DRIVEN) OPERATION	
Start engine and make sure that cooling fan (crankshaft driven) operates.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Check cooling fan (crankshaft driven). Refer to ***LC-32***, "Cooling Fan".

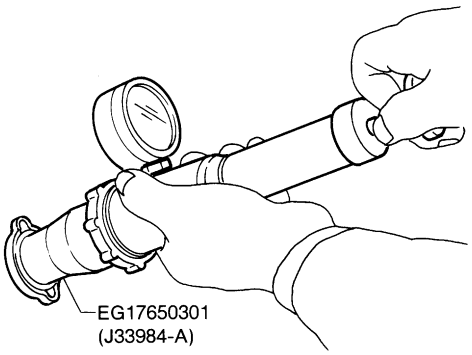
2	CHECK COOLING SYSTEM FOR LEAK	
Apply pressure to the cooling system with a tester, and check if the pressure drops. **CAUTION:** **Higher than the specified pressure may cause radiator damage.** **Testing pressure: 157 kPa (1.6 kg/cm^2, 23 psi)**		
Pressure should not drop.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	**Check the following for leak:** ● Hose ● Radiator ● Water pump Refer to ***LC-28***, "Water Pump".



SLC754A

3	CHECK RADIATOR CAP

Apply pressure to cap with a tester and check radiator cap relief pressure.



SLC755A

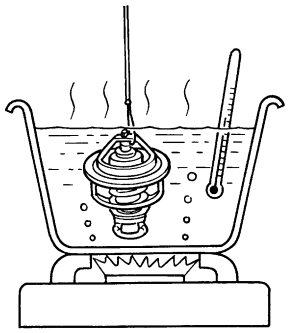
Radiator cap relief pressure:
59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi)

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace radiator cap.

4	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:
82°C (180°F) [standard]
Valve lift:
More than 10 mm/95°C (0.31 in/203°F)

3. Check if valve is closed at 5°C (9°F) below valve opening temperature.

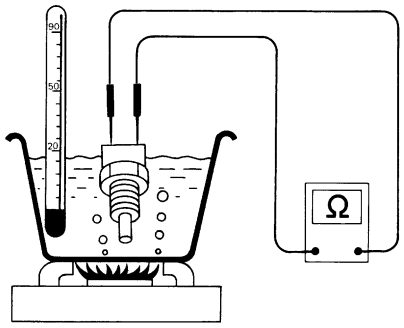
For details, refer to ***LC-29***, "Thermostat".

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace thermostat.

5	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.

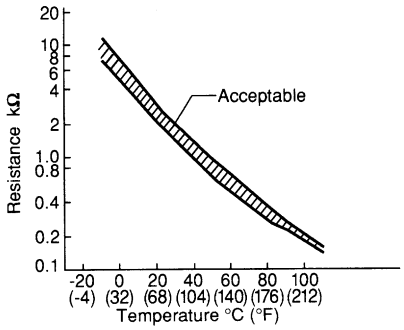


SEF152P

<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

MTBL0229



SEF012P

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace engine coolant temperature sensor.

6	CHECK MAIN 12 CAUSES
If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-926.	
▶	**INSPECTION END**

Main 12 Causes of Overheating

NGEC1056

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-26***, “Changing Engine Coolant”.
	4	• Radiator cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	See ***LC-26***, “System Check”.
ON*2	5	• Coolant leaks	• Visual	No leaks	See ***LC-26***, “System Check”.
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See ***LC-29***, “Thermostat” and ***LC-31***, “Radiator”.
ON*1	7	• Cooling fan (Crankshaft driven)	• Visual	Operating	See ***LC-32***, “Cooling Fan”.
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-26***, “Changing Engine Coolant”.
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See ***MA-25***, “ENGINE MAINTENANCE”.
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See ***EM-88***, “Inspection”.
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See ***EM-104***, “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-34***, “OVERHEATING CAUSE ANALYSIS”.

On Board Diagnosis Logic

NGEC0708

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the CKP sensor signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (OBD)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off. If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink. When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on. If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

Malfunction is detected when multiple cylinders misfire, No. 1 cylinder misfires, No. 2 cylinder misfires, No. 3 cylinder misfires, No. 4 cylinder misfires, No. 5 cylinder misfires and No. 6 cylinder misfires.

POSSIBLE CAUSE

NGEC0708S01

- Improper spark plug
- Insufficient compression
- Incorrect fuel pressure
- The injector circuit is open or shorted
- Injectors
- Intake air leak
- The ignition secondary circuit is open or shorted
- Lack of fuel
- Drive plate or flywheel
- Heated oxygen sensor 1 (front)
- Incorrect distributor rotor

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
P/N POSI SW	OFF
B/FUEL SCHDL	XXX msec

SEF213Y

DTC Confirmation Procedure

=NGEC0709

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-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 5 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-928.

With GST

Follow the procedure “With CONSULT-II”.

Diagnostic Procedure

NGEC0710

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	PERFORM POWER BALANCE TEST

With CONSULT-II

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.

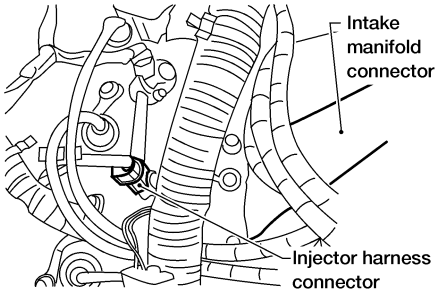
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX %

SEF981Z

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?



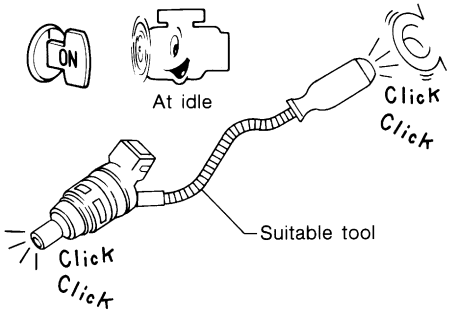
AEC646A

Yes or No

Yes	▶	GO TO 4.
No	▶	GO TO 7.

4	CHECK INJECTOR

Does each injector make an operating sound at idle?



MEC703B

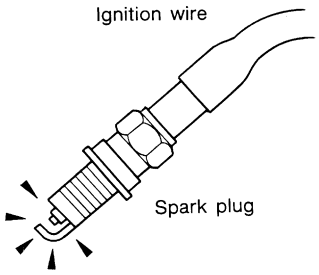
Yes or No

Yes	▶	GO TO 5.
No	▶	Check injector(s) and circuit(s). Refer to EC-1169.

Diagnostic Procedure (Cont'd)

5 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.



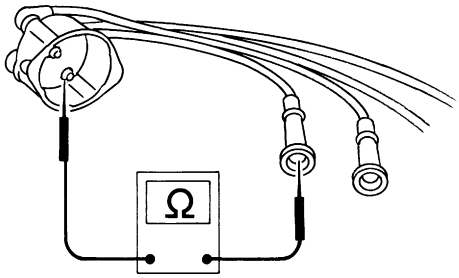
SEF282G

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6 CHECK IGNITION WIRES

1. Inspect wires for cracks, damage, burned terminals and for improper fit.
2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks.



SEF174P

Resistance:

Cylinder No.	Resistance kΩ [at 25°C (77°F)]
1	Approximately 6.5
2	Approximately 10.0
3	Approximately 8.5
4	Approximately 12.5
5	Approximately 8.5
6	Approximately 11.0

MTBL0235

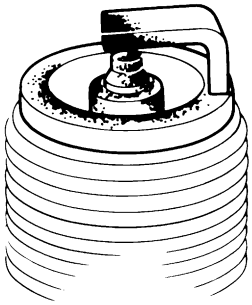
If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.

OK or NG

OK	▶	**Check the following:** ● Distributor rotor head for incorrect parts ● Ignition coil, power transistor and their circuits Refer to EC-1162.
NG	▶	Replace.

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 "ENGINE MAINTENANCE", ***MA-31***.

8	CHECK COMPRESSION PRESSURE

Refer to ***EM-70***.

- Check compression pressure.

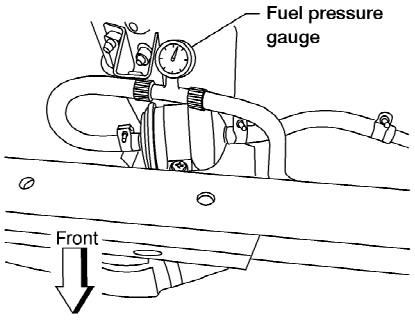
Standard:
1,196 kPa (12.2 kg/cm^2, 173 psi)/300 rpm
Minimum:
883 kPa (9.0 kg/cm^2, 128 psi)/300 rpm
Difference between each cylinder:
98 kPa (1.0 kg/cm^2, 14 psi)/300 rpm

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-637.
3. Install fuel pressure gauge and check fuel pressure.



AEC064B

At idle:
Approx. 235 kPa (2.4 kg/cm^2, 34 psi)

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

Diagnostic Procedure (Cont'd)

10	DETECT MALFUNCTIONING PART
Check the following. ● Fuel pump and circuit (Refer to EC-1177.) ● Fuel pressure regulator (Refer to EC-638.) ● Fuel lines (Refer to "ENGINE MAINTENANCE", ***MA-28***.) ● Fuel filter for clogging	
▶	Repair or replace.

11	CHECK IGNITION TIMING

Check the following items. Refer to "Basic Inspection", EC-694.

Items	Specifications
Ignition timing	10° ± 2° BTDC
Base idle speed	700 ± 50 rpm (in "P" or "N" position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	750 ± 50 rpm (in "P" or "N" position)

MTBL0576

OK or NG

OK (With CONSULT-II) ▶	GO TO 12.
OK (Without CONSULT-II) ▶	GO TO 13.
NG ▶	Adjust ignition timing.

12	CHECK HEATED OXYGEN SENSOR 1 (FRONT)

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "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.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

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 left:

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

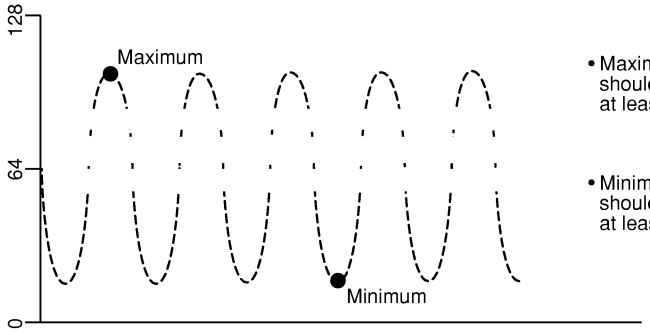
R means HO2S1 MNTR (B1)/(B2) indicates RICH

L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y

- "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.

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



SEF648Y

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.**

OK or NG

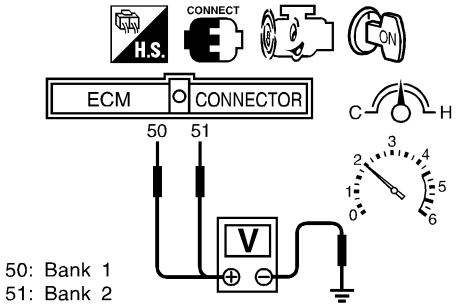
OK	▶	GO TO 14.
NG	▶	Replace heated oxygen sensor 1 (front).

Diagnostic Procedure (Cont'd)

13	CHECK FRONT HEATED OXYGEN SENSOR LH/RH

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 (right bank sensor signal) or 51 (left bank sensor signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.



- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

SEF796Z

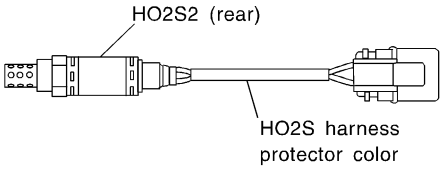
CAUTION:
Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 14.

14	REPLACE HEATED OXYGEN SENSOR 2 (REAR)

1. Stop vehicle and turn ignitioin switch OFF.
2. Check heated oxygen sensor 2 (rear) harness protector color.



HO2S2 (rear) (bank 1): White or Gray
HO2S2 (rear) (bank 2): Red or Red/Brown

SEF372Z

CAUTION:
Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

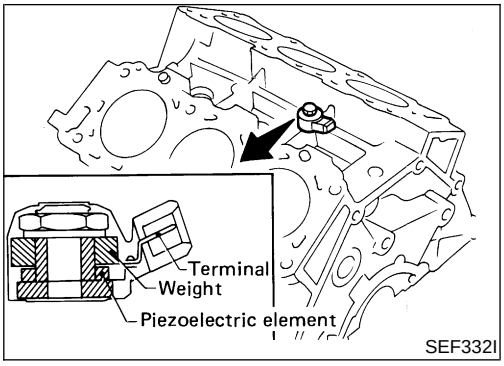
	▶	Replace malfunctioning heated oxygen sensor 2 (rear).

15	CHECK MASS AIR FLOW SENSOR
With CONSULT-II Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT-II. **3.3 - 4.8 g·m/sec: at idling** **12.0 - 14.9 g·m/sec: at 2,500 rpm** **With GST** Check mass air flow sensor signal in MODE 1 with GST. **3.3 - 4.8 g·m/sec: at idling** **12.0 - 14.9 g·m/sec: at 2,500 rpm**	
OK or NG	
OK ▶	GO TO 16.
NG ▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-739.

16	CHECK SYMPTOM MATRIX CHART
Check items on the rough idle symptom in "Symptom Matrix Chart", EC-710.	
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-666.	
▶	GO TO 18.

18	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**



Component Description

NGEC0711

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

Freeze frame data will not be stored in the ECM for the knock sensor. The MIL will not light for knock sensor malfunction. The knock sensor has one trip detection logic.

ECM Terminals and Reference Value

NGEC0712

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
64	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V

On Board Diagnosis Logic

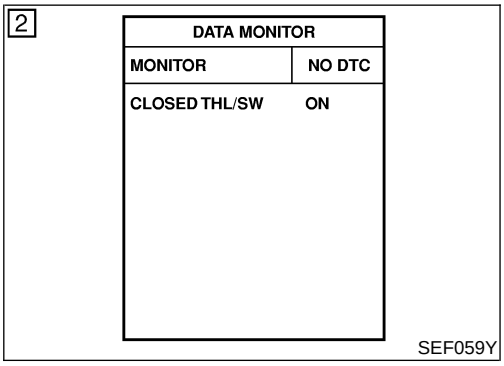
NGEC0713

Malfunction is detected when an excessively low or high voltage from the knock sensor is sent to ECM.

POSSIBLE CAUSE

NGEC0713S01

- Harness or connectors
  (The knock sensor circuit is open or shorted.)
- Knock sensor



DTC Confirmation Procedure

NGEC0714

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

With CONSULT-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-938.

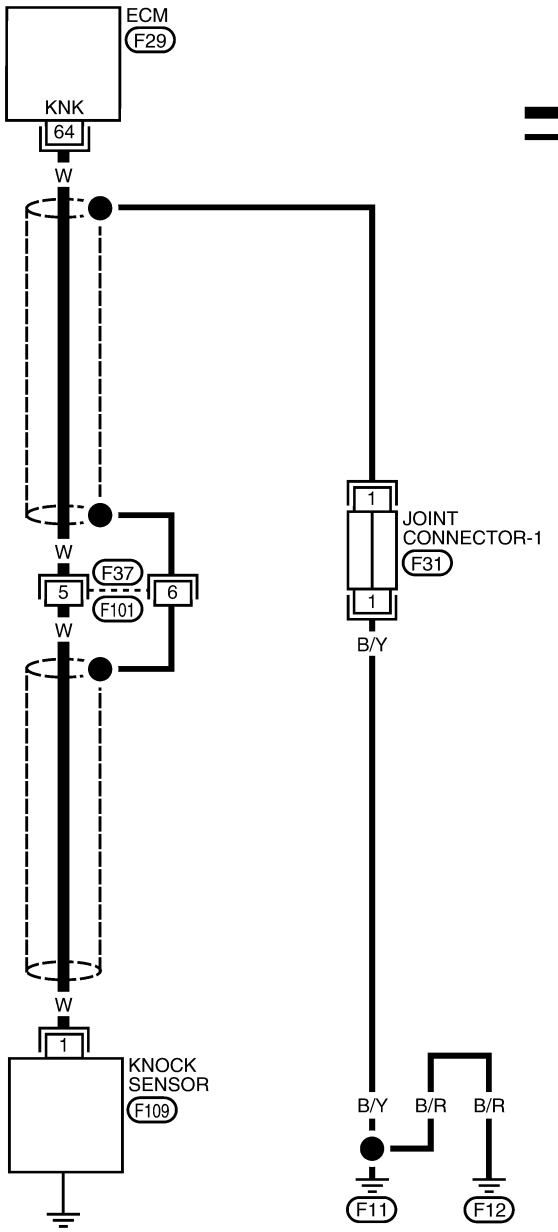
With GST

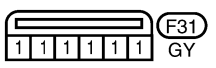
Follow the procedure "With CONSULT-II".

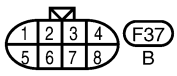
Wiring Diagram

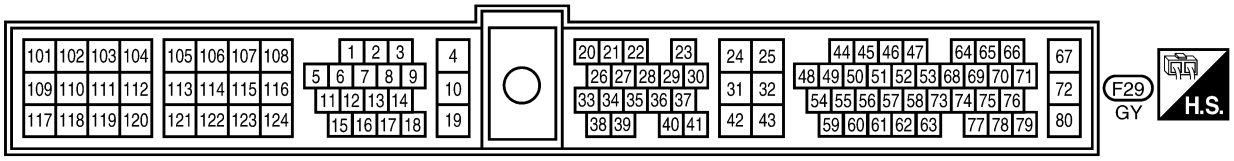
NGEC0715

EC-KS-01









LEC505

Diagnostic Procedure

NGEC0716

1	CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminal 64 and engine ground.
   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.
   Resistance:
   Approximately 500 - 620 kΩ [at 25°C (77°F)]
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT-II

1. Disconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 64 and knock sensor terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

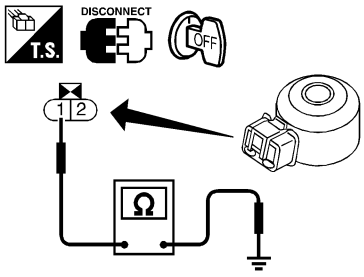
Check the following.
- Harness connector F37, F101
- Harness for open or short between ECM and knock sensor

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK KNOCK SENSOR

- 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 25°C (77°F)]

SEF799Z

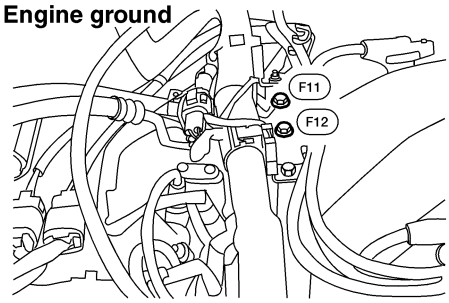
CAUTION:
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace knock sensor.

5	RETIGHTEN GROUND SCREWS

Loose and retighten engine ground screws.



LEC518

	▶	GO TO 6.

6	CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect harness connectors F37, F101.
2. Check harness continuity between harness connector F37 terminal 6 and engine ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART

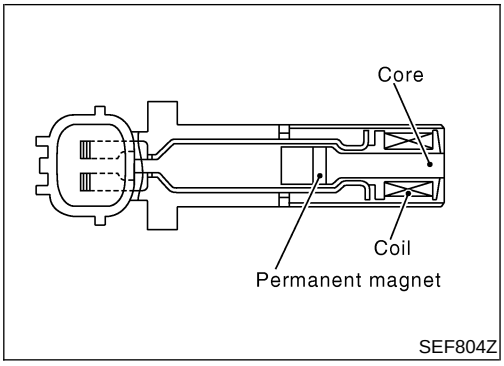
Check the following.
- Harness connectors F37, F101
- Joint connectors - 1
- Harness for open between harness connector F37 and engine ground

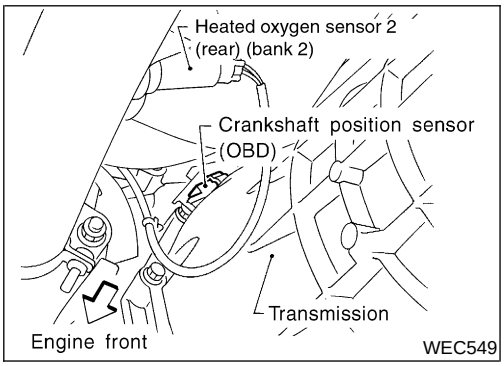
	▶	Repair open circuit or short to power in harness or connectors.

8	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.

	▶	**INSPECTION END**





Component Description

NGEC0717

The crankshaft position sensor (OBD) is located on the transaxle housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet, core and coil.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.
This sensor is not used to control the engine system. It is used only for the on board diagnosis.

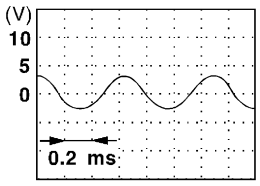
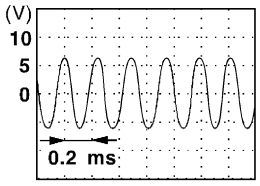
ECM Terminals and Reference Value

NGEC0718

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
47	L	Crankshaft position sensor (OBD)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1 - 2V (AC range)  SEF690W
			[Engine is running] ● Engine speed is 2,000 rpm	3 - 4V (AC range)  SEF691W

On Board Diagnosis Logic

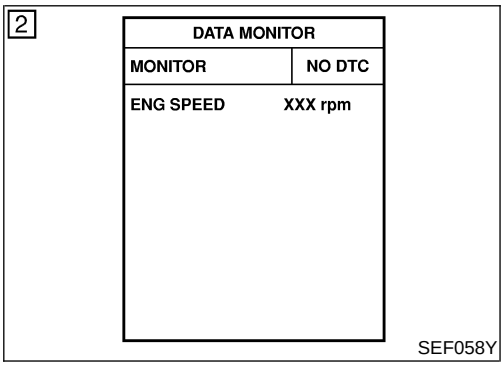
NGEC0719

Malfunction is detected when the proper pulse signal from the crankshaft position sensor (OBD) is not sent to ECM while the engine is running at the specified engine speed.

POSSIBLE CAUSE

NGEC0719S01

- Harness or connectors
  [The crankshaft position sensor (OBD) circuit is open.]
- Crankshaft position sensor (OBD)



DTC Confirmation Procedure

NGEC0720

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

1) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine and run it for at least 15 seconds at idle speed.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-943.

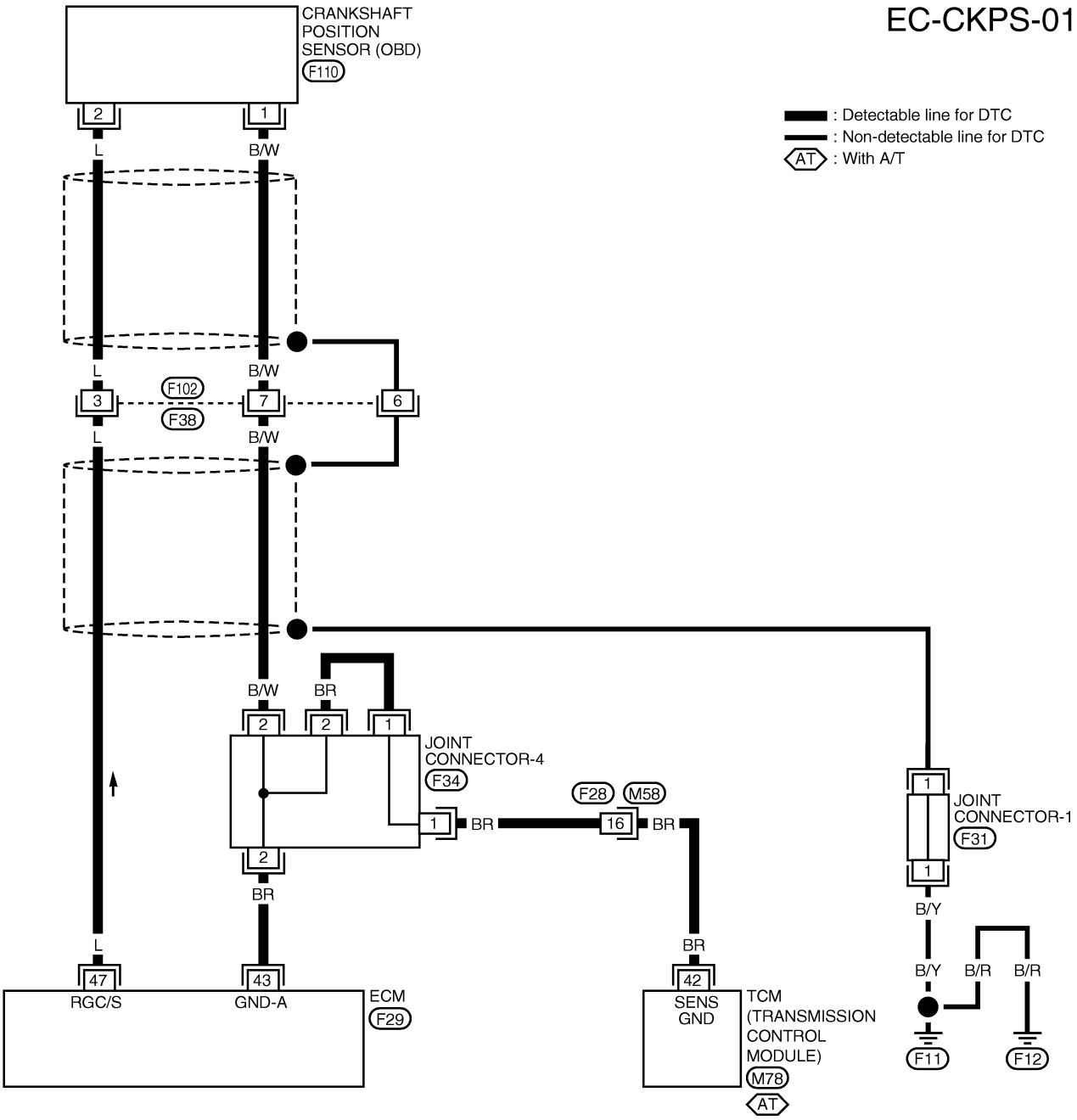
With GST

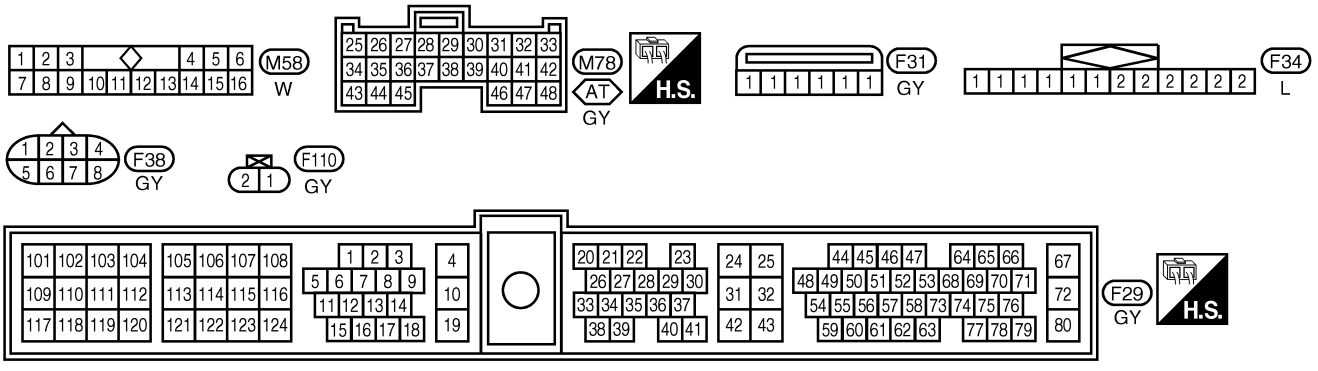
Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0721

EC-CKPS-01





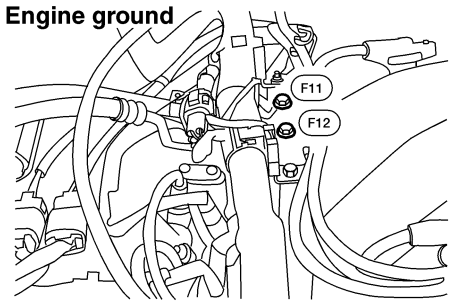
AEC956A

Diagnostic Procedure

NGEC0722

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

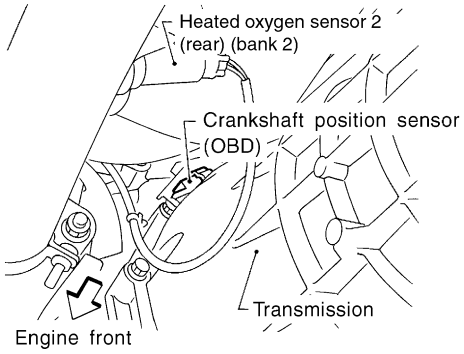


LEC518

	▶	GO TO 2.

2	CHECK CKPS (OBD) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.



WEC549

2. Check continuity between ECM terminal 47 and 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 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F38, F102
- Harness for open or short between ECM and crankshaft position sensor (OBD)

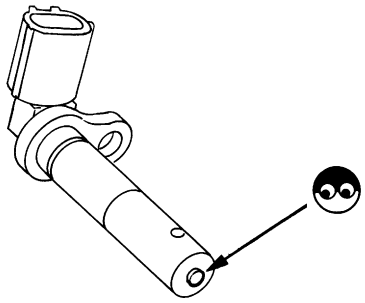
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

4	CHECK CKPS (OBD) GROUND CIRCUIT FOR OPEN AND SHORT	
1. Reconnect ECM harness connector. 2. Check harness continuity between sensor terminal 1 and engine ground. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to ground and short to power. **OK or NG**		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

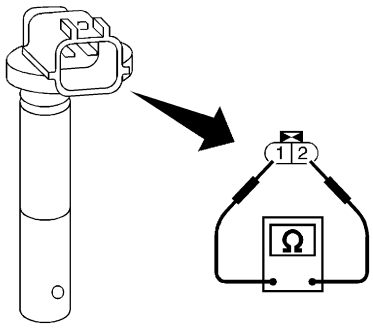
5	DETECT MALFUNCTIONING PART	
Check the following. ● Harness connectors F38, F102 ● Harness connectors F28, M58 ● Joint connector-4 ● Harness for open or short between crankshaft position sensor (OBD) and ECM ● Harness for open or short between crankshaft position sensor (OBD) and TCM (Transmission Control Module)		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK CRANKSHAFT POSITION SENSOR (OBD)	
1. Disconnect crankshaft position sensor (OBD) harness connector. 2. Loosen the fixing bolt of the sensor. 3. Remove the sensor. 4. Visually check the sensor for chipping.		



SEF960N

5. Check resistance as shown in the figure.



SEF504V

Resistance: Approximately 512 - 632Ω [at 20°C (68°F)]

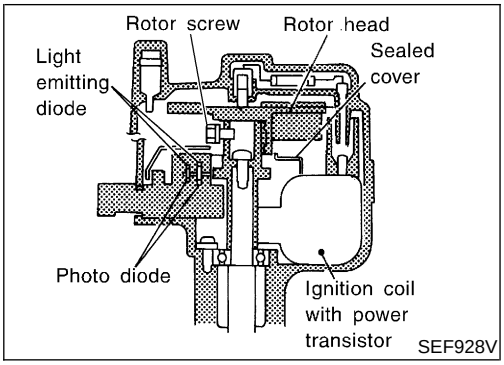
OK or NG

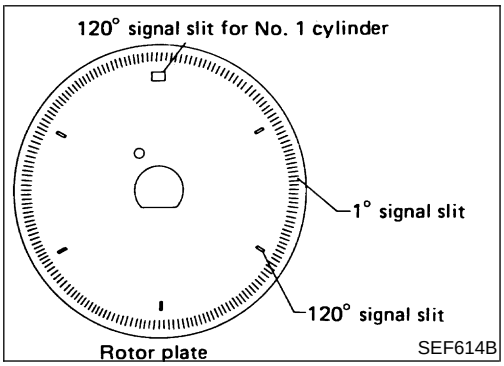
OK	▶	GO TO 7.
NG	▶	Replace crankshaft position sensor (OBD).

7	CHECK CKPS (OBD) SHIELD CIRCUIT FOR OPEN AND SHORT
1. Disconnect harness connectors F38, F102. 2. Check harness continuity between harness connector F38 terminal 6 and engine ground. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to power. **OK or NG**	
OK ▶	GO TO 9.
NG ▶	GO TO 8.

8	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F38, F102 ● Joint connector-1 ● Harness for open between harness connector F38 and engine ground	
▶	Repair open circuit or short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**





Component Description

NGEC0723

The camshaft position sensor is a basic component of the engine control system. It monitors engine speed and piston position. These input signals to the ECM are used to control fuel injection, ignition timing and other functions.

The camshaft position sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for a 1° (POS) signal and 6 slits for a 120° (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.

NOTE:

The rotor screw which secures the distributor rotor head to the distributor shaft must be torqued properly.

: 3.6±0.3 N·m (37±3 kg-cm, 32±3 in-lb)

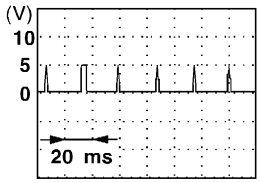
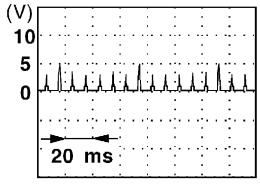
ECM Terminals and Reference Value

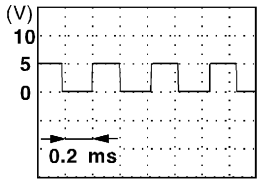
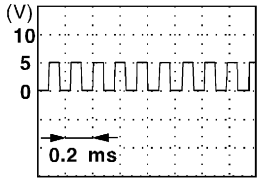
NGEC0724

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
44	PU	Camshaft position sensor (Reference signal)	**[Engine is running]** ● Idle speed	0.3 - 0.5V  SEF997U
48	PU		**[Engine is running]** ● Engine speed is 2,000 rpm	0.3 - 0.5V  SEF998U

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	LG	Camshaft position sensor (Position signal)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2.5V  SEF999U
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2.5V  SEF001V
67	B/P	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0725

Malfunction is detected when
(Malfunction A) either 1° or 120° signal is not sent to ECM for the first few seconds during engine cranking,
(Malfunction B) either 1° or 120° signal is not sent to ECM often enough while the engine speed is higher than the specified engine speed,
(Malfunction C) the relation between 1° and 120° signal is not in the normal range during the specified engine speed.

POSSIBLE CAUSE

NGEC0725S01

- Harness or connectors
  (The camshaft position sensor circuit is open or shorted.)
- Camshaft position sensor
- Starter motor (Refer to ***SC-10***.)
- Starting system circuit (Refer to ***SC-10***.)
- Dead (Weak) battery

DTC Confirmation Procedure

NGEC0726

NOTE:

- **Perform "PROCEDURE FOR MALFUNCTION A" first. If DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B AND C".**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

2

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C

SEF013Y

PROCEDURE FOR MALFUNCTION A

NGEC0726S01

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-950.

With GST

Follow the procedure "With CONSULT-II".

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B AND C

NGEC0726S02

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-950.

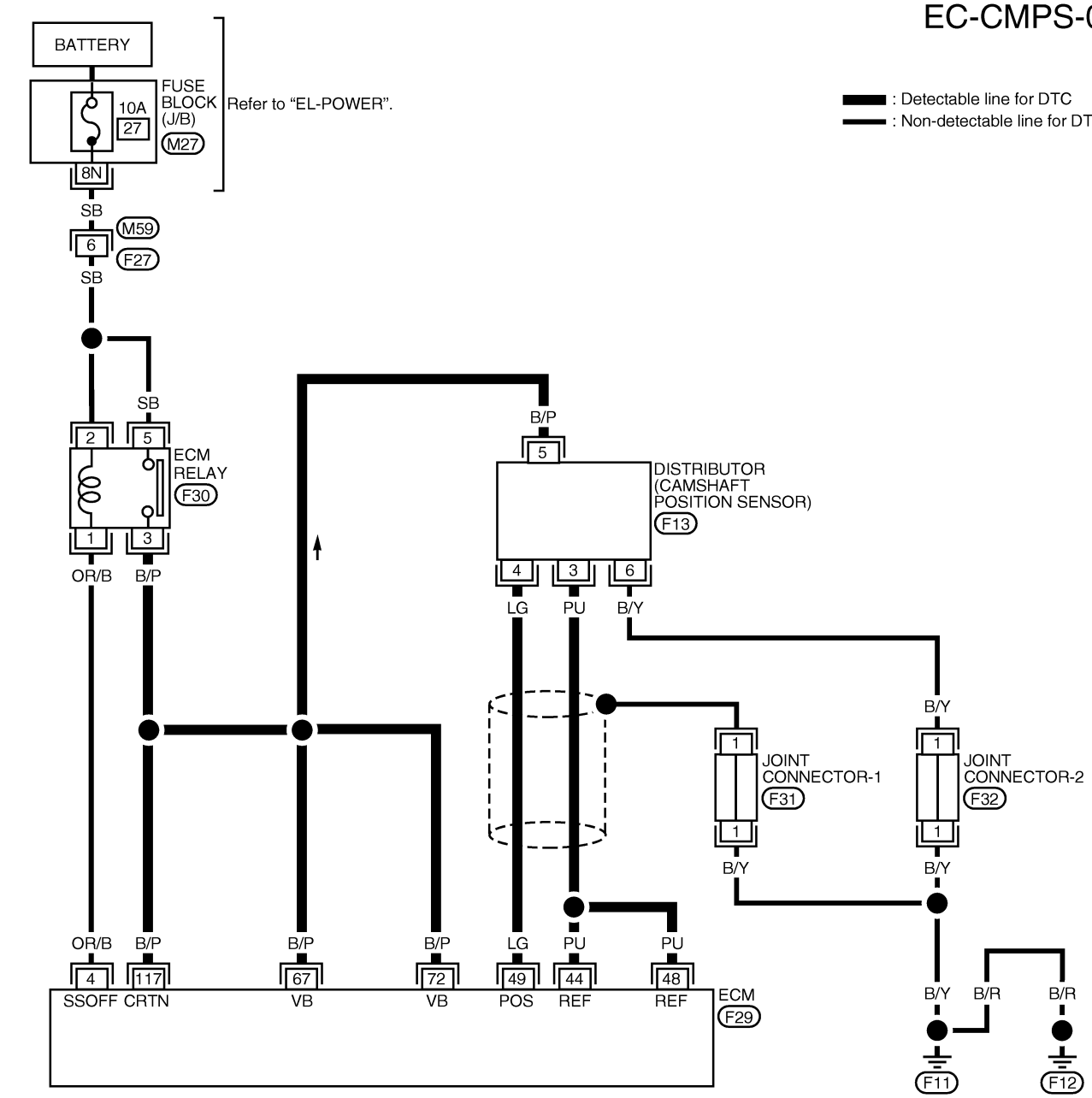
With GST

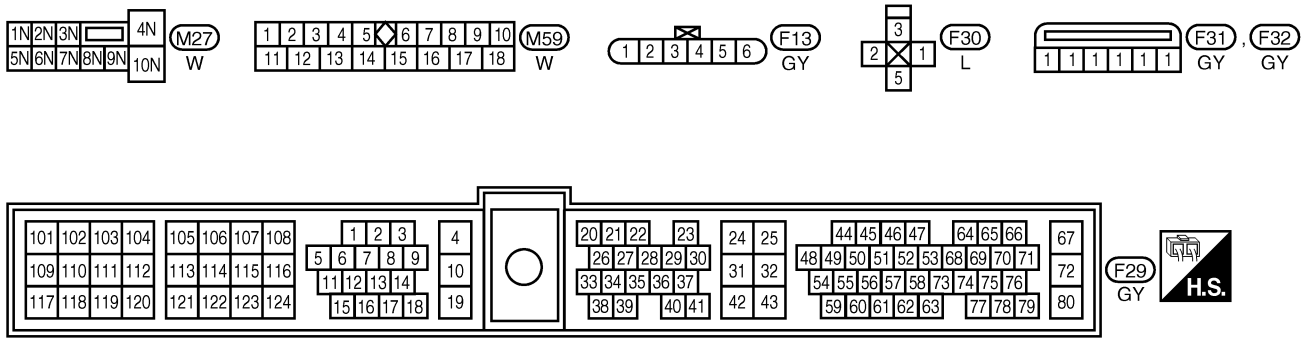
Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC0727

EC-CMPS-01





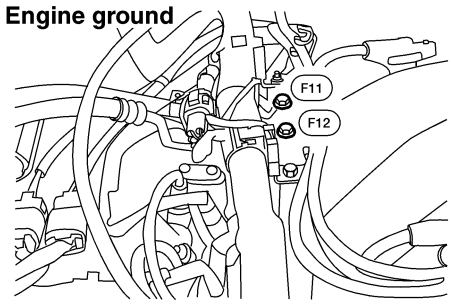
AEC957A

Diagnostic Procedure

NGEC0728

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

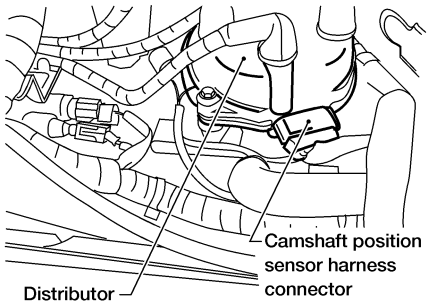


LEC518

▶ GO TO 2.

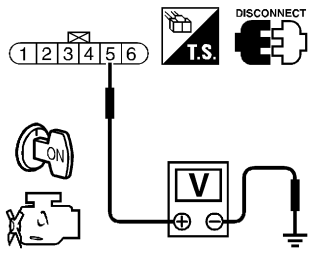
2	CHECK CMPS POWER SUPPLY CIRCUIT

1. Disconnect camshaft position sensor harness connector.



AEC647A

2. Turn ignition switch ON.
3. Check voltage between terminal 5 and ground with CONSULT or tester.



SEF708U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between camshaft position sensor and ECM relay
- Harness for open or short between camshaft position sensor and ECM

▶ Repair harness or connectors.

4	CHECK CMPS INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between sensor terminal 4 and ECM terminal 49, sensor terminal 3 and ECM terminals 44, 48. 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 CMPS GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between sensor terminal 6 and engine ground.
   Continuity should exist.
3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

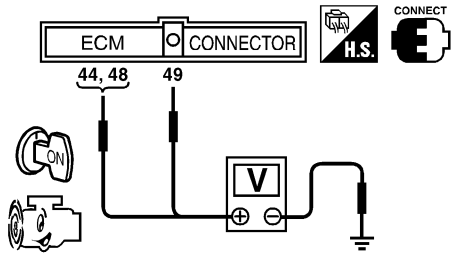
6	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-2
- Harness for open between camshaft position sensor and engine ground

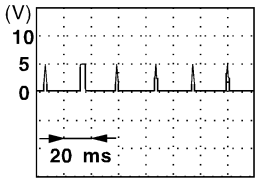
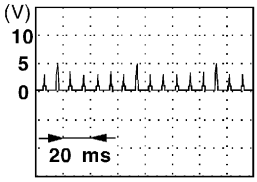
	▶	Repair open circuit or short to power in harness or connector.

7	CHECK CAMSHAFT POSITION SENSOR

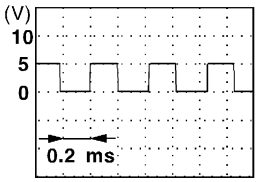
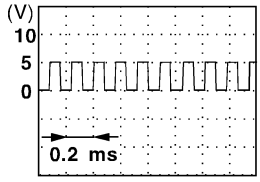
1. Install any parts removed.
2. Start engine.
3. Check voltage between ECM terminals 44, 48 and ground, ECM terminal 49 and ground with DC range.



Terminal 44 or 48 and engine ground

Condition	Idle	2,000 rpm
Voltage	0.3 - 0.5V	0.3 - 0.5V
Pulse signal		

Terminal 49 and engine ground

Condition	Idle	2,000 rpm
Voltage	Approximately 2.5V	Approximately 2.5V
Pulse signal		

AEC072B

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace distributor assembly with camshaft position sensor.

8	CHECK CMPS SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect joint connector-1.
3. Check the following.
- Continuity between joint connector terminal 1 and ground
- Joint connector
  (Refer to ***EL-244***, "HARNESS LAYOUT".)

Continuity should exist.

4. Also check harness for short to power.
5. Then reconnect joint connector-1.

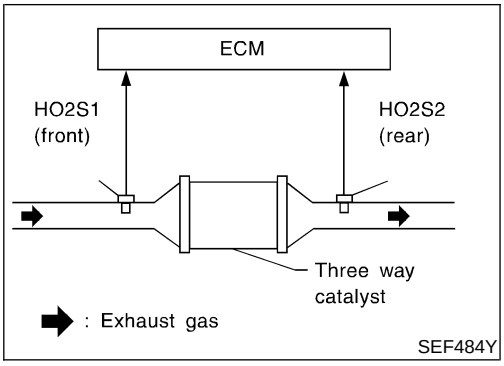
OK or NG

OK	▶	GO TO 9.
NG	▶	Repair open circuit or short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.

▶ **INSPECTION END**



SEF484Y

On Board Diagnosis Logic

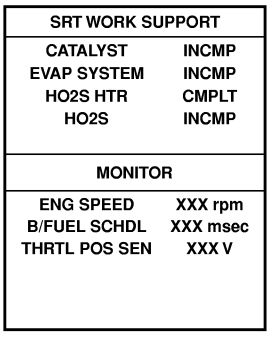
NGEC0740

The ECM monitors the switching frequency ratio of heated oxygen sensors 1 (front) and 2 (rear).
A warm-up 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 heated oxygen sensors 1 (front) and 2 (rear) approaches a specified limit value, the warm-up three way catalyst malfunction is diagnosed.
Malfunction is detected when warm-up three way catalyst does not operate properly, warm-up three way catalyst does not have enough oxygen storage capacity.

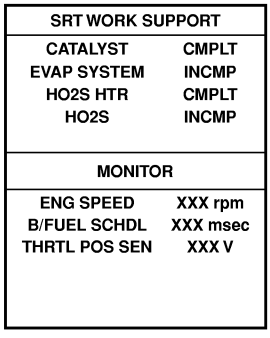
POSSIBLE CAUSE

NGEC0740S01

- Warm-up three way catalyst
- Exhaust tube
- Intake air leaks
- Injectors
- Injector leaks
- Spark plug
- Improper ignition timing



SEF344Z



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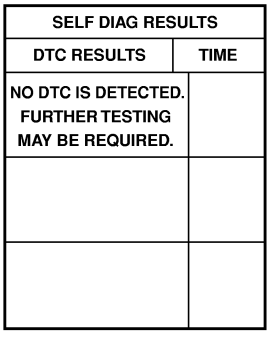


SEF560X

DTC Confirmation Procedure

NGEC0741

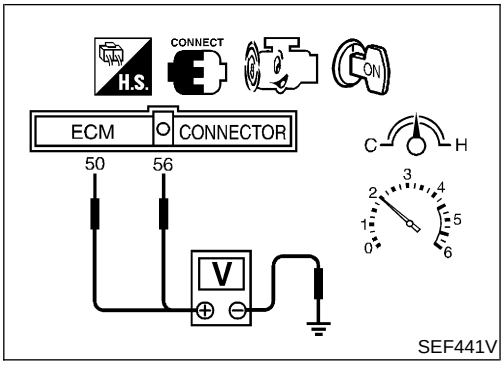
NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

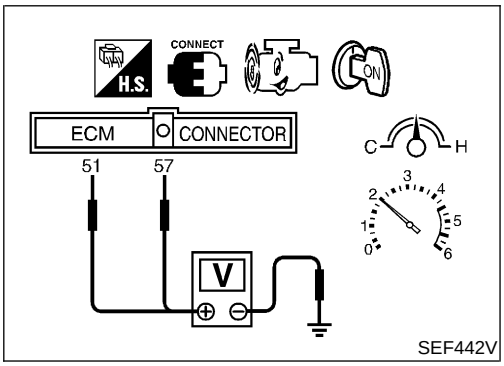
TESTING CONDITION

- **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" the SRT WORK SUPPORT" mode with CONSULT-II.
3) Start engine.
4) Rev engine up to 2,500 to 3,500 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 2,000 to 3,000 rpm and maintain it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take maximum of approximately 5 minute.).
7) Select "SELF-DIAG RESULTS" mode with CONSULT-II.
   If the 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-955. If not "CMPLT", stop engine and cool down "COOLANT TEMP/SE" to less than 70°C (158°F) and retest from step 1).



SEF441V



SEF442V

Overall Function Check

NGEC0742

Use this procedure to check the overall function of the warm-up three way catalyst. During this check, a 1st trip DTC might not be confirmed.

CAUTION:

Always drive vehicle at a safe speed.

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 voltmeters probes between ECM terminals 50 [heated oxygen sensor 1 (front) (bank 1) signal], 51 [heated oxygen sensor 1 (front) (bank 2) signal] and engine ground, and ECM terminals 56 [heated oxygen sensor 2 (rear) (bank 1) signal], 57 [heated oxygen sensor 2 (rear) (bank 2) signal] and engine ground.
4) Keep engine speed at 2,000 rpm constant under no load.
5) Make sure that the voltage switching frequency (high & low) between ECM terminals 56 and engine ground, or 57 and engine ground is very less than that of ECM terminals 50 and engine ground, or 51 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 warm-up three way catalyst does not operate properly. Go to “Diagnostic Procedure”, EC-955.

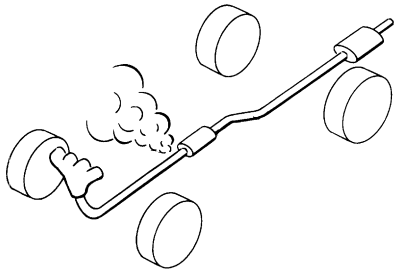
NOTE:

If the voltage at terminal 50 or 51 does not switch periodically more than 5 times within 10 seconds at step 5, perform trouble diagnosis for “DTC P0133, P0153” first. (See EC-807.)

Diagnostic Procedure

=NGEC0743

1	CHECK EXHAUST SYSTEM	
Visually check exhaust tubes and muffler for dent.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Repair or replace it.

2	CHECK EXHAUST AIR LEAK	
1. Start engine and run it at idle. 2. Listen for an exhaust air leak before the warm-up three way catalyst.		
 SEF099P		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	CHECK INTAKE AIR LEAK	
Listen for an intake air leak after the mass air flow sensor.		
OK or NG		
OK	▶	GO TO 4.
NG	▶	Repair or replace.

4	CHECK IGNITION TIMING	
Check the following items. Refer to “Basic Inspection”, EC-694.		

Items	Specifications
Ignition timing	10° ± 2° BTDC
Base idle speed	700 ± 50 rpm (in “P” or “N” position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	750 ± 50 rpm (in “P” or “N” position)

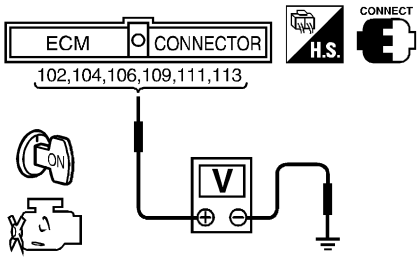
MTBL0576

OK or NG		
OK	▶	GO TO 5.
NG	▶	Adjust ignition timing.

Diagnostic Procedure (Cont'd)

5	CHECK INJECTORS

1. Refer to WIRING DIAGRAM for Injectors, EC-1169.
2. Stop engine and then turn ignition switch ON.
3. Check voltage between ECM terminals 102, 104, 106, 109, 111 and 113 and ground with CONSULT-II or tester.



SEF711U

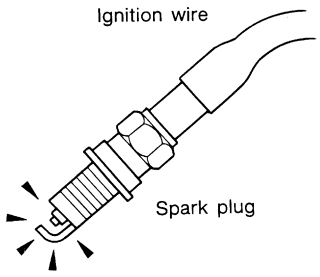
Battery voltage should exist.

OK or NG

OK	▶	GO TO 6.
NG	▶	Perform "Diagnostic Procedure", "INJECTOR", EC-1170.

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.



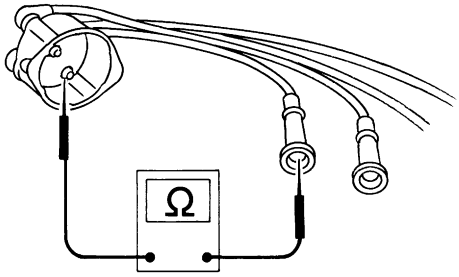
SEF282G

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	CHECK IGNITION WIRES

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.



SEF174P

Resistance:

Cylinder No.	Resistance kΩ [at 25°C (77°F)]
1	Approximately 6.5
2	Approximately 10.0
3	Approximately 8.5
4	Approximately 12.5
5	Approximately 8.5
6	Approximately 11.0

MTBL0235

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.

OK or NG

OK	▶	Check ignition coil, power transistor and their circuits. Refer to EC-1162.
NG	▶	Replace.

8	CHECK INJECTOR

1. Turn ignition switch OFF.
2. Remove injector assembly.
   Refer to EC-638.
   Keep fuel hose and all injectors connected to injector gallery.
3. Disconnect all ignition coil harness connectors.
4. Turn ignition switch ON.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip)	▶	GO TO 9.
NG (Drips)	▶	Replace the injector(s) from which fuel is dripping.

9	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.

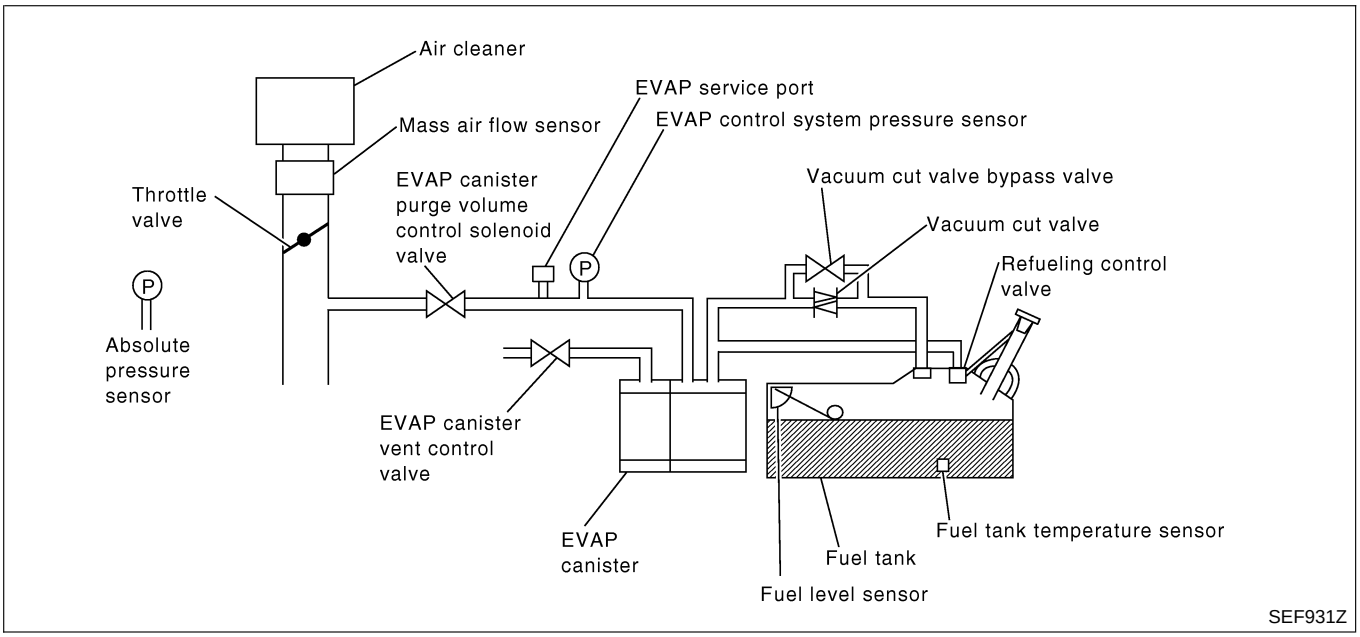
Trouble is fixed	▶	**INSPECTION END**
Trouble is not fixed	▶	Replace warm-up three way catalyst.

On Board Diagnosis Logic

NGEC0744

NOTE:
If DTC P0440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1123.)

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:

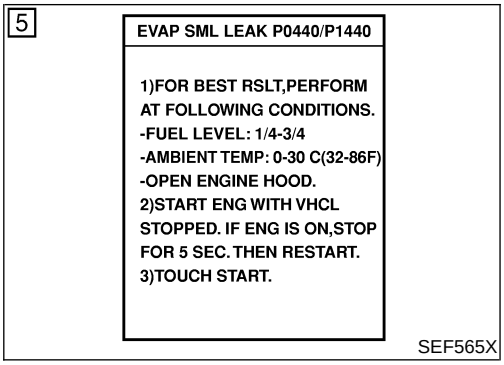
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

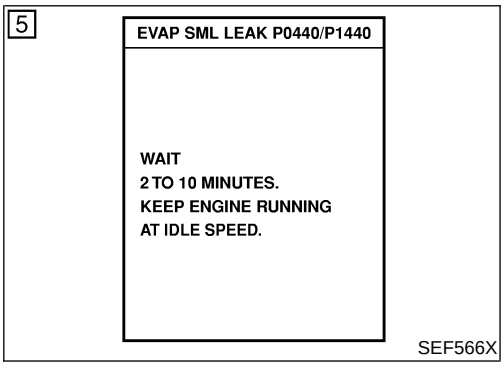
POSSIBLE CAUSE

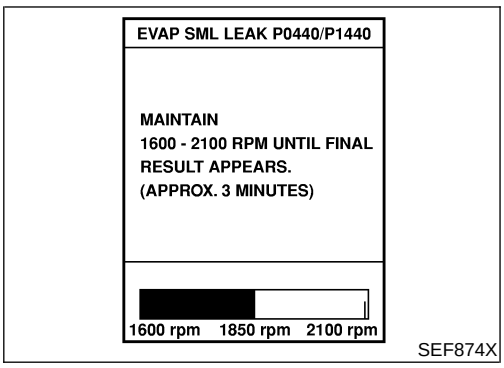
NGEC0744S01

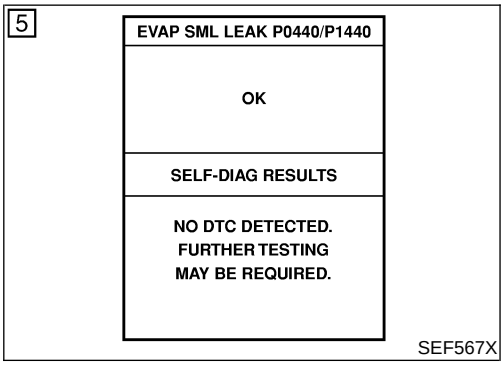
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Fuel filler cap remains open or fails to close.
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister vent control valve.
- EVAP canister or fuel tank leaks
- EVAP purge line (pipe and rubber tube) leaks
- EVAP purge line rubber tube bent.

- Blocked or bent rubber tube to EVAP control system pressure sensor
- Loose or disconnected rubber tube
- EVAP canister vent control valve and the circuit
- EVAP canister purge volume control solenoid valve and the circuit
- Absolute pressure sensor
- Fuel tank temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- EVAP control system pressure sensor
- Fuel level sensor and the circuit.
- Refueling EVAP vapor cut
- ORVR system leaks









DTC Confirmation Procedure

NGEC0745

NOTE:

- **If DTC P0440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1123.)**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- **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

1) Turn ignition switch ON.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
4) Make sure that the following conditions are met.
   COOLAN TEMP/S: 0 - 32°C (32 - 90°F)
   INT/A TEMP SE: More than 0°C (32°F)
5) Select "EVAP SML LEAK P0440" 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-694.

6) Make sure that "OK" is displayed.
   If "NG" is displayed, refer to "Diagnostic Procedure", EC-961.

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

With GST

NOTE:

Be sure to read the explanation of "Driving Pattern" on EC-660 before driving vehicle.

1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-660.
3) Stop vehicle.
4) Select "MODE 1" with GST.
   - If SRT of EVAP system is not set yet, go to the following step.
   - If SRT of EVAP system is set, the result will be OK.
5) Turn ignition switch OFF and wait at least 5 seconds.
6) Start engine.
   It is not necessary to cool engine down before driving.
7) Drive vehicle again according to the "Driving Pattern", EC-660.
8) Stop vehicle.
9) Select "MODE 3" with GST.
   - If P0440 is displayed on the screen, go to "Diagnostic Procedure", EC-961.
   - If P1447 is displayed on the screen, go to "Diagnostic Procedure" for "DTC P1447", EC-1114.
   - If P0440 and P1447 are not displayed on the screen, go to the following step.

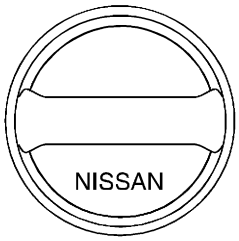
10) Select "MODE 1" with GST.
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

NGEC0967

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

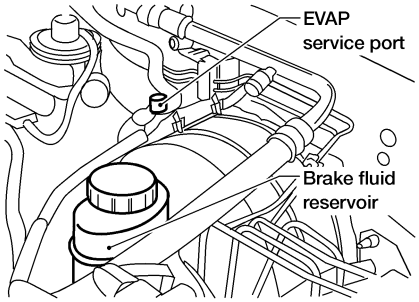
Refer to "Evaporative Emission System", EC-619.

OK or NG

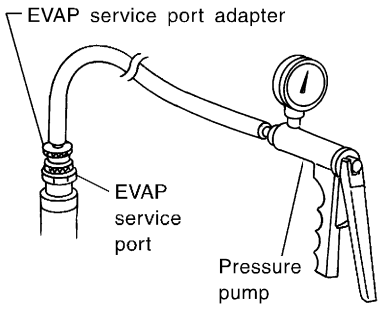
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



AEC649A



SEF916U

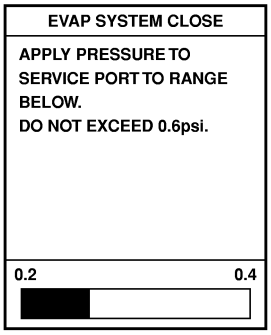
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ▶	GO TO 6.
Models without CONSULT-II ▶	GO TO 7.

6	CHECK FOR EVAP LEAK

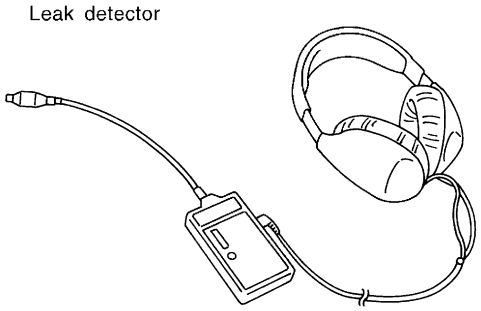
With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-623.



SEF200U

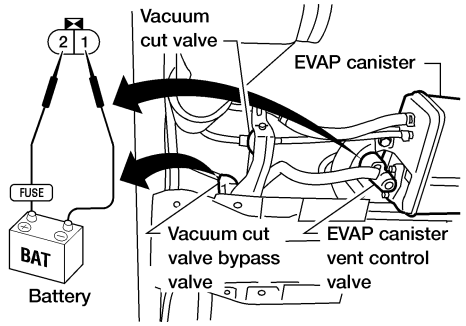
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

7	CHECK FOR EVAP LEAK

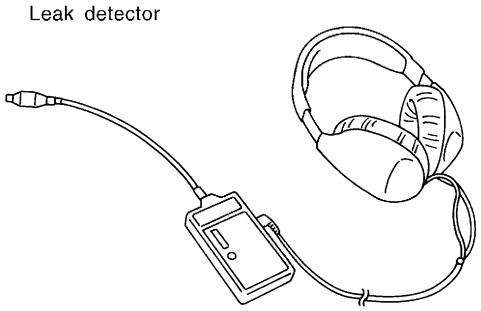
Without CONSULT-II

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.)



AEC632A

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-623.



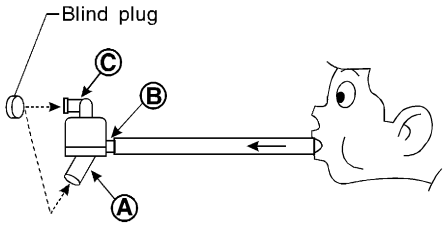
SEF200U

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

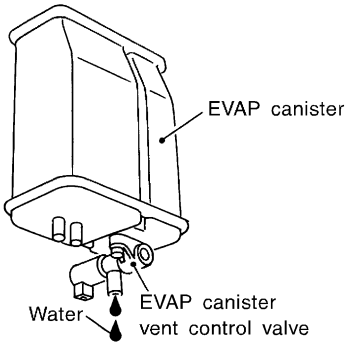
Refer to "DTC Confirmation Procedure", EC-981.

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. Check if water will 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 %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

Vacuum should exist.

SEF984Y

OK or NG

OK ▶	GO TO 17.
NG ▶	GO TO 15.

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.
   Vacuum should exist.

OK or NG

OK ▶	GO TO 17.
NG ▶	GO TO 15.

15	CHECK VACUUM HOSE	
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-613.		
OK or NG		
OK	▶	GO TO 16.
NG	▶	Repair or reconnect the hose.

16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	

With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

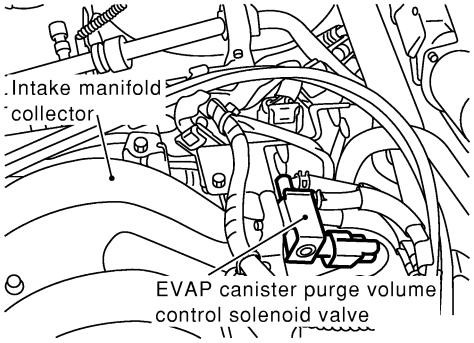
SEF985Y

OK or NG		
OK	▶	GO TO 18.
NG	▶	GO TO 17.

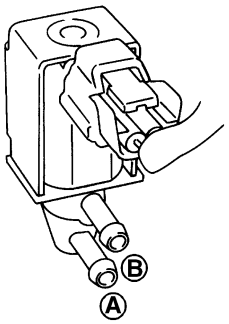
17	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF266X

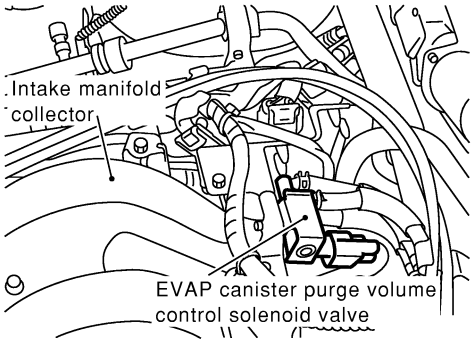


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

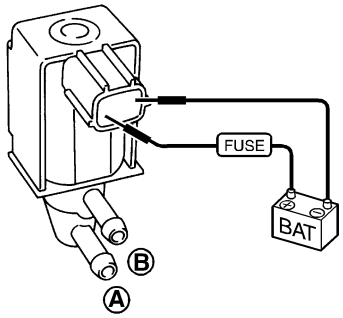
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



SEF266X



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

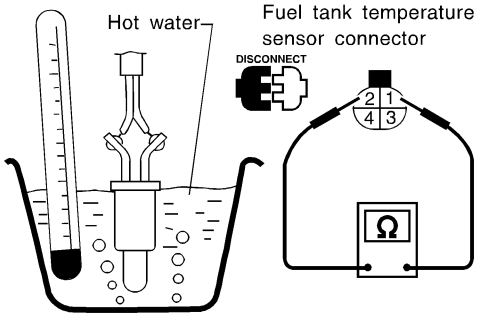
SEF335X

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

18	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 2 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

SEF974Y

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace fuel tank temperature sensor.

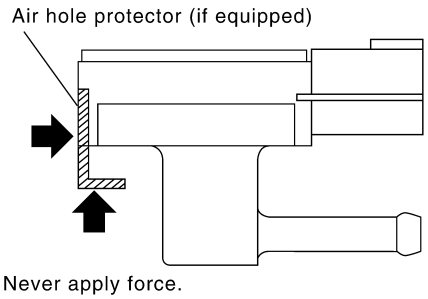
Diagnostic Procedure (Cont'd)

19	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.

CAUTION:

- **Never apply force to the air hole protector of the sensor if equipped.**



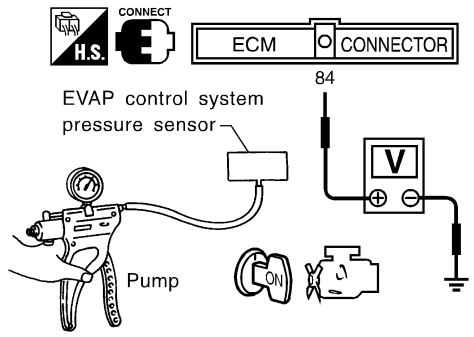
SEF799W

2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch "ON".
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −20 kPa (−150 mmHg, −5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.**

5. Check input voltage between ECM terminal 84 and ground.



Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
–9.3 kPa (–70 mmHg, –2.76 inHg)	0.4 - 0.6

SEF342X

CAUTION:

- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK	▶	GO TO 20.
NG	▶	Replace EVAP control system pressure sensor.

20	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-619.

OK or NG

OK	▶	GO TO 21.
NG	▶	Repair or reconnect the hose.

21	CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

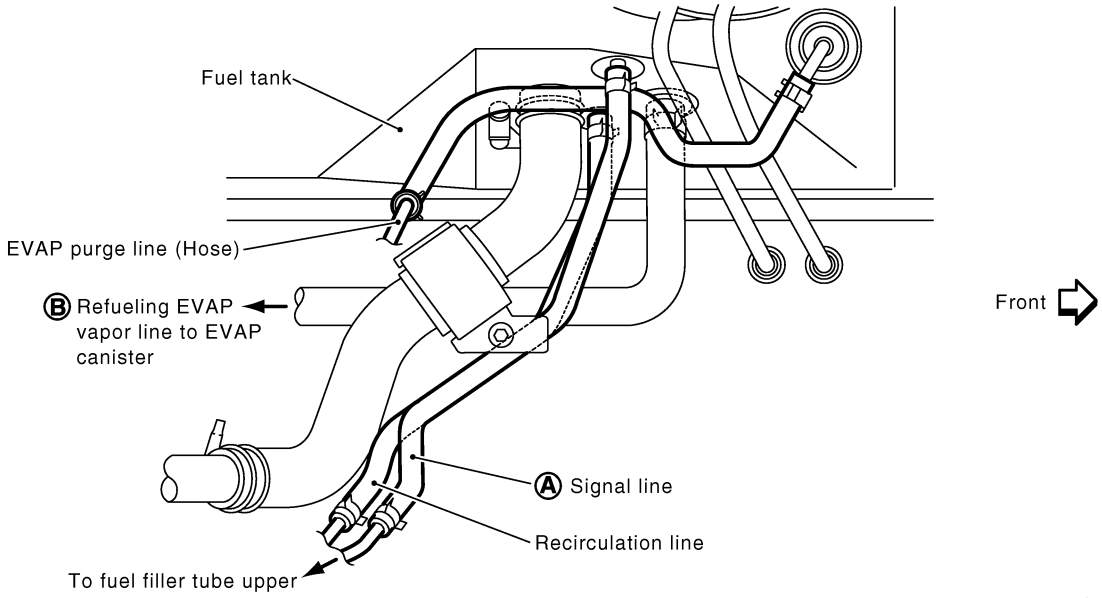
	▶	GO TO 22.

22	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-625.		
OK or NG		
OK	▶	GO TO 23.
NG	▶	Repair or replace hoses and tubes.

23	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 24.
NG	▶	Repair or replace hoses, tubes or filler neck tube.

24 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.



SEF706Z

OK or NG		
OK	▶	GO TO 25.
NG	▶	Replace refueling control valve with fuel tank.

25	CHECK FUEL LEVEL SENSOR	
Refer to ***EL-87***, "Fuel Level Sensor Unit Check".		
OK or NG		
OK	▶	GO TO 26.
NG	▶	Replace fuel level sensor unit.

Diagnostic Procedure (Cont'd)

26	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**

Description

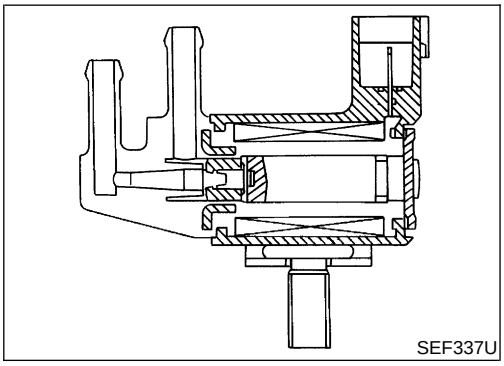
NGEC0747

SYSTEM DESCRIPTION

NGEC0747S01

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 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 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

NGEC0747S02

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

NGEC0748

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	—

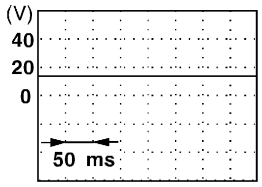
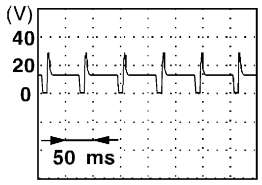
ECM Terminals and Reference Value

NGEC0749

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF994U
			[Engine is running] ● Engine speed is 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)  SEF995U
67	B/P	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

=NGEC0750

Malfunction is detected when an improper voltage signal is sent to ECM through the valve.

POSSIBLE CAUSE

NGEC0750S01

- 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

NGEC0751

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11V at idle.

With CONSULT-II

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-977.

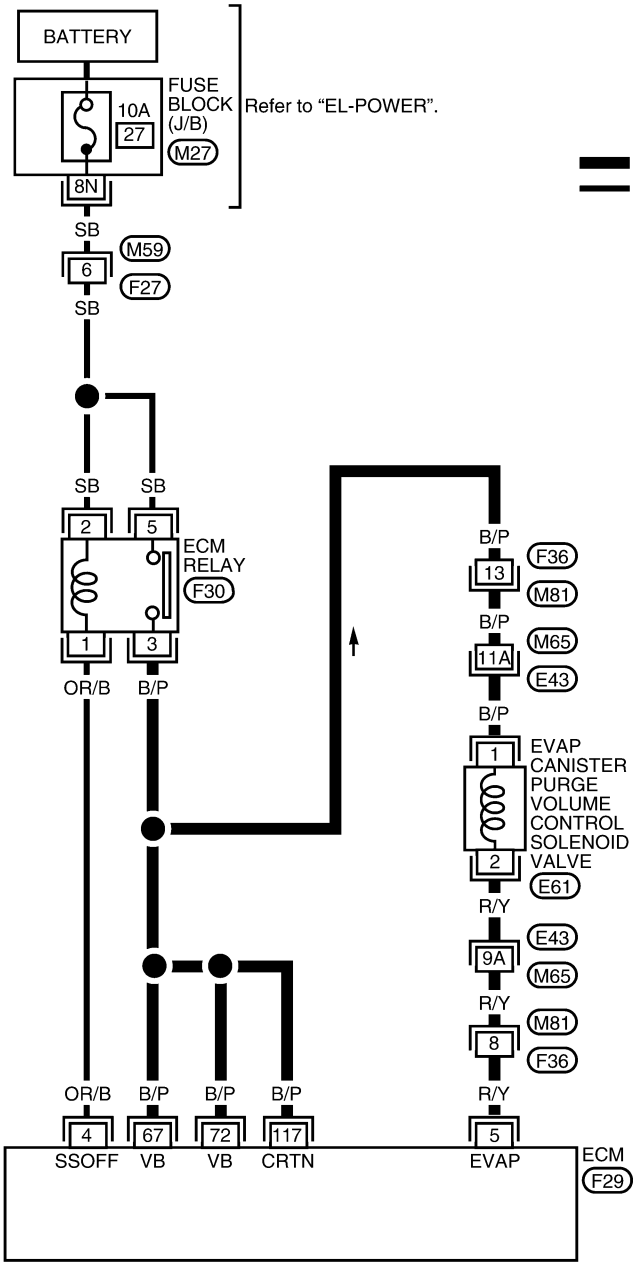
With GST

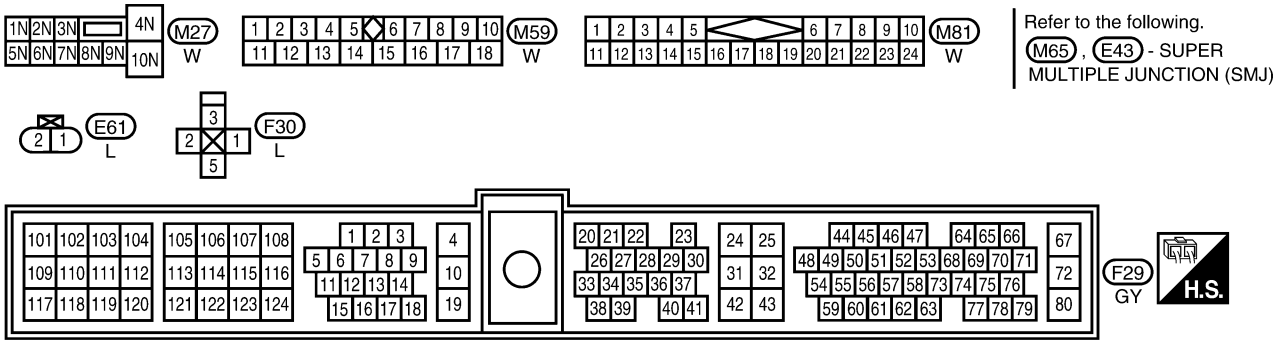
Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0752

EC-PGC/V-01





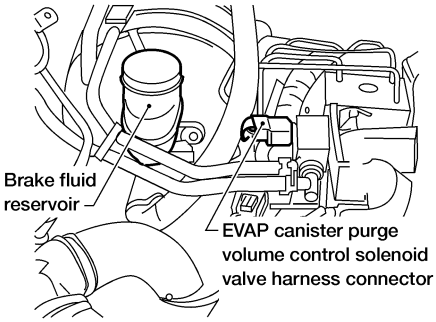
WEC933

Diagnostic Procedure

NGEC0753

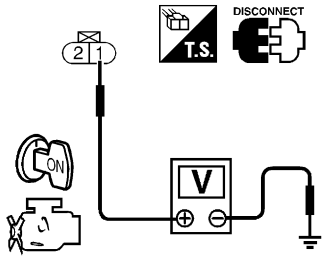
1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.



AEC652A

3. Turn ignition switch ON.
4. Check voltage between terminal 1 and ground with CONSULT-II or tester.



SEF646W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F36, M81
- Harness connectors M82, E74
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay

	▶	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 5 and solenoid 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.

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E74, M82 ● Harness connectors M81, F36 ● 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 CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

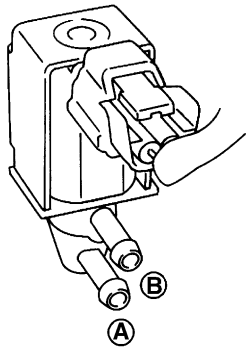
OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Check air passage continuity under the following conditions.



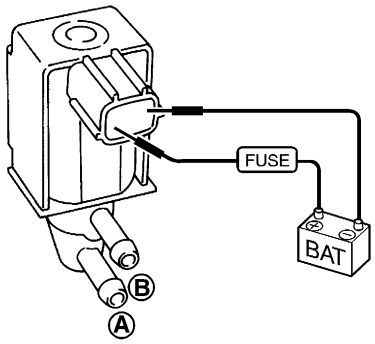
SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

MTBL0241

Without CONSULT-II

1. Check air passage continuity under the following conditions.



SEF661U

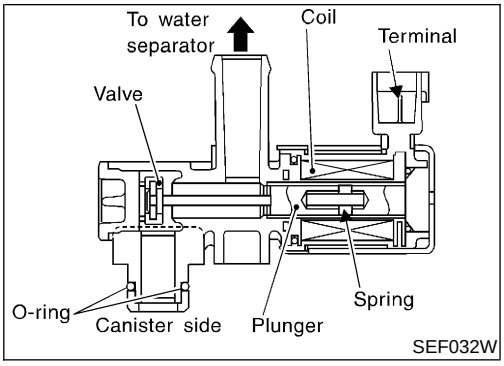
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

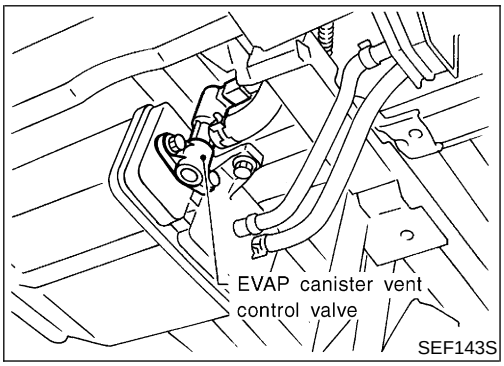
MTBL0242

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-732.	
▶	**INSPECTION END**





Component Description

NGEC0754

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

NGEC0755

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NGEC0756

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

=NGEC0757

Malfunction is detected when an improper voltage signal is sent to ECM through EVAP canister vent control valve.

POSSIBLE CAUSE

NGEC0757S01

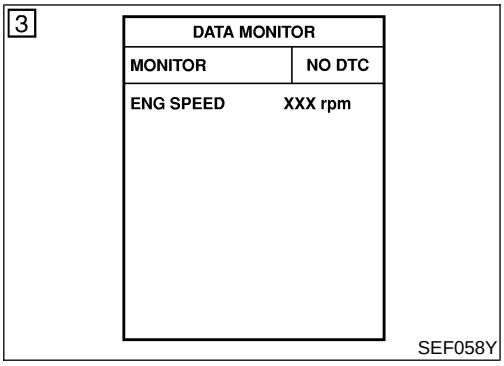
- Harness or connectors
  (The valve circuit is open or shorted.)
- EVAP canister vent control valve

DTC Confirmation Procedure

NGEC0758

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm battery voltage is more than 11V at idle.



With CONSULT-II

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-983.

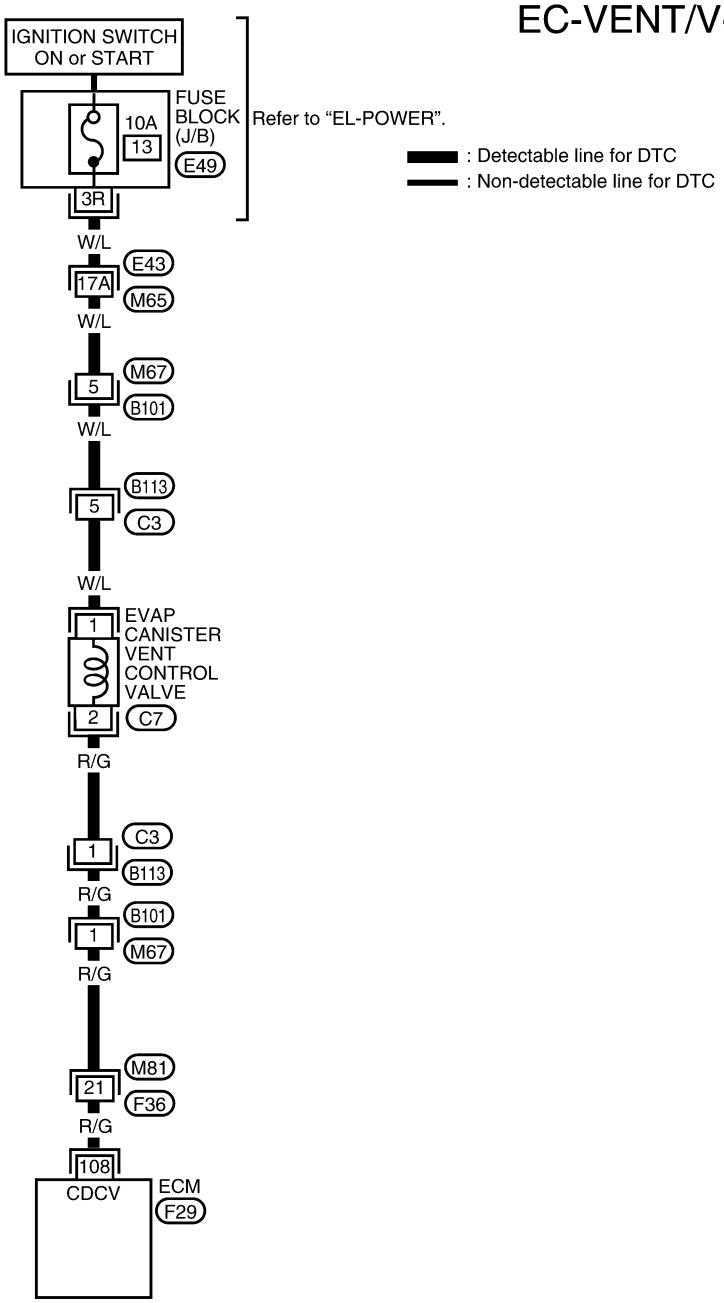
With GST

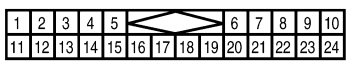
Follow the procedure "With CONSULT-II".

Wiring Diagram

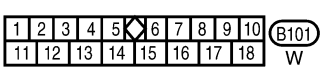
NGEC0759

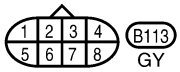
EC-VENT/V-01

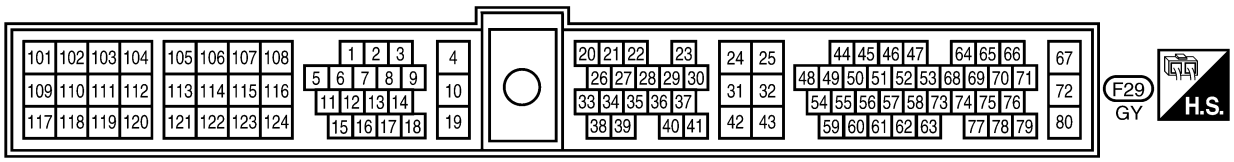




Refer to the following.
M65 , E43 - SUPER MULTIPLE JUNCTION (SMJ)







WEC934

Diagnostic Procedure

NGEC0760

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT	

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 %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	XXX V
THRTL POS SEN	XXX V

SEF989Y

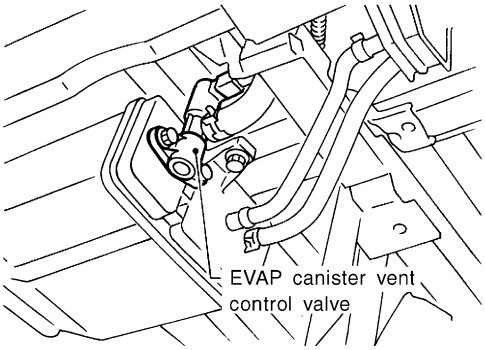
4. Check for operating sound of the valve.
   Clicking noise should be heard.

OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

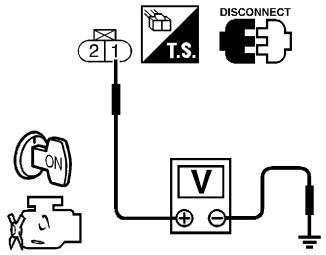
3	CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister vent control valve harness connector.



SEF143S

3. Turn ignition switch ON.
4. Check voltage between terminal 1 and ground with CONSULT-II or tester.



SEF648W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E74, M82
- Harness connectors M67, C101 and B113, C3
- Fuse block (J/B) connector E49
- 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 108 and 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

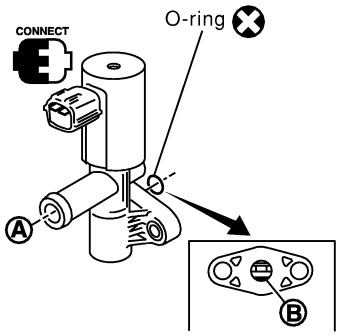
OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors C101, M67 and C3, B113 ● Harness connectors M81, F36 ● Harness for open or short between EVAP canister vent control valve and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
2. 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 (B1)	XXX V
HO2S1 (B2)	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.

SEF991Y

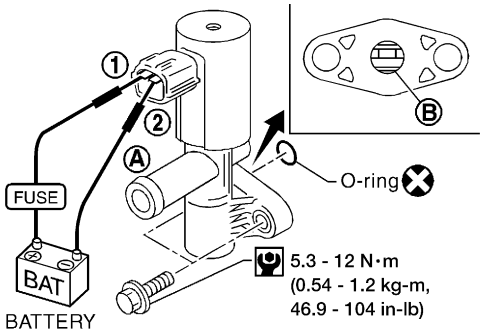
Without CONSULT-II

1. 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

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.



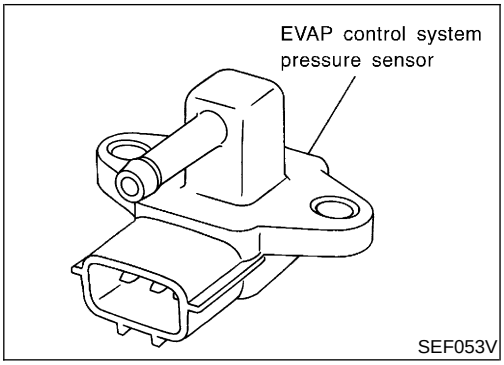
AEC783A

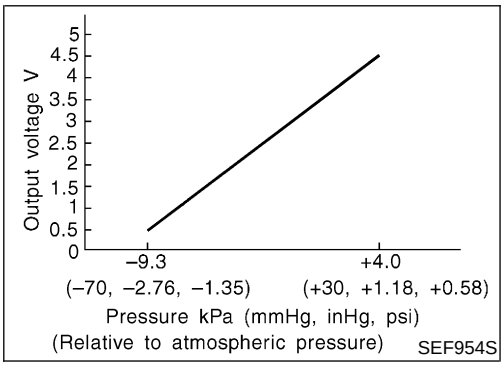
Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EVAP canister vent control valve.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**





Component Description

NGEC0761

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

NGEC0762

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	Approx. 3.4V

ECM Terminals and Reference Value

NGEC0763

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	B/W	Sensors' power supply	**[Ignition switch ON]**	Approximately 5V
43	BR	Sensors' ground	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
62	Y	EVAP control system pressure sensor	**[Ignition switch ON]**	Approximately 3.4V

On Board Diagnosis Logic

=NGEC0764

Malfunction is detected when an improper voltage signal from EVAP control system pressure sensor is sent to ECM.

POSSIBLE CAUSE

NGEC0764S01

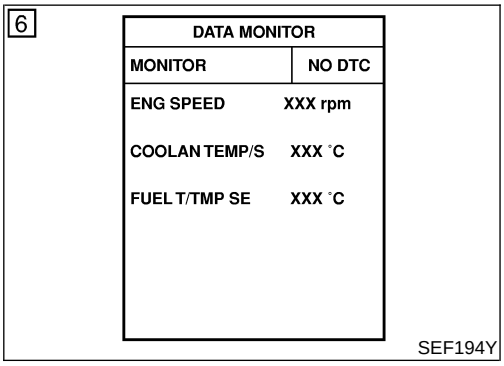
- Harness or connectors
  (The EVAP control system pressure sensor circuit is open or shorted.)
- Rubber hose to EVAP control system pressure sensor is clogged, vent, kinked, disconnected or improper connection.
- EVAP control system pressure sensor
- EVAP canister vent control valve
- EVAP canister purge volume control solenoid valve
- EVAP canister
- Rubber hose from EVAP canister vent control valve to water separator

DTC Confirmation Procedure

NGEC0765

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.



With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON.
4) Select "DATA MONITOR" mode with CONSULT-II.
5) Make sure that "TANK F/TEMP SE" is more than 0°C (32°F).
6) Start engine and wait at least 20 seconds.
7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-989.

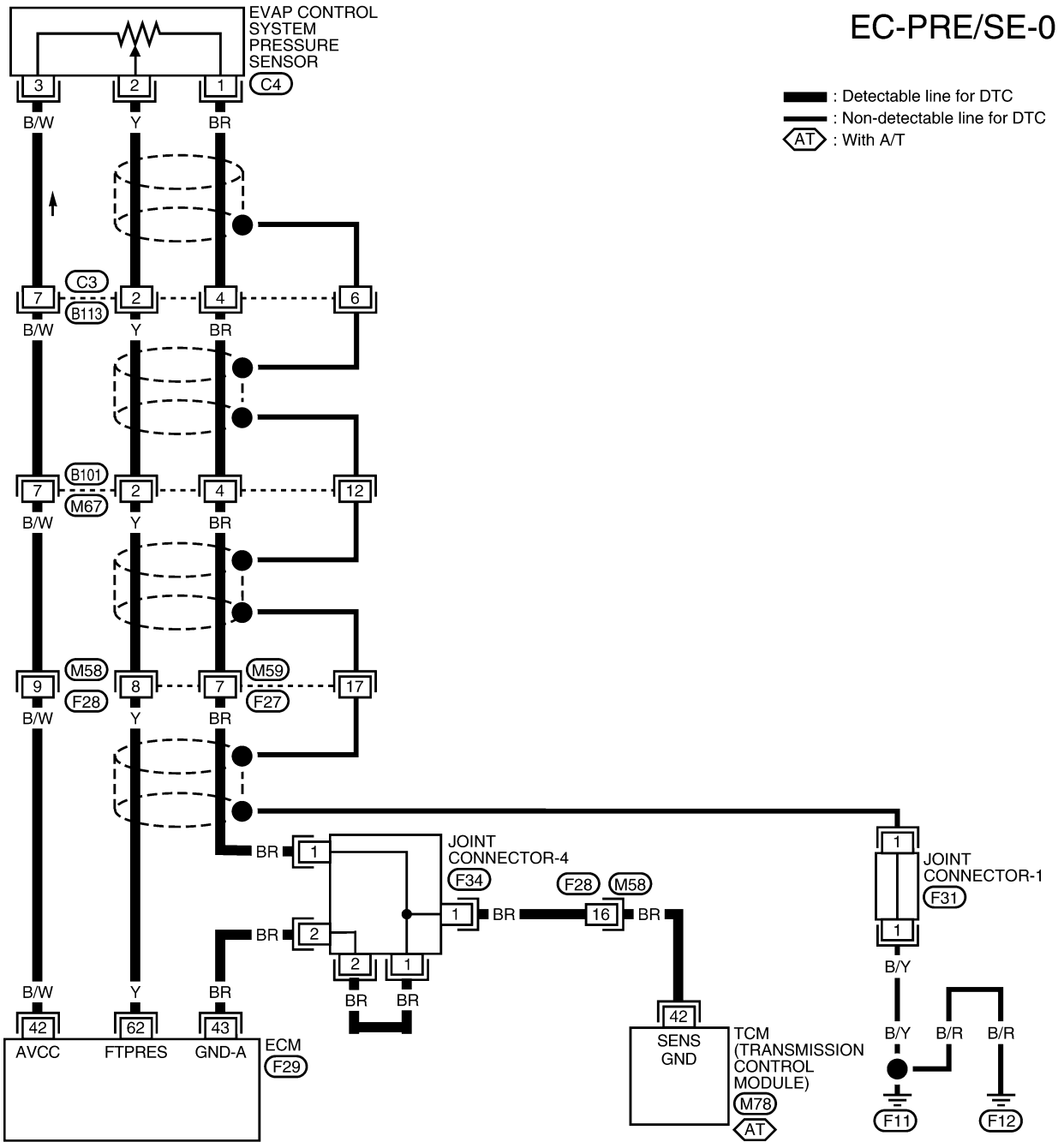
With GST

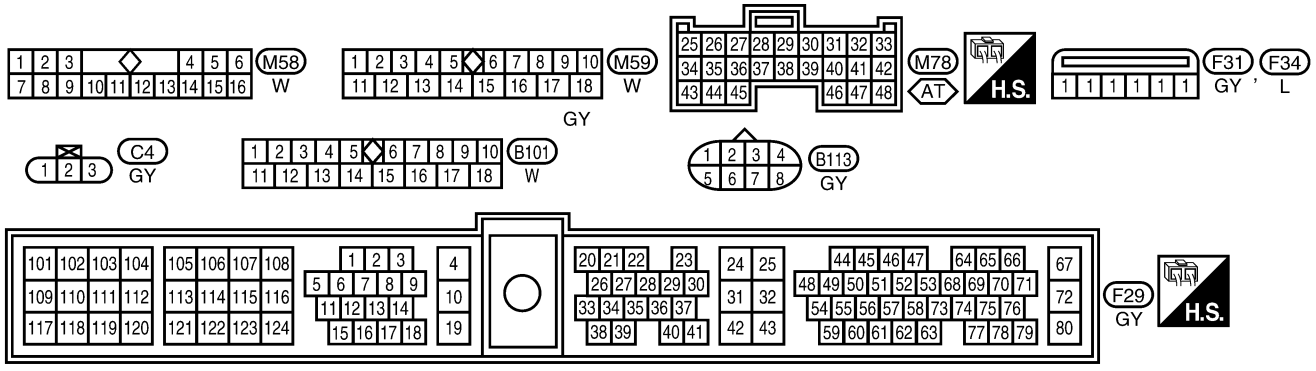
Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC0766

EC-PRE/SE-01





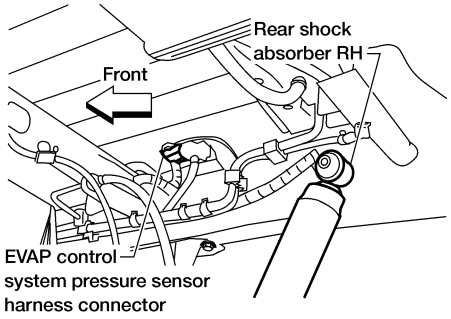
LEC506

Diagnostic Procedure

NGEC0767

1	CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Check rubber tube connected to the sensor for clogging, vent, kink, disconnection or improper connection.



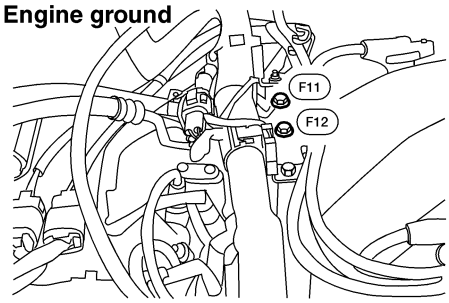
AEC651A

OK or NG

OK	▶	GO TO 2.
NG	▶	Reconnect, repair or replace.

2	RETIGHTEN GROUND SCREWS

1. Loosen and retighten engine ground screws.



LEC518

	▶	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.

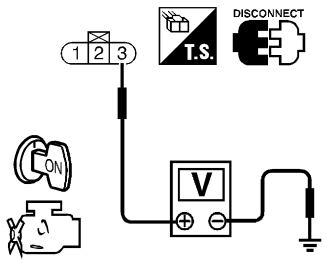
OK or NG

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 terminal 3 and ground with CONSULT-II or tester.



SEF889U

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors C3, B113 and B101, M67
- Harness connectors M58, F28
- 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 sensor terminal 1 and engine ground.
   Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors C3, B113 and B101, M67
- Harness connectors F28, M58
- Joint connector-4
- 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 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 62 and 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 C3, B103 and B101, M67
- 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	0.0%
MONITOR	
ENG SPEED	XXX rpm
FR O2 MNTR-B1	RICH
FR O2 MNTR-B2	RICH
THRTL POS SEN	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

SEF068Y

OK or NG

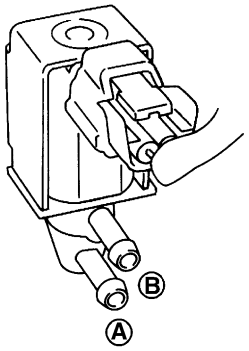
OK	▶	GO TO 12.
NG	▶	GO TO 11.

Diagnostic Procedure (Cont'd)

11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Check air passage continuity under the following conditions.



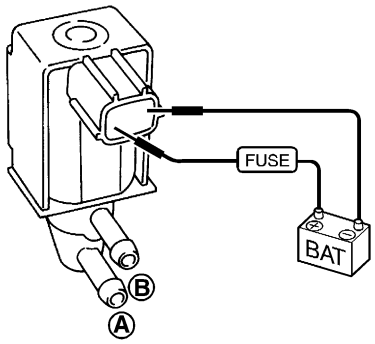
SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

MTBL0241

Without CONSULT-II

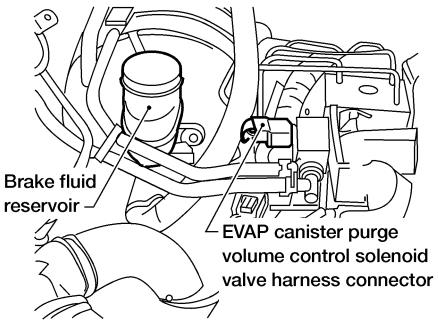
1. Check air passage continuity under the following conditions.



SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

MTBL0242



AEC652A

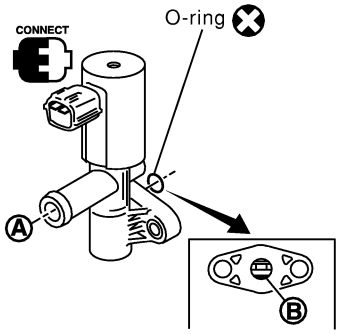
OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

12 **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 (B1)	XXX V
HO2S1 (B2)	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.

SEF991Y

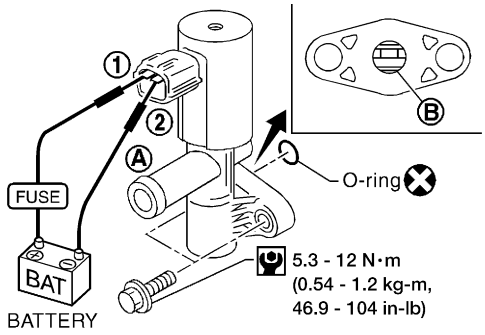
Without CONSULT-II

1. 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

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.



AEC783A

Make sure new O-ring is installed properly.

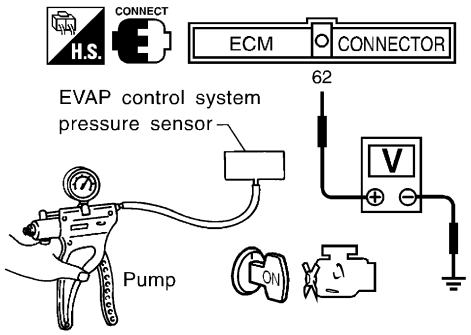
OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

Diagnostic Procedure (Cont'd)

13	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch ON.
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
5. Check input voltage between ECM terminal 62 and ground.



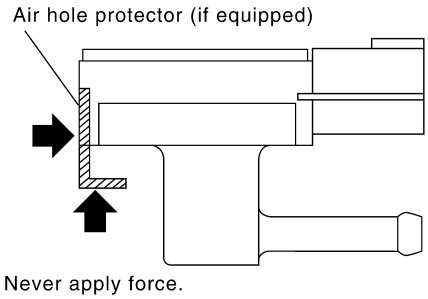
SEF894U

Pressure (Relative to atmosphericpressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
–9.3 kPa (–70 mmHg, –2.76 inHg)	0.4 - 0.6

MTBL0246

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.**

CAUTION:
- **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5m (19.7in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace EVAP control system pressure sensor.

14	CHECK RUBBER TUBE

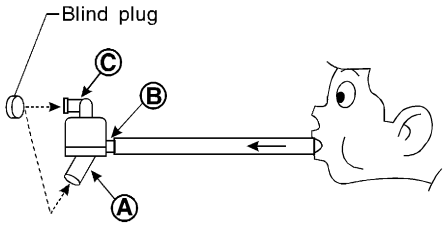
Check obstructed rubber tube connected to EVAP canister vent control valve.

OK or NG

OK	▶	GO TO 15.
NG	▶	Clean, repair or replace rubber tube.

15	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.

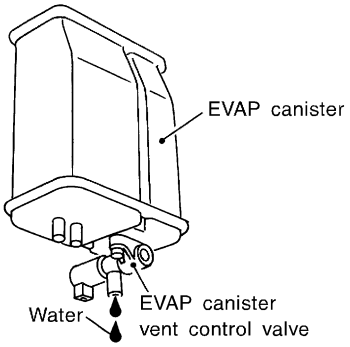
NOTE:
- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace water separator.

16	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 17.
No	▶	GO TO 19.

17	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 19.
NG	▶	GO TO 18.

Diagnostic Procedure (Cont'd)

18	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.

19	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT
1. Reconnect harness connectors disconnected. 2. Disconnect harness connectors C3, B113. 3. Check harness continuity between harness connector B113 terminal 6 and engine ground. **Continuity should exist.** 4. Also check harness for short to power.	
OK or NG	
OK ▶	GO TO 21.
NG ▶	GO TO 20.

20	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors B113 and B101, M67 ● Harness connectors M59, F27 ● Joint connector-1 ● Harness for open between harness connector B113 and engine ground	
▶	Repair open circuit or short to power in harness or connectors.

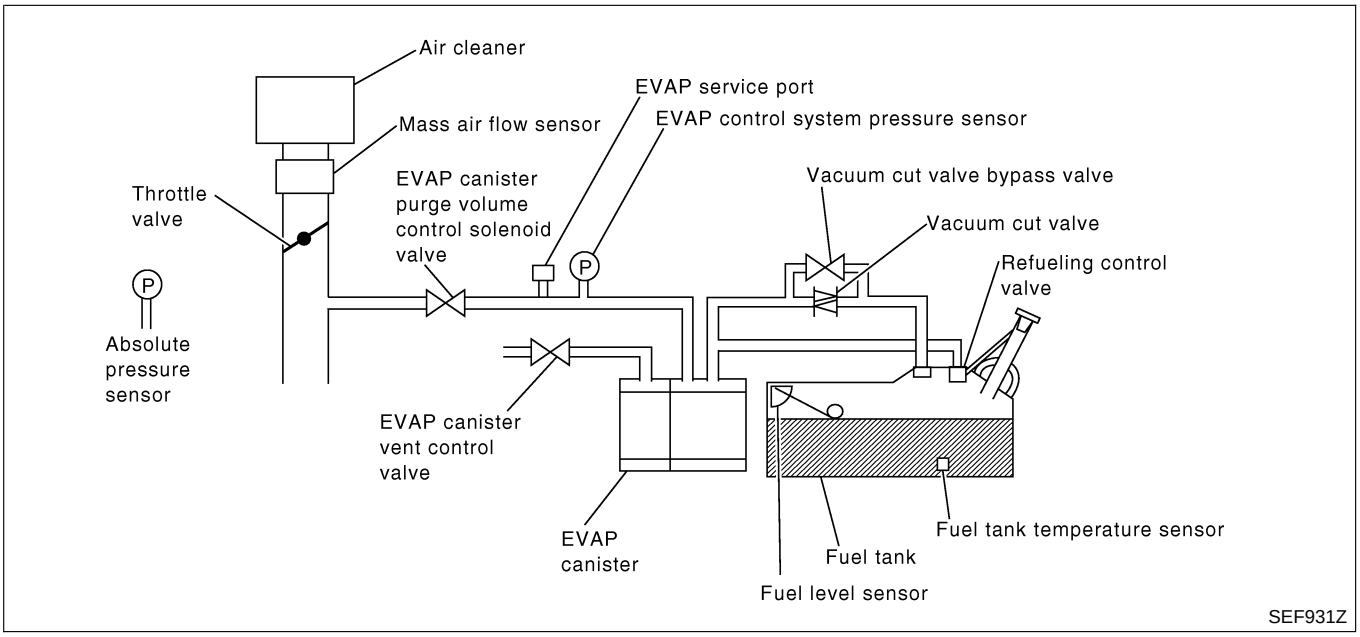
21	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NGEC0954

NOTE:
If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1127.)

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 a very large leak, such as fuel filler cap fell off, EVAP control system does not operate properly.

CAUTION:

- **Fuel filler cap remains open or fails to close.**
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

POSSIBLE CAUSE

NGEC0954S01

- 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

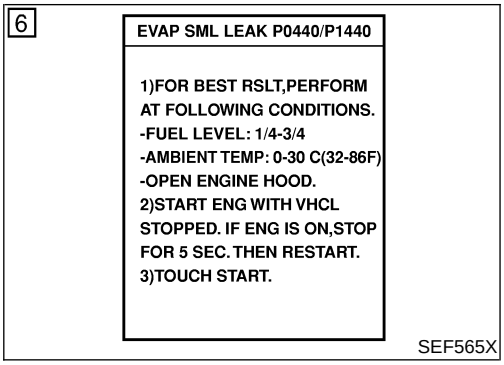
- O-ring of EVAP canister vent control valve is missing or damaged.
- EVAP control system pressure sensor
- Refueling control valve
- ORVR system leaks

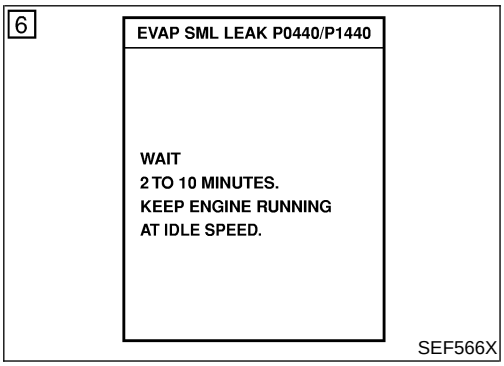
DTC Confirmation Procedure

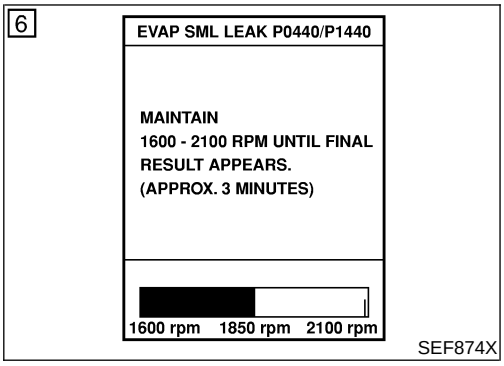
NGEC0955

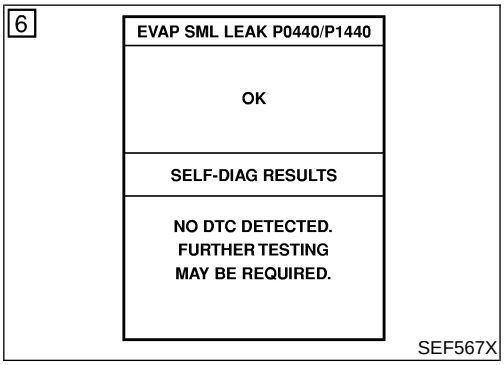
CAUTION:

Never remove fuel filter cap during the DTC confirmation procedure.









NOTE:

- **If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1127.)**
- **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 5 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

1) Tighten fuel filter cap securely until ratcheting sound is heard.
2) Turn ignition switch ON.
3) Turn ignition switch OFF and wait at least 5 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 - 32°C (32 - 90°F)
   INT/A TEMP SE: More than 0°C (32°F)
6) Select "EVAP SML LEAK P0440" 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-694.

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, refer to "Diagnostic Procedure", EC-1000.
   If P0440 is displayed, perform "Diagnostic Procedure" for DTC P0440.

With GST

NOTE:
Be sure to read the explanation of "Driving Pattern" on EC-660 before driving vehicle.

1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-660.
3) Stop vehicle.
4) Select "MODE 1" with GST.

- If SRT of EVAP system is not set yet, go to the following step.
- If SRT of EVAP system is set, the result will be OK.

5) Turn ignition switch "OFF" and wait at least 5 seconds.
6) Start engine.
   It is not necessary to cool engine down before driving.
7) Drive vehicle again according to the "Driving Pattern", EC-660.
8) Stop vehicle.
9) Select "MODE 3" with GST.

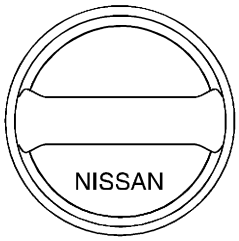
- If P0455 is displayed on the screen, go to "Diagnostic Procedure", EC-1000.

- If P0440 is displayed on the screen, go to "Diagnostic Procedure", EC-961.
- If P1447 is displayed on the screen, go to "Diagnostic Procedure" for "DTC P1447", EC-1114.
- If P0440, P0455 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

NGEC0956

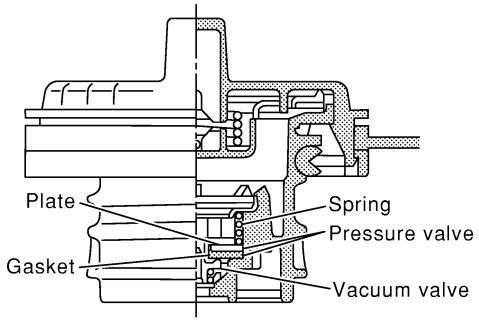
1	CHECK FUEL FILLER CAP DESIGN	
1. Turn ignition switch OFF. 2. Check for genuine NISSAN fuel filler cap design.  SEF915U		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

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.

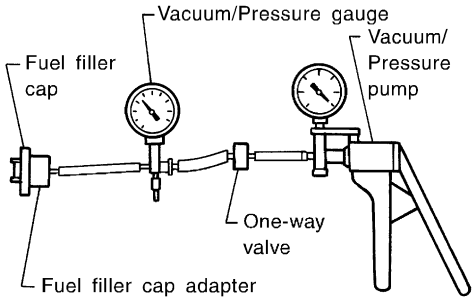
3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	CHECK FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)

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 −0.034 kg/cm^2, −0.87 to −0.48 psi)

CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5	CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection. Refer to "Evaporative Emission System", EC-620.

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

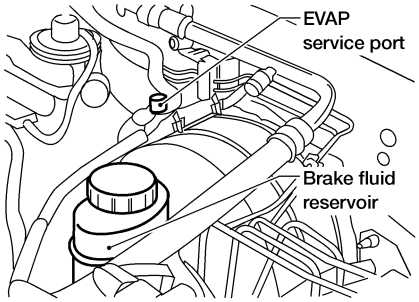
Refer to "DTC Confirmation Procedure", EC-981.

OK or NG

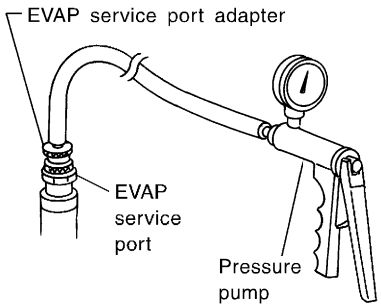
OK	▶	GO TO 8.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

8	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



AEC649A



SEF916U

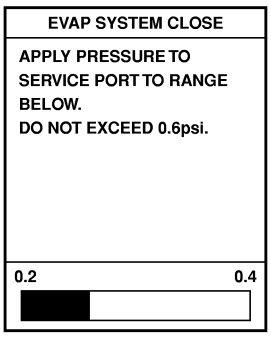
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ▶	GO TO 9.
Models without CONSULT-II ▶	GO TO 10.

9	CHECK FOR EVAP LEAK

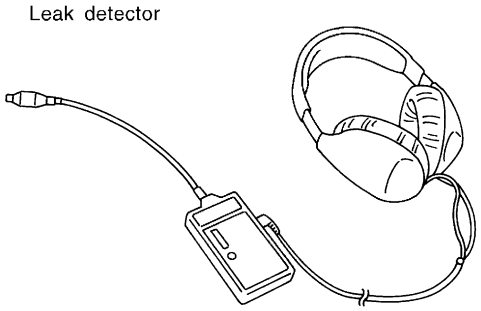
With CONSULT-II

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-623.



SEF200U

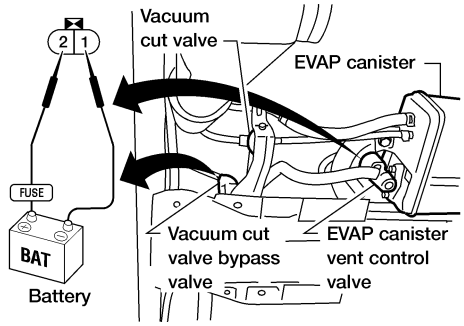
OK or NG

OK	▶	GO TO 11.
NG	▶	Repair or replace.

10	CHECK FOR EVAP LEAK

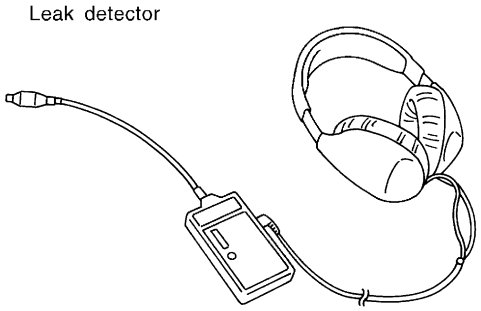
Without CONSULT-II

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



AEC632A

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-623.



SEF200U

OK or NG

OK	▶	GO TO 12.
NG	▶	Repair or replace.

11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II
1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

Vacuum should exist.

SEF984Y

Vacuum should exist.

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-613.

OK or NG

OK (With CONSULT-II)	▶	GO TO 14.
OK (Without CONSULT-II)	▶	GO TO 15.
NG	▶	Repair or reconnect the hose.

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

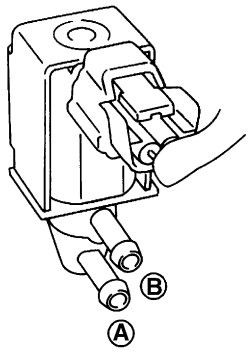
1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

If OK, inspection end. If NG, go to following step.

3. Check air passage continuity.



SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

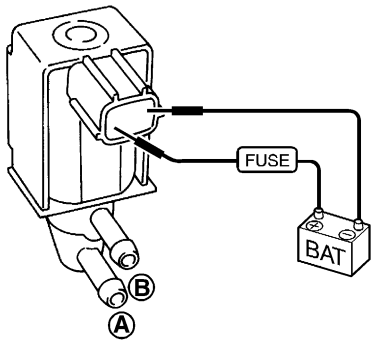
MTBL0241

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

15	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

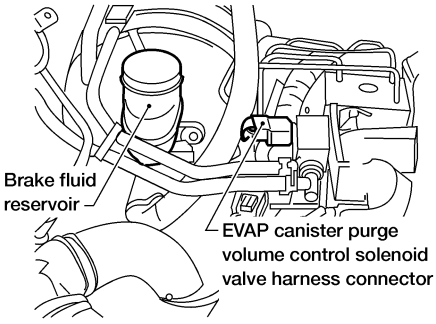
Without CONSULT-II
Check air passage continuity.



SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

MTBL0242



AEC652A

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

16	CHECK ABSOLUTE PRESSURE SENSOR

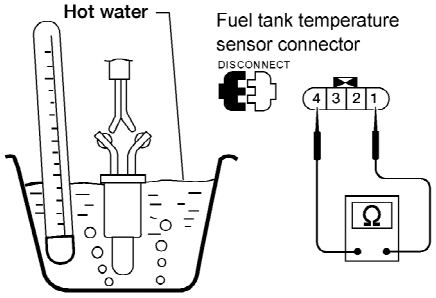
With CONSULT-II
1. Turn ignition switch ON.
2. Select "SELF DIAG RESULTS" mode with CONSULT-II.
3. Touch "ERASE".
4. **Perform "DTC Confirmation Procedure".**
   See EC-748.
5. Is the 1st trip DTC P0105 displayed again?

OK or NG

OK	▶	GO TO 17.
NG	▶	Replace ECM.

17	CHECK FUEL TANK TEMPERATURE SENSOR

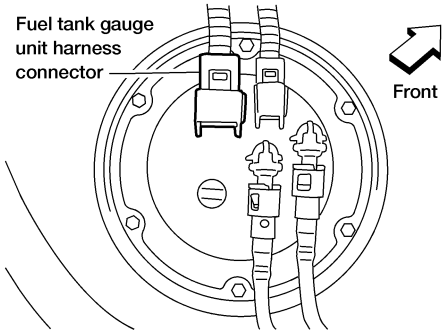
Check resistance by heating with hot water or heat gun as shown in the figure.



AEC052B

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

MTBL0234



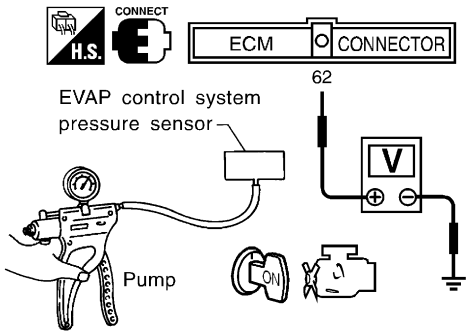
AEC933A

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace fuel tank temperature sensor.

18 **CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR**

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Turn ignition switch ON.
4. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.
5. Check input voltage between ECM terminal 62 and ground.



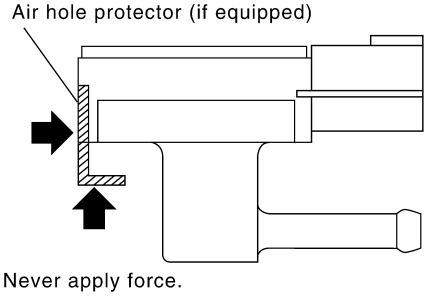
SEF894U

Pressure (Relative to atmosphericpressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
–9.3 kPa (–70 mmHg, –2.76 inHg)	0.4 - 0.6

MTBL0246

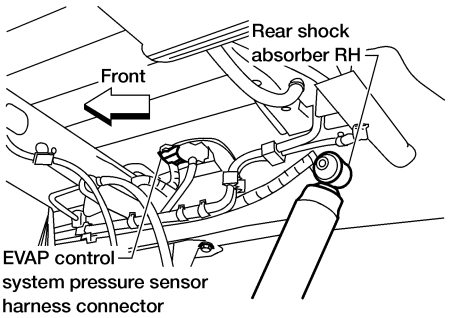
CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −20 kPa (−150 mmHg, −5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.**

CAUTION:
- **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5m (19.7in) onto a hard surface such as a concrete floor; use a new one.**



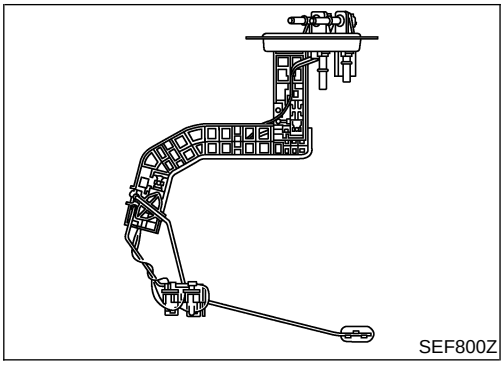
AEC651A

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace EVAP control system pressure sensor.

Diagnostic Procedure (Cont'd)

19	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**


SEF800Z

Component Description

NGEC0968

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.

ECM Terminals and Reference Value

NGEC0974

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)
46	P/B	Fuel level sensor	**[Ignition switch "ON"]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
66	B	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V

On Board Diagnosis Logic

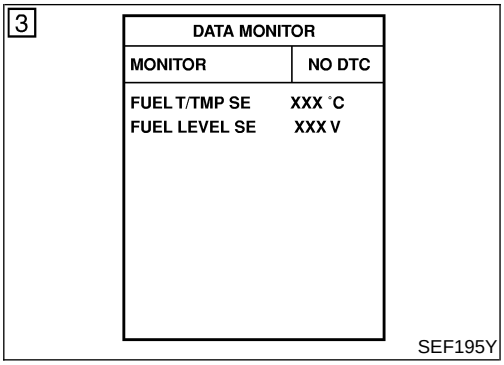
NGEC0969

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

NGEC0969S01

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor



DTC Confirmation Procedure

NGEC0971

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

WITH CONSULT-II

NGEC0971S01

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-1014.

WITH GST

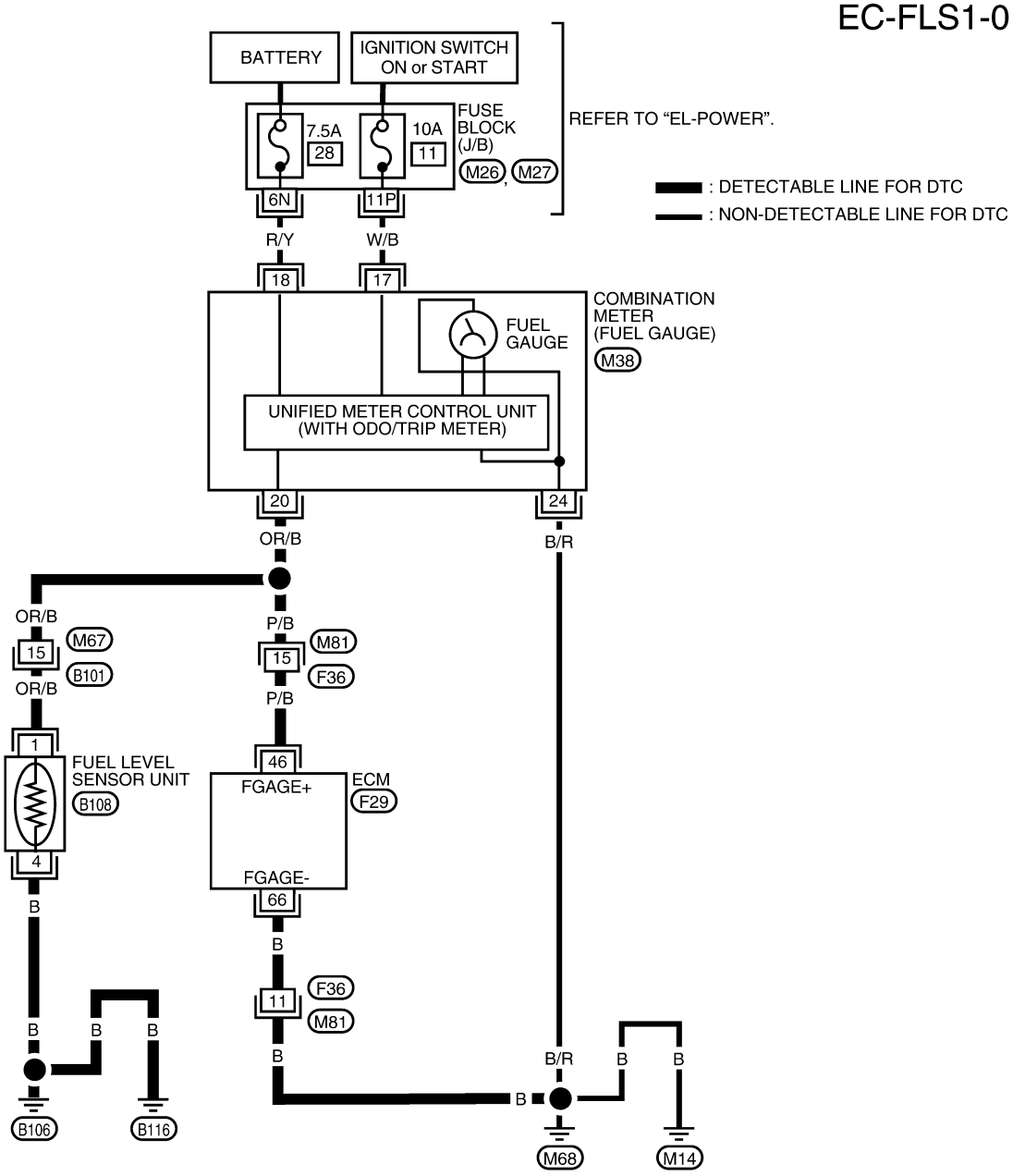
NGEC0971S02

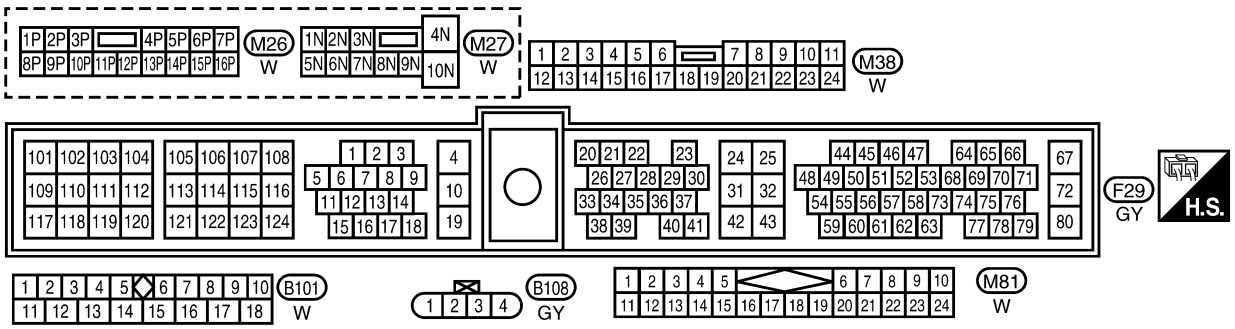
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NGEC0972

EC-FLS1-01





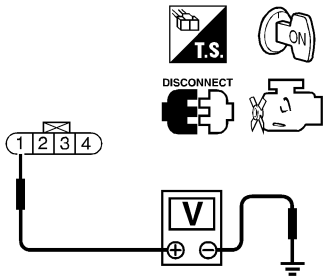
LEC522

Diagnostic Procedure

=NGEC0973

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor until and fuel pump harness connector.
3. Turn ignition switch “ON”.
4. Check voltage between fuel level sensor unit and fuel pump terminal 1 and ground with CONSULT-II or a tester.



Voltage: Approximately 12V

SEF801Z

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M67, B101
- Harness for open or short between combination meter and fuel level sensor until and fuel pump

	▶	Repair or replace harness or connectors.

3	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit and fuel pump terminal 4 and body ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit 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 46 and fuel level sensor unit and fuel pump terminal 1, ECM terminal 66 and fuel level sensor unit and fuel pump terminal 4. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

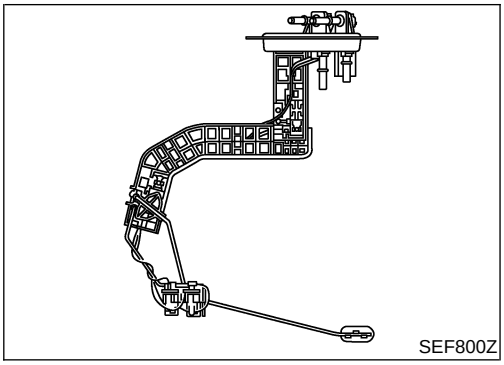
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M66, B101 ● Harness connectors M81, F36 ● 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-XX, "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-732.	
▶	**INSPECTION END**


SEF800Z

Component Description

=NGEC0975

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 Diagnosis Logic

NGEC0976

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

NGEC0976S01

- Harness or connectors
  (The level sensor circuit is open or shorted.)
- Fuel level sensor

Overall Function Check

NGEC0978

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-XX “Fuel Tank”.

TESTING CONDITION:
Before starting overall function check, preparation of draining fuel and refilling fuel is required.

7

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

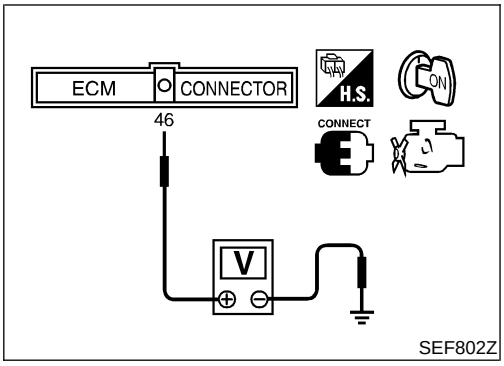
WITH CONSULT-II

NGEC0978S01

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-637.
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 5 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-87***, "FUEL LEVEL SENSOR UNIT CHECK".

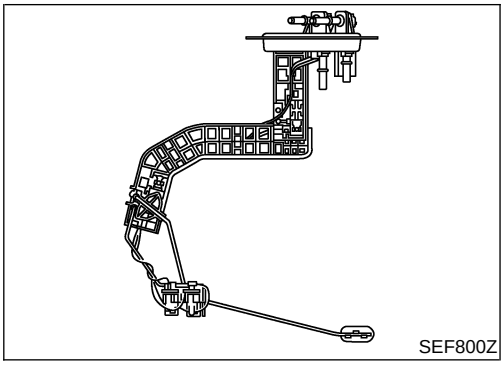


WITH GST

NGEC0978S02

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-637.
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 46 (fuel level sensor signal) and ground.
7) Turn ignition switch "ON".
8) Check voltage between ECM terminal 46 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 46 and ground changes more than 0.03V during step 8 - 10.
If NG, check component of fuel level sensor, refer to ***EL-87***, "FUEL LEVEL SENSOR UNIT CHECK".


SEF800Z

Component Description

NGEC0979

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.

ECM Terminals and Reference Value

NGEC0985

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)
46	P/B	Fuel level sensor	**[Ignition switch "ON"]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
66	B	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V

On Board Diagnosis Logic

NGEC0980

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

NGEC0980S01

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)
- Fuel level sensor

DTC Confirmation Procedure

NGEC0982

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch “ON”.

2

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

NGEC0982S01

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-1021.

WITH GST

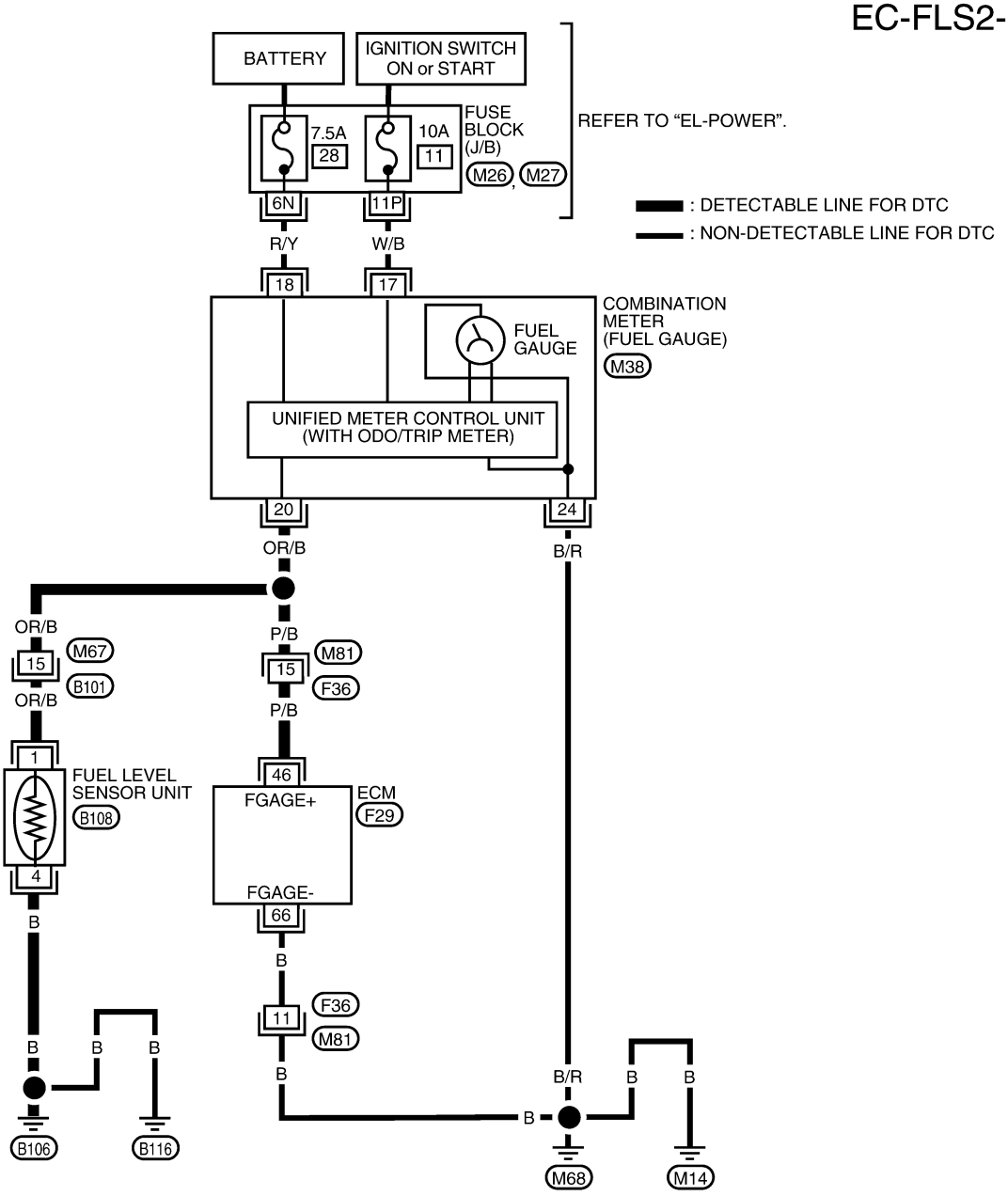
NGEC0982S02

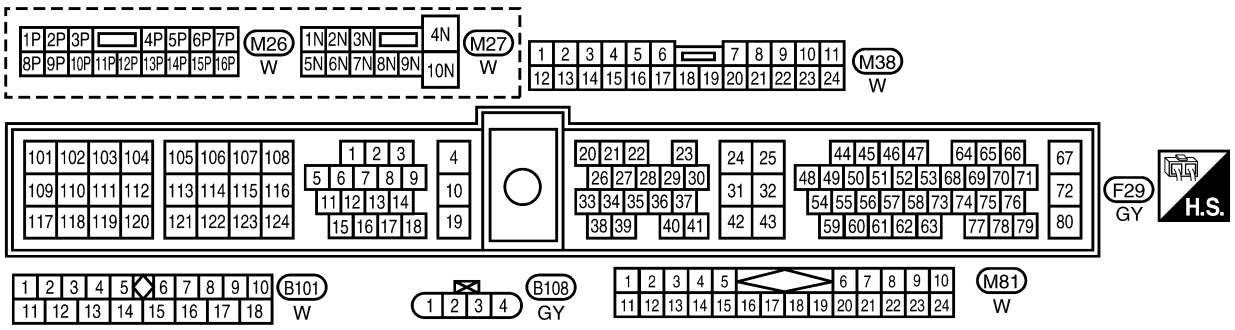
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

NGEC0983

EC-FLS2-01





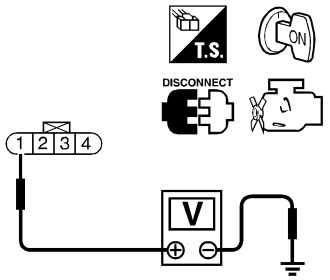
LEC523

Diagnostic Procedure

=NGEC0984

1	CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect fuel level sensor until and fuel pump harness connector.
3. Turn ignition switch “ON”.
4. Check voltage between fuel level sensor unit and fuel pump terminal 1 and ground with CONSULT-II or tester.



Voltage: Approximately 12V

SEF801Z

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M67, B101
- Harness for open or short between combination meter and fuel level sensor until and fuel pump

	▶	Repair or replace harness or connectors.

3	CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch “OFF”.
2. Check harness continuity between fuel level sensor unit and fuel pump terminal 4 and body ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to power in harness or connectors.

4	CHECK FUEL LEVEL SENSOR INPUT CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 46 and fuel level sensor unit and fuel pump terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

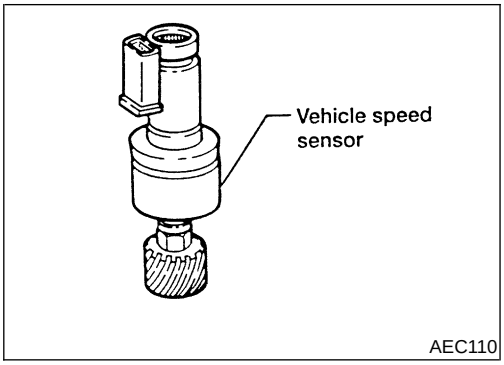
OK	▶	GO TO 6.
NG	▶	GO TO 5.

Diagnostic Procedure (Cont'd)

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M66, B101 ● Harness connectors M81, F36 ● 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-87***, "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-732.	
▶	**INSPECTION END**



Component Description

NGEC0768

The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM.

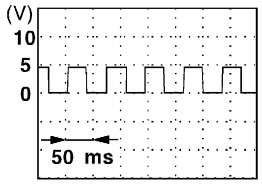
ECM Terminals and Reference Value

NGEC0769

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	G/B	Vehicle speed sensor	**[Engine is running]** ● Lift up the vehicle ● In 1st gear position ● Vehicle speed is 40 km/h (25 MPH)	2 - 3V  SEF996U

On Board Diagnosis Logic

NGEC0770

Malfunction is detected when the almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.

POSSIBLE CAUSE

NGEC0770S01

- Harness or connector
  (The vehicle speed sensor circuit is open or shorted.)
- Vehicle speed sensor

DTC Confirmation Procedure

NGEC0771

CAUTION:

Always drive vehicle at a safe speed.

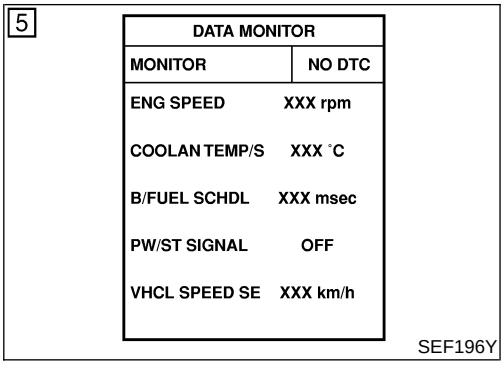
NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

DTC Confirmation Procedure (Cont'd)



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.
   If NG, go to "Diagnostic Procedure", EC-1026.
   If OK, go to following step.
3) Select "DATA MONITOR" mode with CONSULT-II.
4) Warm engine up to normal operating temperature.
5) Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 1,400 rpm (A/T models) More than 2,000 rpm (M/T models)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	4.5 - 9.0 msec
Selector lever	Suitable position
PW/ST SIGNAL	OFF

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1026.

Overall Function Check

NGEC0772

Use this procedure to check the overall function of the vehicle speed sensor circuit. During this check, a 1st trip DTC might not be confirmed.

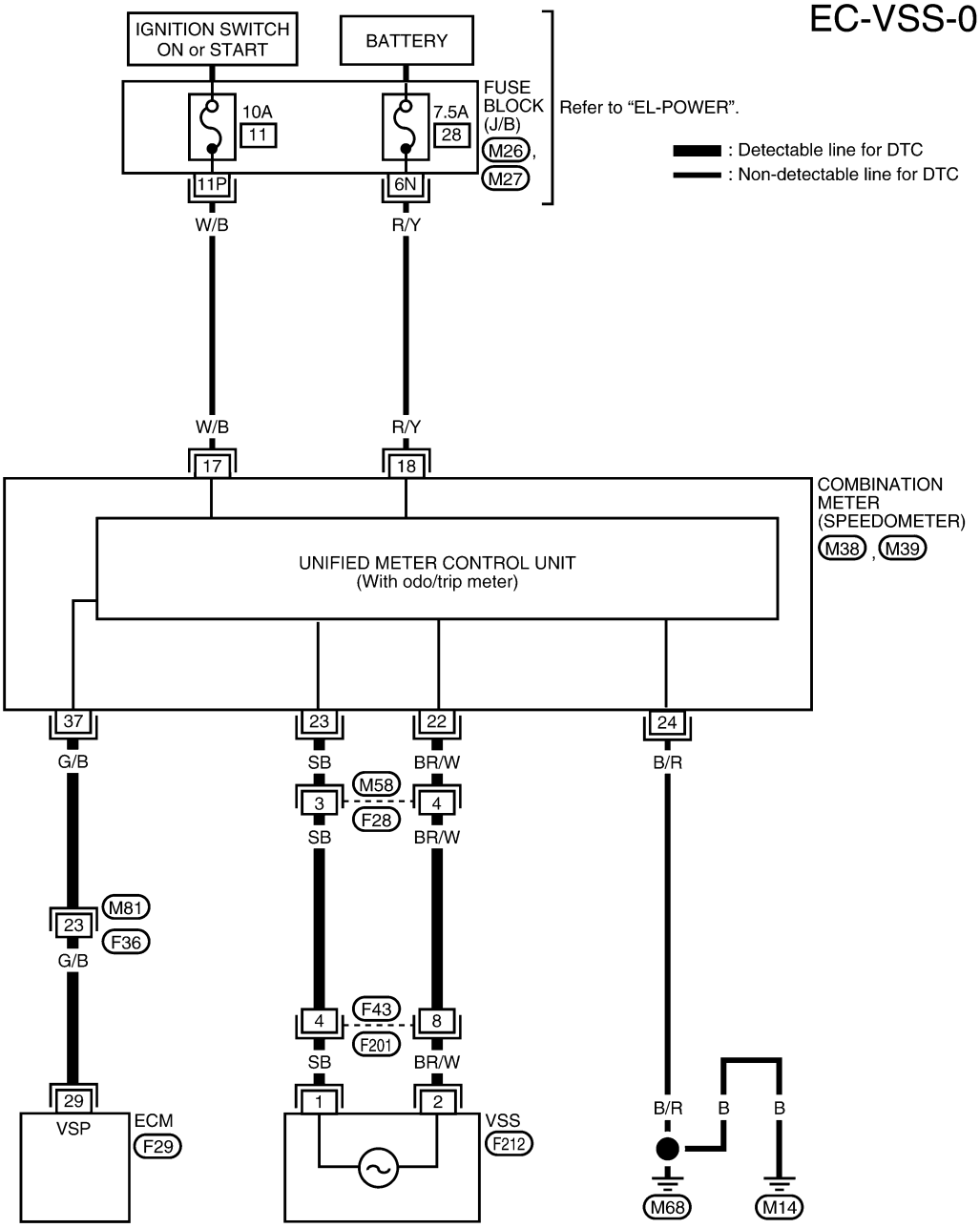
With GST

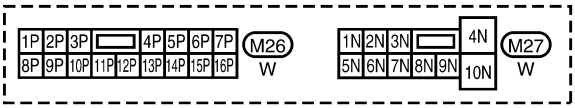
1) Lift up drive wheels.
2) Start engine.
3) Read vehicle speed sensor signal in "MODE 1" with GST.
   The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4) If NG, go to "Diagnostic Procedure", EC-1026.

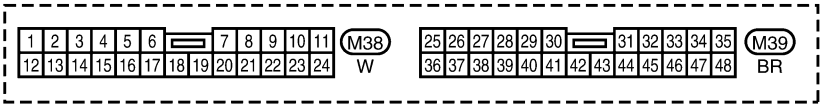
Wiring Diagram

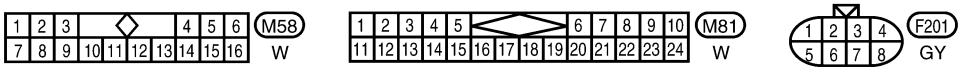
NGEC0773

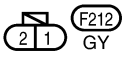
EC-VSS-01











Refer to the following.
F29 - ELECTRICAL UNITS

LEC507

Diagnostic Procedure

NGEC0774

1	CHECK VEHICLE SPEED SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and combination meter harness connector.
3. Check harness continuity between ECM terminal 29 and meter terminal 37.
   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 M81, F36
- 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, F28
- Harness connectors F43, F201
- 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 section.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-732.

	▶	**INSPECTION END**

Description

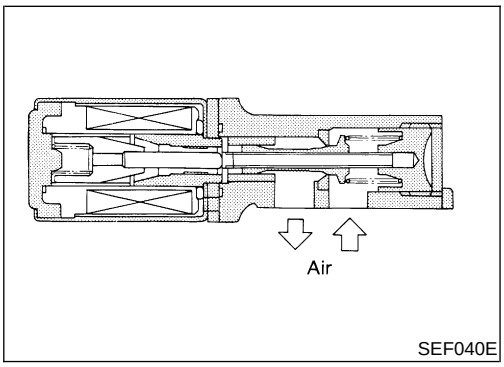
NGEC0775

SYSTEM DESCRIPTION

NGEC0775S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	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		
Ambient air temperature switch	Ambient air temperature		
Intake air temperature sensor	Intake air temperature		
Absolute pressure sensor	Ambient barometic pressure		

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which bypasses the throttle valve via IACV-AAC valve. The IACV-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the ON/OFF time of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner and power steering).



SEF040E

COMPONENT DESCRIPTION

NGEC0775S02

IACV-AAC Valve

NGEC0775S0201

The IACV-AAC valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of air that will flow through the valve. The more air that flows through the valve, the higher the idle speed.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0776

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	• Engine: After warming up • Air conditioner switch: “OFF” • Shift lever: “N” • No-load	Idle	10 - 20%
		2,000 rpm	—

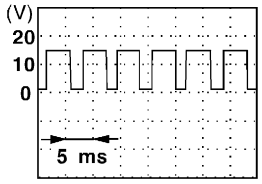
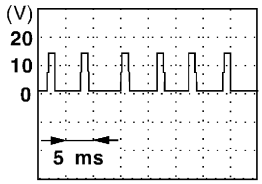
ECM Terminals and Reference Value

NGEC0777

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	OR/L	IACV-AAC valve	**[Engine is running]** • **Warm-up condition** • Idle speed	8 - 11V  SEF005V
			[Engine is running] • **Warm-up condition** • Engine speed is 3,000 rpm	7 - 10V  SEF692W

On Board Diagnosis Logic

NGEC0778

Malfunction is detected when
(Malfunction A) the IACV-AAC valve does not operate properly,
(Malfunction B) the IACV-AAC valve does not operate properly.

POSSIBLE CAUSE

NGEC0778S01

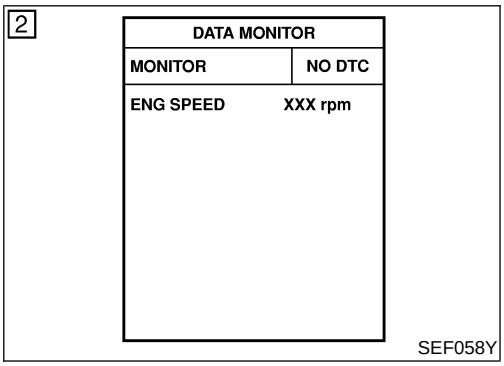
- Harness or connectors
  (The IACV-AAC valve circuit is open.)
- Harness or connectors
  (The IACV-AAC valve circuit is shorted.)
- IACV-AAC valve

DTC Confirmation Procedure

NGEC0779

NOTE:

- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
- **Perform "PROCEDURE FOR MALFUNCTION A" first. If 1st trip DTC cannot be confirmed, perform "PROCEDURE FOR MALFUNCTION B".**



PROCEDURE FOR MALFUNCTION A

NGEC0779S01

TESTING CONDITION:

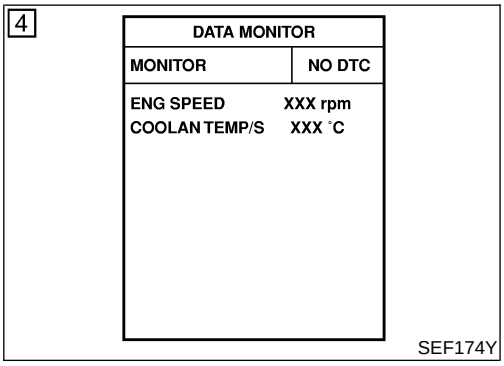
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch "ON".

With CONSULT-II

1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 2 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1031.

With GST

Follow the procedure "With CONSULT-II".



PROCEDURE FOR MALFUNCTION B

NGEC0779S02

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) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON again and select "DATA MONITOR" mode with CONSULT-II.
4) Start engine and run it for at least 1 minute at idle speed.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1031.

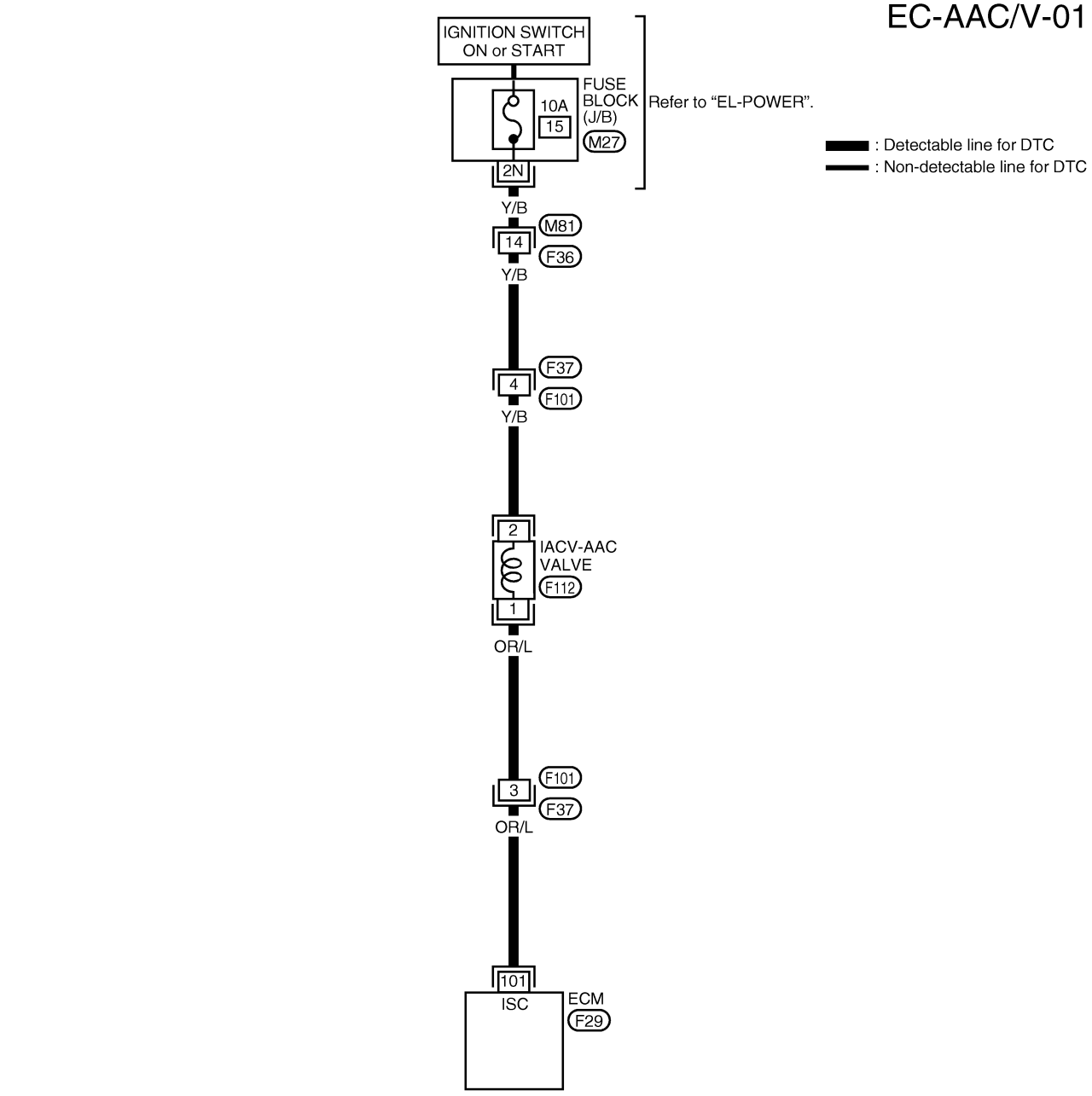
With GST

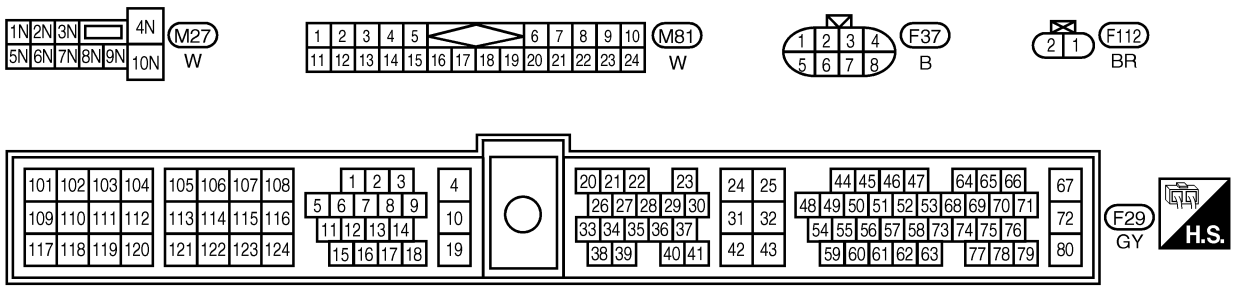
Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC0780

EC-AAC/V-01





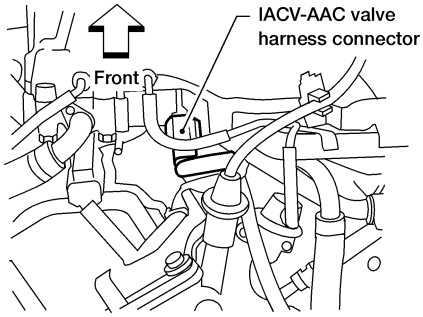
AEC963A

Diagnostic Procedure

NGEC0781

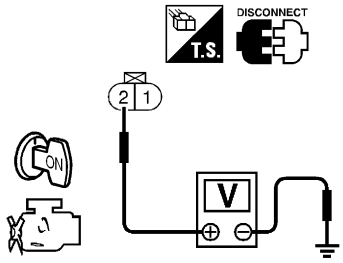
1	CHECK IACV-AAC VALVE POWER SUPPLY CIRCUIT

1. Stop engine.
2. Disconnect IACV-AAC valve harness connector.



LEC514

3. Turn ignition switch ON.
4. Check voltage between terminal 2 and ground with CONSULT-II or tester.



SEF651W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M81, F36
- Harness connectors F37, F101
- Fuse block (J/B) connector M27
- 10A fuse
- Harness for open or short between IACV-AAC valve and fuse

	▶	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 terminal 101 and IACV-AAC valve terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

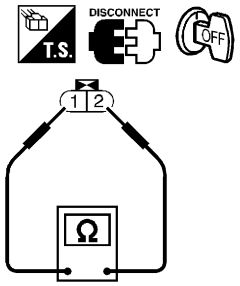
OK	▶	GO TO 5.
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F101, F37 ● Harness for open or short between IACV-AAC valve and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK IACV-AAC VALVE

1. Disconnect IACV-AAC valve harness connector.
2. Remove IACV-AAC valve.
- Check IACV-AAC valve resistance.



SEF202V

Resistance:
Approximately 10Ω [at 20°C (68°F)]

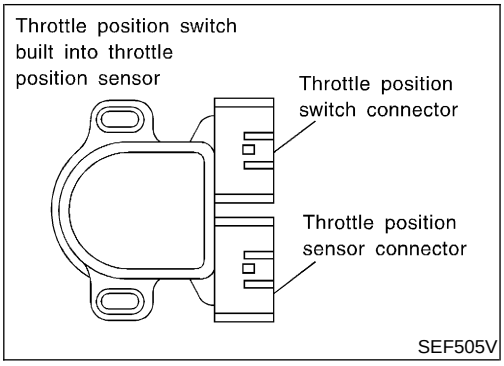
- Check plunger for seizing or sticking.
- Check for broken spring.

3. Supply battery voltage between IACV-AAC valve connector terminals.
Plunger should move.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace IACV-AAC valve.

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**



Component Description

NGEC0782

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

NGEC0783

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

ECM Terminals and Reference Value

NGEC0784

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	BR/W	Throttle position switch (Closed position)	**[Engine is running]** ● **Warm-up condition** ● Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] ● Accelerator pedal depressed	Approximately 0V

On Board Diagnosis Logic

NGEC0785

Malfunction is detected when battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened.

POSSIBLE CAUSE

NGEC0785S01

- Harness or connectors
  (The closed throttle position switch circuit is shorted.)
- Closed throttle position switch
- Throttle position sensor

4

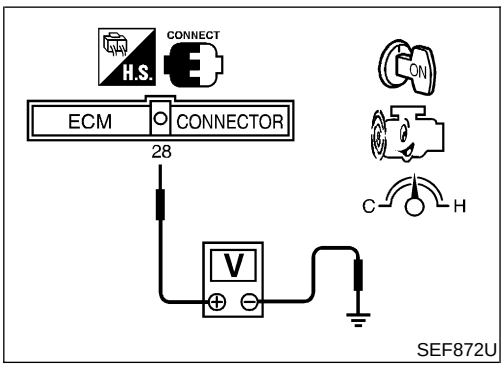
DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
CLSD THL/P SW	ON

SEF197Y

6

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V

SEF198Y



SEF872U

DTC Confirmation Procedure

NGEC0786

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF, wait at least 5 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-1036.
If OK, go to following step.

5) Select "DATA MONITOR" mode with CONSULT-II.
6) Drive the vehicle for at least 5 consecutive seconds under the following condition.

THRTL POS SEN	More than 2.5V
VHCL SPEED SE	More than 5 km/h (3 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-1036.

Overall Function Check

NGEC0787

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 28 (Closed throttle position switch signal) and ground under the following conditions.

At idle: Battery voltage

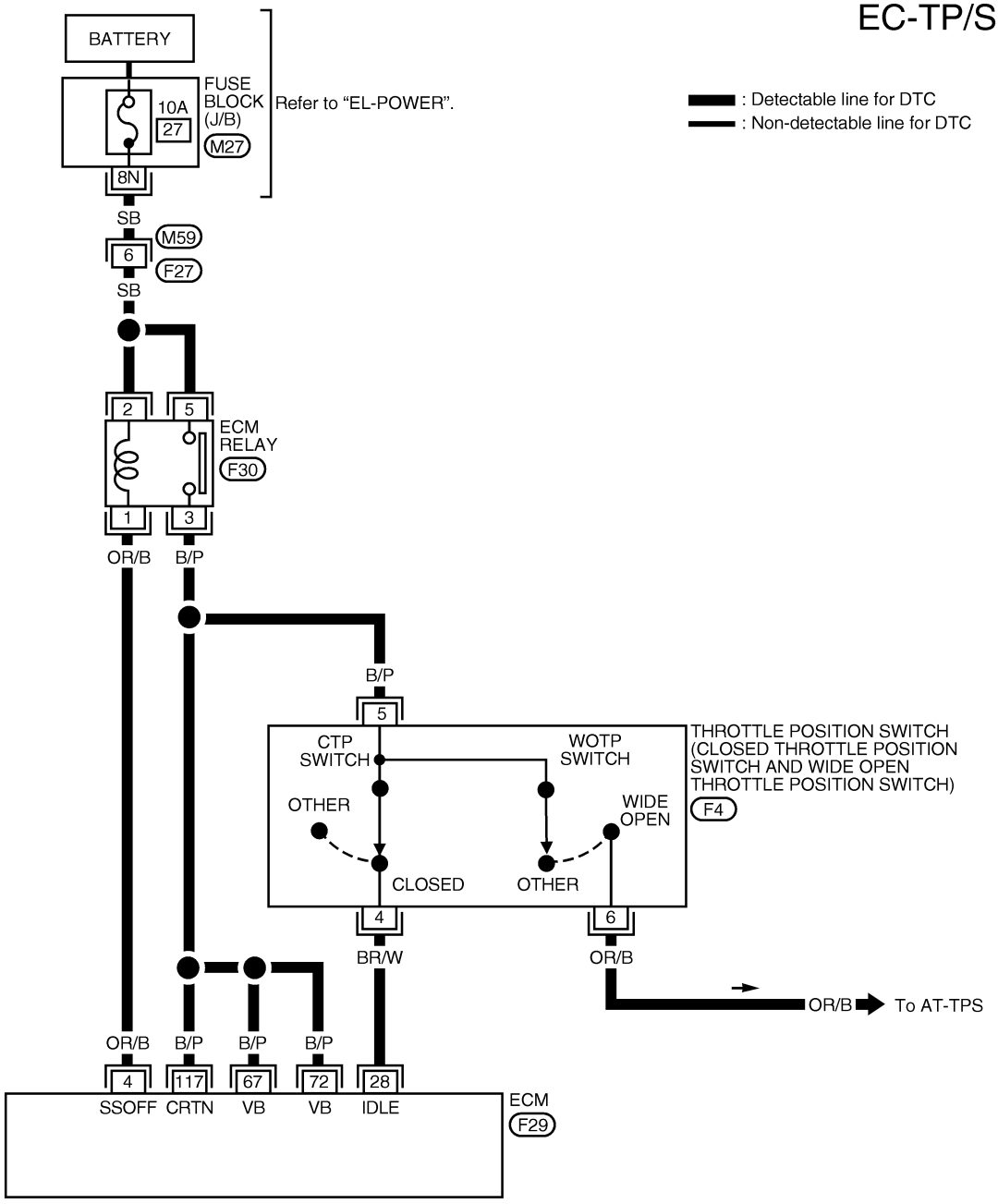
At 2,000 rpm: Approximately 0V

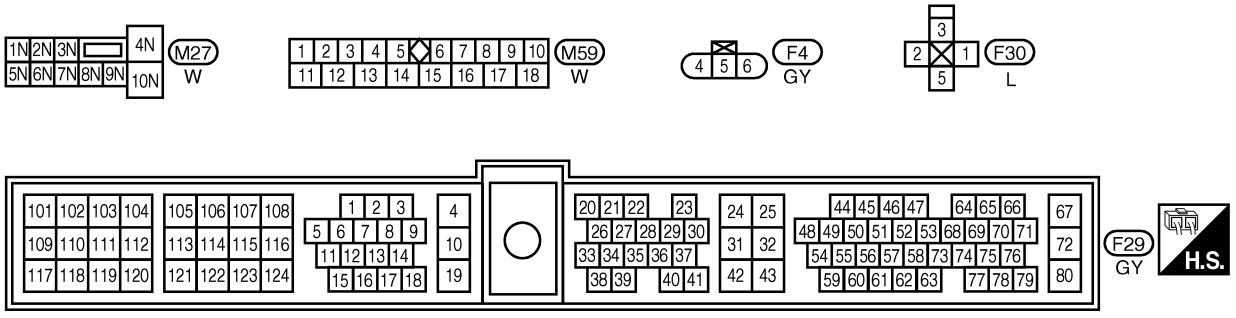
3) If NG, go to "Diagnostic Procedure", EC-1036.

Wiring Diagram

NGEC0788

EC-TP/SW-01





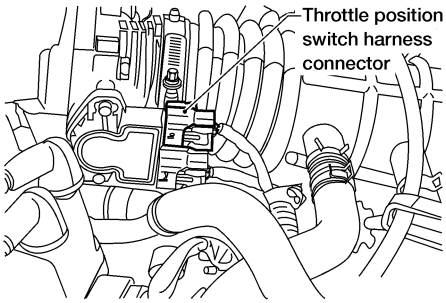
AEC964A

Diagnostic Procedure

NGEC0789

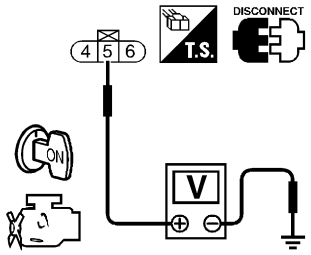
1	CHECK CLOSED THROTTLE POSITION SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect throttle position switch harness connector.



AEC653A

3. Turn ignition switch ON.
4. Check voltage between terminal 5 and engine ground with CONSULT-II or tester.



SEF715U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between throttle position switch and ECM relay
- Harness for open or short between throttle position switch and ECM

	▶	Repair harness or connectors.

3	CHECK CLOSED THROTTLE POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 28 and switch terminal 4.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	ADJUST THROTTLE POSITION SWITCH

Check the following items. Refer to "Basic Inspection", EC-694.

Items	Specifications
Ignition timing	10° ± 2° BTDC
Base idle speed	700 ± 50 rpm (in "P" or "N" position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.2 mm (0.008 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	750 ± 50 rpm (in "P" or "N" position)

WEC959

with CONSULT-II	▶	GO TO 5.
without CONSULT-II	▶	GO TO 6.

5	CHECK CLOSED THROTTLE POSITION SWITCH

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Turn ignition switch ON.
4. Select "DATA MONITOR" mode with CONSULT-II.
5. Check indication of "CLSD THL/P SW".
   Measurement must be made with closed throttle position switch installed in vehicle.

Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely open	OFF

MTBL0355

OK or NG

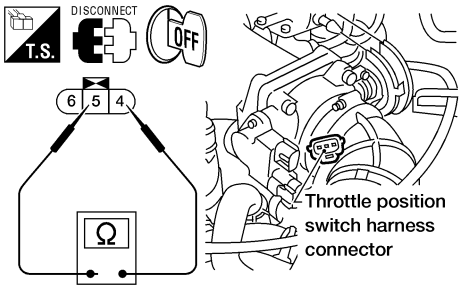
OK	▶	GO TO 8.
NG	▶	GO TO 7.

Diagnostic Procedure (Cont'd)

6	CHECK CLOSED THROTTLE POSITION SWITCH

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect closed throttle position switch harness connector.
4. Check continuity between closed throttle position switch terminals 4 and 5.
   Resistance measurement must be made with closed throttle position switch installed in vehicle.



AEC654A

Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

MTBL0247

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 7.

7	ADJUST THROTTLE POSITION SWITCH

Check the following items. Refer to "Basic Inspection", EC-694.

Items	Specifications
Ignition timing	10° ± 2° BTDC
Base idle speed	700 ± 50 rpm (in "P" or "N" position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.2 mm (0.008 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	750 ± 50 rpm (in "P" or "N" position)

WEC959

If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.

OK or NG

OK (with CONSULT-II)	▶	GO TO 8.
OK (without CONSULT-II)	▶	GO TO 9.
NG	▶	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. Turn ignition switch ON.
4. Select "DATA MONITOR" mode with CONSULT-II.
5. Check voltage of "THRTL POS SEN".

Throttle valve conditions	THRTL POS SEN
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

MTBL0230

Voltage measurement must be made with throttle position sensor installed in vehicle.
If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-694.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace throttle position sensor.

9	CHECK THROTTLE POSITION SENSOR

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Turn ignition switch ON.
4. Check voltage between ECM terminal 23 (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

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-694.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace throttle position sensor.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**

System Description

NGEC0790

These circuit lines are used to control the smooth shifting up and down of A/T during the hard acceleration/deceleration.
Voltage signals are exchanged between ECM and TCM (Transmission Control Module).

ECM Terminals and Reference Value

NGEC0791

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
26	PU/W	A/T signal No. 1	**[Ignition switch "ON"]** **[Engine is running]** ● Idle speed	6 - 8V
27	P/B	A/T signal No. 2	**[Ignition switch "ON"]** **[Engine is running]** ● Idle speed	6 - 8V
35	G/R	A/T signal No. 3	**[Ignition switch "ON"]**	0V

On Board Diagnosis Logic

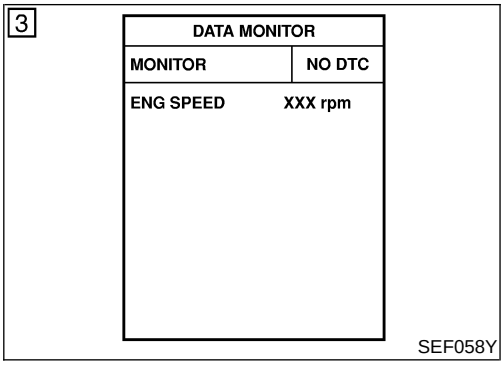
NGEC0792

Malfunction is detected when ECM receives incorrect voltage from TCM (Transmission Control Module) continuously.

POSSIBLE CAUSE

NGEC0792S01

- Harness or connectors
  [The circuit between ECM and TCM (Transmission Control Module) is open or shorted.]



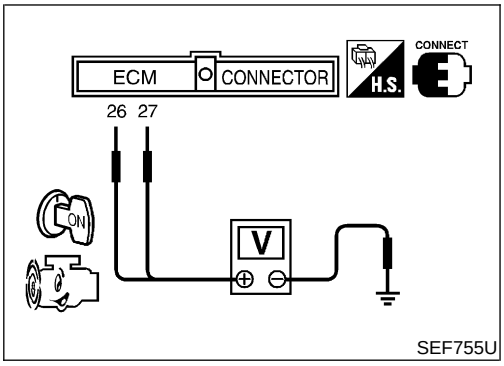
DTC Confirmation Procedure

=NGEC0793

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine, and rev engine more than 1,000 rpm once, then let it idle for more than 40 seconds.
4) If DTC is detected, go to "Diagnostic Procedure", EC-1043.



Overall Function Check

NGEC0794

Use this procedure to check the overall function of the A/T control circuit. During this check, a DTC might not be confirmed.

Without CONSULT-II

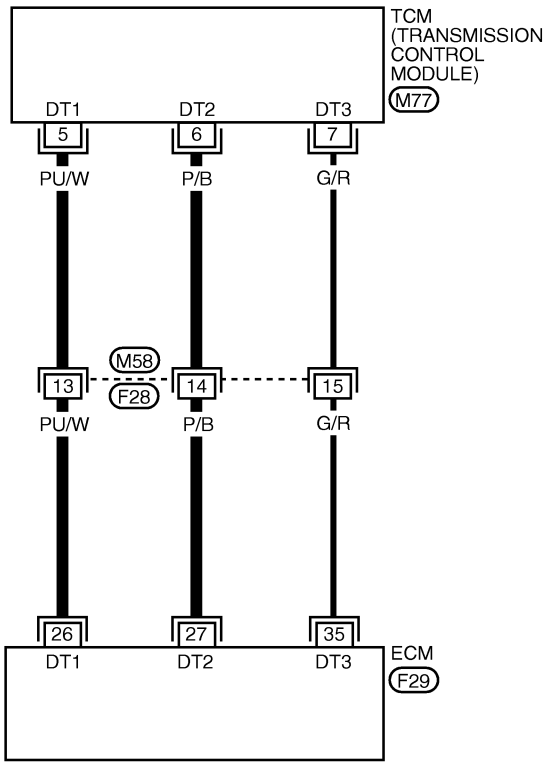
1) Start engine.
2) Check voltage between
   ECM terminal 26 and ground.
   ECM terminal 27 and ground.
   Voltage: 6 - 8V
3) If NG, go to "Diagnostic Procedure", EC-1043.

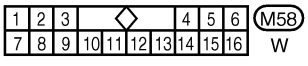
Wiring Diagram

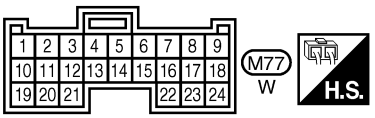
NGEC0795

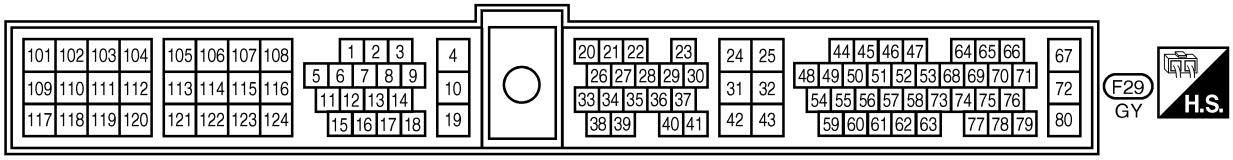
EC-AT/C-01

: Detectable line for DTC
: Non-detectable line for DTC









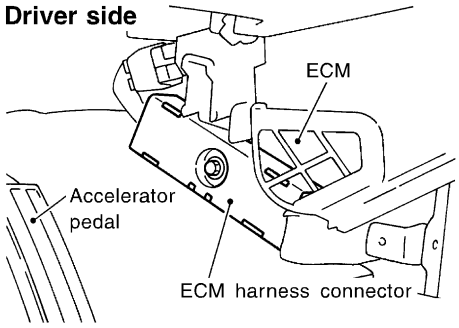
AEC965A

Diagnostic Procedure

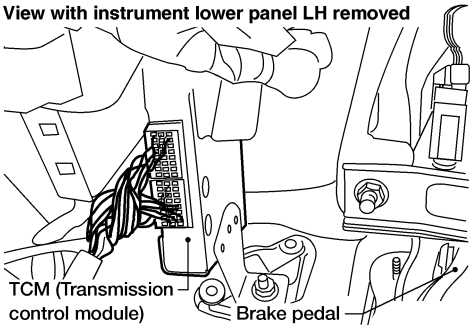
NGEC0796

1	CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR OPEN

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and TCM (Transmission Control Module) harness connector.



SEF324V



AEC655A

3. Check harness continuity between ECM terminal 26 and terminal 5, ECM terminal 27 and terminal 6, ECM terminal 35 and terminal 7.
   Refer to Wiring Diagram.
   Continuity should exist.

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M58, F28
- Harness for open or short between ECM and TCM (Transmission Control Module)

	▶	Repair harness or connectors.

3	CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR SHORT

1. Check harness continuity between ECM terminal 26 and ground, ECM terminal 27 and ground, ECM terminal 35 and ground.
   Refer to Wiring Diagram.
   Continuity should not exist.
2. Also check harness for short to power.

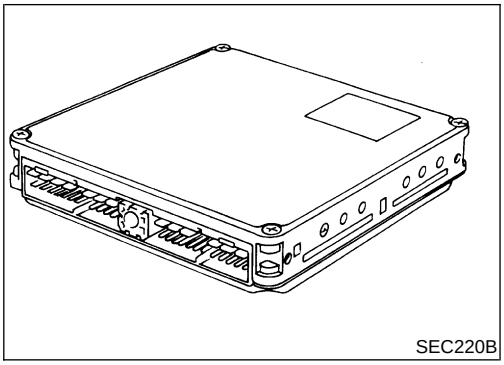
OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

4	DETECT MALFUNCTIONING PART
Check the harness for open or short between ECM and TCM (Transmission Control Module).	
▶	Repair open circuit or short to ground or short to power in harness.

5	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**



SEC220B

Component Description

NGEC0797

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the engine.

On Board Diagnosis Logic

NGEC0798

Malfunction is detected when ECM calculation function is malfunctioning.

POSSIBLE CAUSE

NGEC0798S01

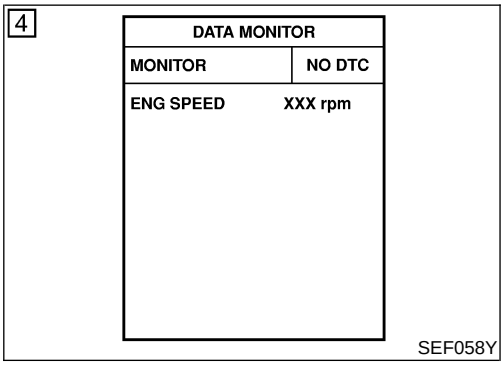
- ECM

DTC Confirmation Procedure

NGEC0799

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.



SEF058Y

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 2 seconds at idle speed.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1046.

With GST

Follow the procedure “With CONSULT-II”.

Diagnostic Procedure

NGEC0800

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-1045. 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-1045. 5. Is the 1st trip DTC P0605 displayed again?		
Yes or No		
Yes	▶	Replace ECM.
No	▶	**INSPECTION END**

On Board Diagnosis Logic

NGEC0986

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

NGEC0986S01

- Thermostat function
- Leakage from sealing portion of thermostat
- Engine coolant temperature sensor

DTC Confirmation Procedure

NGEC0988

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- **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 70°C (158°F).**

WITH CONSULT-II

NGEC0988S01

1) Replace thermostat with new one. Refer to ***LC-30***, "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 70°C (158°F).
   If it is below 70°C (158°F), go to following step.
   If it is above 70°C (158°F), stop engine and cool down the engine to less than 70°C (158°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-597.

WITH GST

NGEC0988S02

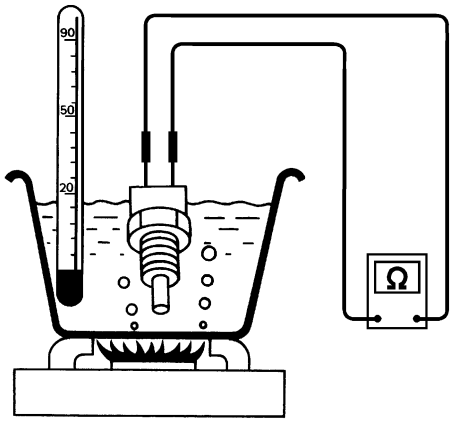
1) Follow the procedure "WITH CONSULT-II" above.

Diagnostic Procedure

NGEC0989

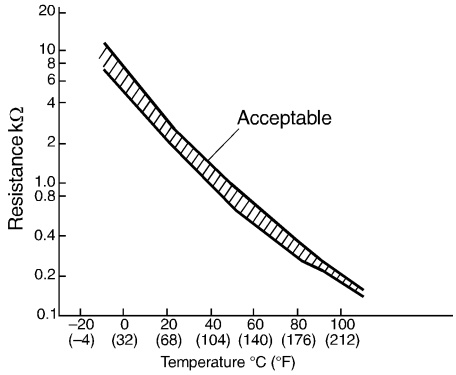
1	CHECK ENGINE COOLANT TEMPERATURE SENSOR

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

NGEC0808

★ The closed loop control has the one trip detection logic.
Malfunction is detected when the closed loop control function for right bank does not operate even when vehicle is driving in the specified condition, the closed loop control function for left bank does not operate even when vehicle is driving in the specified condition.

POSSIBLE CAUSE

NGEC0808S01

- The heated oxygen sensor 1 (front) circuit is open or shorted.
- Heated oxygen sensor 1 (front)
- Heated oxygen sensor 1 heater (front)

DTC Confirmation Procedure

NGEC0809

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- **Never raise engine speed above 3,200 rpm during the “DTC Confirmation Procedure”. If the engine speed limit is exceeded, retry the procedure from step 2.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S2 (B2)	XXX V

SEF967Y

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 one of 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 check result is NG, perform “Diagnosis Procedure”, EC-1050.

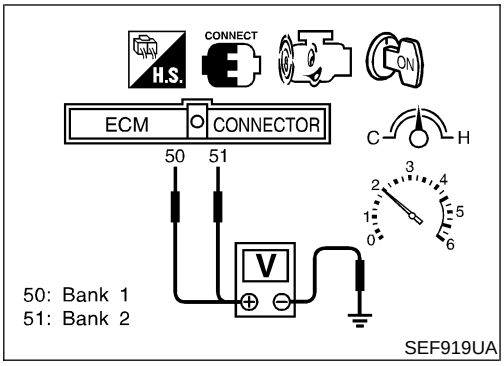
If the check result is OK, perform the following step.

4) Let engine idle at least 5 minutes.
5) Maintain the following condition at least 50 consecutive seconds.

B/FUEL SCHDL	3.3 msec or more
ENG SPEED	1,600 rpm or more
Selector lever	Suitable position
VHCL SPEED SE	More than 71 km/h (44 MPH)

During this test, P0130 and/or P0150 may be displayed on CONSULT-II screen.

6) If DTC is detected, go to "Diagnostic Procedure", EC-1050.



Overall Function Check

NGEC0810

Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed.

Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 [heated oxygen sensor 1 (front) (bank 1) signal] or 51 [heated oxygen sensor 1 (front) (bank 2) 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-1050.

Diagnostic Procedure

NGEC0811

Perform trouble diagnosis for "DTC P0133, P0153", EC-807.

System Description

NGEC0901

COOLING FAN CONTROL

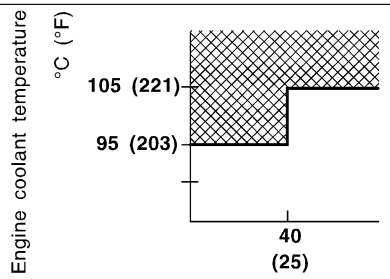
NGEC0901S01

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		
Ignition switch	Start signal		
Camshaft position sensor	Engine speed		

The ECM controls the cooling fan corresponding to the signals sent from the vehicle speed and engine coolant temperature. The control system has 2-step control [ON/OFF].

OPERATION

NGEC0901S02



: Cooling fan does not operate. : Cooling fan operates.

SEF666WA

CONSULT-II Reference Value in Data Monitor Mode

NGEC0902

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
COOLING FAN	● Engine: Idling, after warming up ● Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less.	OFF
		Engine coolant temperature is 95°C (203°F) or more.	ON

ECM Terminals and Reference Value

NGEC0903

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
36	LG/R	Cooling fan relay	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan is operating	0 - 0.6V

On Board Diagnosis Logic

NGEC0904

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise. When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.
Malfunction is detected when engine coolant temperature reaches an abnormally high temperature.

CAUTION:

When a malfunction is indicated be sure to replace the coolant, follow the procedure in "Changing Engine Coolant", "ENGINE MAINTENANCE", *MA-26*. Also, replace the engine oil.

1) **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to "Anti-freeze Coolant Mixture Ratio", "RECOMMENDED FLUIDS AND LUBRICANTS", *MA-15*.**
2) **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

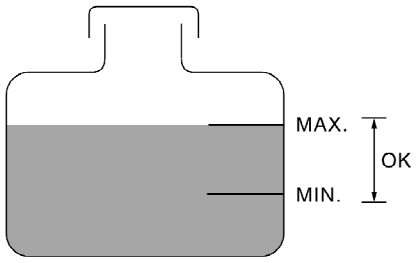
POSSIBLE CAUSE

NGEC0904S01

- 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-1062.

1

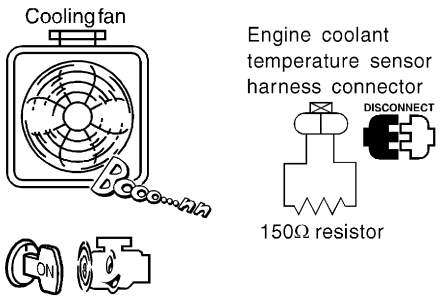


SEF621W

4

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF376X



SEF085T

Overall Function Check

NGEC0905

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-1055.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-1055.
3) Turn ignition switch ON.
4) Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II.
5) Make sure that cooling fan operates.
6) If NG, go to "Diagnostic Procedure", EC-1055.

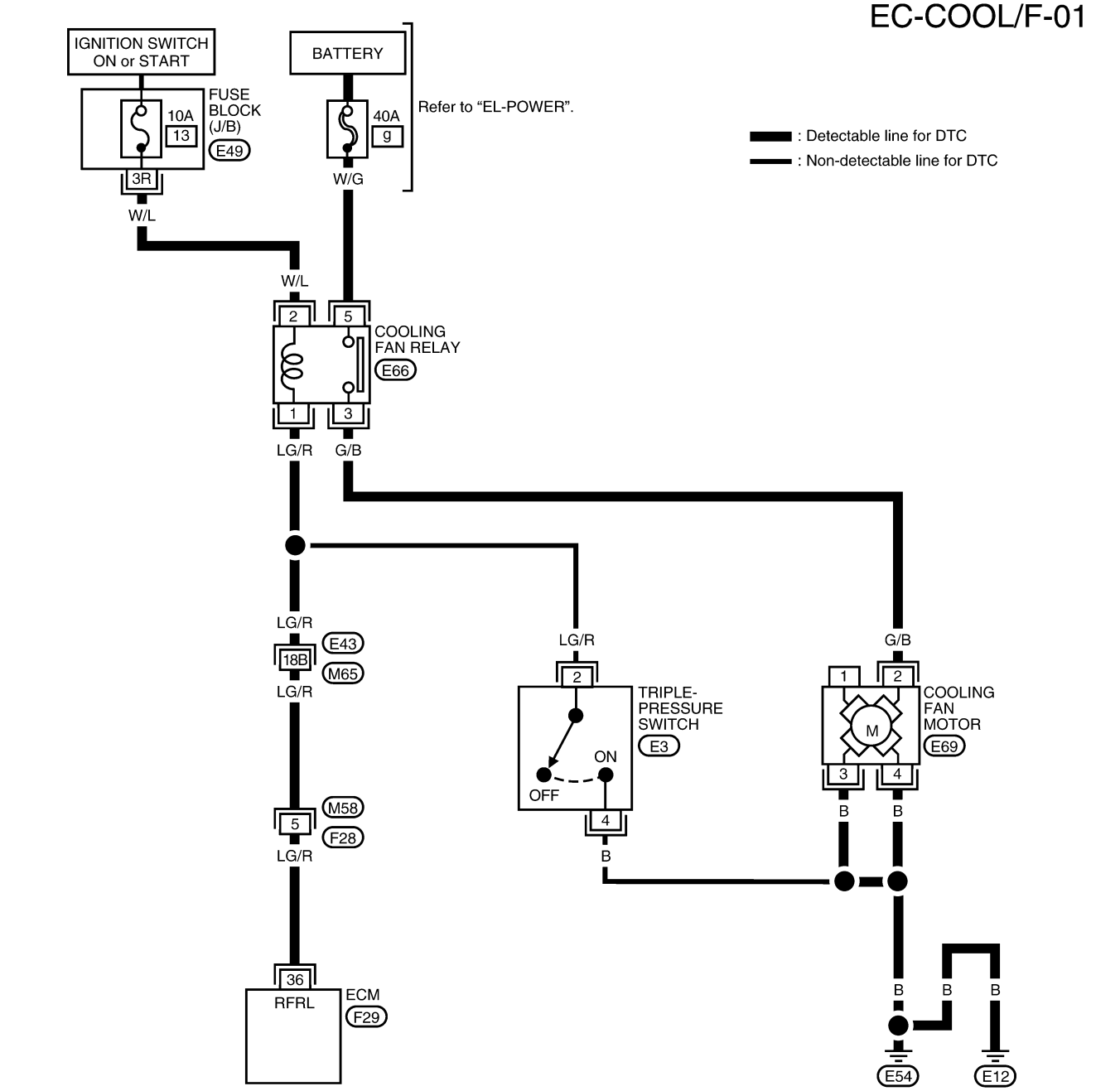
Without CONSULT-II

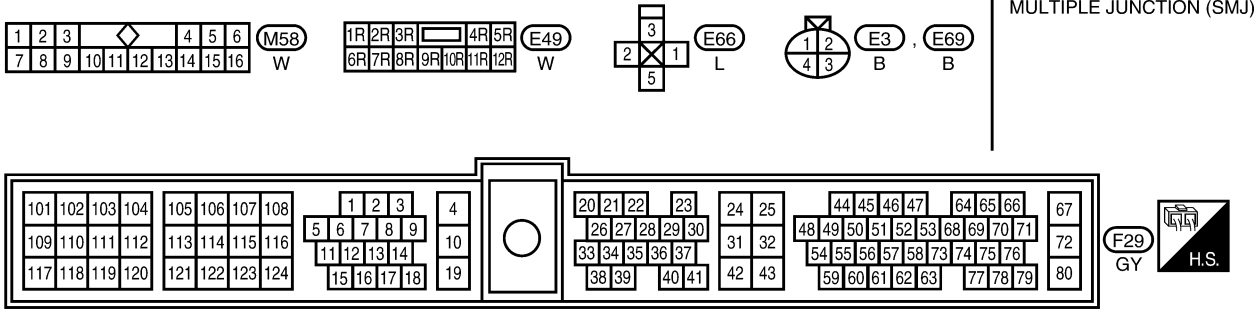
1) Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.
If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to "Diagnostic Procedure", EC-1055.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-1055.
3) Turn ignition switch OFF.
4) Disconnect engine coolant temperature sensor harness connector.
5) Connect 150Ω resistor to engine coolant temperature sensor harness connector.
6) Start engine and make sure that cooling fan operates.
Be careful not to overheat engine.
7) If NG, go to "Diagnostic Procedure", EC-1055.

Wiring Diagram

NGEC0906

EC-COOL/F-01





LEC504

Diagnostic Procedure

NGEC0907

1	INSPECTION START
Do you have CONSULT-II?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK COOLING FAN OPERATION

With CONSULT-II

1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF376X

Does cooling fan rotate?

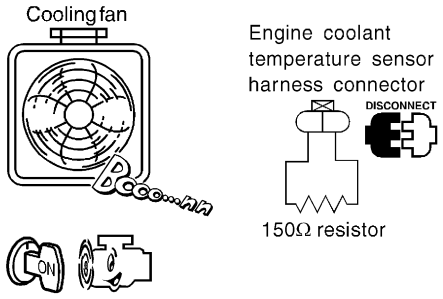
Yes or No

Yes ▶	GO TO 4.
No ▶	GO TO 9.

3	CHECK COOLING FAN OPERATION

Without CONSULT-II

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.
3. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
4. Start engine and make sure that cooling fan operates.



SEF085T

OK or NG

OK ▶	GO TO 4.
NG ▶	GO TO 9.

Diagnostic Procedure (Cont'd)

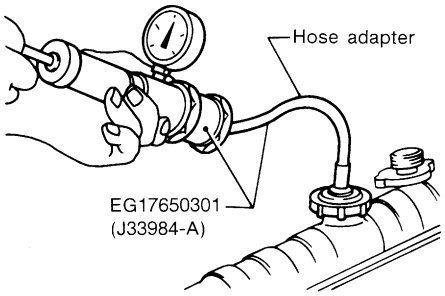
4	CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

CAUTION:

Higher than the specified pressure may cause radiator damage.

Testing pressure: 157 kPa (1.6 kg/cm^2, 23 psi)



SLC754A

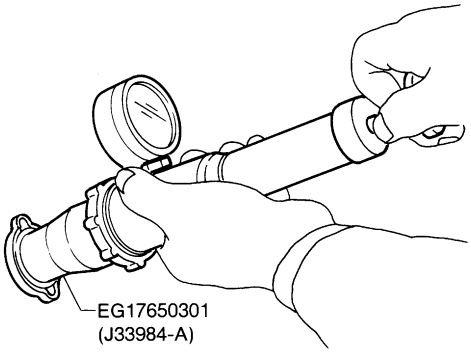
Pressure should not drop.

OK or NG

OK	▶	GO TO 5.
NG	▶	**Check the following for leak** ● Hose ● Radiator ● Water pump Refer to "Water Pump", ***LC-28***.

5	CHECK RADIATOR CAP

Apply pressure to cap with a tester and check radiator cap relief pressure.



SLC755A

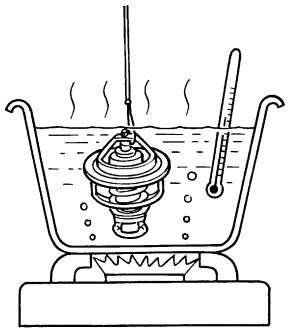
Radiator cap relief pressure:
59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi)

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace radiator cap.

6	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:
82°C (180°F) [standard]
Valve lift:
More than 10 mm/95°C (0.39 in/203°F)

3. Check if valve is closed at 5°C (9°F) below valve opening temperature.

For details, refer to "Thermostat", ***LC-29***.

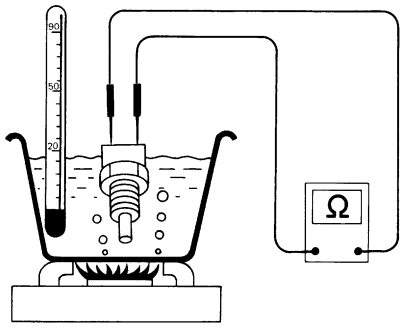
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace thermostat

Diagnostic Procedure (Cont'd)

7	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.

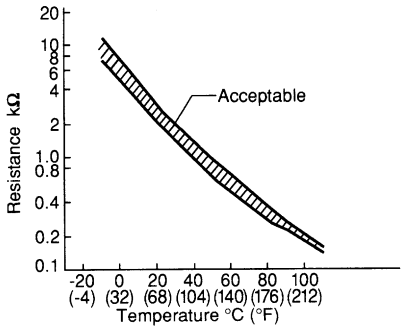


SEF152P

<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

MTBL0229



SEF012P

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace engine coolant temperature sensor.

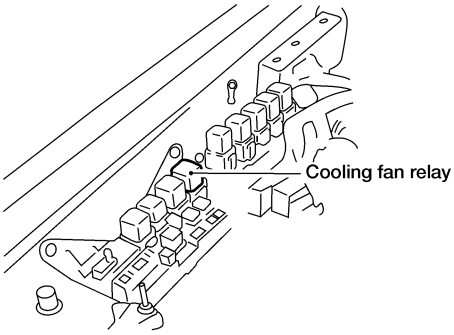
8	CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-1062.

▶ **INSPECTION END**

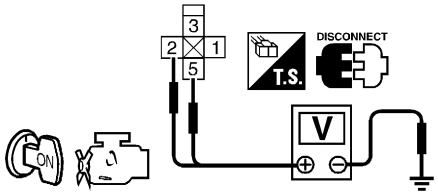
9	CHECK COOLING FAN RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay.



AEC932A

3. Turn ignition switch ON.
4. Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.



SEF667W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

10	DETECT MALFUNCTIONING PART

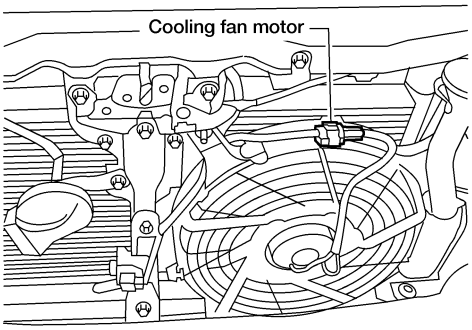
Check the following.
- Fuse block (J/B) connector E49
- 10A fuse
- 40A fusible link
- Harness for open or short between cooling fan relay and fuse
- Harness for open or short between cooling fan relay and battery

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

11	CHECK COOLING FAN MOTOR POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor harness connector.



AEC931A

3. Check harness continuity between relay terminal 3 and motor terminal 2, motor terminals 3, 4 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 12.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

12	CHECK COOLING FAN RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 36 and relay 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 14.
NG	▶	GO TO 13.

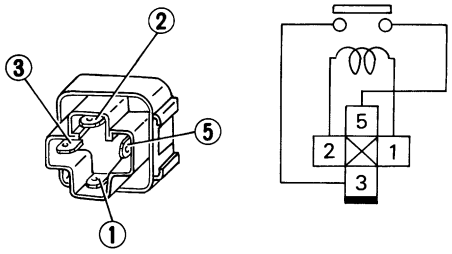
13	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E43, M65
- Harness connectors M58, F28
- Harness for open or short between cooling fan relay and ECM

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

14	CHECK COOLING FAN RELAY

Check continuity between terminals 3 and 5.



SEF511P

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

MTBL0252

OK or NG

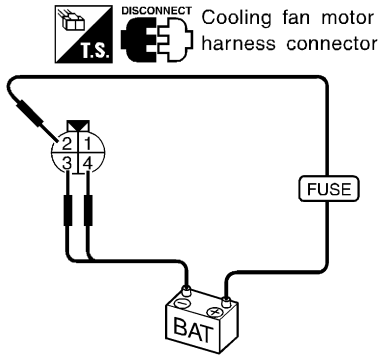
OK	▶	GO TO 15.
NG	▶	Replace cooling fan relay.

15	CHECK COOLING FAN MOTOR

1. Disconnect cooling fan motor harness connector.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Terminals	
	(+)	(–)
Cooling fan motor	2	3, 4

MTBL0253



SEF670W

Cooling fan motor should operate.

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace cooling fan motor.

16	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.

▶ **INSPECTION END**

Main 12 Causes of Overheating

NGEC0908

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	See “RECOMMENDED FLUIDS AND LUBRICANTS”,***MA-13***.
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See “Changing Engine Coolant”, “ENGINE MAINTENANCE”, ***MA-26***.
	4	• Radiator cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	See “System Check”, “ENGINE COOLING SYSTEM”, ***LC-26***.
ON*2	5	• Coolant leaks	• Visual	No leaks	See “System Check”, “ENGINE COOLING SYSTEM”, ***LC-26***.
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See “Thermostat” and “Radiator”, “ENGINE COOLING SYSTEM”, ***LC-29***, ***LC-31***.
ON*1	7	• Cooling fan	• CONSULT-II	Operating	See “TROUBLE DIAGNOSIS FOR OVERHEAT” EC-1051.
OFF	8	• Combustion gas leak	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	See “Changing Engine Coolant”, “ENGINE MAINTENANCE”, ***MA-26***.
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See “ENGINE MAINTENANCE”, ***MA-25***.
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See “Inspection”, “CYLINDER HEAD DISTORTION”, ***EM-88***.
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See “Inspection”, “CYLINDER BLOCK DISTORTION AND WEAR”, ***EM-47***.

*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 “Engine Cooling System”, “OVERHEATING CAUSE ANALYSIS”, ***LC-34***.

On Board Diagnosis Logic

NGEC1062

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise. When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.
Malfunction is detected when engine coolant temperature reaches an abnormally high temperature.

CAUTION:
When a malfunction is indicated be sure to replace the coolant, follow the procedure in *MA-26*, "Changing Engine Coolant". Also, replace the engine oil.

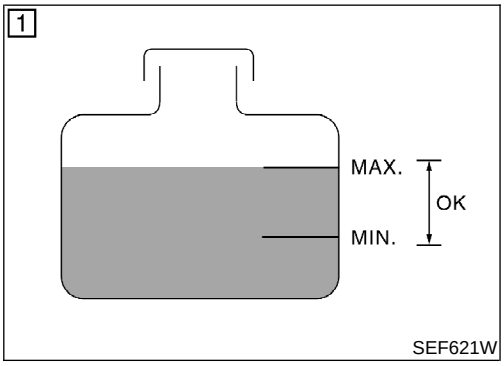
1) **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to *MA-15*, "Anti-freeze Coolant Mixture Ratio".**
2) **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

POSSIBLE CAUSE

NGEC1062S01

- Cooling fan (Crankshaft driven)
- Radiator hose
- Radiator
- Radiator cap
- Water pump
- Thermostat

For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", EC-1067.



Overall Function Check

NGEC1063

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-1064.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-1064.
3) Start engine.
4) Make sure that cooling fan (crankshaft driven) operates.
5) If NG, go to "Diagnostic Procedure", EC-1064.

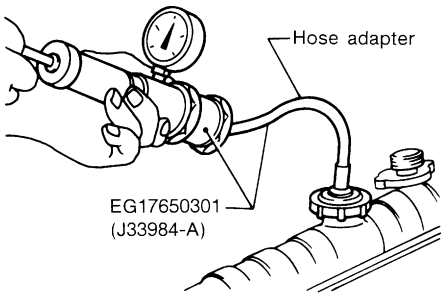
Without CONSULT-II

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-1064.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-1064.
3) Start engine and make sure that cooling fan (crankshaft driven) operates.
Be careful not to overheat engine.
4) If NG, go to "Diagnostic Procedure", EC-1064.

Diagnostic Procedure

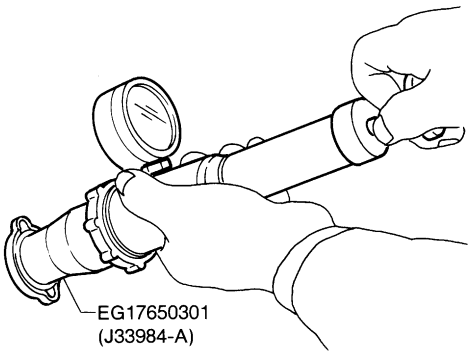
NGEC1064

1	CHECK COOLING FAN (CRANKSHAFT DRIVEN) OPERATION	
Start engine and make sure that cooling fan (crankshaft driven) operates.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Check cooling fan (Crankshaft driven). Refer to ***LC-32***, "Cooling Fan".

2	CHECK COOLING SYSTEM FOR LEAK	
Apply pressure to the cooling system with a tester, and check if the pressure drops. **CAUTION:** **Higher than the specified pressure may cause radiator damage.** **Testing pressure: 157 kPa (1.6 kg/cm^2, 23 psi)**  SLC754A **Pressure should not drop.**		
OK or NG		
OK	▶	GO TO 3.
NG	▶	**Check the following for leak** ● Hose ● Radiator ● Water pump Refer to ***LC-28***, "Water Pump".

3	CHECK RADIATOR CAP

Apply pressure to cap with a tester and check radiator cap relief pressure.



SLC755A

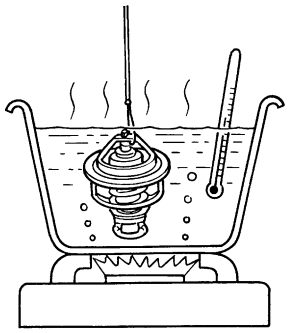
Radiator cap relief pressure:
59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi)

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace radiator cap.

4	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:
82°C (180°F) [standard]
Valve lift:
More than 10 mm/95°C (0.39 in/203°F)

3. Check if valve is closed at 5°C (9°F) below valve opening temperature.

For details, refer to ***LC-29***, "Thermostat".

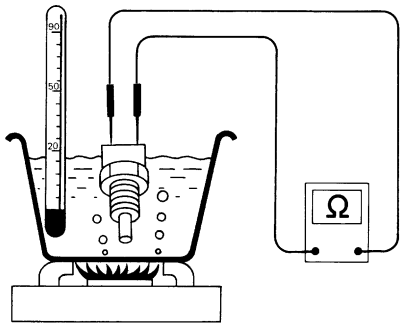
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace thermostat

Diagnostic Procedure (Cont'd)

5	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.

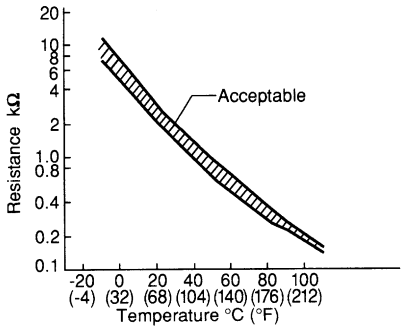


SEF152P

<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

MTBL0229



SEF012P

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace engine coolant temperature sensor.

6	CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-1067.

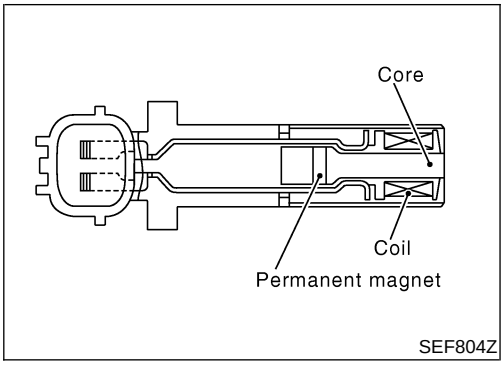
▶ **INSPECTION END**

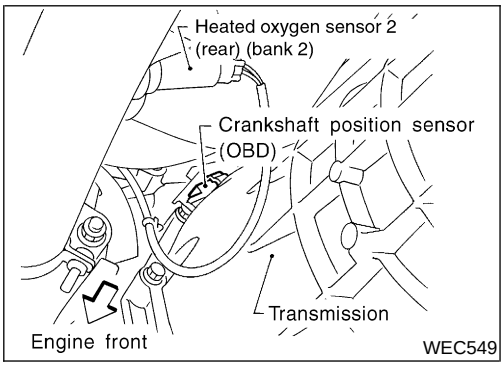
Main 12 Causes of Overheating

NGEC1065

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-26***, “Changing Engine Coolant”.
	4	• Radiator cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	See ***LC-26***, “System Check”.
ON*2	5	• Coolant leaks	• Visual	No leaks	See ***LC-26***, “System Check”.
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See ***LC-29***, “Thermostat” and ***LC-31***, “Radiator”.
ON*1	7	• Cooling fan (Crankshaft driven)	• Visual	Operating	See ***LC-32***, “Cooling Fan”.
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-26***, “Changing Engine Coolant”.
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See ***MA-25***, “ENGINE MAINTENANCE”.
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See ***EM-88***, “Inspection”.
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See ***EM-104***, “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-34***, “OVERHEATING CAUSE ANALYSIS”.





Component Description

NGEC0818

The crankshaft position sensor (OBD) is located on the transmission housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet, core and coil.

When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

This sensor is not used to control the engine system.

It is used only for the on board diagnosis.

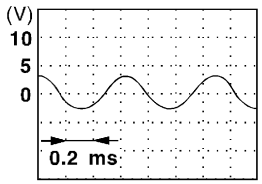
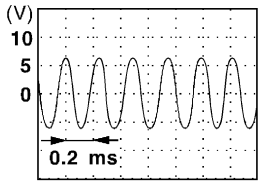
ECM Terminals and Reference Value

NGEC0819

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
47	L	Crankshaft position sensor (OBD)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1 - 2V (AC range)  SEF690W
			[Engine is running] ● Engine speed is 2,000 rpm	3 - 4V (AC range)  SEF691W

On Board Diagnosis Logic

NGEC0820

Malfunction is detected when a chipping of the flywheel or drive plate gear tooth (cog) is detected by the ECM.

POSSIBLE CAUSE

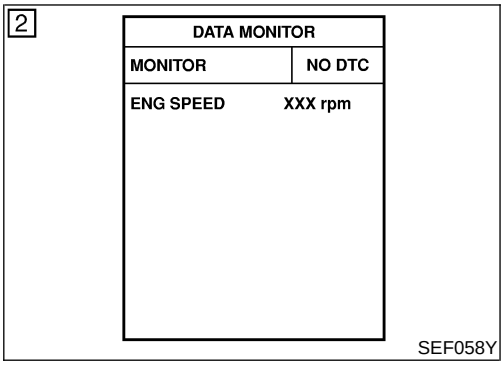
NGEC0820S01

- Harness or connectors
- Crankshaft position sensor (OBD)
- Drive plate/Flywheel

DTC Confirmation Procedure

NGEC0821

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.



With CONSULT-II

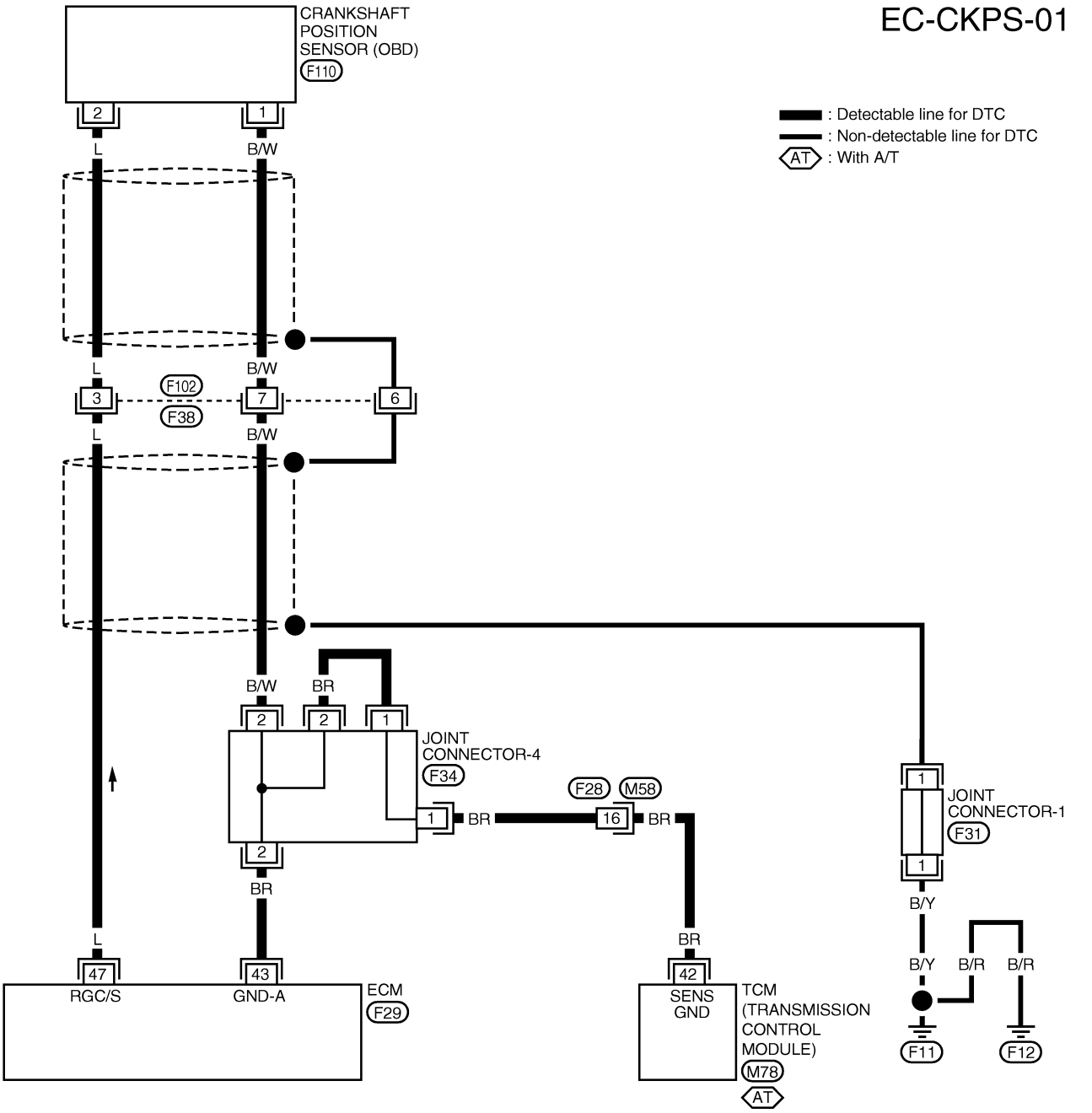
1) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine and run it for at least 2 minutes at idle speed.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1071.

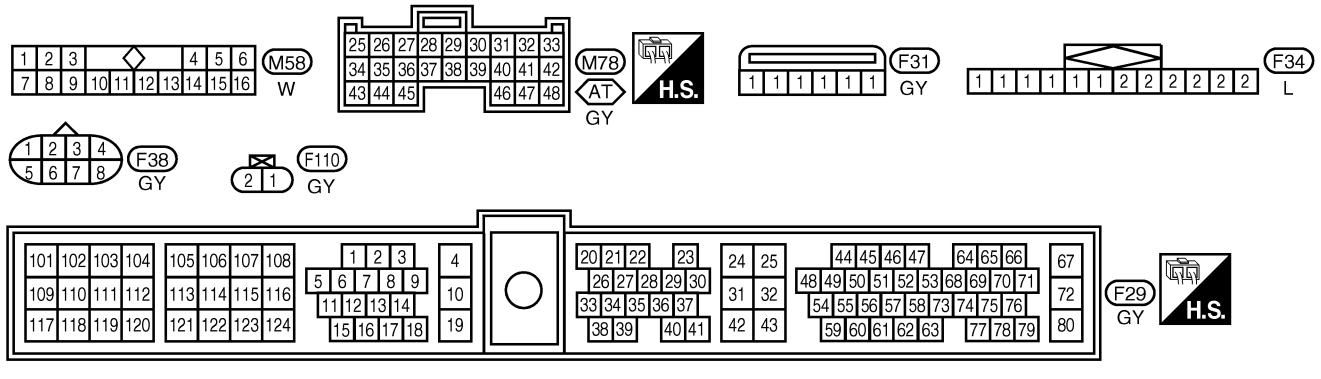
With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0822





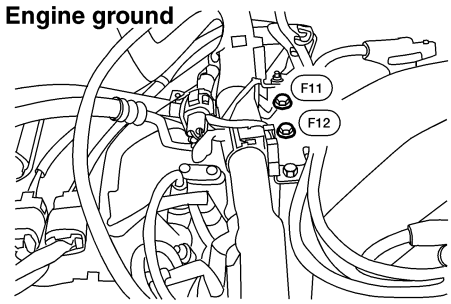
AEC956A

Diagnostic Procedure

NGEC0823

1	RETIGHTEN GROUND SCREWS

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

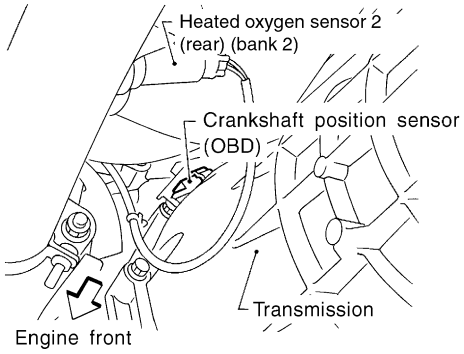


LEC518

	▶	GO TO 2.

2	CHECK CKPS (OBD) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.



WEC549

2. Check continuity between ECM terminal 47 and sensor terminal 2.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F38, F102
- Harness for open or short between ECM and crankshaft position sensor (OBD)

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

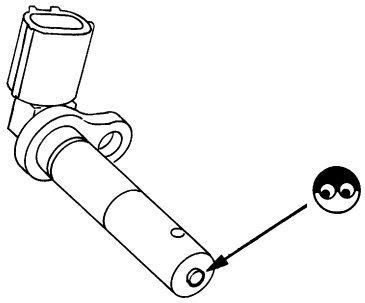
4	CHECK CKPS (OBD) GROUND CIRCUIT FOR OPEN AND SHORT	
1. Reconnect ECM harness connectors. 2. Check harness continuity between CKPS (OBD) terminal 1 and engine ground. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to ground and short to power. **OK or NG**		
OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART	
Check the following. ● Harness connectors F38, F102 ● Harness connectors F28, M58 ● Joint connector-4 ● Harness for open between crankshaft position sensor (OBD) and ECM ● Harness for open between crankshaft position sensor (OBD) and TCM (Transmission Control Module)		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK IMPROPER INSTALLATION	
1. Loosen and retighten the fixing bolt of the crankshaft position sensor (OBD). 2. Perform "DTC Confirmation Procedure", EC-1069 again. **Is a 1st trip DTC P1336 detected?**		
Yes	▶	GO TO 7.
No	▶	**INSPECTION END**

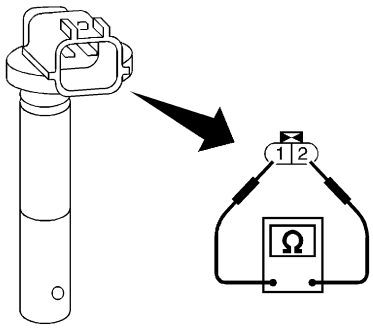
7	CHECK CRANKSHAFT POSITION SENSOR (OBD)

1. Disconnect crankshaft position sensor (OBD) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.



SEF960N

5. Check resistance as shown in the figure.



SEF504V

Resistance: Approximately 512 - 632Ω [at 20°C (68°F)]

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace crankshaft position sensor (OBD).

8	CHECK CKPS (OBD) SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect harness connectors F38, F102.
2. Check harness continuity between harness connector F38 terminal 6 and engine ground.
   Continuity should exist.
3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F38, F102
- Joint connector-1
- Harness for open between harness connector F38 and engine ground

	▶	Repair open circuit or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

10	CHECK GEAR TOOTH	
Visually check for chipping flywheel or drive plate gear tooth (cog).		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace the flywheel or drive plate.

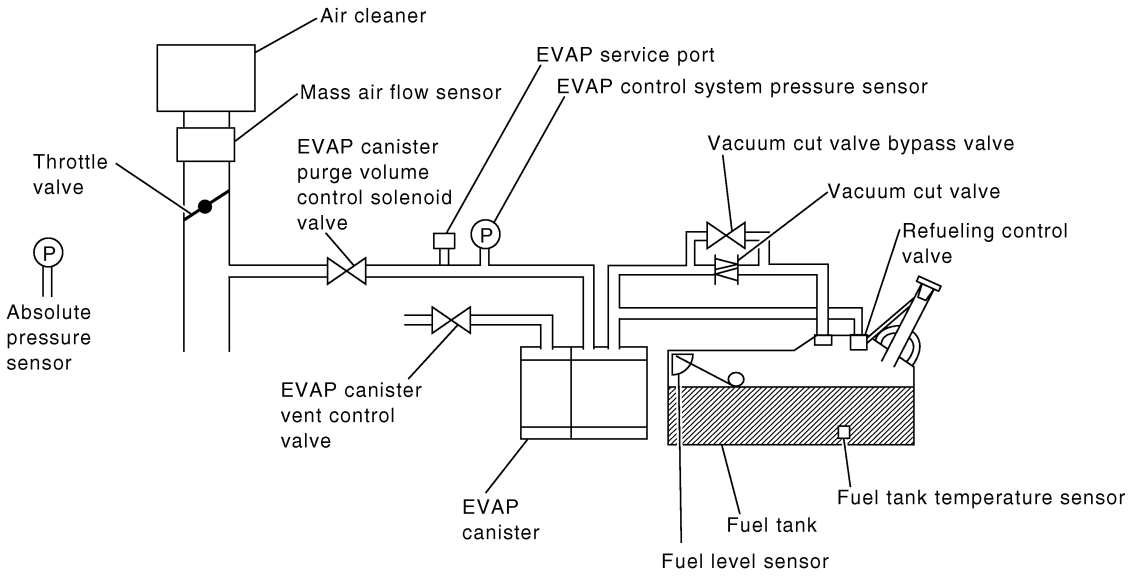
11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NGEC1048

NOTE:
If DTC P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1123.)

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

NGEC1048S02

- 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
- 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

NGEC1050

Refer to "P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK) (NEGATIVE PRESSURE)", EC-1077.

Diagnostic Procedure

NGEC1051

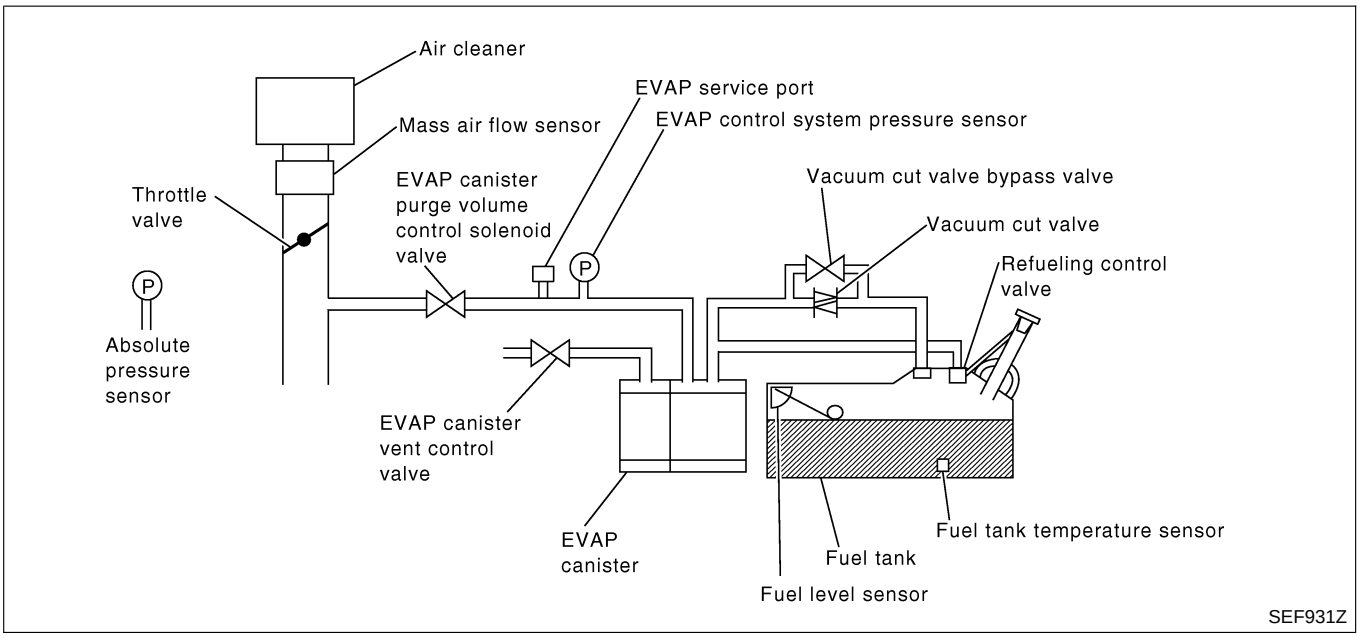
Refer to "P1441 EVAP CONTROL SYSTEM (VERY SMALL LEAK) (NEGATIVE PRESSURE)", EC-1077.

On Board Diagnosis Logic

NGEC0990

This diagnosis detects very small leaks in the EVAP line between the fuel tank and the EVAP canister purge volume control solenoid valve using intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.

If the ECM judges a leak equivalent to a very small leak, the very small leak DTC P1441 will be detected. If the ECM judges a leak equivalent to a small leak, the EVAP small leak DTC P0440 will be detected. Correspondingly, if the ECM judges there is no leak, the diagnosis result is OK.



Malfunction is detected when EVAP control system has a very small leak, EVAP control system does not operate properly.

CAUTION:

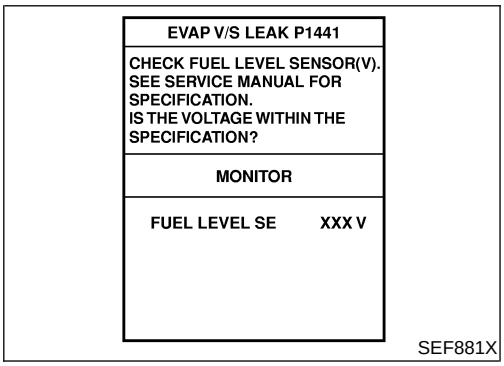
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

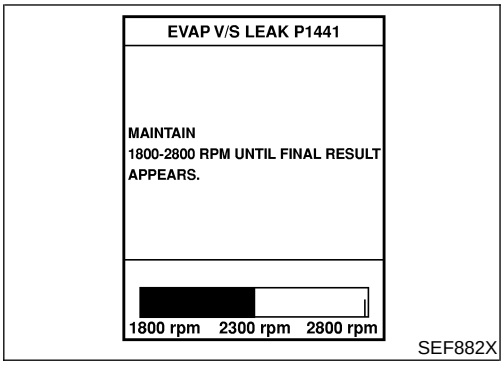
POSSIBLE CAUSE

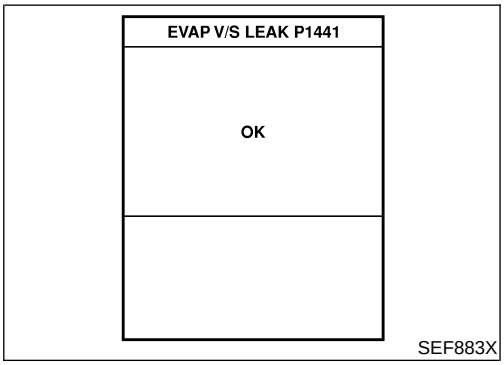
NGEC0990S02

- 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

- 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

NGEC0992

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 5 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 condition is 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: 1.08 - 0.2V
   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 5 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-825.

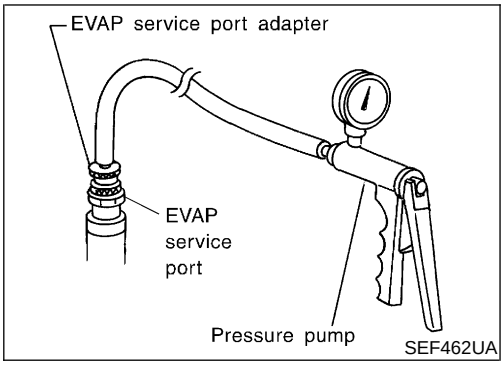
NOTE:
- **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to "Basic inspection", EC-694.**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**

Overall Function Check

NGEC1001

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-825.

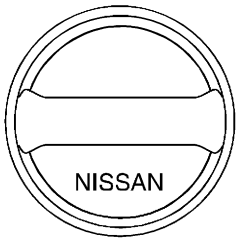
NOTE:
For more information, refer to GST instruction manual.

Diagnostic Procedure

NGEC0993

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

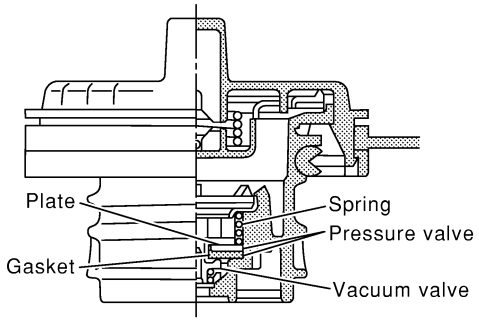
Check for air releasing sound while opening the fuel filler cap.

OK or NG

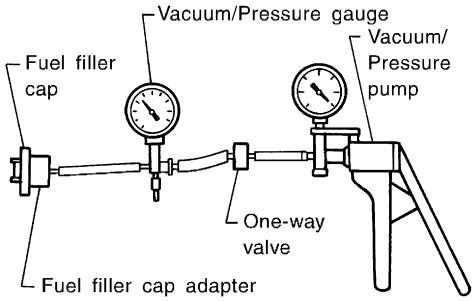
OK	▶	GO TO 5.
NG	▶	GO TO 4.

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 −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)

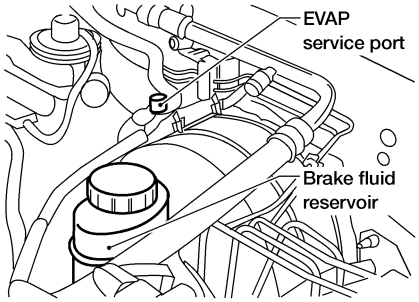
CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

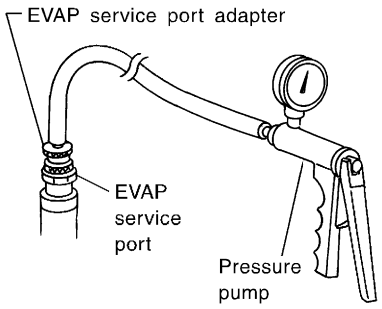
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



AEC649A



SEF916U

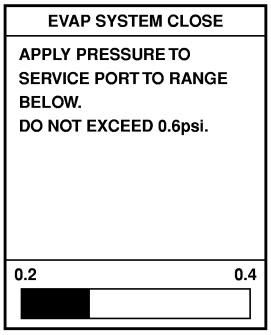
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ▶	GO TO 6.
Models without CONSULT-II ▶	GO TO 7.

6	CHECK FOR EVAP LEAK

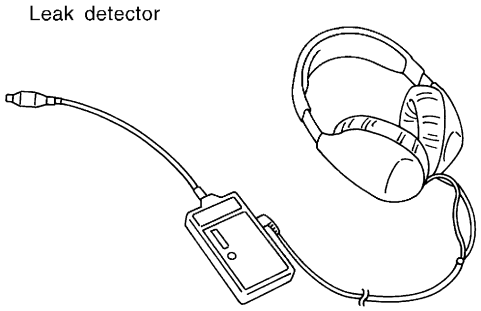
With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-623.



SEF200U

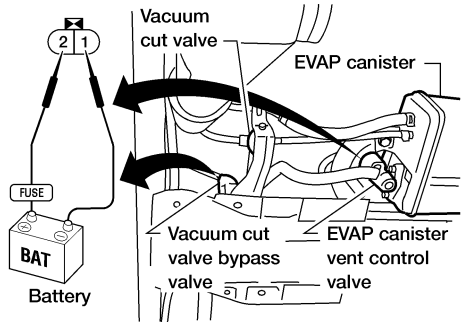
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

7	CHECK FOR EVAP LEAK

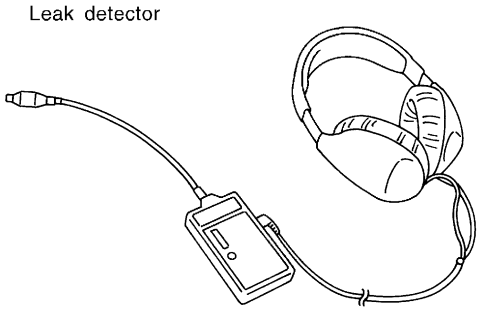
Without CONSULT-II

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.)



AEC632A

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-623.



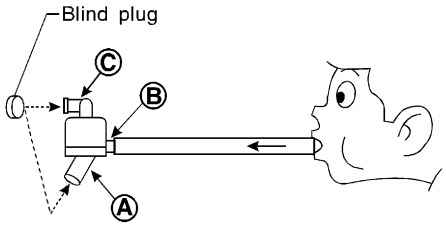
SEF200U

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

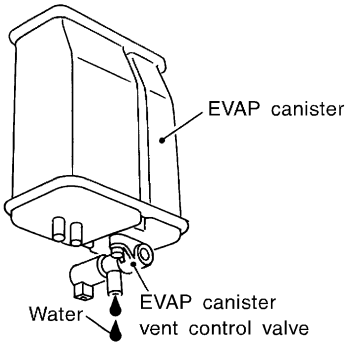
Refer to "DTC Confirmation Procedure", EC-981.

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	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

Vacuum should exist.

SEF984Y

OK or NG

OK ▶	GO TO 16.
NG ▶	GO TO 15.

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK ▶	GO TO 17.
NG ▶	GO TO 15.

15	CHECK VACUUM HOSE	
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-613.		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 16.
OK (Without CONSULT-II)	▶	GO TO 17.
NG	▶	Repair or reconnect the hose.

16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	
With CONSULT-II 1. Start engine. 2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.		

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

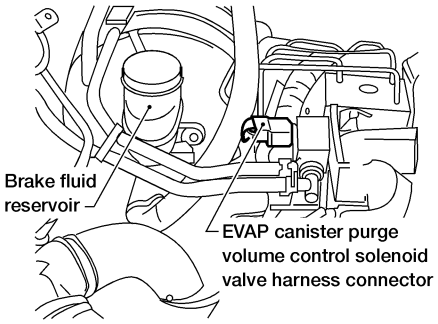
SEF985Y

OK or NG		
OK	▶	GO TO 18.
NG	▶	GO TO 17.

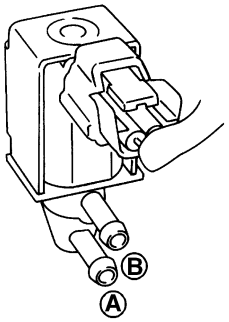
17 **CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE**

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



WEC547

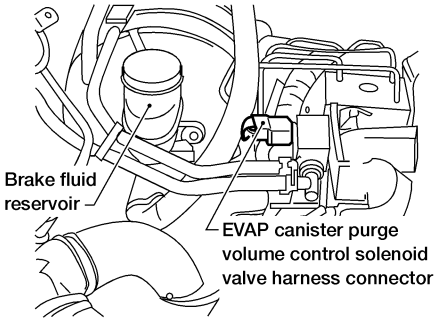


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

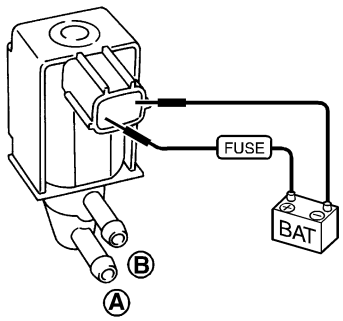
SEF334X

Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



WEC547



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

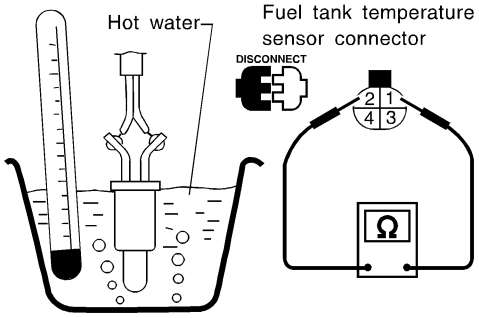
With CONSULT-II
1. Turn ignition switch ON.
2. Select "SELF DIAG RESULTS" mode with CONSULT-II.
3. Touch "ERASE".
4. **Perform "DTC Confirmation Procedure".**
   See EC-748.
5. Is the 1st trip DTC P0105 displayed again?

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace ECM.

19	CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 2 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

SEF974Y

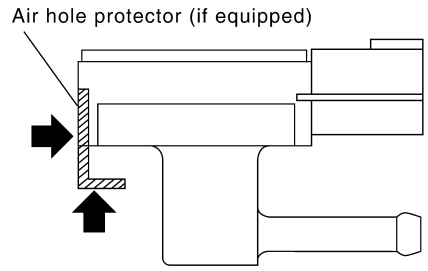
OK or NG

OK	▶	GO TO 20.
NG	▶	Replace fuel level sensor unit.

Diagnostic Procedure (Cont'd)

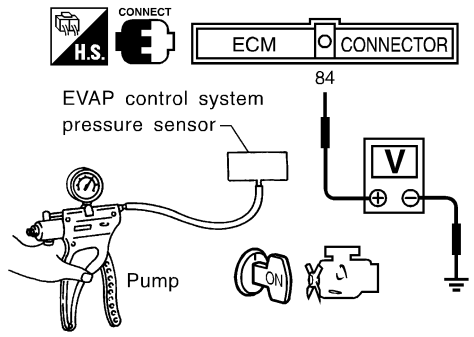
20	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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 and EVAP control system pressure sensor which has been dropped from a height of more than 0.5m (19.7in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK	▶	GO TO 21.
NG	▶	Replace EVAP control system pressure sensor.

21	CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to "Evaporative Emission System", EC-619.

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 FUEL LEVEL SENSOR	
Refer to EL-XX, "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-732.	
▶	**INSPECTION END**

Description

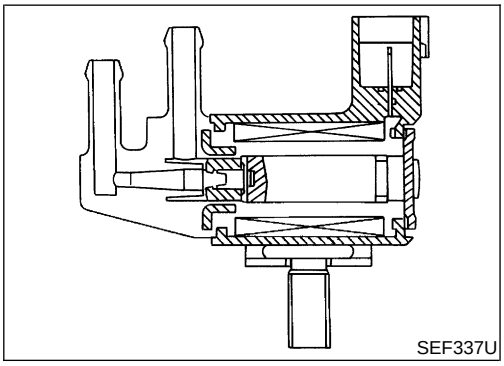
NGEC0845

SYSTEM DESCRIPTION

NGEC0845S01

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 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 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

NGEC0845S02

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

NGEC0846

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	—

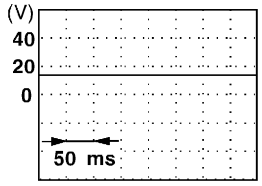
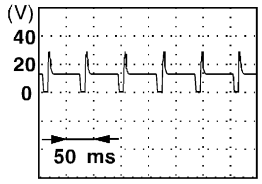
ECM Terminals and Reference Value

NGEC0847

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF994U
			[Engine is running] ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF995U
67	B/P	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0848

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

NGEC0848S01

- EVAP control system pressure sensor
- EVAP canister purge volume control solenoid valve (The valve is stuck open.)
- EVAP canister vent control valve
- EVAP canister

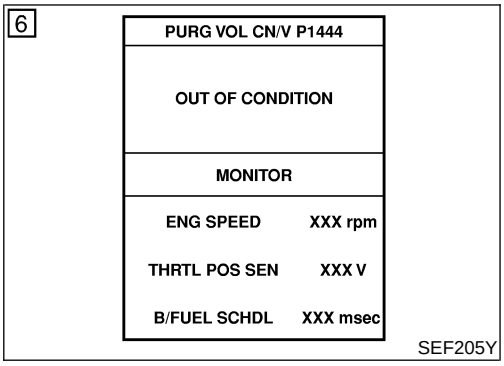
- Hoses
  (Hoses are connected incorrectly or clogged.)

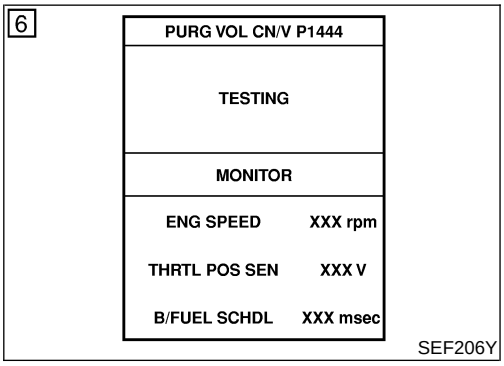
DTC Confirmation Procedure

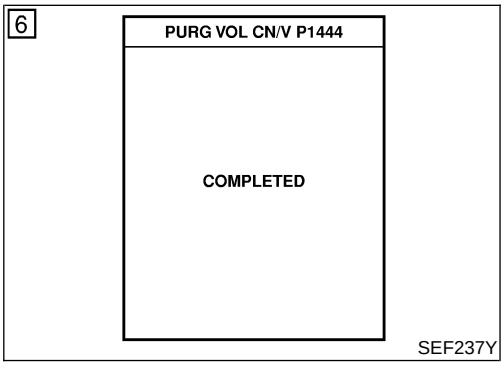
NGEC0849

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.







With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON.
4) Select “PURG 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-1096.

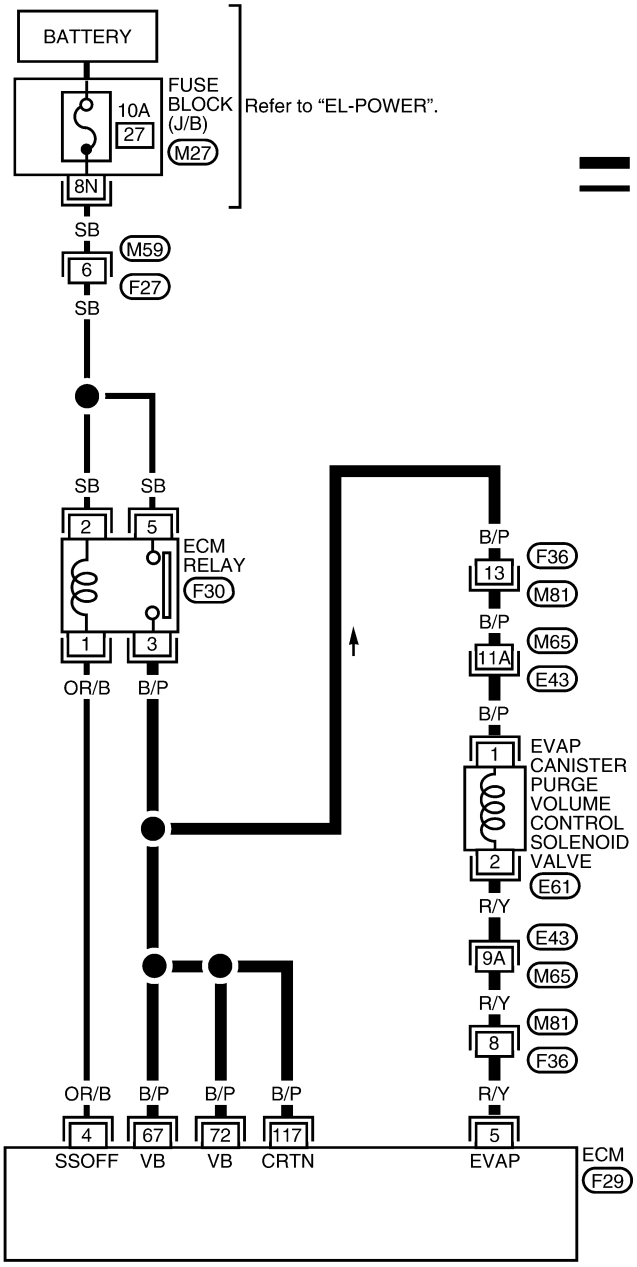
With GST

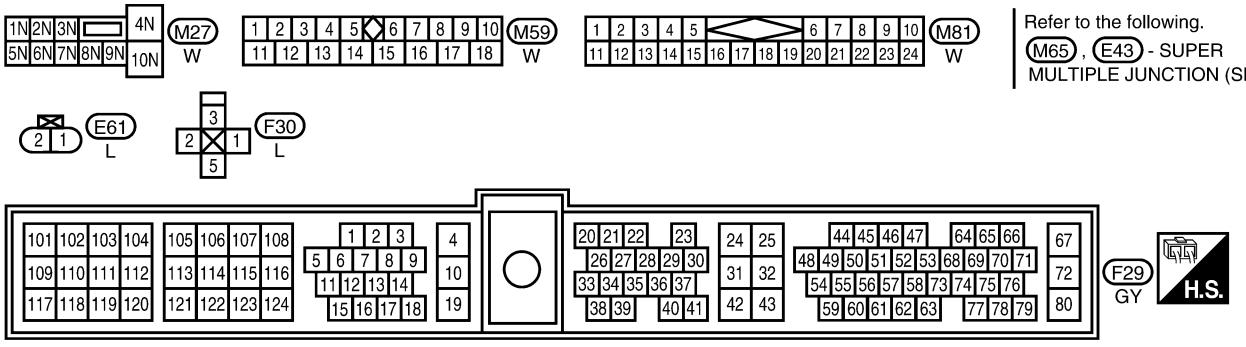
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Start engine and let it idle for at least 20 seconds.
4) Select “MODE 7” with GST.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1096.

Wiring Diagram

NGEC0850

EC-PGC/V-01





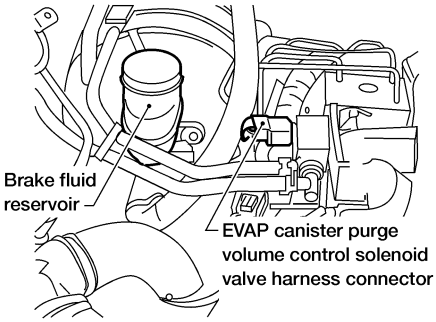
WEC933

Diagnostic Procedure

NGEC0851

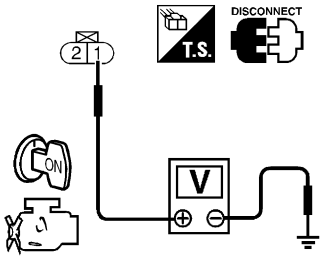
1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.



AEC652A

3. Turn ignition switch ON.
4. Check voltage between terminal 1 and engine ground with CONSULT-II or tester.



SEF646W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F36, M81
- Harness connectors M82, E74
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

	▶	Repair harness or connectors.

3	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

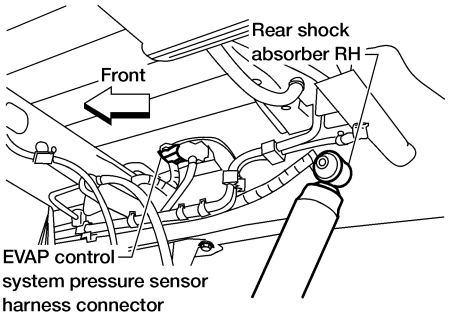
1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 5 and solenoid valve terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

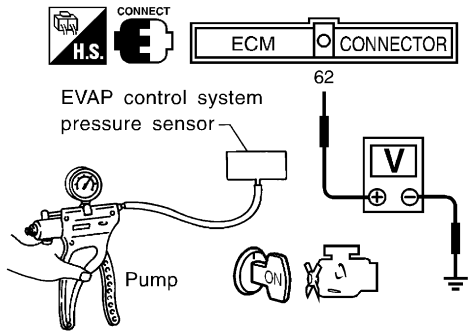
4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E74, M82 ● Harness connectors M81, F36 ● Harness for open or short between EVAP canister purge volume control solenoid valve and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor. **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.  AEC651A 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.
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.
5. Check input voltage between ECM terminal 62 and ground.



SEF894U

Pressure (Relative to atmosphericpressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
–9.3 kPa (–70 mmHg, –2.76 inHg)	0.4 - 0.6

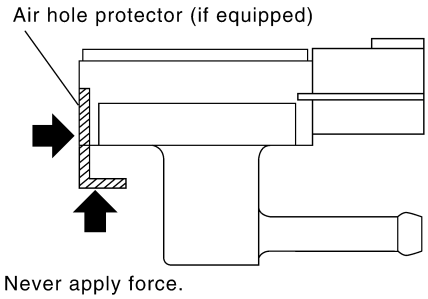
MTBL0246

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.**

CAUTION:

- **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5m (19.7in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK (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

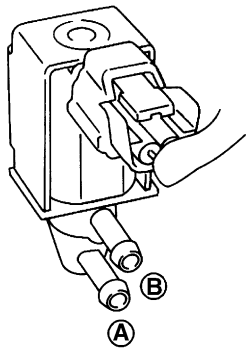
1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

If OK, inspection end. If NG, go to following step.

3. Check air passage continuity.



SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

MTBL0241

If NG, replace the EVAP canister purge volume control solenoid valve.

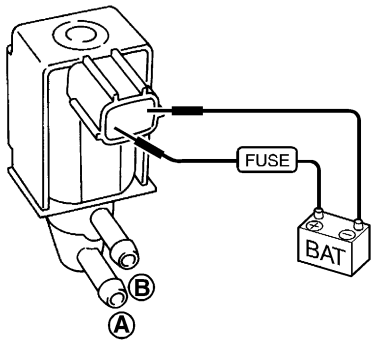
OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

9	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Without CONSULT-II

Check air passage continuity.



SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

MTBL0242

If NG, replace the EVAP canister purge volume control solenoid valve.

OK or NG

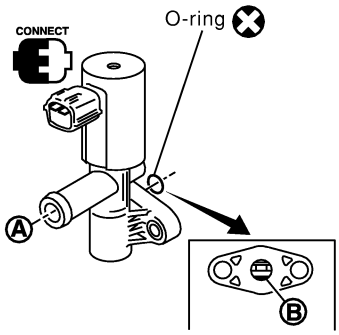
OK	▶	GO TO 10.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

10	CHECK EVAP CANISTER VENT CONTROL VALVE

Check air passage continuity.

With CONSULT-II

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	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.

SEF991Y

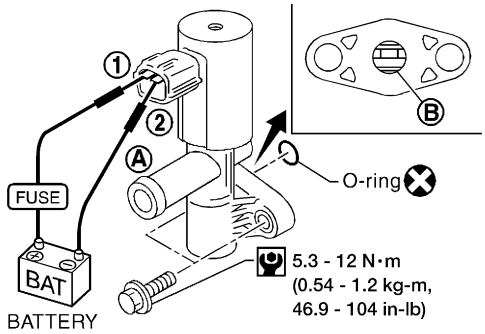
Without CONSULT-II

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If portion **B** is rusted, replace control valve.



AEC783A

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP canister vent control valve.

11	CHECK RUBBER TUBE

Check for obstructed rubber tube connected to EVAP canister vent control valve.

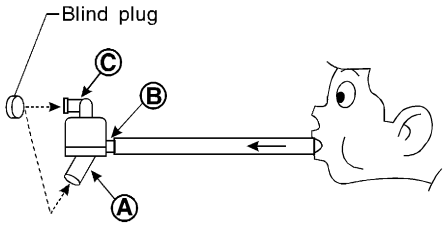
OK or NG

OK	▶	GO TO 12.
NG	▶	Clean, repair or replace rubber tube.

Diagnostic Procedure (Cont'd)

12	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:

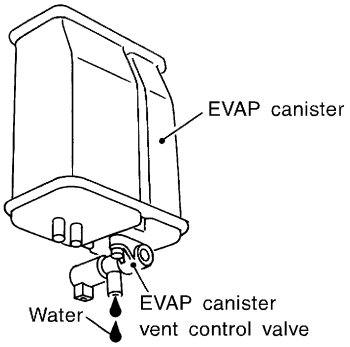
- Do not disassemble water separator.

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace water separator.

13	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

Yes or No

Yes	▶	GO TO 14.
No	▶	GO TO 16.

14	CHECK EVAP CANISTER

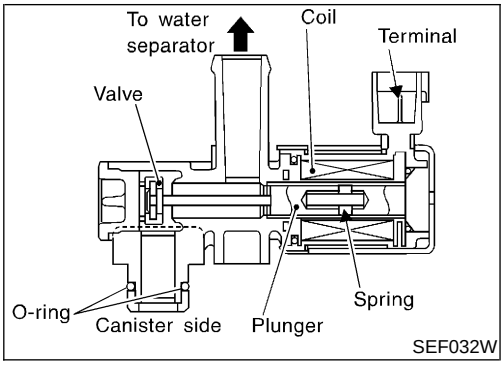
Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

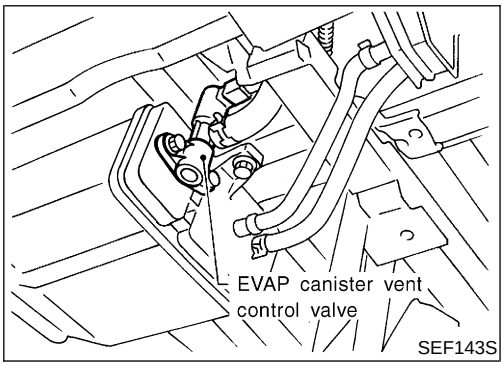
OK or NG

OK	▶	GO TO 16.
NG	▶	GO TO 15.

15	DETECT MALFUNCTIONING PART
Check the following. • EVAP canister for damage • EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

16	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**





Component Description

NGEC0852

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

NGEC0853

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NGEC0854

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

=NGEC0855

Malfunction is detected when EVAP canister vent control valve remains closed under specified driving conditions.

POSSIBLE CAUSE

NGEC0855S01

- 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

NGEC0856

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

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-1107.

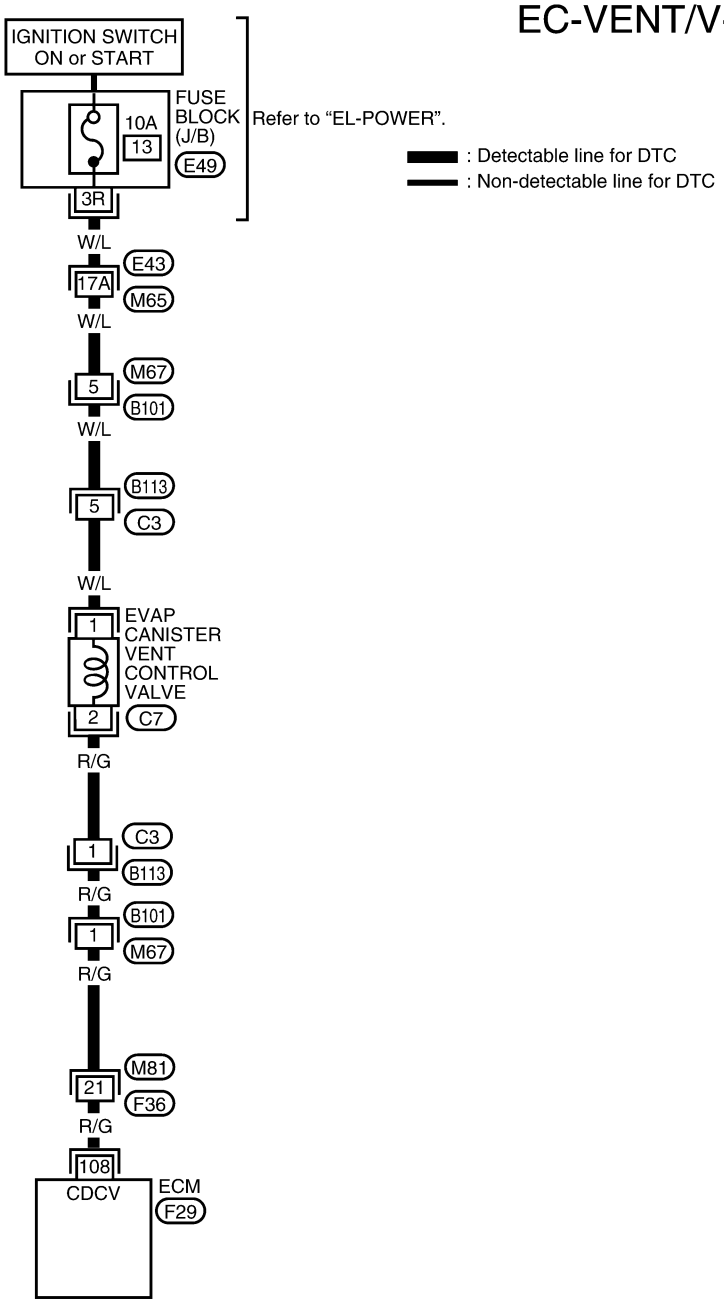
With GST

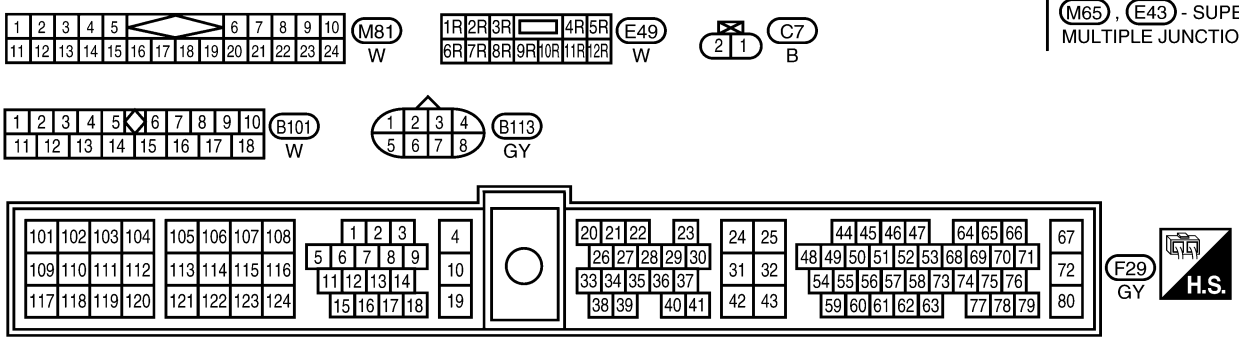
Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0857

EC-VENT/V-01





Refer to the following.
M65 , E43 - SUPER MULTIPLE JUNCTION (SMJ)

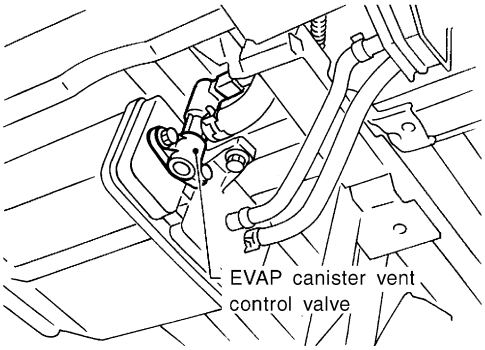
WEC934

Diagnostic Procedure

NGEC0858

1	CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Check obstructed rubber tube connected to EVAP canister vent control valve.



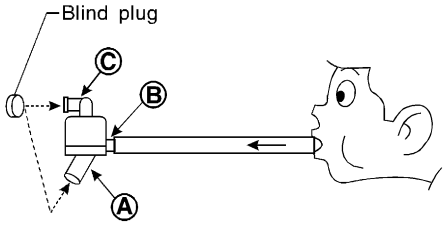
SEF143S

OK or NG

OK	▶	GO TO 2.
NG	▶	Clean, repair or replace rubber tube.

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	▶	Replace water separator.

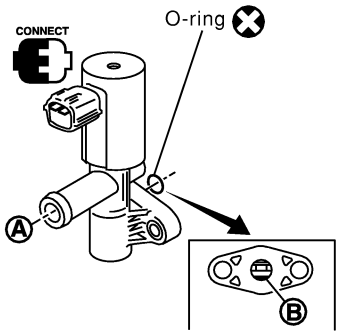
Diagnostic Procedure (Cont'd)

3	CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

Check air passage continuity.

With CONSULT-II

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	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.

SEF991Y

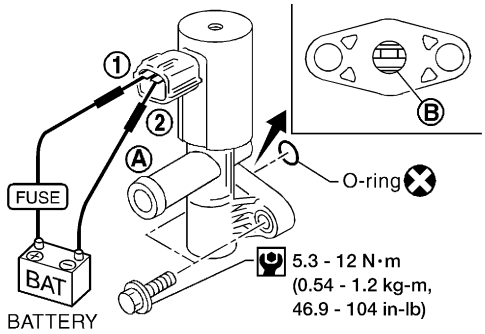
Without CONSULT-II

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If portion **B** is rusted, replace control valve.



AEC783A

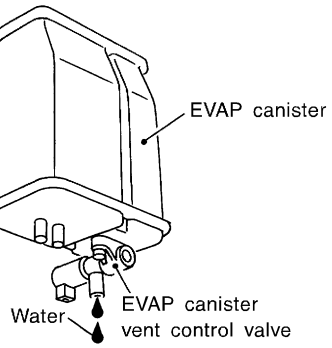
Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve and O-ring.

4	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 5.
No	▶	GO TO 7.

5	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 7.
NG	▶	GO TO 6.

6	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.

7	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

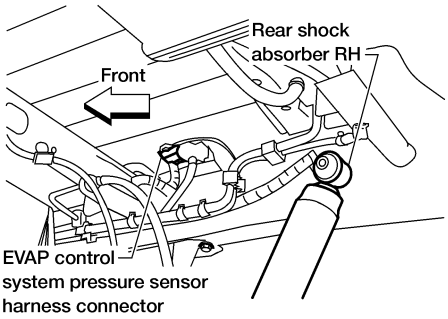
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair it.

Diagnostic Procedure (Cont'd)

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



AEC651A

2. Check connectors for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EVAP control system pressure sensor.

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to "DTC Confirmation Procedure" for DTC P0450, EC-987.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

10	CHECK INTERMITTENT INCIDENT

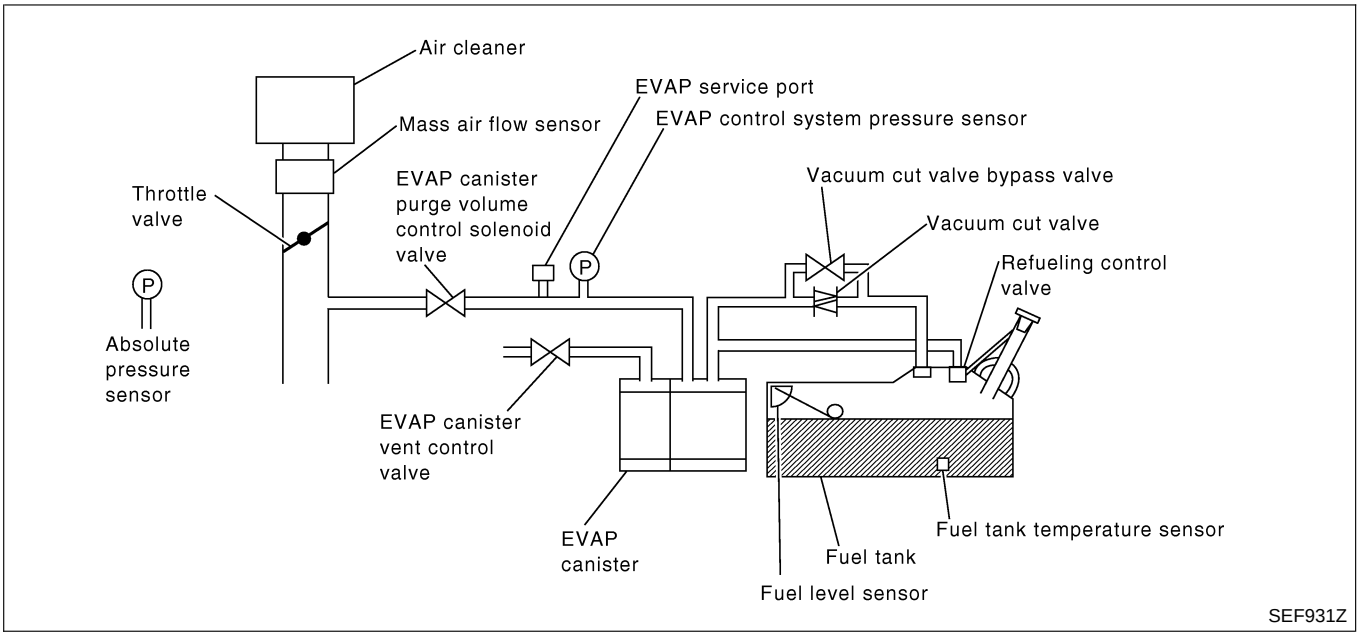
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.

▶ **INSPECTION END**

System Description

NGEC0859

NOTE:
If DTC P1447 is displayed with P0510, perform trouble diagnosis for DTC P0510 first. (See EC-1033.)



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. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

On Board Diagnosis Logic

NGEC0860

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

NGEC0860S01

- 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
- Blocked or bent rubber tube to MAP/BARO switch solenoid valve
- Cracked EVAP canister
- EVAP canister purge volume control solenoid valve circuit
- Closed throttle position switch
- Blocked purge port
- EVAP canister vent control valve

5

PURG FLOW P1447	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF207Y

6

PURG FLOW P1447	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF208Y

6

PURG FLOW P1447
COMPLETED

SEF238Y

DTC Confirmation Procedure

NGEC0861

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

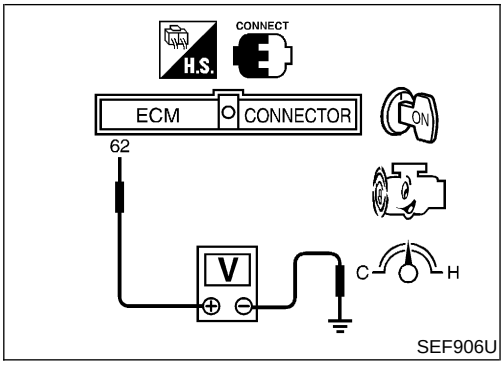
With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Start engine and let it idle for at least 70 seconds.
4) Select "PURG FLOW P1447" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" 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 - 3,400 rpm
B/FUEL SCHDL	1.0 - 10.0 msec
Engine coolant temperature	70 - 100°C (158 - 212°F)

If "TESTING" is not changed for a long time, retry from step 2.

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-1114.



Overall Function Check

=NGEC0862

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.

Without CONSULT-II

1) Lift up drive wheels.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch OFF, wait at least 5 seconds.
4) Start engine and wait at least 70 seconds.
5) Set voltmeter probes to ECM terminals 62 (EVAP control system pressure sensor signal) and 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-1114.

Diagnostic Procedure

=NGEC0863

1	CHECK EVAP CANISTER

1. Turn ignition switch OFF.
2. Check EVAP canister for cracks.

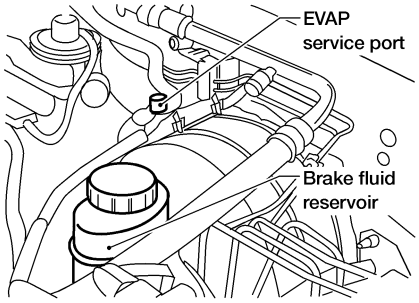
OK or NG

OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Replace EVAP canister.

2	CHECK PURGE FLOW

With CONSULT-II

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.



AEC649A

2. Start engine and let it idle.
3. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II.
4. Rev engine up to 2,000 rpm.
5. Touch “Qd” and “Qu” on CONSULT-II screen to adjust “PURG VOL CONT/V” opening.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
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

PURG VOL CONT/V	VACUUM
100.0%	Should exist
0.0%	Should not exist

SEF012Z

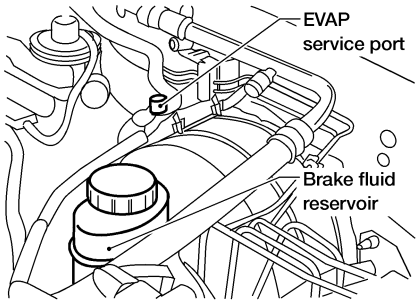
OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 4.

3	CHECK PURGE FLOW

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.



AEC649A

4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum gauge indication when revving engine up to 2,000 rpm.
   Vacuum should exist.
6. Release the accelerator pedal fully and let idle.
   Vacuum should not exist.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 4.

4	CHECK EVAP PURGE LINE

1. Turn ignition switch OFF.
2. Check EVAP purge line for improper connection or disconnection.
   Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-623.

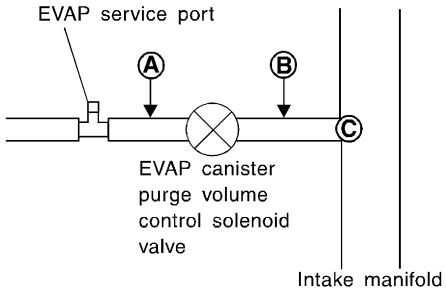
OK or NG

OK	▶	GO TO 5.
NG	▶	Repair it.

Diagnostic Procedure (Cont'd)

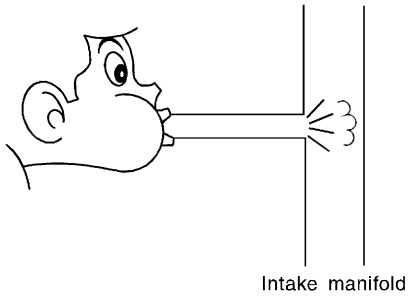
5	CHECK EVAP PURGE HOSE AND PURGE PORT

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

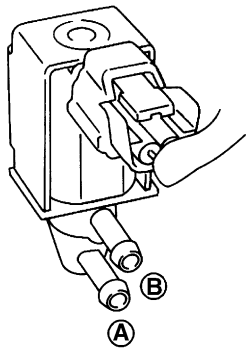
1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

If OK, inspection end. If NG, go to following step.

3. Check air passage continuity.



SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

MTBL0241

If NG, replace the EVAP canister purge volume control solenoid valve.

OK or NG

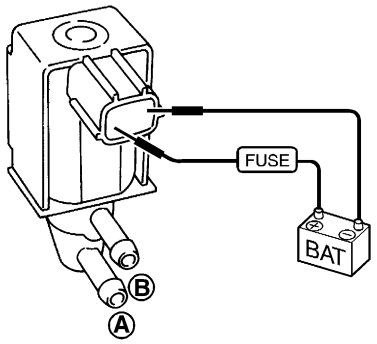
OK	▶	GO TO 8.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

Diagnostic Procedure (Cont'd)

7	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Without CONSULT-II

Check air passage continuity.



SEF661U

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

MTBL0242

If NG, replace the EVAP canister purge volume control solenoid valve.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

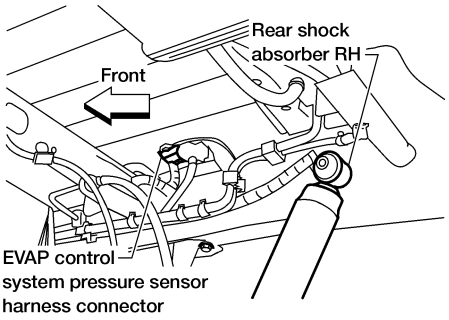
1. Turn ignition switch OFF.
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

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.



AEC651A

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-987.

OK or NG

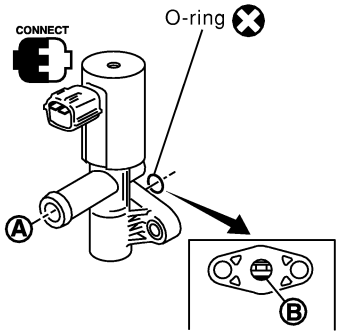
OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

11	CHECK EVAP CANISTER VENT CONTROL VALVE

Check air passage continuity.

With CONSULT-II

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	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.

SEF991Y

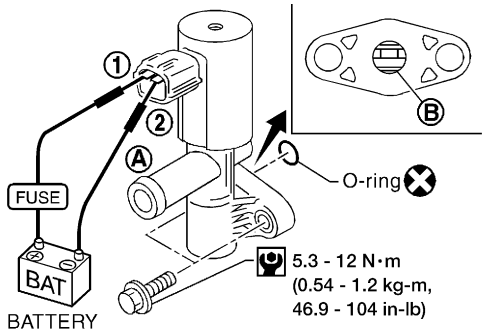
Without CONSULT-II

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If portion **B** is rusted, replace control valve.



AEC783A

Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP canister vent control valve.

Diagnostic Procedure (Cont'd)

12	CHECK CLOSED THROTTLE POSITION SWITCH

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Turn ignition switch ON.
4. Select "DATA MONITOR" mode with CONSULT-II.
5. Check indication of "CLSD THL/P SW".
   Measurement must be made with closed throttle position switch installed in vehicle.

Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely open	OFF

MTBL0355

If NG, adjust closed throttle position switch.
Check the following items. Refer to "Basic Inspection", EC-694.

Items	Specifications
Ignition timing	10° ± 2° BTDC
Base idle speed	700 ± 50 rpm (in "P" or "N" position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	750 ± 50 rpm (in "P" or "N" position)

MTBL0576

6. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.

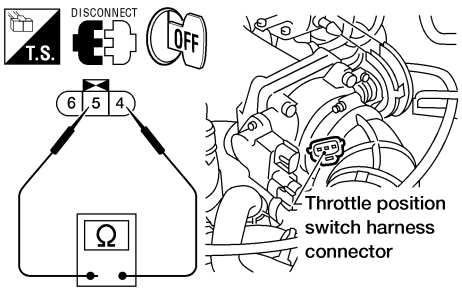
OK or NG

OK	▶	GO TO 14.
NG	▶	Replace throttle position switch with throttle position sensor.

13	CHECK CLOSED THROTTLE POSITION SWITCH

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect closed throttle position switch harness connector.
4. Check continuity between closed throttle position switch terminals 4 and 5.
   Resistance measurement must be made with closed throttle position switch installed in vehicle.



AEC654A

Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

MTBL0247

If NG, adjust closed throttle position switch.
Check the following items. Refer to "Basic Inspection", EC-694.

Items	Specifications
Ignition timing	10° ± 2° BTDC
Base idle speed	700 ± 50 rpm (in "P" or "N" position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	750 ± 50 rpm (in "P" or "N" position)

MTBL0576

5. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace throttle position switch with throttle position sensor.

14	CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-623.

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace it.

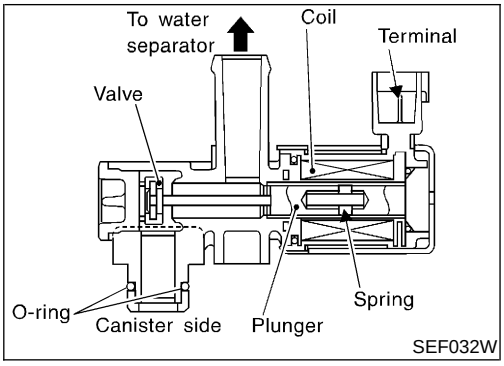
15	CLEAN EVAP PURGE LINE

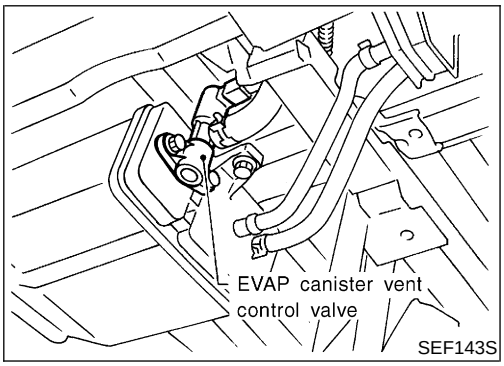
Clean EVAP purge line (pipe and rubber tube) using air blower.

	▶	GO TO 16.

Diagnostic Procedure (Cont'd)

16	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**





Component Description

NGEC0864

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

NGEC0865

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NGEC0866

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0867

Malfunction is detected when EVAP canister vent control valve remains opened under specified driving conditions.

POSSIBLE CAUSE

NGEC0867S01

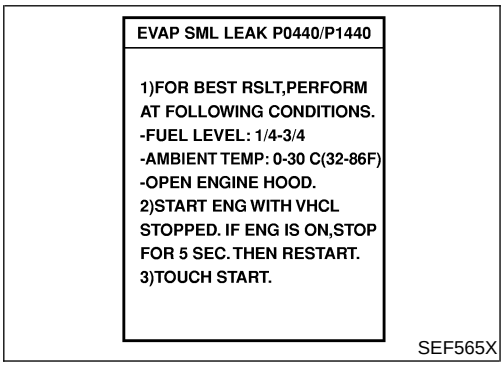
- EVAP canister vent control valve
- EVAP control system pressure sensor and circuit
- Blocked rubber tube to EVAP canister vent control valve
- Water separator
- EVAP canister is saturated with water.
- Vacuum cut valve

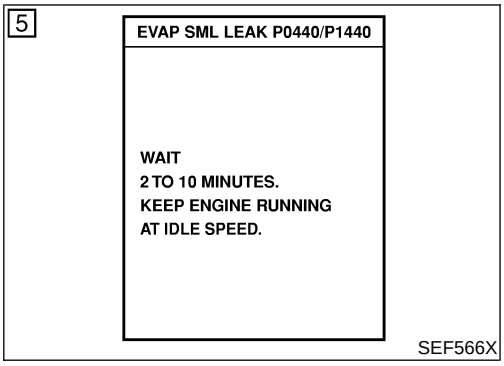
DTC Confirmation Procedure

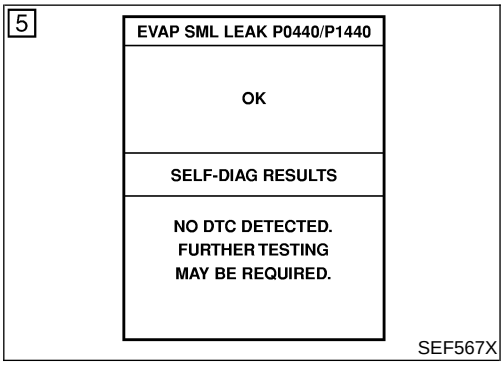
NGEC0868

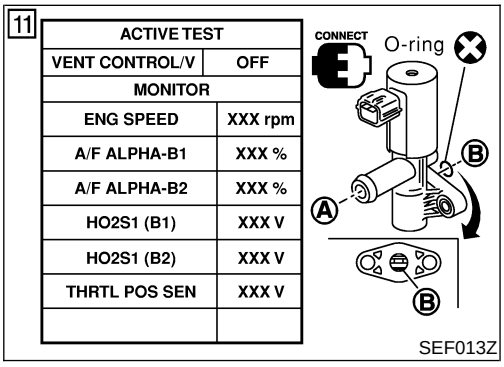
NOTE:

- **If DTC P1448 is displayed with P0440, perform trouble diagnosis for DTC P1448 first.**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.









With CONSULT-II

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is less than 3/4 full and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**
- **It is better that the fuel level is low.**

1) Turn ignition switch ON.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
4) Make sure that the following conditions are met.

COOLAN TEMP/S	0 - 32°C (32 - 90°F)
INT/A TEMP SE	More than 0°C (32°F)

5) Select "EVAP SML LEAK P0440" 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-694.

6) Make sure that "OK" is displayed.
If "NG" is displayed, go to the following step.

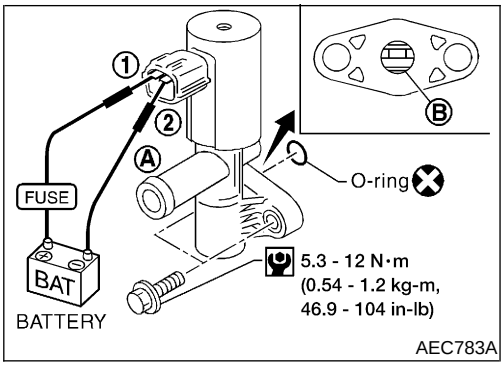
NOTE:

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-1127.
If the result is OK, go to "Diagnostic Procedure" for DTC P0440, EC-958.



Overall Function Check

NGEC0869

Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a DTC might not be confirmed.

Without CONSULT-II

1) Disconnect hose from water separator.
2) Disconnect EVAP canister vent control valve harness connector.
3) Verify the following.

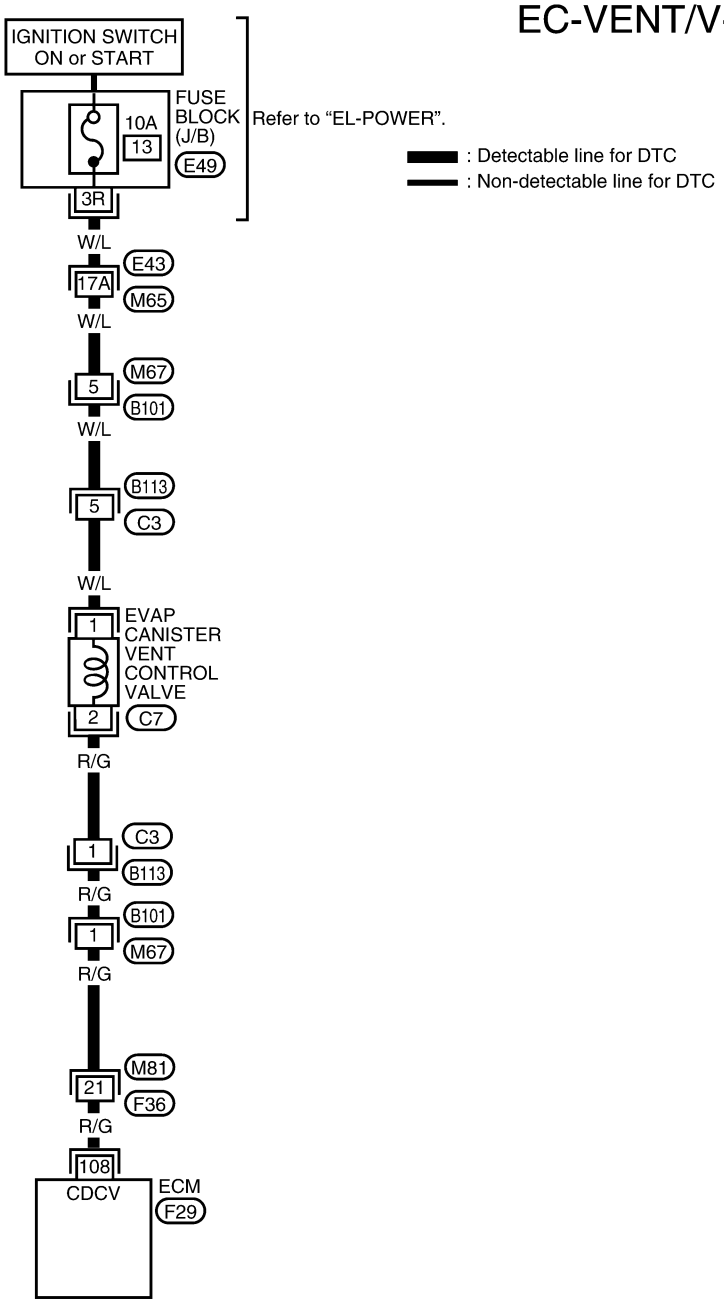
Condition	Air passage continuity
12V direct current supply between terminals 1 and 2	No
No supply	Yes

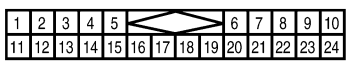
If the result is NG, go to “Diagnostic Procedure”, EC-1127.
If the result is OK, go to “Diagnostic Procedure” for DTC P0440, EC-958.

Wiring Diagram

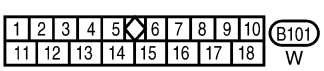
NGEC0870

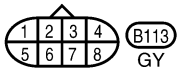
EC-VENT/V-01

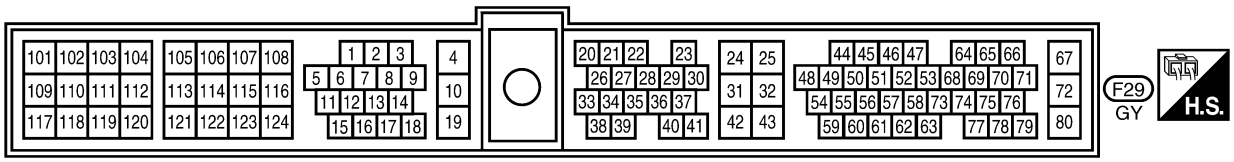




Refer to the following.
M65 , E43 - SUPER MULTIPLE JUNCTION (SMJ)







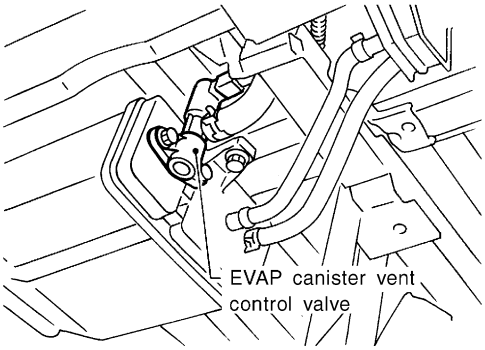
WEC934

Diagnostic Procedure

NGEC0871

1	CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Check obstructed rubber tube connected to EVAP canister vent control valve.



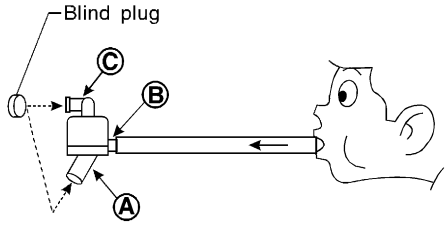
SEF143S

OK or NG

OK	▶	GO TO 2.
NG	▶	Clean, repair or replace rubber tube.

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

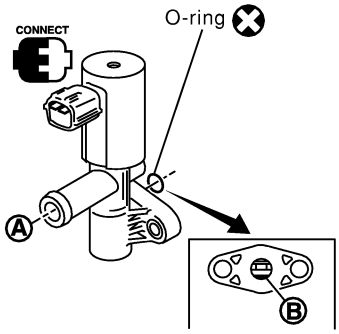
OK	▶	GO TO 3.
NG	▶	Replace water separator.

3	CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

Check air passage continuity.

With CONSULT-II

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	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.

SEF991Y

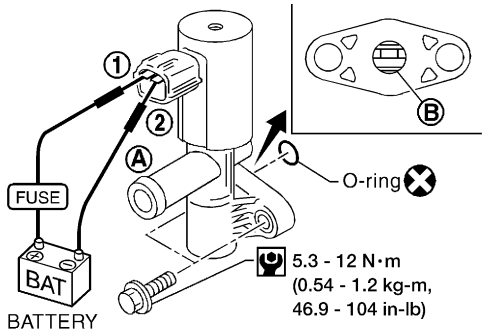
Without CONSULT-II

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If portion **B** is rusted, replace control valve.



AEC783A

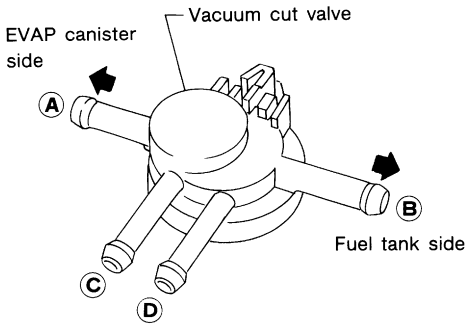
Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve and O-ring.

4	CHECK VACUUM CUT VALVE

Check vacuum cut valve as follows:



SEF379Q

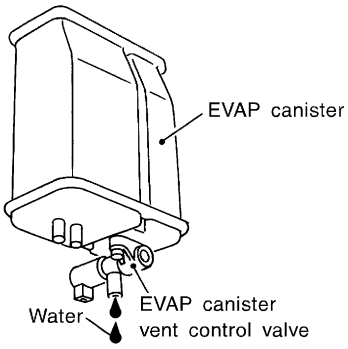
1. Plug port **C** and **D** with fingers.
2. Apply vacuum to port **A** and check that there is no suction from port **B**.
3. Apply vacuum to port **B** and check that there is suction from port **A**.
4. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
5. Open port **C** and **D**.
6. Blow air in port **A** check that air flows freely out of port **C**.
7. Blow air in port **B** check that air flows freely out of port **D**.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace vacuum cut valve.

5	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

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 8.

6	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 8.
NG	▶	Replace the EVAP canister.

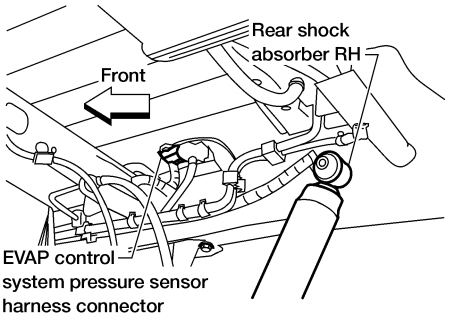
Diagnostic Procedure (Cont'd)

7	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.

8	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 9.
NG ▶	Repair it.

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



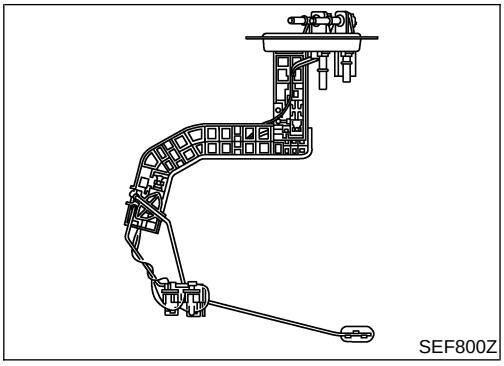
AEC651A

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-987.	
OK or NG	
OK ▶	GO TO 11.
NG ▶	Replace EVAP control system pressure sensor.

11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**


SEF800Z

Component Description

NGEC0994

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.

ECM Terminals and Reference Value

NGEC1000

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)
46	P/B	Fuel level sensor	**[Ignition switch "ON"]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
66	B	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V

On Board Diagnosis Logic

NGEC0995

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

NGEC0995S01

- Fuel level sensor circuit
  (The fuel level sensor circuit is open or shorted.)

DTC Confirmation Procedure

NGEC0997

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

DTC Confirmation Procedure (Cont'd)

3

DATA MONITOR	
MONITOR	NO DTC
FUEL T/TMP SE	XXX °C
FUEL LEVEL SE	XXX V

SEF195Y

WITH CONSULT-II

NGEC0997S01

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-1134.

WITH GST

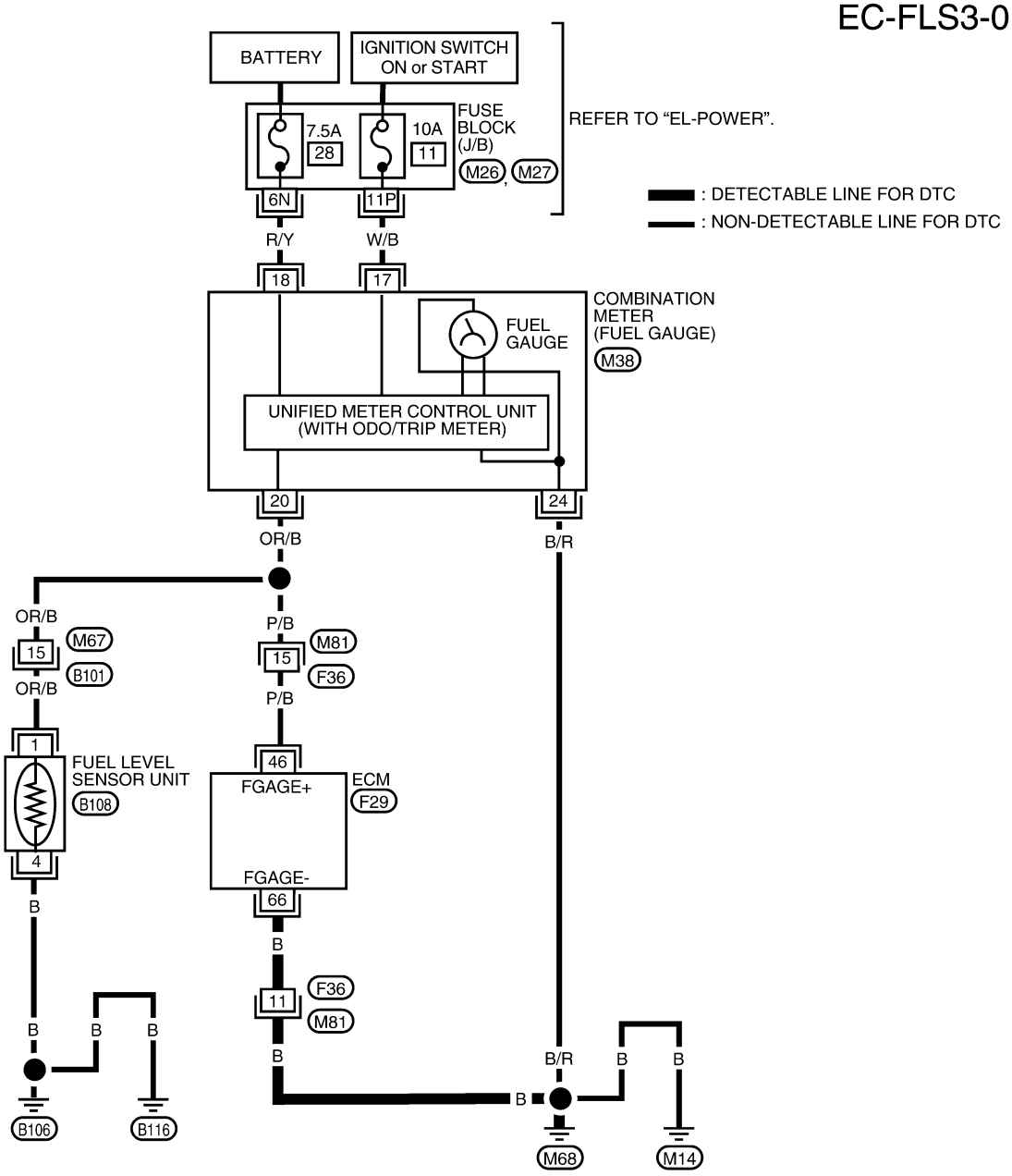
NGEC0997S02

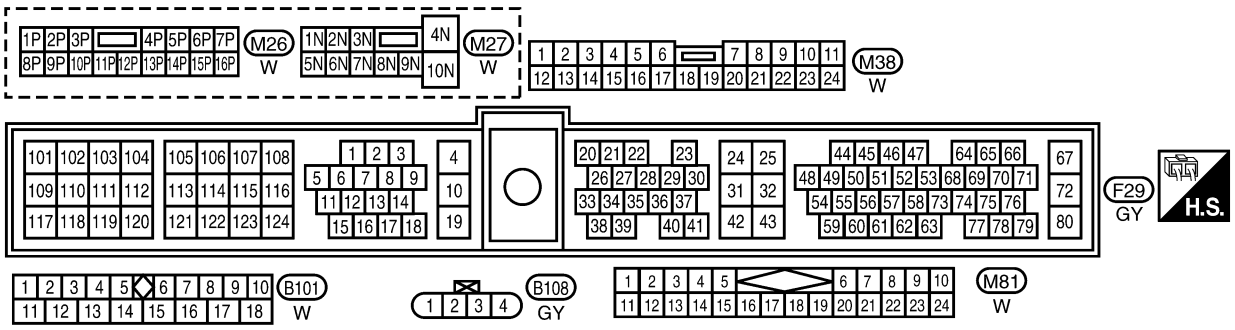
Follow the procedure "WITH CONSULT-II" above.

Wiring Diagram

NGEC0998

EC-FLS3-01





LEC524

Diagnostic Procedure

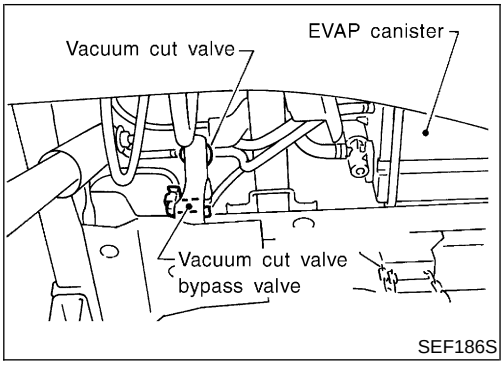
=NGEC0999

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 66 and body ground. Refer to Wiring Diagram. **Continuity should exist.** 4. Also check harness for short to power.	
OK or NG	
OK ▶	GO TO 3.
NG ▶	GO TO 2.

2	DETECT MALFUNCTIONING PART
1. Check the following. ● Harness connectors F36, M81 ● Harness for open and short between ECM and body ground	
▶	Replace open circuit or short to power in harness or connectors.

3	CHECK FUEL LEVEL SENSOR
Refer to EL-XX, “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-732	
OK or NG	
▶	**INSPECTION END**



Description

NGEC0872

COMPONENT DESCRIPTION

NGEC0872S01

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.

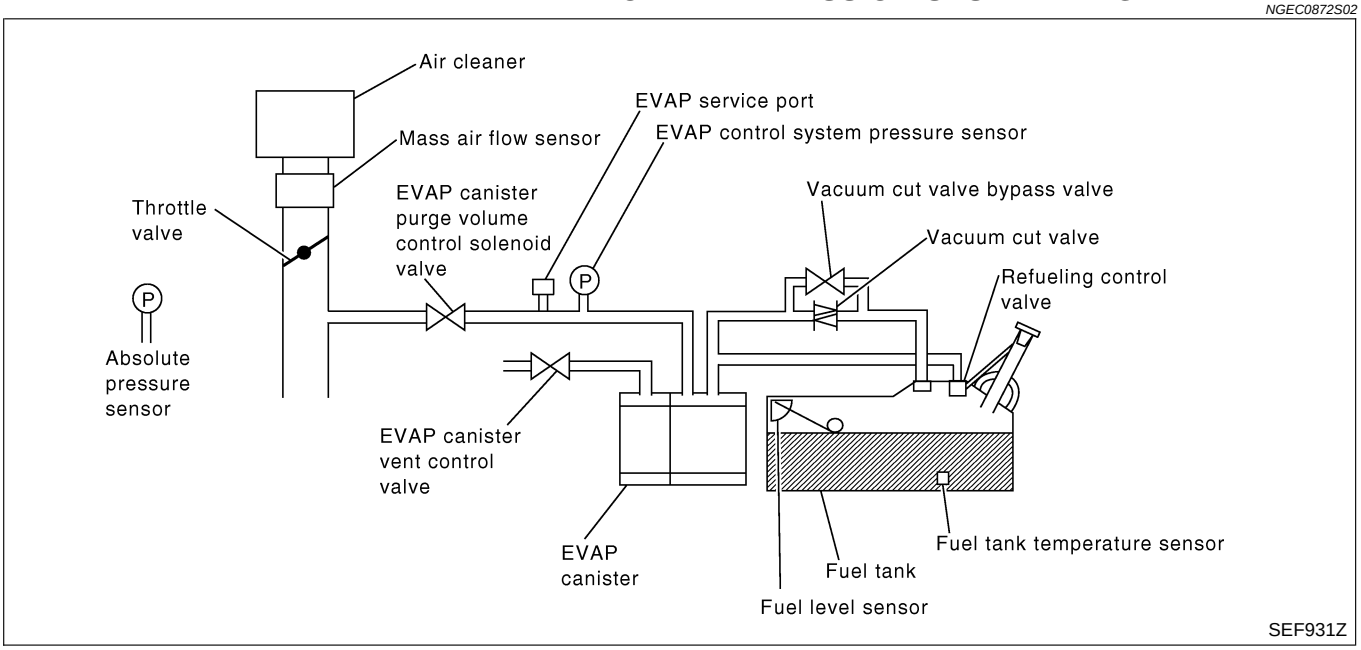
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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

NGEC0872S02



CONSULT-II Reference Value in Data Monitor Mode

NGEC0873

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NGEC0874

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	P/B	Vacuum cut valve bypass valve	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0875

Malfunction is detected when an improper voltage signal is sent to ECM through vacuum cut valve bypass valve.

POSSIBLE CAUSE

NGEC0875S01

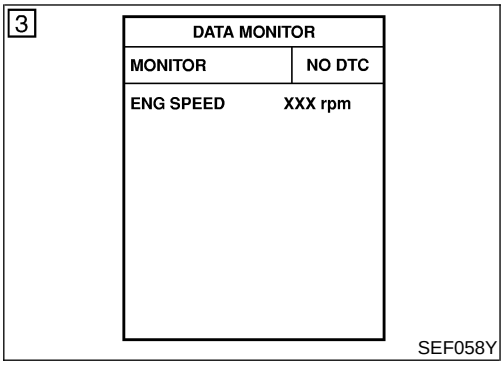
- Harness or connectors
  (The vacuum cut valve bypass valve circuit is open or shorted.)
- Vacuum cut valve bypass valve

DTC Confirmation Procedure

NGEC0876

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle speed.



With CONSULT-II

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-1138.

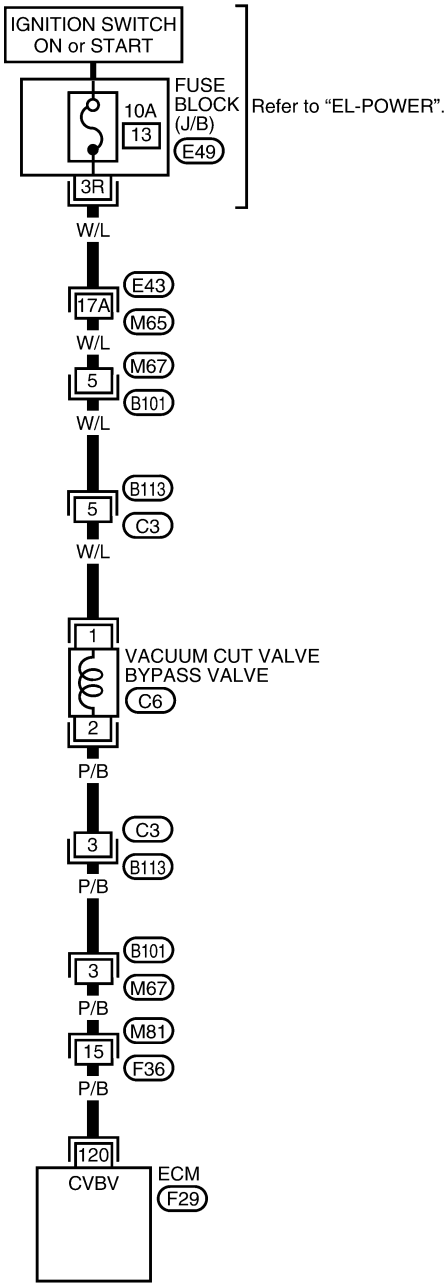
With GST

Follow the procedure “With CONSULT-II”.

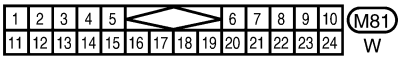
Wiring Diagram

NGEC0877

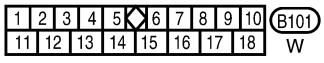
EC-BYPS/V-01

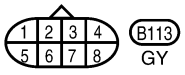


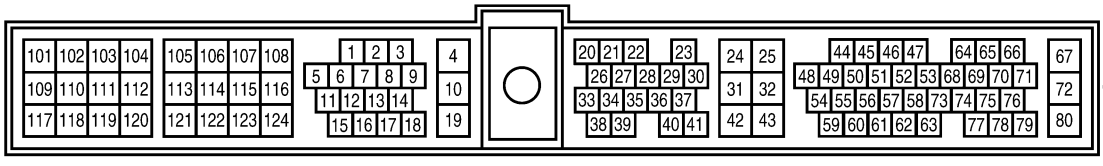
: Detectable line for DTC
: Non-detectable line for DTC



Refer to the following.
M65 , E43 - SUPER MULTIPLE JUNCTION (SMJ)







WEC935

Diagnostic Procedure

NGEC0878

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	XXX V

SEF014Z

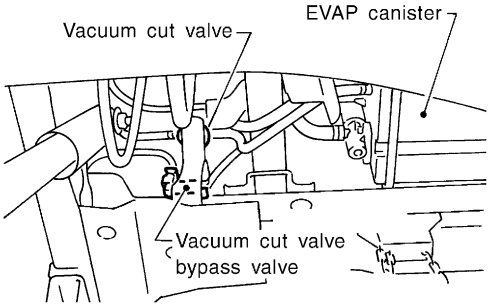
4. Make sure that clicking sound is heard from the vacuum cut valve bypass valve.

OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 3.

3	CHECK VACUUM CUT VALVE BYPASS VALUE POWER SUPPLY CIRCUIT

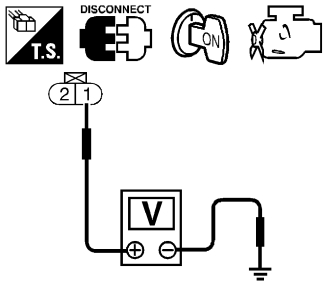
Without CONSULT-II

1. Turn ignition switch OFF.
2. Disconnect vacuum cut valve bypass valve harness connector.



SEF186S

3. Turn ignition switch ON.
4. Check voltage between terminal 1 and ground with CONSULT-II or tester.



SEF659W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E74, M82
- Harness connectors M67, B101 and B113, C3
- Fuse block (J/B) connector E49
- 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 120 and 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

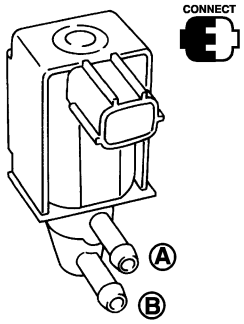
OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors C3, B113 and B101, M67 ● Harness connectors M81, F36 ● 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. 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	XXX V

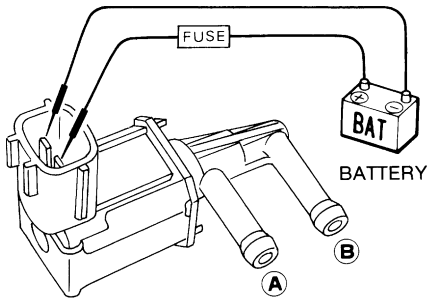
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF016Z

Without CONSULT-II

1. Check air passage continuity and operation delay time under the following conditions.



SEF351Q

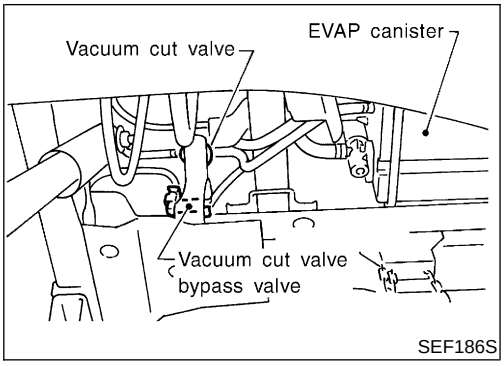
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

MTBL0242

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-732.	
▶	**INSPECTION END**



Description

NGEC0879

COMPONENT DESCRIPTION

NGEC0879S01

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.

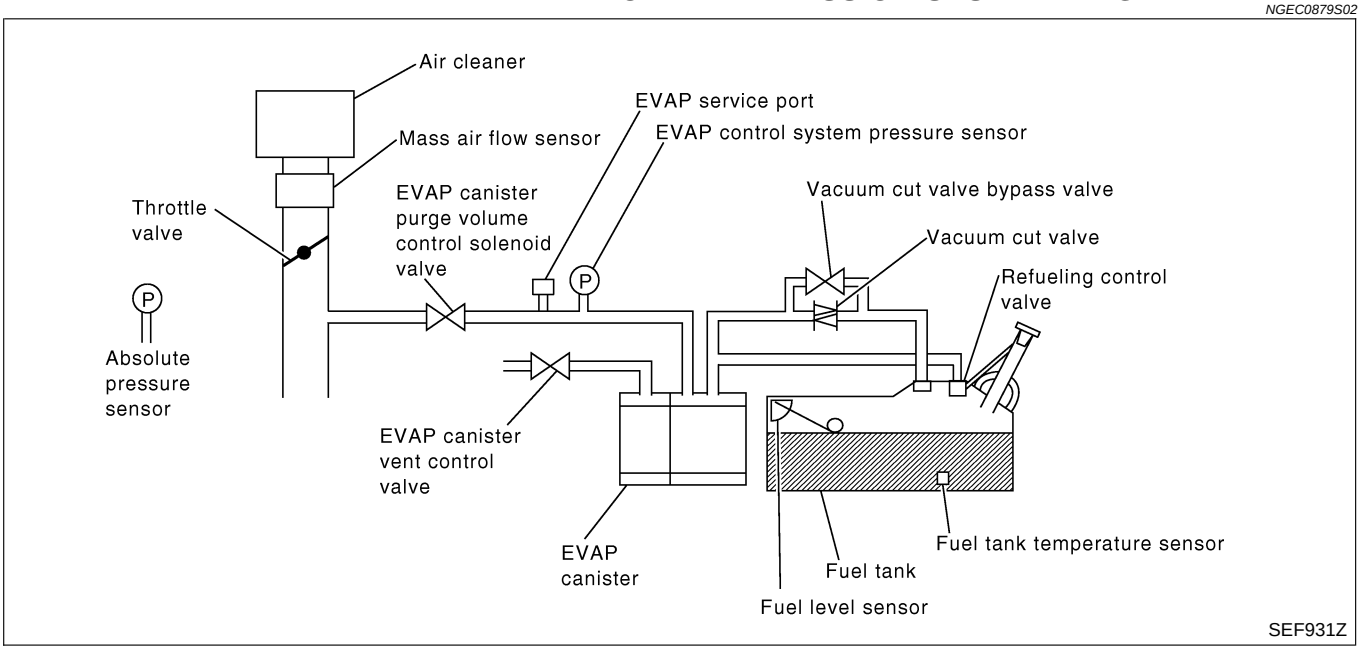
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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

NGEC0879S02



CONSULT-II Reference Value in Data Monitor Mode

NGEC0880

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NGEC0881

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	P/B	Vacuum cut valve bypass valve	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0882

Malfunction is detected when vacuum cut valve bypass valve does not operate properly.

POSSIBLE CAUSE

NGEC0882S01

- 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

NGEC0883

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Always perform test at a temperature of 5 to 30°C (41 to 86°F).

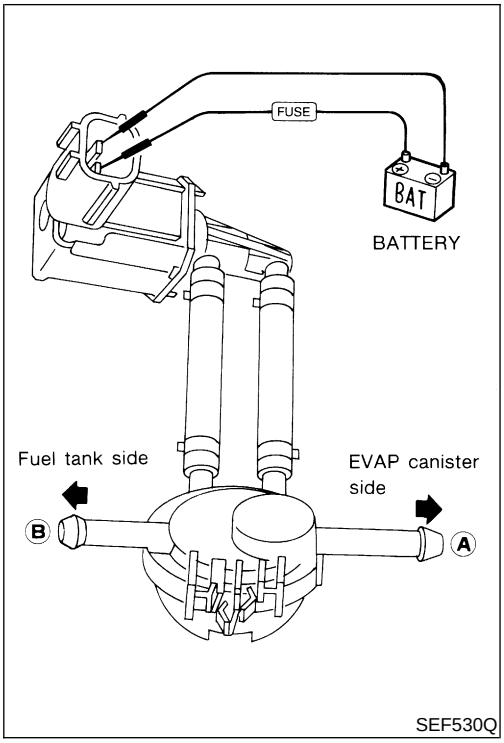
With CONSULT-II

1) Turn ignition switch ON.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch OFF and wait at least 5 seconds.
4) Start engine and let it idle for at least 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	More than 500 rpm
Selector lever	Suitable position
Vehicle speed	More than 37 km/h (23 MPH)
B/FUEL SCHDL	1.0 - 10.0 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-1145.



Overall Function Check

NGEC0884

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.

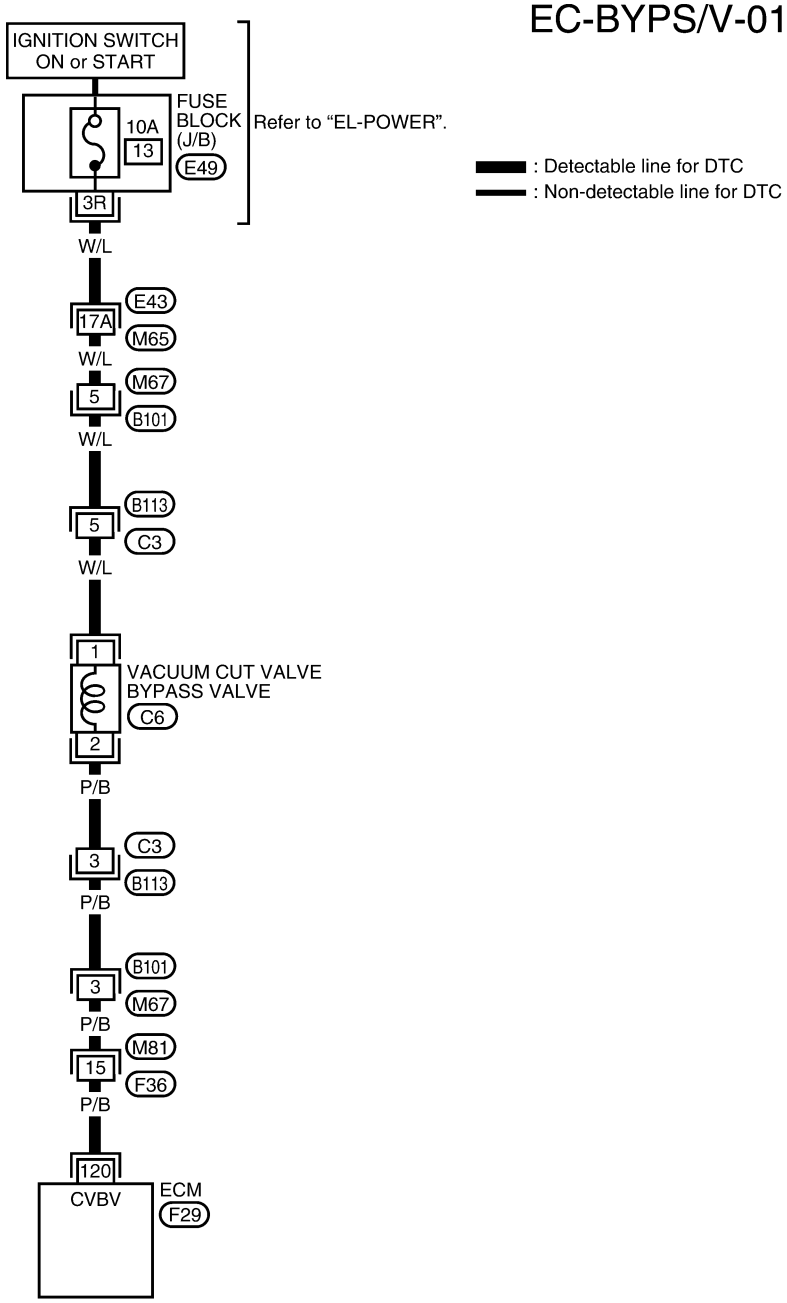
Without CONSULT-II

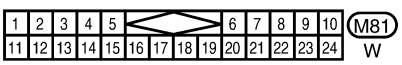
1) Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
2) Apply vacuum to port **A** and check that there is no suction from port **B**.
3) Apply vacuum to port **B** and check that there is suction from port **A**.
4) Blow air in port **B** and check that there is a resistance 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-1145.

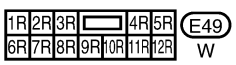
Wiring Diagram

NGEC0885

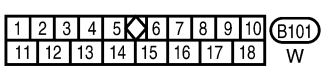
EC-BYPS/V-01

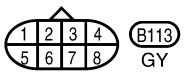


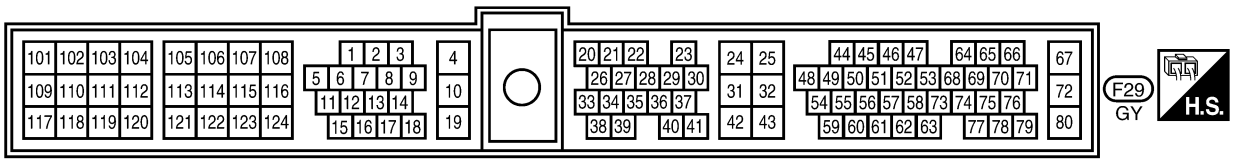




Refer to the following.
M65 , E43 - SUPER MULTIPLE JUNCTION (SMJ)







WEC935

Diagnostic Procedure

NGEC0886

1	INSPECTION START

Do you have CONSULT-II?

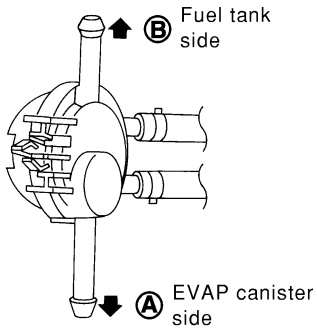
Yes or No

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 ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

SEF017Z

OK or NG

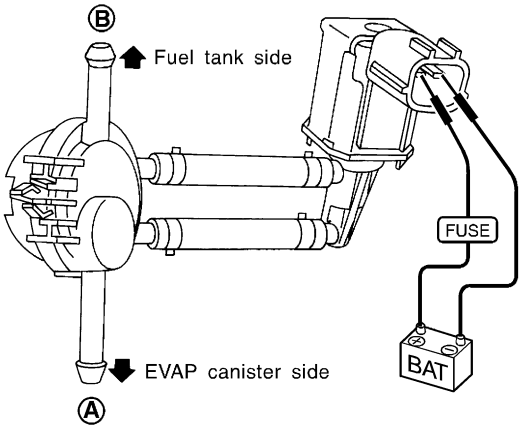
OK	▶	GO TO 4.
NG	▶	GO TO 5.

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 5.

4	CHECK EVAP PURGE LINE

1. Check EVAP purge line between EVAP canister and fuel tank for clogging or disconnection.
2. Check EVAP purge port of fuel tank for clogging.
3. Check EVAP canister. Refer to EC-620.

OK or NG

OK	▶	GO TO 8.
NG (Step 1)	▶	Repair it.
NG (Step 2)	▶	Clean EVAP purge port.
NG (Step 3)	▶	Replace EVAP canister.

5	CHECK BYPASS HOSE

Check bypass hoses for clogging.

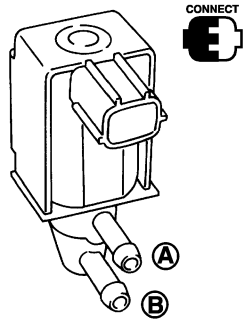
OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or replace hoses.

6	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	XXX V

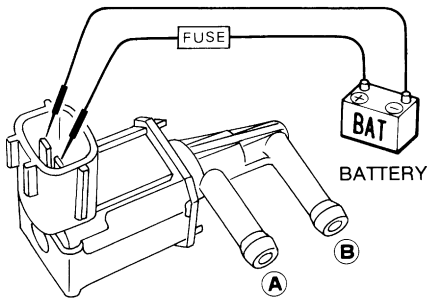
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF016Z

1. Check air passage continuity and operation delay time under the following conditions.

Without CONSULT-II



SEF351Q

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

MTBL0242

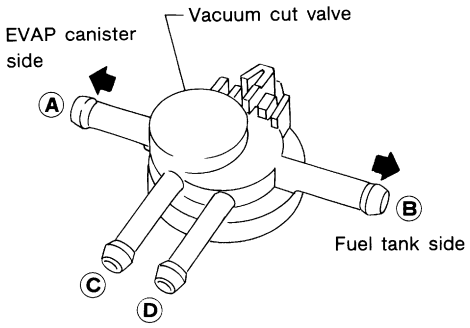
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace vacuum cut valve bypass valve.

Diagnostic Procedure (Cont'd)

7	CHECK VACUUM CUT VALVE

Check vacuum cut valve as follows:



SEF379Q

1. Plug port **C** and **D** with fingers.
2. Apply vacuum to port **A** and check that there is no suction from port **B**.
3. Apply vacuum to port **B** and check that there is suction from port **A**.
4. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
5. Open port **C** and **D**.
6. Blow air in port **A** check that air flows freely out of port **C**.
7. Blow air in port **B** check that air flows freely out of port **D**.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace vacuum cut valve.

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

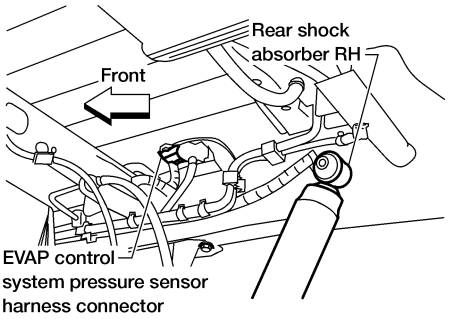
1. Turn ignition switch OFF.
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK	▶	GO TO 9.
NG	▶	Repair it

9	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



AEC651A

2. Check connectors for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

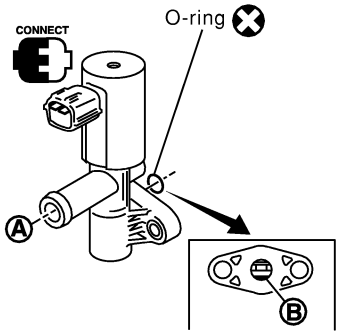
10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION
Refer to "DTC Confirmation Procedure" for DTC P0450, EC-987.	
OK or NG	
OK ▶	GO TO 11.
NG ▶	Replace EVAP control system pressure sensor.

11	CHECK EVAP CANISTER VENT CONTROL VALVE

Check air passage continuity.

With CONSULT-II

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 (B1)	XXX V
HO2S1 (B2)	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.

SEF991Y

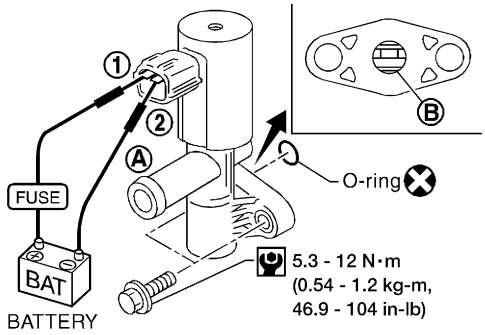
Without CONSULT-II

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

MTBL0240

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If portion **B** is rusted, replace control valve.



AEC783A

Make sure new O-ring is installed properly.

OK or NG

OK ▶	GO TO 12.
NG ▶	Replace EVAP canister vent control valve.

12	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**

Component Description

NGEC0887

The malfunction information related to A/T (Automatic Transmission) is transferred through the line (circuit) from TCM (Transmission control module) to ECM. Therefore, be sure to erase the malfunction information such as DTC not only in TCM (Transmission control module) but also ECM after the A/T related repair.

ECM Terminals and Reference Value

NGEC0888

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
7	G/B	A/T check signal	**[Ignition switch ON]** **[Engine is running]**	0 - 3.0V

On Board Diagnosis Logic

NGEC0889

Malfunction is detected when an incorrect signal from TCM (Transmission control module) is sent to ECM.

POSSIBLE CAUSE

NGEC0889S01

- 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)

3

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

DTC Confirmation Procedure

NGEC0890

NOTE:

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

With CONSULT-II

1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and wait at least 40 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1152.

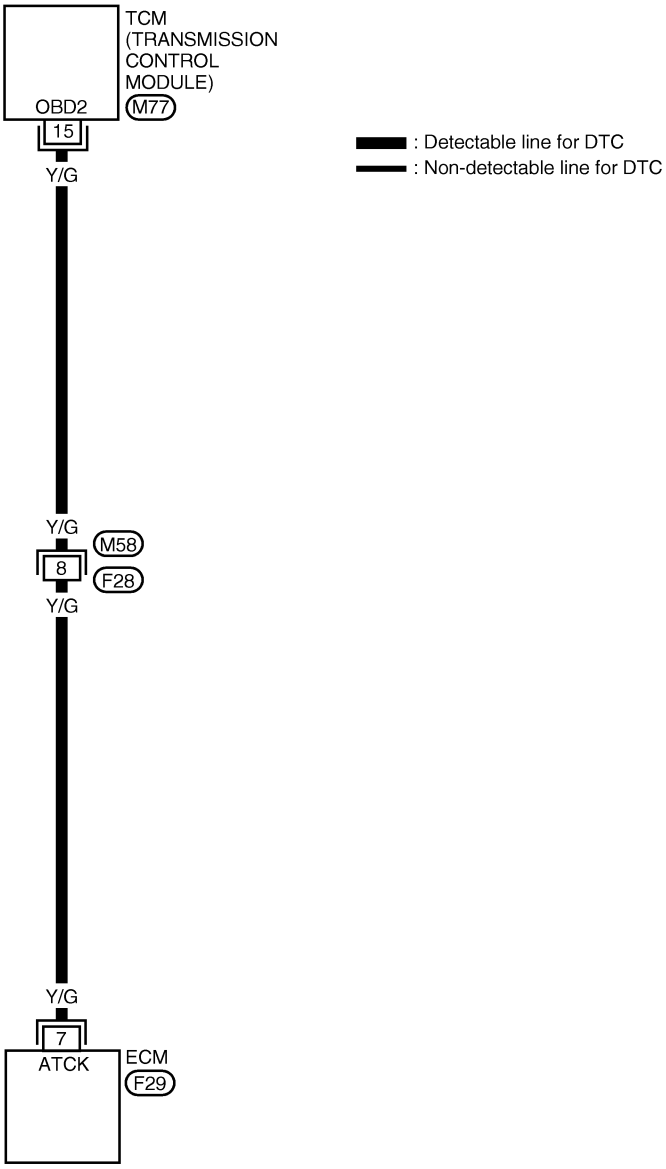
With GST

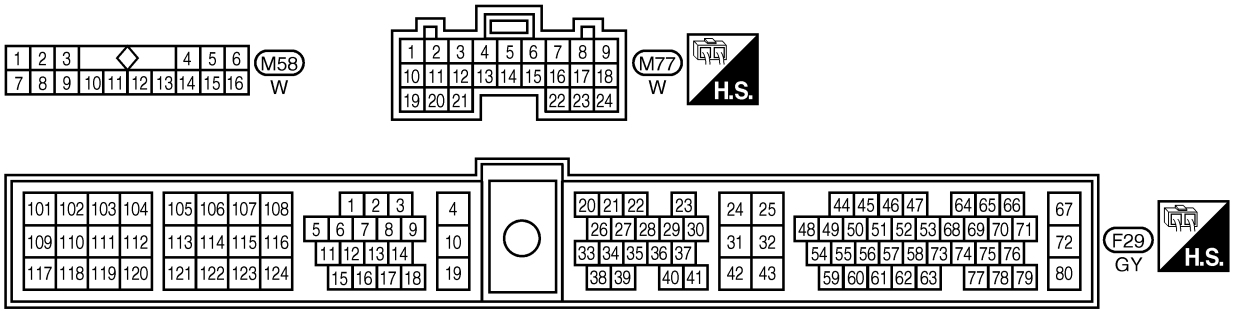
Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC0891

EC-ATDIAG-01





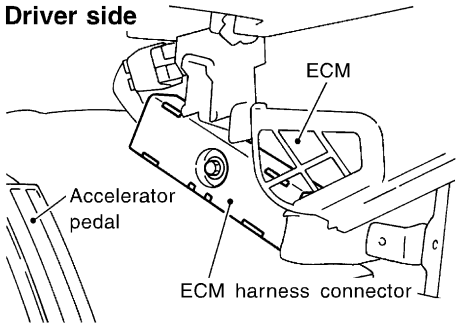
AEC971A

Diagnostic Procedure

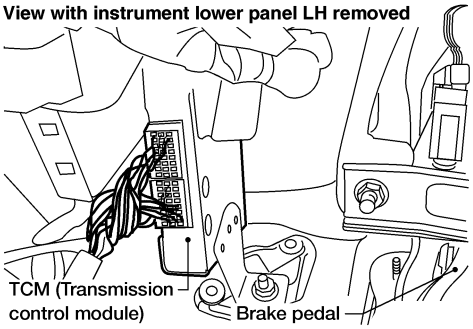
NGEC0892

1	CHECK A/T DIAGNOSIS COMMUNICATION LINE INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and TCM (Transmission Control Module) harness connector.



SEF324V



AEC655A

3. Check harness continuity between ECM terminal 7 and TCM (Transmission Control Module) 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 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

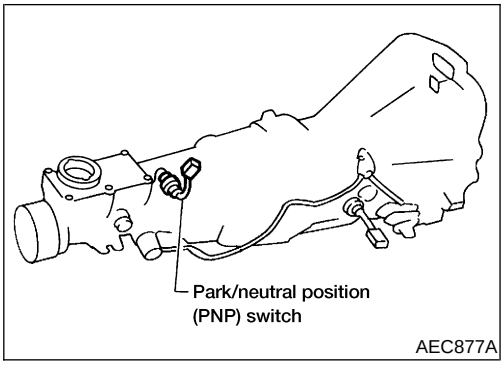
Check the following.
- Harness connectors M58, F28
- Harness for open or short between ECM and TCM (Transmission Control Module)

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-732.

	▶	**INSPECTION END**



Component Description

NGEC0893

When the gear position is “P” (A/T models only) or “N”, park/neutral position (PNP) switch is “ON”.
ECM detects the position because the continuity of the line (the “ON” signal) exists.
For A/T models, the park/neutral position (PNP) switch assembly also includes a transmission range switch to detect selector lever position.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0894

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	• Ignition switch: ON	Shift lever: “P” or “N”	ON
		Except above	OFF

ECM Terminals and Reference Value

NGEC0895

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 the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22	L/B	Park/neutral position (PNP) switch	**[Ignition switch ON]** • Gear position is “N” or “P” (A/T models) • Gear position is neutral (M/T models)	Approximately 0V
			[Ignition switch ON] • Except the above gear position	Approximately 5V

On Board Diagnosis Logic

NGEC0896

Malfunction is detected when the signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.

POSSIBLE CAUSE

NGEC0896S01

- Harness or connectors
  [The park/neutral position (PNP) switch circuit is open or shorted.]
- Park/neutral position (PNP) switch

DTC Confirmation Procedure

NGEC0897

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.

2

DATA MONITOR	
MONITOR	NO DTC
P/N POSI SW	ON

SEF212Y

5

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
P/N POSI SW	OFF
B/FUEL SCHDL	XXX msec

SEF213Y

With CONSULT-II

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.

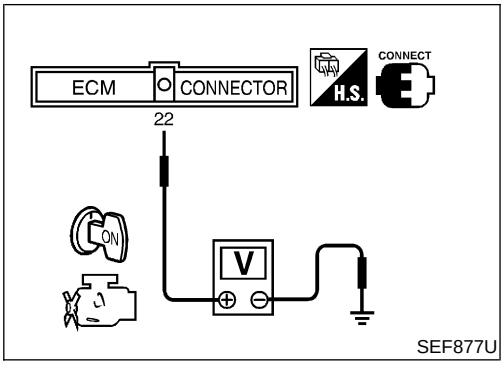
Position (Selector lever)	Known good signal
“N” and “P” position	ON
Except the above position	OFF

If NG, go to “Diagnostic Procedure”, EC-1157.
If OK, go to following step.

3) Select “DATA MONITOR” mode with CONSULT-II.
4) Start engine and warm it up to normal operating temperature.
5) Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,600 - 2,700 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.3 - 13 msec
VHCL SPEED SE	More than 64 km/h (40 MPH)
Selector lever	Suitable position

6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1157.



Overall Function Check

=NGEC0898

Use this procedure to check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT-II

1) Turn ignition switch ON.
2) Check voltage between ECM terminal 22 and body ground under the following conditions.

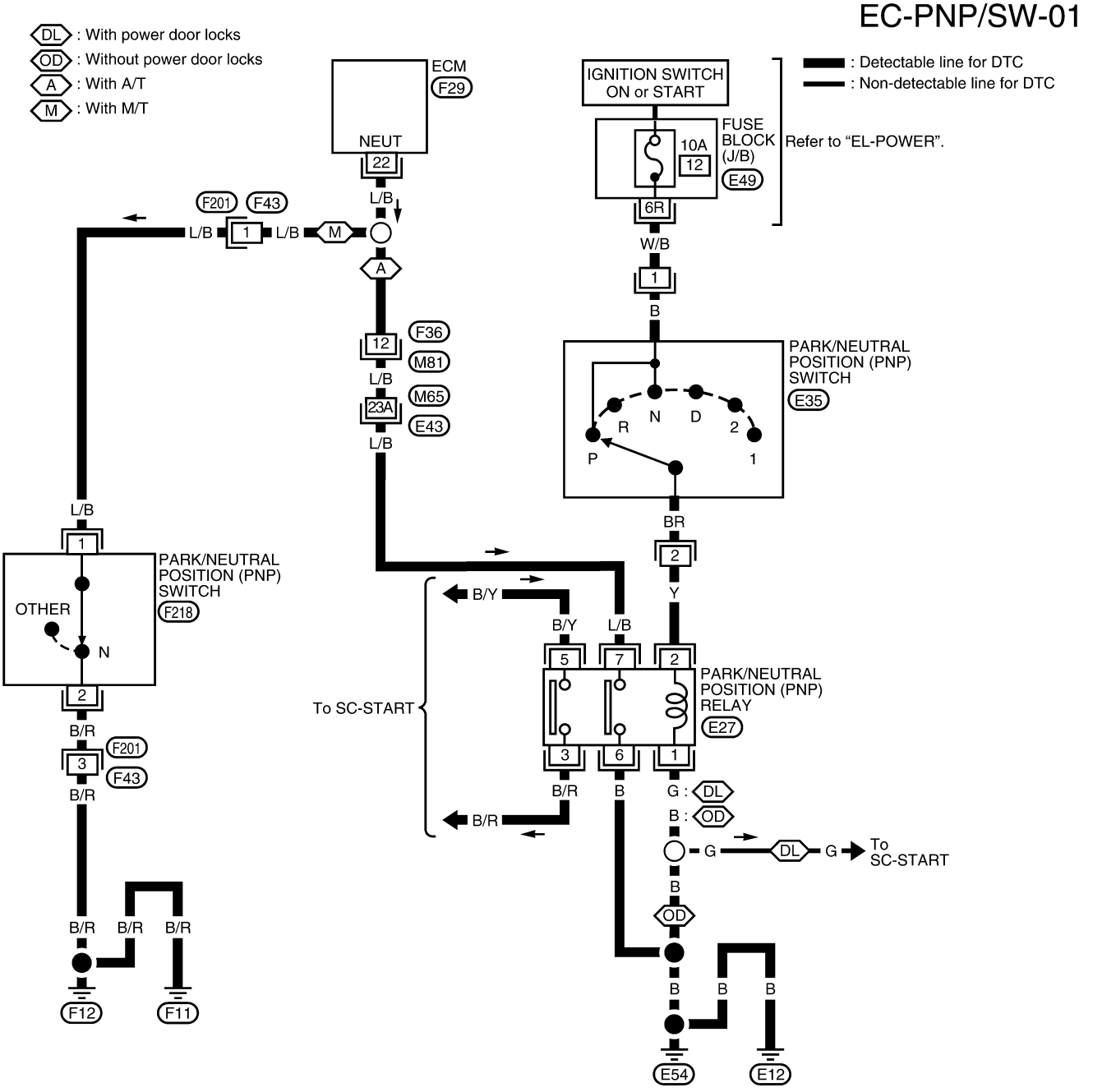
Condition (Gear position)	Voltage (V) (Known good data)
"P" and "N" position	Approx. 0
Except the above position	Approx. 5

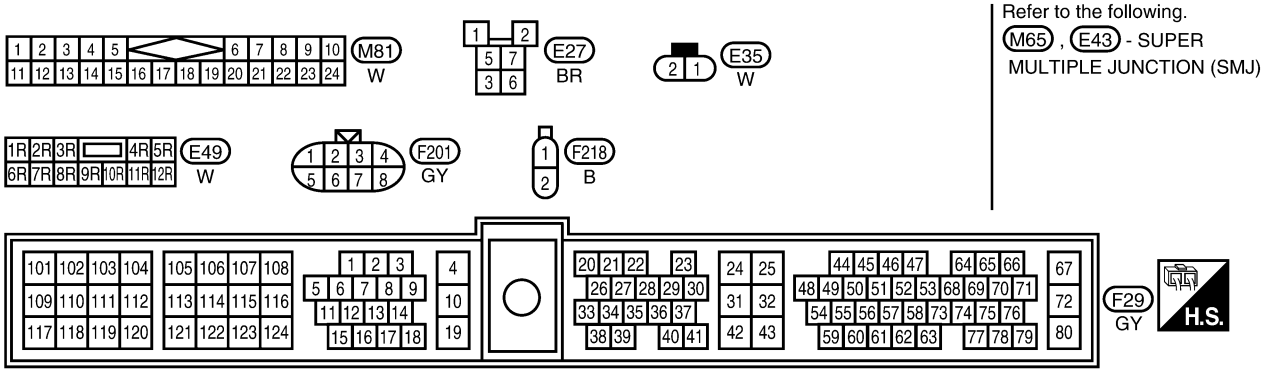
3) If NG, go to "Diagnostic Procedure", EC-1157.

Wiring Diagram

NGEC0899

EC-PNP/SW-01





Refer to the following.
M65 , E43 - SUPER MULTIPLE JUNCTION (SMJ)

LEC508

Diagnostic Procedure

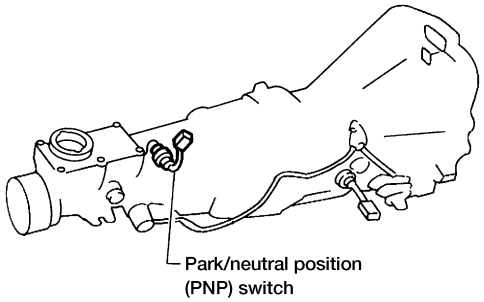
NGEC0900

FOR M/T MODELS

NGEC0900S01

1	CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch harness connector.



AEC877A

3. Check harness continuity between PNP switch terminal 2 and engine ground. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F201, F43
- Harness for open between park/neutral position (PNP) switch and engine ground

	▶	Repair open circuit or short to power in harness or connectors.

3	CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 22 and PNP switch terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F43, F201
- Harness for open or short between ECM and park/neutral position (PNP) switch

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH

Refer to “Position Switch Check”, “ON-VEHICLE SERVICE”, ***MT-8***.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace park/neutral position (PNP) switch.

Diagnostic Procedure (Cont'd)

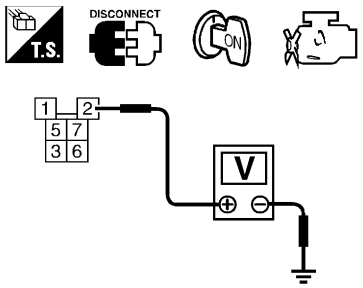
6	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**

FOR A/T MODELS

=NGEC0900S02

1	CHECK PNP SWITCH POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) relay.
3. Turn ignition switch ON.
4. Shift selector lever to "P" or "N" position.
5. Check voltage between terminal 2 and ground with CONSULT-II or tester.



SEF661W

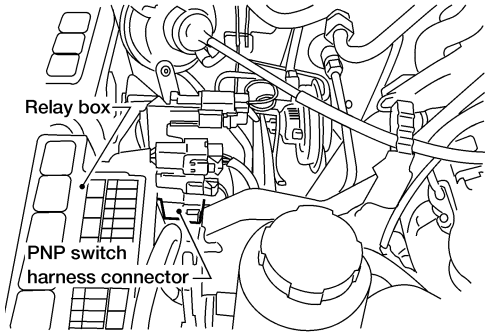
Voltage: Battery voltage

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 2.

2	CHECK PNP SWITCH POWER SUPPLY CIRCUIT-II

1. Turn ignition switch "OFF.
2. Disconnect park/neutral position (PNP) switch harness connector.



AEC662A

3. Check harness continuity between park/neutral position (PNP) switch terminal 2 and park/neutral position (PNP) relay 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 3.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

3	CHECK PNP SWITCH POWER SUPPLY CIRCUIT-III

1. Turn ignition switch ON.
2. Check voltage between park/neutral position (PNP) switch terminal 1 and ground with CONSULT-II or tester. Refer to Wiring Diagram.
   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. ● Fuse block (J/B) connector E49 ● 10A fuse ● Harness for open or short between park/neutral position (PNP) switch and fuse	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH
Refer to "Component Inspection", ***AT-103***.	
OK or NG	
OK ▶	GO TO 11.
NG ▶	Replace park/neutral position (PNP) switch.

6	CHECK PNP RELAY GROUND CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch OFF. 2. Check harness continuity between relay terminals 1, 6 and body ground. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to power.	
OK or NG	
OK ▶	GO TO 8.
NG (With theft warning system) ▶	GO TO 7.
NG (Without theft warning system) ▶	Repair open circuit or short to power in harness or connectors.

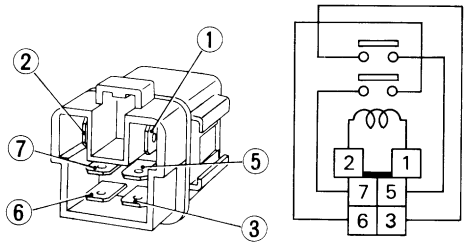
7	DETECT MALFUNCTIONING PART
Check the circuit between park/neutral position (PNP) relay and body ground. Refer to "STARTING SYSTEM", ***SC-10***.	
OK or NG	
OK ▶	GO TO 11.
NG ▶	Repair or replace.

8	CHECK PNP RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 22 and relay terminal 7. 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. ● Harness connectors F36, M81 ● Harness connectors M65, E43 ● Harness for open or short between ECM and park/neutral position (PNP) relay	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

10	CHECK PARK/NEUTRAL POSITION (PNP) RELAY

1. Apply 12V direct current between park/neutral position (PNP) relay terminals 1 and 2.
2. Check continuity between park/neutral position (PNP) relay terminals 3 and 5, 6 and 7.



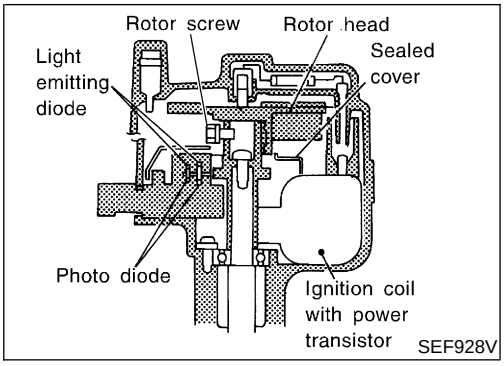
SEC202B

12V (1 and 2) applied: Continuity should exist.
No voltage applied: Continuity should not exist.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace park/neutral position (PNP) relay.

11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**



Component Description

NGEC0812

IGNITION COIL & POWER TRANSISTOR

NGEC0812S01

The power transistor switches on and off the ignition coil primary circuit according to the ECM signal. As the primary circuit is turned on and off, the proper high voltage is induced in the secondary circuit. The distributor is not repairable except for the distributor cap and rotor head.

NOTE:

The rotor screw which secures the distributor rotor head to the distributor shaft must be torqued properly.

: 3.6±0.3 N·m (37±3 kg-cm, 32±3 in-lb)

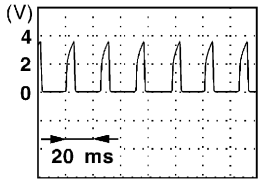
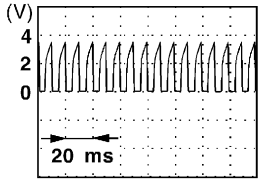
ECM Terminals and Reference Value

NGEC0813

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

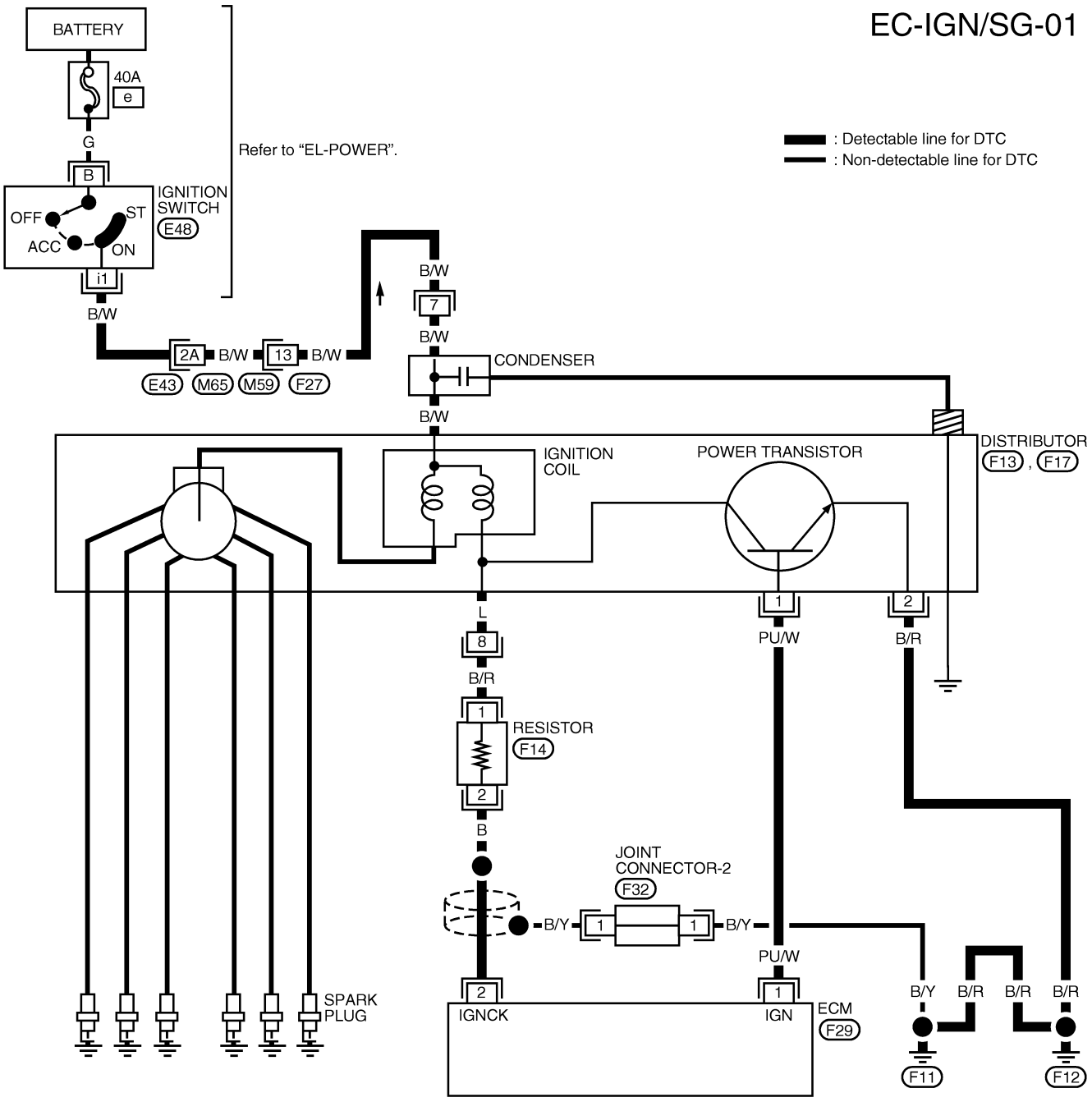
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

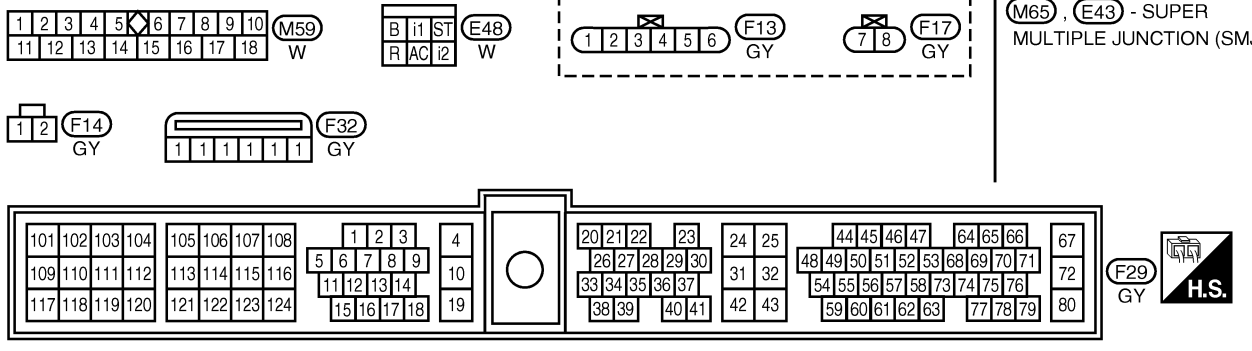
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/W	Ignition signal	**[Engine is running]** ● Idle speed	Approximately 0.7V  SEF988U
			[Engine is running] ● Engine speed is 2,000 rpm	1.1 - 1.5V  SEF989U

Wiring Diagram

NGEC0816

EC-IGN/SG-01





AEC967A

Diagnostic Procedure

NGEC0817

1	INSPECTION 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 3.
No ▶	GO TO 4.

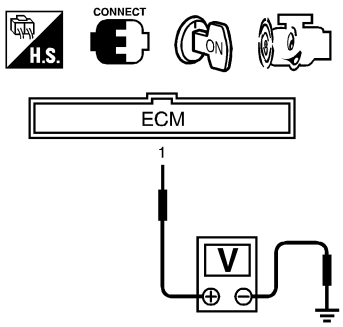
2	CHECK OVERALL FUNCTION
With CONSULT-II 1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II. 2. Make sure that all circuits do not produce a momentary engine speed drop.	

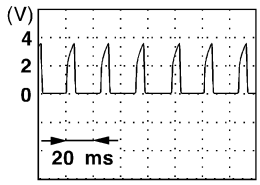
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX %

SEF981Z

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

3	CHECK OVERALL FUNCTION
Without CONSULT-II 1. Let engine idle. 2. Read the voltage signal between ECM terminal 1 and ground with an oscilloscope. 3. Verify that the oscilloscope screen shows the signal wave as shown below.	



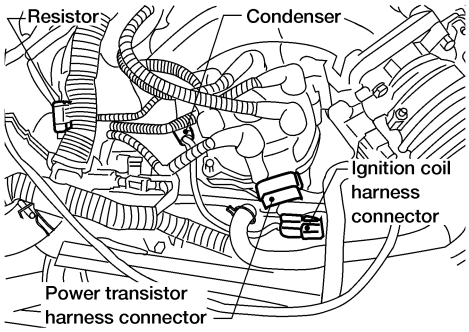


SEC073C

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

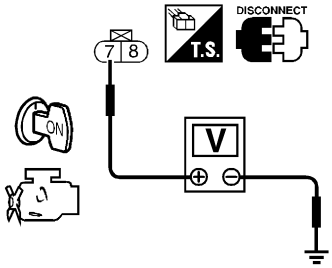
4	CHECK IGNITION COIL POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.



AEC656A

3. Turn ignition switch ON.
4. Check voltage between terminal 7 and ground with CONSULT-II or tester.



SEF721U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E43, M65
- Harness connectors M59, F27
- Harness for open or short between ignition coil and ignition switch

	▶	Repair harness or connectors.

6	CHECK POWER TRANSISTOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect power transistor harness connector.
3. Check harness continuity between power transistor terminal 2 and engine ground. Refer to Wiring Diagram.
   Continuity should 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 POWER TRANSISTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

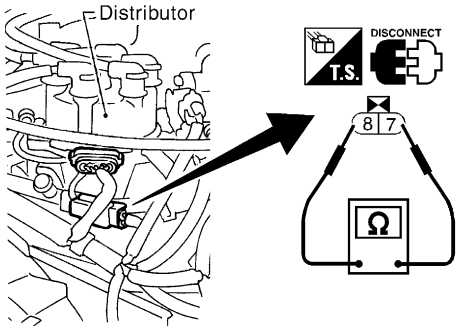
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 1 and power transistor terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

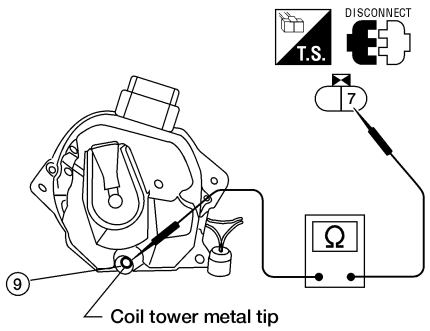
OK	▶	GO TO 8.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK IGNITION COIL

1. Disconnect ignition coil harness connector.
2. Check resistance as shown in the figure.



SEF013S



AEC657A

Terminal	Resistance [at 25°C (77°F)]
7 - 8 (Primary coil)	0.5 - 1.0Ω
7 - 9 (Secondary coil)	Approximately 12 kΩ

MTBL0248

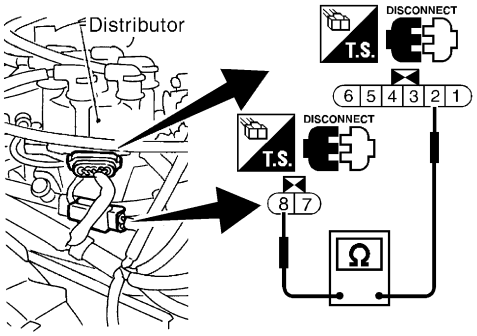
For checking secondary coil, remove distributor cap and measure resistance between coil tower metal tip 9 and terminal 7.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace distributor assembly.

9	CHECK POWER TRANSISTOR

1. Disconnect camshaft position sensor & power transistor harness connector and ignition coil harness connector.
2. Check power transistor resistance between terminals 2 and 8.



SEF015S

Terminals	Resistance	Result
2 and 8	Except 0Ω	OK
	0Ω	NG

MTBL0249

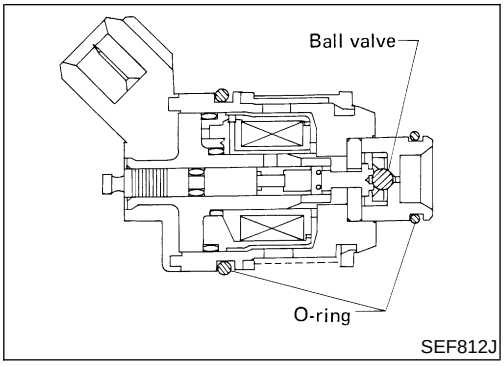
OK or NG

OK	▶	GO TO 10.
NG	▶	Replace distributor assembly.

10	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.

▶ **INSPECTION END**



Component Description

NGEC0909

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 ball 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

NGEC0910

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INJ PULSE-B2 INJ PULSE-B1	• Engine: After warming up • Air conditioner switch: “OFF” • Shift lever: “N” • No-load	Idle	2.4 - 3.7 msec
		2,000 rpm	1.9 - 3.3 msec
B/FUEL SCHDL	ditto	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.4 msec

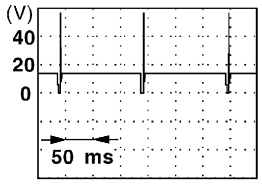
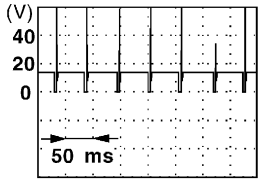
ECM Terminals and Reference Value

NGEC0911

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

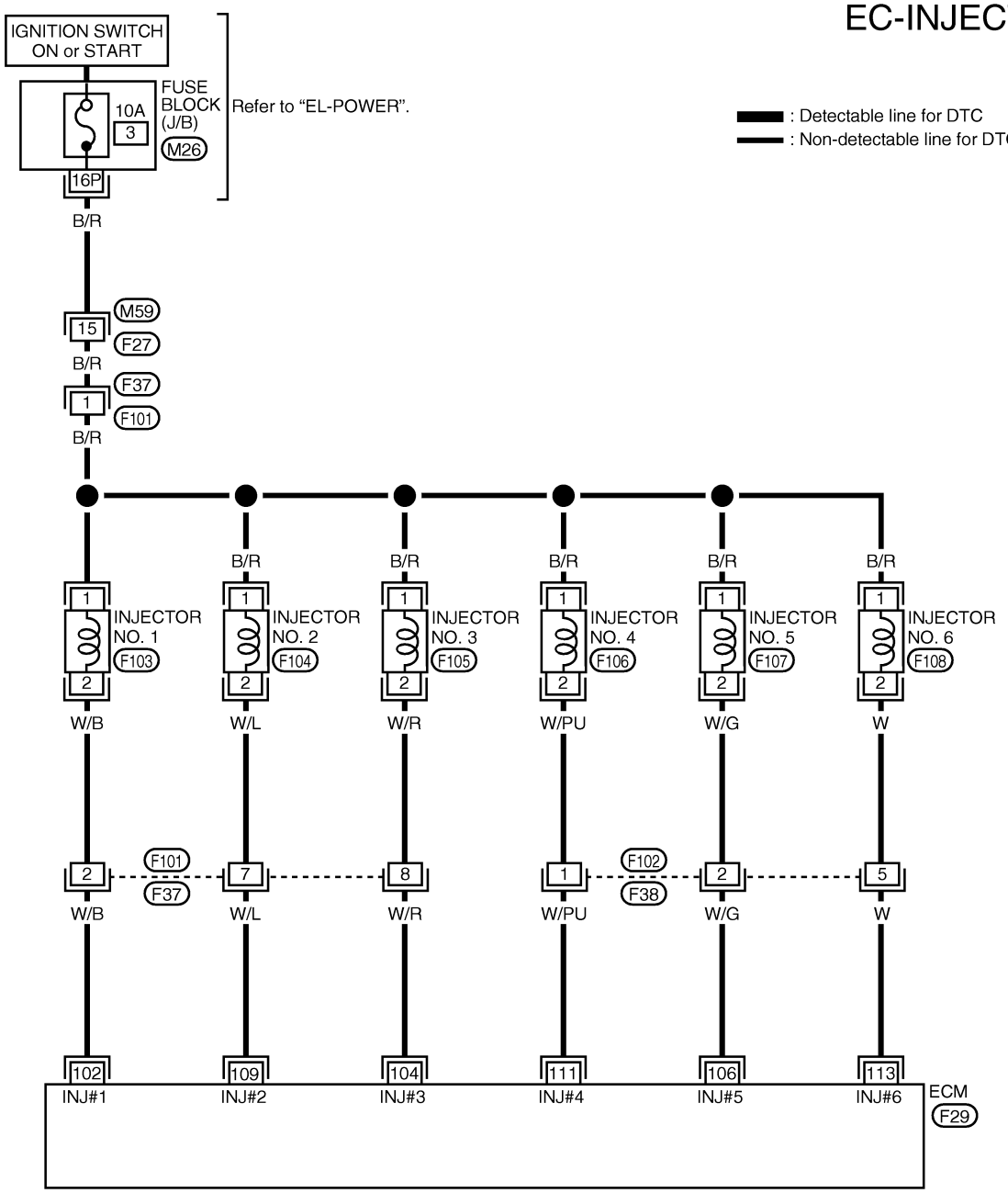
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM’s transistor. Use a ground other than the ECM terminals, such as the ground.

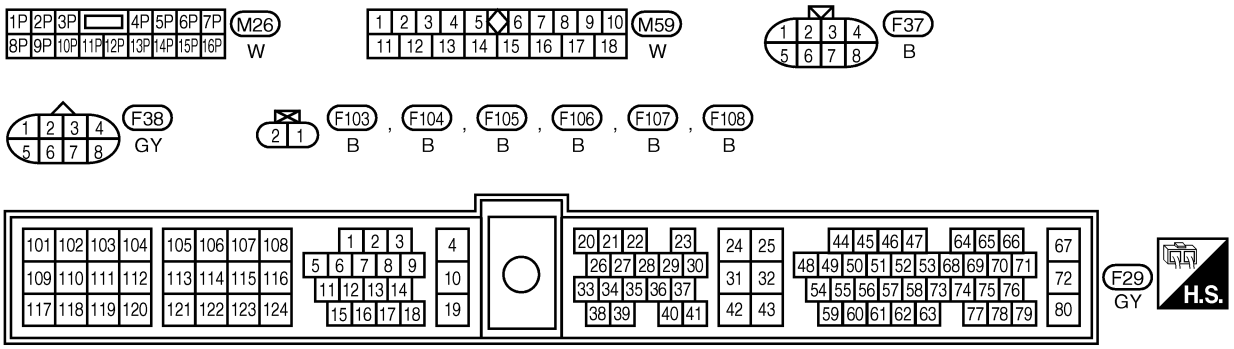
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102 104 106 109 111 113	W/B W/R W/G W/L W/PU W	Injector No. 1 Injector No. 3 Injector No. 5 Injector No. 2 Injector No. 4 Injector No. 6	**[Engine is running]** • **Warm-up condition** • Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF007V
			[Engine is running] • **Warm-up condition** • Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF008V

Wiring Diagram

NGEC0912

EC-INJECT-01





AEC974A

Diagnostic Procedure

NGEC0913

1	INSPECTION START

Turn ignition switch to START.
Is any cylinder ignited?

Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK OVERALL FUNCTION

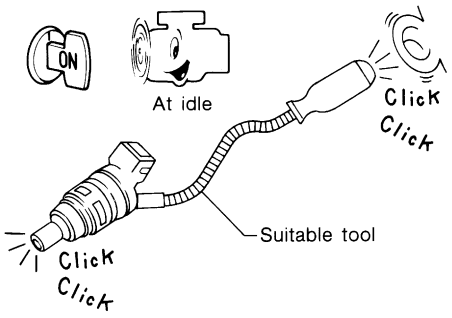
With CONSULT-II
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS AIR/FL SE	XXX V
IACV-AAC/V	XXX %

SEF806Z

3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-II
1. Start engine.
2. Listen to each injector operating sound.



MEC703B

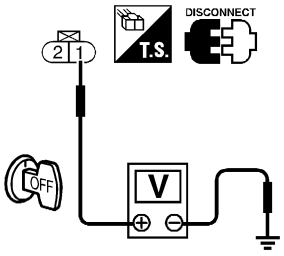
Clicking noise should be heard.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 3.

3	CHECK INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect injector harness connector.
3. Check voltage between terminal 1 and ground with CONSULT-II or tester.



SEF671W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M59, F27
- Harness connectors F37, F101
- Fuse block (J/B) connector M26
- 10A fuse
- Harness for open or short between injector and fuse

	▶	Repair harness or connectors.

5	CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between injector harness connector terminal 2 and ECM terminals 102, 104, 106, 109, 111, 113. 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

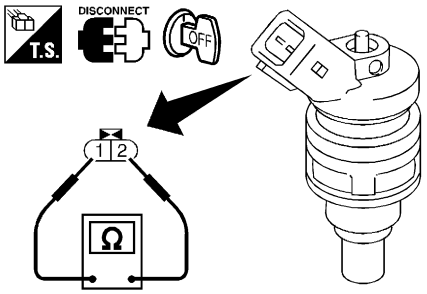
Check the following.
- Harness connectors F37, F101
- Harness connectors F38, F102
- Harness for open or short between ECM and injector

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

7	CHECK INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.



SEF625V

Resistance: 10 - 14Ω [at 25°C (77°F)]

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace injector.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**

CONSULT-II Reference Value in Data Monitor Mode

NGEC0914

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

ECM Terminals and Reference Value

NGEC0915

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

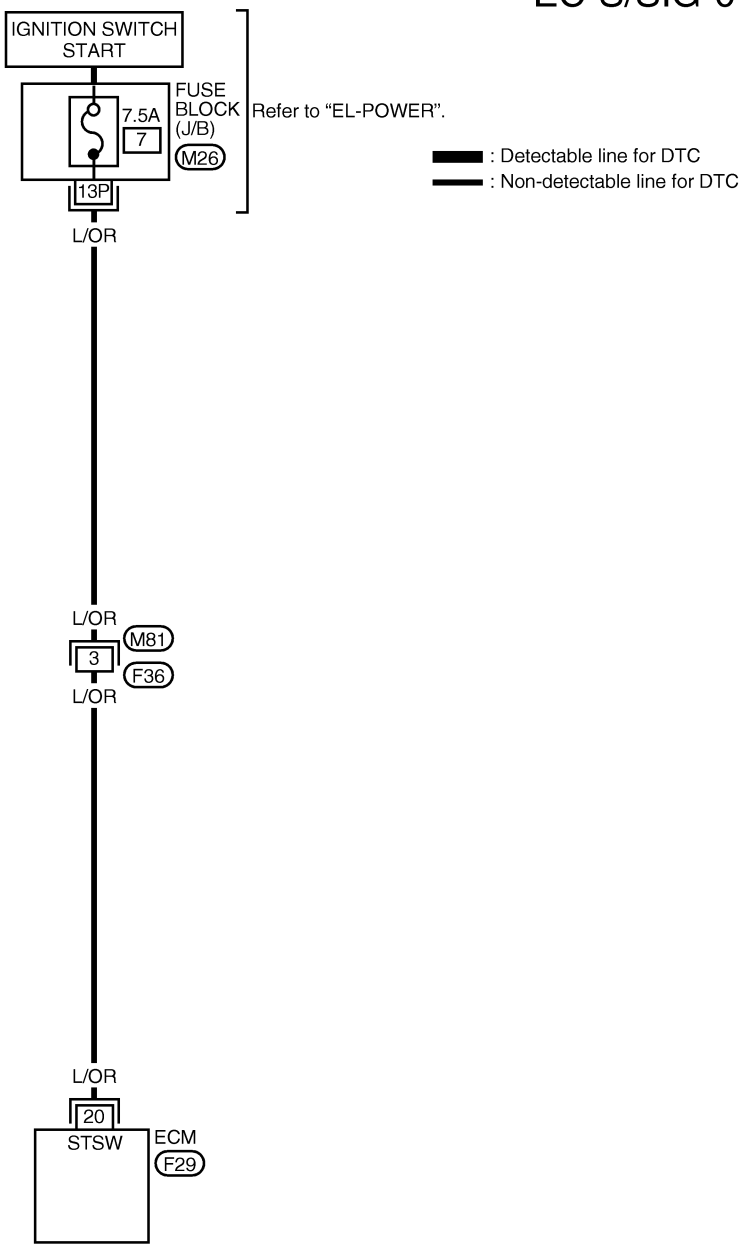
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

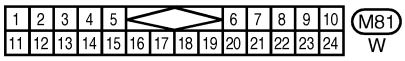
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	L/OR	Start signal	**[Ignition switch ON]**	Approximately 0V
			[Ignition switch START]	BATTERY VOLTAGE (11 - 14V)

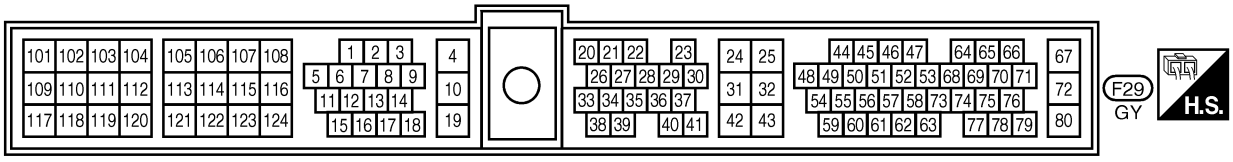
Wiring Diagram

NGEC0916

EC-S/SIG-01







AEC975A

Diagnostic Procedure

NGEC0917

1	INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch ON.
2. Check “START SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
START SIGNAL	OFF
CLSD THL POS	ON
AIR COND SIG	OFF
P/N POSI SW	ON

Condition	“START SIGNAL”
Ignition switch “ON”	OFF
Ignition switch “START”	ON

SEF072Y

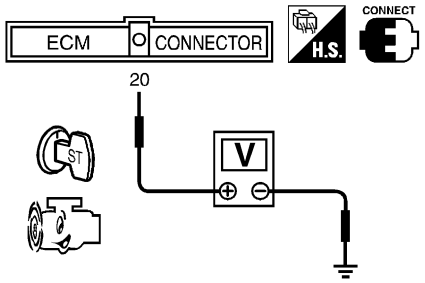
OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

3	CHECK OVERALL FUNCTION

Without CONSULT-II

Check voltage between ECM terminal 20 and ground under the following conditions.



SEF733U

Condition	Voltage
Ignition switch “START”	Battery voltage
Other positions	Approximately 0V

MTBL0148

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

4	CHECK STARTING SYSTEM	
Turn ignition switch OFF, then turn it to START. **Does starter motor operate?**		
	Yes or No	
Yes	▶	GO TO 5.
No	▶	Refer to "STARTING SYSTEM", ***SC-10***.

5	CHECK FUSE	
1. Turn ignition switch OFF. 2. Disconnect 7.5A fuse. 3. Check if 7.5A fuse is OK.		
	OK or NG	
OK	▶	GO TO 6.
NG	▶	Replace 7.5A fuse.

6	CHECK START SIGNAL INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 20 and fuse block. 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 M81, F36 ● Harness for open or short between ECM and fuse		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.		
	▶	**INSPECTION END**

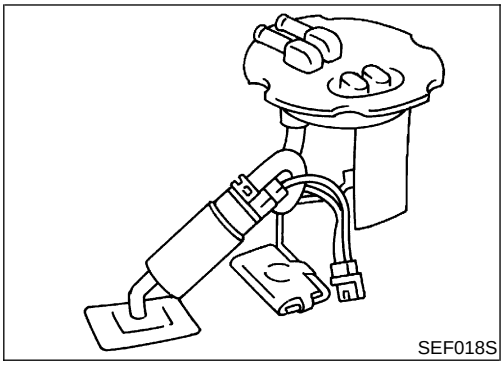
System Description

NGEC0918

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Fuel pump control	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 120° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to operate. If the 120° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 5 seconds
Engine running and cranking	Operates
When engine is stopped	Stops in 1.5 seconds
Except as shown above	Stops


SEF018S

Component Description

NGEC0919

The fuel pump with a fuel damper is an in-tank type (the pump and damper are located in the fuel tank).

CONSULT-II Reference Value in Data Monitor Mode

NGEC0920

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	• Ignition switch is turned to ON. (Operates for 5 seconds.) • Engine running and cranking	ON
	Except as shown above	OFF

ECM Terminals and Reference Value

=NGEC0921

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

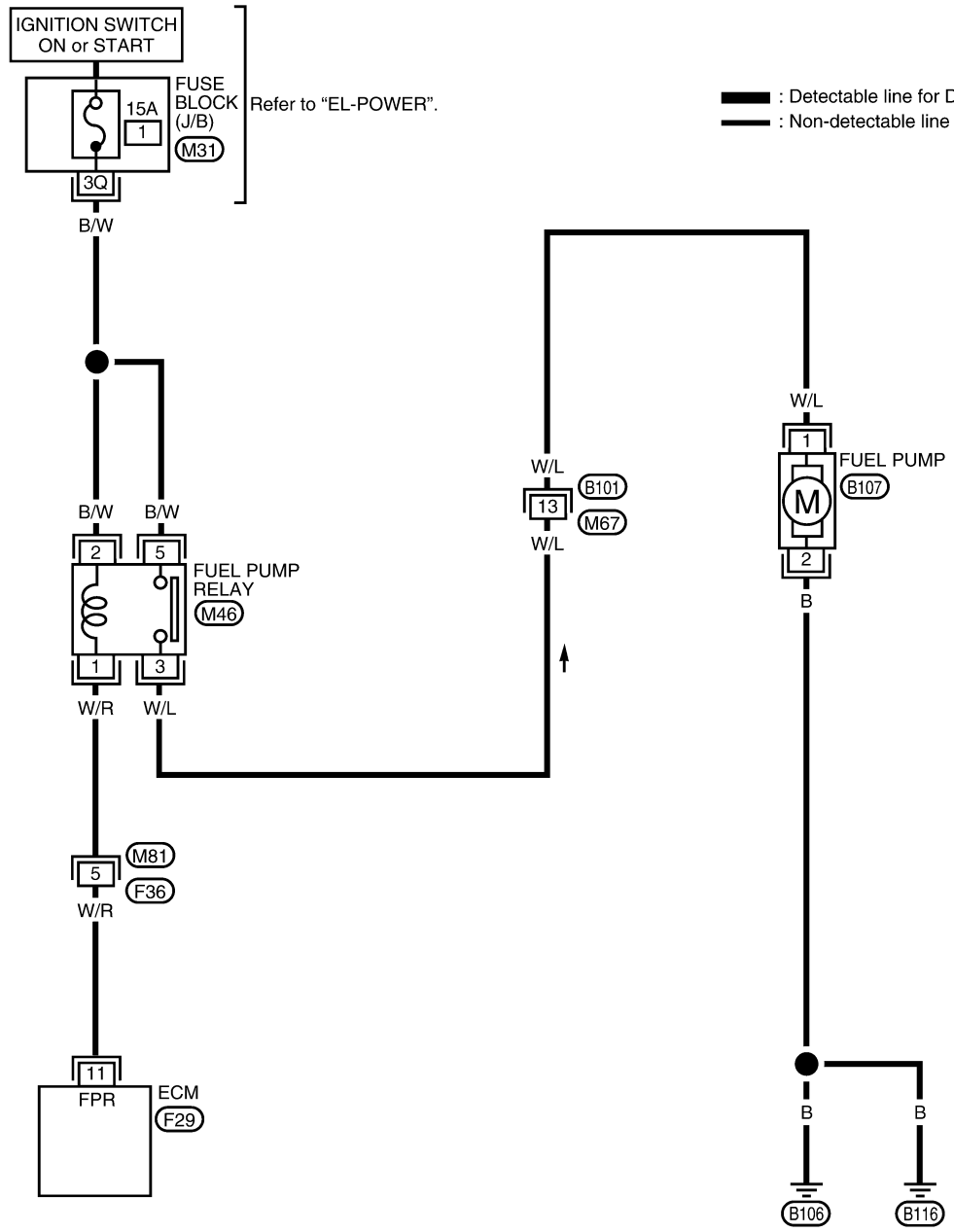
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

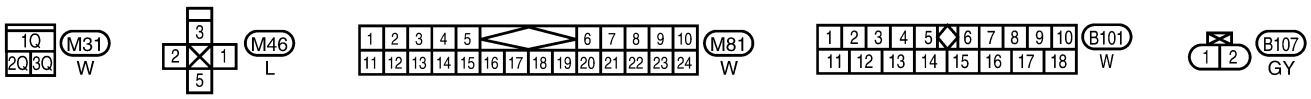
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	W/R	Fuel pump relay	**[Ignition switch ON]** ● For 5 seconds after turning ignition switch "ON" **[Engine is running]**	0 - 1V
			[Ignition switch ON] ● More than 5 seconds after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)

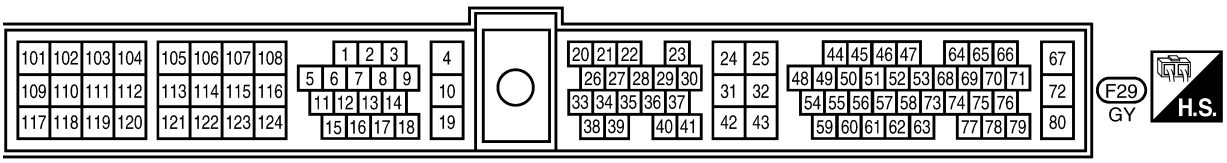
Wiring Diagram

NGEC0922

EC-F/PUMP-01







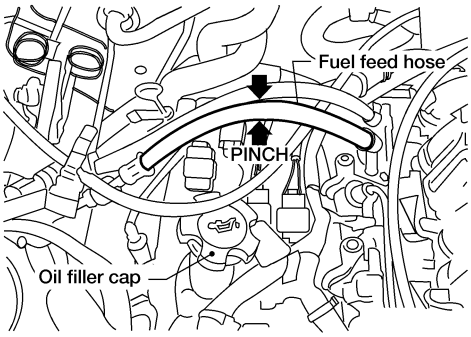
LEC509

Diagnostic Procedure

NGEC0923

1	CHECK OVERALL FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with fingers.



AEC663A

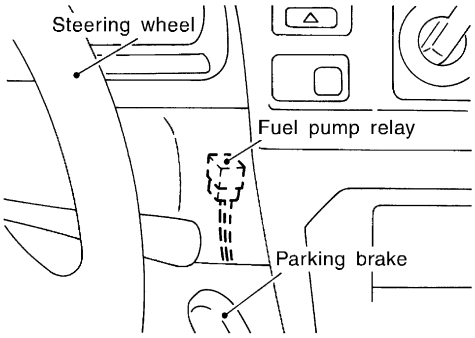
Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned ON.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

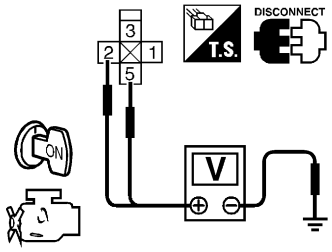
2	CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel pump relay.



SEF349V

3. Turn ignition switch ON.
4. Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.



SEF674W

Voltage: Battery voltage

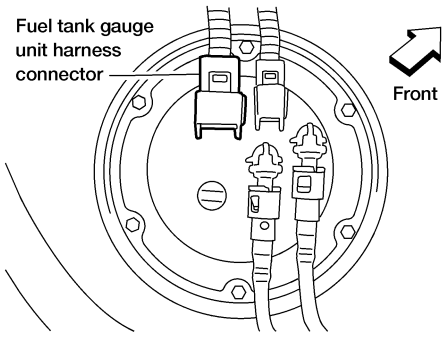
OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● Fuse block (J/B) connector M31 ● 15A fuse ● Harness for open or short between fuse and fuel pump relay	
▶	Repair harness or connectors.

4	CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuel pump harness connector.



AEC933A

3. Check harness continuity between fuel pump terminal 2 and body ground, fuel pump terminal 1 and fuel pump relay terminal 3. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M67, B101 ● Harness for open or short between fuel pump and body ground ● Harness for open or short between fuel pump and fuel pump relay	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK FUEL PUMP RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 11 and fuel pump relay 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 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M81, F36 ● Harness for open or short between ECM and fuel pump relay	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK FUEL PUMP RELAY

With CONSULT-II

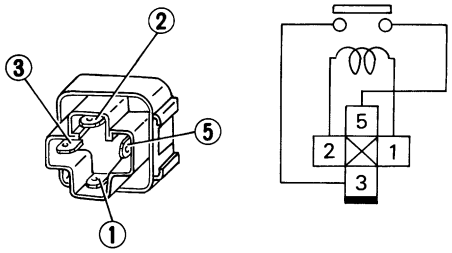
1. Reconnect fuel pump relay, fuel pump harness connector and ECM harness connector.
2. Turn ignition switch ON.
3. Turn fuel pump relay "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound.

ACTIVE TEST	
FUEL PUMP RELAY	ON
MONITOR	
ENG SPEED	XXX rpm

SEF073Y

Without CONSULT-II

Check continuity between terminals 3 and 5.



SEF511P

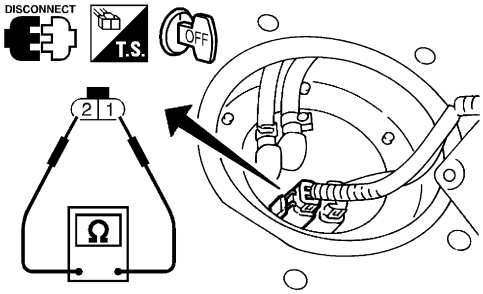
12V direct current supply between terminals 1 and 2
Continuity exists
No current supply
Continuity does not exist

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace fuel pump relay.

9	CHECK FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals 1 and 2.



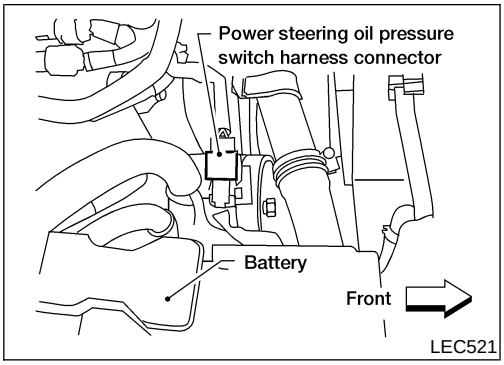
SEF022S

Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace fuel pump.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**



Component Description

NGEC0924

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

NGEC0925

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is fully turned.	ON

ECM Terminals and Reference Value

NGEC0926

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

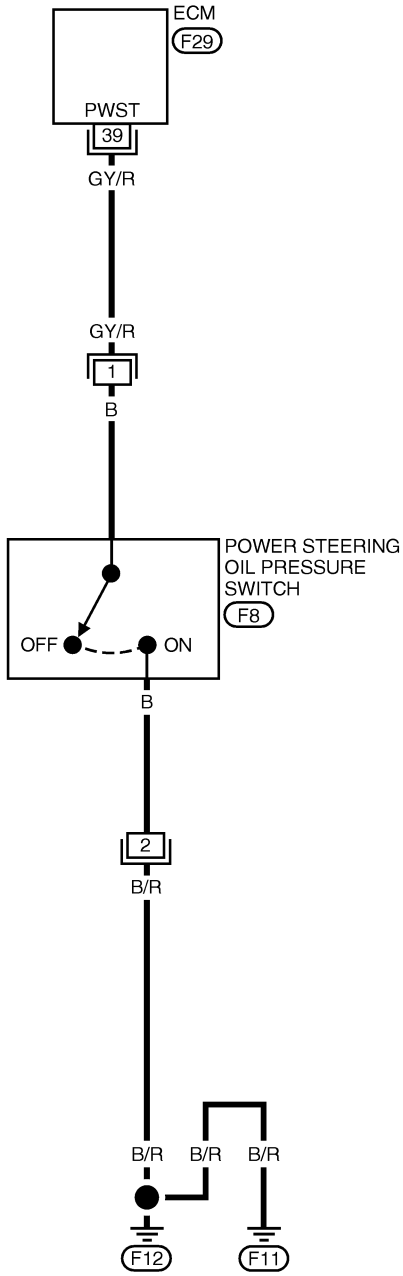
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
39	GY/R	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is being fully turned	0V
			[Engine is running] ● Steering wheel is not being turned	Approximately 5V

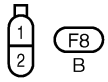
Wiring Diagram

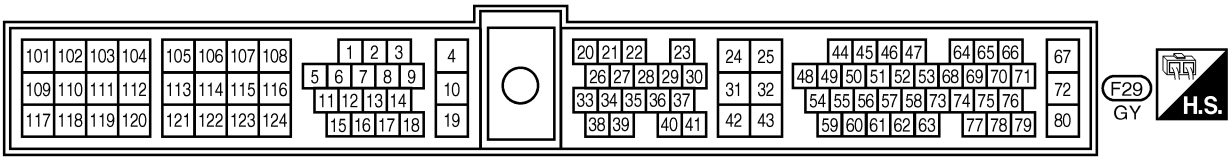
NGEC0927

EC-PST/SW-01



: Detectable line for DTC
: Non-detectable line for DTC





AEC977A

Diagnostic Procedure

NGEC0928

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.

DATA MONITOR	
MONITOR	NO DTC
PW/ST SIGNAL	OFF

Steering is in neutral position	OFF
Steering is turned	ON

SEF228Y

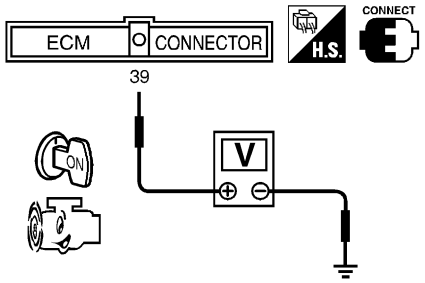
OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

3	CHECK OVERALL FUNCTION

Without CONSULT-II

1. Start engine.
2. Check voltage between ECM terminal 39 and ground.



SEF739U

Condition	Voltage
Steering is neutral position	Approximately 5V
Steering is turned to full position	Approximately 0V

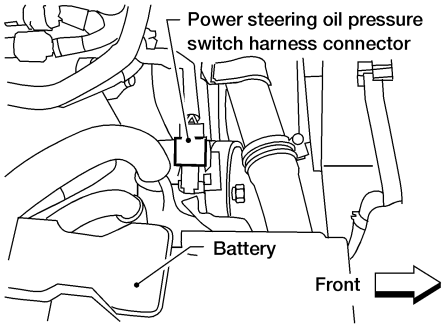
MTBL0145

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

4	CHECK POWER STEERING OIL PRESSURE SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect power steering oil pressure switch harness connector.



LEC521

3. Check harness continuity between switch terminal 2 and engine ground. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to power in harness or connectors.

5	CHECK POWER STEERING OIL PRESSURE SWITCH INPUT SIGNAL CIRCUIT

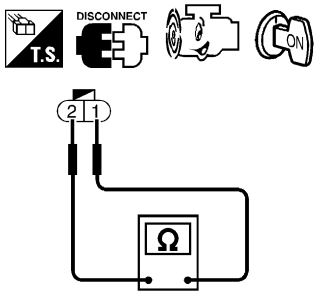
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 39 and switch terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 6.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6	CHECK POWER STEERING OIL PRESSURE SWITCH

1. Disconnect power steering oil pressure switch harness connector then start engine.
2. Check continuity between terminals 1 and 2.



SEF679W

Conditions	Continuity
Steering wheel is being fully turned	Yes
Steering wheel is not being turned	No

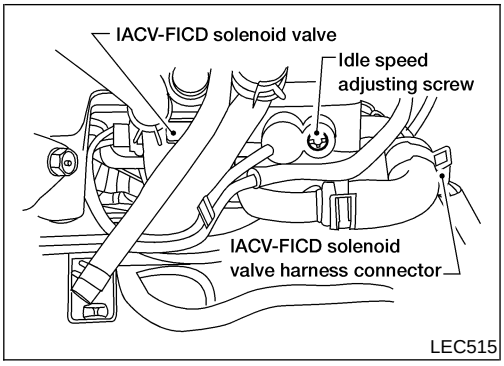
MTBL0254

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace power steering oil pressure switch.

Diagnostic Procedure (Cont'd)

7	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**



Component Description

NGEC0929

When the air conditioner is on, the IACV-FICD solenoid valve supplies additional air to adjust to the increased load.

ECM Terminals and Reference Value

NGEC0930

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 the ECM terminals, such as the ground.

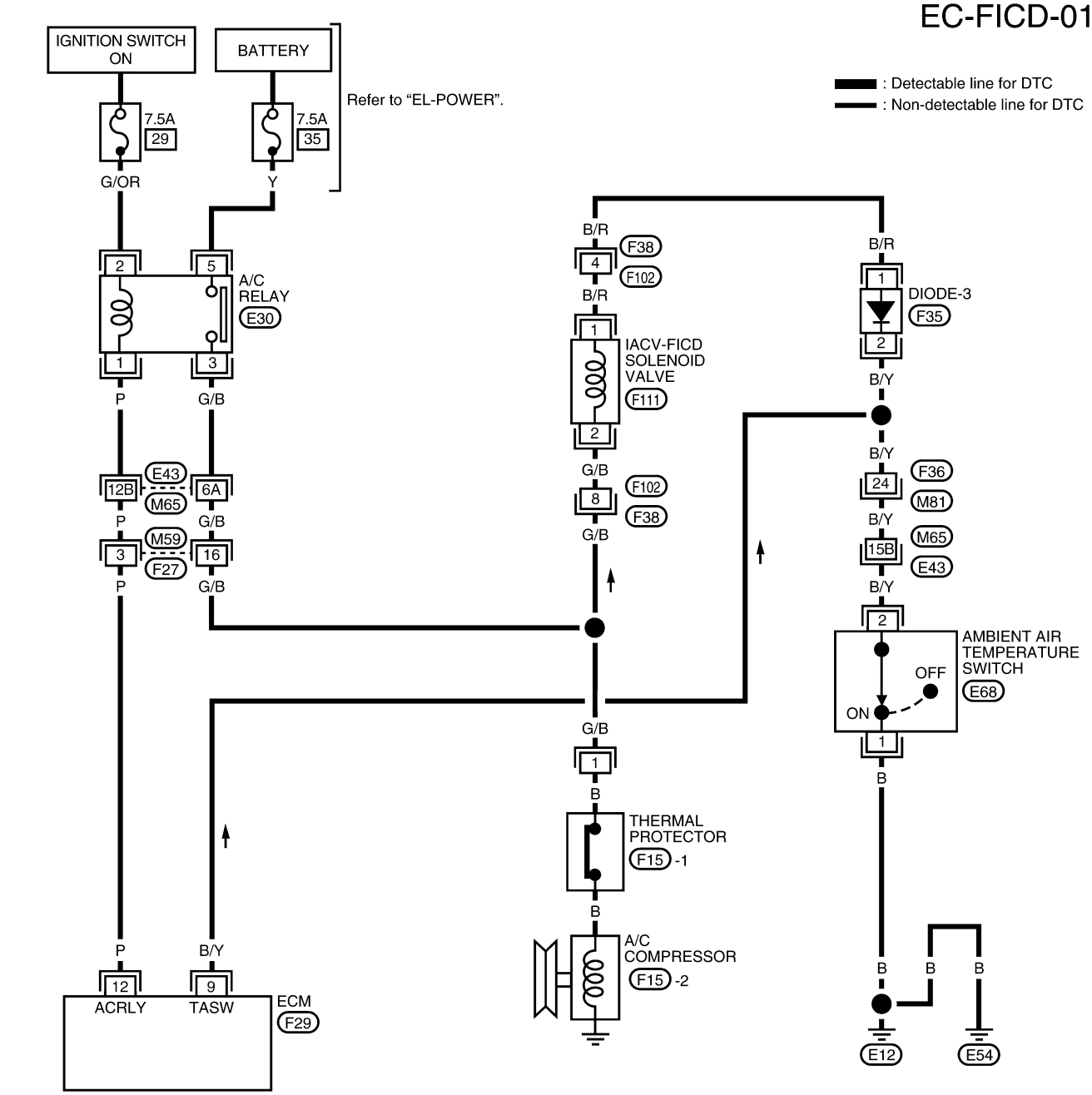
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
9	B/Y	Ambient air temperature switch	**[Engine is running]** ● Idle speed ● Ambient air temperature is above 25°C (77°F) ● Air conditioner is operating	0V
			[Engine is running] ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is not operating	Approximately 5V
12	P	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower fan switch are "ON"*	0 - 1V
			[Engine is running] ● A/C switch is "OFF"	BATTERY VOLTAGE (11 - 14V)
21	G/R	Air conditioner switch	**[Engine is running]** ● Both A/C switch and blower fan switch are "ON" (Compressor operates)*	Approximately 0V
			[Engine is running] ● Air conditioner switch is "OFF"	Approximately 5V

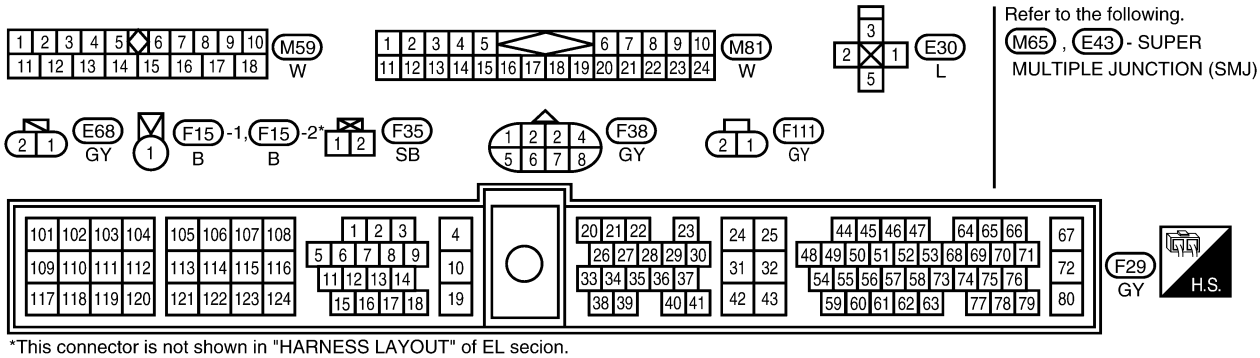
*: Any mode except "OFF", ambient air temperature is above 25°C (77°F).

Wiring Diagram

NGEC0931

EC-FICD-01





Refer to the following.
M65 , E43 - SUPER MULTIPLE JUNCTION (SMJ)

*This connector is not shown in "HARNESS LAYOUT" of EL secion.

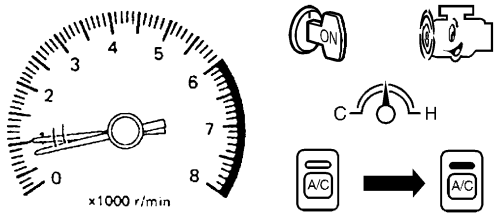
LEC510

Diagnostic Procedure

NGEC0932

1	CHECK OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   750±50 rpm (in "N" position)
   If NG, adjust idle speed.
3. Turn air conditioner switch and blower fan switch ON.
4. Recheck idle speed.



SEF742U

850 rpm or more (in "P" or "N" position)

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

2	CHECK AIR CONDITIONER FUNCTION

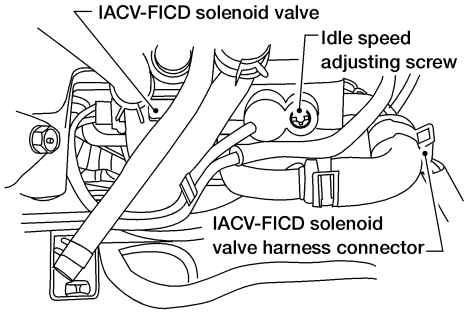
Check if air conditioner compressor functions normally.

OK or NG

OK	▶	GO TO 3.
NG	▶	Refer to "Symptom Table", "TROUBLE DIAGNOSES", ***HA-27***.

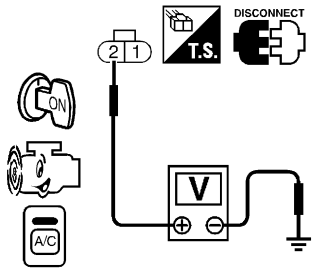
3	CHECK IACV-FICD SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn air conditioner switch and blower fan switch OFF.
2. Stop engine.
3. Disconnect IACV-FICD solenoid valve harness connector.



LEC515

4. Start engine, then turn air conditioner switch and blower fan switch ON.
5. Check voltage between terminal 2 and ground with CONSULT-II or tester.



SEF680W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F38, F102
- Harness for open or short between IACV-FICD solenoid valve and harness connector F27

	▶	Repair harness or connectors.

5	CHECK IACV-FICD SOLENOID VALVE GROUND CIRCUIT

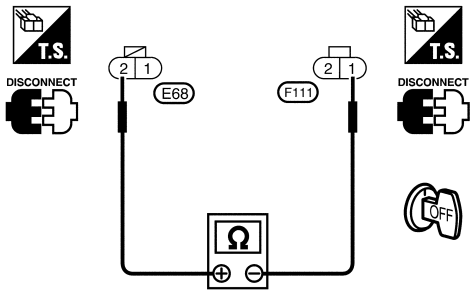
1. Turn ignition switch OFF.
2. Disconnect ambient air temperature switch harness connector.
3. Check harness continuity between switch terminal 1 and body ground.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 7.

6	CHECK IACV-FICD SOLENOID VALVE GROUND CIRCUIT WITH DIODE

1. Check harness continuity between switch terminal 2 and solenoid valve terminal 1.



SEF160X

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

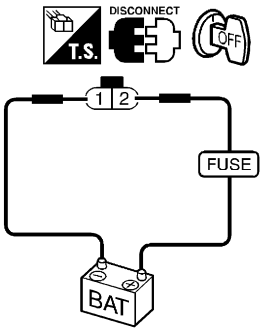
7	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F38, F102
- Harness connectors F36, M81
- Harness connectors M65, E43
- Diode F35
- Harness for open or short between ambient air temperature switch and body ground
- Harness for open or short between IACV-FICD solenoid valve and ambient air temperature switch

	▶	Repair open circuit or short to ground or short to power in harness or connectors.

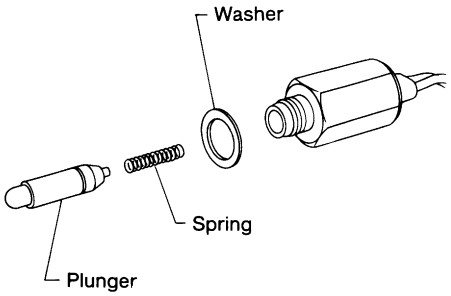
8	CHECK IACV-FICD SOLENOID VALVE

Disconnect IACV-FICD solenoid valve harness connector.
- Check for clicking sound when applying 12V direct current to terminals.



SEF682W

- Check plunger for seizing or sticking.
- Check for broken spring.



SEF097K

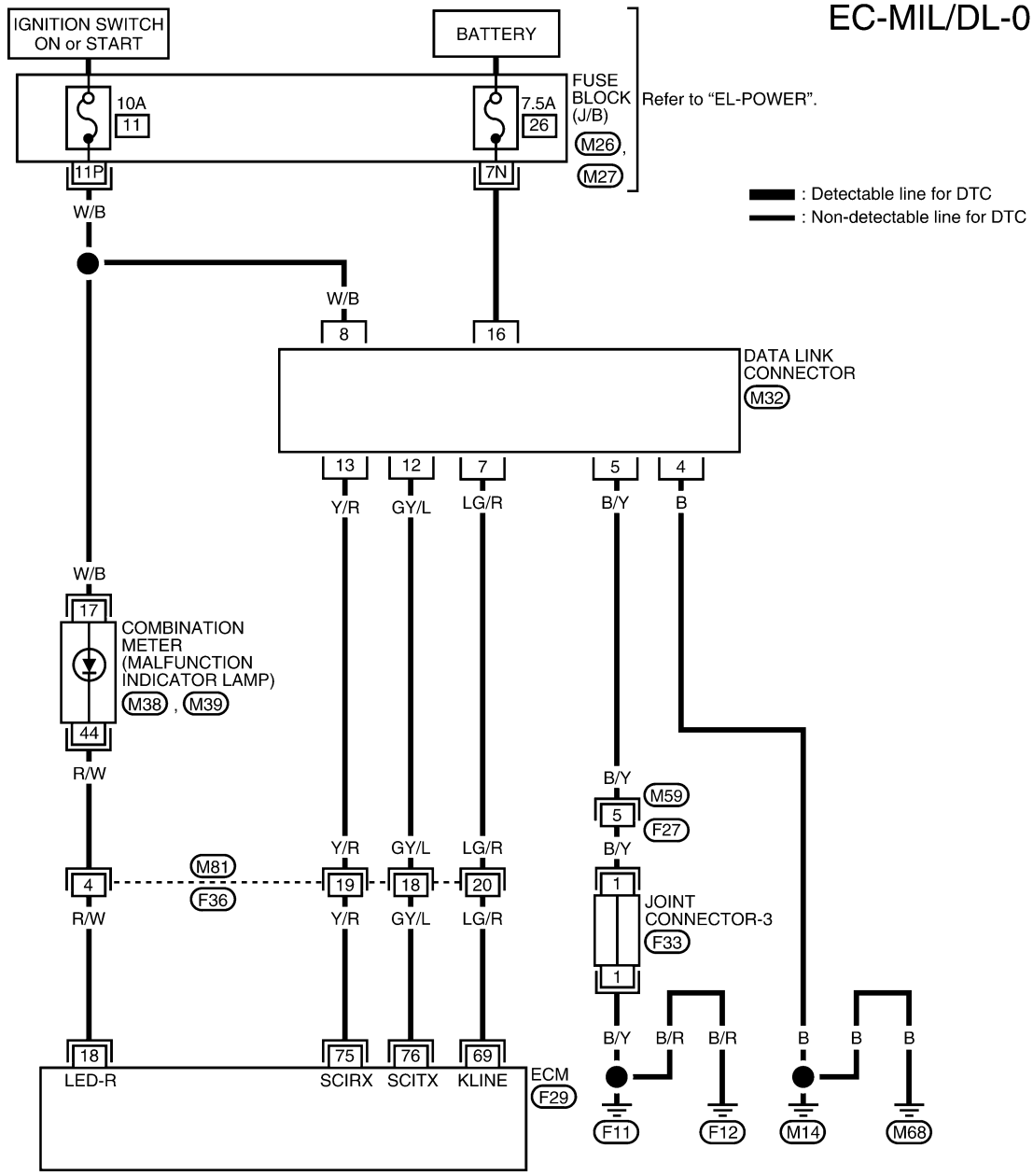
OK or NG

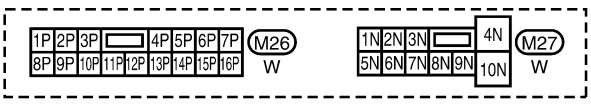
OK	▶	GO TO 9.
NG	▶	Replace IACV-FICD solenoid valve.

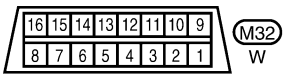
9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-732.	
▶	**INSPECTION END**

Wiring Diagram

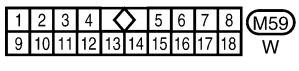
NGEC0933

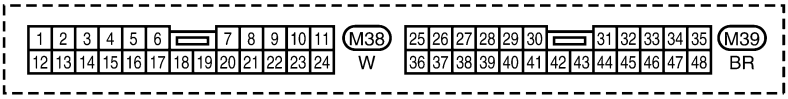


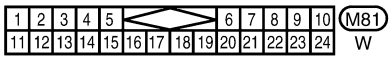


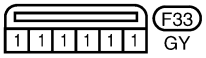


Refer to the following.
F29 - ELECTRICAL UNITS









WEC126A

Fuel Pressure Regulator

NGEC0934

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

NGEC0935

Base idle speed*1	No-load*4 (in “P” or N” position)	700±50 rpm
Target idle speed*2	No-load*4 (in “P” or N” position)	750±50 rpm
Air conditioner: ON	In “P” or N” position	850 rpm or more
Ignition timing*3	In “P” or N” position	10°±2° BTDC
Throttle position sensor idle position		0.15 - 0.85V

*1: Throttle position sensor harness connector disconnected or using CONSULT-II “WORK SUPPORT” mode
*2: Throttle position sensor harness connector connected
*3: Throttle position sensor harness connector disconnected
*4: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Coil

NGEC0936

Primary voltage	12V
Primary resistance [at 20°C (68°F)]	Approximately 1.0Ω
Secondary resistance [at 20°C (68°F)]	Approximately 10 kΩ

Mass Air Flow Sensor

NGEC0937

Supply voltage	Battery voltage (11 - 14)V
Output voltage at idle	1.0 - 1.7*V
Mass air flow (Using CONSULT-II or GST)	3.3 - 4.8 g·m/sec at idle* 12.0 - 14.9 g·m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no-load.

Engine Coolant Temperature Sensor

NGEC0938

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Heated Oxygen Sensor 1 Heater (Front)

NGEC0940

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω

Fuel Pump

NGEC0941

Resistance [at 25°C (77°F)]	0.2 - 5.0Ω

IACV-AAC Valve

NGEC0942

Resistance [at 20°C (68°F)]	Approximately 10.0Ω

Injector

NGEC0943

Resistance [at 25°C (77°F)]	10 - 14Ω

Throttle Position Sensor

NGEC0945

Throttle valve conditions	Voltage [at normal operating temperature, engine off, ignition switch ON, (throttle opener disengaged, if so equipped)]
Completely closed (a)	0.15 - 0.85V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.7V

Calculated Load Value

NGEC0946

	Calculated load value % (Using CONSULT or GST)
At idle	18.0 - 26.0
At 2,500 rpm	18.0 - 21.0

Intake Air Temperature Sensor

NGEC0947

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

Heated Oxygen Sensor 2 Heater (Rear)

NGEC0948

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω

Crankshaft Position Sensor (OBD)

NGEC0949

Resistance [at 20°C (68°F)]	512 - 632Ω

Fuel Tank Temperature Sensor

NGEC0950

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

NOTES