ENGINE CONTROL SYSTEM

SECTION EC

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VG33E

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CONTENTS (Cont'd)

Alphabetical & P No. Index for DTC

NGEC0001

ALPHABETICAL INDEX FOR DTC

NGEC0001S01

Items (CONSULT-II screen terms)	DTC*6		Reference page
	CONSULT-II GST*2	ECM*1	
Unable to access ECM	—	—	EC-110
*COOLAN T SEN/CIRC	P0125	0908	EC-186
ABSL PRES SEN/CIRC	P0105	0803	EC-146
AIR TEMP SEN/CIRC	P0110	0401	EC-161
CAM POS SEN/CIRC	P0340	0101	EC-318
CLOSED LOOP	P1148	0307	EC-447
CLOSED TP SW/CIRC	P0510	0203	EC-422
COOLANT T SEN/CIRC	P0115	0103	EC-167
CPS/CIRC (OBD) COG	P1336	0905	EC-457
CPS/CIRCUIT (OBD)	P0335	0802	EC-312
CYL 1 MISFIRE	P0301	0608	EC-299
CYL 2 MISFIRE	P0302	0607	EC-299
CYL 3 MISFIRE	P0303	0606	EC-299
CYL 4 MISFIRE	P0304	0605	EC-299
ECM	P0605	0301	EC-429
EGR SYSTEM	P0400	0302	EC-326
EGR SYSTEM	P1402	0514	EC-476
EGR TEMP SEN/CIRC	P1401	0305	EC-470
EGRC SOLENOID/V	P1400	1005	EC-463
EGRC-BPT VALVE	P0402	0306	EC-338
EVAP GROSS LEAK	P0455	0715	EC-398
EVAP PURG FLOW/MON	P1447	0111	EC-505
EVAP SMALL LEAK	P0440	0705	EC-351
EVAP SMALL LEAK	P1440	0213	EC-485
EVAP SYS PRES SEN	P0450	0704	EC-383
FR O2 SEN HEATER	P0135	0901	EC-230
FRONT O2 SENSOR	P0130	0303	EC-190
FRONT O2 SENSOR	P0131	0411	EC-198
FRONT O2 SENSOR	P0132	0410	EC-205
FRONT O2 SENSOR	P0133	0409	EC-212
FRONT O2 SENSOR	P0134	0412	EC-223
FUEL SYS DIAG-LEAN	P0171	0115	EC-278
FUEL SYS DIAG-RICH	P0172	0114	EC-286
FUEL TEMP SEN/CIRC	P0180	0402	EC-293

Items (CONSULT-II screen terms)	DTC*6		Reference page
	CONSULT-II GST*2	ECM*1	
IACV/AAC VLV/CIRC	P0505	0205	EC-416
IGN SIGNAL-PRIMARY	P1320	0201	EC-449
KNOCK SEN/CIRCUIT	P0325	0304	EC-308
MAF SEN/CIRCUIT*3	P0100	0102	EC-136
MAP/BARO SW SOL/CIR	P1105	1302	EC-431
MULTI CYL MISFIRE	P0300	0701	EC-299
NO SELF DIAGNOSTIC FAILURE INDICATED	**P0000**	**0505**	**—**
NO SELF DIAGNOSTIC FAILURE INDICATED	No DTC	Flashing*5	EC-70
OVERHEAT	—	0208	EC-547
P-N POS SW/CIRCUIT	P1706	1003	EC-541
PURG VOLUME CONT/V	P0443	1008	EC-367
PURG VOLUME CONT/V	P1444	0214	EC-487
REAR O2 SENSOR	P0137	0511	EC-235
REAR O2 SENSOR	P0138	0510	EC-245
REAR O2 SENSOR	P0139	0707	EC-255
REAR O2 SENSOR	P0140	0512	EC-265
RR O2 SEN HEATER	P0141	0902	EC-273
THRTL POS SEN/CIRC*3	P0120	0403	EC-172
TW CATALYST SYSTEM	P0420	0702	EC-346
VC CUT/V BYPASS/V	P1491	0311	EC-530
VC/V BYPASS/V	P1490	0801	EC-523
VEH SPEED SEN/CIRC*4	P0500	0104	EC-412
VENT CONTROL VALVE	P0446	0903	EC-375
VENT CONTROL VALVE	P1446	0215	EC-499
VENT CONTROL VALVE	P1448	0309	EC-515

*1: In Diagnostic Test Mode II (Self-diagnostic results). These numbers are controlled by NISSAN.
*2: These numbers are prescribed by SAE J2012.
*3: When the fail-safe operation occurs, the MIL illuminates.
*4: The MIL illuminates when the “Revolution sensor signal” and the “Vehicle speed sensor signal” meet the fail-safe condition at the same time.
*5: While engine is running.
*6: 1st trip DTC No. is the same as DTC No.

P NO. INDEX FOR DTC

NGEC0001S02

DTC*6		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*1		
—	—	Unable to access ECM	EC-110
No DTC	Flashing*5	NO SELF DIAGNOSTIC FAILURE INDICATED	EC-70
P0000	**0505**	**NO SELF DIAGNOSTIC FAILURE INDICATED**	**—**

DTC*6		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*1		
P0100	0102	MAF SEN/CIRCUIT*3	EC-136
P0105	0803	ABSL PRES SEN/CIRC	EC-146
P0110	0401	AIR TEMP SEN/CIRC	EC-161
P0115	0103	COOLANT T SEN/CIRC	EC-167
P0120	0403	THRTL POS SEN/CIRC*3	EC-172
P0125	0908	*COOLAN T SEN/CIRC	EC-186
P0130	0303	FRONT O2 SENSOR	EC-190
P0131	0411	FRONT O2 SENSOR	EC-198
P0132	0410	FRONT O2 SENSOR	EC-205
P0133	0409	FRONT O2 SENSOR	EC-212
P0134	0412	FRONT O2 SENSOR	EC-223
P0135	0901	FR O2 SEN HEATER	EC-230
P0137	0511	REAR O2 SENSOR	EC-235
P0138	0510	REAR O2 SENSOR	EC-245
P0139	0707	REAR O2 SENSOR	EC-255
P0140	0512	REAR O2 SENSOR	EC-265
P0141	0902	RR O2 SEN HEATER	EC-273
P0171	0115	FUEL SYS DIAG-LEAN	EC-278
P0172	0114	FUEL SYS DIAG-RICH	EC-286
P0180	0402	FUEL TEMP SEN/CIRC	EC-293
P0300	0701	MULTI CYL MISFIRE	EC-299
P0301	0608	CYL 1 MISFIRE	EC-299
P0302	0607	CYL 2 MISFIRE	EC-299
P0303	0606	CYL 3 MISFIRE	EC-299
P0304	0605	CYL 4 MISFIRE	EC-299
P0325	0304	KNOCK SEN/CIRCUIT	EC-308
P0335	0802	CPS/CIRCUIT (OBD)	EC-312
P0340	0101	CAM POS SEN/CIRC	EC-318
P0400	0302	EGR SYSTEM	EC-326
P0402	0306	EGRC-BPT VALVE	EC-338
P0420	0702	TW CATALYST SYSTEM	EC-346
P0440	0705	EVAP SMALL LEAK	EC-351
P0443	1008	PURG VOLUME CONT/V	EC-367
P0446	0903	VENT CONTROL VALVE	EC-375
P0450	0704	EVAP SYS PRES SEN	EC-383
P0455	0715	EVAP GROSS LEAK	EC-398

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P0505	0205	IACV/AAC VLV/CIRC	EC-416
P0510	0203	CLOSED TP SW/CIRC	EC-422
P0605	0301	ECM	EC-429
P1105	1302	MAP/BARO SW SOL/CIR	EC-431
P1148	0307	CLOSED LOOP	EC-447
P1320	0201	IGN SIGNAL-PRIMARY	EC-449
P1336	0905	CPS/CIRC (OBD) COG	EC-457
P1400	1005	EGRC SOLENOID/V	EC-463
P1401	0305	EGR TEMP SEN/CIRC	EC-470
P1402	0514	EGR SYSTEM	EC-476
P1440	0213	EVAP SMALL LEAK	EC-485
P1444	0214	PURG VOLUME CONT/V	EC-487
P1446	0215	VENT CONTROL VALVE	EC-499
P1447	0111	EVAP PURG FLOW/MON	EC-505
P1448	0309	VENT CONTROL VALVE	EC-515
P1490	0801	VC/V BYPASS/V	EC-523
P1491	0311	VC CUT/V BYPASS/V	EC-530
P1706	1003	P-N POS SW/CIRCUIT	EC-541
—	0208	OVERHEAT	EC-547

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

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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.**

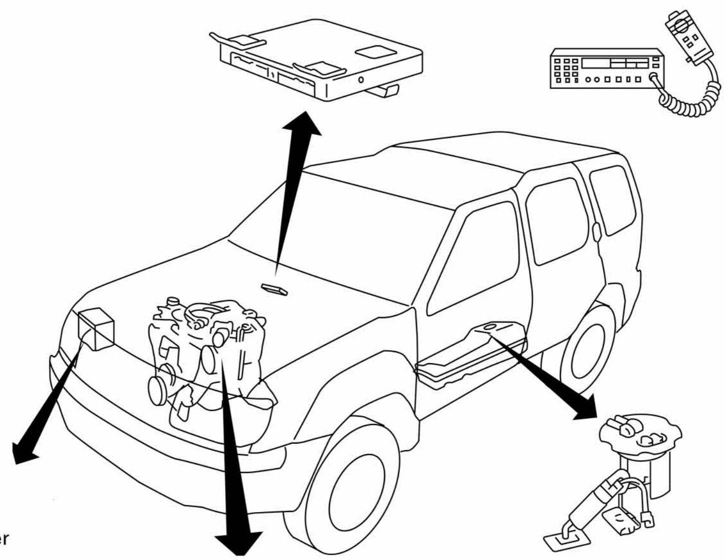
Engine Fuel & Emission Control System

NGEC0004

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.

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.

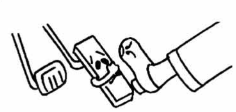
1) Keep the antenna as far away as possible from the electronic control units.
2) Keep the antenna feeder line more than 20 cm (7.9 in) away from the harness of electronic controls.
   Do not let them run parallel for a long distance.
3) Adjust the antenna and feeder line so that the standing-wave ratio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



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).



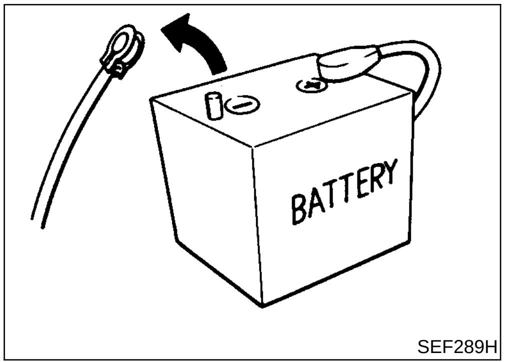
FUEL PUMP
- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque. (Refer to MA section.)

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

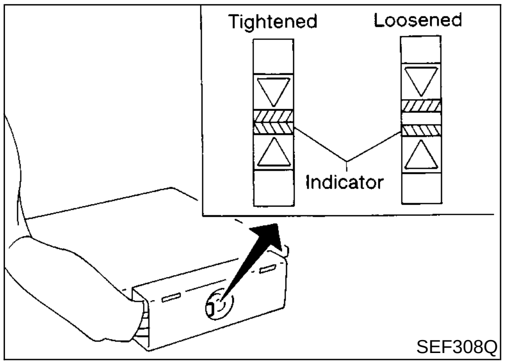
Precautions

NGEC0005



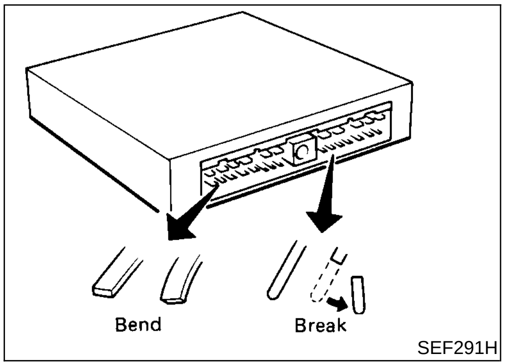
SEF289H

- **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.**



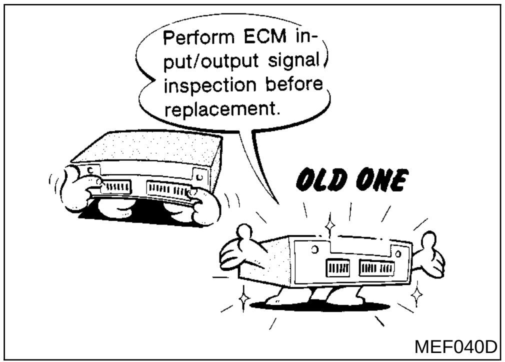
SEF308Q

- **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)



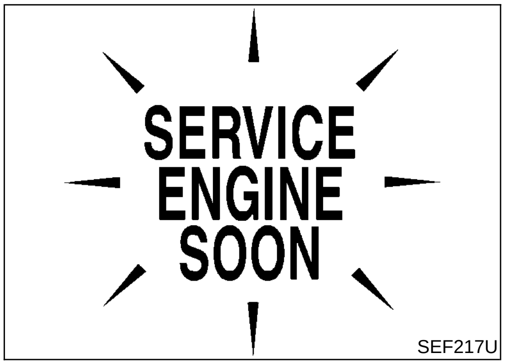
SEF291H

- **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.



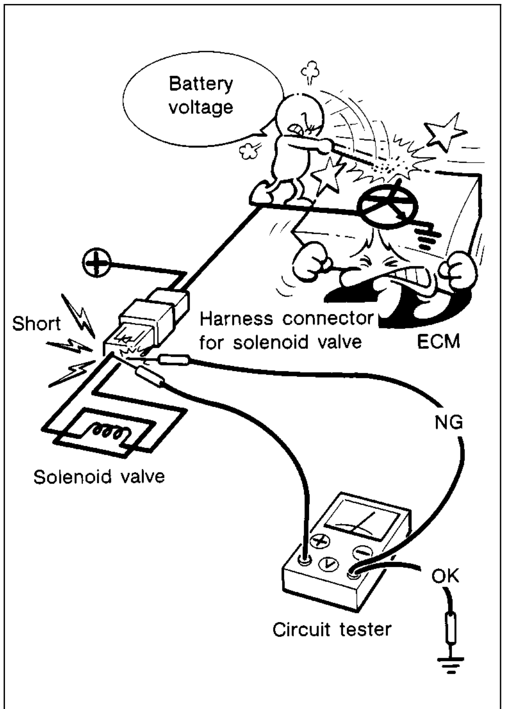
MEF040D

- **Before replacing ECM, perform Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-120.**



SEF217U

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



SEF348N

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

Wiring Diagrams and Trouble Diagnosis

NGEC0006

When you read Wiring diagrams, refer to the followings:

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

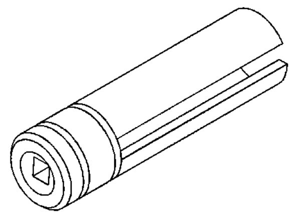
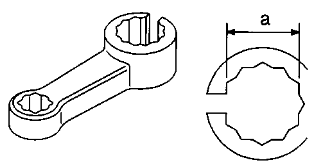
When you perform trouble diagnosis, refer to the followings:

- "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSIS" in ***GI-34***.
- "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", ***GI-23***

Special Service Tools

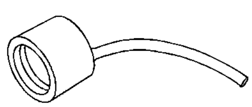
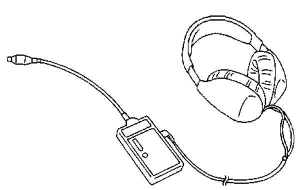
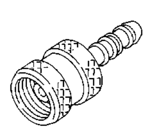
NGEC0007

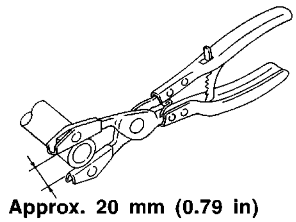
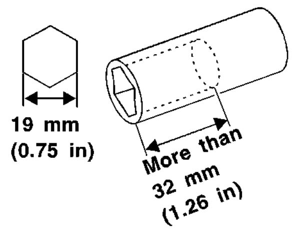
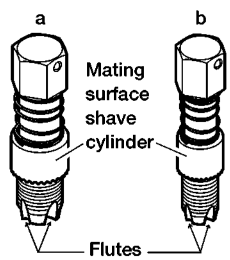
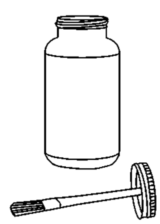
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

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)**

Commercial Service Tools

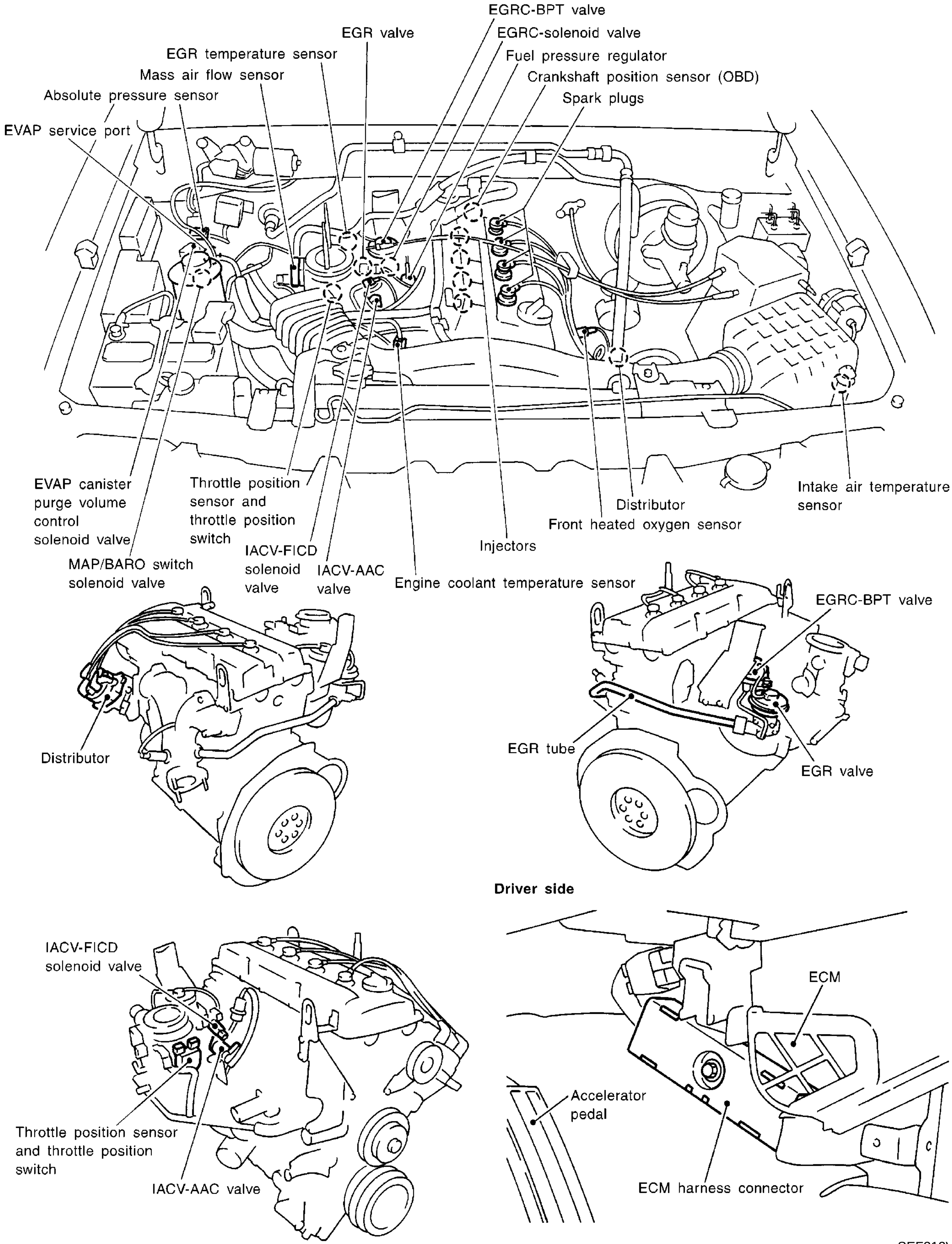
NGEC0008

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

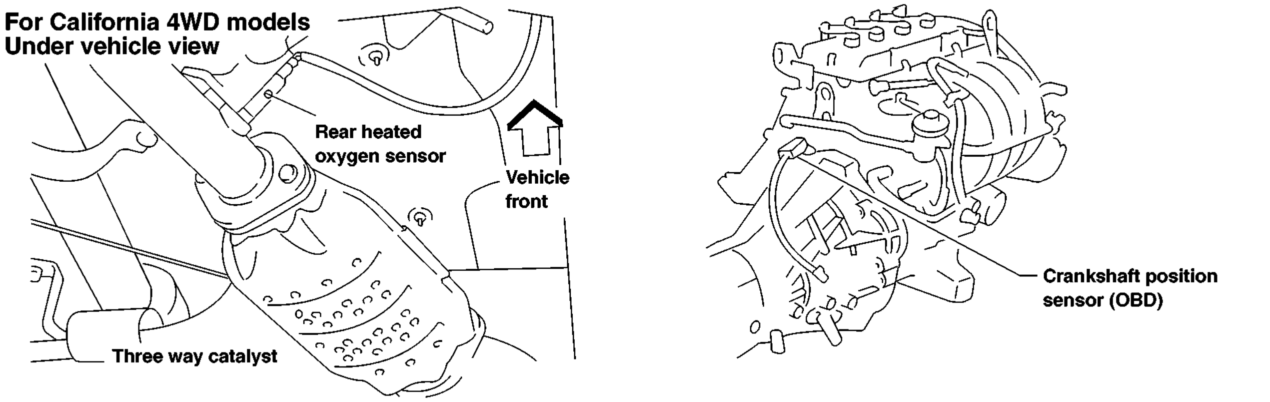
Tool name	Description	
Hose clipper (—)	 NT720	Clamping the EVAP purge hose between the fuel tank and EVAP canister applied to DTC P1440 [EVAP control system (Small leak — Positive pressure)]
Socket wrench	 NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner (J-43897-18) (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



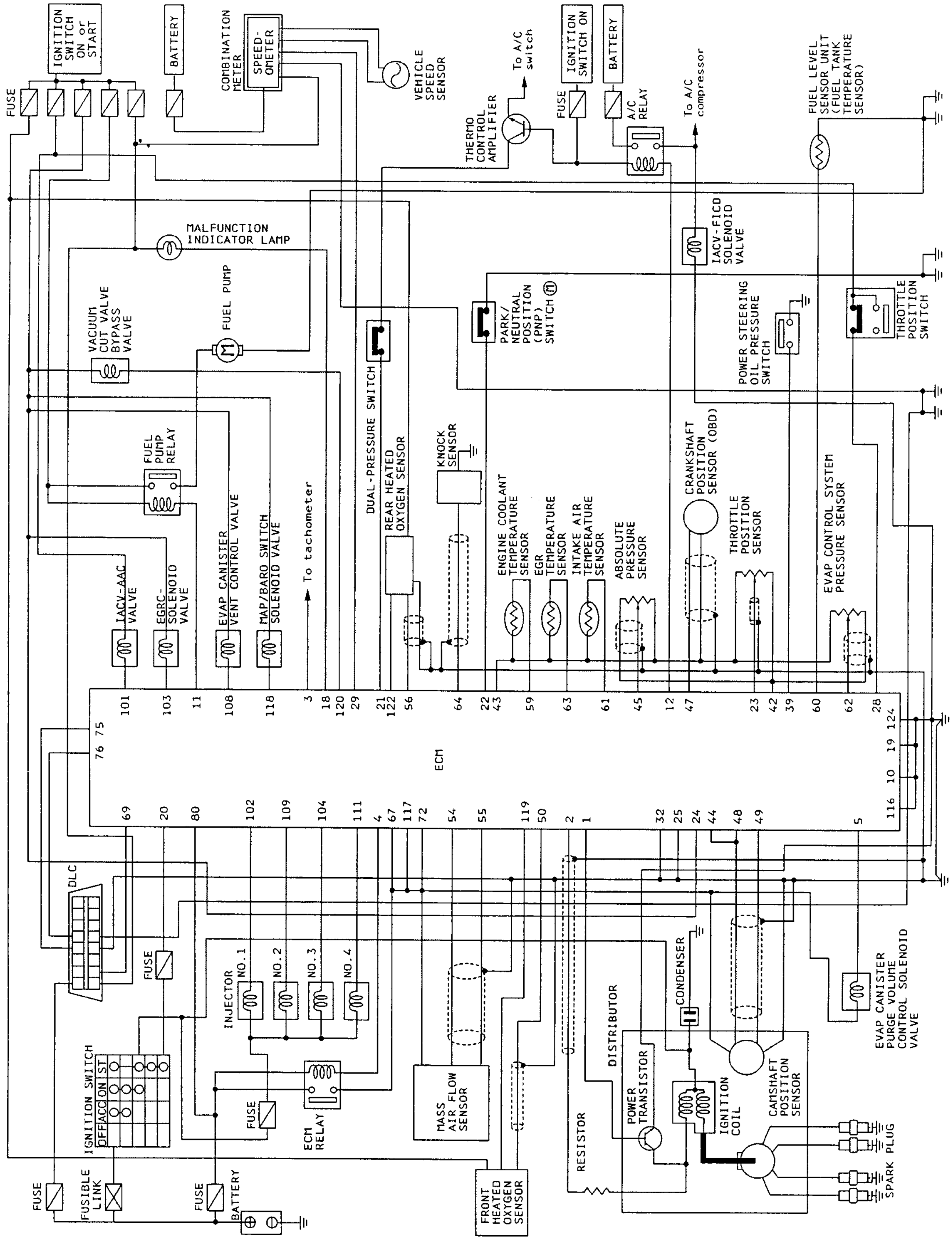
SEF312V


For California 4WD models
Under vehicle view
Rear heated
oxygen sensor
Vehicle
front
Three way catalyst
Crankshaft position
sensor (OBD)

AEC041B

Circuit Diagram

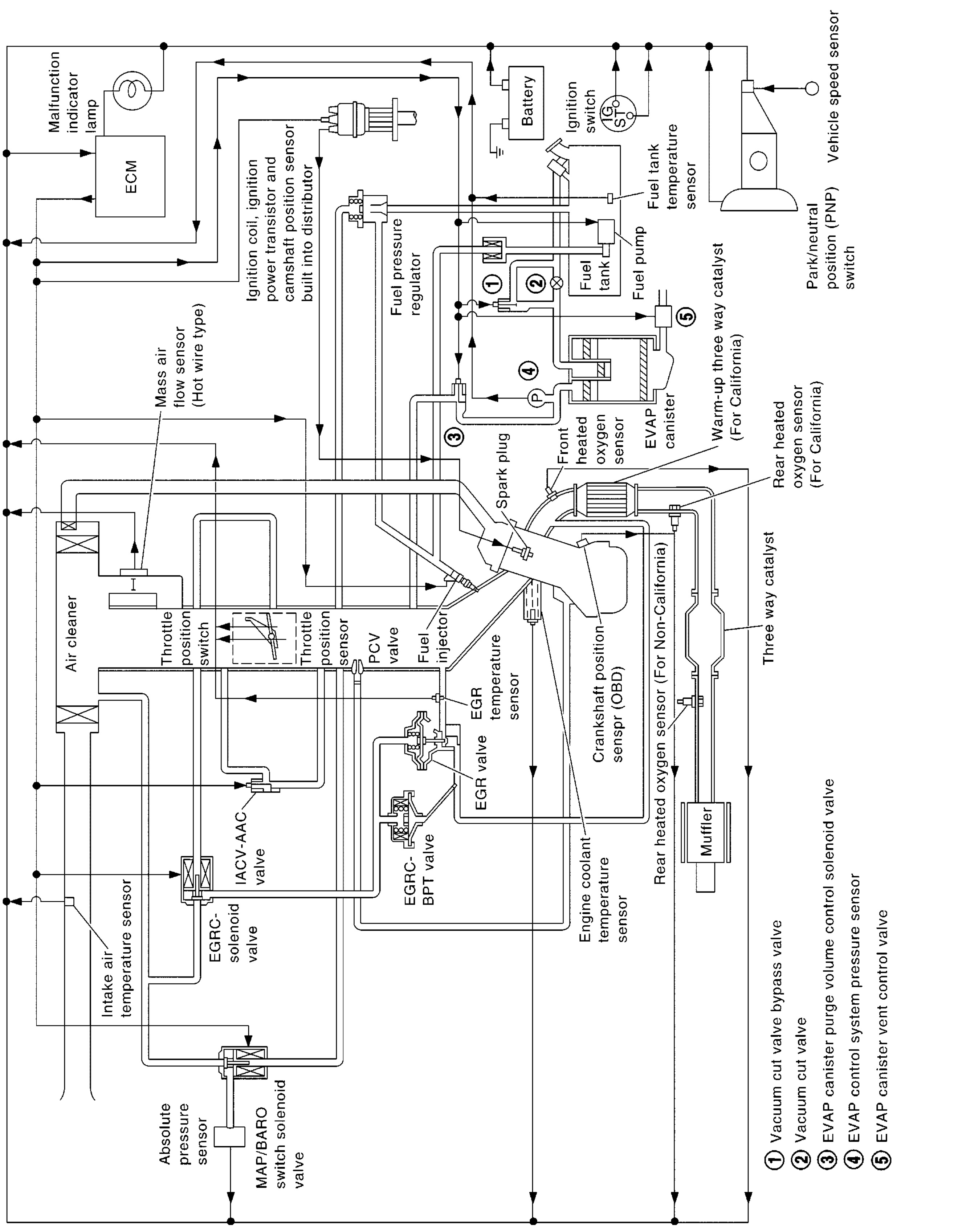
NGEC0010



AEC053B

System Diagram

NGEC0011

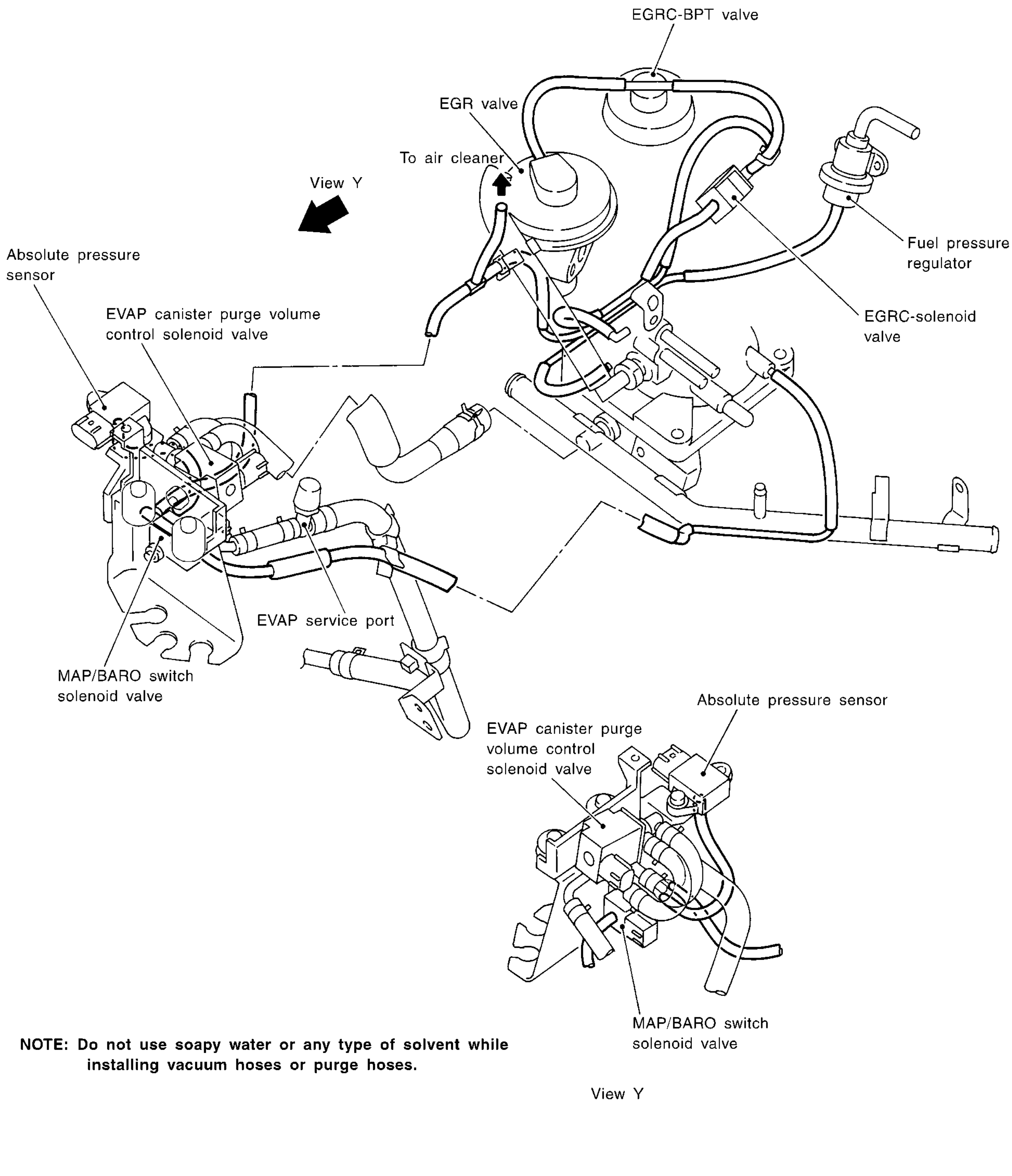


SEF846W

Vacuum Hose Drawing

NGEC0012

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



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

SEF107VA

System Chart

NGEC0013

Input (Sensor)	ECM Function	Output (Actuator)
● Camshaft position sensor ● Mass air flow sensor ● Engine coolant temperature sensor ● Front heated oxygen sensor ● Ignition switch ● Throttle position sensor ● PNP switch ● Air conditioner switch ● Knock sensor ● EGR temperature sensor*1 ● Crankshaft position sensor (OBD) ● EVAP control system pressure sensor*1 ● Fuel tank temperature sensor ● Battery voltage ● Power steering oil pressure switch ● Vehicle speed sensor ● Intake air temperature sensor ● Absolute pressure sensor ● Rear heated oxygen sensor*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
	Front heated oxygen sensor monitor & on board diagnostic system	Malfunction indicator lamp (On the instrument panel)
	EGR control	EGRC-solenoid valve
	Front and rear heated oxygen sensor heater control	Heated oxygen sensor heater
	EVAP canister purge flow control	● EVAP canister purge volume control valve ● EVAP canister purge control solenoid valve
	Air conditioning cut control	Air conditioner relay
	ON BOARD DIAGNOSIS for EVAP system	● EVAP canister vent control valve ● Vacuum cut valve bypass valve ● MAP/BARO switch solenoid valve

*1: These sensors are not used to control the engine system. They are used only for the on board diagnosis.
*2: 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

NGEC0014

Input/Output Signal Chart

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		
Front heated oxygen sensor	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position Throttle valve idle position		
PNP switch	Gear position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Air conditioner switch	Air conditioner operation		
Knock sensor	Engine knocking condition		
Absolute pressure sensor	Ambient barometric pressure		
Battery	Battery voltage		
Power steering oil pressure switch	Power steering operation		
Rear heated oxygen sensor*	Density of oxygen in exhaust gas		

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

Basic Multiport Fuel Injection System

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>

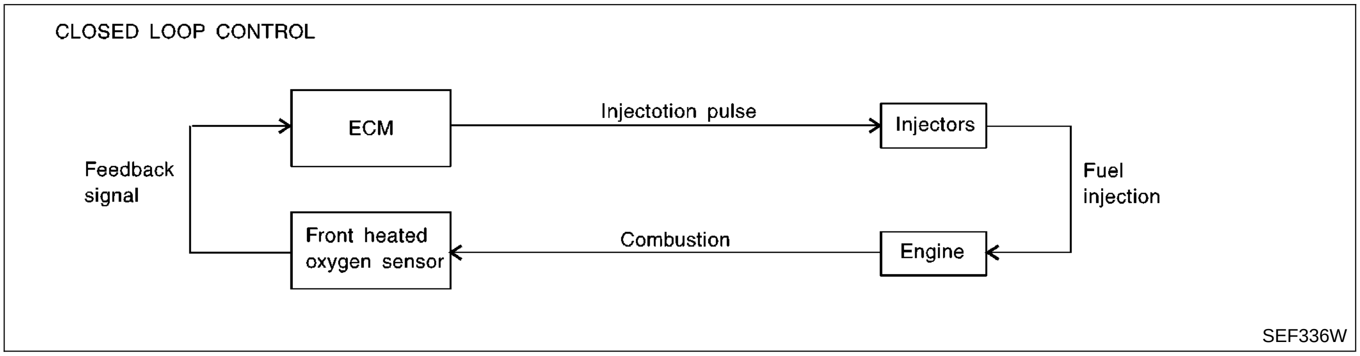
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- High-load, high-speed operation

<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 front heated oxygen sensor, refer to EC-190. This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
Rear heated oxygen sensor is located downstream of the three way catalyst. Even if the switching characteristics of the front heated oxygen sensor shift, the air-fuel ratio is controlled to stoichiometric by the signal from the rear heated oxygen sensor.

Open Loop Control

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 front heated oxygen sensor or its circuit
- Insufficient activation of front heated oxygen sensor at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- When starting the engine

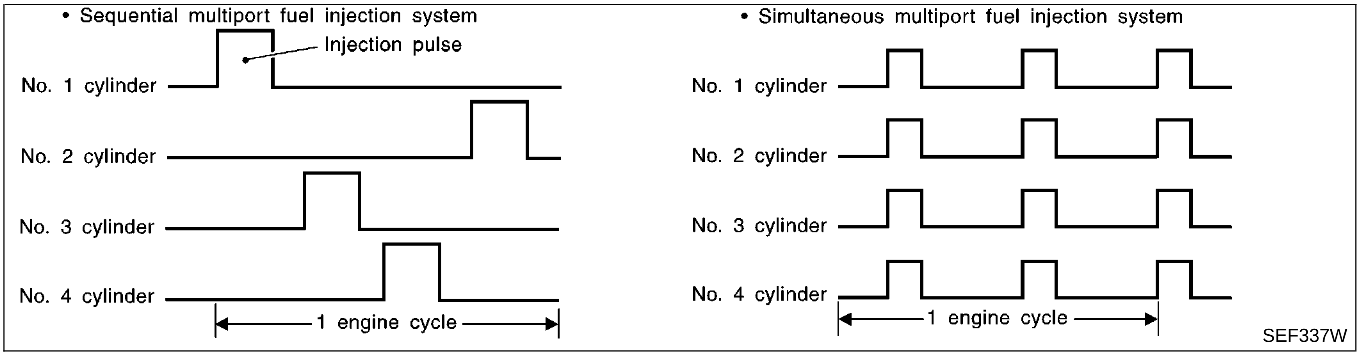
Mixture Ratio Self-learning Control

NGEC0014S06

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

Fuel Injection Timing

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

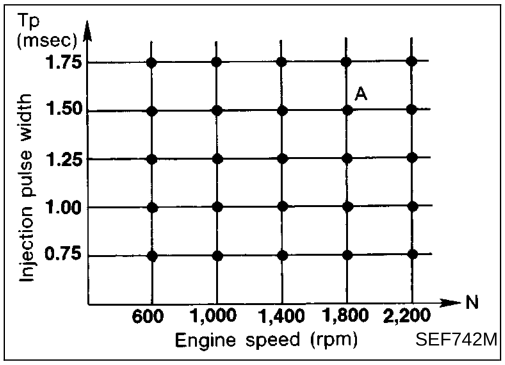
Input/Output Signal Chart

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



SEF742M

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
=NGEC0016
Input/Output Signal Chart
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
NGEC0017
Input/Output Signal Chart
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		

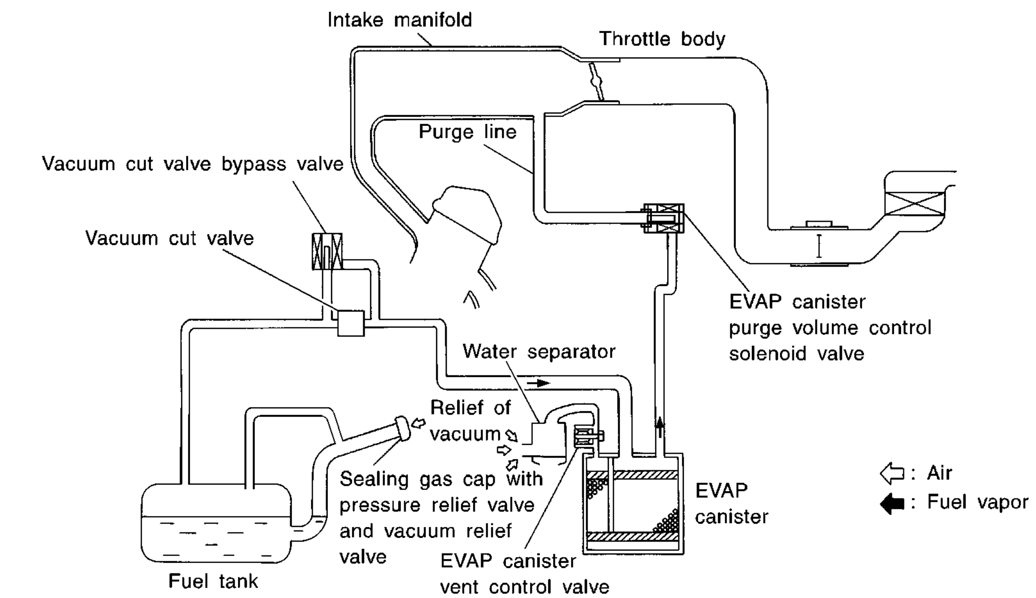
If the engine speed is above 3,000 rpm with no load, (for example, in Neutral and engine speed over 3,000 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.
Fuel cut will operate until the engine speed reaches 1,500 rpm, then fuel cut is cancelled.

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

Evaporative Emission System

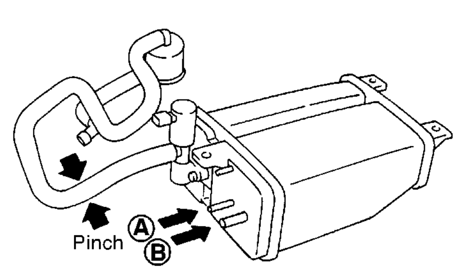
DESCRIPTION

=NGEC0018



SEF927U

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.



SEF314V

INSPECTION

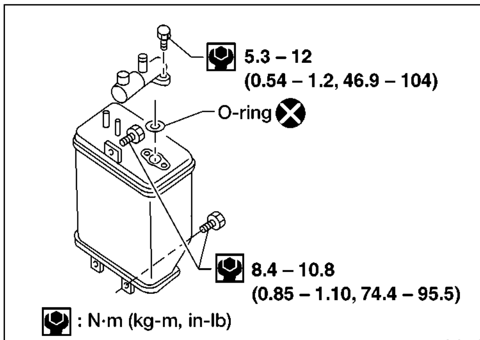
NGEC0019

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**.

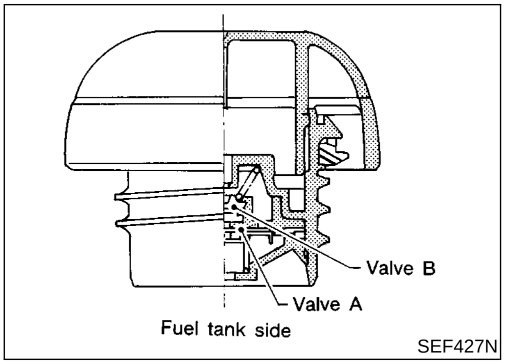


AEC879A

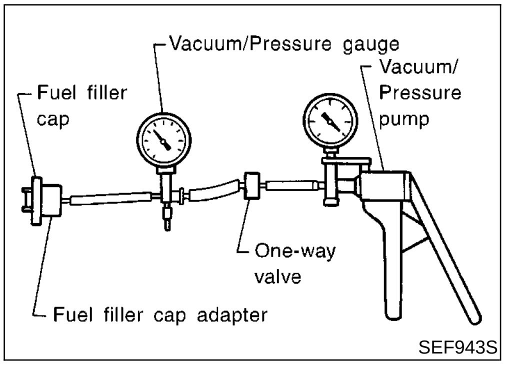
Tightening Torque

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.



SEF427N



SEF943S

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-530.

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve

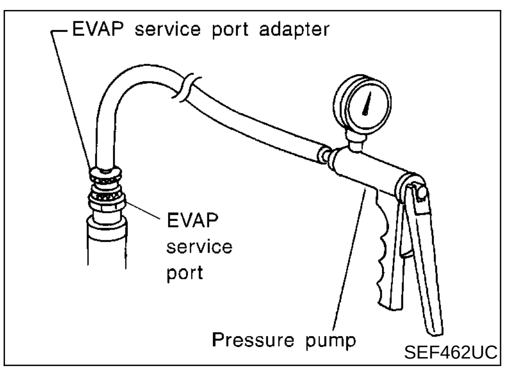
NGEC0019S06

Refer to EC-487.

Tank Fuel Temperature Sensor

NGEC0019S08

Refer to EC-293.

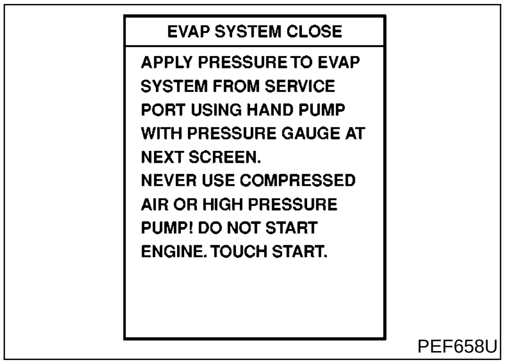


SEF462UC

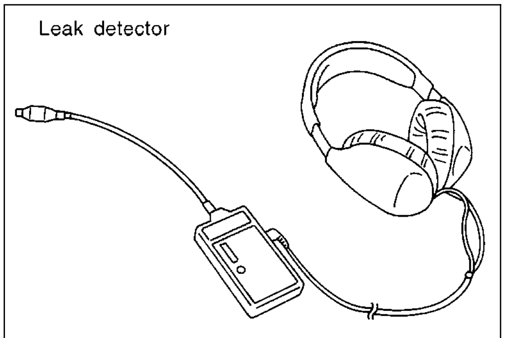
EVAP Service Port

NGEC0019S09

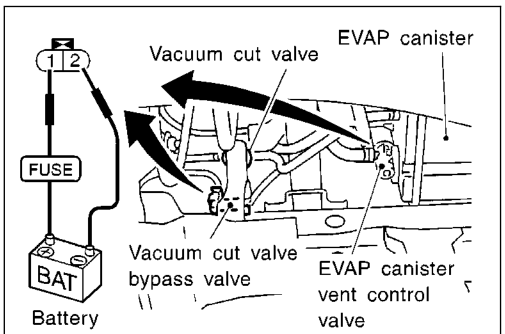
Positive pressure is delivered to the EVAP system through the EVAP service port. If fuel vapor leakage in the EVAP system occurs, use a leak detector to locate the leak.



PEF658U



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-36.

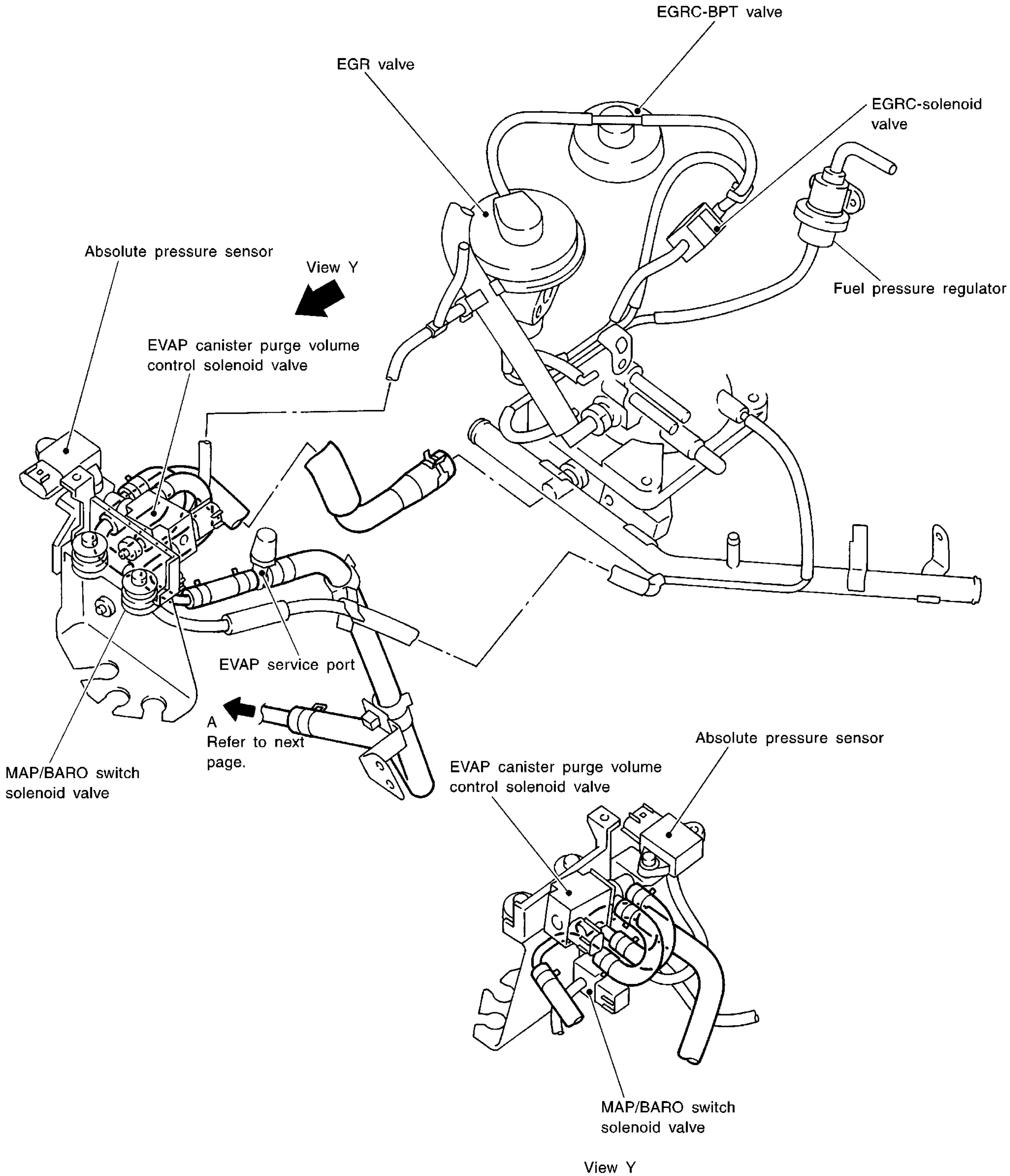
Without CONSULT-II

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-36.

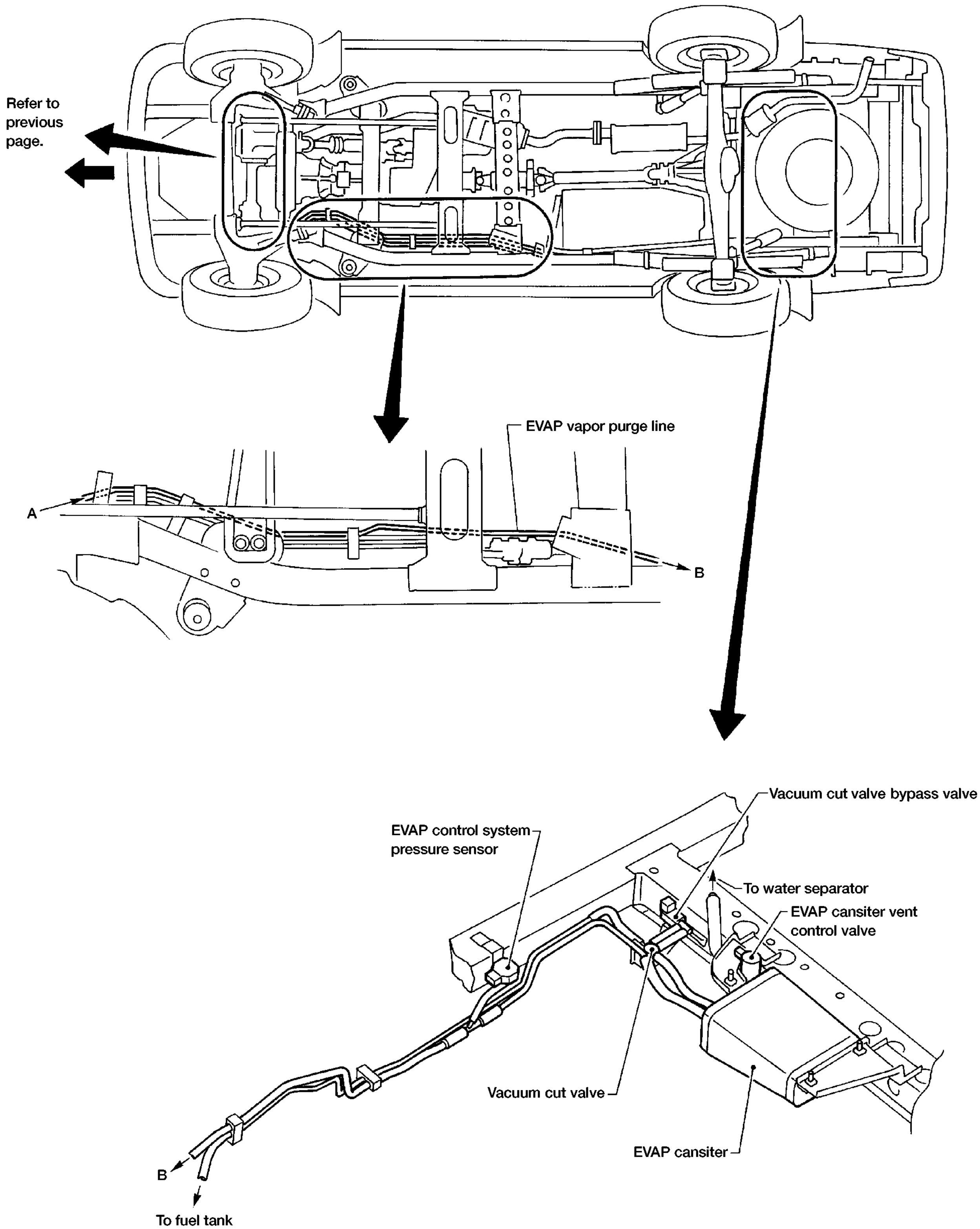
EVAPORATIVE EMISSION LINE DRAWING

NGEC0020

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


EGRC-BPT valve
EGR valve
EGRC-solenoid valve
Absolute pressure sensor
View Y
Fuel pressure regulator
EVAP canister purge volume control solenoid valve
EVAP service port
A
Refer to next page.
MAP/BARO switch solenoid valve
Absolute pressure sensor
EVAP canister purge volume control solenoid valve
MAP/BARO switch solenoid valve
View Y

SEF108V

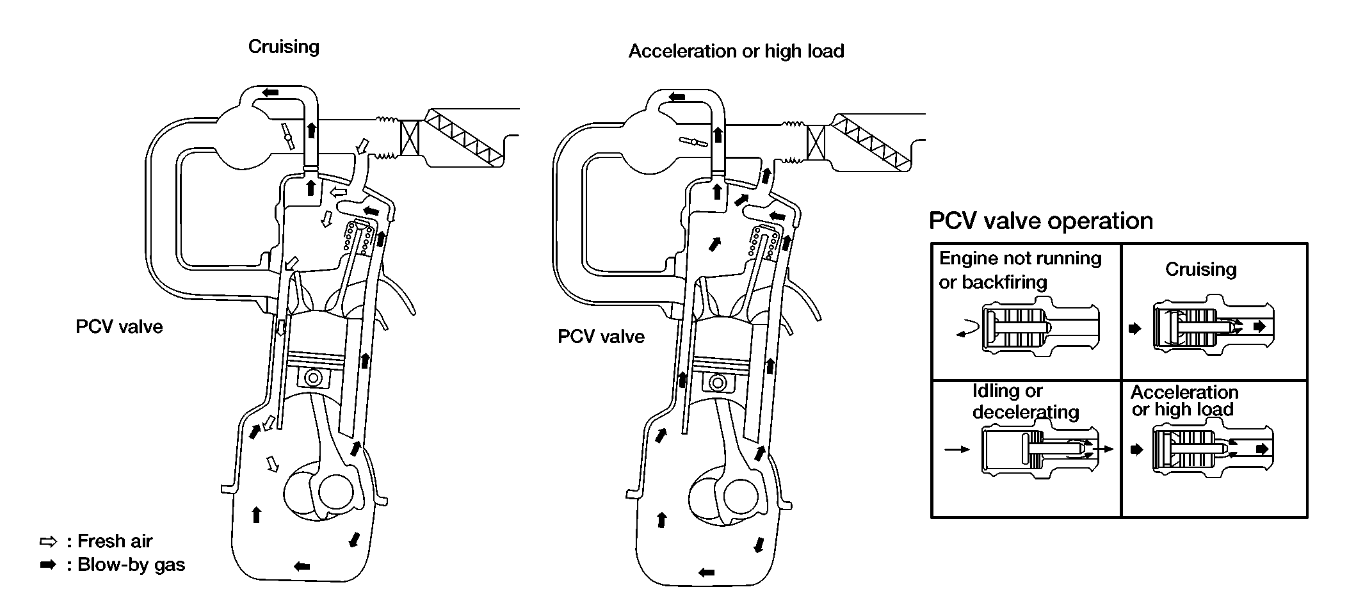

Refer to previous page.
EVAP vapor purge line
A
B
Vacuum cut valve bypass valve
EVAP control system pressure sensor
To water separator
EVAP cansiter vent control valve
Vacuum cut valve
EVAP cansiter
B
To fuel tank

AEC869A

Positive Crankcase Ventilation

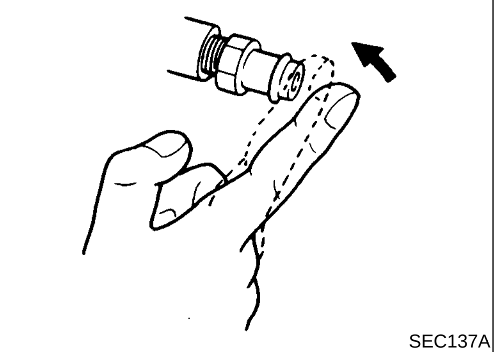
DESCRIPTION

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

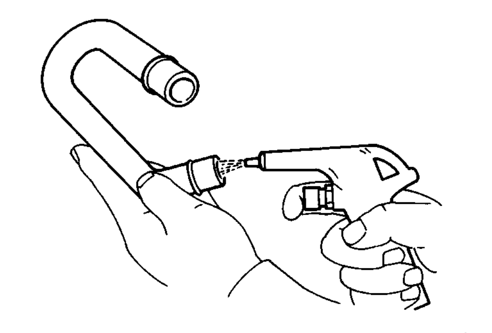
INSPECTION

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.

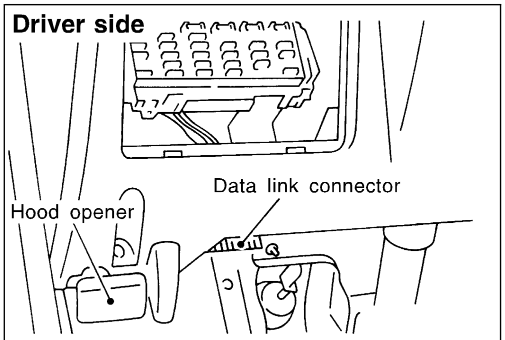


ET277

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.



SEF163X

Fuel Pressure Release

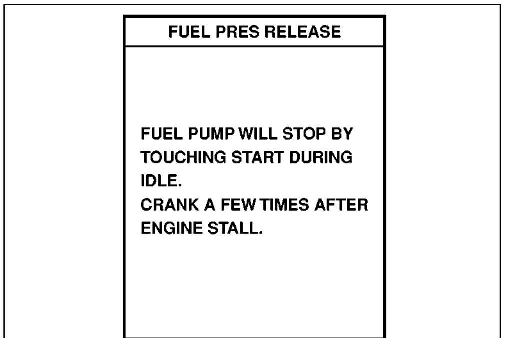
NGEC0024

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

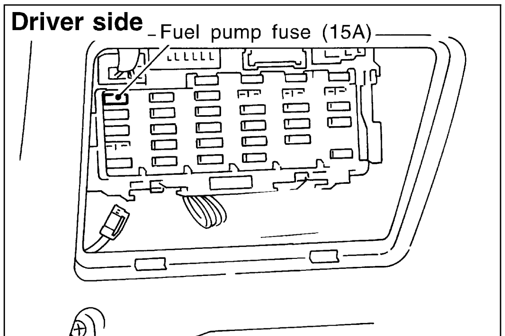
WITH CONSULT-II

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.



PEF823K

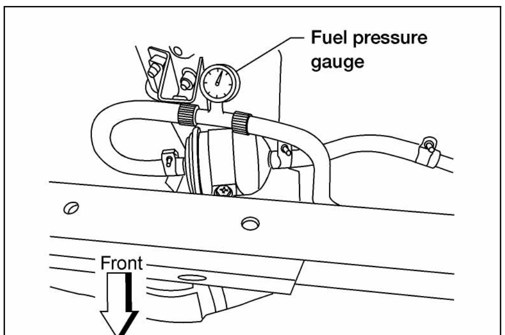


SEF164X

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.



AEC064B

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 pressure gauge between fuel filter and fuel tube.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

At idle speed:

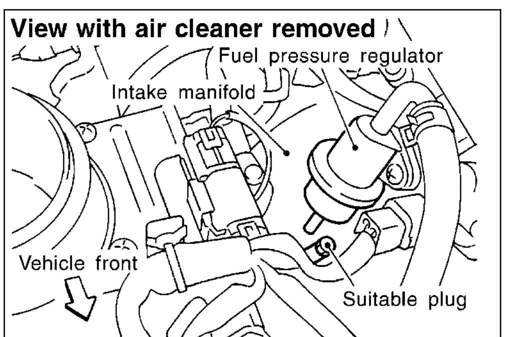
With vacuum hose connected

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

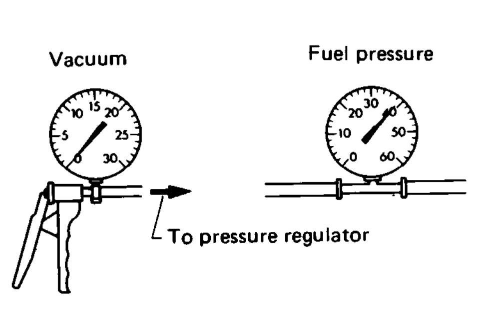
With vacuum hose disconnected

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

If results are unsatisfactory, perform Fuel Pressure Regulator Check, EC-41.



SEF318V



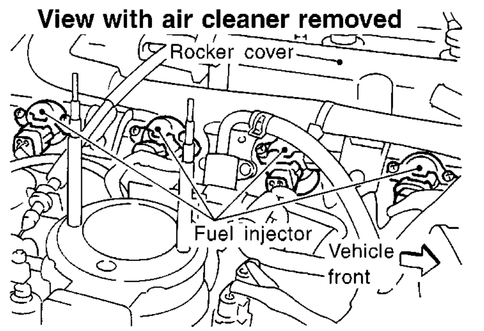
SEF718B

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.



SEF319V

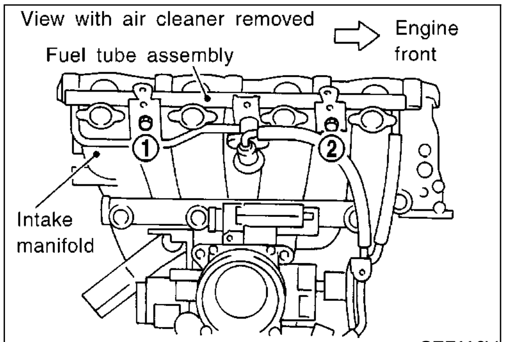
Injector

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.

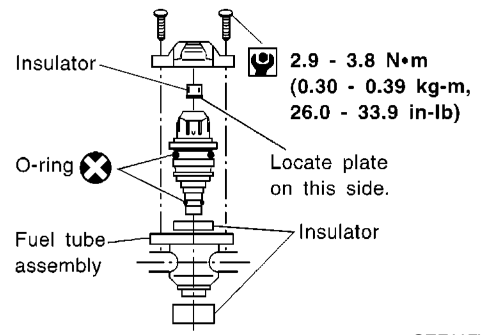
Always replace O-rings with new ones.
Lubricate O-rings with a smear of engine oil.



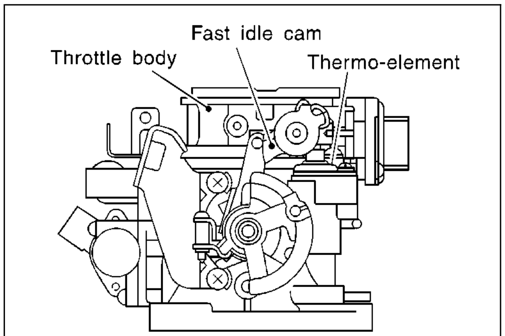
SEF116V

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.



SEF117V



SEF500V

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-95.

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

NGEC0028

PREPARATION

NGEC0028S01

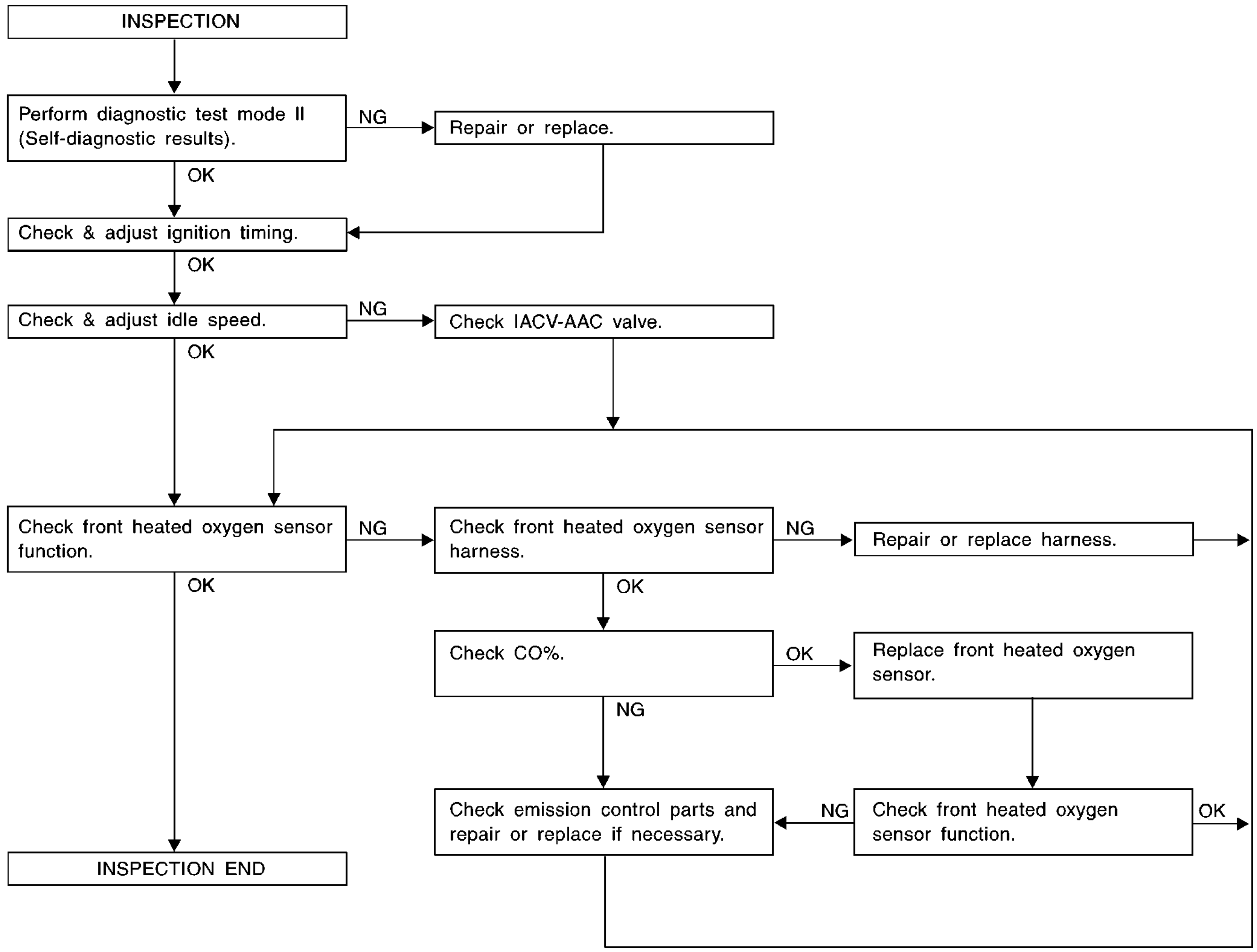
- **Make sure that the following parts are in good order.**

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

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

Overall Inspection Sequence

NGEC0028S0101



SEF941VB

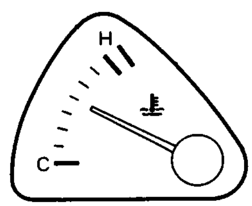
INSPECTION PROCEDURE

=NGEC0028S02

1	INSPECTION START

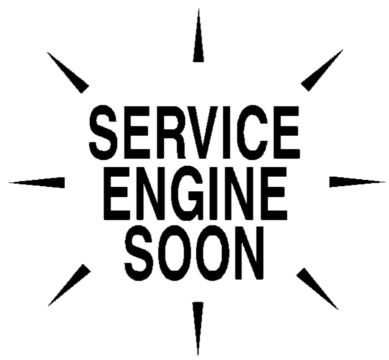
1. Visually check the following:
- Air cleaner clogging
- Hoses and duct for leaks
- EGR valve operation
- Electrical connectors
- Gasket (intake manifold, cylinder head, exhaust system)
- Throttle valve and throttle position sensor operation

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. Perform the Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-71.



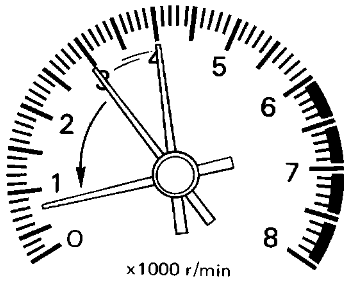
SEF217U

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)

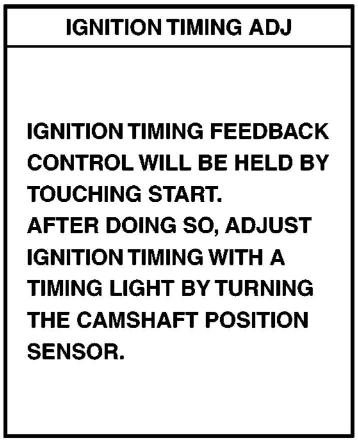
2	CHECK IGNITION TIMING

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

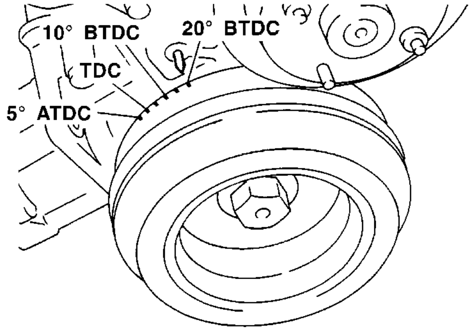
3. Select "IGNITION TIMING ADJ" in WORK SUPPORT mode.
4. Touch "START".


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

M/T: 20°±2° BTDC
A/T: 20°±2° BTDC (in "P" or "N" position)

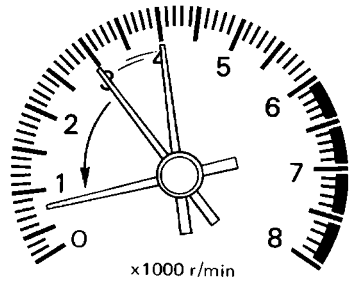
OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

3	CHECK IGNITION TIMING

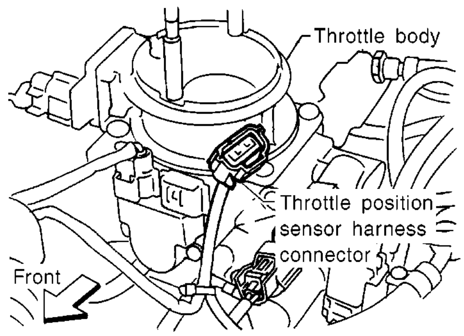
Without CONSULT-II

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.



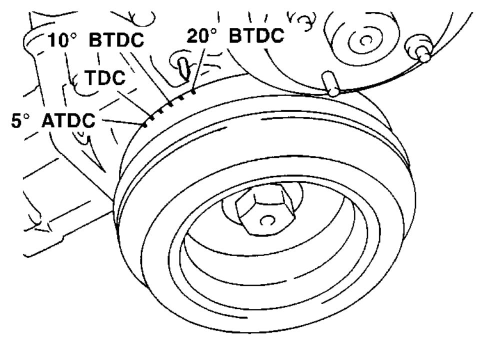
SEF978U

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

M/T: 20°±2° BTDC
A/T: 20°±2° BTDC (in "P" or "N" position)

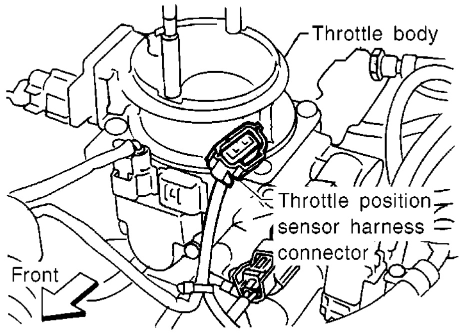
OK or NG

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	
CMPS·RPM(REF)	XXX rpm
IGN TIMING	XXX BTDC
CLSD THL POS	ON

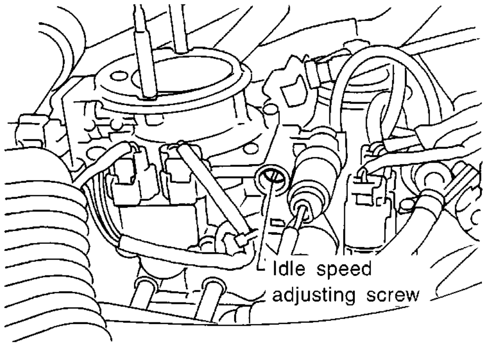
PEF773W

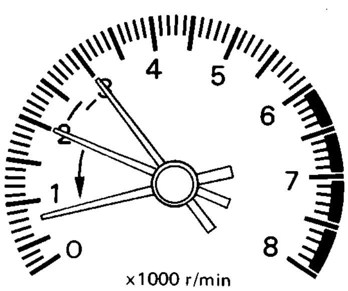
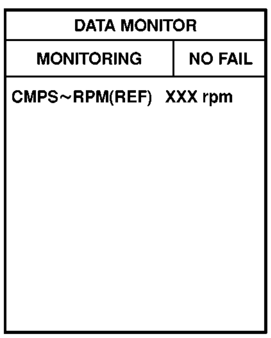
M/T: 750±50 rpm
A/T: 750±50 rpm (in "P" or "N" position)

Without CONSULT-II
1. Check idle speed.
   M/T: 750±50 rpm
   A/T: 750±50 rpm (in "P" or "N" position)

OK or NG

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

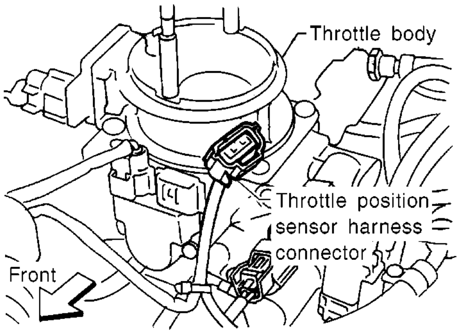
6	ADJUST BASE IDLE SPEED	
1. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed. 2. Adjust idle speed by turning idle speed adjusting screw.  SEF240SA **M/T: 750±50 rpm** **A/T: 750±50 rpm (in "P" or "N" position)**		
Models with CONSULT-II	▶	GO TO 7.
Models 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.  PEF190P **M/T: 800±50 rpm** **A/T: 800±50 rpm (in "P" or "N" position)** **OK or NG**		
OK	▶	GO TO 10.
NG	▶	GO TO 9.

8	CHECK TARGET IDLE SPEED

Without CONSULT-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.

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

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

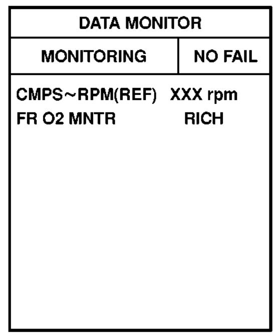
9	DETECT MALFUNCTIONING PART

Check the following.
1. Check IACV-AAC valve and replace if necessary. Refer to EC-416.
2. Check IACV-AAC valve harness and repair if necessary. Refer to EC-416.
3. Check ECM function by substituting another known good ECM.
(ECM may be the cause of a problem, but this is rarely the case.)

	▶	GO TO 10.

10	CHECK FRONT HEATED OXYGEN SENSOR SIGNAL

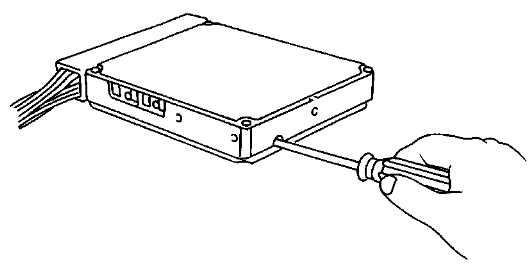
With CONSULT-II
1. See “FR O2 MNTR” in “DATA MONITOR” mode.
2. Run engine at about 2,000 rpm for about 2 minutes under no-load.
3. Maintain engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature) and check that the monitor fluctuates between “LEAN” and “RICH” more than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



PEF054P

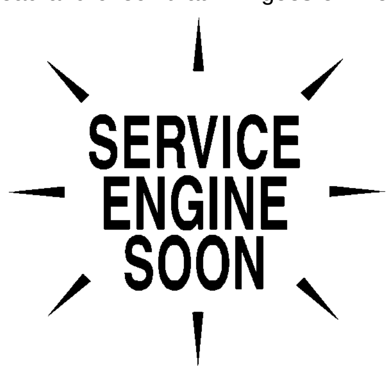
1 cycle: RICH → LEAN → RICH
2 cycles: RICH → LEAN → RICH → LEAN → RICH

Without CONSULT-II
1. Set “Front heated oxygen sensor monitor” in the Diagnostic Test Mode II. (See page EC-70.)



SEF979U

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



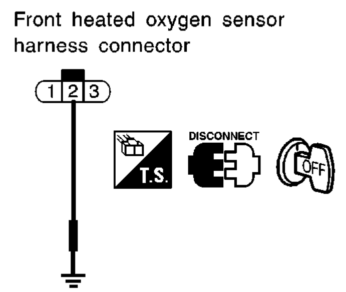
SEF217U

OK or NG

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

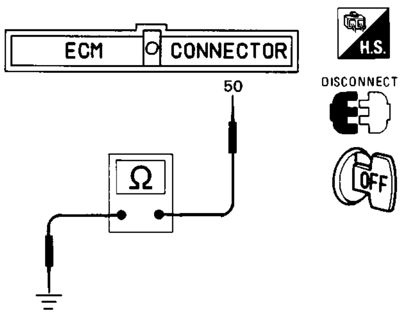
11	CHECK FRONT HEATED OXYGEN SENSOR HARNESS

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



SEF508V

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



SEF250P

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

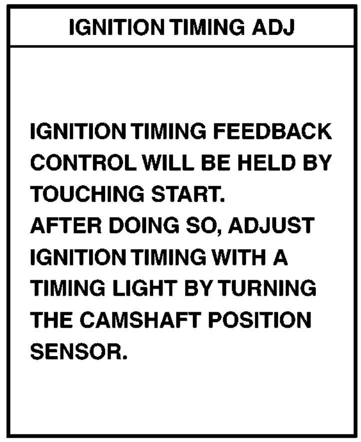
OK or NG

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

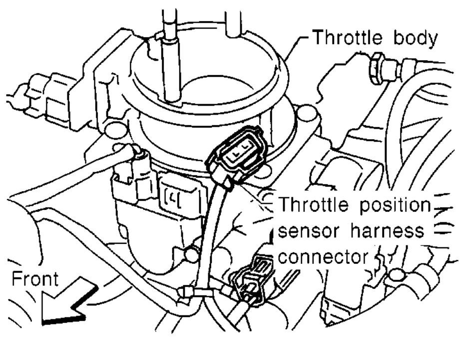
1. Select "IGNITION TIMING ADJ" in "WORK SUPPORT" mode.
2. Touch "START".



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

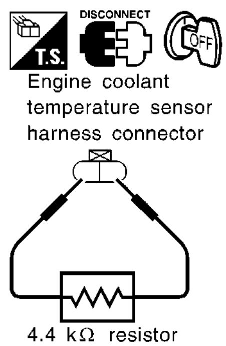
With CONSULT-II

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	
COOLANT TEMP	XXX
MONITOR	
CMPS~RPM(REF)	XXX rpm
INJ PULSE	XXX msec
IGN TIMING	XXX BTDC

PEF946W

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



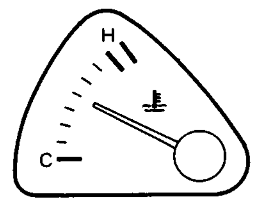
SEF053RA

4. Connect battery ground cable.

▶ GO TO 14.

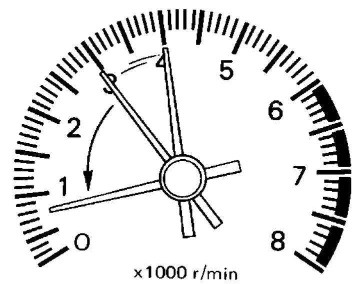
14	CHECK "CO" %

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 FRONT HEATED OXYGEN SENSOR SIGNAL

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

Without CONSULT-II
1. Replace front heated oxygen sensor.
2. Set "Front heated oxygen sensor monitor" in the Diagnostic Test Mode II.
   (See page EC-70.)
3. Maintain engine at 2,000 rpm under no-load. Check that the malfunction indicator lamp goes on and off more than five times during 10 seconds.

OK or NG

OK ▶	GO TO 12.
NG ▶	GO TO 16.

16	DETECT MALFUNCTIONING PART
1. Connect front heated oxygen sensor harness connector to front heated oxygen sensor. 2. Check fuel pressure regulator. Refer to EC-41. 3. Check mass air flow sensor and its circuit. Refer to EC-136. 4. Check injector and its circuit. Refer to EC-552. Clean or replace if necessary. 5. Check engine coolant temperature sensor and its circuit. Refer to EC-167, 186. 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-110.)

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 (0701, 0605 - 0608) is being detected	X	—	—	—	—	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 (0701, 0605 - 0608) is being detected	—	—	X	—	—	X	—	—
Closed loop control — DTC: P1148 (0307)	—	X	—	—	X	—	X	—
Fail-safe items	—	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-67.
For malfunctions in which 1st trip DTCs are displayed, refer to EC-66. 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-93. 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

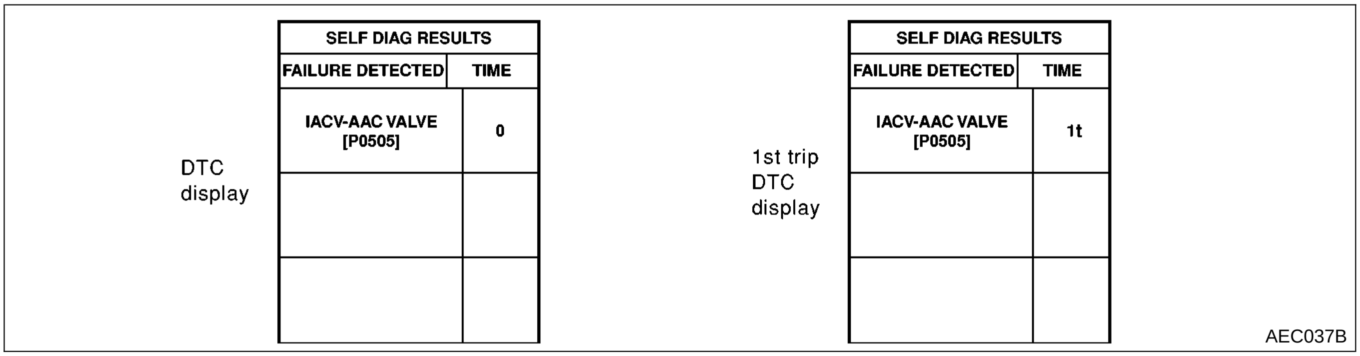
NGEC0031S0101

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

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



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-81.

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

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

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

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION". Refer to EC-67.

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

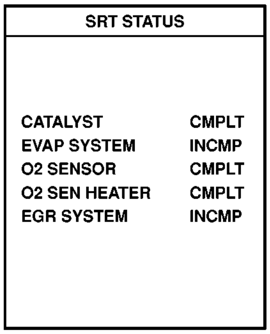
NGEC0031S0301

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.



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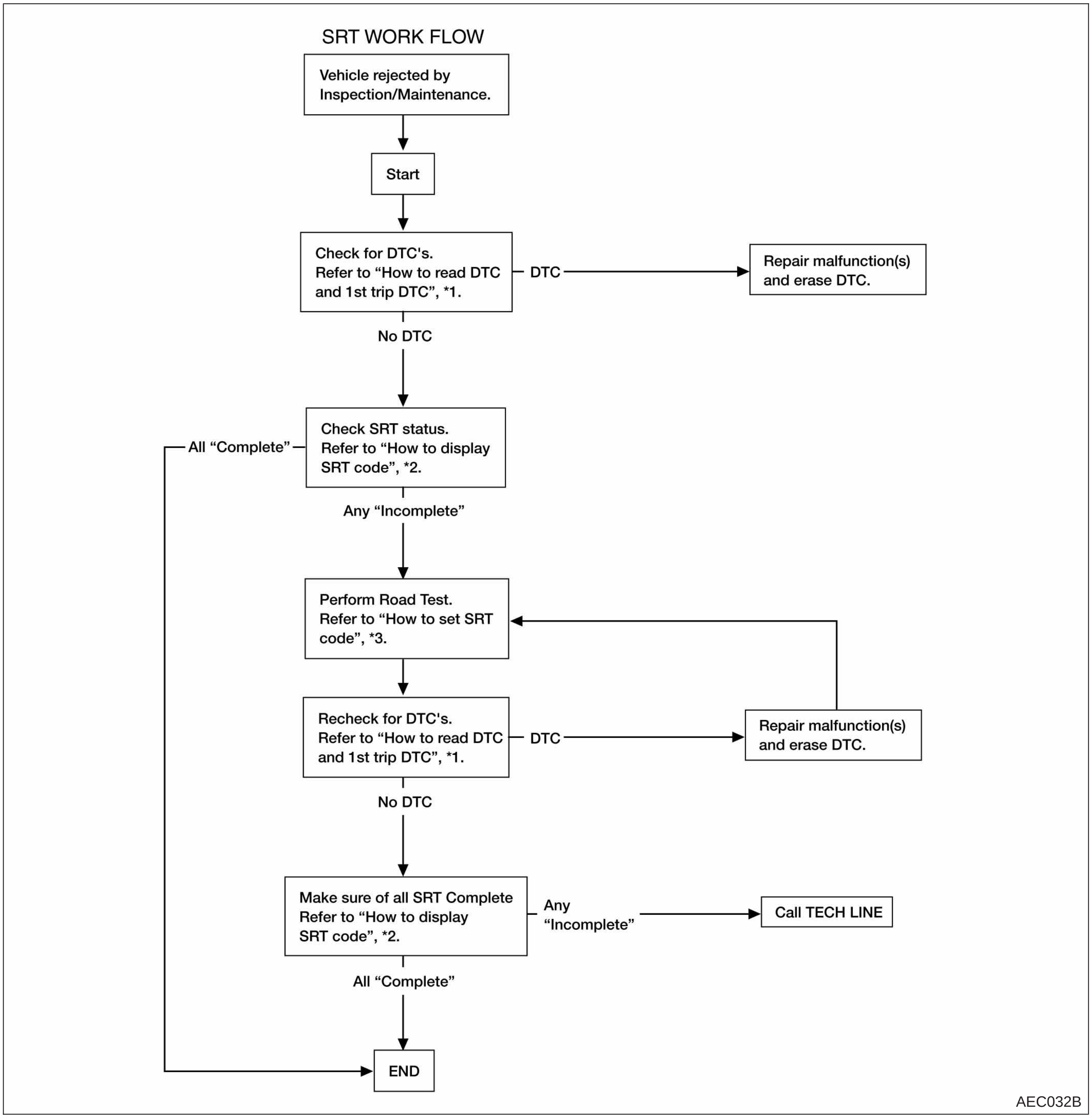
SRT Service Procedure

=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-57 *2 EC-59 *3 EC-62

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

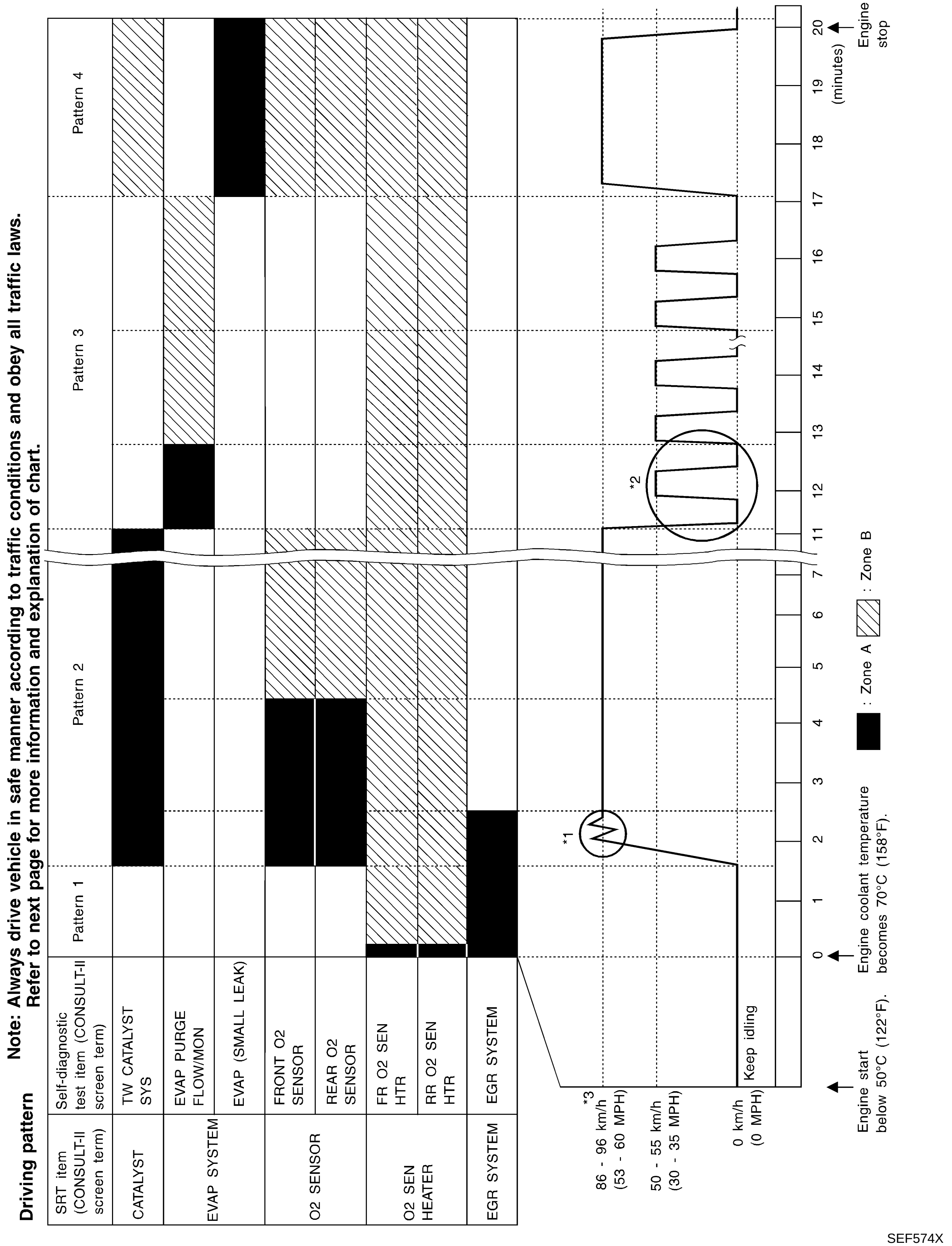
Perform corresponding DTC confirmation procedure one by one based on "Performance Priority" in the table on EC-59.

Without CONSULT-II

The most efficient driving pattern in which SRT codes can be properly set is explained on EC-63. The driving pattern should be performed one or more times to set all SRT codes.

Driving Pattern

NGEC0031S0303



SEF574X

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

- 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.

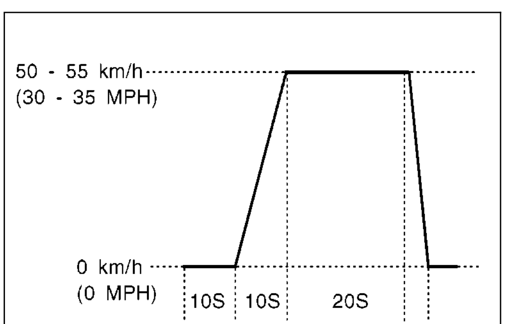
Pattern 1:
- **The engine is started at the engine coolant temperature of −10 to 35°C (14 to 95°F) (where the voltage between the ECM terminals 59 and 43 is 3.0 - 4.3V).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminals 59 and 43 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.



SEF414S

*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	Front heated oxygen sensor	09H	04H	Max.	X
		0AH	84H	Min.	X
		0BH	04H	Max.	X
		0CH	04H	Max.	X
		0DH	04H	Max.	X
	Rear heated oxygen sensor	19H	86H	Min.	X
		1AH	86H	Min.	X
		1BH	06H	Max.	X
		1CH	06H	Max.	X
O2 SENSOR HEATER	Front heated oxygen sensor heater	29H	08H	Max.	X
		2AH	88H	Min.	X
	Rear heated oxygen sensor heater	2DH	0AH	Max.	X
		2EH	8AH	Min.	X

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*4		SRT code	Test value/Test limit (GST only)	1st trip DTC*4	Reference page
	CONSULT-II GST*2	ECM*1				
NO SELF DIAGNOSTIC FAILURE INDICATED	**P0000**	**0505**	—	—	—	—
MAF SEN/CIRCUIT	P0100	0102	—	—	X	EC-136
ABSL PRES SEN/CIRC	P0105	0803	—	—	X	EC-146
AIR TEMP SEN/CIRC	P0110	0401	—	—	X	EC-161
COOLANT T SEN/CIRC	P0115	0103	—	—	X	EC-167
THRTL POS SEN/CIRC	P0120	0403	—	—	X	EC-172
*COOLAN T SEN/CIRC	P0125	0908	—	—	X	EC-186
FRONT O2 SENSOR	P0130	0303	X	X	X*3	EC-190
FRONT O2 SENSOR	P0131	0411	X	X	X*3	EC-198
FRONT O2 SENSOR	P0132	0410	X	X	X*3	EC-205
FRONT O2 SENSOR	P0133	0409	X	X	X*3	EC-212
FRONT O2 SENSOR	P0134	0412	X	X	X*3	EC-223
FR O2 SEN HEATER	P0135	0901	X	X	X*3	EC-230
REAR O2 SENSOR	P0137	0511	X	X	X*3	EC-235
REAR O2 SENSOR	P0138	0510	X	X	X*3	EC-245
REAR O2 SENSOR	P0139	0707	X	X	X*3	EC-255
REAR O2 SENSOR	P0140	0512	X	X	X*3	EC-265
RR O2 SEN HEATER	P0141	0902	X	X	X*3	EC-273
FUEL SYS DIAG-LEAN	P0171	0115	—	—	X	EC-278
FUEL SYS DIAG-RICH	P0172	0114	—	—	X	EC-286
FUEL TEMP SEN/CIRC	P0180	0402	—	—	X	EC-293
MULTI CYL MISFIRE	P0300	0701	—	—	X	EC-299
CYL 1 MISFIRE	P0301	0608	—	—	X	EC-299
CYL 2 MISFIRE	P0302	0607	—	—	X	EC-299
CYL 3 MISFIRE	P0303	0606	—	—	X	EC-299

Items (CONSULT-II screen terms)	DTC*4		SRT code	Test value/Test limit (GST only)	1st trip DTC*4	Reference page
	CONSULT-II GST*2	ECM*1				
CYL 4 MISFIRE	P0304	0605	—	—	X	EC-299
KNOCK SEN/CIRCUIT	P0325	0304	—	—	—	EC-308
CPS/CIRCUIT (OBD)	P0335	0802	—	—	X	EC-312
CAM POS SEN/CIRC	P0340	0101	—	—	X	EC-318
EGR SYSTEM	P0400	0302	X	X	X*3	EC-326
EGRC-BPT VALVE	P0402	0306	X	X	X*3	EC-338
TW CATALYST SYSTEM	P0420	0702	X	X	X*3	EC-346
EVAP SMALL LEAK	P0440	0705	X	X	X*3	EC-351
PURG VOLUME CONT/V	P0443	1008	—	—	X	EC-367
VENT CONTROL VALVE	P0446	0903	—	—	X	EC-375
EVAP SYS PRES SEN	P0450	0704	—	—	X	EC-383
EVAP GROSS LEAK	P0455	0715	X	X	X*3	EC-398
VEH SPEED SEN/CIRC	P0500	0104	—	—	X	EC-412
IACV/AAC VLV/CIRC	P0505	0205	—	—	X	EC-416
CLOSED TP SW/CIRC	P0510	0203	—	—	X	EC-422
ECM	P0605	0301	—	—	X	EC-429
MAP/BARO SW SOL/CIR	P1105	1302	—	—	X	EC-431
CLOSED LOOP	P1148	0307	—	—	—	EC-447
IGN SIGNAL-PRIMARY	P1320	0201	—	—	X	EC-449
CPS/CIRC (OBD) COG	P1336	0905	—	—	X	EC-457
EGRC SOLENOID/V	P1400	1005	—	—	X	EC-463
EGR TEMP SEN/CIRC	P1401	0305	—	—	X	EC-470
EGR SYSTEM	P1402	0514	X	X	X*3	EC-476
EVAP SMALL LEAK	P1440	0213	X	X	X*3	EC-485
PURG VOLUME CONT/V	P1444	0214	—	—	X	EC-487
VENT CONTROL VALVE	P1446	0215	—	—	X	EC-499
EVAP PURG FLOW/MON	P1447	0111	X	X	X*3	EC-505
VENT CONTROL VALVE	P1448	0309	—	—	X	EC-515
VC/V BYPASS/V	P1490	0801	—	—	X	EC-523
VC CUT/V BYPASS/V	P1491	0311	—	—	X	EC-530
P-N POS SW/CIRCUIT	P1706	1003	—	—	X	EC-541

*1: In Diagnostic Test Mode II (Self-diagnostic results). These numbers are controlled by NISSAN.
*2: These numbers are prescribed by SAE J2012.
*3: These are not displayed with GST.
*4: 1st trip DTC No. is the same as DTC No.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

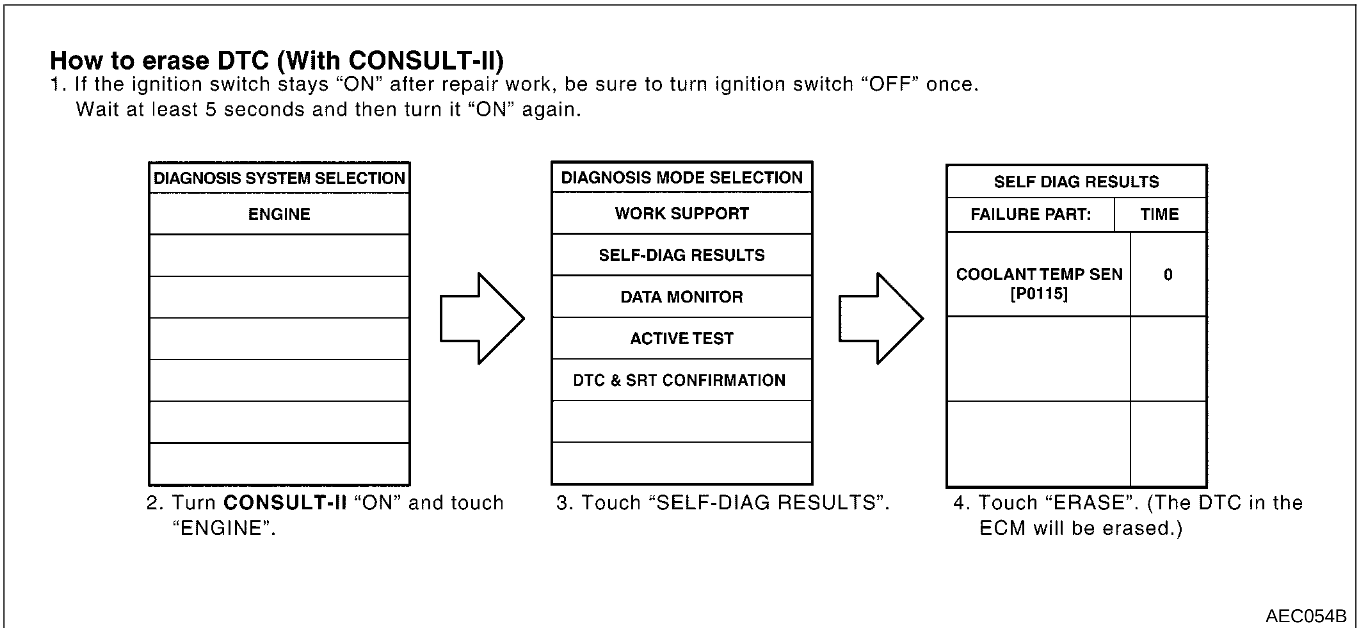
NGEC0031S06

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.)



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).

How to Erase DTC (No Tools)

NGEC0031S0603

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON again.
2. Change the diagnostic test mode from Mode II to Mode I by turning the mode selector on the ECM. (See EC-71.)

The emission-related diagnostic information in the ECM can be erased by changing the diagnostic test mode from Diagnostic Test Mode II to Mode I by turning the mode selector on the ECM. (Refer to EC-71.)

NOTE:

- **If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours.**
- **Erasing the emission-related diagnostic information using CONSULT-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.**

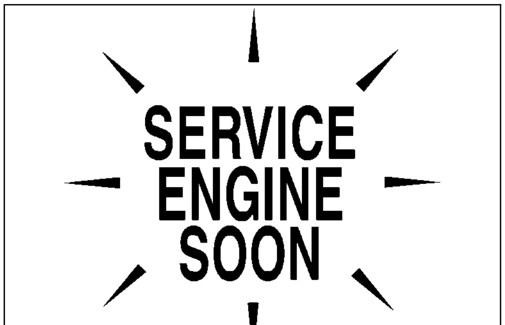
1) Diagnostic trouble codes
2) 1st trip diagnostic trouble codes
3) Freeze frame data
4) 1st trip freeze frame data
5) System readiness test (SRT) codes
6) Test values
7) Others

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

NGEC0032



SEF217U

The MIL is located on the instrument panel.

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

- If the MIL does not light up, refer to “WARNING LAMPS”, ***EL-87*** or see EC-578.

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 four functions.

Diagnostic Test Mode I

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

- "Misfire (Possible three way catalyst damage)"
- "Closed loop control"
- Fail-safe mode

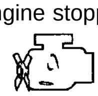
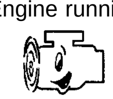
Diagnostic Test Mode II

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

MIL Flashing without DTC

NGEC0032S0101

If the ECM is in Diagnostic Test Mode II, MIL may flash when engine is running. In this case, check ECM test mode selector following "HOW TO SWITCH DIAGNOSTIC TEST MODES" on next page.
How to switch the diagnostic test (function) modes, and details of the above functions are described later. (Refer to EC-71.)

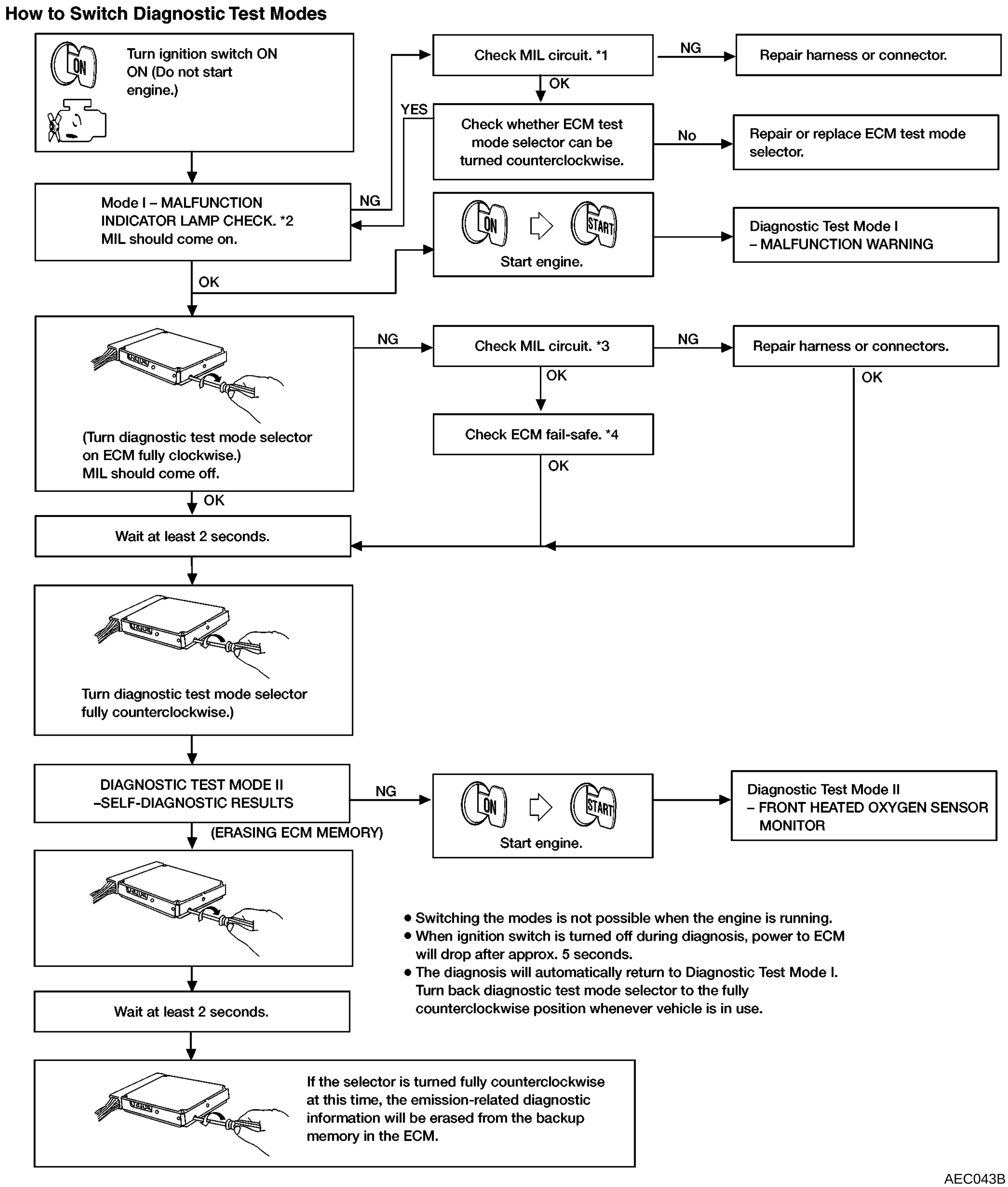
Condition		Diagnostic Test Mode I	Diagnostic Test Mode II
Ignition switch in ON position 	Engine stopped 	BULB CHECK	SELF-DIAGNOSTIC RESULTS
	Engine running 	MALFUNCTION WARNING	FRONT HEATED OXYGEN SENSOR MONITOR

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

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

How to Switch Diagnostic Test Modes

NGEC0032S02



*1: EC-578 *3: EC-578 *4: EC-110
*2: EC-70

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 MIL bulb. Refer to "WARNING LAMPS", ***EL-87*** or see EC-578.

Diagnostic Test Mode I — Malfunction Warning

NGEC0032S04

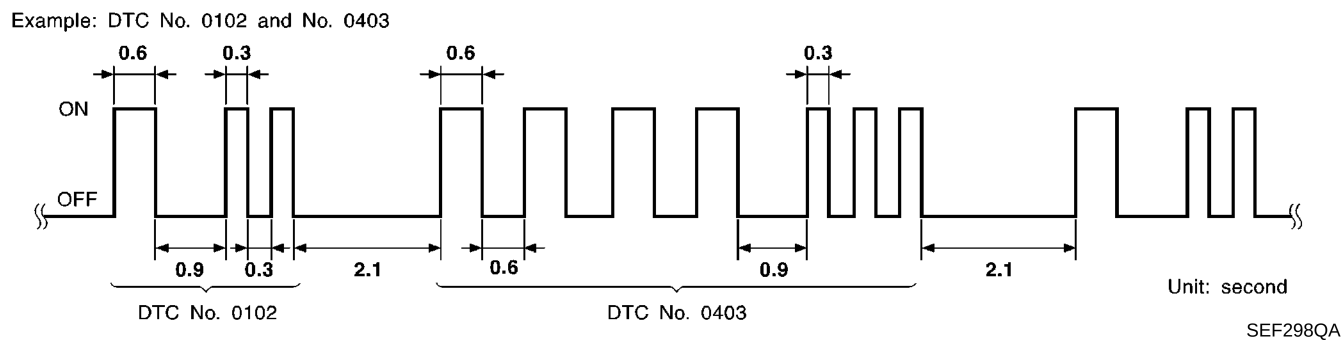
MIL	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction.

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

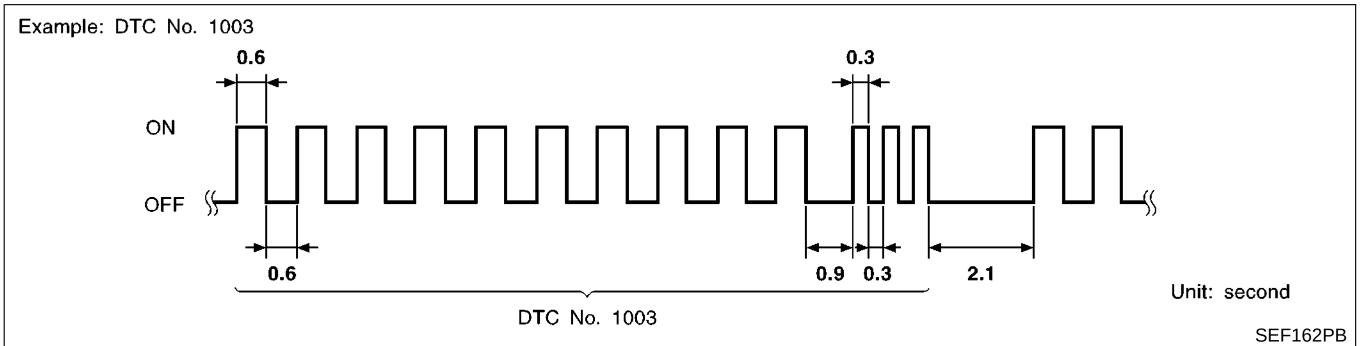
Diagnostic Test Mode II — Self-diagnostic Results

NGEC0032S05

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



SEF298QA



SEF162PB

Long (0.6 second) blinking indicates the two LH digits of number and short (0.3 second) blinking indicates the two RH digits of number. For example, the malfunction indicator lamp blinks 10 times for 6 seconds (0.6 sec x 10 times) and then it blinks three times for about 1 second (0.3 sec x 3 times). This indicates the DTC "1003" and refers to the malfunction of the park/neutral position (PNP) switch.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC "0505" refers to no malfunction. (See TROUBLE DIAGNOSIS — INDEX, EC-13.)

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

NGEC0032S0501

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

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

Diagnostic Test Mode II — Front Heated Oxygen Sensor Monitor

NGEC0032S06

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

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

*: Maintains conditions just before switching to open loop.

To check the front heated oxygen sensor function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.
Next run engine at about 2,000 rpm for about 2 minutes under no-load conditions. Then make sure that the MIL comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no-load.

OBD System Operation Chart

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-56.
- 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

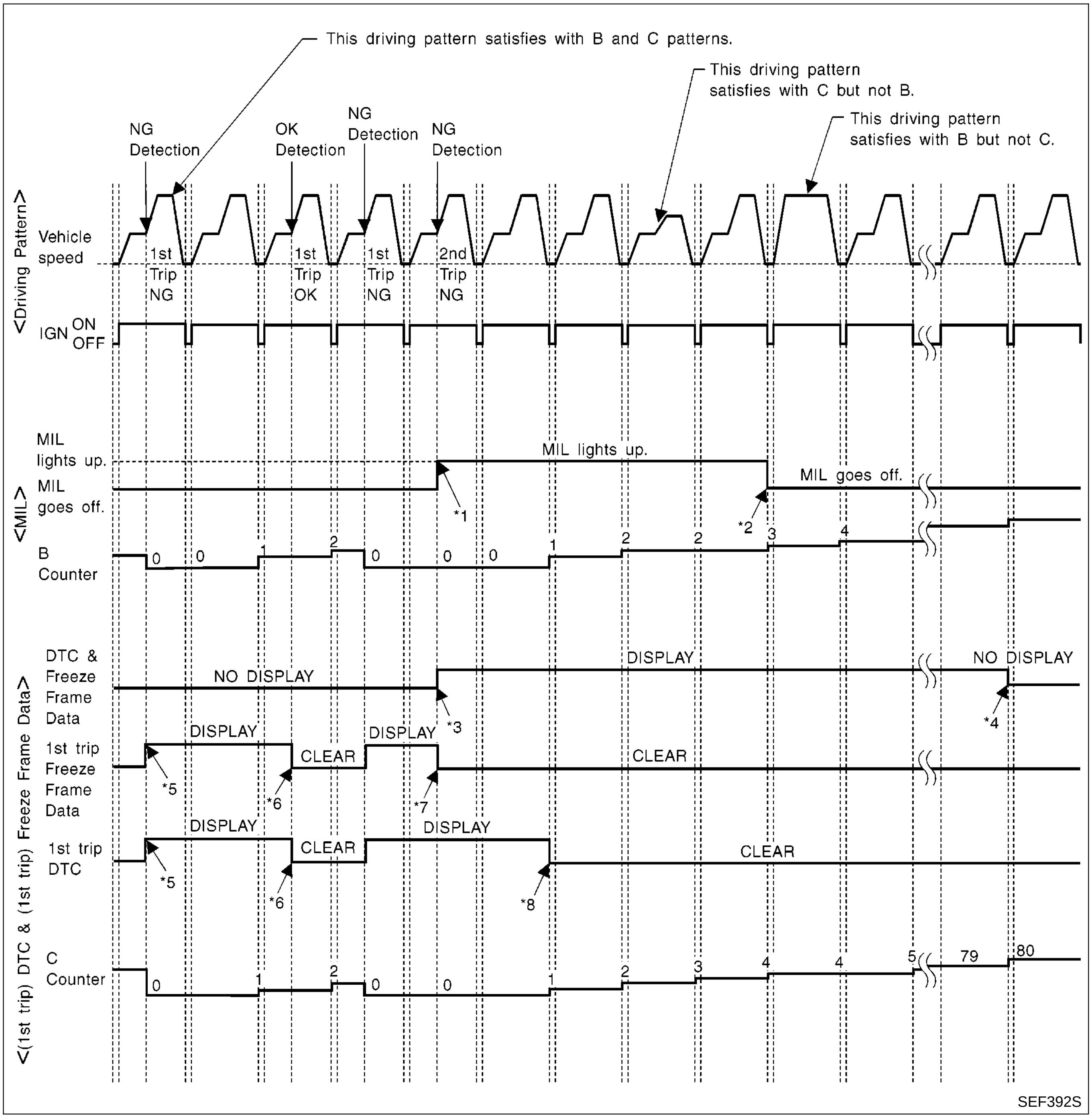
NGEC0033S02

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-75.
For details about patterns "A" and "B" under "Other", see EC-77.
*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:

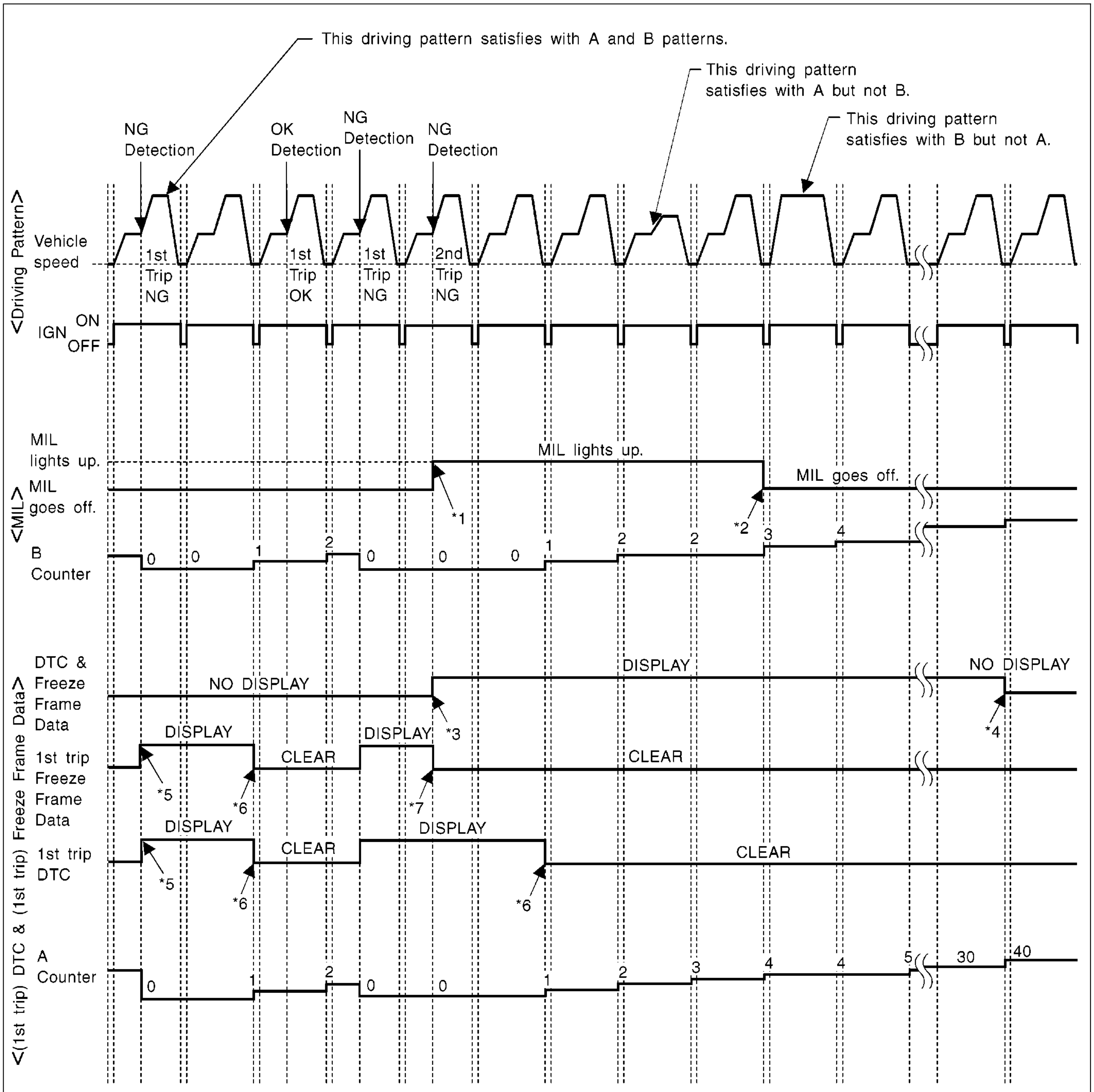
- When the freeze frame data shows lower than 70°C (158°F), “T” should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), “T” should be higher than or equal to 70°C (158°F).

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



SEF393S

*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.

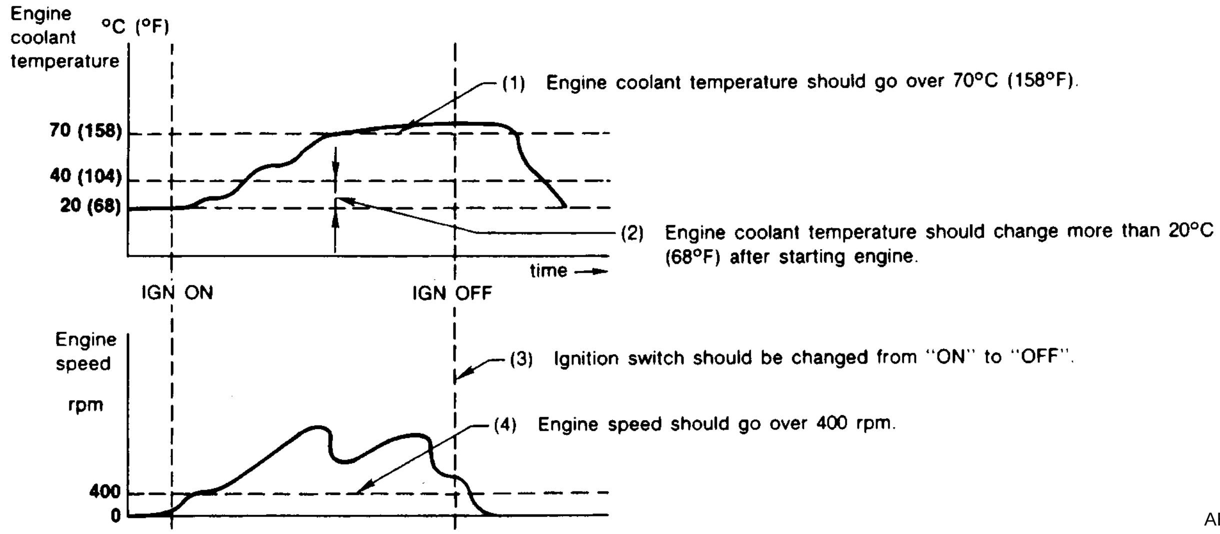
*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

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

NGEC0033S06

Driving Pattern A

NGEC0033S0601



AEC574

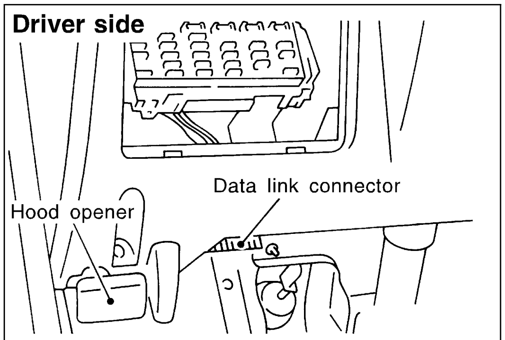
- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

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

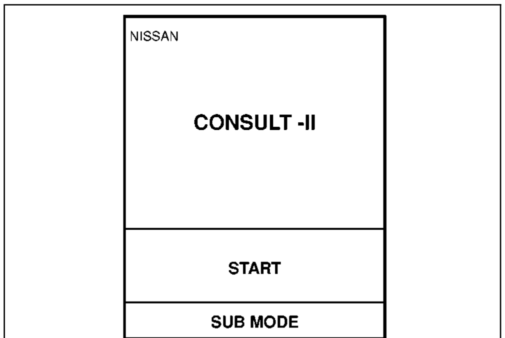
CONSULT-II

=NGEC0034

CONSULT-II INSPECTION PROCEDURE

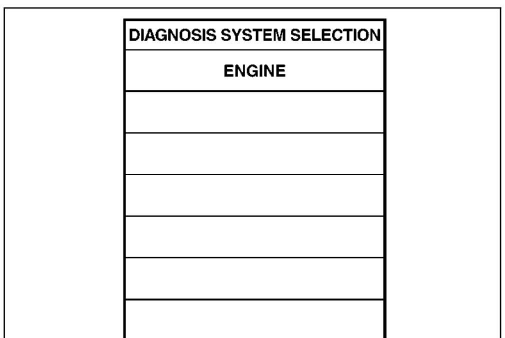
NGEC0034S01

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



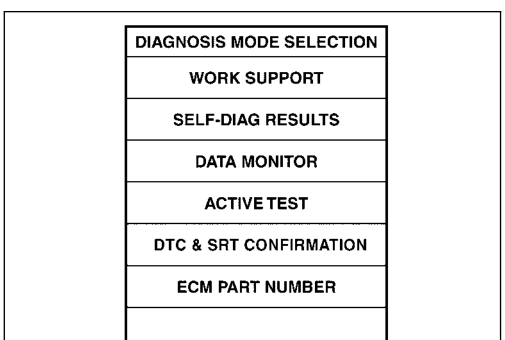
PBR455D

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



PEF895K

5. Touch “ENGINE”.



AEC055B

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	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			
		Mass air flow sensor		X		X			
		Engine coolant temperature sensor		X	X	X	X		
		Front heated oxygen sensor		X		X		X	X
		Rear heated oxygen sensor		X		X		X	X
		Vehicle speed sensor		X	X	X			
		Throttle position sensor	X	X		X			
		Fuel tank temperature sensor		X		X	X		
		EVAP control system pressure sensor		X		X			
		Absolute pressure sensor		X	X	X			
		EGR temperature sensor		X		X			
		Intake air temperature sensor		X		X			
		Crankshaft position sensor (OBD)		X					
		Knock sensor		X					
		Ignition switch (start signal)				X			
		Closed throttle position switch		X		X			
		Closed throttle position switch (throttle position sensor signal)				X			
		Air conditioner switch				X			
		Park/Neutral position (PNP) switch		X		X			
		Power steering oil pressure switch				X			
		Air conditioner pressure switch				X			
		Battery voltage				X			

Item			DIAGNOSTIC TEST MODE						
			WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	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		
		Power transistor (Ignition timing)	X	X (Ignition signal)		X	X		
		IACV-AAC valve	X	X		X	X		
		EVAP canister purge volume control solenoid valve		X		X	X		X
		Air conditioner relay				X			
		Fuel pump relay	X			X	X		
		EGRC-solenoid valve		X		X	X		
		Front heated oxygen sensor heater		X		X		X	
		Rear heated oxygen sensor heater		X		X		X	
		Torque converter clutch solenoid valve		X		X			X
		EVAP canister vent control valve		X		X	X		
		Vacuum cut valve bypass valve		X		X	X		X
		MAP/BARO switch solenoid valve		X		X	X		
		Calculated load value			X	X			

X: Applicable

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-58.

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.
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
IGNITION TIMING ADJ	● IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING "START". AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CRANKSHAFT POSITION SENSOR.	When adjusting initial ignition timing
IACV-AAC VALVE ADJ	SET ENGINE SPEED AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS. ● ENGINE WARMED UP ● NO-LOAD	When adjusting idle speed
FUEL PRESSURE RELEASE	● FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
EVAP SYSTEM CLOSE	OPEN THE VACUUM CUT VALVE BYPASS VALVE AND CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. ● BATTERY VOLTAGE IS SUFFICIENT. ● IGN SW "ON" ● ENGINE NOT RUNNING ● AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). ● NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM ● TANK FUEL TEMP. IS MORE THAN 0°C (32°F). ● WITHIN 10 MINUTES AFTER STARTING "EVAP SYSTEM CLOSE" WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE CONDITIONS ABOVE, CONSULT-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

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).]
FUEL SYS DATA	● "Fuel injection system status" at the moment a malfunction is detected is displayed. ● One mode in the following is displayed. "MODE 2": Open loop due to detected system malfunction "MODE 3": Open loop due to driving conditions (power enrichment, deceleration enrichment) "MODE 4": Closed loop - using oxygen sensor(s) as feedback for fuel control "MODE 5": Open loop - has not yet satisfied condition to go to closed loop
CAL/LD VALUE [%]	● The calculated load value at the moment a malfunction is detected is displayed.

Freeze frame data item*	Description
COOLANT TEMP [°C] or [°F]	● The engine coolant temperature at the moment a malfunction is detected is displayed.
S-FUEL TRIM [%]	● "Short-term fuel trim" at the moment a malfunction is detected is displayed. ● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
L-FUEL TRIM [%]	● "Long-term fuel trim" at the moment a malfunction is detected is displayed. ● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
ENGINE SPEED [rpm]	● The engine speed at the moment a malfunction is detected is displayed.
VHCL SPEED [km/h] or [mph]	● The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL PRESS [kPa] or [kg/cm^2] or [psi]	● The absolute pressure at the moment a malfunction is detected is displayed.

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

DATA MONITOR MODE

NGEC0034S06

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
CMPS·RPM (REF) [rpm]	○	○	● Indicates the engine speed computed from the REF signal (180° signal) of the camshaft position sensor.	● Accuracy becomes poor if engine speed drops below the idle rpm. ● If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS AIR/FL SE [V]	○	○	● The signal voltage of the mass air flow sensor is displayed.	● When the engine is stopped, a certain value is indicated.
COOLAN TEMP/S [°C] or [°F]	○	○	● The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	● When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
FR O2 SENSOR [V]	○	○	● The signal voltage of the front heated oxygen sensor is displayed.	
RR O2 SENSOR [V]	○	○	● The signal voltage of the rear heated oxygen sensor is displayed.	
FR O2 MNTR [RICH/LEAN]	○	○	● Display of front heated oxygen sensor signal during air-fuel ratio feedback control: RICH ... means the mixture became "rich", and control is being affected toward a leaner mixture. LEAN ... means the mixture became "lean", and control is being affected toward a rich mixture.	● After turning ON the ignition switch, "RICH" is displayed until air-fuel mixture ratio feedback control begins. ● When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
RR O2 MNTR [RICH/LEAN]	○		● Display of rear heated oxygen sensor signal: RICH ... means the amount of oxygen after three way catalyst is relatively small. LEAN ... means the amount of oxygen after three way catalyst is relatively large.	● When the engine is stopped, a certain value is indicated.

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
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.	
EGR TEMP SEN [V]	○		● The signal voltage of the EGR temperature sensor is displayed.	
INT/A TEMP SE [°C] or [°F]	○		● The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated.	
START SIGNAL [ON/OFF]	○	○	● Indicates [ON/OFF] condition from the starter signal.	● After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL/P SW [ON/OFF]			● Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch.	
CLSD THL POS [ON/OFF]	○	○	● Indicates idle position [ON/OFF] computed by ECM according to the throttle position sensor signal.	
AIR COND SIG [ON/OFF]	○	○	● Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioning signal.	
P/N POSI SW [ON/OFF]	○	○	● Indicates [ON/OFF] condition from the PNP switch signal.	
PW/ST SIGNAL [ON/OFF]	○	○	● Indicates [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure switch signal.	
IGNITION SW [ON/OFF]	○		● Indicates [ON/OFF] condition from ignition switch.	
INJ PULSE [msec]		○	● Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	● When the engine is stopped, a certain computed value is indicated.
B/FUEL SCHDL [msec]		○	● "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
IGN TIMING [BTDC]		○	● Indicates the ignition timing computed by ECM according to the input signals.	
IACV-AAC/V [%]		○	● Indicates the IACV-AAC valve control value computed by ECM according to the input signals.	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
PURG VOL C/V [step]		○	● Indicates the EVAP canister purge volume control value computed by the ECM according to the input signals. ● The opening becomes larger as the value increases.	
A/F ALPHA [%]			● Indicates the mean value of the air-fuel ratio feedback correction factor per cycle.	● When the engine is stopped, a certain value is indicated. ● This data also includes the data for the air-fuel ratio learning control.
EVAP SYS PRES [V]		○	● The signal voltage of EVAP control system pressure sensor is displayed.	
AIR COND RLY [ON/OFF]			● Indicates the air conditioner relay control condition determined by ECM according to the input signals.	
FUEL PUMP RLY [ON/OFF]			● Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
EGRC SOL/V [ON/OFF] (FLOW/CUT)			● Indicates the control condition of the EGRC-solenoid valve determined by ECM according to the input signals. ● ON ... EGR valve is operational OFF ... EGR valve operation is cut-off	
VENT CONT/V [ON/OFF]			● The control condition of the EVAP canister vent control valve (determined by ECM according to the input signal) is indicated. ● ON ... Closed OFF ... Open	
FR O2 HEATER [ON/OFF]			● Indicates [ON/OFF] condition of front heated oxygen sensor heater determined by ECM according to the input signals.	
RR O2 HEATER [ON/OFF]			● Indicates [ON/OFF] condition of rear heated oxygen sensor heater determined by ECM according to the input signals.	
VC/V BYPASS/V [ON/OFF]			● The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated. ● ON ... Open OFF ... Closed	
CAL/LD VALUE [%]			● "Calculated load value" indicates the value of the current airflow divided by peak airflow.	
ABSOL TH·P/S [%]			● "Absolute throttle position sensor" indicates the throttle opening computed by ECM according to the signal voltage of the throttle position sensor.	
MASS AIRFLOW [gm/s]			● Indicates the mass airflow computed by ECM according to the signal voltage of the mass air flow sensor.	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
MAP/BARO SW/V [MAP/BARO]			● The control condition of the MAP/BARO switch solenoid valve (determined by ECM according to the input signal) is indicated. MAP ... Intake manifold absolute pressure BARO ... Ambient barometric pressure	
ABSOL PRES/SE [V]			● The signal voltage of the absolute pressure sensor is displayed.	
VOLTAGE [V]			● Voltage measured by the voltage probe.	
PULSE [msec] or [Hz] or [%]			● Pulse width, frequency or duty cycle measured by the pulse probe.	● Only "#" is displayed if item is unable to be measured. ● Figures with "#"s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.

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

ACTIVE TEST MODE

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
IACV-AAC/V OPENING	● Engine: After warming up, idle the engine. ● Change the IACV-AAC valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	● Harness and connector ● IACV-AAC valve
ENG COOLANT TEMP	● Engine: Return to the original trouble condition ● Change the engine coolant temperature indication using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connector ● Engine coolant temperature sensor ● Fuel injectors
IGNITION TIMING	● Engine: Return to the original trouble condition ● Timing light: Set ● Retard the ignition timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Adjust initial ignition timing
POWER BALANCE	● Engine: After warming up, idle the engine. ● 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
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)
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
SELF-LEARNING CONT	● In this test, the coefficient of self-learning control mixture ratio returns to the original coefficient by touching "CLEAR" on the screen.		
PURG VOL CONT/V	● Engine: After warming up, run engine at 1,500 rpm. ● Change the EVAP canister purge volume control valve opening step using CONSULT-II.	Engine speed changes according to the opening step.	● Harness and connector ● EVAP canister purge volume control valve
TANK F/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
MAP/BARO SW/V	● Ignition switch: ON (Engine stopped) ● Turn the MAP/BARO switch solenoid valve between "MAP" and "BARO" using CONSULT-II and listen to operating sound.	MAP/BARO switch solenoid valve makes an operating sound.	● Harness and connector ● MAP/BARO switch solenoid valve

DTC & SRT CONFIRMATION MODE
=NGEC0034S08

SRT STATUS Mode
NGEC0034S0801

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-58.

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-351
	EVAP SML LEAK P1440		EC-485
	PURG VOL CN/V P1444		EC-487
	PURGE FLOW P1447		EC-505
	VC CUT/V BP/V P1491		EC-530
	PURG CN/V & S/V P1493		EC-367
FR O2 SENSOR	FR O2 SENSOR P0130		EC-190
	FR O2 SENSOR P0131		EC-198
	FR O2 SENSOR P0132		EC-205
	FR O2 SENSOR P0133		EC-212
RR O2 SENSOR	RR O2 SENSOR P0137		EC-235
	RR O2 SENSOR P0138		EC-245
	RR O2 SENSOR P0139		EC-255
EGR SYSTEM	EGR SYSTEM P0400		EC-326
	EGRC-BPT/VLV P0402		EC-338
	EGR SYSTEM P1402		EC-476

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.

GI
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EL
IDX

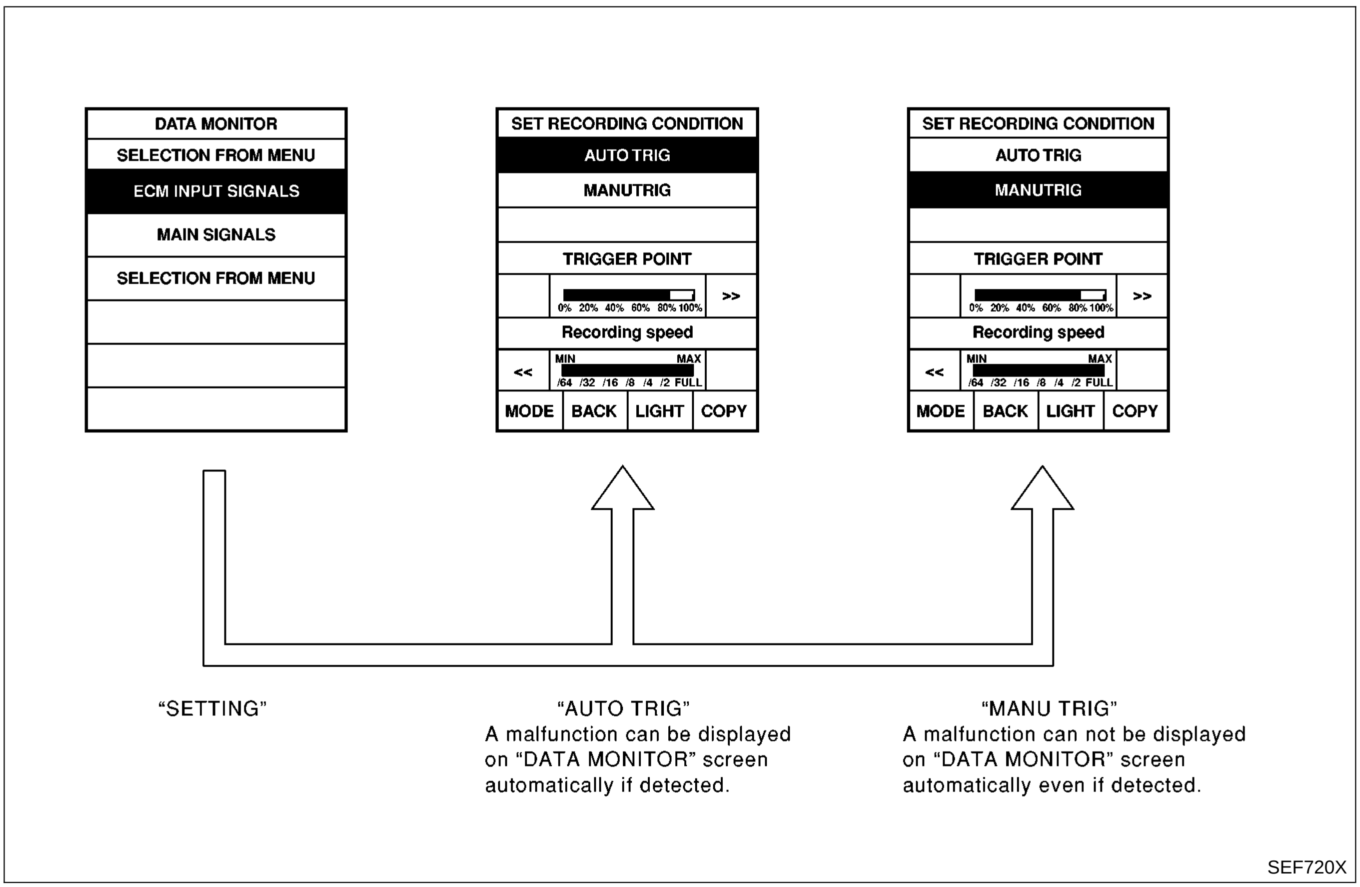
Use these triggers as follows:

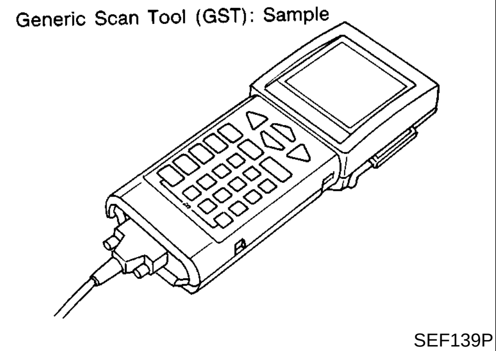
1) "AUTO TRIG"

- 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-24***.

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.





SEF139P

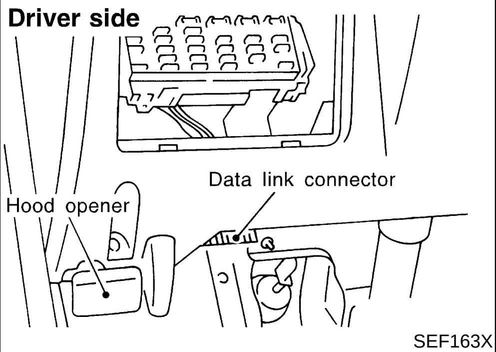
Generic Scan Tool (GST)

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.

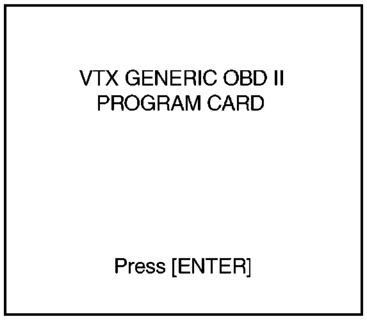


SEF163X

GST INSPECTION PROCEDURE

NGEC0035S02

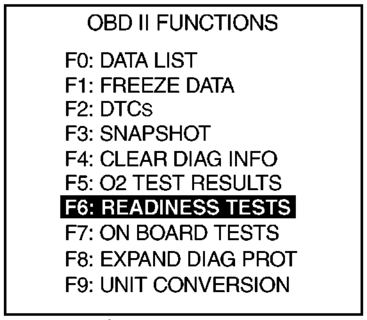
1. Turn ignition switch OFF.
2. Connect “GST” to data link connector for GST. (Data link connector for GST is located under LH dash panel near the fuse box cover.)



Sample screen*
SEF398S

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

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



Sample screen*
SEF416S

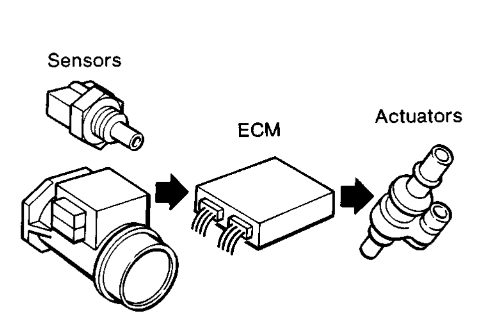
5. Perform each diagnostic mode according to each service procedure.

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

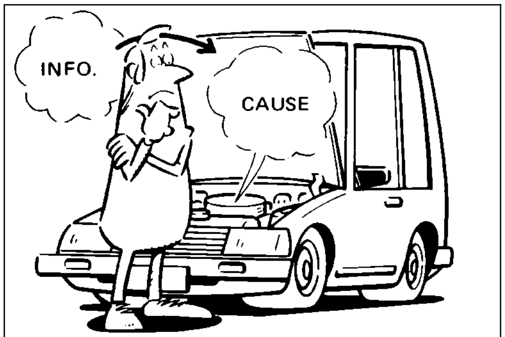
FUNCTION

NGEC0035S03

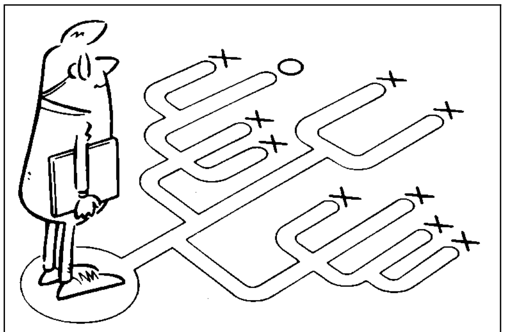
Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-81).]
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

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-93.

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.

KEY POINTS

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

SEF907L

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].

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

Worksheet Sample

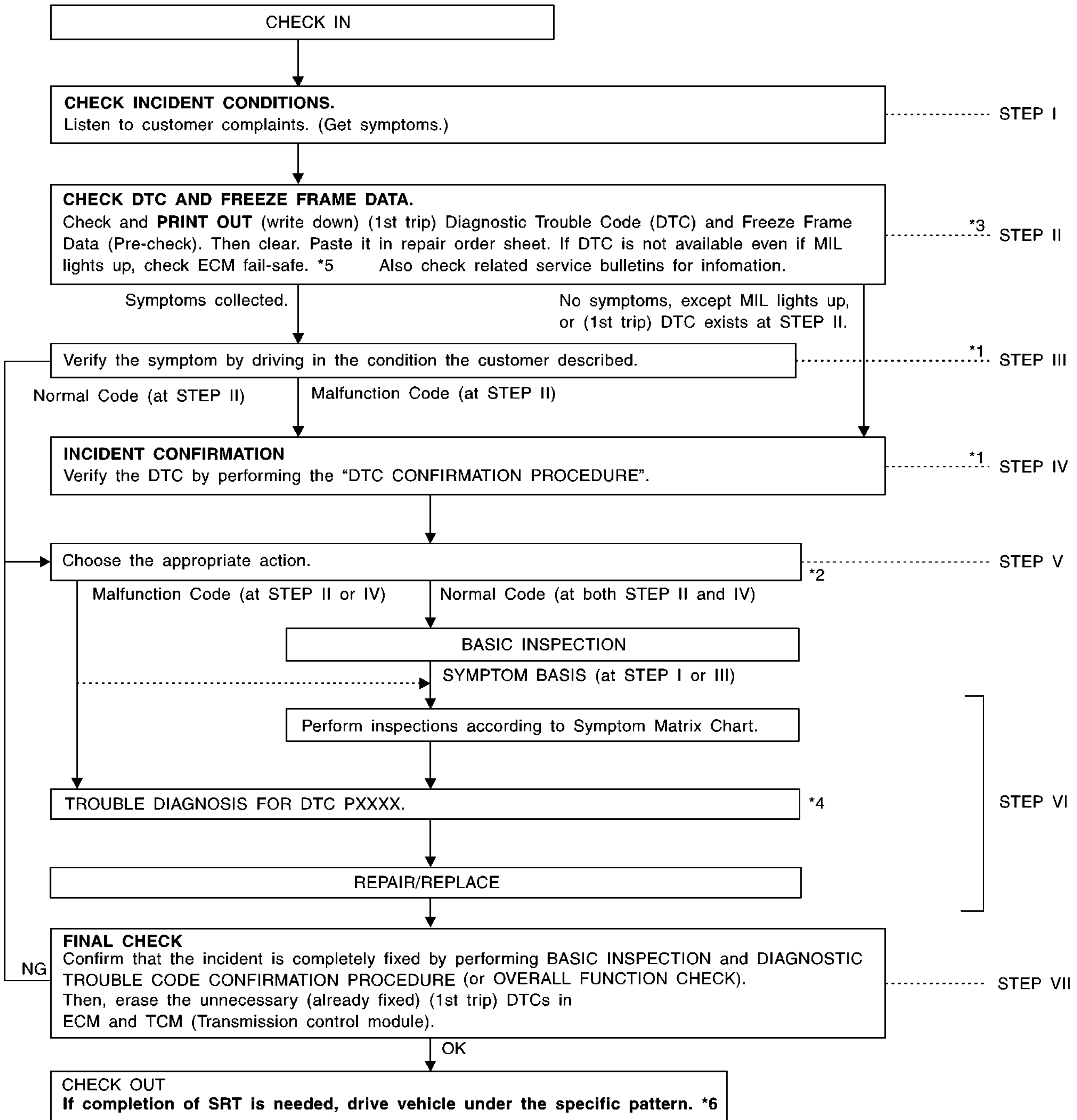
NGEC0036S0101

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



SEF944VB

*1: If the incident cannot be duplicated, refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

*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-129.

*3: If time data of "SELF-DIAG RESULTS" is other than "0" or "1t" refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT", EC-128.

*4: If the malfunctioning part cannot be found, refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

*5: EC-110

*6: EC-63

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-92.
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-67.) 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-111.) 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-95.) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-111.)
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-120. 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-26***. 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-67.)

Basic Inspection

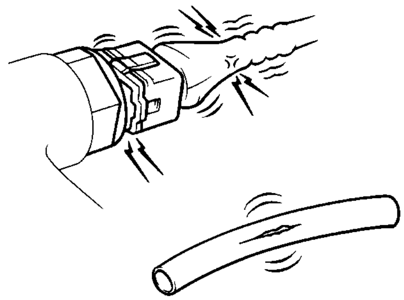
NGEC0038

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.**

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

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

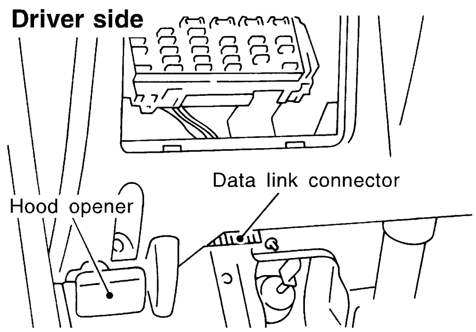


SEF142I

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-78.



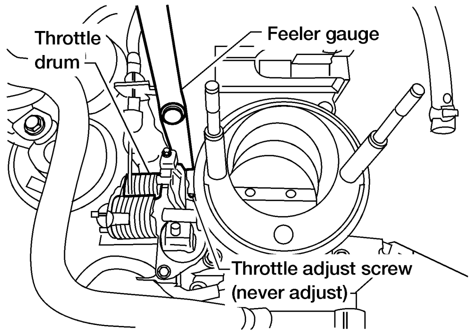
SEF163X

▶	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

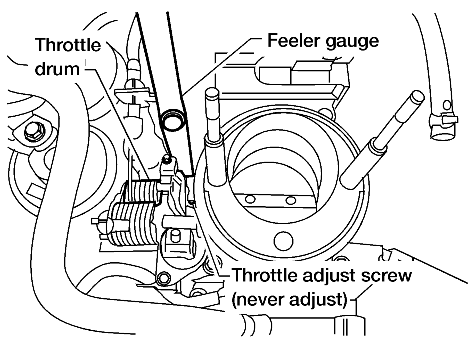
OK or NG

OK	▶	GO TO 6.
NG	▶	Replace throttle body assembly. Refer to "OUTER COMPONENT PARTS", ***EM-12***.

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

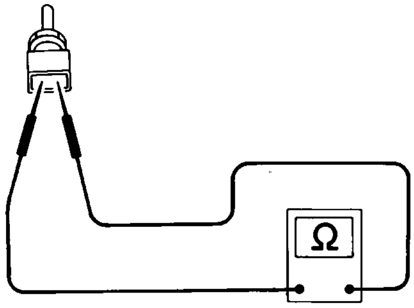
OK or NG

OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 14.
NG	▶	Replace throttle body assembly. Refer to "OUTER COMPONENT PARTS", ***EM-12***.

5	CHECK FI CAM FUNCTION

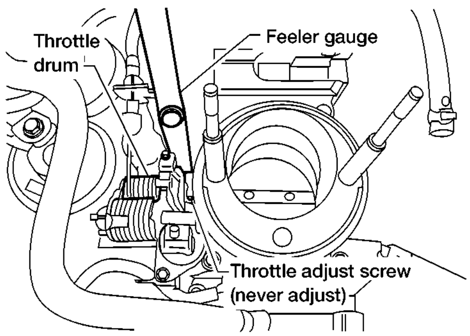
No Tools

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 0.05mm (0.002in), between stopper and throttle adjusting screw as shown in figure.



AEC871A

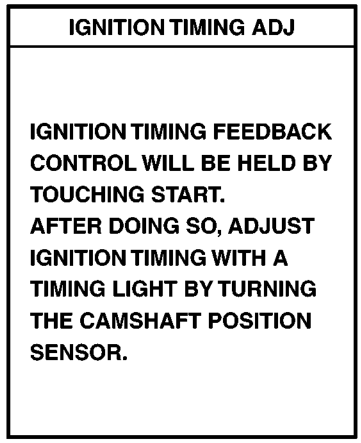
OK or NG

OK	▶	GO TO 14.
NG	▶	Replace throttle body assembly. Refer to "OUTER COMPONENT PARTS", ***EM-12***.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

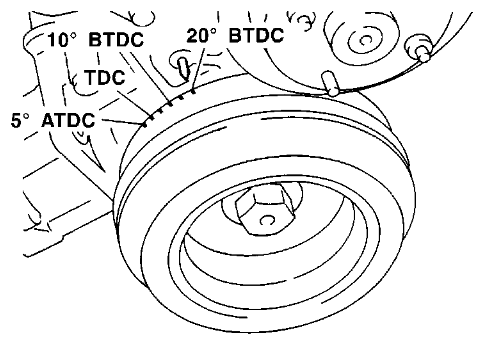
6	CHECK IGNITION TIMING

With CONSULT-II
1. Warm up engine to normal operating temperature.
2. Select "IGNITION TIMING ADJ" in "WORK SUPPORT" mode.
3. Touch "START".



PEF546N

4. Check ignition timing at idle using timing light.

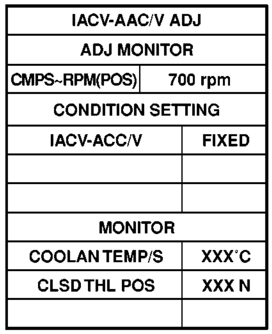


SEF320V

Ignition timing:
20°±2° BTDC (in "P" or "N" position)

OK or NG

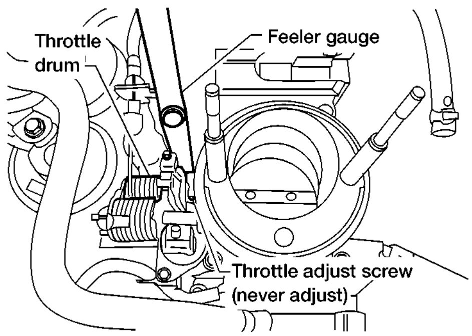
OK	▶	GO TO 7.
NG	▶	1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-42. 2. GO TO 7.

7	CHECK BASE IDLE SPEED	
With CONSULT-II 1. Select "IGNITION TIMING ADJ" in "WORK SUPPORT" mode and touch "START".  PEF120W 2. Check idle speed. **750±50 rpm (in "P" or "N" position)** **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-42. 2. GO TO 8.

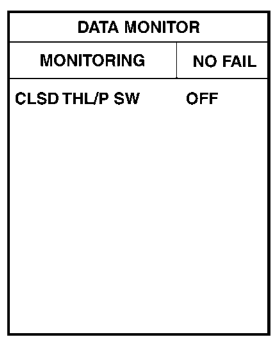
8	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION (CHECK THROTTLE POSITION SENSOR IDLE POSITION)

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



PEF122W

"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

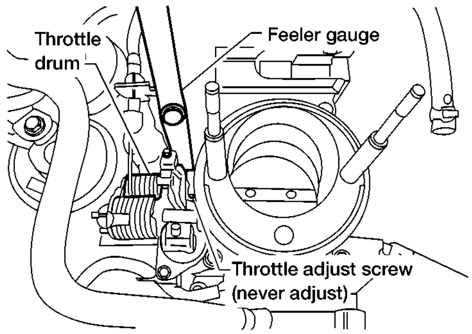
OK ▶	GO TO 12.
NG ▶	GO TO 9.

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	
MONITORING	NO FAIL
CLSD THL/P SW	OFF

PEF122W

"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.

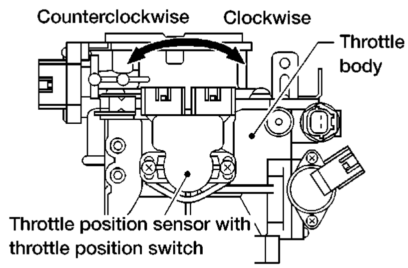
OK or NG

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".



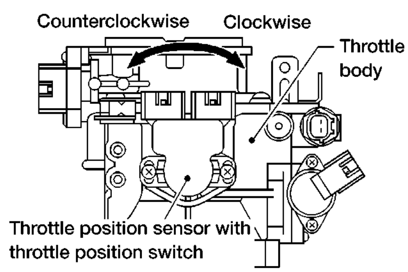
AEC872A

▶	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.

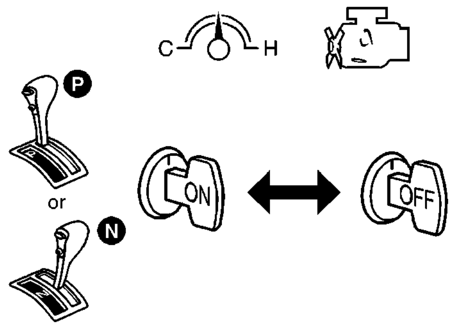
12	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

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 FAIL
CLSD THL POS	ON

PEF123W

▶	GO TO 13.

13	CHECK TARGET IDLE SPEED

With CONSULT-II

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

   800±50 rpm (in "P" or "N" position)

OK or NG

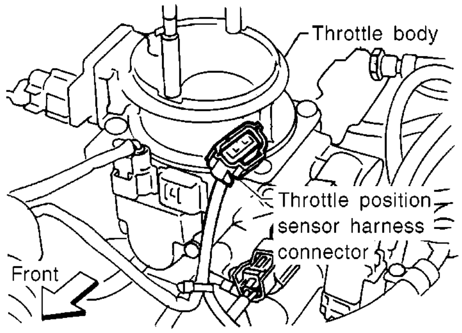
OK ▶	**INSPECTION END**
NG ▶	Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-42.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

14	CHECK IGNITION TIMING

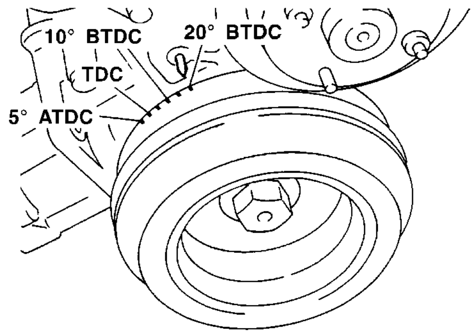
Without CONSULT-II

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:
20°±2° BTDC (in "P" or "N" position)

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-42. 2. GO TO 15.

15	CHECK BASE IDLE SPEED

Without CONSULT-II

Make sure that engine speed falls to the following speed.

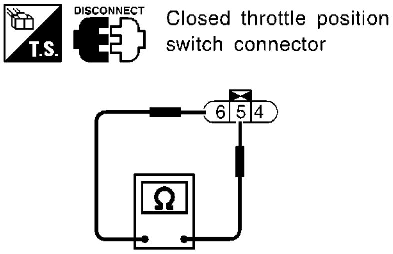
M/T: 750±50 rpm
A/T: 750±50 rpm (in "P" or "N" position)

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-42. 2. GO TO 16.

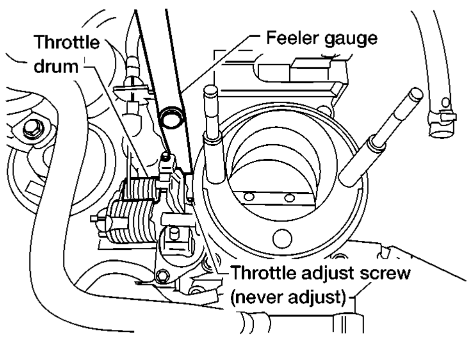
16	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION (CHECK THROTTLE POSITION SENSOR IDLE POSITION)

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

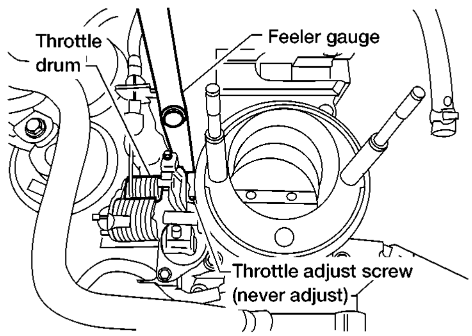
OK	▶	GO TO 18.
NG	▶	GO TO 17.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

17	ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-1

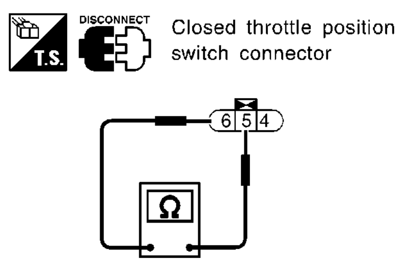
Without CONSULT-II
NOTE:
- **Never adjust throttle adjust screw (TAS).**
- **Do not touch throttle drum when checking "continuity".**
  Doing so may cause an incorrect adjustment.

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

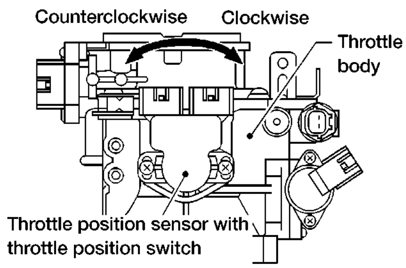
The continuity should not exist while closing the throttle position sensor body.
If it is impossible to adjust closed throttle position switch, replace throttle position sensor.

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.

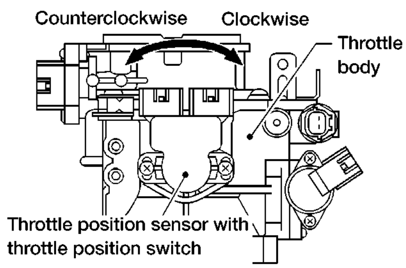


AEC872A

▶	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.

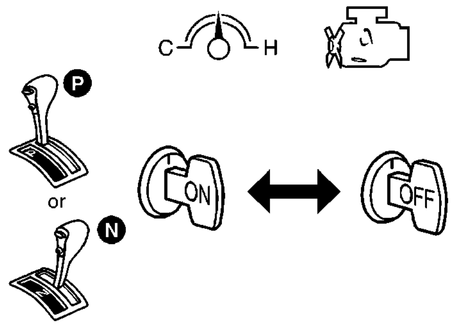
20	REINSTALLATION

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.
   800±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 23.
NG	▶	1. Adjust target idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-42. 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-67) .

▶	**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 (0102) ● P0110 Intake air temperature sensor (0401) ● P0115, P0125 Engine coolant temperature sensor (0103) (0908) ● P0120 Throttle position sensor (0403) ● P0180 Fuel tank temperature sensor (0402) ● P0325 Knock sensor (0304) ● P0340 Camshaft position sensor (0101) ● P0500 Vehicle speed sensor (0104) ● P0605 ECM (0301) ● P1320 Ignition signal (0201) ● P1400 EGRC-solenoid valve (1005) ● P1706 Park/neutral position switch (1003)
2	● P0105 Absolute pressure sensor (0803) ● P0130 - P0134 Front heated oxygen sensor (0303 - 0412) ● P0135 Front heated oxygen sensor heater (0901) ● P0137 - P0140 Rear heated oxygen sensor (0510 - 0707) ● P0141 Rear heated oxygen sensor heater (0902) ● P0335, P1336 Crankshaft position sensor (OBD) (0802) (0905) ● P0443, P1444 EVAP canister purge volume control solenoid valve (1008), (0214) ● P0446, P1446, P1448 EVAP canister vent control valve (0903), (0215), (0309) ● P0450 EVAP control system pressure sensor (0704) ● P0510 Closed throttle position switch (0203) ● P1105 MAP/BARO switch solenoid valve (1302) ● P1401 EGR temperature sensor (0305) ● P1447 EVAP control system purge flow monitoring (0111) ● P1490, P1491 Vacuum cut valve bypass valve (0801) (0311)
3	● P0172, P0171 Fuel injection system function (0114), (0115) ● P0300 - P0304 Misfire (0701 - 0605) ● P0400, P1402 EGR function (0302) (0514) ● P0402 EGRC-BPT valve function (0306) ● P0420 Three way catalyst function (0702) ● P0440, P1440, P0445 EVAP control system (SMALL LEAK) (0705) (0213), (GROSS LEAK) (0715) ● P0505 IACV-AAC valve (0205) ● P1148 Closed loop control (0307)

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.

<table>
<tr><th colspan="2">DTC No.</th><th rowspan="2">Detected items</th><th colspan="2" rowspan="2">Engine operating condition in fail-safe mode</th></tr>
<tr><th>CON-SULT-II GST</th><th>ECM*1</th></tr>
<tr><td>P0100</td><td>0102</td><td>Mass air flow sensor circuit</td><td colspan="2">Engine speed will not rise more than 2,400 rpm due to the fuel cut.</td></tr>
<tr><td>P0110</td><td>0401</td><td>Intake air temperature sensor</td><td colspan="2">The ECM functions on the assumption that the intake air temperature is 25°C (77°F).</td></tr>
<tr><td rowspan="5">P0115</td><td rowspan="5">0103</td><td rowspan="5">Engine coolant temperature sensor circuit</td><td colspan="2">Engine coolant temperature will be determined by ECM based on the time after turning ignition switch to ON or START.
CONSULT-II displays the engine coolant temperature decided by ECM.</td></tr>
<tr><td>Condition</td><td>Engine coolant temperature decided (CONSULT-II display)</td></tr>
<tr><td>Just as ignition switch is turned to ON or Start</td><td>40°C (104°F)</td></tr>
<tr><td>More than approx. 4 minutes after ignition ON or Start</td><td>80°C (176°F)</td></tr>
<tr><td>Except as shown above</td><td>40 - 80°C (104 - 176°F)
(Depends on the time)</td></tr>
<tr><td rowspan="4">P0120</td><td rowspan="4">0403</td><td rowspan="4">Throttle position sensor circuit</td><td colspan="2">Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.</td></tr>
<tr><td>Condition</td><td>Driving condition</td></tr>
<tr><td>When engine is idling</td><td>Normal</td></tr>
<tr><td>When accelerating</td><td>Poor acceleration</td></tr>
<tr><td rowspan="8">Unable to access ECM</td><td rowspan="8">Unable to access Diagnostic Test Mode II</td><td rowspan="8">ECM</td><td colspan="2">ECM fail-safe activating condition
The computing function of the ECM was judged to be malfunctioning.
When the fail-safe system activates (i.e., if the ECM detects a malfunction condition in the CPU of ECM), the MIL on the instrument panel lights to warn the driver.
However it is not possible to access ECM and DTC cannot be confirmed.
Engine control with fail-safe
When ECM fail-safe is operating, fuel injection, ignition timing, fuel pump operation and IACV-AAC valve operation are controlled under certain limitations.</td></tr>
<tr><td></td><td>ECM fail-safe operation</td></tr>
<tr><td>Engine speed</td><td>Engine speed will not rise more than 3,000 rpm</td></tr>
<tr><td>Fuel injection</td><td>Simultaneous multiport fuel injection system</td></tr>
<tr><td>Ignition timing</td><td>Ignition timing is fixed at the preset valve</td></tr>
<tr><td>Fuel pump</td><td>Fuel pump relay is “ON” when engine is running and “OFF” when engine stalls</td></tr>
<tr><td>IACV-AAC valve</td><td>Full open</td></tr>
<tr><td colspan="2">Replace ECM, if ECM fail-safe condition is confirmed.</td></tr>
</table>

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

Symptom Matrix Chart

NGEC0041

SYSTEM — ENGINE CONTROL SYSTEM

NGEC0041S01

		SYMPTOM													
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-561
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-41
	Injector circuit	1	1	2	3	2		2	2			2			EC-553
	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-39
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-42
	IACV-AAC valve circuit	1	1	2	3	3	2	2	2	2		2		2	EC-416
	IACV-FICD solenoid valve circuit	2	2	3	3	3	3	3	3	3		3			EC-573
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-42
	Ignition circuit	1	1	2	2	2		2	2			2			EC-449
EGR	EGRC-solenoid valve circuit		2	2	3	3						3			EC-463
	EGR system	2	1	2	3	3	3	2	2	3		3			EC-326, 338, 476
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3		2	EC-129
Air conditioner circuit		2	2	3	3	3	3	3	3	3		3		2	***HA-22***

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-318
Mass air flow sensor circuit	1	1	2	2	2		2	2			2			EC-136
Front heated oxygen sensor circuit		1	2	3	2		2	2			2			EC-190, 198
Engine coolant temperature sensor circuit	1	1	2	3	2	3	2	2	3		2			EC-167, 186
Throttle position sensor circuit		1	2		2	2	2	2	2		2			EC-172
Incorrect throttle position sensor adjust-ment		3	1		1	1	1	1	1		1			EC-95
Vehicle speed sensor circuit		2	3		3						3			EC-412
Knock sensor circuit			2								3			EC-308
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-429, 110
Start signal circuit	2													EC-558
PNP switch circuit			3		3		3	3			3			EC-541
Power steering oil pressure switch circuit		2					3	3						EC-569

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

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

NGEC0041S03

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												***FE-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			
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor — throttle body)	5			5		5			5					
	Throttle body, Throttle wire														***FE-3***
	Air leakage from intake manifold/ Collector/Gasket														—
Cranking	Battery	1	1	1		1		1	1			1		1	***SC-2***
	Alternator circuit														
	Starter circuit	3													
	Flywheel/Drive plate	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 mecha-nism	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-8***
	Three way catalyst														
Lubrica-tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5			***MA-21***, ***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-18***

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
CMPS·RPM (REF)	• 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	0.9 - 1.8V
		2,500 rpm	1.9 - 2.3V
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
FR O2 SENSOR	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
FR O2 MNTR			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.
RR O2 SENSOR	• Engine: After warming up	Revving engine from idle to 3,000 rpm quickly	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
RR O2 MNTR			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
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL/P SW	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF
CLSD THL POS	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF
AIR COND SIG	• Engine: After warming up, idle the engine	A/C switch: OFF	OFF
		A/C switch: ON (Compressor operates.)	ON
P/N POSI SW	• Ignition switch: ON	Shift lever: "P" or "N"	ON
		Except above	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned	ON

MONITOR ITEM	CONDITION		SPECIFICATION
IGNITION SW	● Ignition switch: ON → OFF → ON		ON → OFF → ON
INJ PULSE	● 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
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
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
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)	—
A/F ALPHA	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	50 - 159%
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
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)
VENT CONT/V	● Ignition switch: ON		OFF
FR O2 HEATER	● 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
RR O2 HEATER	● Engine speed: Idle after driving 2 minutes at 70 km/h (43 MPH) or more		ON
	● Ignition switch: ON (Engine stopped)		OFF
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	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%

MONITOR ITEM	CONDITION		SPECIFICATION
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
MAP/BARO SW/V	• Engine: For 5 seconds after starting engine		BARO
	• Ignition switch: More than 5 seconds after turning ignition switch "ON" • Engine: More than 5 seconds after stating engine		MAP
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

Major Sensor Reference Graph in Data Monitor Mode

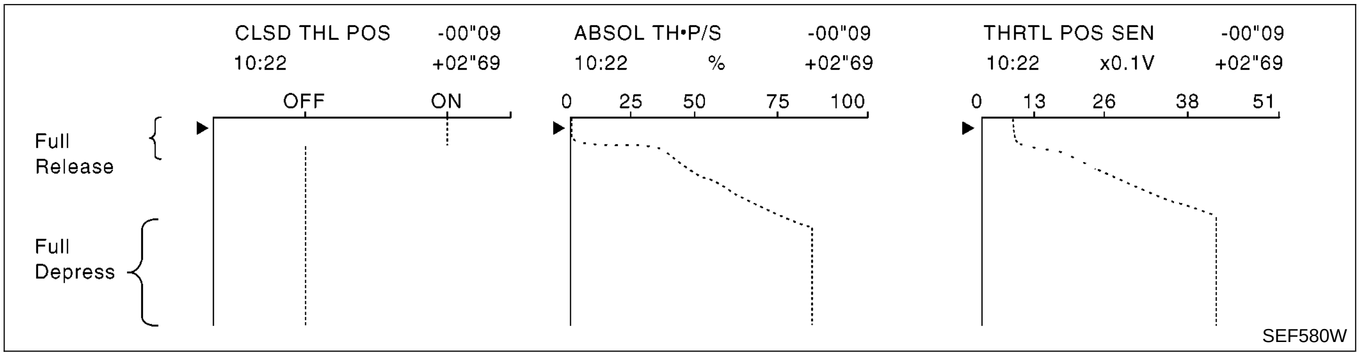
NGEC0043

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".



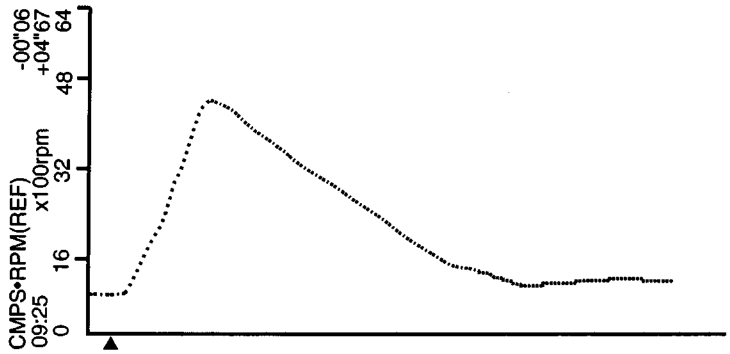
SEF580W

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

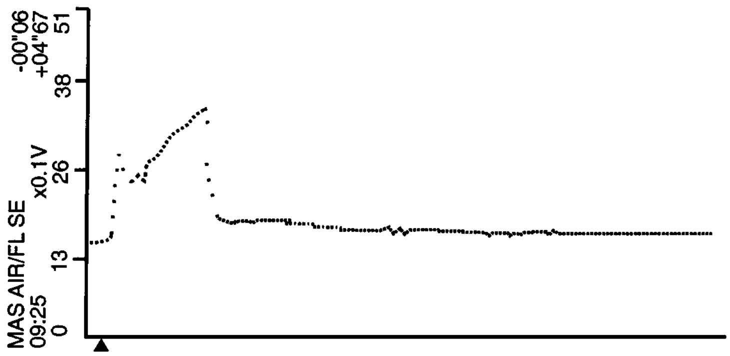
NGEC0043S02

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

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

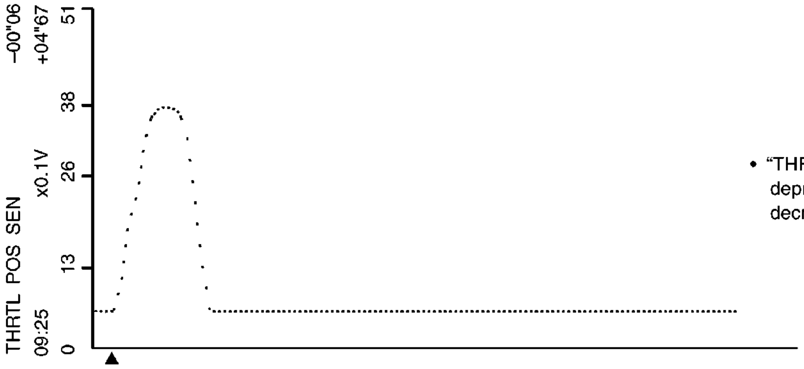


- "CMPS•RPM(REF)" should increase gradually while depressing the accelerator pedal and should decrease gradually after releasing the pedal without any intermittent drop or rise.

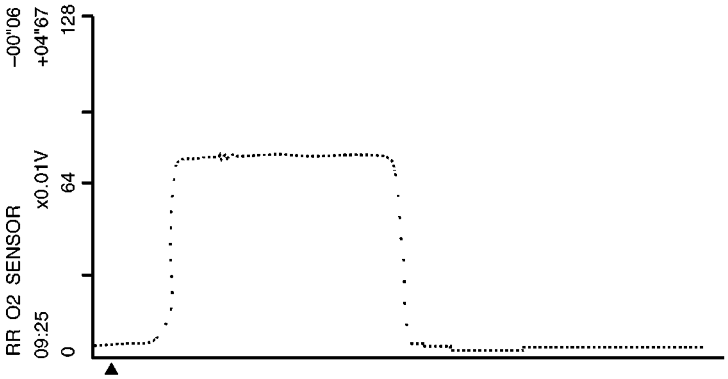


- "MAS AIR/FL SE" should increase when depressing the accelerator pedal and should decrease at the moment "THRTL POS SEN" is closed (accelerator pedal is released).

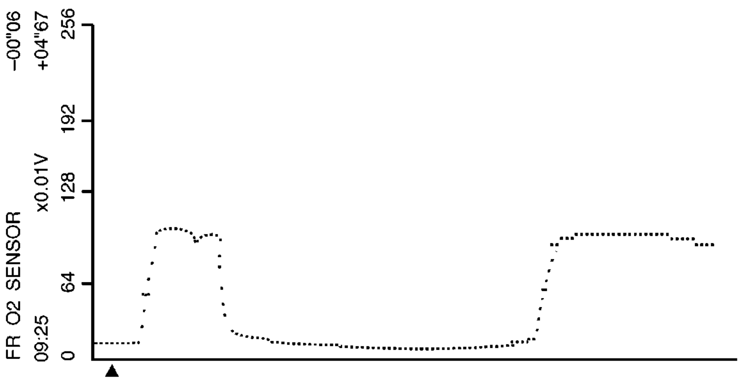
SEF059P



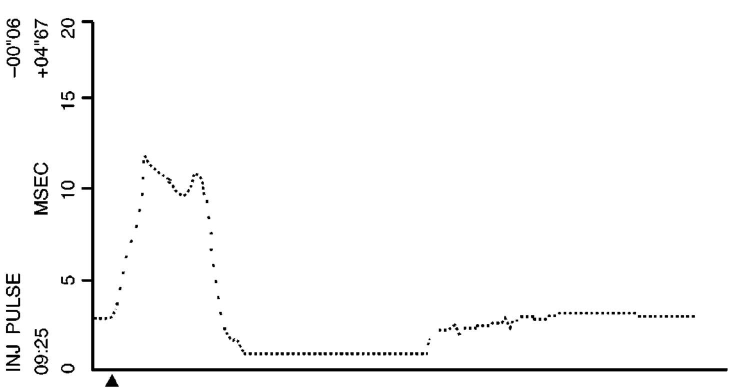
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



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

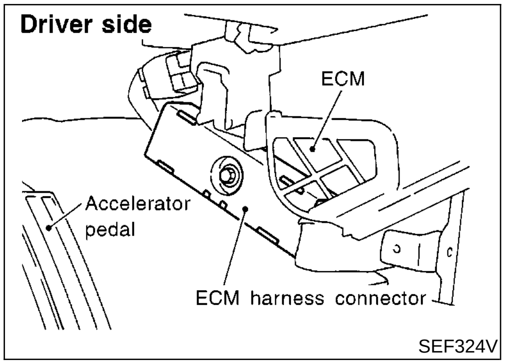


- "FR O2 SENSOR" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



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

SEF417R



SEF324V

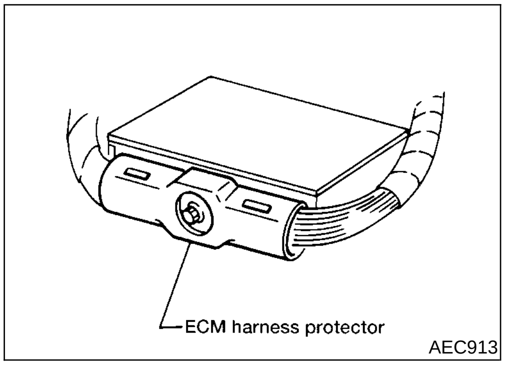
ECM Terminals and Reference Value

NGEC0044

PREPARATION

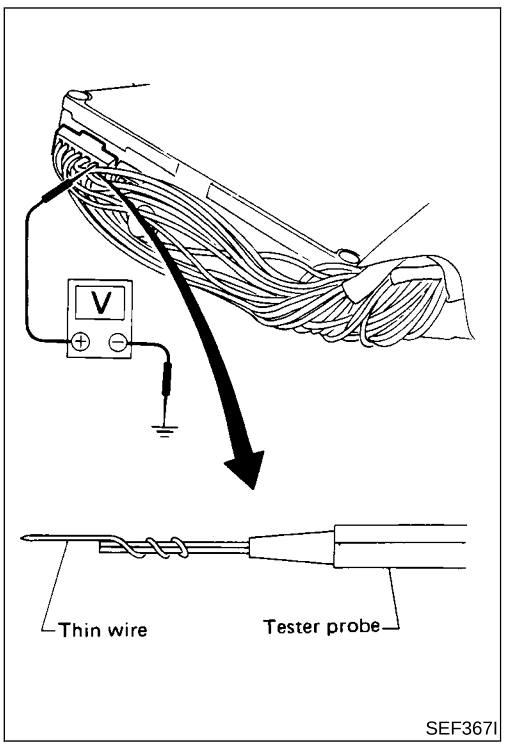
NGEC0044S01

1. ECM is located behind the instrument lower cover. For this inspection:
- Remove instrument lower cover.



AEC913

2. Remove ECM harness protector.

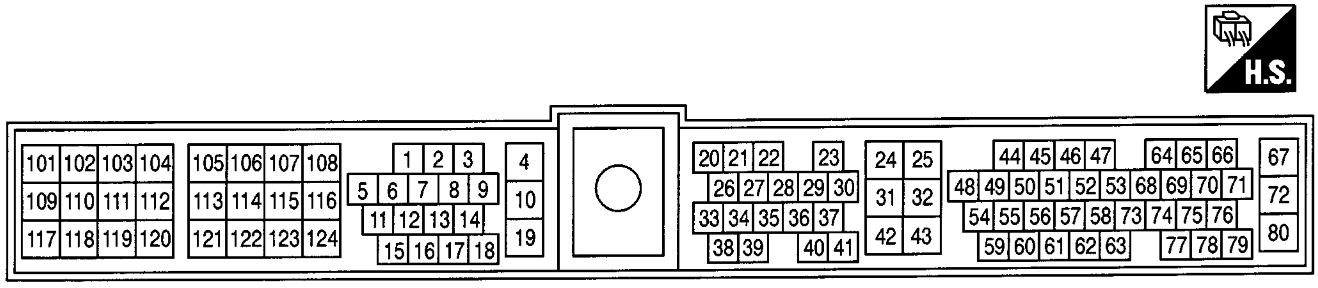


SEF367I

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

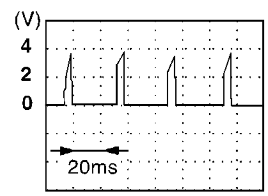
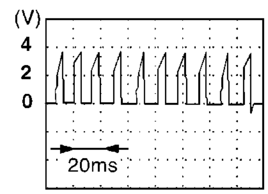
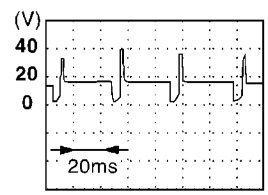
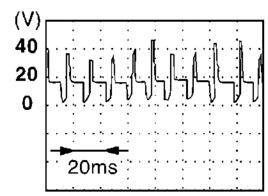


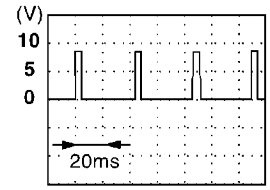
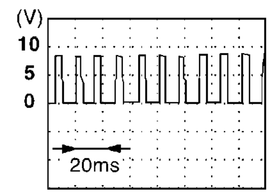
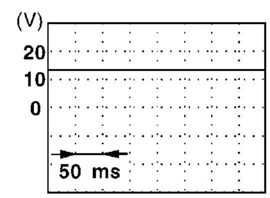
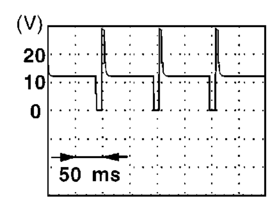
SEF533P

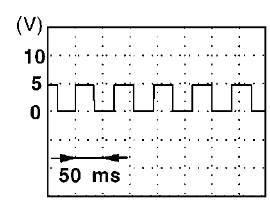
ECM INSPECTION TABLE

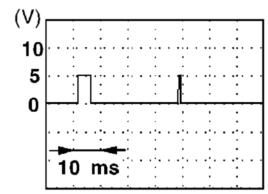
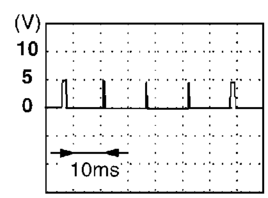
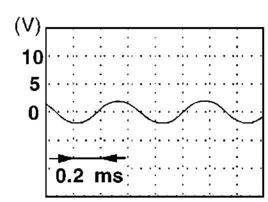
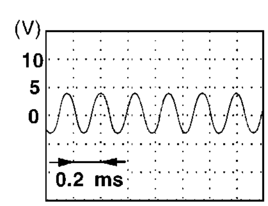
NGEC0044S03

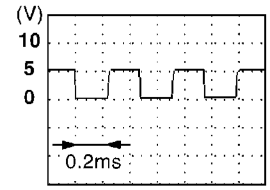
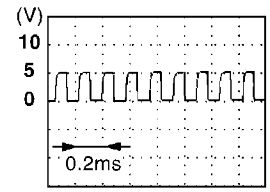
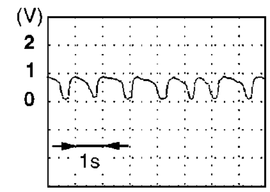
Specification data are reference values and are measured between each terminal and 32 (ECM ground).

TER-MINAL 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 
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 

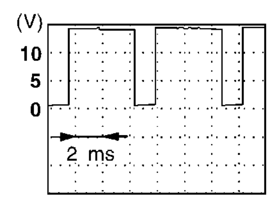
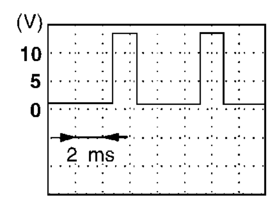
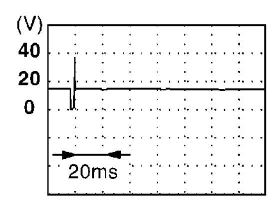
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	P/L	Tachometer	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 1V 
			[Engine is running] ● Engine speed is 2,000 rpm	0.5 - 2V 
4	LG/R	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
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)

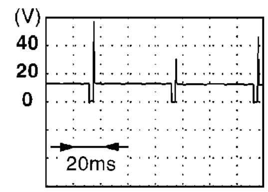
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12	P	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower switch are ON* *: Any mode except "OFF", ambient air temperature above 10°C (50°F).	Approximately 0V
			[Engine is running] ● A/C switch is OFF	BATTERY VOLTAGE (11 - 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
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 

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground (Probe this terminal with (−) tester probe when measuring)
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 
48	PU		**[Engine is running]** ● Engine speed is 2,000 rpm	0 - 0.5V 
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
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 

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 2.6V 
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2.5 - 2.6V 
50	B	Front heated oxygen sensor	**[Engine is running]** ● After warning up to normal operating temperature and engine speed is 2,000 rpm.	0 - Approximately 1.0V 
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	Rear heated oxygen sensor	**[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

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
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
67	B/P	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P			
69	LG/R	Data link connector for GST	**[Engine is running]** ● Idle speed (GST is disconnected)	0.2 - 14V
75	Y/R	Data link connector for CONSULT-II	**[Engine is running]** ● Idle speed (CONSULT-II is connected and turned ON)	3 - 10V
76	GY/L			0 - 4V
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	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		

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
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)
118	LG/B	MAP/BARO switch solenoid valve	**[Ignition switch ON]** ● For 5 seconds after turning ignition switch ON **[Engine is running]** ● Idle speed ● For 5 seconds after starting engine	0 - 1V
			[Ignition switch ON] ● More than 5 seconds after turning ignition switch ON **[Engine is running]** ● Idle speed ● More than 5 seconds after starting engine	BATTERY VOLTAGE (11 - 14V)
119	BR/Y	Front heated oxygen sensor heater	**[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	Rear heated oxygen sensor heater	**[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

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-67.	
▶	GO TO 2.

2	CHECK GROUND TERMINALS
Check ground terminals for corroding or loose connection. Refer to "Circuit Inspection", "GROUND INSPECTION", ***GI-29***. **OK or NG**	
OK ▶	GO TO 3.
NG ▶	Repair or replace.

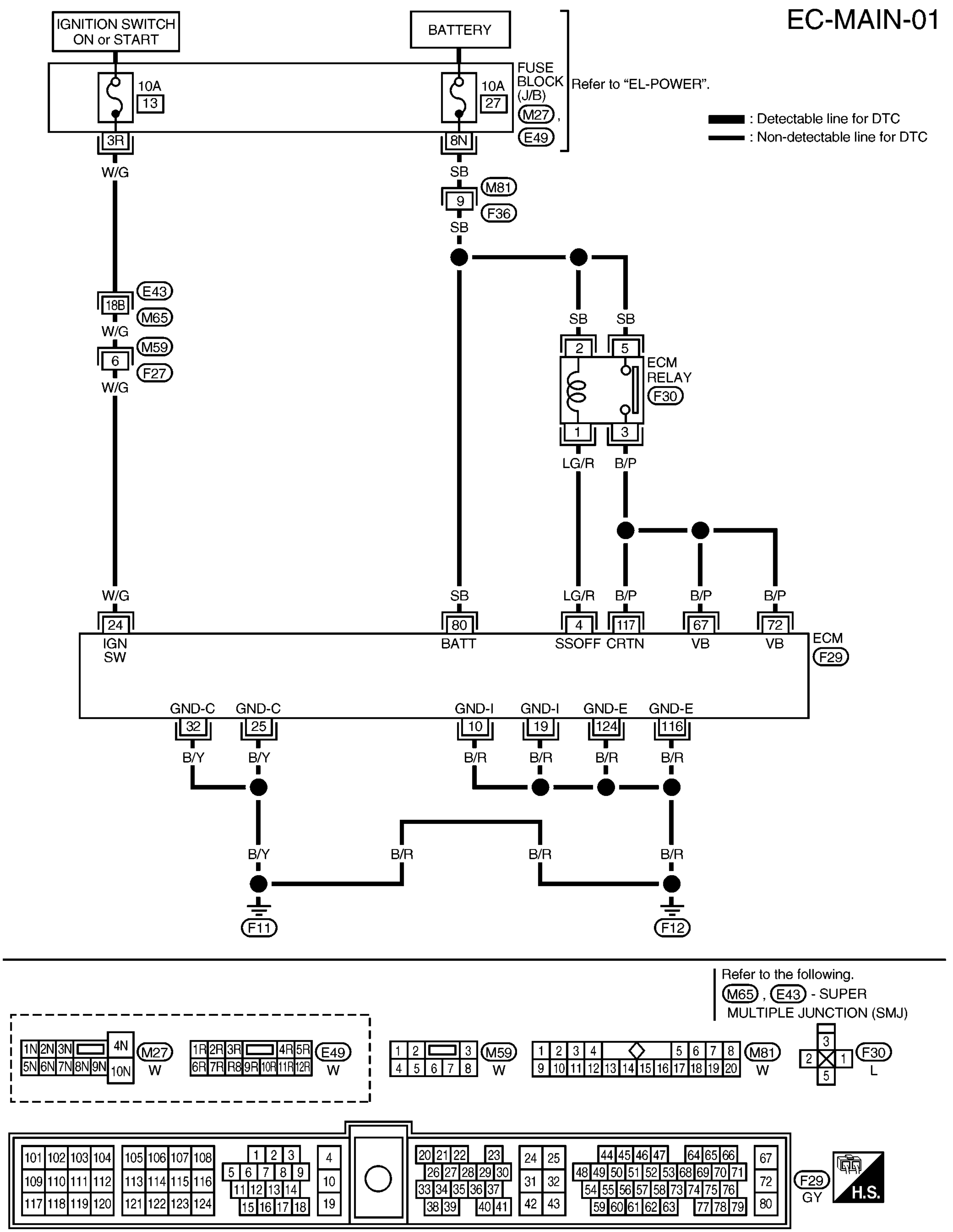
3	SEARCH FOR ELECTRICAL INCIDENT
Perform "Incident Simulation Tests", ***GI-24***. **OK or NG**	
OK ▶	GO TO 4.
NG ▶	Repair or replace.

4	CHECK CONNECTOR TERMINALS
Refer to "How to Check Enlarged Contact Spring of Terminal", ***GI-21***. **OK or NG**	
OK ▶	**INSPECTION END**
NG ▶	Repair or replace connector.

Main Power Supply and Ground Circuit

WIRING DIAGRAM

NGEC0047



AEC980A

ECM TERMINALS AND REFERENCE VALUE

NGEC0048

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

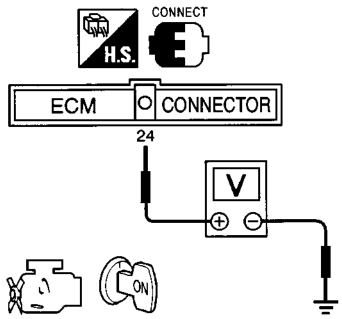
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	LG/R	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1V
			[Ignition switch OFF] ● A few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 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

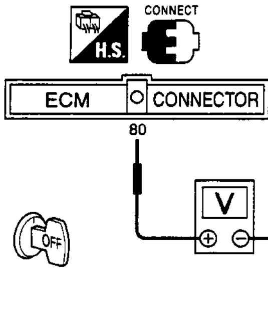
OK or NG

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.

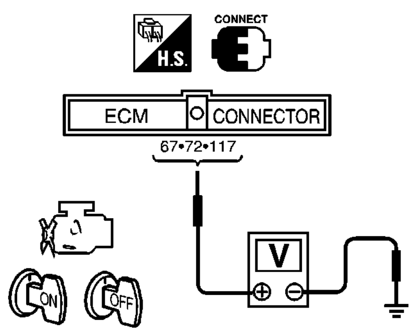
5	DETECT MALFUNCTIONING PART

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:

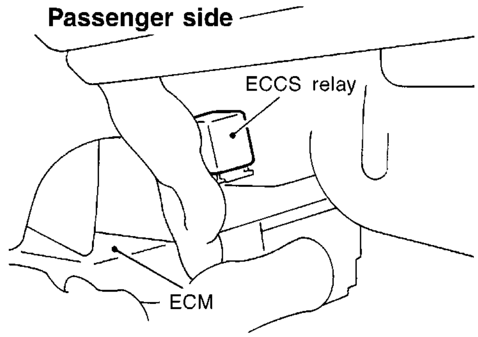
After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0V.

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.

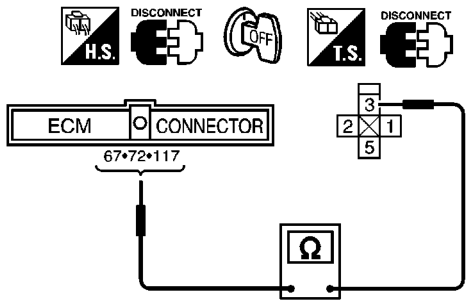
7	CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM

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

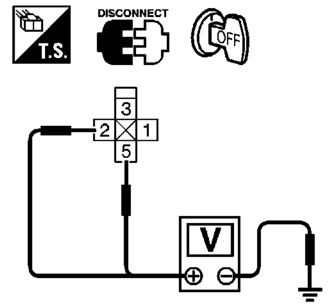
Check the following.
- Harness for open or short between ECM relay and ECM

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

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

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.

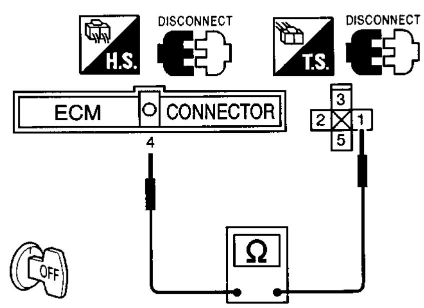
10	DETECT MALFUNCTIONING PART

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.



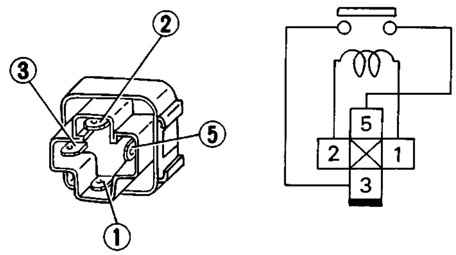
SEF605P

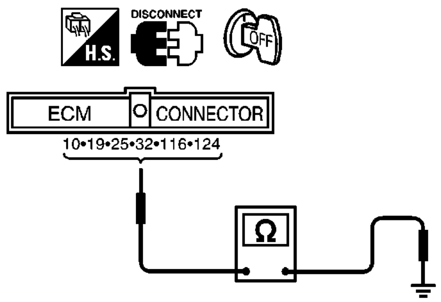
Continuity should exist.

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

OK or NG

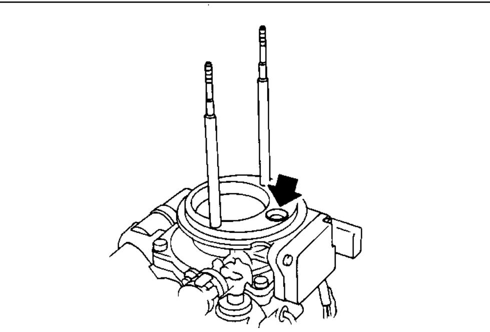
OK ▶	GO TO 12.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

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

14	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.	
▶	**INSPECTION END**

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX


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 43 (ECM 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 0102	A)	An excessively high voltage from the sensor is sent to ECM when engine is not running.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor
	C)	A high voltage from the sensor is sent to ECM under light load driving condition.	
	B)	An excessively low voltage from the sensor is sent to ECM* when engine is running.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor
	D)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	

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

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

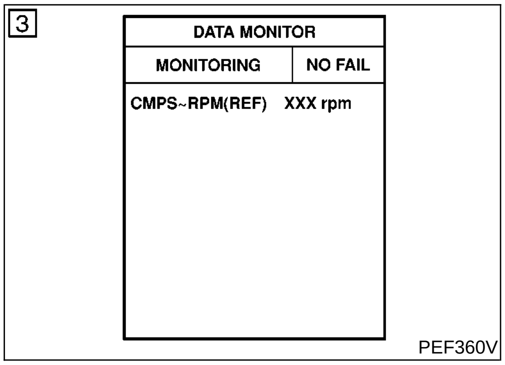
DTC Confirmation Procedure

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

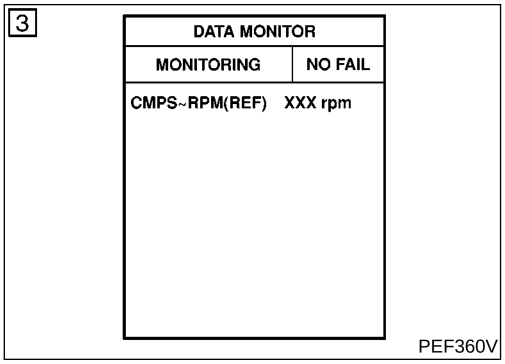
NGEC0054S01

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-141.

With GST

Follow the procedure “With CONSULT-II”.



PROCEDURE FOR MALFUNCTION B

NGEC0054S02

With CONSULT-II

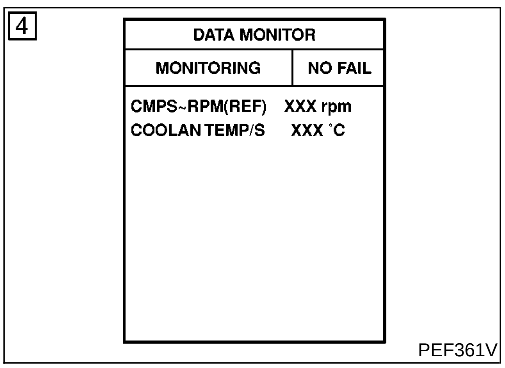
1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and wait 5 seconds at most.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-141.

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.



PROCEDURE FOR MALFUNCTION C

NGEC0054S03

NOTE:

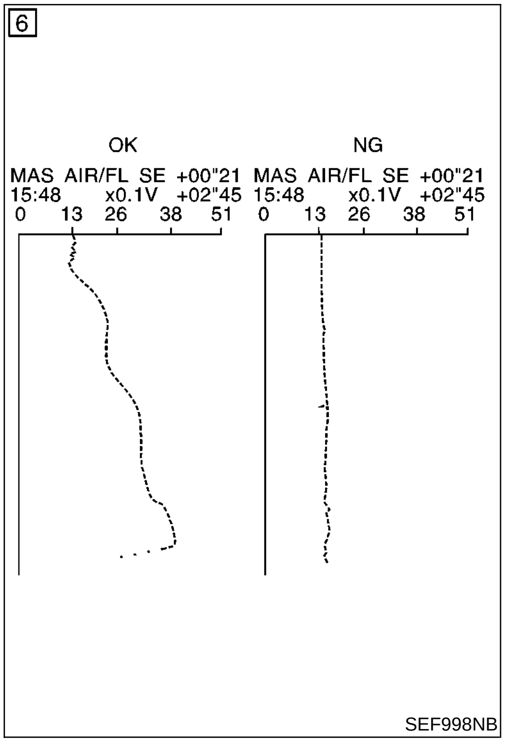
If engine will not start or stops soon wait at least 10 seconds with engine stopped (Ignition switch “ON”) instead of running engine at idle speed.

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-141.

With GST

Follow the procedure “With CONSULT-II”.



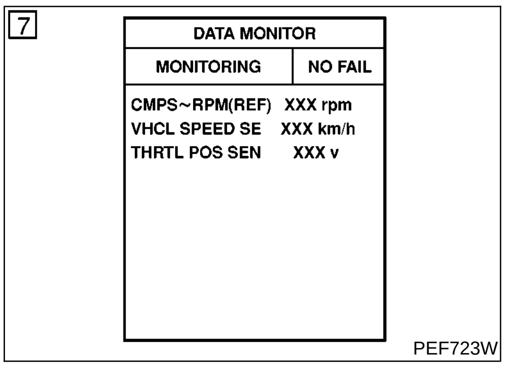
SEF998NB

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-141.
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-141.
   If OK, go to following step.
7) Maintain the following conditions for at least 10 consecutive seconds.



PEF723W

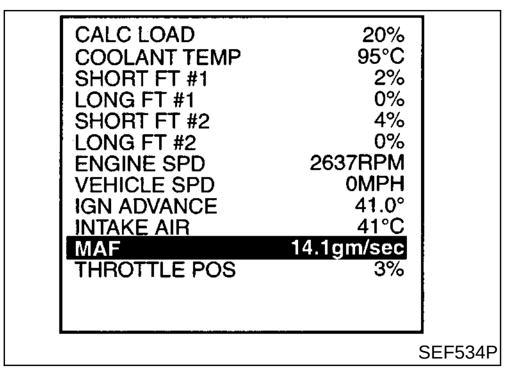
CMPS·RPM (REF)	More than 2,000 rpm
THRTL POS SEN	More than 3V
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

8) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-141.

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.



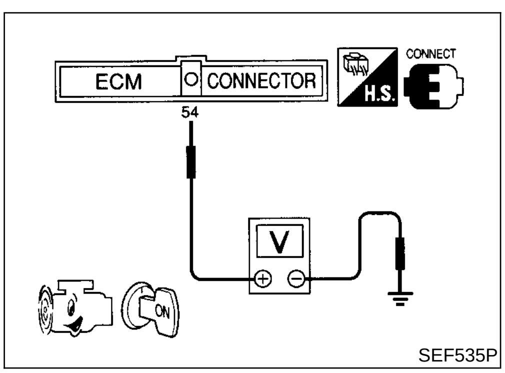
SEF534P

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-141.



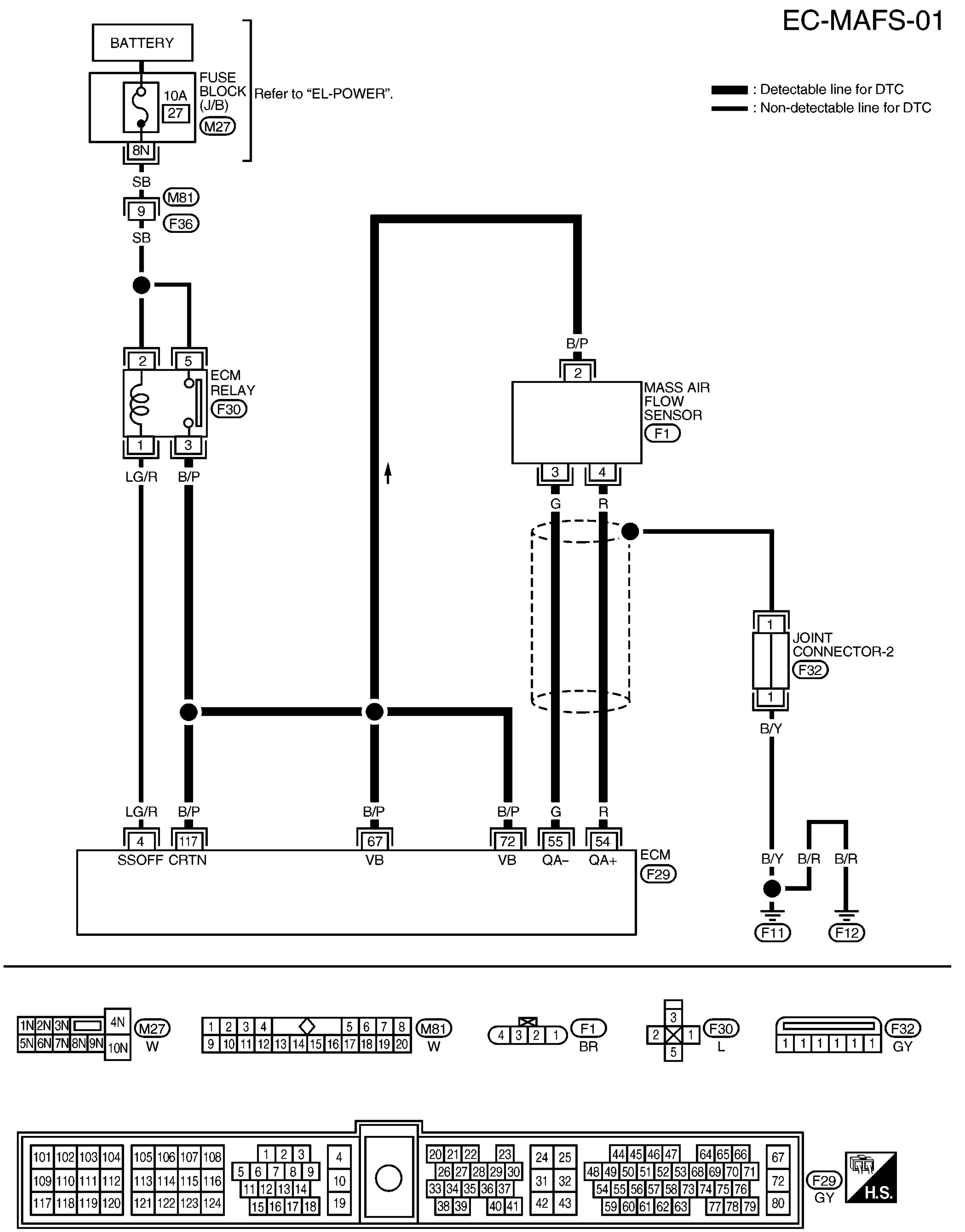
SEF535P

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-141.

Wiring Diagram

NGEC0056



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

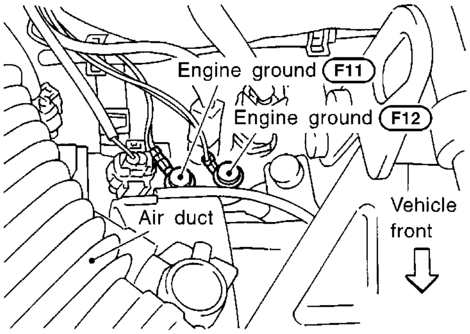
Check the followings for connection.
- Air duct
- Air cleaner
- Vacuum hoses
- Intake air passage between air duct to collector

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.

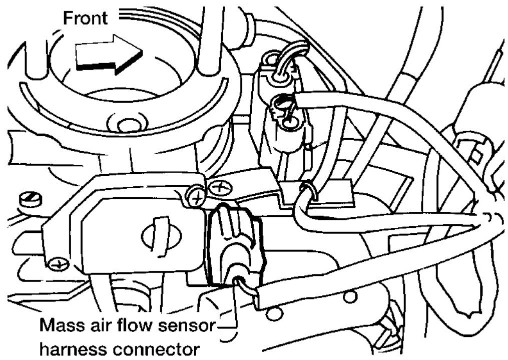


SEF325V

	▶	GO TO 4.

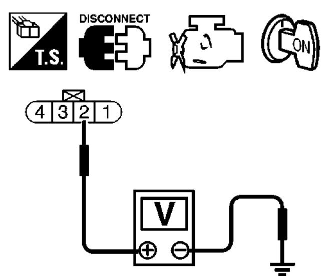
4	CHECK POWER SUPPLY

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

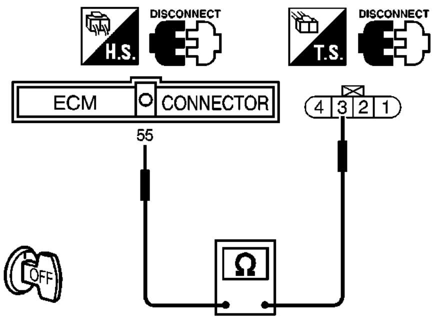
OK	▶	GO TO 6.
NG	▶	GO TO 5.

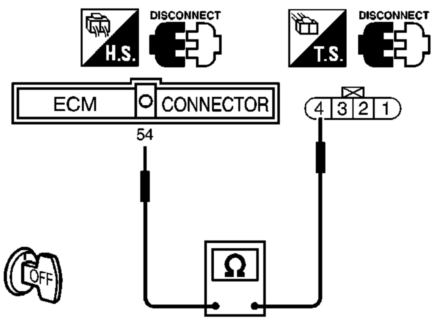
5	DETECT MALFUNCTIONING PART

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

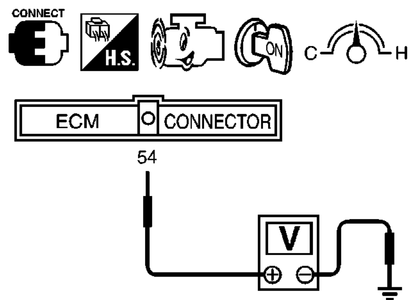
	▶	Repair harness or connectors.

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-140.  SEF124V **Continuity should exist.** 4. Also check harness for short to ground and short to power. **OK or NG**		
OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK INPUT SIGNAL CIRCUIT	
1. Check harness continuity between terminal 4 and ECM terminal 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.



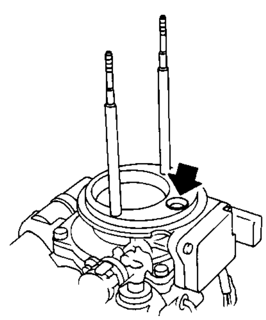
SEF326V

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.

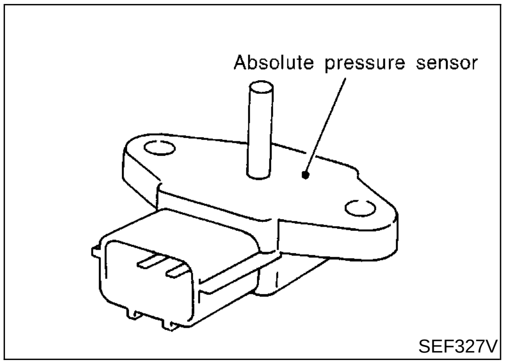
9	CHECK SHIELD CIRCUIT

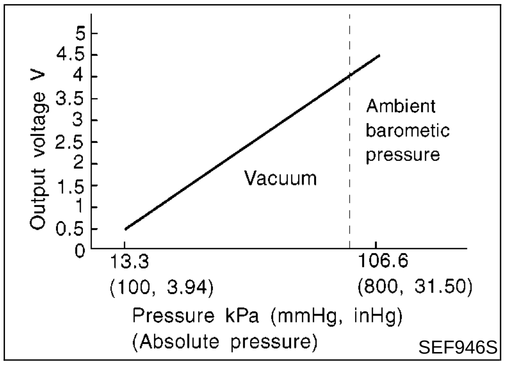
1. Turn ignition switch OFF.
2. Disconnect joint connector-2.
3. Check the following.
- Continuity between joint connector-2 terminal 1 and ground
- Joint connector-2
  (Refer to "HARNESS LAYOUT", ***EL-272***.)
  Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

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

10	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.	
▶	**INSPECTION END**





Component Description

NGEC0059

The absolute pressure sensor is connected to the MAP/BARO switch solenoid valve by a hose. The sensor detects ambient barometric pressure and intake manifold pressure and sends the voltage signal to the ECM. As the pressure increases, the voltage rises.

On Board Diagnosis Logic

NGEC0060

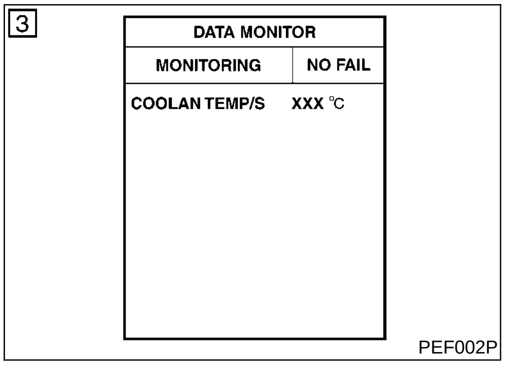
DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P0105 0803	A)	An excessively low or high voltage from the sensor is sent to ECM.	● Harness or connectors (Absolute pressure sensor circuit is open or shorted.) ● Absolute pressure sensor
	B)	A high voltage from the sensor is sent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

DTC Confirmation Procedure

=NGEC0061

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

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



PEF002P

PROCEDURE FOR MALFUNCTION A

NGEC0061S01

With CONSULT-II

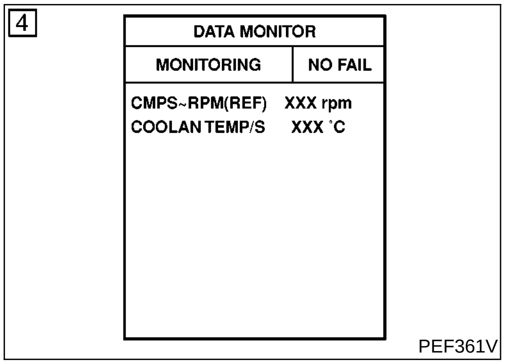
1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Wait at least 6 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-150.

With GST

1) Turn ignition switch ON and wait at least 6 seconds.
2) Select “MODE 7” with GST.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-150.

No Tools

1) Turn ignition switch ON and wait at least 6 seconds.
2) Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
3) Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-150.



PEF361V

PROCEDURE FOR MALFUNCTION B

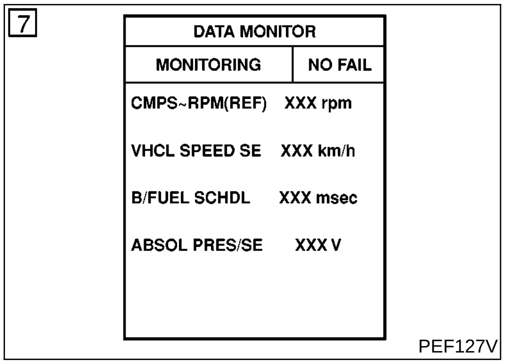
NGEC0061S02

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 “DATA MONITOR” mode with CONSULT-II.
4) Start engine and let it idle.
5) Wait at least 10 seconds.
6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-150.

With GST

Follow the procedure “With CONSULT-II”.



PEF127V

PROCEDURE FOR MALFUNCTION C

NGEC0061S03

CAUTION:

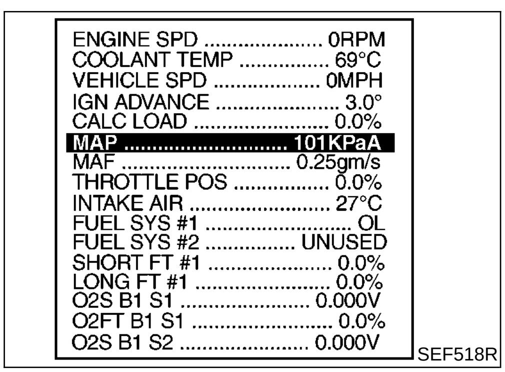
Always drive vehicle at a safe speed.

With CONSULT-II

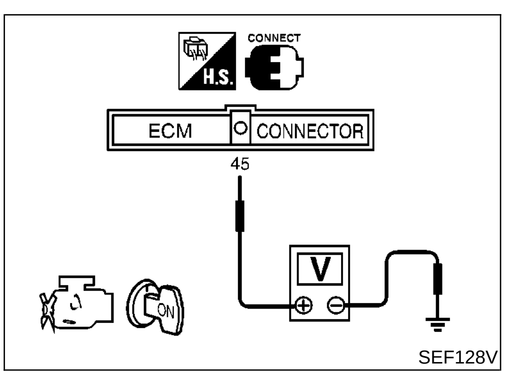
1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II and check "ABSOL PRES/SE" signal.
The voltage of "ABSOL PRES/SE" should be more than 1.74 [V].
If the check result is NG, go to "Diagnostic Procedure", EC-150.
If the check result is OK, go to following step.
3) Start engine and warm it up to normal operating temperature.
4) Turn ignition switch OFF and wait at least 5 seconds.
5) Start engine and let it idle for at least 10 seconds.
6) Select "DATA MONITOR" mode with CONSULT-II.
7) Drive the vehicle at least 3 consecutive seconds under the following conditions,

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

8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-150.



SEF518R



SEF128V

Overall Function Check

NGEC0062

PROCEDURE FOR MALFUNCTION C

NGEC0062S01

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

With GST

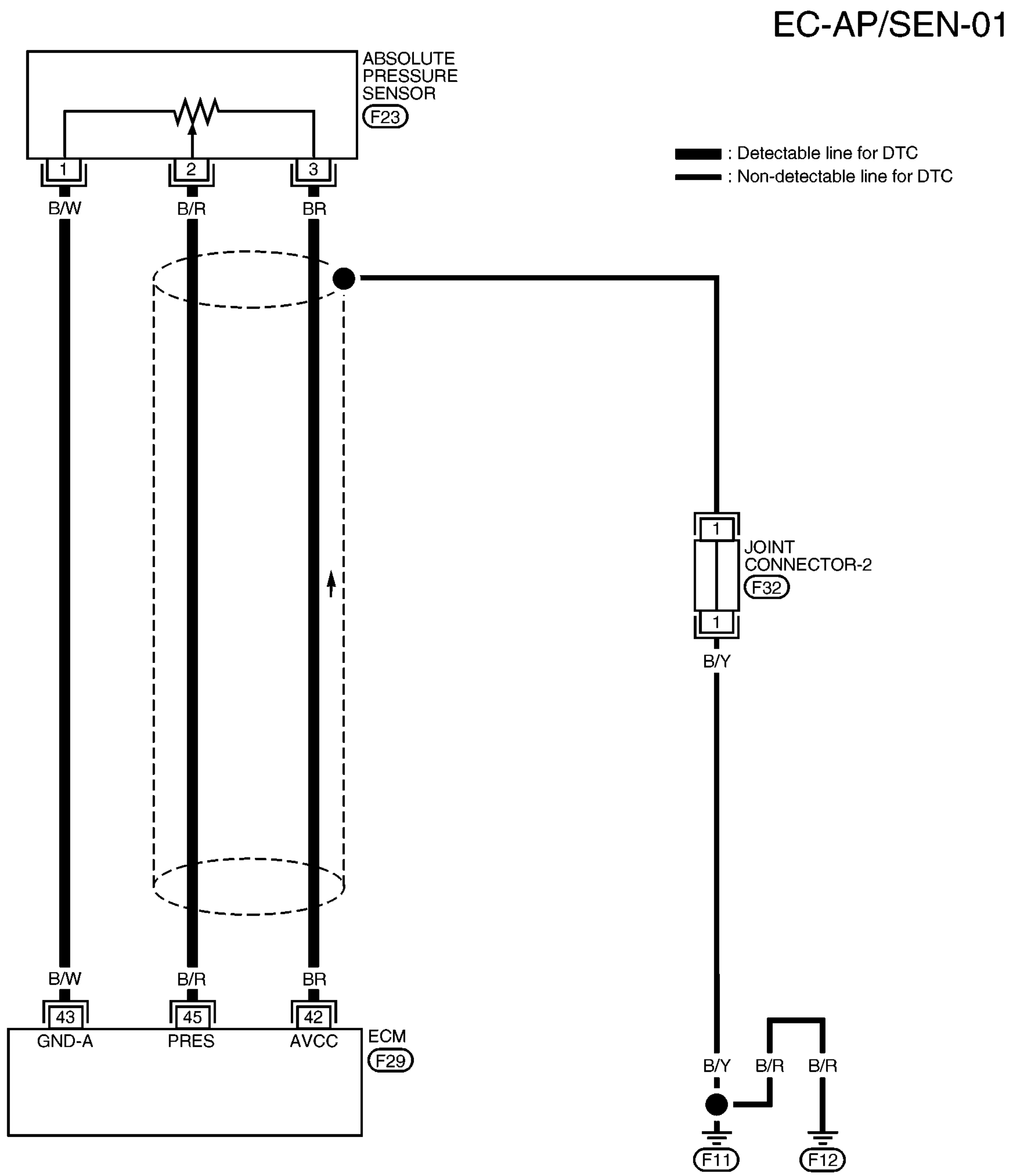
1) Turn ignition switch ON.
2) Select absolute pressure sensor signal in "MODE 1" with GST.
3) Make sure that the pressure of absolute pressure sensor signal is more than 46 kPa (0.47 kg/cm^2, 6.7 psi).
4) If NG, go to "Diagnostic Procedure", EC-150.

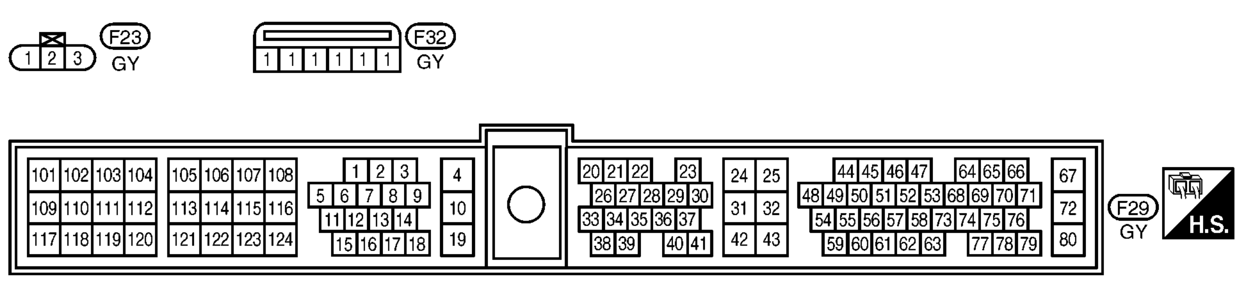
No Tools

1) Turn ignition switch ON.
2) Make sure that the voltage between ECM terminal 45 (Absolute pressure sensor signal) and ground is more than 1.74 [V].
3) If NG, go to "Diagnostic Procedure", EC-150.

Wiring Diagram

NGEC0063





AEC982A

Diagnostic Procedure

NGEC0064

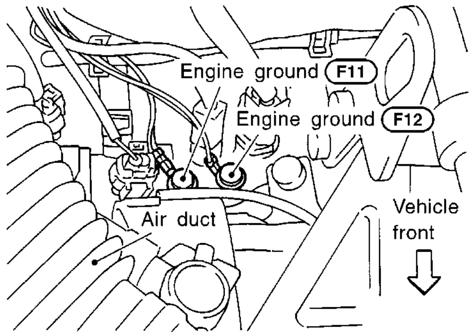
If the trouble is duplicated after "PROCEDURE FOR MALFUNCTION A or C", perform "PROCEDURE A" below. If the trouble is duplicated after "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE B" EC-154.

PROCEDURE A

NGEC0064S01

1	RETIGHTEN GROUND SCREWS

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

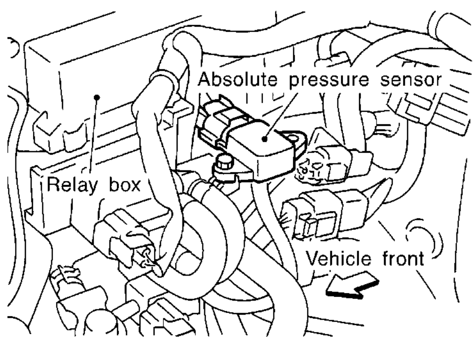


SEF325V

▶	GO TO 2.

2	CHECK CONNECTOR

1. Disconnect absolute pressure sensor harness connector.



SEF328V

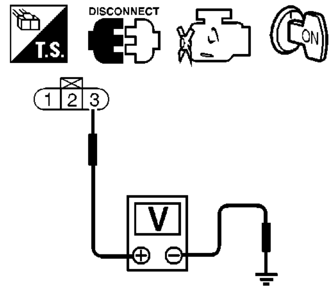
2. Check sensor harness connector for water.
   Water should not exist.

OK or NG

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

3	CHECK POWER SUPPLY

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



SEF095S

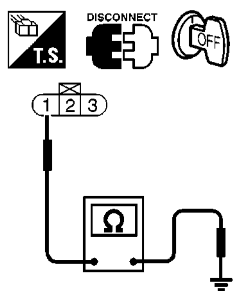
Voltage: Approximately 5V

OK or NG

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

4	CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check harness continuity between absolute pressure sensor terminal 1 and engine ground. Refer to EC-149.



SEF096S

Continuity should exist.

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

OK or NG

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

GI
MA
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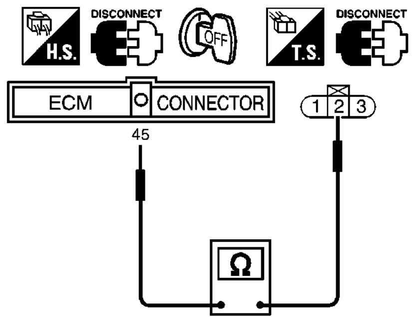
IDX

5	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM harness connector F29 terminal 45 and absolute pressure sensor harness connector F23 terminal 2.



SEF129V

Continuity should exist.

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

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

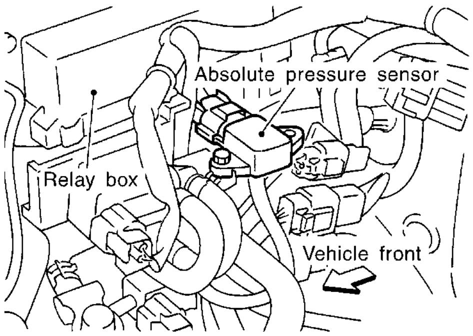
6	DETECT MALFUNCTIONING PART

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

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

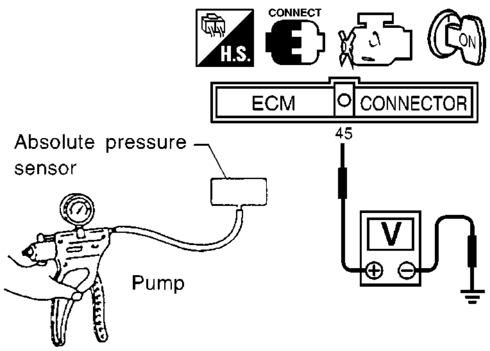
7	CHECK ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.



SEF328V

2. Remove hose from absolute pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM harness connector terminal 45 (Absolute pressure sensor signal) and engine ground.



SEF132V

The voltage should be 3.2 to 4.8V.

4. Use pump to apply vacuum of −26.7 kPa (−200 mmHg, −7.87 inHg) to absolute pressure sensor as shown in figure and check the output voltage.
   The voltage should be 1.0 to 1.4V lower than the value measured in step 3.
   CAUTION:
   - **Always calibrate the vacuum pump gauge when using it.**
   - **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

OK or NG

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

8	CHECK SHIELD CIRCUIT

1. Turn ignition switch OFF.
2. Remove joint connector-2.
3. Check the following.
- Continuity between joint connector-2 terminal 1 and ground
- Joint connector-2
  (Refer to "HARNESS LAYOUT" ***EL-263***.)
  Continuity should exist.
4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector-2.

OK or NG

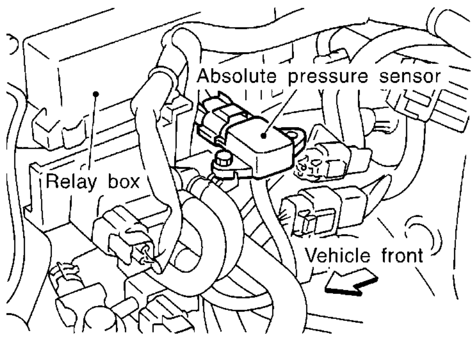
OK	▶	GO TO 9.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.	
▶	INSPECTION END

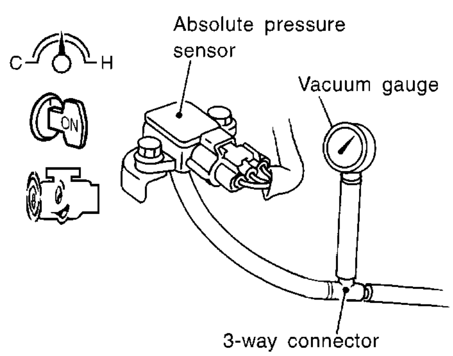
PROCEDURE B

NGEC0064S02

1	INSPECTION START
1. Start engine and warm it up to normal operating temperature. 2. Turn ignition switch OFF. 3. Connect MAP/BARO switch solenoid valve and absolute pressure sensor with a rubber tube that has a vacuum gauge.	



SEF328V



SEF385U

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

2 CHECK VACUUM SOURCE TO ABSOLUTE PRESSURE SENSOR

(With CONSULT-II)

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

ACTIVE TEST	
MAP/BARO SW/V	MAP
MONITOR	
CMPS~RPM (REF)	XXX rpm
MAP/BARO SW/V	MAP
ABSOL PRES/SE	XXX V

ACTIVE TEST	
MAP/BARO SW/V	BARO
MONITOR	
CMPS~RPM (REF)	XXX rpm
MAP/BARO SW/V	BARO
ABSOL PRES/SE	XXX V

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

SEF174X

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 4.

3 CHECK VACUUM SOURCE TO ABSOLUTE PRESSURE SENSOR

(Without CONSULT-II)

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

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

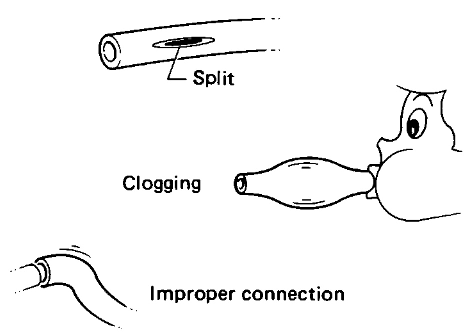
MTBL0080

OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 4.

4 CHECK VACUUM HOSE

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



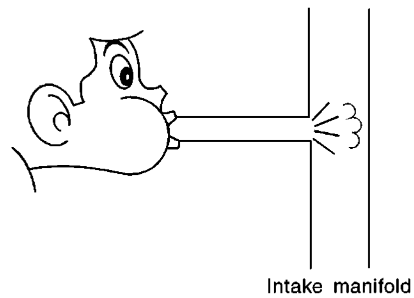
SEF109L

OK or NG

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

5	CHECK VACUUM PORT

Check vacuum port for clogging.



SEF368U

OK or NG

OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Clean or repair the vacuum port.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

6	CHECK MAP/BARO SWITCH SOLENOID VALVE

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Perform "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT-II.
3. Check the following.

- Condition: At idle under no-load
- CONSULT-II display
- Time for voltage to change

ACTIVE TEST	
MAP/BARO SW/V	MAP
MONITOR	
CMPS~RPM (REF)	XXX rpm
MAP/BARO SW/V	MAP
ABSOL PRES/SE	XXX V

MAP/BARO	AVSOL PRES/SE (Voltage)
BARO	More than 2.6V
MAP	Less than the voltage at BARO

ACTIVE TEST	
MAP/BARO SW/V	BARO
MONITOR	
CMPS~RPM (REF)	XXX rpm
MAP/BARO SW/V	BARO
ABSOL PRES/SE	XXX V

MAP/BARO SW/V	Required time to switch
BARO to MAP	Less than 1 second
MAP to BARO	

SEF170X

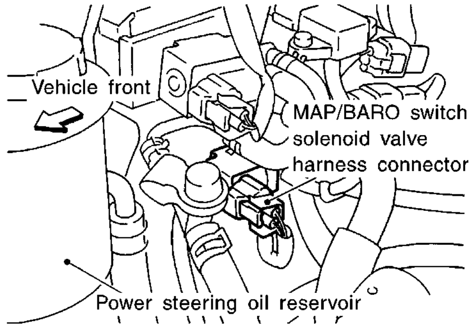
OK or NG

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

7	CHECK MAP/BARO SWITCH SOLENOID VALVE

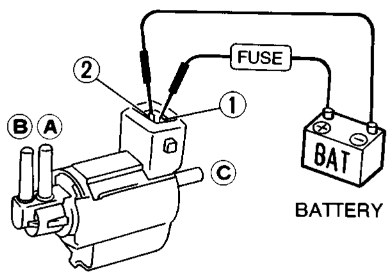
Without CONSULT-II

1. Turn ignition switch OFF and remove MAP/BARO switch solenoid valve.



SEF338V

2. Check air passage continuity.



MEC488B

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

3. Check the time required for the solenoid valve to switch. It should be less than 1 second.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace MAP/BARO switch solenoid valve.

8	CHECK INTAKE SYSTEM

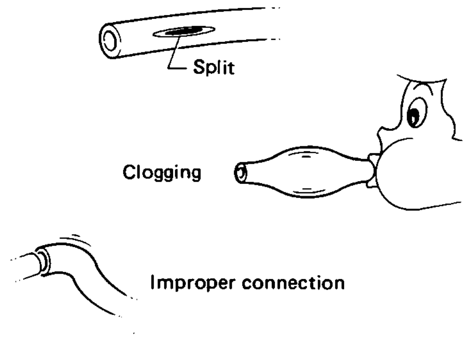
Check intake system for air leaks.

OK or NG

OK	▶	GO TO 12.
NG	▶	Repair it.

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

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



SEF109L

OK or NG

OK	▶	GO TO 10.
NG	▶	Repair or reconnect hose.

10	CHECK HARNESS CONNECTOR

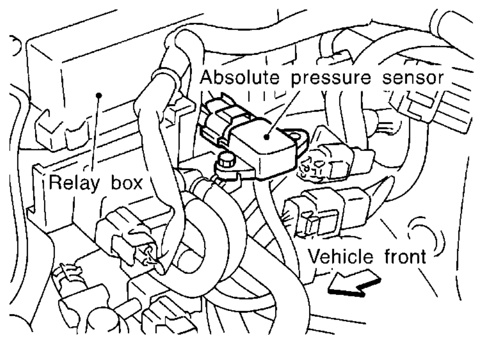
1. Disconnect absolute pressure sensor harness connector.
2. Check sensor harness connector for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 11.
NG	▶	Repair or replace harness connector.

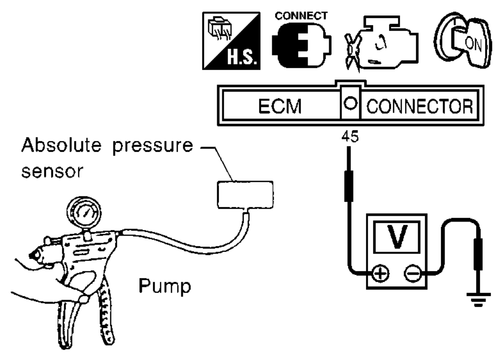
11	CHECK ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.



SEF328V

2. Remove hose from absolute pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 45 (Absolute pressure sensor signal) and engine ground.



SEF132V

   The voltage should be 3.2 to 4.8V.
4. Use pump to apply vacuum of −26.7 kPa (−200 mmHg, −7.87 inHg) to absolute pressure sensor as shown in figure and check the output voltage.
   The voltage should be 1.0 to 1.4V lower than the value measured in step 3.
   CAUTION:
   - **Always calibrate the vacuum pump gauge when using it.**
   - **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace absolute pressure sensor.

12	CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-128.

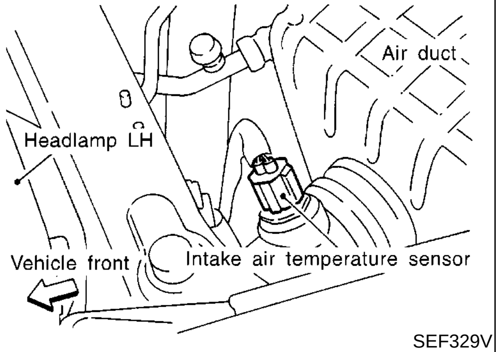
	▶	**INSPECTION END**

Component Description

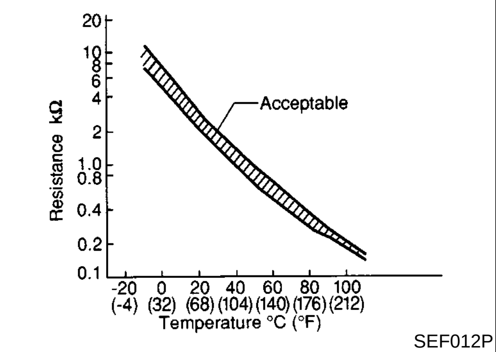
NGEC0066

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.



SEF329V



SEF012P

<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 ECM terminal 32 (ECM ground).

On Board Diagnosis Logic

NGEC0067

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

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

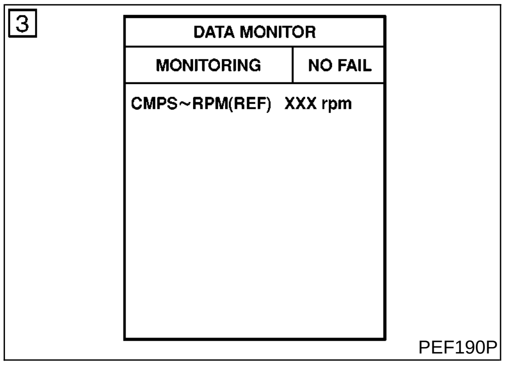
DTC Confirmation Procedure

=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.



PEF190P

PROCEDURE FOR MALFUNCTION A

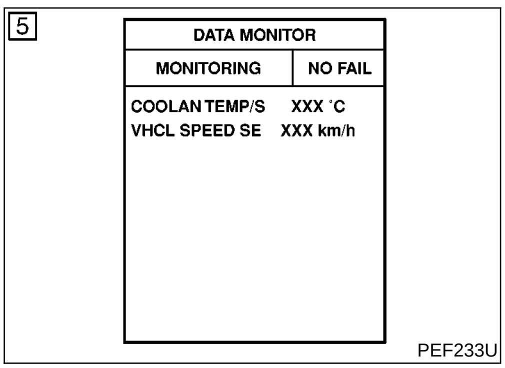
NGEC0068S01

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-164.

With GST

Follow the procedure “With CONSULT-II”.



PEF233U

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

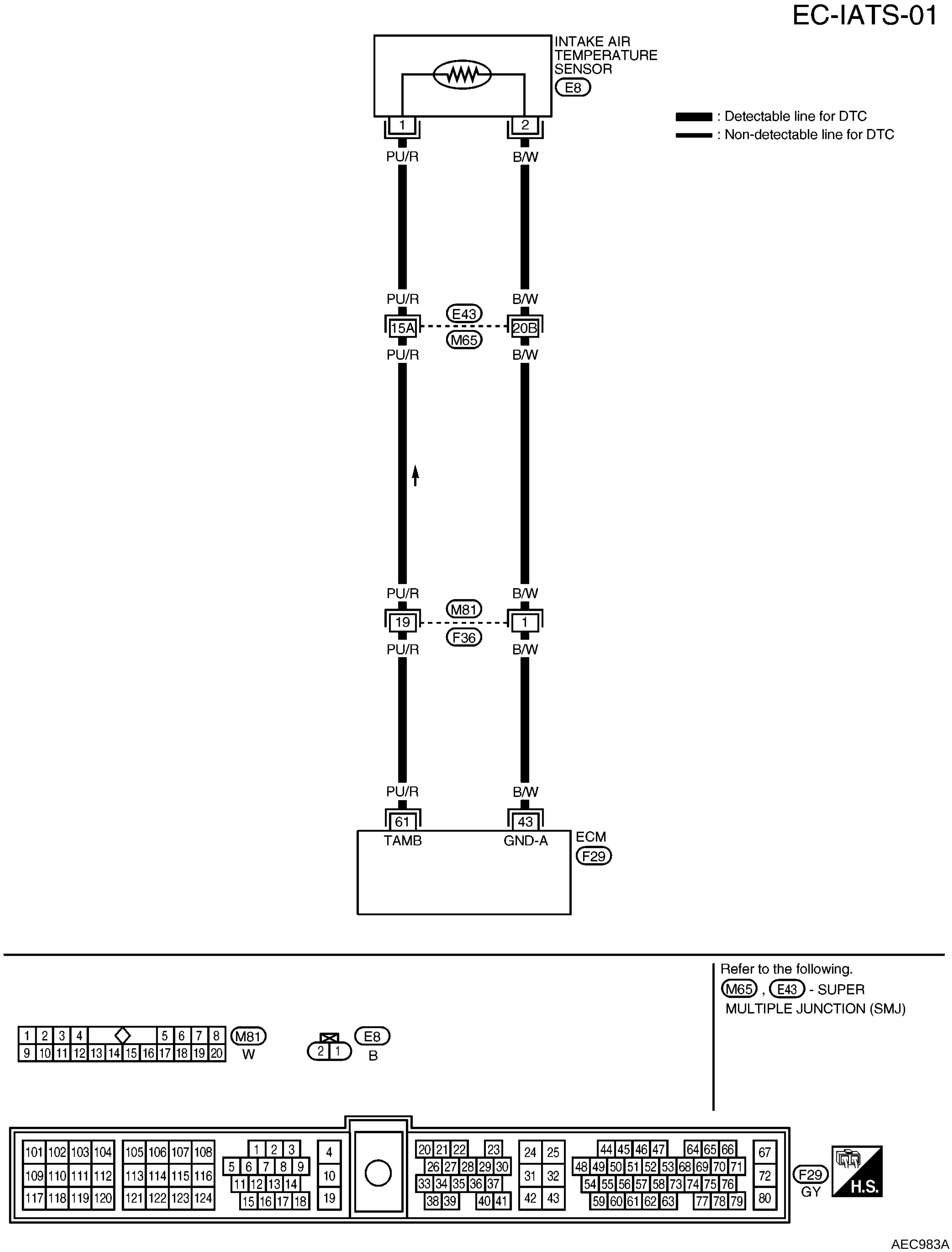
1) Wait until engine coolant temperature is less than 90°C (194°F).
a) Turn ignition switch ON.
b) Select “DATA MONITOR” mode with CONSULT-II.
c) Check the engine coolant temperature.
d) If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch “OFF” and cool down engine.
- 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 (44 MPH) for 105 consecutive seconds.
6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-164.

With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0069

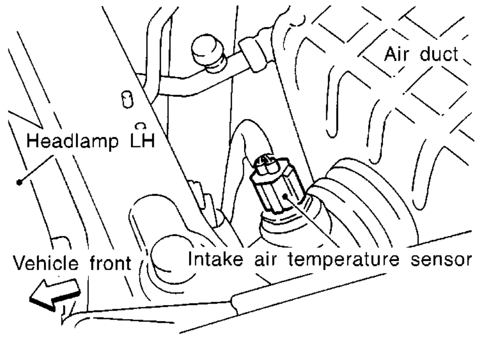


Diagnostic Procedure

NGEC0070

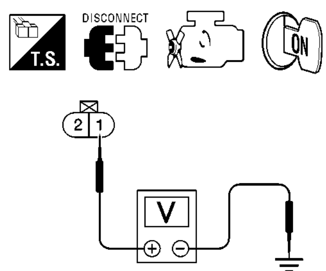
1 CHECK POWER SUPPLY

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.

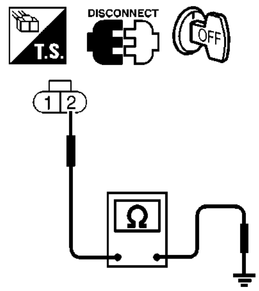
2 DETECT MALFUNCTIONING PART

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.

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 ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

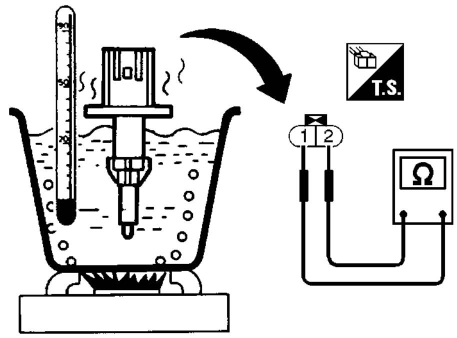
4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors 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.



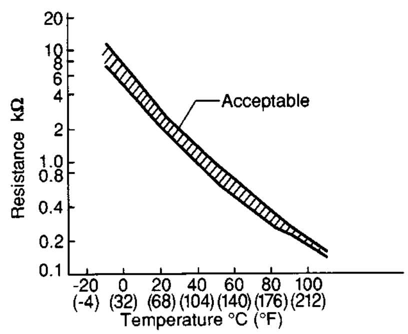
SEF205W

<Reference data>

EGR coolant temperature °C (°F)	Voltage* V	Resistance 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 ECM terminal 32 (ECM ground).

MTBL0327



SEF012P

OK or NG

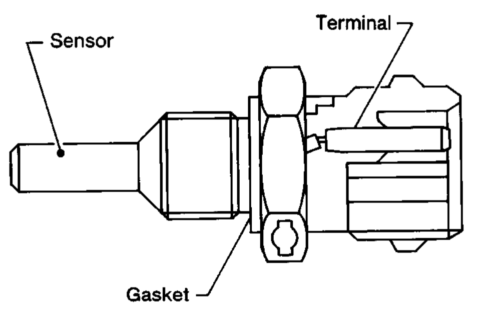
OK	▶	GO TO 6.
NG	▶	Replace intake air temperature sensor.

6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

	▶	**INSPECTION END**

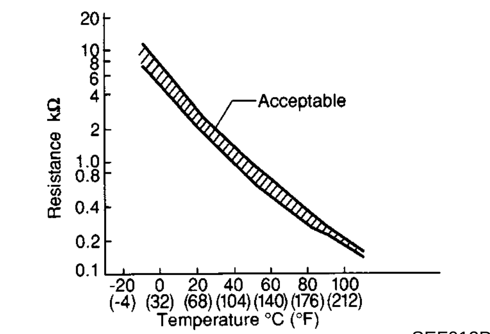
Component Description



SEF594K

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.



SEF012P

<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 ECM terminal 32 (ECM 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)

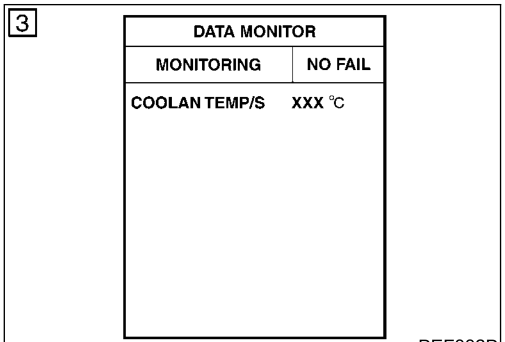
On Board Diagnosis Logic

NGEC0074

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

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

<table>
<tr><th>Detected items</th><th colspan="2">Engine operating condition in fail-safe mode</th></tr>
<tr><td rowspan="5">Engine coolant temperature sensor circuit</td><td colspan="2">Engine coolant temperature will be determined by ECM based on the time after turning ignition switch to ON or START.
CONSULT-II displays the engine coolant temperature decided by ECM.</td></tr>
<tr><td>Condition</td><td>Engine coolant temperature decided (CONSULT-II display)</td></tr>
<tr><td>Just as ignition switch is turned to ON or Start</td><td>40°C (104°F)</td></tr>
<tr><td>More than approx. 4 minutes after ignition ON or Start</td><td>80°C (176°F)</td></tr>
<tr><td>Except as shown above</td><td>40 - 80°C (104 - 176°F)
(Depends on the time)</td></tr>
</table>



PEF002P

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

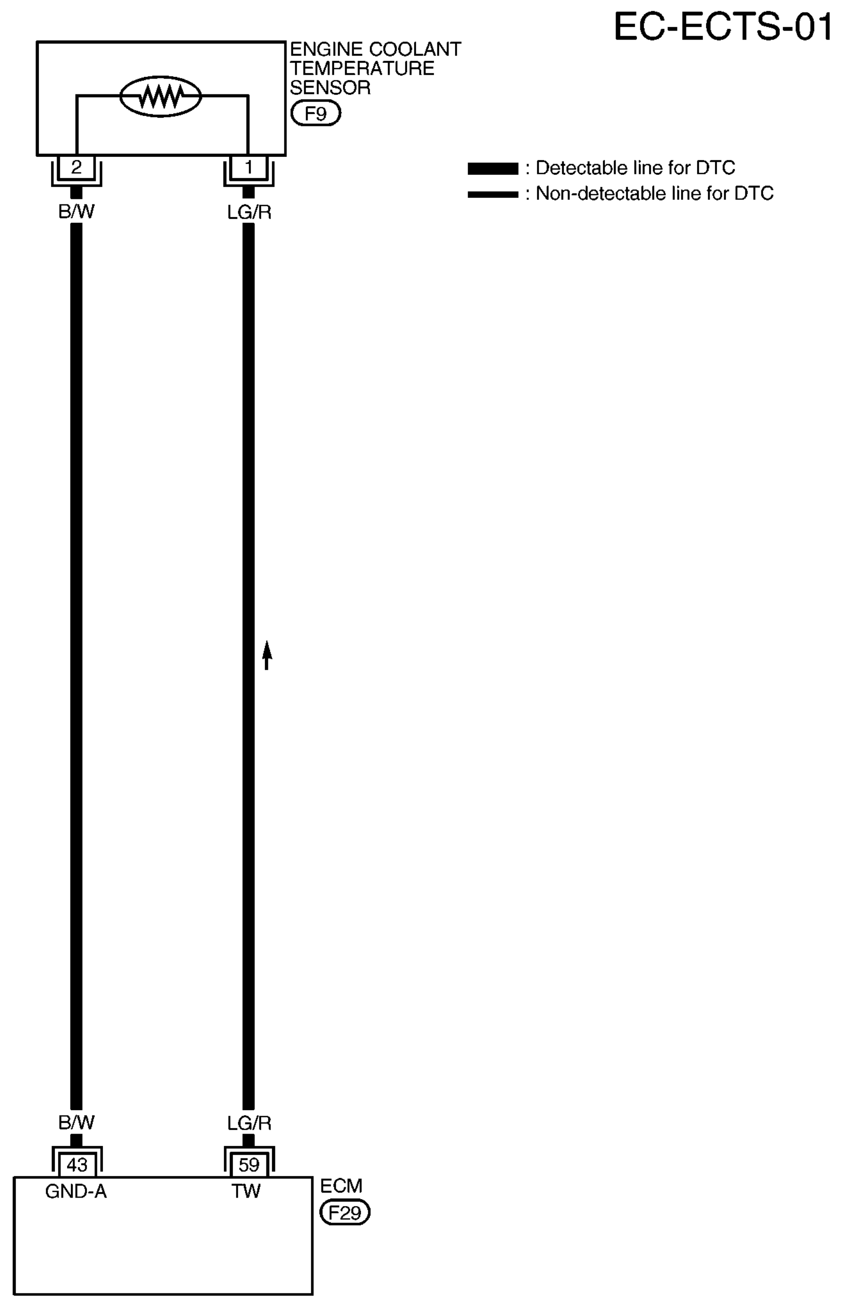
1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-170.

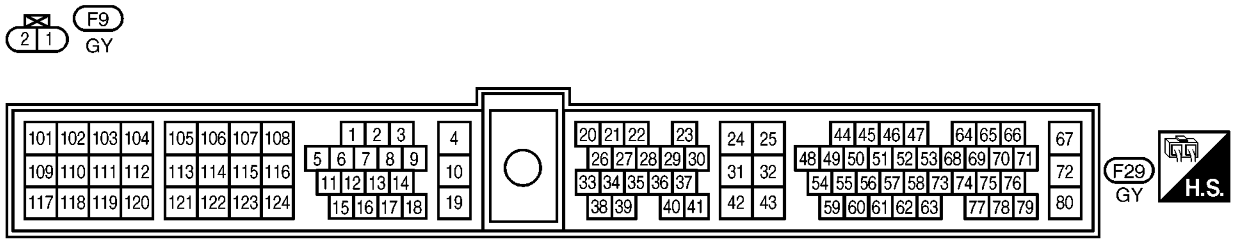
With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0076





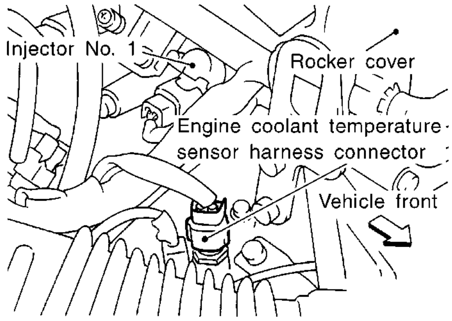
AEC984A

Diagnostic Procedure

NGEC0077

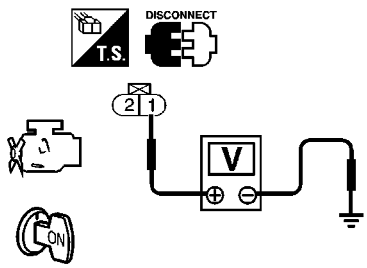
1	CHECK POWER SUPPLY

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-141***.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

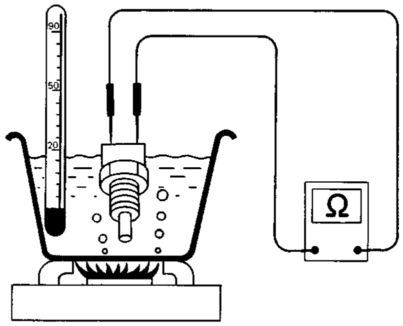
4	DETECT MALFUNCTIONING PART

Check the harness for open or short between 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.

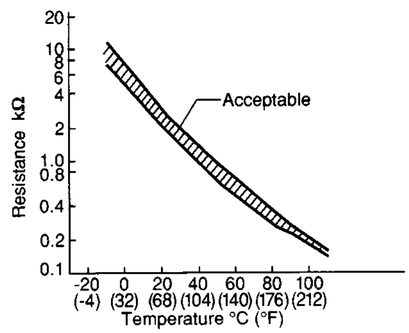


SEF152P

<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 INTERMITTENT INCIDENT**

Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-128.

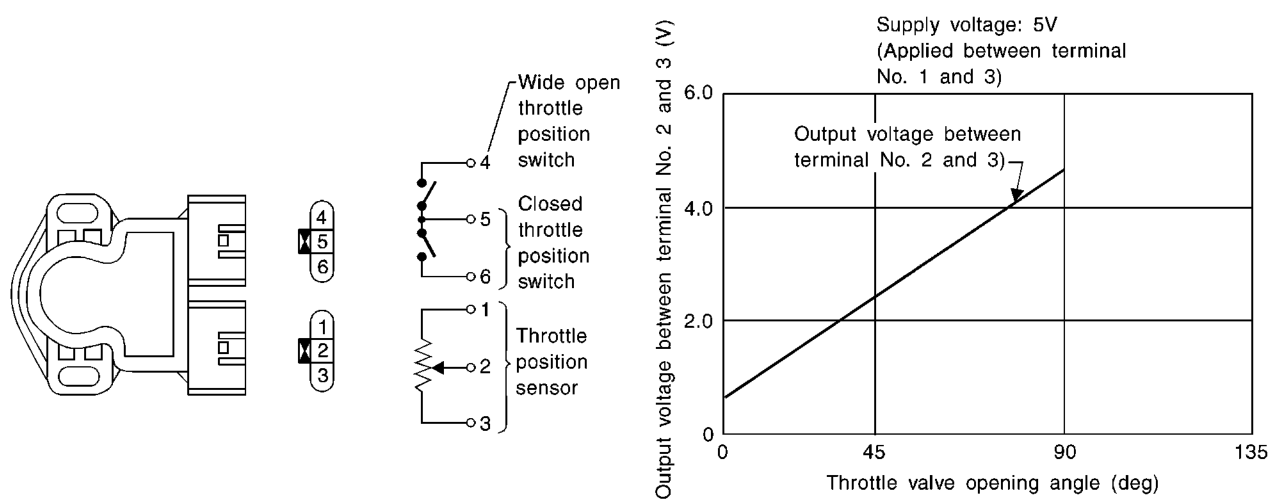
	▶	**INSPECTION END**

Component Description

NGEC0079

NOTE:
If DTC P0120 (0403) is displayed with DTC P0510 (0203), first perform trouble diagnosis for DTC P0510, EC-422.

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.



SEF105S

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 43 (ECM 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 0403	A)	An excessively low or high voltage from the sensor is sent to ECM.*	● Harness or connectors (The throttle position sensor circuit is open or shorted.) ● Throttle position sensor
	B)	A high voltage from the sensor is sent to ECM under light load driving condition.	● Harness or connectors (The throttle position sensor circuit is open or shorted.) ● Throttle position sensor ● Fuel injector ● Camshaft position sensor ● Mass air flow sensor
	C)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	● Harness or connectors (The throttle position sensor circuit is open or shorted.) ● Intake air leaks ● Throttle position sensor

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

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

DTC Confirmation Procedure

=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 MAL-FUNCTION 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

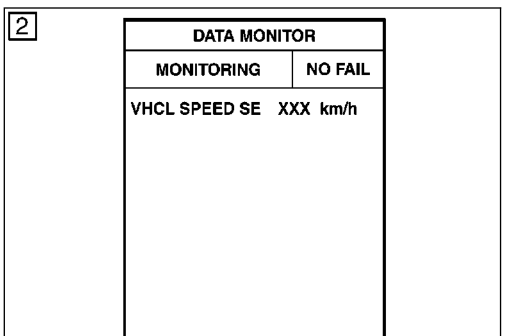
NGEC0083S01

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.**



PEF651U

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-178.

With GST

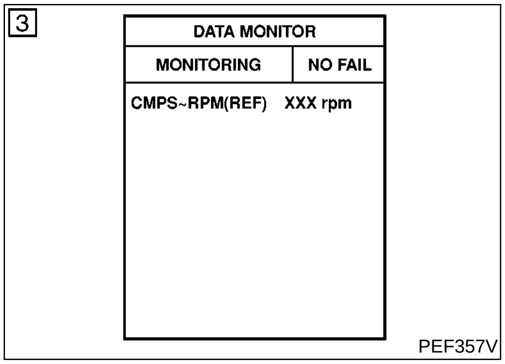
Follow the procedure "With CONSULT-II".

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-178.



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-178.

With GST

Follow the procedure "With CONSULT-II".

No Tools

1) 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

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-178.

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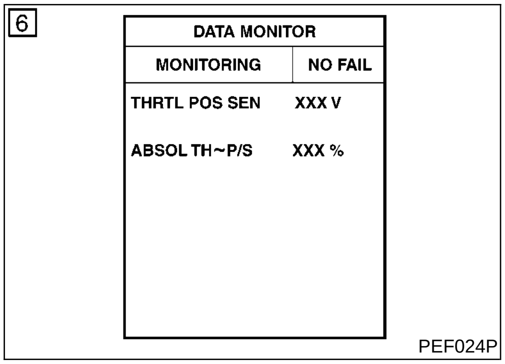
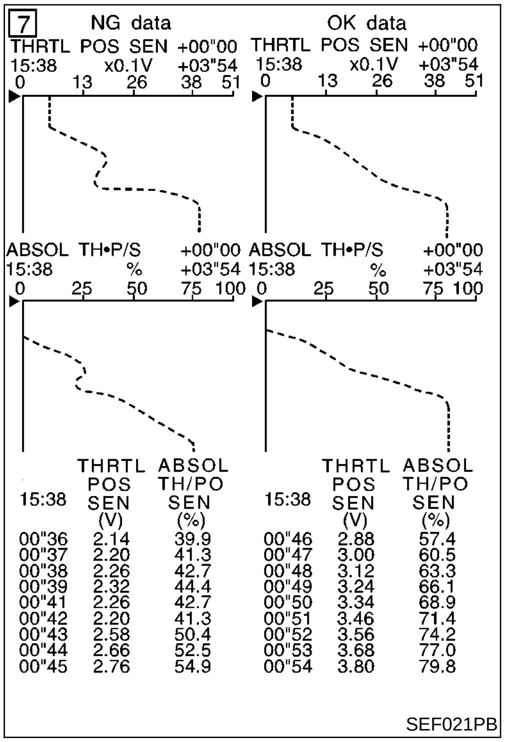
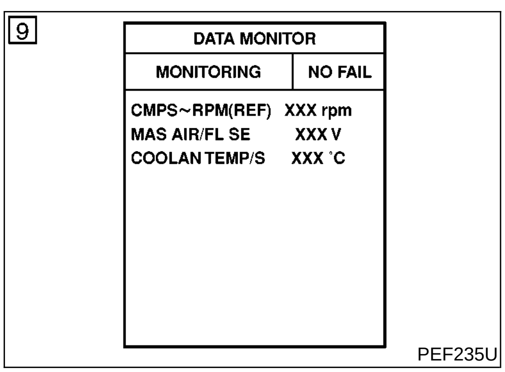






PROCEDURE FOR MALFUNCTION C

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-178.
   If OK, go to following step.
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)
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-178.

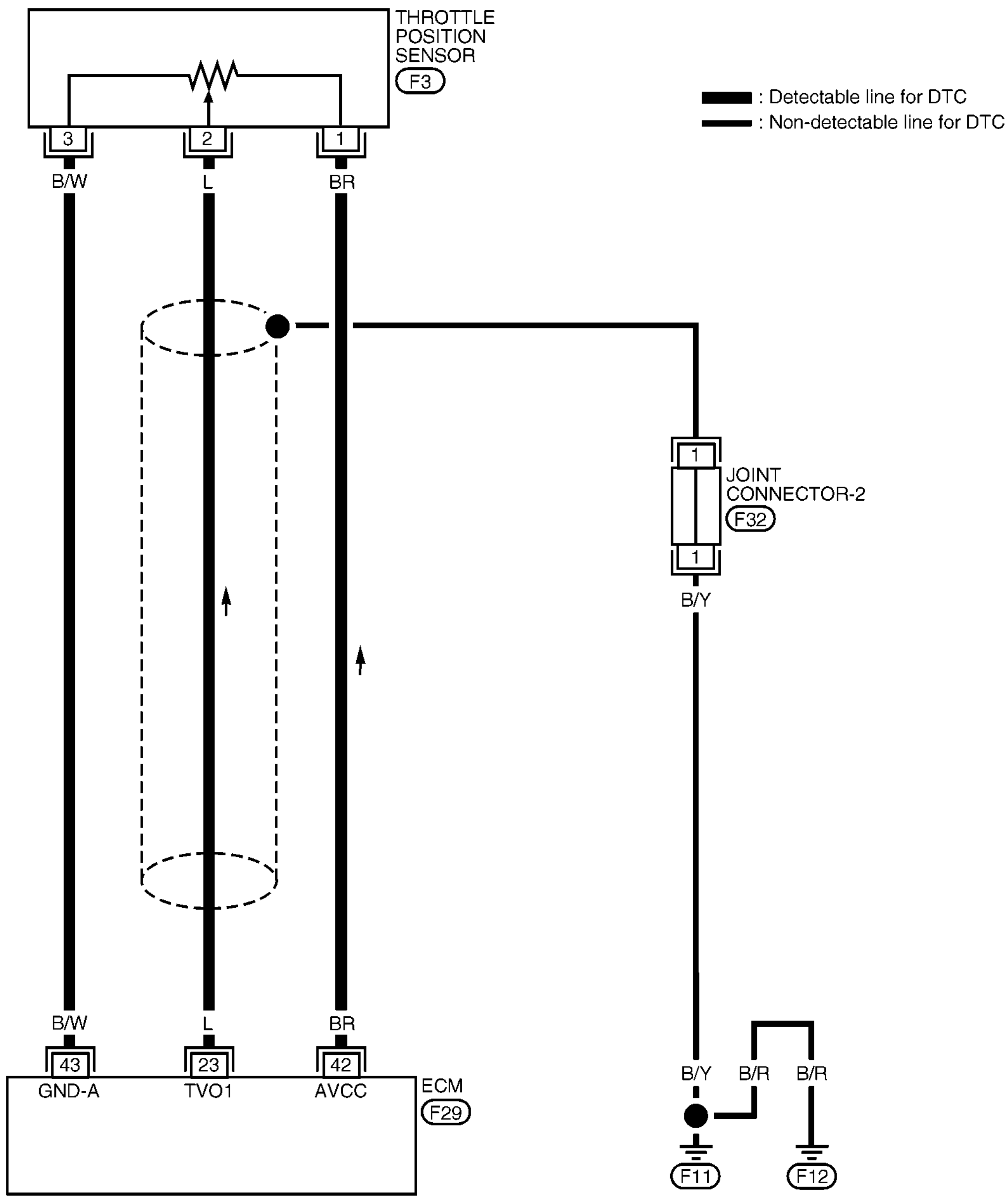
With GST

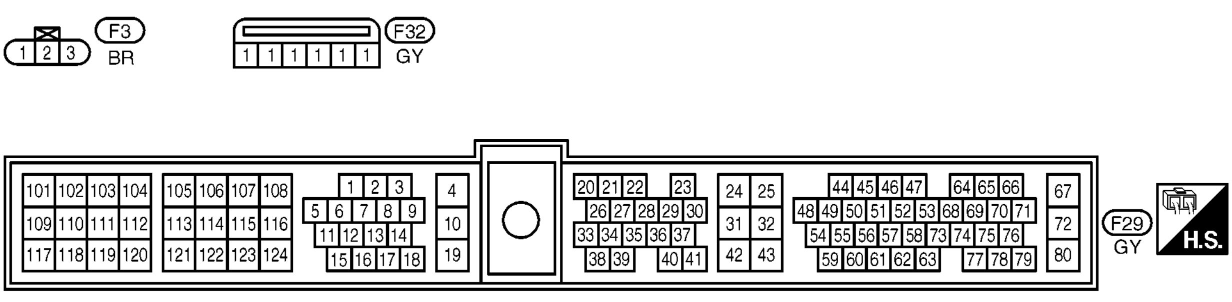
Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0084

EC-TPS-01





AEC985A

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-95.

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.

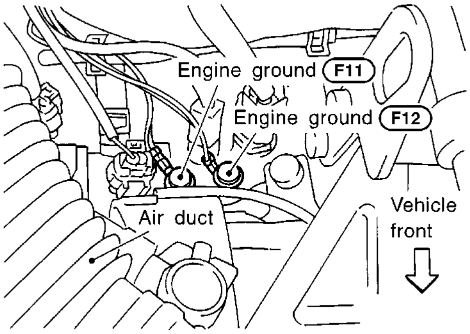
3	CHECK INTAKE SYSTEM

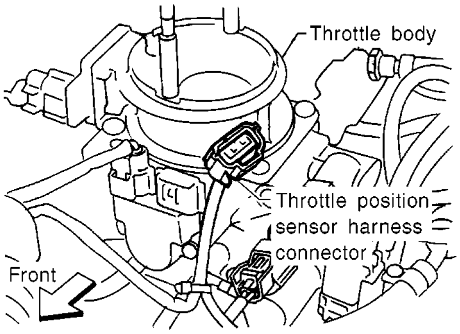
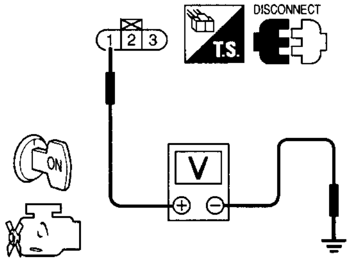
Check the following for connection.

- Air duct
- Air cleaner
- Vacuum hoses
- Intake air passage between air duct to intake manifold collector

OK or NG

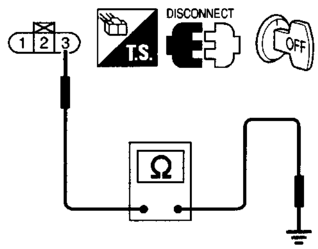
OK	▶	GO TO 4.
NG	▶	Reconnect the parts.

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 ground and short to power.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

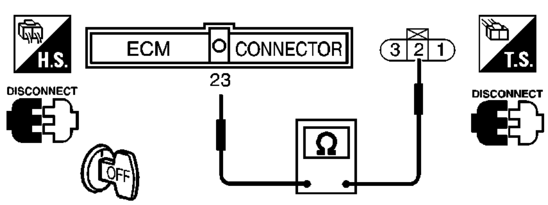
7	DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between ECM and throttle position sensor

	▶	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.

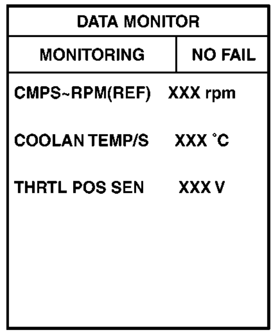
3. Also check harness for short to ground and short to power.

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.

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.



PEF765W

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

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

MTBL0329

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-95.

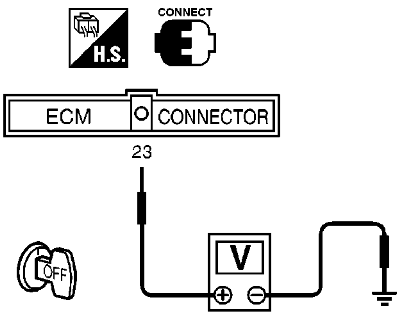
OK or NG

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-95.

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	0.15 - 0.85 (a)
Partially open	Between (a) and (b)
Completely open	3.5 - 4.7 (b)

MTBL0329

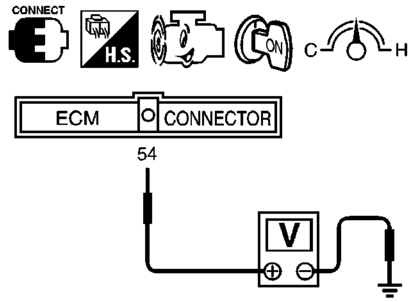
If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-95.

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-95.

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.



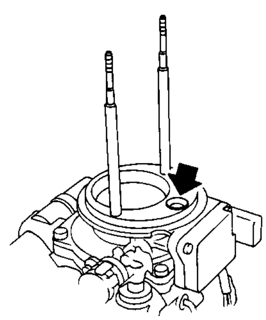
SEF326V

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.



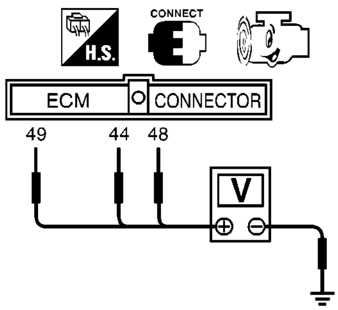
SEF893J

OK or NG

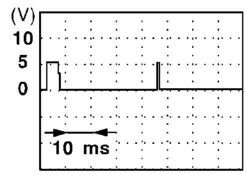
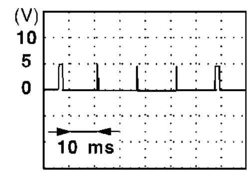
OK	▶	GO TO 12.
NG	▶	Replace mass air flow sensor.

12	CHECK CAMSHAFT POSITION SENSOR

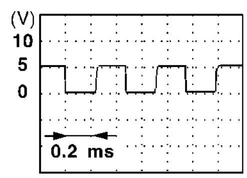
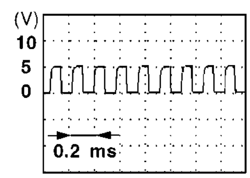
1. Start engine and warm it up to normal operating temperature.
2. Check voltage between ECM terminals 49 and engine ground, ECM terminal 44 or 48 and ground.



Terminal 44 or 48 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		

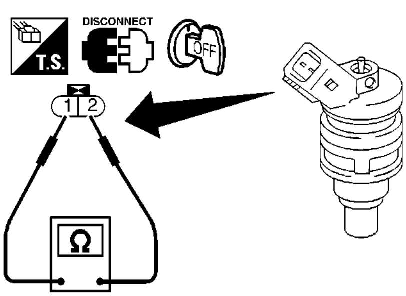
SEF893W

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)]

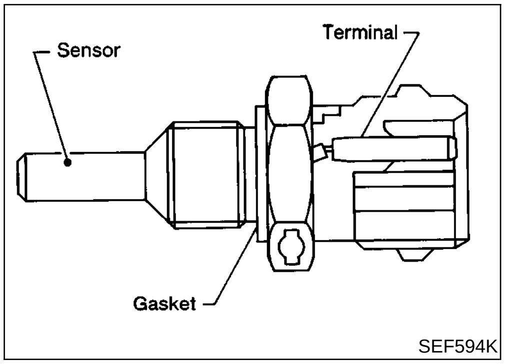
OK or NG

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

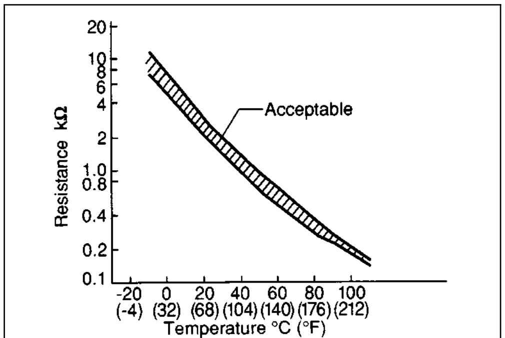
14	CHECK SHIELD CIRCUIT	
1. Turn ignition switch OFF. 2. Remove joint connector-2. 3. Check the following. ● Continuity between joint connector-2 terminal 1 and ground ● Joint connector-2 (Refer to "HARNESS LAYOUT", ***EL-263***.) **Continuity should exist.** 4. Also check harness for short to ground and short to power. 5. Then reconnect joint connector. **OK or NG**		
OK	▶	GO TO 15.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

15	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.		
	▶	**INSPECTION END**

DTC P0125 ENGINE COOLANT TEMPERATURE (ECT) SENSOR



SEF594K



SEF012P

Component Description

NGEC0087

NOTE:

If DTC P0125 (0908) is displayed with P0115 (0103), first perform trouble diagnosis for DTC P0115, EC-167.

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>

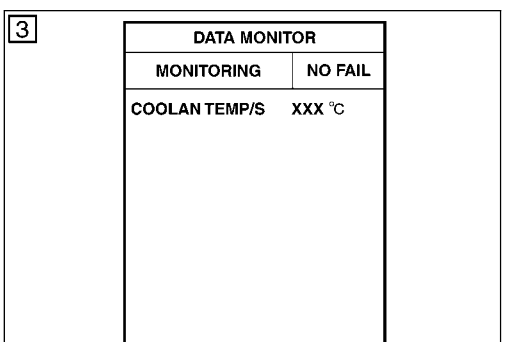
Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
−10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 59 (Engine coolant temperature sensor) and ECM terminal 32 (ECM ground).

On Board Diagnosis Logic

NGEC0089

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



PEF002P

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

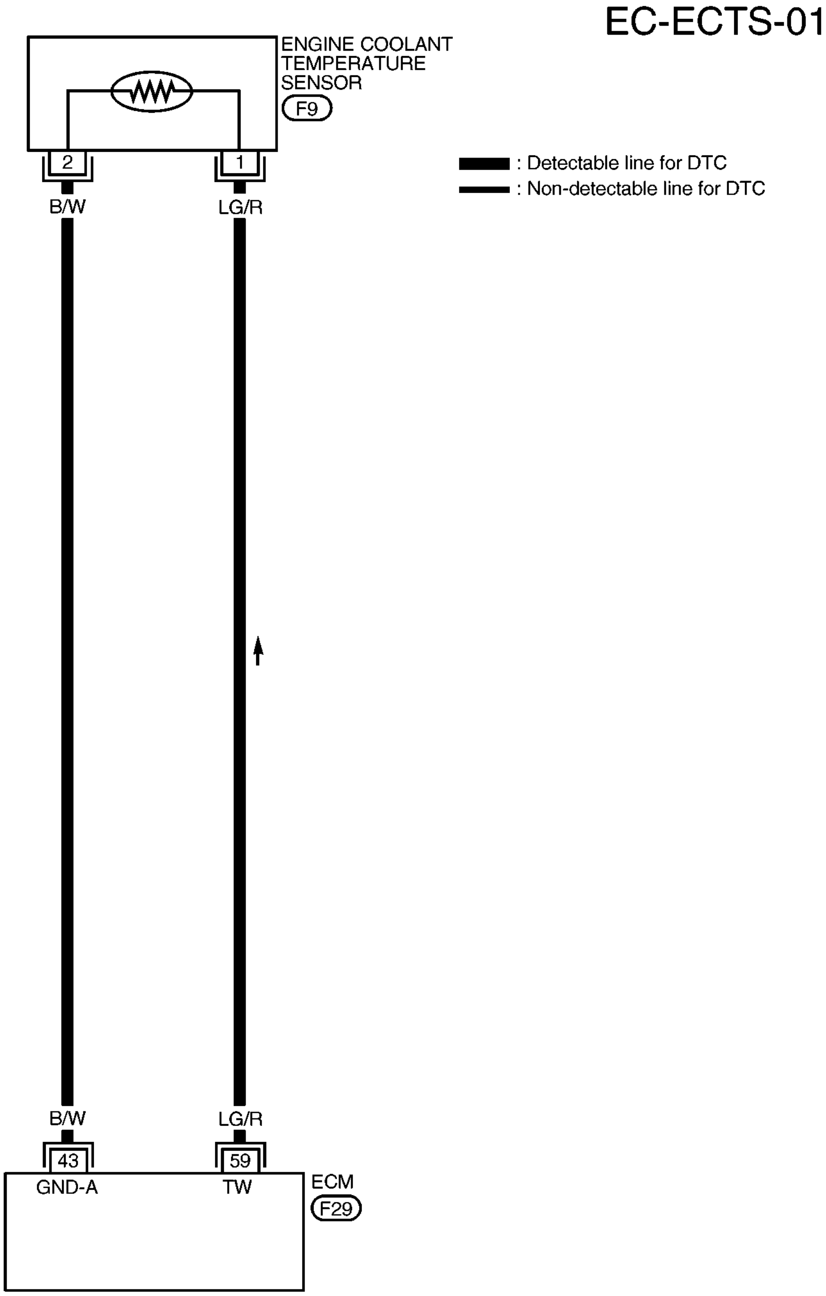
1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and run it for 65 minutes at idle speed.
   If “COOLAN TEMP/S” increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-188.

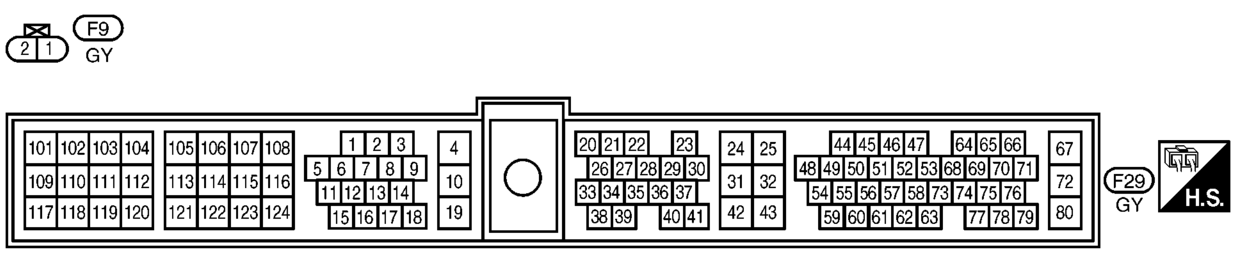
With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0091





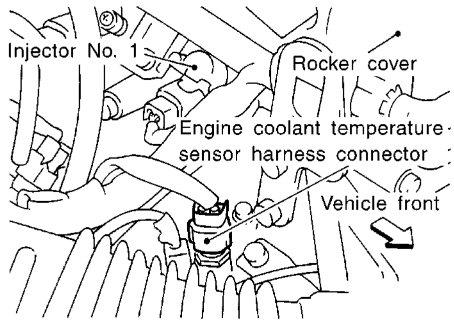
AEC984A

Diagnostic Procedure

NGEC0092

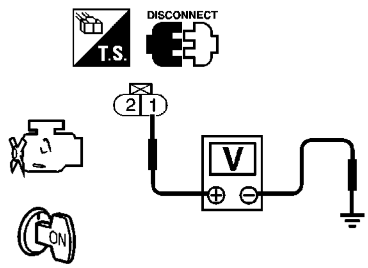
1	CHECK POWER SUPPLY

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 ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

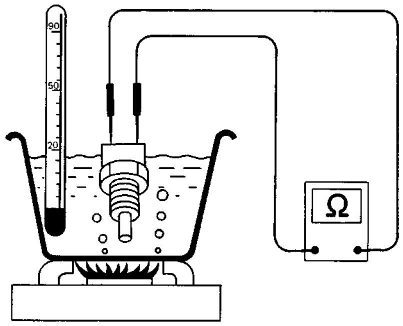
4	DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM and 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.

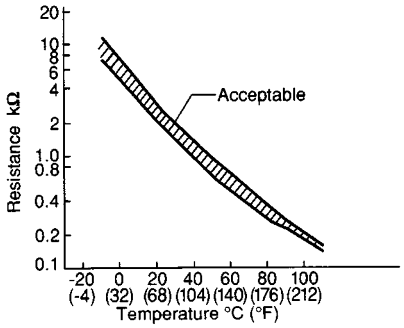


SEF152P

<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.

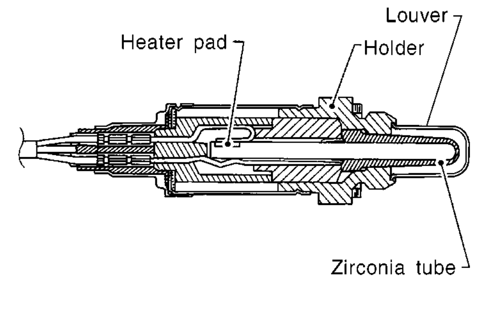
OK or NG

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

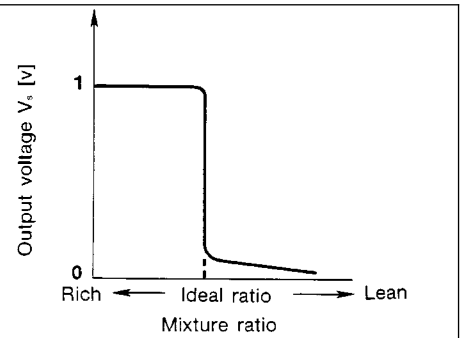
7	CHECK INTERMITTENT INCIDENT

Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-128.

	▶	**INSPECTION END**



SEF463R



SEF288D

Component Description

NGEC0094

The front heated oxygen sensor is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The front heated oxygen sensor has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The front heated oxygen sensor signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0095

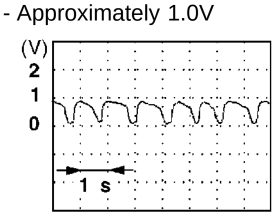
Specification data are reference values.

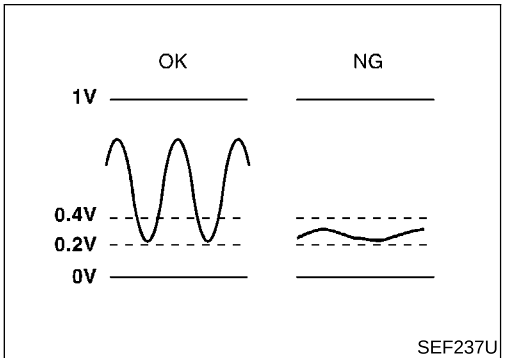
MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SENSOR	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
FR O2 MNTR			LEAN ←→ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NGEC0096

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

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



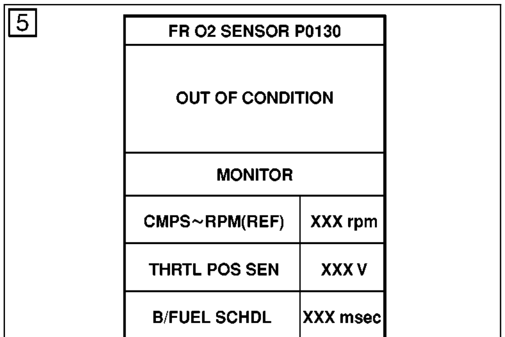
SEF237U

On Board Diagnosis Logic

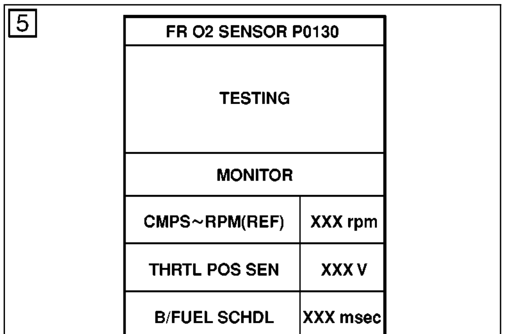
NGEC0097

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

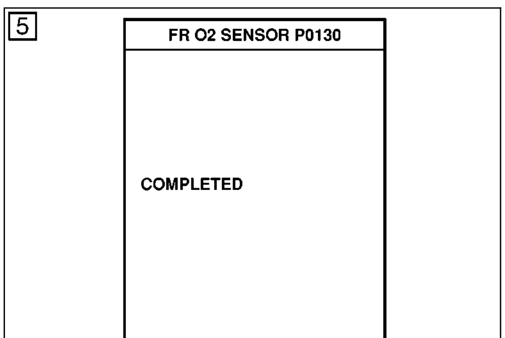
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0130 0303	• The voltage from the sensor is constantly approx. 0.3V.	• Harness or connectors (The sensor circuit is open or shorted.) • Front heated oxygen sensor



PEF138V



PEF139V



PEF210V

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 "FR O2 SENSOR P0130" of "FRONT O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT-II.
3) Touch "START".
4) Let it idle for at least 3 minutes.

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

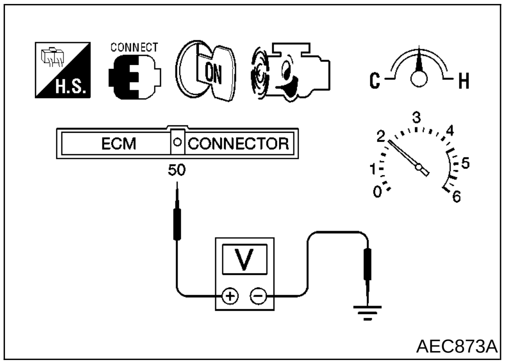
5) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 10 to 60 seconds.)

CMPS·RPM (REF)	1,400 - 3,200 rpm
Vehicle speed	70 - 100 km/h (43 - 62 MPH)
B/FUEL SCHDL	1.0 - 5.2 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-195.

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 front heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

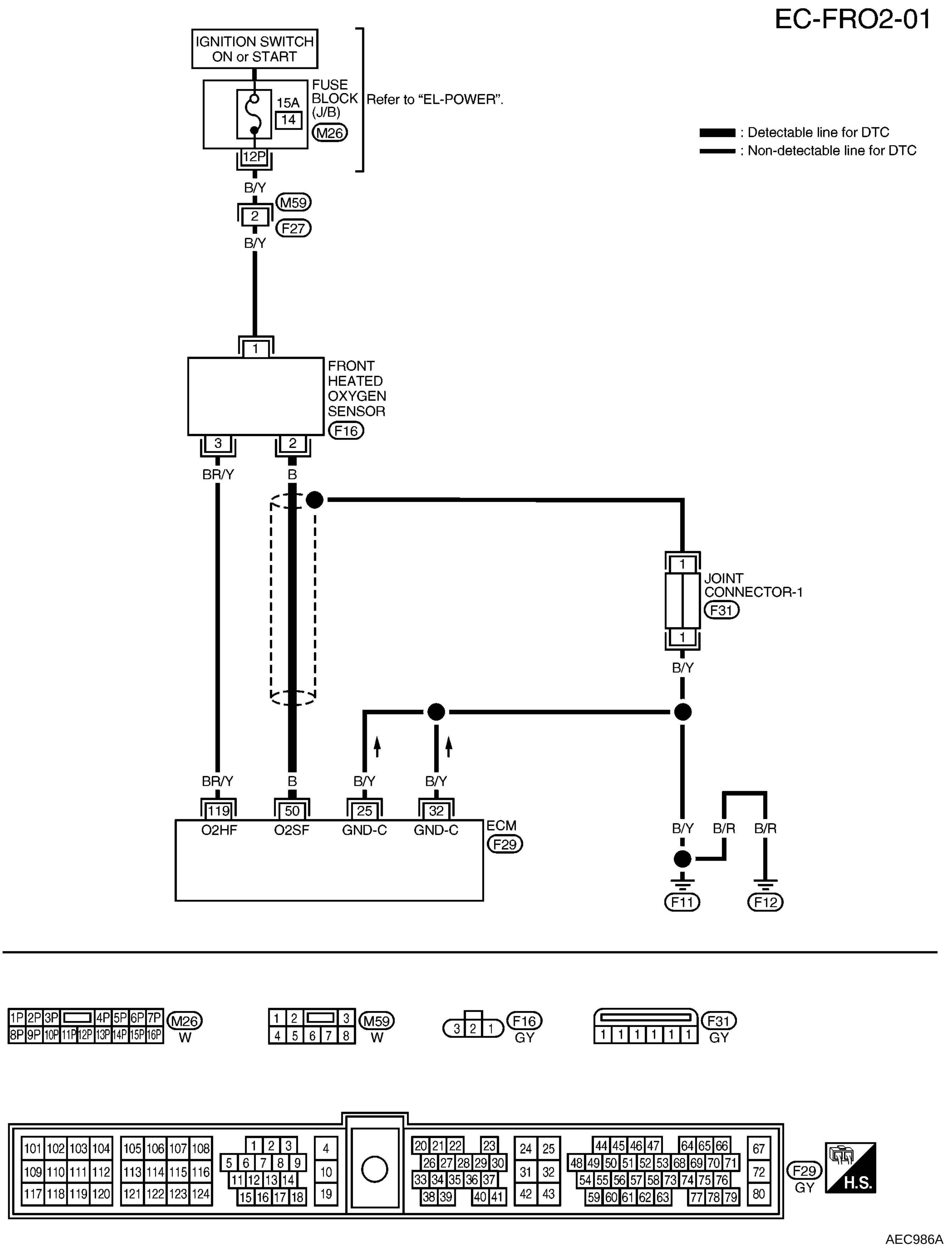
Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 (Front heated oxygen sensor signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.
- The voltage does not remain in the range of 0.2 - 0.4V.

4) If NG, go to “Diagnostic Procedure”, EC-195.

Wiring Diagram

NGEC0100

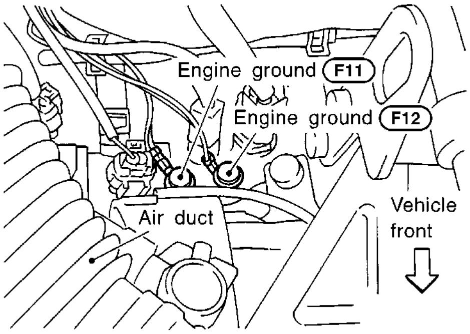


Diagnostic Procedure

NGEC0101

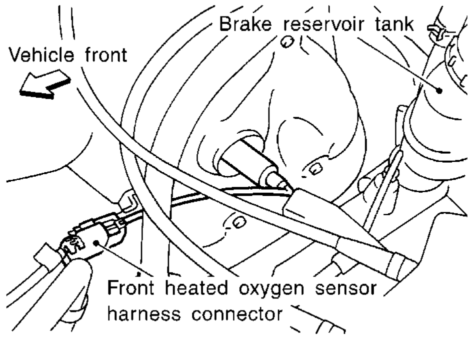
1	INSPECTION START

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



SEF325V

3. Disconnect front heated oxygen sensor harness connector.

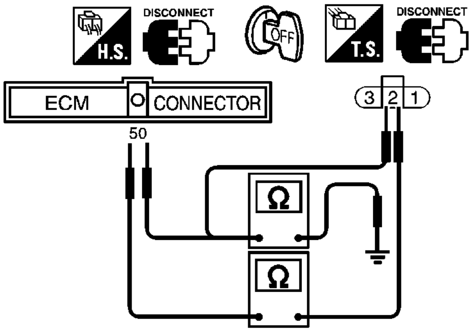


SEF331V

▶	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

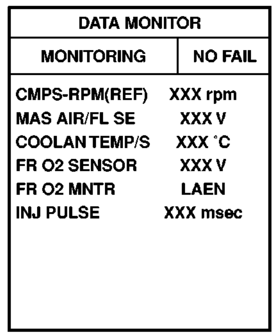
OK (With CONSULT-II)	▶	GO TO 3.
OK (Without CONSULT-II)	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

3	CHECK FRONT HEATED OXYGEN SENSOR

With CONSULT-II

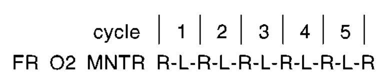
1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode, and the trigger point is adjusted to 100%.
3. Select "FR O2 SENSOR" AND "FR O2 MNTR" in Item Selection.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "START" on CONSULT-II screen.



PEF084P

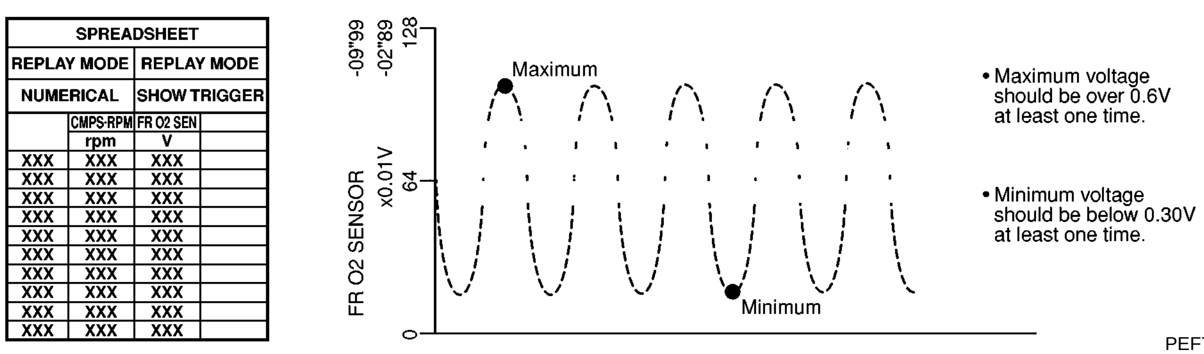
6. Check the following.

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



SEF947V

  R = "FR O2 MNTR", "RICH"
  L = "FR O2 MNTR", "LEAN"
- "FR O2 SENSOR" voltage goes above 0.6V at least once.
- "FR O2 SENSOR" voltage goes below 0.3V at least once.
- "FR O2 SENSOR" voltage never exceeds 1.0V.



PEF736W

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.**

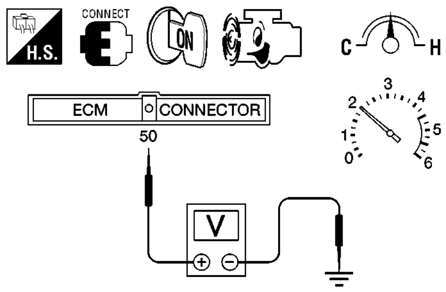
OK or NG

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

4	CHECK FRONT HEATED OXYGEN SENSOR

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 (Front heated oxygen sensor signal) and engine 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 (FRONT HEATED OXYGEN SENSOR MONITOR).
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

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

5	CHECK SHIELD CIRCUIT

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

- Continuity between joint connector-1 terminal 1 and ground
- Joint connector-1
  (Refer to "HARNESS LAYOUT", ***EL-272***.)

Continuity should exist.

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

OK or NG

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

6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

	▶	**INSPECTION END**

GI
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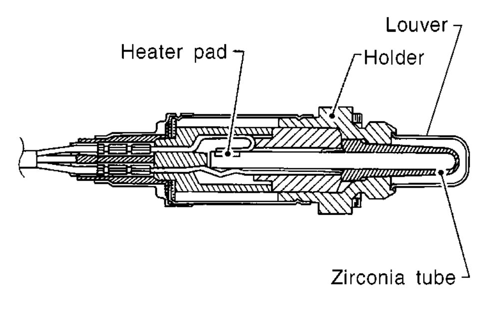
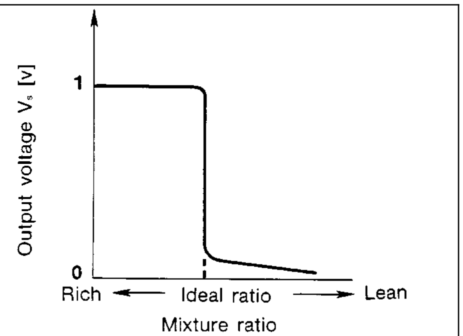


SEF463R



SEF288D

Component Description

NGEC0103

The front heated oxygen sensor is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The front heated oxygen sensor has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The front heated oxygen sensor signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0104

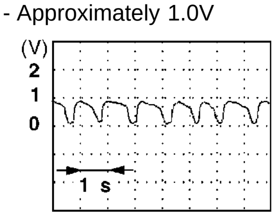
Specification data are reference values.

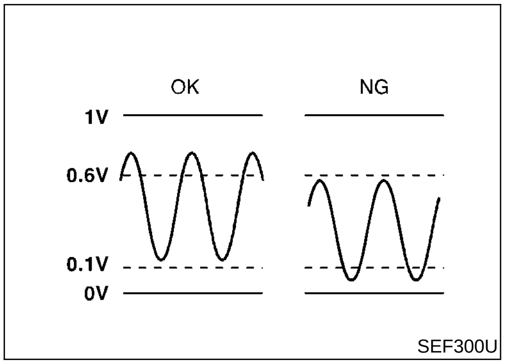
MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SENSOR	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
FR O2 MNTR			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NGEC0105

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

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



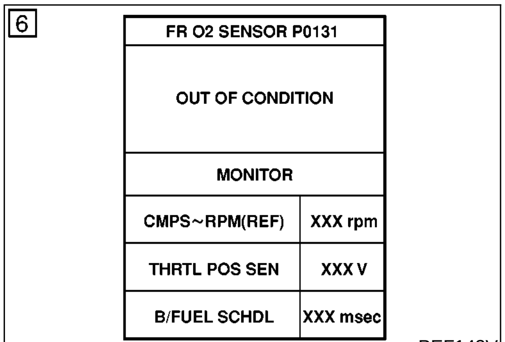
SEF300U

On Board Diagnosis Logic

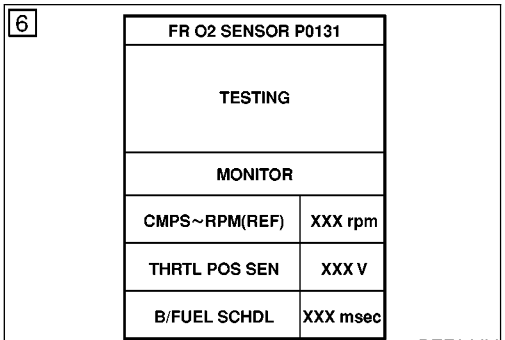
NGEC0106

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

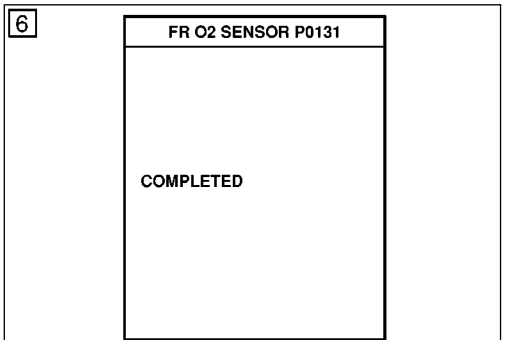
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0131 0411	• The maximum and minimum voltages from the sensor are not reached to the specified voltages.	• Front heated oxygen sensor • Front heated oxygen sensor heater • Fuel pressure • Injectors • Intake air leaks



PEF143V



PEF144V



PEF211V

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 “FR O2 SENSOR P0131” of “FRONT O2 SENSOR” in “DTC WORK SUPPORT” mode with CONSULT-II.
4) Touch “START”.
5) Start engine and let it idle for at least 3.0 minutes.

NOTE:

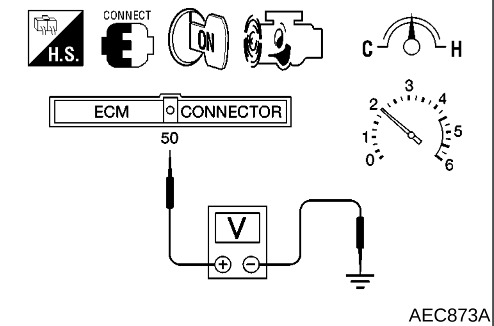
Never raise engine speed above 3,000 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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.)

CMPS·RPM (REF)	1,700 - 3,000 rpm
Vehicle speed	80 - 100 km/h (50 - 62 MPH)
B/FUEL SCHDL	1.0 - 4.9 msec
Selector lever	Suitable position

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

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-200.



AEC873A

Overall Function Check

NGEC0108

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.

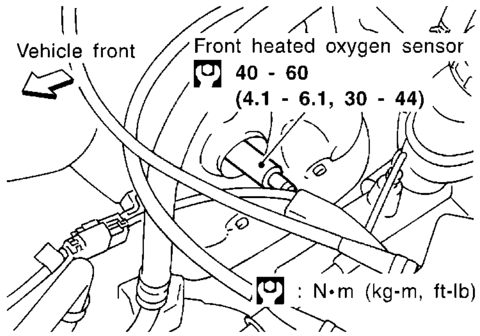
Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 (Front heated oxygen sensor signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is over 0.1V at least one time.

4) If NG, go to "Diagnostic Procedure", EC-200.

Diagnostic Procedure

NGEC0109

1	RETIGHTEN FRONT HEATED OXYGEN SENSOR
1. Turn ignition switch OFF. 2. Loosen and retighten front heated oxygen sensor.  SEF332V **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.

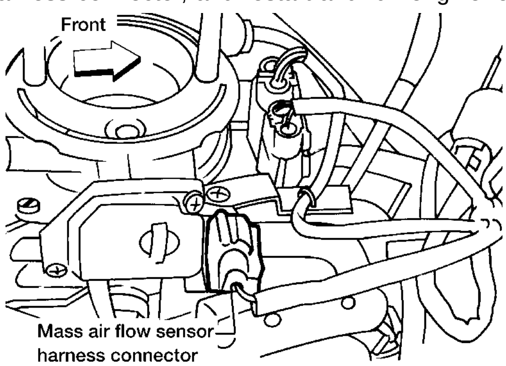
With CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “ACTIVE TEST” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.

ACTIVE TEST	
SELF-LEARN CONTROL	100 %
MONITOR	
CMPS-RPM	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SENSOR	XXX V
A/F ALPHA	XXX %

SEF165X

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

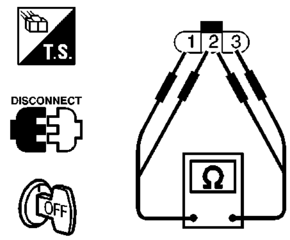
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure diagnostic trouble code No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Refer to “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-67.
7. Make sure diagnostic trouble code No. 0505 is displayed in Diagnostic Test Mode II.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0115 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171. Refer to EC-278.
No	▶	GO TO 3.

3	CHECK FRONT HEATED OXYGEN SENSOR HEATER

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.

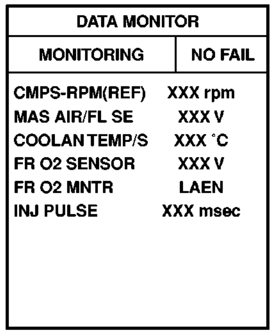
OK or NG

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

4	CHECK FRONT HEATED OXYGEN SENSOR

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 "FR O2 SENSOR" AND "FR O2 MNTR" 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.



PEF084P

6. Check the following.

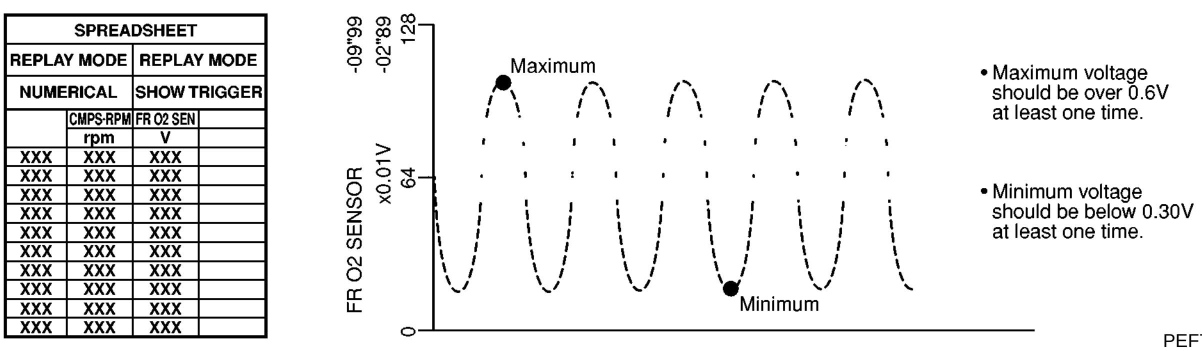
- "FR O2 MNTR" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
  5 times (cycles) are counted as shown below:

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

SEF947V

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

- "FR O2 SENSOR" voltage goes above 0.6V at least once.
- "FR O2 SENSOR" voltage goes below 0.3V at least once.
- "FR O2 SENSOR" voltage never exceeds 1.0V.



PEF736W

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

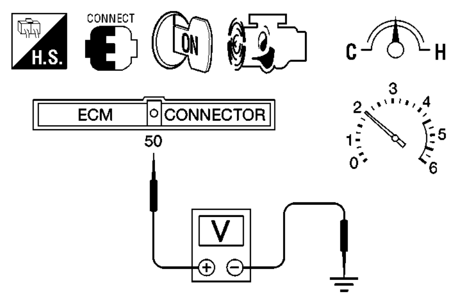
OK	▶	GO TO 6.
NG	▶	Replace front heated oxygen sensor.

Diagnostic Procedure (Cont'd)

5	CHECK FRONT HEATED OXYGEN SENSOR

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 (Front heated oxygen sensor signal) and engine 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 (FRONT HEATED OXYGEN SENSOR MONITOR).
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

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

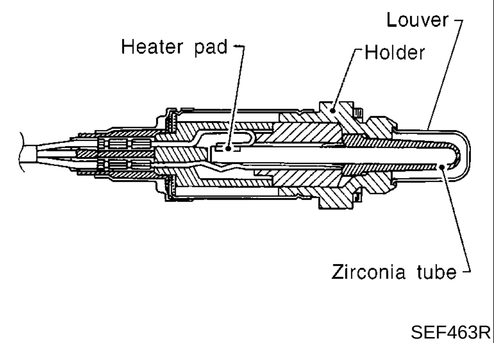
OK or NG

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

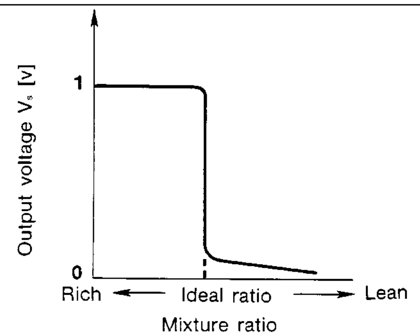
6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.
Refer to "Wiring Diagram", EC-194, for circuit.

	▶	**INSPECTION END**



SEF463R



SEF288D

Component Description

NGEC0111

The front heated oxygen sensor is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The front heated oxygen sensor has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The front heated oxygen sensor signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0112

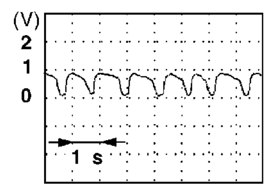
Specification data are reference values.

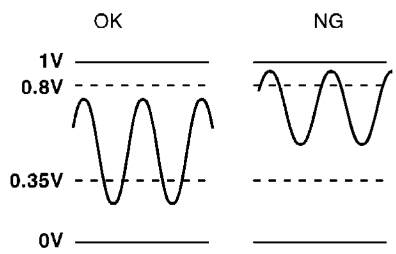
MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SENSOR	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
FR O2 MNTR			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NGEC0113

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

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



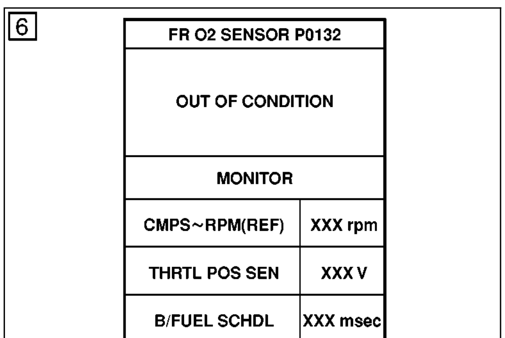
SEF299U

On Board Diagnosis Logic

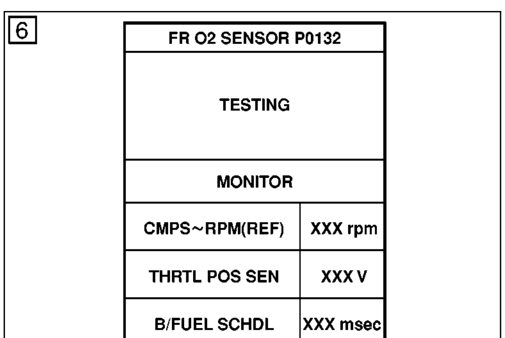
NGEC0114

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

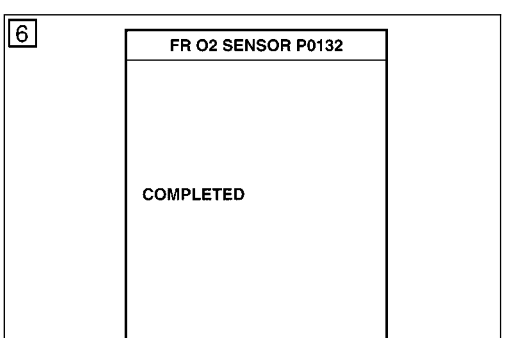
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0132 0410	• The maximum and minimum voltages from the sensor are beyond the specified voltages.	• Front heated oxygen sensor • Front heated oxygen sensor heater • Fuel pressure • Injectors



PEF146V



PEF147V



PEF212V

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 "FR O2 SENSOR P0132" of "FRONT O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT-II.
4) Touch "START".
5) Start engine and let it idle for at least 3.0 minutes.

NOTE:

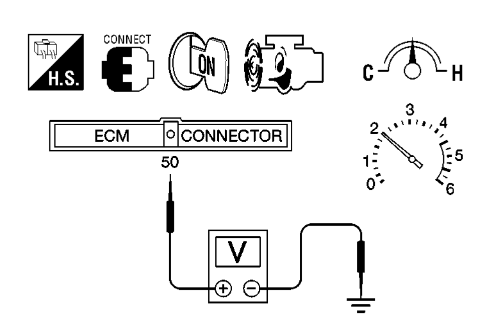
Never raise engine speed above 3,000 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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.)

CMPS·RPM (REF)	1,700 - 3,000 rpm
Vehicle speed	80 - 100 km/h (50 - 62 MPH)
B/FUEL SCHDL	1.0 - 4.9 msec
Selector lever	Suitable position

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

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-207.



AEC873A

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 (Front heated oxygen sensor 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.

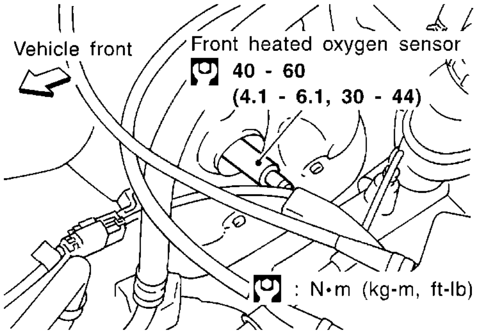
4) If NG, go to "Diagnostic Procedure", EC-207.

Diagnostic Procedure

NGEC0117

1	RETIGHTEN FRONT HEATED OXYGEN SENSOR

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



SEF332V

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 "ACTIVE TEST" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

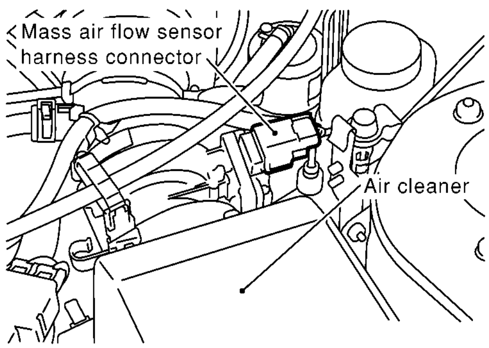
ACTIVE TEST	
SELF-LEARN CONTROL	100 %
MONITOR	
CMPS~RPM	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SENSOR	XXX V
A/F ALPHA	XXX %

SEF165X

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 diagnostic trouble code No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-67.
7. Make sure diagnostic trouble code No. 0505 is displayed in Diagnostic Test Mode II.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0114 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172. Refer to EC-286.
No	▶	GO TO 3.

3 CHECK HARNESS CONNECTOR

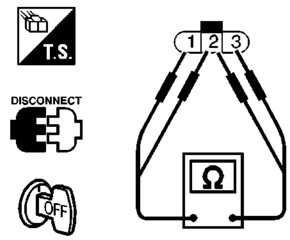
1. Turn ignition switch OFF.
2. Disconnect front heated oxygen sensor harness connector.
3. Check harness connector for water.
   Water should not exit.

OK or NG

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

4	CHECK FRONT HEATED OXYGEN SENSOR HEATER

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.**

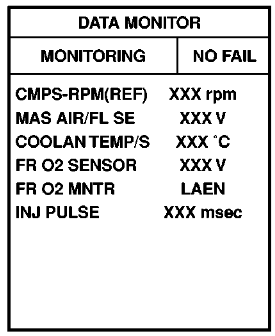
OK or NG

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

5	CHECK FRONT HEATED OXYGEN SENSOR

With CONSULT-II

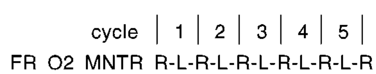
1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode, and the trigger point is adjusted to 100%.
3. Select "FR O2 SENSOR" and "FR O2 MNTR" in item selection.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "RECORD" on CONSULT-II screen.



PEF084P

6. Check the following.

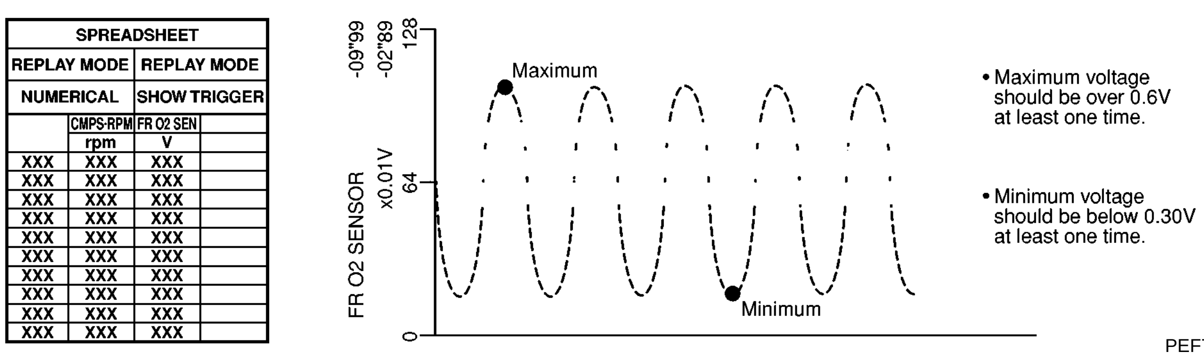
- "FR O2 MNTR" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
  5 times (cycles) are counted as shown below:



SEF947V

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

- "FR O2 SENSOR" voltage goes above 0.6V at least once.
- "FR O2 SENSOR" voltage goes below 0.3V at least once.
- "FR O2 SENSOR" voltage never exceeds 1.0V.



PEF736W

CAUTION:

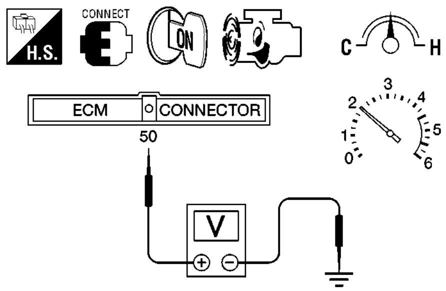
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897–18 or J-43897–12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

OK or NG

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

6	CHECK FRONT HEATED OXYGEN SENSOR

Without CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 (Front heated oxygen sensor signal) and engine 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 (FRONT HEATED OXYGEN SENSOR MONITOR).
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

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

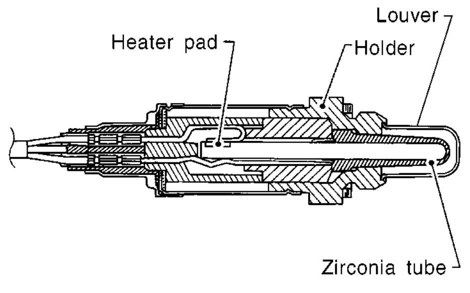
OK or NG

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

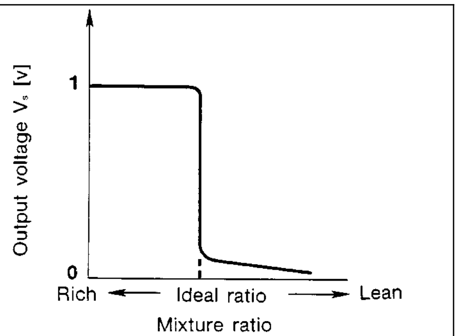
7	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.
Refer to "Wiring Diagram", EC-194, for circuit.

	▶	**INSPECTION END**



SEF463R



SEF288D

Component Description

NGEC0119

The front heated oxygen sensor is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The front heated oxygen sensor has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The front heated oxygen sensor signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0120

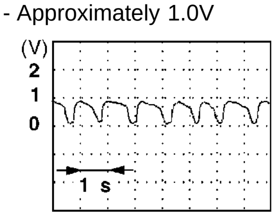
Specification data are reference values.

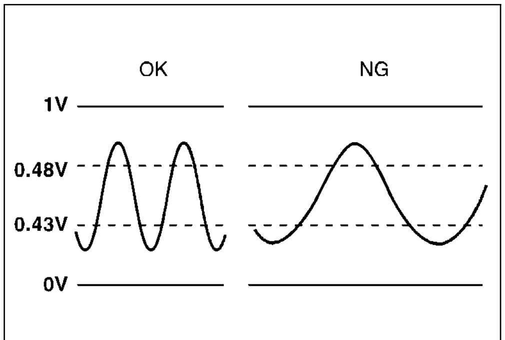
MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SENSOR	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
FR O2 MNTR			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NGEC0121

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

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



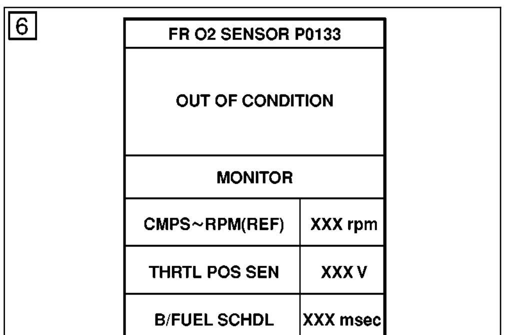
SEF298U

On Board Diagnosis Logic

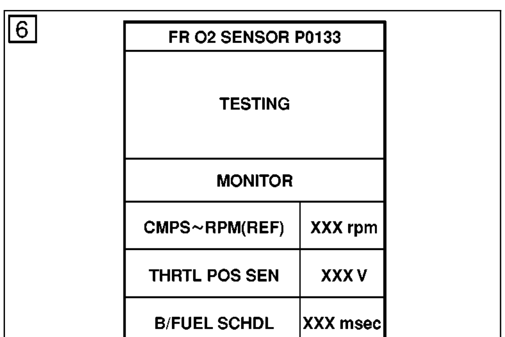
NGEC0122

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

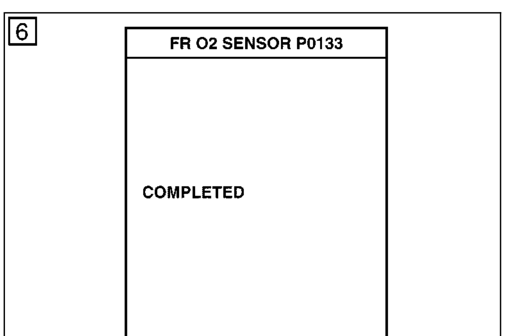
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0133 0409	• The response of the voltage signal from the sensor takes more than the specified time.	• Harness or connectors (The sensor circuit is open or shorted.) • Front heated oxygen sensor • Front heated oxygen sensor heater •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



PEF148V



PEF149V



PEF213V

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 "FR O2 SENSOR P0133" of "FRONT O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT-II.
4) Touch "START".
5) Start engine and let it idle for at least 3.0 minutes.

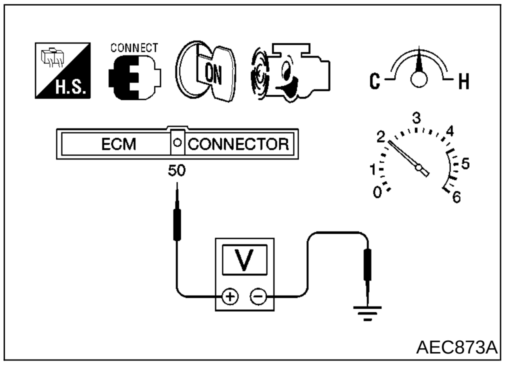
NOTE:
Never raise engine speed above 3,000 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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.)

CMPS·RPM (REF)	1,700 - 3,600 rpm
Vehicle speed	80 - 120 km/h (50 - 75 MPH)
B/FUEL SCHDL	1.1 - 4.9 msec
Selector lever	Suitable position

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

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-216.



AEC873A

Overall Function Check

NGEC0124

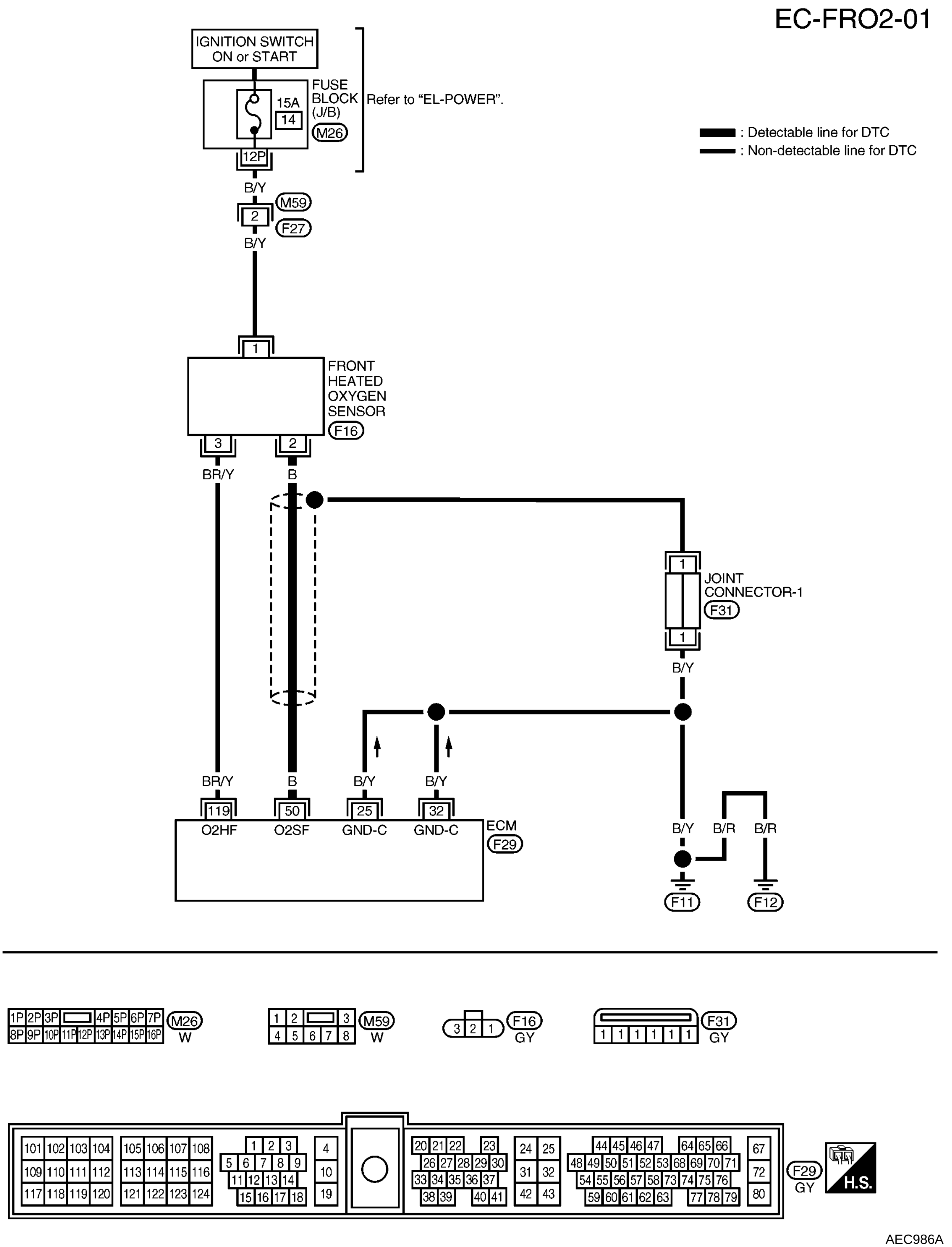
Use this procedure to check the overall function of the front heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 (Front heated oxygen sensor signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.
- Malfunction indicator lamp goes on more than five times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).
4) If NG, go to "Diagnostic Procedure", EC-216.

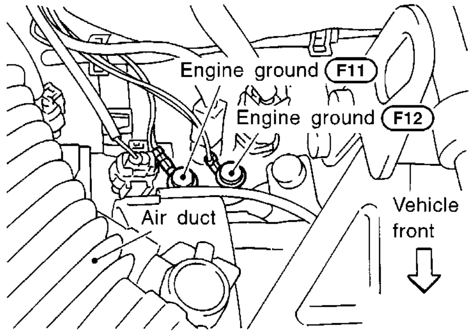
Wiring Diagram

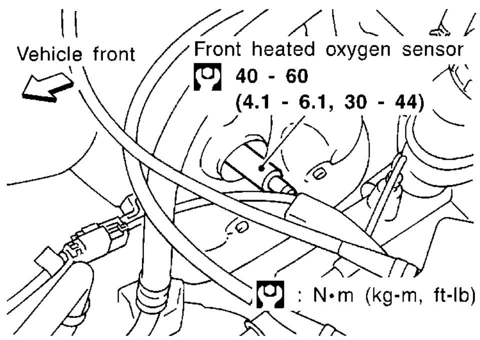
NGEC0125

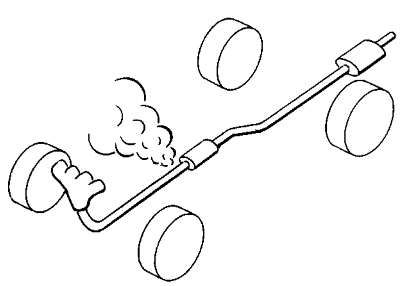


Diagnostic Procedure

NGEC0126

1	RETIGHTEN GROUND SCREWS
1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.  SEF325V	
▶	GO TO 2.

2	RETIGHTEN FRONT HEATED OXYGEN SENSOR
Loosen and retighten front heated oxygen sensor.  SEF332V **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.

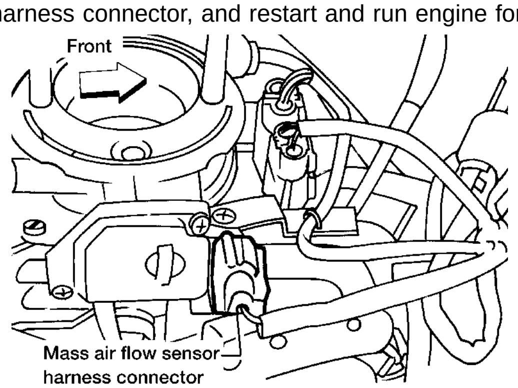
5	CLEAR THE SELF-LEARNING DATA	
With CONSULT-II 1. Start engine and warm it up to normal operating temperature. 2. Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode with CONSULT-II. 3. Clear the self-learning control coefficient by touching "CLEAR".		

ACTIVE TEST	
SELF-LEARN CONTROL	100 %
MONITOR	
CMPS~RPM	XXX rpm
COOLAN TEMP/S	XXX ˚C
FR O2 SENSOR	XXX V
A/F ALPHA	XXX %

SEF165X

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 diagnostic trouble code No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-67.
7. Make sure diagnostic trouble code No. 0505 is displayed in Diagnostic Test Mode II.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0114 or 0115 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0172. Refer to EC-278, 286.
No	▶	GO TO 6.

GI
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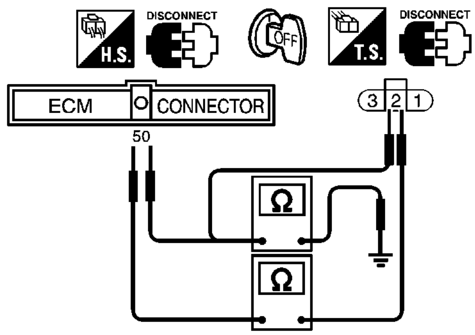
6	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect front heated oxygen sensor 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.

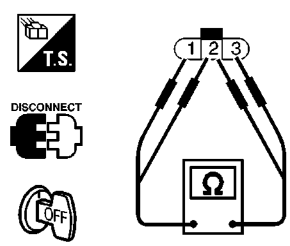
4. Also check harness for short to power.

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 FRONT HEATED OXYGEN SENSOR HEATER

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.**

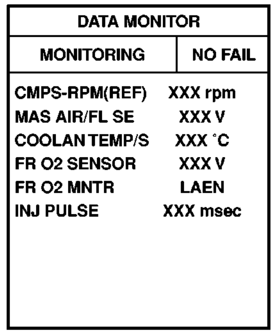
OK or NG

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

8	CHECK FRONT HEATED OXYGEN SENSOR

With CONSULT-II

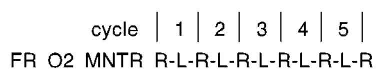
1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" in "DATA MONITOR" mode, and the trigger point is adjusted to 100%.
3. Select "FR O2 SENSOR" and "FR O2 MNTR" in item selection.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch "START" on CONSULT-II screen.



PEF084P

6. Check the following.

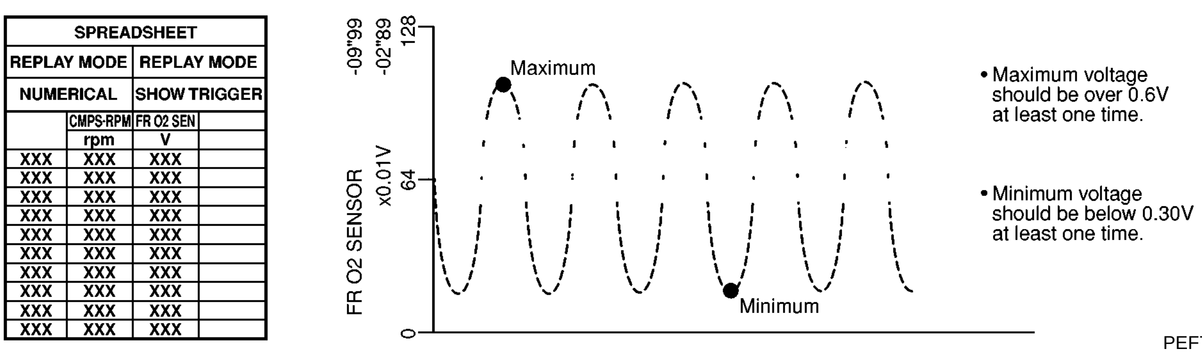
- "FR O2 MNTR" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
  5 times (cycles) are counted as shown below:



SEF947V

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

- "FR O2 SENSOR" voltage goes above 0.6V at least once.
- "FR O2 SENSOR" voltage goes below 0.3V at least once.
- "FR O2 SENSOR" voltage never exceeds 1.0V.



PEF736W

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.**

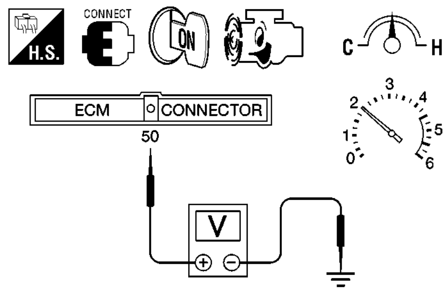
OK or NG

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

9	CHECK FRONT HEATED OXYGEN SENSOR

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 (Front heated oxygen sensor signal) and engine 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 (FRONT HEATED OXYGEN SENSOR MONITOR).
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

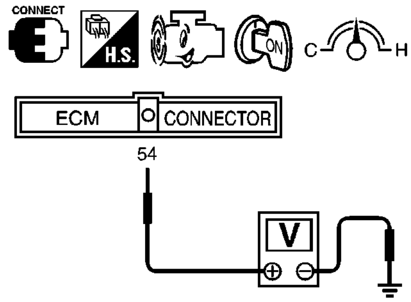
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897–18 or J-43897–12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

OK or NG

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

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.



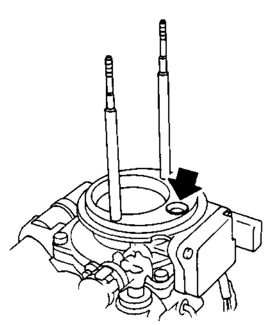
SEF326V

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

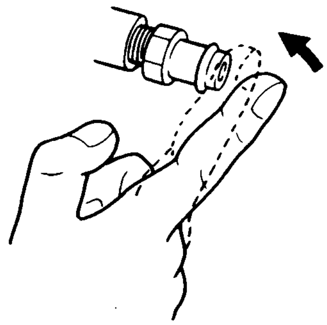
OK or NG

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-272***.)
  Continuity should exist.
4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector.

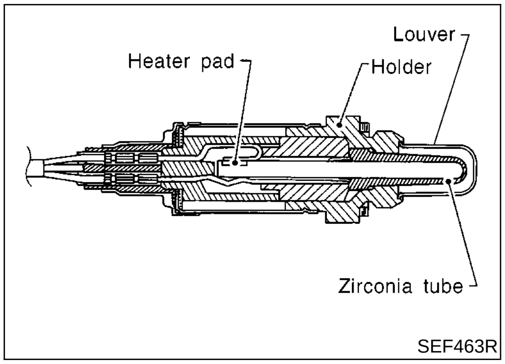
OK or NG

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

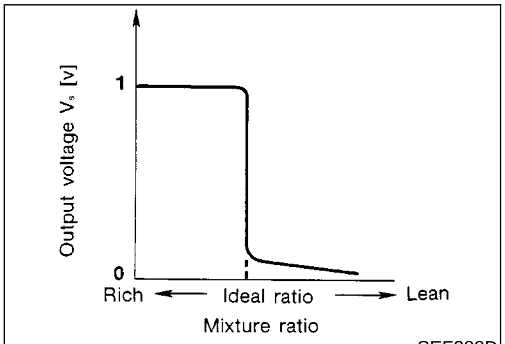
13	**CHECK INTERMITTENT INCIDENT**

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

	▶	**INSPECTION END**



SEF463R



SEF288D

Component Description

NGEC0128

The front heated oxygen sensor is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The front heated oxygen sensor has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The front heated oxygen sensor signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0129

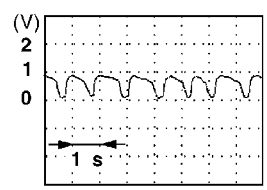
Specification data are reference values.

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

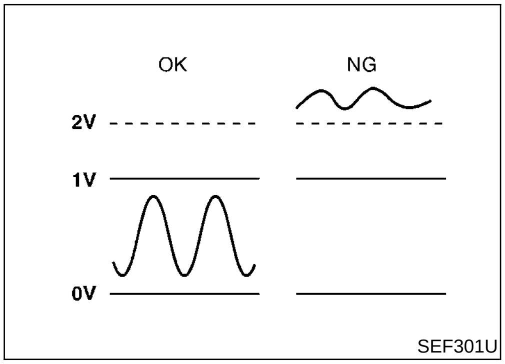
ECM Terminals and Reference Value

NGEC0130

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

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

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX



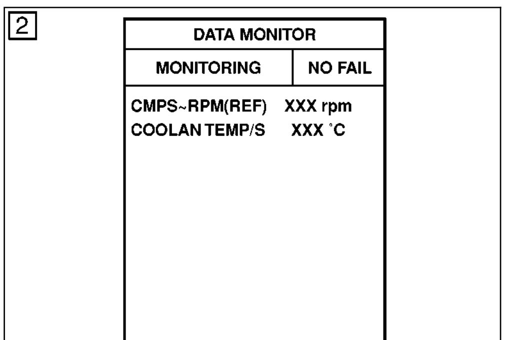
SEF301U

On Board Diagnosis Logic

NGEC0131

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

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0134 0412	● An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Front heated oxygen sensor



PEF361V

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-226.

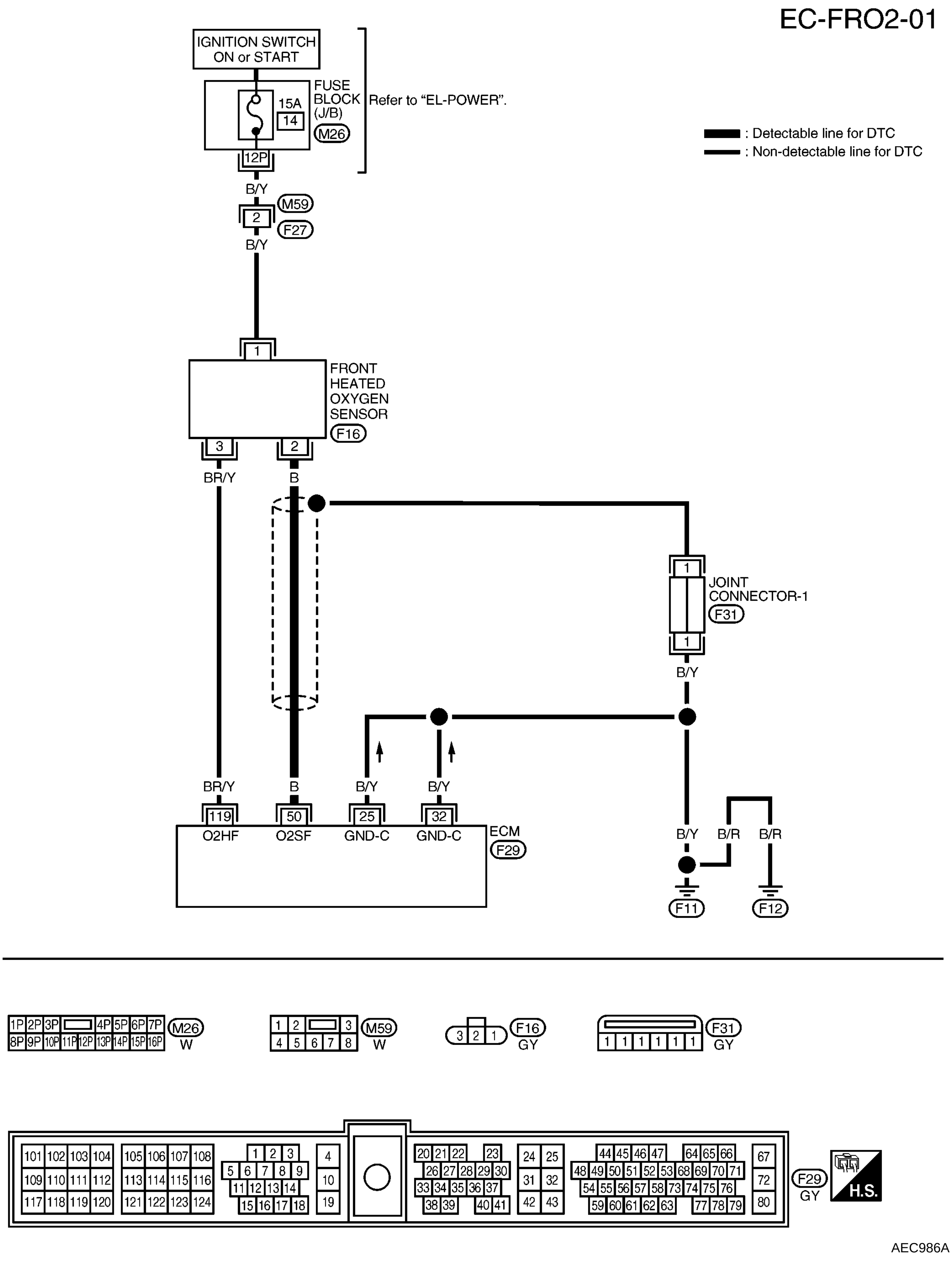
With GST

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-226.

- **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.**

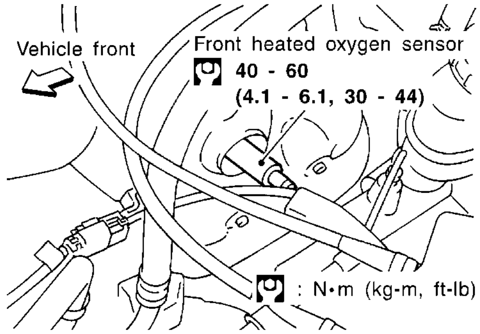
Wiring Diagram

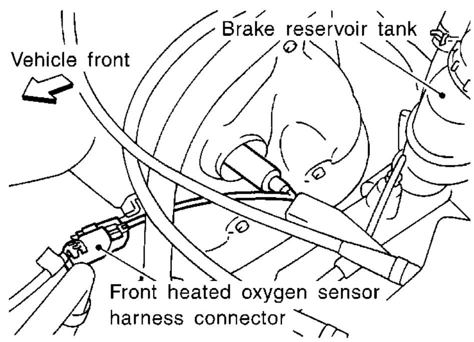
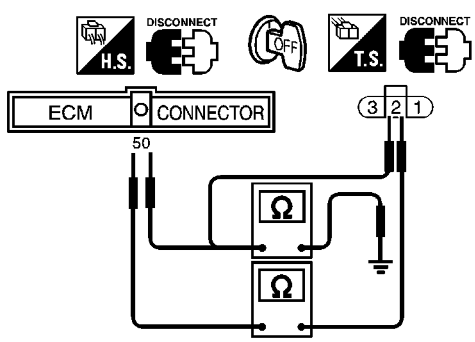
NGEC0133



Diagnostic Procedure

NGEC0134

1	RETIGHTEN FRONT HEATED OXYGEN SENSOR
1. Turn ignition switch OFF. 2. Loosen and retighten front heated oxygen sensor.  SEF332V **Tightening torque:** **40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)**	
▶	GO TO 2.

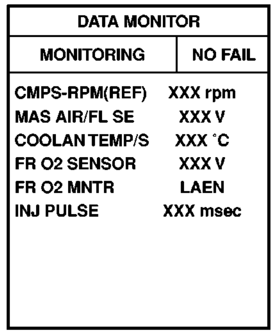
2	CHECK INPUT SIGNAL CIRCUIT
1. Disconnect front heated oxygen sensor harness connector and ECM harness connector.  SEF331V 2. Check harness continuity between ECM terminal 50 and terminal 2.  SEF141V **Continuity should exist.** 3. Check harness continuity between ECM terminal 50 (or terminal 2) and 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 front heated oxygen sensor 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 FRONT HEATED OXYGEN SENSOR

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 "FR O2 SENSOR" and "FR O2 MNTR" 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.



PEF084P

6. Check the following.

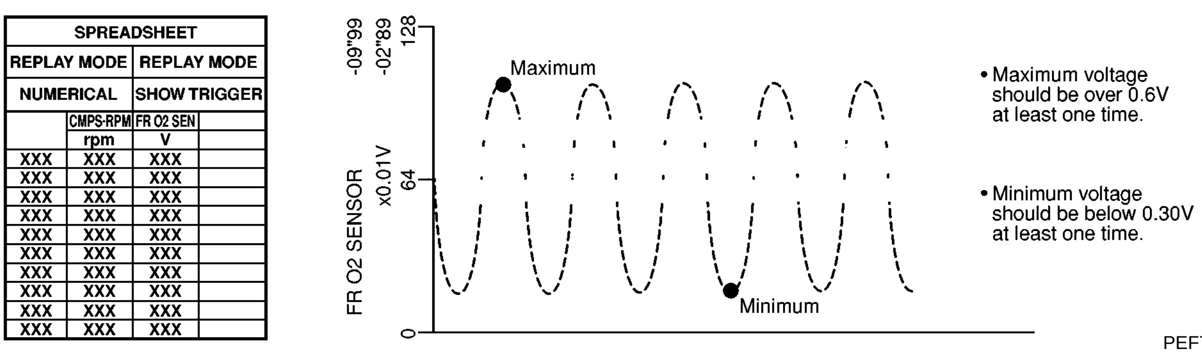
- "FR O2 MNTR" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
  5 times (cycles) are counted as shown below:

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

SEF947V

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

- "FR O2 SENSOR" voltage goes above 0.6V at least once.
- "FR O2 SENSOR" voltage goes below 0.3V at least once.
- "FR O2 SENSOR" voltage never exceeds 1.0V.



PEF736W

CAUTION:

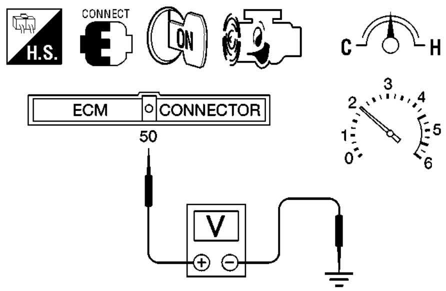
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897–18 or J-43897–12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

OK or NG

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

5	CHECK FRONT HEATED OXYGEN SENSOR

Without CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 (Front heated oxygen sensor signal) and engine 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 (FRONT HEATED OXYGEN SENSOR MONITOR).
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

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

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-272***.)
  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 ground or short to power in harness or connectors.

7	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

	▶	**INSPECTION END**

Description

NGEC0136

SYSTEM DESCRIPTION

NGEC0136S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Front heated oxygen sensor heater control	Front heated oxygen sensor heater

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

OPERATION

NGEC0136S02

Engine speed	Front heated oxygen sensor heater
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
FR O2 HEATER	• 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 32 (ECM ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
119	BR/Y	Front heated oxygen sensor heater	**[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 0901	• The current amperage in the front heated oxygen sensor heater circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the front heated oxygen sensor heater.)	• Harness or connectors (The front heated oxygen sensor heater circuit is open or shorted.) • Front heated oxygen sensor heater

DTC Confirmation Procedure

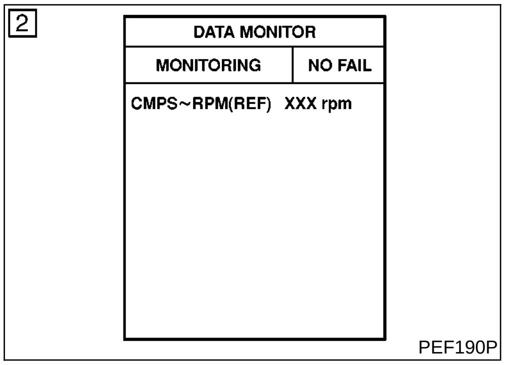
NGEC0140

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.



PEF190P

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-233.

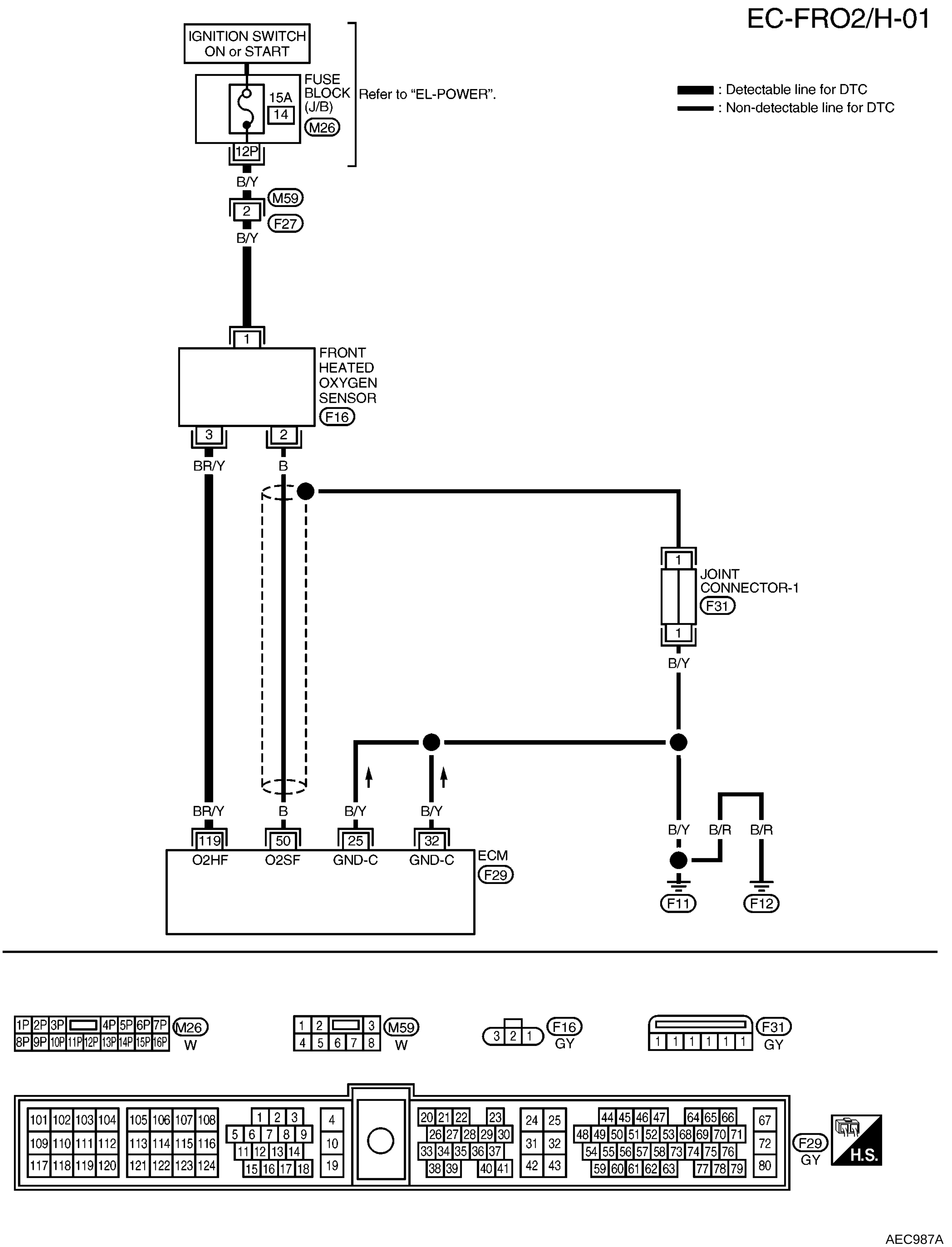
With GST

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-233.

- **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

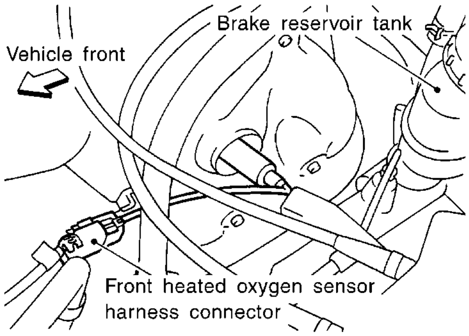


Diagnostic Procedure

NGEC0142

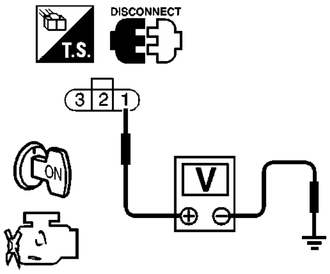
1	CHECK POWER SUPPLY

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



SEF331V

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 front heated oxygen sensor and 15A fuse

	▶	Repair harness or connectors.

3	CHECK GROUND CIRCUIT

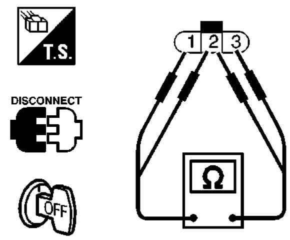
1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between front heated oxygen sensor terminal 3 and ECM terminal 119. Refer to the wiring diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

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

4	CHECK FRONT HEATED OXYGEN SENSOR HEATER

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.**

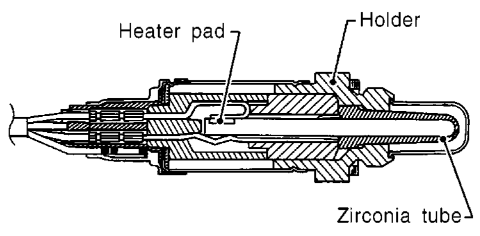
OK or NG

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

5	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

	▶	**INSPECTION END**



SEF327R

Component Description

NGEC0144

The rear heated oxygen sensor (Rear HO2S), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the front heated oxygen sensor are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the rear heated oxygen sensor.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the rear heated oxygen sensor is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0145

Specification data are reference values.

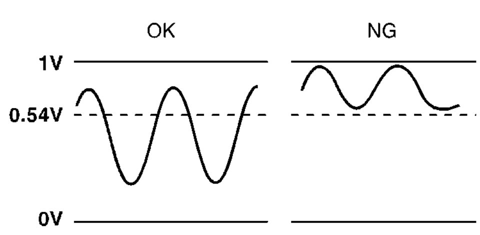
MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SENSOR	• Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
RR O2 MNTR			LEAN ⟷ RICH

ECM Terminals and Reference Value

NGEC0146

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Rear heated oxygen sensor	**[Engine is running]** • After warming up to normal operating temperature and revving engine from idle to 3,000 rpm quickly	0 - Approximately 1.0V



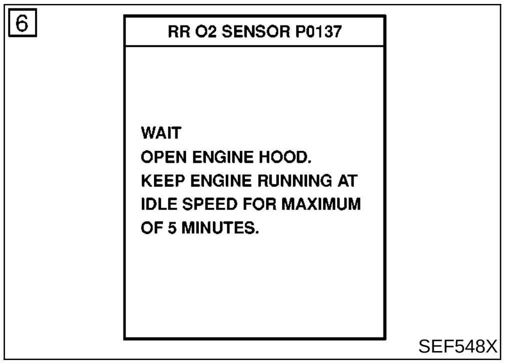
SEF304U

On Board Diagnosis Logic

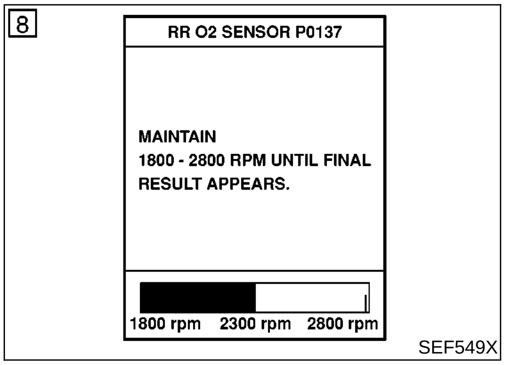
NGEC0147

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

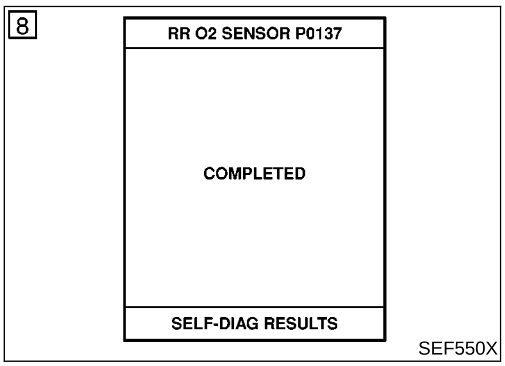
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0137 0511	• The minimum voltage from the sensor does not reach the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted.) • Rear heated oxygen sensor • Fuel pressure • Injectors



SEF548X



SEF549X



SEF550X

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.

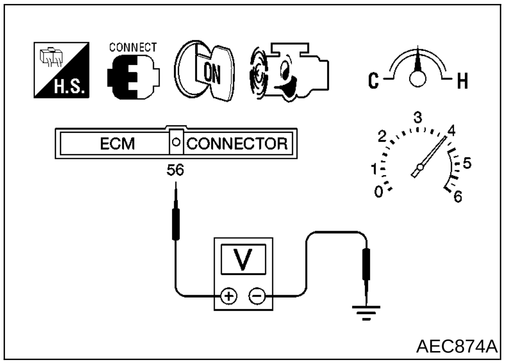
TESTING CONDITION:

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 "RR O2 SEN P0137", of "REAR O2 SENSOR" 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-239.
   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) 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 rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

CAUTION:

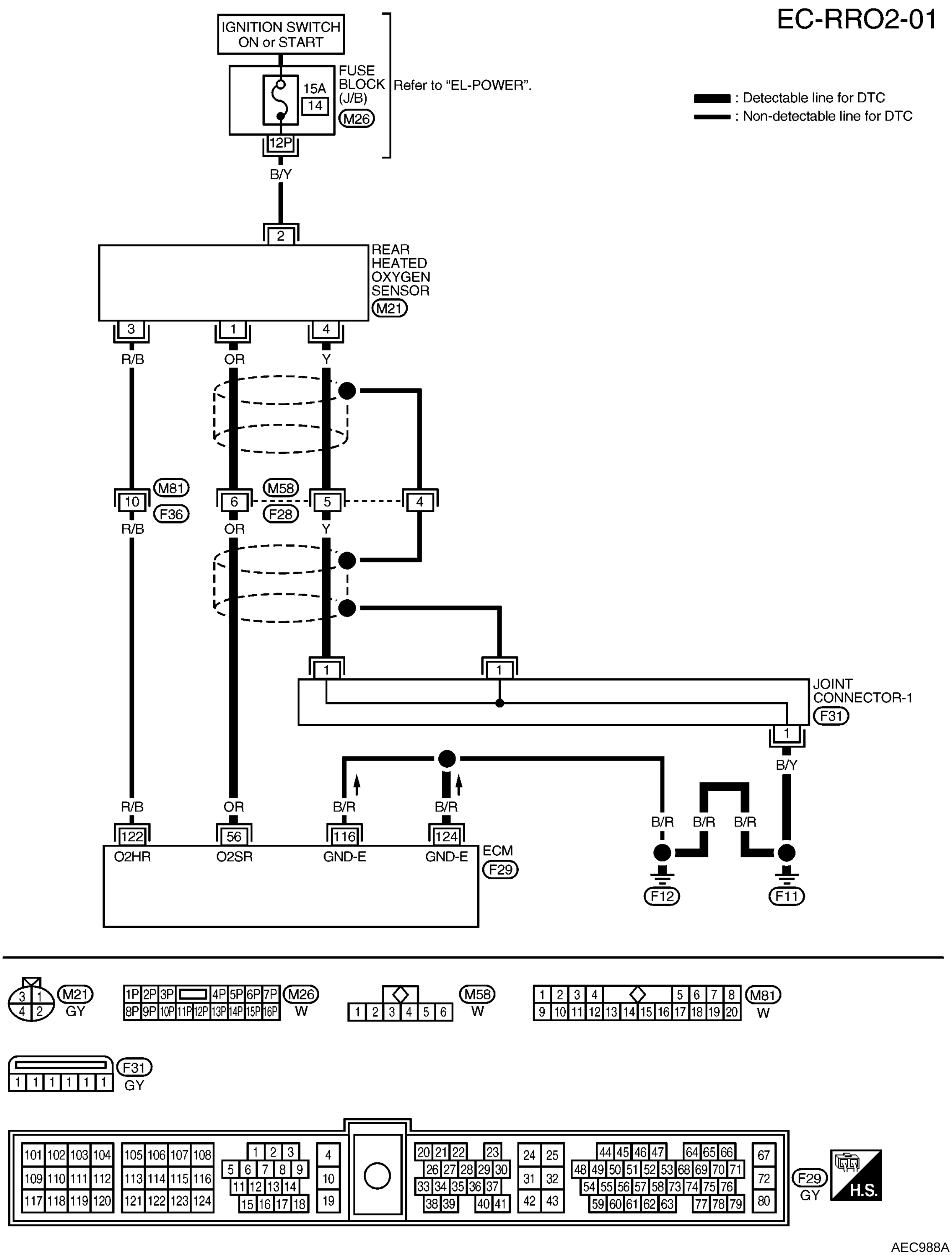
Always drive vehicle at a safe speed.

Without CONSULT-II

1) Start engine and drive vehicle at a speed of 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 (Rear heated oxygen sensor 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-239.

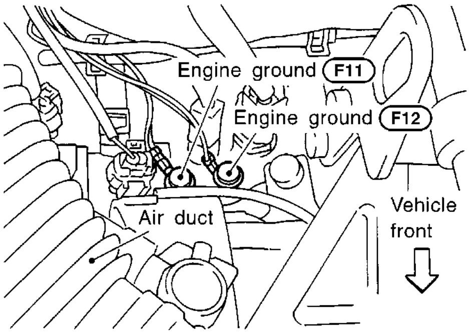
Wiring Diagram

NGEC0150



Diagnostic Procedure

NGEC0151

1	RETIGHTEN GROUND SCREWS
1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.  SEF325V	
▶	GO TO 2.

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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 "ACTIVE TEST" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

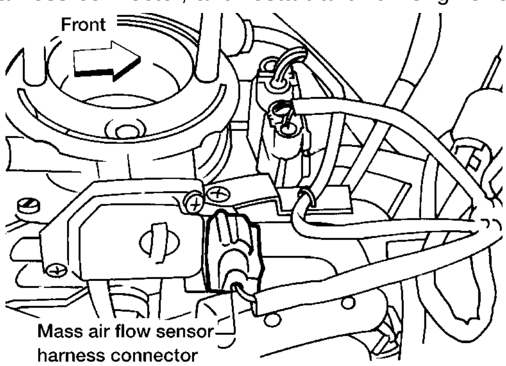
ACTIVE TEST	
SELF-LEARN CONTROL	100 %
MONITOR	
CMPS-RPM	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SENSOR	XXX V
A/F ALPHA	XXX %

SEF165X

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.

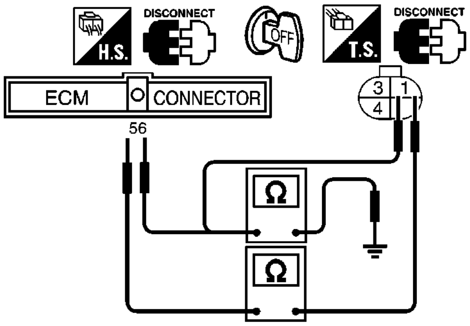


AEC131A

4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure diagnostic trouble code No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-67.
7. Make sure diagnostic trouble code No. 0505 is displayed in Diagnostic Test Mode II.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0114 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172. Refer to EC-286.
No	▶	GO TO 3.

3	CHECK INPUT SIGNAL CIRCUIT	
1. Turn ignition switch OFF. 2. Disconnect rear heated oxygen sensor harness connector and ECM harness connector. 3. Check harness continuity between ECM terminal 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 rear heated oxygen sensor and ECM		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK GROUND CIRCUIT	
1. Check harness continuity between rear heated oxygen sensor terminal 4 and engine ground. Refer to "Wiring Diagram", EC-238. **Continuity should exist.** 2. 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 4.

6 CHECK REAR HEATED OXYGEN SENSOR

With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “RR O2 SENSOR” as the monitor item with CONSULT-II.
4. Check “RR O2 SENSOR” at idle speed when adjusting “FUEL INJECTION” to ±25%.

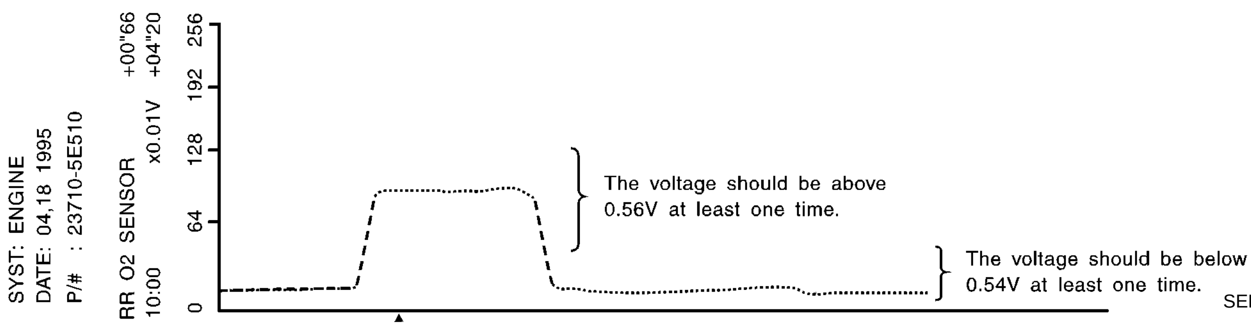
ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
CMPS~RPM(REF)	XXX rpm
FR O2 SENSOR	XXX V
RR O2 SENSOR	XXX V
FR O2 MNTR	RICH
RR O2 MNTR	RICH

PEF102P

“RR O2 SENSOR” should be above 0.56V at least once when the “FUEL INJECTION” is +25%.“RR O2 SENSOR” 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.**



SEF431RB

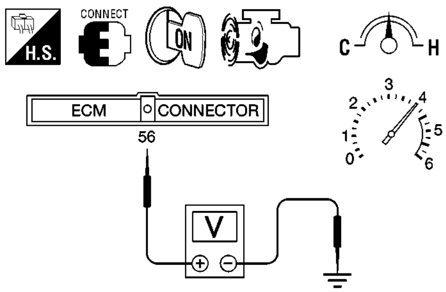
OK or NG

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

7	CHECK REAR HEATED OXYGEN SENSOR

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 (Rear heated oxygen sensor signal) and ECM ground.



AEC874A

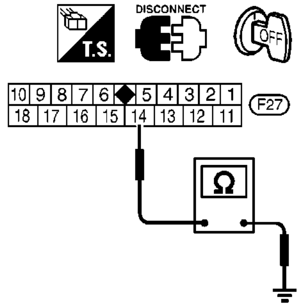
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.56V at least once.
   If the voltage is above 0.56V at step 4, step 5 is not necessary.
5. Check the voltage when revving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

8	CHECK SHIELD CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect harness connectors F27.
3. Check harness continuity between harness connector F27 terminal 14 and ground.



SEF158V

Continuity should exist.

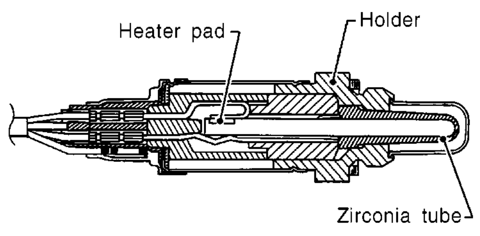
4. Also check harness for short to ground and short to power.
5. Then reconnect harness connectors.

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART
Check the following. ● Joint connector-1 (Refer to "HARNESS LAYOUT", ***EL-272***.) ● Harness for open or short between harness connector F27 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-128.	
▶	**INSPECTION END**



SEF327R

Component Description

NGEC0153

The rear heated oxygen sensor (Rear HO2S), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the front heated oxygen sensor are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the rear heated oxygen sensor.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the rear heated oxygen sensor is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0154

Specification data are reference values.

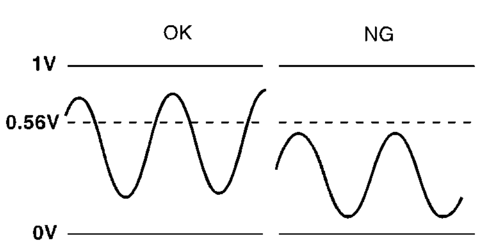
MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SENSOR	● Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
RR O2 MNTR			LEAN ←→ RICH

ECM Terminals and Reference Value

NGEC0155

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Rear heated oxygen sensor	**[Engine is running]** ● After warming up to normal operating temperature and revving engine from idle to 3,000 rpm quickly	0 - Approximately 1.0V



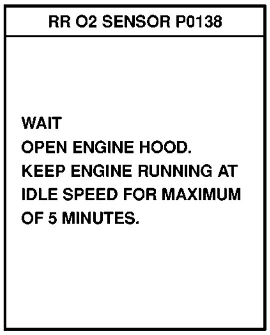
SEF303U

On Board Diagnosis Logic

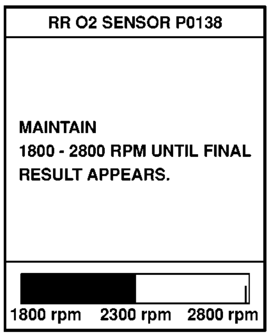
NGEC0156

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

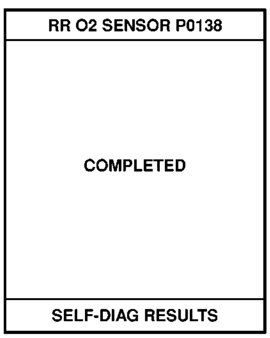
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0138 0510	● The maximum voltage from the sensor does not reach the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted.) ● Rear heated oxygen sensor ● Fuel pressure ● Injectors ● Intake air leaks



SEF551X



SEF552X



SEF553X

DTC Confirmation Procedure

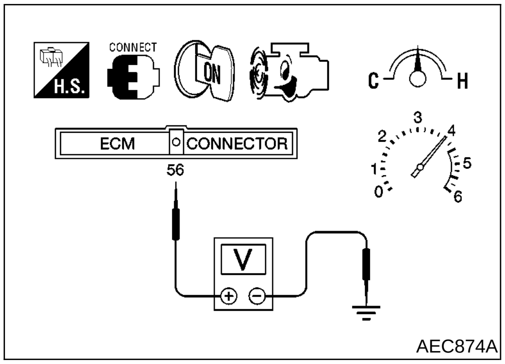
NGEC0157

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 "RR O2 SEN P0138", of "REAR O2 SENSOR" 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-249.
   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) 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 (Rear heated oxygen sensor 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-249.

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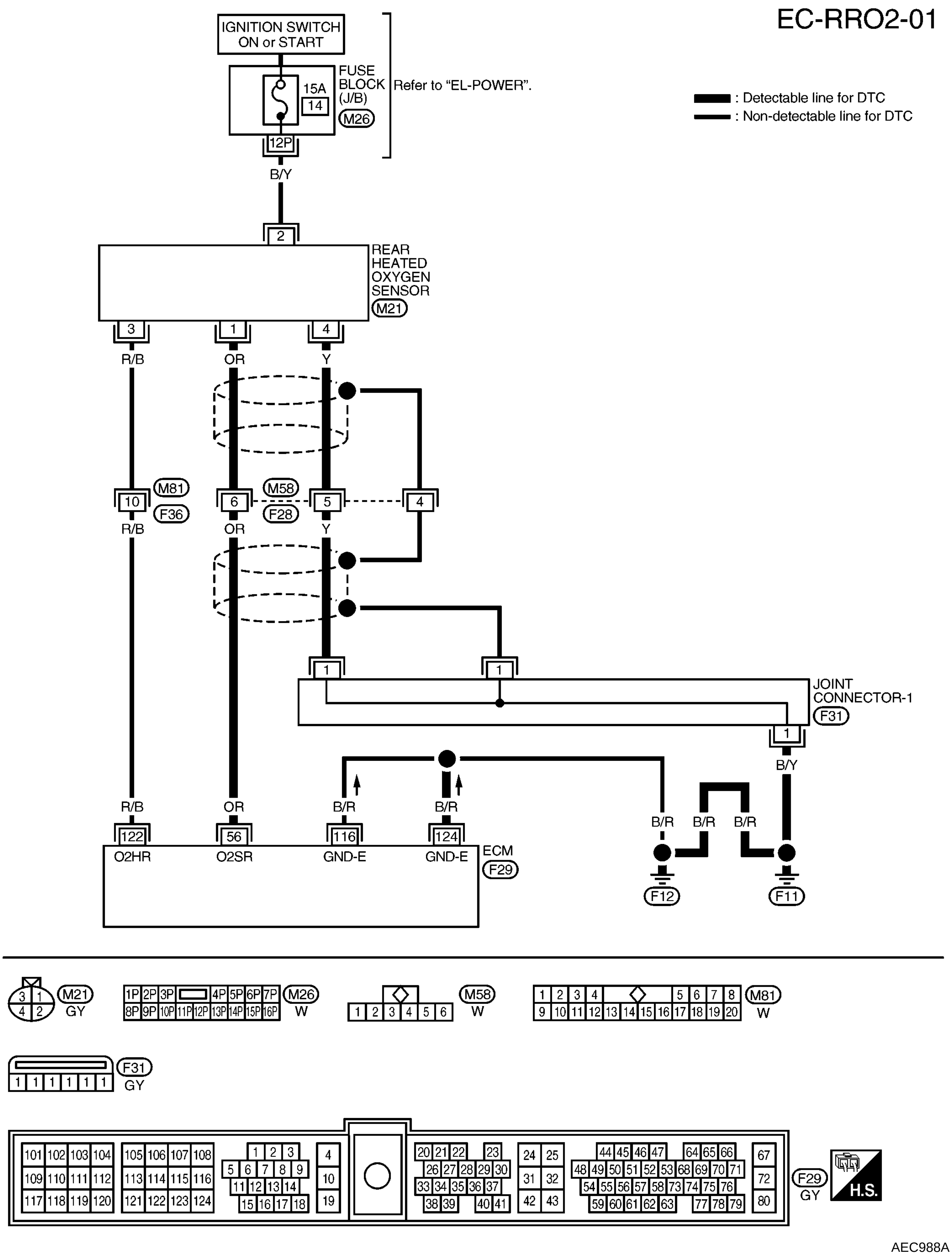
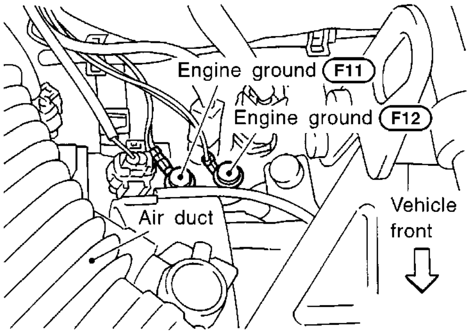
Wiring Diagram

NGEC0159



Diagnostic Procedure

NGEC0160

1	RETIGHTEN GROUND SCREWS
1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.  SEF325V	
▶	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 “ACTIVE TEST” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.

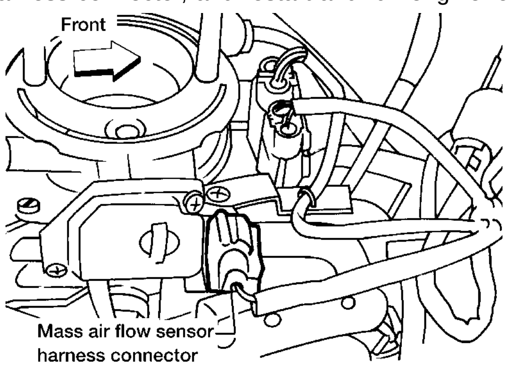
ACTIVE TEST	
SELF-LEARN CONTROL	100 %
MONITOR	
CMPS-RPM	XXX rpm
COOLAN TEMP/S	XXX ˚C
FR O2 SENSOR	XXX V
A/F ALPHA	XXX %

SEF165X

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

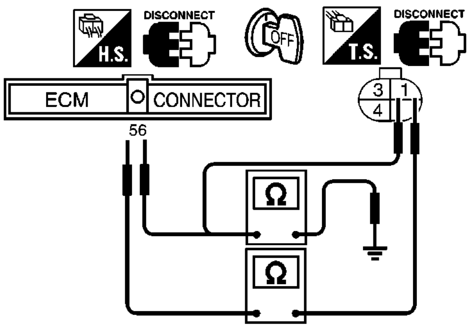
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure diagnostic trouble code No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Refer to “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-67.
7. Make sure diagnostic trouble code No. 0505 is displayed in Diagnostic Test Mode II.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0115 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171. Refer to EC-278.
No	▶	GO TO 3.

3	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect rear heated oxygen sensor 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 rear heated oxygen sensor

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

5	CHECK GROUND CIRCUIT

1. Check harness continuity between rear heated oxygen sensor connector M21 terminal 4 and engine ground. Refer to :Wiring Diagram", EC-248.
   Continuity should exist.
2. 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	▶	Repair open circuit or short to ground or short to power in harness or connectors.

6 CHECK REAR HEATED OXYGEN SENSOR

With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “RR O2 SENSOR” as the monitor item with CONSULT-II.
4. Check “RR O2 SENSOR” at idle speed when adjusting “FUEL INJECTION” to ±25%.

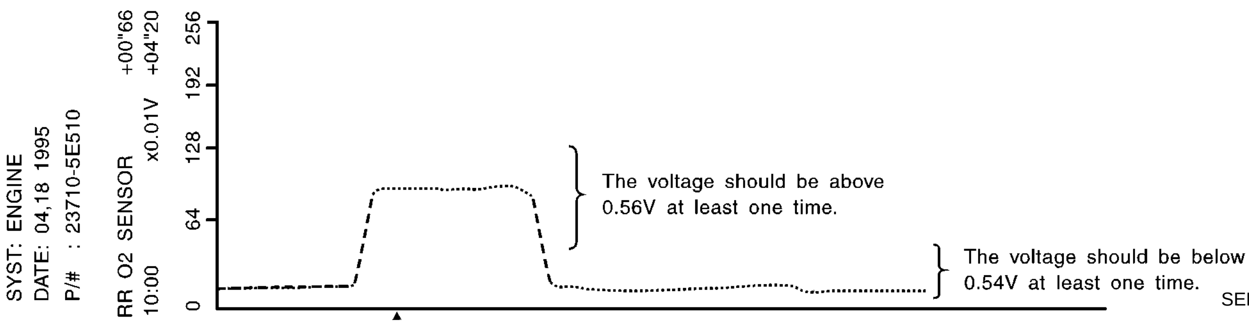
ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
CMPS~RPM(REF)	XXX rpm
FR O2 SENSOR	XXX V
RR O2 SENSOR	XXX V
FR O2 MNTR	RICH
RR O2 MNTR	RICH

PEF102P

“RR O2 SENSOR” should be above 0.56V at least once when the “FUEL INJECTION” is +25%.“RR O2 SENSOR” 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.**



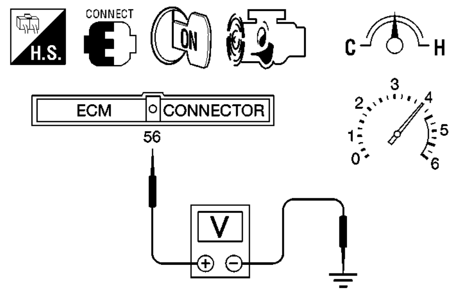
SEF431RB

OK or NG

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

7 CHECK REAR HEATED OXYGEN SENSOR

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 (Rear heated oxygen sensor signal) and ECM ground.



AEC874A

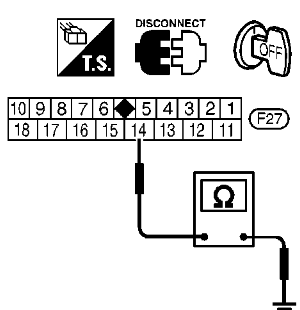
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.56V at least once.
   If the voltage is above 0.56V at step 4, step 5 is not necessary.
5. Check the voltage when revving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

8 CHECK SHIELD CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect harness connectors F27.
3. Check harness continuity between harness connector F27 terminal 14 and ground.



SEF158V

Continuity should exist.

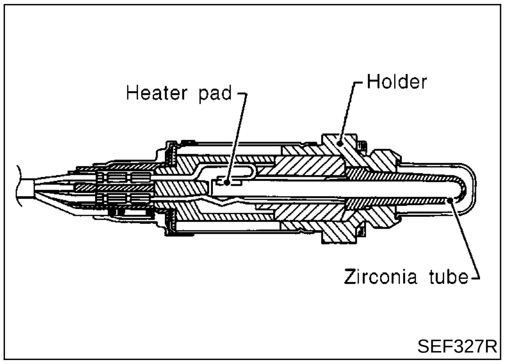
4. Also check harness for short to ground and short to power.
5. Then reconnect harness connectors.

OK or NG

OK ▶	GO TO 10.
NG ▶	GO TO 9.

9	DETECT MALFUNCTIONING PART
Check the following. ● Joint connector-1 (Refer to "HARNESS LAYOUT", ***EL-262***.) ● Harness for open or short between harness connector F27 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-128.	
▶	**INSPECTION END**



SEF327R

Component Description

NGEC0162

The rear heated oxygen sensor (Rear HO2S), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the front heated oxygen sensor are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the rear heated oxygen sensor.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the rear heated oxygen sensor is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0163

Specification data are reference values.

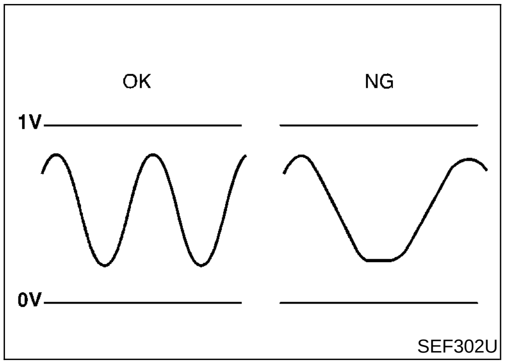
MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SENSOR	• Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
RR O2 MNTR			LEAN ⟷ RICH

ECM Terminals and Reference Value

NGEC0164

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Rear heated oxygen sensor	**[Engine is running]** • After warming up to normal operating temperature and revving engine from idle to 3,000 rpm	0 - Approximately 1.0V



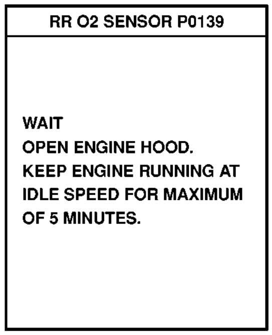
SEF302U

On Board Diagnosis Logic

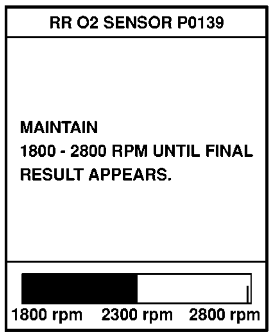
NGEC0165

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

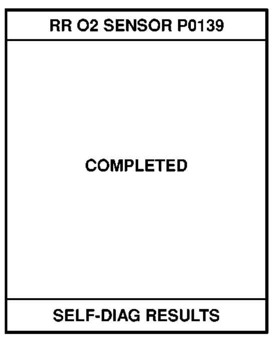
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0139 0707	• It takes more than the specified time for the sensor to respond between rich and lean.	• Harness or connectors (The sensor circuit is open or shorted.) • Rear heated oxygen sensor • Fuel pressure • Injectors • Intake air leaks



SEF554X



SEF555X



SEF556X

DTC Confirmation Procedure

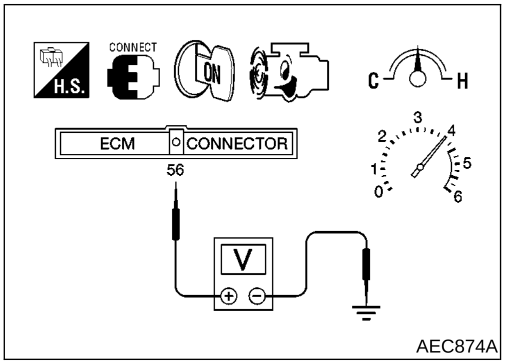
NGEC0166

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 "RR O2 SEN P0139", of "REAR O2 SENSOR" 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-259.
   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) 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 rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

CAUTION:

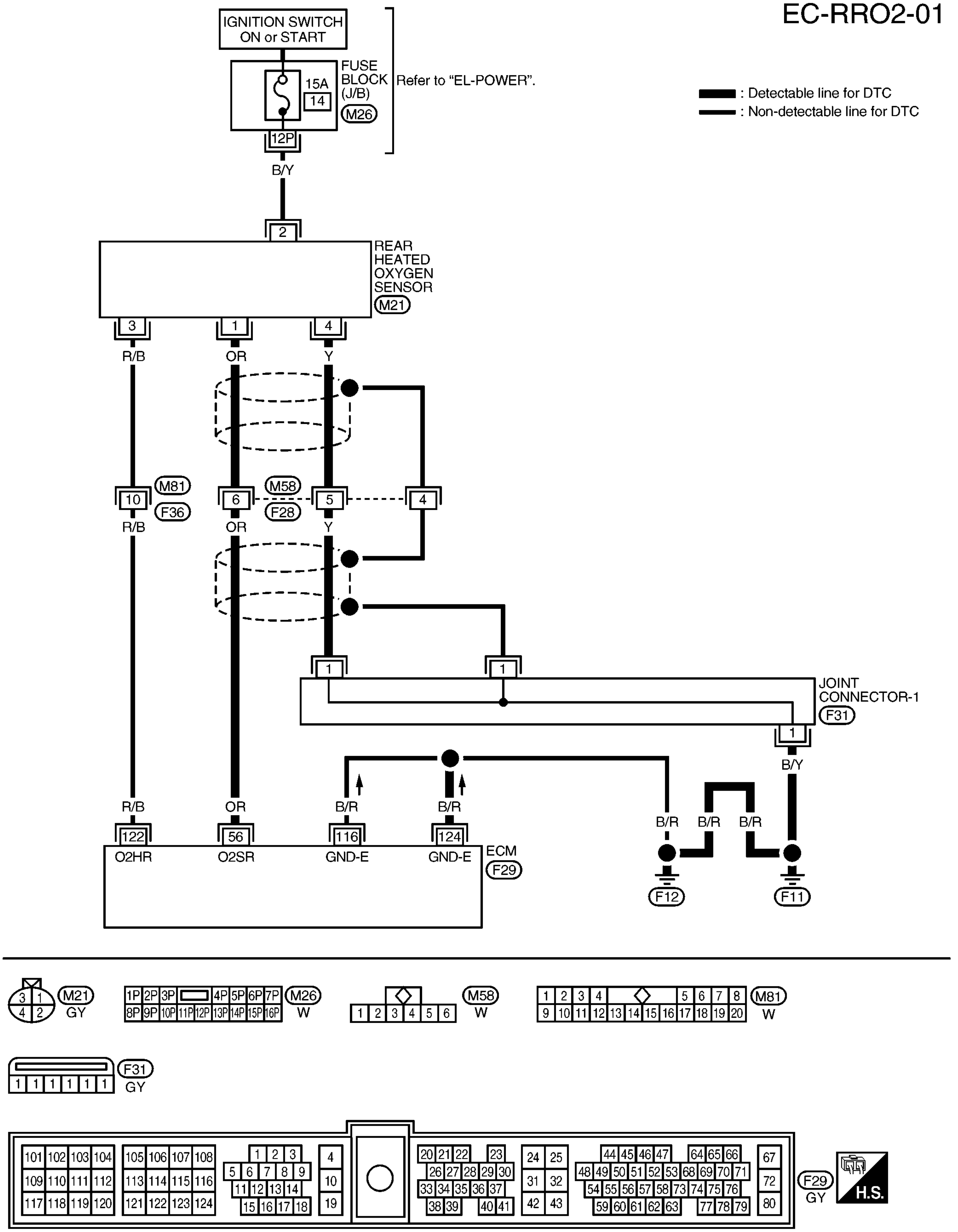
Always drive vehicle at a safe speed.

Without CONSULT-II

1) Start engine and drive vehicle at a speed of 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 (Rear heated oxygen sensor signal) and engine ground.
4) Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should change at more than 0.06V for 1 second during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
   The voltage should change at more than 0.06V for 1 second during this procedure.
6) If NG, go to “Diagnostic Procedure”, EC-259.

Wiring Diagram

NGEC0168



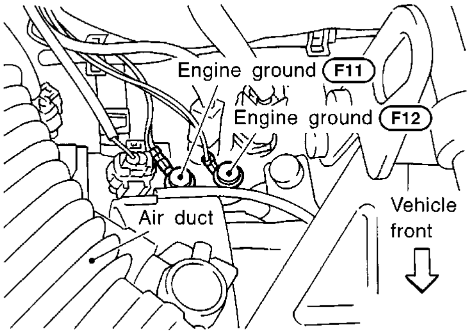
AEC988A

Diagnostic Procedure

NGEC0169

1	RETIGHTEN GROUND SCREWS

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



SEF325V

▶	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 "ACTIVE TEST" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

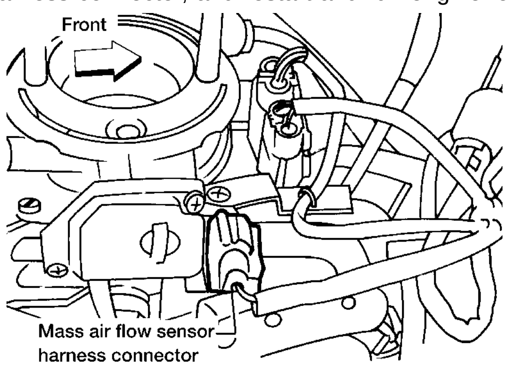
ACTIVE TEST	
SELF-LEARN CONTROL	100 %
MONITOR	
CMPS-RPM	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SENSOR	XXX V
A/F ALPHA	XXX %

SEF165X

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

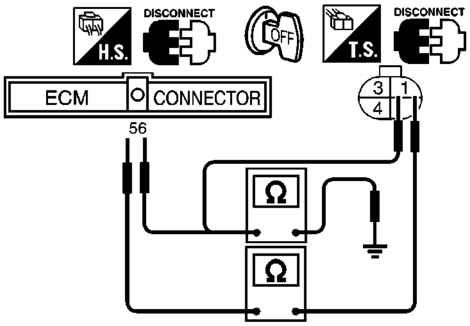
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure diagnostic trouble code No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-67.
7. Make sure diagnostic trouble code No. 0505 is displayed in Diagnostic Test Mode II.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0114 or 0115 detected? Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-278 or EC-286.
No	▶	GO TO 3.

3	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect rear heated oxygen sensor 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 rear heated oxygen sensor and ECM

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

5	CHECK GROUND CIRCUIT

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

OK or NG

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

Diagnostic Procedure (Cont'd)

6	CHECK REAR HEATED OXYGEN SENSOR

With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “RR O2 SENSOR” as the monitor item with CONSULT-II.
4. Check “RR O2 SENSOR” at idle speed when adjusting “FUEL INJECTION” to ±25%.

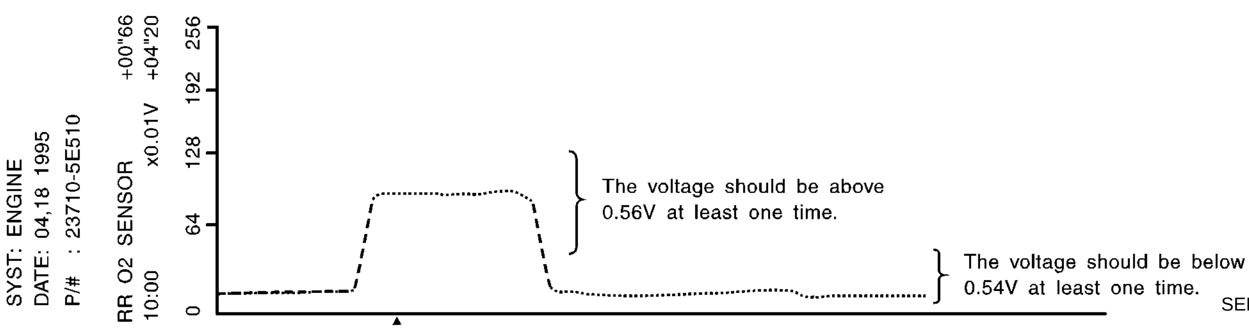
ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
CMPS~RPM(REF)	XXX rpm
FR O2 SENSOR	XXX V
RR O2 SENSOR	XXX V
FR O2 MNTR	RICH
RR O2 MNTR	RICH

PEF102P

“RR O2 SENSOR” should be above 0.56V at least once when the “FUEL INJECTION” is +25%.“RR O2 SENSOR” 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.**



SEF431RB

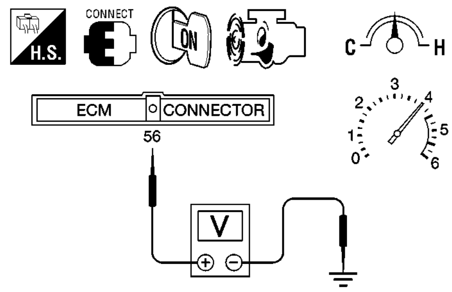
OK or NG

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

7	CHECK REAR HEATED OXYGEN SENSOR

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 (Rear heated oxygen sensor signal) and engine ground.



AEC874A

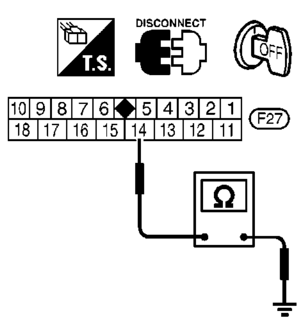
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.56V at least once.
   If the voltage is above 0.56V at step 4, step 5 is not necessary.
5. Check the voltage when revving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

8	CHECK SHIELD CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect harness connectors F27.
3. Check harness continuity between harness connector F27 terminal 14 and ground.



SEF158V

Continuity should exist.

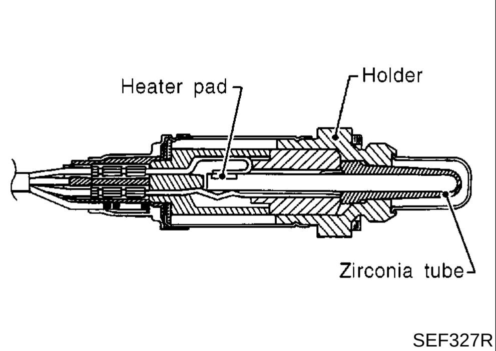
4. Also check harness for short to ground and short to power.
5. Then reconnect harness connectors.

OK or NG

OK ▶	GO TO 10.
NG ▶	GO TO 9.

9	DETECT MALFUNCTIONING PART
Check the following. ● Joint connector-1 (Refer to "HARNESS LAYOUT", ***EL-272***.) ● Harness for open or short between harness connector F27 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-128.	
▶	**INSPECTION END**



SEF327R

Component Description

NGEC0171

The rear heated oxygen sensor (Rear HO2S), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the front heated oxygen sensor are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the rear heated oxygen sensor.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the rear heated oxygen sensor is not used for engine control operation.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0172

Specification data are reference values.

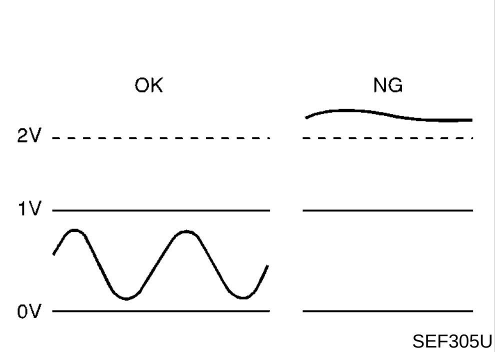
MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SENSOR	● Engine: After warming up	Revving engine from idle to 3,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
RR O2 MNTR			LEAN ⟷ RICH

ECM Terminals and Reference Value

NGEC0173

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Rear heated oxygen sensor	**[Engine is running]** ● After warming up to normal operating temperature and revving engine from idle to 3,000 rpm	0 - Approximately 1.0V



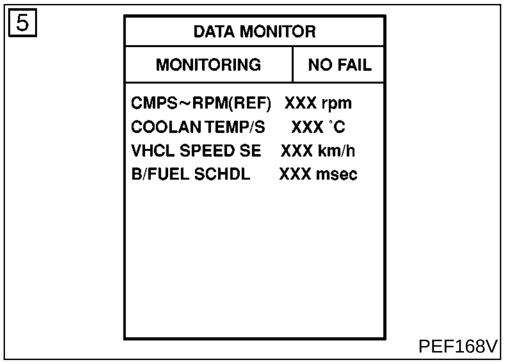
SEF305U

On Board Diagnosis Logic

NGEC0174

The rear heated oxygen sensor has a much longer switching time between rich and lean than the front heated oxygen sensor. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of rear heated oxygen sensor, ECM monitors whether or not the voltage is too high during various driving conditions such as fuel-cut.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0140 0512	● An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Rear heated oxygen sensor



PEF168V

DTC Confirmation Procedure

NGEC0175

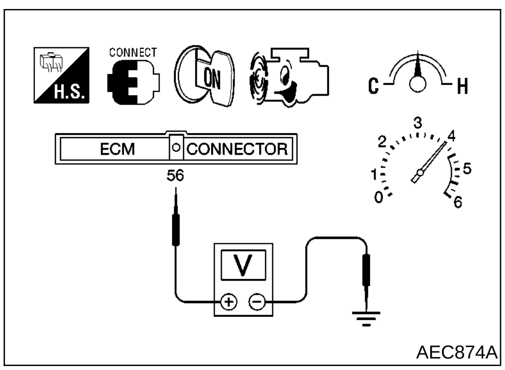
NOTE:
If "DTC Confirmation Procedure " has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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.

CMPS·RPM (REF)	1,400 - 3,200 rpm
VHCL SPEED SE	64 - 120 km/h (40 - 75 MPH)
B/FUEL SCHDL	0.5 - 4.8 msec (A/T) 0.5 - 5.2 msec (M/T)
COOLAN TEMP/S	70 - 100°C (158 - 212°F)
Selector lever	Suitable position

4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-268.



AEC874A

Overall Function Check

NGEC0176

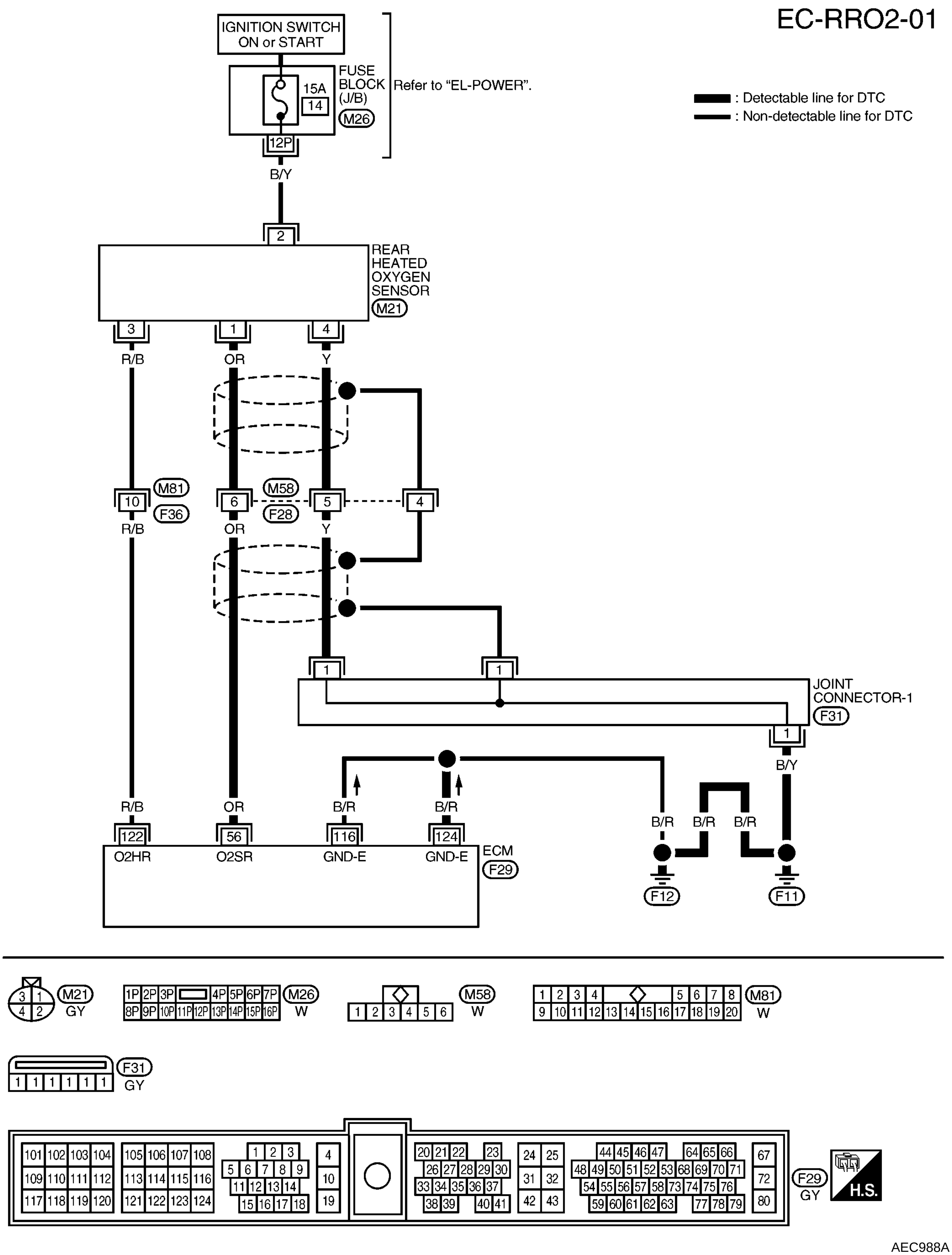
Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

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 (Rear heated oxygen sensor 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 2V during this procedure.
5) If NG, go to "Diagnostic Procedure", EC-268.

Wiring Diagram

NGEC0177



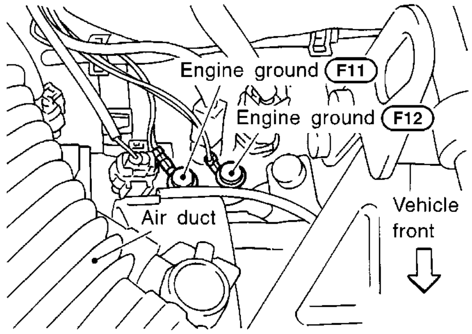
GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

Diagnostic Procedure

NGEC0178

1	RETIGHTEN GROUND SCREWS

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

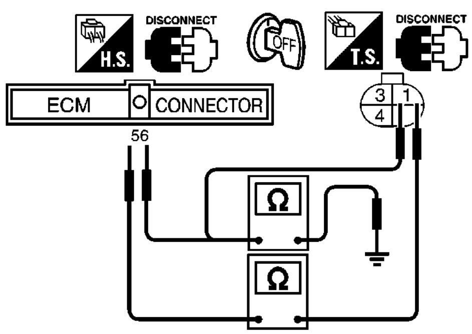


SEF325V

▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect rear heated oxygen sensor 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 rear heated oxygen sensor and ECM

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

4	CHECK GROUND CIRCUIT	
1. Check harness continuity between rear heated oxygen sensor terminal 4 and engine ground. Refer to "Wiring Diagram", EC-267. **Continuity should exist.** 2. Also check harness for short to ground and short to power. **OK or NG**		
OK	▶	GO TO 5.
NG	▶	GO TO 4.

5	CHECK HARNESS CONNECTOR	
Check rear heated oxygen sensor 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.

Diagnostic Procedure (Cont'd)

6	CHECK REAR HEATED OXYGEN SENSOR

With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “RR O2 SENSOR” as the monitor item with CONSULT-II.
4. Check “RR O2 SENSOR” at idle speed when adjusting “FUEL INJECTION” to ±25%.

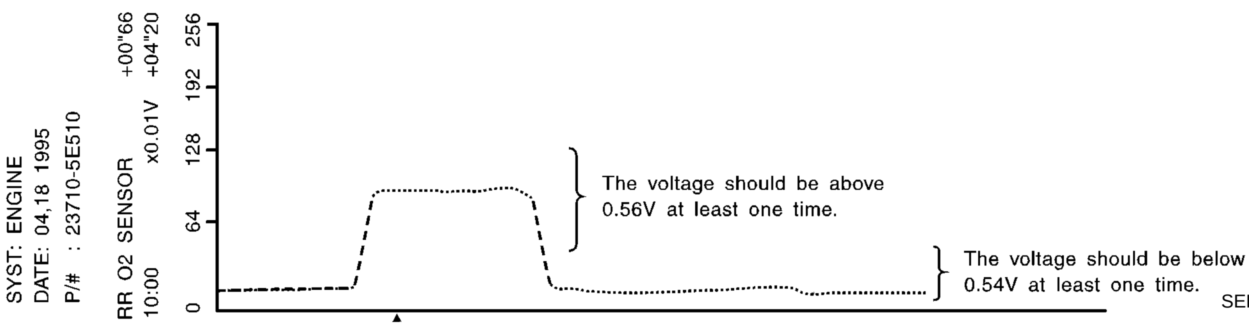
ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
CMPS~RPM(REF)	XXX rpm
FR O2 SENSOR	XXX V
RR O2 SENSOR	XXX V
FR O2 MNTR	RICH
RR O2 MNTR	RICH

PEF102P

“RR O2 SENSOR” should be above 0.56V at least once when the “FUEL INJECTION” is +25%.“RR O2 SENSOR” 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.**



SEF431RB

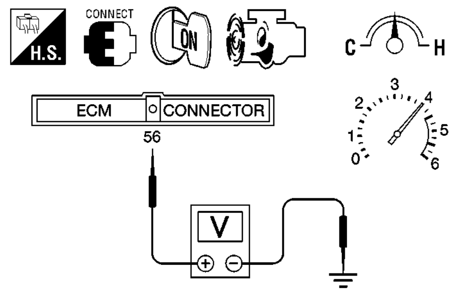
OK or NG

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

7	CHECK REAR HEATED OXYGEN SENSOR

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 (Rear heated oxygen sensor signal) and ECM ground.



AEC874A

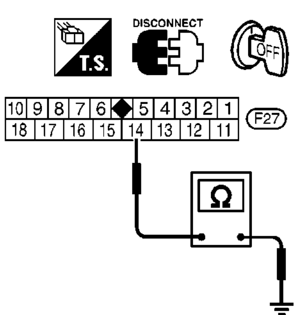
4. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.56V at least once.
   If the voltage is above 0.56V at step 4, step 5 is not necessary.
5. Check the voltage when revving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

8	CHECK SHIELD CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect harness connectors F27.
3. Check harness continuity between harness connector F27 terminal 14 and ground.



SEF158V

Continuity should exist.

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

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART
Check the following. ● Joint connector-1 (Refer to "HARNESS LAYOUT", ***EL-272***.) ● Harness for open or short between harness connector F27 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-128.	
▶	**INSPECTION END**

Description

NGEC0180

SYSTEM DESCRIPTION

NGEC0180S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Rear heated oxygen sensor heater control	Rear heated oxygen sensor heater

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

OPERATION

NGEC0180S02

Engine condition	Rear heated oxygen sensor heater
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
RR O2 HEATER	● Engine speed: Idle [After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more]	ON
	● Ignition switch ON (Engine stopped)	OFF

ECM Terminals and Reference Value

NGEC0182

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
122	R/B	Rear heated oxygen sensor heater	**[Engine is running]** ● After driving for 2 minutes at a speed of 70 km/h (43 MPH) or more	Approximately 0.4V
			[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 0902	● The current amperage in the rear heated oxygen sensor heater circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the rear heated oxygen sensor heater.)	● Harness or connectors (The rear heated oxygen sensor heater circuit is open or shorted.) ● Rear heated oxygen sensor heater

DTC Confirmation Procedure

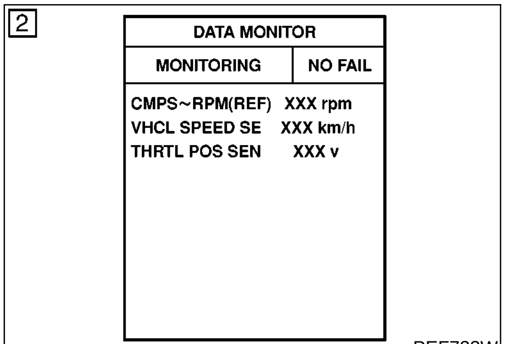
NGEC0184

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.



PEF723W

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-276.

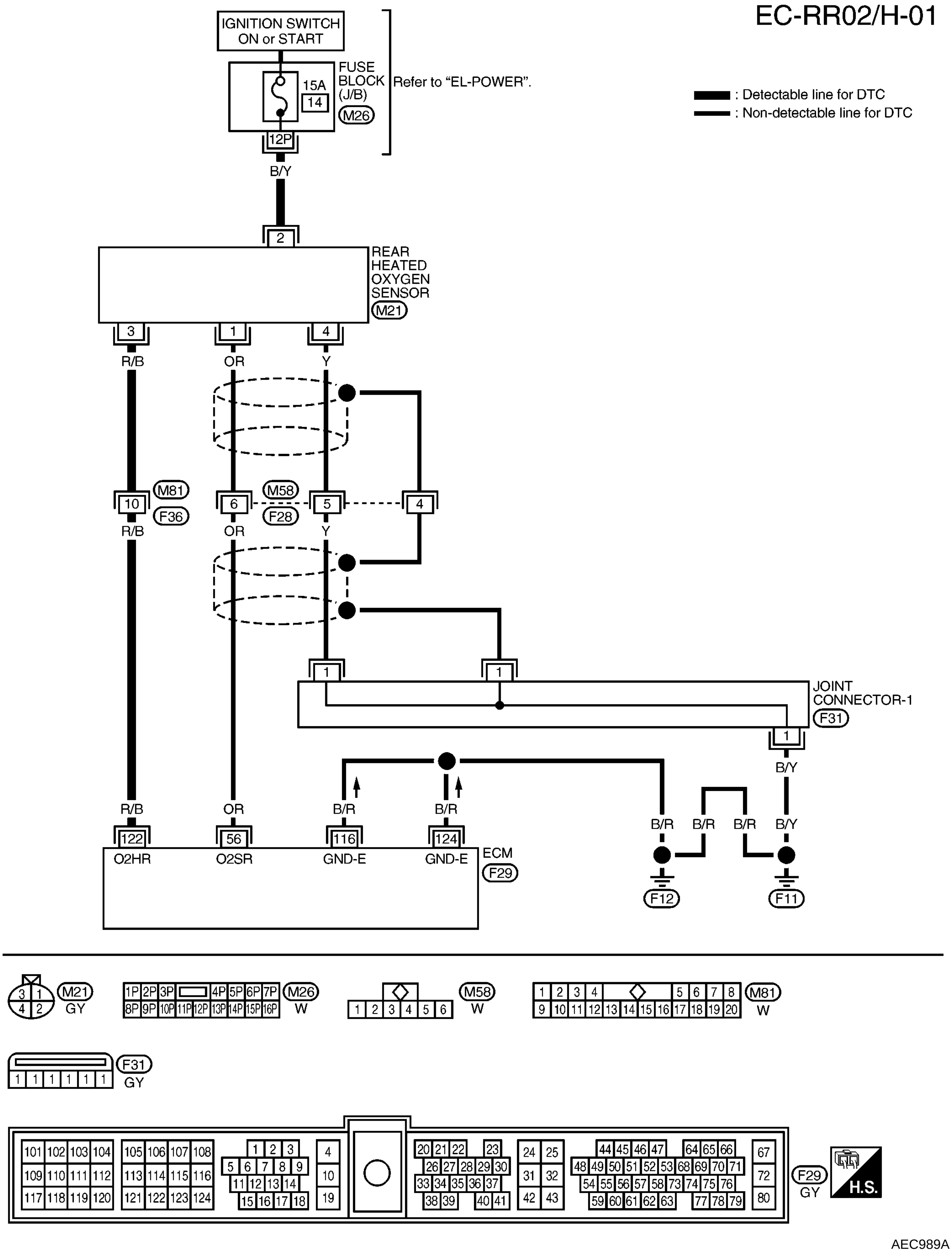
With GST

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-276.

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



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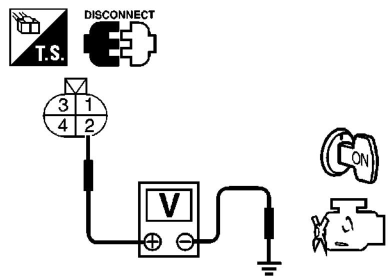
Diagnostic Procedure

NGEC0186

1	CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect rear heated oxygen sensor harness connector.
3. Turn ignition switch ON.
4. Check voltage between terminal 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 rear heated oxygen sensor 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 rear heated oxygen sensor terminal 3 and ECM terminal 122. Refer to the 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.

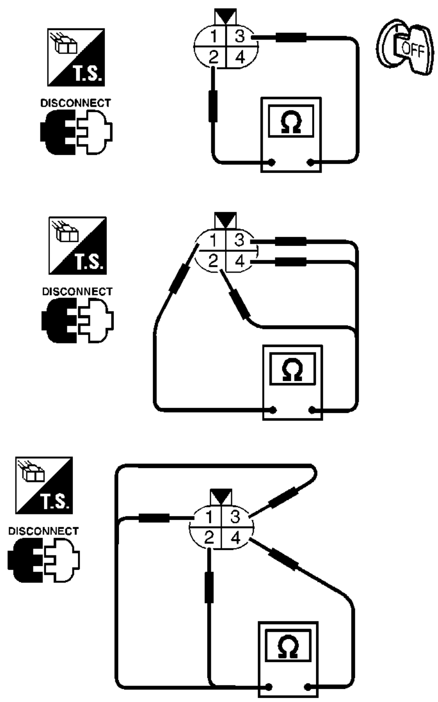
4	DETECT MALFUNCTIONING PART

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

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

5	CHECK REAR HEATED OXYGEN SENSOR HEATER

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 rear heated oxygen sensor.

6	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

▶	**INSPECTION END**

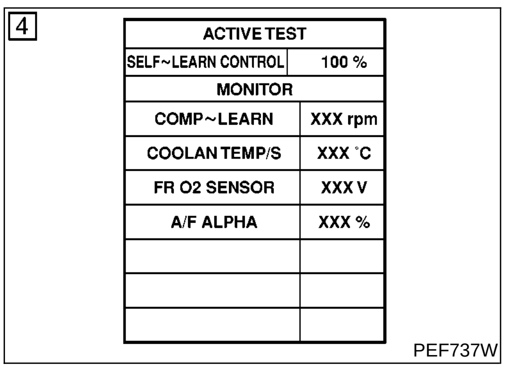
On Board Diagnosis Logic

NGEC0188

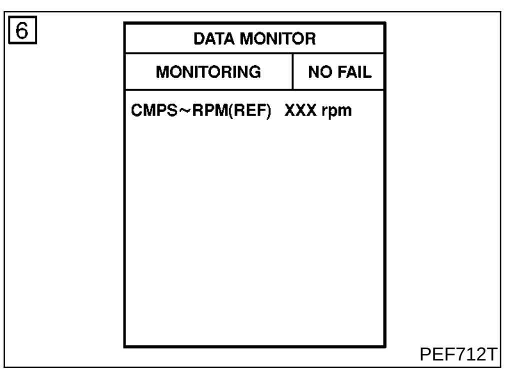
With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the front heated oxygen sensor. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Front heated oxygen sensor	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection & mixture ratio control	Injectors

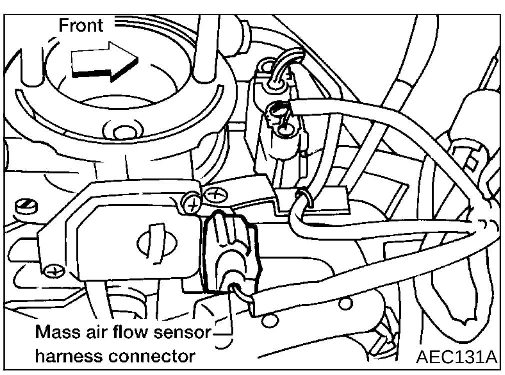
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0171 0115	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	• Intake air leaks • Front heated oxygen sensor • Injectors • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor



PEF737W



PEF712T



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 “ACTIVE TEST” 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-281.
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-281. 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.

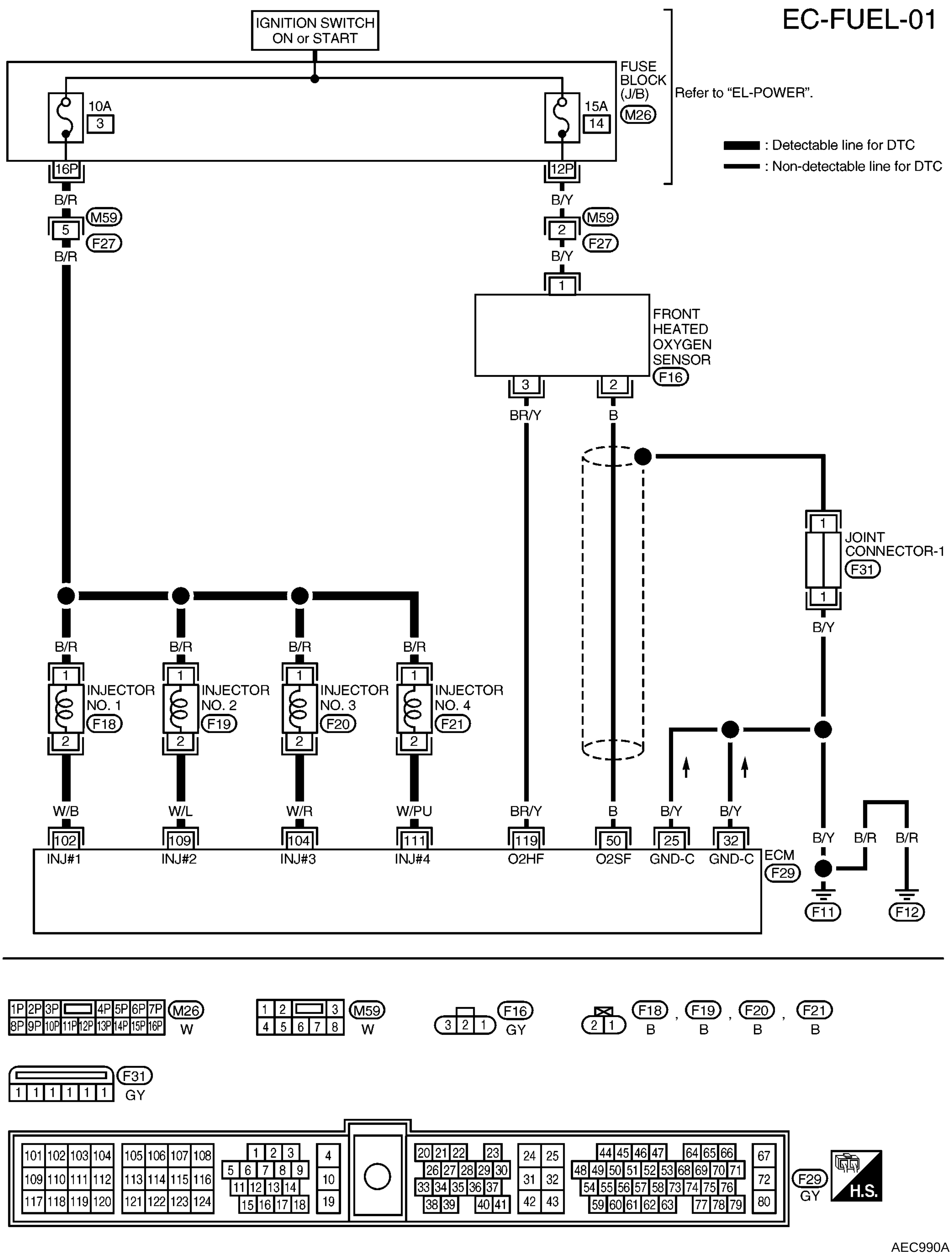
7) Start engine again and run it for at least 10 minutes at idle speed.
8) Select "MODE 7" with GST. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-281.
9) If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
10) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-281. If engine does not start, visually check for exhaust and intake air leak.

No Tools

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Turn ignition switch OFF.
6) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure 1st trip DTC 0102 is detected.
7) Erase the 1st trip DTC 0102 by changing from Diagnostic Test Mode II to Diagnostic Test Mode I. Refer to "How to Erase DTC (No Tools)", EC-68.
8) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure DTC 0505 is detected.
9) Start engine again and run it for at least 10 minutes at idle speed. The 1st trip DTC 0115 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-281.
10) If it is difficult to start engine at step 9, the fuel injection system also has a malfunction.
11) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-281. If engine does not start, visually check for exhaust and intake air leak.

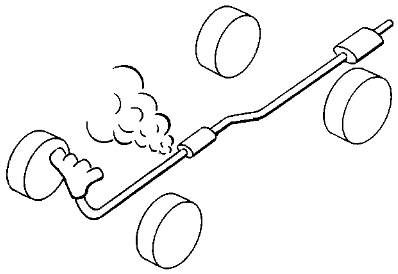
Wiring Diagram

NGEC0190



Diagnostic Procedure

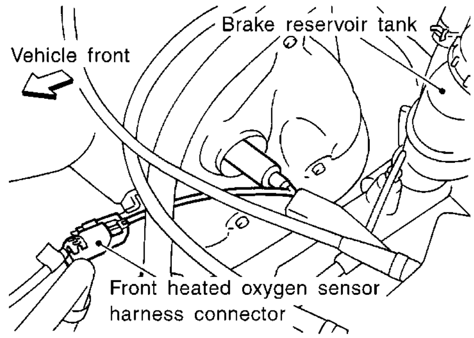
NGEC0191

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.

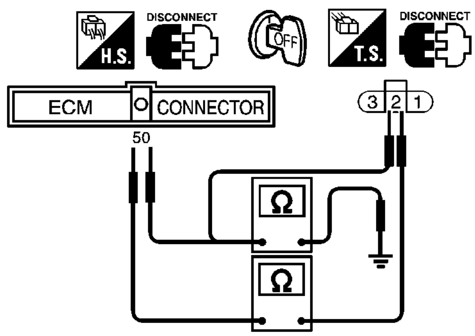
3 CHECK FRONT HEATED OXYGEN SENSOR CIRCUIT

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



SEF331V

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-40.
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-561.
- Fuel pressure regulator Refer to EC-41.
- Fuel lines Refer to "ENGINE MAINTENANCE", ***MA-20***.
- Fuel filter for clogging

	▶	Repair or replace.

<table>
<tr><td>6</td><td colspan="2">CHECK MASS AIR FLOW SENSOR</td></tr>
<tr><td colspan="3">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</td></tr>
<tr><td colspan="3">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</td></tr>
<tr><td colspan="3">No Tools
1. Start engine and warm it up to normal operating temperature.
2. Check voltage between ECM terminal 47 (Mass air flow sensor signal) and ground.
at idling: 0.9 - 1.8V
at 2,500 rpm: 1.9 - 2.3V
OK or NG</td></tr>
<tr><td colspan="2">OK ▶</td><td>GO TO 7.</td></tr>
<tr><td colspan="2">NG ▶</td><td>Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-136.</td></tr>
</table>

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.

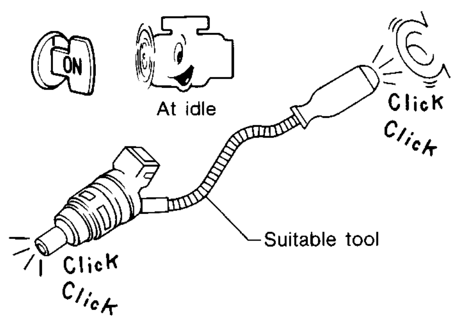
ACTIVE TEST	
POWER BALANCE	
MONITOR	
CMPS~RPM(REF)	XXX rpm
MAS AIR/FL SEN	XXX V
IACV-AAC/V	XXX %

SEF167X

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-553.

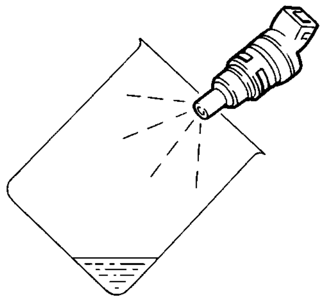
8	REMOVE INJECTOR

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-41.
   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-128.

	▶	**INSPECTION END**

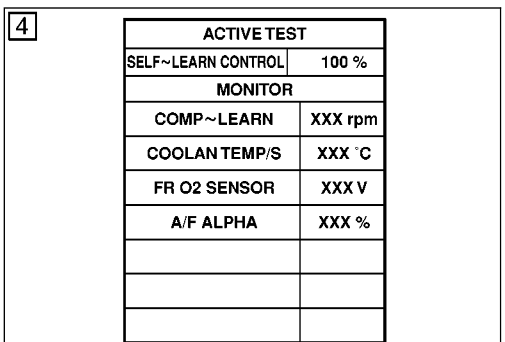
On Board Diagnosis Logic

NGEC0192

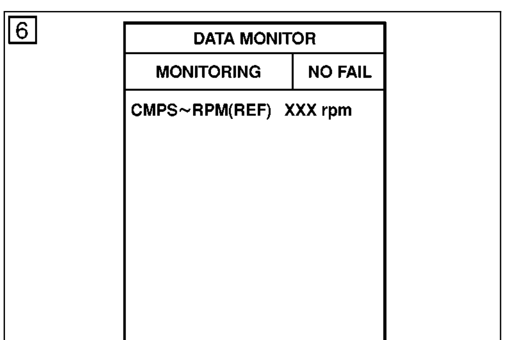
With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the front heated oxygen sensor. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Front heated oxygen sensor	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection & mixture ratio control	Injectors

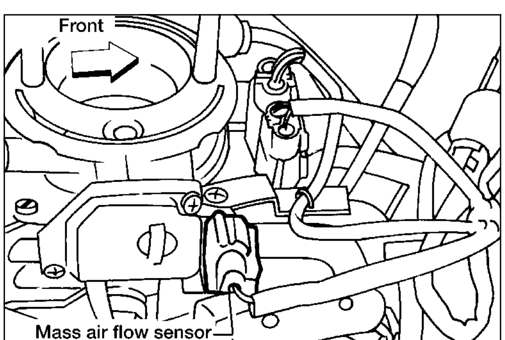
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0172 0114	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	● Front heated oxygen sensor ● Injectors ● Exhaust gas leaks ● Incorrect fuel pressure ● Mass air flow sensor



PEF737W



PEF712T



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 “ACTIVE TEST” 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-289.
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-289. 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.

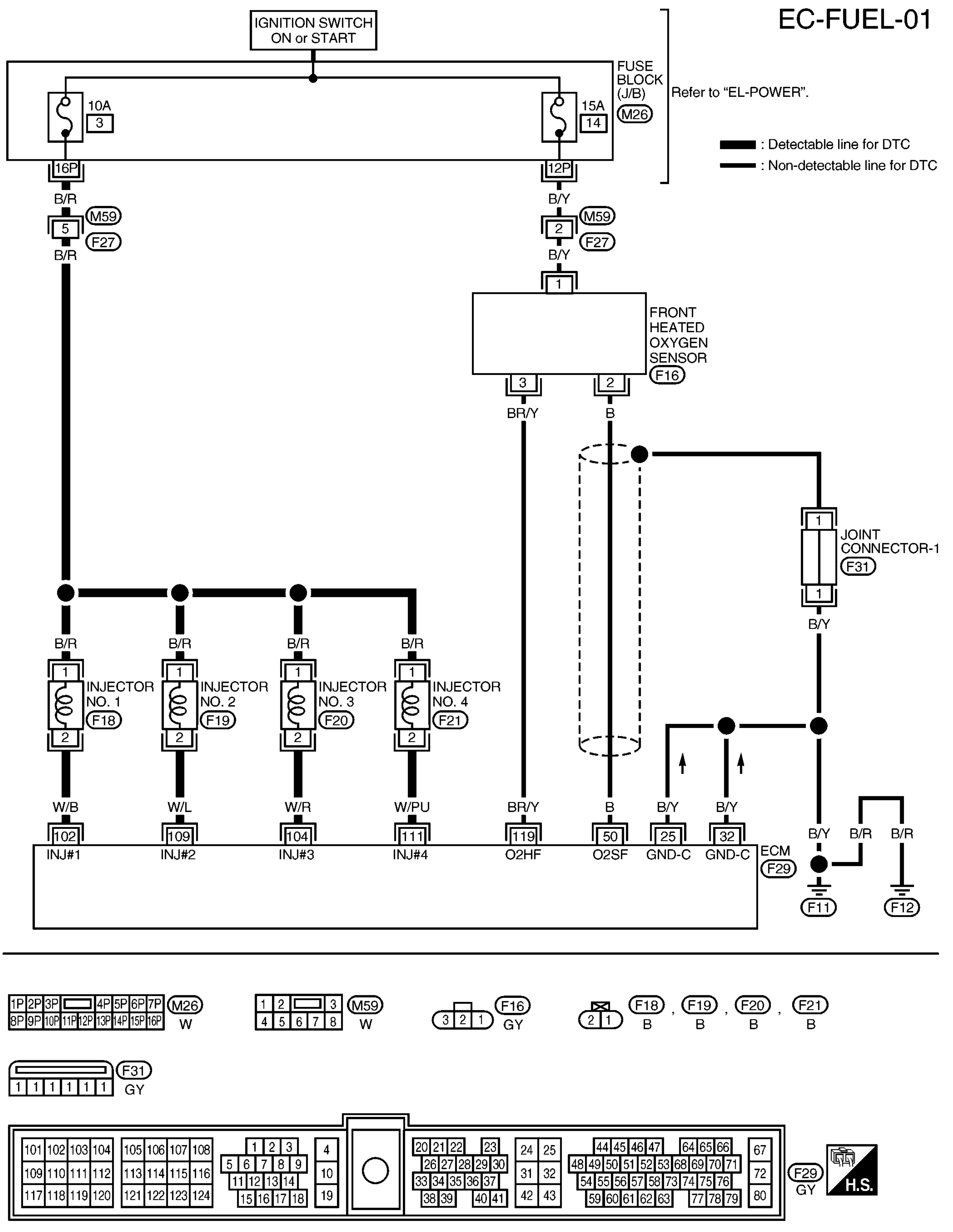
7) Start engine again and run it for at least 10 minutes at idle speed.
8) Select "MODE 7" with GST. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-289.
9) If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
10) Crank engine while depressing accelerator pedal.
If engine starts, go to "Diagnostic Procedure", EC-289. If engine does not start, remove ignition plugs and check for fouling, etc.

No Tools

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart engine and run it for at least 3 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Turn ignition switch ON.
6) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure 1st trip DTC 0102 is detected.
7) Erase the 1st trip DTC 0102 by changing from Diagnostic Test Mode II to Diagnostic Test Mode I. Refer to "How to Erase DTC (No Tools)", EC-68.
8) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure DTC 0505 is detected.
9) Start engine again and run it for at least 10 minutes at idle speed. The 1st trip DTC 0114 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-289.
10) If it is difficult to start engine at step 9, the fuel injection system also has a malfunction.
11) Crank engine while depressing accelerator pedal.
If engine starts, go to "Diagnostic Procedure", EC-289. If engine does not start, remove ignition plugs and check for fouling, etc.

Wiring Diagram

NGEC0194



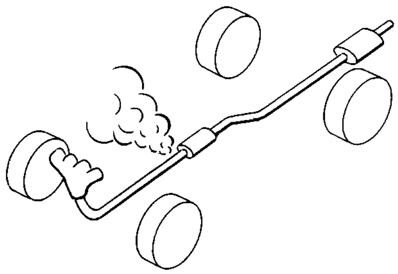
AEC990A

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 the warm-up three way catalyst (California model), the three way catalyst (Non-California model).



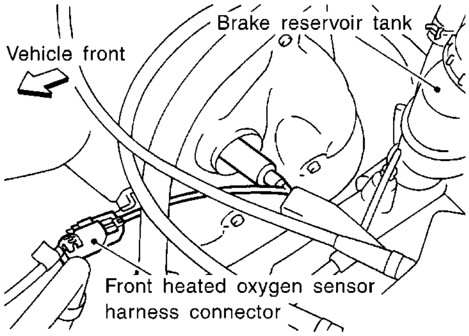
SEF099P

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace.

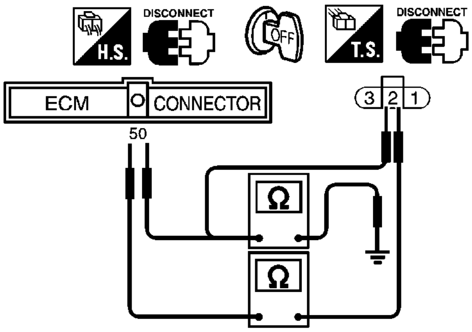
2	CHECK FRONT HEATED OXYGEN SENSOR CIRCUIT

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



SEF331V

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-40. 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-561.) ● Fuel pressure regulator (Refer to EC-41.)	
▶	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**	
No Tools 1. Start engine and warm it up to normal operating temperature. 2. Check voltage between ECM terminal 47 (Mass air flow sensor signal) and ground. **at idling: 0.9 - 1.8V** **at 2,500 rpm: 1.9 - 2.3V** **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-141.

6	CHECK FUNCTION OF INJECTORS

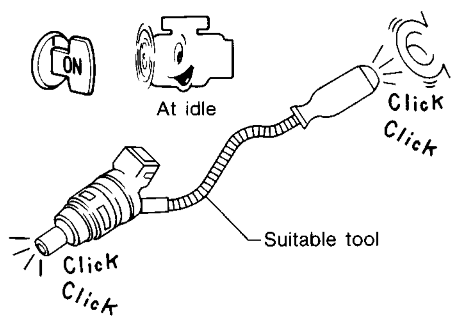
With CONSULT-II
1. Install all parts removed.
2. Start engine.
3. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.

ACTIVE TEST	
POWER BALANCE	
MONITOR	
CMPS~RPM(REF)	XXX rpm
MAS AIR/FL SEN	XXX V
IACV-AAC/V	XXX %

PEF564N

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-553.

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-41.
Keep fuel hose and all injectors connected to injector gallery.

	▶	GO TO 8.

8	CHECK INJECTOR

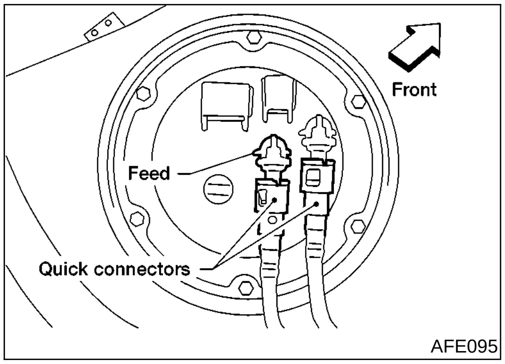
1. Disconnect all injector harness connectors.
2. Disconnect all ignition coil harness connectors.
3. Prepare pans or saucers under each injectors.
4. Crank engine for about 3 seconds.
Make sure fuel does not drip from injector.

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.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

9	**CHECK INTERMITTENT INCIDENT**
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.	
▶	**INSPECTION END**

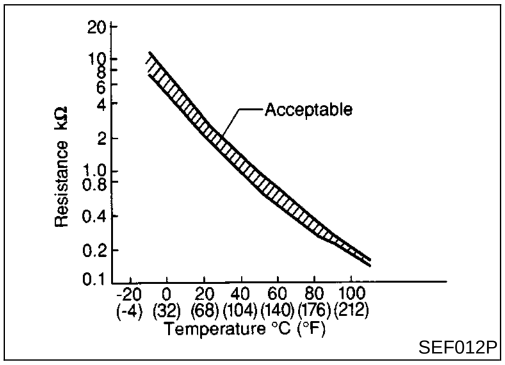


AFE095

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.



SEF012P

<Reference data>

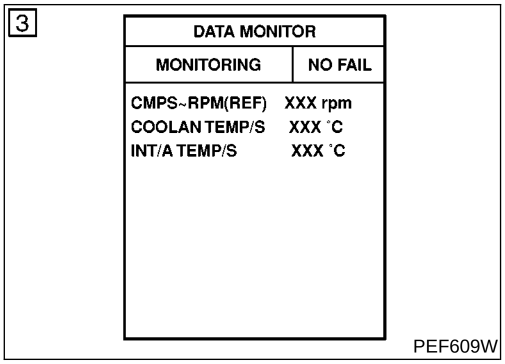
Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between ECM terminal 60 (Fuel tank temperature sensor) and ECM terminal 32 (ECM ground).

On Board Diagnosis Logic

NGEC0197

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0180 0402	• An excessively high or low voltage is sent to ECM. • Rationally incorrect voltage is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • Fuel tank temperature sensor



PEF609W

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-296.
   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-296.

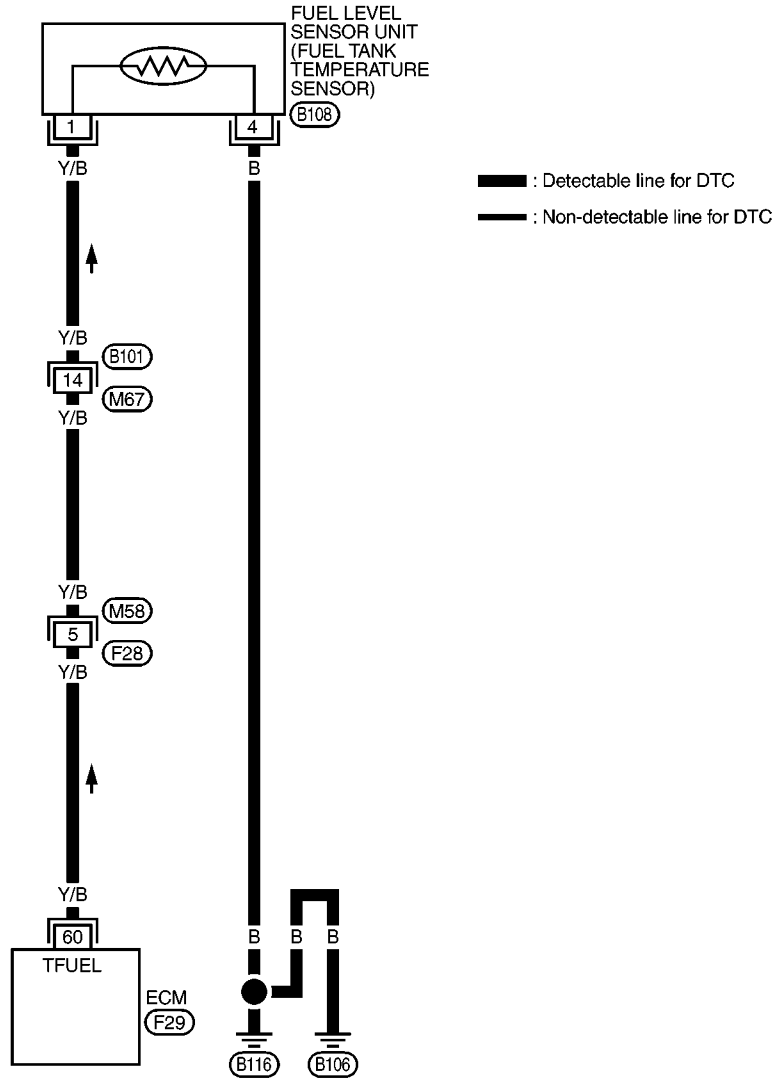
With GST

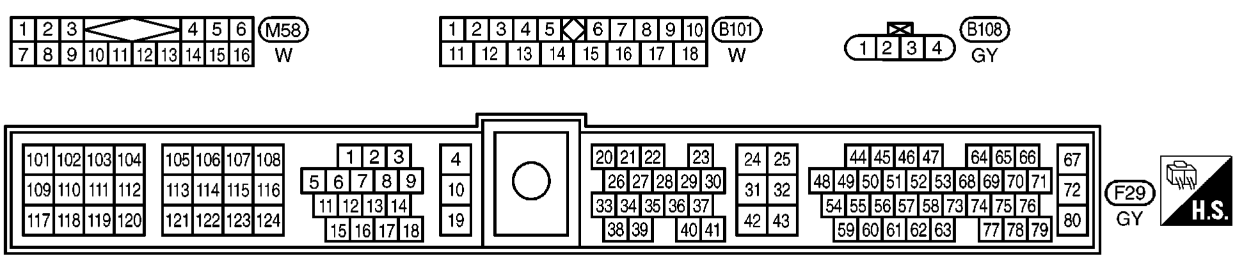
Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0199

EC-TFTS-01





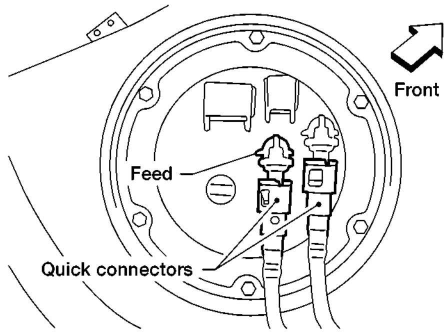
SEF841W

Diagnostic Procedure

NGEC0200

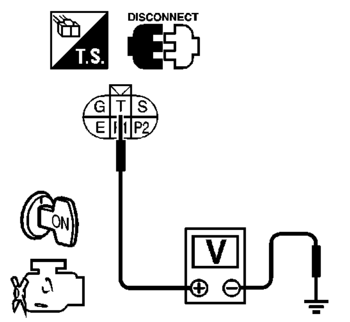
1	CHECK POWER SUPPLY

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



AFE095

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



SEF170V

Voltage: Approximately 5V

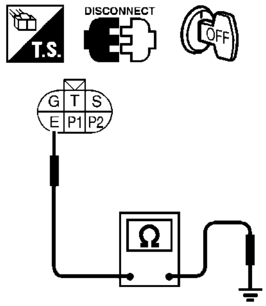
OK or NG

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

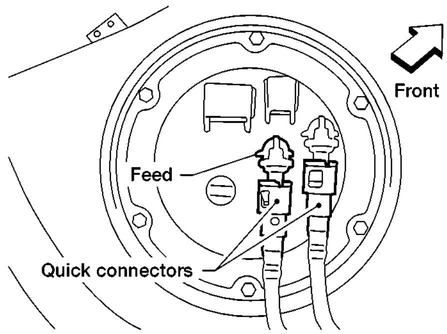
	▶	Repair harness or connector.

3	CHECK GROUND CIRCUIT	
1. Turn ignition switch OFF. 2. Check harness continuity between terminal E and body ground.  SEF171V **Continuity should exist.** 3. Also check harness for short to ground and short to power. **OK or NG**		
OK	▶	GO TO 5.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

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 ground or short to power in harness or connectors.

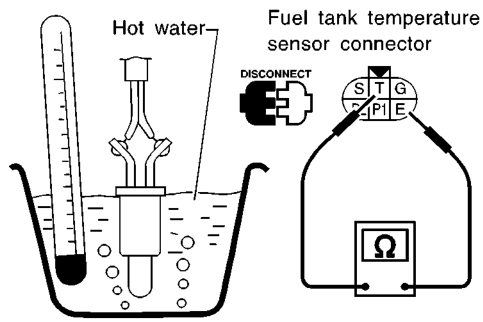
5 CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.



AFE095

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



SEF172VA

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-128.

	▶	**INSPECTION END**

On Board Diagnosis Logic

NGEC0202

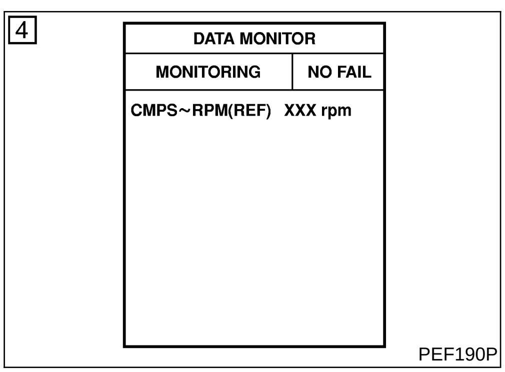
When a misfire occurs, the engine speed will fluctuate. If the engine speed fluctuates enough to cause the CKP sensor signal to vary, ECM can determine that a misfire is occurring.

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 emission), the MIL will only light when the misfire is detected on a second trip. During this condition, ECM monitors the CKP sensor signal every 1000 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 (0701)	• Multiple cylinders misfire.	• Improper spark plug • Insufficient compression • Incorrect fuel pressure • EGR valve • The injector circuit is open or shorted • Injectors • Intake air leak • The ignition secondary circuit is open or shorted • Lack of fuel • Drive plate/Flywheel • Front heated oxygen sensor • Incorrect distributor rotor
P0301 (0608)	• No. 1 cylinder misfires.	
P0302 (0607)	• No. 2 cylinder misfires.	
P0303 (0606)	• No. 3 cylinder misfires.	
P0304 (0605)	• No. 4 cylinder misfires.	



PEF190P

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 - 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-300.

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-476. **OK or NG**		
OK	▶	GO TO 4.
NG	▶	Repair EGR system.

4	PERFORM POWER BALANCE TEST

With CONSULT-II

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.

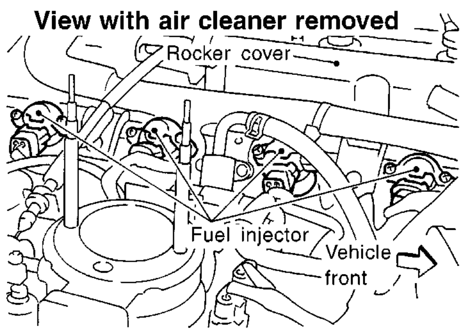
ACTIVE TEST	
POWER BALANCE	
MONITOR	
CMPS~RPM(REF)	XXX rpm
MAS AIR/FL SEN	XXX V
IACV-AAC/V	XXX %

PEF564N

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?



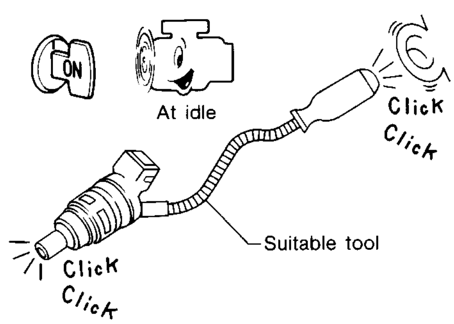
SEF319V

Yes or No

Yes	▶	GO TO 5.
No	▶	GO TO 8.

5	CHECK INJECTOR

Does each injector make an operating sound at idle?



MEC703B

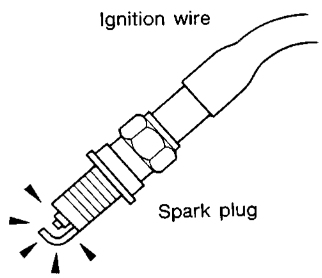
Yes or No

Yes	▶	GO TO 6.
No	▶	Check injector(s) and circuit(s). Refer to EC-553.

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

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.



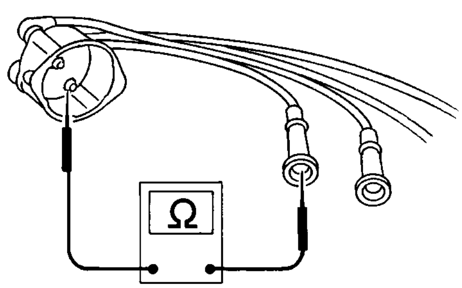
SEF282G

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)

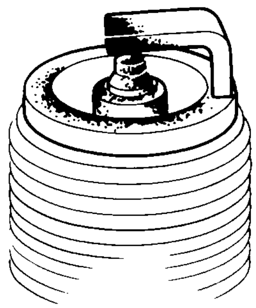
If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.

OK or NG

OK	▶	Check distributor rotor head for incorrect parts. Check ignition coil, power transistor and their circuits. Refer to EC-449.
NG	▶	Replace.

8	CHECK SPARK PLUGS	

Remove the spark plugs and check for fouling, etc.



SEF156I

OK or NG

OK	▶	GO TO 9.
NG	▶	Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to “ENGINE MAINTENANCE”, ***MA-22***.

9	CHECK COMPRESSION PRESSURE

Refer to ***EM-15***.

- Check compression pressure.

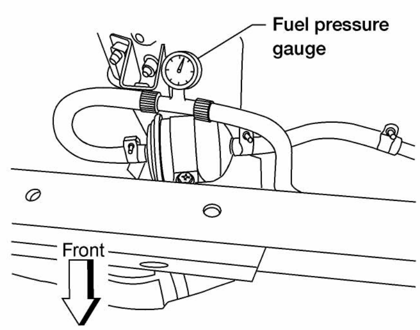
Standard:
1,226 kPa (12.5 kg/cm^2, 178 psi)/300 rpm
Minimum:
1,030 kPa (10.5 kg/cm^2, 149 psi)/300 rpm
Difference between each cylinder:
98 kPa (1.0 kg/cm^2, 14 psi)/300 rpm

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-40.
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.

Diagnostic Procedure (Cont'd)

11	DETECT MALFUNCTIONING PART	
Check the following. ● Fuel pump and circuit Refer to EC-561. ● Fuel pressure regulator Refer to EC-41. ● Fuel lines Refer to "ENGINE MAINTENANCE", ***MA-20***. ● Fuel filter for clogging		
▶	Repair or replace.	

12	CHECK IGNITION TIMING	
1. Check the following items. Refer to "Basic Inspection", EC-95.		

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

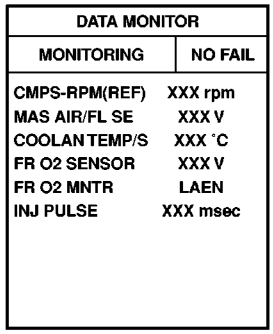
OK or NG

OK (With CONSULT-II)	▶	GO TO 13.
OK (Without CONSULT-II)	▶	GO TO 14.
NG	▶	Adjust ignition timing.

13 CHECK FRONT HEATED OXYGEN SENSOR

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 "FR O2 SENSOR" and "FR O2 MNTR" 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.



PEF084P

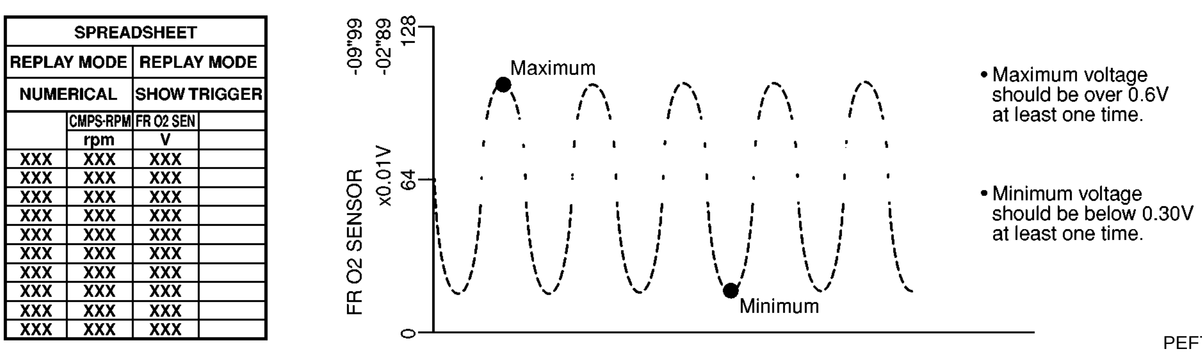
6. Check the following.

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

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

SEF947V

  R = "FR O2 MNTR", "RICH"
  L = "FR O2 MNTR", "LEAN"
- "FR O2 SENSOR" voltage goes above 0.6V at least once.
- "FR O2 SENSOR" voltage goes below 0.3V at least once.
- "FR O2 SENSOR" voltage never exceeds 1.0V.



PEF736W

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.**

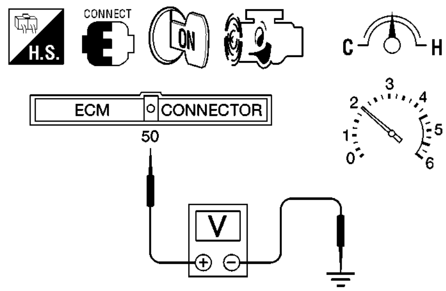
OK or NG

OK	▶	GO TO 15.
NG	▶	Replace front heated oxygen sensor.

14	CHECK FRONT HEATED OXYGEN SENSOR

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 (Front heated oxygen sensor 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 (FRONT HEATED OXYGEN SENSOR MONITOR).
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

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

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

No Tools

Check voltage between ECM terminal 47 (Mass air flow sensor signal) and ground.

at idling: 0.9 - 1.8V
at 2,500 rpm: 1.9 - 2.3V

OK or NG

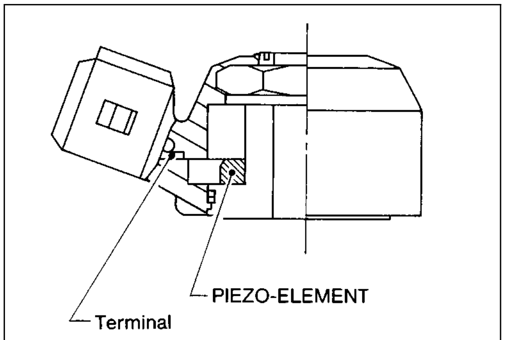
OK	▶	GO TO 17.
NG	▶	GO TO 16.

16	CHECK CONNECTORS
Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-136. **OK or NG**	
NG ▶	Repair or replace it.

17	CHECK SYMPTOM MATRIX CHART
Check items on the rough idle symptom in "Symptom Matrix Chart", EC-111. **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-67.	
▶	GO TO 19.

19	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.	
▶	**INSPECTION END**



SEF598K

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

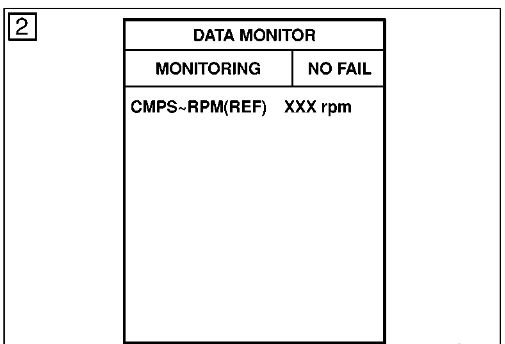
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

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 0304	● An excessively low or high voltage from the knock sensor is sent to ECM.	● Harness or connectors (The knock sensor circuit is open or shorted.) ● Knock sensor



PEF357V

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-310.

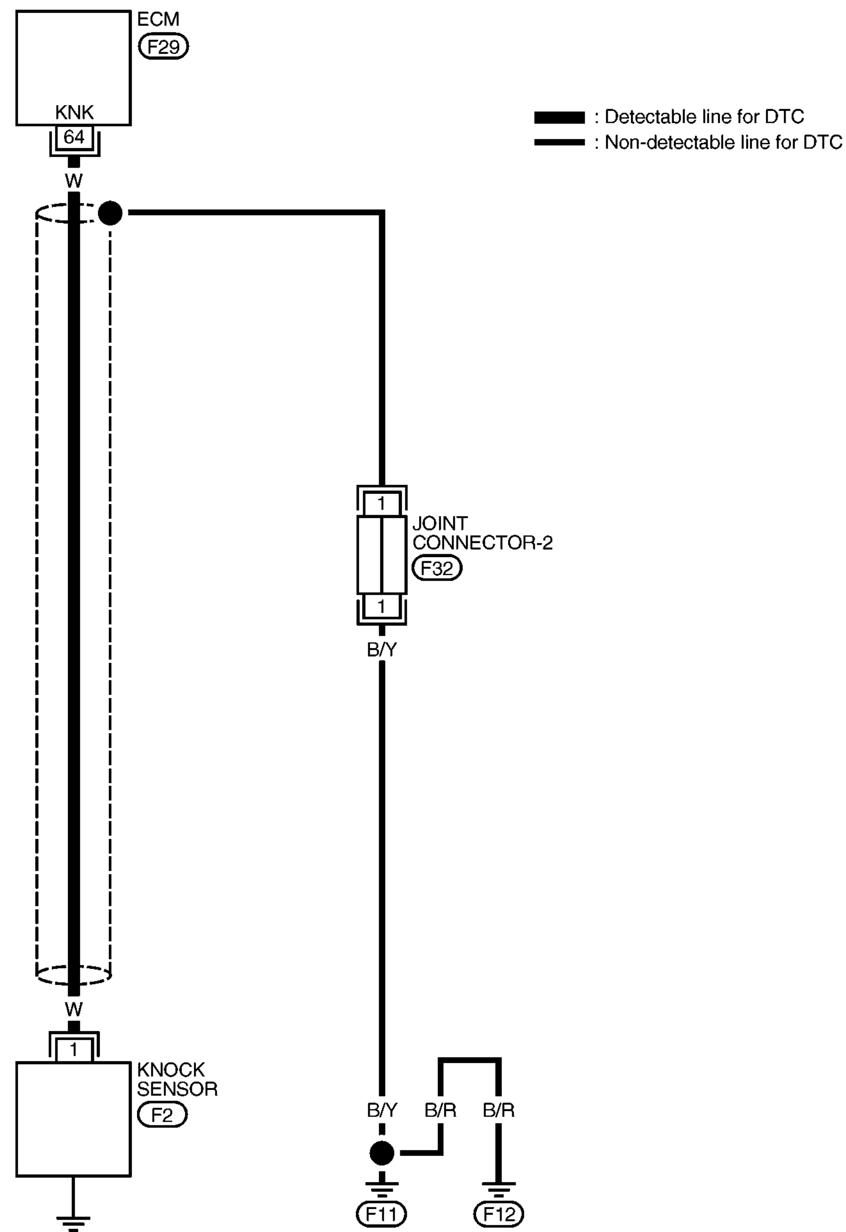
With GST

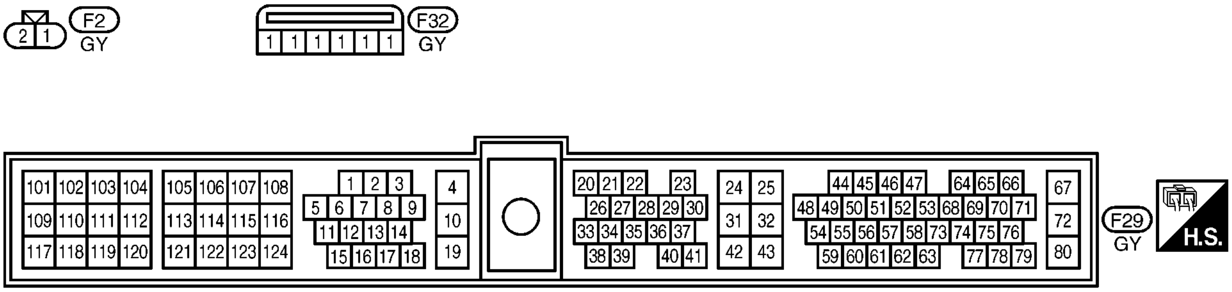
Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0210

EC-KS-01

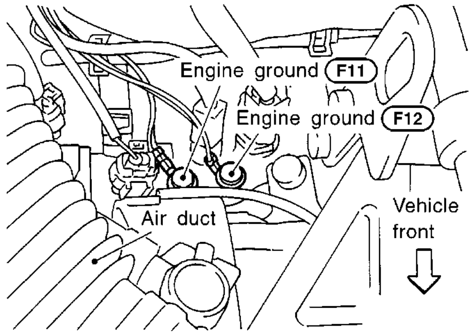


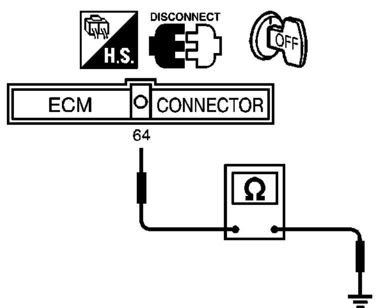


AEC992A

Diagnostic Procedure

NGEC0211

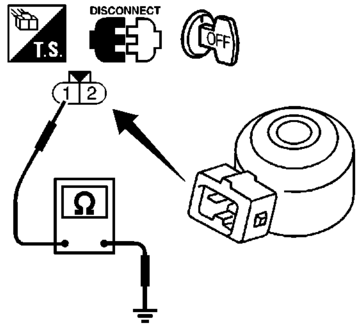
1	RETIGHTEN GROUND SCREWS
Loosen and retighten engine ground screws.  SEF325V	
▶	GO TO 2.

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.

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-2.
3. Check the following. Refer to the wiring diagram.
- Continuity between joint connector-2 terminal 1 and ground
- Joint connector-2 (Refer to "HARNESS LAYOUT", ***EL-272***.)

Continuity should exist.

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

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

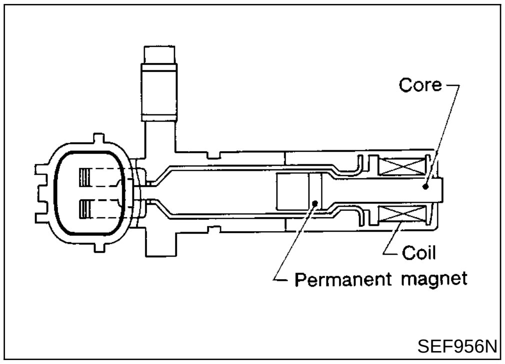
Check the joint connector-2. (Refer to "HARNESS LAYOUT", ***EL-272***.)

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

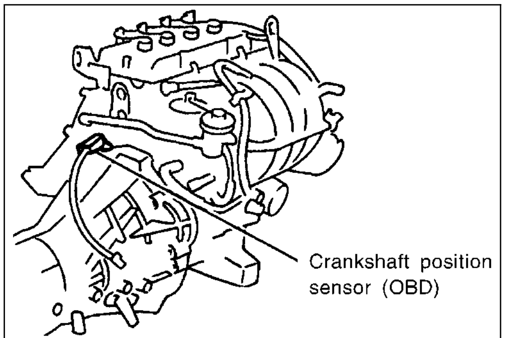
7	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

	▶	**INSPECTION END**



SEF956N



SEF335V

Component Description

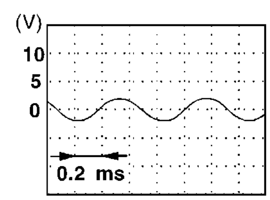
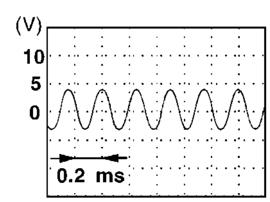
NGEC0213

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

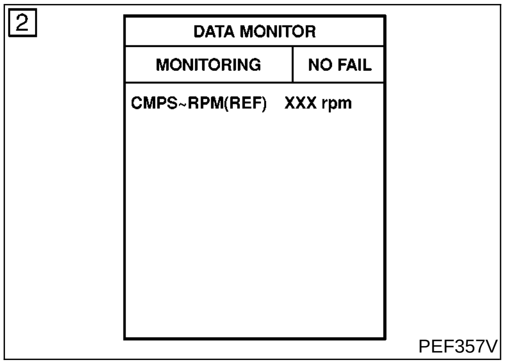
Specification data are reference values and are measured between each terminal and 32 (ECM ground).

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 0802	● The proper pulse signal from the crankshaft position sensor (OBD) is not sent to ECM while the engine is running at the specified engine speed.	● Harness or connectors (The crankshaft position sensor (OBD) circuit is open.) ● Crankshaft position sensor (OBD) ● 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

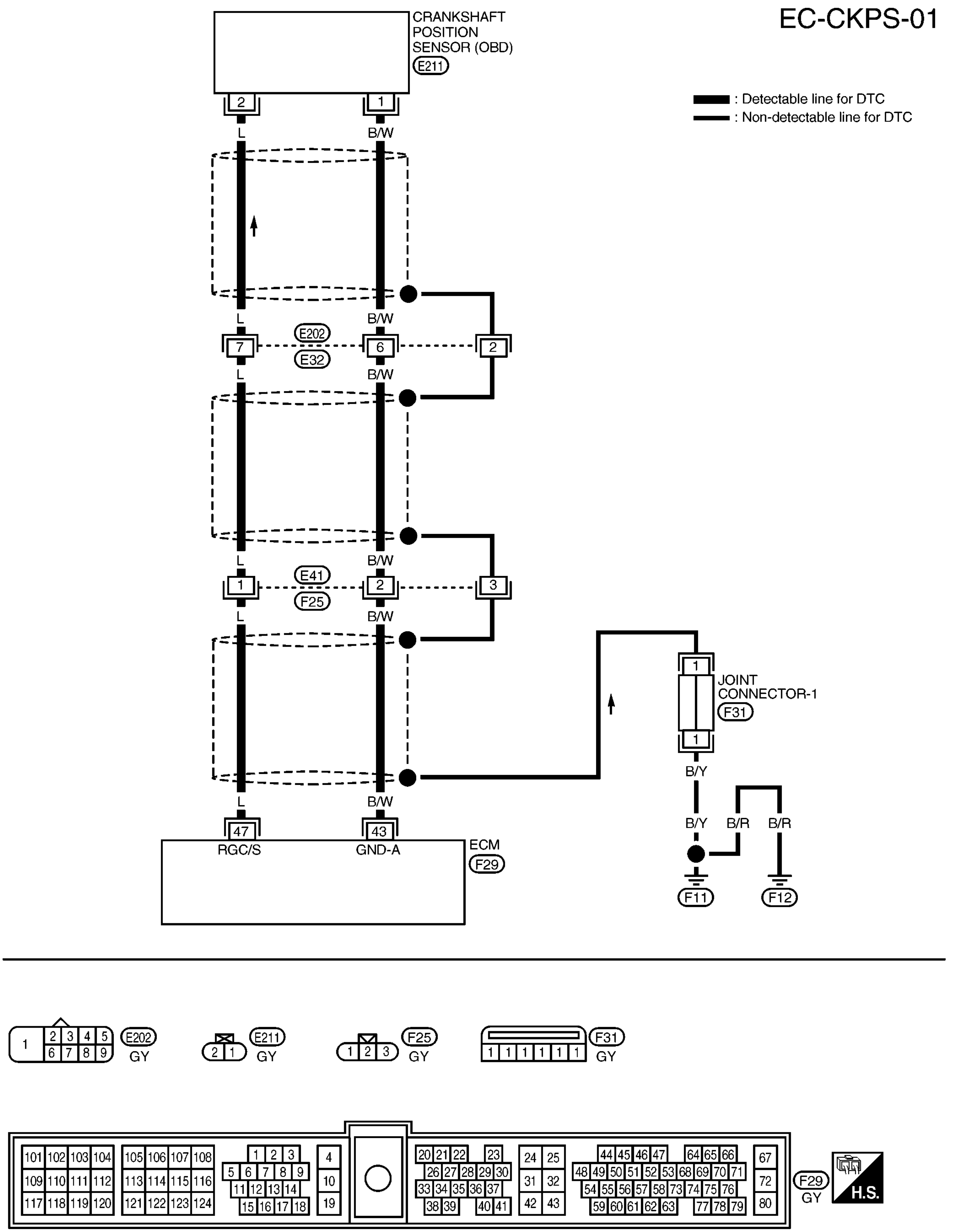
1) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine and run it for at least 15 seconds at idle speed.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-315.

With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

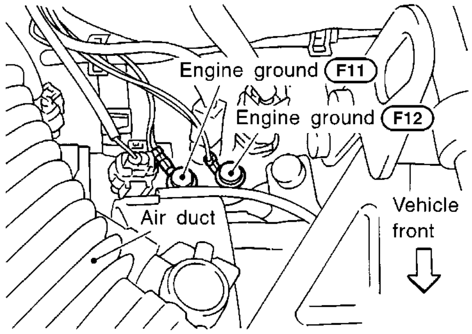
NGEC0217

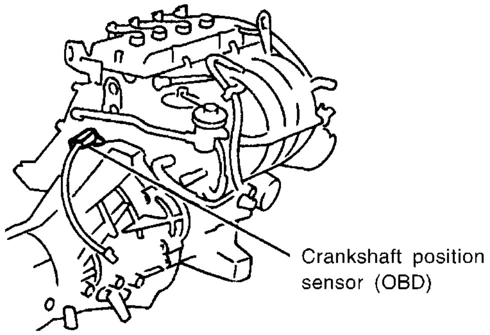
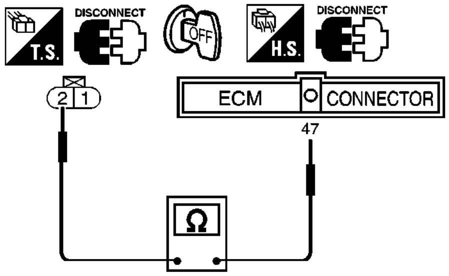


AEC993A

Diagnostic Procedure

NGEC0218

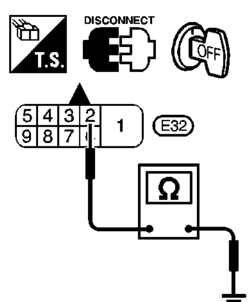
1	RETIGHTEN GROUND SCREWS
1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.  SEF325V	
▶	GO TO 2.

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.

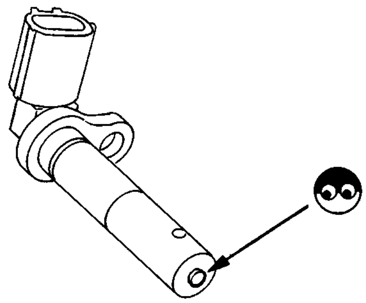
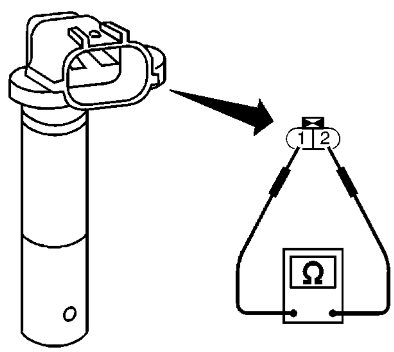
3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E202, E32 ● Harness connectors E41, F25 ● Harness for open or short between crankshaft position sensor (OBD) and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

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 ground and short to power. **OK or NG**	
OK ▶	GO TO 6.
NG ▶	GO TO 5.

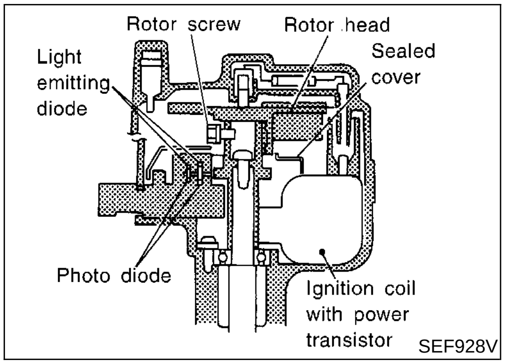
5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E202, E32 ● Harness connectors E41, F25 ● Harness for open or short between crankshaft position sensor (OBD) and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

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 ground and short to power. 5. Then reconnect harness connectors. **OK or NG**	
OK ▶	GO TO 8.
NG ▶	GO TO 7.

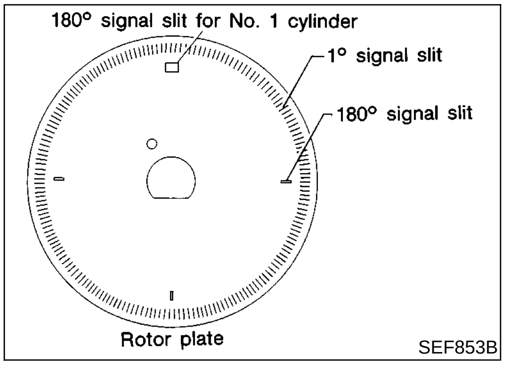
7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E41, F25 ● Joint connector-1 (Refer to "HARNESS LAYOUT", ***EL-272***.) ● Harness for open or short between harness connector E32 and Engine ground	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK 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-128.	
▶	**INSPECTION END**



SEF928V



SEF853B

Component Description

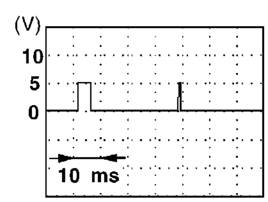
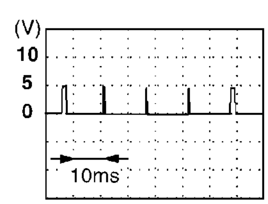
NGEC0220

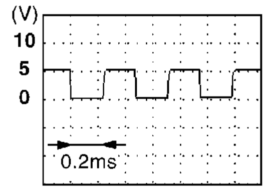
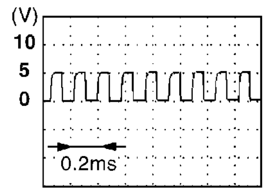
The camshaft position sensor is a basic component of the engine control system. It monitors engine speed and piston position. These input signals to the engine control system are used to control fuel injection, ignition timing and other functions.
The camshaft position sensor has a rotor plate and a 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 32 (ECM 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 

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 2.6V 
			[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 0101	A)	Either 1° or 180° signal is not sent to ECM for the first few seconds during engine cranking.	● Harness or connectors (The camshaft position sensor circuit is open or shorted.) ● Camshaft position sensor ● Starter motor (Refer to EL section.) ● Starting system circuit (Refer to EL section.) ● Dead (Weak) battery
	B)	Either 1° or 180° signal is not sent to ECM often enough while the engine speed is higher than the specified engine speed.	
	C)	The relation between 1° and 180° signal is not in the normal range during the specified engine speed.	

GI
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SC
EL
IDX

DTC Confirmation Procedure

=NGEC0223

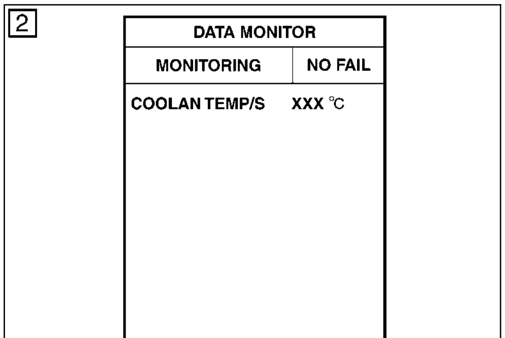
Perform "Procedure for malfunction A" first. If DTC cannot be confirmed, perform "Procedure for malfunction B and C".

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.



PEF002P

PROCEDURE FOR MALFUNCTION A

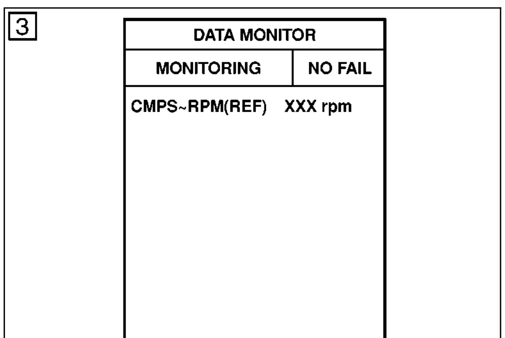
NGEC0223S01

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-322.

With GST

Follow the procedure "With CONSULT-II".



PEF357V

PROCEDURE FOR MALFUNCTION B AND C

NGEC0223S02

With CONSULT-II

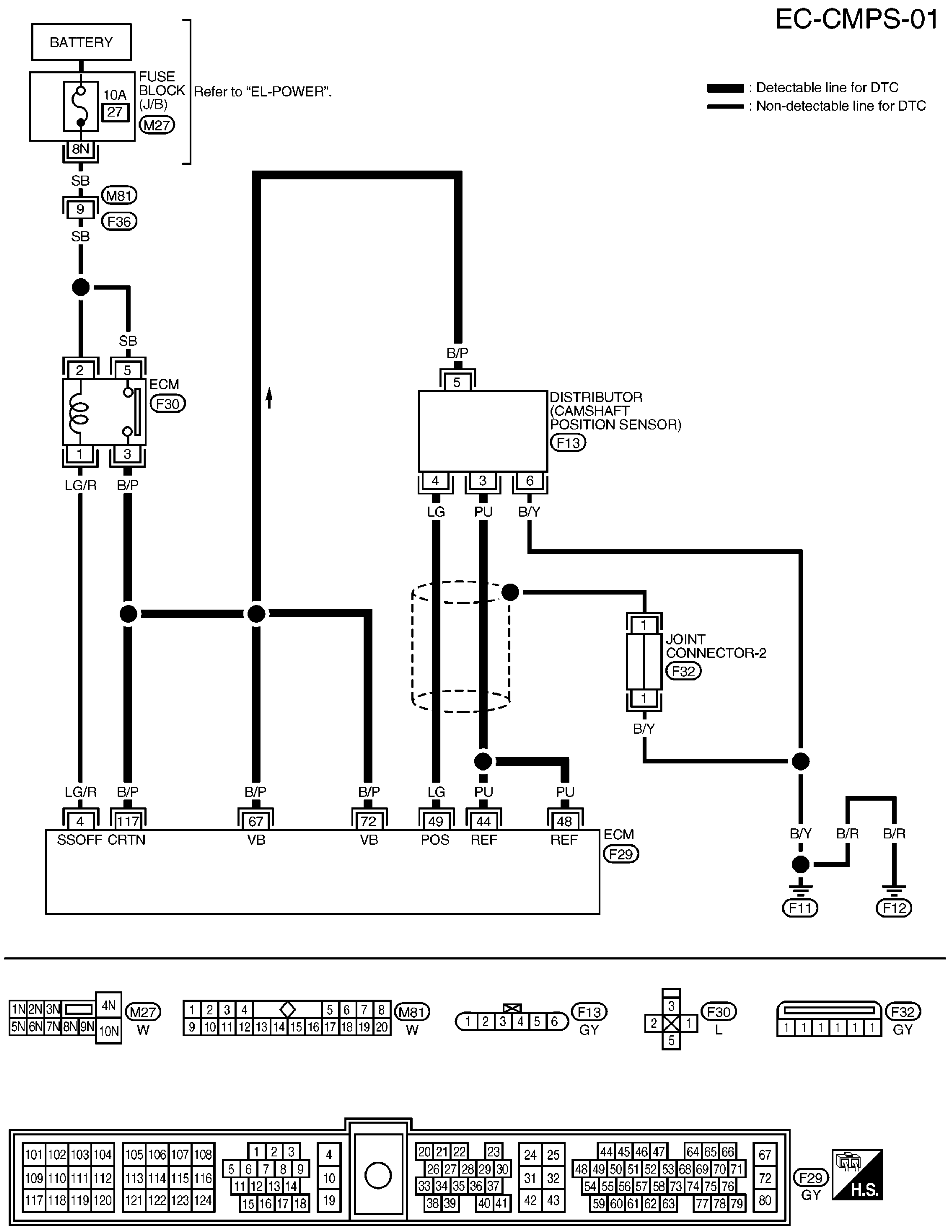
1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and run it for at least 2 seconds at idle speed.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-322.

With GST

Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC0224

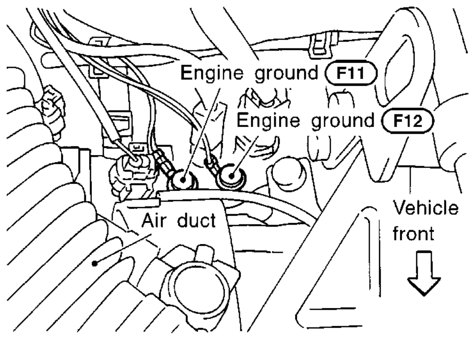


AEC994A

Diagnostic Procedure

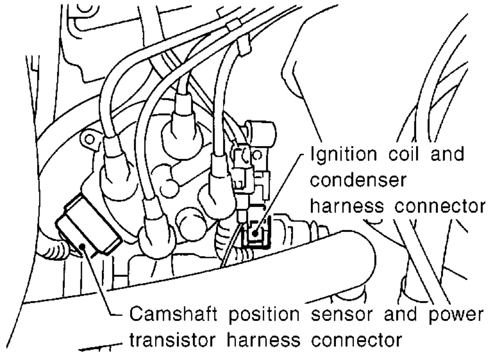
NGEC0225

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.

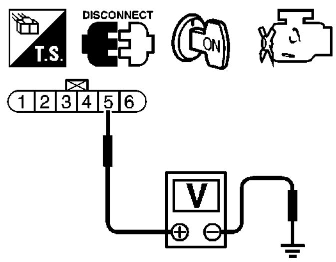
3	CHECK POWER SUPPLY

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

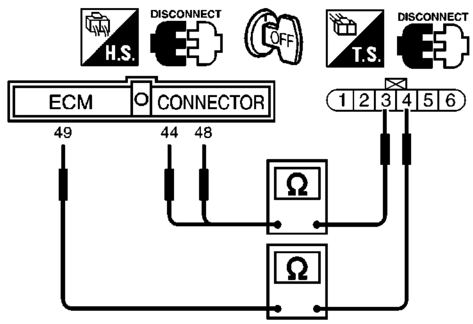
Check the following.

- 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

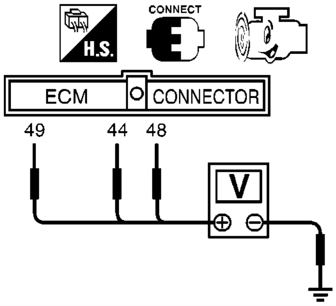
1. Turn ignition switch OFF.
2. Check harness continuity between distributor (camshaft position sensor) terminal 6 and engine ground. Refer to the wiring diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

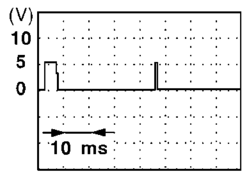
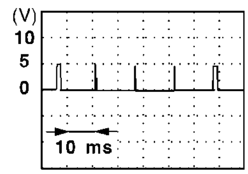
OK	▶	GO TO 7.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK CAMSHAFT POSITION SENSOR

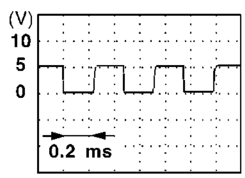
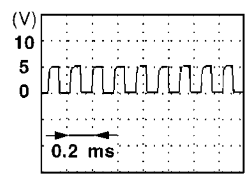
1. Start engine and warm it up to normal operating temperature.
2. Check voltage between ECM terminal 49 and engine ground, ECM terminal 44 or 48 and ground.



Terminal 44 or 48 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		

SEF893W

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-2.
3. Check the following.
- Continuity between joint connector-2 terminal 1 and ground
- Joint connector-2
  (Refer to "HARNESS LAYOUT", ***EL-272***.)

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

OK or NG

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

9	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

	▶	**INSPECTION END**

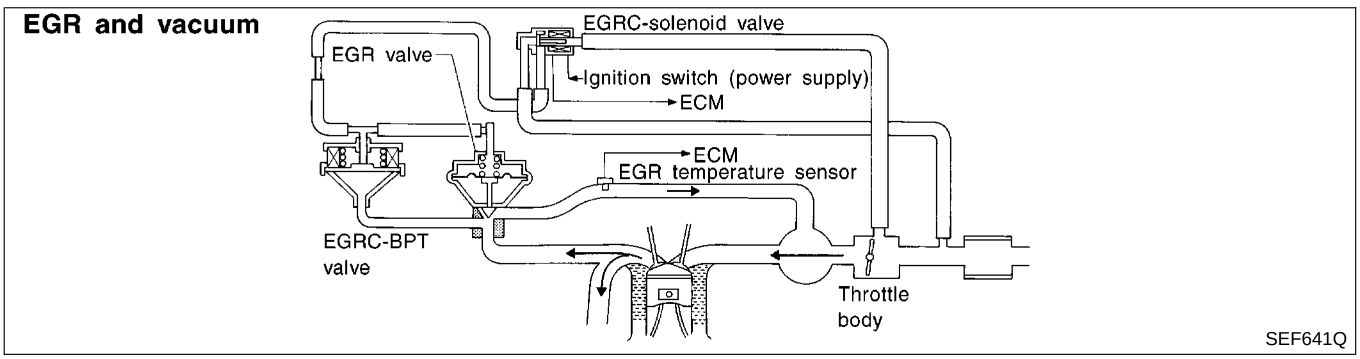
Description
NGEC0227

SYSTEM DESCRIPTION
NGEC0227S01

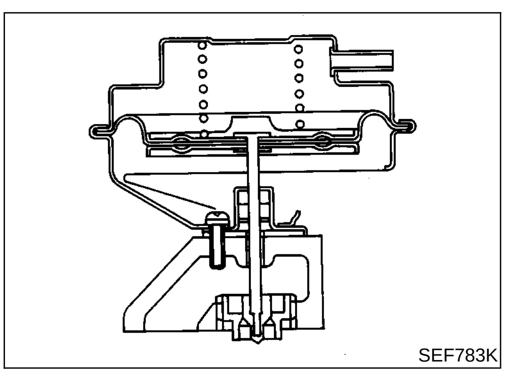
Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EGR control	EGRC-solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Intake air temperature sensor	Intake air temperature		
Ignition switch	Start 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



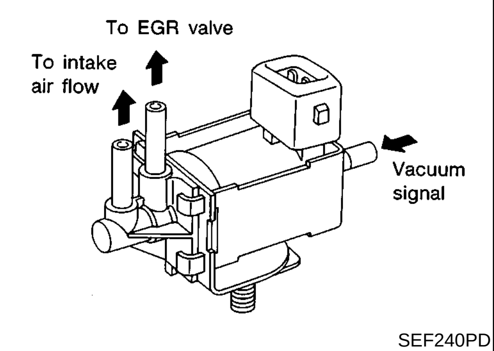
SEF641Q


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.

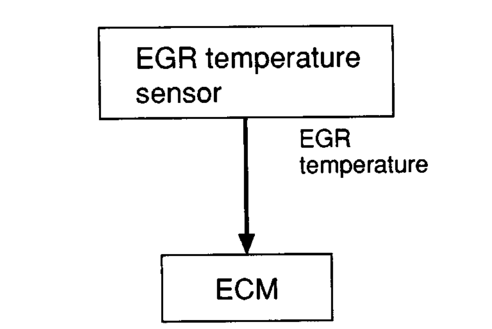


SEF240PD

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.



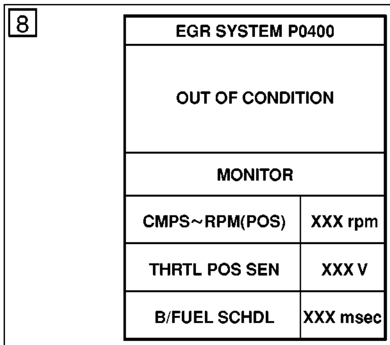
SEF073P

On Board Diagnosis Logic

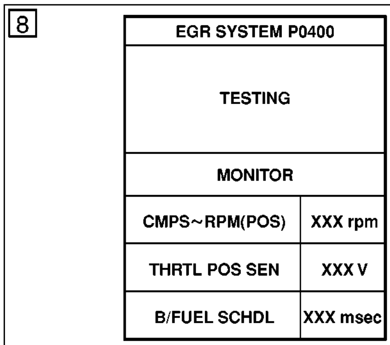
NGEC0228

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.

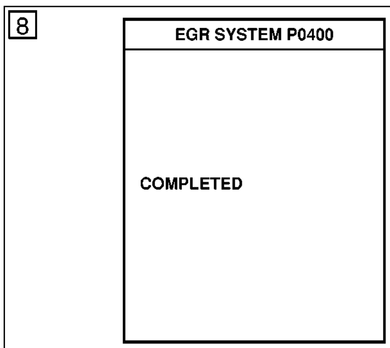
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0400 0302	• No EGR flow is detected under conditions that call for EGR.	• EGR valve stuck closed • EGRC-BPT valve • Vacuum hose • EGRC-solenoid valve • EGR passage • EGR temperature sensor • Exhaust gas leaks



PEF603W



PEF604W



PEF785U

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

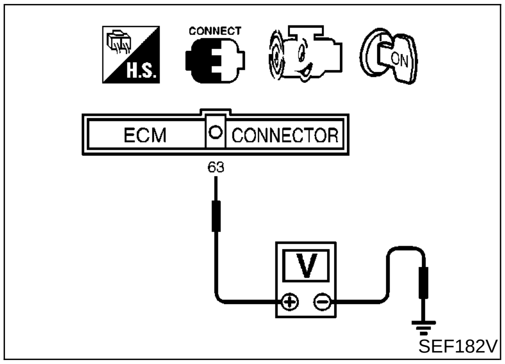
1) Turn ignition switch ON.
2) Check "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II and confirm it is within the range listed below.

   COOLAN TEMP/S: Less than 40°C (104°F)

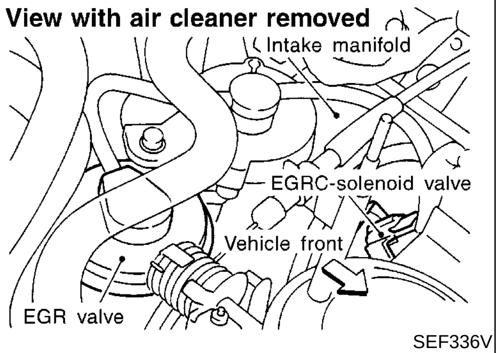
   If the value is out of range, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to lower the coolant temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.
3) Start engine and let it idle monitoring "COOLAN 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.)

CMPS·RPM (REF)	2,000 - 2,600 rpm
Vehicle speed	10 km/h (6 MPH) or more
B/FUEL SCHDL	2.5 - 3.5 msec
THRTL POS SEN	(X + 0.23) − (X + 0.74) V X = Voltage value measured at step 7
Selector lever	Suitable position

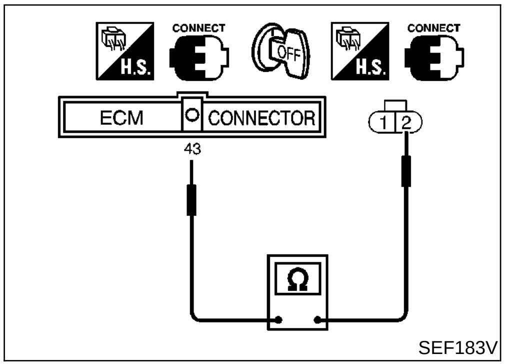
   If "TESTING" is not displayed after 5 minutes, retry from step 2.
9) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-331.



SEF182V



SEF336V



SEF183V

Overall Function Check

NGEC0230

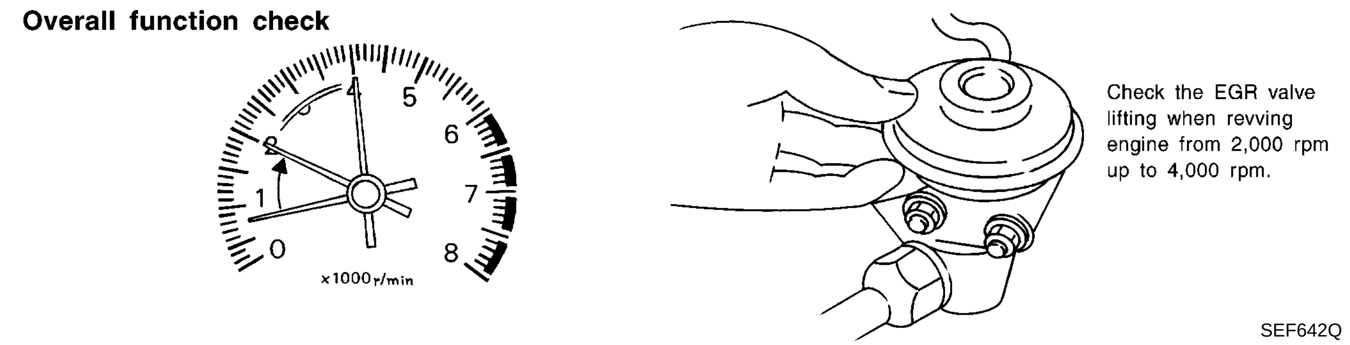
Use this procedure to check the overall EGR function. During this check, a 1st trip DTC might not be confirmed.

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-331.

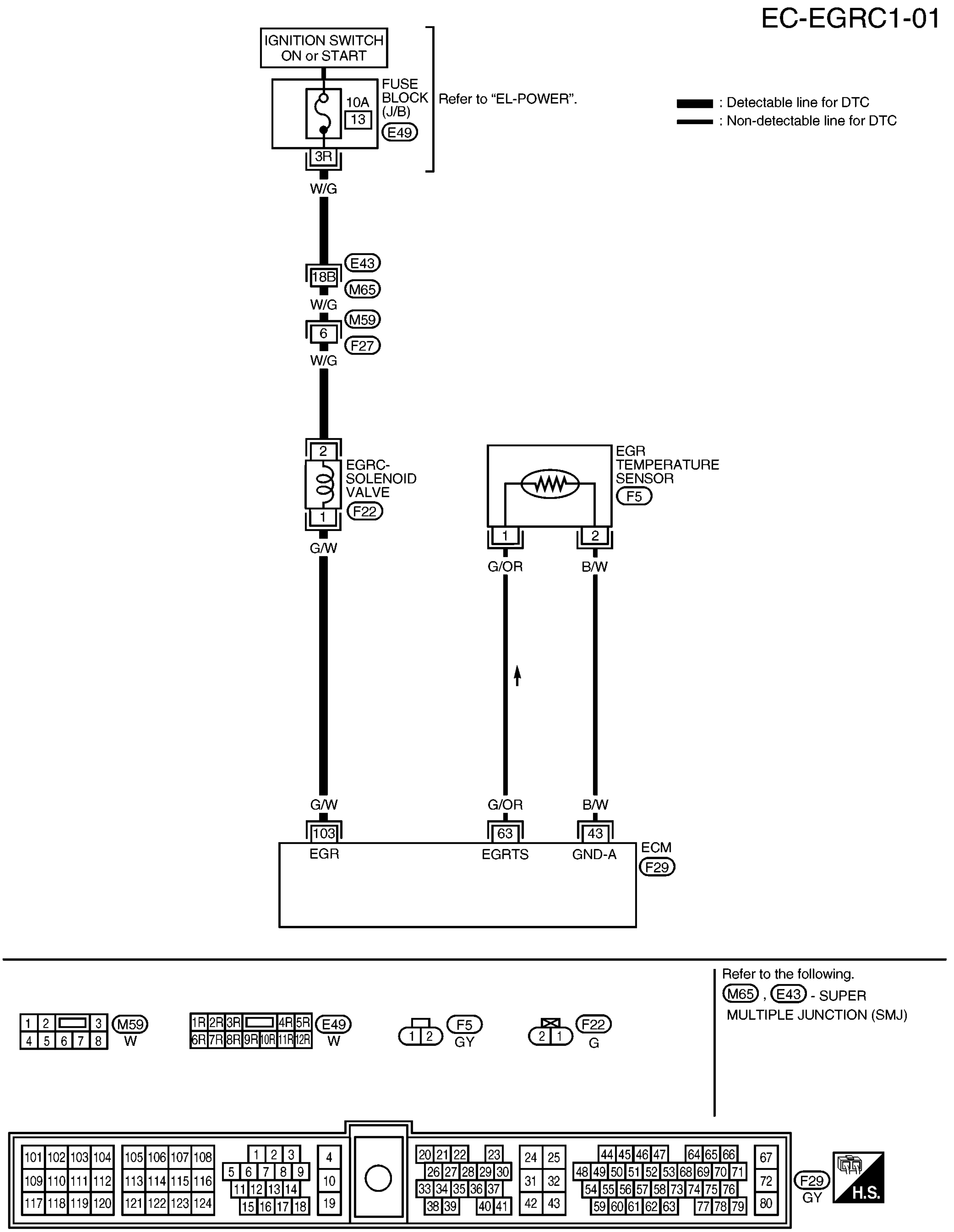
3) Check voltage between ECM terminal 63 (EGR temperature sensor signal) and ground at idle speed.
   Less than 4.5V should exist.
   If NG, go to next step.
4) Turn ignition switch OFF.
5) Check harness continuity between EGR temperature sensor harness connector terminal 2 and ECM terminal 43 (ECM ground).
   Continuity should exist.
6) Check "EGR TEMPERATURE SENSOR". Refer to "CHECK EGR TEMPERATURE SENSOR" in "Diagnostic Procedure".



SEF642Q

Wiring Diagram

NGEC0231



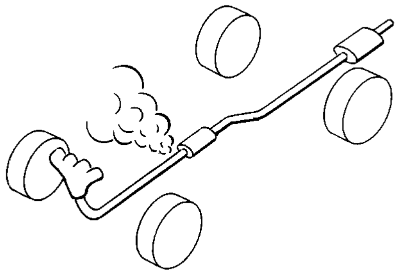
AEC995A

Diagnostic Procedure

NGEC0232

1 CHECK EXHAUST SYSTEM

1. Start engine.
2. Check exhaust pipes and muffler for leaks.



SEF099P

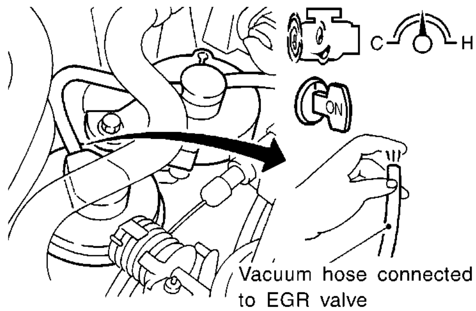
OK or NG

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)	FLOW
MONITOR	
CMPS·RPM(REF)	XXX rpm

PEF788U

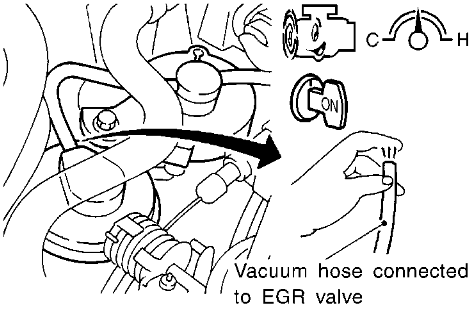
Vacuum should exist when revving engine.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 5.

3	CHECK VACUUM SOURCE TO EGR VALVE

Without CONSULT-II
1. Warm engine up to normal operating temperature.
2. Disconnect vacuum hose to EGR valve.
3. Check for vacuum existence at idle.



SEF337V

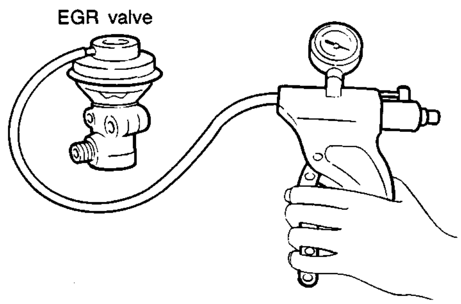
Vacuum should not exist at idle.
4. Disconnect EGRC-solenoid valve harness connector. (The 1st trip DTC for EGRC-solenoid valve will be displayed, but ignore it.)
5. Check for vacuum existence when revving engine from 2,000 rpm up to 4,000 rpm.
Vacuum should exist when revving engine.

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

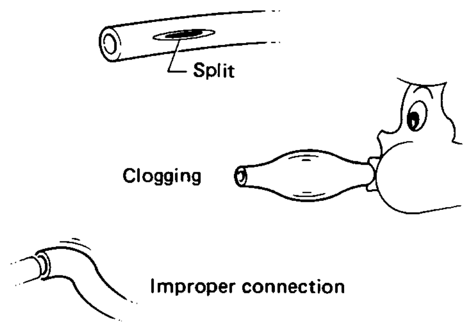
EGR valve spring should lift.
- Check for sticking.

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)	FLOW
MONITOR	
CMPS·RPM(REF)	XXX rpm

PEF788U

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.

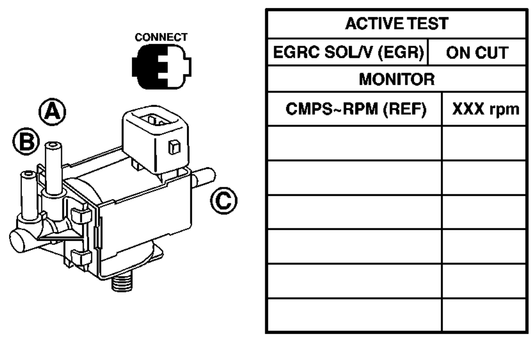
8	DETECT MALFUNCTION PART
Check the following. ● Harness connectors E43, M65 ● Harness connectors M59, F27 ● 10A fuse ● Harness for open or short between fuse block and EGRC-solenoid valve ● Harness for open or short between ECM and EGRC-solenoid valve	
▶	Repair open circuit or short to ground or short 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.

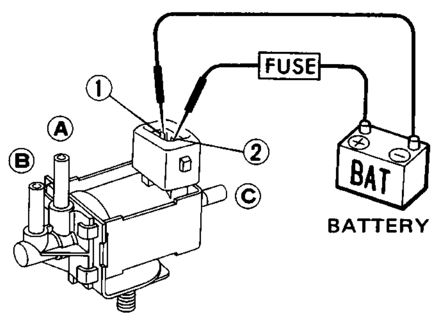


Condition EGRC SOLENOID VALVE	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
ON	Yes	No
OFF	No	Yes

SEF169X

Without CONSULT-II

Check air passage continuity shown in the figure.



AEC919

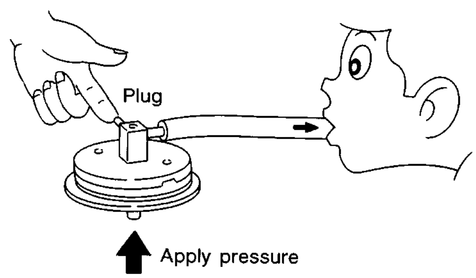
Condition	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

MTBL0283

If NG or operation takes more than 1 second, replace solenoid valve.

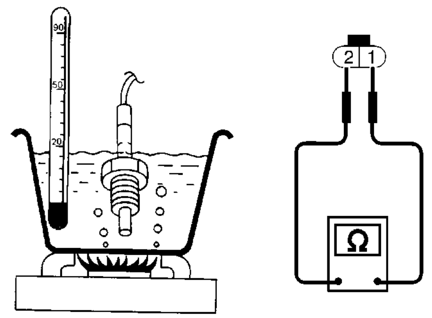
OK or NG

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.

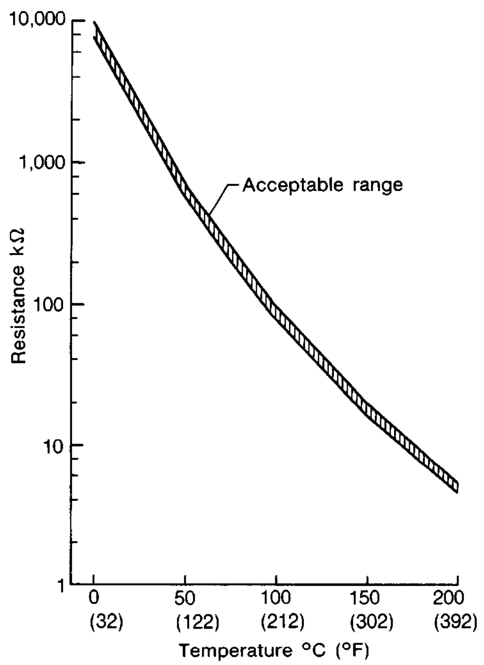


SEF643Q

<Reference data>

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

MTBL0294



SEF526Q

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EGR temperature sensor.

12	CHECK INTERMITTENT INCIDENT

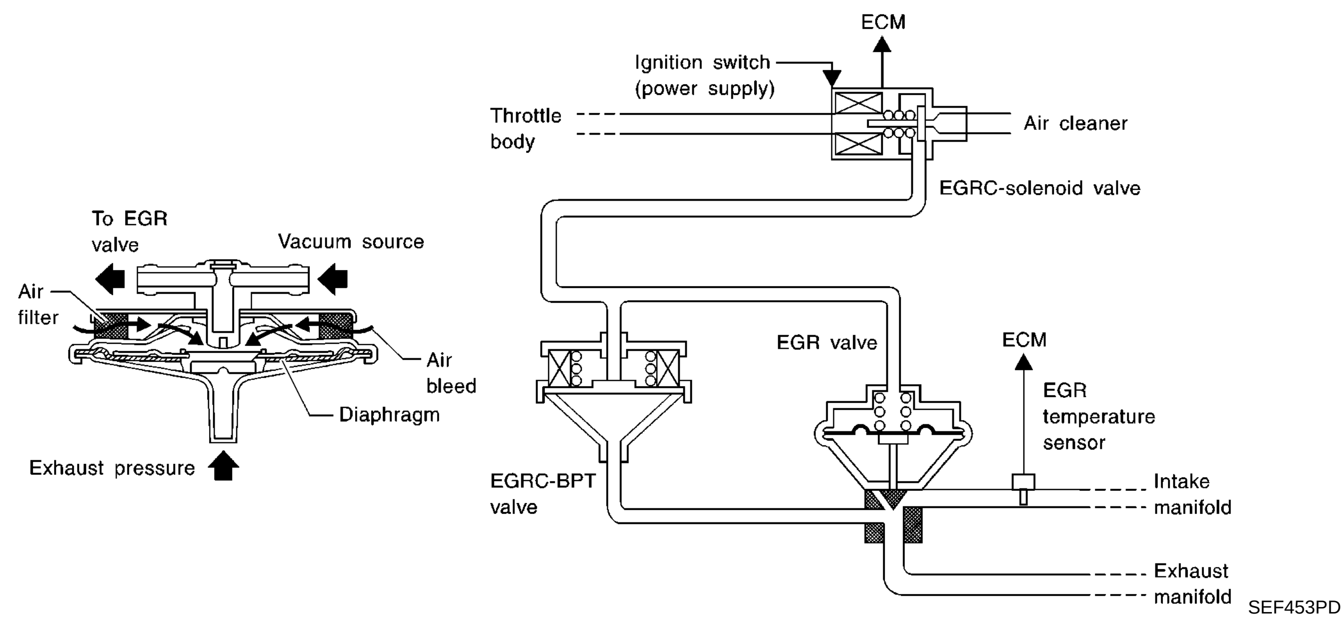
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

	▶	**INSPECTION END**

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

Description

NGEC0234



SEF453PD

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 0306	● The EGRC-BPT valve does not operate properly.	● EGRC-BPT valve ● EGR valve ● Loose or disconnected rubber tube ● Blocked rubber tube ● Camshaft position sensor ● Blocked exhaust system ● Orifice ● Mass air flow sensor ● EGRC-solenoid valve

DTC Confirmation Procedure

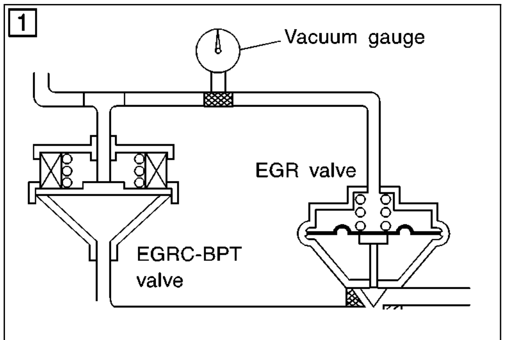
NGEC0236

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.

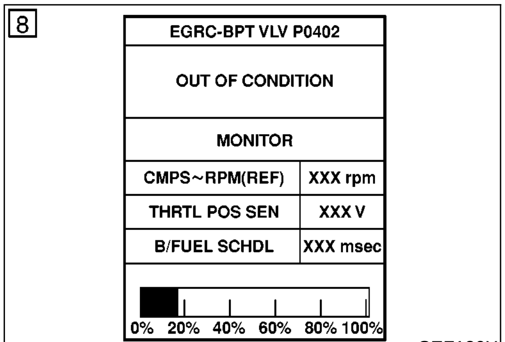
TESTING CONDITION:
- **Always perform at a temperature above 5°C (41°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

With CONSULT-II

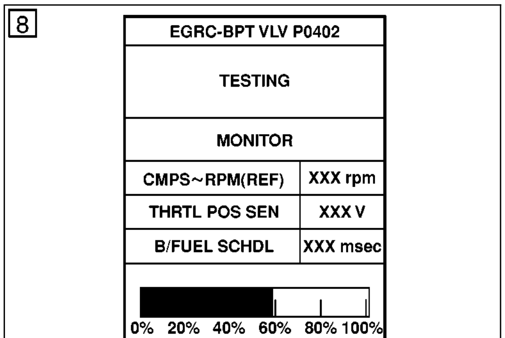


SEF930VA

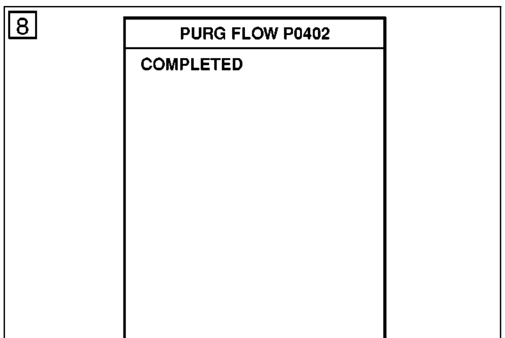
1) Install vacuum gauge between EGRC-BPT valve and EGR valve as shown in the illustration.
2) Start engine and warm it up to normal operating temperature.
3) Stop engine and wait at least 5 seconds.
4) Turn ignition switch ON and select "EGRC-BPT/V P0402" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with 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.



SEF180X



PEF187V

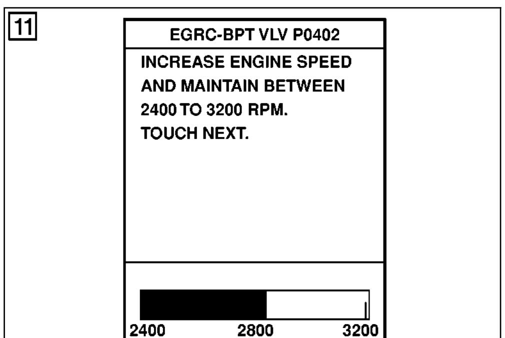


PEF868U

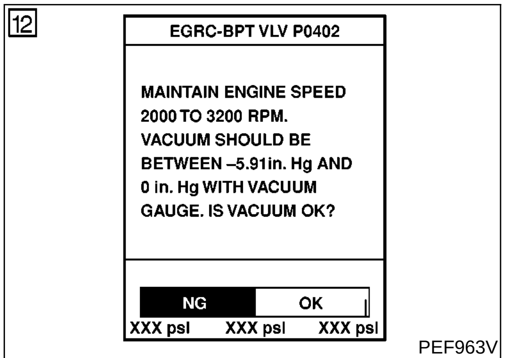
Selector lever	Suitable position
CMPS·RPM (REF)	1,400 - 1.800 rpm
Vehicle speed	30 - 100 km/h (19 - 62 MPH)
B/FUEL SCHDL	2.0 - 2.8 msec
THRTL POS SEN	(X-(X+0.88) V X = Voltage value measured at step 7

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-341.
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.

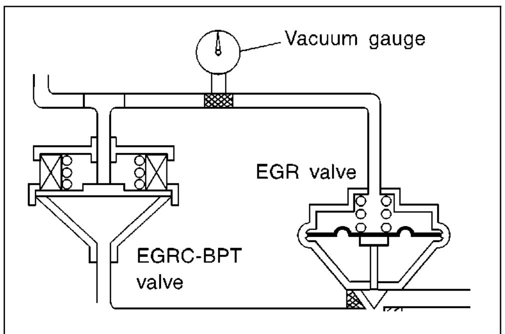


SEF384X



PEF963V

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-341.
    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.



SEF930V

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-341.
    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-341.

Diagnostic Procedure

=NGEC0238

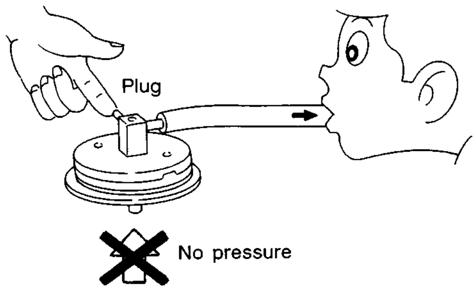
1	CHECK HOSE
Check vacuum hose for clogging and improper connection.	
OK or NG	
OK ▶	GO TO 2.
NG ▶	Repair or replace vacuum hose.

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.

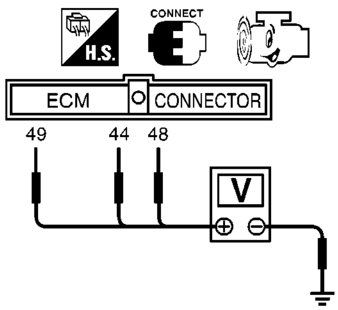


SEF172P

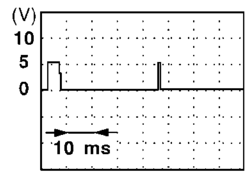
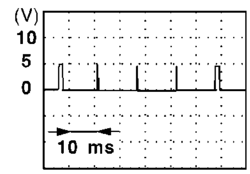
OK or NG	
OK ▶	GO TO 5.
NG ▶	Replace EGRC-BPT valve.

5	CHECK CAMSHAFT POSITION SENSOR

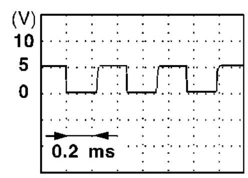
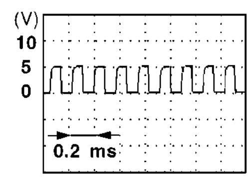
1. Start engine and warm it up to normal operating temperature.
2. Check voltage between ECM terminals 49 and engine ground ECM terminal 44 or 48 and ground.



Terminal 44 or 48 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		

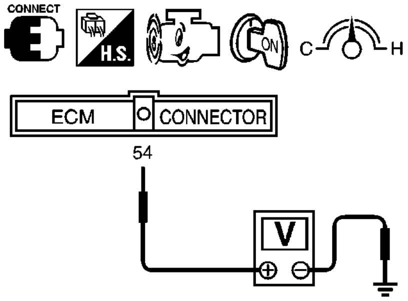
SEF893W

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace camshaft position sensor.

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.



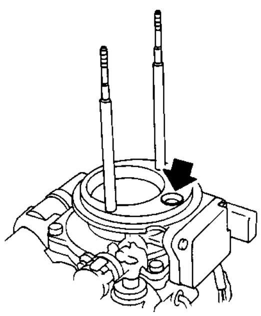
SEF326V

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.



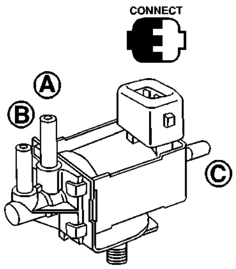
SEF893J

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.

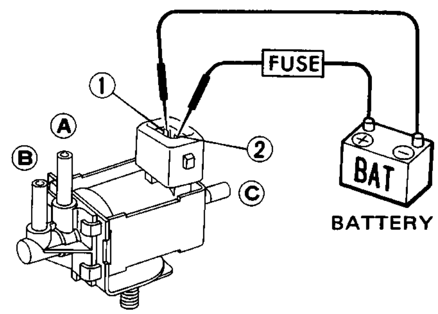


ACTIVE TEST	
EGRC SOL/V (EGR)	ON CUT
MONITOR	
CMPS~RPM (REF)	XXX rpm

Condition EGRC SOLENOID VALVE	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
ON	Yes	No
OFF	No	Yes

SEF169X

Without CONSULT-II
Check air passage continuity shown in the figure.



AEC919

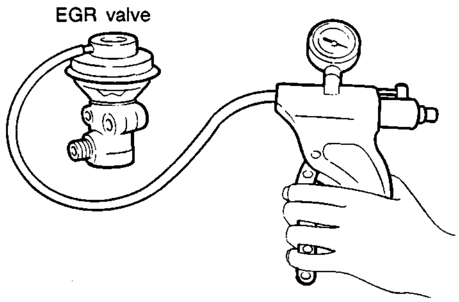
Condition	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

MTBL0283

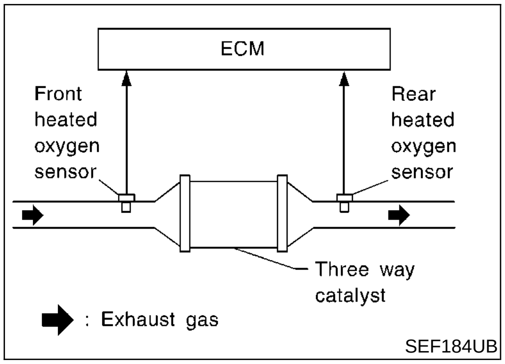
If NG or operation takes more than 1 second, replace solenoid valve.

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-128.		
	▶	**INSPECTION END**



SEF184UB

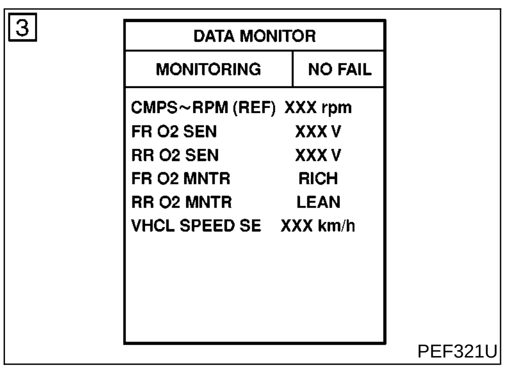
On Board Diagnosis Logic

NGEC0240

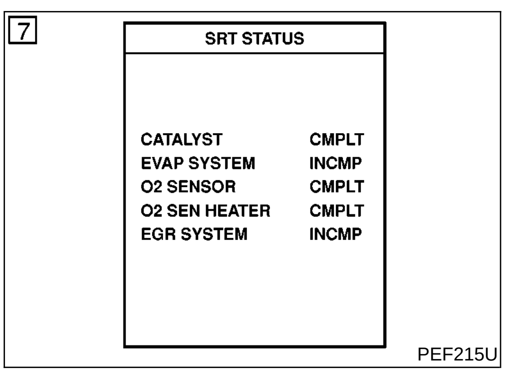
The ECM monitors the switching frequency ratio of front and rear heated oxygen sensors.
A three way catalyst* with high oxygen storage capacity will indicate a low switching frequency of rear heated oxygen sensor. As oxygen storage capacity decreases, the rear heated oxygen sensor switching frequency will increase.
When the frequency ratio of front and rear heated oxygen sensors approaches a specified limit value, the three way catalyst* malfunction is diagnosed.
*: 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)



PEF321U



PEF215U

DTC Confirmation Procedure

NGEC0241

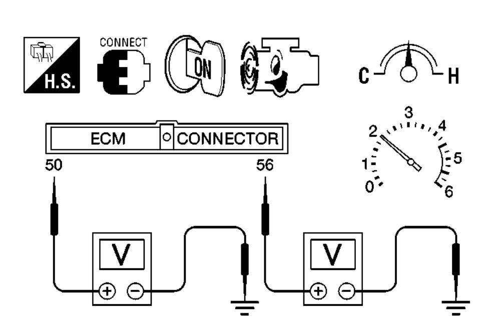
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set “MANU TRIG” and “HI SPEED”, then select “FR O2 SENSOR”, “RR O2 SENSOR”, “FR O2 MNTR”, “RR O2 MNTR” in “DATA MONITOR” mode with CONSULT-II.
4) Touch “RECORD” on CONSULT-II screen with engine speed held at 2,000 rpm constantly under no load.
5) Make sure that the switching frequency between “RICH” and “LEAN” of “RR O2 MNTR” is much less than that of “FR O2 MNTR” as shown below.
   Switching frequency ratio = A/B
   A: Rear heated oxygen sensor switching frequency
   B: Front heated oxygen sensor switching frequency
   This ratio should be less than 0.75.
   If the ratio is greater than above, the warm-up three way catalyst (models for California) is not operating properly.
   If the “FR O2 MNTR” does not indicate “RICH” and “LEAN” periodically more than 5 times within 10 seconds at step 4, perform trouble diagnoses for DTC P0133 first. (See EC-212.)
   If the result is NG, go to “Diagnostic Procedure”, EC-348.
   If the result is OK, go to following step.
6) Select “AUTO TRIG” in “DATA MONITOR” mode with CONSULT-II.
7) Drive vehicle (with transmission in 5th position) at a speed of approximately 84 to 96 km/h (52 to 60 MPH) with the following for at least 10 consecutive minutes.

(Drive the vehicle in an area where vehicle speed and accelerator pressure can be held steady and constant.)
If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-348.

8) Select "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-II.
9) Verify that "CATALYST" is "CMPLT".
If not "CMPLT", repeat the test from step 6.



AEC876A

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 (Front heated oxygen sensor signal), 56 (Rear heated oxygen sensor signal) and engine ground.
4) Keep engine speed at 2,000 rpm constant under no load.
5) Make sure that the voltage switching frequency (high & low) between ECM terminal 56 and engine ground is much less than that of ECM terminal 50 and engine ground.
Switching frequency ratio = A/B
A: Rear heated oxygen sensor voltage switching frequency
B: Front heated oxygen sensor voltage switching frequency
This ratio should be less than 0.75.
If the ratio is greater than above, it means three way catalyst does not operate properly.

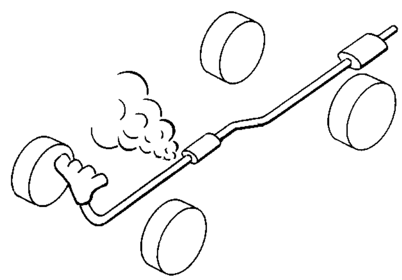
NOTE:
If the voltage at terminal 50 does not switch periodically more than 5 times within 10 seconds at step 4, perform trouble diagnosis for DTC P0133 first. (See EC-190.)

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 the warm-up three way catalyst (California model), the three way catalyst (Non-California model).		



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-95.	

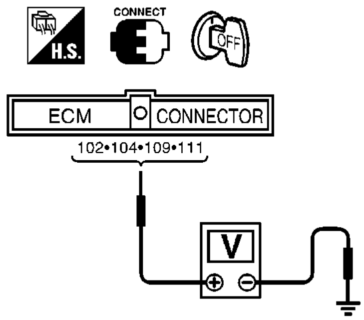
Items	Specifications
Ignition timing	20° ± 2° BTDC
Base idle speed	750 ± 50 rpm (in “P” or “N” position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF
Target idle speed	800 ± 50 rpm (in “P” or “N” position)

MTBL0328

OK or NG		
OK	▶	GO TO 5.
NG	▶	Adjust ignition timing.

5	CHECK INJECTORS

1. Refer to Wiring Diagram for Injectors, EC-553.
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

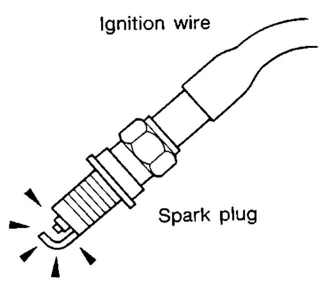
Battery voltage should exist.

OK or NG

OK	▶	GO TO 6.
NG	▶	Perform "Diagnostic Procedure" INJECTOR, EC-554.

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.



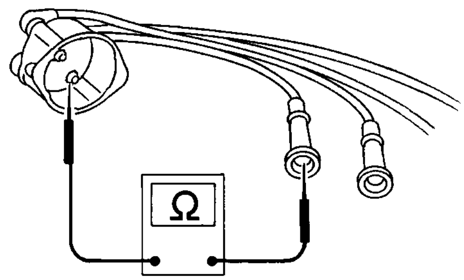
SEF282G

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-449.
NG	▶	Replace.

8	CHECK INJECTOR

1. Turn ignition switch OFF.
2. Remove injector assembly. Refer to EC-41.
   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-128.

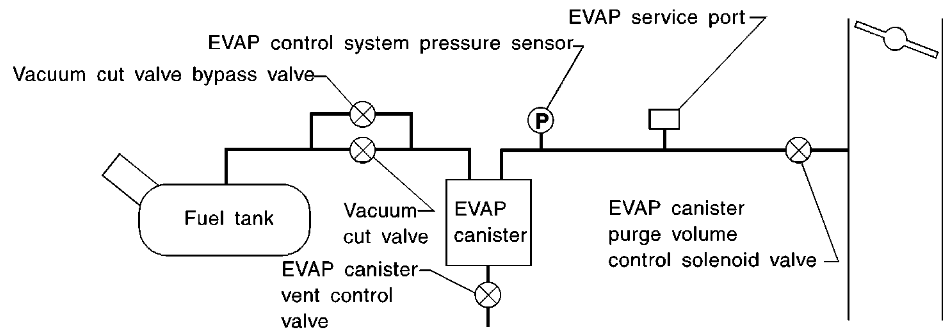
Trouble is fixed.	▶	**INSPECTION END**
Trouble is not fixed.	▶	Replace warm-up three way catalyst*. *: Three way catalyst (For Non-California)

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-515.)

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.

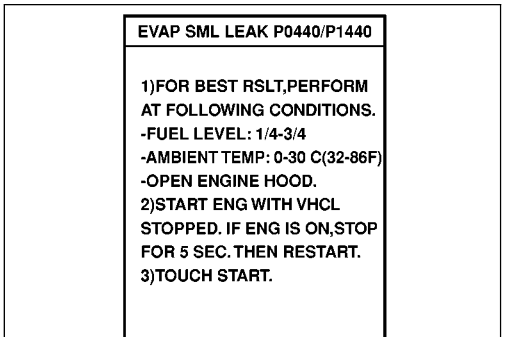


SEF918U

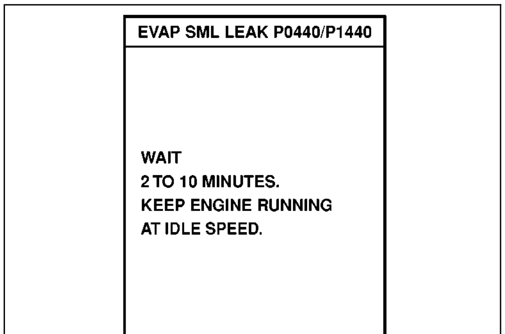
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0440 0705	• EVAP control system has a leak. • EVAP control system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel filler cap remains open or fails to close. • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge 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 • MAP/BARO switch solenoid valve and the circuit • Blocked or bent rubber tube to MAP/BARO switch solenoid valve • O-ring of EVAP canister vent control valve is missing or damaged. • Water separator • EVAP canister is saturated with water. • EVAP control system pressure sensor • Fuel level sensor

CAUTION:

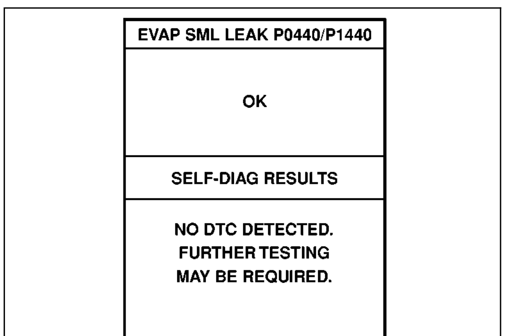
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**



SEF565X



SEF566X



SEF567X

DTC Confirmation Procedure

NGEC0245

NOTE:

- **If DTC P0440 or P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. Refer to EC-515.**
- 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-95.**

6) Make sure that "OK" is displayed. If "NG" is displayed, refer to "Diagnostic Procedure", EC-354.

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-63.

NOTE:

Be sure to read the explanation of "Driving pattern" on EC-63 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-63.
8) Stop vehicle.
9) Select "MODE 3" with GST.
- If P1447 is displayed on the screen, go to "Diagnostic Procedure", EC-507.
- If P0440 is displayed on the screen, go to "Diagnostic Procedure", EC-354.

- If P1440 is displayed on the screen, go to “Diagnostic Procedure”, EC-486.
- If P0440, P1440 and P1447 are not displayed on the screen, go to the following step.

10) Select “MODE 1” with GST.

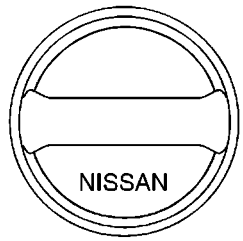
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 5.

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

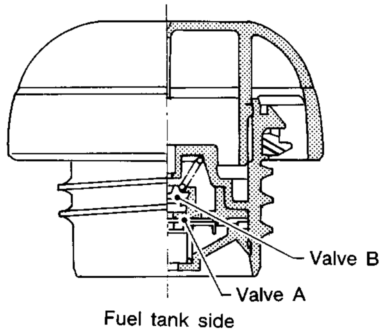
Check for air releasing sound while opening the fuel filler cap.

OK or NG

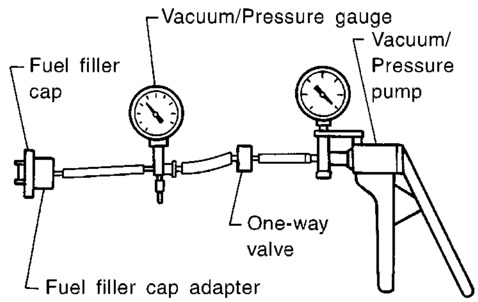
OK	▶	GO TO 5.
NG	▶	GO TO 4.

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)

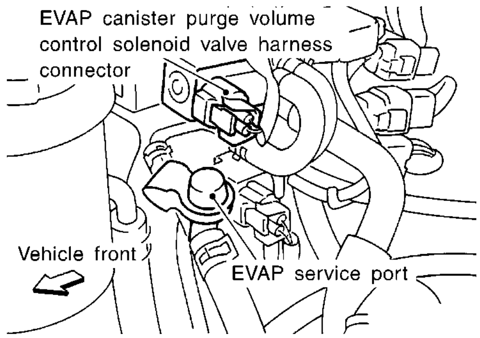
CAUTION:
Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

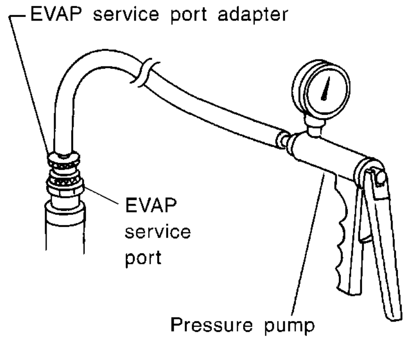
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5	INSTALL PRESSURE PUMP

1. Install the EVAP service port adapter and the pressure pump securely to EVAP service port.



SEF339V



SEF462UE

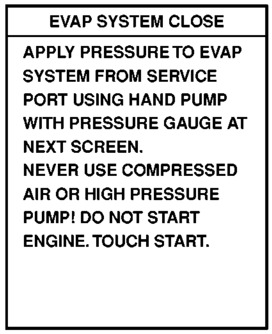
NOTE:
- **Improper installation of service port may cause leaking.**

Models with CONSULT-II	▶	GO TO 6.
Models without CONSULT-II	▶	GO TO 7.

6 CHECK FOR EVAP LEAK

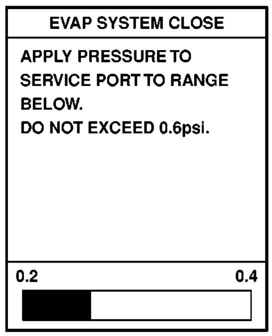
With CONSULT-II

1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.



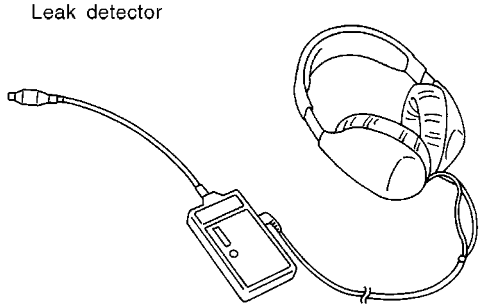
PEF658U

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/cm², 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-36.



SEF200U

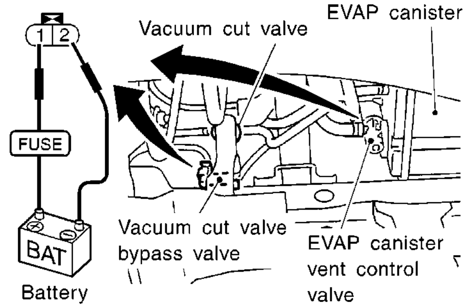
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

7	CHECK FOR EVAP LEAK

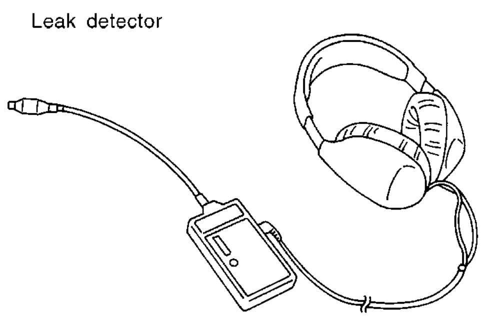
Without CONSULT-II

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)



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-36.



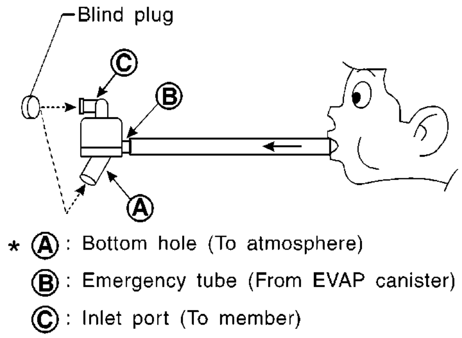
SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

8	CHECK WATER SEPARATOR

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



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

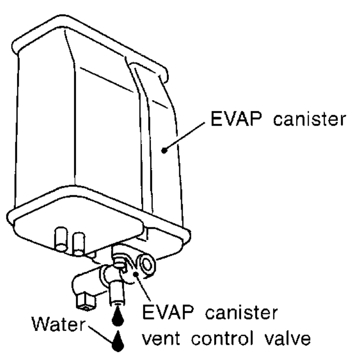
Refer to "DTC Confirmation Procedure", EC-376.

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.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

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	
CMPS~RPM(REF)	XXX rpm
FR O2 MNTR	RICH
A/F ALPHA	XXX %
THRTL POS SEN	XXX V

PEF190V

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	
CMPS~RPM(REF)	XXX rpm
FR O2 MNTR	RICH
A/F ALPHA	XXX %
THRTL POS SEN	XXX V

PEF190V

3. Check air passage continuity.

Condition PURG VOL CONT/V value	Air passage continuity between **A** and **B**
100.0%	Yes
0.0%	No

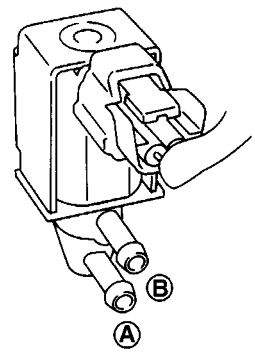
MTBL0302

OK or NG

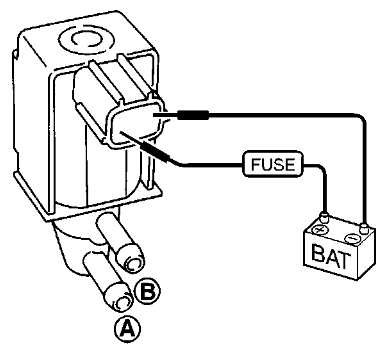
OK ▶	GO TO 18.
NG ▶	Replace EVAP canister purge volume control solenoid valve.

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

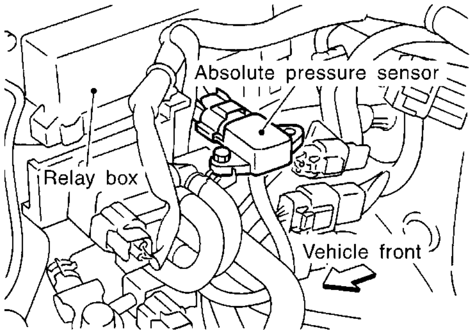
MTBL0303

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

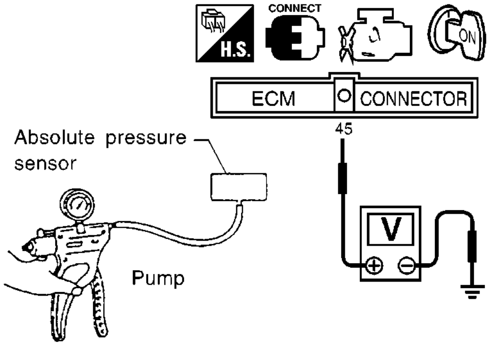
18 CHECK ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.



SEF328V

2. Remove hose from absolute pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 45 (Absolute pressure sensor signal) and engine ground.



SEF132V

The voltage should be 3.2 to 4.8V.

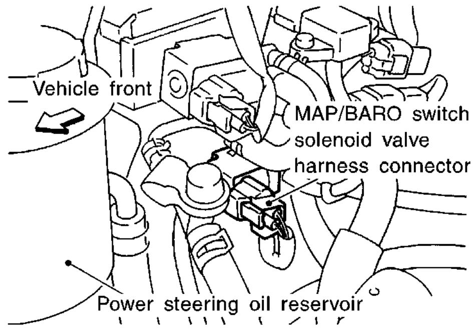
4. Use pump to apply vacuum of −26.7 kPa (−200 mmHg, −7.87 inHg) to absolute pressure sensor as shown in figure and check the output voltage.
   The voltage should be 1.0 to 1.4V lower than the value measured in step 3.
   CAUTION:
   - **Always calibrate the vacuum pump gauge when using it.**
   - **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace absolute pressure sensor.

19	CHECK MAP/BARO SWITCH SOLENOID VALVE AND CIRCUIT

Refer to "DTC Confirmation Procedure", EC-432.



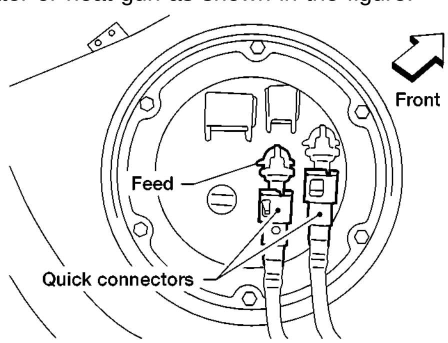
SEF338V

OK or NG

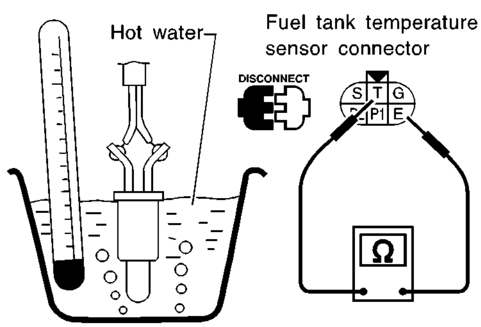
OK	▶	GO TO 20.
NG	▶	Repair or replace MAP/BARO switch solenoid valve or harness/connector.

20	CHECK FUEL TANK TEMPERATURE SENSOR

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



AFE095



SEF172VA

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

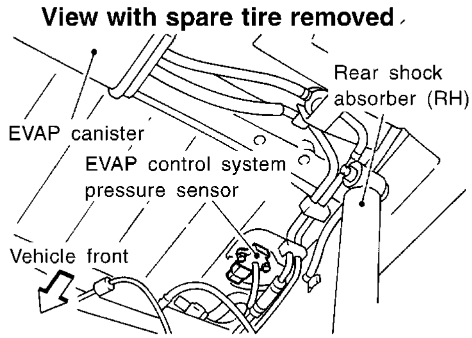
MTBL0291

OK or NG

OK	▶	GO TO 21.
NG	▶	Replace fuel tank temperature sensor.

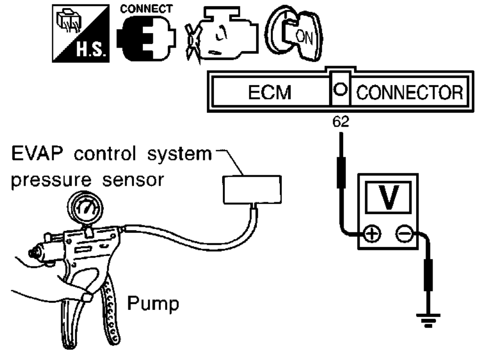
21	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.



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.



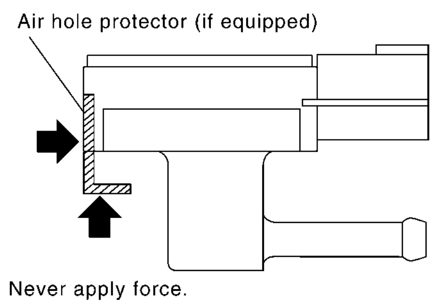
SEF198V

Pressure (Relative to 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

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 22.
NG	▶	Replace EVAP control system pressure sensor.

22	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-36. **OK or NG**	
OK ▶	GO TO 23.
NG ▶	Repair or reconnect the hose.

23	CLEAN EVAP PURGE LINE
Clean EVAP purge line (pipe and rubber tube) using air blower.	
▶	GO TO 24.

24	CHECK FUEL LEVEL SENSOR
1. Remove fuel level sensor assembly. Refer to ***FE-4***. 2. Refer to "FUEL LEVEL SENSOR CHECK", ***EL-86*** **OK or NG**	
OK ▶	GO TO 25.
NG ▶	Replace fuel level sensor.

25	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.	
▶	**INSPECTION END**

Description

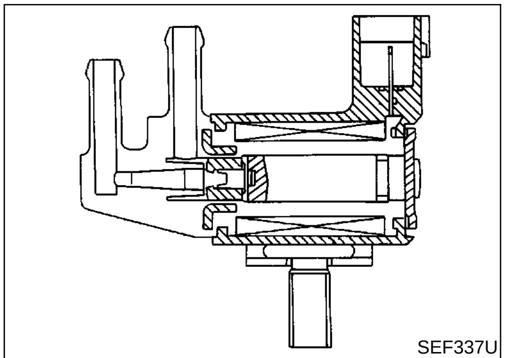
NGEC0248

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		
Front heated oxygen sensors	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.



SEF337U

COMPONENT DESCRIPTION

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

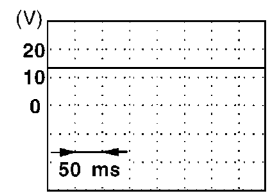
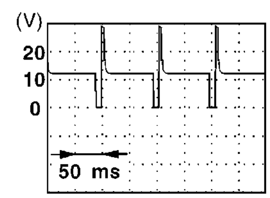
Specification data are reference values.

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

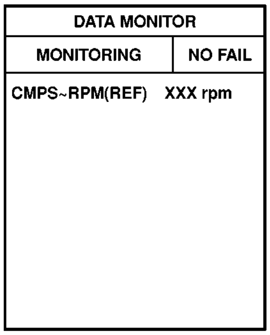
Specification data are reference values and are measured between each terminal and 32 (ECM ground).

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 1008	An improper voltage signal is sent to ECM through the valve.	● Harness or connectors (The valve circuit is open or shorted.) ● EVAP canister purge volume control solenoid valve



PEF357V

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

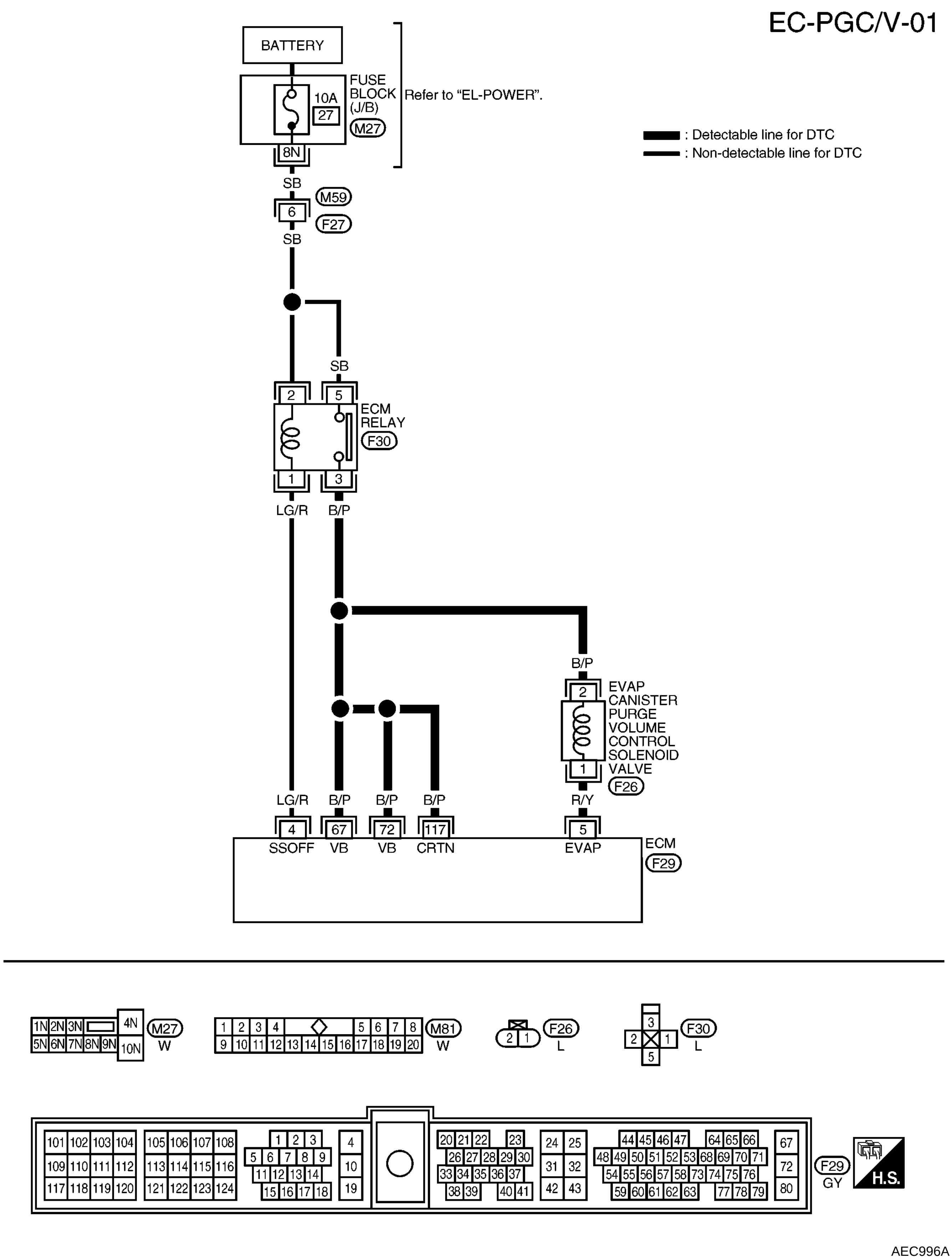
1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and let it idle for at least 30 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-371

With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0253

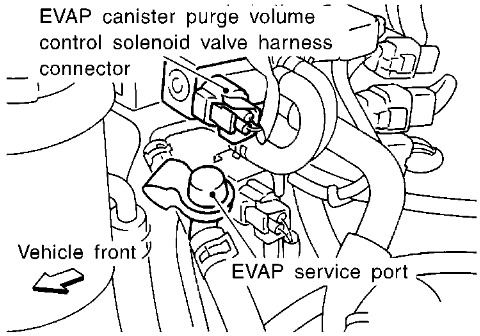


Diagnostic Procedure

NGEC0254

1	CHECK POWER SUPPLY

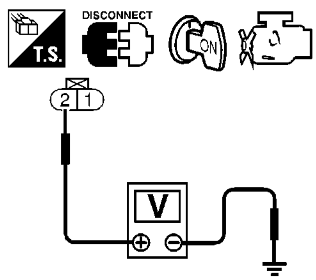
1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.



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

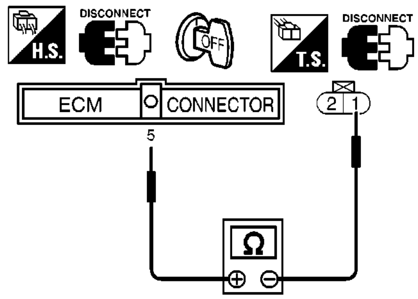
OK	▶	GO TO 3.
NG	▶	GO TO 2.

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.

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	
CMPS~RPM(REF)	XXX rpm
FR O2 MNTR	RICH
A/F ALPHA	XXX %
THRTL POS SEN	XXX V

PEF190V

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

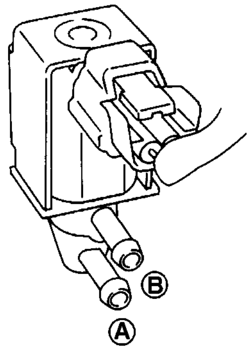
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

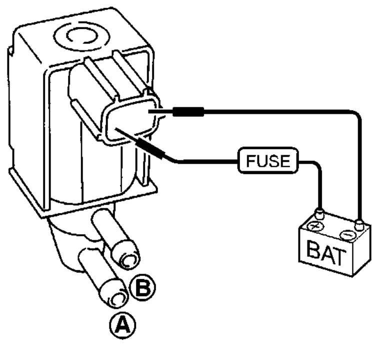
6 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

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.

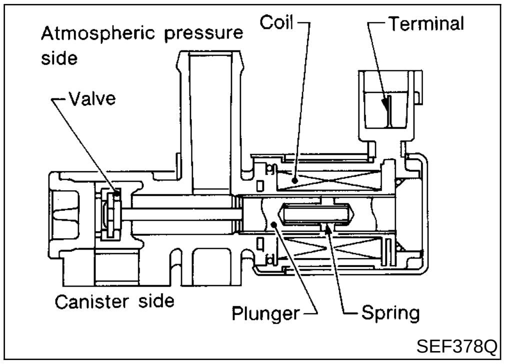
7 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

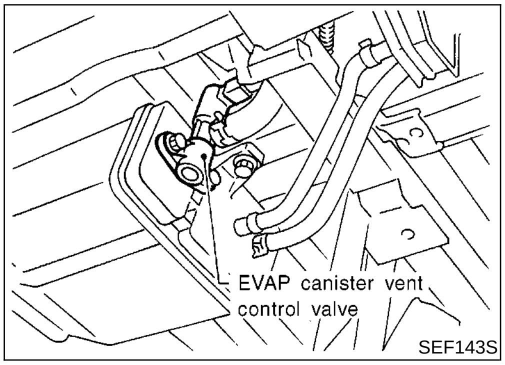
	▶	INSPECTION END

Component Description

NGEC0256



SEF378Q



SEF143S

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 32 (ECM ground).

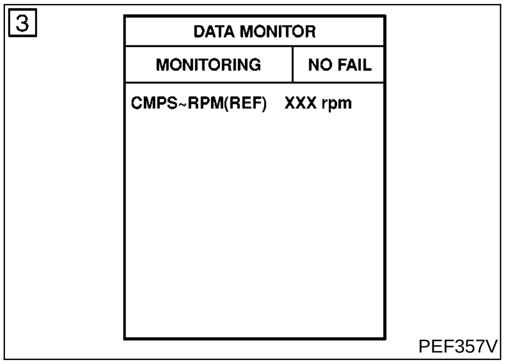
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0259

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0446 0903	• An improper voltage signal is sent to ECM through EVAP canister vent control valve.	• Harness or connectors (EVAP canister vent control valve circuit is open or shorted.) • EVAP canister vent control valve

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX



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

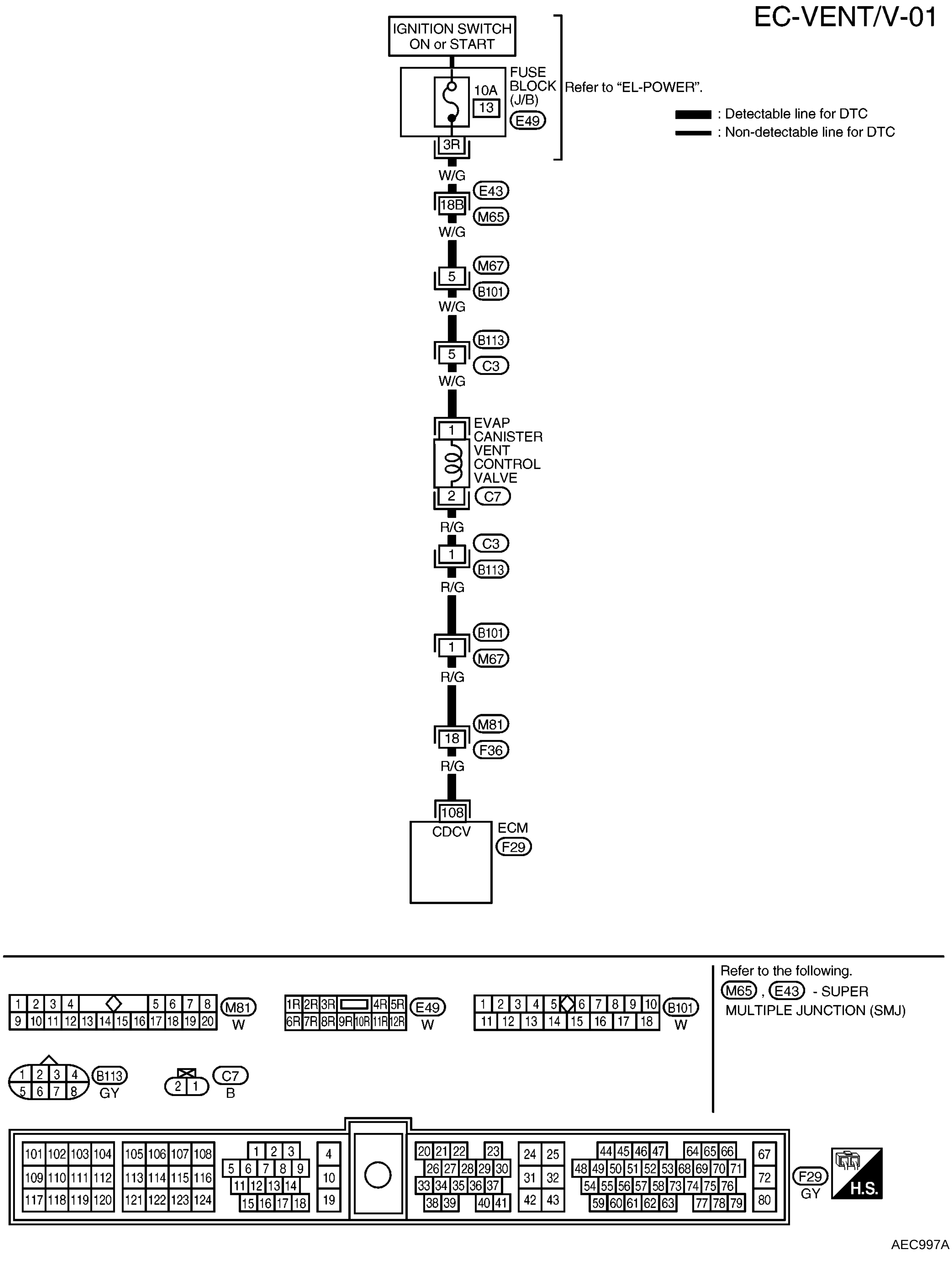
1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and wait at least 5 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-378.

With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0261



Diagnostic Procedure

NGEC0262

1	INSPECTION START
Do you have CONSULT-II?	

Yes or No

Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK CIRCUIT

1. Turn ignition switch ON.
2. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
CMPS~RPM(REF)	XXX rpm
FR O2 MNTR	RICH
A/F ALPHA	XXX %
THRTL POS SEN	XXX V

PEF361U

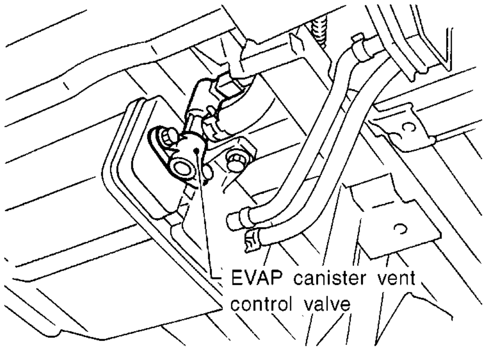
3. Make sure that ratcheting sound is heard from the vent control valve.

OK or NG

OK ▶	GO TO 7.
NG ▶	GO TO 3.

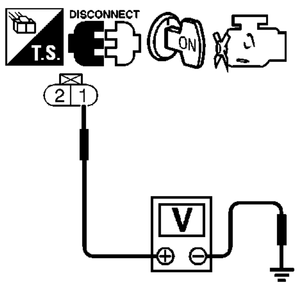
3	CHECK POWER SUPPLY

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

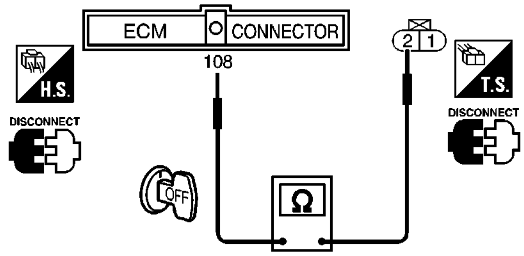
Check the following.
- Harness connectors E43, M65
- Harness connectors M67, B101
- Harness connectors B113, C3
- 10A fuse
- Harness for open or short between EVAP canister vent control valve and 10A fuse

	▶	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.

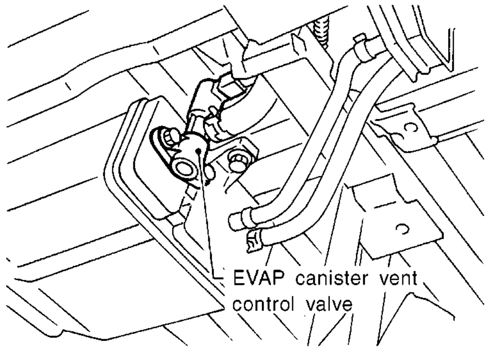
6	DETECT MALFUNCTIONING PART

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

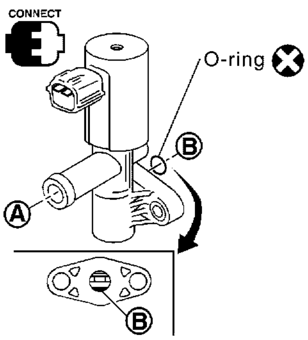
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

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	
CMPS~RPM (REF)	XXX rpm
FR O2 MNTR	RICH
A/F ALPHA	XXX %
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between **A** and **B**
ON	No
OFF	Yes

SEF172X

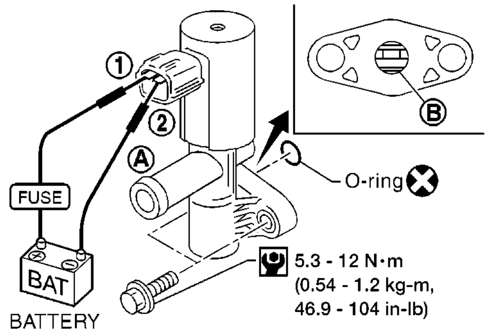
If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EVAP canister vent control valve and O-ring.

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

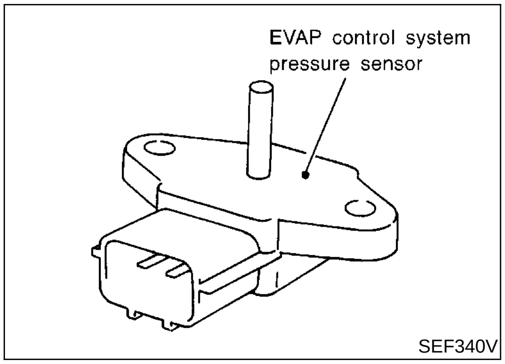
MTBL0297

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.

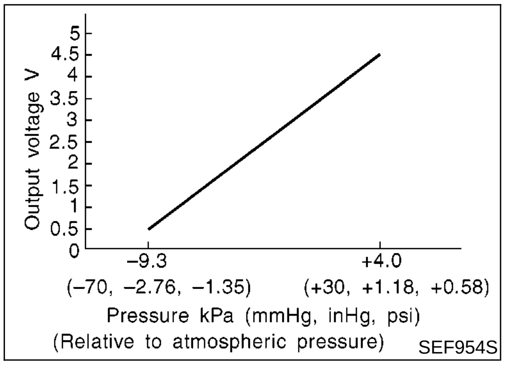
OK or NG

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-128.	
▶	**INSPECTION END**



SEF340V



SEF954S

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

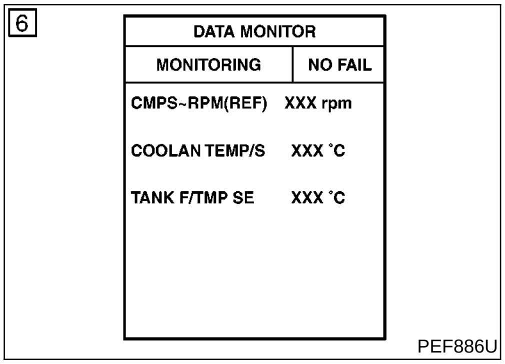
Specification data are reference values and are measured between each terminal and 32 (ECM ground).

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 0704	● An improper voltage signal from EVAP control system pressure sensor is sent to ECM.	● Harness or connectors (The EVAP control system pressure sensor circuit is open or shorted.) ● Rubber hose to EVAP control system pressure is clogged, vent, kinked, disconnected or improper connection. ● EVAP control system pressure sensor ● EVAP canister vent control valve ● EVAP canister purge volume control solenoid valve ● EVAP canister ● Rubber hose from EVAP canister vent control valve to water separator



PEF886U

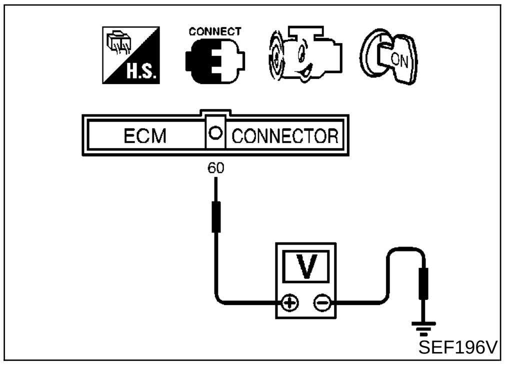
DTC Confirmation Procedure

=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-387.



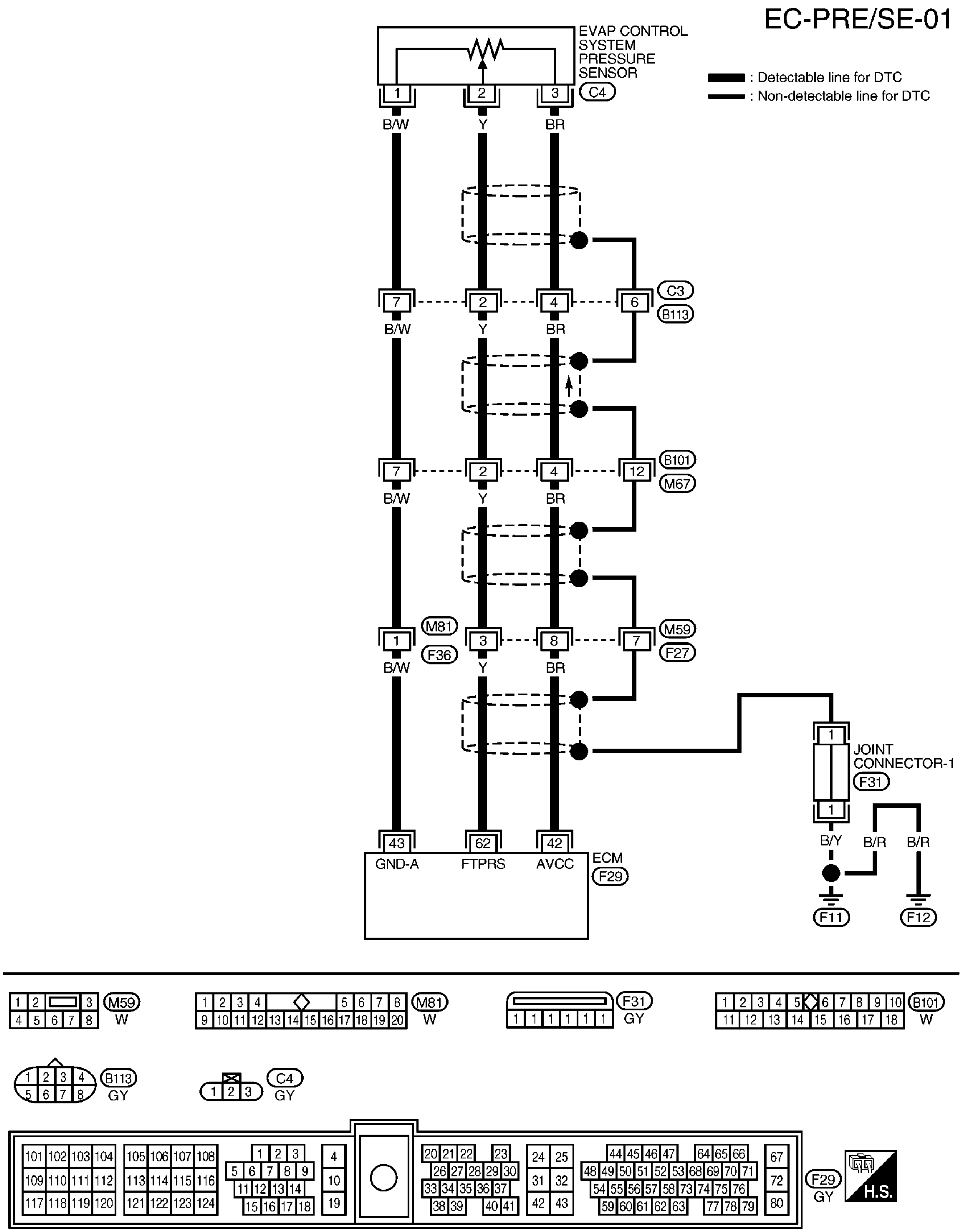
SEF196V

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-387.

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-387.

Wiring Diagram

NGEC0269



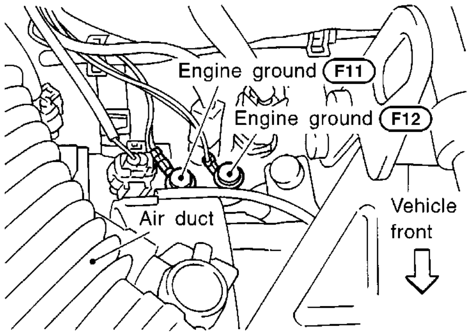
AEC998A

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.	

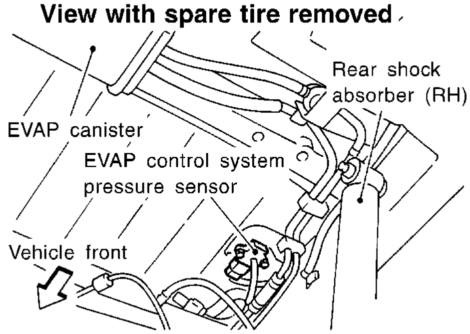


SEF325V

▶	GO TO 3.

3	CHECK HARNESS CONNECTOR
1. Disconnect EVAP control system pressure sensor harness connector.	

View with spare tire removed



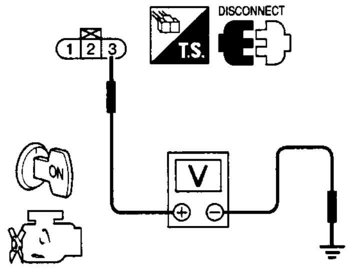
SEF341V

2. Check sensor harness connector for water. **Water should not exist.** **OK or NG**	
OK ▶	GO TO 4.
NG ▶	Repair or replace harness connector.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

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.

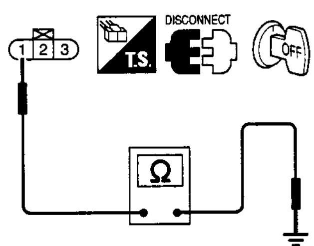
5	DETECT MALFUNCTIONING PART

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 ground and short to power.

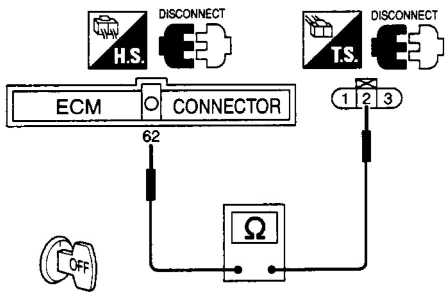
OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
Check the following. ● Harness connectors 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.

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	
CMPS~RPM(REF)	XXX rpm
FR O2 MNTR	RICH
A/F ALPHA	XXX %
THRTL POS SEN	XXX V

PEF190V

3. Check air passage continuity.

Condition PURG VOL CONT/V value	Air passage continuity between **A** and **B**
100.0%	Yes
0.0%	No

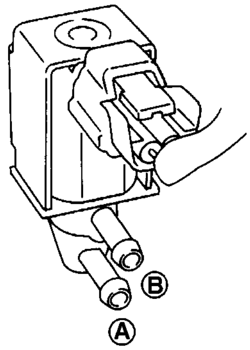
MTBL0302

OK or NG

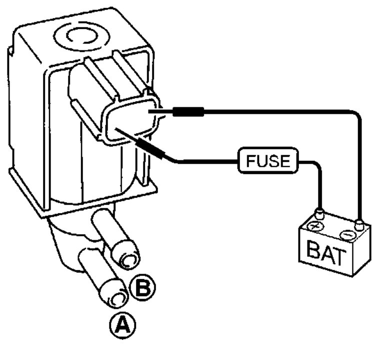
OK	▶	GO TO 12.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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

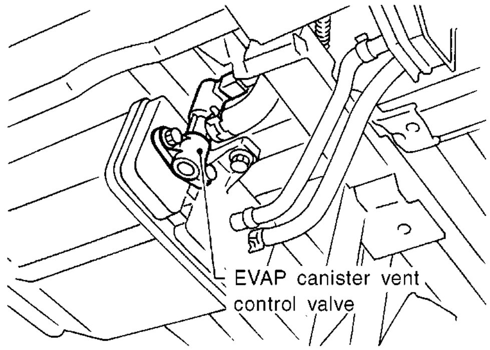
MTBL0303

OK or NG

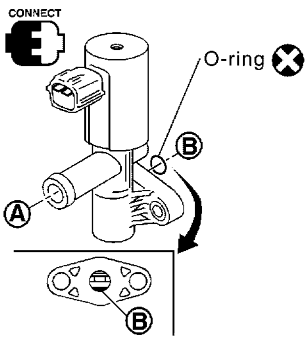
OK	▶	GO TO 13.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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	
CMPS-RPM (REF)	XXX rpm
FR O2 MNTR	RICH
A/F ALPHA	XXX %
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between **A** and **B**
ON	No
OFF	Yes

SEF172X

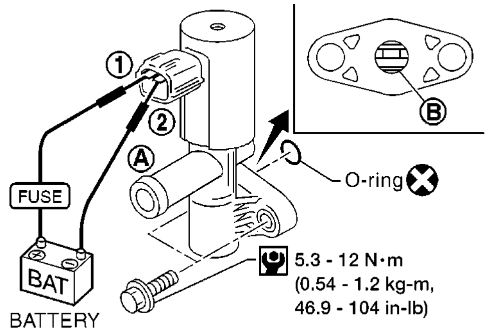
If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace EVAP canister vent control valve.

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

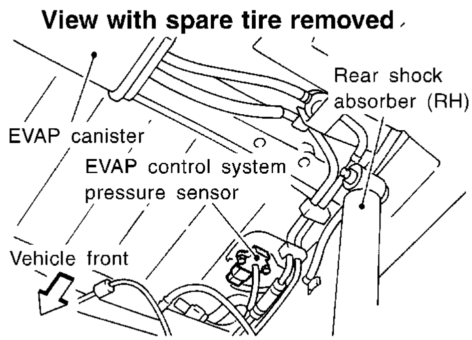
If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace EVAP canister vent control valve.

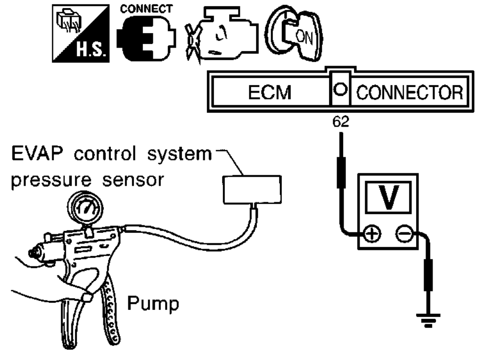
14	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.



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.

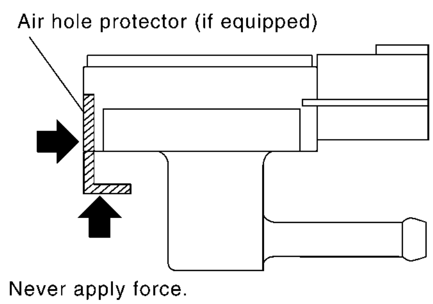


SEF198V

Pressure (Relative to 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

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

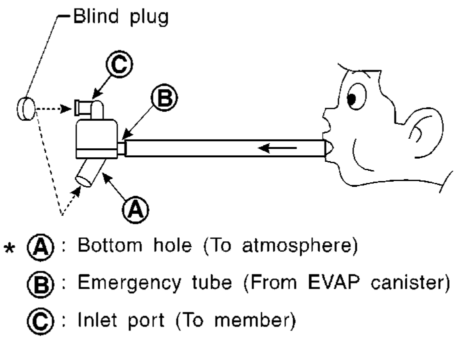
- **Never apply force to the air hole protector of the sensor, if equipped.**
- **Discard any EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

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.



SEF829T

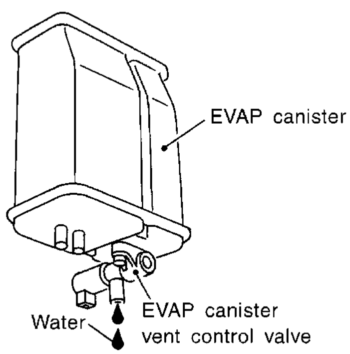
5. In case of NG in items 2 - 4, replace the parts.
- **Do not disassemble water separator.**

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

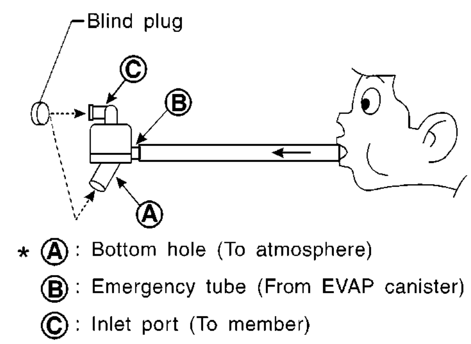
Weigh the EVAP canister with EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK	▶	GO TO 19.
NG	▶	GO TO 18.

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.



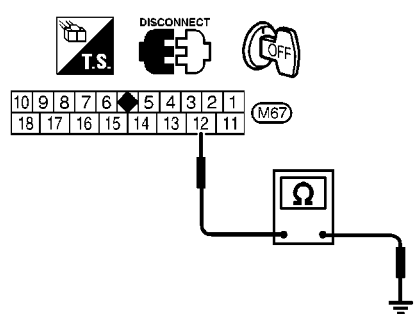
SEF829T

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 M67.
4. Check harness continuity between harness connector M67 terminal 12 and ground.



SEF197V

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-272***.)
- 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.

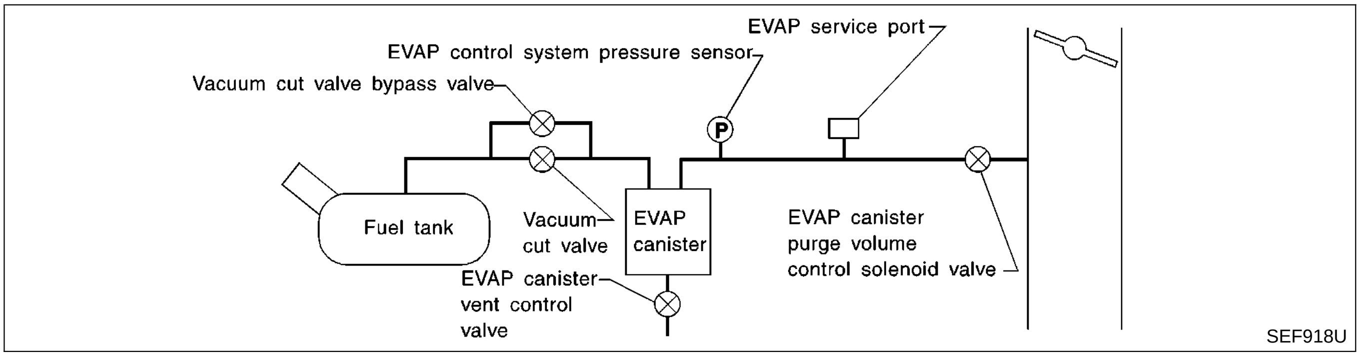
21	CHECK INTERMITTENT INCIDENT
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NGEC0951

NOTE:
If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-506.)

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

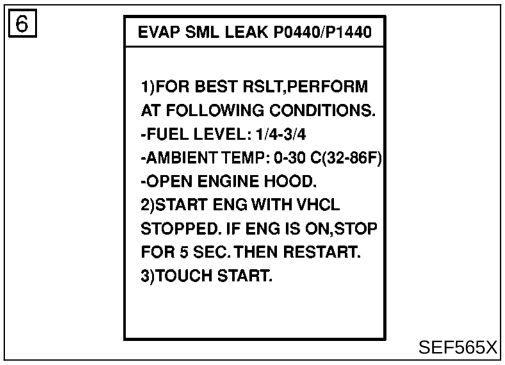
- Fuel filler cap remains open or fails to close.
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister 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
- Tank fuel temperature sensor
- O-ring of EVAP canister vent control valve is missing or damaged.
- EVAP control system pressure sensor

DTC Confirmation Procedure

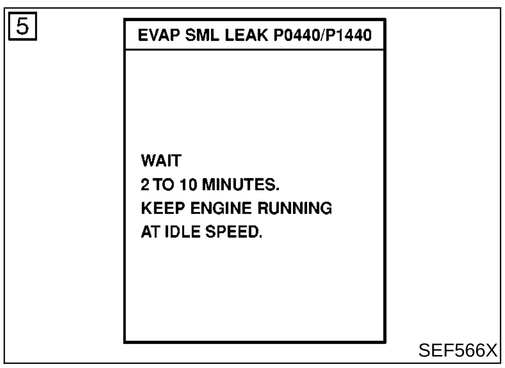
NGEC0952

CAUTION:

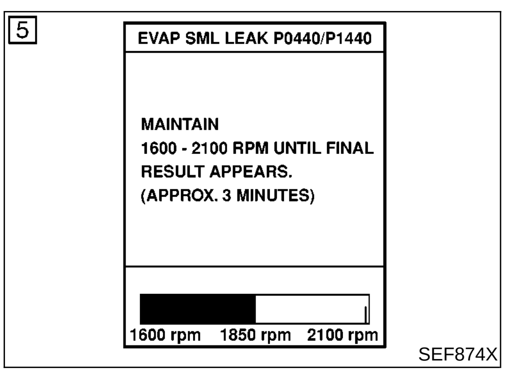
Never remove fuel filter cap during the DTC confirmation procedure.



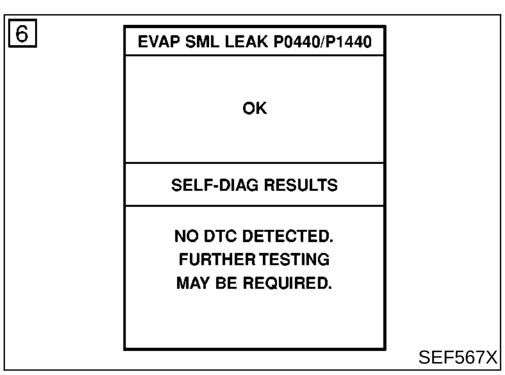
SEF565X



SEF566X



SEF874X



SEF567X

NOTE:

- **If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-516.)**
- 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-95.

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-400.
   If P0440 is displayed, perform "Diagnostic Procedure" for DTC P0440.

With GST

NOTE:

- Be sure to read the explanation of "Driving Pattern" on EC-63 before driving vehicle.
- It is better that the fuel level is low.

1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-63.
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-63.
8) Stop vehicle.
9) Select "MODE 3" with GST.
- If P0455 is displayed on the screen, go to "Diagnostic Procedure", EC-400.
- If P0440 is displayed on the screen, go to "Diagnostic Procedure", EC-354.
- If P1440 is displayed on the screen, go to "Diagnostic Procedure", EC-486.
- If P1447 is displayed on the screen, go to "Diagnostic Procedure", EC-507.
- If P0440, P0455, P1440 and P1447 are not displayed on the screen, go to the following step.

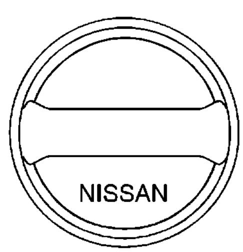
10) Select "MODE 1" with GST.
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

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

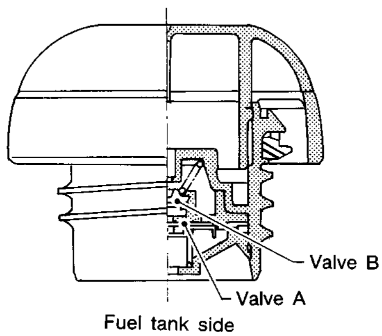
OK	▶	GO TO 2.
NG	▶	Replace with genuine NISSAN fuel filler cap.

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.

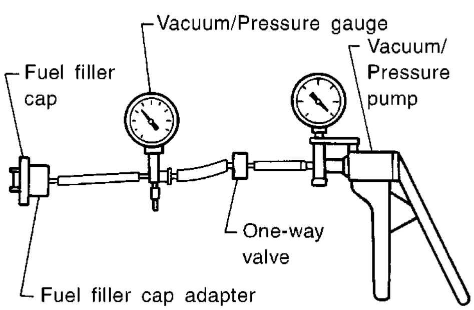
3	CHECK FUEL FILLER CAP FUNCTION	
Check for air releasing sound while opening the fuel filler cap. **OK or NG**		
OK	▶	GO TO 6.
NG	▶	GO TO 4.

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

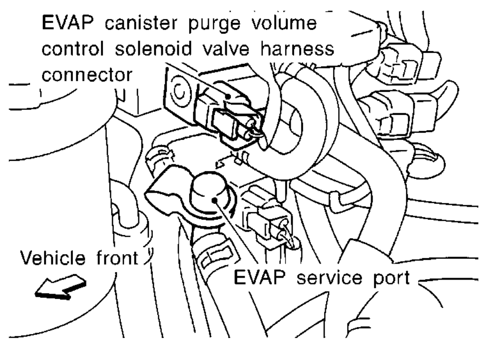
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

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.

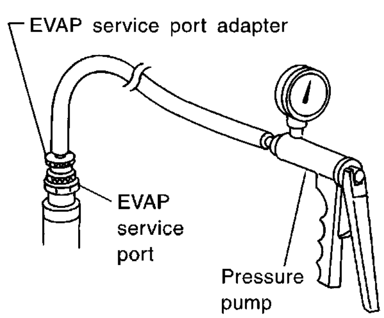
6	CLEAN EVAP PURGE LINE
Clean EVAP purge line (pipe and rubber tube) using air blower.	
▶	GO TO 7.

7	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT
Refer to "DTC Confirmation Procedure", EC-376. **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



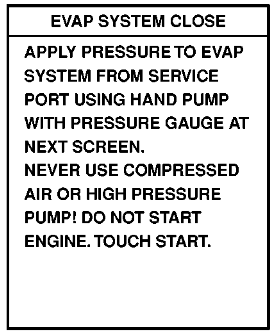
SEF916U

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.

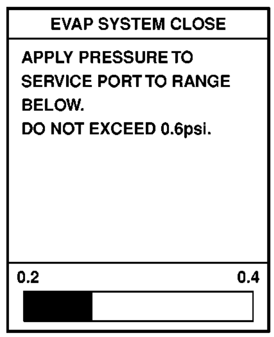
9	CHECK FOR EVAP LEAK

With CONSULT-II
1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.



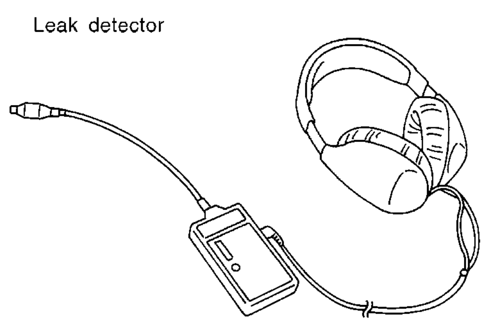
PEF658U

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-36.



SEF200U

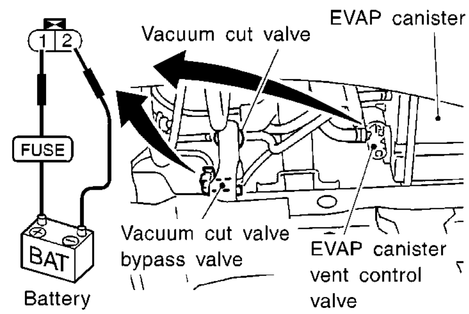
OK or NG

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

10	CHECK FOR EVAP LEAK

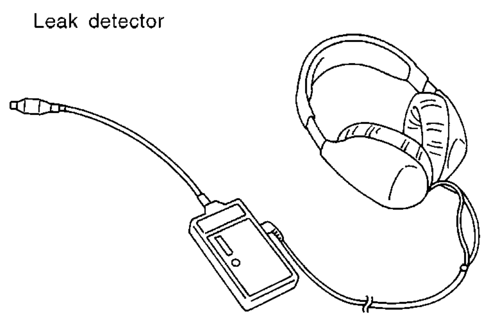
Without CONSULT-II

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



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-36.



SEF200U

OK or NG

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

11 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-II screen to increase “PURG VOL CONT/V” opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
CMPS~RPM(REF)	XXX rpm
FR O2 MNTR-B2	RICH
FR O2 MNTR-B1	RICH
A/F ALPHA-B2	XXX %
A/F ALPHA-B1	XXX %
THRTL POS SEN	XXX V

PEF882U

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 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.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

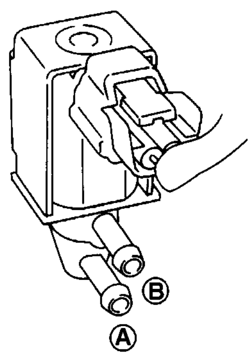
1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
CMPS~RPM(REF)	XXX rpm
FR O2 MNTR-B2	RICH
FR O2 MNTR-B1	RICH
A/F ALPHA-B2	XXX %
A/F ALPHA-B1	XXX %
THRTL POS SEN	XXX V

PEF882U

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

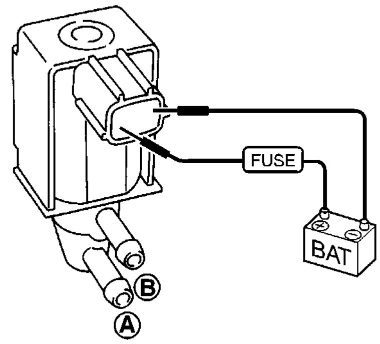
MTBL0241

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

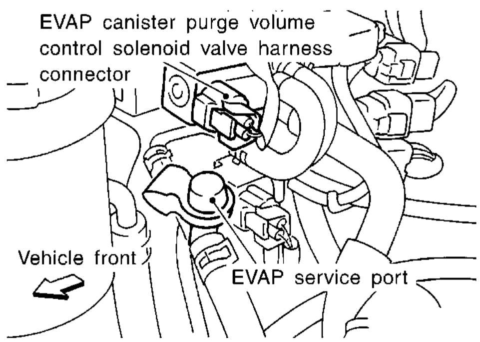
Without CONSULT-II
Check air passage continuity.



SEF661U

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

MTBL0242



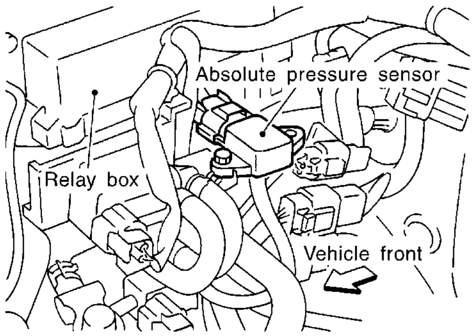
SEF339V

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

16	CHECK ABSOLUTE PRESSURE SENSOR

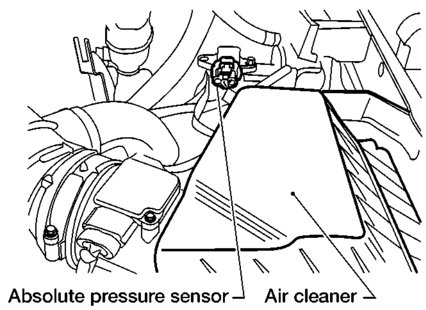
1. Remove absolute pressure sensor with its harness connector connected.



SEF328V

2. Remove hose from absolute pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 45 and engine ground.
   The voltage should be 3.2 to 4.8V.
4. Use pump to apply vacuum of −26.7 kPa (−200 mmHg, −7.87 inHg) to absolute pressure sensor as shown in figure and check the output voltage.
   The voltage should be 1.0 to 1.4V lower than the value measured in step 3.

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



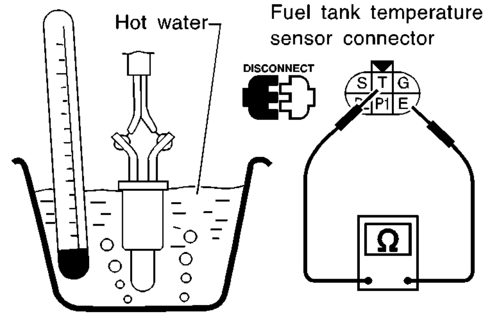
AEC642A

OK or NG

OK	▶	GO TO 17.
NG	▶	Replace absolute pressure sensor.

17	CHECK FUEL TANK TEMPERATURE SENSOR

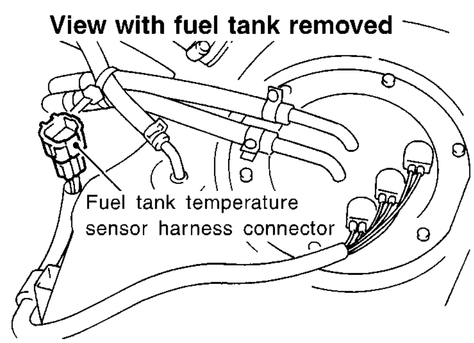
Check resistance by heating with hot water or heat gun as shown in the figure.



SEF172VA

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

MTBL0234



SEF334VA

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace fuel tank temperature sensor, ***FE-4***.

GI
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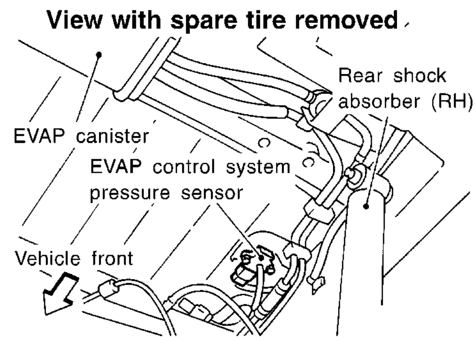
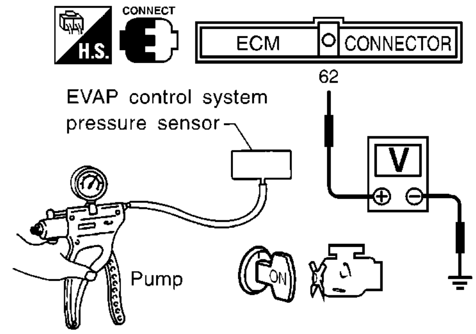
18	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.



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.



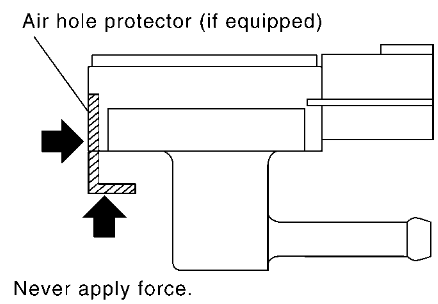
SEF894U

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

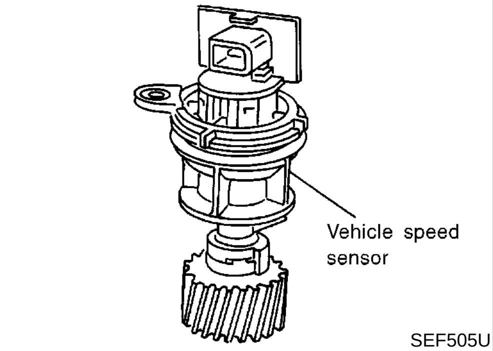
- **Discard and EVAP control system pressure sensor which has been dropped from a height of more than 0.5m (19.7in) onto a hard surface such as a concrete floor; use a new one.**

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace EVAP control system pressure sensor.

19	CHECK FUEL LEVEL SENSOR	
1. Remove fuel level sensor assembly. Refer to ***FE-5***. 2. Refer to "FUEL LEVEL SENSOR UNIT CHECK", ***EL-86***. **OK or NG**		
OK	▶	EC-411
NG	▶	Replace fuel level sensor.

20	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.		
	▶	**INSPECTION END**



SEF505U

Component Description

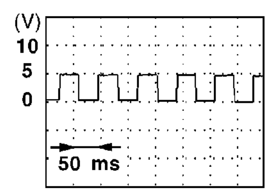
NGEC0272

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 32 (ECM 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 0104	● The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	● Harness or connector (The vehicle speed sensor circuit is open or shorted.) ● Vehicle speed sensor

DTC Confirmation Procedure

NGEC0275

CAUTION:

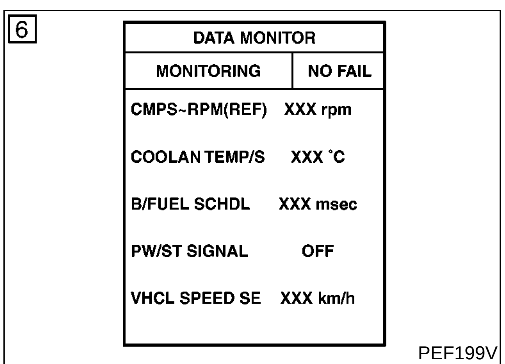
Always drive vehicle at a safe speed.

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.



PEF199V

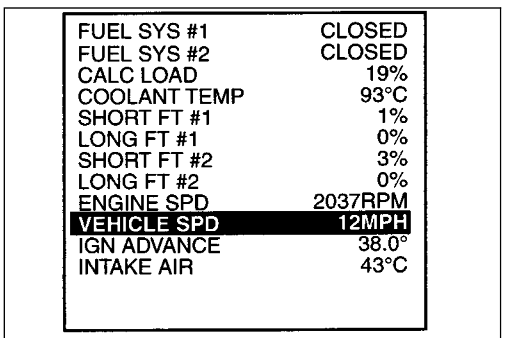
With CONSULT-II

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-415.
   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.

CMPS·RPM (REF)	1,450 - 2,550 rpm (A/T) 1,800 - 3,000 rpm (2WD M/T) 2,150 - 3,000 rpm (4WD M/T)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	2.1 - 4.8 msec (A/T) 2.5 - 5.3 msec (M/T)
Selector lever	Suitable position
PW/ST SIGNAL	OFF

7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-415.



SEF568P

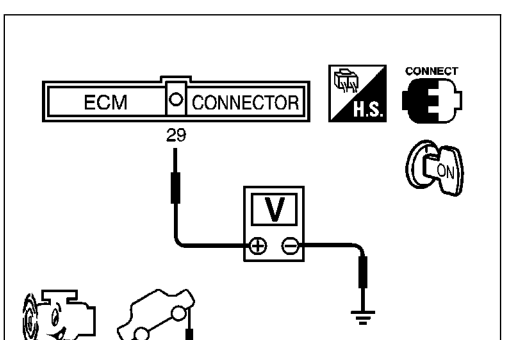
Overall Function Check

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-415.



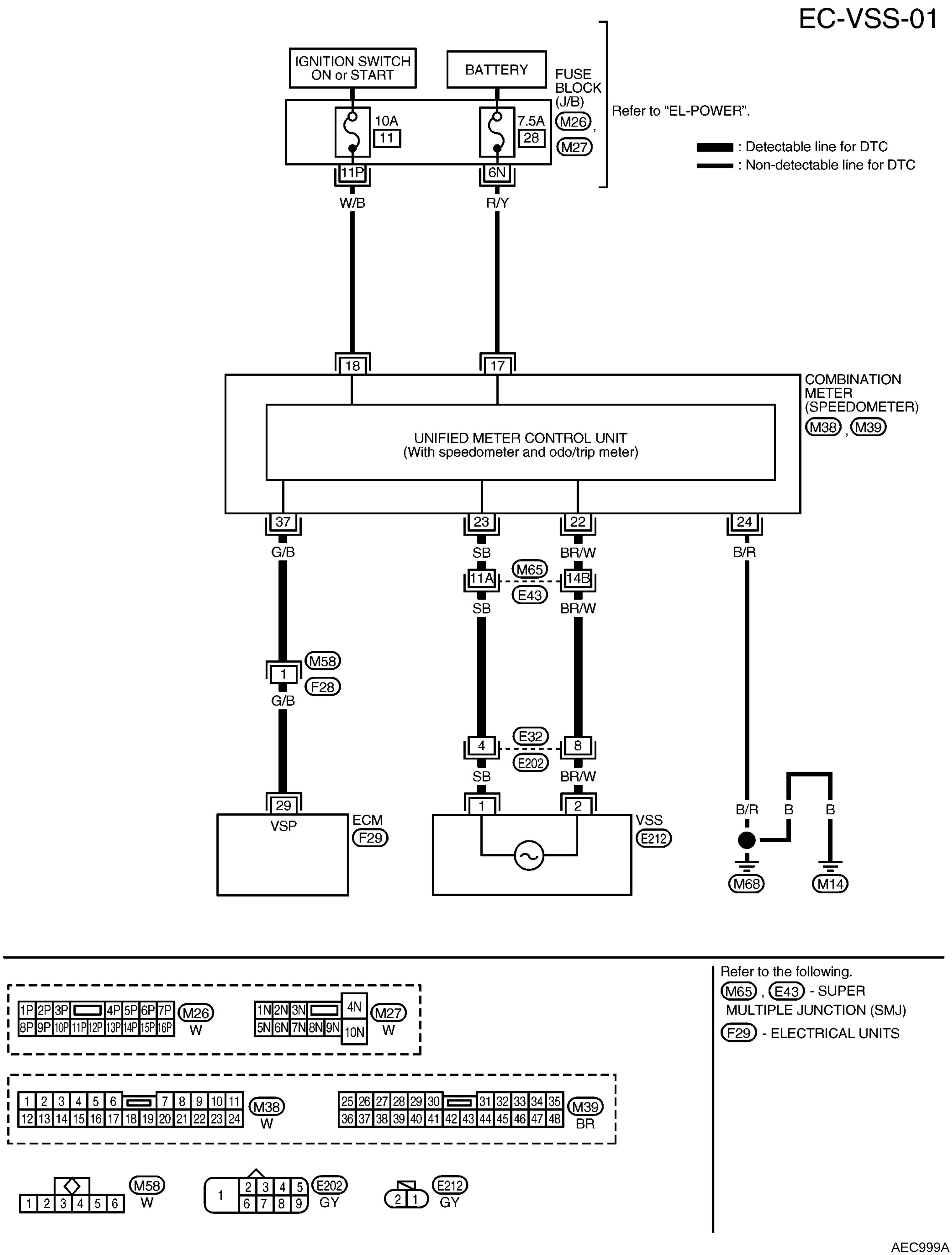
MEC254C

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-412.
5) If NG, go to "Diagnostic Procedure", EC-415.

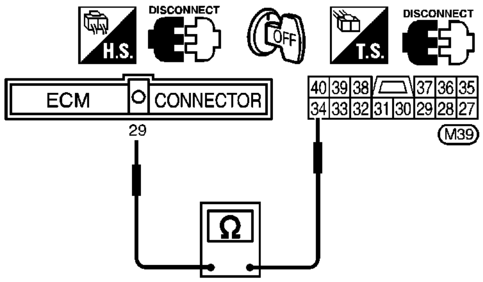
Wiring Diagram

NGEC0277



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-82***.

5	CHECK INTERMITTENT INCIDENT
Perform “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-128.	
▶	**INSPECTION END**

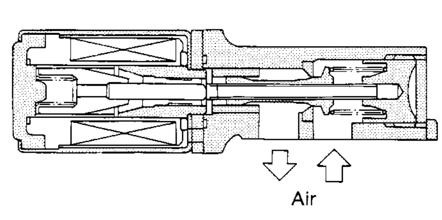
Description
NGEC0279

SYSTEM DESCRIPTION
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).

COMPONENT DESCRIPTION
NGEC0279S02



SEF040E

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

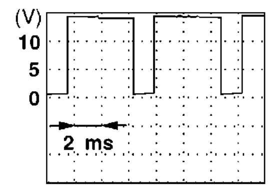
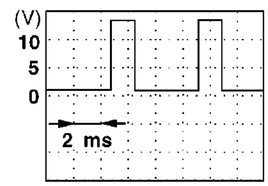
NGEC0280

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 32 (ECM 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

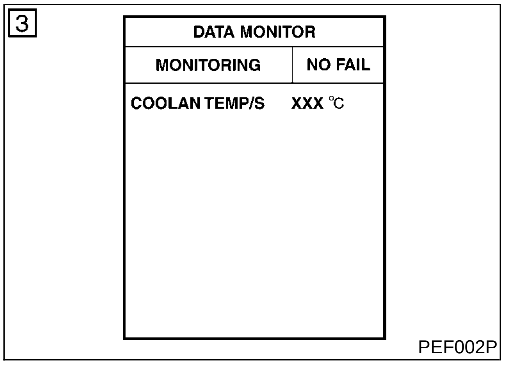
DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0505 0205	A)	The IACV-AAC valve does not operate properly.	• Harness or connectors (The IACV-AAC valve circuit is open.) • IACV-AAC valve
	B)	The IACV-AAC valve does not operate properly.	• Harness or connectors (The IACV-AAC valve circuit is shorted.) • IACV-AAC valve

DTC Confirmation Procedure

=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:

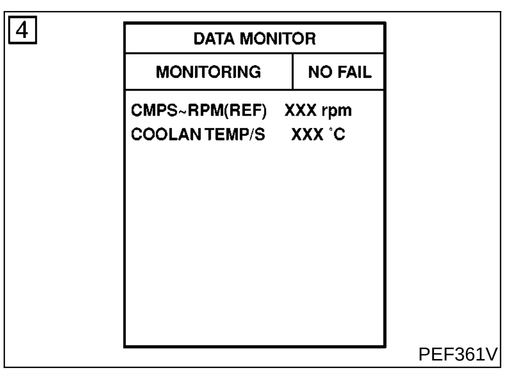
Before performing the following procedure, confirm battery voltage is more than 10.5V with ignition switch ON.

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-420.

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

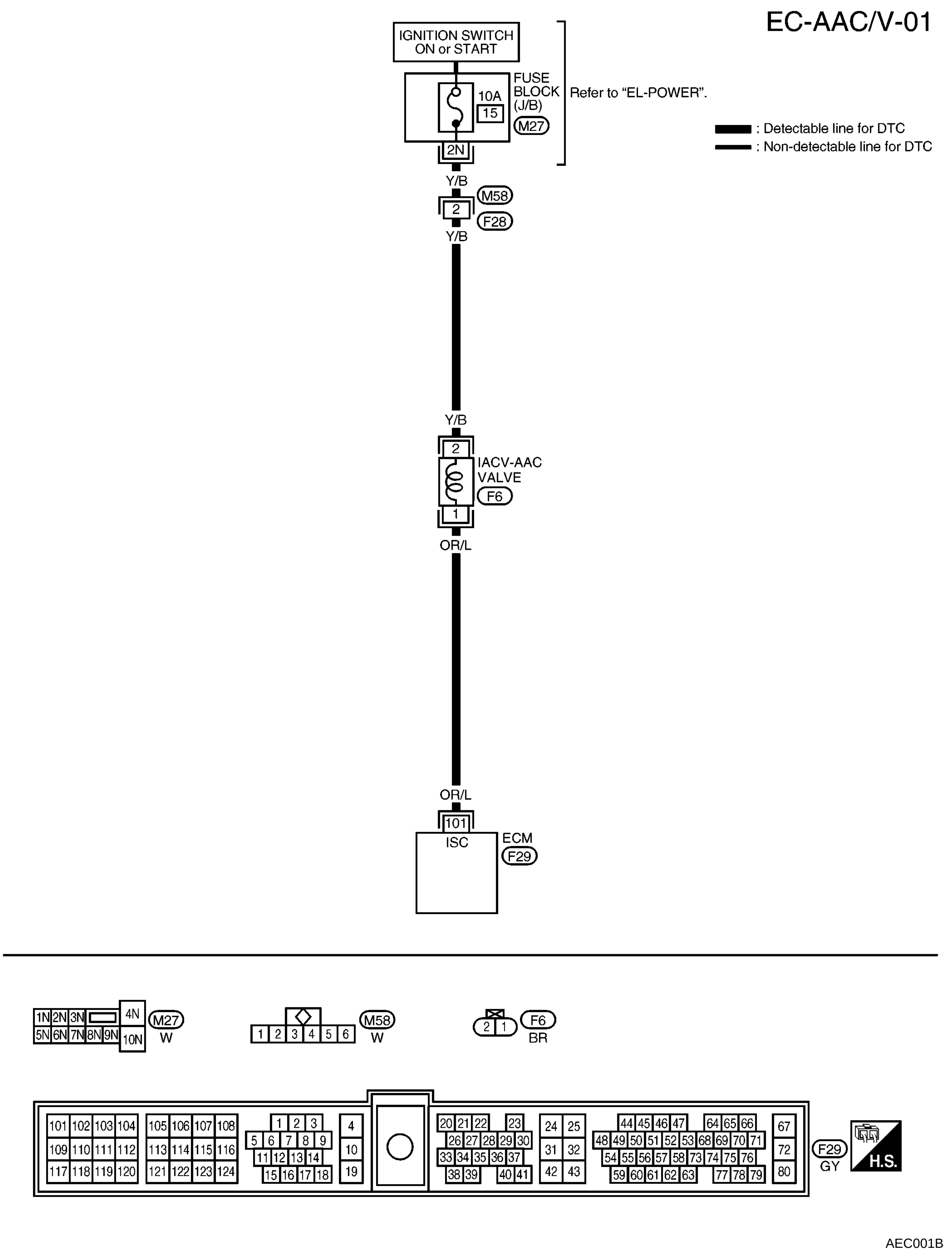
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON again and select "DATA MONITOR" mode with CONSULT-II.
4) Start engine and run it for at least 6 minute at idle speed.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-420.

With GST

Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC0284

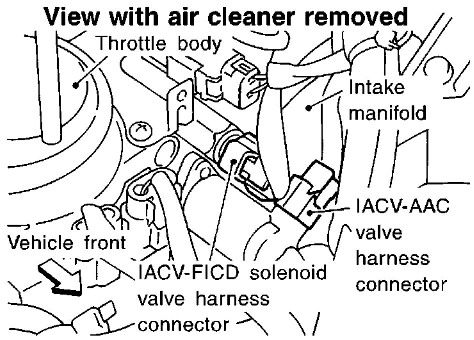


Diagnostic Procedure

NGEC0285

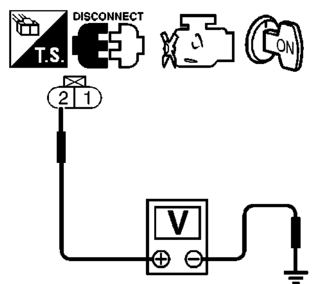
1	CHECK POWER SUPPLY

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

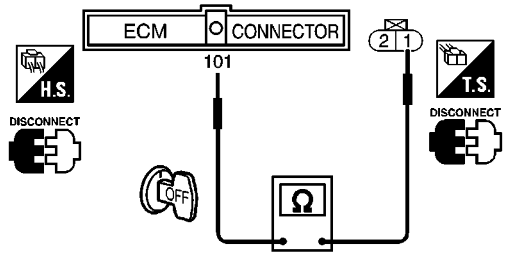
OK or NG

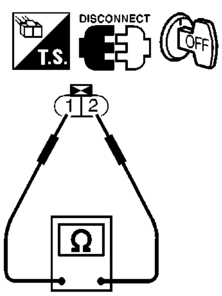
OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

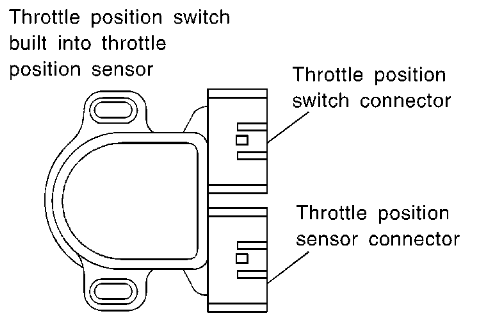
Check the following.
- Harness connectors M58, F28
- 10A fuse
- Harness for open or short between IACV-AAC valve harness connector and 10A fuse

	▶	Repair harness or connectors.

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-128.		
	▶	**INSPECTION END**



SEF505V

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

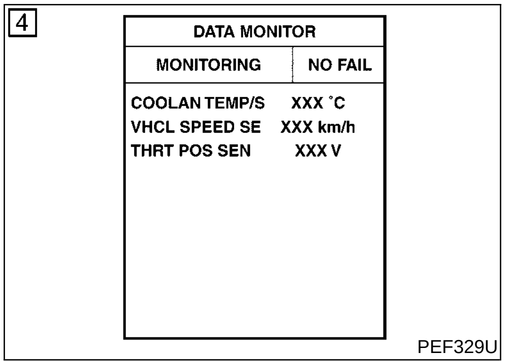
Specification data are reference values and are measured between each terminal and 32 (ECM ground).

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 0203	● Battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened.	● Harness or connectors (The closed throttle position switch circuit is shorted.) ● Closed throttle position switch ● Throttle position sensor



PEF329U

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.

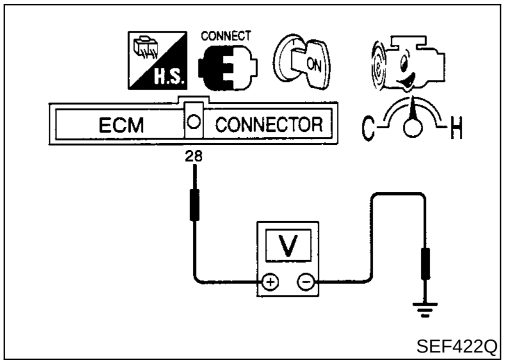
Condition	Voltage
At idle	ON
At 2,000 rpm	OFF

If the result is NG, go to “Diagnostic Procedure”, EC-425.
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-425.



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

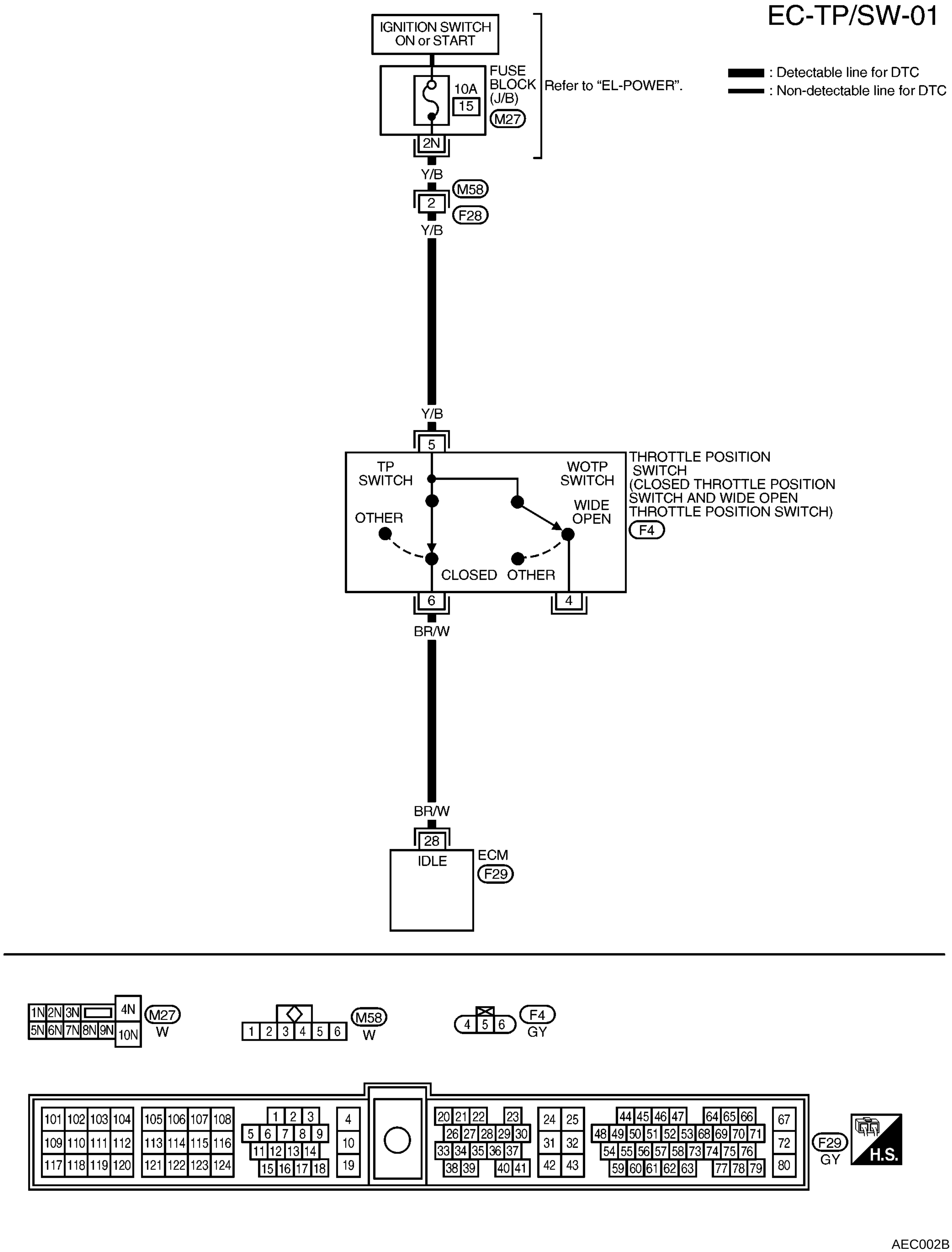
1) Start engine and warm it up to normal operating temperature.
2) Check the voltage between ECM terminal 28 (Closed throttle position switch signal) and ground under the following conditions.

Condition	Voltage
At idle	Battery voltage
At 2,000 rpm	Approximately 0 - 1V

3) If NG, go to “Diagnostic Procedure”, EC-425.

Wiring Diagram

NGEC0292

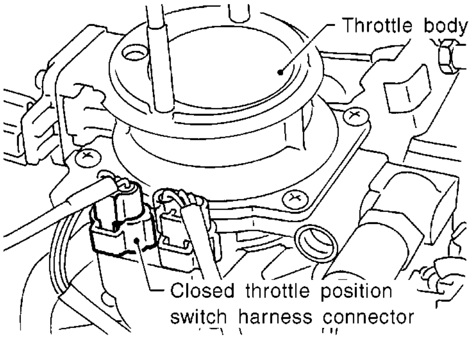


Diagnostic Procedure

NGEC0293

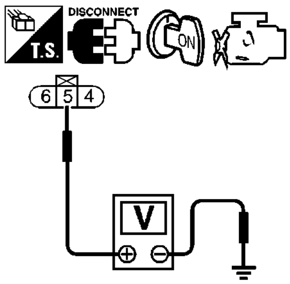
1	CHECK POWER SUPPLY

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.

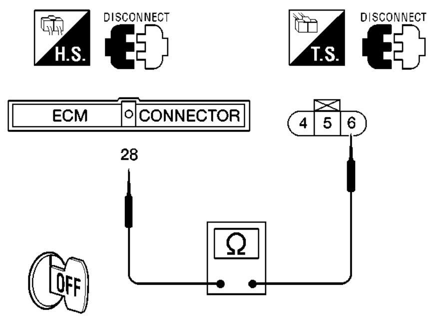
2	DETECT MALFUNCTIONING PART

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-95.

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)

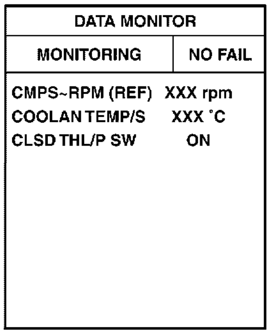
MTBL0328

▶	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.



Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely open	OFF

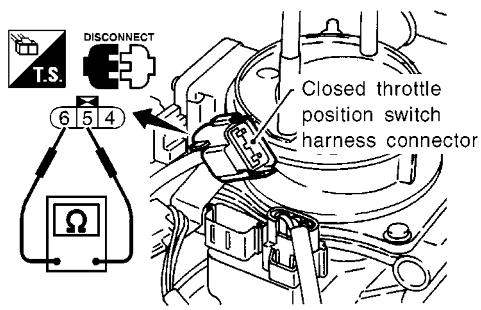
SEF173X

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-95.

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-95.

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

OK or NG

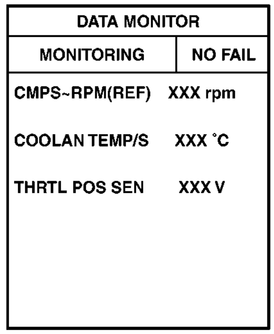
OK	▶	GO TO 7.
NG	▶	Replace throttle position switch.

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

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.



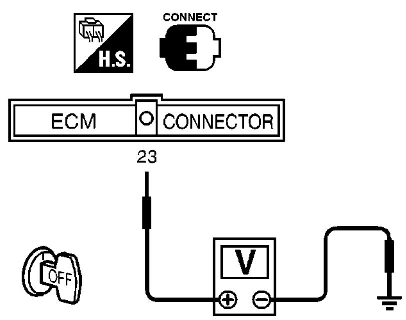
PEF765W

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-95.

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

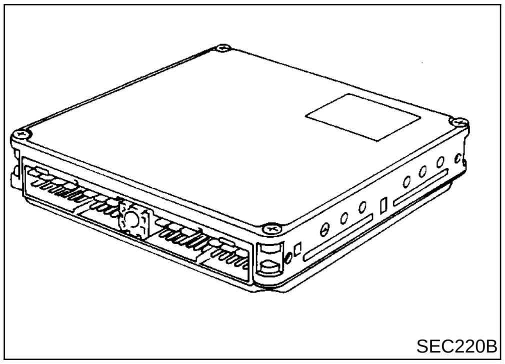
NOTE:
Voltage measurement must be made with throttle position sensor installed in vehicle.
If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-95.

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-128.	
▶	**INSPECTION END**


SEC220B

Component Description

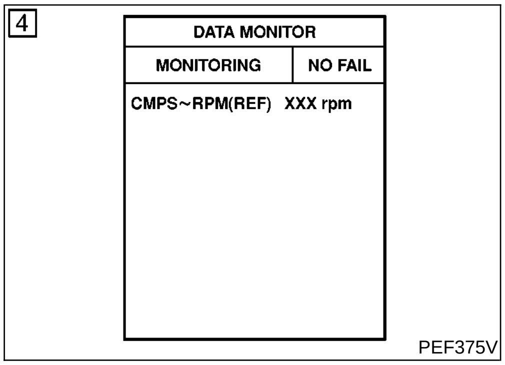
NGEC0295

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 0301	• ECM calculation function is malfunctioning.	• ECM



PEF375V

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-430.

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?		
No Tools 1. Turn ignition switch ON. 2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-68. 3. Perform “DTC Confirmation Procedure”. See previous page. 4. Is the 1st trip DTC 0301 displayed again? **Yes or No**		
Yes	▶	Replace ECM.
No	▶	**INSPECTION END**

Description

NGEC0299

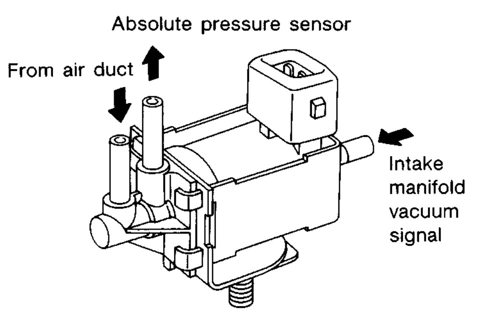
SYSTEM DESCRIPTION

NGEC0299S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	On board diagnosis of EVAP system	MAP/BARO switch solenoid valve
Ignition switch	Start signal		

This system allows the absolute pressure sensor to monitor either ambient barometric pressure or intake manifold pressure. The MAP/BARO switch solenoid valve switches between two passages by ON-OFF pulse signals from the ECM. (One passage is from the intake air duct, the other is from the intake manifold.) Either ambient barometric pressure or intake manifold pressure is applied to the absolute pressure sensor.

Solenoid	Conditions
ON	● For 5 seconds after turning ignition switch “ON” (Engine is not running) or ● For 5 seconds after starting engine or ● More than 5 minutes after the solenoid valve shuts OFF. and ● Engine running



SEF417Q

COMPONENT DESCRIPTION

NGEC0299S02

The MAP/BARO switch solenoid valve switches its air flow passage according to the voltage signal sent from the ECM. When voltage is supplied from the ECM, the MAP/BARO switch solenoid turns “ON”. Then, the absolute pressure sensor can monitor the ambient barometric pressure. When voltage is not supplied from the ECM, the MAP/BARO switch solenoid valve turns “OFF”. Then, the sensor monitors intake manifold pressure.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0300

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
MAP/BARO SW/V	● For 5 seconds after starting engine	BARO
	● More than 5 seconds after turning ignition switch “ON” ● More than 5 seconds after starting engine	MAP

ECM Terminals and Reference Value

NGEC0301

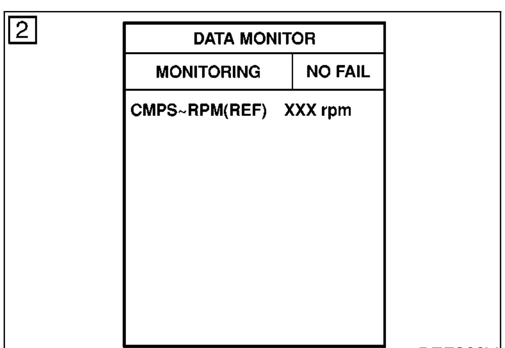
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
118	LG/B	MAP/BARO switch solenoid valve	**[Ignition switch "ON"]** ● For 5 seconds after turning ignition switch "ON" **[Engine is running]** ● For 5 seconds after starting engine	0 - 1V
			[Ignition switch "ON"] ● More than 5 seconds after turning ignition switch "ON" **[Engine is running]** ● More than 5 seconds after starting engine	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0302

DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P1105 1302	A)	MAP/BARO switch solenoid valve receives the voltage supplied though ECM does not supply the voltage to the valve.	● Harness or connectors (MAP/BARO switch solenoid valve circuit is open or shorted.) ● MAP/BARO switch solenoid valve
	B)	There is little difference between MAP/BARO switch solenoid valve input voltage at ambient barometric pressure and voltage at intake manifold pressure.	● Harness or connectors (MAP/BARO switch solenoid valve circuit is open or shorted.) ● Hoses (Hoses are clogged, vent, kinked, disconnected or improper connection.) ● Absolute pressure sensor ● MAP/BARO switch solenoid valve



PEF360V

DTC Confirmation Procedure

NGEC0303

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

NOTE:

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

PROCEDURE FOR MALFUNCTION A

NGEC0303S01

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch "ON".

With CONSULT-II

1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2) Wait at least 10 seconds.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-435.

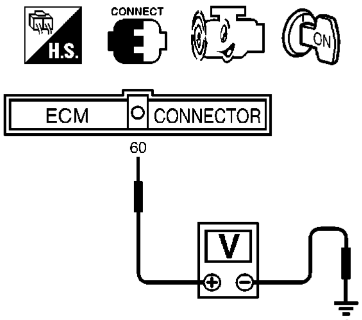
With GST

Follow the procedure "With CONSULT-II".

5

DATA MONITOR	
MONITORING	NO FAIL
CMPS~RPM(REF)	XXX rpm
COOLAN TEMP/S	XXX °C
TANK F/TMP SE	XXX °C

PEF398V



SEF196V

PROCEDURE FOR MALFUNCTION B

NGEC0303S02

TESTING CONDITION:

Always perform at a temperature above 5°C (41°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) Make sure that "TANK/F/TEMP SE" is more than 0°C (32°F).
5) Start engine and let it idle for at least 10 seconds.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-435.

With GST

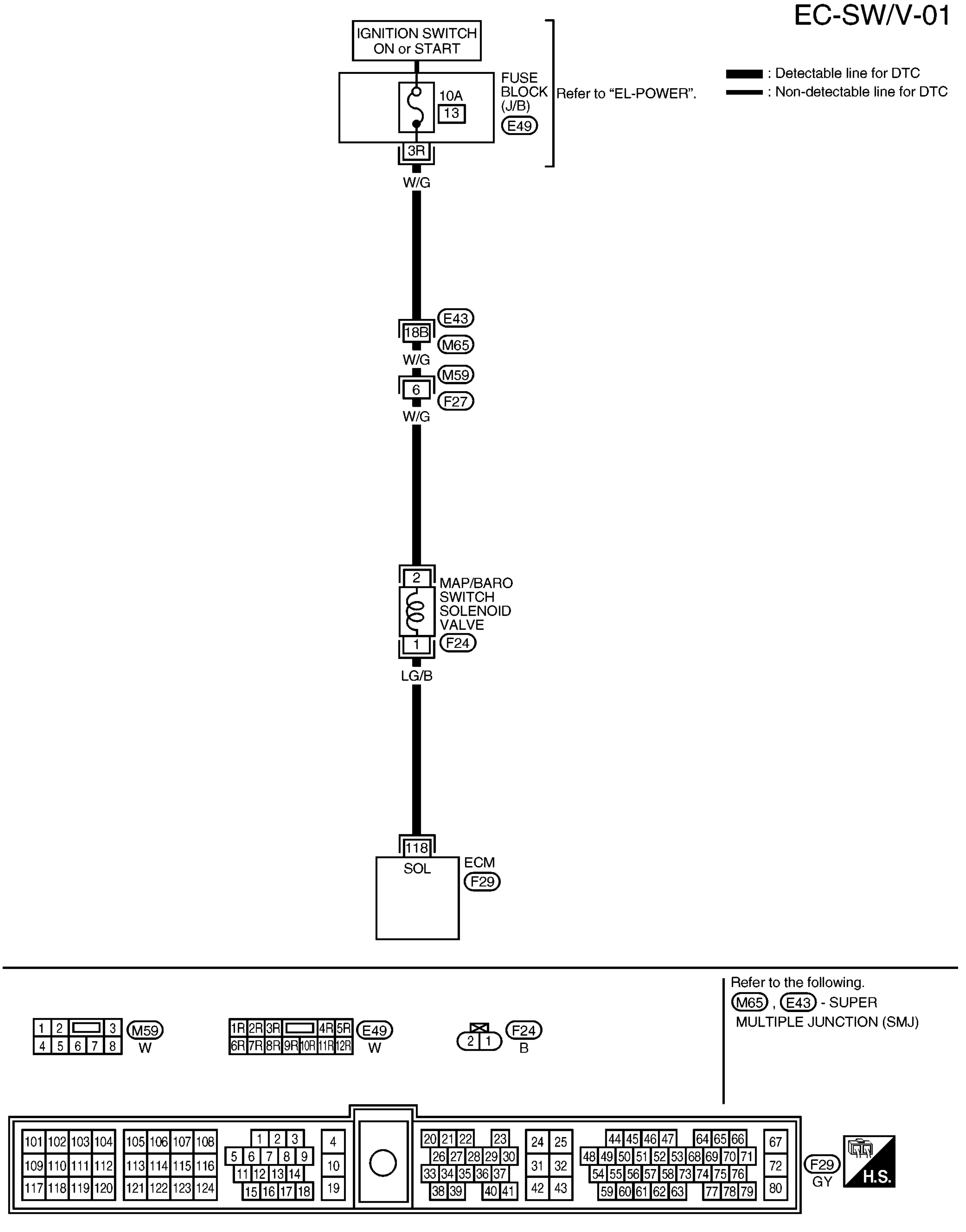
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON.
4) Check that voltage between ECM terminal 60 and ground is less than 4.2V.
5) Start engine and let it idle for at least 10 seconds.
6) Select "MODE 7" with GST.
7) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-435.

No Tools

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON.
4) Check that voltage between ECM terminal 60 and ground is less than 4.2V.
5) Start engine and let it idle for at least 10 seconds.
6) Turn ignition switch OFF, wait at least 5 seconds and then turn ignition ON.
7) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-435.

Wiring Diagram

NGEC0304



AEC003B

Diagnostic Procedure

NGEC0305

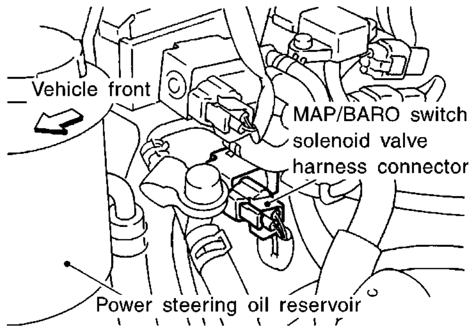
If the trouble is duplicated after "PROCEDURE FOR MALFUNCTION A", perform "PROCEDURE A" below. If the trouble is duplicated after "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE B" on EC-439.

PROCEDURE A

NGEC0305S01

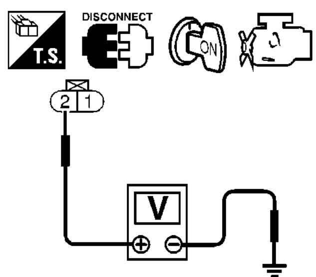
1 CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect MAP/BARO switch solenoid valve harness connector.



SEF338V

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



SEF192V

Voltage: Battery voltage

OK or NG

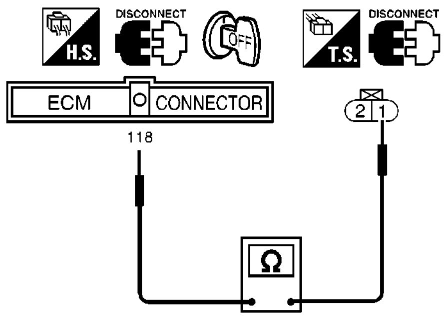
OK	▶	GO TO 3.
NG	▶	GO TO 2.

2 DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E43, M65
- Harness connectors M59, F27
- 10A fuse
- Harness for open or short between MAP/BARO switch solenoid valve and 10A fuse

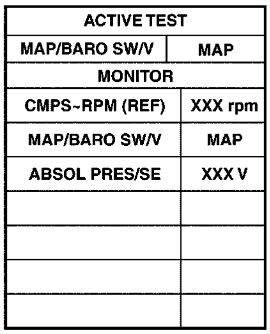
	▶	Repair harness or connectors.

3	CHECK OUTPUT SIGNAL CIRCUIT	
1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. 3. Check harness continuity between ECM terminal 118 and terminal 1.  SEF205V **Continuity should exist.** 4. Also check harness for short to ground and short to power. **OK or NG**		
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART	
Check the harness for open or short between MAP/BARO switch solenoid valve and ECM.		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK MAP/BARO SWITCH SOLENOID VALVE

With CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Perform "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT-II.
3. Check the following.
- Condition: At idle under no-load
- CONSULT-II display
- Time for voltage to change



MAP/BARO	AVSOL PRES/SE (Voltage)
BARO	More than 2.6V
MAP	Less than the voltage at BARO

MAP/BARO SW/V	Required time to switch
BARO to MAP	Less than 1 second
MAP to BARO	

SEF170X

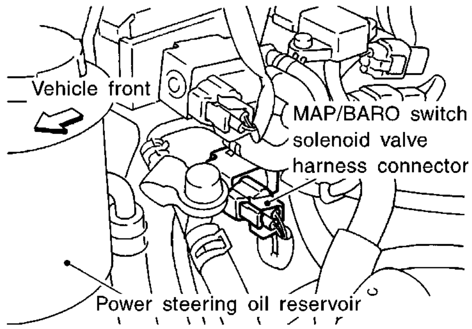
OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	CHECK MAP/BARO SWITCH SOLENOID VALVE

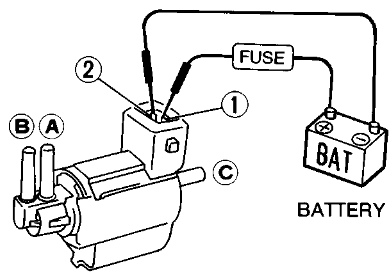
Without CONSULT-II

1. Turn ignition switch OFF and remove MAP/BARO switch solenoid valve.



SEF338V

2. Check air passage continuity.



MEC488B

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

3. Check the time required for the solenoid valve to switch. It should be less than 1 second.

OK or NG

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

7	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

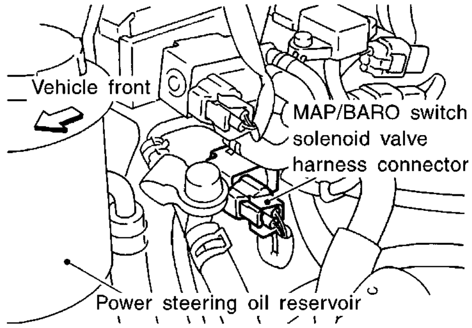
	▶	**INSPECTION END**

PROCEDURE B

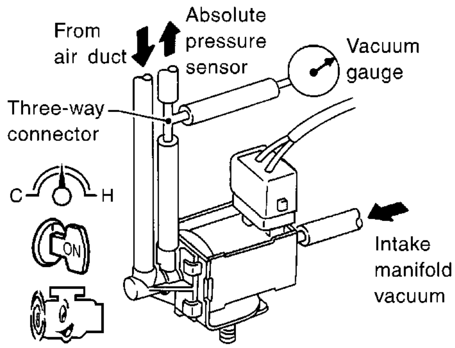
NGEC0305S02

1	INSPECTION START

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Connect MAP/BARO switch solenoid valve and absolute pressure sensor with a rubber tube that has vacuum gauge.



SEF338V



SEF676T

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

2 CHECK VACUUM SOURCE TO MAP/BARO SWITCH SOLENOID VALVE AND CIRCUIT

With CONSULT-II

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

ACTIVE TEST	
MAP/BARO SW/V	MAP
MONITOR	
CMPS~RPM(REF)	XXX rpm
MAP/BARO SW/V	MAP
ABSOL PRES/SE	XXX V

PEF396V

ACTIVE TEST	
MAP/BARO SW/V	BARO
MONITOR	
CMPS~RPM(REF)	XXX rpm
MAP/BARO SW/V	BARO
ABSOL PRES/SE	XXX V

PEF397V

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

MTBL0079

OK or NG

OK	▶	GO TO 13.
NG	▶	GO TO 4.

3 CHECK VACUUM SOURCE TO ABSOLUTE PRESSURE SENSOR

Without CONSULT-II

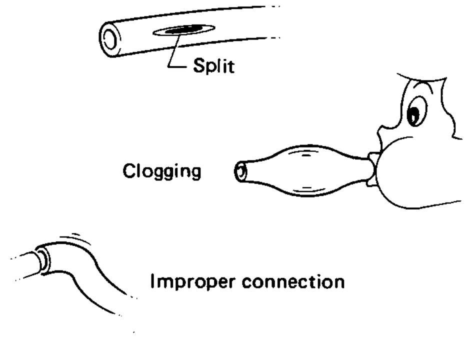
1. Start engine and let it idle.
2. Check for vacuum under the following condition.

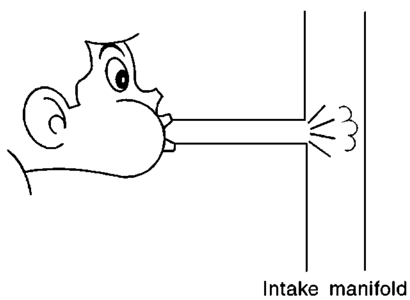
Condition	Vacuum
For 5 seconds after starting engine	Should not exist
More than 5 seconds after starting engine	Should exist

MTBL0080

OK or NG

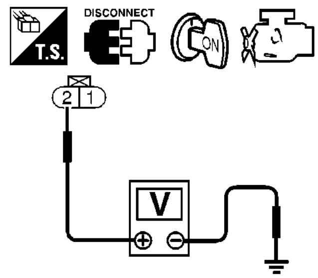
OK	▶	GO TO 13.
NG	▶	GO TO 4.

4	CHECK VACUUM HOSE	
1. Turn ignition switch OFF. 2. Check hose for clogging, cracks, disconnection or improper connection.  SEF109L **OK or NG**		
OK	▶	GO TO 5.
NG	▶	Clean, repair or reconnect the hose.

5	CHECK VACUUM PORT	
Check vacuum port for clogging.  SEF368U **OK or NG**		
OK	▶	GO TO 6.
NG	▶	Clean or repair the vacuum port.

6 CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect MAP/BARO switch solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check voltage between terminal 2 and ground with CONSULT-II or tester.



SEF192V

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

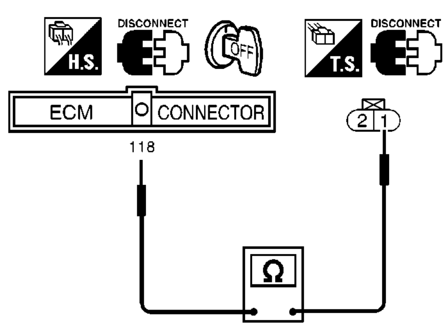
7 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E43, M65
- Harness connectors M59, F27
- 10A fuse
- Harness for open or short between MAP/BARO switch solenoid valve and 10A fuse

	▶	Repair harness or connectors.

8 CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 118 and terminal 1 with CONSULT-II or tester.



SEF205V

Continuity should exist.

4. 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 harness for open or short between MAP/BARO switch solenoid valve and ECM.	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

10	CHECK MAP/BARO SWITCH SOLENOID VALVE

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Perform "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT-II.

ACTIVE TEST	
MAP/BARO SW/V	MAP
MONITOR	
CMPS~RPM(REF)	XXX rpm
MAP/BARO SW/V	MAP
ABSOL PRES/SE	XXX V

PEF396V

ACTIVE TEST	
MAP/BARO SW/V	BARO
MONITOR	
CMPS~RPM(REF)	XXX rpm
MAP/BARO SW/V	BARO
ABSOL PRES/SE	XXX V

PEF397V

3. Check the following.

- Condition: At idle under no-load
- CONSULT-II display

MAP/BARO	ABSOL PRES/SE (Voltage)
BARO	More than 2.6V
MAP	Less than the voltage at BARO

MTBL0281

- Time for voltage to change

MAP/BARO SW/V	Required time to switch
BARO to MAP	Less than 1 second
MAP to BARO	

MTBL0282

4. If NG, check solenoid valve as shown below.

OK or NG

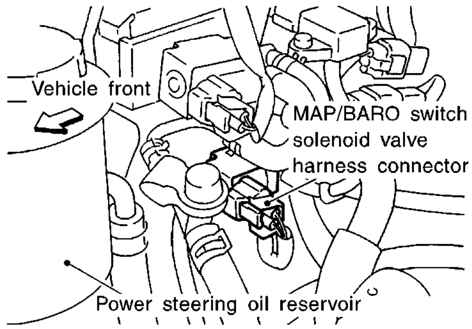
OK	▶	GO TO 12.
NG	▶	Replace MAP/BARO switch solenoid valve.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

11	CHECK MAP/BARO SWITCH SOLENOID VALVE

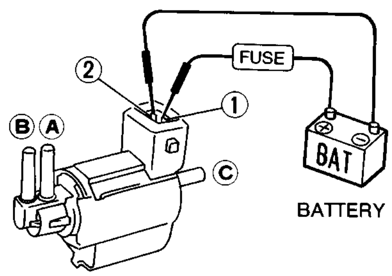
Without CONSULT-II

1. Turn ignition switch OFF and remove MAP/BARO switch solenoid valve.



SEF338V

2. Check air passage continuity.



MEC488B

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

3. Check the time required for the solenoid valve to switch. It should be less than 1 second.

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace MAP/BARO switch solenoid valve.

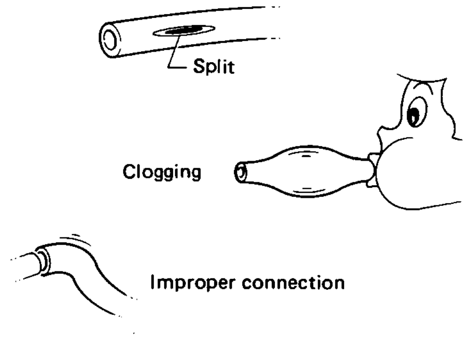
12	CHECK INTAKE SYSTEM

Check intake system for air leaks.

OK or NG

OK	▶	GO TO 16.
NG	▶	Repair it.

13	CHECK HOSE BETWEEN ABSOLUTE PRESSURE SENSOR AND MAP/BARO SWITCH SOLENOID VALVE	
Check hose for clogging, cracks, disconnection or improper connection.		



SEF109L

OK or NG

OK	▶	GO TO 14.
NG	▶	Repair or reconnect hose.

14	CHECK HARNESS CONNECTOR

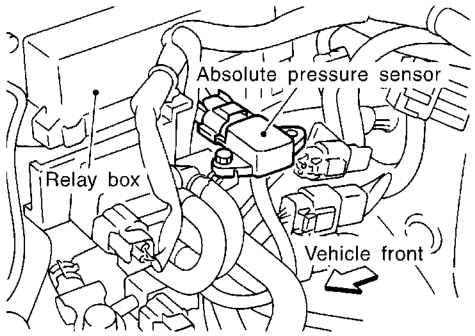
1. Disconnect absolute pressure sensor harness connector.
2. Check sensor harness connector for water.
   Water should not exist.

OK or NG

OK	▶	GO TO 15.
NG	▶	Repair or replace harness connector.

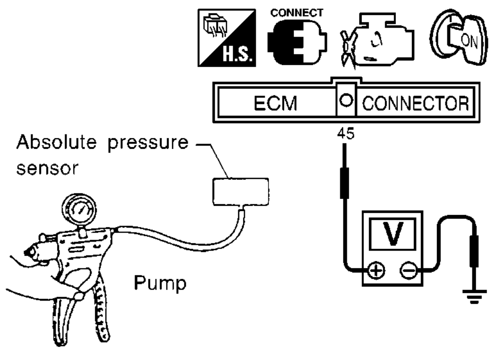
15	CHECK ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.



SEF328V

2. Remove hose from absolute pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 45 (Absolute pressure sensor signal) and engine ground.



SEF132V

The voltage should be 3.2 to 4.8V.

4. Use pump to apply vacuum of −26.7 kPa (−200 mmHg, −7.87 inHg) to absolute pressure sensor as shown in figure and check the output voltage.
   The voltage should be 1.0 to 1.4V lower than the value measured in step 3.
   CAUTION:
   - **Always calibrate the vacuum pump gauge when using it.**
   - **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace absolute pressure sensor.

16	CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-128.

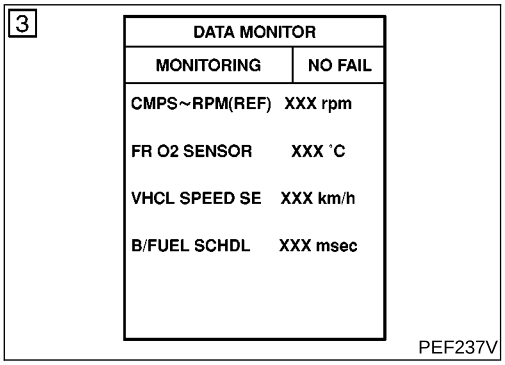
	▶	**INSPECTION END**

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 0307	● The closed loop control function does not operate even when vehicle is driving in the specified condition.	● The front heated oxygen sensor circuit is open or shorted. ● Front heated oxygen sensor ● Front heated oxygen sensor heater



PEF237V

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.**

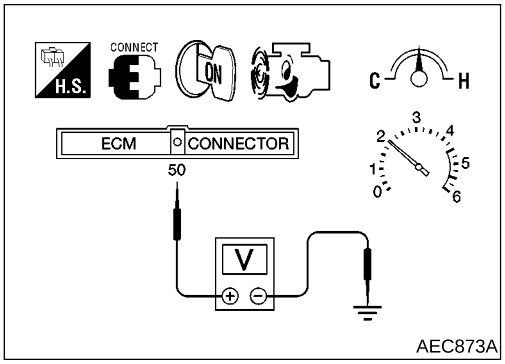
With CONSULT-II

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.
- “FR O2 SENSOR” voltage should go above 0.70V at least once.
- “FR O2 SENSOR” voltage should go below 0.21V at least once.
  If the result is NG, perform “Diagnosis Procedure”, EC-448.
  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	1.3 msec or more
CMPS·RPM (REF)	1,650 - 3,000 rpm
Selector lever	Suitable position
VHCL SPEED SE	More than 70 km/h (44 MPH)

During this test, P0130 DTC may be displayed on CONSULT-II screen.

6) If DTC is detected, go to “Diagnostic Procedure”, EC-448.



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

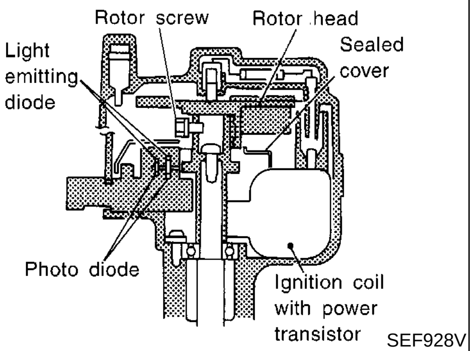
1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 (Front heated oxygen sensor signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.
- The voltage should go above 0.70V at least once.
- The voltage should go below 0.21V at least once.

4) If NG, go to “Diagnostic Procedure”, EC-448.

Diagnostic Procedure

NGEC0310

Refer to “Diagnostic Procedure” for DTC P0133, EC-216.



SEF928V

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

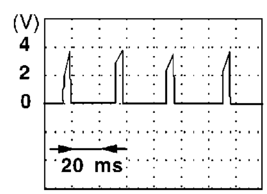
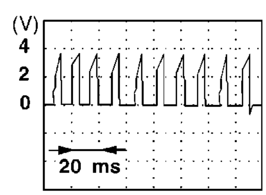
NGEC0320

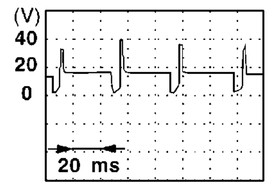
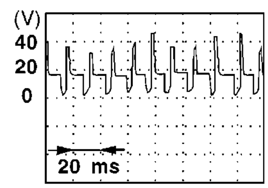
MONITOR ITEM	CONDITION		SPECIFICATION
IGN TIMING	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: “N” • No-load	Idle	Approx. 20° BTDC
		2,000 rpm	More than 25° BTDC

ECM Terminals and Reference Value

NGEC0321

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
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

On Board Diagnosis Logic

NGEC0322

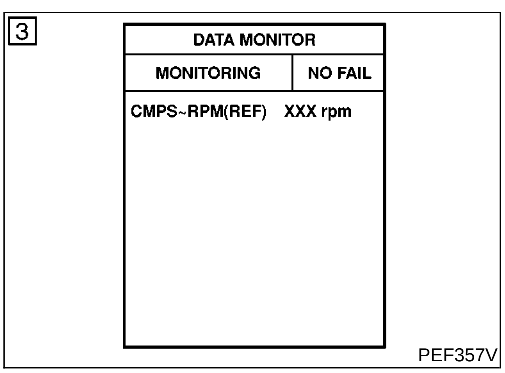
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1320 0201	● The ignition signal in the primary circuit is not sent to ECM during engine cranking or running.	● Harness or connectors (The ignition primary circuit is open or shorted.) ● Power transistor unit. ● Resistor ● Camshaft position sensor ● Camshaft position sensor circuit

DTC Confirmation Procedure

NGEC0323

NOTE:

- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
- **If DTC P1320 (0201) is displayed with P0340 (0101), perform trouble diagnosis for DTC P0340 first. Refer to EC-318.**



PEF357V

With CONSULT-II

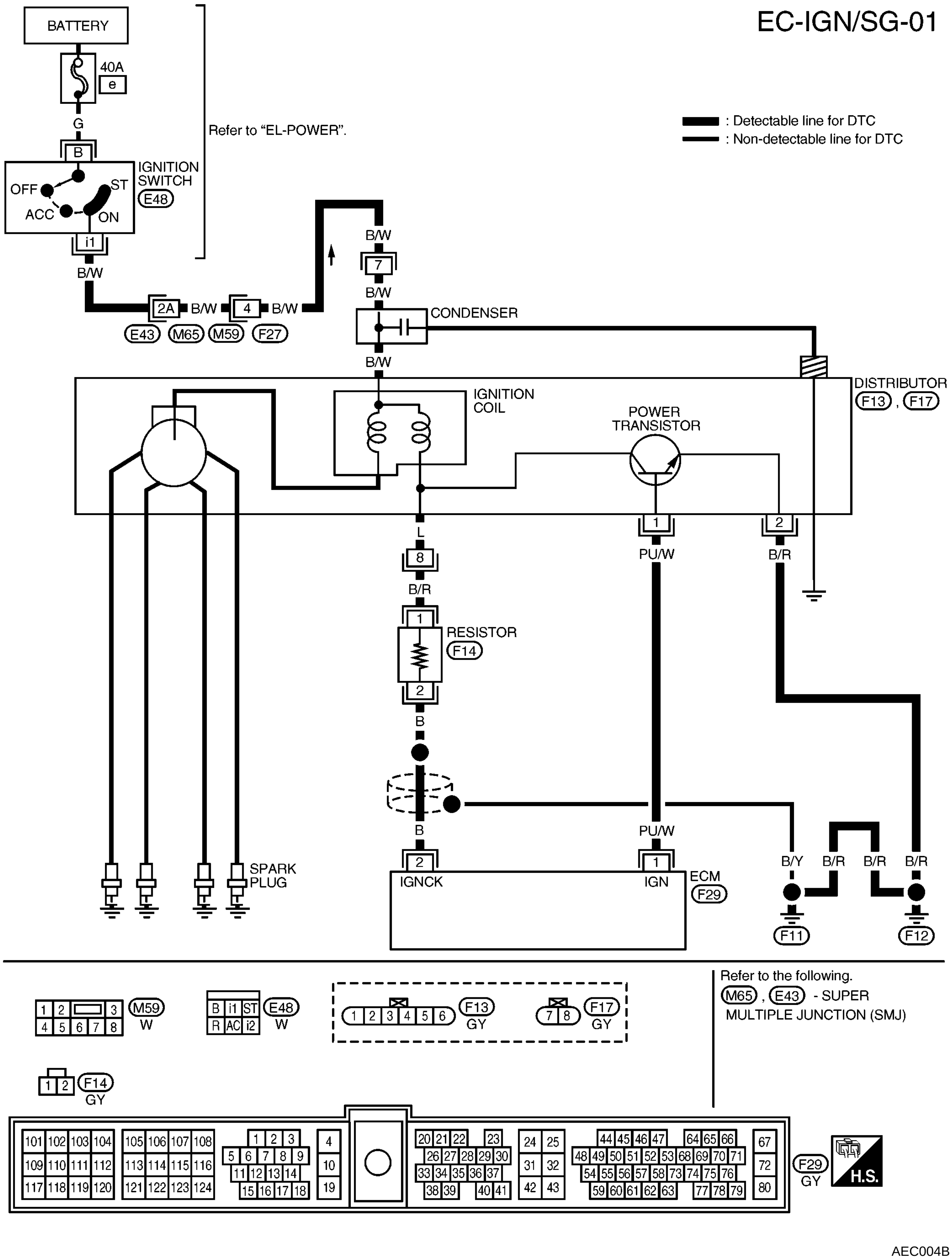
1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and wait at least 4 seconds. (If engine does not run, turn ignition switch to "START" at least 5 seconds.)
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-452.

With GST

Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC0324



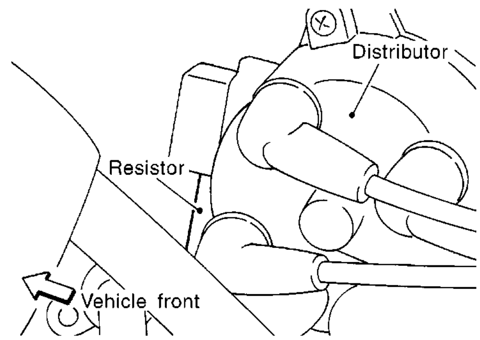
GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

Diagnostic Procedure

NGEC0325

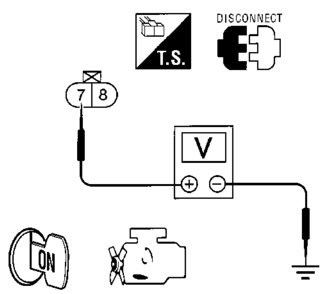
1	CHECK ENGINE START
Turn ignition switch OFF, and restart engine. **Is engine running?**	
Yes or No	
Yes ▶	GO TO 7.
No ▶	GO TO 2.

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

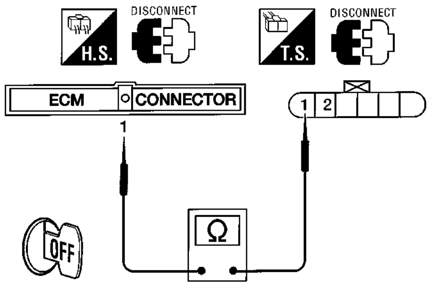
Voltage: Battery voltage

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

5	CHECK INPUT SIGNAL CIRCUIT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 1 and power transistor terminal 1.	

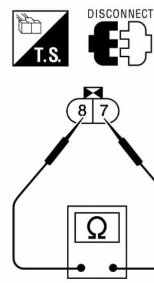


AEC700

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

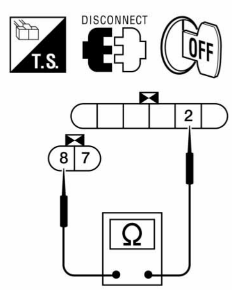
If NG, replace distributor assembly as a unit.

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

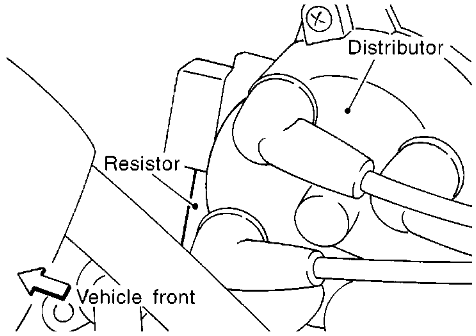
MTBL0301

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace distributor assembly.

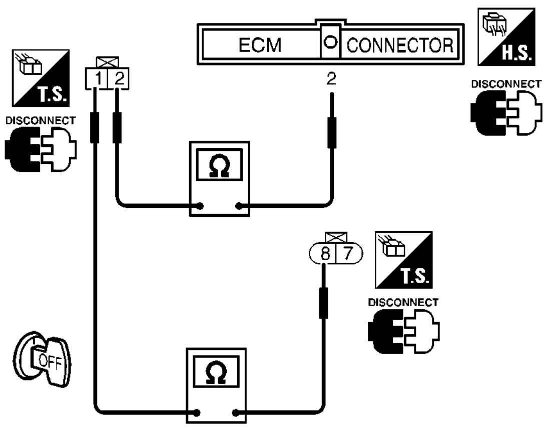
8	CHECK INPUT SIGNAL CIRCUIT

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.

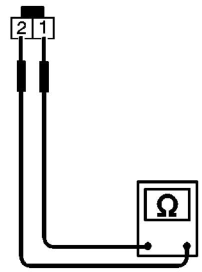
7. Also check harness for short to ground and short to power.

OK or NG

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

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)]

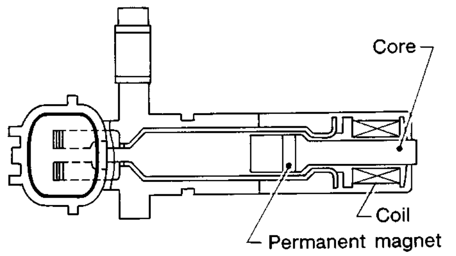
OK or NG

OK	▶	GO TO 10.
NG	▶	Replace resistor.

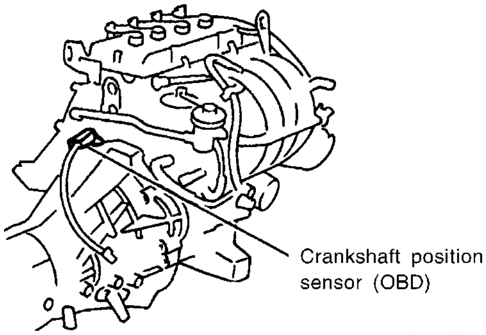
10	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

	▶	**INSPECTION END**



SEF956N



SEF335V

Component Description

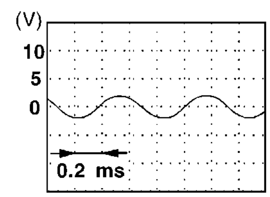
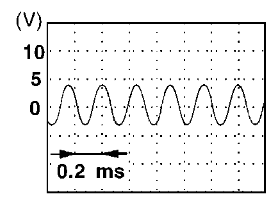
NGEC0327

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

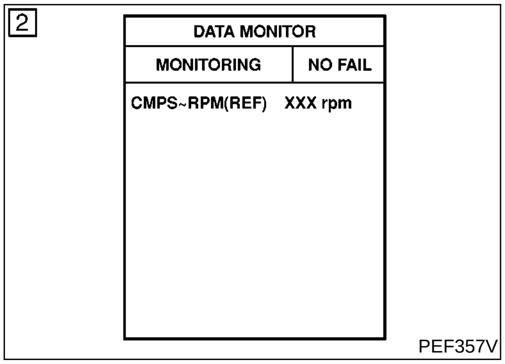
Specification data are reference values and are measured between each terminal and 32 (ECM ground).

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 0905	● A chipping of the flywheel or drive plate gear tooth (cog) is detected by the ECM.	● Harness or connectors ● Crankshaft position sensor (OBD) ● Drive plate/Flywheel



PEF357V

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

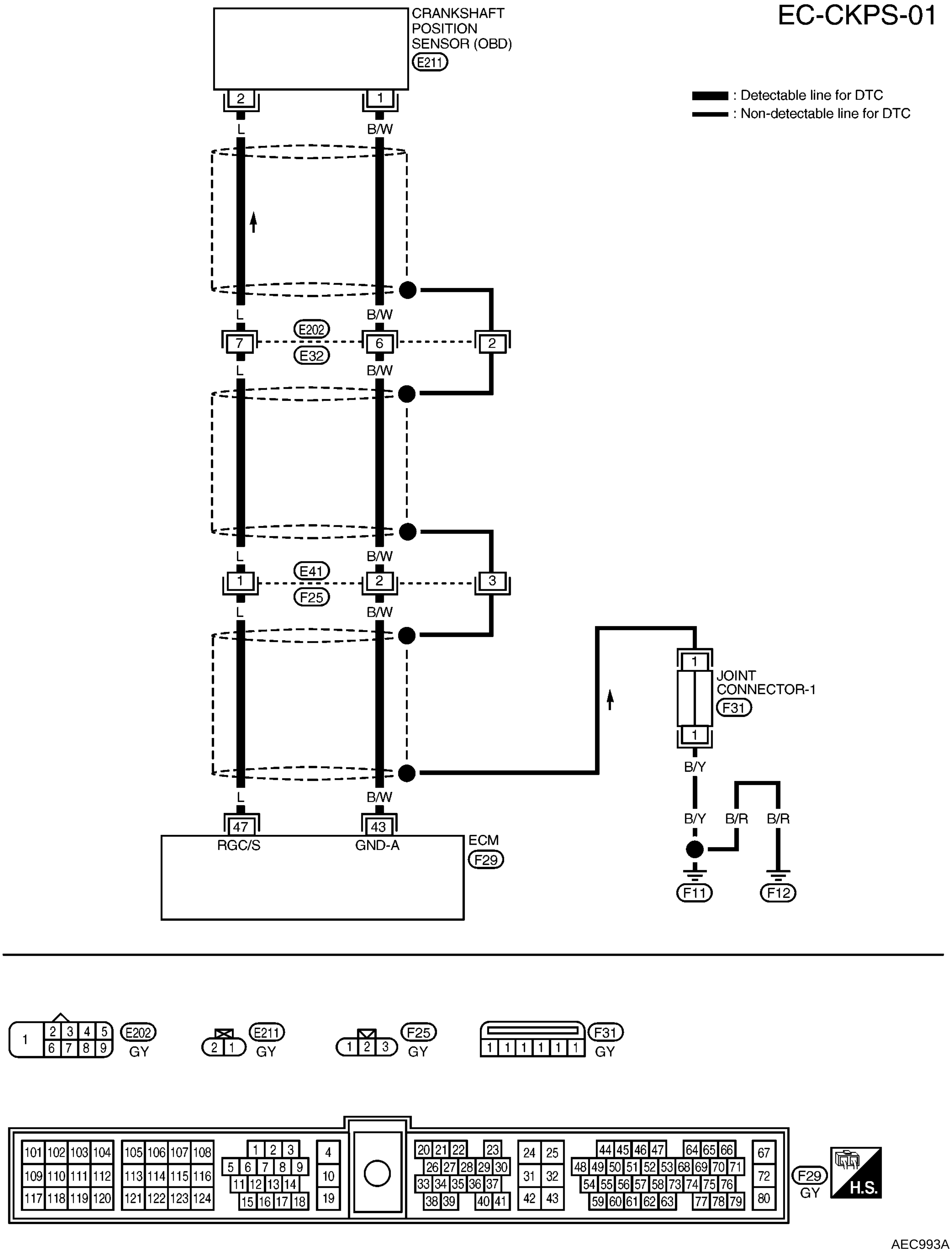
1) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine and run it for at least 2 minutes at idle speed.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-460.

With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

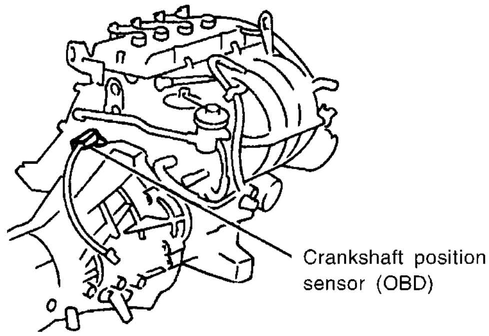
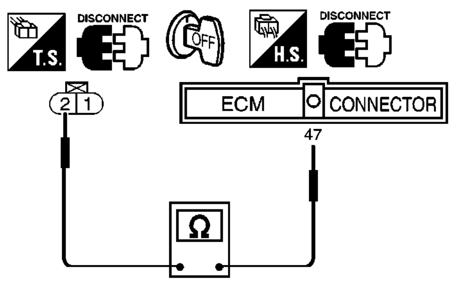
NGEC0331



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.

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 ground and short to power.

OK or NG

OK ▶	GO TO 6.
NG ▶	GO TO 5.

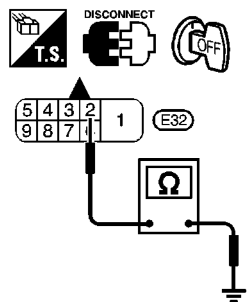
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors 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 ground and 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-272***.)
- 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

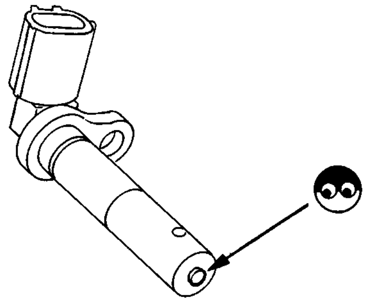
Loosen and retighten the fixing bolt of the crankshaft position sensor (OBD). Then retest.

Trouble is not fixed. ▶	GO TO 9.

Diagnostic Procedure (Cont'd)

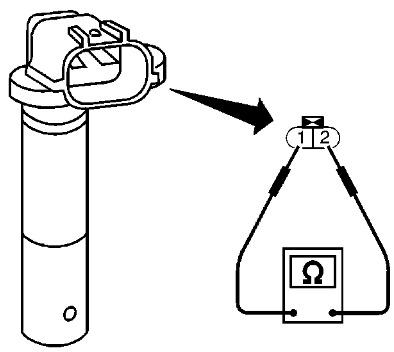
9	CHECK CRANKSHAFT POSITION SENSOR (OBD)

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).

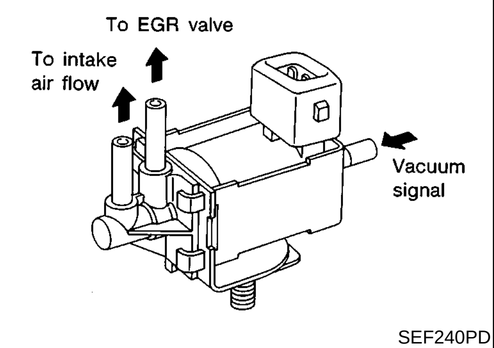
OK or NG

OK	▶	GO TO 11.
NG	▶	Replace the flywheel or drive plate.

11	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

	▶	**INSPECTION END**



SEF240PD

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

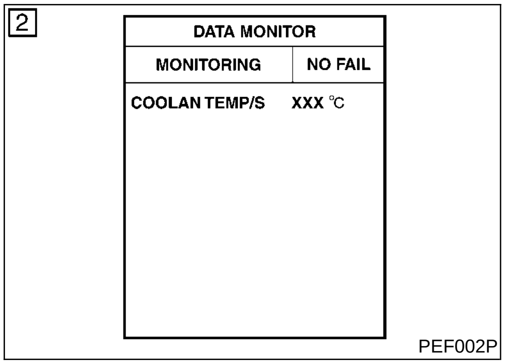
Specification data are reference values and are measured between each terminal and 32 (ECM ground).

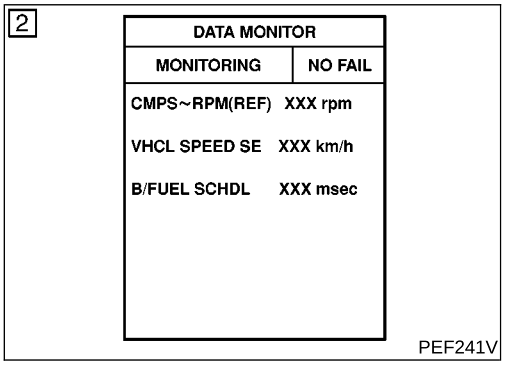
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
103	G/W	EGRC-solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 1V
			[Engine is running] ● **Warm-up condition** ● M/T models: Lift up drive wheels and shift to 1st gear position. ● Rev engine up from 2,000 to 4,000 rpm.	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0337

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1400 1005	● The improper voltage signal is sent to ECM through EGRC-solenoid valve.	● Harness or connectors (The EGRC-solenoid valve circuit is open or shorted.) ● EGRC-solenoid valve





DTC Confirmation Procedure

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.

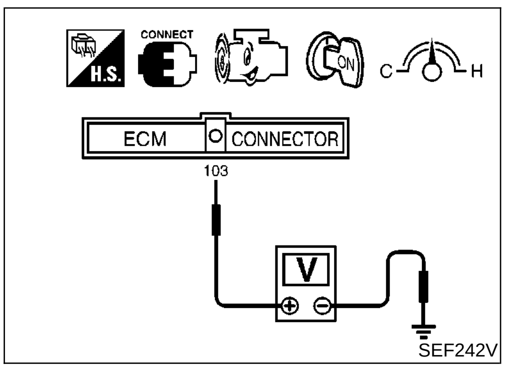
TESTING CONDITION:
Always perform at a temperature above –10°C (14°F).

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.
   CMPS·RPM (REF): 1,000 - 3,400 rpm
   B/FUEL SCHDL: 2 msec or more
   VHCL SPEED SE: Suitable speed
4) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE", EC-466.

With GST

- Follow the procedure with "CONSULT-II".



Overall Function Check

NGEC0521

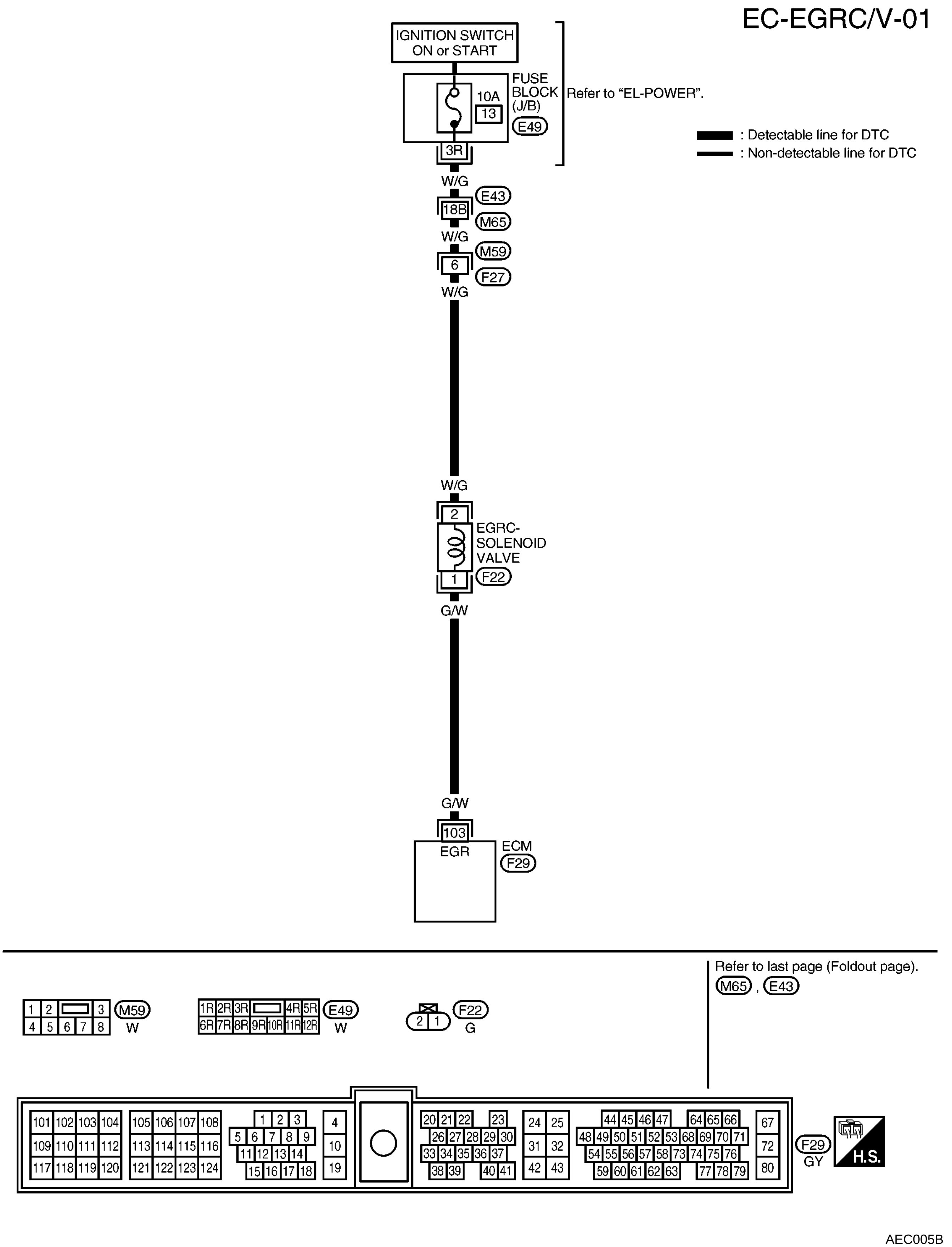
Use this procedure to check the overall function of the EGR temperature sensor. During this check, a 1st trip DTC might not be confirmed.

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-466.

Wiring Diagram

NGEC0339



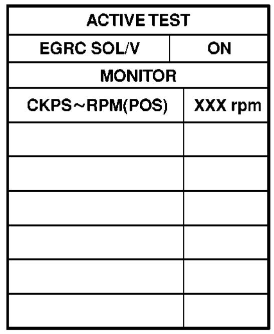
Diagnostic Procedure

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.



PEF594P

Without CONSULT-II

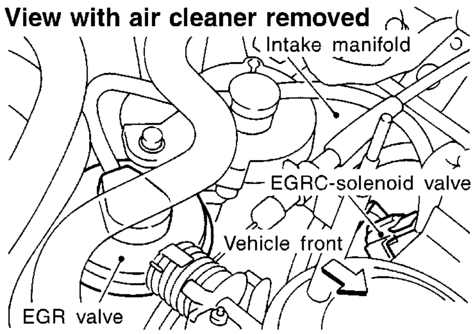
1. Start engine and rev engine up to 3,000 rpm quickly.
2. When disconnecting and reconnecting the EGRC-solenoid valve harness connector, make sure that the EGRC-solenoid valve makes operating sound. (The DTC or the 1st trip DTC for the EGRC-solenoid valve will be displayed, however, ignore it.)

OK or NG

OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	GO TO 2.

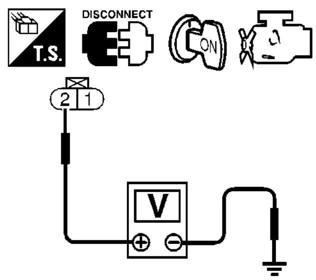
2	CHECK POWER SUPPLY

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.

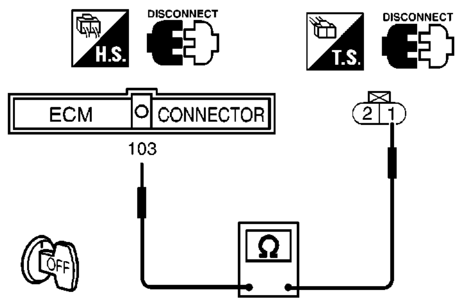
3	DETECT MALFUNCTIONING PART

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.

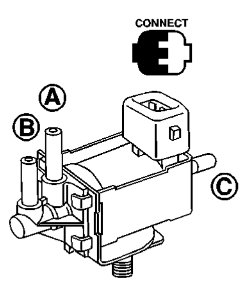
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

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 (EGR)	ON CUT
MONITOR	
CMPS~RPM (REF)	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

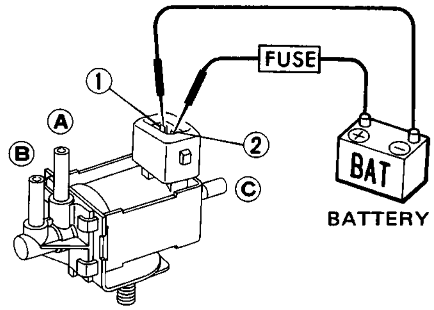
SEF169X

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.

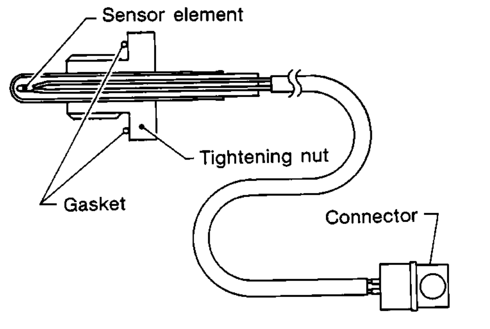
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EGRC-solenoid valve.

8	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

▶	**INSPECTION END**

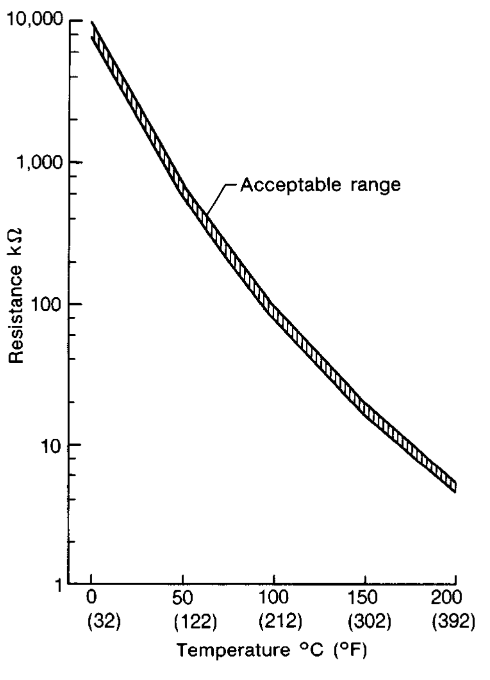


SEF599K

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.



SEF526Q

<Reference data>

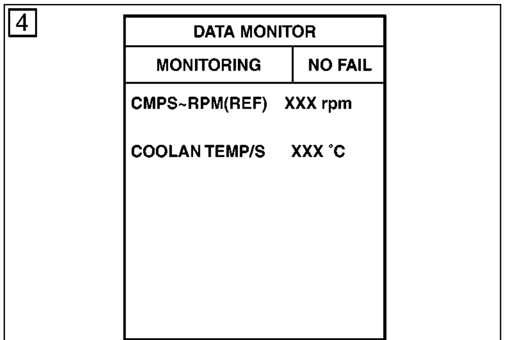
EGR temperature °C (°F)	Voltage* V	Resistance MΩ
0 (32)	4.81	7.9 - 9.7
50 (122)	2.82	0.57 - 0.70
100 (212)	0.8	0.08 - 0.10

*: These data are reference values and are measured between ECM terminal 63 (EGR temperature sensor) and ECM terminal 32 (ECM 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 0305	A)	An excessively low voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is low.	• Harness or connectors (The EGR temperature sensor circuit is shorted.) • EGR temperature sensor • Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve
	B)	An excessively high voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is high.	• Harness or connectors (The EGR temperature sensor circuit is open.) • EGR temperature sensor • Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve



PEF779U

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

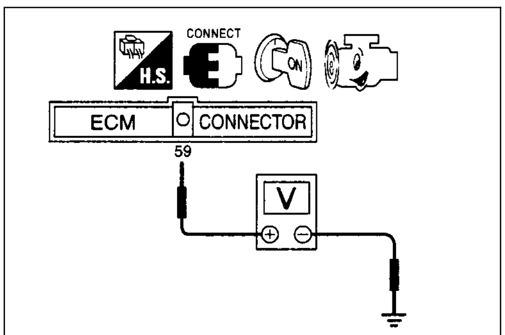
NGEC0344S01

With CONSULT-II

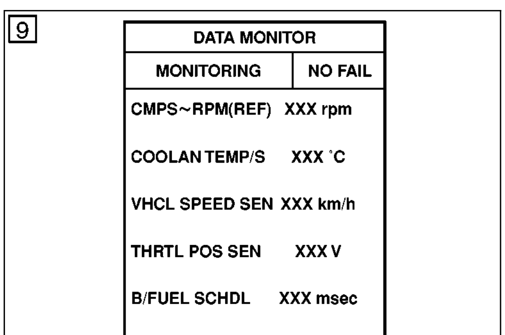
1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Verify that engine coolant temperature is less than 50°C (122°F).
   If the engine coolant temperature is above the range, cool the engine down.
4) Start engine and let it idle for at least 8 seconds.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-474.

With GST

- Follow the procedure “With CONSULT-II”.



SEF347Q



PEF724W

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).

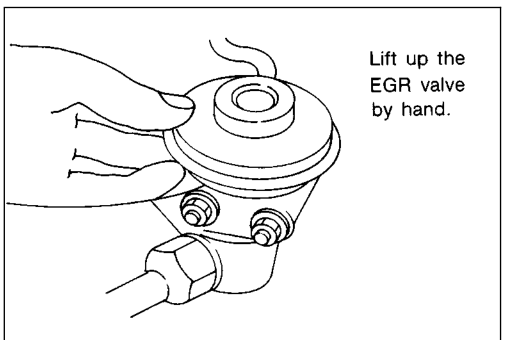
With CONSULT-II

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-476.
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-474.
   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.

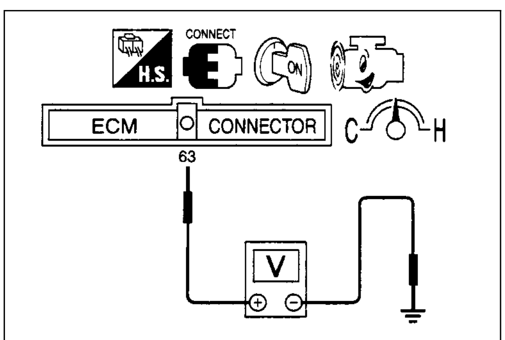
10) Maintain the following conditions for at least 5 consecutive seconds.

CMPS·RPM (REF)	2,000 - 2,600 rpm
VHCL SPEED SE	10 km/h (6 MPH) or more
B/FUEL SCHDL	2.5 - 3.5 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-474.



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

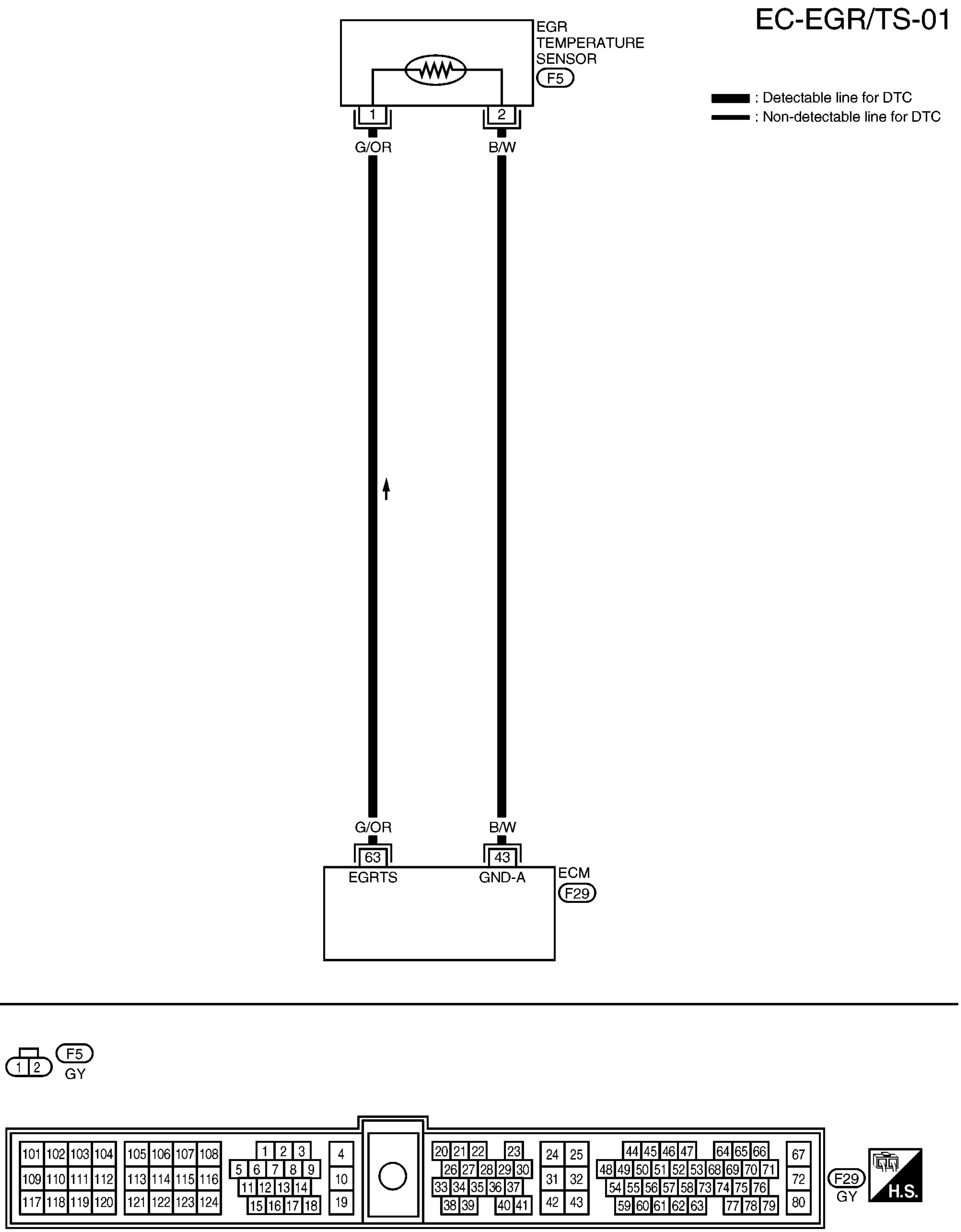
NGEC0345S01

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-477.
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-474.
   If OK, perform trouble diagnoses for DTC P0400 and P1400. Refer to EC-326, 463.

Wiring Diagram

NGEC0346



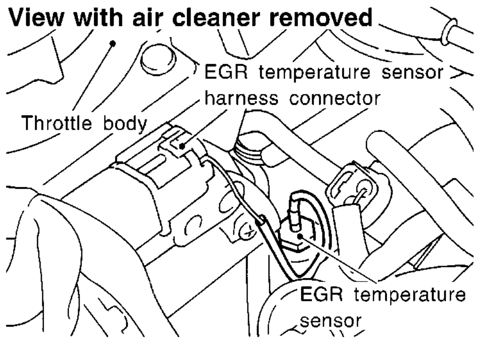
AEC006B

Diagnostic Procedure

NGEC0347

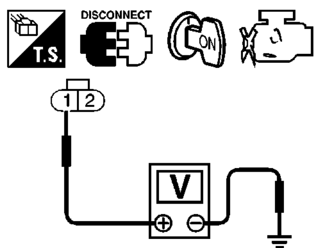
1	CHECK POWER SUPPLY

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

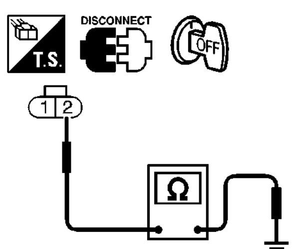
Voltage: Approximately 5V

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 ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

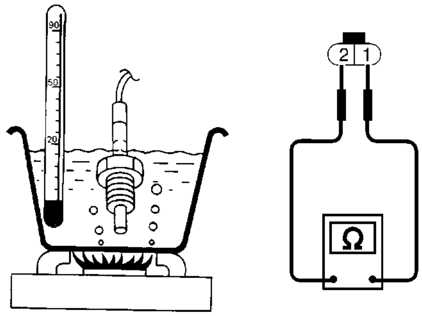
3	DETECT MALFUNCTIONING PART

Check the harness for open or short between 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.

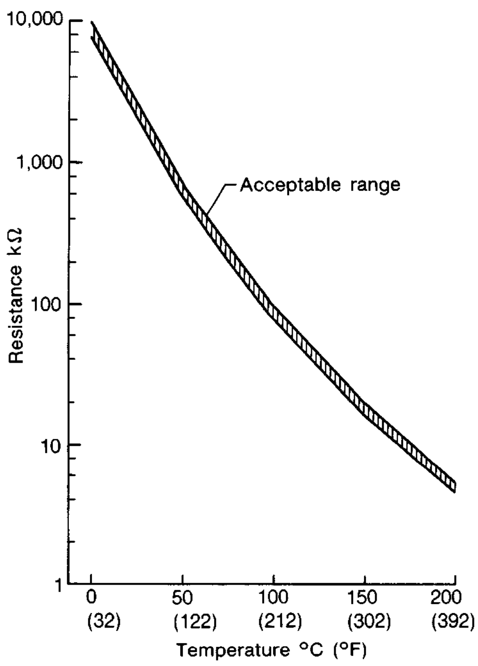


SEF643Q

<Reference data>

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

MTBL0294



SEF526Q

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace EGR temperature sensor.

5	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

	▶	**INSPECTION END**

Description

NGEC0349

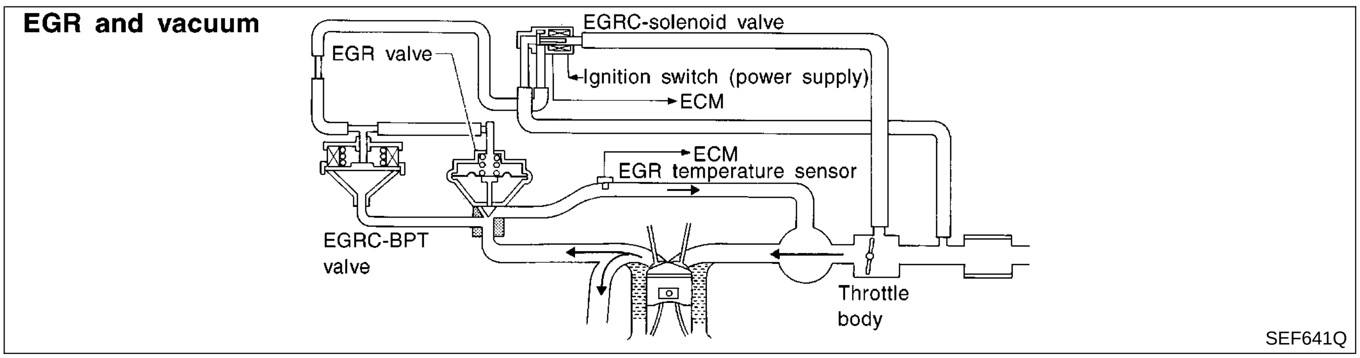
SYSTEM DESCRIPTION

NGEC0349S01

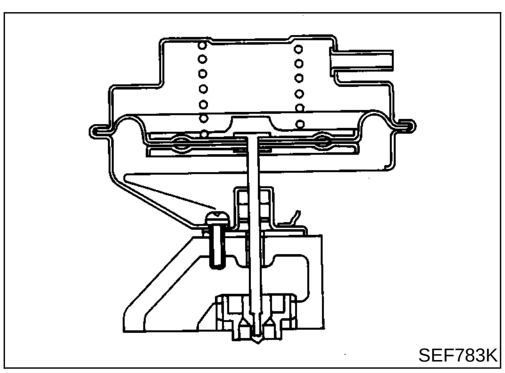
Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EGR control	EGRC-solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		

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



SEF641Q


SEF783K

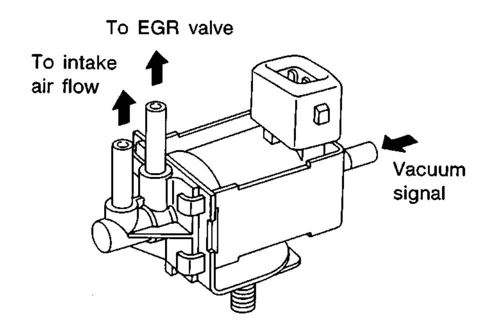
COMPONENT DESCRIPTION

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.

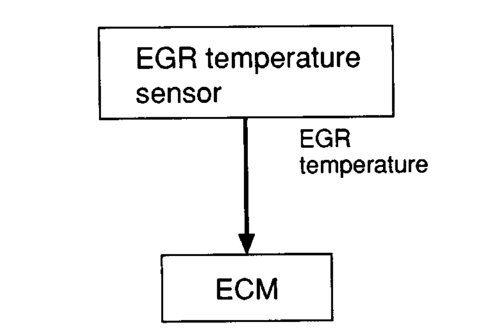


SEF240PD

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.



SEF073P

On Board Diagnosis Logic

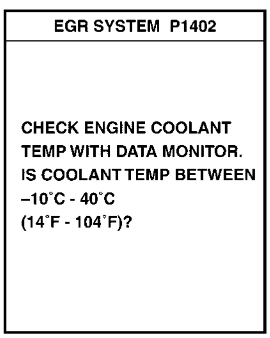
NGEC0350

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

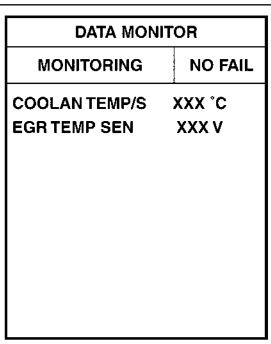
NOTE:

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 0514	• EGR flow is detected under conditions that do not call for EGR.	• EGRC-solenoid valve • EGR valve leaking or stuck open • EGR temperature sensor • EGRC-BPT valve



PEF803W



PEF347U

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 40°C (14 to 104°F)*
  EGR TEMP SEN: Less than 4.8V
  If the values are out of the ranges indicated above, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to reduce the engine coolant or EGR temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.

*: Although CONSULT-II screen displays "−10 to 40°C (14 to 104°F)" as a range of engine coolant temperature, ignore it.

GI
MA
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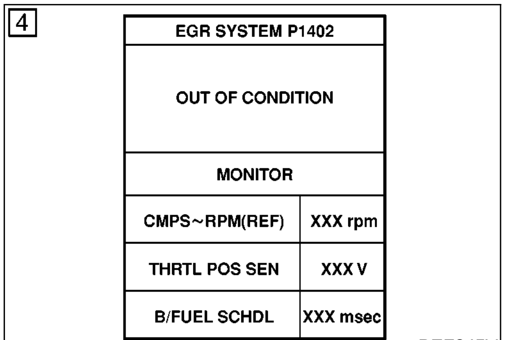
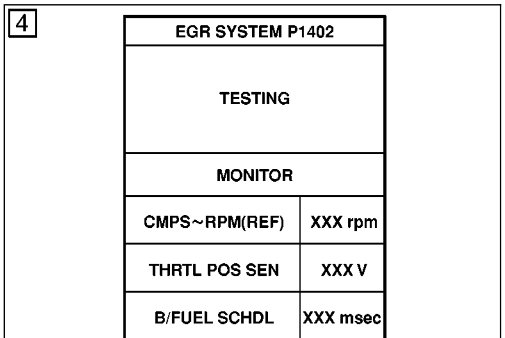


PEF245V



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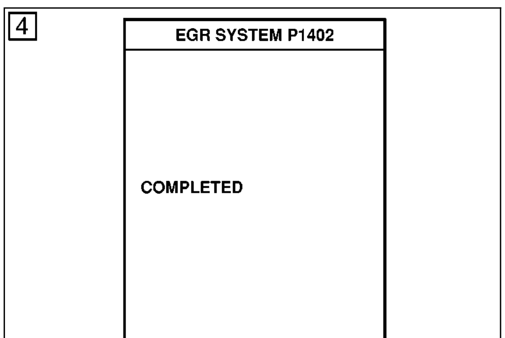
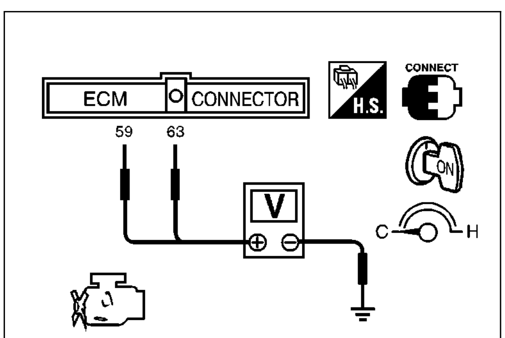


PEF897U



SEF247V

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-480.

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-480.

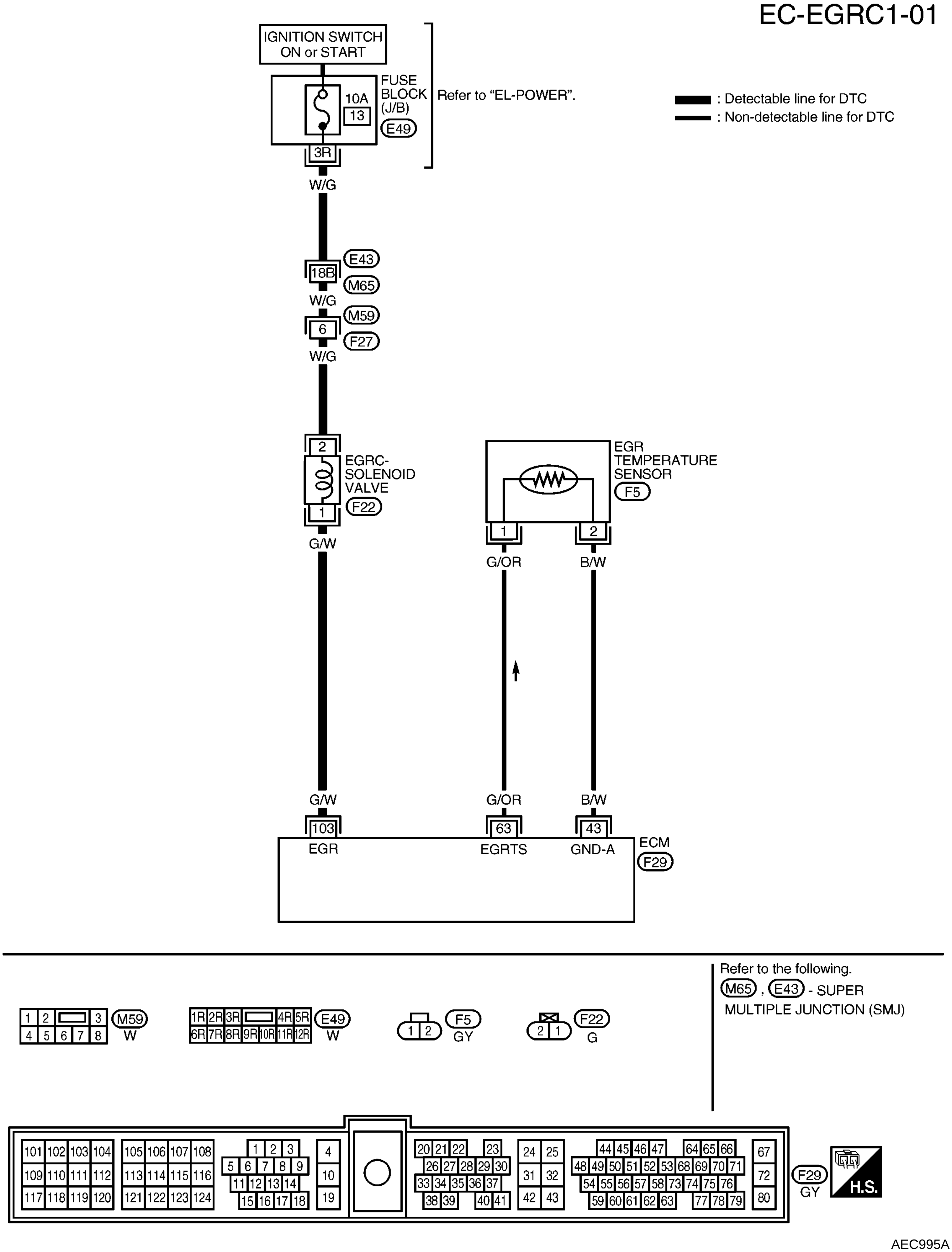
No Tools

1) Turn ignition switch ON.
2) Check the following voltages.
   ECM terminal 59 (Engine coolant temperature sensor signal) and ground: 2.7 - 4.4V
   ECM terminal 63 (EGR temperature sensor signal) and ground: Less than 4.8V
3) Start engine and let it idle for at least 60 seconds.
4) Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
5) Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
6) If DTC is detected, go to “Diagnostic Procedure”, EC-480.

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

NGEC0352

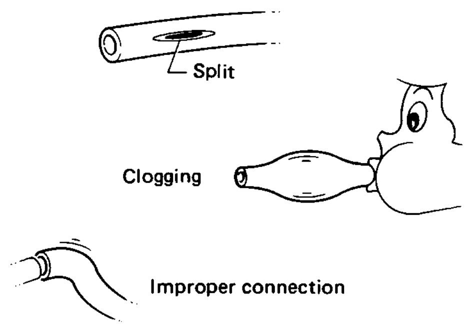


Diagnostic Procedure

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)	FLOW
MONITOR	
CMPS·RPM(REF)	XXX rpm

PEF788U

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.

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

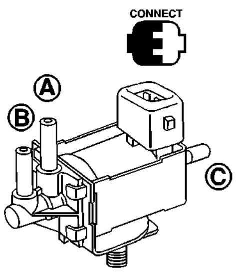
OK ▶	GO TO 5.
NG ▶	Repair open circuit or short to power in harness or connector.

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 (EGR)	ON CUT
MONITOR	
CMPS~RPM (REF)	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

SEF169X

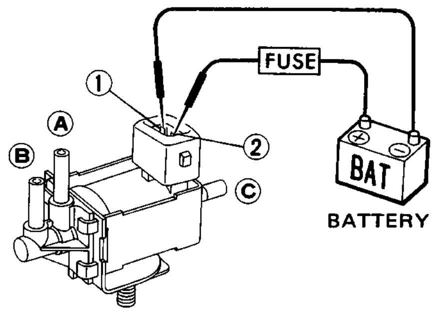
OK or NG

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

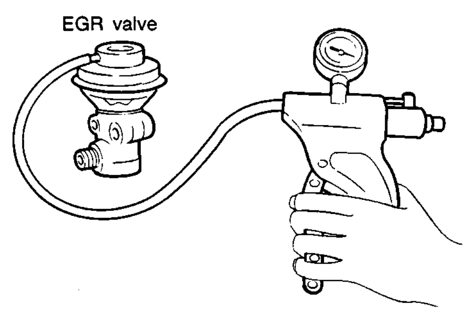
If NG or operation takes more than 1 second, replace solenoid valve.

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.



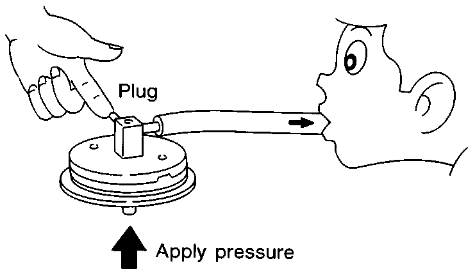
MEF137D

EGR valve spring should lift.

- Check for sticking.

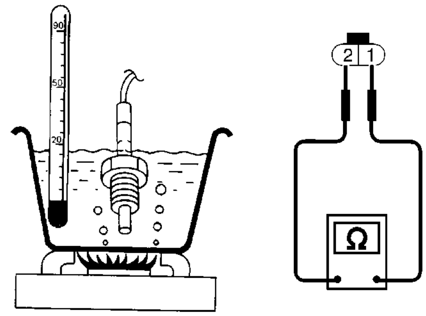
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EGR valve.

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.

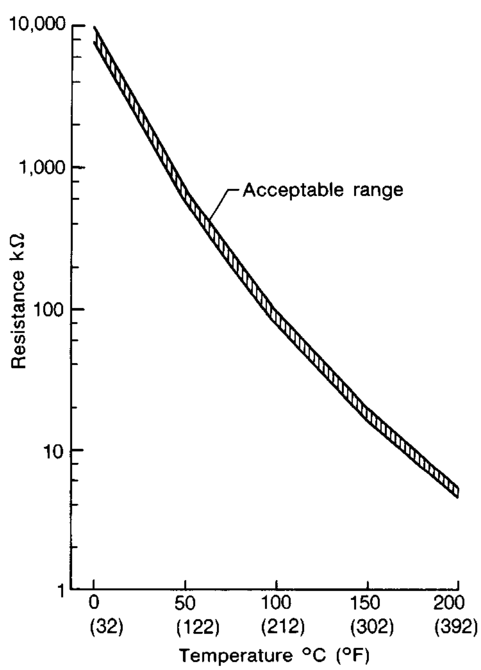


SEF643Q

<Reference data>

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

MTBL0294



SEF526Q

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EGR temperature sensor.

10	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

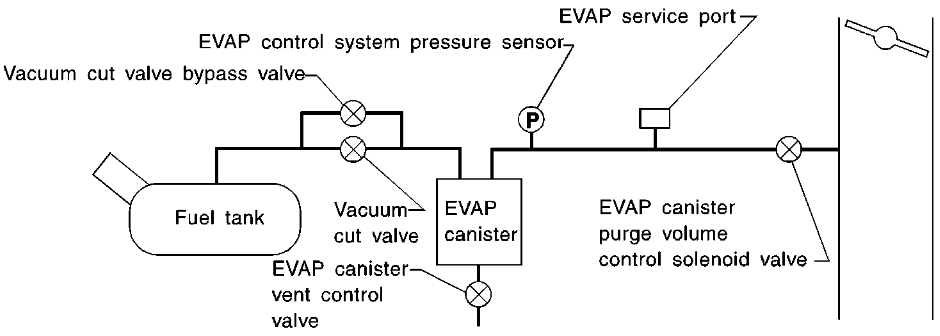
	▶	**INSPECTION END**

On Board Diagnosis Logic

NGEC0355

NOTE:
If DTC P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. Refer to EC-515.

This diagnosis detects leaks in the EVAP purge line using vapor pressure in the fuel tank.
The EVAP canister vent control valve is closed to shut the EVAP purge line. The vacuum cut valve bypass valve will then be opened to clear the line between the fuel tank and the EVAP canister purge control valve. The EVAP control system pressure sensor can now monitor the pressure inside the fuel tank.
If pressure increases, the ECM will check for leaks in the line between the vacuum cut valve and EVAP canister purge control valve.



SEF918U

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1440 0213	● EVAP control system has a leak. ● EVAP control system does not operate properly.	● 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 ● 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 ● MAP/BARO switch solenoid valve ● Blocked or bent rubber tube to MAP/BARO switch solenoid valve ● O-ring of EVAP canister vent control valve is missing or damaged. ● Water separator ● EVAP canister is saturated with water. ● Fuel level sensor

CAUTION:
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC Confirmation Procedure

NGEC0356

NOTE:
Refer to"P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)", EC-352.

Diagnostic Procedure

NGEC0357

NOTE:
Refer to"P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)", EC-354.

Description

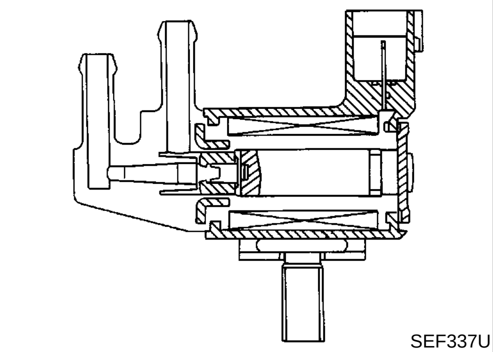
NGEC0359

SYSTEM DESCRIPTION

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		
Front heated oxygen sensors	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.



SEF337U

COMPONENT DESCRIPTION

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

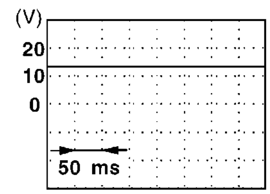
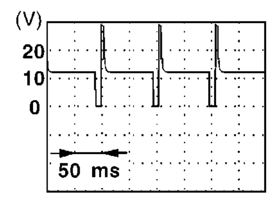
Specification data are reference values.

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 32 (ECCS ground).

TERMI-NAL 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

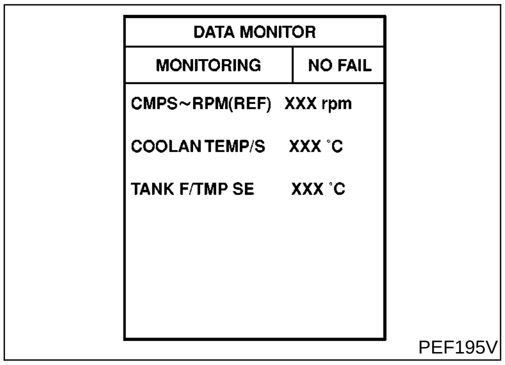
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1444 0214	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	● EVAP control system pressure sensor ● EVAP canister purge volume 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.



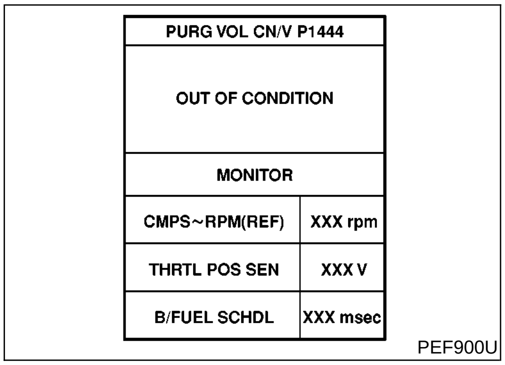
PEF195V

With CONSULT-II

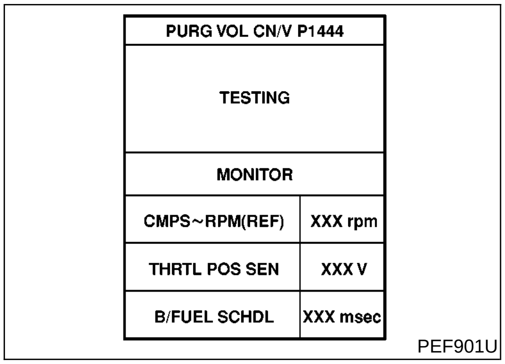
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON.
4) Select “DATA MONITOR” mode with CONSULT-II.
5) Check that TANK F/TEMP SE is 0°C (32°F) or more.
6) Select “PURG VOL C/V P1444” of “EVAPORATIVE SYSTEM” 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-491.

With GST

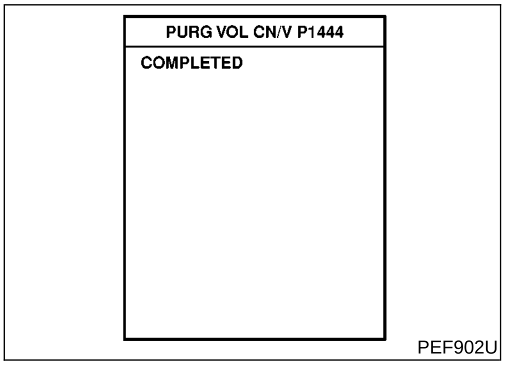
Follow the procedure “With CONSULT-II”.



PEF900U



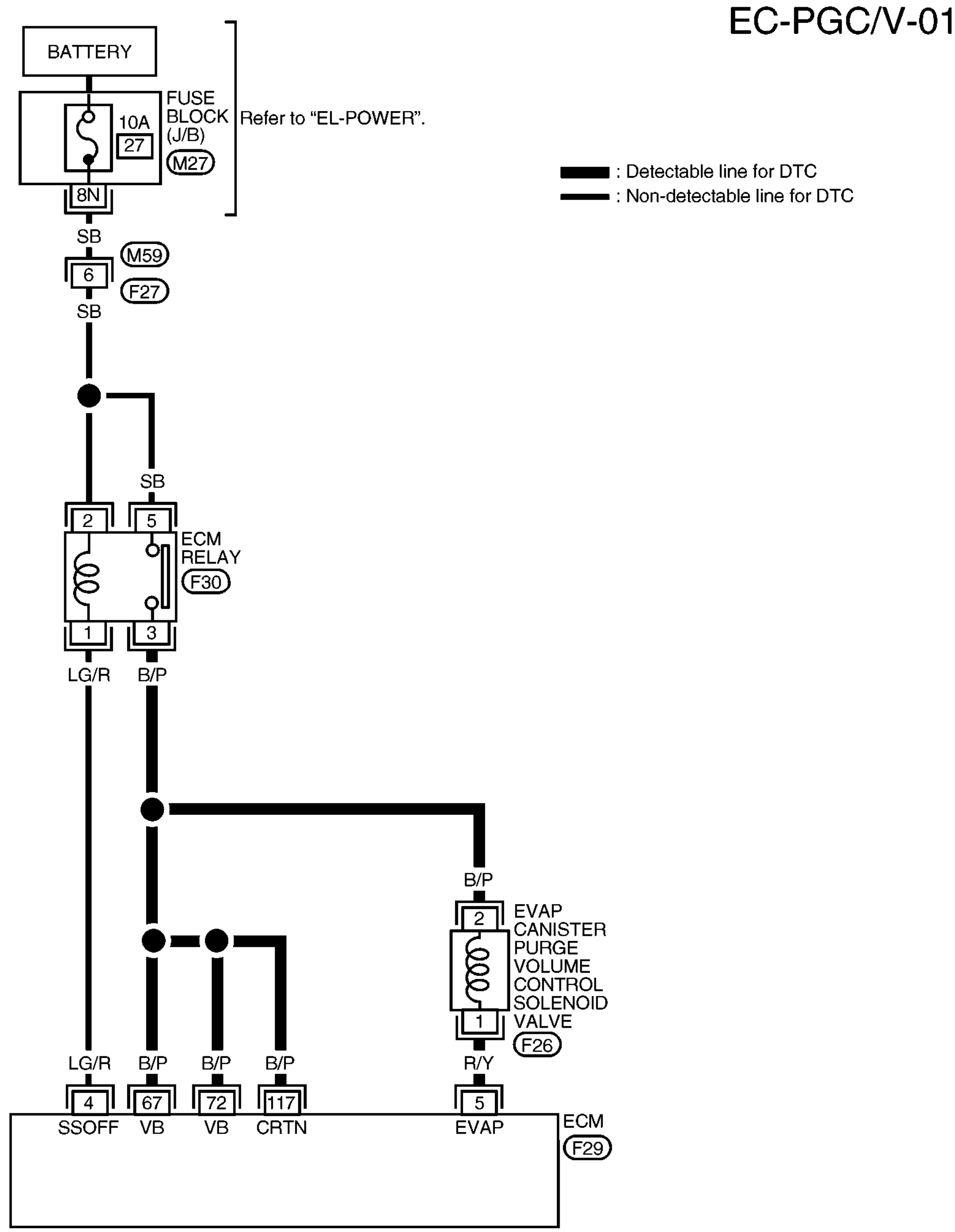
PEF901U

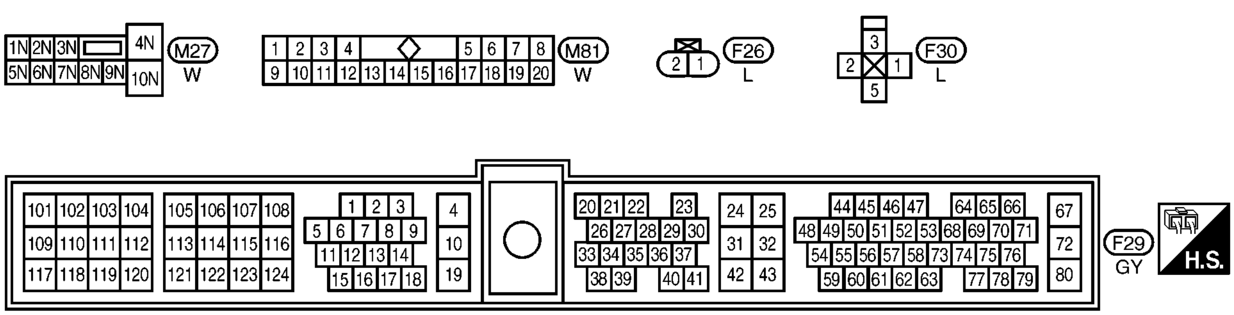


PEF902U

Wiring Diagram

NGEC0504





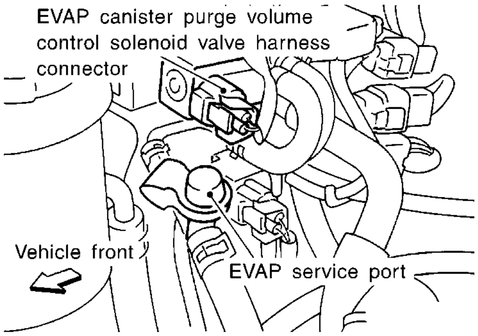
AEC996A

Diagnostic Procedure

=NGEC0364

1	CHECK POWER SUPPLY

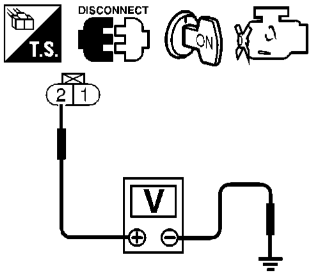
1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.



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.

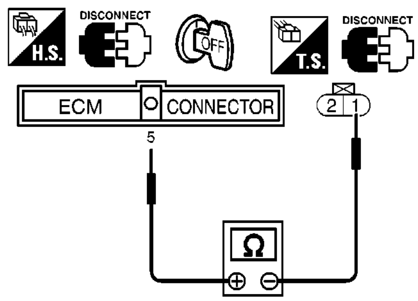
2	DETECT MALFUNCTIONING PART

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.

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.

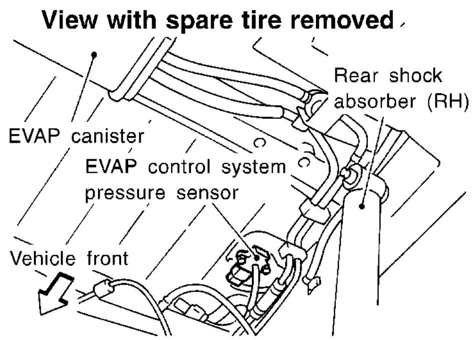
4	DETECT MALFUNCTIONING PART

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.

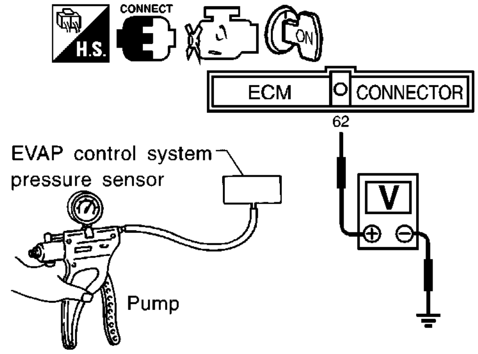
5 CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.



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.

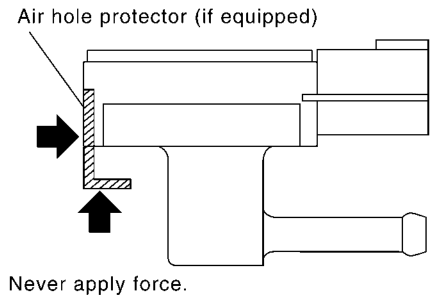


SEF198V

Pressure (Relative to 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

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.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

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	
CMPS~RPM(REF)	XXX rpm
FR O2 MNTR	RICH
A/F ALPHA	XXX %
THRTL POS SEN	XXX V

PEF190V

3. Check air passage continuity.

Condition PURG VOL CONT/V value	Air passage continuity between **A** and **B**
100.0%	Yes
0.0%	No

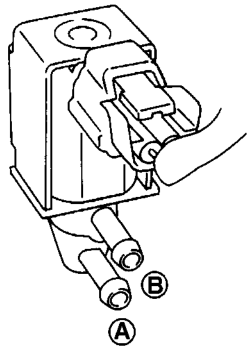
MTBL0302

OK or NG

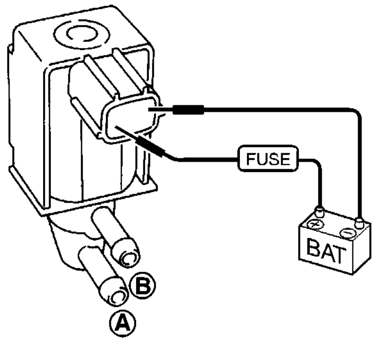
OK	▶	GO TO 8.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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

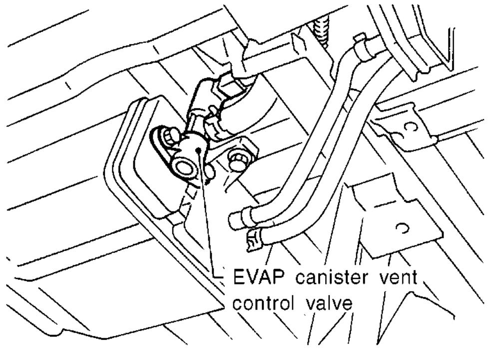
OK	▶	GO TO 9.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

8	CHECK EVAP CANISTER VENT CONTROL VALVE

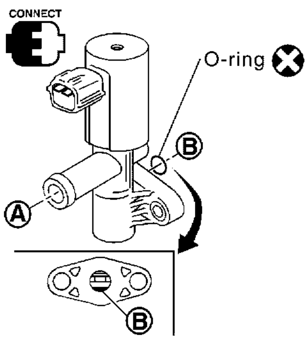
With CONSULT-II

Check air passage continuity.

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



SEF143S



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
CMPS-RPM (REF)	XXX rpm
FR O2 MNTR	RICH
A/F ALPHA	XXX %
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between **A** and **B**
ON	No
OFF	Yes

SEF172X

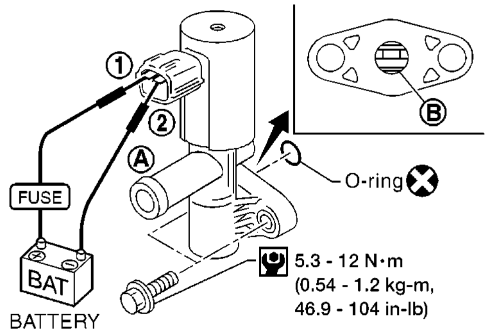
OK or NG

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.

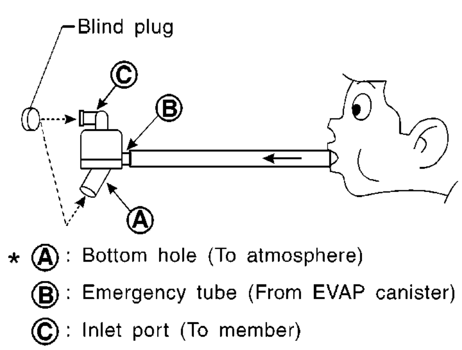
OK or NG

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.



SEF829T

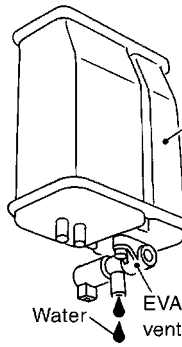
5. In case of NG in items 2 - 4, replace the parts.
- **Do not disassemble water separator.**

OK or NG

OK	▶	GO TO 11.
NG	▶	Clean, repair or replace rubber tube and/or water separator.

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

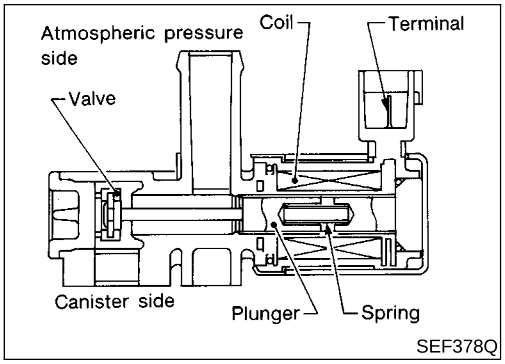
Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and water separator for clogging or poor connection

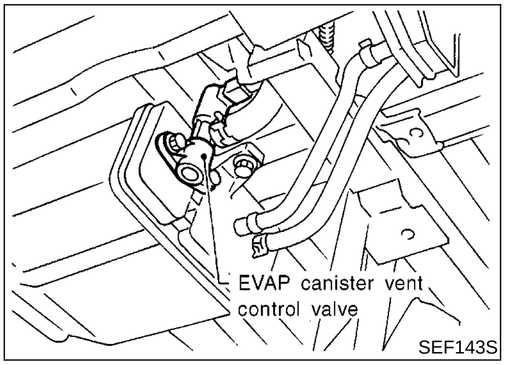
▶	Repair hose or replace EVAP canister.

14	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

▶	**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

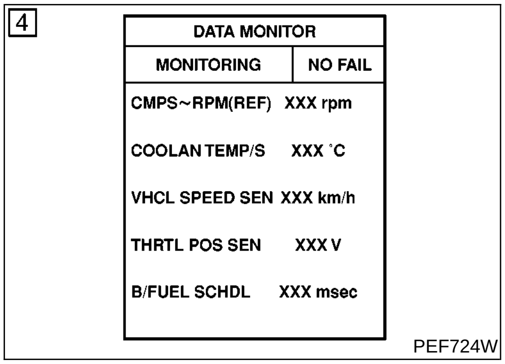
Specification data are reference values and are measured between each terminal and 32 (ECM ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

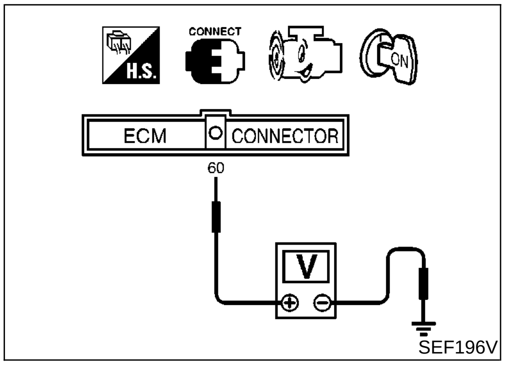
On Board Diagnosis Logic

NGEC0369

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1446 0215	● EVAP canister vent control valve remains closed under specified driving conditions.	● EVAP canister vent control valve ● EVAP control system pressure sensor and the circuit ● Blocked rubber tube to EVAP canister vent control valve ● Water separator ● EVAP canister is saturated with water.



PEF724W



SEF196V

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-501.

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-501.

No Tools

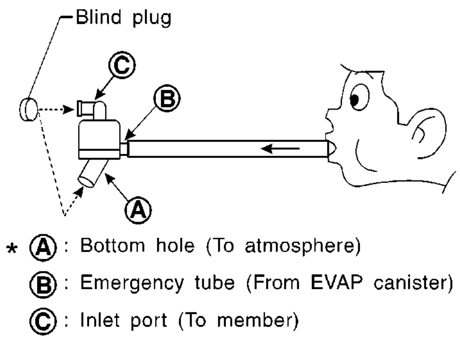
1) Start engine and warm it up to normal operating temperature.
2) Check that voltage between ECM terminal 60 (fuel tank temperature sensor signal) and ground is less than 4.2V.
3) Drive vehicle at a speed of approximately 80 km/h (50 MPH) for 15 minutes.
4) Turn ignition switch OFF and wait at least 5 seconds.
5) Turn ignition switch ON and perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
6) If 1st trip DTC is detected, go to "DIAGNOSTIC PROCEDURE" on next page.

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.



SEF829T

5. In case of NG in items 2 - 4, replace the parts.
- **Do not disassemble water separator.**

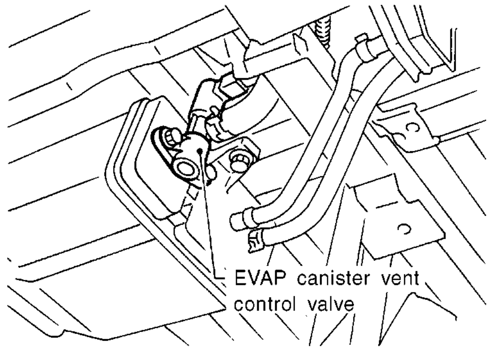
OK or NG

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.

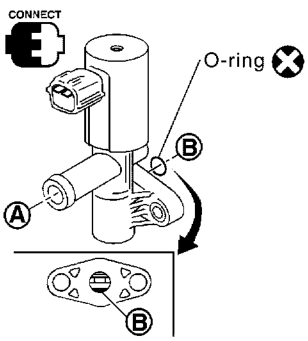
Diagnostic Procedure (Cont'd)

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	
CMPS~RPM (REF)	XXX rpm
FR O2 MNTR	RICH
A/F ALPHA	XXX %
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between **A** and **B**
ON	No
OFF	Yes

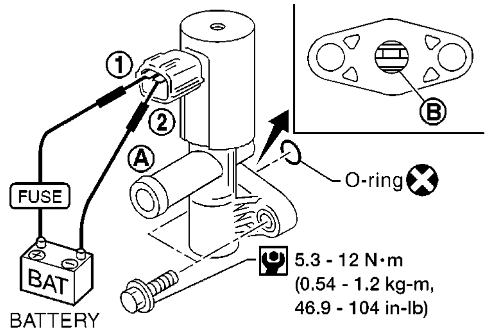
SEF172X

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

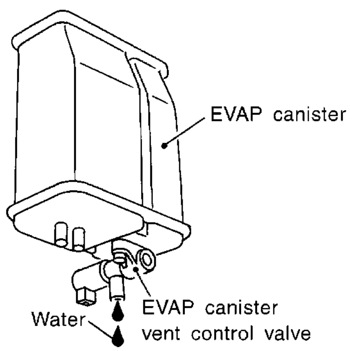
If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.

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

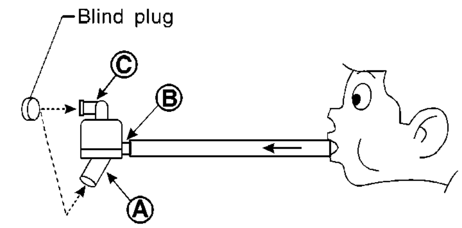
Weigh the EVAP canister with EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

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.



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-385.

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

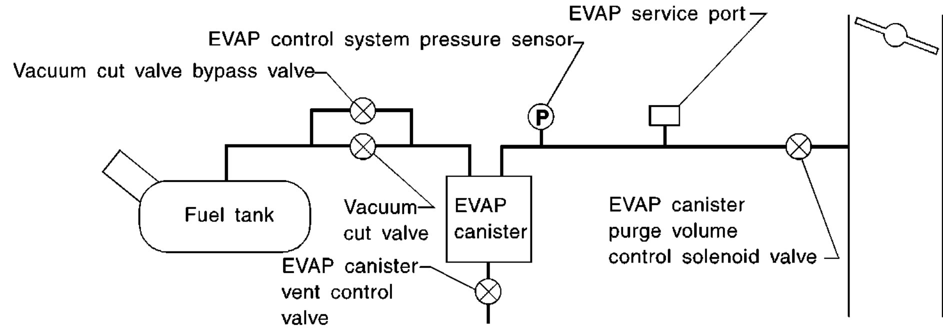
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

▶	**INSPECTION END**

System Description

NGEC0373

NOTE:
If both DTC P0510 and P1447 are displayed, perform trouble diagnosis for "DTC P0510" first. (See EC-422.)



SEF918U

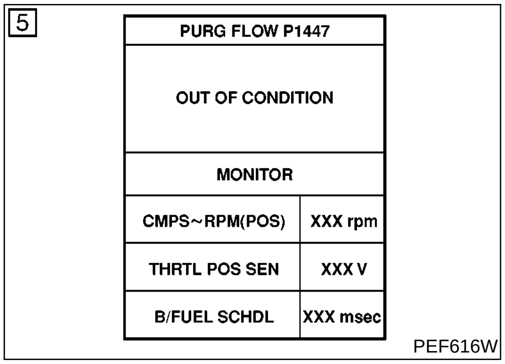
In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

On Board Diagnosis Logic

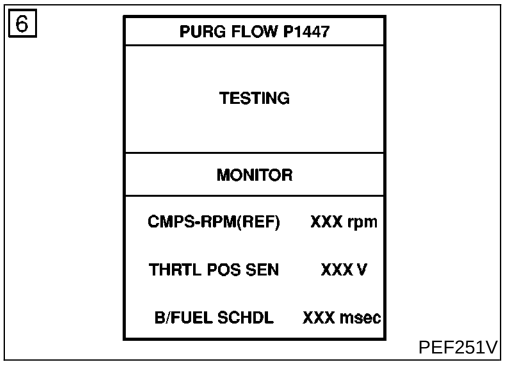
NGEC0374

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.

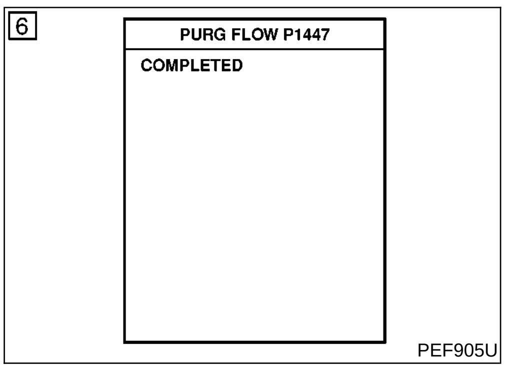
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1447 0111	● EVAP control system does not operate properly. ● EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	● EVAP canister purge volume control solenoid valve stuck closed ● EVAP control 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 ● Closed throttle position switch ● Blocked purge port ● EVAP canister vent control valve



PEF616W



PEF251V



PEF905U

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.**

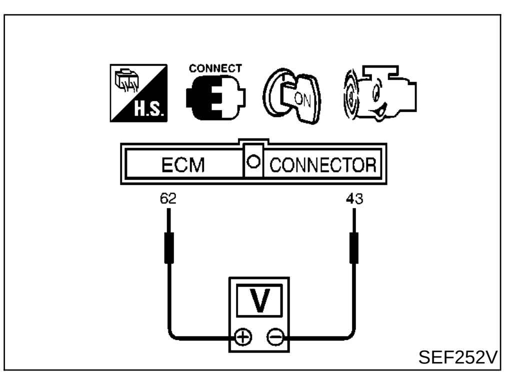
With CONSULT-II

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)
CMPS·RPM (POS)	500 - 3,600 rpm
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".



SEF252V

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.

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Diagnostic Procedure

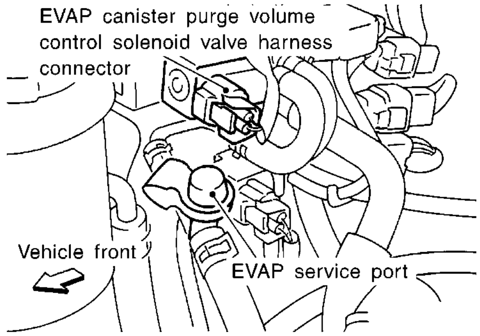
NGEC0377

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	0.0%
MONITOR	
CMPS~RPM(REF)	XXX rpm
FR O2 MNTR-B2	LEAN
FR O2 MNTR-B1	LEAN
A/F ALPHA-B2	XXX %
A/F ALPHA-B1	XXX %
THRTL POS SEN	XXX V

PEF908U

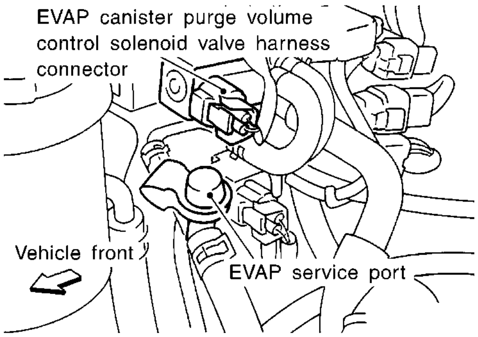
4. Rev engine up to 2,000 rpm.
5. Touch "Qd" and "Qu" on CONSULT-II screen to adjust "PURG VOL CONT/V" opening.
   100.0%: Vacuum should exist.
   0.0%: Vacuum should not exist.

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-36.

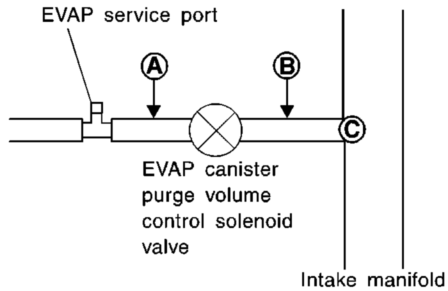
OK or NG

OK ▶	GO TO 5.
NG ▶	Repair it.

Diagnostic Procedure (Cont'd)

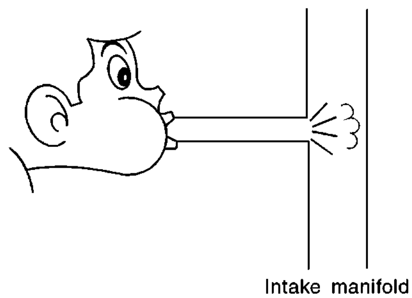
5 CHECK EVAP PURGE HOSE AND PURGE PORT

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.



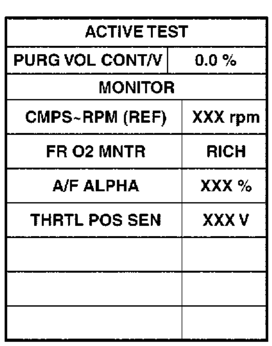
SEF368U

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.



Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

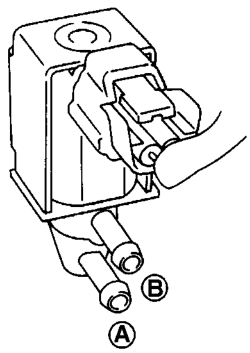
SEF175X

OK or NG

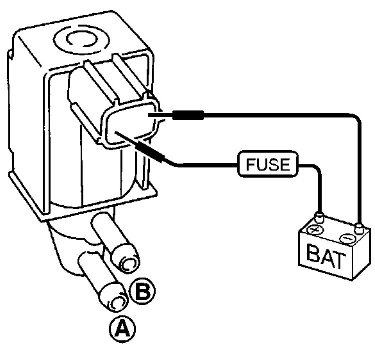
OK	▶	GO TO 8.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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

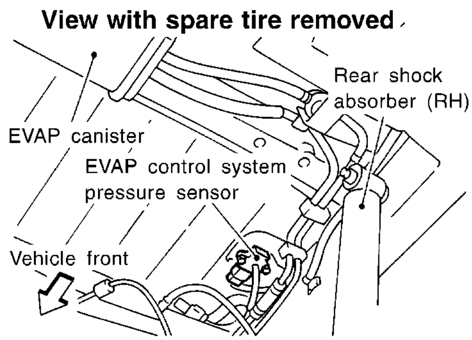
OK	▶	GO TO 8.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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

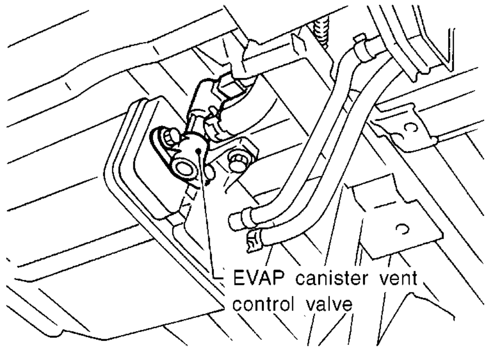
OK	▶	GO TO 9.
NG	▶	Repair it.

9	CHECK CONNECTOR	
1. Disconnect EVAP control system pressure sensor harness connector.  SEF341V 2. Check connectors for water. **Water should not exist.** **OK or NG**		
OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

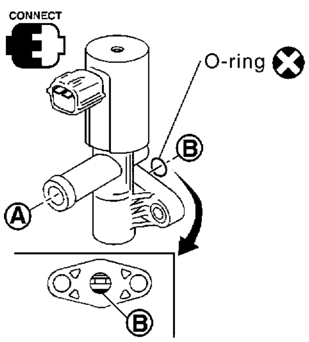
10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR AND CIRCUIT	
Refer to "DTC Confirmation Procedure" for DTC P0450, EC-385. **OK or NG**		
OK (With CONSULT-II)	▶	GO TO 11.
OK (Without CONSULT-II)	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

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	
CMPS~RPM (REF)	XXX rpm
FR O2 MNTR	RICH
A/F ALPHA	XXX %
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between **A** and **B**
ON	No
OFF	Yes

SEF172X

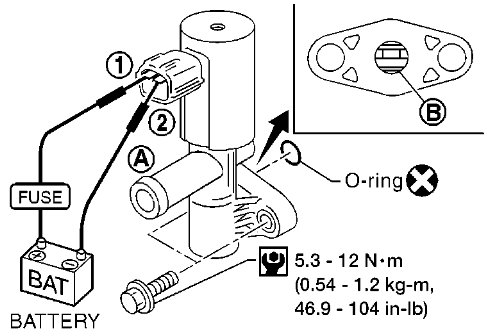
OK or NG

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 EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-36.

OK or NG

OK	▶	GO TO 14.
NG	▶	Replace it.

14	CLEAN EVAP PURGE LINE

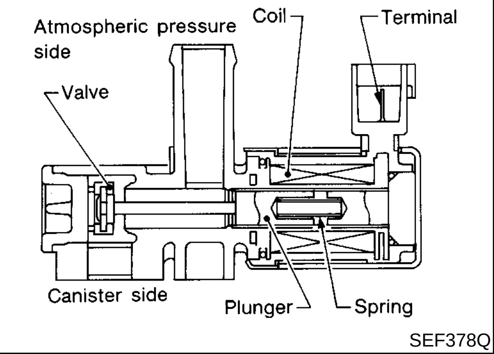
Clean EVAP purge line (pipe and rubber tube) using air blower.

	▶	GO TO 15.

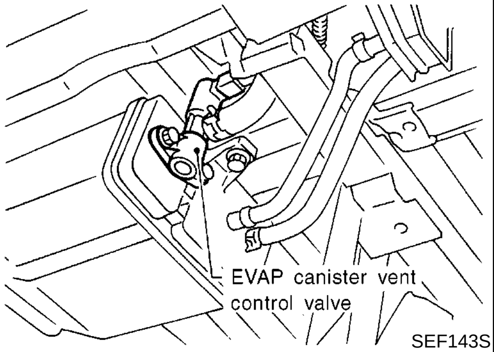
15	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

	▶	**INSPECTION END**



SEF378Q



SEF143S

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

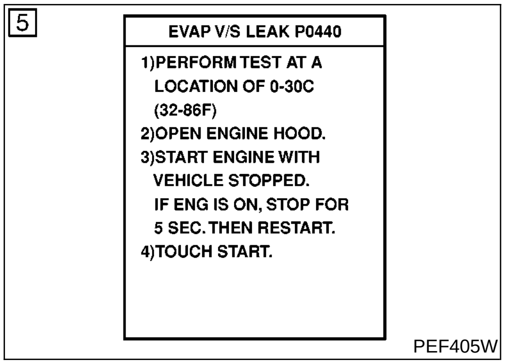
Specification data are reference values and are measured between each terminal and 43 (ECM ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

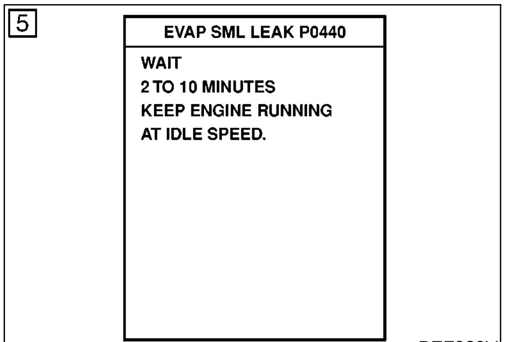
On Board Diagnosis Logic

NGEC0382

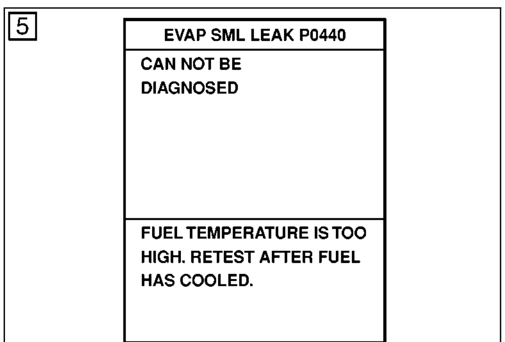
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1448 0309	● EVAP canister vent control valve remains opened under specified driving conditions.	● EVAP canister vent control valve ● EVAP control system pressure sensor ● Blocked rubber tube to EVAP canister vent control valve ● Water separator ● EVAP canister is saturated with water. ● Vacuum cut valve



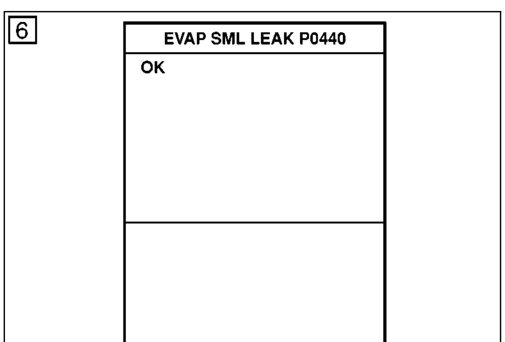
PEF405W



PEF929V



PEF669U



PEF297U

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:

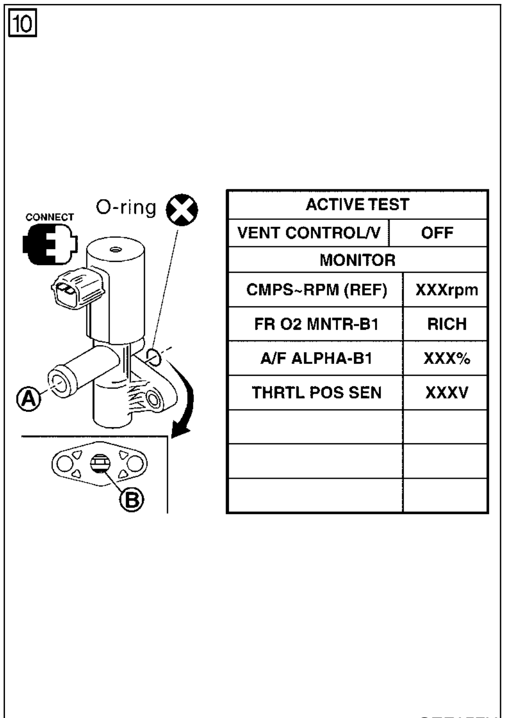
- **If the CONSULT-II screen shown at left is displayed, stop the engine and stabilize the vehicle temperature at 25°C (77°F) or cooler. After "TANK F/TMP SE" becomes less than 30°C (86°F), retest. (Use a fan to reduce the stabilization time.)**
- **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to "Basic Inspection", EC-95.**
- **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.

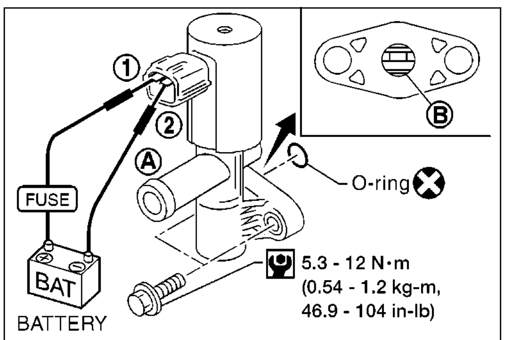


SEF157X

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-518.
If the result is OK, go to "Diagnostic Procedure" for DTC P0440, EC-354.



AEC783A

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-518.
If the result is OK, perform trouble diagnosis for DTC P0440. Refer to EC-351.

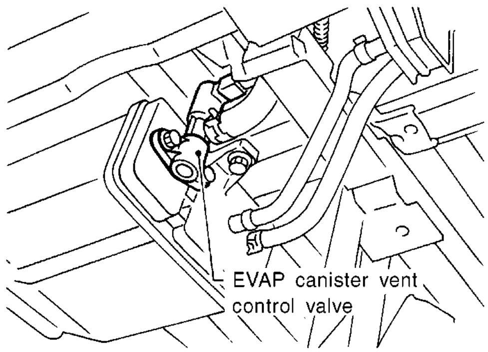
Diagnostic Procedure

NGEC0385

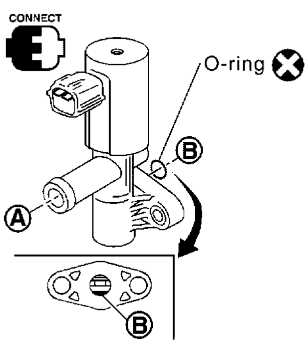
1	CHECK RUBBER TUBE	
1. Turn ignition switch OFF. 2. Check disconnection or obstruction of rubber tube connected to EVAP canister vent control valve. **OK or NG**		
OK (With CONSULT-II)	▶	GO TO 2.
OK (Without CONSULT-II)	▶	GO TO 3.
NG	▶	Repair or clean rubber tube.

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	
CMPS·RPM (REF)	XXX rpm
FR O2 MNTR	RICH
A/F ALPHA	XXX %
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between **A** and **B**
ON	No
OFF	Yes

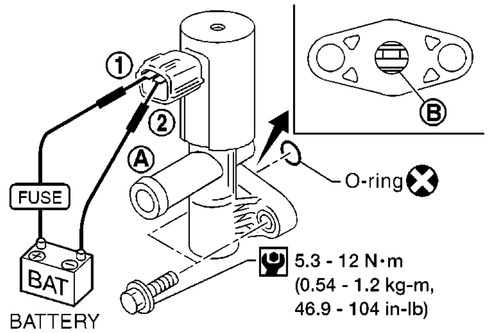
SEF172X

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

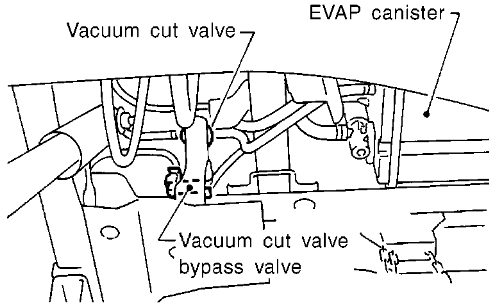
If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If the portion B is rusted, replace EVAP canister vent control valve. Make sure new O-ring is installed properly.

OK or NG

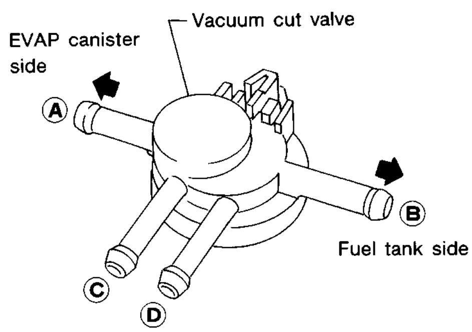
OK	▶	GO TO 4.
NG	▶	Replace EVAP canister vent control valve and O-ring.

4	CHECK VACUUM CUT VALVE

Check vacuum cut valve as follows:



SEF186S



SEF379Q

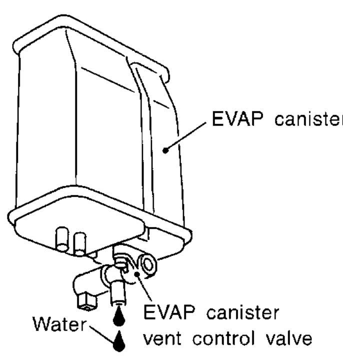
1. Plug port **C** and **D** with fingers.
2. Apply vacuum to port **A** and check that there is no suction from port **B**.
3. Apply vacuum to port **B** and check that there is suction from port **A**.
4. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
5. Open 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.

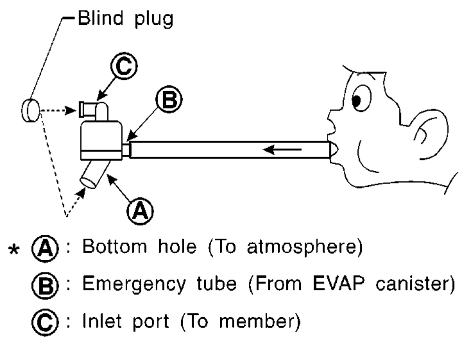


SEF596U

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.

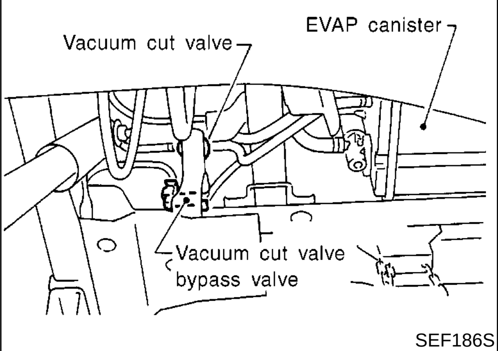
7	DETECT MALFUNCTIONING PART
Check the following. 1. Visually check the EVAP canister for damage. 2. Check hose connection between EVAP canister and water separator for clogging and poor connection. 3. Check water separator. a. Check visually for insect nests in the water separator air inlet. b. Check 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.  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.

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR
Perform "DTC Confirmation Procedure", EC-385.	
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-128.	
▶	**INSPECTION END**



SEF186S

Description

NGEC0387

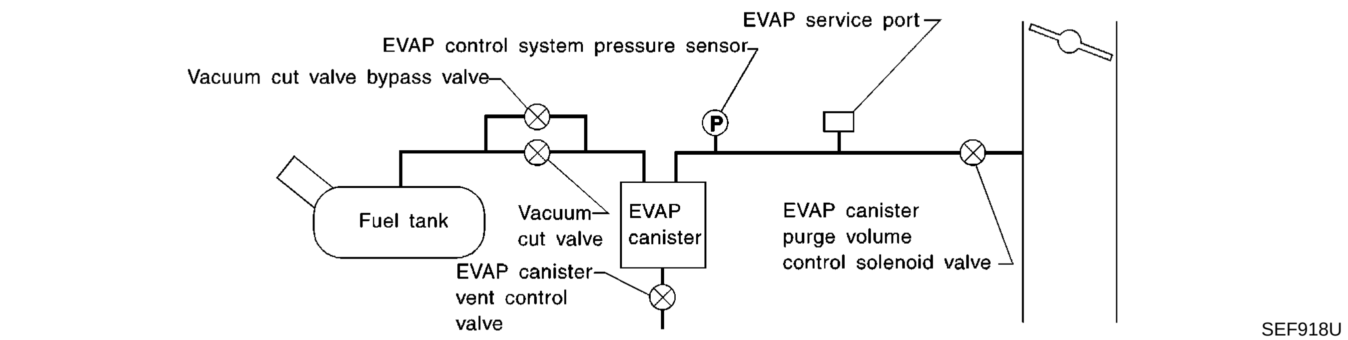
COMPONENT DESCRIPTION

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



SEF918U

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 43 (ECM 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

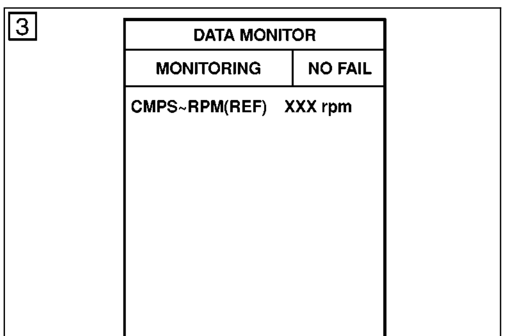
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1490 0801	• An improper voltage signal is sent to ECM through vacuum cut valve bypass valve.	• Harness or connectors (The vacuum cut valve bypass valve circuit is open or shorted.) • Vacuum cut valve bypass valve

DTC Confirmation Procedure

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.



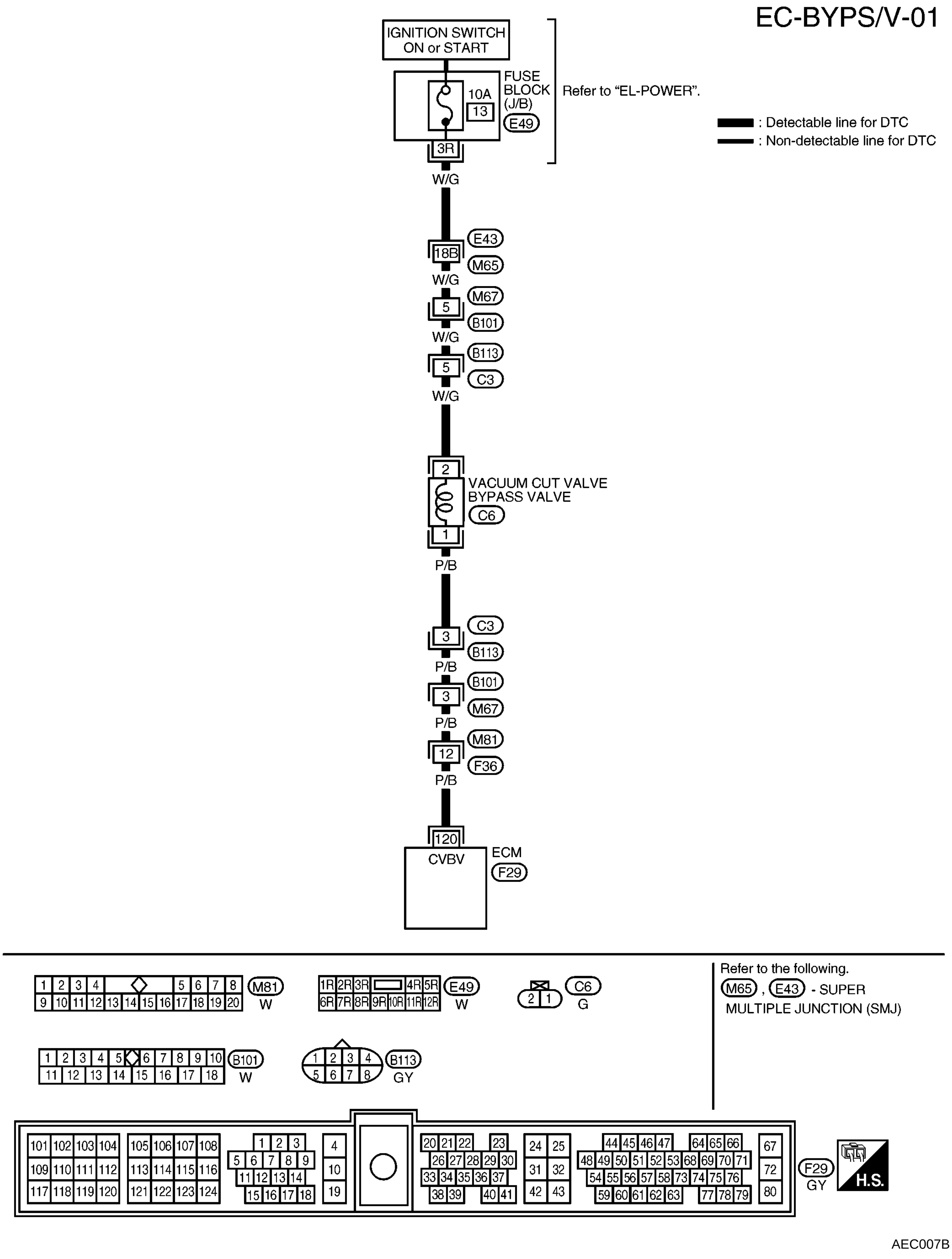
PEF357V

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-526.

With GST
Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0392



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	
MONITOR	
CMPS~RPM(REF)	XXX rpm
FR O2 MNTR	RICH
A/F ALPHA	XXX %
THRTL POS SEN	XXX V

PEF364U

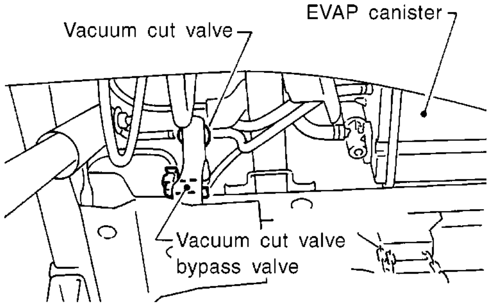
3. Make sure that clicking sound is heard from the vacuum cut valve bypass valve.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 3.

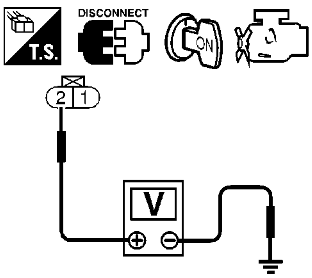
3	CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect vacuum cut valve bypass valve harness connector.



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.

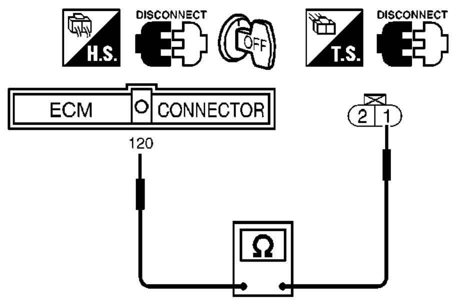
4	DETECT MALFUNCTIONING PART

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.

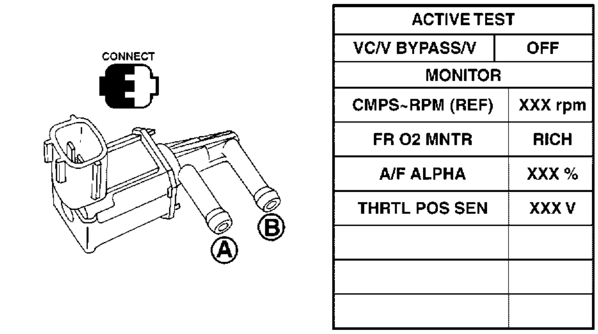
6	DETECT MALFUNCTIONING PART

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.

7	CHECK VACUUM CUT VALVE BYPASS VALVE

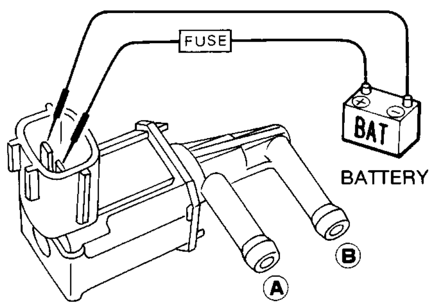
With CONSULT-II
Check air passage continuity.
Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.



Condition VC/V BYPASS/V	Air passage continuity between **A** and **B**
ON	Yes
OFF	No

SEF171X

Without CONSULT-II
Check air passage continuity shown in the figure.



SEF351Q

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

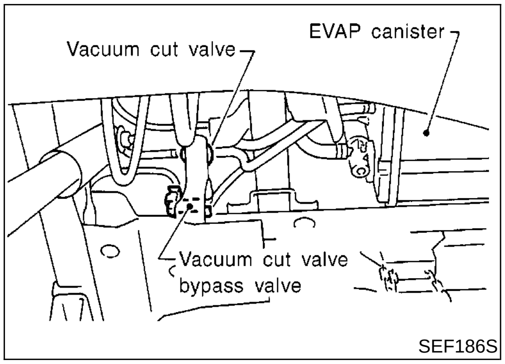
MTBL0303

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-128.	
▶	**INSPECTION END**



SEF186S

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.

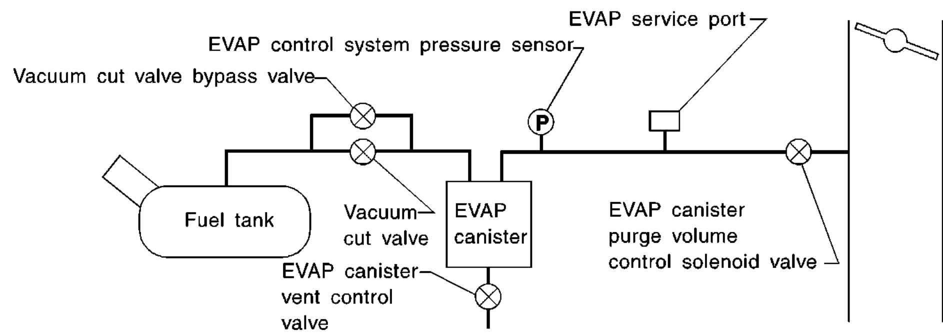
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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



SEF918U

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

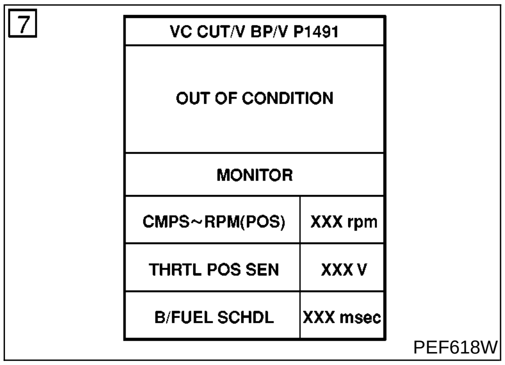
Specification data are reference values and are measured between each terminal and 32 (ECM ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	P/B	Vacuum cut valve bypass valve	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

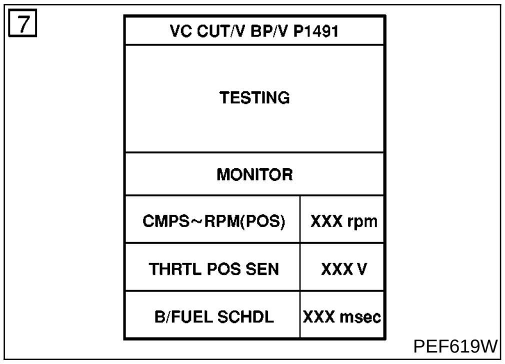
On Board Diagnosis Logic

NGEC0398

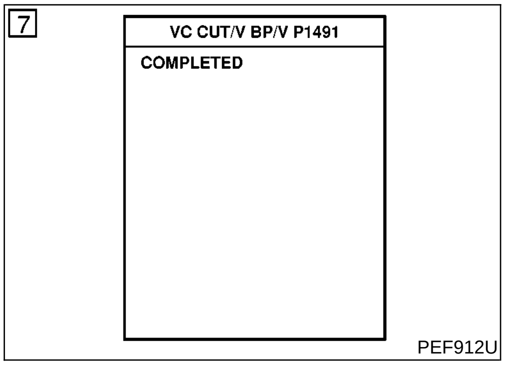
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1491 0311	Vacuum cut valve bypass valve does not operate properly.	● Vacuum cut valve bypass valve ● Vacuum cut valve ● Bypass hoses for clogging ● EVAP control system pressure sensor ● EVAP canister vent control valve ● Hose between fuel tank and vacuum cut valve clogged ● Hose between vacuum cut valve and EVAP canister clogged ● EVAP canister ● EVAP purge port of fuel tank for clogging



PEF618W



PEF619W



PEF912U

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.**

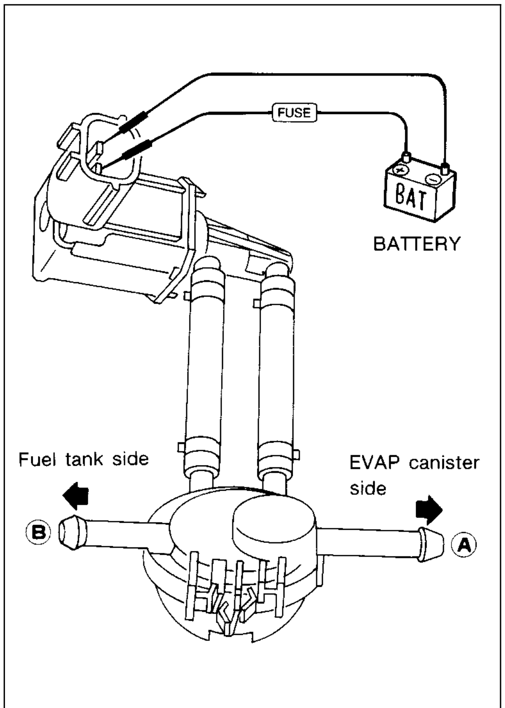
With CONSULT-II

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.)

CMPS·RPM (POS)	1,000 - 3,200 rpm
Selector lever	Suitable position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
B/FUEL SCHDL	Less than 4.5 msec

If "TESTING" is not displayed after 5 minutes, retry from step 3.

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



SEF530Q

Overall Function Check

NGEC0400

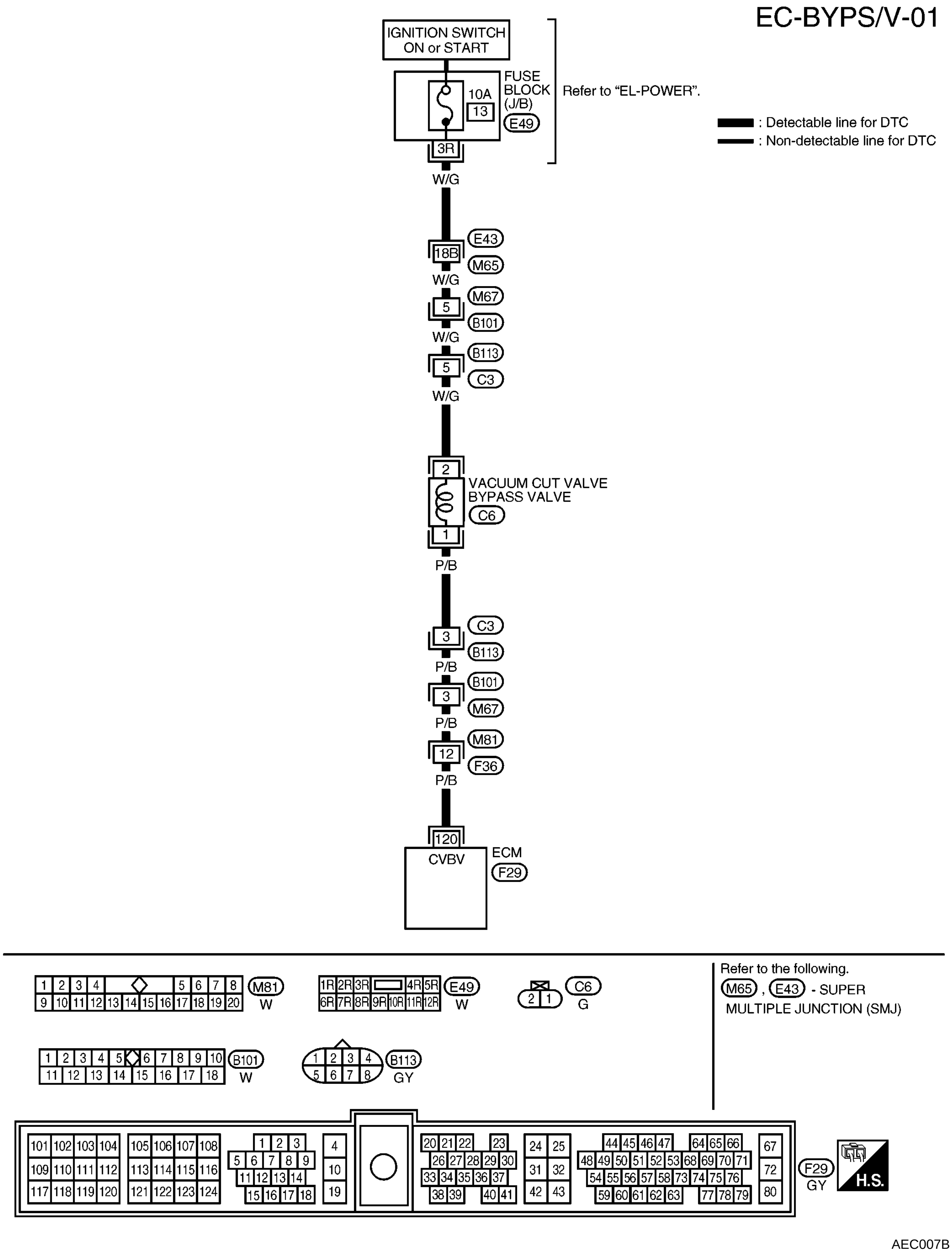
Use this procedure to check the overall function of vacuum cut valve bypass valve. During this check, the 1st trip DTC might not be confirmed.

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-534.

Wiring Diagram

NGEC0505



Diagnostic Procedure

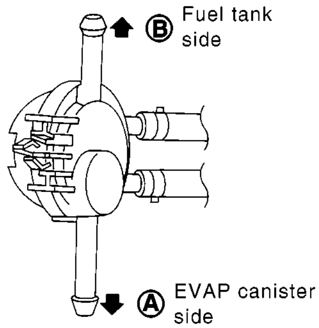
NGEC0401

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	ON
MONITOR	
CMPS~RPM(REF)	XXX rpm
FR O2 MNTR-B2	LEAN
FR O2 MNTR-B1	LEAN
A/F ALPHA-B2	XXX %
A/F ALPHA-B1	XXX %
THRTL POS SEN	XXX V

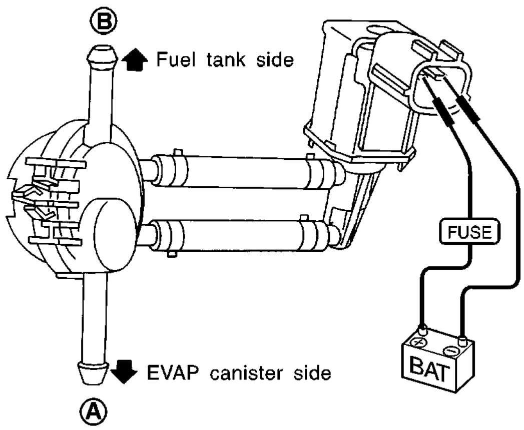
PEF913U

OK or NG

OK ▶	GO TO 4.
NG ▶	GO TO 5.

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.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

6	CHECK VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II
Check air passage continuity.
Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.

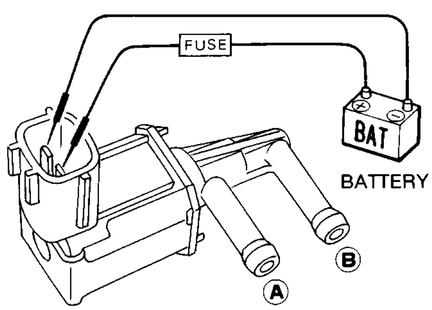
ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
CMPS~RPM(REF)	XXX rpm
FR O2 MNTR	RICH
A/F ALPHA	XXX %
THRTL POS SEN	XXX V

PEF395V

Condition VC/V BYPASS/V	Air passage continuity between **A** and **B**
ON	Yes
OFF	No

MTBL0304

Without CONSULT-II
Check air passage continuity shown in the figure.



SEF351Q

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

MTBL0303

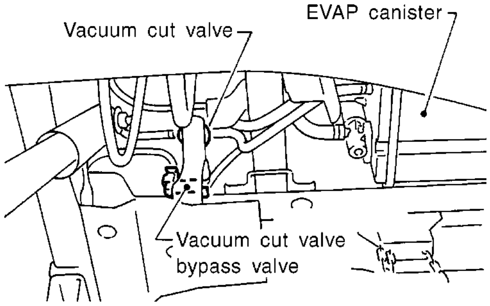
If NG or operation takes more than 1 second, replace vacuum cut valve bypass valve.

OK or NG

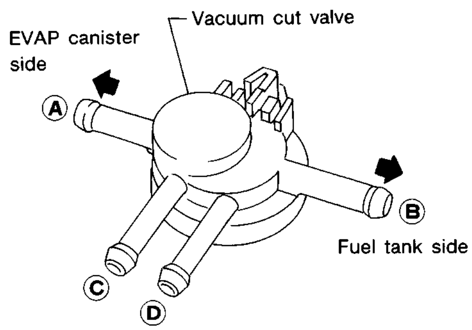
OK	▶	GO TO 7.
NG	▶	Replace vacuum cut valve bypass valve.

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

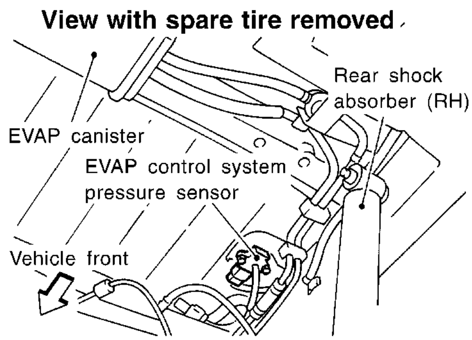
OK	▶	GO TO 8.
NG	▶	Replace vacuum cut valve.

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.  SEF341V 2. Check connectors for water. **Water should not exist.** **OK or NG**		
OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

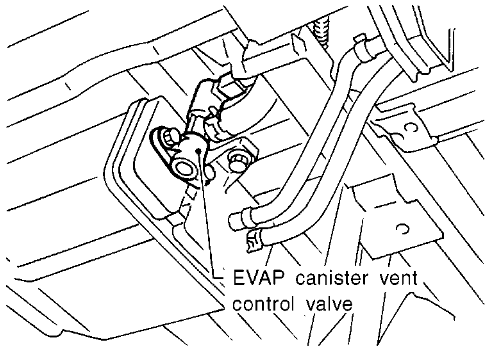
10	CHECK COMPONENT AND CIRCUIT	
(EVAP control system pressure sensor) Refer to "DTC Confirmation Procedure" for DTC P0450, EC-385. **OK or NG**		
OK (With CONSULT-II)	▶	GO TO 11.
OK (Without CONSULT-II)	▶	GO TO 12.
NG	▶	Replace EVAP control system pressure sensor.

11	CHECK EVAP CANISTER VENT CONTROL VALVE

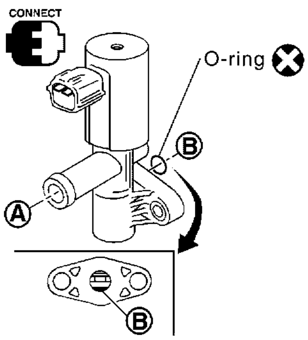
With CONSULT-II

Check air passage continuity.

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.



SEF143S



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
CMPS~RPM (REF)	XXX rpm
FR O2 MNTR	RICH
A/F ALPHA	XXX %
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between **A** and **B**
ON	No
OFF	Yes

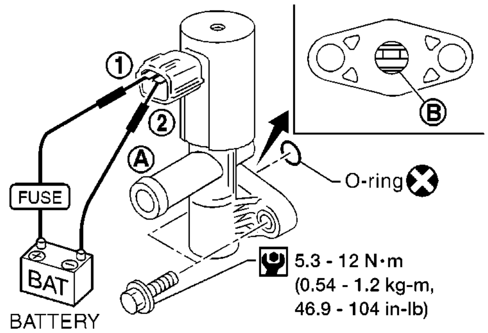
SEF172X

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.

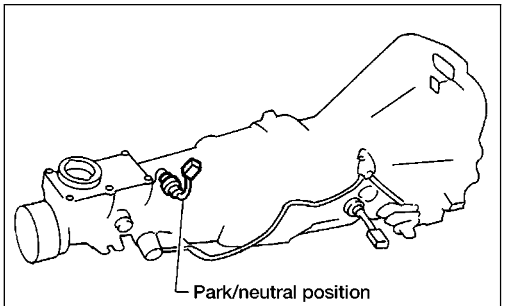
OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

13	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

	▶	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 32 (ECM 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 1003	● The signal of the PNP switch is not changed in the process of engine starting and driving.	● Harness or connectors (The PNP switch circuit is open or shorted.) ● PNP switch

DTC Confirmation Procedure

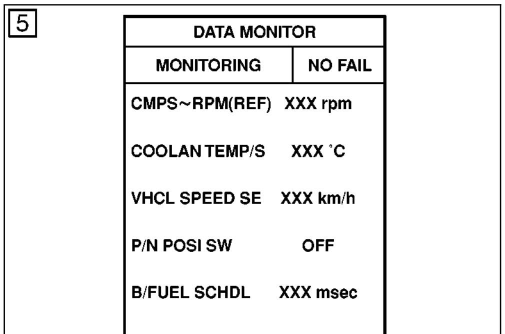
=NGEC0428

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.



PEF726W

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.

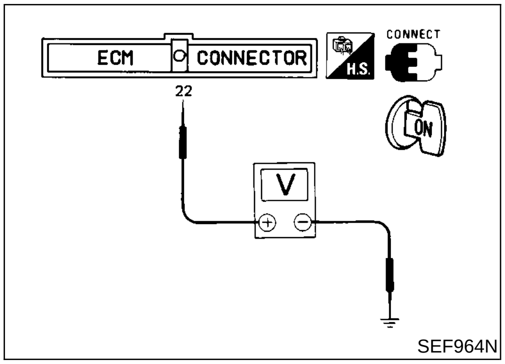
Position (Selector lever)	Known good signal
“N”	ON
Except the above position	OFF

If NG, go to “Diagnostic Procedure”, EC-545.
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.

CMPS·RPM (REF)	1,800 - 3,200 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	1.0 - 5.3 msec
VHCL SPEED SE	70 - 100 km/h (43 - 62 MPH)
Selector lever	Suitable position

6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-545.



SEF964N

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

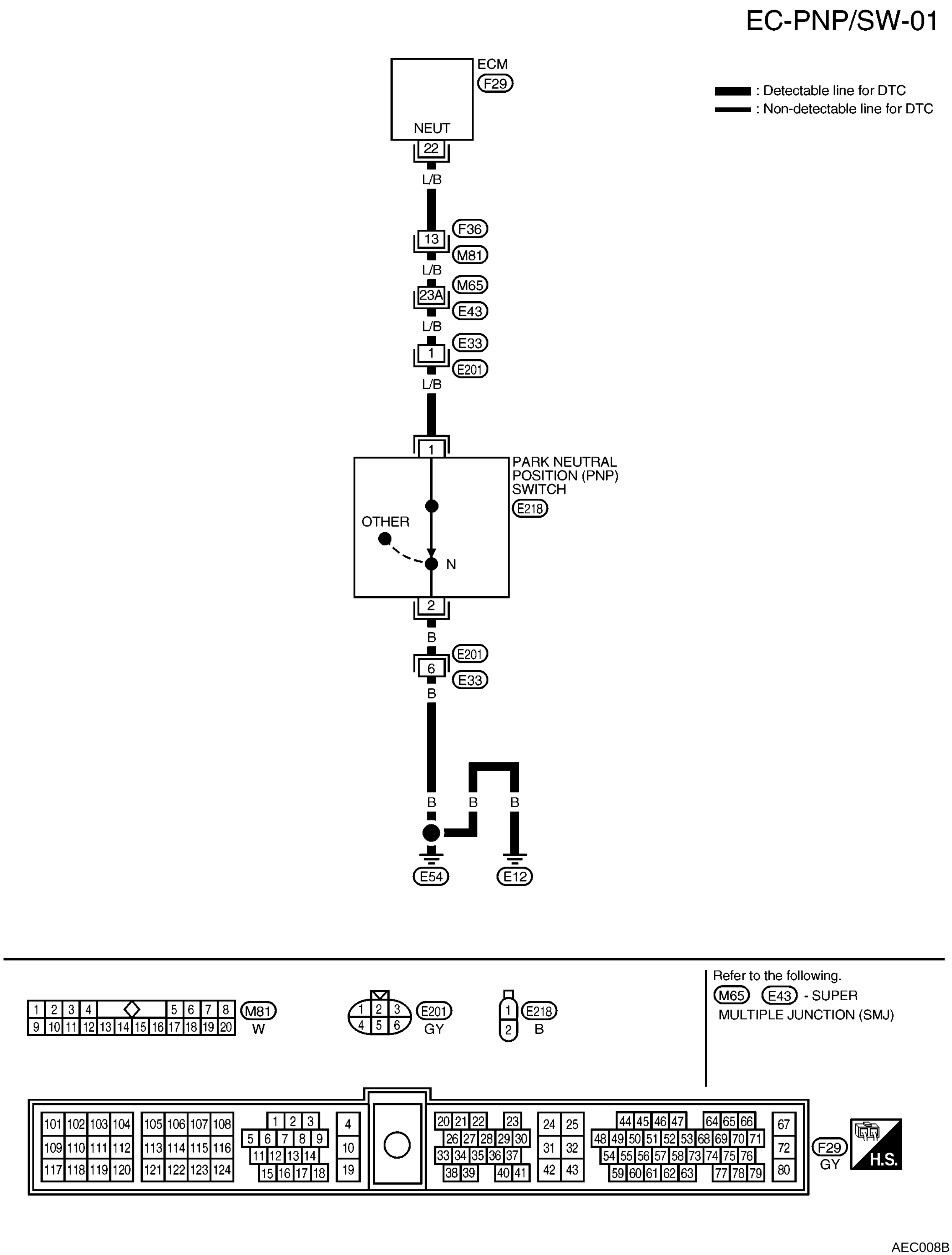
1) Turn ignition switch ON.
2) Check voltage between ECM terminal 22 (PNP switch signal) and body ground under the following conditions.

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-545.

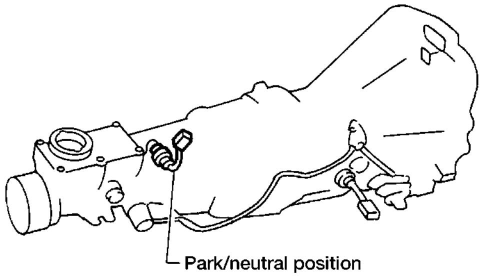
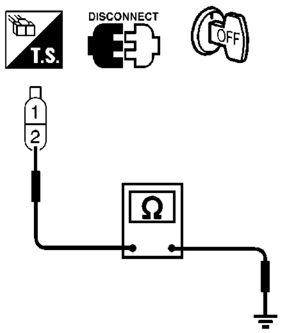
Wiring Diagram

NGEC0430

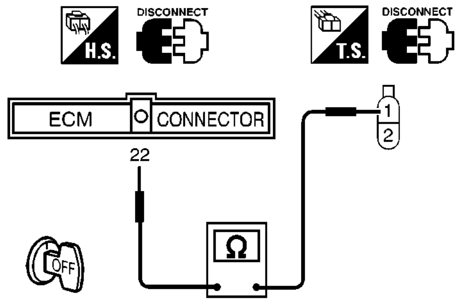


Diagnostic Procedure For M/T Models

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 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 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-128.	
▶	**INSPECTION END**

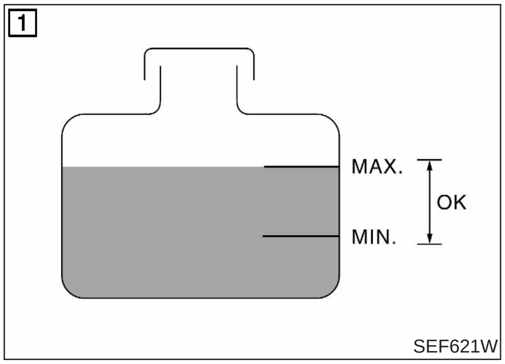
On Board Diagnosis Logic

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 0208	● 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-551.

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.**



SEF621W

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-548.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to “Diagnostic Procedure”, EC-548.

Diagnostic Procedure

NGEC0491

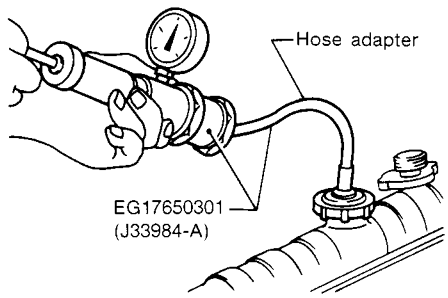
1	CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

Testing pressure: 157 kPa (1.6 kg/cm², 23 psi)

CAUTION:

Higher than the specified pressure may cause radiator damage.



SLC754A

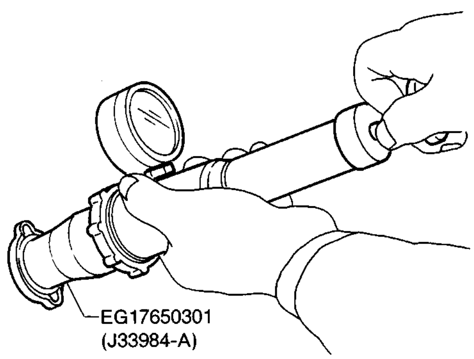
Pressure should not drop.

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.

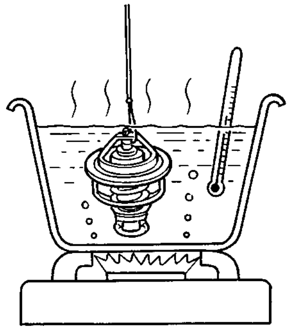


SLC755A

Radiator cap relief pressure:
78 - 98 kPa (0.8 - 1.0 kg/cm², 11 - 14 psi)

OK or NG

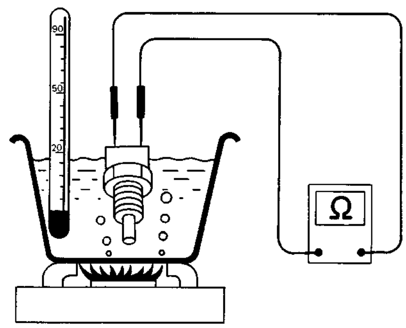
OK	▶	GO TO 3.
NG	▶	Replace radiator cap.

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	

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

4	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.

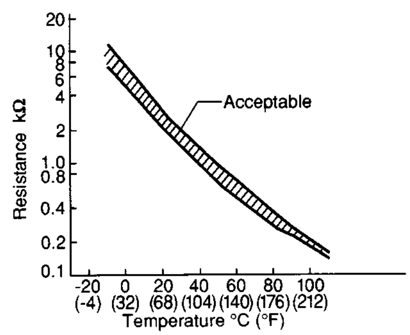


SEF152P

<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-551.

	▶	**INSPECTION END**

Perform FINAL CHECK by the following procedure after repair is completed.

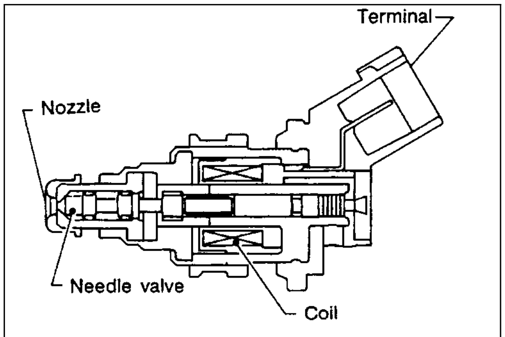
1. Warm up engine. Run the vehicle for at least 20 minutes. Pay attention to engine coolant temperature gauge on the instrument panel. If the reading shows an abnormally high temperature, another part may be malfunctioning.
2. Stop vehicle and let engine idle. Check the intake and exhaust systems for 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 LUBRI-CANTS” 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 chemi-cal tester 4 Gas ana-lyzer	Negative	—
ON*3	8	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driv-ing and idling	See “Changing Engine Coolant”, “ENGINE MAINTENANCE” in MA section.
OFF*4	9	• Coolant return from reservoir tank to radia-tor	• Visual	Should be initial level in reservoir tank	See “ENGINE MAINTE-NANCE” in MA section.
OFF	10	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maxi-mum distortion (warping)	See “Inspection”, “CYLIN-DER HEAD” in EM sec-tion.
	11	• Cylinder block and pis-tons	• Visual	No scuffing on cylinder walls or piston	See “Inspection”, “CYLIN-DER BLOCK” in EM sec-tion.

*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.



SEF596K

Component Description

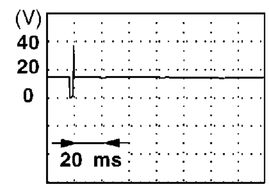
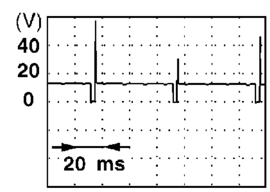
NGEC0435

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 needle valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.

ECM Terminals and Reference Value

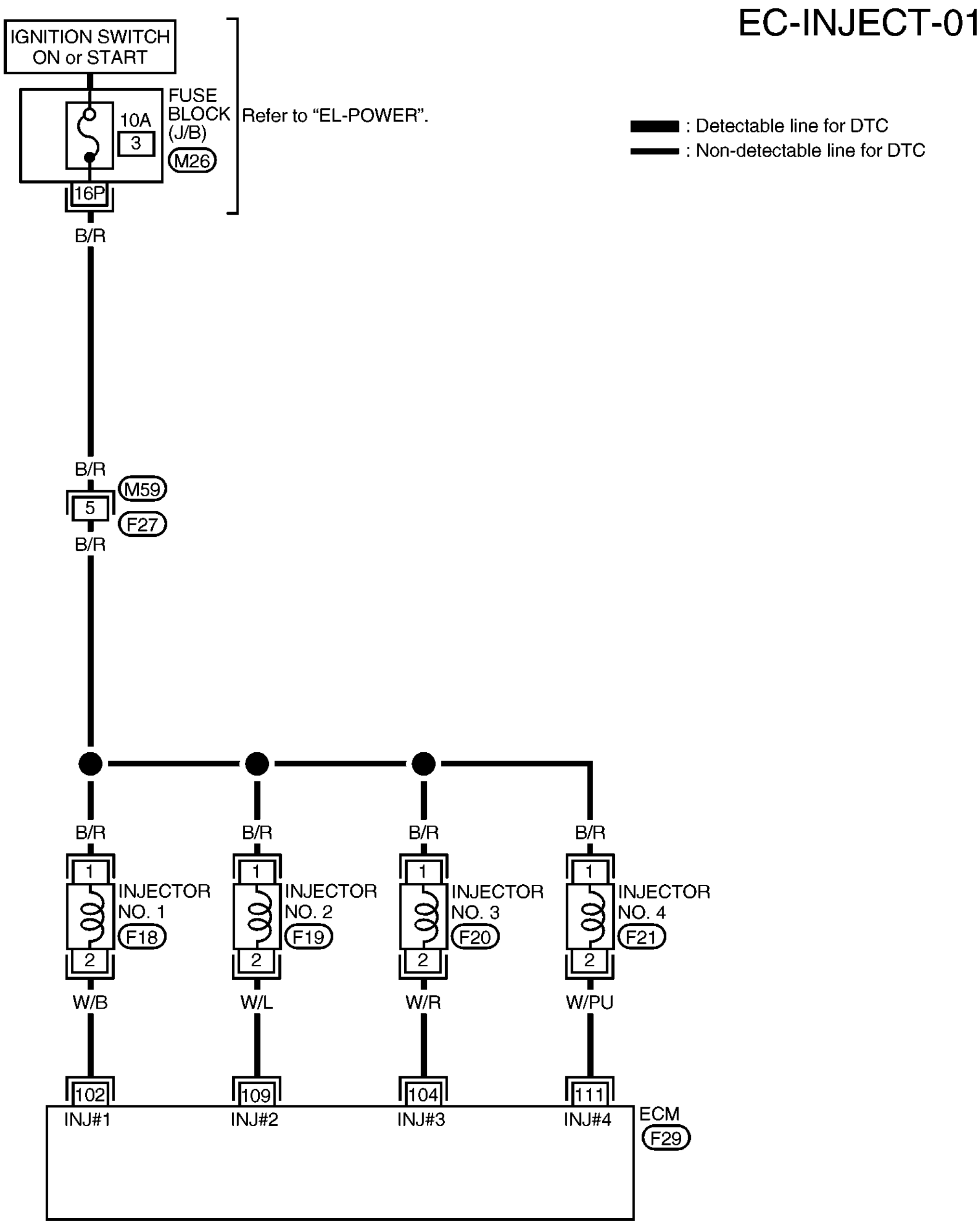
NGEC0437

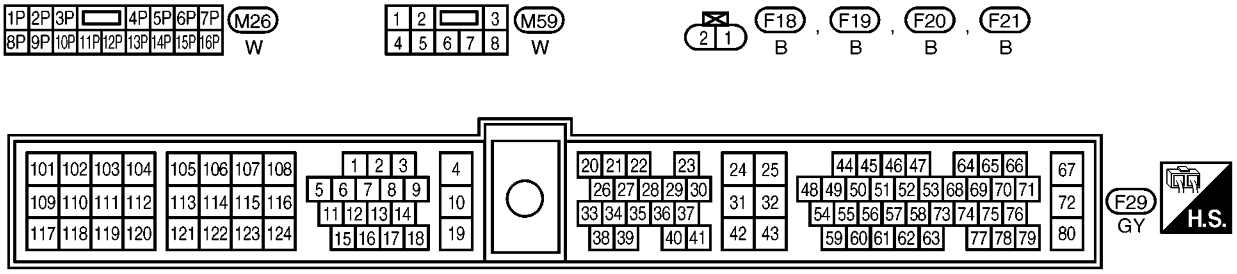
Specification data are reference values and are measured between each terminal and 32 (ECM ground).

<table>
<tr><th>TERMI-NAL NO.</th><th>WIRE COLOR</th><th>ITEM</th><th>CONDITION</th><th>DATA (DC Voltage)</th></tr>
<tr><td rowspan="2">102
104
109
111</td><td rowspan="2">W/B
W/R
W/L
W/PU</td><td rowspan="2">Injector No. 1
Injector No. 3
Injector No. 2
Injector No. 4</td><td>[Engine is running]
● Warm-up condition
● Idle speed</td><td>BATTERY VOLTAGE
(11 - 14V)

SEF011W</td></tr>
<tr><td>[Engine is running]
● Warm-up condition
● Engine speed is 2,000 rpm</td><td>BATTERY VOLTAGE
(11 - 14V)

SEF012W</td></tr>
</table>

Wiring Diagram

NGEC0434





AEC009B

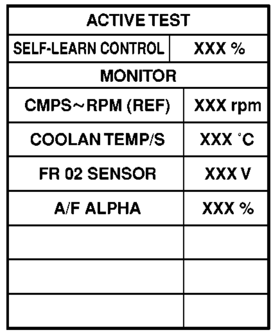
Diagnostic Procedure

NGEC0438

1	CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.

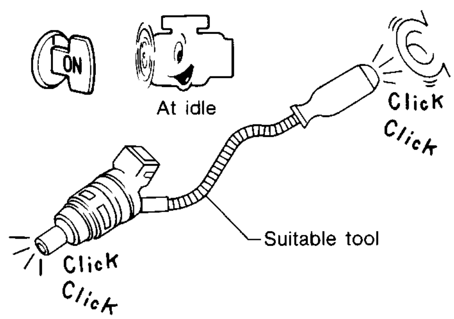


PEF839V

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

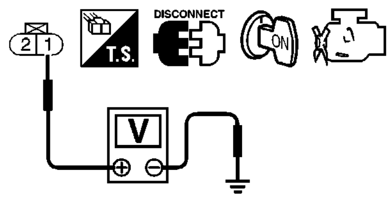
Clicking noise should be heard.

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.

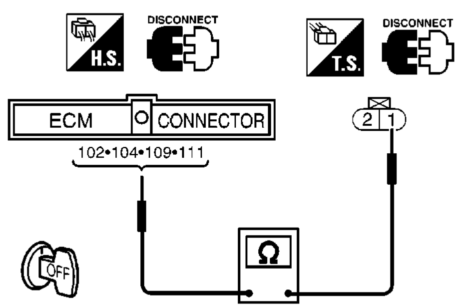
3	DETECT MALFUNCTIONING PART

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.

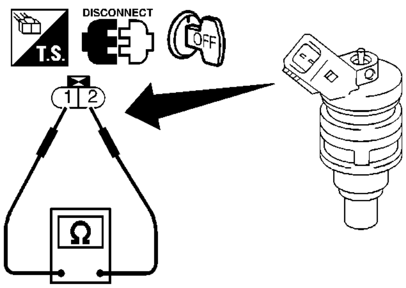
OK or NG

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: 10 - 14Ω [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-128.		
	▶	**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

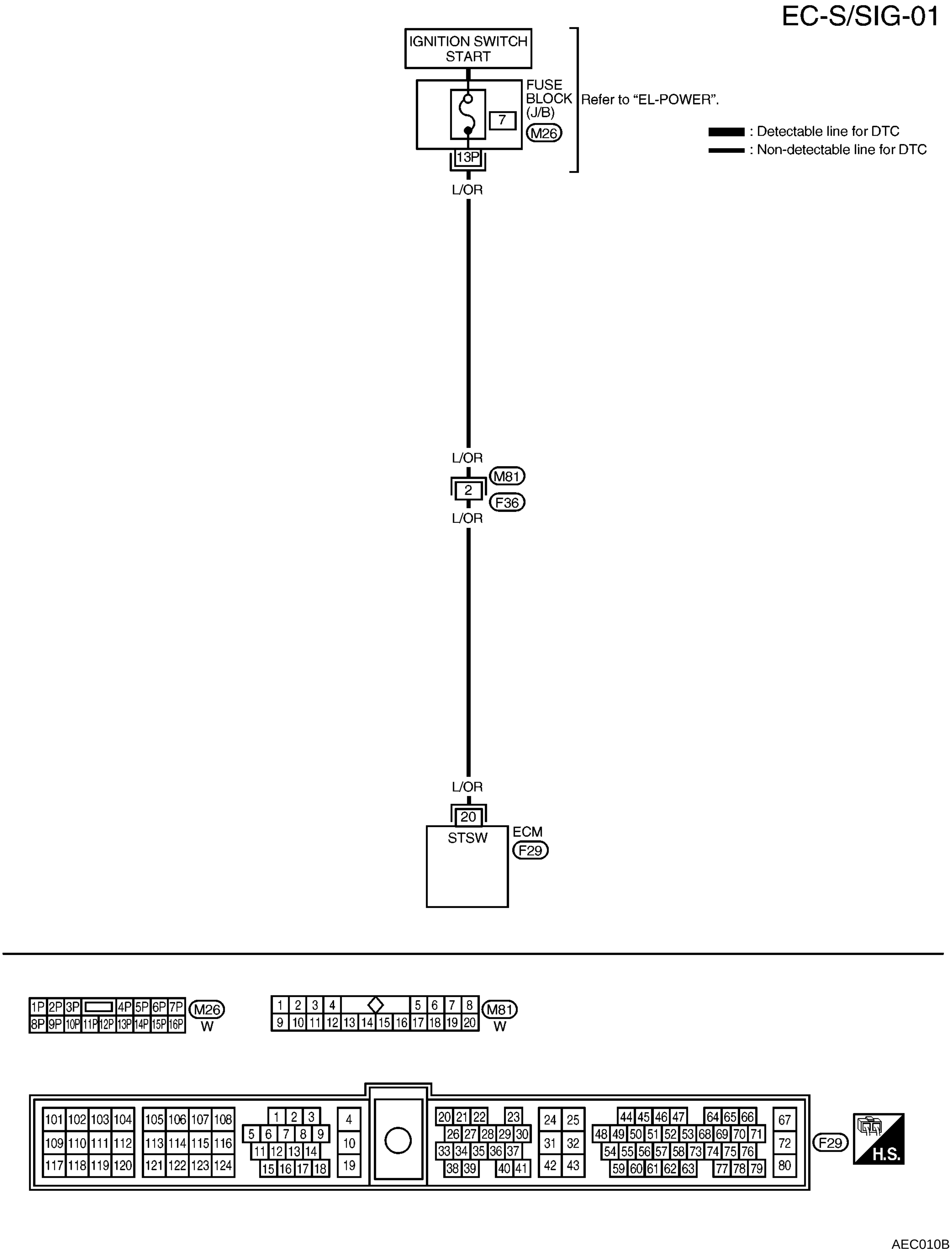
NGEC0442

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



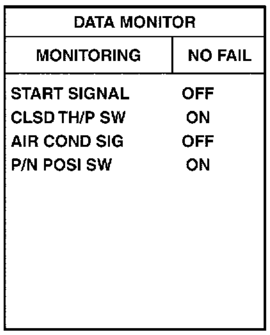
Diagnostic Procedure

=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.



Condition	“START SIGNAL”
IGN “ON”	OFF
IGN “START”	ON

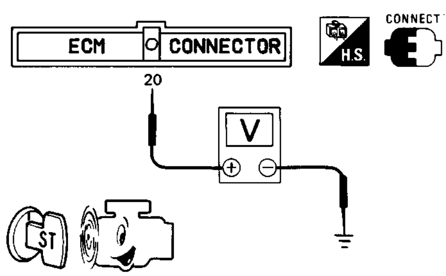
SEF176X

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

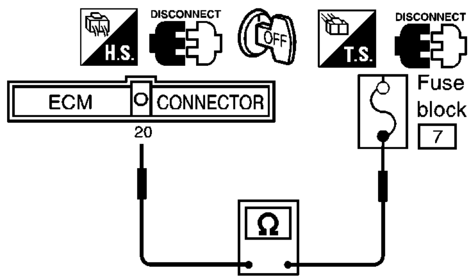
MTBL0143

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

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-128.		
	▶	**INSPECTION END**

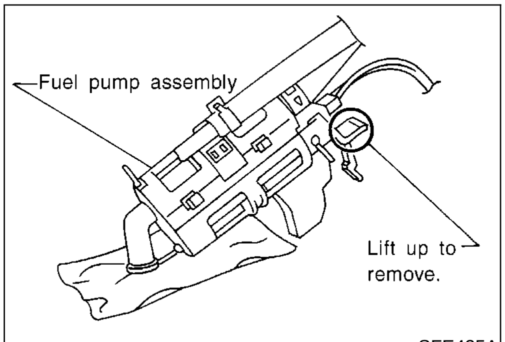
System Description

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.



SFE425A

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

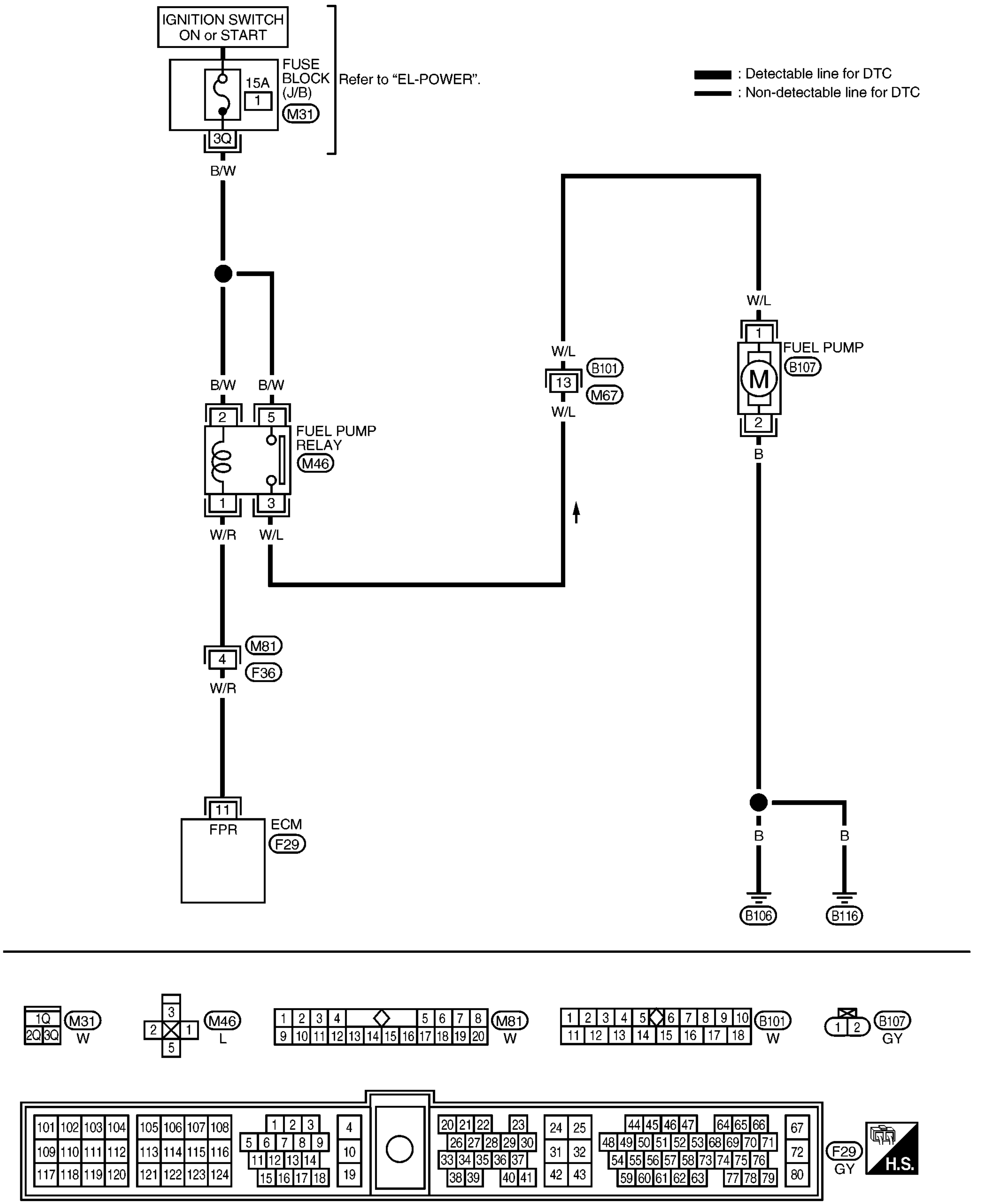
Specification data are reference values and are measured between each terminal and 32 (ECM ground).

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



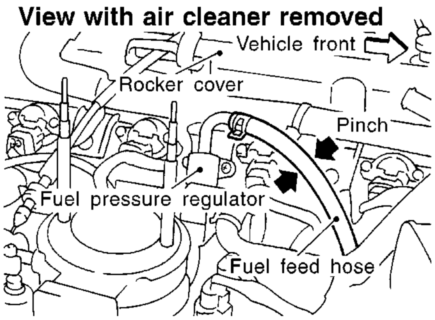
AEC011B

Diagnostic Procedure

NGEC0448

1	CHECK OVERALL FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with two fingers.



SEF348V

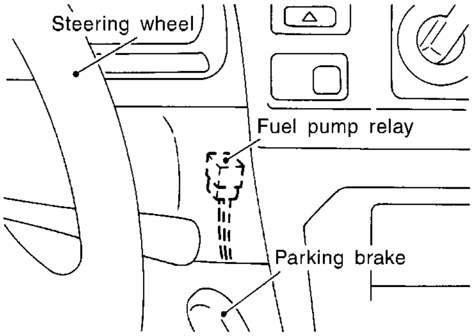
Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned “ON”.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

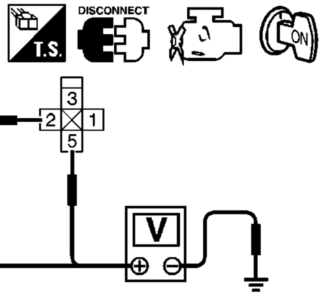
2	CHECK POWER SUPPLY

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

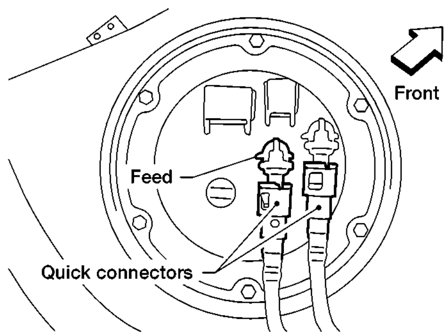
OK	▶	GO TO 4.
NG	▶	GO TO 3.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

3	DETECT MALFUNCTIONING PART
Check the following. ● 15A fuse ● Harness for open or short between fuse and fuel pump relay	
▶	Repair harness or connectors.

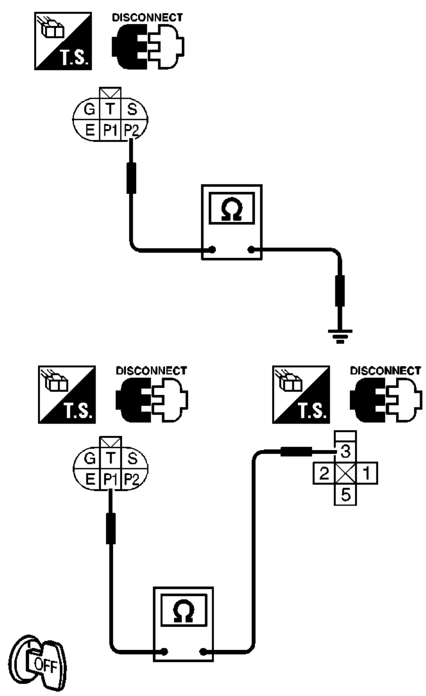
4	CHECK POWER GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel pump harness connector.



AFE095

3. Check harness continuity between terminal P2 and body ground, terminal P1 and fuel pump relay connector terminal 3.



SEF226V

Continuity should exist.

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

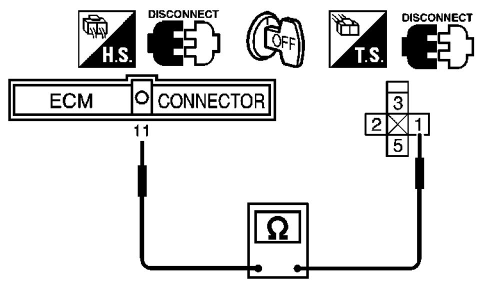
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors 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 ground or short to power in harness or connectors.

6	CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 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 ground or short to power in harness or connectors.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

8	CHECK FUEL PUMP RELAY

With CONSULT-II

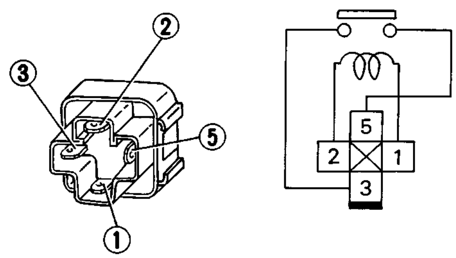
1. Reconnect fuel pump relay, fuel pump harness connector and ECM harness connector.
2. Turn ignition switch ON.
3. Turn fuel pump relay “ON” and “OFF” in “ACTIVE TEST” mode with CONSULT-II and check operating sound.

ACTIVE TEST	
FUEL PUMP RELAY	ON
MONITOR	
CMPS~RPM(REF)	XXX rpm

SEF385X

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

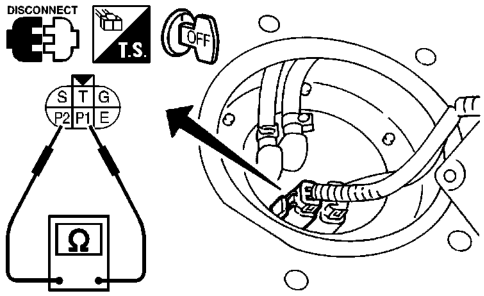
MTBL0306

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace fuel pump relay.

9	CHECK FUEL PUMP

1. Disconnect fuel pump harness connector.



SEF228V

2. Check resistance between terminals P1 and P2.
   Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]

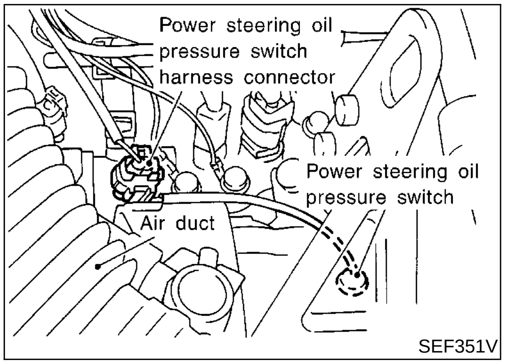
OK or NG

OK	▶	GO TO 10.
NG	▶	Replace fuel pump.

10	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

	▶	**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

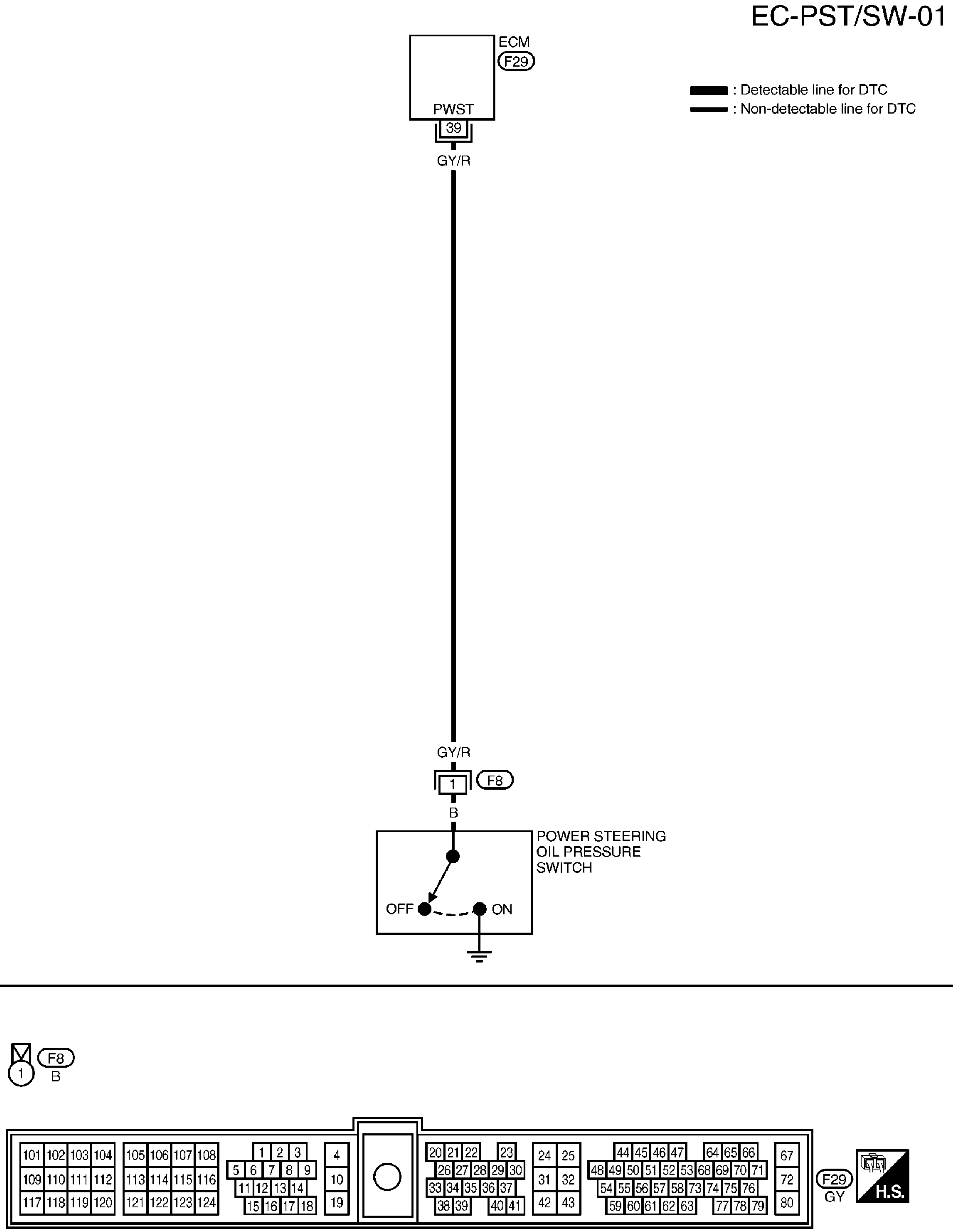
NGEC0453

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



AEC012B

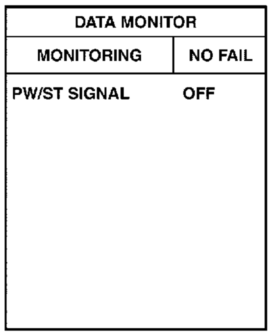
Diagnostic Procedure

=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.



Steering is in neutral position	OFF
Steering is turned	ON

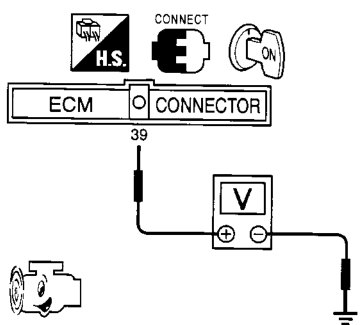
SEF177X

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

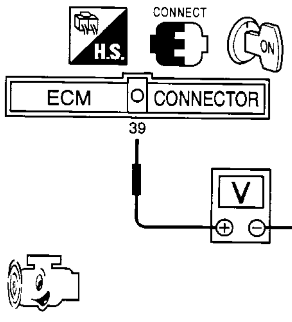
MTBL0142

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.

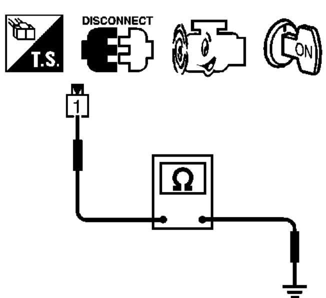
5	DETECT MALFUNCTIONING PART

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

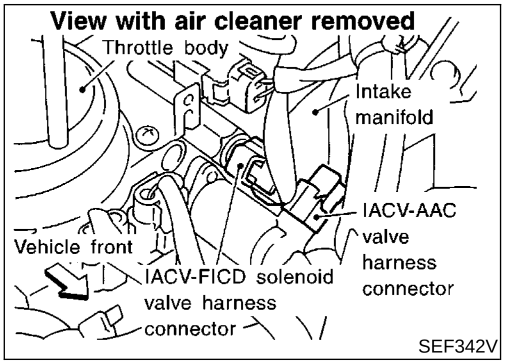
OK	▶	GO TO 7.
NG	▶	Replace power steering oil pressure switch.

7	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.

	▶	**INSPECTION END**

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX



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

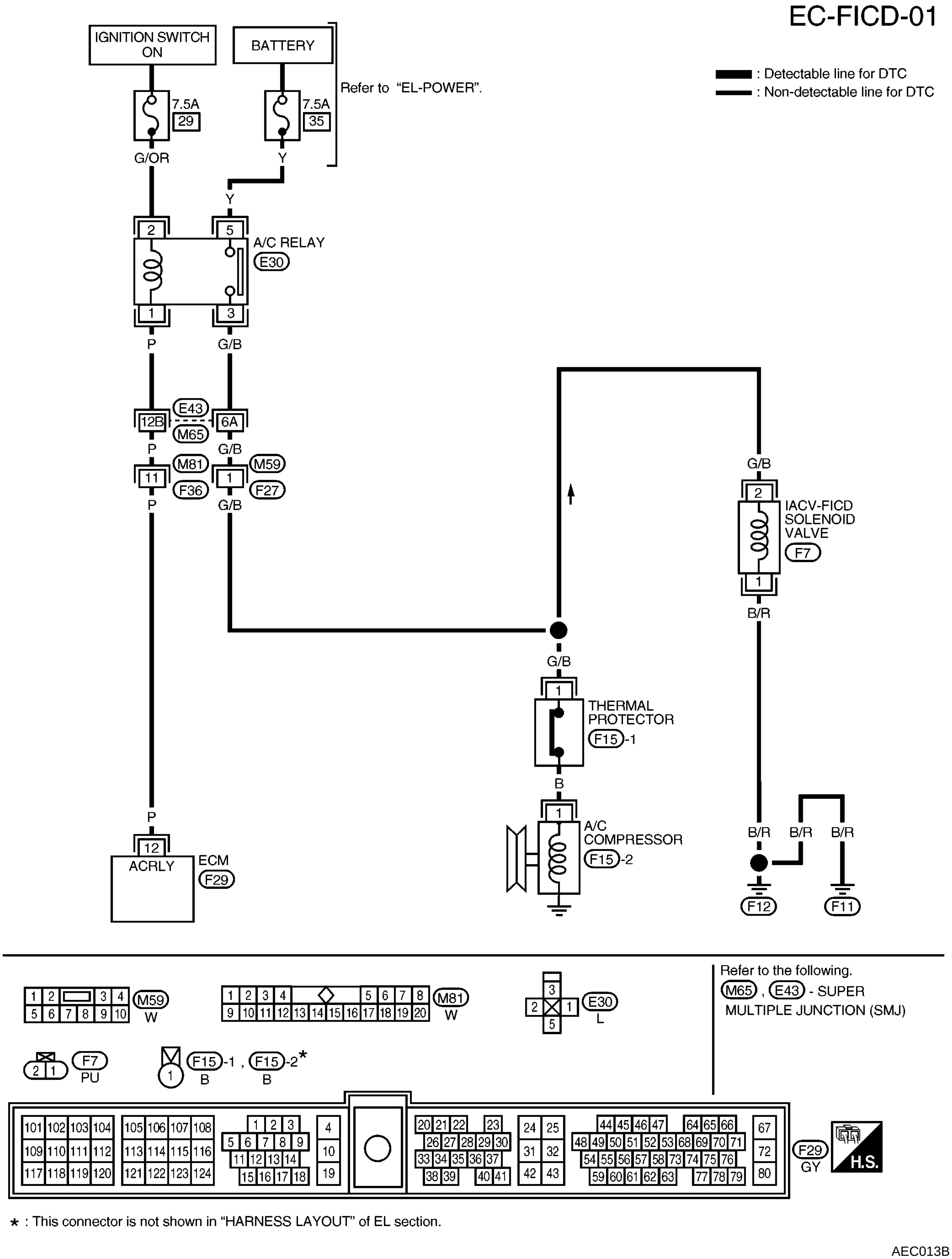
Specification data are reference values and are measured between each terminal and 32 (ECM ground).

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.

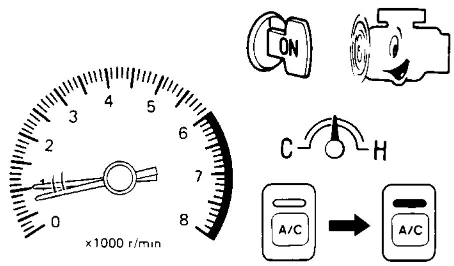
Wiring Diagram

NGEC0461



Diagnostic Procedure

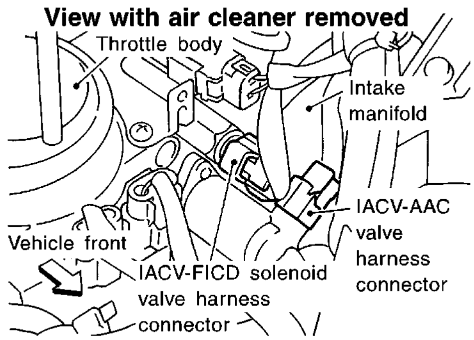
=NGEC0464

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-26***.

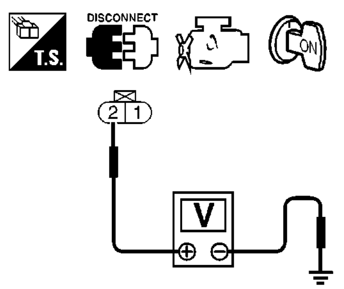
3	CHECK POWER SUPPLY

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.

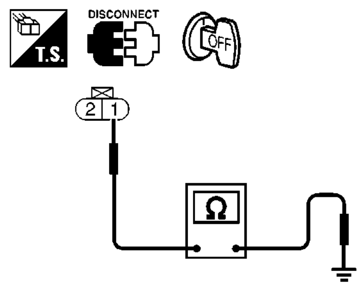
4	DETECT MALFUNCTIONING PART

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 ground and short to power.

OK or NG

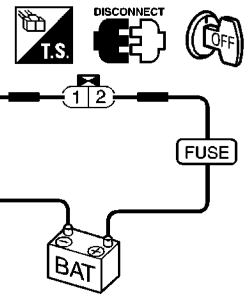
OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the harness for open or short between IACV-FICD solenoid valve and body ground.

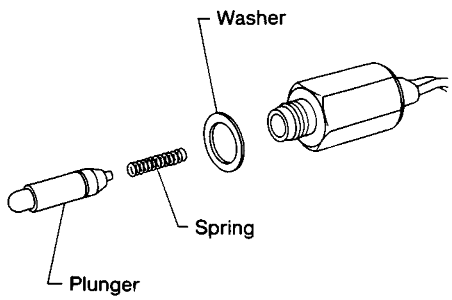
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

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

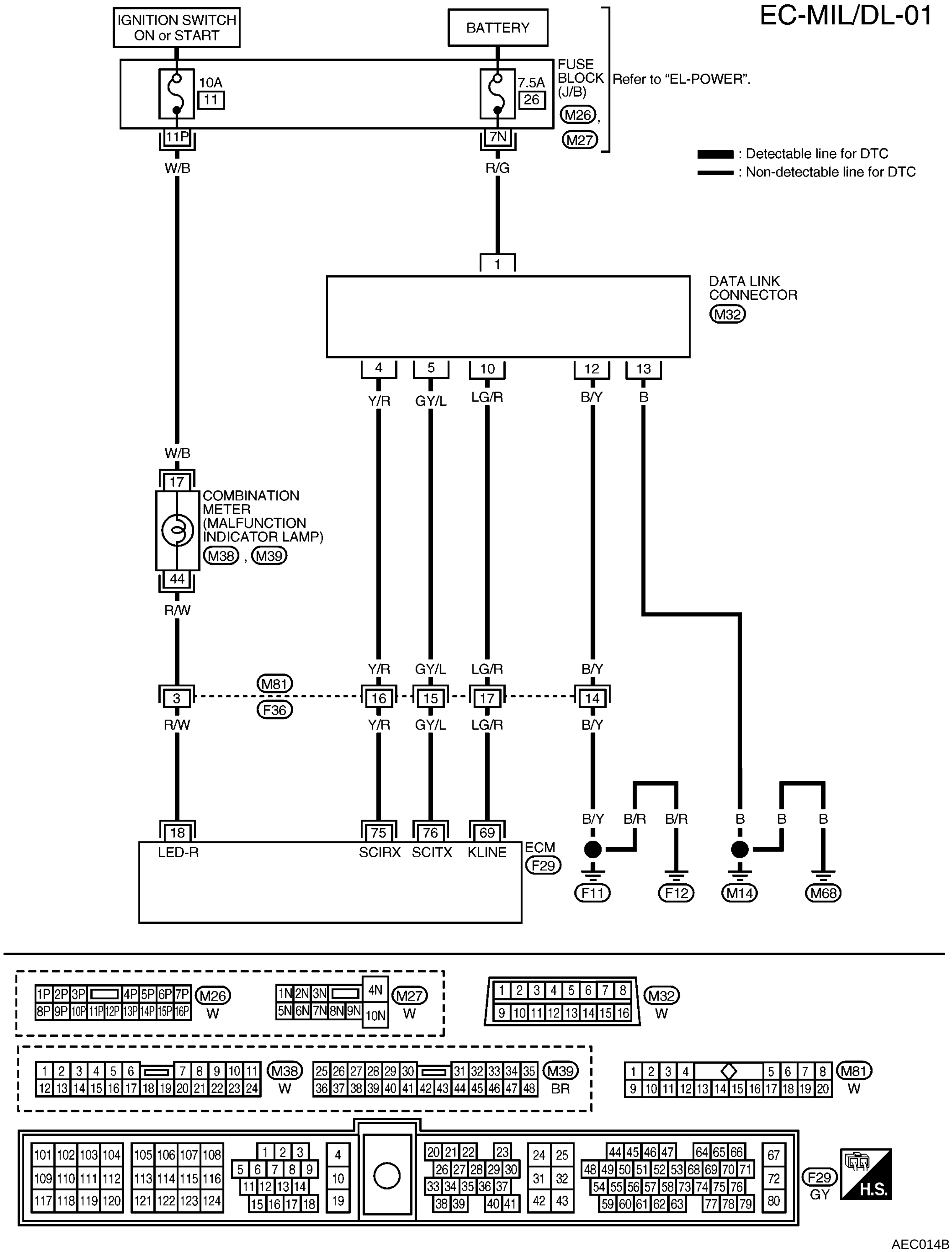
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace IACV-FICD solenoid valve.

8	CHECK INTERMITTENT INCIDENT	
Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-128.		
	▶	**INSPECTION END**

Wiring Diagram

NGEC0466



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)	4.81	7.9 - 9.7
50 (122)	2.82	0.57 - 0.70
100 (212)	0.8	0.08 - 0.10

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	10 - 14

Resistor

NGEC0476

Resistance [at 25°C (77°F)] Ω	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

Front Heated Oxygen Sensor Heater

NGEC0478

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

Calculated Load Value

NGEC0479

	Calculated load value % (Using CONSULT 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

Rear Heated Oxygen Sensor Heater

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*6		Reference page
	ECM*1	CONSULT-II GST*2	
Unable to access ECM	—	—	EC-687
ABSL PRES SEN/CIRC	0803	P0105	EC-722
AIR TEMP SEN/CIRC	0401	P0110	EC-734
A/T 1ST GR FNCTN	1103	P0731	***AT-120***
A/T 2ND GR FNCTN	1104	P0732	***AT-126***
A/T 3RD GR FNCTN	1105	P0733	***AT-132***
A/T 4TH GR FNCTN	1106	P0734	***AT-138***
A/T COMM LINE	—	P0600	EC-1006
A/T DIAG COMM LINE	0804	P1605	EC-1121
A/T TCC S/V FNCTN	1107	P0744	***AT-152***
ATF TEMP SEN/CIRC	1208	P0710	***AT-105***
CAM POS SEN/CIRC	0101	P0340	EC-912
CLOSED LOOP-B1	0307	P1148	EC-1026
CLOSED LOOP-B2	0308	P1168	EC-1026
CLOSED TP SW/CIRC	0203	P0510	EC-998
COOLANT T SEN/CIRC*3	0103	P0115	EC-739
*COOLANT T SEN/CIRC	0908	P0125	EC-758
CPS/CIRC (OBD) COG	0905	P1336	EC-1036
CPS/CIRCUIT (OBD)	0802	P0335	EC-906
CYL 1 MISFIRE	0608	P0301	EC-893
CYL 2 MISFIRE	0607	P0302	EC-893
CYL 3 MISFIRE	0606	P0303	EC-893
CYL 4 MISFIRE	0605	P0304	EC-893
CYL 5 MISFIRE	0604	P0305	EC-893
CYL 6 MISFIRE	0603	P0306	EC-893
ECM	0301	P0605	EC-1011
EGR SYSTEM (If so equipped)	0302	P0400	EC-919
EGR SYSTEM (If so equipped)	0514	P1402	EC-1055
EGR TEMP SEN/CIRC (If so equipped)	0305	P1401	EC-1048
EGRC SOLENOID/V (If so equipped)	1005	P1400	EC-1043
EGRC-BPT VALVE (If so equipped)	0306	P0402	EC-933

Items (CONSULT-II screen terms)	DTC*6		Reference page
	ECM*1	CONSULT-II GST*2	
ENGINE SPEED SIG	1207	P0725	***AT-116***
ENG OVER TEMP	0211	P0217	EC-880
EVAP GROSS LEAK	0715	P0455	EC-974
EVAP PURG FLOW/MON	0111	P1447	EC-1086
EVAP SYS PRES SEN	0704	P0450	EC-963
EVAP SMALL LEAK	0705	P0440	EC-947
EVAP SMALL LEAK	0213	P1440	EC-1065
FR O2 SE HEATER-B1	0901	P0135	EC-809
FR O2 SE HEATER-B2	1001	P0155	EC-809
FRONT O2 SENSOR-B1	0503	P0130	EC-763
FRONT O2 SENSOR-B1	0415	P0131	EC-772
FRONT O2 SENSOR-B1	0414	P0132	EC-780
FRONT O2 SENSOR-B1	0413	P0133	EC-788
FRONT O2 SENSOR-B1	0509	P0134	EC-801
FRONT O2 SENSOR-B2	0303	P0150	EC-763
FRONT O2 SENSOR-B2	0411	P0151	EC-772
FRONT O2 SENSOR-B2	0410	P0152	EC-780
FRONT O2 SENSOR-B2	0409	P0153	EC-788
FRONT O2 SENSOR-B2	0412	P0154	EC-801
FUEL SYS LEAN/BK1	0115	P0171	EC-860
FUEL SYS LEAN/BK2	0210	P0174	EC-860
FUEL SYS RICH/BK1	0114	P0172	EC-868
FUEL SYS RICH/BK2	0209	P0175	EC-868
FUEL TEMP SEN/CIRC	0402	P0180	EC-875
IACV/AAC VLV/CIRC	0205	P0505	EC-992
IGN SIGNAL-PRIMARY	0201	P1320	EC-1028
KNOCK SENSOR	0304	P0325	EC-902
L/PRES SOL/CIRC	1205	P0745	***AT-160***
MAP/BARO SW SOL/CIR	1302	P1105	EC-1013
MAF SEN/CIRCUIT*3	0102	P0100	EC-713
MULTI CYL MISFIRE	0701	P0300	EC-893
NO SELF DIAGNOSTIC FAILURE INDICATED	**0505**	**P0000**	**—**
NO SELF DIAGNOSTIC FAILURE INDICATED	Flashing*5	No DTC	EC-643
OVER HEAT	0208	—	EC-1132
O/R CLTCH S/CIRC	1203	P1760	***AT-184***
P-N POS SW/CIRCUIT	1003	P0705	EC-1124

Items (CONSULT-II screen terms)	DTC*6		Reference page
	ECM*1	CONSULT-II GST*2	
PNP SW/CIRC	1101	P0705	***AT-99***
PURG VOLUME CONT/V	1008	P0443	EC-950
PURG VOLUME CONT/V	0214	P1444	EC-1067
REAR O2 SENSOR-B1	0511	P0137	EC-815
REAR O2 SENSOR-B1	0510	P0138	EC-825
REAR O2 SENSOR-B1	0707	P0139	EC-835
REAR O2 SENSOR-B1	0512	P0140	EC-845
REAR O2 SENSOR-B2	0314	P0157	EC-815
REAR O2 SENSOR-B2	0313	P0158	EC-825
REAR O2 SENSOR-B2	0708	P0159	EC-835
REAR O2 SENSOR-B2	0315	P0160	EC-845
RR O2 SE HEATER-B1	0902	P0141	EC-853
RR O2 SE HEATER-B2	1002	P0161	EC-853
SFT SOL A/CIRC*3	1108	P0750	***AT-165***
SFT SOL B/CIRC*3	1201	P0755	***AT-170***
TCC SOLENOID/CIRC	1204	P0740	***AT-147***
TP SEN/CIRC A/T*3	1206	P1705	***AT-175***
TRTL POS SEN/CIRC*3	0403	P0120	EC-744
TW CATALYST SYS-B1	0702	P0420	EC-941
TW CATALYST SYS-B2	0703	P0430	EC-941
VC CUT/V BYPASS/V	0311	P1491	EC-1112
VC/V BYPASS/V	0801	P1490	EC-1106
VEH SPEED SEN/CIRC*4	0104	P0500	EC-988
VEH SPD SEN/CIRC*4	1102	P0720	***AT-111***
VENT CONTROL VALVE	0903	P0446	EC-957
VENT CONTROL VALVE	0215	P1446	EC-1079
VENT CONTROL VALVE	0309	P1448	EC-1098

*1: In Diagnostic Test Mode II (Self-diagnostic results). These numbers are controlled by NISSAN.
*2: These numbers are prescribed by SAE J2012.
*3: When the fail-safe operation occurs, the MIL illuminates.
*4: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.
*5: While engine is running.
*6: 1st trip DTC No. is the same as DTC No.

NOTE:
Regarding D22 models, "-B1" and "BK1" indicate right bank and "-B2" and "BK2" indicate left bank.

P NO. INDEX FOR DTC

=NGEC0522S02

DTC*6		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*1		
—	—	Unable to access ECM	EC-687
No DTC	Flashing*5	NO SELF DIAGNOSTIC FAILURE INDICATED	EC-643
P0000	**0505**	**NO SELF DIAGNOSTIC FAILURE INDICATED**	**—**
P0100	0102	MAF SEN/CIRCUIT*3	EC-713
P0105	0803	ABSL PRES SEN/CIRC	EC-722
P0110	0401	AIR TEMP SEN/CIRC	EC-734
P0115	0103	COOLANT T SEN/CIRC*3	EC-739
P0120	0403	THRTL POS SEN/CIRC*3	EC-744
P0125	0908	*COOLANT T SEN/CIRC	EC-758
P0130	0503	FRONT O2 SENSOR-B1	EC-763
P0131	0415	FRONT O2 SENSOR-B1	EC-772
P0132	0414	FRONT O2 SENSOR-B1	EC-780
P0133	0413	FRONT O2 SENSOR-B1	EC-788
P0134	0509	FRONT O2 SENSOR-B1	EC-801
P0135	0901	FR O2 SE HEATER-B1	EC-809
P0137	0511	REAR O2 SENSOR-B1	EC-815
P0138	0510	REAR O2 SENSOR-B1	EC-825
P0139	0707	REAR O2 SENSOR-B1	EC-835
P0140	0512	REAR O2 SENSOR-B1	EC-845
P0141	0902	RR O2 SE HEATER-B1	EC-853
P0150	0303	FRONT O2 SENSOR-B2	EC-763
P0151	0411	FRONT O2 SENSOR-B2	EC-772
P0152	0410	FRONT O2 SENSOR-B2	EC-780
P0153	0409	FRONT O2 SENSOR-B2	EC-788
P0154	0412	FRONT O2 SENSOR-B2	EC-801
P0155	1001	FR O2 SE HEATER-B2	EC-809
P0157	0314	REAR O2 SENSOR-B2	EC-815
P0158	0313	REAR O2 SENSOR-B2	EC-825
P0159	0708	REAR O2 SENSOR-B2	EC-835
P0160	0315	REAR O2 SENSOR-B2	EC-845
P0161	1002	RR O2 SE HEATER-B2	EC-853
P0171	0115	FUEL SYS LEAN/BK1	EC-860
P0172	0114	FUEL SYS RICH/BK1	EC-868
P0174	0210	FUEL SYS LEAN/BK2	EC-860
P0175	0209	FUEL SYS RICH/BK2	EC-868

DTC*6		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*1		
P0180	0402	FUEL TEMP SEN/CIRC	EC-875
P0217	0211	ENG OVER TEMP	EC-880
P0300	0701	MULTI CYL MISFIRE	EC-893
P0301	0608	CYL 1 MISFIRE	EC-893
P0302	0607	CYL 2 MISFIRE	EC-893
P0303	0606	CYL 3 MISFIRE	EC-893
P0304	0605	CYL 4 MISFIRE	EC-893
P0305	0604	CYL 5 MISFIRE	EC-893
P0306	0603	CYL 6 MISFIRE	EC-893
P0325	0304	KNOCK SENSOR	EC-902
P0335	0802	CPS/CIRCUIT (OBD)	EC-906
P0340	0101	CAM POS SEN/CIRC	EC-912
P0400	0302	EGR SYSTEM (If so equipped)	EC-919
P0402	0306	EGRC-BPT VALVE (If so equipped)	EC-933
P0420	0702	TW CATALYST SYS-B1	EC-941
P0430	0703	TW CATALYST SYS-B2	EC-941
P0440	0705	EVAP SMALL LEAK	EC-947
P0443	1008	PURG VOLUME CONT/V	EC-950
P0455	0715	EVAP GROSS LEAK	EC-974
P0446	0903	VENT CONTROL VALVE	EC-957
P0450	0704	EVAP SYS PRES SEN	EC-963
P0455	0715	EVAP GROSS LEAK	EC-974
P0500	0104	VEH SPEED SEN/CIRC*4	EC-988
P0505	0205	IACV/AAC VLV/CIRC	EC-992
P0510	0203	CLOSED TP SW/CIRC	EC-998
P0600	—	A/T COMM LINE	EC-1006
P0605	0301	ECM	EC-1011
P0705	1101	PNP SW/CIRC	***AT-99***
P0710	1208	ATF TEMP SEN/CIRC	***AT-105***
P0720	1102	VEH SPD SEN/CIRC A/T*4	***AT-111***
P0725	1207	ENGINE SPEED SIG	***AT-116***
P0731	1103	A/T 1ST GR FNCTN	***AT-120***
P0732	1104	A/T 2ND GR FNCTN	***AT-126***
P0733	1105	A/T 3RD GR FNCTN	***AT-132***
P0734	1106	A/T 4TH GR FNCTN	***AT-138***

DTC*6		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*1		
P0740	1204	TCC SOLENOID/CIRC	***AT-147***
P0744	1107	A/T TCC S/V FNCTN	***AT-152***
P0745	1205	L/PRESS SOL/CIRC	***AT-160***
P0750	1108	SFT SOL A/CIRC*3	***AT-165***
P0755	1201	SFT SOL B/CIRC*3	***AT-170***
P1105	1302	MAP/BARO SW SOL/CIR	EC-1013
P1148	0307	CLOSED LOOP-B1	EC-1026
P1168	0308	CLOSED LOOP-B2	EC-1026
P1320	0201	IGN SIGNAL-PRIMARY	EC-1028
P1336	0905	CPS/CIRC (OBD) COG	EC-1036
P1400	1005	EGRC SOLENOID/V (If so equipped)	EC-1043
P1401	0305	EGR TEMP SEN/CIRC (If so equipped)	EC-1048
P1402	0514	EGR SYSTEM (If so equipped)	EC-1055
P1440	0213	EVAP SMALL LEAK	EC-1065
P1444	0214	PURG VOLUME CONT/V	EC-1067
P1446	0215	VENT CONTROL VALVE	EC-1079
P1447	0111	EVAP PURG FLOW/MON	EC-1086
P1448	0309	VENT CONTROL VALVE	EC-1098
P1490	0801	VC/V BYPASS/V	EC-1106
P1491	0311	VC CUT/V BYPASS/V	EC-1112
P1605	0804	A/T DIAG COMM LINE	EC-1121
P1705	1206	TP SEN/CIRC A/T*3	***AT-175***
P1706	1003	P-N POS SW/CIRCUIT	EC-1124
P1760	1203	O/R CLUTCH SOL/CIRC	***AT-184***
—	0208	OVER HEAT	EC-1132

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*2: These numbers are prescribed by SAE J2012.
*3: When the fail-safe operation occurs, the MIL illuminates.
*4: The MIL illuminates when both the “Revolution sensor signal” and the “Vehicle speed sensor signal” meet the fail-safe condition at the same time.
*5: While engine is running.
*6: 1st trip DTC No. is the same as DTC No.

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

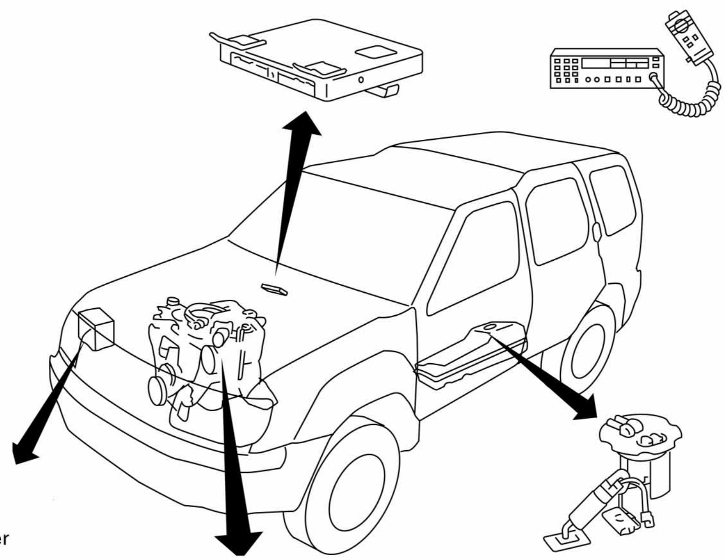
WIRELESS EQUIPMENT

- 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

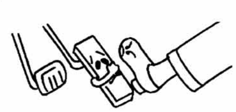
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.

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.)

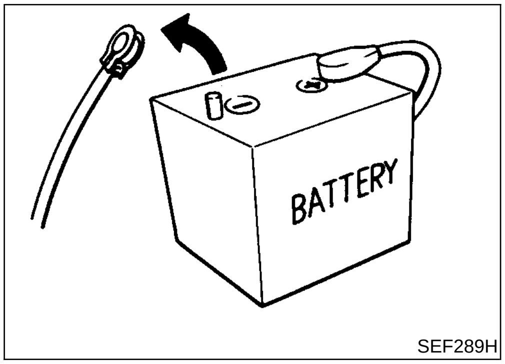
ECM HARNESS HANDLING

- 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

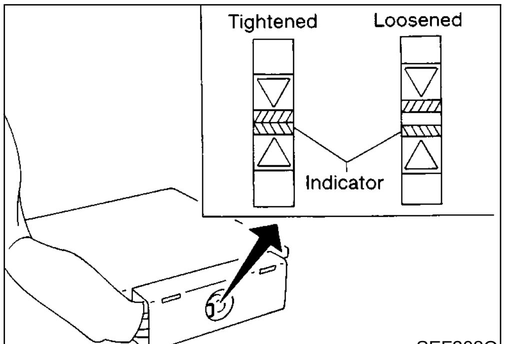
Precautions

NGEC0526



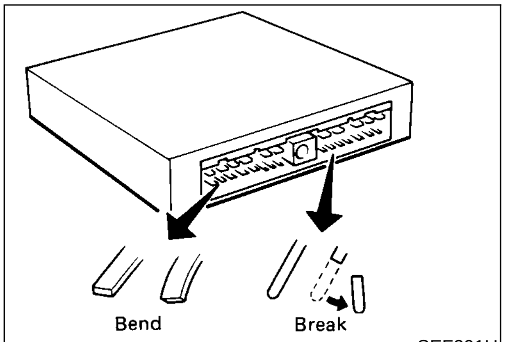
SEF289H

- **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.**



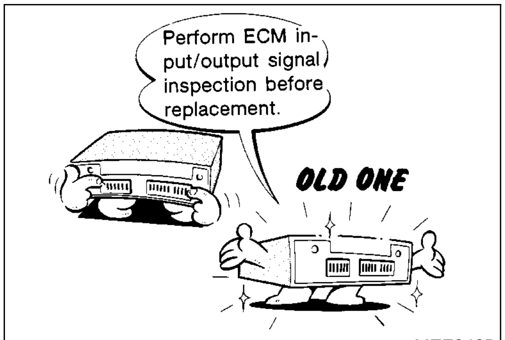
SEF308Q

- **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)



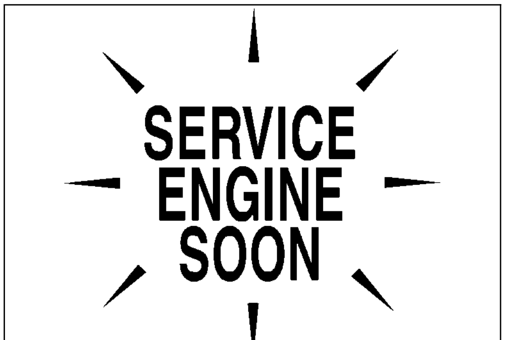
SEF291H

- **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.



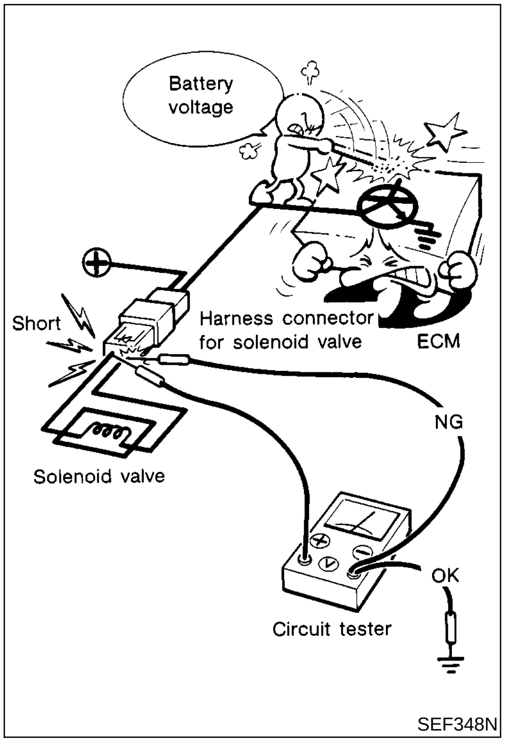
MEF040D

- **Before replacing ECM, perform "ECM Terminals and Reference Value" inspection and make sure ECM functions properly. Refer to EC-697.**

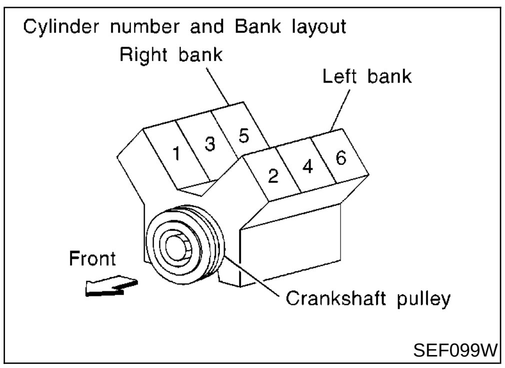


SEF217U

- **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.



- **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 followings:

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

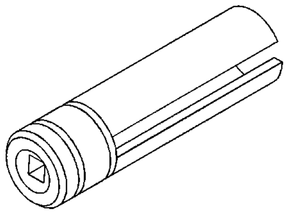
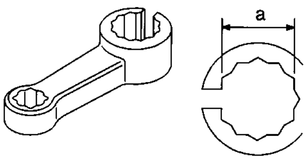
When you perform trouble diagnosis, refer to the followings:

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

Special Service Tools

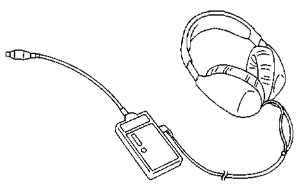
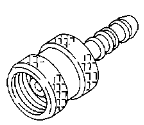
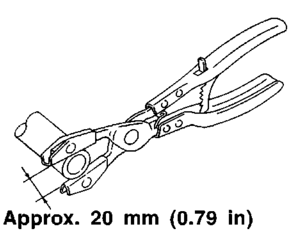
NGEC0528

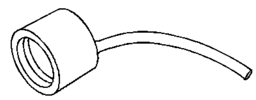
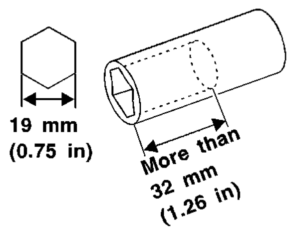
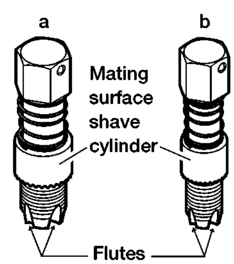
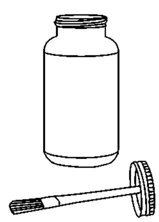
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

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)**

Commercial Service Tools

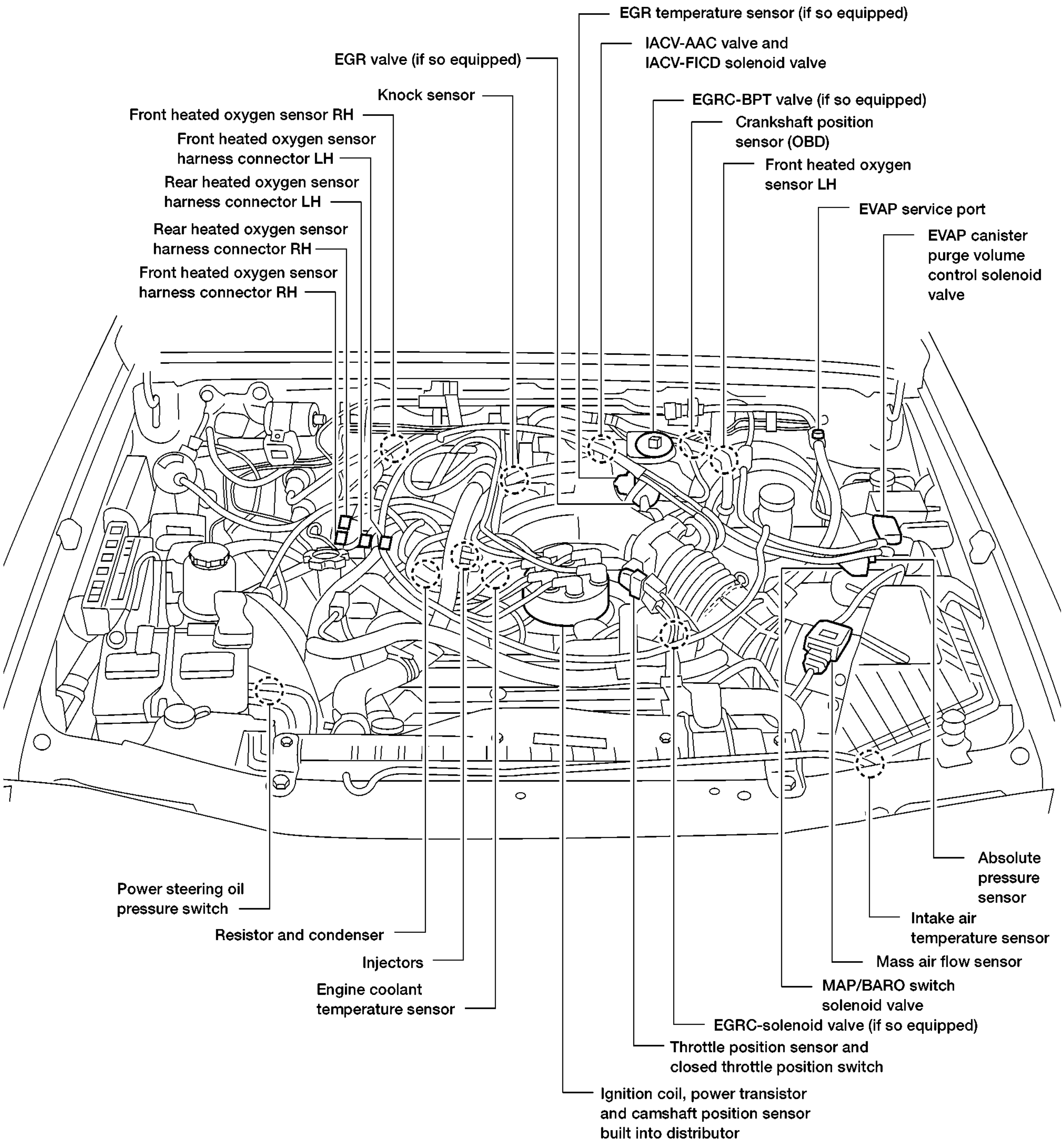
NGEC0529

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
Hose clipper	 NT720	Clamping the EVAP purge hose between the fuel tank and EVAP canister applied to DTC P1440 [EVAP control system (small leak-positive pressure)]

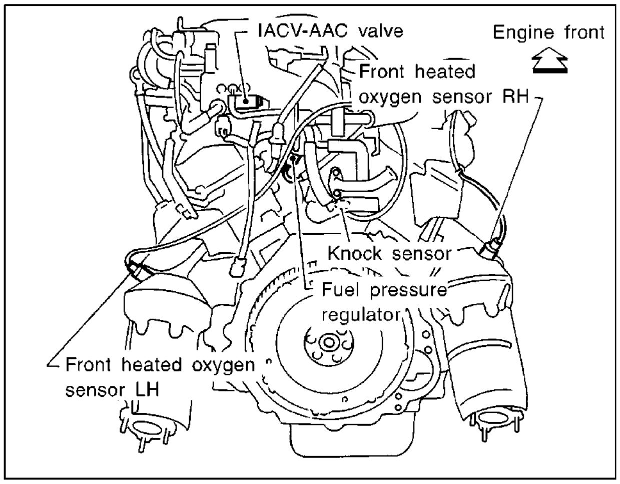
Tool name (Kent-Moore No.)	Description	
Fuel filler cap adapter	 NT653	Checking fuel tank vacuum relief valve opening pressure
Socket wrench	 NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner (J-43897-18) (J-43897-12)	 AEM488	Reconditioning the exhaust system 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.

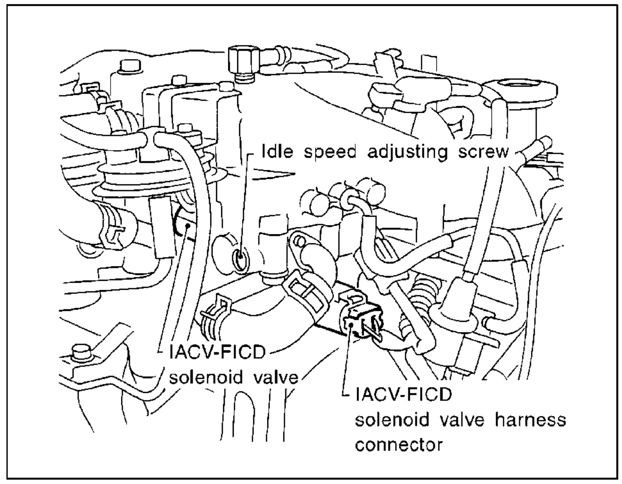
Engine Control Component Parts Location

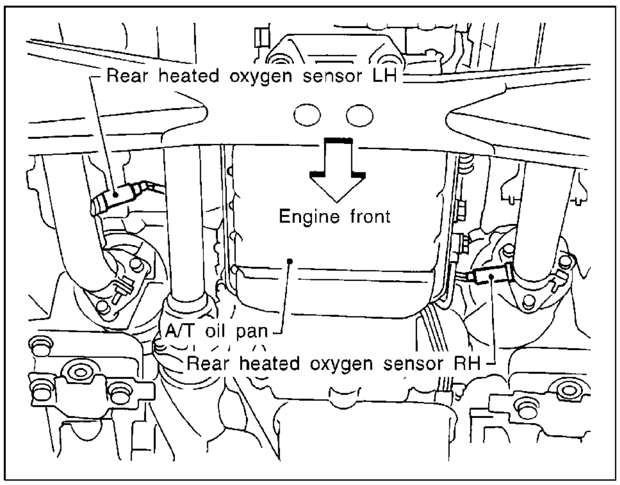
NGEC0530

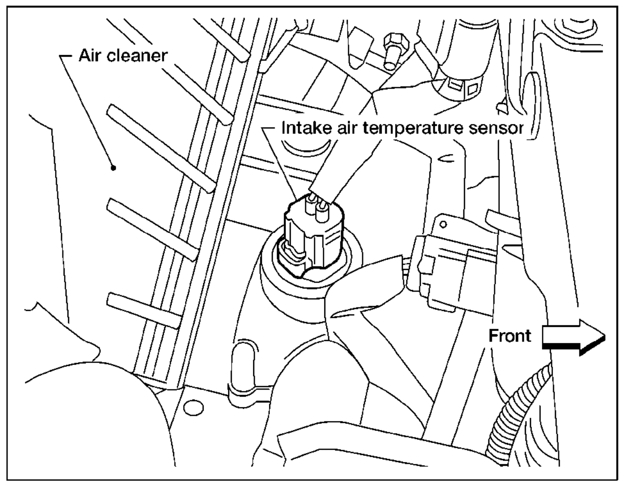


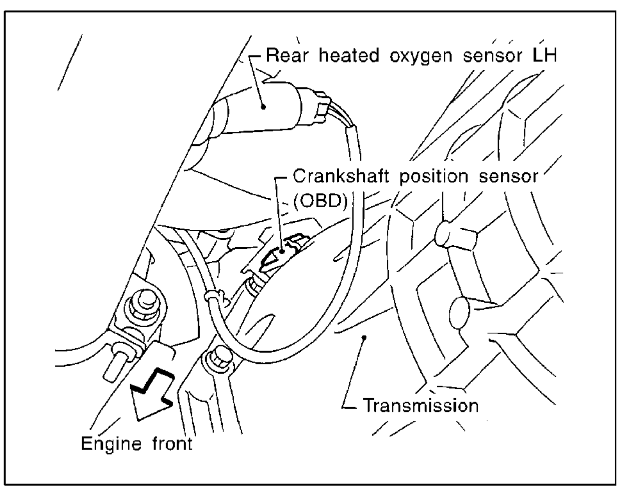
AEC065B

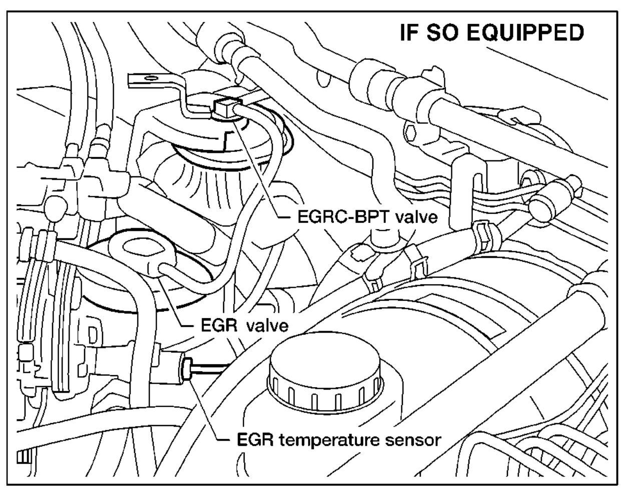

IACV-AAC valve
Engine front
Front heated oxygen sensor RH
Knock sensor
Fuel pressure regulator
Front heated oxygen sensor LH


Idle speed adjusting screw
IACV-FICD solenoid valve
IACV-FICD solenoid valve harness connector


Rear heated oxygen sensor LH
Engine front
A/T oil pan
Rear heated oxygen sensor RH


Air cleaner
Intake air temperature sensor
Front

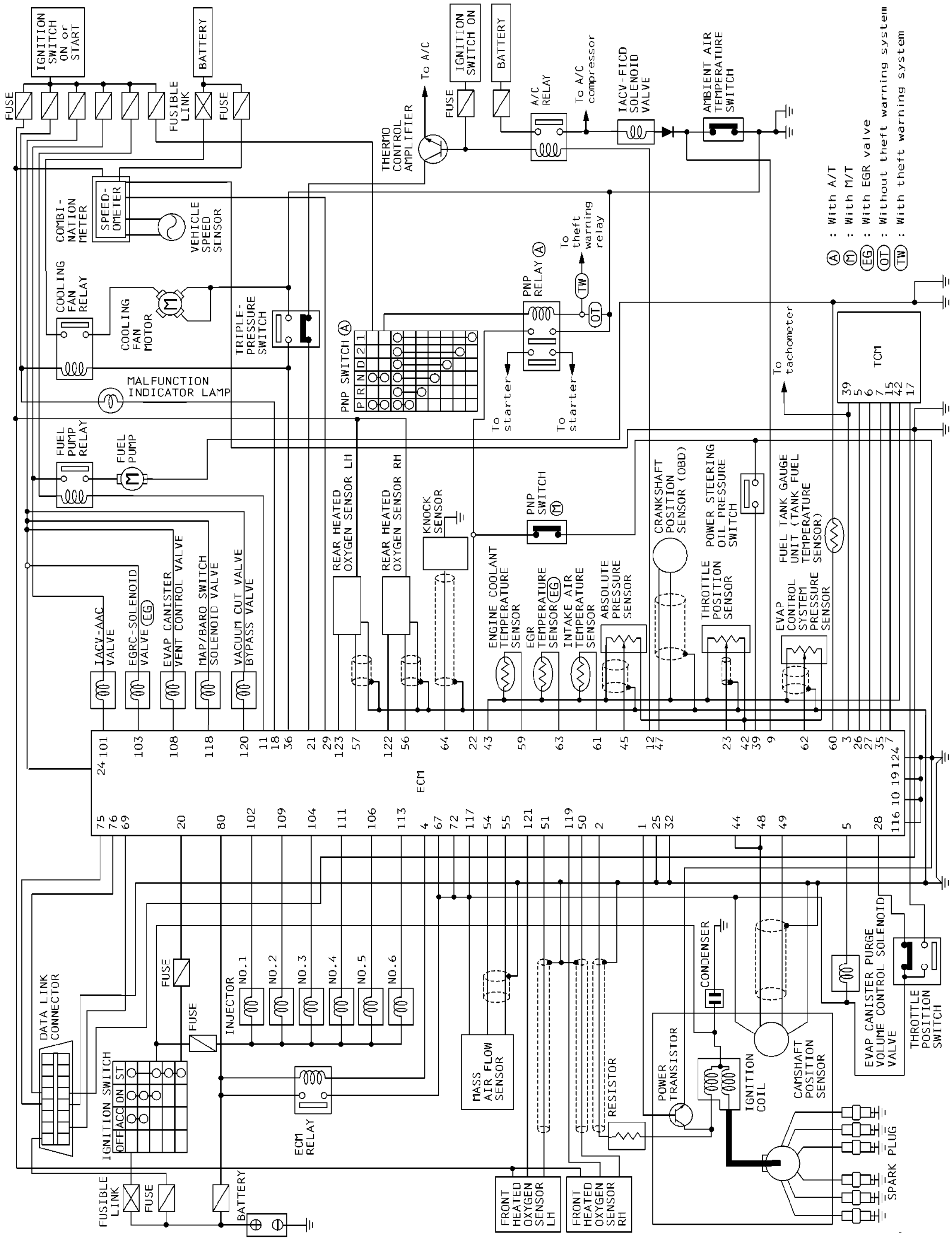

Rear heated oxygen sensor LH
Crankshaft position sensor (OBD)
Transmission
Engine front


IF SO EQUIPPED
EGRC-BPT valve
EGR valve
EGR temperature sensor

AEC066B

Circuit Diagram

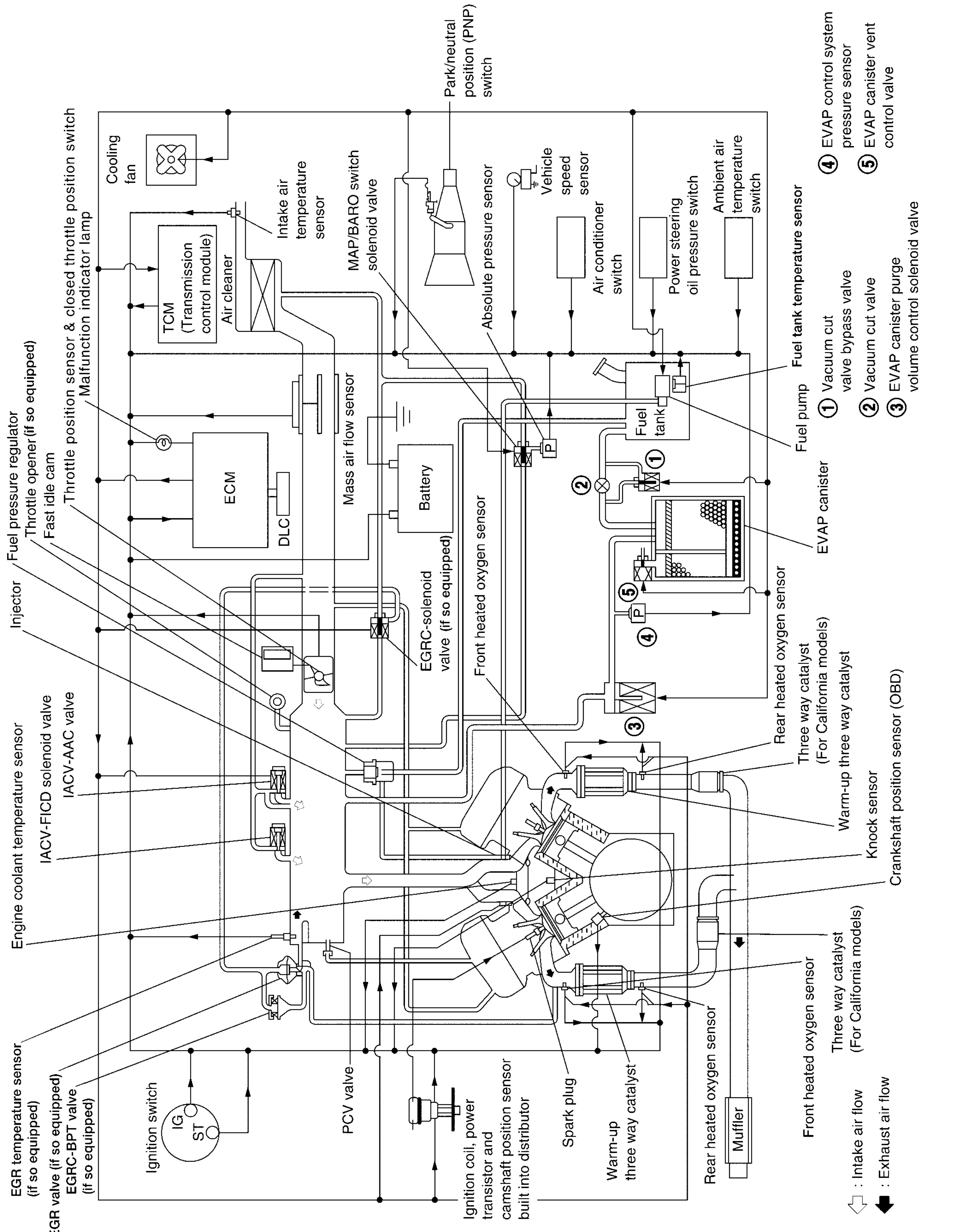
NGEC0531



AEC067B

System Diagram

NGEC0532



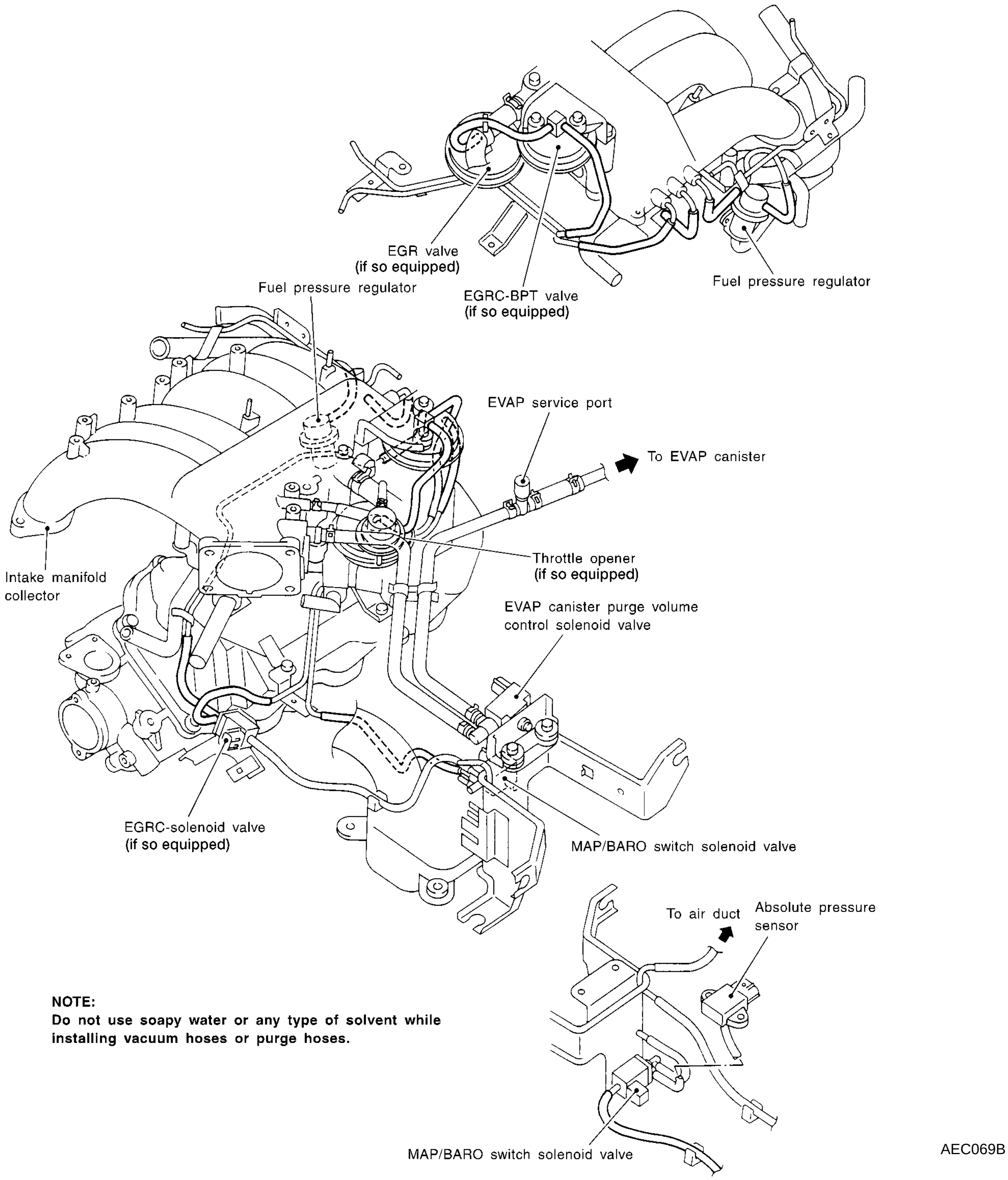
AEC068B

Vacuum Hose Drawing

NGEC0533

Refer to “System Diagram”, EC-596 for Vacuum Control System.

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX



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 • Front heated oxygen sensor • Ignition switch • Throttle position sensor • Closed throttle position switch *4 • Park/neutral position (PNP) switch • Air conditioner switch • Knock sensor • EGR temperature sensor *1 (If so equipped) • Intake air temperature sensor • Absolute pressure sensor • EVAP control system pressure sensor *1 • Battery voltage • Power steering oil pressure switch • Vehicle speed sensor • Fuel tank temperature sensor *1 • Crankshaft position sensor (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
	Front heated oxygen sensor monitor & on board diagnostic system	MIL (On the instrument panel)
	EGR control (If so equipped)	EGRC-solenoid valve (If so equipped)
	Front heated oxygen sensor heater control	Front heated oxygen sensor heater
	Rear heated oxygen sensor heater control	Rear heated oxygen sensor heater
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Air conditioning cut control	Air conditioner relay
	Cooling fan control	Cooling fan relays
	ON BOARD DIAGNOSIS for EVAP system	• EVAP canister vent control valve • Vacuum cut valve bypass valve • MAP/BARO switch solenoid valve

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

Multiport Fuel Injection (MFI) System

DESCRIPTION

NGEC0535

Input/Output Signal Chart

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		
Front heated oxygen sensor	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position Throttle valve idle position		
Park/neutral position (PNP) switch	Gear position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Air conditioner switch	Air conditioner operation		
Knock sensor	Engine knocking condition		
Battery	Battery voltage		
Absolute pressure sensor	Manifold absolute pressure Ambient air barometric pressure		
Power steering oil pressure switch	Power steering operation		
Rear heated oxygen sensor*	Density of oxygen in exhaust gas		

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

Basic Multiport Fuel Injection System

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>

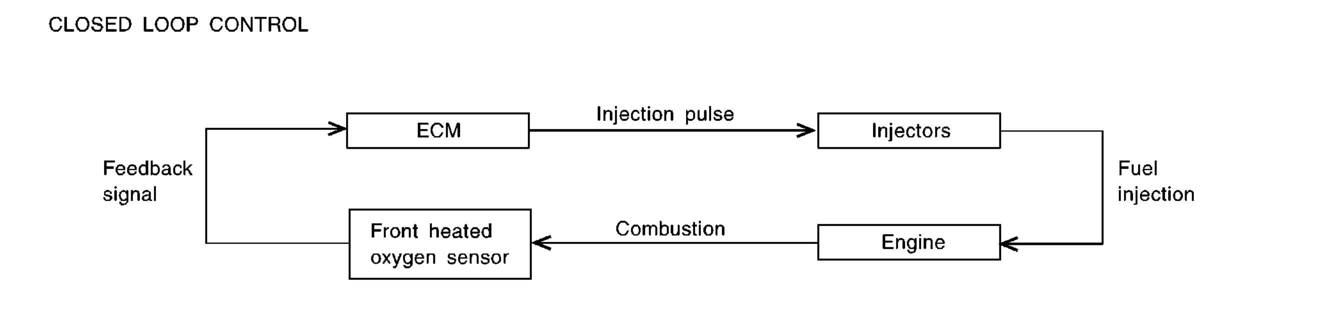
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from “N” to “D”
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

Mixture Ratio Feedback Control (Closed loop control)

NGEC0535S04



SEF932V

The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The warm-up three way catalyst can then better reduce CO, HC and NOx emissions. This system uses a front heated oxygen sensor in the exhaust manifold to monitor if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the front heated oxygen sensor, refer to EC-763. This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
Rear heated oxygen sensor is located downstream of the warm-up three way catalyst. Even if the switching characteristics of the front heated oxygen sensor shift, the air-fuel ratio is controlled to stoichiometric by the signal from the rear heated oxygen sensor.

Open Loop Control

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 front heated oxygen sensor or its circuit
- Insufficient activation of front heated oxygen sensor at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- When starting the engine

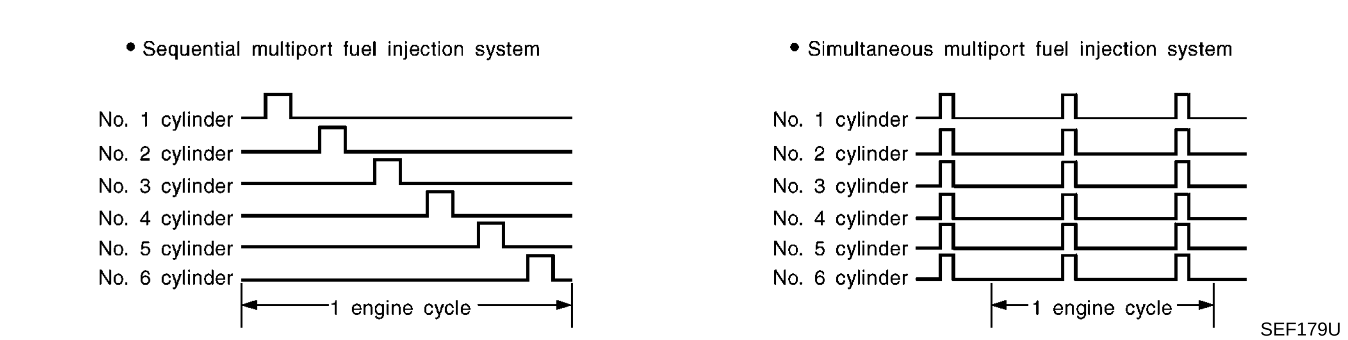
Mixture Ratio Self-learning Control

NGEC0535S06

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

Fuel Injection Timing

NGEC0535S07



SEF179U

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

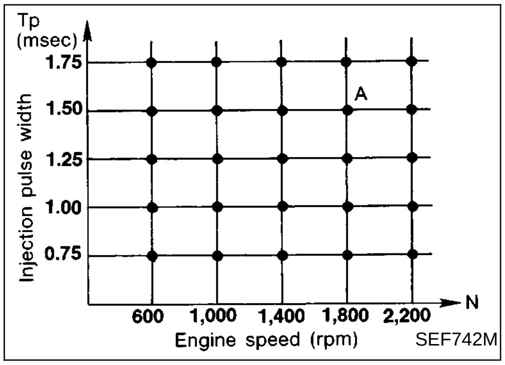
Input/Output Signal Chart

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		

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

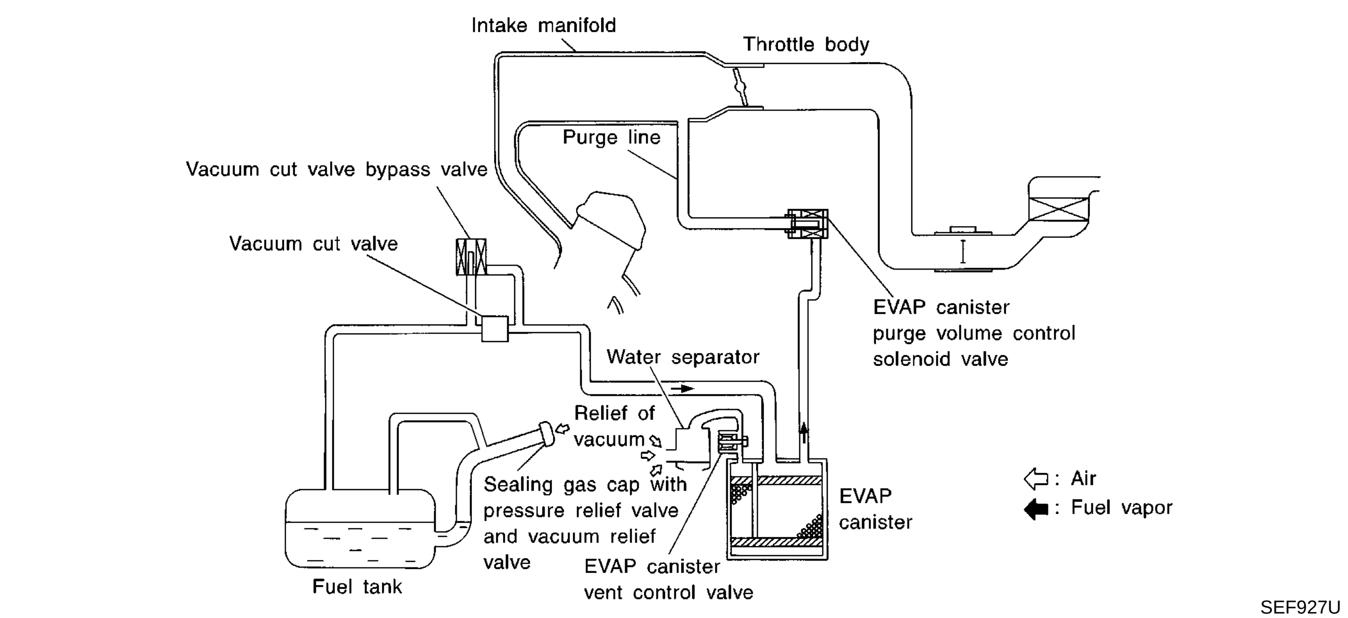
Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Fuel cut control	Injectors
Park/neutral position (PNP) switch	Neutral position		
Throttle position sensor	Throttle position		
Engine coolant temperature sensor	Engine coolant temperature		
Camshaft position sensor	Engine 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-599.

Evaporative Emission System

DESCRIPTION
NGEC0539



SEF927U

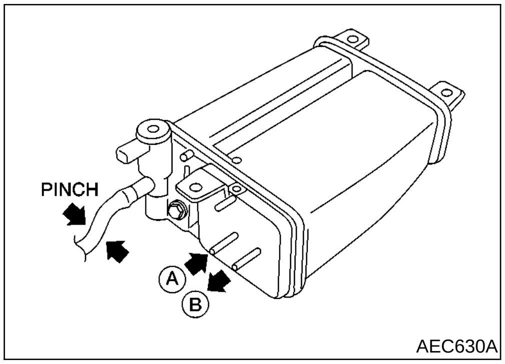
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon 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

NGEC0540

EVAP Canister

NGEC0540S01



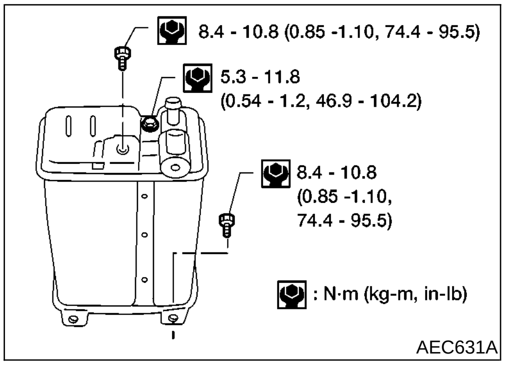
AEC630A

Check EVAP canister as follows:

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

Tightening Torque

NGEC0540S02



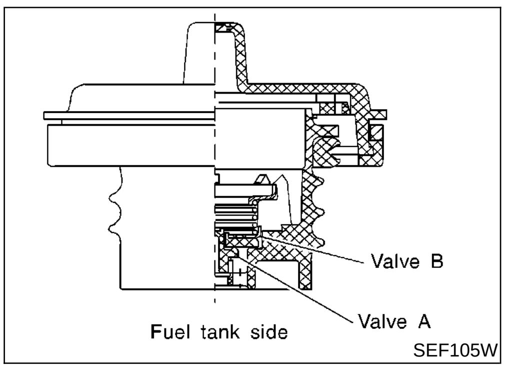
AEC631A

Tighten EVAP canister as shown in the figure.

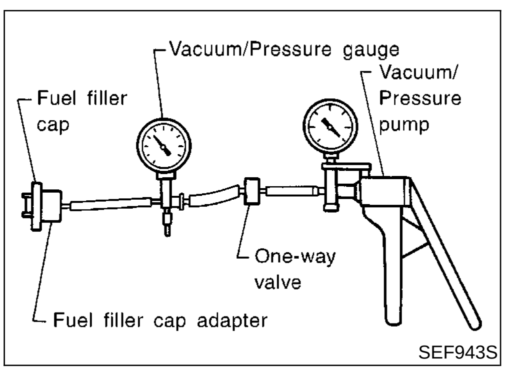
Make sure new O-ring is installed properly between EVAP canister and EVAP canister vent control valve.

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

NGEC0540S03



SEF105W



SEF943S

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

Pressure:

15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)

Vacuum:

−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)

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

CAUTION:

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

Vacuum Cut Valve and Vacuum Cut Valve Bypass Valve

NGEC0540S04

Refer to EC-1112.

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve

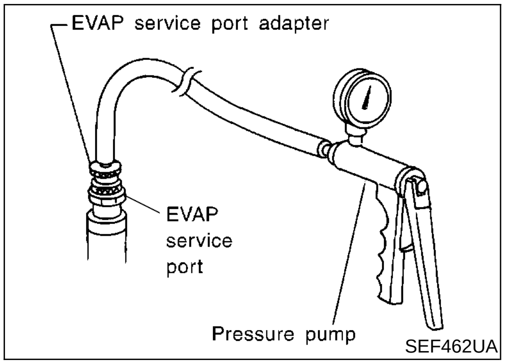
NGEC0540S05

Refer to EC-950.

Tank Fuel Temperature Sensor

NGEC0540S06

Refer to EC-875.

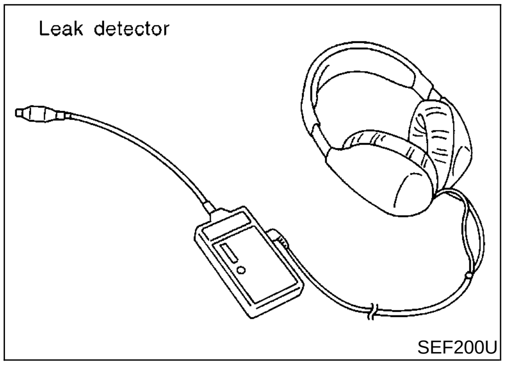


SEF462UA

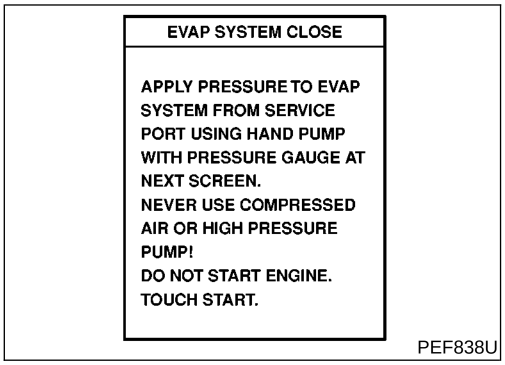
Evap Service Port

NGEC0540S07

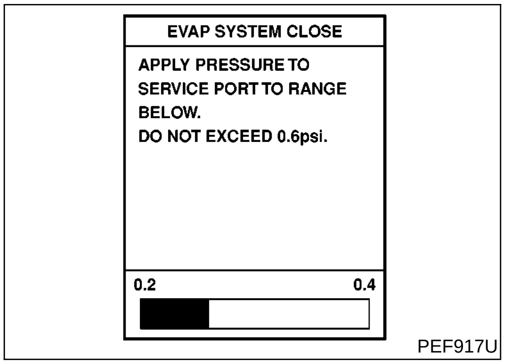
Positive pressure is delivered to the EVAP system through the EVAP service port. If fuel vapor leakage in the EVAP system occurs, use a leak detector to locate the leak.



SEF200U



PEF838U



PEF917U

How to Detect Fuel Vapor Leakage

NGEC0540S08

CAUTION:

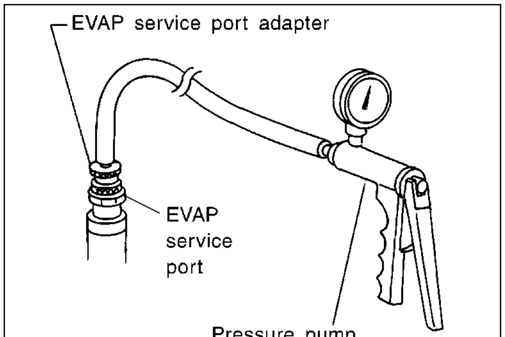
- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in EVAP system.**

NOTE:

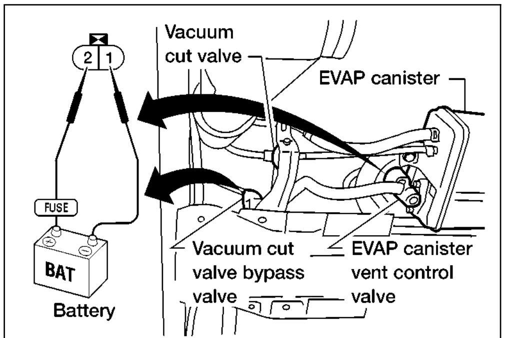
- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

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-607.



SEF462UA



AEC632A

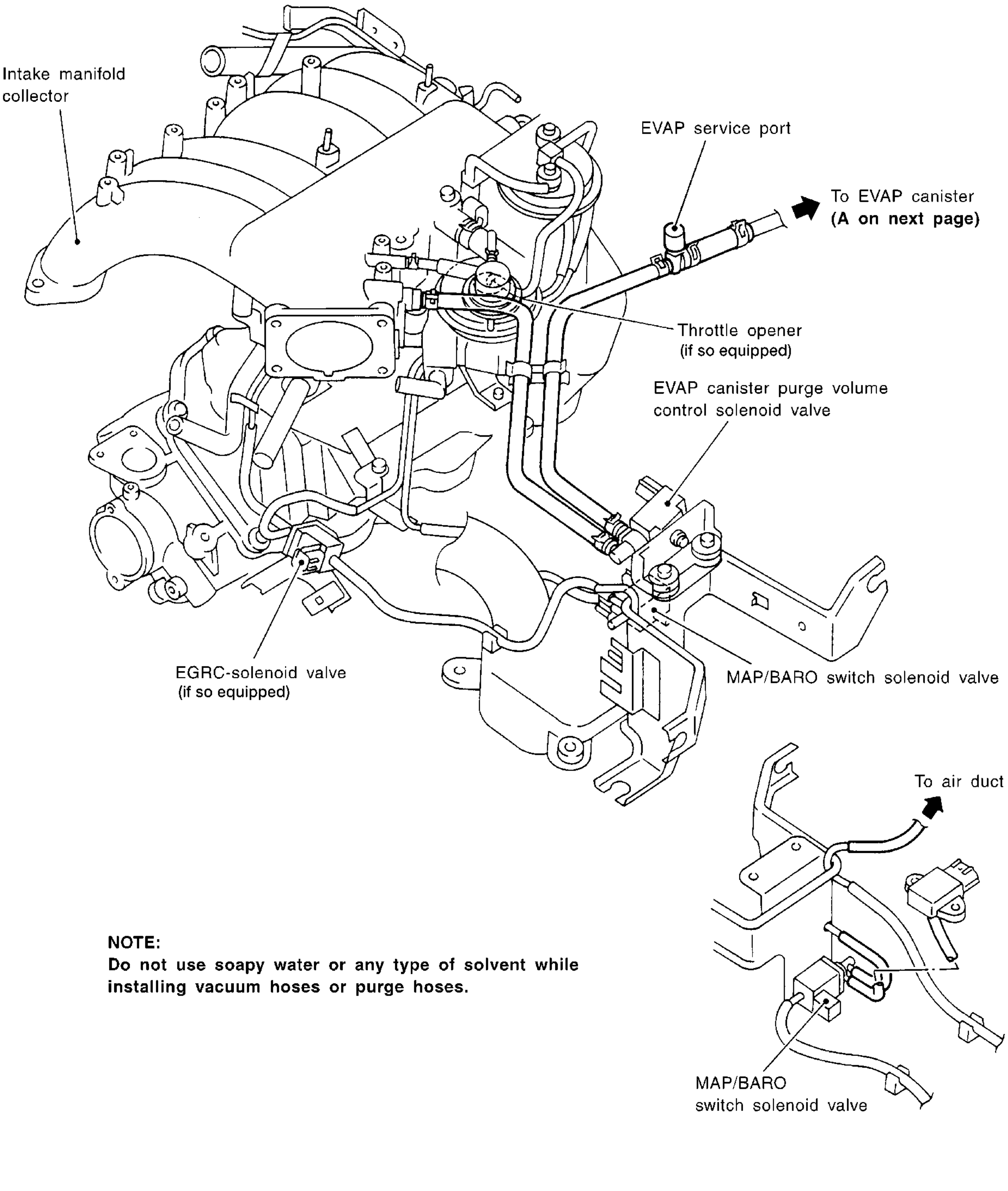
Without CONSULT-II

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 - 2.76 kPa (0.014 - 0.028 kg/cm^2, 0.2 - 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-607.

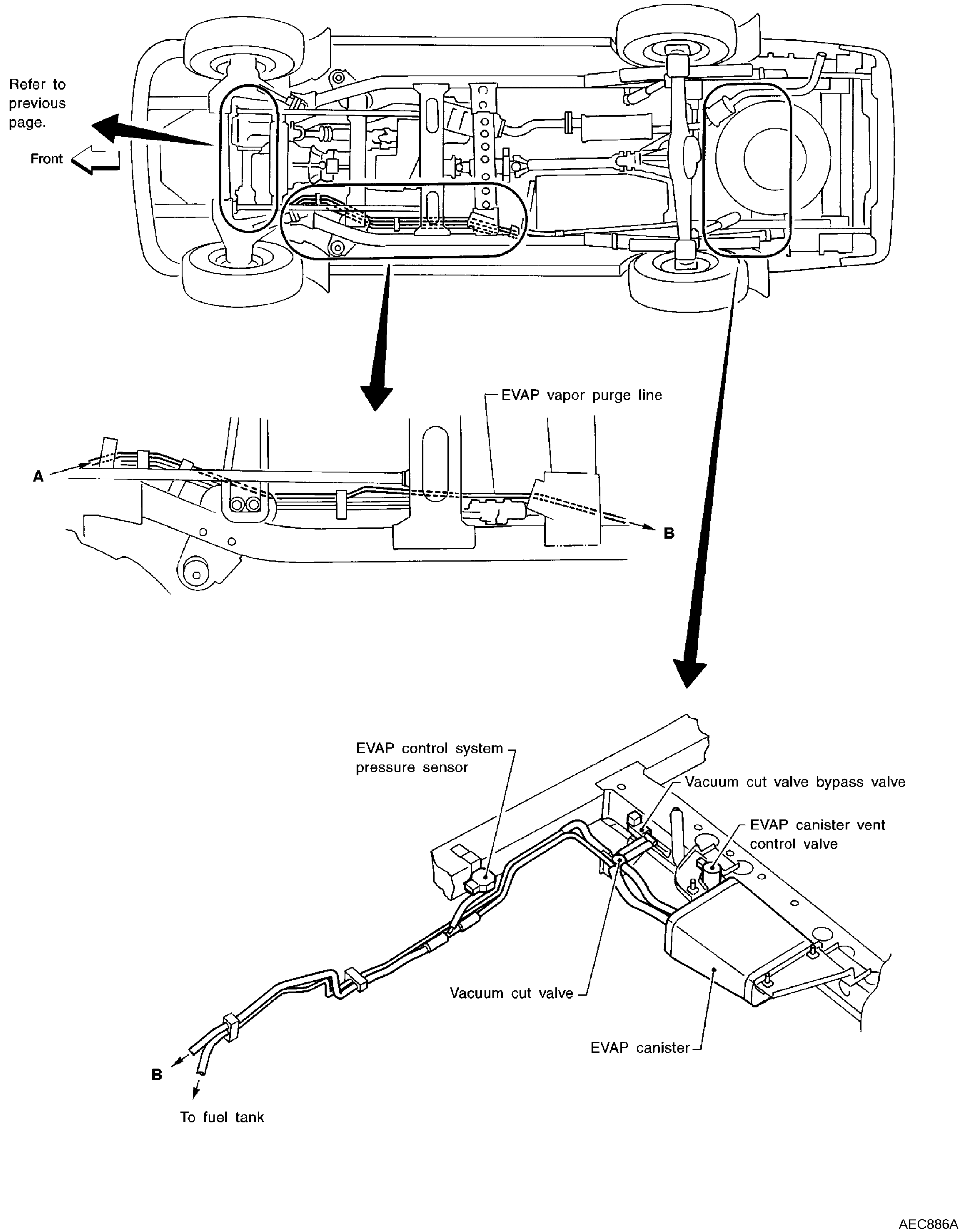
EVAPORATIVE EMISSION LINE DRAWING

NGEC0541

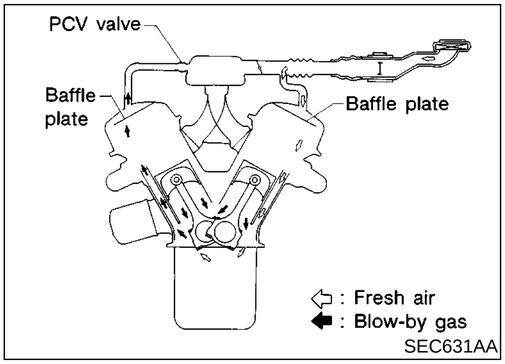
GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX



AEC070B


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

Positive Crankcase Ventilation

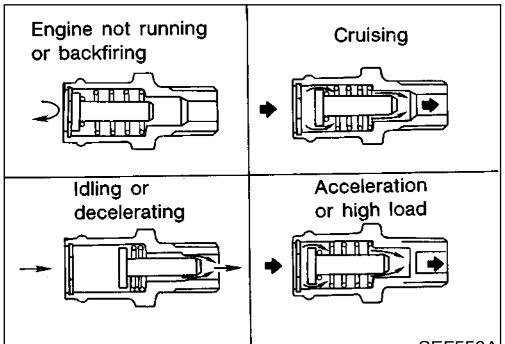


SEC631AA

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.



SEF559A

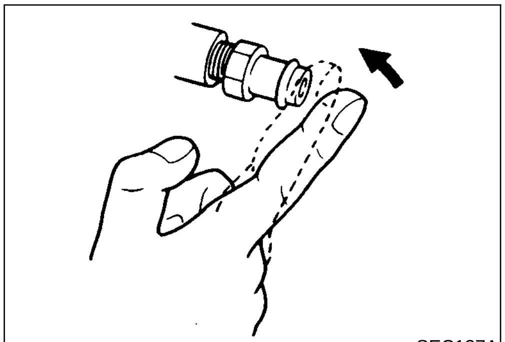
INSPECTION

NGEC0543

PCV (Positive Crankcase Ventilation) Valve

NGEC0543S01

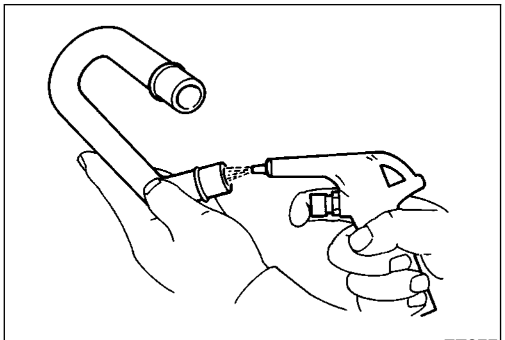
With engine running at idle, remove PCV valve ventilation hose from PCV valve; if the valve is working properly, a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.


SEC137A

PCV Valve Ventilation Hose

NGEC0543S02

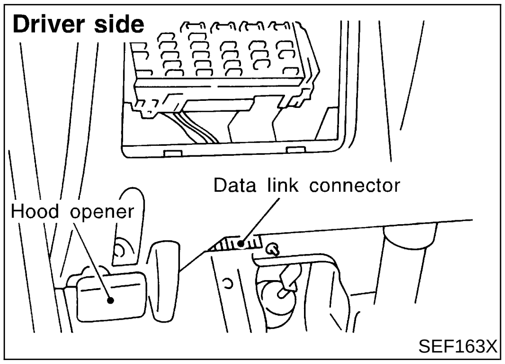
1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.


ET277

Fuel Pressure Release

NGEC0544

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

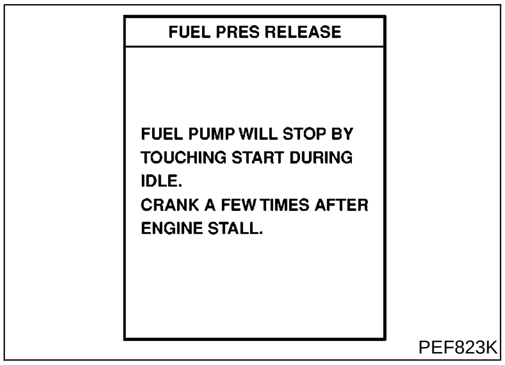


SEF163X

WITH CONSULT-II

NGEC0544S01

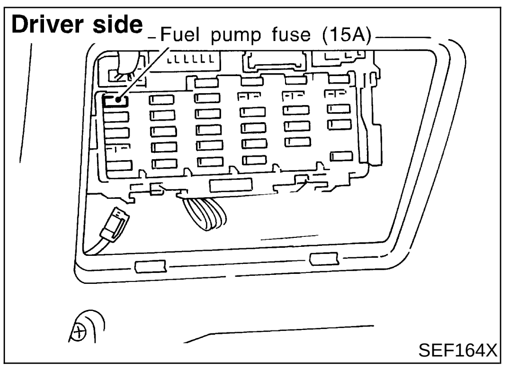
1. Turn ignition switch ON.
2. Perform “FUEL PRESSURE RELEASE” in “WORK SUPPORT” mode with CONSULT-II.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.



PEF823K

WITHOUT CONSULT-II

NGEC0544S02



SEF164X

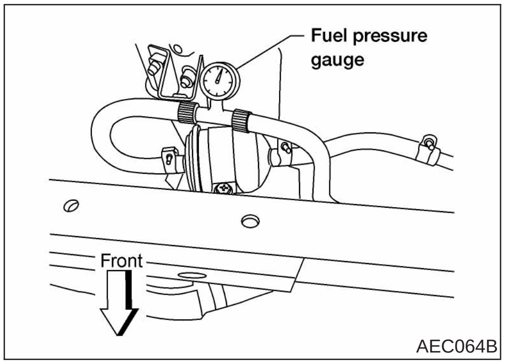
1. Remove fuel pump fuse located in fuse box.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.

Fuel Pressure Check

NGEC0545

- **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).



AEC064B

3. Install pressure gauge between fuel filter and fuel tube.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

At idling:

With vacuum hose connected

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

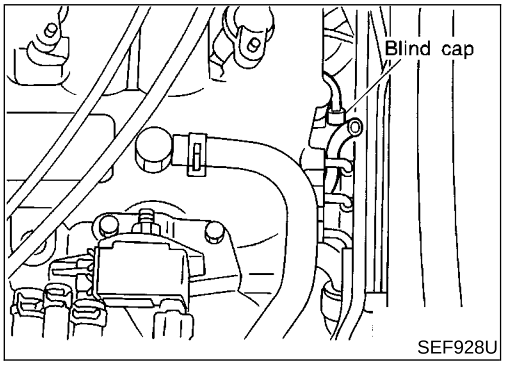
With vacuum hose disconnected

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

If results are unsatisfactory, perform Fuel Pressure Regulator Check.

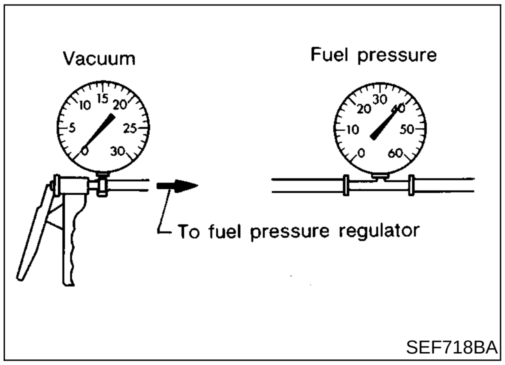
Fuel Pressure Regulator Check

NGEC0546



SEF928U

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

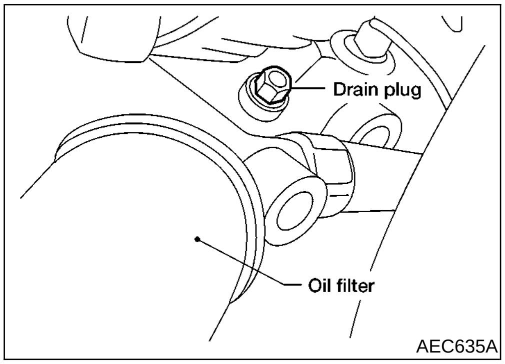
4. Start engine and read indication of fuel pressure gauge as vacuum is changed.

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

Injector

REMOVAL AND INSTALLATION

NGEC0547



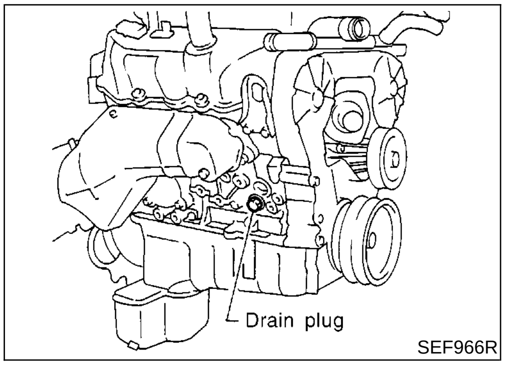
AEC635A

1. Release fuel pressure to zero. Refer to EC-610.
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
- EGRC-solenoid valve (If so equipped)
- EGR temperature sensor (If so equipped)
- Ground harness

b. PCV valve ventilation hoses

c. Vacuum hoses for
- Brake booster
- EGRC-solenoid valve (If so equipped)



SEF966R

- Fuel pressure regulator
- EGRC-BPT valve (If so equipped)

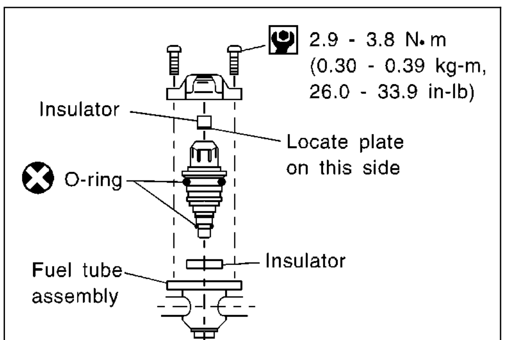
d. Air hoses from
- Air duct
- IACV-AAC valve

e. Water hoses for
- Throttle body
- Air relief plug

f. EVAP canister purge hose

g. EGR flare tube (If so equipped)

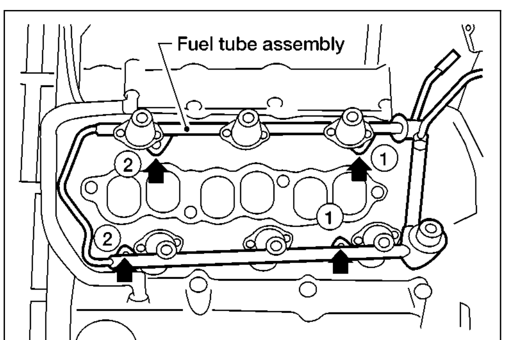
5. Remove injector fuel tube assembly.
   The following parts should be disconnected or removed.
- Vacuum hose for fuel pressure regulator
- Fuel feed and return hose
- All injectors harness connectors
- **Push injector tail piece.**
- **Do not pull on connector.**
- **Do not extract injector by pinching.**



SEF114W

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.



AEC035B

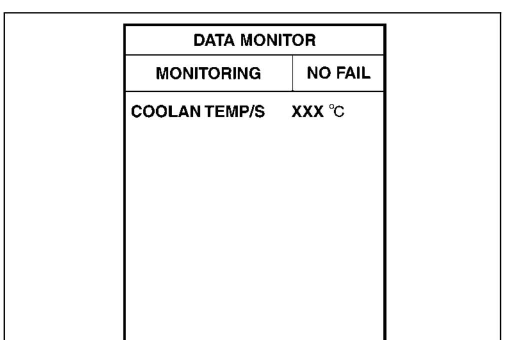
9. Install injectors with fuel tube assembly to intake manifold.
   Tighten in numerical order shown in the figure.

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.



PEF002P

Fast Idle Cam (FIC)

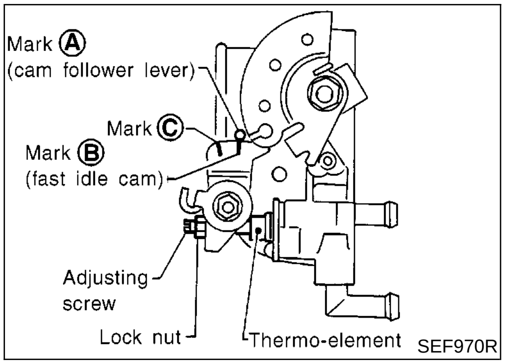
INSPECTION AND ADJUSTMENT

NGEC0548

With CONSULT-II

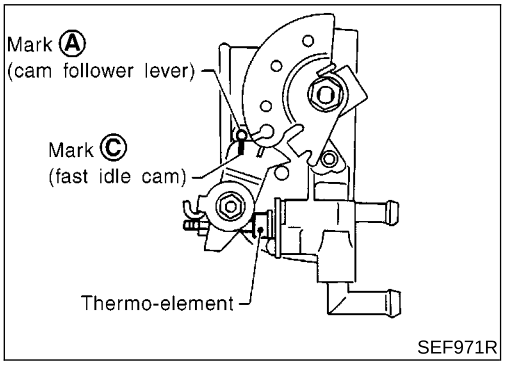
NGEC0548S01

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.



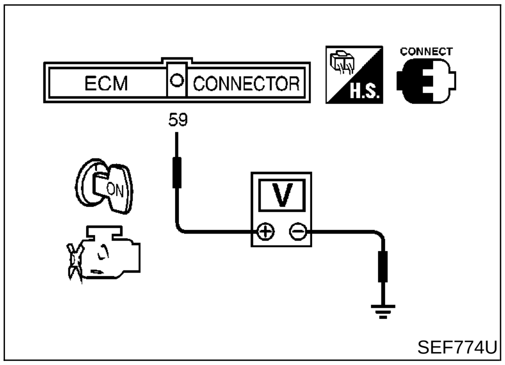
SEF970R

- 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)



SEF971R

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.

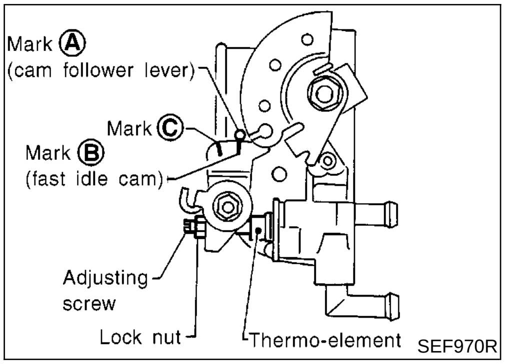


SEF774U

Without CONSULT-II

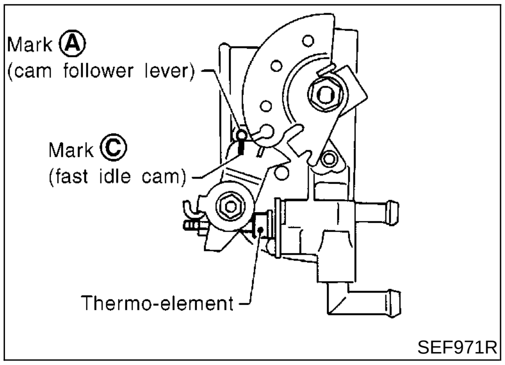
NGEC0548S02

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.



SEF970R

- 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)



SEF971R

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

PREPARATION

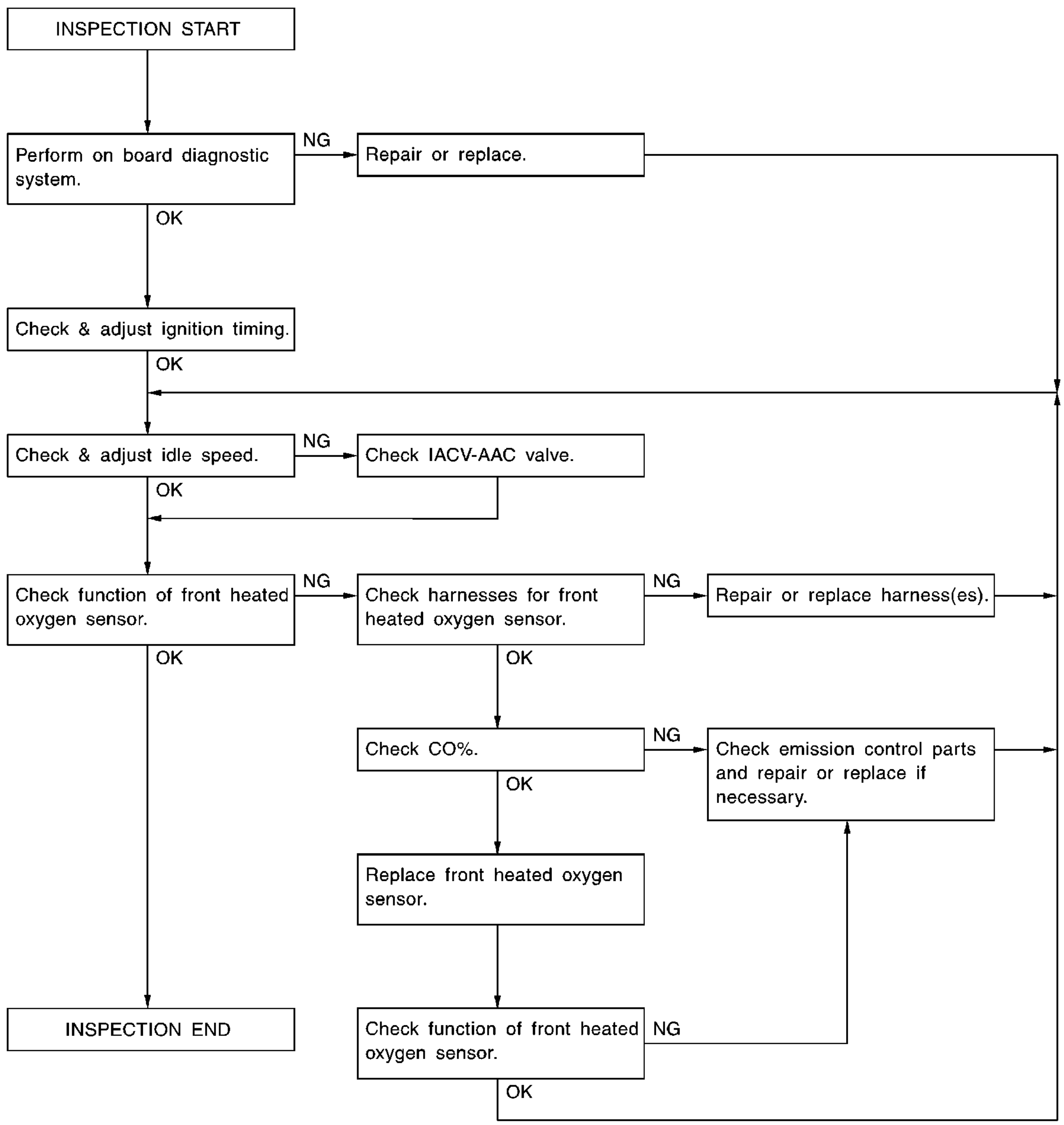
NGEC0549S01

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



SEF117W

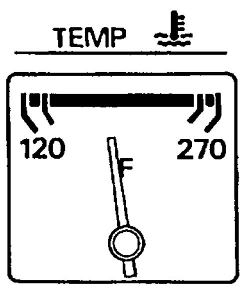
NOTE:
If a vehicle contains a part which is operating outside of design specifications with no MIL illumination, the part shall not be replaced prior to emission testing unless it is determined that the part has been tampered with or abused in such a way that the diagnostic system cannot reasonably be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

INSPECTION PROCEDURE

=NGEC0549S02

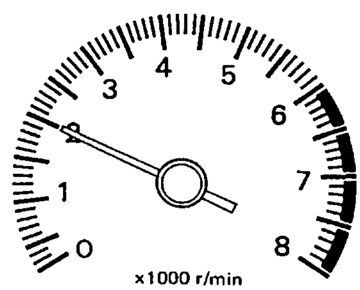
1	INSPECTION START

1. Visually check the following:
- Air cleaner clogging
- Hoses and ducts for leaks
- EGR valve operation (If so equipped)
- 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. Perform diagnostic test mode II (Self-diagnostic results). Refer to EC-644.

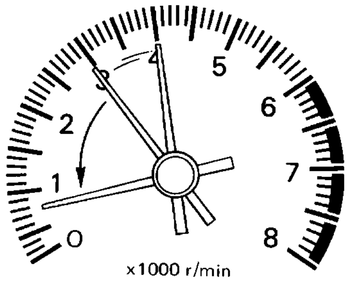
SEF217U

OK or NG

OK	▶	GO TO 2.
NG	▶	1. Repair or replace components as necessary. 2. GO TO 2.

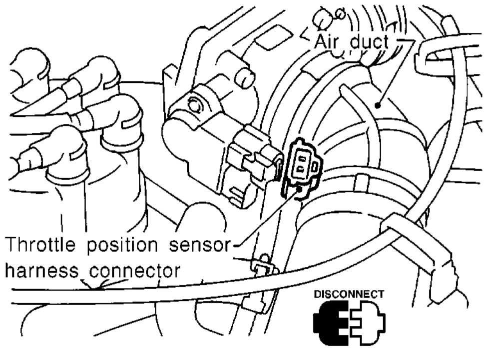
2	CHECK IGNITION TIMING

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.



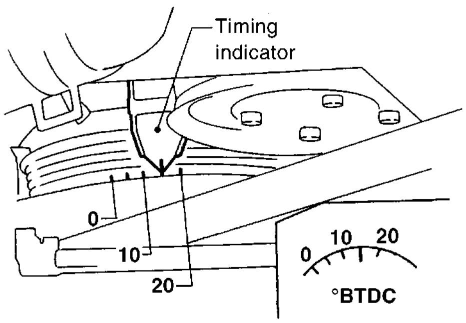
SEF978U

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



SEF975R

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



SEF371S

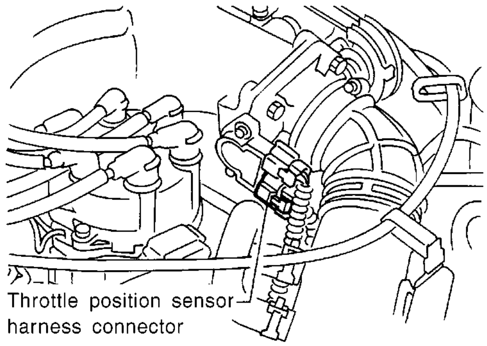
15°±2° BTDC (in "P" or "N" position)

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.



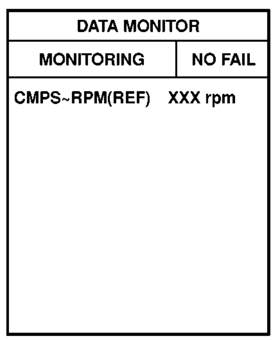
SEF972R

▶	GO TO 2.

4	CHECK BASE IDLE SPEED

With CONSULT-II

1. Read idle speed in “DATA MONITOR” mode with CONSULT-II.



PEF356V

700±50 rpm (in “P” or “N” position)

Without CONSULT-II

1. Check idle speed.

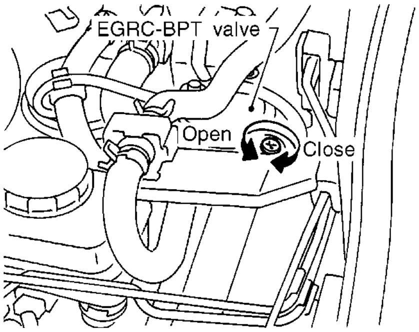
700±50 rpm (in “P” or “N” position)

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.



SEF973R

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	
MONITORING	NO FAIL
CMPS~RPM(REF)	XXX rpm

PEF356V

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

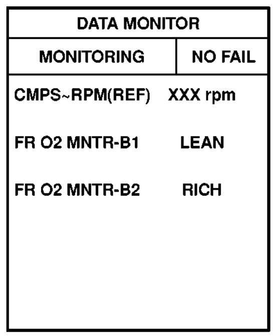
OK (With CONSULT-II)	▶	GO TO 8.
OK (Without CONSULT-II)	▶	GO TO 9.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
Check the following. 1. Check IACV-AAC valve and replace if necessary. Refer to EC-992. 2. Check IACV-AAC valve harness and repair if necessary. Refer to EC-992. 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 FRONT HEATED OXYGEN SENSOR LH SIGNAL

With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. See "FR O2 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.



PEF358V

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

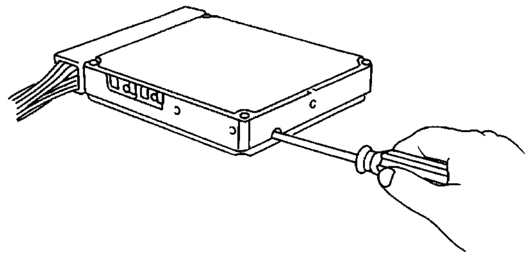
OK or NG

OK	▶	GO TO 12.
NG (Monitor does not fluctuate.)	▶	GO TO 17.
NG (Monitor fluctuates less than 5 times.)	▶	1. Replace front heated oxygen sensor LH. 2. GO TO 10.

9	CHECK FRONT HEATED OXYGEN SENSOR LH SIGNAL

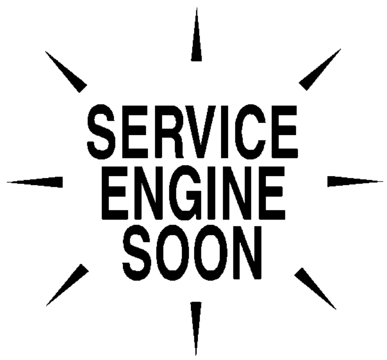
Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Set "Left bank front heated oxygen sensor monitor" in the Diagnostic Test Mode II. Refer to EC-644.



SEF979U

3. Make sure that MIL goes on more than 5 times during 10 seconds at 2,000 rpm.



SEF217U

OK or NG

OK	▶	GO TO 12.
NG (MIL does not blink.)	▶	GO TO 17.
NG (MIL blinks less than 5 times.)	▶	1. Replace front heated oxygen sensor LH. 2. GO TO 10.

10	CHECK FRONT HEATED OXYGEN SENSOR LH SIGNAL

With CONSULT-II

1. Warm engine to normal operating temperature.
2. Run engine at approx. 2000 rpm for approx. 2 minutes under no-load.
3. See "FR O2 MNTR-B2" in "DATA MONITOR" mode.
4. 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. Warm engine to normal operating temperature.
2. Run engine at approx. 2000 rpm for approx. 2 minutes under no-load.
3. Set "Left bank front heated oxygen sensor monitor" in the Diagnostic Test Mode II. Refer to EC-644.
4. Make sure that MIL goes on more than 5 times during 10 seconds at 2,000 rpm.

OK or NG

OK (With CONSULT-II)	▶	GO TO 12.
OK (Without CONSULT-II)	▶	GO TO 13.
NG	▶	GO TO 11.

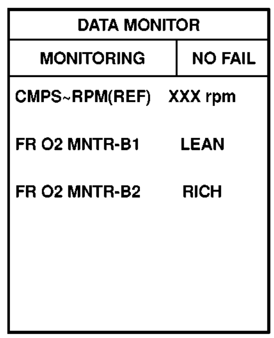
11 DETECT MALFUNCTIONING PART

Check the following.
1. Check fuel pressure regulator. Refer to EC-611.
2. Check mass air flow sensor and its circuit. Refer to EC-713.
3. Check injector and its circuit. Refer to EC-1145.
   Clean or replace if necessary.
4. Check engine coolant temperature sensor and its circuit. Refer to EC-758.
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 FRONT HEATED OXYGEN SENSOR RH SIGNAL

With CONSULT-II
1. See "FR O2 MNTR-B1" in "DATA MONITOR" mode.
2. Maintaining engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.



PEF358V

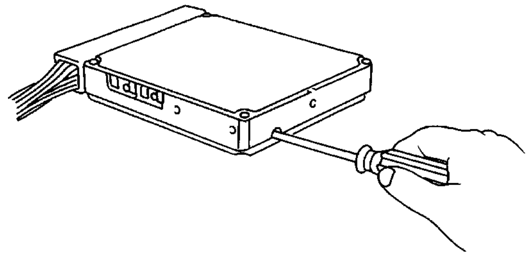
1 time: RICH → LEAN → RICH
2 times: RICH → LEAN → RICH → LEAN → RICH

OK or NG

OK	▶	**INSPECTION END**
NG (Monitor does not fluctuate.)	▶	GO TO 16.
NG (Monitor fluctuates less than 5 times.)	▶	1. Replace front heated oxygen sensor RH. 2. GO TO 14.

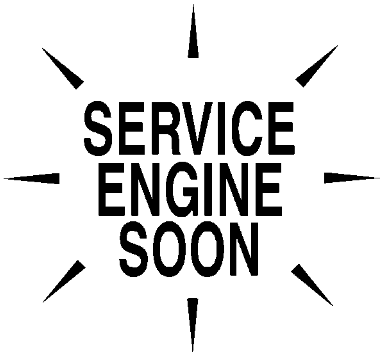
13	CHECK FRONT HEATED OXYGEN SENSOR RH SIGNAL

Without CONSULT-II
1. Set "Right bank front heated oxygen sensor monitor" in the Diagnostic Test Mode II. Refer to EC-644.



SEF979U

2. Make sure that MIL goes on more than 5 times during 10 seconds at 2,000 rpm.



SEF217U

OK or NG

OK	▶	**INSPECTION END**
NG (MIL does not blink.)	▶	GO TO 16.
NG (MIL blinks less than 5 times.)	▶	1. Replace front heated oxygen sensor RH. 2. GO TO 14.

14	CHECK FRONT HEATED OXYGEN SENSOR RH SIGNAL

With CONSULT-II
1. Warm engine to normal operating temperature.
2. Run engine at approx. 2000 rpm for approx. 2 minutes under no-load.
3. See "FR O2 MNTR-B1" in "DATA MONITOR" mode.
4. 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

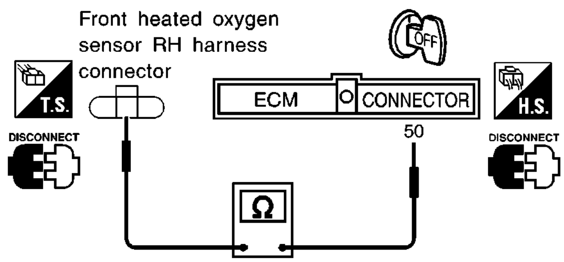
Without CONSULT-II
1. Warm engine to normal operating temperature.
2. Run engine at approx. 2000 rpm for approx. 2 minutes under no-load.
3. Set "Right bank front heated oxygen sensor monitor" in the Diagnostic Test Mode II. Refer to EC-644.
4. Make sure that MIL goes on more than 5 times during 10 seconds at 2,000 rpm.

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 15.

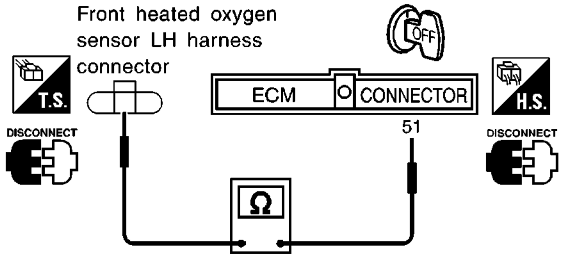
GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

15	DETECT MALFUNCTIONING PART
Check the following. 1. Check fuel pressure regulator. Refer to EC-611. 2. Check mass air flow sensor and its circuit. Refer to EC-713. 3. Check injector and its circuit. Refer to EC-1145. Clean or replace if necessary. 4. Check engine coolant temperature sensor and its circuit. Refer to EC-758. 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 FRONT HEATED OXYGEN SENSOR RH HARNESS
1. Turn off engine and disconnect battery ground cable. 2. Disconnect ECM harness connector. 3. Disconnect front heated oxygen sensor RH harness connector. 4. Check harness continuity between ECM terminal 50 and front heated oxygen sensor RH harness connector.	
 SEF980U	
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 FRONT HEATED OXYGEN SENSOR LH HARNESS

1. Turn off engine and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect front heated oxygen sensor LH harness connector.
4. Check harness continuity between ECM terminal 51 and front heated oxygen sensor LH harness connector.



SEF981U

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)

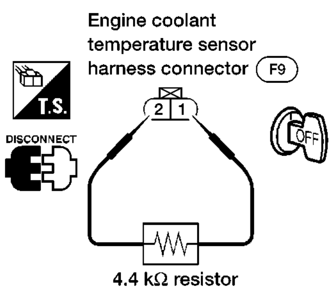
18	PREPARATION FOR "CO" % CHECK

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	
COOLANT TEMP	5˚C
MONITOR	
CMPS~RPM(REF)	XXX rpm
INJ PULSE-B2	XXX msec
INJ PULSE-B1	XXX msec
IGN TIMING	XXX BTDC

PEF359V

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.



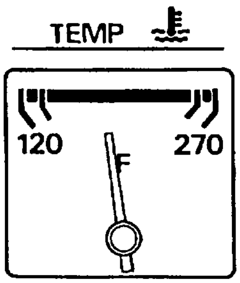
AEC036B

	▶	GO TO 19.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

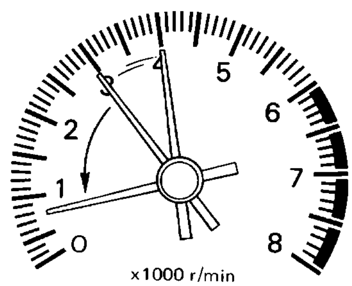
19	CHECK "CO" %

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%
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-611.
3. Check mass air flow sensor and its circuit. Refer to EC-713.
4. Check injector and its circuit. Refer to EC-1145.
   Clean or replace if necessary.
5. Check engine coolant temperature sensor and its circuit. Refer to EC-758.
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
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-687.)

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				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 (0701, 0603 - 0608) is being detected	X	—	—	—	—	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 (0701, 0603 - 0608) is being detected	—	—	X	—	—	X	—	—
Closed loop control — DTC: P1148 (0307)	—	X	—	—	X	—	X	—
Fail-safe items	—	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-640.
For malfunctions in which 1st trip DTCs are displayed, refer to EC-638. 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-667. 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

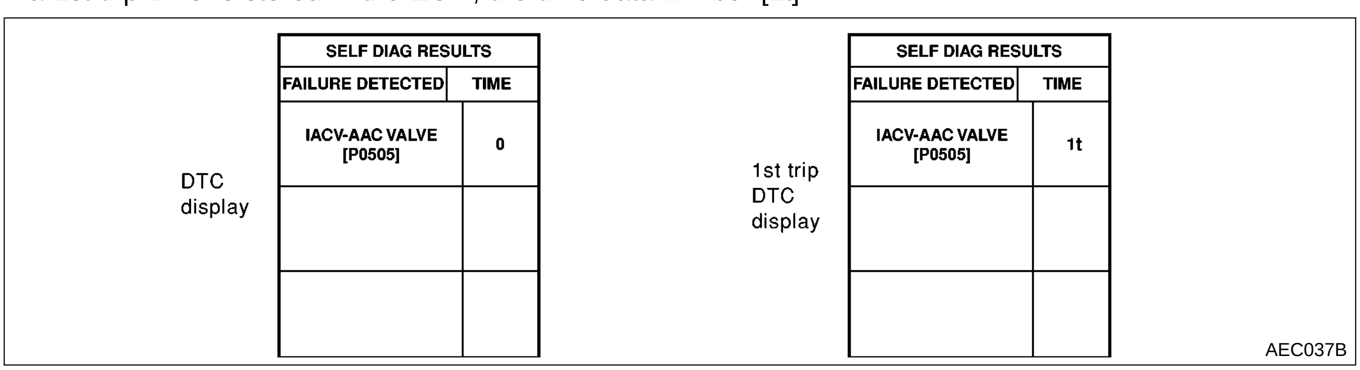
NGEC0552S0101

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

1) **No Tools**
   The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) Examples: 0101, 0201, 1003, 1104, etc.
   These DTCs are controlled by NISSAN.
2) **With CONSULT-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 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-654.
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 (0701, 0603 - 0608) Fuel Injection System Function — DTC: P0171 (0115), P0172 (0114)
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.
Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-640.

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 "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.
The following table shows required self-diagnostic items to set the SRT to "complete".

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

SRT item (CONSULT-II indication)	Performance Priority *1	Required self-diagnostic items to set the SRT to ″complete″	Corresponding DTC No.
CATALYST	3	Three way catalyst function	P0420, P0430
EVAP SYSTEM	2	EVAP control system (small leak) (negative pressure)	P0440
	–	EVAP control system (small leak) (positive pressure)	P1440 *2
	3	EVAP control system purge flow monitoring	P1447
O2 SENSOR	3	Front heated oxygen sensor (circuit)	P0130, P0150
		Front heated oxygen sensor (lean shift monitoring)	P0131, P0151
		Front heated oxygen sensor (rich shift monitoring)	P0132, P0152
		Front heated oxygen sensor (response monitoring)	P0133, P0153
		Front heated oxygen sensor (high voltage)	P0134, P0154
		Rear heated oxygen sensor (min. voltage monitoring)	P0137, P0157
		Rear heated oxygen sensor (max. voltage monitoring)	P0138, P0158
		Rear heated oxygen sensor (response monitoring)	P0139, P0159
		Rear heated oxygen sensor (high voltage)	P0140, P0160
O2 SEN HEATER	3	Front heated oxygen sensor heater	P0135, P0155
		Rear heated oxygen sensor heater	P0141, P0161
EGR SYSTEM (If so equipped)	3	EGR function (close)	P0400
		EGRC-BPT valve function	P0402
	1	EGR function (open)	P1402

*1: 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.

*2: P1440 [EVAP control system (small leak) (positive pressure) diagnosis] is a kind of the SRT related diagnosis. This diagnosis, however, does not contribute to setting the SRT as “complete” when no malfunction exists in the EVAP system. Therefore, P0440 must be used instead of P1440.

SRT Set Timing

NGEC0552S0301

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.

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.

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".

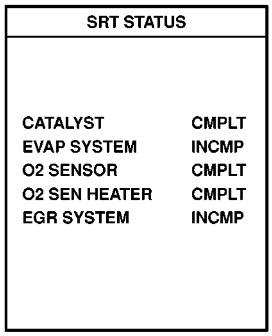
NOTE:
SRT can be set as "complete" together with the DTC(s). Therefore, DTC check must always be carried out prior to the State emission inspection even though the SRT indicates "complete".

How to Display SRT Code

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.



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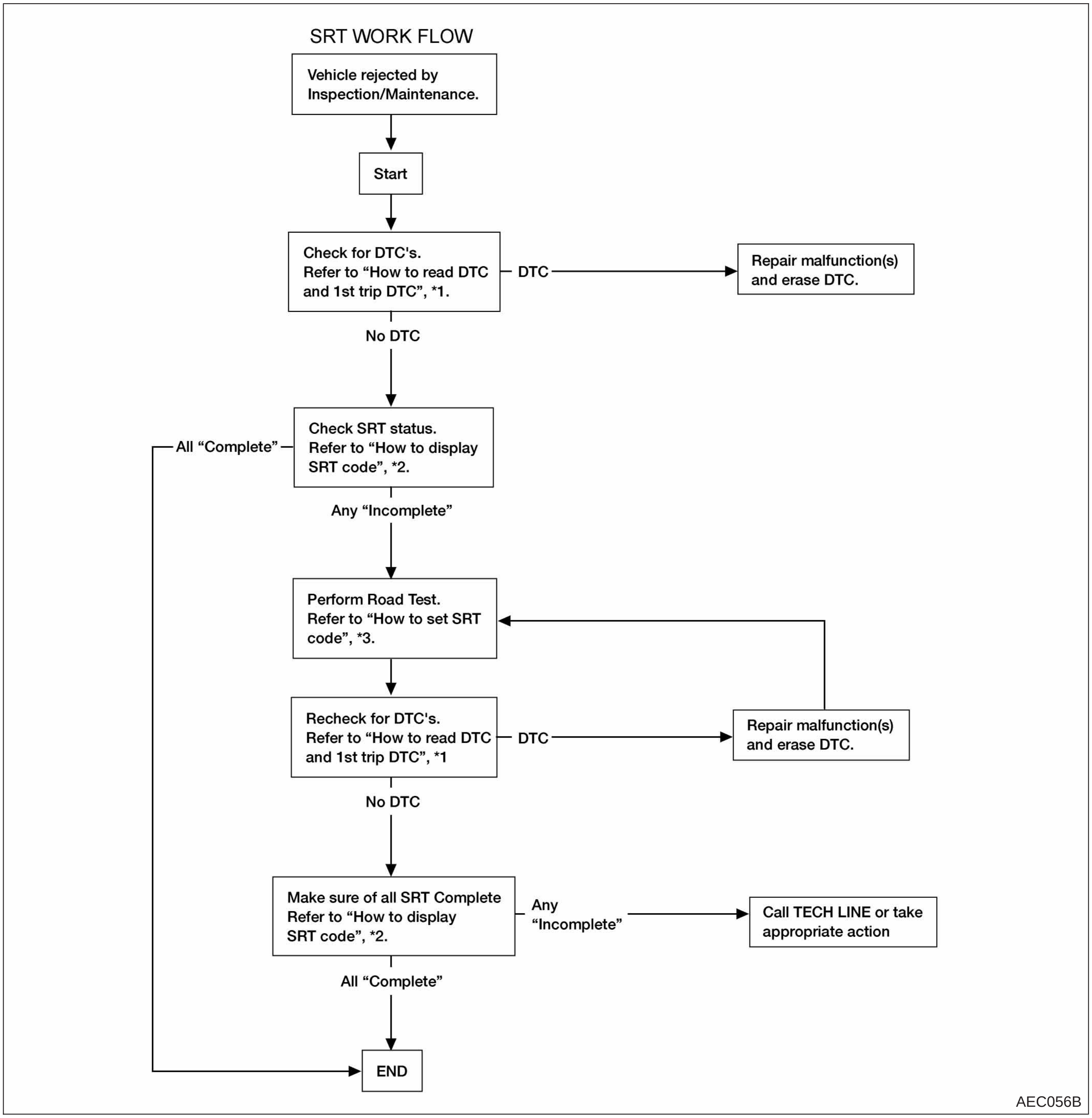
SRT Service Procedure

NGEC0552S0302

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-628 *2 EC-631 *3 EC-633

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-629.

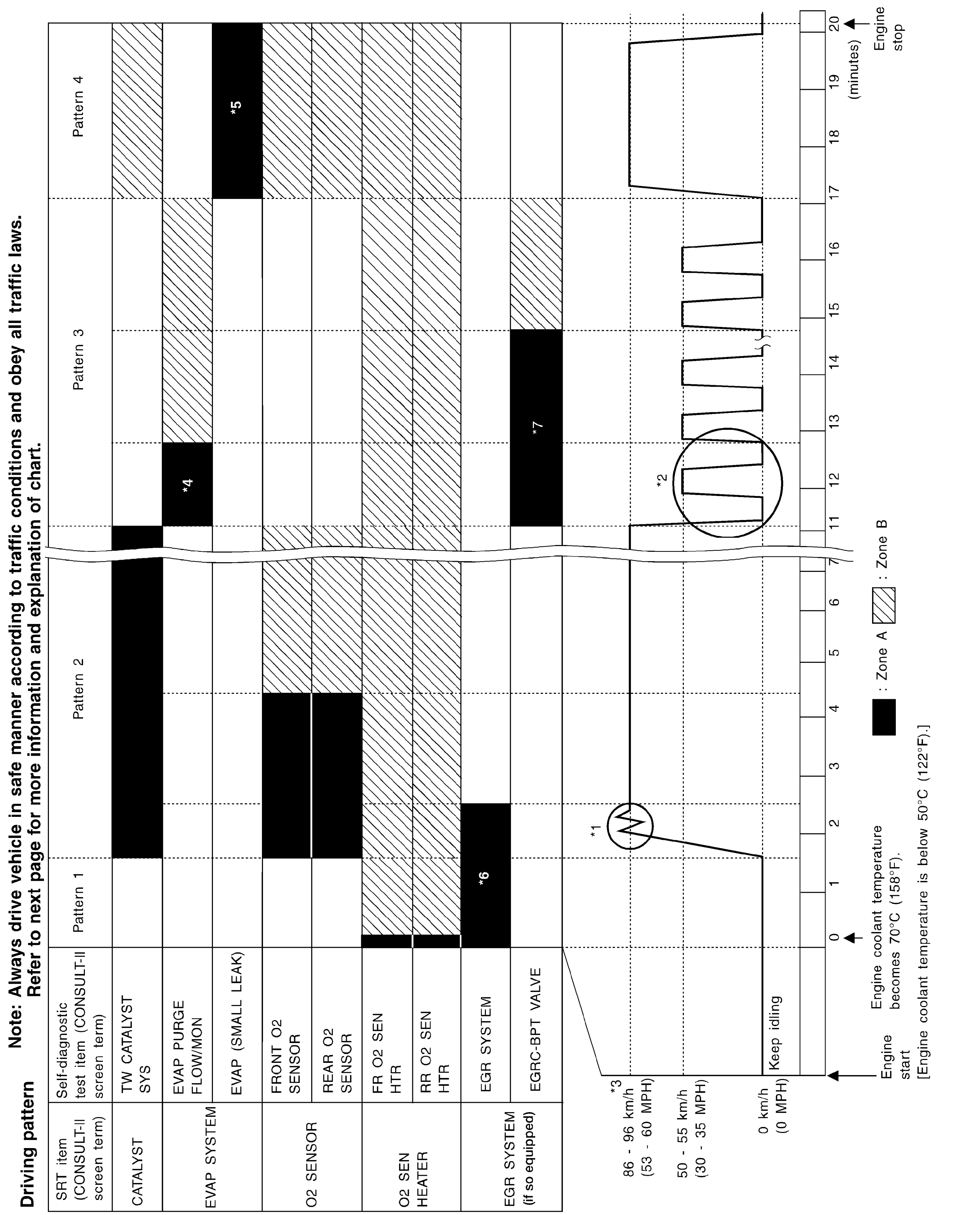
Without CONSULT-II

The most efficient driving pattern in which SRT codes can be properly set is explained on EC-634. The driving pattern should be performed one or more times to set all SRT codes.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

Driving Pattern

NGEC0552S0305



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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 43 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 43 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:

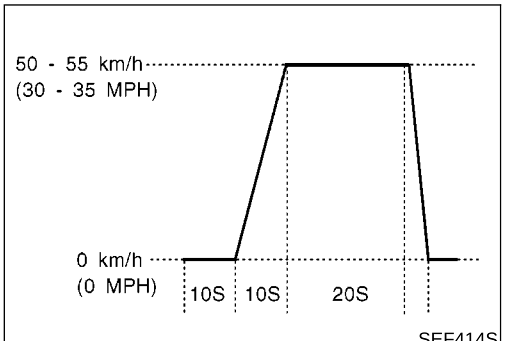
- The driving pattern outlined in *2 must be repeated at least 3 times.

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.



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*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	Front heated oxygen sensor (Right bank)	09H	04H	Max.	X
		0AH	84H	Min.	X
		0BH	04H	Max.	X
		0CH	04H	Max.	X
		0DH	04H	Max.	X
	Front heated oxygen sensor (Left bank)	11H	05H	Max.	X
		12H	85H	Min.	X
		13H	05H	Max.	X
		14H	05H	Max.	X
		15H	05H	Max.	X
	Rear heated oxygen sensor (Right bank)	19H	86H	Min.	X
		1AH	86H	Min.	X
		1BH	06H	Max.	X
		1CH	06H	Max.	X
	Rear heated oxygen sensor (Left bank)	21H	87H	Min.	X
		22H	87H	Min.	X
		23H	07H	Max.	X
		24H	07H	Max.	X
O2 SENSOR HEATER	Front heated oxygen sensor heater (Right bank)	29H	08H	Max.	X
		2AH	88H	Min.	X
	Front heated oxygen sensor heater (Left bank)	2BH	09H	Max.	X
		2CH	89H	Min.	X
	Rear heated oxygen sensor heater (Right bank)	2DH	0AH	Max.	X
		2EH	8AH	Min.	X
	Rear heated oxygen sensor heater (Left bank)	2FH	0BH	Max.	X
		30H	8BH	Min.	X
EGR SYSTEM (If so equipped)	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

NGEC0552S05

X: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*4		SRT code	Test value/ Test limit (GST only)	1st trip DTC*4	Reference page
	CONSULT-II GST*2	ECM*1				
NO SELF DIAGNOSTIC FAILURE INDICATED	**P0000**	**0505**	—	—	—	—
MAF SEN/CIRCUIT	P0100	0102	—	—	X	EC-713
ABSL PRES SEN/CIRC	P0105	0803	—	—	X	EC-722
AIR TEMP SEN/CIRC	P0110	0401	—	—	X	EC-734
COOLANT T SEN/CIRC	P0115	0103	—	—	X	EC-739
THRTL POS SEN/CIRC	P0120	0403	—	—	X	EC-744
*COOLAN T SEN/CIRC	P0125	0908	—	—	X	EC-758
FRONT O2 SENSOR-B1	P0130	0503	X	X	X*3	EC-763
FRONT O2 SENSOR-B1	P0131	0415	X	X	X*3	EC-772
FRONT O2 SENSOR-B1	P0132	0414	X	X	X*3	EC-780
FRONT O2 SENSOR-B1	P0133	0413	X	X	X*3	EC-788
FRONT O2 SENSOR-B1	P0134	0509	X	X	X*3	EC-801
FR O2 SE HEATER-B1	P0135	0901	X	X	X*3	EC-809
REAR O2 SENSOR-B1	P0137	0511	X	X	X*3	EC-815
REAR O2 SENSOR-B1	P0138	0510	X	X	X*3	EC-825
REAR O2 SENSOR-B1	P0139	0707	X	X	X*3	EC-835
REAR O2 SENSOR-B1	P0140	0512	X	X	X*3	EC-845
RR O2 SE HEATER-B1	P0141	0902	X	X	X*3	EC-853
FRONT O2 SENSOR-B2	P0150	0303	X	X	X*3	EC-763
FRONT O2 SENSOR-B2	P0151	0411	X	X	X*3	EC-772
FRONT O2 SENSOR-B2	P0152	0410	X	X	X*3	EC-780
FRONT O2 SENSOR-B2	P0153	0409	X	X	X*3	EC-788
FRONT O2 SENSOR-B2	P0154	0412	X	X	X*3	EC-801
FR O2 SE HEATER-B2	P0155	1001	X	X	X*3	EC-809
REAR O2 SENSOR-B2	P0157	0314	X	X	X*3	EC-815
REAR O2 SENSOR-B2	P0158	0313	X	X	X*3	EC-825
REAR O2 SENSOR-B2	P0159	0708	X	X	X*3	EC-835
REAR O2 SENSOR-B2	P0160	0315	X	X	X*3	EC-845
RR O2 SE HEATER-B2	P0161	1002	X	X	X*3	EC-853
FUEL SYS LEAN/BK1	P0171	0115	—	—	X	EC-860
FUEL SYS RICH/BK1	P0172	0114	—	—	X	EC-868
FUEL SYS LEAN/BK2	P0174	0210	—	—	X	EC-860
FUEL SYS RICH/BK2	P0175	0209	—	—	X	EC-868
FUEL TEMP SEN/CIRC	P0180	0402	—	—	X	EC-875

Items (CONSULT-II screen terms)	DTC*4		SRT code	Test value/ Test limit (GST only)	1st trip DTC*4	Reference page
	CONSULT-II GST*2	ECM*1				
ENG OVER TEMP	P0217	0211	—	—	X	EC-880
MULTI CYL MISFIRE	P0300	0701	—	—	X	EC-893
CYL 1 MISFIRE	P0301	0608	—	—	X	EC-893
CYL 2 MISFIRE	P0302	0607	—	—	X	EC-893
CYL 3 MISFIRE	P0303	0606	—	—	X	EC-893
CYL 4 MISFIRE	P0304	0605	—	—	X	EC-893
CYL 5 MISFIRE	P0305	0604	—	—	X	EC-893
CYL 6 MISFIRE	P0306	0603	—	—	X	EC-893
KNOCK SEN/CIRC	P0325	0304	—	—	—	EC-902
CPS/CIRCUIT (OBD)	P0335	0802	—	—	X	EC-906
CAM POS SEN/CIRC	P0340	0101	—	—	X	EC-912
EGR SYSTEM (If so equipped)	P0400	0302	X	X	X*3	EC-919
EGRC-BPT VALVE (If so equipped)	P0402	0306	X	X	X*3	EC-933
TW CATALYST SYS-B1	P0420	0702	X	X	X*3	EC-941
TW CATALYST SYS-B2	P0430	0703	X	X	X*3	EC-941
EVAP SMALL LEAK	P0440	0705	X	X	X*3	EC-947
PURG VOLUME CONT/V	P0443	1008	—	—	X	EC-950
VENT CONTROL VALVE	P0446	0903	—	—	X	EC-957
EVAP SYS PRES SEN	P0450	0704	—	—	X	EC-963
EVAP GROSS LEAK	P0455	0715	X	X	X	EC-974
VEH SPEED SEN/CIRC	P0500	0104	—	—	X	EC-988
IACV/AAC VLV/CIRC	P0505	0205	—	—	X	EC-992
CLOSED TP SW/CIRC	P0510	0203	—	—	X	EC-998
A/T COMM LINE	P0600	—	—	—	—	EC-1006
ECM	P0605	0301	—	—	X	EC-1011
PNP SW/CIRC	P0705	1101	—	—	X	***AT-99***
ATF TEMP SEN/CIRC	P0710	1208	—	—	X	***AT-105***
VEH SPD SEN/CIR AT	P0720	1102	—	—	X	***AT-111***
ENGINE SPEED SIG	P0725	1207	—	—	X	***AT-116***
A/T 1ST GR FNCTN	P0731	1103	—	—	X	***AT-120***
A/T 2ND GR FNCTN	P0732	1104	—	—	X	***AT-126***
A/T 3RD GR FNCTN	P0733	1105	—	—	X	***AT-132***
A/T 4TH GR FNCTN	P0734	1106	—	—	X	***AT-138***
TCC SOLENOID/CIRC	P0740	1204	—	—	X	***AT-147***
A/T TCC S/V FNCTN	P0744	1107	—	—	X	***AT-152***

Items (CONSULT-II screen terms)	DTC*4		SRT code	Test value/ Test limit (GST only)	1st trip DTC*4	Reference page
	CONSULT-II GST*2	ECM*1				
L/PRESS SOL/CIRC	P0745	1205	—	—	X	***AT-160***
SFT SOL A/CIRC	P0750	1108	—	—	X	***AT-165***
SFT SOL B/CIRC	P0755	1201	—	—	X	***AT-170***
MAP/BARO SW SOL/CIR	P1105	1302	—	—	X	EC-1013
CLOSED LOOP-B1	P1148	0307	—	—	X	EC-1026
CLOSED LOOP-B2	P1168	0308	—	—	X	EC-1026
IGN SIGNAL-PRIMARY	P1320	0201	—	—	X	EC-1028
CPS/CIRC (OBD) COG	P1336	0905	—	—	X	EC-1036
EGRC SOLENOID/V (If so equipped)	P1400	1005	—	—	X	EC-1043
EGR TEMP SEN/CIRC (If so equipped)	P1401	0305	—	—	X	EC-1048
EGR SYSTEM (If so equipped)	P1402	0514	X	X	X*3	EC-1055
EVAP SMALL LEAK	P1440	0213	X	X	X*3	EC-1065
PURG VOLUME CONT/V	P1444	0214	—	—	X	EC-1067
VENT CONTROL VALVE	P1446	0215	—	—	X	EC-1079
EVAP PURG FLOW/MON	P1447	0111	X	X	X*3	EC-1086
VENT CONTROL VALVE	P1448	0309	—	—	X	EC-1098
VC/V BYPASS/V	P1490	0801	—	—	X	EC-1106
VC CUT/V BYPASS/V	P1491	0311	—	—	X	EC-1112
A/T DIAG COMM LINE	P1605	0804	—	—	X	EC-1121
TP SEN/CIRC A/T	P1705	1206	—	—	X	***AT-175***
P-N POS SW/CIRCUIT	P1706	1003	—	—	X	EC-1124
O/R CLTCH SOL/CIRC	P1760	1203	—	—	X	***AT-184***

*1: In Diagnostic Test Mode II (Self-diagnostic results). These numbers are controlled by NISSAN.
*2: These numbers are prescribed by SAE J2012.
*3: These are not displayed with GST.
*4: 1st trip DTC No. is the same as DTC No.

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

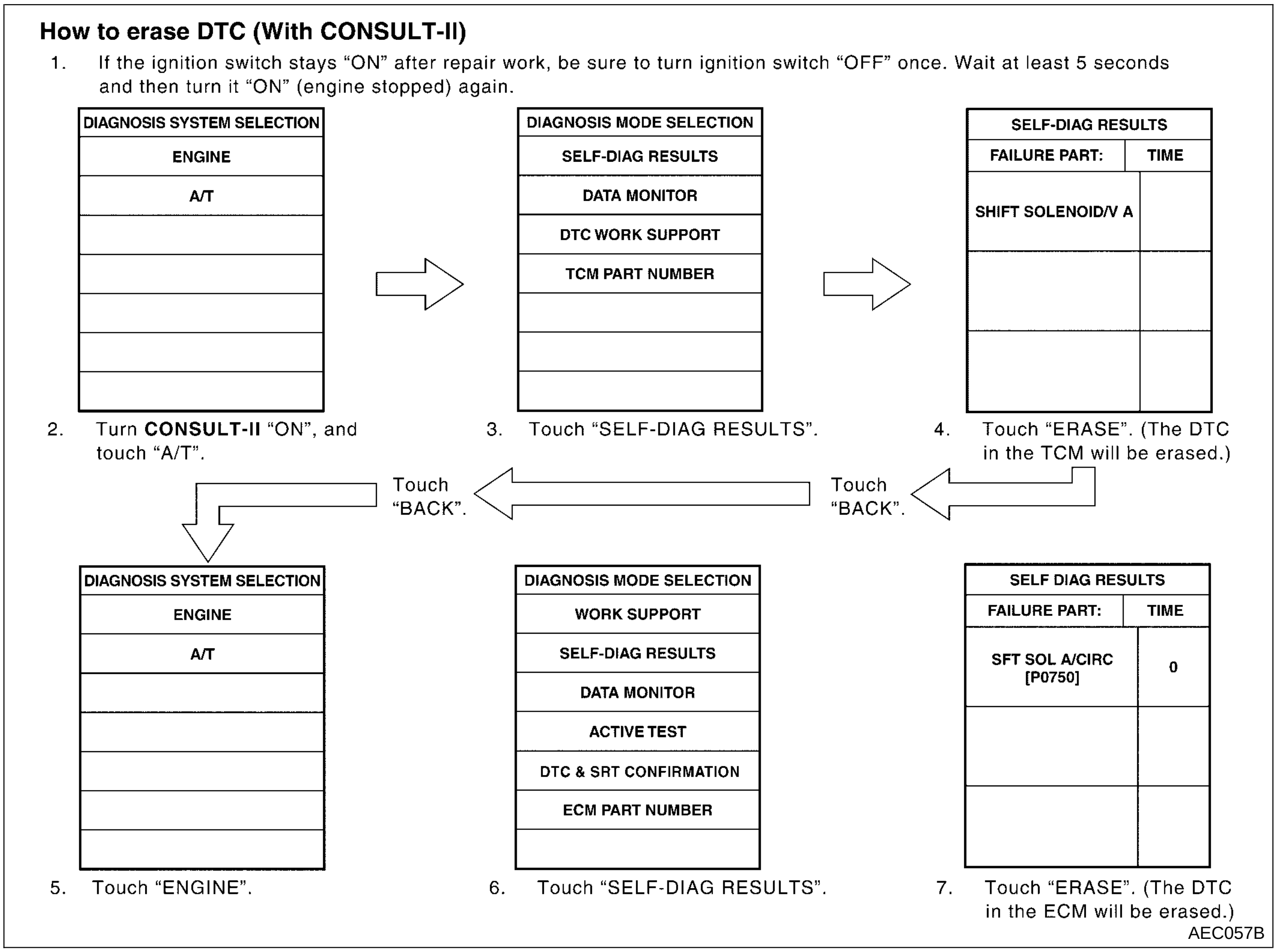
How to Erase DTC (With CONSULT-II)

NGEC0552S0601

NOTE:
If the DTC is not for A/T related items (see EC-581), 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).



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 (With GST)

NGEC0552S0602

NOTE:
If the DTC is not for A/T related items (see EC-581), 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.

How to Erase DTC (No Tools)

NGEC0552S0603

NOTE:
If the DTC is not for A/T related items (see EC-581), skip step 2.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it "ON" again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-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.)

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

3. Change the diagnostic test mode from Mode II to Mode I by turning the mode selector on the ECM. (See EC-644.)

The emission related diagnostic information in the ECM can be erased by changing the diagnostic test mode from Diagnostic Test Mode II to Mode I by turning the mode selector on the ECM.

- **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.**

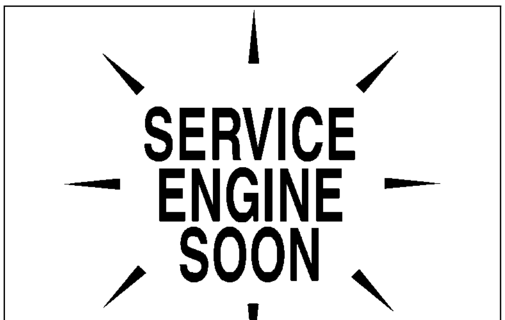
1) Diagnostic trouble codes
2) 1st trip diagnostic trouble codes
3) Freeze frame data
4) 1st trip freeze frame data
5) System readiness test (SRT) codes
6) Test values
7) Others

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



SEF217U

The MIL is located on the instrument panel.

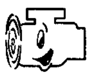
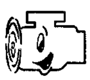
1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.

- If the MIL does not light up, refer to EL section ("WARNING LAMPS") or see EC-1170.

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 four 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 and ECM test mode selector. (See EC-644.)
	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. ● "Misfire (Possible three way catalyst damage)" ● "Closed loop control" ● Fail-safe mode
Mode II	Ignition switch in ON position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.
	Engine running 	FRONT HEATED OXYGEN SENSOR MONITOR	This function allows the fuel mixture condition (lean or rich), monitored by front heated oxygen sensor, to be read.

MIL Flashing without DTC
NGEC0553S0101

If the ECM is in Diagnostic Test Mode II, MIL may flash when engine is running. In this case, check ECM test mode selector following "How to Switch Diagnostic Test Modes", EC-644.
How to switch the diagnostic test (function) modes, and details of the above functions are described later. (Refer to EC-644.)
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

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HA
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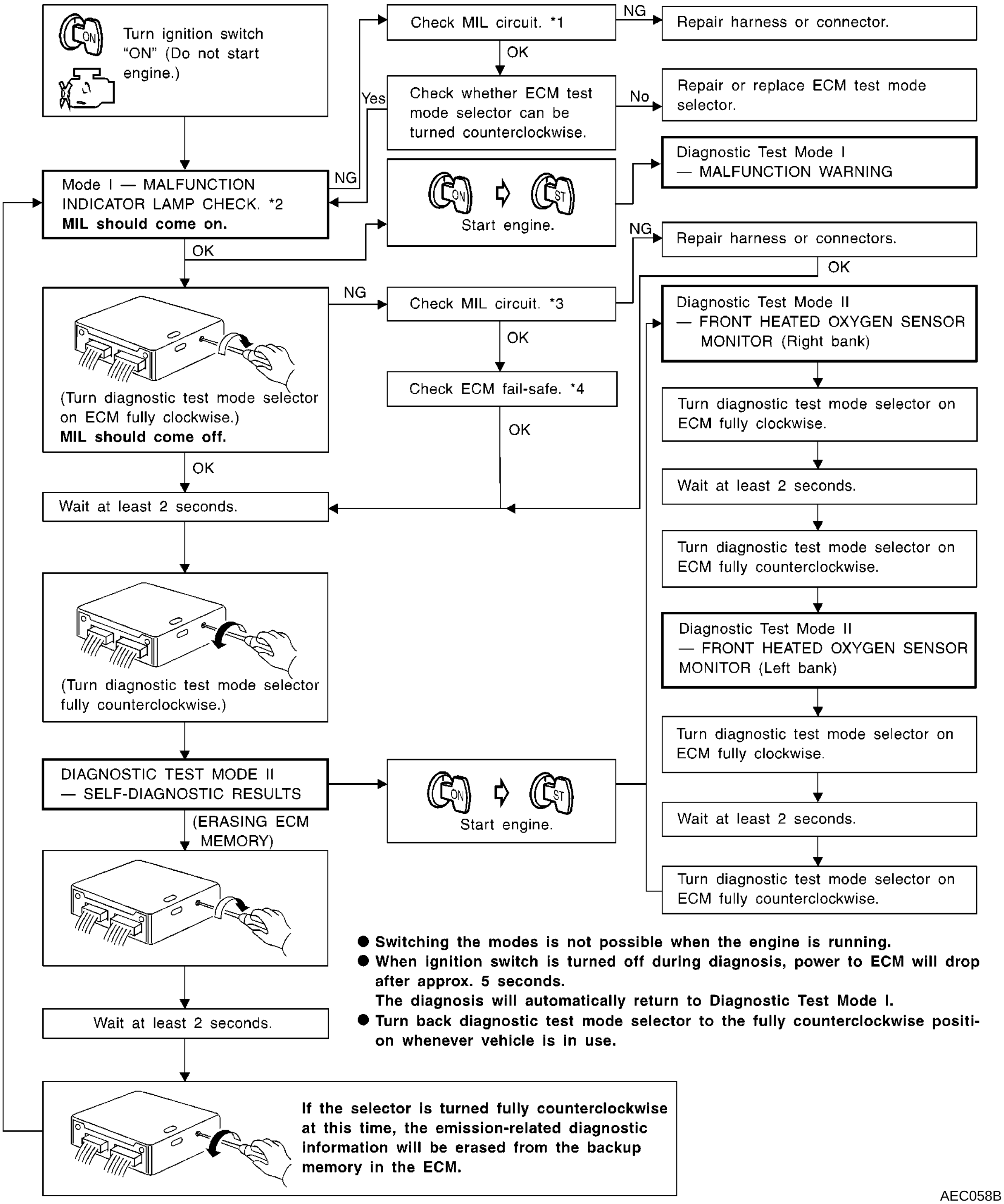
EL
IDX

How to Switch Diagnostic Test Modes

NGEC0553S02



AEC058B

*1 EC-1170	*3 EC-1170	*4 EC-687
*2 EC-642		

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-87*** or see EC-1170.

Diagnostic Test Mode I — Malfunction Warning

NGEC0553S04

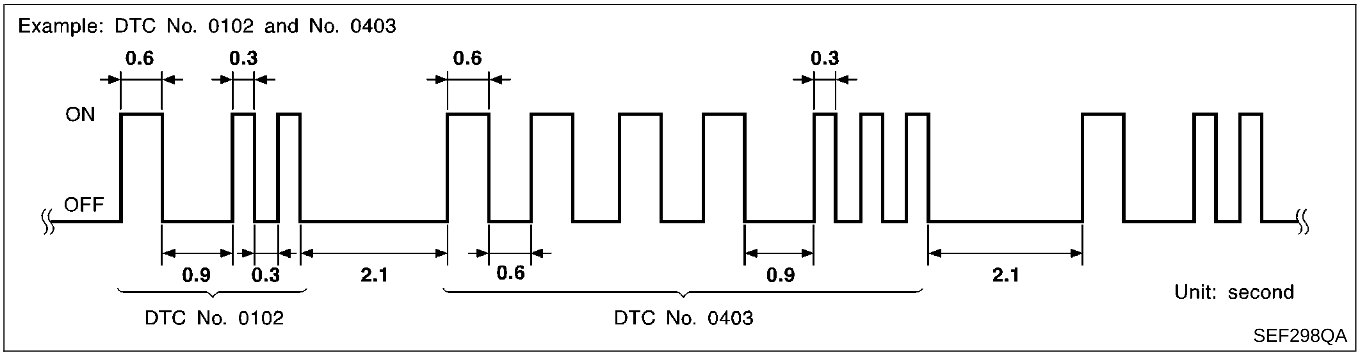
MIL	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction.

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

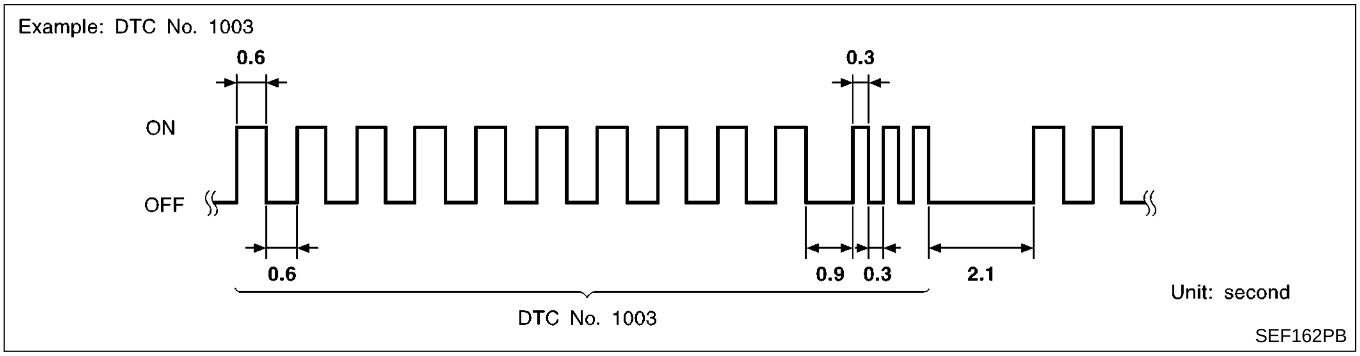
Diagnostic Test Mode II — Self-diagnostic Results

NGEC0553S05

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



SEF298QA



SEF162PB

Long (0.6 second) blinking indicates the two LH digits of number and short (0.3 second) blinking indicates the two RH digits of number. For example, the MIL blinks 10 times for 6 seconds (0.6 sec x 10 times) and then it blinks three times for about 1 second (0.3 sec x 3 times). This indicates the DTC "1003" and refers to the malfunction of the park/neutral position (PNP) switch.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC "0505" refers to no malfunction. (See TROUBLE DIAGNOSIS — INDEX, EC-581.)

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

NGEC0553S0501

The DTC can be erased from the backup memory in the ECM when the diagnostic test mode is changed from Diagnostic Test Mode II to Diagnostic Test Mode I. (Refer to "How to Switch Diagnostic Test Modes", EC-644.)

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

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

Diagnostic Test Mode II — Front Heated Oxygen Sensor Monitor

=NGEC0553S06

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

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

*: Maintains conditions just before switching to open loop.

To check the front heated oxygen sensor function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.
Next run engine at about 2,000 rpm for about 2 minutes under no-load conditions. Then make sure that the MIL comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no-load.

OBD System Operation Chart

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-627.
- 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

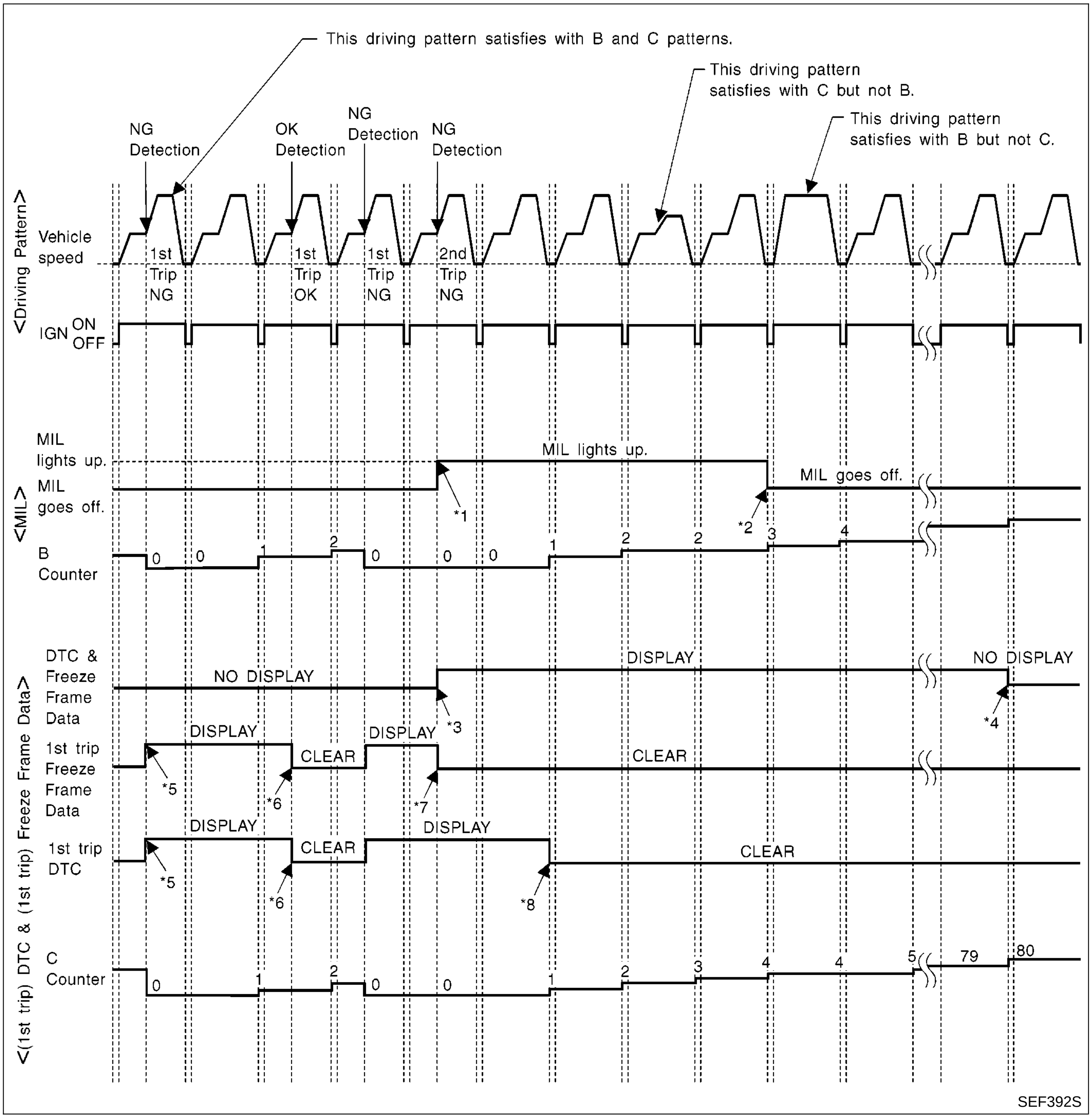
NGEC0554S02

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)
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-648.
For details about patterns "A" and "B" under "Other", see EC-650.
*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



SEF392S

*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.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

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:

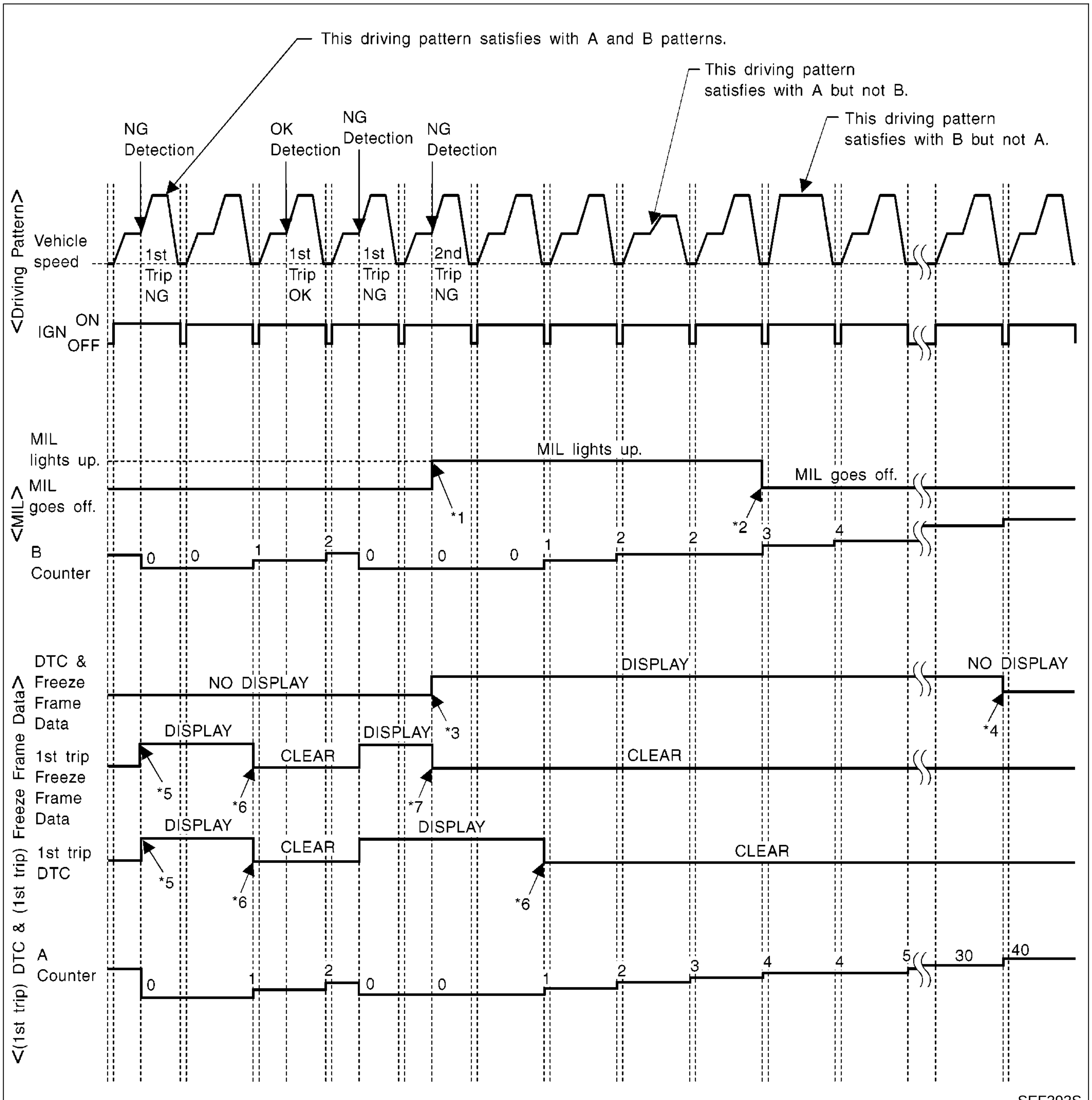
- When the freeze frame data shows lower than 70°C (158°F), "T" should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), "T" should be higher than or equal to 70°C (158°F).

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



SEF393S

*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.

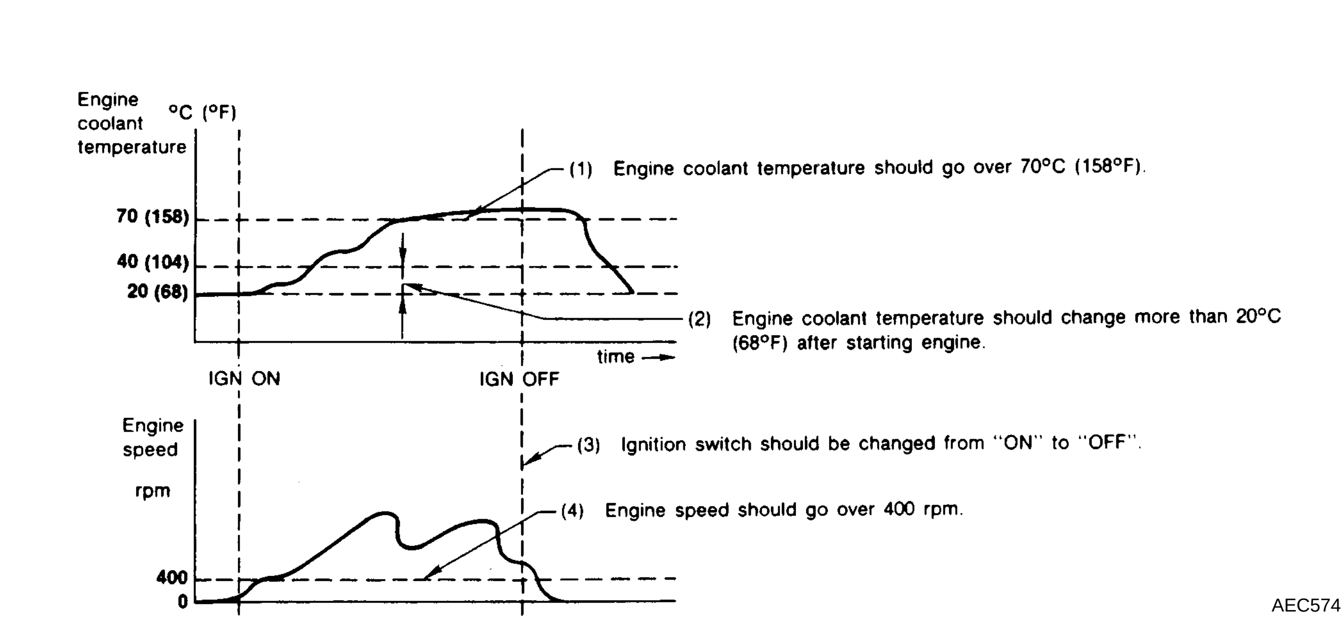
*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

EXPLANATION FOR DRIVING PATTERNS <u>EXCEPT</u> 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.

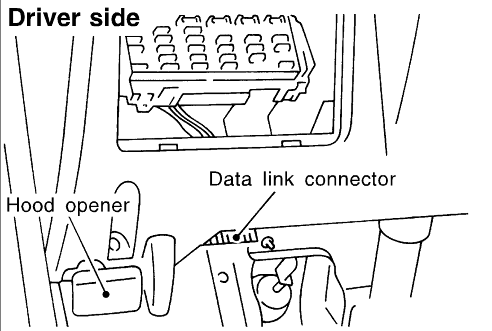
- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MIL will go off when the B counter reaches 3 (*2 in "OBD SYSTEM OPERATION CHART").

CONSULT-II

=NGEC0555

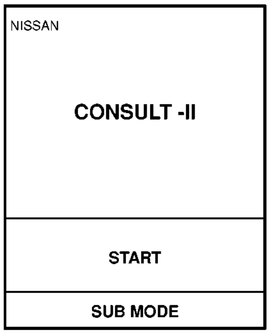
CONSULT-II INSPECTION PROCEDURE

NGEC0555S01



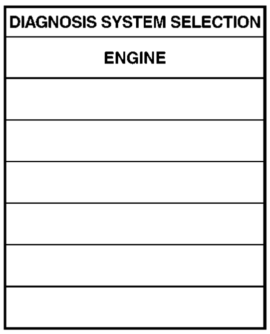
SEF163X

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



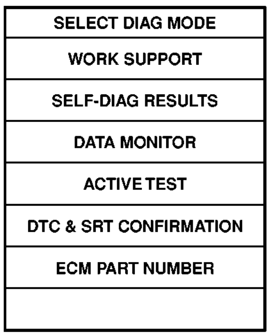
PBR455D

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



PEF895K

5. Touch “ENGINE”.



SEF673X

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

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

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ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

NGEC0555S02

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

Item			DIAGNOSTIC TEST MODE						
			WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	ACTIVE TEST	DTC CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2			SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Injectors				X	X		
		Power transistor (Ignition timing)		X (Ignition signal)		X	X		
		IACV-AAC valve	X	X		X	X		
		EVAP canister purge volume control solenoid valve		X		X	X		X
		Air conditioner relay				X			
		Fuel pump relay	X			X	X		
		Cooling fan		X		X	X		
		EGRC-solenoid valve (If so equipped)		X		X	X		
		Front heated oxygen sensor heater		X		X		X	
		Rear heated oxygen sensor heater		X		X		X	
		EVAP canister vent control valve		X		X	X		
		Vacuum cut valve bypass valve		X		X	X		X
		MAP/BARO switch solenoid valve		X		X	X		
		Calculated load value			X	X			

X: Applicable

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-629.

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.
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
DTC & SRT confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
ECM part number	ECM part number can be read.

*1 The following emission-related diagnostic information is cleared when the ECM memory is erased.
1) Diagnostic trouble codes
2) 1st trip diagnostic trouble codes
3) Freeze frame data
4) 1st trip freeze frame data
5) System readiness test (SRT) codes
6) Test values
7) Others

WORK SUPPORT MODE

NGEC0555S04

WORK ITEM	CONDITION	USAGE
IACV-AAC VALVE 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
FUEL PRESSURE RELEASE	● FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
EVAP SYSTEM CLOSE	OPEN THE VACUUM CUT VALVE BYPASS VALVE AND CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. ● IGN SW ON ● ENGINE NOT RUNNING ● AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). ● NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM ● 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

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-581.)

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-581.)
FUEL SYS-B1 *2 FUEL SYS-B2 *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
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 [%] S-FUEL TRIM-B2 [%]	● "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 [%] L-FUEL TRIM-B2 [%]	● "Long-term fuel trim" at the moment a malfunction is detected is displayed. ● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
ENGINE SPEED [rpm]	● The engine speed at the moment a malfunction is detected is displayed.
VHCL SPEED [km/h] or [mph]	● The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL PRESS [kPa] or [kg/cm^2] or [psi]	● The absolute pressure at the moment a malfunction is detected is displayed.
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
CMPS·RPM (POS) [rpm]	○	○	• Indicates the engine speed computed from the POS signal (1° signal) of the camshaft position sensor.	
CMPS·RPM (REF) [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.
FR O2 SEN-B2 [V]	○	○	• The signal voltage of the front heated oxygen sensor is displayed.	
FR O2 SEN-B1 [V]	○			
RR O2 SEN-B1 [V]	○	○	• The signal voltage of the rear heated oxygen sensor is displayed.	
RR O2 SEN-B2 [V]	○			
FR O2 MNTR-B2 [RICH/LEAN]	○	○	• Display of front heated oxygen sensor signal during air-fuel ratio feedback control: RICH ... means the mixture became "rich", and control is being affected toward a leaner mixture. LEAN ... means the mixture became "lean", and control is being affected toward a rich mixture.	• After turning ON the ignition switch, "RICH" is displayed until air-fuel mixture ratio feedback control begins. • When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
FR O2 MNTR-B1 [RICH/LEAN]	○	○		
RR O2 MNTR-B1 [RICH/LEAN]	○		• Display of rear heated oxygen sensor signal: RICH ... means the amount of oxygen after three way catalyst is relatively small. LEAN ... means the amount of oxygen after three way catalyst is relatively large.	• When the engine is stopped, a certain value is indicated.
RR O2 MNTR-B2 [RICH/LEAN]	○	○		
VHCL SPEED SE [km/h] or [mph]	○	○	• The vehicle speed computed from the vehicle speed sensor signal is displayed.	
BATTERY VOLT [V]	○	○	• The power supply voltage of ECM is displayed.	
THRTL POS SEN [V]	○	○	• The throttle position sensor signal voltage is displayed.	
TANK F/TMP SE [°C] or [°F]	○		• The fuel temperature judged from the fuel tank temperature sensor signal voltage is displayed.	
EGR TEMP SEN [V] (If so equipped)	○		• The signal voltage of the EGR temperature sensor is displayed.	
INT/A TEMP SE [°C] or [°F]	○		• The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated.	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
START SIGNAL [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the starter signal.	• After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL/P SW [ON/OFF]			• Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch.	
CLSD THL POS [ON/OFF]	○	○	• Indicates idle position [ON/OFF] computed by ECM according to the throttle position sensor signal.	
AIR COND SIG [ON/OFF]	○	○	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL [ON/OFF]	○	○	• [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure signal is indicated.	
AMB TEMP SW [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the ambient air temperature switch signal.	
IGNITION SW [ON/OFF]	○		• Indicates [ON/OFF] condition from ignition switch.	
INJ PULSE-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 [%]				
EVAP SYS PRES [V]			• The signal voltage of EVAP control system pressure sensor is displayed.	
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	
EGRC SOL/V [ON/OFF] (FLOW/CUT) (If so equipped)			● The control condition of the EGRC-solenoid valve (determined by ECM according to the input signal) is indicated. ● ON ... EGR is operational OFF ... EGR operation is cut-off	
VENT CONT/V [ON/OFF]			● The control condition of the EVAP canister vent control valve (determined by ECM according to the input signal) is indicated. ● ON ... Closed OFF ... Open	
FR O2 HTR-B1 [ON/OFF]			● Indicates [ON/OFF] condition of front heated oxygen sensor heater determined by ECM according to the input signals.	
FR O2 HTR-B2 [ON/OFF]				
RR O2 HTR-B1 [ON/OFF]			● Indicates [ON/OFF] condition of rear heated oxygen sensor heater determined by ECM according to the input signals.	
RR O2 HTR-B2 [ON/OFF]				
VC/V BYPASS/V [ON/OFF]			● The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated. ● ON ... Open OFF ... Closed	
CAL/LD VALUE [%]			● "Calculated load value" indicates the value of the current airflow divided by peak airflow.	
ABSOL TH·P/S [%]			● "Absolute throttle position sensor" indicates the throttle 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.	
MAP/BARO SW/V [MAP/BARO]			● The control condition of the MAP/BARO switch solenoid valve (determined by ECM according to the input signal) is indicated. MAP ... Intake manifold absolute pressure BARO ... Ambient air barometric pressure	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ABSOL PRES/SE [V]			• The signal voltage of the absolute pressure sensor is displayed.	
VOLTAGE [V]			• Voltage measured by the voltage probe.	
PULSE [msec] or [Hz] or [%]			• Pulse width, frequency or duty cycle measured by the pulse probe.	• Only "#" is displayed if item is unable to be measured. • Figures with "#"s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.

NOTE:
- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
- Regarding D22 model, "-B1" indicates right bank and "-B2" indicates left bank.

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

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
SELF-LEARN-ING CONT	• In this test, the coefficient of self-learning control mixture ratio returns to the original coefficient by touching "CLEAR" on the screen.		
PURG VOL CONT/V	• Engine: After warming up, run engine at 1,500 rpm. • Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	• Harness and connector • Solenoid valve
TANK F/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
MAP/BARO SW/V	• Ignition switch: ON (Engine stopped) • Turn the MAP/BARO switch solenoid valve between "MAP" and "BARO" using CONSULT-II and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve

DTC CONFIRMATION MODE

NGEC0555S08

SRT STATUS Mode

NGEC0555S0801

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-629.

SRT WORK SUPPORT Mode

NGEC0555S0803

SRT status and some of the data monitor item can be read.

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-947
	EVAP SML LEAK P1440		EC-1065
	PURG VOL CN/V P1444		EC-1067
	PURGE FLOW P1447		EC-1086
	VC CUT/V BP/V P1491		EC-1112
FR O2 SENSOR	FR O2 SEN-B1 P0130		EC-763
	FR O2 SEN-B1 P0131		EC-772
	FR O2 SEN-B1 P0132		EC-780
	FR O2 SEN-B1 P0133		EC-788
	FR O2 SEN-B2 P0150		EC-763
	FR O2 SEN-B2 P0151		EC-772
	FR O2 SEN-B2 P0152		EC-780
	FR O2 SEN-B2 P0153		EC-788
RR O2 SENSOR	RR O2 SEN-B1 P0137		EC-815
	RR O2 SEN-B1 P0138		EC-825
	RR O2 SEN-B1 P0139		EC-835
	RR O2 SEN-B2 P0157		EC-815
	RR O2 SEN-B2 P0158		EC-825
	RR O2 SEN-B2 P0159		EC-835
EGR SYSTEM (If so equipped)	EGR SYSTEM P0400		EC-919
	EGRC-BPT/VLV P0402		EC-933
	EGR SYSTEM P1402		EC-1055

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 at the moment the malfunction is detected by ECM.
  DATA MONITOR can be performed continuously until a malfunction is detected. However, DATA MONITOR cannot continue any longer after the malfunction detection.

2) “MANU TRIG” (Manual trigger):

- DTC/1st trip DTC and malfunction item will not be displayed automatically on CONSULT-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”

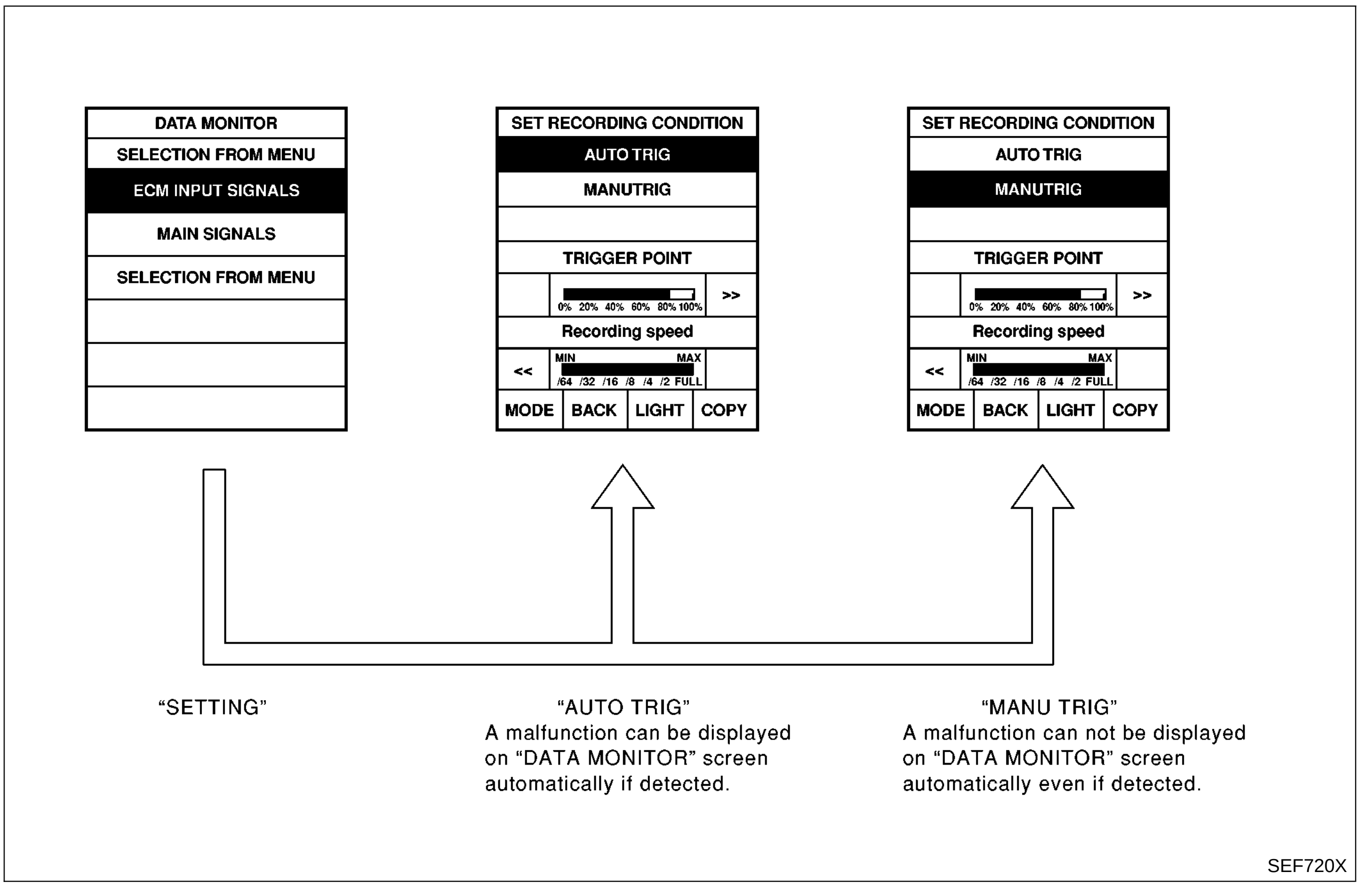
- While trying to detect the DTC/1st trip DTC by performing the

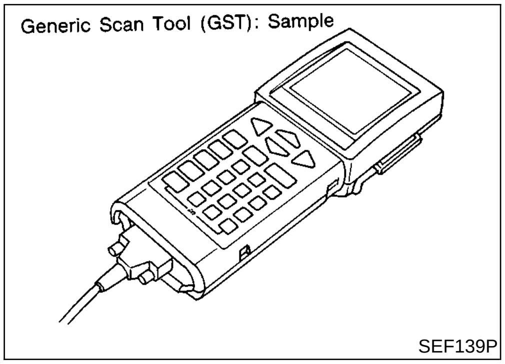
"DTC Confirmation Procedure", be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.

- 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-24***.

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.





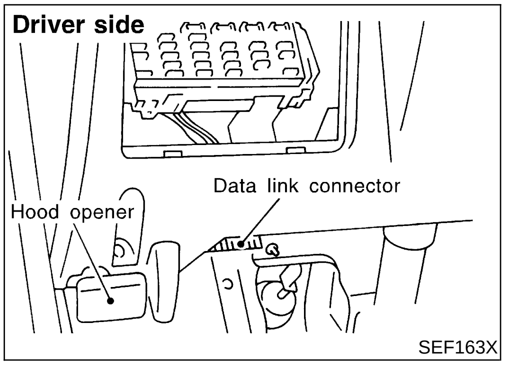
Generic Scan Tool (GST)

=NGEC0556

DESCRIPTION

NGEC0556S01

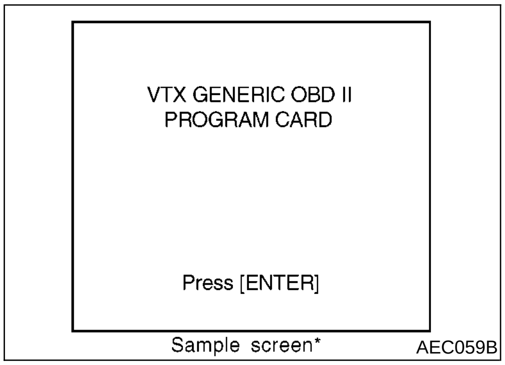
Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 7 different functions explained on the next page.
ISO9141 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.



GST INSPECTION PROCEDURE

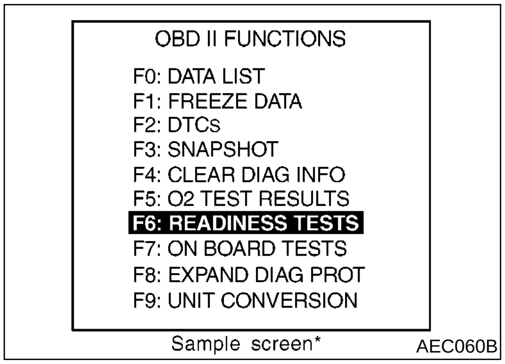
NGEC0556S02

1. Turn ignition switch OFF.
2. Connect “GST” to data link connector for GST. (Data link connector for GST 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.)



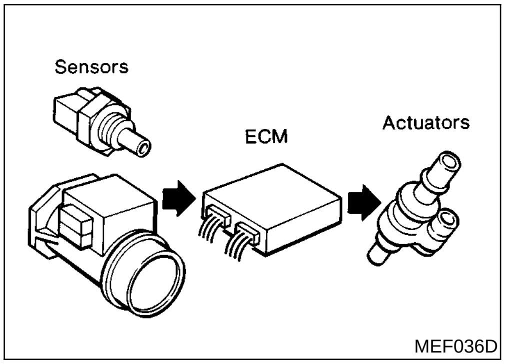
5. Perform each diagnostic mode according to each service procedure.

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

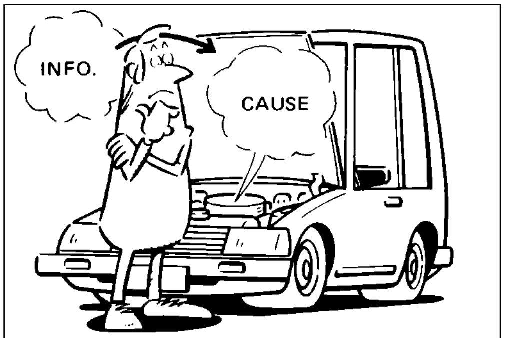
FUNCTION

NGEC0556S03

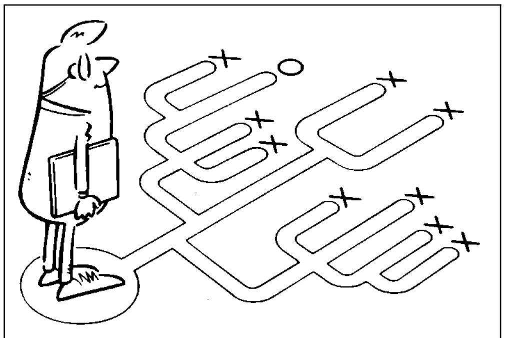
Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-654).]
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.



MEF036D



SEF233G


SEF234G

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-667.

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.

KEY POINTS

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

SEF907L

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

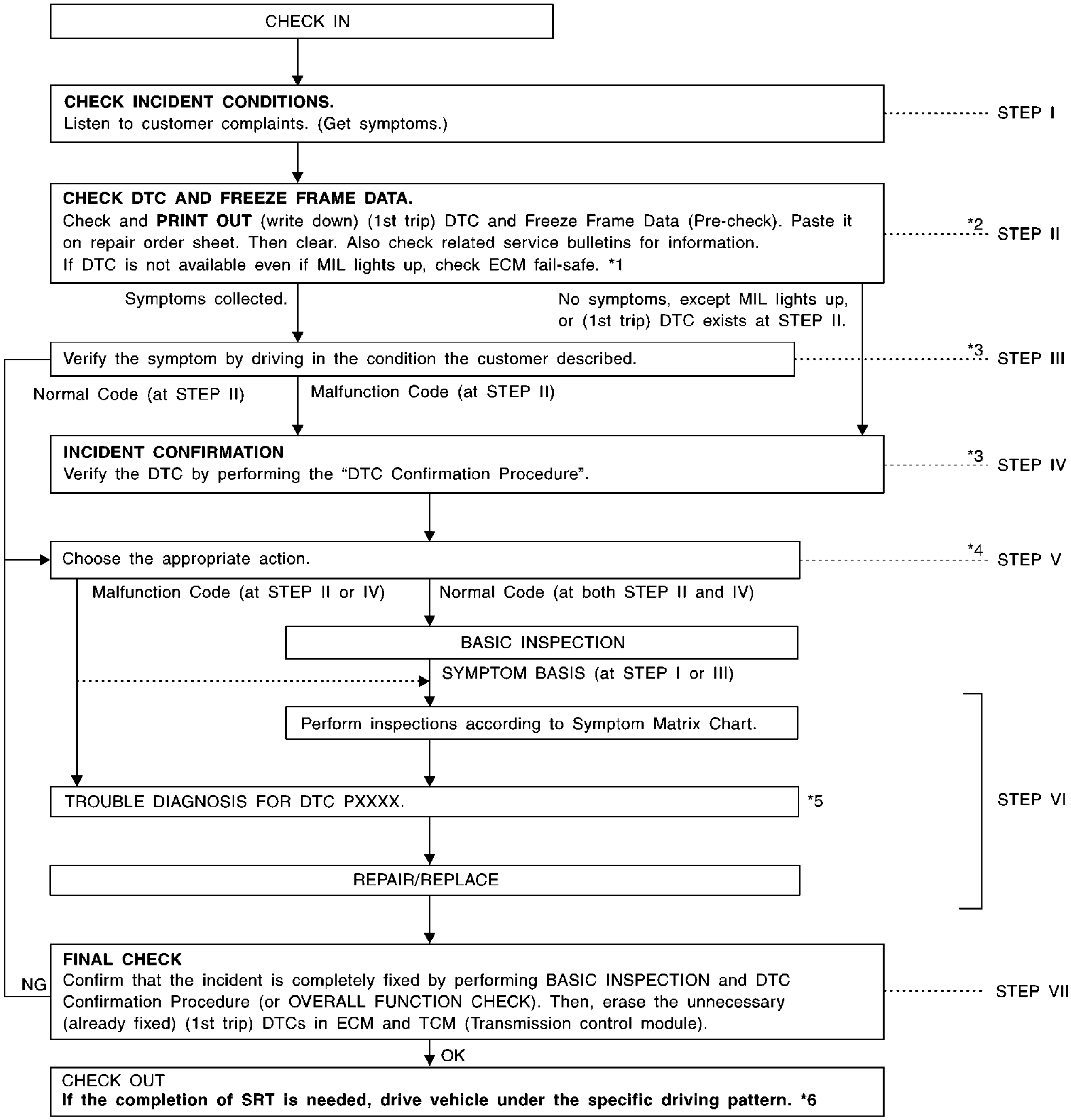
NGEC0557S0101

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



SEF935V

*1 EC-687

*2 If time data of "SELF-DIAG RESULTS" is other than "0" or "[1t]", perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.

*3 If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.

*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-707.

*5 If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.

*6 EC-634

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-666.
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-640.) 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-706. 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-688.) 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-706. 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-706. 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-669.) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-688.)
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-692, EC-697. 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-26***. Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.
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-640.)

Basic Inspection

NGEC0559

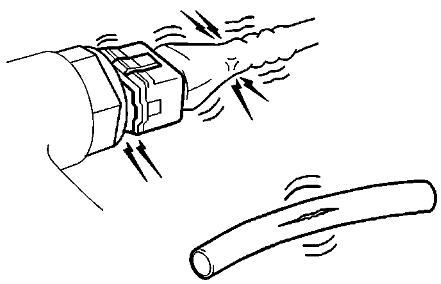
Precaution:

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-651.

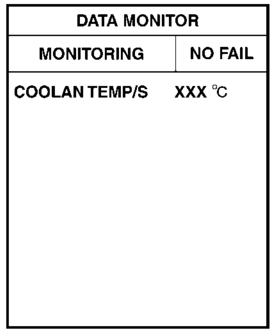
With GST
Connect “GST” to the data link connector for GST.
Refer to EC-663.

Models with CONSULT-II	▶	GO TO 3.
Models with GST	▶	GO TO 15.

3	CHECK FI CAM FUNCTION

With CONSULT-II

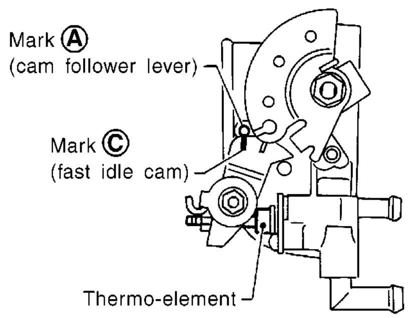
1. Turn ignition switch ON.
2. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
3. Start engine and warm it up.



PEF002P

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	▶	Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-612.

4	CHECK IGNITION TIMING

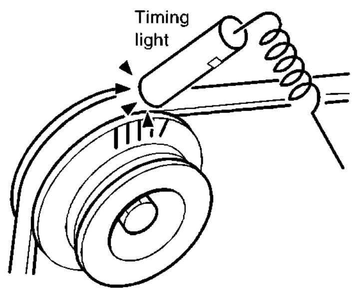
With CONSULT-II

1. Warm up engine to normal operating temperature.
2. Select “IACV-AAC/V ADJ” in “WORK SUPPORT” mode and touch “START”.

IACV-AAC/V ADJ	
ADJ MONITOR	
CMPS-RPM(POS)	700 rpm
CONDITION SETTING	
IACV-ACC/V	FIXED
MONITOR	
COOLAN TEMP/S	XXX°C
CLSD THL POS	XXX N

PEF120W

3. Check ignition timing at idle using a timing light.



SEF984U

Ignition timing: 15°±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-614. 2. GO TO 5.

5	CHECK BASE IDLE SPEED

With CONSULT-II

1. Select “IACV-AAC/V ADJ” in “WORK SUPPORT” mode and touch “START”.

IACV-AAC/V ADJ	
ADJ MONITOR	
CMPS-RPM(POS)	700 rpm
CONDITION SETTING	
IACV-ACC/V	FIXED
MONITOR	
COOLAN TEMP/S	XXX°C
CLSD THL POS	XXX N

PEF120W

2. Check idle speed.

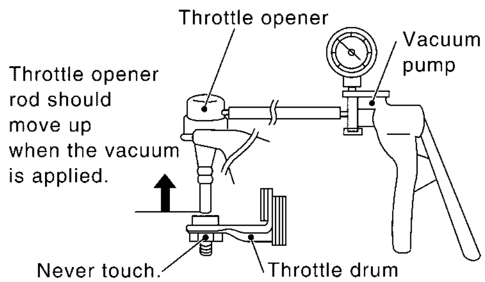
700±50 rpm (in “P” or “N” position)

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-614. 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.
4. Remove the vacuum hose connected to the throttle opener (If so equipped).
5. Connect suitable vacuum hose to vacuum pump as shown below.



SEF793W

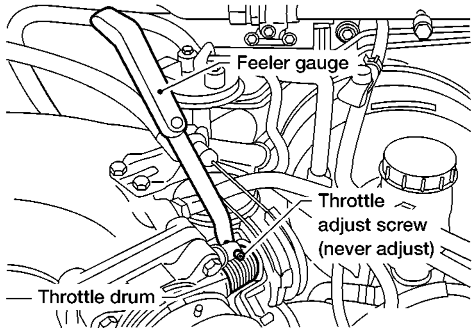
6. Apply vacuum [more than -40.0 kPa (-300 mmHg, -11.81 inHg)}

▶	GO TO 7.

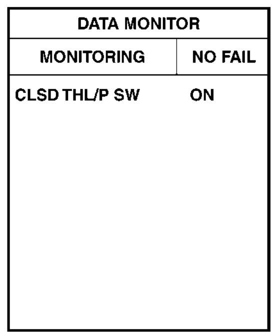
7	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

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 0.3 mm (0.012 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.



AEC887A



PEF577W

"CLSD THL/P SW" signal should remain "ON" while inserting 0.3 mm (0.012 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.

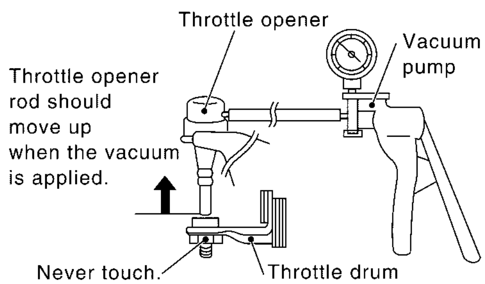
8	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION

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.
5. Remove the vacuum hose connected to the throttle opener (If so equipped).
6. Connect suitable vacuum hose to vacuum pump as shown below.



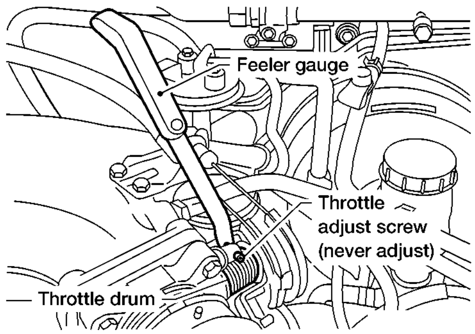
SEF793W

7. Apply vacuum [more than -40.0 kPa (-300 mmHg, -11.82 inHg)] until the throttle drum becomes free from the rod of the throttle opener. During adjustment procedure, vacuum should be applied.

▶	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 0.35 mm (0.0138 in) feeler gauge between throttle adjust screw and throttle drum as shown in the figure.



AEC887A

4. Open throttle valve and then close.
5. Check "CLSD THL/P SW" signal.

DATA MONITOR	
MONITORING	NO FAIL
CLSD THL/P SW	OFF

PEF122W

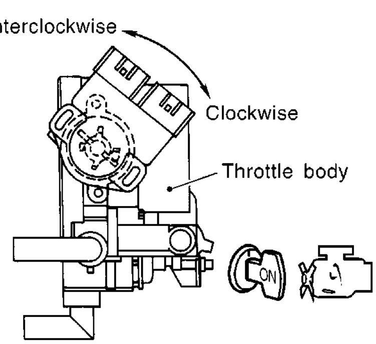
"CLSD THL/P SW" signal should remain "OFF" when the throttle valve is closed.

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

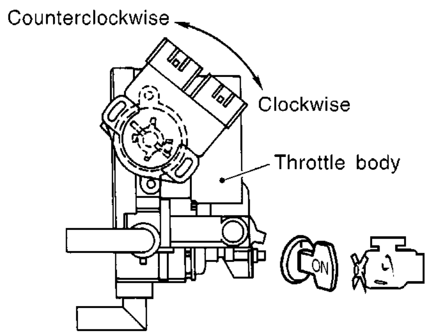
▶	GO TO 11.

11	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-IV

With CONSULT-II

1. Remove 0.35 mm (0.0138 in) feeler gauge then insert 0.3 mm (0.012 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

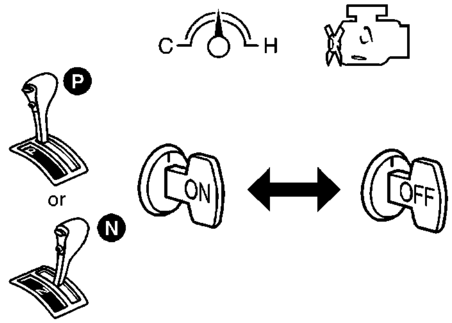
3. Make sure two or three times that the signal is “ON” when the throttle valve is closed and “OFF” when it is opened.
4. Remove 0.3 mm (0.012 in) feeler gauge then insert 0.4 mm (0.016 in) feeler gauge.
5. Make sure two or three times that the signal remains “OFF” when the throttle valve is closed.
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	
MONITORING	NO FAIL
CLSD THL POS	ON

PEF123W

▶	GO TO 13.

13	REMOVE VACUUM PUMP

1. Release vacuum from the throttle opener.
2. Remove vacuum pump and vacuum hose from the throttle opener.
3. Reinstall the original vacuum hose to the throttle opener securely.

▶	GO TO 14.

14	CHECK TARGET IDLE SPEED

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

750±50 rpm (in "P" or "N" position)

OK or NG

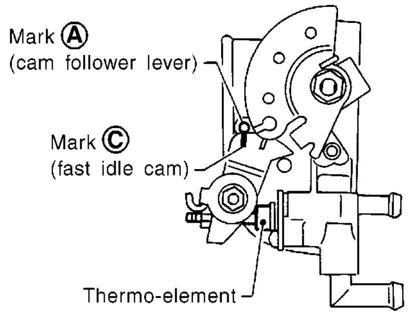
OK ▶	**INSPECTION END**
NG ▶	Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-614.

15 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

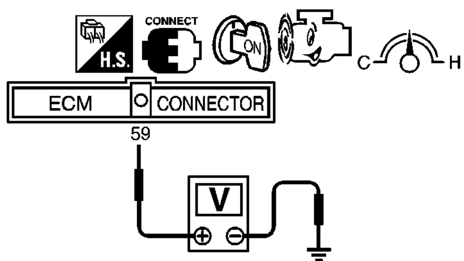
OK or NG

OK	▶	GO TO 17.
NG	▶	Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-612.

16 CHECK FI CAM FUNCTION

No Tools

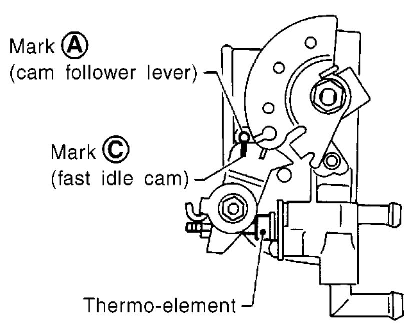
1. Set the voltmeter between ECM terminal 59 (Engine coolant temperature sensor signal) and ground.
2. Start engine and warm it up.



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

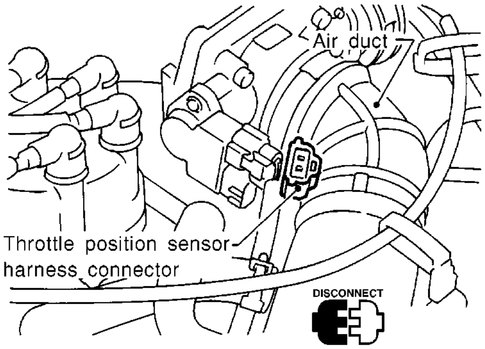
OK or NG

OK	▶	GO TO 17.
NG	▶	Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-612.

17	CHECK IGNITION TIMING

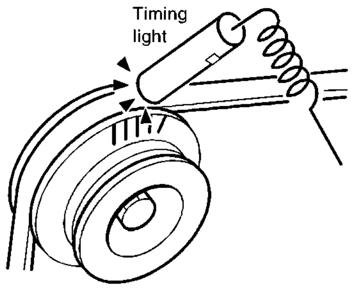
Without CONSULT-II

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: 15°±2° BTDC

OK or NG

OK	▶	GO TO 18.
NG	▶	1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/ Idle Mixture Ratio Adjustment", EC-614. 2. GO TO 18.

18	CHECK BASE IDLE SPEED

Without CONSULT-II

Does engine speed fall to the following speed?

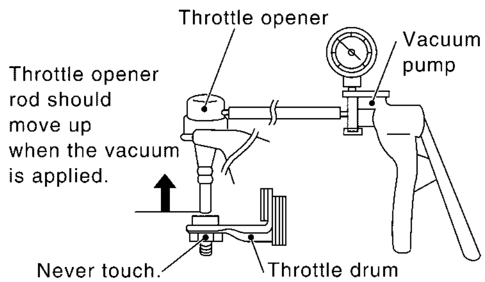
700±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 19.
NG	▶	1. Adjust engine speed by turning idle speed adjusting screw. Refer to "Idle Speed/ Ignition Timing/ Idle Mixture Ratio Adjustment", EC-614. 2. GO TO 19.

19	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.
4. Remove the vacuum hose connected to the throttle opener (If so equipped).
5. Connect suitable vacuum hose to vacuum pump as shown below.



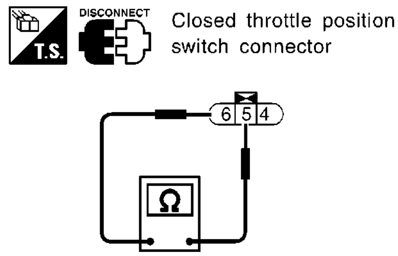
SEF793W

6. Apply vacuum [more than -40.0 kPa (-300 mmHg, -11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener. During checking procedure, vacuum should be applied.

▶	GO TO 20.

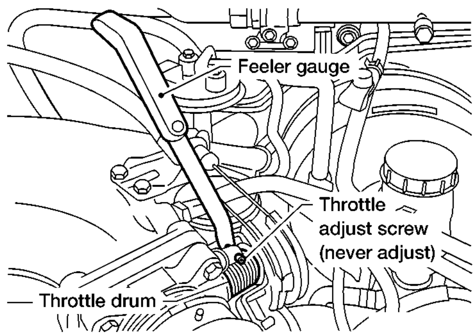
20	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-I

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 0.3 mm (0.012 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.



AEC887A

"Continuity should exist" while inserting 0.3 mm (0.012 in) feeler gauge.
"Continuity should not exist" while inserting 0.4 mm (0.016 in) feeler gauge.

OK or NG

OK	▶	GO TO 25.
NG	▶	GO TO 21.

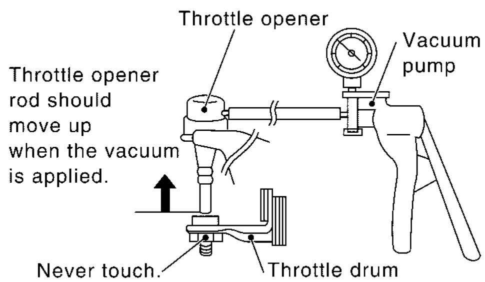
21	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION

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.
5. Remove the vacuum hose connected to the throttle opener (If so equipped).
6. Connect suitable vacuum hose to vacuum pump as shown below.



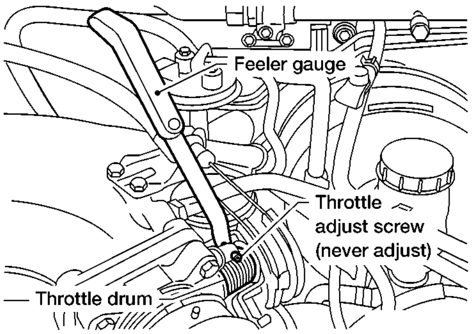
SEF793W

7. Apply vacuum [more than -40.0 kPa (-300 mmHg, -11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener. During adjustment procedure, vacuum should be applied.

▶	GO TO 22.

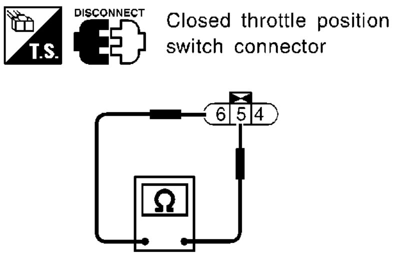
22	ADJUSTMENT CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

1. Disconnect closed throttle position switch harness connector.
2. Insert 0.35 mm (0.0138 in) feeler gauge between the throttle adjust screw and throttle drum as shown in the figure.



AEC887A

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



SEF862V

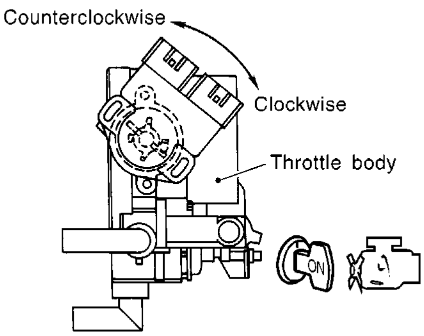
Continuity should not exist while closing the throttle position sensor.

OK or NG

OK	▶	GO TO 24.
NG	▶	GO TO 23.

23	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-III

Without CONSULT-II
Turn throttle position sensor body clockwise until continuity does not exist.



SEF689W

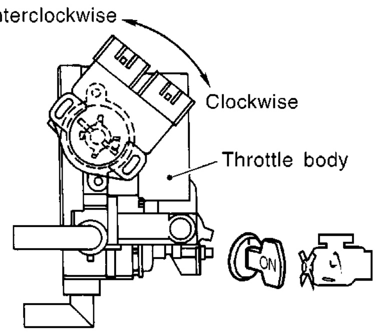
	▶	GO TO 24.

24	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-IV

Without CONSULT-II

1. Remove 0.35 mm (0.0138 in) feeler gauge then insert 0.3 mm (0.012 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 0.3 mm (0.012 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 25.
NG ▶	GO TO 21.

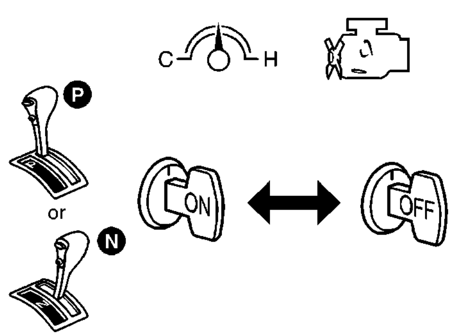
25	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

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 26.

26	REINSTALLATION
Without CONSULT-II 1. Release vacuum from the throttle opener (If so equipped). 2. Remove vacuum pump and vacuum hose from the throttle opener. 3. Reinstall the original vacuum hose to the throttle opener securely. 4. Reconnect throttle position sensor harness connector and closed throttle position switch harness connector. 5. 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 27.

27	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 28.
NG ▶	Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-614.

28	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-640 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 (0102) ● P0110 Intake air temperature sensor (0401) ● P0115 P0125 Engine coolant temperature sensor (0103) (0908) ● P0120 Throttle position sensor (0403) ● P0180 Fuel tank temperature sensor (0402) ● P0325 Knock sensor (0304) ● P0335 P1336 Crankshaft position sensor (OBD) (0802) (0905) ● P0340 Camshaft position sensor (0101) ● P0500 Vehicle speed sensor (0104) ● P0600 A/T communication line ● P0605 ECM (0301) ● P1320 Ignition signal (0201) ● P1400 EGRC-solenoid valve (1005) (If so equipped) ● P1605 A/T diagnosis communication line (0804) ● P1706 Park/Neutral position (PNP) switch (1003)
2	● P0105 Absolute pressure sensor (0803) ● P0130-P0134, P0150-P0154 Front heated oxygen sensor (0413-0415) (0503)(0509), (0303) (0409-0412) ● P0135 P0155 Front heated oxygen sensor heater (0901) (1001) ● P0137-P0140, P0157-P0160 Rear heated oxygen sensor (0510-0512) (0707), (0313-0315) (0708) ● P0141 P0161 Rear heated oxygen sensor heater (0902) (1002) ● P0443 P1444 EVAP canister purge volume control solenoid valve (1008) (0214) ● P0446 P1446 P1448 EVAP canister vent control valve (0903) (0215) (0309) ● P0450 EVAP control system pressure sensor (0704) ● P0510 Closed throttle position switch (0203) ● P0705-P0755 P1705 P1760 A/T related sensors, solenoid valves and switches (1101-1208) ● P1105 MAP/BARO switch solenoid valve (1302) ● P1401 EGR temperature sensor (0305) (If so equipped) ● P1447 EVAP control system purge flow monitoring (0111) ● P1490 P1491 Vacuum cut valve bypass valve (0801) (0311)
3	● P0171 P0172 P0174 P0175 Fuel injection system function (0115) (0114) (0210) (0209) ● P0217 Engine coolant overtemperature enrichment protection (0211) ● P0306 - P0300 Misfire (0603 - 0701) ● P0400 P1402 EGR function (0302) (0514) (If so equipped) ● P0402 EGRC-BPT valve function (0306) (If so equipped) ● P0420 P0430 Three way catalyst function (0702) (0703) ● P0440, P1440, P0455 EVAP control system (SMALL LEAK) (0705), (0213), (GROSS LEAK) (0715) ● P0505 IACV-AAC valve (0205) ● P0731-P0734 P0744 A/T function (1103 - 1106) (1107) ● P1148 P1168 Closed loop control (0307) (0308)

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.

<table>
<tr><th colspan="2">DTC No.</th><th rowspan="2">Detected items</th><th colspan="2" rowspan="2">Engine operating condition in fail-safe mode</th></tr>
<tr><th>CONSULT-II
GST</th><th>ECM*1</th></tr>
<tr><td>P0100</td><td>0102</td><td>Mass air flow sensor circuit</td><td colspan="2">Engine speed will not rise more than 2,400 rpm due to the fuel cut.</td></tr>
<tr><td rowspan="5">P0115</td><td rowspan="5">0103</td><td rowspan="5">Engine coolant temperature sensor circuit</td><td colspan="2">Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START.
CONSULT-II displays the engine coolant temperature decided by ECM.</td></tr>
<tr><td>Condition</td><td>Engine coolant temperature decided (CONSULT-II display)</td></tr>
<tr><td>Just as ignition switch is turned ON or Start</td><td>40°C (104°F)</td></tr>
<tr><td>More than approx. 4 minutes after ignition ON or Start</td><td>80°C (176°F)</td></tr>
<tr><td>Except as shown above</td><td>40 - 80°C (104 - 176°F)
(Depends on the time)</td></tr>
<tr><td rowspan="4">P0120</td><td rowspan="4">0403</td><td rowspan="4">Throttle position sensor circuit</td><td colspan="2">Throttle position will be determined based on the injected fuel amount and the engine speed.
Therefore, acceleration will be poor.</td></tr>
<tr><td>Condition</td><td>Driving condition</td></tr>
<tr><td>When engine is idling</td><td>Normal</td></tr>
<tr><td>When accelerating</td><td>Poor acceleration</td></tr>
<tr><td rowspan="8">Unable to access ECM</td><td rowspan="8">Unable to access Diagnostic Test Mode II</td><td rowspan="8">ECM</td><td colspan="2">ECM fail-safe activating condition
The computing function of the ECM was judged to be malfunctioning.
When the fail-safe system activates (i.e., if the ECM detects a malfunction condition in the CPU of ECM), the MIL on the instrument panel lights to warn the driver.
However it is not possible to access ECM and DTC cannot be confirmed.
Engine control with fail-safe
When ECM fail-safe is operating, fuel injection, ignition timing, fuel pump operation, and IACV-AAC valve operation are controlled under certain limitations.</td></tr>
<tr><td></td><td>ECM fail-safe operation</td></tr>
<tr><td>Engine speed</td><td>Engine speed will not rise more than 3,000 rpm</td></tr>
<tr><td>Fuel injection</td><td>Simultaneous multiport fuel injection system</td></tr>
<tr><td>Ignition timing</td><td>Ignition timing is fixed at the preset value</td></tr>
<tr><td>Fuel pump</td><td>Fuel pump relay is “ON” when engine is running and “OFF” when engine stalls</td></tr>
<tr><td>IACV-AAC valve</td><td>Full open</td></tr>
<tr><td colspan="2">Replace ECM, if ECM fail-safe condition is confirmed.</td></tr>
</table>

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

Symptom Matrix Chart

NGEC0562

SYSTEM — BASIC ENGINE CONTROL SYSTEM

NGEC0562S01

<table>
<tr><th colspan="2" rowspan="2"></th><th colspan="13">SYMPTOM</th><th rowspan="3">Reference page</th></tr>
<tr><th>HARD/NO START/RESTART (EXCP. HA)</th><th>ENGINE STALL</th><th>HESITATION/SURGING/FLAT SPOT</th><th>SPARK KNOCK/DETONATION</th><th>LACK OF POWER/POOR ACCELERATION</th><th>HIGH IDLE/LOW IDLE</th><th>ROUGH IDLE/HUNTING</th><th>IDLING VIBRATION</th><th>SLOW/NO RETURN TO IDLE</th><th>OVERHEATS/WATER TEMPERATURE HIGH</th><th>EXCESSIVE FUEL CONSUMPTION</th><th>EXCESSIVE OIL CONSUMPTION</th><th>BATTERY DEAD (UNDER CHARGE)</th></tr>
<tr><td colspan="2">Warranty symptom code</td><td>AA</td><td>AB</td><td>AC</td><td>AD</td><td>AE</td><td>AF</td><td>AG</td><td>AH</td><td>AJ</td><td>AK</td><td>AL</td><td>AM</td><td>HA</td></tr>
<tr><td rowspan="4">Fuel</td><td>Fuel pump circuit</td><td rowspan="2">1</td><td rowspan="2">1</td><td rowspan="2">2</td><td rowspan="2">3</td><td rowspan="2">2</td><td rowspan="2"></td><td>3</td><td rowspan="2">2</td><td rowspan="2"></td><td rowspan="12"></td><td rowspan="2">3</td><td rowspan="4"></td><td>1</td><td>EC-1153</td></tr>
<tr><td>Injector circuit</td><td>2</td><td rowspan="5"></td><td>EC-1145</td></tr>
<tr><td>Fuel pressure regulator system</td><td rowspan="3">4</td><td rowspan="3">4</td><td rowspan="3">4</td><td rowspan="3">4</td><td rowspan="3">4</td><td rowspan="3">4</td><td rowspan="3">4</td><td rowspan="3">3</td><td rowspan="3">3</td><td rowspan="3">4</td><td>EC-611</td></tr>
<tr><td>Evaporative emission system</td><td>EC-603</td></tr>
<tr><td rowspan="4">Air</td><td>Positive crankcase ventilation system</td><td>1</td><td>EC-609</td></tr>
<tr><td>Incorrect idle speed adjustment</td><td>3</td><td>3</td><td></td><td></td><td></td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td rowspan="9"></td><td>EC-614</td></tr>
<tr><td>IACV-AAC valve circuit</td><td rowspan="2">2</td><td>1</td><td rowspan="2">3</td><td rowspan="2">3</td><td rowspan="2">3</td><td>2</td><td>2</td><td rowspan="2">2</td><td rowspan="2">2</td><td rowspan="2">3</td><td>1</td><td>EC-992</td></tr>
<tr><td>IACV-FICD solenoid valve circuit</td><td>2</td><td>3</td><td>3</td><td rowspan="5"></td><td>EC-1165</td></tr>
<tr><td rowspan="2">Ignition</td><td>Incorrect ignition timing adjustment</td><td>3</td><td>3</td><td>1</td><td>1</td><td>1</td><td rowspan="3"></td><td>1</td><td>1</td><td rowspan="3"></td><td>1</td><td>EC-614</td></tr>
<tr><td>Ignition circuit</td><td>1</td><td>1</td><td rowspan="2">2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>EC-1028</td></tr>
<tr><td rowspan="2">EGR (If so equipped</td><td>EGRC-solenoid valve circuit</td><td></td><td>2</td><td>3</td><td>3</td><td></td><td></td><td>3</td><td>EC-1043</td></tr>
<tr><td>EGR system</td><td>4</td><td>4</td><td>4</td><td>4</td><td>4</td><td>4</td><td>4</td><td>3</td><td>3</td><td>4</td><td>EC-919, 1055</td></tr>
<tr><td colspan="2">Main power supply and ground circuit</td><td>1</td><td rowspan="2">2</td><td rowspan="2">3</td><td rowspan="2">3</td><td rowspan="2">3</td><td></td><td rowspan="2">3</td><td rowspan="2">2</td><td></td><td>1</td><td rowspan="2">3</td><td rowspan="2">1</td><td>EC-707</td></tr>
<tr><td colspan="2">Air conditioner circuit</td><td>2</td><td>3</td><td>2</td><td></td><td>***HA-22***</td></tr>
</table>

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			2				2						EC-912
Mass air flow sensor circuit		1	2		2						2			EC-713
Front heated oxygen sensor circuit				3			2							EC-763
Engine coolant temperature sensor circuit	1	2	3		3	3			2		3			EC-739, 758
Throttle position sensor circuit		1	2		2	2					2			EC-744
Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-669
Vehicle speed sensor circuit		2												EC-988
Knock sensor circuit			3	3	3						3			EC-902
ECM	2	2				3	3	2	2	1				EC-1011, 687
Start signal circuit	1													EC-1150
Park/neutral position (PNP) switch circuit			3		3		3	2			3			EC-1124
Power steering oil pressure switch circuit		2												EC-1160

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

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													***FE-4***
	Fuel piping			5	5	5		5	4			5			
	Vapor lock		5												
	Valve deposit	5		5	5	5		5	4			5			
	Poor fuel (Heavy weight gasoline, Low octane)														—
Air	Air duct														
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor — throttle body)		5	5	5	5		5	4			5			
	Throttle body, Throttle wire	5					5			4					***FE-3***
	Air leakage from intake manifold/ Collector/Gasket				5										—
Cranking	Battery		1	1		1		1	1			1		1	
	Generator circuit	1													***SC-3***
	Starter circuit														
	Park/neutral position (PNP) switch														***AT-99***
	Drive plate/Flywheel	6													***EM-110***

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			
	Cylinder head gasket										2		2		
	Cylinder block														
	Piston												3		
	Piston ring	6	6	6	6	6		6	6			6			
	Connecting rod														
	Bearing														***EM-75***, ***EM-84*** and ***EM-102***
	Crankshaft														
Valve mechanism	Timing chain														
	Camshaft	6													
	Intake valve		6	6	6	6		6	6			6	2		
	Exhaust valve														
	Hydraulic lash adjuster														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	6	6	6	6	6		6	6			6			***FE-8***
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	6	6	6	6	6		6	6			6	2		***MA-30***, ***EM-72*** and ***LC-20***
	Oil level (Low/Filthy) oil														***MA-30***
Cooling	Radiator/Hose/Radiator filler cap														
	Thermostat						5			5					
	Water pump														***LC-26***
	Water gallery	6	6	6	6	6		6	6		2	6			
	Cooling fan						5			5					
	Coolant level (low)/Contaminated coolant														***MA-27***

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
CMPS·RPM (POS) CMPS·RPM (REF)	• 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)
FR O2 SEN-B2 FR O2 SEN-B1	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V $\longleftrightarrow$ Approx. 0.6 - 1.0V
FR O2 MNTR-B2 FR O2 MNTR-B1			LEAN $\longleftrightarrow$ RICH Changes more than 5 times during 10 seconds.
RR O2 SEN-B1 RR O2 SEN-B2	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V $\longleftrightarrow$ Approx. 0.6 - 1.0V
RR O2 MNTR-B1 RR O2 MNTR-B2			LEAN $\longleftrightarrow$ 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
EGR TEMP SEN (If so equipped)	• Engine: After warming up		Less than 4.5V
START SIGNAL	• Ignition switch: ON $\rightarrow$ START $\rightarrow$ ON		OFF $\rightarrow$ ON $\rightarrow$ 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
EGRC SOL/V (If so equipped)	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: "N" • No-load	Idle	OFF (CUT)
		Engine speed: Revving from idle up to 3,000 rpm quickly	ON (FLOW)
VENT CONT/V	• Ignition switch: ON		OFF
FR O2 HTR-B1 FR O2 HTR-B2	• Engine speed: Below 3,200 rpm		ON
	• Engine speed: Above 3,200 rpm		OFF
RR O2 HTR-B1 RR O2 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

MONITOR ITEM	CONDITION		SPECIFICATION
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%
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
MAP/BARO SW/V	• Ignition switch: ON (Engine stopped)		MAP
	• Engine speed: Idle	For 5 seconds after starting engine	BARO
		More than 5 seconds after starting engine	MAP
ABSOL PRES/SE	• Ignition switch: ON (Engine stopped)		Approx. 4.4V
	• Engine speed: Idle	For 5 seconds after starting engine	Approx. 4.4V
		More than 5 seconds after starting engine	Approx. 1.3V

Major Sensor Reference Graph in Data Monitor Mode

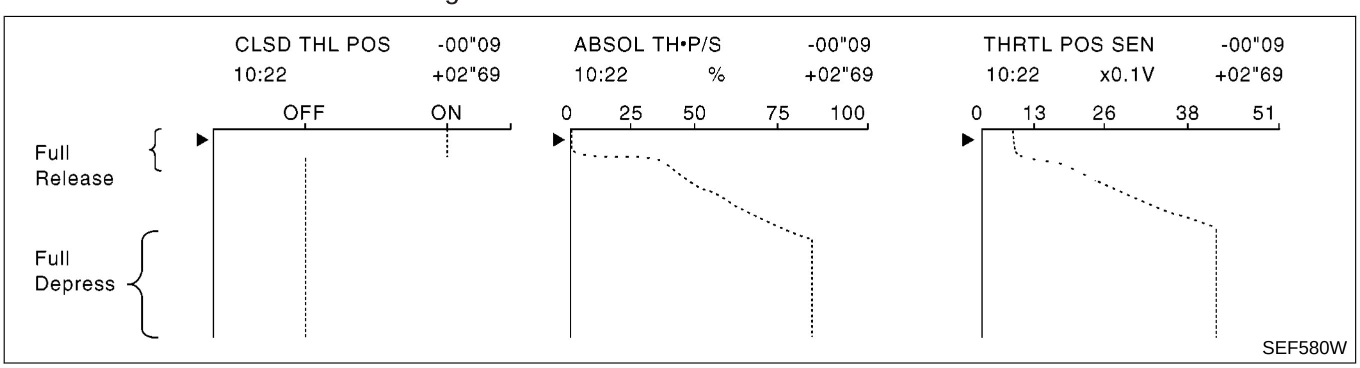
NGEC0564

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".

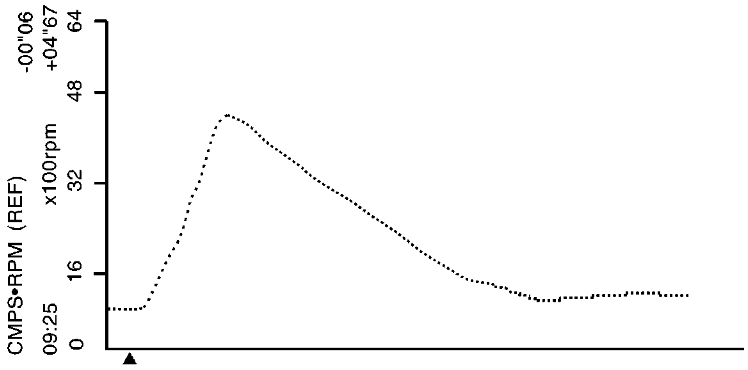


SEF580W

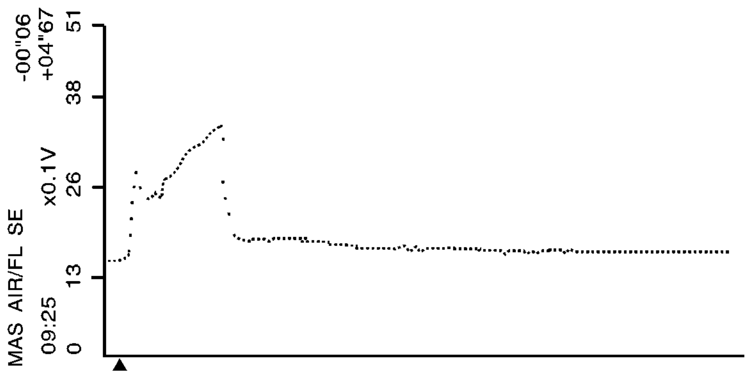
CMPS·RPM (REF), MAS AIR/FL SE, THRTL POS SEN, RR O2 SEN-B1, FR O2 SEN-B1, INJ PULSE-B1

NGEC0564S02

Below is the data for "CMPS·RPM (REF)", "MAS AIR/FL SE", "THRTL POS SEN", "RR O2 SEN-B1", "FR O2 SEN-B1" and "INJ PULSE-B1" when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.
Each value is for reference, the exact value may vary.

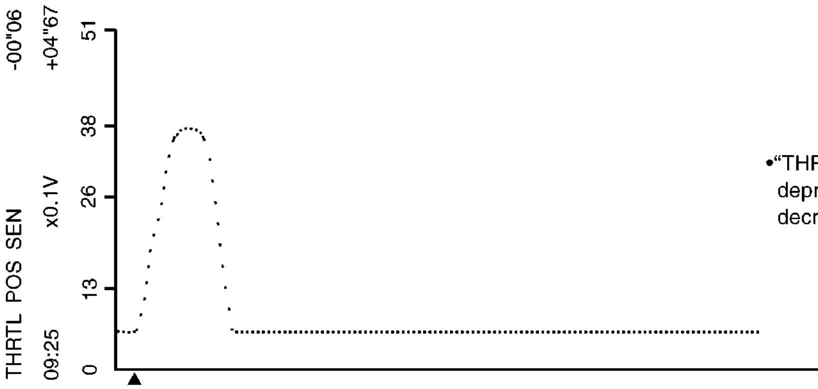


- "CMPS•RPM (REF)" should increase gradually while depressing the accelerator pedal and should decrease gradually after releasing the pedal without any intermittent drop or rise.

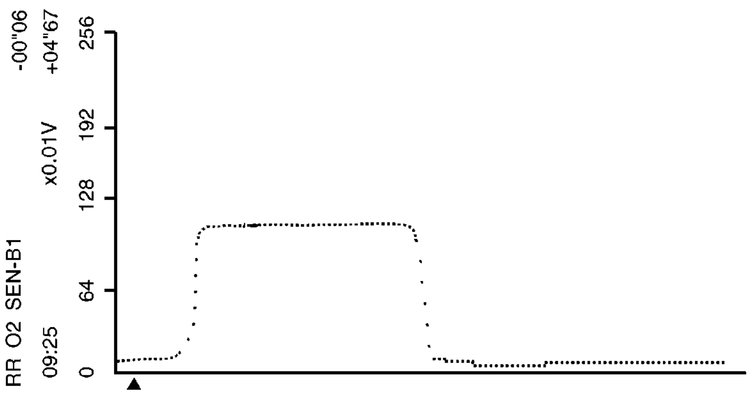


- "MAS AIR/FL SE" should increase when depressing the accelerator pedal and should decrease at the moment "THRTL POS SEN" is closed (accelerator pedal is released).

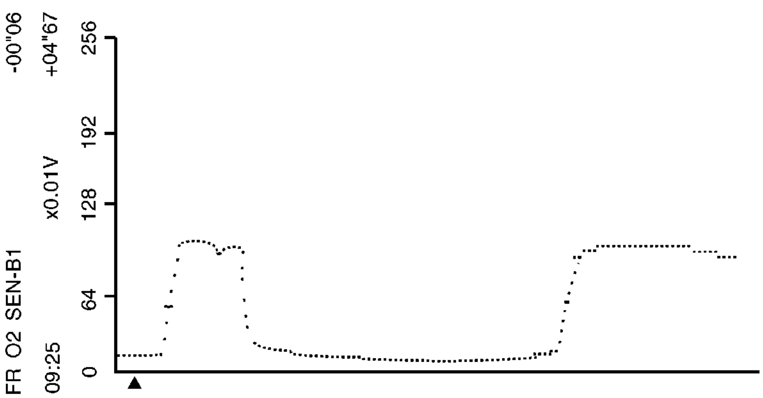
SEF935QA



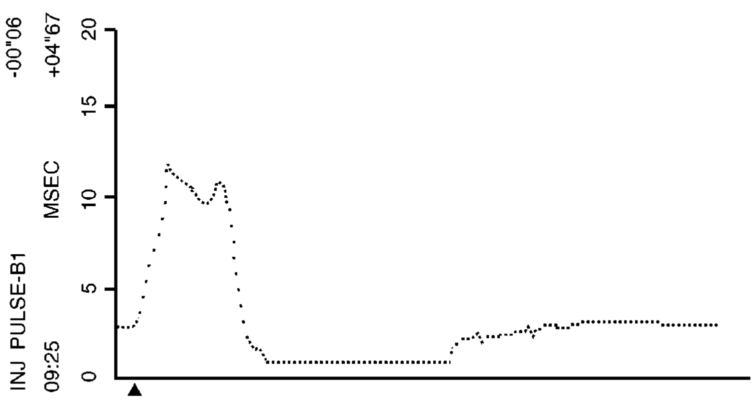
•"THRTL POS SEN" should increase while depressing the accelerator pedel and should decrease while releasing it.



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



•"FR O2 SEN-B1" may increase immediately after depressing the accelerator pedel 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.

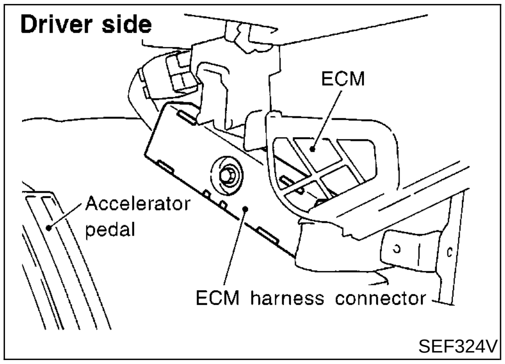
SEF936Q

ECM Terminals and Reference Value

NGEC0565

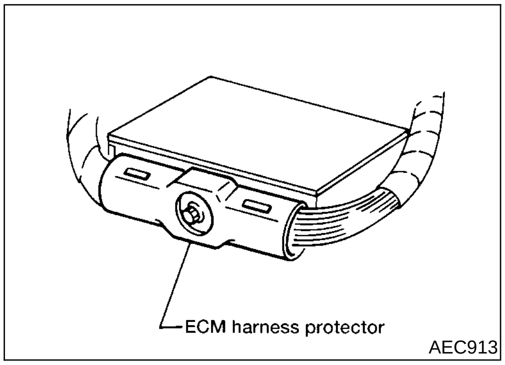
PREPARATION

NGEC0565S01



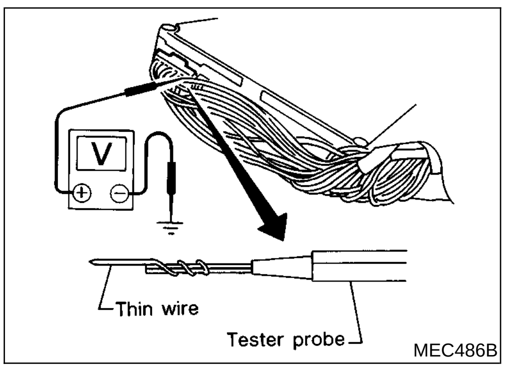
SEF324V

1. ECM is located behind the instrument lower cover. For this inspection:
- Remove instrument lower cover.



AEC913

2. Remove ECM harness protector.

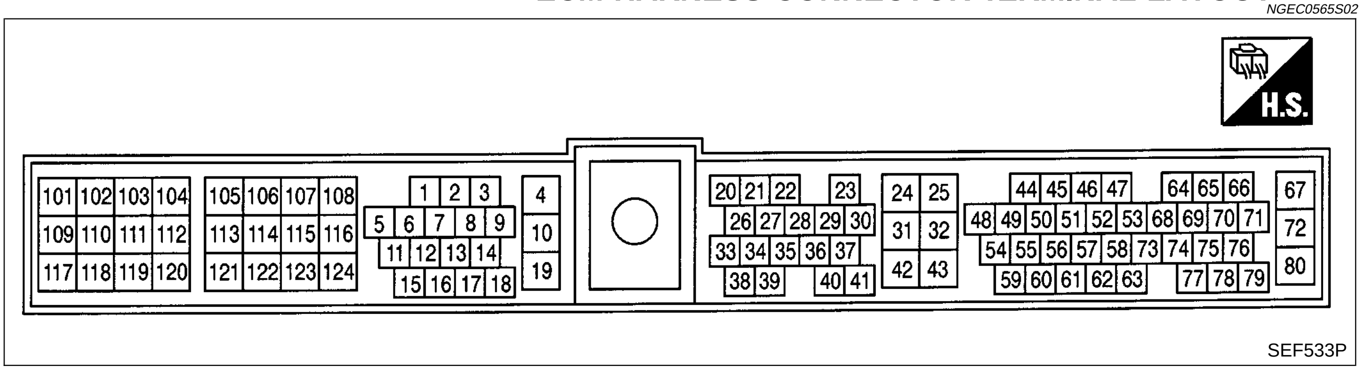


MEC486B

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

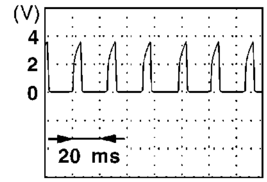
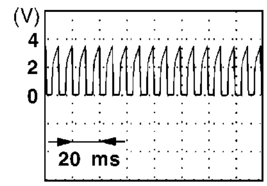
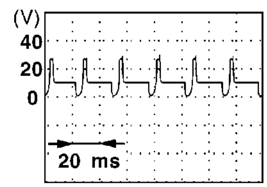
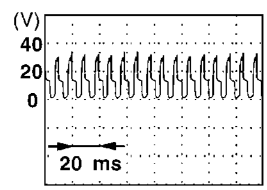
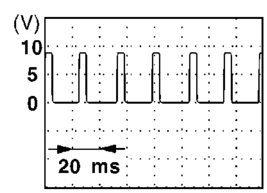
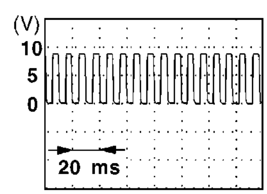


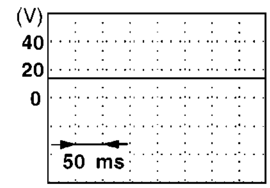
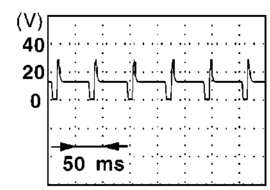
SEF533P

ECM INSPECTION TABLE

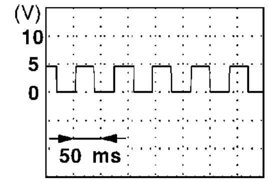
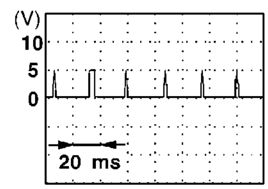
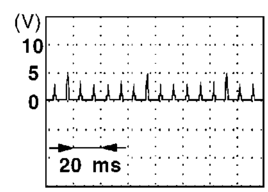
NGEC0565S03

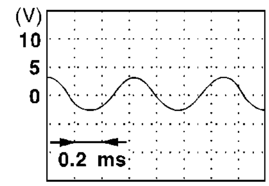
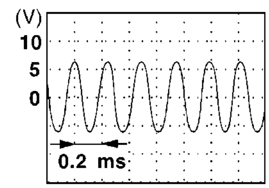
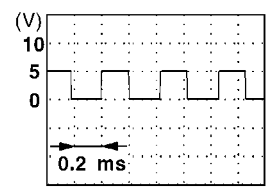
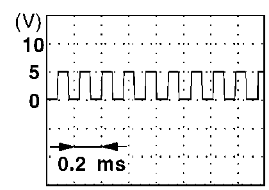
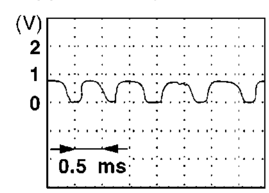
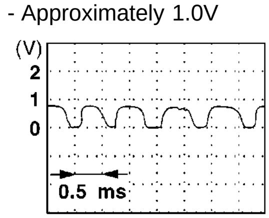
Specification data are reference values and are measured between each terminal and 32 (ECM ground).

TER-MINAL 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
2	B	Ignition check	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 12V  SEF990U
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 11V  SEF991U
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

TER-MINAL 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 sole-noid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF994U
			[Engine is running] ● Engine speed is 2,000 rpm (More than 100 sec-onds 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 tempera-ture 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*	0 - 1V
			[Engine is running] ● A/C switch is OFF	BATTERY VOLTAGE (11 - 14V)

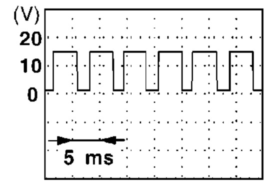
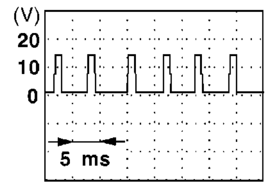
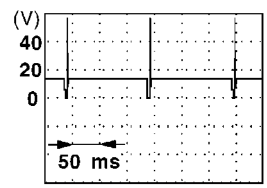
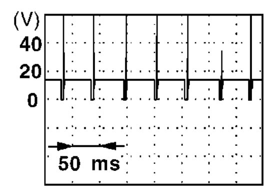
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
18	R/W	Malfunction indicator lamp	**[Ignition switch ON]**	0 - 1V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
19	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
20	L/OR	Start signal	**[Ignition switch ON]**	Approximately 0V
			[Ignition switch START]	9 - 12V
21	G/R	Air conditioner switch	**[Engine is running]** ● Both A/C switch and blower switch are ON (Compressor operates)*	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

TER-MINAL 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)	2 - 3V  SEF996U
32	B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground (Probe this terminal with (−) tester probe when measuring)
35	G/R	A/T signal No. 3	**[Ignition switch ON]**	0V
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 - 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 48	PU 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
45	B/R	Absolute pressure sensor	**[Ignition switch ON]** ● Engine is not running **[Engine is running]** ● Idle (for 5 seconds after engine start)	Approximately 4.4V
			[Engine is running] ● Idle (More than 5 seconds after engine start)	Approximately 1.3V

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC 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
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	Front heated oxygen sensor RH	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V
51	G	Front heated oxygen sensor LH	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V

TER-MINAL 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
56	OR	Rear heated oxygen sensor RH	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V
57	Y	Rear heated oxygen sensor LH	**[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
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	**[Ignition switch ON]**	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 2.5V
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)

ECM Terminals and Reference Value (Cont'd)

TER-MINAL 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
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
**103	G/W	EGRC-solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Engine speed is revving from idle up to 3,000 rpm quickly	0 - 1.5V
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)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
118	Y/B	MAP/BARO switch solenoid valve	**[Ignition switch ON]** ● Engine is not running ● For 5 seconds after ignition switch is turned ON **[Engine is running]** ● Idle (for 5 seconds after engine start)	0 - 1V
			[Ignition switch ON] ● Engine is not running ● More than 5 seconds after ignition switch is turned ON **[Engine is running]** ● Idle (More than 5 seconds after engine start)	BATTERY VOLTAGE (11 - 14V)
119	BR/Y	Front heated oxygen sensor heater RH	**[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	Front heated oxygen sensor heater LH	**[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	Rear heated oxygen sensor heater RH	**[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	Rear heated oxygen sensor heater LH	**[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)
124	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

*: Any mode except OFF, ambient air temperature is above 25°C (77°F).

**: If equipped with EGR valve.

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-640.	
▶	GO TO 2.

2	CHECK GROUND TERMINALS
Check ground terminals for corroding or loose connection. Refer to “Circuit Inspection”, “GROUND INSPECTION”, ***GI-29***. **OK or NG**	
OK ▶	GO TO 3.
NG ▶	Repair or replace.

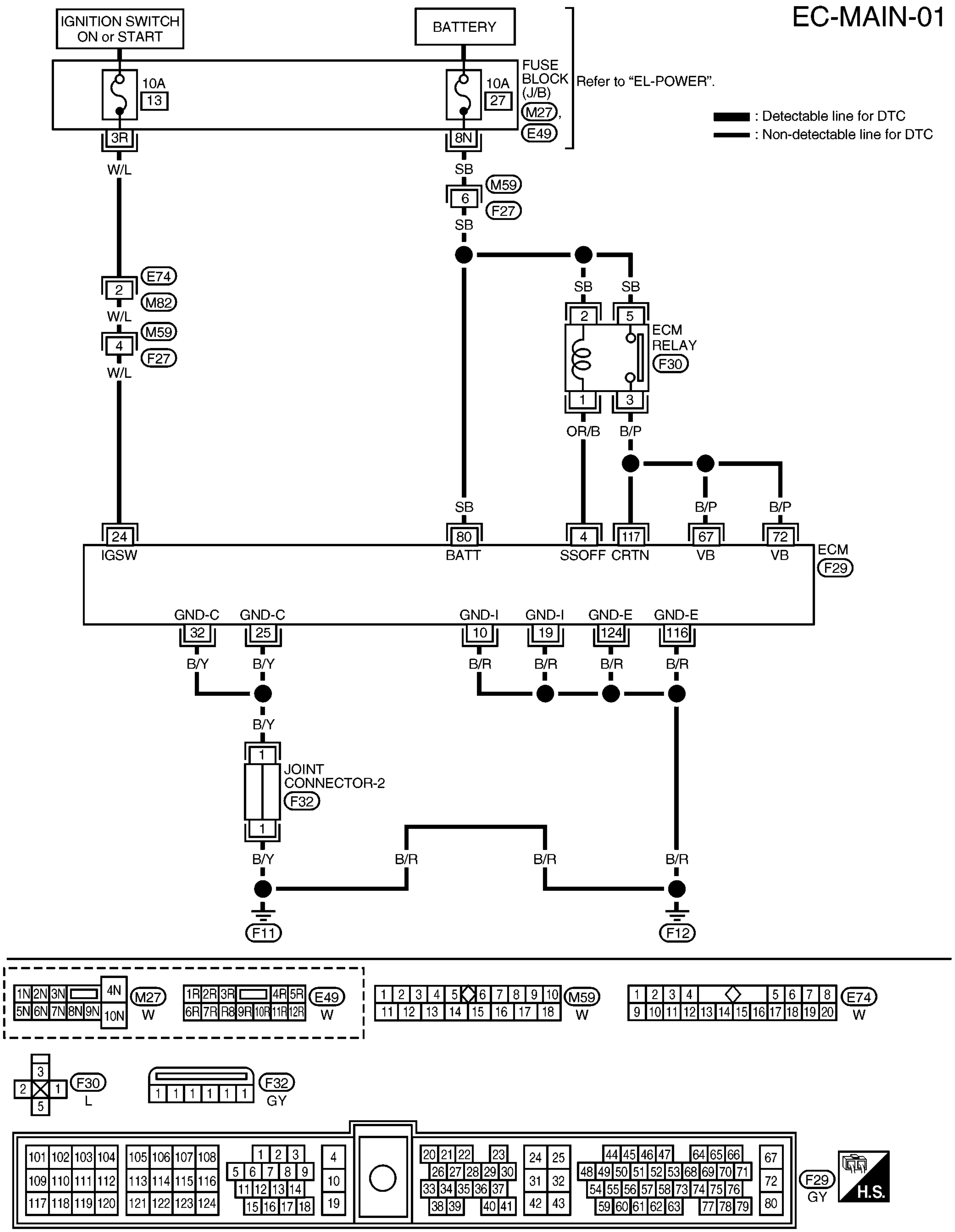
3	SEARCH FOR ELECTRICAL INCIDENT
Perform “Incident Simulation Tests”, ***GI-24***. **OK or NG**	
OK ▶	GO TO 4.
NG ▶	Repair or replace.

4	CHECK CONNECTOR TERMINALS
Refer to “How to Check Enlarged Contact Spring of Terminal”, ***GI-21***. **OK or NG**	
OK ▶	**INSPECTION END**
NG ▶	Repair or replace connector.

Main Power Supply and Ground Circuit

WIRING DIAGRAM

NGEC0568



AEC938A

ECM TERMINALS AND REFERENCE VALUE

NGEC0569

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	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

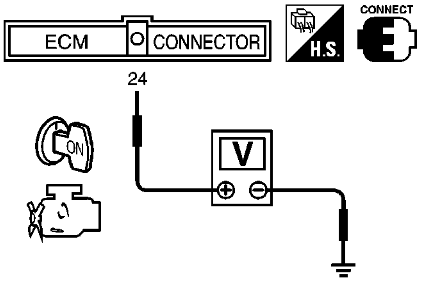
DIAGNOSTIC PROCEDURE

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 ground and short to power.

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 5.

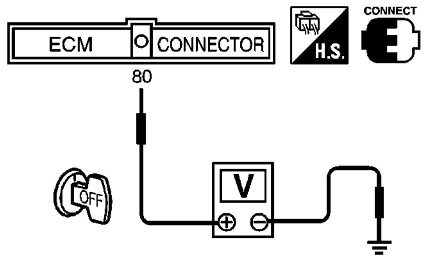
5	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-2
- Harness for open or short between ECM and engine ground

	▶	Repair open circuit or short to ground 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.

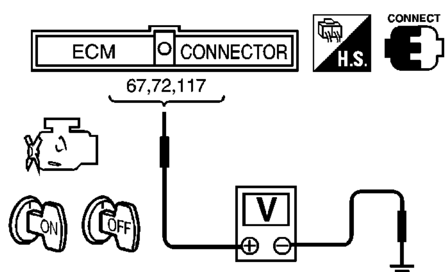
7	DETECT MALFUNCTIONING PART

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

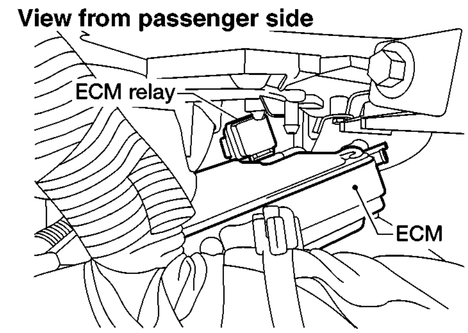
Voltage:
After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0V.

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.

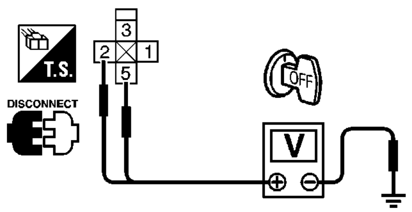
9	CHECK ECM POWER SUPPLY CIRCUIT-IV

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

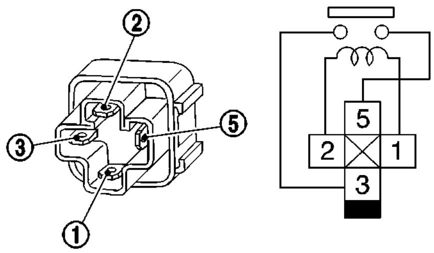
1. Check harness continuity between ECM terminals 67, 72, 117 and ECM relay terminal 3.
   Refer to WIRING DIAGRAM.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

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.

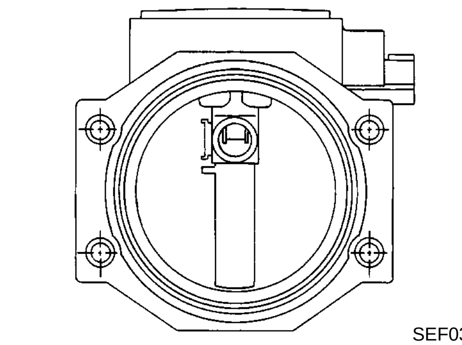
14	CHECK ECM GROUND CIRCUIT-II FOR OPEN AND SHORT

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 ground and 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-706.	
▶	**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 32 (ECM 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.

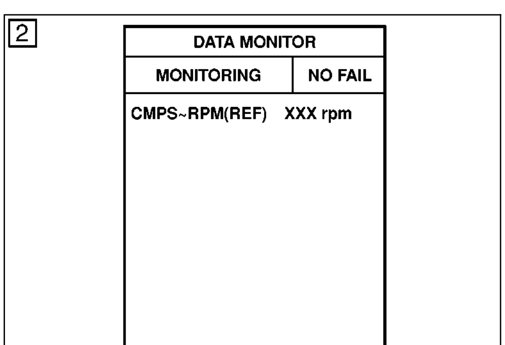
Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

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.



PEF356V

PROCEDURE FOR MALFUNCTION A

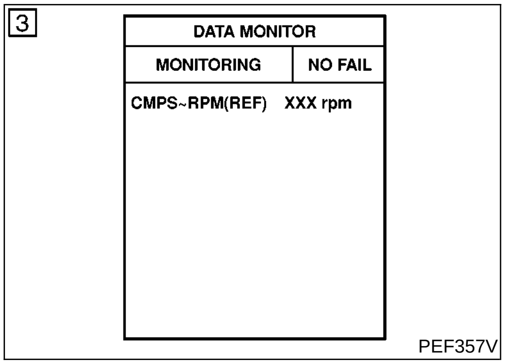
NGEC0575S01

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-718.

With GST

Follow the procedure "With CONSULT-II".



PROCEDURE FOR MALFUNCTION B

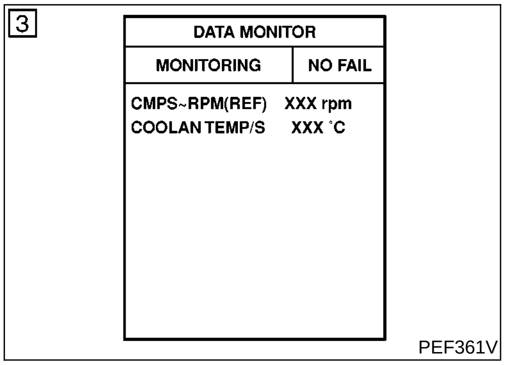
NGEC0575S02

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-718.

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-718.

With GST

Follow the procedure “With CONSULT-II”.

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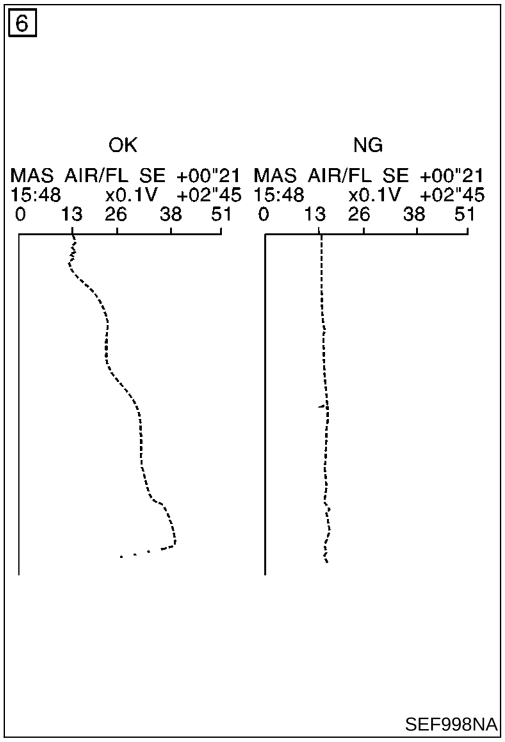
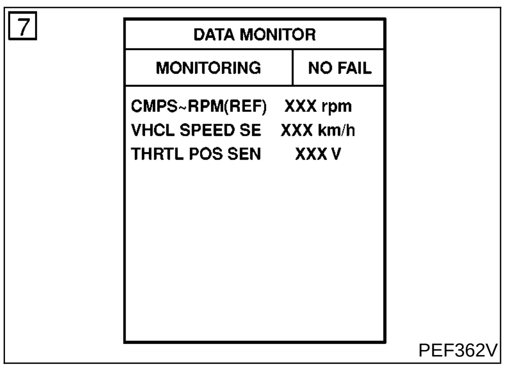


SEF998NA



PEF362V

PROCEDURE FOR MALFUNCTION D

NGEC0575S04

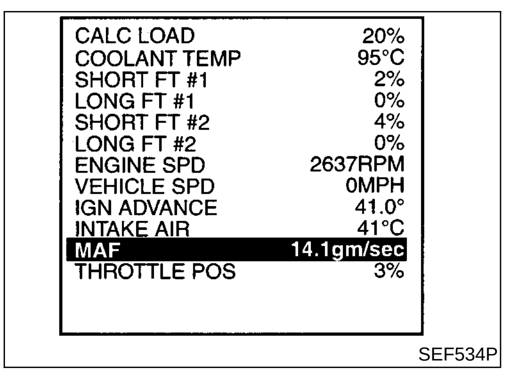
CAUTION:
Always drive vehicle at a safe speed.

With CONSULT-II

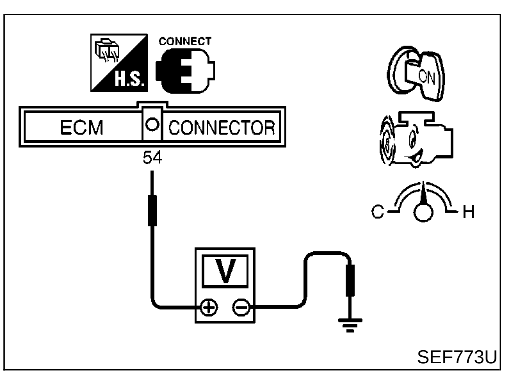
1) Turn ignition switch "ON".
2) Start engine and warm it up to normal operating temperature. **If engine cannot be started, go to "Diagnostic Procedure", EC-718.**
3) Select "DATA MONITOR" mode with CONSULT-II.
4) Check the voltage of MAS AIR/FL SE with "DATA MONITOR".
5) Increases engine speed to about 4,000 rpm.
6) Monitor the linear voltage rise in response to engine speed increases.
   If NG, go to "Diagnostic Procedure", EC-718.
   If OK, go to following step.
7) Maintain the following conditions for at least 10 consecutive seconds.

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

8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-718.



SEF534P



SEF773U

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

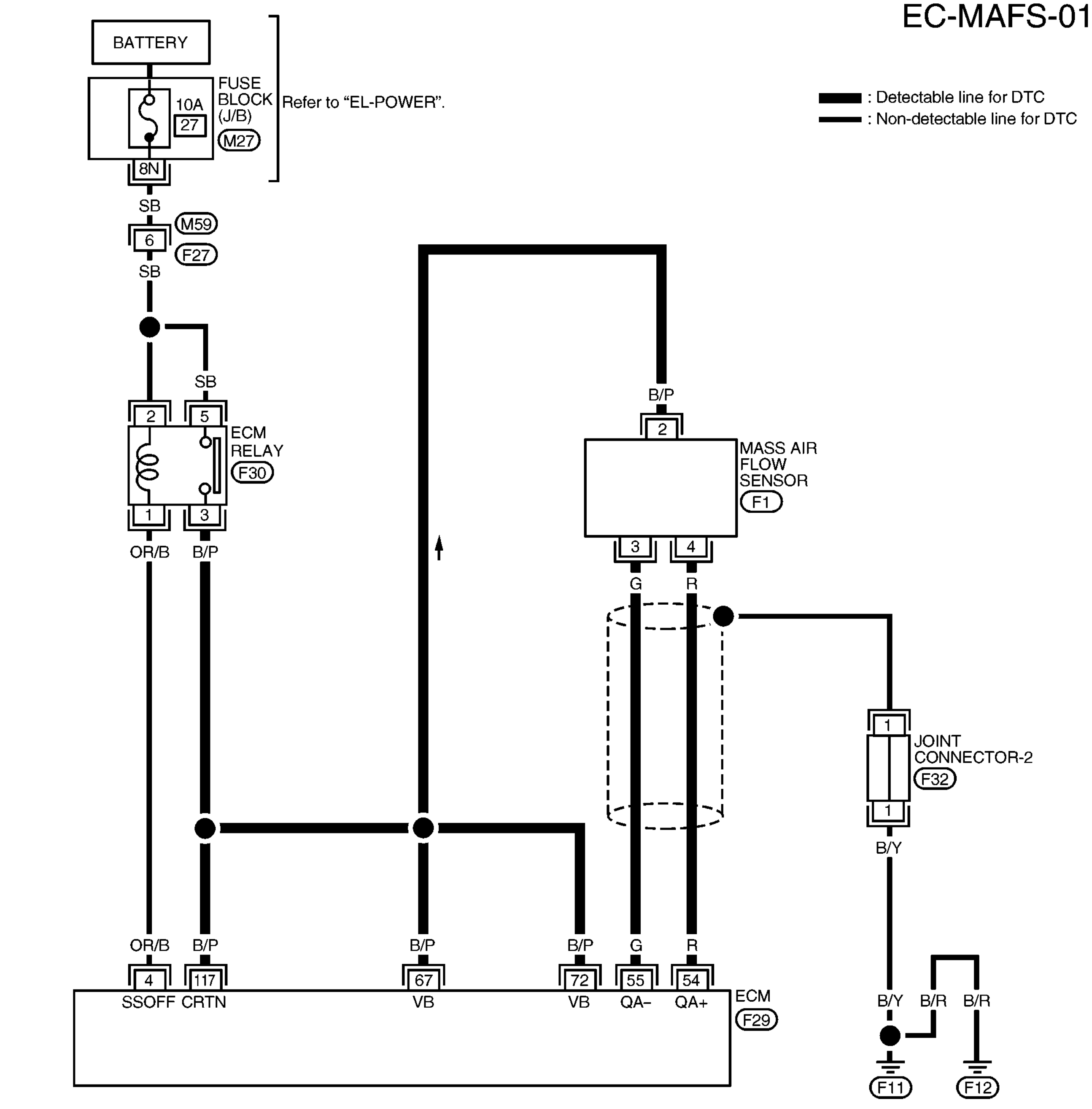
1) Start engine and warm it up to normal operating temperature.
2) Select "MODE 1" with GST.
3) Check the mass air flow sensor signal with "MODE 1".
4) Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.
5) If NG, go to "Diagnostic Procedure", EC-718.

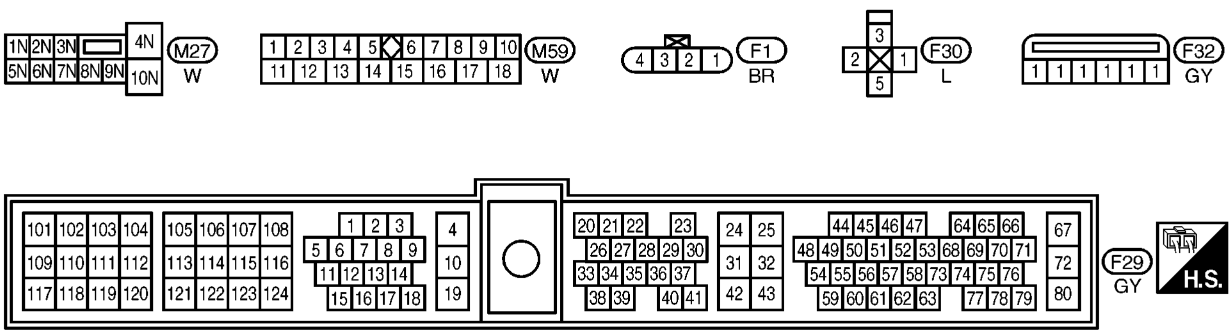
No Tools

1) Start engine and warm it up to normal operating temperature.
2) Check the voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.
3) Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.
4) If NG, go to "Diagnostic Procedure", EC-718.

Wiring Diagram

NGEC0577





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

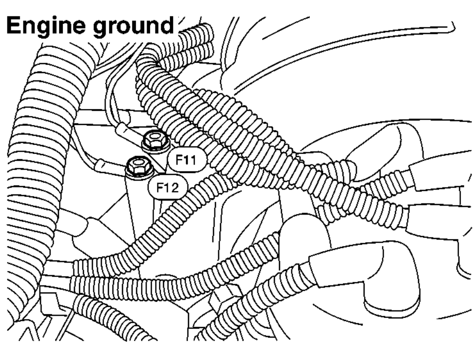
Check the following for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold collector

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.

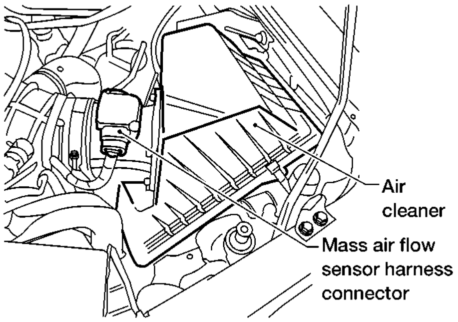


AEC640A

▶	GO TO 4.

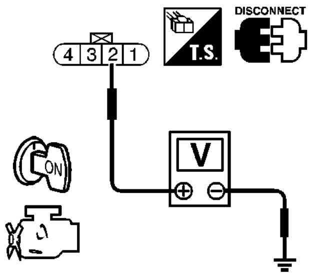
4	CHECK MAFS POWER SUPPLY CIRCUIT

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 ground and short to power.

OK or NG

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

7	CHECK MAFS INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

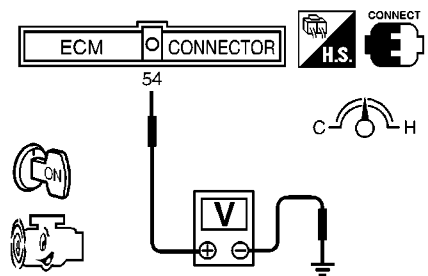
1. Check harness continuity between MAFS terminal 4 and ECM terminal 54.
   Refer to Wiring Diagram.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

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.

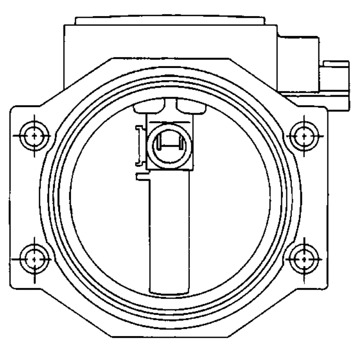


SEF747U

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.



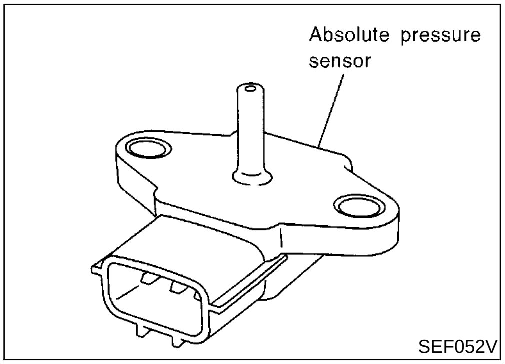
SEF030T

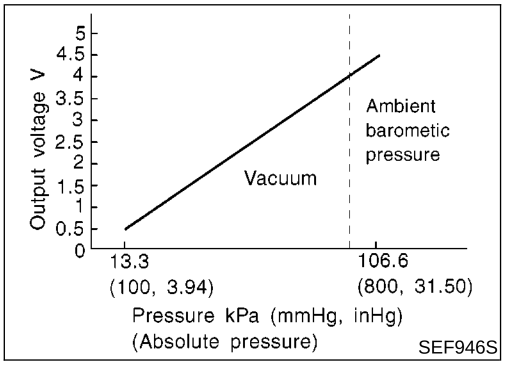
OK or NG

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", ***EL-292***.) **Continuity should exist.** 4. Also check harness for short to ground and short to power. 5. Then reconnect joint connector-2. **OK or NG**		
OK	▶	GO TO 10.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.		
	▶	**INSPECTION END**





Component Description

NGEC0579

The absolute pressure sensor is connected to the MAP/BARO switch solenoid valve by a hose. The sensor detects ambient barometric pressure and intake manifold absolute pressure and sends the voltage signal to the ECM. As the pressure increases, the voltage rises.

On Board Diagnosis Logic

NGEC0580

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

NGEC0580S01

Malfunction A

NGEC0580S0101

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

Malfunction B

NGEC0580S0102

- Hoses
  (Hoses between the intake manifold and absolute pressure sensor are disconnected or clogged.)
- Intake air leaks
- MAP/BARO switch solenoid valve
- Absolute pressure sensor

Malfunction C

NGEC0580S0103

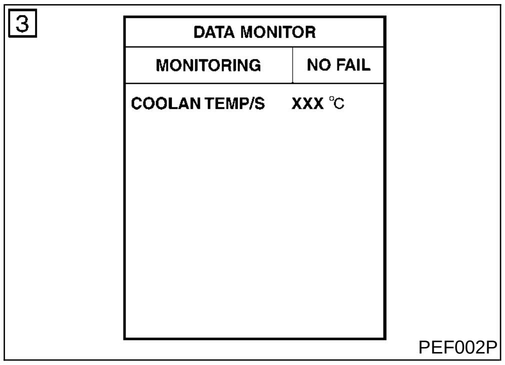
- Absolute pressure sensor

DTC Confirmation Procedure

NGEC0581

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

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



PROCEDURE FOR MALFUNCTION A

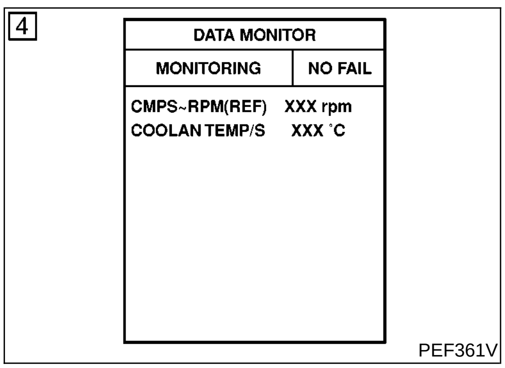
NGEC0581S01

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-726.

With GST

Follow the procedure "With CONSULT-II".



PROCEDURE FOR MALFUNCTION B

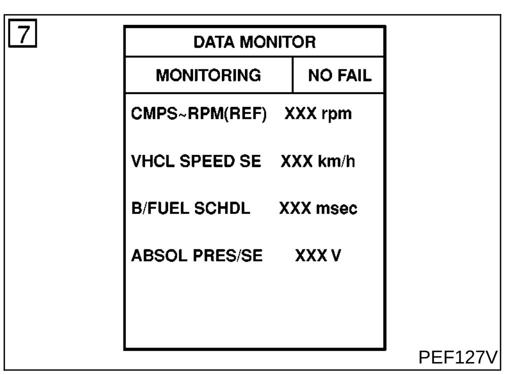
NGEC0581S02

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 "DATA MONITOR" mode with CONSULT-II.
4) Start engine and let it idle.
5) Wait at least 15 seconds.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-726.

With GST

Follow the procedure "With CONSULT-II".



PROCEDURE FOR MALFUNCTION C

NGEC0581S03

CAUTION:
Always drive vehicle at a safe speed.

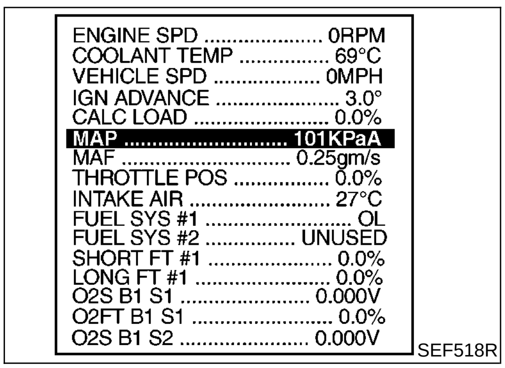
With CONSULT-II

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
   The voltage of "ABSOL PRES/SE" should be more than 1.74 [V].
   If the check result is NG, go to "Diagnostic Procedure", EC-726.
   If the check result is OK, go to following step.

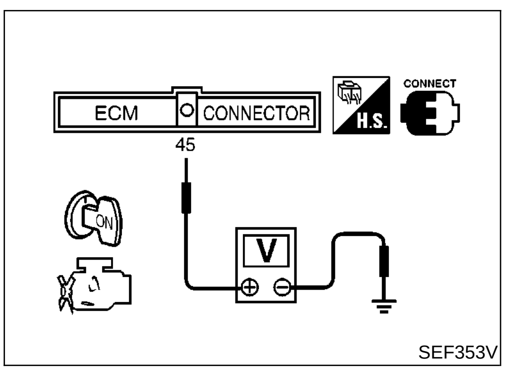
3) Start engine and warm it up to normal operating temperature.
4) Turn ignition switch OFF and wait at least 5 seconds.
5) Start engine and let it idle for at least 13 seconds.
6) Select "DATA MONITOR" mode with CONSULT-II.
7) Drive the vehicle at least 3 consecutive seconds under the following conditions,

CMPS·RPM (REF)	3,000 - 4,800 rpm
B/FUEL SCHDL	More than 4.6 msec
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-726.



SEF518R



SEF353V

Overall Function Check

NGEC0582

PROCEDURE FOR MALFUNCTION C

NGEC0582S01

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

With GST

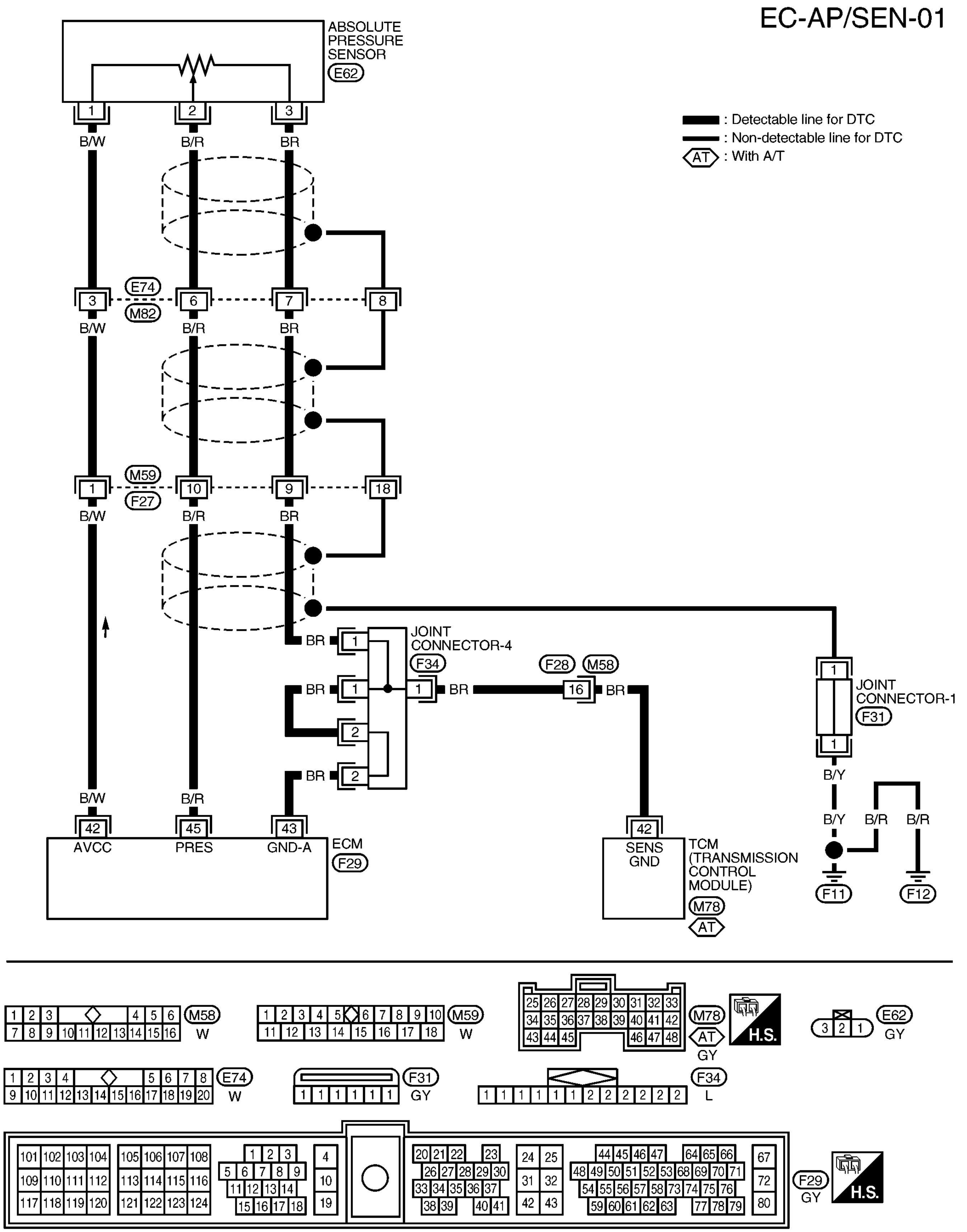
1) Turn ignition switch ON.
2) Select absolute pressure sensor signal in "MODE 1" with GST.
3) Make sure that the signal is more than 46 kPa (0.47 kg/cm^2, 6.7 psi).
4) If NG, go to "Diagnostic Procedure", EC-726.

No Tools

1) Turn ignition switch ON.
2) Make sure that the voltage between ECM terminal 45 (Absolute pressure sensor signal) and ground is more than 1.74 [V].
3) If NG, go to "Diagnostic Procedure", EC-726.

Wiring Diagram

NGEC0583



AEC940A

GI
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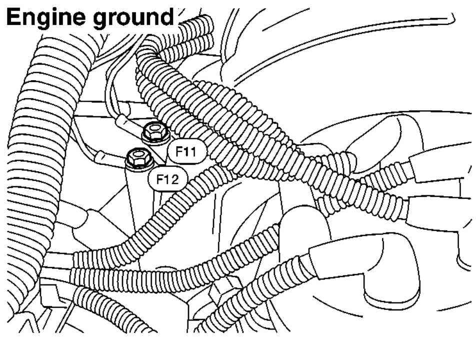
Diagnostic Procedure

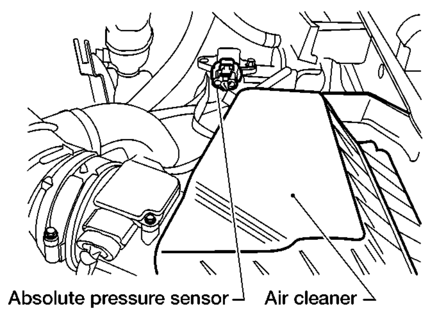
NGEC0584

If the trouble is duplicated after “PROCEDURE FOR MALFUNCTION A or C”, perform “PROCEDURE A” below. If the trouble is duplicated after “PROCEDURE FOR MALFUNCTION B”, perform “PROCEDURE B”, EC-730.

PROCEDURE A

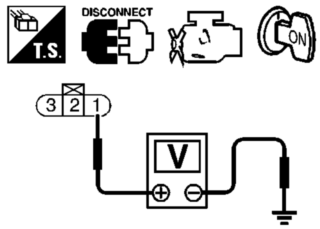
NGEC0584S01

1	RETIGHTEN GROUND SCREWS
1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.  AEC640A	
▶	GO TO 2.

2	CHECK ABSOLUTE PRESSURE SENSOR CONNECTOR FOR WATER
1. Disconnect absolute pressure sensor harness connector.  AEC642A 2. Check sensor harness connector for water. **Water should not exist.** **OK or NG**	
OK ▶	GO TO 3.
NG ▶	Repair or replace harness connector.

3	CHECK ABSOLUTE PRESSURE SENSOR POWER SUPPLY CIRCUIT

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



SEF200W

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E74, M82
- Harness connectors M59, F27
- Harness for open or short between ECM and absolute pressure sensor

	▶	Repair harness or connectors.

5	CHECK ABSOLUTE PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E74, M82
- Harness connectors M59, F27
- Harness connectors F28, M58
- Joint connector-4
- Harness for open or short between ECM and absolute pressure sensor
- Harness for open or short between TCM (Transmission Control Module) and absolute pressure sensor

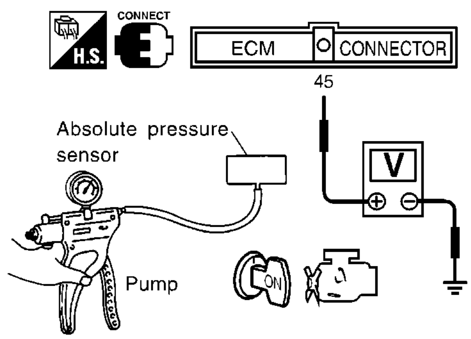
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

7	CHECK ABSOLUTE PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 45 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 9.
NG ▶	GO TO 8.

8	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E74, M82 ● Harness connectors M59, F27 ● Harness for open or short between ECM and absolute pressure sensor	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.
2. Remove hose from absolute pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 45 and engine ground.



SEF749U

The voltage should be 3.2 to 4.8V.

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

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

OK or NG

OK ▶	GO TO 10.
NG ▶	Replace absolute pressure sensor.

10	CHECK ABSOLUTE PRESSURE SENSOR 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 Refer to Wiring Diagram. ● Joint connector (Refer to "HARNESS LAYOUT", ***EL-292***.) **Continuity should exist.** 4. Also check harness for short to ground and short to power. 5. Then reconnect joint connector-1. **OK or NG**	
OK ▶	GO TO 11.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

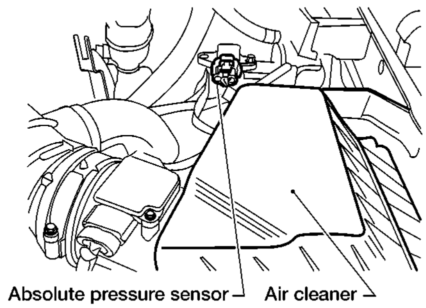
11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.	
▶	**INSPECTION END**

PROCEDURE B

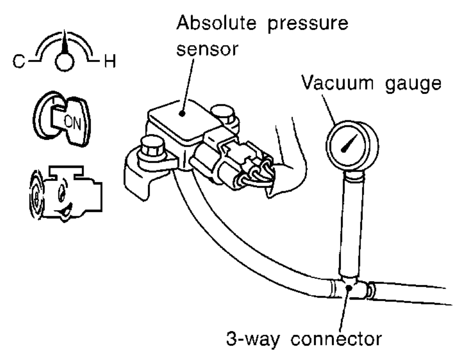
=NGEC0584S02

1 INSPECTION START

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



AEC642A



SEF385U

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

2 CHECK VACUUM SOURCE TO ABSOLUTE PRESSURE SENSOR

(With CONSULT-II)

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

ACTIVE TEST	
MAP/BARO SW/V	MAP
MONITOR	
CMPS~RPM (REF)	XXXrpm
MAP/BARO SW/V	MAP
ABSOL PRES/SE	XXXV

ACTIVE TEST	
MAP/BARO SW/V	BARO
MONITOR	
CMPS~RPM (REF)	XXXrpm
MAP/BARO SW/V	BARO
ABSOL PRES/SE	XXXV

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

SEF183X

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 4.

3 CHECK VACUUM SOURCE TO ABSOLUTE PRESSURE SENSOR

(Without CONSULT-II)
1. Start engine and let it idle.
2. Check for vacuum under the following condition.

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

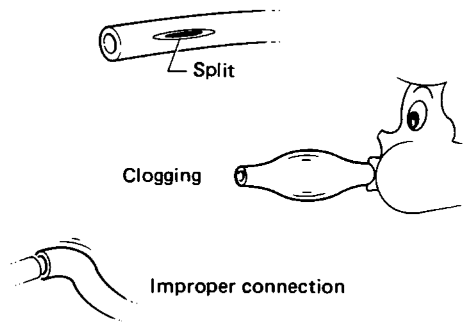
MTBL0080

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 4.

4 CHECK VACUUM HOSE

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



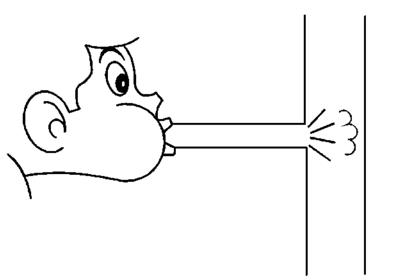
SEF109L

OK or NG

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

5 CHECK VACUUM PORT

Check vacuum port for clogging.



SEF368U

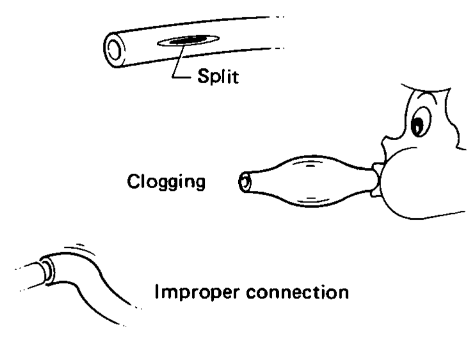
OK or NG

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

6	CHECK MAP/BARO SWITCH SOLENOID VALVE
Refer to "Component Inspection", EC-669.	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Replace MAP/BARO switch solenoid valve.

7	CHECK INTAKE SYSTEM
Check intake system for air leaks.	
OK or NG	
OK ▶	GO TO 11.
NG ▶	Repair it.

8	CHECK HOSE BETWEEN ABSOLUTE PRESSURE SENSOR AND MAP/BARO SWITCH SOLENOID VALVE
1. Turn ignition switch OFF. 2. Check hose for clogging, cracks, disconnection or improper connection.	



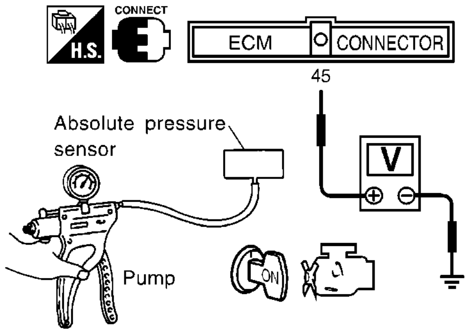
SEF109L

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

9	CHECK ABSOLUTE PRESSURE SENSOR HARNESS CONNECTOR FOR WATER
1. Disconnect absolute pressure sensor harness connector. 2. Check sensor harness connector for water. **Water should not exist.**	
OK or NG	
OK ▶	GO TO 10.
NG ▶	Repair or replace harness connector.

10	CHECK ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.
2. Remove hose from absolute pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 45 and engine ground.



SEF749U

The voltage should be 3.2 to 4.8V.

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

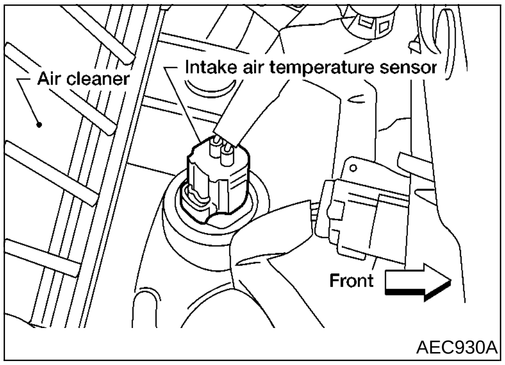
CAUTION:

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

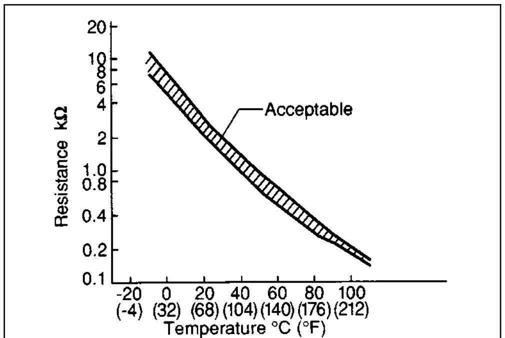
OK or NG

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

11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.	
▶	**INSPECTION END**



AEC930A



SEF012P

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 ECM terminal 32 (ECM 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

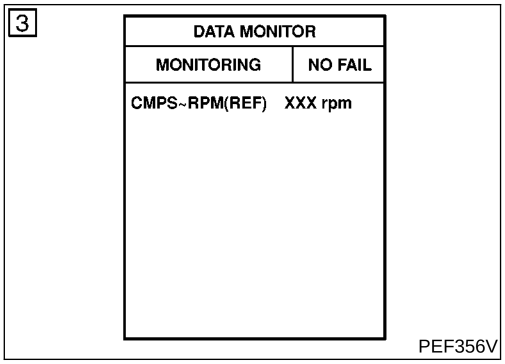
- Harness or connectors
  (The sensor circuit is open or shorted.)
- Intake air temperature sensor

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.



PROCEDURE FOR MALFUNCTION A

NGEC0587S01

With CONSULT-II

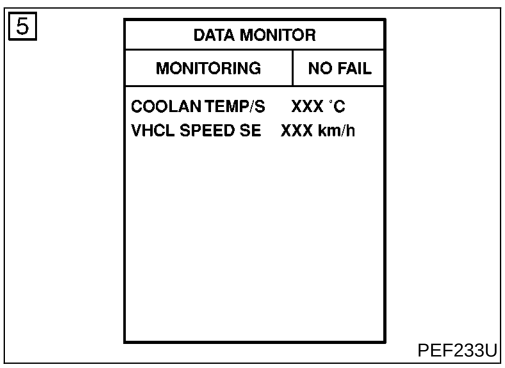
1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-737.

With GST

Follow the procedure "With CONSULT-II".

No Tools

1) Turn ignition switch ON and wait at least 5 seconds.
2) Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-737.



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

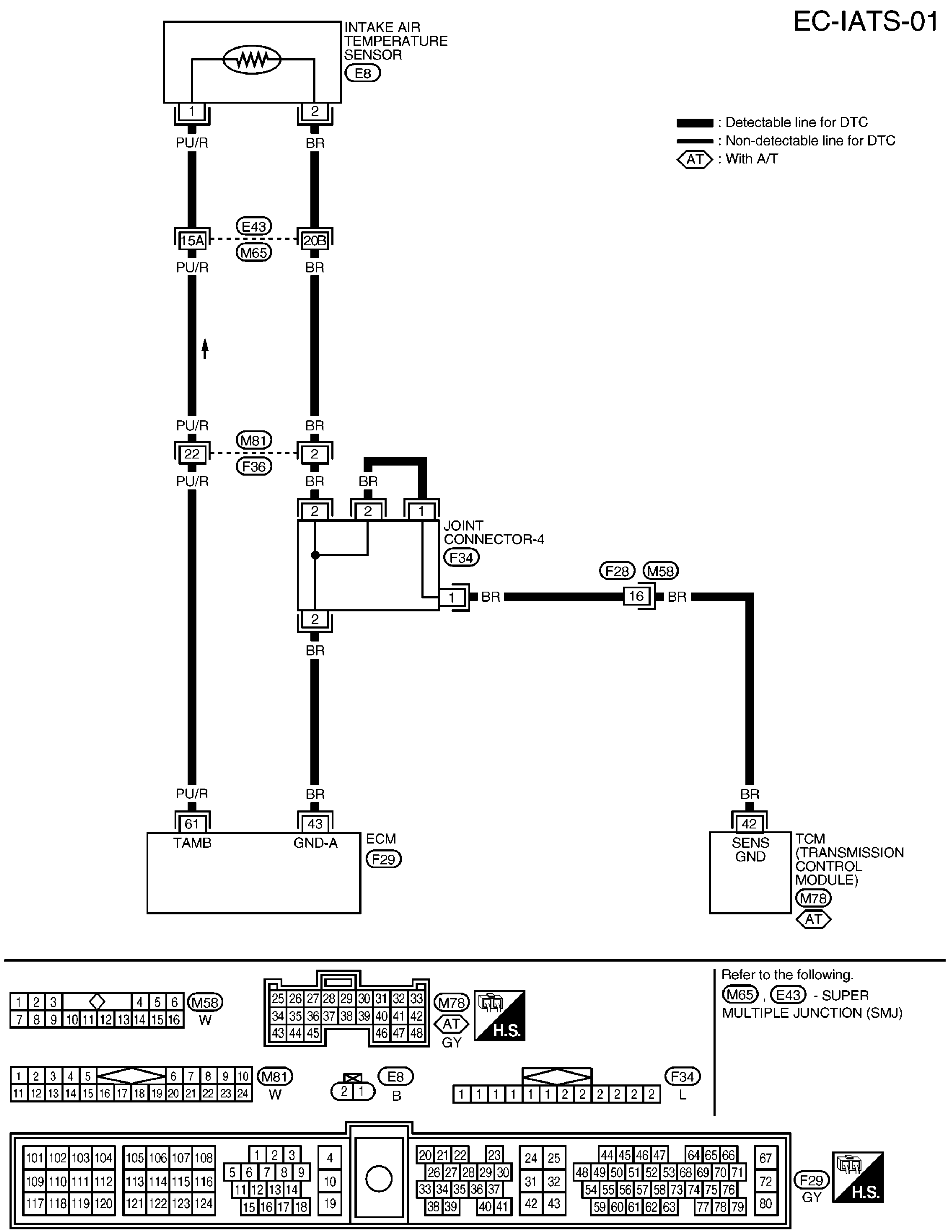
1) Wait until engine coolant temperature is less than 90°C (194°F).
a) Turn ignition switch ON.
b) Select "DATA MONITOR" mode with CONSULT-II.
c) Check the engine coolant temperature.
d) If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch OFF and cool down engine.
- 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-737.

With GST

Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC0588



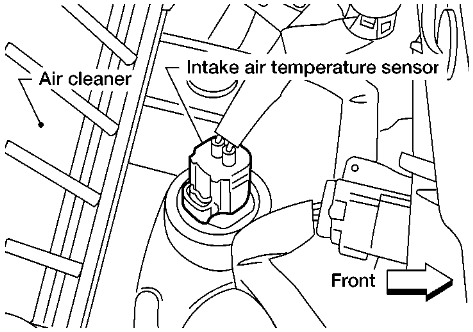
AEC941A

Diagnostic Procedure

NGEC0589

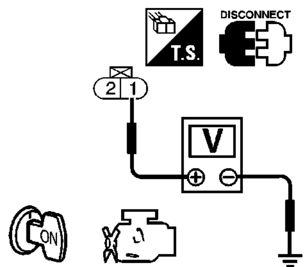
1	CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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



AEC930A

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 ground and short to power.

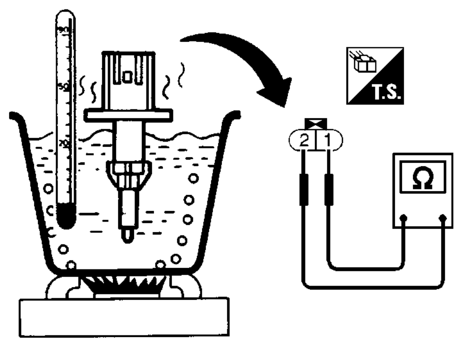
OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors 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 ground or short to power in harness or connectors.

5	CHECK INTAKE AIR TEMPERATURE SENSOR

Check resistance as shown in the figure.

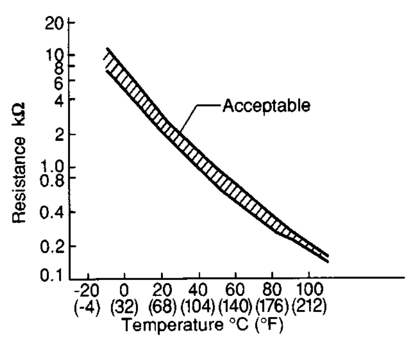


SEF947Q

<Reference data>

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

MTBL0228

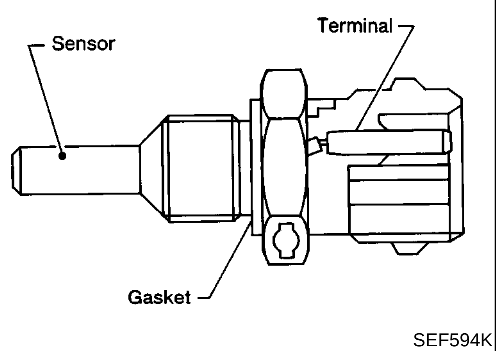


SEF012P

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-706.	
▶	**INSPECTION END**

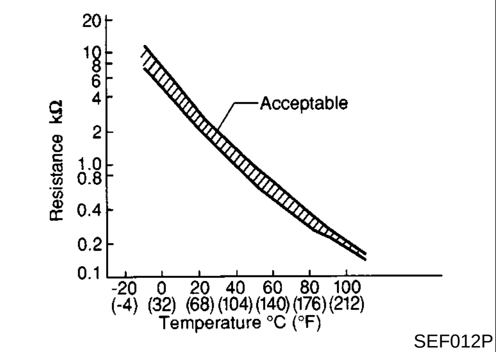


SEF594K

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.



SEF012P

<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 ECM terminal 32 (ECM 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

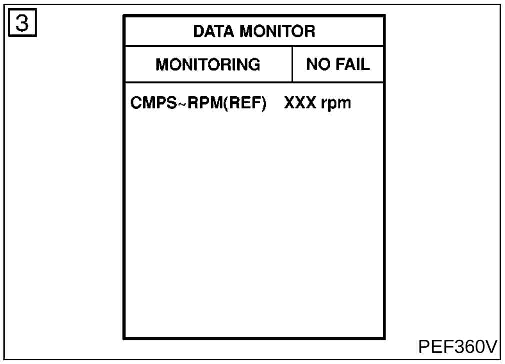
- Harness or connectors
  (The sensor circuit is open or shorted.)
- Engine coolant temperature sensor

FAIL-SAFE MODE

NGEC0591S02

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

<table>
<tr><th>Detected items</th><th colspan="2">Engine operating condition in fail-safe mode</th></tr>
<tr><td rowspan="5">Engine coolant temperature sensor circuit</td><td colspan="2">Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START.
CONSULT-II displays the engine coolant temperature decided by ECM.</td></tr>
<tr><td>Condition</td><td>Engine coolant temperature decided (CONSULT-II display)</td></tr>
<tr><td>Just as ignition switch is turned ON or Start</td><td>40°C (104°F)</td></tr>
<tr><td>More than approx. 4 minutes after ignition ON or Start</td><td>80°C (176°F)</td></tr>
<tr><td>Except as shown above</td><td>40 - 80°C (104 - 176°F)
(Depends on the time)</td></tr>
</table>



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

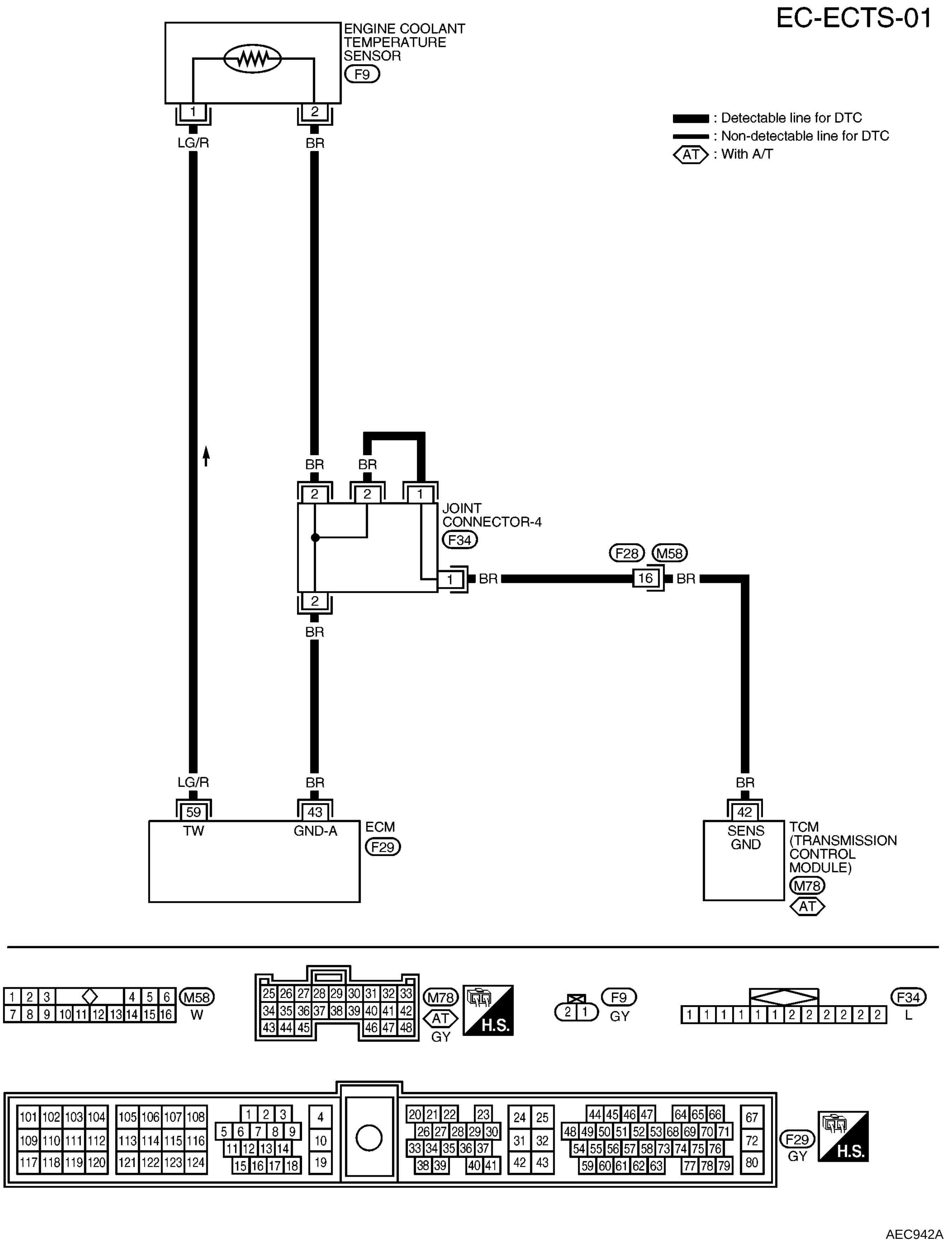
1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Wait at least 5 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-742.

With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0593

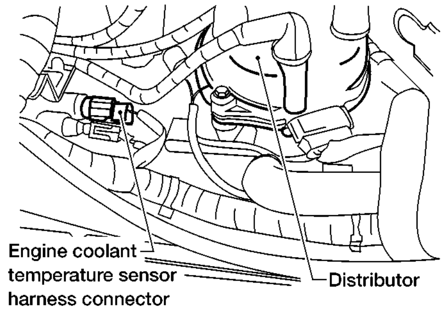


Diagnostic Procedure

NGEC0594

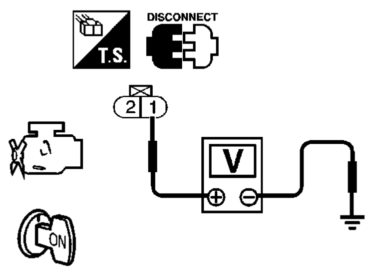
1	CHECK ECTS POWER SUPPLY CIRCUIT	

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 CIRCUIT

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

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

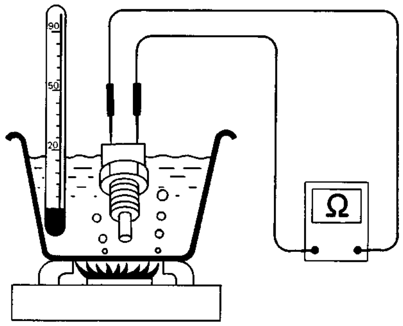
3	DETECT MALFUNCTIONING PART

Check the following.
- Harness 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 ground or short to power in harness or connectors.

4	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.

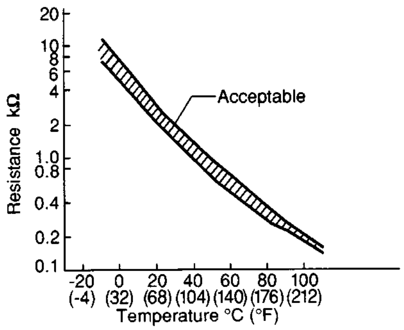


SEF152P

<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-706.

	▶	**INSPECTION END**

Description

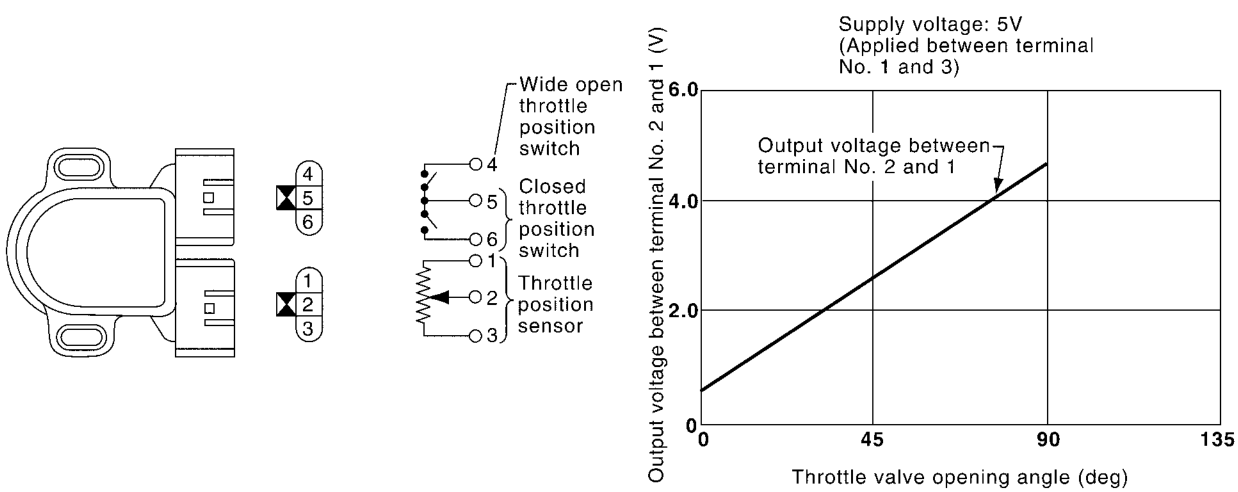
NGEC0595

NOTE:
If DTC P0120 (0403) is displayed with DTC P0510 (0203), first perform the trouble diagnosis for DTC P0510. Refer to EC-998.

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.



SEF349X

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 32 (ECM 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

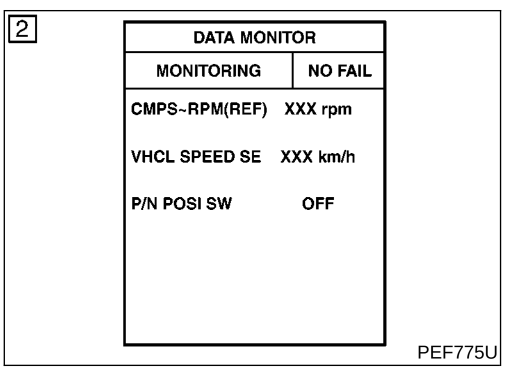
NGEC0599S01

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

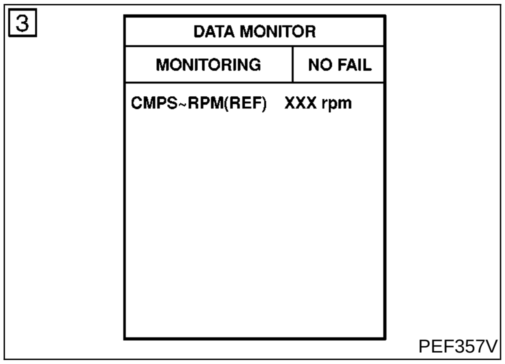
1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2) Start engine and maintain the following conditions for at least 5 consecutive seconds.

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-750.

With GST

Follow the procedure "With CONSULT-II".



PROCEDURE FOR MALFUNCTION B

NGEC0599S02

With CONSULT-II

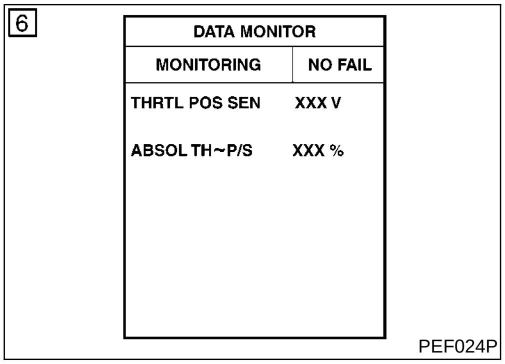
1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and let it idle for at least 10 seconds.
   If idle speed is over 1,000 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,000 rpm.

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

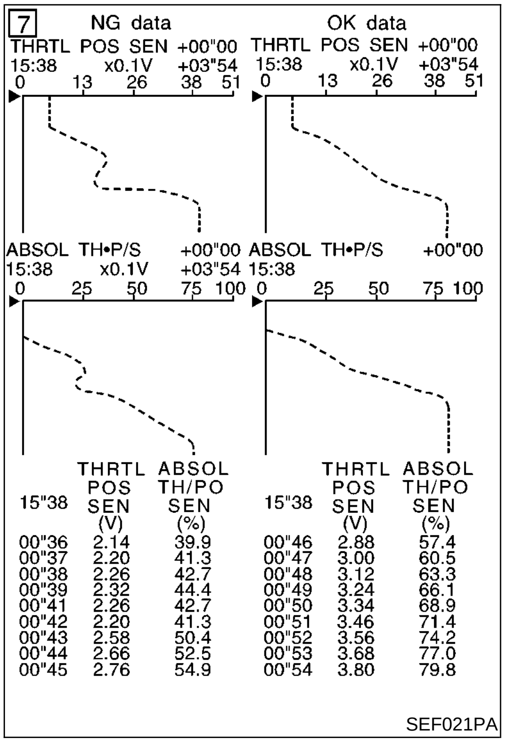
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-750.

With GST

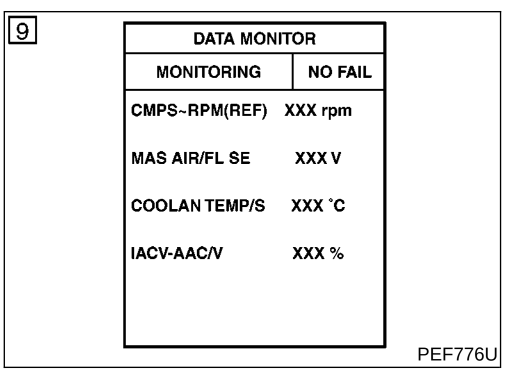
Follow the procedure "With CONSULT-II".



PEF024P



SEF021PA



PEF776U

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-750.
     If OK, go to following step.
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.

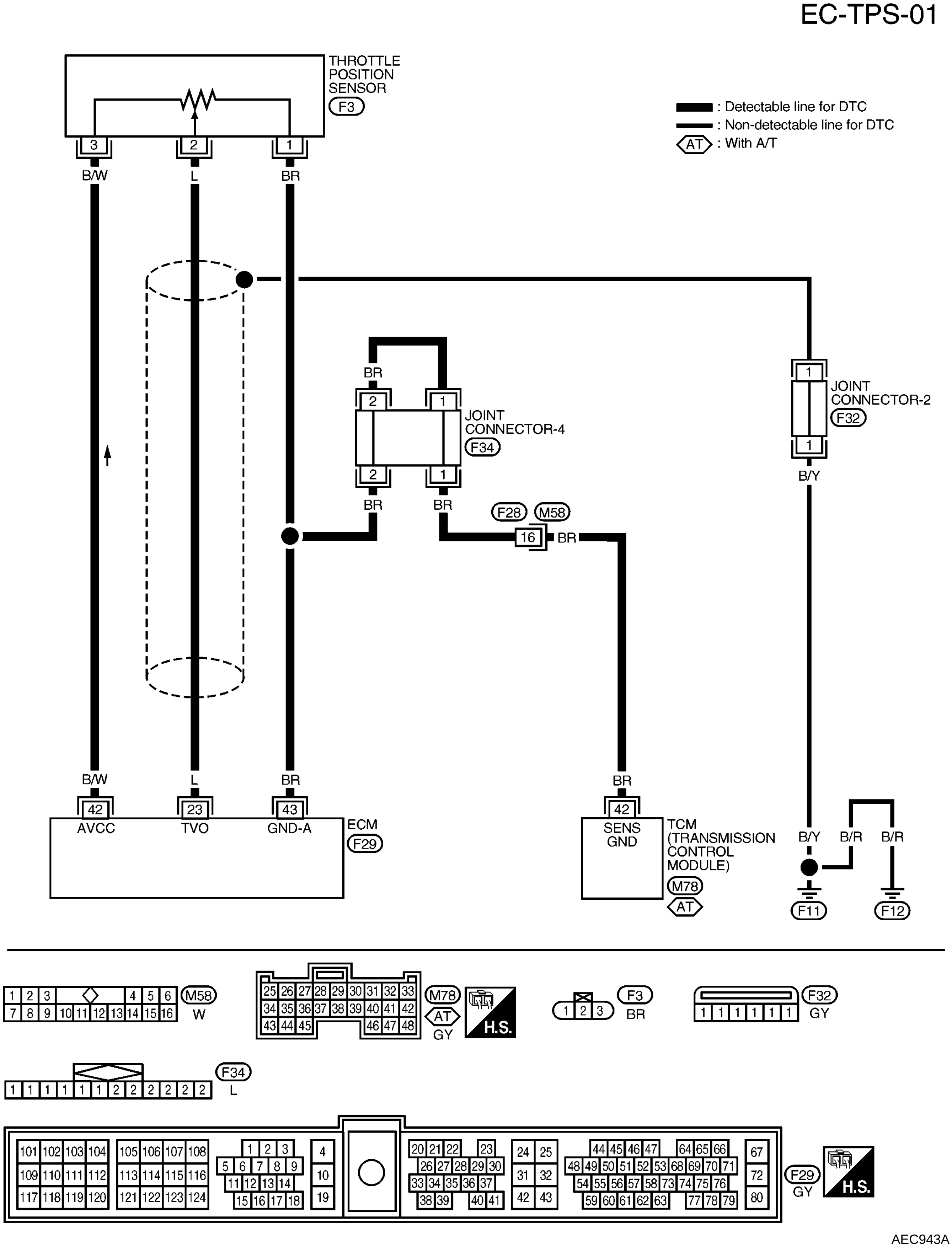
10) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-750.

With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0600



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-669.

Items	Specifications
Ignition timing	15° ± 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)

MTBL0226

▶	GO TO 3.

3	CHECK INTAKE SYSTEM.

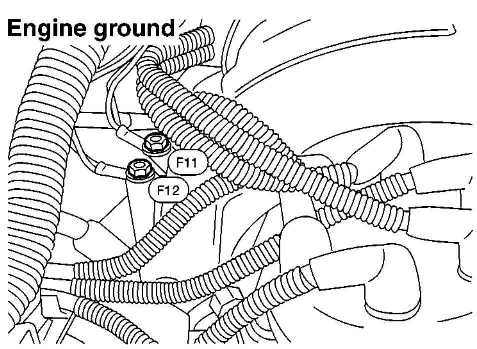
1. Turn ignition switch OFF.
2. Check the following for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold collector

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.

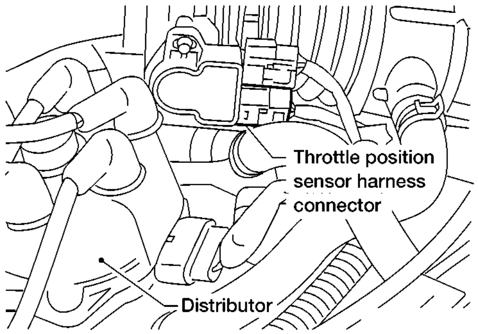


AEC640A

▶	GO TO 5.

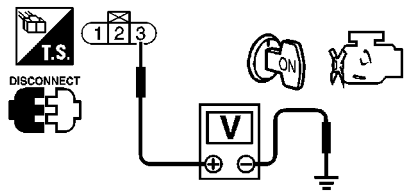
5	CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

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.

6	CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART

Check the following.
- Harness 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

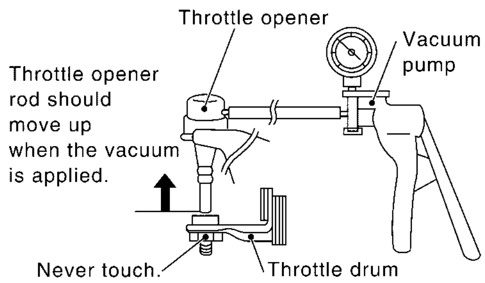
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

8	CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 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

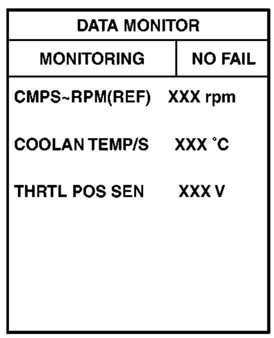
With CONSULT-II

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



SEF793W

6. Turn ignition switch ON.
7. Select "DATA MONITOR" mode with CONSULT-II.
8. Check voltage of "THRTL POS SEN".



PEF765W

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

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

MTBL0230

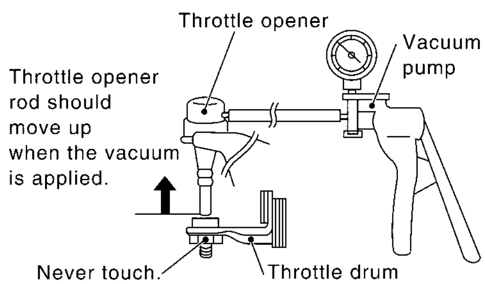
OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 11.

10 CHECK THROTTLE POSITION SENSOR

Without CONSULT-II

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



SEF793W

6. Turn ignition switch ON.
7. Check voltage between ECM terminal 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-669.

Items	Specifications
Ignition timing	15° ± 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)

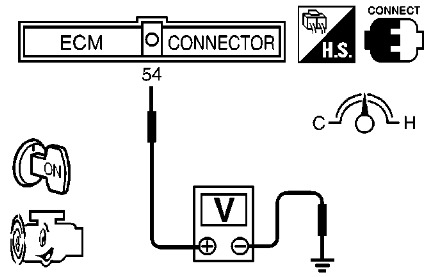
MTBL0226

OK or NG

OK ▶	GO TO 12.
NG ▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-669.

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.

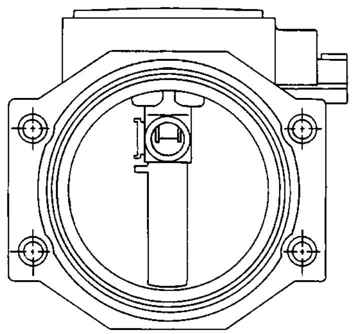


SEF747U

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.



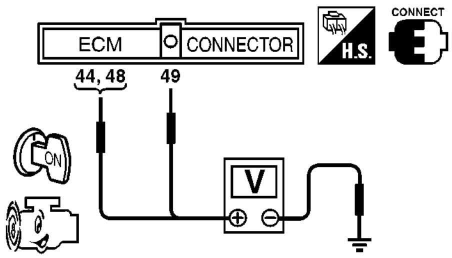
SEF030T

OK or NG

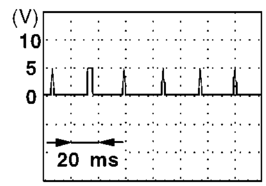
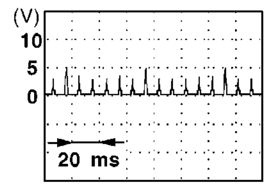
OK	▶	GO TO 13.
NG	▶	Replace mass air flow sensor.

13	CHECK CAMSHAFT POSITION SENSOR

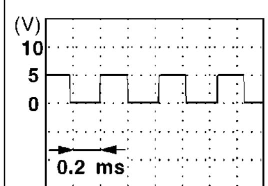
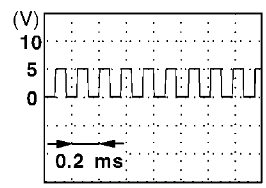
1. Install any parts removed.
2. Start engine.
3. Check voltage between ECM terminals 44, 48 and ground, ECM terminal 49 and ground with DC range.



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		

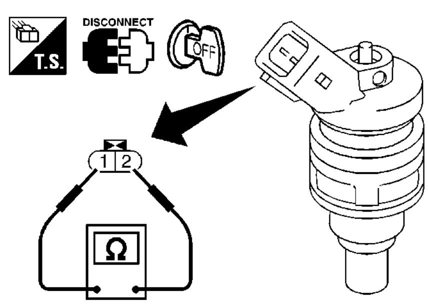
AEC072B

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.

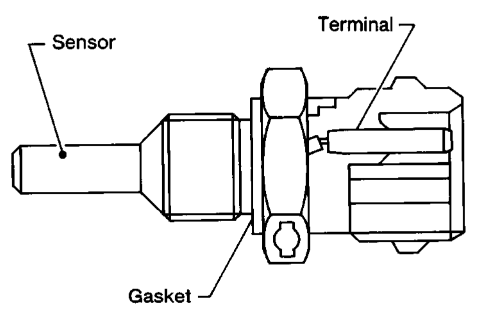
15	CHECK THROTTLE POSITION SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF. 2. Disconnect joint connector-2. 3. Check the following. ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to "HARNESS LAYOUT", ***EL-292***.) **Continuity should exist.** 4. Also check harness for short to ground and short to power. 5. Then reconnect joint connector-2. **OK or NG**		
OK	▶	GO TO 16.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

16	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.		
	▶	**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-739.

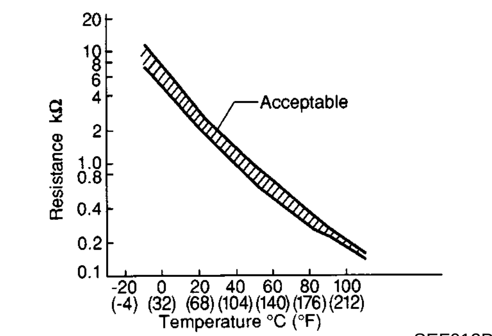


SEF594K

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.



SEF012P

<Reference data>

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

*: These data are reference values and are measured between ECM terminal 59 (Engine coolant temperature sensor) and ECM terminal 32 (ECM ground).

On Board Diagnosis Logic

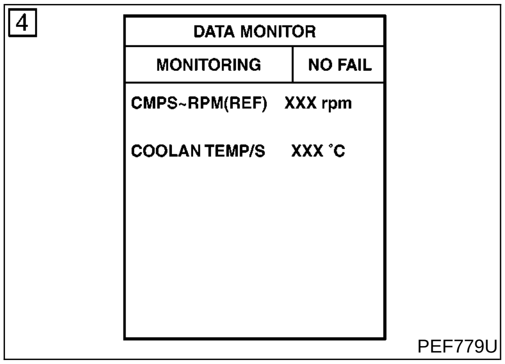
NGEC0603

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



PEF779U

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

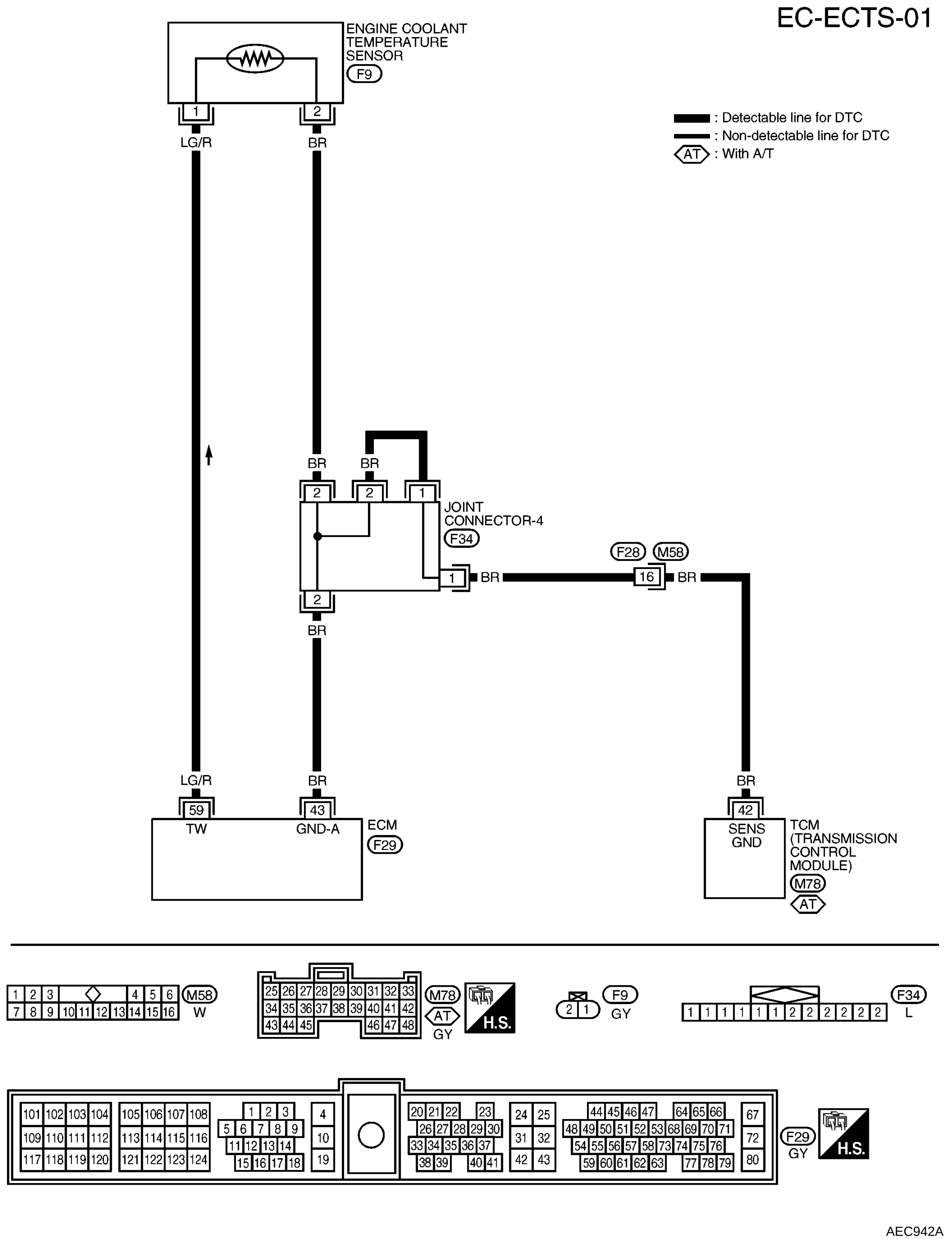
1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Check that "COOLAN TEMP/S" is above 10°C (50°F).
   If it is above 10°C (50°F), the test result will be OK.
   If it is below 10°C (50°F), go to following step.
4) Start engine and run it for 65 minutes at idle speed.
   If "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-761.

With GST

Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC0605

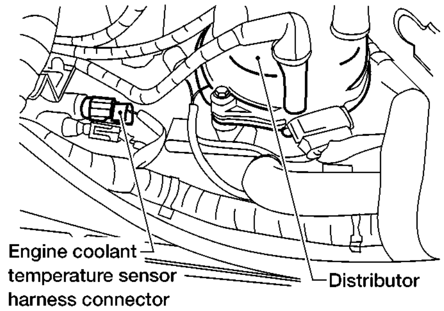


Diagnostic Procedure

NGEC0606

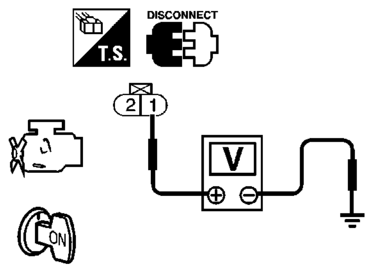
1 CHECK ECTS POWER SUPPLY CIRCUIT

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 ground and short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

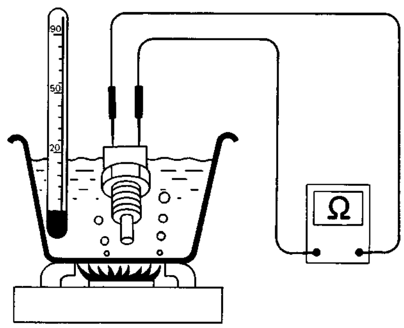
3 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors 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 ground or short to power in harness or connectors.

4	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.

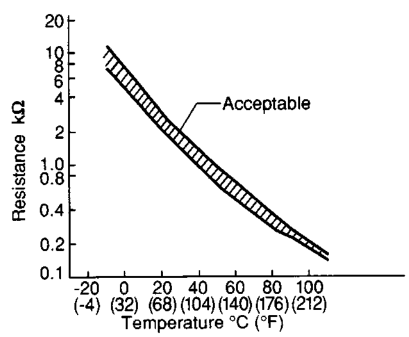


SEF152P

<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.

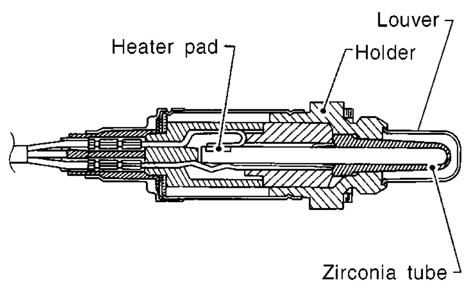
OK or NG

OK	▶	GO TO 6.
NG	▶	Repair or replace thermostat. Refer to "Thermostat", "ENGINE COOLING SYSTEM", ***LC-13***.

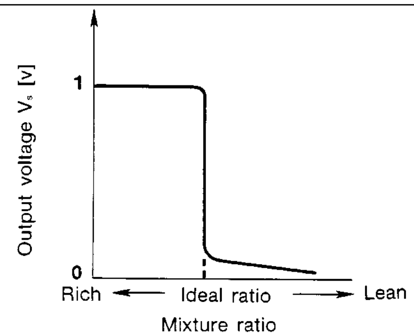
6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.

	▶	**INSPECTION END**



SEF463R



SEF288D

Component Description

NGEC0607

The front heated oxygen sensor is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The front heated oxygen sensor has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The front heated oxygen sensor signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0608

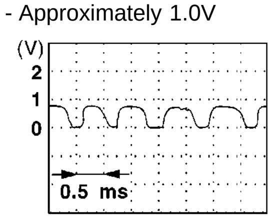
Specification data are reference values.

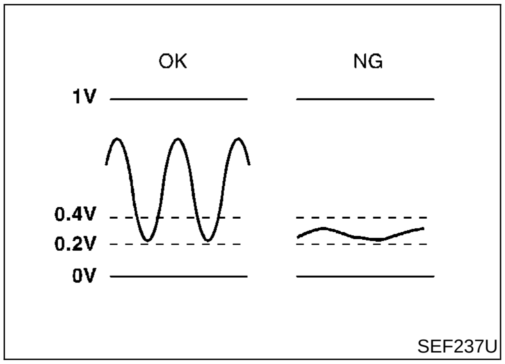
MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SEN-B1 FR O2 SEN-B2	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
FR O2 MNTR-B1 FR O2 MNTR-B2			LEAN ←→ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NGEC0609

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Front heated oxygen sensor RH	**[Engine is running]** • After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V
51	G	Front heated oxygen sensor LH		



SEF237U

On Board Diagnosis Logic

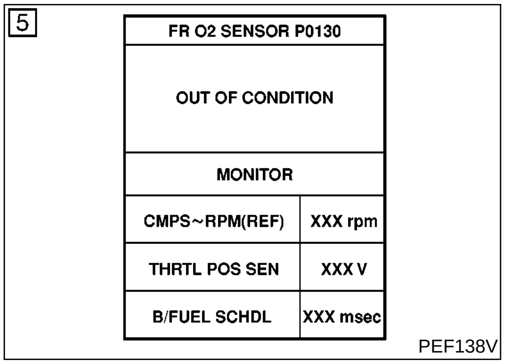
NGEC0610

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

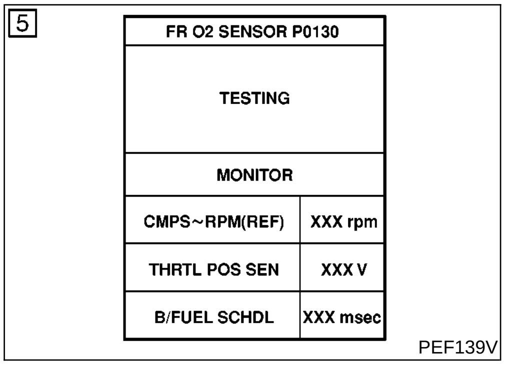
POSSIBLE CAUSE

NGEC0610S01

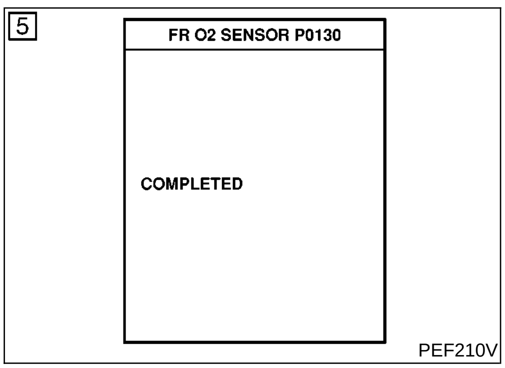
- Harness or connectors
  (The sensor circuit is open or shorted.)
- Front heated oxygen sensor



PEF138V



PEF139V



PEF210V

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 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 "FR O2 SEN-B1 (-B2) P0130 (P0150)" of "FRONT O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT-II.
3) Touch "START".
4) Let it idle for at least 3.5 minutes.

NOTE:

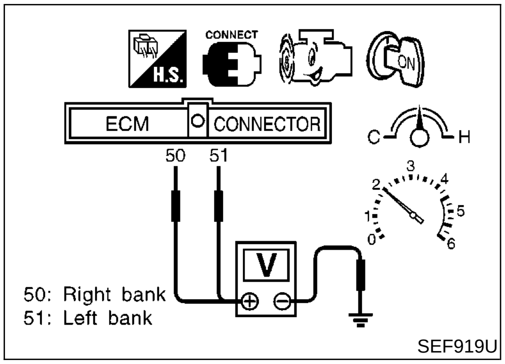
Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 4.

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.)

CMPS·RPM (POS)	1,800 - 2,600 rpm (A/T models) 1,900 - 2,700 rpm (M/T models)
Vehicle speed	70 - 100 km/h (43 - 62 MPH)
B/FUEL SCHDL	1.6 - 6.5 msec (A/T models) 1.4 - 5.5 msec (M/T models)
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-769.
During this test, P1148 and P1168 may be stored in ECM.



SEF919U

Overall Function Check

=NGEC0612

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

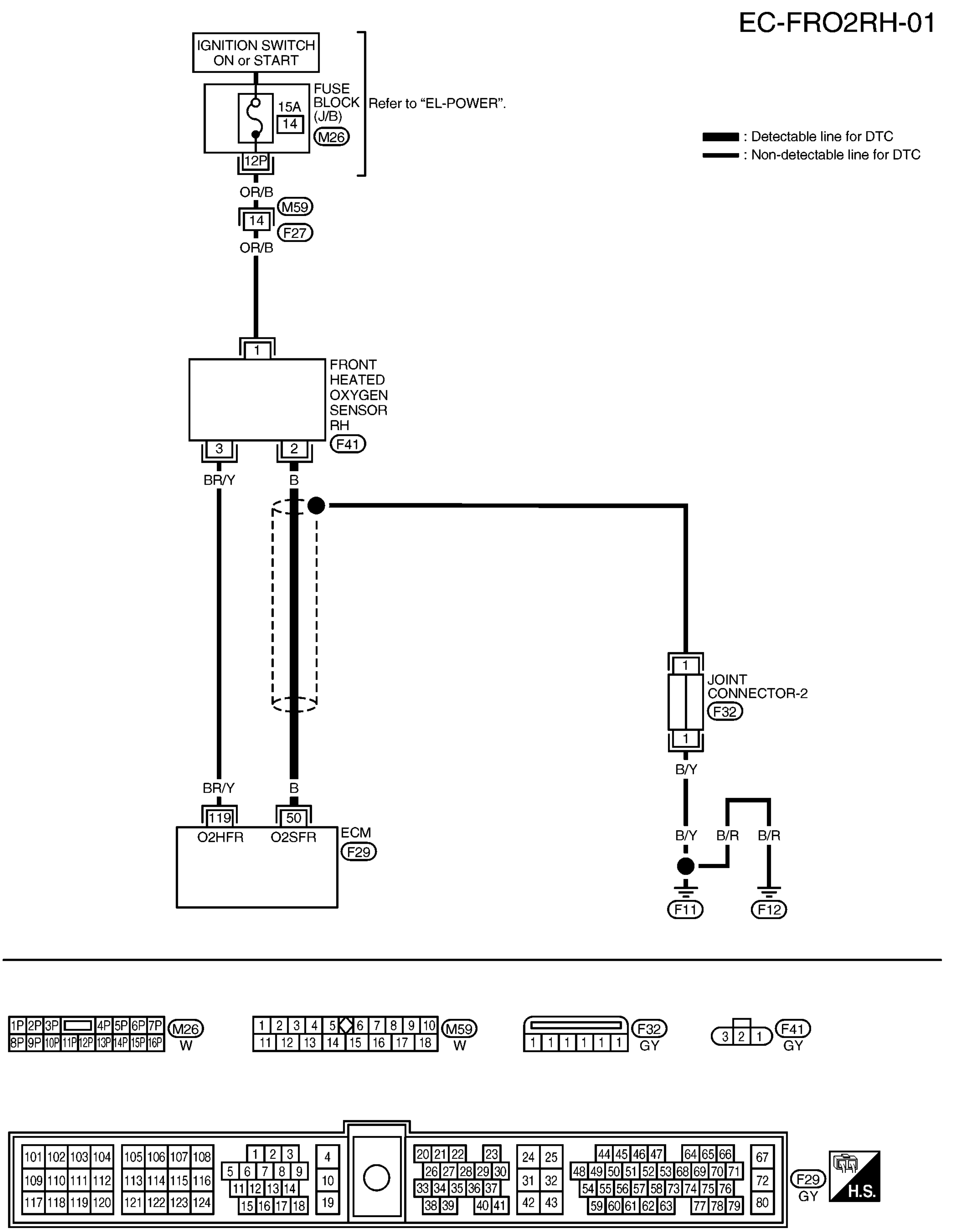
1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 (right bank sensor signal) or 51 (left bank sensor signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.
- The voltage does not remain in the range of 0.2 - 0.4V.
4) If NG, go to “Diagnostic Procedure”, EC-769.

Wiring Diagram

NGEC0613

RIGHT BANK

NGEC0613S01

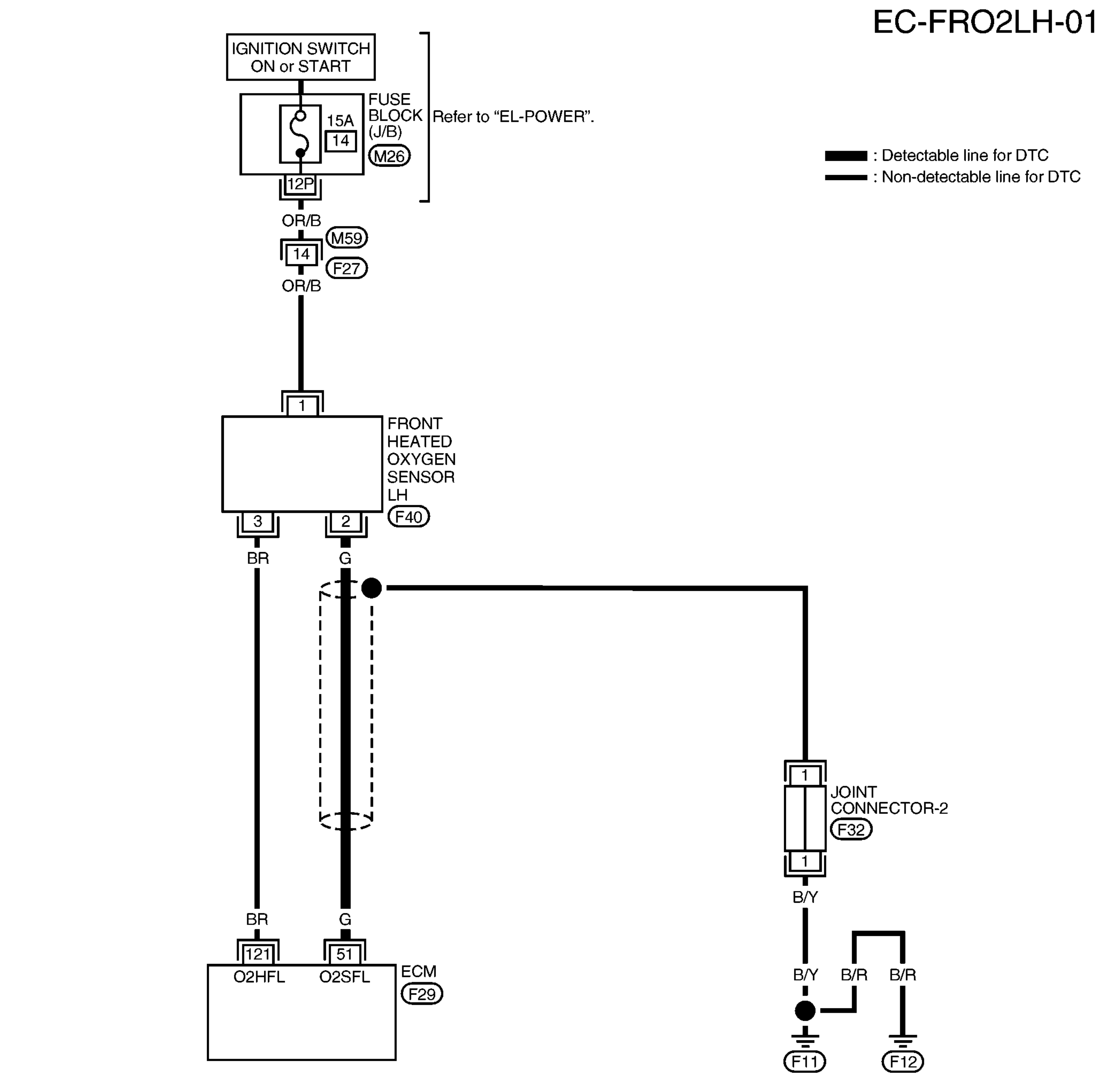


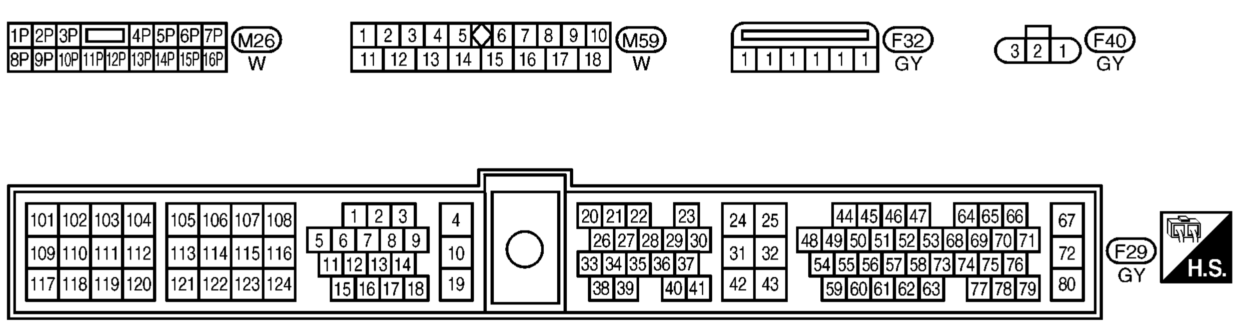
AEC944A

Wiring Diagram (Cont'd)

LEFT BANK

NGEC0613S02





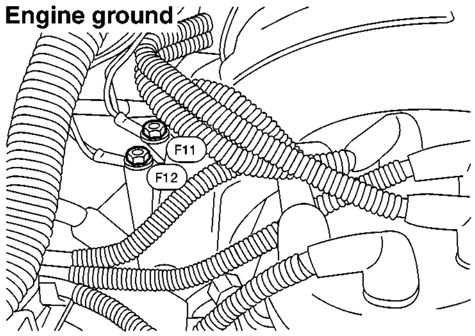
AEC945A

Diagnostic Procedure

NGEC0614

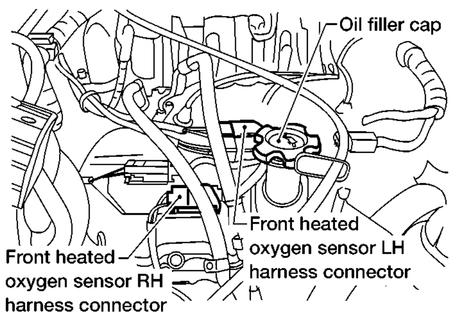
1	INSPECTION START

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



AEC640A

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



AEC644A

▶	GO TO 2.

2	CHECK FRONT HO2S INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	Terminals		Bank
	ECM	Sensor	
P0130	50	2	Right
P0150	51	2	Left

AEC888A

Continuity should exist.

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

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0130	50 or 2	Ground	Right
P0150	51 or 2	Ground	Left

AEC889A

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

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

3	CHECK FRONT HEATED OXYGEN SENSOR

With CONSULT-II

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

DATA MONITOR	
MONITORING	NO FAIL
CMPS·RPM(REF)	XXX rpm
MAS AIR/FL SE	XXX V
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 MNTR-B1	LEAN
INJ PULSE-B1	XXX msec
A/F ALPHA-B1	XXX %
FR O2 HTR-B1	ON

PEF365V

5. Check the following.

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

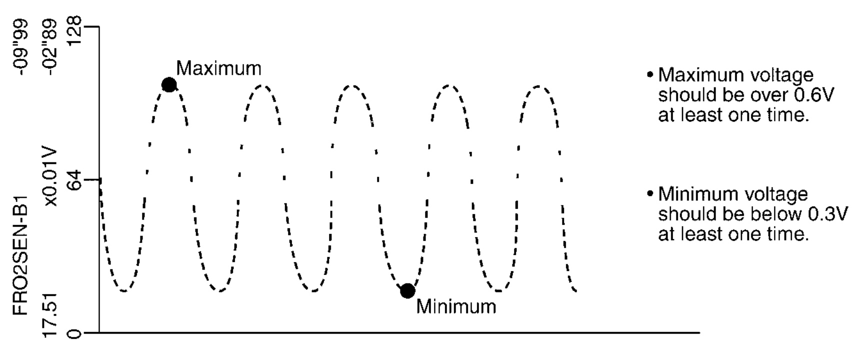
```
Right bank
                 cycle      | 1 | 2 | 3 | 4 | 5 |
  FR O2 MNTR-B1  R-L-R-L-R-L-R-L-R-L-R

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

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

SEF702W

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



SEF154X

CAUTION:

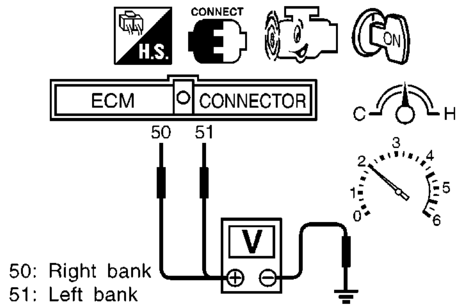
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897–18 or J-43897–12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

OK or NG

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

4	CHECK FRONT HEATED OXYGEN SENSOR

Without CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 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.



SEF919U

- MIL goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

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

5	CHECK FRONT HO2S 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 ground and short to power.
5. Then reconnect joint connector-2.

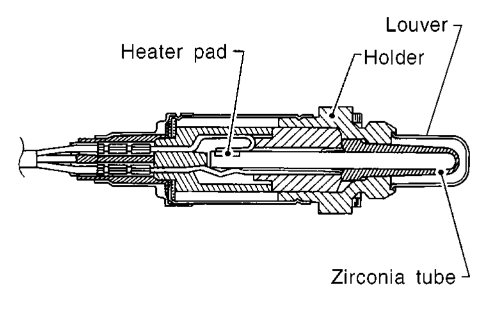
OK or NG

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

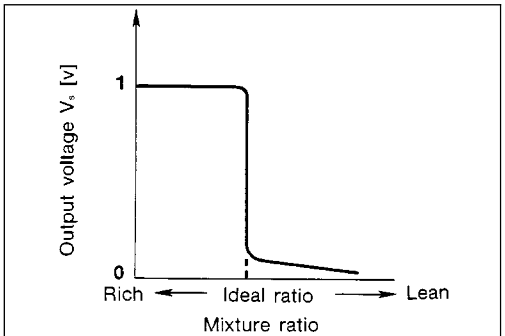
6	CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-706.

	▶	**INSPECTION END**



SEF463R



SEF288D

Component Description

NGEC0615

The front heated oxygen sensor is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The front heated oxygen sensor has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The front heated oxygen sensor signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0616

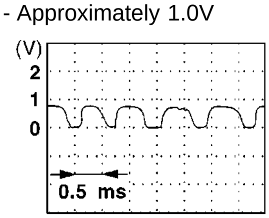
Specification data are reference values.

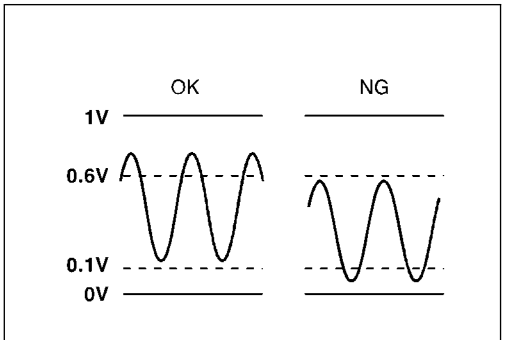
MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SEN-B1 FR O2 SEN-B2	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
FR O2 MNTR-B1 FR O2 MNTR-B2			LEAN ←→ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NGEC0617

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Front heated oxygen sensor RH	**[Engine is running]** • After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V
51	G	Front heated oxygen sensor LH		



SEF300U

On Board Diagnosis Logic

NGEC0618

To judge the malfunction, the output from the front heated oxygen sensor is monitored to determine whether the “rich” output is sufficiently high and whether the “lean” output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.
Malfunction is detected when the maximum and minimum voltage from the sensor are not reached to the specified voltages.

POSSIBLE CAUSE

NGEC0618S01

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

DTC Confirmation Procedure

=NGEC0619

CAUTION:

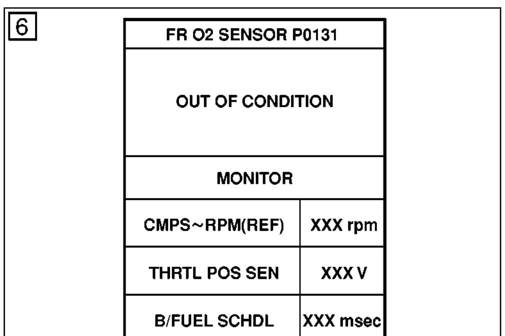
Always drive vehicle at a safe speed.

NOTE:

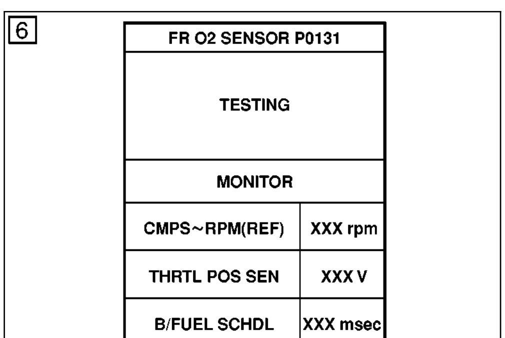
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

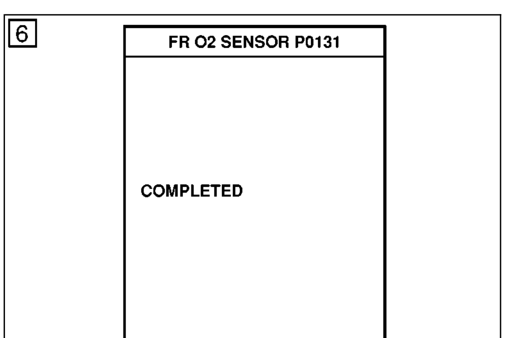
- **Always perform at a temperature above −10°C (14°F).**
- **Before performing following procedure, confirm that battery voltage is more than 11V at idle.**



PEF143V



PEF144V



PEF211V

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 "FR O2 SEN-B1 (-B2) P0131 (P0151)" of "FRONT O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT-II.
4) Touch "START".
5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

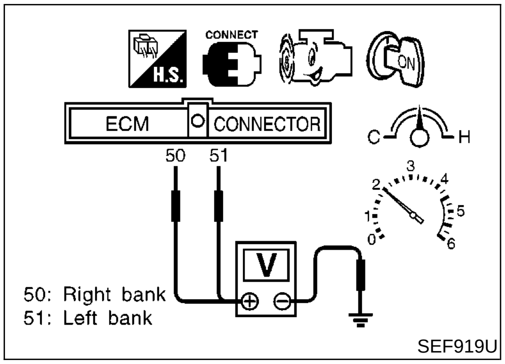
Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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.)

CMPS·RPM (POS)	1,800 - 2,800 rpm (A/T models) 1,900 - 3,100 rpm (M/T models)
Vehicle speed	80 - 100 km/h (50 - 62 MPH)
B/FUEL SCHDL	1.6 - 6.5 msec (A/T models) 1.4 - 5.5 msec (M/T models)
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-775.



Overall Function Check

NGEC0620

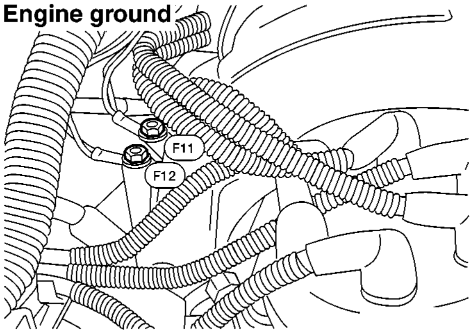
Use this procedure to check the overall function of the front heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 (right bank sensor signal) or 51 (left bank sensor 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-775.

Diagnostic Procedure

NGEC0621

1	RETIGHTEN GROUND SCREWS
1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.  Engine ground F11 F12 AEC640A	
▶	GO TO 2.

2	RETIGHTEN FRONT HEATED OXYGEN SENSOR
Loosen and retighten corresponding front heated oxygen sensor. **Tightening torque:** **40 - 50 N·m (4.1 - 5.1 kg-m, 30 - 37 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 "ACTIVE TEST" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

ACTIVE TEST	
SELF-LEARN	B1: XXX %
CONTROL	B2: XXX %
MONITOR	
CMPS·RPM(REF)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 SEN-B2	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

PEF921U

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

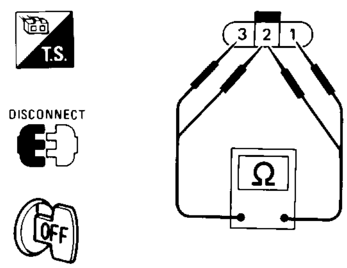
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-640.
7. Make sure DTC No. 0505 is displayed in Diagnostic Test Mode II.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0115 or 0210 detected?
   Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-860.
No	▶	GO TO 4.

4	CHECK FRONT HEATED OXYGEN SENSOR HEATER

Check resistance between FRONT HO2S terminals 3 and 1.



AEC158A

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

Check continuity between FRONT HO2S 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.**

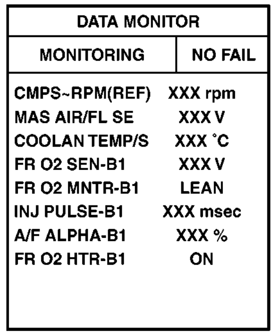
OK or NG

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

5	CHECK FRONT HEATED OXYGEN SENSOR

With CONSULT-II

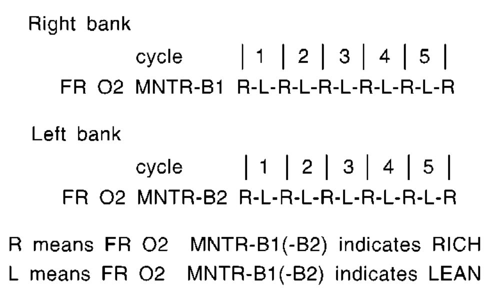
1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "FR O2 SEN-B1 (-B2)" and "FR O2 MNTR-B1 (-B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II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



PEF365V

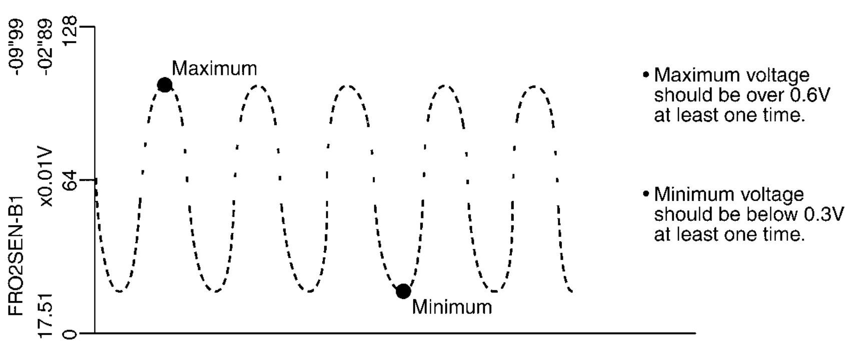
5. Check the following.

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



SEF702W

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



SEF154X

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.**

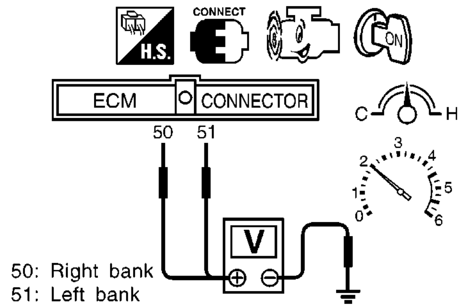
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace malfunctioning front heated oxygen sensor.

6	CHECK FRONT HEATED OXYGEN SENSOR

Without CONSULT-II

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



SEF919U

- MIL goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

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

7	CHECK FRONT HO2S SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect joint connector.
3. For circuit, refer to "DTC P0130 (RIGHT BANK, -B1), P0150 (LEFT BANK, -B2) FRONT HEATED OXYGEN SENSOR (FRONT HO2S) (CIRCUIT)", EC-763.
4. Check the following.

- Continuity between joint connector terminal 1 and ground
- Joint connector
  (Refer to "HARNESS LAYOUT", ***EL-292***.)

  Continuity should exist.

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

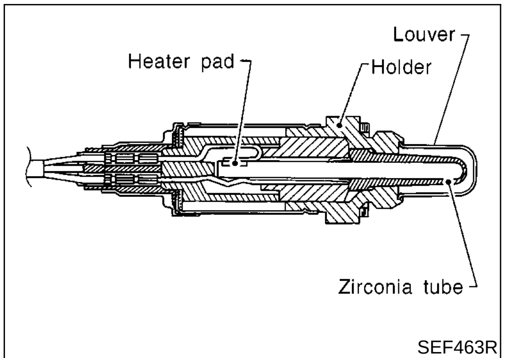
OK or NG

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

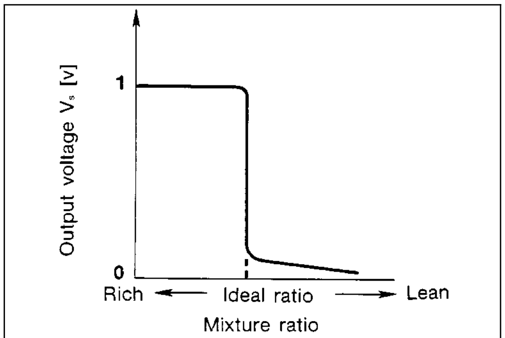
8	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.
For circuit, refer to "DTC P0130 (RIGHT BANK, -B1), P0150 (LEFT BANK, -B2) FRONT HEATED OXYGEN SENSOR (FRONT HO2S) (CIRCUIT)", EC-763.

▶	**INSPECTION END**



SEF463R



SEF288D

Component Description

NGEC0622

The front heated oxygen sensor is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The front heated oxygen sensor has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The front heated oxygen sensor signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0623

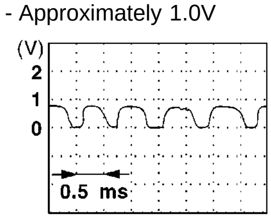
Specification data are reference values.

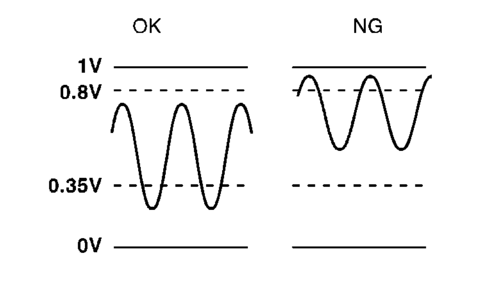
MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SEN-B1 FR O2 SEN-B2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
FR O2 MNTR-B1 FR O2 MNTR-B2			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NGEC0624

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

TERMI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Front heated oxygen sensor RH	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V
51	G	Front heated oxygen sensor LH		



SEF299U

On Board Diagnosis Logic

NGEC0625

To judge the malfunction, the output from the front heated oxygen sensor is monitored to determine whether the “rich” output is sufficiently high. The “lean” output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.
Malfunction is detected when the maximum and minimum voltages from the sensor are beyond the specified voltages.

POSSIBLE CAUSE

NGEC0625S01

- Front heated oxygen sensor
- Fuel pressure
- Injectors
- Front heated oxygen sensor heater

DTC Confirmation Procedure

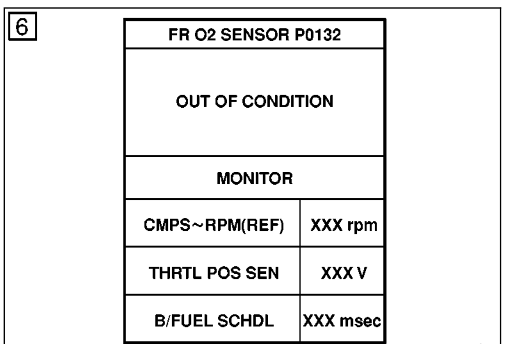
=NGEC0626

CAUTION:
Always drive vehicle at a safe speed.

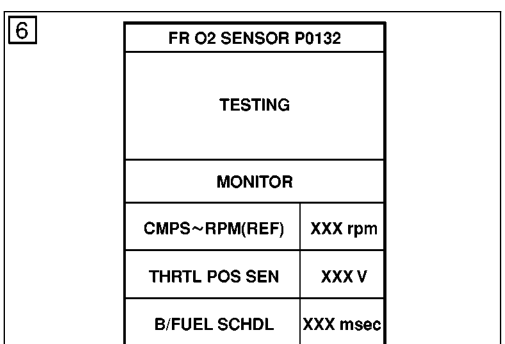
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

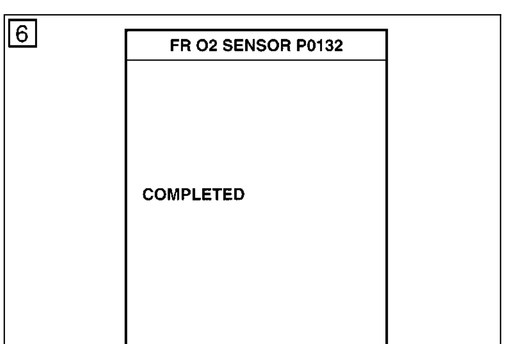
- **Always perform at a temperature above −10°C (14°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**



PEF146V



PEF147V



PEF212V

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 “FR O2 SEN-B1 (-B2) P0132 (P0152)” of “FRONT O2 SENSOR” in “DTC WORK SUPPORT” mode with CONSULT-II.
4) Touch “START”.
5) Start engine and let it idle for at least 3.5 minutes.

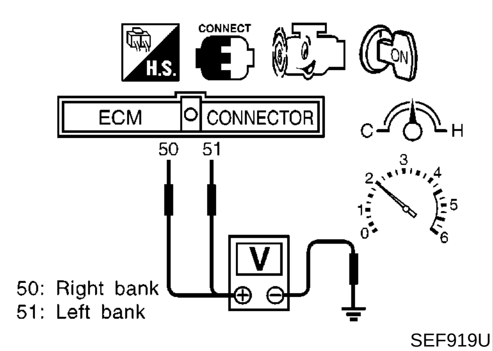
NOTE:
Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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.)

CMPS·RPM (POS)	1,800 - 2,800 rpm (A/T models) 1,900 - 3,100 rpm (M/T models)
Vehicle speed	80 - 100 km/h (50 - 62 MPH)
B/FUEL SCHDL	1.6 - 6.5 msec (A/T models) 1.4 - 5.5 msec (M/T models)
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-783.



SEF919U

Overall Function Check

NGEC0627

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.

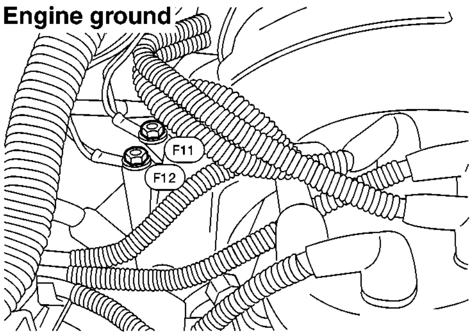
Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 (right bank sensor signal) or 51 (left bank sensor 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-783.

Diagnostic Procedure

NGEC0628

1	RETIGHTEN GROUND SCREWS
1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.  AEC640A	
▶	GO TO 2.

2	RETIGHTEN FRONT HEATED OXYGEN SENSOR
Loosen and retighten corresponding front heated oxygen sensor. **Tightening torque:** **40 - 50 N·m (4.1 - 5.1 kg-m, 30 - 37 ft-lb)**	
▶	GO TO 3.

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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 "ACTIVE TEST" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

ACTIVE TEST	
SELF-LEARN	B1: XXX %
CONTROL	B2: XXX %
MONITOR	
CMPS·RPM(REF)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 SEN-B2	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

PEF921U

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 No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-640.
7. Make sure DTC No. 0505 is displayed in Diagnostic Test Mode II.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0114 or 0209 detected?
   Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-868.
No	▶	GO TO 4.

4 CHECK FRONT HO2S CONNECTOR FOR WATER

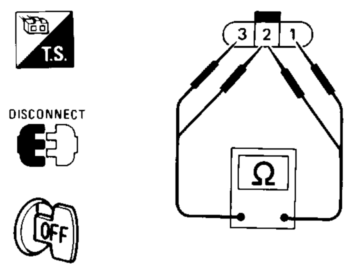
1. Turn ignition switch OFF.
2. Disconnect front heated oxygen sensor harness connector.
3. Check connectors for water.
   Water should not exist.

OK or NG

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

5	CHECK FRONT HEATED OXYGEN SENSOR HEATER

Check resistance between FRONT HO2S terminals 3 and 1.



AEC158A

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

Check continuity between FRONT HO2S 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.**

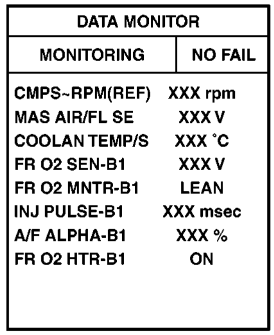
OK or NG

OK (With CONSULT-II)	▶	GO TO 6.
OK (Without CONSULT-II)	▶	GO TO 7.
NG	▶	Replace malfunctioning front heated oxygen sensor.

6	CHECK FRONT HEATED OXYGEN SENSOR

With CONSULT-II

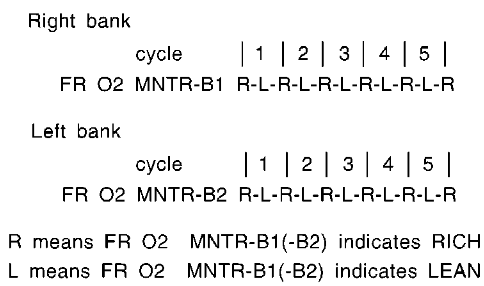
1. Start engine and warm it up to normal operating temperature.
2. Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "FR O2 SEN-B1 (-B2)" and "FR O2 MNTR-B1 (-B2)".
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch "RECORD" on CONSULT-II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



PEF365V

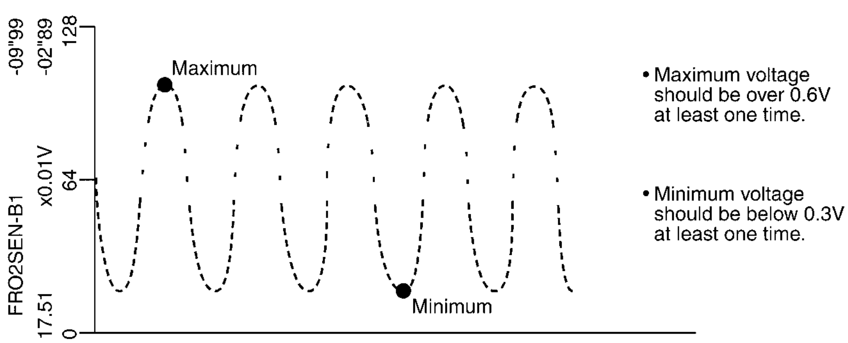
5. Check the following.

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



SEF702W

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



SEF154X

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.**

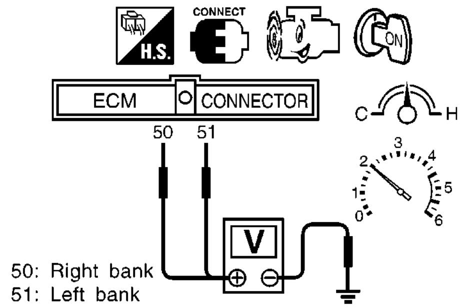
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace malfunctioning front heated oxygen sensor.

7	CHECK FRONT HEATED OXYGEN SENSOR

Without CONSULT-II

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



SEF919U

- MIL goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

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

8	CHECK FRONT HO2S SHIELD CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect joint connector.
   For circuit, refer to "DTC P0130 (RIGHT BANK, -B1), P0150 (LEFT BANK, -B2) FRONT HEATED OXYGEN SENSOR (FRONT HO2S) (CIRCUIT)", EC-763.
3. Check the following.

- Continuity between joint connector terminal 1 and ground
- Joint connector
  (Refer to "HARNESS LAYOUT", ***EL-292***.)
  Continuity should exist.

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

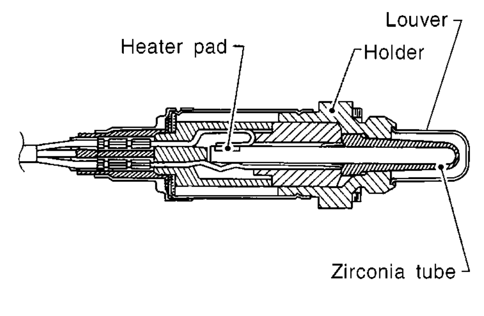
OK or NG

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

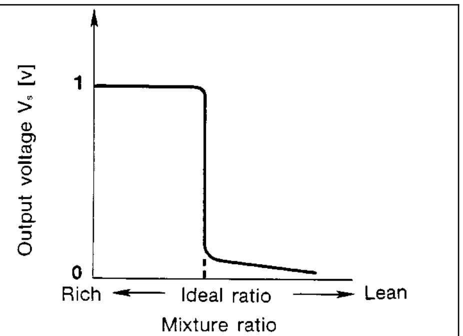
9	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.
For circuit, refer to "DTC P0130 (RIGHT BANK, -B1), P0150 (LEFT BANK, -B2) FRONT HEATED OXYGEN SENSOR (FRONT HO2S) (CIRCUIT)", EC-763.

▶	**INSPECTION END**



SEF463R



SEF288D

Component Description

NGEC0629

The front heated oxygen sensor is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The front heated oxygen sensor has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The front heated oxygen sensor signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0630

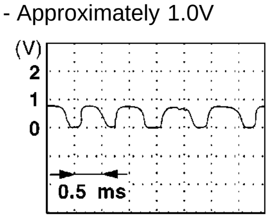
Specification data are reference values.

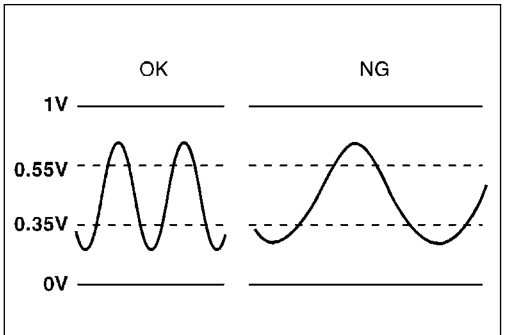
MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SEN-B1 FR O2 SEN-B2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
FR O2 MNTR-B1 FR O2 MNTR-B2			LEAN ←→ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NGEC0631

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Front heated oxygen sensor RH	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V
51	G	Front heated oxygen sensor LH		



SEF010V

On Board Diagnosis Logic

NGEC0632

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

POSSIBLE CAUSE

NGEC0632S01

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Front heated oxygen sensor
- Front heated oxygen sensor heater
- Fuel pressure
- Injectors
- Intake air leaks
- Exhaust gas leaks
- PCV valve
- Mass air flow sensor

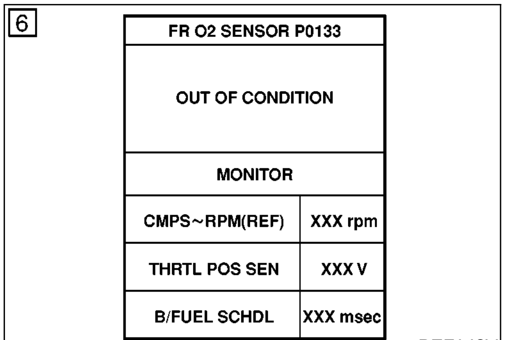
DTC Confirmation Procedure

NGEC0633

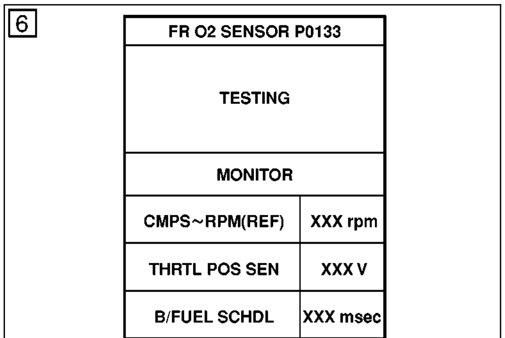
CAUTION:
Always drive vehicle at a safe speed.

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.

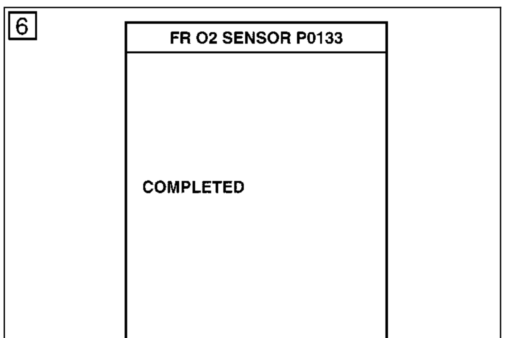
TESTING CONDITION:
- **Always perform at a temperature above −10°C (14°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**



PEF148V



PEF149V



PEF213V

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 "FR O2 SEN-B1 (-B2) P0133 (P0153)" of "FRONT O2 SENSOR" in "DTC WORK SUPPORT" mode with CONSULT-II.
4) Touch "START".
5) Start engine and let it idle for at least 3.5 minutes.

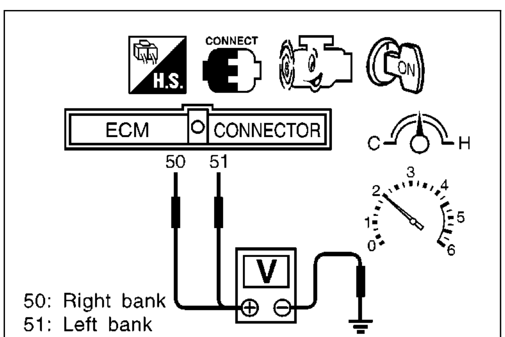
NOTE:
Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 5.

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.)

CMPS·RPM (POS)	1,800 - 2,800 rpm (A/T models) 1,900 - 3,300 rpm (M/T models)
Vehicle speed	80 - 120 km/h (50 - 75 MPH)
B/FUEL SCHDL	1.6 - 6.5 msec (A/T models) 1.4 - 5.5 msec (M/T models)
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-793.



SEF919U

Overall Function Check

NGEC0634

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 (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.

- MIL goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).

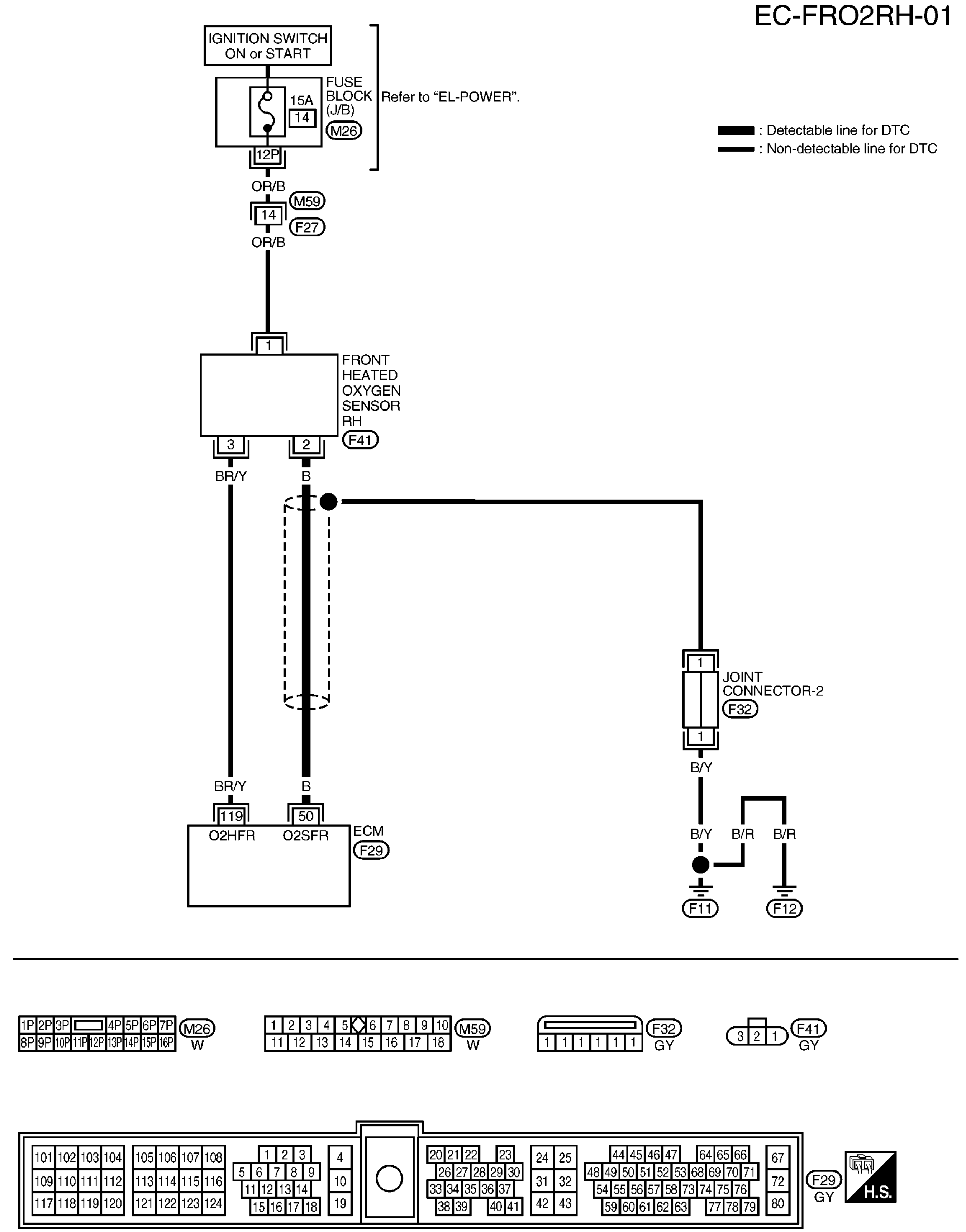
4) If NG, go to "Diagnostic Procedure", EC-793.

Wiring Diagram

NGEC0635

RIGHT BANK

NGEC0635S01



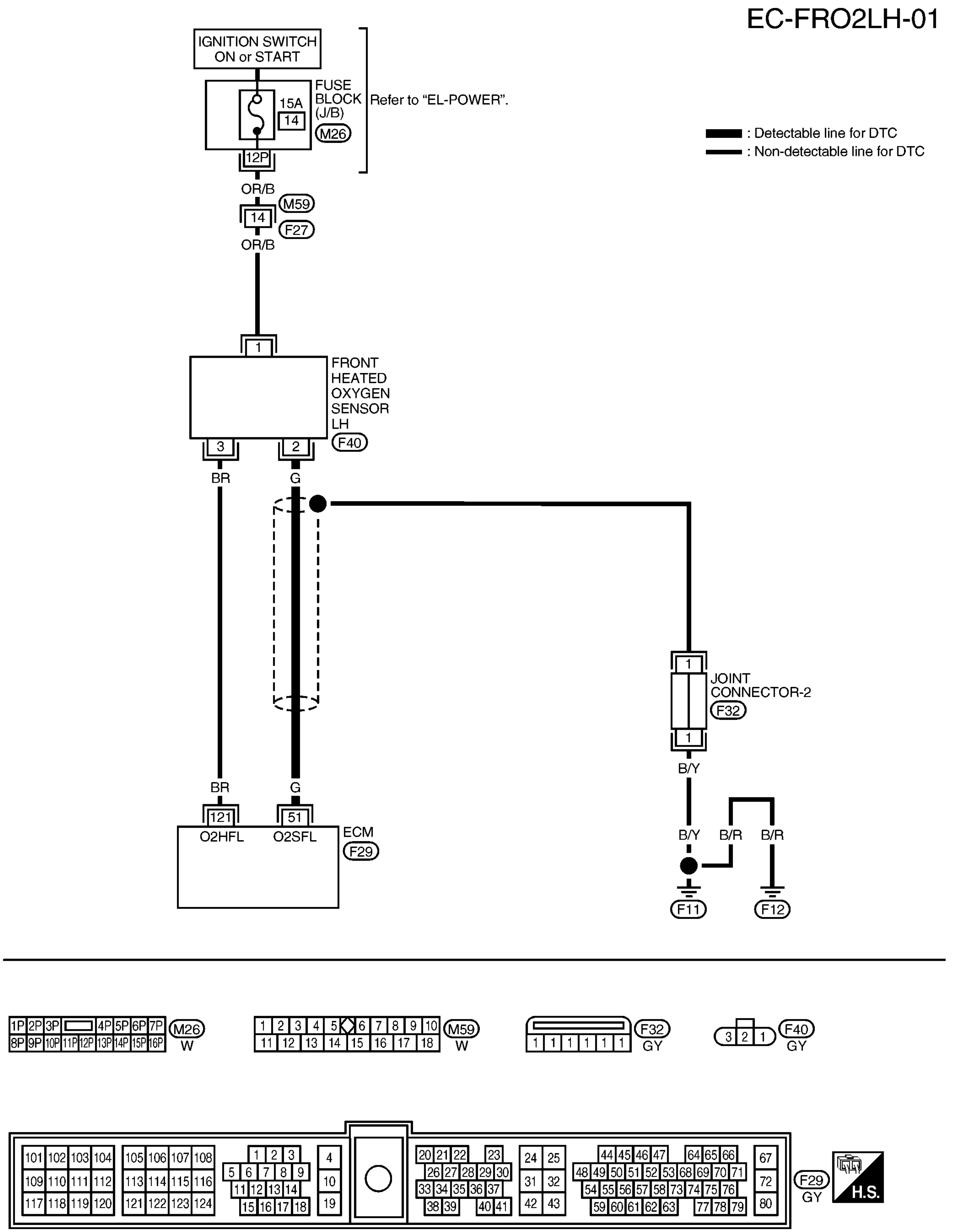
AEC944A

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

Wiring Diagram (Cont'd)

LEFT BANK

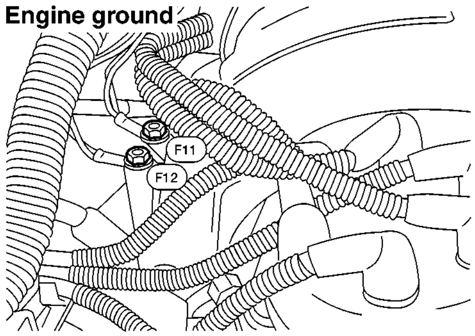
NGEC0635S02



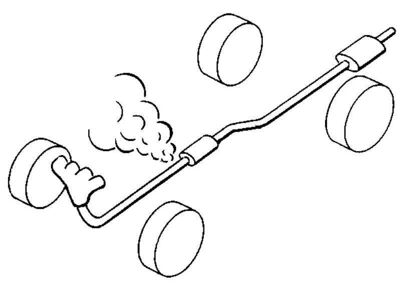
AEC945A

Diagnostic Procedure

NGEC0636

1	RETIGHTEN GROUND SCREWS
1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.  AEC640A	
▶	GO TO 2.

2	RETIGHTEN FRONT HEATED OXYGEN SENSOR
Loosen and retighten corresponding front heated oxygen sensor. **Tightening torque:** **40 - 50 N·m (4.1 - 5.1 kg-m, 30 - 37 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 "ACTIVE TEST" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".

ACTIVE TEST	
SELF-LEARN	B1: XXX %
CONTROL	B2: XXX %
MONITOR	
CMPS·RPM(REF)	XXX rpm
COOLAN TEMP/S	XXX ˚C
FR O2 SEN-B1	XXX V
FR O2 SEN-B2	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

PEF921U

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?

Without CONSULT-II

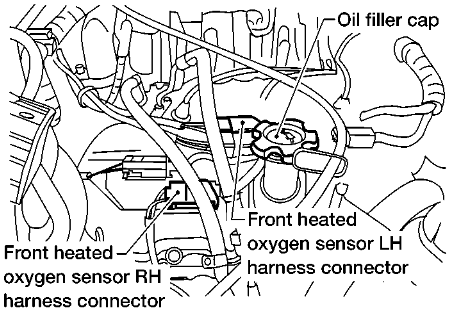
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-640.
7. Make sure DTC No. 0505 is displayed in Diagnostic Test Mode II.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0114, 0115, 0209 or 0210 detected?
   Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-860, 868.
No	▶	GO TO 6.

6	CHECK FRONT HO2S INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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



AEC644A

3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and FRONT HO2S terminal as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0133	50	2	Right
P0153	51	2	Left

AEC890A

Continuity should exist.

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

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0133	50 or 2	Ground	Right
P0153	51 or 2	Ground	Left

AEC891A

Continuity should not exist.

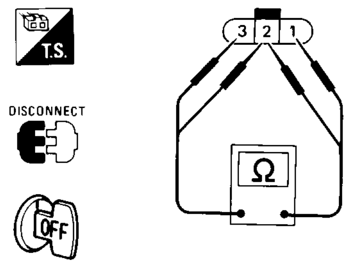
6. Also check harness for short to power.

OK or NG

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

7	CHECK FRONT HEATED OXYGEN SENSOR HEATER

Check resistance between FRONT HO2S terminals 3 and 1.



AEC158A

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

Check continuity between FRONT HO2S terminals 2 and 1, 3 and 2.

Continuity should not exist.

CAUTION:

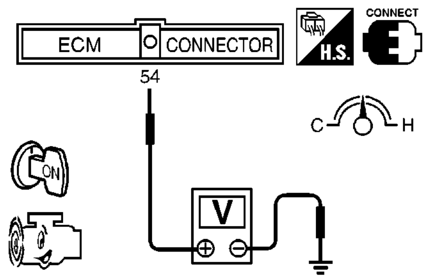
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897–18 or J-43897–12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

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace malfunctioning front heated oxygen sensor.

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.

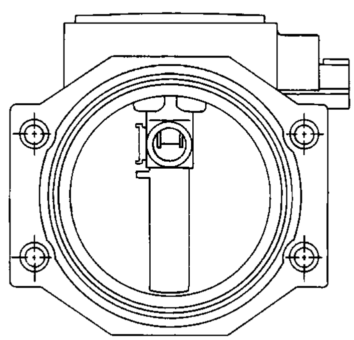


SEF747U

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

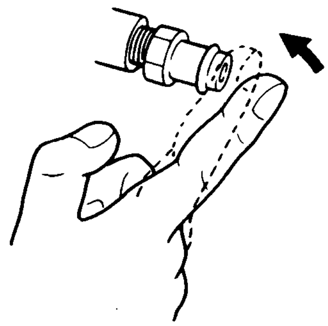
4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Then repeat above check.
5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.



SEF030T

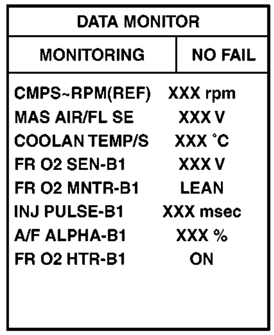
OK or NG

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; 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.  SEC137A **OK or NG**		
OK (With CONSULT-II) ▶	GO TO 10.	
OK (Without CONSULT-II) ▶	GO TO 11.	
NG ▶	Replace PCV valve.	

10	CHECK FRONT HEATED OXYGEN SENSOR

With CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and “HI SPEED” in “DATA MONITOR” mode with CONSULT-II, and select “FR O2 SEN-B1 (-B2)” and “FR O2 MNTR-B1 (-B2)”.
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. Touch “RECORD” on CONSULT-II screen.



PEF365V

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

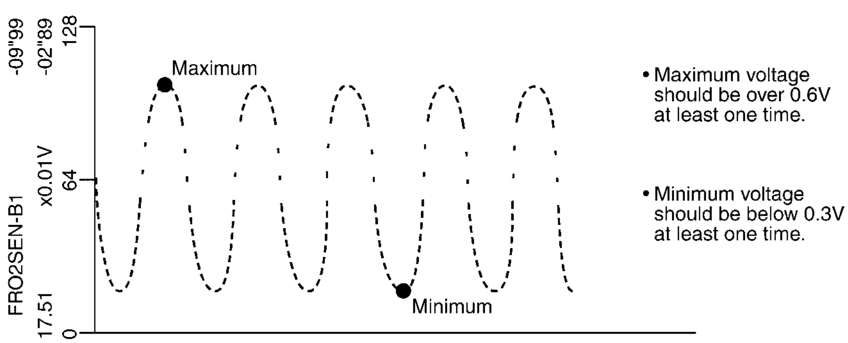
Right bank
cycle | 1 | 2 | 3 | 4 | 5 |
FR O2 MNTR-B1 R-L-R-L-R-L-R-L-R-L-R

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

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

SEF702W

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



SEF154X

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.**

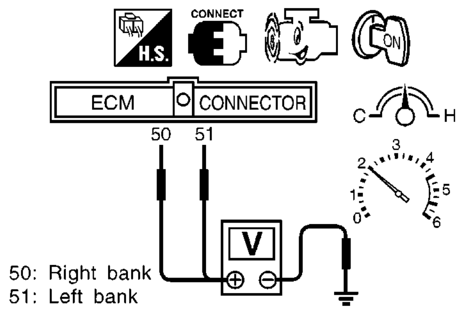
OK or NG

OK	▶	GO TO 12.
NG	▶	Replace malfunctioning front heated oxygen sensor.

11	CHECK FRONT HEATED OXYGEN SENSOR

Without CONSULT-II

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



SEF919U

- MIL goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

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

12	CHECK FRONT HO2S 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 ground and short to power.
5. Then reconnect joint connector.

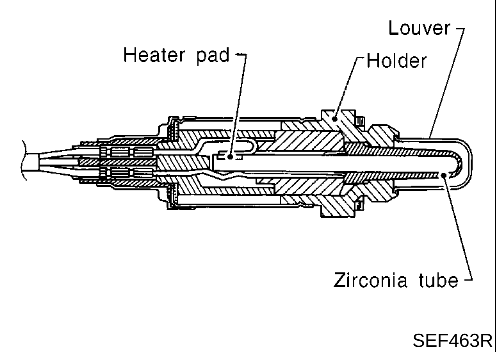
OK or NG

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

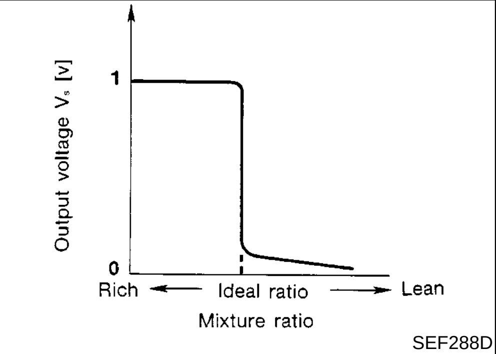
13	CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-706.

	▶	**INSPECTION END**



SEF463R



SEF288D

Component Description

NGEC0637

The front heated oxygen sensor is placed into the front tube. It detects the amount of oxygen in the exhaust gas compared to the outside air. The front heated oxygen sensor has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The front heated oxygen sensor signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0638

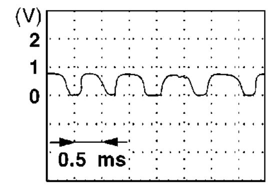
Specification data are reference values.

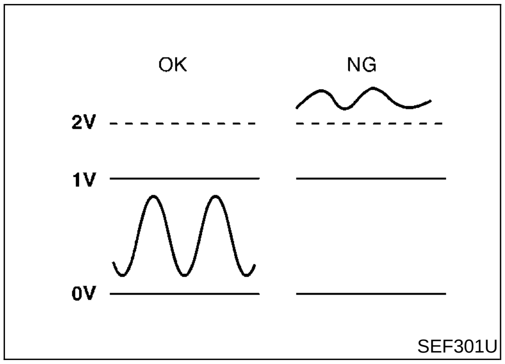
MONITOR ITEM	CONDITION		SPECIFICATION
FR O2 SEN-B1 FR O2 SEN-B2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
FR O2 MNTR-B1 FR O2 MNTR-B2			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

ECM Terminals and Reference Value

NGEC0639

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Front heated oxygen sensor RH	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V
51	G	Front heated oxygen sensor LH		



SEF301U

On Board Diagnosis Logic

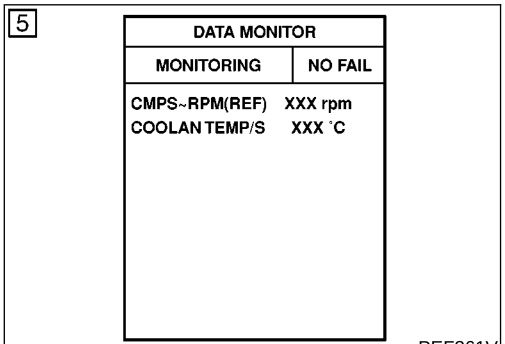
NGEC0640

To judge the malfunction, the diagnosis checks that the front heated oxygen sensor output is not inordinately high.
Malfunction is detected when an excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

NGEC0640S01

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



PEF361V

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 20 seconds.
6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-805.

With GST

Follow the procedure “With CONSULT-II”.

No Tools

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Restart engine and let it idle for 20 seconds.
4) Turn ignition switch OFF, wait at least 5 seconds and then turn “ON”.
5) Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
6) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-805.

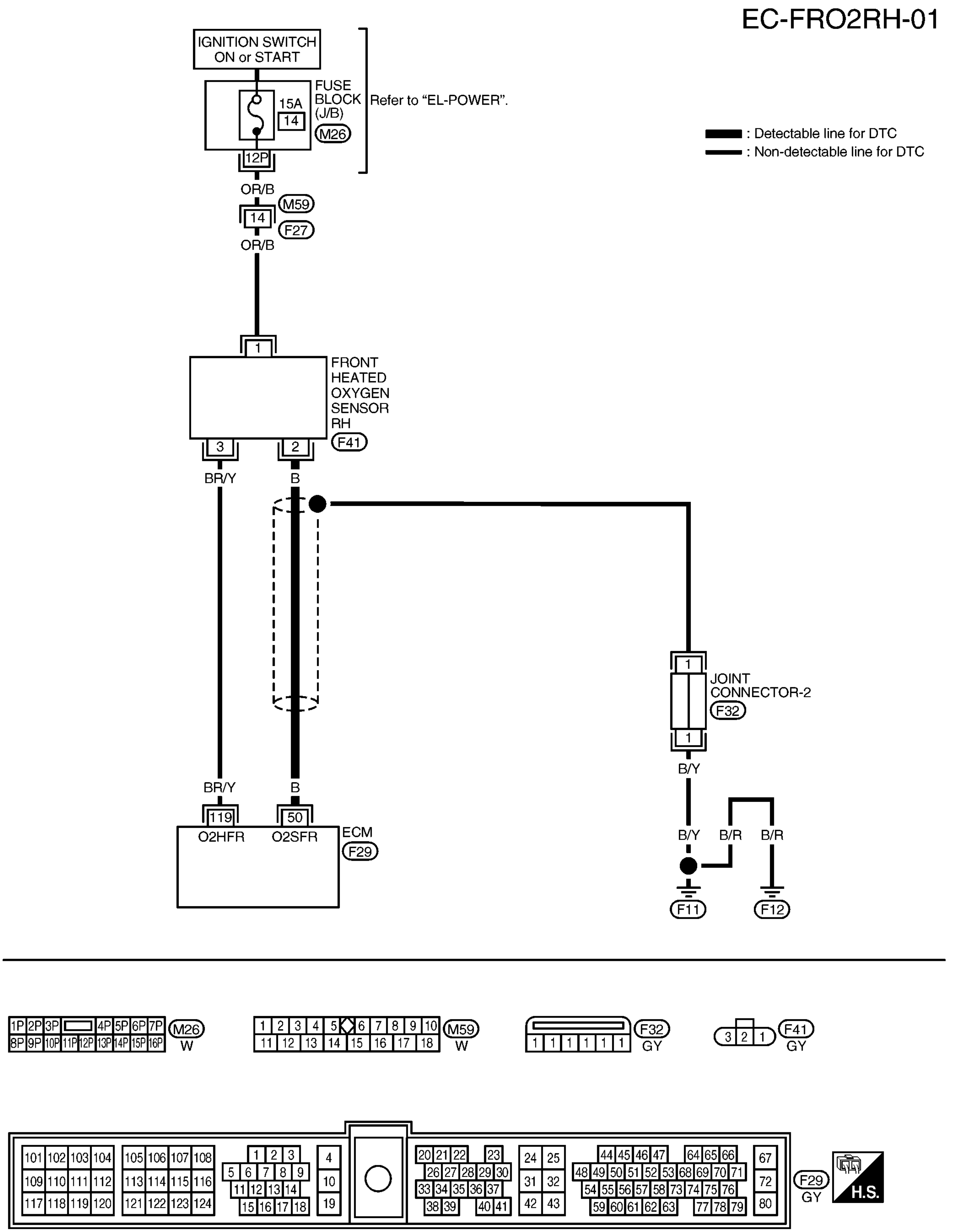
- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II or ECM (Diagnostic Test Mode II) because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II or ECM (Diagnostic Test Mode II) is recommended.**

Wiring Diagram

NGEC0642

RIGHT BANK

NGEC0642S01

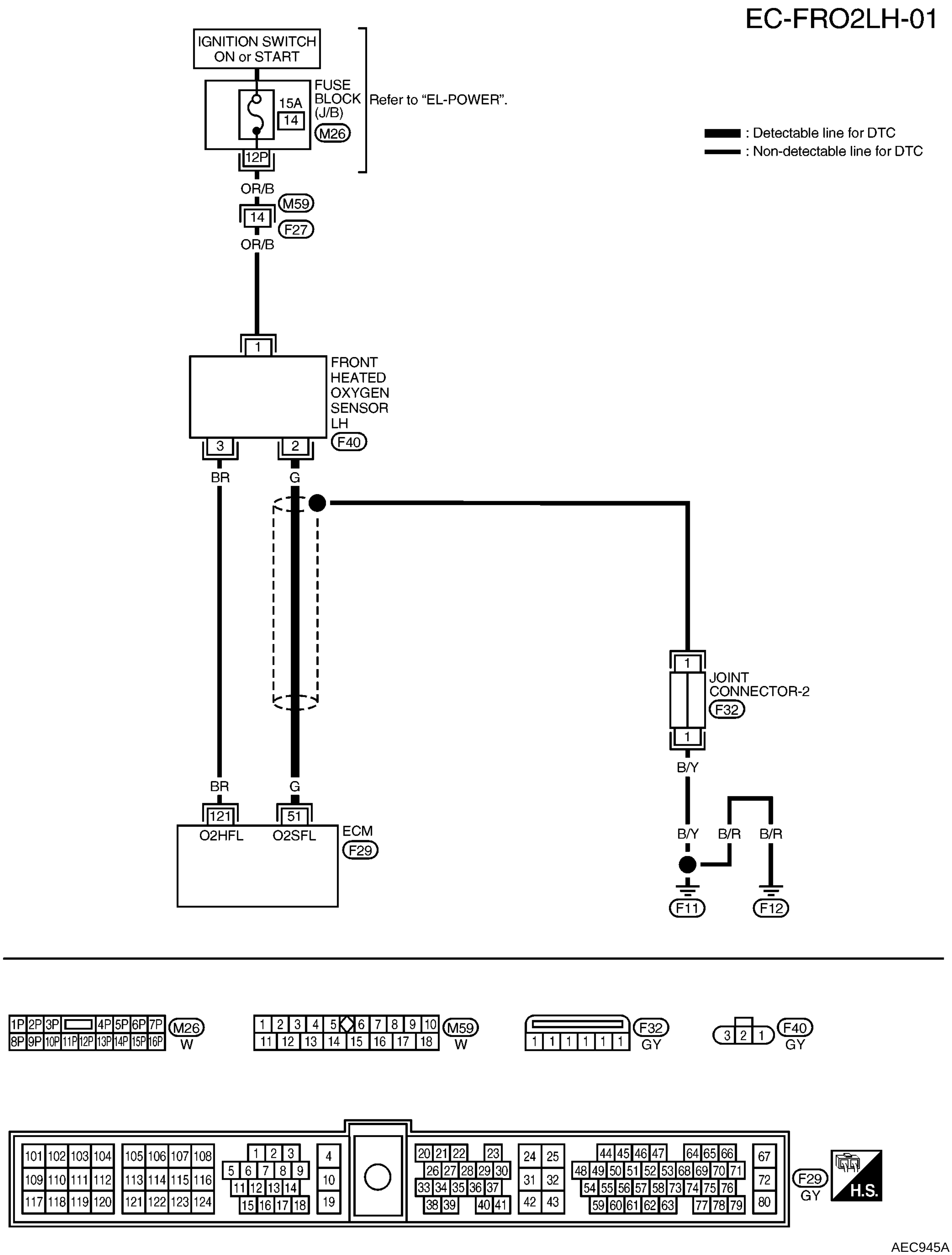


AEC944A

Wiring Diagram (Cont'd)

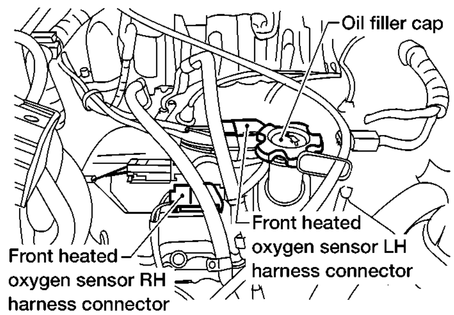
LEFT BANK

NGEC0642S02



Diagnostic Procedure

NGEC0643

1	INSPECTION START
	1. Turn ignition switch OFF. 2. Disconnect corresponding front heated oxygen sensor harness connector.  AEC644A
▶	GO TO 2.

2	RETIGHTEN FRONT HEATED OXYGEN SENSOR
	1. Loosen and retighten corresponding front heated oxygen sensor. **Tightening torque:** **40 - 50 N·m (4.1 - 5.1 kg-m, 30 - 37 ft-lb)**
▶	GO TO 3.

3	CHECK FRONT HO2S INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	Terminals		Bank
	ECM	Sensor	
P0134	50	2	Right
P0154	51	2	Left

AEC892A

Continuity should exist.

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

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0134	50 or 2	Ground	Right
P0154	51 or 2	Ground	Left

AEC893A

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

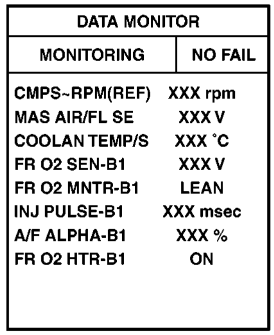
OK	▶	GO TO 4.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK FRONT HO2S CONNECTOR FOR WATER	
1. Disconnect front heated oxygen sensor harness connector. 2. Check connectors for water. **Water should not exist.** **OK or NG**		
OK (With CONSULT-II)	▶	GO TO 5.
OK (Without CONSULT-II)	▶	GO TO 6.
NG	▶	Repair or replace harness or connectors.

5	CHECK FRONT HEATED OXYGEN SENSOR

With CONSULT-II

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



PEF365V

5. Check the following.

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

Right bank

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

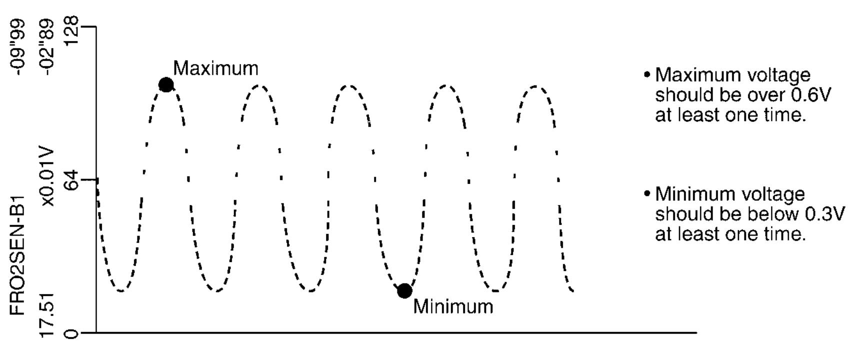
Left bank

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

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

SEF702W

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



SEF154X

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.**

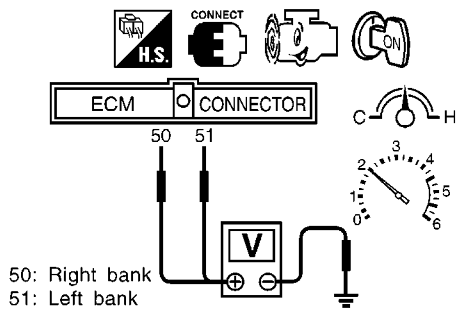
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace malfunctioning front heated oxygen sensor.

6	CHECK FRONT HEATED OXYGEN SENSOR

Without CONSULT-II

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



SEF919U

- MIL goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

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

7	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.

	▶	**INSPECTION END**

Description

NGEC0644

SYSTEM DESCRIPTION

NGEC0644S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Front heated oxygen sensor heater control	Front heated oxygen sensor heaters

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

OPERATION

NGEC0644S02

Engine speed rpm	Front heated oxygen sensor heaters
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
FR O2 HTR-B1 FR O2 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 32 (ECM ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
119 (Right bank)	BR/Y	Front heated oxygen sensor heater	**[Engine is running]** • Engine speed is below 3,200 rpm	Approximately 0.4V
121 (Left bank)	BR		**[Engine is running]** • Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

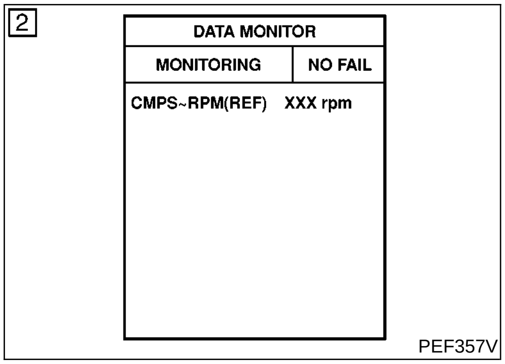
NGEC0647

Malfunction is detected when the current amperage in the front heated oxygen sensor heater circuit is out of the normal range.
(An improper voltage drop signal is sent to ECM through the front heated oxygen sensor heater.)

POSSIBLE CAUSE

NGEC0647S01

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



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-813.

With GST

Follow the procedure “With CONSULT-II”.

No Tools

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) Perform “Diagnostic Test Mode II (Self-diagnostic results)” with ECM.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-813.

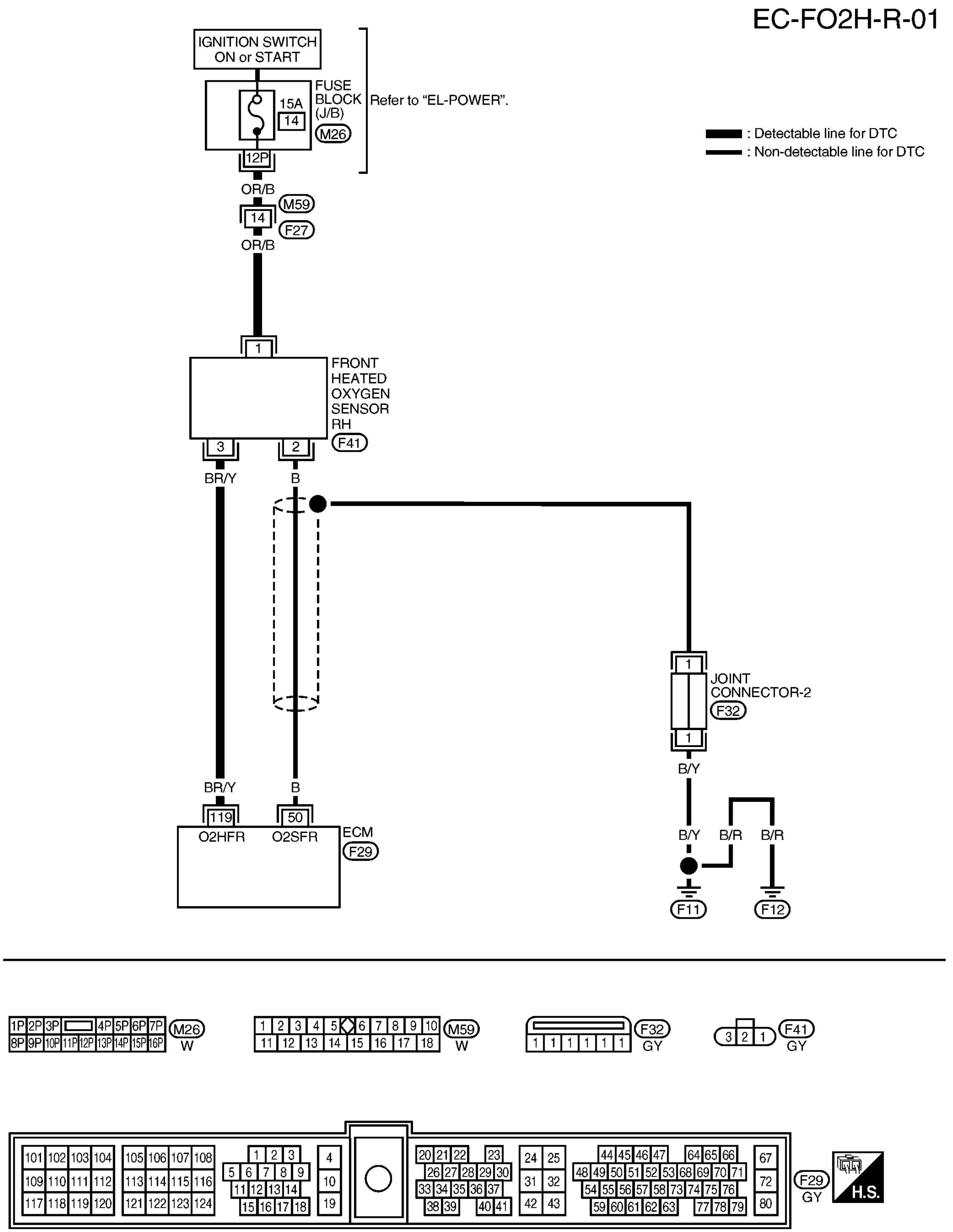
- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II or ECM (Diagnostic Test Mode II) because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II or ECM (Diagnostic Test Mode II) is recommended.**

Wiring Diagram

NGEC0649

RIGHT BANK

NGEC0649S01

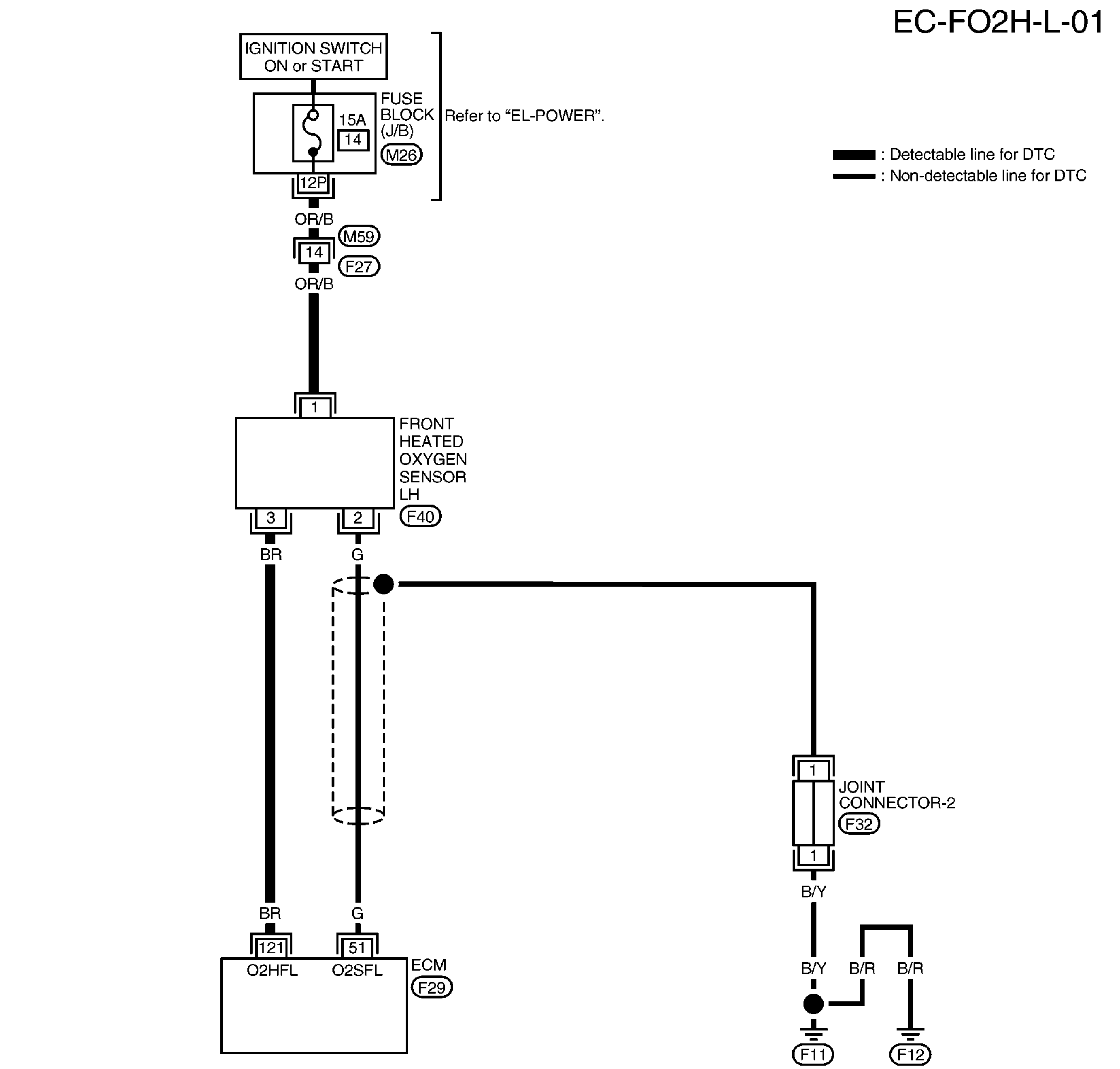


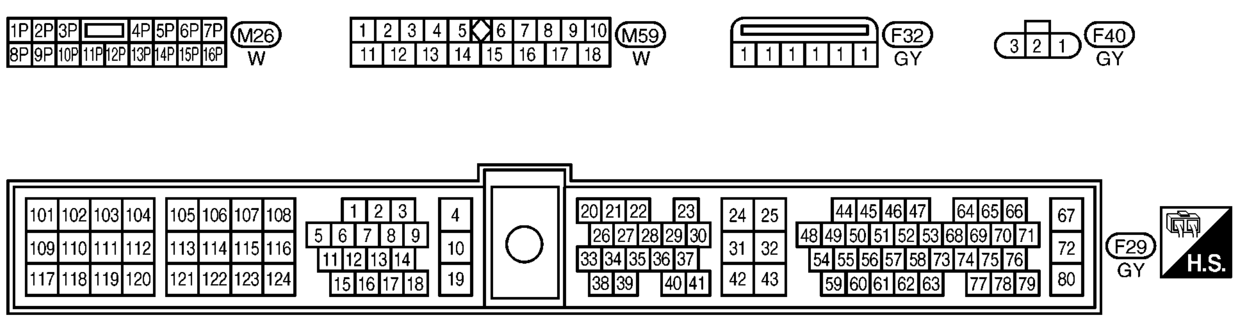
AEC946A

Wiring Diagram (Cont'd)

LEFT BANK

NGEC0649S02





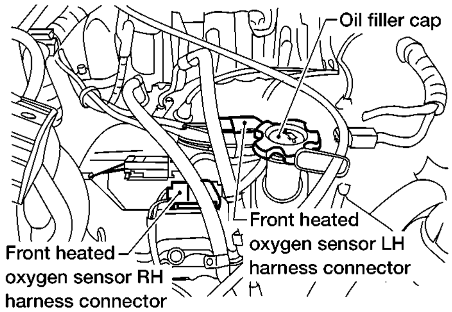
AEC947A

Diagnostic Procedure

NGEC0650

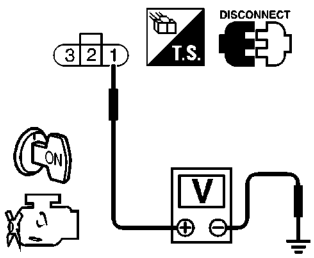
1 CHECK FRONT HO2S POWER SUPPLY CIRCUIT

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



AEC644A

3. Turn ignition switch ON.
4. Check voltage between FRONT HO2S 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 front heated oxygen sensor and fuse

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

3	CHECK FRONT HO2S GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal and FRONT HO2S terminal as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0135	119	3	Right
P0155	121	3	Left

AEC894A

Continuity should exist.

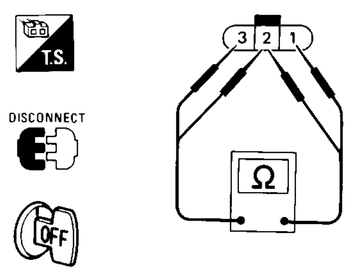
4. Also check harness for short to ground and short to power.

OK or NG

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

4	CHECK FRONT HEATED OXYGEN SENSOR HEATER

Check resistance between FRONT HO2S terminals 3 and 1.



AEC158A

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

Check continuity between FRONT HO2S 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.**

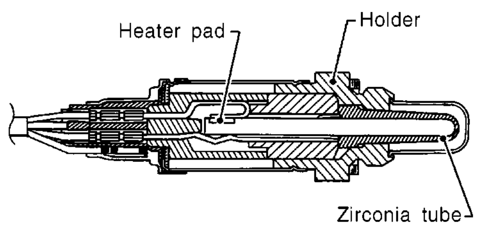
OK or NG

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

5	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.

	▶	**INSPECTION END**



SEF327R

Component Description

NGEC0651

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

CONSULT-II Reference Value in Data Monitor Mode

NGEC0652

Specification data are reference values.

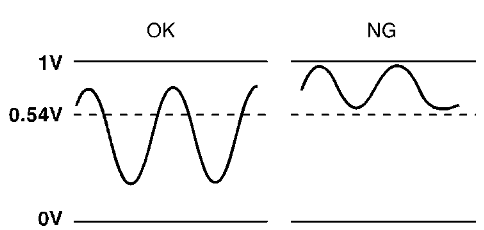
MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SEN-B1 RR O2 SEN-B2	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
RR O2 MNTR-B1 RR O2 MNTR-B2			LEAN ⟷ RICH

ECM Terminals and Reference Value

NGEC0653

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56 (Right bank)	OR	Rear heated oxygen sensor	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57 (Left bank)	Y			



SEF304U

On Board Diagnosis Logic

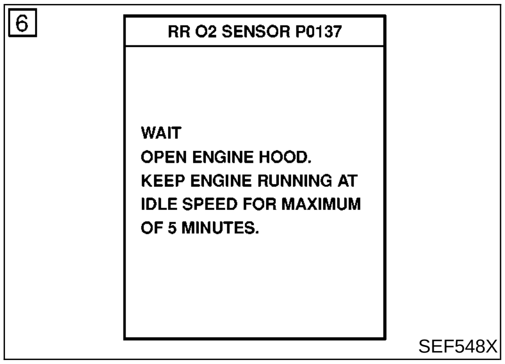
NGEC0654

The rear heated oxygen sensor has a much longer switching time between rich and lean than the front heated oxygen sensor. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of rear heated oxygen sensor, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.
Malfunction is detected when the minimum voltage from the sensor is not reached to the specified voltage.

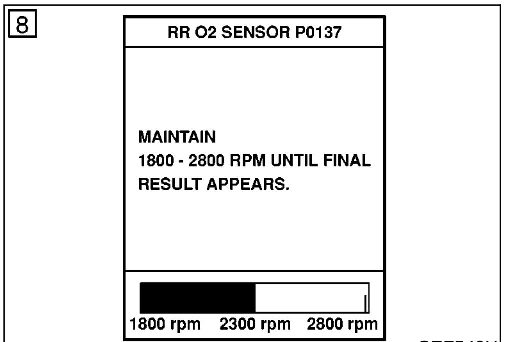
POSSIBLE CAUSE

NGEC0654S01

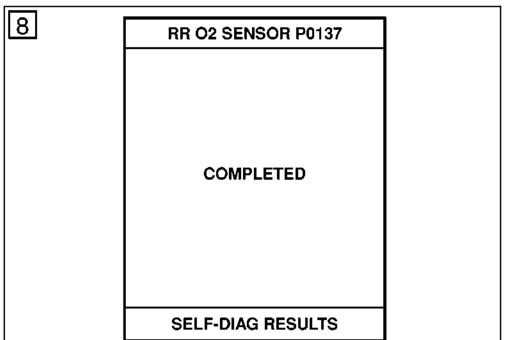
- Harness or connectors
  (The sensor circuit is open or shorted.)
- Rear heated oxygen sensor
- Fuel pressure
- Injectors



SEF548X



SEF549X



SEF550X

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.

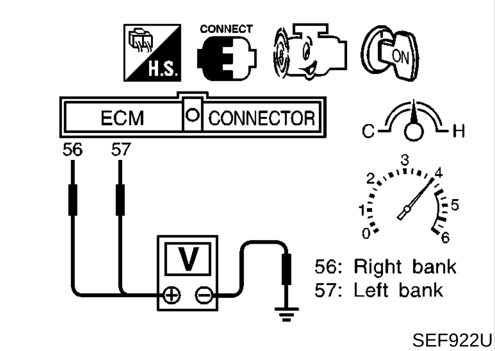
TESTING CONDITION:

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 "RR 02 SEN -B1 (-B2), P0137 (P0157) of "RR 02 SENSOR" 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-820.
   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) Perform from step 6) again when the "COOLANT TEMP/S" reaches to 70°C 158°F)



SEF922U

Overall Function Check

=NGEC0656

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 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 (right bank sensor signal) or 57 (left bank sensor signal) and engine ground.
4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)
   The voltage should be below 0.54V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), “D” position with “O/D” OFF (A/T).
   The voltage should be below 0.54V at least once during this procedure.
6) If NG, go to “Diagnostic Procedure”, EC-820.

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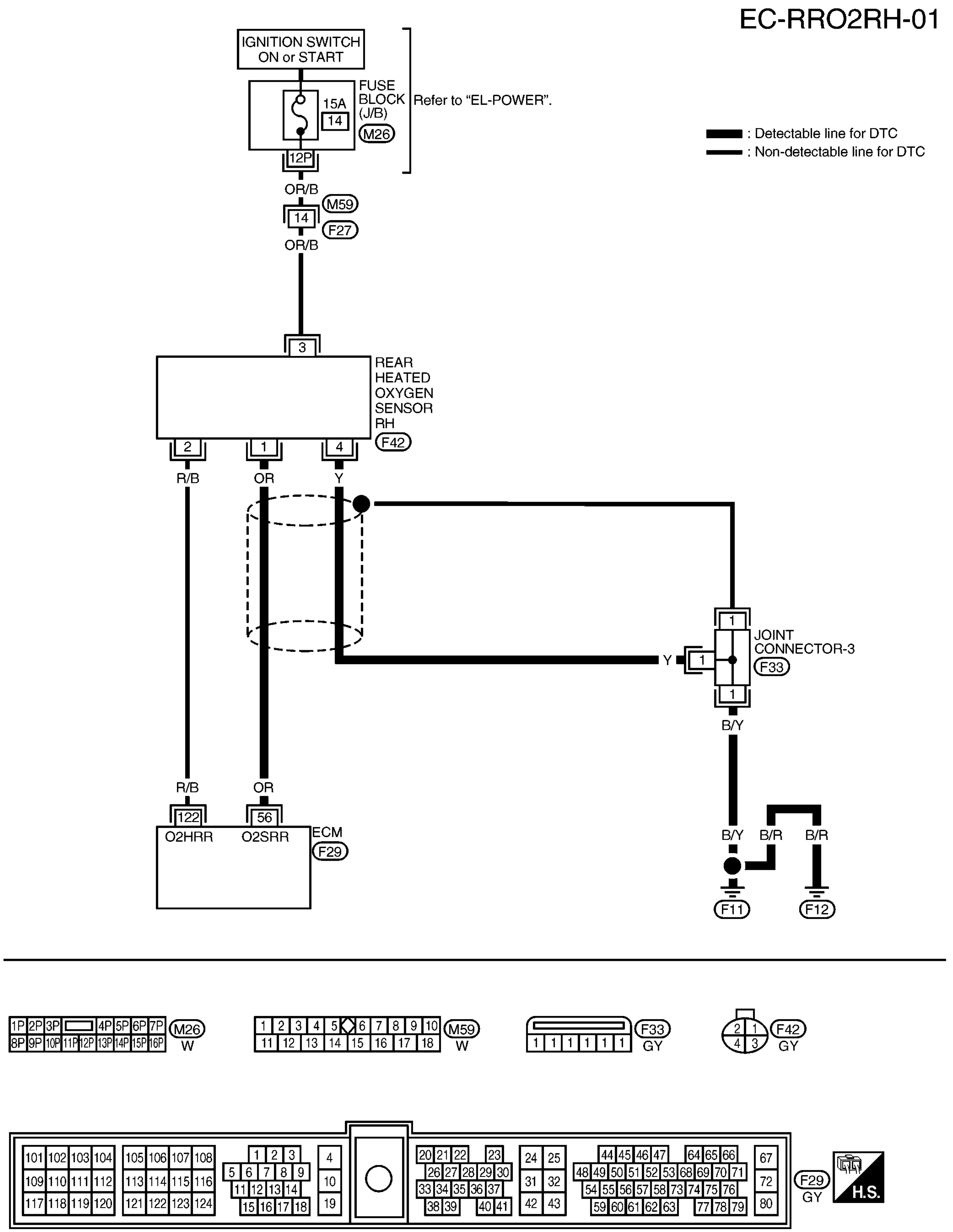
Wiring Diagram

NGEC0657

RIGHT BANK

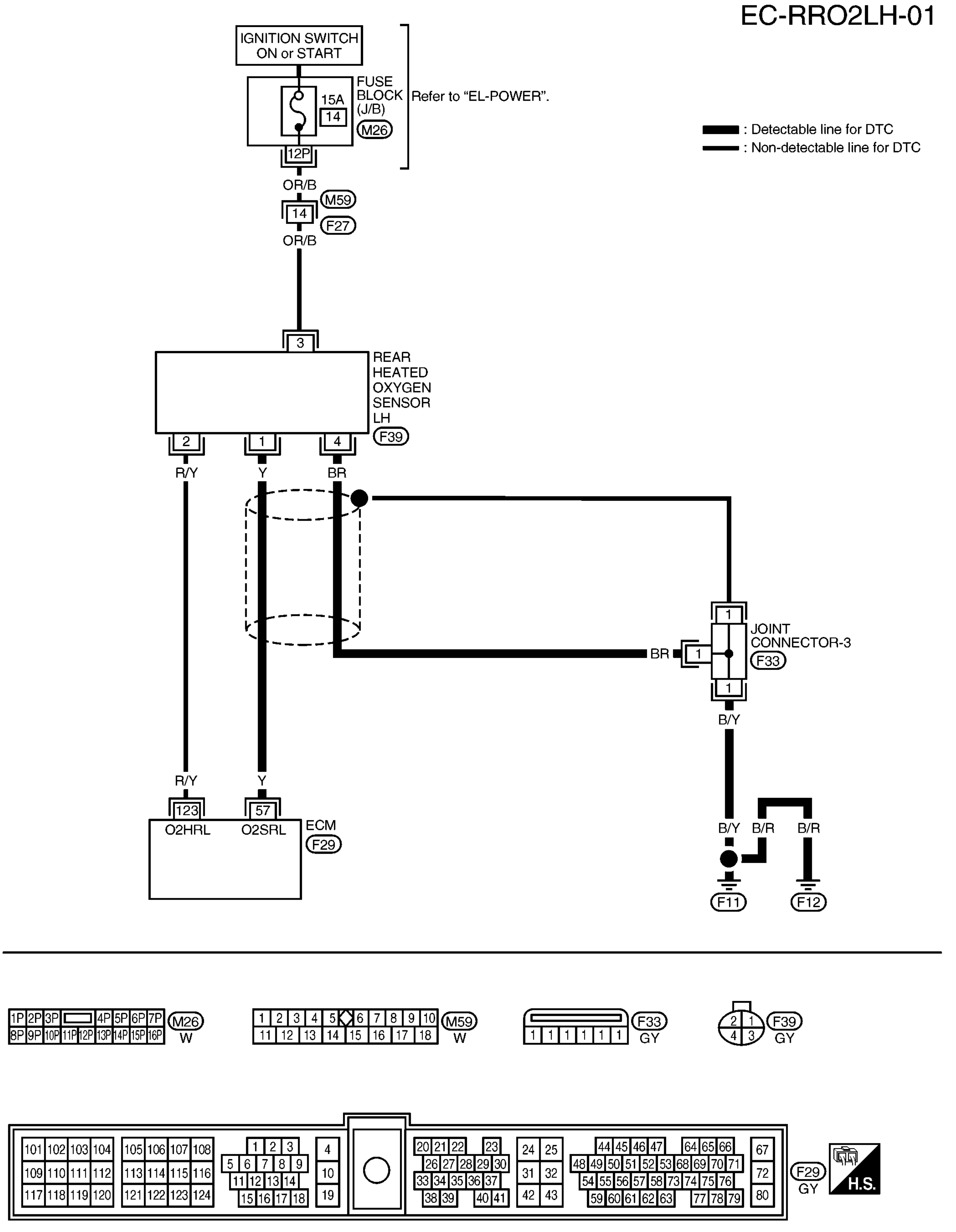
NGEC0657S01



AEC948A

LEFT BANK

NGEC0657S02



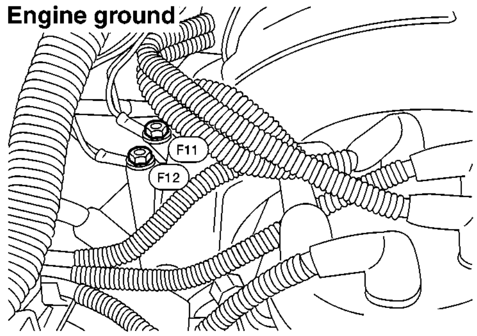
AEC949A

Diagnostic Procedure

NGEC0658

1 RETIGHTEN GROUND SCREWS

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



AEC640A

▶	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 “ACTIVE TEST” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.

ACTIVE TEST	
SELF-LEARN	B1: XXX %
CONTROL	B2: XXX %
MONITOR	
CMPS·RPM(REF)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 SEN-B2	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

PEF921U

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

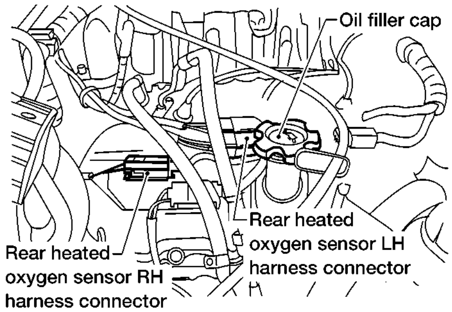
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Refer to “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-640.
7. Make sure DTC No. 0505 is displayed in Diagnostic Test Mode II.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0114 or 0209 detected?
   Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-869.
No	▶	GO TO 3.

3	CHECK REAR HO2S INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect corresponding rear heated oxygen sensor harness connector.



AEC645A

3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and REAR HO2S terminal as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0137	56	1	Right
P0157	57	1	Left

AEC895A

Continuity should exist.

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

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0137	56 or 1	Ground	Right
P0157	57 or 1	Ground	Left

AEC896A

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 REAR HO2S GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between REAR HO2S terminal 4 and engine ground.
   Refer to Wiring Diagram.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG

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

5	DETECT MALFUNCTIONING PART

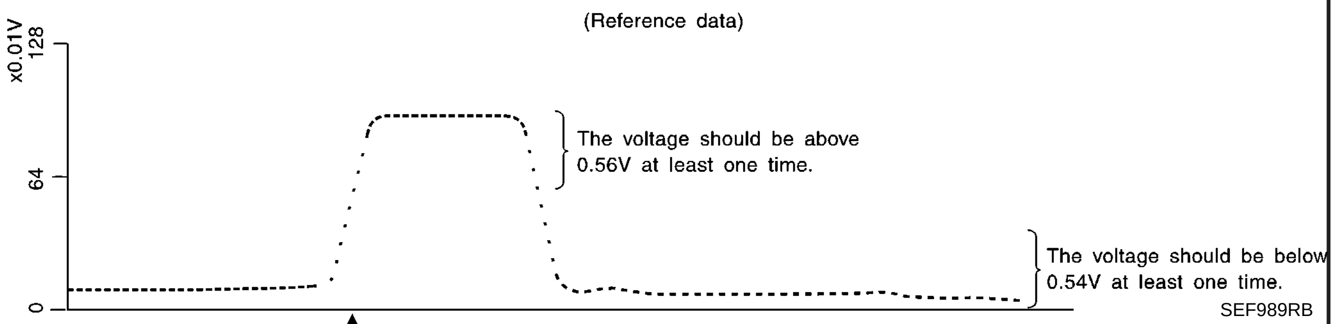
Check the following.
- Joint connector-3
- Harness for open or short between rear heated oxygen sensor and engine ground.

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

6	CHECK REAR HEATED OXYGEN SENSOR

With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "RR O2 SEN-B1 (-B2)" as the monitor item with CONSULT-II.
4. Check "RR O2 SEN-B1 (-B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.



SEF989RB

"RR O2 SEN-B1 (-B2)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%.
"RR O2 SEN-B1 (-B2)" should be below 0.54V at least once when the "FUEL INJECTION" is −25%.

CAUTION:

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

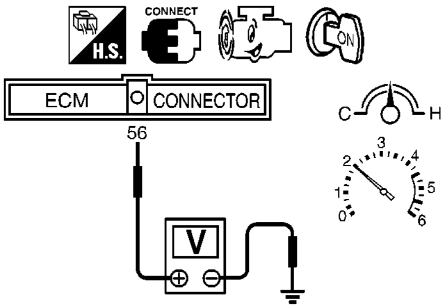
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace malfunctioning rear heated oxygen sensor.

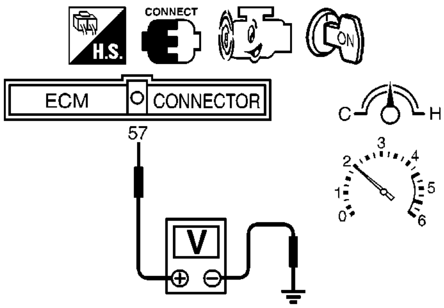
7	CHECK REAR HEATED OXYGEN SENSOR

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 (right bank sensor signal) or 57 (left bank sensor 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)



SEF923U



SEF924U

   The voltage should be above 0.56V at least once during this procedure.
   If the voltage is above 0.56V at 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 0.54V at least once during this procedure.

CAUTION:

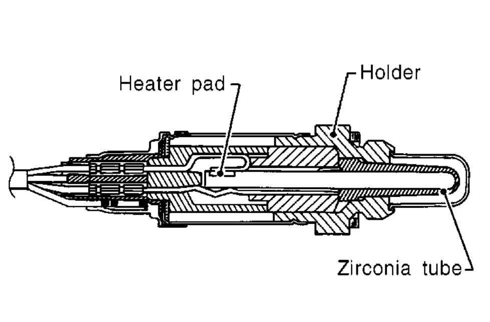
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897–18 or J-43897–12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

OK or NG

OK ▶	GO TO 8.
NG ▶	Replace malfunctioning rear heated oxygen sensor.

8	CHECK REAR HO2S 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 "HARNESS LAYOUT", ***EL-292***.) **Continuity should exist.** 4. Also check harness for short to ground and short to power. 5. Then reconnect joint connector-3. **OK or NG**	
OK ▶	GO TO 9.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.	
▶	**INSPECTION END**



SEF327R

Component Description

NGEC0659

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

CONSULT-II Reference Value in Data Monitor Mode

NGEC0660

Specification data are reference values.

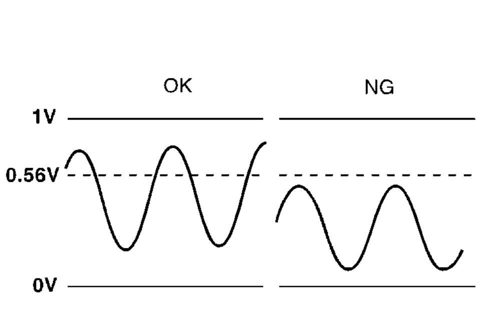
MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SEN-B1 RR O2 SEN-B2	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
RR O2 MNTR-B1 RR O2 MNTR-B2			LEAN ⟷ RICH

ECM Terminals and Reference Value

NGEC0661

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56 (Right bank)	OR	Rear heated oxygen sensor	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57 (Left bank)	Y			



SEF303U

On Board Diagnosis Logic

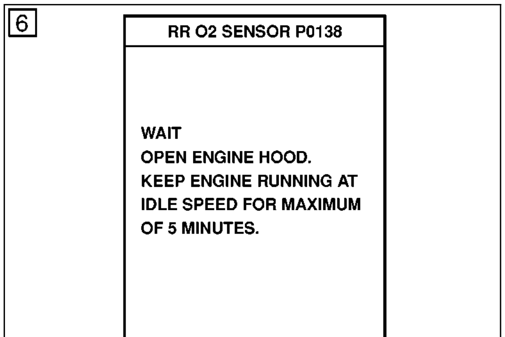
NGEC0662

The rear heated oxygen sensor has a much longer switching time between rich and lean than the front heated oxygen sensor. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of rear heated oxygen sensor, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.
Malfunction is detected when the maximum voltage from the sensor is not reached to the specified voltage.

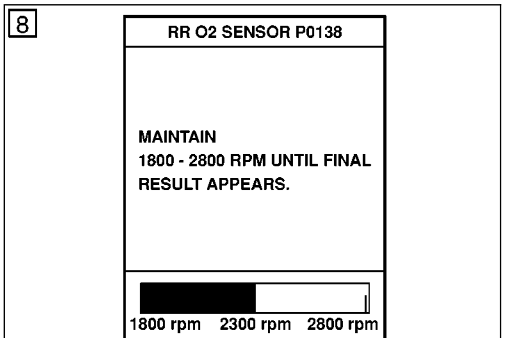
POSSIBLE CAUSE

NGEC0662S01

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Rear heated oxygen sensor
- Fuel pressure
- Injectors
- Intake air leaks



SEF551X



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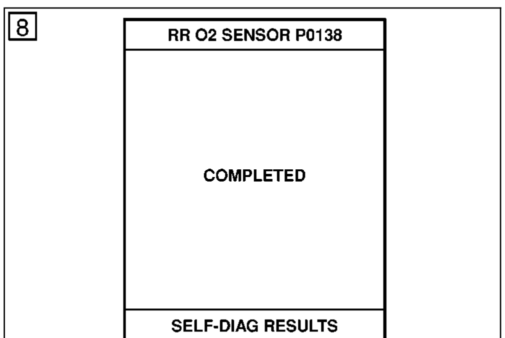


SEF553X

DTC Confirmation Procedure

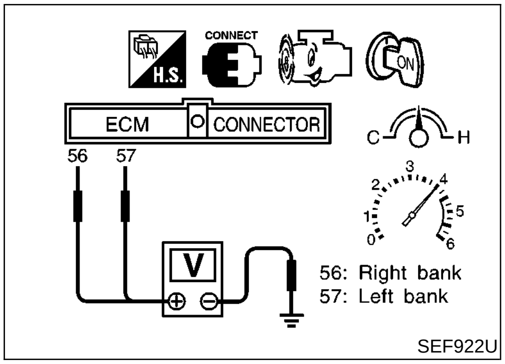
NGEC0663

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 "RR 02 SEN -B1 (-B2), P0138 (P0158) of "RR 02 SENSOR" 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-830.
   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) Perform from step 6) again when the "COOLANT TEMP/S" reaches to 70°C 158°F)



SEF922U

Overall Function Check

=NGEC0664

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 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 (right bank sensor signal) or 57 (left bank sensor signal) and engine ground.
4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)
   The voltage should be above 0.56V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), “D” position with “O/D” OFF (A/T).
   The voltage should be above 0.56V at least once during this procedure.
6) If NG, go to “Diagnostic Procedure”, EC-830.

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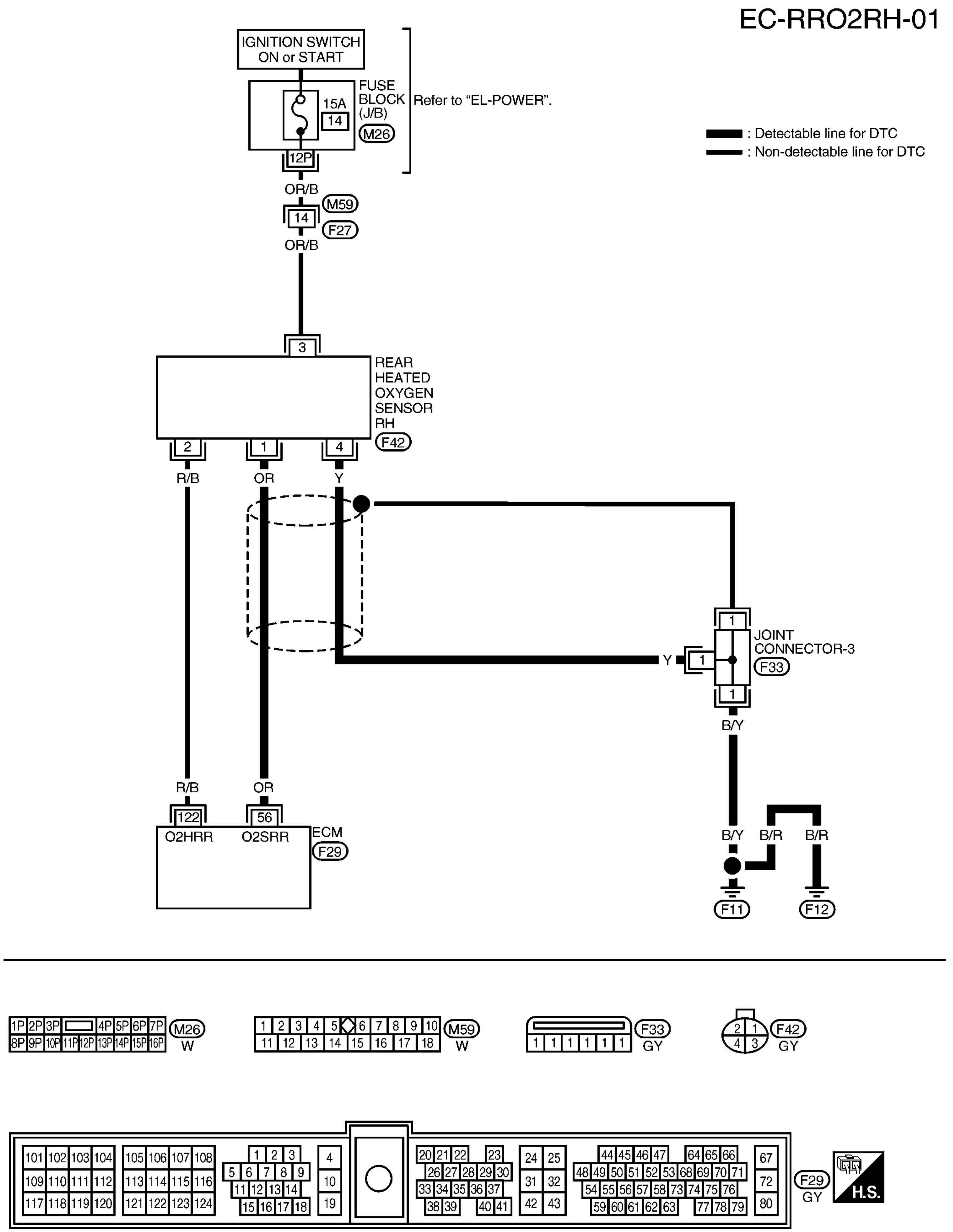
Wiring Diagram

NGEC0665

RIGHT BANK

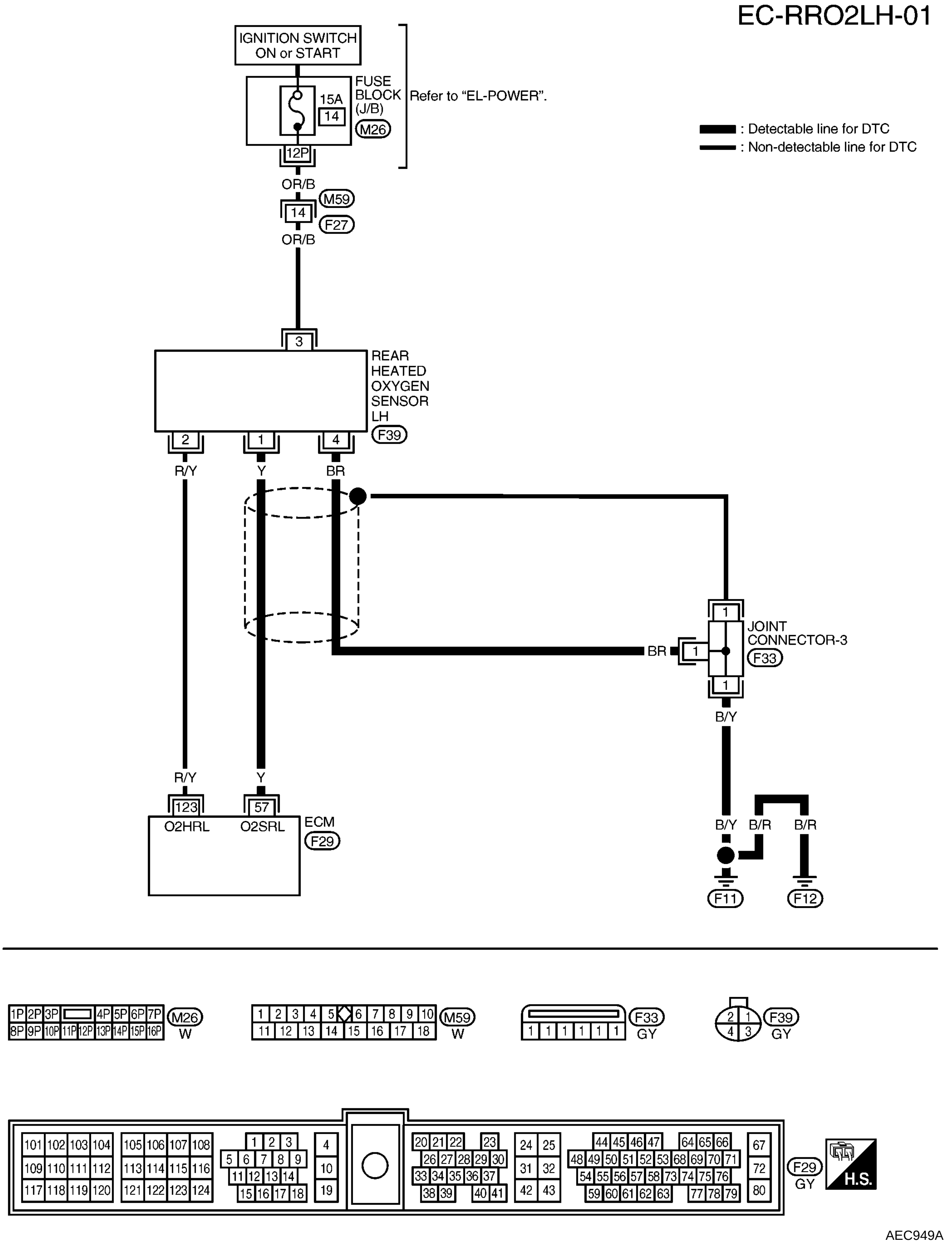
NGEC0665S01



AEC948A

LEFT BANK

NGEC0665S02

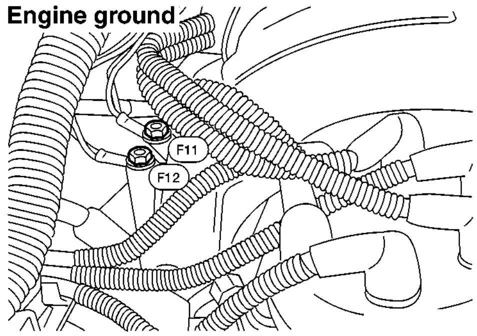


Diagnostic Procedure

NGEC0666

1	RETIGHTEN GROUND SCREWS

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



AEC640A

▶ 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 “ACTIVE TEST” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.

ACTIVE TEST	
SELF-LEARN	B1: XXX %
CONTROL	B2: XXX %
MONITOR	
CMPS·RPM(REF)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 SEN-B2	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

PEF921U

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 No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Refer to “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-640.
7. Make sure DTC No. 0505 is displayed in Diagnostic Test Mode II.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0115 or 0210 detected?
   Is it difficult to start engine?

Yes or No

Yes ▶	Perform trouble diagnosis for DTC P0171, P0174. Refer to EC-861.
No ▶	GO TO 3.

3	CHECK REAR HO2S INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect corresponding rear heated oxygen sensor harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and REAR HO2S terminal as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	56	1	Right
P0158	57	1	Left

AEC897A

Continuity should exist.

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

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0138	56 or 1	Ground	Right
P0158	57 or 1	Ground	Left

AEC898A

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 REAR HO2S GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between REAR HO2S terminal 4 and engine ground.
   Refer to Wiring Diagram.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG

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

5	DETECT MALFUNCTIONING PART

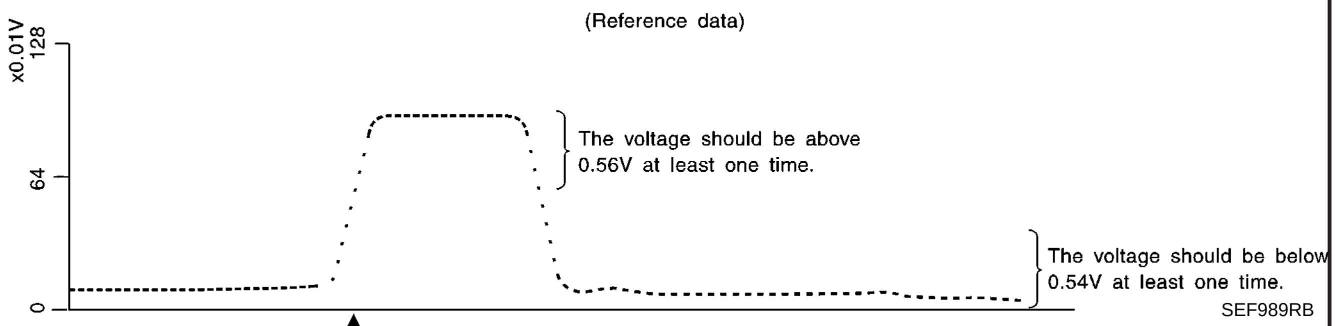
Check the following.
- Joint connector-3
- Harness for open or short between rear heated oxygen sensor and engine ground.

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

6 CHECK REAR HEATED OXYGEN SENSOR

With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “RR O2 SEN-B1 (-B2)” as the monitor item with CONSULT-II.
4. Check “RR O2 SEN-B1 (-B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“RR O2 SEN-B1 (-B2)” should be above 0.56V at least once when the “FUEL INJECTION” is +25%.
“RR O2 SEN-B1 (-B2)” should be below 0.54V at least once when the “FUEL INJECTION” is −25%.

CAUTION:

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

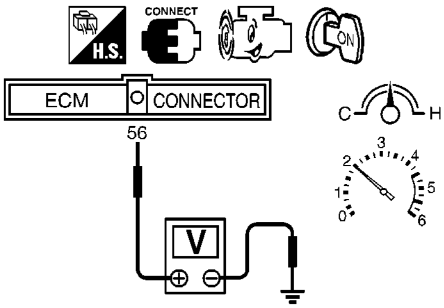
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace malfunctioning rear heated oxygen sensor.

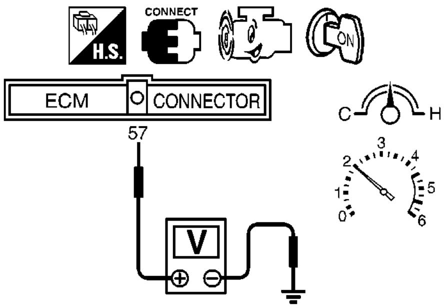
7	CHECK REAR HEATED OXYGEN SENSOR

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 (right bank sensor signal) or 57 (left bank sensor 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)



SEF923U



SEF924U

   The voltage should be above 0.56V at least once during this procedure.
   If the voltage is above 0.56V at 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 0.54V at least once during this procedure.

CAUTION:

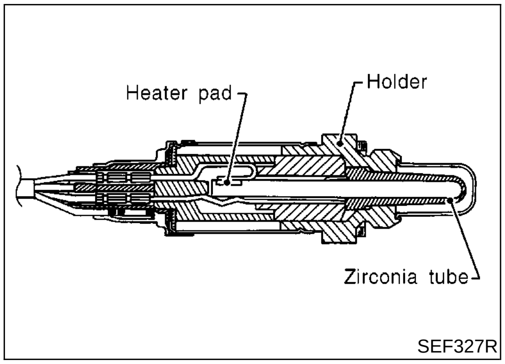
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897–18 or J-43897–12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

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace malfunctioning rear heated oxygen sensor.

8	CHECK REAR HO2S 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 ground and short to power. 5. Then reconnect joint connector. **OK or NG**	
OK ▶	GO TO 9.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.	
▶	**INSPECTION END**



SEF327R

Component Description

NGEC0667

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

CONSULT-II Reference Value in Data Monitor Mode

NGEC0668

Specification data are reference values.

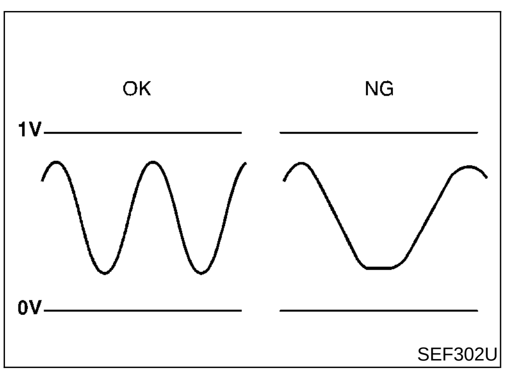
MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SEN-B1 RR O2 SEN-B2	• Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
RR O2 MNTR-B1 RR O2 MNTR-B2			LEAN ←→ RICH

ECM Terminals and Reference Value

NGEC0669

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56 (Right bank)	OR	Rear heated oxygen sensor	**[Engine is running]** • Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57 (Left bank)	Y			



SEF302U

On Board Diagnosis Logic

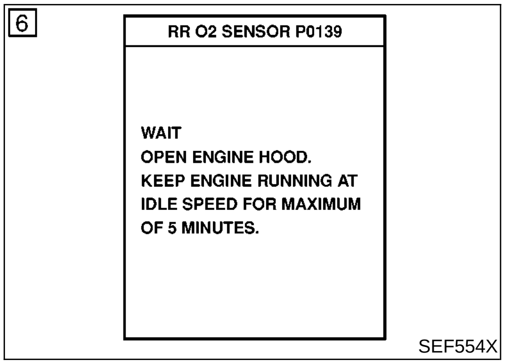
NGEC0670

The rear heated oxygen sensor has a much longer switching time between rich and lean than the front heated oxygen sensor. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of rear heated oxygen sensor, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.
Malfunction is detected when it takes more time for the sensor to respond between rich and lean than the specified time.

POSSIBLE CAUSE

NGEC0670S01

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Rear heated oxygen sensor
- Fuel pressure
- Injectors
- Intake air leaks



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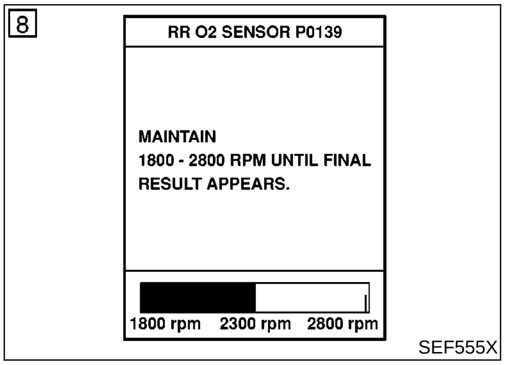

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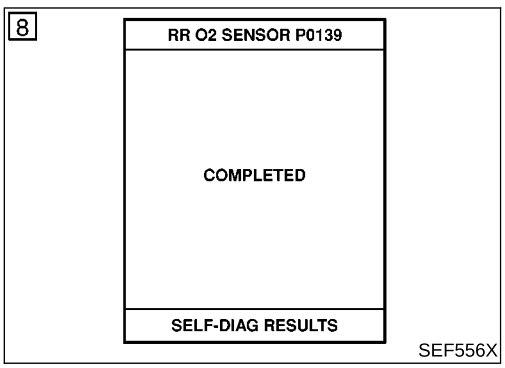


SEF556X

DTC Confirmation Procedure

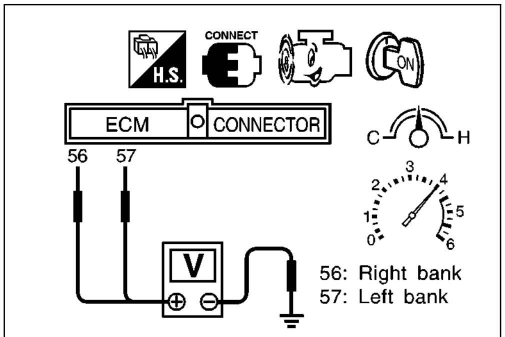
NGEC0671

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 "RR 02 SEN -B1 (-B2), P0139 (P0159) of "RR 02 SENSOR" 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-840.
   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) Perform from step 6) again when the "COOLANT TEMP/S" reaches to 70°C 158°F)



SEF922U

Overall Function Check

=NGEC0672

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 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 (right bank sensor signal) or 57 (left bank sensor 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-840.

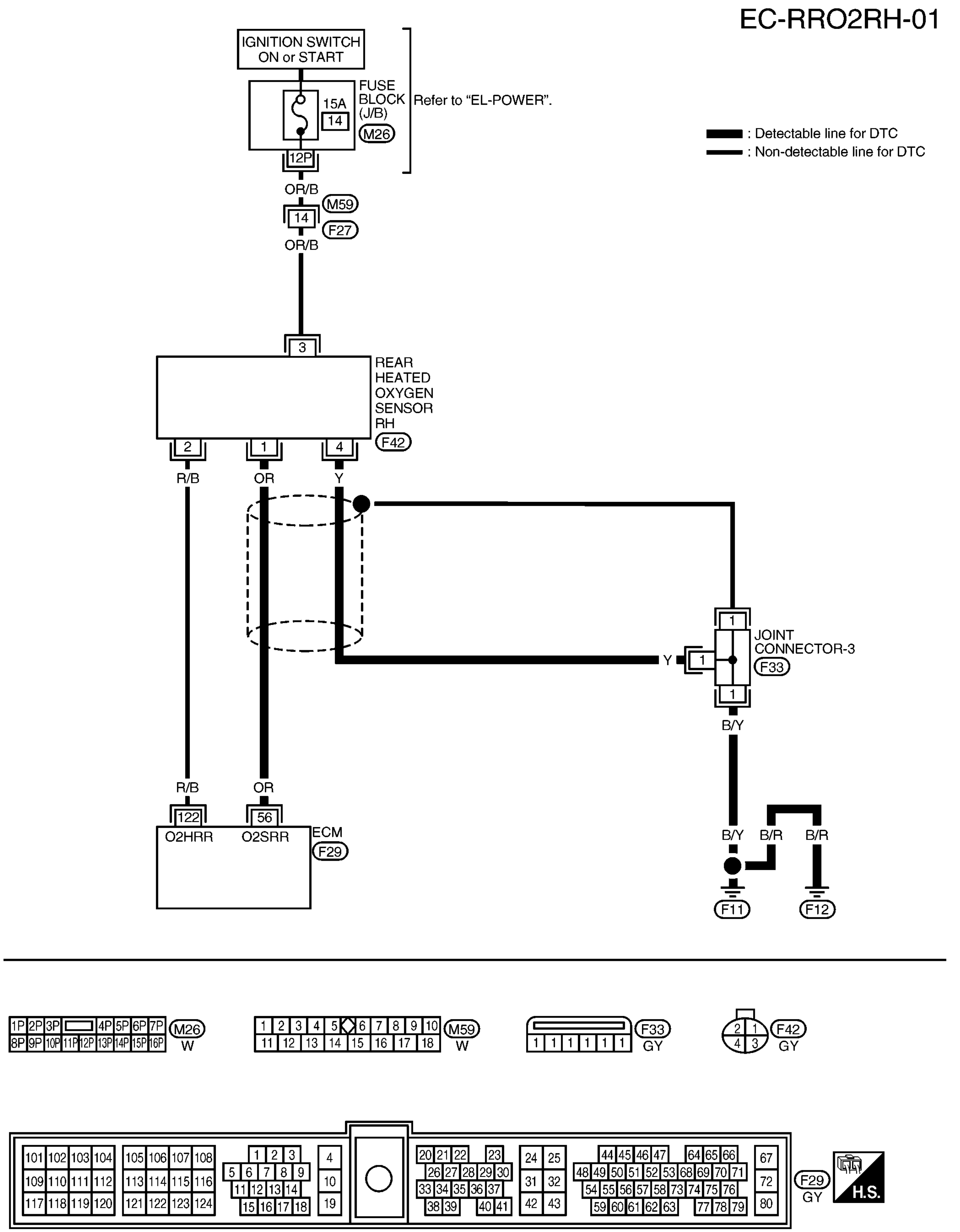
GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

Wiring Diagram

NGEC0673

RIGHT BANK

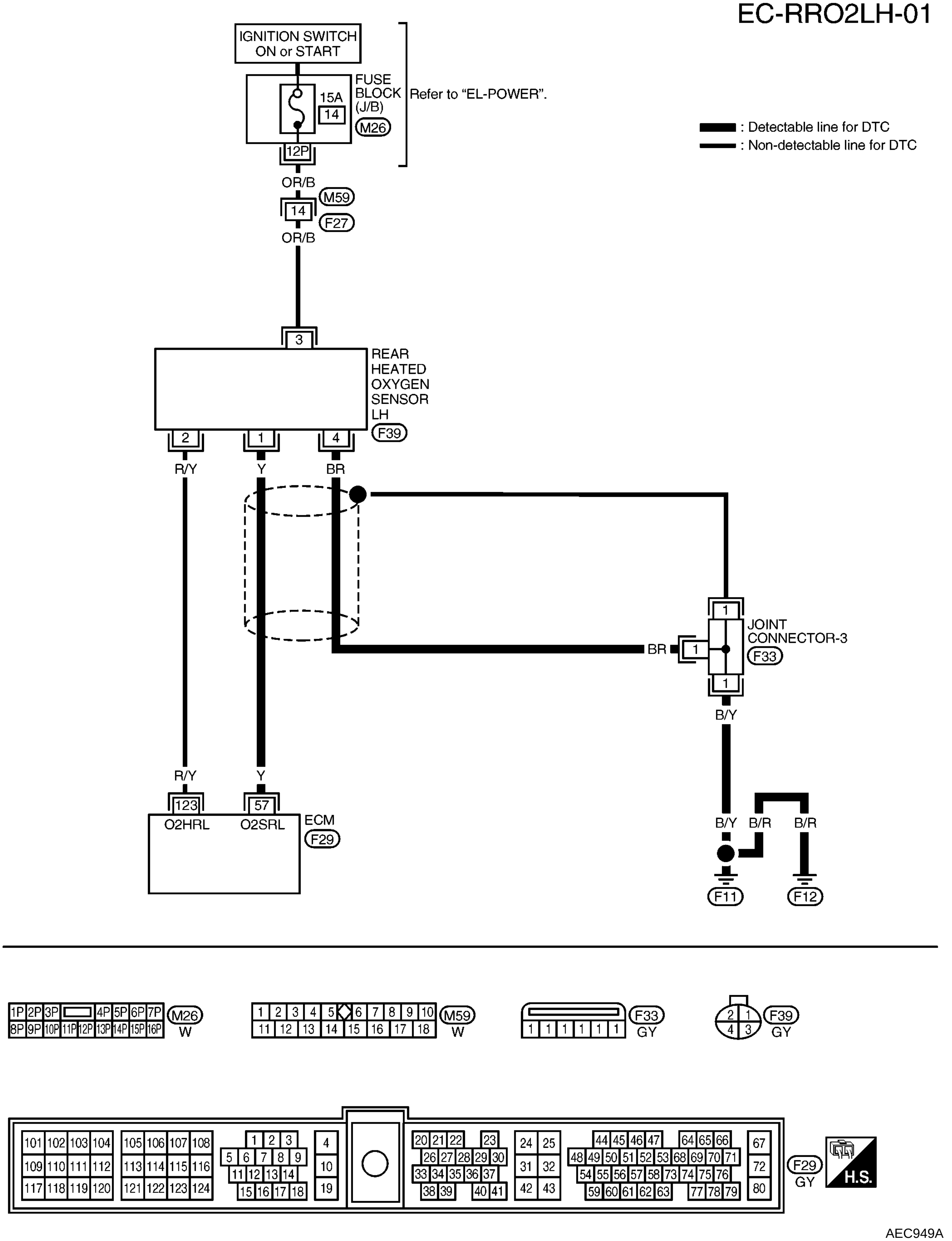
NGEC0673S01



AEC948A

LEFT BANK

NGEC0673S02

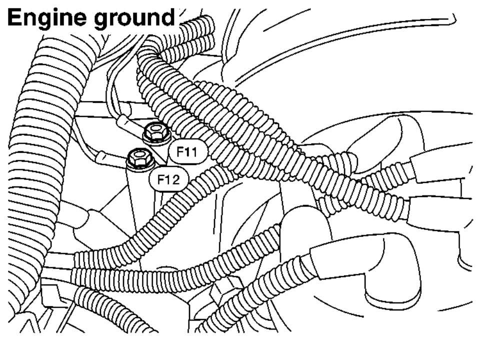


Diagnostic Procedure

NGEC0674

1 RETIGHTEN GROUND SCREWS

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



AEC640A

▶ 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 “ACTIVE TEST” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.

ACTIVE TEST	
SELF-LEARN	B1: XXX %
CONTROL	B2: XXX %
MONITOR	
CMPS·RPM(REF)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 SEN-B2	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

PEF921U

4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?
   Is it difficult to start engine?

Without CONSULT-II

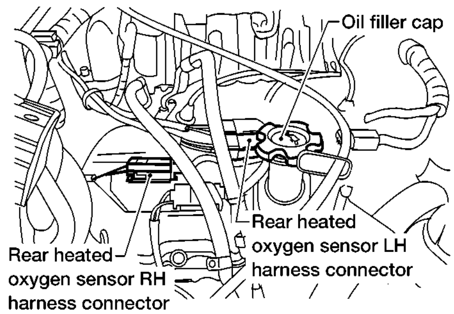
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Refer to “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-640.
7. Make sure DTC No. 0505 is displayed in Diagnostic Test Mode II.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC 0114, 0115, 0209 or 0210 detected?
   Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-860, 868.
No	▶	GO TO 3.

3	CHECK REAR HO2S INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect corresponding rear heated oxygen sensor harness connector.



AEC645A

3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and REAR HO2S terminal as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0139	56	1	Right
P0159	57	1	Left

AEC899A

Continuity should exist.

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

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0139	56 or 1	Ground	Right
P0159	57 or 1	Ground	Left

AEC900A

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 REAR HO2S GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between REAR HO2S terminal 4 and engine ground.
   Refer to Wiring Diagram.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG

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

5	DETECT MALFUNCTIONING PART

Check the following.

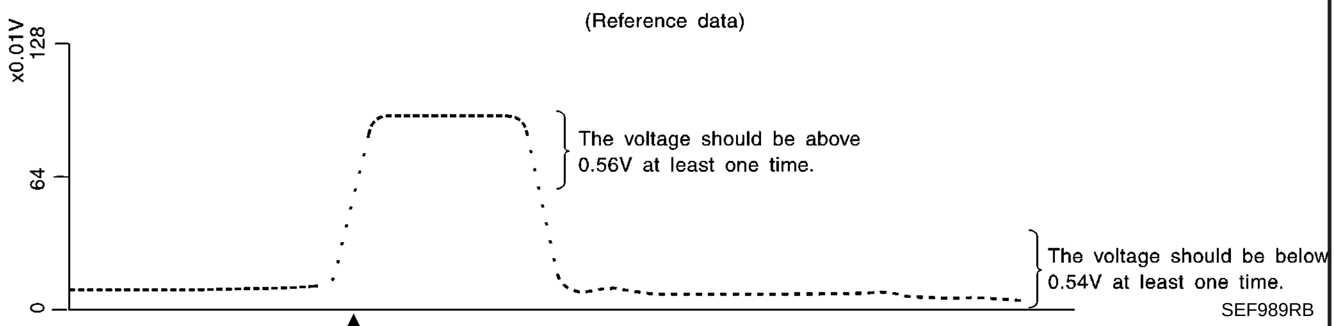
- Joint connector-3
- Harness for open or short between rear heated oxygen sensor and engine ground.

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

6	CHECK REAR HEATED OXYGEN SENSOR

With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "RR O2 SEN-B1 (-B2)" as the monitor item with CONSULT-II.
4. Check "RR O2 SEN-B1 (-B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.



SEF989RB

"RR O2 SEN-B1 (-B2)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%.
"RR O2 SEN-B1 (-B2)" should be below 0.54V at least once when the "FUEL INJECTION" is −25%.

CAUTION:

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

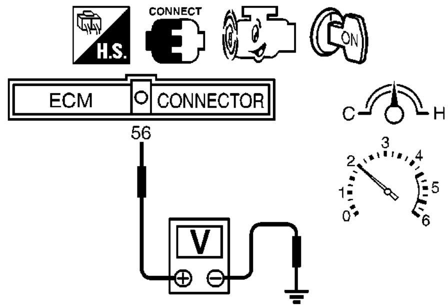
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace malfunctioning rear heated oxygen sensor.

7	CHECK REAR HEATED OXYGEN SENSOR

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 (right bank sensor signal) or 57 (left bank sensor 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)



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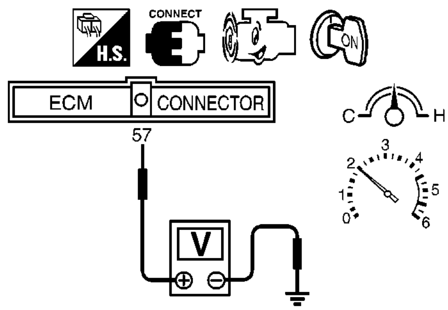


SEF924U

   The voltage should be above 0.56V at least once during this procedure.
   If the voltage is above 0.56V at 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 0.54V at least once during this procedure.

CAUTION:

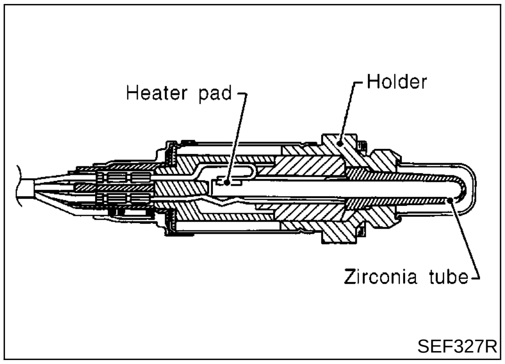
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897–18 or J-43897–12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

OK or NG

OK ▶	GO TO 8.
NG ▶	Replace malfunctioning rear heated oxygen sensor.

8	CHECK REAR HO2S 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 ground and short to power. 5. Then reconnect joint connector. **OK or NG**	
OK ▶	GO TO 9.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.	
▶	**INSPECTION END**



SEF327R

Component Description

NGEC0675

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

CONSULT-II Reference Value in Data Monitor Mode

NGEC0676

Specification data are reference values.

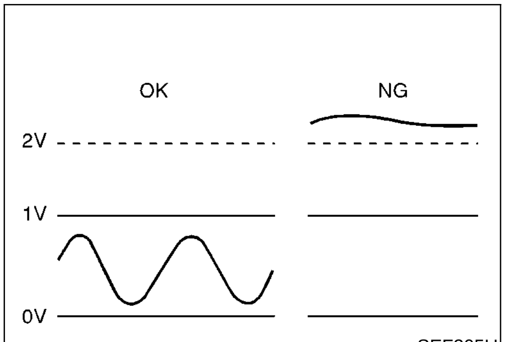
MONITOR ITEM	CONDITION		SPECIFICATION
RR O2 SEN-B1 RR O2 SEN-B2	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
RR O2 MNTR-B1 RR O2 MNTR-B2			LEAN ⟷ RICH

ECM Terminals and Reference Value

NGEC0677

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56 (Right bank)	OR	Rear heated oxygen sensor	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V
57 (Left bank)	Y			



SEF305U

On Board Diagnosis Logic

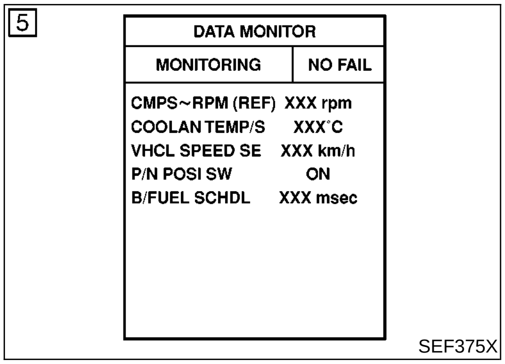
NGEC0678

The rear heated oxygen sensor has a much longer switching time between rich and lean than the front heated oxygen sensor. The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of rear heated oxygen sensor, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.
Malfunction is detected when an excessively high voltage from the sensor is sent to ECM.

POSSIBLE CAUSE

NGEC0678S01

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



SEF375X

DTC Confirmation Procedure

NGEC0679

CAUTION:
Always drive vehicle at a safe speed.

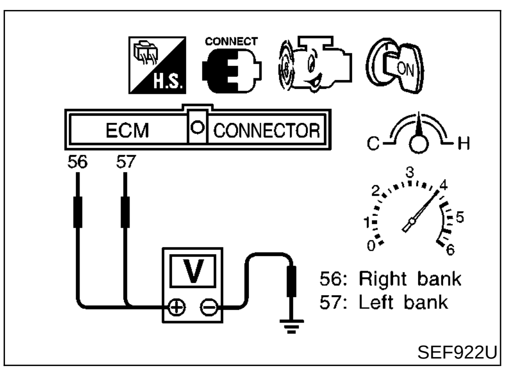
NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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.

CMPS·RPM (REF)	1,300 - 3,100 rpm (A/T models) 1,500 - 3,600 rpm (M/T models)
VHCL SPEED SE	64 - 130 km/h (40 - 80 MPH)
B/FUEL SCHDL	0.5 - 6.4 msec (A/T models) 0.5 - 5.9 msec (M/T models)
COOLAN TEMP/S	70 - 100°C (158 - 212°F)
Selector lever	Suitable position

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-849.



SEF922U

Overall Function Check

NGEC0680

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

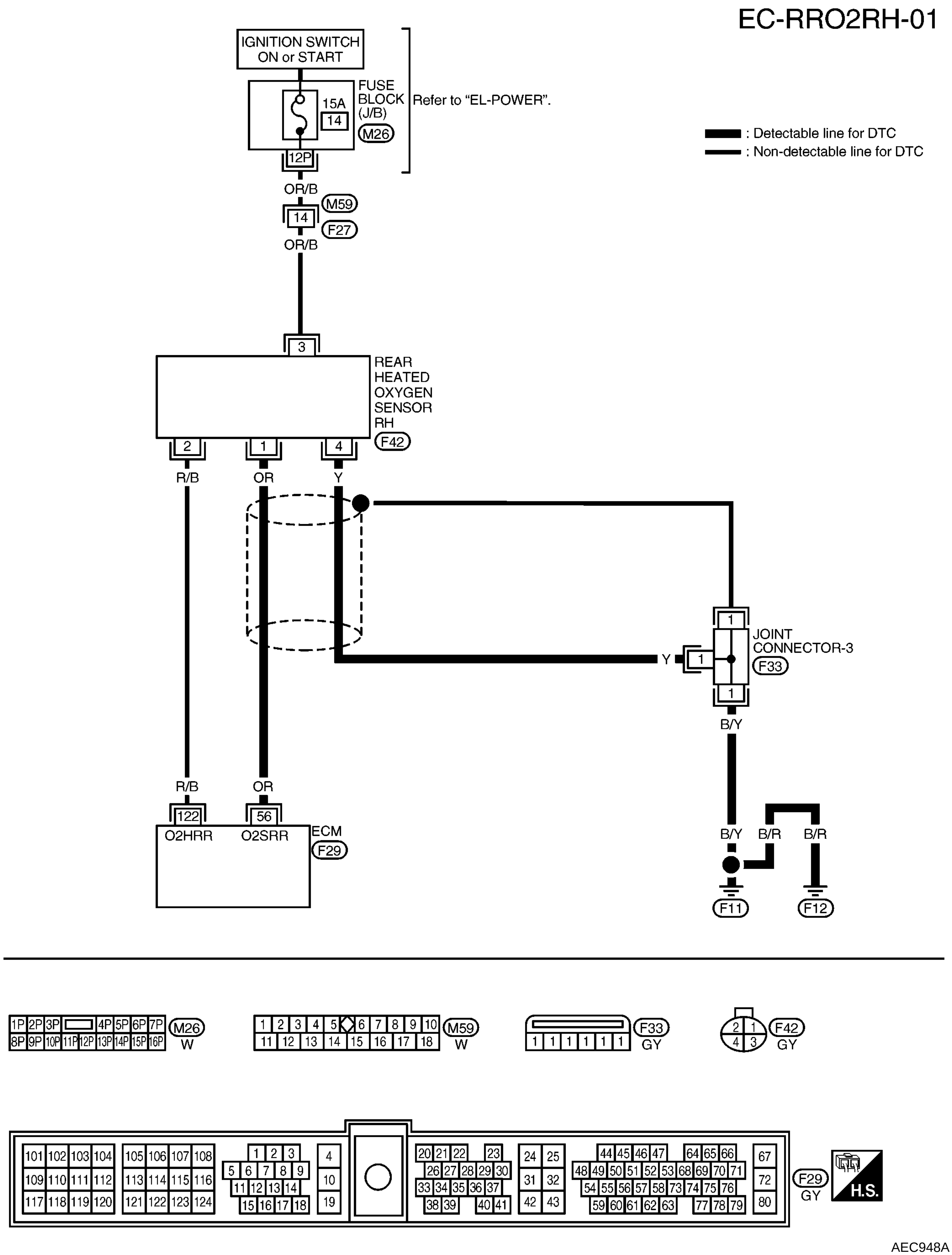
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 56 (right bank sensor signal) or 57 (left bank sensor signal) and engine ground.
4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
(depress and release accelerator pedal as soon as possible)
The voltage should be below 2V during this procedure.
5) If NG, go to "Diagnostic Procedure", EC-849.

Wiring Diagram

NGEC0681

RIGHT BANK

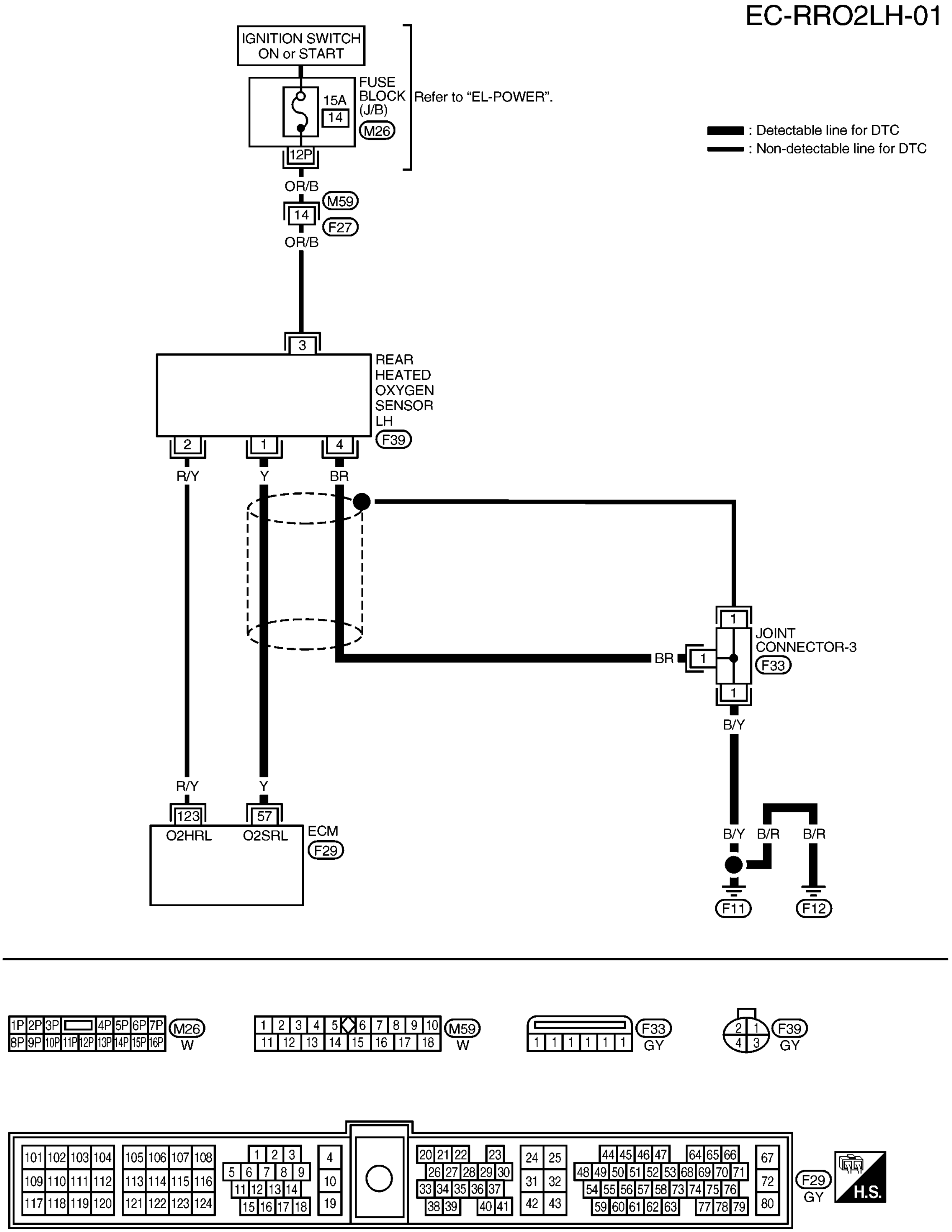
NGEC0681S01



Wiring Diagram (Cont'd)

LEFT BANK

NGEC0681S02



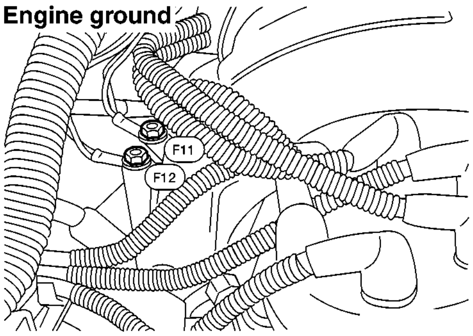
AEC949A

Diagnostic Procedure

NGEC0682

1	INSPECTION START

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



AEC640A

3. Disconnect corresponding rear heated oxygen sensor harness connector.
4. Disconnect ECM harness connector.

▶	GO TO 2.

2	CHECK REAR HO2S INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and REAR HO2S terminal as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0140	56	1	Right
P0160	57	1	Left

AEC901A

Continuity should exist.

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

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0140	56 or 1	Ground	Right
P0160	57 or 1	Ground	Left

AEC902A

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

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

3	CHECK REAR HO2S GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between REAR HO2S terminal 4 and engine ground.
   Refer to Wiring Diagram.
   Continuity should exist.
2. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

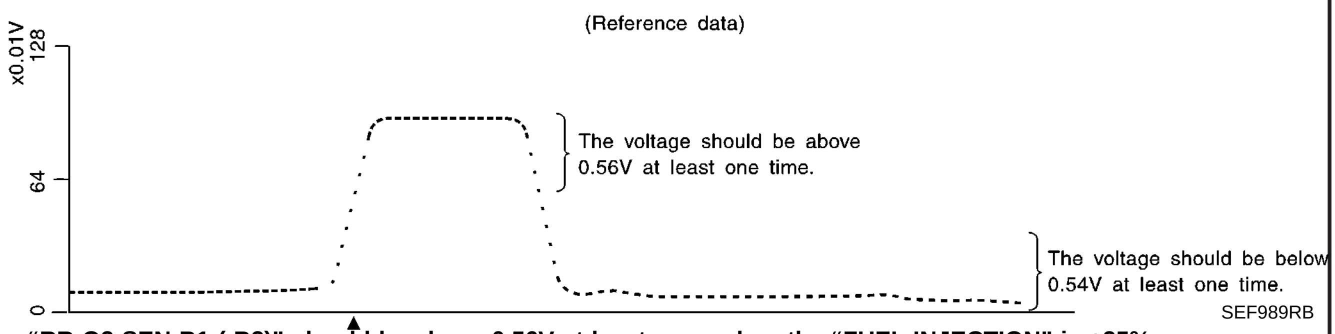
4	DETECT MALFUNCTIONING PART
Check the following. ● Joint connector-3 ● Harness for open or short between rear heated oxygen sensor and engine ground.	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK REAR HO2S CONNECTORS FOR WATER
Check rear heated oxygen sensor connector and harness connector for water. **Water should not exist.** **OK or NG**	
OK (With CONSULT-II) ▶	GO TO 6.
OK (Without CONSULT-II) ▶	GO TO 7.
NG ▶	Repair or replace harness or connectors.

6	CHECK REAR HEATED OXYGEN SENSOR

With CONSULT-II

1. Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2. Stop vehicle with engine running.
3. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "RR O2 SEN-B1 (-B2)" as the monitor item with CONSULT-II.
4. Check "RR O2 SEN-B1 (-B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.



SEF989RB

"RR O2 SEN-B1 (-B2)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%.
"RR O2 SEN-B1 (-B2)" should be below 0.54V at least once when the "FUEL INJECTION" is −25%.

CAUTION:

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

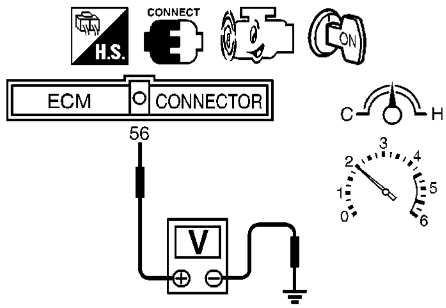
OK or NG

OK ▶	GO TO 8.
NG ▶	Replace malfunctioning rear heated oxygen sensor.

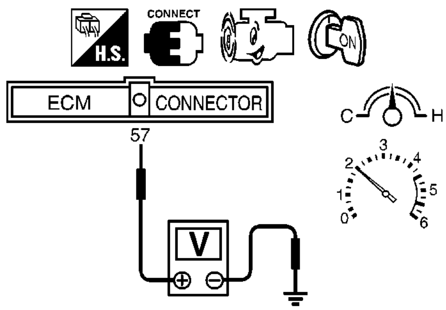
7	CHECK REAR HEATED OXYGEN SENSOR

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 (right bank sensor signal) or 57 (left bank sensor 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)



SEF923U



SEF924U

   The voltage should be above 0.56V at least once during this procedure.
   If the voltage is above 0.56V at 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 0.54V at least once during this procedure.

CAUTION:

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

8	CHECK REAR HO2S 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-292***.) **Continuity should exist.** 4. Also check harness for short to ground and short to power. 5. Then reconnect joint connector. **OK or NG**		
OK	▶	GO TO 9.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.		
	▶	**INSPECTION END**

Description

NGEC0683

SYSTEM DESCRIPTION

NGEC0683S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Rear heated oxygen sensor heater control	Rear heated oxygen sensor heaters

The ECM performs ON/OFF control of the rear heated oxygen sensor heaters corresponding to the engine speed.

OPERATION

NGEC0683S02

Engine speed rpm	Rear heated oxygen sensor heaters
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
RR O2 HTR-B1 RR O2 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 32 (ECM ground).

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
122 (Right bank)	R/B	Rear heated oxygen sensor heater	**[Ignition switch "ON"]** • Engine stopped **[Engine is running]** • Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
123 (Left bank)	R/Y		**[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 rear heated oxygen sensor heater circuit is out of the normal range.
(An improper voltage drop signal is sent to ECM through the rear heated oxygen sensor heater.)

POSSIBLE CAUSE

NGEC0686S01

- Harness or connectors
  (The rear heated oxygen sensor heater circuit is open or shorted.)
- Rear heated oxygen sensor heater

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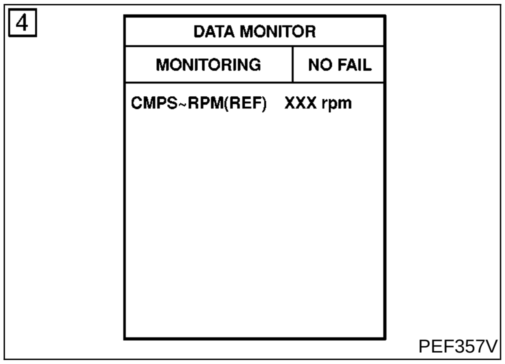


DTC Confirmation Procedure

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-857.

With GST

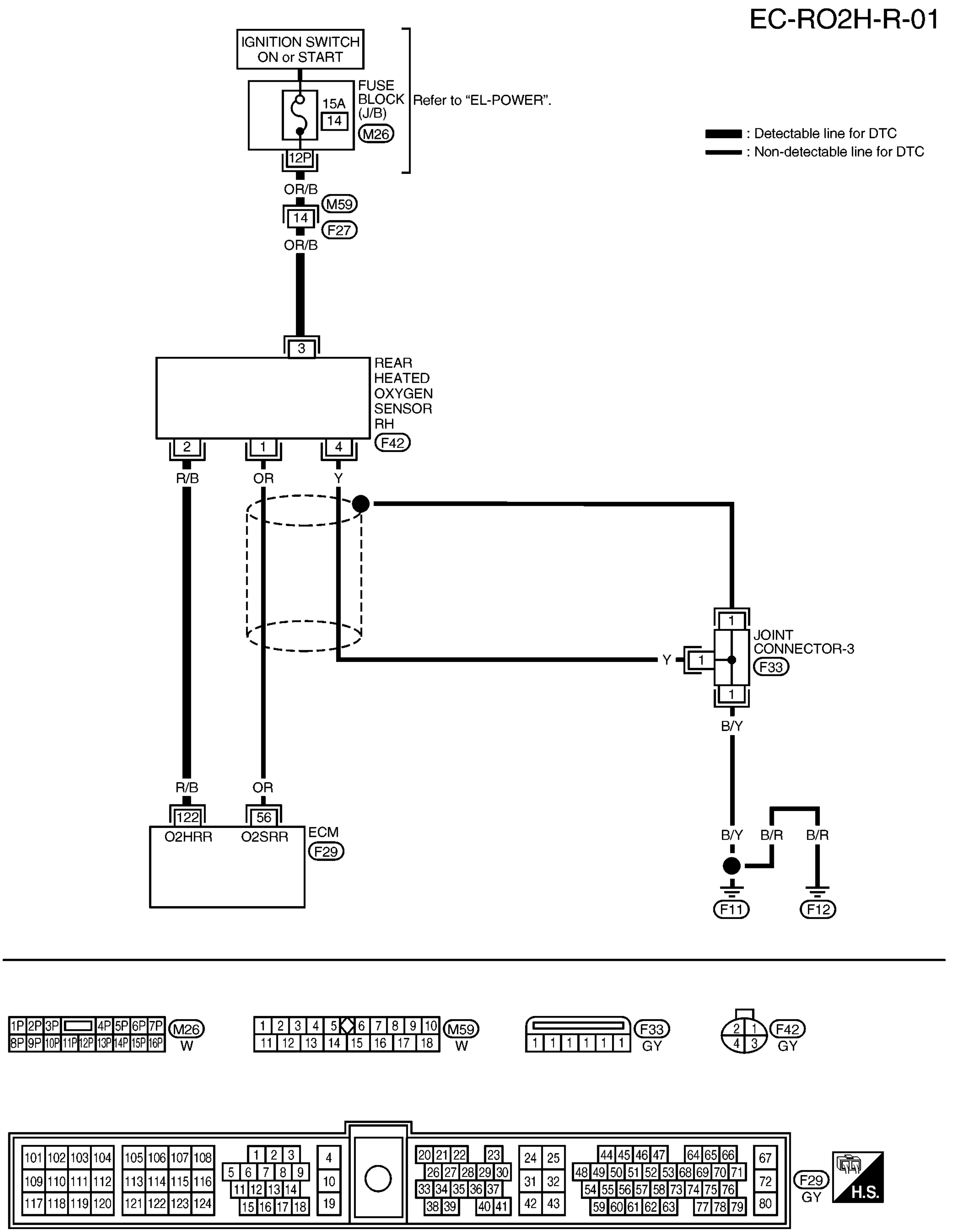
Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0688

RIGHT BANK

NGEC0688S01

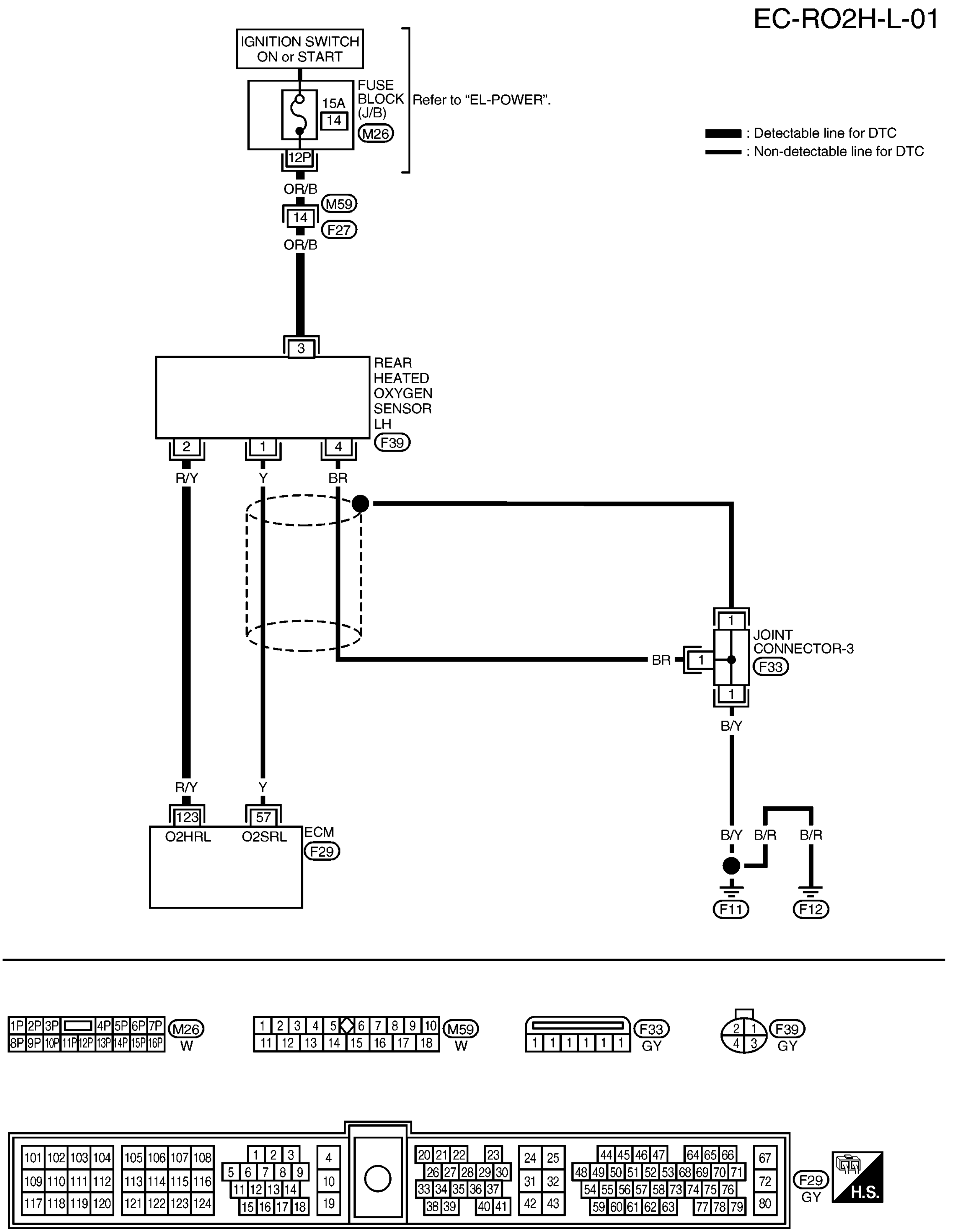


AEC950A

Wiring Diagram (Cont'd)

LEFT BANK

NGEC0688S02



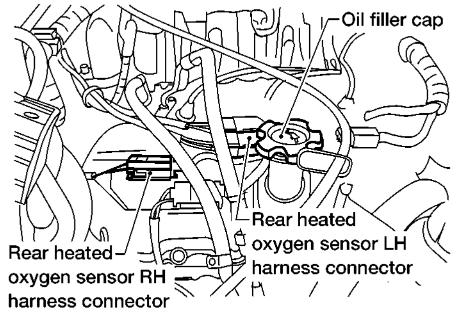
AEC951A

Diagnostic Procedure

NGEC0689

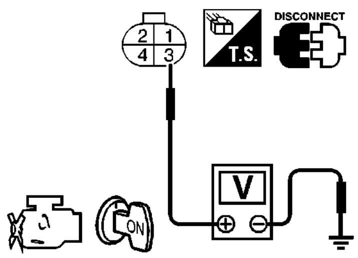
1	CHECK REAR HO2S POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect corresponding rear heated oxygen sensor harness connector.



AEC645A

3. Turn ignition switch ON.
4. Check voltage between REAR HO2S 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 rear heated oxygen sensor and fuse

	▶	Repair harness or connectors.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

3	CHECK REAR HO2S GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal and REAR HO2S terminal as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0141	122	4	Right
P0161	123	4	Left

AEC903A

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

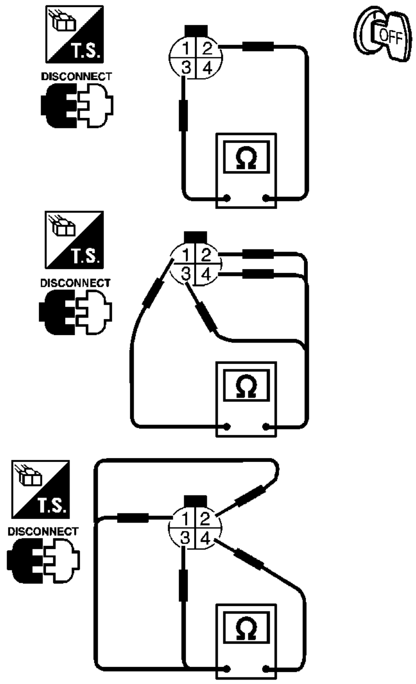
Check the following.

- Joint connector-3
- Harness for open or short between rear heated oxygen sensor and engine ground.

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

5	CHECK REAR HEATED OXYGEN SENSOR HEATER

Check the following.
1. Check resistance between REAR HO2S 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 6.
NG ▶	Replace malfunctioning front heated oxygen sensor.

6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.

▶	**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 front heated oxygen sensors. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Front heated oxygen sensors	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

Malfunction is detected when fuel injection system does not operate properly, the amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)

POSSIBLE CAUSE

NGEC0690S01

- Intake air leaks
- Front heated oxygen sensor
- Injectors
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Mass air flow sensor

4

ACTIVE TEST	
SELF-LEARN	B1: 100 %
CONTROL	B2: 100%
MONITOR	
CMPS·RPM(REF)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 SEN-B2	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

PEF717W

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 “ACTIVE TEST” 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-864.
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-864. If engine does not start, check exhaust and intake air leak visually.

With GST

Follow the procedure “With CONSULT-II”.

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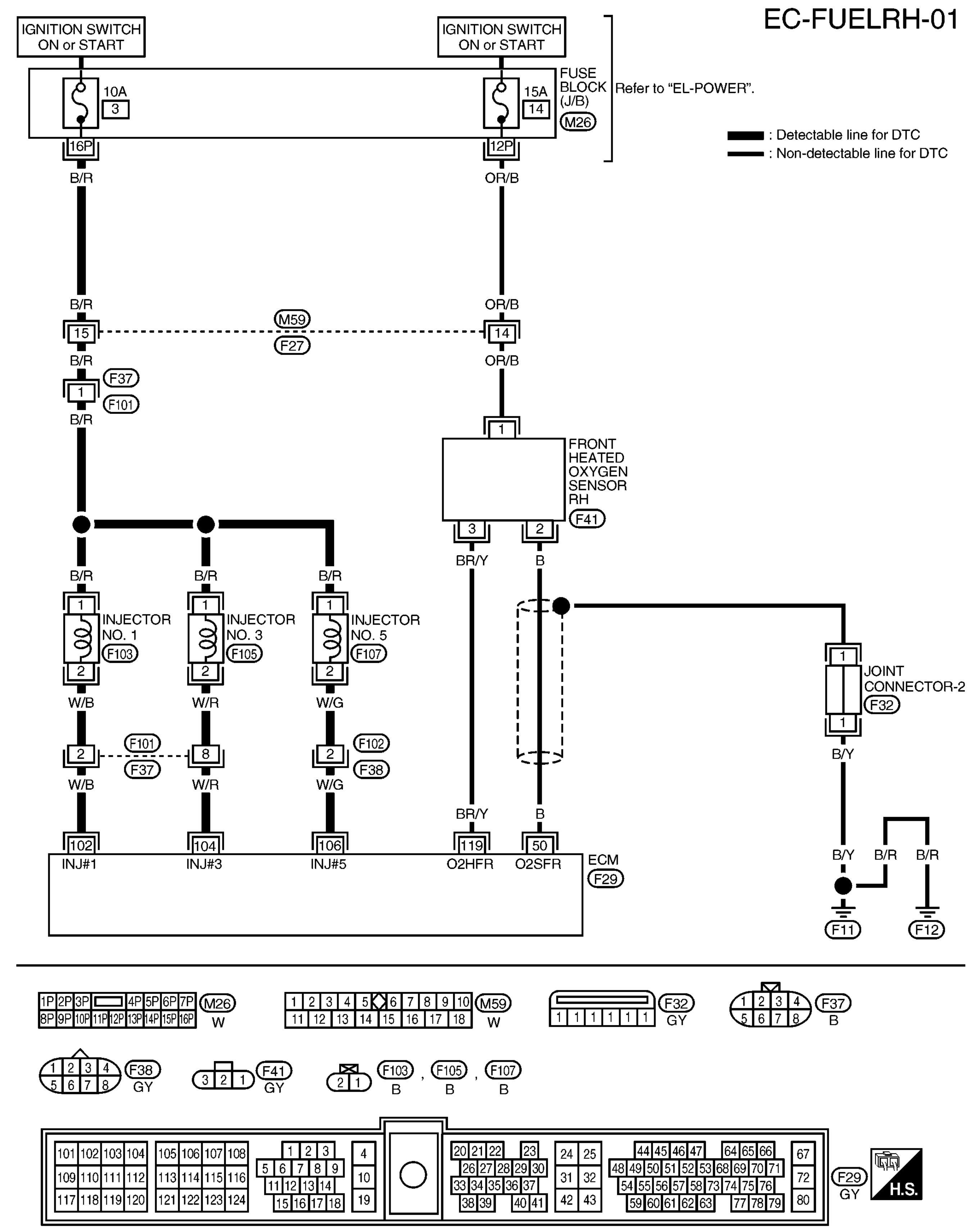
Wiring Diagram

NGEC0692

RIGHT BANK

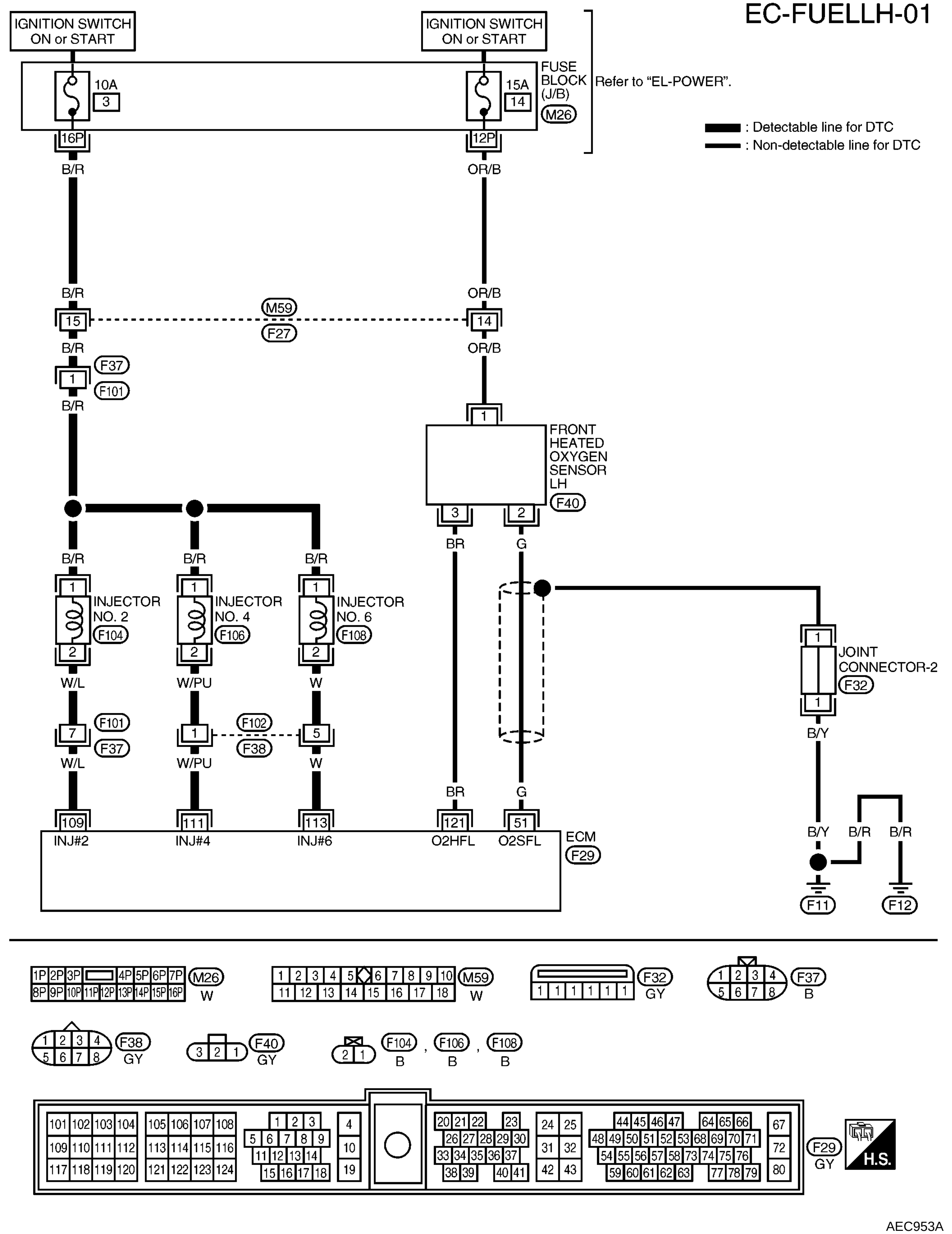
NGEC0692S01



AEC952A

LEFT BANK

NGEC0692S02

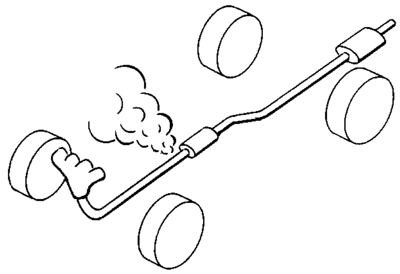


Diagnostic Procedure

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 FRONT HEATED OXYGEN SENSOR CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect corresponding front heated oxygen sensor harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and FRONT HO2S terminal as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0171	50	2	Right
P0174	51	2	Left

AEC904A

Continuity should exist.

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

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0171	50 or 2	Ground	Right
P0174	51 or 2	Ground	Left

AEC905A

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-610. 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-1153.) ● Fuel pressure regulator (Refer to EC-611.) ● Fuel lines (Refer to "ENGINE MAINTENANCE", ***MA-29***.) ● 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**		
No Tools 1. Install all parts removed. 2. Check voltage between ECM terminal 54 and ground. **1.0 - 1.7V: at idling** **1.7 - 2.3V: 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-713.

7	CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

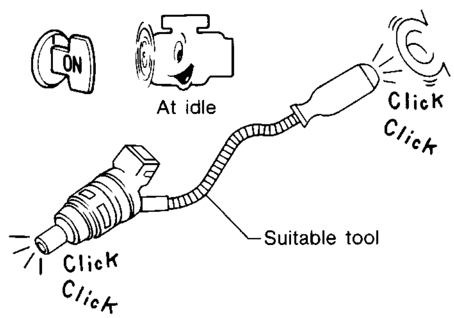
ACTIVE TEST	
POWER BALANCE	
MONITOR	
CMPS~RPM(REF)	XXX rpm
MAS AIR/FL SE	XXX V
IACV-AAC/V	XXX %

PEF389V

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

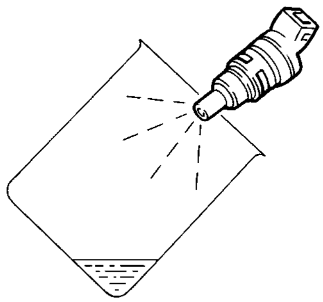
Clicking noise should be heard.

OK or NG

OK	▶	GO TO 8.
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-1145.

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-611.
   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-706.	
▶	**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 front heated oxygen sensors. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Front heated oxygen sensors	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

Malfunction is detected when fuel injection system does not operate properly, the amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)

POSSIBLE CAUSE

NGEC0694S01

- Front heated oxygen sensor
- Injectors
- Exhaust gas leaks
- Incorrect fuel pressure
- Mass air flow sensor

4

ACTIVE TEST	
SELF-LEARN	B1: 100 %
CONTROL	B2: 100%
MONITOR	
CMPS·RPM(REF)	XXX rpm
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 SEN-B2	XXX V
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %

PEF717W

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 “ACTIVE TEST” 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-872.
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-872. If engine does not start, remove ignition plugs and check for fouling, etc.

With GST

Follow the procedure “With CONSULT-II”.

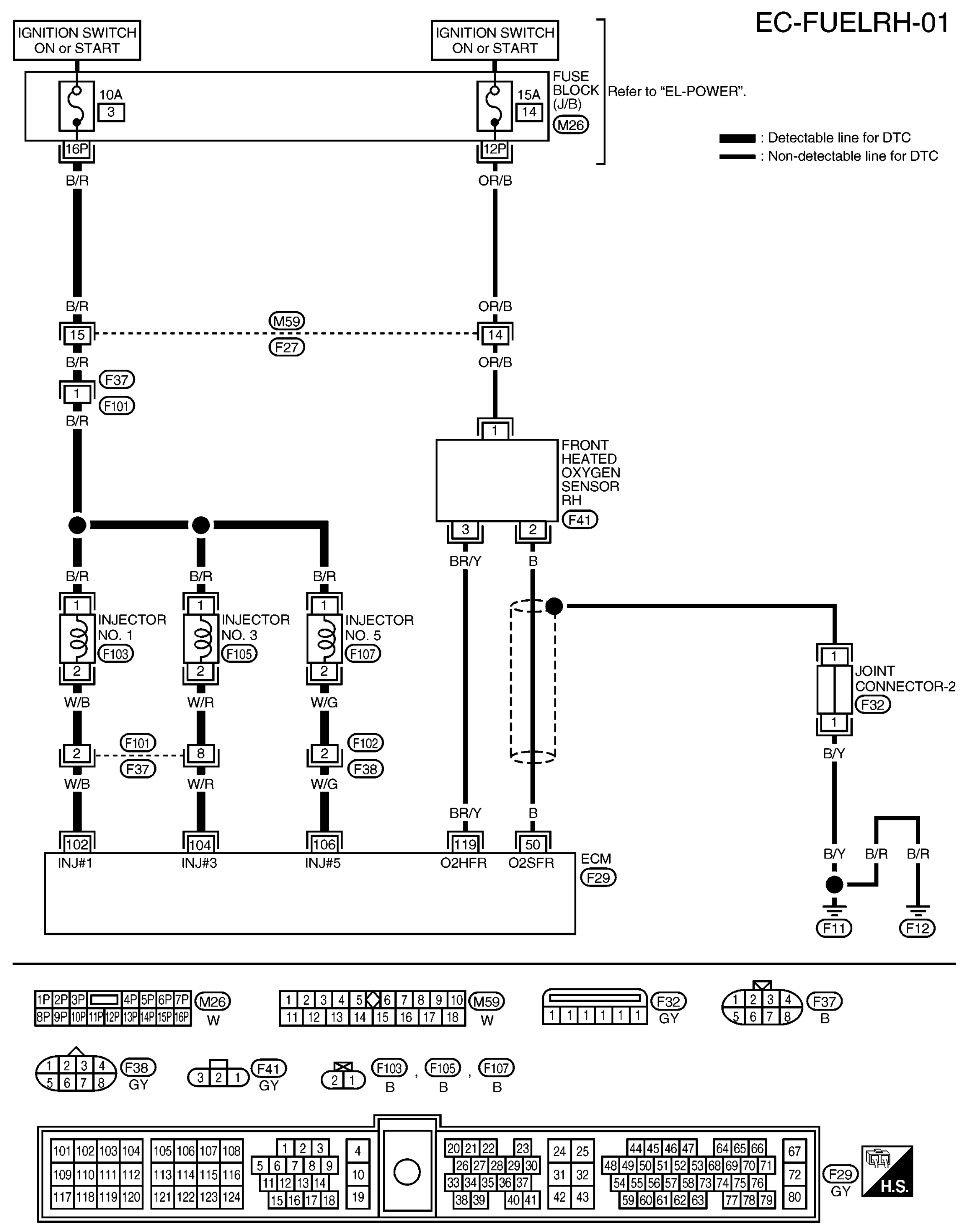
GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

Wiring Diagram

NGEC0696

RIGHT BANK

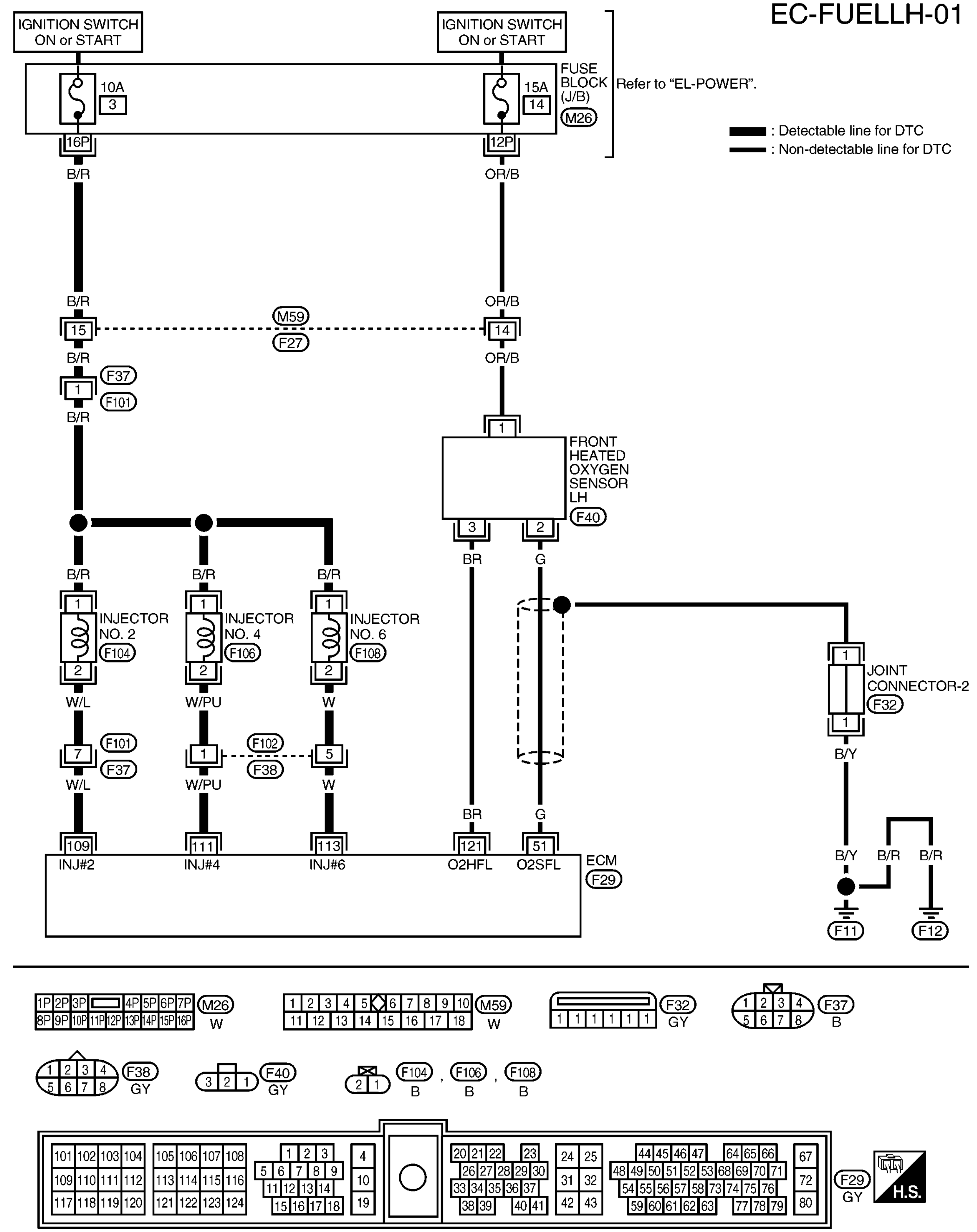
NGEC0696S01



AEC952A

LEFT BANK

NGEC0696S02



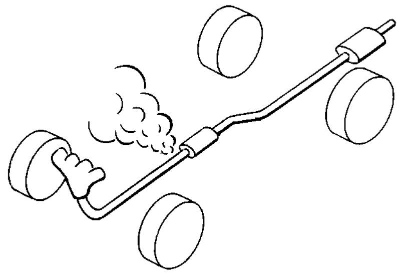
AEC953A

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.

3 CHECK FRONT HEATED OXYGEN SENSOR CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect corresponding front heated oxygen sensor harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and FRONT HO2S terminal as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0172	50	2	Right
P0175	51	2	Left

AEC906A

Continuity should exist.

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

DTC	Terminals		Bank
	ECM or sensor	Ground	
P0172	50 or 2	Ground	Right
P0175	51 or 2	Ground	Left

AEC907A

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-610. 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/cm², 34 psi)** **When fuel pressure regulator valve vacuum hose is disconnected.** **294 kPa (3.0 kg/cm², 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-1153.) ● Fuel pressure regulator (Refer to EC-611.)		
	▶	Repair or replace.

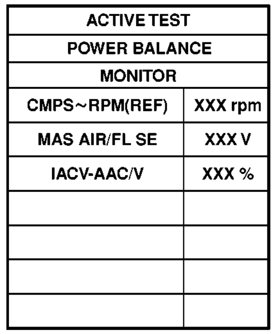
6	CHECK MASS AIR FLOW SENSOR	
With CONSULT-II 1. Install all parts removed. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. **3.3 - 4.8 g·m/sec: at idling** **12.0 - 14.9 g·m/sec: at 2,500 rpm**		
With GST 1. Install all parts removed. 2. Check mass air flow sensor signal in MODE 1 with GST. **3.3 - 4.8 g·m/sec: at idling** **12.0 - 14.9 g·m/sec: at 2,500 rpm**		
No Tools 1. Install all parts removed. 2. Check voltage between ECM terminal 54 and ground. **1.0 - 1.7V: at idling** **1.7 - 2.3V: 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-713.

Diagnostic Procedure (Cont'd)

7	CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

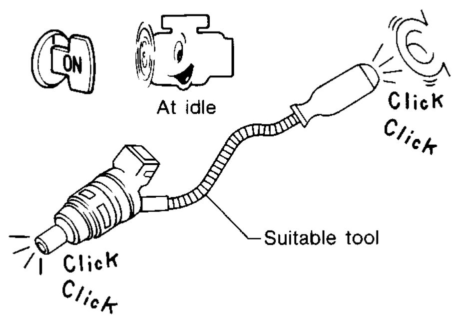


PEF389V

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-1145.

8	CHECK INJECTOR

1. Remove injector assembly. Refer to EC-611.
   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.

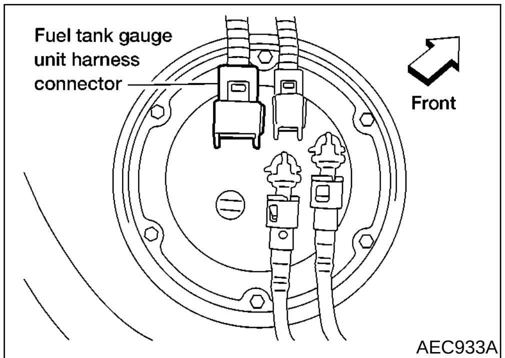
OK or NG

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-706.

	▶	**INSPECTION END**

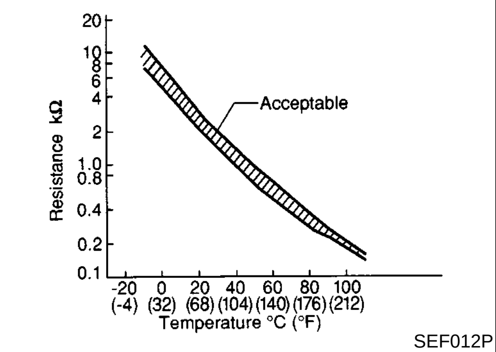


AEC933A

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.



SEF012P

<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 ECM terminal 32 (ECM 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

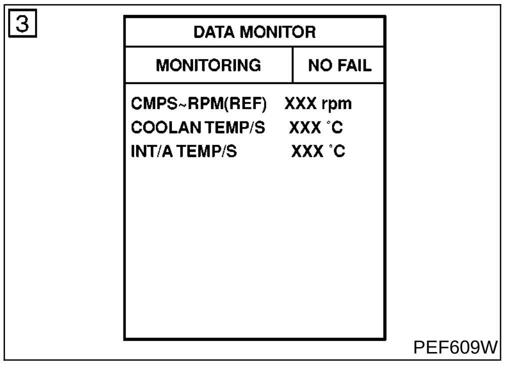
- Harness or connectors
  (The sensor circuit is open or shorted.)
- Tank fuel temperature sensor

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

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

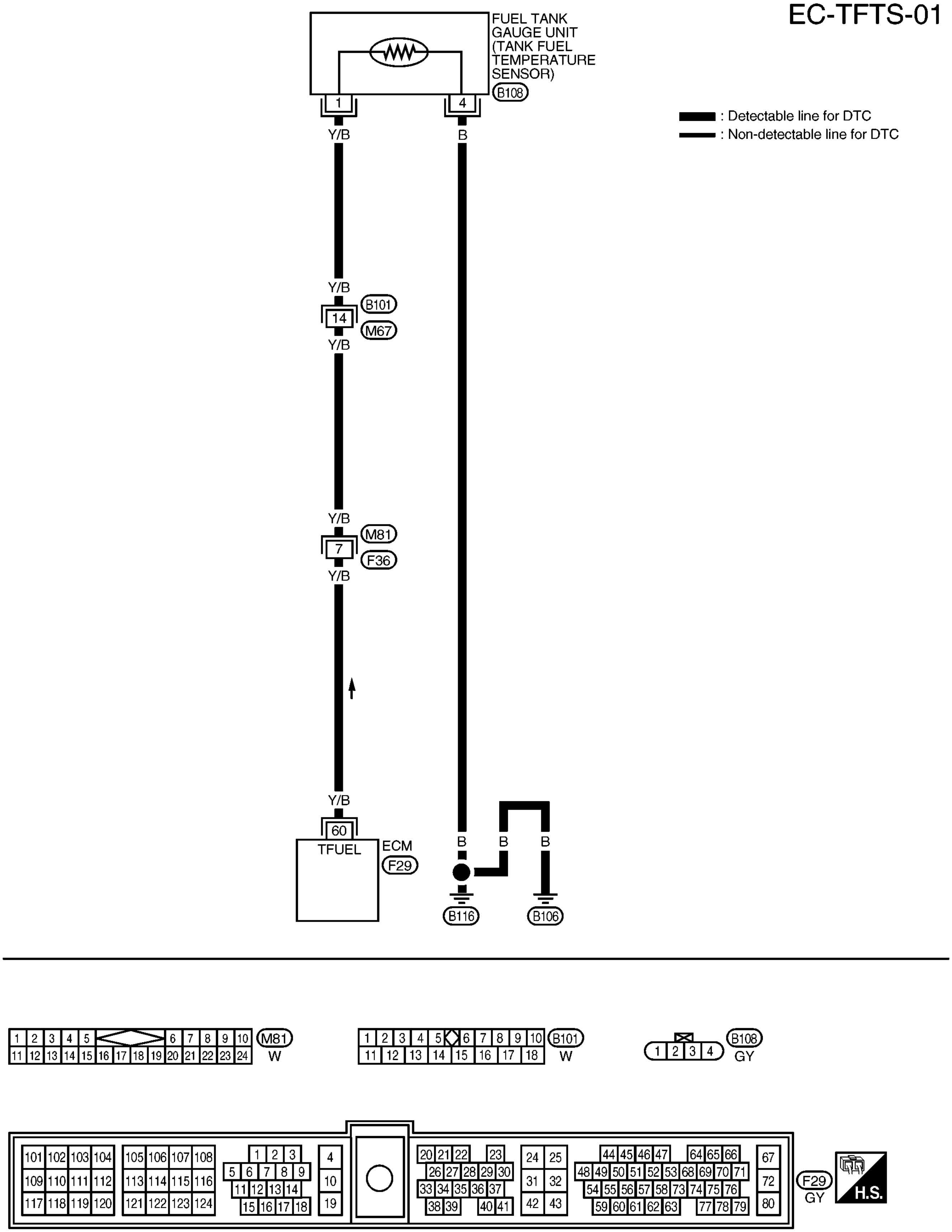
1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Wait at least 10 seconds.
   If the result is NG, go to “Diagnostic Procedure”, EC-878.
   If the result is OK, go to following step.
4) Check “COOLAN TEMP/S” value.
   If “COOLAN TEMP/S” is less than 60°C (140°F), the result 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-878.

With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0701



AEC954A

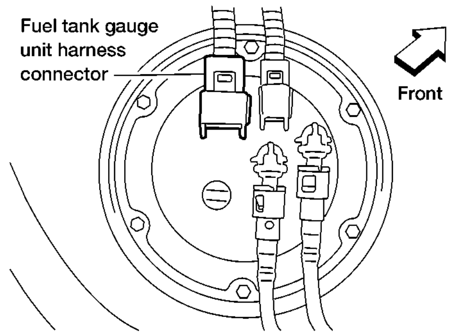
GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

Diagnostic Procedure

NGEC0702

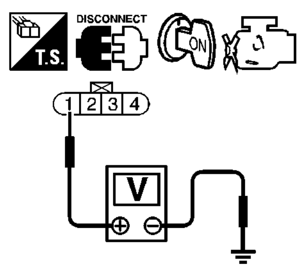
1	CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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 C1, 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

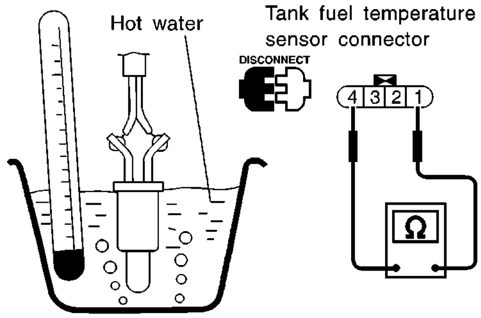
1. Turn ignition switch OFF.
2. Check harness continuity between sensor terminal 4 and body ground. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors C1, M67 ● Harness for open or short between fue tank temperature sensor and body ground	
▶	Repair open circuit or short to ground 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.	



SEF641W

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 tank fuel temperature sensor.

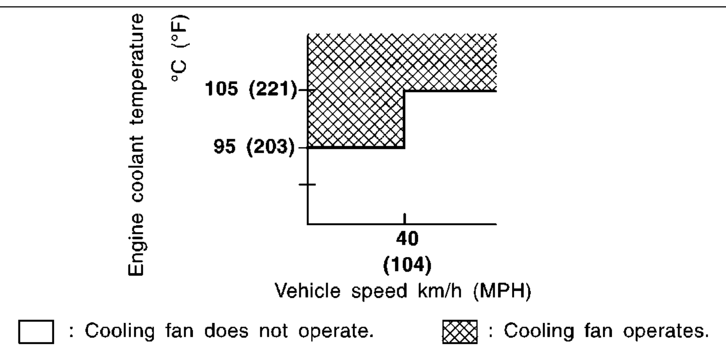
6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.	
▶	**INSPECTION END**

On Board Diagnosis Logic

NGEC0703

This diagnosis checks whether the engine coolant temperature is extraordinarily high, even though the driving condition is not high load.
When malfunction is detected, the malfunction indicator lamp (MIL) will light up even in the first trip.

Diagnostic Trouble	Malfunction is detected when...	Check Items
P0217	Engine coolant temperature is excessively high under normal engine speed.	● 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 front end cover) ● Crushed vehicle frontal area (Vehicle frontal area has been damaged from a collision but not repaired) ● Blocked air passage by improper installation of front fog lamp or fog lamps. ● Improper mixture ratio of coolant ● Damaged bumper For more information, refer to “Main 12 Causes of Overheating”, EC-892.



SEF666W

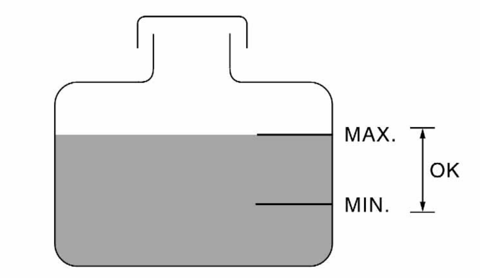
Overall Function Check

=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.



SEF621W

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-885.
- If the coolant mixture ratio is out of range between 45 to 55%, replace the coolant. Refer to “Changing Engine Coolant”, ***MA-27***.

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-16***.

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-885.
3. Turn ignition switch ON.

4

ACTIVE TEST	
COOLANT TEMP	95°C
MONITOR	
CMPS~RPM(POS)	XXX rpm
INJ PULSE-B1	XXX msec
IGN TIMING	XXX BTDC

SEF383X

4. Perform “COOLANT TEMP” in “ACTIVE TEST” mode with CONSULT-II.

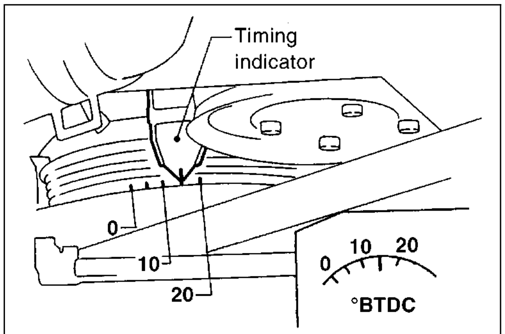
1) Set “COOLANT TEMP” to 95°C (194°F) and make sure that cooling fan operates at low speed. If NG, go to “Diagnostic Procedure”, EC-885.

2) Set “COOLANT TEMP” to 105°C (221°F) and make sure that cooling fan operates at high speed. If NG, go to “Diagnostic Procedure”, EC-885. 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-885. 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.

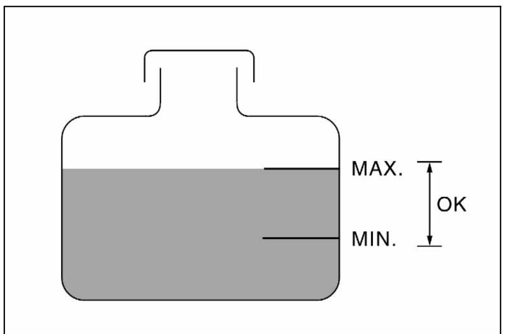
Check for improper fitting of front end cover, damaged radiator grille or bumper, vehicle frontal area damaged by collision but not repaired.
If NG, take appropriate action and then go to next step.

7. Check ECT sensor for proper operation. Refer to step 7 of "Diagnostic Procedure", EC-885. If NG, replace ECT sensor and go to next step.



SEF371S

8. Check ignition timing. Refer to "Basic Inspection", EC-669.
Make sure that ignition timing is 15° ± 2° at 700 ± 50 rpm.
If NG, adjust ignition timing and then recheck.



SEF621W

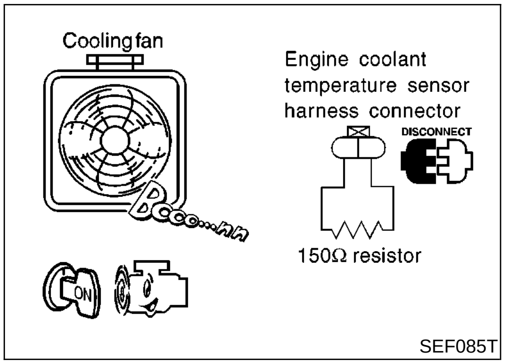
WITHOUT CONSULT-II

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-885.
- If the coolant mixture ratio is out of range between 45 to 55%, replace the coolant. Refer to "Changing Engine Coolant", ***MA-27***.

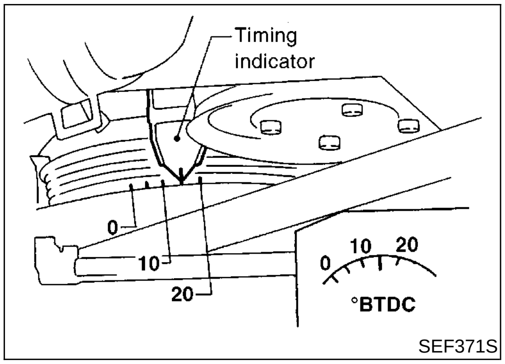
a) Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to "Anti-freeze Coolant Mixture Ratio", ***MA-16***.
b) After refilling coolant, run engine to ensure that no water-flow 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-885.
3. Turn ignition switch OFF.
4. Disconnect engine coolant temperature sensor harness connector.



SEF085T

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-885. 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-885. 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-885. If NG, replace ECT sensor and go to next step.

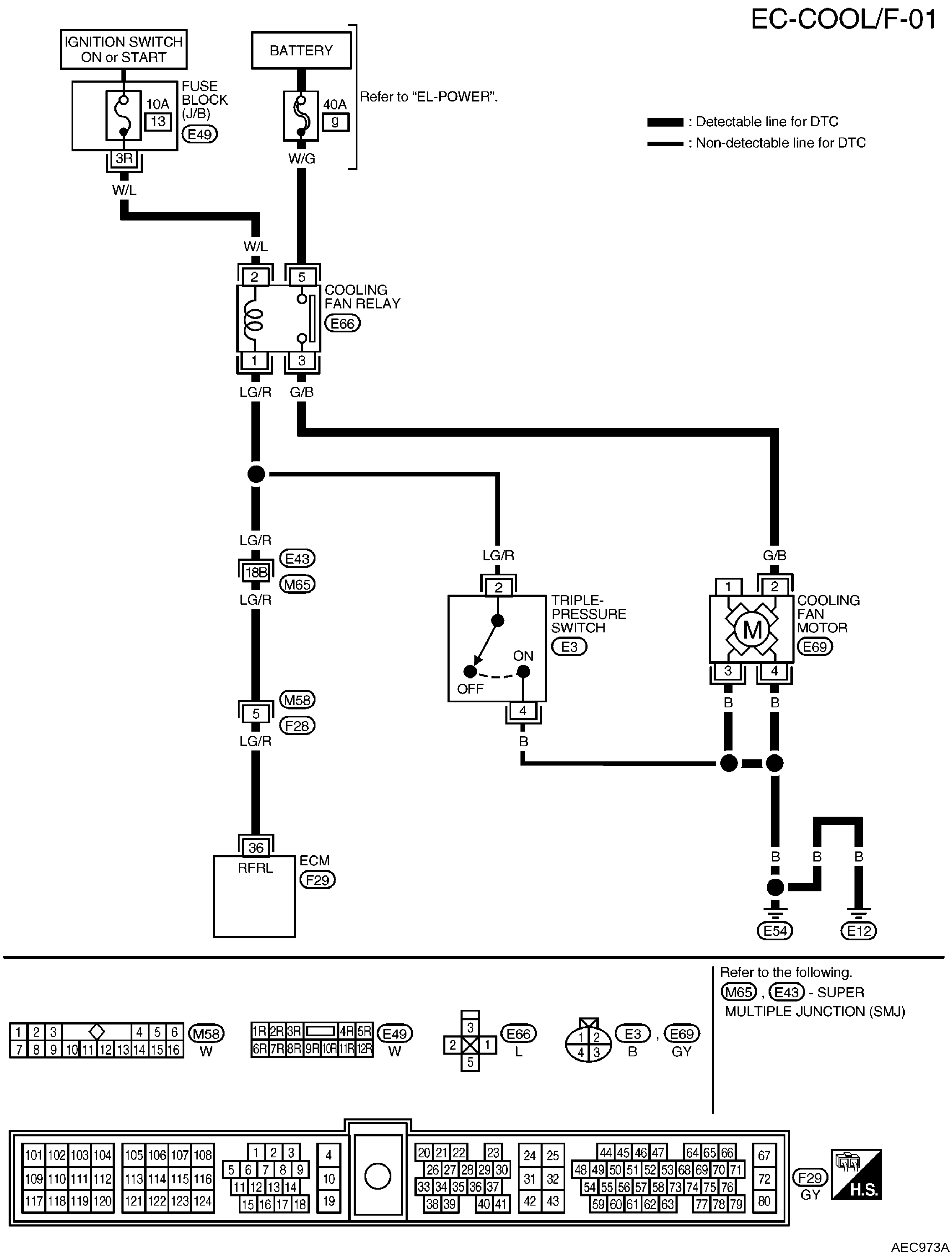


SEF371S

10. Check ignition timing. Refer to "Basic Inspection", EC-669.
    Make sure that ignition timing is 15° ± 2° at 700 ± 50 rpm.
    If NG, adjust ignition timing and then recheck.

Wiring Diagram

NGEC0705



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 (Low speed).

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

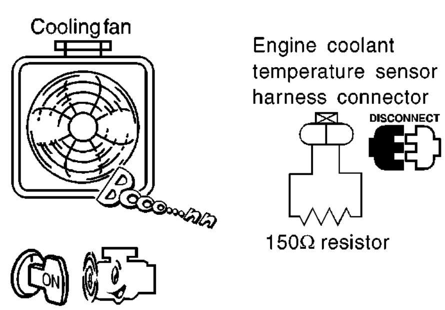
SEF376X

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.

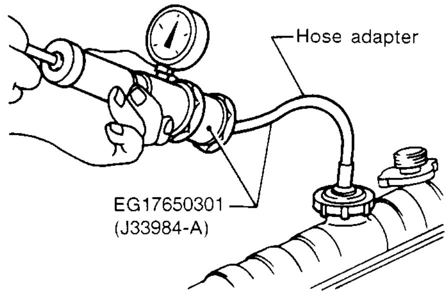


SEF085T

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

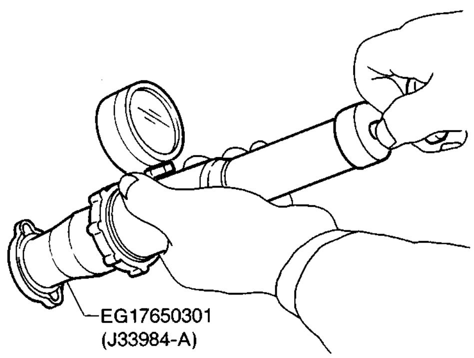
Pressure should not drop.

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.

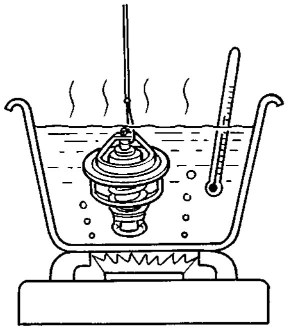


SLC755A

Radiator cap relief pressure:
59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi)

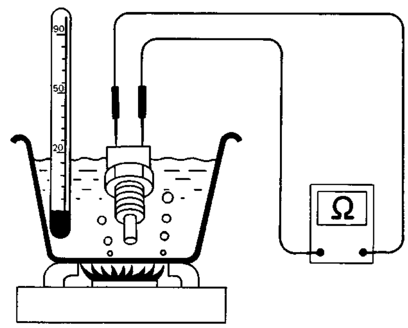
OK or NG

OK	▶	GO TO 6.
NG	▶	Replace radiator cap.

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 (170°F) [standard]** **Valve lift:** **More than 10 mm/95°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 "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.

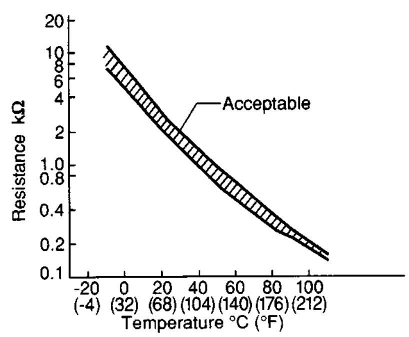


SEF152P

<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.

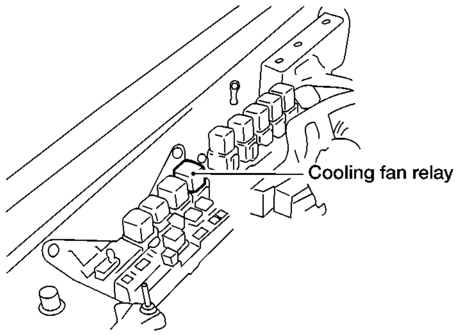
8	CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-892.

	▶	**INSPECTION END**

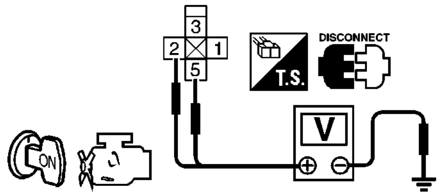
9	CHECK COOLING FAN RELAY POWER SUPPLY CIRCUIT	

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.

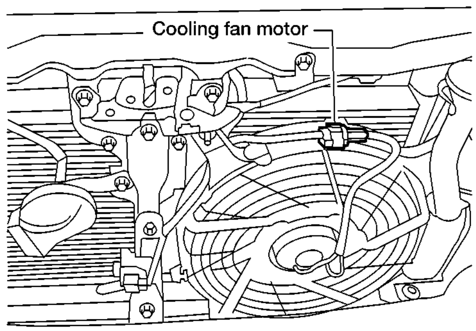
10	DETECT MALFUNCTIONING PART

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.

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.

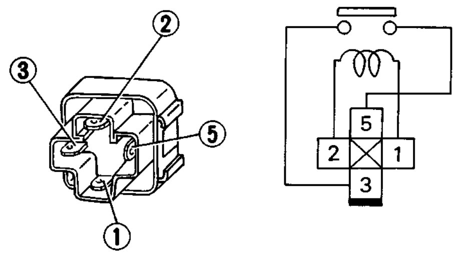
13	DETECT MALFUNCTIONING PART

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

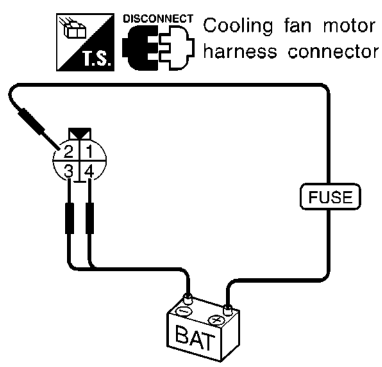
OK	▶	GO TO 15.
NG	▶	Replace cooling fan relay.

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-706.

	▶	**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 LUBRI-CANTS” in ***MA-14***.
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See “Changing Engine Coolant”, “ENGINE MAINTENANCE” in ***MA-27***.
	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 DIAG-NOSIS FOR OVER-HEAT” (EC-1132).
OFF	8	● Combustion gas leak	● Color checker chemi-cal tester 4 Gas ana-lyzer	Negative	—
ON*3	9	● Coolant temperature gauge	● Visual	Gauge less than 3/4 when driving	—
		● Coolant overflow to reservoir tank	● Visual	No overflow during driv-ing and idling	See “Changing Engine Coolant”, “ENGINE MAINTENANCE” in ***MA-27***.
OFF*4	10	● Coolant return from reservoir tank to radia-tor	● Visual	Should be initial level in reservoir tank	See “ENGINE MAINTE-NANCE” in ***MA-27***.
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maxi-mum distortion (warping)	See “Inspection”, “CYLIN-DER HEAD” in ***EM-88***.
	12	● Cylinder block and pis-tons	● Visual	No scuffing on cylinder walls or piston	See “Inspection”, “CYLIN-DER 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

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.

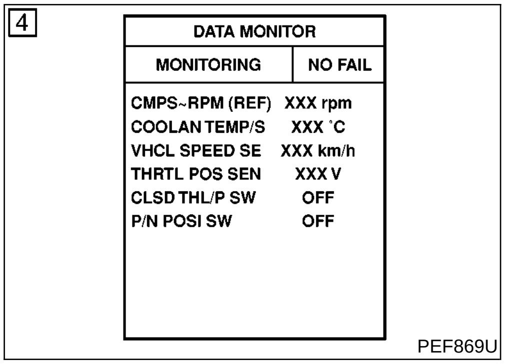
1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink. When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a 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 emission), the MIL will only light when the misfire is detected on a second trip. During this condition, ECM monitors the CKP sensor signal every 1000 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
- EGR valve
- The injector circuit is open or shorted
- Injectors
- Intake air leak
- The ignition secondary circuit is open or shorted
- Lack of fuel
- Drive plate
- Front heated oxygen sensor
- Incorrect distributor rotor



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-894.

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	CHECK EGR FUNCTION
Perform "DTC Confirmation Procedure" of "DTC P1402 EGR FUNCTION (OPEN)". Refer to EC-1056. **OK or NG**	
OK ▶	GO TO 4.
NG ▶	Repair EGR system.

4	PERFORM POWER BALANCE TEST

With CONSULT-II

1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.

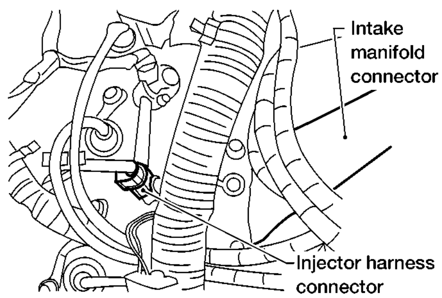
ACTIVE TEST	
POWER BALANCE	
MONITOR	
CMPS~RPM(REF)	XXX rpm
MAS AIR/FL SE	XXX V
IACV-AAC/V	XXX %

PEF389V

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?



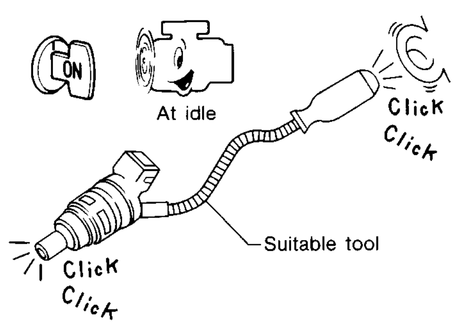
AEC646A

Yes or No

Yes	▶	GO TO 5.
No	▶	GO TO 8.

5	CHECK INJECTOR

Does each injector make an operating sound at idle?



MEC703B

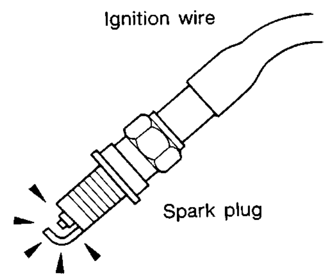
Yes or No

Yes	▶	GO TO 6.
No	▶	Check injector(s) and circuit(s). Refer to EC-1145.

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

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.



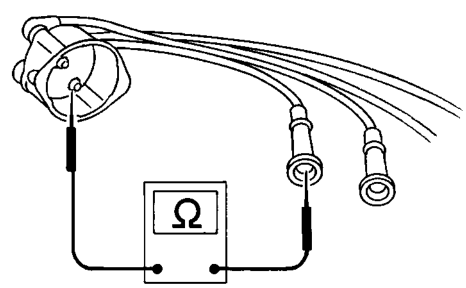
SEF282G

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:

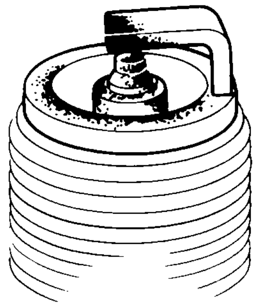
Cylinder No.	Resistance kΩ [at 25°C (77°F)]
1	Approximately 6.5
2	Approximately 10.0
3	Approximately 8.5
4	Approximately 12.5
5	Approximately 8.5
6	Approximately 11.0

MTBL0235

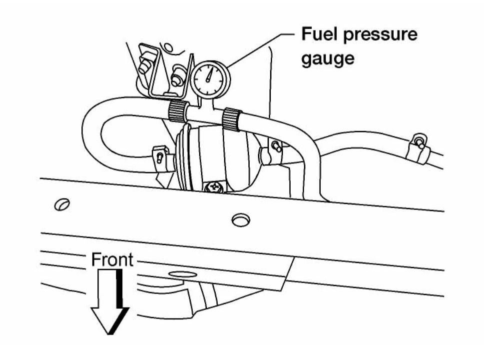
If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.

OK or NG

OK ▶	**Check the following:** ● Distributor rotor head for incorrect parts ● Ignition coil, power transistor and their circuits Refer to EC-1028.
NG ▶	Replace.

8	CHECK SPARK PLUGS	
Remove the spark plugs and check for fouling, etc.  SEF156I **OK or NG**		
OK	▶	GO TO 9.
NG	▶	Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to "ENGINE MAINTENANCE", ***MA-31***.

9	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 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-610. 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-1153.) ● Fuel pressure regulator (Refer to EC-611.) ● Fuel lines (Refer to "ENGINE MAINTENANCE", ***MA-28***.) ● Fuel filter for clogging	
▶	Repair or replace.

12	CHECK IGNITION TIMING
Check the following items. Refer to "Basic Inspection", EC-669.	

Items	Specifications
Ignition timing	15° ± 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)

MTBL0226

OK or NG

OK (With CONSULT-II) ▶	GO TO 13.
OK (Without CONSULT-II) ▶	GO TO 14.
NG ▶	Adjust ignition timing.

13	CHECK FRONT HEATED OXYGEN SENSOR LH/RH

With CONSULT-II

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

DATA MONITOR	
MONITORING	NO FAIL
CMPS~RPM(REF)	XXX rpm
MAS AIR/FL SE	XXX V
COOLAN TEMP/S	XXX °C
FR O2 SEN-B1	XXX V
FR O2 MNTR-B1	LEAN
INJ PULSE-B1	XXX msec
A/F ALPHA-B1	XXX %
FR O2 HTR-B1	ON

PEF365V

5. Check the following.

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

Right bank

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

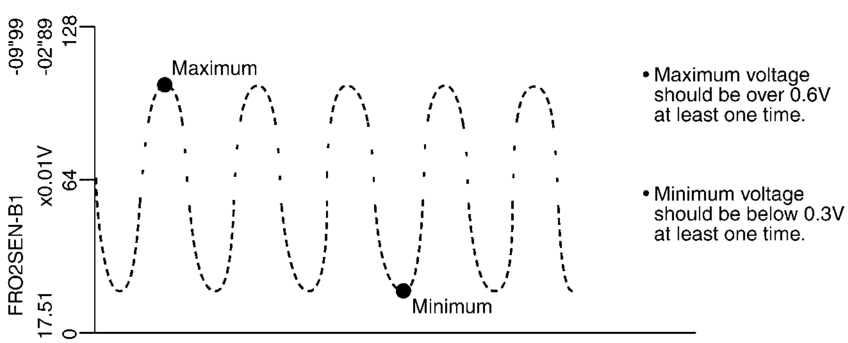
Left bank

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

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

SEF702W

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



SEF154X

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.**

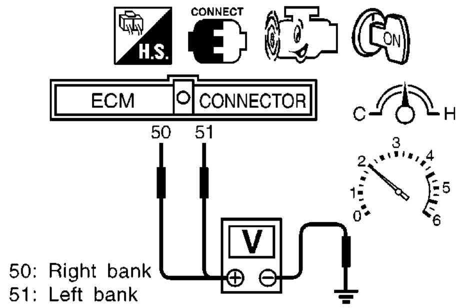
OK or NG

OK	▶	GO TO 15.
NG	▶	Replace front heated oxygen sensor.

14	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.



SEF919U

- MIL goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

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

15	CHECK MASS AIR FLOW SENSOR

With CONSULT-II

Check mass air flow sensor signal in “DATA MONITOR” mode with CONSULT-II.

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

No Tools

Check voltage between ECM terminal 54 and ground.

1.0 - 1.7V: at idling
1.7 - 2.3V: at 2,500 rpm

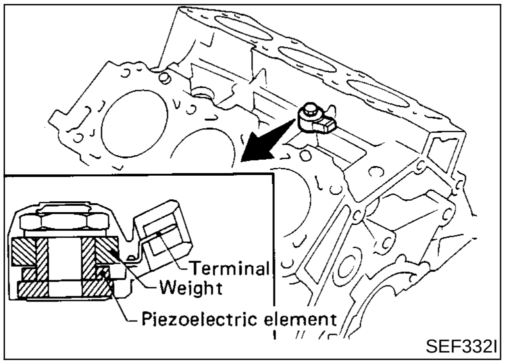
OK or NG

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-713.

16	CHECK SYMPTOM MATRIX CHART	
Check items on the rough idle symptom in "Symptom Matrix Chart", EC-688. **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-640.		
	▶	GO TO 18.

18	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.		
	▶	**INSPECTION END**



SEF332I

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 32 (ECM 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

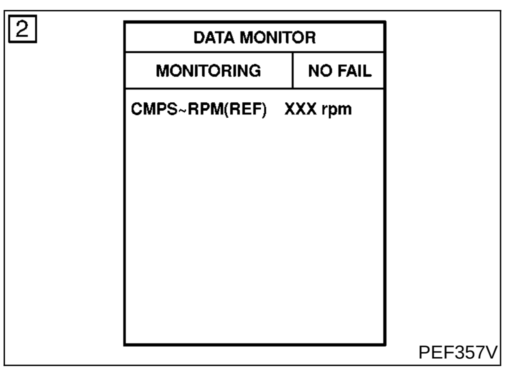
NGEC0713

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



PEF357V

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-904.

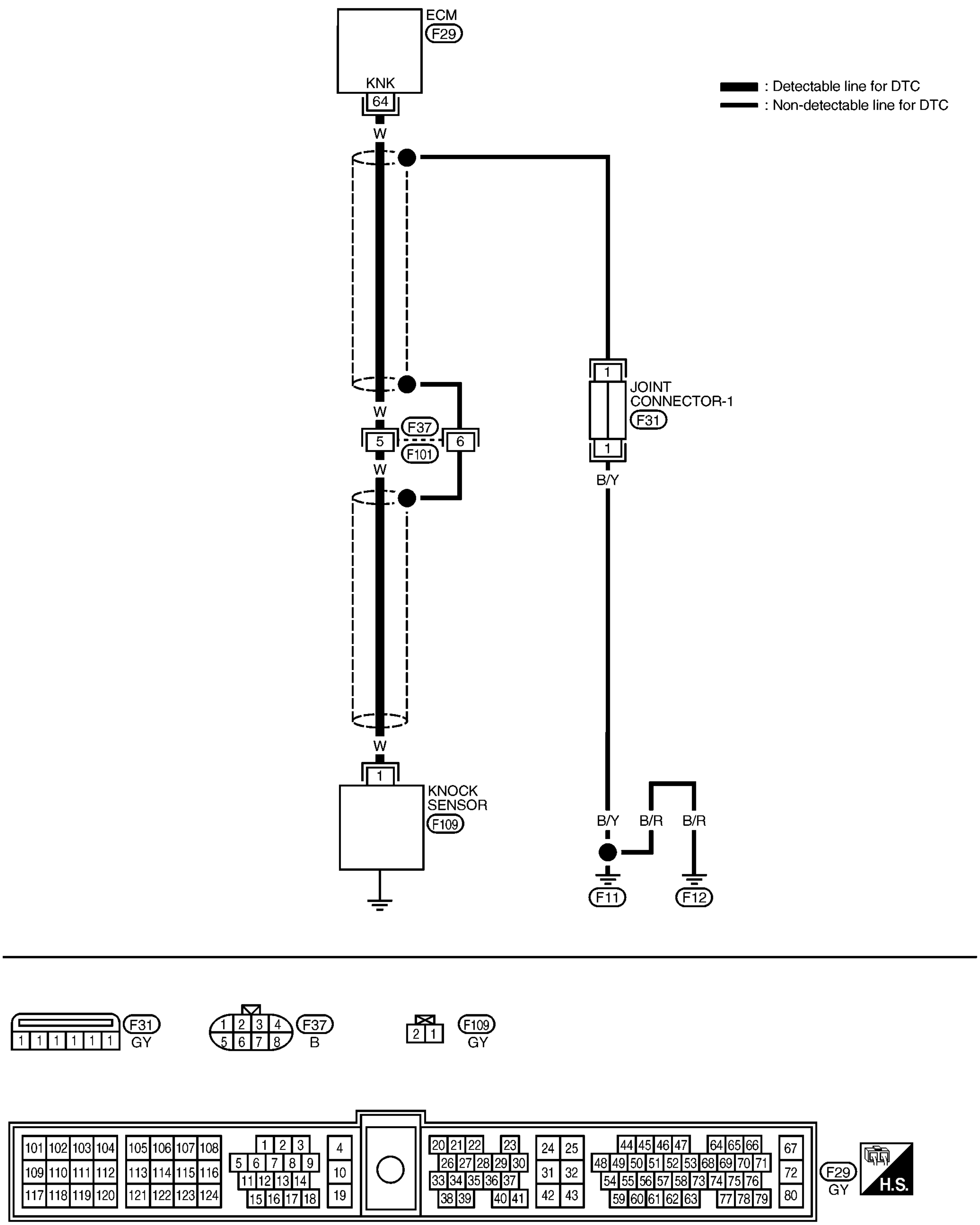
With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0715

EC-KS-01



AEC955A

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.

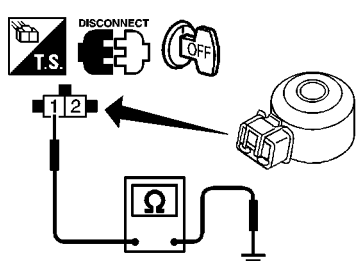
3	DETECT MALFUNCTIONING PART

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 2 and ground.



SEF643W

Resistance: 500 - 620 kΩ [at 25°C (77°F)]

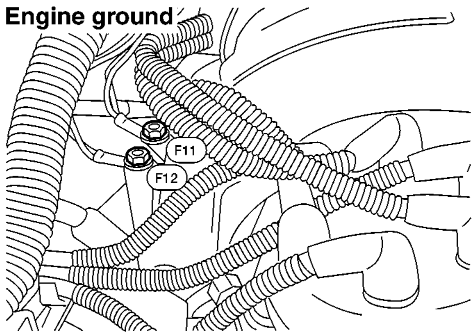
CAUTION:

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.	
▶	GO TO 6.

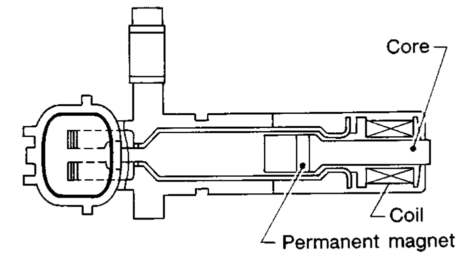


AEC640A

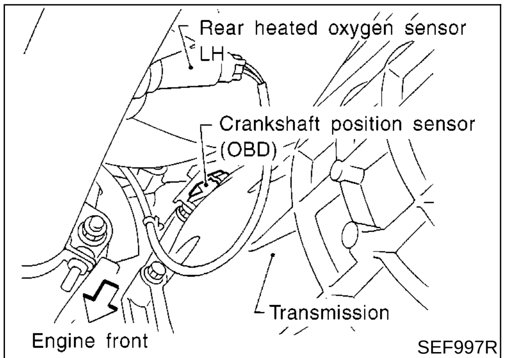
6	CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT
1. Disconnect harness connectors F37, F101. 2. Check harness continuity between harness connector F37 terminal 6 and engine ground. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to ground and short to power. **OK or NG**	
OK ▶	GO TO 8.
NG ▶	GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F37, F101 ● Joint connectors - 1 ● Harness for open or short between harness connector F37 and engine ground	
▶	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-706.	
▶	**INSPECTION END**



SEF956N



SEF997R

Component Description

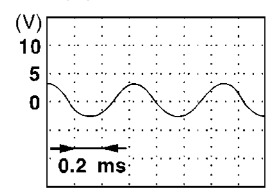
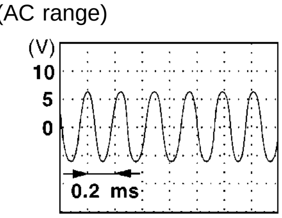
NGEC0717

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 32 (ECM 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

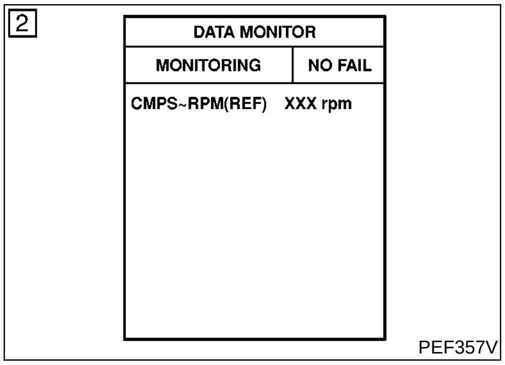
NGEC0719

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)



PEF357V

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

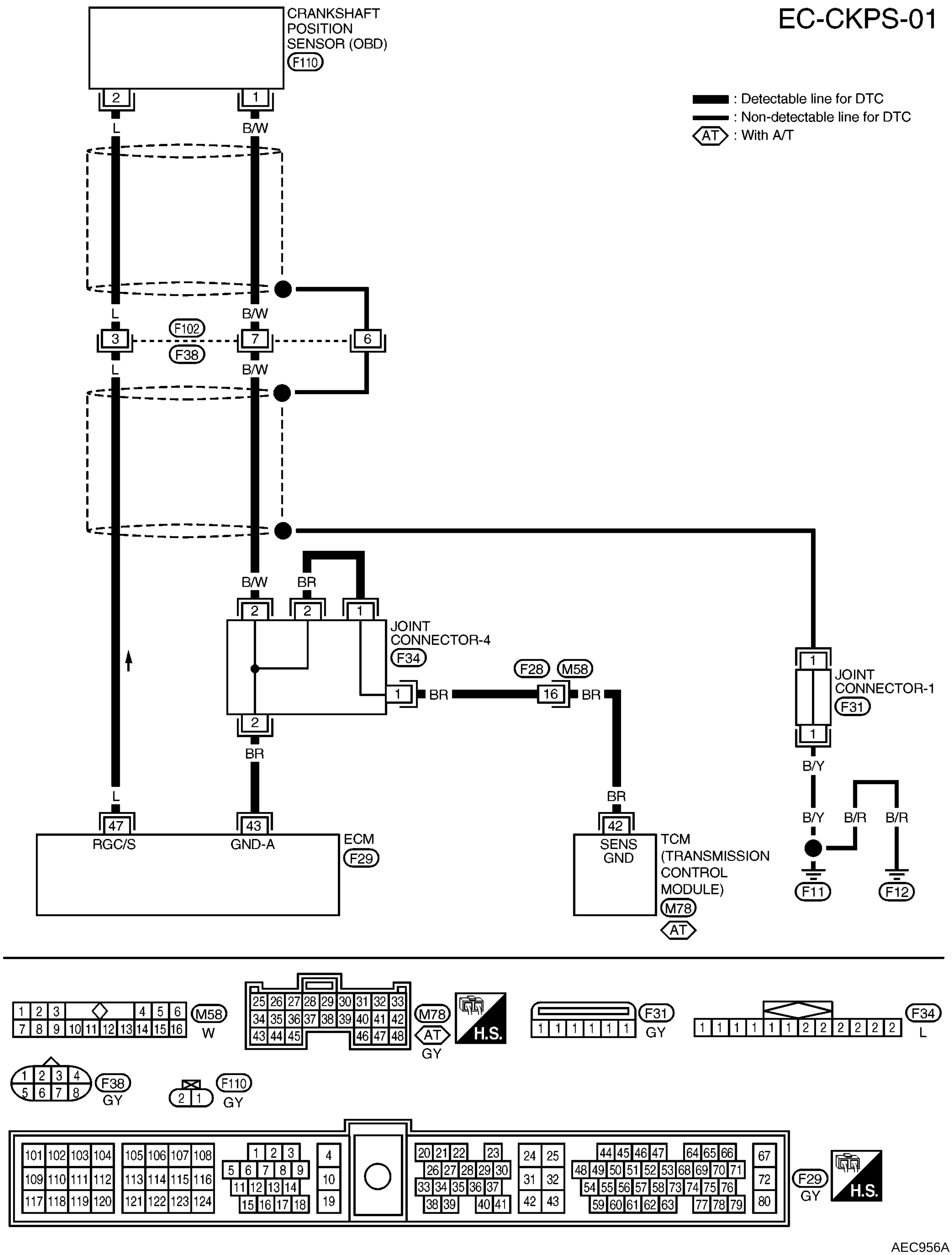
1) Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2) Start engine and run it for at least 15 seconds at idle speed.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-909.

With GST

Follow the procedure “With CONSULT-II”.

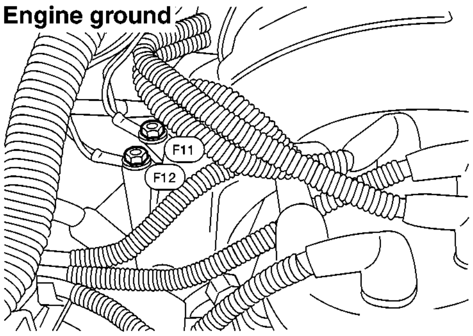
Wiring Diagram

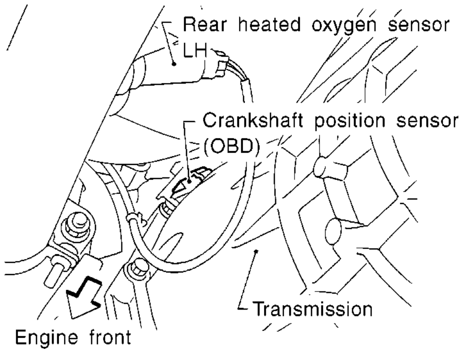
NGEC0721



Diagnostic Procedure

NGEC0722

1	RETIGHTEN GROUND SCREWS
1. Turn ignition switch OFF. 2. Loosen and retighten engine ground screws.  AEC640A	
▶	GO TO 2.

2	CHECK CKPS (OBD) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.  SEF997R 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.

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.

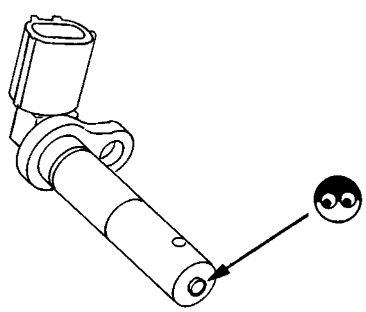
5	DETECT MALFUNCTIONING PART

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.

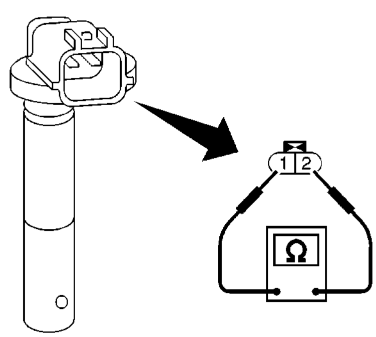
6	CHECK CRANKSHAFT POSITION SENSOR (OBD)

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)]

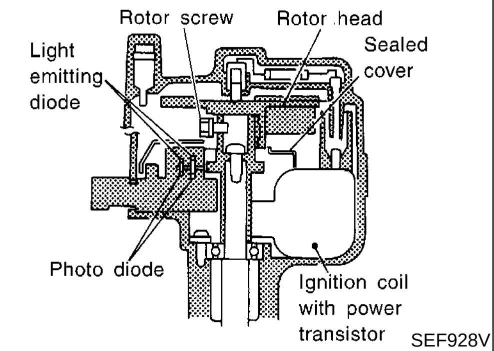
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace crankshaft position sensor (OBD).

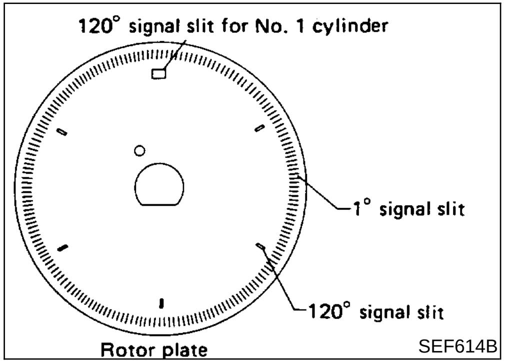
7	CHECK CKPS (OBD) SHIELD CIRCUIT FOR OPEN AND SHORT
1. Disconnect harness connectors F38, F102. 2. Check harness continuity between harness connector F38 terminal 6 and engine ground. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to ground and short to power. **OK or NG**	
OK ▶	GO TO 9.
NG ▶	GO TO 8.

8	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F38, F102 ● Joint connector-1 ● Harness for open or short between harness connector F38 and engine ground	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.	
▶	**INSPECTION END**



SEF928V



SEF614B

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.

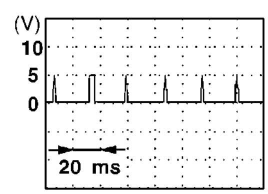
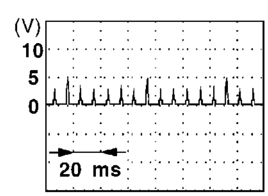
NOTE:
The rotor screw which secures the distributor rotor head to the distributor shaft must be torqued properly.

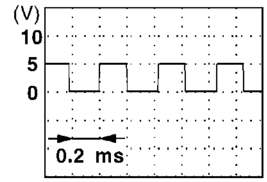
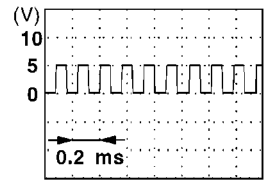
: 3.6±0.3 N·m (37±3 kg-cm, 32±3 in-lb)

ECM Terminals and Reference Value

NGEC0724

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

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
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-6***.)
- Starting system circuit (Refer to ***SC-6***.)
- Dead (Weak) battery

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

DTC Confirmation Procedure

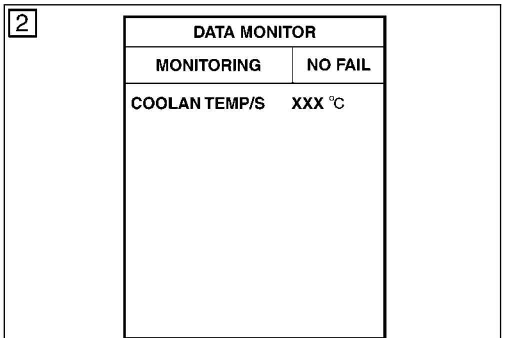
NGEC0726

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.



PEF002P

PROCEDURE FOR MALFUNCTION A

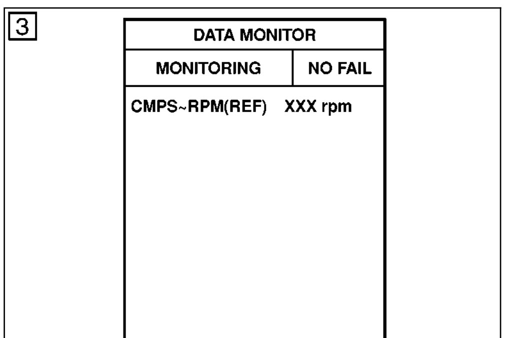
NGEC0726S01

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-916.

With GST

Follow the procedure "With CONSULT-II".



PEF357V

PROCEDURE FOR MALFUNCTION B AND C

NGEC0726S02

With CONSULT-II

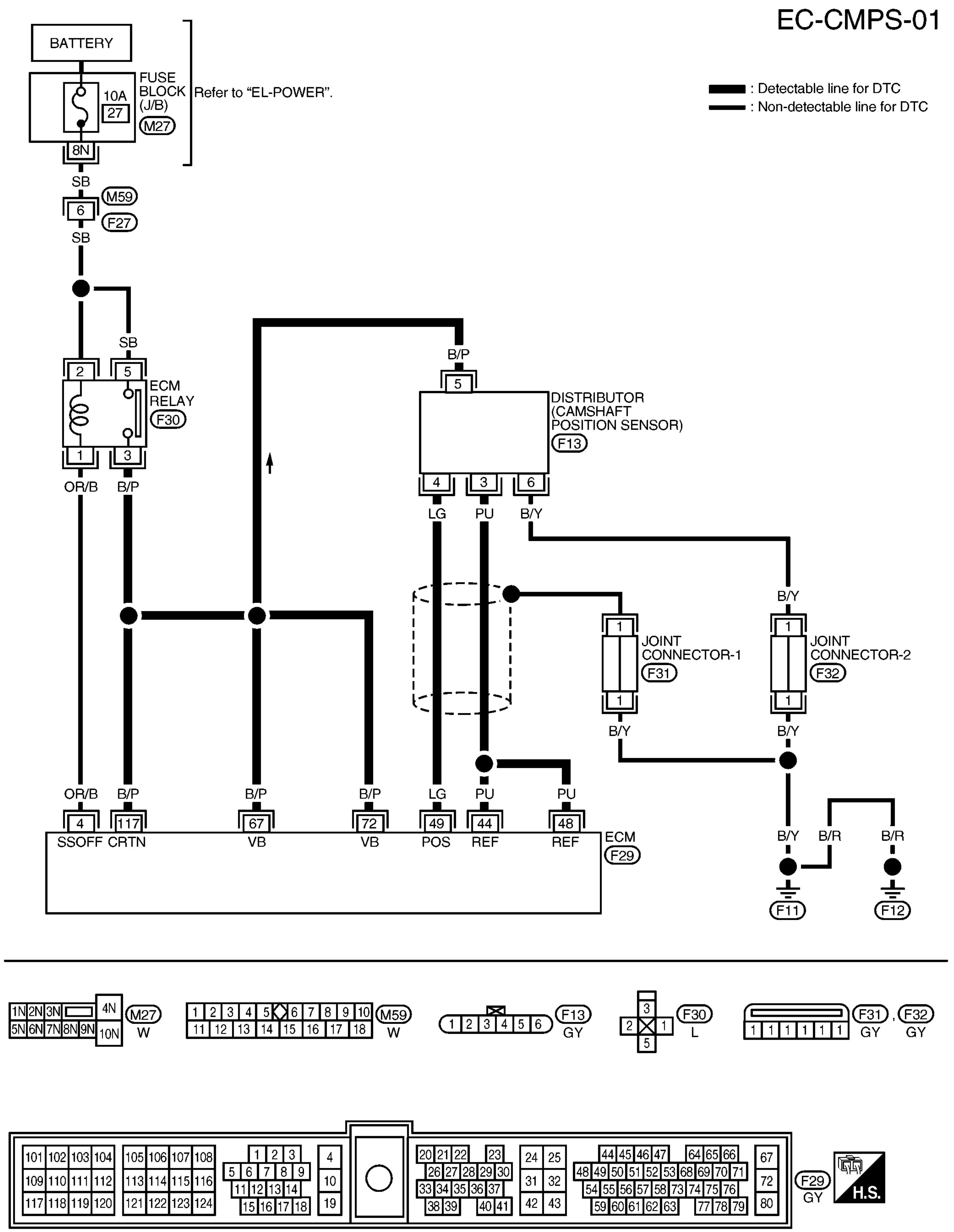
1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and run it for at least 2 seconds at idle speed.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-916.

With GST

Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC0727



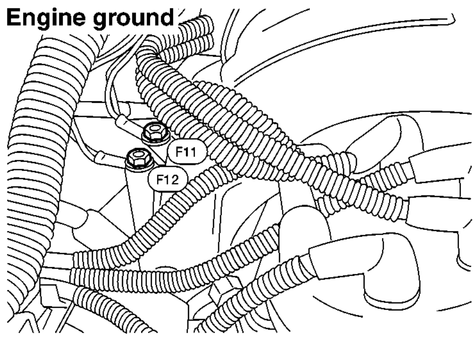
AEC957A

Diagnostic Procedure

NGEC0728

1	RETIGHTEN GROUND SCREWS

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

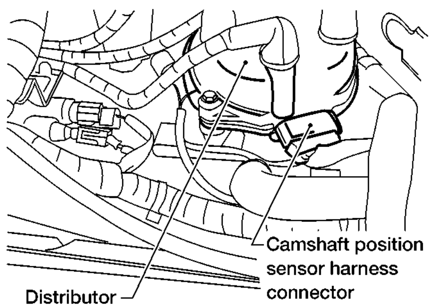


AEC640A

▶	GO TO 2.

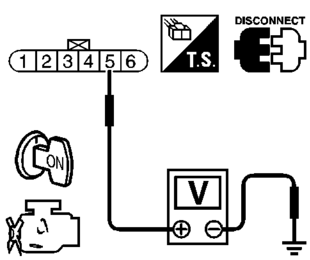
2	CHECK CMPS POWER SUPPLY CIRCUIT

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 ground and short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

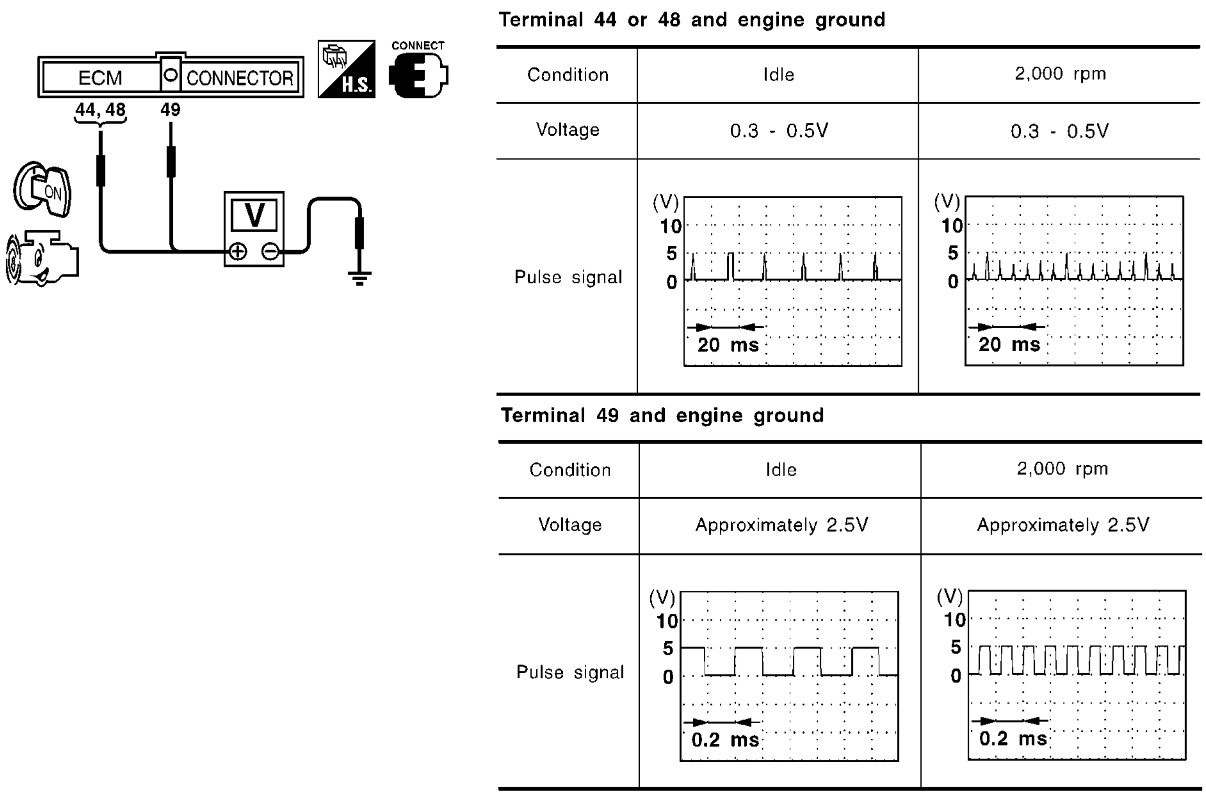
6	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-2
- Harness for open or short between camshaft position sensor and engine ground

	▶	Repair open circuit or short to ground 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.



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 "HARNESS LAYOUT", ***EL-292***.)
  Continuity should exist.
4. Also check harness for short to ground and short to power.
5. Then reconnect joint connector-1.

OK or NG

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

9	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.

	▶	**INSPECTION END**

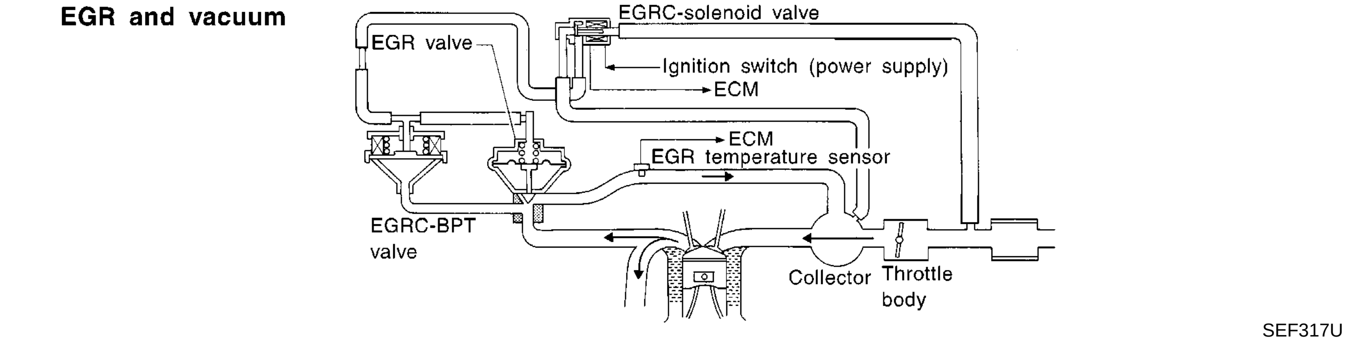
Description (If Equipped with EGR Valve)
NGEC0729

SYSTEM DESCRIPTION
NGEC0729S01

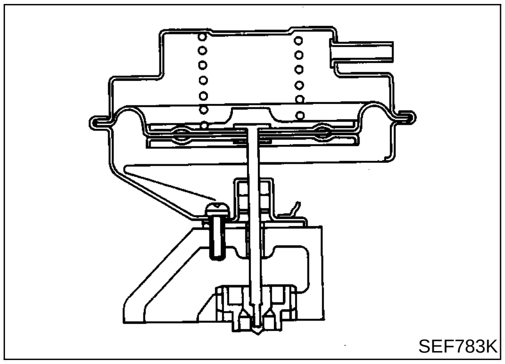
Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EGR control	EGRC-solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		

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 does not flow through the solenoid valve. This causes the intake manifold 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



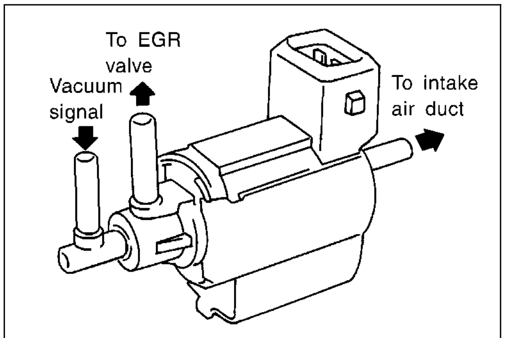
SEF317U


SEF783K

COMPONENT DESCRIPTION
=NGEC0729S02

Exhaust Gas Recirculation (EGR) Valve
NGEC0729S0201

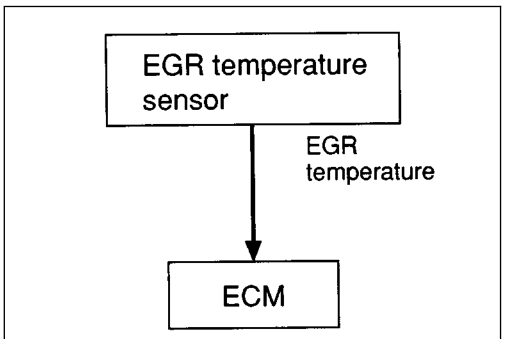
The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening and EGRC-BPT valve operation. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.



SEF318UC

EGRC-solenoid Valve
NGEC0729S0202

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 (from the intake manifold collector to the EGR valve) 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.



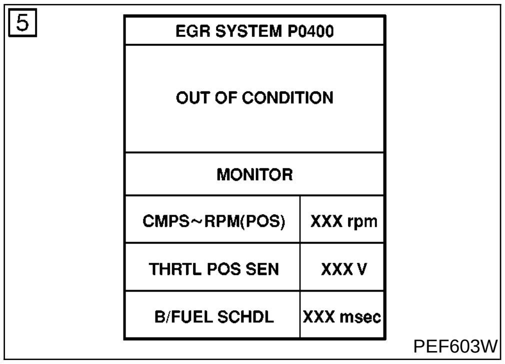
SEF073P

On Board Diagnosis Logic
NGEC0730

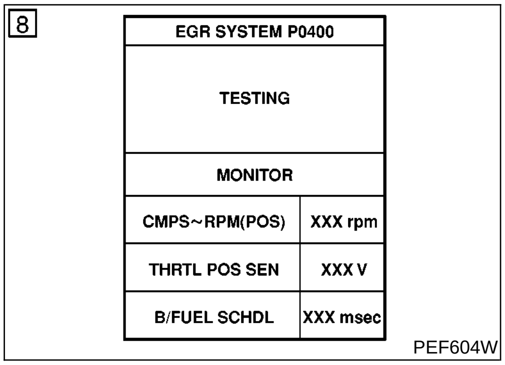
If the absence of EGR flow is detected by EGR temperature sensor under the condition that calls for EGR, a low-flow malfunction is diagnosed.
Malfunction is detected when no EGR flow is detected under condition that calls for EGR.

POSSIBLE CAUSE
NGEC0730S01

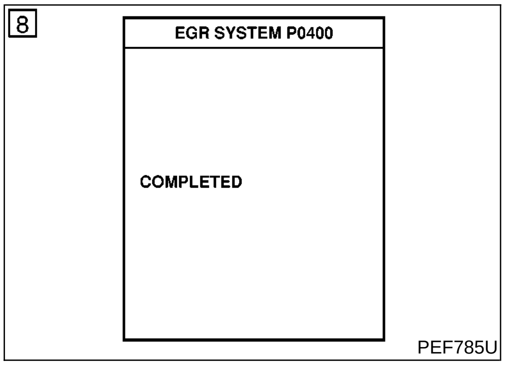
- EGR valve stuck closed
- EGRC-BPT valve
- Vacuum hoses
- EGRC-solenoid valve
- EGR passage
- EGR temperature sensor
- Exhaust gas leaks



PEF603W



PEF604W



PEF785U

DTC Confirmation Procedure

NGEC0731

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:

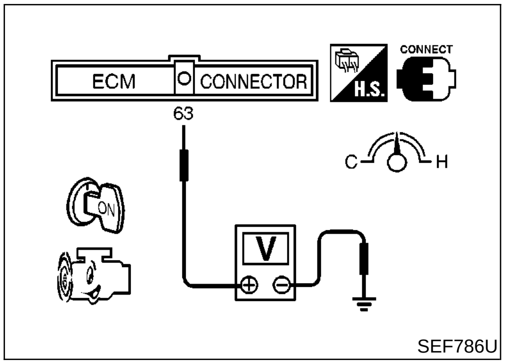
For best results, perform the test at a temperature of 5°C (41°F) or higher.

With CONSULT-II

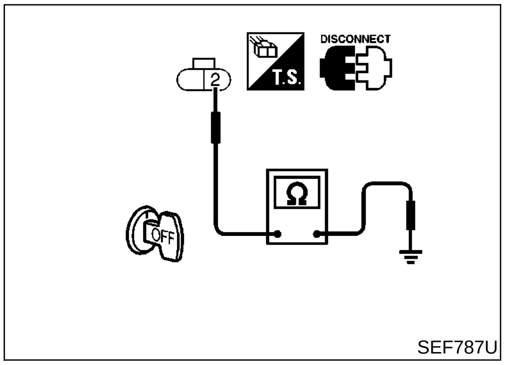
1) Turn ignition switch ON
2) Check "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
   Confirm COOLAN TEMP/S value is within the range listed below.
   COOLAN TEMP/S: Less than 40°C (104°F)
   If the value is out of range, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to lower the engine coolant temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.
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 60 seconds or more.)

CMPS·RPM (POS)	1,600 - 2,400 rpm (A/T models) 1,800 - 2,600 rpm (M/T models)
B/FUEL SCHDL	3.0 - 4.5 msec
THRTL POS SEN	X − (X + 0.7) 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-924.



SEF786U



SEF787U

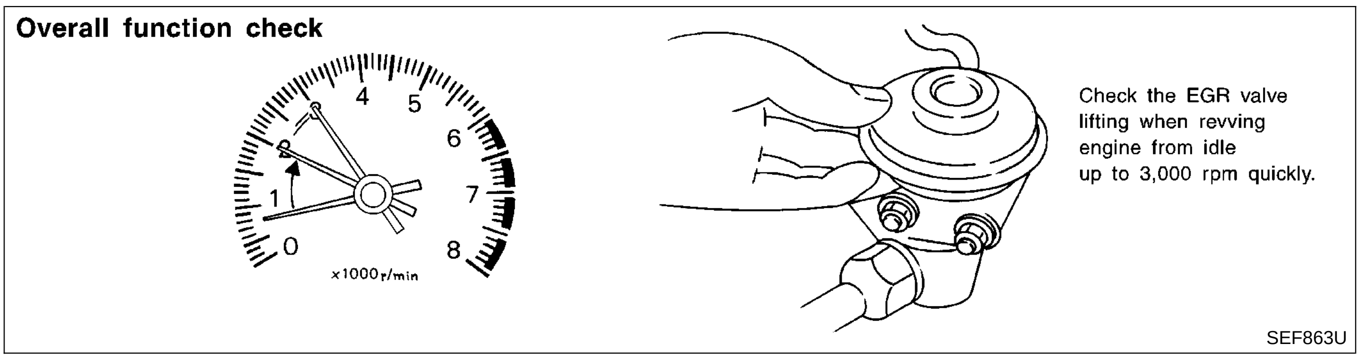
Overall Function Check

NGEC0732

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

Without CONSULT-II

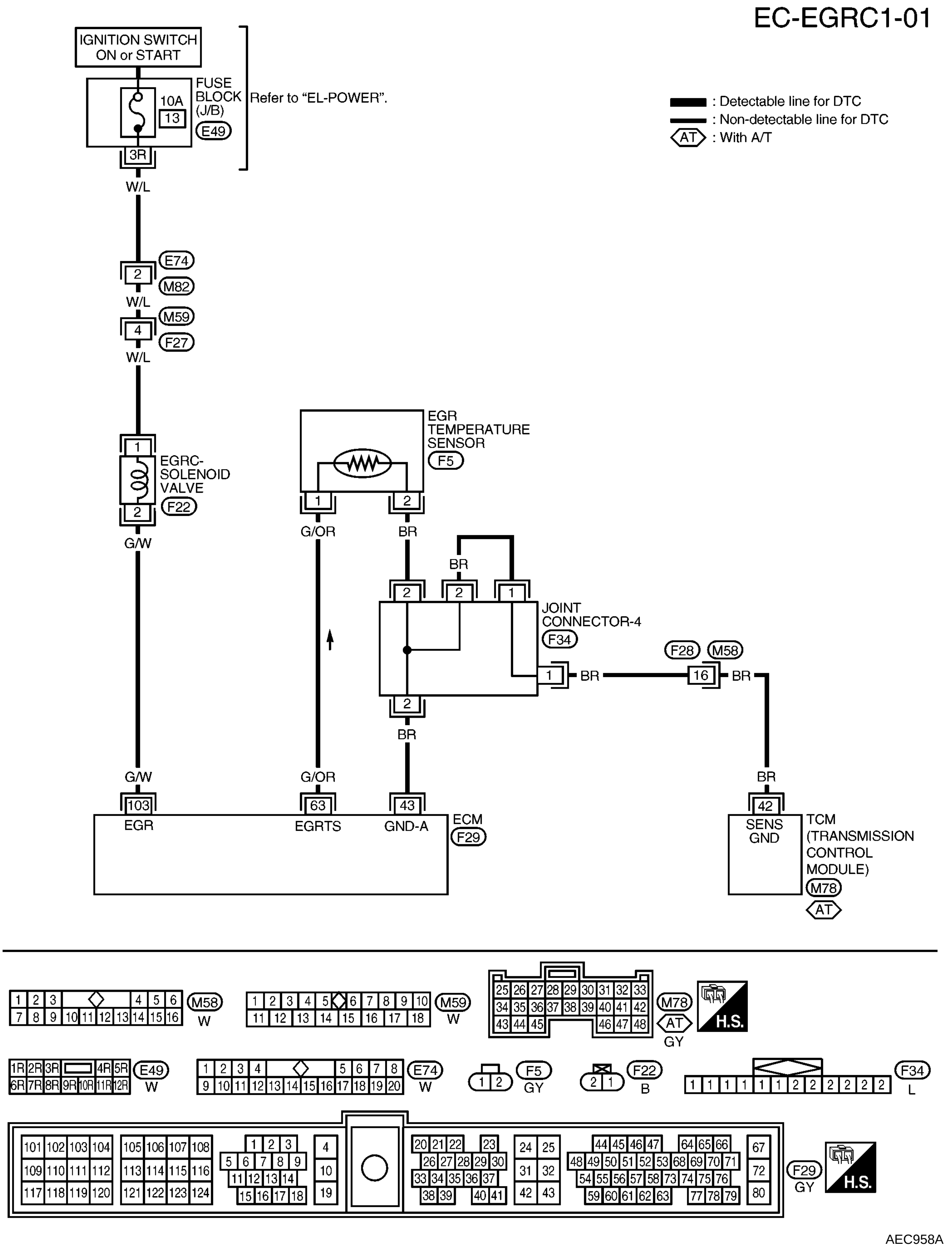
1) Start engine and warm it up to normal operating temperature.
2) Check the EGR valve lifting when revving engine from idle up to 3,000 rpm quickly under no load.
   EGR valve should lift up and down without sticking.
   If NG, go to "Diagnostic Procedure", EC-924.
3) Check voltage between ECM terminal 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) Disconnect EGR temperature sensor harness connector.
6) Check harness continuity between EGR temperature sensor harness connector terminal 2 and ground.
   Continuity should exist.
7) Perform "CHECK EGR TEMPERATURE SENSOR" in "Diagnostic Procedure".



SEF863U

Wiring Diagram

NGEC0733

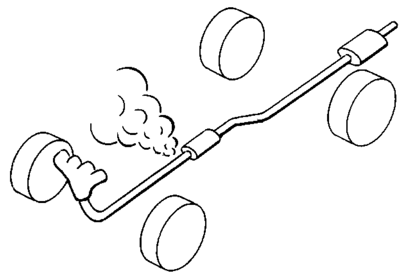


Diagnostic Procedure

NGEC0734

1	CHECK EXHAUST SYSTEM

1. Start engine.
2. Check exhaust pipes and muffler for leaks.



SEF099P

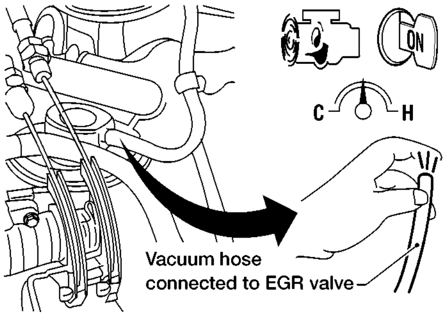
OK or NG

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.



AEC648A

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 idle up to 3,000 rpm.

ACTIVE TEST	
EGRC SOL/V	ON
(EGR)	FLOW
MONITOR	
CMPS·RPM(REF)	XXX rpm

PEF788U

Vacuum should exist when revving engine.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 5.

GI
MA
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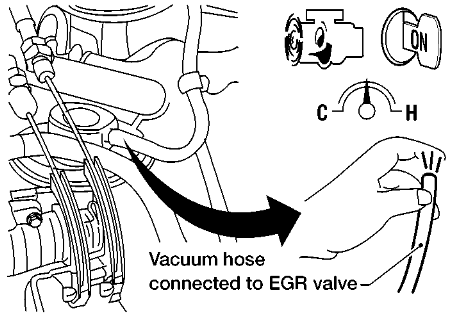
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

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.



AEC648A

Vacuum should not exist at idle.

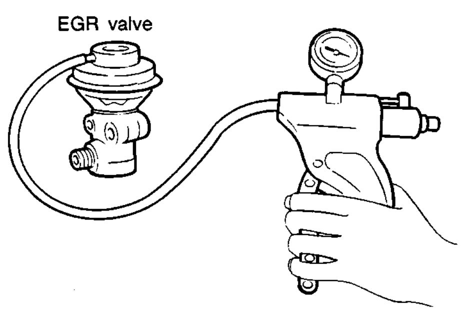
4. Check for vacuum existence when revving engine from idle up to 3,000 rpm quickly.
   Vacuum should exist when revving engine.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 5.

4	CHECK EGR VALVE

Apply vacuum to EGR vacuum port with a hand vacuum pump.



MEF137D

EGR valve spring should lift.

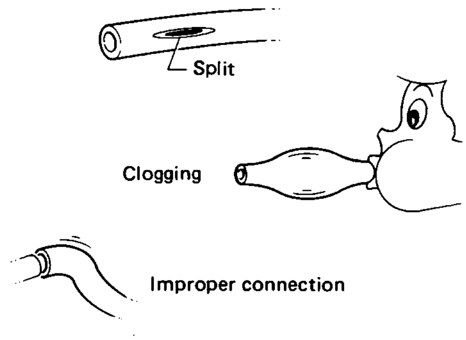
- Check for sticking.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EGR valve.

5	CHECK VACUUM HOSE

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



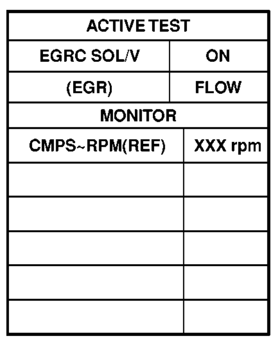
SEF109L

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)	FLOW
MONITOR	
CMPS~RPM(REF)	XXX rpm

PEF789U

Clicking noise should be heard.

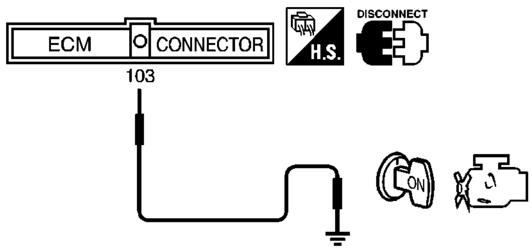
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace EGRC-solenoid valve or repair circuit.

7	CHECK EGRC-SOLENOID VALVE OPERATION

Without CONSULT-II

1. Disconnect ECM harness connector.
2. Turn ignition switch ON.
3. Connect a suitable jumper wire between ECM terminal 103 and engine ground.



SEF354V

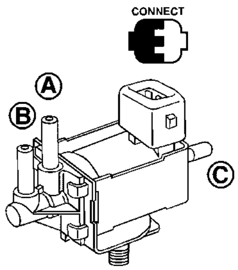
4. Check operating sound of EGRC-solenoid valve when disconnecting and connecting the jumper wire.
   Clicking noise should be heard.

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace EGRC-solenoid valve or repair circuit.

8	CHECK EGRC-SOLENOID VALVE

With CONSULT-II
1. Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.
2. Check air passage continuity and operation delay time.

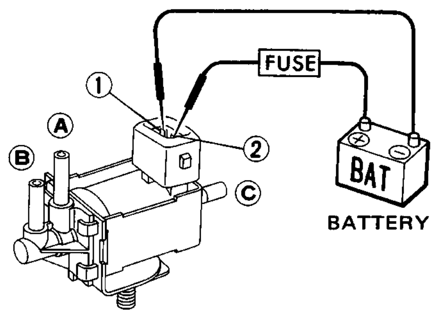


ACTIVE TEST	
EGRC SOL/V (EGR)	ON FLOW
MONITOR	
CMPS~RPM (REF)	XXXrpm

Conditions	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes

SEF155X

Without CONSULT-II
1. Check air passage continuity and operation delay time under the following conditions.



AEC919

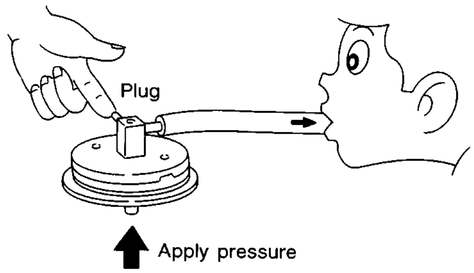
Condition	Air passage continuity between A and B	Air passage continuity between A and C
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

MTBL0237

OK or NG

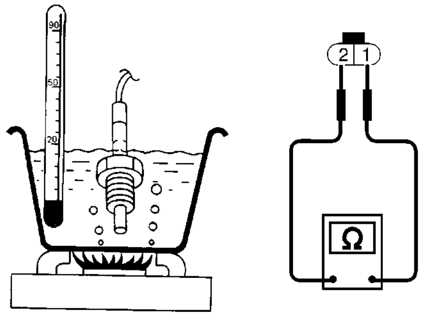
OK	▶	GO TO 9.
NG	▶	Replace EGRC-solenoid valve.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

9	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 **Leakage should not exist.** **OK or NG**		
OK	▶	GO TO 10.
NG	▶	Replace EGRC-BPT valve.

10	CHECK EGR TEMPERATURE SENSOR

Check resistance change and resistance value.

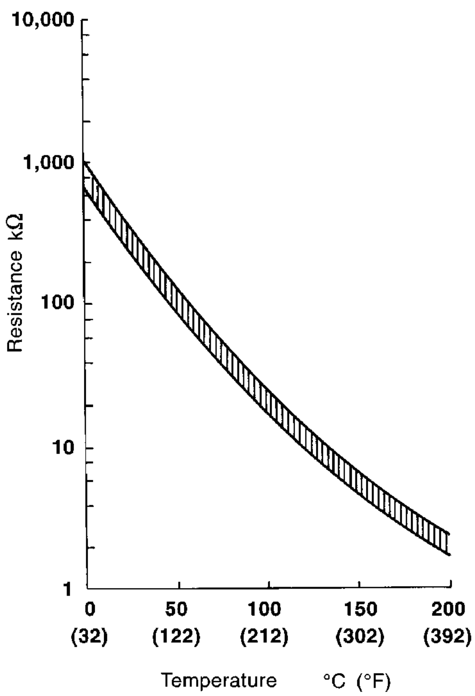


SEF643Q

<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

AEC039B



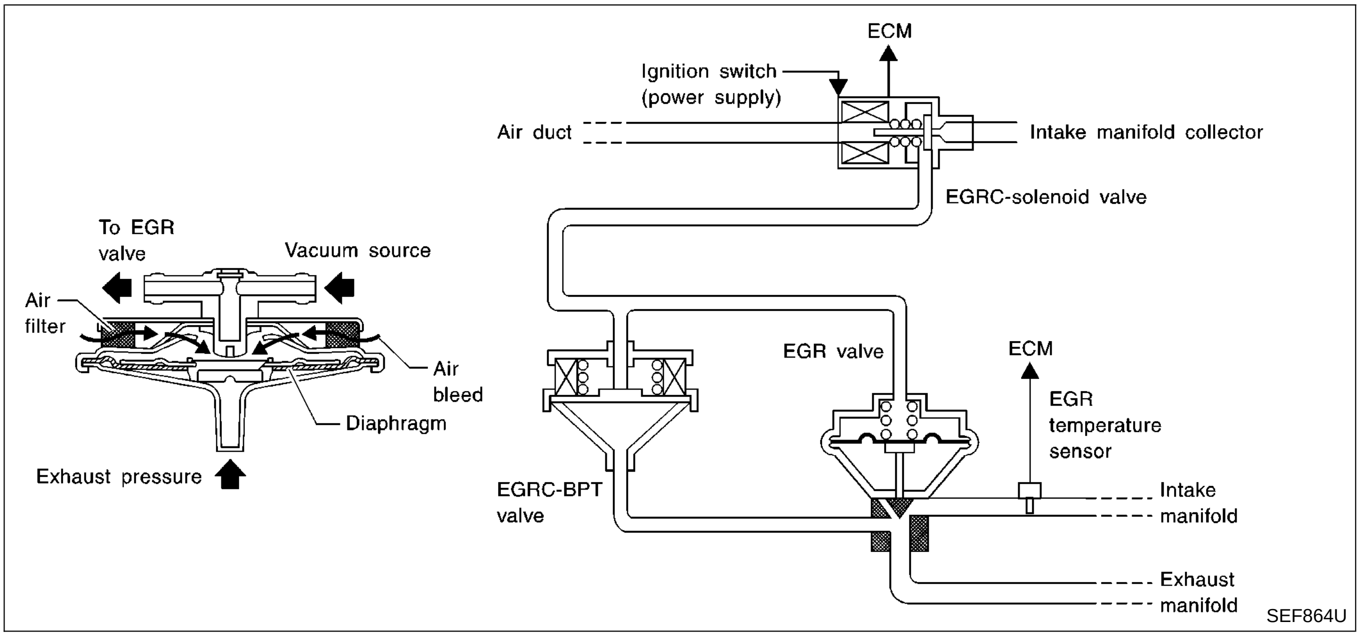
SEF320U

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EGR temperature sensor.

11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.	
▶	INSPECTION END

Description (If Equipped with EGR Valve)
NGEC0735



SYSTEM DESCRIPTION
NGEC0735S01

The EGRC-BPT valve monitors exhaust pressure to activate the diaphragm, controlling intake manifold 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
NGEC0736

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. Malfunction is detected when the EGRC-BPT valve does not operate properly.

POSSIBLE CAUSE
NGEC0736S01

- EGRC-BPT valve
- EGR valve
- Loose or disconnected rubber tube
- Blocked rubber tube
- Camshaft position sensor
- Blocked exhaust system
- Orifice
- Mass air flow sensor
- EGRC-solenoid valve

DTC Confirmation Procedure

NGEC0737

CAUTION:

Always drive vehicle at a safe speed.

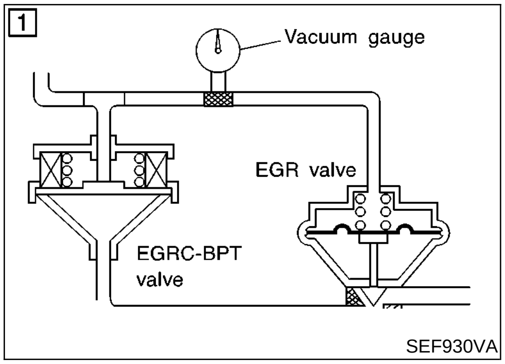
NOTE:

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

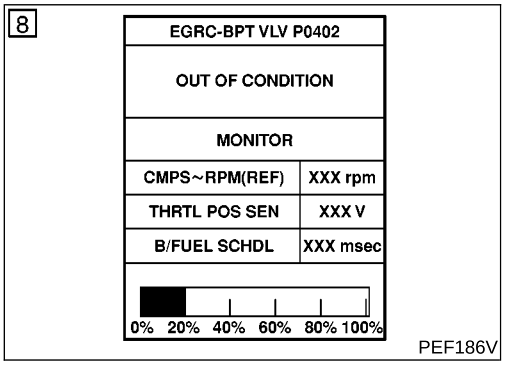
TESTING CONDITION

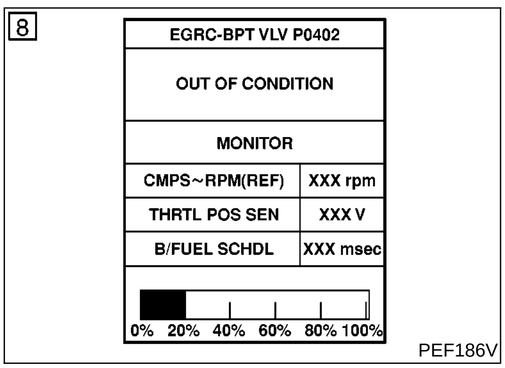
For best results, perform the test at a temperature of 5°C (41°F) or higher.

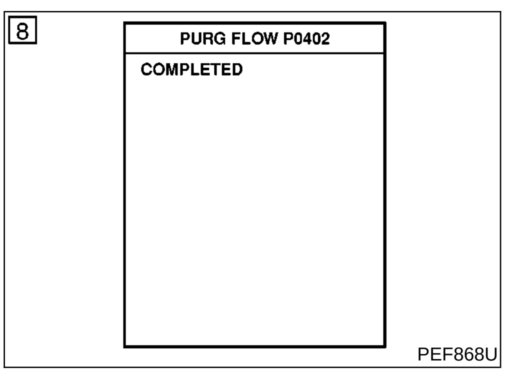
With CONSULT-II



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.



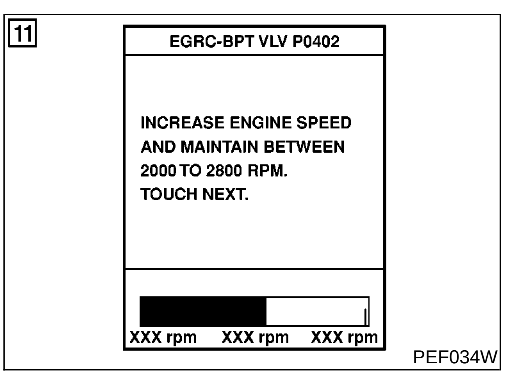


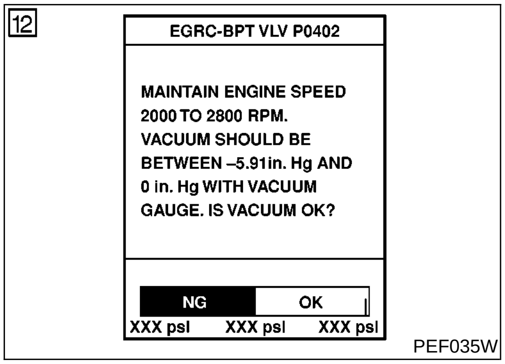


CMPS·RPM (POS)	1,400 - 2,000 rpm (A/T models) 1,400 - 1,800 rpm (M/T models)
Vehicle speed	30 - 60 km/h (19 - 37 MPH) (A/T models) 30 - 100 km/h (19 - 62 MPH) (M/T models)
B/FUEL SCHDL	2.3 - 2.8 msec
THRTL POS SEN	X − (X + 0.44) V X = Voltage value measured at step 7
Selector lever	Suitable position

- **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 3.**

9) If CONSULT-II instructs to carry out "OVERALL FUNCTION CHECK", go to next step. If "NG" is displayed, refer to "Diagnostic Procedure", EC-935.
10) Open engine hood.
11) Raise engine speed to 2,000 to 2,800 rpm under no-load and hold it. Then touch "NEXT" on CONSULT-II screen.





PEF035W

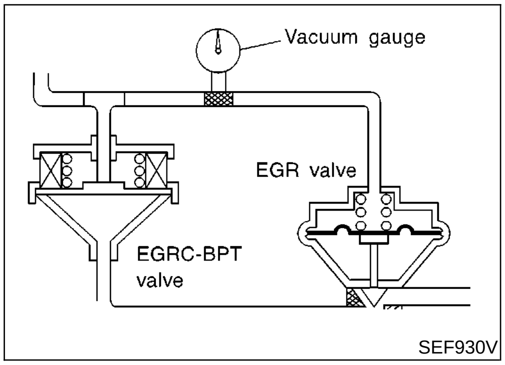
12) Check vacuum gauge while keeping engine speed 2,000 to 2,800 rpm.
Vacuum should be 0 to −20 kPa (0 to −150 mmHg, 0 to −5.91 inHg).
If NG, go to "Diagnostic Procedure", EC-935.
If OK, touch "YES" on the CONSULT-II screen.
13) Check the rubber tube between intake manifold collector, EGRC-solenoid valve, EGR valve and EGRC-BPT valve for cracks, blockages or twist.
If NG, repair or replace.
If OK, touch "YES" on the CONSULT-II screen.

Overall Function Check

NGEC0738

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



SEF930V

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 or "1" position.
4) Check vacuum gauge while keeping engine speed 2,000 to 2,800 rpm.
Vacuum should be 0 to −20 kPa (0 to −150 mmHg, 0 to −5.91 inHg).
If NG, go to "Diagnostic Procedure", EC-935.
If OK, go to next step.
5) Check rubber tube between intake manifold collector, EGRC-solenoid valve, EGR valve and EGRC-BPT valve for misconnections, cracks or blockages.
If NG, repair or replace.

Diagnostic Procedure

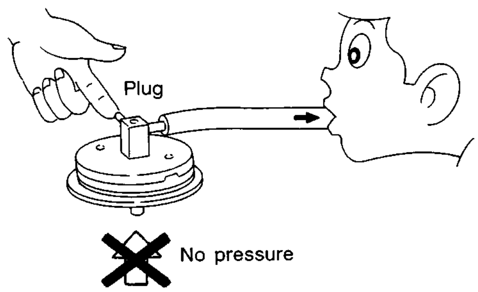
NGEC0739

1	CHECK HOSE	
1. Turn ignition switch OFF. 2. 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.	



SEF172P

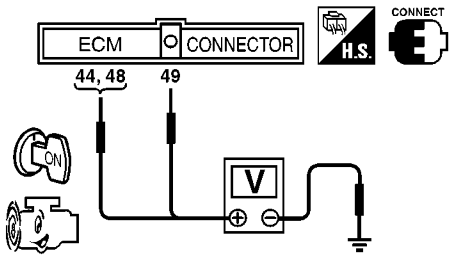
Leakage should exist.

OK or NG

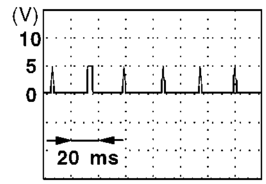
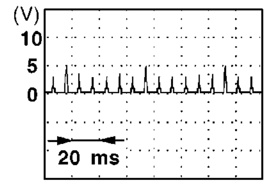
OK ▶	GO TO 5.
NG ▶	Replace EGRC-BPT valve.

5	CHECK CAMSHAFT POSITION SENSOR

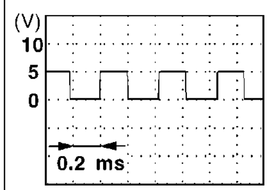
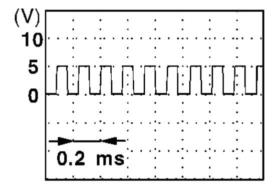
1. Install any parts removed.
2. Start engine.
3. Check voltage between ECM terminals 44, 48 and ground, ECM terminal 49 and ground with DC range.



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		

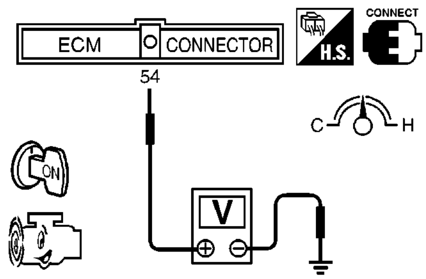
AEC072B

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace distributor assembly with camshaft position sensor.

6	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.

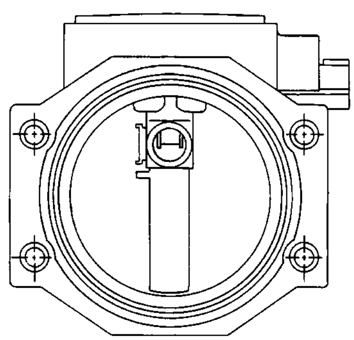


SEF747U

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

AEC040B

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

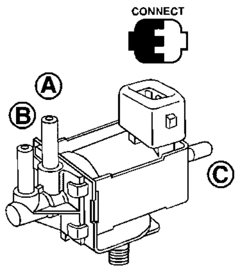
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace mass air flow sensor.

7	CHECK EGRC-SOLENOID VALVE

With CONSULT-II

1. Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.
2. Check air passage continuity and operation delay time.



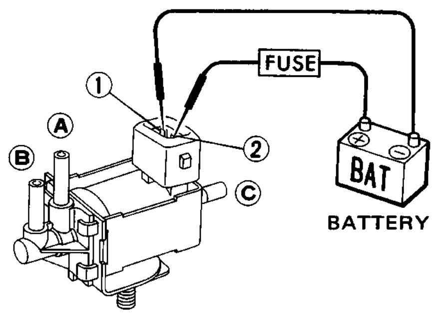
ACTIVE TEST	
EGRC SOL/V (EGR)	ON FLOW
MONITOR	
CMPS~RPM (REF)	XXXrpm

Conditions	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes

SEF155X

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



AEC919

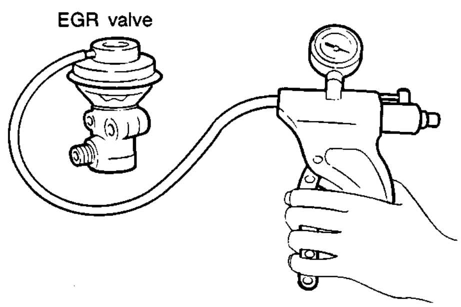
Condition	Air passage continuity between A and B	Air passage continuity between A and C
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

MTBL0237

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

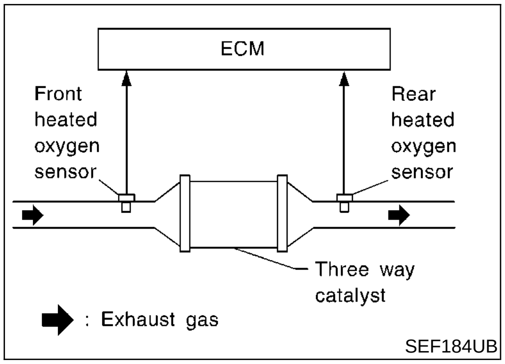
EGR valve spring should lift.

- Check for sticking.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EGR valve.

9	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.		
	▶	**INSPECTION END**



On Board Diagnosis Logic

NGEC0740

The ECM monitors the switching frequency ratio of front and rear heated oxygen sensors.
A warm-up three way catalyst with high oxygen storage capacity will indicate a low switching frequency of rear heated oxygen sensor. As oxygen storage capacity decreases, the rear heated oxygen sensor switching frequency will increase.
When the frequency ratio of front and rear heated oxygen sensors approaches a specified limit value, the warm-up three way catalyst malfunction is diagnosed.
Malfunction is detected when warm-up three way catalyst does not operate properly, warm-up three way catalyst does not have enough oxygen storage capacity.

POSSIBLE CAUSE

NGEC0740S01

- Warm-up three way catalyst
- Exhaust tube
- Intake air leaks
- Injectors
- Injector leaks
- Spark plug
- Improper ignition timing

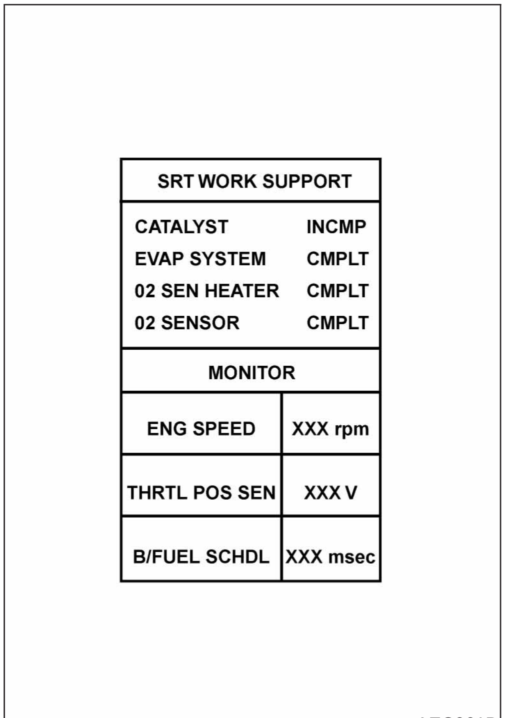
DTC Confirmation Procedure

NGEC0741

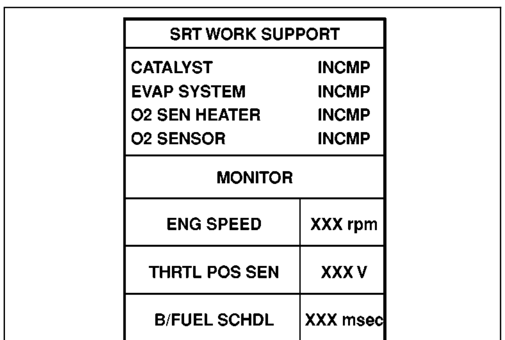
NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

With CONSULT-II

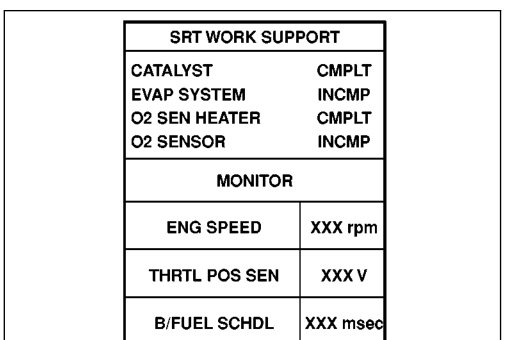
1) Turn ignition switch ON.
2) Select "DTC & SRT CONFIRMATION" the SRT WORK SUPPORT" mode with CONSULT-II.
3) Start engine.
4) Rev engine up to 2,500 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
5) Wait 5 seconds at idle.
6) Rev engine up to 2,500 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-944. If not "CMPLT", stop engine and cool down "COOLANT TEMP/SE" to less than 70°C (158°F) and retest from step 1).



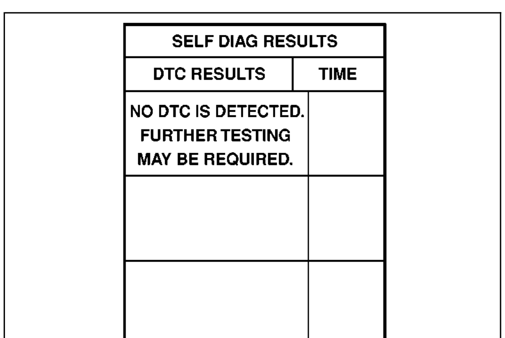
AEC061B



SEF558X



SEF559X



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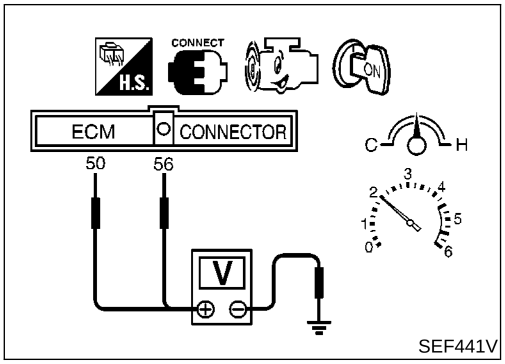
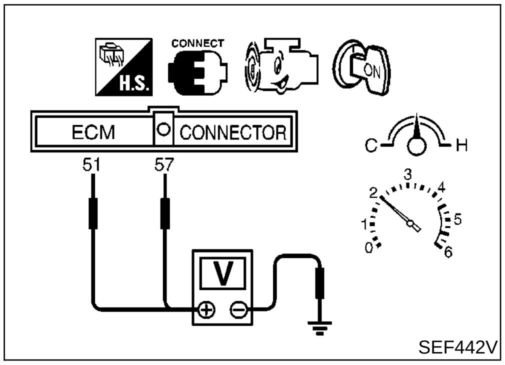


SEF441V



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 (front heated oxygen sensor right bank signal), 51 (front heated oxygen sensor left bank signal) and engine ground, and ECM terminals 56 (rear heated oxygen sensor right bank signal), 57 (rear heated oxygen sensor left bank signal) and engine ground.
4) Keep engine speed at 2,000 rpm constant under no load.
5) Make sure that the voltage switching frequency (high & low) between ECM terminals 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: Rear heated oxygen sensor voltage switching frequency
   B: Front heated oxygen sensor voltage switching frequency
   This ratio should be less than 0.75.
   If the ratio is greater than above, it means warm-up three way catalyst does not operate properly. Go to “Diagnostic Procedure”, EC-944.

NOTE:

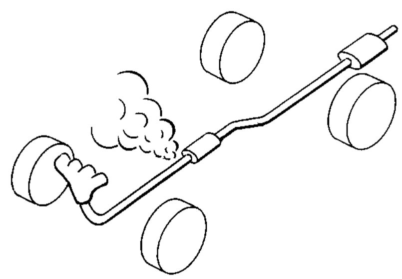
If the voltage at terminal 50 or 51 does not switch periodically more than 5 times within 10 seconds at step 5, perform trouble diagnosis for “DTC P0133, P0153” first. (See EC-788.)

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.

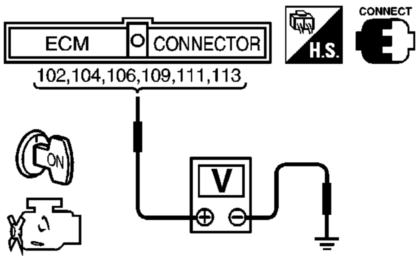
3	CHECK INTAKE AIR LEAK
Listen for an intake air leak after the mass air flow sensor.	
OK or NG	
OK ▶	GO TO 4.
NG ▶	Repair or replace.

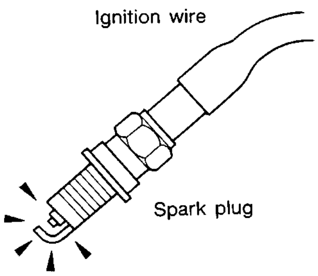
4	CHECK IGNITION TIMING
Check the following items. Refer to “Basic Inspection”, EC-669.	

Items	Specifications
Ignition timing	15° ± 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)

MTBL0226

OK or NG	
OK ▶	GO TO 5.
NG ▶	Adjust ignition timing.

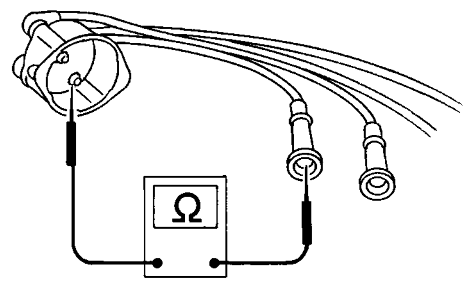
5	CHECK INJECTORS	
1. Refer to WIRING DIAGRAM for Injectors, EC-1145. 2. Stop engine and then turn ignition switch ON. 3. Check voltage between ECM terminals 102, 104, 106, 109, 111 and 113 and ground with CONSULT-II or tester.  SEF711U **Battery voltage should exist.** **OK or NG**		
OK	▶	GO TO 6.
NG	▶	Perform "Diagnostic Procedure", "INJECTOR", EC-1146.

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.

GI MA EM LC **EC** FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

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-1028.
NG	▶	Replace.

8	CHECK INJECTOR

1. Turn ignition switch OFF.
2. Remove injector assembly.
   Refer to EC-611.
   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-706.

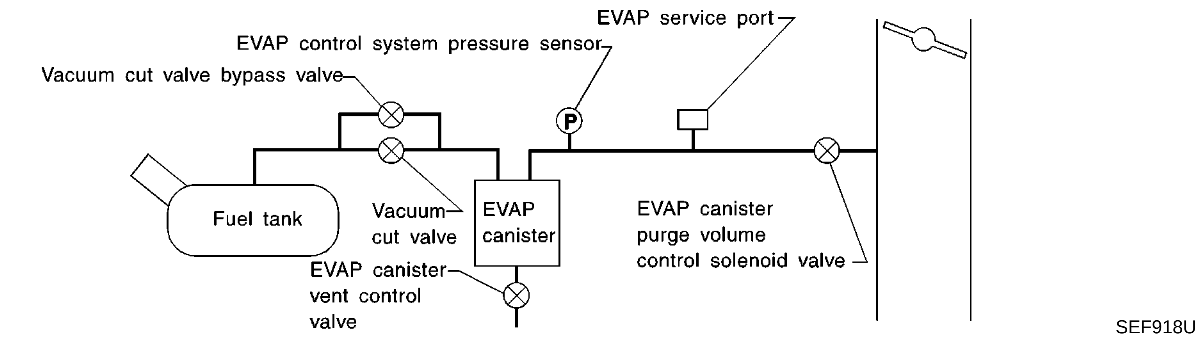
Trouble is fixed	▶	**INSPECTION END**
Trouble is not fixed	▶	Replace warm-up three way catalyst.

On Board Diagnosis Logic

NGEC0744

NOTE:
If DTC P0440 or P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1098.)

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.



SEF918U

Malfunction is detected when EVAP control system has a leak, EVAP control system does not operate properly.

CAUTION:

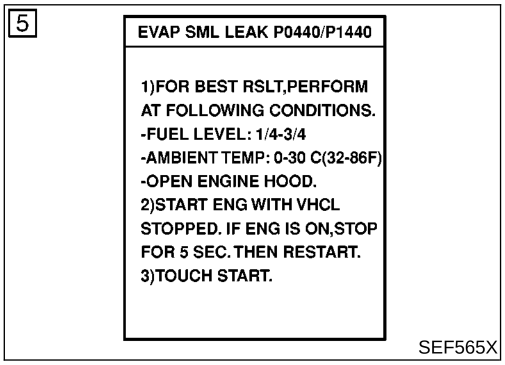
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

POSSIBLE CAUSE

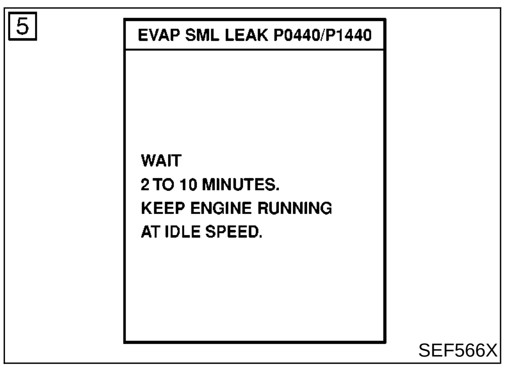
NGEC0744S01

- 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

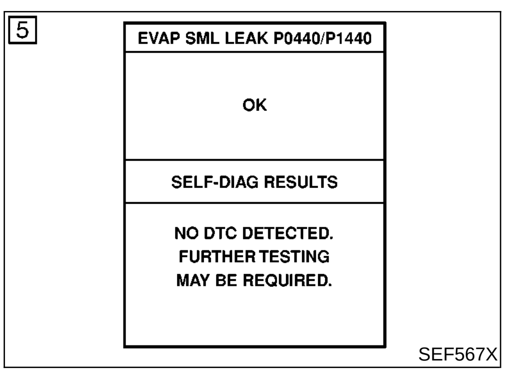
- MAP/BARO switch solenoid valve and the circuit
- Blocked or bent rubber tube to MAP/BARO switch solenoid valve and the circuit
- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- EVAP control system pressure sensor
- Fuel level sensor



SEF565X



SEF566X



SEF567X

DTC Confirmation Procedure

NGEC0745

NOTE:

- **If DTC P0440 or P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1098.)**
- 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.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**

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 - 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 speed cannot be maintained within the range displayed on the CONSULT-II screen, go to "Basic Inspection", EC-669.

6) Make sure that "OK" is displayed.
   If "NG" is displayed, refer to "Diagnostic Procedure", EC-949.

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-634 before driving vehicle.

1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-634.
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-634.
8) Stop vehicle.
9) Select "MODE 3" with GST.
- If P0440 is displayed on the screen, go to "Diagnostic Procedure", EC-949.
- If P1440 is displayed on the screen, go to "Diagnostic Procedure" for "DTC P1440", EC-1066.
- If P1447 is displayed on the screen, go to "Diagnostic Procedure" for "DTC P1447", EC-1089.
- If P0440, P1440 and P1447 are not displayed on the screen, go to the following step.

10) Select "MODE 1" with GST.
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

NGEC0746

NOTE:
Refer to "P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)", EC-949.

Description

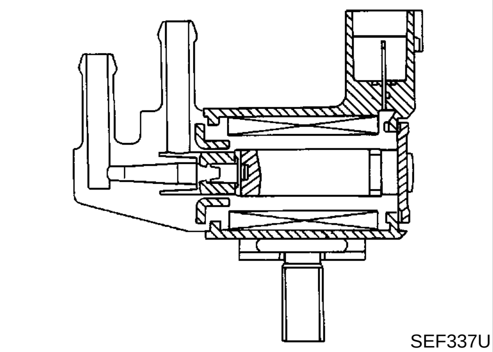
NGEC0747

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		
Front heated oxygen sensors	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Tank fuel temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control 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

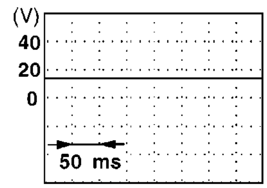
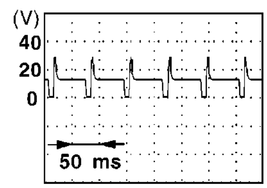
Specification data are reference values.

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 32 (ECM 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)

GI
MA
EM
LC
EC
FE
CL
MT
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TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

On Board Diagnosis Logic

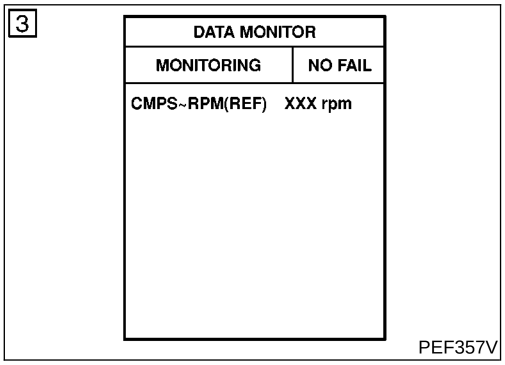
=NGEC0750

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



PEF357V

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

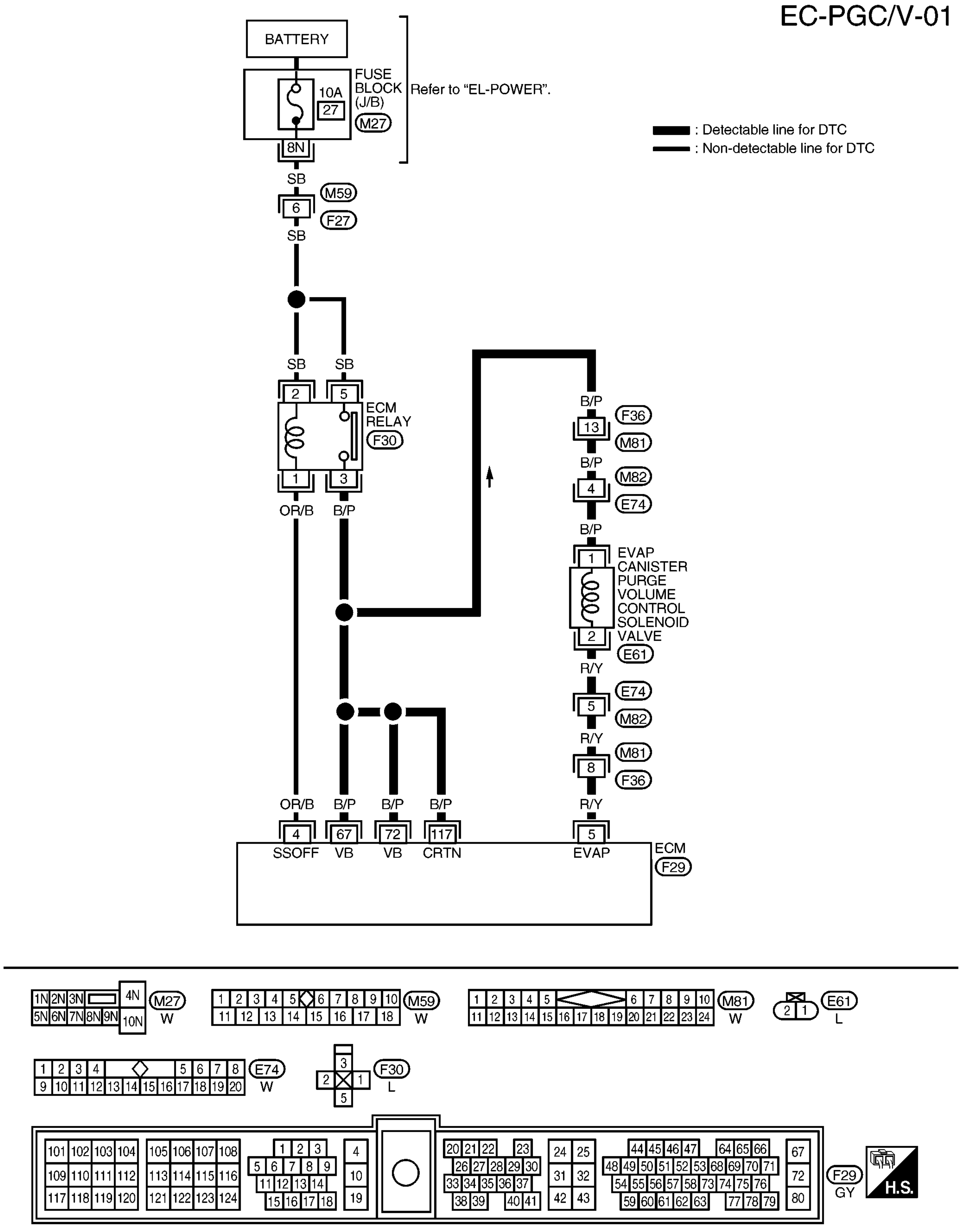
1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and let it idle for at least 13 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-954.

With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0752



AEC959A

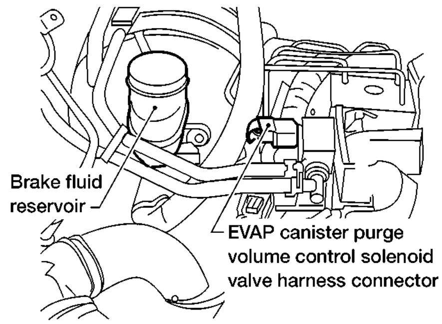
GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

Diagnostic Procedure

NGEC0753

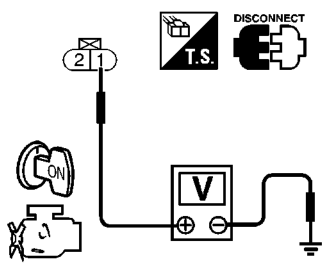
1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

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.

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

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	
CMPS~RPM(REF)	XXX rpm
FR O2 MNTR-B2	RICH
FR O2 MNTR-B1	RICH
A/F ALPHA-B2	XXX %
A/F ALPHA-B1	XXX %
THRTL POS SEN	XXX V

PEF882U

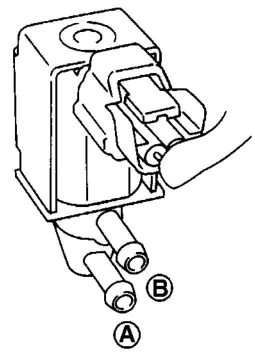
OK or NG

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.



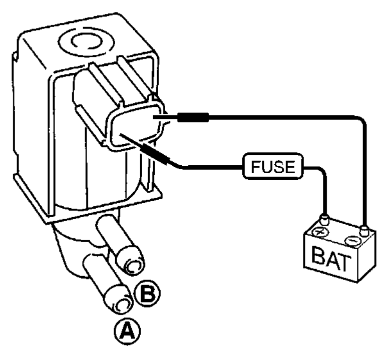
SEF660U

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

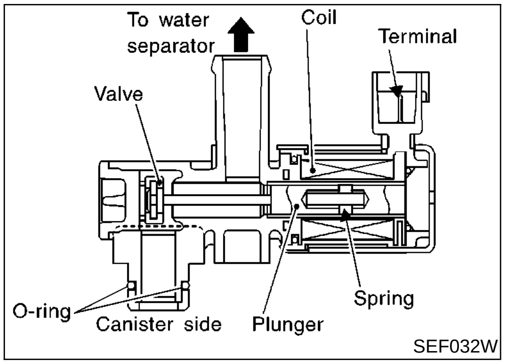
OK or NG

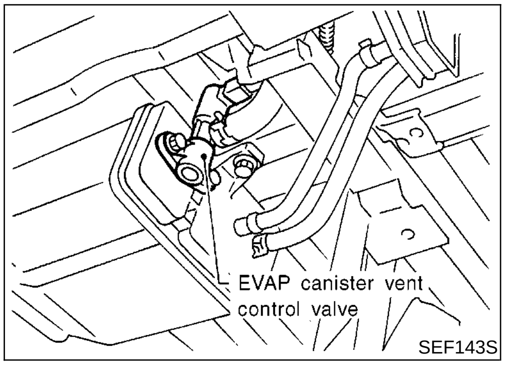
OK	▶	GO TO 7.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

7 CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.

	▶	**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 32 (ECM 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)

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

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

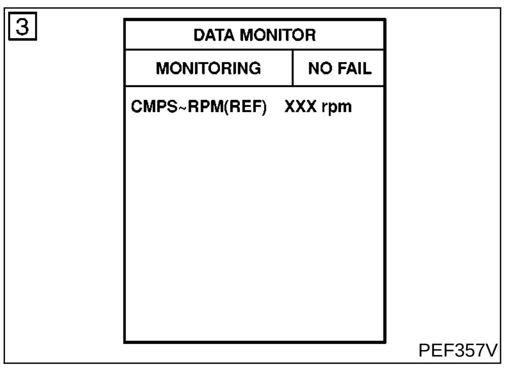
- Harness or connectors
  (The valve circuit is open or shorted.)
- EVAP canister vent control valve

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.



PEF357V

With CONSULT-II

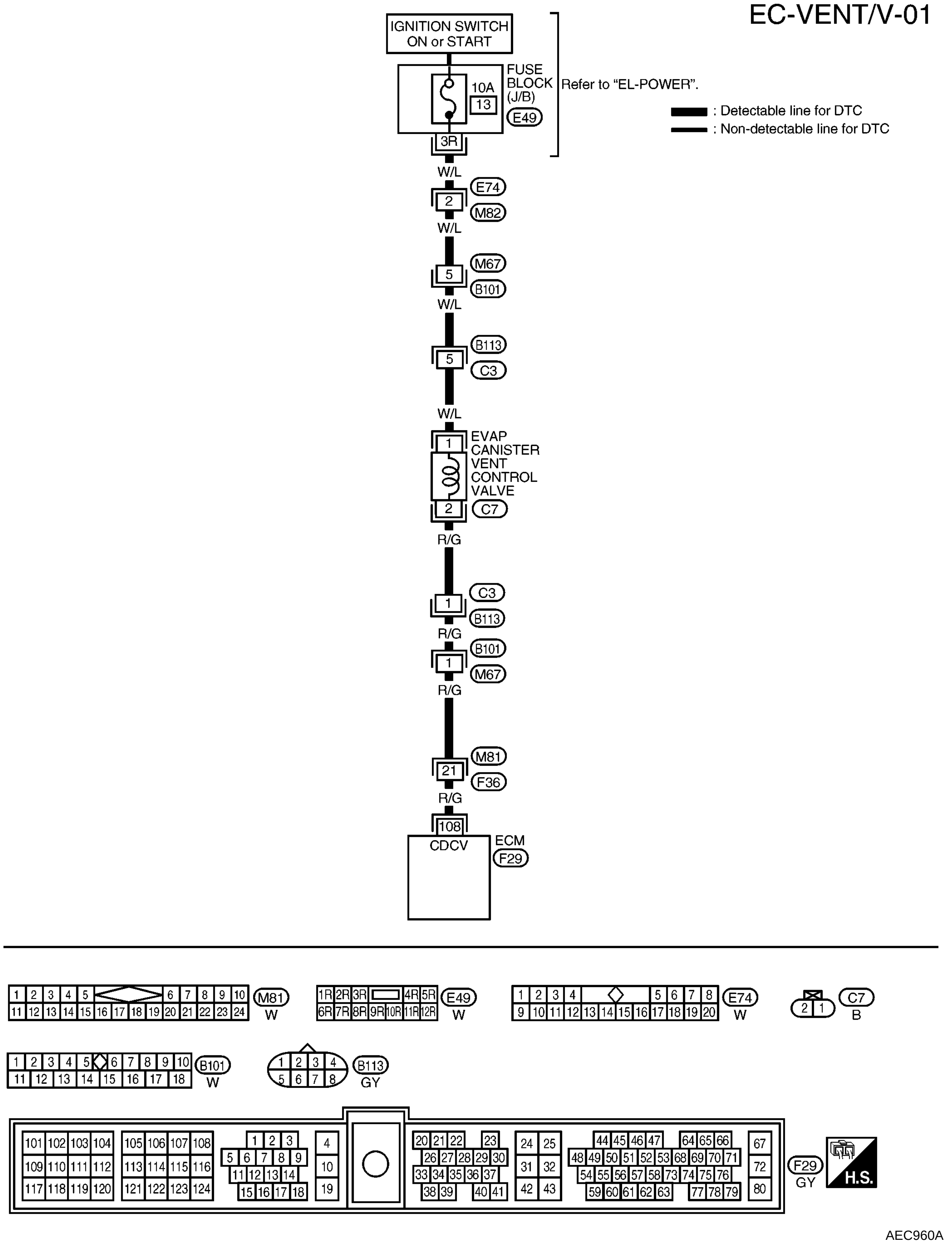
1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and wait at least 8 seconds.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-960.

With GST

Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC0759



GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

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	ON
MONITOR	
CMPS~RPM (REF)	XXX rpm
FR O2 MNTR-B2	LEAN
FR O2 MNTR-B1	LEAN
A/F ALPHA-B2	XXX %
A/F ALPHA-B1	XXX %
THRTL POS SEN	XXX V

PEF883U

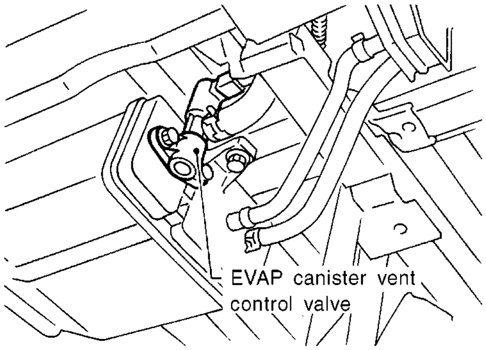
4. Check for operating sound of the valve.
   Clicking noise should be heard.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 3.

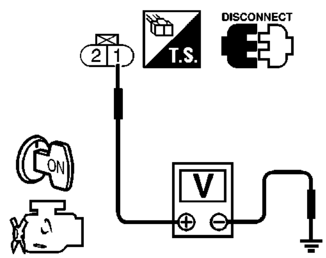
3 CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister vent control valve harness connector.



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, C1
- 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.

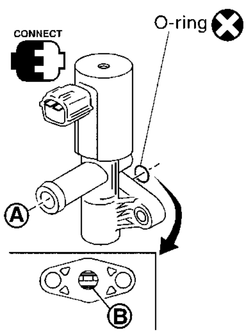
GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors C1, M67 ● 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	
CMPS~RPM (REF)	XXXrpm
FR O2 MNTR-B1	RICH
A/F ALPHA-B1	XXX%
THRTL POS SEN	XXXV

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

SEF156X

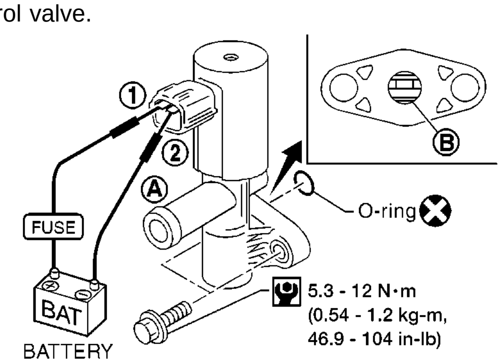
Without CONSULT-II

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.

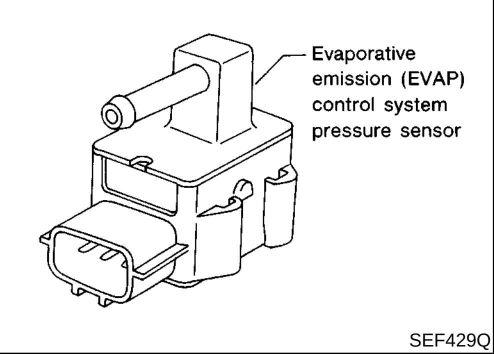
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EVAP canister vent control valve.

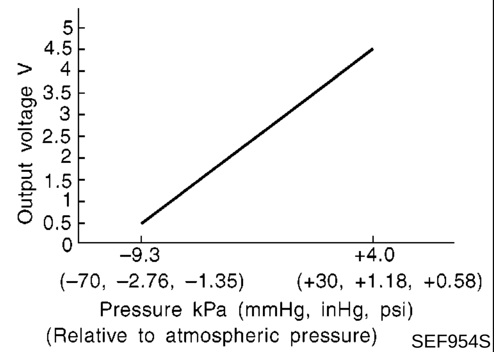
8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.	
▶	**INSPECTION END**

Component Description

NGEC0761



SEF429Q



SEF954S

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 32 (ECM 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

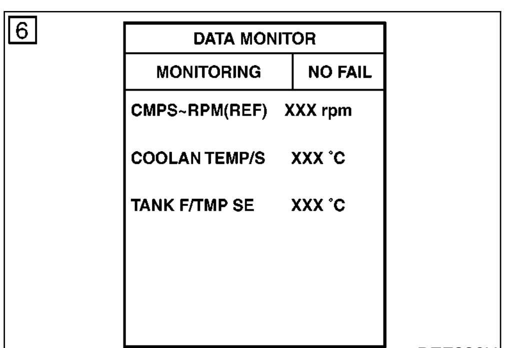
- Harness or connectors
  (The EVAP control system pressure sensor circuit is open or shorted.)
- Rubber hose to EVAP control system pressure sensor is clogged, vent, kinked, disconnected or improper connection.
- EVAP control system pressure sensor
- EVAP canister vent control valve
- EVAP canister 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.



PEF886U

With CONSULT-II

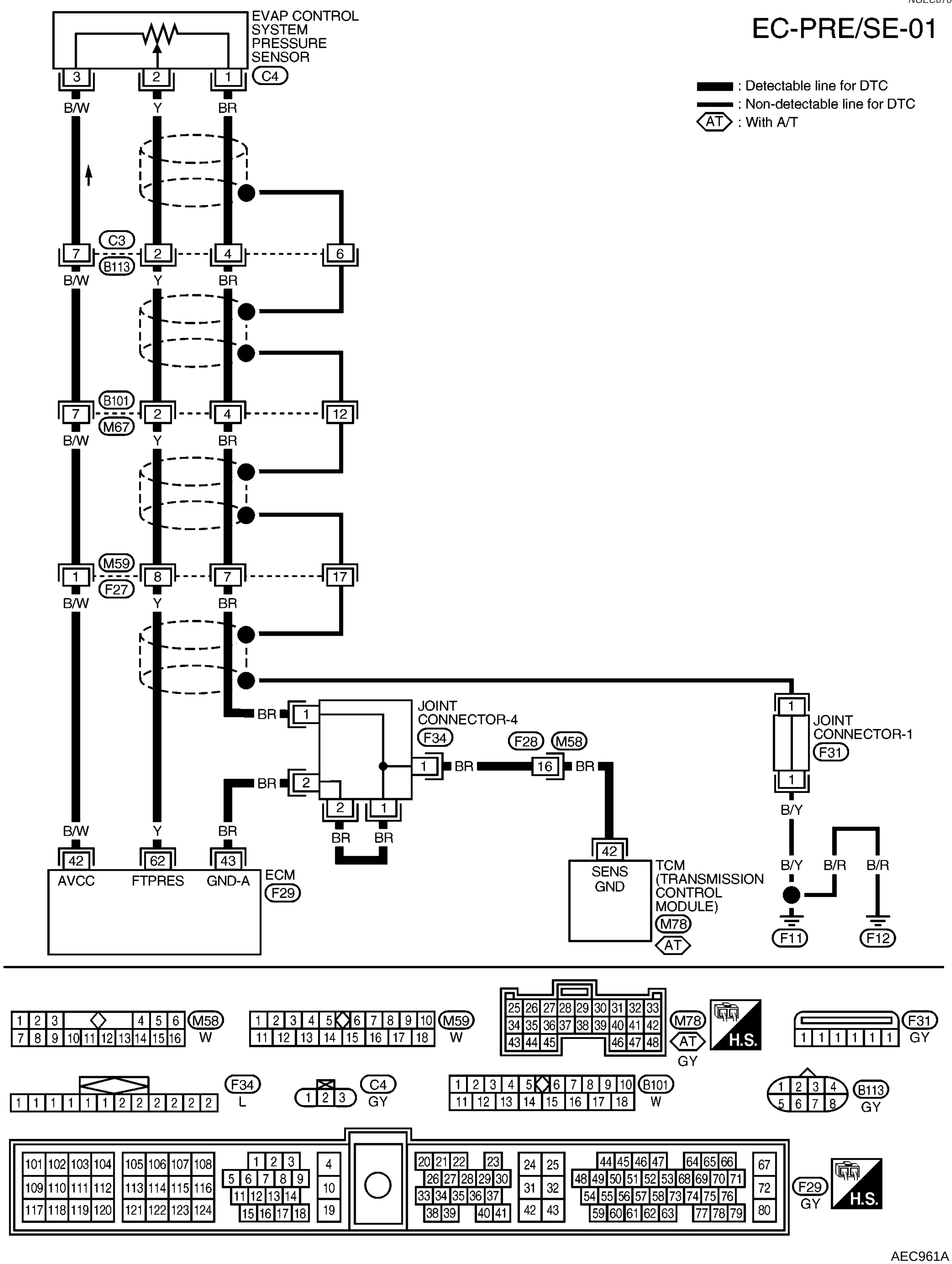
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON.
4) Select “DATA MONITOR” mode with CONSULT-II.
5) Make sure that “TANK F/TEMP SE” is more than 0°C (32°F).
6) Start engine and wait at least 20 seconds.
7) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-966.

With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0766



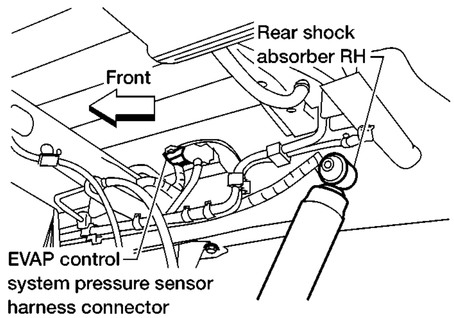
GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

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.



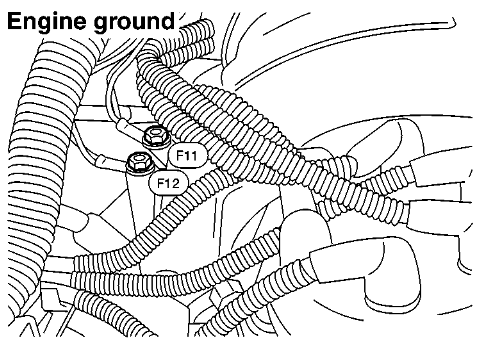
AEC651A

OK or NG

OK	▶	GO TO 2.
NG	▶	Reconnect, repair or replace.

2	RETIGHTEN GROUND SCREWS

1. Loosen and retighten engine ground screws.



AEC640A

	▶	GO TO 3.

3	CHECK CONNECTOR

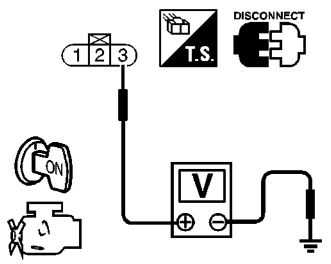
1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.
   Water should not exist.

OK or NG

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

4	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check voltage between 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 C1, M67
- Harness connectors M59, F27
- 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 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 C1, M67
- Harness connectors M59, F27
- 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 ground or short to power in harness or connectors.

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 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 C1, 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	
CMPS~RPM(REF)	XXX rpm
FR O2 MNTR-B2	RICH
FR O2 MNTR-B1	RICH
A/F ALPHA-B2	XXX %
A/F ALPHA-B1	XXX %
THRTL POS SEN	XXX V

PEF882U

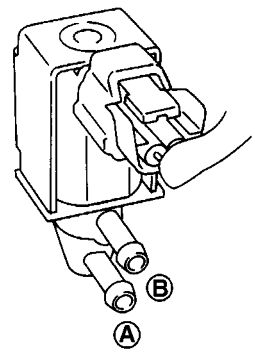
OK or NG

OK ▶	GO TO 12.
NG ▶	GO TO 11.

11 CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Check air passage continuity under the following conditions.



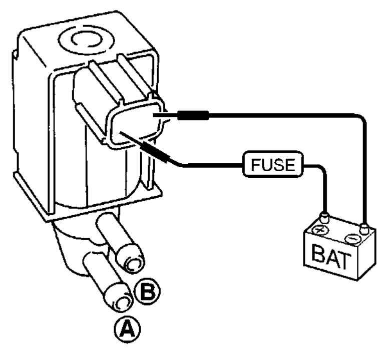
SEF660U

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

MTBL0241

Without CONSULT-II

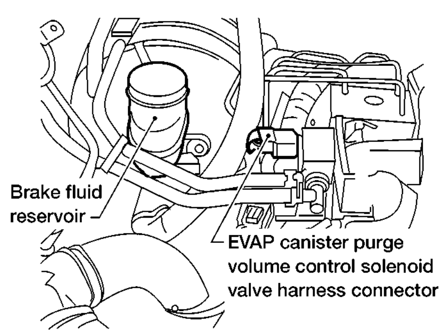
1. Check air passage continuity under the following conditions.



SEF661U

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

MTBL0242



AEC652A

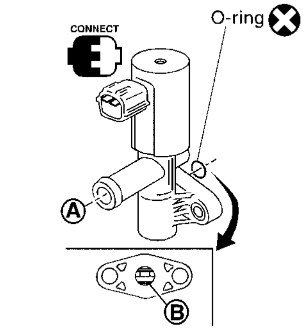
OK or NG

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	
CMPS~RPM (REF)	XXXrpm
FR O2 MNTR-B1	RICH
A/F ALPHA-B1	XXX%
THRTL POS SEN	XXXV

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

SEF156X

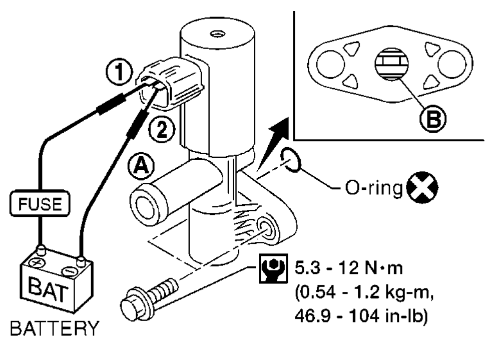
Without CONSULT-II

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

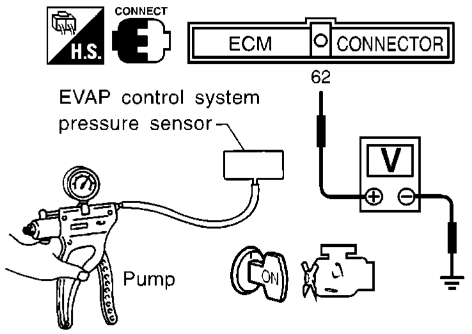
Make sure new O-ring is installed properly.

OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP canister vent control valve.

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.



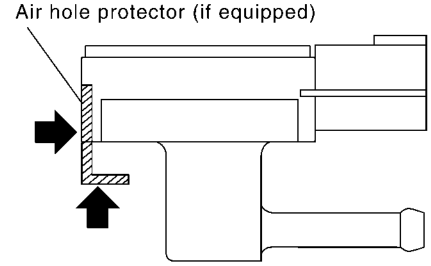
SEF894U

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

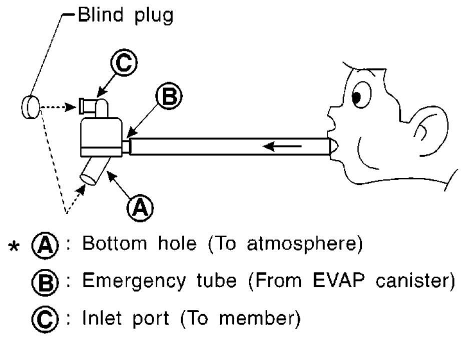
Check obstructed rubber tube connected to EVAP canister vent control valve.

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.



SEF829T

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

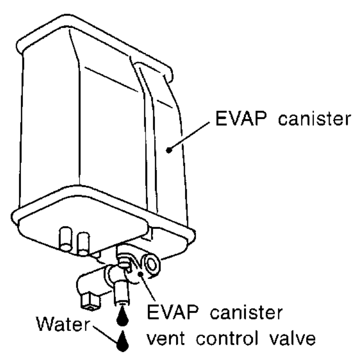
NOTE:
- Do not disassemble water separator.

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.

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 C1, M67. 3. Check harness continuity between harness connector M67 terminal 12 and engine ground. **Continuity should exist.** 4. Also check harness for short to ground and short to power. **OK or NG**		
OK	▶	GO TO 21.
NG	▶	GO TO 20.

20	DETECT MALFUNCTIONING PART	
Check the following. ● Harness connectors C1, M67 ● Harness connectors M59, F27 ● Joint connector-1 ● Harness for open or short between harness connector M67 and engine ground		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

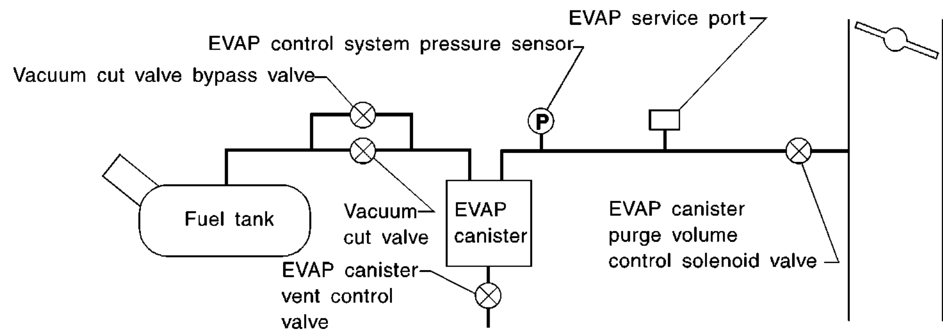
21	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.		
	▶	**INSPECTION END**

On Board Diagnosis Logic

NGEC0954

NOTE:
If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1102.)

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.



SEF918U

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

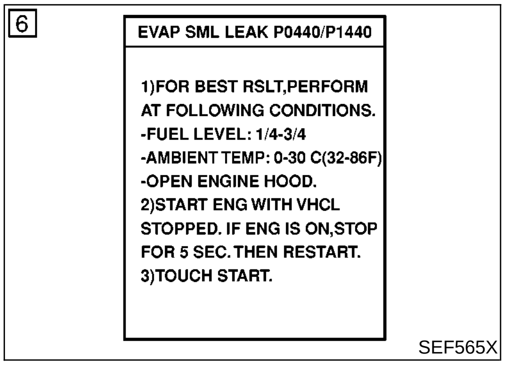
- Fuel filler cap remains open or fails to close.
- Incorrect fuel tank vacuum relief valve
- Incorrect fuel filler cap used
- Foreign matter caught in fuel filler cap.
- Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.
- Foreign matter caught in EVAP canister 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

DTC Confirmation Procedure

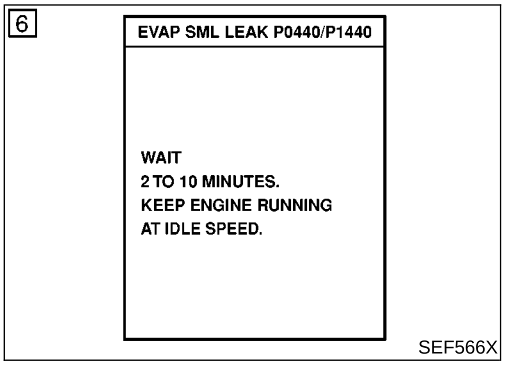
NGEC0955

CAUTION:

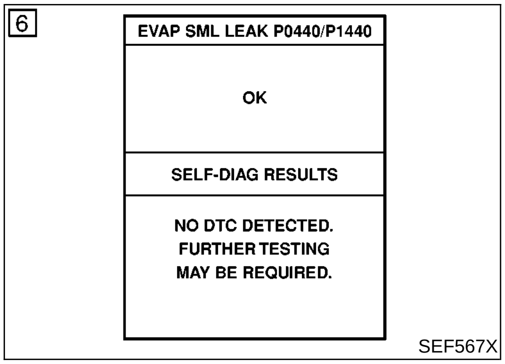
Never remove fuel filter cap during the DTC confirmation procedure.



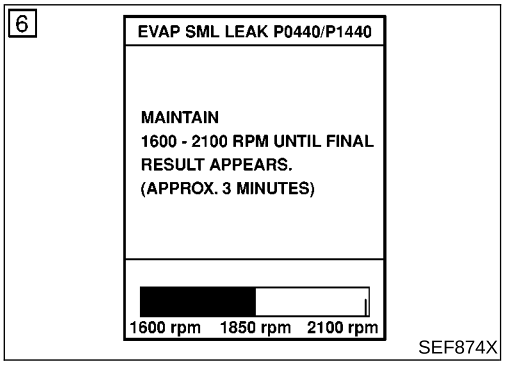
SEF565X



SEF566X



SEF567X



SEF874X

NOTE:

- **If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1102.)**
- **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.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F). 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 - 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-669.

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-976. If P0440 is displayed, perform "Diagnostic Procedure" for DTC P0440.

With GST

NOTE:

Be sure to read the explanation of "Driving Pattern" on EC-634 before driving vehicle.

1) Start engine.
   0956
2) Drive vehicle according to "Driving Pattern", EC-634.
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-634.
8) Stop vehicle.
9) Select "MODE 3" with GST.
- If P0440 is displayed on the screen, go to "Diagnostic Procedure", EC-949.
- If P1447 is displayed on the screen, go to "Diagnostic Procedure" for "DTC P1447", EC-1089.
- If P0440, P1440 and P1447 are not displayed on the screen, go to the following step.

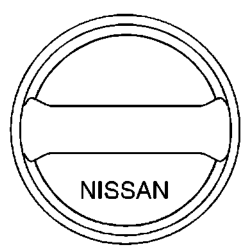
10) Select "MODE 1" with GST.
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

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

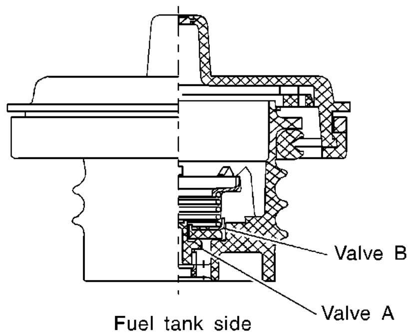
Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

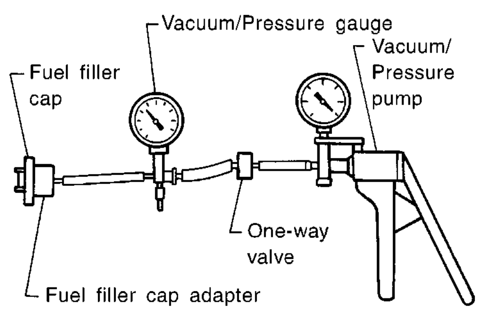
OK	▶	GO TO 3.
NG	▶	• Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. • Retighten until ratcheting sound is heard.

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.		



SEF105W



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-604. **OK or NG**		
OK	▶	GO TO 6.
NG	▶	Repair or reconnect the hose.

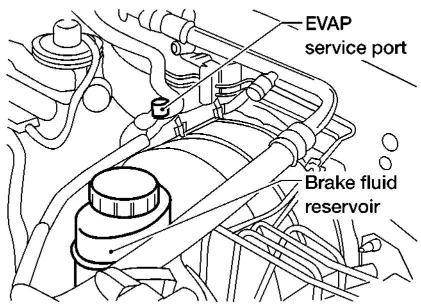
GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

6	CLEAN EVAP PURGE LINE
Clean EVAP purge line (pipe and rubber tube) using air blower.	
▶	GO TO 7.

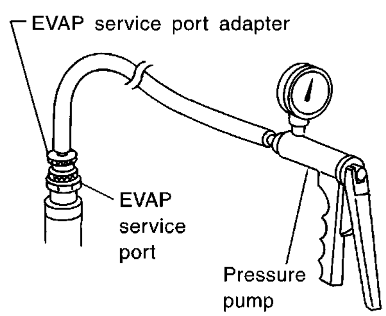
7	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT
Refer to "DTC Confirmation Procedure", EC-958. **OK or NG**	
OK ▶	GO TO 8.
NG ▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

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

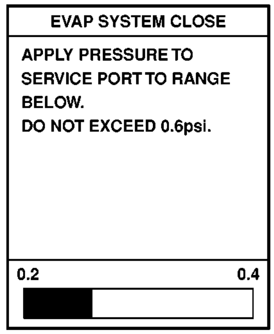
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ▶	GO TO 9.
Models without CONSULT-II ▶	GO TO 10.

9	CHECK FOR EVAP LEAK

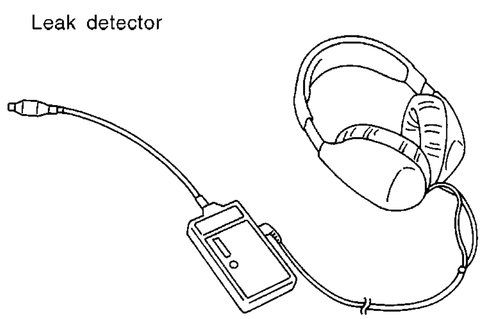
With CONSULT-II

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-607.



SEF200U

OK or NG

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

GI
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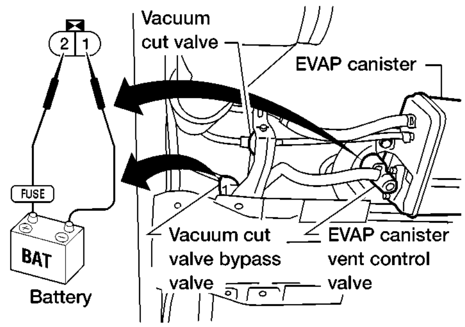
HA
SC
EL
IDX

10	CHECK FOR EVAP LEAK

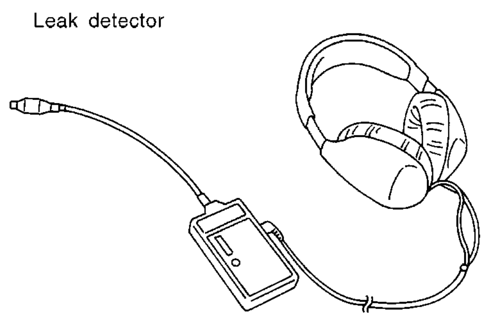
Without CONSULT-II

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-607.



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	0.0%
MONITOR	
CMPS~RPM(REF)	XXX rpm
FR O2 MNTR-B2	RICH
FR O2 MNTR-B1	RICH
A/F ALPHA-B2	XXX %
A/F ALPHA-B1	XXX %
THRTL POS SEN	XXX V

PEF882U

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-597.

OK or NG

OK (With CONSULT-II)	▶	GO TO 14.
OK (Without CONSULT-II)	▶	GO TO 15.
NG	▶	Repair or reconnect the hose.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

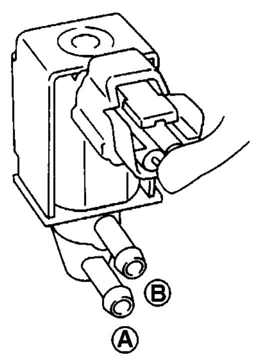
1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
CMPS~RPM(REF)	XXX rpm
FR O2 MNTR-B2	RICH
FR O2 MNTR-B1	RICH
A/F ALPHA-B2	XXX %
A/F ALPHA-B1	XXX %
THRTL POS SEN	XXX V

PEF882U

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

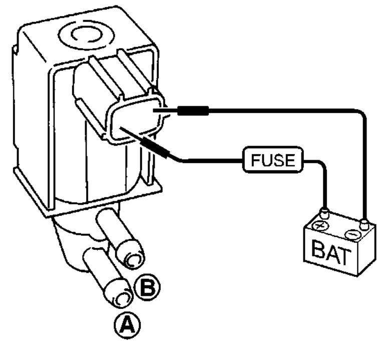
MTBL0241

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

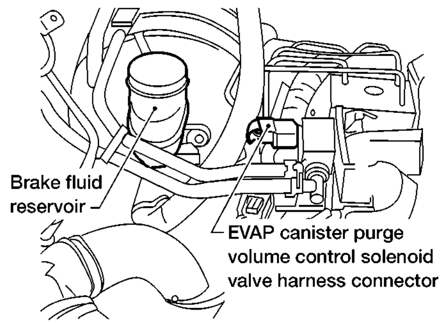
Without CONSULT-II
Check air passage continuity.



SEF661U

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

MTBL0242



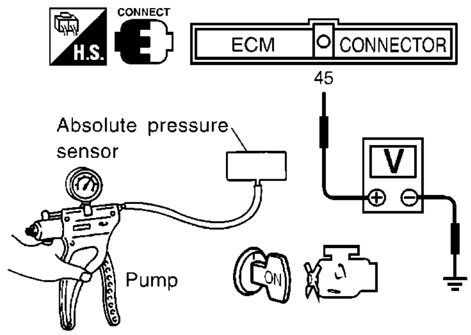
AEC652A

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

16	CHECK ABSOLUTE PRESSURE SENSOR

1. Remove absolute pressure sensor with its harness connector connected.
2. Remove hose from absolute pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 45 and engine ground.

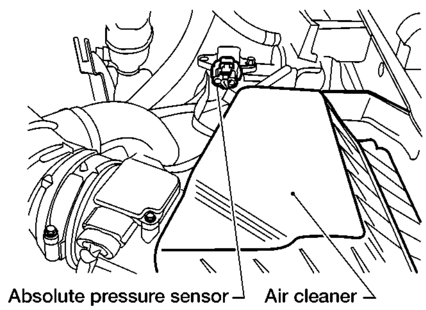


SEF749U

The voltage should be 3.2 to 4.8V.

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

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



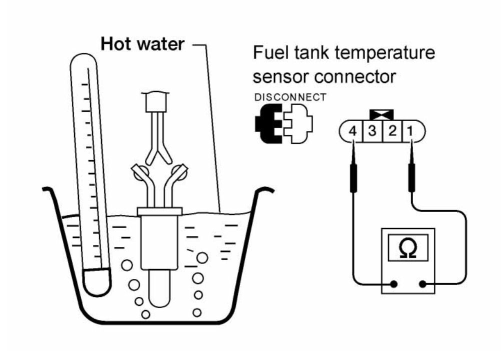
AEC642A

OK or NG

OK	▶	GO TO 17.
NG	▶	Replace absolute pressure sensor.

17	CHECK FUEL TANK TEMPERATURE SENSOR

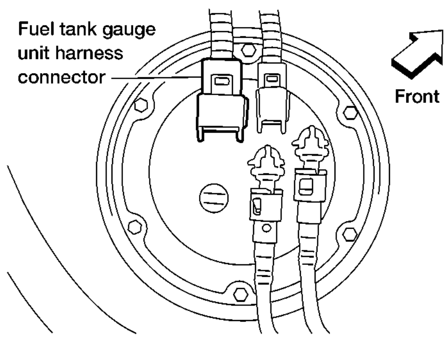
Check resistance by heating with hot water or heat gun as shown in the figure.



AEC052B

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

MTBL0234



AEC933A

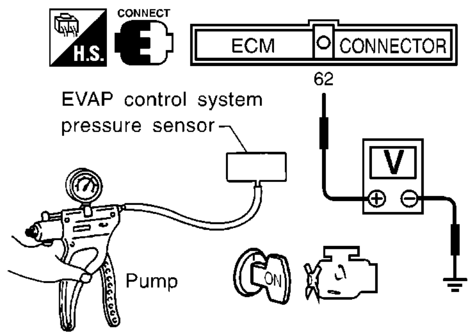
OK or NG

OK	▶	GO TO 18.
NG	▶	Replace fuel tank temperature sensor.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

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.



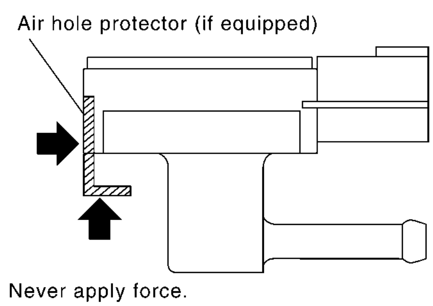
SEF894U

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

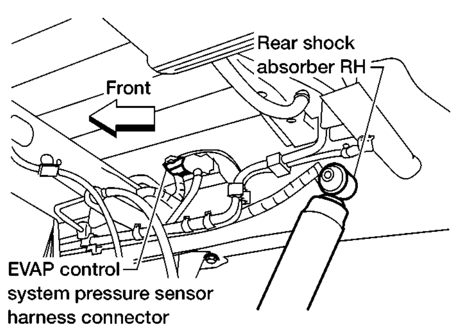
CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −20 kPa (−150 mmHg, −5.91 inHg) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.**

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.**

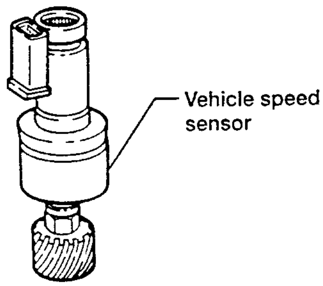


AEC651A

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace EVAP control system pressure sensor.

19	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.	
▶	INSPECTION END



AEC110

Component Description

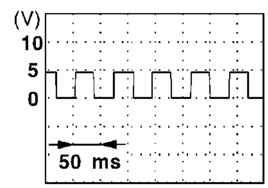
NGEC0768

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 32 (ECM 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

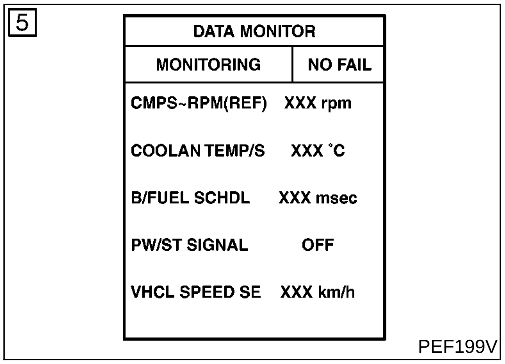
DTC Confirmation Procedure

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.



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-991.
   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.

CMPS·RPM (REF)	1,400 - 2,800 rpm (A/T models) 2,000 - 3,000 rpm (M/T models)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	2.3 - 4.5 msec (A/T models) 3.1 - 5.5 msec (M/T models)
Selector lever	Suitable position
PW/ST SIGNAL	OFF

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-991.

Overall Function Check

NGEC0772

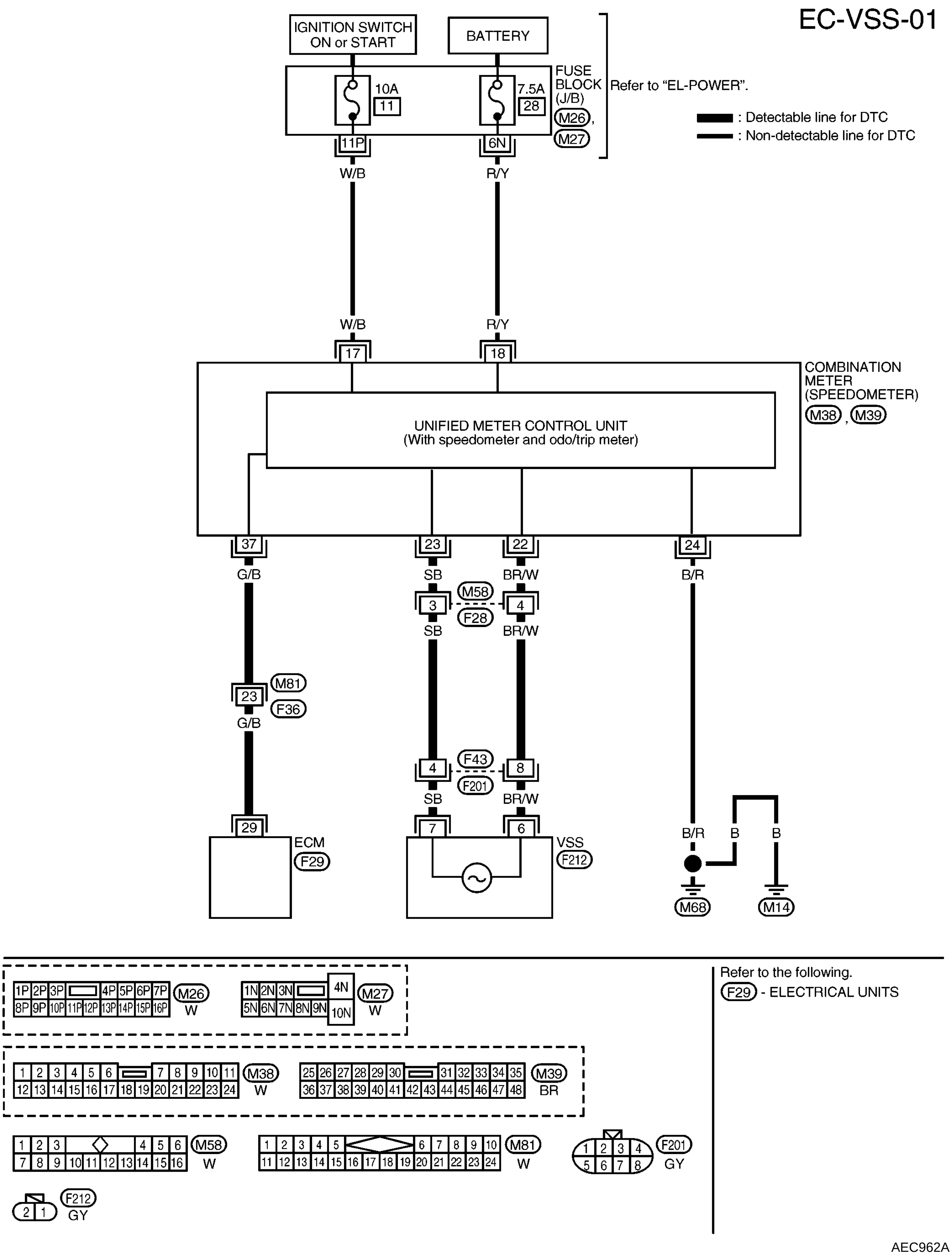
Use this procedure to check the overall function of the vehicle speed sensor circuit. During this check, a 1st trip DTC might not be confirmed.

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-991.

Wiring Diagram

NGEC0773



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 34. 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-706.	
▶	**INSPECTION END**

Description

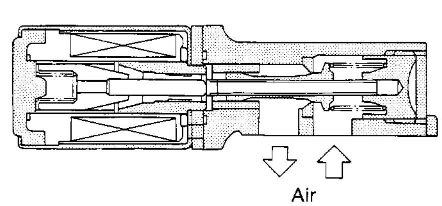
NGEC0775

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

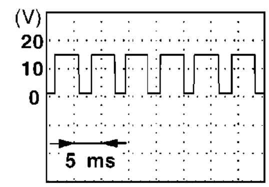
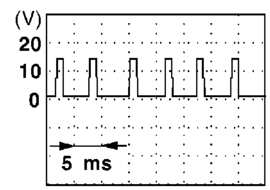
Specification data are reference values.

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 32 (ECM 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”.**

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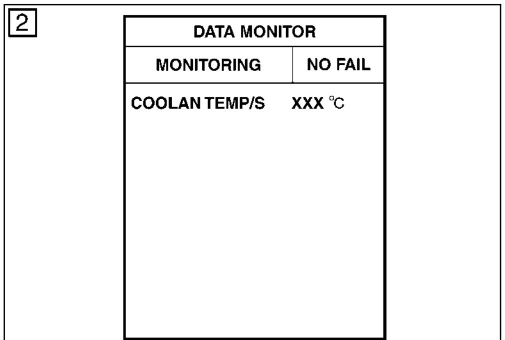


PEF002P

PROCEDURE FOR MALFUNCTION A

NGEC0779S01

TESTING CONDITION:

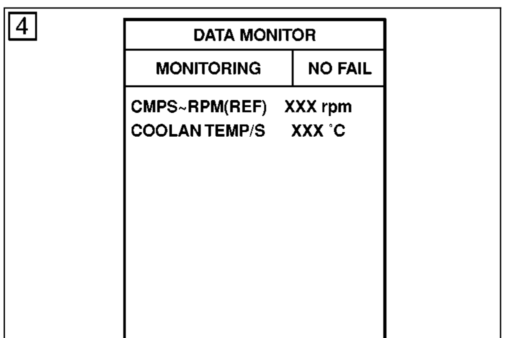
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch "ON".

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-996.

With GST

Follow the procedure "With CONSULT-II".



PEF361V

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

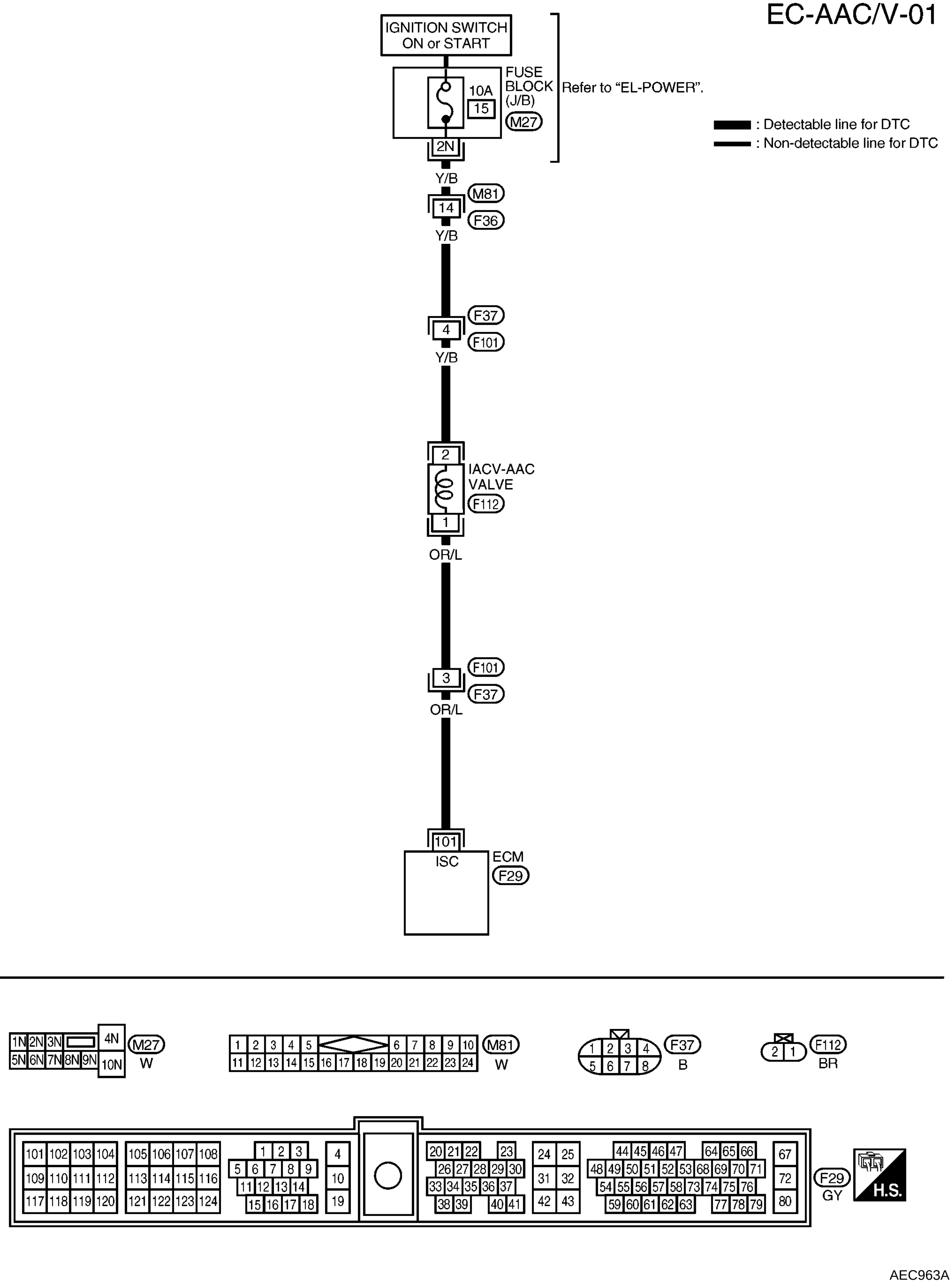
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON again and select "DATA MONITOR" mode with CONSULT-II.
4) Start engine and run it for at least 1 minute at idle speed.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-996.

With GST

Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC0780

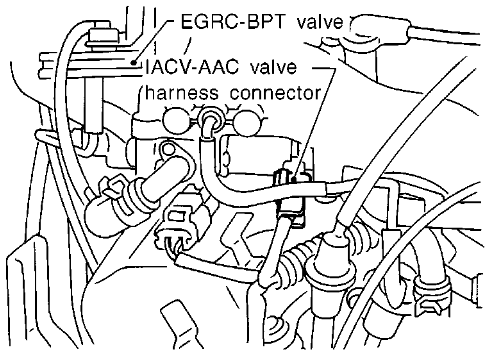


Diagnostic Procedure

NGEC0781

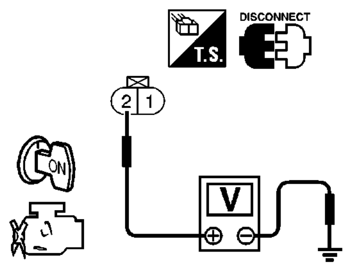
1	CHECK IACV-AAC VALVE POWER SUPPLY CIRCUIT

1. Stop engine.
2. Disconnect IACV-AAC valve harness connector.



SEF007S

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

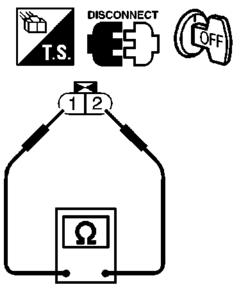
1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 101 and IACV-AAC valve terminal 1.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

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.

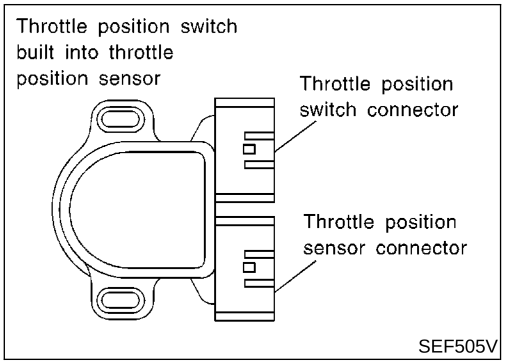
3. Supply battery voltage between IACV-AAC valve connector terminals.
Plunger should move.

OK or NG

OK ▶	GO TO 6.
NG ▶	Replace IACV-AAC valve.

6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.	
▶	**INSPECTION END**

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX



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 32 (ECM ground).

TER-MINAL 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

DTC Confirmation Procedure

NGEC0786

CAUTION:

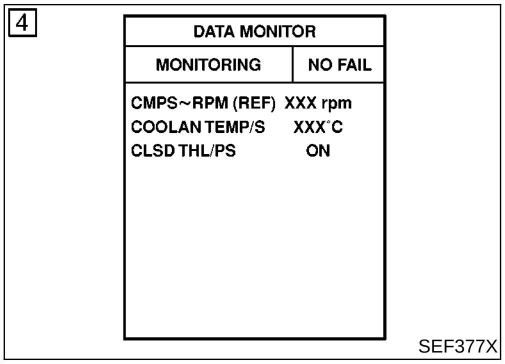
Always drive vehicle at a safe speed.

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.

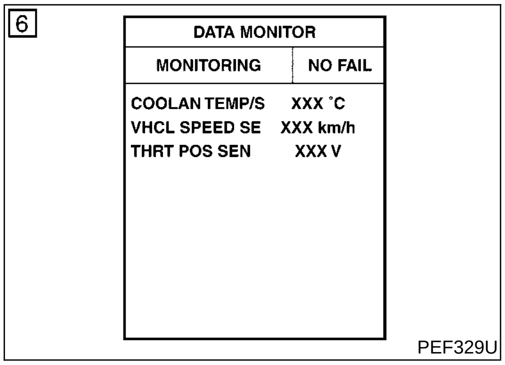


SEF377X

Condition	Signal indication
Throttle valve: Idle position	ON
Throttle valve: Slightly open	OFF

If the result is NG, go to “Diagnostic Procedure”, EC-1001.
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.



PEF329U

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.

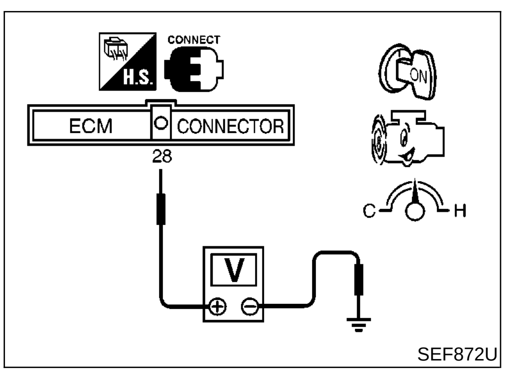
7) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1001.

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



SEF872U

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.

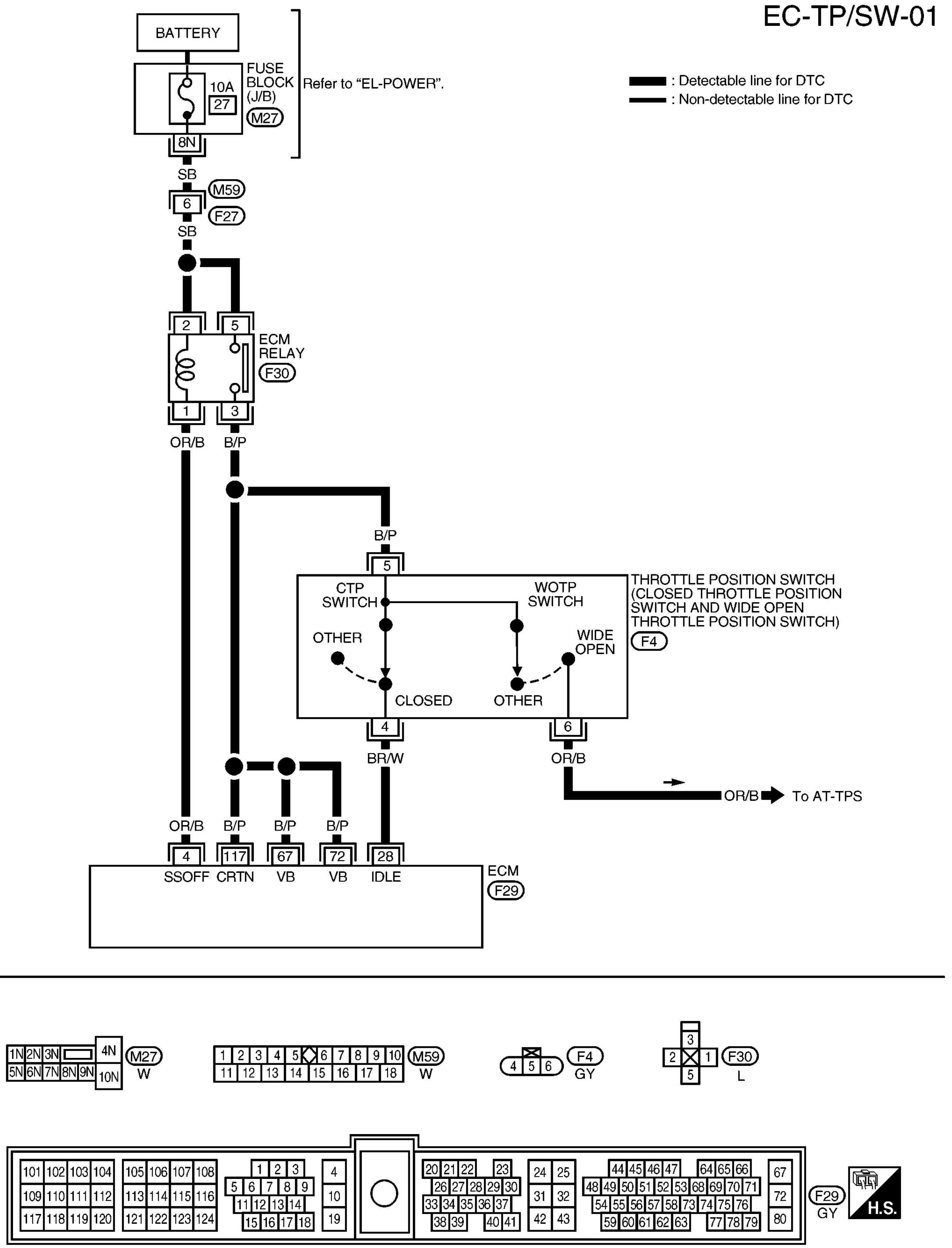
   At idle: Battery voltage

   At 2,000 rpm: Approximately 0V

3) If NG, go to “Diagnostic Procedure”, EC-1001.

Wiring Diagram

NGEC0788



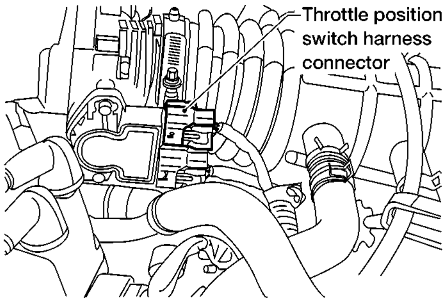
AEC964A

Diagnostic Procedure

NGEC0789

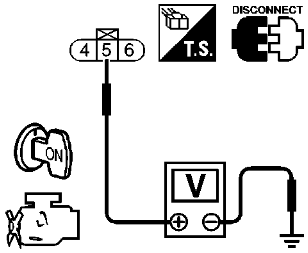
1	CHECK CLOSED THROTTLE POSITION SWITCH POWER SUPPLY CIRCUIT

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-669.

Items	Specifications
Ignition timing	15° ± 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)

MTBL0226

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. Remove vacuum hose connected to throttle opener (If so equipped).
4. Connect suitable vacuum hose to vacuum pump and the throttle opener.
5. Apply vacuum [more than -40.0kPa (-300mmHg, -11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
6. Turn ignition switch ON.
7. Select "DATA MONITOR" mode with CONSULT-II.
8. Check indication of "CLSD THL/P SW".
   Measurement must be made with closed throttle position switch installed in vehicle.

Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

MTBL0247

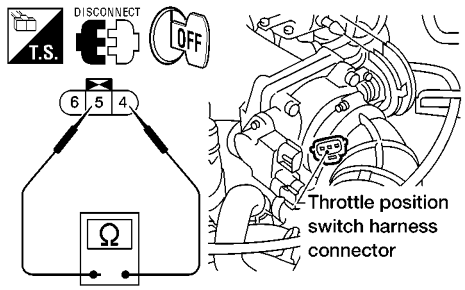
OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

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. Remove vacuum hose connected to throttle opener (If so equipped).
4. Connect suitable vacuum hose to vacuum pump and the throttle opener.
5. Apply vacuum [more than -40.0kPa (-300mmHg, -11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
6. Disconnect closed throttle position switch harness connector.
7. 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-669.

Items	Specifications
Ignition timing	15° ± 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)

MTBL0226

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

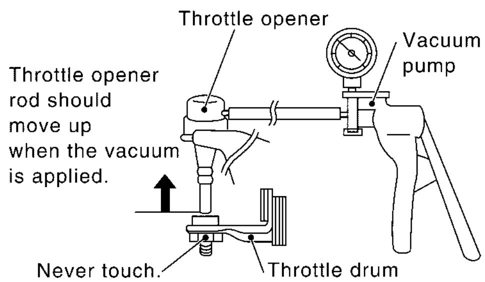
OK or NG

OK (with CONSULT-II)	▶	GO TO 8.
OK (without CONSULT-II)	▶	GO TO 9.
NG	▶	Replace throttle position switch.

8	CHECK THROTTLE POSITION SENSOR

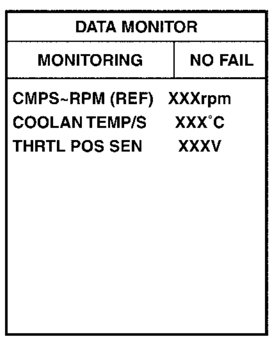
With CONSULT-II

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



SEF793W

6. Turn ignition switch ON.
7. Select "DATA MONITOR" mode with CONSULT-II.
8. Check voltage of "THRTL POS SEN".



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

SEF182X

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

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-669.

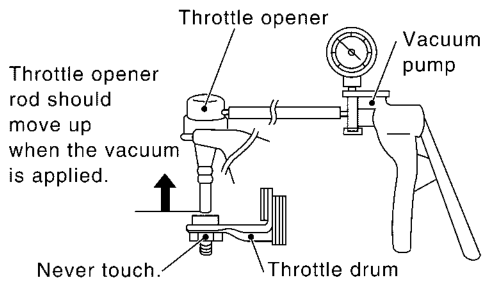
OK or NG

OK	▶	GO TO 10.
NG	▶	Replace throttle position sensor.

9	CHECK THROTTLE POSITION SENSOR

Without CONSULT-II

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



SEF793W

6. Turn ignition switch ON.
7. Check voltage between ECM terminal 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-669.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace throttle position sensor.

10	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.

	▶	**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 32 (ECM 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

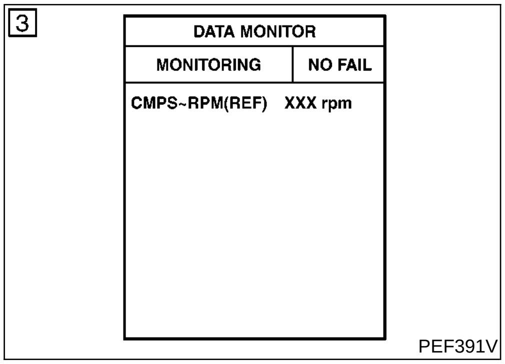
NGEC0792

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.]



PEF391V

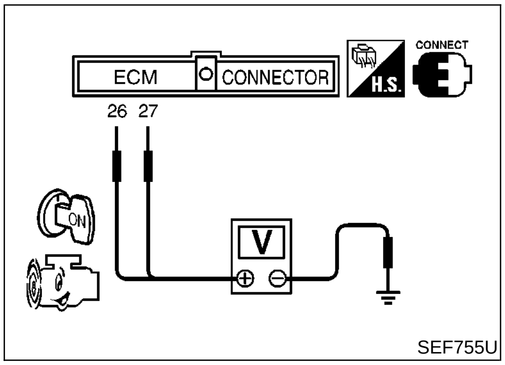
DTC Confirmation Procedure

=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-1009.



SEF755U

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

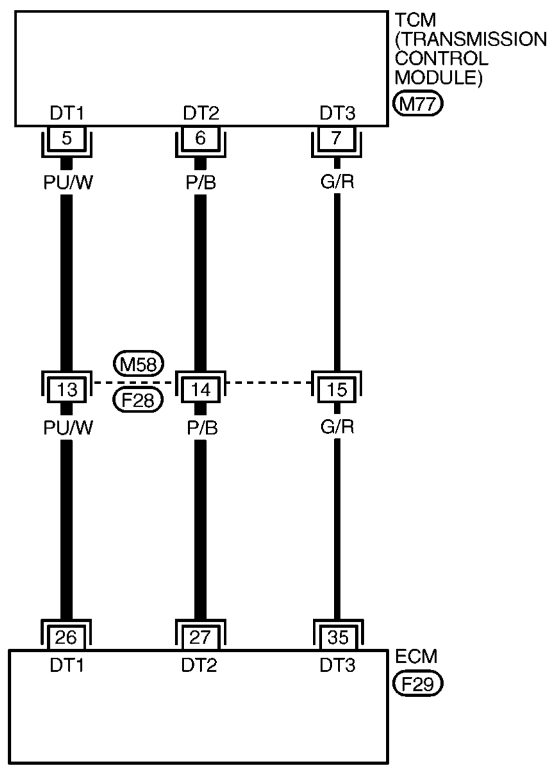
1) Start engine.
2) Check voltage between
   ECM terminal 26 and ground.
   ECM terminal 27 and ground.
   Voltage: 6 - 8V
3) If NG, go to "Diagnostic Procedure", EC-1009.

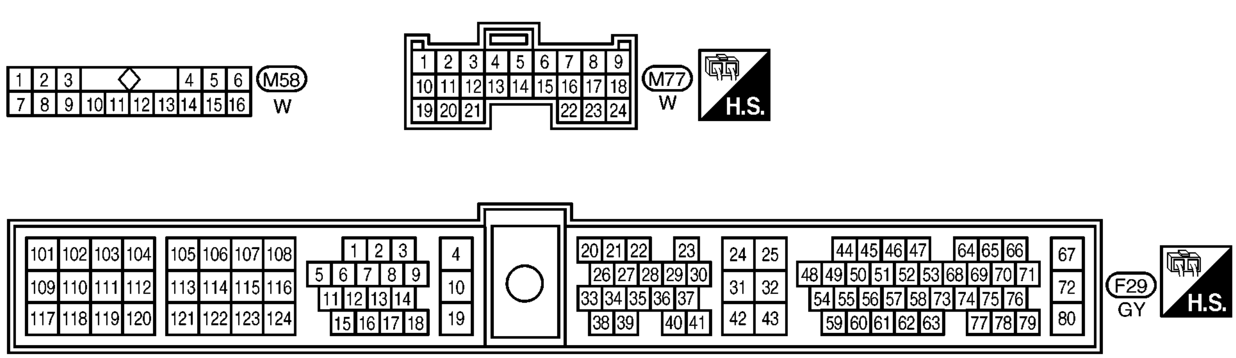
Wiring Diagram

NGEC0795

EC-AT/C-01

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





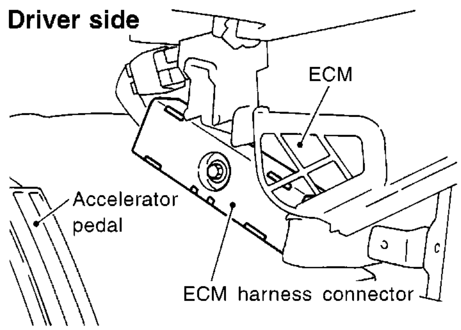
AEC965A

Diagnostic Procedure

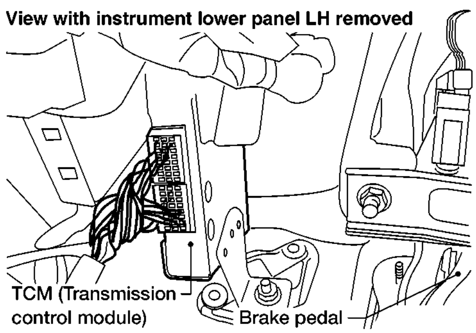
NGEC0796

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

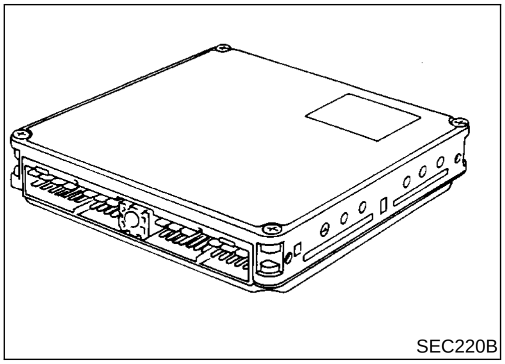
1. Check harness continuity between ECM terminal 26 and ground, ECM terminal 27 and ground, ECM terminal 35 and ground.
   Refer to Wiring Diagram.
   Continuity should not exist.
2. Also check harness for short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

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-706.	
▶	**INSPECTION END**



SEC220B

Component Description

NGEC0797

The ECM consists of a microcomputer, diagnostic test mode selector, and connectors for signal input and output and for power supply. The unit controls the engine.

On Board Diagnosis Logic

NGEC0798

Malfunction is detected when ECM calculation function is malfunctioning.

POSSIBLE CAUSE

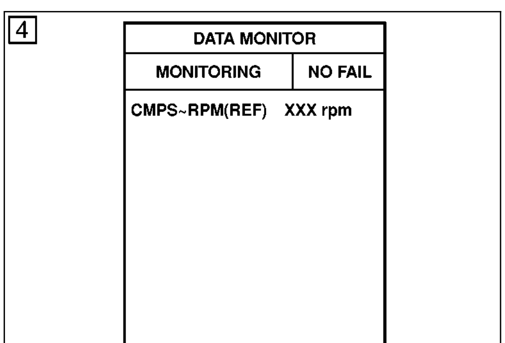
NGEC0798S01

- 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.



PEF357V

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-1012.

With GST

Follow the procedure “With CONSULT-II”.

GI
MA
EM
LC
EC
FE
CL
MT
AT
TF
PD
AX
SU
BR
ST
RS
BT
HA
SC
EL
IDX

Diagnostic Procedure

NGEC0800

<table>
<tr><td>1</td><td colspan="3">INSPECTION START</td></tr>
<tr><td colspan="4">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-1011.
5. Is the 1st trip DTC P0605 displayed again?</td></tr>
<tr><td colspan="4">With GST
1. Turn ignition switch ON.
2. Select MODE 4 with GST.
3. Touch “ERASE”.
4. Perform “DTC Confirmation Procedure”.
See EC-1011.
5. Is the 1st trip DTC P0605 displayed again?</td></tr>
<tr><td colspan="4">No Tools
1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-640.
3. Perform “DTC Confirmation Procedure”.
See EC-1011.
4. Is the 1st trip DTC 0301 displayed again?</td></tr>
<tr><td colspan="4" align="center">Yes or No</td></tr>
<tr><td colspan="2">Yes</td><td>▶</td><td>Replace ECM.</td></tr>
<tr><td colspan="2">No</td><td>▶</td><td>INSPECTION END</td></tr>
</table>

Description

NGEC0801

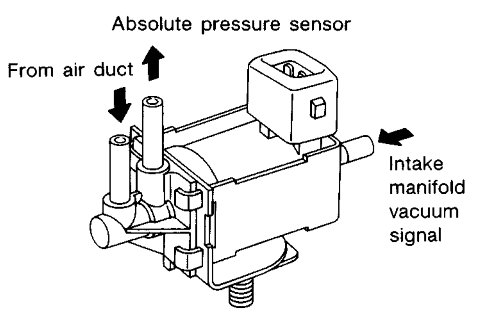
SYSTEM DESCRIPTION

NGEC0801S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	On board diagnosis	MAP/BARO switch solenoid valve
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Vehicle speed sensor	Vehicle speed		

This system allows the absolute pressure sensor to monitor either ambient barometric pressure or intake manifold pressure. The MAP/BARO switch solenoid valve switches between two passages by ON-OFF pulse signals from the ECM. (One passage is from the intake air duct, the other is from the intake manifold.) Either ambient barometric pressure or intake manifold pressure is applied to the absolute pressure sensor.

Solenoid	Conditions
ON	• For 5 seconds after turning ignition switch ON (Engine is not running.) or • For 5 seconds after starting engine or • More than 5 minutes after the solenoid valve shuts OFF.



SEF417Q

COMPONENT DESCRIPTION

NGEC0801S02

The MAP/BARO switch solenoid valve switches its air flow passage according to the voltage signal sent from the ECM. When voltage is supplied from the ECM, the MAP/BARO switch solenoid turns “ON”. Then, the absolute pressure sensor can monitor the ambient barometric pressure. When voltage is not supplied from the ECM, the MAP/BARO switch solenoid valve turns “OFF”. Then, the sensor monitors intake manifold pressure.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0802

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAP/BARO SW/V	• Ignition switch: ON (Engine stopped)		MAP
	• Engine speed: Idle	For 5 seconds after starting engine	BARO
		More than 5 seconds after starting engine	MAP

ECM Terminals and Reference Value

NGEC0803

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
118	Y/B	MAP/BARO switch solenoid valve	**[Ignition switch ON]** ● Engine is not running ● For 5 seconds after ignition switch is turned ON **[Engine is running]** ● Idle (for 5 seconds after engine start)	0 - 1V
			[Ignition switch ON] ● Engine is not running ● More than 5 seconds after ignition switch is turned ON **[Engine is running]** ● Idle (More than 5 seconds after engine start)	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NGEC0804

Malfunction is detected when
(Malfunction A) MAP/BARO switch solenoid valve receives the voltage supplied though ECM does not supply the voltage to the valve,
(Malfunction B) There is little difference between MAP/BARO switch solenoid valve input voltage at ambient barometric pressure and voltage at intake manifold pressure.

POSSIBLE CAUSE

NGEC0804S01

Malfunction A

NGEC0804S0101

- Harness or connectors
  (MAP/BARO switch solenoid valve circuit is open or shorted.)
- MAP/BARO switch solenoid valve

Malfunction B

NGEC0804S0102

- Harness or connectors
  (MAP/BARO switch solenoid valve circuit is open or shorted.)
- Hoses
  (Hoses are clogged, vent, kinked, disconnected or improper connection.)
- Absolute pressure sensor
- MAP/BARO switch solenoid valve

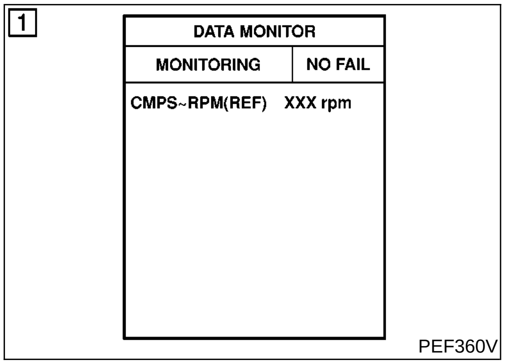
DTC Confirmation Procedure

NGEC0805

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.



PEF360V

PROCEDURE FOR MALFUNCTION A

NGEC0805S01

TESTING CONDITION:

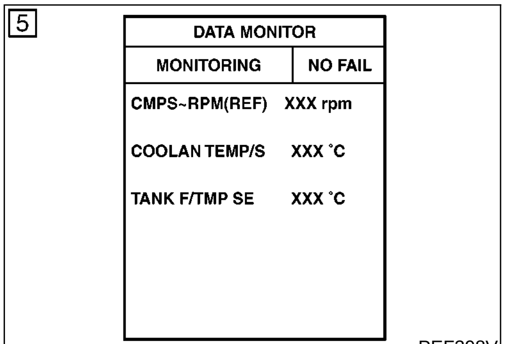
Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch "ON".

With CONSULT-II

1) Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2) Wait at least 10 seconds.
3) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1017.

With GST

Follow the procedure "With CONSULT-II".



PEF398V

PROCEDURE FOR MALFUNCTION B

NGEC0805S02

With CONSULT-II

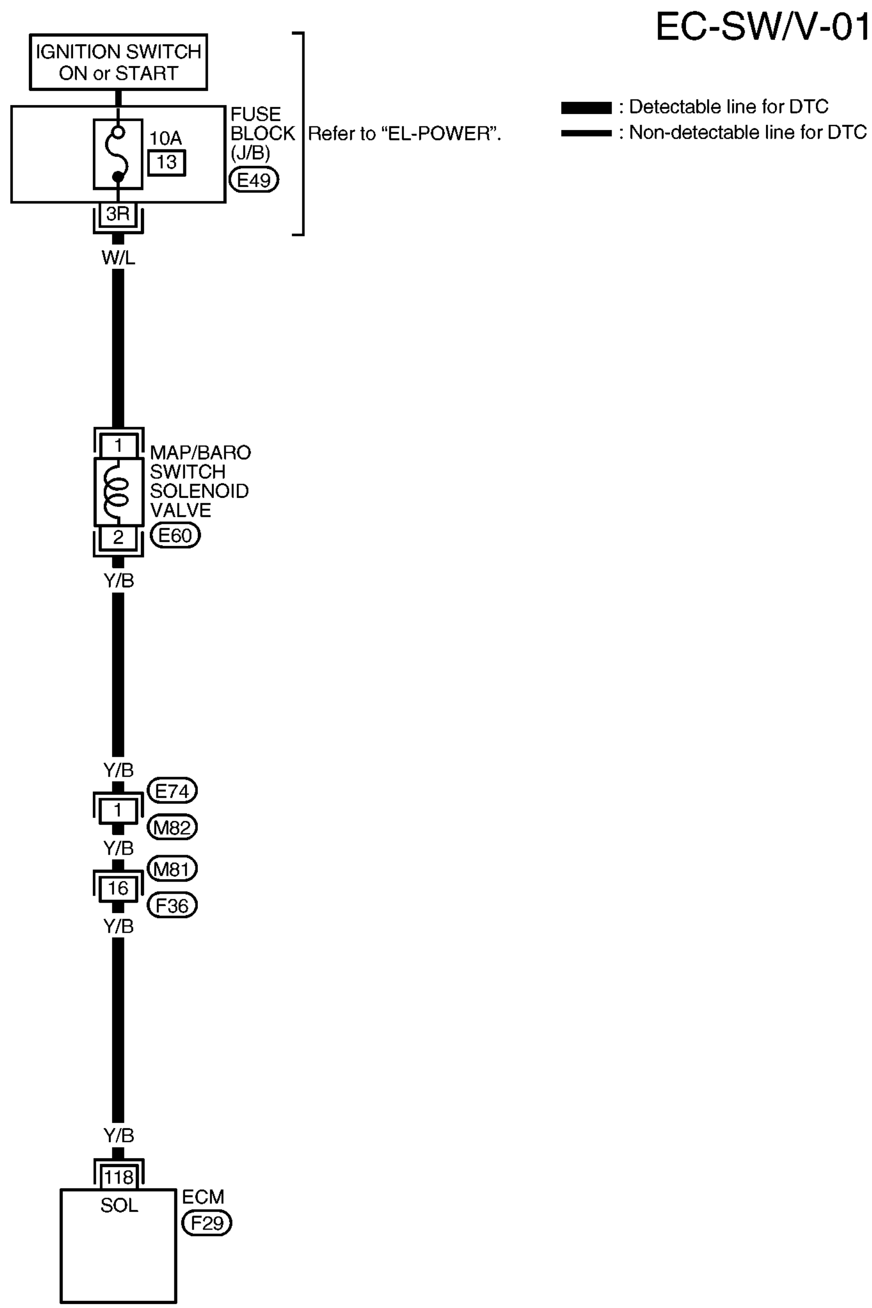
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON again and select "DATA MONITOR" mode with CONSULT-II.
4) Make sure that "TANK F/TMP SE" is more than 0°C (32°F).
5) Start engine and let it idle for at least 10 seconds.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1017.

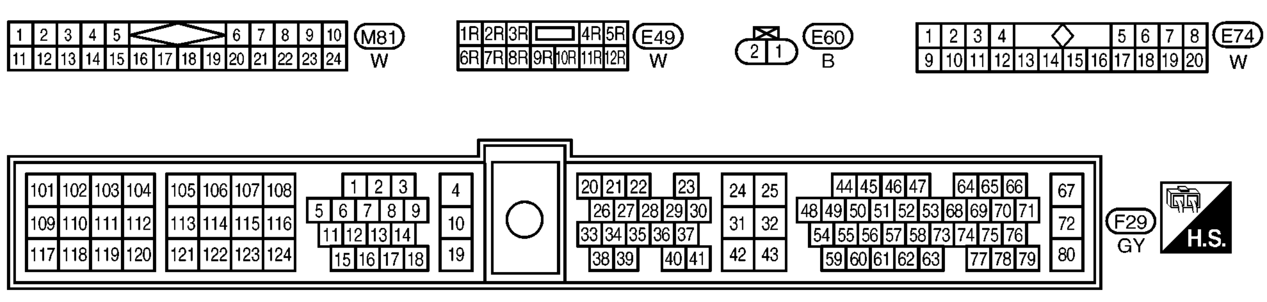
With GST

Follow the procedure "With CONSULT-II".

Wiring Diagram

NGEC0806





AEC966A

Diagnostic Procedure

NGEC0807

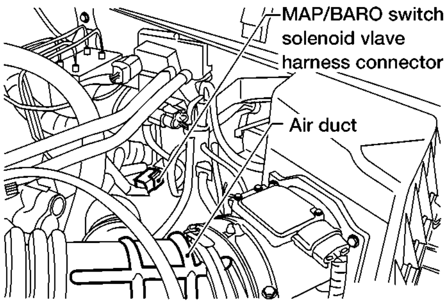
If the trouble is duplicated after "PROCEDURE FOR MALFUNCTION A", perform "PROCEDURE A" below. If the trouble is duplicated after "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE B" on next page.

PROCEDURE A

NGEC0807S01

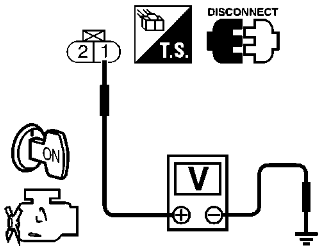
1 CHECK MAP/BARO SWITCH SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect MAP/BARO switch solenoid valve harness connector.



AEC650A

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



SEF653W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2 DETECT MALFUNCTIONING PART

Check the following.
- Fuse block (J/B) connector E49
- 10A fuse
- Harness for open or short between MAP/BARO switch solenoid valve and fuse

	▶	Repair harness or connectors.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

3	CHECK MAP/BARO SWITCH 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 118 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 MAP/BARO switch solenoid valve and ECM	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

5	CHECK MAP/BARO SWITCH SOLENOID VALVE

With CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Perform "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT-II.
3. Check the following.
- Condition: At idle under no-load
- CONSULT-II display

ACTIVE TEST	
MAP/BARO SW/V	MAP
MONITOR	
CMPS~RPM (REF)	XXXrpm
MAP/BARO SW/V	MAP
ABSOL PRES/SE	XXXV

ACTIVE TEST	
MAP/BARO SW/V	BARO
MONITOR	
CMPS~RPM (REF)	XXXrpm
MAP/BARO SW/V	BARO
ABSOL PRES/SE	XXXV

MAP/BARO	ABSOL PRES/SE (Voltage)
BARO	More than 2.6V
MAP	Less than the voltage at BARO

SEF181X

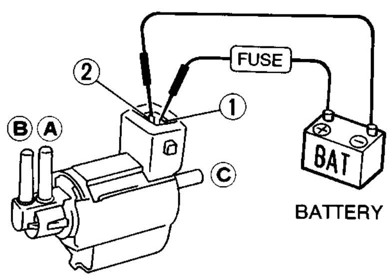
- Time for voltage to change

MAP/BARO SW/V	Required time to switch
BARO to MAP	Less than 1 second
MAP to BARO	

MTBL0244

4. If NG, check solenoid valve as shown below.

Without CONSULT-II
1. Remove MAP/BARO switch solenoid valve.
2. Check air passage continuity.



MEC488B

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

MTBL0237

3. If NG or operation takes more than 1 second, replace solenoid valve.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace MAP/BARO switch solenoid valve.

6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.

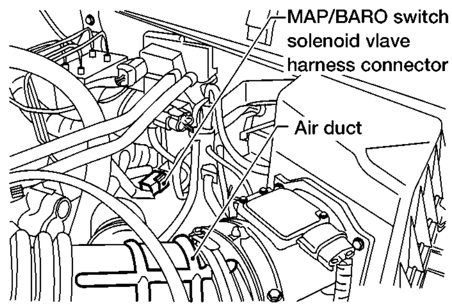
	▶	**INSPECTION END**

PROCEDURE B

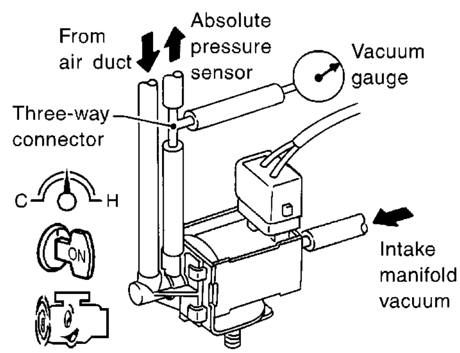
=NGEC0807S02

1	INSPECTION START

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



AEC650A



SEF676T

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

2	CHECK VACUUM SOURCE TO ABSOLUTE PRESSURE SENSOR

With CONSULT-II

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

ACTIVE TEST	
MAP/BARO SW/V	MAP
MONITOR	
CMPS~RPM (REF)	XXXrpm
MAP/BARO SW/V	MAP
ABSOL PRES/SE	XXXV

ACTIVE TEST	
MAP/BARO SW/V	BARO
MONITOR	
CMPS~RPM (REF)	XXXrpm
MAP/BARO SW/V	BARO
ABSOL PRES/SE	XXXV

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

SEF183X

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 4.

3	CHECK VACUUM SOURCE TO ABSOLUTE PRESSURE SENSOR

Without CONSULT-II
1. Start engine and let it idle.
2. Check for vacuum under the following condition.

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

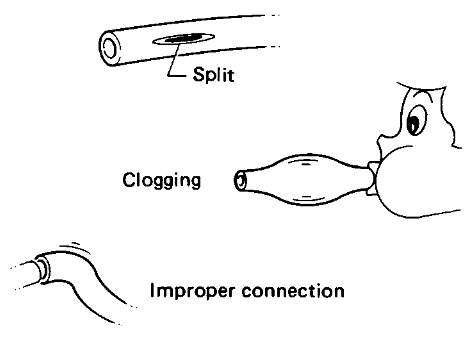
MTBL0080

OK or NG

OK	▶	GO TO 12.
NG	▶	GO TO 4.

4	CHECK VACUUM HOSE

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



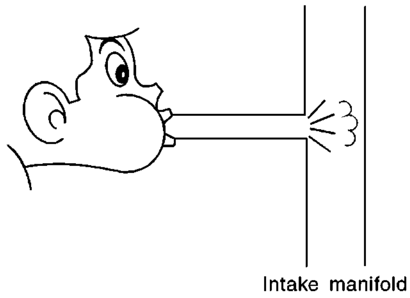
SEF109L

OK or NG

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

5	CHECK VACUUM PORT

Check vacuum port for clogging.



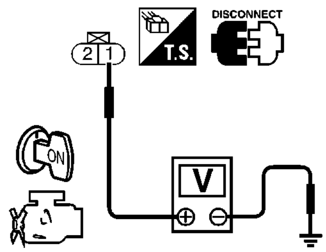
SEF368U

OK or NG

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

6	CHECK MAP/BARO SWITCH SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect MAP/BARO switch solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check voltage between terminal 1 and ground with CONSULT-II or tester.



SEF653W

Voltage: Battery voltage

OK or NG

OK ▶	GO TO 8.
NG ▶	GO TO 7.

7	DETECT MALFUNCTIONING PART

Check the following.
- Fuse block (J/B) connector E49
- 10A fuse
- Harness for open or short between MAP/BARO switch solenoid valve and fuse

▶	Repair harness or connectors.

8	CHECK MAP/BARO SWITCH 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 118 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 10.
NG ▶	GO TO 9.

9	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E74, M82
- Harness connectors M81, F36
- Harness for open or short between MAP/BARO switch solenoid valve and ECM

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

10	CHECK MAP/BARO SWITCH SOLENOID VALVE

With CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Perform "MAP/BARO SW/V" in "ACTIVE TEST" mode with CONSULT-II.
3. Check the following.
- Condition: At idle under no-load
- CONSULT-II display

ACTIVE TEST	
MAP/BARO SW/V	MAP
MONITOR	
CMPS~RPM (REF)	XXXrpm
MAP/BARO SW/V	MAP
ABSOL PRES/SE	XXXV

ACTIVE TEST	
MAP/BARO SW/V	BARO
MONITOR	
CMPS~RPM (REF)	XXXrpm
MAP/BARO SW/V	BARO
ABSOL PRES/SE	XXXV

MAP/BARO	ABSOL PRES/SE (Voltage)
BARO	More than 2.6V
MAP	Less than the voltage at BARO

SEF181X

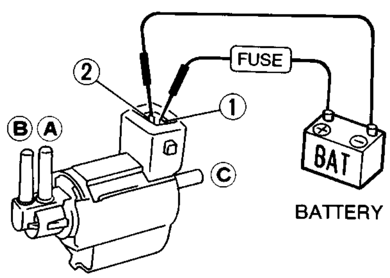
- Time for voltage to change

MAP/BARO SW/V	Required time to switch
BARO to MAP	Less than 1 second
MAP to BARO	

MTBL0244

4. If NG, check solenoid valve as shown below.

Without CONSULT-II
1. Remove MAP/BARO switch solenoid valve.
2. Check air passage continuity.



MEC488B

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

MTBL0237

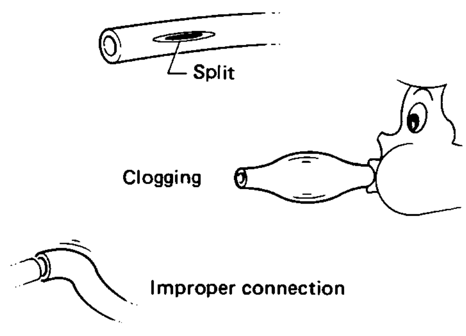
3. If NG or operation takes more than 1 second, replace solenoid valve.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace MAP/BARO switch solenoid valve.

11	CHECK INTAKE SYSTEM	
Check intake system for air leaks.		
OK or NG		
OK	▶	GO TO 15.
NG	▶	Repair it.

12	CHECK HOSE BETWEEN ABSOLUTE PRESSURE SENSOR AND MAP/BARO SWITCH SOLENOID VALVE	
Check hose for clogging, cracks, disconnection or improper connection.		



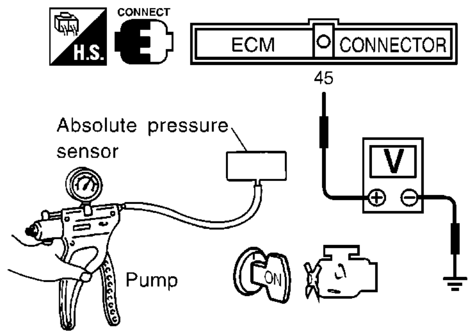
SEF109L

OK or NG		
OK	▶	GO TO 13.
NG	▶	Repair or reconnect hose.

13	CHECK HARNESS CONNECTOR	
1. Disconnect absolute pressure sensor harness connector. 2. Check sensor harness connector for water. **Water should not exist.**		
OK or NG		
OK	▶	GO TO 14.
NG	▶	Repair or replace harness connector.

14	CHECK ABSOLUTE PRESSURE SENSOR	

1. Remove absolute pressure sensor with its harness connector connected.
2. Remove hose from absolute pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 45 and engine ground.



SEF749U

The voltage should be 3.2 to 4.8V.

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

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

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace absolute pressure sensor.

15	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.		
	▶	**INSPECTION END**

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

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 front heated oxygen sensor circuit is open or shorted.
- Front heated oxygen sensor
- Front heated oxygen sensor heater

DTC Confirmation Procedure

NGEC0809

CAUTION:

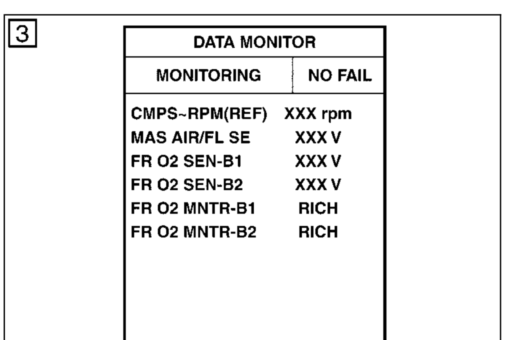
Always drive vehicle at a safe speed.

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.**



PEF392V

With CONSULT-II

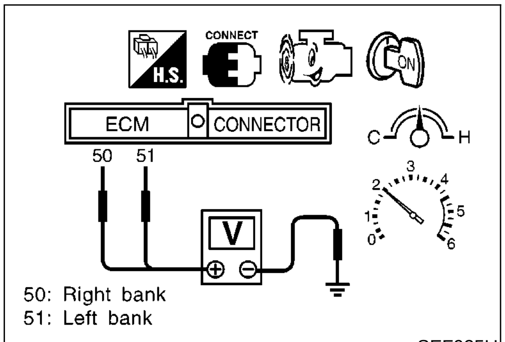
1) Start engine and warm it up to normal operating temperature.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Hold engine speed at 2,000 rpm and check one of the following.

- “FR O2 SEN-B1 (-B2)” voltage should go above 0.70V at least once.
- “FR O2 SEN-B1 (-B2)” voltage should go below 0.21V at least once.
  If the check result is NG, perform “Diagnosis Procedure”, EC-1027.

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	1.6 msec or more (A/T models) 2.0 msec or more (M/T models)
CMPS·RPM (POS)	1,600 rpm or more (A/T models) 1,900 rpm or more (M/T models)
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-1027.



SEF925U

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

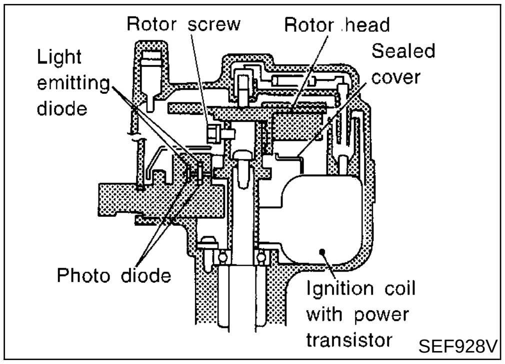
1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 (front heated oxygen sensor right bank signal) or 51 (front heated oxygen sensor left bank signal) and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no-load.
- The voltage should go above 0.70V at least once.
- The voltage should go below 0.21V at least once.

4) If NG, go to "Diagnostic Procedure", EC-1027.

Diagnostic Procedure

NGEC0811

Perform trouble diagnosis for "DTC P0133, P0153", EC-788.



SEF928V

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:

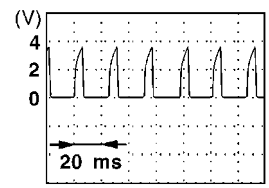
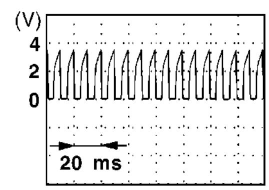
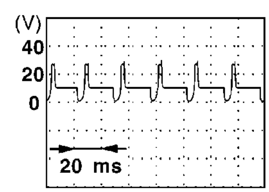
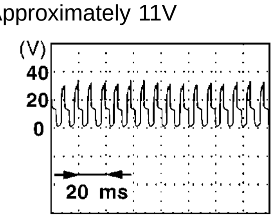
The rotor screw which secures the distributor rotor head to the distributor shaft must be torqued properly.

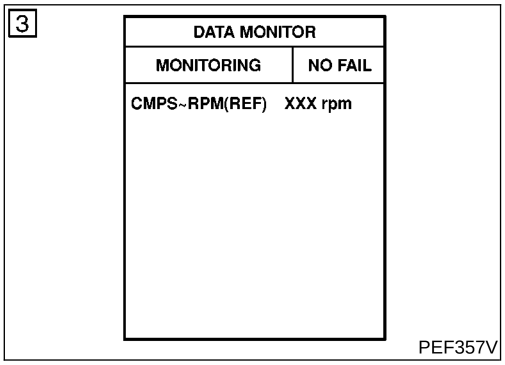
: 3.6±0.3 N·m (37±3 kg-cm, 32±3 in-lb)

ECM Terminals and Reference Value

NGEC0813

Specification data are reference values and are measured between each terminal and 32 (ECM 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
2	B	Ignition check	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 12V  SEF990U
			[Engine is running] ● Engine speed is 2,000 rpm.	Approximately 11V  SEF991U



On Board Diagnosis Logic

NGEC0814

Malfunction is detected when the ignition signal in the primary circuit is not sent to ECM during engine cranking or running.

POSSIBLE CAUSE

NGEC0814S01

- Harness or connectors (The ignition primary circuit is open or shorted.)
- Power transistor unit.
- Resistor
- Camshaft position sensor
- Camshaft position sensor circuit

DTC Confirmation Procedure

NGEC0815

NOTE:

- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
- **If DTC P1320 (0201) is displayed with DTC P0340 (0101), perform trouble diagnosis for DTC P0340 first. Refer to EC-912.**

With CONSULT-II

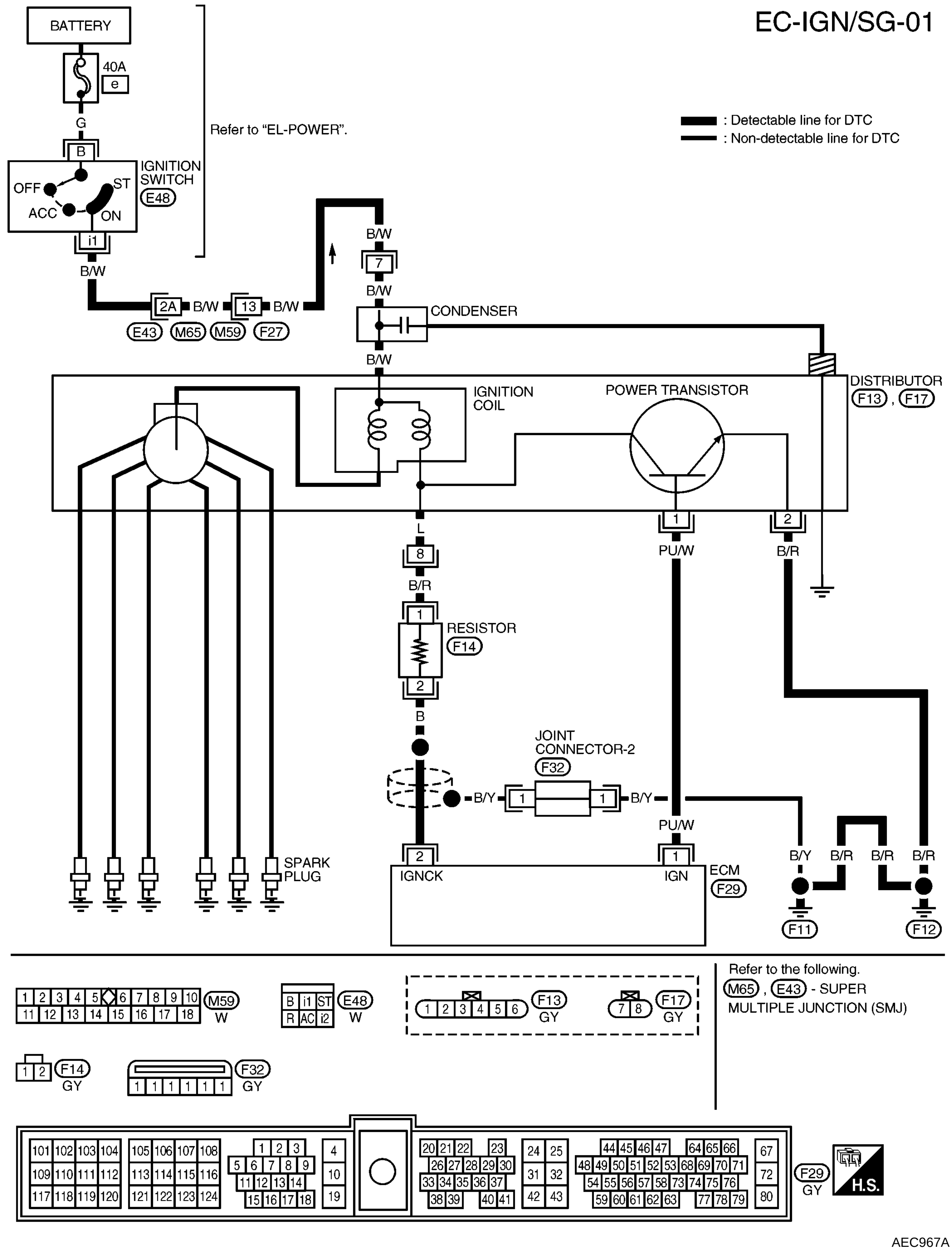
1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine. (If engine does not run, turn ignition switch to START for at least 5 seconds.)
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1031.

With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0816

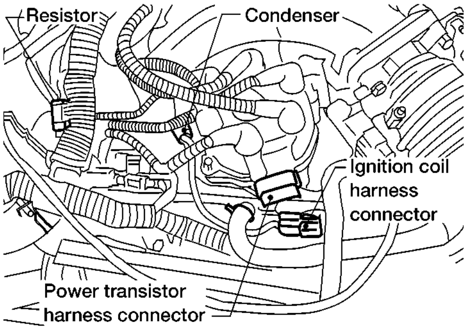


Diagnostic Procedure

NGEC0817

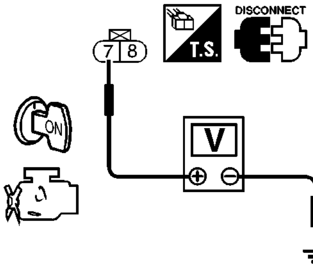
1	CHECK ENGINE START	
Turn ignition switch OFF, and restart engine. **Is engine running?** **Yes or No**		
Yes	▶	GO TO 7.
No	▶	GO TO 2.

2	CHECK 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 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.

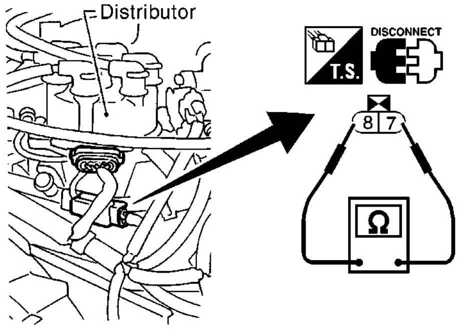
GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

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

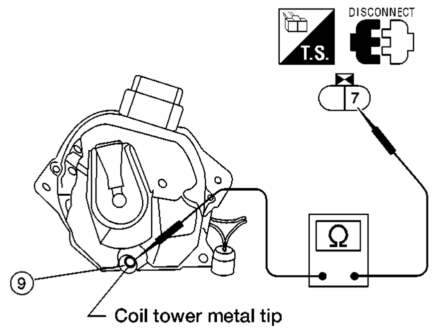
5	CHECK POWER TRANSISTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 1 and power transistor terminal 1. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to ground and short to power. **OK or NG**	
OK ▶	GO TO 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. 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

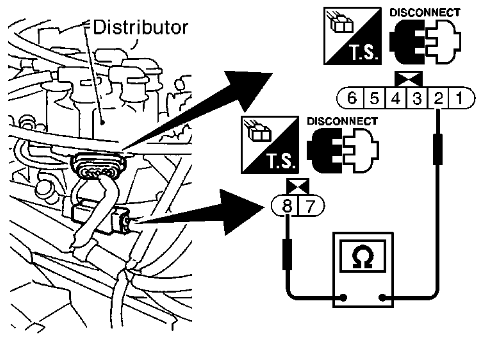
For checking secondary coil, remove distributor cap and measure resistance between coil tower metal tip 9 and terminal 7.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace distributor assembly.

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.



SEF015S

Terminals	Resistance	Result
2 and 8	Except 0Ω	OK
	0Ω	NG

MTBL0249

OK or NG

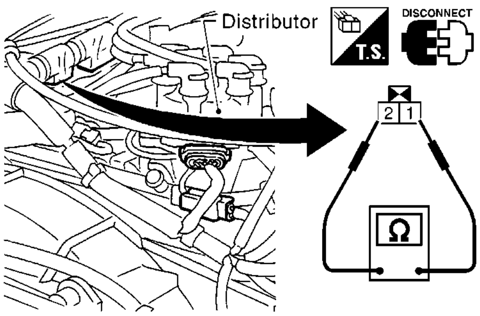
OK	▶	GO TO 11.
NG	▶	Replace distributor assembly.

8	CHECK IGNITION COIL INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Stop engine.
2. Disconnect ignition coil harness connector.
3. Strip tape covering resistor.
4. Disconnect resistor harness connector.
5. Disconnect ECM harness connector.
6. Check harness continuity between ignition coil terminal 8 and resistor terminal 1, resistor terminal 2 and ECM terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
7. Also check harness for short to ground and short to power.

OK or NG

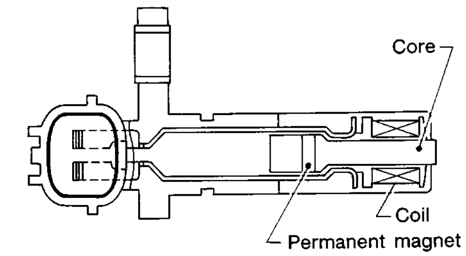
OK	▶	GO TO 9.
NG	▶	Repair open circuit or short to ground or short to power in harness or connectors.

9	CHECK RESISTOR
1. Disconnect resistor harness connector. 2. Check resistance between terminals 1 and 2.  SEF757U **Resistance: Approximately 2.2 kΩ [at 25°C (77°F)]** **OK or NG**	
OK ▶	GO TO 10.
NG ▶	Replace resistor.

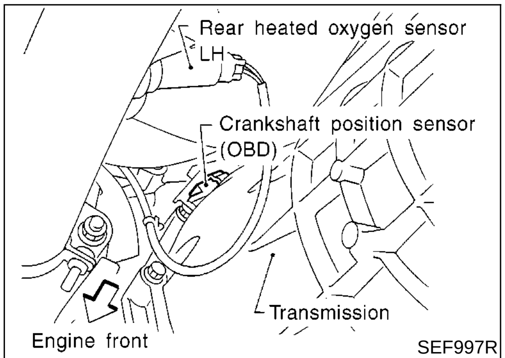
10	CHECK SHIELD CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch OFF. 2. Disconnect joint connector-2. 3. Check the following. ● Continuity between joint connector terminal 1 and ground ● Joint connector (Refer to "HARNESS LAYOUT", ***EL-292***.) **Continuity should exist.** 4. Also check harness for short to ground and short to power. 5. Then reconnect joint connector-2. **OK or NG**	
OK ▶	GO TO 11.
NG ▶	Repair open circuit or short to ground or short to power in harness or connectors.

11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.	
▶	**INSPECTION END**

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX



SEF956N



SEF997R

Component Description

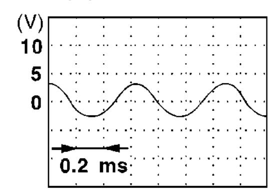
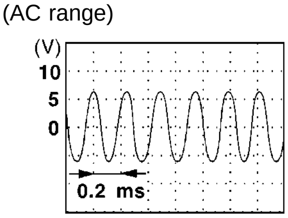
NGEC0818

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 32 (ECM 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

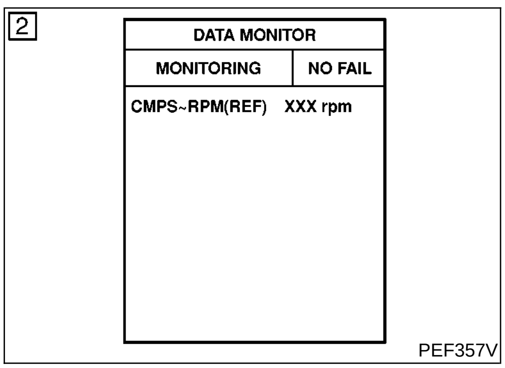
NGEC0820S01

- 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.



PEF357V

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-1039.

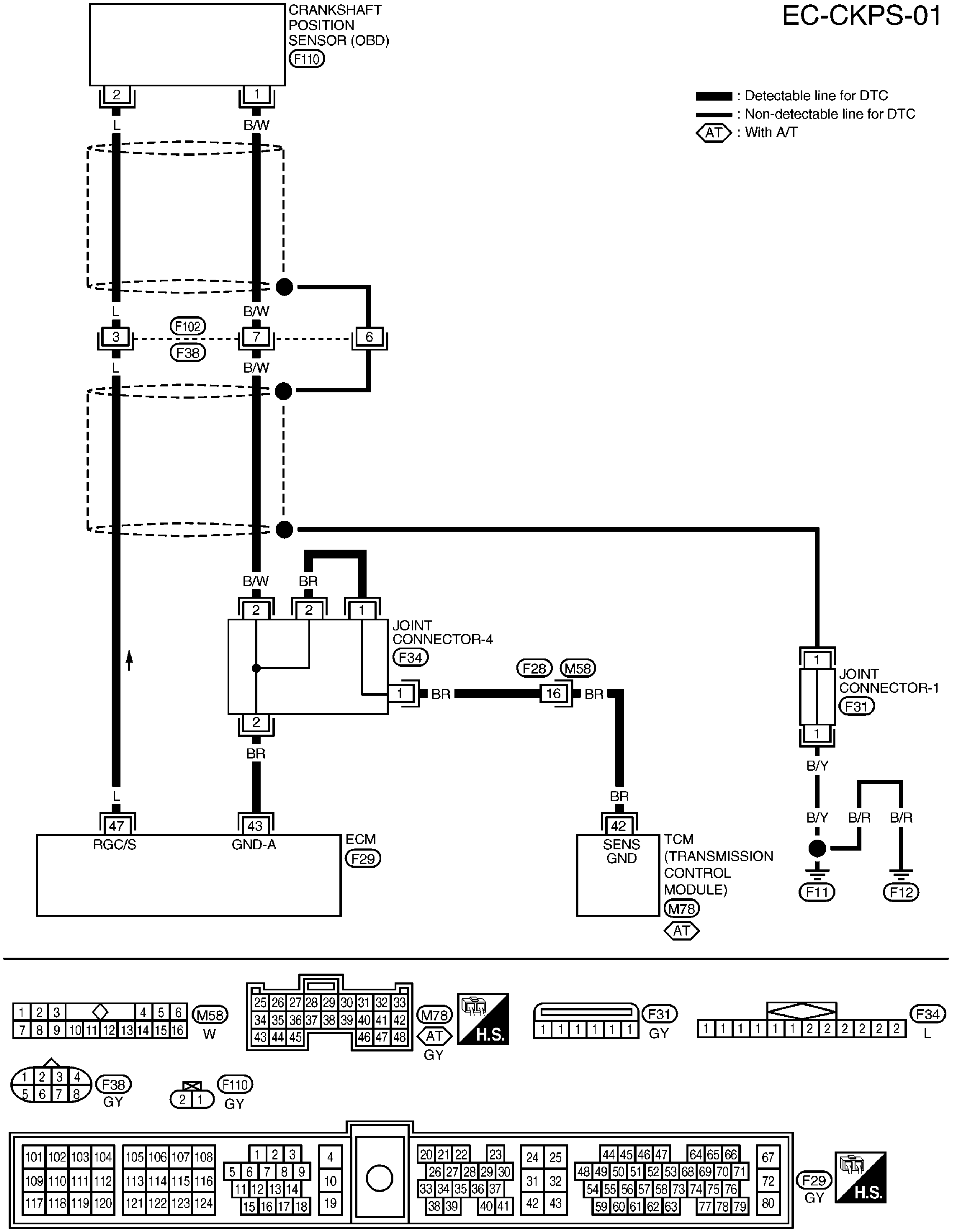
With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0822

EC-CKPS-01



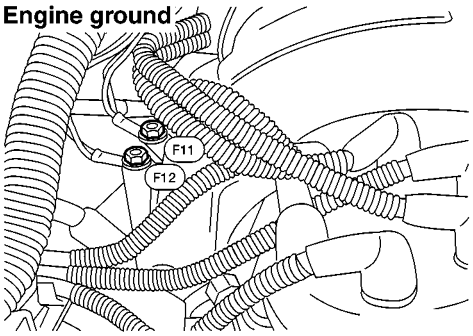
AEC956A

Diagnostic Procedure

NGEC0823

1	RETIGHTEN GROUND SCREWS

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

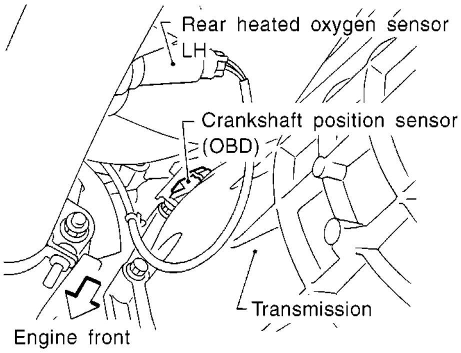


AEC640A

▶	GO TO 2.

2	CHECK CKPS (OBD) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.



SEF997R

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.

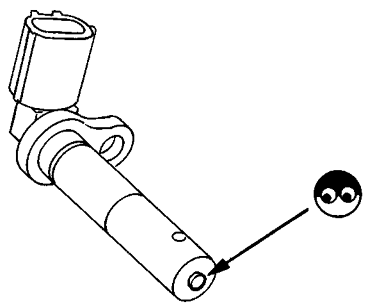
4	CHECK CKPS (OBD) GROUND CIRCUIT FOR OPEN AND SHORT
1. Reconnect ECM harness connectors. 2. Check harness continuity between CKPS (OBD) terminal 1 and engine ground. Refer to Wiring Diagram. **Continuity should exist.** 3. Also check harness for short to ground and short to power. **OK or NG**	
OK ▶	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 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 IMPROPER INSTALLATION
1. Loosen and retighten the fixing bolt of the crankshaft position sensor (OBD). 2. Perform "DTC Confirmation Procedure", EC-1037 again. **Is a 1st trip DTC P1336 (0905) detected?**	
Yes ▶	GO TO 7.
No ▶	**INSPECTION END**

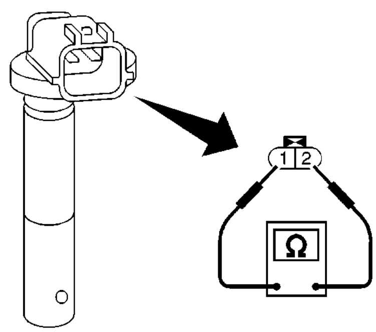
7 CHECK CRANKSHAFT POSITION SENSOR (OBD)

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 ground and short to power.

OK or NG

OK ▶	GO TO 10.
NG ▶	GO TO 9.

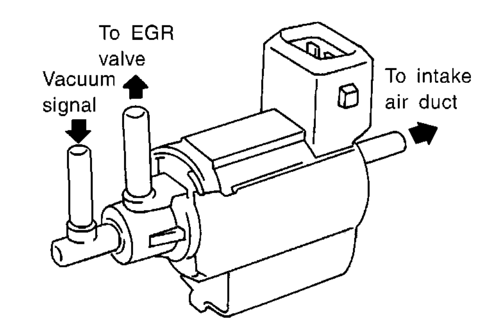
9 DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F38, F102
- Joint connector-1
- Harness for open or short between harness connector F38 and engine ground

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

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-706.		
	▶	**INSPECTION END**



SEF318UC

Component Description (If Equipped with EGR Valve)

NGEC0824

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 (from the intake manifold collector) 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.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0825

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGRC SOL/V	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	OFF
		Engine speed: Revving from idle up to 3,000 rpm quickly	ON

ECM Terminals and Reference Value

NGEC0826

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
103	G/W	EGRC-solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Revving engine from idle up to 3,000 rpm quickly	0 - 1.5V

On Board Diagnosis Logic

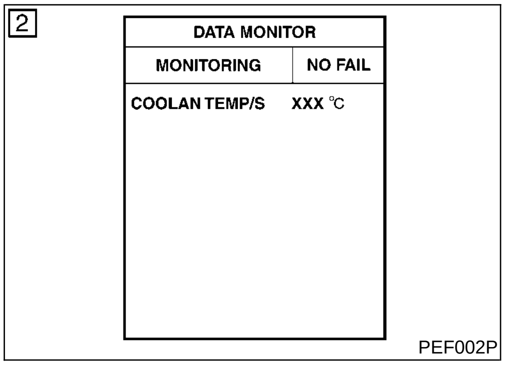
=NGEC0827

Malfunction is detected when the improper voltage signal is sent to ECM through EGRC-solenoid valve.

POSSIBLE CAUSE

NGEC0827S01

- Harness or connectors
  (The EGRC-solenoid valve circuit is open or shorted.)
- EGRC-solenoid valve



DTC Confirmation Procedure

NGEC0828

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

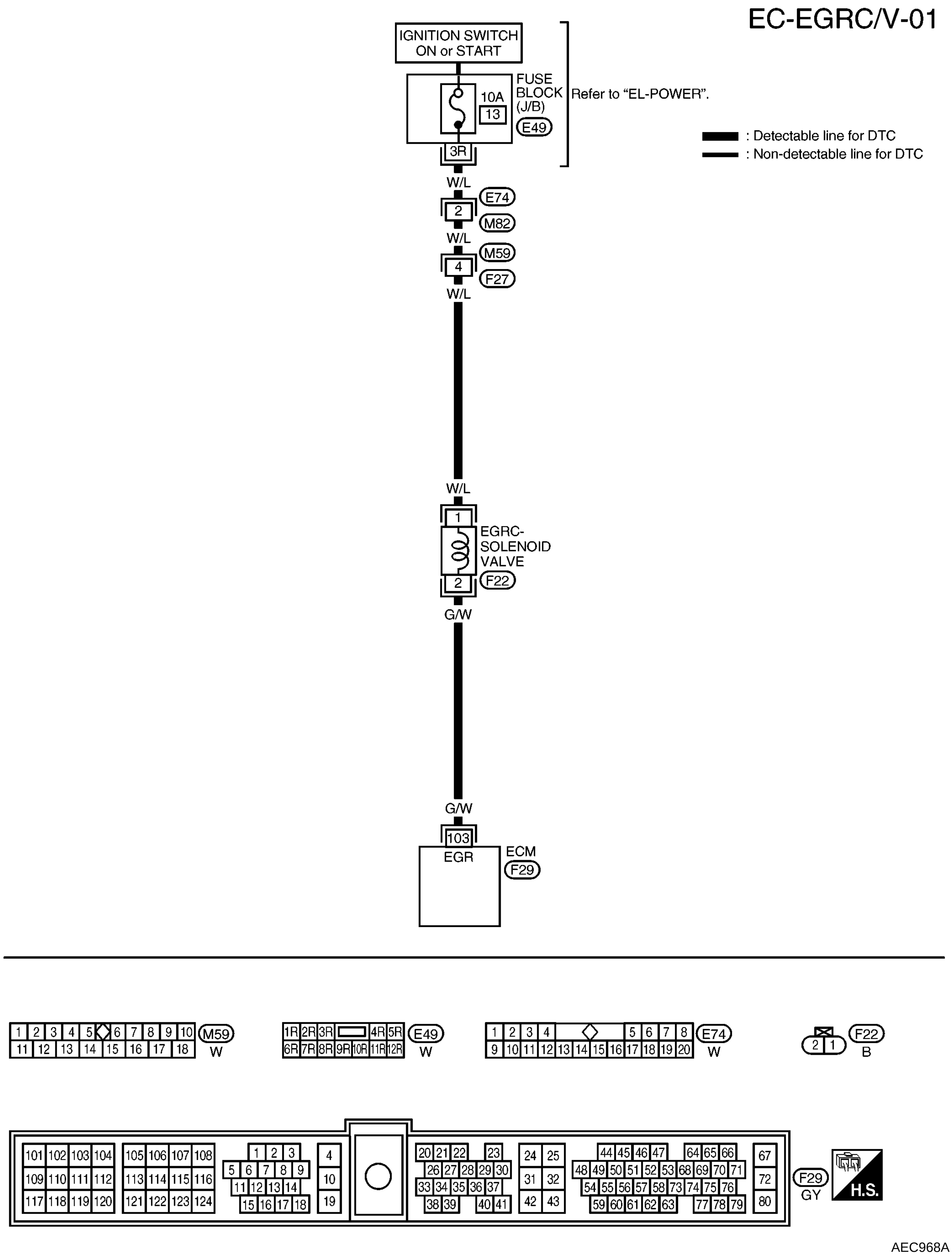
1) Turn ignition switch ON.
2) Select “DATA MONITOR” mode with CONSULT-II and wait at least 5 seconds.
3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1046.

With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0829

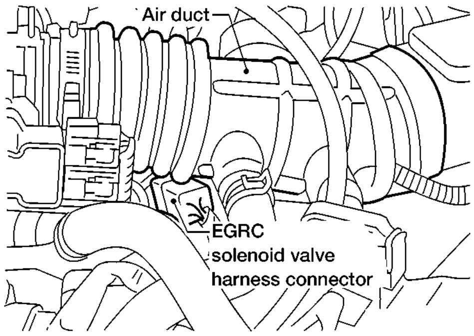


Diagnostic Procedure

NGEC0830

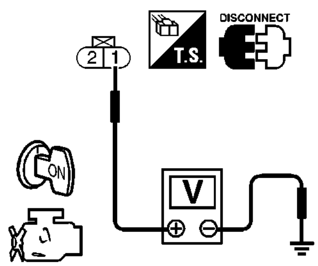
1	CHECK EGRC-SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EGRC-solenoid valve harness connector.



AEC659A

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



SEF657W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	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 EGRC-solenoid valve and fuse

	▶	Repair harness or connectors.

3	CHECK EGRC-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 103 solenoid valve and terminal 2. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

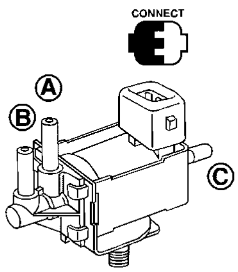
OK or NG

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

4	CHECK EGRC-SOLENOID VALVE

With CONSULT-II

1. Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.
2. Check air passage continuity and operation delay time under the following conditions.



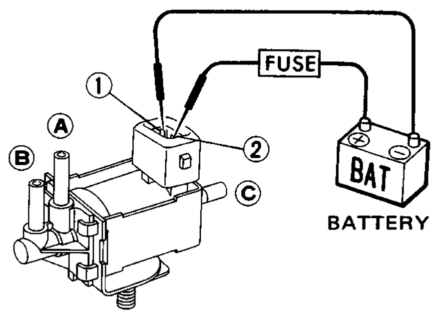
ACTIVE TEST	
EGRC SOL/V (EGR)	ON FLOW
MONITOR	
CMPS~RPM (REF)	XXXrpm

Conditions	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes

SEF155X

Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.



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

MTBL0237

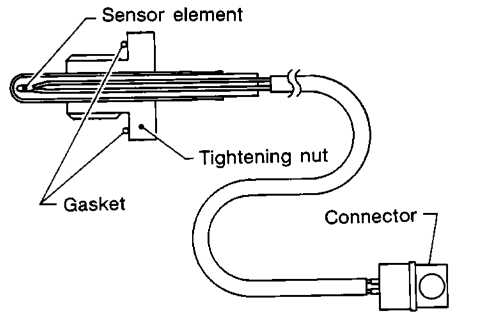
OK or NG

OK ▶	GO TO 5.
NG ▶	Replace EGRC-solenoid valve.

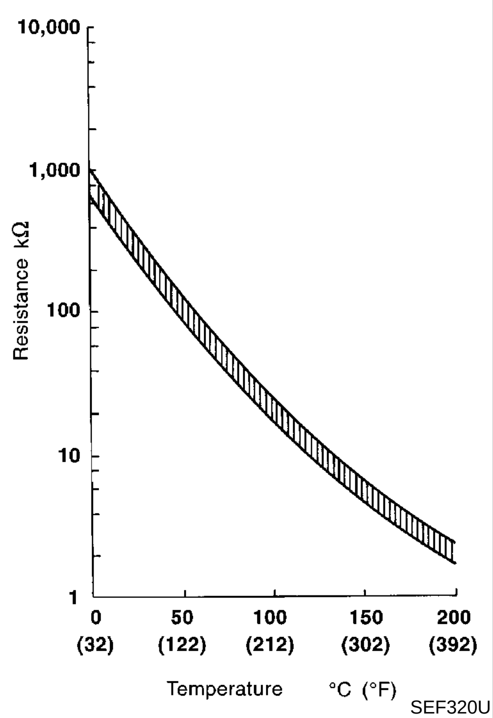
5	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.

▶	**INSPECTION END**



SEF599K



SEF320U

Component Description (If Equipped with EGR Valve)

NGEC0831

The EGR temperature sensor detects temperature changes in the EGR passage way. When the EGR valve opens, hot exhaust gases flow, and the temperature in the passage way changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases.
This sensor is not used to control the engine system. It is used only for the on board diagnosis.

<Reference data>

EGR temperature °C (°F)	Voltage* (V)	Resistance (MΩ)
0 (32)	4.56	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 ECM terminal 32 (ECM ground).
When EGR system is operating.
Voltage: 0 - 1.5V

On Board Diagnosis Logic

NGEC0832

Malfunction is detected when
(Malfunction A) an excessively low voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is low,
(Malfunction B) an excessively high voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is high.

POSSIBLE CAUSE

NGEC0832S01

Malfunction A

NGEC0832S0101

- Harness or connectors (The EGR temperature sensor circuit is shorted.)
- EGR temperature sensor
- Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve

Malfunction B

NGEC0832S0102

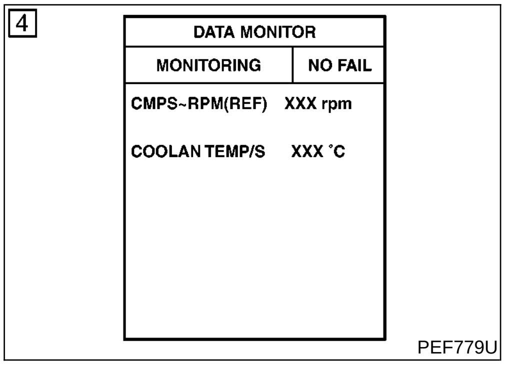
- Harness or connectors (The EGR temperature sensor circuit is open.)
- EGR temperature sensor
- Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve

DTC Confirmation Procedure

NGEC0833

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.



PEF779U

PROCEDURE FOR MALFUNCTION A

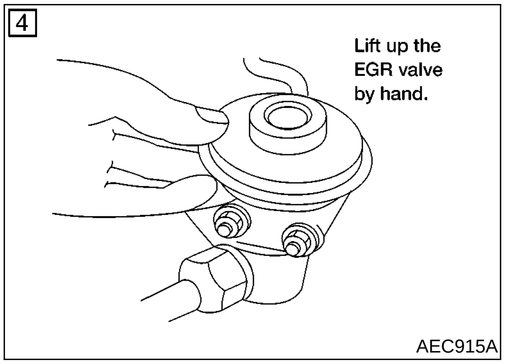
NGEC0833S01

With CONSULT-II

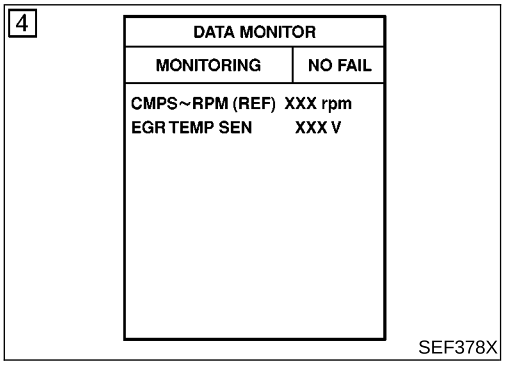
1) Turn ignition switch ON.
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Verify that "COOLAN TEMP/S" is less than 40°C (104°F).
   If the engine coolant temperature is above the range, cool the engine down.
4) Start engine and let it idle for at least 8 seconds.
5) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1052.

With GST

Follow the procedure "With CONSULT-II".



AEC915A



SEF378X

PROCEDURE FOR MALFUNCTION B

NGEC0833S02

CAUTION:
Always drive vehicle at a safe speed.

TESTING CONDITION:
Always perform the test at a temperature of 5°C (41°F) or higher.

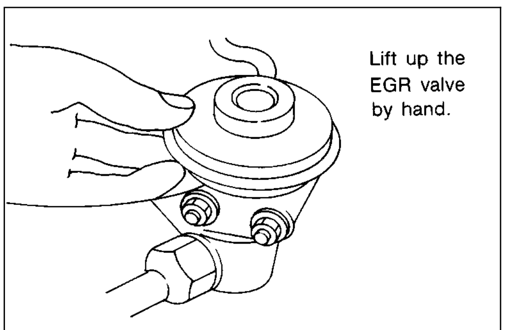
With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Confirm that EGR valve is not lifting at idle.
   If the check result is NG, go to trouble diagnoses for "DTC P1402". (See page EC-1055.)
3) Select "DATA MONITOR" mode with CONSULT-II.
4) Read "EGR TEMP SEN" at about 1,500 rpm while holding the EGR valve in full open position by hand.
   Voltage should decrease to less than 1.5V.
   If the check result is NG, go to "Diagnostic Procedure", EC-1052.
   If the check result is OK, go to following step.
5) Turn ignition switch OFF and wait at least 5 seconds.
6) Turn ignition switch ON.
7) Check the output voltage of "THRTL POS SEN" at closed throttle position and note it.

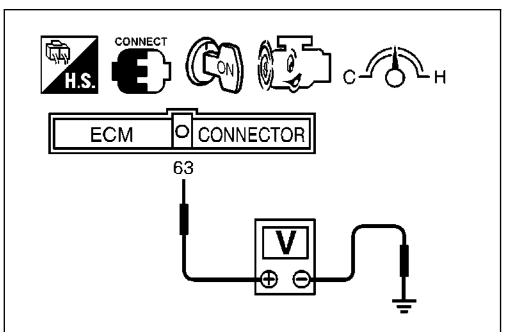
8) Start engine.
9) Maintain the following conditions for at least 5 consecutive seconds.

CMPS·RPM (REF)	1,600 - 2,400 rpm (A/T models) 1,800 - 2,600 rpm (M/T models)
COOLAN TEMP/S	Above 70°C (158°F)
B/FUEL SCHDL	3.0 - 4.5 msec
THRTL POS SEN	X − (X + 0.70) V X = Voltage value measured at step 7
Selector lever	Suitable position

10) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1052.



SEF360Q



SEF875U

Overall Function Check

NGEC0834

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

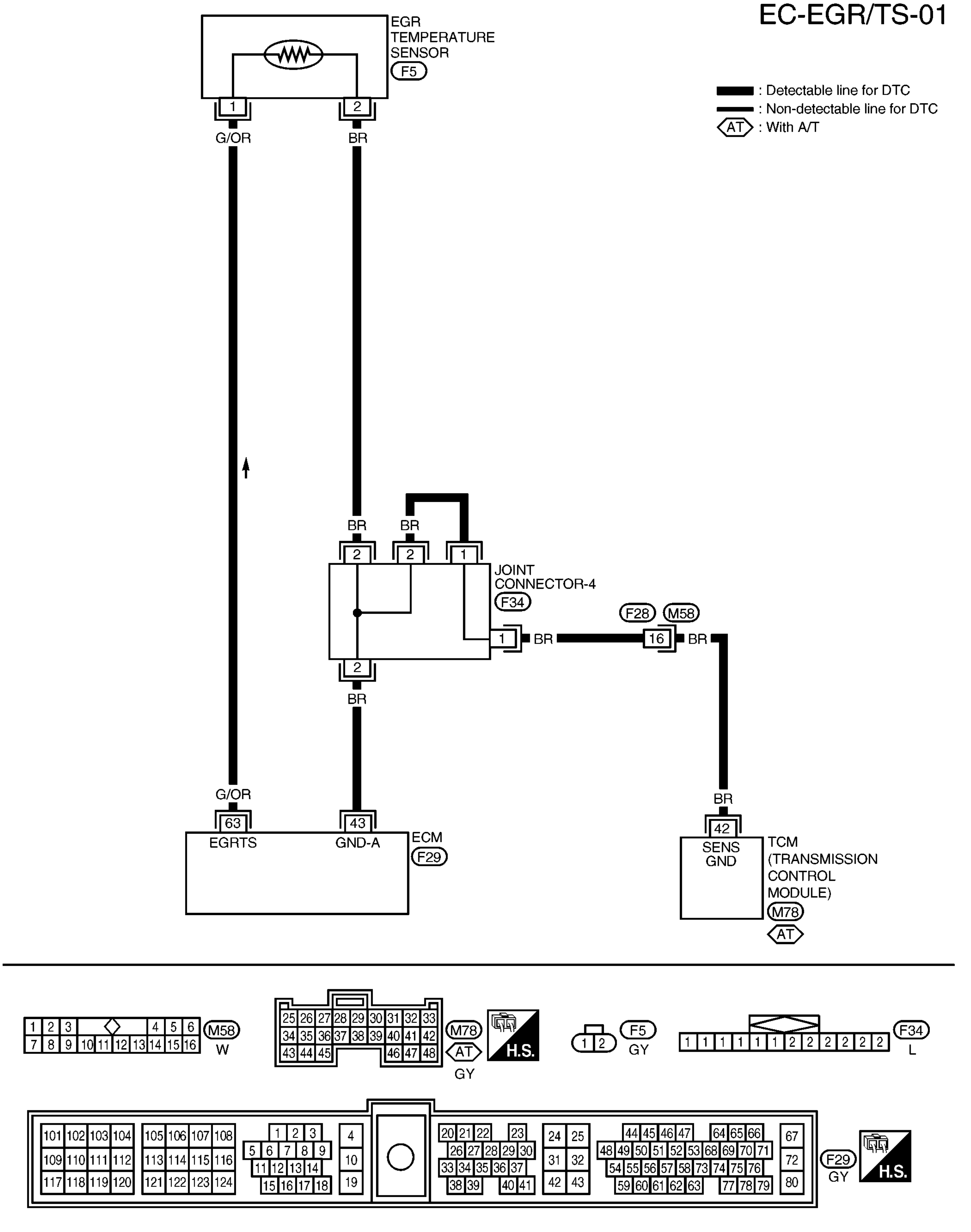
NGEC0834S01

Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Confirm that EGR valve is not lifting at idle. If NG, go to trouble diagnoses for DTC P0400 and P0402 (See pages EC-919 and 933).
3) 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 1.5V.
   If NG, go to "Diagnostic Procedure", EC-1052.
4) If step 4 is OK, perform trouble diagnoses for "DTC P0400, P1400" (See pages EC-919 and 1043).

Wiring Diagram

NGEC0835



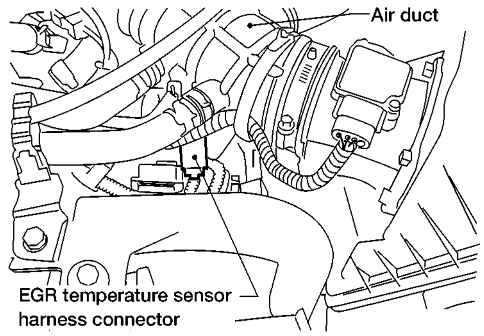
AEC969A

Diagnostic Procedure

NGEC0836

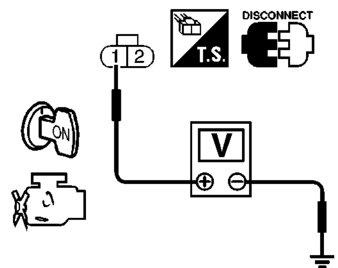
1	CHECK EGR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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



AEC660A

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



SEF728U

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 EGR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

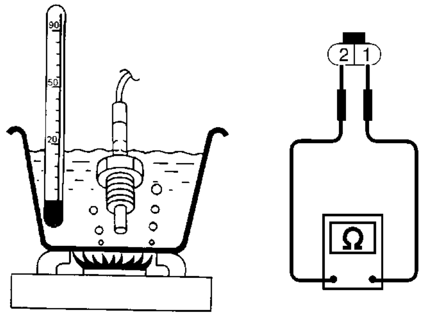
3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F28, M58
- Joint connector-4
- Harness for open or short between ECM and EGR temperature sensor
- Harness for open or short between TCM (Transmission Control Module) and EGR temperature sensor

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

4	CHECK EGR TEMPERATURE SENSOR

Check resistance change and resistance value.

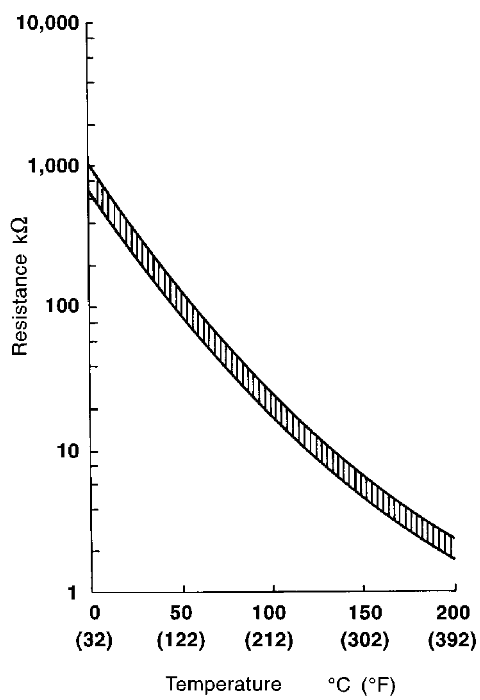


SEF643Q

<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

AEC039B



SEF320U

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace EGR temperature sensor.

5	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.	
▶	INSPECTION END

Description (If Equipped with EGR Valve)

NGEC0837

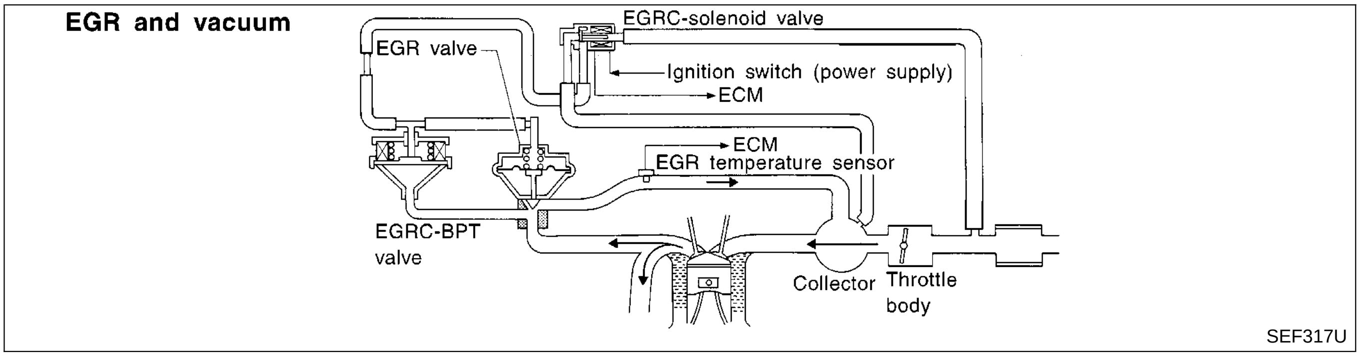
SYSTEM DESCRIPTION

NGEC0837S01

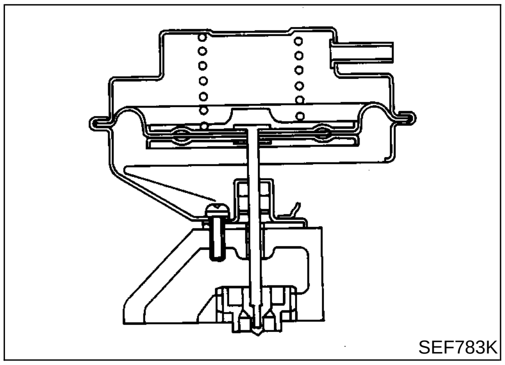
Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EGR control	EGRC-solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		

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 does not flow through the solenoid valve. This causes the intake manifold 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



SEF317U


SEF783K

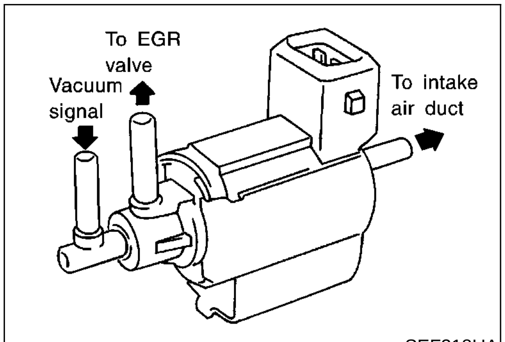
COMPONENT DESCRIPTION

NGEC0837S02

Exhaust Gas Recirculation (EGR) Valve

NGEC0837S0201

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 and EGRC-BPT valve operation. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.

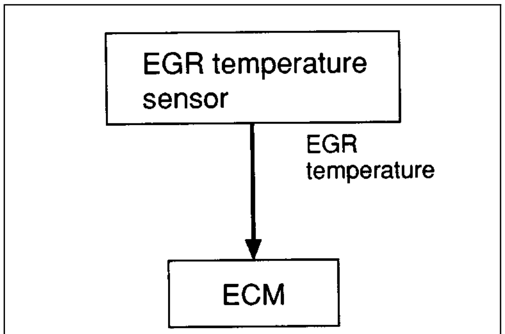


SEF318UA

EGRC-solenoid Valve

NGEC0837S0202

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 (from the intake manifold colletctor) 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.



SEF073P

On Board Diagnosis Logic

NGEC0838

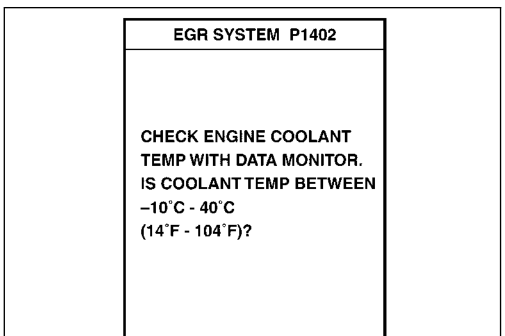
If the EGR temperature sensor detects EGR flow under the condition that does not call for EGR, a high-flow malfunction is diagnosed.
Malfunction is detected when EGR flow is detected under condition that does not call for EGR.

NOTE:
Diagnosis for this DTC will occur when engine coolant temperature is below 50-60°C (122-140°F). Therefore, it will be better to turn ignition switch "ON" (start engine) at the engine coolant temperature below 30°C (86°F) when starting DTC confirmation procedure.

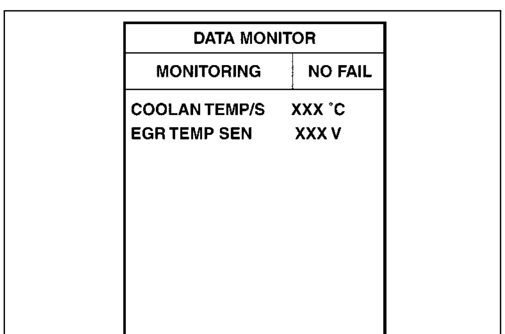
POSSIBLE CAUSE

NGEC0838S01

- EGRC-solenoid valve
- EGR valve leaking or stuck open
- EGR temperature sensor
- EGRC-BPT valve



PEF803W



PEF347U

DTC Confirmation Procedure

NGEC0839

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.

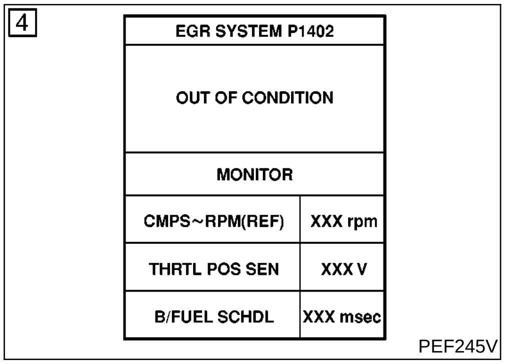
TESTING CONDITION:

- **Always perform the test at a temperature of −10°C (14°F) or higher.**
- **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.**

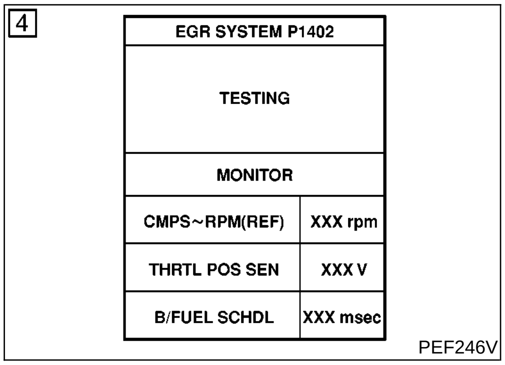
  COOLAN TEMP/S: −10 to 30°C (14 to 86°F)*
  EGR TEMP SEN: Less than 4.8V

  If the values are out of the ranges indicated above, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to reduce the engine coolant temperature or EGR temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.

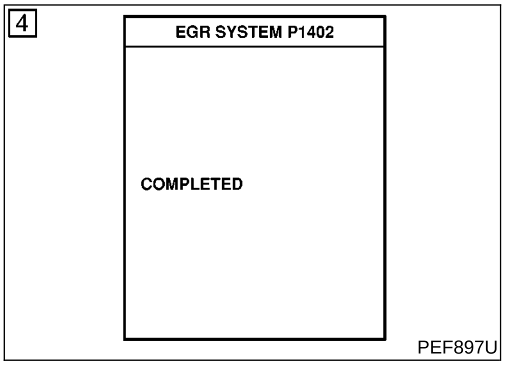
*: Although CONSULT-II screen displays "−10 to 40°C (14 to 104°F)" as a range of engine coolant temperature, ignore it.



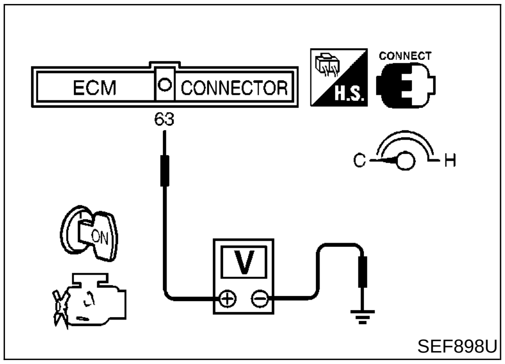
PEF245V



PEF246V



PEF897U



SEF898U

With CONSULT-II

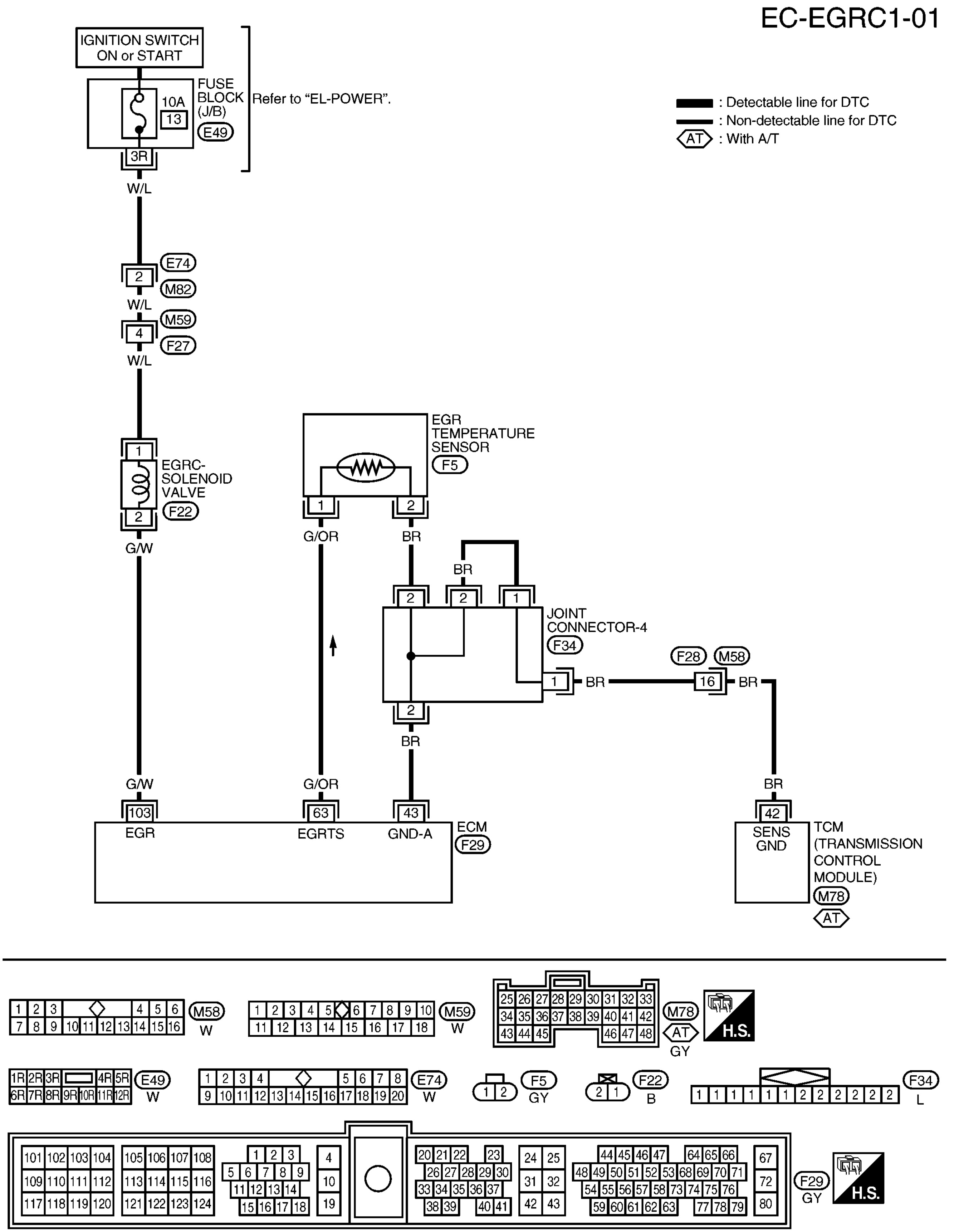
1) Turn ignition switch OFF, and wait at least 5 seconds, and then turn "ON".
2) Select "EGR SYSTEM P1402" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
3) Follow the CONSULT-II instructions.
4) Start engine and let it idle until "TESTING" on CONSULT-II screen is turned to "COMPLETED". (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 30°C (14 to 86°F). Retry from step 1.
5) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-1059.

With GST

1) Turn ignition switch ON and select "MODE 1" with GST.
2) Check that engine coolant temperature is within the range of −10 to 30°C (14 to 86°F).
3) Check that voltage between ECM terminal 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-1059.

Wiring Diagram

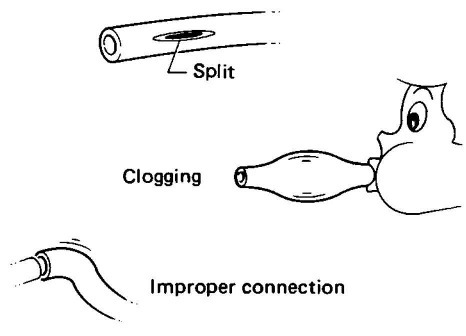
NGEC0840

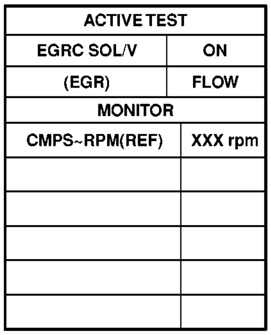


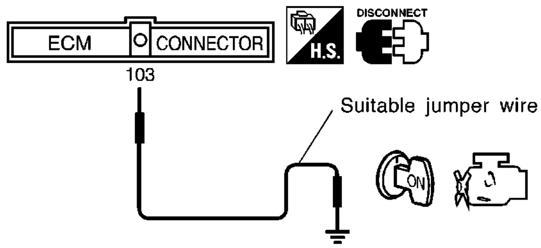
AEC958A

Diagnostic Procedure

NGEC0841

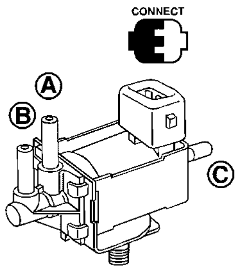
1	CHECK VACUUM HOSE	
1. Turn ignition switch OFF. 2. Check vacuum hose for clogging, cracks or improper connection. Refer to "Vacuum Hose Drawing", EC-597.  SEF109L **OK or NG**		
OK (with CONSULT-II) ▶	GO TO 2.	
OK (without CONSULT-II) ▶	GO TO 3.	
NG ▶	Repair or replace vacuum hose.	

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.  PEF789U **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. Disconnect ECM harness connector. 2. Turn ignition switch ON. 3. Connect a suitable jumper wire between ECM terminal 103 and engine ground.  SEF937V 4. Check operating sound of EGRC-solenoid valve when disconnecting and connecting the jumper wire. **Clicking noise should be heard.** **OK or NG**		
OK	▶	GO TO 4.
NG	▶	Repair or replace EGRC-solenoid valve or repair circuit.

4	CHECK EGRC-SOLENOID VALVE

With CONSULT-II
1. Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.
2. Check air passage continuity and operation delay time under the following conditions.

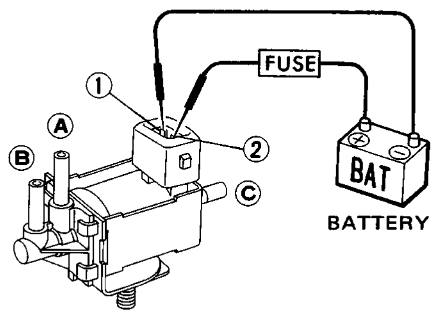


ACTIVE TEST	
EGRC SOL/V (EGR)	ON FLOW
MONITOR	
CMPS~RPM (REF)	XXXrpm

Conditions	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes

SEF155X

Without CONSULT-II
Check air passage continuity and operation delay time under the following conditions.



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

MTBL0237

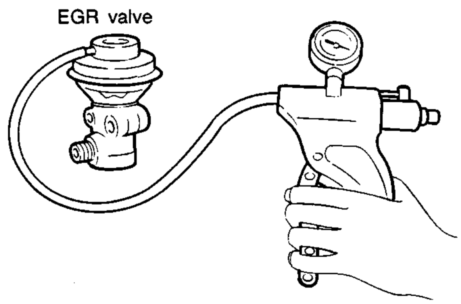
OK or NG

OK	▶	GO TO 5.
NG	▶	Replace EGRC-solenoid valve.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

5 CHECK EGR VALVE

Apply vacuum to EGR vacuum port with a hand vacuum pump.



MEF137D

EGR valve spring should lift.

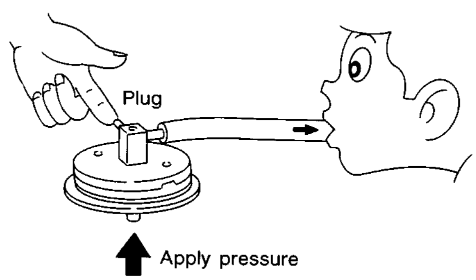
- Check for sticking.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace EGR valve.

6 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

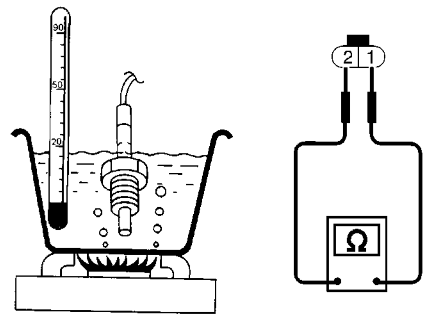
Leakage should not exist.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace EGRC-BPT valve.

7	CHECK EGR TEMPERATURE SENSOR

Check resistance change and resistance value.

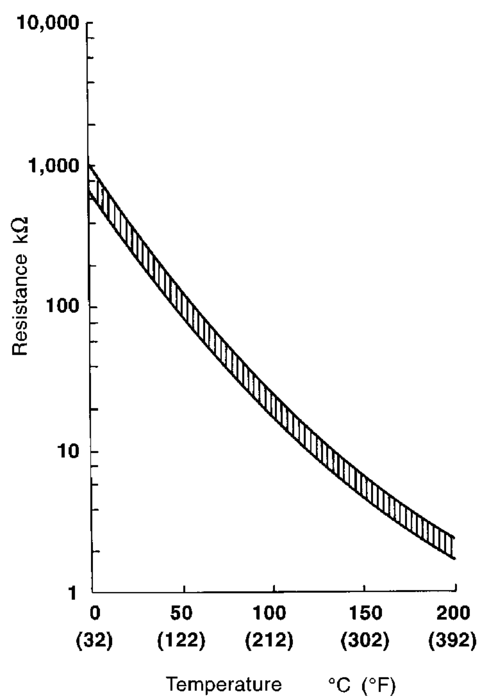


SEF643Q

<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

AEC039B



SEF320U

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EGR temperature sensor.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.	
▶	INSPECTION END

On Board Diagnosis Logic

NGEC0842

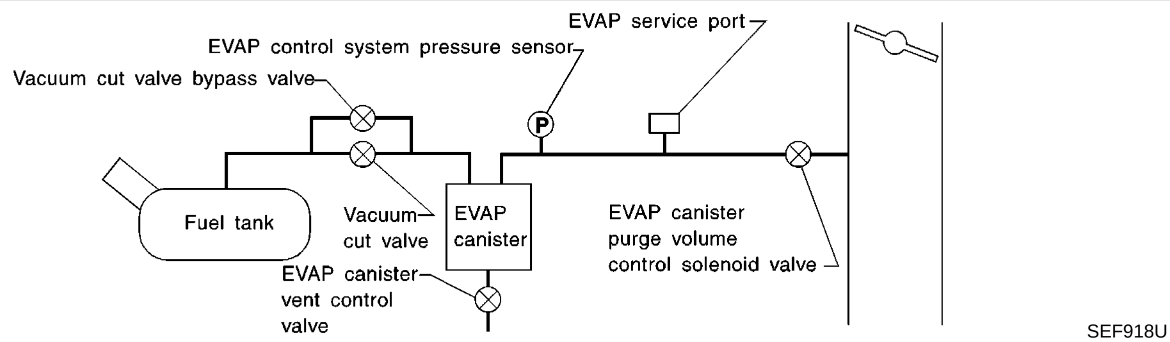
NOTE:

If DTC P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1098.)

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

NGEC0842S01

- 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
- MAP/BARO switch solenoid valve

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

- Blocked or bent rubber tube to MAP/BARO switch solenoid valve
- O-ring of EVAP canister vent control valve is missing or damaged.
- Water separator
- EVAP canister is saturated with water.
- EVAP control system pressure sensor

DTC Confirmation Procedure

NGEC0843

NOTE:
Refer to “P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)”, EC-948.

Diagnostic Procedure

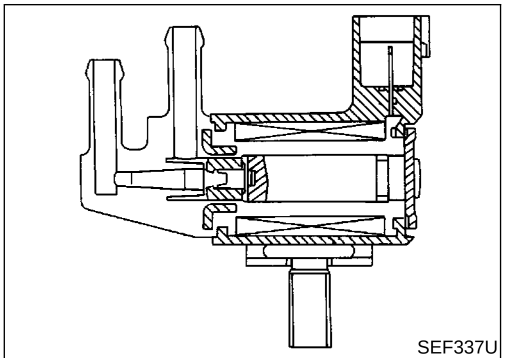
NGEC0844

NOTE:
Refer to “P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)”, EC-949.

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		
Front heated oxygen sensors	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Tank fuel temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control 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

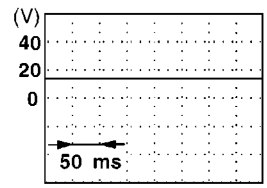
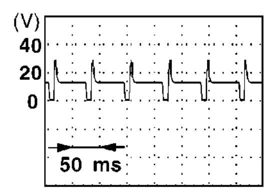
Specification data are reference values.

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 32 (ECM 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

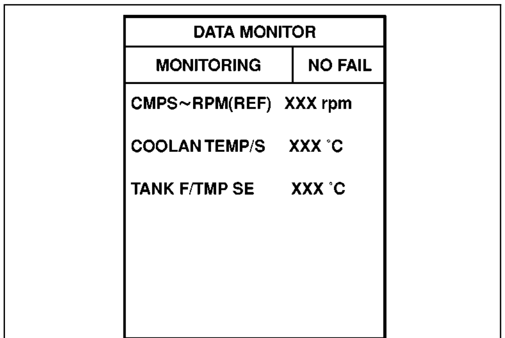
Malfunction is detected when the canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.

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.)



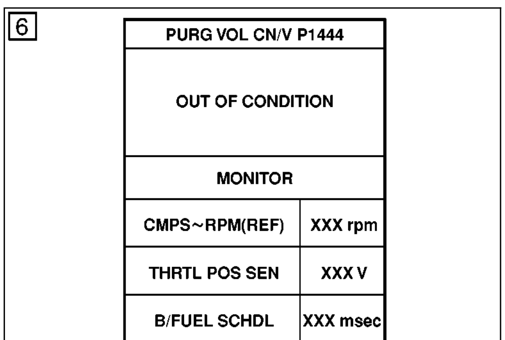
PEF195V

DTC Confirmation Procedure

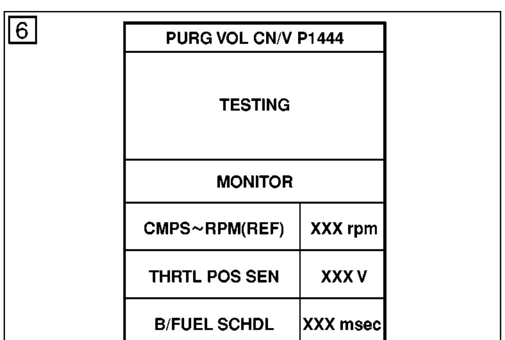
NGEC0849

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.

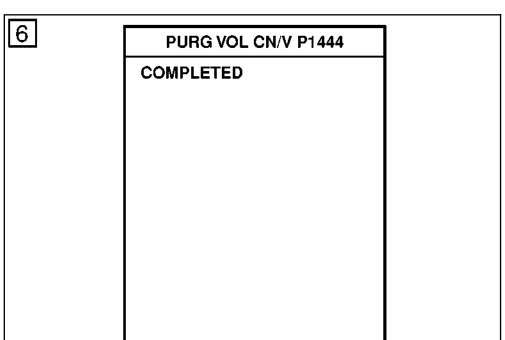
TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.



PEF900U



PEF901U



PEF902U

With CONSULT-II

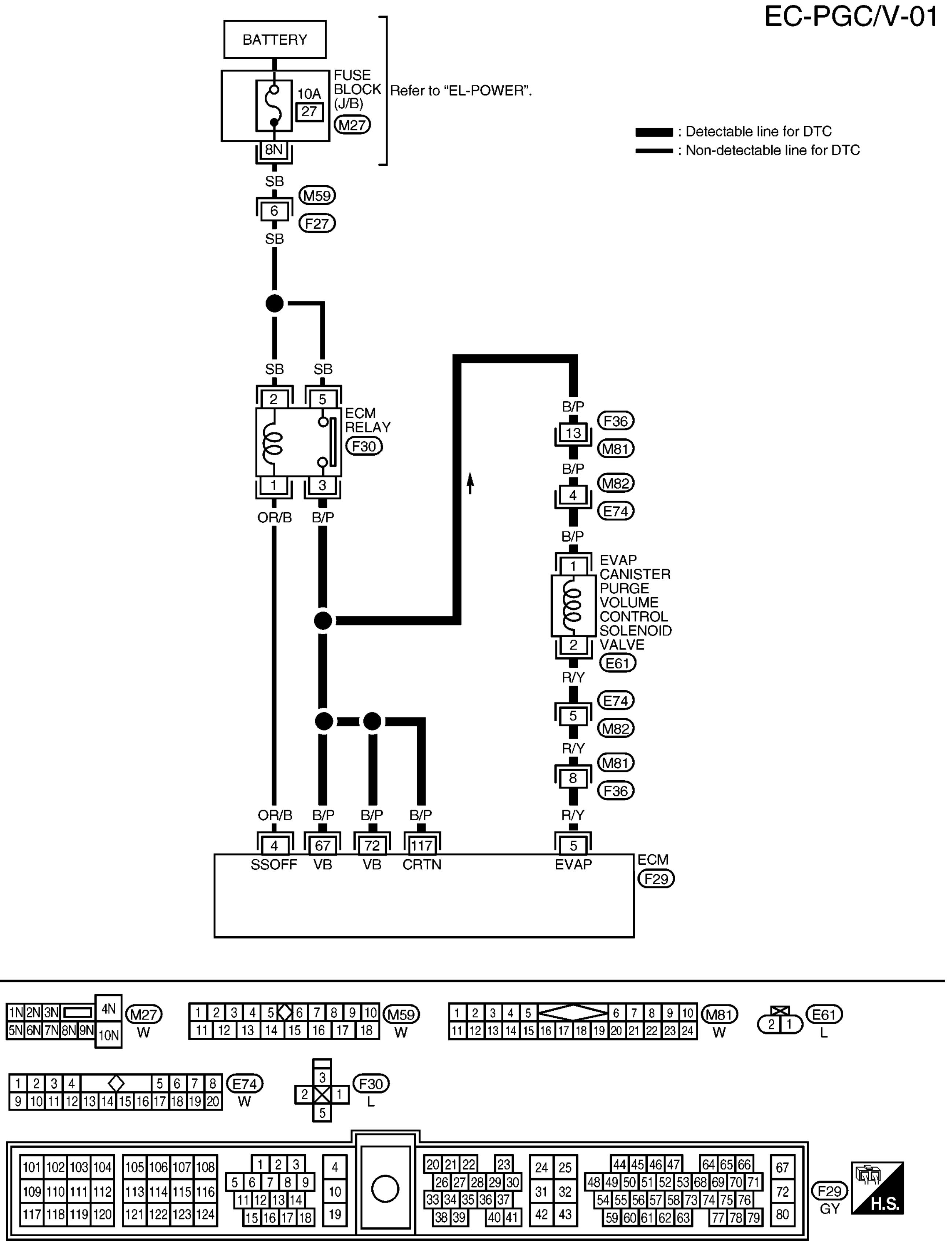
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch OFF and wait at least 5 seconds.
3) Turn ignition switch ON.
4) Select “PURG VOL CN/V P1444” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
5) Touch “START”.
6) Start engine and let it idle until “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-1071.

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-1071.

Wiring Diagram

NGEC0850



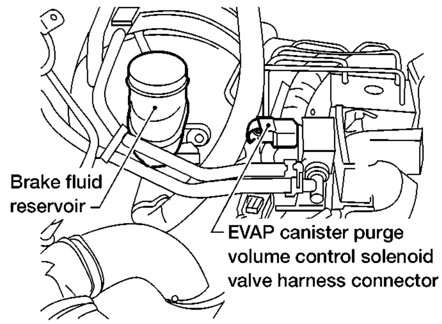
AEC959A

Diagnostic Procedure

NGEC0851

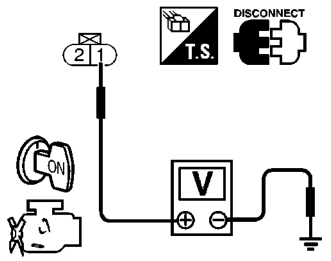
1	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

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

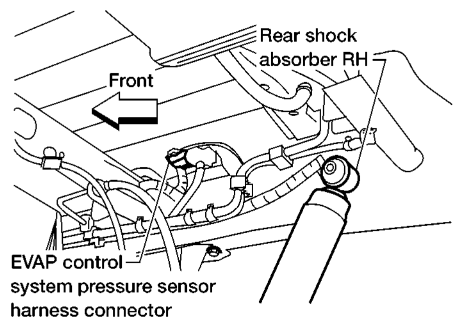
OK ▶	GO TO 5.
NG ▶	GO TO 4.

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

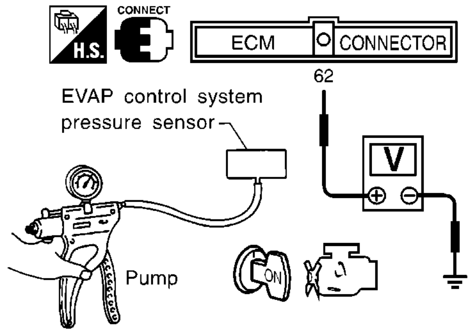
2. Check connectors for water.
   Water should not exist.

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.



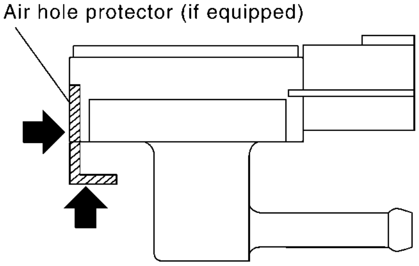
SEF894U

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

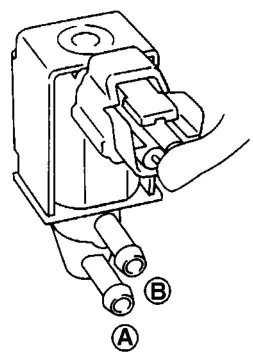
1. Start engine.
2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
CMPS~RPM(REF)	XXX rpm
FR O2 MNTR-B2	RICH
FR O2 MNTR-B1	RICH
A/F ALPHA-B2	XXX %
A/F ALPHA-B1	XXX %
THRTL POS SEN	XXX V

PEF882U

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

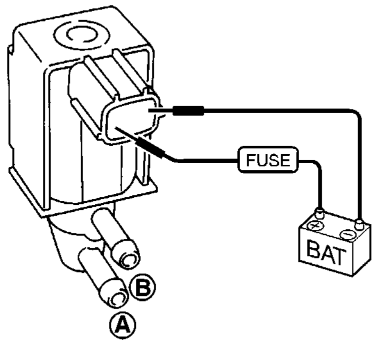
If NG, replace the EVAP canister purge volume control solenoid valve.

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

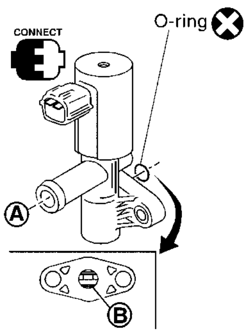
OK	▶	GO TO 10.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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	
CMPS~RPM (REF)	XXXrpm
FR O2 MNTR-B1	RICH
A/F ALPHA-B1	XXX%
THRTL POS SEN	XXXV

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

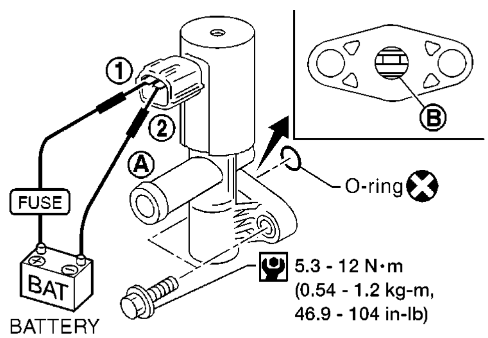
SEF156X

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

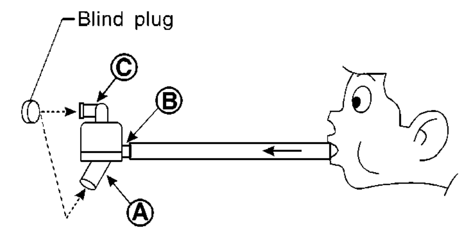
Check for obstructed rubber tube connected to EVAP canister vent control valve.

OK or NG

OK	▶	GO TO 12.
NG	▶	Clean, repair or replace rubber tube.

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.



SEF829T

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

NOTE:

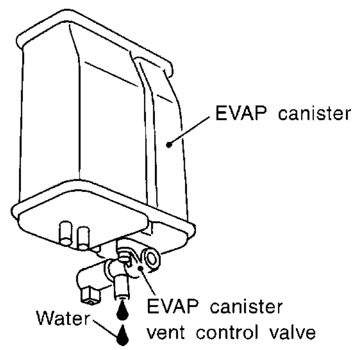
- Do not disassemble water separator.

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

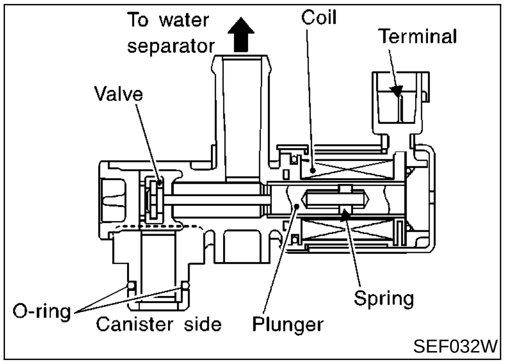
Weigh the EVAP canister with the EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0 lb).

OK or NG

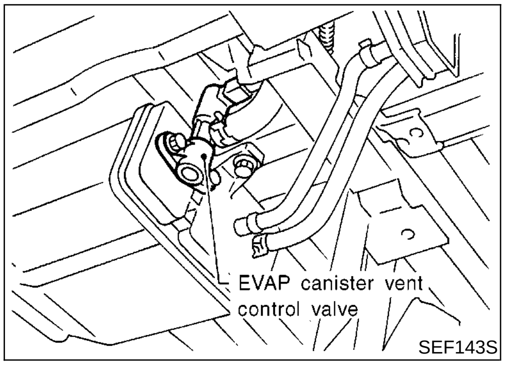
OK	▶	GO TO 16.
NG	▶	GO TO 15.

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-706.	
▶	**INSPECTION END**



SEF032W



SEF143S

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 32 (ECM 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

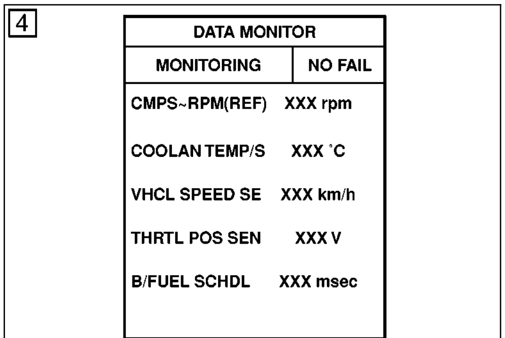
=NGEC0855

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.



PEF403V

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.

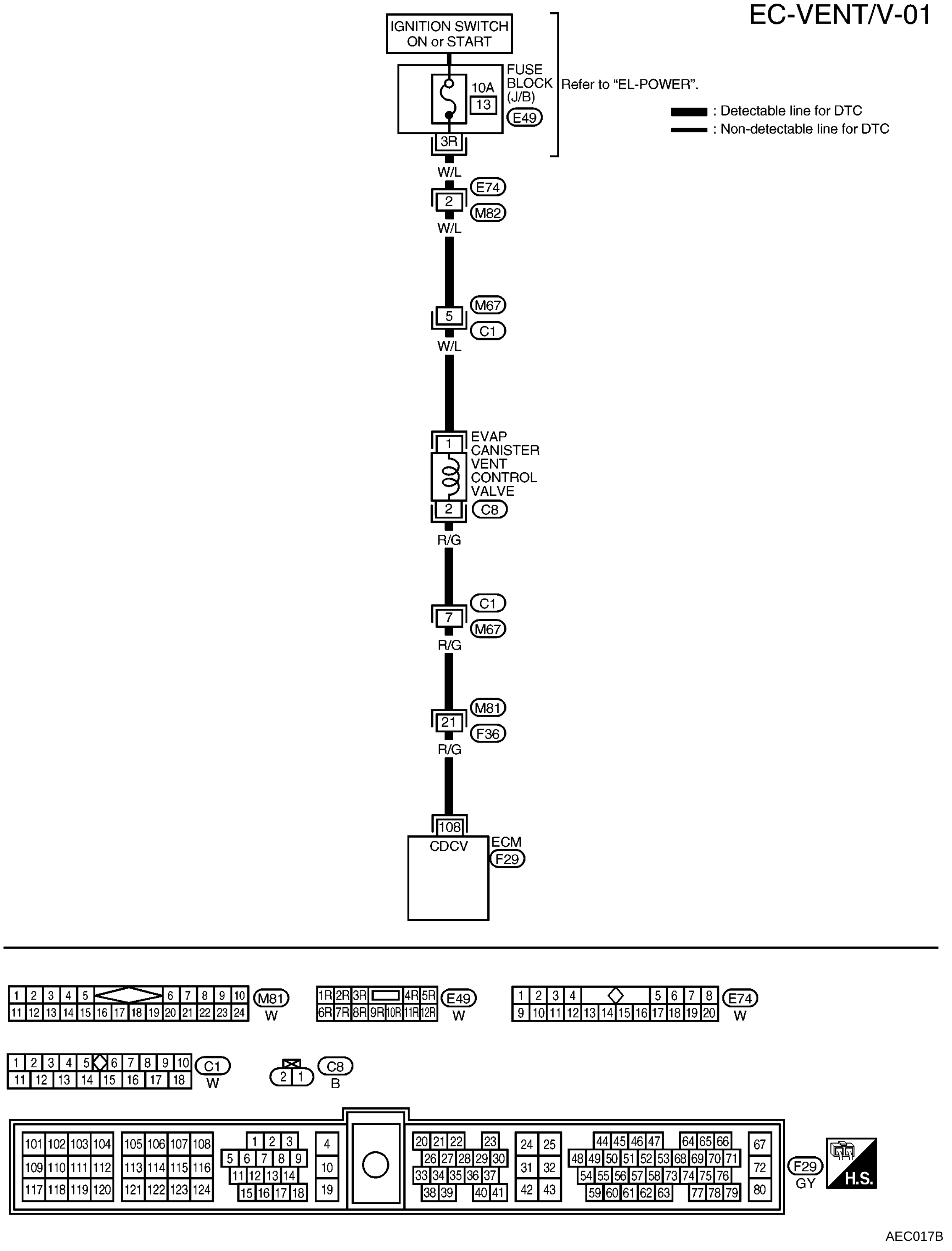
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-1082.

With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

NGEC0857

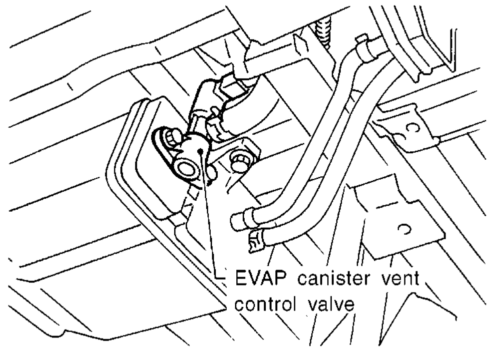


Diagnostic Procedure

NGEC0858

1	CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Check obstructed rubber tube connected to EVAP canister vent control valve.



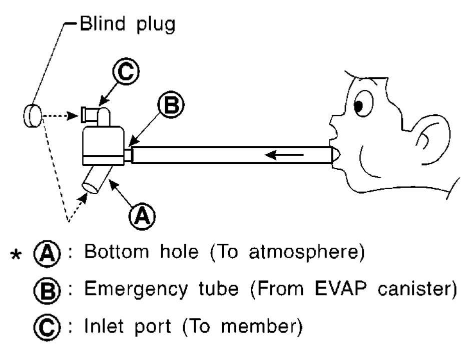
SEF143S

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.



SEF829T

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

NOTE:

- Do not disassemble water separator.

OK or NG

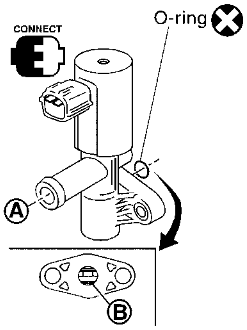
OK ▶	GO TO 3.
NG ▶	Replace water separator.

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	
CMPS~RPM (REF)	XXXrpm
FR O2 MNTR-B1	RICH
A/F ALPHA-B1	XXX%
THRTL POS SEN	XXXV

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

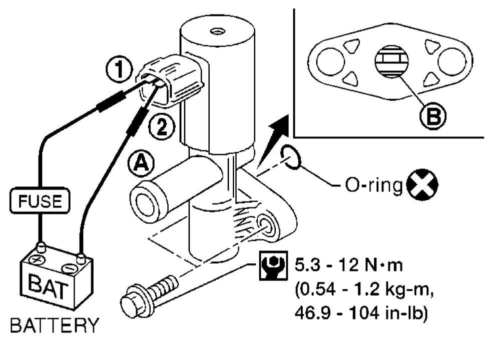
SEF156X

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.



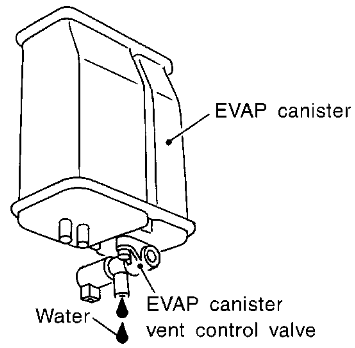
AEC783A

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.	



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.

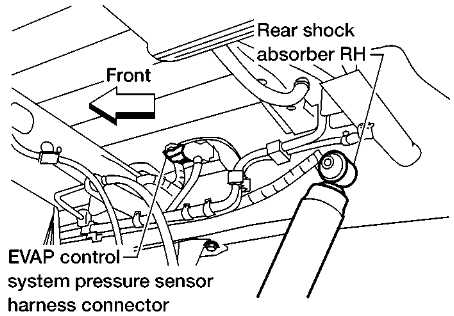
7	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.	

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair it.

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-964.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

10	CHECK INTERMITTENT INCIDENT	

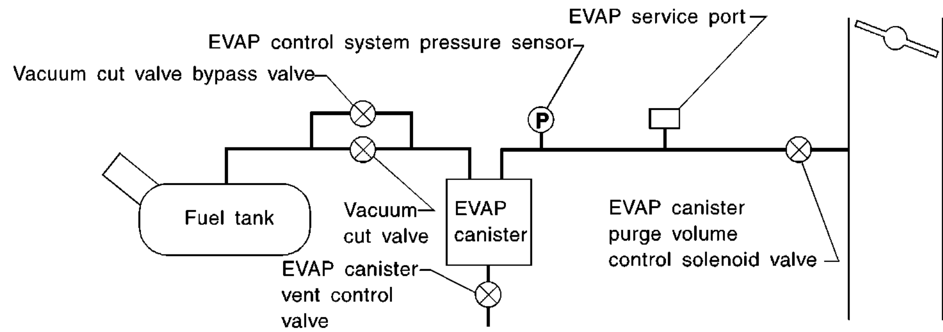
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.

	▶	**INSPECTION END**

System Description

NGEC0859

NOTE:
If DTC P1447 is displayed with P0510, perform trouble diagnosis for DTC P0510 first. (See EC-998.)



SEF918U

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

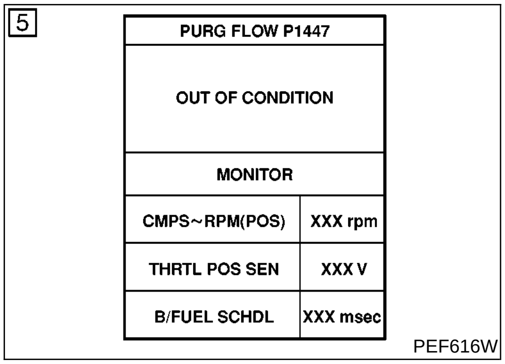
NGEC0860

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.

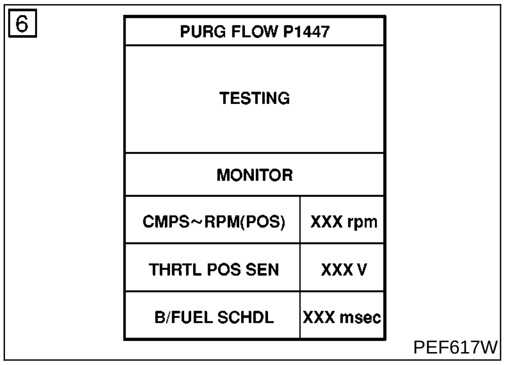
POSSIBLE CAUSE

NGEC0860S01

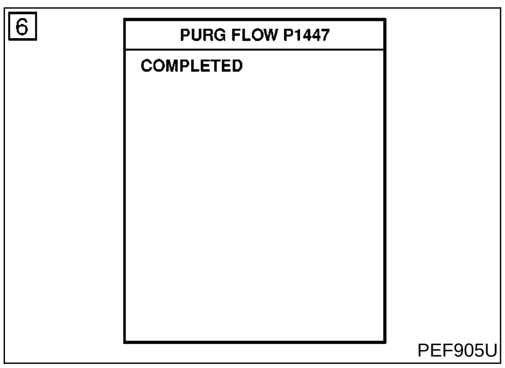
- EVAP canister purge volume control solenoid valve stuck closed
- EVAP control system pressure sensor and the circuit
- Loose, disconnected or improper connection of rubber tube
- Blocked rubber tube
- Blocked or bent rubber tube to MAP/BARO switch solenoid valve
- Cracked EVAP canister
- EVAP canister purge volume control solenoid valve circuit
- Closed throttle position switch
- Blocked purge port
- EVAP canister vent control valve



PEF616W



PEF617W



PEF905U

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)
CMPS·RPM (POS)	500 - 3,400 rpm
B/FUEL SCHDL	Less than 4 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-1089.

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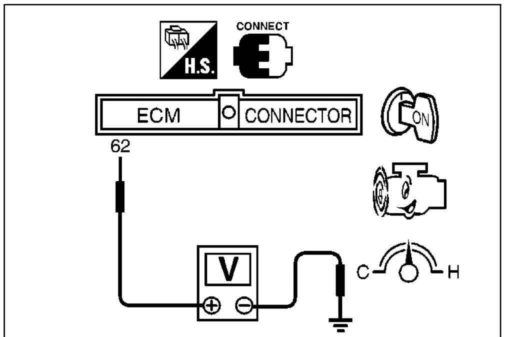


SEF906U

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-1089.

Diagnostic Procedure

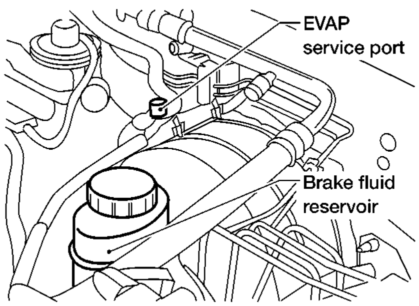
=NGEC0863

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	0.0%
MONITOR	
CMPS~RPM(REF)	XXX rpm
FR O2 MNTR-B2	LEAN
FR O2 MNTR-B1	LEAN
A/F ALPHA-B2	XXX %
A/F ALPHA-B1	XXX %
THRTL POS SEN	XXX V

PEF908U

100.0%: Vacuum should exist.
0.0%: Vacuum should not exist.

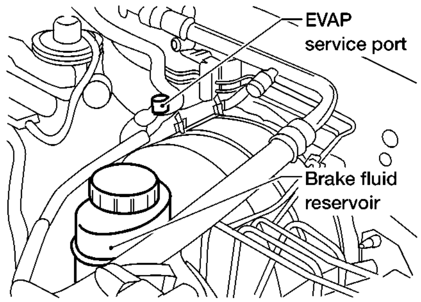
OK or NG

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	

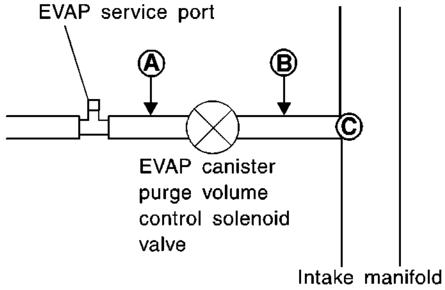
1. Turn ignition switch OFF.
2. Check EVAP purge line for improper connection or disconnection.
   Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-607.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair it.

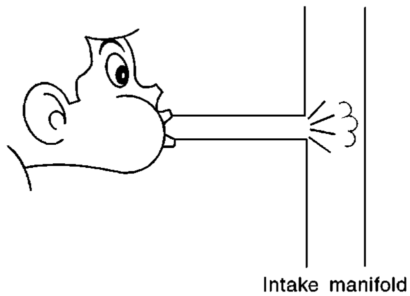
5	CHECK EVAP PURGE HOSE AND PURGE PORT

1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B**.



SEF367U

2. Blow air into each hose and EVAP purge port **C**.
3. Check that air flows freely.



SEF368U

OK or NG

OK (with CONSULT-II)	▶	GO TO 6.
OK (without CONSULT-II)	▶	GO TO 7.
NG	▶	Repair or clean hoses and/or purge port.

Diagnostic Procedure (Cont'd)

6	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

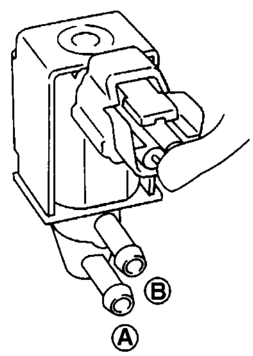
1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
CMPS~RPM(REF)	XXX rpm
FR O2 MNTR-B2	RICH
FR O2 MNTR-B1	RICH
A/F ALPHA-B2	XXX %
A/F ALPHA-B1	XXX %
THRTL POS SEN	XXX V

PEF882U

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

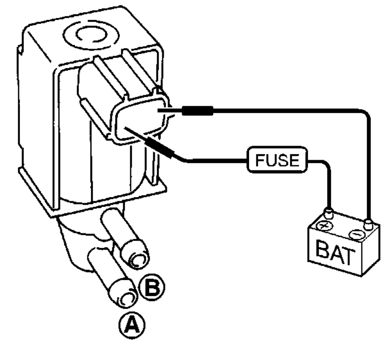
If NG, replace the EVAP canister purge volume control solenoid valve.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

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

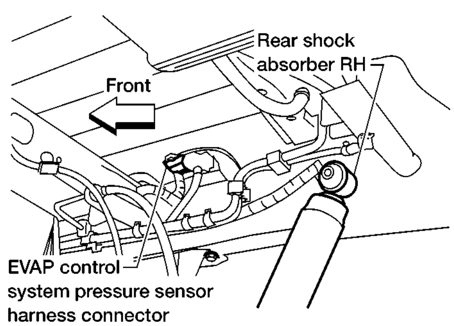
1. Turn ignition switch OFF.
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

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.

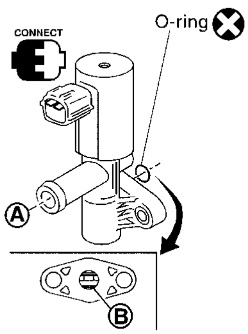
10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION
Refer to "DTC Confirmation Procedure" for DTC P0450, EC-964.	
OK or NG	
OK ▶	GO TO 11.
NG ▶	Replace EVAP control system pressure sensor.

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	
CMPS~RPM (REF)	XXXrpm
FR O2 MNTR-B1	RICH
A/F ALPHA-B1	XXX%
THRTL POS SEN	XXXV

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

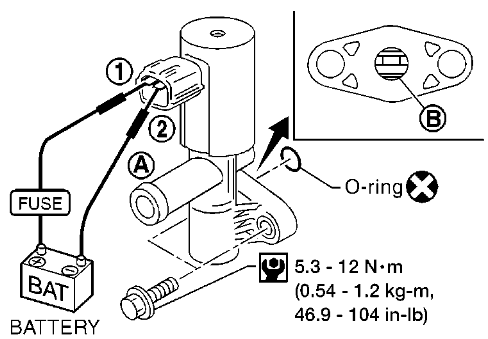
SEF156X

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 CLOSED THROTTLE POSITION SWITCH

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Remove vacuum hose connected to throttle opener.
4. Connect suitable vacuum hose to vacuum pump and the throttle opener (If so equipped).
5. Apply vacuum [more than -40.0kPa (-300mmHg, 11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
6. Turn ignition switch ON.
7. Select "DATA MONITOR" mode with CONSULT-II.
8. Check indication of "CLSD THL/P SW".
   Measurement must be made with closed throttle position switch installed in vehicle.

Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

MTBL0247

If NG, adjust closed throttle position switch.
Check the following items. Refer to "Basic Inspection", EC-669.

Items	Specifications
Ignition timing	15° ± 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)

MTBL0226

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

OK or NG

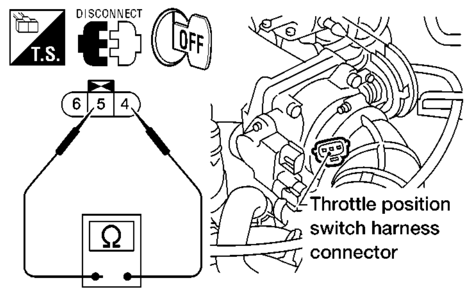
OK	▶	GO TO 14.
NG	▶	Replace throttle position switch with throttle position sensor.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

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. Remove vacuum hose connected to throttle opener (If so equipped).
4. Connect suitable vacuum hose to vacuum pump and the throttle opener.
5. Apply vacuum [more than -40.0kPa (-300mmHg, 11.81 inHg)] until the throttle drum becomes free from the rod of the throttle opener.
6. Disconnect closed throttle position switch harness connector.
7. 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-669.

Items	Specifications
Ignition timing	15° ± 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)

MTBL0226

8. 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-607.

OK or NG

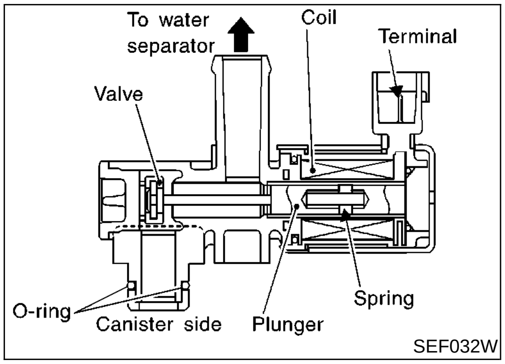
OK ▶	GO TO 15.
NG ▶	Replace it.

15 CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

▶	GO TO 16.

16	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.	
▶	INSPECTION END



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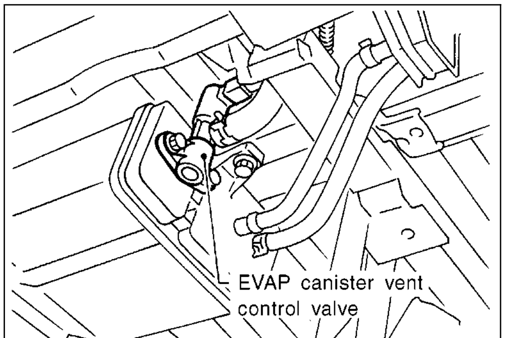


SEF143S

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 32 (ECM 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

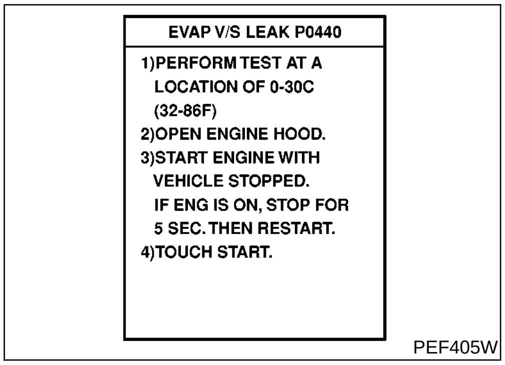
- EVAP canister vent control valve
- EVAP control system pressure sensor and circuit
- Blocked rubber tube to EVAP canister vent control valve
- Water separator
- EVAP canister is saturated with water.
- Vacuum cut valve

DTC Confirmation Procedure

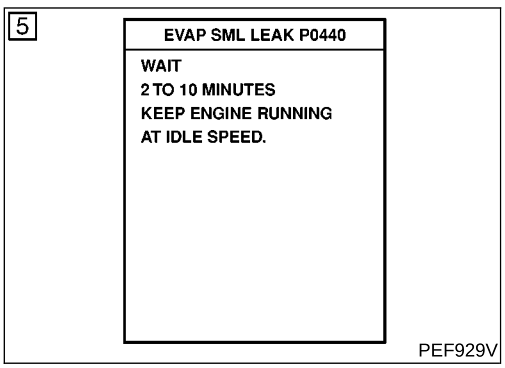
NGEC0868

NOTE:

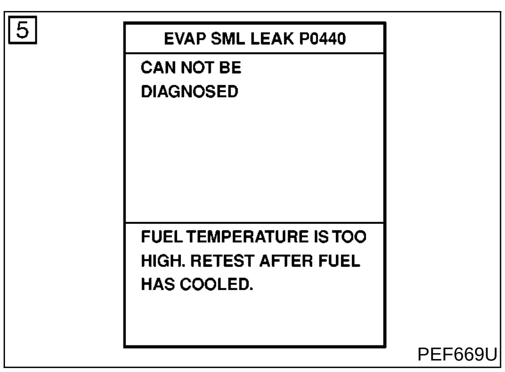
- **If DTC P1448 is displayed with P0440, perform trouble diagnosis for DTC P1448 first.**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.



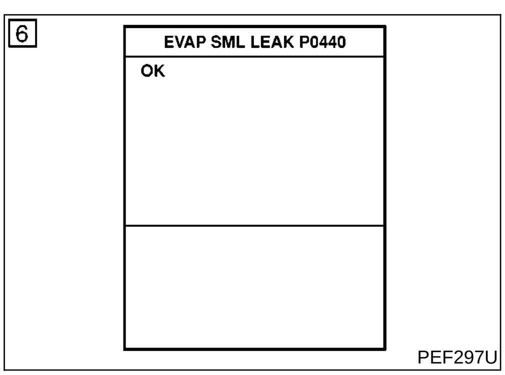
PEF405W



PEF929V



PEF669U



PEF297U

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 - 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:

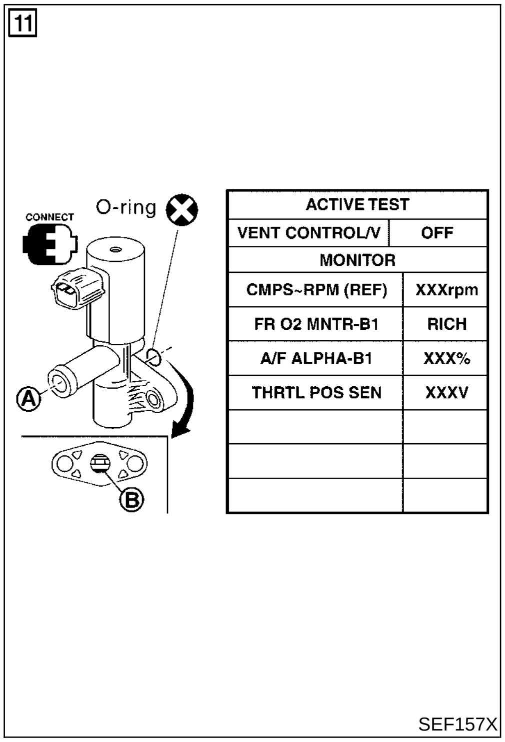
- **If the CONSULT-II screen shown at left is displayed, stop the engine and stabilize the vehicle temperature at 25°C (77°F) or cooler. After "TANK F/TMP SE" becomes less than 30°C (86°F), retest.**
  (Use a fan to reduce the stabilization time.)
- **If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to "Basic Inspection", EC-669.**
- **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 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.

DTC Confirmation Procedure (Cont'd)

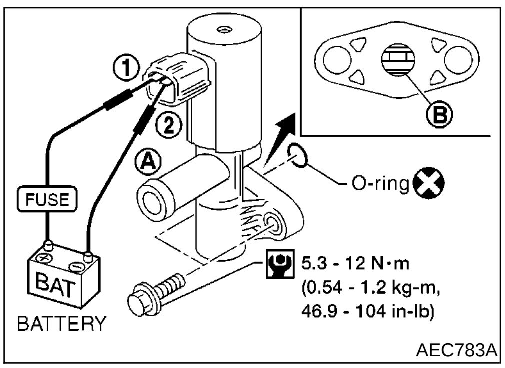


SEF157X

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-1102.
If the result is OK, go to "Diagnostic Procedure" for DTC P0440, EC-949.



AEC783A

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

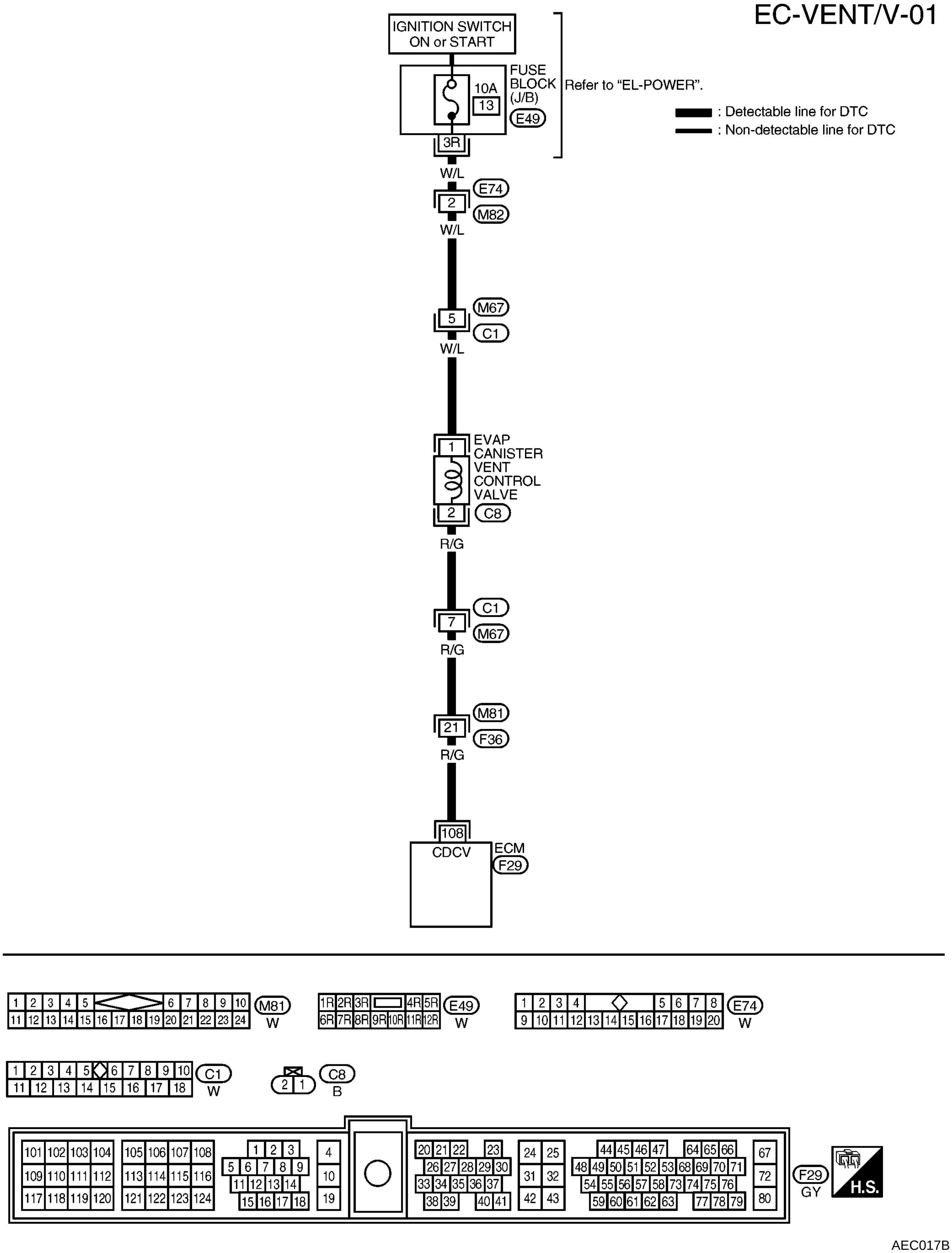
1) Disconnect hose from water separator.
2) Disconnect EVAP canister vent control valve harness connector.
3) Verify the following.

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-1102.
If the result is OK, go to "Diagnostic Procedure" for DTC P0440, EC-949.

Wiring Diagram

NGEC0870

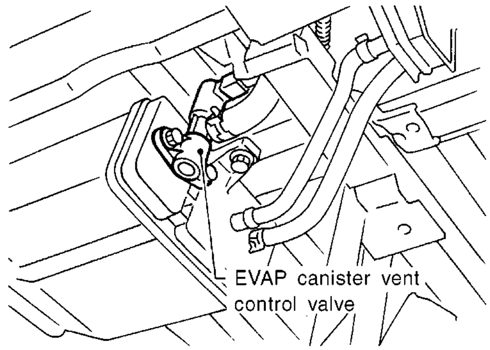


Diagnostic Procedure

NGEC0871

1	CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Check obstructed rubber tube connected to EVAP canister vent control valve.



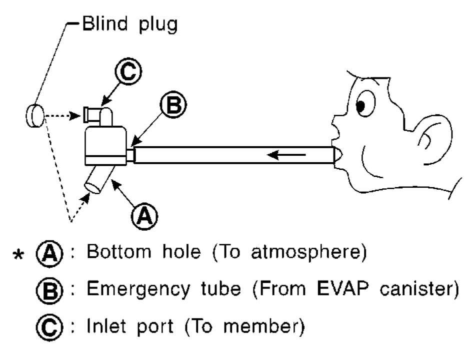
SEF143S

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.



SEF829T

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

NOTE:
- Do not disassemble water separator.

OK or NG

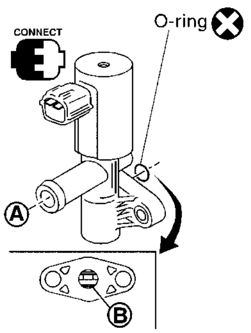
OK	▶	GO TO 3.
NG	▶	Replace water separator.

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	
CMPS~RPM (REF)	XXXrpm
FR O2 MNTR-B1	RICH
A/F ALPHA-B1	XXX%
THRTL POS SEN	XXXV

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

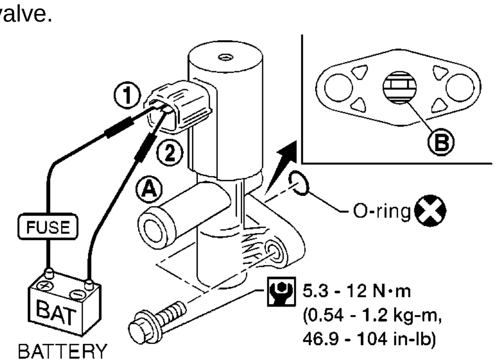
SEF156X

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

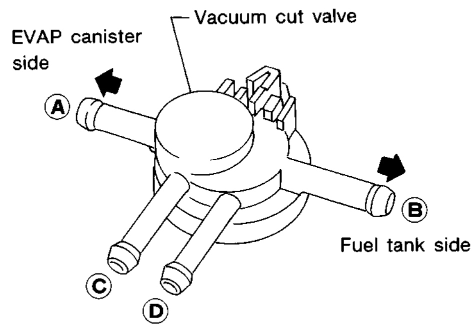
Make sure new O-ring is installed properly.

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

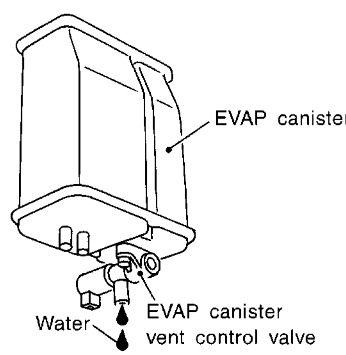
1. Plug port **C** and **D** with fingers.
2. Apply vacuum to port **A** and check that there is no suction from port **B**.
3. Apply vacuum to port **B** and check that there is suction from port **A**.
4. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
5. Open 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

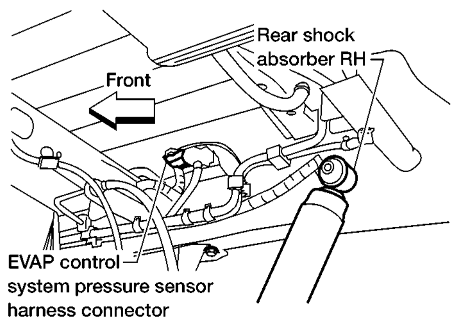
OK	▶	GO TO 8.
NG	▶	Replace the EVAP canister.

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

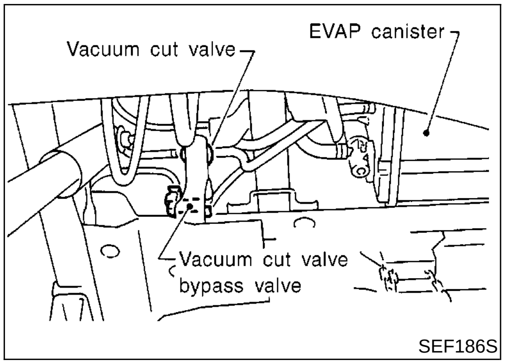
2. Check connectors for water.
   Water should not exist.

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-964. **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-706.	
▶	**INSPECTION END**



SEF186S

Description

NGEC0872

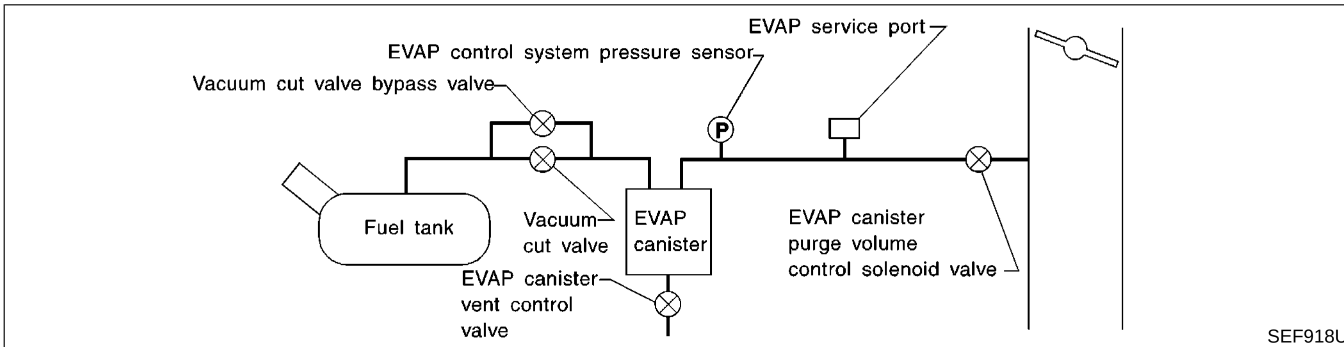
COMPONENT DESCRIPTION

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



SEF918U

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 32 (ECM 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

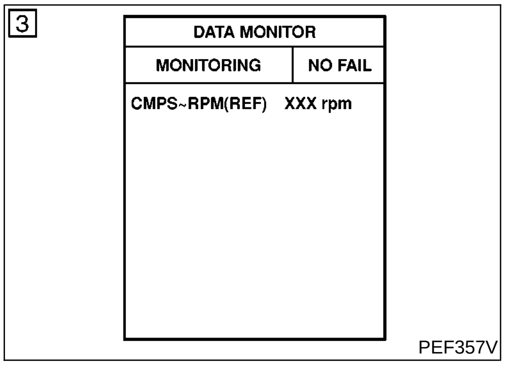
- Harness or connectors
  (The vacuum cut valve bypass valve circuit is open or shorted.)
- Vacuum cut valve bypass valve

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.



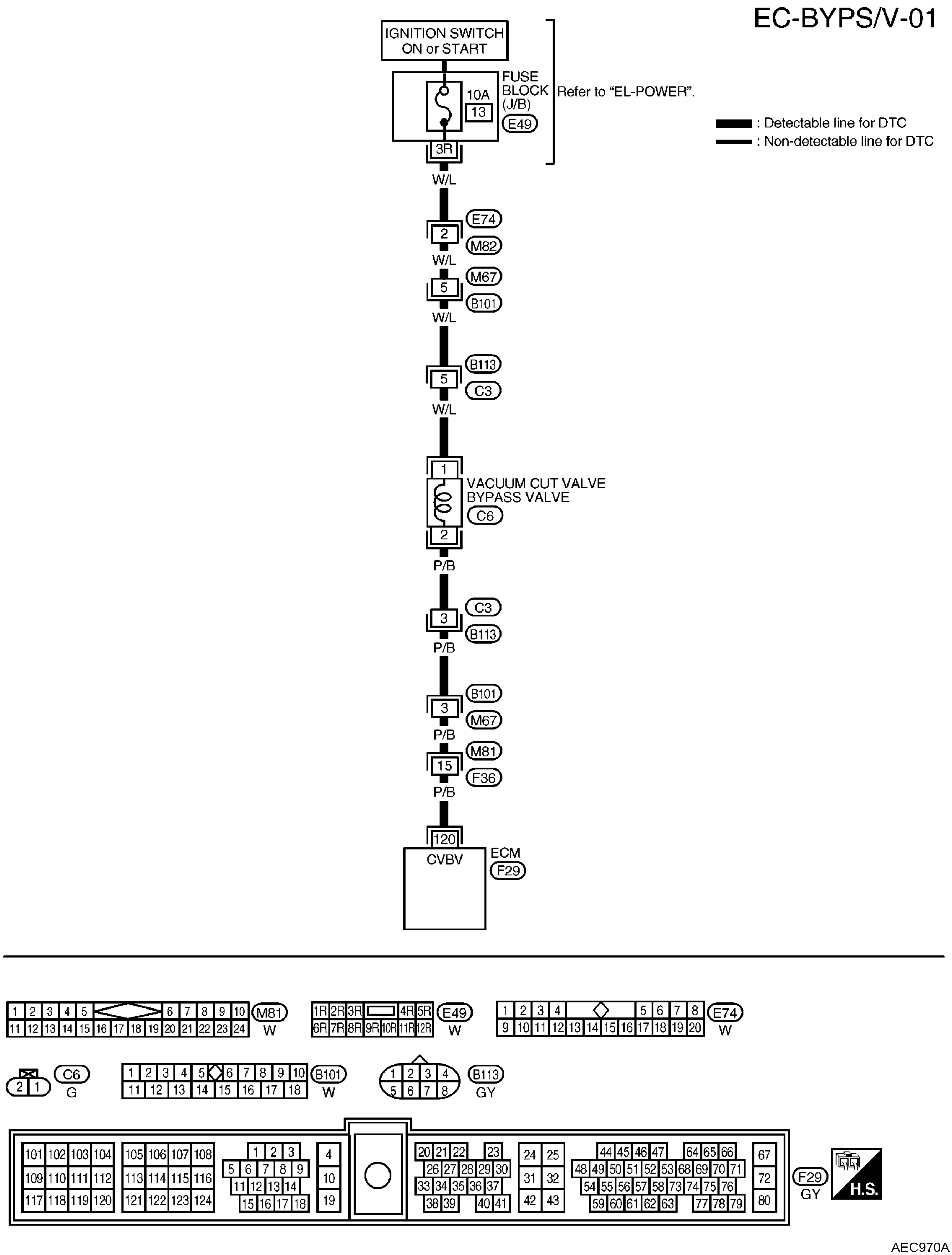
PEF357V

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-1109.

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

Wiring Diagram

NGEC0877



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	ON
MONITOR	
CMPS~RPM(REF)	XXX rpm
FR O2 MNTR-B2	LEAN
FR O2 MNTR-B1	LEAN
A/F ALPHA-B2	XXX %
A/F ALPHA-B1	XXX %
THRTL POS SEN	XXX V

PEF909U

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.

GI
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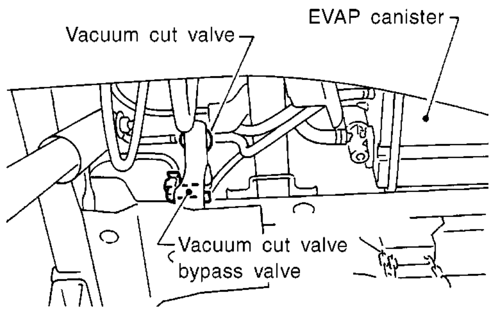
IDX

3	CHECK VACUUM CUT VALVE BYPASS VALUE POWER SUPPLY CIRCUIT

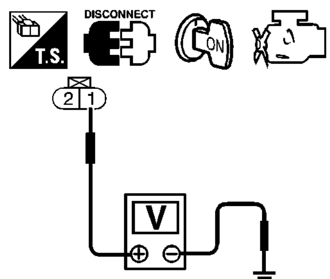
Without CONSULT-II

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, C1
- 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

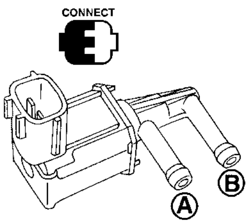
OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors C1, 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.



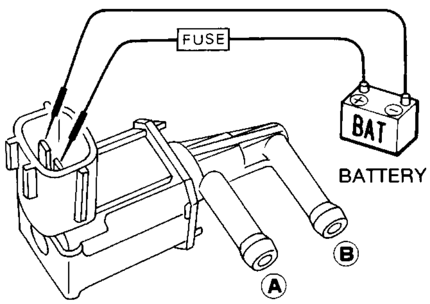
ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
CMPS~RPM (REF)	XXXrpm
FR O2 MNTR-B1	RICH
A/F ALPHA-B1	XXX%
THRTL POS SEN	XXXV

Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

SEF158X

Without CONSULT-II

1. Check air passage continuity and operation delay time under the following conditions.



SEF351Q

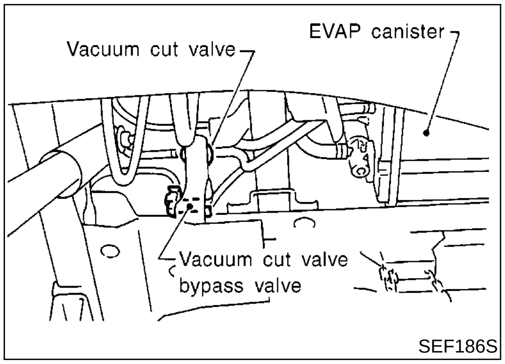
Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

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-706.	
▶	**INSPECTION END**



Description

NGEC0879

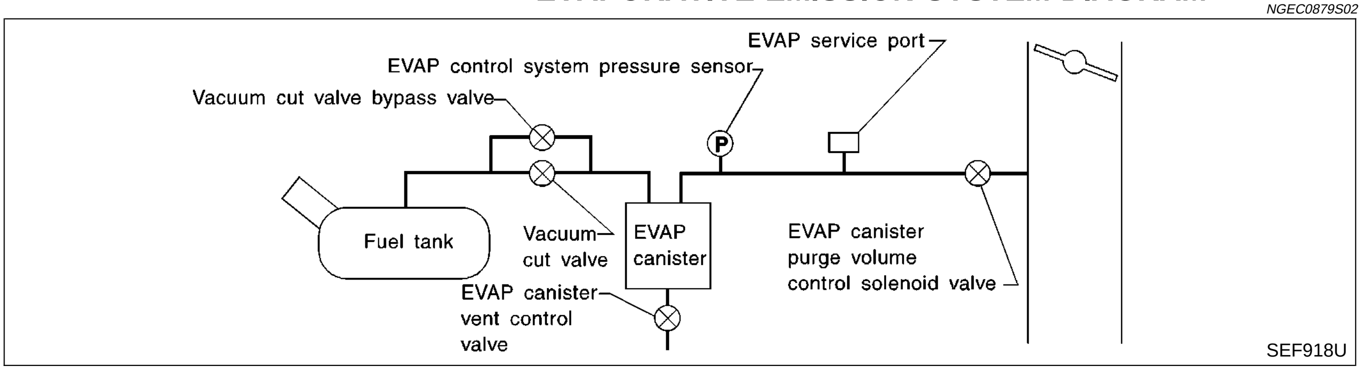
COMPONENT DESCRIPTION

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 32 (ECM 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.

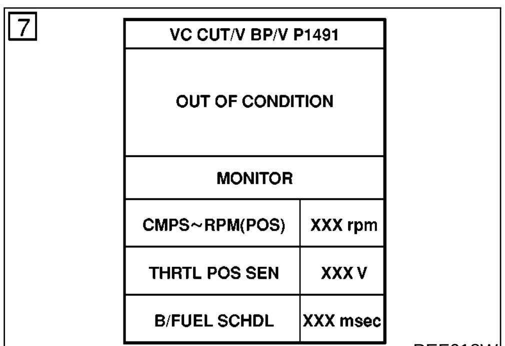
POSSIBLE CAUSE

NGEC0882S01

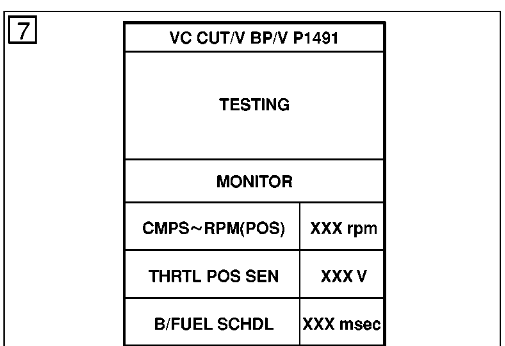
- Vacuum cut valve bypass valve
- Vacuum cut valve
- Bypass hoses for clogging
- EVAP control system pressure sensor and circuit
- EVAP canister vent control valve
- Hose between fuel tank and vacuum cut valve clogged
- Hose between vacuum cut valve and EVAP canister clogged
- EVAP canister
- EVAP purge port of fuel tank for clogging

DTC Confirmation Procedure

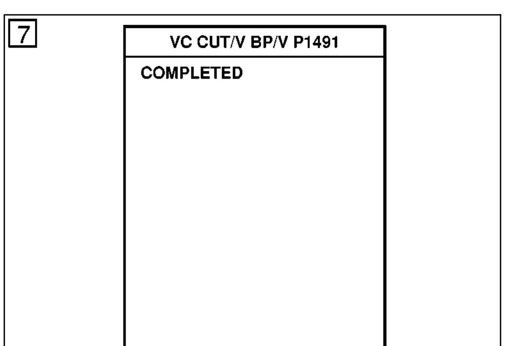
NGEC0883



PEF618W



PEF619W



PEF912U

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

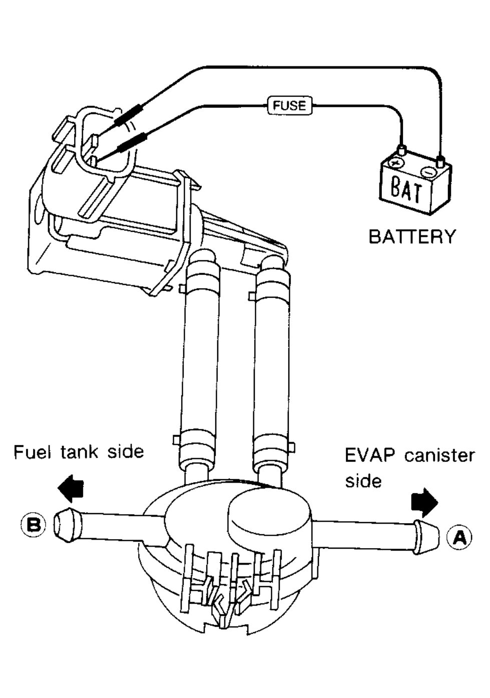
1) Turn ignition switch ON.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch OFF and wait at least 5 seconds.
4) Start engine and let it idle for at least 70 seconds.
5) Select “VC CUT/V BP/V P1491” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
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.)

CMPS·RPM (POS)	500 - 3,000 rpm (A/T models) 500 - 3,300 rpm (M/T models)
Selector lever	Suitable position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
B/FUEL SCHDL	Less than 5 msec

If “TESTING” is not displayed after 5 minutes, retry from step 3.

8) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-1116.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX



Overall Function Check

NGEC0884

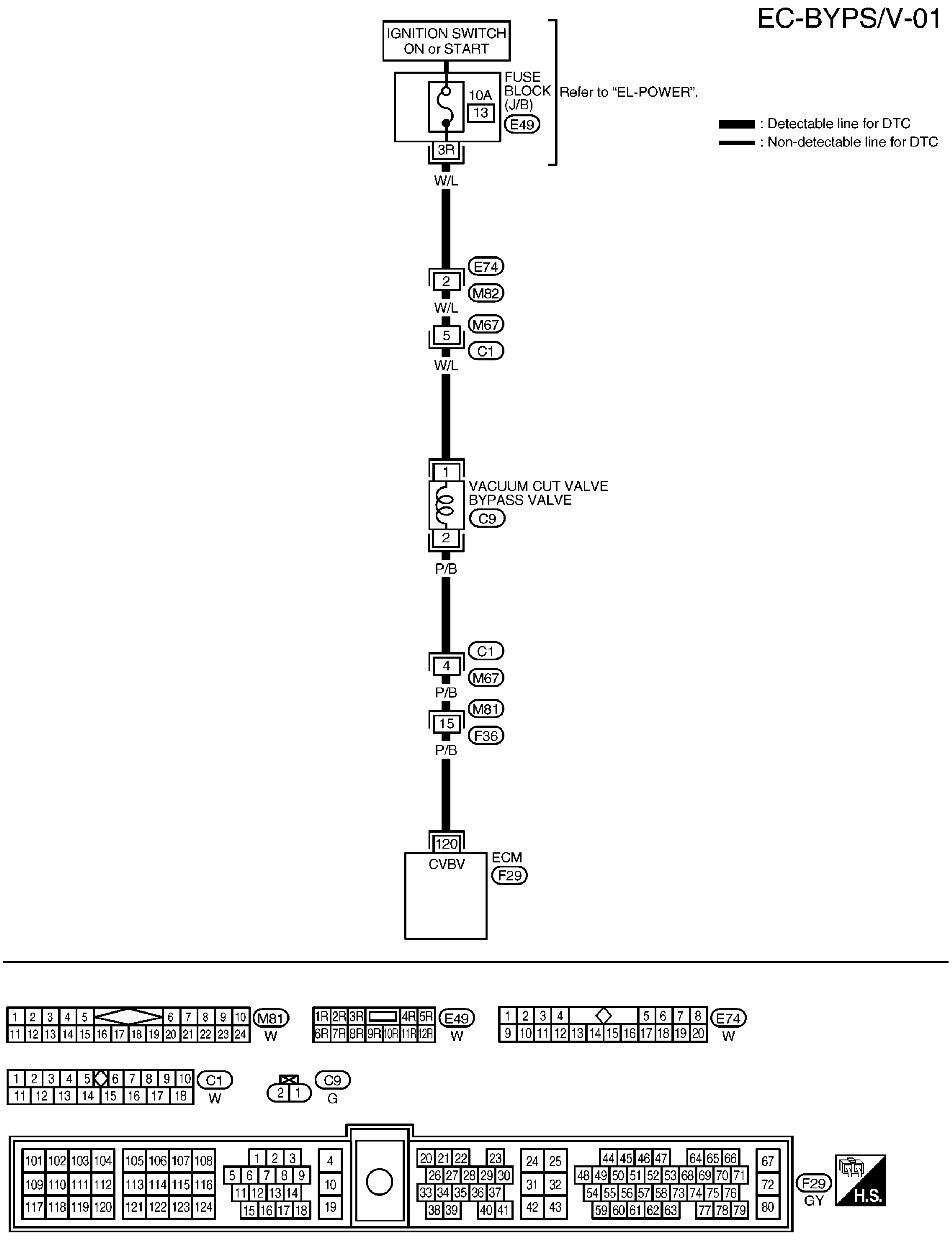
Use this procedure to check the overall function of vacuum cut valve bypass valve. During this check, the 1st trip DTC might not be confirmed.

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-1116.

Wiring Diagram

NGEC0885



AEC019B

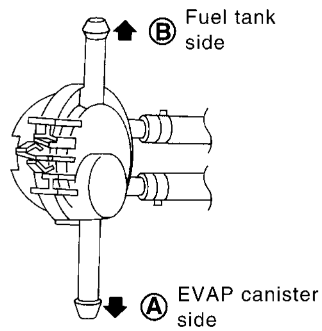
Diagnostic Procedure

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	ON
MONITOR	
CMPS~RPM (REF)	XXXrpm
FR O2 MNTR-B2	LEAN
FR O2 MNTR-B1	LEAN
A/F ALPHA-B2	XXX%
A/F ALPHA-B1	XXX%
THRTL POS SEN	XXXV

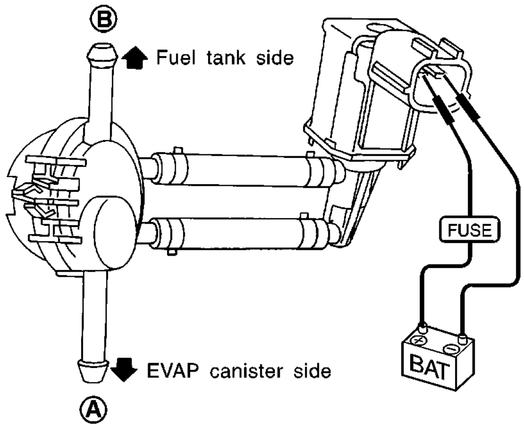
SEF159X

OK or NG	
OK ▶	GO TO 4.
NG ▶	GO TO 5.

3	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION

Without CONSULT-II

1. Turn ignition switch OFF.
2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
3. Apply vacuum to port A and check that there is no suction from port B.
4. Apply vacuum to port B and check that there is suction from port A.
5. Blow air in port B and check that there is a resistance to flow out of port A.
6. Disconnect vacuum cut valve bypass valve harness connector.
7. Supply battery voltage to the terminal.
8. Blow air in port A and check that air flows freely out of port B.
9. Blow air in port B and check that air flows freely out of port A.



SEF914U

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 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-604.

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.

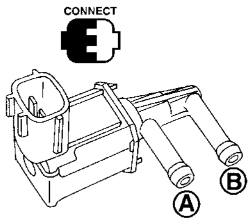
OK or NG

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.



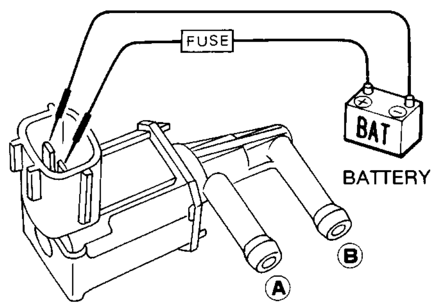
ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
CMPS~RPM (REF)	XXXrpm
FR O2 MNTR-B1	RICH
A/F ALPHA-B1	XXX%
THRTL POS SEN	XXXV

Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

SEF158X

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

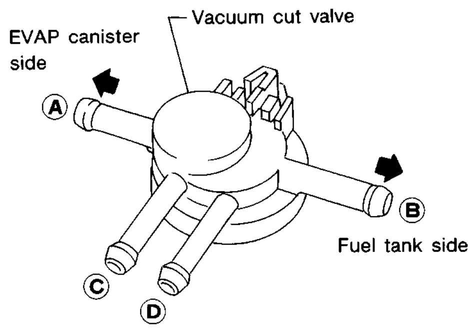
MTBL0242

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace vacuum cut valve bypass valve.

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

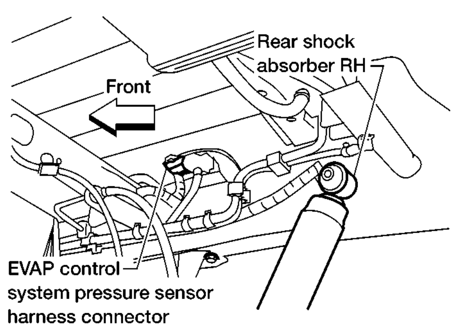
1. Turn ignition switch OFF.
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

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.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to "DTC Confirmation Procedure" for DTC P0450, EC-964.

OK or NG

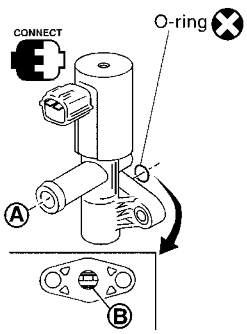
OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

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	
CMPS~RPM (REF)	XXXrpm
FR O2 MNTR-B1	RICH
A/F ALPHA-B1	XXX%
THRTL POS SEN	XXXV

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

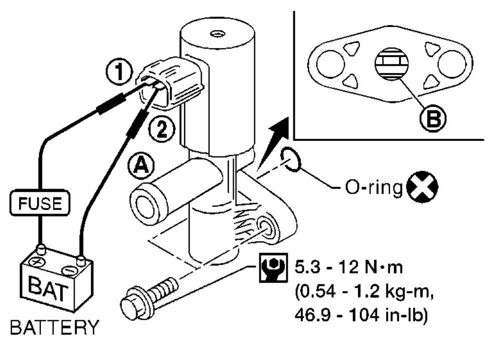
SEF156X

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-706.

	▶	**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 32 (ECM 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

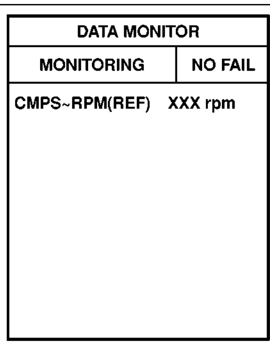
Malfunction is detected when an incorrect signal from TCM (Transmission control module) is sent to ECM.

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



PEF357V

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-1123.

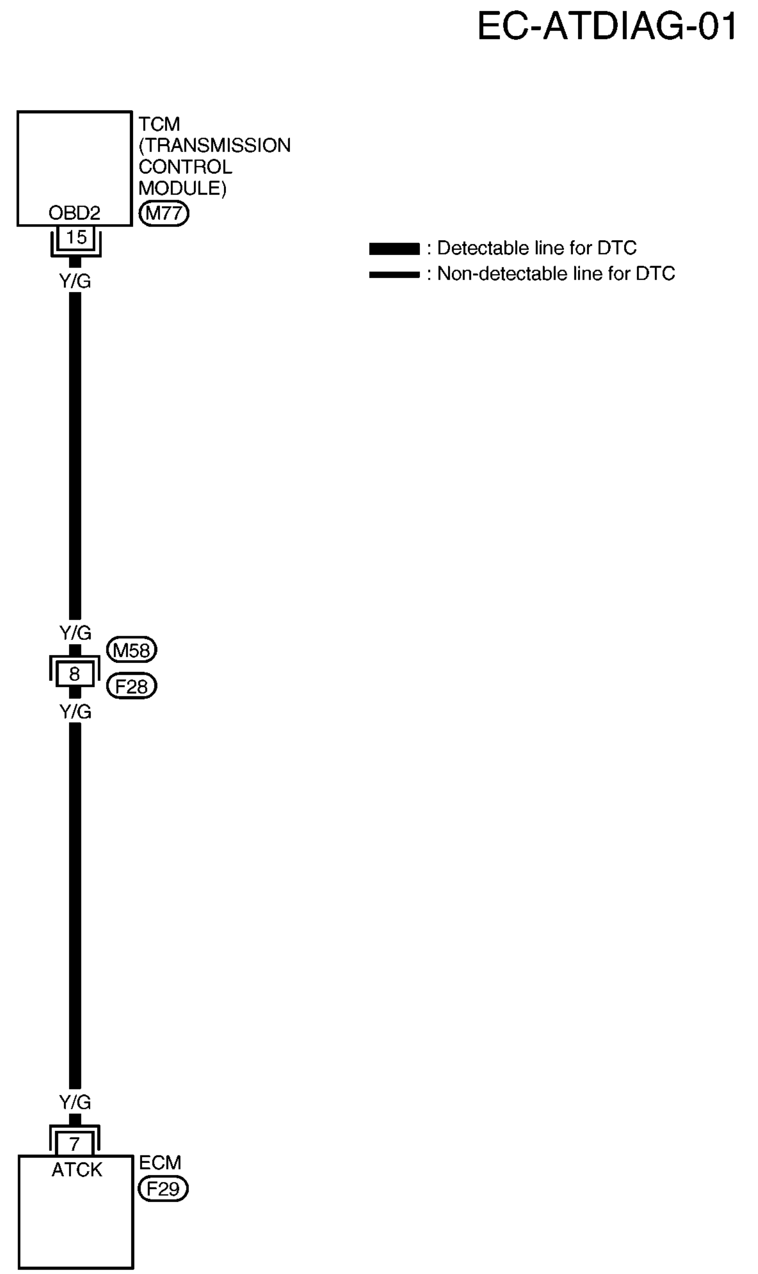
With GST

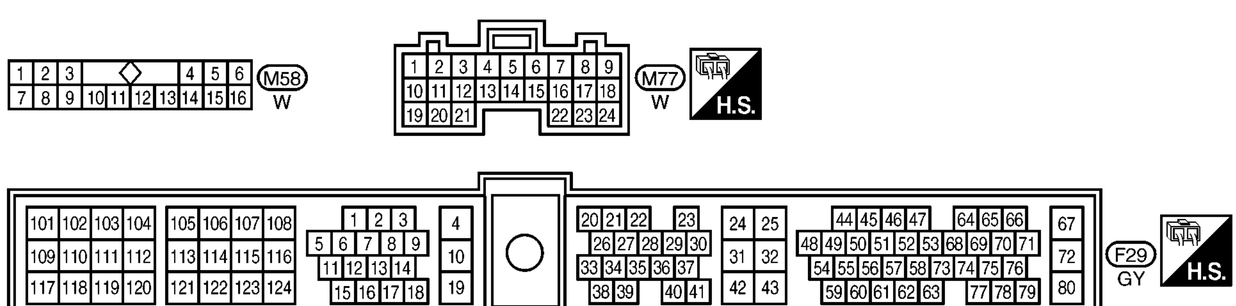
Follow the procedure “With CONSULT-II”.

GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

Wiring Diagram

NGEC0891





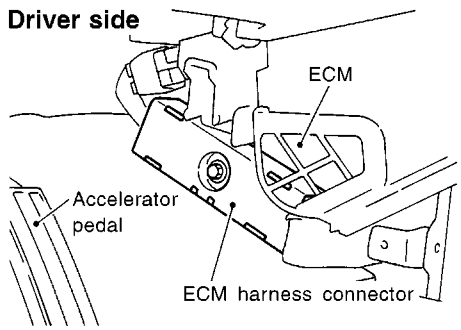
AEC971A

Diagnostic Procedure

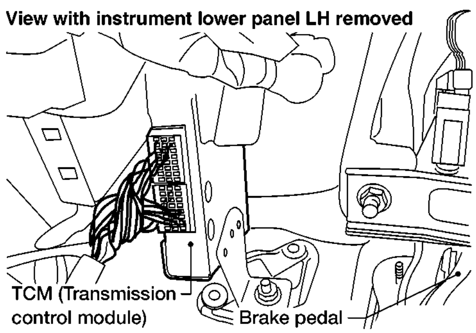
NGEC0892

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

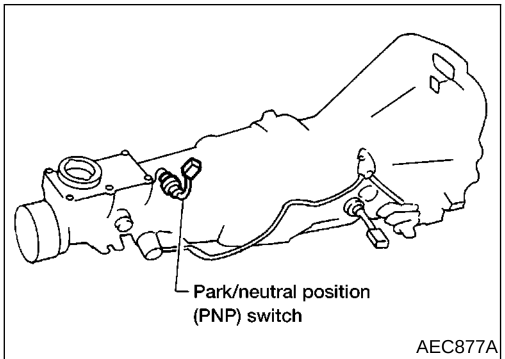
Check the following.
- Harness connectors M58, F28
- Harness for open or short between ECM and TCM (Transmission Control Module)

	▶	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-706.

	▶	**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 32 (ECM 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

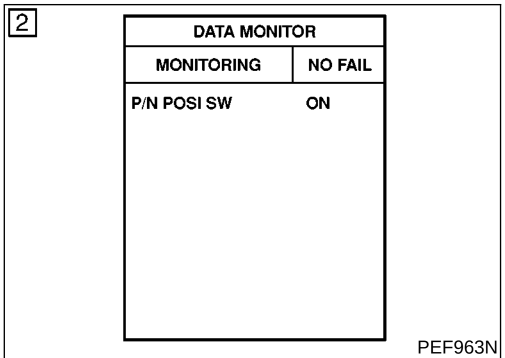
- Harness or connectors
  [The park/neutral position (PNP) switch circuit is open or shorted.]
- Park/neutral position (PNP) switch

DTC Confirmation Procedure

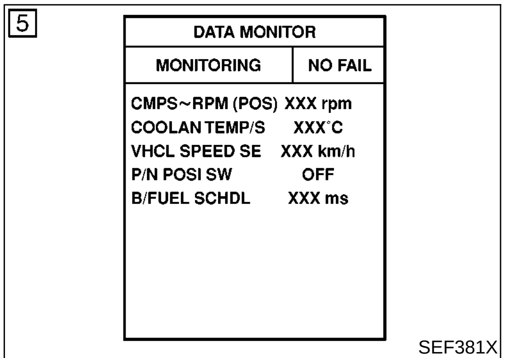
NGEC0897

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.



PEF963N



SEF381X

With CONSULT-II

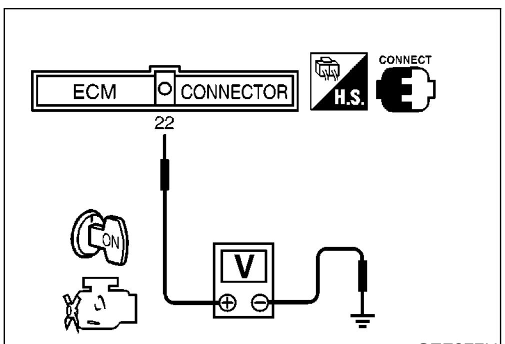
1) Turn ignition switch ON.
2) Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-II. Then check the "P/N POSI SW" signal under the following conditions.

Position (Selector lever)	Known good signal
"N" and "P" position	ON
Except the above position	OFF

If NG, go to "Diagnostic Procedure", EC-1127.
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.

CMPS·RPM (POS)	1,600 - 2,650 rpm (A/T models) 1,700 - 2,700 rpm (M/T models)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	1.6 - 6.5 msec (A/T models) 1.9 - 5.5 msec (M/T models)
VHCL SPEED SE	71 - 100 km/h (44 - 62 MPH)
Selector lever	Suitable position

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-1127.



SEF877U

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

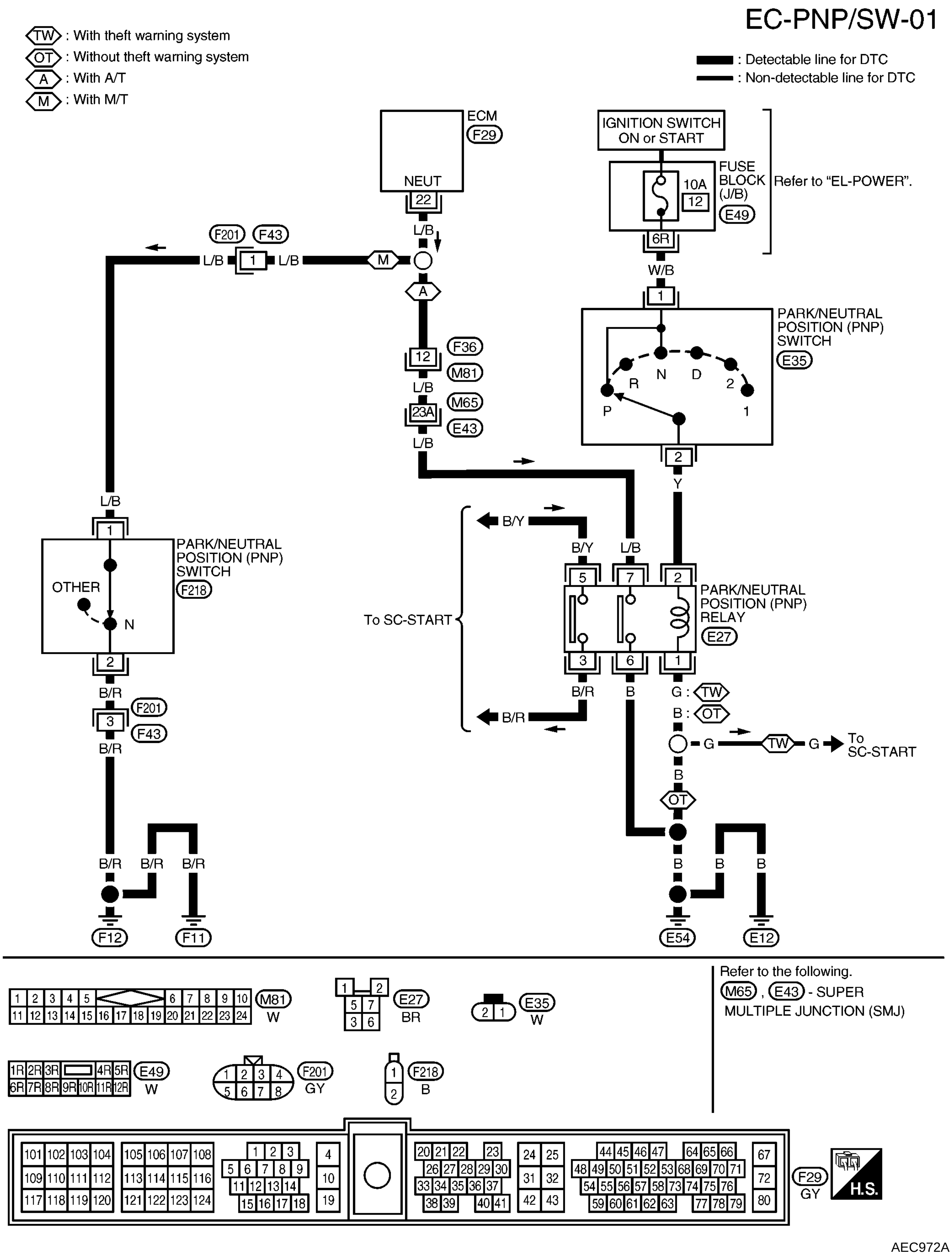
1) Turn ignition switch ON.
2) Check voltage between ECM terminal 22 and body ground under the following conditions.

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-1127.

Wiring Diagram

NGEC0899



Diagnostic Procedure

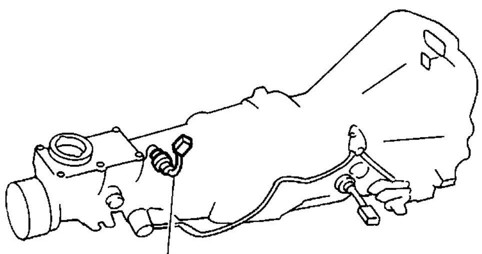
NGEC0900

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 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 F201, F43
- Harness for open or short between park/neutral position (PNP) switch and engine ground

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

3	CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

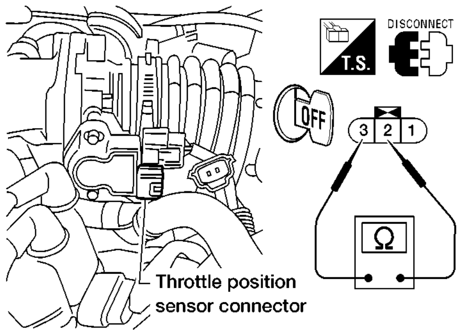
6	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.	
▶	INSPECTION END

FOR A/T MODELS

=NGEC0900S02

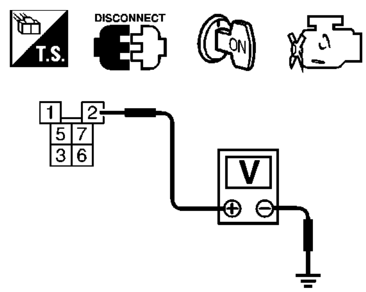
1 CHECK PNP SWITCH POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) relay.



AEC665A

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

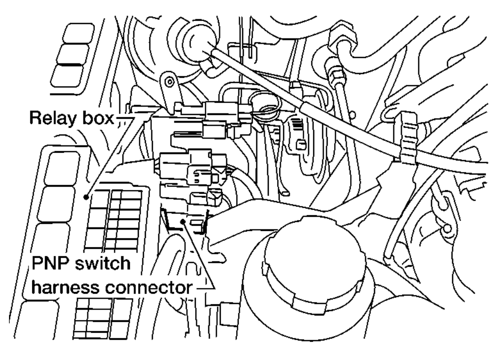
Voltage: Battery voltage

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 OFF. 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.

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.

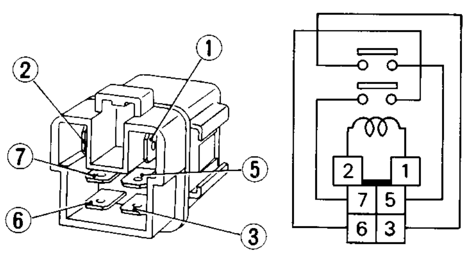
5	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH	
Refer to "Component Inspection", ***AT-104***. **OK or NG**		
OK	▶	GO TO 11.
NG	▶	Replace park/neutral position (PNP) switch.

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 ground and 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 ground 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-6***. **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-706.	
▶	**INSPECTION END**

System Description

NGEC0901

COOLING FAN CONTROL

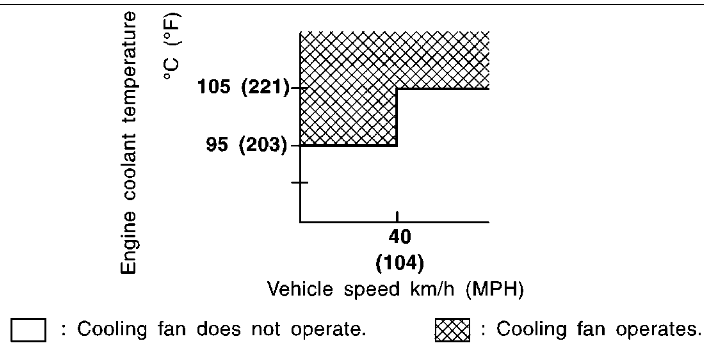
NGEC0901S01

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



SEF666W

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 32 (ECM 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-27*. Also, replace the engine oil.

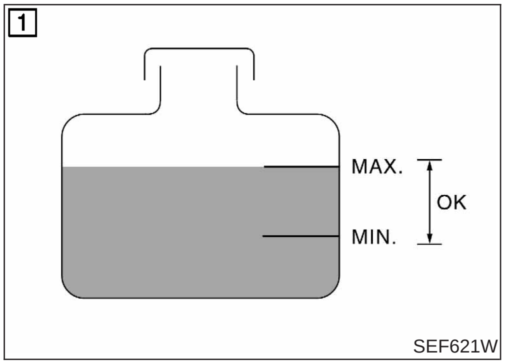
1) **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to “Anti-freeze Coolant Mixture Ratio”, “RECOMMENDED FLUIDS AND LUBRICANTS”, *MA-16*.**
2) **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

POSSIBLE CAUSE

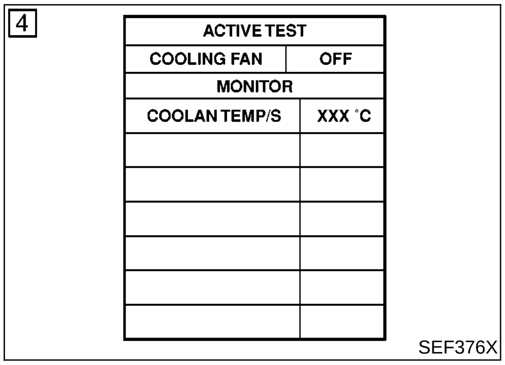
NGEC0904S01

- Harness or connectors
  (The cooling fan circuit is open or shorted.)
- Cooling fan
- Radiator hose
- Radiator
- Radiator cap
- Water pump
- Thermostat

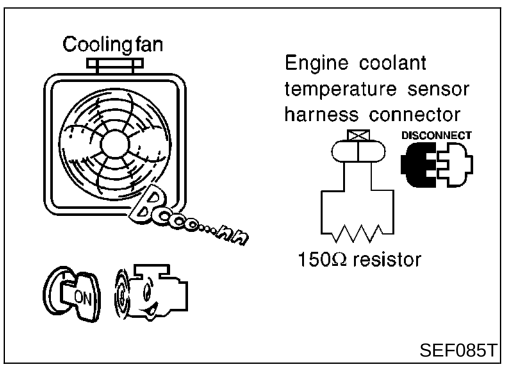
For more information, refer to “MAIN 12 CAUSES OF OVERHEATING”, EC-1143.



SEF621W



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

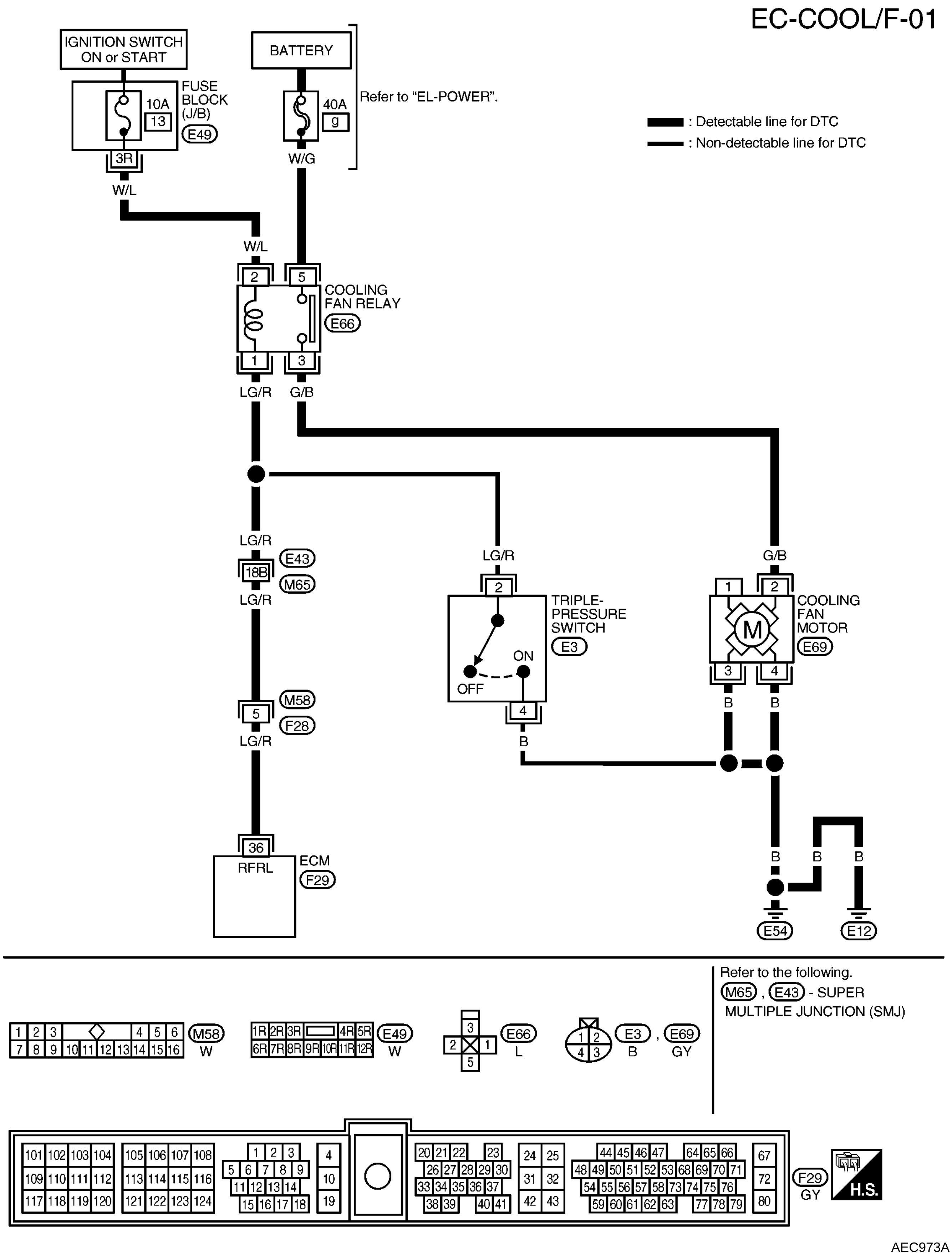
1) Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to "Diagnostic Procedure", EC-1136.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-1136.
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-1136.

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-1136.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "Diagnostic Procedure", EC-1136.
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-1136.

Wiring Diagram

NGEC0906



Diagnostic Procedure

NGEC0907

1	INSPECTION START

Do you have CONSULT-II?

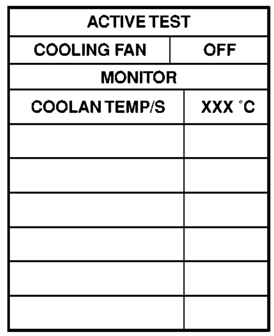
Yes or No

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 (Low speed).



SEF376X

Does cooling fan rotate?

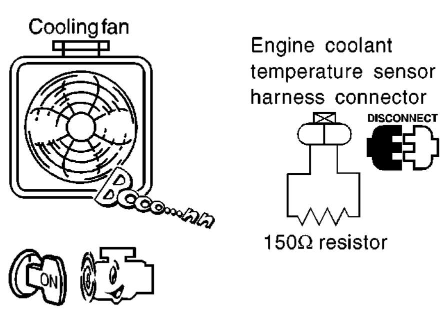
Yes or No

Yes	▶	GO TO 4.
No	▶	GO TO 9.

3	CHECK COOLING FAN OPERATION

Without CONSULT-II

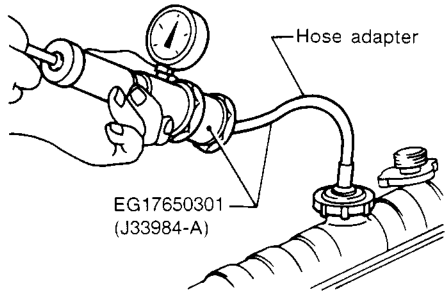
1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.
3. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
4. Start engine and make sure that cooling fan operates.

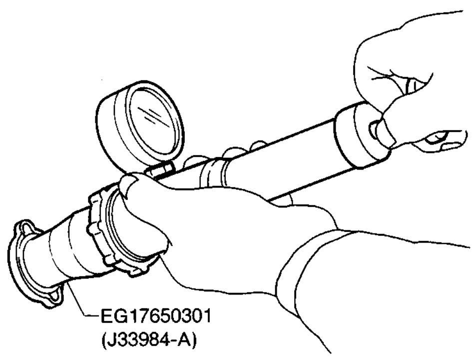


SEF085T

OK or NG

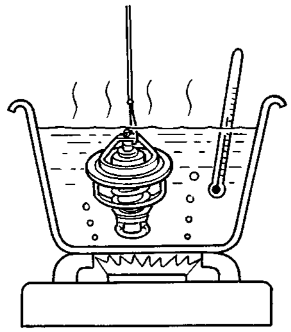
OK	▶	GO TO 4.
NG	▶	GO TO 9.

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/cm², 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/cm², 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.

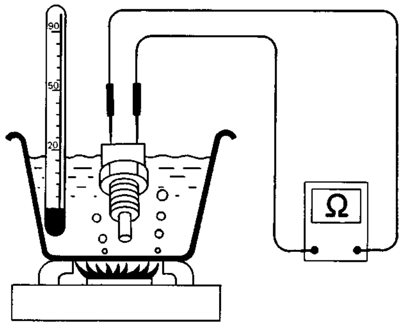
For details, refer to "Thermostat", ***LC-29***.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace thermostat

7	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.

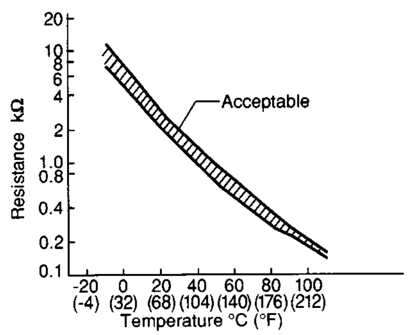


SEF152P

<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.

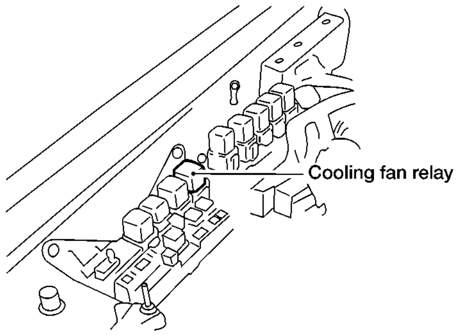
8	CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-1143.

	▶	**INSPECTION END**

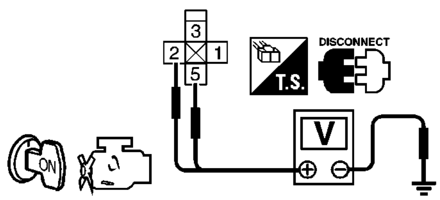
9	CHECK COOLING FAN RELAY POWER SUPPLY CIRCUIT

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.

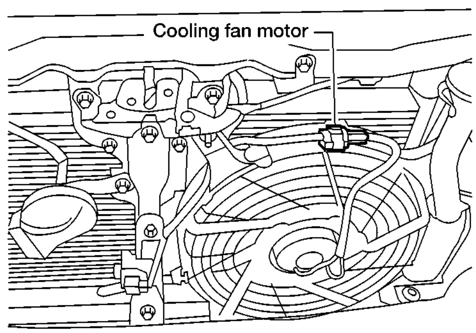
10	DETECT MALFUNCTIONING PART

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.

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.

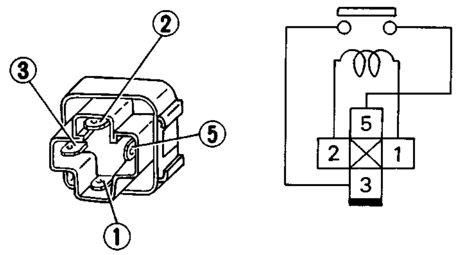
13	DETECT MALFUNCTIONING PART

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

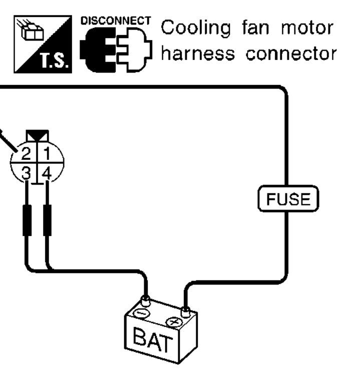
OK ▶	GO TO 15.
NG ▶	Replace cooling fan relay.

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-706.

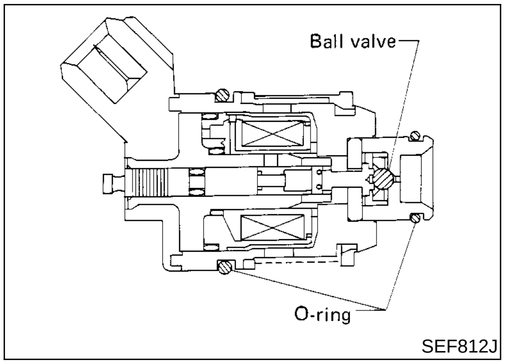
▶	**INSPECTION END**

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 LUBRI-CANTS”,***MA-14***.
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See “Changing Engine Coolant”, “ENGINE MAINTENANCE”, ***MA-27***.
	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 DIAG-NOSIS FOR OVER-HEAT” EC-1132.
OFF	8	• Combustion gas leak	• Color checker chemi-cal tester 4 Gas ana-lyzer	Negative	—
ON*3	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driv-ing and idling	See “Changing Engine Coolant”, “ENGINE MAINTENANCE”, ***MA-27***.
OFF*4	10	• Coolant return from reservoir tank to radia-tor	• Visual	Should be initial level in reservoir tank	See “ENGINE MAINTENANCE”, ***MA-26***.
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maxi-mum distortion (warping)	See “Inspection”, “CYLIN-DER HEAD DISTORTION”, ***EM-88***.
	12	• Cylinder block and pis-tons	• Visual	No scuffing on cylinder walls or piston	See “Inspection”, “CYLIN-DER BLOCK DISTOR-TION AND WEAR”, ***EM-105***.

*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***.



SEF812J

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 needle valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.

CONSULT-II Reference Value in Data Monitor Mode

NGEC0910

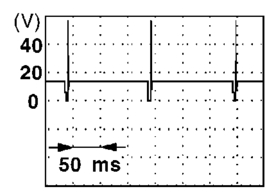
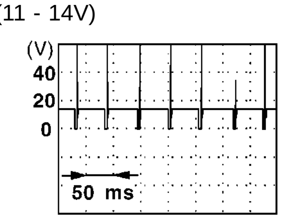
Specification data are reference values.

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

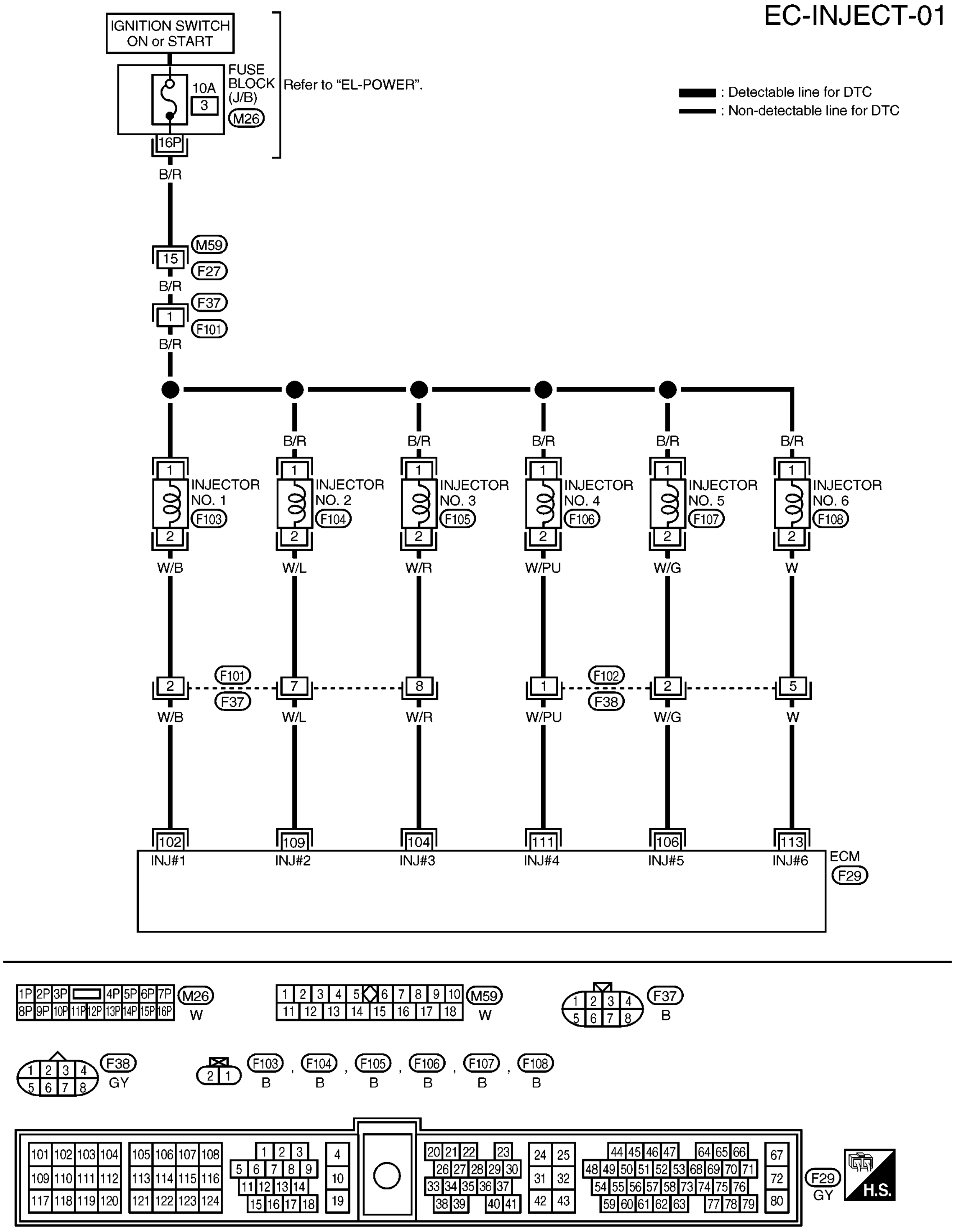
NGEC0911

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



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.

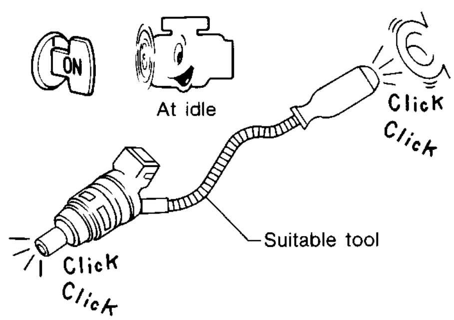
ACTIVE TEST	
POWER BALANCE	
MONITOR	
CMPS~RPM(REF)	XXX rpm
MAS AIR/FL SE	XXX V
IACV-AAC/V	XXX %

PEF389V

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

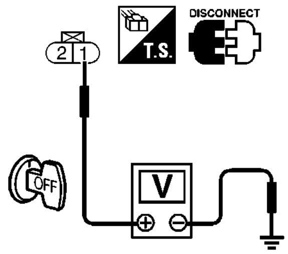
Clicking noise should be heard.

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.

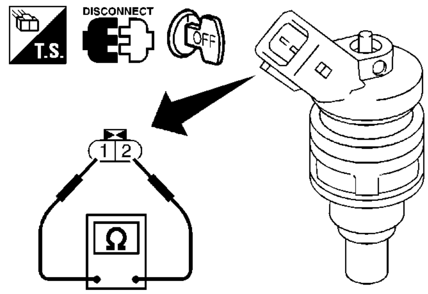
OK or NG

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.

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-706.		
	▶	**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

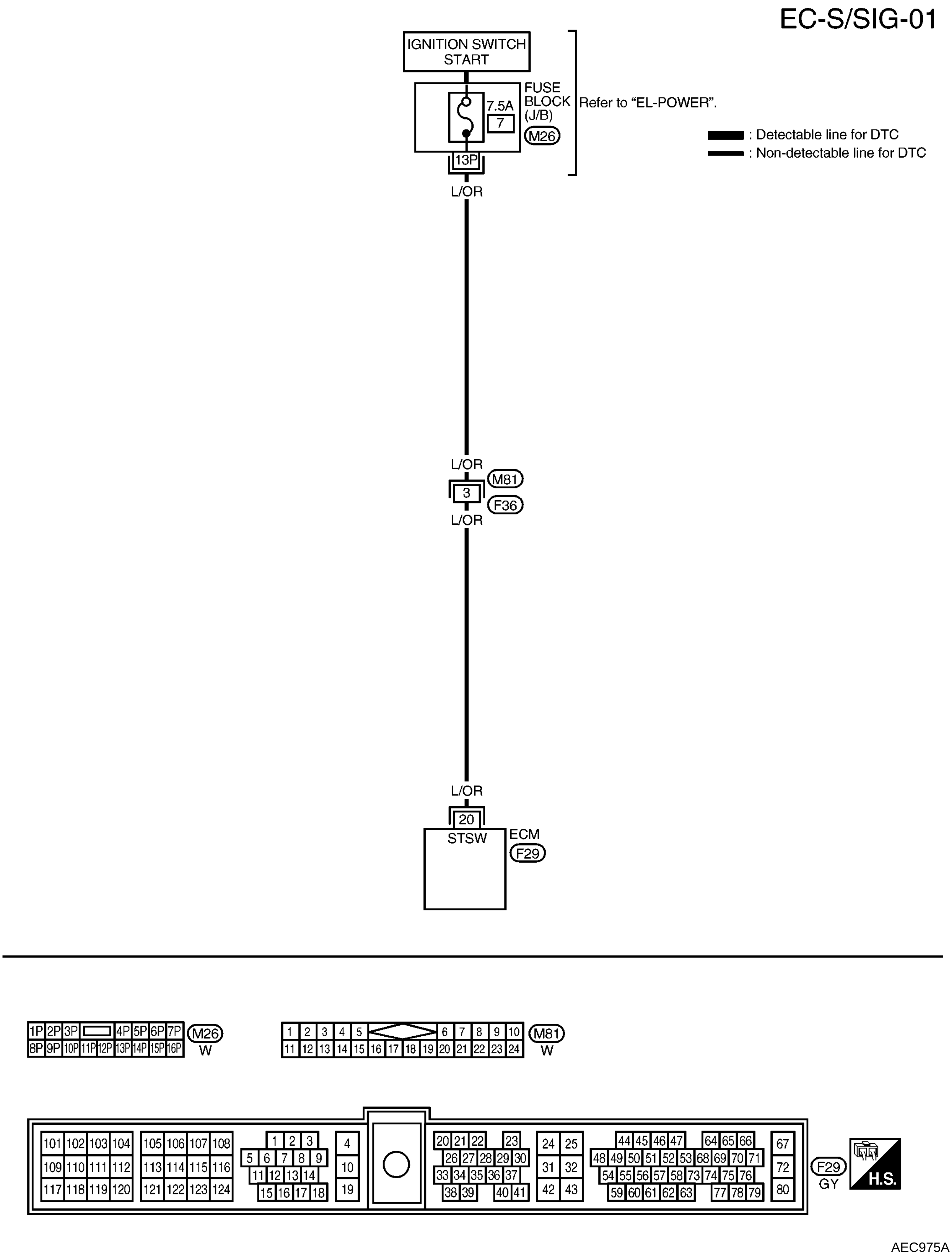
NGEC0915

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



Diagnostic Procedure

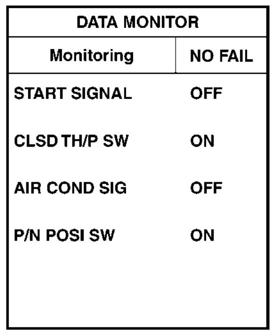
NGEC0917

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.



PEF111P

Condition	“START SIGNAL”
Ignition switch “ON”	OFF
Ignition switch “START”	ON

MTBL0147

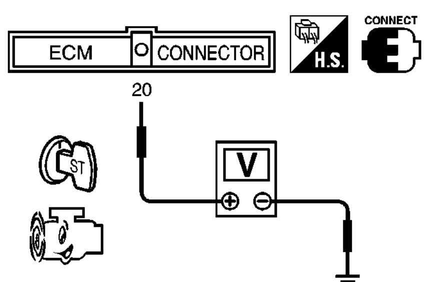
OK or NG

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.

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-6***.

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-706.	
▶	**INSPECTION END**

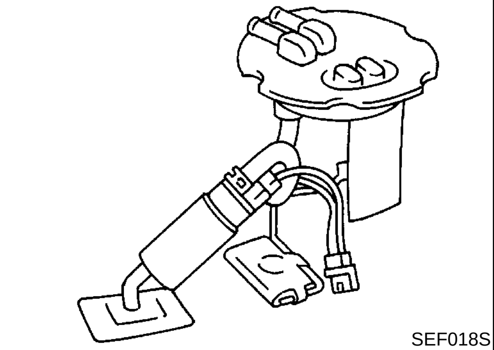
System Description

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

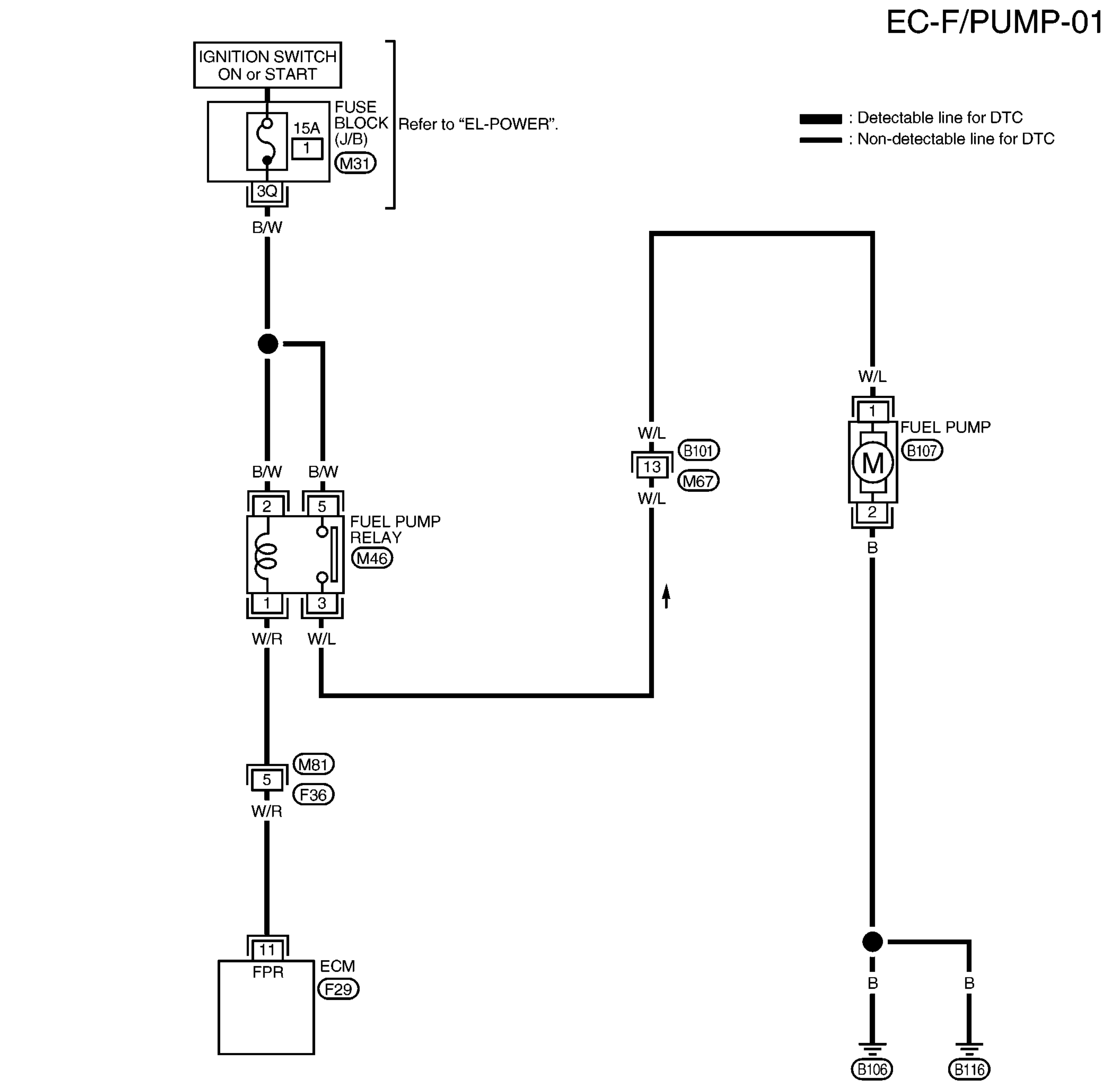
NGEC0921

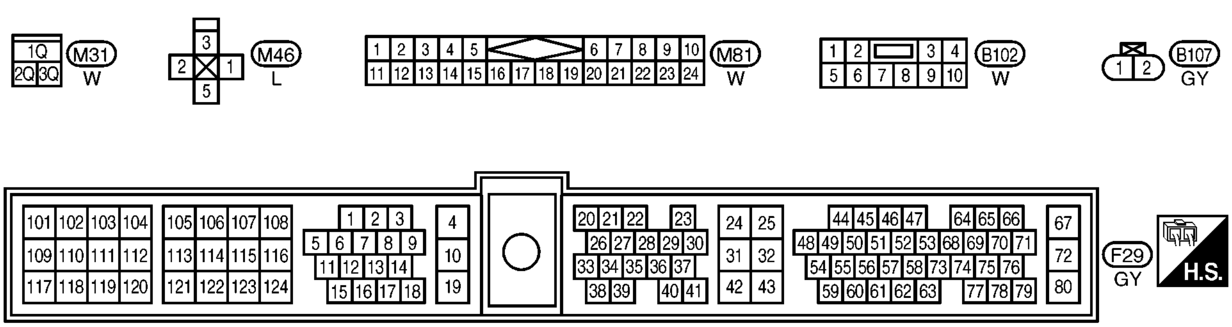
Specification data are reference values and are measured between each terminal and 32 (ECM ground).

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





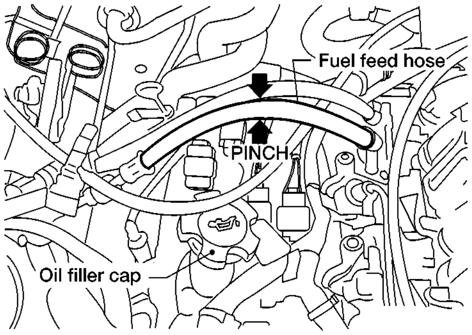
AEC976A

Diagnostic Procedure

NGEC0923

1	CHECK OVERALL FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with fingers.



AEC663A

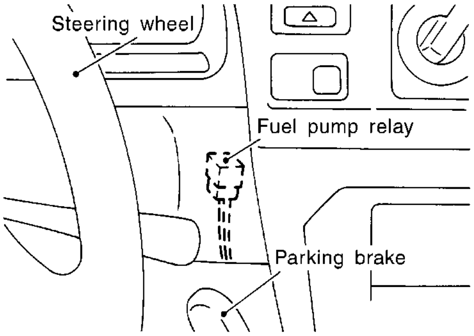
Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned ON.

OK or NG

OK ▶	**INSPECTION END**
NG ▶	GO TO 2.

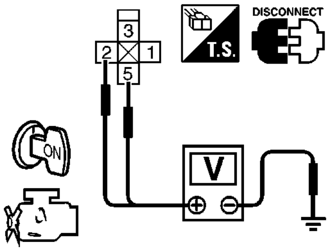
2	CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT

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

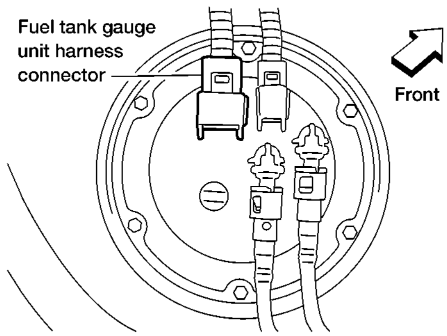
OK or NG

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, C1 ● 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

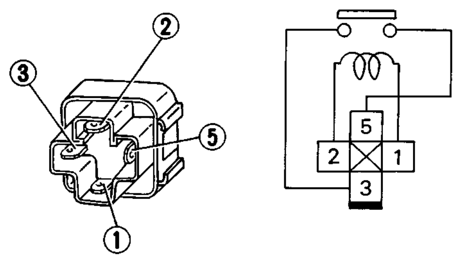
1. Reconnect fuel pump relay, fuel pump harness connector and ECM harness connector.
2. Turn ignition switch ON.
3. Turn fuel pump relay “ON” and “OFF” in “ACTIVE TEST” mode with CONSULT-II and check operating sound.

ACTIVE TEST	
FUEL PUMP RELAY	ON
MONITOR	
CMPS~RPM	XXX rpm

SEF380X

Without CONSULT-II

Check continuity between terminals 3 and 5.

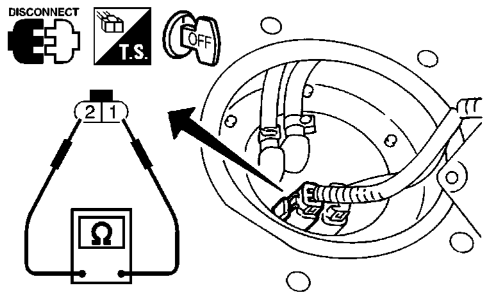


SEF511P

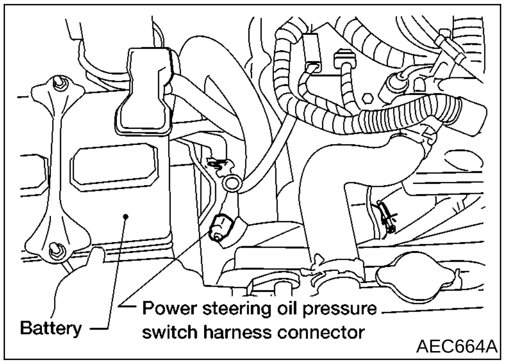
12V direct current supply between terminals 1 and 2
Continuity exists
No current supply
Continuity does not exist

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-706.		
	▶	**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 32 (ECM 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

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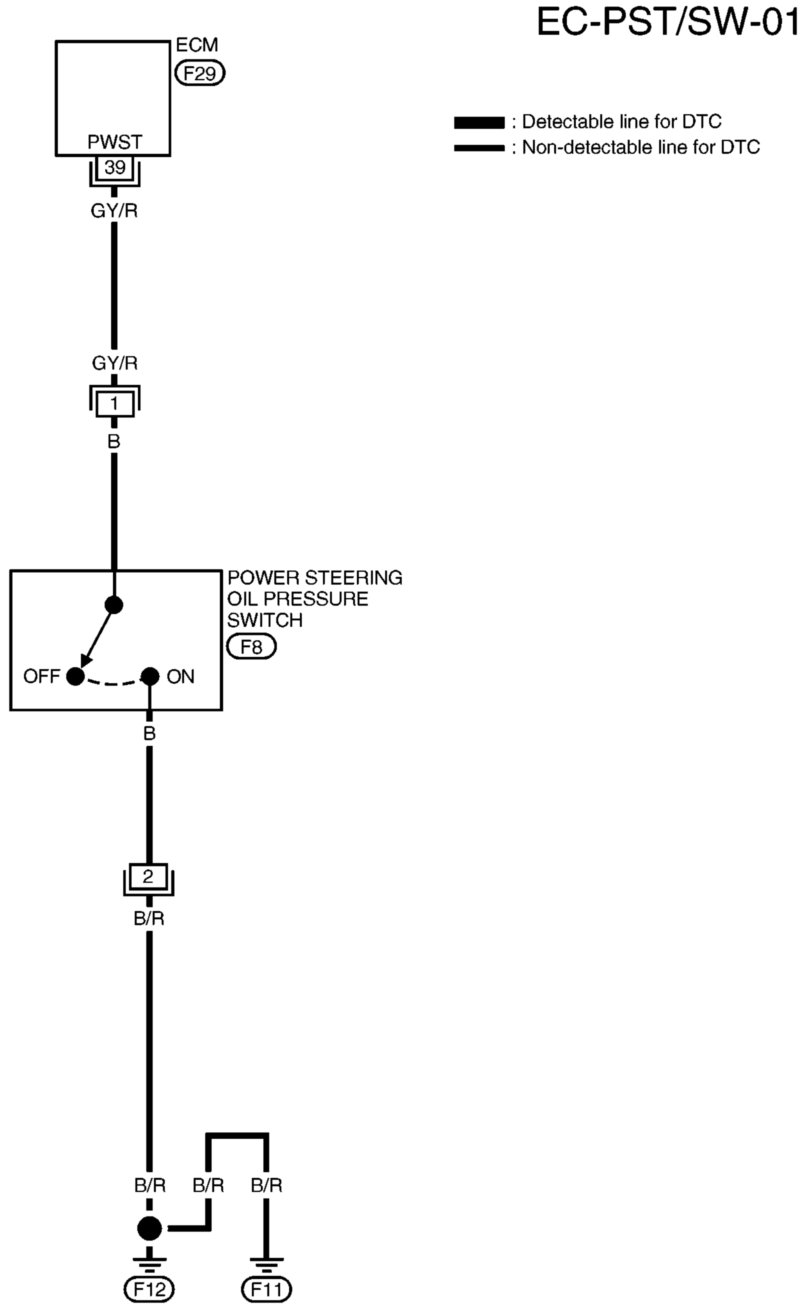
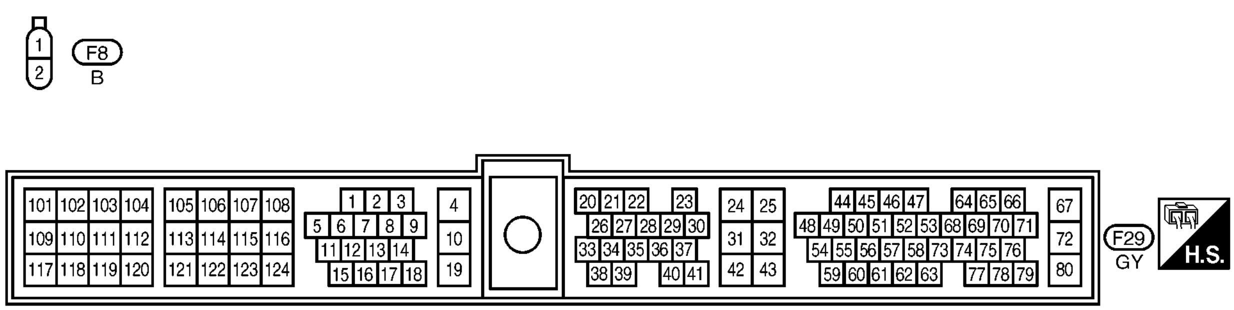
Wiring Diagram

NGEC0927





AEC977A

Diagnostic Procedure

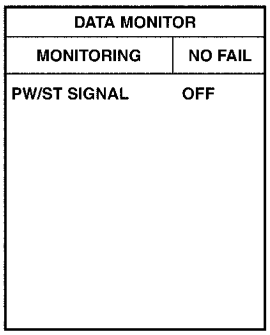
NGEC0928

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.



Condition	“PW/ST SIGNAL”
Steering is neutral position	OFF
Steering is turned to full position	ON

SEF184X

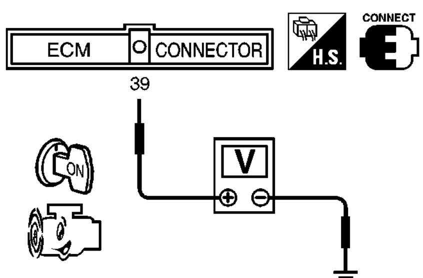
OK or NG

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

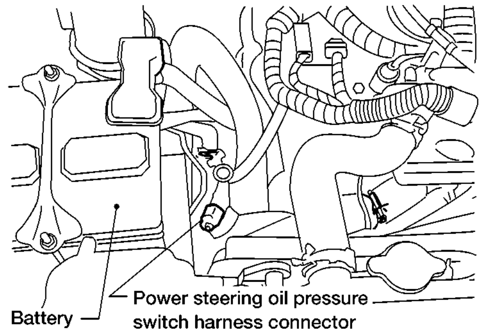
MTBL0145

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.



AEC664A

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 ground and short to power.

OK or NG

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

5 CHECK POWER STEERING OIL PRESSURE SWITCH INPUT SIGNAL CIRCUIT

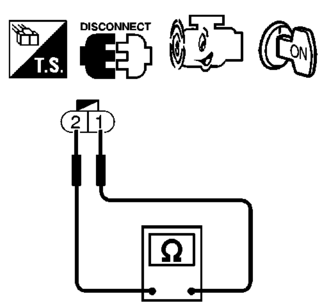
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 39 and switch terminal 1. Refer to Wiring Diagram.
   Continuity should exist.
3. Also check harness for short to ground and short to power.

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

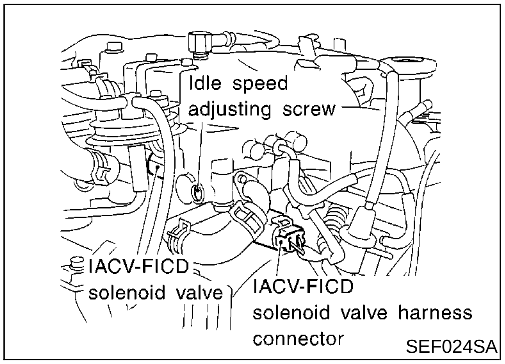
Conditions	Continuity
Steering wheel is being fully turned	Yes
Steering wheel is not being turned	No

MTBL0254

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace power steering oil pressure switch.

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-706.	
▶	INSPECTION END



SEF024SA

Component Description

NGEC0929

When the air conditioner is on, the IACV-FICD solenoid valve supplies additional air to adjust to the increased load. For more information, refer to “FAST IDLE CONTROL DEVICE (FICD)”, ***HA-79***.

ECM Terminals and Reference Value

NGEC0930

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

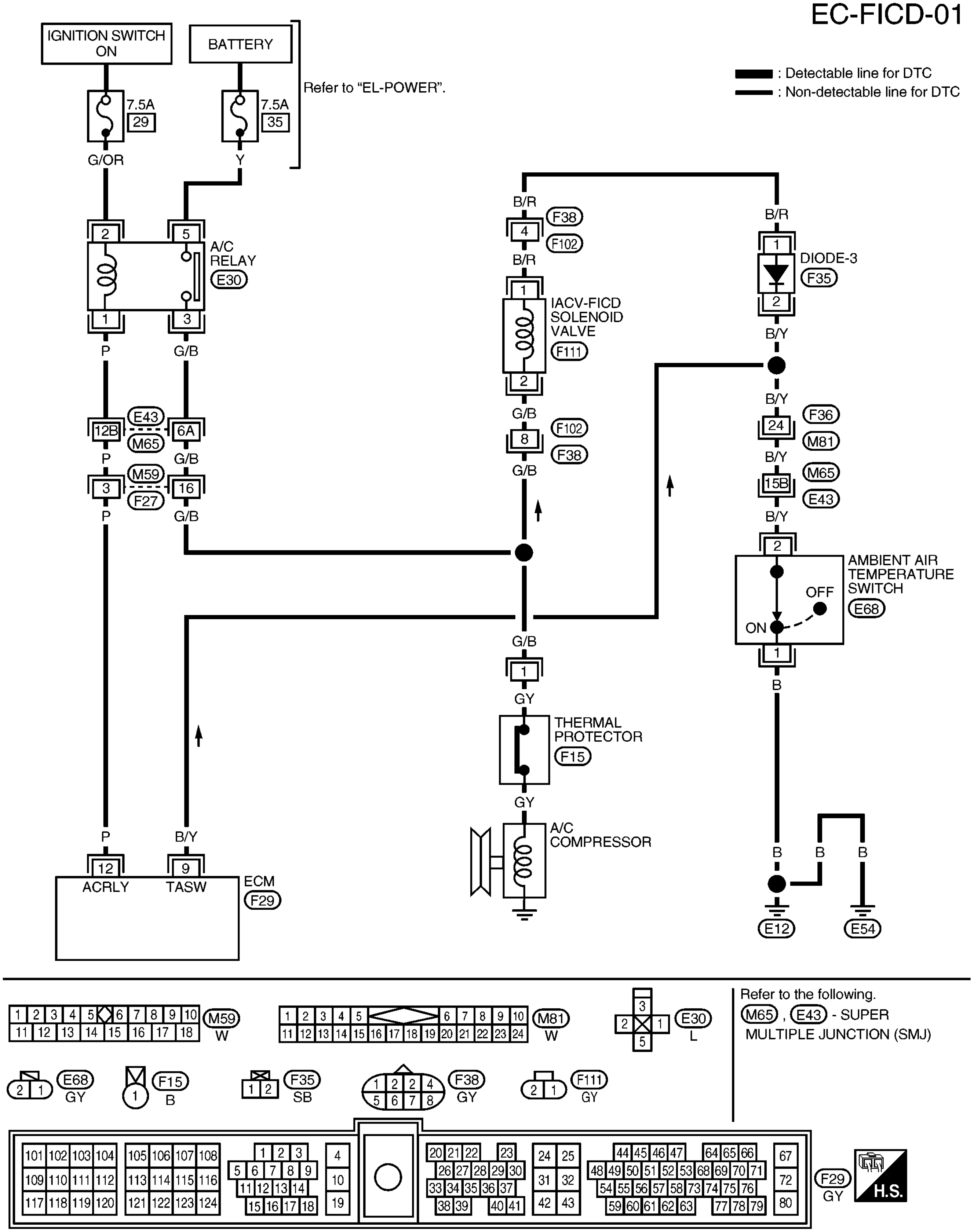
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
9	B/Y	Ambient air temperature switch	**[Engine is running]** ● Idle speed ● Ambient air temperature is above 25°C (77°F) ● Air conditioner is operating	0V
			[Engine is running] ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air 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



AEC978A

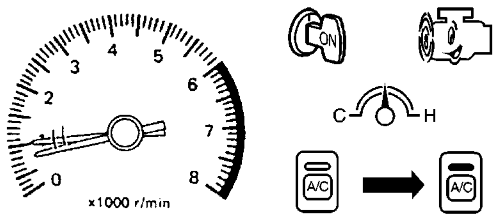
GI MA EM LC EC FE CL MT AT TF PD AX SU BR ST RS BT HA SC EL IDX

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

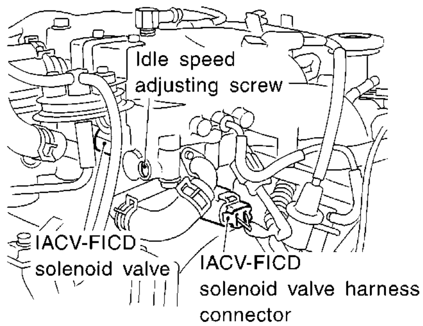
Check if air conditioner compressor functions normally.

OK or NG

OK	▶	GO TO 3.
NG	▶	Refer to "Symptom Table", "TROUBLE DIAGNOSES", ***HA-26***.

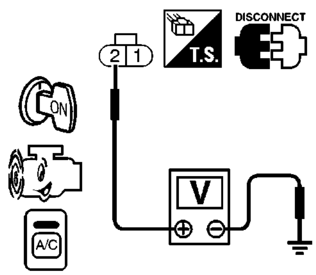
3	CHECK IACV-FICD SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn air conditioner switch and blower fan switch OFF.
2. Stop engine.
3. Disconnect IACV-FICD solenoid valve harness connector.



SEF024SA

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

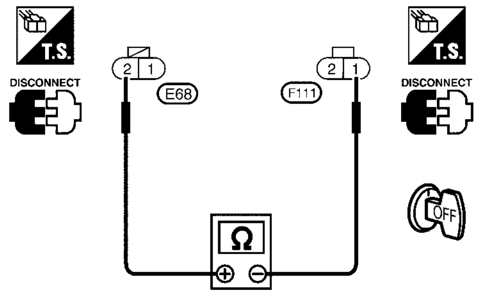
1. Turn ignition switch OFF.
2. Disconnect ambient air temperature switch harness connector.
3. Check harness continuity between switch terminal 1 and body ground.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to ground and short to power.

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.

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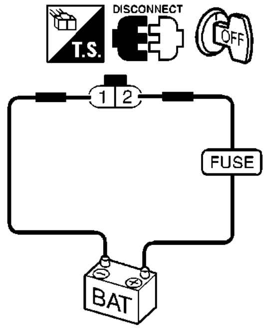
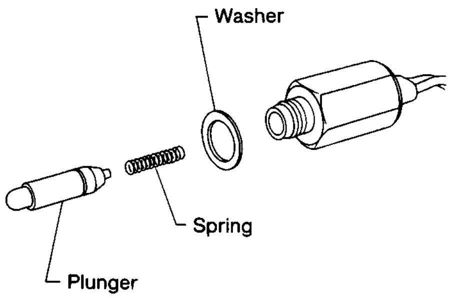
8	CHECK IACV-FICD SOLENOID VALVE

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.

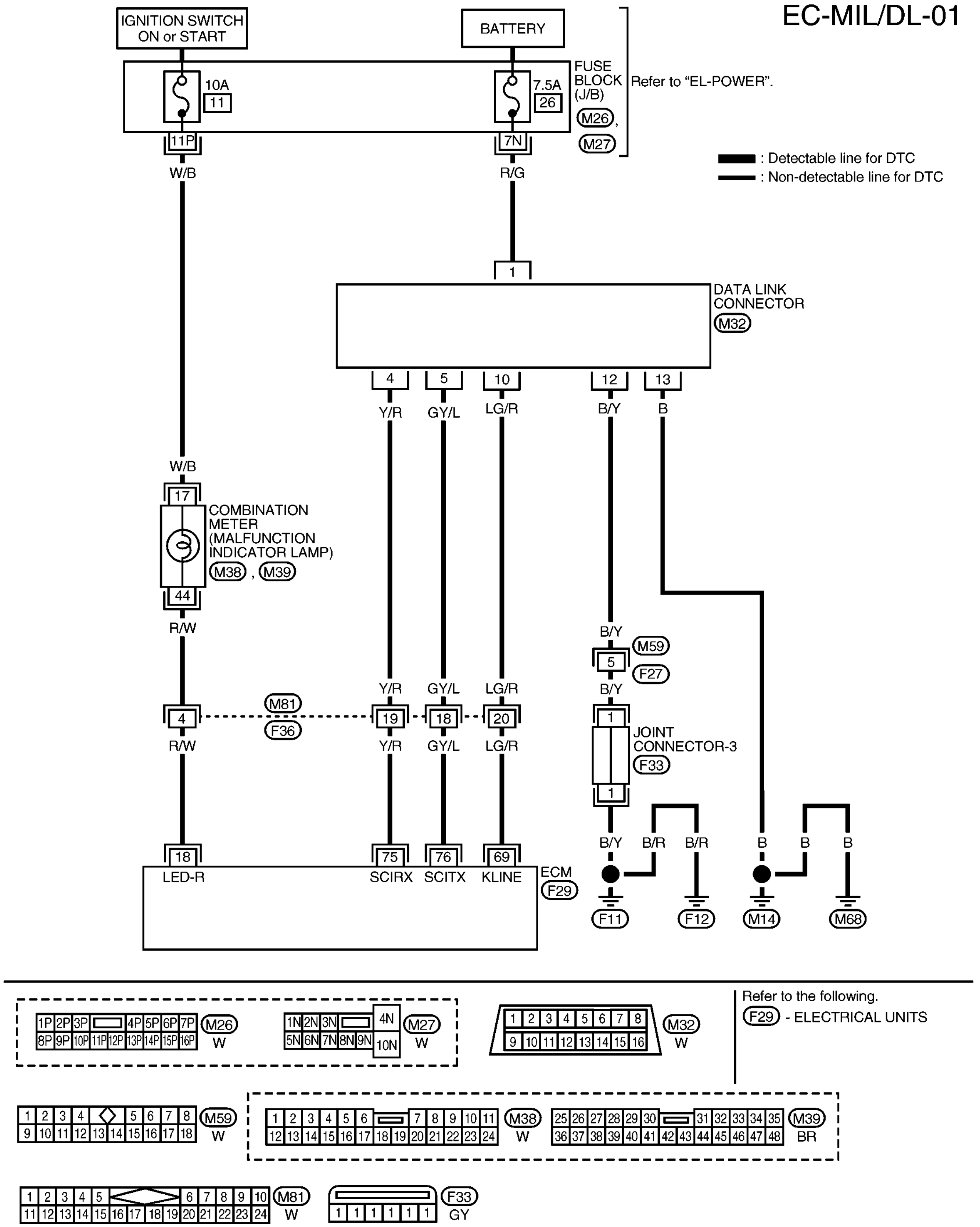
9	CHECK INTERMITTENT INCIDENT

Refer to “TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT”, EC-706.

	▶	**INSPECTION END**

Wiring Diagram

NGEC0933



AEC979A

Fuel Pressure Regulator

NGEC0934

Fuel pressure at idling kPa (kg/cm², psi)		
	Vacuum hose is connected	Approximately 235 (2.4, 34)
	Vacuum hose is disconnected	Approximately 294 (3.0, 43)

Idle Speed and Ignition Timing

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	15°±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

EGR Temperature Sensor (If So Equipped)

NGEC0939

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

Front Heated Oxygen Sensor Heater

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

Resistor

NGEC0944

Resistance [at 25°C (77°F)]	Approximately 2.2 kΩ

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

Rear Heated Oxygen Sensor Heater

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