ENGINE CONTROL SYSTEM

SECTION EC

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NDEC0001

ALPHABETICAL INDEX FOR DTC

NDEC0001S01

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*1: 1st trip DTC No. is the same as DTC No.
*2: This DTC is displayed with CONSULT-II only.
*3: When the fail-safe operation occurs, the MIL illuminates.
*4: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

P NO. INDEX FOR DTC

NDEC0001S02

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P0733	A/T 3RD GR FNCTN	***AT-139***
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DTC*1	Items (CONSULT-II screen terms)	Reference page
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P1706	P-N POS SW/CIRCUIT	EC-477
P1760	O/R CLUTCH SOL/CIRC	***AT-192***

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

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

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

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

Supplemental Restraint System (SRS) “AIR BAG”

NDEC0002

The Supplemental Restraint System “AIR BAG”, used along with a seat belt, helps 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), a diagnosis sensor unit, 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.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow harness connectors.**

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

NDEC0003

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-6* “Description”.
- **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 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.**

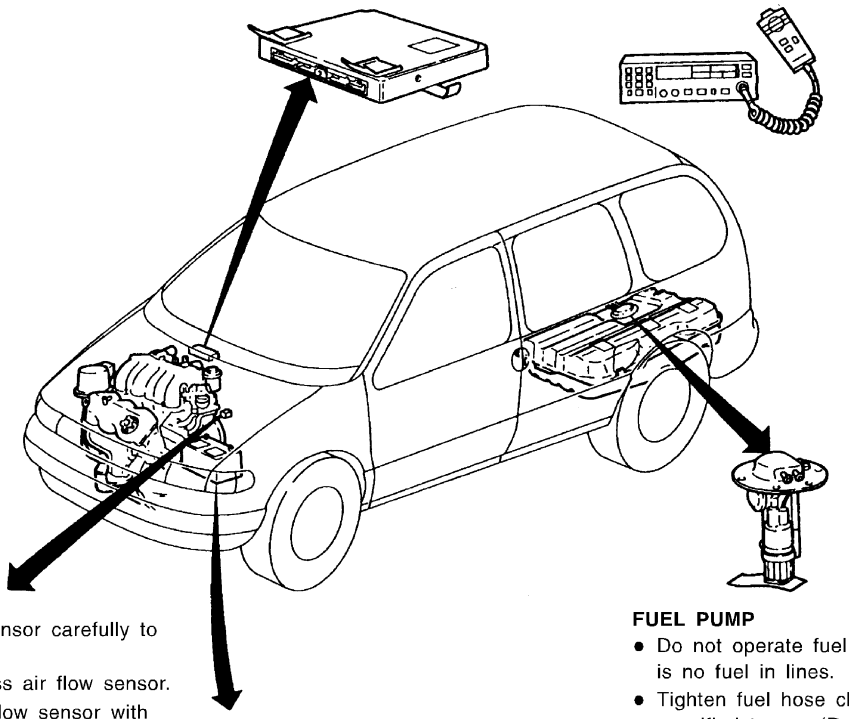
Engine Fuel & Emission Control System

NDEC0004

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

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 as possible away 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 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).

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.

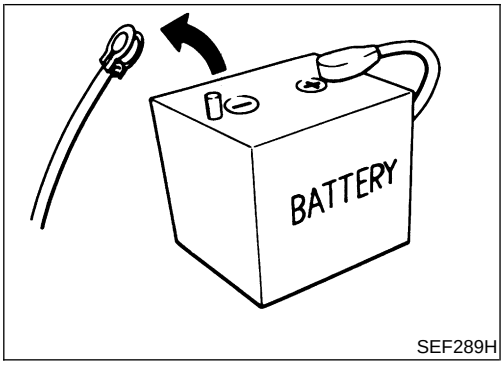
FUEL PUMP
- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque (Refer to MA section).

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.

SEF098W

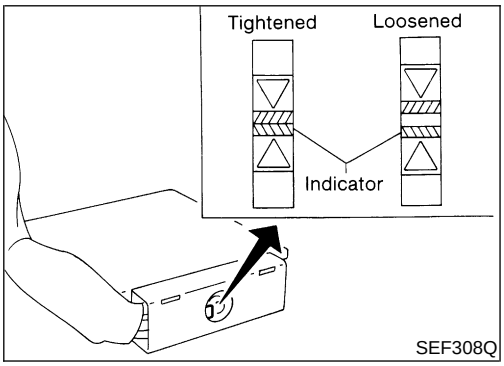
Precautions

NDEC0005



SEF289H

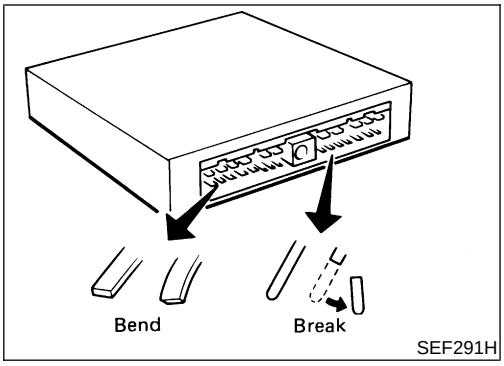
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned off.**



SEF308Q

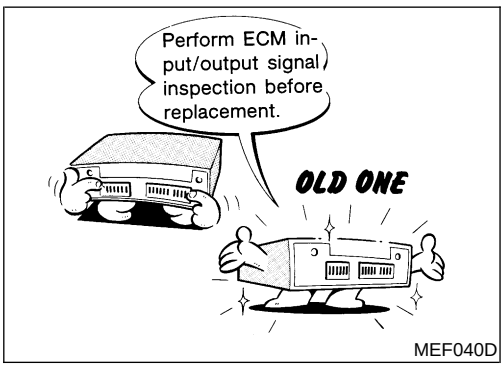
- **When connecting ECM harness connector, tighten securing bolt until the gap between orange indicators disappears.**

  : 3 - 5 N·m (0.3 - 0.5 kg-m, 26 - 43 in-lb)



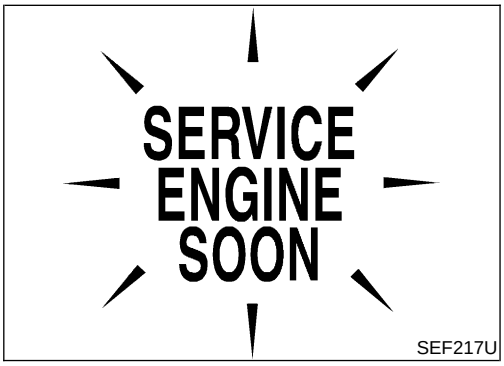
SEF291H

- **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.



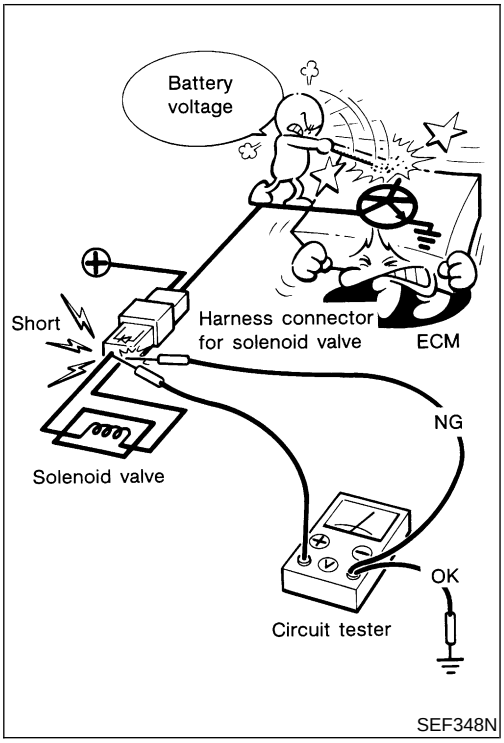
MEF040D

- **Before replacing ECM, perform “ECM Terminals and Reference Value” inspection and make sure ECM functions properly. Refer to EC-113.**

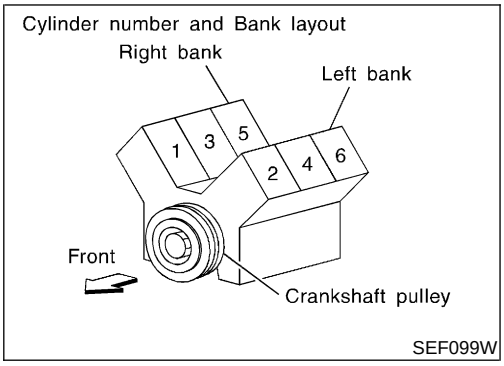


SEF217U

- **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 V41, cylinder number and bank layout are as shown in the figure.**

Wiring Diagrams and Trouble Diagnosis

NDEC0006

When you read Wiring diagrams, refer to the followings:

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

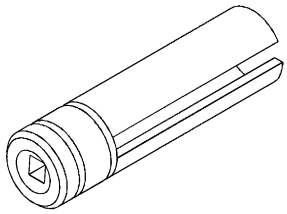
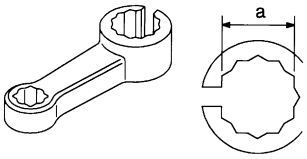
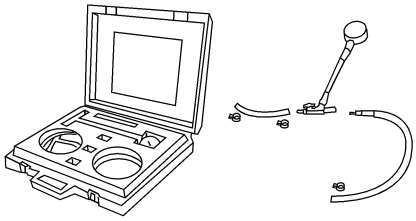
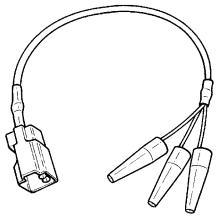
When you perform trouble diagnosis, refer to the followings:

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

Special Service Tools

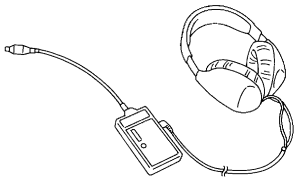
NDEC0007

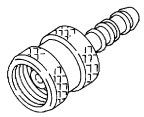
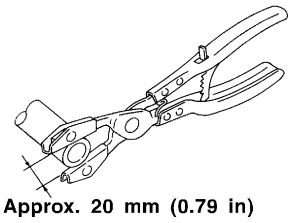
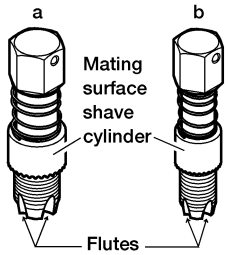
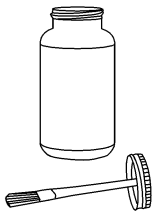
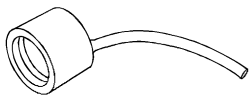
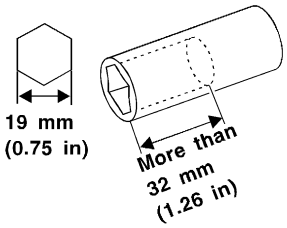
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
KV10117100 (J36471-A) Heated oxygen sensor wrench	 NT379	Loosening or tightening front heated oxygen sensor with 22 mm (0.87 in) hexagon nut
KV10114400 (J-38365) Heated oxygen sensor wrench	 NT636	Loosening or tightening rear heated oxygen sensor **a: 22 mm (0.87 in)**
(J-44321) Fuel pressure gauge kit	 LEC642	Checking fuel pressure
(J-45178) TPS test connector	 LEC120A	Used to test the throttle position sensor

Commercial Service Tools

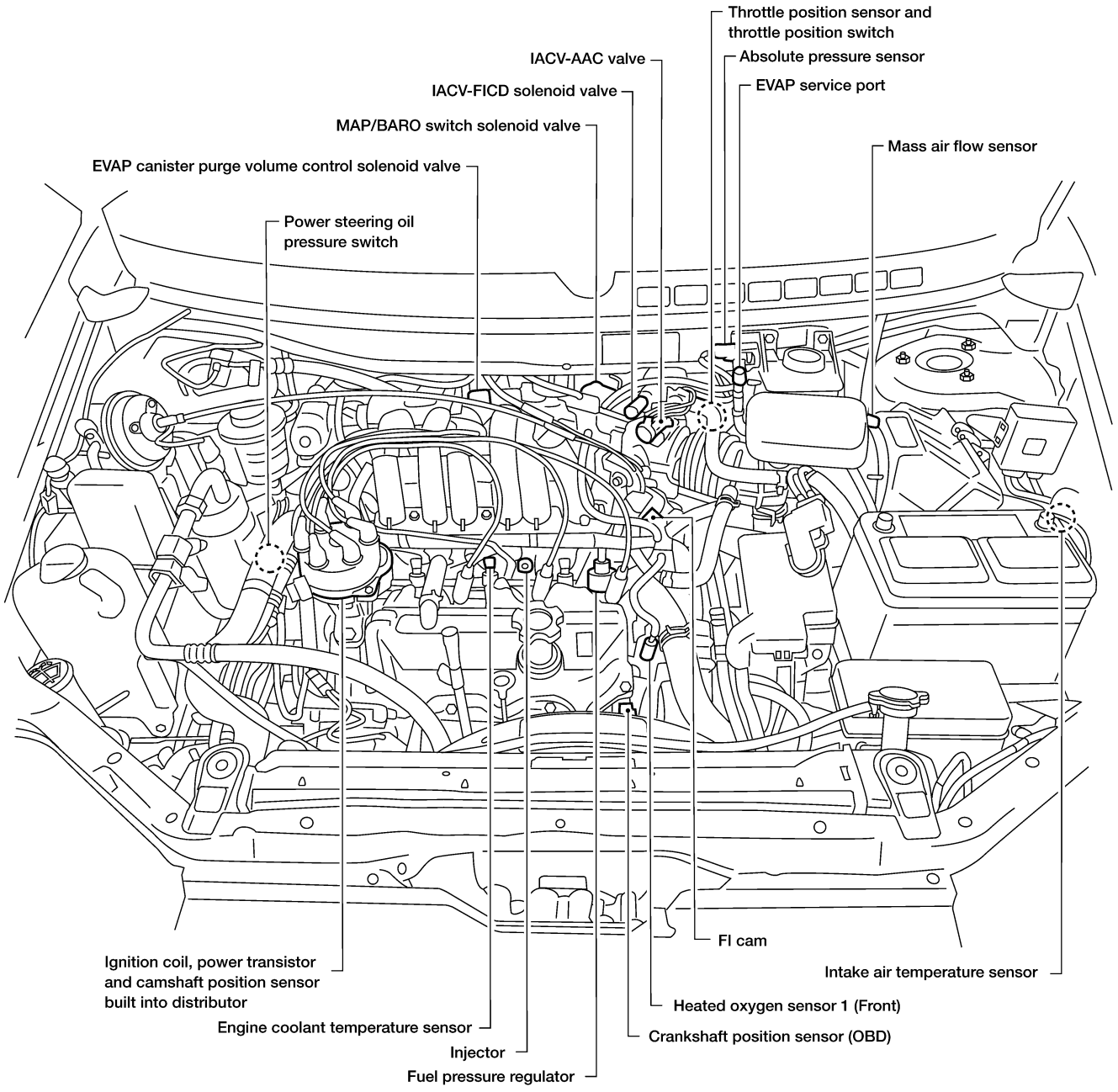
NDEC0008

Tool name (Kent-Moore No.)	Description	
Leak detector (J41416)	 NT703	Locating the EVAP leak

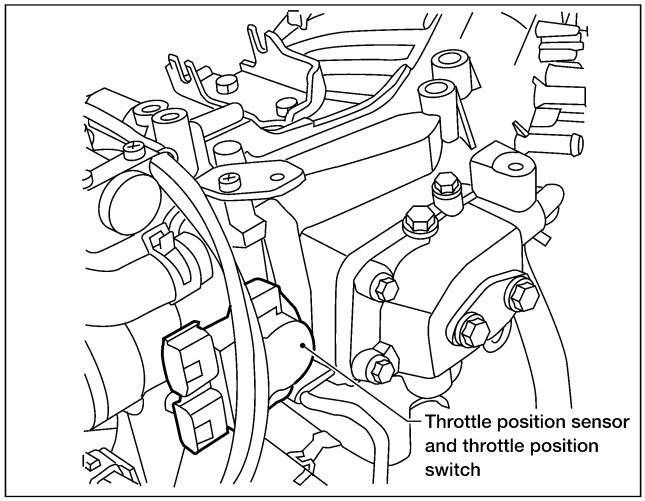
Tool name (Kent-Moore No.)	Description	
EVAP service port adapter (J41413-OBD)	 NT704	Applying positive pressure through EVAP service port
Hose clipper	 NT720	Clamping the EVAP purge hose between the fuel tank and EVAP canister applied to DTC P1440 [EVAP control system (small leak-positive pressure)]
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 below.
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.
Fuel filler cap adapter	 NT653	Checking fuel tank vacuum relief valve opening pressure
Socket wrench	 NT705	Removing and installing engine coolant temperature sensor

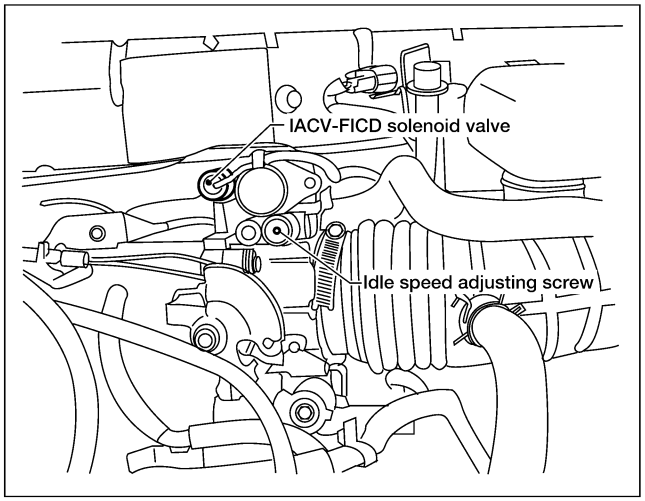
Engine Control Component Parts Location

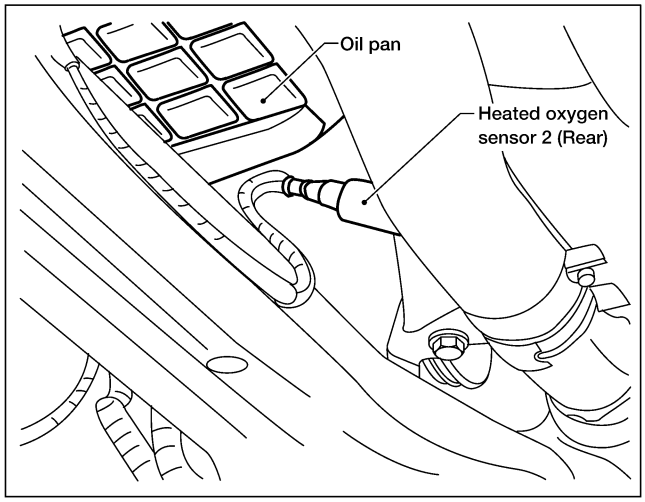
NDEC0009

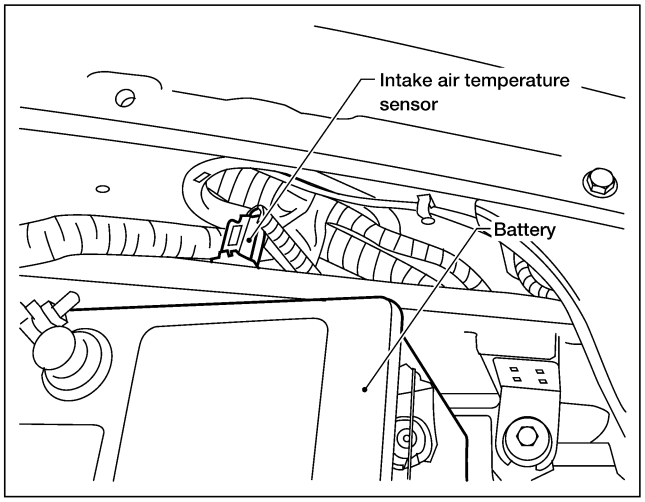


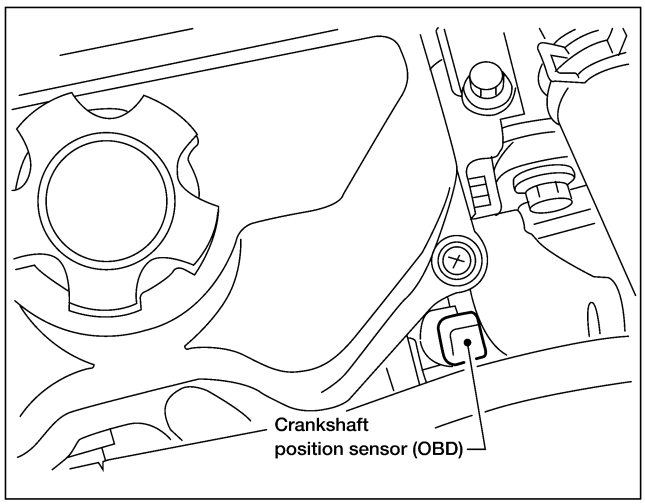
WEC745


Throttle position sensor
and throttle position
switch


IACV-FICD solenoid valve
Idle speed adjusting screw


Oil pan
Heated oxygen
sensor 2 (Rear)

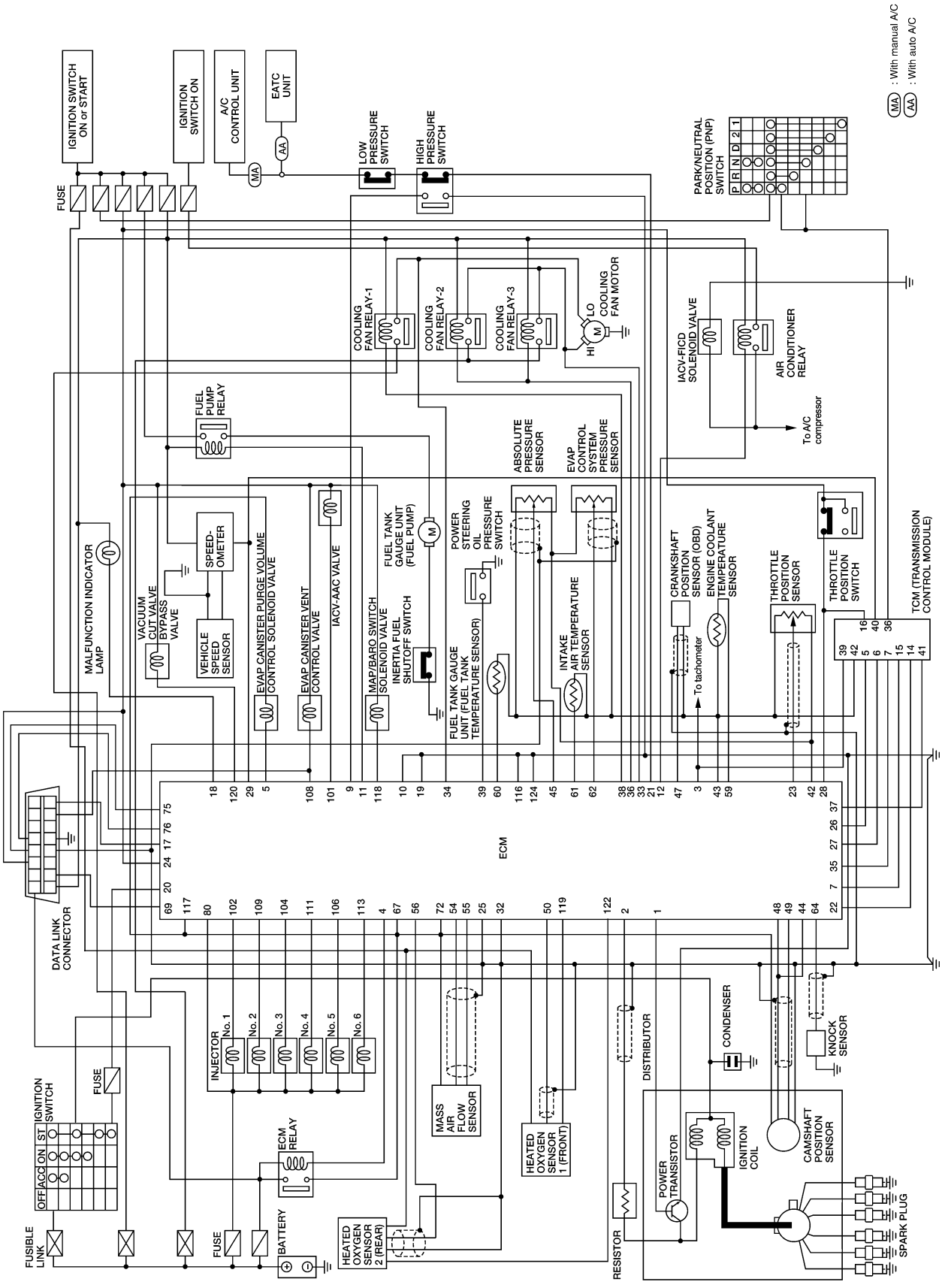

Intake air temperature
sensor
Battery


Crankshaft
position sensor (OBD)

WEC746

Circuit Diagram

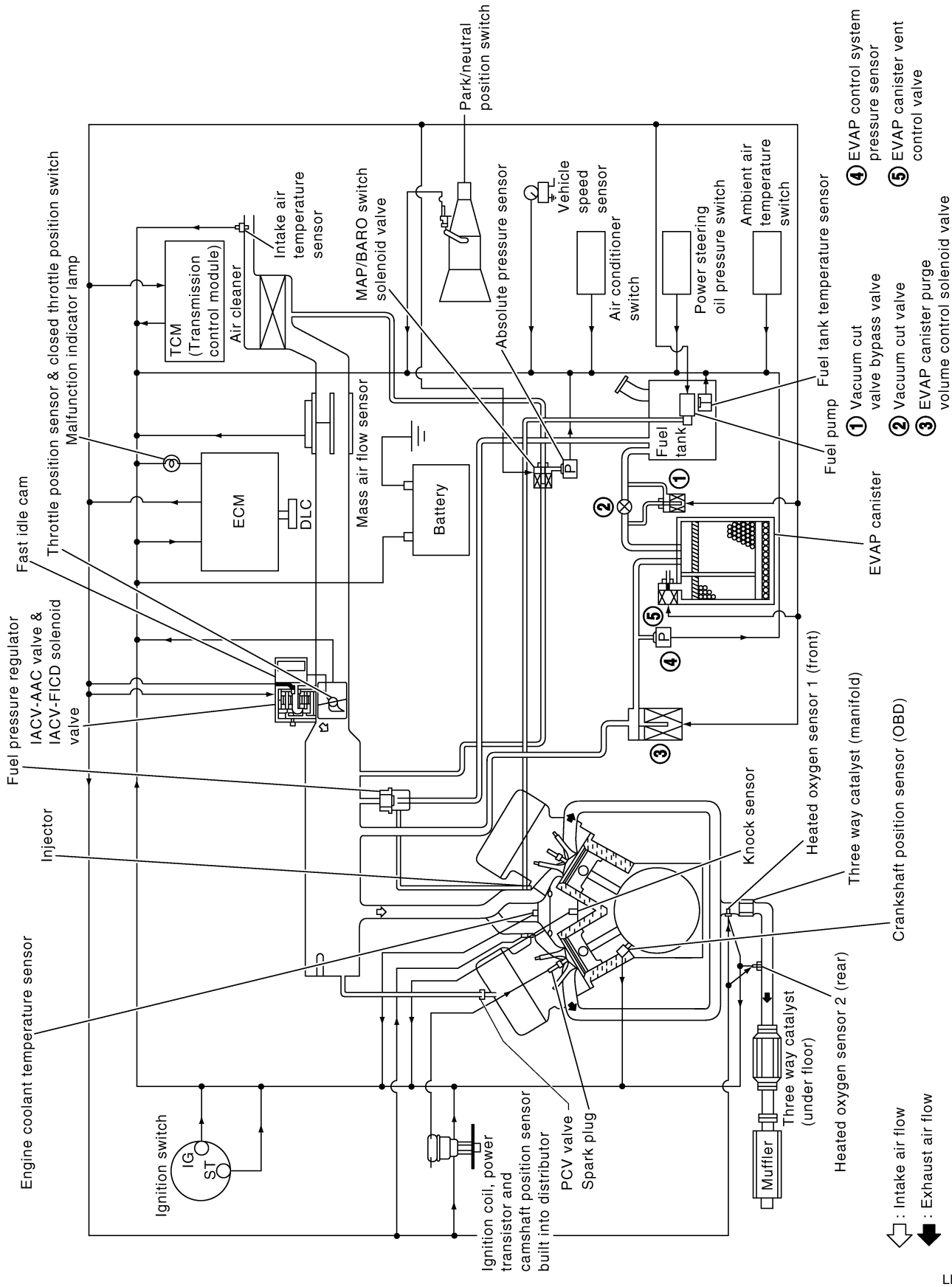
NDEC0010



WEC097A

System Diagram

NDEC0011

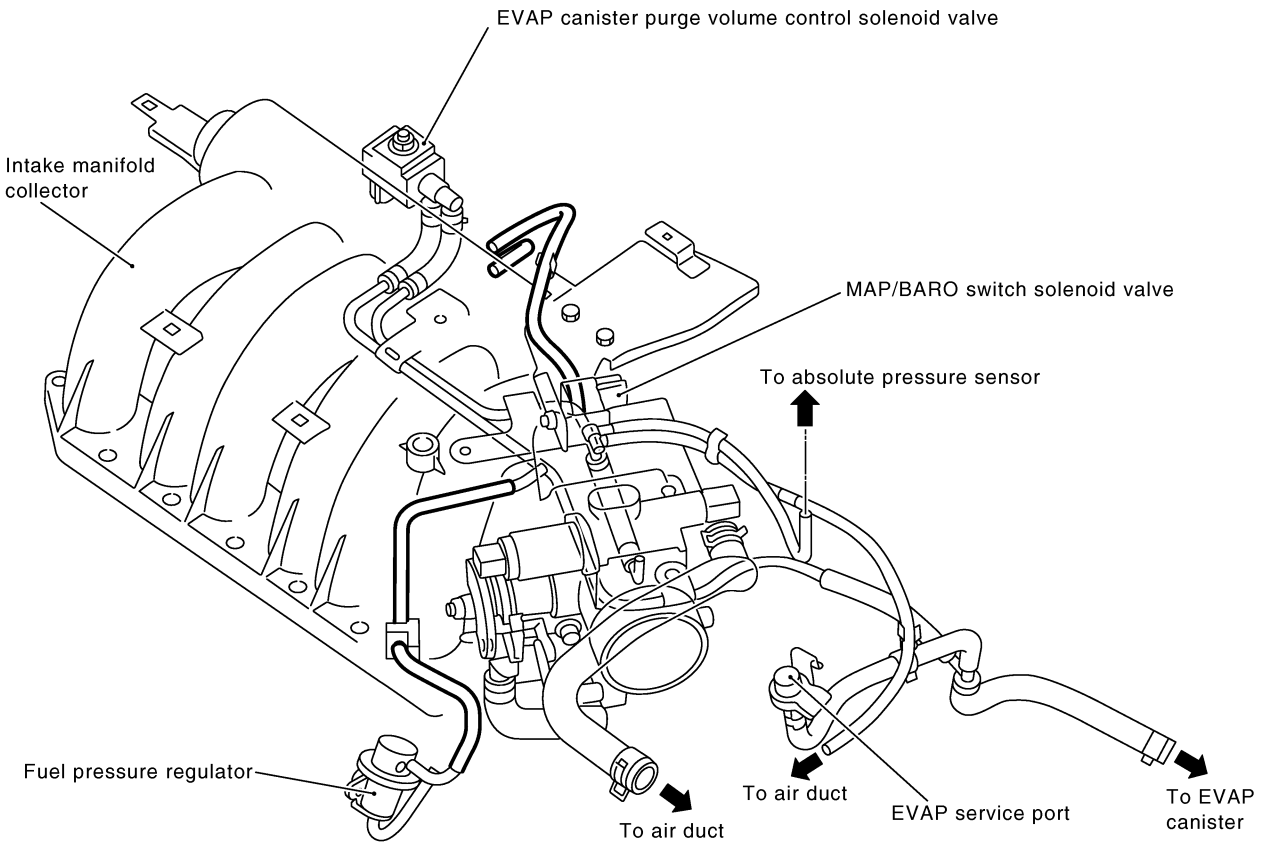


LEC757

Vacuum Hose Drawing

NDEC0012

Refer to “System Diagram”, EC-21 for Vacuum Control System.



SEF933Z

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

System Chart

NDEC0013

Input (Sensor)	ECM Function	Output (Actuator)
• Camshaft position sensor • Mass air flow sensor • Engine coolant temperature sensor • Heated oxygen sensor 1 (front) • Ignition switch • Throttle position sensor • Closed throttle position switch *4 • Park/Neutral position switch • Air conditioner switch • Knock sensor • 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 • Heated oxygen sensor 2 (rear) *3 • TCM (Transmission control module) *2 • Air conditioner high pressure 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
	Heated oxygen sensor 1 (front) monitor & on board diagnostic system	MIL (On the instrument panel)
	Heated oxygen sensor 1 heater (front) control	Heated oxygen sensor 1 heater (front)
	Heated oxygen sensor 2 heater (rear) control	Heated oxygen sensor 2 heater (rear)
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Air conditioning cut control	Air conditioner relay
	Cooling fan control	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

NDEC0014

Input/Output Signal Chart

NDEC0014S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed and piston position	Fuel injection & mixture ratio control	Injectors
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position Throttle valve idle position		
Park/Neutral position 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 barometric pressure		
Power steering oil pressure switch	Power steering operation		
Heated oxygen sensor 2 (rear)*	Density of oxygen in exhaust gas		

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

Basic Multiport Fuel Injection System

NDEC0014S02

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

NDEC0014S03

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

<Fuel increase>

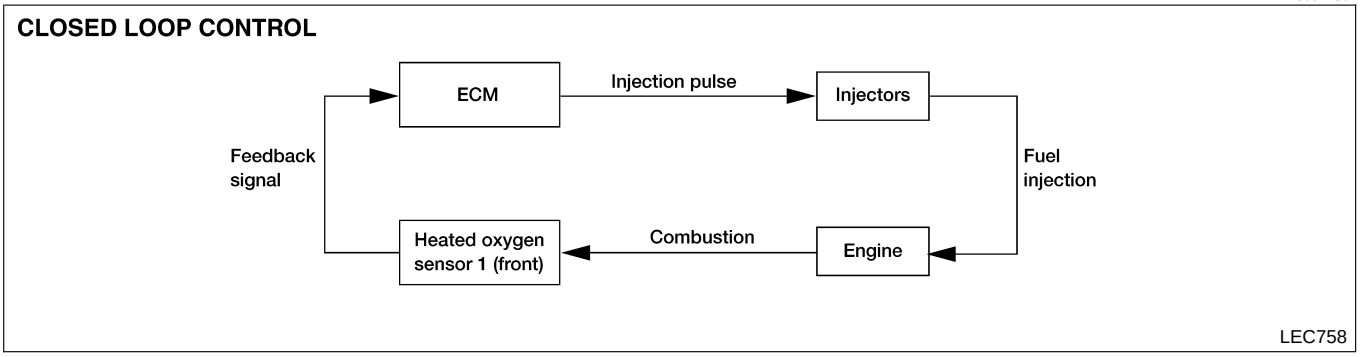
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from “N” to “D”
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

Mixture Ratio Feedback Control (Closed loop control)

NDEC0014S04



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses a heated oxygen sensor 1 (front) in the exhaust manifold to monitor if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the heated oxygen sensor 1 (front), refer to EC-183. This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
Heated oxygen sensor 2 (rear) is located downstream of the three way catalyst (under floor). Even if the switching characteristics of the heated oxygen sensor 1 (front) shift, the air-fuel ratio is controlled to stoichiometric by the signal from the heated oxygen sensor 2 (rear).

Open Loop Control

NDEC0014S05

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

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 (front) or its circuit
- Insufficient activation of heated oxygen sensor 1 (front) at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- When starting the engine

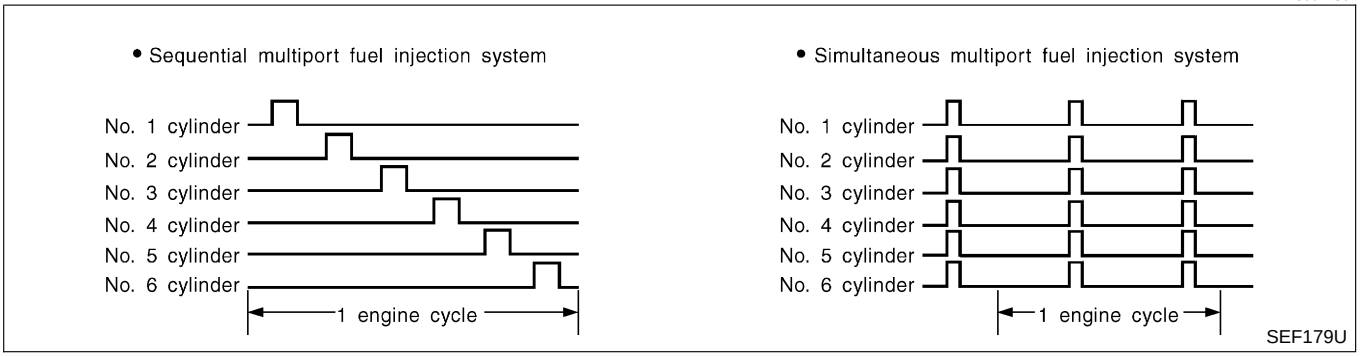
Mixture Ratio Self-learning Control

NDEC0014S06

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the heated oxygen sensor 1 (front). This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio.
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.
"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.
"Short term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from the heated oxygen sensor 1 (front) indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.
"Long term fuel trim" is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

Fuel Injection Timing

NDEC0014S07



Two types of systems are used.

Sequential Multiport Fuel Injection System

NDEC0014S0701

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

NDEC0014S0702

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

NDEC0014S08

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

Distributor Ignition (DI) System

DESCRIPTION

NDEC0015

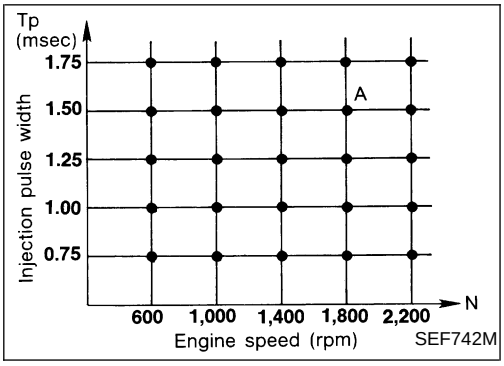
Input/Output Signal Chart

NDEC0015S01

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 switch	Gear position		
Battery	Battery voltage		

System Description

NDEC0015S02



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

NDEC0016

Input/Output Signal Chart

NDEC0016S01

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

NDEC0016S02

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

NDEC0017

Input/Output Signal Chart

NDEC0017S01

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

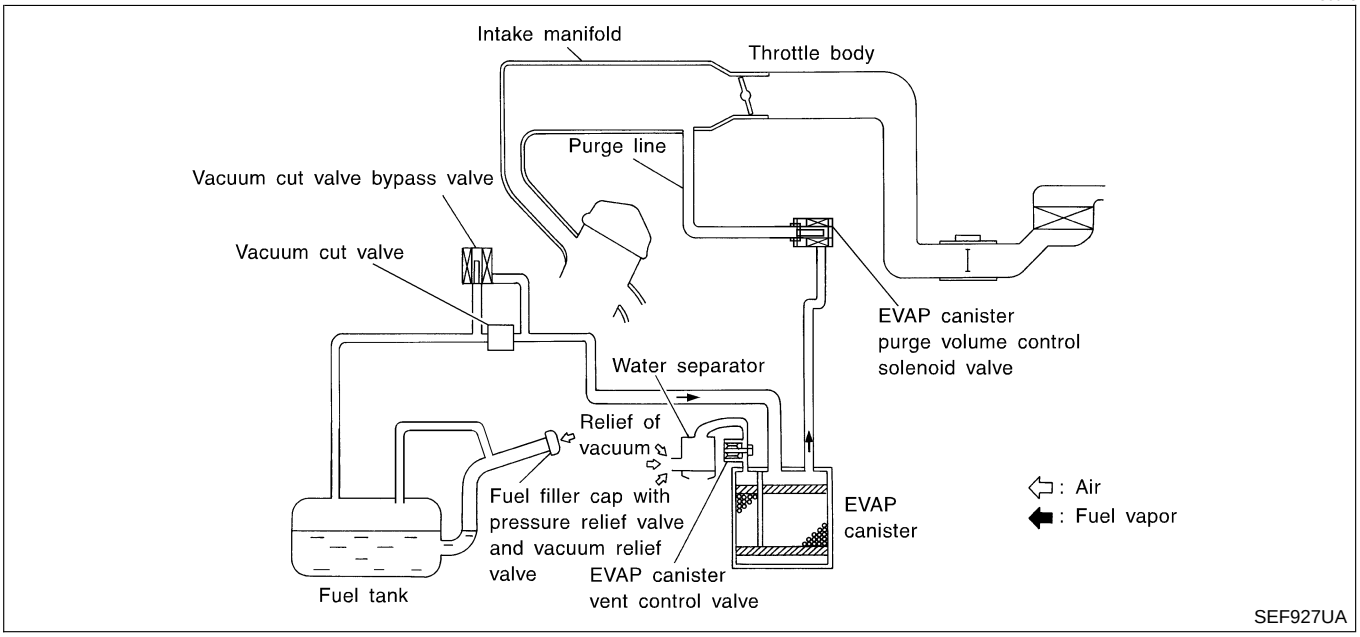
If the engine speed is above 2,500 rpm with no load (for example, in neutral and engine speed over 2,500 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will operate until the engine speed reaches 2,000 rpm, then fuel cut is cancelled.

NOTE:
This function is different from deceleration control listed under “Multiport Fuel Injection (MFI) System”, EC-24.

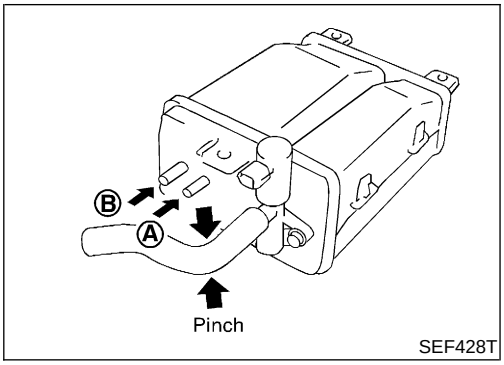
Evaporative Emission System

DESCRIPTION

NDEC0018



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.



SEF428T

INSPECTION

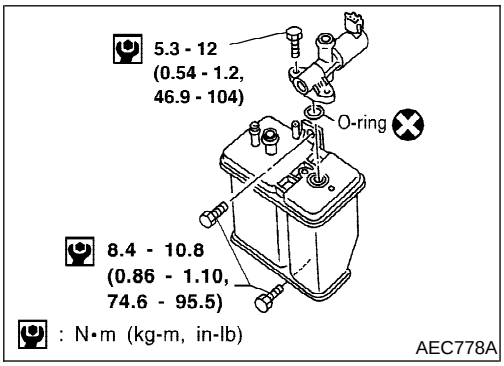
NDEC0019

EVAP Canister

NDEC0019S01

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**.



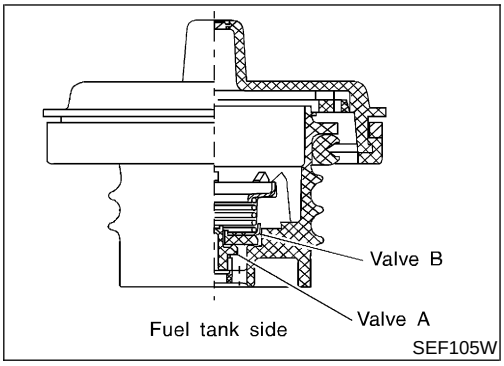
AEC778A

Tightening Torque

NDEC0019S02

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.



SEF105W

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

NDEC0019S03

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)

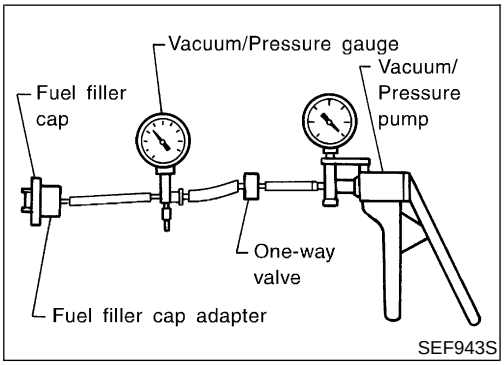
Vacuum:

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



SEF943S

Vacuum Cut Valve and Vacuum Cut Valve Bypass Valve

NDEC0019S05

Refer to EC-466.

Evaporative Emission (EVAP) Canister Purge Volume Control Solenoid Valve

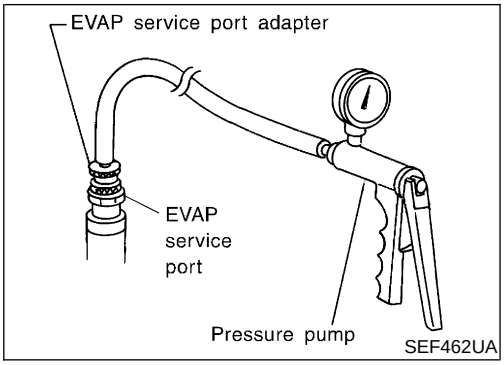
NDEC0019S06

Refer to EC-326.

Fuel Tank Temperature Sensor

NDEC0019S08

Refer to EC-280.

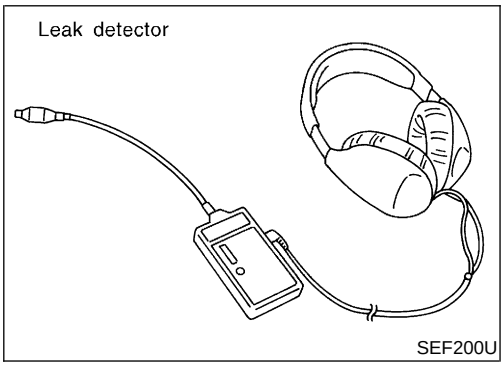


SEF462UA

Evap Service Port

NDEC0019S09

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



SEF200U

How to Detect Fuel Vapor Leakage

NDEC0019S10

CAUTION:

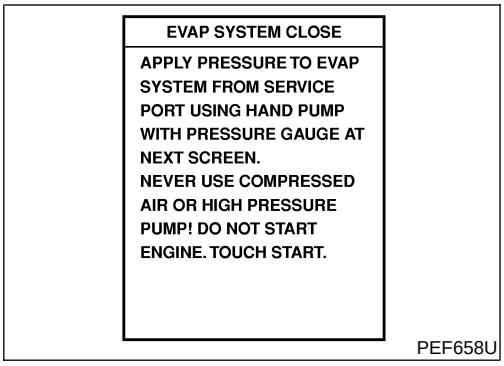
- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in EVAP system.**

NOTE:

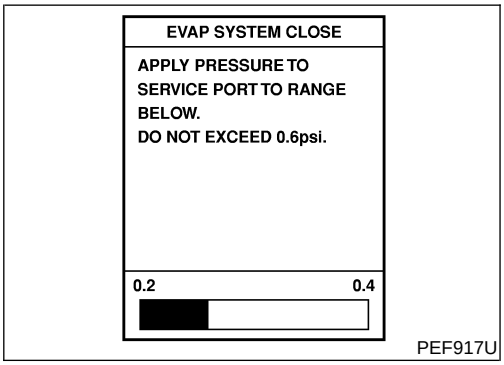
- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

With CONSULT-II

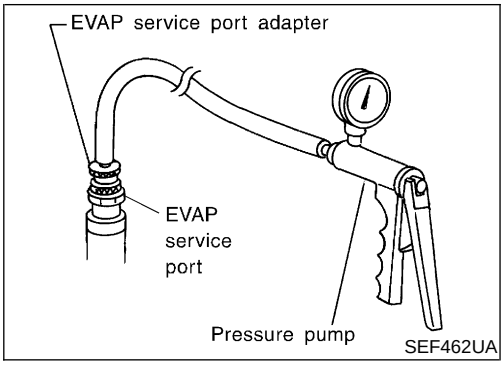
1) Attach the EVAP service port adapter securely to the EVAP service port.
2) Also attach the pressure pump and hose to the EVAP service port adapter.
3) Turn ignition switch "ON".
4) Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT MODE" with CONSULT-II.
5) Touch "START". A bar graph (Pressure indicating 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-32.

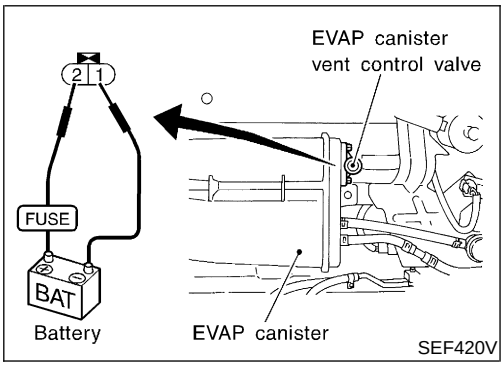


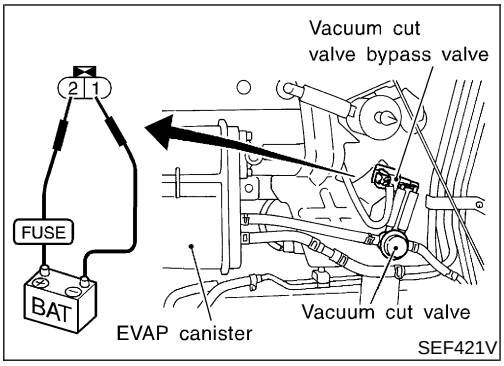
PEF658U



PEF917U





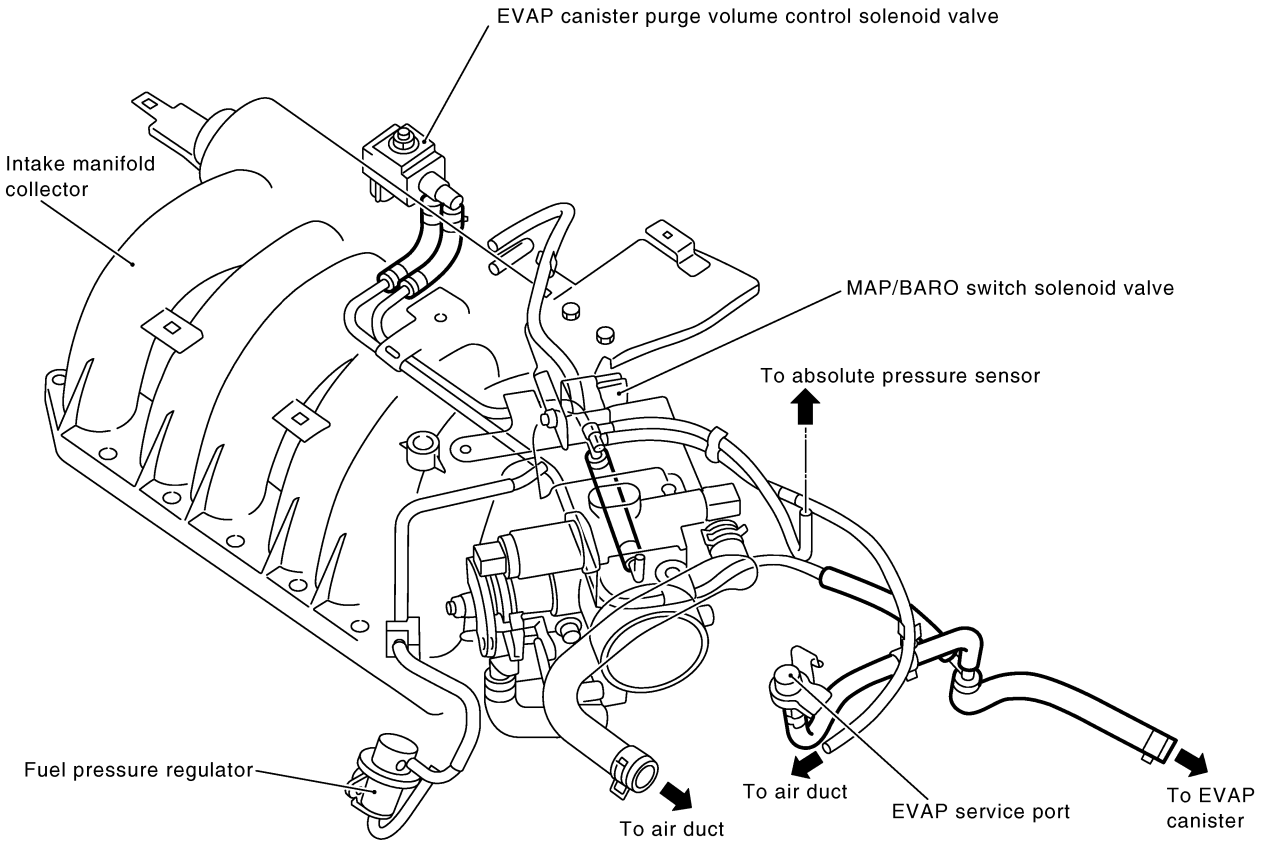


Without CONSULT-II

1) Attach the EVAP service port adapter securely to the EVAP service port.
2) Also attach the pressure pump with pressure gauge to the EVAP service port adapter.
3) Apply battery voltage to between the terminals of both EVAP canister vent control valve and vacuum cut valve bypass valve to make a closed EVAP system.
4) To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm^2, 0.2 to 0.4 psi).
5) Remove EVAP service port adapter and hose with pressure pump.
6) Locate the leak using a leak detector. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-32.

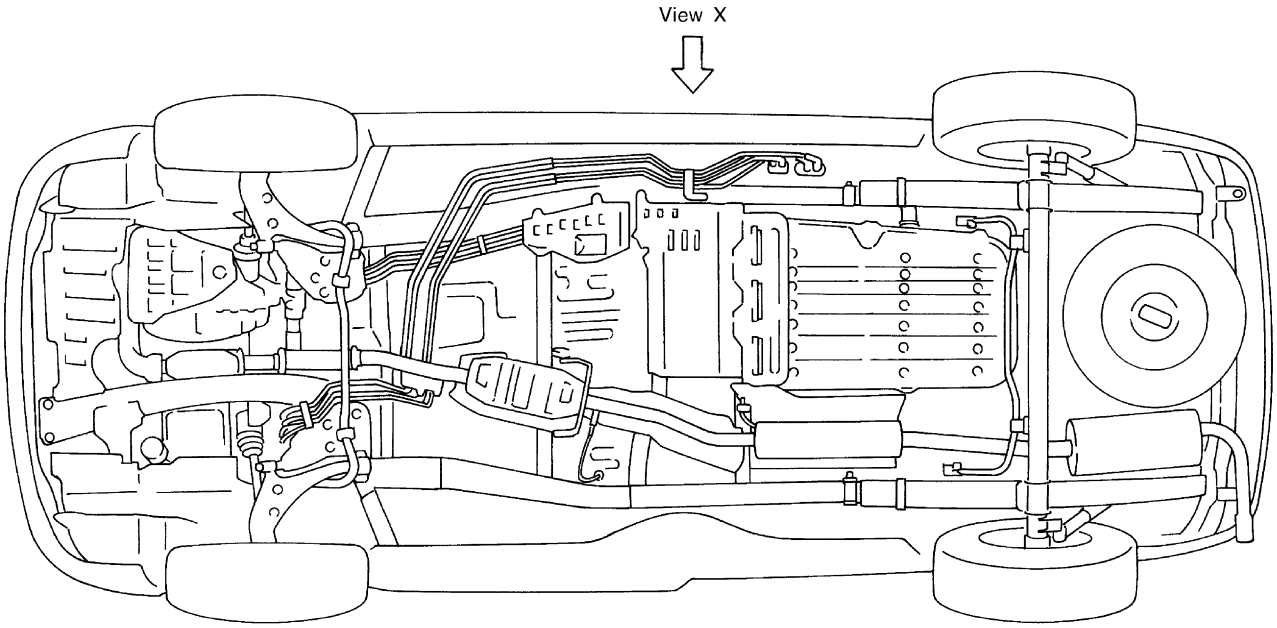
EVAPORATIVE EMISSION LINE DRAWING

NDEC0020

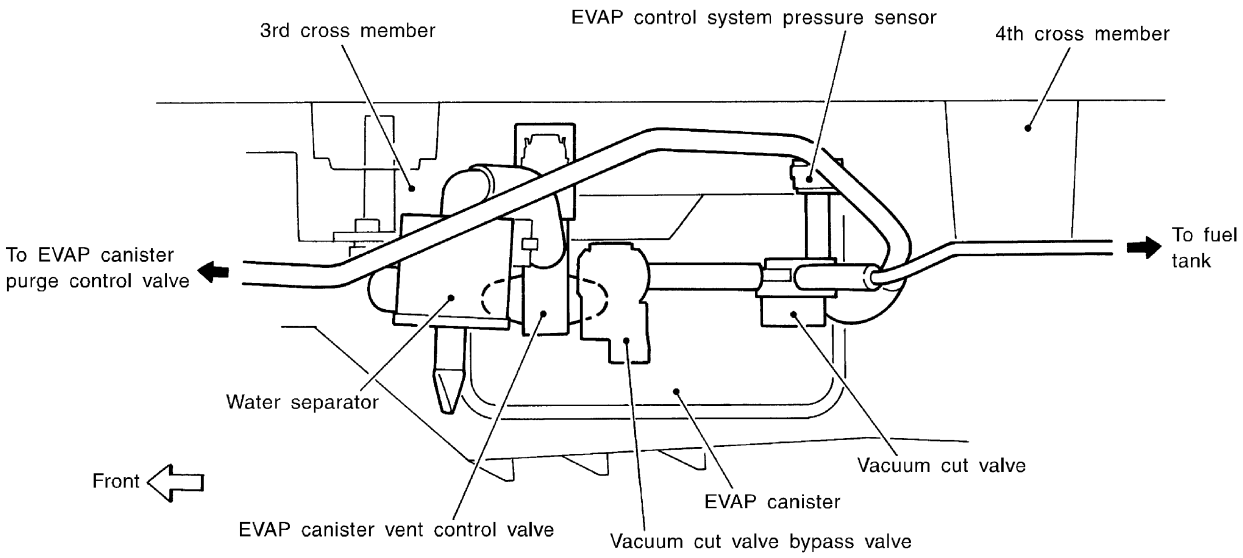


SEF934Z

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



View X



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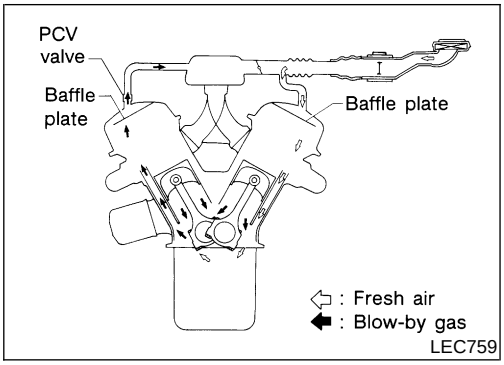
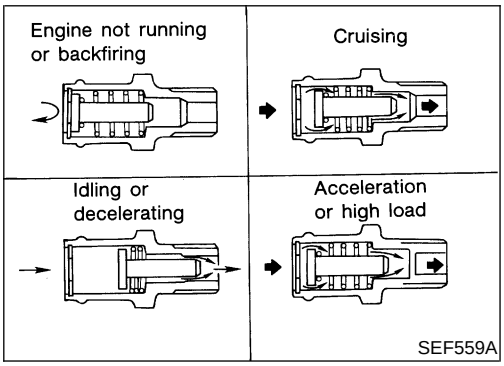


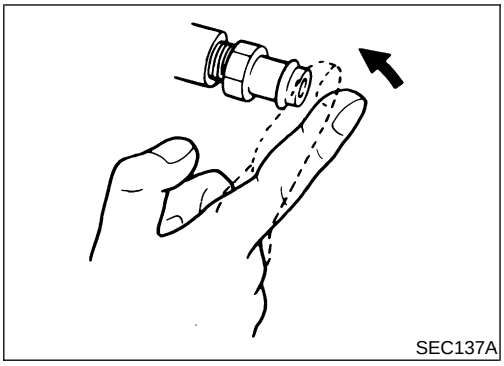


Positive Crankcase Ventilation

DESCRIPTION

NDEC0021

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



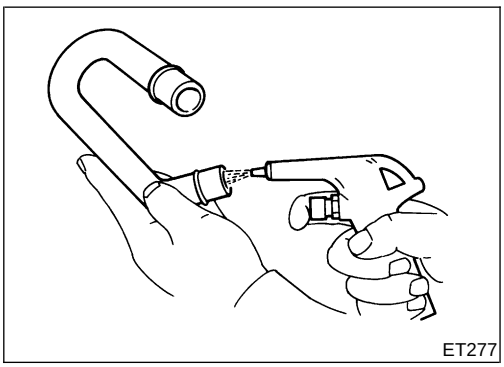
INSPECTION

NDEC0022

PCV (Positive Crankcase Ventilation) Valve

NDEC0022S01

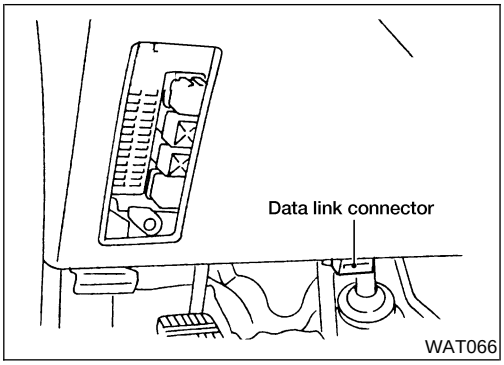
With engine running at idle, remove PCV valve ventilation hose from PCV valve; if the valve is working properly, a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.

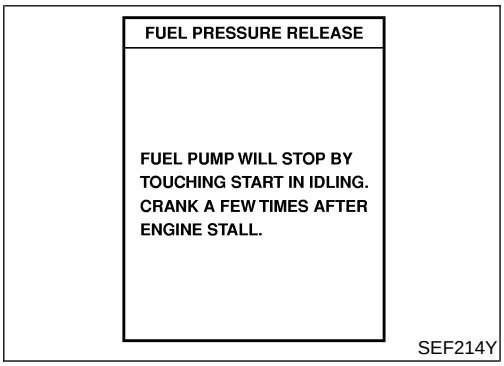


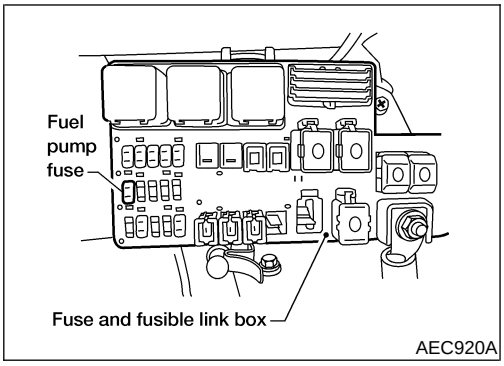
PCV Valve Ventilation Hose

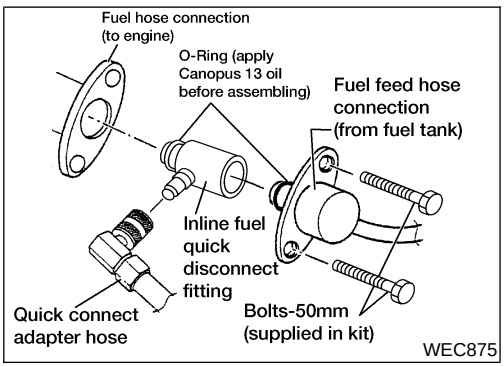
NDEC0022S02

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.









Fuel Pressure Release

NDEC0023

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

WITH CONSULT-II

NDEC0023S01

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

WITHOUT CONSULT-II

NDEC0023S02

1. Remove fuel pump fuse located in fusible link 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

NDEC0024

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

1. Release fuel pressure to zero.
2. Install the inline fuel quick disconnect fitting between the connection of the fuel feed hose (from tank) and the fuel hose (to engine).
3. Connect the fuel pressure test gauge (quick connect adapter hose) to the quick disconnect fitting.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

At idling:

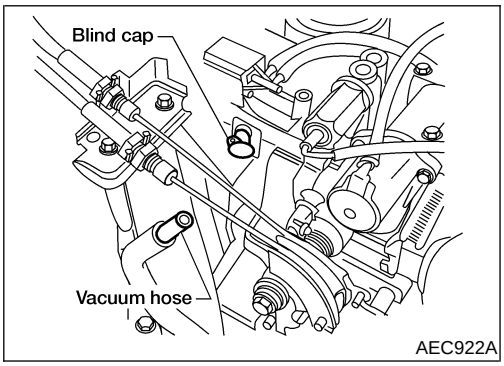
With vacuum hose connected

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

With vacuum hose disconnected

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

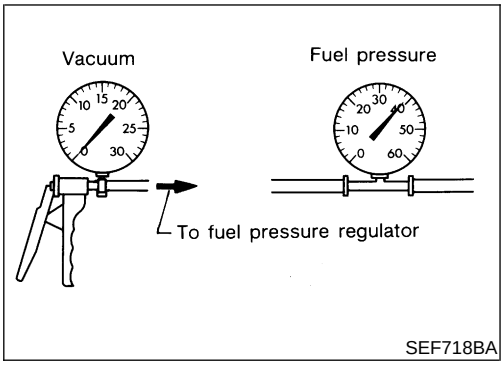
If results are unsatisfactory, perform Fuel Pressure Regulator Check.



Fuel Pressure Regulator Check

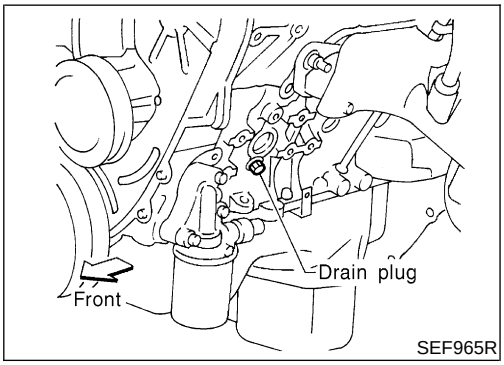
NDEC0387

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.



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

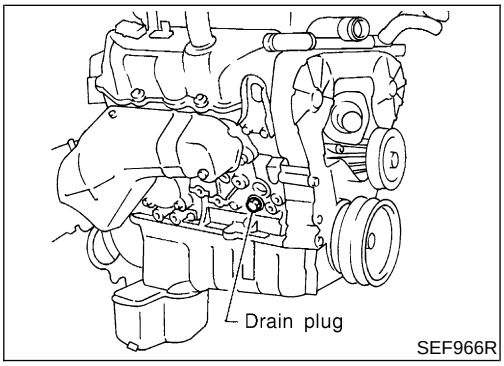
NDEC0025

1. Release fuel pressure to zero. Refer to EC-35.
2. Drain coolant by removing drain plugs from both sides of cylinder block.
3. Separate ASCD and accelerator control wire from intake manifold collector.
4. Remove intake manifold collector from engine.
   The following parts should be disconnected or removed.

a. Harness connectors for
- IACV-AAC valve
- IACV-FICD solenoid valve
- Throttle position sensor and closed throttle position switch assembly
- Ground harness

b. PCV valve ventilation hoses
c. Vacuum hoses for
- Brake booster
- Fuel pressure regulator

d. Air hoses from
- Air duct

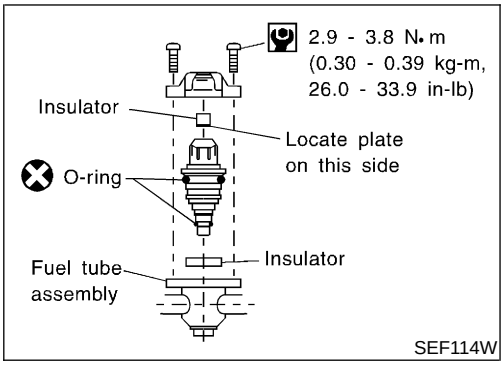


- IACV-AAC valve

e. Water hoses for
- Throttle body
- Air relief plug

f. EVAP canister purge hose

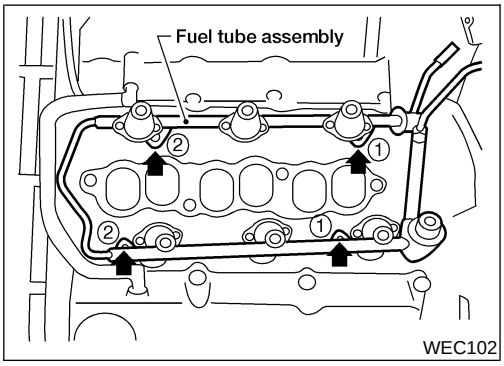
5. Remove injector fuel tube assembly.
   The following parts should be disconnected or removed.
- Vacuum hose for fuel pressure regulator
- Fuel feed and return hose
- All injectors harness connectors
- **Push injector tail piece.**
- **Do not pull on connector.**
- **Do not extract injector by pinching.**



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.



WEC102

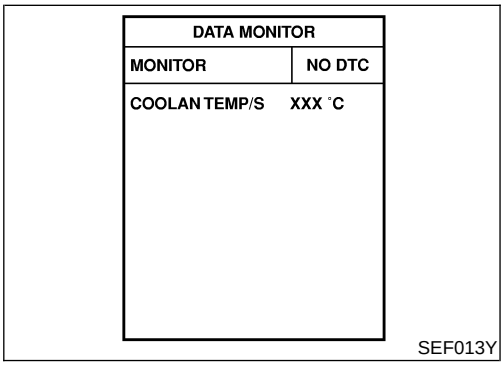
9. Install injectors with fuel tube assembly to intake manifold.
   Tighten in numerical order shown in the figure.

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.



SEF013Y

Fast Idle Cam (FIC)

INSPECTION AND ADJUSTMENT

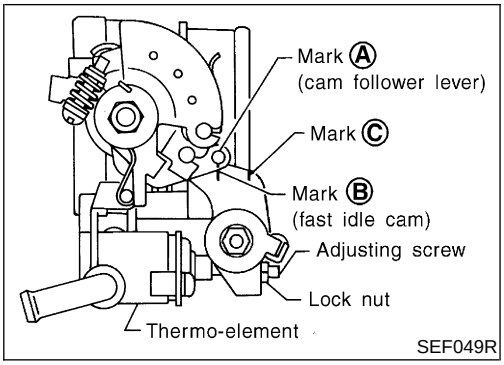
NDEC0026

With CONSULT-II

NDEC0026S01

1. Turn ignition switch "ON".
2. See "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.

Fast Idle Cam (FIC) (Cont'd)

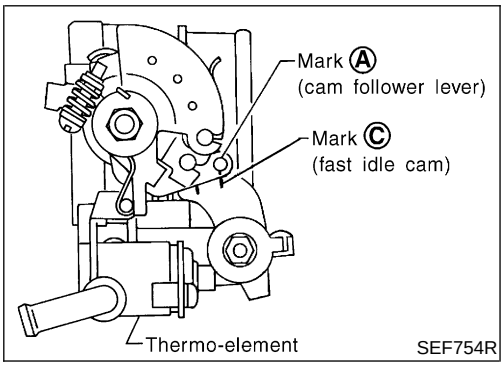


3. When engine coolant temperature is 20 to 30°C (68 to 86°F), make sure that the center of mark **A** is aligned with mark **B** as shown in the figure.

- If NG, adjust by turning adjusting screw.

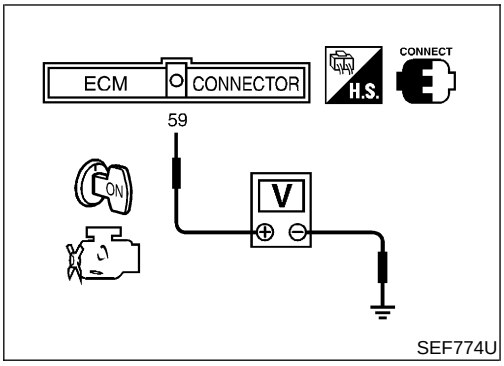
Lock nut:

: 0.98 - 1.96 N·m (10 - 20 kg-cm, 8.7 - 17.4 in-lb)



4. Start engine and warm it up.
5. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.

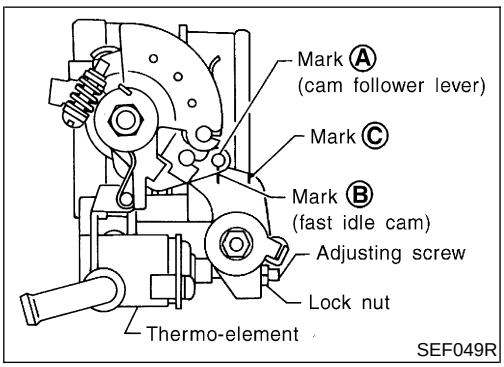
- The center of mark **A** is aligned with mark **C**.
- The cam follower lever's roller is not touching the fast idle cam.
- If NG, replace thermo-element and perform the above inspection and adjustment again.



Without CONSULT-II

NDEC0026S02

1. Turn ignition switch "ON".
2. Check voltage between ECM terminal 59 (Engine coolant temperature sensor signal) and ground.

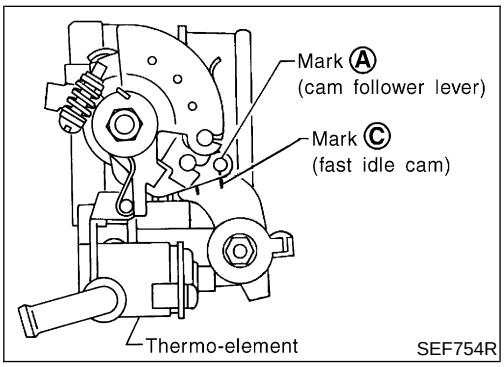


3. When the voltage is between 3.12 to 3.52V, make sure that the center of mark **A** is aligned with mark **B** as shown in the figure.

- If NG, adjust by turning adjusting screw.

Lock nut:

: 0.98 - 1.96 N·m (10 - 20 kg-cm, 8.7 - 17.4 in-lb)



4. Start engine and warm it up.
5. When the voltage is between 1.10 to 1.36V, check the following.

- The center of mark **A** is aligned with mark **C**.
- The cam follower lever's roller is not touching the fast idle cam.
- If NG, replace thermo-element and perform the above inspection and adjustment again.

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

NDEC0027

NDEC0027S01

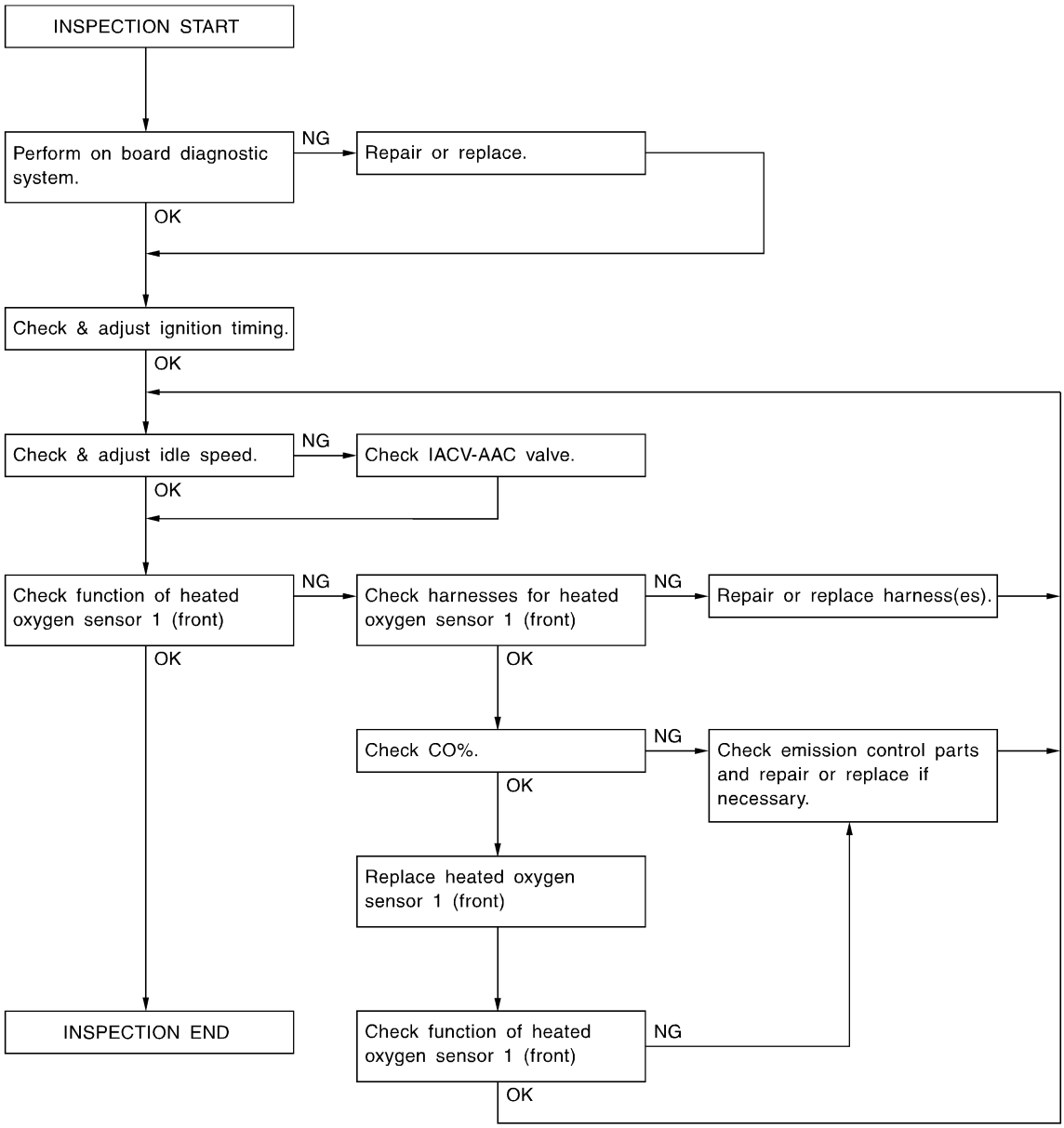
PREPARATION

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

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

Overall Inspection Sequence

NDEC0027S0101



SEF554Y

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

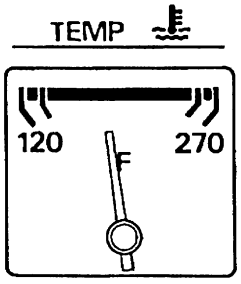
INSPECTION PROCEDURE

=NDEC0027S02

1	INSPECTION START

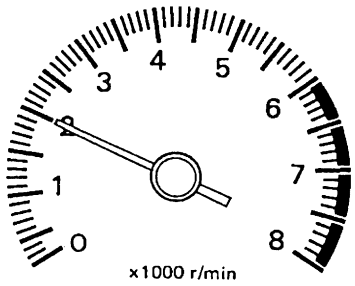
1. Visually check the following:
- Air cleaner clogging
- Hoses and ducts for leaks
- Electrical connectors
- Gasket
- Throttle valve and throttle position sensor operation

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



SEF976U

3. Open engine hood and run engine at about 2,000 rpm for about 2 minutes under no-load.



SEF977U

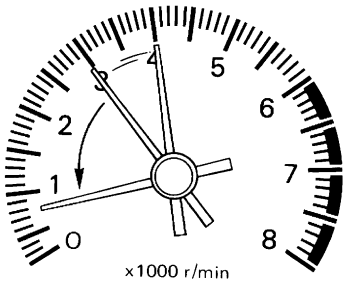
4. Make sure that no DTC is displayed with CONSULT-II or GST.

OK or NG

OK	▶	GO TO 2.
NG	▶	1. Repair or replace components as necessary. 2. GO TO 2.

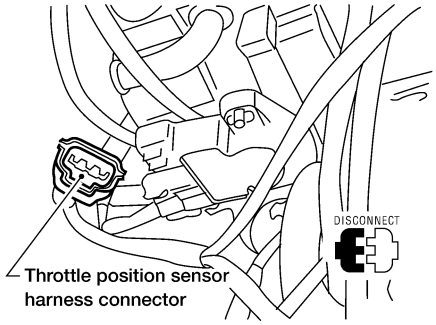
2	CHECK IGNITION TIMING

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



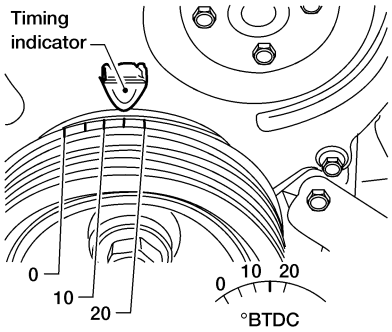
SEF978U

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



LEC747

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



AEC789A

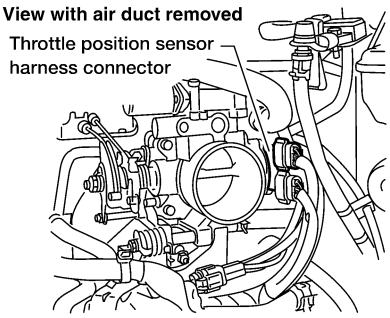
15°±2° BTDC (in "P" or "N" position)

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	ADJUST IGNITION TIMING

1. Adjust ignition timing to the specified value by turning distributor after loosening securing bolts which secure distributor.
   15°±2° BTDC (in "P" or "N" position)
2. Turn off engine and connect throttle position sensor harness connector to throttle position sensor.



WEC748

▶	GO TO 2.

4	CHECK BASE IDLE SPEED

With CONSULT-II

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

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

700±50 rpm (in "P" or "N" position)

Without CONSULT-II

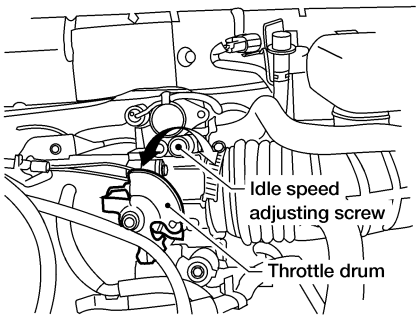
1. Check idle speed.
   700±50 rpm (in "P" or "N" position)

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	ADJUST BASE IDLE SPEED

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



AEC791A

700±50 rpm (in "P" or "N" position)

▶	GO TO 6.

6	CHECK TARGET IDLE SPEED

With CONSULT-II

1. Turn off engine and connect throttle position sensor harness connector.
2. Start and rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run at idle speed.
3. Read idle speed in "DATA MONITOR" mode with CONSULT-II.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

750±50 rpm (in "P" or "N" position)

Without CONSULT-II

1. Turn off engine and connect throttle position sensor harness connector.
2. Start and rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run at idle speed.
3. Check idle speed.

750±50 rpm (in "P" or "N" position)

OK or NG

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

7	DETECT MALFUNCTIONING PART
Check the following. 1. Check IACV-AAC valve and replace if necessary. Refer to EC-362. 2. Check IACV-AAC valve harness and repair if necessary. Refer to EC-362. 3. Check ECM function by substituting another known good ECM. (ECM may be the cause of a problem, but this is rarely the case.)	
With CONSULT-II ▶	GO TO 8.
Without CONSULT-II ▶	GO TO 9.

8	CHECK HEATED OXYGEN SENSOR 1 (FRONT) SIGNAL

With CONSULT-II

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

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

SEF820Y

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

OK or NG

OK ▶	**INSPECTION END**
NG (Monitor does not fluctuate.) ▶	GO TO 11.
NG (Monitor fluctuates less than 5 times.) ▶	1. Replace heated oxygen sensor 1 (front). 2. GO TO 10.

9	CHECK HEATED OXYGEN SENSOR 1 (FRONT) SIGNAL

Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Set voltmeter probe between ECM terminal 50 and ground.
3. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

OK or NG

OK ▶	**INSPECTION END**
NG (Voltage does not fluctuate.) ▶	GO TO 11.
NG (Voltage fluctuates less than 5 times.) ▶	1. Replace heated oxygen sensor 1 (front). 2. GO TO 10.

10	CHECK HEATED OXYGEN SENSOR 1 (FRONT) SIGNAL

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Run engine at about 2,000 rpm for about 2 minutes under no-load.
3. See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode.
4. Running engine at 2,000 rpm under no-load , 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. Start engine and warm it up to normal operating temperature.
2. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
3. Set voltmeter probe between ECM terminal 50 and ground.
4. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

OK or NG

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

11	CHECK HEATED OXYGEN SENSOR 1 (FRONT) HARNESS

1. Turn off engine and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect heated oxygen sensor 1 (front) harness connector.
4. Check harness continuity between ECM terminal 50 and heated oxygen sensor 1 (front) harness connector. Refer to Wiring Diagram, EC-186.
   Continuity should exist.

OK or NG

OK	▶	1. Connect ECM harness connector. 2. GO TO 13.
NG	▶	GO TO 12.

12	FIX THE MALFUNCTION

1. Repair or replace harness between ECM and heated oxygen sensor 1 (front).
2. Connect ECM harness connector.
3. Disconnect throttle position sensor harness connector.
4. Start engine.

	▶	GO TO 5.

13	PREPARATION FOR "CO" % CHECK

With CONSULT-II

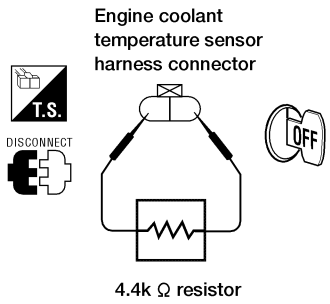
1. Turn ignition switch "ON".
2. Select "COOLANT TEMP" in "ACTIVE TEST" mode.
3. Set "COOLANT TEMP" to 5°C (41°F) by touching "DWN" and "Qd".

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

SEF172Y

Without CONSULT-II

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

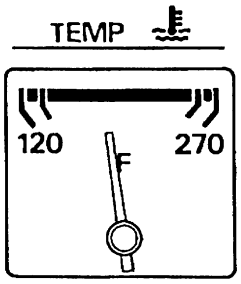


LEC101

▶	GO TO 14.

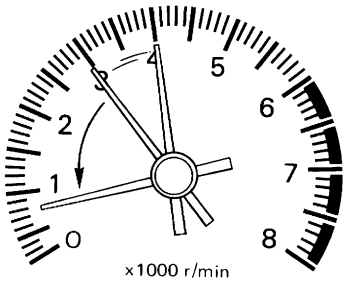
14	CHECK "CO" %

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: 2.2 to 10.8% and engine runs smoothly.
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 heated oxygen sensor 1 (front). 2. GO TO 15.
NG	▶	GO TO 17.

15	DISCONNECT THROTTLE POSITION SENSOR HARNESS CONNECTOR

1. Turn ignition switch "OFF".
2. Disconnect throttle position sensor harness connector.

	▶	GO TO 5.

16	CHECK HEATED OXYGEN SENSOR 1 (FRONT) SIGNAL

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Run engine at about 2,000 rpm for about 2 minutes under no-load.
3. See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode.
4. Running engine at 2,000 rpm under no-load , 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. Start engine and warm it up to normal operating temperature.
2. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
3. Set voltmeter probe between ECM terminal 50 and ground.
4. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

OK or NG

OK	▶	GO TO 16.
NG	▶	GO TO 17.

17	DETECT MALFUNCTIONING PART

Check the following.

1. Connect heated oxygen sensor 1 (front) harness connector to heated oxygen sensor 1 (front).
2. Check fuel pressure regulator. Refer to EC-36.
3. Check mass air flow sensor and its circuit. Refer to EC-134.
4. Check injector and its circuit. Refer to EC-485.
   Clean or replace if necessary.
5. Check engine coolant temperature sensor and its circuit. Refer to EC-160, 177.
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 15.

Introduction

NDEC0028

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

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

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

X: Applicable —: Not applicable

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

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

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-103.)

Two Trip Detection Logic

NDEC0029

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 is being detected	X	—	—	—	—	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	—	—	X	—	—	X	—	—
Closed loop control — DTC: P1148	—	X	—	—	X	—	X	—
Fail-safe items (Refer to EC-103.)	—	X	—	—	X*1	—	X*1	—
Except above	—	—	—	X	—	X	X	—

*1: Except “ECM”

Emission-related Diagnostic Information

NDEC0030

DTC AND 1ST TRIP DTC

NDEC0030S01

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-61.

For malfunctions in which 1st trip DTCs are displayed, refer to EC-59. 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-86. 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

NDEC0030S0101

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

With CONSULT-II

With GST

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

These DTCs are prescribed by SAE J2012.

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

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

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

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

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

DTC display

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

1st trip DTC display

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

SEF992X

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

NDEC0030S02

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-73.
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0306 Fuel Injection System Function — DTC: P0171, P0172
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-61.

SYSTEM READINESS TEST (SRT) CODE

NDEC0030S03

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.

The following table shows required self-diagnostic items to set the SRT to "complete".

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
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
HO2S	3	Heated oxygen sensor 1 (front) (circuit)	P0130
		Heated oxygen sensor 1 (front) (lean shift monitoring)	P0131
		Heated oxygen sensor 1 (front) (rich shift monitoring)	P0132
		Heated oxygen sensor 1 (front) (response monitoring)	P0133
		Heated oxygen sensor 1 (front) (high voltage)	P0134
		Heated oxygen sensor 2 (rear) (min. voltage monitoring)	P0137
		Heated oxygen sensor 2 (rear) (max. voltage monitoring)	P0138
		Heated oxygen sensor 2 (rear) (response monitoring)	P0139
		Heated oxygen sensor 2 (rear) (high voltage)	P0140
HO2S.HTR	3	Heated oxygen sensor 1 heater (front)	P0135
		Heated oxygen sensor 2 heater (rear)	P0141

*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

NDEC0030S0307

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.

Emission-related Diagnostic Information (Cont'd)

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 (If so equipped)	"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 (If so equipped)	"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 (If so equipped)	"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".

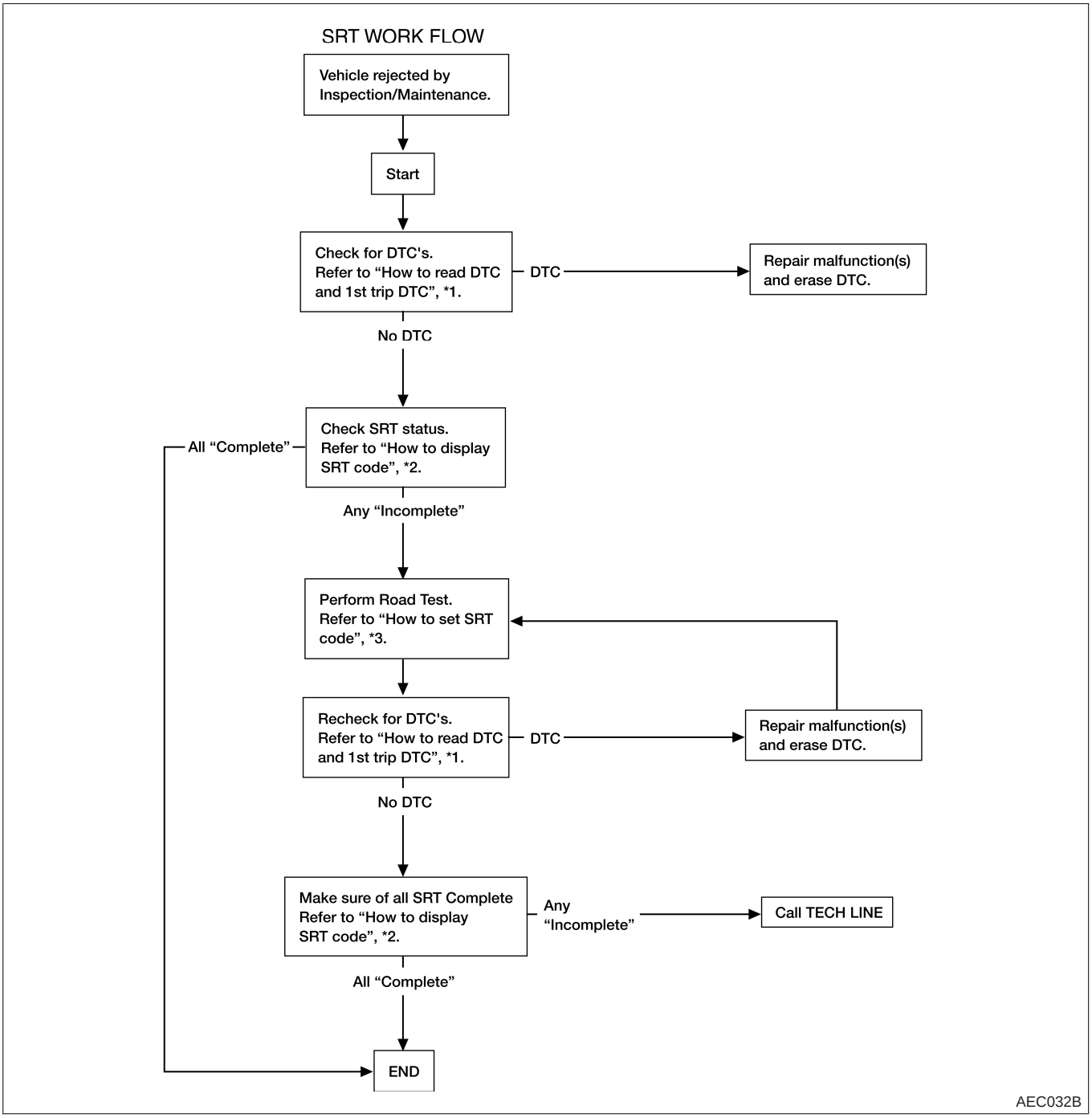
NOTE:

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".

SRT Service Procedure

NDEC0030S0308

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.



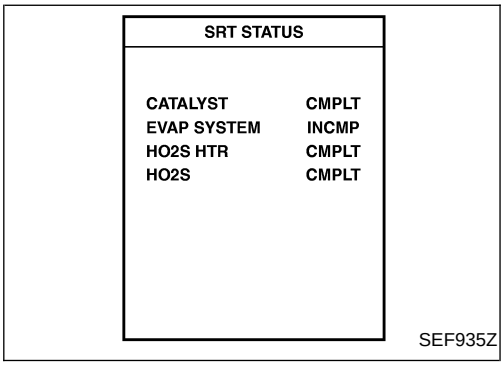
*1 EC-51 *2 EC-55 *3 EC-56

How to Display SRT Code

NDEC0030S0301

1. **With CONSULT-II**
   Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-II.
   For items whose SRT codes are set, a "CMPLT" is displayed on the CONSULT-II screen; for items whose SRT codes are not set, "INCMP" is displayed.
2. **With GST**
   Selecting Mode 1 with GST (Generic Scan Tool)

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



How to Set SRT Code

NDEC0030S0302

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-57.

Without CONSULT-II

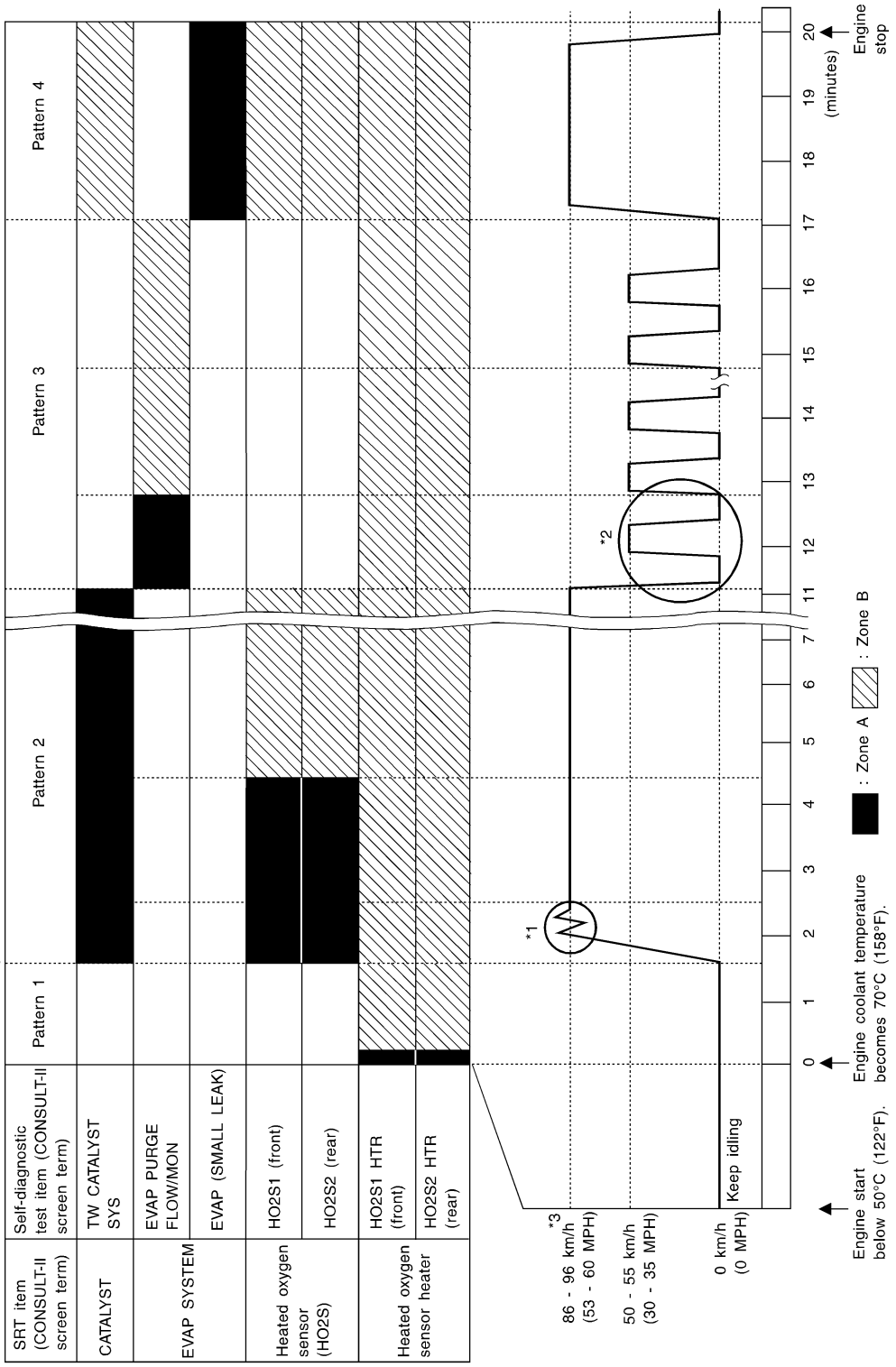
The most efficient driving pattern in which SRT codes can be properly set is explained on page EC-57. The driving pattern should be performed one or more times to set all SRT codes.

Driving Pattern

NDEC0030S0303

Driving pattern

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



SEF947Y

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

*: Normal conditions refer to the following:

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

Pattern 1:

- **The engine is started at the engine coolant temperature of −10 to 35°C (14 to 95°F) (where the voltage between the ECM terminal 59 and ground is 3.0 - 4.3V).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 59 and ground is lower than 1.4V).**
- **The engine is started at the tank fuel temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 60 and ground is less than 4.1V).**

Pattern 2:

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

Pattern 3:

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

Pattern 4:

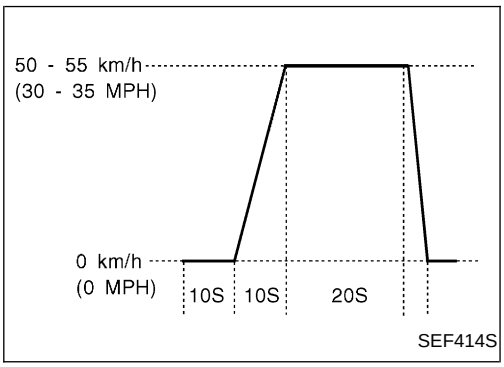
- Tests are performed after the engine has been operated for at least 17 minutes.
- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

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

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

1) Decelerate vehicle to 0 km/h (0 MPH) and let engine idle.
2) Repeat driving pattern shown below at least 10 times.

- **During acceleration, hold the accelerator pedal as steady as possible.**



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

Suggested Transmission Gear Position for A/T Models

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

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

NDEC0030S04

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	01H	01H	Max.	X
		02H	81H	Min.	X
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Max.	X
	EVAP control system purge flow monitoring	06H	83H	Min.	X
O2 SENSOR	Heated oxygen sensor 1 (front)	09H	04H	Max.	X
		0AH	84H	Min.	X
		0BH	04H	Max.	X
		0CH	04H	Max.	X
		0DH	04H	Max.	X
	Heated oxygen sensor 2 (rear)	19H	86H	Min.	X
		1AH	86H	Min.	X
		1BH	06H	Max.	X
		1CH	06H	Max.	X
O2 SENSOR HEATER	Heated oxygen sensor 1 heater (front)	29H	08H	Max.	X
		2AH	88H	Min.	X
	Heated oxygen sensor 2 heater (rear)	2DH	0AH	Max.	X
		2EH	8AH	Min.	X

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

NDEC0030S05

X: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
NO SELF DIAGNOSTIC FAILURE INDICATED	**P0000**	—	—	—	—
MAF SEN/CIRCUIT	P0100	—	—	X	EC-134
ABSL PRES SEN/CIRC	P0105	—	—	X	EC-143
AIR TEMP SEN/CIRC	P0110	—	—	X	EC-154
COOLANT T SEN/CIRC	P0115	—	—	X	EC-160
THRTL POS SEN/CIRC	P0120	—	—	X	EC-166
*COOLAN T SEN/CIRC	P0125	—	—	X	EC-177
HO2S1 (B1)	P0130	X	X	X*2	EC-183
HO2S1 (B1)	P0131	X	X	X*2	EC-191
HO2S1 (B1)	P0132	X	X	X*2	EC-197

Emission-related Diagnostic Information (Cont'd)

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
HO2S1 (B1)	P0133	X	X	X*2	EC-204
HO2S1 (B1)	P0134	X	X	X*2	EC-214
HO2S1 HTR (B1)	P0135	X	X	X*2	EC-220
HO2S2 (B1)	P0137	X	X	X*2	EC-226
HO2S2 (B1)	P0138	X	X	X*2	EC-235
HO2S2 (B1)	P0139	X	X	X*2	EC-244
HO2S2 (B1)	P0140	X	X	X*2	EC-252
HO2S2 HTR (B1)	P0141	X	X	X*2	EC-259
FUEL SYS-LEAN/BK1	P0171	—	—	X	EC-265
FUEL SYS-RICH/BK1	P0172	—	—	X	EC-273
FUEL TEMP SEN/CIRC	P0180	—	—	X	EC-280
MULTI CYL MISFIRE	P0300	—	—	X	EC-285
CYL 1 MISFIRE	P0301	—	—	X	EC-285
CYL 2 MISFIRE	P0302	—	—	X	EC-285
CYL 3 MISFIRE	P0303	—	—	X	EC-285
CYL 4 MISFIRE	P0304	—	—	X	EC-285
CYL 5 MISFIRE	P0305	—	—	X	EC-285
CYL 6 MISFIRE	P0306	—	—	X	EC-285
KNOCK SEN/CIRC-B1	P0325	—	—	—	EC-291
CKP SEN/CIRCUIT	P0335	—	—	X	EC-296
CMP SEN/CIRCUIT	P0340	—	—	X	EC-302
TW CATALYST SYS-B1	P0420	X	X	X*2	EC-310
EVAP SMALL LEAK	P0440	X	X	X*2	EC-315
PURG VOLUME CONT/V	P0443	—	—	X	EC-326
VENT CONTROL VALVE	P0446	—	—	X	EC-333
EVAPO SYS PRES SEN	P0450	—	—	X	EC-340
EVAP GROSS LEAK	P0455	—	X	X	EC-348
VEH SPEED SEN/CIRC	P0500	—	—	X	EC-358
IACV/AAC VLV/CIRC	P0505	—	—	X	EC-362
CLOSED TP SW/CIRC	P0510	—	—	X	EC-369
A/T COMM LINE	P0600	—	—	—	EC-377
ECM	P0605	—	—	X	EC-382
PNP SW/CIRC	P0705	—	—	X	***AT-103***
ATF TEMP SEN/CIRC	P0710	—	—	X	***AT-110***
VEH SPD SEN/CIR AT	P0720	—	—	X	***AT-117***
ENGINE SPEED SIG	P0725	—	—	X	***AT-123***
A/T 1ST GR FNCTN	P0731	—	—	X	***AT-127***

Items (CONSULT-II screen terms)	DTC*1	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
A/T 2ND GR FNCTN	P0732	—	—	X	***AT-133***
A/T 3RD GR FNCTN	P0733	—	—	X	***AT-139***
A/T 4TH GR FNCTN	P0734	—	—	X	***AT-145***
TCC SOLENOID/CIRC	P0740	—	—	X	***AT-154***
A/T TCC S/V FNCTN	P0744	—	—	X	***AT-159***
L/PRESS SOL/CIRC	P0745	—	—	X	***AT-167***
SFT SOL A/CIRC	P0750	—	—	X	***AT-173***
SFT SOL B/CIRC	P0755	—	—	X	***AT-179***
MAP/BARO SW SOL/CIR	P1105	—	—	X	EC-384
CLOSED LOOP-B1	P1148	—	—	—	EC-396
ENG OVER TEMP	P1217	—	—	X	EC-398
IGN SIGNAL-PRIMARY	P1320	—	—	X	EC-414
CKP SENSOR COG	P1336	—	—	X	EC-421
EVAP SMALL LEAK	P1440	X	X	X*2	EC-427
PURG VOLUME CONT/V	P1444	—	—	X	EC-429
VENT CONTROL VALVE	P1446	—	—	X	EC-438
EVAP PURG FLOW/MON	P1447	X	X	X*2	EC-444
VENT CONTROL VALVE	P1448	—	—	X	EC-452
VC/V BYPASS/V	P1490	—	—	X	EC-459
VC CUT/V BYPASS/V	P1491	—	—	X	EC-466
A/T DIAG COMM LINE	P1605	—	—	X	EC-474
TP SEN/CIRC A/T	P1705	—	—	X	***AT-185***
P-N POS SW/CIRCUIT	P1706	—	—	X	EC-477
O/R CLTCH SOL/CIRC	P1760	—	—	X	***AT-192***

*1: 1st trip DTC No. is the same as DTC No.
*2: These are not displayed with GST.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

NDEC0030S06

How to Erase DTC (Ⓐ With CONSULT-II)

NDEC0030S0601

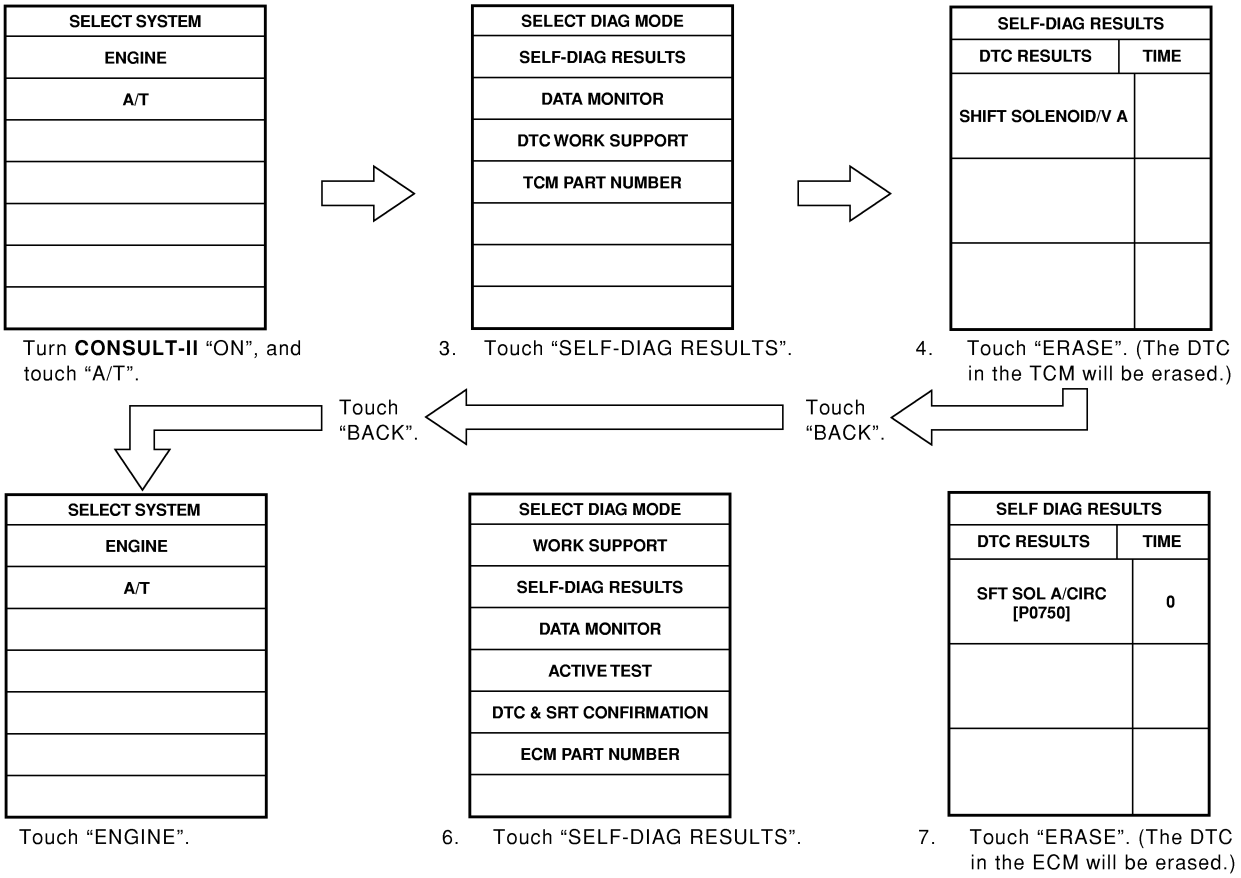
NOTE:
If the DTC is not for A/T related items (see EC-7), skip steps 2 through 4.

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

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

How to erase DTC (With CONSULT-II)

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



SEF966XA

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

How to Erase DTC (GST With GST)

NDEC0030S0602

NOTE:

If the DTC is not for A/T related items (see EC-7), skip step 2.

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II)" in AT section titled "TROUBLE DIAGNOSIS", "Self-diagnosis". (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 with GST (Generic Scan Tool).

The emission related diagnostic information in the ECM can be erased by selecting Mode 4 with GST.

- **If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours.**
- **Erasing the emission-related diagnostic information using CONSULT-II or GST is easier and quicker than switching the mode selector on the ECM.**
- **The following data are cleared when the ECM memory is erased.**

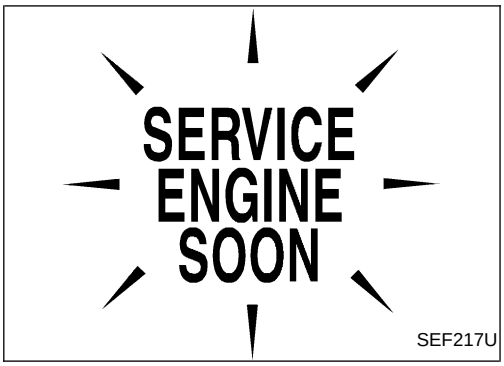
1) Diagnostic trouble codes
2) 1st trip diagnostic trouble codes
3) Freeze frame data
4) 1st trip freeze frame data
5) System readiness test (SRT) codes
6) Test values
7) Others

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

Malfunction Indicator Lamp (MIL)

DESCRIPTION

NDEC0031



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-101*** or see EC-516.

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.

Diagnostic Test Mode I — Bulb Check

NDEC0031S03

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to “WARNING LAMPS”, ***EL-101*** or see EC-516.

Diagnostic Test Mode I — Malfunction Warning

NDEC0031S04

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

OBD System Operation Chart

NDEC0032

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

NDEC0032S01

- 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-50.
- 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

NDEC0032S02

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

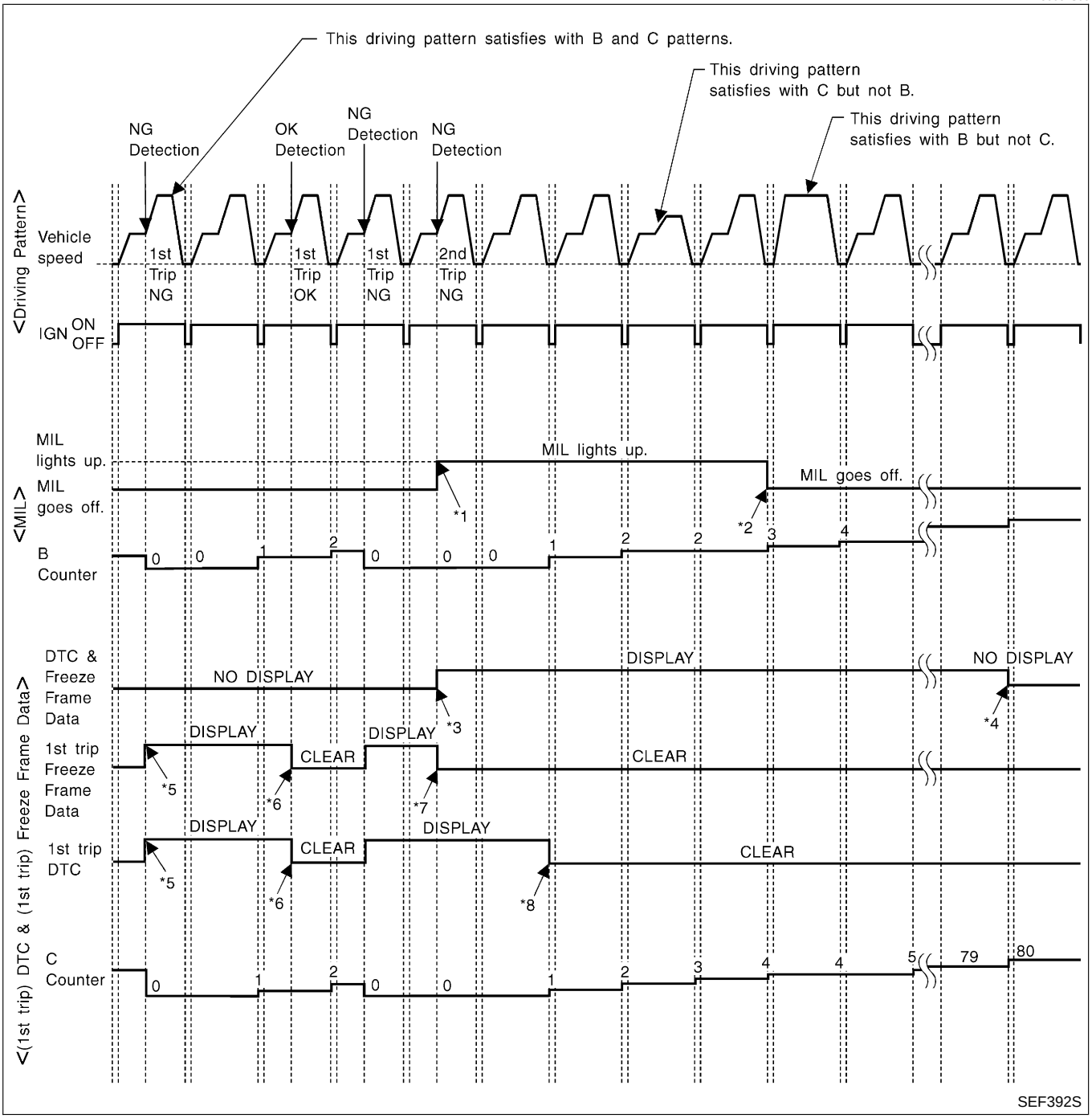
OBD System Operation Chart (Cont'd)

Items	Fuel Injection System	Misfire	Other
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

For details about patterns "B" and "C" under "Fuel Injection System" and "Misfire", see EC-66.
For details about patterns "A" and "B" under "Other", see EC-68.
*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"

=NDEC0032S03



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

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

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

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

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

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

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

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

OBD System Operation Chart (Cont'd)

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

NDEC0032S04

<Driving Pattern B>

NDEC0032S0401

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>

NDEC0032S0402

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:

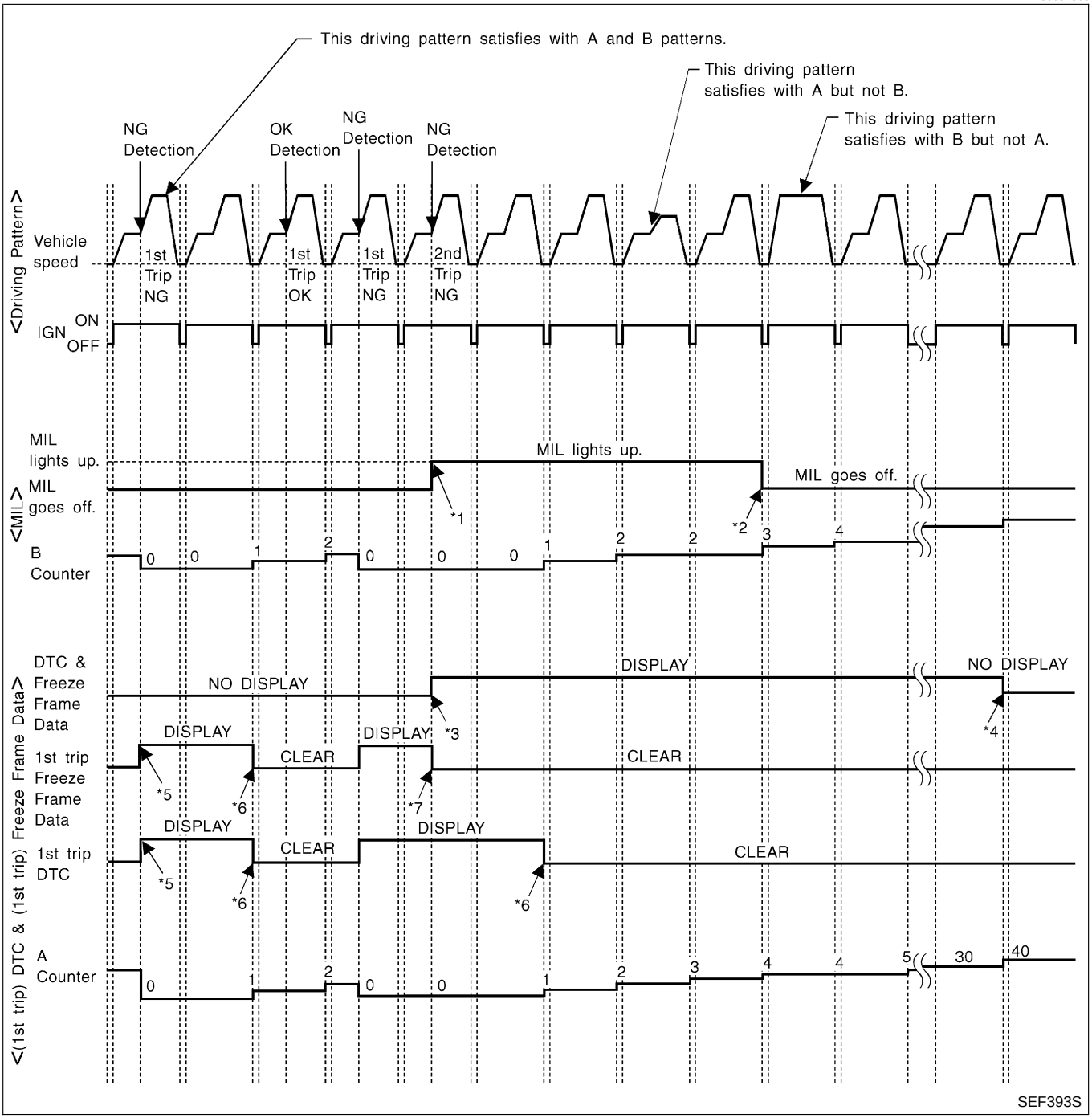
- When the freeze frame data shows lower than 70°C (158°F), "T" should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), "T" should be higher than or equal to 70°C (158°F).

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"

NDEC0032S05



*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.

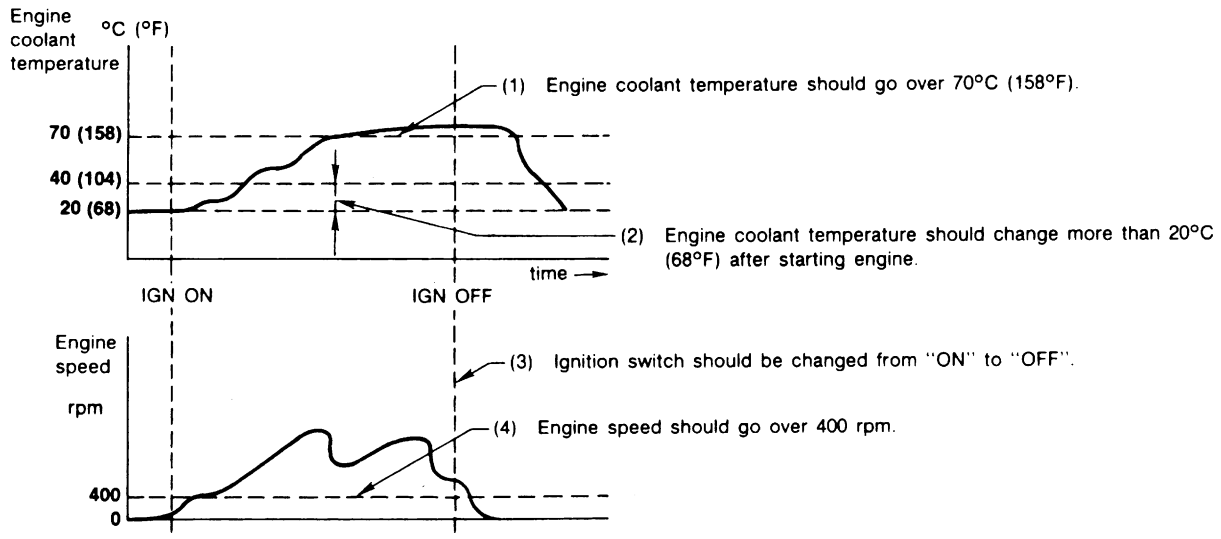
*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

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

NDEC0032S06

<Driving Pattern A>

NDEC0032S0601



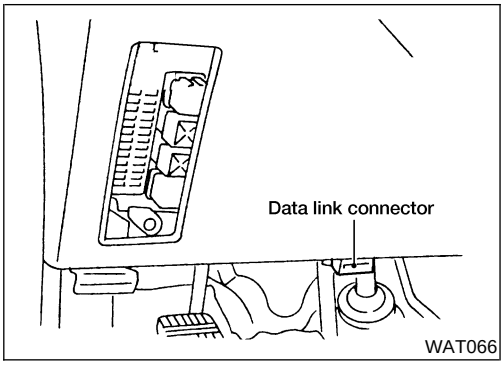
- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

<Driving Pattern B>

NDEC0032S0602

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").



WAT066

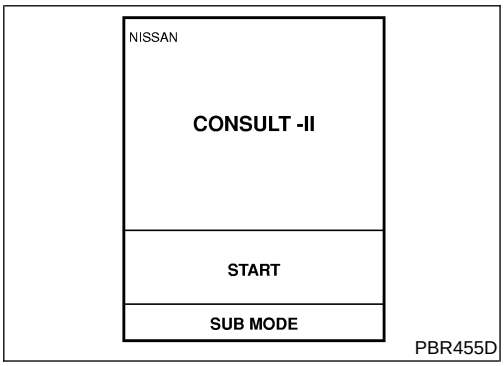
CONSULT-II

=NDEC0033

CONSULT-II INSPECTION PROCEDURE

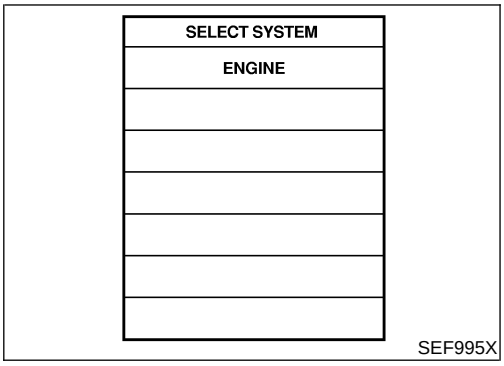
NDEC0033S01

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.)



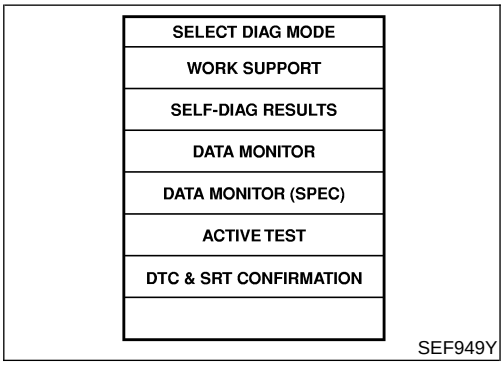
PBR455D

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



SEF995X

5. Touch “ENGINE”.



SEF949Y

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

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

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

NDEC0033S02

Item			DIAGNOSTIC TEST MODE							
			WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Camshaft position sensor		X	X	X	X			
		Mass air flow sensor		X		X	X			
		Engine coolant temperature sensor		X	X	X	X	X		
		Heated oxygen sensor 1 (front)		X		X	X		X	X
		Heated oxygen sensor 2 (rear)		X		X	X		X	X
		Vehicle speed sensor		X	X	X	X			
		Throttle position sensor		X		X	X			
		Fuel tank temperature sensor		X		X	X	X		
		EVAP control system pressure sensor		X		X	X			
		Absolute pressure sensor		X		X	X			
		Intake air temperature sensor		X		X	X			
		Crankshaft position sensor (OBD)		X						
		Knock sensor		X						
		Ignition switch (start signal)				X	X			
		Closed throttle position switch	X	X		X	X			
		Closed throttle position switch (throttle position sensor signal)				X	X			
		Air conditioner switch				X	X			
		Park/Neutral position switch		X		X	X			
		Power steering oil pressure switch				X	X			
		Air conditioner pressure switch				X				
		Battery voltage				X	X			

Item			DIAGNOSTIC TEST MODE							
			WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	OUT-PUT	Injectors				X	X	X		
		Power transistor (Ignition timing)		X (Ignition signal)		X	X	X		
		IACV-AAC valve	X	X		X	X	X		
		EVAP canister purge vol-ume control solenoid valve		X		X	X	X		X
		Air conditioner relay				X	X			
		Fuel pump relay	X			X	X	X		
		Cooling fan		X		X	X	X		
		Heated oxygen sensor 1 heater (front)		X		X	X		X	
		Heated oxygen sensor 2 heater (rear)		X		X	X		X	
		EVAP canister vent control valve		X		X	X	X		
		Vacuum cut valve bypass valve		X		X	X	X		X
		MAP/BARO switch solenoid valve		X		X		X		
		Calculated load value			X	X	X			

X: Applicable

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-51.

CONSULT-II (Cont'd)

FUNCTION

=NDEC0033S03

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

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

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

WORK SUPPORT MODE

NDEC0033S04

WORK ITEM	CONDITION	USAGE
TP SW/TP SEN IDLE POSI ADJ	● FOLLOW THE BASIC INSPECTION INSTRUCTION IN THE SERVICE MANUAL.	When adjusting the idle throttle position
TARGET IGNITION TIMING ADJ	● IDLE CONDITION	When adjusting target ignition timing After adjustment, confirm target ignition timing with a timing light.
FUEL PRESSURE RELEASE	● FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
SELF-LEARNING CONT	● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clear the coefficient of self-learning control value

WORK ITEM	CONDITION	USAGE
EVAP SYSTEM CLOSE	OPEN THE VACUUM CUT VALVE BYPASS VALVE AND CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. ● IGN SW "ON" ● ENGINE NOT RUNNING ● AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). ● NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM ● TANK FUEL TEMP. IS MORE THAN 0°C (32°F). ● WITHIN 10 MINUTES AFTER STARTING "EVAP SYSTEM CLOSE" ● WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE CONDITION EXCEPT ABOVE, CONSULT-II WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. **NOTE:** **WHEN STARTING ENGINE, CONSULT MAY DISPLAY "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", EVEN IN USING CHARGED BATTERY.**	When detecting EVAP vapor leak point of EVAP system
TARGET IDLE RPM ADJ	SET ENGINE SPEED AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS. ● ENGINE WARMED UP ● NO-LOAD	When adjusting initial ignition timing and idle speed

SELF-DIAGNOSTIC MODE

NDEC0033S05

DTC and 1st Trip DTC

NDEC0033S0501

Regarding items of "DTC and 1st trip DTC", refer to "TROUBLE DIAGNOSIS — INDEX", EC-7.

Freeze Frame Data and 1st Trip Freeze Frame Data

NDEC0033S0502

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-7.)
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 [%]	● "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.

CONSULT-II (Cont'd)

Freeze frame data item*1	Description
ABSOL PRESS [kPa] or [kg/cm^2] or [psi]	● The absolute pressure at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	● The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	● The intake air temperature at the moment a malfunction is detected is displayed.

*1: The items are the same as those of 1st trip freeze frame data.
*2: Regarding V41 model, "-B1" indicates right bank and "-B2" indicates left bank.

DATA MONITOR MODE

=NDEC0033S06

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	○	○	• Indicates the engine speed computed from the REF signal (120° signal) of the camshaft position sensor.	
MAS A/F SE-B1 [V]	○	○	• The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a certain value is indicated.
COOLAN TEMP/S [°C] or [°F]	○	○	• The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	• When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
HO2S1 (B1) [V]	○	○	• The signal voltage of the heated oxygen sensor 1 (front) is displayed.	
HO2S2 (B1) [V]	○	○	• The signal voltage of the heated oxygen sensor 2 (rear) is displayed.	
HO2S1 MNTR (B1) [RICH/LEAN]	○	○	• Display of heated oxygen sensor 1 (front) signal during air-fuel ratio feedback control: RICH ... means the mixture became "rich", and control is being affected toward a leaner mixture. LEAN ... means the mixture became "lean", and control is being affected toward a rich mixture.	• After turning ON the ignition switch, "RICH" is displayed until air-fuel mixture ratio feedback control begins. • When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
HO2S2 MNTR (B1) [RICH/LEAN]	○		• Display of heated oxygen sensor 2 (rear) signal: RICH ... means the amount of oxygen after three way catalyst is relatively small. LEAN ... means the amount of oxygen after three way catalyst is relatively large.	• When the engine is stopped, a certain value is indicated.
VHCL SPEED SE [km/h] or [mph]	○	○	• The vehicle speed computed from the vehicle speed sensor signal is displayed.	
BATTERY VOLT [V]	○	○	• The power supply voltage of ECM is displayed.	
THRTL POS SEN [V]	○	○	• The throttle position sensor signal voltage is displayed.	
FUEL T/TMP SE [°C] or [°F]	○		• The fuel temperature judged from the tank fuel temperature sensor signal voltage is displayed.	
INT/A TEMP SE [°C] or [°F]	○		• The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated.	
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.	

CONSULT-II (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
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 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.	
IGNITION SW [ON/OFF]	○		• Indicates [ON/OFF] condition from ignition switch.	
A/C PRESS SW [ON/OFF]	○		• Indicates [ON/OFF] condition of the air conditioner pressure switch.	
INJ PULSE-B1 [msec]		○	• Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
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-B1 [%]			• The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • This data also includes the data for the air-fuel ratio learning control.
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.	
FUEL PUMP RLY [ON/OFF]			• Indicates the fuel pump relay control condition determined by ECM according to the input signals.	

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
COOLING FAN [HI/LOW/OFF]			● Indicates the control condition of the cooling fan (determined by ECM according to the input signal). HI ... High speed operation LOW ... Low speed operation OFF ... Stop	
VENT CONT/V [ON/OFF]			● The control condition of the EVAP canister vent control valve (determined by ECM according to the input signal) is indicated. ● ON ... Closed OFF ... Open	
HO2S1 HTR (B1) [ON/OFF]			● Indicates [ON/OFF] condition of heated oxygen sensor 1 heater (front) determined by ECM according to the input signals.	
HO2S2 HTR (B1) [ON/OFF]			● Indicates [ON/OFF] condition of heated oxygen sensor 2 heater (rear) 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 [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 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:

CONSULT-II (Cont'd)

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

DATA MONITOR (SPEC) MODE

NDEC0033S11

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

NOTE:

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

ACTIVE TEST MODE

NDEC0033S07

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	• Engine: Return to the original trouble condition • Change the amount of fuel injection using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Fuel injectors • Heated oxygen sensor 1 (front)
IACV-AAC/V OPENING	• Engine: After warming up, idle the engine. • Change the IACV-AAC valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	• Harness and connector • IACV-AAC valve
ENG COOLANT TEMP	• Engine: Return to the original trouble condition • Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Engine coolant temperature sensor • Fuel injectors
IGNITION TIMING	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	• Adjust initial ignition timing
POWER BALANCE	• Engine: After warming up, idle the engine. • A/C switch "OFF" • Shift lever "N" • Cut off each injector signal one at a time using CONSULT-II.	Engine runs rough or dies.	• Harness and connector • Compression • Injectors • Power transistor • Spark plugs • Ignition coils
COOLING FAN	• Ignition switch: ON • Turn the cooling fan "ON" and "OFF" using CONSULT-II.	Cooling fan moves and stops.	• Harness and connector • Cooling fan motor • Cooling fan relay
FUEL PUMP RELAY	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay "ON" and "OFF" using CONSULT-II and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connector • Fuel pump relay

CONSULT-II (Cont'd)

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
PURG VOL CONT/V	• Engine: After warming up, run engine at 1,500 rpm. • Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	• Harness and connector • Solenoid valve
FUEL/T TEMP SEN	• Change the tank fuel 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 & SRT CONFIRMATION MODE

NDEC0033S10

SRT STATUS Mode

NDEC0033S1001

For details, refer to "SYSTEM READINESS TEST (SRT) CODE", EC-52.

SRT Work Support Mode

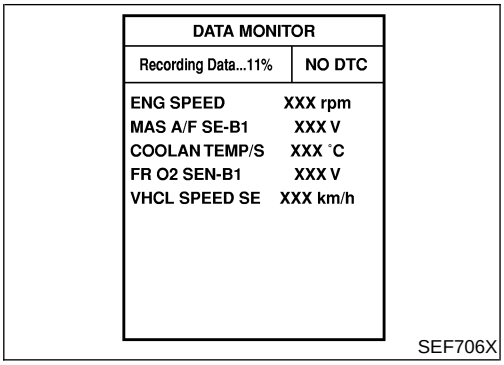
NDEC0033S1003

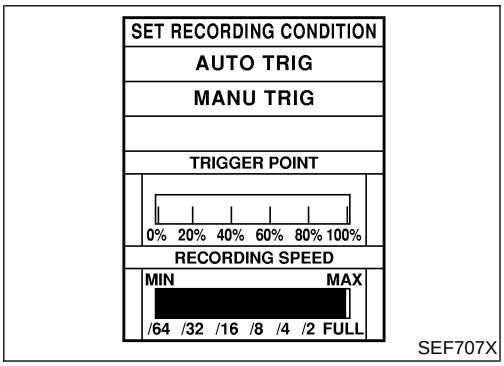
This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

DTC Work Support Mode

NDEC0033S1002

Test mode	Test item	Condition	Reference page
EVAPORATIVE SYSTEM	EVAP SML LEAK P0440/P1440	Refer to corresponding trouble diagnosis for DTC.	EC-315, EC-427
	PURG VOL CN/V P1444		EC-429
	PURGE FLOW P1447		EC-444
	VC CUT/V BP/V P1491		EC-466
HEATED OXYGEN SENSOR 1 (FRONT)	HO2S1 (B1) P0130		EC-183
	HO2S1 (B1) P0131		EC-191
	HO2S1 (B1) P0132		EC-197
	HO2S1 (B1) P0133		EC-204
HEATED OXYGEN SENSOR 2 (REAR)	HO2S2 (B1) P0137		EC-226
	HO2S2 (B1) P0138		EC-235
	HO2S2 (B1) P0139		EC-244





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

NDEC0033S09

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

1) "AUTO TRIG" (Automatic trigger):

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

2) "MANU TRIG" (Manual trigger):

- DTC/1st trip DTC and malfunction item will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM.
  DATA MONITOR can be performed continuously even though a malfunction is detected.

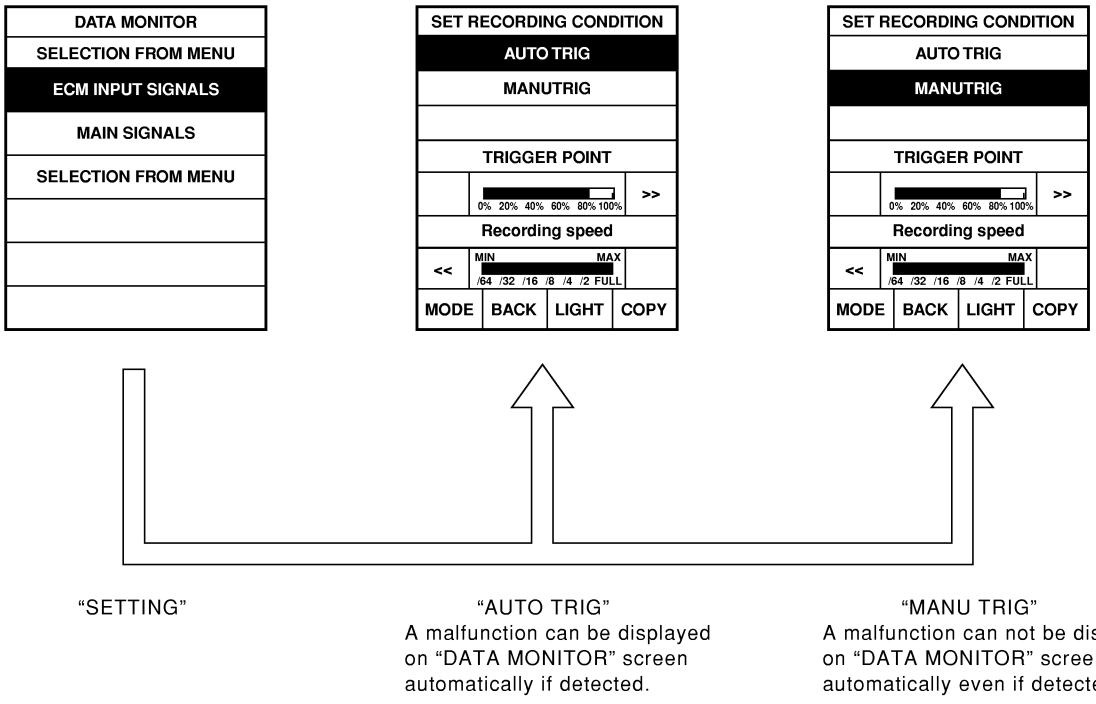
Use these triggers as follows:

1) "AUTO TRIG"

- While trying to detect the DTC/1st trip DTC by performing the "DTC Confirmation Procedure", be sure to select to "DATA MONITOR (AUTO TRIG)" mode. You can confirm the malfunction at the moment it is detected.
- While narrowing down the possible causes, CONSULT-II should be set in "DATA MONITOR (AUTO TRIG)" mode, especially in case the incident is intermittent.
  When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the "DTC Confirmation Procedure", the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to ***GI-23***, "Incident Simulation Tests".)

2) "MANU TRIG"

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

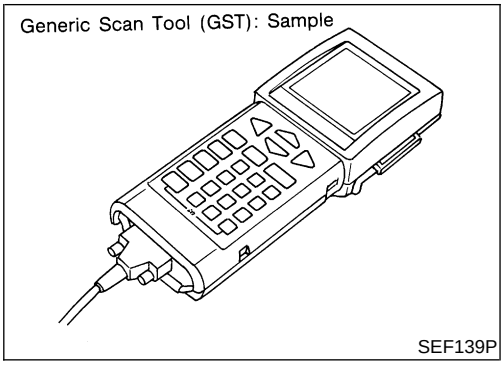


"SETTING"

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

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

SEF720X



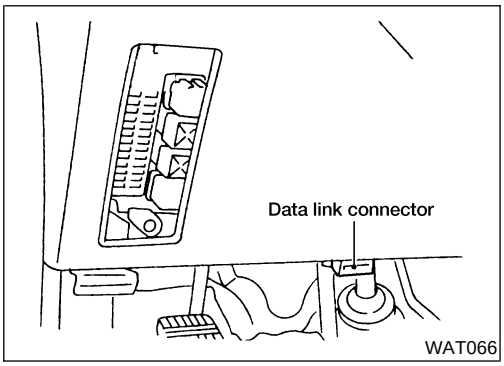
Generic Scan Tool (GST)

=NDEC0034

DESCRIPTION

NDEC0034S01

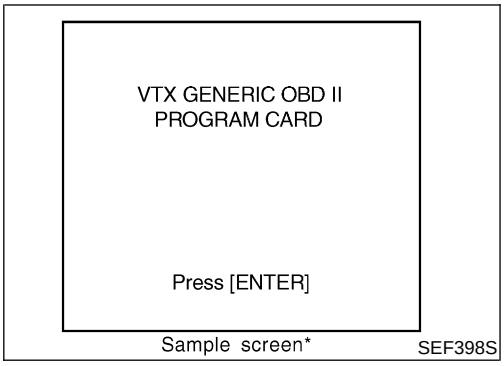
Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 8 different functions explained on the next page.
ISO9141 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.



GST INSPECTION PROCEDURE

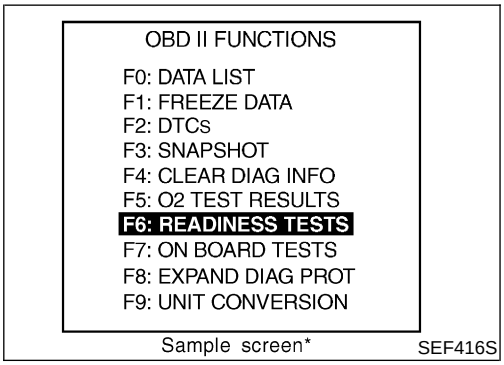
NDEC0034S02

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.)



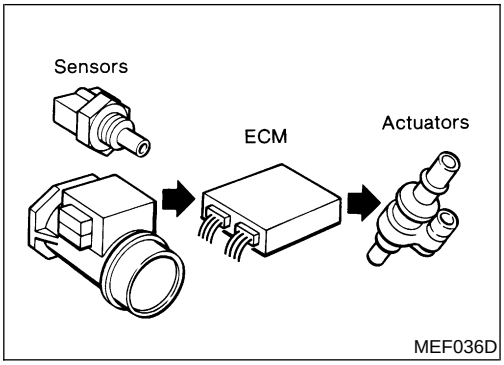
5. Perform each diagnostic mode according to each service procedure.

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

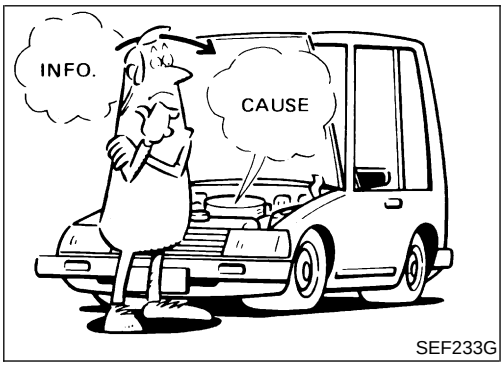
FUNCTION

NDEC0034S03

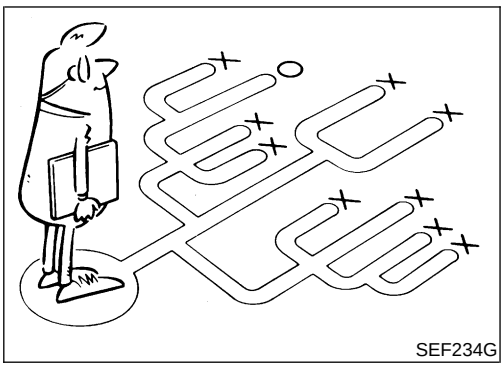
Diagnostic test mode		Function
MODE 1	READINESS TESTS	This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode gains access to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-73).]
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 allows the off-board to request vehicle specific information such as Vehicle Identification Number (VIN) and calibration ID



MEF036D



SEF233G


SEF234G

KEY POINTS

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

SEF907L

Introduction

NDEC0035

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-86.

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

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

DIAGNOSTIC WORKSHEET

NDEC0035S01

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

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

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

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

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.

Worksheet Sample

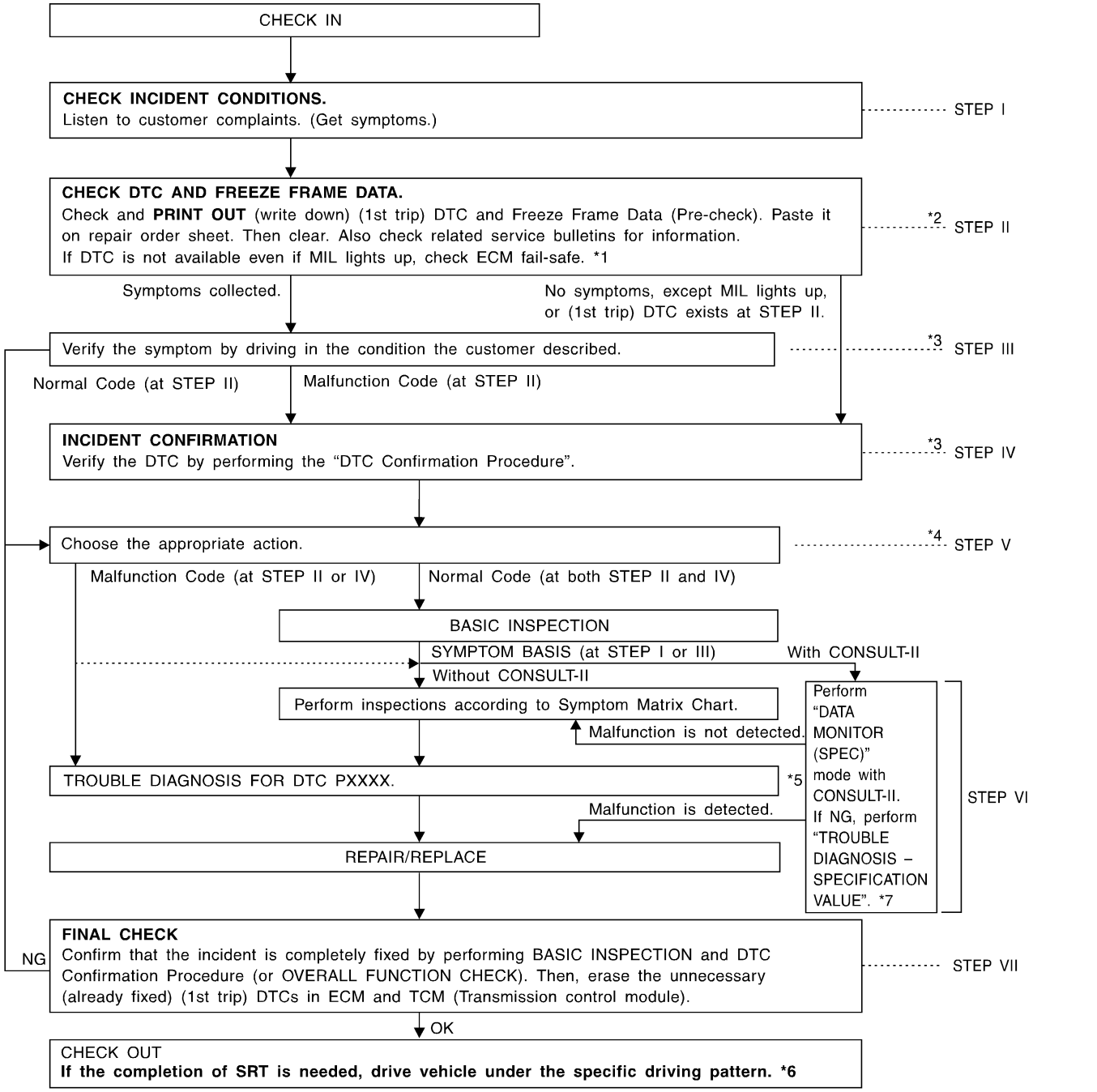
NDEC0035S0101

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

NDEC0036



SEF510ZF

*1 EC-103

*2 If time data of "SELF-DIAG RESULTS" is other than "0" or "[1t]", perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.

*3 If the incident cannot be verified, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.

*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-127.

*5 If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.

*6 EC-57

DESCRIPTION FOR WORK FLOW

NDEC0036S01

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-85.
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-61.) 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-126. 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-104.) 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-126. 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-126. 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-88.) If CONSULT-II is available, perform "DATA MONITOR (SPEC)" mode with CONSULT-II and proceed to the "TROUBLE DIAGNOSIS — SPECIFICATION VALUE", EC-122 (If malfunction is detected, proceed to "REPAIR REPLACE" .) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-104.)
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-108, EC-113. The "Diagnostic Procedure" in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to GI section ("HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", "Circuit Inspection"). Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.
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-61.)

Basic Inspection

NDEC0037

Precaution:

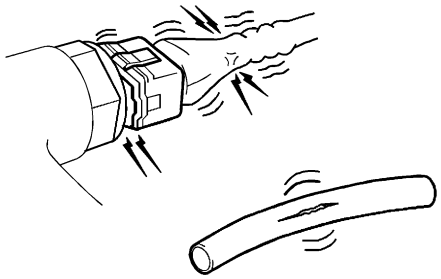
Perform Basic Inspection without electrical or mechanical loads applied;

- 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

	▶	GO TO 2.

2	CONNECT CONSULT-II OR GST TO THE VEHICLE	
With CONSULT-II Connect “CONSULT-II” to the data link connector and select “ENGINE” from the menu. Refer to EC-69.		
With GST Connect “GST” to the data link connector. Refer to EC-82.		
Models with CONSULT-II	▶	GO TO 3.
Models with GST	▶	GO TO 12.

3	CHECK FI CAM FUNCTION

With CONSULT-II

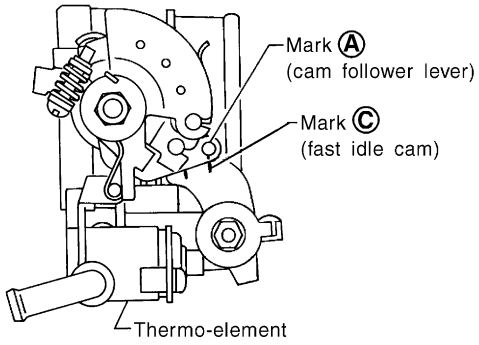
1. Turn ignition switch "ON".
2. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
3. Start engine and warm it up.

DATA MONITOR	
MONITOR	NO DTC
COOLAN TEMP/S	XXX °C

SEF013Y

4. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.

- The center of mark **A** is aligned with mark **C**.
- The cam follower lever's roller is not touching the fast idle cam.



SEF754R

OK or NG

OK	▶	GO TO 4.
NG	▶	1. Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-37. 2. GO TO 4.

4	CHECK IGNITION TIMING

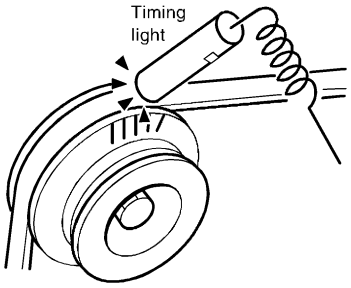
With CONSULT-II

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

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-39. 2. GO TO 5.

5	CHECK BASE IDLE SPEED

With CONSULT-II

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

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-39. 2. GO TO 6.

6	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION

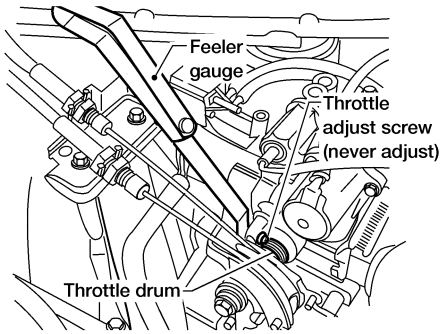
With CONSULT-II

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 "TP SW/TP SEN IDLE POSI ADJ" in "WORK SUPPORT" mode.
6. Read "CLSD THL/P SW" signal under the following conditions.

- Insert a 0.2 mm (0.008 in) and 0.4 mm (0.016 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure and check the signal.



AEC919A

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

SEF715Y

"CLSD THL/P SW" signal should remain "ON" while inserting 0.2 mm (0.008 in) feeler gauge.
"CLSD THL/P SW" signal should remain "OFF" while inserting 0.4 mm (0.016 in) feeler gauge.

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 7.

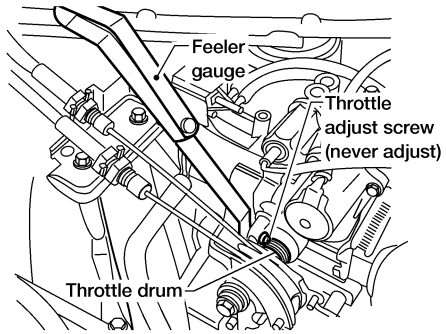
7	ADJUSTMENT CLOSED THROTTLE POSITION SWITCH IDLE POSITION

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. Turn ignition switch "ON".
6. Select "TP SW/TP SEN IDLE POSI ADJ" in "WORK SUPPORT" mode.
7. Insert 0.3 mm (0.012 in) feeler gauge between throttle adjust screw and throttle drum as shown in the figure.



AEC919A

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

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

SEF715Y

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

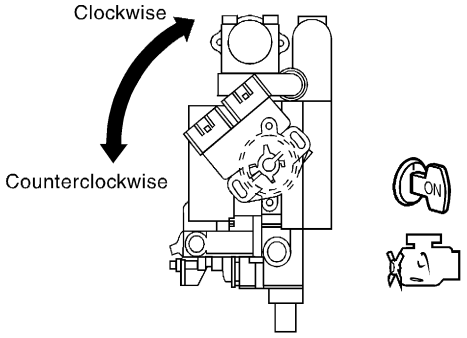
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	ADJUST THROTTLE POSITION SENSOR BODY

With CONSULT-II

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



SEF769W

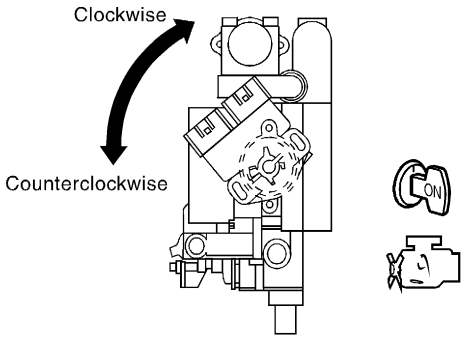
▶	GO TO 9.

9	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION

With CONSULT-II

1. Remove 0.3 mm (0.012 in) feeler gauge then insert 0.2 mm (0.008 in) feeler gauge.
2. Temporarily tighten sensor body fixing bolts as follows.

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



SEF769W

3. Make sure two or three times that the signal is "ON" when the throttle valve is closed and "OFF" when it is opened.
4. Remove 0.2 mm (0.008 in) feeler gauge then insert 0.4 mm (0.016 in) feeler gauge.
5. Make sure two or three times that the signal remains "OFF" when the throttle valve is closed.
6. Tighten throttle position sensor.
7. Check the "CLSD THL/P SW" signal again.
   The signal remains "OFF" while closing throttle valve.

OK or NG

OK	▶	1. Remove 0.4 mm (0.016 in) feeler gauge. 2. GO TO 10.
NG	▶	GO TO 7.

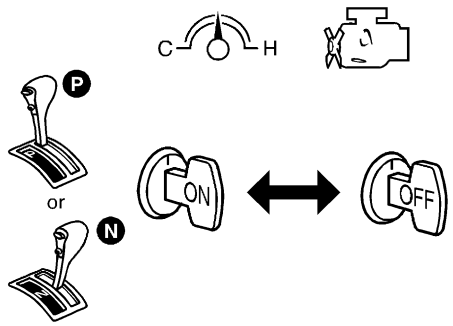
10	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

With CONSULT-II

NOTE:

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

1. Start engine.
2. Warm up engine to normal operating temperature.
3. Select "TP SW/TP SEN IDLE POSI ADJ" in "WORK SUPPORT" mode.
4. Stop engine. (Turn ignition switch "OFF".)
5. Turn ignition switch "ON" and wait at least 5 seconds.



SEF864V

6. Turn ignition switch "OFF" and wait at least 5 seconds.
7. Repeat steps 5 and 6 until "CLSD THL POS" signal changes to "ON".

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

SEF715Y

	▶	GO TO 11.

11	CHECK TARGET IDLE SPEED

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "ENG SPEED" in "DATA MONITOR" mode.
3. Check idle speed.

750±50 rpm (in "P" or "N" position)

OK or NG

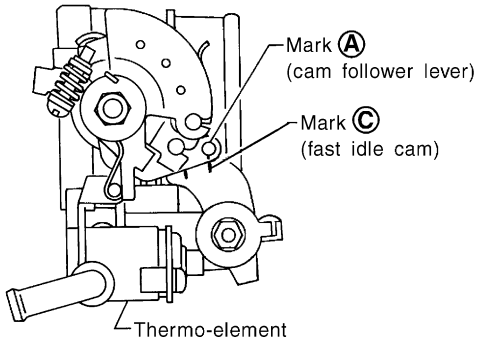
OK	▶	**INSPECTION END**
NG	▶	1. Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-39. 2. GO TO 22.

12	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.



SEF754R

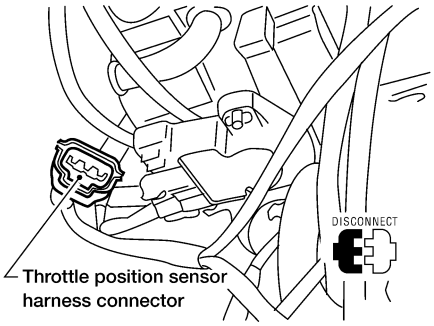
OK or NG

OK	▶	GO TO 13.
NG	▶	1. Check FI cam. Refer to "Fast Idle Cam (FIC)", EC-37. 2. GO TO 13.

13	CHECK IGNITION TIMING

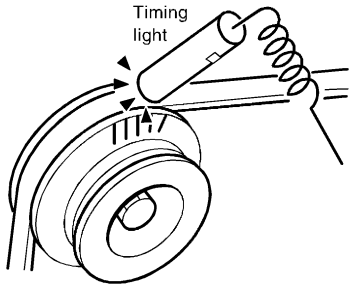
Without CONSULT-II

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



LEC747

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 14.
NG	▶	1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-39. 2. GO TO 14.

14	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 15.
NG	▶	1. Adjust engine speed by turning idle speed adjusting screw. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-39. 2. GO TO 15.

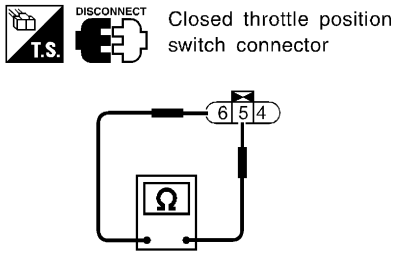
15	CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION

Without CONSULT-II

NOTE:

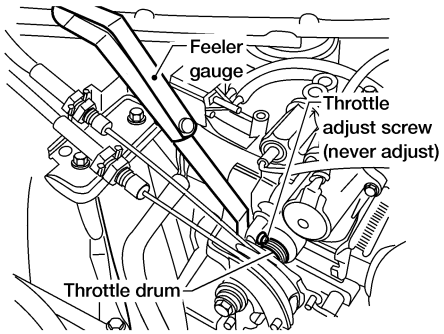
Always check ignition timing and base idle speed before performing the following.

1. Warm up engine to normal operating temperature.
2. Check FI cam, refer to procedure 12 or 13.
3. Stop engine.
4. Disconnect closed throttle position switch harness connector.
5. Check continuity between closed throttle position switch terminals **5** and **6** under the following conditions.



SEF862V

- Insert the 0.2 mm (0.008 in) and 0.4 mm (0.016 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure.



AEC919A

"Continuity should exist" while inserting 0.2 mm (0.008 in) feeler gauge.
"Continuity should not exist" while inserting 0.4 mm (0.016 in) feeler gauge.

OK or NG

OK	▶	GO TO 19.
NG	▶	GO TO 16.

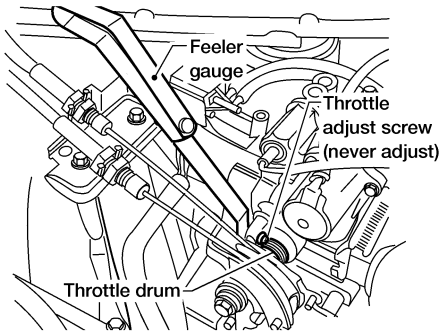
16	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION

Without CONSULT-II

NOTE:

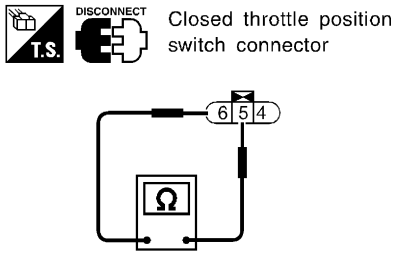
- **Never adjust throttle adjust screw (TAS).**
- **Do not touch throttle drum when checking "continuity", doing so may cause an incorrect adjustment.**

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. Disconnect closed throttle position switch harness connector.
6. Insert 0.3 mm (0.012 in) feeler gauge between the throttle adjust screw and throttle drum as shown in the figure.



AEC919A

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



SEF862V

Continuity should not exist while closing the throttle position sensor.

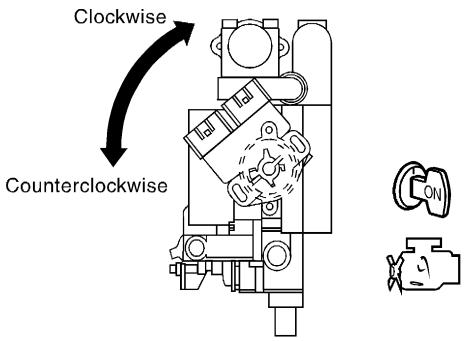
OK or NG

OK	▶	GO TO 18.
NG	▶	GO TO 17.

17	ADJUST THROTTLE POSITION SENSOR BODY

Without CONSULT-II

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



SEF769W

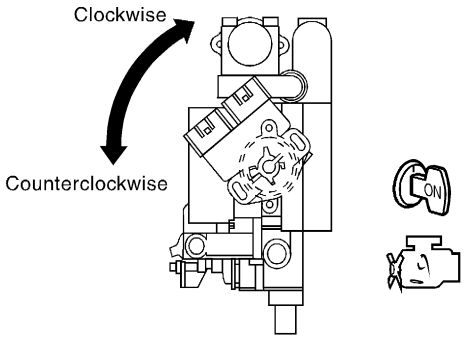
	▶	GO TO 18.

18	ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION

Without CONSULT-II

1. Remove 0.3 mm (0.012 in) feeler gauge then insert 0.2 mm (0.008 in) feeler gauge.
2. Temporarily tighten sensor body fixing bolts as follows.

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



SEF769W

3. Make sure two or three times that the continuity exists when the throttle valve is closed and continuity does not exist when it is opened.
4. Remove 0.2 mm (0.008 in) feeler gauge then insert 0.4 mm (0.016 in) feeler gauge.
5. Make sure two or three times that the continuity does not exist when the throttle valve is closed.
6. Tighten throttle position sensor.
7. Check the continuity again.

Continuity does not exist while closing the throttle valve.

OK or NG

OK	▶	GO TO 19.
NG	▶	GO TO 16.

19	REINSTALLATION

Without CONSULT-II

- Remove 0.4 mm (0.016 in) feeler gauge.
- Reconnect throttle position sensor harness connector and closed throttle position switch harness connector.
- 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 20.

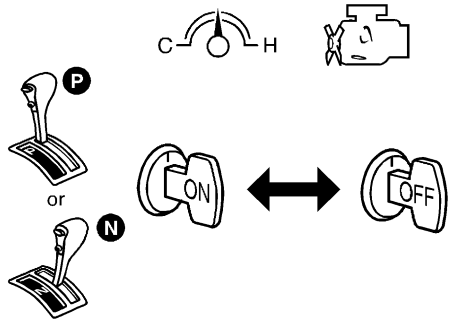
20	RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

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 21.

21	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 22.
NG	▶	1. Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", EC-39. 2. GO TO 22.

22	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-61 and "HOW TO ERASE DTC", ***AT-37***.

▶	**INSPECTION END**

DTC Inspection Priority Chart

NDEC0038

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

Priority	Detected items (DTC)
1	• P0100 Mass air flow sensor • P0110 Intake air temperature sensor • P0115 P0125 Engine coolant temperature sensor • P0120 Throttle position sensor • P0180 Fuel tank temperature sensor • P0325 Knock sensor • P0335 P1336 Crankshaft position sensor (OBD) • P0340 Camshaft position sensor • P0500 Vehicle speed sensor • P0600 A/T communication line • P0605 ECM • P1320 Ignition signal • P1605 A/T diagnosis communication line • P1706 Park/Neutral position (PNP) switch
2	• P0105 Absolute pressure sensor • P0130-P0134 Heated oxygen sensor 1 (front) • P0135 Heated oxygen sensor 1 heater (front) • P0137-P0140 Heated oxygen sensor 2 (rear) • P0141 Heated oxygen sensor 2 heater (rear) • P0443 P1444 EVAP canister purge volume control solenoid valve • P0446 P1446 P1448 EVAP canister vent control valve • P0450 EVAP control system pressure sensor • P0510 Closed throttle position switch • P0705-P0755 P1705 P1760 A/T related sensors, solenoid valves and switches • P1105 MAP/BARO switch solenoid valve • P1490 P1491 Vacuum cut valve bypass valve • P1447 EVAP control system purge flow monitoring
3	• P0171 P0172 Fuel injection system function • P0306 - P0300 Misfire • P0420 Three way catalyst function • P0440 P1440, P0455 EVAP control system (SMALL LEAK), (GROSS LEAK) • P0505 IACV-AAC valve • P0731-P0734 P0744 A/T function • P1148 Closed loop control

Fail-safe Chart

=NDEC0039

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 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>Engine speed will not rise more than 2,400 rpm due to the fuel cut.</td></tr>
<tr><td>P0115</td><td>0103</td><td>Engine coolant temperature sensor circuit</td><td>Engine coolant temperature will be determined by ECM based on the time after turning ignition switch “ON” or “START”.
CONSULT displays the engine coolant temperature decided by ECM.
Condition: Engine coolant temperature decided (CONSULT-II display)
Just as ignition switch is turned ON or Start: 40°C (104°F)
More than approx. 4 minutes after ignition ON or Start: 80°C (176°F)
Except as shown above: 40 - 80°C (104 - 176°F) (Depends on the time)</td></tr>
<tr><td>P0120</td><td>0403</td><td>Throttle position sensor circuit</td><td>Throttle position will be determined based on the injected fuel amount and the engine speed.
Therefore, acceleration will be poor.
Condition: Driving condition
When engine is idling: Normal
When accelerating: Poor acceleration</td></tr>
<tr><td>Unable to access ECM</td><td>Unable to access Diagnostic Test Mode II</td><td>ECM</td><td>ECM fail-safe activating condition
The computing function of the ECM was judged to be malfunctioning.
When the fail-safe system activates (i.e., if the ECM detects a malfunction condition in the CPU of ECM), the MIL on the instrument panel lights to warn the driver.
However it is not possible to access ECM and DTC cannot be confirmed.
Engine control with fail-safe
When ECM fail-safe is operating, fuel injection, ignition timing, fuel pump operation, and IACV-AAC valve operation are controlled under certain limitations.
ECM fail-safe operation
Engine speed: Engine speed will not rise more than 3,000 rpm
Fuel injection: Simultaneous multiport fuel injection system
Ignition timing: Ignition timing is fixed at the preset value
Fuel pump: Fuel pump relay is “ON” when engine is running and “OFF” when engine stalls
IACV-AAC valve: Full open
Replace ECM, if ECM fail-safe condition is confirmed.</td></tr>
</table>

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

Symptom Matrix Chart

NDEC0040

SYSTEM — BASIC ENGINE CONTROL SYSTEM

NDEC0040S01

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		3	2			3		1	EC-494
	Injector circuit							2							EC-485
	Fuel pressure regulator system	4	4	4	4	4	4	4	3	3		4			EC-36
	Evaporative emission system														EC-28
Air	Positive crankcase ventilation system												1		EC-34
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-39
	IACV-AAC valve circuit	2	1	3	3	3	2	2	2	2		3		1	EC-362
	IACV-FICD solenoid valve circuit		2				3	3							EC-506
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-39
	Ignition circuit	1	1	2	2	2		2	2			2			EC-414
Main power supply and ground circuit		1	2	3	3	3		3	2		1	3		1	EC-127
Air conditioner circuit		2					3			2					***HA-30***

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

(continued on next page)

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor circuit	1	1	2	2	2		2	2	2		2			EC-302
Mass air flow sensor circuit				3										EC-134
Heated oxygen sensor 1 (front) circuit														EC-183
Engine coolant temperature sensor circuit	1	2	3		3	3					3			EC-160, 177
Throttle position sensor circuit		1	2		2	2					2			EC-166
Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-88
Vehicle speed sensor circuit		2	3		3						3			EC-358
Knock sensor circuit				3										EC-291
ECM	2	2				3	3	2	2	1				EC-382, 103
Start signal circuit	1													EC-490
Park/Neutral position (PNP) switch circuit			3		3		3	2			3			EC-477
Power steering oil pressure switch circuit		2												EC-502

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

(continued on next page)

Symptom Matrix Chart (Cont'd)

SYSTEM — ENGINE MECHANICAL & OTHER

NDEC0040S03

		SYMPTOM													Reference section
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												***FE-5***
	Fuel piping			5	5	5		5	4			5			—
	Vapor lock														
	Valve deposit	5		5	5	5		5	4			5			
	Poor fuel (Heavy weight gasoline, Low octane)														
Air	Air duct	5	5	5	5	5	5	5	4	4		5			
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor — throttle body)														
	Throttle body, Throttle wire														***FE-3***
	Air leakage from intake manifold/ Collector/Gasket				5										—
Cranking	Battery	1	1	1		1		1	1			1		1	***SC-4***, ***SC-10***, ***SC-22***
	Generator circuit														
	Starter circuit														
	PNP switch														***AT-103***

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

(continued on next page)

		SYMPTOM													Reference section
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Engine	Cylinder head	5	5	5	5	5		5	5			5			***EM-27***
	Cylinder head gasket										2		2		
	Cylinder block	6	6	6	6	6		6	6			6	3		
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain	6	6	6	6	6		6	6			6	2		
	Camshaft														
	Intake valve														
	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-21***, ***EM-14***, ***LC-4***
	Oil level (Low)/Filthy oil														***MA-20***
Cooling	Radiator/Hose/Radiator filler cap	6	6	6	6	6		6	6		2	6			***LC-8***
	Thermostat						5			5					
	Water pump														
	Water gallery														
	Cooling fan						5			5					
	Coolant level (low)/Contaminated coolant														***MA-14***

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

CONSULT-II Reference Value in Data Monitor Mode

NDEC0041

Remarks:

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

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

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

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT-II value.		Almost the same speed as the CONSULT-II value.
MAS A/F SE-B1	• Engine: After warming up • Air conditioner switch: “OFF” • Shift lever: “N” • No-load	Idle	1.0 - 1.7V
		2,500 rpm	1.7 - 2.3V
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
HO2S1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.
HO2S2 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ⟷ RICH
VHCL SPEED SE	• Turn drive wheels and compare speedometer indication with the CONSULT-II value		Almost the same speed as the CONSULT-II value
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V
THRTL POS SEN	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: fully closed (a)	0.15 - 0.85V
		Throttle valve: partially open	Between (a) and (b)
		Throttle valve: fully opened (b)	Approx. 3.5 - 4.7V
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS CLSD THL/P SW	• Engine: After warming up • 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	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
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON

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

MONITOR ITEM	CONDITION		SPECIFICATION
INJ PULSE-B1	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 2.8 msec
B/FUEL SCHDL	ditto	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.3 msec
IGN TIMING	ditto	Idle	10° BTDC
		2,000 rpm	More than 25° BTDC
IACV-AAC/V	ditto	Idle	10 - 20%
		2,000 rpm	—
PURG VOL C/V	ditto	Idle	0 %
		2,000 rpm	—
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	• Engine: Idling, after warming up • Air conditioner switch: "OFF" • Vehicle speed	Engine coolant temperature is 94°C (201°F) or less.	OFF
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F).	LOW
		Engine coolant temperature is 105°C (221°F) or more.	HI
VENT CONT/V	• Ignition switch: ON		OFF
HO2S1 HTR (B1)	• Engine speed: Below 3,200 rpm		ON
	• Engine speed: Above 3,200 rpm		OFF
HO2S2 HTR (B1)	• Engine speed: Above 3,200 rpm		OFF
	• Engine is running at below 3,200 rpm [After driving 2 minutes at 70 km/h (43 MPH) or more]		ON
VC/V BYPASS/V	Ignition switch: ON		OFF
CAL/LD VALUE	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	18.5 - 26.0%
		2,500 rpm	18.0 - 21.0%
ABSOL TH·P/S	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: fully closed	0.0%
		Throttle valve: fully opened	Approx. 80%
MASS AIRFLOW	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	3.3 - 4.8 g·m/s
		2,500 rpm	12.0 - 14.9 g·m/s

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

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
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

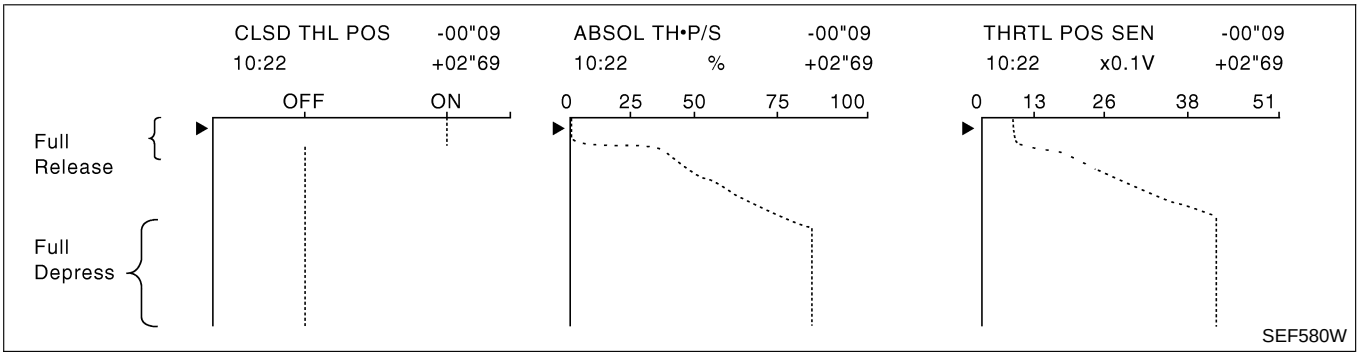
NDEC0042

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

NDEC0042S01

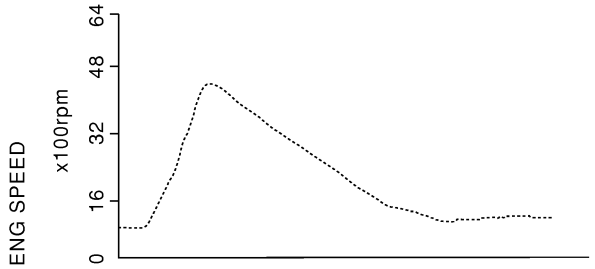
Below is the data for "THRTL POS SEN", "ABSOL TH·P/S" and "CLSD THL POS" when depressing the accelerator pedal with the ignition switch "ON".
The signal of "THRTL POS SEN" and "ABSOL TH·P/S" should rise gradually without any intermittent drop or rise after "CLSD THL POS" is changed from "ON" to "OFF".



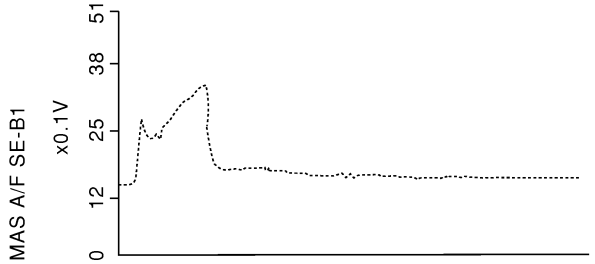
ENG SPEED, MAF A/F SE-B1, THRTL POS SEN, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

NDEC0042S02

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

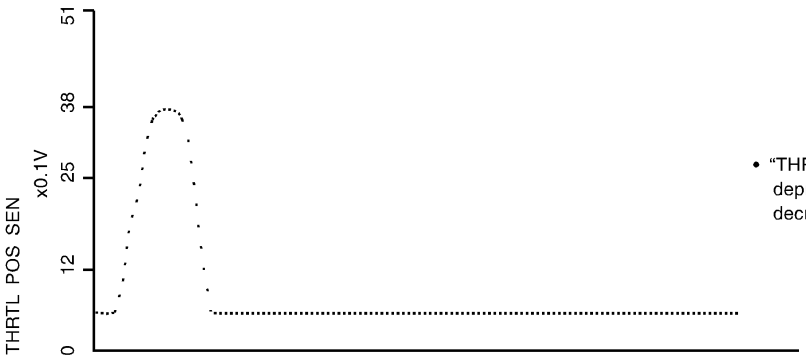


• "ENG SPEED" should increase gradually while depressing the accelerator pedal and should decrease gradually after releasing the pedal without any intemittent drop or rise.

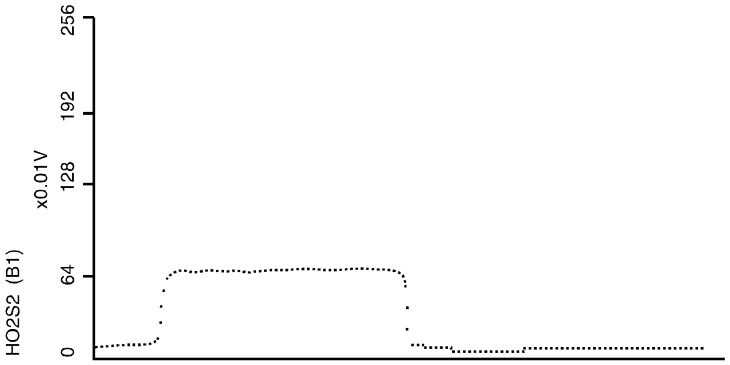


• "MAS A/F SE-B1" should increase when depressing the accelerator pedal and should decrease at the moment "THRTL POS SEN" is closed (accelerator pedal is released).

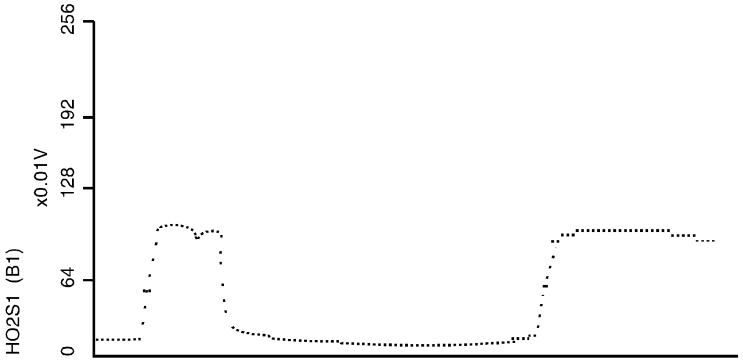
SEF241Y



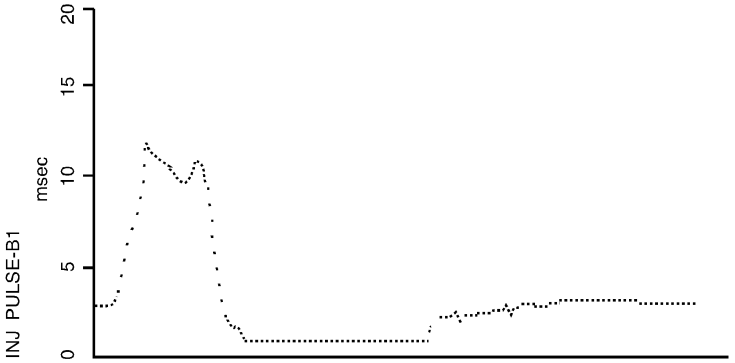
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



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

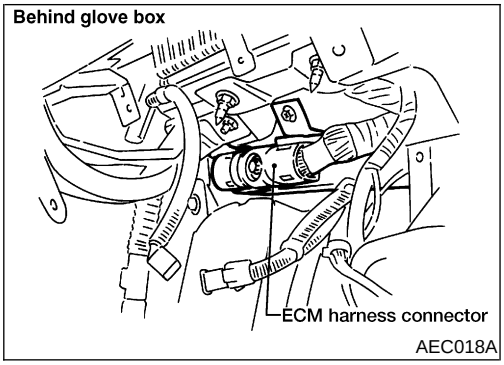


- "HO2S1 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



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

SEF242YA



ECM Terminals and Reference Value

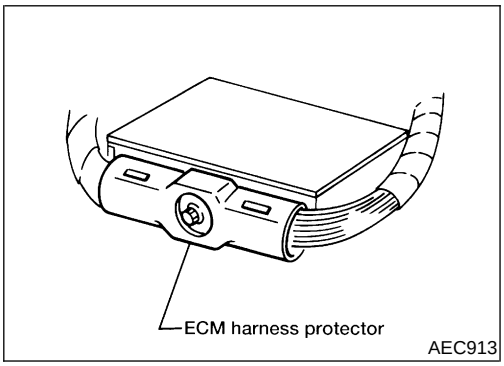
NDEC0043

PREPARATION

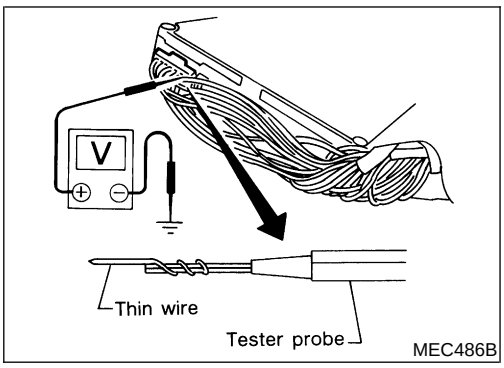
NDEC0043S01

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

- Remove instrument lower cover.



2. Remove ECM harness protector.

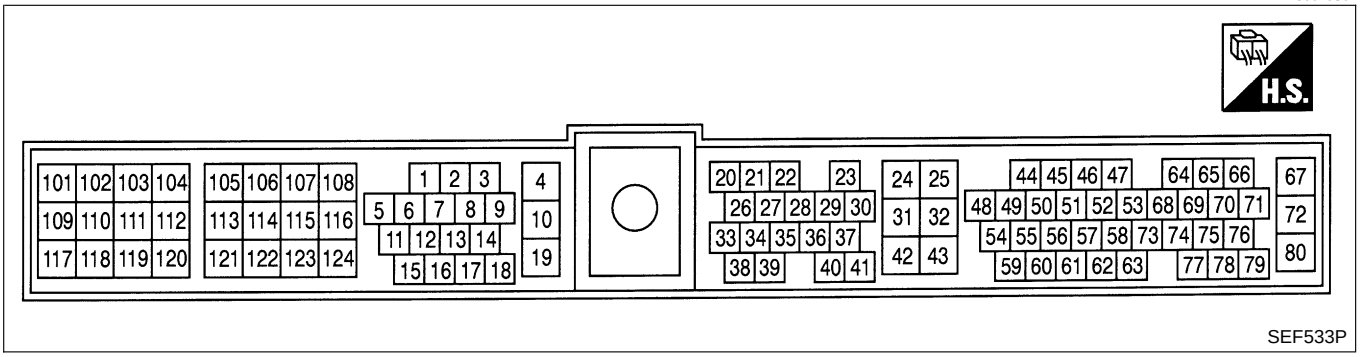


3. Perform all voltage measurements with the connector connected. Extend tester probe as shown to perform tests easily.

- Open harness securing clip to make testing easier.
- Use extreme care not to touch 2 pins at one time.
- Data is for comparison and may not be exact.

ECM HARNESS CONNECTOR TERMINAL LAYOUT

NDEC0043S02



ECM INSPECTION TABLE

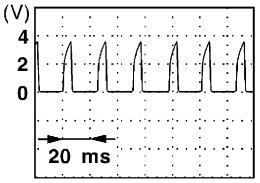
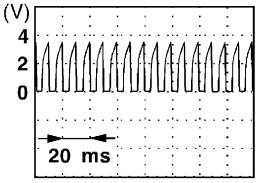
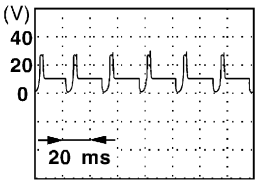
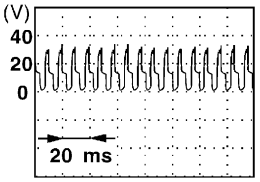
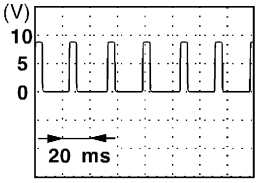
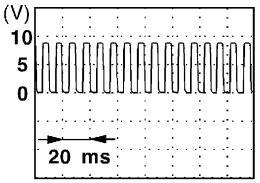
NDEC0043S03

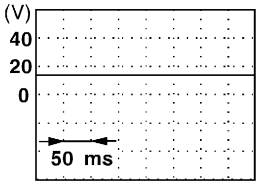
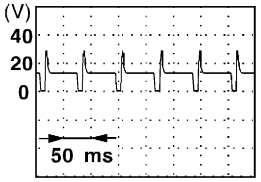
Specification data are reference values and are measured between each terminal and ground.

CAUTION:

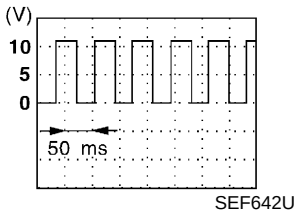
Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

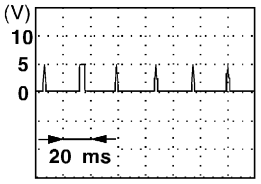
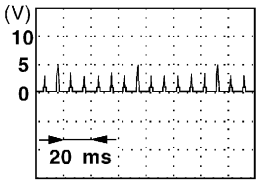
ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	L	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	W	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	W	Tachometer	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 2V  SEF992U
			[Engine is running] ● Engine speed is 2,000 rpm	4 - 5V  SEF993U

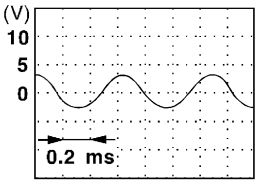
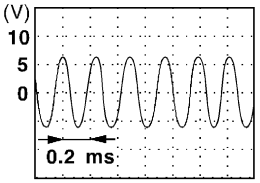
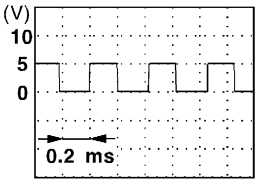
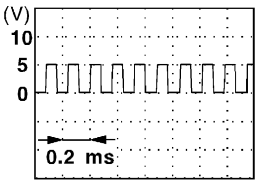
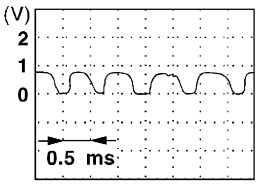
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	W/G	ECM relay (Self shutoff)	**[Engine is running]** **[Ignition switch "OFF"]** ● For a few seconds after turning ignition switch "OFF"	0 - 1.5V
			[Ignition switch "OFF"] ● A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
5	G/B	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF994U
			[Engine is running] ● Engine speed is 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)  SEF995U
7	G/B	A/T check signal	**[Ignition switch "ON"]** **[Engine is running]**	0 - 3.0V
9	L/B	Air conditioner high pressure switch	**[Ignition switch "ON"]**	Approximately 5V
10	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
11	L/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	LG	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)
17	L/W	Data link connector	**[Engine is running]** ● Idle speed (Connect CONSULT-II and turned on)	0 - 14V
18	PU	Malfunction indicator lamp	**[Ignition switch "ON"]**	0 - 1V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
19	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

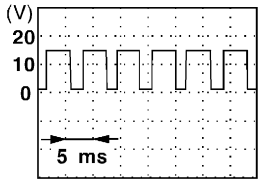
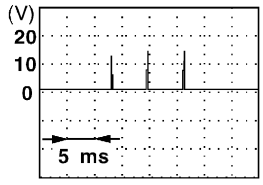
ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	L/B	Start signal	**[Ignition switch "ON"]**	Approximately 0V
			[Ignition switch "START"]	9 - 12V
21	W/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"	Approximately 5V
22	GY/R	PNP switch	**[Ignition switch "ON"]** ● Gear position is "N" or "P"	Approximately 0V
			[Ignition switch "ON"] ● Except the above gear position	Approximately 5V
23	R	Throttle position sensor	**[Ignition switch "ON"]** ● **Warm-up condition** ● Accelerator pedal fully released	0.15 – 0.85V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed	3.5 – 4.7V
24	L/Y	Ignition switch	**[Ignition switch "OFF"]**	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
25	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
26	G/W	A/T signal No. 1	**[Ignition switch "ON"]** **[Engine is running]** ● Idle speed	6 - 8V
27	W	A/T signal No. 2	**[Ignition switch "ON"]** **[Engine is running]** ● Idle speed	6 - 8V
28	BR/Y	Throttle position switch (Closed position)	**[Ignition switch "ON"]** ● **Warm-up condition** ● Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] ● Accelerator pedal depressed	Approximately 0V
29	G/Y	Vehicle speed sensor	**[Engine is running]** ● Lift up the vehicle. ● In 2nd gear position ● Vehicle speed is 40 km/h (25 MPH)	2 - 3V  SEF642U
32	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
35	P/B	A/T signal No. 3	**[Ignition switch "ON"]**	0V
36	BR/W	Cooling fan relay (High)	**[Engine is running]** ● Cooling fan is not operating	Battery voltage (11 - 14V)
			[Engine is running] ● Cooling fan (High) is operating	0 - 1V

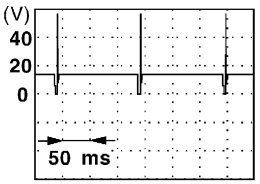
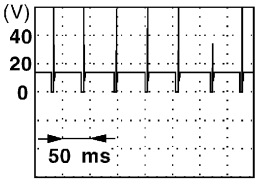
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
37	R/G	Throttle position sensor signal to TCM (Transmission control module)	**[Ignition switch "ON"]** ● **Warm-up condition** ● Accelerator pedal fully released	Approximately 0.4V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed	Approximately 3V
38	L/OR	Cooling fan relay (Low)	**[Engine is running]** ● Cooling fan is not operating	Battery voltage (11 - 14V)
			[Engine is running] ● Cooling fan (Low) is operating	0 - 1V
39	P	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	BR	Sensors' power supply	**[Ignition switch "ON"]**	Approximately 5V
43	B/Y	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
44 48	W W	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	P	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

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	LG	Crankshaft position sensor (OBD)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 1V (AC range)  SEF690W
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2V (AC range)  SEF691W
49	OR	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	LG	Heated oxygen sensor 1 (front)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V
54	W/L	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	L/OR	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	BR	Heated oxygen sensor 2 (rear)	**[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	R/Y	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel temperature
61	Y/G	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
62	R	EVAP control system pressure sensor	**[Ignition switch "ON"]**	Approximately 3.4V
64	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
67	B/W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
69	Y/G	Data link connector	**[Engine is running]** ● Idle speed (GST is disconnected)	6 - 10V
72	B/W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
75	Y/R	Data link connector	Not used	—
76	Y/B			—
80	Y	Power supply (Back-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
101	SB	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	1 - 2V  SEF006V

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102 104 106 109 111 113	G/OR G/R Y/G G Y/PU GY/L	Injector No. 1 Injector No. 3 Injector No. 5 Injector No. 2 Injector No. 4 Injector No. 6	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF007V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF008V
108	LG/B	EVAP canister vent control valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
116	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
117	B/W	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
118	PU	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	B	Heated oxygen sensor 1 heater (front)	**[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	L/G	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
122	Y	Heated oxygen sensor 2 heater (rear)	**[Ignition switch "ON"]** ● Engine is not running **[Engine is running]** ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is below 3,200 rpm ● After driving 2 minutes at 70 km/h (43 MPH) or more	Approximately 0.4V

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
124	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

*: Any mode except "OFF", ambient air temperature is above 23.5°C (74°F).

Description

NDEC0546

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

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

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

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

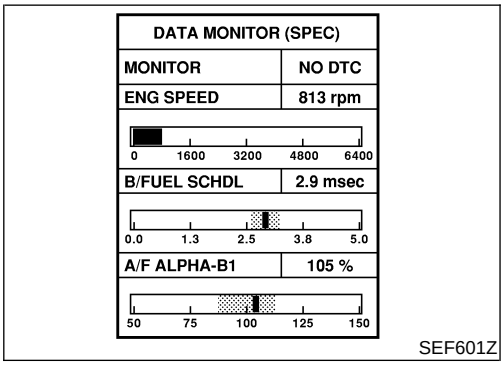
Testing Condition

NDEC0547

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

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

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



Inspection Procedure

NDEC0548

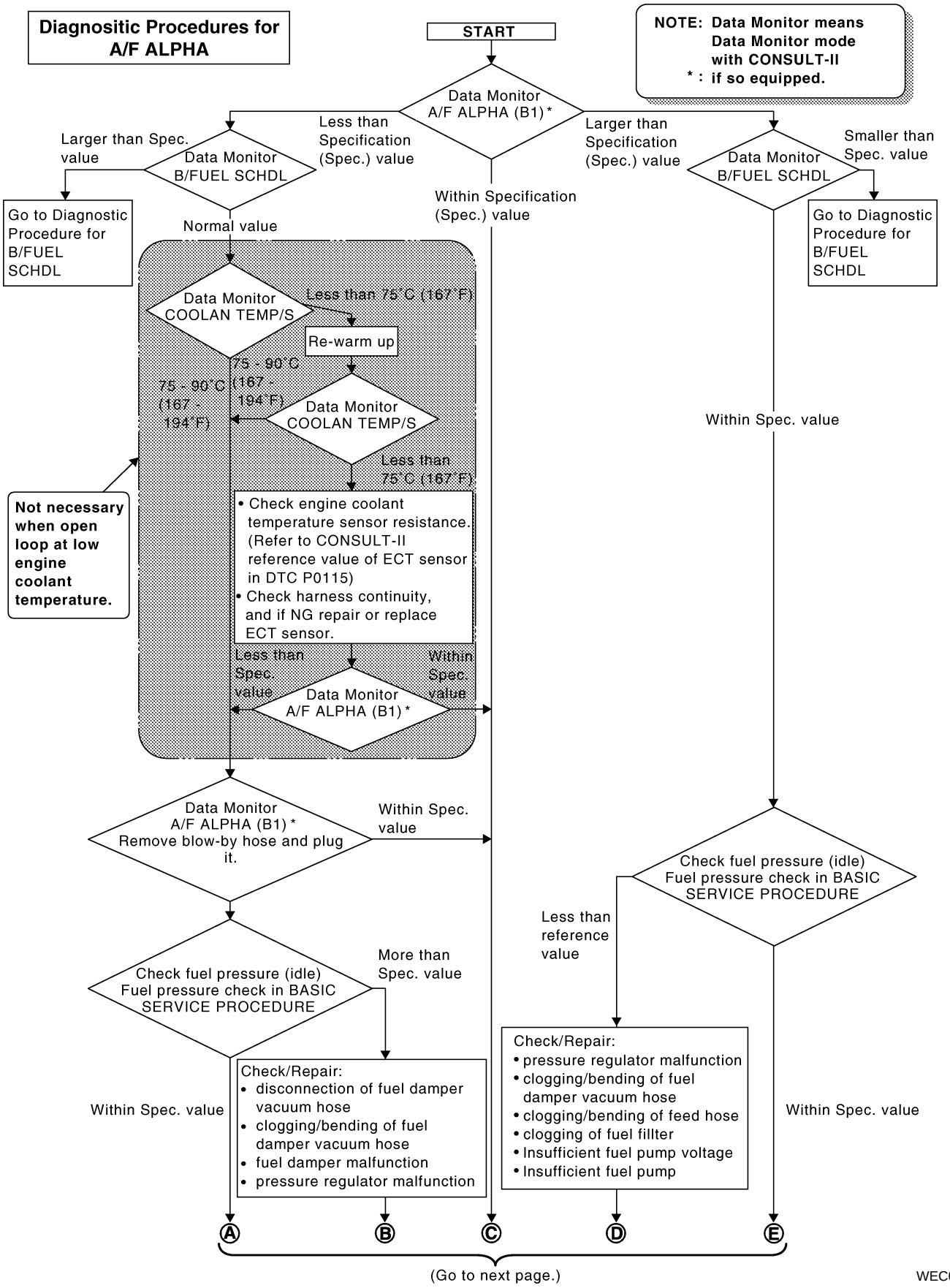
NOTE:

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

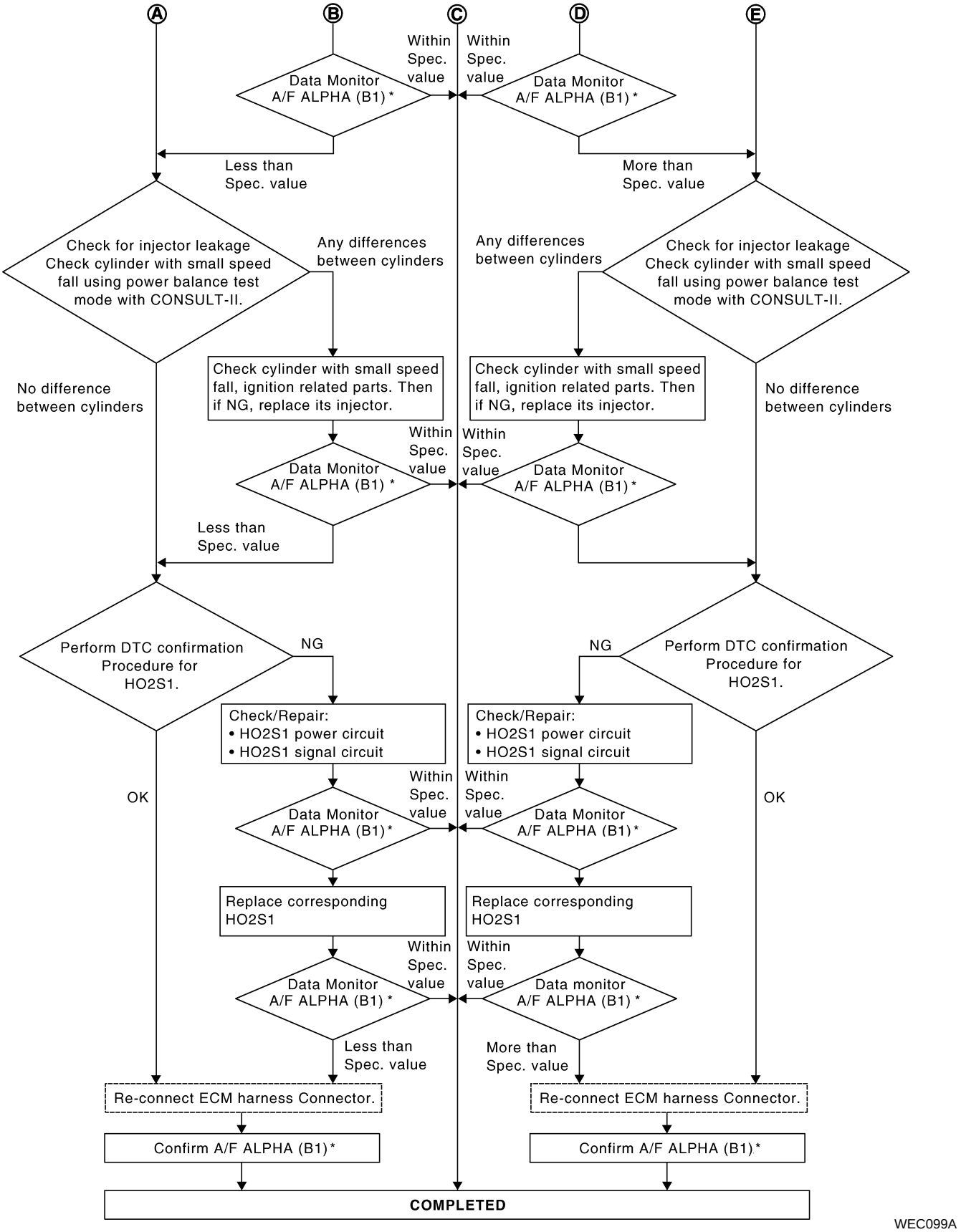
1. Perform “Basic Inspection”, EC-88.
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1”, “A/F ALPHA-B2” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to “Diagnostic Procedure”, EC-123.

Diagnostic Procedure

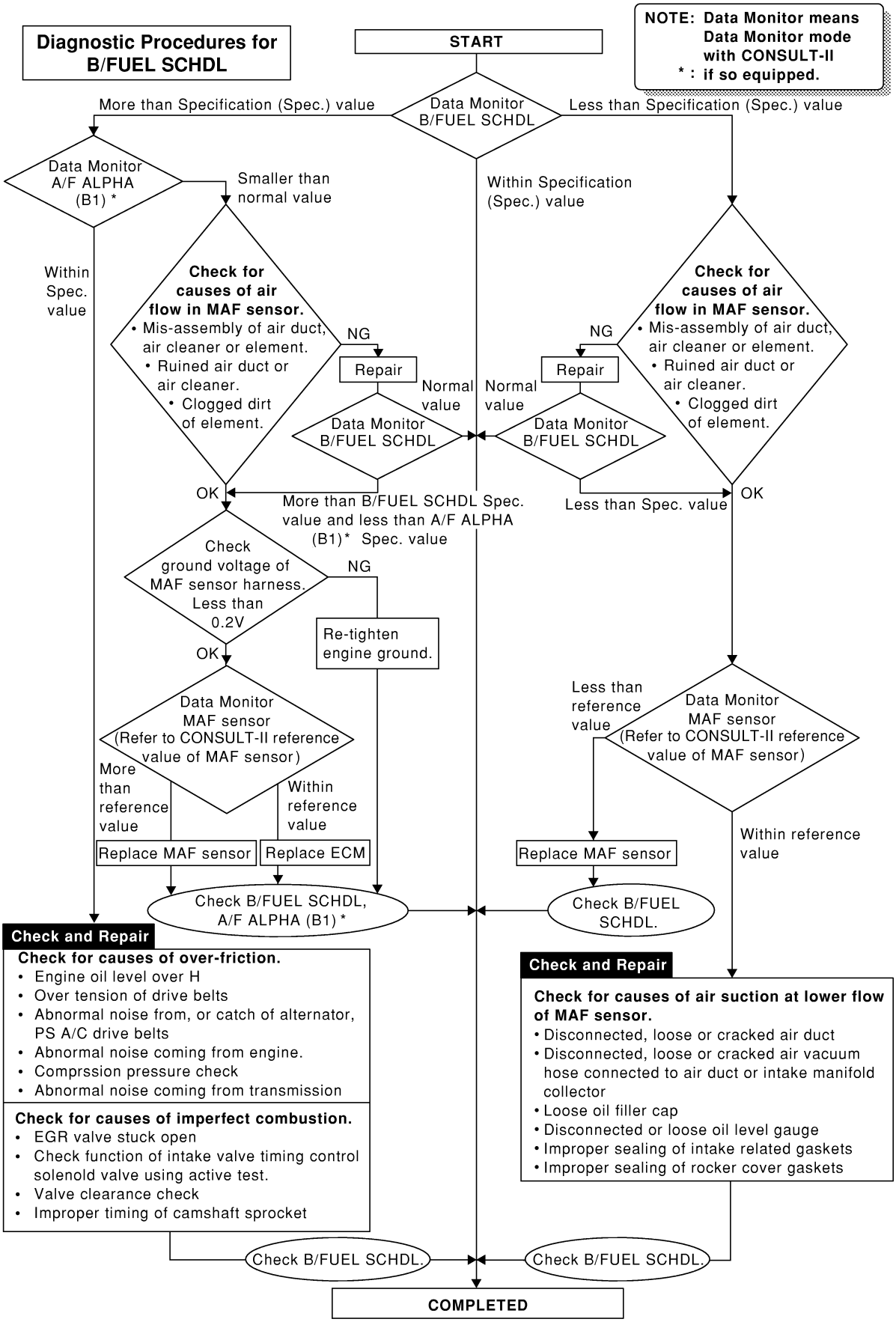
NDEC0549



WEC098A


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

WEC099A


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

WEC100A

Description

NDEC0388

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

NDEC0388S01

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

NDEC0389

1	INSPECTION START
Erase (1st trip) DTCs. Refer to "HOW TO ERASE EMISSION — RELATED INFORMATION", EC-61.	
▶	GO TO 2.

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

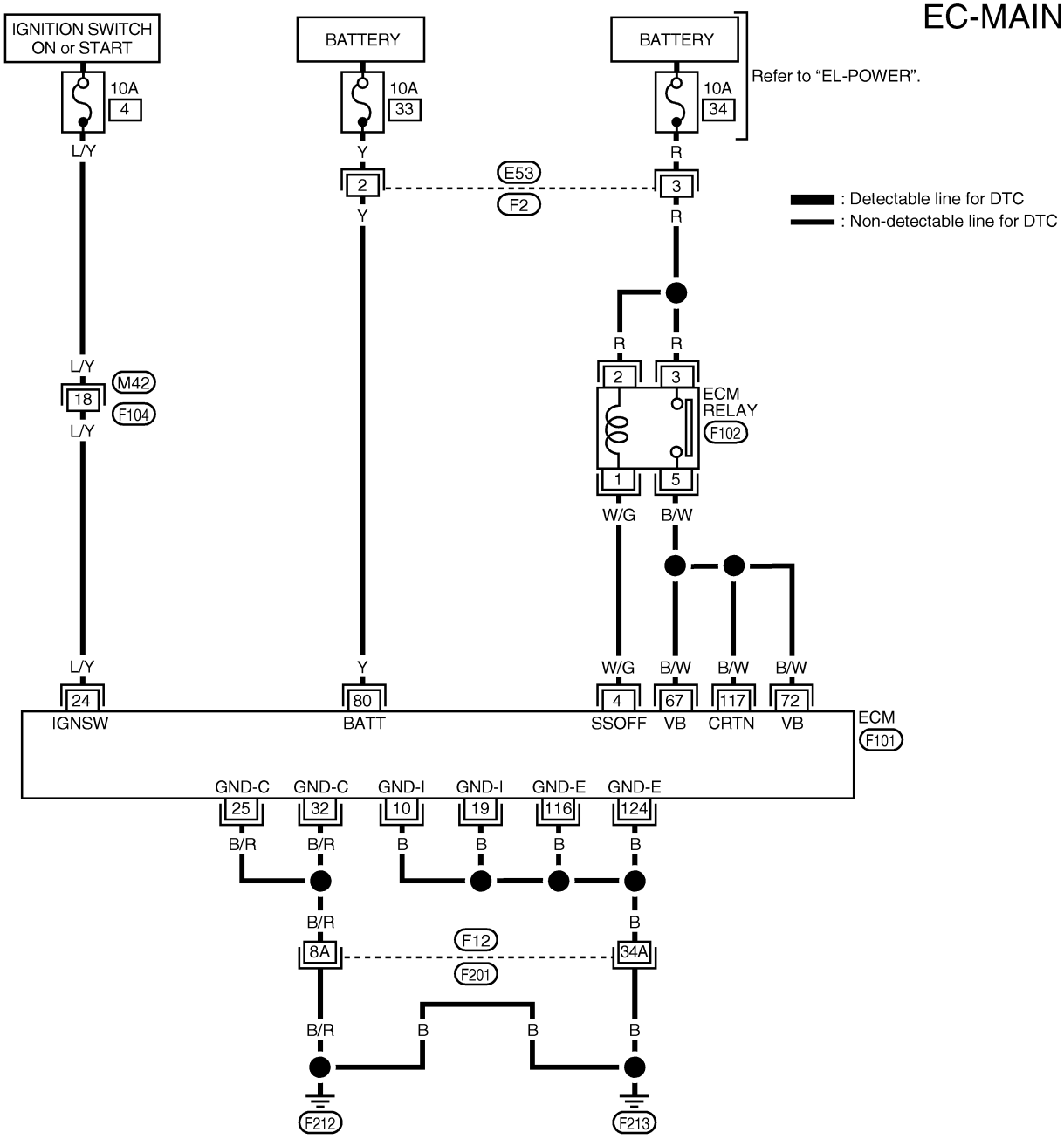
3	SEARCH FOR ELECTRICAL INCIDENT
Perform "Incident Simulation Tests", ***GI-23***.	
OK or NG	
OK ▶	GO TO 4.
NG ▶	Repair or replace.

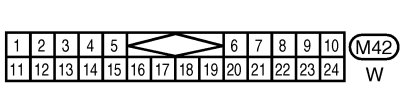
4	CHECK CONNECTOR TERMINALS
Refer to "How to Check Enlarged Contact Spring of Terminal", ***GI-20***.	
OK or NG	
OK ▶	**INSPECTION END**
NG ▶	Repair or replace connector.

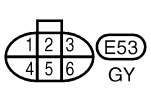
Main Power Supply and Ground Circuit

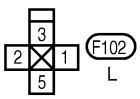
WIRING DIAGRAM

NDEC0044

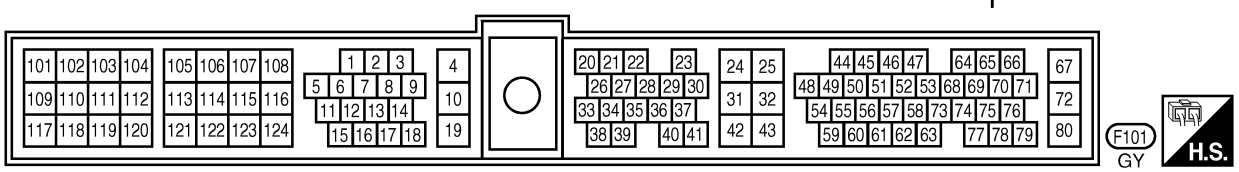








Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)



WEC060

ECM TERMINALS AND REFERENCE VALUE

NDEC0045

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	W/G	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	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
19	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
24	L/Y	Ignition switch	**[Ignition switch "OFF"]**	0V
			[Ignition switch "ON"]	BATTERY VOLTAGE (11 - 14V)
25	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
32	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
67	B/W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
72	B/W			
80	Y	Power supply (Back-up)	**[Ignition switch "OFF"]**	BATTERY VOLTAGE (11 - 14V)
116	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
117	B/W	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
124	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

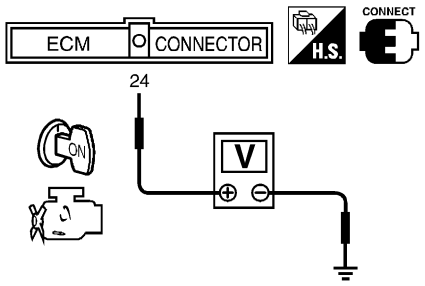
DIAGNOSTIC PROCEDURE

NDEC0046

1	**INSPECTION START**
Start engine. **Is engine running?** **Yes or No**	
Yes ▶	GO TO 6.
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.



SEF674U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M42, F104
- 10A fuse
- Harness for open or short between ECM and fuse

	▶	Repair harness or connectors.

4	CHECK GROUND CIRCUIT-I

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", EC-127.
   Continuity should exist.
4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 5.

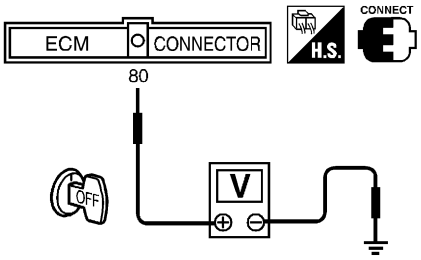
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, F201
- Harness for open or short between ECM and engine ground

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

6	CHECK POWER SUPPLY-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.

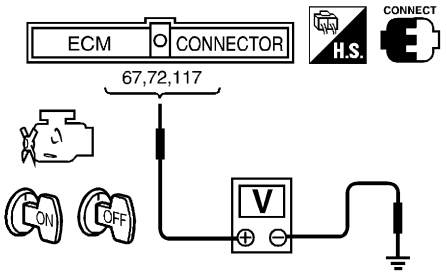
7	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E53, F2
- 10A fuse
- Harness for open or short between ECM and fuse

	▶	Repair harness or connectors.

8	CHECK POWER SUPPLY-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

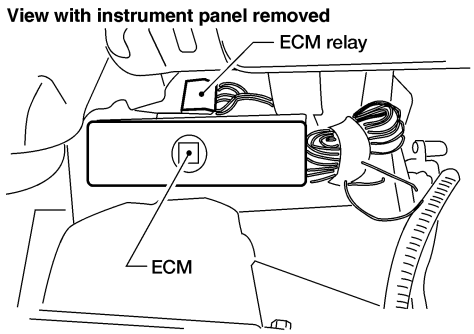
Voltage:
After turning ignition switch "OFF", battery voltage will exist for a few seconds, then drop to approximately 0V.

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.

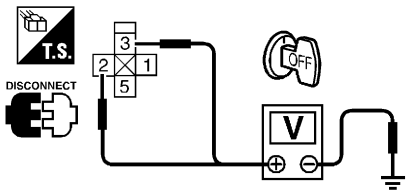
9	CHECK POWER SUPPLY-IV

1. Disconnect ECM relay.



AEC923A

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



SEF036W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

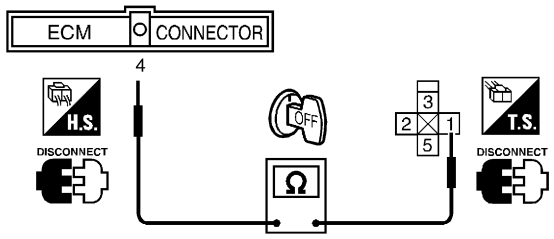
10	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E53, F2
- 10A fuse
- Harness for open or short between ECM relay and battery

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

11	CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 4 and ECM relay terminal 1.
   Refer to "WIRING DIAGRAM", EC-127.



SEF037W

Continuity should exist.

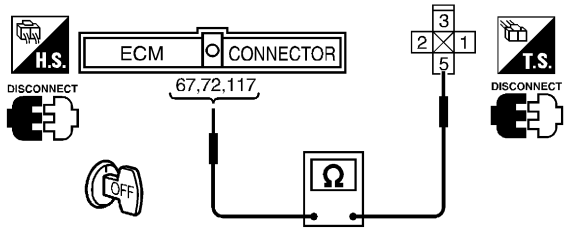
3. Also check harness for short to ground and short to power.

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

1. Check harness continuity between ECM terminals 67, 72, 117 and ECM relay terminal 5.
   Refer to "WIRING DIAGRAM", EC-127.



SEF038W

Continuity should exist.

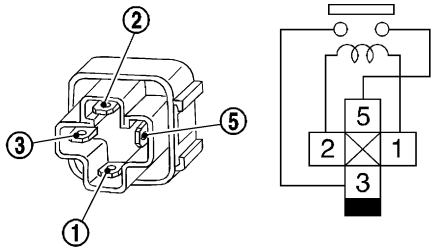
2. Also check harness for short to ground and short to power.

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

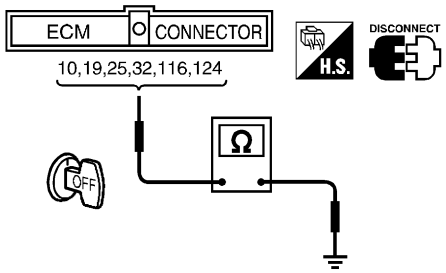
12V (1 - 2) applied: Continuity exists.
No voltage applied: No continuity

OK or NG

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

14	CHECK GROUND CIRCUIT-II

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", EC-127.



SEF675U

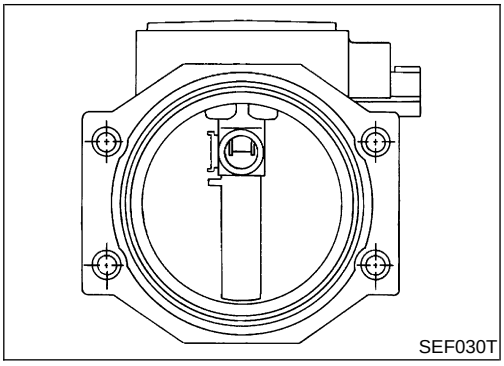
Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 15.
NG	▶	GO TO 5.

15	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.	
▶	**INSPECTION END**


SEF030T

Component Description

NDEC0047

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

CONSULT-II Reference Value in Data Monitor Mode

NDEC0048

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: “OFF” ● Shift lever: “N” ● No-load	Idle	1.0 - 1.7V
		2,500 rpm	1.7 - 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

NDEC0049

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

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	W/L	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	L/OR	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

On Board Diagnosis Logic

=NDEC0050

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

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

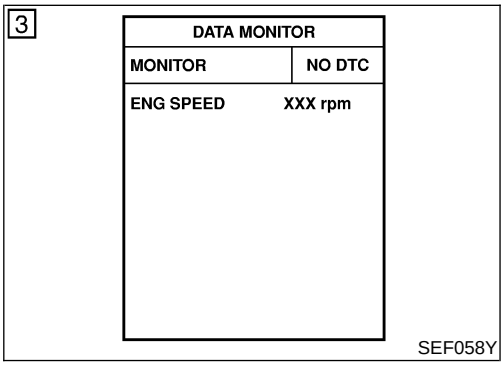
Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

DTC Confirmation Procedure

NDEC0051

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

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



PROCEDURE FOR MALFUNCTION A

NDEC0051S01

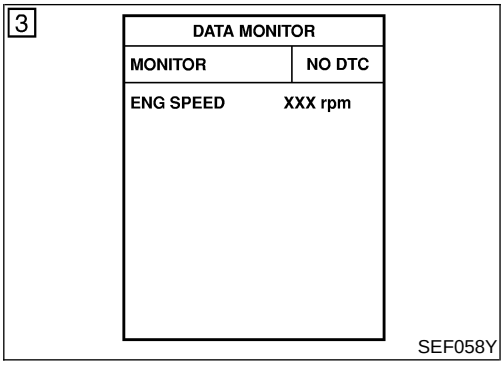
With CONSULT-II

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-139.

With GST

Follow the procedure “With CONSULT-II”

DTC Confirmation Procedure (Cont'd)



PROCEDURE FOR MALFUNCTION B

NDEC0051S02

With CONSULT-II

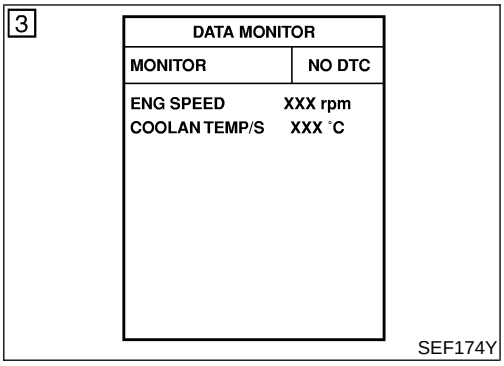
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT-II.
3) Start engine and wait 5 seconds at most.
4) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-139.

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

NDEC0051S03

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.

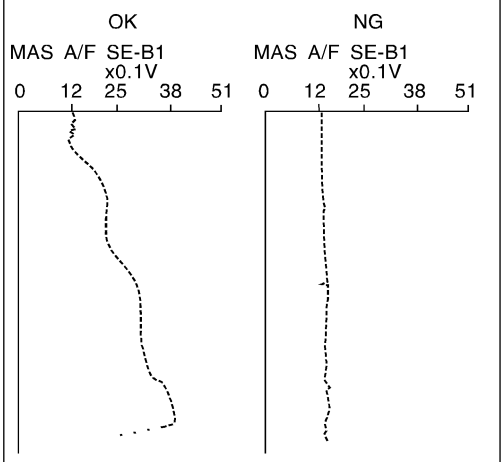
With CONSULT-II

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-139.

With GST

Follow the procedure "With CONSULT-II"

6



SEF243Y

7

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

SEF175Y

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

SEF534P

PROCEDURE FOR MALFUNCTION D

NDEC0051S04

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-139.**
3) Select "DATA MONITOR" mode with CONSULT-II.
4) Check the voltage of MAS A/F SE-B1 with "DATA MONITOR".
5) Increases engine speed to about 4,000 rpm.
6) Monitor the linear voltage rise in response to engine speed increases.
   If NG, go to "Diagnostic Procedure", EC-139.
   If OK, go to following step.
7) Maintain the following conditions for at least 10 consecutive seconds.

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

8) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-139.

Overall Function Check

NDEC0539

PROCEDURE FOR MALFUNCTION D

NDEC0539S01

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.

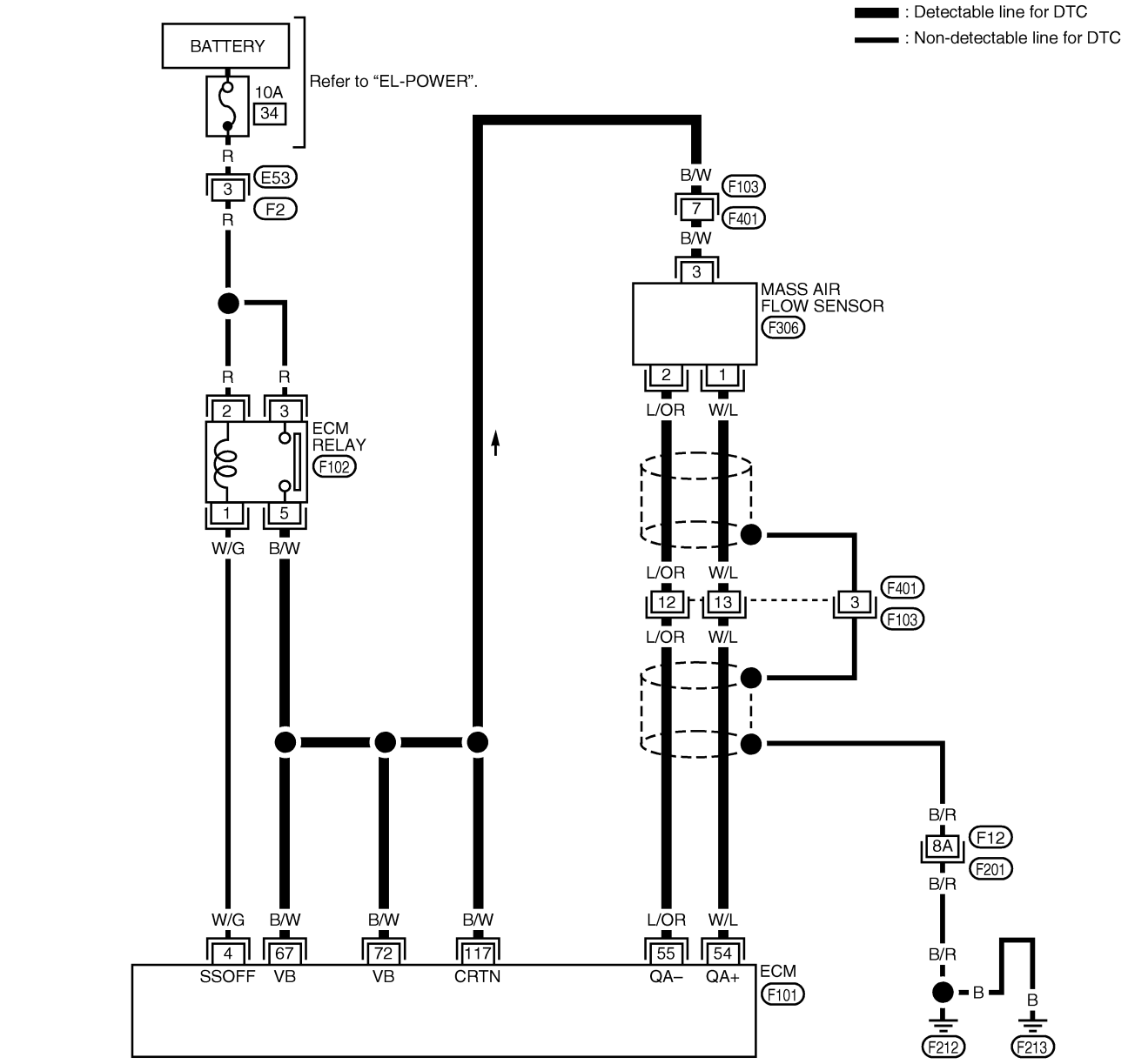
With GST

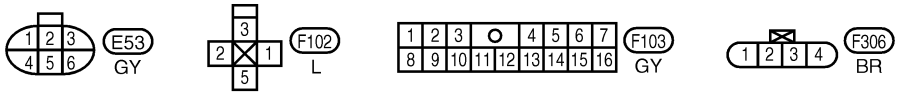
1) Start engine and warm it up to normal operating temperature.
2) Select "MODE 1" with GST.
3) Check the mass air flow sensor signal with "MODE 1".
4) Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.
5) If NG, go to "Diagnostic Procedure", EC-139.

Wiring Diagram

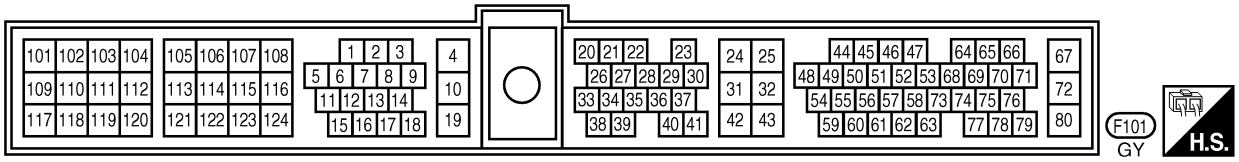
NDEC0052

EC-MAFS-01





Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)



WEC061

Diagnostic Procedure

NDEC0053

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

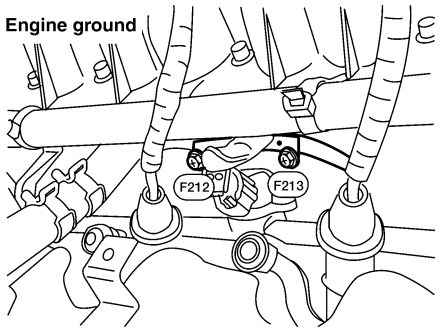
Check the following for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold collector

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.



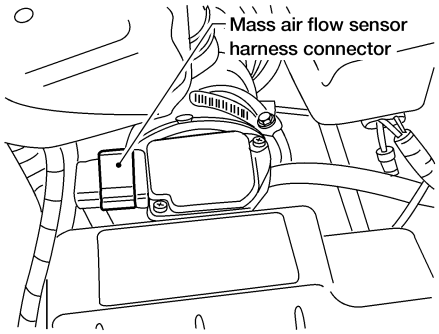
LEC749

	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

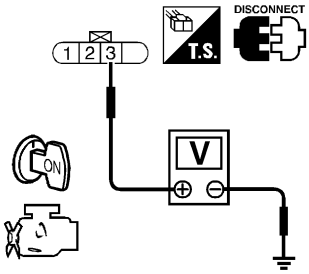
4	CHECK POWER SUPPLY

1. Disconnect mass air flow sensor harness connector.



AEC793A

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



SEF682U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

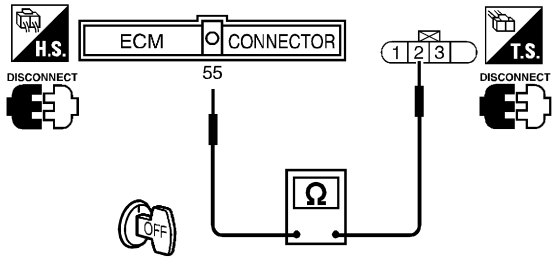
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F103, F401
- 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 FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between MAFS terminal 2 and ECM terminal 55.
   Refer to "Wiring Diagram", EC-138



SEF683U

Continuity should exist.

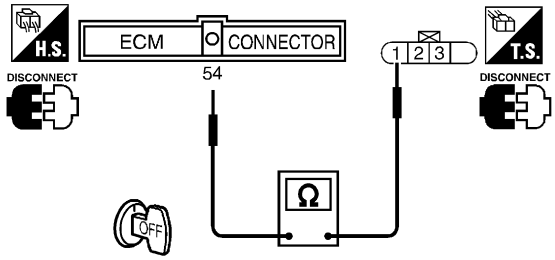
4. Also check harness for short to ground and short to power.

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 FOR OPEN AND SHORT

1. Check harness continuity between MAFS terminal 1 and ECM terminal 54.
   Refer to "Wiring Diagram", EC-138.



SEF684U

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 connectors.

8	CHECK MASS AIR FLOW SENSOR

Refer to "Component Inspection", EC-142.

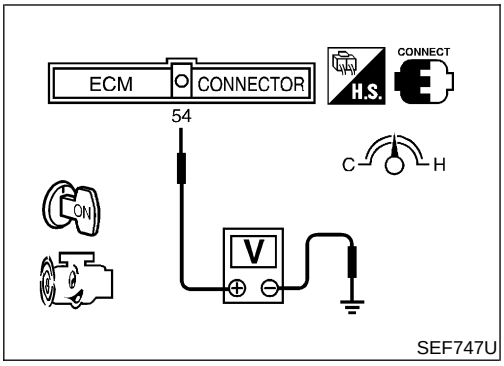
OK or NG

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

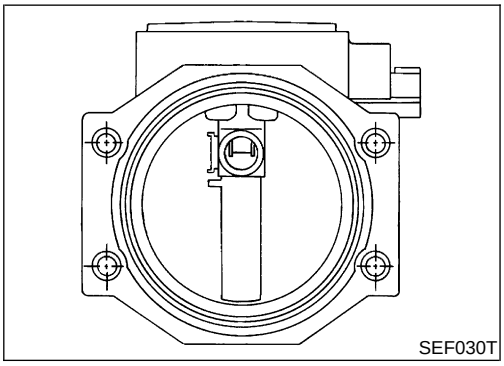
Diagnostic Procedure (Cont'd)

9	CHECK SHIELD CIRCUIT FOR OPEN AND SHORT
1. Turn ignition switch "OFF". 2. Disconnect harness connectors F103, F401. 3. Check harness continuity between harness connector F103 and engine ground **Continuity should exist.** 4. Also check harness for short to power. **OK or NG**	
OK ▶	GO TO 10.
NG ▶	Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.	
▶	**INSPECTION END**



SEF747U


SEF030T

Component Inspection

NDEC0054

MASS AIR FLOW SENSOR

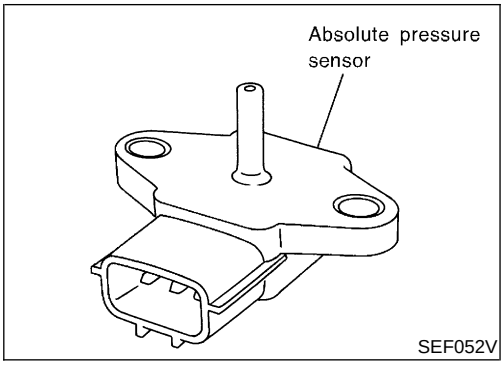
NDEC0054S01

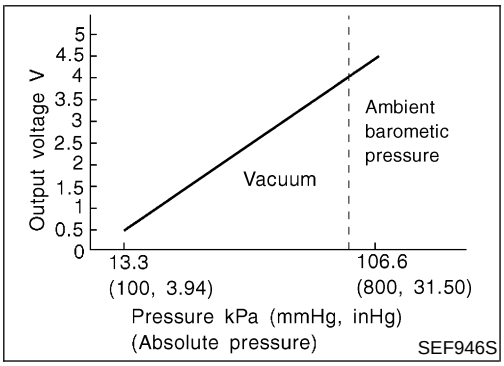
1. Reconnect harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.3
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

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

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





Component Description

NDEC0055

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

NDEC0056

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0105	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

=NDEC0057

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.

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NDEC0057S01

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-147.

With GST

- Follow the procedure “With CONSULT-II”.

4

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

SEF174Y

PROCEDURE FOR MALFUNCTION B

NDEC0057S02

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-147.

With GST

- Follow the procedure “With CONSULT-II”.

7

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec
ABSOL PRES/SE	XXX V

SEF936Z

PROCEDURE FOR MALFUNCTION C

NDEC0057S03

CAUTION:
Always drive vehicle at a safe speed.

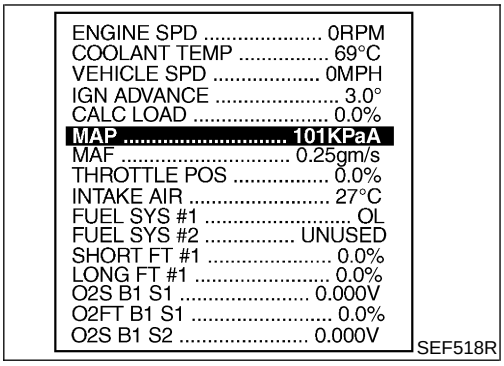
With CONSULT-II

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-147.
   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,

ENG SPEED	3,000 - 4,800 rpm
B/FUEL SCHDL	More than 9.3 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-147.



Overall Function Check

NDEC0540

PROCEDURE FOR MALFUNCTION C

NDEC0540S01

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.

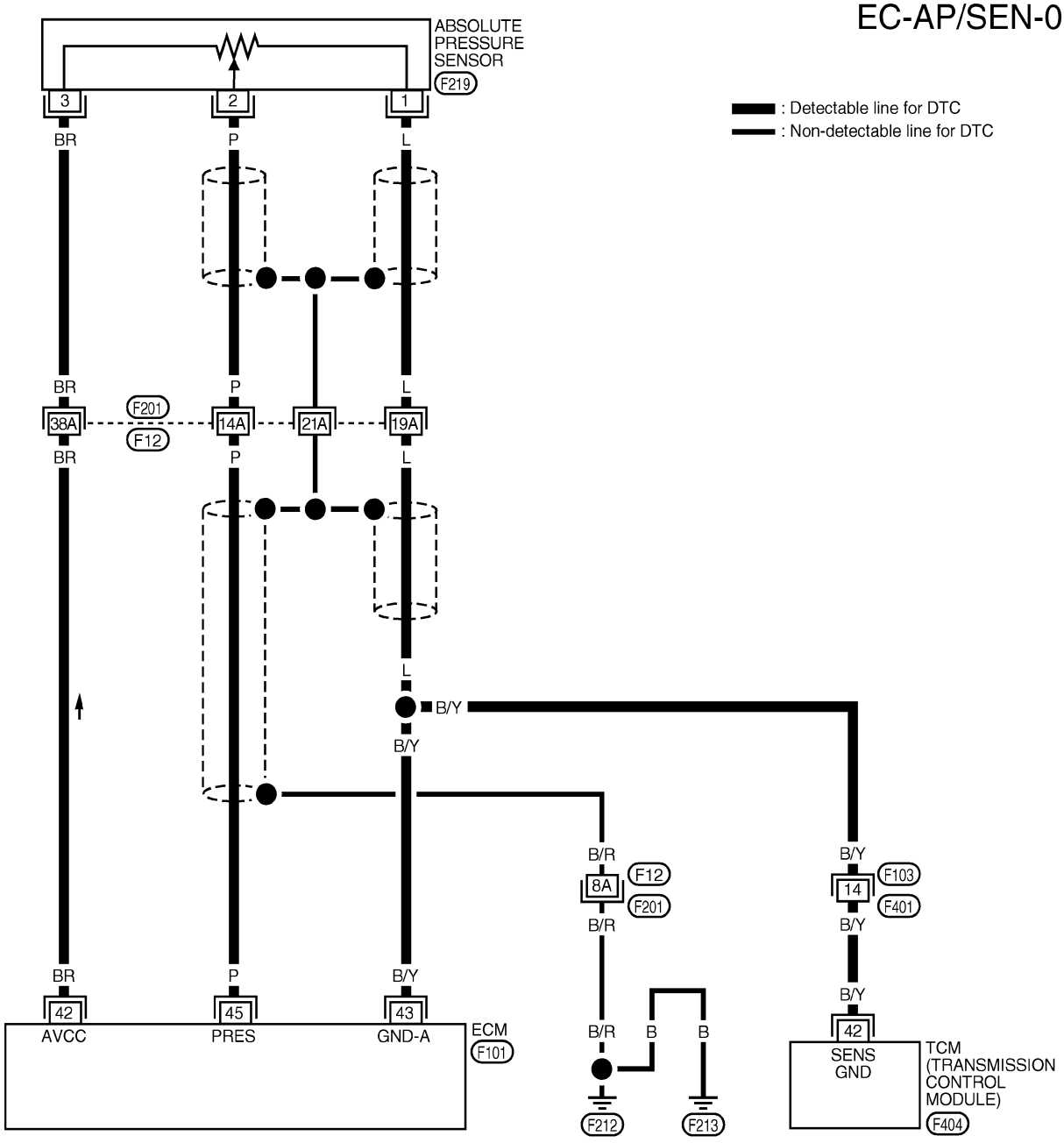
With GST

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-147.

Wiring Diagram

NDEC0058

EC-AP/SEN-01



Diagnostic Procedure

NDEC0059

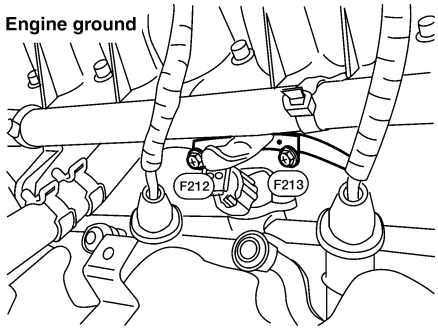
If the trouble is duplicated after "PROCEDURE FOR MALFUNCTION A or C", perform "PROCEDURE A" below. If the trouble is duplicated after "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE B", EC-150.

PROCEDURE A

NDEC0059S01

1	RETIGHTEN GROUND SCREWS

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

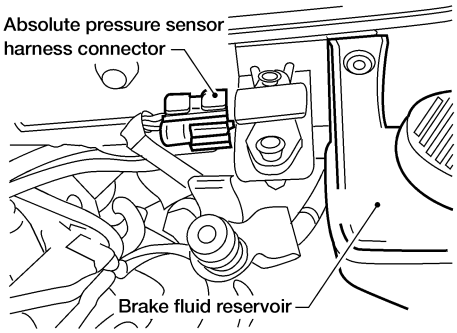


LEC749

▶ GO TO 2.

2	CHECK CONNECTOR

1. Disconnect absolute pressure sensor harness connector.



AEC794A

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

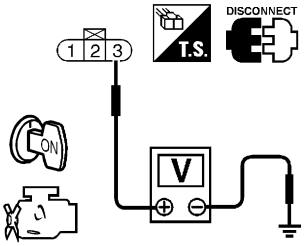
OK or NG

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

Diagnostic Procedure (Cont'd)

3	CHECK POWER SUPPLY

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



SEF685U

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

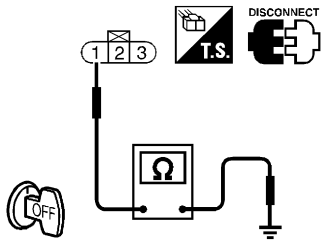
4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, F201
- 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 absolute pressure sensor terminal 1 and engine ground.
   Refer to "Wiring Diagrams", EC-146.



SEF686U

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

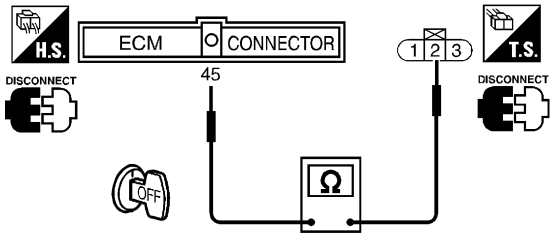
6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, F201
- Harness connectors F103, F401
- 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 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 absolute pressure sensor terminal 2.
   Refer to "Wiring Diagrams", EC-146.



SEF687U

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 F12, F201
- 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

Refer to "Component Inspection", EC-153.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace absolute pressure sensor.

10	CHECK ABSOLUTE PRESSURE SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect harness connectors F12, F201.
2. Check harness continuity between harness connector F201 and engine ground.
   Continuity should exist.
3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 11.
NG	▶	Repair open circuit or short to power in harness or connectors.

11	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.

	▶	**INSPECTION END**

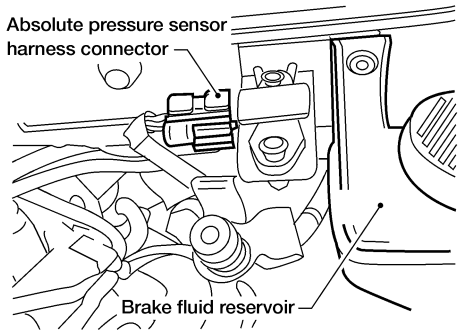
Diagnostic Procedure (Cont'd)

PROCEDURE B

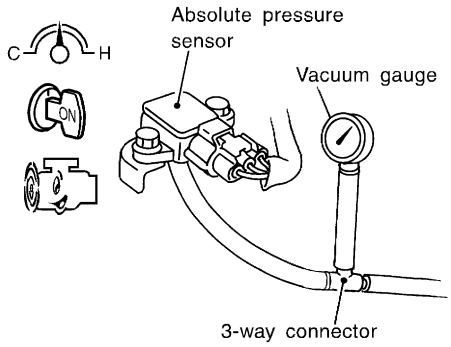
=NDEC0059S02

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.



AEC794A



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	
ENG SPEED	XXXrpm
MAP/BARO SW/V	MAP
ABSOL PRES/SE	XXXV

ACTIVE TEST	
MAP/BARO SW/V	BARO
MONITOR	
ENG SPEED	XXXrpm
MAP/BARO SW/V	BARO
ABSOL PRES/SE	XXXV

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

SEF937Z

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

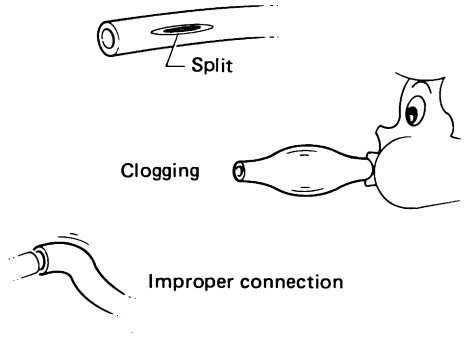
MTBL0080

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.



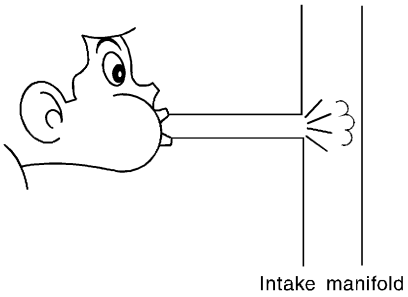
SEF109L

OK or NG

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

5	CHECK VACUUM PORT

Check vacuum port for clogging.



SEF368U

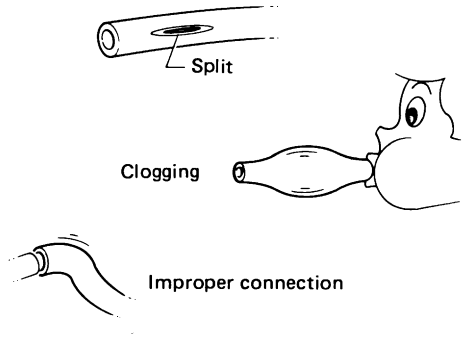
OK or NG

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

Diagnostic Procedure (Cont'd)

6	CHECK MAP/BARO SWITCH SOLENOID VALVE (WITH CONSULT-II)	
Refer to "Component Inspection" EC-394.		
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	
Refer to "Component Inspection", EC-153.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace absolute pressure sensor.

11	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.	
▶	**INSPECTION END**

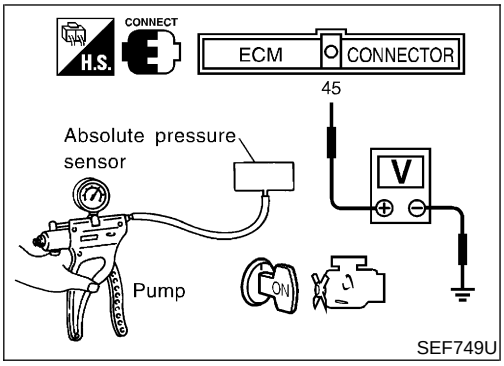
Component Inspection

ABSOLUTE PRESSURE SENSOR

NDEC0060

NDEC0060S01

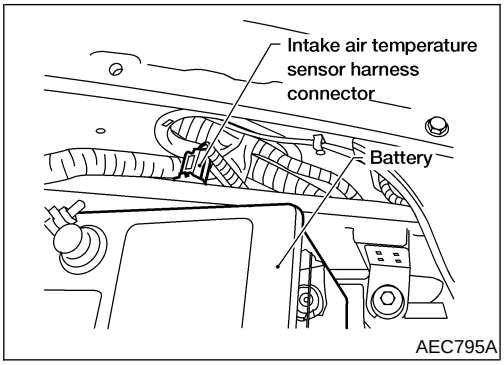
1. Remove absolute pressure sensor with its harness connector connected.
2. Remove hose from absolute pressure sensor.



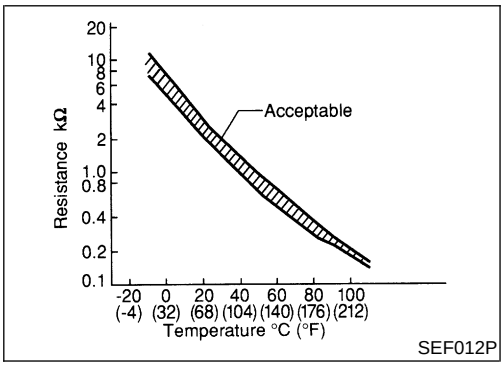
3. Turn ignition switch "ON" and check output voltage between ECM terminal 45 and engine ground.
   The voltage should be 3.2 to 4.8V.
4. Use pump to apply vacuum of −26.7 kPa (−200 mmHg, −7.87 inHg) to absolute pressure sensor as shown in figure and check the output voltage.
   The voltage should be 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.**



AEC795A



SEF012P

Component Description

NDEC0061

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

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

<Reference data>

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

*: These data are reference values and are measured between ECM terminal 61 (Intake air temperature sensor) and ground.

CAUTION:

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

On Board Diagnosis Logic

NDEC0062

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

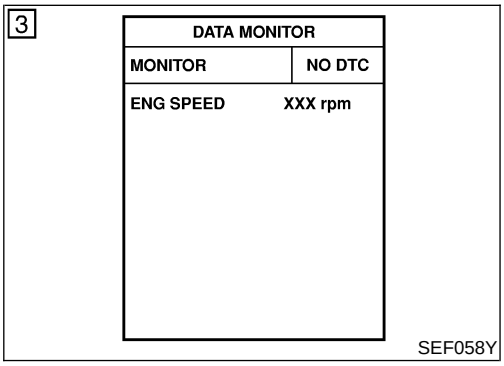
DTC Confirmation Procedure

NDEC0063

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.



SEF058Y

PROCEDURE FOR MALFUNCTION A

NDEC0063S01

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-157.

With GST

- Follow the procedure "With CONSULT-II".

5

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

SEF174Y

PROCEDURE FOR MALFUNCTION B

NDEC0063S02

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-157.

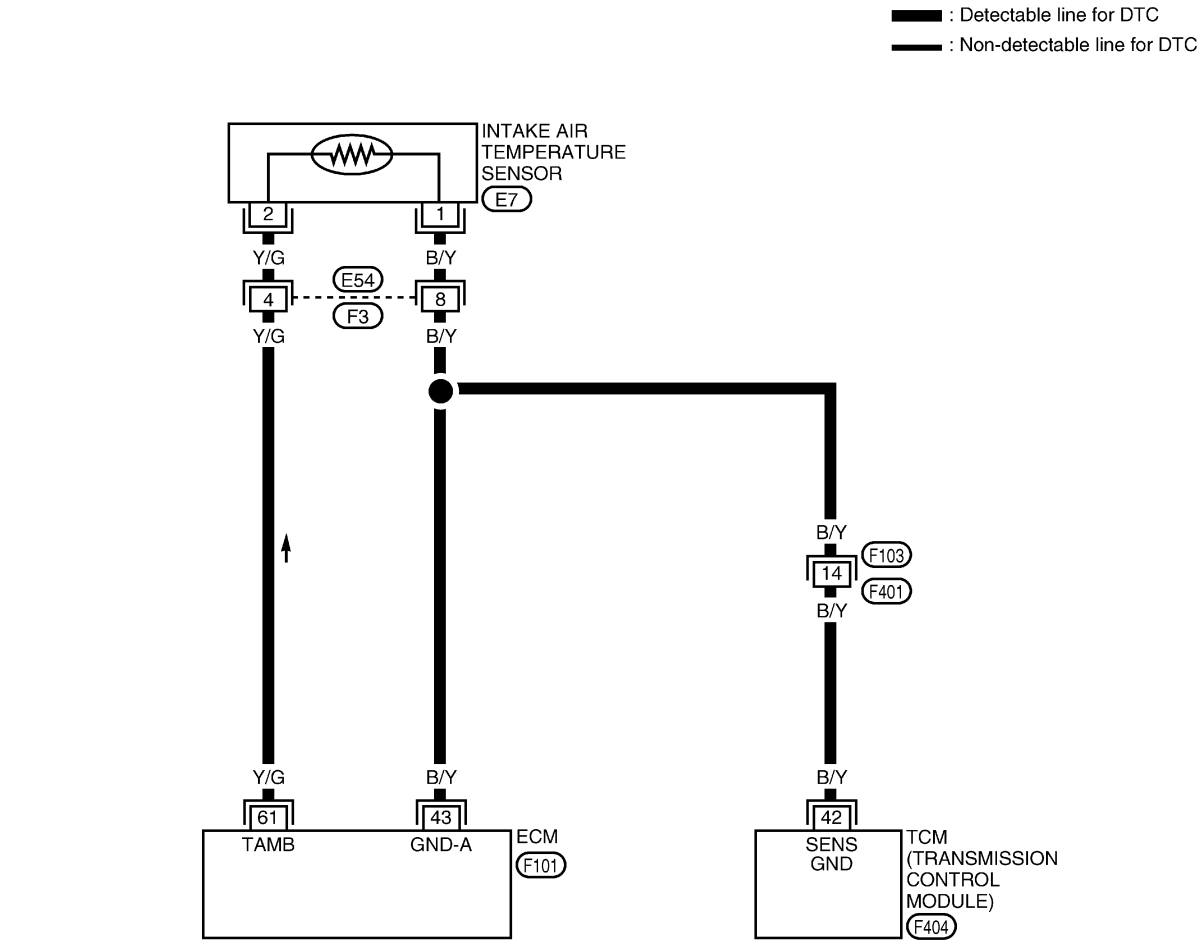
With GST

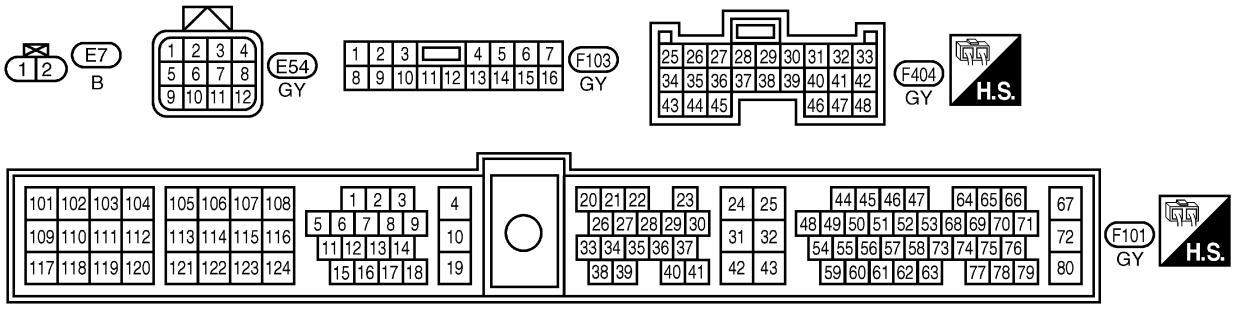
- Follow the procedure "With CONSULT-II".

Wiring Diagram

NDEC0064

EC-IATS-01





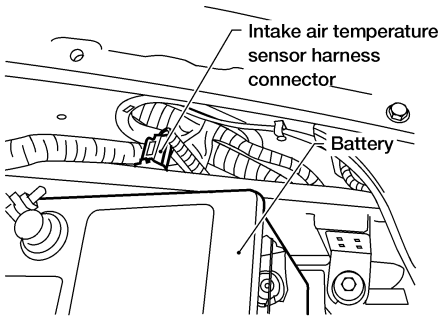
AEC602A

Diagnostic Procedure

NDEC0065

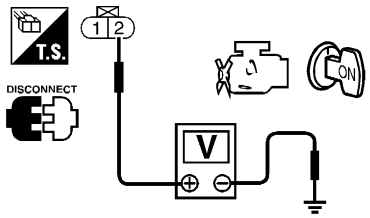
1	CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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



AEC795A

3. Turn ignition switch “ON”.
4. Check voltage between intake air temperature sensor terminal 2 and ground.



SEF688U

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

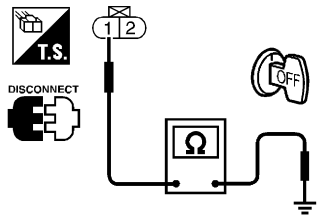
Check the following.
- Harness connectors E54, F3
- Harness for open or short between ECM and intake air temperature sensor

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

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

1. Turn ignition switch "OFF".
2. Check harness continuity between intake air temperature sensor terminal 1 and engine ground.
   Refer to "Wiring Diagrams", EC-156.



SEF689U

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E54, F3
- Harness connectors F103, F401
- Harness for open or short between ECM and intake air temperature sensor
- Harness for open or short between TCM (Transmission control module) and intake air temperature sensor

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

5	CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to "Component Inspection", EC-158.

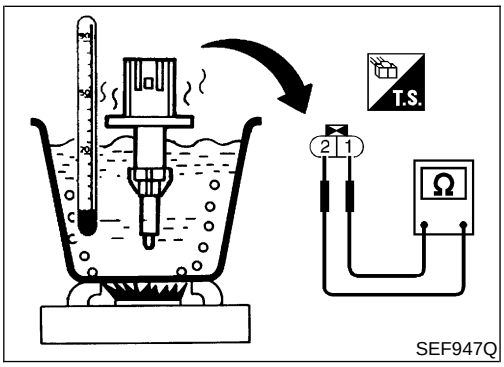
OK or NG

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

6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.

	▶	**INSPECTION END**



SEF947Q

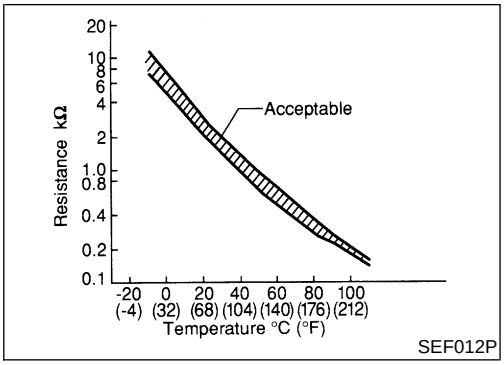
Component Inspection

NDEC0066

INTAKE AIR TEMPERATURE SENSOR

NDEC0066S01

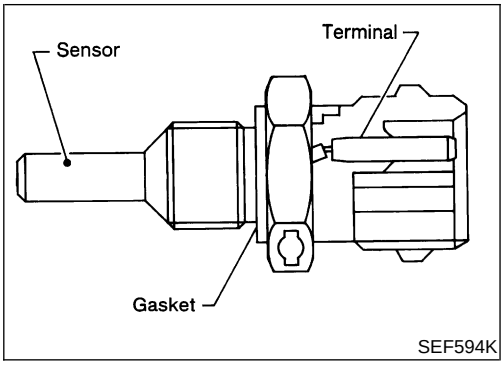
Check resistance as shown in the figure.



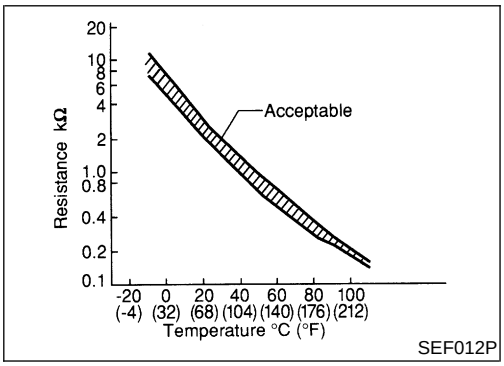
<Reference data>

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

If NG, replace intake air temperature sensor.



SEF594K



SEF012P

Component Description

NDEC0067

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

<Reference data>

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

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

CAUTION:

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

On Board Diagnosis Logic

NDEC0068

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

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

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

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

=NDEC0069

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-163.

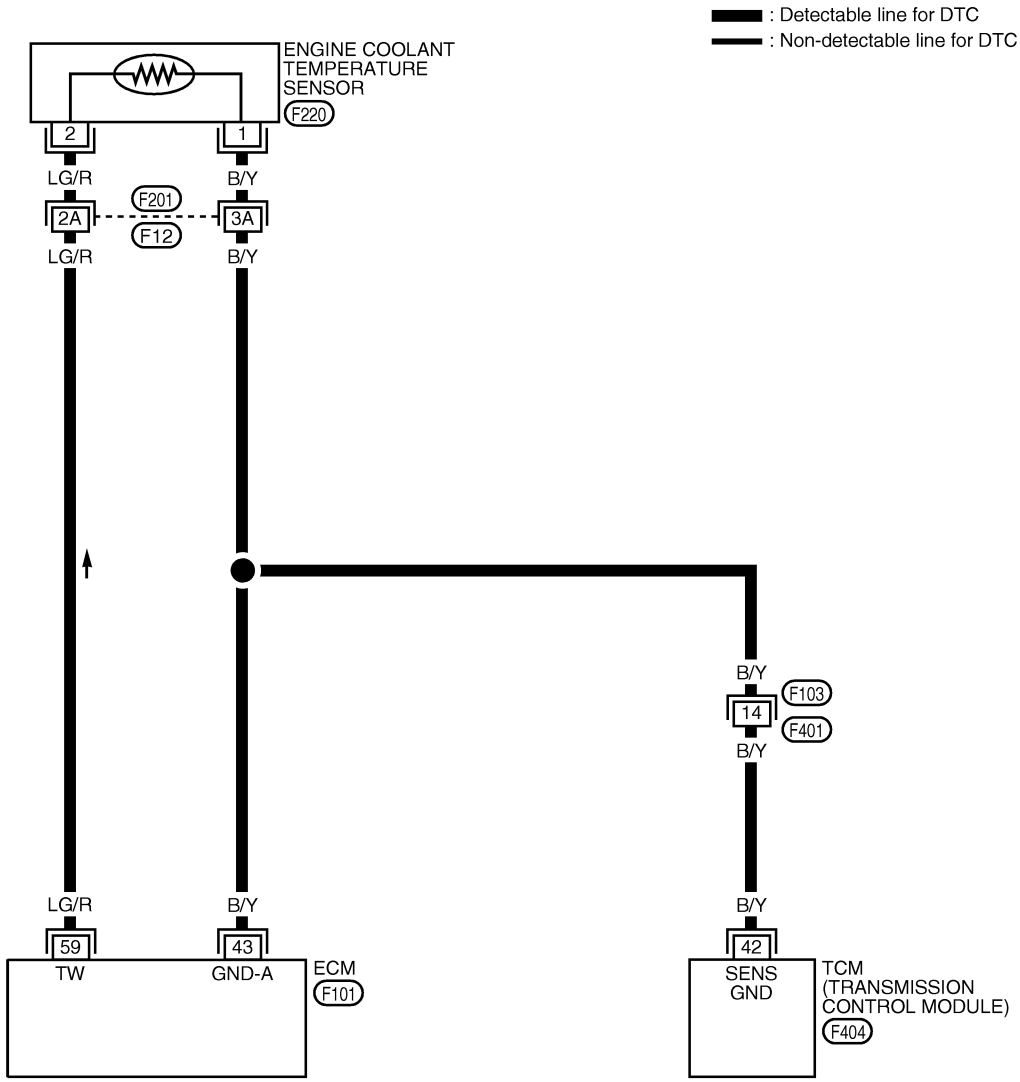
With GST

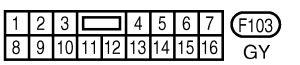
- Follow the procedure “With CONSULT-II”.

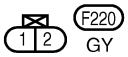
Wiring Diagram

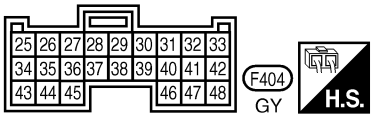
NDEC0070

EC-ECTS-01

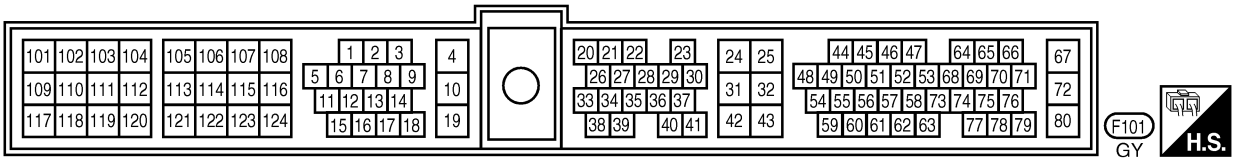








Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)



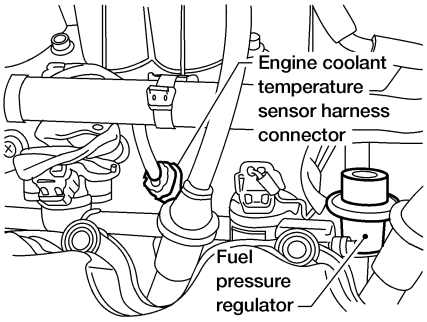
WEC063

Diagnostic Procedure

NDEC0071

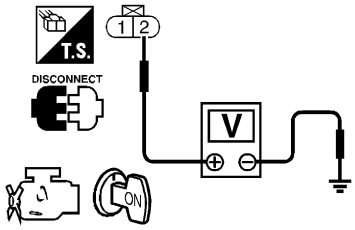
1	CHECK ECTS POWER SUPPLY CIRCUIT

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



AEC796A

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



SEF690U

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

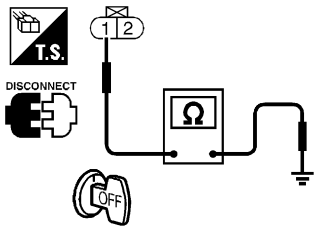
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, F201
- 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.

3	CHECK ECTS GROUND CIRCUIT FOR OPEN AND SHORT

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



SEF691U

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, F201
- Harness connectors F103, F401
- Harness for open or short between ECM and engine coolant temperature sensor
- Harness for open or short between TCM (Transmission control module) and engine coolant temperature sensor

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

5	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to "Component Inspection", EC-165.

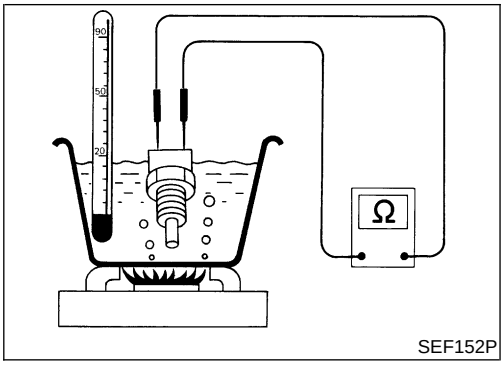
OK or NG

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

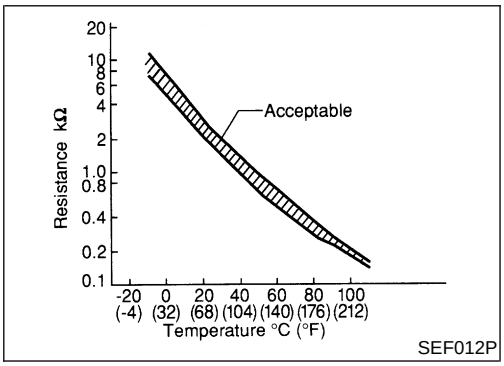
6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.

	▶	**INSPECTION END**



SEF152P



SEF012P

Component Inspection

NDEC0072

ENGINE COOLANT TEMPERATURE SENSOR

NDEC0072S01

Check resistance as shown in the figure.

<Reference data>

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

Description

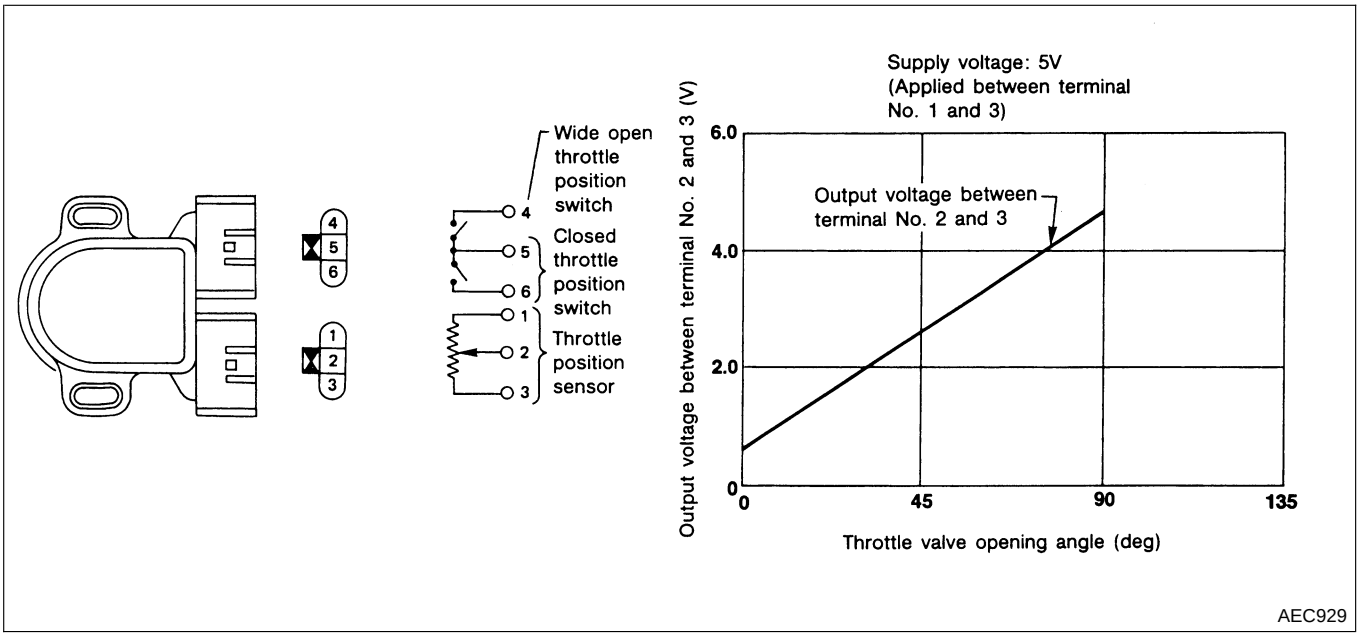
NDEC0073

NOTE:
If DTC P0120 is displayed with DTC P0510, first perform the trouble diagnosis for DTC P0510, refer to EC-369.

COMPONENT DESCRIPTION

NDEC0073S01

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.



AEC929

CONSULT-II Reference Value in Data Monitor Mode

NDEC0074

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL POS SEN	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: fully closed	0.15 - 0.85V
		Throttle valve: fully opened	Approx. 3.5 − 4.7V
ABSOL TH·P/S	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: fully closed	0.0%
		Throttle valve: fully opened	Approx. 80%

ECM Terminals and Reference Value

=NDEC0075

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	R	Throttle position sensor	**[Ignition switch "ON"]** ● **Warm-up condition** ● Accelerator pedal fully released	0.15 - 0.85V
			[Ignition switch "ON"] ● Accelerator pedal fully depressed	Approximately 3.5 − 4.7V
42	BR	Sensors' power supply	**[Ignition switch "ON"]**	Approximately 5V
43	B/Y	Sensors' ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

On Board Diagnosis Logic

NDEC0076

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0120	A)	An excessively low or high voltage from the sensor is sent to ECM*.	● Harness or connectors (The throttle position sensor circuit is open or shorted.) ● Throttle position sensor
	B)	A high voltage from the sensor is sent to ECM under light load driving conditions.	● 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 conditions.	● 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

NDEC0077

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

NDEC0077S01

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

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

2

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

SEF065Y

With CONSULT-II

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

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

3) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-172.

With GST

- Follow the procedure “With CONSULT-II”. EC-172.

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B

NDEC0077S02

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-172.

With GST

- Follow the procedure "With CONSULT-II".

6

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

SEF177Y

PROCEDURE FOR MALFUNCTION C

NDEC0077S03

CAUTION:

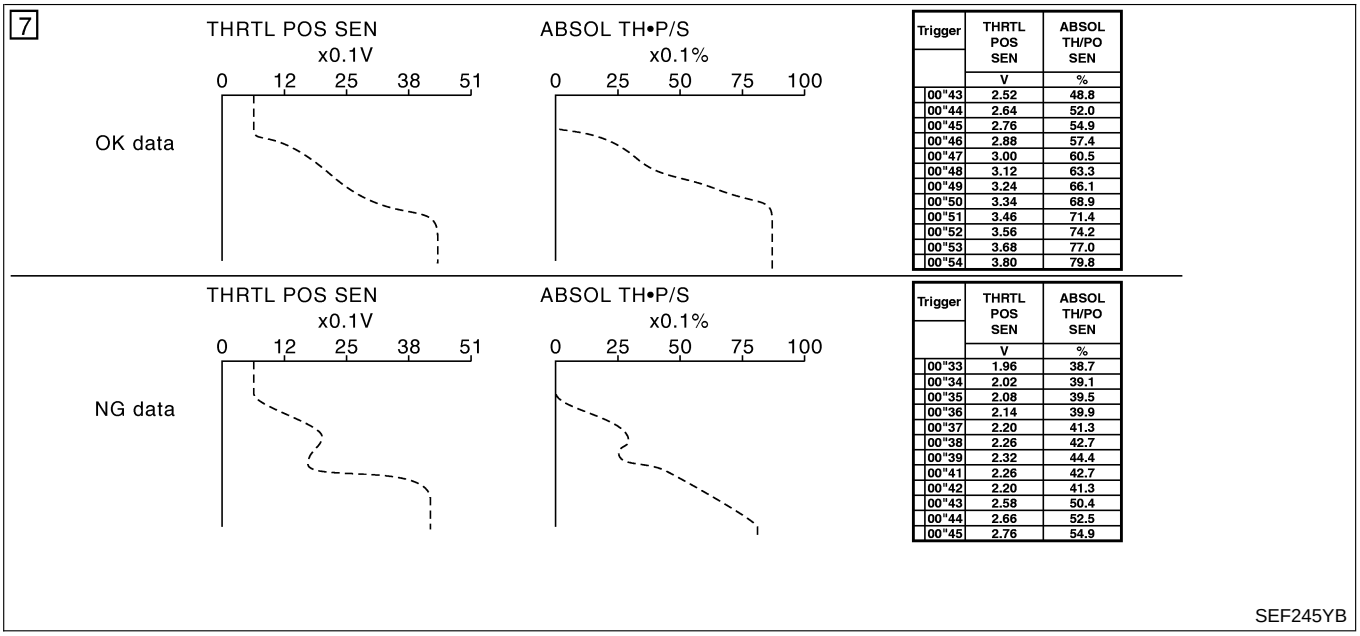
Always drive vehicle at a safe speed.

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-172.
  If OK, go to following step.

7

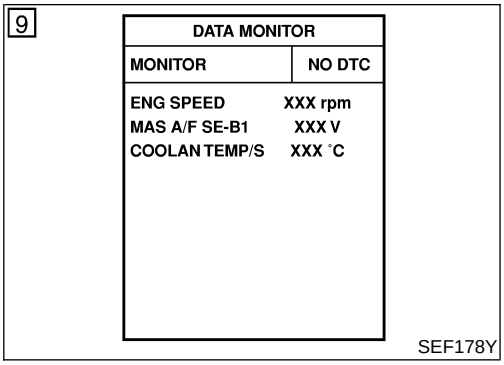


Trigger	THRTL POS SEN	ABSOL TH/PO SEN
	V	%
00"43	2.52	48.8
00"44	2.64	52.0
00"45	2.76	54.9
00"46	2.88	57.4
00"47	3.00	60.5
00"48	3.12	63.3
00"49	3.24	66.1
00"50	3.34	68.9
00"51	3.46	71.4
00"52	3.56	74.2
00"53	3.68	77.0
00"54	3.80	79.8

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

SEF245YB

DTC Confirmation Procedure (Cont'd)



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

ENG SPEED	More than 2,000 rpm
MAS A/F SE-B1	More than 3V
COOLAN TEMP/S	More than 70°C (158°F)
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-172.

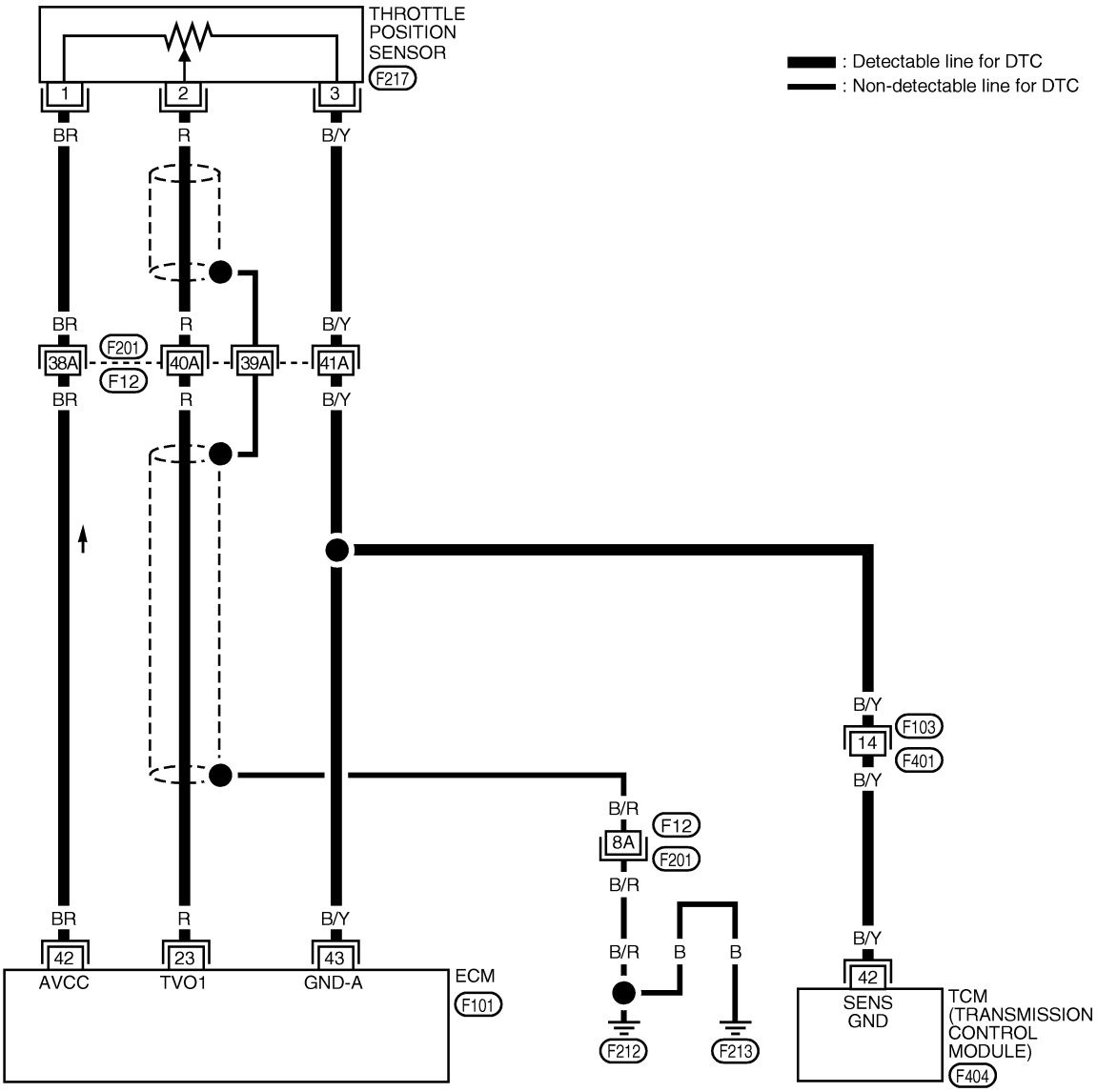
With GST

- Follow the procedure "With CONSULT-II"

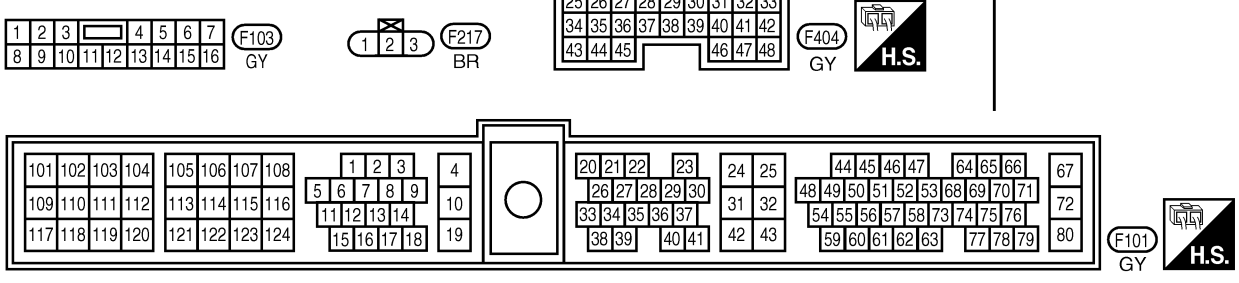
Wiring Diagram

NDEC0078

EC-TPS-01



Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)



WEC064

Diagnostic Procedure

NDEC0079

1	INSPECTION START

Which malfunction A, B or C is duplicated?

MALFUNCTION	Type
A	A
B	B
C	C

MTBL0066

Type A, B or C

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

2	ADJUST THROTTLE POSITION SENSOR

Perform “Basic Inspection”, EC-88.

	▶	GO TO 3.

3	CHECK INTAKE SYSTEM.

1. Turn ignition switch “OFF”.
2. Check the following for connection.

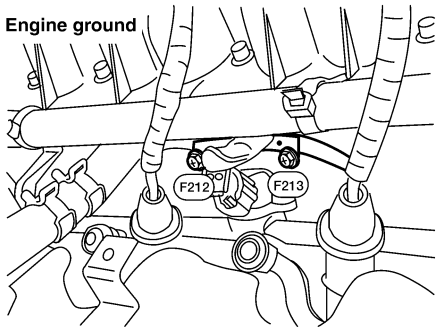
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold collector

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.

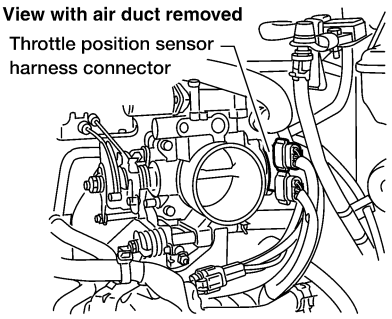


LEC749

	▶	GO TO 5.

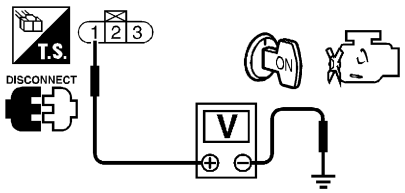
5	CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect throttle position sensor harness connector.



WEC748

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



SEF040W

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

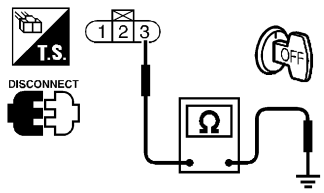
6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, F201
- 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.

7	CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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



SEF041W

Continuity should exist.

3. Also check harness for short to power.

OK or NG

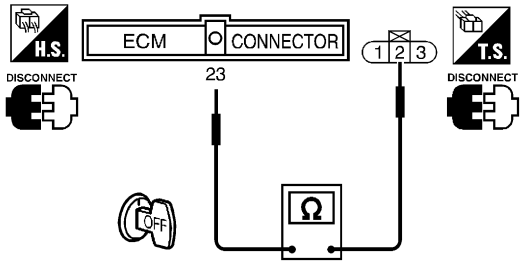
OK	▶	GO TO 9.
NG	▶	GO TO 8.

Diagnostic Procedure (Cont'd)

8	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F12, F201 ● Harness connectors F103, F401 ● Harness for open or short between ECM and throttle position sensor ● Harness for open or short between TCM (Transmission control module) and throttle position sensor	
▶	Repair open circuit or short to power in harness or connectors.

9	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 throttle position sensor terminal 2.



SEF694U

Continuity should exist.

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

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

10	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F12, F201 ● 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.

11	CHECK THROTTLE POSITION SENSOR

Refer to "Component Inspection" EC-175.

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-88.

12	CHECK MASS AIR FLOW SENSOR

Refer to "Component Inspection", EC-142.

OK or NG

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

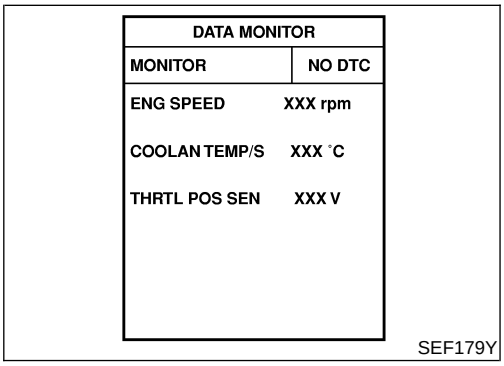
13	CHECK CAMSHAFT POSITION SENSOR	
Refer to "Component Inspection", EC-308.		
OK or NG		
OK	▶	GO TO 14.
NG	▶	Replace camshaft position sensor.

14	CHECK FUEL INJECTOR	
Refer to "Component Inspection", EC-489.		
OK or NG		
OK	▶	GO TO 15.
NG	▶	Replace fuel injector.

15	CHECK SHIELD CIRCUIT	
1. Disconnect harness connectors F12, F201. 2. Check harness continuity between harness connector F201 and engine ground. **Continuity should exist.** 3. Also check harness for short to power.		
OK or NG		
OK	▶	GO TO 17.
NG	▶	GO TO 16.

16	DETECT MALFUNCTIONING PART	
Check the following. ● Harness connectors F12, F201 ● Harness for open or short between harness connector F12 and engine ground		
	▶	Repair open circuit or short to power in harness or connectors.

17	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.		
	▶	**INSPECTION END**



Component Inspection

NDEC0080

THROTTLE POSITION SENSOR

NDEC0080S01

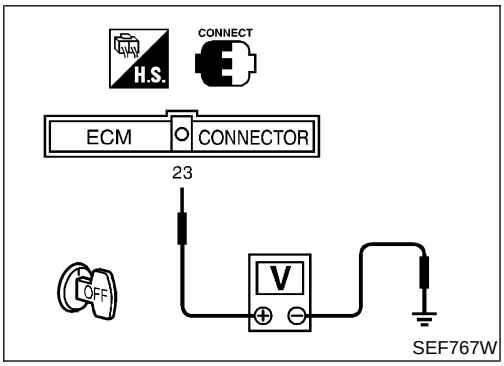
With CONSULT-II

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

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

If NG, adjust closed throttle position sensor. Refer to "Basic Inspection", EC-88.

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

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

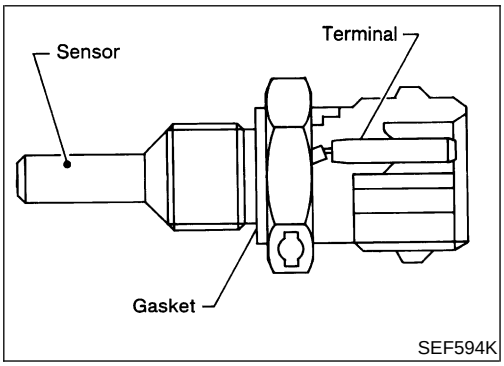
If NG, adjust closed throttle position sensor. Refer to "Basic Inspection", EC-88.

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

Description

NDEC0081

NOTE:
If DTC P0125 is displayed with P0115, first perform the trouble diagnosis for DTC P0115, refer to EC-160.

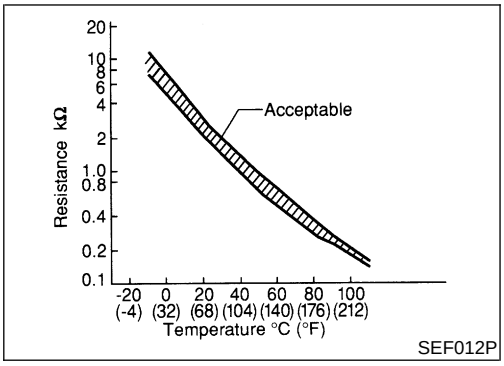


SEF594K

COMPONENT DESCRIPTION

NDEC0081S01

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

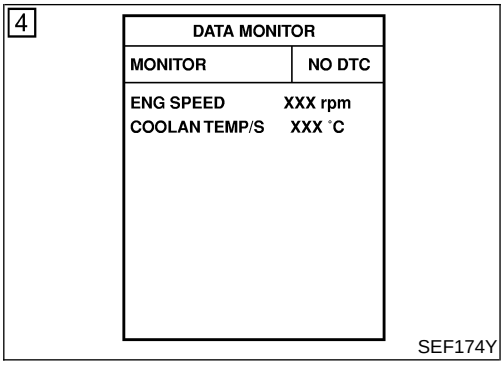
*: These data are reference values and are measured between ECM terminal 59 (Engine coolant temperature sensor) and ground.

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

On Board Diagnosis Logic

NDEC0082

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



DTC Confirmation Procedure

NDEC0083

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-180.

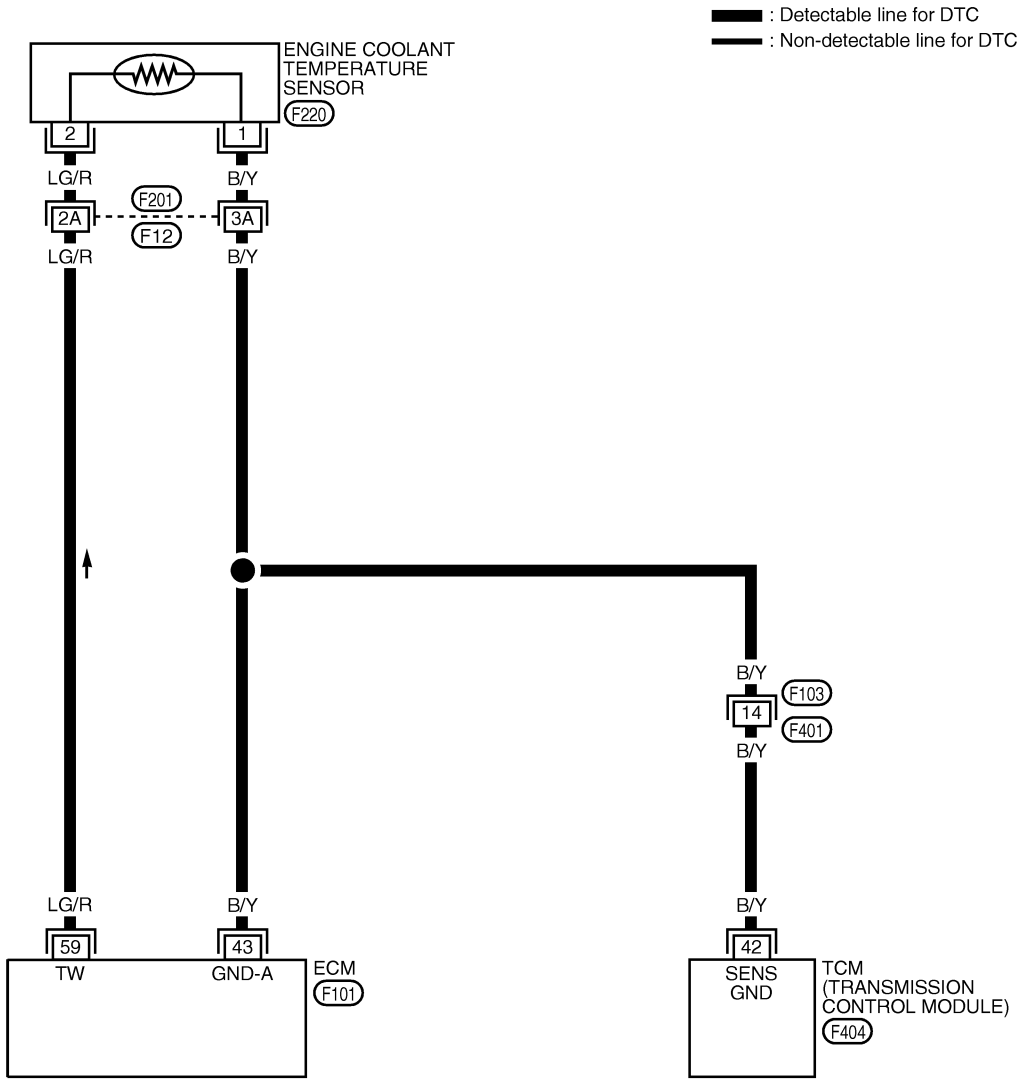
With GST

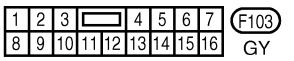
- Follow the procedure “With CONSULT-II”.

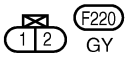
Wiring Diagram

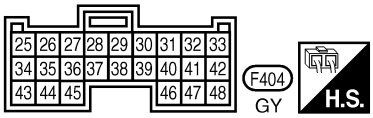
NDEC0084

EC-ECTS-01

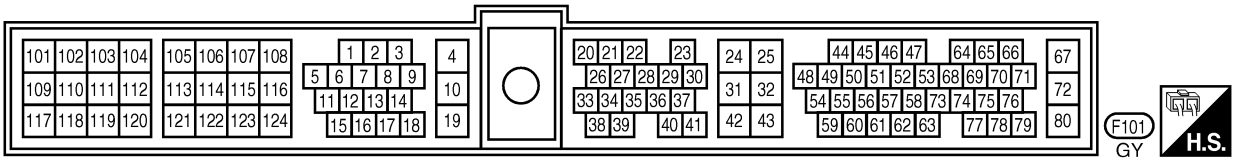








Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)



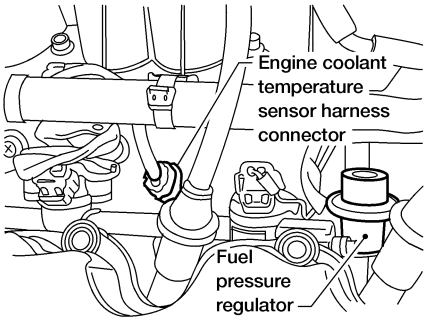
WEC063

Diagnostic Procedure

NDEC0085

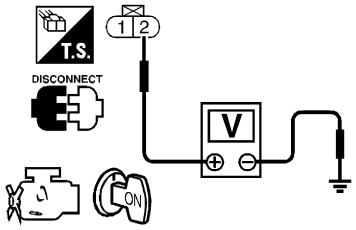
1	CHECK POWER SUPPLY

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



AEC796A

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



SEF690U

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

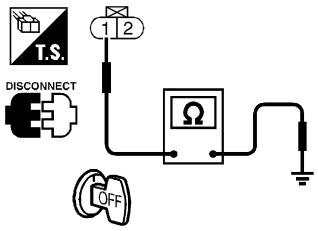
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, F201
- 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.

3	CHECK GROUND CIRCUIT

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



SEF691U

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, F201
- Harness connectors F103, F401
- Harness for open or short between ECM and engine coolant temperature sensor
- Harness for open or short between TCM (Transmission control module) and engine coolant temperature sensor

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

5	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to "Component Inspection", EC-182.

OK or NG

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

6	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.

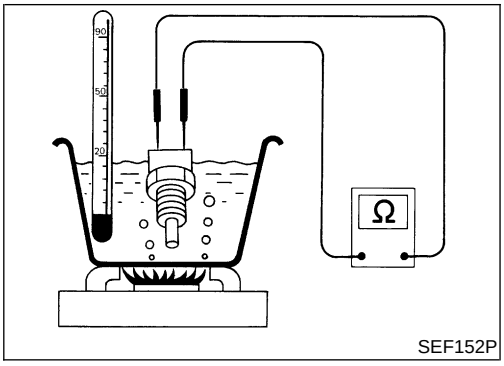
OK or NG

OK	▶	GO TO 7.
NG	▶	Replace thermostat. Refer to "Thermostat", ***LC-11***.

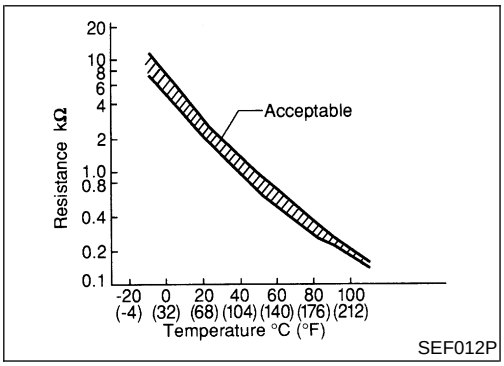
7	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.

	▶	**INSPECTION END**



SEF152P



SEF012P

Component Inspection

NDEC0086

ENGINE COOLANT TEMPERATURE SENSOR

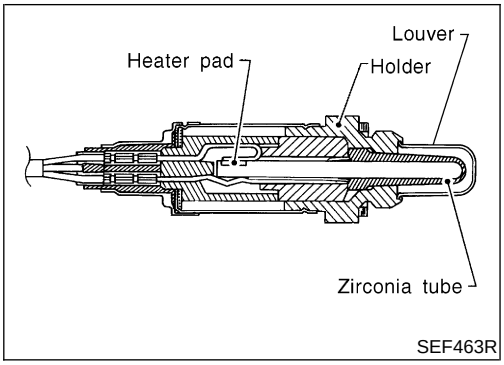
NDEC0086S01

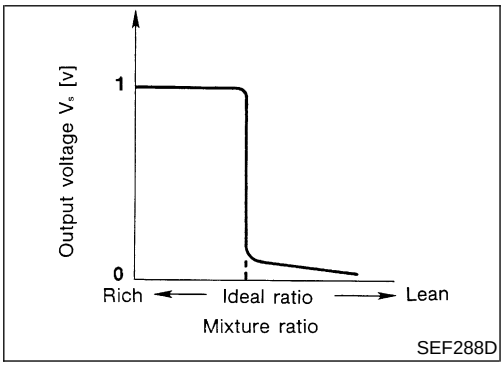
Check resistance as shown in the figure.

<Reference data>

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

If NG, replace engine coolant temperature sensor.





Component Description

NDEC0090

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

CONSULT-II Reference Value in Data Monitor Mode

NDEC0091

Specification data are reference values.

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

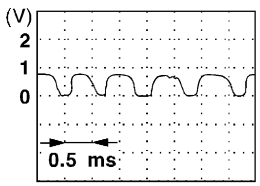
ECM Terminals and Reference Value

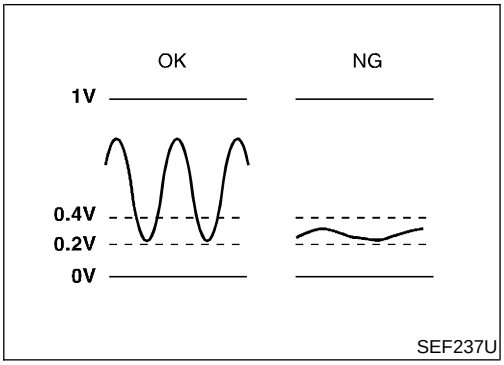
NDEC0092

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	LG	Heated oxygen sensor 1 (front)	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V



On Board Diagnosis Logic

NDEC0093

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

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

5

HO2S1 (B1) P0130	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

SEF643Y

5

HO2S1 (B1) P0130	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
THRTL POS SEN	XXX V

SEF644Y

5

HO2S1 (B1) P0130
COMPLETED

SEF645Y

DTC Confirmation Procedure

NDEC0390

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

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

With CONSULT-II

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

NOTE:

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

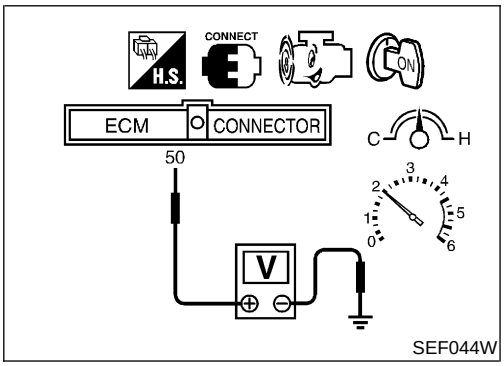
5) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 10 to 60 seconds.)

ENG SPEED	1,500 - 2,500 rpm
Vehicle speed	More than 64 km/h (40 MPH)
B/FUEL SCHDL	1.4 - 6.5 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-187.
During this test, P1148 may be stored in ECM.



Overall Function Check

NDEC0094

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

Without CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

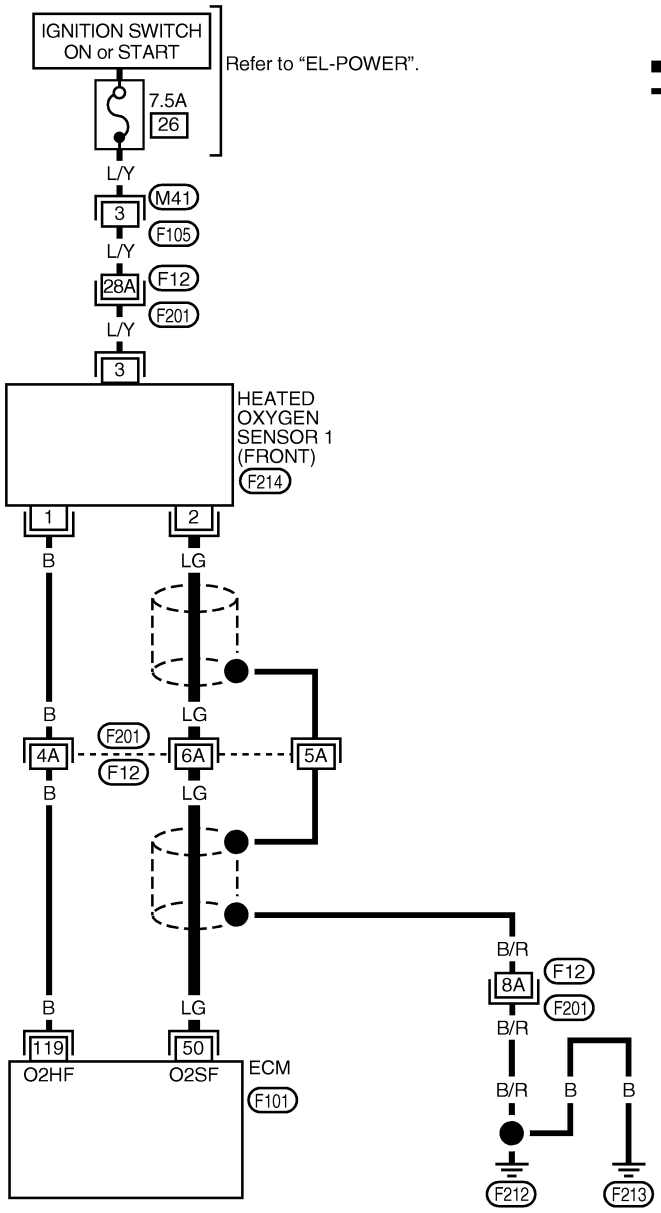
- The voltage does not remain in the range of 0.2 - 0.4V.

4) If NG, go to "Diagnostic Procedure", EC-187.

Wiring Diagram

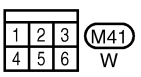
NDEC0095

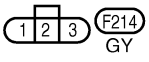
EC-HO2S1-01

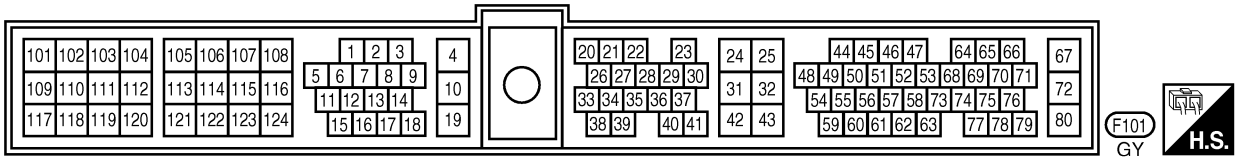


: Detectable line for DTC
: Non-detectable line for DTC

Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)







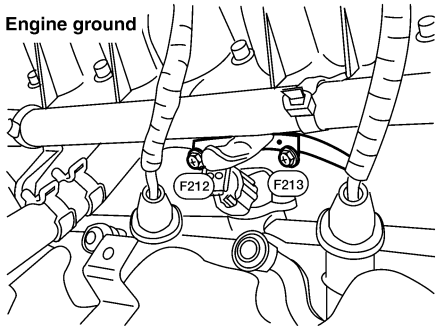
WEC632

Diagnostic Procedure

NDEC0096

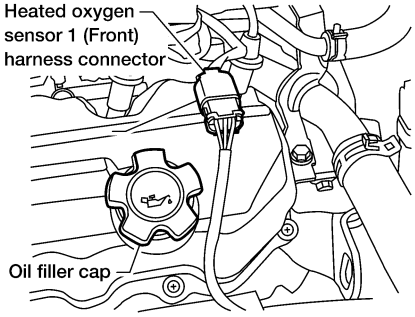
1	INSPECTION START

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



LEC749

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

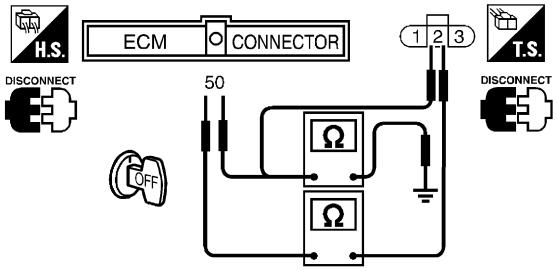


LEC750

▶	GO TO 2.

2	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 50 and HO2S1 terminal 2.



SEF042W

Continuity should exist.

3. Check harness continuity between ECM terminal 50 (or HO2S1 terminal 2) and ground.

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F12, F201 ● Harness for open or short between ECM and heated oxygen sensor 1 (front)	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK HEATED OXYGEN SENSOR 1 (FRONT)	
Refer to "Component Inspection", EC-189.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	Replace heated oxygen sensor 1 (front).

5	CHECK SHIELD CIRCUIT	
1. Disconnect harness connectors F12, F201. 2. Check harness continuity between harness connector F201 and engine ground. **Continuity should exist.** 3. Also check harness for short to power.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F12, F201 ● Harness for open or short between harness connector F12 and engine ground	
▶	Repair open circuit or short to power in harness or connectors.

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.	
▶	**INSPECTION END**

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

SEF646Y

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

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

SEF217YA

Component Inspection

NDEC0391

HEATED OXYGEN SENSOR 1 (FRONT)

NDEC0391S01

With CONSULT-II

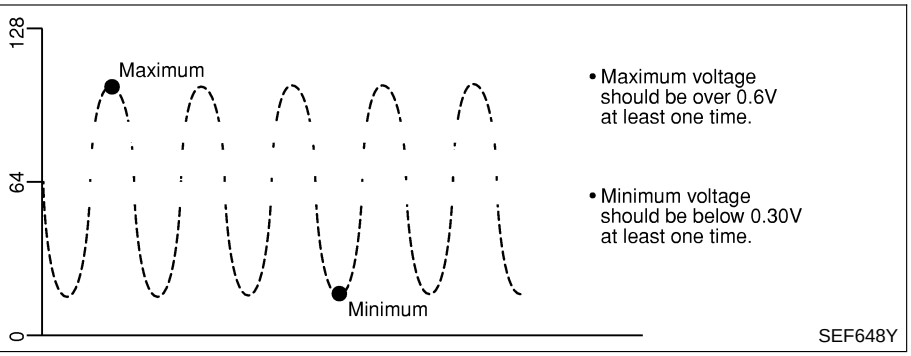
1) Start engine and warm it up to normal operating temperature.
2) Select “MANU TRIG” and “HI SPEED” in “DATA MONITOR” mode with CONSULT-II, and select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch “RECORD” on CONSULT-II screen.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

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

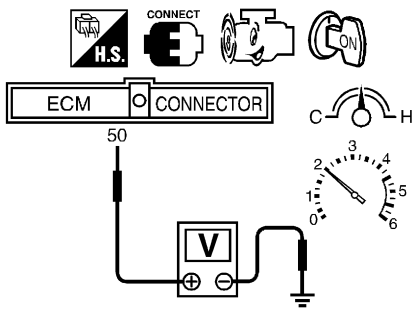
CAUTION:

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

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y



SEF044W

Without CONSULT-II

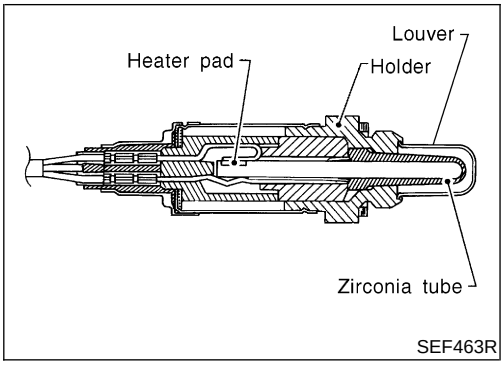
1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

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

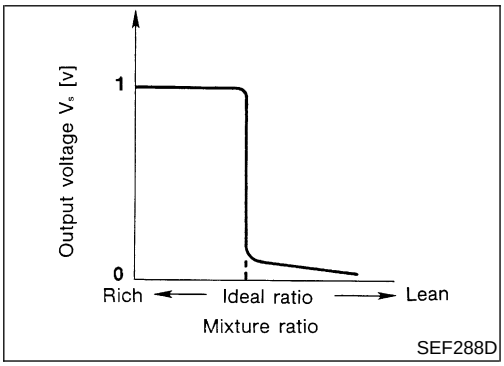
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

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



SEF463R



SEF288D

Component Description

NDEC0392

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

CONSULT-II Reference Value in Data Monitor Mode

NDEC0393

Specification data are reference values.

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

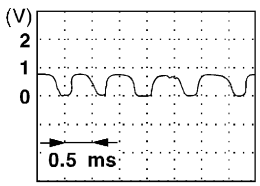
ECM Terminals and Reference Value

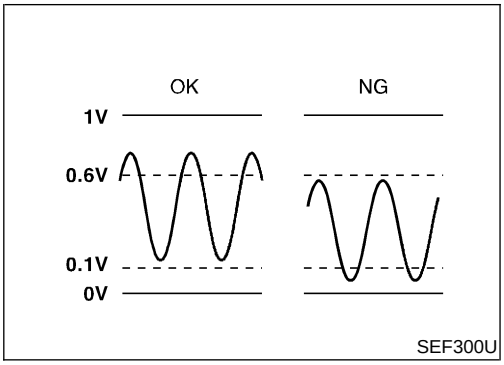
NDEC0394

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	LG	Heated oxygen sensor 1 (front)	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V



SEF300U

On Board Diagnosis Logic

NDEC0395

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

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

6

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

SEF649Y

6

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

SEF650Y

6

HO2S1 (B1) P0131
COMPLETED

SEF651Y

DTC Confirmation Procedure

NDEC0396

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

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

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Stop engine and wait at least 5 seconds.
3) Turn ignition switch “ON” and select “HO2S1 (B1) P0131” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4) Touch “START”.
5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

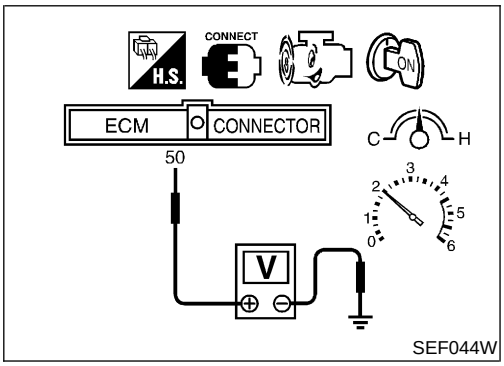
Never raise engine speed above 3,200 rpm after this step. If engine speed limit is exceeded, return to step 5.

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

ENG SPEED	1,500 - 2,300 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	3.3 - 10 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-193.



Overall Function Check

NDEC0397

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

Without CONSULT-II

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

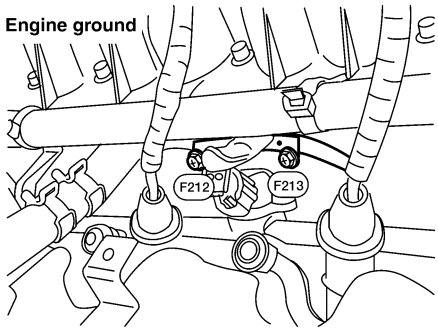
4) If NG, go to "Diagnostic Procedure", EC-193.

Diagnostic Procedure

NDEC0399

1	RETIGHTEN GROUND SCREWS

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

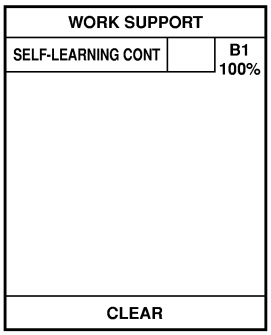


▶	GO TO 2.

Diagnostic Procedure (Cont'd)

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)	
Loosen and retighten heated oxygen sensor 1 (front). **Tightening torque:** **40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)**		
	▶	GO TO 3.

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



SEF215Z

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

Without CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-61.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, refer to EC-265.
No	▶	GO TO 4.

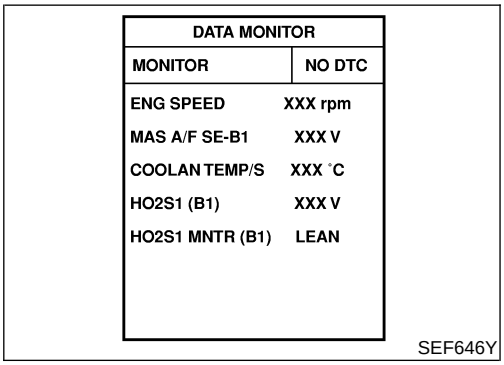
4	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)	
Refer to "Component inspection", EC-224. **OK or NG**		
OK	▶	GO TO 5.
NG	▶	Replace heated oxygen sensor 1 (front).

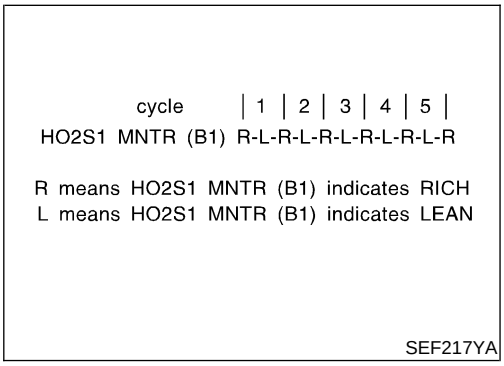
5	CHECK HEATED OXYGEN SENSOR 1 (FRONT)	
Refer to "Component Inspection", EC-195.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Replace heated oxygen sensor 1 (front).

6	CHECK SHIELD CIRCUIT	
1. Disconnect harness connectors F12, F201. 2. For circuit, refer to "Wiring Diagram", EC-186. 3. Check harness continuity between harness connector F12 and engine ground. **Continuity should exist.** 4. Also check harness for short to power.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
Check the following. ● Harness connectors F12, F201 ● Harness for open or short between harness connector F21 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-126. For circuit, refer to "Wiring Diagram", EC-186.		
	▶	**INSPECTION END**





Component Inspection

NDEC0400

HEATED OXYGEN SENSOR 1 (FRONT)

NDEC0400S01

With CONSULT-II

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

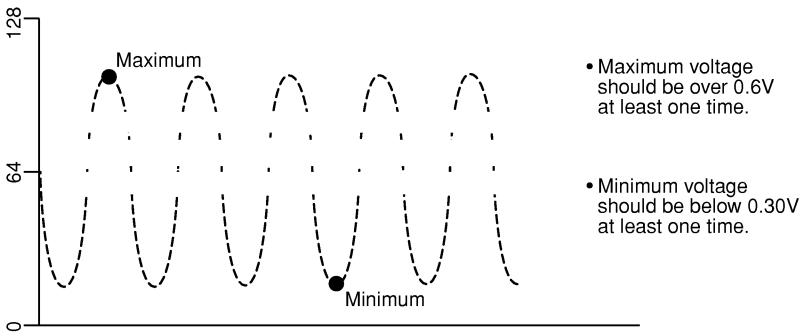
- "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
  5 times (cycles) are counted as shown left:
- "HO2S1 (B1)" voltage goes above 0.6V at least once.
- "HO2S1 (B1)" voltage goes below 0.3V at least once.
- "HO2S1 (B1)" voltage never exceeds 1.0V.

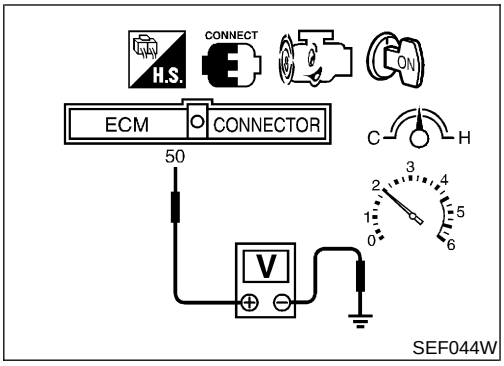
CAUTION:

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

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

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX





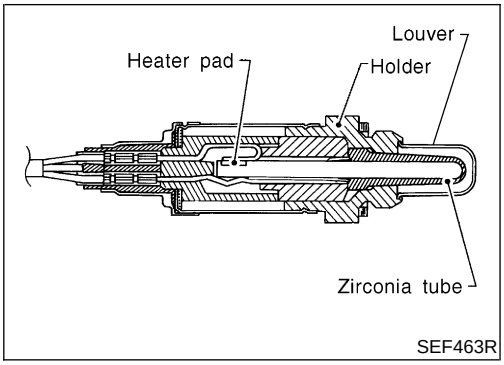
Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

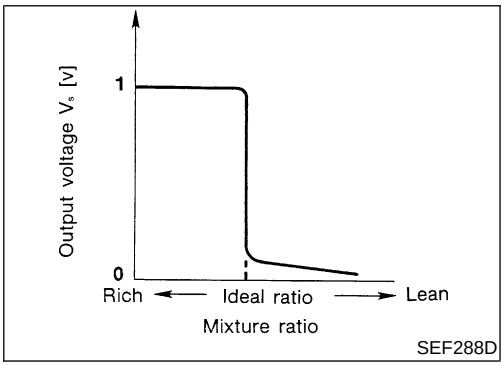
- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times within 10 seconds.
  1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
  2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at 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.**



SEF463R



SEF288D

Component Description

NDEC0401

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

CONSULT-II Reference Value in Data Monitor Mode

NDEC0402

Specification data are reference values.

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

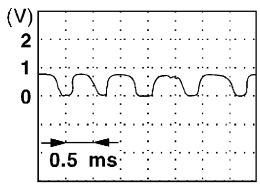
ECM Terminals and Reference Value

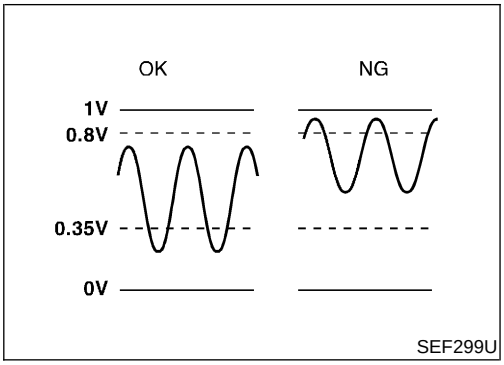
NDEC0403

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	LG	Heated oxygen sensor 1 (front)	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V



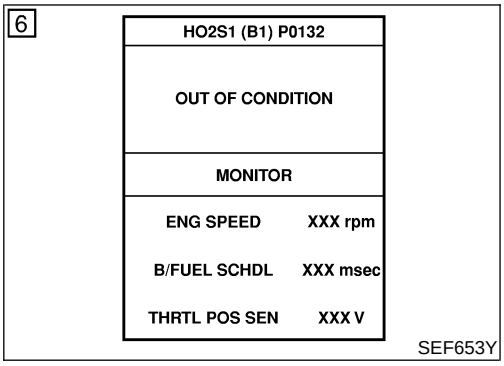
SEF299U

On Board Diagnosis Logic

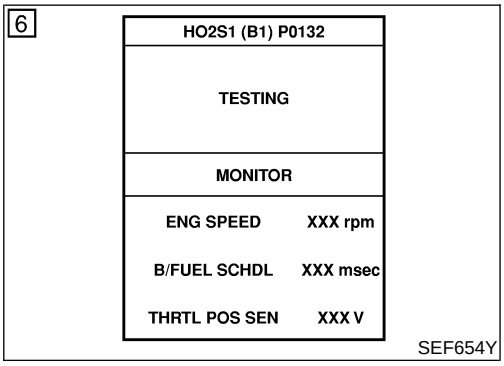
NDEC0404

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

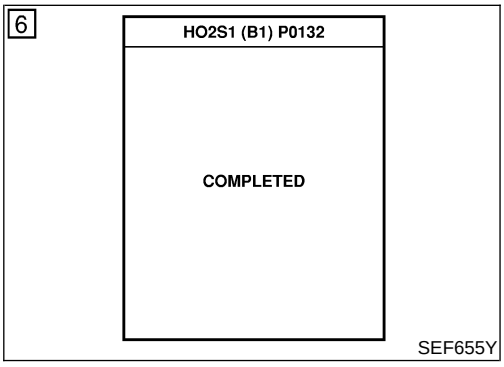
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0132	• The maximum and minimum voltages from the sensor are beyond the specified voltages.	• Heated oxygen sensor 1 (front) • Fuel pressure • Injectors • Heated oxygen sensor 1 heater (front)



SEF653Y



SEF654Y



SEF655Y

DTC Confirmation Procedure

NDEC0405

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

TESTING CONDITION:

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

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Stop engine and wait at least 5 seconds.
3) Turn ignition switch “ON” and select “HO2S1 (B1) P0132” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4) Touch “START”.
5) Start engine and let it idle for at least 3.5 minutes.

NOTE:

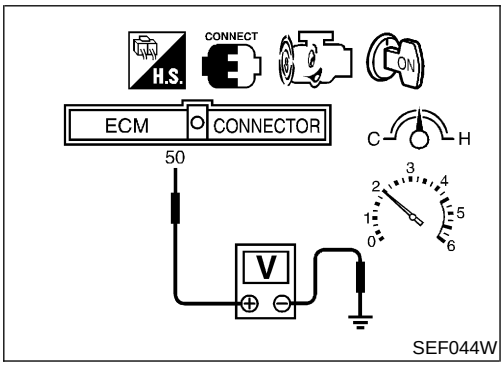
Never raise engine speed above 3,200 rpm after this step. If engine speed limit is exceeded, return to step 5.

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

ENG SPEED	1,500 - 2,300 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	3.3 - 10 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-199.



Overall Function Check

NDEC0406

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

Without CONSULT-II

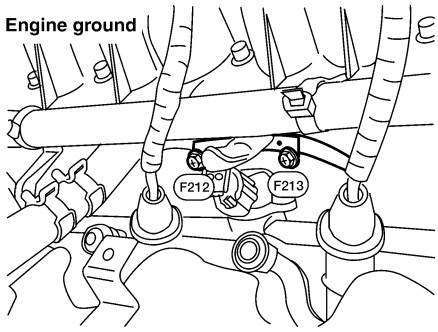
1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground.
3) Check one of the following with engine speed held at 2,000 rpm constant under no load.
   - The maximum voltage is below 0.8V at least one time.
   - The minimum voltage is below 0.35V at least one time.
4) If NG, go to "Diagnostic Procedure", EC-199.

Diagnostic Procedure

NDEC0408

1	RETIGHTEN GROUND SCREWS

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

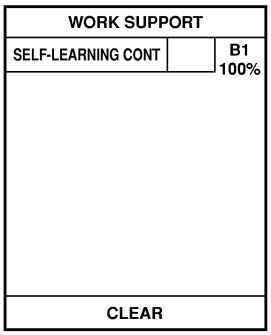


▶	GO TO 2.

Diagnostic Procedure (Cont'd)

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)	
Loosen and retighten heated oxygen sensor 1 (front). **Tightening torque:** **40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)**		
	▶	GO TO 3.

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



SEF215Z

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

Without CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-61.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172, refer to EC-273.
No	▶	GO TO 4.

4	CHECK CONNECTOR FOR WATER	
1. Turn ignition switch "OFF". 2. Disconnect heated oxygen sensor 1 (front) 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 HEATED OXYGEN SENSOR 1 HEATER (FRONT)	
Refer to "Component Inspection", EC-224.		
OK or NG		
OK	▶	GO TO 6.
NG	▶	Replace heated oxygen sensor 1 (front).

6	CHECK HEATED OXYGEN SENSOR 1 (FRONT)	
Refer to "Component Inspection", EC-202.		
OK or NG		
OK	▶	GO TO 7.
NG	▶	Replace heated oxygen sensor 1 (front).

7	CHECK SHIELD CIRCUIT	
1. Disconnect harness connectors F12, F201. For circuit, refer to "Wiring Diagram", EC-186. 2. Check harness continuity between harness connector F12 and engine ground. **Continuity should exist.** 3. Also check harness for short to power.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART	
Check the following. ● Harness connectors F12, F201 ● Harness for open or short between harness connector F12 and engine ground		
	▶	Repair open circuit or short to power in harness or connector.

9	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126. For circuit, refer to "Wiring Diagram", EC-186.		
	▶	**INSPECTION END**

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

SEF646Y

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

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

SEF217YA

Component Inspection

NDEC0409

HEATED OXYGEN SENSOR 1 (FRONT)

NDEC0409S01

With CONSULT-II

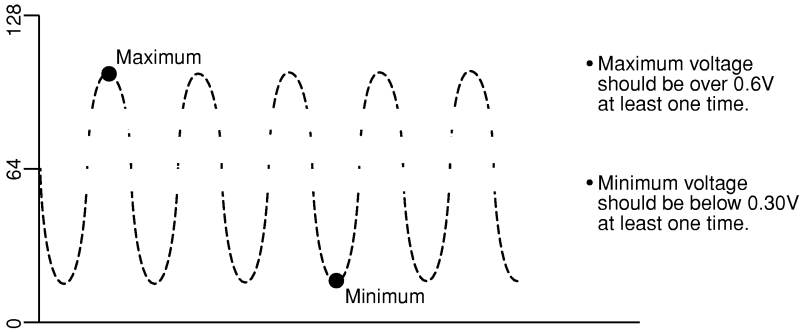
1) Start engine and warm it up to normal operating temperature.
2) Select “MANU TRIG” and “HI SPEED” in “DATA MONITOR” mode with CONSULT-II, and select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch “RECORD” on CONSULT-II screen.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

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

CAUTION:

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

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



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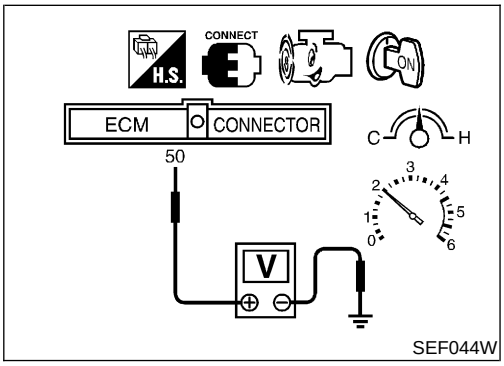


SEF044W

Without CONSULT-II

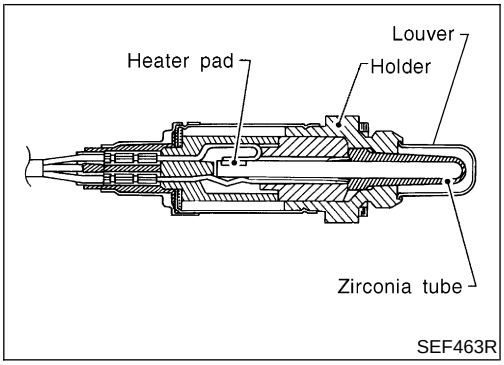
1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

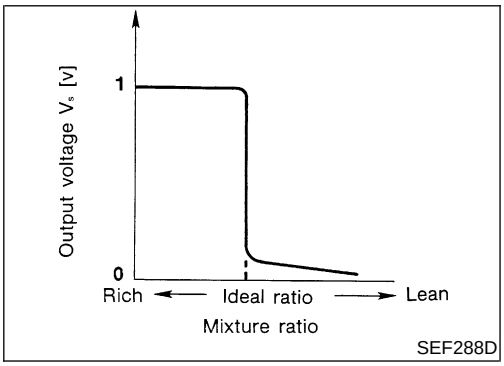
- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times within 10 seconds.
  1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
  2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

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

CAUTION:

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





Component Description

NDEC0410

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

CONSULT-II Reference Value in Data Monitor Mode

NDEC0411

Specification data are reference values.

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

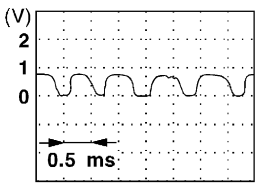
ECM Terminals and Reference Value

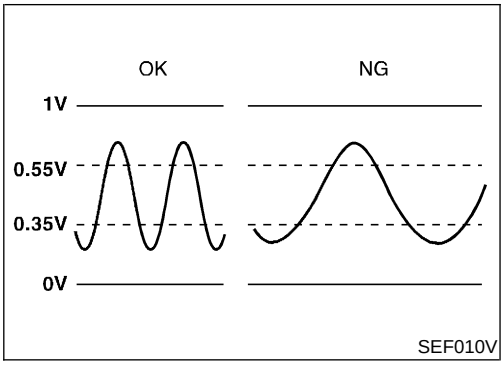
NDEC0412

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	LG	Heated oxygen sensor 1 (front)	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V



On Board Diagnosis Logic

NDEC0413

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

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

DTC Confirmation Procedure

NDEC0414

CAUTION:

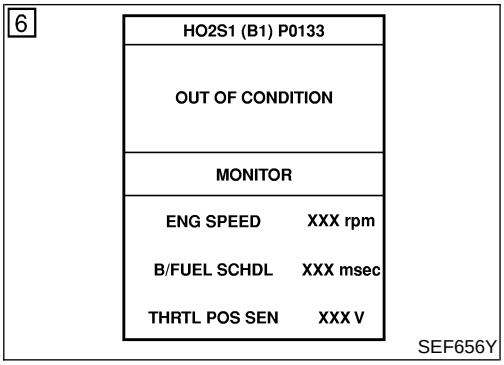
Always drive vehicle at a safe speed.

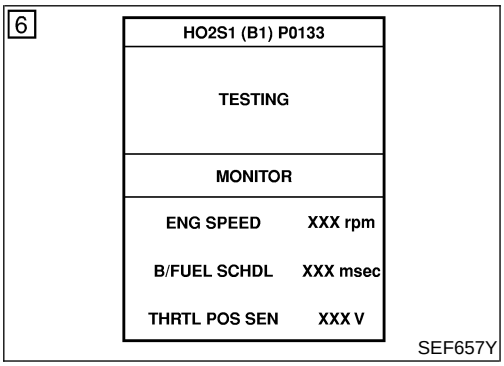
NOTE:

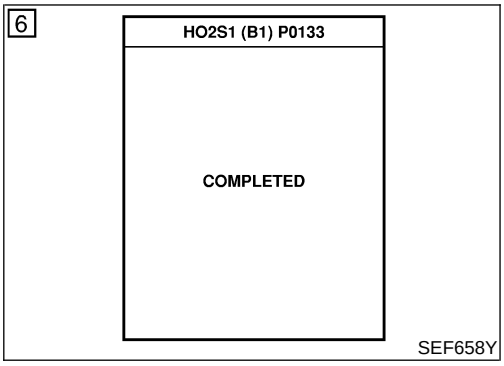
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

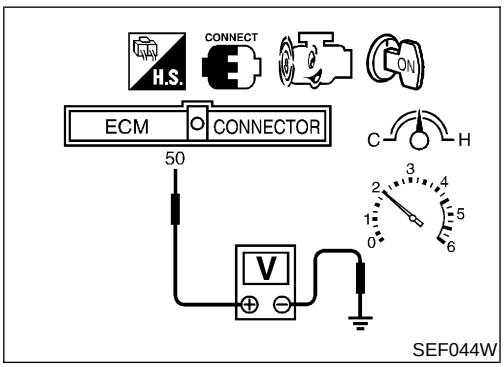
TESTING CONDITION:

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









With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Stop engine and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "HO2S1 (B1) P0133" of "HO2S1" in "DTC WORK SUPPORT" mode with CONSULT-II.
4) Touch "START".
5) Start engine and let it idle for at least 3.5 minutes.

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

6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 40 to 50 seconds.)

ENG SPEED	1,600 - 2,600 rpm
Vehicle speed	More than 80 km/h (50 MPH)
B/FUEL SCHDL	2.8 - 11 msec
Selector lever	Suitable position

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

7) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to "Diagnostic Procedure", EC-208.

Overall Function Check

NDEC0415

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

Without CONSULT

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

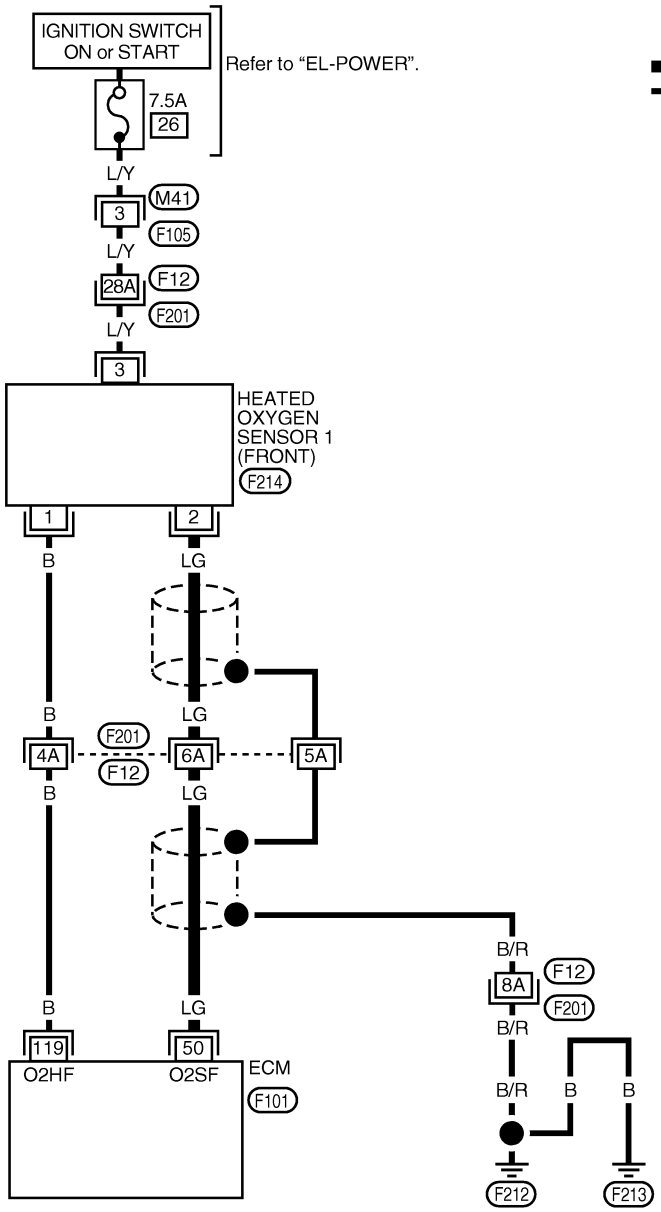
- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times within 10 seconds.
  1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
  2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

4) If NG, go to "Diagnostic Procedure", EC-208.

Wiring Diagram

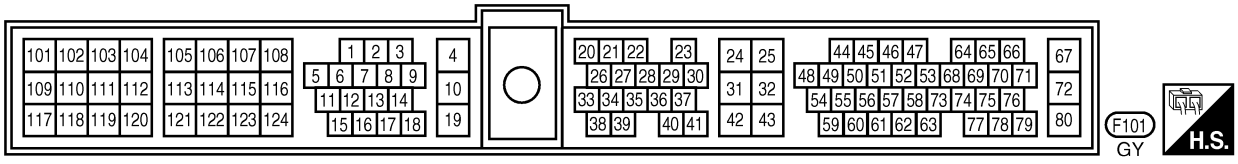
NDEC0416

EC-HO2S1-01



: Detectable line for DTC
: Non-detectable line for DTC

Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)



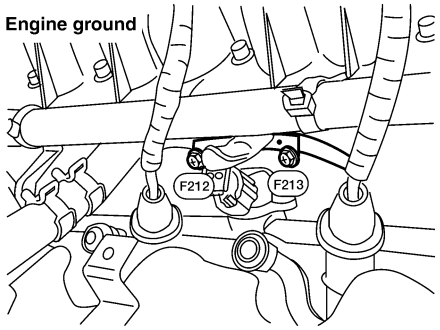
WEC632

Diagnostic Procedure

NDEC0417

1	RETIGHTEN GROUND SCREWS

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



LEC749

▶ GO TO 2.

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)

Loosen and retighten heated oxygen sensor 1 (front).

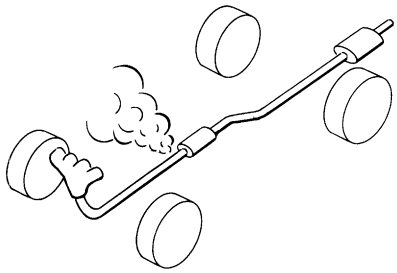
Tightening torque:

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

▶ GO TO 3.

3	CHECK FOR EXHAUST AIR LEAK

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



SEF099P

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace.

4	CHECK FOR INTAKE AIR LEAK

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

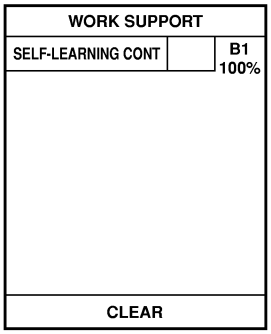
OK or NG

OK	▶	GO TO 5.
NG	▶	Repair or replace.

5	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

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



SEF215Z

4. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected?
Is it difficult to start engine?

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION", EC-61.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.

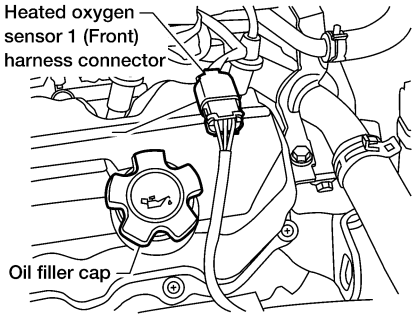
Is the 1st trip DTC P0171 or P0172 detected?
Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171 or P0172, refer to EC-265, 273.
No	▶	GO TO 6.

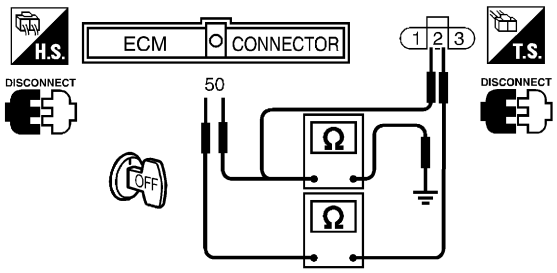
6	CHECK INPUT SIGNAL CIRCUIT

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



LEC750

3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 50 and HO2S1 terminal 2.



SEF042W

Continuity should exist.

5. Check harness continuity between ECM terminal 50 (or HO2S1 terminal 2) and ground.
   Continuity should not exist.
6. Also check harness for short to power.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, F201
- Harness for open or short between ECM and heated oxygen sensor 1 (front)

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

8	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)

Refer to "Component Inspection", EC-224.

OK or NG

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

9	CHECK MASS AIR FLOW SENSOR

Refer to "Component Inspection", EC-142.

OK or NG

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

10	CHECK PCV VALVE
Refer to "Positive Crankcase Ventilation", EC-34.	
OK or NG	
OK ▶	GO TO 11.
NG ▶	Replace PCV valve.

11	CHECK HEATED OXYGEN SENSOR 1 (FRONT)
Refer to "Component Inspection", EC-212.	
OK or NG	
OK ▶	GO TO 12.
NG ▶	Replace heated oxygen sensor 1 (front).

12	CHECK SHIELD CIRCUIT
1. Disconnect harness connectors F12, F201. 2. Check harness continuity between harness connector F12 and engine ground. **Continuity should exist.** 3. Also check harness for short to power.	
OK or NG	
OK ▶	GO TO 14.
NG ▶	GO TO 13.

13	DETECT MALFUNCTIONING PART
Check the following. • Harness connectors F12, F201 • Harness for open or short between harness connector F12 and engine ground	
▶	Repair open circuit or short to power in harness or connectors.

14	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.	
▶	**INSPECTION END**

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

SEF646Y

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

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

SEF217YA

Component Inspection

NDEC0418

HEATED OXYGEN SENSOR 1 (FRONT)

NDEC0418S01

With CONSULT-II

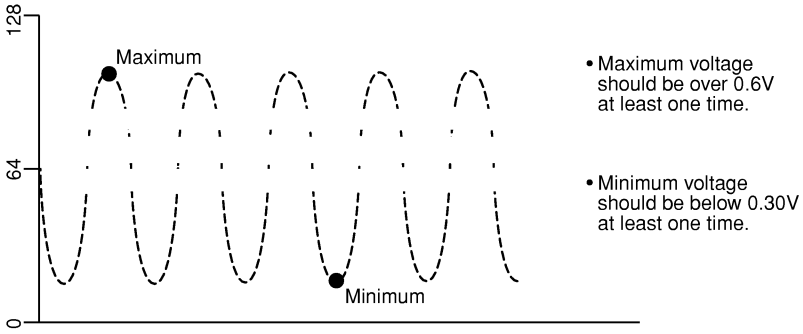
1) Start engine and warm it up to normal operating temperature.
2) Select “MANU TRIG” and “HI SPEED” in “DATA MONITOR” mode with CONSULT-II, and select “HO2S1” and “HO2S1 MNTR (B1)”.
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch “RECORD” on CONSULT-II screen.
5)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

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

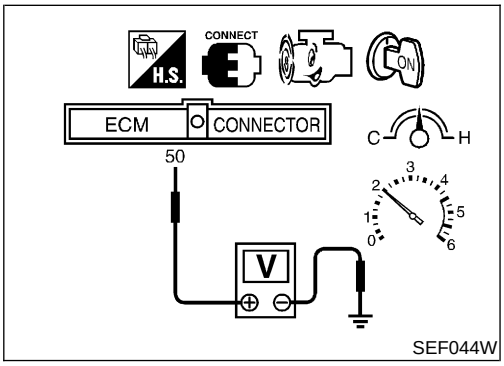
CAUTION:

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

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y



SEF044W

Without CONSULT-II

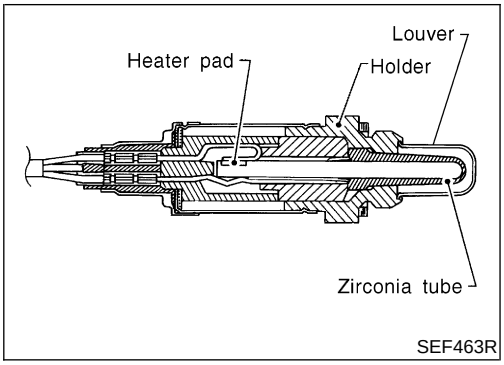
1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

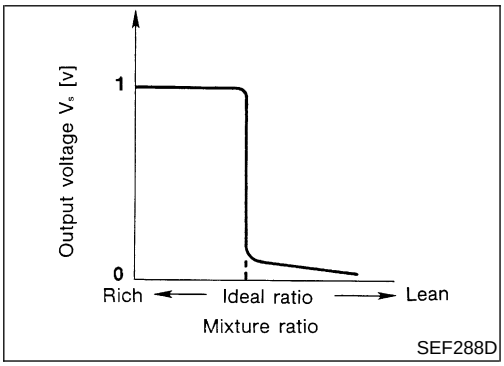
- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times within 10 seconds.
  1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
  2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

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

CAUTION:

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





Component Description

NDEC0419

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

CONSULT-II Reference Value in Data Monitor Mode

NDEC0420

Specification data are reference values.

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

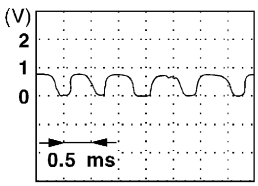
ECM Terminals and Reference Value

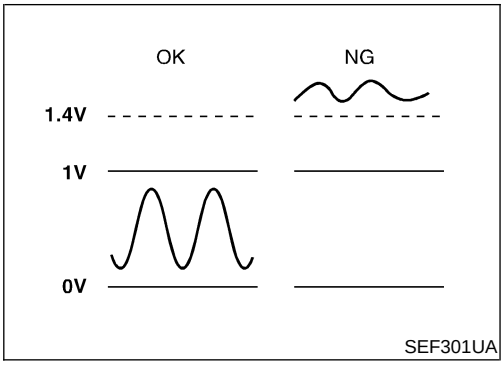
NDEC0421

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	LG	Heated oxygen sensor 1 (front)	**[Engine is running]** ● After warming up to normal operating temperature and engine speed is 2,000 rpm	0 - Approximately 1.0V  SEF002V

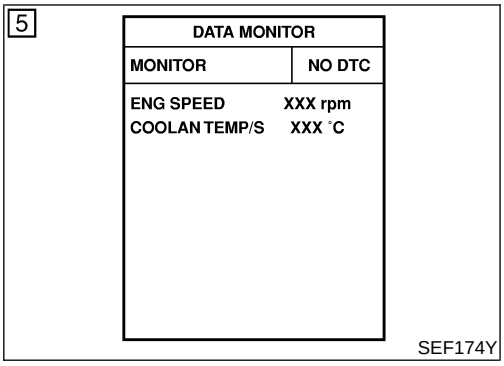


On Board Diagnosis Logic

NDEC0422

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

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



DTC Confirmation Procedure

NDEC0423

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-217.

With GST

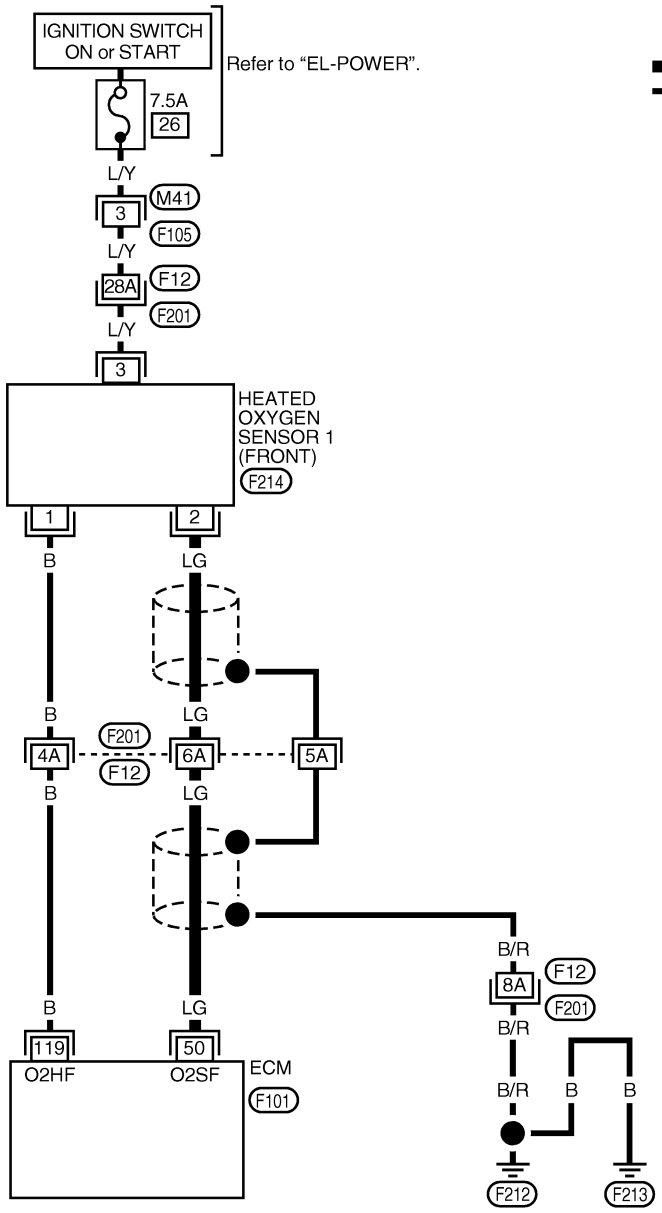
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Restart engine and let it idle for 20 seconds.
4) Turn ignition switch "OFF" and wait at least 5 seconds.
5) Restart engine and let it idle for 20 seconds.
6) Select "MODE 3" with GST.
7) If DTC is detected, go to "Diagnostic Procedure", EC-217.

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

Wiring Diagram

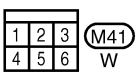
NDEC0424

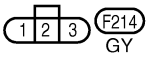
EC-HO2S1-01

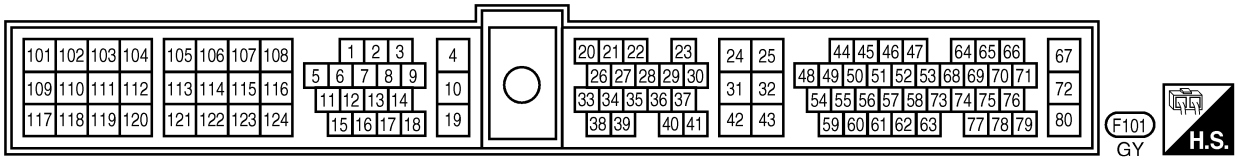


: Detectable line for DTC
: Non-detectable line for DTC

Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)







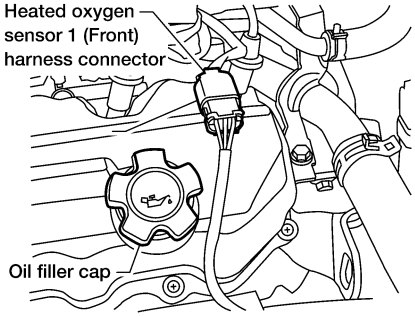
WEC632

Diagnostic Procedure

NDEC0425

1	INSPECTION START

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



LEC750

▶ GO TO 2.

2	RETIGHTEN HEATED OXYGEN SENSOR 1 (FRONT)

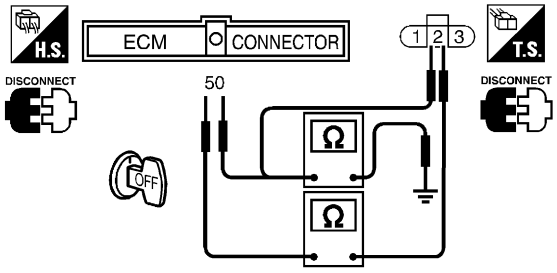
1. Loosen and retighten heated oxygen sensor 1 (front).

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

▶ GO TO 3.

3	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 50 and HO2S1 terminal 2.



SEF042W

Continuity should exist.

3. Check harness continuity between ECM terminal 50 (or HO2S1 terminal 2) and ground.

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, F201
- Harness for open or short between ECM and heated oxygen sensor 1 (front)

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

Diagnostic Procedure (Cont'd)

5	CHECK CONNECTOR FOR WATER
1. Disconnect heated oxygen sensor 1 (front) harness connector. 2. Check connectors for water. **Water should not exist.**	
OK or NG	
OK ▶	GO TO 6.
NG ▶	Repair or replace harness or connectors.

6	CHECK HEATED OXYGEN SENSOR 1 (FRONT)
Refer to "Component Inspection", EC-218.	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Replace heated oxygen sensor 1 (front).

7	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.	
▶	**INSPECTION END**

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

SEF646Y

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

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

SEF217YA

Component Inspection

NDEC0426

HEATED OXYGEN SENSOR 1 (FRONT)

NDEC0426S01

With CONSULT-II

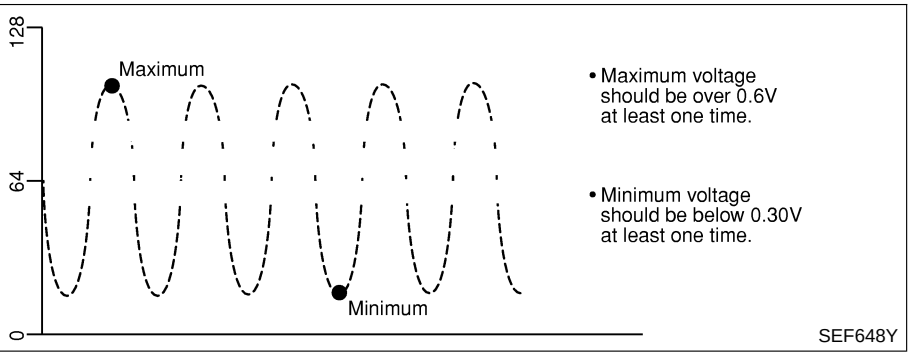
1) Start engine and warm it up to normal operating temperature.
2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT-II, and select "HO2S1" and "HO2S1 MNTR (B1)".
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch "RECORD" on CONSULT-II screen.
5)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

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

CAUTION:

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

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



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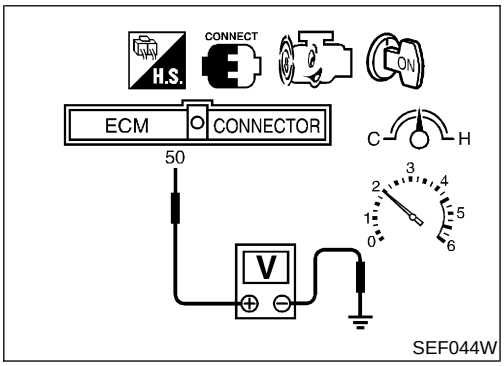


SEF044W

Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five times within 10 seconds.
  1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
  2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

CAUTION:

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

Description

NDEC0427

SYSTEM DESCRIPTION

NDEC0427S01

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

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

OPERATION

NDEC0427S02

Engine speed rpm	Heated oxygen sensor 1 heater (front)
Above 3,200	OFF
Below 3,200	ON

CONSULT-II Reference Value in Data Monitor Mode

NDEC0428

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1)	● Engine speed: Below 3,200 rpm	ON
	● Engine speed: Above 3,200 rpm	OFF

ECM Terminals and Reference Value

NDEC0429

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
119	B	Heated oxygen sensor 1 heater (front)	**[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)

On Board Diagnosis Logic

NDEC0430

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

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

DTC Confirmation Procedure

NDEC0431

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-223.

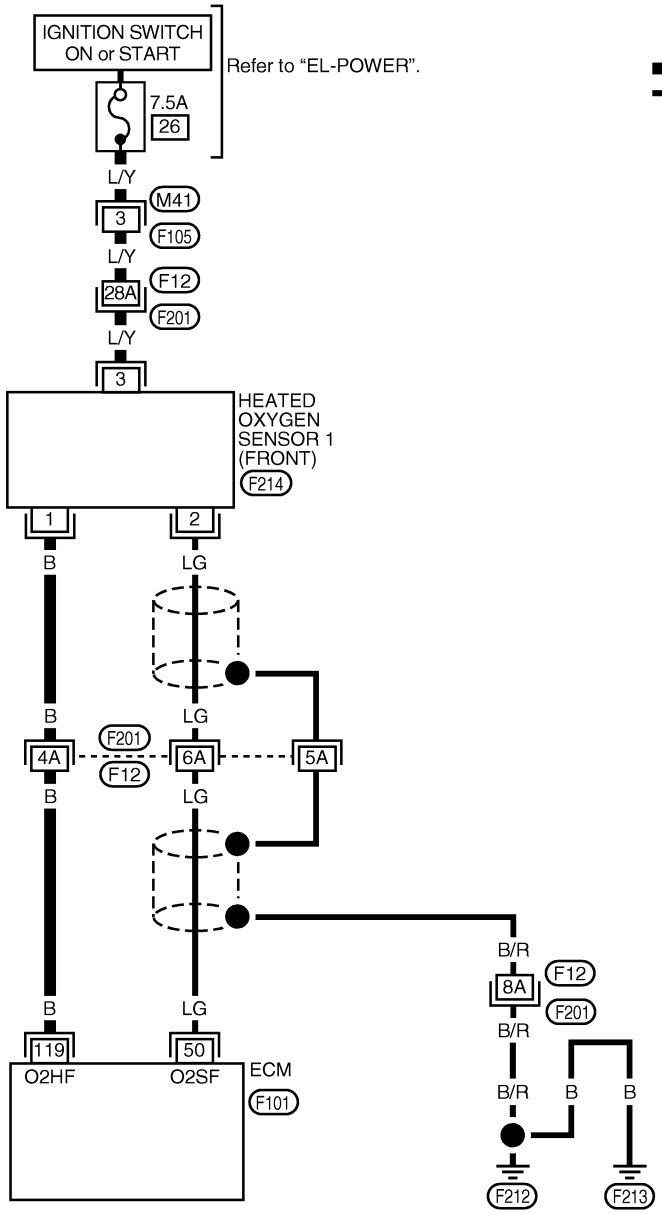
With GST

- Follow the procedure “With CONSULT-II”.

Wiring Diagram

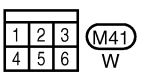
NDEC0432

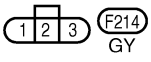
EC-HO2S1H-01

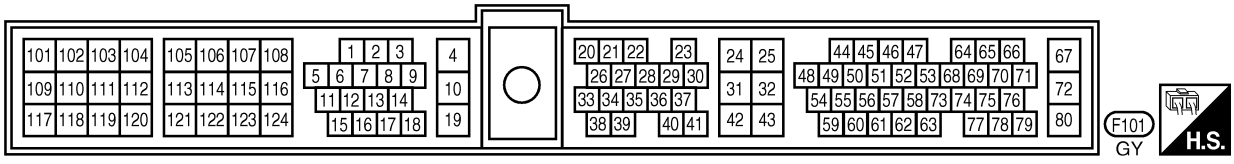


: Detectable line for DTC
: Non-detectable line for DTC

Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)







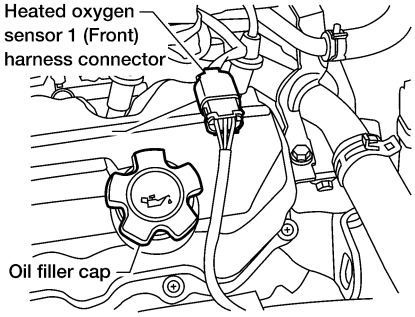
WEC633

Diagnostic Procedure

NDEC0433

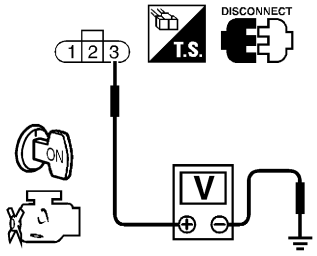
1	CHECK POWER SUPPLY CIRCUIT

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



LEC750

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



SEF696U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

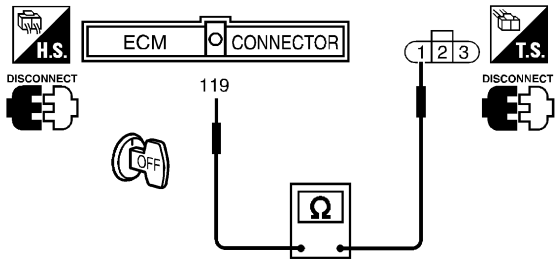
Check the following.
- Harness connectors M41, F104
- Harness connectors F12, F201
- 7.5A fuse
- Harness for open or short between heated oxygen sensor 1 (front) and fuse

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

3	CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S1 terminal 1 and ECM terminal 119.



SEF045W

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 F12, F201
- Harness for open or short between ECM and heated oxygen sensor 1 (front)

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

5	CHECK HEATED OXYGEN SENSOR 1 HEATER (FRONT)

Refer to "Component Inspection", EC-224.

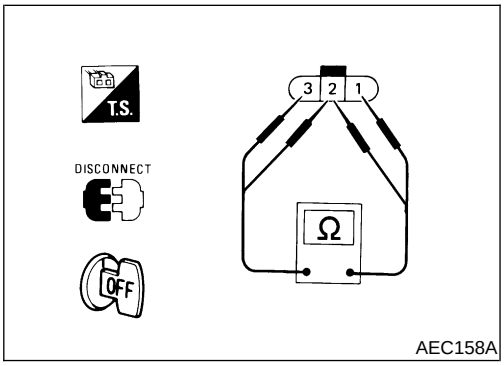
OK or NG

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

6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.

	▶	**INSPECTION END**



AEC158A

Component Inspection

NDEC0434

HEATED OXYGEN SENSOR 1 HEATER (FRONT)

NDEC0434S01

Check resistance between terminals 3 and 1.

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

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

Continuity should not exist.

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

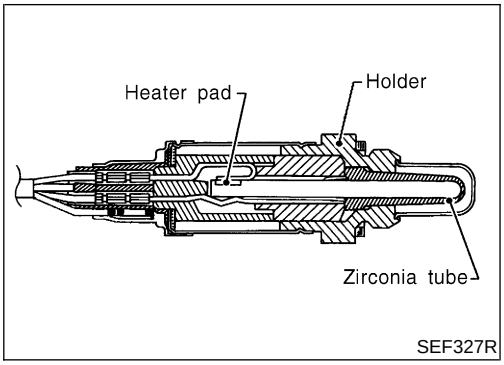
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a**

hard surface such as a concrete floor; use a new one.

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

Component Description



Component Description

NDEC0105

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

CONSULT-II Reference Value in Data Monitor Mode

NDEC0106

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ⟷ RICH

ECM Terminals and Reference Value

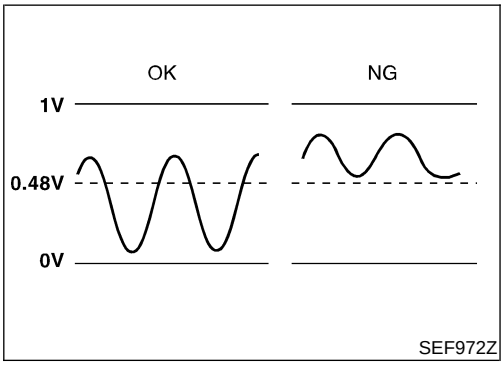
NDEC0107

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	BR	Heated oxygen sensor 2 (rear)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V

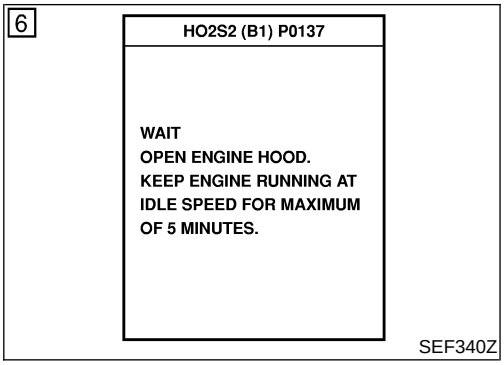


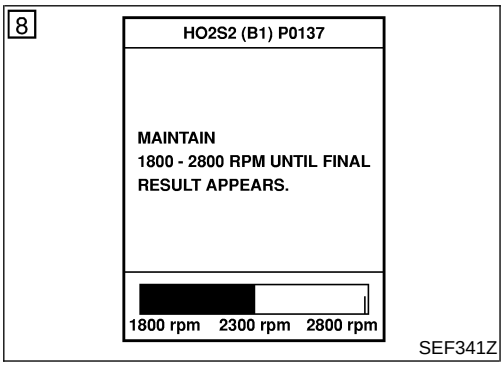
On Board Diagnosis Logic

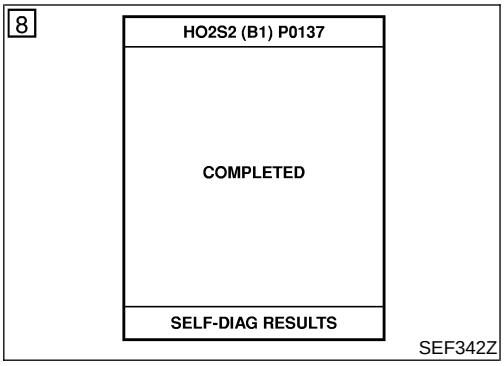
NDEC0108

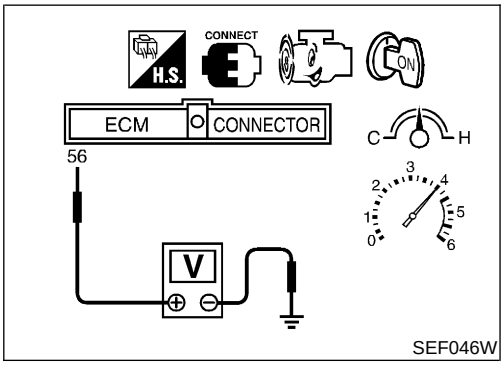
The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether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

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









DTC Confirmation Procedure

NDEC0435

NOTE:

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

TESTING CONDITION:

Open engine hood before conducting following procedure.

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" indicates more than 70°C (158° F).
6) Select "HO2S2 (B1) P0137" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
7) Start engine and follow the instruction of CONSULT-II.
8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
   If NG is displayed, refer to "Diagnostic Procedure", EC-230.
   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).

Overall Function Check

NDEC0109

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed.

CAUTION:

Always drive vehicle at a safe speed.

Without CONSULT-II

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 56 [Heated oxygen sensor 2 (rear) signal] and engine ground.
4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)
   The voltage should be below 0.48V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in "D" position with "OD" OFF.

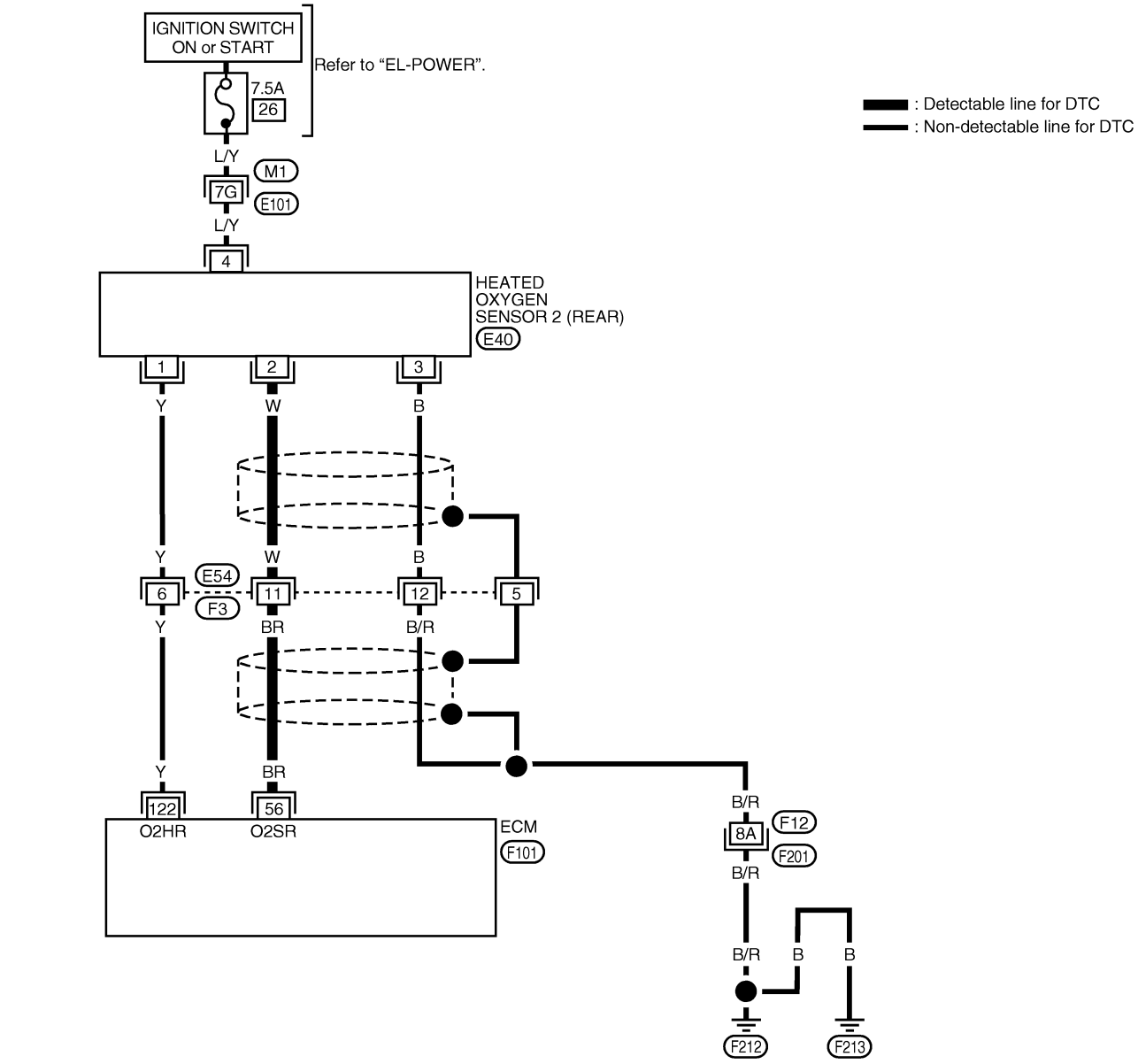
The voltage should be below 0.48V at least once during this procedure.

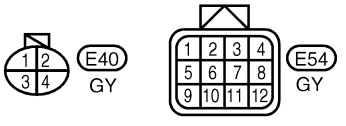
6) If NG, go to "Diagnostic Procedure", EC-230.

Wiring Diagram

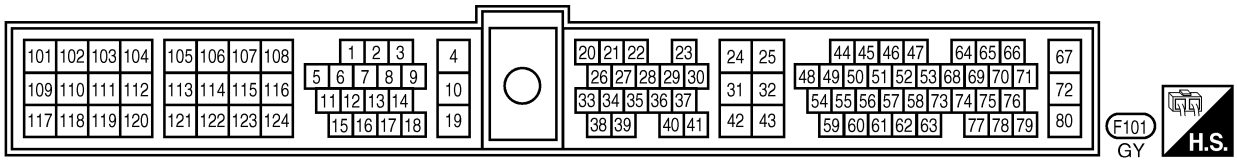
NDEC0110

EC-HO2S2-01





Refer to the following.
M1 , E101 , SUPER MULTIPLE JUNCTION (SMJ)
F12 , F201



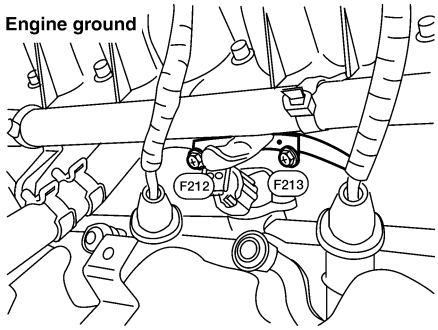
WEC634

Diagnostic Procedure

NDEC0111

1	RETIGHTEN GROUND SCREWS

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



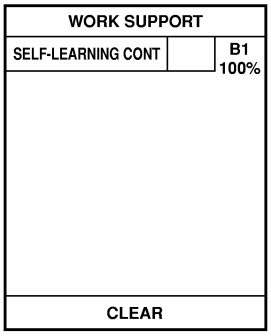
LEC749

	▶	GO TO 2.

2	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

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



SEF215Z

4. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 detected?
Is it difficult to start engine?

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-61.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.

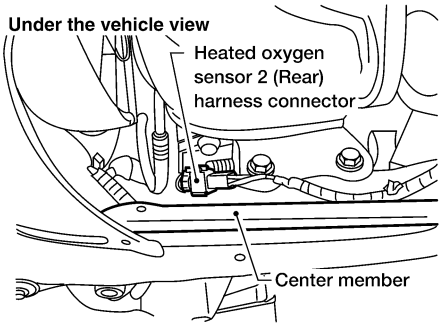
Is the 1st trip DTC P0172 detected?
Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0172, refer to EC-273.
No	▶	GO TO 3.

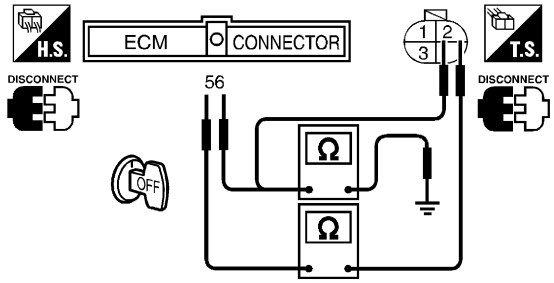
3	CHECK INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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



LEC751

3. Check harness continuity between ECM terminal 56 and HO2S2 terminal 2.



SEF047W

Continuity should exist.

4. Check harness continuity between ECM terminal 56 (or HO2S2 terminal 2) and ground.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

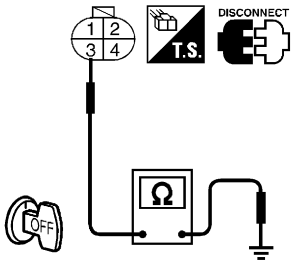
Check the following.
- Harness connectors E54, F3
- Harness for open or short between ECM and heated oxygen sensor 2 (rear)

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

Diagnostic Procedure (Cont'd)

5	CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between terminal 3 and engine ground.



SEF048W

Continuity should exist.

2. 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 E54, F3
- Harness connectors F12, F201
- Harness for open or short between heated oxygen sensor 2 (rear) and engine ground

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

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)

Refer to "Component Inspection", EC-233.

OK or NG

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

8	CHECK SHIELD CIRCUIT

1. Disconnect harness connectors E54, F3.
2. Check harness continuity between harness connector F3 and engine ground.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E54, F3
- Harness connectors F12, F201
- Harness for open or short between harness connector F3 and engine ground

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

10	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.	
▶	**INSPECTION END**

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

SEF662Y

Component Inspection

NDEC0436

HEATED OXYGEN SENSOR 2 (REAR)

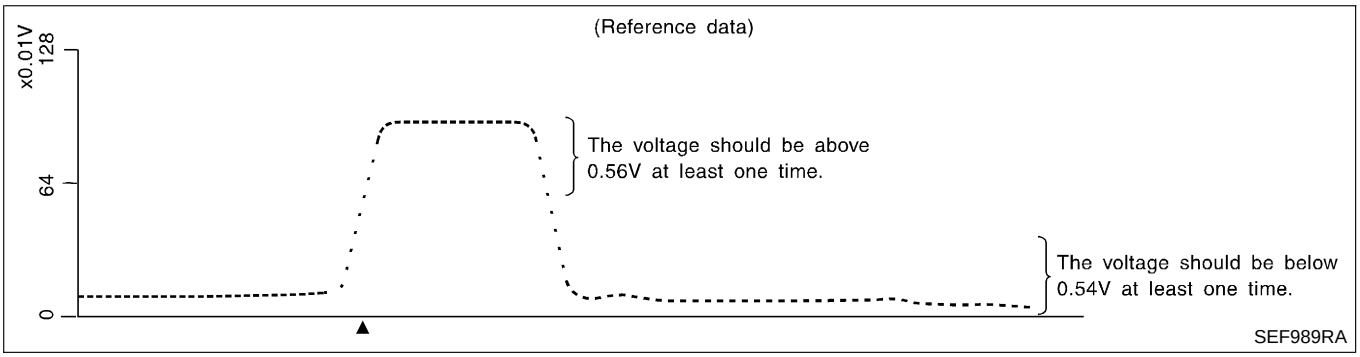
NDEC0436S01

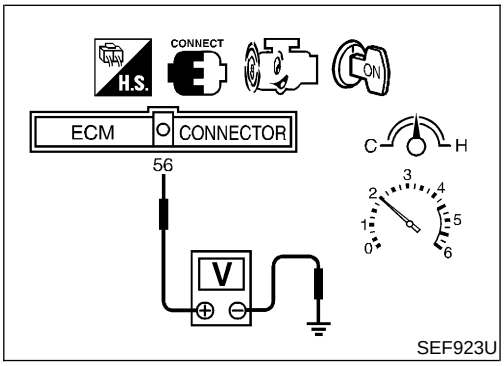
With CONSULT-II

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.
4) Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to ±25%.
   "HO2S2 (B1)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%.
   "HO2S2 (B1)" should be below 0.54V at least once when the "FUEL INJECTION" is −25%.

CAUTION:

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





Without CONSULT-II

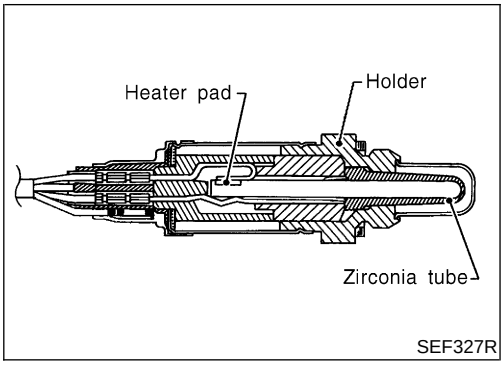
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 56 [Heated oxygen sensor 2 (rear) signal] engine ground.
4) Check the voltage when racing up to 4,000 rpm under no load 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 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 "D" position with "OD" OFF.
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.**



Component Description

NDEC0437

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

CONSULT-II Reference Value in Data Monitor Mode

NDEC0438

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ⟷ RICH

ECM Terminals and Reference Value

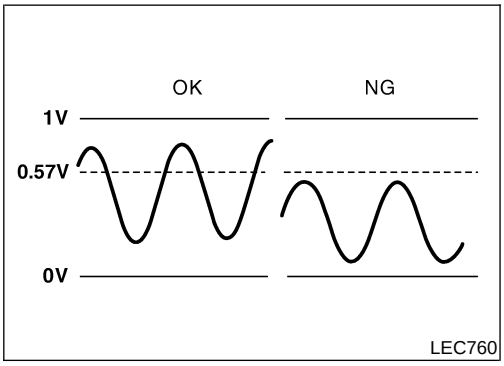
NDEC0439

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	BR	Heated oxygen sensor 2 (rear)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V

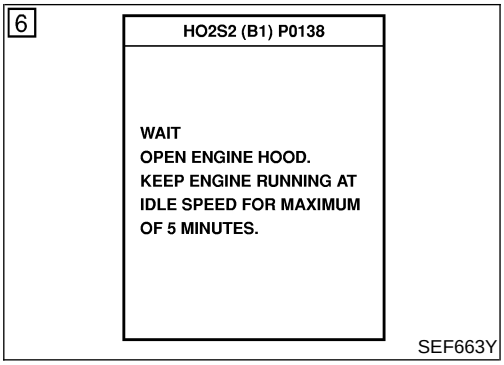


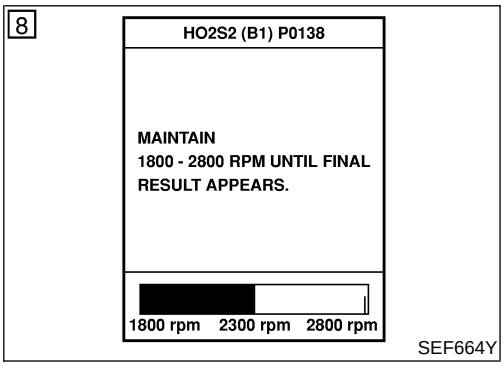
On Board Diagnosis Logic

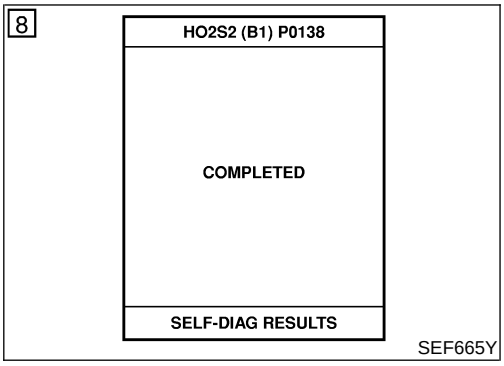
NDEC0440

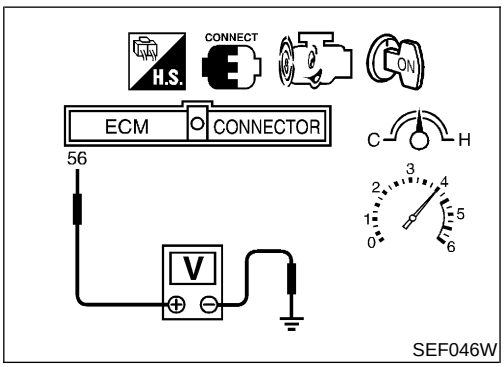
The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether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

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









DTC Confirmation Procedure

NDEC0441

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:

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” indicates more than 70°C (158°F).
6) Select “HO2S2 (B1) P0138” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.
7) Start engine and follow the 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-239.
   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).

Overall Function Check

NDEC0442

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed.

CAUTION:

Always drive vehicle at a safe speed.

Without CONSULT-II

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 56 [Heated oxygen sensor 2 (rear) 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 0.57V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in “D” position with “OD” OFF.

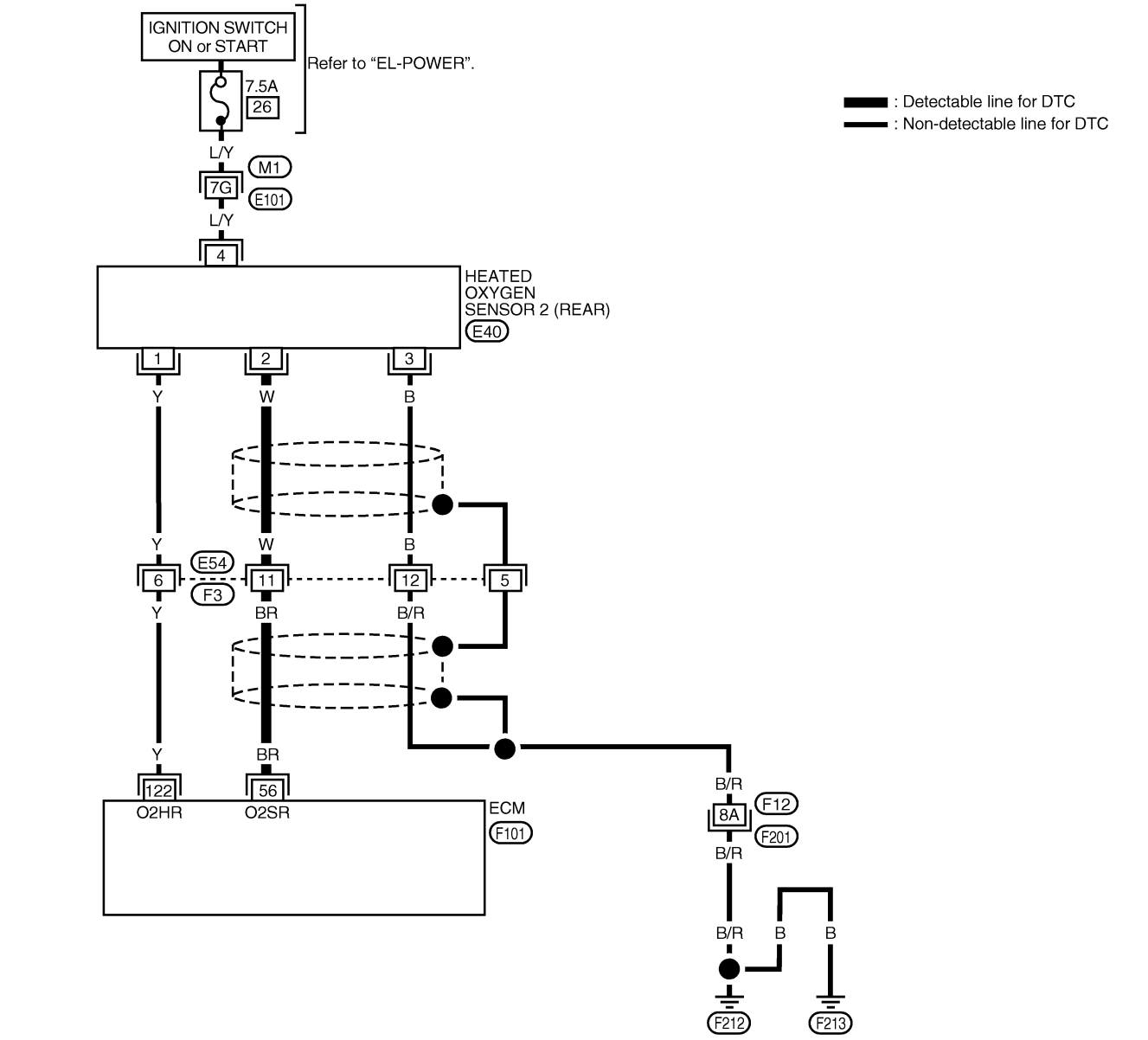
The voltage should be above 0.57V at least once during this procedure.

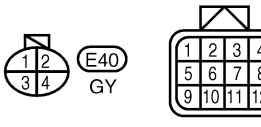
6) If NG, go to "Diagnostic Procedure", EC-239.

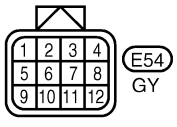
Wiring Diagram

NDEC0443

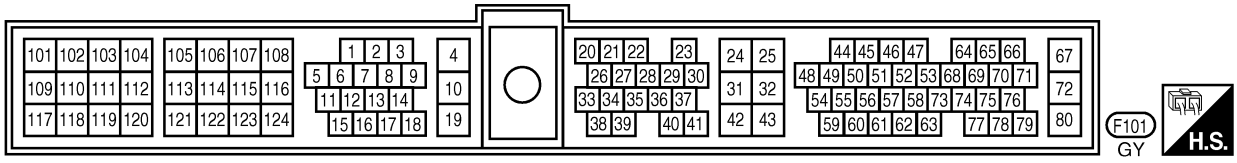
EC-HO2S2-01







Refer to the following.
M1 , E101 , SUPER MULTIPLE JUNCTION (SMJ)
F12 , F201



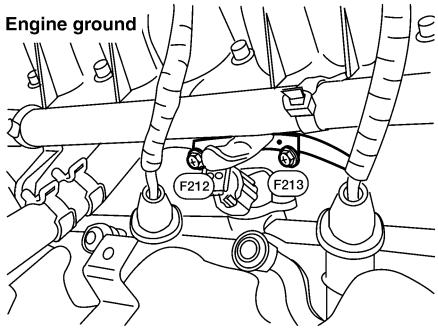
WEC634

Diagnostic Procedure

NDEC0444

1	RETIGHTEN GROUND SCREWS

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



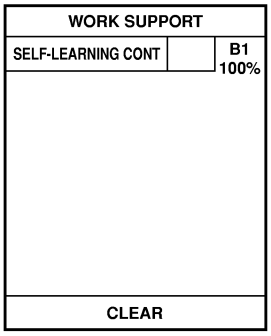
LEC749

▶	GO TO 2.

2	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

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



SEF215Z

4. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 detected?
Is it difficult to start engine?

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-61.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 detected?
Is it difficult to start engine?

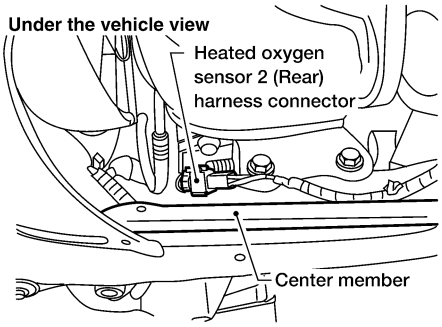
Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171, refer to EC-265.
No	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

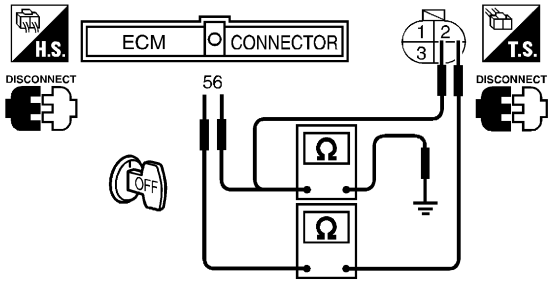
3	CHECK INPUT SIGNAL CIRCUIT

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



LEC751

3. Check harness continuity between ECM terminal 56 and HO2S2 terminal 2.



SEF047W

Continuity should exist.

4. Check harness continuity between ECM terminal 56 (or HO2S2 terminal 2) and ground.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

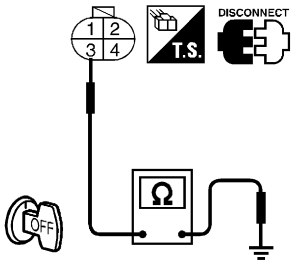
4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E54, F3
- Harness for open or short between ECM and heated oxygen sensor 2 (rear)

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

5	CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S2 terminal 3 and engine ground.



SEF048W

Continuity should exist.

2. Also check harness for short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUCTIONING PART

Check the following.
- Harness connectors E54, F3
- Harness connectors F12, F201
- Harness for open or short between heated oxygen sensor 2 (rear) and engine ground

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

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)

Refer to "Component Inspection", EC-242.

OK or NG

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

8	CHECK SHIELD CIRCUIT

1. Disconnect harness connectors E54, F3.
2. Check harness continuity between harness connector F3 and engine ground.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

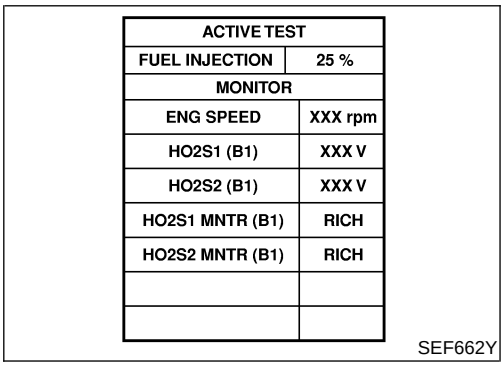
9	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E54, F3
- Harness connectors F12, F201
- Harness for open or short between harness connector F3 and engine ground

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

Diagnostic Procedure (Cont'd)

10	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.	
▶	**INSPECTION END**



Component Inspection

NDEC0445

HEATED OXYGEN SENSOR 2 (REAR)

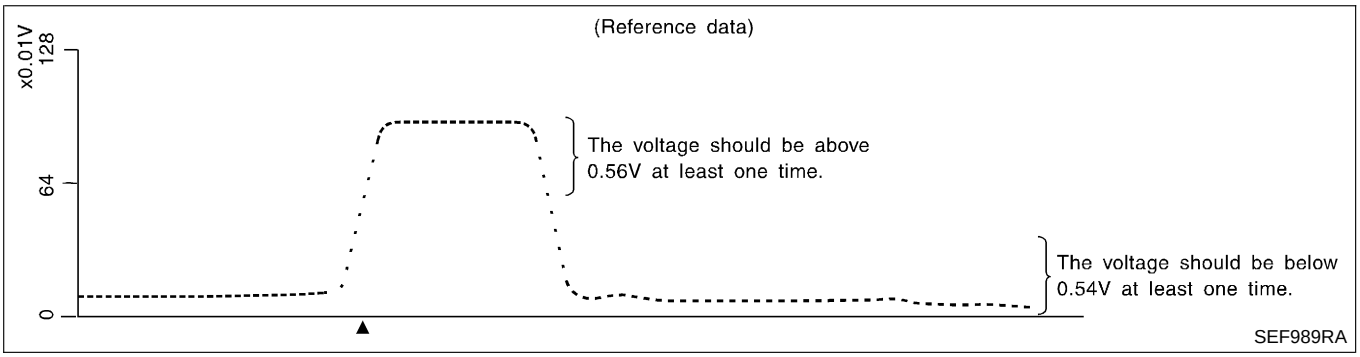
NDEC0445S01

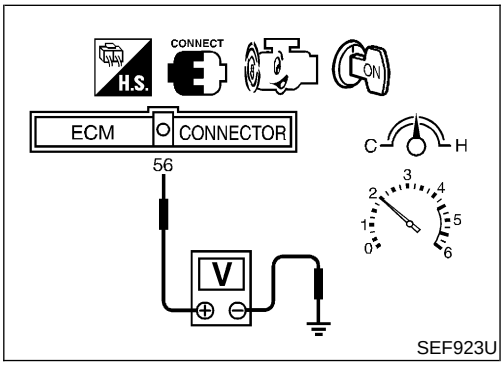
With CONSULT-II

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.
4) Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to ±25%.
   "HO2S2 (B1)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%.
   "HO2S2 (B1)" should be below 0.54V at least once when the "FUEL INJECTION" is −25%.

CAUTION:

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





Without CONSULT-II

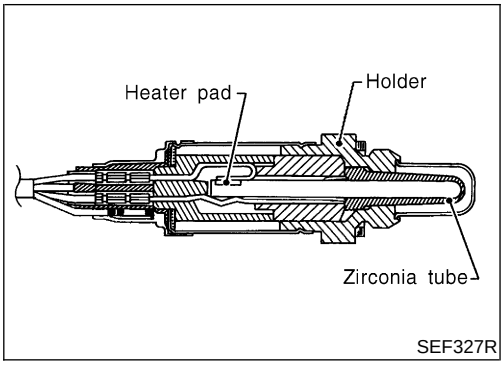
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 56 [Heated oxygen sensor 2 (rear) signal] and engine ground.
4) Check the voltage when racing up to 4,000 rpm under no 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 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 "D" position with "OD" OFF.
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.**



Component Description

NDEC0446

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

CONSULT-II Reference Value in Data Monitor Mode

NDEC0447

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ⟷ RICH

ECM Terminals and Reference Value

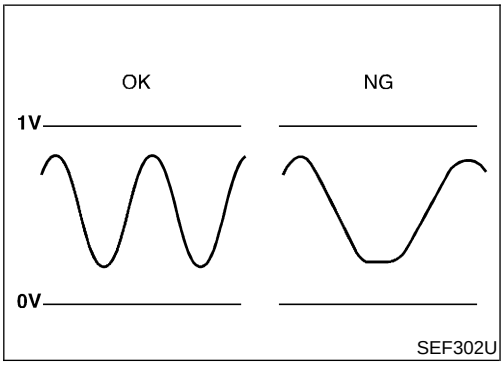
NDEC0448

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	BR	Heated oxygen sensor 2 (rear)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V

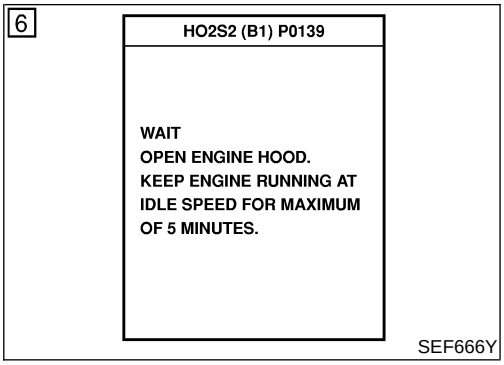


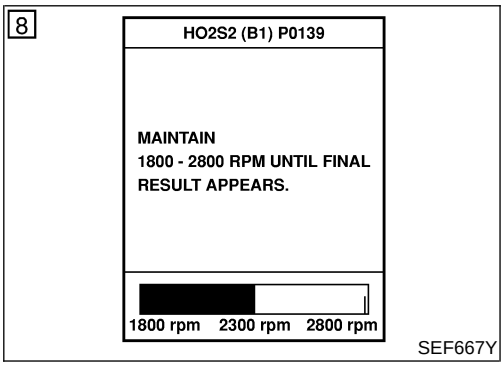
On Board Diagnosis Logic

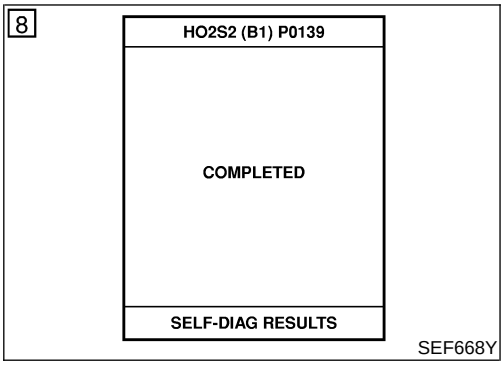
NDEC0449

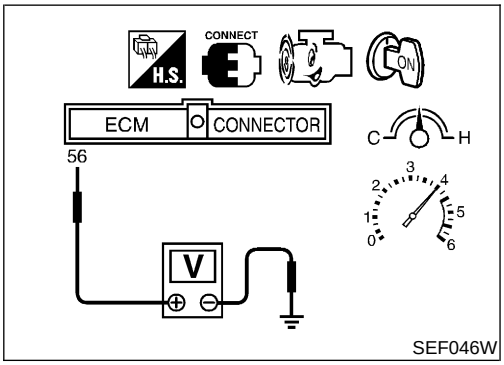
The heated oxygen sensor 2 (rear) has a much longer switching time between rich and lean than the heated oxygen sensor 1 (front). The oxygen storage capacity before the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2 (rear), ECM monitors whether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

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









DTC Confirmation Procedure

NDEC0450

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:
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" indicates more than 70°C (158°F).
6) Select "HO2S2 (B1) P0139" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
7) Start engine and follow the instruction of CONSULT-II.
8) Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
   If NG is displayed, refer to "Diagnostic Procedure", EC-247.
   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).

Overall Function Check

NDEC0451

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed.

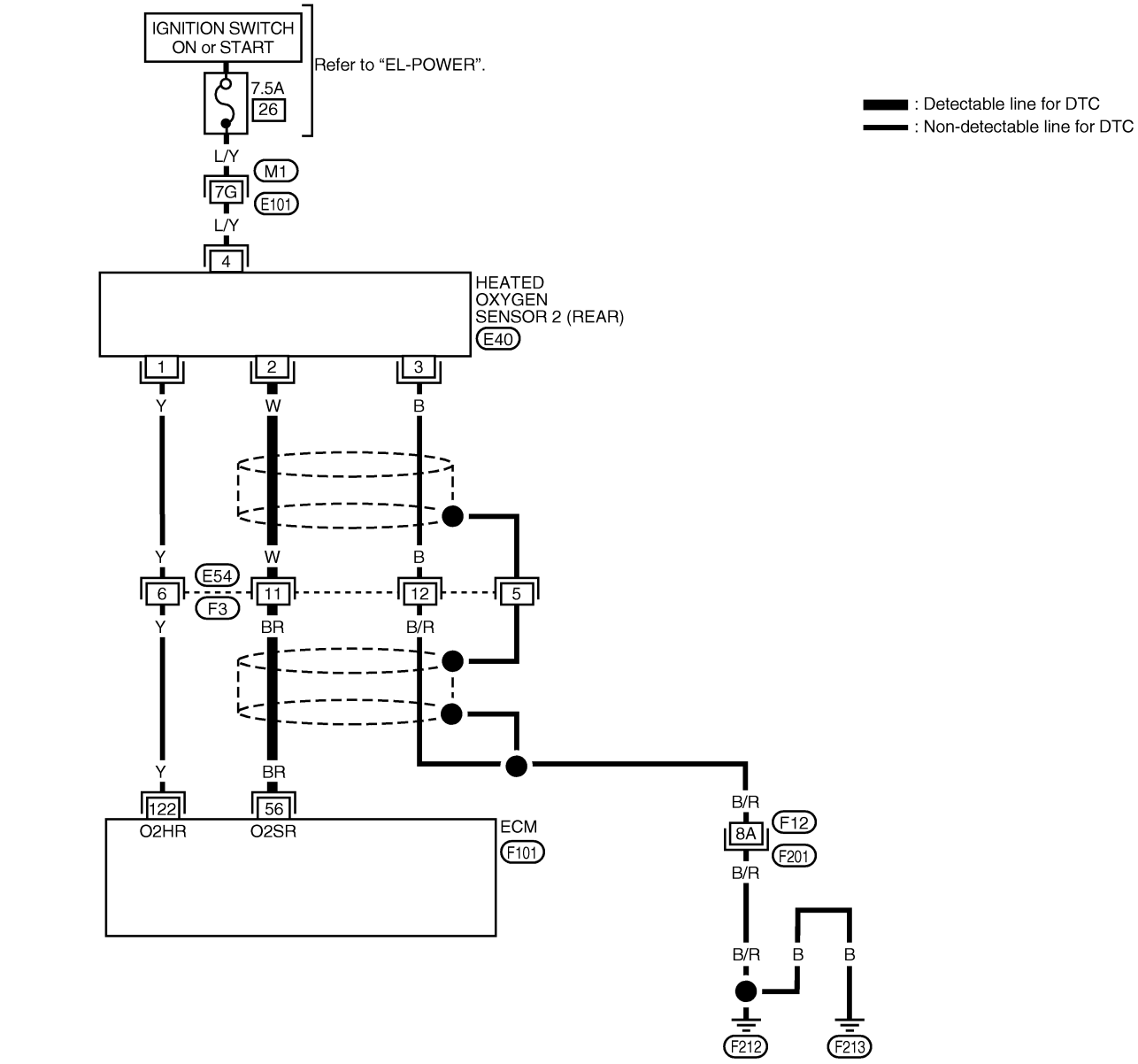
Without CONSULT-II

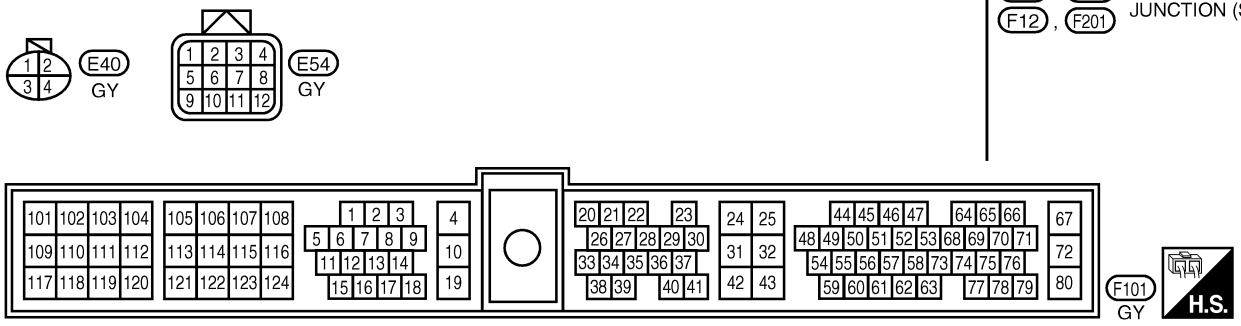
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 56 [Heated oxygen sensor 2 (rear) signal] and engine ground.
4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)
   The voltage should change at more than 0.06V for 1 second during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
5) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in "D" position with "OD" OFF.
   The voltage should change at more than 0.06V for 1 second during this procedure.
6) If NG, go to "Diagnostic Procedure", EC-247.

Wiring Diagram

NDEC0452

EC-HO2S2-01





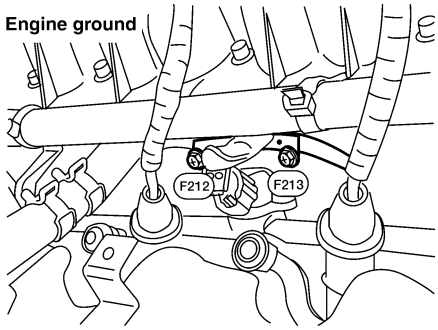
WEC634

Diagnostic Procedure

NDEC0453

1	RETIGHTEN GROUND SCREWS

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



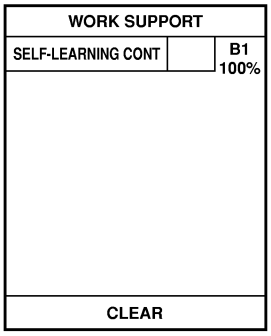
LEC749

▶	GO TO 2.

2	CLEAR THE SELF-LEARNING DATA

With CONSULT-II

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



SEF215Z

4. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 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 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure 1st trip DTC P0100 is displayed.
6. Erase the 1st trip DTC memory. Refer to “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”, EC-61.
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.

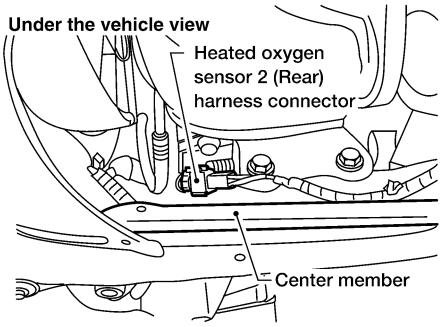
Is the 1st trip DTC P0171 or P0172 detected?
Is it difficult to start engine?

Yes or No

Yes	▶	Perform trouble diagnosis for DTC P0171 or P0172, refer to EC-265, 273.
No	▶	GO TO 3.

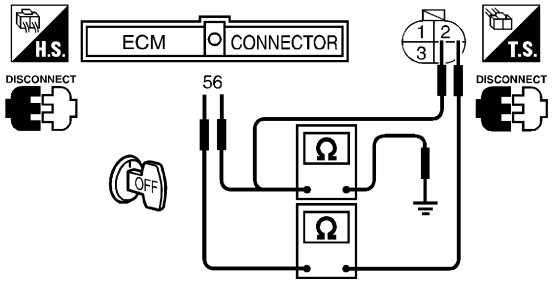
3	CHECK INPUT SIGNAL CIRCUIT

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



LEC751

3. Check harness continuity between ECM terminal 56 and HO2S2 terminal 2.



SEF047W

Continuity should exist.

4. Check harness continuity between ECM terminal 56 (or HO2S2 terminal 2) and ground.
Continuity should not exist.
5. Also check harness for short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

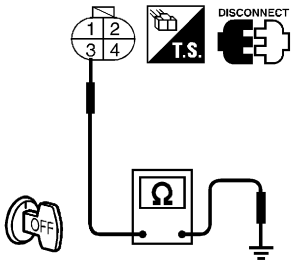
4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E54, F3
- Harness for open or short between ECM and heated oxygen sensor 2 (rear)

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

5	CHECK GROUND CIRCUIT

1. Check harness continuity between HO2S2 terminal 3 and engine ground.



SEF048W

Continuity should exist.

2. Also check harness for short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E54, F3
- Harness connectors F12, F201
- Harness for open or short between heated oxygen sensor 2 (rear) and engine ground

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

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)

Refer to "Component Inspection", EC-250.

OK or NG

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

8	CHECK SHIELD CIRCUIT

1. Disconnect harness connectors E54, F3.
2. Check harness continuity between harness connector F3 and engine ground.
   Continuity should exist.
3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E54, F3
- Harness connectors F12, F201
- Harness for open or short between harness connector F3 and engine ground

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

10	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.	
▶	**INSPECTION END**

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

SEF662Y

Component Inspection

NDEC0454

HEATED OXYGEN SENSOR 2 (REAR)

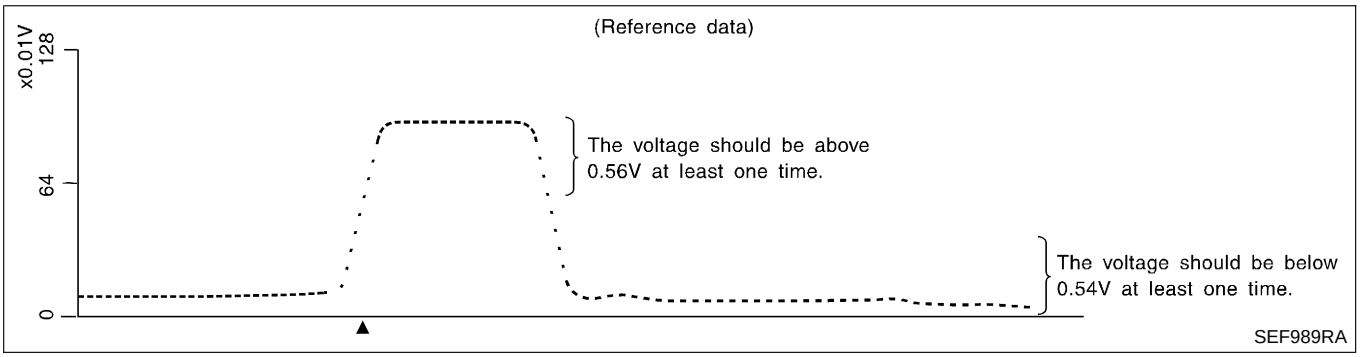
NDEC0454S01

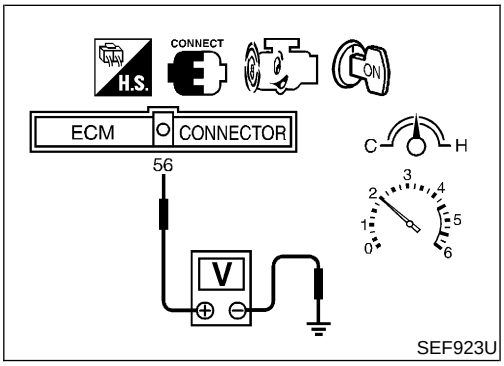
With CONSULT-II

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.
4) Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to ±25%.
   "HO2S2 (B1)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%.
   "HO2S2 (B1)" should be below 0.54V at least once when the "FUEL INJECTION" is −25%.

CAUTION:

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





Without CONSULT-II

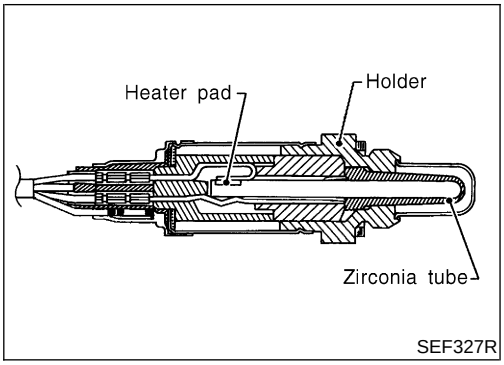
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 56 [Heated oxygen sensor 2 (rear) signal] and engine ground.
4) Check the voltage when racing up to 4,000 rpm under no 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 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 "D" position with "OD" OFF.
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.**



Component Description

NDEC0455

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

CONSULT-II Reference Value in Data Monitor Mode

NDEC0456

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up	Revving engine from idle up to 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ⟷ RICH

ECM Terminals and Reference Value

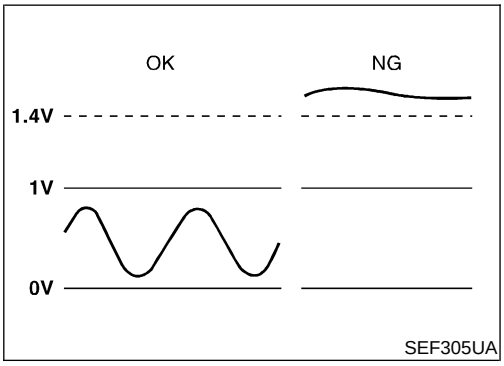
NDEC0457

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	BR	Heated oxygen sensor 2 (rear)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 2,000 rpm	0 - Approximately 1.0V

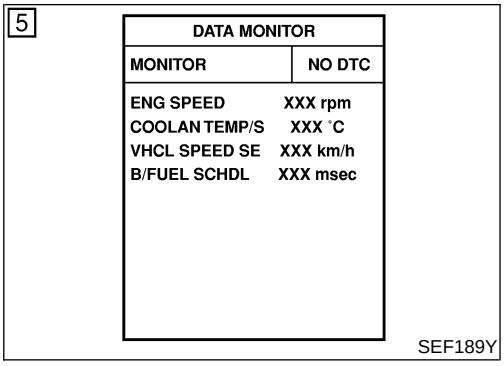


On Board Diagnosis Logic

NDEC0458

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

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0140	● An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2 (rear)



DTC Confirmation Procedure

NDEC0459

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

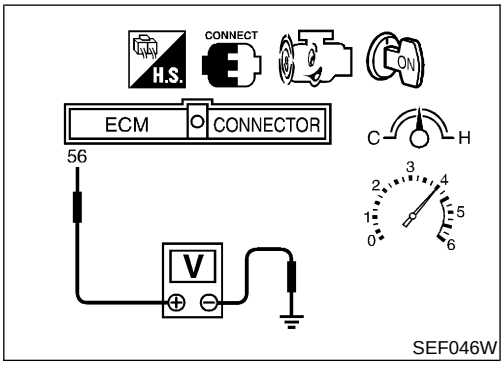
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

With CONSULT-II

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
3) Stop vehicle with engine running.
4) Let engine idle for 1 minute.
5) Maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	Less than 3,200 rpm
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-255.



Overall Function Check

NDEC0460

Use this procedure to check the overall function of the heated oxygen sensor 2 (rear) circuit. During this check, a 1st trip DTC might not be confirmed.

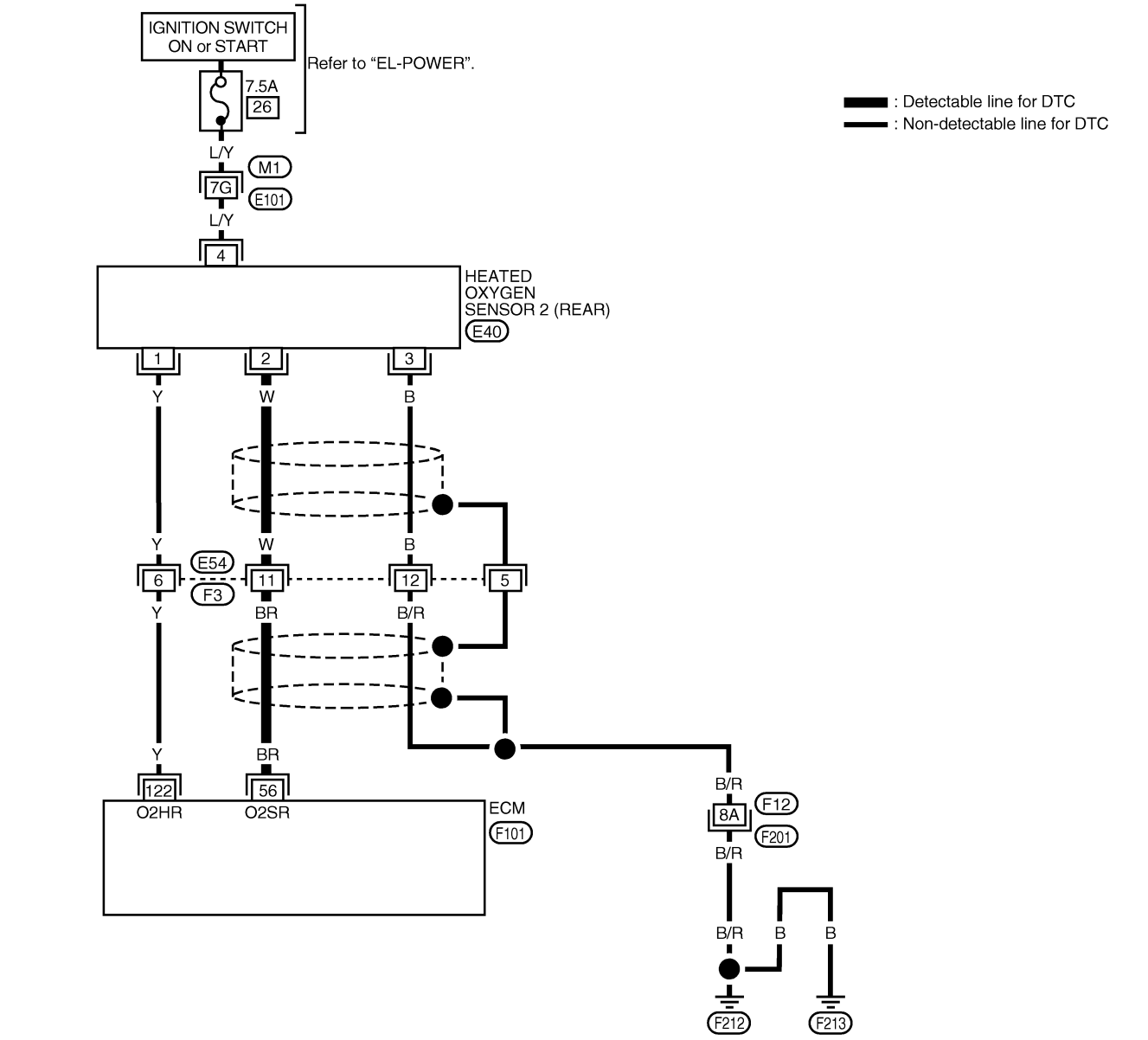
Without CONSULT-II

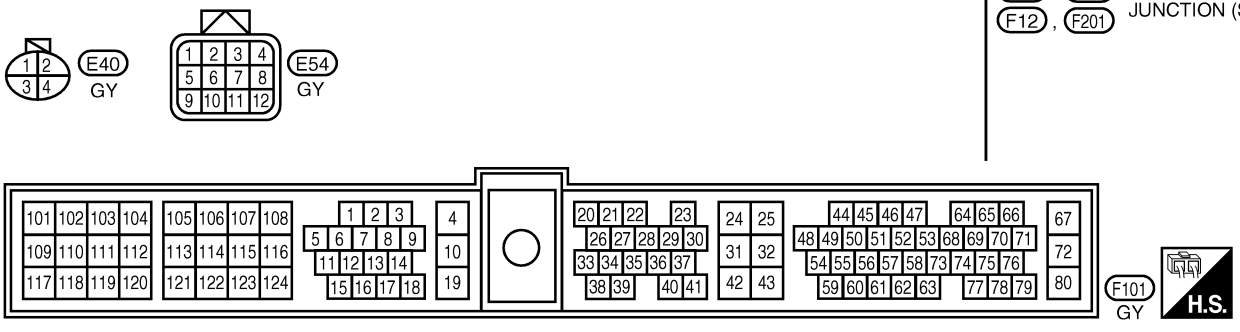
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 56 [Heated oxygen sensor 2 (rear) signal] and engine ground.
4) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)
   The voltage should be below 1.4V during this procedure.
5) If NG, go to "Diagnostic Procedure", EC-255.

Wiring Diagram

NDEC0461

EC-HO2S2-01





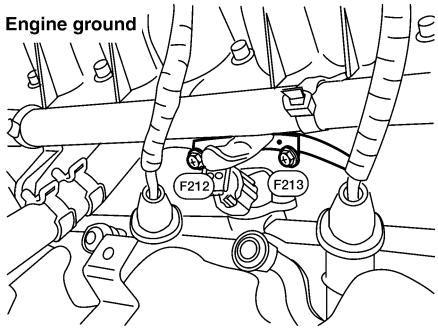
WEC634

Diagnostic Procedure

NDEC0462

1	RETIGHTEN GROUND SCREWS

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

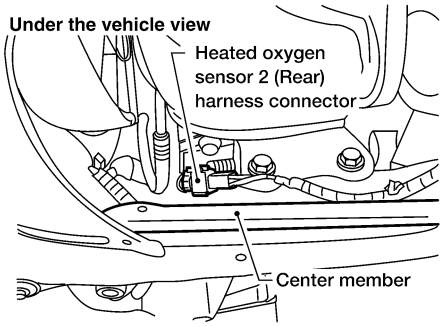


LEC749

	▶	GO TO 2.

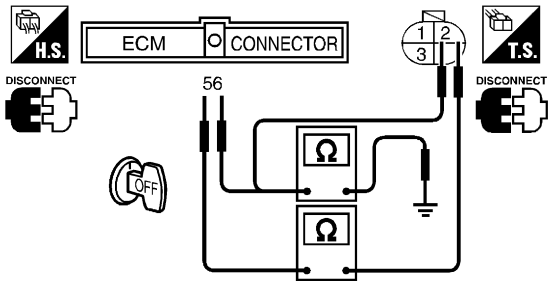
2	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect heated oxygen sensor 2 (rear) harness connector and ECM harness connector.



LEC751

2. Check harness continuity between ECM terminal 56 and HO2S2 terminal 2.



SEF047W

Continuity should exist.

3. Check harness continuity between ECM terminal 56 (or HO2S2 terminal 2) and ground.

Continuity should not exist.

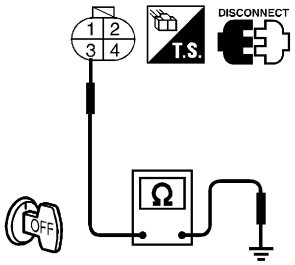
4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E54, F3 ● Harness for open or short between ECM and heated oxygen sensor 2 (rear)	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

4	CHECK GROUND CIRCUIT
1. Check harness continuity between HO2S2 terminal 3 and engine ground.  SEF048W **Continuity should exist.** 2. Also check harness for short to power.	
OK or NG	
OK ▶	GO TO 6.
NG ▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E54, F3 ● Harness connectors F12, F201 ● Harness for open or short between heated oxygen sensor 2 (rear) and engine ground	
▶	Repair open circuit or short to power in harness or connectors.

6	CHECK CONNECTORS FOR WATER
Check heated oxygen sensor 2 (rear) connector and harness connector for water. **Water should not exist.**	
OK or NG	
OK ▶	GO TO 7.
NG ▶	Repair or replace harness or connectors.

7	CHECK HEATED OXYGEN SENSOR 2 (REAR)
Refer to "Component Inspection", EC-257.	
OK or NG	
OK ▶	GO TO 8.
NG ▶	Replace heated oxygen sensor 2 (rear).

8	CHECK SHIELD CIRCUIT
1. Disconnect harness connectors E54, F3. 2. Check harness continuity between harness connector F3 and engine ground. **Continuity should exist.** 3. Also check harness for short to power. **OK or NG**	
OK ▶	GO TO 10.
NG ▶	GO TO 9.

9	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors E54, F3 ● Harness connectors F12, F201 ● Harness for open or short between harness connector F3 and engine ground	
▶	Repair open circuit or short to power in harness or connectors.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.	
▶	**INSPECTION END**

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

SEF662Y

Component Inspection

NDEC0463

HEATED OXYGEN SENSOR 2 (REAR)

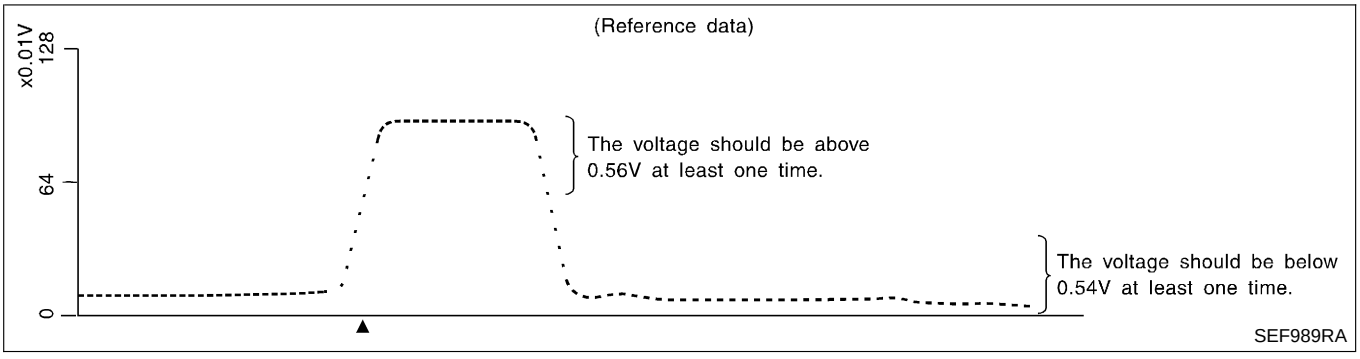
NDEC0463S01

With CONSULT-II

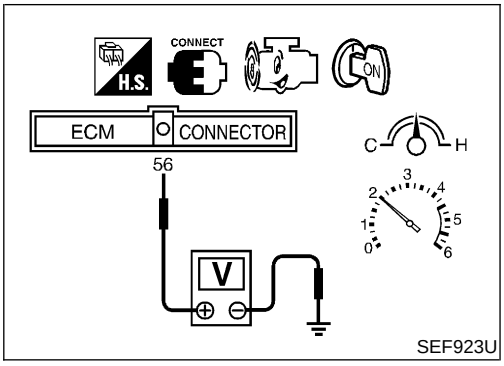
1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)" as the monitor item with CONSULT-II.
4) Check "HO2S2 (B1)" at idle speed when adjusting "FUEL INJECTION" to ±25%.
"HO2S2 (B1)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%.
"HO2S2 (B1)" should be below 0.54V at least once when the "FUEL INJECTION" is −25%.

CAUTION:

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



Component Inspection (Cont'd)



Without CONSULT-II

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeter probes between ECM terminal 56 [Heated oxygen sensor 2 (rear) 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 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 "D" position with "OD" OFF.
   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.**

Description

NDEC0112

SYSTEM DESCRIPTION

NDEC0112S01

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

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

OPERATION

NDEC0112S02

Engine speed rpm	Heated oxygen sensor 2 heater (rear)
Above 3,200	OFF
Below 3,200	ON

CONSULT-II Reference Value in Data Monitor Mode

NDEC0113

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1)	● Ignition switch: ON (Engine is not running) ● Engine is running at above 3,200 rpm	OFF
	● Engine is running at 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

NDEC0114

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

CAUTION:

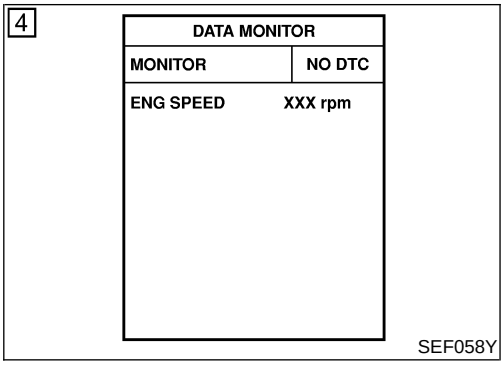
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
122	Y	Heated oxygen sensor 2 heater (rear)	**[Ignition switch "ON"]** ● Engine is not running **[Engine is running]** ● Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is below 3,200 rpm ● After driving for 2 consecutive minutes at a speed of 70 km/h (43 MPH) or more	Approximately 0.4V

On Board Diagnosis Logic

NDEC0115

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



DTC Confirmation Procedure

NDEC0116

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-262.

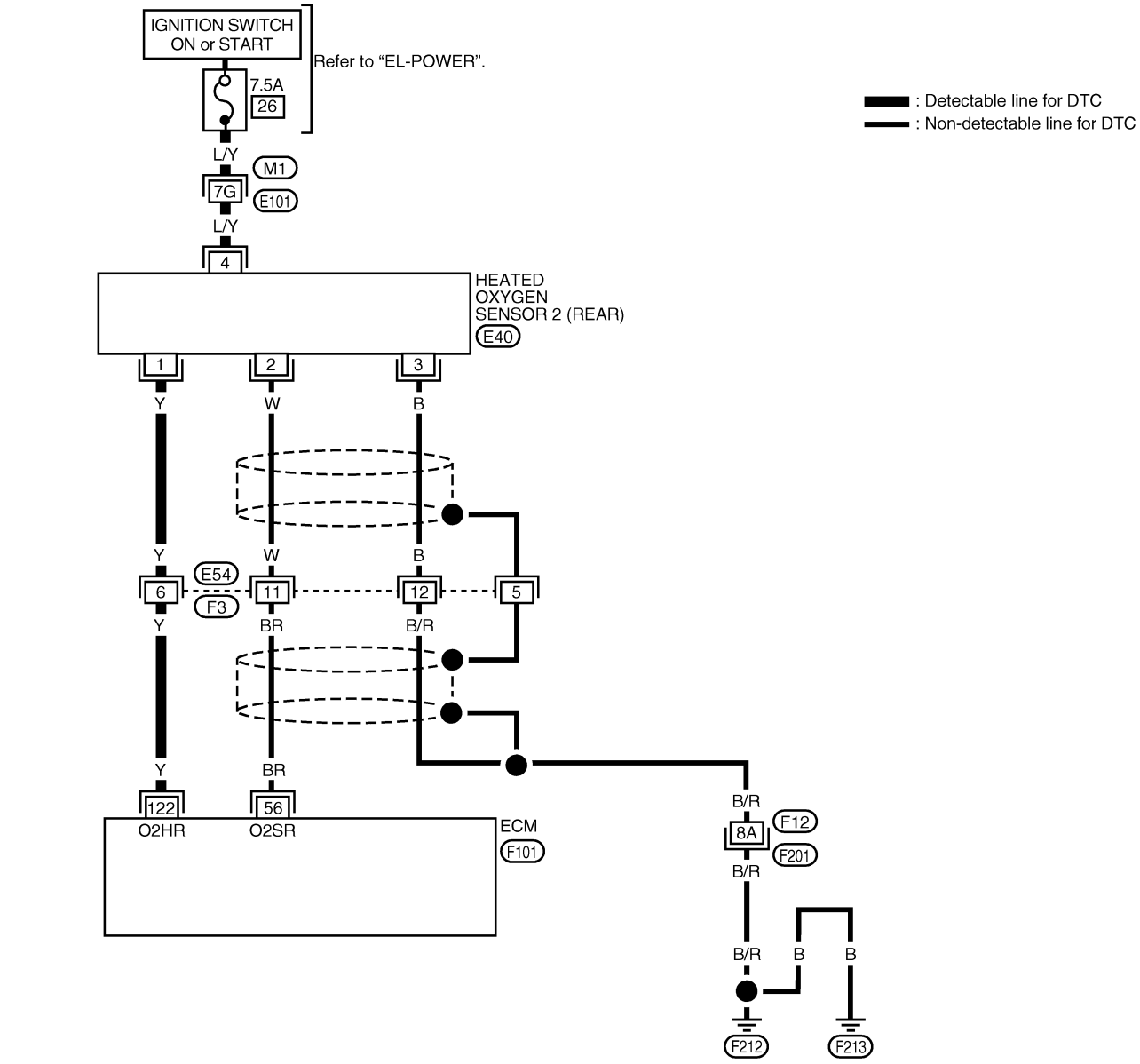
With GST

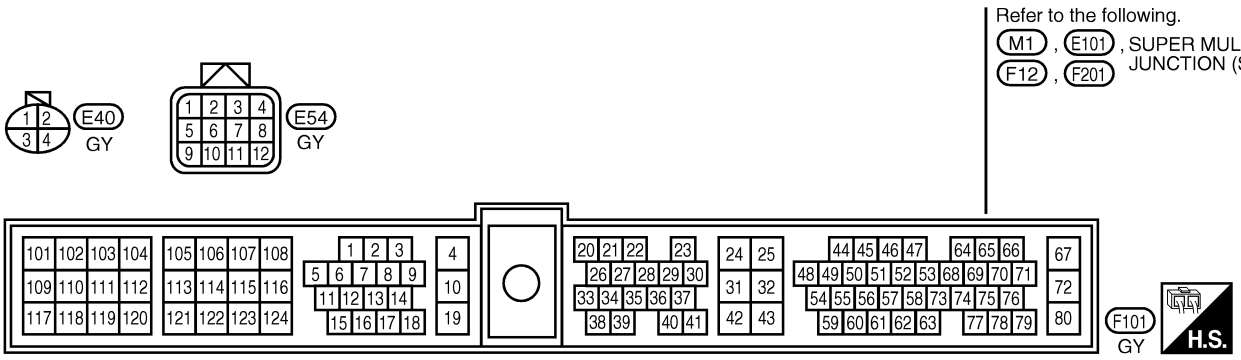
- Follow the procedure “With CONSULT-II”.

Wiring Diagram

NDEC0117

EC-HO2S2H-01





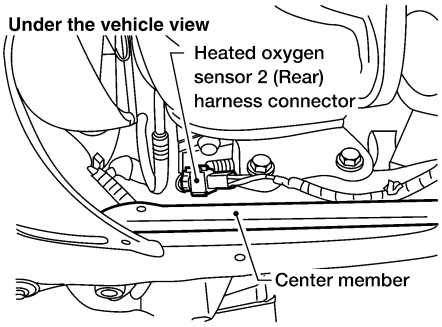
WEC635

Diagnostic Procedure

NDEC0118

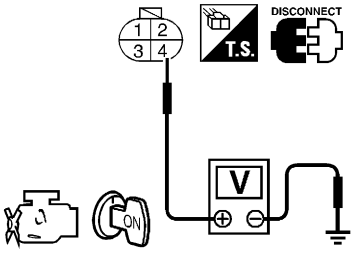
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect heated oxygen sensor 2 (rear) harness connector.



LEC751

3. Turn ignition switch “ON”.
4. Check voltage between HO2S2 terminal 4 and ground.



SEF049W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

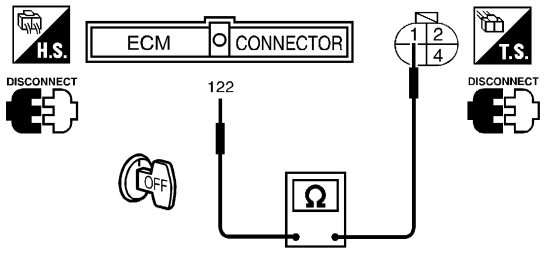
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M1, E101
- 7.5A fuse
- Harness for open or short between heated oxygen sensor 2 (rear) and fuse

	▶	Repair harness or connectors.

3	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 122 and HO2S2 terminal 1.



SEF050W

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 E54, F3
- Harness for open or short between ECM and heated oxygen sensor 2 (rear)

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

5	CHECK HEATED OXYGEN SENSOR 2 HEATER (REAR)

Refer to "COMPONENT INSPECTION", EC-264.

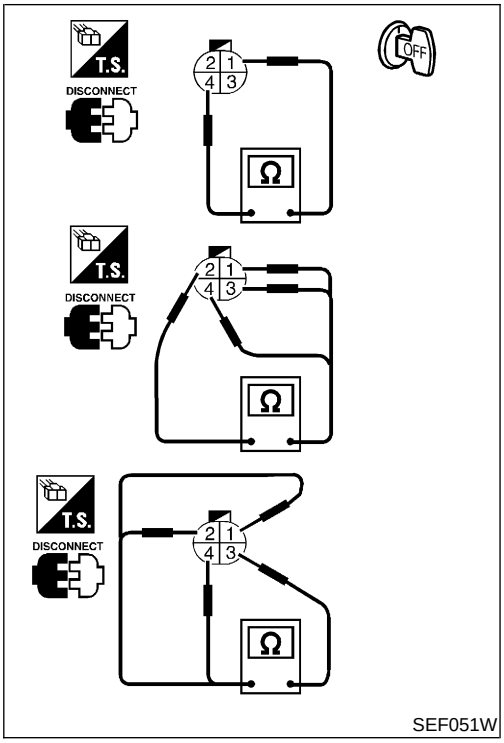
OK or NG

OK	▶	GO TO 6.
NG	▶	Replace heated oxygen sensor 2 (rear).

6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.

	▶	**INSPECTION END**



Component Inspection

NDEC0119

HEATED OXYGEN SENSOR 2 HEATER (REAR)

NDEC0119S01

Check the following.

1. Check resistance between terminals 4 and 1.

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

2. Check continuity.

Terminal No.	Continuity
2 and 1, 3, 4	No
3 and 1, 2, 4	

If NG, replace the heated oxygen sensor 2 (rear).

CAUTION:

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

On Board Diagnosis Logic

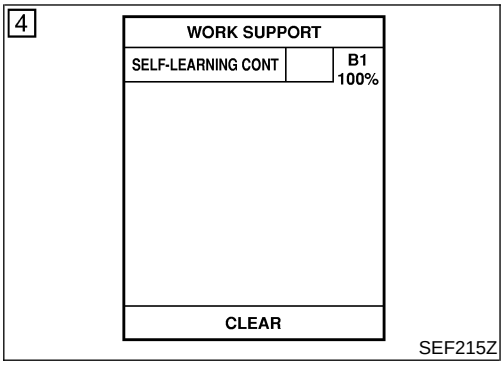
NDEC0150

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

In case the amount of the compensation value is extremely large (the actual mixture ratio is too lean), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

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



DTC Confirmation Procedure

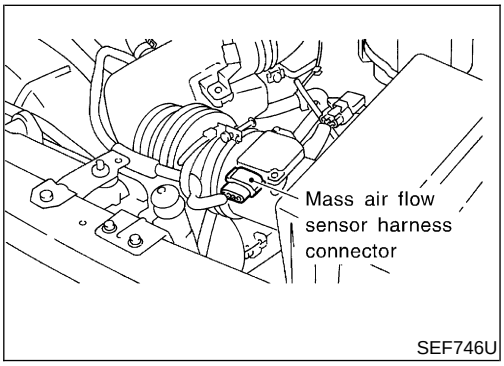
NDEC0151

NOTE:

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

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "SELF-LEARN CONTROL" in "WORK SUPPORT" mode with CONSULT-II.
4) Clear the self-learning control coefficient by touching "CLEAR".
5) Select "DATA MONITOR" mode with CONSULT-II.
6) Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-268.
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-268. If engine does not start, check exhaust and intake air leak visually.



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 5 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Select "MODE 7" with GST. Make sure 1st trip DTC P0100 is detected.
6) Select "MODE 4" with GST and erase the 1st trip DTC P0100.
7) Start engine again and let it idle for at least 10 minutes.

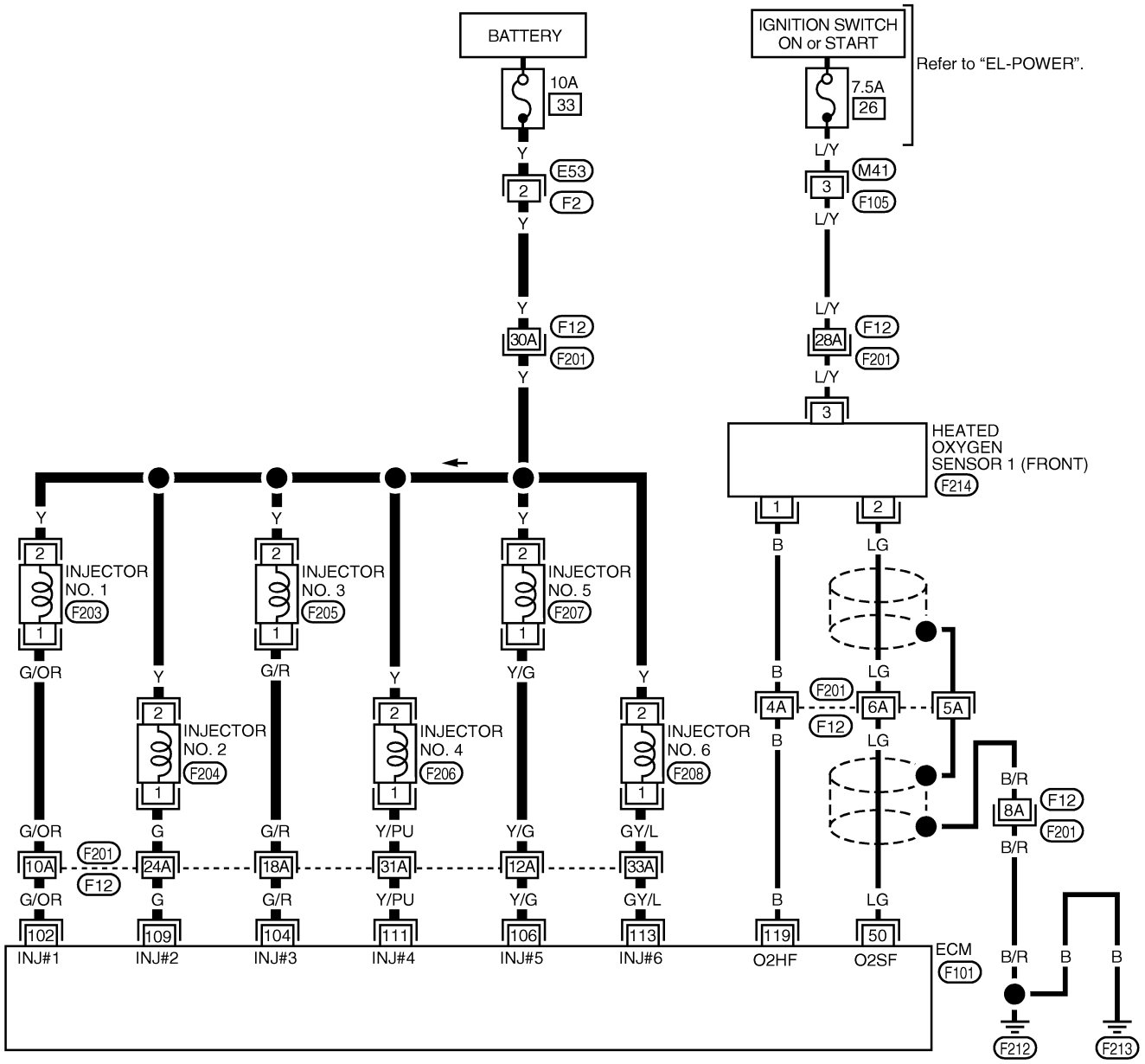
DTC Confirmation Procedure (Cont'd)

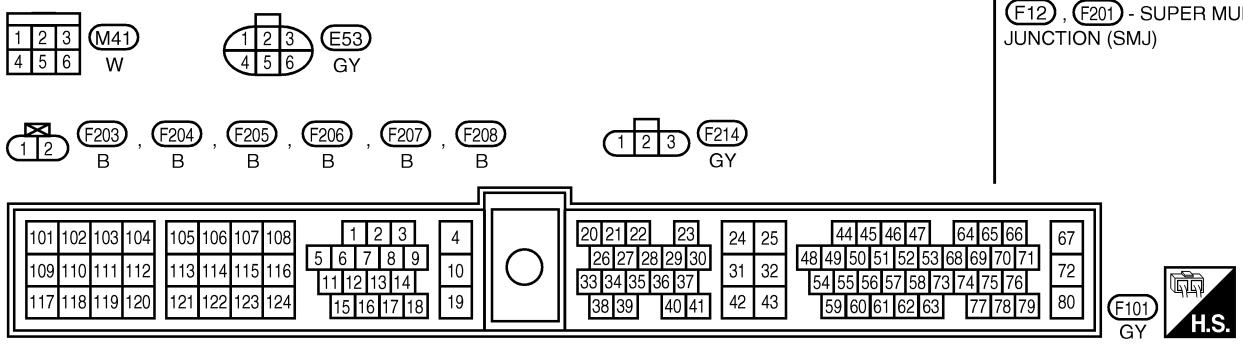
8) Select "MODE 7" with GST. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-268.
9) If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-268. If engine does not start, check exhaust and intake air leak visually.

Wiring Diagram

NDEC0152

EC-FUEL-01





Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)

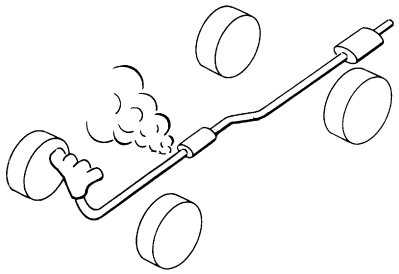
WEC636

Diagnostic Procedure

NDEC0153

1	CHECK EXHAUST AIR LEAK

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



SEF099P

OK or NG

OK	▶	GO TO 2.
NG	▶	Repair or replace.

2	CHECK FOR INTAKE AIR LEAK

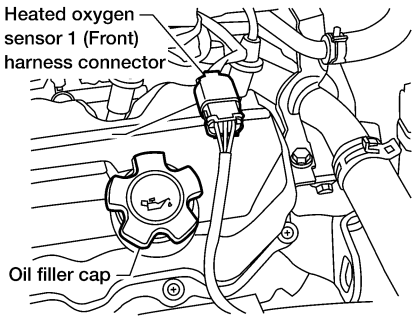
Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace.

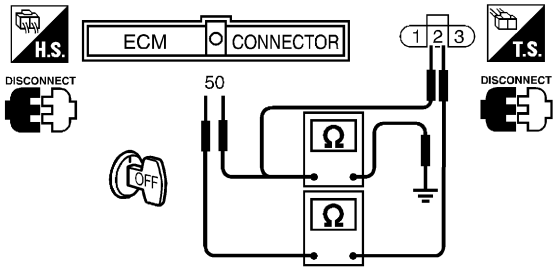
3	CHECK HEATED OXYGEN SENSOR 1 (FRONT) CIRCUIT

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



LEC750

3. Check harness continuity between ECM terminal 50 and HO2S1 terminal 2.



SEF042W

Continuity should exist.

4. Check harness continuity between ECM terminal 50 (or HO2S1 terminal 2) and ground.
   Continuity should not exist.
5. Also check harness for short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, F201
- Harness for open or short between ECM and heated oxygen sensor 1 (front)

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

5	CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-35.
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 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART
Check the following. ● Fuel pump and circuit (Refer to EC-494.) ● Fuel pressure regulator (Refer to EC-36.) ● Fuel lines (Refer to "ENGINE MAINTENANCE", ***MA-18***.) ● Fuel filter for clogging	
▶	Repair or replace.

7	CHECK MASS AIR FLOW SENSOR
With CONSULT-II 1. Install all parts removed. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. **3.3 - 4.8 g·m/sec: at idling** **12.0 - 14.9 g·m/sec: at 2,500 rpm**	
With GST 1. Install all parts removed. 2. Check mass air flow sensor signal in MODE 1 with GST. **3.3 - 4.8 g·m/sec: at idling** **12.0 - 14.9 g·m/sec: at 2,500 rpm**	
OK or NG	
OK ▶	GO TO 8.
NG ▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-134.

8	CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

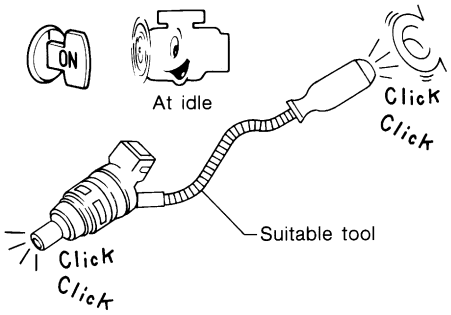
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

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

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.



MEC703B

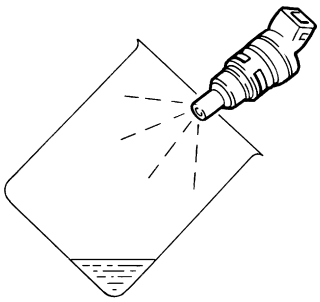
Clicking noise should be heard.

OK or NG

OK	▶	GO TO 9.
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-485.

9	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. Remove injector gallery assembly. Refer to EC-36.
   Keep fuel hose and all injectors connected to injector gallery.
   The injector harness connectors should remain connected.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each injector.
6. 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 10.
NG	▶	Replace injectors from which fuel does not spray out. Always replace injector O-rings with new ones.

10	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.	
▶	**INSPECTION END**

On Board Diagnosis Logic

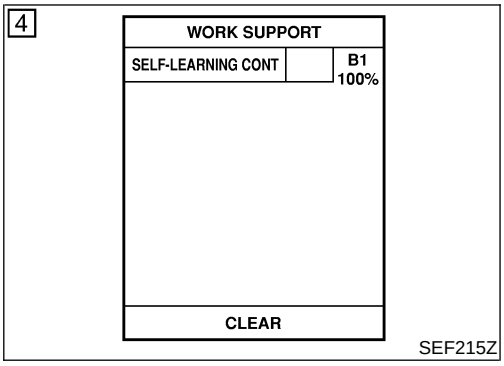
NDEC0154

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

In case the amount of the compensation value is extremely large (the actual mixture ratio is too rich), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

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



SEF215Z

DTC Confirmation Procedure

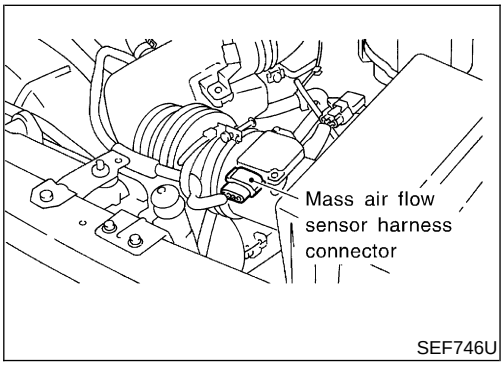
NDEC0155

NOTE:

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

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "SELF-LEARN CONTROL" in "WORK SUPPORT" mode with CONSULT-II.
4) Clear the self-learning control coefficient by touching "CLEAR".
5) Select "DATA MONITOR" mode with CONSULT-II.
6) Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-276.
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-276. If engine does not start, remove ignition plugs and check for fouling, etc.



SEF746U

With GST

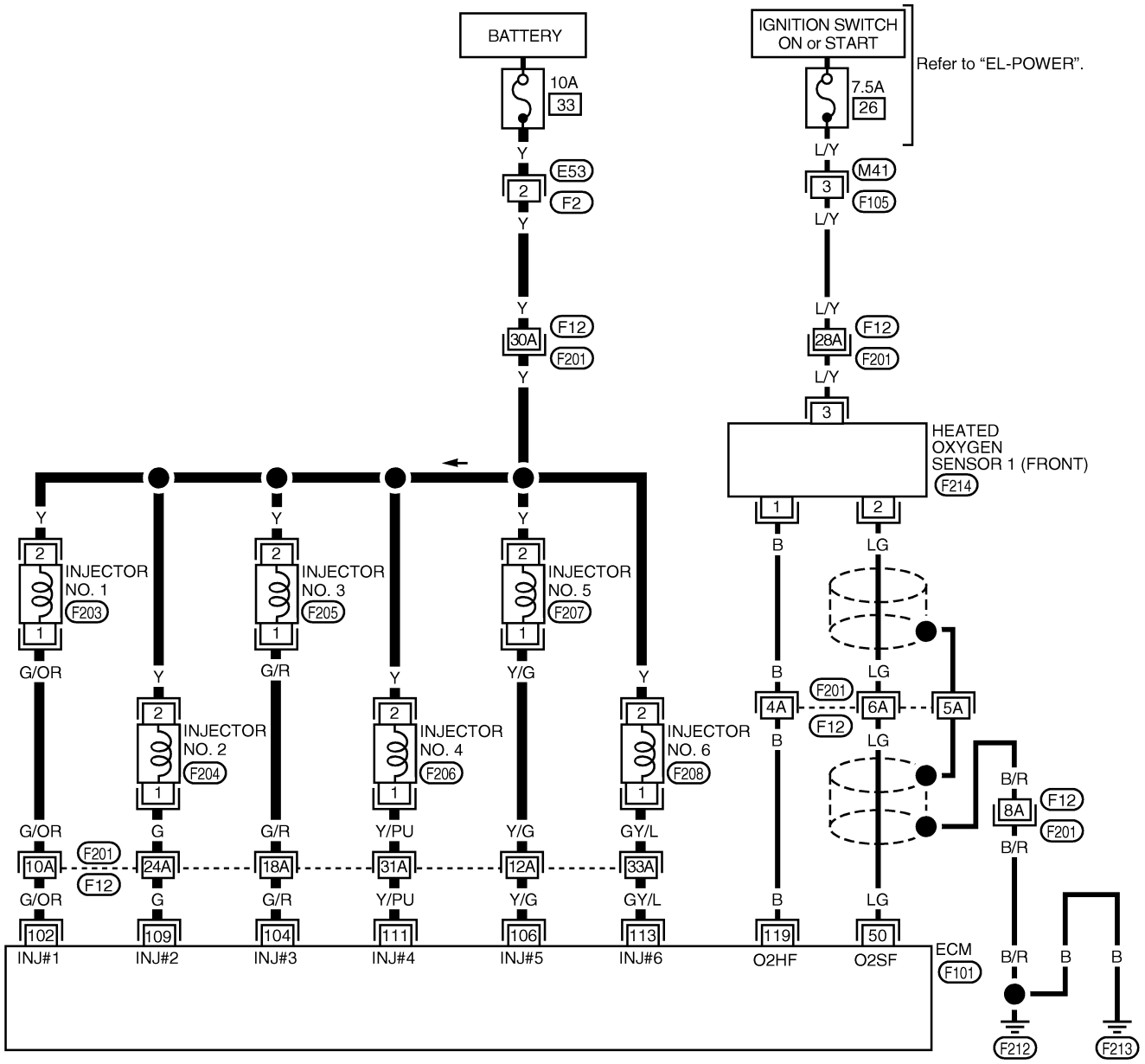
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4) Stop engine and reconnect mass air flow sensor harness connector.
5) Select "MODE 7" with GST. Make sure 1st trip DTC P0100 is detected.
6) Select "MODE 4" with GST and erase the 1st trip DTC P0100.
7) Start engine again and let it idle for at least 10 minutes.

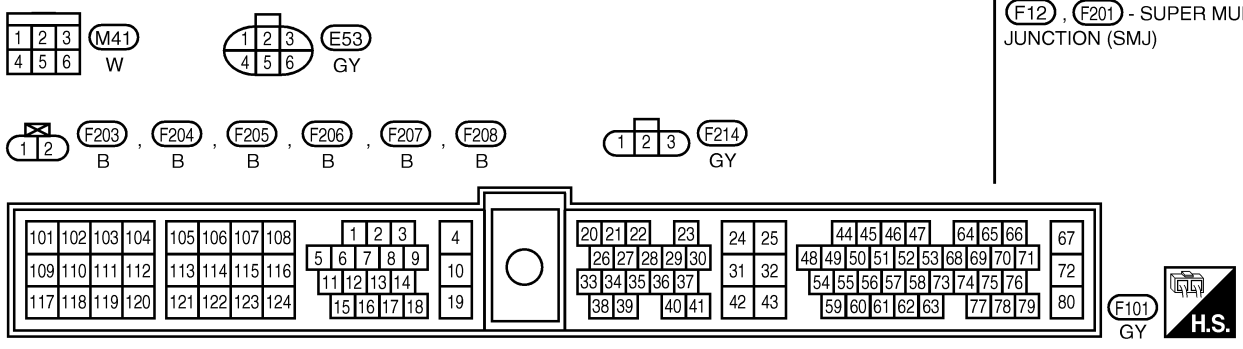
8) Select "MODE 7" with GST. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to "Diagnostic Procedure", EC-276.
9) If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10) Crank engine while depressing accelerator pedal. If engine starts, go to "Diagnostic Procedure", EC-276. If engine does not start, remove ignition plugs and check for fouling, etc.

Wiring Diagram

NDEC0156

EC-FUEL-01



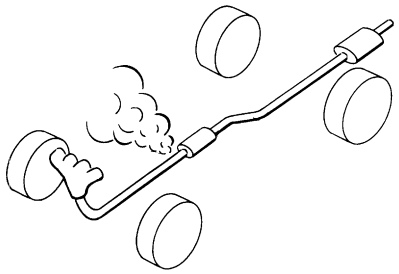


Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)

WEC636

Diagnostic Procedure

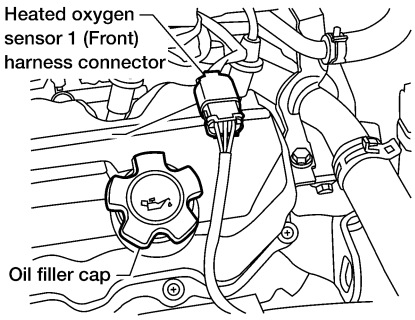
NDEC0157

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

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

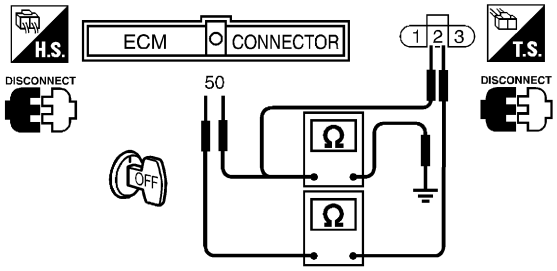
3	CHECK HEATED OXYGEN SENSOR 1 (FRONT) CIRCUIT

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



LEC750

3. Check harness continuity between ECM terminal 50 and HO2S1 terminal 2.



SEF042W

Continuity should exist.

4. Check harness continuity between ECM terminal 50 (or HO2S1 terminal 2) and ground.
   Continuity should not exist.
5. Also check harness for short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, F201
- Harness for open or short between ECM and heated oxygen sensor 1 (front)

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

5	CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-35.
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 7.
NG	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

6	DETECT MALFUNCTIONING PART
Check the following. ● Fuel pump and circuit (Refer to EC-494.) ● Fuel pressure regulator (Refer to EC-36.)	
▶	Repair or replace.

7	CHECK MASS AIR FLOW SENSOR
With CONSULT-II 1. Install all parts removed. 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. **3.3 - 4.8 g·m/sec: at idling** **12.0 - 14.9 g·m/sec: at 2,500 rpm**	
With GST 1. Install all parts removed. 2. Check mass air flow sensor signal in MODE 1 with GST. **3.3 - 4.8 g·m/sec: at idling** **12.0 - 14.9 g·m/sec: at 2,500 rpm**	
OK or NG	
OK ▶	GO TO 8.
NG ▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-134.

8	CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.

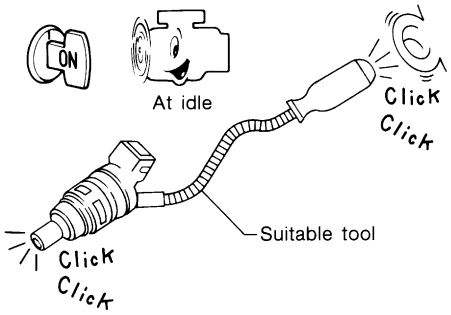
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

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

Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.



MEC703B

Clicking noise should be heard.

OK or NG

OK	▶	GO TO 9.
NG	▶	Perform trouble diagnosis for "INJECTORS", EC-485.

9	CHECK INJECTOR

1. Remove injector assembly. Refer to EC-36.
   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.
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.

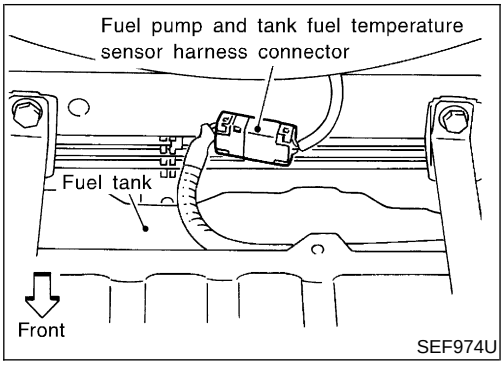
OK or NG

OK (Does not drip)	▶	GO TO 10.
NG (Drips)	▶	Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

10	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.

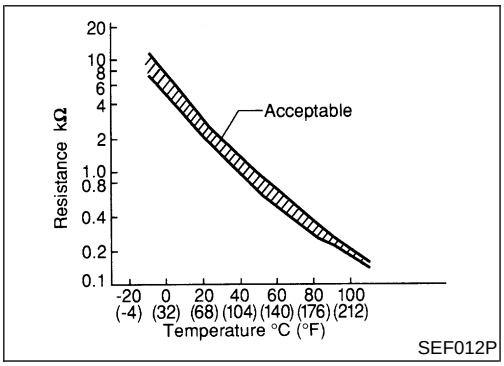
▶ **INSPECTION END**



Component Description

NDEC0166

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



<Reference data>

Fluid temperature °C (°F)	Voltage* (V)	Resistance (kΩ)
0 (32)	4.2	4.70 - 6.81
25 (77)	3.3	1.89 - 2.21
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 ground.

CAUTION:

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

On Board Diagnosis Logic

NDEC0167

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

DTC Confirmation Procedure

NDEC0168

NOTE:

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

3

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

SEF174Y

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-283.
   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-283.

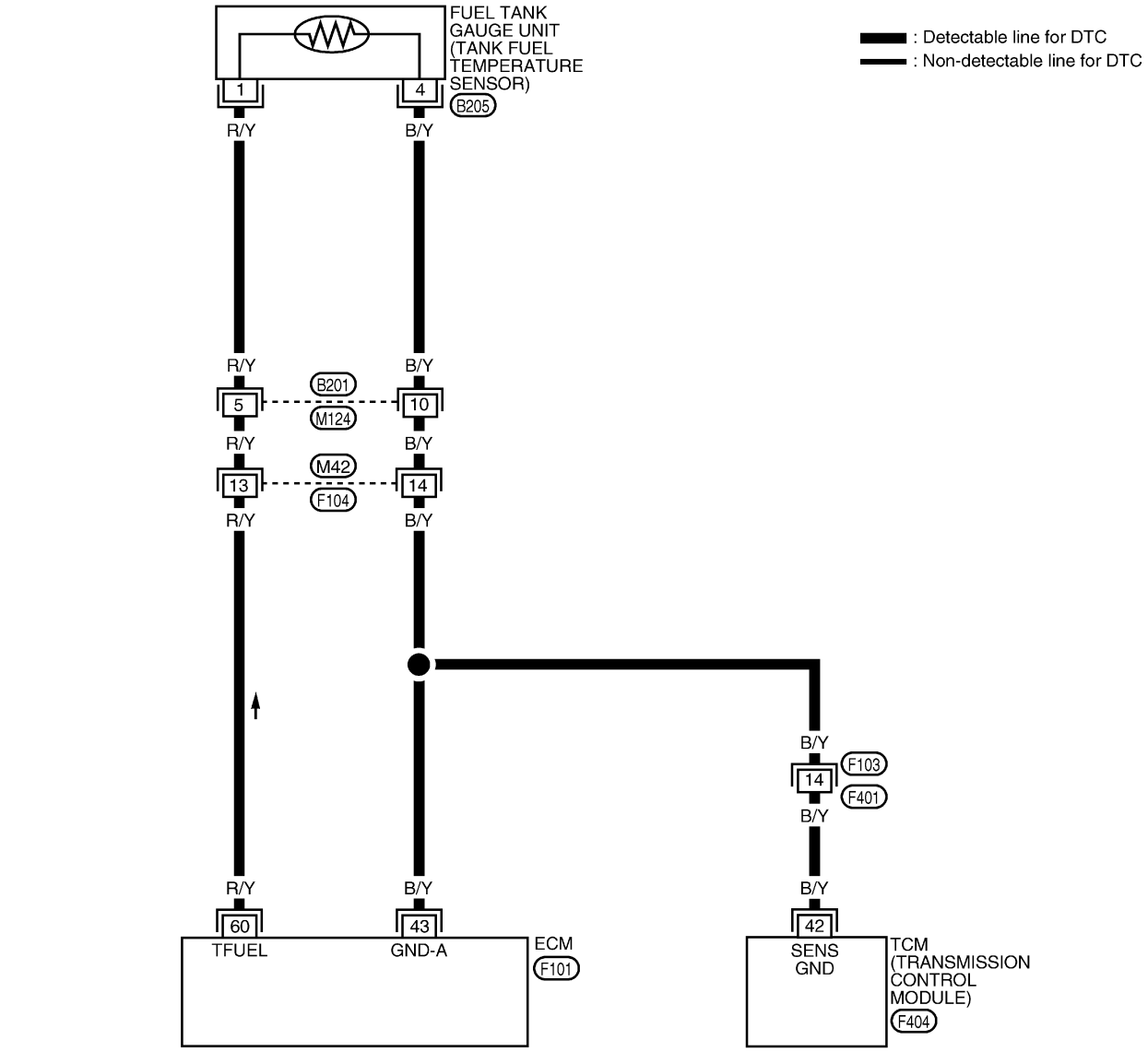
With GST

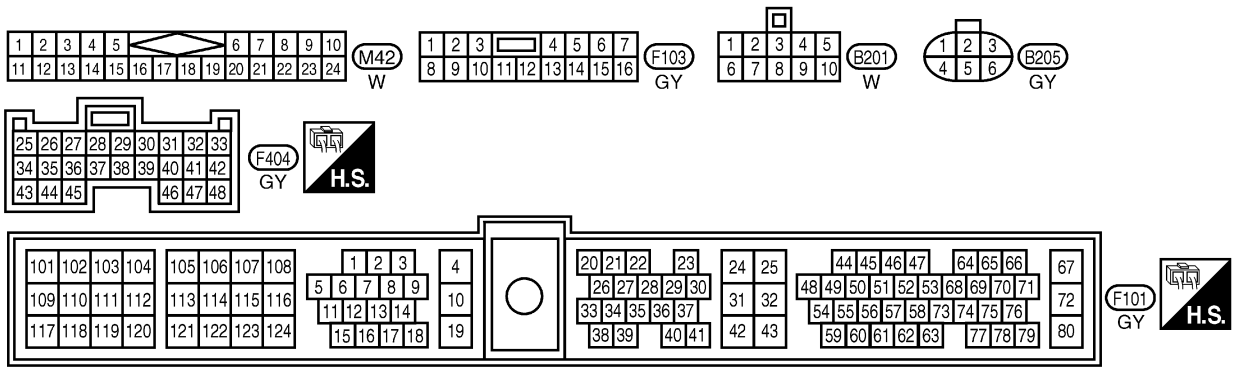
Follow the procedure "With CONSULT-II".

Wiring Diagram

NDEC0169

EC-TFTS-01





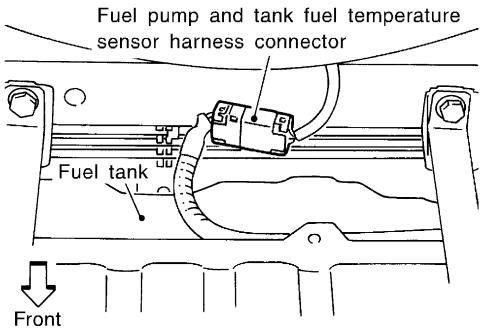
AEC612A

Diagnostic Procedure

NDEC0170

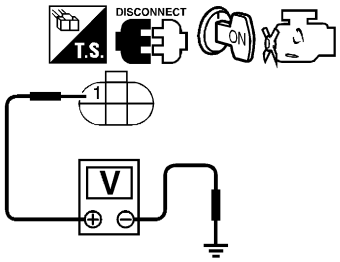
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect fuel tank gauge unit harness connector.



SEF974U

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



SEF052W

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

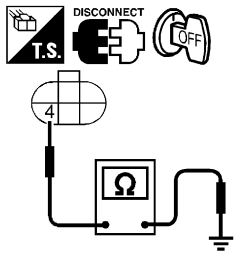
Check the following.
- Harness connectors B201, M124
- Harness connectors M42, F104
- Harness for open or short between ECM and fuel tank temperature sensor

	▶	Repair harness or connector.

Diagnostic Procedure (Cont'd)

3	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Check harness continuity between fuel tank gauge unit terminal 4 and body ground.



SEF053W

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B201, M124
- Harness connectors M42, F104
- Harness connectors F103, F401
- Harness for open or short between ECM and fuel tank temperature sensor
- Harness for open or short between TCM (Transmission control module) and fuel tank temperature sensor

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

5	CHECK FUEL TANK TEMPERATURE SENSOR

Refer to "Component Inspection", EC-284.

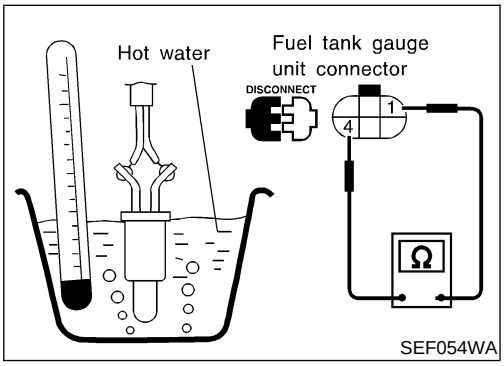
OK or NG

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

6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.

	▶	**INSPECTION END**



SEF054WA

Component Inspection

NDEC0171

FUEL TANK TEMPERATURE SENSOR

NDEC0171S01

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

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

If NG, replace fuel tank temperature sensor.

On Board Diagnosis Logic

NDEC0172

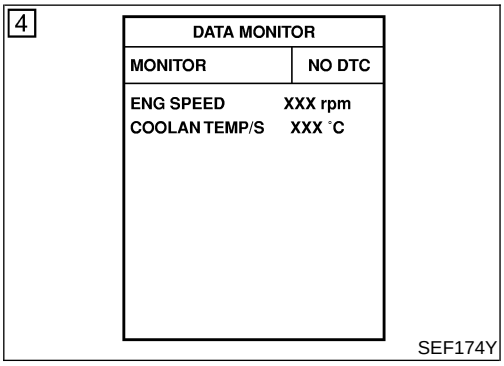
If a misfire occurs, the engine speed will fluctuate. If the fluctuation is detected by the crankshaft position sensor (OBD), the misfire is diagnosed.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (OBD)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the crankshaft position sensor (OBD) signal every 200 engine revolutions, for a change.
   When the misfire conditions decreases to a level that will not damage the TWC, the MIL will turn off. If another misfire conditions occurs that can damage the TWC on a second trip, the MIL will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on. If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not cause damage to the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the crankshaft position sensor (OBD) signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0300	Multiple cylinders misfire.	• Improper spark plug • Insufficient compression • Incorrect fuel pressure • The injector circuit is open or shorted • Injectors • Intake air leak • The ignition secondary circuit is open or shorted • Lack of fuel • Drive plate • Heated oxygen sensor 1 (front) • Incorrect distributor rotor
P0301	• No. 1 cylinder misfires.	
P0302	• No. 2 cylinder misfires.	
P0303	• No. 3 cylinder misfires.	
P0304	• No. 4 cylinder misfires.	
P0305	• No. 5 cylinder misfires.	
P0306	• No. 6 cylinder misfires.	



DTC Confirmation Procedure

NDEC0173

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-286.

With GST

Follow the procedure "With CONSULT-II".

Diagnostic Procedure

NDEC0174

1	CHECK FOR INTAKE AIR LEAK	
1. Start engine and run it at idle speed. 2. Listen for the sound of the intake air leak.		
OK or NG		
OK	▶	GO TO 2.
NG	▶	Discover air leak location and repair.

2	CHECK FOR EXHAUST SYSTEM CLOGGING	
Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair or replace it.

3 PERFORM POWER BALANCE TEST

With CONSULT-II

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.

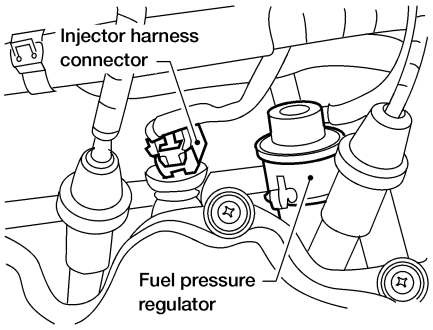
ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
IACV-AAC/V	XXX step

SEF190Y

2. Is there any cylinder which does not produce a momentary engine speed drop?

Without CONSULT-II

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?



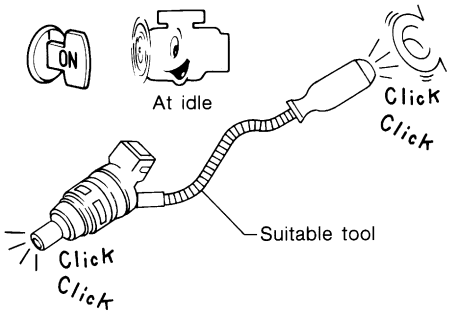
AEC799A

Yes or No

Yes	▶	GO TO 4.
No	▶	GO TO 7.

4	CHECK INJECTOR

Does each injector make an operating sound at idle?



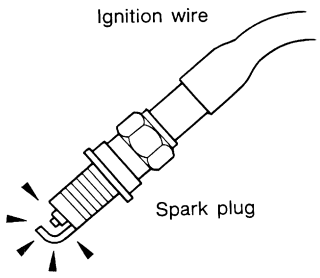
MEC703B

Yes or No

Yes	▶	GO TO 5.
No	▶	Check injector(s) and circuit(s). Refer to EC-485.

5	CHECK IGNITION SPARK

1. Disconnect ignition wire from spark plug.
2. Connect a known good spark plug to the ignition wire.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.



SEF282G

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	CHECK IGNITION WIRES

Refer to "Component Inspection", EC-290.

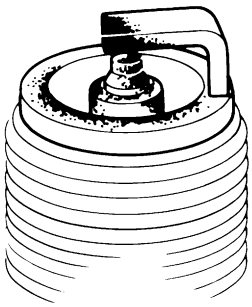
OK or NG

OK	▶	**Check the following:** ● Distributor rotor head for incorrect parts ● Ignition coil, power transistor and their circuits Refer to EC-414.
NG	▶	Replace.

Diagnostic Procedure (Cont'd)

7	CHECK SPARK PLUGS

Remove the spark plugs and check for fouling, etc.



SEF156I

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to "ENGINE MAINTENANCE", ***MA-21***.

8	CHECK COMPRESSION PRESSURE

Refer to ***EM-13***.

- Check compression pressure.

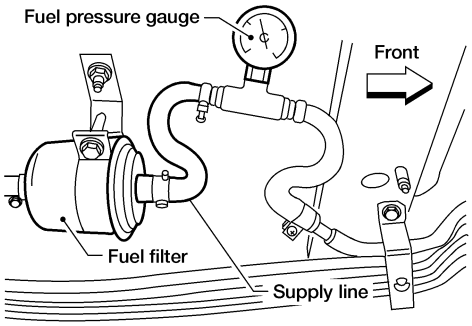
Standard:
1,196 kPa (12.2 kg/cm^2, 173 psi)/300 rpm
Minimum:
883 kPa (9.0 kg/cm^2, 128 psi)/300 rpm
Difference between each cylinder:
98 kPa (1.0 kg/cm^2, 14 psi)/300 rpm

OK or NG

OK	▶	GO TO 9.
NG	▶	Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

9	CHECK FUEL PRESSURE

1. Install any parts removed.
2. Release fuel pressure to zero.
   Refer to EC-35.
3. Install fuel pressure gauge and check fuel pressure.



AEC921A

At idle:
Approx. 235 kPa (2.4 kg/cm^2, 34 psi)

OK or NG

OK	▶	GO TO 11.
NG	▶	GO TO 10.

10	DETECT MALFUNCTIONING PART
Check the following. ● Fuel pump and circuit (Refer to EC-494.) ● Fuel pressure regulator (Refer to EC-36.) ● Fuel lines (Refer to "ENGINE MAINTENANCE", ***MA-18***.) ● Fuel filter for clogging	
▶	Repair or replace.

11	CHECK IGNITION TIMING	
Perform "Basic Inspection", EC-88.		
OK or NG		
OK	▶	GO TO 12.
NG	▶	Adjust ignition timing.

12	ADJUST CLOSED THROTTLE POSITION SWITCH	
Adjust closed throttle position switch. Refer to "Basic Inspection", EC-88.		
OK or NG		
OK	▶	GO TO 13.
NG	▶	Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-88.

13	CHECK HEATED OXYGEN SENSOR 1 (FRONT)	
Refer to "Component Inspection", EC-189.		
OK or NG		
OK	▶	GO TO 14.
NG	▶	Replace heated oxygen sensor 1 (front).

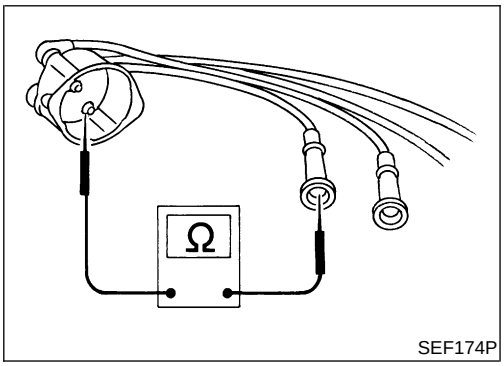
14	CHECK MASS AIR FLOW SENSOR	
With CONSULT-II Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-II. **3.3 - 4.8 g·m/sec: at idling** **12.0 - 14.9 g·m/sec: at 2,500 rpm**		
With GST Check mass air flow sensor signal in MODE 1 with GST. **3.3 - 4.8 g·m/sec: at idling** **12.0 - 14.9 g·m/sec: at 2,500 rpm**		
OK or NG		
OK	▶	GO TO 15.
NG	▶	Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-134.

15	CHECK SYMPTOM MATRIX CHART	
Check items on the rough idle symptom in "Symptom Matrix Chart", EC-104.		
OK or NG		
OK	▶	GO TO 16.
NG	▶	Repair or replace.

Diagnostic Procedure (Cont'd)

16	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-61.	
▶	GO TO 17.

17	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.	
▶	**INSPECTION END**



SEF174P

Component Inspection

NDEC0175

IGNITION WIRES

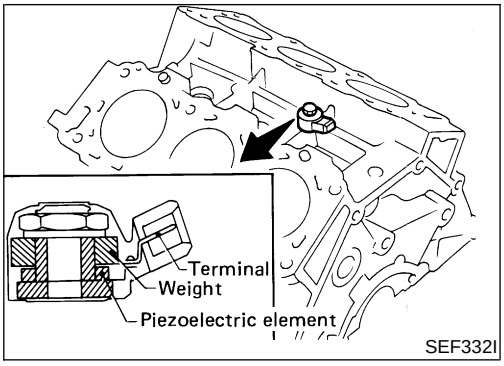
NDEC0175S01

1. Inspect wires for cracks, damage, burned terminals and for improper fit.
2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks.

   Resistance:

   9.6 - 22.4 kΩ/m (2.93 - 6.83 kΩ/ft) at 25°C (77°F)

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



Component Description

NDEC0176

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

NDEC0177

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

CAUTION:

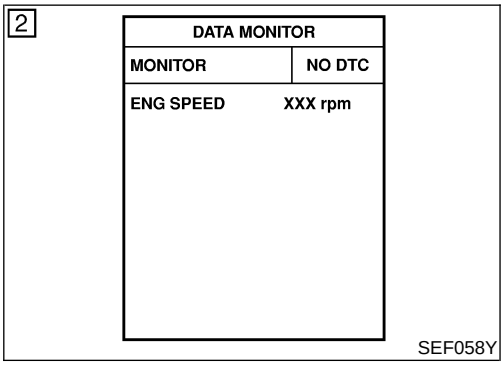
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
64	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V

On Board Diagnosis Logic

NDEC0178

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0325	● An excessively low or high voltage from the knock sensor is sent to ECM.	● Harness or connectors (The knock sensor circuit is open or shorted.) ● Knock sensor



DTC Confirmation Procedure

NDEC0179

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-293.

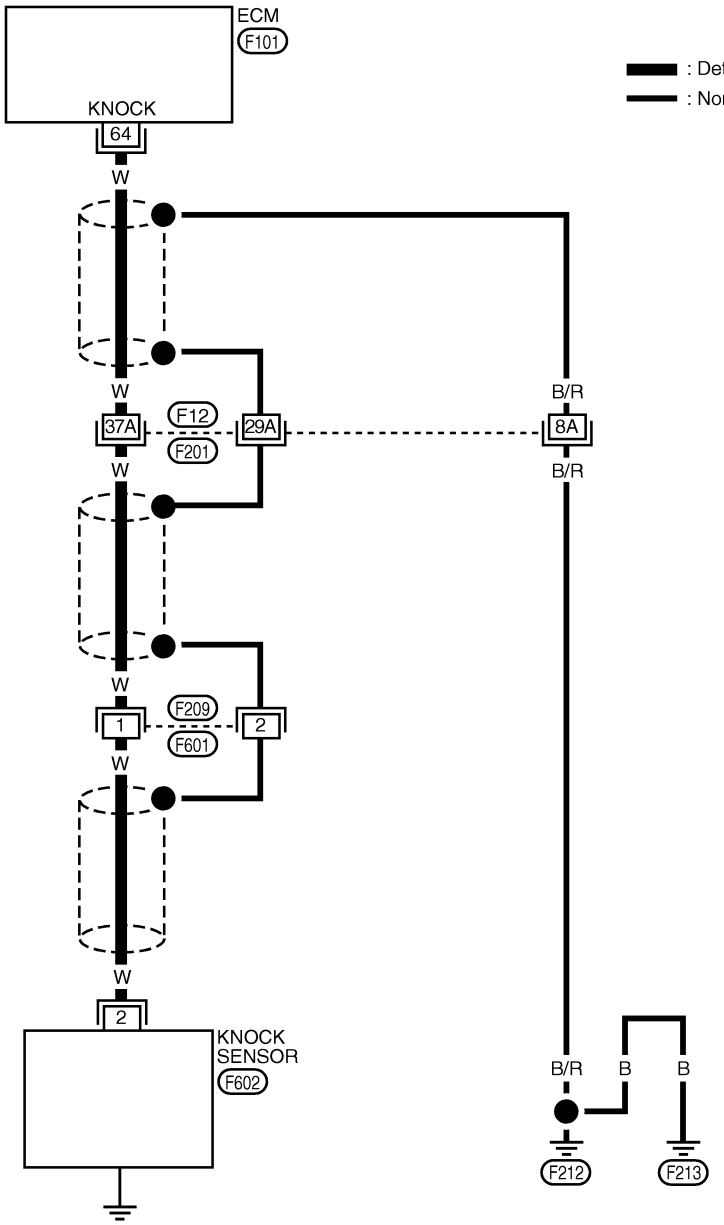
With GST

Follow the procedure "With CONSULT-II".

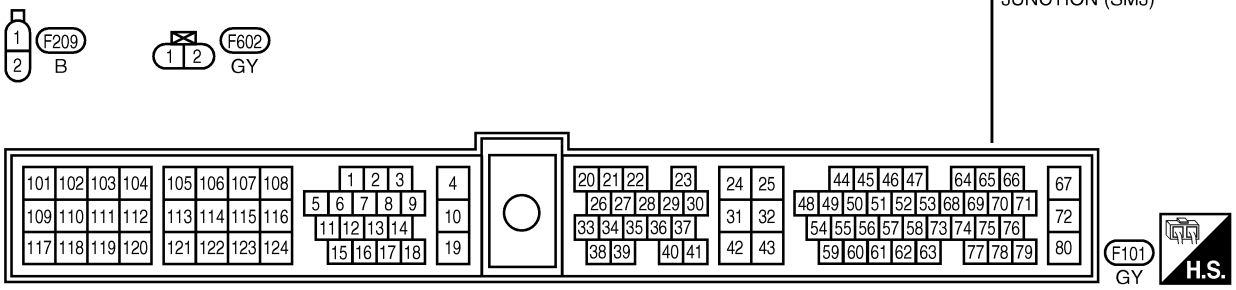
Wiring Diagram

NDEC0180

EC-KS-01



Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)



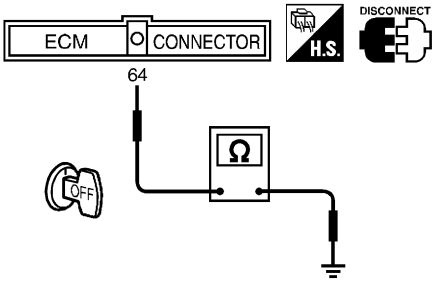
WEC075

Diagnostic Procedure

NDEC0181

1	CHECK INPUT SIGNAL CIRCUIT-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.



SEF704U

Resistance:
Approximately 500 - 620 kΩ [at 25°C (77°F)]

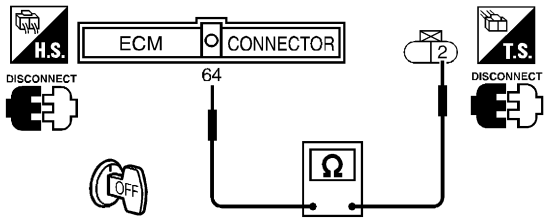
4. Also check harness for short to ground and short to power.

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 2.



SEF055W

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.

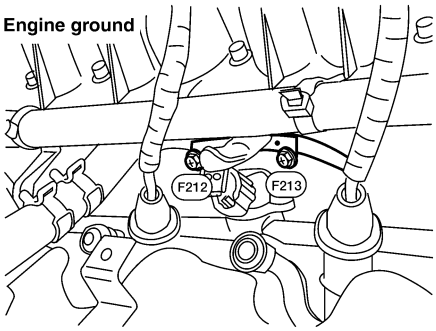
3	DETECT MALFUNCTIONING PART

Check the following.
- Harness connector F12, F201
- Harness connectors F209, F601
- 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.

Diagnostic Procedure (Cont'd)

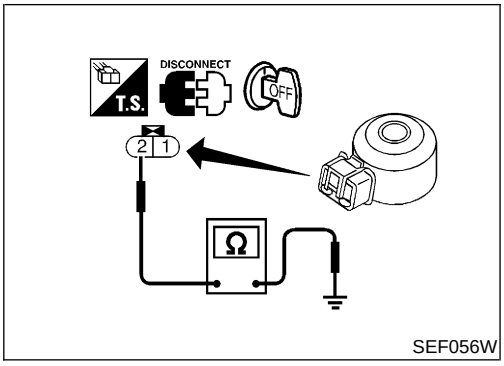
4	CHECK KNOCK SENSOR	
Refer to "Component Inspection", EC-295.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace knock sensor.

5	RETIGHTEN GROUND SCREWS	
Loose and retighten engine ground screws.		
 LEC749		
	▶	GO TO 6.

6	CHECK SHIELD CIRCUIT	
1. Disconnect harness connectors F209, F601. 2. Check harness continuity between harness connector F209 and engine ground. **Continuity should exist.** 3. Also check harness for short to power.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART	
Check the following. ● Harness connectors F12, F201 ● Harness connectors F209, F601 ● Harness for open or short between harness connector F209 and engine ground		
	▶	Repair open circuit or short to power in harness or connectors.

8	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.		
	▶	**INSPECTION END**



SEF056W

Component Inspection

NDEC0182

KNOCK SENSOR

NDEC0182S01

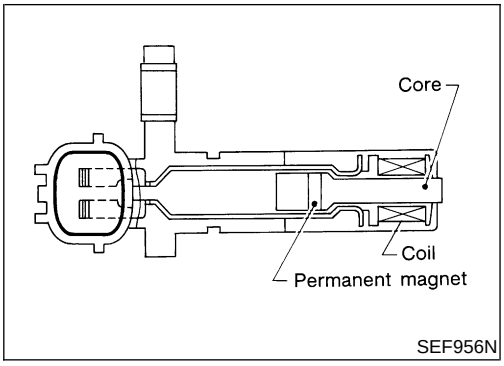
- Use an ohmmeter which can measure more than 10 MΩ.

1. Disconnect knock sensor harness connector.
2. Check resistance between terminal 2 and ground.

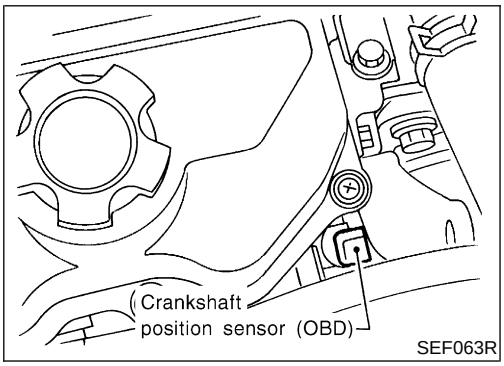
Resistance: 500 - 620 kΩ [at 25°C (77°F)]

CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.



SEF956N



SEF063R

Component Description

NDEC0183

The crankshaft position sensor (OBD) is located on the transaxle housing facing the gear teeth (cogs) of the 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.

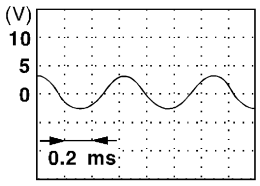
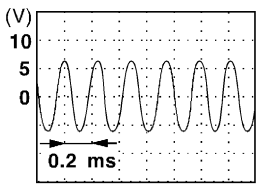
ECM Terminals and Reference Value

NDEC0184

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

CAUTION:

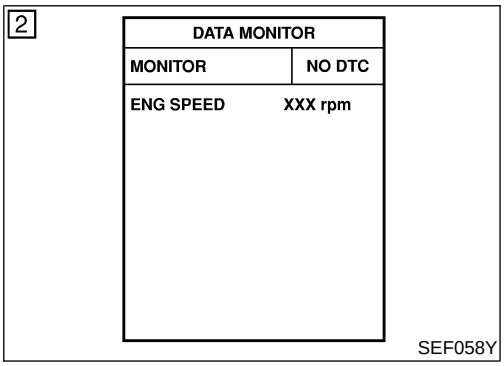
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
47	LG	Crankshaft position sensor (OBD)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 1V (AC range)  SEF690W
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2V (AC range)  SEF691W

On Board Diagnosis Logic

NDEC0185

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0335	• The proper pulse signal from the crankshaft position sensor (OBD) is not sent to ECM while the engine is running at the specified engine speed.	• Harness or connectors (The crankshaft position sensor (OBD) circuit is open.) • Crankshaft position sensor (OBD)



DTC Confirmation Procedure

NDEC0186

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-299.

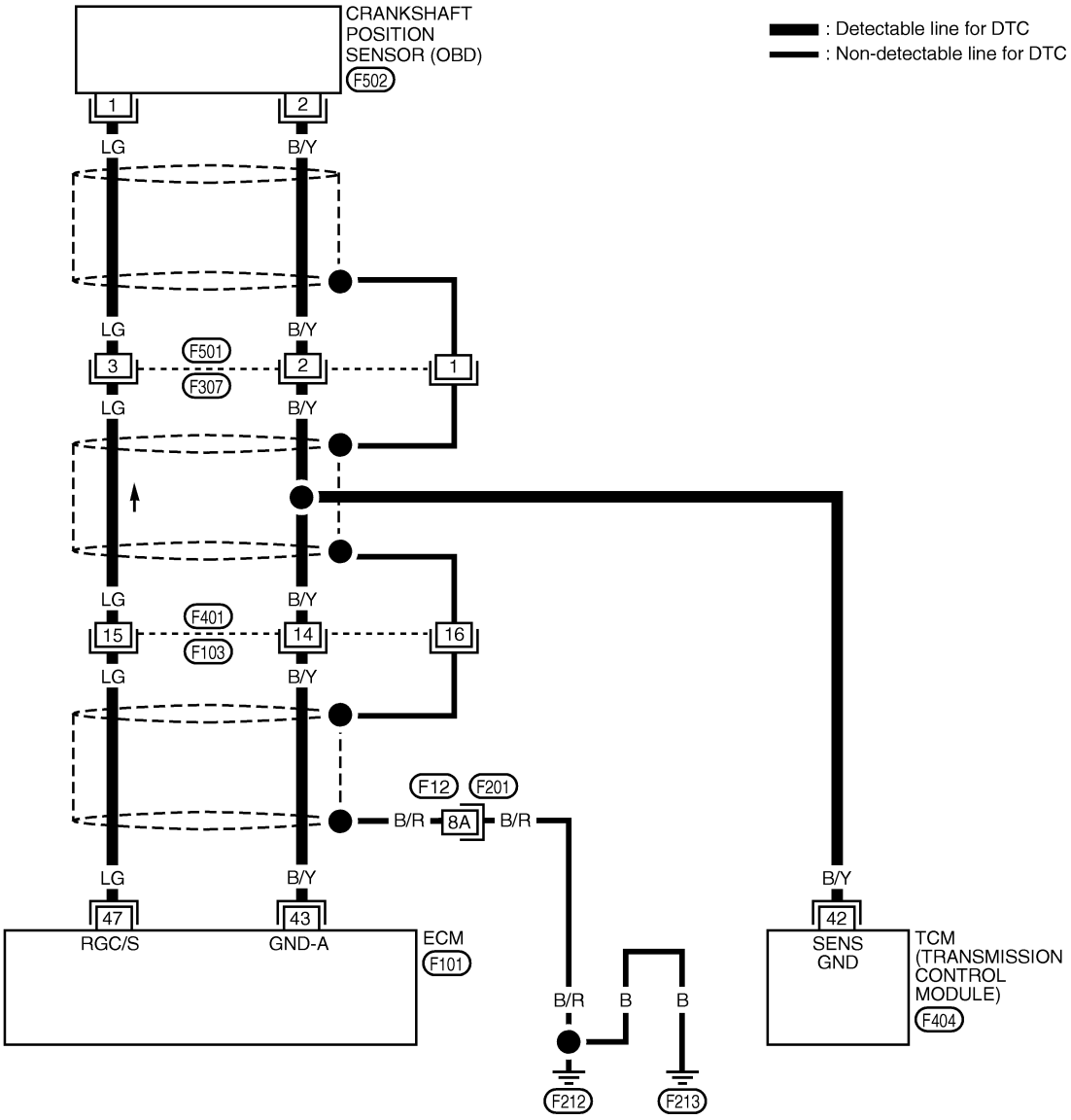
With GST

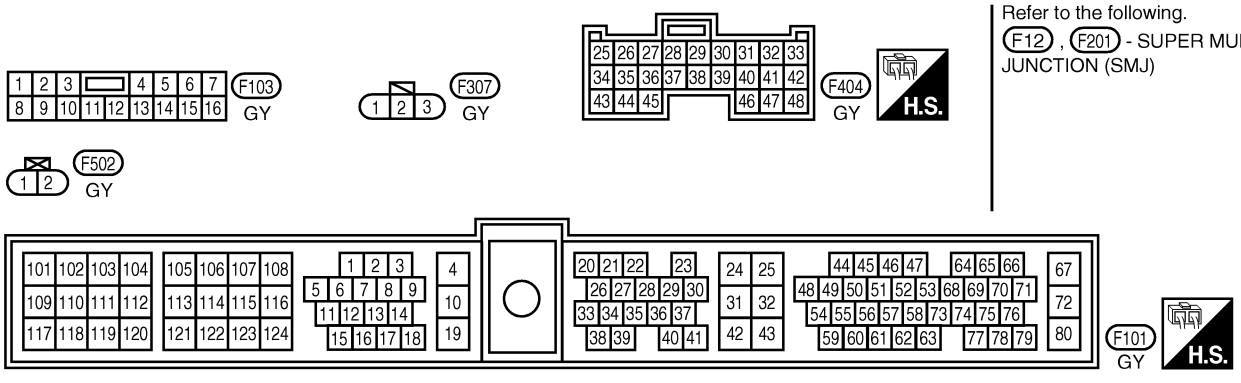
Follow the procedure “With CONSULT-II”.

Wiring Diagram

NDEC0187

EC-CKPS-01





Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)

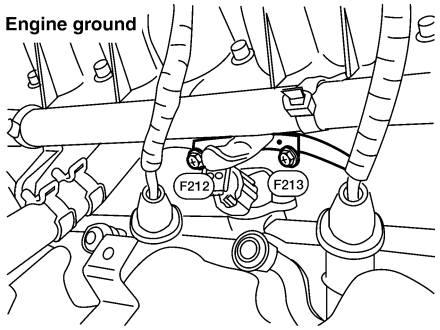
WEC076

Diagnostic Procedure

NDEC0188

1	RETIGHTEN GROUND SCREWS

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

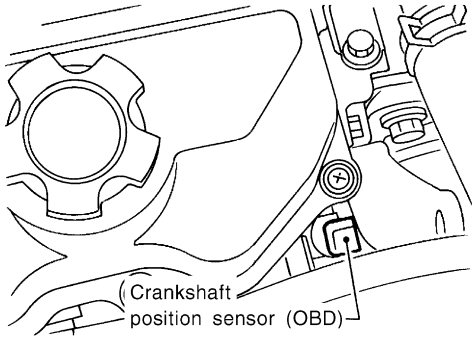


LEC749

▶	GO TO 2.

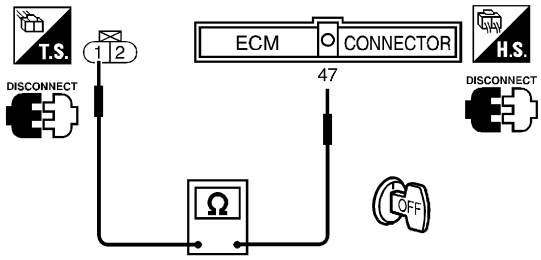
2	CHECK CKPS (ODB) INPUT SIGNAL CIRCUIT

1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.



SEF063R

2. Check harness continuity between ECM terminal 47 and crankshaft position sensor (OBD) terminal 1.



SEF706U

Continuity should exist.

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

OK or NG

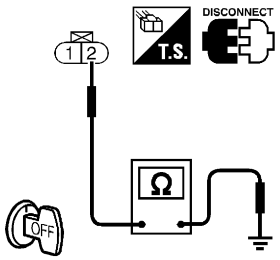
OK	▶	GO TO 4.
NG	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F103, F401 ● Harness connectors F307, F501 ● 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 GROUND CIRCUIT

1. Reconnect ECM harness connector.
2. Check harness continuity between crankshaft position sensor (OBD) terminal 2 and engine ground.



SEF707U

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F103, F401 ● Harness connectors F307, F501 ● 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 power in harness or connectors.

6	CHECK CRANKSHAFT POSITION SENSOR (OBD)
Refer to "Component Inspection", EC-301.	

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace crankshaft position sensor (OBD).

7	CHECK SHIELD CIRCUIT

1. Disconnect harness connectors F307, F501.
2. Check harness continuity between harness connector F307 and engine.

Continuity should exist.

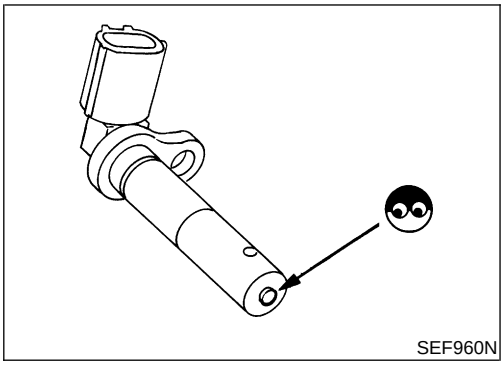
3. Also check harness for short to power.

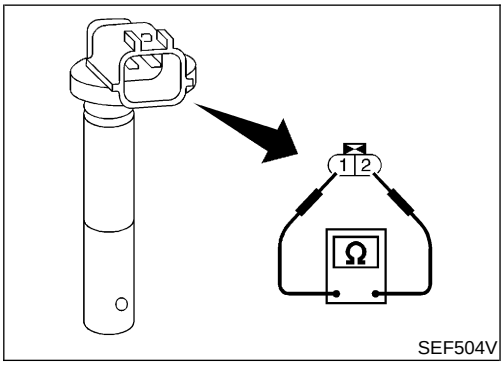
OK or NG

OK	▶	GO TO 9.
NG	▶	GO TO 8.

8	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F103, F401 ● Harness connectors F307, F501 ● Harness connectors F12, F201 ● Harness for open between harness connector F307 and engine ground	
▶	Repair open circuit or short to power in harness or connectors.

9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.	
▶	**INSPECTION END**


SEF960N



SEF504V

Component Inspection

NDEC0541

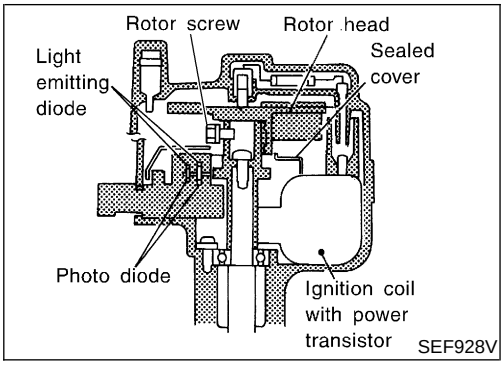
CRANKSHAFT POSITION SENSOR (OBD)

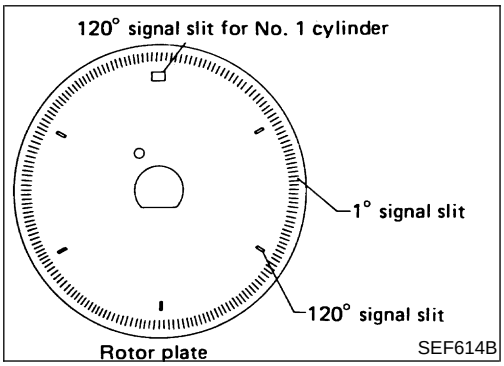
NDEC0541S01

1. Disconnect crankshaft position sensor (OBD) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.
5. Check resistance as shown in the figure.

Resistance: Approximately 512 – 632Ω [at 20°C (68°F)]

If NG, replace crankshaft position sensor (OBD).





Component Description

NDEC0190

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)

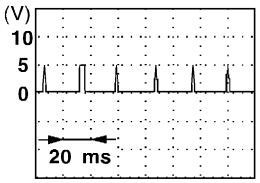
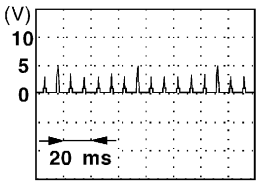
ECM Terminals and Reference Value

NDEC0191

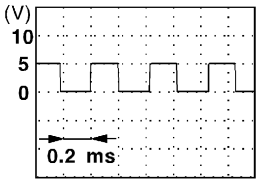
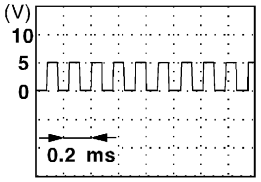
Specification data are reference values and are measured between each terminal and ground.

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	W/G	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)
44 48	W W	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

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	OR	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/W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
72	B/W			
117	B/W	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NDEC0192

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P0340	A)	Either 1° or 120° 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, ***SC-10*** ● Starting system circuit, ***SC-10*** ● Dead (Weak) battery
	B)	Either 1° or 120° 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 120° signal is not in the normal range during the specified engine speed.	

DTC Confirmation Procedure

NDEC0193

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.

DTC Confirmation Procedure (Cont'd)

2

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION A

NDEC0193S01

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-306.

With GST

Follow the procedure "With CONSULT-II".

3

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm

SEF058Y

PROCEDURE FOR MALFUNCTION B AND C

NDEC0193S02

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-306.

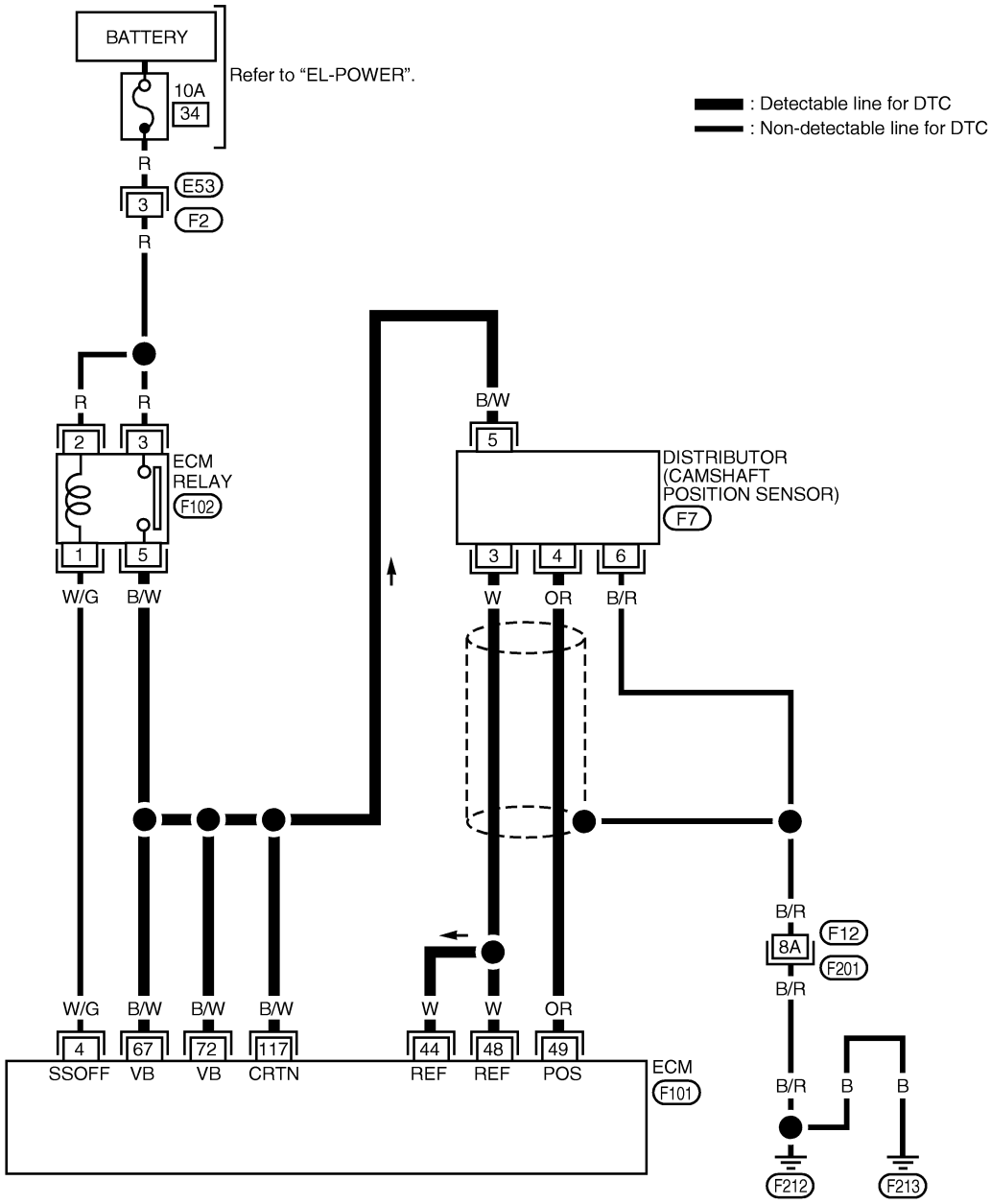
With GST

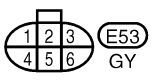
Follow the procedure "With CONSULT-II".

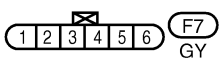
Wiring Diagram

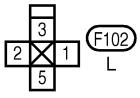
NDEC0194

EC-CMPS-01

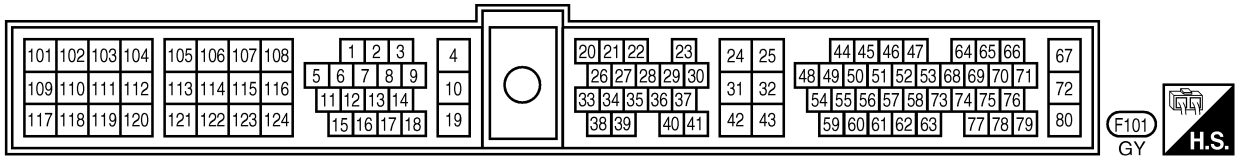








Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)



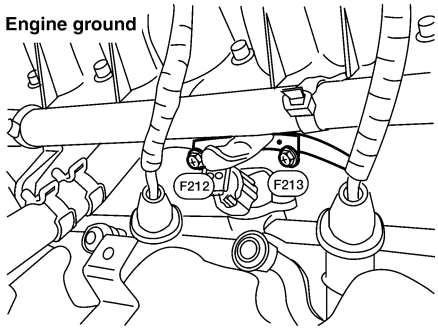
WEC077

Diagnostic Procedure

NDEC0195

1	RETIGHTEN GROUND SCREWS

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

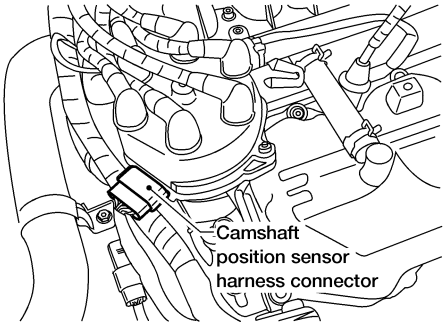


LEC749

▶	GO TO 2.

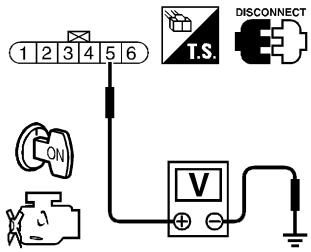
2	CHECK POWER SUPPLY

1. Disconnect camshaft position sensor harness connector.



AEC800A

2. Turn ignition switch “ON”.
3. Check voltage between camshaft position sensor terminal 5 and ground with CONSULT-II or tester.



SEF708U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

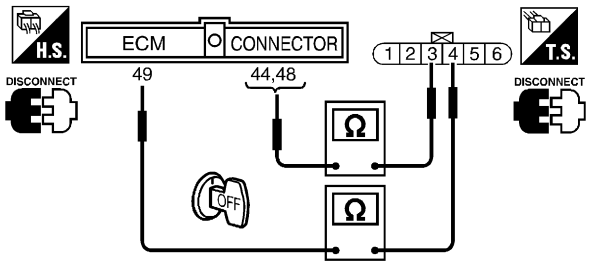
3	DETECT MALFUNCTIONING PART

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 INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between camshaft position sensor terminal 4 and ECM terminal 49, sensor terminal 3 and ECM terminals 44, 48.



SEF709U

Continuity should exist.

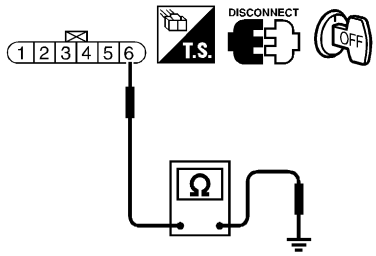
4. Also check harness for short to ground and short to power.

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 GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Check harness continuity between camshaft position sensor terminal 6 and engine ground.



SEF710U

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, F201
- Harness for open between camshaft position sensor and engine ground

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

7	CHECK CAMSHAFT POSITION SENSOR

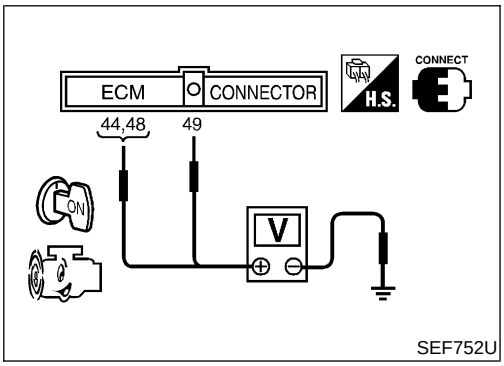
Refer to "Component Inspection", EC-308.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace camshaft position sensor.

Diagnostic Procedure (Cont'd)

8	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.	
▶	**INSPECTION END**



SEF752U

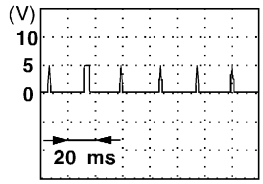
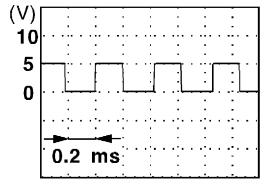
Component Inspection

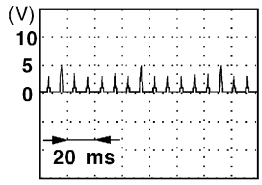
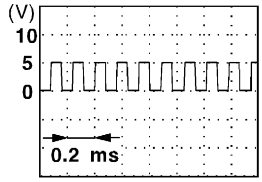
NDEC0542

CAMSHAFT POSITION SENSOR

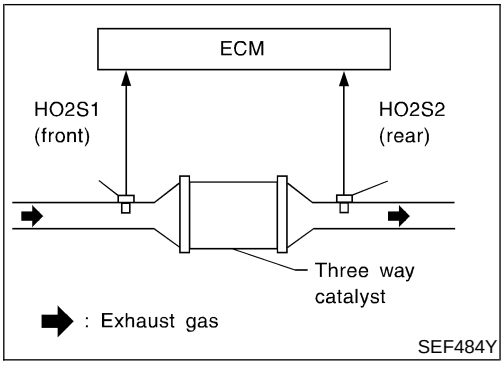
NDEC0542S01

1. Install any removed parts.
2. Start engine.
3. Check voltage between ECM terminals 44, 48 and ground, ECM terminal 49 and ground with DC range.

Condition	ECM terminal	Voltage
Engine running at idle	44,48 and ground	0.3 – 0.5V  SEF997U
	49 and ground	Approximately 2.5V  SEF999U

Condition	ECM terminal	Voltage
Engine speed is 2,000 rpm	44, 48 and ground	0.3 – 0.5V  SEF998U
	49 and ground	Approximately 2.5V  SEF001V

If NG, replace distributor assembly with camshaft position sensor.



On Board Diagnosis Logic

NDEC0207

The ECM monitors the switching frequency ratio of heated oxygen sensor 1 (front) and 2 (rear).
A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2 (rear). As oxygen storage capacity decreases, the heated oxygen sensor 2 (rear) switching frequency will increase.
When the frequency ratio of heated oxygen sensor 1 (front) and 2 (rear) approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0420	• Three way catalyst (manifold) does not operate properly. • Three way catalyst (manifold) does not have enough oxygen storage capacity.	• Three way catalyst (manifold) • Exhaust tube • Intake air leaks • Injectors • Injector leaks • Spark plug • Improper ignition timing

4

SRT WORK SUPPORT	
CATALYST	INCMP
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
B/FUEL SCHDL	XXX msec
A/F ALPHA-B1	XXX V
COOLAN TEMP/S	XX °C
HO2S1 (B1)	XXX V

SEF940Z

8

SRT WORK SUPPORT	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
B/FUEL SCHDL	XXX msec
A/F ALPHA-B1	XXX V
COOLAN TEMP/S	XX °C
HO2S1 (B1)	XXX V

SEF941Z

7

SELF DIAG RESULTS	
DTC RESULTS	TIME
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	

SEF535Z

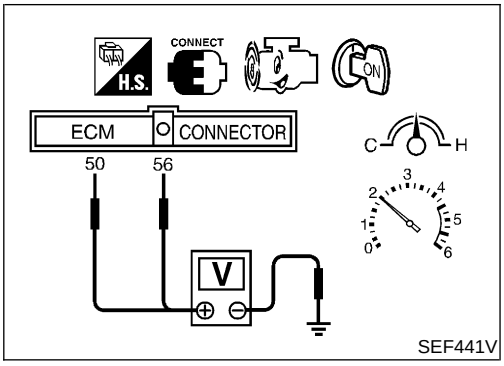
DTC Confirmation Procedure

NDEC0467

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” then “SRT WORK SUPPORT” mode with CONSULT-II.
3) Start engine.
4) Rev engine up to 2,000 to 3,000 rpm and hold for 3 consecutive minutes then release the accelerator pedal completely.
   If “INCMP” of CATALYST changes to “CMPLT”, go to step 7.
5) Wait 5 seconds at idle.
6) Rev engine up to 2,000 to 3,000 rpm and hold until “INCMP” of “CATALYST” changes to “CMPLT” (It will take approximately 5 minutes.)
   If not “CMPLT”, stop engine and cool down to less than 70°C (158°F) and then retest from step 1.
7) Select “SELF-DIAG RESULTS” mode with CONSULT-II.
8) Confirm that the 1st trip DTC is not detected.
   If the 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-311.



Overall Function Check

NDEC0208

Use this procedure to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

CAUTION:

Always drive vehicle at a safe speed.

With GST

1) Start engine and drive vehicle at a speed of more than 70 km/h (43 MPH) for 2 consecutive minutes.
2) Stop vehicle with engine running.
3) Set voltmeters probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground, and ECM terminal 56 [Heated oxygen sensor 2 (rear) signal] and engine ground.
4) Keep engine speed at 2,000 rpm constant under no load.
5) Make sure that the voltage switching frequency (high & low) between ECM terminal 56 and engine ground is very 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 (manifold) does not operate properly. Go to “Diagnostic Procedure”, EC-311.

NOTE:

If the voltage at ECM terminal 50 does not switch periodically more than 5 times within 10 seconds at step 5, perform trouble diagnosis for “DTC P0133” first. (See EC-204.)

Diagnostic Procedure

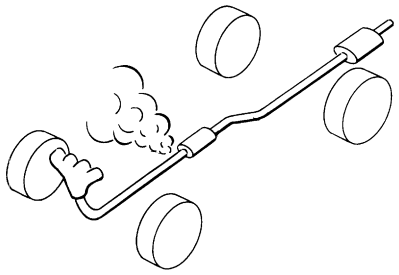
NDEC0209

1	CHECK EXHAUST SYSTEM	
Visually check exhaust tubes and muffler for dent. **OK or NG**		
OK	▶	GO TO 2.
NG	▶	Repair or replace it.

Diagnostic Procedure (Cont'd)

2	CHECK EXHAUST AIR LEAK

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



SEF099P

OK or NG

OK	▶	GO TO 3.
NG	▶	Repair or replace.

3	CHECK INTAKE AIR LEAK

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

OK or NG

OK	▶	GO TO 4.
NG	▶	Repair or replace.

4	CHECK IGNITION TIMING

Check the following items. Refer to "TROUBLE DIAGNOSIS — BASIC INSPECTION", EC-88.

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 0.2 mm (0.008 in): ON 0.3 mm (0.012 in): OFF
Target idle speed	750 ± 50 rpm (in "P" or "N" position)

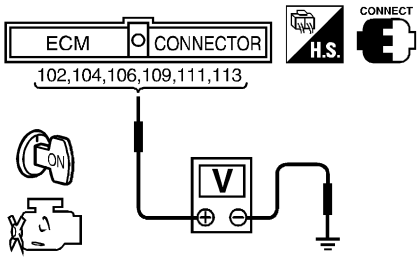
WEC126

OK or NG

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

5	CHECK INJECTORS

1. Refer to WIRING DIAGRAM for Injectors, EC-486.
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

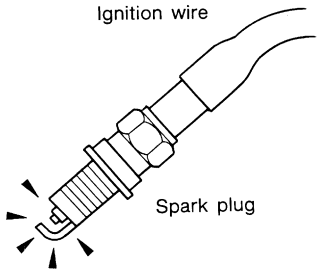
Battery voltage should exist.

OK or NG

OK	▶	GO TO 6.
NG	▶	Perform "Diagnostic Procedure", "INJECTOR", EC-487.

6	CHECK IGNITION SPARK

1. Turn ignition switch "OFF".
2. Disconnect ignition wire from spark plug.
3. Connect a known good spark plug to the ignition wire.
4. Place end of spark plug against a suitable ground and crank engine.
5. Check for spark.



SEF282G

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	CHECK IGNITION WIRES

Refer to "Component Inspection", EC-290.

OK or NG

OK	▶	Check ignition coil, power transistor and their circuits. Refer to EC-414.
NG	▶	Replace.

Diagnostic Procedure (Cont'd)

8	CHECK INJECTOR
1. Turn ignition switch "OFF". 2. Remove injector assembly. Refer to EC-36. 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.

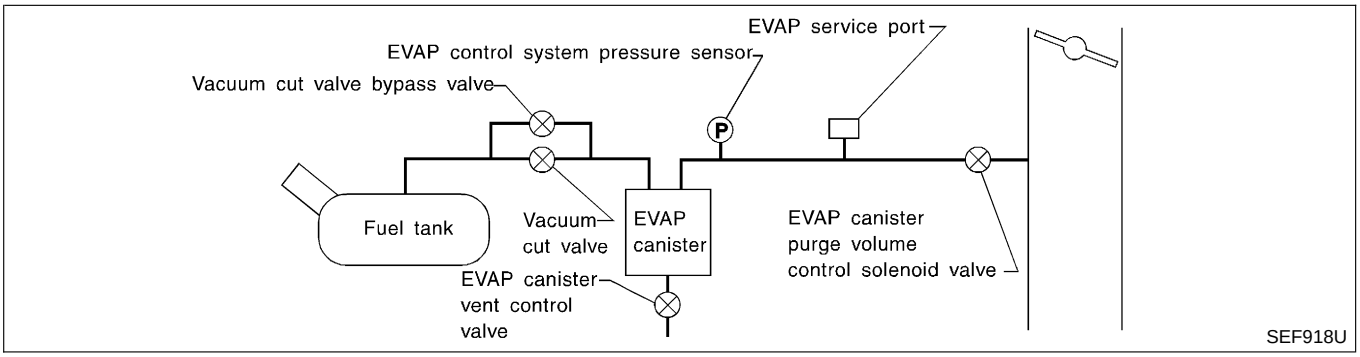
9	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.	
Trouble is fixed ▶	**INSPECTION END**
Trouble is not fixed ▶	Replace warm-up three way catalyst.

On Board Diagnosis Logic

NDEC0210

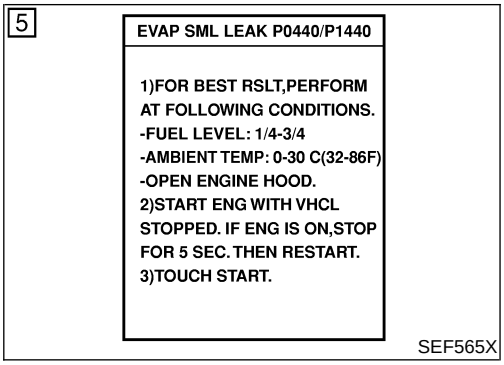
NOTE:
If DTC P0440 or P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-452.)

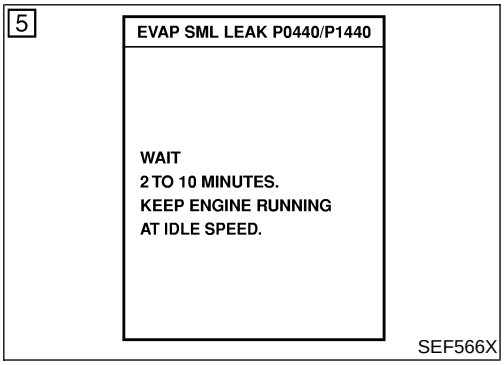
This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.
If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following “Vacuum test” conditions.
The vacuum cut valve bypass valve is opened to clear the line between the fuel tank and the EVAP canister purge volume control solenoid valve. The EVAP canister vent control valve will then be closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve is opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.

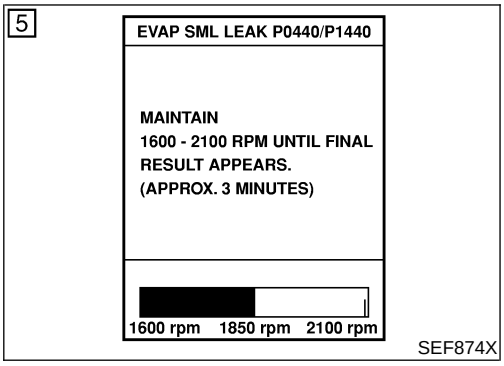


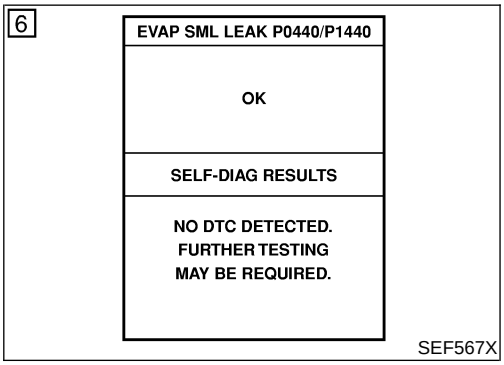
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0440	• EVAP control system has a leak. • EVAP control system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel filler cap remains open or fails to close. • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent. • Blocked or bent rubber tube to EVAP control system pressure sensor • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge volume control solenoid valve and the circuit • Absolute pressure sensor • Fuel tank temperature sensor • 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.

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

NDEC0211

NOTE:

- **If DTC P0440 or P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-452.)**
- **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).**
- **It is better that the fuel level is low.**

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/P1440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.

NOTE:

- If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to "Basic Inspection", EC-88.

6) Make sure that "OK" is displayed.
   If "NG" is displayed, refer to "Diagnostic Procedure", EC-317.

With GST

NOTE:

Be sure to read the explanation of "Driving Pattern" on EC-57 before driving vehicle.

1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-57.
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-57.
8) Stop vehicle.
9) Select "MODE 3" with GST.

- If P0440 is displayed on the screen, go to "Diagnostic Procedure", EC-317.

- If P1440 is displayed on the screen, go to "Diagnostic Procedure" for "DTC P1440", EC-427.
- If P1447 is displayed on the screen, go to "Diagnostic Procedure" for "DTC P1447", EC-446.
- If P0440, P1440 and P1447 are not displayed on the screen, go to the following step.

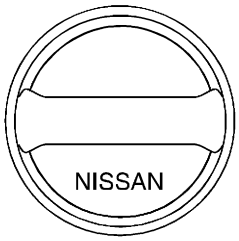
10) Select "MODE 1" with GST.
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

NDEC0212

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)

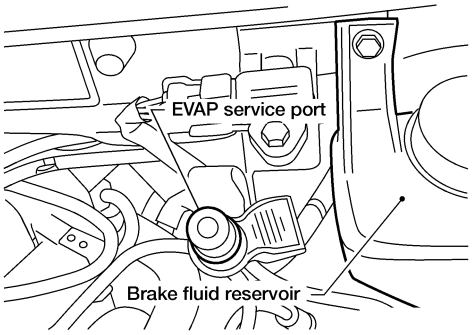
Refer to "Evaporative Emission System", EC-28.

OK or NG

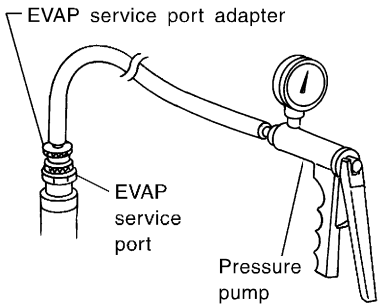
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

5	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



AEC802A



SEF916U

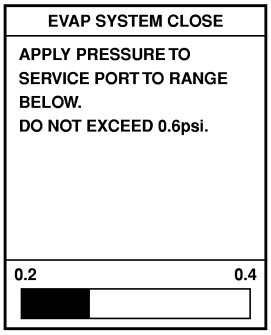
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

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

6	CHECK FOR EVAP LEAK

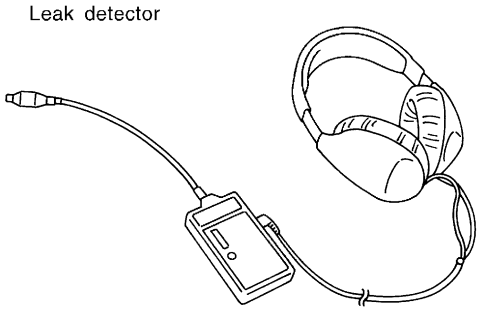
With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**



PEF917U

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-32.



SEF200U

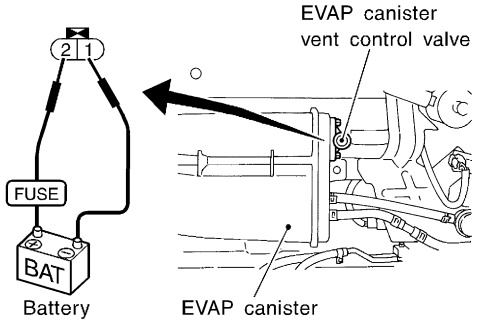
OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

7	CHECK FOR EVAP LEAK

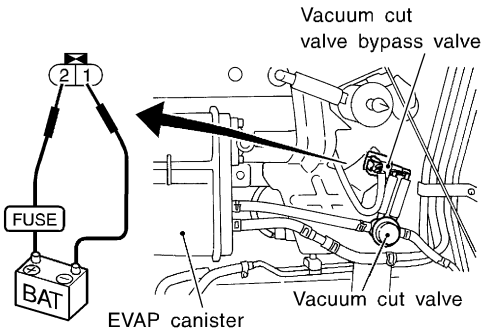
Without CONSULT-II

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.)



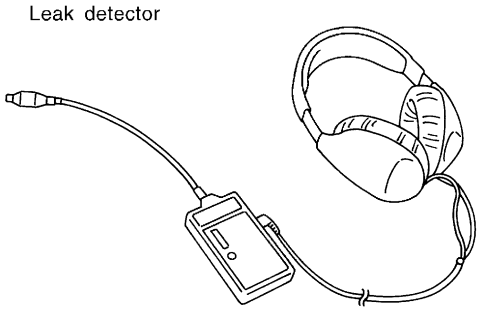
SEF420V

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



SEF421V

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-32.



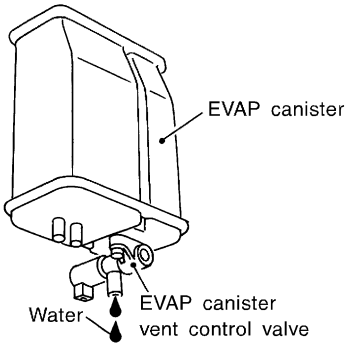
SEF200U

OK or NG

OK	▶	GO TO 8.
NG	▶	Repair or replace.

8	CHECK WATER SEPARATOR	
Refer to "Component Inspection", EC-443.		
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-334.		
OK or NG		
OK	▶	GO TO 10.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

10	CHECK IF EVAP CANISTER SATURATED WITH WATER	
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister.		
 SEF596U		
Yes or No		
Yes	▶	GO TO 11.
No (With CONSULT-II)	▶	GO TO 13.
No (Without CONSULT-II)	▶	GO TO 14.

11	CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve attached. **The weight should be less than 1.8 kg (4.0 lb).**		
OK or NG		
OK (With CONSULT-II)	▶	GO TO 13.
OK (Without CONSULT-II)	▶	GO TO 14.
NG	▶	GO TO 12.

12	DETECT MALFUNCTIONING PART	
Check the following. ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection		
	▶	Repair hose or replace EVAP canister.

13	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

SEF801Y

Vacuum should exist.

OK or NG

OK	▶	GO TO 17.
NG	▶	GO TO 15.

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.
   Vacuum should exist.

OK or NG

OK	▶	GO TO 17.
NG	▶	GO TO 15.

15	CHECK VACUUM HOSE

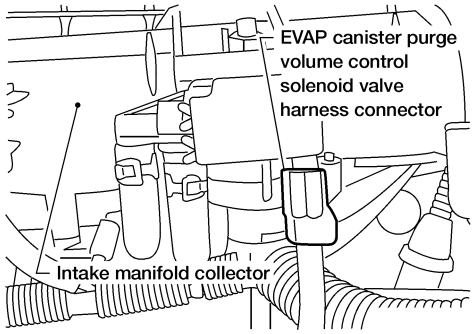
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-22.

OK or NG

OK	▶	GO TO 16.
NG	▶	Repair or reconnect the hose.

16	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to "Component Inspection", EC-332.



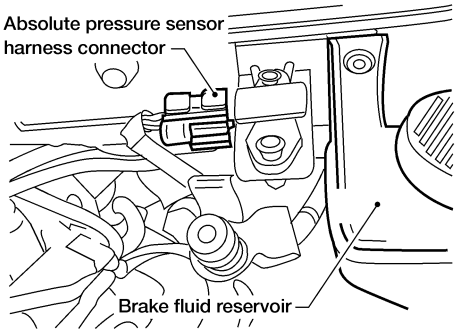
AEC804A

OK or NG

OK	▶	GO TO 17.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

17	CHECK ABSOLUTE PRESSURE SENSOR

Refer to "Component Inspection", EC-153.



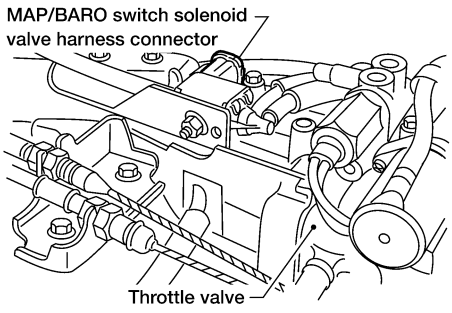
AEC794A

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace absolute pressure sensor.

18	CHECK MAP/BARO SWITCH SOLENOID VALVE AND CIRCUIT

Refer to "Component Inspection", EC-394.



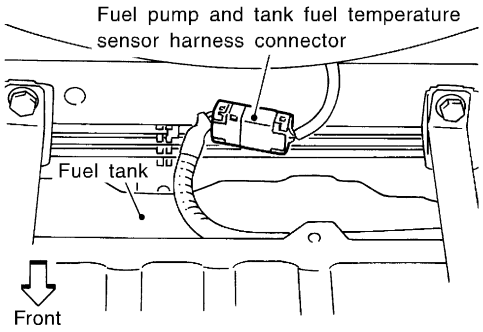
LEC752

OK or NG

OK	▶	GO TO 19.
NG	▶	Replace MAP/BARO switch solenoid valve.

19	CHECK FUEL TANK TEMPERATURE SENSOR

Refer to "Component Inspection", EC-284.



SEF974U

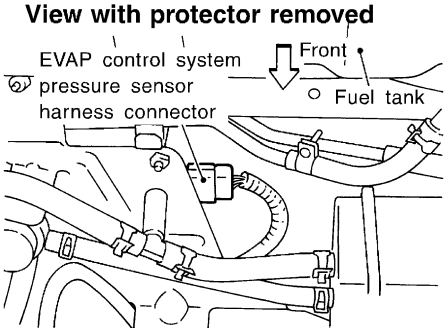
OK or NG

OK	▶	GO TO 20.
NG	▶	Replace fuel tank temperature sensor.

20	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to "Component Inspection", EC-347.

View with protector removed



SEF092V

OK or NG

OK	▶	GO TO 21.
NG	▶	Replace EVAP control system pressure sensor.

21	CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to "Evaporative Emission System", EC-28.

OK or NG

OK	▶	GO TO 22.
NG	▶	Repair or reconnect the hose.

22	CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

▶ GO TO 23.

23	CHECK FUEL LEVEL SENSOR	
1. Remove fuel level sensor assembly. Refer to FE section. 2. Refer to "FUEL LEVEL SENSOR UNIT CHECK", ***EL-99***.		
OK or NG		
OK	▶	GO TO EC-325
NG	▶	Replace fuel level sensor.

24	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.	
▶	**INSPECTION END**

Description

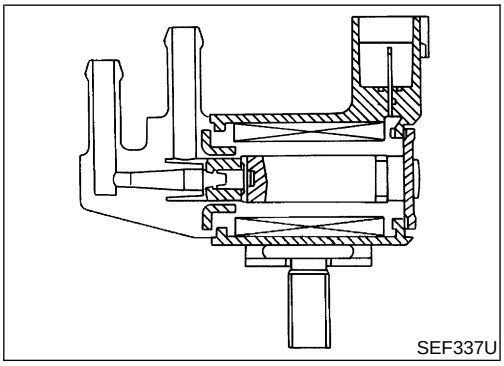
NDEC0214

SYSTEM DESCRIPTION

NDEC0214S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
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

NDEC0214S02

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

NDEC0215

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	—

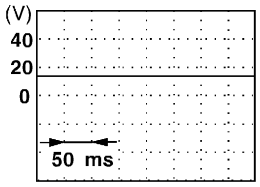
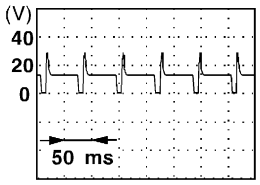
ECM Terminals and Reference Value

NDEC0216

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

CAUTION:

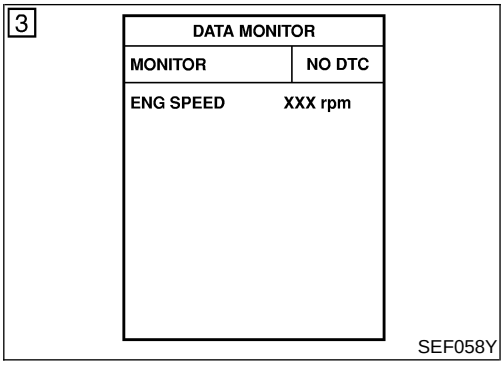
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	W/G	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	G/B	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/W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
72	B/W			
117	B/W	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NDEC0217

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0443	An improper voltage signal is sent to ECM through the valve.	● Harness or connectors (The valve circuit is open or shorted.) ● EVAP canister purge volume control solenoid valve



DTC Confirmation Procedure

NDEC0218

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-330.

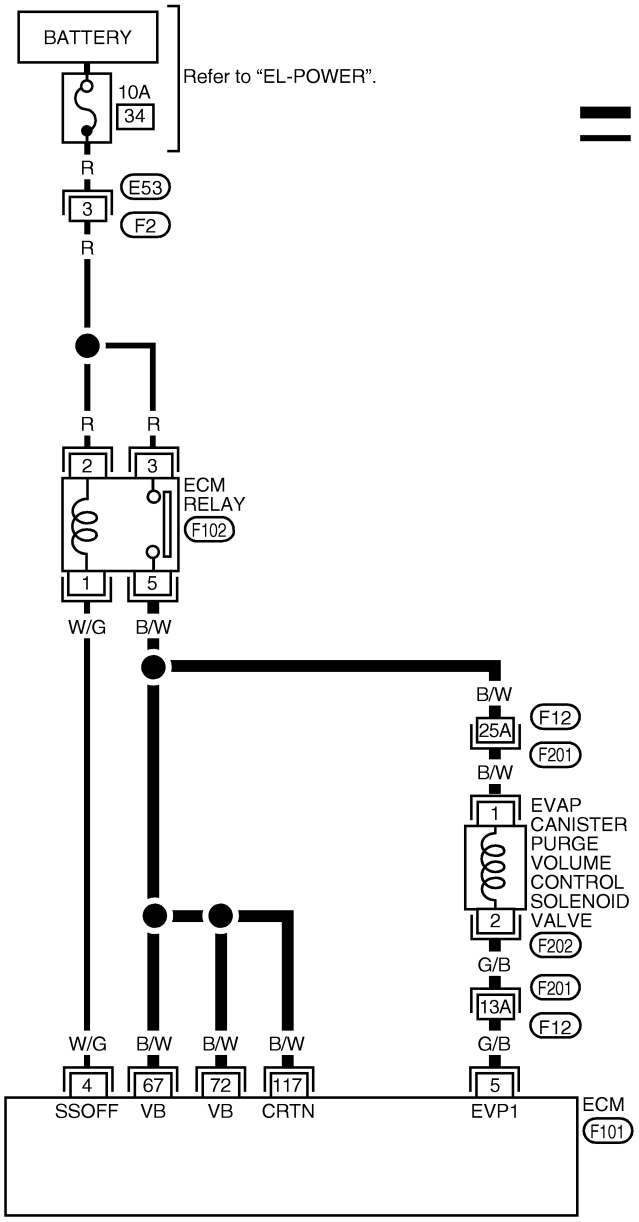
With GST

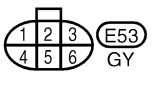
Follow the procedure with “With CONSULT-II”.

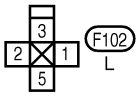
Wiring Diagram

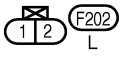
NDEC0219

EC-PGC/V-01

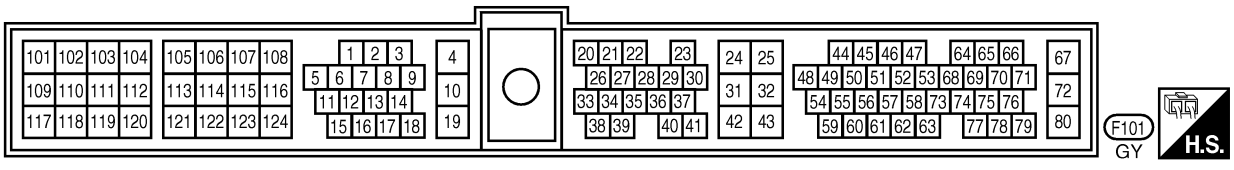








Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)



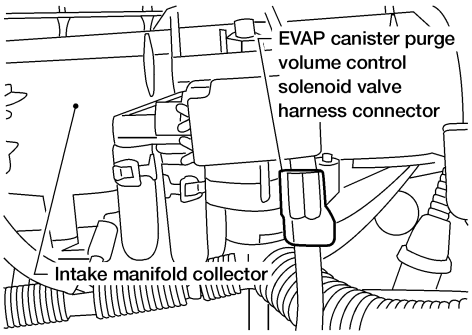
WEC079

Diagnostic Procedure

NDEC0220

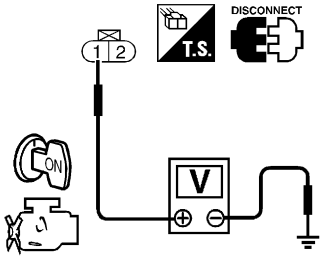
1	CHECK POWER SUPPLY

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



AEC804A

3. Turn ignition switch “ON”.
4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.



SEF057W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

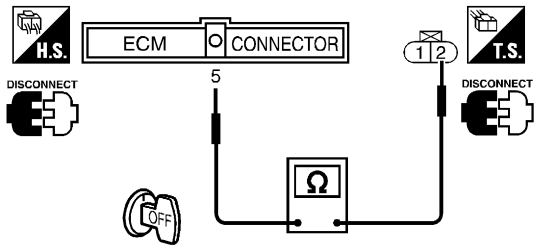
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, F201
- 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 EVAP canister purge volume control solenoid valve terminal 2.



SEF058W

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 F12, F201
- 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

Refer to "Component Inspection", EC-332.

OK or NG

OK	▶	GO TO 6.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

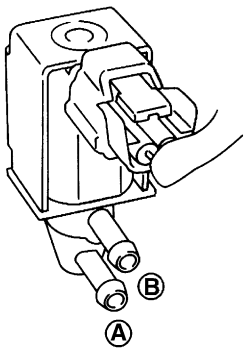
6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.

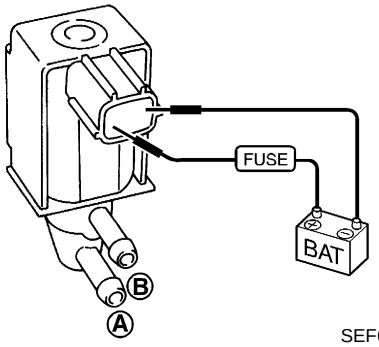
	▶	**INSPECTION END**

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

SEF801Y



SEF660U



SEF661U

Component Inspection

NDEC0221

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

NDEC0221S01

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

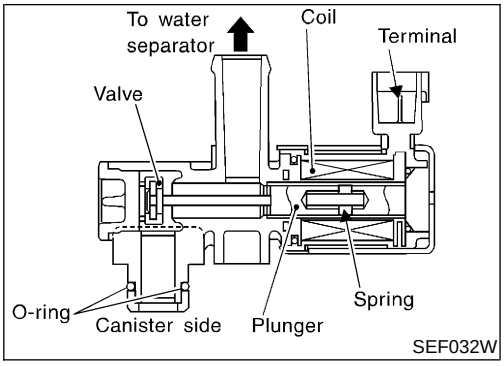
If NG, replace the EVAP canister purge volume control solenoid valve.

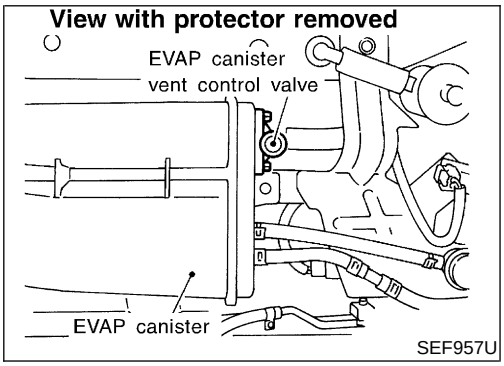
Without CONSULT-II

Check air passage continuity.

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

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





Component Description

NDEC0222

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

NDEC0223

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NDEC0224

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

CAUTION:

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

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

On Board Diagnosis Logic

NDEC0225

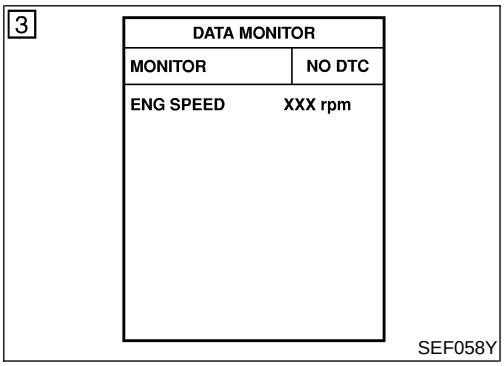
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0446	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	• Harness or connectors (The valve circuit is open or shorted.) • EVAP canister vent control valve

DTC Confirmation Procedure

NDEC0226

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

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



With CONSULT-II

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and wait at least 8 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-336.

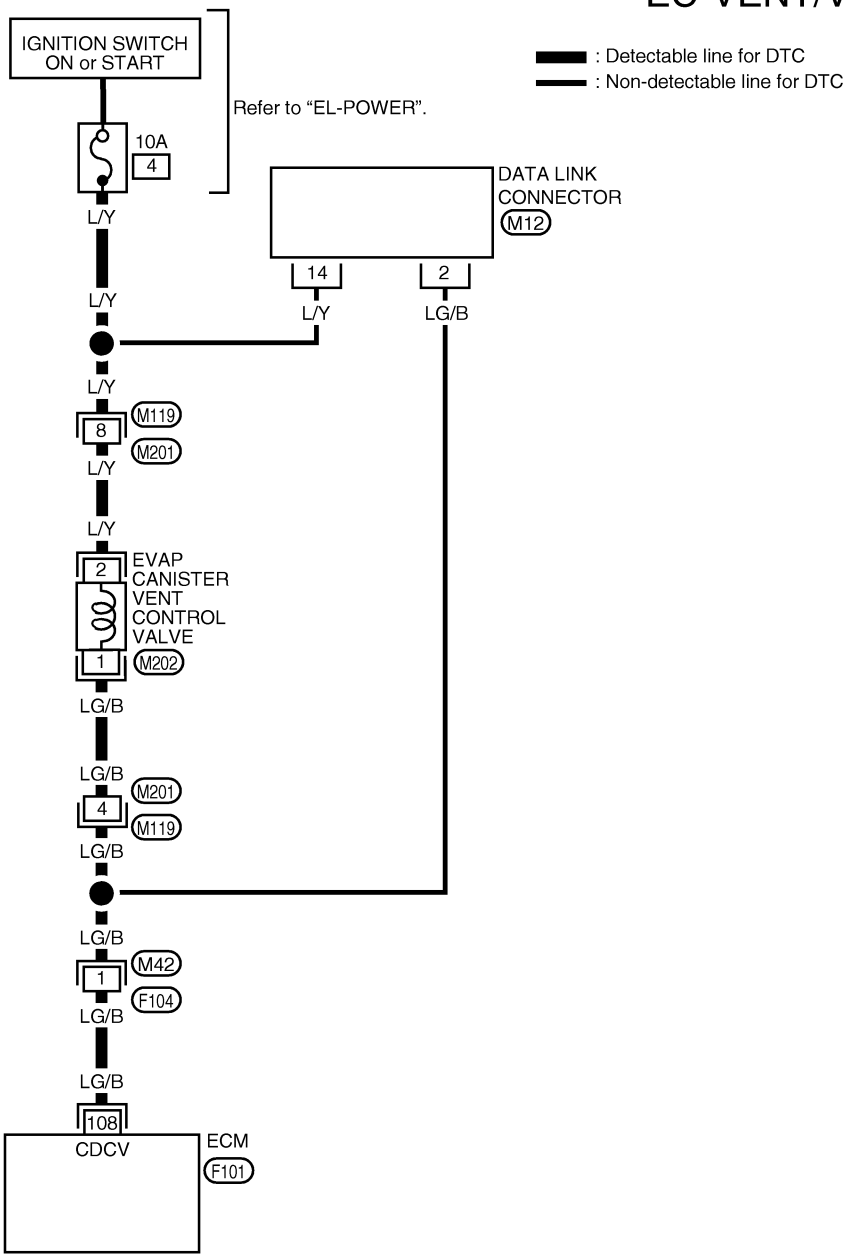
With GST

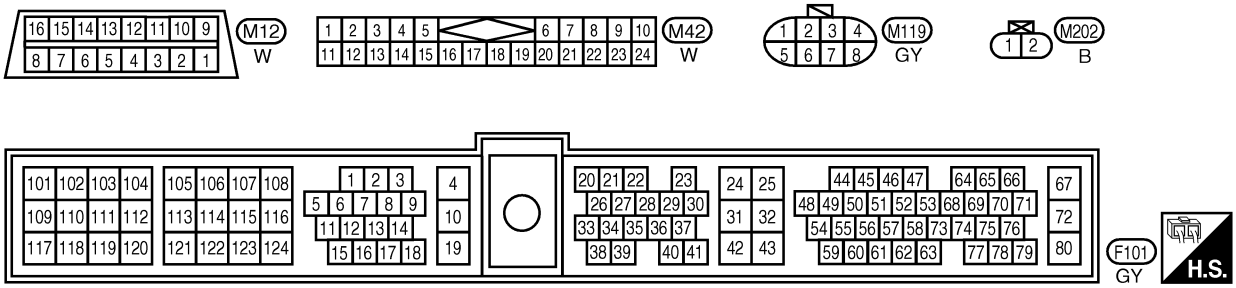
Follow the procedure “With CONSULT-II”.

Wiring Diagram

NDEC0228

EC-VENT/V-01





WEC637

Diagnostic Procedure

NDEC0229

1	INSPECTION START
Do you have CONSULT-II? **Yes or No**	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

1. Turn ignition switch “OFF” and then turn “ON”.
2. Select “VENT CONTROL/V” in “ACTIVE TEST” mode with CONSULT-II.
3. Touch “ON/OFF” on CONSULT-II screen.

ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

SEF802Y

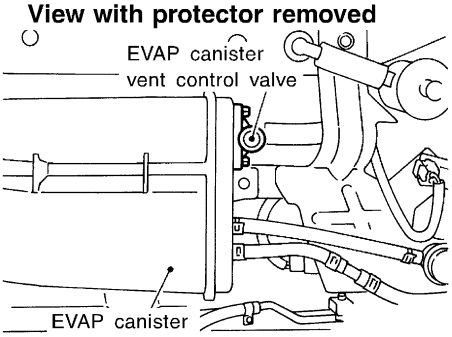
4. Check for operating sound of the valve.
   Clicking noise should be heard.

OK or NG	
OK ▶	GO TO 7.
NG ▶	GO TO 3.

3	CHECK POWER SUPPLY

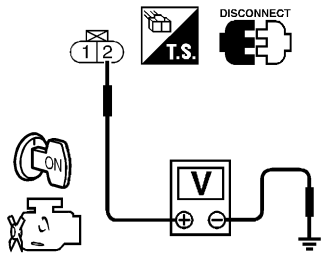
1. Turn ignition switch "OFF".
2. Disconnect EVAP canister vent control valve harness connector.

View with protector removed



SEF957U

3. Turn ignition switch "ON".
4. Check voltage between EVAP canister vent control valve terminal 2 and ground with CONSULT-II or tester.



SEF884U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

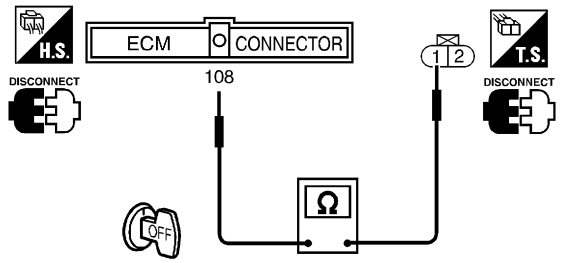
Check the following.
- Harness connectors M119, M201
- 10A fuse
- Harness for open or short between EVAP canister vent control valve and fuse

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

5	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and EVAP canister vent control valve terminal 1.



SEF885U

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 M119, M201
- Harness connectors M42, F104
- 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

Refer to "Component Inspection", EC-338.

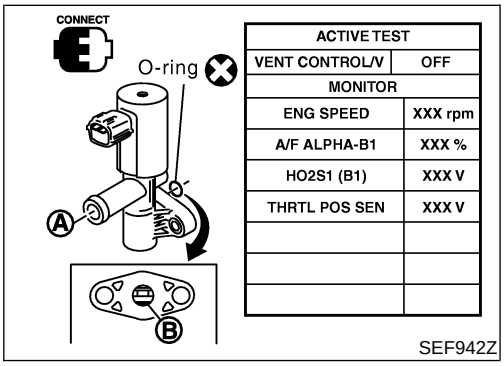
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace EVAP canister vent control valve.

8	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.

	▶	**INSPECTION END**



SEF942Z

Component Inspection

NDEC0230

EVAP CANISTER VENT CONTROL VALVE

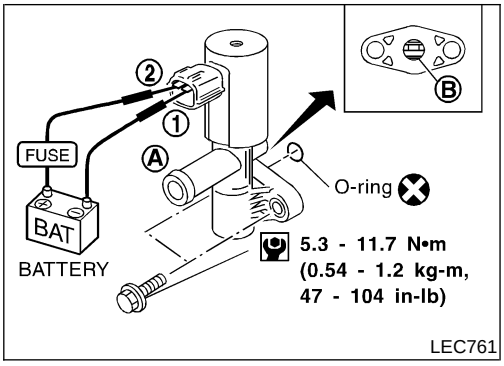
NDEC0230S01

Check air passage continuity.

With CONSULT-II

Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.

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



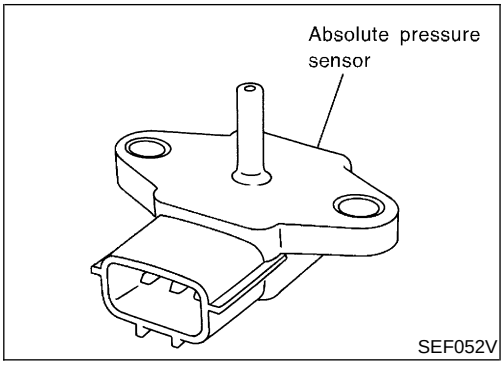
Without CONSULT-II

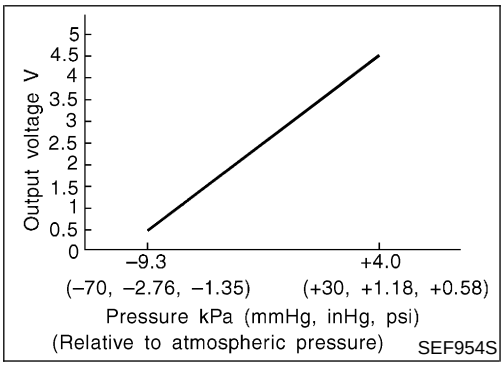
Condition	Air passage continuity between **A** and **B**
12V direct current supply between terminals 1 and 2	No
No supply	Yes

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If portion B is rusted, replace EVAP canister vent control valve.

Make sure new O-ring is installed properly.





Component Description

NDEC0231

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

NDEC0232

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	Approx. 3.4V

ECM Terminals and Reference Value

NDEC0233

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	BR	Sensors' power supply	**[Ignition switch "ON"]**	Approximately 5V
43	B/Y	Sensors' ground	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
62	R	EVAP control system pressure sensor	**[Ignition switch "ON"]**	Approximately 3.4V

On Board Diagnosis Logic

NDEC0234

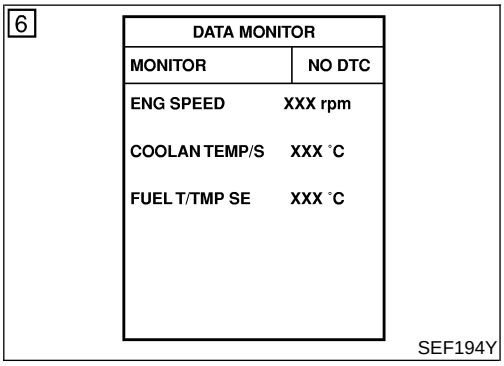
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0450	• An improper voltage signal from EVAP control system pressure sensor is sent to ECM.	• Harness or connectors (The EVAP control system pressure sensor circuit is open or shorted.) • Rubber hose to EVAP control system pressure 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

NDEC0235

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

TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.



With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON".
4) Select "DATA MONITOR" mode with CONSULT-II.
5) Make sure that "FUEL T/TMP 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-343.

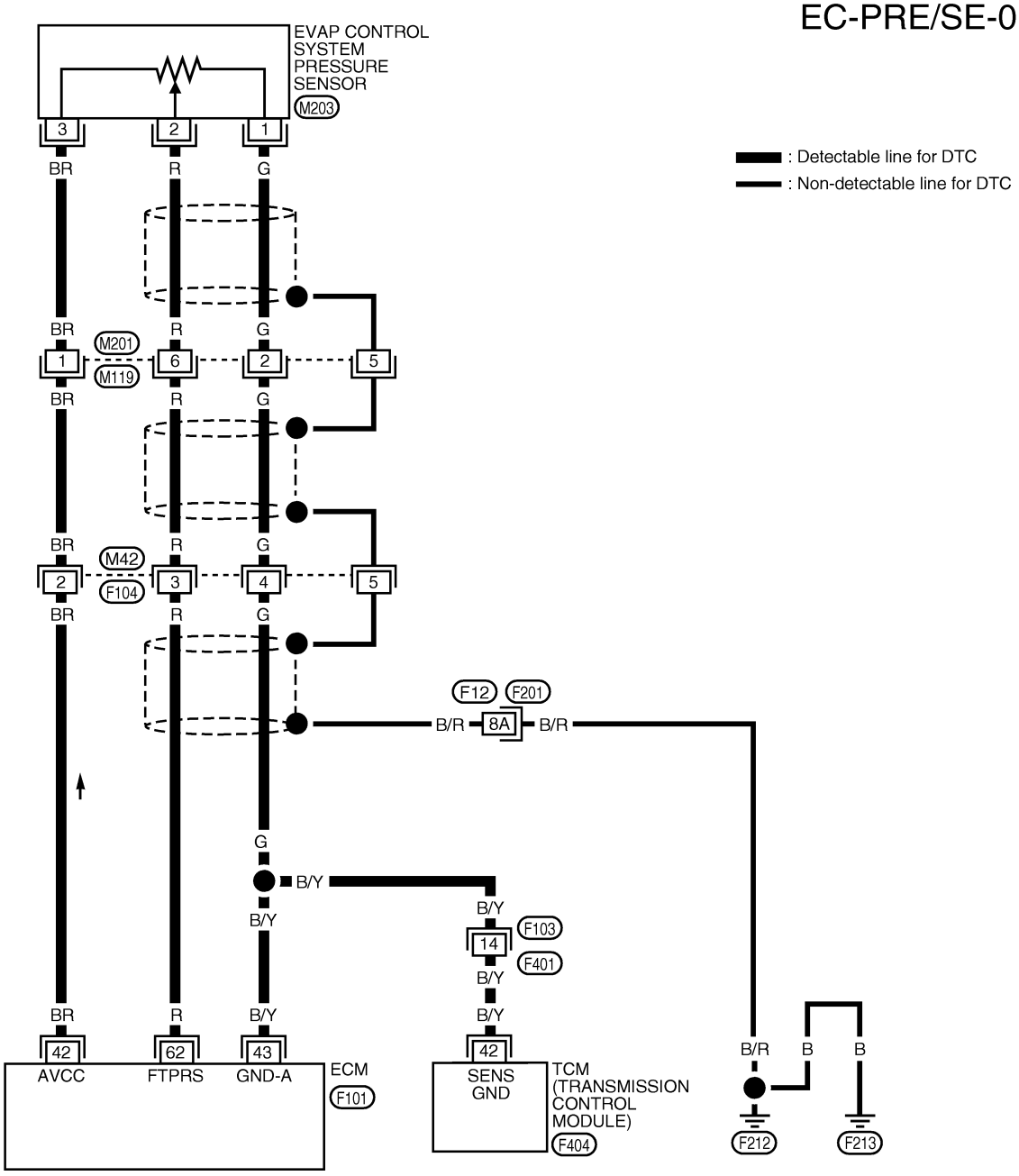
With GST

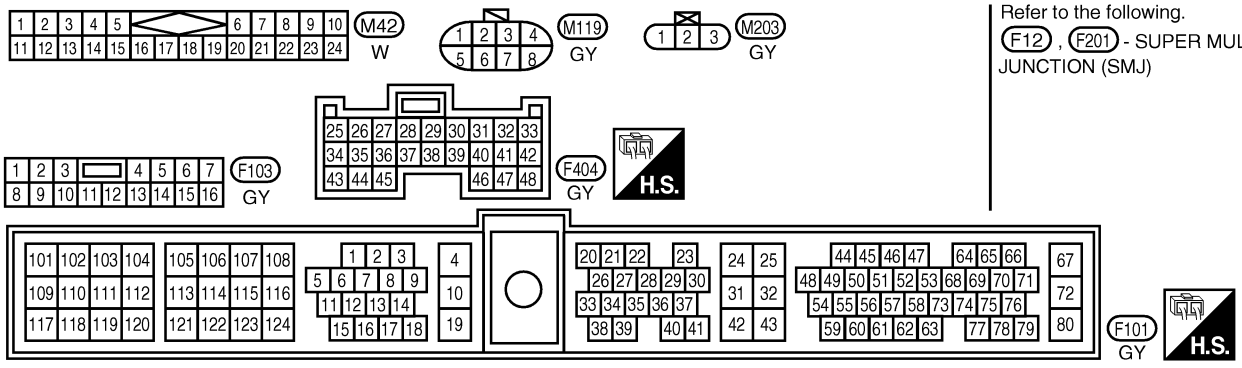
Follow the Procedure "With CONSULT-II".

Wiring Diagram

NDEC0236

EC-PRE/SE-01





Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)

WEC080

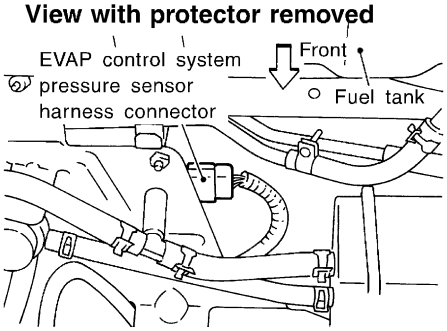
Diagnostic Procedure

NDEC0237

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.

View with protector removed



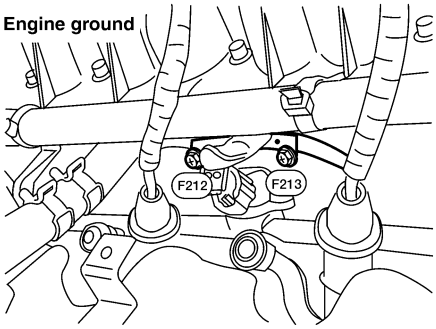
SEF092V

OK or NG

OK	▶	GO TO 2.
NG	▶	Reconnect, repair or replace.

2	RETIGHTEN GROUND SCREWS

1. Loosen and retighten engine ground screws.



LEC749

	▶	GO TO 3.

3	CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.

Water should not exist.

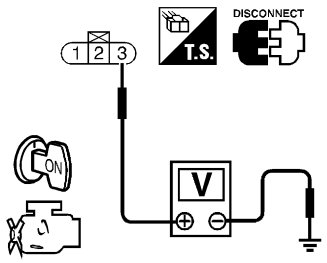
OK or NG

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

Diagnostic Procedure (Cont'd)

4	CHECK POWER SUPPLY

1. Turn ignition switch "ON".
2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-II or tester.



SEF889U

Voltage: Approximately 5V

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

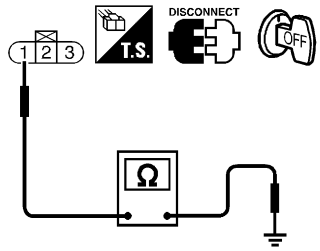
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M201, M119
- Harness connectors M42, F104
- 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.



SEF890U

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

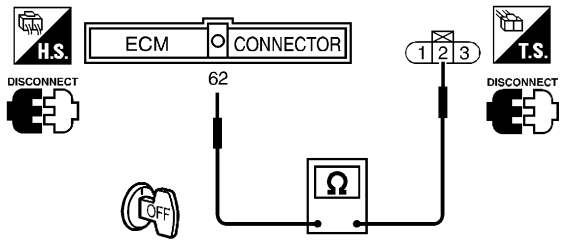
7	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M201, M119
- Harness connectors M42, F104
- Harness connectors F103, F401
- Harness for open or short between EVAP control system pressure sensor and ECM
- Harness for open or short between EVAP control system pressure sensor and TCM (Transmission control module)

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

8	CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 62 and EVAP control system pressure sensor terminal 2.



SEF891U

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 M201, M119
- Harness connectors M42, F104
- 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

Refer to "Component Inspection", EC-332.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

11	CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to "Component Inspection", EC-338.

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace EVAP canister vent control valve.

12	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to "Component Inspection", EC-347.

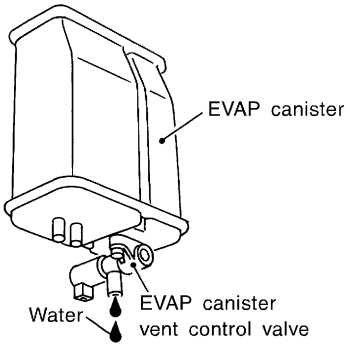
OK or NG

OK	▶	GO TO 13.
NG	▶	Replace EVAP control system pressure sensor.

Diagnostic Procedure (Cont'd)

13	CHECK RUBBER TUBE
1. Check obstructed rubber tube connected to EVAP canister vent control valve. 2. Clean the rubber tube using air blower. **OK or NG**	
OK ▶	GO TO 14.
NG ▶	Clean, repair or replace rubber tube.

14	CHECK IF EVAP CANISTER SATURATED WITH WATER
1. Remove EVAP canister with EVAP canister vent control valve attached. 2. Check if water will drain from the EVAP canister.	



SEF596U

Yes or No

Yes ▶	GO TO 15.
No ▶	GO TO 17.

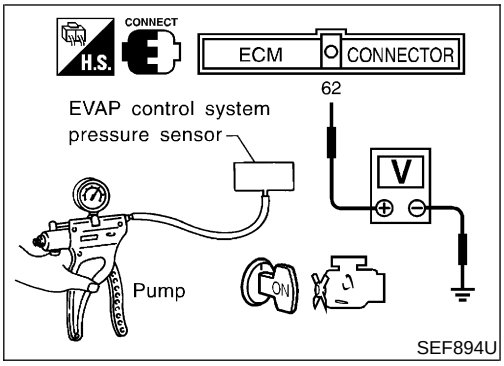
15	CHECK EVAP CANISTER
Weigh the EVAP canister with the EVAP canister vent control valve attached. **The weight should be less than 1.8 kg (4.0 lb).** **OK or NG**	
OK ▶	GO TO 17.
NG ▶	GO TO 16.

16	DETECT MALFUNCTIONING PART
Check the following. ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection	
▶	Repair hose or replace EVAP canister.

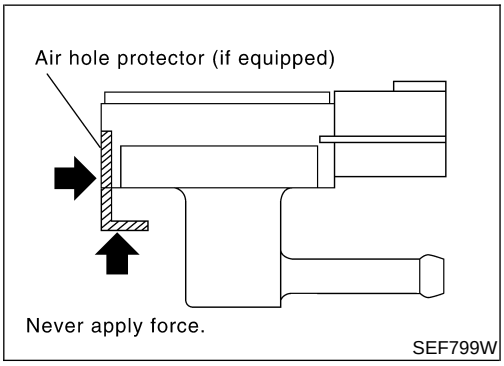
17	CHECK SHIELD CIRCUIT
1. Reconnect harness connectors disconnected. 2. Disconnect harness connectors M201, M119. 3. Check harness continuity between harness connector M119 and engine ground. **Continuity should exist.** 4. Also check harness for short to power. **OK or NG**	
OK ▶	GO TO 19.
NG ▶	GO TO 18.

18	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M201, M119 ● Harness connectors M42, F104 ● Harness connectors F12, F201 ● Harness for open between harness connector M119 and engine ground	
▶	Repair open circuit or short to power in harness or connectors.

19	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.	
▶	**INSPECTION END**



SEF894U



SEF799W

Component Inspection

EVAP CONTROL SYSTEM PRESSURE SENSOR

NDEC0238

NDEC0238S01

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 (EVAP control system pressure sensor signal) and ground.

Pressure (Relative to atmospheric pressure)	Voltage (V)
0 kPa (0 mmHg, 0 inHg)	3.0 - 3.6
−9.3 kPa (−70 mmHg, −2.76 inHg)	0.4 - 0.6

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.**

6. If NG, replace EVAP control system pressure sensor.

CAUTION:

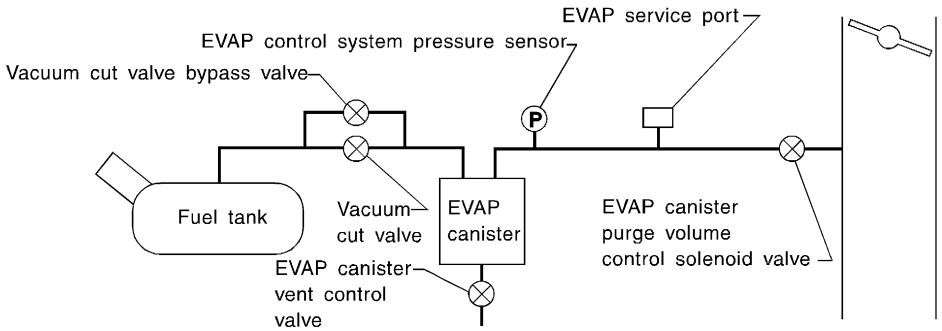
- **Never apply force to the air hole protector of the sensor if equipped.**
- **Discard any EVAP control system pressure sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

On Board Diagnosis Logic

NDEC0543

NOTE:
If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-452.)

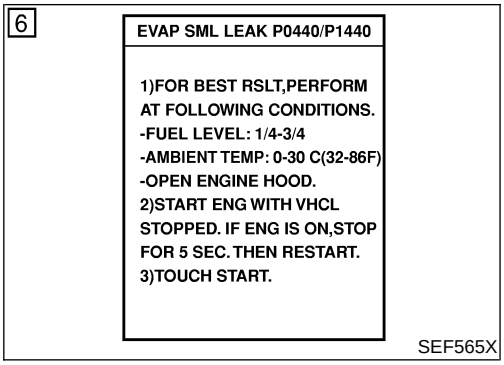
This diagnosis detects a very large leak (fuel filler cap fell off, etc.) in the EVAP system, between the fuel tank and the EVAP canister purge volume control solenoid valve.

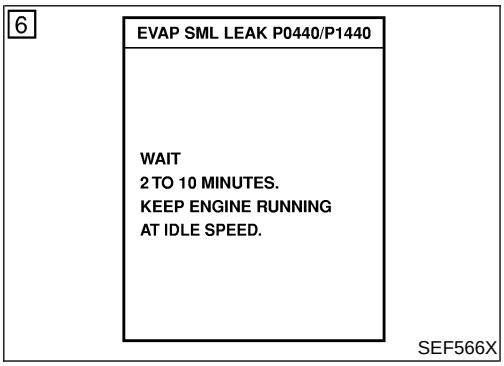


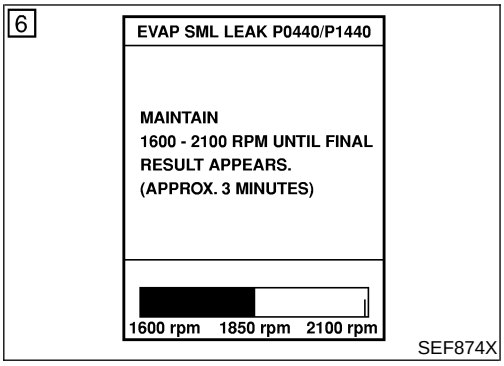
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0455	• EVAP system has a very large leak such as fuel filler cap fell off. • EVAP control system does not operate properly.	• Fuel filler cap remains open or fails to close. • Incorrect fuel tank vacuum relief valve • Incorrect fuel 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 • 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

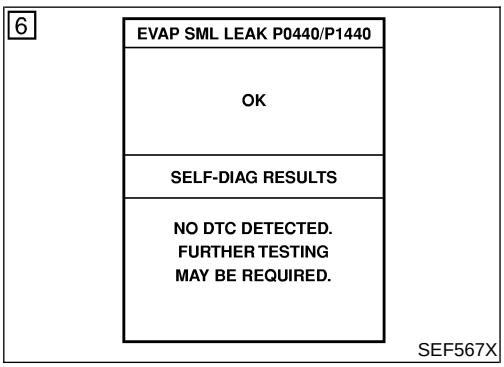
CAUTION:

- **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

NDEC0544

CAUTION:

Never remove fuel filler cap during the DTC Confirmation Procedure.

NOTE:

- **If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-452.)**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.**
- **Open engine hood before conducting the following procedure.**
- **It is better that the fuel level is low.**

With CONSULT-II

1) Tighten fuel filler cap securely until racheting 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/P1440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II. Follow the instruction displayed.

NOTE:

- If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to "Basic Inspection", EC-88.

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-350.
If P0440 is displayed, perform "Diagnostic Procedure" for P0440. Refer to EC-317.

With GST

NOTE:

Be sure to read the explanation of "Driving Pattern" on EC-57 before driving vehicle.

1) Start engine.
2) Drive vehicle according to "Driving Pattern", EC-57.
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-57.
8) Stop vehicle.
9) Select "MODE 3" with GST.

- If P0440 is displayed on the screen, go to "Diagnostic Procedure", EC-317.
- If P1440 is displayed on the screen, go to "Diagnostic Procedure" for "DTC P1440", EC-427.
- If P1447 is displayed on the screen, go to "Diagnostic Procedure" for "DTC P1447", EC-446.
- If P0440, P1440 and P1447 are not displayed on the screen, go to the following step.

10) Select "MODE 1" with GST.

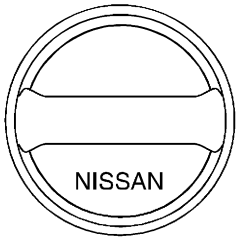
- If SRT of EVAP system is set, the result will be OK.
- If SRT of EVAP system is not set, go to step 6.

Diagnostic Procedure

NDEC0545

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)	
Refer to "Evaporative Emission System", EC-28. **OK or NG**		
OK	▶	GO TO 5.
NG	▶	Replace fuel filler cap with a genuine one.

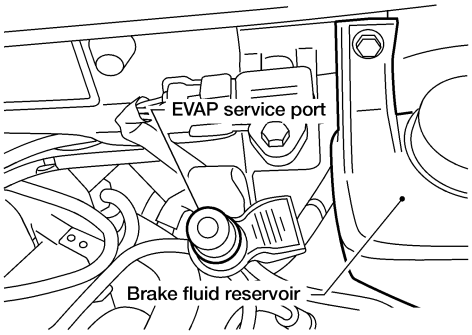
5	CHECK EVAP PURGE LINE	
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection. Refer to "Evaporative Emission System", EC-28. **OK or NG**		
OK	▶	GO TO 6.
NG	▶	Repair or reconnect the hose.

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

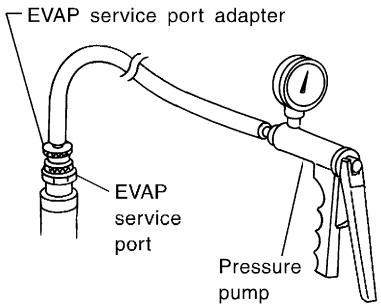
7	CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT	
Refer to "DTC Confirmation Procedure", EC-334. **OK or NG**		
OK	▶	GO TO 8.
NG	▶	Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

8	INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



AEC802A



SEF916U

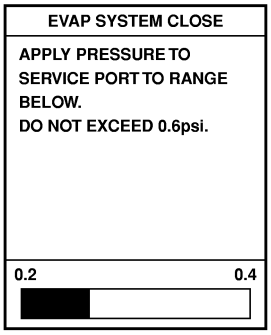
NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II ▶	GO TO 9.
Models without CONSULT-II ▶	GO TO 10.

9	CHECK FOR EVAP LEAK

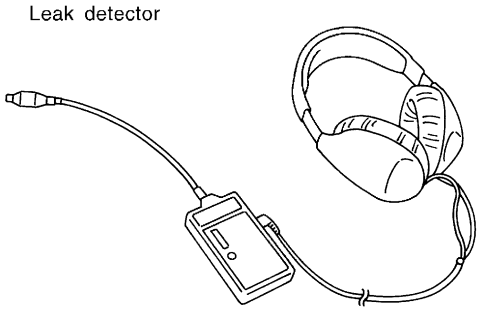
With CONSULT-II

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-32.



SEF200U

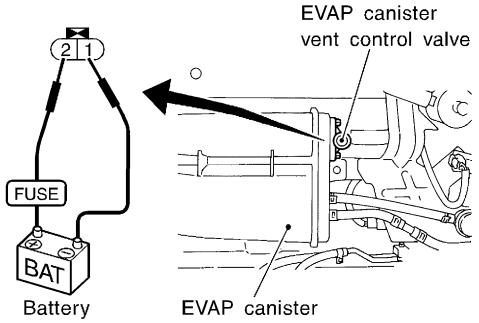
OK or NG

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

10	CHECK FOR EVAP LEAK

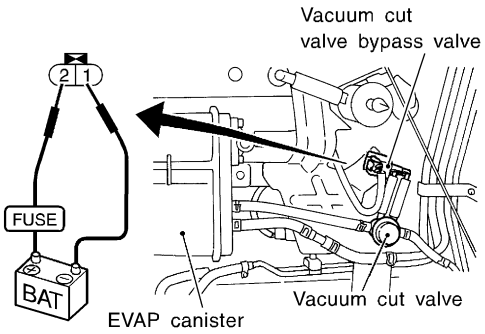
Without CONSULT-II

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.)



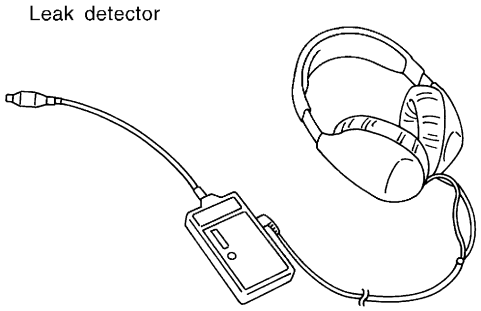
SEF420V

3. Apply 12 volts DC to vacuum cut valve bypass valve. The valve will open. (Continue to apply 12V until the end of test.)



SEF421V

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-32.



SEF200U

OK or NG

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

11	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

SEF801Y

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

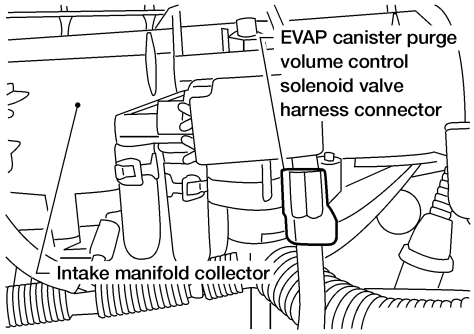
Check vacuum hoses for clogging or disconnection. Refer to "Vacuum Hose Drawing", EC-22.

OK or NG

OK	▶	GO TO 14.
NG	▶	Repair or reconnect the hose.

14	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to "Component Inspection", EC-332.



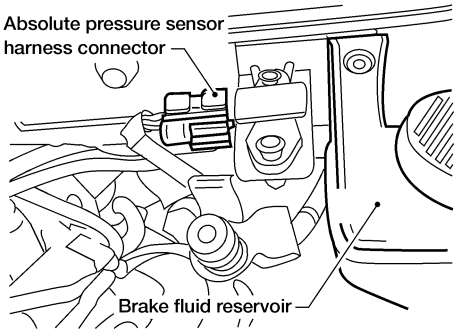
AEC804A

OK or NG

OK	▶	GO TO 15.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

15	CHECK ABSOLUTE PRESSURE SENSOR

Refer to "Component Inspection", EC-153.



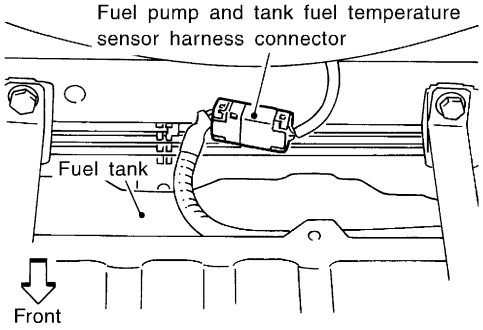
AEC794A

OK or NG

OK	▶	GO TO 16.
NG	▶	Replace absolute pressure sensor.

16	CHECK FUEL TANK TEMPERATURE SENSOR

Refer to "Component Inspection", EC-284.



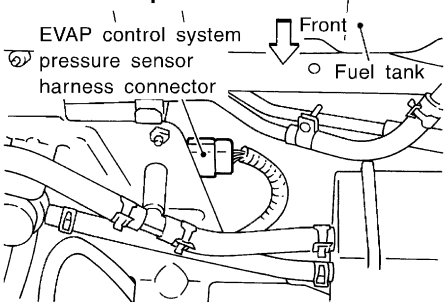
SEF974U

OK or NG

OK	▶	GO TO 17.
NG	▶	Replace fuel tank temperature sensor.

17	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	
Refer to "Component Inspection", EC-347.		

View with protector removed

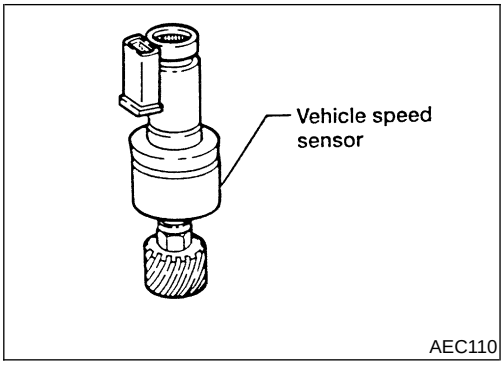


SEF092V

OK or NG

OK	▶	GO TO 18.
NG	▶	Replace EVAP control system pressure sensor.

18	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.		
	▶	**INSPECTION END**



Component Description

NDEC0239

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.

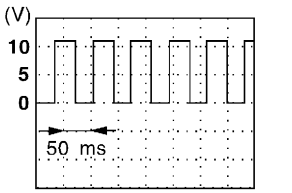
ECM Terminals and Reference Value

NDEC0240

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	G/Y	Vehicle speed sensor	**[Engine is running]** ● Lift up the vehicle ● In 1st gear position ● Vehicle speed is 40 km/h (25 MPH)	2 - 3V  SEF642U

On Board Diagnosis Logic

NDEC0241

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0500	● The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	● Harness or connector (The vehicle speed sensor circuit is open or shorted.) ● Vehicle speed sensor

DTC Confirmation Procedure

NDEC0242

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.

5

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
B/FUEL SCHDL	XXX msec
PW/ST SIGNAL	OFF
VHCL SPEED SE	XXX km/h

SEF196Y

With CONSULT-II

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-361.
   If OK, go to following step.
3) Select "DATA MONITOR" mode with CONSULT-II.
4) Warm engine up to normal operating temperature.
5) Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 1,600 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	6.0 - 15 msec
Selector lever	Suitable position
PW/ST SIGNAL	OFF

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-361.

Overall Function Check

NDEC0468

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.

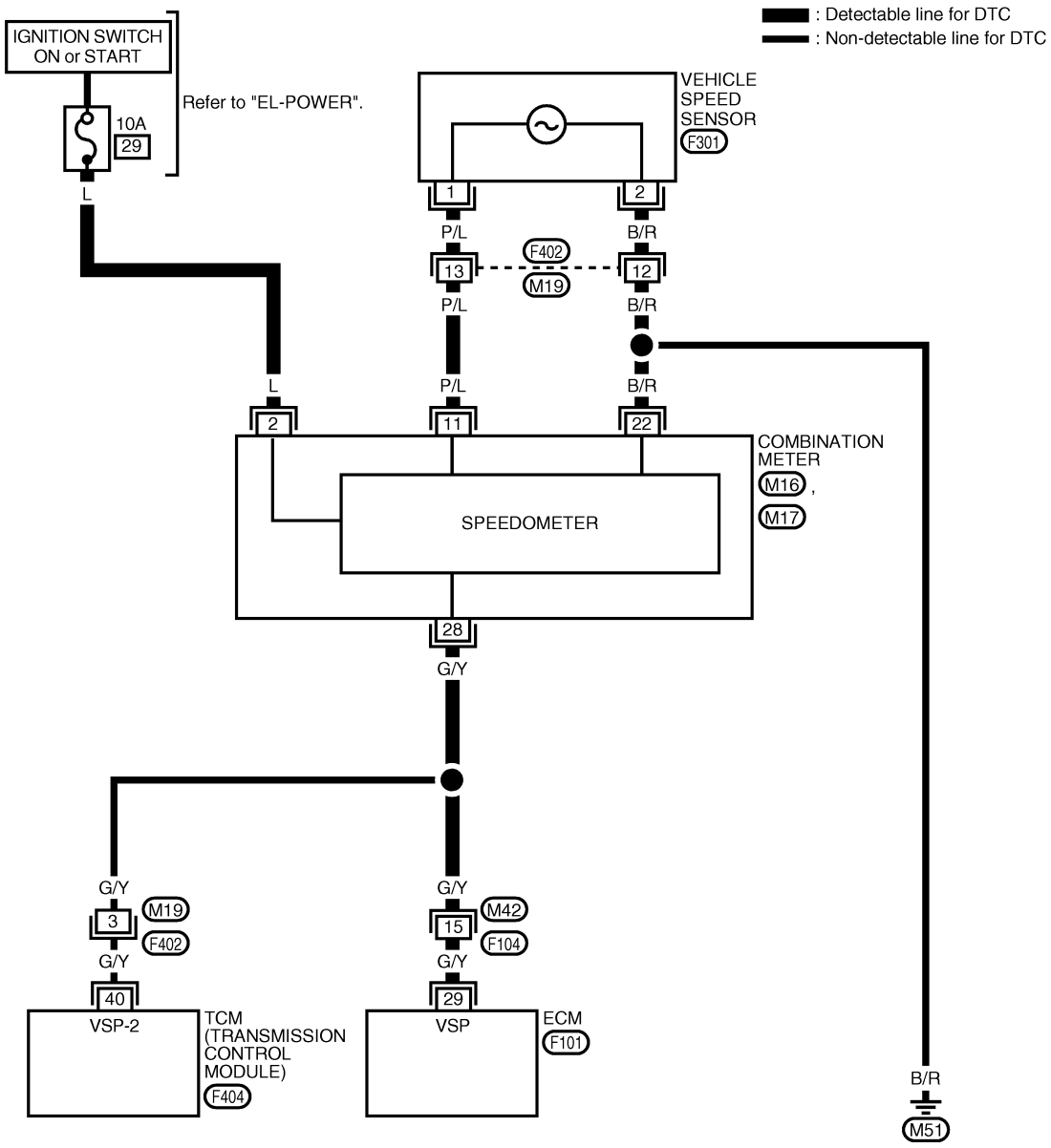
With GST

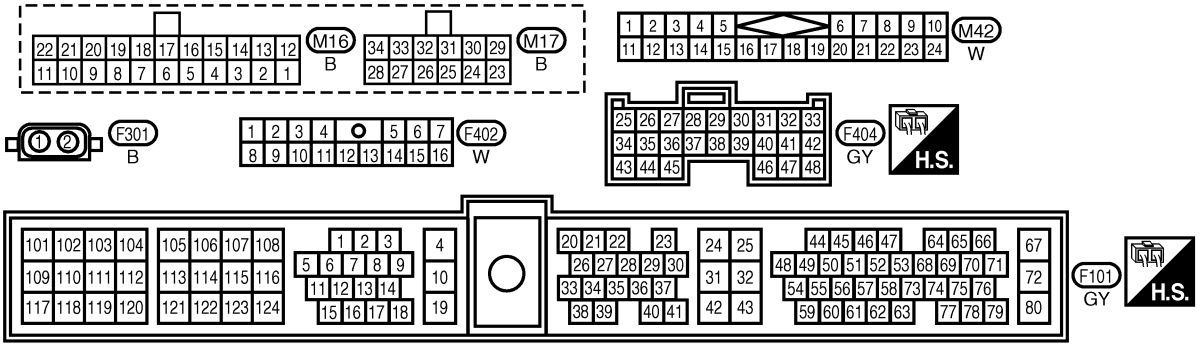
1) Lift up drive wheels.
2) Start engine.
3) Read vehicle speed sensor signal in "MODE 1" with GST.
   The signal should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4) If NG, go to "Diagnostic Procedure", EC-361.

Wiring Diagram

NDEC0243

EC-VSS-01





WEC638

Diagnostic Procedure

NDEC0244

1	CHECK INPUT SIGNAL CIRCUIT	
1. Turn ignition switch “OFF”. 2. Disconnect ECM harness connector and combination meter harness connector. 3. Check harness continuity between ECM terminal 29 and combination meter terminal 28. 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 M42, F104 ● 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	
Check the following. ● Harness connectors M19, F402 ● Harness for open or short between combination meter and vehicle speed sensor		
OK or NG		
OK	▶	Check combination meter and vehicle speed sensor. Refer to ***EL-85***.
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-126.		
	▶	**INSPECTION END**

Description

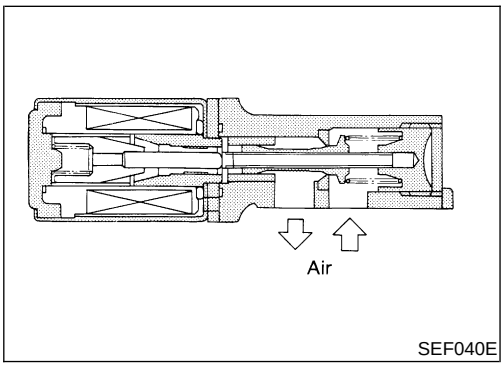
NDEC0245

SYSTEM DESCRIPTION

NDEC0245S01

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 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 barometric 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

NDEC0245S02

IACV-AAC Valve

NDEC0245S0201

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

NDEC0246

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	—

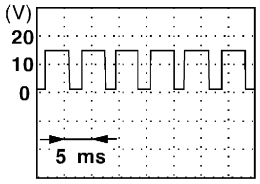
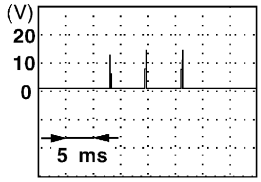
ECM Terminals and Reference Value

NDEC0247

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	SB	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	1 - 2V  SEF006V

On Board Diagnosis Logic

NDEC0248

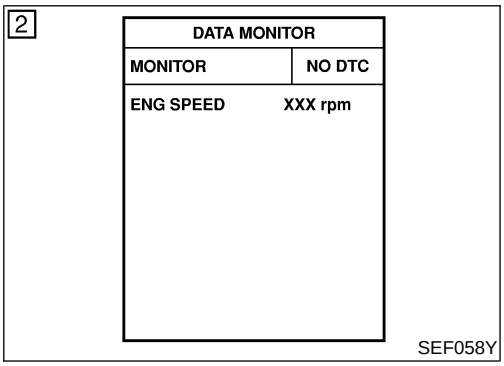
DTC No.		Malfunction is detected when ...	Check Items (Possible Cause)
P0505	A)	The IACV-AAC valve does not operate properly.	• Harness or connectors (The IACV-AAC valve circuit is open.) • IACV-AAC valve
	B)	The IACV-AAC valve does not operate properly.	• Harness or connectors (The IACV-AAC valve circuit is shorted.) • IACV-AAC valve

DTC Confirmation Procedure

NDEC0249

NOTE:

- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.
- **Perform “PROCEDURE FOR MALFUNCTION A” first. If 1st trip DTC cannot be confirmed, perform “PROCEDURE FOR MALFUNCTION B”.**



PROCEDURE FOR MALFUNCTION A

NDEC0249S01

TESTING CONDITION:

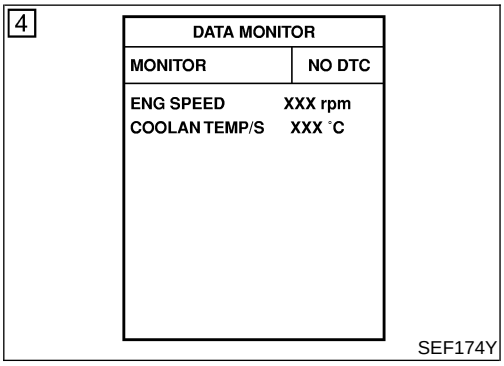
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch “ON”.

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-366.

With GST

Follow the procedure “With CONSULT-II”.



PROCEDURE FOR MALFUNCTION B

NDEC0249S02

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-366.

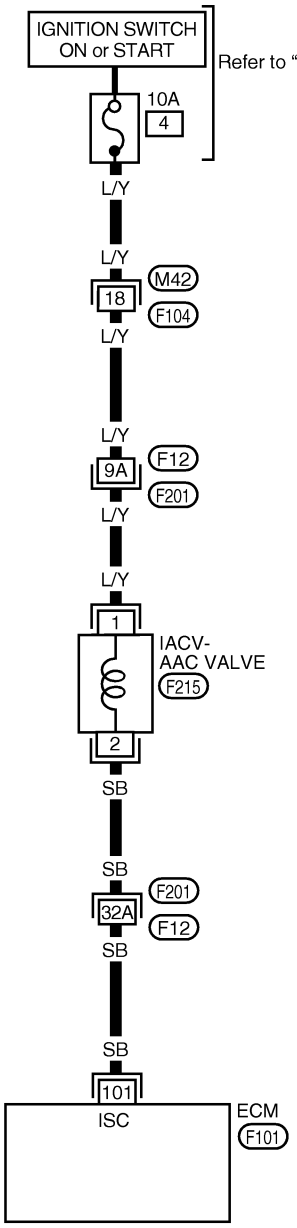
With GST

Follow the procedure “With CONSULT-II”.

Wiring Diagram

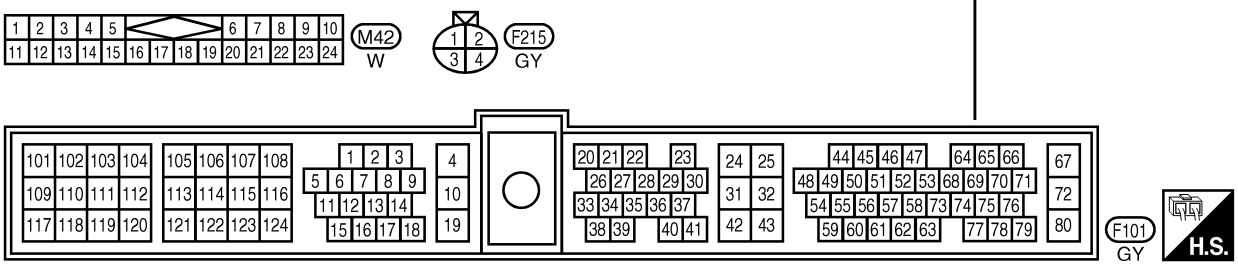
NDEC0250

EC-AAC/V-01



: Detectable line for DTC
: Non-detectable line for DTC

Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)



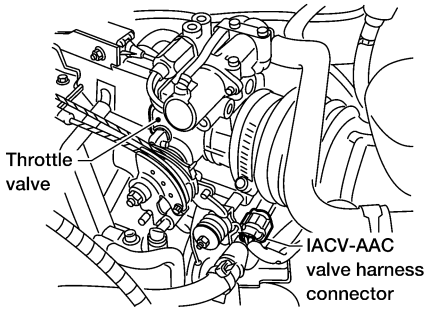
WEC081

Diagnostic Procedure

NDEC0251

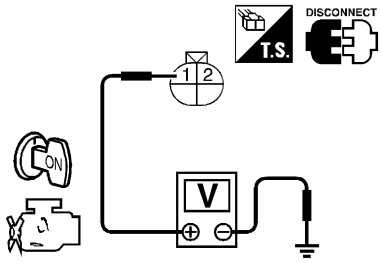
1	CHECK POWER SUPPLY

1. Stop engine.
2. Disconnect IACV-AAC valve harness connector.



LEC753

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



SEF060W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

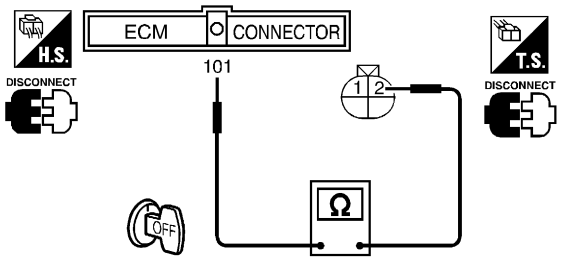
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M42, F104
- Harness connectors F12, F201
- 10A fuse
- Harness for open or short between IACV-AAC valve and fuse

	▶	Repair harness or connectors.

3	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 101 and IACV-AAC valve terminal 2.



SEF061W

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 F12, F201
- 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

Refer to "Component Inspection", EC-368.

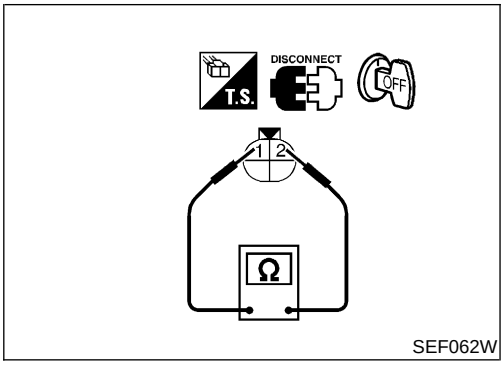
OK or NG

OK	▶	GO TO 6.
NG	▶	Replace IACV-AAC valve.

6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.

	▶	**INSPECTION END**



SEF062W

Component Inspection

=NDEC0252

IACV-AAC VALVE

NDEC0252S01

1. Disconnect IACV-AAC valve harness connector.
2. Remove IACV-AAC valve.

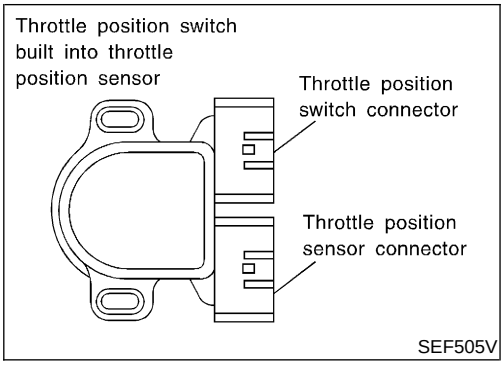
- Check IACV-AAC valve resistance.

  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.



Component Description

NDEC0253

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

NDEC0537

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
CLSD THL/P SW	• Engine: After warming up • Ignition switch: ON (Engine stopped)	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF

ECM Terminals and Reference Value

NDEC0255

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	BR/Y	Throttle position switch (Closed position)	**[Ignition switch "ON"]** • **Warm-up condition** • Accelerator pedal fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch "ON"] • Accelerator pedal depressed	Approximately 0V

On Board Diagnosis Logic

NDEC0256

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0510	• Battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened.	• Harness or connectors (The closed throttle position switch circuit is shorted.) • Closed throttle position switch • Throttle position sensor

4

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

SEF197Y

6

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

SEF175Y

DTC Confirmation Procedure

NDEC0257

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 turn “ON”.
3) Select “CLSD THL/P SW” in “DATA MONITOR” mode with CONSULT-II.
4) Check “CLSD THL/P SW” signal under the following conditions.

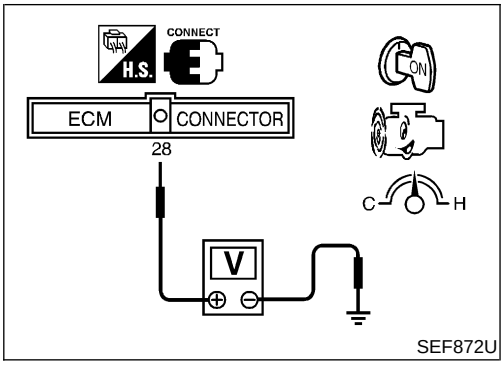
Condition	Signal indication
Throttle valve: Idle position	ON
Throttle valve: Slightly open	OFF

If the check result is NG, go to “Diagnostic Procedure”, EC-373.
If OK, go to following step.

5) Select “DATA MONITOR” mode with CONSULT-II.
6) Drive the vehicle for at least 5 consecutive seconds under the following condition.

THRTL POS SEN	More than 2.5V
VHCL SPEED SE	More than 5 km/h (3 MPH)
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

7) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-373.



Overall Function Check

=NDEC0469

Use this procedure to check the overall function of the closed throttle position switch circuit. During this check, a 1st trip DTC might not be confirmed.

Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Check the voltage between ECM terminal 28 (Closed throttle position switch signal) and ground under the following conditions.

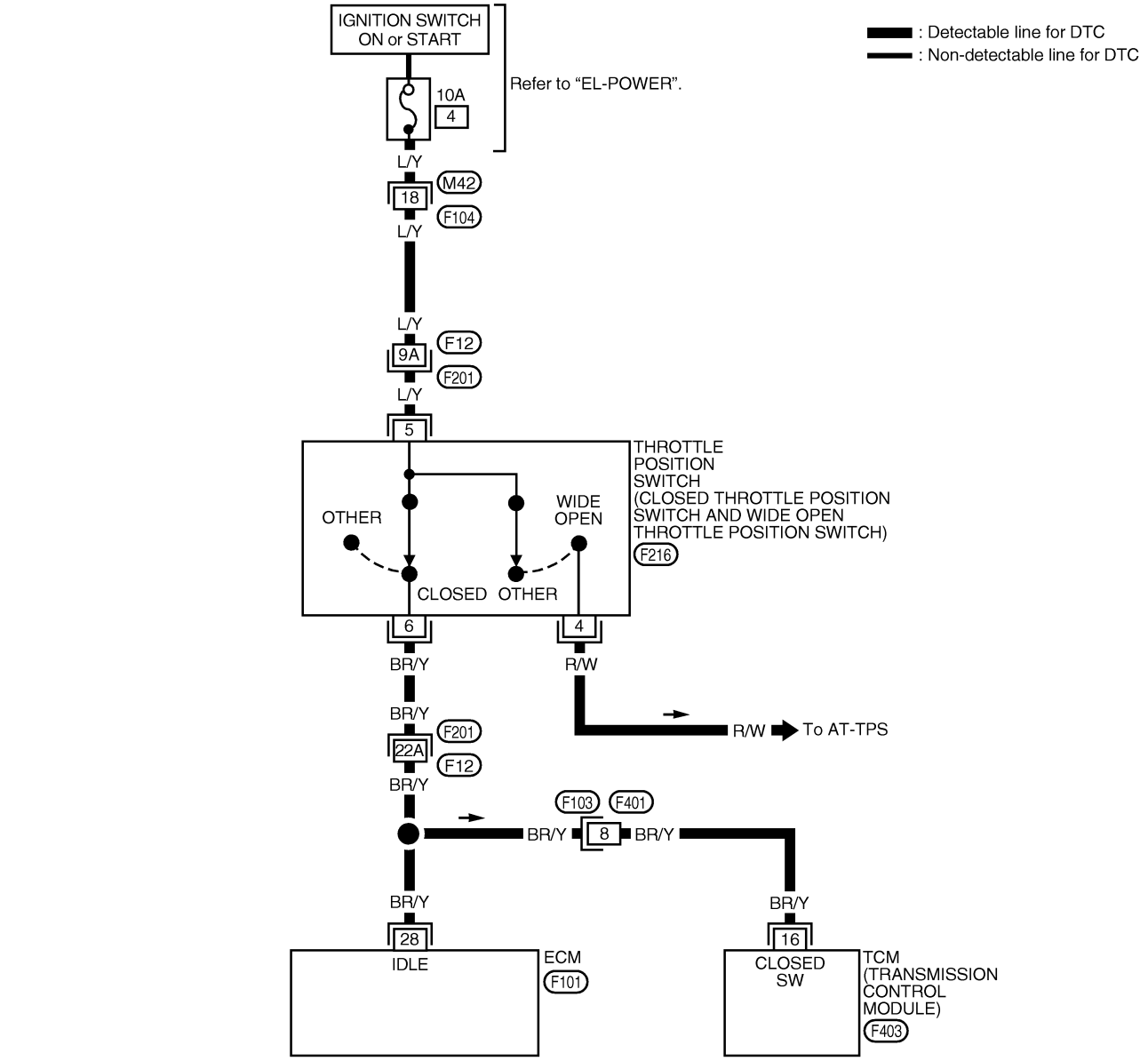
At idle	Battery voltage
At 2,000 rpm	Approximately 0V

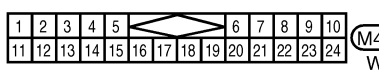
3) If NG, go to “Diagnostic Procedure”, EC-373.

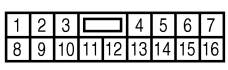
Wiring Diagram

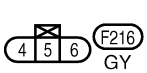
NDEC0258

EC-TP/SW-01

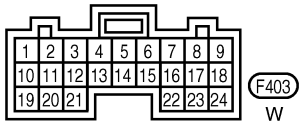


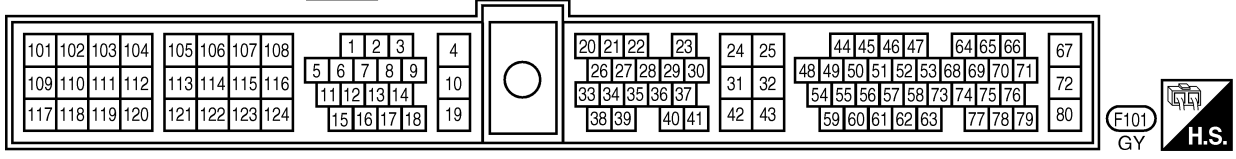






Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)





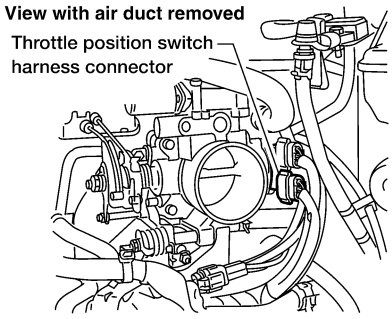
WEC082

Diagnostic Procedure

NDEC0259

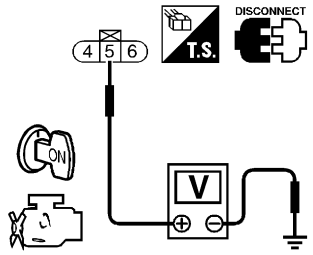
1	CHECK POWER SUPPLY

1. Turn ignition switch “OFF”.
2. Disconnect throttle position switch harness connector.



WEC754

3. Turn ignition switch “ON”.
4. Check voltage between throttle position switch 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

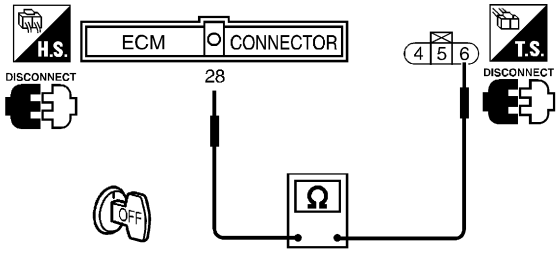
Check the following.
- Harness connectors M42, F104
- Harness connectors F12, F201
- 10A fuse
- Harness for open or short between throttle position switch and fuse

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

3	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 28 and throttle position switch terminal 6.



SEF063W

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 F12, F201
- Harness for open or short between ECM and throttle position switch

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

5	ADJUST THROTTLE POSITION SWITCH

Check the following items. Refer to "BASIC INSPECTION", EC-88.

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 0.2 mm (0.008 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	750 ± 50 rpm (in "P" or "N" position)

WEC960

	▶	GO TO 6.

6	CHECK CLOSED THROTTLE POSITION SWITCH

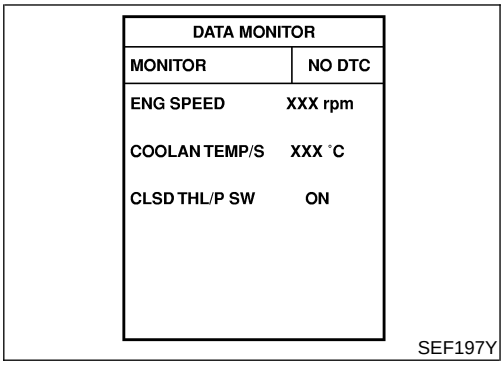
Refer to "Component Inspection", EC-375.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace throttle position switch.

7	CHECK THROTTLE POSITION SENSOR	
Refer to "Component Inspection", EC-175.		
	OK or NG	
OK	▶	GO TO 8.
NG	▶	Replace throttle position sensor.

8	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.	
▶	**INSPECTION END**



Component Inspection

NDEC0260

CLOSED THROTTLE POSITION SWITCH

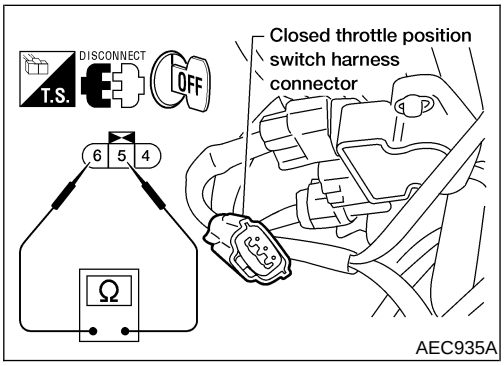
NDEC0260S01

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".
   Measurement must be made with closed throttle position switch installed in vehicle.

Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely open	OFF

   If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-88.
5) If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace closed throttle position switch.



No Tools

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF".
3) Disconnect closed throttle position switch harness connector.
4) Check continuity between terminals 5 and 6.
   Measurement must be made with closed throttle position switch installed in vehicle.

Throttle valve conditions	Continuity
Completely closed	Yes

Component Inspection (Cont'd)

Partially open or completely open	No

If NG, adjust closed throttle position switch. Refer to "Basic Inspection", EC-88.

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

System Description

NDEC0261

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

NDEC0262

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

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

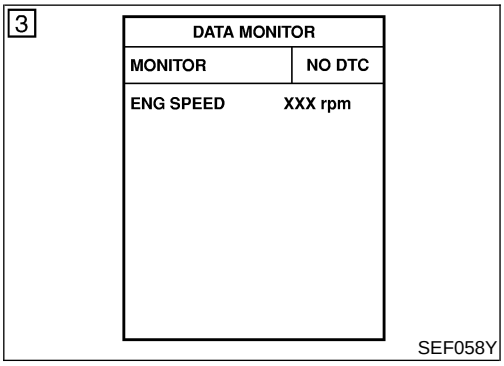
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
26	G/W	A/T signal No. 1	**[Ignition switch "ON"]** **[Engine is running]** ● Idle speed	6 - 8V
27	W	A/T signal No. 2	**[Ignition switch "ON"]** **[Engine is running]** ● Idle speed	6 - 8V
35	P/B	A/T signal No. 3	**[Ignition switch "ON"]**	0V

On Board Diagnosis Logic

NDEC0263

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0600*	● ECM receives incorrect voltage from TCM (Transmission control module) continuously.	● Harness or connectors [The circuit between ECM and TCM (Transmission control module) is open or shorted.]

*: This DTC can be detected only by "DATA MONITOR (AUTO TRIG)" with CONSULT-II.



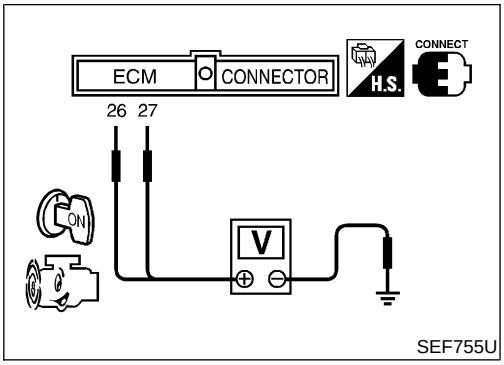
DTC Confirmation Procedure

NDEC0264

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-380.



Overall Function Check

NDEC0265

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

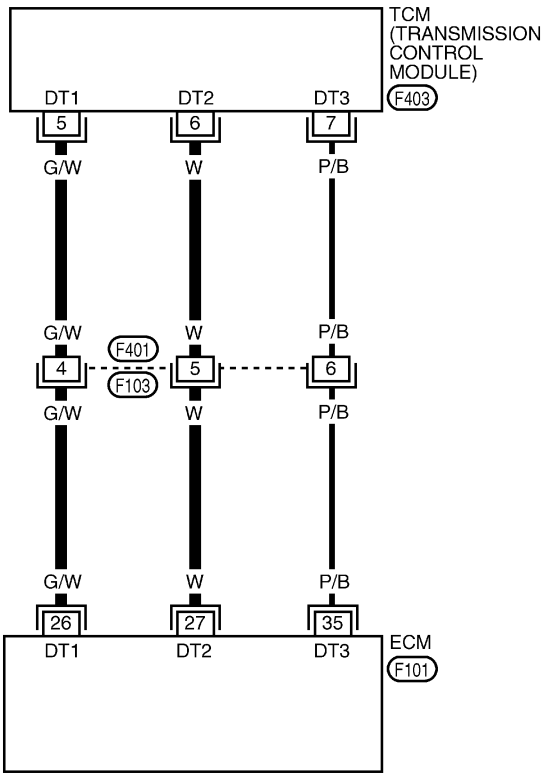
1) Start engine.
2) Check voltage between
   ECM terminal 26 and ground.
   ECM terminal 27 and ground.
   Voltage: 6 - 8V
3) If NG, go to “Diagnostic Procedure”, EC-380.

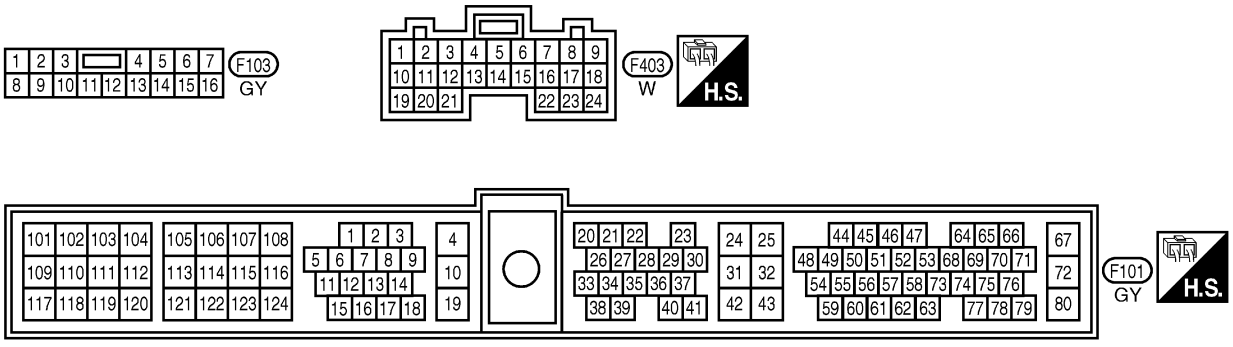
Wiring Diagram

NDEC0266

EC-AT/C-01

: Detectable line for DTC
: Non-detectable line for DTC





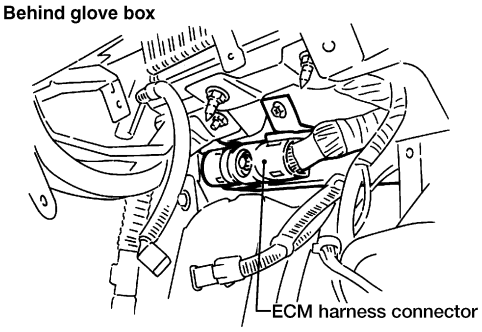
AEC588A

Diagnostic Procedure

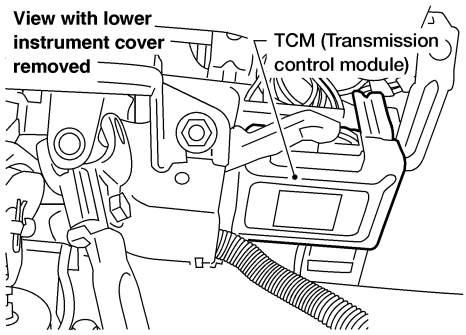
NDEC0267

1	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and TCM (Transmission control module) harness connector.

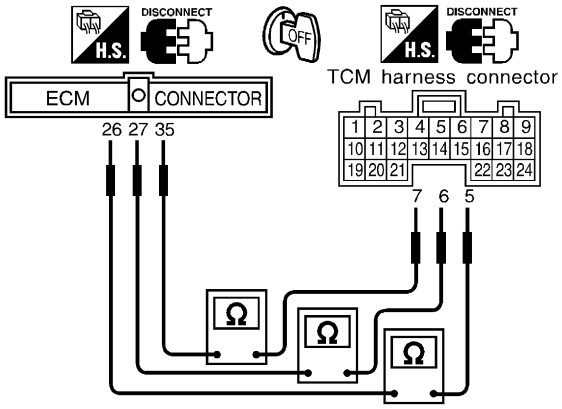


AEC018A



AEC808A

3. Check harness continuity between ECM terminal 26 and terminal 5, ECM terminal 27 and terminal 6, ECM terminal 35 and terminal 7.



SEF065W

Continuity should exist.

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

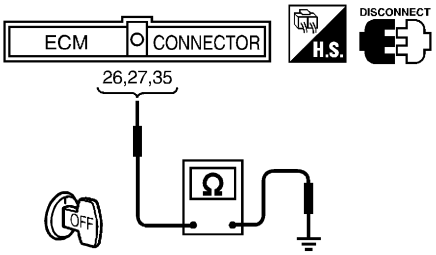
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F103, F401
- Harness for open or short between ECM and TCM (Transmission control module)

	▶	Repair harness or connectors.

3	CHECK INPUT SIGNAL CIRCUIT

1. Check harness continuity between ECM terminal 26 and ground, ECM terminal 27 and ground, ECM terminal 35 and ground.



SEF718U

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

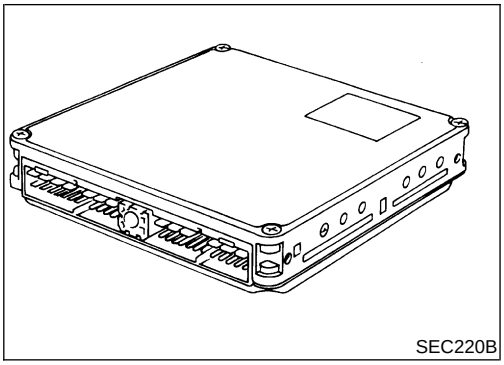
Check the harness for short between ECM or TCM (Transmission control module), and ground.

	▶	Repair short in harness.

5	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.

	▶	**INSPECTION END**


SEC220B

Component Description

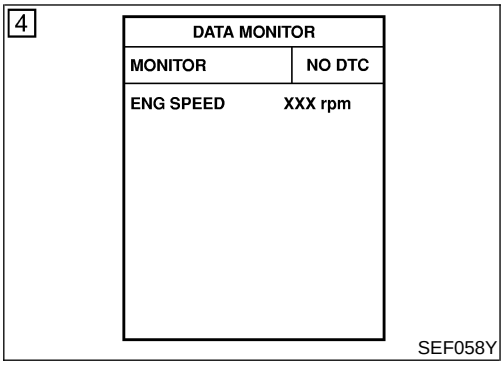
NDEC0268

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

NDEC0269

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0605	• ECM calculation function is malfunctioning.	• ECM



SEF058Y

DTC Confirmation Procedure

NDEC0270

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 2 seconds at idle speed.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-383.

With GST

Follow the procedure “With CONSULT-II”.

Diagnostic Procedure

NDEC0271

1	INSPECTION START	
With CONSULT-II 1. Turn ignition switch “ON”. 2. Select “SELF DIAG RESULTS” mode with CONSULT-II. 3. Touch “ERASE”. 4. **Perform “DTC Confirmation Procedure”.** See EC-382. 5. Is the 1st trip DTC P0605 displayed again?		
With GST 1. Turn ignition switch “ON”. 2. Select MODE 4 with GST. 3. Touch “ERASE”. 4. **Perform “DTC Confirmation Procedure”.** See EC-382. 5. Is the 1st trip DTC P0605 displayed again?		
Yes or No		
Yes	▶	Replace ECM.
No	▶	**INSPECTION END**

Description

NDEC0279

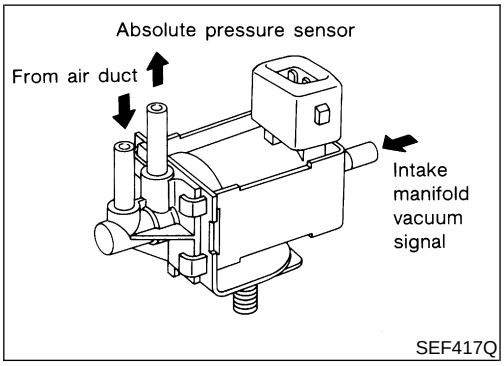
SYSTEM DESCRIPTION

NDEC0279S01

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.



COMPONENT DESCRIPTION

NDEC0279S02

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

NDEC0280

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

NDEC0281

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
118	PU	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

NDEC0282

DTC No.	Malfunction is detected when ...		Check Items (Possible Cause)
P1105	A)	MAP/BARO switch solenoid valve receives the voltage supplied though ECM does not supply the voltage to the valve.	● Harness or connectors (MAP/BARO switch solenoid valve circuit is open or shorted.) ● MAP/BARO switch solenoid valve
	B)	There is little difference between MAP/BARO switch solenoid valve input voltage at ambient barometric pressure and voltage at intake manifold pressure.	● Harness or connectors (MAP/BARO switch solenoid valve circuit is open or shorted.) ● Hoses (Hoses are clogged, vent, kinked, disconnected or improper connection.) ● Absolute pressure sensor ● MAP/BARO switch solenoid valve

DTC Confirmation Procedure

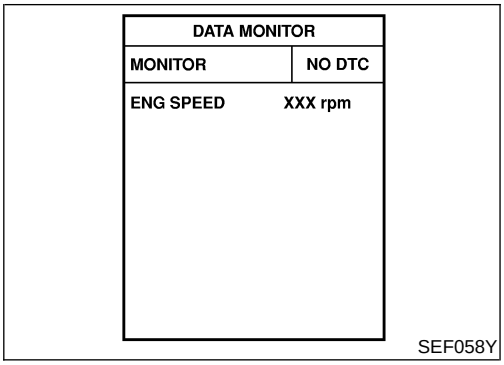
NDEC0283

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.

DTC Confirmation Procedure (Cont'd)



PROCEDURE FOR MALFUNCTION A

NDEC0283S01

TESTING CONDITION:

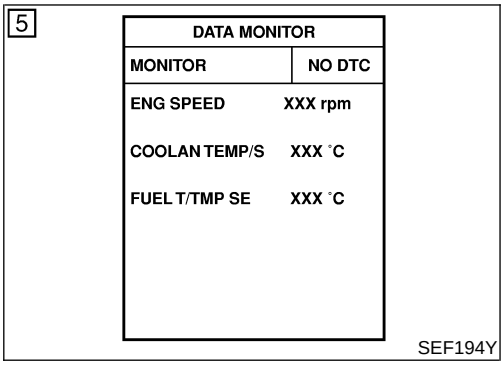
Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch "ON".

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-388.

With GST

Follow the procedure "With CONSULT-II".



PROCEDURE FOR MALFUNCTION B

NDEC0283S02

With CONSULT-II

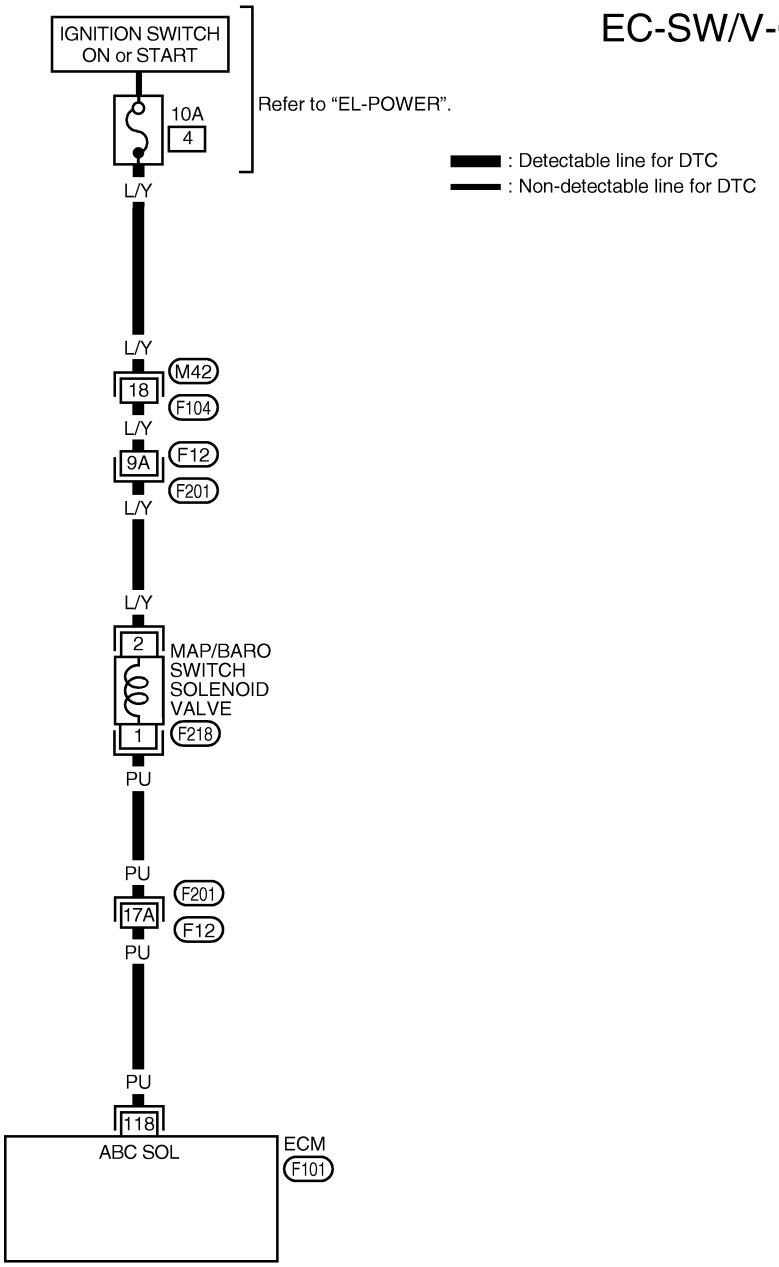
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" again and select "DATA MONITOR" mode with CONSULT-II.
4) Make sure that "FUEL T/TMP SE" is more than 0°C (32°F).
5) Start engine and let it idle for at least 10 seconds.
6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-388.

With GST

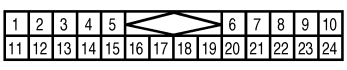
Follow the procedure "With CONSULT-II".

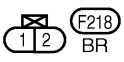
Wiring Diagram

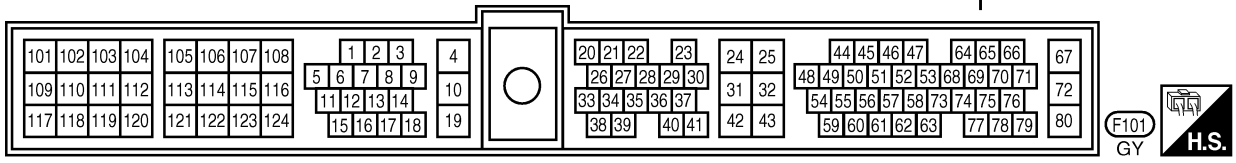
NDEC0284



Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)







WEC083

Diagnostic Procedure

NDEC0285

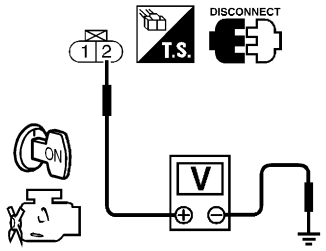
If the trouble is duplicated after "PROCEDURE FOR MALFUNCTION A", perform "PROCEDURE A" below. If the trouble is duplicated after "PROCEDURE FOR MALFUNCTION B", perform "PROCEDURE B" on next page.

PROCEDURE A

NDEC0285S01

1	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 MAP/BARO switch solenoid valve terminal 2 and ground with CONSULT-II or tester.



SEF719U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

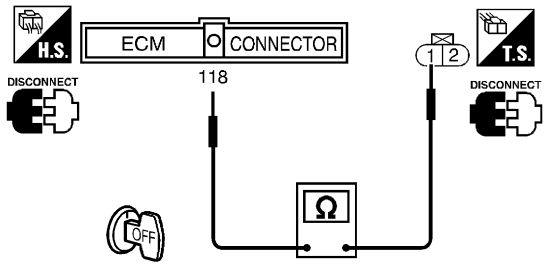
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M42, F104
- Harness connectors F12, F201
- 10A fuse
- Harness for open or short between MAP/BARO switch solenoid valve and fuse

	▶	Repair harness or connectors.

3	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 118 and MAP/BARO switch solenoid valve terminal 1.



SEF720U

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 F12, F201
- Harness for open or short between MAP/BARO switch solenoid valve and ECM

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

5	CHECK MAP/BARO SWITCH SOLENOID VALVE

Refer to "Component Inspection", EC-394.

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-126.

	▶	**INSPECTION END**

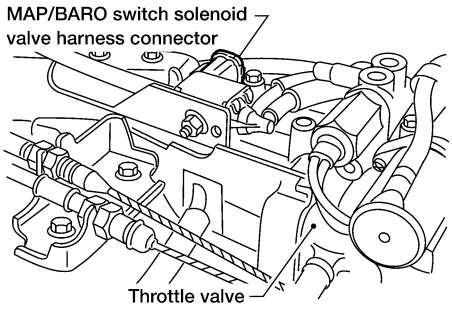
Diagnostic Procedure (Cont'd)

PROCEDURE B

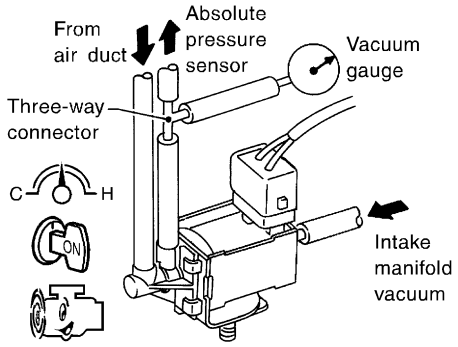
NDEC0285S02

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.



LEC752



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	
ENG SPEED	XXXrpm
MAP/BARO SW/V	MAP
ABSOL PRES/SE	XXXV

ACTIVE TEST	
MAP/BARO SW/V	BARO
MONITOR	
ENG SPEED	XXXrpm
MAP/BARO SW/V	BARO
ABSOL PRES/SE	XXXV

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

SEF944Z

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

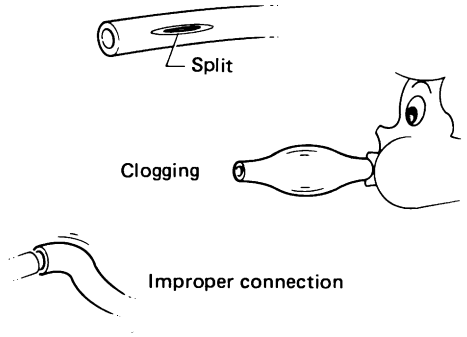
MTBL0080

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.



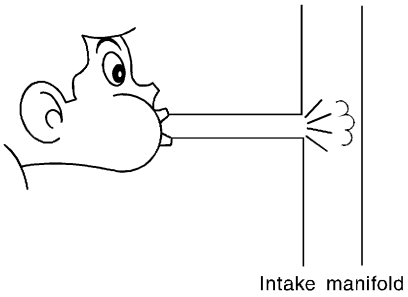
SEF109L

OK or NG

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

5	CHECK VACUUM PORT

Check vacuum port for clogging.



SEF368U

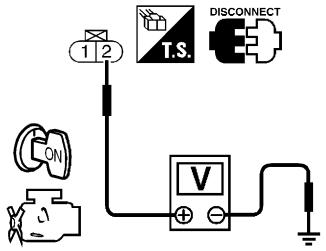
OK or NG

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

Diagnostic Procedure (Cont'd)

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 MAP/BARO switch solenoid valve terminal 2 and ground with CONSULT-II or tester.



SEF719U

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 7.

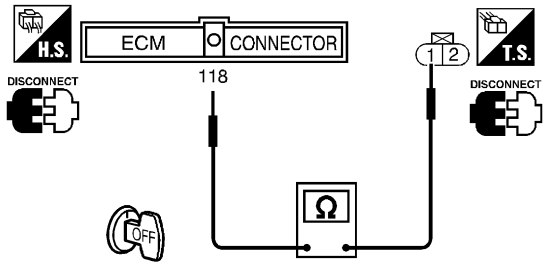
7	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M42, F104
- Harness connectors F12, F201
- 10A fuse
- Harness for open or short between MAP/BARO switch solenoid valve and fuse

	▶	Repair harness or connectors.

8	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 118 and MAP/BARO switch solenoid valve terminal 1.



SEF720U

Continuity should exist.

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

OK or NG

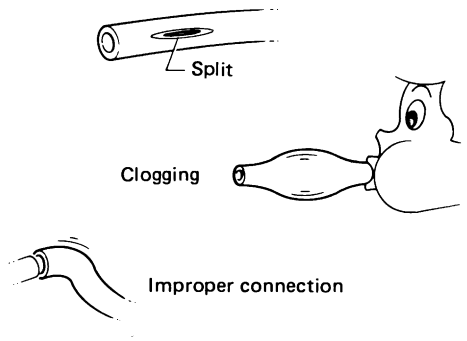
OK	▶	GO TO 10.
NG	▶	GO TO 9.

9	DETECT MALFUNCTIONING PART	
Check the following. ● Harness connectors F12, F201 ● Harness for open or short between MAP/BARO switch solenoid valve and ECM		
	▶	Repair open circuit or short to ground or short to power in harness or connectors.

10	CHECK MAP/BARO SWITCH SOLENOID VALVE	
Refer to "Component Inspection", EC-394.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace MAP/BARO switch solenoid valve.

11	CHECK INTAKE SYSTEM	
Check intake system for air leaks.		
OK or NG		
OK	▶	GO TO 15.
NG	▶	Repair it.

12	CHECK HOSE BETWEEN ABSOLUTE PRESSURE SENSOR AND MAP/BARO SWITCH SOLENOID VALVE	
Check hose for clogging, cracks, disconnection or improper connection.		
OK or NG		
OK	▶	GO TO 13.
NG	▶	Repair or reconnect hose.



SEF109L

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.

Diagnostic Procedure (Cont'd)

14	CHECK ABSOLUTE PRESSURE SENSOR	
Refer to "Component Inspection", EC-153.		
OK or NG		
OK	▶	GO TO 15.
NG	▶	Replace absolute pressure sensor.

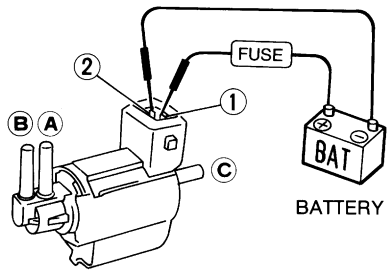
15	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.	
▶	**INSPECTION END**

ACTIVE TEST	
MAP/BARO SW/V	MAP
MONITOR	
ENG SPEED	XXX rpm
MAP/BARO SW/V	MAP
ABSOL PRES/SE	XXX V

SEF945Z

ACTIVE TEST	
MAP/BARO SW/V	BARO
MONITOR	
ENG SPEED	XXX rpm
MAP/BARO SW/V	BARO
ABSOL PRES/SE	XXX V

SEF946Z



MEC488B

Component Inspection

NDEC0286

MAP/BARO SWITCH SOLENOID VALVE

NDEC0286S01

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

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

- Time for voltage to change

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

4) If NG, check solenoid valve as shown below.

Without CONSULT-II

1) Remove MAP/BARO switch solenoid valve.
2) Check air passage continuity.

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

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

On Board Diagnosis Logic

NDEC0470

★ The closed loop control has the one trip detection logic.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1148	• The closed loop control function does not operate even when vehicle is driving in the specified condition.	• The heated oxygen sensor 1 (front) circuit is open or shorted. • Heated oxygen sensor 1 (front) • Heated oxygen sensor 1 heater (front)

DTC Confirmation Procedure

NDEC0471

CAUTION:

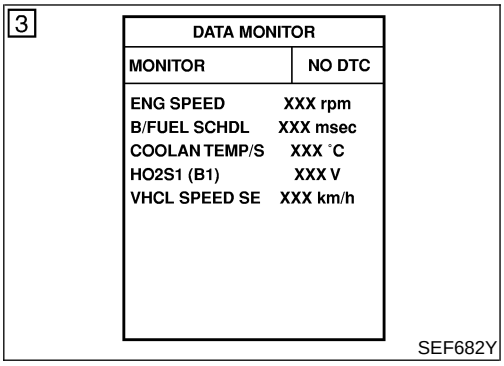
Always drive vehicle at a safe speed.

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 "DATA MONITOR" mode with CONSULT-II.

NOTE:

Never raise engine speed above 3,200 rpm after this step. If the engine speed limit is exceeded, return to step 2.

3) Hold engine speed at 2,000 rpm and check one of the following.

- "HO2S1 (B1)" voltage should go above 0.70V at least once.
- "HO2S1 (B1)" voltage should go below 0.21V at least once.

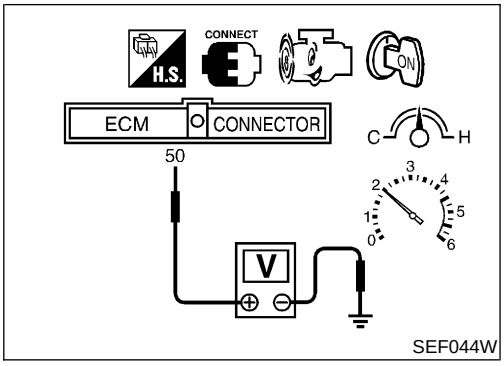
If the check result is NG, perform "Diagnosis Procedure", EC-397.
If the check result is OK, perform the following step.

4) Let engine idle at least 5 minutes.
5) Maintain the following condition at least 50 consecutive seconds.

B/FUEL SCHDL	3.3 msec or more
ENG SPEED	1,600 rpm or more
Selector lever	Suitable position
VHCL SPEED SE	More than 71 km/h (44 MPH)

During this test, P0130 may be displayed on CONSULT-II screen.

6) If DTC is detected, go to "Diagnostic Procedure", EC-397.



Overall Function Check

NDEC0472

Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed.

Without CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 (front) signal] and engine ground.
3) Check the following with engine speed held at 2,000 rpm constant under no-load.

- The voltage should go above 0.70V at least once.
- The voltage should go below 0.21V at least once.

4) If NG, go to “Diagnostic Procedure”, EC-397.

Diagnostic Procedure

NDEC0473

Perform trouble diagnosis for “DTC P0133”, EC-204.

System Description

NDEC0523

COOLING FAN CONTROL

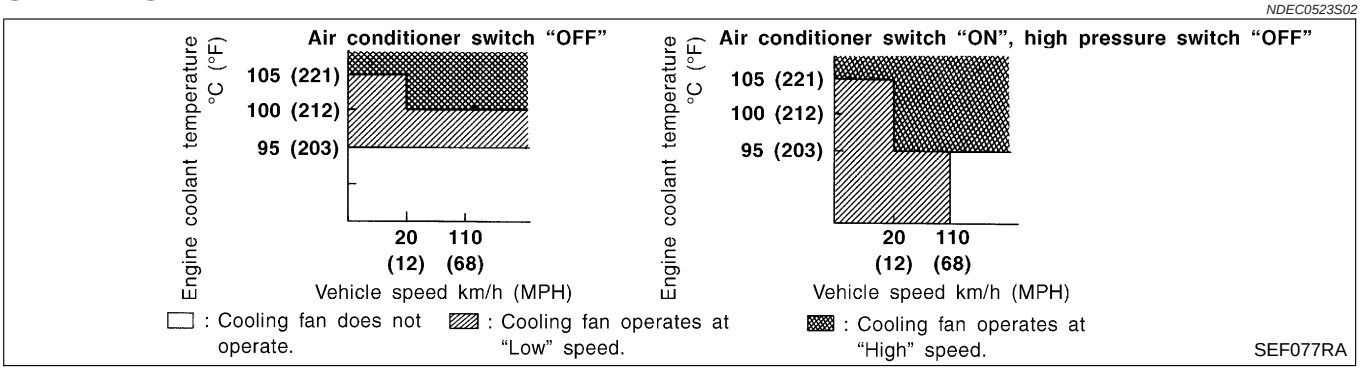
NDEC0523S01

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Cooling fan control	Cooling fan relay(s)
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner “ON” signal		
Ignition switch	Start signal		
Camshaft position sensor	Engine speed		
Air conditioner high pressure switch	Air conditioner pressure signal		

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, air conditioner high pressure signal, and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].
When both air conditioner switch and high pressure switch are “ON”, cooling fan operates at “HIGH” speed.

OPERATION

NDEC0523S02



CONSULT-II Reference Value in Data Monitor Mode

NDEC0524

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
AIR COND SIG	● Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
COOLING FAN	● Engine: Idling, after warming up ● Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less.	OFF
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F).	LOW
		Engine coolant temperature is 105°C (221°F) or more.	HIGH

ECM Terminals and Reference Value

=NDEC0525

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
36	BR/W	Cooling fan relay (High)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan (High) is operating	0 - 1V
38	L/OR	Cooling fan relay (Low)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan (Low) is operating	0 - 1V

On Board Diagnosis Logic

NDEC0526

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

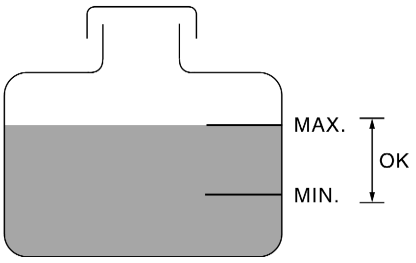
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1217	● Engine coolant temperature reaches an abnormally high temperature.	● Harness or connectors (The cooling fan circuit is open or shorted.) ● Cooling fan ● Radiator hose ● Radiator ● Radiator cap ● Water pump ● Thermostat For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", EC-412.

CAUTION:

When a malfunction is indicated, be sure to replace the coolant following the procedure, "Changing Engine Coolant", "ENGINE MAINTENANCE", *MA-14*. 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-12*.**
2) **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

1

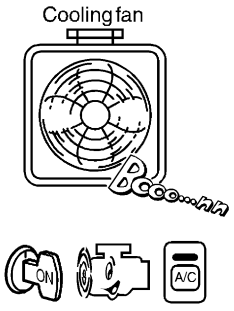


SEF621W

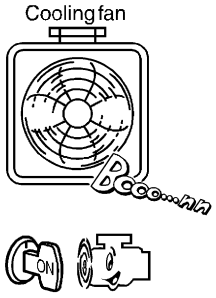
4

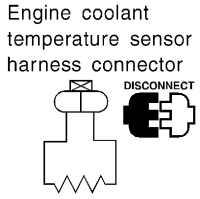
ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF376X



SEF084T





SEF085T

Overall Function Check

NDEC0527

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

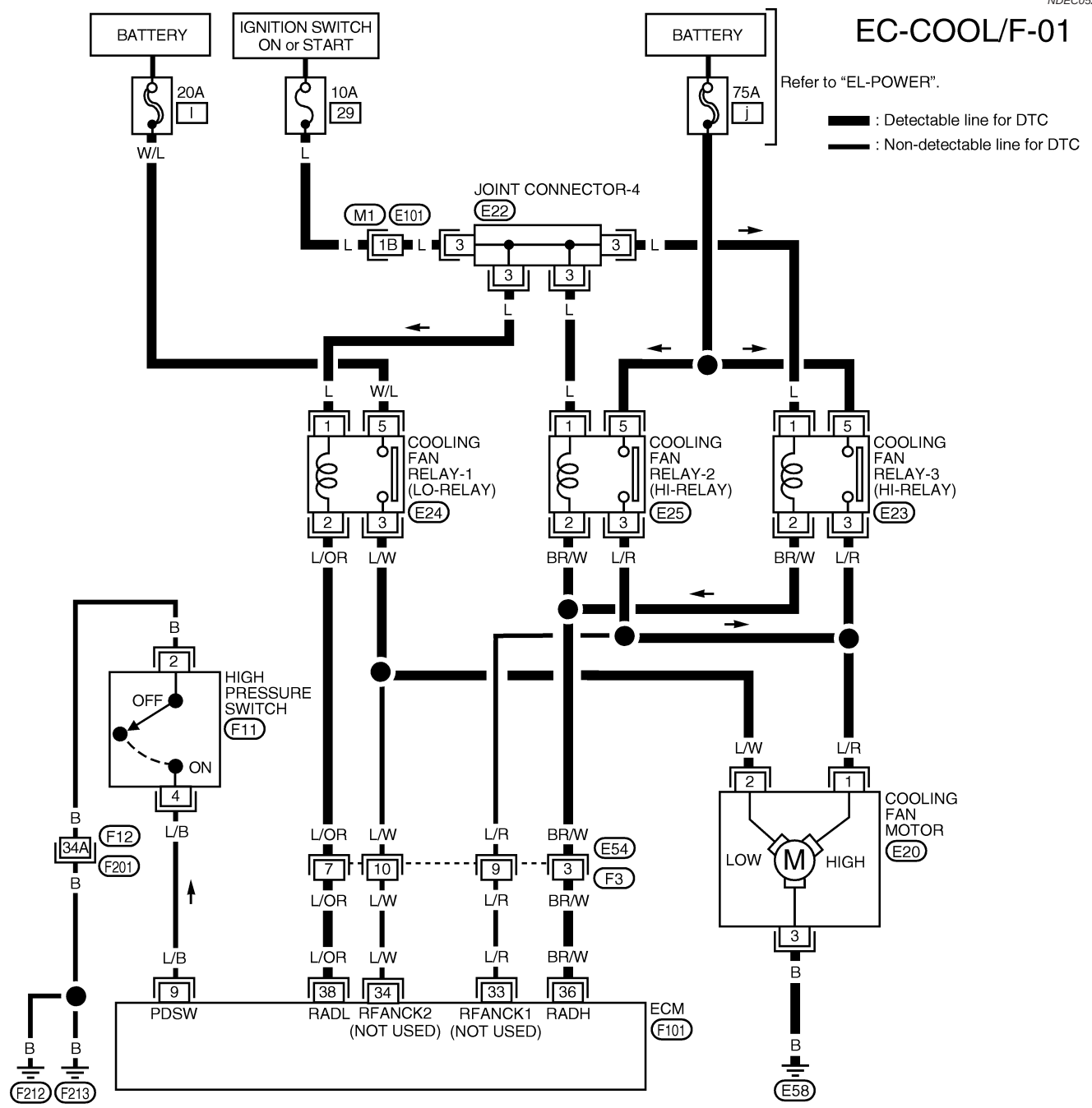
1) Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to “Diagnostic Procedure” (EC-402).
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to “Diagnostic Procedure” (EC-402).
3) Turn ignition switch “ON”.
4) Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II (LOW speed and HI speed).
5) Make sure that cooling fan operates properly.
6) If NG, go to “Diagnostic Procedure”, EC-402.

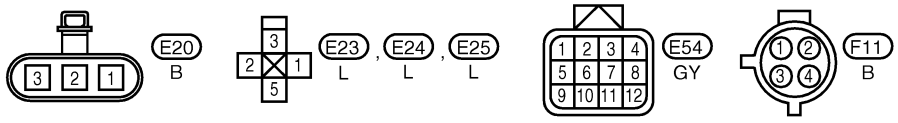
Without CONSULT-II

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-402).
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to “Diagnostic Procedure” (EC-402).
3) Start engine.
   Be careful not to overheat engine.
4) Set temperature control lever to full cold position.
5) Turn air conditioner switch “ON”.
6) Turn blower fan switch “ON”.
7) Run engine at idle for a few minutes with air conditioner operating.
   Be careful not to overheat engine.
8) Make sure that cooling fan operates at low speed.
9) If NG, go to “Diagnostic Procedure”, EC-402.
10) Turn ignition switch “OFF”.
11) Turn air conditioner switch and blower fan switch “OFF”.
12) Disconnect engine coolant temperature sensor harness connector.
13) Connect 150Ω resistor to engine coolant temperature sensor harness connector.
14) Restart engine and make sure that cooling fan operates at higher speed than low speed.
    Be careful not to overheat engine.
15) If NG, go to “Diagnostic Procedure”, EC-402.

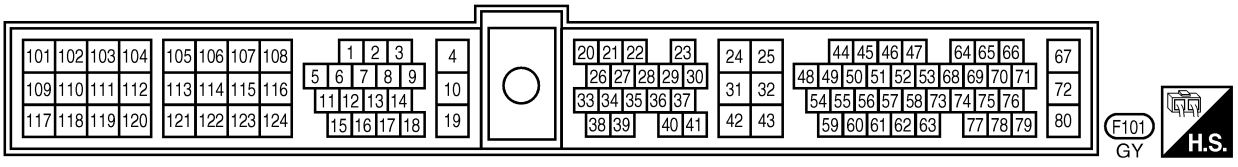
Wiring Diagram

NDEC0528





Refer to the following.
M1 , E101 , F12 , F201
- SUPER MULTIPLE JUNCTION (SMJ)
E22 - JOINT CONNECTOR



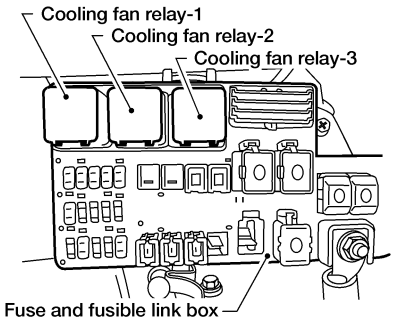
WEC639

Diagnostic Procedure

NDEC0529

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK COOLING FAN LOW SPEED OPERATION	



AEC924A

With CONSULT-II

1. Disconnect cooling fan relays-2 and -3.
2. Turn ignition switch “ON”.
3. 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?

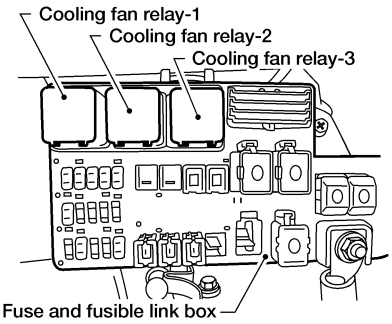
Yes or No

Yes	▶	GO TO 4.
No	▶	Go to PROCEDURE A, EC-407.

3	CHECK COOLING FAN LOW SPEED OPERATION

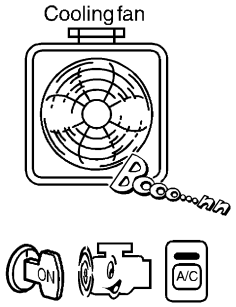
Without CONSULT-II

1. Disconnect cooling fan relays-2 and -3.



AEC924A

2. Start engine.
3. Set temperature lever at full cold position.
4. Turn air conditioner switch "ON".
5. Turn blower fan switch "ON".
6. Run engine at idle for a few minutes with air conditioner operating.
7. Make sure that cooling fan operates at low speed.



SEF084T

OK or NG

OK	▶	GO TO 5.
NG	▶	Go to PROCEDURE A, EC-407.

4	CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-II

1. Turn ignition switch "OFF".
2. Reconnect cooling fan relays-2 and -3.
3. Disconnect cooling fan relay-1.
4. Turn ignition switch "ON".
5. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT-II (High speed).

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF376X

Does cooling fan rotate?

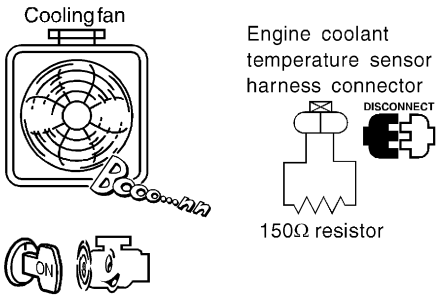
Yes or No

Yes	▶	GO TO 6.
No	▶	Go to PROCEDURE B, EC-410.

5	CHECK COOLING FAN HIGH SPEED OPERATION

Without CONSULT-II

1. Turn ignition switch "OFF".
2. Reconnect cooling fan relays-2 and -3.
3. Disconnect cooling fan relay-1.
4. Turn air conditioner switch and blower fan switch "OFF".
5. Disconnect engine coolant temperature sensor harness connector.
6. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
7. Restart engine and make sure that cooling fan operates at higher speed than low speed.



SEF085T

OK or NG

OK	▶	GO TO 6.
NG	▶	Go to PROCEDURE B, EC-410.

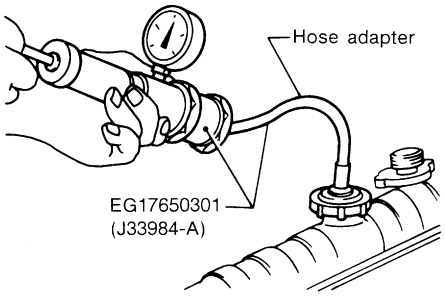
6	CHECK COOLING SYSTEM FOR LEAK

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

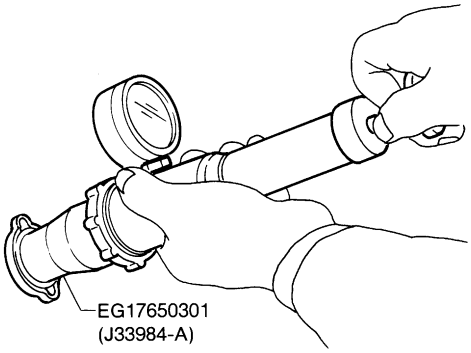
Pressure should not drop.

OK or NG

OK	▶	GO TO 7.
NG	▶	**Check the following for leak** ● Hose ● Radiator ● Water pump Refer to "Water Pump", ***LC-9***.

7	CHECK RADIATOR CAP

Apply pressure to radiator cap with a tester and check radiator cap relief pressure.



SLC755A

Radiator cap relief pressure:

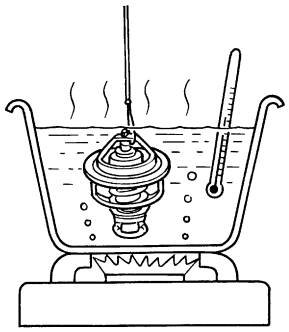
59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi)

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace radiator cap.

8	CHECK THERMOSTAT

1. Check valve seating condition at normal room temperatures.
   It should seat tightly.
2. Check valve opening temperature and valve lift.



SLC343

Valve opening temperture	76.5°C (170°F) [standard]
Valve lift	More than 9 mm/90°C (0.35 in/194°F)

MTBL0580

3. Check if valve is closed at 5°C (9°F) below valve opening temperature.
For details, refer to "Thermostat", ***LC-11***.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace thermostat

9	CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to "COMPONENT INSPECTION", EC-165.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace engine coolant temperature sensor.

10	CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to "MAIN 12 CAUSES OF OVERHEATING", EC-412.

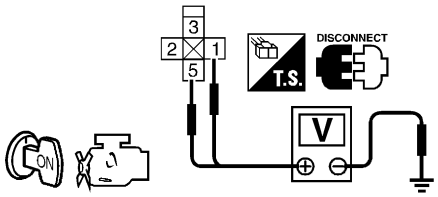
	▶	**INSPECTION END**

PROCEDURE A

NDEC0529S01

1	CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect cooling fan relay-1.
3. Turn ignition switch "ON".
4. Check voltage between cooling fan relay-1 terminals 1, 5 and ground with CONSULT-II or tester.



SEF090W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

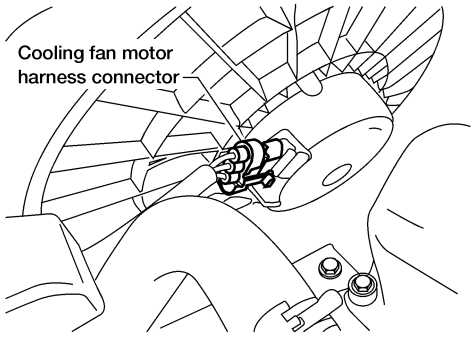
Check the following.
- Harness connectors M1, E101
- Joint connector-4
- 10A fuse
- 20A fusible link
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

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

Diagnostic Procedure (Cont'd)

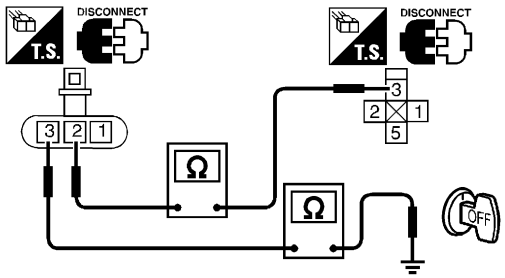
3	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect cooling fan motor harness connector.



AEC925A

3. Check harness continuity between cooling fan relay-1 terminal 3 and cooling fan motor terminal 2, cooling fan motor terminal 3 and body ground.



SEF091W

Continuity should exist.

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

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

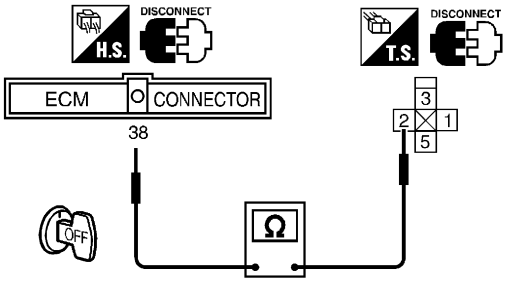
4	DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between cooling fan relay-1 and cooling fan motor
- Harness for open between cooling fan motor and body ground

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

5	CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 38 and cooling fan relay-1 terminal 2.



SEF092W

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 E54, F3
- Harness for open or short between cooling fan relay-1 and ECM

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

7	CHECK COOLING FAN RELAY-1

Refer to "Component Inspection", EC-412.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace cooling fan relay.

8	CHECK COOLING FAN MOTOR

Refer to "Component Inspection", EC-413.

OK or NG

OK	▶	GO TO 9.
NG	▶	Replace cooling fan motor.

9	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.

	▶	**INSPECTION END**

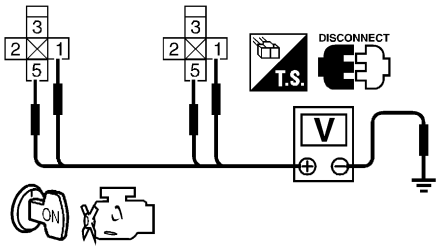
Diagnostic Procedure (Cont'd)

PROCEDURE B

=NDEC0529S02

1	CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect cooling fan relays-2 and -3.
3. Turn ignition switch "ON".
4. Check voltage between cooling fan relays-2 and -3 terminals 1, 5 and ground with CONSULT-II or tester.



SEF093W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

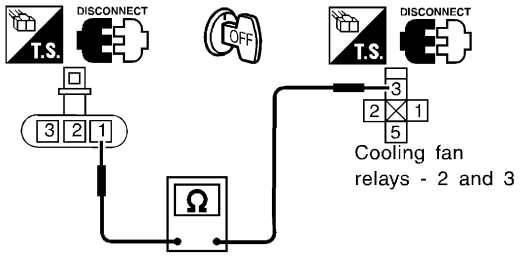
2	DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-4
- 75A fusible link
- Harness for open or short between cooling fan relays-2, -3 and joint connector-4
- Harness for open and short between cooling fan relays-2, -3 and battery

	▶	Repair harness or connectors.

3	CHECK POWER AND GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect cooling fan motor harness connector.
3. Check harness continuity between cooling fan motor terminal 1 and cooling fan relays-2, 3 terminal 3.



SEF094W

Continuity should exist.

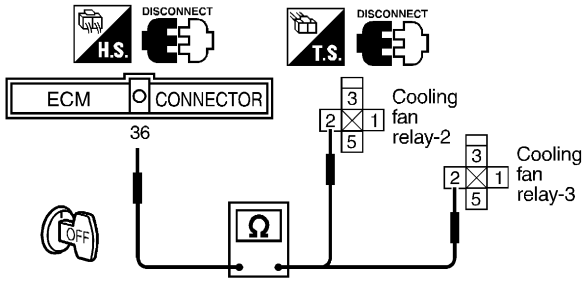
4. Also check harness for short to ground and short to power.

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 OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 36 and cooling fan relays-2, 3 terminal 2.



SEF095W

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 E54, F3
- Harness for open or short between cooling fan relays-2, -3 and ECM

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

6	CHECK COOLING FAN RELAYS-2 AND -3

Refer to "Component Inspection", EC-412.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace cooling fan relays.

7	CHECK COOLING FAN MOTOR

Refer to "Component Inspection", EC-413.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace cooling fan motor.

8	CHECK INTERMITTENT INCIDENT

Perform "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.

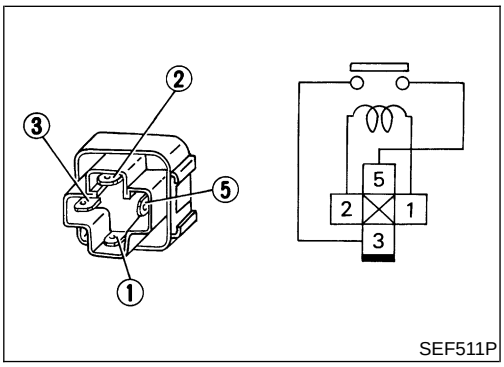
	▶	**INSPECTION END**

Main 12 Causes of Overheating

NDEC0530

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	See “RECOMMENDED FLUIDS AND LUBRICANTS”, ***MA-11***.
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See “Changing Engine Coolant”, ***MA-14***.
	4	• Radiator cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	See “System Check”, ***LC-8***.
ON*2	5	• Coolant leaks	• Visual	No leaks	See “System Check”, ***LC-8***.
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See “Thermostat” and “Radiator”, ***LC-11*** and ***LC-12***.
ON*1	7	• Cooling fan	• CONSULT-II	Operating	See “TROUBLE DIAGNOSIS FOR OVERHEAT” (EC-398).
OFF	8	• Combustion gas leak	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	See “Changing Engine Coolant”, ***MA-14***.
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See “ENGINE MAINTENANCE”, ***MA-13***.
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See “Inspection”, “CYLINDER HEAD”, ***EM-31***.
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See “Inspection”, “CYLINDER BLOCK”, ***EM-49***.

*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-14***.



SEF511P

Component Inspection

NDEC0531

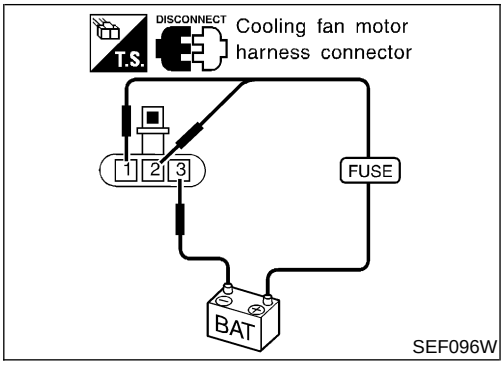
COOLING FAN RELAYS-1, -2 AND -3

NDEC0531S01

Check continuity between terminals 3 and 5.

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

If NG, replace relay.



COOLING FAN MOTOR

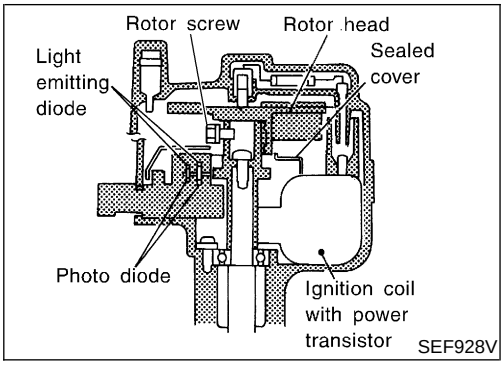
NDEC0531S02

1. Disconnect cooling fan motor harness connector.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Speed	Terminals	
		(+)	(−)
Cooling fan motor	Low	2	3
	High	1	3

Cooling fan motor should operate.

If NG, replace cooling fan motor.



Component Description

NDEC0287

IGNITION COIL & POWER TRANSISTOR

NDEC0287S01

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)

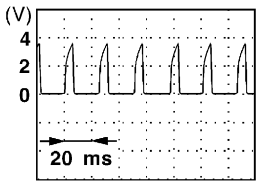
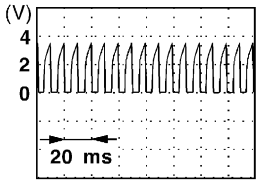
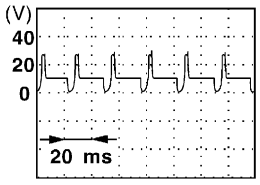
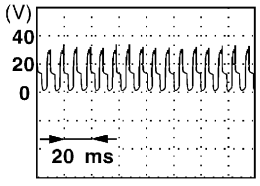
ECM Terminals and Reference Value

NDEC0289

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

CAUTION:

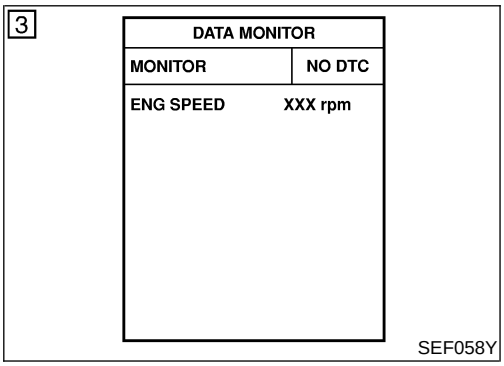
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	L	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	W	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

NDEC0290

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1320	● The ignition signal in the primary circuit is not sent to ECM during engine cranking or running.	● Harness or connectors (The ignition primary circuit is open or shorted.) ● Power transistor unit. ● Resistor ● Camshaft position sensor ● Camshaft position sensor circuit



DTC Confirmation Procedure

NDEC0291

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 is displayed with DTC P0340, perform trouble diagnosis for DTC P0340 first. Refer to EC-302.**

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-417.

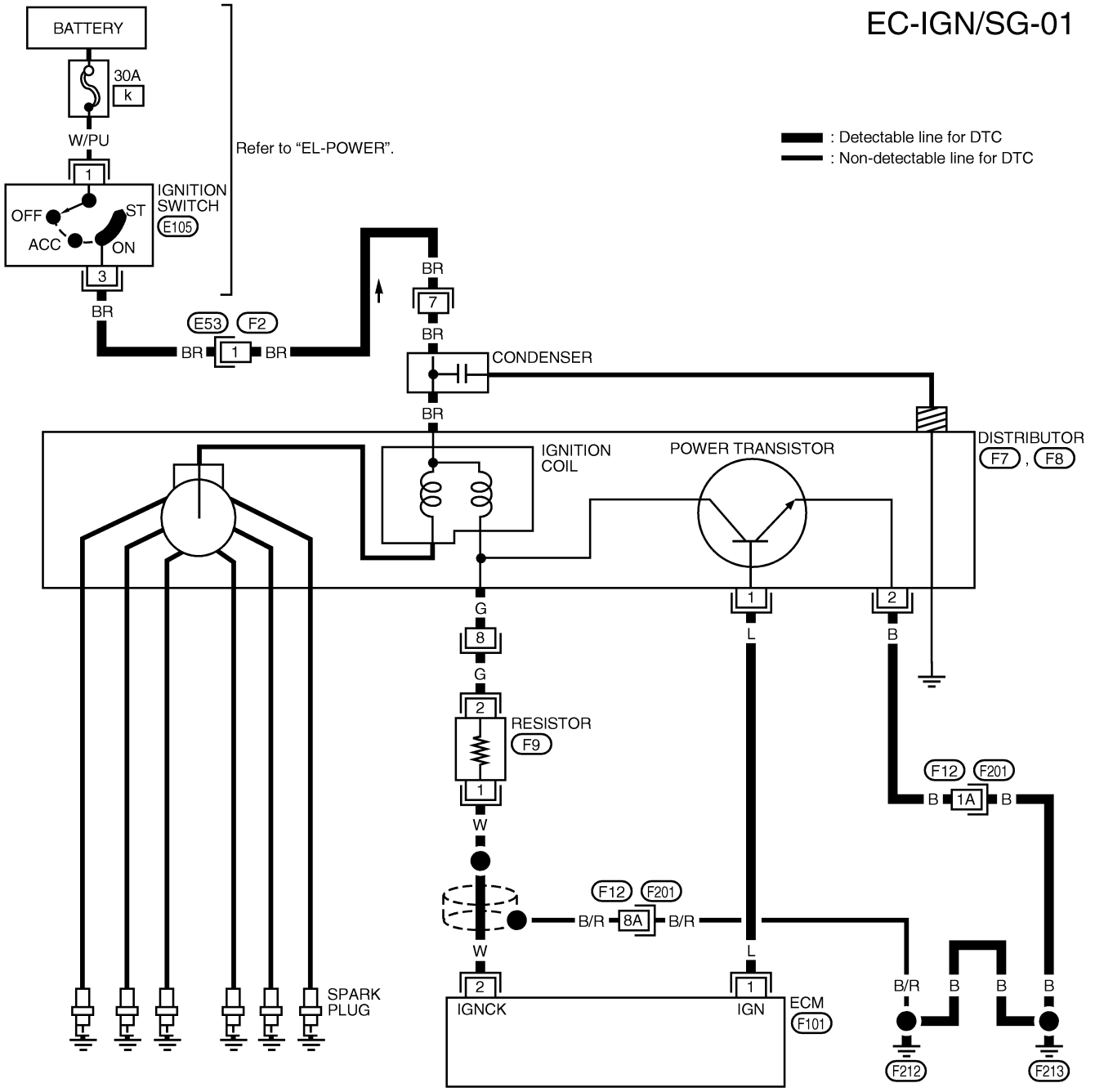
With GST

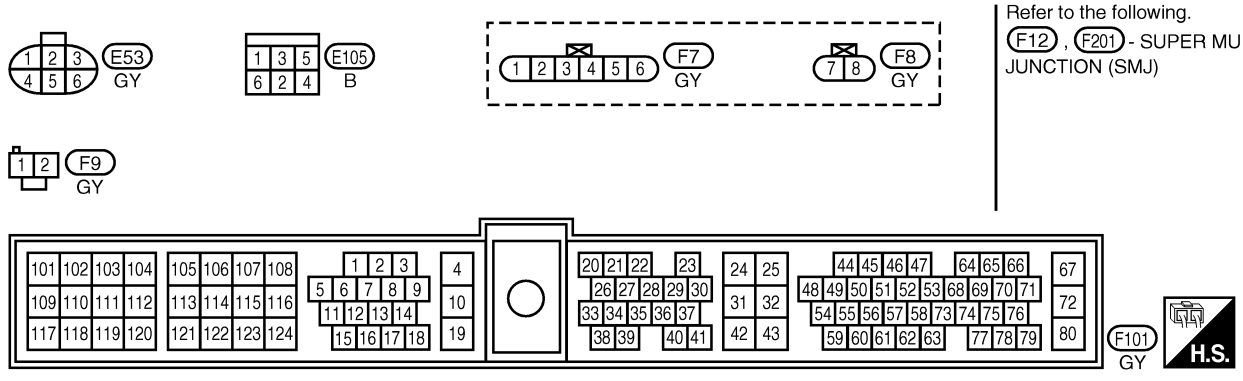
Follow the procedure “With CONSULT-II”.

Wiring Diagram

NDEC0292

EC-IGN/SG-01





Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)

WEC084

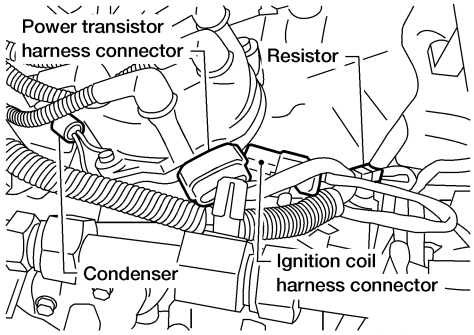
Diagnostic Procedure

NDEC0293

1	CHECK ENGINE START	
Turn ignition switch “OFF”, and restart engine. **Is engine running?**		
Yes or No		
Yes	▶	GO TO 8.
No	▶	GO TO 2.

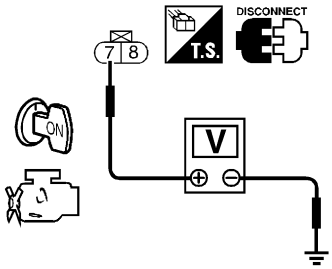
2	CHECK POWER SUPPLY	

1. Turn ignition switch “OFF”.
2. Disconnect distributor harness connector.



AEC809A

3. Turn ignition switch “ON”.
4. Check voltage between distributor terminal 7 and ground with CONSULT-II or tester.



SEF721U

Voltage: Battery voltage

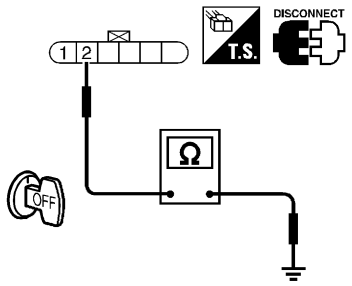
OK or NG		
OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART	
Check the following. ● Harness connectors E53, F2 ● Harness for open or short between distributor and ignition switch		
	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

4	CHECK POWER TRANSISTOR GROUND CIRCUIT FOR OPEN AND SHORT

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



SEF722U

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

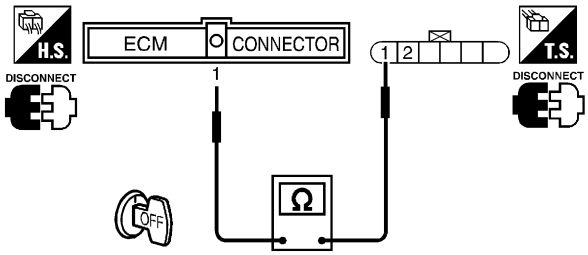
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, F201
- Harness for open between ignition coil and engine ground

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

6	CHECK POWER TRANSISTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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



SEF723U

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 IGNITION COIL AND POWER TRANSISTOR

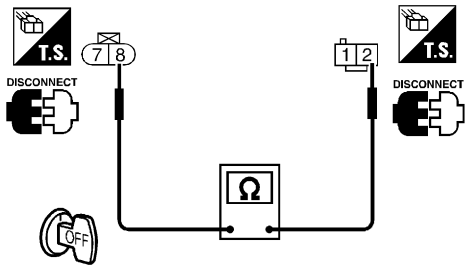
Refer to "Component Inspection", EC-420.

OK or NG

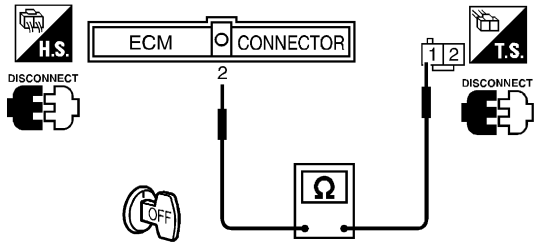
OK	▶	GO TO 10.
NG	▶	Replace malfunctioning component(s).

8	CHECK INPUT SIGNAL CIRCUIT

1. Stop engine.
2. Disconnect distributor harness connector.
3. Strip tape covering resistor.
4. Disconnect resistor harness connector.
5. Disconnect ECM harness connector.
6. Check harness continuity between distributor terminal 8 and resistor terminal 2, resistor terminal 1 and ECM terminal 2.



SEF066W



SEF067W

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

Refer to "Component Inspection", EC-420.

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 harness connector F12, F201.
3. Check the following:

- Continuity between F201 connector terminal and ground.
- Harness connector F12, F201

Continuity should exist.

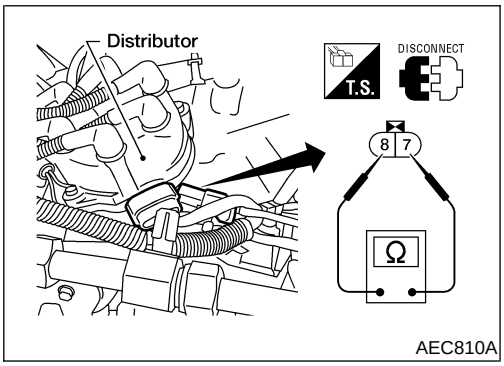
4. Also check harness for short to power.
5. Then reconnect harness connector.

OK or NG

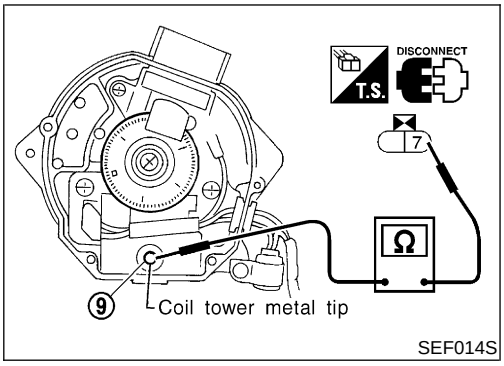
OK	▶	GO TO 11.
NG	▶	Repair open circuit or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

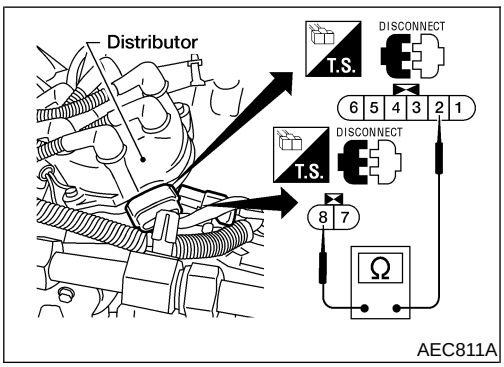
11	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.	
▶	INSPECTION END



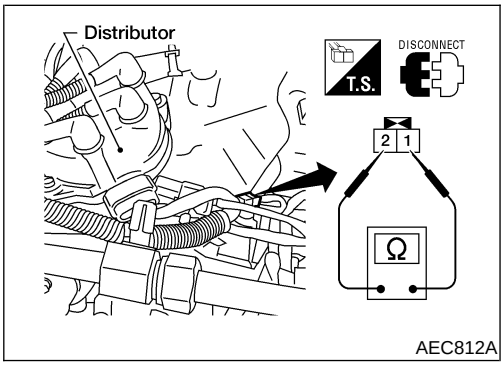
AEC810A



SEF014S



AEC811A



AEC812A

Component Inspection

NDEC0294

IGNITION COIL

NDEC0294S01

1. Disconnect distributor harness connector.
2. Check resistance as shown in the figure.

Terminal	Resistance [at 25°C (77°F)]
7 - 8 (Primary coil)	0.5 - 1.0Ω
7 - 9 (Secondary coil)	Approximately 12 kΩ

For checking secondary coil, remove distributor cap and measure resistance between coil tower metal tip 9 and terminal 7.
If NG, replace distributor assembly as a unit.

POWER TRANSISTOR

NDEC0294S02

1. Disconnect distributor harness connector.
2. Check power transistor resistance between terminals 2 and 8.

Terminals	Resistance	Result
2 and 8	Except 0Ω	OK
	0Ω	NG

If NG, replace distributor assembly.

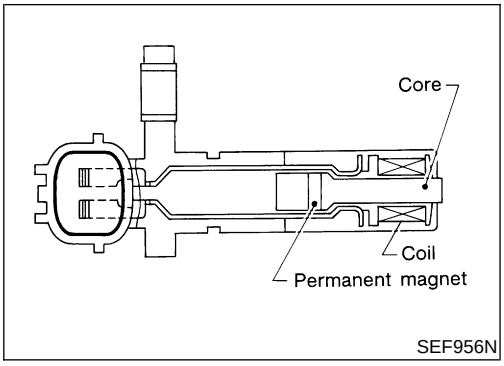
RESISTOR

NDEC0294S03

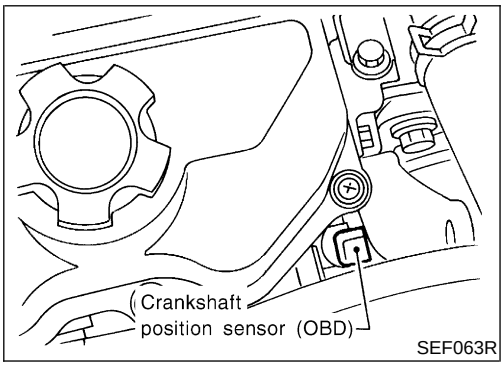
1. Disconnect resistor harness connector.
2. Check resistance between terminals 1 and 2.

Resistance: Approximately 2.2 kΩ [at 25°C (77°F)]

If NG, replace resistor.



SEF956N



SEF063R

Component Description

NDEC0295

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.

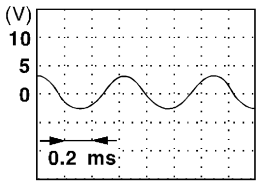
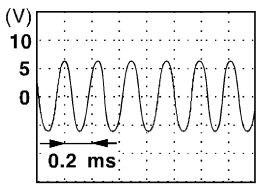
ECM Terminals and Reference Value

NDEC0296

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
47	LG	Crankshaft position sensor (OBD)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 1V (AC range)  SEF690W
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2V (AC range)  SEF691W

On Board Diagnosis Logic

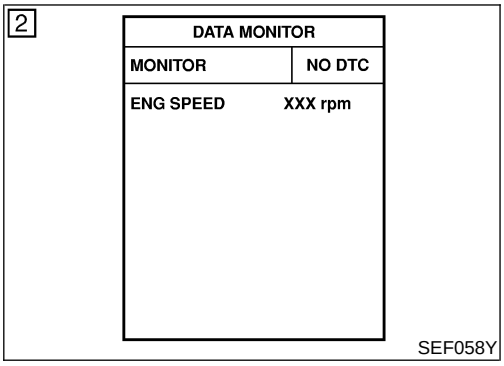
NDEC0297

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1336	• A chipping of the flywheel or drive plate gear tooth (cog) is detected by the ECM.	• Harness or connectors • Crankshaft position sensor (OBD) • Drive plate

DTC Confirmation Procedure

NDEC0298

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-424.

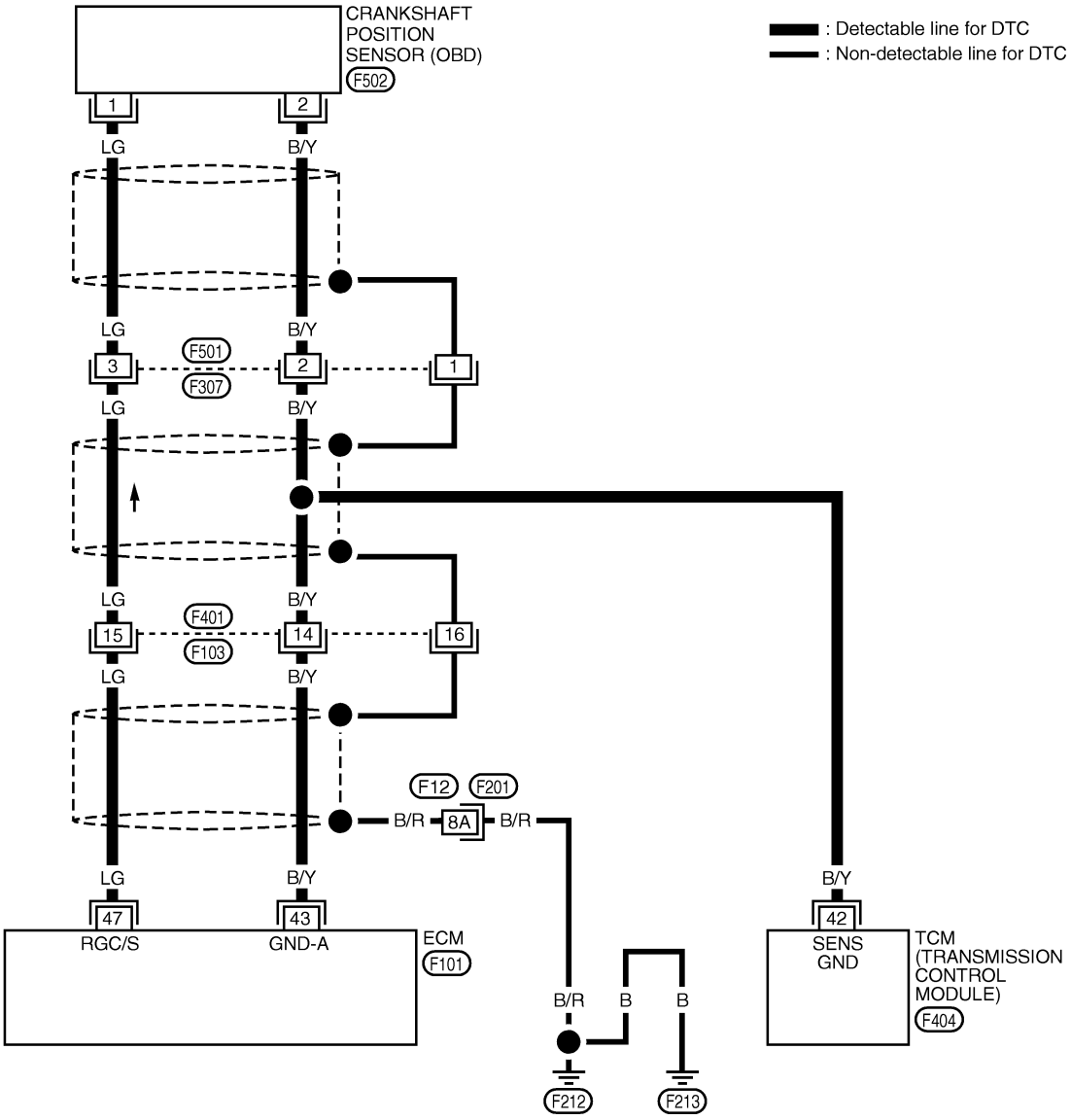
With GST

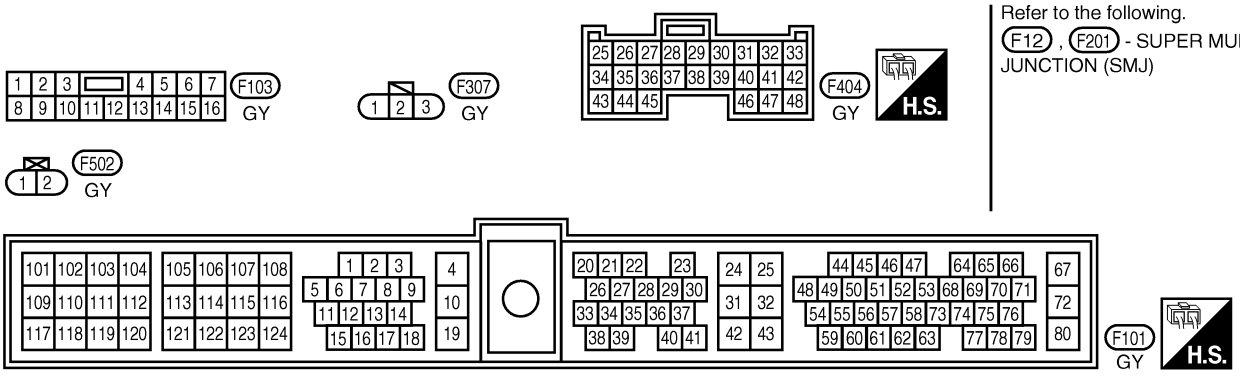
Follow the procedure “With CONSULT-II”.

Wiring Diagram

NDEC0299

EC-CKPS-01





Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)

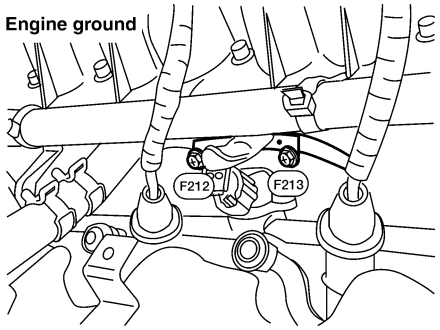
WEC076

Diagnostic Procedure

NDEC0300

1	RETIGHTEN GROUND SCREWS

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

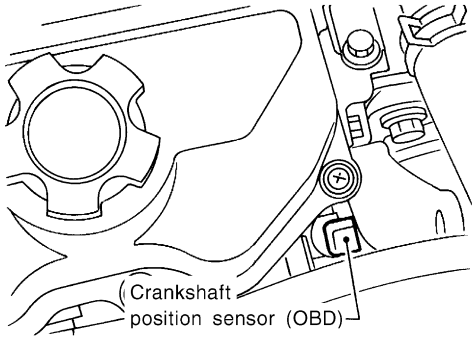


LEC749

▶	GO TO 2.

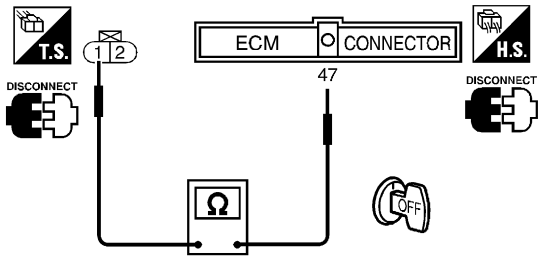
2	CHECK CKPS (OBD) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.



SEF063R

2. Check continuity between ECM terminal 47 and CKPS (OBD) terminal 1.



SEF706U

Continuity should exist.

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

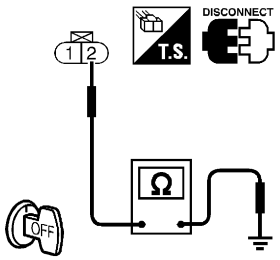
OK or NG

OK	▶	GO TO 4.
NG	▶	GO TO 3.

3	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F501, F307 ● Harness connectors F401, F103 ● 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 2 and engine ground.



SEF707U

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors F501, F307 ● Harness connectors F401, F103 ● 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 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-422 again.

Is a 1st trip DTC P1336 (0905) detected?

Yes	▶	GO TO 7.
No	▶	**INSPECTION END**

7	CHECK CRANKSHAFT POSITION SENSOR (OBD)
Refer to "Component Inspection", EC-426.	

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace crankshaft position sensor (OBD).

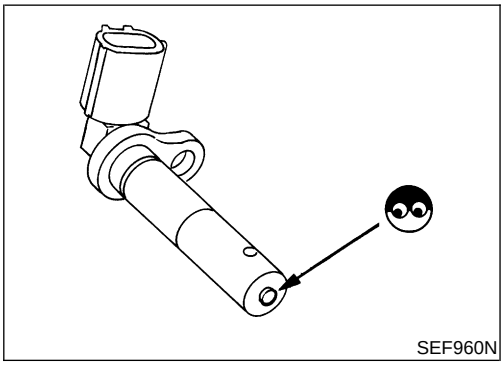
Diagnostic Procedure (Cont'd)

8	CHECK CKPS (OBD) SHIELD CIRCUIT FOR OPEN AND SHORT	
1. Disconnect harness connectors F501, F307. 2. Check harness continuity between harness connector F307 and engine ground. **Continuity should exist.** 3. Also check harness for short to power. **OK or NG**		
OK	▶	GO TO 10.
NG	▶	GO TO 9.

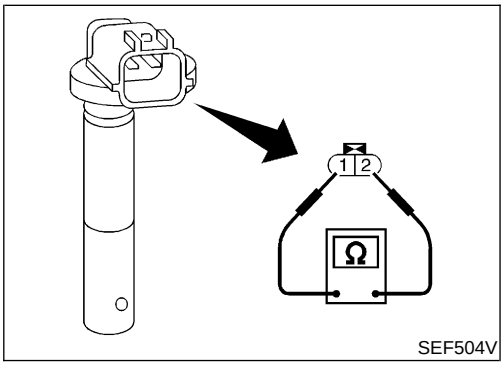
9	DETECT MALFUNCTIONING PART	
Check the following. ● Harness connectors F501, F307 ● Harness connectors F401, F103 ● Harness connectors F12, F201 ● Harness for open between harness connector F307 and engine ground		
	▶	Repair open circuit or short to power in harness or connectors.

10	CHECK GEAR TOOTH	
Visually check for chipping drive plate gear tooth (cog). **OK or NG**		
OK	▶	GO TO 11.
NG	▶	Replace the drive plate.

11	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.		
	▶	**INSPECTION END**



SEF960N



SEF504V

Component Inspection

NDEC0301

CRANKSHAFT POSITION SENSOR (OBD)

NDEC0301S01

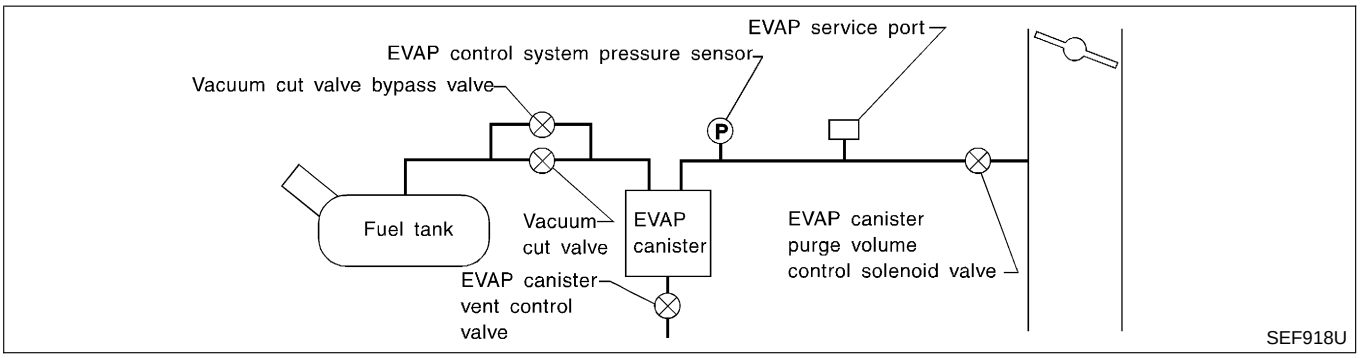
1. Disconnect crankshaft position sensor (OBD) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.
5. Check resistance as shown in the figure.
   Resistance: Approximately 512 - 632Ω [at 20°C (68°F)]

On Board Diagnosis Logic

NDEC0481

NOTE:
If DTC P1440 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-452.)

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.



DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1440	• 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 • 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. • EVAP control system pressure sensor

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

DTC Confirmation Procedure

NDEC0482

Refer to “P0440 EVAP CONTROL SYSTEM (SMALL LEAK) (NEGATIVE PRESSURE)”, EC-315.

Description

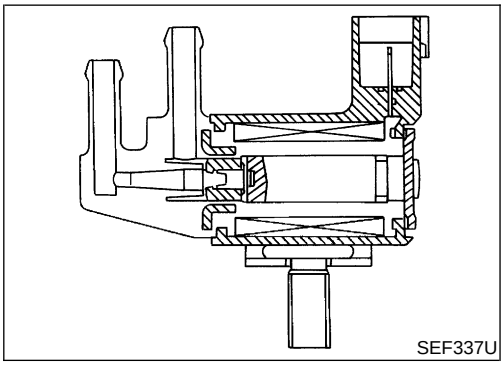
NDEC0325

SYSTEM DESCRIPTION

NDEC0325S01

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Throttle position switch	Closed throttle position		
Heated oxygen sensor 1 (front)	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed		

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


SEF337U

COMPONENT DESCRIPTION

NDEC0325S02

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

NDEC0326

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	—

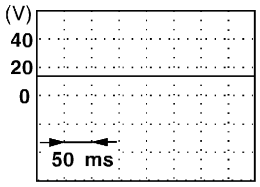
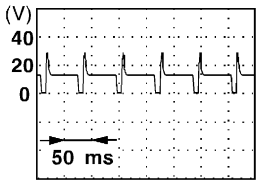
ECM Terminals and Reference Value

NDEC0327

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

CAUTION:

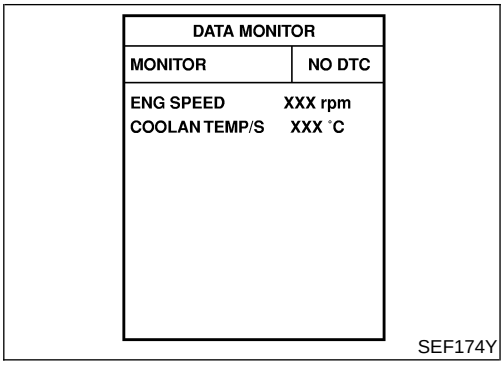
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

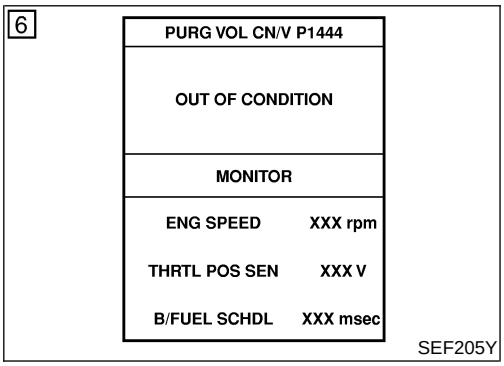
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch "OFF"]** ● For a few seconds after turning ignition switch "OFF"	0 - 1.5V
			[Ignition switch "OFF"] ● A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
5	G/B	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/W	Power supply for ECM	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)
72	B/W			
117	B/W	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

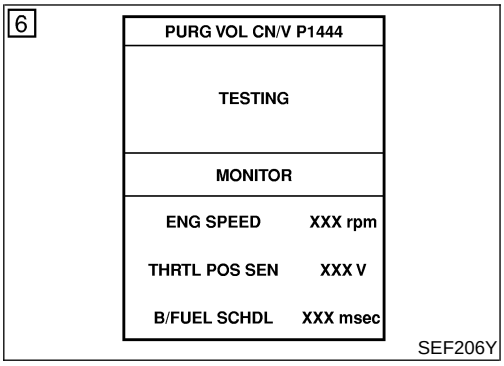
On Board Diagnosis Logic

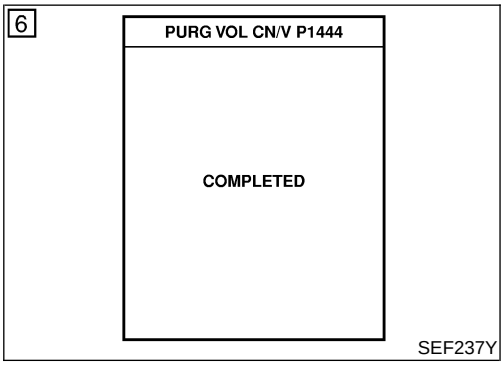
NDEC0328

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1444	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	● EVAP control system pressure sensor ● EVAP canister purge volume control solenoid valve (The valve is stuck open.) ● EVAP canister vent control valve ● EVAP canister ● Hoses (Hoses are connected incorrectly or clogged.)









DTC Confirmation Procedure

NDEC0329

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

TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 5 seconds.
3) Turn ignition switch “ON”.
4) Select “PURG VOL CN/V P1444” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
5) Touch “START”.
6) Start engine and let it idle until “TESTING” on CONSULT-II changes to “COMPLETED”. (It will take for approximately 10 seconds.)
   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7) Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to “Diagnostic Procedure”, EC-433.

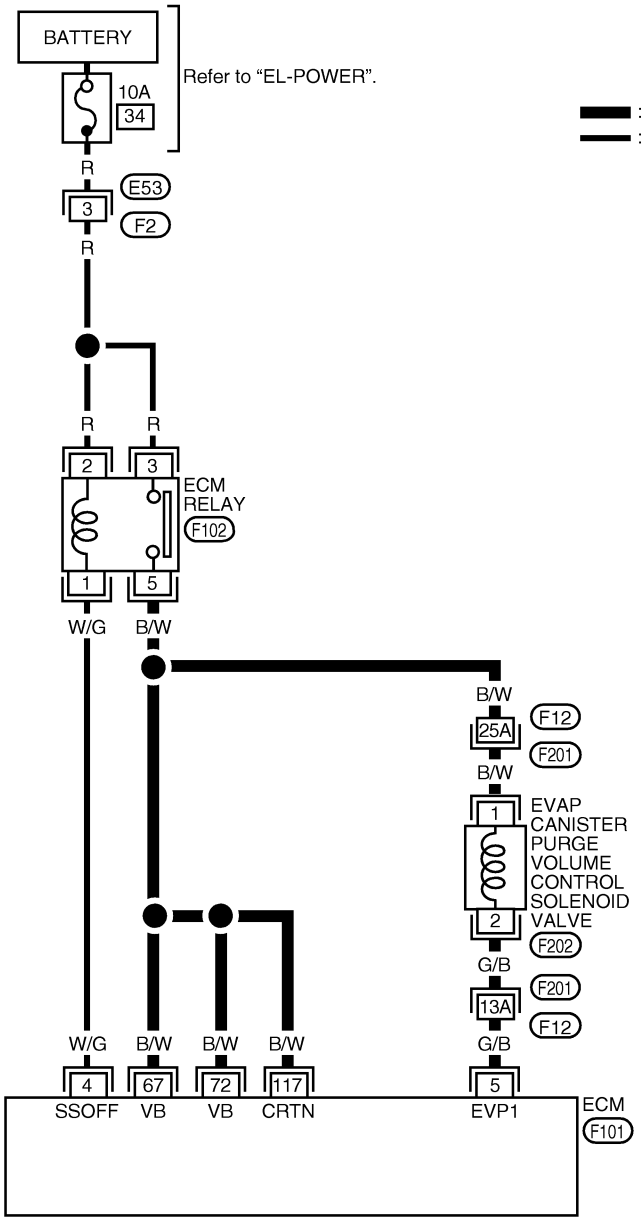
With GST

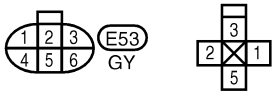
1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch “OFF” and wait at least 5 seconds.
3) Start engine and let it idle for at least 20 seconds.
4) Select “MODE 7” with GST.
5) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-433.

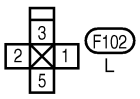
Wiring Diagram

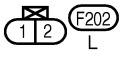
NDEC0330

EC-PGC/V-01

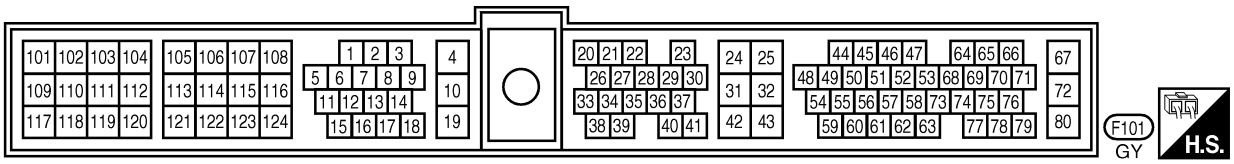








Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)



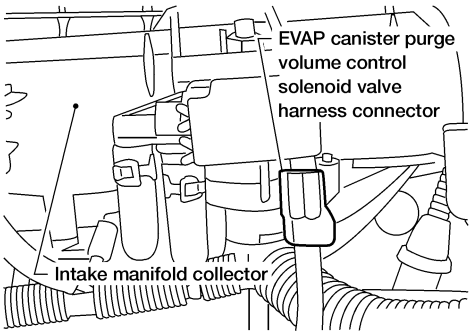
WEC079

Diagnostic Procedure

NDEC0331

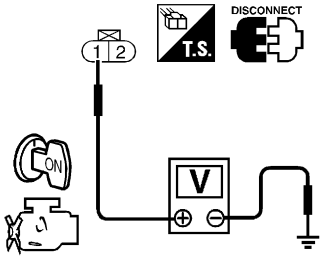
1	CHECK POWER SUPPLY

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



AEC804A

3. Turn ignition switch “ON”.
4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and engine ground with CONSULT-II or tester.



SEF057W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

2	DETECT MALFUNCTIONING PART

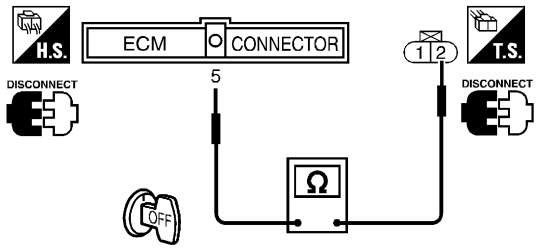
Check the following.
- Harness connectors F12, F201
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

3	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 5 and EVAP canister purge volume control solenoid valve terminal 2.



SEF058W

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 F12, F201
- 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.

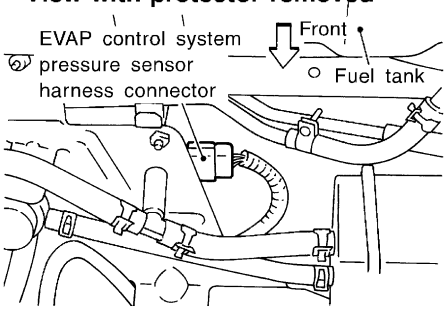
OK or NG

OK	▶	GO TO 6.
NG	▶	Repair it.

6	CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.

View with protector removed



SEF092V

2. Check connectors for water.

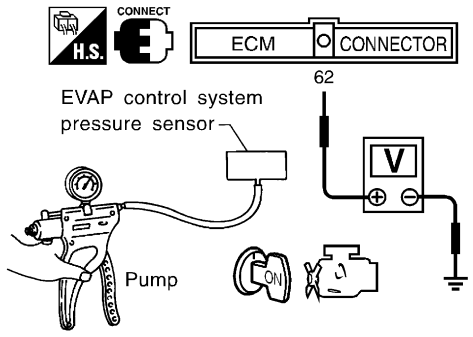
Water should not exist.

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.



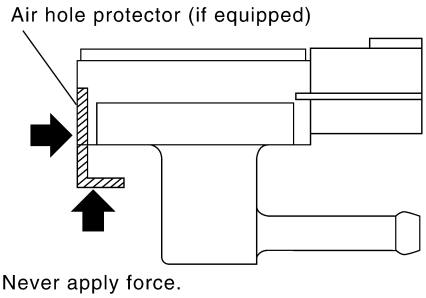
SEF894U

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 inHh) or over 20 kPa (150 mmHg, 5.91 inHg) of pressure.**
- **Never apply force to the air hole protector of the sensor if equipped.**



SEF799W

- **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 8.
NG	▶	Replace EVAP control system pressure sensor.

8	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to "Component Inspection", EC-437.

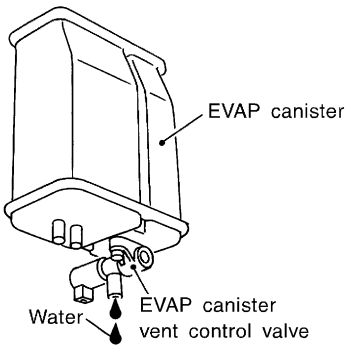
OK or NG

OK	▶	GO TO 9.
NG	▶	Replace EVAP canister purge volume control solenoid valve.

9	CHECK EVAP CANISTER VENT CONTROL VALVE	
Refer to "Component Inspection", EC-443.		
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. For water separator, refer to EC-443.		
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.		
Yes or No		
Yes	▶	GO TO 12.
No	▶	GO TO 14.



SEF596U

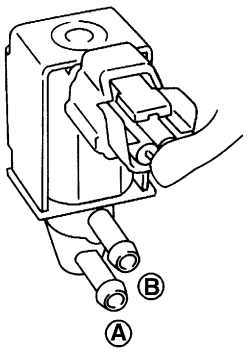
12	CHECK EVAP CANISTER	
Weigh the EVAP canister with the EVAP canister vent control valve attached. **The weight should be less than 1.8 kg (4.0 lb).**		
OK or NG		
OK	▶	GO TO 14.
NG	▶	GO TO 13.

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.

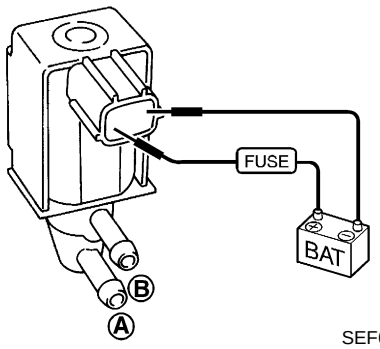
14	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.		
	▶	**INSPECTION END**

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

SEF801Y



SEF660U



SEF661U

Component Inspection

NDEC0332

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

NDEC0332S01

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

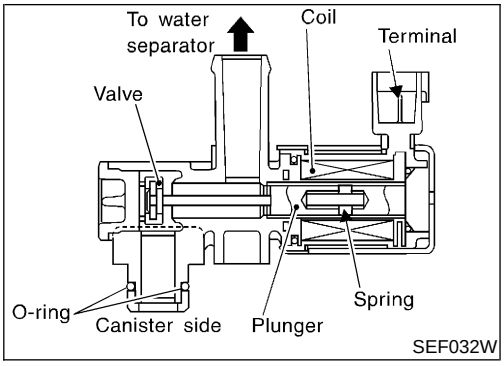
If NG, replace the EVAP canister purge volume control solenoid valve.

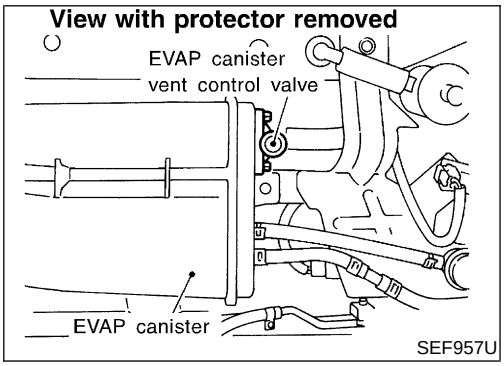
Without CONSULT-II

Check air passage continuity.

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

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





Component Description

NDEC0484

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

NDEC0485

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NDEC0486

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

CAUTION:

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

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

On Board Diagnosis Logic

NDEC0487

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1446	• EVAP canister vent control valve remains closed under specified driving conditions.	• EVAP canister vent control valve • EVAP control system pressure sensor and the circuit • Blocked rubber tube to EVAP canister vent control valve • Water separator • EVAP canister is saturated with water.

4

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
THRTL POS SEN	XXX V
B/FUEL SCHDL	XXX msec

SEF201Y

DTC Confirmation Procedure

NDEC0488

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-441.

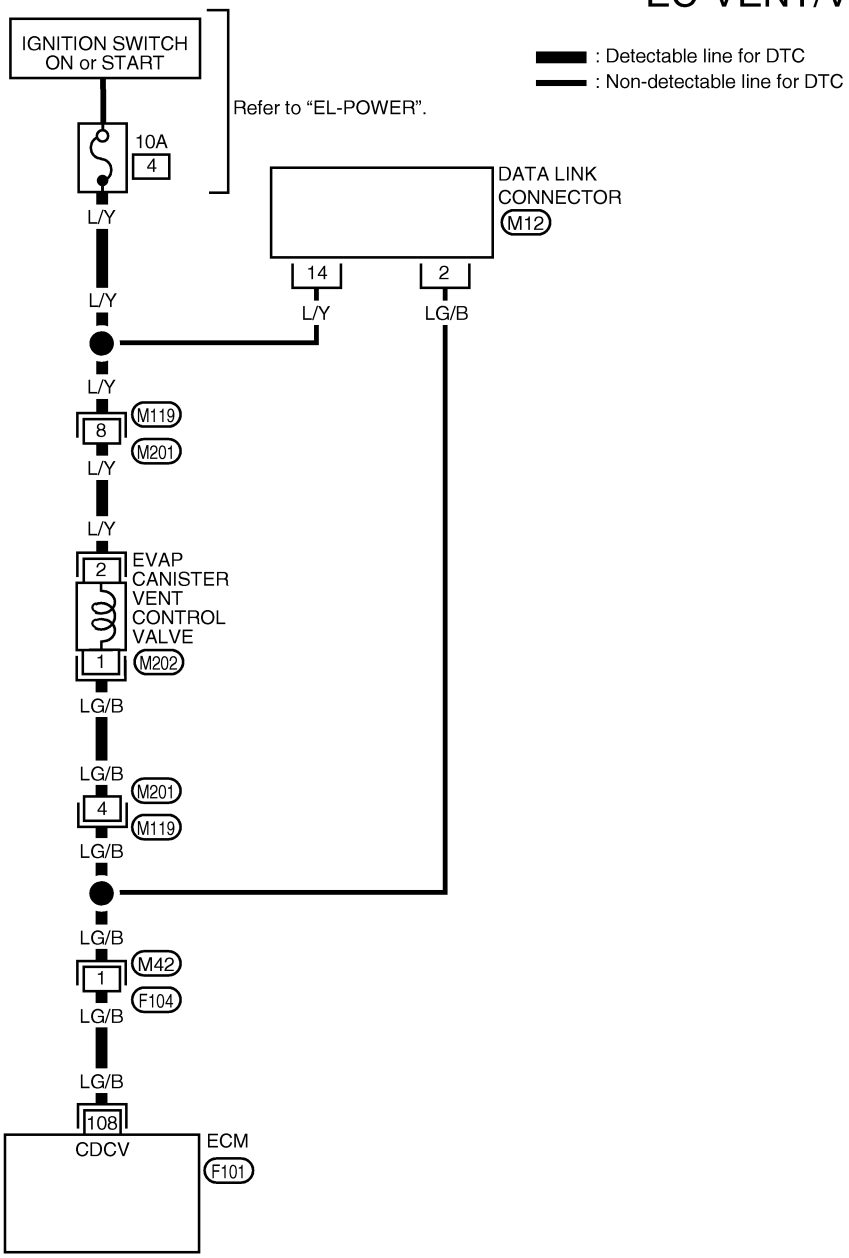
With GST

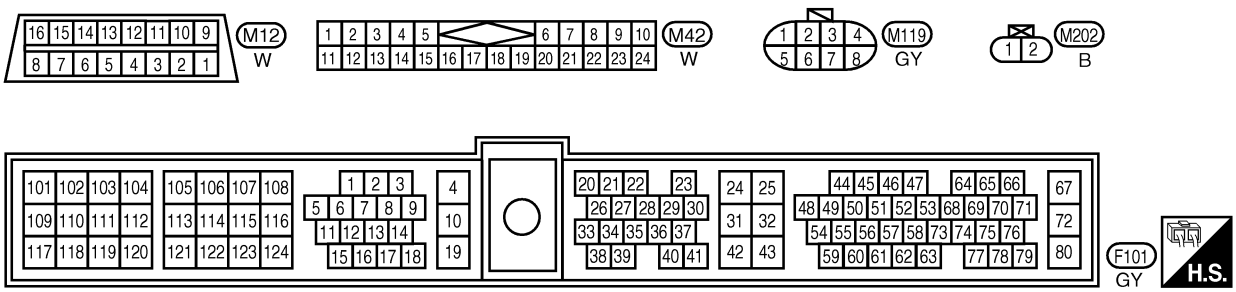
Follow the procedure "With CONSULT-II".

Wiring Diagram

NDEC0489

EC-VENT/V-01





WEC637

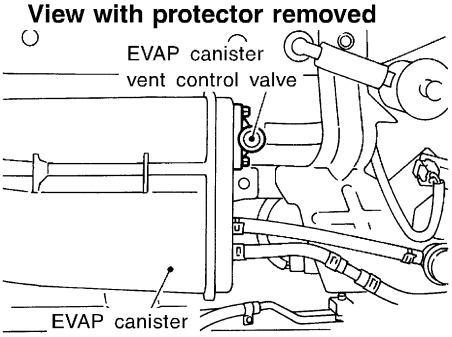
Diagnostic Procedure

NDEC0490

1	CHECK RUBBER TUBE

1. Turn ignition switch “OFF”.
2. Check obstructed water separator and rubber tube connected to EVAP canister vent control valve.
3. Clean the rubber tube using air blower. For water separator, refer to EC-443.

View with protector removed



SEF957U

OK or NG

OK	▶	GO TO 2.
NG	▶	Clean, repair or replace rubber tube and/or water separator.

2	CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

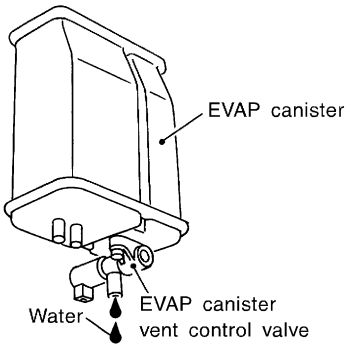
Refer to “Component Inspection”, EC-443.

OK or NG

OK	▶	GO TO 3.
NG	▶	Replace EVAP canister vent control valve and O-ring.

3	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

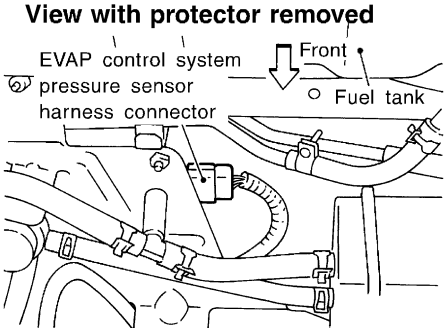
Yes	▶	GO TO 4.
No	▶	GO TO 6.

Diagnostic Procedure (Cont'd)

4	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 6.
NG	▶	GO TO 5.

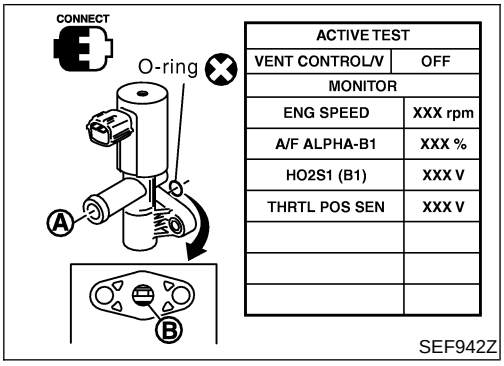
5	DETECT MALFUNCTIONING PART	
Check the following. ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection		
	▶	Repair hose or replace EVAP canister.

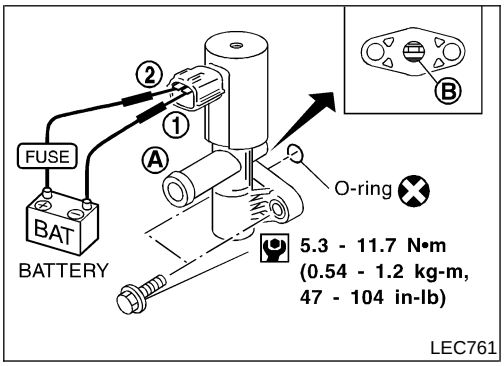
6	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor. **OK or NG**		
OK	▶	GO TO 7.
NG	▶	Repair it.

7	CHECK CONNECTOR	
1. Disconnect EVAP control system pressure sensor harness connector. **View with protector removed**  SEF092V 2. Check connectors for water. **Water should not exist.** **OK or NG**		
OK	▶	GO TO 8.
NG	▶	Replace EVAP control system pressure sensor.

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION	
Refer to "DTC Confirmation Procedure" for DTC P0450, EC-341. **OK or NG**		
OK	▶	GO TO 9.
NG	▶	Replace EVAP control system pressure sensor.

9	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.		
	▶	**INSPECTION END**





Component Inspection

NDEC0491

EVAP CANISTER VENT CONTROL VALVE

NDEC0491S01

Check air passage continuity.

With CONSULT-II

Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.

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

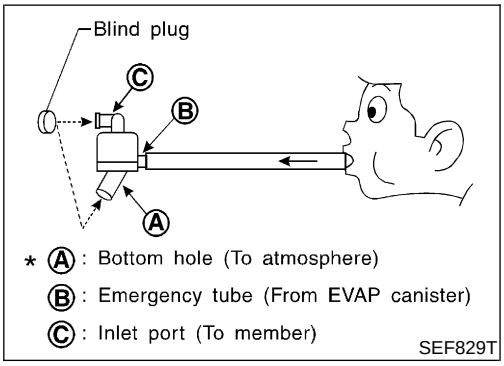
Without CONSULT-II

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

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If portion **B** is rusted, replace control valve.

Make sure new O-ring is installed properly.



WATER SEPARATOR

NDEC0491S02

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

NOTE:

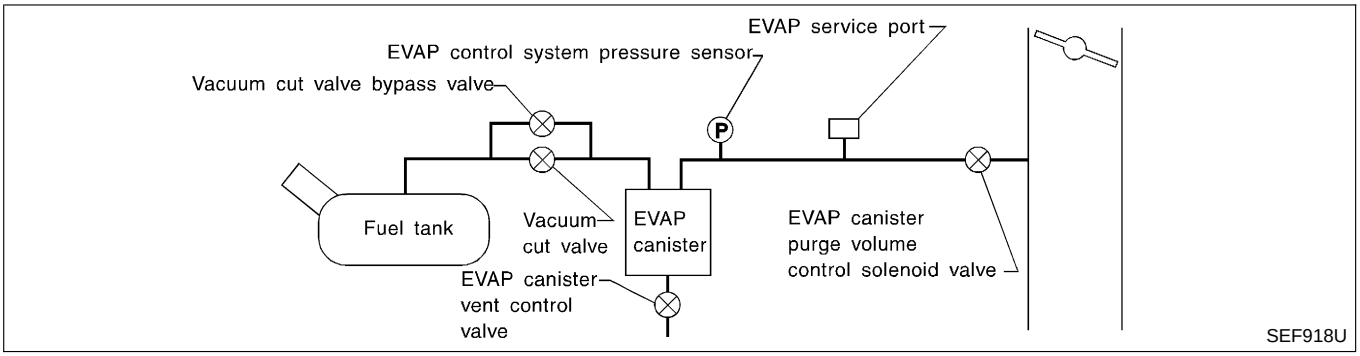
- Do not disassemble water separator.

DTC P1447 EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM PURGE FLOW MONITORING

System Description

NDEC0333

NOTE:
If DTC P1447 is displayed with P0510, perform trouble diagnosis for DTC P0510 first. (See EC-369.)



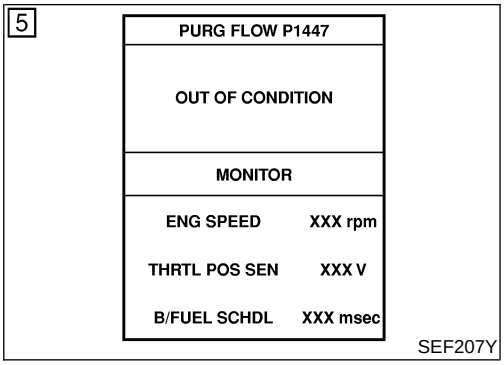
In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

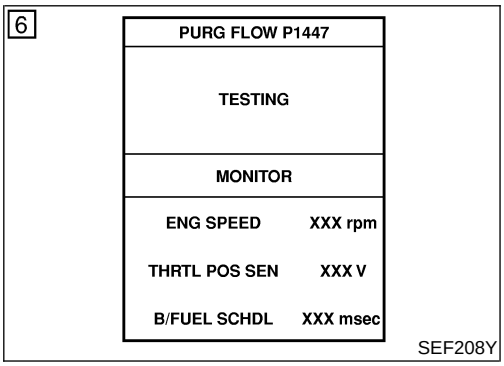
On Board Diagnosis Logic

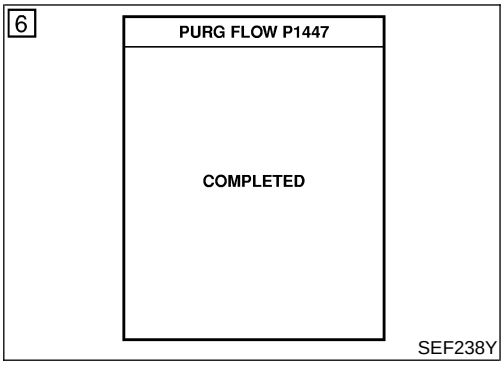
NDEC0334

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1447	• EVAP control system does not operate properly. • EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	• EVAP canister purge volume control solenoid valve stuck closed • EVAP control system pressure sensor and the circuit • Loose, disconnected or improper connection of rubber tube • Blocked rubber tube • 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







DTC Confirmation Procedure

NDEC0335

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 0°C (32°F) or more.

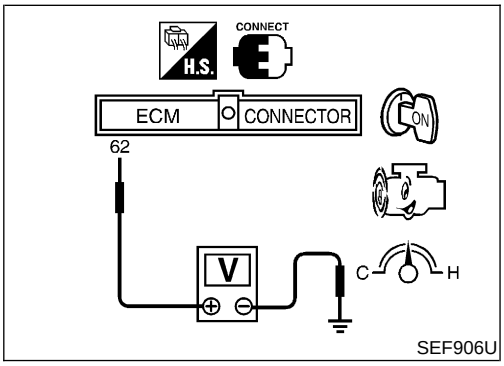
With CONSULT-II

1) Start engine and warm it up to normal operating temperature.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and let it idle for at least 70 seconds.
4) Select "PURG FLOW P1447" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
5) Touch "START".
   If "COMPLETED" is displayed, go to step 7.
6) When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

Selector lever	Suitable position
Vehicle speed	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,400 rpm
B/FUEL SCHDL	Less than 8 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-446.



Overall Function Check

NDEC0492

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-446.

Diagnostic Procedure

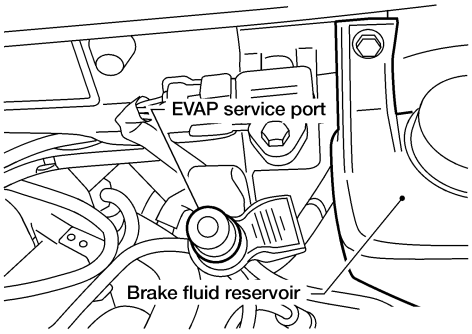
NDEC0336

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.



AEC802A

2. Start engine and let it idle.
3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-II.
4. Rev engine up to 2,000 rpm.
5. Touch "Qd" and "Qu" on CONSULT-II screen to adjust "PURG VOL CONT/V" opening.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

SEF801Y

100.0%: Vacuum should exist.
0.0%: Vacuum should not exist.

OK or NG

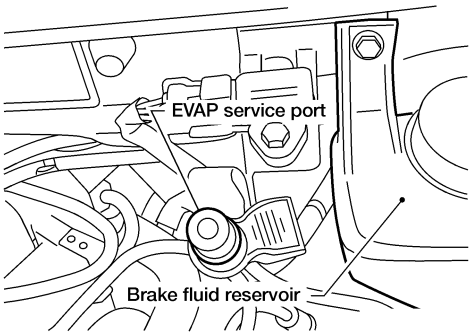
OK	▶	GO TO 7.
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

3	CHECK PURGE FLOW

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.



AEC802A

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

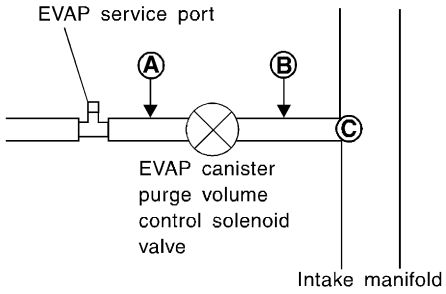
1. Turn ignition switch "OFF".
2. Check EVAP purge line for improper connection or disconnection.
   Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-32.

OK or NG

OK	▶	GO TO 5.
NG	▶	Repair it.

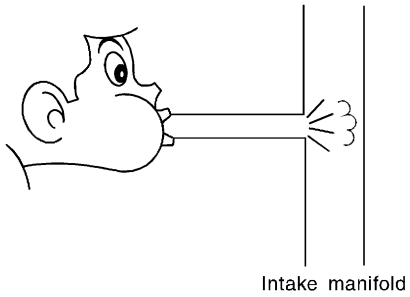
5	CHECK EVAP PURGE HOSE AND PURGE PORT

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	▶	GO TO 6.
NG	▶	Repair or clean hoses and/or purge port.

6	CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to "Component Inspection", EC-437.

OK or NG

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

7	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

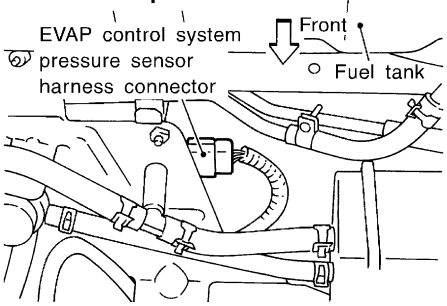
OK	▶	GO TO 8.
NG	▶	Repair it.

Diagnostic Procedure (Cont'd)

8	CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.

View with protector removed



SEF092V

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-341.

OK or NG

OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

10	CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to "Component Inspection", EC-443.

OK or NG

OK	▶	GO TO 11.
NG	▶	Replace EVAP canister vent control valve.

11	CHECK CLOSED THROTTLE POSITION SWITCH

Refer to "Component Inspection", EC-375.

OK or NG

OK	▶	GO TO 12.
NG	▶	Replace throttle position switch with throttle position sensor.

12	CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to "EVAPORATIVE EMISSION LINE DRAWING", EC-32.

OK or NG

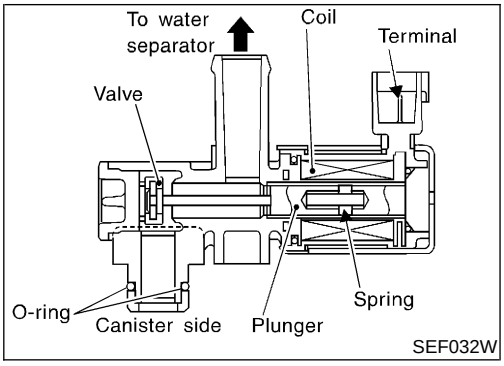
OK	▶	GO TO 13.
NG	▶	Replace it.

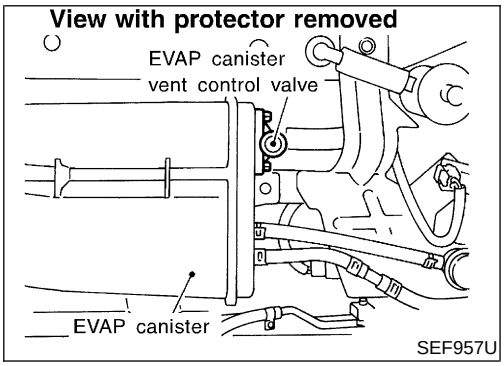
13	CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

	▶	GO TO 14.

14	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.	
▶	**INSPECTION END**





Component Description

NDEC0493

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

NDEC0494

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NDEC0495

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

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

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

On Board Diagnosis Logic

NDEC0496

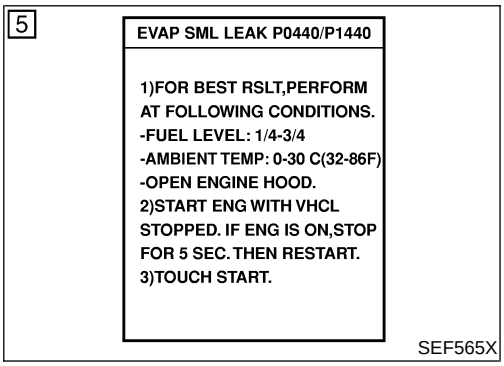
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1448	• EVAP canister vent control valve remains opened under specified driving conditions.	• EVAP canister vent control valve • EVAP control system pressure sensor and circuit • Blocked rubber tube to EVAP canister vent control valve • Water separator • EVAP canister is saturated with water. • Vacuum cut valve

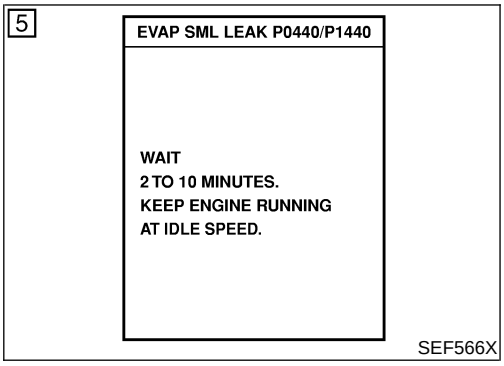
DTC Confirmation Procedure

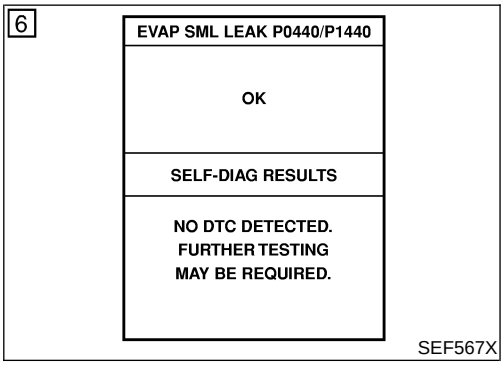
NDEC0497

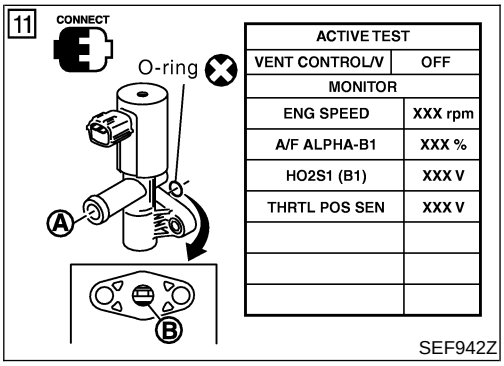
NOTE:

- **If DTC P1448 is displayed with P0440, perform trouble diagnosis for DTC P1448 first.**
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.









With CONSULT-II

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is less than 3/4 full and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**
- **It is better that the fuel level is low.**

1) Turn ignition switch "ON".
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
4) Make sure that the following conditions are met.

COOLAN TEMP/S	0 - 70°C (32 - 158°F)
INT/A TEMP SE	0 - 60°C (32 - 140°F)

5) Select "EVAP SML LEAK P0440/P1440" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.

NOTE:

- **If the CONSULT-II screen shown at left is displayed, stop the engine and stabilize the vehicle temperature at 25°C (77°F) or cooler. After "FUEL T/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-88.**
- **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.

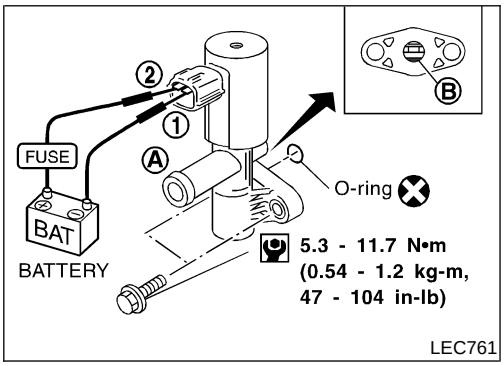
NOTE:

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.
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-456.
If the result is OK, go to "Diagnostic Procedure" for DTC P0440, EC-317.



Overall Function Check

NDEC0498

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.

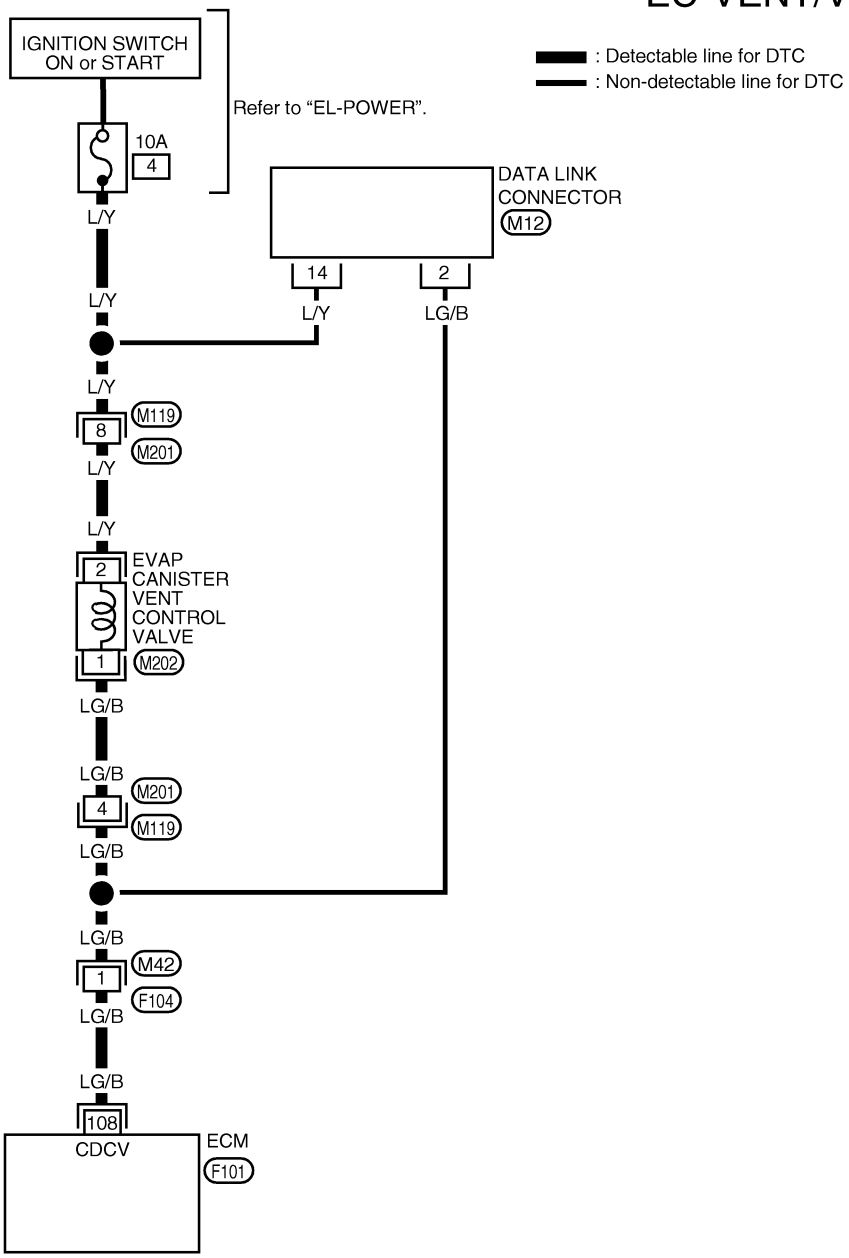
Condition	Air passage continuity
12V direct current supply between terminals 1 and 2	No
No supply	Yes

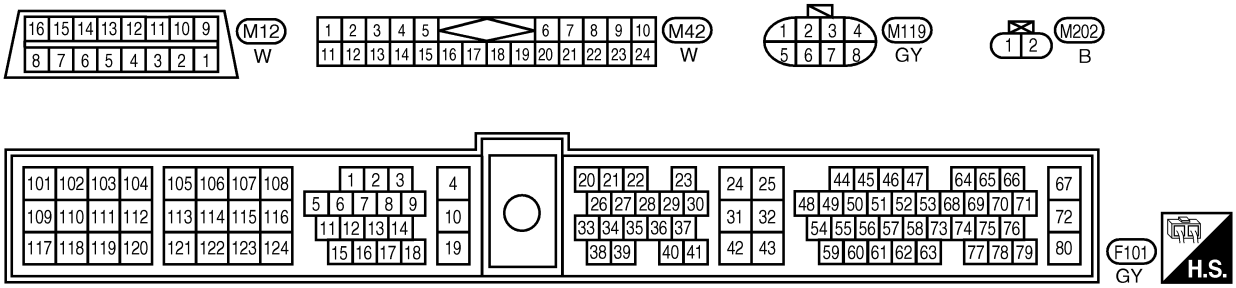
If the result is NG, go to "Diagnostic Procedure", EC-456.
If the result is OK, go to "Diagnostic Procedure" for DTC P0440, EC-317.

Wiring Diagram

NDEC0499

EC-VENT/V-01





WEC637

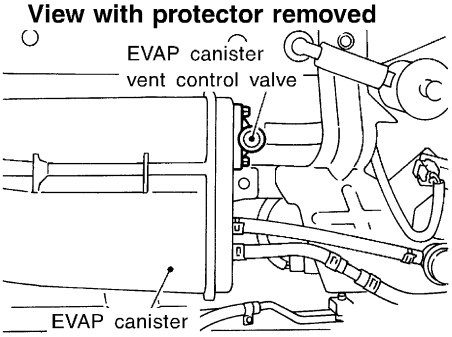
Diagnostic Procedure

NDEC0500

1	CHECK RUBBER TUBE

1. Turn ignition switch “OFF”.
2. Check obstructed water separator and rubber tube connected to EVAP canister vent control valve.
3. Clean the rubber tube using air blower. For water separator, refer to EC-458.

View with protector removed



SEF957U

OK or NG

OK	▶	GO TO 2.
NG	▶	Clean, repair or replace rubber tube and/or water separator.

2	CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

Refer to “Component Inspection”, EC-458.

OK or NG

OK	▶	GO TO 3.
NG	▶	Replace EVAP canister vent control valve and O-ring.

3	CHECK VACUUM CUT VALVE

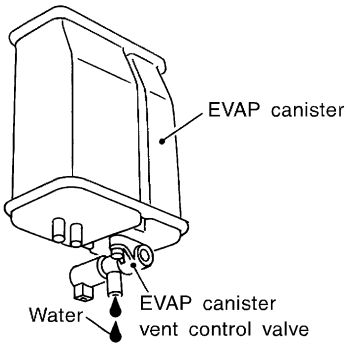
Refer to “Component Inspection”, EC-473.

OK or NG

OK	▶	GO TO 4.
NG	▶	Replace vacuum cut valve.

4	CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.



SEF596U

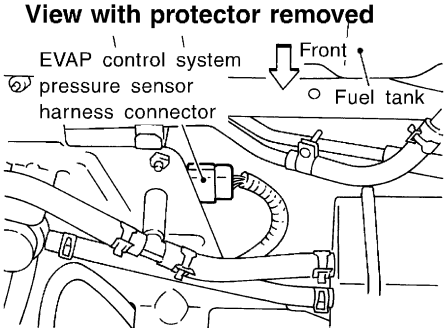
OK or NG

OK	▶	GO TO 5.
NG	▶	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	▶	Replace the EVAP canister.

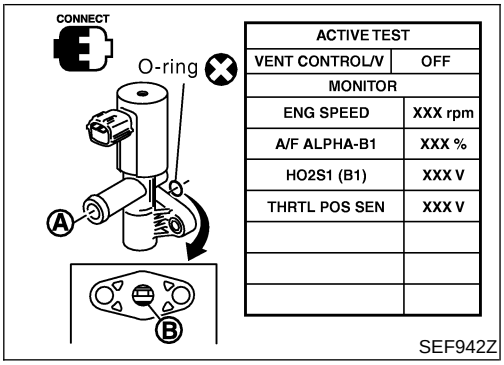
6	DETECT MALFUNCTIONING PART	
Check the following. ● EVAP canister for damage ● EVAP hose between EVAP canister and water separator for clogging or poor connection		
	▶	Repair hose or replace EVAP canister.

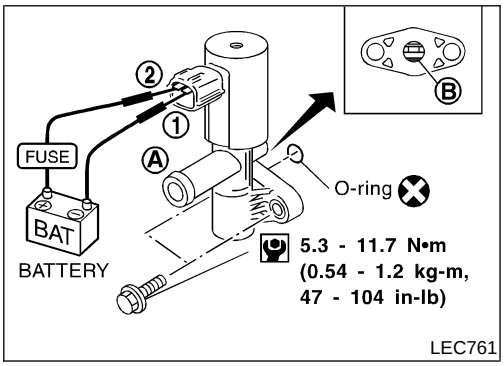
7	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor. **OK or NG**		
OK	▶	GO TO 8.
NG	▶	Repair it.

8	CHECK CONNECTOR	
1. Disconnect EVAP control system pressure sensor harness connector. **View with protector removed**  SEF092V 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-341. **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-126.		
	▶	**INSPECTION END**





Component Inspection

NDEC0501

EVAP CANISTER VENT CONTROL VALVE

NDEC0501S01

Check air passage continuity.

With CONSULT-II

Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.

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

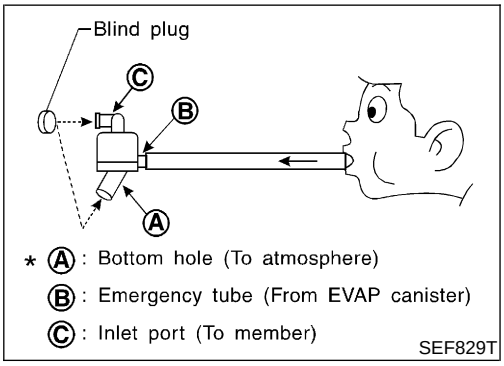
Without CONSULT-II

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

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If portion **B** is rusted, replace control valve.

Make sure new O-ring is installed properly.



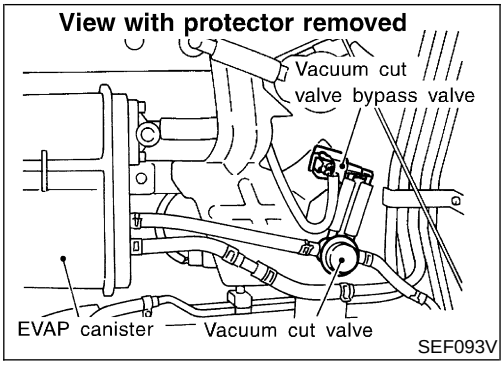
WATER SEPARATOR

NDEC0501S02

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

NOTE:

- Do not disassemble water separator.



Description

NDEC0502

COMPONENT DESCRIPTION

NDEC0502S01

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.

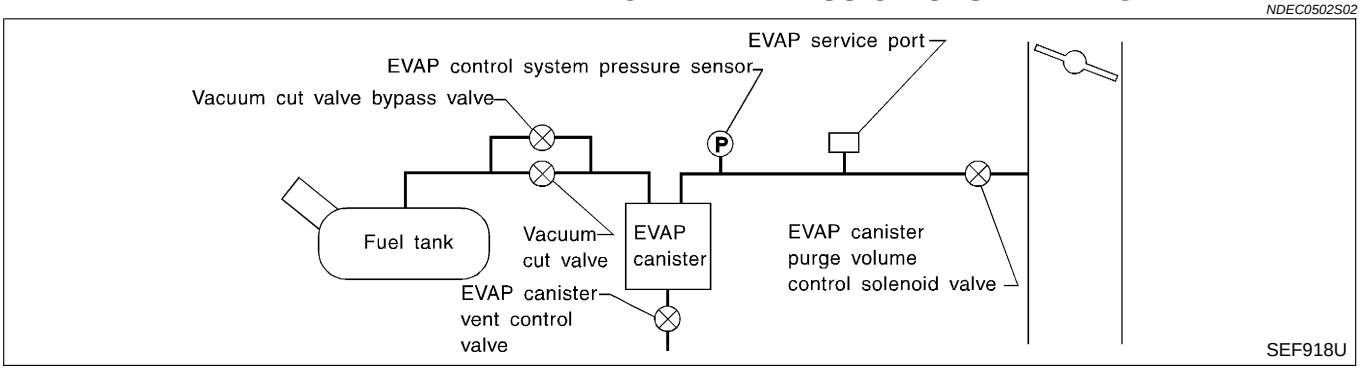
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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

NDEC0502S02



CONSULT-II Reference Value in Data Monitor Mode

NDEC0503

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NDEC0504

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	L/G	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NDEC0505

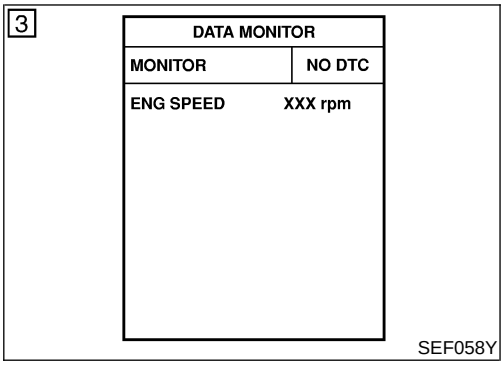
DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1490	An improper voltage signal is sent to ECM through vacuum cut valve bypass valve.	● Harness or connectors (The vacuum cut valve bypass valve circuit is open or shorted.) ● Vacuum cut valve bypass valve

DTC Confirmation Procedure

NDEC0506

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

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



With CONSULT-II

1) Turn ignition switch “ON”.
2) Select “DATA MONITOR” mode with CONSULT-II.
3) Start engine and wait at least 5 seconds.
4) If 1st trip DTC is detected, go to “Diagnostic Procedure”, EC-462

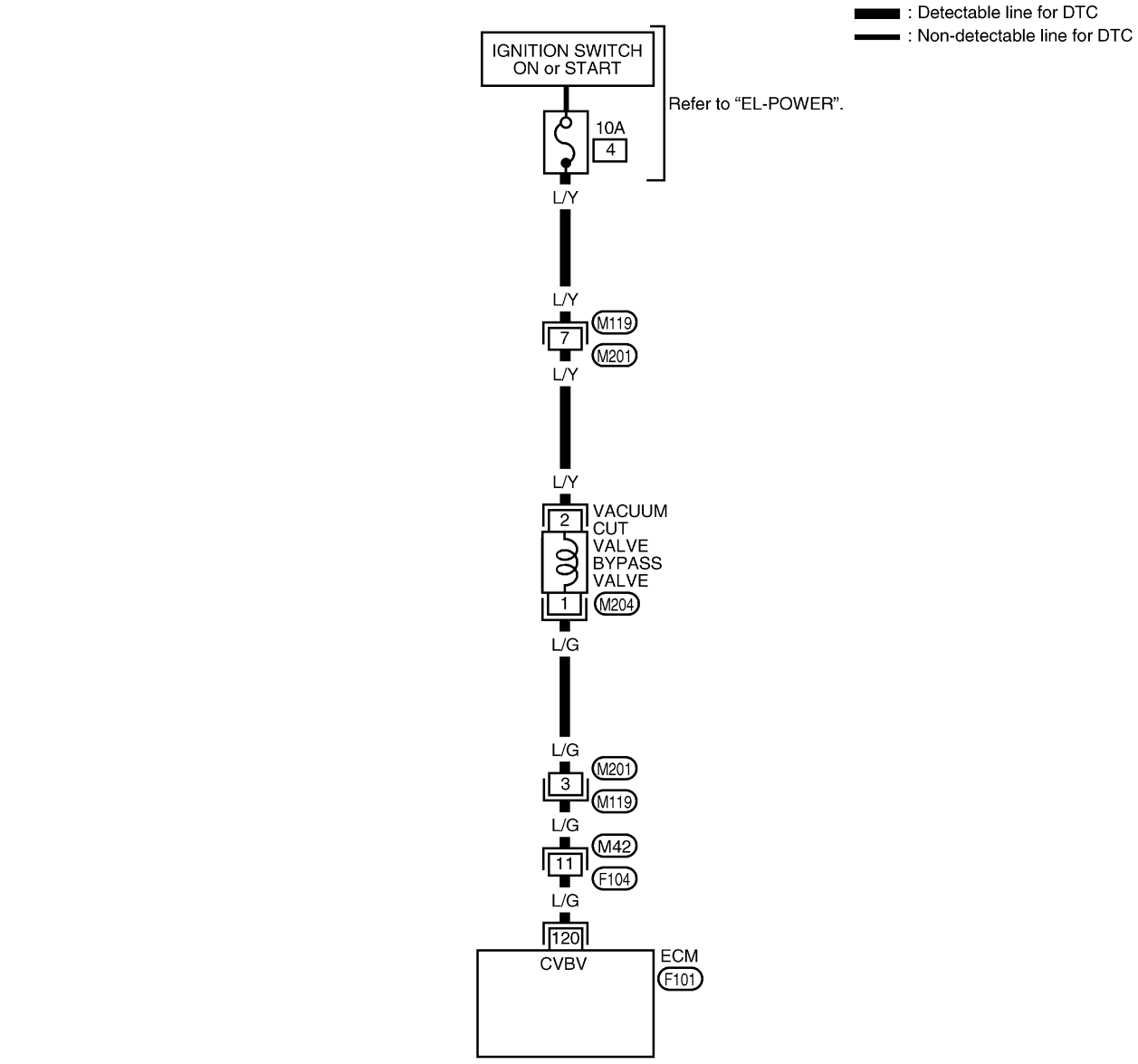
With GST

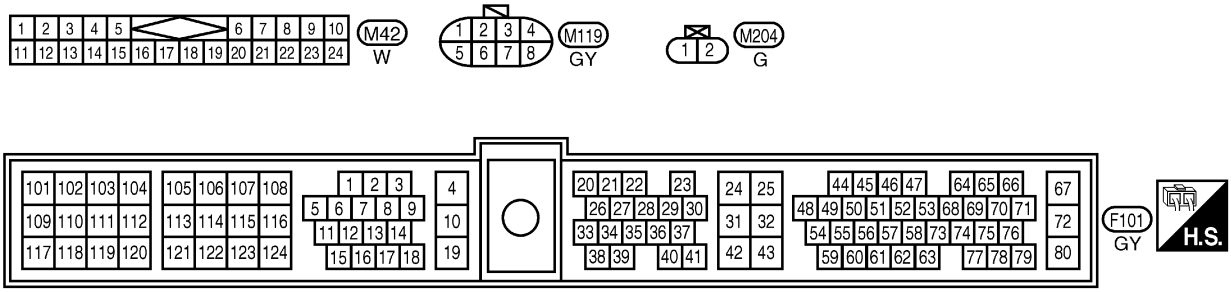
Follow the procedure “With CONSULT-II”.

Wiring Diagram

NDEC0507

EC-BYPS/V-01





AEC592A

Diagnostic Procedure

NDEC0508

1	INSPECTION START	
Do you have CONSULT-II?		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE CIRCUIT	

With CONSULT-II

1. Turn ignition switch “OFF” and then “ON”.
2. Select “VC/V BYPASS/V” in “ACTIVE TEST” mode with CONSULT-II.
3. Touch “ON/OFF” on CONSULT-II screen.

ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	RICH
THRTL POS SEN	XXX V

SEF806Y

4. Make sure that clicking sound is heard from the vacuum cut valve bypass valve.

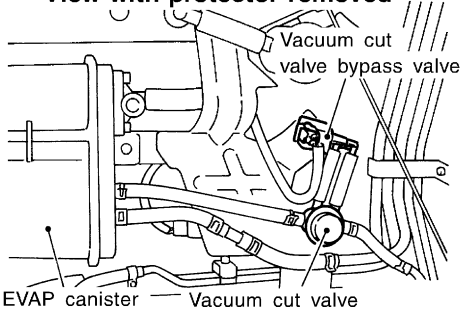
OK or NG		
OK	▶	GO TO 7.
NG	▶	GO TO 3.

3	CHECK POWER SUPPLY

Without CONSULT-II

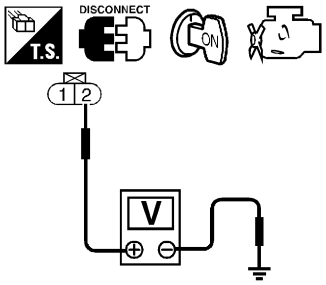
1. Turn ignition switch "OFF".
2. Disconnect vacuum cut valve bypass valve harness connector.

View with protector removed



SEF093V

3. Turn ignition switch "ON".
4. Check voltage between vacuum cut valve bypass valve terminal 2 and ground with CONSULT-II or tester.



SEF877T

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

Check the following.

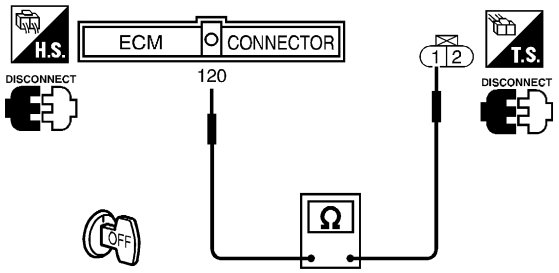
- Harness connectors M119, M201
- 10A fuse
- Harness for open or short between vacuum cut valve bypass valve and fuse

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

5	CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 120 and vacuum cut valve bypass valve terminal 1.



SEF394V

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 M201, M119
- Harness connectors M42, F104
- Harness for open or short between vacuum cut valve bypass valve and ECM

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

7	CHECK VACUUM CUT VALVE BYPASS VALVE

Refer to "Component Inspection", EC-465.

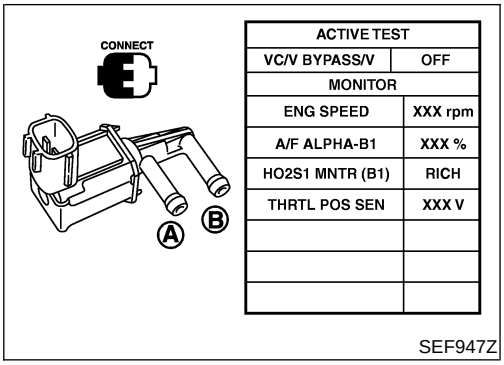
OK or NG

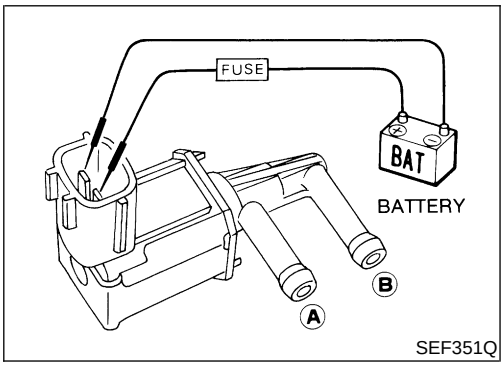
OK	▶	GO TO 8.
NG	▶	Replace vacuum cut valve bypass valve.

8	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.

	▶	**INSPECTION END**





Component Inspection

NDEC0509

VACUUM CUT VALVE BYPASS VALVE

NDEC0509S01

Check air passage continuity.

With CONSULT-II

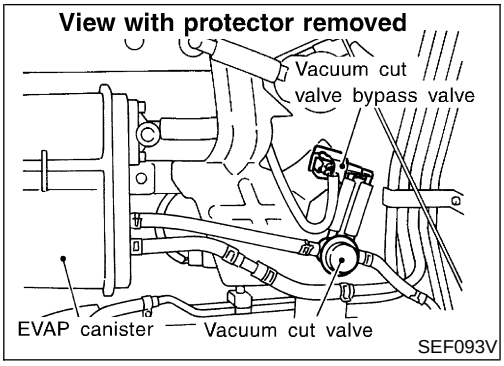
Perform “VC/V BYPASS/V” in “ACTIVE TEST” mode.

Condition VC/V BYPASS/V	Air passage continuity between **A** and **B**
ON	Yes
OFF	No

Without CONSULT-II

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

If NG or operation takes more than 1 second, replace vacuum cut valve bypass valve.



Description

NDEC0510

COMPONENT DESCRIPTION

NDEC0510S01

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.

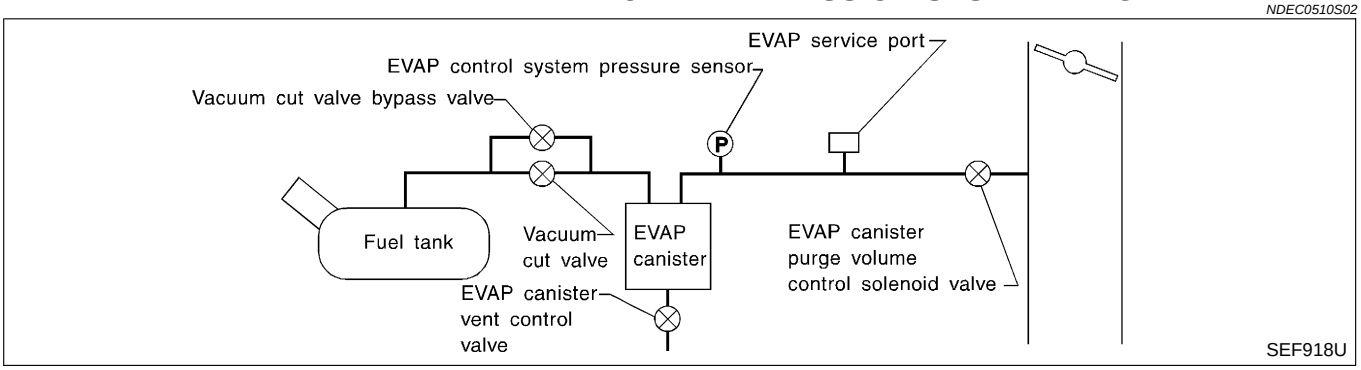
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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

NDEC0510S02



CONSULT-II Reference Value in Data Monitor Mode

NDEC0511

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	• Ignition switch: ON	OFF

ECM Terminals and Reference Value

NDEC0512

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	L/G	Vacuum cut valve bypass valve	**[Ignition switch "ON"]**	BATTERY VOLTAGE (11 - 14V)

On Board Diagnosis Logic

NDEC0513

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1491	Vacuum cut valve bypass valve does not operate properly.	• Vacuum cut valve bypass valve • Vacuum cut valve • Bypass hoses for clogging • EVAP control system pressure sensor and circuit • EVAP canister vent control valve • Hose between fuel tank and vacuum cut valve clogged • Hose between vacuum cut valve and EVAP canister clogged • EVAP canister • EVAP purge port of fuel tank for clogging

7

VC CUT/V BP/V P1491	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
VHCL SPEED SE	XXX km/h

SEF748Y

7

VC CUT/V BP/V P1491	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
VHCL SPEED SE	XXX km/h

SEF749Y

7

VC CUT/V BP/V P1491
COMPLETED

SEF239Y

DTC Confirmation Procedure

NDEC0514

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 0°C (32°F) or higher.

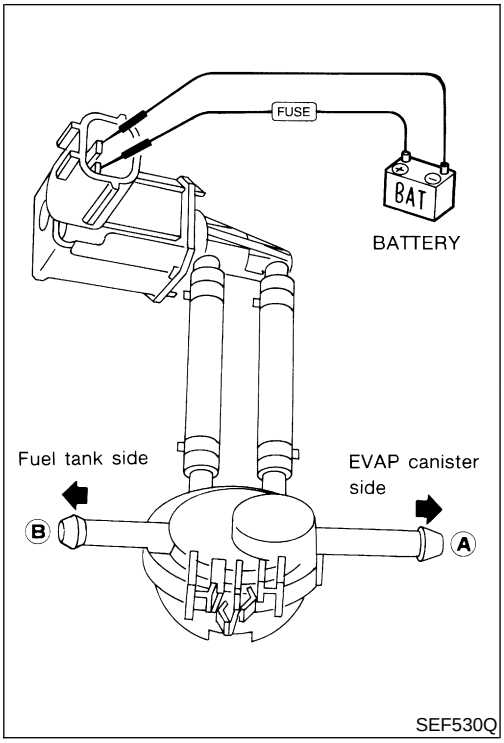
With CONSULT-II

1) Turn ignition switch “ON”.
2) Start engine and warm it up to normal operating temperature.
3) Turn ignition switch “OFF” and wait at least 5 seconds.
4) Start engine and let it idle for at least 70 seconds.
5) Select “VC CUT/V BP/V P1491” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
6) Touch “START”.
7) When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take at least 30 seconds.)

ENG SPEED	More than 500 rpm
Selector lever	Suitable position
Vehicle speed	More than 37 km/h (23 MPH)
B/FUEL SCHDL	1.0 - 10 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-470.



Overall Function Check

NDEC0515

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.

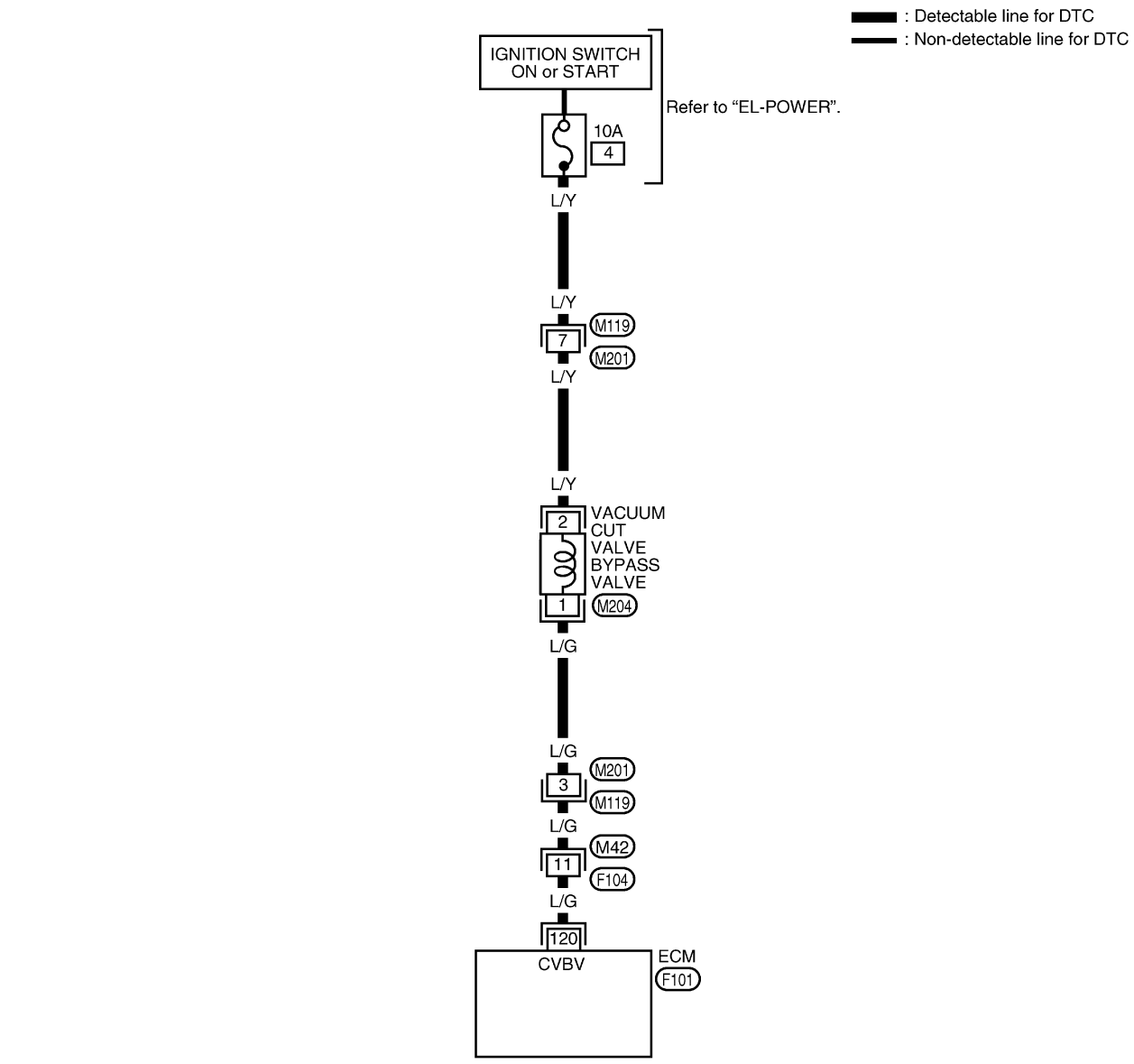
Without CONSULT-II

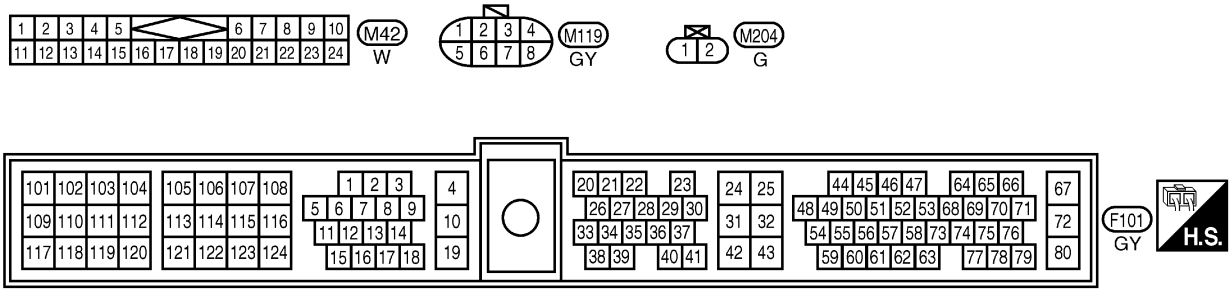
1) Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
2) Apply vacuum to port **A** and check that there is no suction from port **B**.
3) Apply vacuum to port **B** and check that there is suction from port **A**.
4) Blow air in port **B** and check that there is a resistance 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-470.

Wiring Diagram

NDEC0516

EC-BYPS/V-01





AEC592A

Diagnostic Procedure

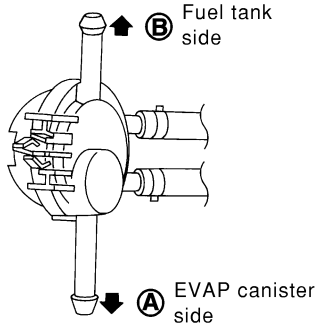
NDEC0517

1	INSPECTION START
Do you have CONSULT-II?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK VACUUM CUT VALVE BYPASS VALVE OPERATION

With CONSULT-II

1. Turn ignition switch “OFF”.
2. Remove vacuum cut valve and vacuum cut valve bypass valve as an assembly.
3. Apply vacuum to port A and check that there is no suction from port B.
4. Apply vacuum to port B and check that there is suction from port A.
5. Blow air in port B and check that there is a resistance to flow out of port A.
6. Turn ignition switch “ON”.
7. Select “VC/V BYPASS/V” in “ACTIVE TEST” mode with CONSULT-II and touch “ON”.
8. Blow air in port A and check that air flows freely out of port B.
9. Blow air in port B and check that air flows freely out of port A.



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	RICH
THRTL POS SEN	XXX V

SEF808Y

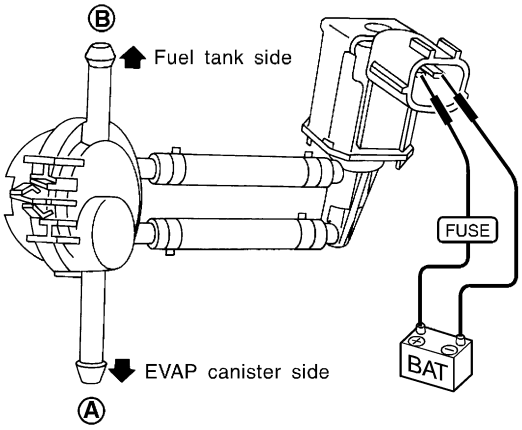
OK or NG

OK ▶	GO TO 4.
NG ▶	GO TO 5.

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-29.

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

Refer to "Component Inspection", EC-473.

OK or NG

OK	▶	GO TO 7.
NG	▶	Replace vacuum cut valve bypass valve.

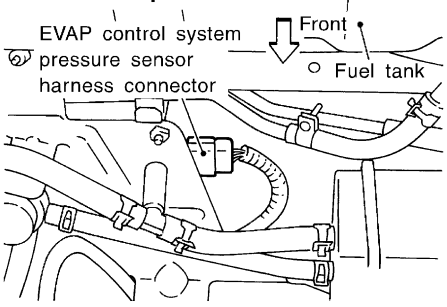
Diagnostic Procedure (Cont'd)

7	CHECK VACUUM CUT VALVE	
Refer to "Component Inspection", EC-473.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace vacuum cut valve.

8	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE	
1. Turn ignition switch "OFF". 2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Repair it

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

View with protector removed



SEF092V

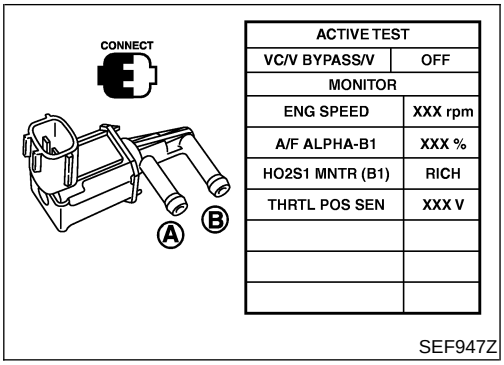
2. Check connectors for water.
Water should not exist.

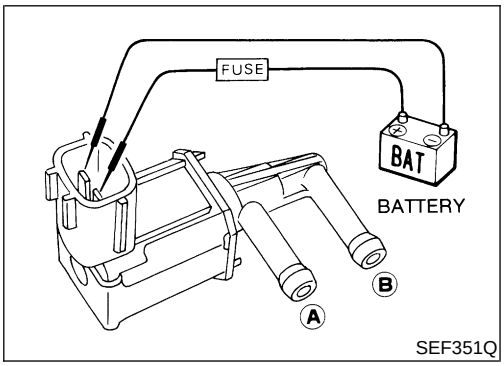
OK or NG		
OK	▶	GO TO 10.
NG	▶	Replace EVAP control system pressure sensor.

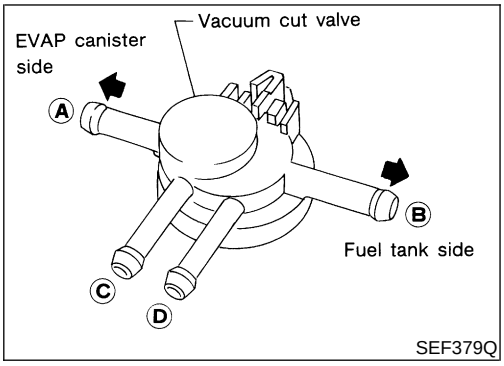
10	CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION	
Refer to "DTC Confirmation Procedure" for DTC P0450, EC-341.		
OK or NG		
OK	▶	GO TO 11.
NG	▶	Replace EVAP control system pressure sensor.

11	CHECK EVAP CANISTER VENT CONTROL VALVE	
Refer to "Component Inspection", EC-458.		
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-126.		
	▶	**INSPECTION END**







Component Inspection

NDEC0518

VACUUM CUT VALVE BYPASS VALVE

NDEC0518S01

Check air passage continuity.

With CONSULT-II

Perform “VC/V BYPASS/V” in “ACTIVE TEST” mode.

Condition VC/V BYPASS/V	Air passage continuity between **A** and **B**
ON	Yes
OFF	No

Without CONSULT-II

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

If NG or operation takes more than 1 second, replace vacuum cut valve bypass valve.

VACUUM CUT VALVE

NDEC0518S02

Check vacuum cut valve as follows:

1. Plug port **C** and **D** with fingers.
2. Apply vacuum to port **A** and check that there is no suction from port **B**.
3. Apply vacuum to port **B** and check that there is suction from port **A**.
4. Blow air in port **B** and check that there is a resistance to flow out of port **A**.
5. Open port **C** and **D**.
6. Blow air in port **A** check that air flows freely out of port **C**.
7. Blow air in port **B** check that air flows freely out of port **D**.

Component Description

NDEC0338

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

NDEC0339

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

CAUTION:

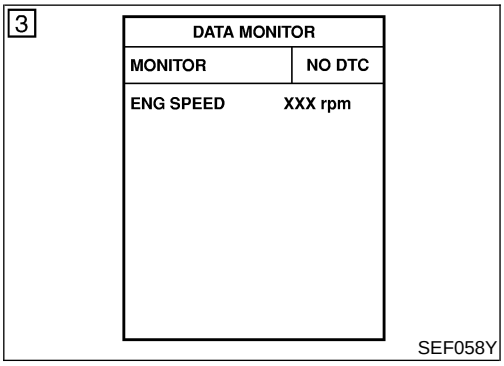
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
7	G/B	A/T check signal	**[Ignition switch "ON"]** **[Engine is running]**	0 - 3.0V

On Board Diagnosis Logic

NDEC0340

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1605	• An incorrect signal from TCM (Transmission control module) is sent to ECM.	• Harness or connectors [The communication line circuit between ECM and TCM (Transmission control module) is open or shorted.] • Dead (Weak) battery • TCM (Transmission control module)



DTC Confirmation Procedure

NDEC0341

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-476.

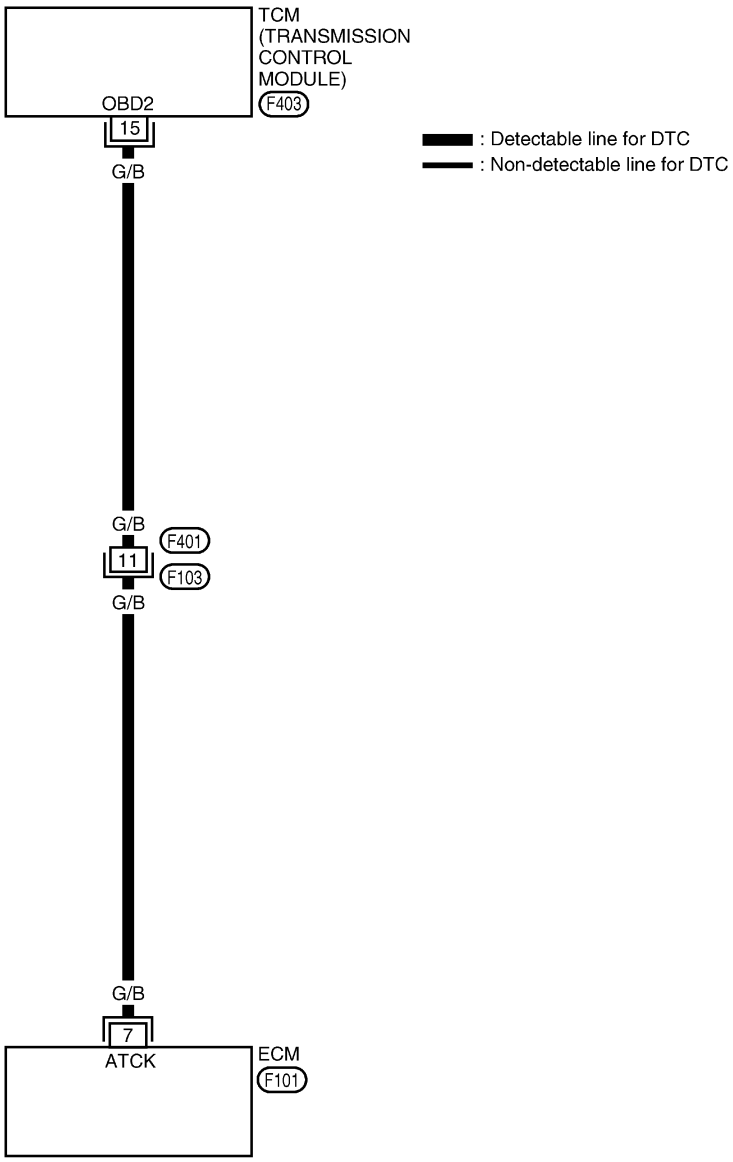
With GST

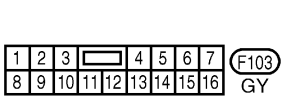
Follow the procedure "With CONSULT-II".

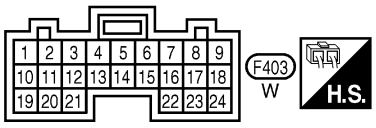
Wiring Diagram

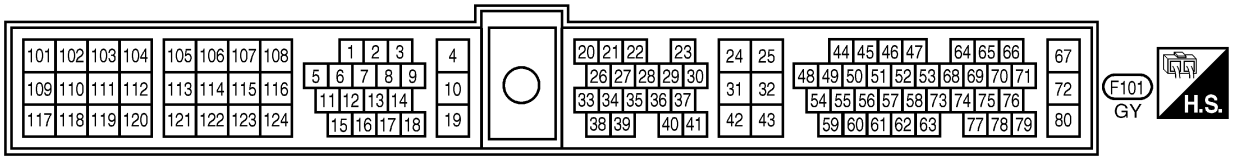
NDEC0342

EC-ATDIAG-01









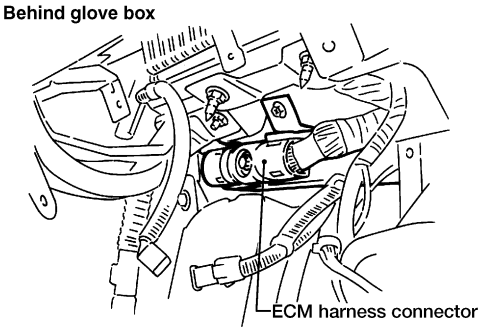
AEC593A

Diagnostic Procedure

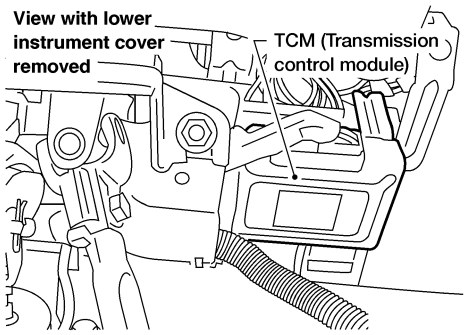
NDEC0343

1	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch “OFF”.
2. Disconnect ECM harness connector and TCM (Transmission control module) harness connector.

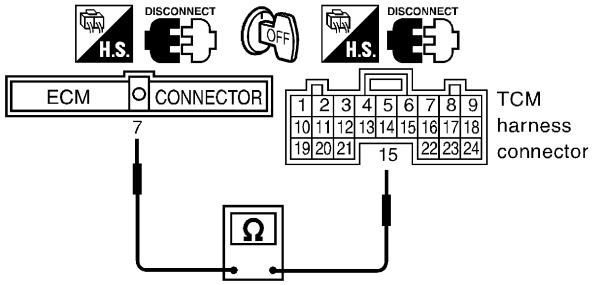


AEC018A



AEC808A

3. Check harness continuity between ECM terminal 7 and TCM (Transmission control module) terminal 15.



SEF070W

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

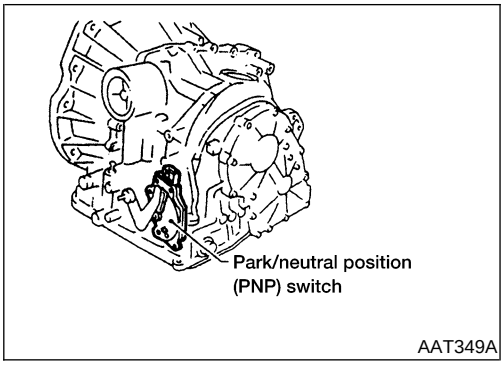
Check the following.
- Harness connectors F401, F103
- Harness for open or short between ECM and TCM (Transmission control module)

	▶	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-126.

	▶	**INSPECTION END**



Component Description

NDEC0272

When the gear position is “P” or “N”, park/neutral position (PNP) switch is “ON”.
ECM detects the position because the continuity of the line (the “ON” signal) exists.
The park/neutral (PNP) switch assembly also includes a transmission range switch to detect selector lever position.

CONSULT-II Reference Value in Data Monitor Mode

NDEC0273

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

NDEC0274

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

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22	GY/R	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

On Board Diagnosis Logic

NDEC0275

DTC No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1706	• The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	• Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.] • Park/neutral position (PNP) switch

DTC Confirmation Procedure

NDEC0276

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.

DTC Confirmation Procedure (Cont'd)

2

DATA MONITOR	
MONITOR	NO DTC
P/N POSI SW	ON

SEF212Y

5

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h
P/N POSI SW	OFF
B/FUEL SCHDL	XXX msec

SEF213Y

With CONSULT-II

1) Turn ignition switch "ON".
2) Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-II. Then check the "P/N POSI SW" signal under the following conditions.

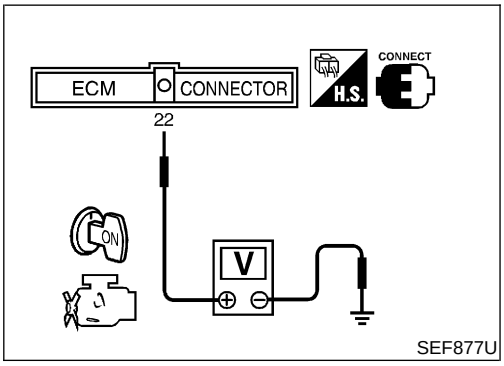
Position (Selector lever)	Known good signal
"N" and "P" position	ON
Except the above position	OFF

If NG, go to "Diagnostic Procedure", EC-480.
If OK, go to following step.

3) Select "DATA MONITOR" mode with CONSULT-II.
4) Start engine and warm it up to normal operating temperature.
5) Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,450 - 2,600 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.6 - 12.6 msec
VHCL SPEED SE	More than 64 km/h (40 MPH)
Selector lever	Suitable position

6) If 1st trip DTC is detected, go to "Diagnostic Procedure", EC-480.



SEF877U

Overall Function Check

NDEC0519

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.

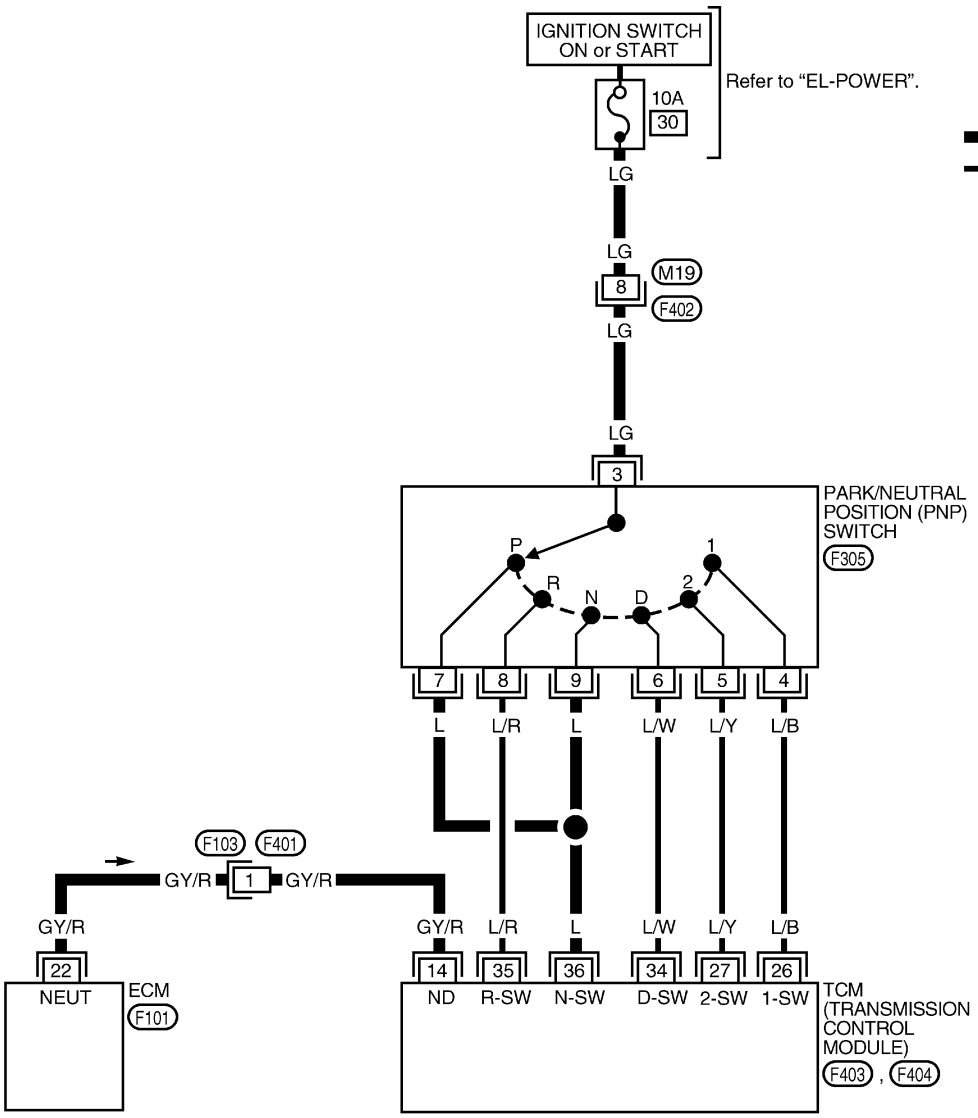
Condition (Gear position)	Voltage (V) (Known good data)
"P" and "N" position	Approx. 0
Except the above position	Approx. 5

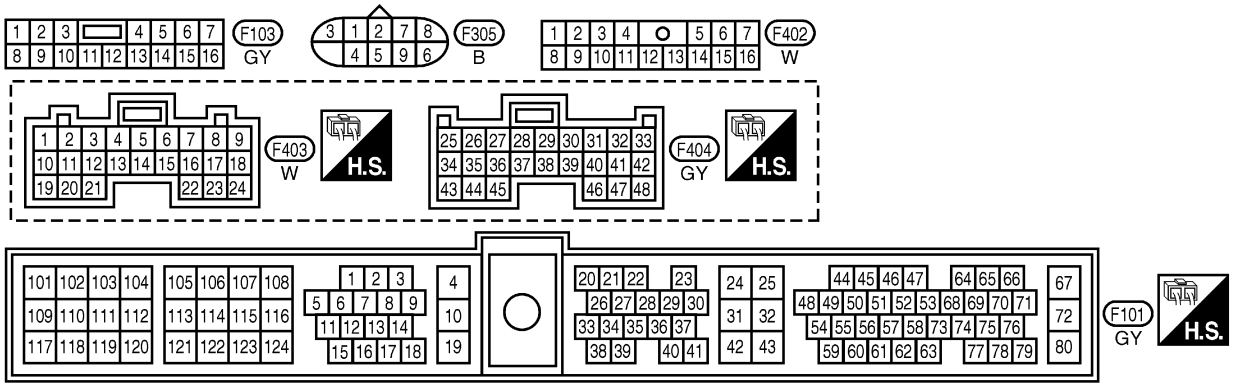
3) If NG, go to "Diagnostic Procedure", EC-480.

Wiring Diagram

NDEC0277

EC-PNP/SW-01





AEC619A

Diagnostic Procedure

NDEC0278

1	INSPECTION START
Do you have CONSULT-II?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT

With CONSULT-II

1. Turn ignition switch “ON”.
2. Select “A/T”, then “DATA MONITOR” with CONSULT-II.
3. Select “P/N POSI SW” signal, and check it under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
P/N POSI SW	ON

SEF212Y

Condition (Gear position)	P/N POSI SW
“P” or “N” position	ON
Other positions	OFF

MTBL0126

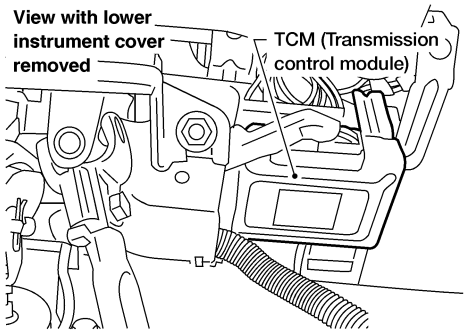
OK or NG

OK ▶	GO TO 8.
NG ▶	GO TO 4.

3	CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT

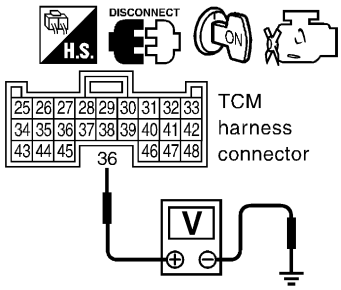
Without CONSULT-II

1. Turn ignition switch "OFF".
2. Disconnect TCM (Transmission control module) harness connector.



AEC808A

3. Turn ignition switch "ON".
4. Check voltage between TCM terminal 36 and ground under the following conditions.



SEF073W

Condition (Gear position)	Voltage
"P" or "N" position	Approx. 0V
Other positions	Approx. 5V

MTBL0127

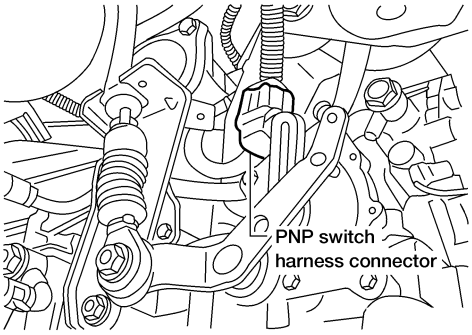
OK or NG

OK	▶	GO TO 8.
NG	▶	GO TO 4.

Diagnostic Procedure (Cont'd)

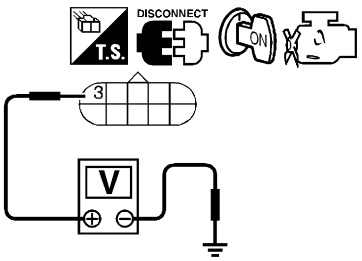
4	CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect park/neutral position (PNP) switch harness connector.



AEC816A

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



SEF075W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

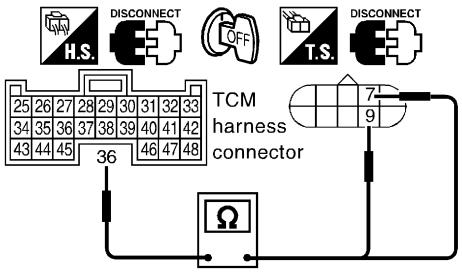
5	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M19, F402
- 10 A fuse
- Harness for open or short between park/neutral position (PNP) switch and fuse

	▶	Repair harness or connectors.

6	CHECK INPUT SIGNAL CIRCUIT-I

1. Turn ignition switch "OFF".
2. Disconnect TCM (Transmission control module) harness connector.
3. Check harness continuity between TCM terminal 36 and PNP switch terminals 7, 9.



SEF076W

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 PARK/NEUTRAL POSITION (PNP) SWITCH

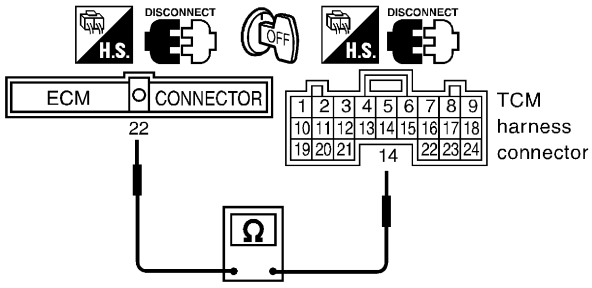
Refer to "DTC P0705 PNP SWITCH", ***AT-103***.

OK or NG

OK	▶	GO TO 8.
NG	▶	Replace park/neutral position (PNP) switch.

8	CHECK INPUT SIGNAL CIRCUIT-II

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector and TCM (Transmission control module) harness connector.
3. Check harness continuity between ECM terminal 22 and TCM terminal 14.



SEF077W

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.

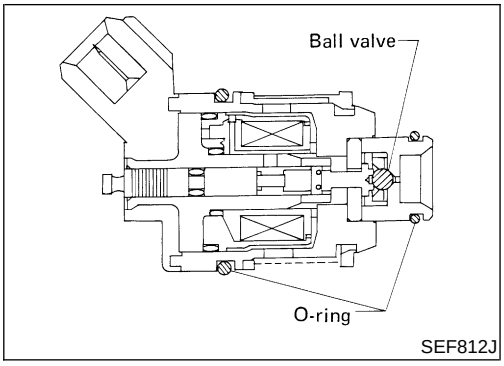
9	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F103, F401
- Harness for open or short between ECM and TCM

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

Diagnostic Procedure (Cont'd)

10	**CHECK INTERMITTENT INCIDENT**
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126	
▶	**INSPECTION END**



Component Description

NDEC0345

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

NDEC0522

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INJ PULSE	• Engine: After warming up • Air conditioner switch: “OFF” • Shift lever: “N” • No-load	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 2.8 msec
B/FUEL SCHDL	ditto	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.3 msec

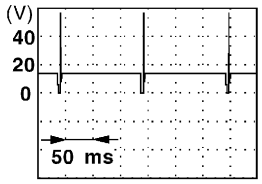
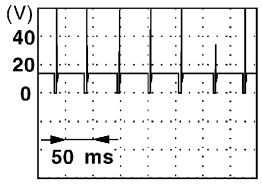
ECM Terminals and Reference Value

NDEC0346

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

CAUTION:

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

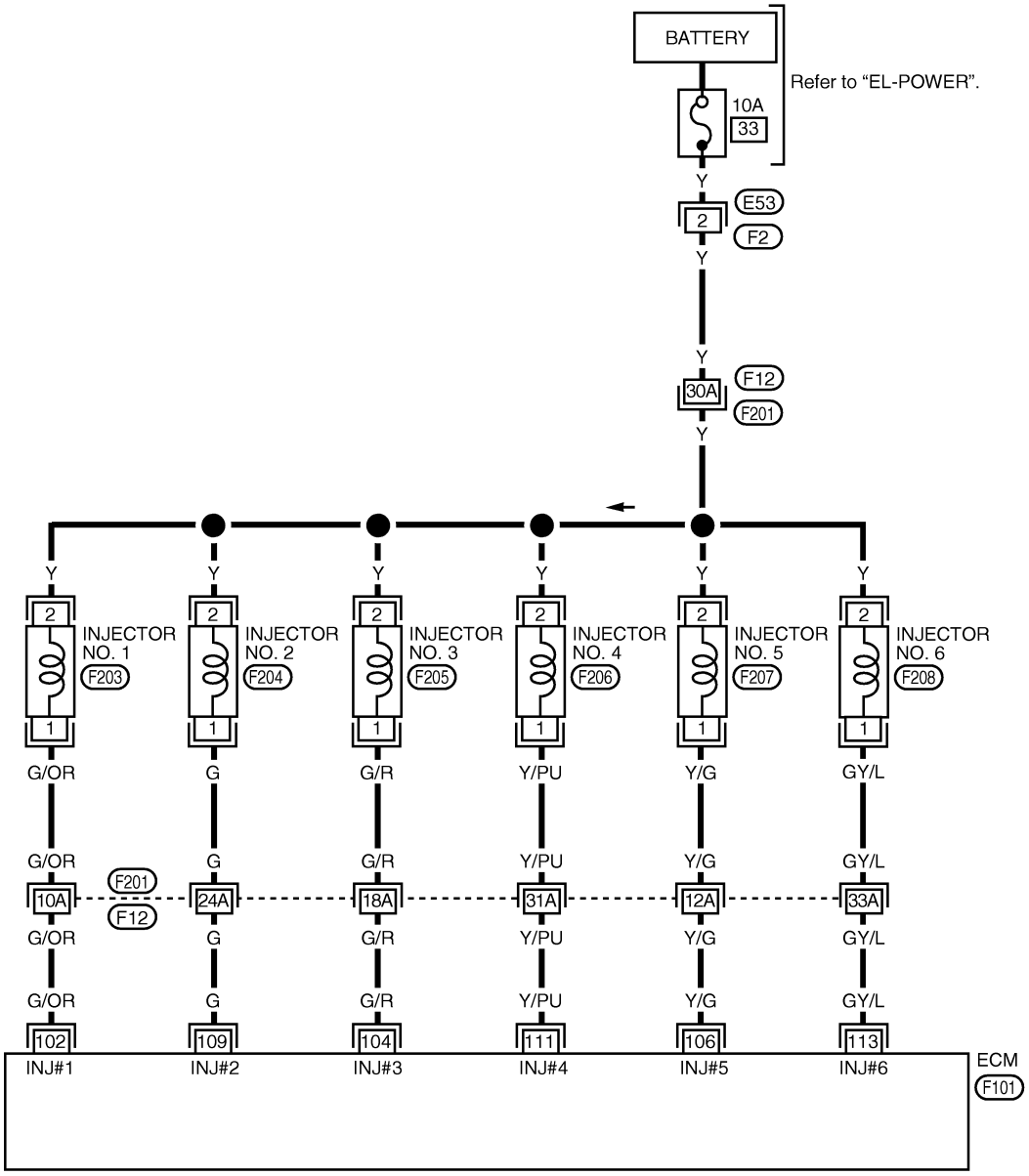
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102 104 106 109 111 113	G/OR G/R Y/G G Y/PU GY/L	Injector No. 1 Injector No. 3 Injector No. 5 Injector No. 2 Injector No. 4 Injector No. 6	**[Engine is running]** • **Warm-up condition** • Idle speed	BATTERY VOLTAGE (11 - 14V)  SEF007V
			[Engine is running] • **Warm-up condition** • Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  SEF008V

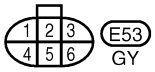
Wiring Diagram

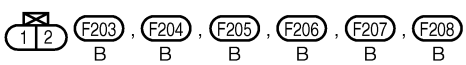
NDEC0344

EC-INJECT-01

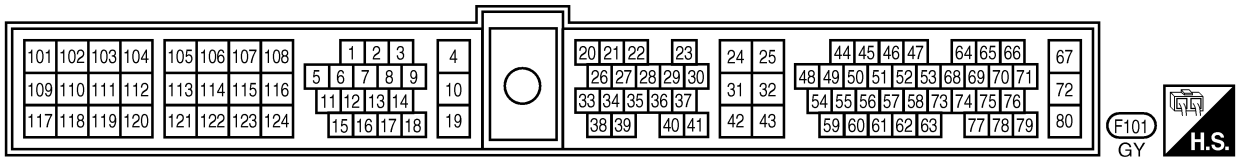
: Detectable line for DTC
: Non-detectable line for DTC







Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)



WEC088

Diagnostic Procedure

=NDEC0347

1	INSPECTION START

Turn ignition switch to “START”.
Is any cylinder ignited?

Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK OVERALL FUNCTION

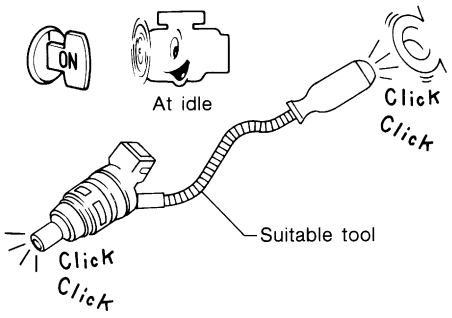
With CONSULT-II
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.

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

SEF190Y

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

Without CONSULT-II
1. Start engine.
2. Listen to each injector operating sound.



MEC703B

Clicking noise should be heard.

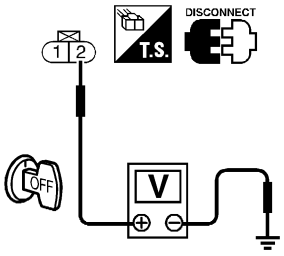
OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect injector harness connector.
3. Check voltage between terminal 2 and ground with CONSULT-II or tester.



SEF078W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

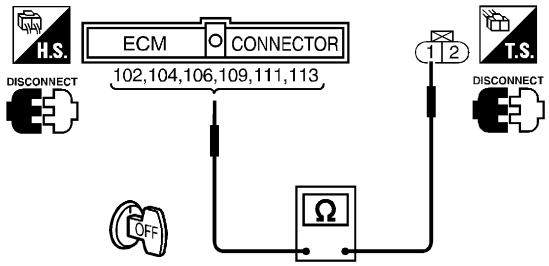
4	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, F201
- Harness connectors E53, F2
- Harness for open or short between injector and battery

	▶	Repair harness or connectors.

5	CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between injector terminal 1 and ECM terminals 102, 104, 106, 109, 111, 113.



SEF732U

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.

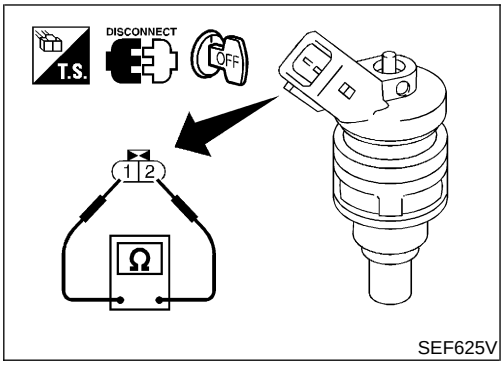
6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, F201
- 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	
Refer to "Component Inspection", EC-489.		
OK or NG		
OK	▶	GO TO 8.
NG	▶	Replace injector.

8	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.		
	▶	**INSPECTION END**



Component Inspection

NDEC0348

INJECTOR

NDEC0348S01

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

   Resistance: 10 - 14Ω [at 25°C (77°F)]

   If NG, replace injector.

CONSULT-II Reference Value in Data Monitor Mode

NDEC0350

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

ECM Terminals and Reference Value

NDEC0351

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

CAUTION:

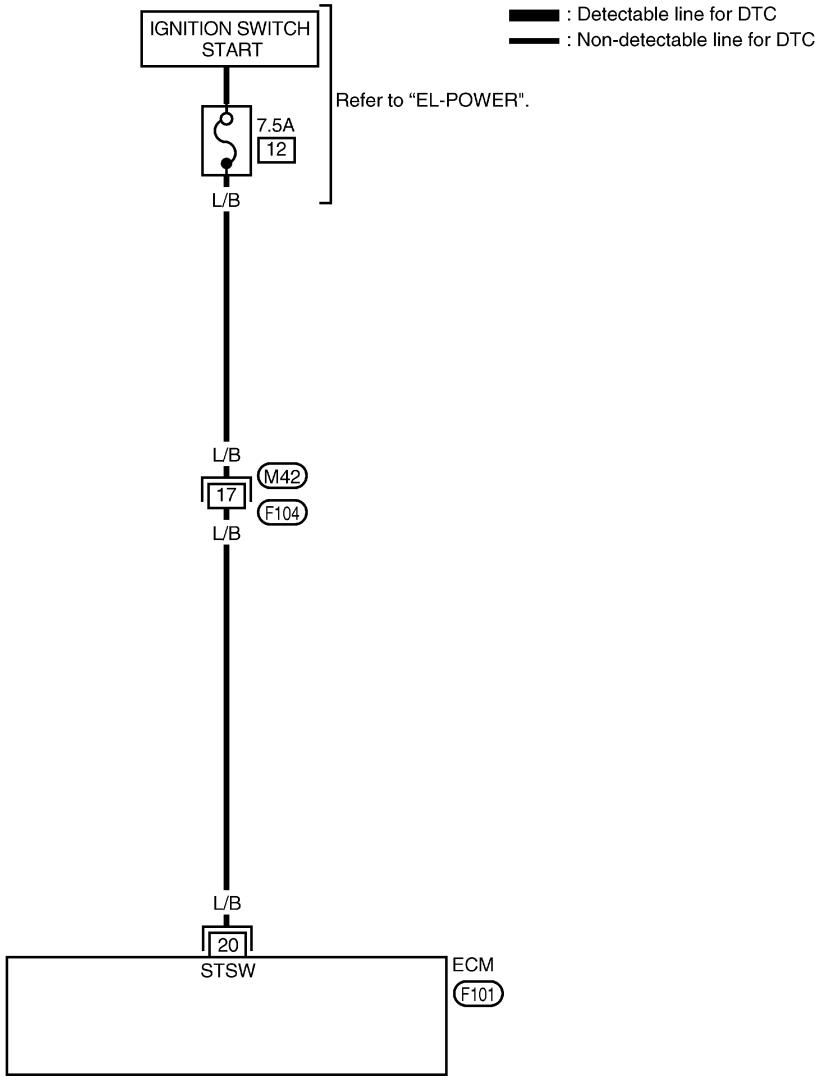
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

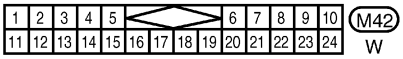
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	L/B	Start signal	**[Ignition switch "ON"]**	Approximately 0V
			[Ignition switch "START"]	9 - 12V

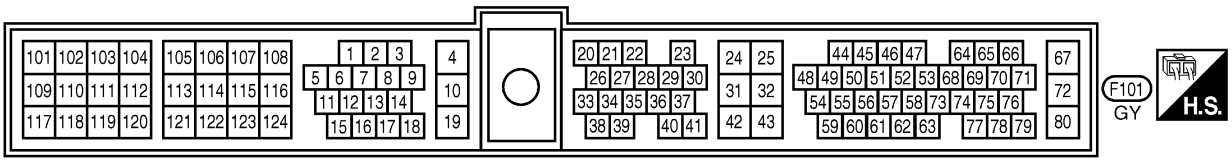
Wiring Diagram

NDEC0349

EC-S/SIG-01







AEC621A

Diagnostic Procedure

NDEC0352

1	INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	CHECK OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch “ON”.
2. Check “START SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
START SIGNAL	OFF

Condition	“START SIGNAL”
Ignition switch “ON”	OFF
Ignition switch “START”	ON

SEF227Y

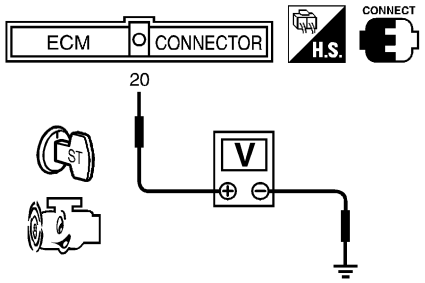
OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

3	CHECK OVERALL FUNCTION

Without CONSULT-II

Check voltage between ECM terminal 20 and ground under the following conditions.



SEF733U

Condition	Voltage
Ignition switch “START”	9 - 12V
Other positions	Approximately 0V

MTBL0191

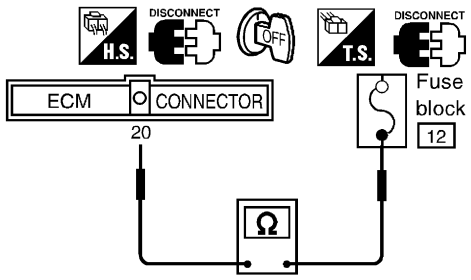
OK or NG

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 EL section "STARTING SYSTEM".

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 INPUT SIGNAL CIRCUIT-II	
1. Disconnect ECM harness connector. 2. Check harness continuity between ECM terminal 20 and fuse block.		



SEF079W

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 M42, F104 ● 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-126.		
	▶	**INSPECTION END**

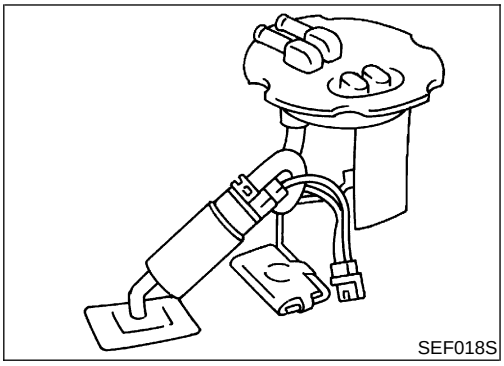
System Description

NDEC0353

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

NDEC0538

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

NDEC0354

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

=NDEC0355

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

CAUTION:

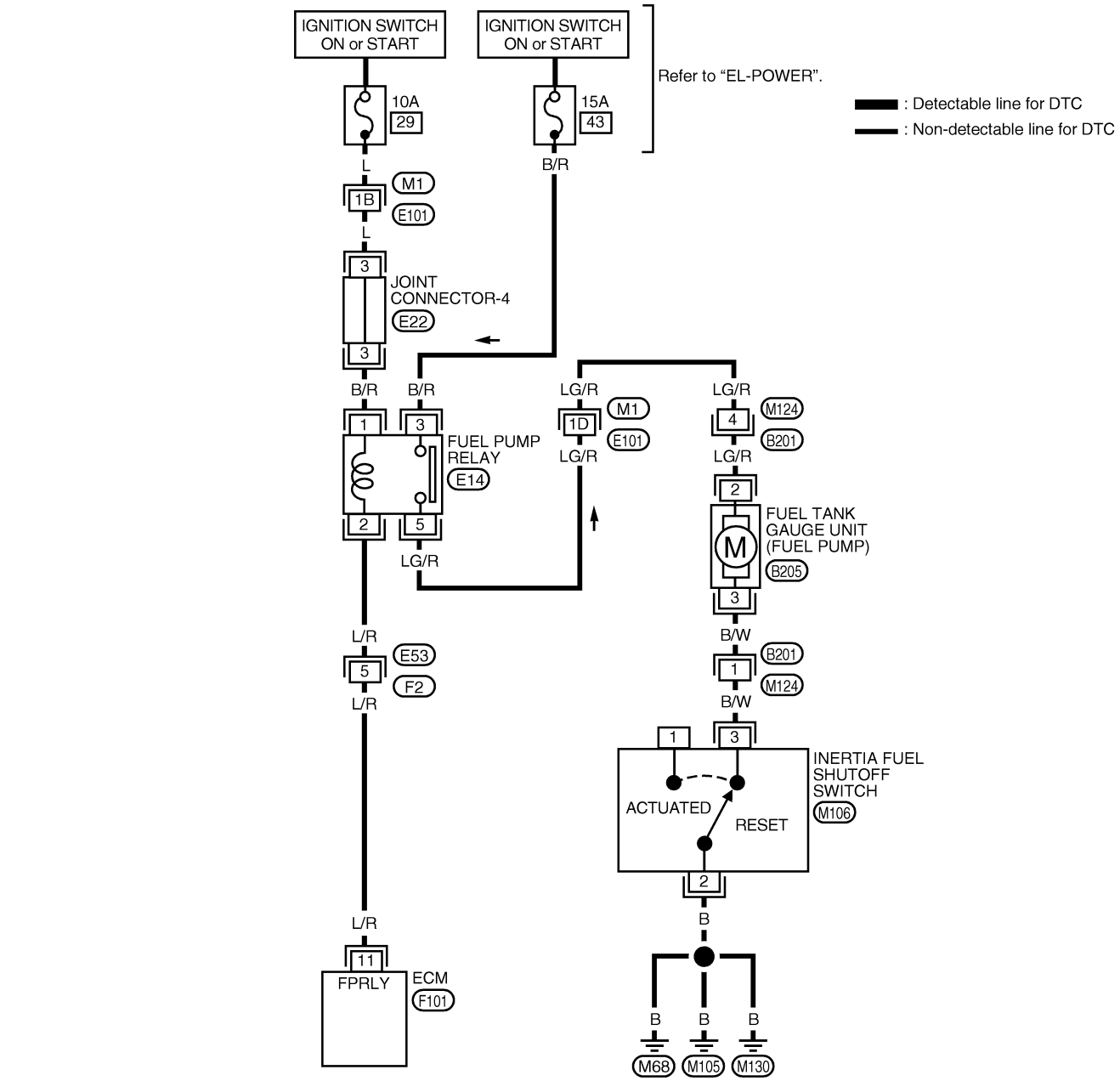
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

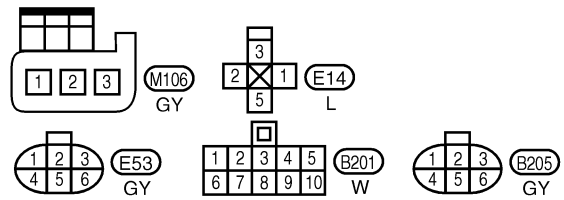
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	L/R	Fuel pump relay	**[Ignition switch "ON"]** ● For 5 seconds after turning ignition switch "ON" **[Engine is running]**	0 - 1V
			[Ignition switch "ON"] ● More than 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)

Wiring Diagram

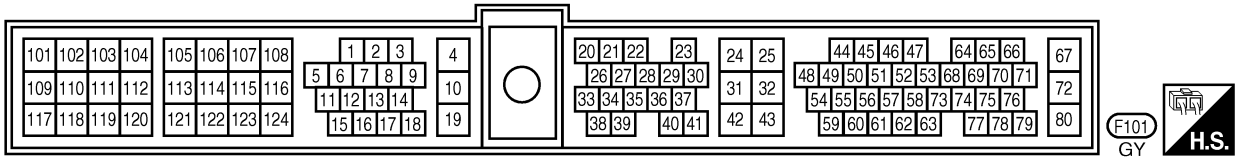
NDEC0356

EC-F/PUMP-01





Refer to the following.
M1 , E101 - SUPER MULTIPLE JUNCTION (SMJ)
E22 - JOINT CONNECTOR



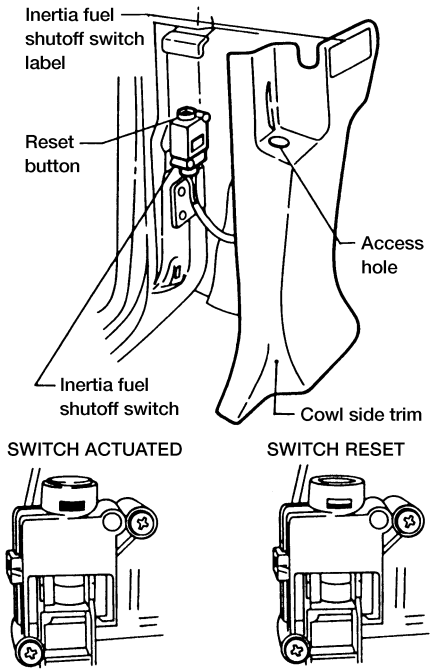
WEC089

Diagnostic Procedure

NDEC0357

1	INSPECTION START

Check inertia fuel shutoff switch.
Is the switch triggered?
NOTE:
If the engine cranks but does not start after a collision, this switch may have been triggered. Red reset button/indicator shows the switch ON/OFF condition. And the indicator is visible through side slots of shroud.



AEC936A

Yes or No

Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	RESET INERTIA FUEL SHUTOFF SWITCH

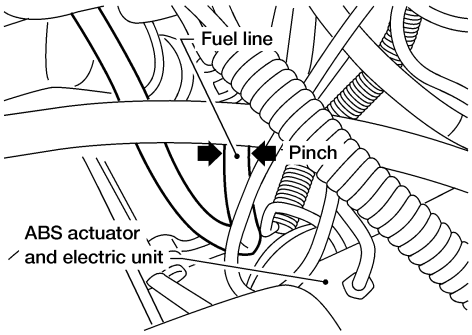
Push the reset button to reset inertia fuel shutoff switch.
WARNING:
If you see or smell gasoline at any time other than during fueling, do not reset the switch.

	▶	GO TO 3.

Diagnostic Procedure (Cont'd)

3	CHECK OVERALL FUNCTION

1. Turn ignition switch "ON".
2. Pinch fuel feed hose with fingers.



AEC817A

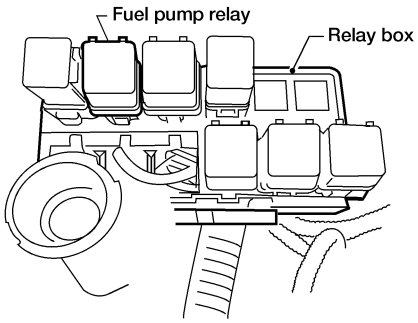
Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned "ON".

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 4.

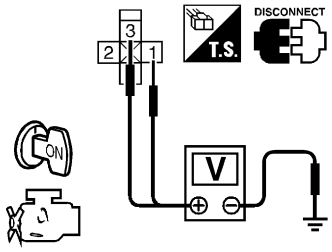
4	CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect fuel pump relay.



AEC926A

3. Turn ignition switch "ON".
4. Check voltage between fuel pump relay terminals 1, 3 and ground with CONSULT-II or tester.



SEF087W

Voltage: Battery voltage

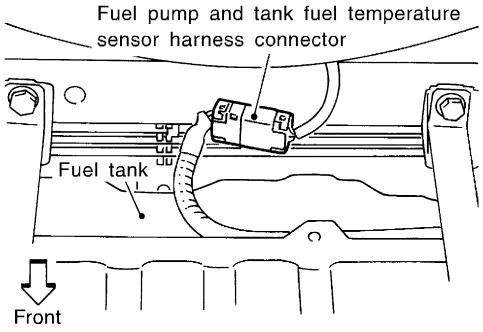
OK or NG

OK	▶	GO TO 6.
NG	▶	GO TO 5.

5	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M1, E101 ● Joint connector-4 ● 10A fuse ● Harness for open or short between fuse and fuel pump relay	
▶	Repair harness or connectors.

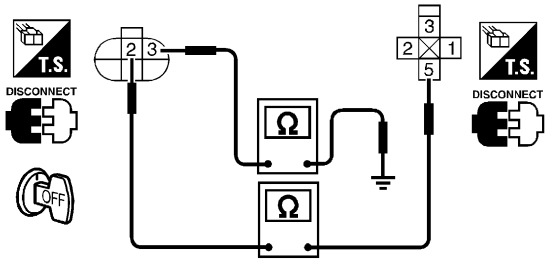
6	CHECK POWER AND GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect fuel tank gauge unit harness connector.



SEF974U

3. Check harness continuity between fuel tank gauge unit terminal 3 and body ground, fuel tank gauge unit terminal 2 and fuel pump relay terminal 5.



SEF088W

Continuity should exist.

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

OK or NG

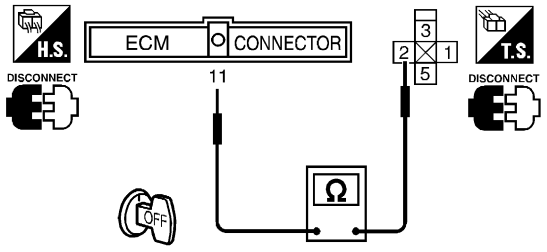
OK	▶	GO TO 8.
NG	▶	GO TO 7.

7	DETECT MALFUNCTIONING PART
Check the following. ● Harness connectors M1, E101 ● Harness connectors M124, B201 ● Harness for open or short between fuel pump and body ground ● Harness for open or short between fuel pump and fuel pump relay ● Inertia fuel shutoff switch Refer to "Component Inspection", EC-501.	
▶	Repair open circuit or short to ground or short to power in harness or connectors.

Diagnostic Procedure (Cont'd)

8	CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 11 and fuel pump relay terminal 2.



SEF089W

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 E53, F2
- 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.

10	CHECK FUEL PUMP RELAY

With CONSULT-II

1. Reconnect fuel pump relay, fuel pump harness connector and ECM harness connector.
2. Turn ignition switch "ON".
3. Turn fuel pump relay "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound.

ACTIVE TEST	
FUEL PUMP RELAY	ON
MONITOR	
ENG SPEED	XXX rpm

SEF948Z

Without CONSULT-II

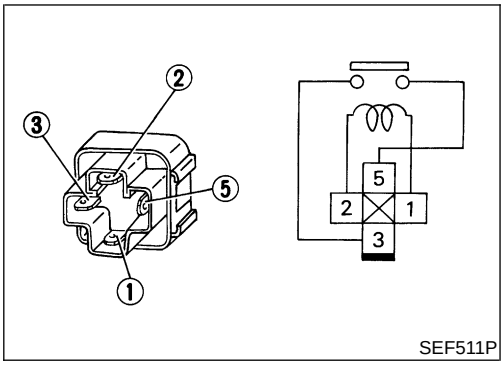
Refer to "Component Inspection", EC-501.

OK or NG

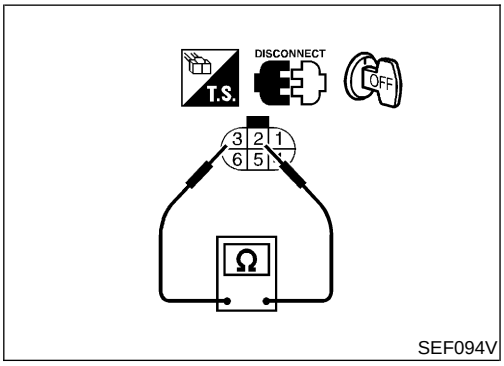
OK	▶	GO TO 11.
NG	▶	Replace fuel pump relay.

11	CHECK FUEL PUMP	
Refer to "Component Inspection", EC-501.		
	OK or NG	
OK	▶	GO TO 12.
NG	▶	Replace fuel pump.

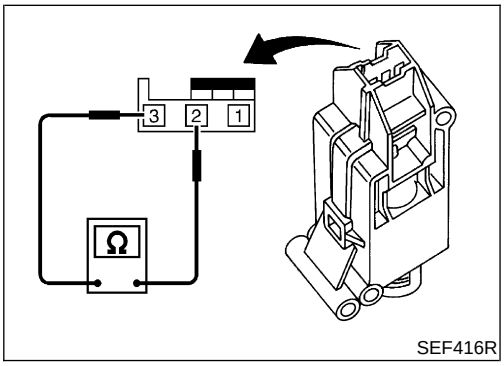
12	CHECK INTERMITTENT INCIDENT	
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.		
	▶	**INSPECTION END**



SEF511P



SEF094V



SEF416R

Component Inspection

NDEC0358

FUEL PUMP RELAY

NDEC0358S01

Check continuity between terminals 3 and 5.

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

If NG, replace relay.

FUEL PUMP

NDEC0358S02

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals 2 and 3.

   Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]

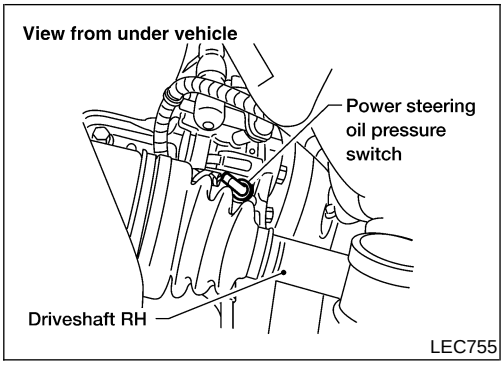
   If NG, replace fuel pump.

INERTIA FUEL SHUTOFF SWITCH

NDEC0358S03

1. Disconnect inertia fuel shutoff switch harness connector.
2. Check inertia fuel shutoff switch, following the table as shown below:

Conditions	Continuity between terminals 2 and 3
Switch open (tripped)	No
Switch closed (set)	Yes



Component Description

NDEC0360

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

NDEC0361

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

NDEC0362

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

CAUTION:

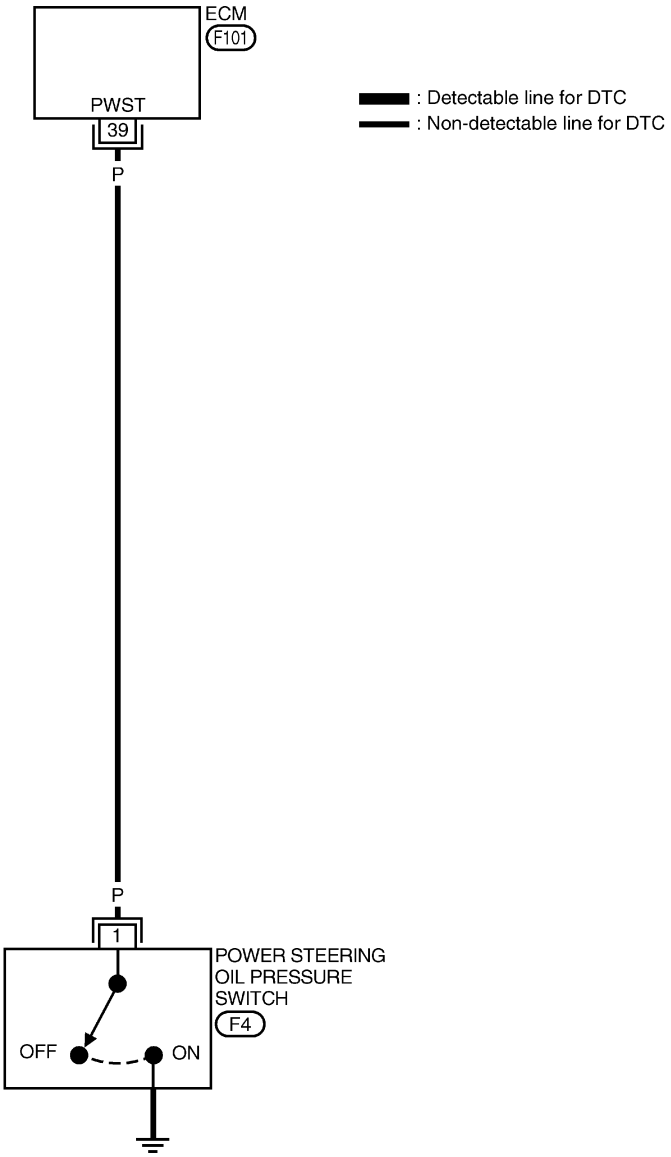
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

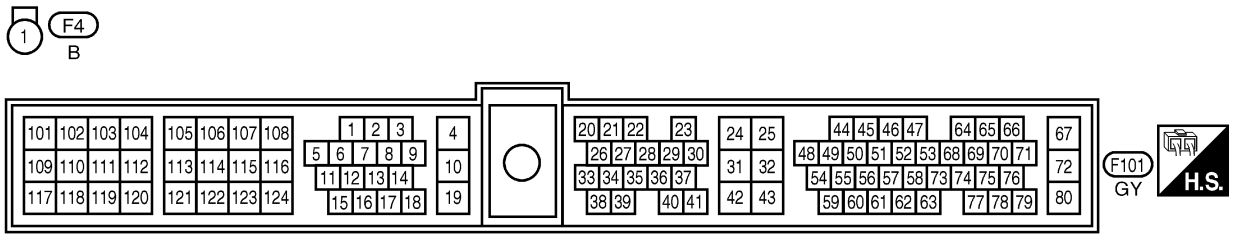
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
39	P	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is being fully turned	0V
			[Engine is running] ● Steering wheel is not being turned	Approximately 5V

Wiring Diagram

NDEC0359

EC-PST/SW-01





AEC623A

Diagnostic Procedure

=NDEC0363

1	INSPECTION START
Do you have CONSULT-II?	
Yes or No	
Yes ▶	GO TO 2.
No ▶	GO TO 3.

2	CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Check “PW/ST SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
PW/ST SIGNAL	OFF

Condition	PW/ST SIGNAL indication
Steering is in neutral position	OFF
Steering is turned	ON

SEF531Z

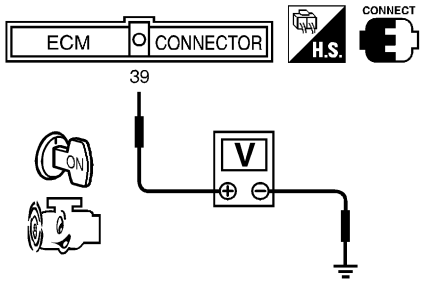
OK or NG

OK ▶	**INSPECTION END**
NG ▶	GO TO 4.

3	CHECK OVERALL FUNCTION

Without CONSULT-II

1. Start engine.
2. Check voltage between ECM terminal 39 and ground under the following conditions.



SEF739U

Condition	Voltage
Steering is neutral position	Approximately 5V
Steering is turned to full position	Approximately 0V

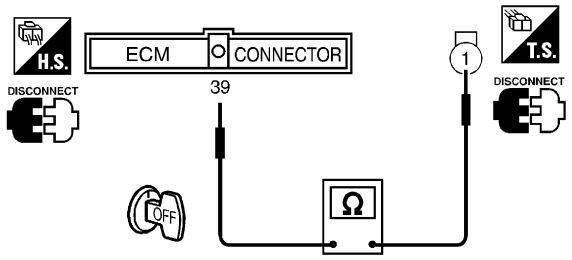
MTBL0145

OK or NG

OK ▶	**INSPECTION END**
NG ▶	GO TO 4.

4	CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect power steering oil pressure switch harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 39 and terminal 1.



SEF080W

Continuity should exist.

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

OK or NG

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

5	CHECK POWER STEERING OIL PRESSURE SWITCH

Refer to "Component Inspection", EC-505.

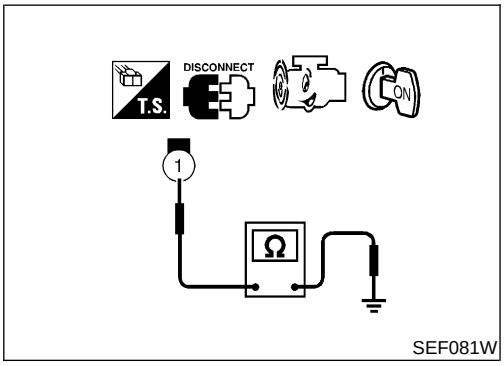
OK or NG

OK	▶	GO TO 6.
NG	▶	Replace power steering oil pressure switch.

6	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.

	▶	**INSPECTION END**



SEF081W

Component Inspection

NDEC0364

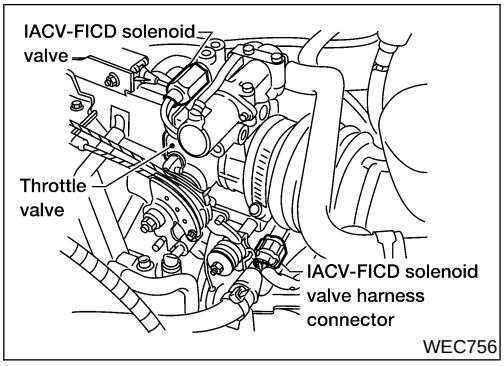
POWER STEERING OIL PRESSURE SWITCH

NDEC0364S01

1. Disconnect power steering oil pressure switch harness connector then start engine.
2. Check continuity between terminal 1 and ground.

Conditions	Continuity
Steering wheel is being fully turned	Yes
Steering wheel is not being turned	No

If NG, replace power steering oil pressure switch.



Component Description

NDEC0366

When the air conditioner is on, the IACV-FICD solenoid valve supplies additional air to adjust to the increased load.

ECM Terminals and Reference Value

NDEC0367

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

CAUTION:

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

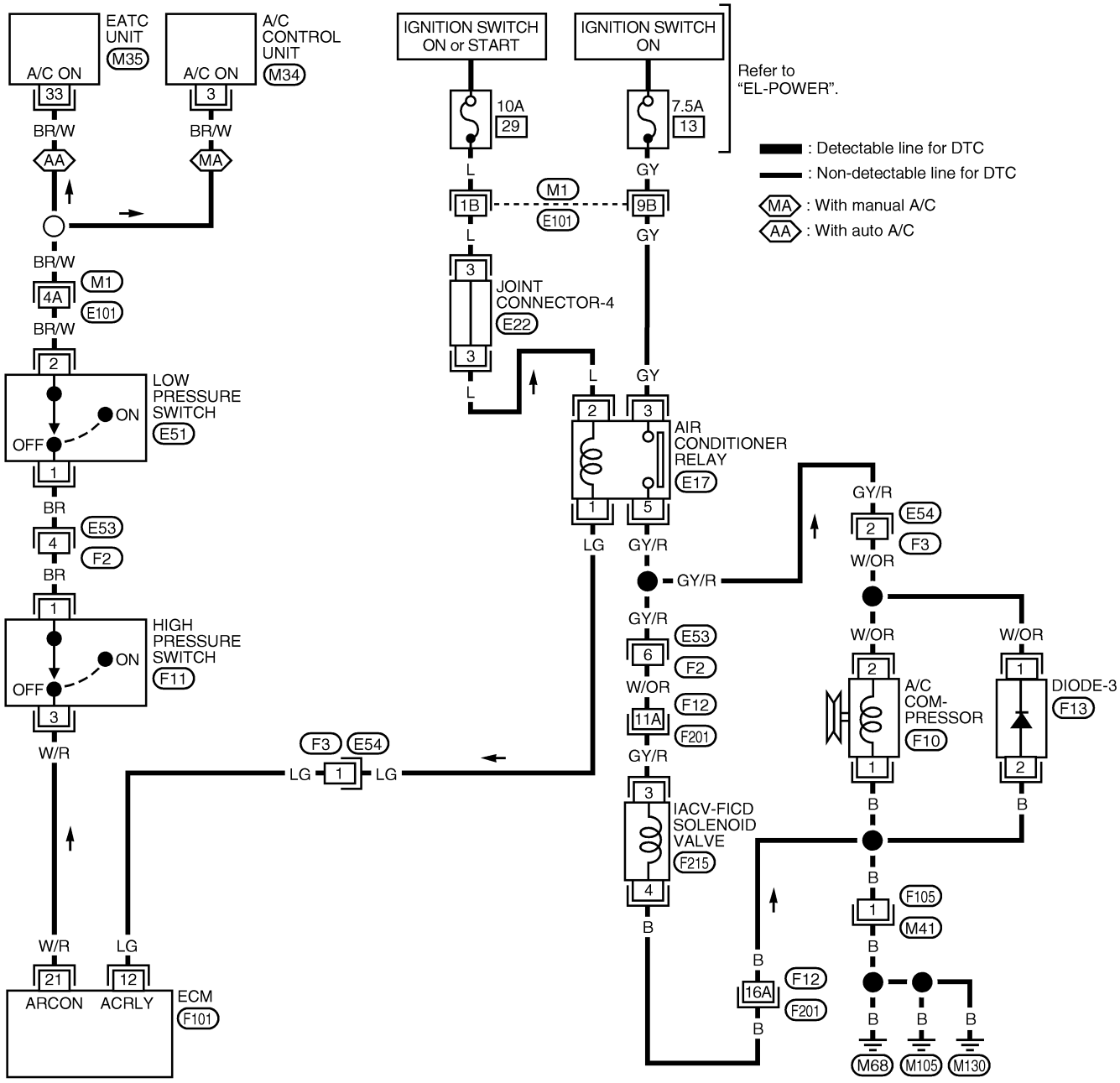
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12	LG	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower fan switch are "ON"*	0 - 1V
			[Engine is running] ● A/C switch is "OFF"	BATTERY VOLTAGE (11 - 14V)
21	W/R	Air conditioner switch	**[Engine is running]** ● Both A/C switch and blower fan switch are "ON" (Compressor operates)*	Approximately 0V
			[Engine is running] ● Air conditioner switch is "OFF"	Approximately 5V

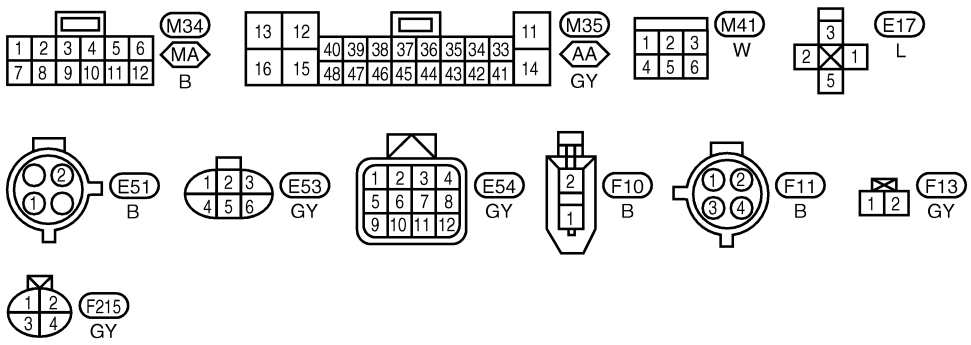
*: Any mode except "OFF", ambient air temperature is above 23.5°C (74°F).

Wiring Diagram

NDEC0365

EC-FICD-01





Refer to the following.
M1 , E101 , F12 , F201
- SUPER MULTIPLE JUNCTION (SMJ)
E22 - JOINT CONNECTOR
F101 - ELECTRICAL UNITS

WEC640

Diagnostic Procedure

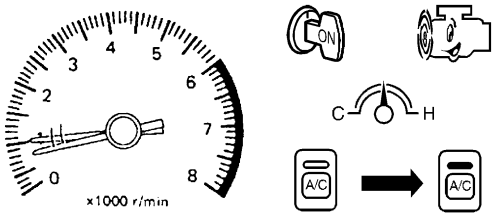
=NDEC0368

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

800 rpm or more (in “P” or “N” position)

OK or NG

OK	▶	**INSPECTION END**
NG	▶	GO TO 2.

2	CHECK AIR CONDITIONER FUNCTION

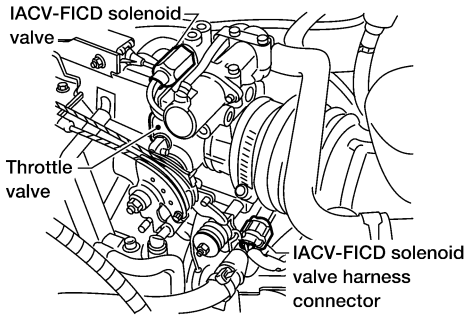
Check if air conditioner compressor functions normally.

OK or NG

OK	▶	GO TO 3.
NG	▶	Refer to “TROUBLE DIAGNOSES”, ***HA-27***.

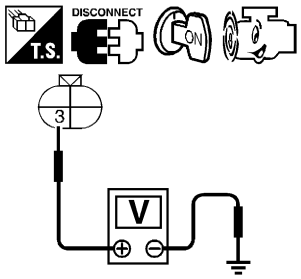
3	CHECK POWER SUPPLY

1. Turn air conditioner switch and blower fan switch "OFF".
2. Stop engine.
3. Disconnect IACV-FICD solenoid valve harness connector.



WEC756

4. Start engine and let it idle.
5. Check voltage between IACV-FICD solenoid valve terminal 3 and ground with CONSULT-II or tester.



SEF082W

Voltage: Battery voltage

OK or NG

OK	▶	GO TO 5.
NG	▶	GO TO 4.

4	DETECT MALFUNCTIONING PART

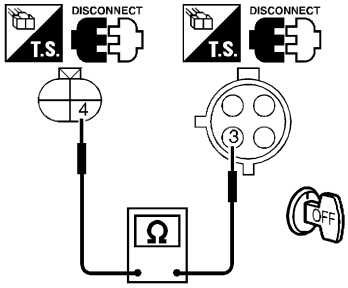
Check the following.
- Harness connectors E53, F2
- Harness connectors F12, F201
- Harness for open or short between IACV-FICD solenoid valve and air conditioner relay

	▶	Repair harness or connectors.

Diagnostic Procedure (Cont'd)

5	CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Check harness continuity between IACV-FICD solenoid valve terminal 4 and body ground.



SEF083W

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK	▶	GO TO 7.
NG	▶	GO TO 6.

6	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, F201
- Harness for open or short between IACV-FICD solenoid valve and body ground

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

7	CHECK IACV-FICD SOLENOID VALVE

Refer to "Component Inspection", EC-510.

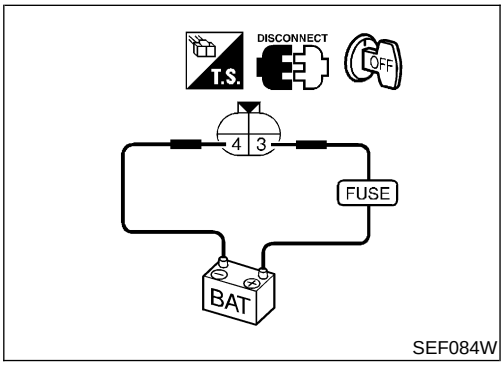
OK or NG

OK	▶	GO TO 8.
NG	▶	Replace IACV-FICD solenoid valve.

8	CHECK INTERMITTENT INCIDENT

Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.

	▶	**INSPECTION END**



SEF084W

Component Inspection

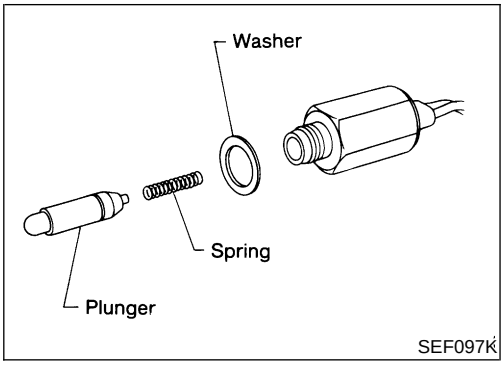
NDEC0369

IACV-FICD SOLENOID VALVE

NDEC0369S01

Disconnect IACV-FICD solenoid valve harness connector.

- Check for clicking sound when applying 12V direct current to terminals.



- Check plunger for seizing or sticking.
- Check for broken spring.

System Description

NDEC0533

COOLING FAN CONTROL BY AIR CONDITIONER HIGH PRESSURE SWITCH

NDEC0533S01

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner ″ON″ signal	Cooling fan control	Cooling fan relay(s)
Air conditioner high pressure switch	Air conditioner pressure signal		

When both air conditioner switch and high pressure switch are “ON”, cooling fans operate at “High” speed.

ECM Terminals and Reference Value

NDEC0534

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

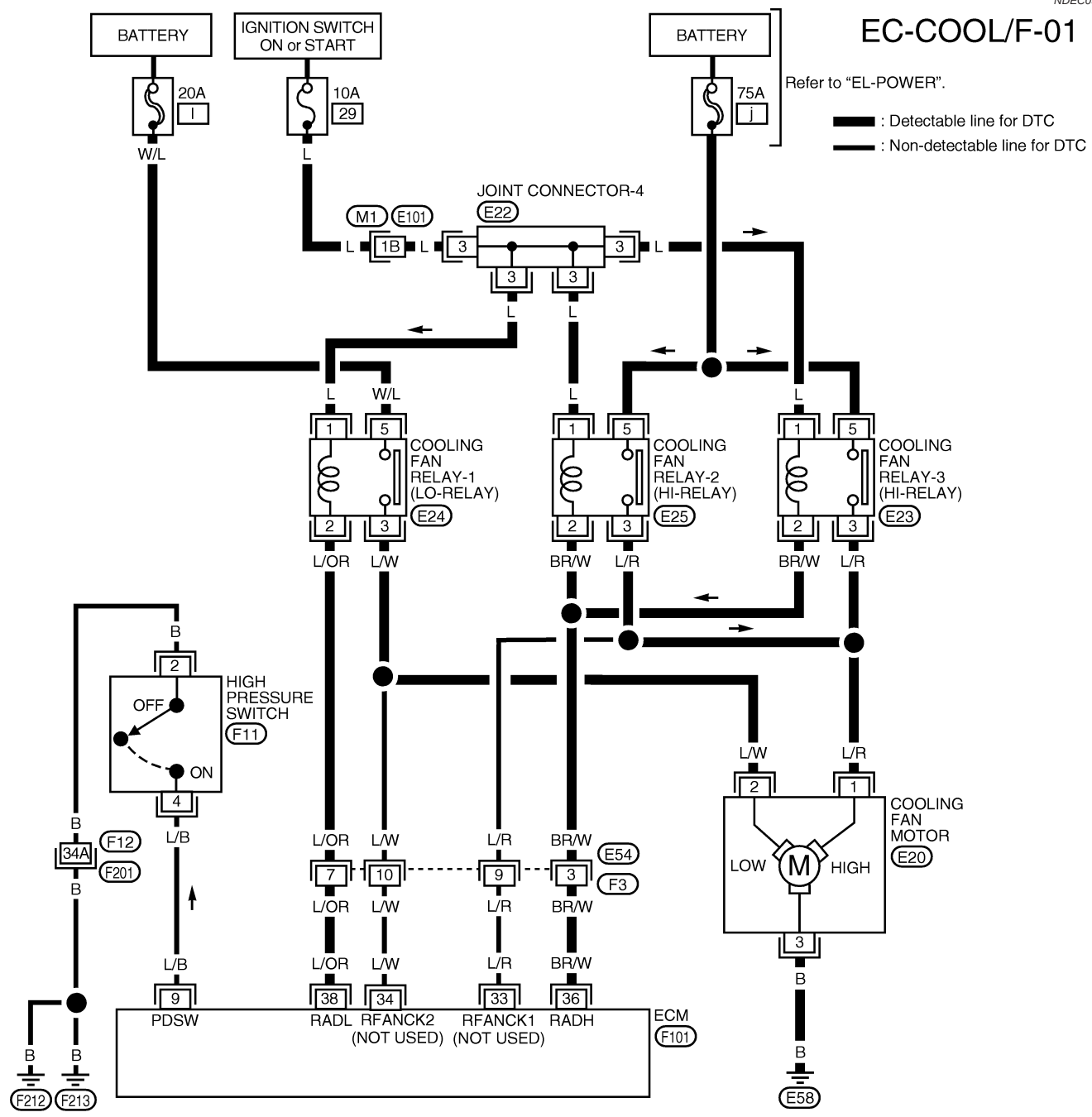
CAUTION:

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

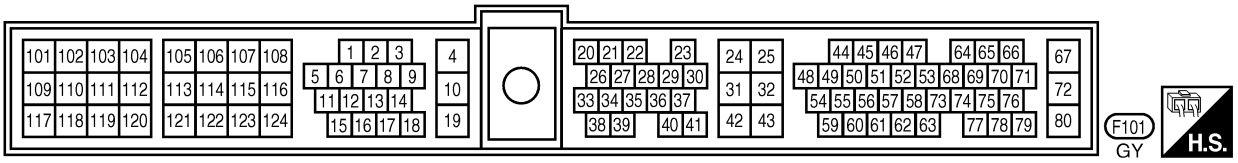
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
9	L/B	High pressure switch	**[Ignition switch ″ON″]**	Approximately 5V
36	BR/W	Cooling fan relay (High)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan is operating at high speed	0 - 1V
38	L/OR	Cooling fan relay (low)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan is operating at low speed	0 - 1V

Wiring Diagram

NDEC0532



Refer to the following.
M1, E101, F12, F201
- SUPER MULTIPLE JUNCTION (SMJ)
E22 - JOINT CONNECTOR



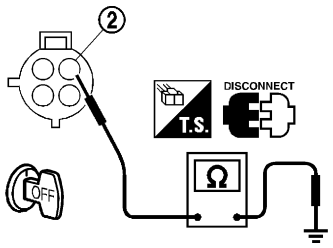
WEC639

Diagnostic Procedure

=NDEC0535

1	CHECK GROUND CIRCUIT

1. Turn ignition switch ”OFF”.
2. Disconnect high pressure switch harness connector.
3. Check harness continuity between high pressure switch terminal 2 and engine ground.



SEF085W

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK	▶	GO TO 3.
NG	▶	GO TO 2.

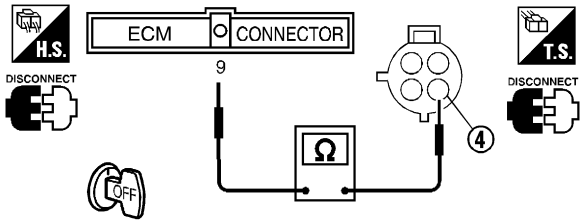
2	DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F12, F201
- Harness for open or short between high pressure switch and engine ground

	▶	Repair open circuit 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 9 and high pressure switch terminal 4.



SEF086W

Continuity should exist.

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

OK or NG

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

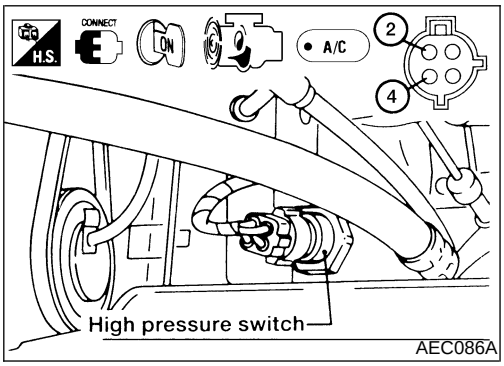
4	CHECK HIGH PRESSURE SWITCH

Refer to “Component Inspection”, EC-515.

OK or NG

OK	▶	GO TO 5.
NG	▶	Replace high pressure switch.

5	CHECK INTERMITTENT INCIDENT
Refer to "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT", EC-126.	
▶	INSPECTION END



AEC086A

Component Inspection

HIGH PRESSURE SWITCH

NDEC0536

NDEC0536S01

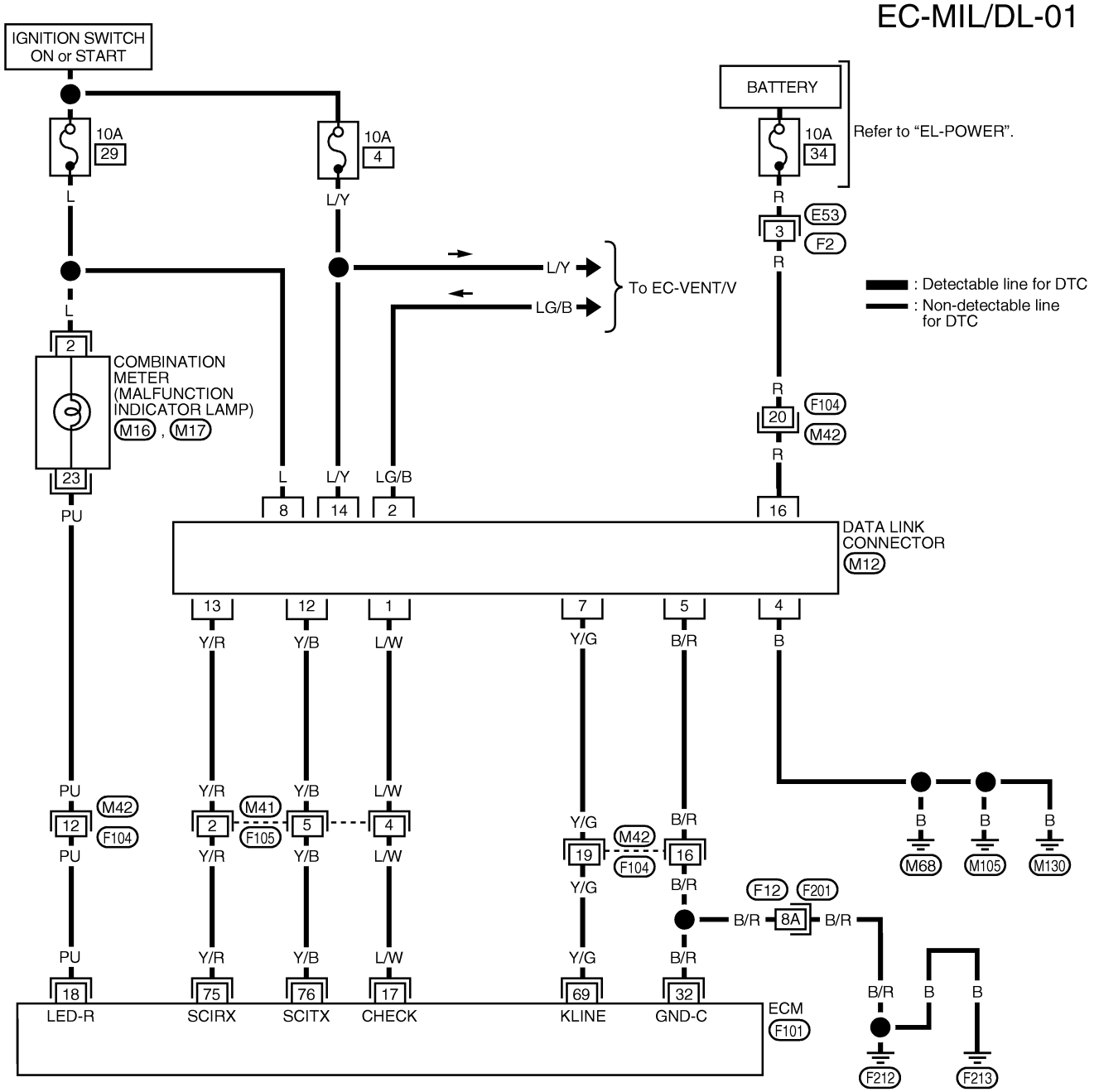
Check continuity between terminals 2 and 4.

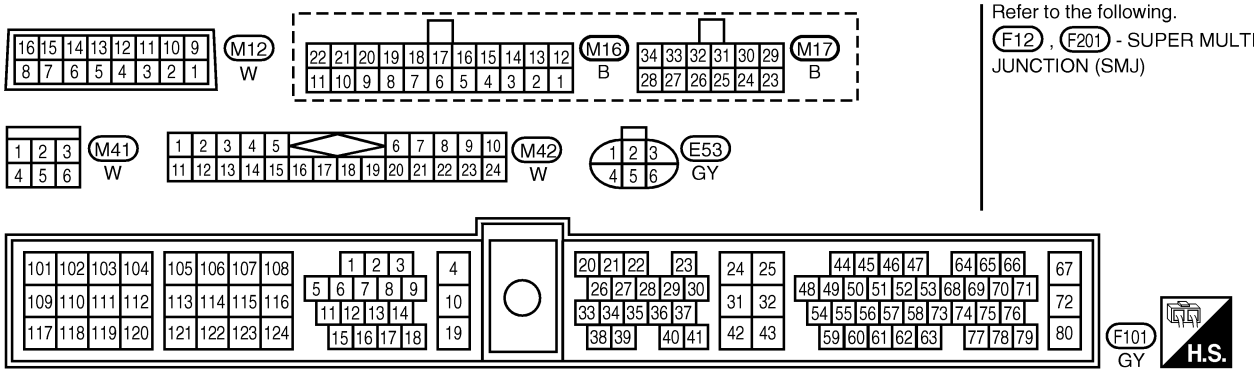
High-pressure side line pressure	kPa (kg/cm^2, psi)	Operation	Continuity
Increasing to	2,246 (22.9, 326)	Fan OFF	Does not exist
Decreasing to	1,824 (18.6, 264)	Fan ON	Exists

Wiring Diagram

NDEC0370

EC-MIL/DL-01





Refer to the following.
F12 , F201 - SUPER MULTIPLE JUNCTION (SMJ)

WEC641

Fuel Pressure Regulator

NDEC0371

Condition	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

NDEC0372

Base idle speed*1 rpm	No-load*4 (in “P” or “N” position)	700±50
Target idle speed*2 rpm	No-load*4 (in “P” or “N” position)	750±50
Air conditioner: ON rpm	In “P” or “N” position	800 or more
Ignition timing*3	In “P” or “N” position	15°±2° BTDC
Throttle position sensor idle position V		0.15 - 0.85

*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

NDEC0373

Primary voltage	12V
Primary resistance [at 20°C (68°F)]	Approximately 0.49 - 0.59Ω
Secondary resistance [at 20°C (68°F)]	Approximately 10 kΩ

Mass Air Flow Sensor

NDEC0374

Supply voltage	Battery voltage (11 - 14)V
Output voltage at idle	1.0 - 1.7*V
Mass air flow (Using CONSULT 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 sufficiently and running under no-load.

Engine Coolant Temperature Sensor

NDEC0375

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

Heated Oxygen Sensor 1 Heater (Front)

NDEC0377

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

Fuel Pump

NDEC0378

Resistance [at 25°C (77°F)]	0.2 - 5.0Ω

IACV-AAC Valve

NDEC0379

Resistance [at 20°C (68°F)]	Approximately 10.0Ω

Injector

NDEC0380

Resistance [at 25°C (77°F)]	10 - 14Ω

Resistor

NDEC0381

Resistance [at 25°C (77°F)]	Approximately 2.2 kΩ

Throttle Position Sensor

NDEC0382

Throttle valve conditions	Voltage (at normal operating temperature, 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

Calculated Load Value

NDEC0383

	Calculated load value % (Using CONSULT-II or GST)
At idle	18.0 - 26.0
At 2,500 rpm	18.0 - 21.0

Intake Air Temperature Sensor

NDEC0384

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

Heated Oxygen Sensor 2 Heater (Rear)

NDEC0385

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

Crankshaft Position Sensor (OBD)

NDEC0386

Resistance [at 20°C (68°F)]	512 - 632Ω

Fuel Tank Temperature Sensor

NDEC0521

Temperature °C (°F)	Resistance kΩ
0 (32)	1.89 - 2.21
25 (77)	4.70 - 6.81
50 (122)	0.79 - 0.90