SECTION EC

CONTENTS

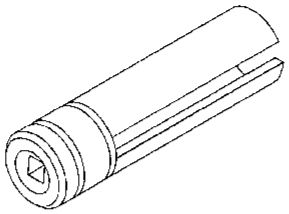
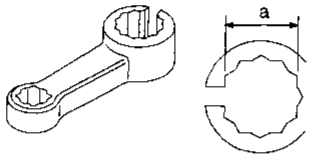
CONTENTS (Cont'd)

When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **Read EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES" and "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".

Special Service Tools

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)**

Supplemental Restraint System (SRS) "AIR BAG"

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 are covered with yellow insulation either just before the harness connectors or for the complete harness, for easy identification.**

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

The ECM (ECCS control module) 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:

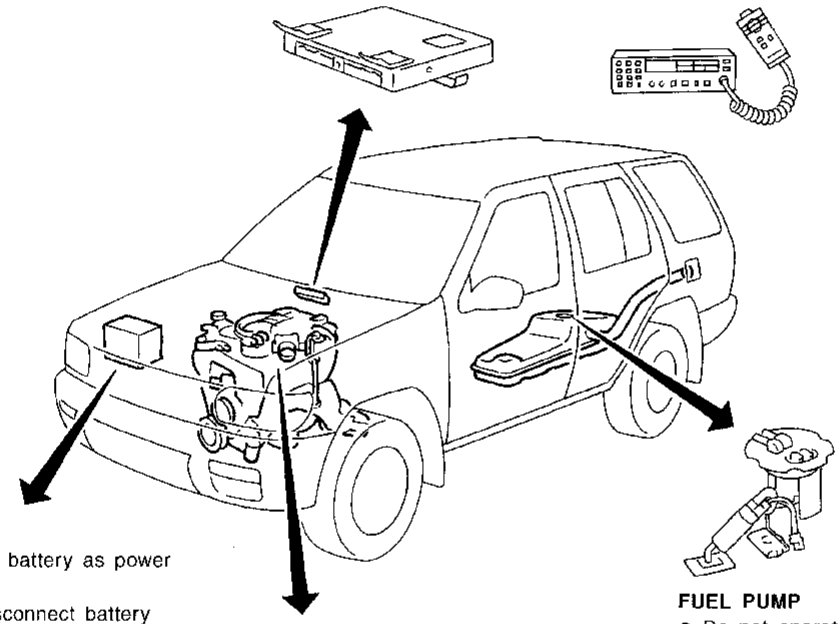
- **Be sure to turn the ignition switch "OFF" and disconnect the negative battery terminal before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. 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.)**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EGR system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM or A/T control unit before returning the vehicle to the customer.**

Engine Fuel & Emission Control System

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



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

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

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

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

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.

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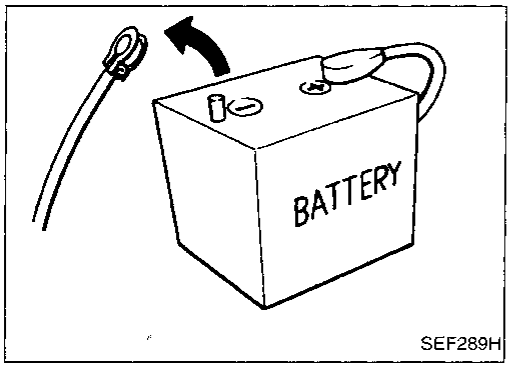

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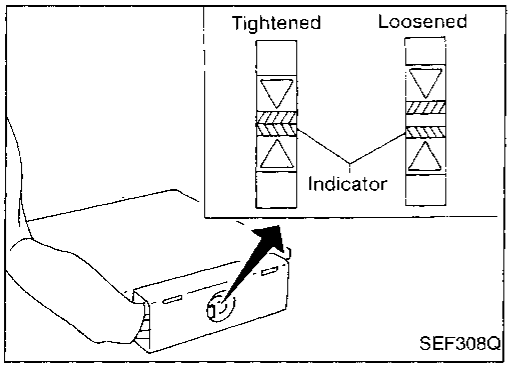
Precautions

- 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.



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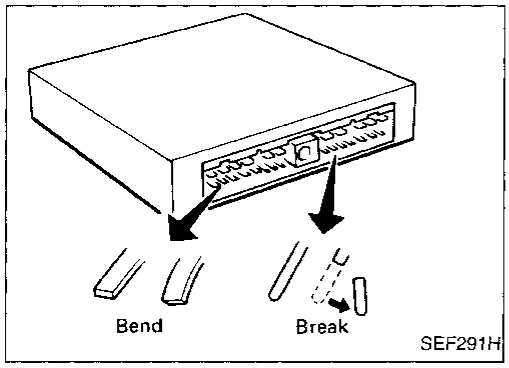
- When connecting ECM harness connector, tighten securing bolt until the gap between orange indicators disappears.
  : 3.0 - 5.0 N·m (0.3 - 0.5 kg-m, 26 - 43 in-lb)



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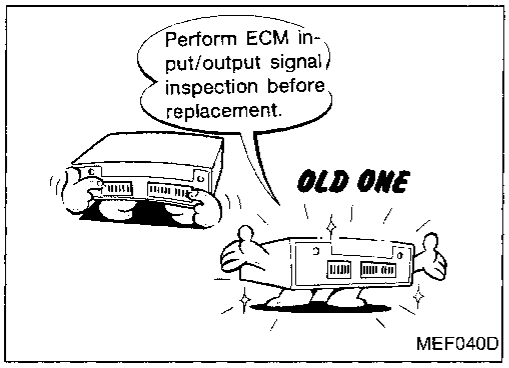
- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.



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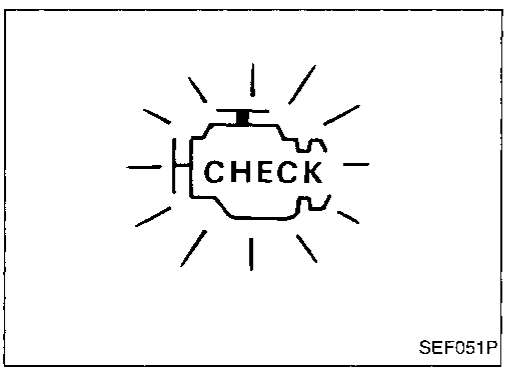
- Before replacing ECM, perform Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-83.



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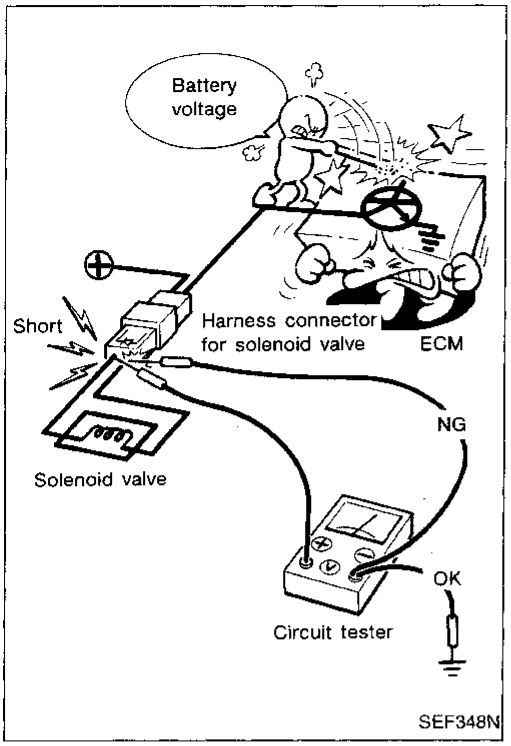
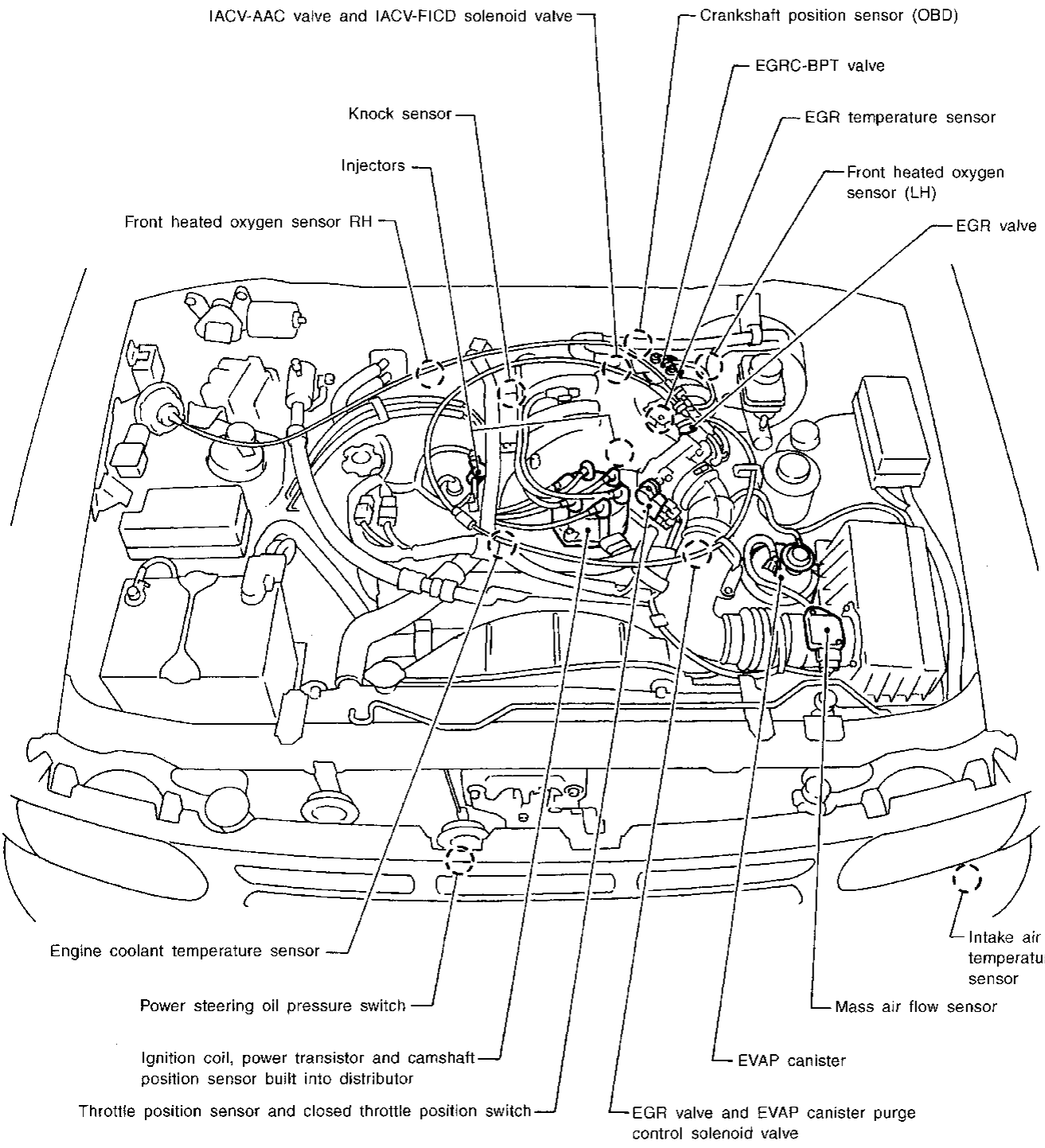
- After performing each TROUBLE DIAGNOSIS, perform "OVERALL FUNCTION CHECK" or "DTC (Diagnostic Trouble Code) CONFIRMATION PROCEDURE".
  The DTC should not be displayed in the "DTC CONFIRMATION PROCEDURE" if the repair is completed. The "OVERALL FUNCTION CHECK" should be a good result if the repair is completed.

Precautions (Cont'd)



- **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.

ECCS Component Parts Location



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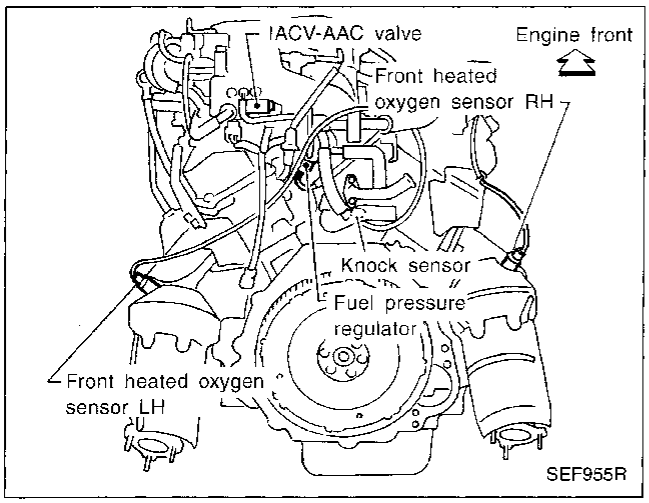
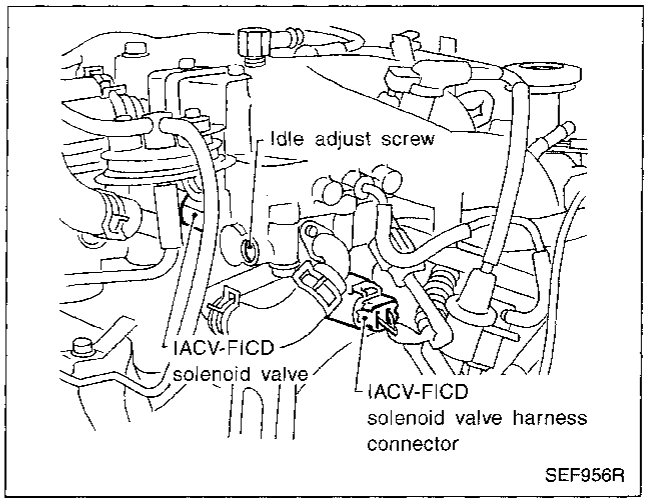
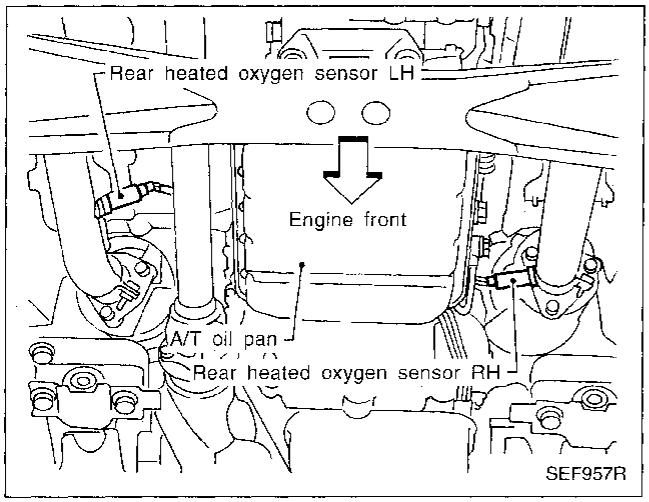
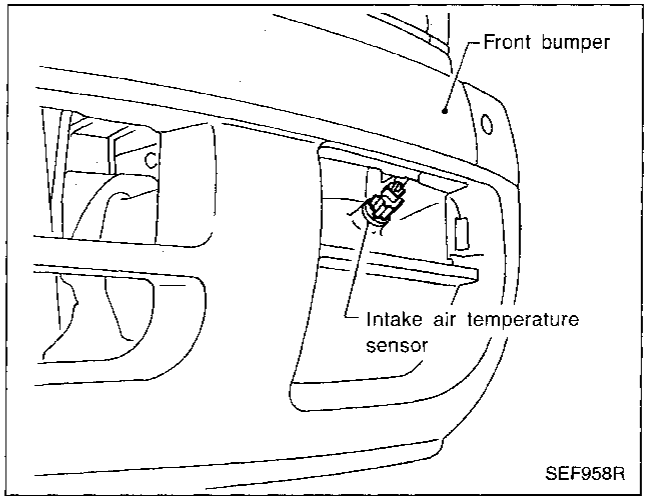
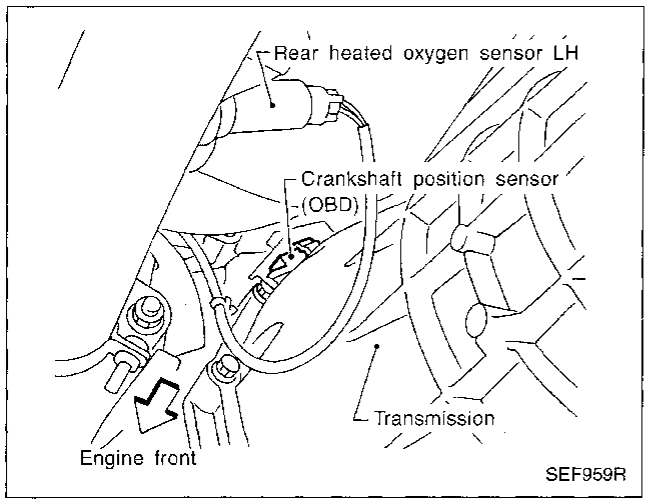
ECCS Component Parts Location (Cont'd)

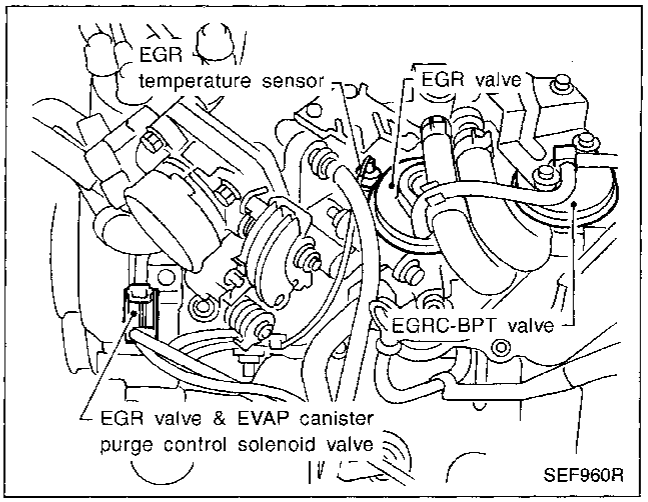




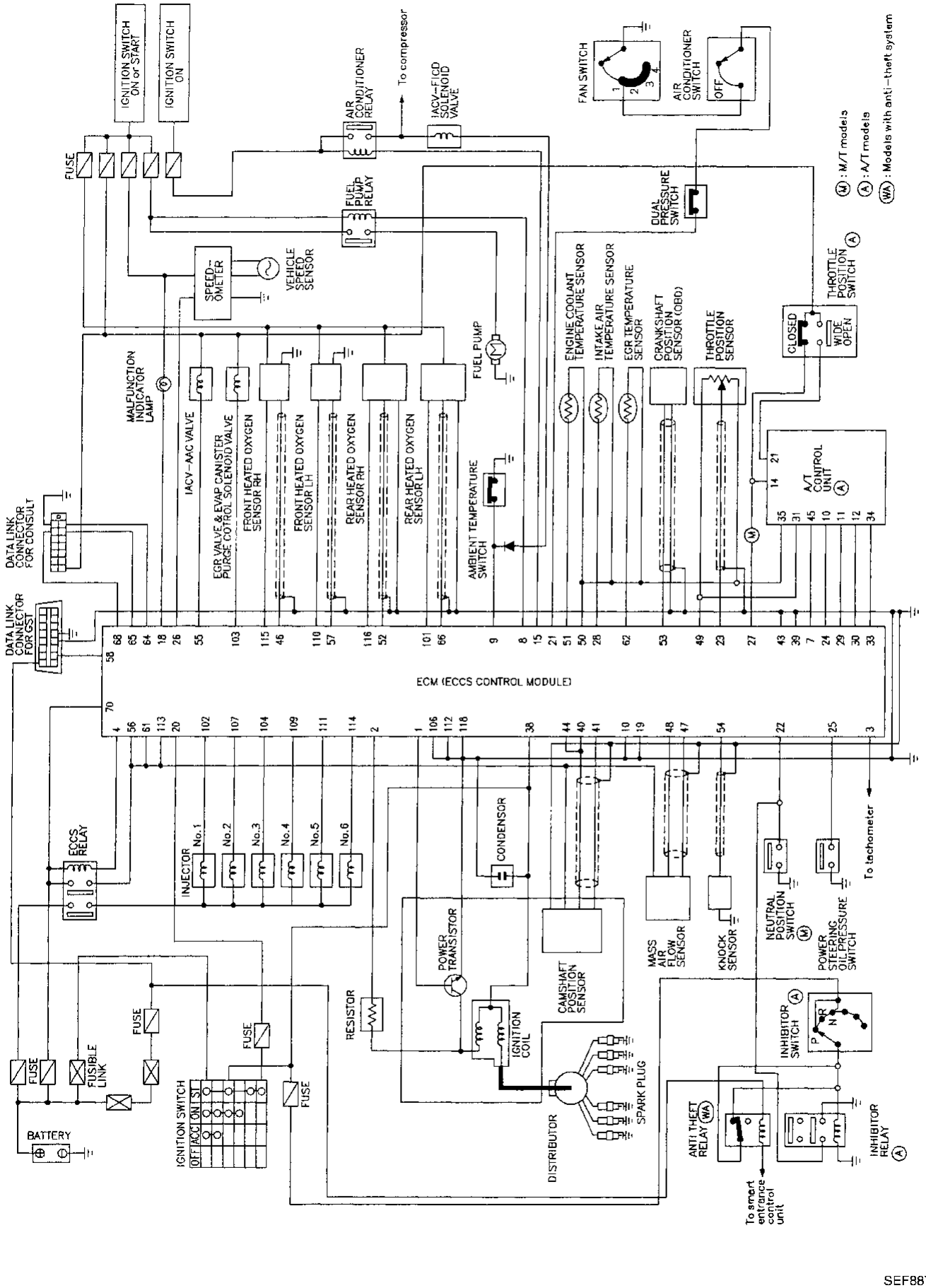








Circuit Diagram



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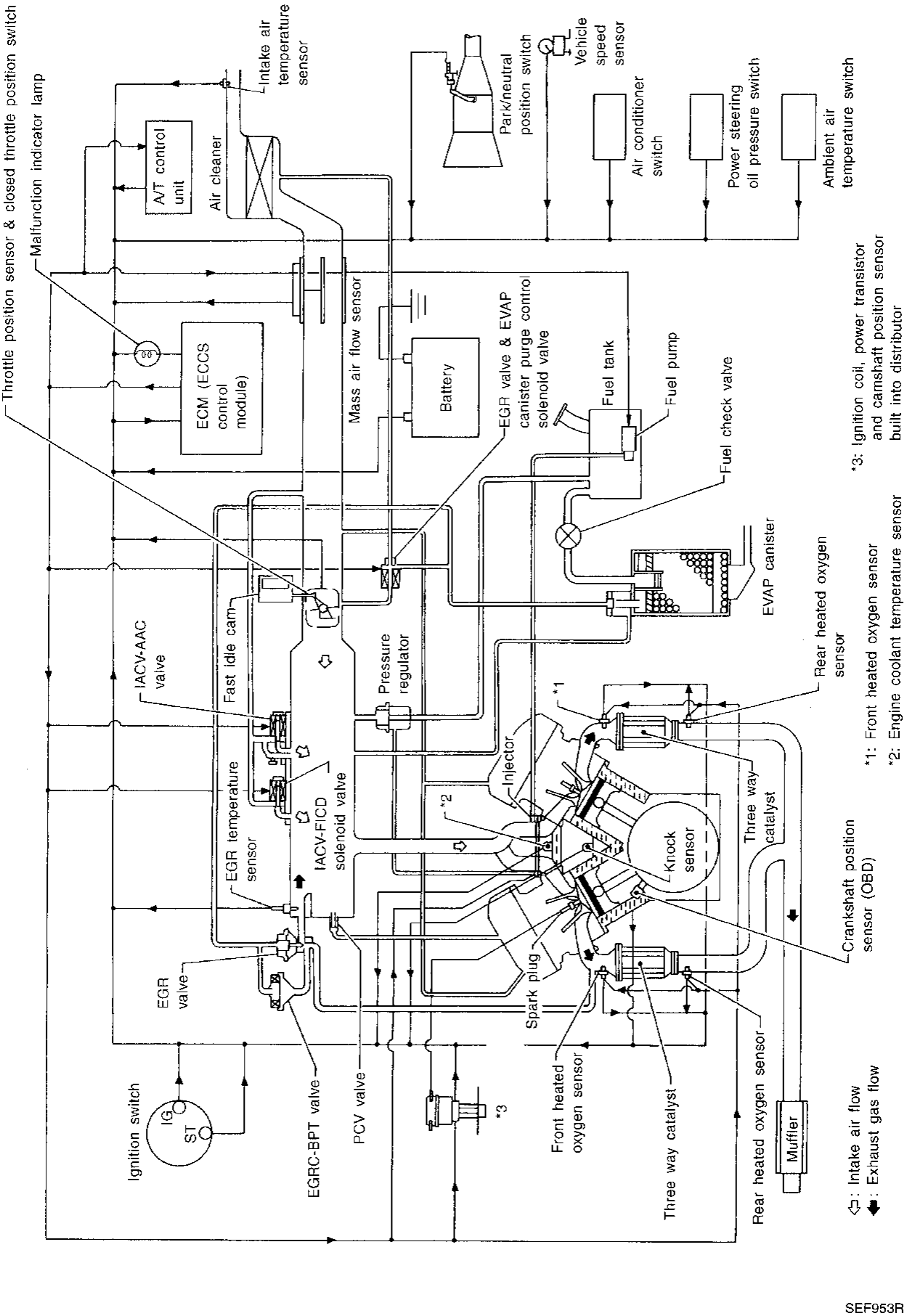
System Diagram



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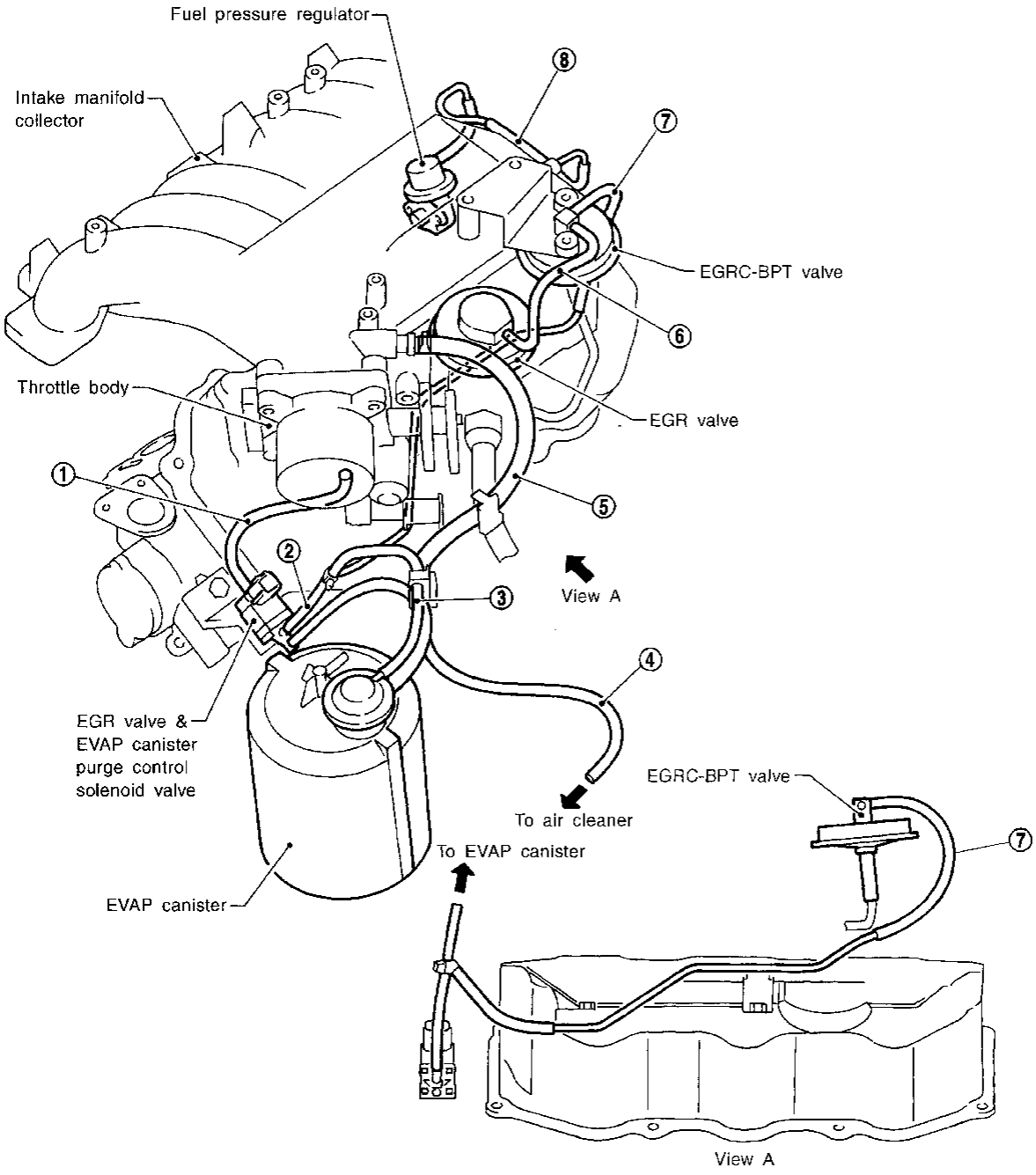
Vacuum Hose Drawing



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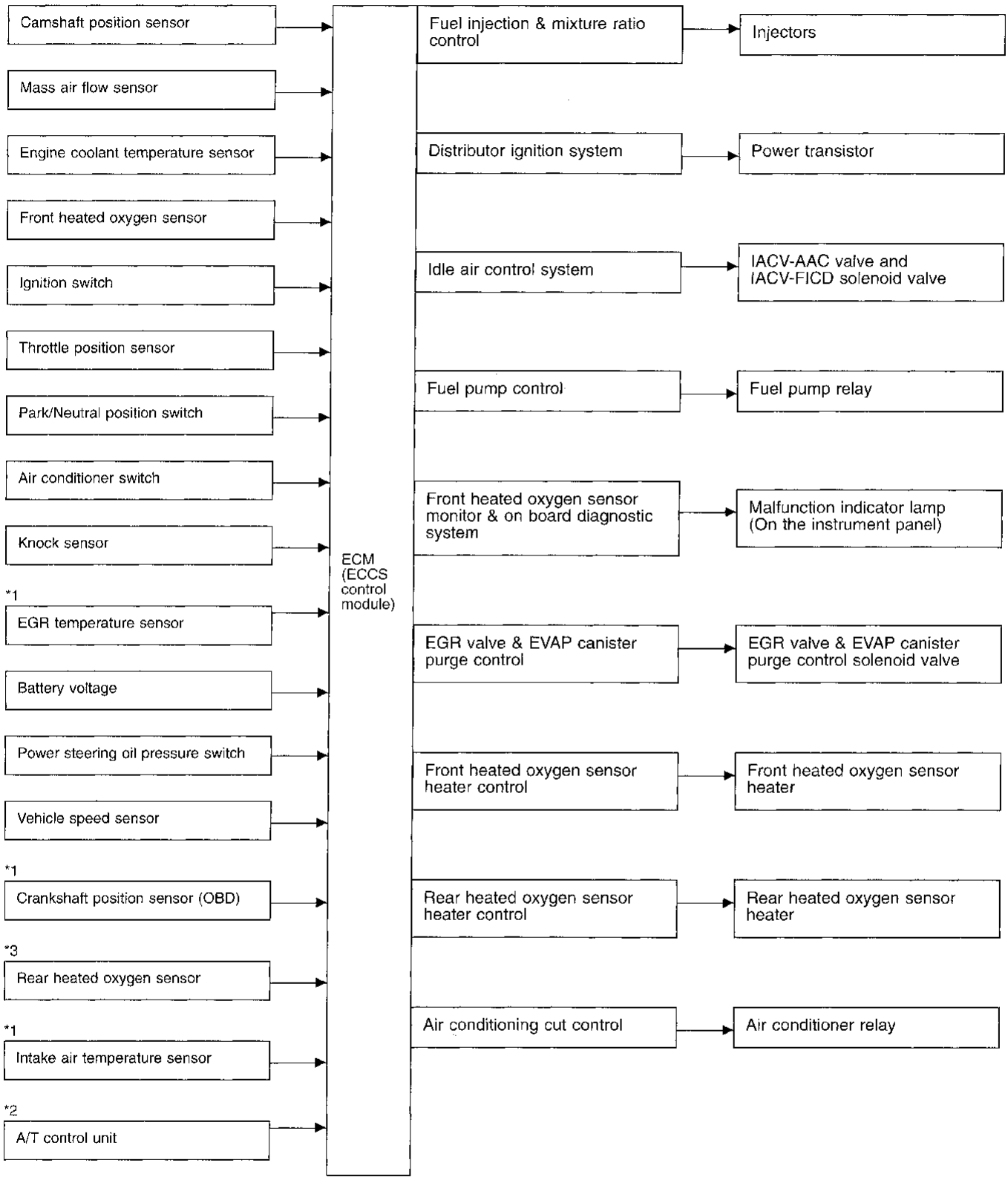
① Throttle body to EGR valve and EVAP canister purge control solenoid valve
② EGR valve and EVAP canister purge control solenoid valve to 3-way connector
③ 3-way connector to EVAP canister
④ EGR valve and EVAP canister purge control solenoid valve to air cleaner
⑤ EVAP canister (purge port) to intake manifold collector
⑥ EGR valve to EGRC-BPT valve
⑦ EGRC-BPT valve to 3-way connector
⑧ Fuel pressure regulator to intake manifold collector

Refer to "System Diagram", EC-10 for vacuum control system.

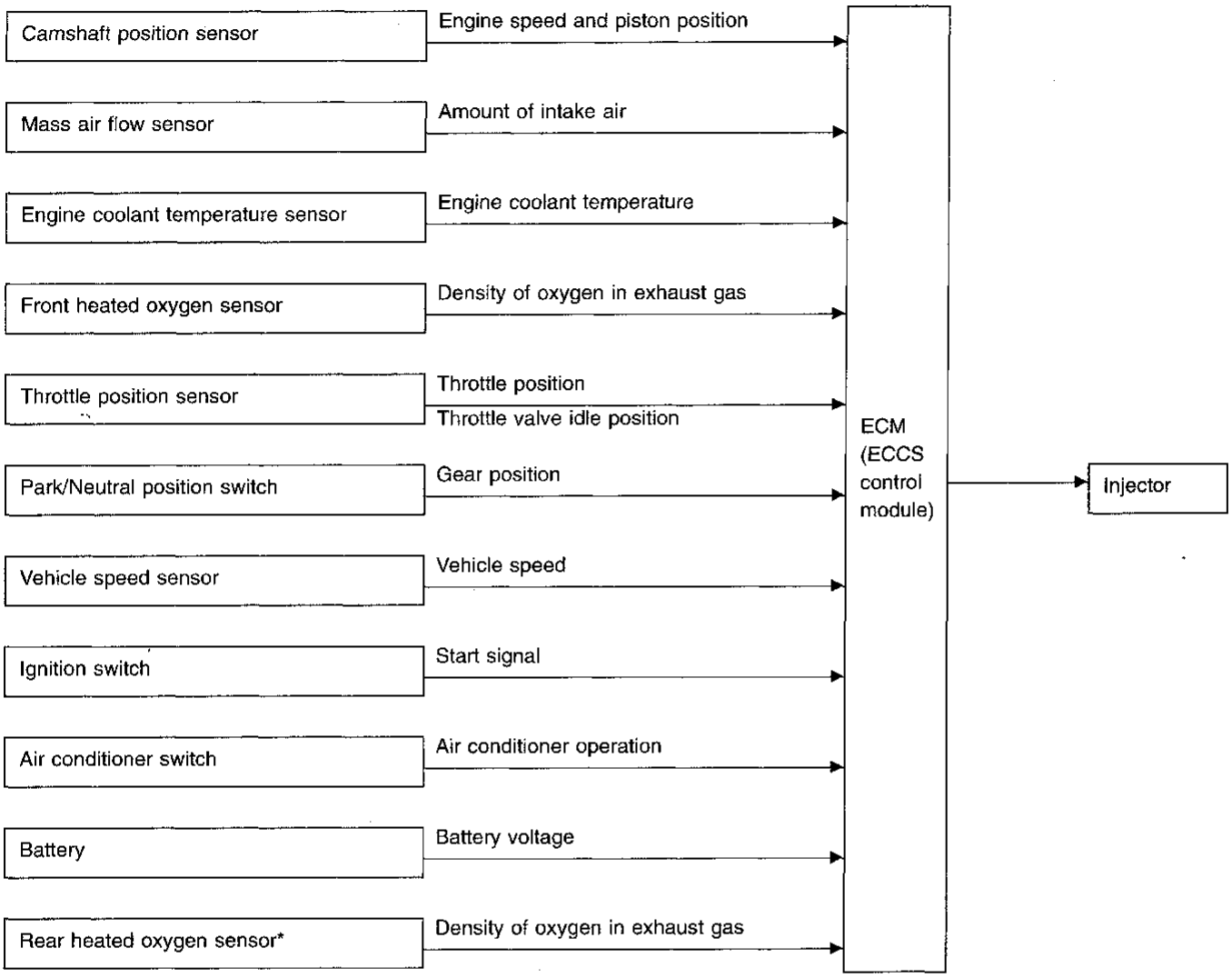
System Chart



*1: These sensors are not directly used to control the engine system. They are used only for the on board diagnosis.
*2: The DTC related to A/T will be sent to ECM.
*3: Under normal conditions, this sensor is not for engine control operation.

Multiport Fuel Injection (MFI) System

INPUT/OUTPUT SIGNAL LINE



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

BASIC MULTIPORT FUEL INJECTION SYSTEM

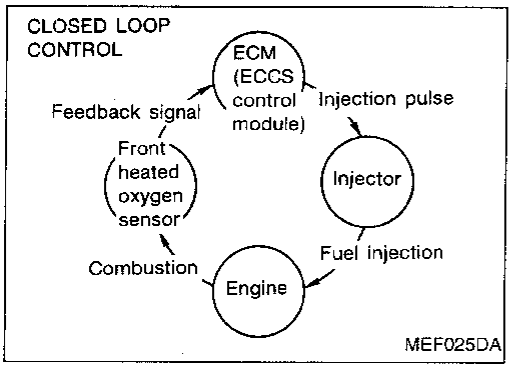
The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions 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

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 operation

⟨Fuel decrease⟩
- During deceleration
- During high engine speed operation



Multiport Fuel Injection (MFI) System (Cont'd)

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)

The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst can then better reduce CO, HC and NOx emissions. This system uses a front heated oxygen sensor in the exhaust manifold to monitor if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the front heated oxygen sensor, refer to EC-118, 135. This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
Rear heated oxygen sensor is located downstream of the three way catalyst. Even if the switching characteristics of the front heated oxygen sensor shift, the air-fuel ratio is controlled to stoichiometric by the signal from the rear heated oxygen sensor.

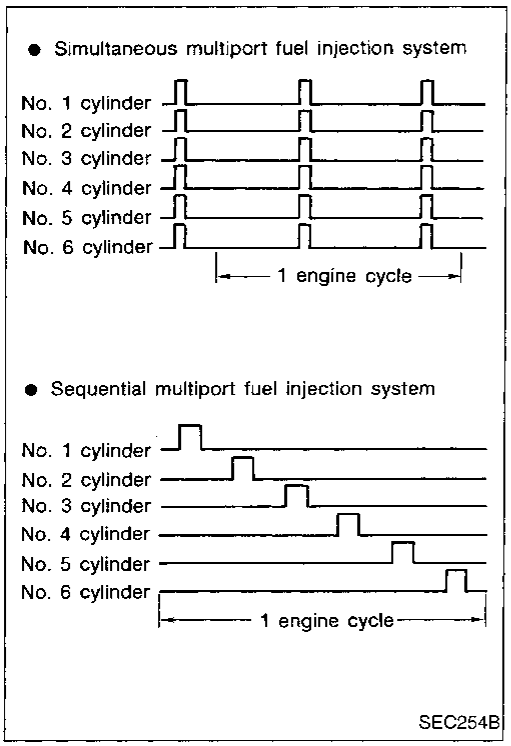
OPEN LOOP CONTROL

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

MIXTURE RATIO SELF-LEARNING CONTROL

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



Multiport Fuel Injection (MFI) System (Cont'd)

FUEL INJECTION TIMING

Two types of systems are used.

Sequential multiport fuel injection system

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

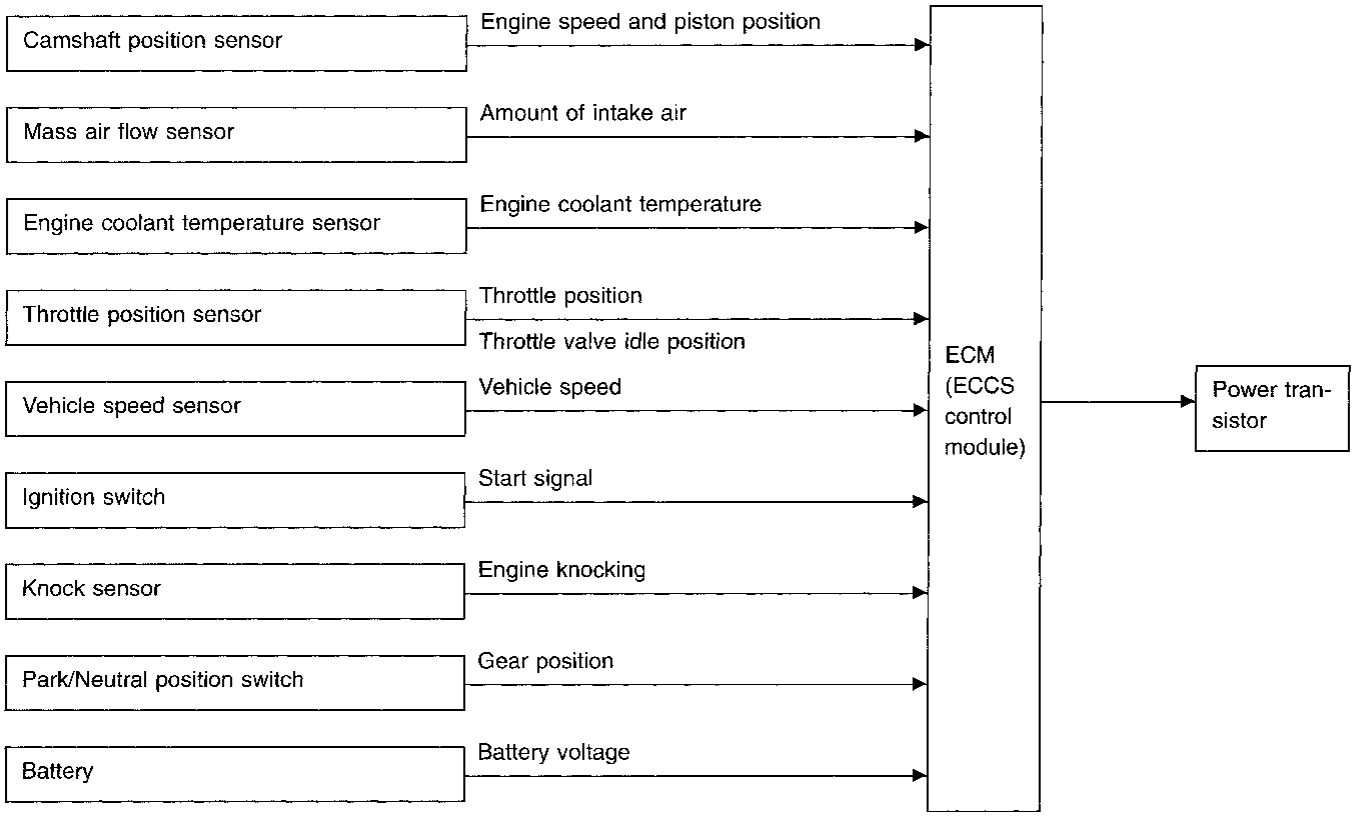
Fuel is injected simultaneously into all six cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
The six injectors will then receive the signals two times for each engine cycle.
This system is used when the engine is being started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

FUEL SHUT-OFF

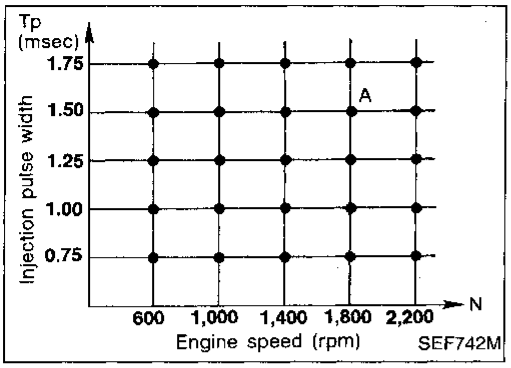
Fuel to each cylinder is cut off during deceleration or operation of the engine at excessively high speeds.

Distributor Ignition (DI) System

INPUT/OUTPUT SIGNAL LINE



Distributor Ignition (DI) System (Cont'd)



SYSTEM DESCRIPTION

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

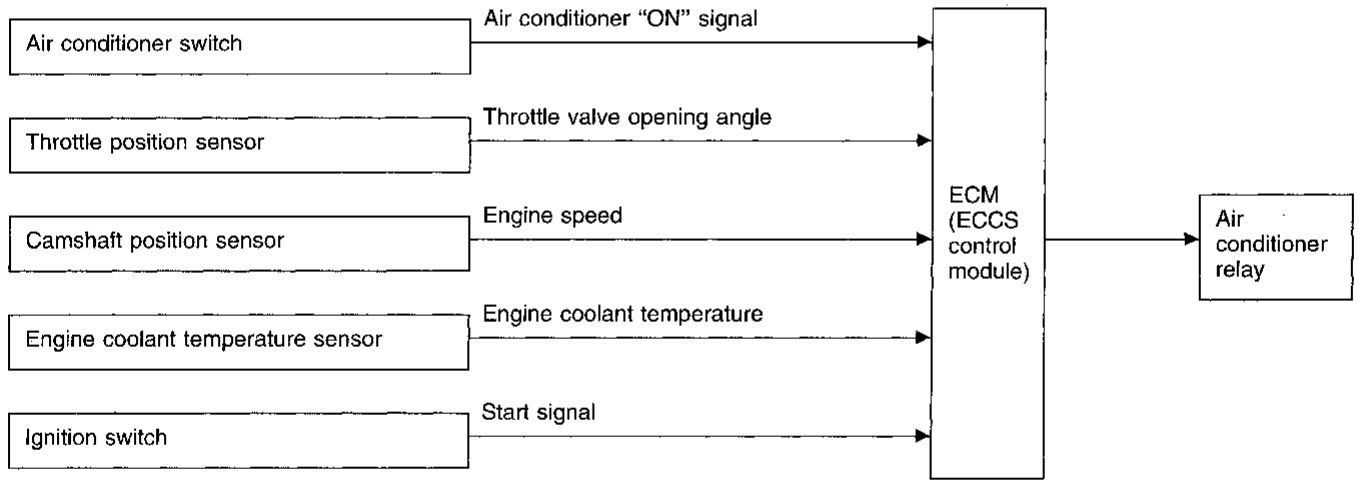
During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

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

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 (ECCS control module). The ECM retards the ignition timing to eliminate the knocking condition.

Air Conditioning Cut Control

INPUT/OUTPUT SIGNAL LINE

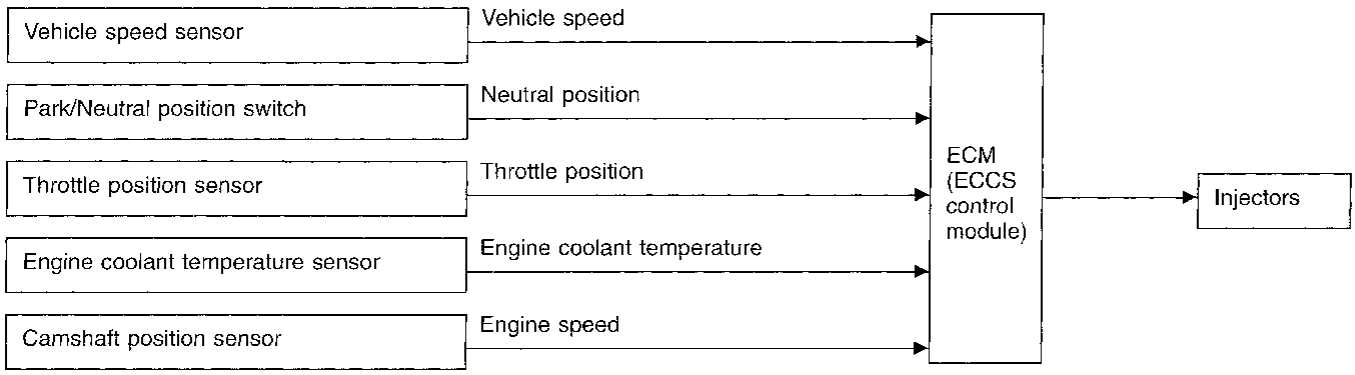


SYSTEM DESCRIPTION

This system improves acceleration when the air conditioner is used.
When the accelerator pedal is fully depressed, the air conditioner is turned off for a few seconds.
When engine coolant temperature becomes excessively high, the air conditioner is turned off. This continues until the coolant temperature returns to normal.

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

INPUT/OUTPUT SIGNAL LINE



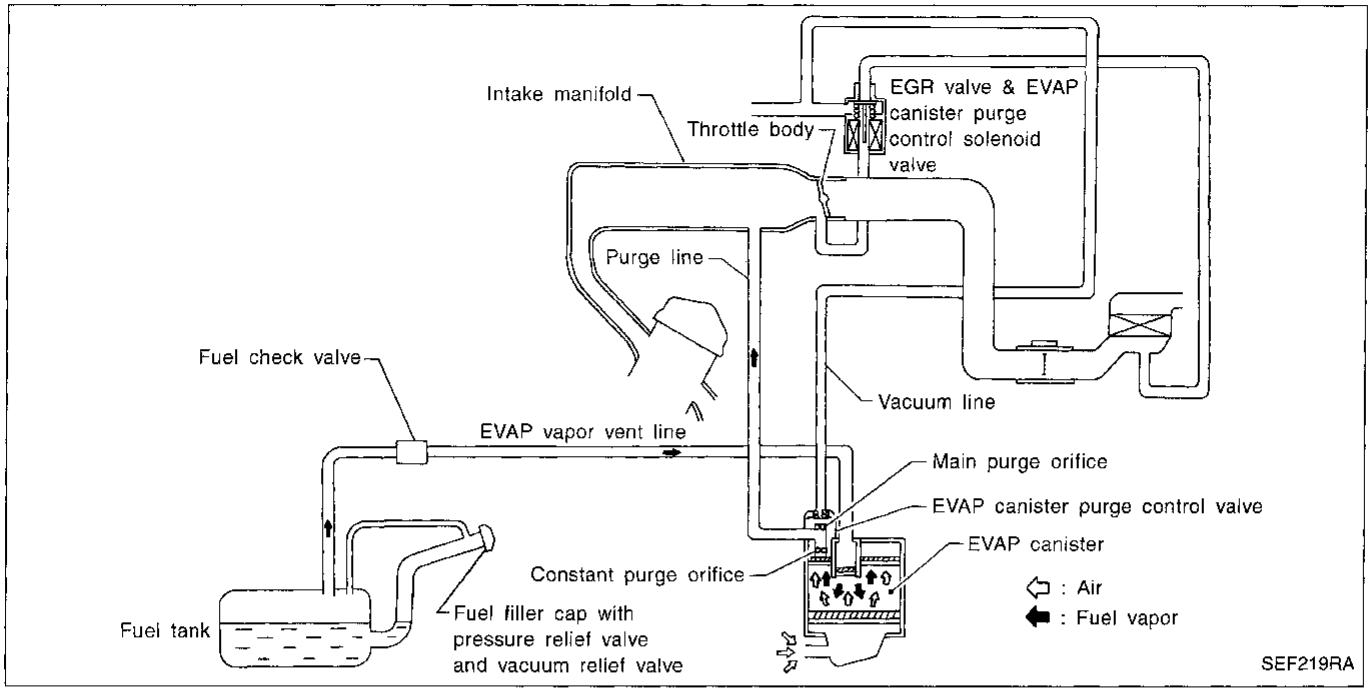
If the engine speed is above 2,500 rpm with no load (for example, in neutral and engine speed over 2,500 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

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-13.

Description



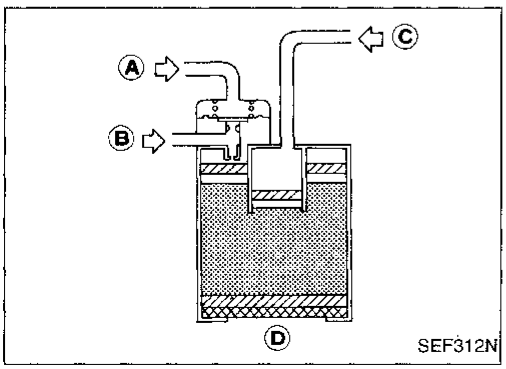
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

The fuel vapor from sealed fuel tank is led into the EVAP canister when the engine is off. The fuel vapor is then stored in the EVAP canister. The EVAP canister retains the fuel vapor until the EVAP canister is purged by air.

When the engine is running, the air is drawn through the bottom of the EVAP canister. The fuel vapor will then be led to the intake manifold.

When the engine runs at idle, the EVAP canister purge control valve is closed. Only a small amount of vapor flows into the intake manifold through the constant purge orifice.

As the engine speed increases and the throttle vacuum rises, the EVAP canister purge control valve opens. The vapor is sucked through both main purge and constant purge orifices.



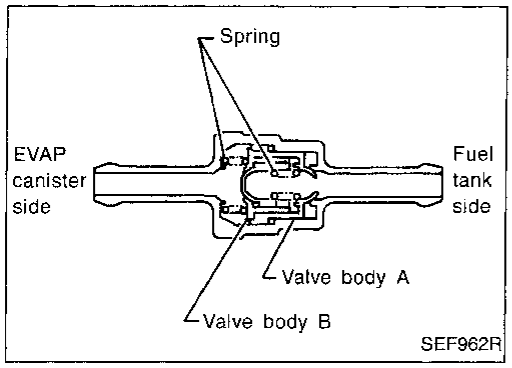
Inspection

EVAP CANISTER

Check EVAP canister as follows:

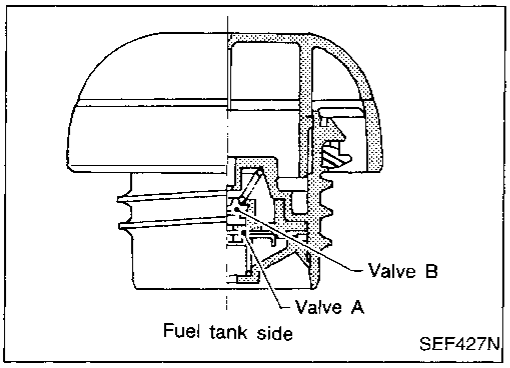
1. Blow air in port Ⓐ and check that there is no leakage.
2. Apply vacuum to port Ⓐ. [Approximately −13.3 to −20.0 kPa (−100 to −150 mmHg, −3.94 to −5.91 inHg)]
3. Cover port Ⓓ by hand.
4. Blow air in port Ⓒ and check that it flows freely out of port Ⓑ.

Inspection (Cont'd)



FUEL CHECK VALVE

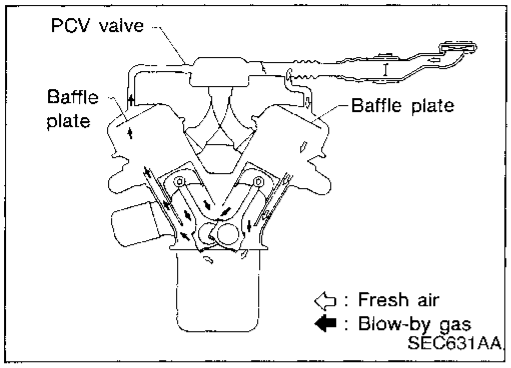
1. Blow air through connector on fuel tank side.
   A considerable resistance should be felt and a portion of air flow should be directed toward the EVAP canister side.
2. Blow air through connector on EVAP canister side.
   Air flow should be smoothly directed toward fuel tank side.
3. If fuel check valve is suspected of not properly functioning in steps 1 and 2 above, replace it.



FUEL TANK VACUUM RELIEF VALVE

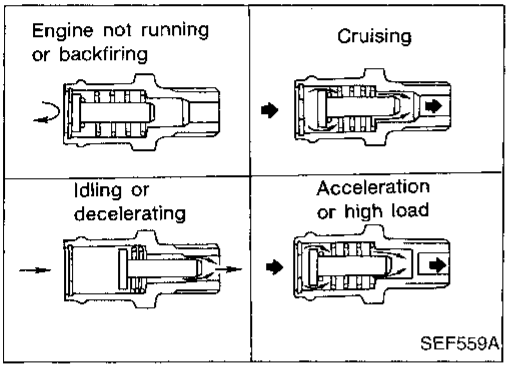
1. Wipe clean valve housing.
2. Suck air through the cap. A slight resistance accompanied by valve clicks indicates that valve A is in good mechanical condition. Note also that, by further sucking air, the resistance should disappear with valve clicks.
3. Blow air on fuel tank side and ensure that continuity of air passage exists through valve B.
4. If valve is clogged or if no resistance is felt, replace cap as an assembly.

Use only a genuine filler cap as a replacement.



Description

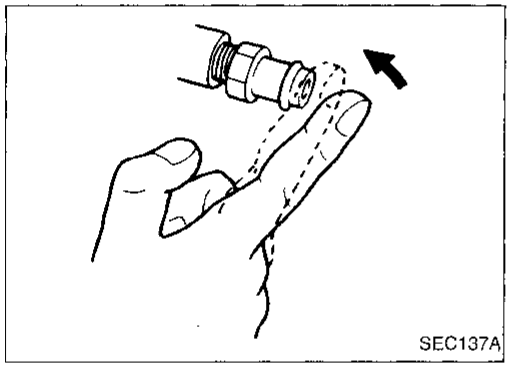
This system returns blow-by gas to the intake manifold.
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.
Normally, the capacity 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

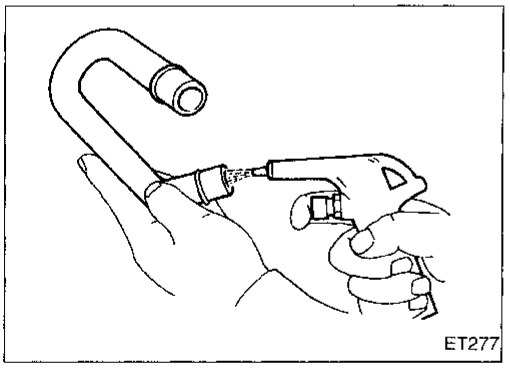
PCV (Positive Crankcase Ventilation) VALVE

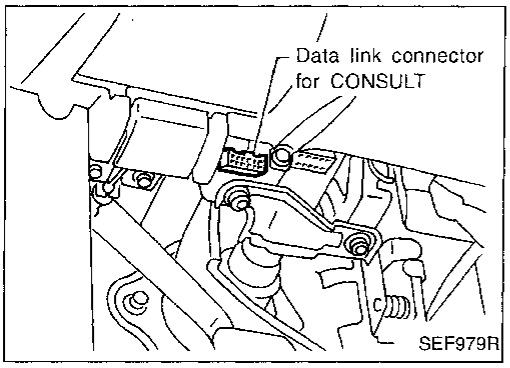
With engine running at idle, remove PCV hose from PCV valve; if the valve is working properly, a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.



PCV HOSE

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.

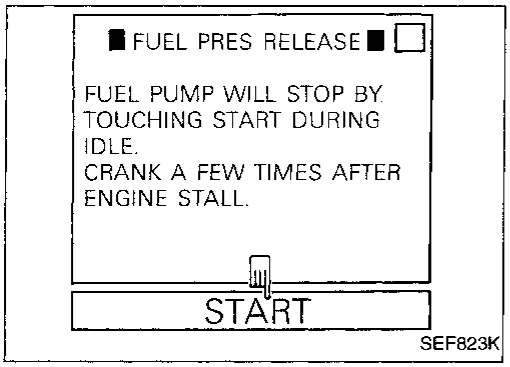


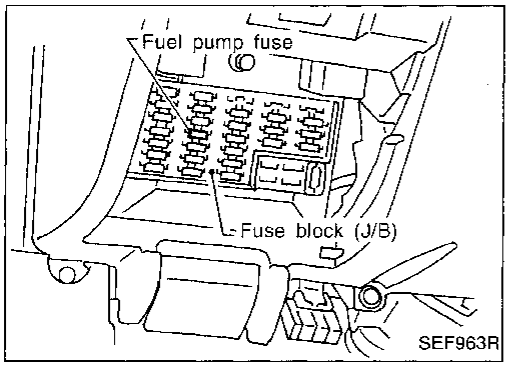


Fuel Pressure Release

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

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



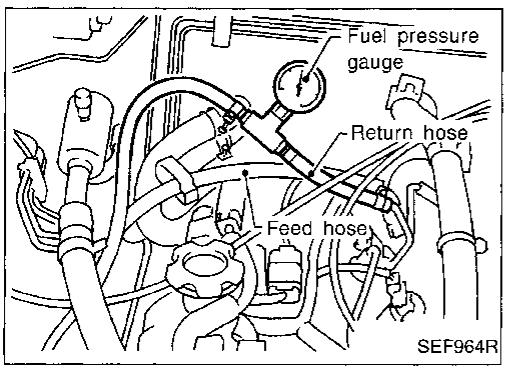


1. Remove fuel pump fuse located in fusible link box.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch "OFF".
5. Reinstall fuel pump fuse after servicing fuel system.

Fuel Pressure Check

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

1. Release fuel pressure to zero.
2. Disconnect fuel hose between fuel filter and fuel tube (engine side).



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

At idling:

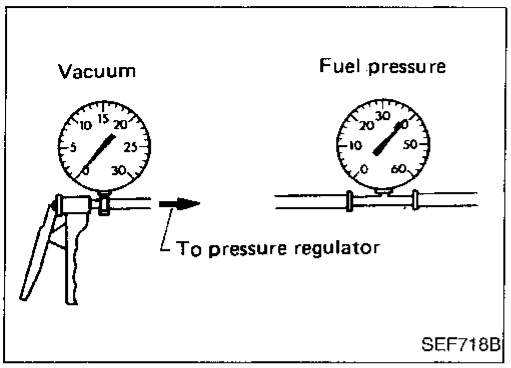
With vacuum hose connected

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

With vacuum hose disconnected

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

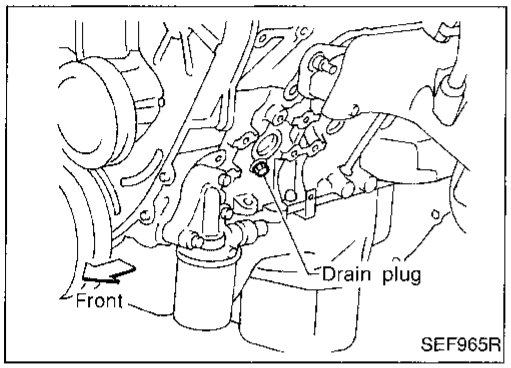
If results are unsatisfactory, perform Fuel Pressure Regulator Check.

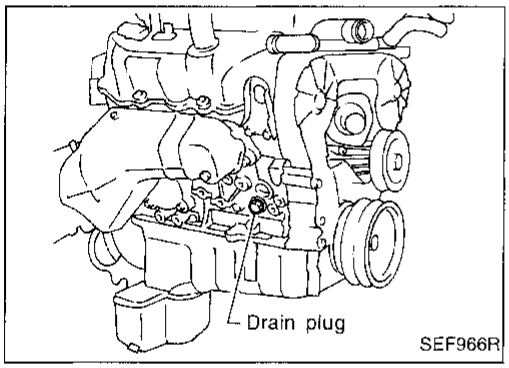


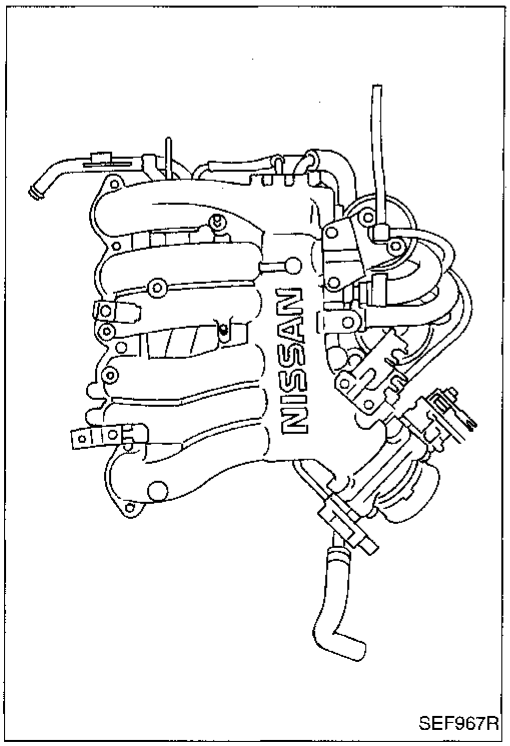
Fuel Pressure Regulator Check

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

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







Injector Removal and Installation

1. Release fuel pressure to zero. Refer to previous page.
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
   - EGR valve and EVAP canister purge control solenoid valve
   - EGR temperature sensor
   - Ground harness

   b. PCV hoses
   c. Vacuum hoses for
   - Brake booster
   - EGR valve and EVAP canister purge control solenoid valve
   - Fuel pressure regulator
   - EVAP canister
   - EGRC-BPT valve

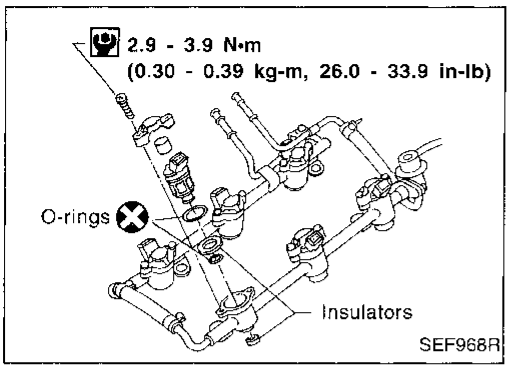
   d. Air hoses from
   - Air duct
   - IACV-AAC valve

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

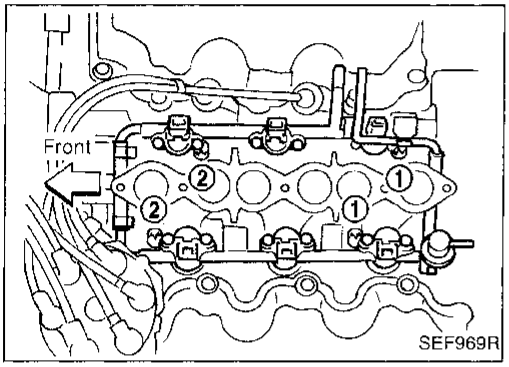
   f. EVAP canister purge hose
   g. EGR flare tube
5. Remove injector fuel tube assembly.
   The following parts should be disconnected or removed.
   - Vacuum hose for fuel pressure regulator
   - Fuel feed and return hose
   - All injectors harness connectors

- **Push injector tail piece.**
- **Do not pull on connector.**
- **Do not extract injector by pinching.**

Injector Removal and Installation (Cont'd)



6. Push out any malfunctioning injector from injector fuel tube.
7. Replace or clean injector as necessary.
   - **Always replace O-rings with new ones.**
   - **Lubricate O-rings with engine oil.**
8. Install injector to injector fuel tube assembly.



9. Install injectors with fuel tube assembly to intake manifold.

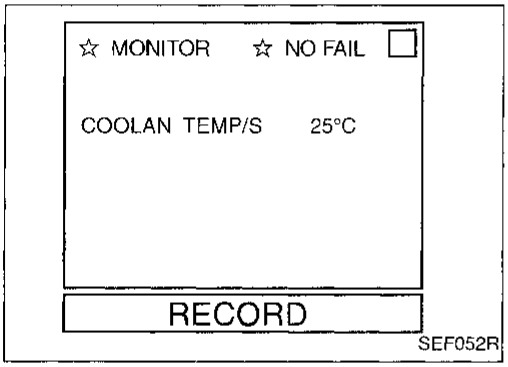
Tighten in numerical order shown in the figure.

a) First, tighten all bolts to 6 to 7 N·m (0.6 to 0.7 kg-m, 4.3 to 5.1 ft-lb).
b) Then, tighten all bolts to 10.8 to 14.7 N·m (1.1 to 1.5 kg-m, 8 to 11 ft-lb).

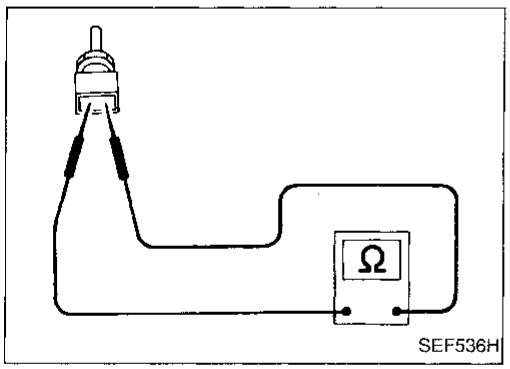
10. Reinstall any part removed in reverse order of removal.

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

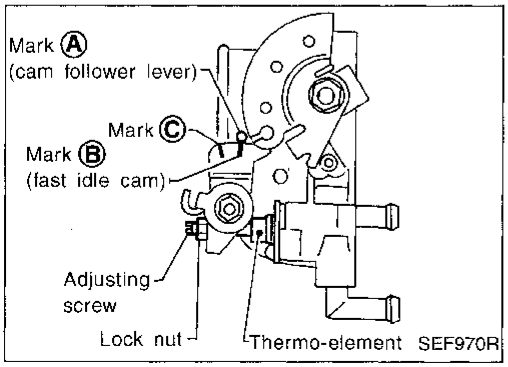
Fast Idle Cam (FIC) Inspection and Adjustment



1. Turn ignition switch "ON".
2. See "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT.
3. When engine temperature is 25±5°C (77±9°F), make sure that the center of mark Ⓐ is aligned with mark Ⓑ as shown in the figure.

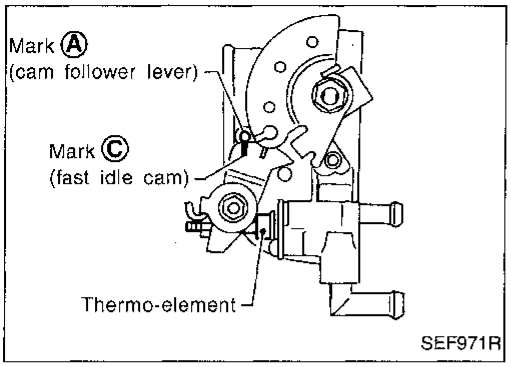


1. Turn ignition switch "OFF".
2. Disconnect engine temperature sensor harness connector and check resistance as shown in the figure.
3. Start engine and warm it up.
   When the resistance of engine temperature sensor is 1.65 to 2.4 kΩ, make sure that the center of mark Ⓐ is aligned with mark Ⓑ as shown 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)

Fast Idle Cam (FIC) Inspection and Adjustment (Cont'd)



4. Start engine and warm it up.

5. When engine temperature is 80±5°C (176±9°F), check the following.
   - The center of mark Ⓐ is aligned with mark Ⓒ.
   - The cam follower lever's roller is not touching the fast idle cam.

5. When the resistance of engine temperature sensor is 0.26 to 0.39 kΩ, check the following.
   - The center of mark Ⓐ is aligned with mark Ⓒ.
   - 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

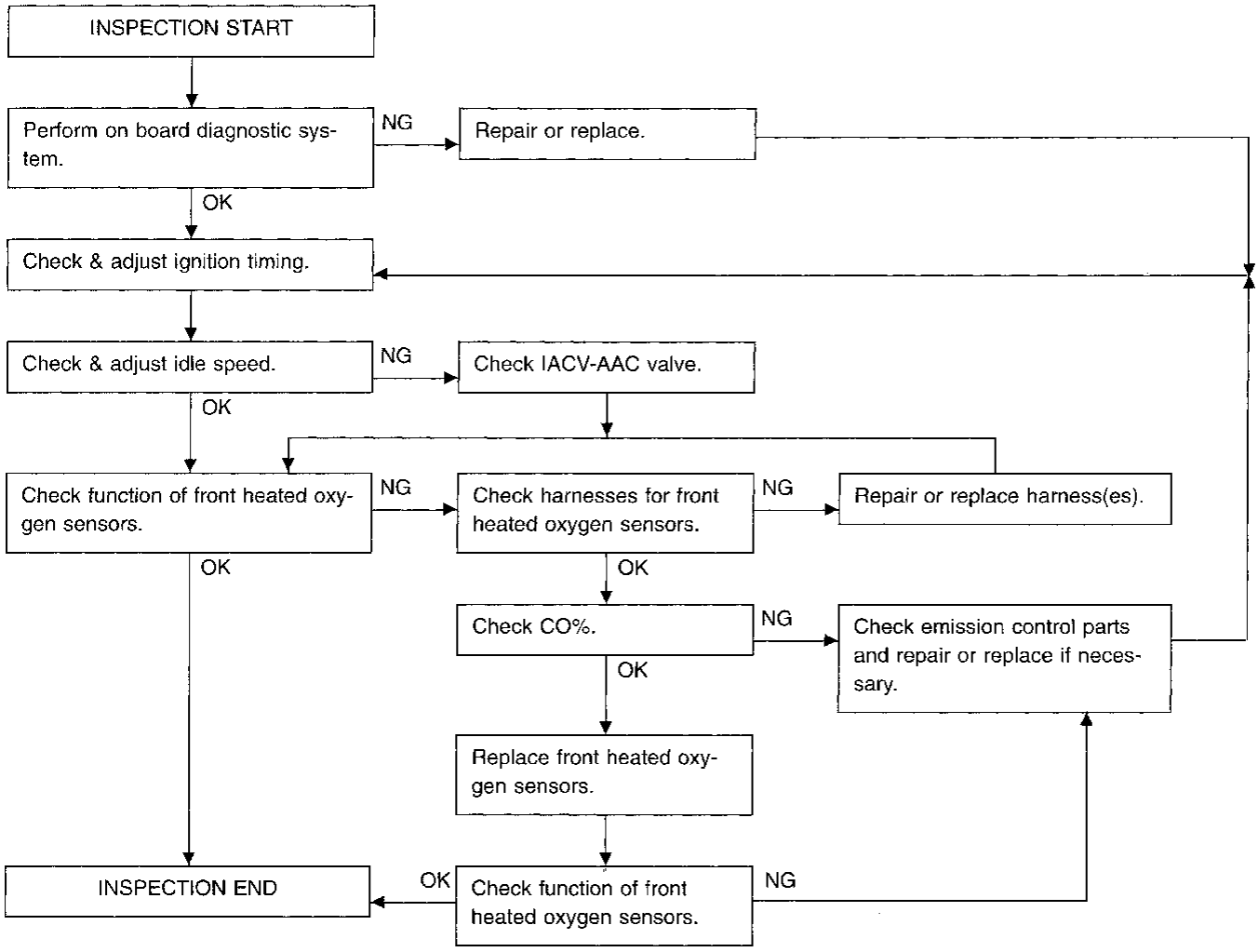
PREPARATION

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

- Battery
- Ignition system
- Engine oil and coolant levels
- Fuses
- ECM harness connector
- Vacuum hoses
- Air intake system
  (Oil filler cap, oil level gauge, etc.)
- Fuel pressure
- Engine compression
- EGR valve operation
- Throttle valve
- EVAP canister purge control valve

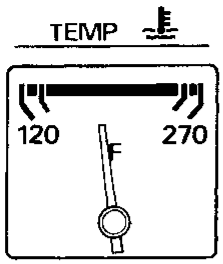
2. On air conditioner equipped models, checks should be carried out while the air conditioner is "OFF".
3. On automatic transmission equipped models, when checking idle rpm, ignition timing and mixture ratio, checks should be carried out while shift lever is in "N" position.
4. When measuring "CO" percentage, 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



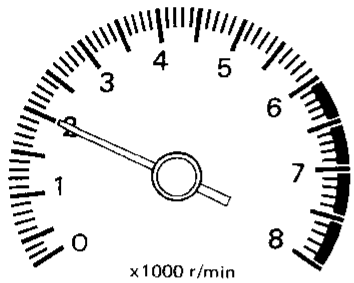
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

A



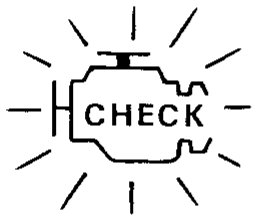
SEF246F

B



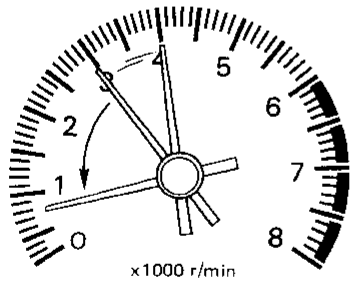
SEF247F

C



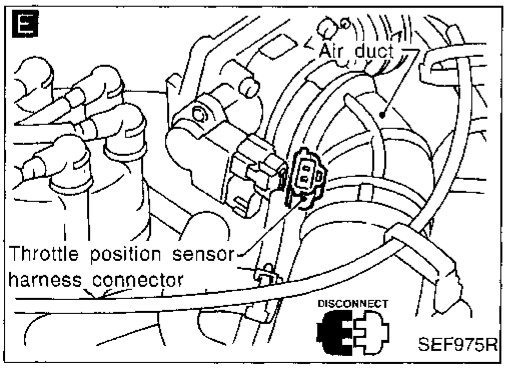
SEF051P

D



SEF248F

E



SEF975R

START

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

A

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

B

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

C

Perform diagnostic test mode II (Self-diagnostic results) (Diagnostic Test Mode II). Refer to EC-35.

OK / NG

NG → Repair or replace components as necessary.

D

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

E

Turn off engine and disconnect throttle position sensor harness connector.

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

F

Check ignition timing with a timing light.

15°±2° BTDC (in "N" position)

OK / NG

NG → Adjust ignition timing by turning distributor after loosening securing bolts.

G

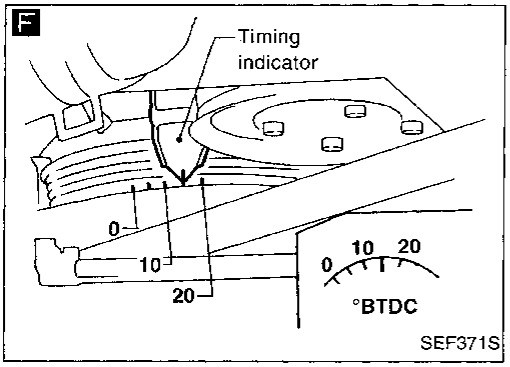
Turn off engine and connect throttle position sensor harness connector to throttle position sensor.

G → H

OK → A

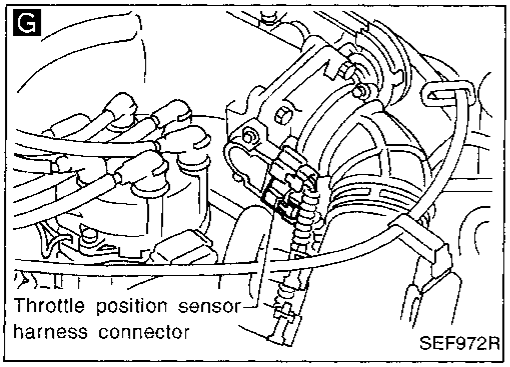
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

F



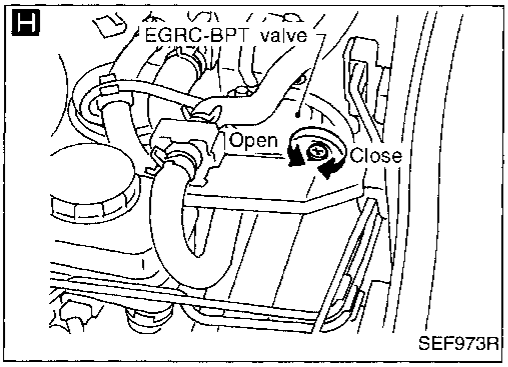
SEF371S

G



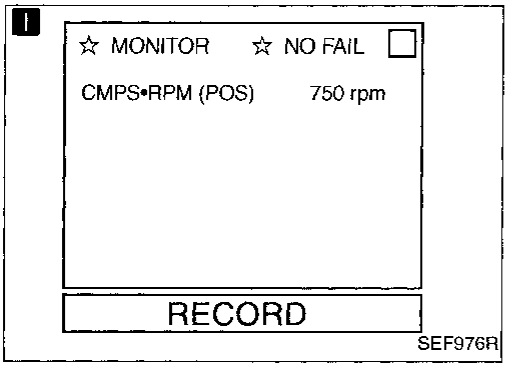
SEF972R

H



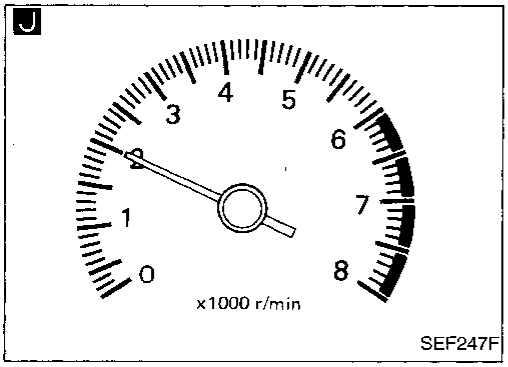
SEF973R

I



SEF976R

J



SEF247F

Ⓐ

Check idle speed.

Read idle speed in "DATA MONITOR" mode with CONSULT.

Check idle speed.

700±50 rpm (in "N" position)

OK

NG

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

H

Adjust idle speed by turning idle speed adjusting screw.

Read idle speed in "DATA MONITOR" mode with CONSULT.

Check idle speed.

700±50 rpm (in "N" position)

Turn off engine and connect throttle position sensor harness connector.

Start and race engine (2,000 - 3,000 rpm) 2 or 3 times under no-load then run at idle speed.

I

Check idle speed.

Read idle speed in "DATA MONITOR" mode with CONSULT.

OR

Check idle speed.

750±50 rpm (in "N" position)

OK

NG

Check IACV-AAC valve and replace if necessary. Refer to EC-204.

Check IACV-AAC valve harness and repair if necessary. Refer to EC-204.

Check ECM function* by substituting another known good ECM.

J

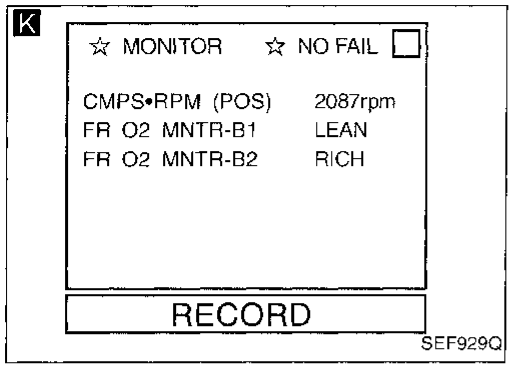
Run engine at about 2,000 rpm for about 2 minutes under no-load.

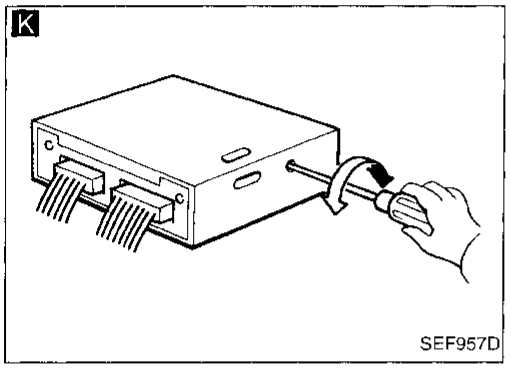
Ⓘ

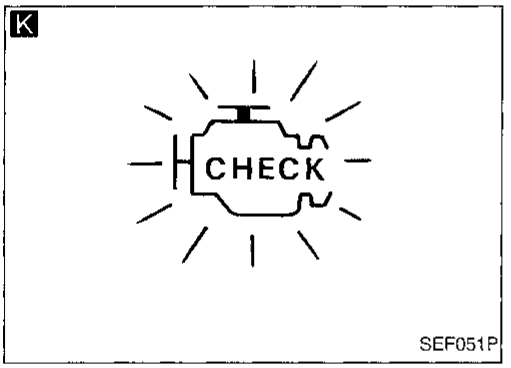
Ⓓ

*: ECM may be the cause a problem, but this is rarely the case.

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)







Ⓓ

Check front heated oxygen sensor LH signal.
1. See "FR O2 MNTR-B2" in "DATA MONITOR" mode.
2. Running engine at 2,000 rpm under no-load (engine is warmed up sufficiently.), 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

Monitor does not fluctuate. Malfunction indicator lamp does not blink. → Ⓕ

OR

1. Set "Left bank front heated oxygen sensor monitor" in the Diagnostic Test Mode II. Refer to EC-35.
2. Make sure that malfunction indicator lamp goes on more than 5 times during 10 seconds at 2,000 rpm.

OK → Ⓛ

Less than 5 times

Replace front heated oxygen sensor LH. ← Ⓙ

Check front heated oxygen sensor LH signal.
1. See "FR O2 MNTR-B2" in "DATA MONITOR" mode.
2. Running engine at 2,000 rpm under no-load (engine is warmed up sufficiently.), 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

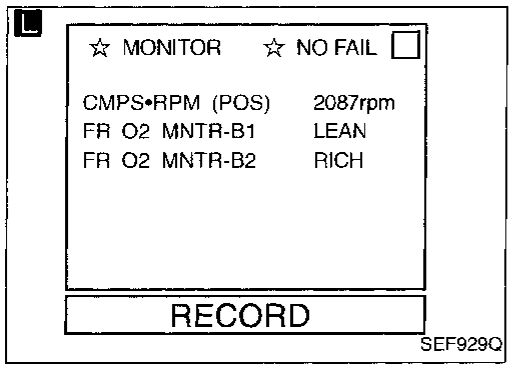
OK → Ⓛ

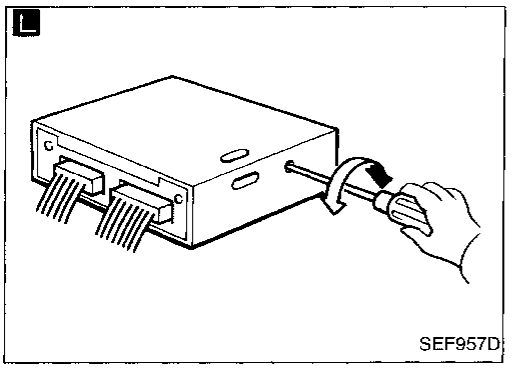
NG → Ⓚ → Ⓔ

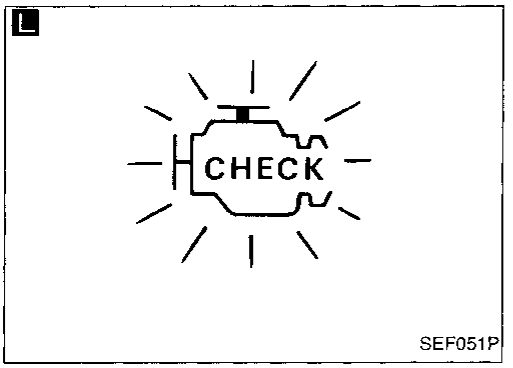
OR

1. Set "Left bank front heated oxygen sensor monitor" in the Diagnostic Test Mode II. Refer to EC-35.
2. Make sure that malfunction indicator lamp goes on more than 5 times during 10 seconds at 2,000 rpm.

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)







Check front heated oxygen sensor RH signal.

1. See "FR O2 MNTR-B1" in "DATA MONITOR" mode.
2. Maintaining engine at 2,000 rpm under no-load (engine is warmed up sufficiently.), 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

OR

1. Set "Right bank front heated oxygen sensor monitor" in the Diagnostic Test Mode II. Refer to EC-35.
2. Make sure that malfunction indicator lamp goes on more than 5 times during 10 seconds at 2,000 rpm.

Monitor does not fluctuate. Malfunction indicator lamp does not blink. → Ⓒ

OK → END

Less than 5 times → Replace front heated oxygen sensor RH.

Check front heated oxygen sensor RH signal.

1. See "FR O2 MNTR-B1" in "DATA MONITOR" mode.
2. Maintaining engine at 2,000 rpm under no-load (engine is warmed up sufficiently.), 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

OR

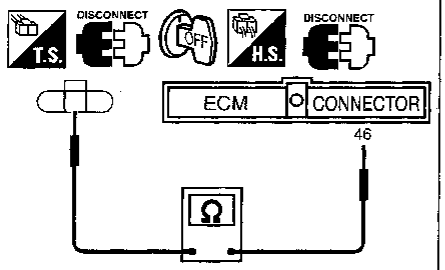
1. Set "Right bank front heated oxygen sensor monitor" in the Diagnostic Test Mode II. Refer to EC-35.
2. Make sure that malfunction indicator lamp goes on more than 5 times during 10 seconds at 2,000 rpm.

NG → Ⓔ

OK → END

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

Ⓜ Front heated oxygen sensor RH harness connector



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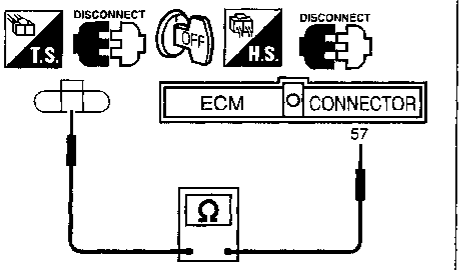
Ⓝ Front heated oxygen sensor LH harness connector



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Ⓜ

Check front heated oxygen sensor RH harness:
1. Turn off engine and disconnect battery ground cable.
2. Disconnect ECM SMJ harness connector from ECM.
3. Disconnect front heated oxygen sensor RH harness connector.
4. Check for continuity between terminal No. ㊻ of ECM SMJ harness connector and harness connector for front heated oxygen sensor RH.

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

OK → Connect ECM SMJ harness connector to ECM.

NG → Repair or replace harness. → Ⓘ

Ⓝ

Check front heated oxygen sensor LH harness:
1. Turn off engine and disconnect battery ground cable.
2. Disconnect ECM SMJ harness connector from ECM.
3. Disconnect front heated oxygen sensor LH harness connector.
4. Check for continuity between terminal No. ㊼ of ECM SMJ harness connector and harness connector for front heated oxygen sensor LH.

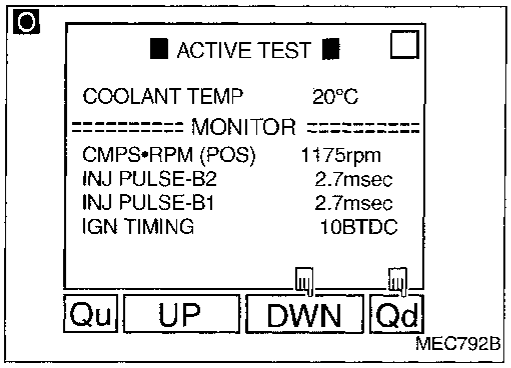
Continuity exists. ..... OK
Continuity does not exist. ..... NG

OK → Connect ECM SMJ harness connector to ECM.

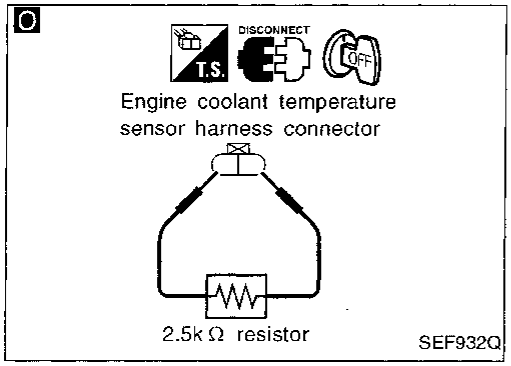
NG → Repair or replace harness. → Ⓘ

Ⓒ → Ⓕ → Ⓖ

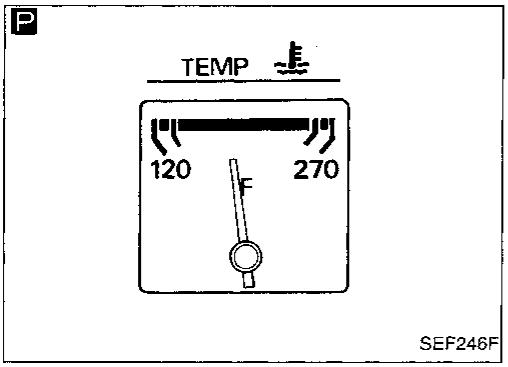
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)



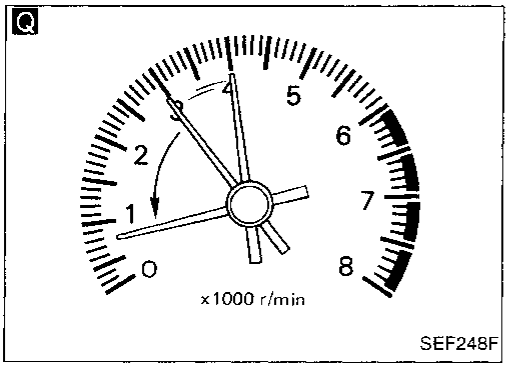
MEC792B



SEF932Q



SEF246F



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Ⓖ

O

1. Select "COOLANT TEMP" in "ACTIVE TEST" mode.
2. Set "COOLANT TEMP" to 20°C (68°F) by touching "DWN" and "Qd".

OR

1. Disconnect engine coolant temperature sensor harness connector.
2. Connect a resistor (2.5 kΩ) between terminals of engine coolant temperature sensor harness connector.

P

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

Q

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

Check "CO" %. → OK → Ⓙ

Idle CO: 0.2 - 8%

After checking CO%,
1. Disconnect the resistor from terminals of engine coolant temperature sensor.
2. Connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.

NG

Connect front heated oxygen sensor harness connectors to front heated oxygen sensor.

Check fuel pressure regulator. Refer to EC-21. ← Ⓚ

Check mass air flow sensor and its circuit. Refer to EC-239

Check injector and its circuit. Refer to EC-239.
Clean or replace if necessary.

Check engine coolant temperature sensor and its circuit. Refer to EC-103.

Check ECM function* by substituting another known good ECM. → Ⓗ

*: ECM may be the cause of a problem, but this is rarely the case.

Introduction

The ECM (ECCS control module) has an on board diagnostic system, which detects engine system malfunctions related to sensors or actuators. 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).

Two Trip Detection Logic

When a malfunction is detected for the first time, the malfunction (DTC and freeze frame data) is stored in the ECM memory. ⟨1st trip⟩ The malfunction indicator lamp will not light up at this stage.
If the same malfunction is detected during the next drive, this second detection causes the malfunction indicator lamp to light up. ⟨2nd trip⟩ Specific on board diagnostic items will light up or blink the MIL even in the 1st trip as below.

Items	MIL		
	1st trip		2nd trip lighting up
	Blinking	Lighting up	
Misfire (Possible three way catalyst damage)— DTC: P0300-P0306 (0701-0603) is being detected	X		
Misfire (Possible three way catalyst damage)— DTC: P0300-P0306 (0701-0603) has been detected		X	
Three way catalyst function — DTC: P0420 (0702), P0430 (0703)		X	
Closed loop control — DTC: P0130 (0307), P0150 (0308)		X	
Except above			X

The "trip" in the "Two Trip Detection Logic" means performing of the "DTC Confirmation Procedure".

Diagnostic Trouble Code (DTC)

HOW TO READ DTC

The diagnostic trouble code can be read by the following methods.
(Either code for the 1st trip or the 2nd trip can be read.)

1. The number of blinks of the malfunction indicator lamp in the Diagnostic Test Mode II (Self-Diagnostic Results) Examples: 0101, 0201, 1003, 1104, etc.
   These DTCs are controlled by NISSAN.
2. CONSULT or GST (Generic Scan Tool) Examples: P0340, P1320, P0705, P0750, etc.
   These DTCs are prescribed by SAE J2012.

- **Output of the trouble code means that the indicated circuit has a malfunction. However, in case of the Mode II and GST they do not indicate whether the malfunction is still occurring or occurred in the past and returned to normal.**
  CONSULT can identify them. Therefore, using CONSULT (if available) is recommended.

HOW TO ERASE DTC

The diagnostic trouble code can be erased by the following methods.

Selecting "ERASE" in the "SELF-DIAG RESULTS" mode with CONSULT.

Selecting Mode 4 with GST (Generic Scan Tool).

Changing the diagnostic test mode from Diagnostic Test Mode II to Mode I. (Refer to EC-35.)

- **If the battery terminal is disconnected, the diagnostic trouble code will be lost within 24 hours.**
- **When you erase the DTC, using CONSULT or GST is easier and quicker than switching the diagnostic test modes.**

HOW TO ERASE DTC (With CONSULT)

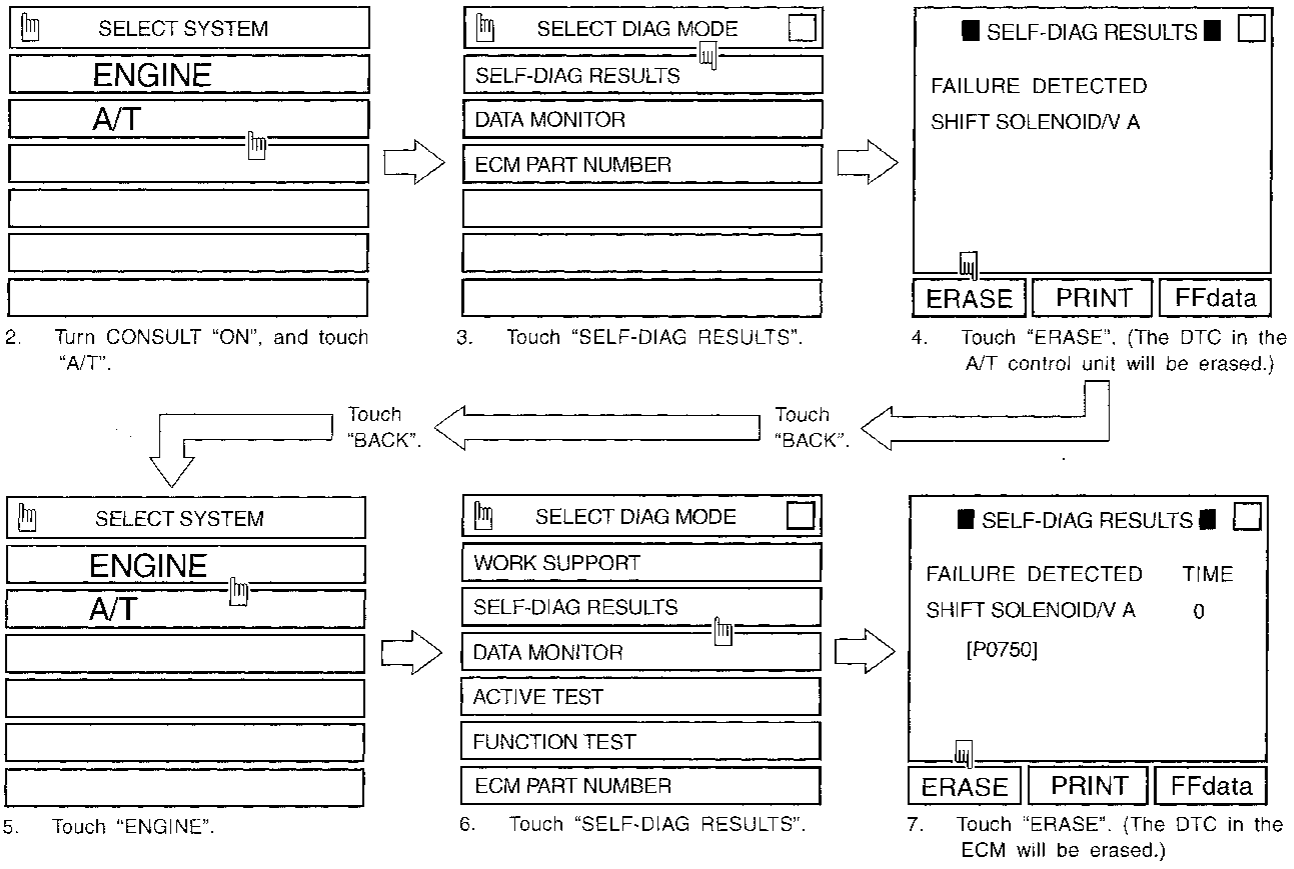
- **If a DTC is displayed for both ECM and A/T control unit, it needs to be erased for both ECM and A/T control unit.**
- **If diagnostic trouble code is not for A/T related items (refer to EC-72), skip steps 2 through 4.**

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

Diagnostic Trouble Code (DTC) (Cont'd)

How to erase DTC (With CONSULT)

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 "ON", and touch "A/T".
3. Touch "SELF-DIAG RESULTS".
4. Touch "ERASE". (The DTC in the A/T control unit will be erased.)
5. Touch "ENGINE".
6. Touch "SELF-DIAG RESULTS".
7. Touch "ERASE". (The DTC in the ECM will be erased.)

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HOW TO ERASE DTC (With GST)

- **If the diagnostic trouble code is not for A/T related items (refer to EC-72), 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)" 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).

HOW TO ERASE DTC (No Tools)

- **If the diagnostic trouble code is not for A/T related items (refer to EC-72), skip step 2.**

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT)" in AT section "TROUBLE DIAGNOSIS", "Self-diagnosis".
3. Change the diagnostic test mode from Mode II to Mode I. (See page EC-35.)

Freeze Frame Data

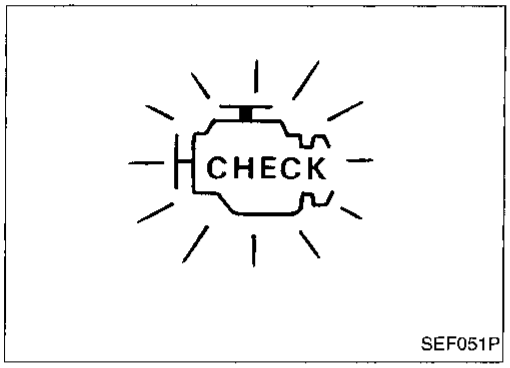
The ECM has a memory function which stores the driving condition at the moment the ECM detects a malfunction. This includes fuel system status, calculated load value, engine coolant temperature, short fuel trim, long fuel trim, engine speed, vehicle speed.
Stored data is called Freeze Frame Data.
The data is useful for tracking down conditions at the time of the malfunction. Such conditions include whether vehicle was running or stopped, engine warm up, air-fuel ratio, etc.
This data can be utilized to duplicate the malfunction and to diagnose the trouble.
The data will be erased along with the diagnostic trouble code by the above-mentioned method.

Freeze Frame Data (Cont'd)

The data can be stored only for the 1st trip. It can not be renewed even at the 2nd trip. The freeze frame data can be stored for only one item. Therefore, the ECM has the following priorities to update the data.

Priority	Detected items
1	Misfires — DTC: P0300-P0306 (0701-0603) Fuel Injection System Function — DTC: P0171 (0115), P0172 (0114), P0174 (0210), P0175 (0209)
2	Except the above items (includes A/T items)

For example, an EGR malfunction (Priority: 2) was detected and the freeze frame data was stored at the 1st trip. After that, misfire (Priority: 1) is detected in another trip, and freeze frame data is updated from the EGR malfunction for the misfire.



Malfunction Indicator Lamp (MIL)

1. The malfunction indicator lamp will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
   - If the malfunction indicator lamp does not light up, refer to EL section ("WARNING LAMPS AND CHIME") or see EC-255.
2. When the engine is started, the malfunction indicator lamp should go off.
   If the lamp remains on, the on board diagnostic system has detected an engine system malfunction.

ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following four functions.

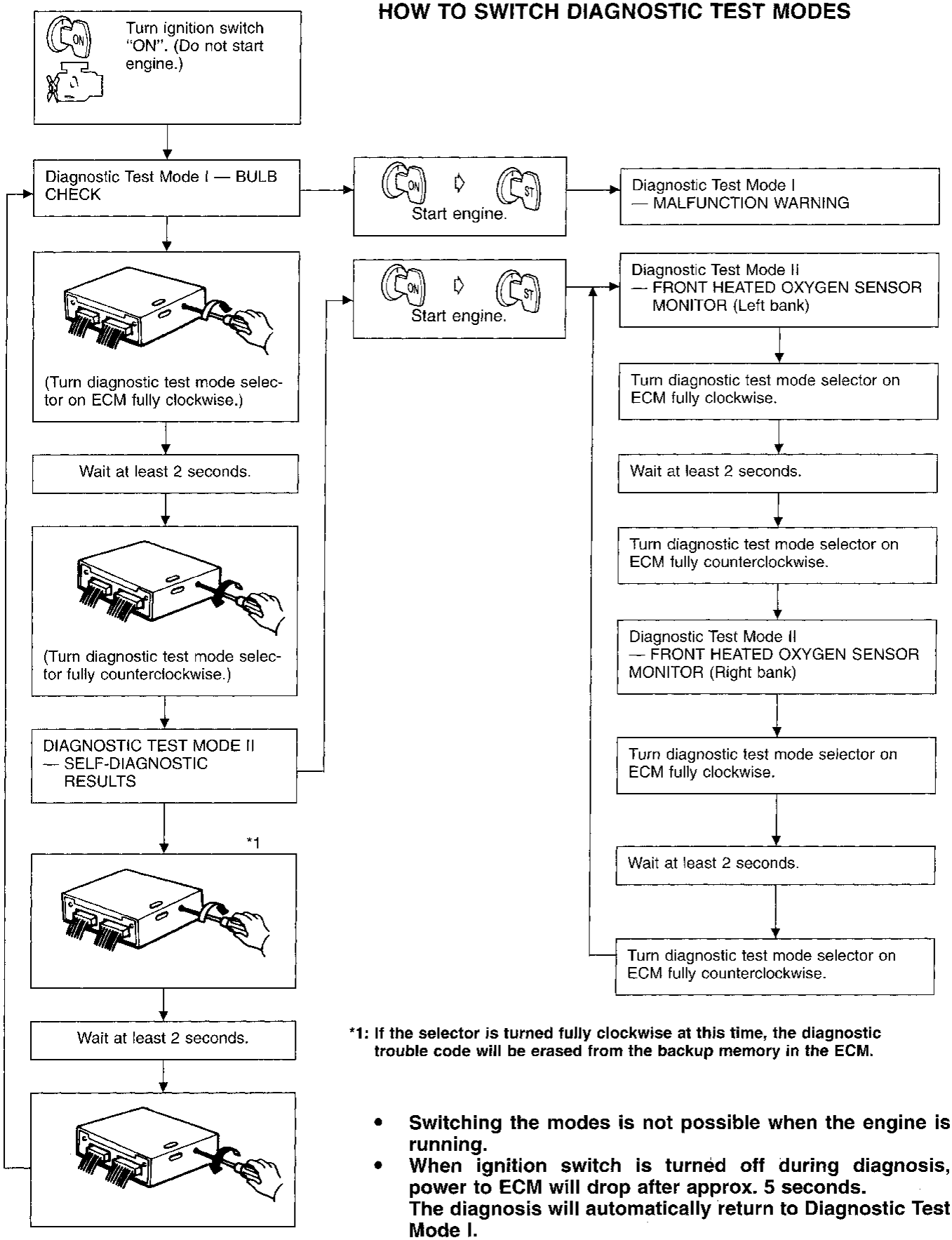
1. BULB CHECK : This function checks the MIL bulb for damage (blown, open circuit, etc.).
2. MALFUNCTION WARNING : This is a usual driving condition. When a malfunction is detected twice (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected.
   Only the following malfunctions will light up or blink the MIL even in the 1st trip.
   - "Misfire (Possible three way catalyst damage)"
   - "Three way catalyst function"
   - "Closed loop control"
3. SELF-DIAGNOSTIC RESULTS : This function allows diagnostic trouble codes to be read.
4. FRONT HEATED OXYGEN SENSOR MONITOR : This function allows the fuel mixture condition (lean or rich), monitored by front heated oxygen sensor, to be read.

Refer to "HOW TO SWITCH DIAGNOSTIC TEST MODES" on next page.

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

Malfunction Indicator Lamp (MIL) (Cont'd)

HOW TO SWITCH DIAGNOSTIC TEST MODES



***1: If the selector is turned fully clockwise at this time, the diagnostic trouble code will be erased from the backup memory in the ECM.**

- **Switching the modes is not possible when the engine is running.**
- **When ignition switch is turned off during diagnosis, power to ECM will drop after approx. 5 seconds. The diagnosis will automatically return to Diagnostic Test Mode I.**
- **Turn back diagnostic test mode selector to the fully counterclockwise position whenever vehicle is in use.**

Malfunction Indicator Lamp (MIL) (Cont'd)

DIAGNOSTIC TEST MODE I—BULB CHECK

In this mode, the MALFUNCTION INDICATOR LAMP on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to EL section ("WARNING LAMPS AND CHIME") or see EC-255.

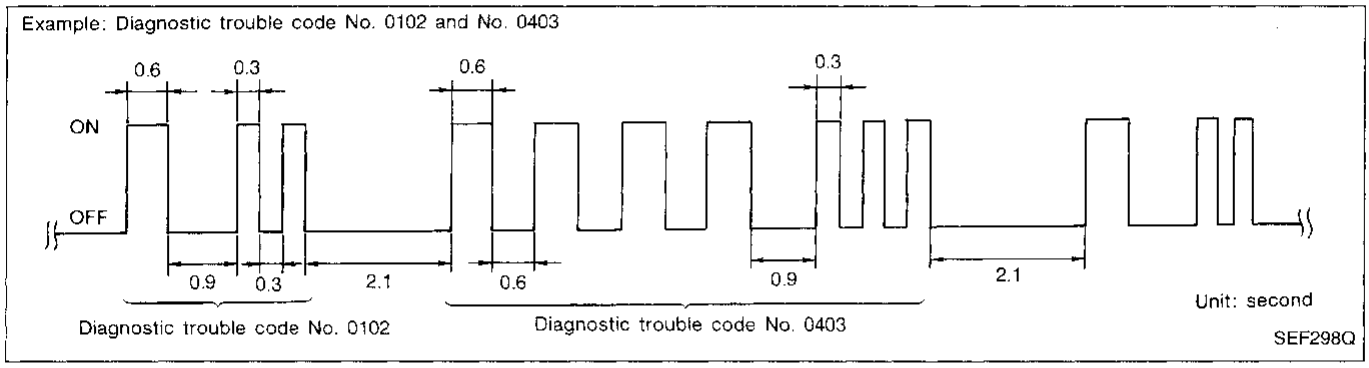
DIAGNOSTIC TEST MODE I—MALFUNCTION WARNING

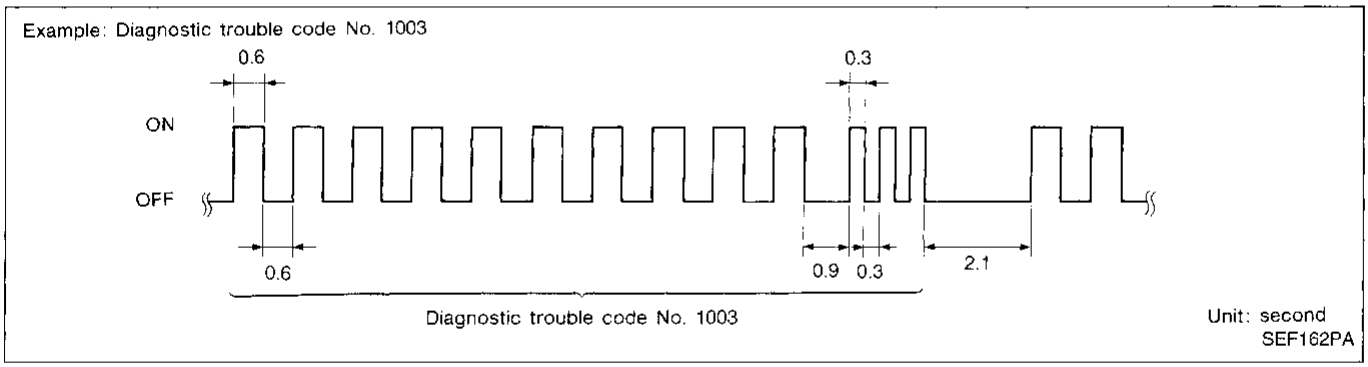
MALFUNCTION INDICATOR LAMP	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning. (The "1 trip" or "2 trip" is shown in the "MIL Illumination" of the "DTC Chart".) Refer to EC-62.
OFF	No malfunction.

- These Diagnostic Trouble Code Numbers are clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS).

DIAGNOSTIC TEST MODE II—SELF-DIAGNOSTIC RESULTS

In this mode, a diagnostic trouble code is indicated by the number of blinks of the MALFUNCTION INDICATOR LAMP as shown below.





Long (0.6 second) blinking indicates the number of ten digits, and short (0.3 second) blinking indicates the number of single digits. For example, the malfunction indicator lamp blinks 10 times for 6 seconds (0.6 sec x 10 times) and then it blinks three times for about 1 second (0.3 sec x 3 times). This indicates the DTC "1003" and refers to the malfunction of the park/neutral position switch.
In this way, all the detected malfunctions are classified by their diagnostic trouble code numbers. The DTC "0505" refers to no malfunction. (See DIAGNOSTIC TROUBLE CODE CHART, EC-62.)

HOW TO ERASE DIAGNOSTIC TEST MODE II (Self-diagnostic results)

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

- **If the battery terminal is disconnected, the diagnostic trouble code will be lost from the backup memory within 24 hours.**
- **Be careful not to erase the stored memory before starting trouble diagnoses.**

Malfunction Indicator Lamp (MIL) (Cont'd)

DIAGNOSTIC TEST MODE II—FRONT HEATED OXYGEN SENSOR MONITOR

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

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

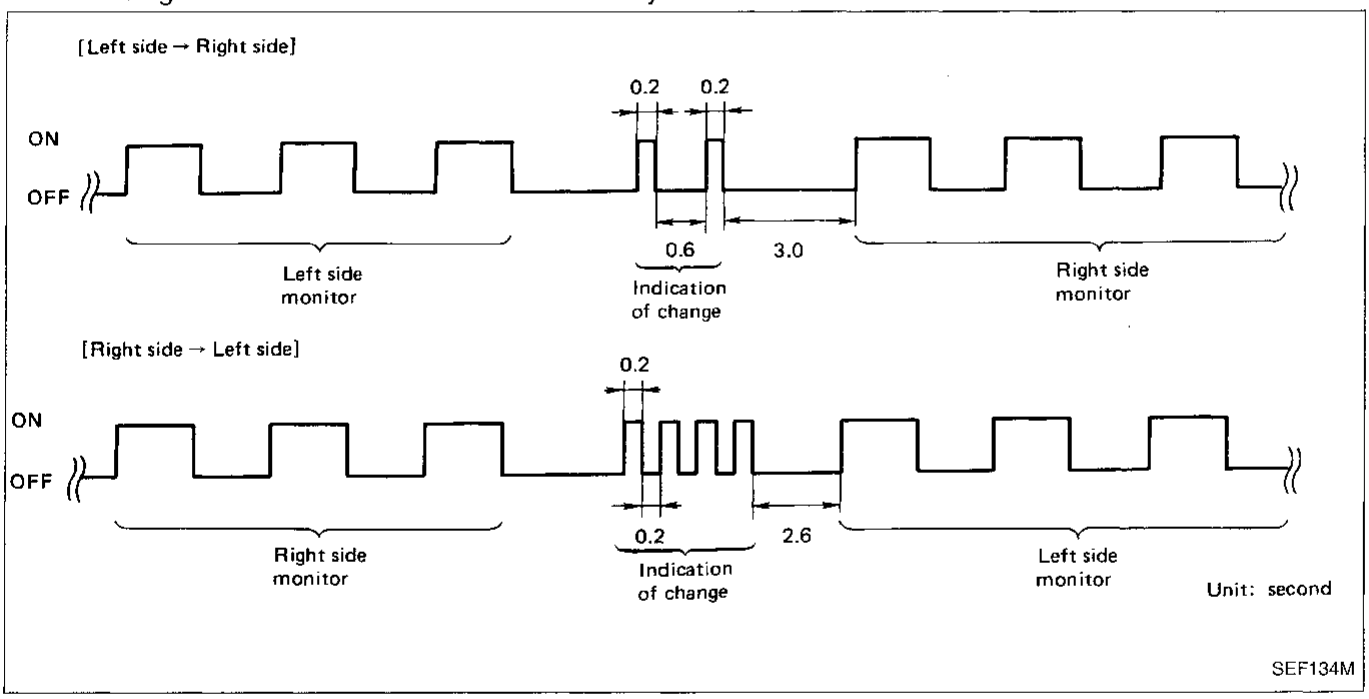
*: Maintains conditions just before switching to open loop.

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

How to switch monitored sensor from left bank to right bank or vice versa

- **The following procedure should be performed while the engine is running.**

1. Turn diagnostic test mode selector on ECM fully clockwise.
2. Wait at least 2 seconds.
3. Turn diagnostic test mode selector on ECM fully counterclockwise.



OBD System Operation Chart

RELATIONSHIP BETWEEN MIL, DTC, CONSULT AND DETECTABLE ITEMS

- When a malfunction is detected for the first time, the DTC and the freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the MIL will come on. For details, refer to "Two Trip Detection Logic" on EC-32.
- The MIL will go off after the vehicle is driven three 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 MIL will remain on until the vehicle is driven (in the recorded driving pattern) three times with no malfunction.
- The DTC and the freeze frame data can be displayed until the vehicle is driven 40 times (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data can be displayed until the vehicle is driven 80 times. The "TIME" IN "SELF-DIAGNOSTIC RESULTS" mode of CONSULT will count in response to the number of times the vehicle is driven.

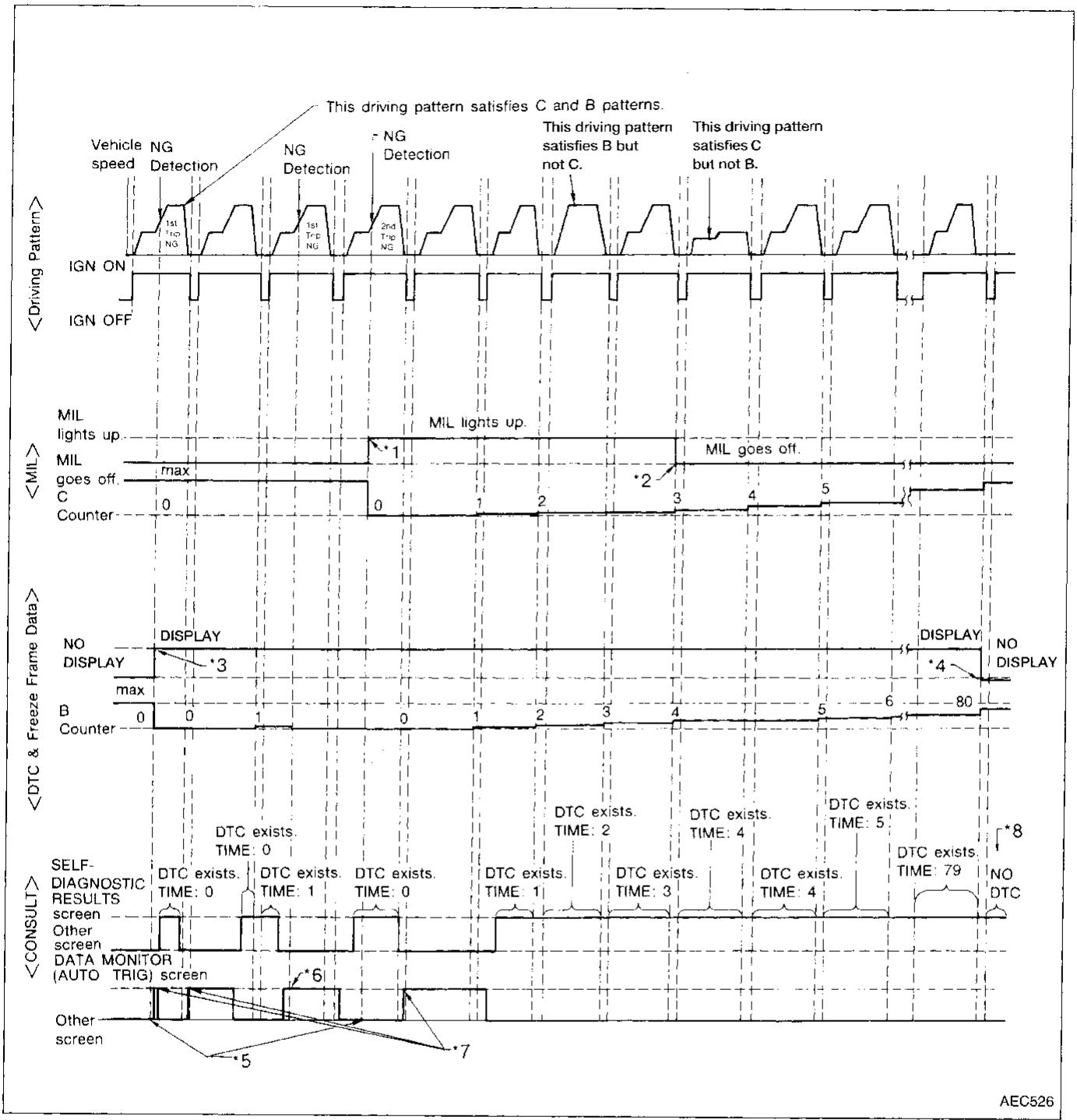
SUMMARY CHART

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

Details about patterns "A", "B", and "C" are on EC-40.

OBD System Operation Chart (Cont'd)

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



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

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

*3: When a malfunction is detected for the first time, 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 B) without the same malfunction.
(The DTC and the freeze frame data still remain in ECM.)

*5: Other screen except DATA MONITOR (AUTO TRIG) can not display the malfunction.

*6: DATA MONITOR (AUTO TRIG) can display the malfunction at the moment it is detected.

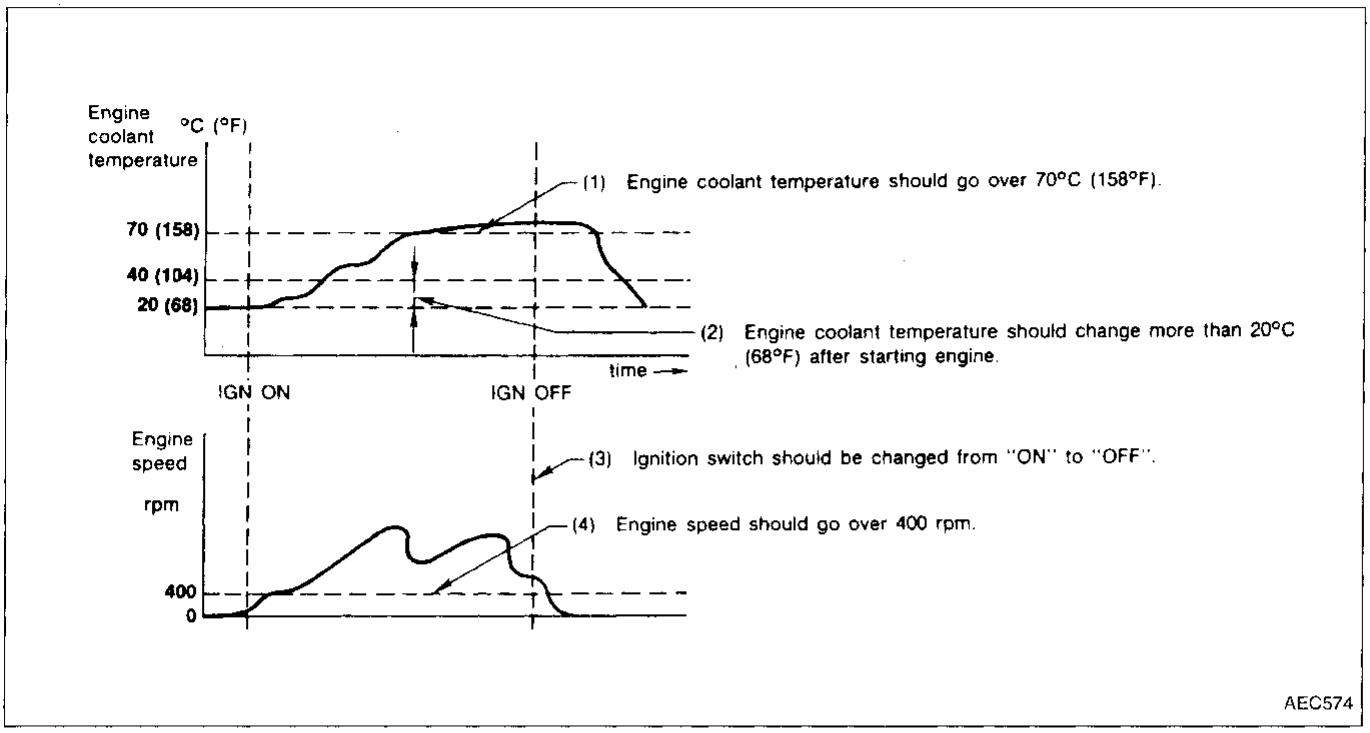
*7: The malfunction can not be displayed because the timing to set DATA MONITOR (AUTO TRIG) screen was missed against the NG detection.

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

OBD System Operation Chart (Cont'd)

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

〈**Driving pattern A**〉



〈**Driving pattern B**〉

Driving pattern B means vehicle operation is as follows:
All components and systems should be monitored at least once by the OBD system.

- The B counter will reset when the malfunction is detected twice regardless of the driving pattern.
- The B counter will count the number of times driving pattern B is satisfied without the malfunction.
- The DTC will not be displayed after the B counter reaches 80.

〈**Driving pattern C**〉

Driving pattern C means vehicle operation is as follows:
(1) Driving pattern A should be satisfied.
(2) 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:

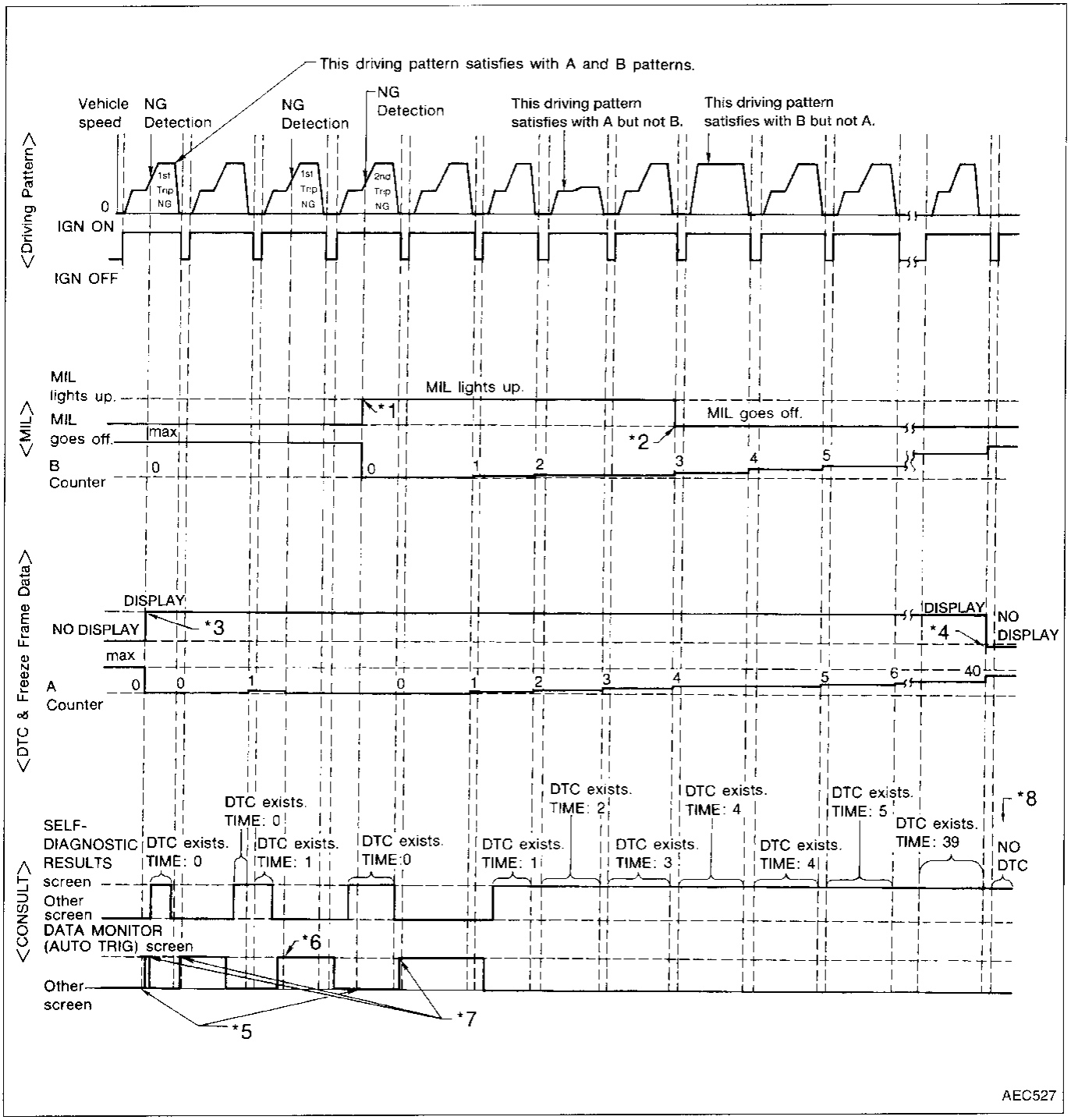
- When the freeze frame data shows lower than 70°C (158°F), "T" should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), "T" should be higher than or equal to 70°C (158°F).

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), (2). (*1 in "OBD SYSTEM OPERATION CHART")
- The C counter will be counted up when (1), (2) are satisfied without the same malfunction.
- The MIL will go off when the C counter reaches 3. (*2 in "OBD SYSTEM OPERATION CHART")

OBD System Operation Chart (Cont'd)

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



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

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

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

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

*5: Other screen except DATA MONITOR (AUTO TRIG) can not display the malfunction.

*6: DATA MONITOR (AUTO TRIG) can display the malfunction at the moment it is detected.

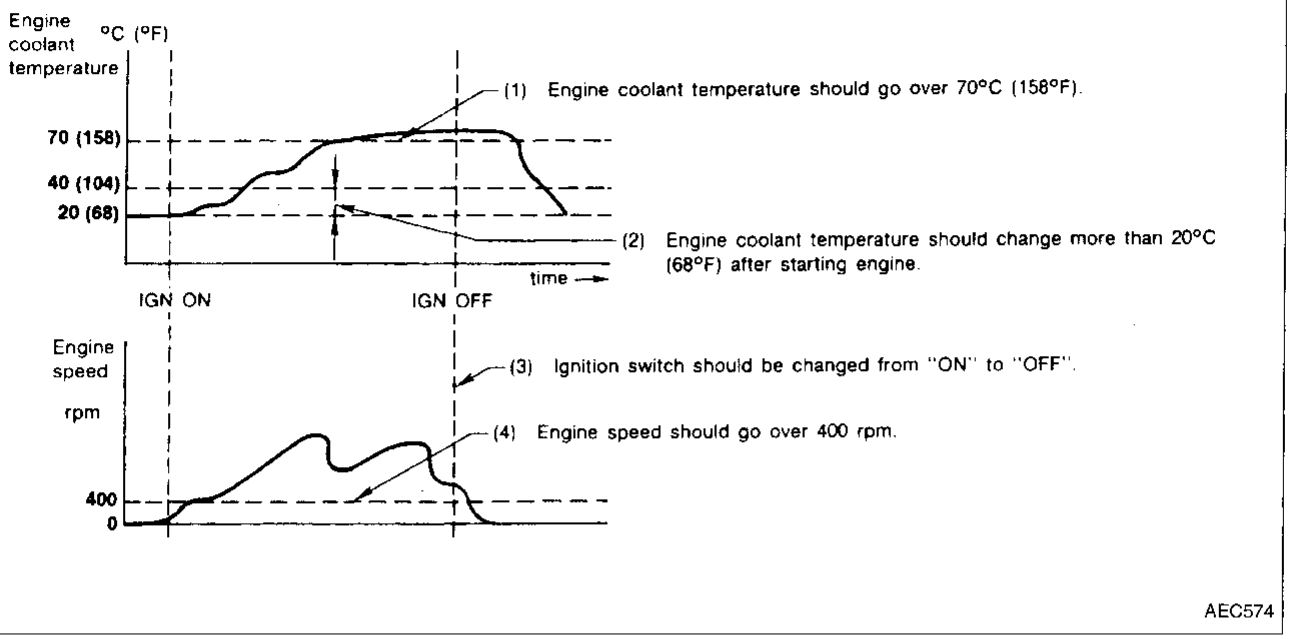
*7: The malfunction can not be displayed because the timing to set DATA MONITOR (AUTO TRIG) screen was missed against the NG detection.

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

OBD System Operation Chart (Cont'd)

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

〈Driving pattern A〉

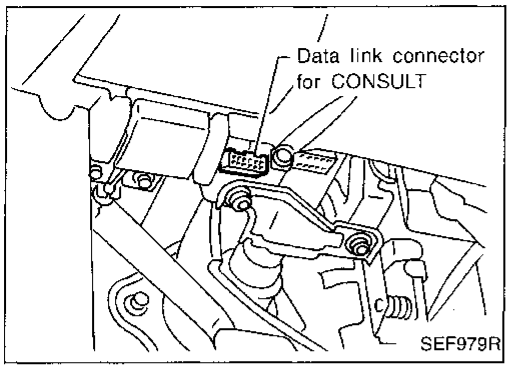


- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

〈Driving pattern B〉

Driving pattern B means vehicle operation is as follows:
All components and systems should be monitored at least once by the OBD system.

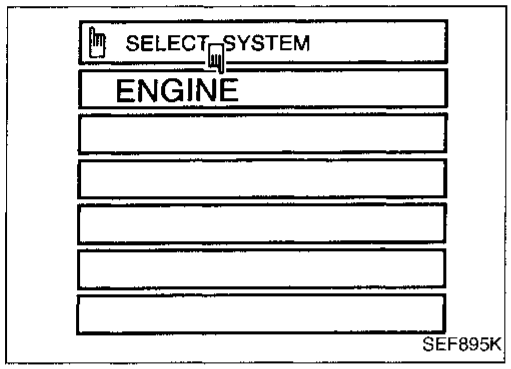
- The B counter will be cleared when the malfunction is detected twice regardless of the driving pattern (*1 in "OBD SYSTEM OPERATION CHART").
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MIL will go off when the B counter reaches 3 (*2 in "OBD SYSTEM OPERATION CHART").



CONSULT

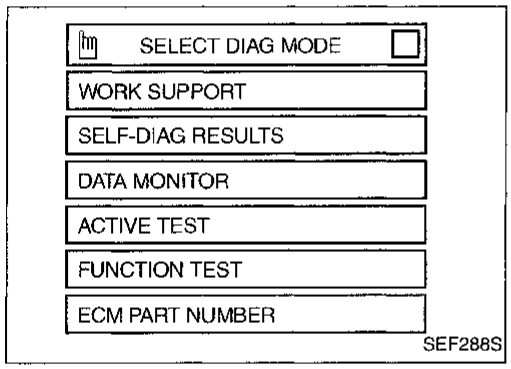
CONSULT INSPECTION PROCEDURE

1. Turn off ignition switch.
2. Connect "CONSULT" to data link connector for CONSULT. (Data link connector for CONSULT is located behind the fuse box cover.)



3. Turn on ignition switch.
4. Touch "START".
5. Touch "ENGINE".
6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT Operation Manual.



CONSULT (Cont'd)

ECCS COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

Item			DIAGNOSTIC TEST MODE					
			WORK SUP-PORT	SELF-DIAG-NOSTIC RESULTS	DATA MONITOR	ACTIVE TEST	FUNC-TION TEST	FREEZE FRAME DATA *1
ECCS COMPONENT PARTS	INPUT	Camshaft position sensor		X	X			X
		Mass air flow sensor		X	X			
		Engine coolant temperature sensor		X	X	X		X
		Front heated oxygen sensors		X	X		X	
		Rear heated oxygen sensors		X	X			
		Vehicle speed sensor		X	X		X	X
		Throttle position sensor	X	X	X		X	
		EGR temperature sensor		X	X			
		Intake air temperature sensor		X	X			
		Crankshaft position sensor (OBD)		X				
		Knock sensor		X				
		Ignition switch (start signal)			X		X	
		Closed throttle position switch			X		X	
		Air conditioner switch			X			
		Park/Neutral position switch		X	X		X	
		Power steering oil pressure switch			X		X	
		Ambient air temperature switch			X			
		Battery voltage			X			
	OUTPUT	Injectors			X	X	X	
		Power transistor (Ignition timing)		X (Ignition signal)	X	X	X	
		IACV-AAC valve	X	X	X	X	X	
		Air conditioner relay			X			
		Fuel pump relay	X		X	X	X	
		EGRC-solenoid valve (EGR valve & EVAP canister purge control solenoid valve)		X	X	X	X	
		Front heated oxygen sensor heater		X	X			
		Rear heated oxygen sensor heater		X	X			
		Calculated load value			X			X

X: Applicable

*1: The items appear on CONSULT screen in FREEZE FRAME DATA mode only if a diagnostic trouble code (DTC) is detected. For details, refer to EC-52.

CONSULT (Cont'd)

FUNCTION

Diagnostic test mode	Function
Work support	A technician can adjust some devices faster and more accurately by following indications on CONSULT.
Self-diagnostic results	Self-diagnostic results can be read and erased quickly.
Freeze frame data	ECM stores the driving condition at the moment a malfunction is detected, and stored data can be read. For details, refer to "Freeze Frame Data" (EC-52).
Data monitor	Input/Output data in the ECM can be read.
Active test	CONSULT drives some actuators apart from the ECM's and also shifts some parameters in a specified range.
ECM part numbers	ECM part numbers can be read.
Function test	Conducted by CONSULT instead of a technician to determine whether each system is "OK" or "NG".

WORK SUPPORT MODE

WORK ITEM	CONDITION	USAGE
THRTL POS SEN ADJ	CHECK THE THROTTLE POSITION SENSOR SIGNAL. ADJUST IT TO THE SPECIFIED VALUE BY ROTATING THE SENSOR BODY UNDER THE FOLLOWING CONDITIONS. • IGN SW "ON" • ENG NOT RUNNING • ACC PEDAL NOT PRESSED	When adjusting throttle position sensor initial position
IACV-AAC VALVE ADJ	SET ENGINE SPEED AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS. • ENGINE WARMED UP • NO-LOAD	When adjusting idle speed
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line

CONSULT (Cont'd)

SELF-DIAGNOSTIC MODE

Regarding items detected in "SELF-DIAG RESULTS" mode, refer to "Diagnostic Trouble Code (DTC) chart". (See EC-62.)

DATA MONITOR MODE

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

NOTE:
Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
Regarding R50 model, "B1" indicates right bank and "B2" indicates left bank.

CONSULT (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
BATTERY VOLT [V]	○	○	• The power supply voltage of ECM is displayed.	
THRTL POS SEN [V]	○	○	• The throttle position sensor signal voltage is displayed.	
EGR TEMP SEN [V]	○		• The signal voltage of the EGR temperature sensor is displayed.	
INT/A TEMP SE [°C] or [°F]	○		• The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated.	
START SIGNAL [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the starter signal.	• After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL/P SW [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the throttle position sensor signal.	
AIR COND SIG [ON/OFF]	○	○	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the park/neutral position switch signal.	
PW/ST SIGNAL [ON/OFF]	○	○	• [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure signal is indicated.	
AMB TEMP SW [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the ambient air temperature switch signal	
IGNITION SW [ON/OFF]	○		• Indicates [ON/OFF] condition from ignition switch.	
INJ PULSE-B2 [msec]		○	• Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
INJ PULSE-B1 [msec]				
B/FUEL SCHDL [msec]		○	• "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
IGN TIMING [BTDC]		○	• Indicates the ignition timing computed by ECM according to the input signals.	• When the engine is stopped, a certain value is indicated.
IACV-AAC/V [%]		○	• Indicates the idle air control valve (AAC valve) control value computed by ECM according to the input signals.	
A/F ALPHA-B2 [%]			• The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B1 [%]				
AIR COND RLY [ON/OFF]		○	• The air conditioner relay control condition (determined by ECM according to the input signal) is indicated.	
FUEL PUMP RLY [ON/OFF]		○	• Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
EGRC SOL/V [ON/OFF]			• The control condition of the EGR valve & EVAP canister purge control solenoid valve (determined by ECM according to the input signal) is indicated. • ON ... EGR operation is cut-off OFF ... EGR is operational	
FR O2 HTR-B1 [ON/OFF]			• Indicates [ON/OFF] condition of front heated oxygen sensor heater determined by ECM according to the input signals.	
FR O2 HTR-B2 [ON/OFF]				

CONSULT (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
RR O2 HTR-B1 [ON/OFF]			• Indicates [ON/OFF] condition of rear heated oxygen sensor heater determined by ECM according to the input signals.	
RR O2 HTR-B2 [ON/OFF]				
CAL/LD VALUE [%]			• "Calculated load value" indicates the value of the current airflow divided by peak airflow.	
ABSOL TH-P/S [%]			• "Absolute throttle position sensor" indicates the throttle opening computed by ECM according to the signal voltage of the throttle position sensor.	
MASS AIRFLOW [g·m/s]			• Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor.	
VOLTAGE [V]			• Voltage measured by the voltage probe.	
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.

CONSULT (Cont'd)

ACTIVE TEST MODE

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	• Engine: Return to the original trouble condition • Change the amount of fuel injection using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Fuel injectors • Front heated oxygen sensor
IACV-AAC/V OPENING	• Engine: After warming up, idle the engine. • Change the IACV-AAC valve opening percent using CONSULT.	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.	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.	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.	Engine runs rough or dies.	• Harness and connector • Compression • Injectors • Power transistor • Spark plugs • Ignition coils
FUEL PUMP RELAY	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay "ON" and "OFF" using CONSULT and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connector • Fuel pump relay
EGRC SOLENOID VALVE	• Ignition switch: ON • Turn solenoid valve "ON" and "OFF" with the CONSULT and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve
SELF-LEARNING CONT	• In this test, the coefficient of self-learning control mixture ratio returns to the original coefficient by touching "CLEAR" on the screen.		

CONSULT (Cont'd)

FUNCTION TEST MODE

FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
SELF-DIAG RESULTS	• Ignition switch: ON (Engine stopped) • Displays the results of on- board diagnostic system.	—		Objective system
CLOSED THROTTLE POSI	• Ignition switch: ON (Engine stopped) • Throttle position sensor circuit is tested when throttle is opened and closed fully. ("IDLE POSITION" is the test item name for the vehicles in which idle is selected by throttle position sensor.)	Throttle valve: opened	OFF	• Harness and connector • Throttle position sensor (Closed throttle position) • Throttle position sensor (Closed throttle position) adjustment • Throttle linkage • Verify operation in DATA MONITOR mode.
		Throttle valve: closed	ON	
THROTTLE POSI SEN CKT	• Ignition switch: ON (Engine stopped) • Throttle position sensor circuit is tested when throttle is opened and closed fully.	Range (Throttle valve fully opened — Throttle valve fully closed)	More than 3.0V	• Harness and connector • Throttle position sensor • Throttle position sensor adjustment • Throttle linkage • Verify operation in DATA MONITOR mode.
PARK/NEUT POSI SW CKT	• Ignition switch: ON (Engine stopped) • Inhibitor position switch circuit is tested when shift lever is manipulated.	Out of N/P positions	OFF	• Harness and connector • Inhibitor switch • Linkage or Inhibitor switch adjustment
		In N/P positions	ON	
FUEL PUMP CIRCUIT	• Ignition switch: ON (Engine stopped) • Fuel pump circuit is tested by checking the pulsation in fuel pressure when fuel tube is pinched.	There is pressure pulsation on the fuel feed hose.		• Harness and connector • Fuel pump • Fuel pump relay • Fuel filter clogging • Fuel level
EGRC SOL/V CIRCUIT	• Ignition switch: ON (Engine stopped) • EGR valve and EVAP canister purge control solenoid valve circuit is tested by checking solenoid valve operating noise.	The solenoid valve makes an operating sound every 3 seconds.		• Harness and connector • EGR valve and EVAP canister purge control solenoid valve
START SIGNAL CIRCUIT	• Ignition switch: ON → START • Start signal circuit is tested when engine is started by operating the starter. Battery voltage and engine coolant temperature before cranking, and average battery voltage, mass air flow sensor output voltage and cranking speed during cranking are displayed.	Start signal: OFF → ON		• Harness and connector • Ignition switch

CONSULT (Cont'd)

FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
PW/ST SIGNAL CIRCUIT	• Ignition switch: ON (Engine running) • Power steering circuit is tested when steering wheel is rotated fully and then set to a straight line running position.	Locked position	ON	• Harness and connector • Power steering oil pressure switch • Power steering oil pump
		Neutral position	OFF	
VEHICLE SPEED SEN CKT	• Vehicle speed sensor circuit is tested when vehicle is running at a speed of 10 km/h (6 MPH) or higher.	Vehicle speed sensor input signal is greater than 4 km/h (2 MPH)		• Harness and connector • Vehicle speed sensor • Speedometer
IGN TIMING ADJ	• After warming up, idle the engine. • Ignition timing is checked by reading ignition timing with a timing light and checking whether it agrees with specifications.	The timing light indicates the same value on the screen.		• Adjust ignition timing (by moving camshaft position sensor or distributor) • Camshaft position sensor drive mechanism
MIXTURE RATIO TEST	• Air-fuel ratio feedback circuit (injection system, ignition system, vacuum system, etc.) is tested by examining the front heated oxygen sensor output at 2,000 rpm under non-loaded state.	Front heated oxygen sensor COUNT: More than 5 times during 10 seconds		• INJECTION SYS (Injector, fuel pressure regulator, harness or connector) • IGNITION SYS (Spark plug, power transistor, ignition coil, harness or connector) • VACUUM SYS (Intake air leaks) • Front heated oxygen sensor circuit • Front heated oxygen sensor operation • Fuel pressure high or low • Mass air flow sensor
IACV-AAC/V SYSTEM	• After warming up, idle the engine. • IACV-AAC valve system is tested by detecting change in engine speed when IACV-AAC valve opening is changed to 0%, 20% and 80%.	Difference in engine speed is greater than 150 rpm between when valve opening is at 80% and 20%.		• Harness and connector • IACV-AAC valve • Air passage restriction between air inlet and IACV-AAC valve • IAS (Idle adjusting screw) adjustment
POWER BALANCE	• After warming up, idle the engine. • Injector operation of each cylinder is stopped one after another, and resultant change in engine rotation is examined to evaluate combustion of each cylinder. (This is only displayed for models where a sequential multiport fuel injection system is used.)	Difference in engine speed is greater than 25 rpm before and after cutting off the injector of each cylinder.		• Injector circuit (Injector, harness or connector) • Ignition circuit (Spark plug, ignition coil with power transistor harness or connector) • Compression • Valve timing

CONSULT (Cont'd)

FREEZE FRAME DATA OF SELF-DIAGNOSTIC RESULTS MODE

Freeze frame data item	Description
DIAG TROUBLE CODE [PXXXX]	• ECCS component part/control system has a trouble code, it is displayed as "PXXXX". [Refer to "Alphabetical & P No. Index for DTC (EC-256).]
FUEL SYS-B1*1	• "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 heated oxygen sensor(s) as feedback for fuel control "MODE 5": Open loop - has not yet satisfied condition to go to closed loop
FUEL SYS-B2*1	
CAL/LD VALUE [%]	• The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	• The engine coolant temperature at the moment a malfunction is detected is displayed.
S-FUEL TRIM-B1 [%]	• "Short term fuel trim" at the moment a malfunction is detected is displayed. • The short term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
S-FUEL TRIM-B2 [%]	
L-FUEL TRIM-B1 [%]	• "Long term fuel trim" at the moment a malfunction is detected is displayed. • The long term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short term fuel trim.
L-FUEL TRIM-B2 [%]	
ENGINE SPEED [rpm]	• The engine speed at the moment a malfunction is detected is displayed.
VHCL SPEED [km/h] or [mph]	• The vehicle speed at the moment a malfunction is detected is displayed.

*1: Regarding R50 model, "B1" indicates right bank and "B2" indicates left bank.

CONSULT (Cont'd)

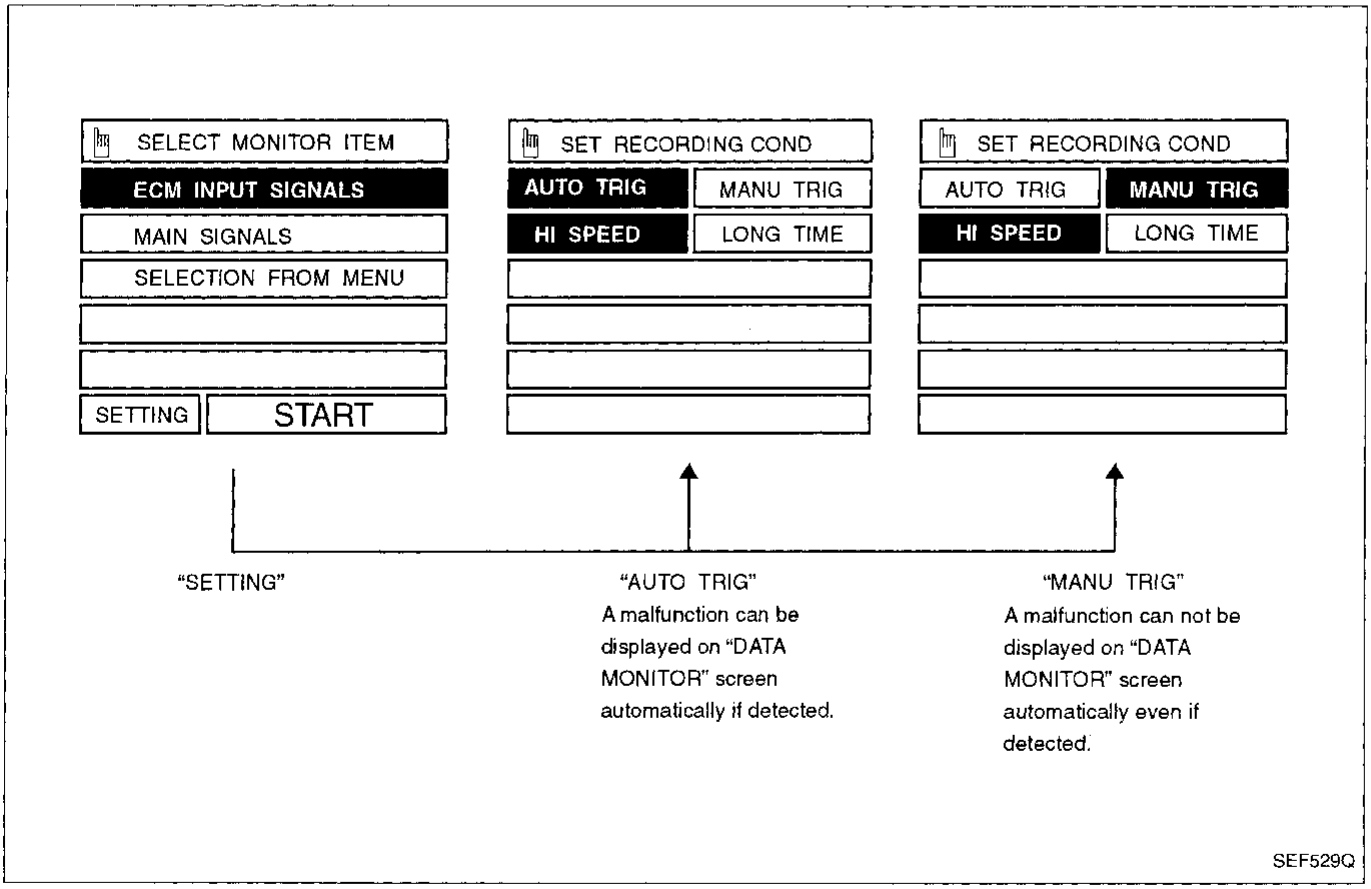
REAL TIME DIAGNOSIS IN DATA MONITOR MODE

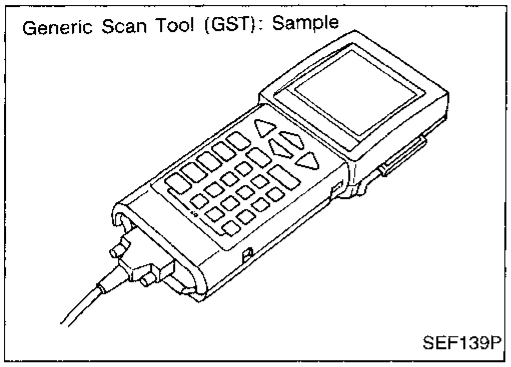
CONSULT has two kinds of triggers and they can be selected by touching "SETTING" in "DATA MONITOR" mode.

1. "AUTO TRIG" (Automatic trigger):
   - The malfunction will be identified on the CONSULT screen in real time.
     In other words, DTC and malfunction item will be displayed at the moment the malfunction is detected by ECM.
     DATA MONITOR can be performed continuously until a malfunction is detected. However, DATA MONITOR cannot continue any longer after the malfunction detection.
2. "MANU TRIG" (Manual trigger):
   - DTC and malfunction item will not be displayed automatically on CONSULT 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 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 should be set in "DATA MONITOR (AUTO TRIG)" mode, especially in case the incident is intermittent.
     Inspect the circuit by gently shaking (or twisting) suspicious connectors, components and harness in the "DTC CONFIRMATION PROCEDURE". The moment a malfunction is found the DTC will be displayed. (Refer to GI section, "Incident Simulation Tests" in "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".)
2. "MANU TRIG"
   - If the malfunction is displayed as soon as "DATA MONITOR" is selected, reset CONSULT to "MANU TRIG". By selecting "MANU TRIG" you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.

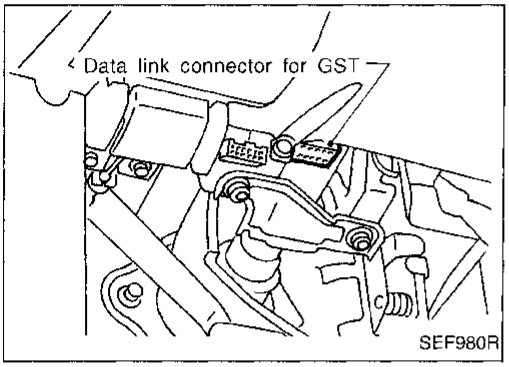




Generic Scan Tool (GST)

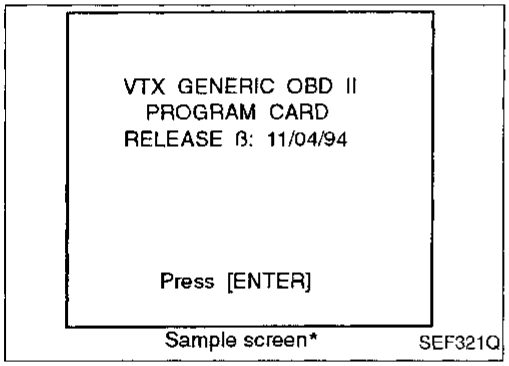
DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has five 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.



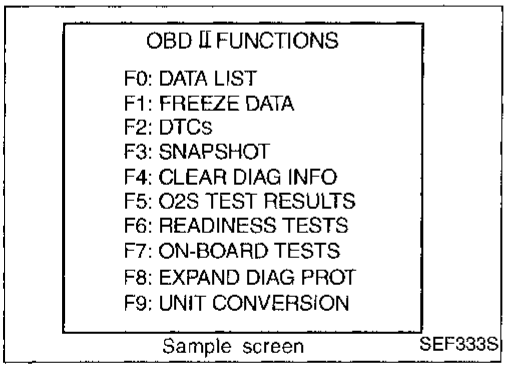
GST INSPECTION PROCEDURE

1. Turn off ignition switch.
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 on ignition switch.
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.)



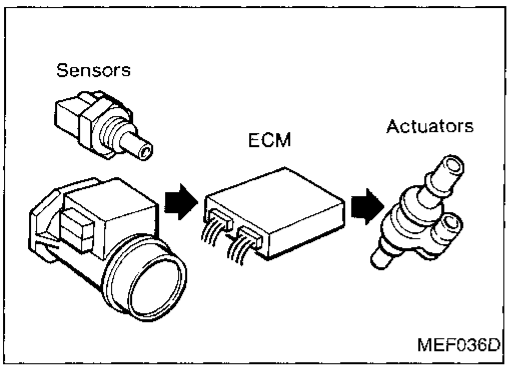
5. Perform each diagnostic mode according to each service procedure.

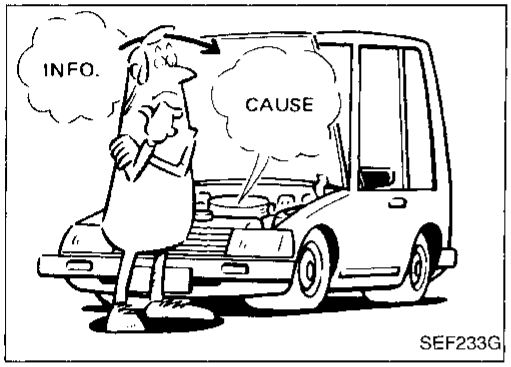
For further information, see the GST Operation Manual of the tool maker.

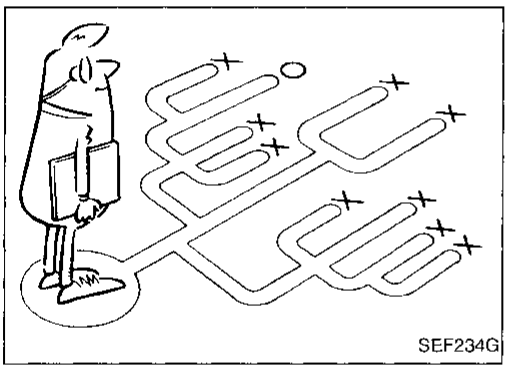
Generic Scan Tool (GST) (Cont'd)

FUNCTION

Diagnostic test mode		Function
MODE 1	(DATA LIST)	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. Refer to "FREEZE FRAME DATA OF SELF-DIAGNOSTIC RESULTS MODE" (EC-52).
MODE 3	(DTCs)	This mode gains access to emission-related powertrain 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) • Clear oxygen sensor test data (MODE 5) • Reset status of system monitoring test (MODE 1)
MODE 5	(O2S test results)	This mode gains access to the on board heated oxygen sensor monitoring test results.







Introduction

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 (or GST) or a circuit tester connected should be performed. Follow the "Work Flow" on the next page.

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 EC-57 should be used.

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

KEY POINTS

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

SEF907L

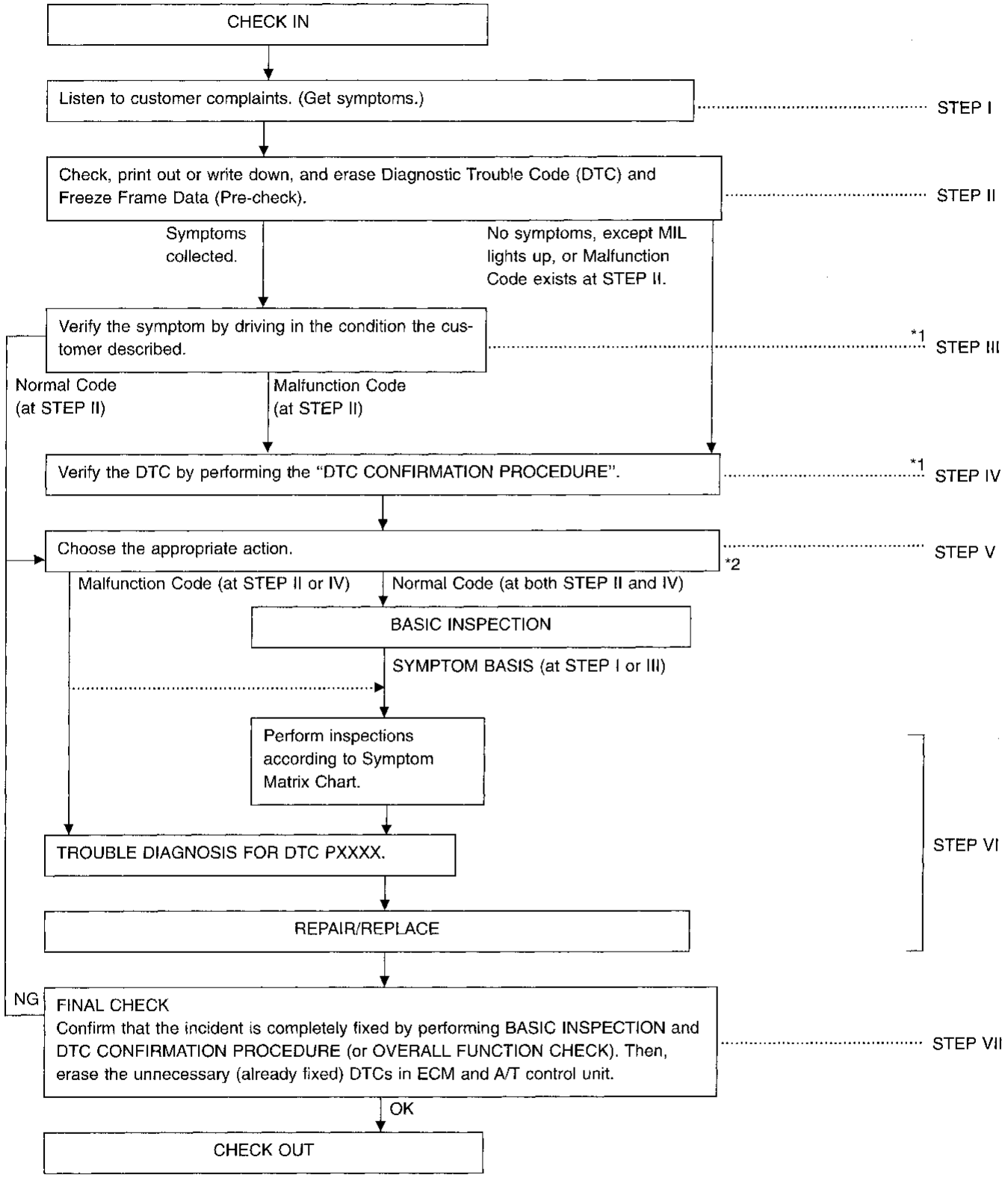
Diagnostic Worksheet

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one shown below in order to organize all the information for troubleshooting.

WORKSHEET SAMPLE

Customer name MR/MS	Model & Year	VIN
Engine #	Trans.	Mileage
Incident Date	Manuf. Date	In Service Date
Symptoms — ☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
Symptoms — ☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
Symptoms — ☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [ ]	
Symptoms — ☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence	☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency	☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions	☐ Not affected	
Weather	☐ 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	

Work Flow



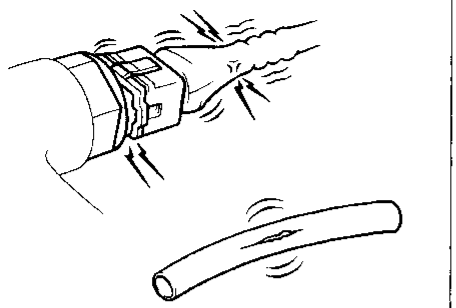
***1: If the incident cannot be duplicated, refer to GI section ("Incident Simulation Tests", "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT").**

***2: If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to "TROUBLE DIAGNOSIS FOR POWER SUPPLY", EC-89.**

Description for Work Flow

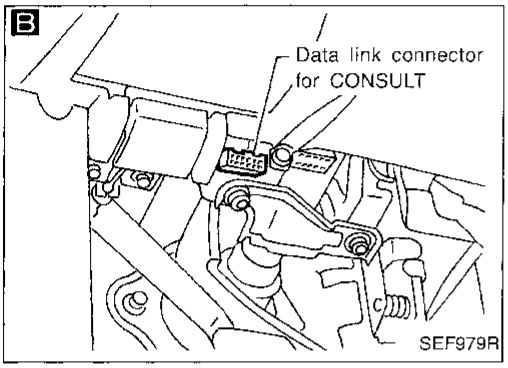
STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORKSHEET" as shown on the next page.
STEP II	Before confirming the concern, check and write down (print out using CONSULT or Generic Scan Tool) the Diagnostic Trouble Code (DTC) and the freeze frame data, then erase the code and the data. Refer to EC-32.) The DTC and the freeze frame data can be used when duplicating the incident at STEP III & IV. Study the relationship between the cause, specified by DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. Refer to EC-76.)
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 to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform INCIDENT SIMULATION TESTS. Refer to GI section. If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the Diagnostic Trouble Code (DTC) by driving in (or performing) the "DTC CONFIRMATION PROCEDURE". Check and read the DTC and freeze frame data by using CONSULT or Generic Scan Tool. During the DTC verification, be sure to connect CONSULT to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform INCIDENT SIMULATION TESTS. Refer to GI section. In case the "DTC CONFIRMATION PROCEDURE" is not available, perform the "OVERALL FUNCTION CHECK" instead. The 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 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-60. Then perform inspections according to the Symptom Matrix Chart. Refer to EC-76.
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 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. Refer to EC-79. 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 ("Circuit Inspection", "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT"). Repair or replace the malfunction parts.
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the "DTC CONFIRMATION PROCEDURE" and confirm the normal code (Diagnostic trouble code No. 0505 or P0000) is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) DTC in ECM and A/T control unit. (Refer to EC-32.)

A



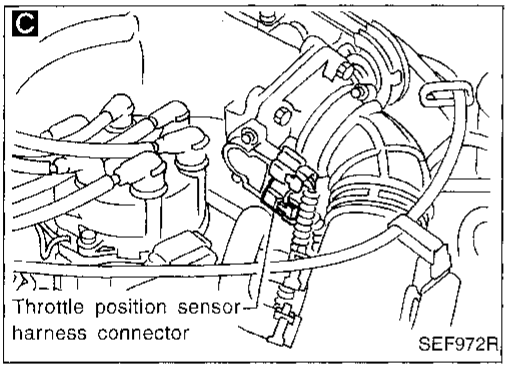
SEF142I

B



SEF979R

C



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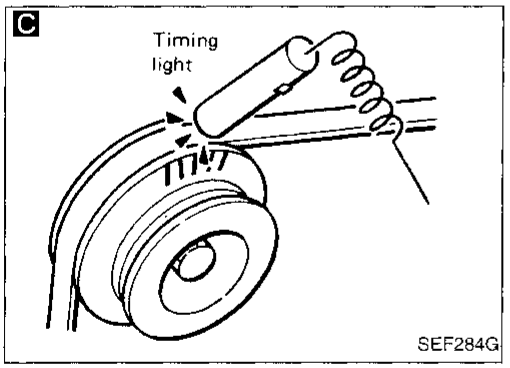


SEF284G

Basic Inspection

Precaution:

Perform Basic Inspection without electrical or mechanical loads applied;

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

A

BEFORE STARTING

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

↓

B

CONNECT CONSULT TO THE VEHICLE.

Connect "CONSULT" to the data link connector for CONSULT and select "ENGINE" from the menu. Refer to EC-43.

↓

DOES ENGINE START? — No → Go to D.

↓ Yes

C

CHECK IGNITION TIMING.

1. Warm up engine sufficiently.
2. Stop engine and disconnect throttle position sensor harness connector.
3. Start engine.
4. Check ignition timing at idle using timing light.

   Ignition timing:

   15°±2° BTDC

NG → Adjust ignition timing by turning distributor.

↓ OK

CHECK IDLE ADJ. SCREW INITIAL SET RPM.

Does engine speed fall to the following speed?

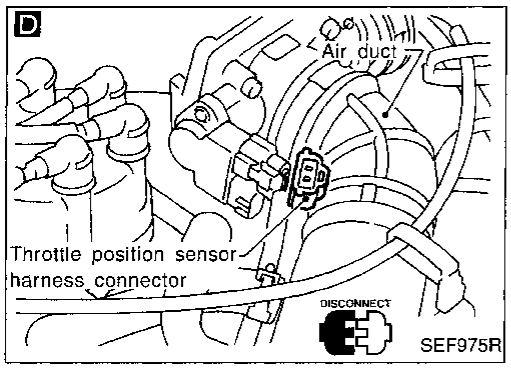
700±50 rpm (A/T in "N" position)

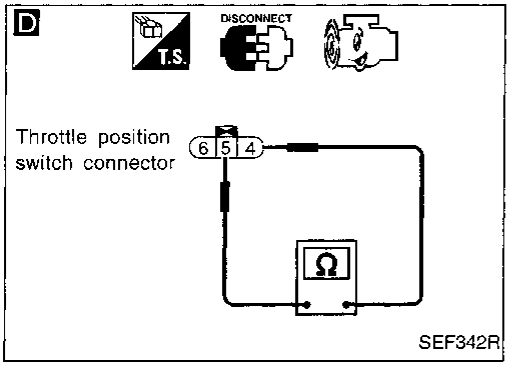
NG → Adjust engine speed by turning idle adjusting screw.

↓ OK

(Go to Ⓐ on next page.)

Basic Inspection (Cont'd)





Ⓐ

D

CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION.

1. Disconnect throttle position sensor harness connector and closed throttle position switch harness connector.
2. Check continuity between closed throttle position switch terminals ④ and ⑤ under the following condition.
   - Raise engine speed to 2,000 rpm.
   - Gradually lower engine speed.

Engine speed at the point throttle position switch switches from OFF (No continuity)
→ ON (continuity exists): 950±150 rpm

NG → Adjust continuity signal by rotating throttle position sensor body.

OK

Reconnect throttle position sensor harness connector and closed throttle position switch harness connector.

RESET IDLE POSITION MEMORY.

1. Warm up engine sufficiently and stop.
   Select "CLSD THL/P SW" in "DATA MONITOR" mode with CONSULT before stopping engine.
2. Reconnect throttle position sensor harness connector and closed throttle position switch harness connector.
3. Turn ignition switch "ON".
4. Turn ignition switch "OFF" and wait at least 5 seconds.
5. Repeat steps 3. and 4. until "CLSD THL/P SW" in "DATA MONITOR" mode with CONSULT changes to "ON".
   Repeat steps 3. and 4. 20 times.

CHECK IDLE SPEED

Read the engine idle speed in "DATA MONITOR" mode with CONSULT.
750±50 rpm
(in "N" position)

— OR —

Check idle speed.
750±50 rpm
(in "N" position)

NG → Adjust idle speed. Refer to EC-25.

OK

After this inspection, unnecessary diagnostic trouble code No. might be displayed.
Erase the stored memory in ECM and A/T control unit.
Refer to "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" (EC-32) and "HOW TO ERASE DTC" in AT section.

OK

INSPECTION END

Diagnostic Trouble Code (DTC) Chart

ENGINE RELATED ITEMS

Diagnostic trouble code No.		Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" mode)	Malfunction is detected when ...
CONSULT GST	MIL		
(P0000)	0505	No failure (NO SELF DIAGNOSTIC FAILURE INDICATED...)	• No malfunction related to OBD system is detected by both ECM and A/T control unit.
P0100	0102	Mass air flow sensor circuit (MASS AIR FLOW SEN)	• An excessively high or low voltage is sent to ECM. • Voltage sent to ECM is not practical when compared with the camshaft position sensor signal and throttle position sensor signals.
P0110	0401	Intake air temperature sensor circuit (INT AIR TEMP SEN)	• An excessively low or high voltage from the sensor is sent to ECM. • Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.
P0115	0103	Engine coolant temperature sensor circuit (COOLANT TEMP SEN)	• An excessively high or low voltage from the sensor is sent to ECM.
P0120	0403	Throttle position sensor circuit (THROTTLE POSI SEN)	• An excessively low or high voltage from the sensor is sent to ECM. • Rationally incorrect voltage from the sensor is sent to ECM compared with the voltage signals from mass air flow sensor, camshaft position sensor and IACV-AAC valve.
P0125	0908	Engine coolant temperature sensor function (*COOLANT TEMP SEN)	• 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.
P0130	0307	Closed loop control (right bank) (CLOSED LOOP-B1)	• The closed loop control function for right bank does not operate even when vehicle is driving in the specified condition.
P0130	0503	Front heated oxygen sensor (right bank) circuit (FRONT O2 SENSOR-B1)	• An excessively high voltage from the sensor is sent to ECM. • The voltage from the sensor is constantly approx. 0.3V. • The maximum and minimum voltages from the sensor are not reached to the specified voltages. • It takes more time for the sensor to respond between rich and lean than the specified time.
P0135	0901	Front heated oxygen sensor heater (right bank) circuit (FR O2 SEN HTR-B1)	• The current amperage in the heater circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the heater.)

Note: A dead (weak) battery will reduce the accuracy of the on board diagnosis and may cause the MIL to light up without any malfunctions.

Abbreviations for Quick Reference of "DTC CONFIRMATION PROCEDURE"
IGN: ON : Turning the ignition switch ON is required for checking the function of the sensor, switch, solenoid and circuit.
RUNNING : Running engine is required for checking the function of the sensor, switch, solenoid and circuit.
LIFTING : Lifting up the vehicle, running engine and spinning wheels are required.
DRIVING : Driving the vehicle in the specified pattern is required.

Abbreviations for Quick Reference of "OVERALL FUNCTION CHECK"
IGN: ON : Turning the ignition switch ON is required for the ECM to detect a malfunction (if one exists).
RUNNING : Running engine is required for the ECM to detect a malfunction (if one exists).
LIFTING : Lifting up the vehicle, running engine and spinning wheels are required for the ECM to detect a malfunction (if one exists).
DRIVING : Driving the vehicle in the specified pattern is required for the ECM to detect a malfunction (if one exists).

Diagnostic Trouble Code (DTC) Chart (Cont'd)

X: Applicable
—: Not applicable

Check Items (Possible Cause)	"DTC CONFIRMATION PROCEDURE" Quick Ref. *1	"OVERALL FUNCTION CHECK" Quick Ref. *2	Fail Safe System	MIL Illumination	Reference Page
• No failure	—	—	—	—	—
• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor	RUNNING	RUNNING	X	2 trip	EC-93
• Harness or connectors (The sensor circuit is open or shorted.) • Intake air temperature sensor ..... • Intake air temperature sensor	IGN: ON ..... LIFTING	—	—	2 trip	EC-98
• Harness or connectors (The sensor circuit is open or shorted.) • Engine coolant temperature sensor	IGN: ON	—	X	2 trip	EC-103
• Harness or connectors (The sensor circuit is open or shorted.) • Throttle position sensor	—	IGN: ON	X	2 trip	EC-107
• Harness or connectors (High resistance in the sensor circuit) • Engine coolant temperature sensor • Thermostat	—	RUNNING	—	2 trip	EC-112
• The front heated oxygen sensor (right bank) circuit is open or shorted. • Front heated oxygen sensor (right bank) • Front heated oxygen sensor heater (right bank)	—	RUNNING	—	1 trip	EC-117
• Harness or connectors (The sensor circuit is open or shorted.) • Front heated oxygen sensor (right bank) • Injectors • Intake air leaks • Fuel pressure	—	RUNNING	—	2 trip	EC-118
• Harness or connectors (The heater circuit is open or shorted.) • Front heated oxygen sensor heater (right bank)	RUNNING	—	—	2 trip	EC-123

*1: • This is Quick Reference of "DTC CONFIRMATION PROCEDURE".
Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

*2: • The "OVERALL FUNCTION CHECK" is a simplified and effective way to inspect a component or circuit.
In some cases, the "OVERALL FUNCTION CHECK" is used rather than a "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE".
When no DTC CONFIRMATION PROCEDURE is available, the "NG" result of the OVERALL FUNCTION CHECK can be considered to mean the same as a DTC detection.
• During an "NG" OVERALL FUNCTION CHECK, the DTC might not be confirmed.
• This is Quick Reference of "OVERALL FUNCTION CHECK".
Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

ENGINE RELATED ITEMS

Diagnostic trouble code No.		Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" mode)	Malfunction is detected when ...
CONSULT GST	MIL		
P0136	0707	Rear heated oxygen sensor (right bank) circuit (REAR O2 SENSOR-B1)	• An excessively high voltage from the sensor is sent to ECM. • The voltage from the sensor is constantly approx. 0.3V. • The maximum and minimum voltages from the sensor are not reached to the specified voltages. • It takes more time for the sensor to respond between rich and lean than the specified time.
P0141	0902	Rear heated oxygen sensor heater (right bank) circuit (RR O2 SEN HTR-B1)	• The current amperage in the heater circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the heater.)
P0150	0303	Front heated oxygen sensor (left bank) circuit (FRONT O2 SENSOR-B2)	• An excessively high voltage from the sensor is sent to ECM. • The voltage from the sensor is constantly approx. 0.3V. • The maximum and minimum voltages from the sensor are not reached to the specified voltages. • It takes more time for the sensor to respond between rich and lean than the specified time.
P0150	0308	Closed loop control (left bank) (CLOSED LOOP-B2)	• The closed loop control function does not operate even when vehicle is driving in the specified condition.
P0155	1001	Front heated oxygen sensor heater (left bank) circuit (FR O2 SEN HTR-B2)	• The current amperage in the heater circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the heater.)
P0156	0708	Rear heated oxygen sensor (left bank) circuit (REAR O2 SENSOR-B2)	• An excessively high voltage from the sensor is sent to ECM. • The voltage from the sensor is constantly approx. 0.3V. • The maximum and minimum voltages from the sensor are not reached to the specified voltages. • It takes more time for the sensor to respond between rich and lean than the specified time.
P0161	1002	Rear heated oxygen sensor heater (left bank) circuit (RR O2 SEN HTR-B2)	• The current amperage in the heater circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the heater.)
P0171	0115	Fuel injection system function (right bank) (lean side) (FUEL SYS LEAN/BK1)	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)

Note: A dead (weak) battery will reduce the accuracy of the on board diagnosis and may cause the MIL to light up without any malfunctions.

Abbreviations for Quick Reference of "DTC CONFIRMATION PROCEDURE"
IGN: ON : Turning the ignition switch ON is required for checking the function of the sensor, switch, solenoid and circuit.
RUNNING : Running engine is required for checking the function of the sensor, switch, solenoid and circuit.
LIFTING : Lifting up the vehicle, running engine and spinning wheels are required.
DRIVING : Driving the vehicle in the specified pattern is required.

Abbreviations for Quick Reference of "OVERALL FUNCTION CHECK"
IGN: ON : Turning the ignition switch ON is required for the ECM to detect a malfunction (if one exists).
RUNNING : Running engine is required for the ECM to detect a malfunction (if one exists).
LIFTING : Lifting up the vehicle, running engine and spinning wheels are required for the ECM to detect a malfunction (if one exists).
DRIVING : Driving the vehicle in the specified pattern is required for the ECM to detect a malfunction (if one exists).

Diagnostic Trouble Code (DTC) Chart (Cont'd)

X: Applicable
—: Not applicable

Check Items (Possible Cause)	"DTC CONFIRMATION PROCEDURE" Quick Ref. *1	"OVERALL FUNCTION CHECK" Quick Ref. *2	Fail Safe System	MIL Illumination	Reference Page
• Harness or connectors (The sensor circuit is open or shorted.) • Rear heated oxygen sensor (right bank) • Fuel pressure • Injectors • Intake air leaks	—	RUNNING (DRIVING)	—	2 trip	EC-126
• Harness or connectors (The heater circuit is open or shorted.) • Rear heated oxygen sensor heater (right bank)	RUNNING	—	—	2 trip	EC-131
• Harness or connectors (The sensor circuit is open or shorted.) • Front heated oxygen sensor (left bank) • Injectors • Intake air leaks • Fuel pressure	—	RUNNING	—	2 trip	EC-135
• The front heated oxygen sensor (left bank) circuit is open or shorted. • Front heated oxygen sensor (left bank) • Front heated oxygen sensor heater (left bank)	—	RUNNING	—	1 trip	EC-117
• Harness or connectors (The heater circuit is open or shorted.) • Front heated oxygen sensor heater (left bank)	RUNNING	—	—	2 trip	EC-140
• Harness or connectors (The sensor circuit is open or shorted.) • Rear heated oxygen sensor (left bank) • Fuel pressure • Injectors • Intake air leaks	—	RUNNING (DRIVING)	—	2 trip	EC-143
• Harness or connectors (The heater circuit is open or shorted.) • Rear heated oxygen sensor heater (left bank)	RUNNING	—	—	2 trip	EC-148
• Intake air leaks • Front heated oxygen sensor (right bank) • Injector (right bank) • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor	RUNNING	—	—	2 trip	EC-151

*1: • This is Quick Reference of "DTC CONFIRMATION PROCEDURE".
Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

*2: • The "OVERALL FUNCTION CHECK" is a simplified and effective way to inspect a component or circuit.
In some cases, the "OVERALL FUNCTION CHECK" is used rather than a "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE".
When no DTC CONFIRMATION PROCEDURE is available, the "NG" result of the OVERALL FUNCTION CHECK can be considered to mean the same as a DTC detection.
• During an "NG" OVERALL FUNCTION CHECK, the DTC might not be confirmed.
• This is Quick Reference of "OVERALL FUNCTION CHECK".
Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

ENGINE RELATED ITEMS

Diagnostic trouble code No.		Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" mode)	Malfunction is detected when ...	
CONSULT GST	MIL			
P0172	0114	Fuel injection system function (right bank) (rich side) (FUEL SYS RICH/BK1)	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	
P0174	0210	Fuel injection system function (left bank) (lean side) (FUEL SYS LEAN/BK2)	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	
P0175	0209	Fuel injection system function (left bank) (rich side) (FUEL SYS RICH/BK2)	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	
P0300	0701	Multiple cylinders' misfire (MULTI CYL MISFIRE)	⟨Three way catalyst damage⟩ The misfire occurs, which will damage three way catalyst by overheating.	⟨Exhaust quality deterioration⟩ The misfire occurs, which will not damage three way catalyst but will affect emission deterioration.
P0301	0608	No. 1 cylinder's misfire (CYL 1 MISFIRE)		
P0302	0607	No. 2 cylinder's misfire (CYL 2 MISFIRE)		
P0303	0606	No. 3 cylinder's misfire (CYL 3 MISFIRE)		
P0304	0605	No. 4 cylinder's misfire (CYL 4 MISFIRE)		
P0305	0604	No. 5 cylinder's misfire (CYL 5 MISFIRE)		
P0306	0603	No. 6 cylinder's misfire (CYL 6 MISFIRE)		
P0325 (*4)	0304	Knock sensor circuit (KNOCK SENSOR)	• An excessively low or high voltage from the sensor is sent to ECM.	
P0335	0802	Crankshaft position sensor (OBD) circuit [CRANK POS SEN (OBD)]	• The proper pulse signal from the sensor is not sent to ECM while the engine is running with the specified engine speed.	
P0340	0101	Camshaft position sensor circuit (CAMSHAFT POSI SEN)	• Either 1° or 120° signal is not sent to ECM for the first few seconds during engine cranking. • Either 1° or 120° signal is not sent to ECM often enough while the engine speed is higher than the specified engine speed. • The relation between 1° and 120° signal is not in the normal range during the specified engine speed.	

Note: A dead (weak) battery will reduce the accuracy of the on board diagnosis and may cause the MIL to light up without any malfunctions.

Abbreviations for Quick Reference of "DTC CONFIRMATION PROCEDURE"
IGN: ON : Turning the ignition switch ON is required for checking the function of the sensor, switch, solenoid and circuit.
RUNNING : Running engine is required for checking the function of the sensor, switch, solenoid and circuit.
LIFTING : Lifting up the vehicle, running engine and spinning wheels are required.
DRIVING : Driving the vehicle in the specified pattern is required.

Abbreviations for Quick Reference of "OVERALL FUNCTION CHECK"
IGN: ON : Turning the ignition switch ON is required for the ECM to detect a malfunction (if one exists).
RUNNING : Running engine is required for the ECM to detect a malfunction (if one exists).
LIFTING : Lifting up the vehicle, running engine and spinning wheels are required for the ECM to detect a malfunction (if one exists).
DRIVING : Driving the vehicle in the specified pattern is required for the ECM to detect a malfunction (if one exists).

*4: Freeze frame data is not stored in the ECM for the "Knock sensor". The MIL will not light up for a "Knock sensor" malfunction.

Diagnostic Trouble Code (DTC) Chart (Cont'd)

X: Applicable
—: Not applicable

Check Items (Possible Cause)	"DTC CONFIRMATION PROCEDURE" Quick Ref. *1	"OVERALL FUNCTION CHECK" Quick Ref. *2	Fail Safe System	MIL Illumination	Reference Page
• Front heated oxygen sensor (right bank) • Injectors (right bank) • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor	RUNNING	—	—	2 trip	EC-156
• Intake air leaks • Front heated oxygen sensor (left bank) • Injectors (left bank) • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor	RUNNING	—	—	2 trip	EC-161
• Front heated oxygen sensor (left bank) • Injectors (left bank) • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor	RUNNING	—	—	2 trip	EC-166
• Improper spark plug • The secondary ignition control circuit is open or shorted. • Insufficient compression • Incorrect fuel pressure • EGR valve • The injector circuit is open or shorted. • Injectors • Intake air leaks • Lack of fuel • Magnetized drive plate	DRIVING	—	—	⟨Three way catalyst damage⟩ 1 trip ⟨Exhaust quality deterioration⟩ 2 trip	EC-171
• Harness or connectors (The sensor circuit is open or shorted.) • Knock sensor	RUNNING	—	—	—	EC-175
• Harness or connectors (The sensor circuit is open or shorted.) • Crankshaft position sensor (OBD) • Dead (Weak) battery	RUNNING	—	—	2 trip	EC-178
• Harness or connectors (The sensor circuit is open or shorted.) • Camshaft position sensor • Starter motor (EL section) • Starting system circuit (EL section) • Dead (Weak) battery	RUNNING	—	—	2 trip	EC-182

*1: • This is Quick Reference of "DTC CONFIRMATION PROCEDURE".
Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

*2: • The "OVERALL FUNCTION CHECK" is a simplified and effective way to inspect a component or circuit.
In some cases, the "OVERALL FUNCTION CHECK" is used rather than a "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE".
When no DTC CONFIRMATION PROCEDURE is available, the "NG" result of the OVERALL FUNCTION CHECK can be considered to mean the same as a DTC detection.
• During an "NG" OVERALL FUNCTION CHECK, the DTC might not be confirmed.
• This is Quick Reference of "OVERALL FUNCTION CHECK".
Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

ENGINE RELATED ITEMS

Diagnostic trouble code No.		Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" mode)	Malfunction is detected when ...
CONSULT GST	MIL		
P0400	0302	EGR function (EGR SYSTEM)	• The EGR flow is excessively low or high during the specified driving condition.
P0402	0306	EGRC-BPT valve function (EGRC-BPT VALVE)	• EGRC-BPT valve does not operate properly.
P0420	0702	Three way catalyst function (right bank) (TW CATALYST SYS-B1)	• Three way catalyst does not operate properly. • Three way catalyst does not have enough oxygen storage capacity.
P0430	0703	Three way catalyst function (left bank) (TW CATALYST SYS-B2)	• Three way catalyst does not operate properly. • Three way catalyst does not have enough oxygen storage capacity.
P0500	0104	Vehicle speed sensor circuit (VEHICLE SPEED SEN)	• The almost 0 km/h (0 MPH) signal from the sensor is sent to ECM even when vehicle is driving.
P0505	0205	Idle speed control function (IACV-AAC VALVE)	• The idle speed control function does not operate properly.
P0600 (*5)	—	Signal circuit from A/T control unit to ECM (A/T COMM LINE)	• ECM receives incorrect voltage from A/T control unit continuously. * This DTC can be detected using "DATA MONITOR (AUTO TRIG)" with CONSULT.
P0605	0301	ECM (ECM)	• ECM calculation function is malfunctioning.
P0705	1003	Park/Neutral position switch circuit (PARK/NEUT POSI SW)	• The signal of the park/neutral position switch is not changed in the process of engine starting and driving.
P1320	0201	Ignition signal circuit (IGN SIGNAL-PRIMARY)	• The ignition signal in the primary circuit is not sent to ECM during engine cranking or running.

Note: A dead (weak) battery will reduce the accuracy of the on board diagnosis and may cause the MIL to light up without any malfunctions.

Abbreviations for Quick Reference of "DTC CONFIRMATION PROCEDURE"
IGN: ON : Turning the ignition switch ON is required for checking the function of the sensor, switch, solenoid and circuit.
RUNNING : Running engine is required for checking the function of the sensor, switch, solenoid and circuit.
LIFTING : Lifting up the vehicle, running engine and spinning wheels are required.
DRIVING : Driving the vehicle in the specified pattern is required.

Abbreviations for Quick Reference of "OVERALL FUNCTION CHECK"
IGN: ON : Turning the ignition switch ON is required for the ECM to detect a malfunction (if one exists).
RUNNING : Running engine is required for the ECM to detect a malfunction (if one exists).
LIFTING : Lifting up the vehicle, running engine and spinning wheels are required for the ECM to detect a malfunction (if one exists).
DRIVING : Driving the vehicle in the specified pattern is required for the ECM to detect a malfunction (if one exists).

X: Applicable
—: Not applicable

Check Items (Possible Cause)	"DTC CONFIRMATION PROCEDURE" Quick Ref. *1	"OVERALL FUNCTION CHECK" Quick Ref. *2	Fail Safe System	MIL Illumination	Reference Page
• EGR valve stuck closed, open or leak • Passage obstructed • EGRC-solenoid valve • EGR valve vacuum tube leaks • EGR temperature sensor	—	RUNNING	—	2 trip	EC-187
• EGRC-BPT valve • Rubber tube (obstructed, loose or disconnected)	—	RUNNING	—	2 trip	EC-195
• Three way catalyst • Exhaust tube • Injectors • Injector leaks • Intake air leaks	—	RUNNING	—	1 trip	EC-197
• Three way catalyst • Exhaust tube • Injectors • Injector leaks • Intake air leaks	—	RUNNING	—	1 trip	EC-197
• Harness or connectors (The sensor circuit is open or shorted.) • Vehicle speed sensor	DRIVING	LIFTING	—	2 trip	EC-200
• Harness or connectors (The IACV-AAC valve circuit is shorted.) • IACV-AAC valve ..... • Harness or connectors (The IACV-AAC valve circuit is open.) • IACV-AAC valve	IGN: ON ..... RUNNING	—	—	2 trip	EC-204
• Harness or connectors (The circuit between ECM and A/T control unit is open or shorted.) • A/T control unit	—	RUNNING	—	—	EC-208
• ECM (ECCS control module)	IGN: ON	—	X	2 trip	EC-211
• Harness or connectors (The inhibitor switch circuit is open or shorted.) • Harness or connectors (The circuit between ECM and A/T control unit is open or shorted.) • Inhibitor switch • A/T control unit	—	IGN: ON	—	2 trip	EC-213
• Harness or connectors (The primary ignition control circuit is open or shorted.) • Power transistor unit • Ignition coil • Camshaft position sensor • Camshaft position sensor circuit	RUNNING	—	—	2 trip	EC-219

*1: • This is Quick Reference of "DTC CONFIRMATION PROCEDURE".
Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

*2: • The "OVERALL FUNCTION CHECK" is a simplified and effective way to inspect a component or circuit.
In some cases, the "OVERALL FUNCTION CHECK" is used rather than a "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE".
When no DTC CONFIRMATION PROCEDURE is available, the "NG" result of the OVERALL FUNCTION CHECK can be considered to mean the same as a DTC detection.
• During an "NG" OVERALL FUNCTION CHECK, the DTC might not be confirmed.
• This is Quick Reference of "OVERALL FUNCTION CHECK".
Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

ENGINE RELATED ITEMS

Diagnostic trouble code No.		Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" mode)	Malfunction is detected when ...
CONSULT GST	MIL		
P1336	0905	Crankshaft position sensor (OBD) [CRANK P/S (OBD)-COG]	• The chipping of the drive plate gear tooth (cog) is detected by ECM.
P1400	1005	EGR valve and EVAP canister purge control solenoid valve (EGRC SOLENOID/V)	• An improper voltage signal is sent to ECM through the solenoid valve.
P1401	0305	EGR temperature sensor circuit (EGR TEMP SENSOR)	• An excessively low or high voltage from the sensor is sent to ECM, even when engine coolant temperature is low or high.
P1605	0804	A/T diagnosis communication line (A/T DIAG COMM LINE)	• An incorrect signal from A/T control unit is sent to ECM.
P1900	0208	Overheat (OVER HEAT)	• An excessively low voltage (high engine coolant temperature) from engine coolant temperature sensor is sent to ECM.

Note: A dead (weak) battery will reduce the accuracy of the on board diagnosis and may cause the MIL to light up without any malfunctions.

Abbreviations for Quick Reference of "DTC CONFIRMATION PROCEDURE"
IGN: ON : Turning the ignition switch ON is required for checking the function of the sensor, switch, solenoid and circuit.
RUNNING : Running engine is required for checking the function of the sensor, switch, solenoid and circuit.
LIFTING : Lifting up the vehicle, running engine and spinning wheels are required.
DRIVING : Driving the vehicle in the specified pattern is required.

Abbreviations for Quick Reference of "OVERALL FUNCTION CHECK"
IGN: ON : Turning the ignition switch ON is required for the ECM to detect a malfunction (if one exists).
RUNNING : Running engine is required for the ECM to detect a malfunction (if one exists).
LIFTING : Lifting up the vehicle, running engine and spinning wheels are required for the ECM to detect a malfunction (if one exists).
DRIVING : Driving the vehicle in the specified pattern is required for the ECM to detect a malfunction (if one exists).

*5: In case of this diagnostic item, the freeze frame data will not be stored in ECM.
This diagnosis does not have the 2 trip detection logic, and will not light up the MIL.

Diagnostic Trouble Code (DTC) Chart (Cont'd)

X: Applicable
—: Not applicable

Check Items (Possible Cause)	"DTC CONFIRMATION PROCEDURE" Quick Ref. *1	"OVERALL FUNCTION CHECK" Quick Ref. *2	Fail Safe System	MIL Illumination	Reference Page
• Harness or connectors • Crankshaft position sensor (OBD) • Drive plate (A/T models) • Flywheel (M/T models)	RUNNING	—	—	2 trip	EC-224
• Harness or connectors (The EGR valve and EVAP canister purge control solenoid valve circuit is open or shorted.) • EGR valve and EVAP canister purge control solenoid valve	—	IGN: ON	—	2 trip	EC-228
• Harness or connectors (The EGR temperature sensor circuit is open or shorted.) • EGR temperature sensor • Malfunction of EGR or EGRC-solenoid valve	—	RUNNING	—	2 trip	EC-232
• Harness or connectors (The communication line circuit is open or shorted.) • A/T control unit • Dead (Weak) battery	IGN: ON	—	—	2 trip	EC-236
Refer to "Overheat cause analysis", ENGINE COOLING SYSTEM in LC section.	—	IGN: ON (RUNNING)	—	—*3	LC section

*1: • This is Quick Reference of "DTC CONFIRMATION PROCEDURE".
Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

*2: • The "OVERALL FUNCTION CHECK" is a simplified and effective way to inspect a component or circuit.
In some cases, the "OVERALL FUNCTION CHECK" is used rather than a "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE".
When no DTC CONFIRMATION PROCEDURE is available, the "NG" result of the OVERALL FUNCTION CHECK can be considered to mean the same as a DTC detection.
• During an "NG" OVERALL FUNCTION CHECK, the DTC might not be confirmed.
• This is Quick Reference of "OVERALL FUNCTION CHECK".
Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

*3: • When this malfunction is detected, MIL lights up as a warning.

Diagnostic Trouble Code (DTC) Chart (Cont'd)

A/T RELATED ITEMS (Be sure to erase the DTC stored in ECM after the A/T related repair.)

Diagnostic trouble code No.		Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" mode)	Malfunction is detected when ...
CONSULT GST	MIL		
P0705	1101	Inhibitor switch circuit (INHIBITOR SWITCH)	• A/T control unit does not receive the correct voltage signal from the switch based on the gear position.
P0710	1208	Fluid temperature sensor (FLUID TEMP SENSOR)	• A/T control unit receives an excessively low or high voltage from the sensor.
P0720	1102	Revolution sensor (VHCL SPEED SEN·A/T)	• A/T control unit does not receive the proper voltage signal from the sensor.
P0725	1207	Engine speed signal (ENGINE SPEED SIG)	• A/T control unit does not receive the proper voltage signal from the ECM.
P0731	1103	Improper shifting to 1st gear position (A/T 1ST SIGNAL)	• A/T cannot be shifted to the 1st gear position even electrical circuit is good.
P0732	1104	Improper shifting to 2nd gear position (A/T 2ND SIGNAL)	• A/T cannot be shifted to the 2nd gear position even electrical circuit is good.
P0733	1105	Improper shifting to 3rd gear position (A/T 3RD SIGNAL)	• A/T cannot be shifted to the 3rd gear position even electrical circuit is good.
P0734	1106	Improper shifting to 4th gear position or TCC (A/T 4TH SIGNAL OR TCC)	• A/T cannot be shifted to the 4th gear position or perform lock-up even electrical circuit is good.
P0740	1204	T/C clutch solenoid valve (TOR CONV CLUTCH SV)	• A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.
P0745	1205	Line pressure solenoid valve (LINE PRESSURE S/V)	• A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.
P0750	1108	Shift solenoid valve A (SHIFT SOLENOID/V A)	• A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.
P0755	1201	Shift solenoid valve B (SHIFT SOLENOID/V B)	• A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.
P1705	1206	Throttle position sensor Throttle position switch (THRTL POSI SEN·A/T)	• A/T control unit receives an excessively low or high voltage from the sensor.
P1760	1203	Overrun clutch solenoid valve (OVERRUN CLUTCH S/V)	• A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.

*1: DRIVING pattern 1-6 means as follows:
Pattern 1 should meet b and c.
Pattern 2 should meet a and c.
Pattern 3 should meet a through e.
Pattern 4 should meet a and b.
Pattern 5 should meet a through c.
Pattern 6 should meet a through d.

a: Selector lever is in "D" position.
b: Vehicle speed is over 10 km/h (6 MPH).
c: Throttle opening is over 1/8.
d: Engine speed is over 450 rpm.
e: A/T fluid temperature is 20 - 120°C (68 - 248°F).
*: For details, refer to each DTC CONFIRMATION PROCEDURE in AT section.

Diagnostic Trouble Code (DTC) Chart (Cont'd)

X: Applicable
—: Not applicable

Check Items (Possible Cause)	"DTC CONFIRMATION PROCEDURE" Quick Ref. *1	"OVERALL FUNCTION CHECK" Quick Ref. *2	Fail Safe System	MIL Illumination	Reference Page
• Harness or connectors (The switch circuit is open or shorted.) • Inhibitor switch	DRIVING (pattern 1)	—	—	2 trip	See "Self-diagnosis", "TROUBLE DIAGNOSES" in AT section.
• Harness or connectors (The sensor circuit is open or shorted.) • Fluid temperature sensor	DRIVING (pattern 6)	—	X	2 trip	
• Harness or connectors (The sensor circuit is open or shorted.) • Revolution sensor	DRIVING (pattern 2)	—	X	2 trip	
• Harness or connectors (The signal circuit is open or shorted.)	DRIVING (pattern 5)	—	X	2 trip	
• Shift solenoid valve A • Shift solenoid valve B • Overrun clutch solenoid valve • Line pressure solenoid valve • Each clutch • Hydraulic control circuit • T/C clutch solenoid valve	DRIVING (pattern 3)	—	—	2 trip	
• Harness or connectors (The solenoid circuit is open or shorted.) • T/C clutch solenoid valve	IGN: ON	—	X	2 trip	
• Harness or connectors (The solenoid circuit is open or shorted.) • Line pressure solenoid valve	IGN: ON	—	X	2 trip	
• Harness or connectors (The solenoid circuit is open or shorted.) • Shift solenoid valve A	IGN: ON	—	X	2 trip	
• Harness or connectors (The solenoid circuit is open or shorted.) • Shift solenoid valve B	IGN: ON	—	X	2 trip	
• Harness or connectors (The sensor circuit is open or shorted.) • Throttle position sensor • Throttle position switch	DRIVING (pattern 4)	—	X	2 trip	
• Harness or connectors (The solenoid circuit is open or shorted.) • Overrun clutch solenoid valve	IGN: ON	—	X	2 trip	

*1: • This is Quick Reference of "DTC CONFIRMATION PROCEDURE".
Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

*2: • The "OVERALL FUNCTION CHECK" is a simplified and effective way to inspect a component or circuit.
In some cases, the "OVERALL FUNCTION CHECK" is used rather than a "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE".
When no DTC CONFIRMATION PROCEDURE is available, the "NG" result of the OVERALL FUNCTION CHECK can be considered to mean the same as a DTC detection.
• During an "NG" OVERALL FUNCTION CHECK, the DTC might not be confirmed.
• This is Quick Reference of "OVERALL FUNCTION CHECK".
Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

Diagnostic Trouble Code (DTC) Chart (Cont'd)

INSPECTION PRIORITY

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	• ECM (P0605, 0301)	• Camshaft position sensor circuit (P0340, 0101)	• Engine coolant temperature sensor circuit (P0115, 0103) (P0125, 0908)
	• Mass air flow sensor circuit (P0100, 0102)	• Vehicle speed sensor circuit (P0500, 0104)	• Ignition signal circuit (P1320, 0201)
	• Throttle position sensor circuit (P0120, 0403)	• Intake air temperature sensor circuit (P0110, 0401)	• Park/Neutral position switch circuit (P0705, 1003)
	• EGR valve and EVAP canister purge control solenoid valve (P1400, 1005)	• Knock sensor circuit (P0325, 0304)	
	• A/T diagnosis communication line (P1605, 0804)		
2	• EGR temperature sensor circuit (P1401, 0305)	• Front heated oxygen sensor heater circuit (P0135, 0901) (P0155, 1001)	• Front heated oxygen sensor circuit (P0130, 0503) (P0150, 0303)
	• A/T related sensors, solenoid valves and switches (P0705-P0710, 1101-1208)	• Crankshaft position sensor (OBD) circuit (P0335, 0802) (P1336, 0905)	• Rear heated oxygen sensor circuit (P0136, 0707) (P0156, 0708)
			• Rear heated oxygen sensor heater circuit (P0141, 0902) (P0161, 1002)
3	• EGR function (P0400, 0302)	• Misfire (P0306 - P0300, 0603 - 0701)	• Fuel injection system function (P0172, 0114), (P0171, 0115), (P0175, 0209), (P0174, 0210)
	• EGRC-BPT valve function (P0402, 0306)	• Closed loop control (P0130, 0307) (P0150, 0308)	• Three way catalyst function (P0420, 0702) (P0430, 0703)
	• IACV-AAC valve circuit (P0505, 0205)	• Improper shifting (P0731 - P0734, 1103 - 1106)	• Signal circuit from A/T control unit to ECM (P0600)

Fail-Safe Chart

The ECM enters fail-safe mode, if any of the following DTCs is recorded due to the open or short circuit.

DTC No. CONSULT GST	DTC No. MIL	Detected items	Engine operating condition in fail-safe mode
P0100	0102	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.
P0115	0103	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined based on the time after turning ignition switch "ON" or "START". Condition: Just as ignition switch is turned ON or Start — Engine coolant temperature decided: 20°C (68°F) Condition: More than approx. 6 minutes after ignition ON or Start — Engine coolant temperature decided: 80°C (176°F) Condition: Except as shown above — Engine coolant temperature decided: 20 - 80°C (68 - 176°F) (Depends on the time)
P0120	0403	Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor. When engine is idling — Driving condition: Normal When accelerating — Driving condition: Poor acceleration
—	—	Start signal circuit	If the ECM always receives a start signal, the ECM will judge the start signal "OFF" when engine speed is above 1,000 rpm. This prevents extra enrichment. After the engine speed is below 200 rpm, start-up enrichment will be allowed until the engine speed reaches 1,000 rpm.
—	—	ECM	**Fail-safe system activating condition when ECM is malfunctioning** 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 MALFUNCTION INDICATOR LAMP on the instrument panel lights to warn the driver. **Engine control, with fail-safe system, operates when ECM is malfunctioning** When the fail-safe system is operating, fuel injection, ignition timing, fuel pump operation, and IACV-AAC valve operation are controlled under certain limitations. **Engine speed** — Operation: **Engine speed will not rise more than 3,000 rpm** Fuel injection — Simultaneous multiport fuel injection system Ignition timing — Ignition timing is fixed at the preset valve Fuel pump — Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls IACV-AAC valve — Full open

Symptom Matrix Chart

SYSTEM — Basic engine control system		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)	
		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	●	●	●	○	●		○	○			○		○	EC-244
	Fuel pressure regulator system	●	○	●	○	○	○	○	○	○		○			EC-21
	Injector circuit	●	●	●	○	●		●	○			○			EC-239
	Evaporative emission system	○	○	○	○	○	○	○	○	○		○			EC-18
Air	Positive crankcase ventilation system	○	●	○	○	○	○	●	○	○		○	○		EC-20
	Incorrect idle speed adjustment	●	●				●	●	○	○		○			EC-25
	IACV-AAC valve circuit	○	●	○	○	○	●	●	○	○		○		○	EC-204
	IACV-FICD solenoid valve circuit	○	○	○	○	○	○	○	○	○		○			EC-252
Ignition	Incorrect ignition timing adjustment	●	●	●	●	●		●	○			●			EC-25
	Ignition circuit	●	●	●	●	●		●	○			●			EC-219
EGR	EGR valve & EVAP canister purge control solenoid valve circuit		○	●	○	○						○			EC-228
	EGR system	○	●	●	●	●	○	●	○	○		○			EC-187
Main power supply and ground circuit		●	○	○	○	○		○	○		○	○		○	EC-89
Air conditioner circuit		○	○	○	○	○	○	○	○	○		○		○	HA section

● ; High Possibility Item
○ ; Low Possibility Item

(continued on next page)

Symptom Matrix Chart (Cont'd)

SYSTEM — ECCS system		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)	
		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
ECCS	Camshaft position sensor circuit	●	●	●	●	●		●	○			●			EC-182
	Mass air flow sensor circuit	●	●	●	○	●		●	○			●			EC-93
	Front heated oxygen sensor circuit		●	●	○	●		●	○			●			EC-118, 135
	Engine coolant temperature sensor circuit	●	○	○	○	○	○	●	○	○		○			EC-103, 112
	Throttle position sensor circuit		●	●		●	●	●	○	○		●			EC-107
	Incorrect throttle position sensor adjustment		●	●		●	●	●	○	○		○			EC-60
	Vehicle speed sensor circuit		○	○		○						○			EC-200
	Knock sensor circuit			○	○	○						○			EC-175
	ECM	○	○	○	○	○	○	○	○	○	○	○			EC-211, 75
	Start signal circuit	○													EC-242
	Park/Neutral position switch circuit			○		○		○	○			○			EC-213
	Power steering oil pressure switch circuit		○					○	○						EC-249

● ; High Possibility Item
○ ; Low Possibility Item

(continued on next page)

Symptom Matrix Chart (Cont'd)

SYSTEM — Engine mechanical & other		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)	
		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	○	○												
	Fuel piping	○	○	○	○	○		○	○			○			
	Vapor lock		○												
	Valve deposit	○	○	○	○	○		○	○			○			
	Poor fuel (Heavy weight gasoline, Low octane)	○	○	○	○	○		○	○			○			—
Air	Air duct		○	○		○		○	○			○			
	Air cleaner		○	○		○		○	○			○			
	Air leakage from air duct (Mass air flow sensor — throttle body)	○	○	○	○	○	○	○	○	○		○			
	Throttle body, Throttle wire	●	●	●		●	●	●	○	●		○			FE section
	Air leakage from intake manifold/ Collector/Gasket	○	●	●	○	○	○	●	○	○		○			—
Cranking	Battery	○	○	○		○		○	○			○		○	
	Alternator circuit	○	○	○		○		○	○			○		○	EL section
	Starter circuit	●													
	Flywheel	○													—
	Clutch interlock switch	○													CL section
	Inhibitor switch	○													AT section
Engine	Cylinder head	○	○	○	○	○		○	○			○			
	Cylinder head gasket	○	○	○	○	○		○	○		●	○	○		
	Cylinder block	○	○	○	○	○		○	○			○	○		
	Piston	○	○	○	○	○		○	○			○	○		
	Piston ring	○	○	○	○	○		○	○			○	○		
	Connecting rod	○	○	○	○	○		○	○			○			
	Bearing	○	○	○	○	○		○	○			○			
	Crankshaft	●	●	●	○	●		○	○			○			
Valve mechanism	Timing belt	●	●	○	○	●		●	○			○			
	Camshaft	○	○	○	○	○		○	○			○			
	Intake valve	○	○	○	○	○		○	○			○	○		
	Exhaust valve	○	○	○	○	○		○	○			○	○		
	Hydraulic lash adjuster		○	○	○	○		○	○			○			—
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	○	○	○	○	○		○	○			○			
	Three way catalyst	○	○	○	○	●		○	○			○			
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	●	●	○	○	○		●	●			○	●		
	Oil level (Low)/Filthy oil	○	○	○	○	○		○	○			○	○		
Cooling	Radiator/Hose/Radiator filler cap	○	○	○	○	○		○	○		●	○			
	Thermostat	○	○	○	○	○	○	○	○	○	○	○			
	Water pump	○	○	○	○	○		○	○		●	○			
	Water gallery	○	○	○	○	○		○	○		○	○			
	Cooling fan	○	○	○	○	○	○	○	○	○	○	○			
	Coolant level (low)/Contaminated coolant	○	○	○	○	○		○	○		○	○			

● ; High Possibility Item
○ ; Low Possibility Item

CONSULT Reference Value in Data Monitor Mode

Remarks:

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

MONITOR ITEM	CONDITION		SPECIFICATION
CMPS-RPM (POS)	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT value.		Almost the same speed as the CONSULT value.
MAS AIR/FL SE	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	1.0 - 1.7V
		2,000 rpm	1.5 - 2.1V
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
FR O2 SEN-B2 ..... FR O2 SEN-B1	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
FR O2 MNTR-B2 ..... FR O2 MNTR-B1			LEAN ↔ RICH Changes more than 5 times during 10 seconds.
RR O2 SEN-B1 ..... RR O2 SEN-B2	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ Approx. 0.6 - 1.0V
RR O2 MNTR-B1 ..... RR O2 MNTR-B2			LEAN ↔ RICH
VHCL SPEED SE	• Turn drive wheels and compare speedometer indication with the CONSULT value		Almost the same speed as the CONSULT value
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V
THRTL POS SEN	• Ignition switch: ON (Engine stopped)	Throttle valve: fully closed	0.35 - 0.65V
		Throttle valve: fully opened	Approx. 4.0V
EGR TEMP SEN	• Engine: After warming up		Less than 4.5V
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL/P SW	• 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
AMB TEMP SW	• Ignition switch: ON • Compare ambient temperature with the following:	Below 23.5°C (74°F)	OFF
		Above 23.5°C (74°F)	ON

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

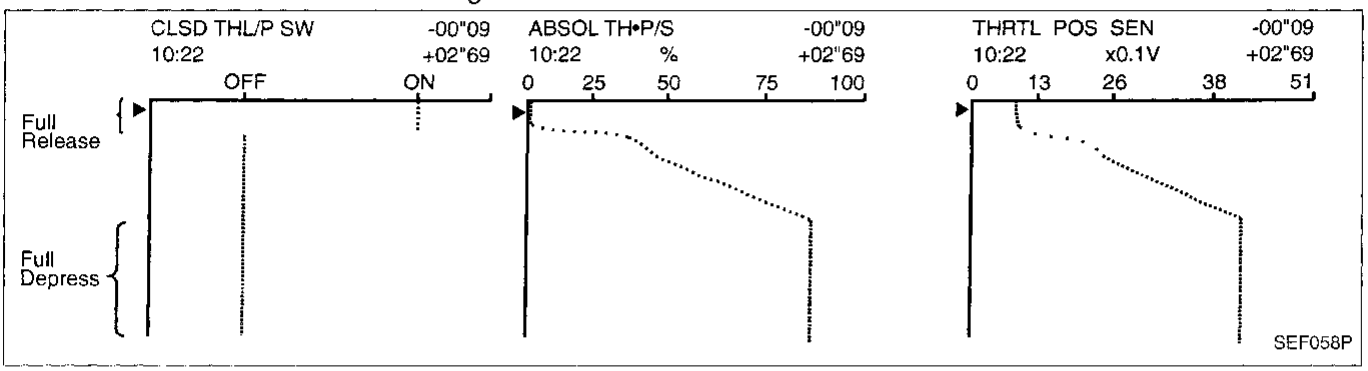
MONITOR ITEM	CONDITION		SPECIFICATION
IGNITION SW	• Ignition switch: ON → OFF		ON → OFF
INJ PULSE-B2 INJ PULSE-B1	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 2.8 msec
B/FUEL SCHDL	ditto	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 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	—
A/F ALPHA-B2 A/F ALPHA-B1	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	54 - 155%
AIR COND RLY	• Air conditioner switch: OFF → ON		OFF → ON
FUEL PUMP RLY	• Ignition switch is turned to ON (Operates for 5 seconds) • Engine running and cranking		ON
	Except as shown above		OFF
EGRC SOL/V	• Engine: After warming up • Air conditioner switch: "OFF" • Shift lever: "N" • No-load	Idle	ON
		Engine speed is 2,000 rpm.	OFF
FR O2 HTR-B1 FR O2 HTR-B2	• Engine speed: Idle		ON
	• Engine speed: Above 3,200 rpm		OFF
RR O2 HTR-B1 RR O2 HTR-B2	• Engine speed: Idle		ON
	• Engine speed: Above 3,200 rpm		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	• 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

Major Sensor Reference Graph in Data Monitor Mode

The following are the major sensor reference graphs in "DATA MONITOR" mode.
(Select "HI SPEED" in "DATA MONITOR" with CONSULT.)

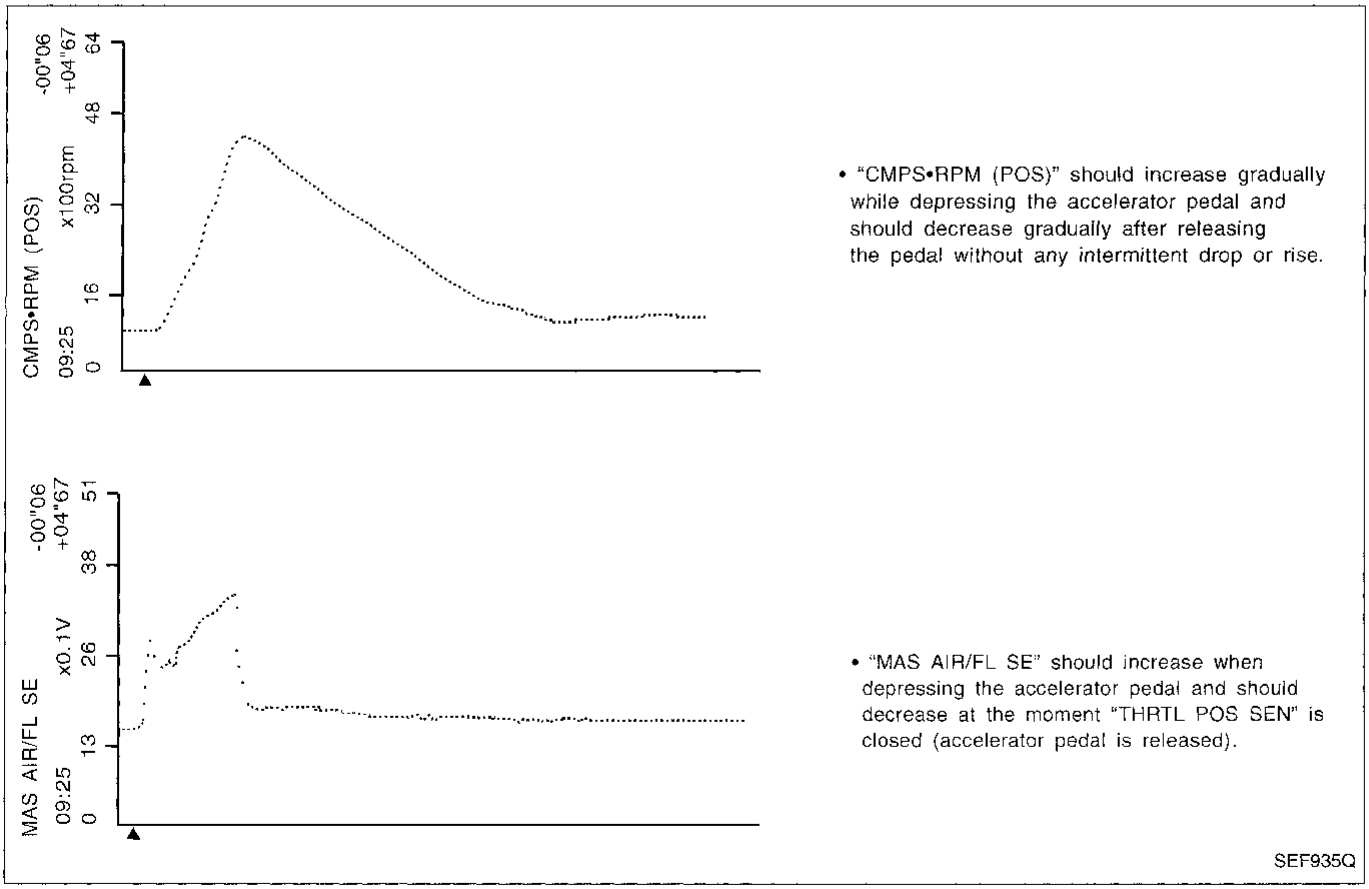
THRTL POS SEN, ABSOL TH·P/S, CLSD THL/P SW

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

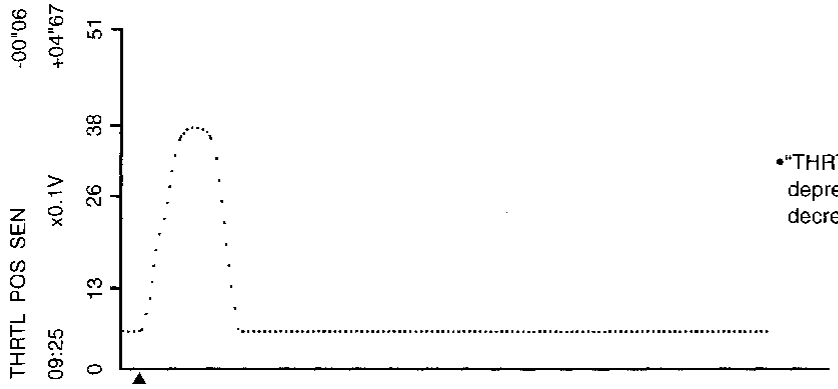


CMPS·RPM (POS), MAS AIR/FL SE, THRTL POS SEN, RR O2 SEN-B1, FR O2 SEN-B1, INJ PULSE-B1

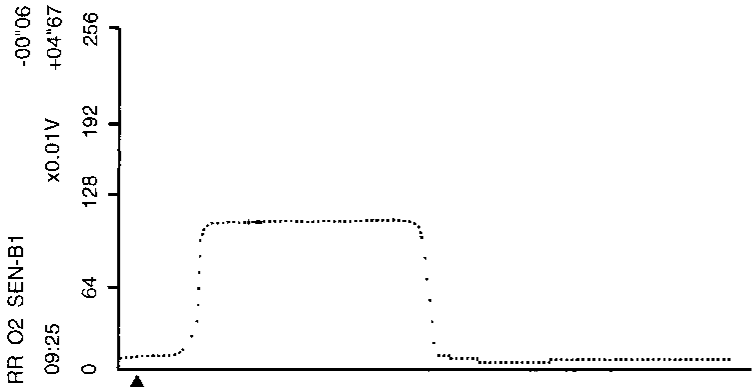
Below is the data for "CMPS·RPM (POS)", "MAS AIR/FL SE", "THRTL POS SEN", "RR O2 SEN-B1", "FR O2 SEN-B1" and "INJ PULSE-B1" when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.
Each value is for reference, the exact value may vary.



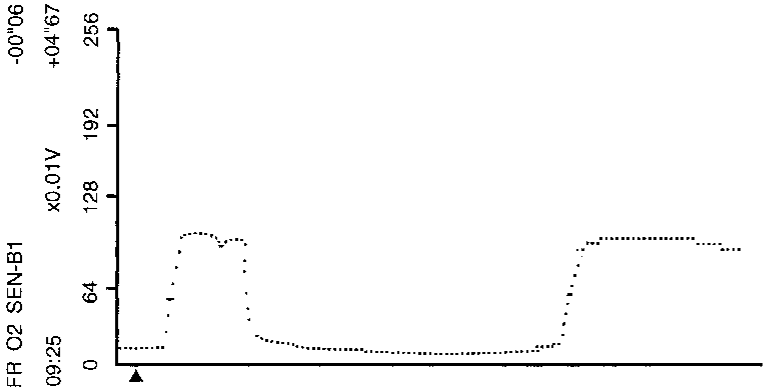
Major Sensor Reference Graph in Data Monitor Mode (Cont'd)



•"THRTL POS SEN" should increase while depressing the accelerator pedel and should decrease while releasing it.



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



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

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

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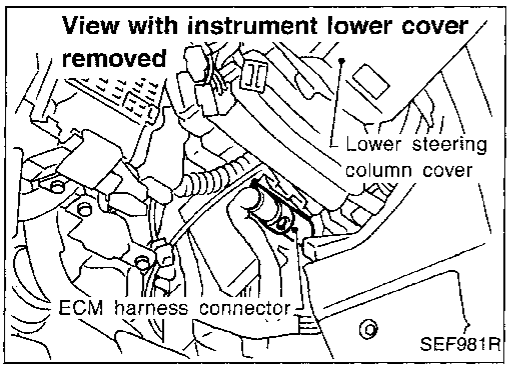
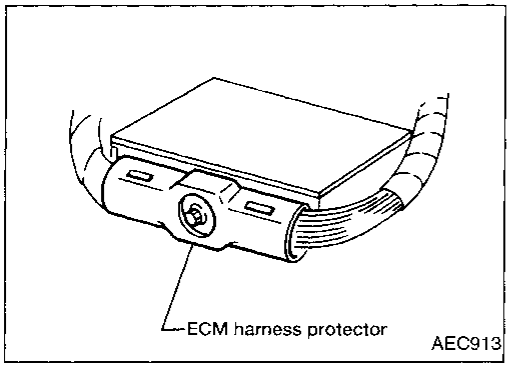


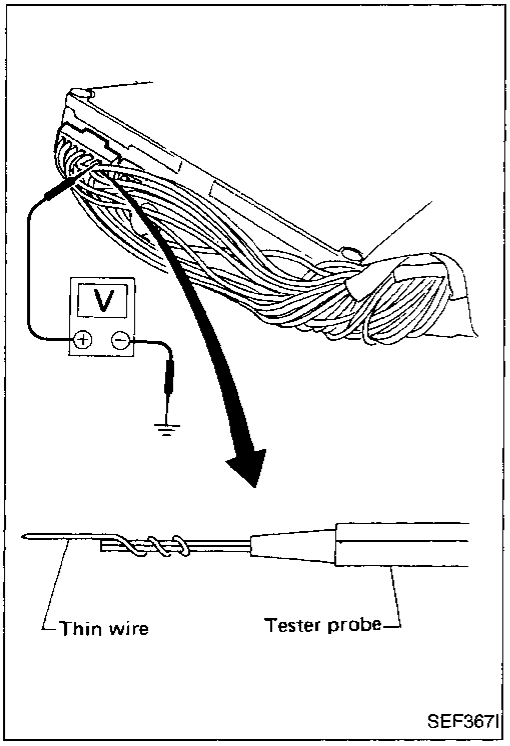
ECM Terminals and Reference Value

PREPARATION

1. ECM is located behind the glove box. For this inspection:
   - Remove glove box bucket.
   - Remove lower finisher panel by reaching through the glove box and releasing the spring clips.

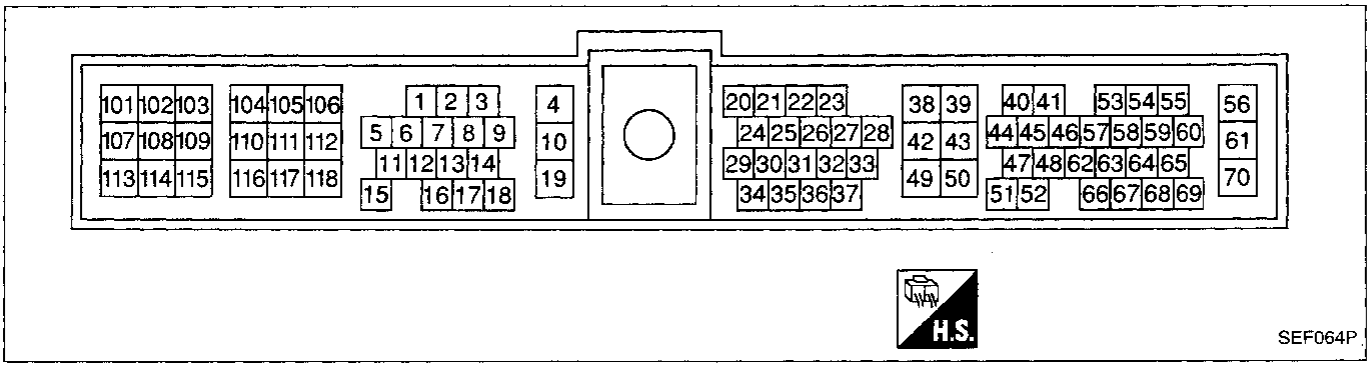


2. Remove ECM harness protector.



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



ECM Terminals and Reference Value (Cont'd)

ECM INSPECTION TABLE

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	W/B	Ignition signal	Engine is running. └ Idle speed	Approximately 0.9V (AC voltage)
			Engine is running. └ Engine speed is 2,000 rpm	1.1 - 1.3V* (AC voltage)
2	W/G	Ignition check	Engine is running. └ Idle speed	6.1 - 6.5V* (AC voltage)
3	W	Tachometer	Engine is running. └ Idle speed	3.0 - 3.1V* (AC voltage)
			Engine is running. └ Engine speed is 2,000 rpm	3.2 - 3.6V* (AC voltage)
4	L/B	ECCS relay (Self-shutoff)	Engine is running. Ignition switch "OFF" └ For a few seconds after turning ignition switch "OFF"	0 - 1V
			Ignition switch "OFF" └ A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
7	Y/G	A/T check signal	Ignition switch "ON" Engine is running.	0 - 3.0V
8	R/L	Fuel pump relay	Ignition switch "ON" └ For 5 seconds after turning ignition switch "ON" Engine is running.	0.7 - 0.9V
			Ignition switch "ON" └ More than 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
9	G/OR	Ambient air temperature switch	Ignition switch "ON" ├ Idle speed ├ Ambient air temperature is above 23.5°C (74°F) └ Air conditioner is operating	0V
			Ignition switch "ON" ├ Idle speed ├ Ambient air temperature is below 23.5°C (74°F) └ Air conditioner is operating	BATTERY VOLTAGE (11 - 14V)
10	B	ECCS ground	Engine is running. └ Idle speed	Engine ground

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

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
15	G/R	Air conditioner relay	Engine is running. └ Both A/C switch and blower switch are "ON"*	Approximately 0V
			Engine is running. └ A/C switch is "OFF"	BATTERY VOLTAGE (11 - 14V)
18	G/R	Malfunction indicator lamp	Ignition switch "ON"	Approximately 0.7V
			Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
19	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
20	B/Y	Start signal	Ignition switch "ON"	Approximately 0V
			Ignition switch "START"	BATTERY VOLTAGE (8 - 12V)
21	B/W	Air conditioner switch	Engine is running. └ Both air conditioner switch and blower switch are "ON" (Compressor operates)	Approximately 0V
			Engine is running. └ Air conditioner switch is "OFF"	BATTERY VOLTAGE (11 - 14V)
22	L/B	Neutral position switch (M/T models) Inhibitor switch (A/T models)	Ignition switch "ON" └ Gear position is "Neutral" (M/T models) └ Gear position is "N" or "P" (A/T models)	Approximately 0V
			Ignition switch "ON" └ Except the above gear position	BATTERY VOLTAGE (8 - 12V)
23	W	Throttle position sensor	Ignition switch "ON" └ Accelerator pedal released	0.4 - 0.6V
			Ignition switch "ON" └ Accelerator pedal fully depressed	Approximately 4V
24	PU/W	A/T signal No. 1	Ignition switch "ON" Engine is running. └ Idle speed	6 - 8V
25	R/B	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

*: Any mode except "OFF", ambient temperature above 10°C (50°F).

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
26	W/L	Vehicle speed sensor	Engine is running. — Lift up the vehicle. — In 1st gear position	Approximately 1.9 - 2.1V* (AC voltage)
28	Y/L	Intake air temperature sensor	Engine is running.	0 - 5.0V Output voltage varies with intake air temperature.
29	P/B	A/T signal No. 2	Ignition switch "ON" Engine is running. — Idle speed	6 - 8V
30	P	A/T signal No. 3	Ignition switch "ON"	0V
33	P	Throttle position sensor signal	Ignition switch "ON" — Accelerator pedal released	Approximately 0.4V
			Ignition switch "ON" — Accelerator pedal fully depressed	Approximately 4V
38	B/W	Ignition switch	Ignition switch "OFF"	0V
			Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
39	B	ECCS ground	Engine is running. — Idle speed	Engine ground
40	L	Camshaft position sensor (Reference signal)	Engine is running. — Idle speed	Approximately 1.1V* (AC voltage)
44	L			
41	B/W	Camshaft position sensor (Position signal)	Engine is running. — Idle speed	Approximately 2.5V* (AC voltage)
43	B	ECCS ground	Engine is running. — Idle speed	Engine ground (Probe this terminal with ⊖ tester probe when measuring.)
46	W	Front heated oxygen sensor (RH)	Engine is running. — After warming up sufficiently and engine speed is 2,000 rpm	0 - Approximately 1.0V (periodically change)
47	W	Mass air flow sensor	Engine is running. (Warm-up condition) — Idle speed	1.3 - 1.7V
			Engine is running. (Warm-up condition) — Engine speed is 2,000 rpm	1.7 - 2.1V
48	B	Mass air flow sensor ground	Engine is running. (Warm-up condition) — Idle speed	Approximately 0V
49	P/B	Throttle position sensor power supply	Ignition switch "ON"	Approximately 5V
50	B	Sensors' ground	Engine is running. (Warm-up condition) — Idle speed	Approximately 0V

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

ECM Terminals and Reference Value (Cont'd)

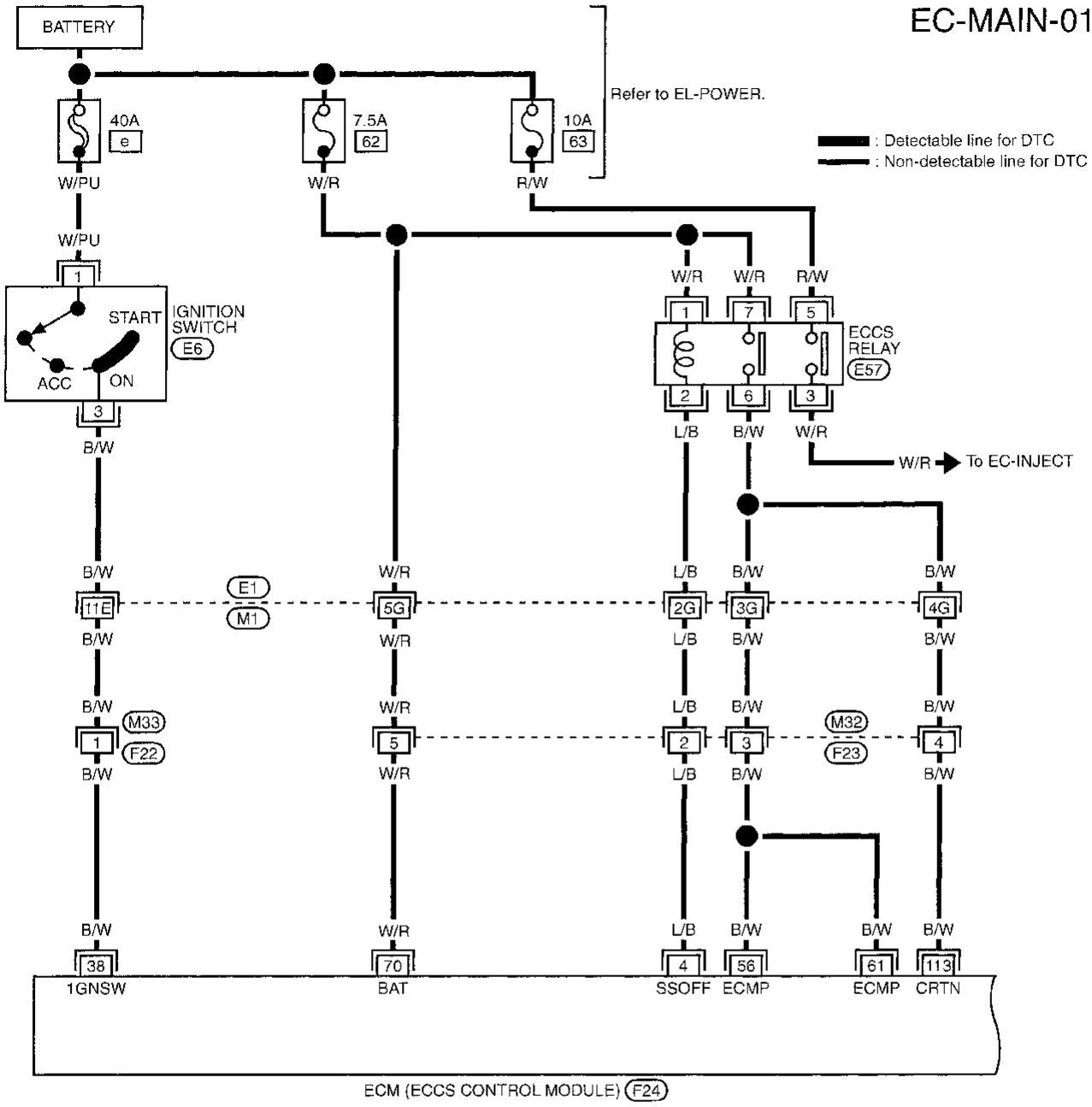
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	LG/R	Engine coolant temperature sensor	Engine is running.	0 - 5V Output voltage varies with engine coolant temperature.
52	L/W	Rear heated oxygen sensor (RH)	Engine is running. └ After warming up sufficiently and engine speed is 2,000 rpm	0 - Approximately 1.0V
53	L	Crankshaft position sensor (OBD)	Engine is running. (A/T: N range, M/T: Neutral) └ Idle speed (Air conditioner switch "OFF")	Approximately 1.4V* (AC voltage)
54	W	Knock sensor	Engine is running. └ Idle speed	Approximately 2.5V
55	OR	IACV-AAC valve	Engine is running. └ Idle speed	8 - 11V
			Engine is running. ├ Rear window defogger is operating ├ Steering wheel is being turned ├ Air conditioner is operating └ Headlamps are in high position	5 - 8V
56	B/W	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
61	B/W			
57	W	Front heated oxygen sensor (LH)	Engine is running. └ After warming up sufficiently and engine speed is 2,000 rpm	0 - Approximately 1.0V (periodically changes)
58	LG/R	Data link connector for GST	Engine is running. └ Idle speed (GST is disconnected)	6 - 10V
62	P/G	EGR temperature sensor	Engine is running. (Warm-up condition) └ Idle speed	Less than 4.5V
			Engine is running. (Warm-up condition) └ EGR system is operating	0 - 1.5V
64	W	Data link connector for CONSULT	Engine is running. └ Idle speed (CONSULT is connected and turned on)	Approximately 0V
65	L			Approximately 4 - 9V
68	OR			Approximately 3.5V*
70	W/R	Power supply (Back-up)	Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
101	PU/R	Rear heated oxygen sensor (LH)	Engine is running. └ After warming up sufficiently and engine speed is 2,000 rpm	0 - Approximately 1.0V

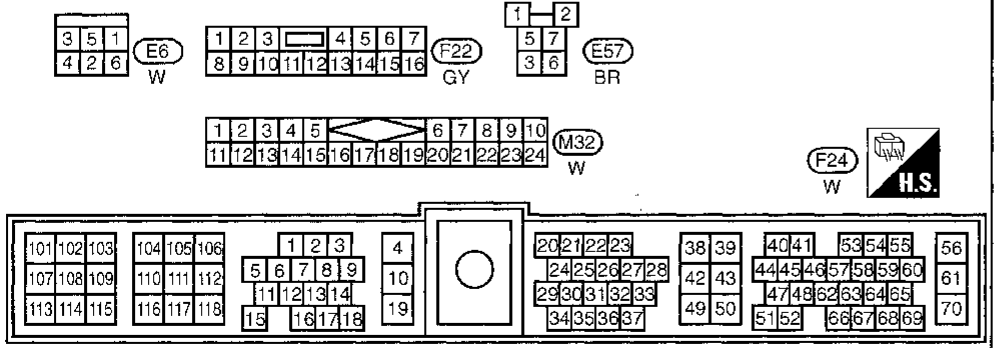
*: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

ECM Terminals and Reference Value (Cont'd)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	W	Injector No. 1	Engine is running	BATTERY VOLTAGE (11 - 14V)
104	Y/R	Injector No. 3		
107	Y	Injector No. 2		
109	W/L	Injector No. 4		
111	W/G	Injector No. 5		
114	W/B	Injector No. 6		
101		Rear heated oxygen sensor heater (LH)	Engine is running. └ Engine speed is below 3,200 rpm	Approximately 0.4V
			Engine is running. └ Engine speed is above 3,200 rpm	BATTERY VOLTAGE
103	L/W	EGR valve & EVAP canister purge control solenoid valve	Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)
			Engine is running. (Warm-up condition) — Lift up the vehicle — Engine speed is above 2,000 rpm — Idle speed └ In 1st gear position	0.8 - 0.9V
106	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
110	PU/W	Front heated oxygen sensor heater (LH)	Engine is running. └ Engine speed is below 3,200 rpm	Approximately 0.4V
			Engine is running. └ Engine speed is above 3,200 rpm	BATTERY VOLTAGE
112	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
113	B/W	Current return	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
115	PU	Front heated oxygen sensor heater (RH)	Engine is running. └ Engine speed is below 3,200 rpm	Approximately 0.4V
			Engine is running. └ Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
116	PU/G	Rear heated oxygen sensor heater (RH)	Engine is running. └ Engine speed is below 3,200 rpm	Approximately 0.4V
			Engine is running. └ Engine speed is above 3,200 rpm	BATTERY VOLTAGE (11 - 14V)
118	B	ECCS ground	Engine is running. └ Idle speed	Engine ground

Main Power Supply and Ground Circuit





Refer to last page (Foldout page).
E1 , M1

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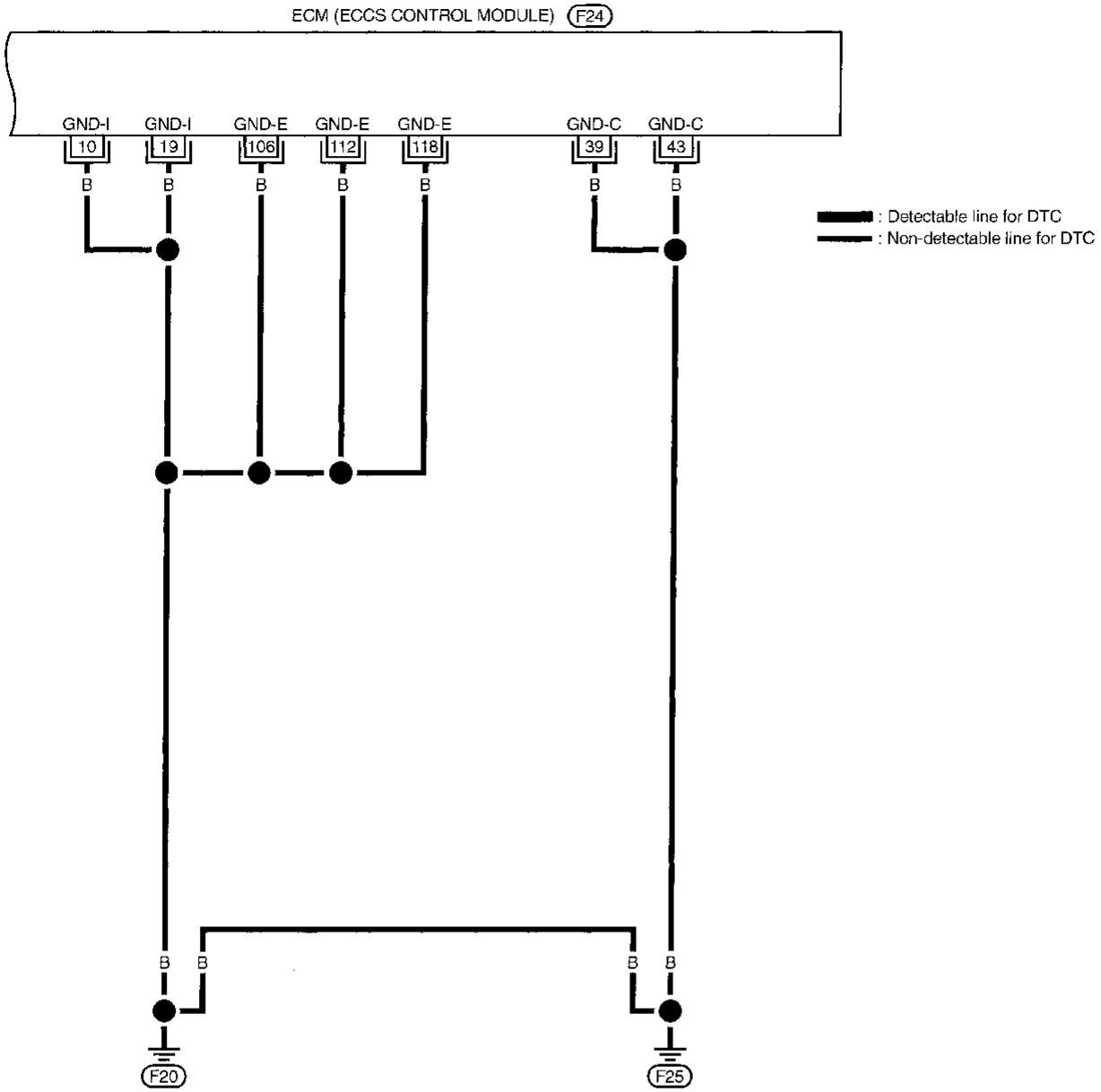
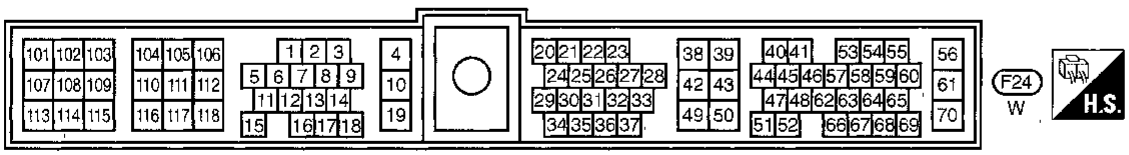
Main Power Supply and Ground Circuit (Cont'd)

EC-MAIN-02





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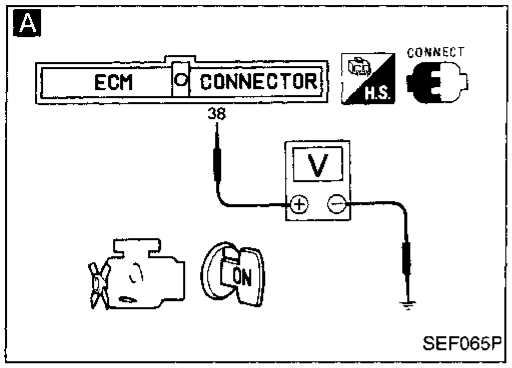
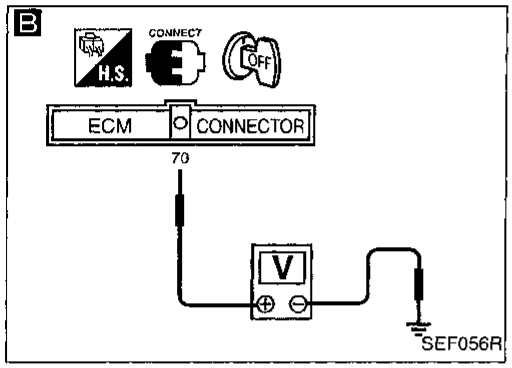
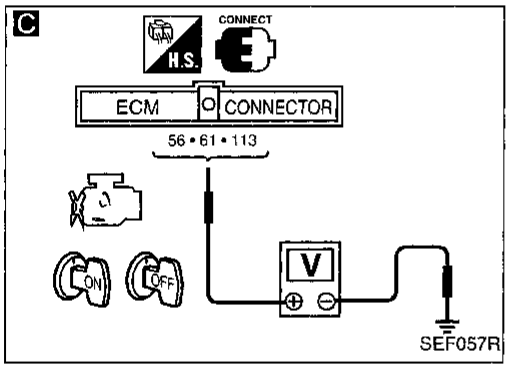
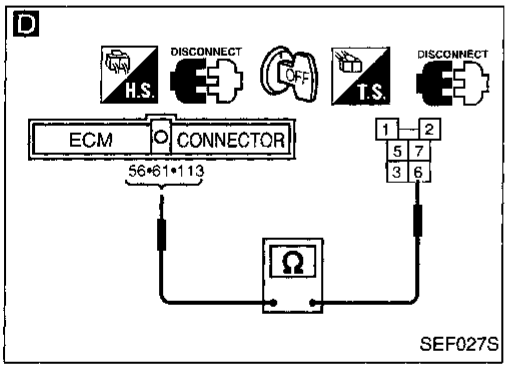
Main Power Supply and Ground Circuit (Cont'd)









INSPECTION START

Start engine.
Is engine running?

No → **A**

CHECK POWER SUPPLY-I.
1. Turn ignition switch "ON".
2. Check voltage between ECM terminal (38) and ground with CONSULT or tester.
   Voltage: Battery voltage

If NG, check the following.
- Harness connectors (F22), (M33)
- Harness connectors (M1), (E1)
- Harness for open or short between ECM and ignition switch

If NG, repair harness or connectors.

OK → Go to H "CHECK GROUND CIRCUIT" on next page.

Yes

B

CHECK POWER SUPPLY-II.
1. Stop engine.
2. Check voltage between ECM terminal (70) and ground with CONSULT or tester.
   Voltage: Battery voltage

NG →
Check the following.
- Harness connectors (F23), (M32)
- Harness connectors (M1), (E1)
- 7.5A fuse
- Harness for open or short between ECM and battery

If NG, repair harness or connectors.

OK

C

CHECK POWER SUPPLY-III.
1. Turn ignition switch "ON" and then "OFF".
2. Check voltage between ECM terminals (56), (61), (113) and ground with CONSULT or tester.
   Voltage:
   After turning ignition switch "OFF", battery voltage will exist for a few seconds, then drop to approximately 0V.

OK → Go to H "CHECK GROUND CIRCUIT" on next page.

Case-1: Battery voltage does not exist.
Case-2: Battery voltage exists for more than a few seconds.

NG

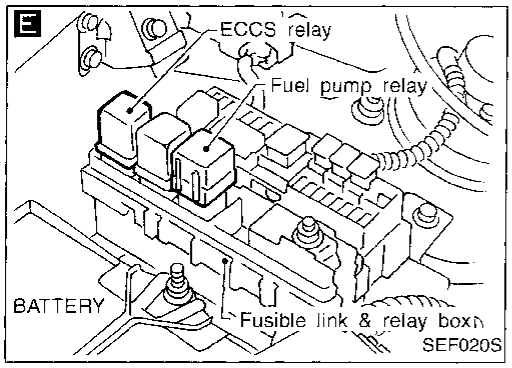
Case-1 → Ⓐ

Case-2 → Go to G "CHECK ECCS RELAY" on next page.

Main Power Supply and Ground Circuit (Cont'd)

(A)

E



D

CHECK HARNESS CONTINUITY BETWEEN ECCS RELAY AND ECM

1. Disconnect ECM harness connector.
2. Disconnect ECCS relay harness connector.
3. Check harness continuity between ECM terminals (56), (61), (113) and relay terminal (6).

Continuity should exist.

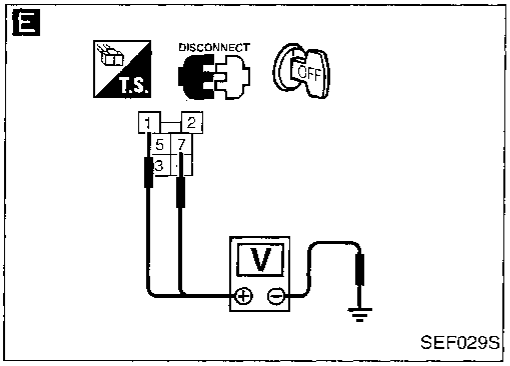
If OK, check harness for short.

NG → Check the following.
- Harness connectors (F23), (M32)
- Harness connectors (E1), (M1)
- Harness for open or short between relay and ECM

If NG, repair harness or connectors.

OK ↓

E



E

CHECK VOLTAGE BETWEEN ECCS RELAY AND GROUND.

Check voltage between relay terminals (1), (7) and ground with CONSULT or tester.

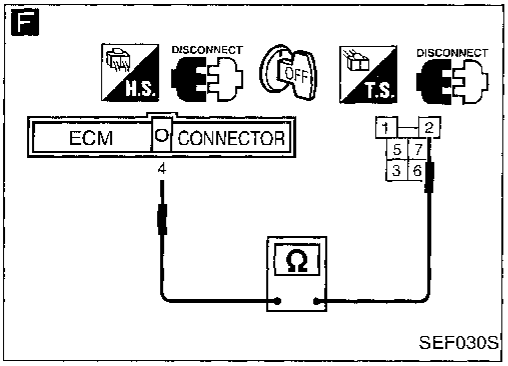
Voltage: Battery voltage

NG → Check the following.
- Harness connectors (E56), (F6)
- Harness for open or short between ECCS relay and battery

If NG, repair harness or connectors.

OK ↓

F



F

CHECK OUTPUT SIGNAL CIRCUIT.

Check harness continuity between ECM terminal (4) and relay terminal (2).

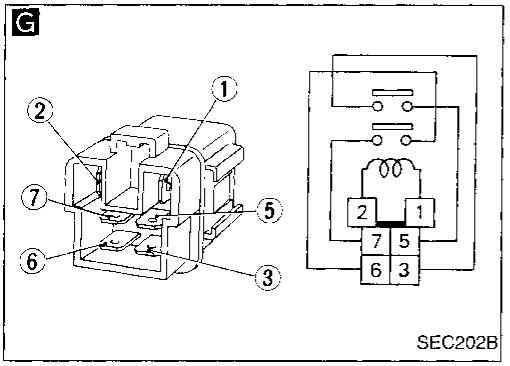
Continuity should exist.

If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

G



G

CHECK ECCS RELAY.

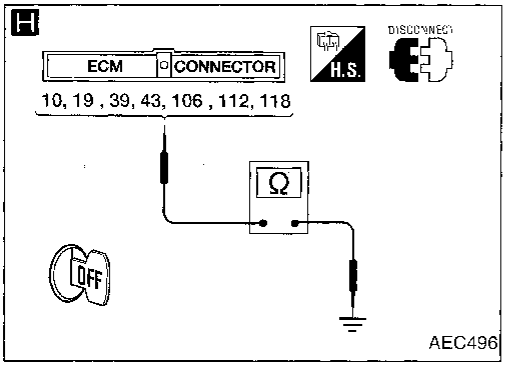
1. Apply 12V direct current between relay terminals (1) and (2).
2. Check continuity between relay terminals (3) and (5), (7) and (6).

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

NG → Replace ECCS relay.

OK ↓

H



H

CHECK GROUND CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals (10), (19), (39), (43), (106), (112), (118) and engine ground.

Continuity should exist.

If OK, check harness for short.

NG → Check the following.
- Harness connectors (F23), (M32)
- Harness connectors (M1), (E1)
- Harness for open or short between ECM and ground

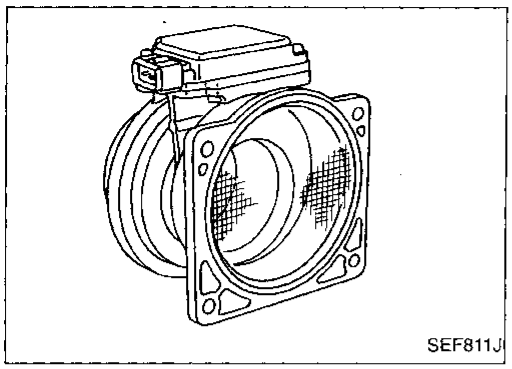
If NG, repair harness or connectors.

OK ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector.

↓

INSPECTION END


SEF811J

Mass Air Flow Sensor (MAFS) (DTC: 0102)

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

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0100 0102	A) An excessively high or low voltage from the sensor is sent to ECM. B), C) Voltage sent to ECM is not practical when compared with the camshaft position sensor and throttle position sensor signals.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Perform "Procedure for malfunction A" first. If DTC cannot be confirmed, perform "Procedure for malfunction B". If DTC still cannot be confirmed, perform "OVERALL FUNCTION CHECK", "Procedure for malfunction C".

Procedure for malfunction A

1) Turn ignition switch "ON", and wait at least 6 seconds.
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and wait at least 3 seconds.

OR

1) Turn ignition switch "ON", and wait at least 6 seconds.
2) Start engine and wait at least 3 seconds.
3) Select "MODE 3" with GST.

OR

1) Turn ignition switch "ON", and wait at least 6 seconds.
2) Start engine and wait at least 3 seconds.
3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
4) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

Mass Air Flow Sensor (MAFS) (DTC: 0102) (Cont'd)

Procedure for malfunction B

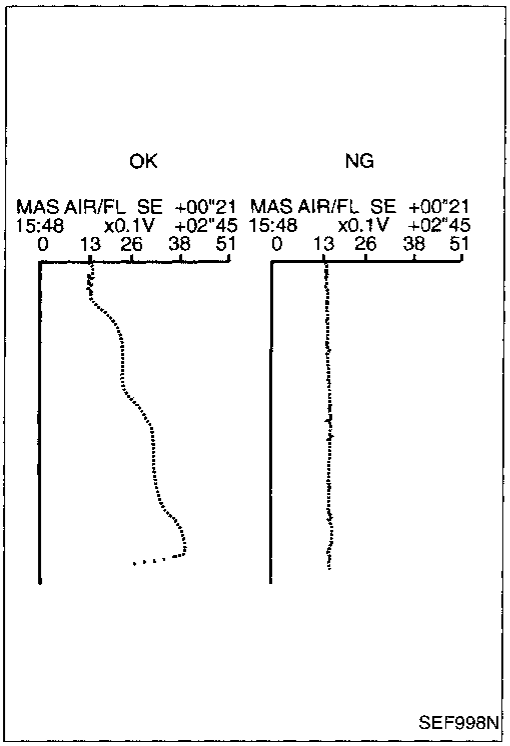
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and warm it up sufficiently.
4) Run engine for at least 10 seconds at idle speed.

OR

1) Turn ignition switch "ON".
2) Start engine and warm it up sufficiently.
3) Run engine for at least 10 seconds at idle speed.
4) Select "MODE 3" with GST.

OR

1) Turn ignition switch "ON".
2) Start engine and warm it up sufficiently.
3) Run engine for at least 10 seconds at idle speed.
4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
5) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.



OVERALL FUNCTION CHECK

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

Procedure for malfunction C

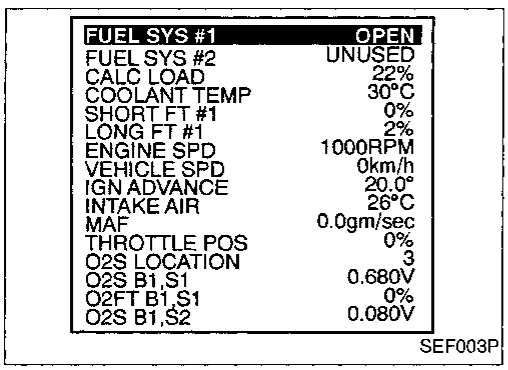
1) Turn ignition switch "ON".
2) Start engine and warm it up sufficiently.
3) Select "DATA MONITOR" mode with CONSULT.
4) Check the voltage of mass air flow sensor with "DATA MONITOR".
5) Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.

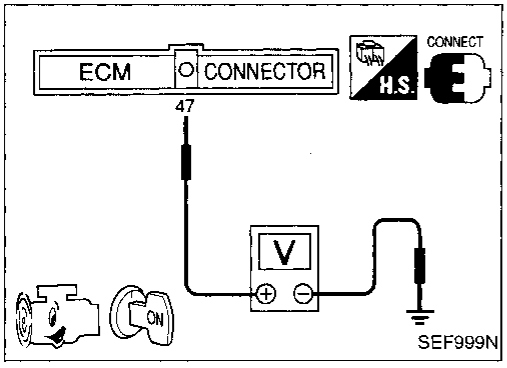
OR

1) Turn ignition switch "ON".
2) Start engine and warm it up sufficiently.
3) Select "MODE 1" with GST.
4) Check the mass air flow with "MODE 1".
5) Check for linear mass air flow rise in response to increases to about 4,000 rpm in engine speed.

OR

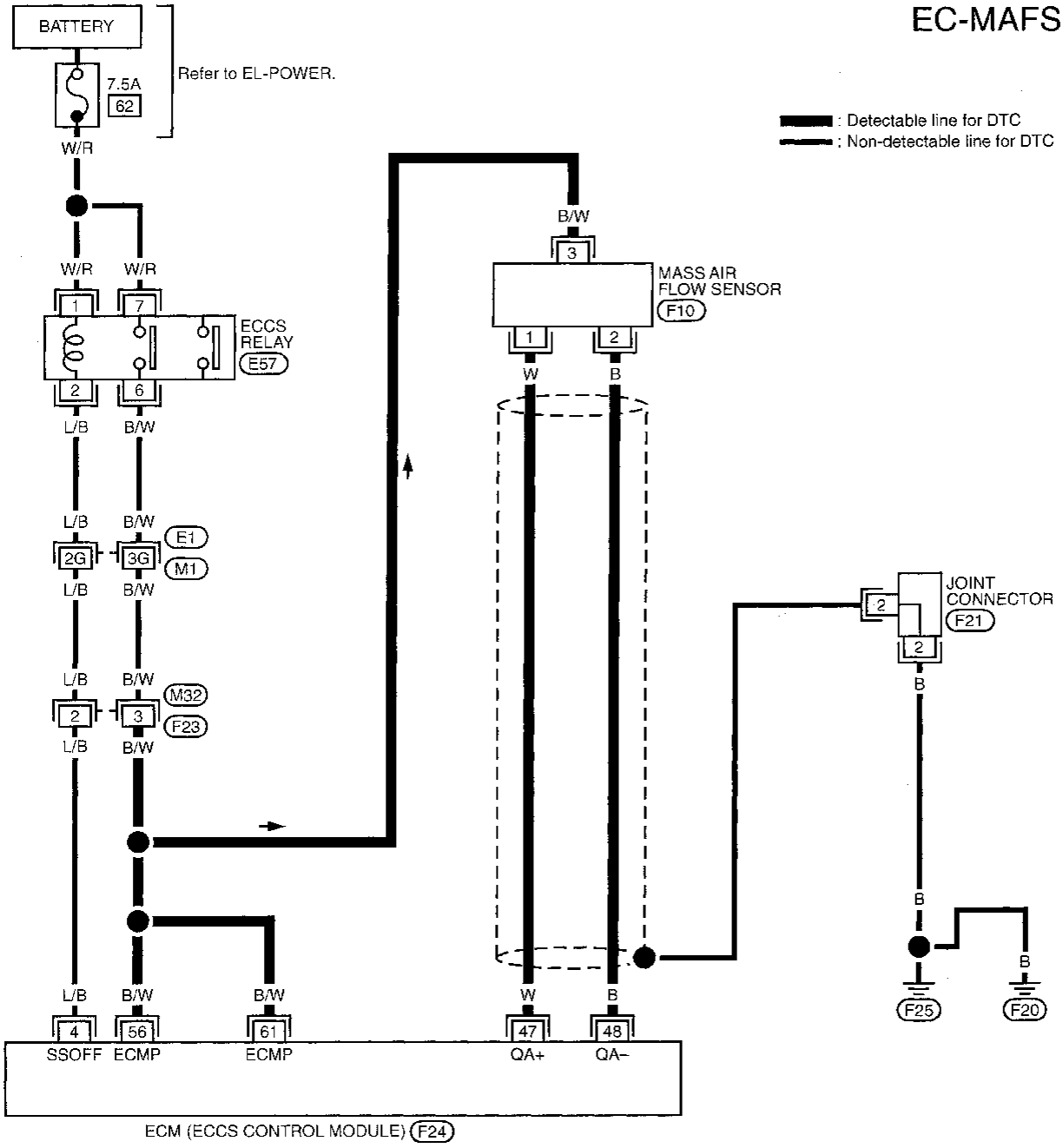
1) Turn ignition switch "ON".
2) Start engine and warm it up sufficiently.
3) Check the voltage between ECM terminal ㊼ and ground.
4) Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.

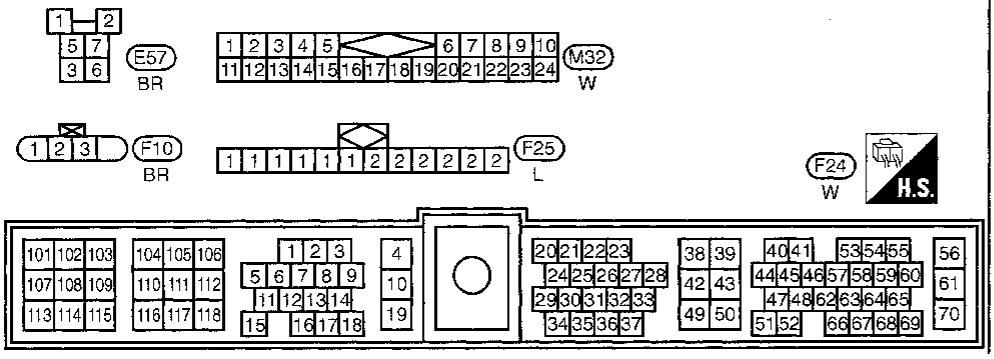




Mass Air Flow Sensor (MAFS) (DTC: 0102) (Cont'd)

EC-MAFS-01



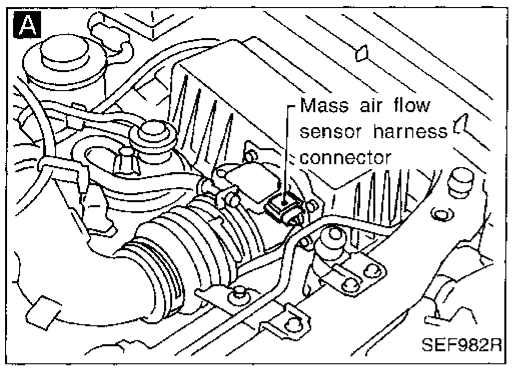


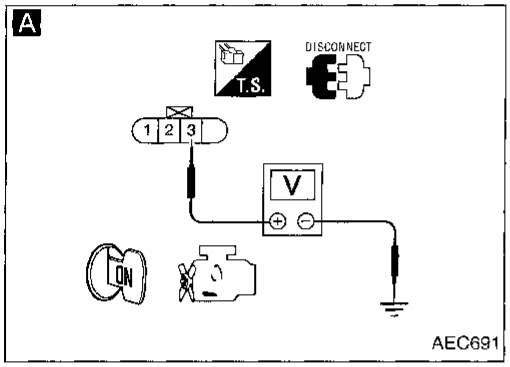
Refer to last page (Foldout page).
E1 , M1

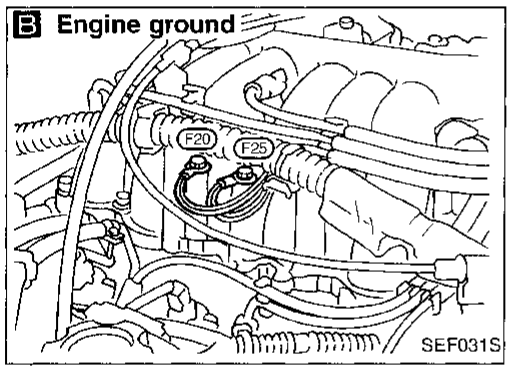
SEF891R

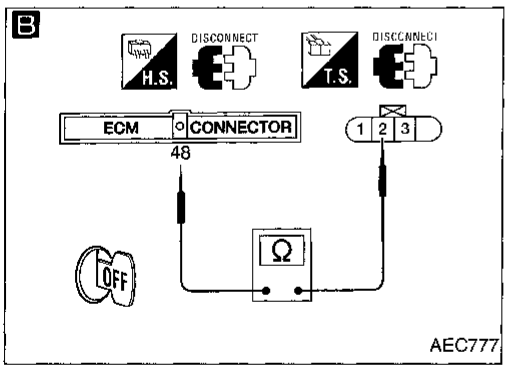
Mass Air Flow Sensor (MAFS) (DTC: 0102) (Cont'd)

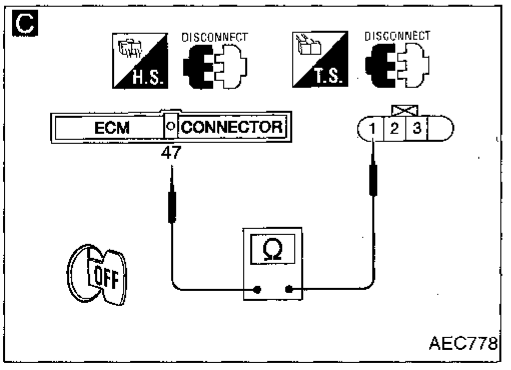
DIAGNOSTIC PROCEDURE











INSPECTION START

A

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect mass air flow sensor harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ③ and ground with CONSULT or tester.
   Voltage: Battery positive voltage

NG → Check the following.
- Harness connectors (F23), (M32)
- Harness connectors (M1), (E1)
- Harness for open or short between ECCS relay and mass air flow sensor

If NG, repair harness or connectors.

OK ↓

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Loosen and retighten engine ground screws.
4. Check harness continuity between terminal ② and ECM terminal ㊽.
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

C

CHECK INPUT SIGNAL CIRCUIT.
Check harness continuity between terminal ① and ECM terminal ㊼.
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(Mass air flow sensor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace mass air flow sensor.

OK ↓

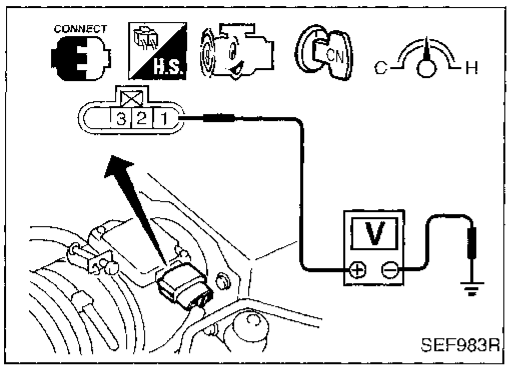
Disconnect and reconnect harness connectors in the circuits. Then retest.

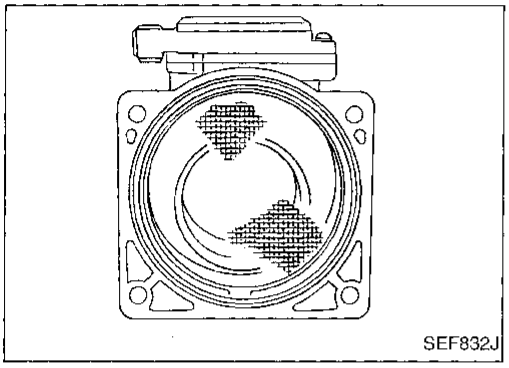
Trouble is not fixed. ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

Mass Air Flow Sensor (MAFS) (DTC: 0102) (Cont'd)





COMPONENT INSPECTION

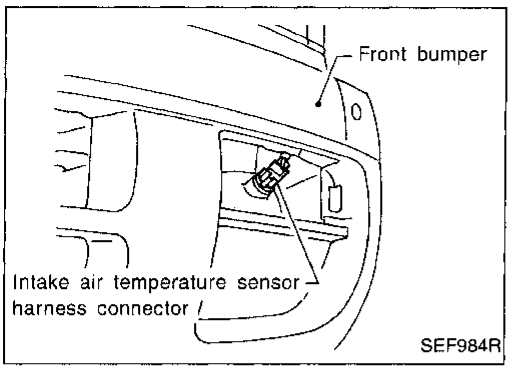
Mass air flow sensor

1. Turn ignition switch "ON".
2. Start engine and warm it up sufficiently.
3. Check voltage between terminal ① and ground.

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up sufficiently.)	1.3 - 1.7
Idle to about 4,000 rpm*	1.3 - 1.7 to Approx. 4.0

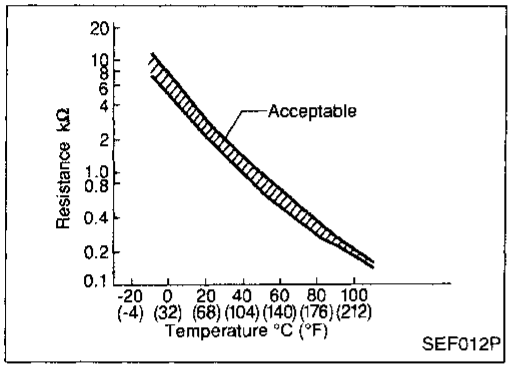
*: Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.

4. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.



Intake Air Temperature Sensor (DTC: 0401)

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.
This sensor is not used to control the engine system. It is used only for the on board diagnosis.



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

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

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

Procedure for malfunction A

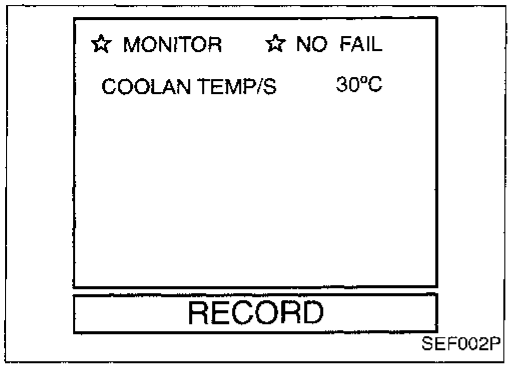
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 5 seconds.

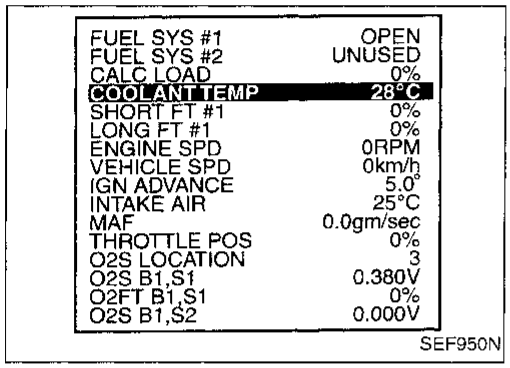
OR

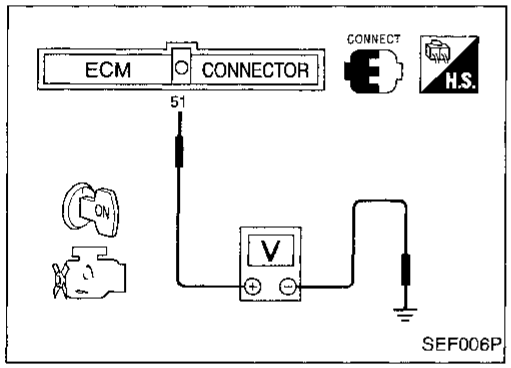
1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Select MODE 3 with GST.

OR

1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform diagnostic test mode II (Self-diagnostic results) with ECM.







Intake Air Temperature Sensor (DTC: 0401) (Cont'd)

Procedure for malfunction B

1) Lift up vehicle and open engine hood.
2) Wait until engine coolant temperature is less than 90°C (194°F).
   (a) Turn ignition switch "ON".
   (b) Select "DATA MONITOR" mode with CONSULT.
   (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).
3) Turn ignition switch "ON".
4) Select "DATA MONITOR" mode with CONSULT.
5) Start engine.
6) Shift selector lever to "D" position.
7) Hold vehicle speed at 70 - 80 km/h (43 - 50 MPH) for 2 minutes.

OR

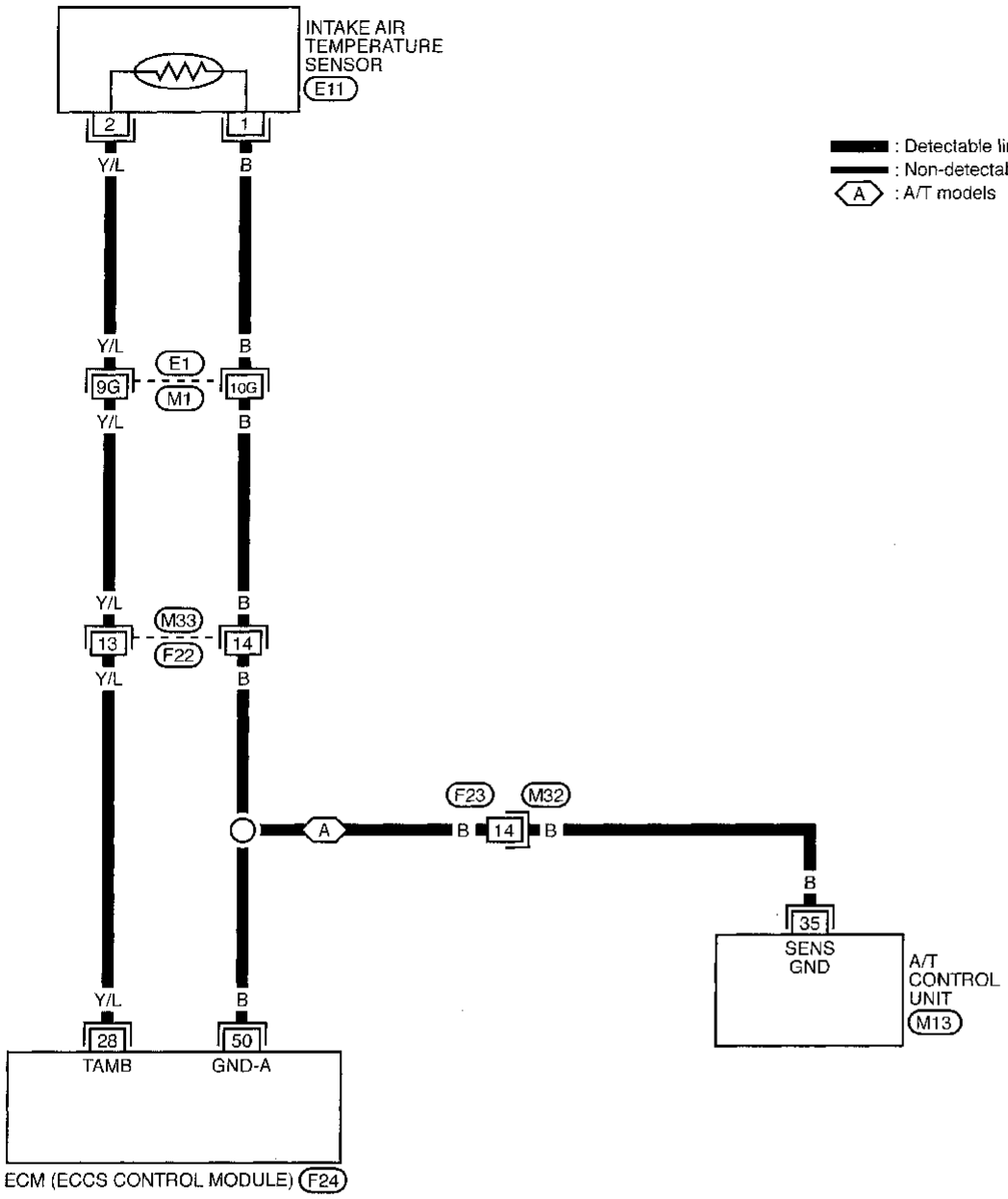
1) Lift up vehicle and open engine hood.
2) Wait until engine coolant temperature is less than 90°C (194°F).
   (a) Turn ignition switch "ON".
   (b) Select MODE 1 with GST.
   (c) Check the engine coolant temperature.
   (d) If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch "OFF" and cool down engine.
   - Perform the following steps before engine coolant temperature is above 90°C (194°F).
3) Start engine.
4) Shift selector lever to "D" position.
5) Hold vehicle speed at 70 - 80 km/h (43 - 50 MPH) for 2 minutes.
6) Select MODE 3 with GST.

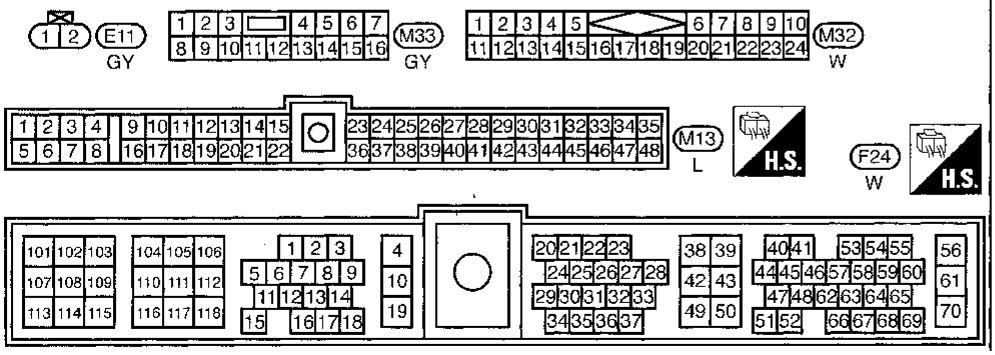
OR

1) Lift up vehicle and open engine hood.
2) Wait until engine coolant temperature is less than 90°C (194°F).
   (a) Turn ignition switch "ON".
   (b) Check voltage between ECM terminal (51) and ground.
   Voltage: More than 1.0 (V)
   (c) If the voltage is not more than 1.0 (V), turn ignition switch "OFF" and cool down engine.
   - Perform the following steps before the voltage is below 1.0V.
3) Start engine.
4) Shift selector lever to "D" position.
5) Hold vehicle speed at 70 - 80 km/h (43 - 50 MPH) for 2 minutes.
6) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
7) Perform diagnostic test mode II (Self-diagnostic results) with ECM.

Intake Air Temperature Sensor (DTC: 0401) (Cont'd)

EC-IATS-01



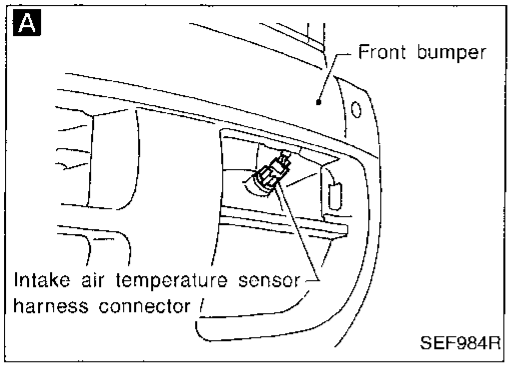


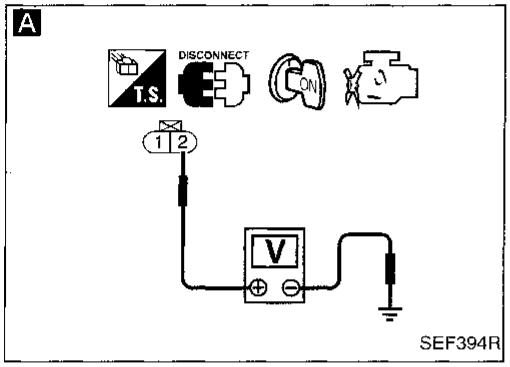
Refer to last page (Foldout page).
E1 , M1

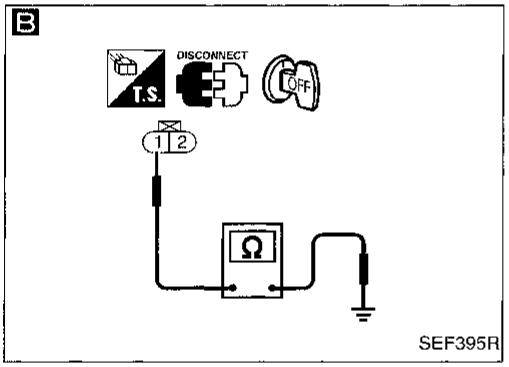
SEF892R

Intake Air Temperature Sensor (DTC: 0401) (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

A

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect intake air temperature sensor harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ② and ground.
   Voltage:
   Approximately 5V

NG → Check the following.
- Harness connectors (F22), (M33)
- Harness connectors (M1), (E1)
- Harness for open or short between ECM and intake air temperature sensor

If NG, repair harness or connectors.

OK ↓

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Check harness continuity between terminal ① and engine ground.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors (F22), (M33)
- Harness connectors (F23), (M32) (A/T models)
- Harness connectors (M1), (E1)
- Harness for open or short between ECM and intake air temperature sensor
- Harness for open or short between A/T control unit and intake air temperature sensor

If NG, repair harness or connectors

OK ↓

CHECK COMPONENT
(Intake air temperature sensor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace intake air temperature sensor.

OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector.
Reconnect ECM harness connector and retest.

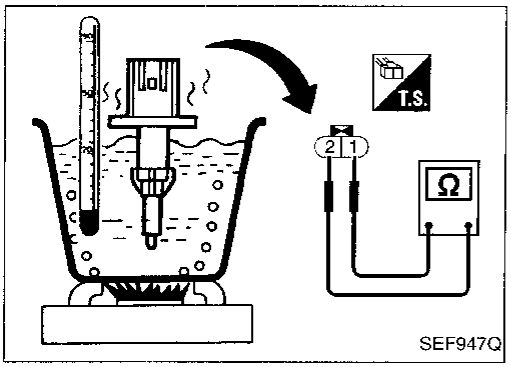
INSPECTION END

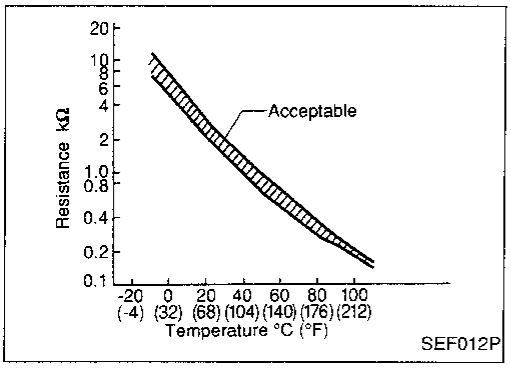
Intake Air Temperature Sensor (DTC: 0401) (Cont'd)

COMPONENT INSPECTION

Intake air temperature sensor

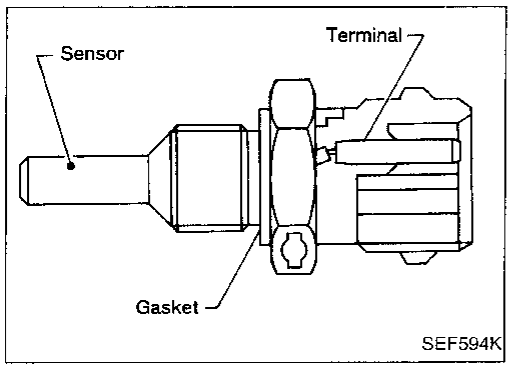
Check resistance as shown in the figure.





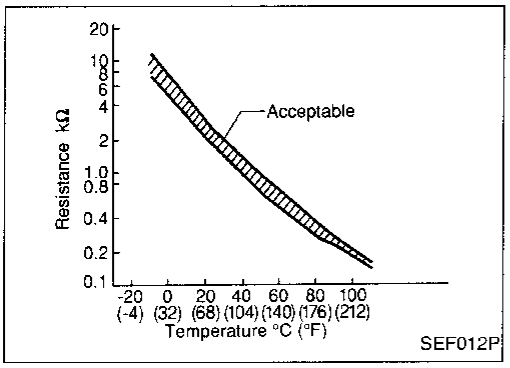
Intake air temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

If NG, replace intake air temperature sensor.



Engine Coolant Temperature Sensor (ECTS) (DTC: 0103)

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

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

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 5 seconds.

OR

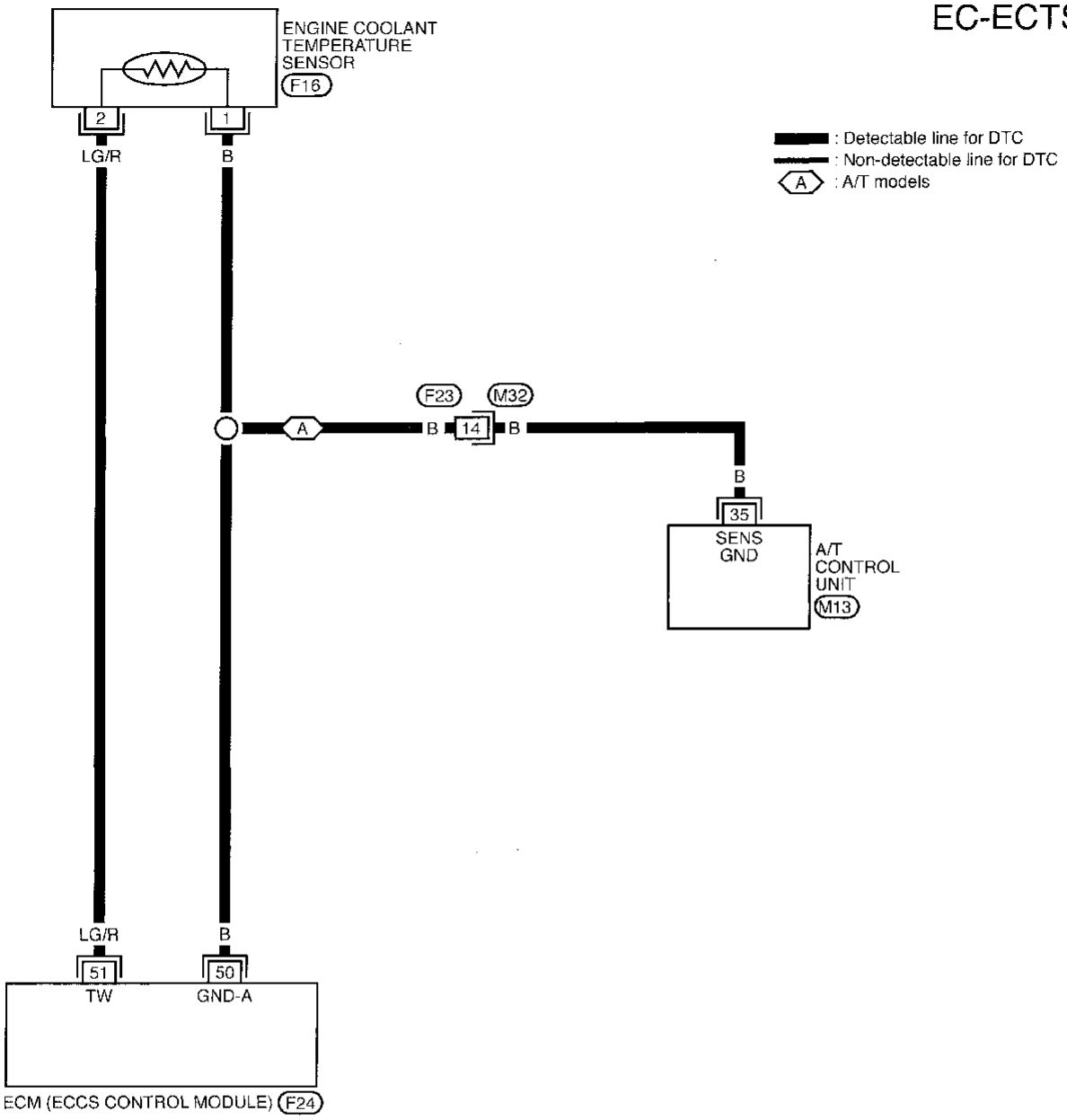
1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Select "MODE 3" with GST.

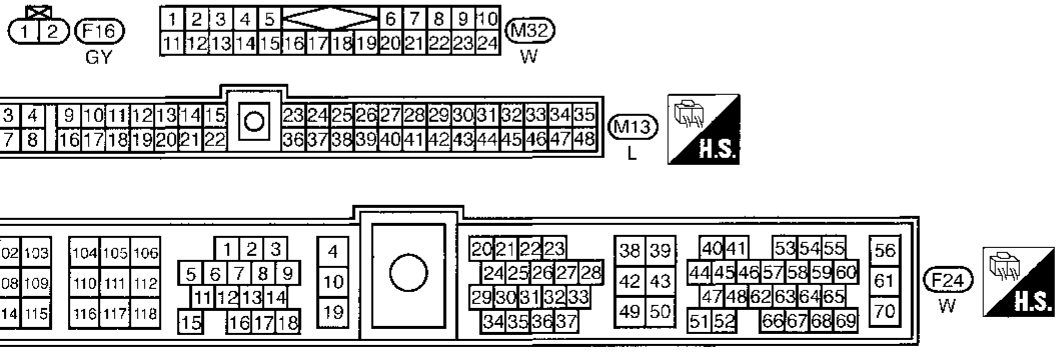
OR

1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

Engine Coolant Temperature Sensor (ECTS) (DTC: 0103) (Cont'd)

EC-ECTS-01

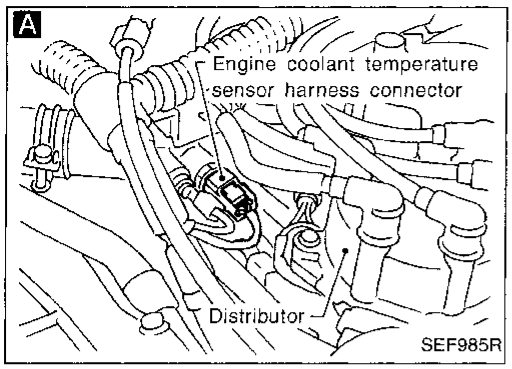


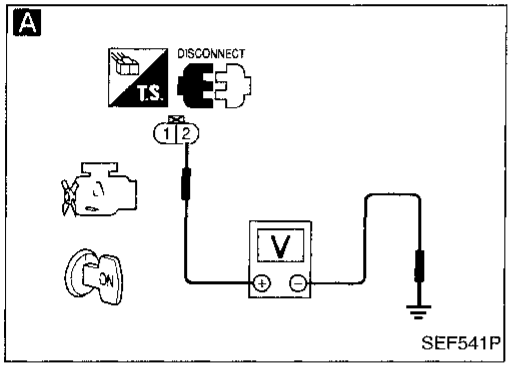


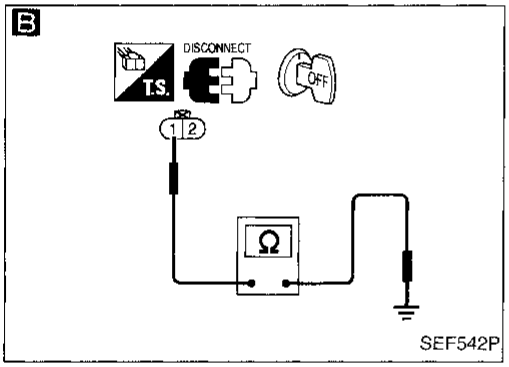
SEF893R

Engine Coolant Temperature Sensor (ECTS) (DTC: 0103) (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

A

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect engine coolant temperature sensor harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ② and ground with CONSULT or tester.

Voltage:
Approximately 5V

NG → Repair harness or connectors.

OK

B

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

Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors (F23), (M32) (A/T models)
- Harness for open or short between ECM and engine coolant temperature sensor
- Harness for open or short between A/T control unit and engine coolant temperature sensor

If NG, repair harness or connectors.

OK

CHECK COMPONENT
(Engine coolant temperature sensor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace engine coolant temperature sensor.

OK

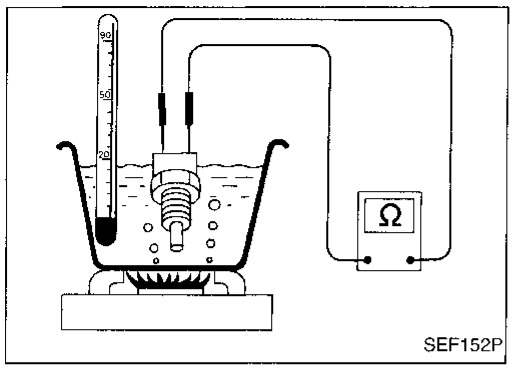
Disconnect and reconnect harness connectors in the circuits. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

Engine Coolant Temperature Sensor (ECTS) (DTC: 0103) (Cont'd)

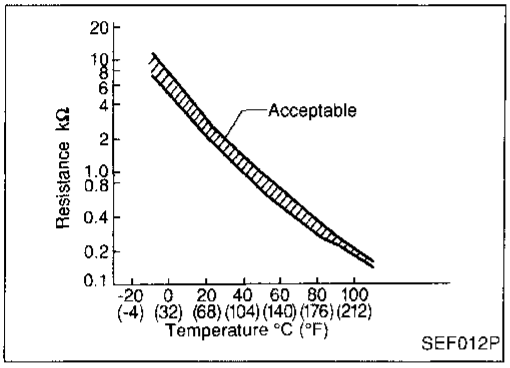


COMPONENT INSPECTION

Engine coolant temperature sensor

Check resistance as shown in the figure.

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

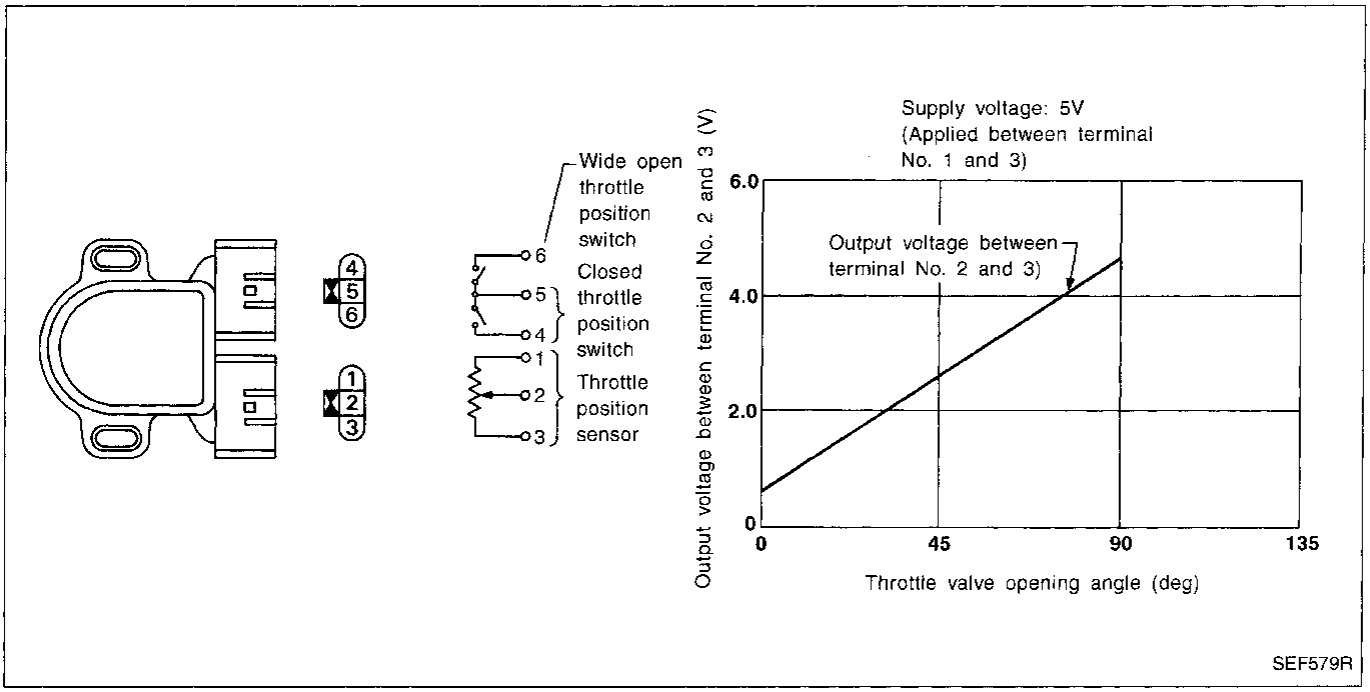


If NG, replace engine coolant temperature sensor.

Throttle Position Sensor (DTC: 0403)

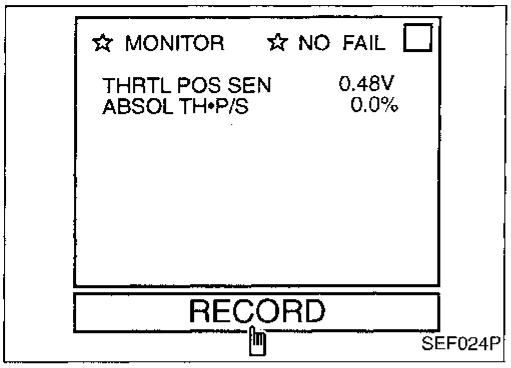
The throttle position sensor responds to the accelerator pedal movement. This sensor is a kind of potentiometer which transforms the throttle position into output voltage, and emits the voltage signal to the ECM. In addition, the sensor detects the opening and closing speed of the throttle valve and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

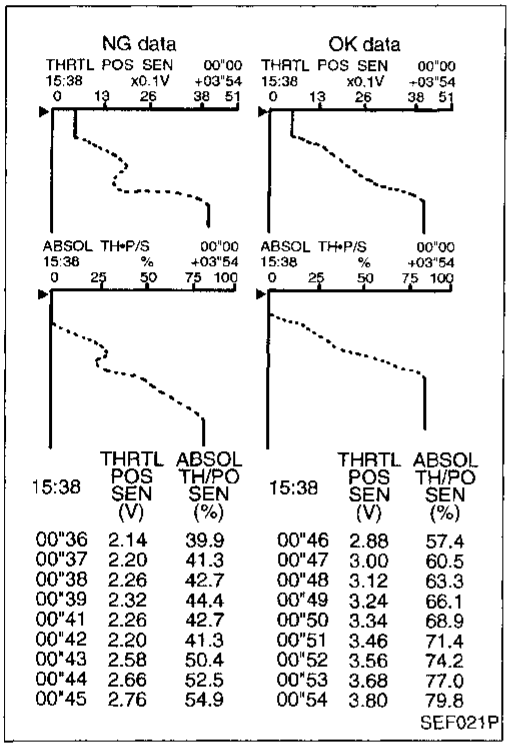
Idle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This sensor controls engine operation such as fuel cut. On the other hand, the "Wide open and closed throttle position switch", which is built into the throttle position sensor unit, is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



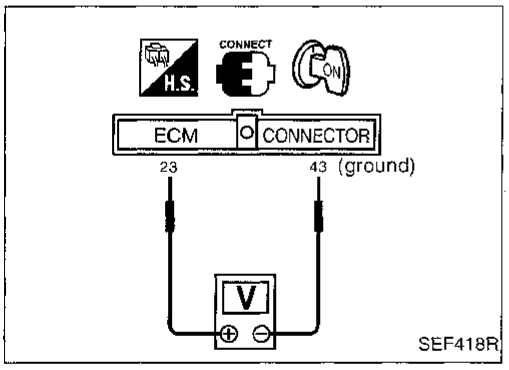
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0120 0403	• An excessively low or high voltage from the sensor is sent to ECM. • Voltage sent to ECM is not practical when compared with mass air flow sensor and camshaft position sensor signals.	• Harness or connectors (The sensor circuit is open or shorted.) • Throttle position sensor

Throttle Position Sensor (DTC: 0403) (Cont'd)





15:38	THRTL POS SEN (V)	ABSOL TH/PO SEN (%)	15:38	THRTL POS SEN (V)	ABSOL TH/PO SEN (%)
00"36	2.14	39.9	00"46	2.88	57.4
00"37	2.20	41.3	00"47	3.00	60.5
00"38	2.26	42.7	00"48	3.12	63.3
00"39	2.32	44.4	00"49	3.24	66.1
00"41	2.26	42.7	00"50	3.34	68.9
00"42	2.20	41.3	00"51	3.46	71.4
00"43	2.58	50.4	00"52	3.56	74.2
00"44	2.66	52.5	00"53	3.68	77.0
00"45	2.76	54.9	00"54	3.80	79.8



OVERALL FUNCTION CHECK

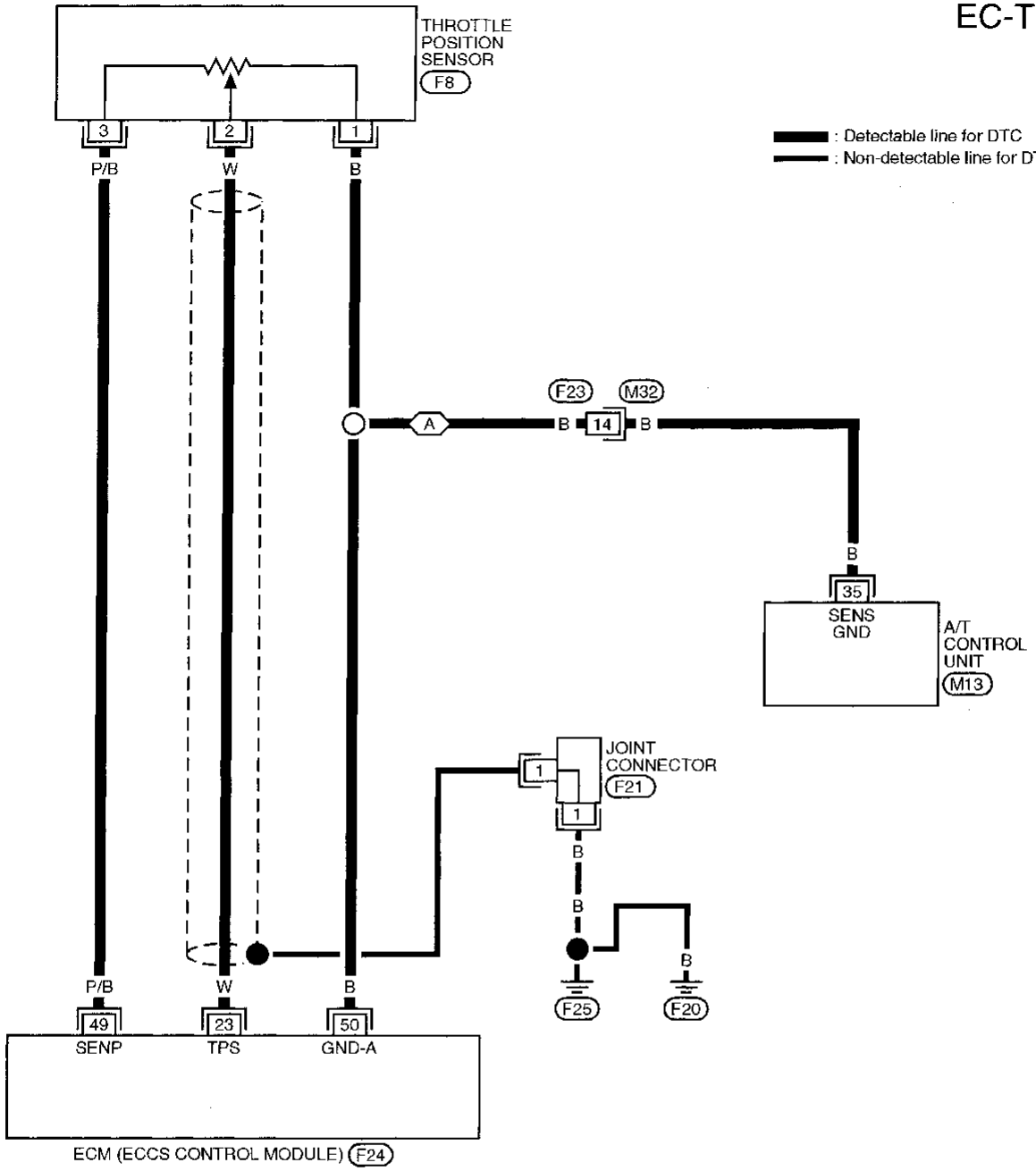
Use this procedure to check the overall function of the throttle position sensor. During this check, a DTC might not be confirmed.

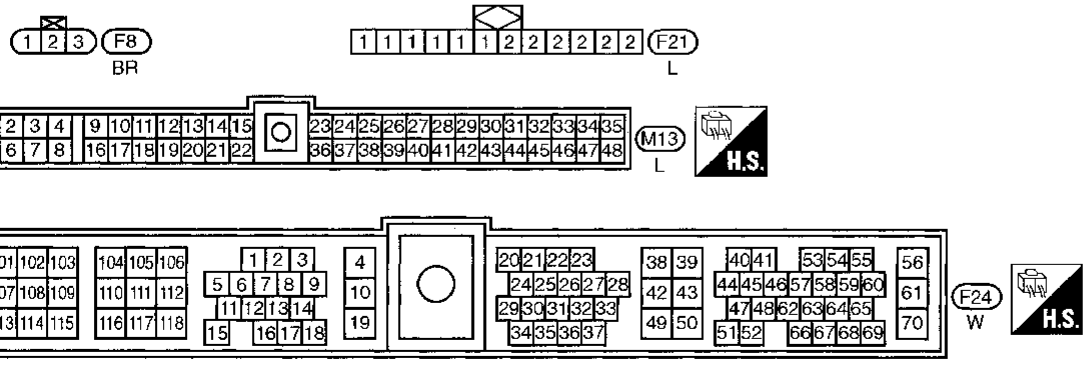
1) Turn ignition switch "ON".
2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT.
3) Select "THRTL POS SEN" and "ABSOL TH/PS" in "DATA MONITOR" mode with CONSULT.
4) Press RECORD on CONSULT SCREEN at the same time accelerator pedal is depressed.
5) Print out the recorded data and check the following:
   - The voltage when accelerator pedal fully released is approximately 0.3 - 0.7V.
   - The voltage rise is linear in response to accelerator pedal depression.
   - The voltage when accelerator pedal fully depressed is approximately 4V.

OR

1) Turn ignition switch "ON".
2) Check the voltage between ECM terminal ㉓ and ㊸ (ground) and check the following:
   - The voltage when accelerator pedal fully released is approximately 0.3 - 0.7V.
   - The voltage rise is linear in response to accelerator pedal depression.
   - The voltage when accelerator pedal fully depressed is approximately 4V.

EC-TPS-01

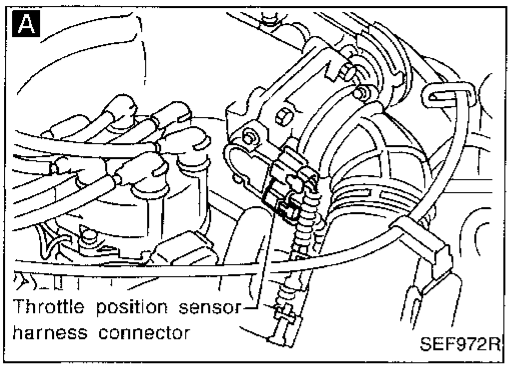


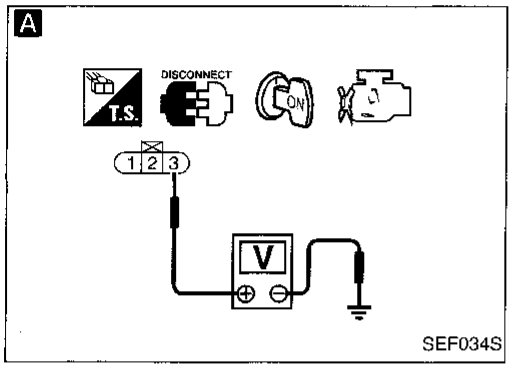


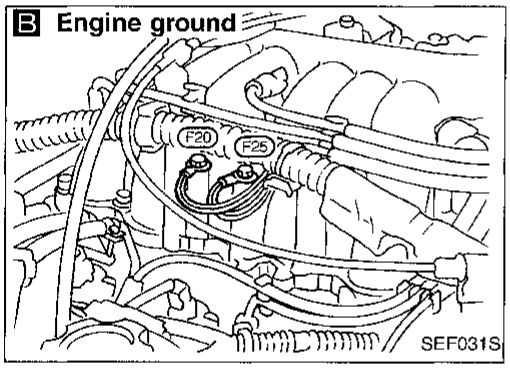
SEF914R

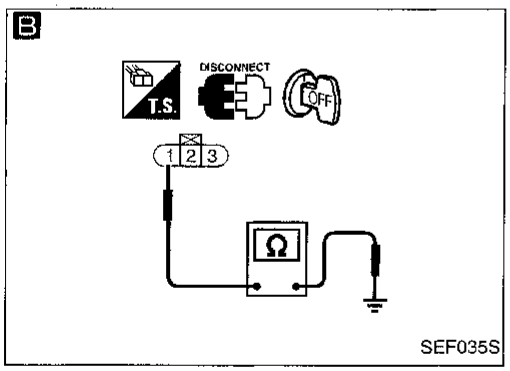
Throttle Position Sensor (DTC: 0403) (Cont'd)

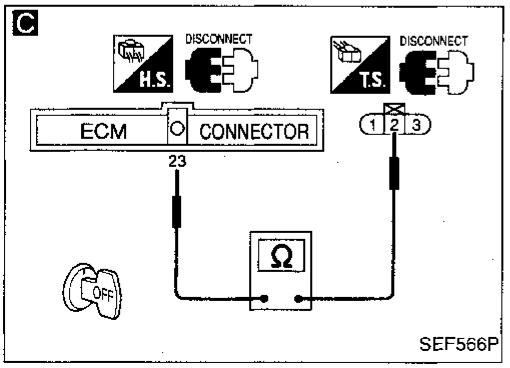
DIAGNOSTIC PROCEDURE











INSPECTION START

A

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect throttle position sensor harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ③ and ground with CONSULT or tester.
   Voltage: Approximately 5V

NG → Repair harness or connectors.

OK

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screw.
3. Check harness continuity between terminal ① and engine ground.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors (F23), (M32) (A/T models)
- Harness for open or short between ECM and throttle position sensor
- Harness continuity between A/T control unit and throttle position sensor

If NG, repair harness or connectors.

OK

C

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ㉓ and terminal ②.
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

OK

ADJUST THROTTLE POSITION SENSOR.
Perform "Basic Inspection", EC-60.

OK

CHECK COMPONENT
(Throttle position sensor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace throttle position sensor. To adjust it, perform "Basic Inspection", EC-60.

OK

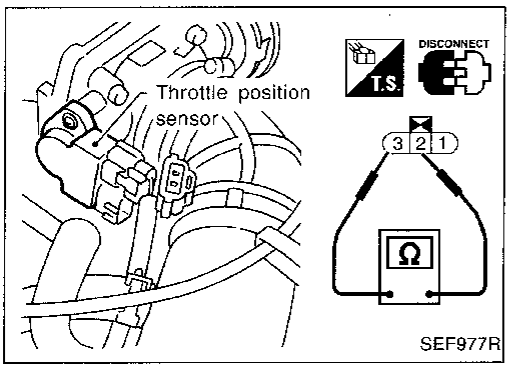
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

Throttle Position Sensor (DTC: 0403) (Cont'd)



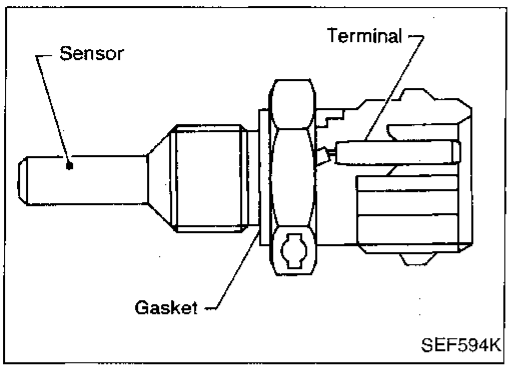
COMPONENT INSPECTION

Throttle position sensor

1. Disconnect throttle position sensor harness connector.
2. Make sure that resistance between terminals ② and ③ changes when opening throttle valve manually.

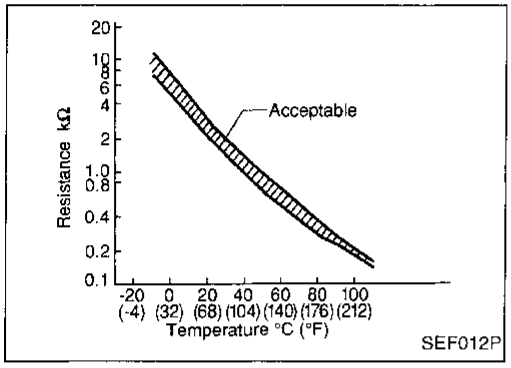
Throttle valve conditions	Resistance [at 25°C (77°F)]
Completely closed	Approximately 0.5 kΩ
Partially open	0.5 - 4 kΩ
Completely open	Approximately 4 kΩ

If NG, replace throttle position sensor.
To adjust it, perform "Basic Inspection", EC-60.



Engine Coolant Temperature (ECT) Sensor (DTC: 0908)

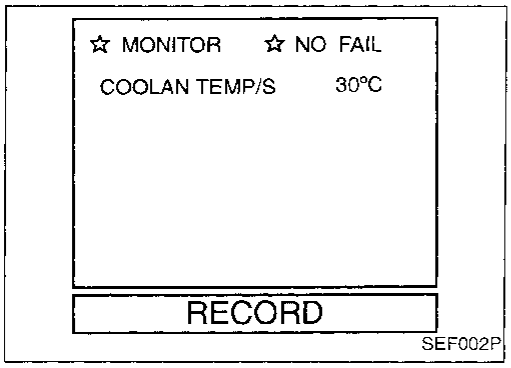
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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

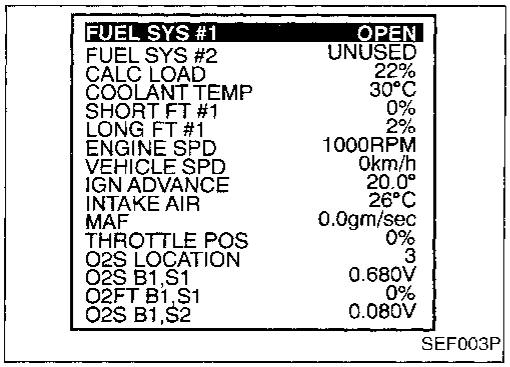


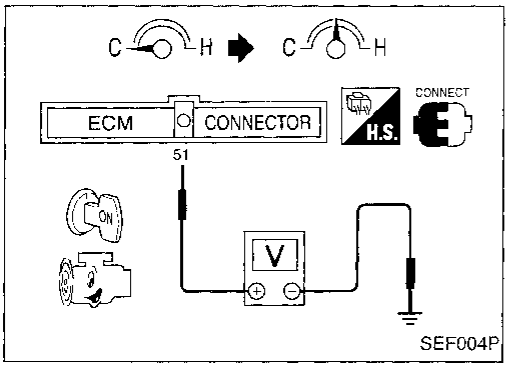
〈Reference data〉

Engine coolant temperature °C (°F)	Voltage (V)	Resistance (kΩ)
−10 (14)	4.4	9.2
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

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







Engine Coolant Temperature (ECT) Sensor (DTC: 0908) (Cont'd)

OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the engine coolant temperature sensor circuit. During this check, a DTC might not be confirmed.

Note: If both DTC P0115 (0103) and P0125 (0908) are displayed, first perform TROUBLE DIAGNOSIS FOR DTC P0115. Refer to EC-103.

1) Turn ignition switch "ON".
2) Select "COOLANT TEMP/S" in "DATA MONITOR" mode with CONSULT.
3) Start engine and run it at idle speed.
4) Check that the engine coolant temperature rises to 25°C (77°F) or more within 15 minutes. (Be careful not to overheat engine.)

OR

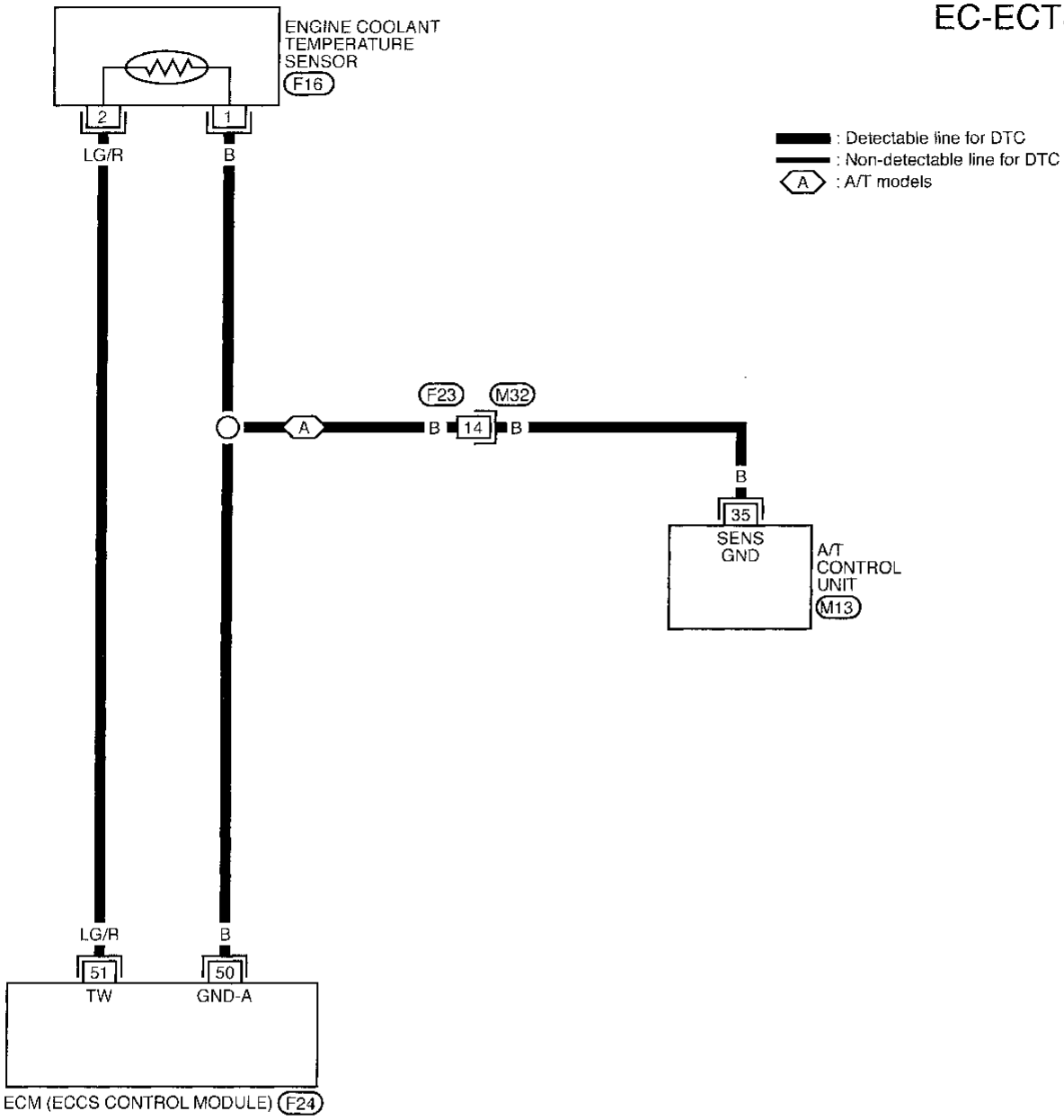
1) Turn ignition switch "ON".
2) Select "MODE 1" with GST.
3) Start engine and run it at idle speed.
4) Check that the engine coolant temperature rises to 25°C (77°F) or more within 15 minutes. (Be careful not to overheat engine.)

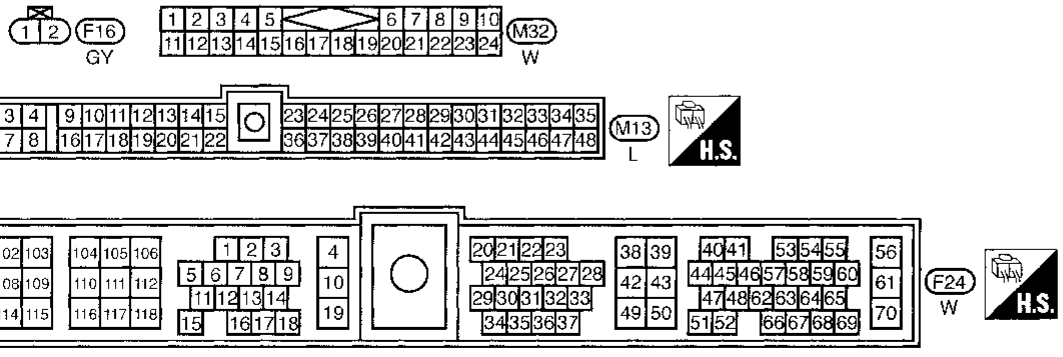
OR

1) Turn ignition switch "ON".
2) Probe voltage meter between ECM terminal ⑤① and ground.
3) Start engine and run it at idle speed.
4) Check that voltage of engine coolant temperature changes to less than 3.3 (V) within 15 minutes. (Be careful not to overheat engine.)

Engine Coolant Temperature (ECT) Sensor (DTC: 0908) (Cont'd)

EC-ECTS-01

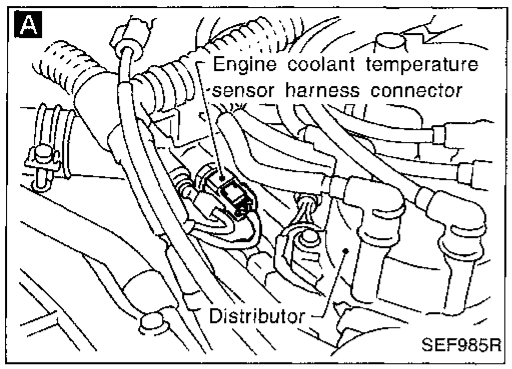


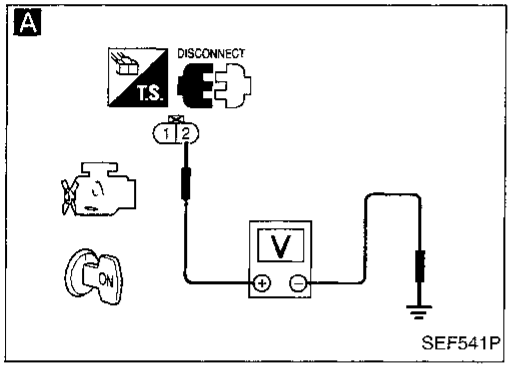


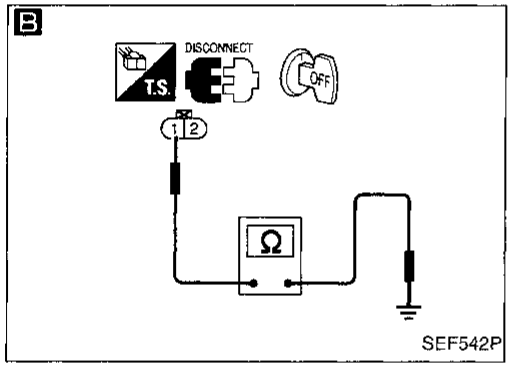
SEF893R

Engine Coolant Temperature (ECT) Sensor (DTC: 0908) (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

A

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect engine coolant temperature sensor harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ② and ground with CONSULT or tester.
   Voltage:
   Approximately 5V

NG → Repair harness or connectors.

OK

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Check harness continuity between terminal ① and engine ground.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors (F23), (M32) (A/T models)
- Harness for open or short between ECM and engine coolant temperature sensor
- Harness for open or short between A/T control unit and engine coolant temperature sensor

If NG, repair harness or connectors.

OK

CHECK COMPONENT
(Engine coolant temperature sensor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace engine coolant temperature sensor.

OK

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.

NG → CHECK COMPONENT (Thermostat).
Refer to LC section ("Thermostat", "ENGINE COOLING SYSTEM").
If NG, replace it.

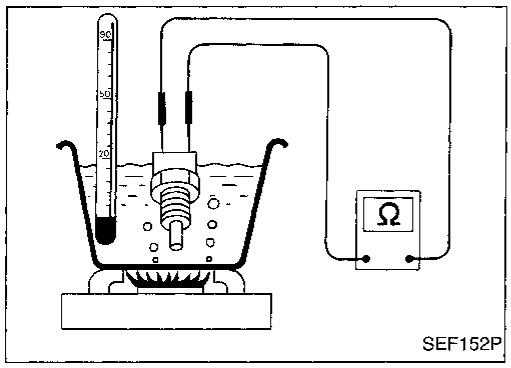
OK

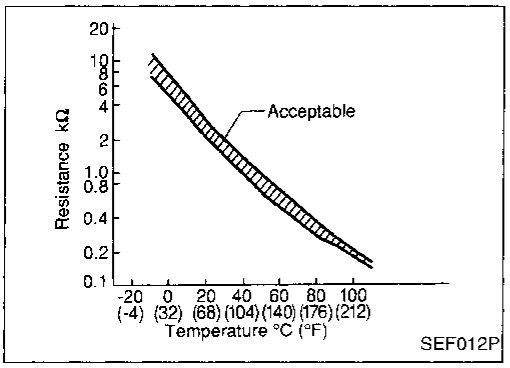
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END





Engine Coolant Temperature (ECT) Sensor (DTC: 0908) (Cont'd)

COMPONENT INSPECTION

Engine coolant temperature sensor

Check resistance as shown in the figure.

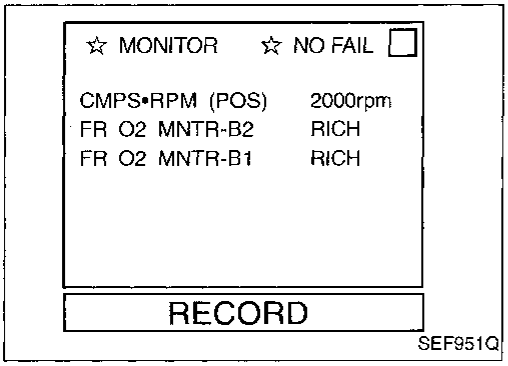
Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.0
90 (194)	0.236 - 0.260

If NG, replace engine coolant temperature sensor.

Closed Loop Control (DTC: 0307, 0308)

★ **The closed loop control has the one trip detection logic.**

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0130 0307	• The closed loop control function for right bank does not operate even when vehicle is driving in the specified condition.	• The front heated oxygen sensor (right bank) circuit is open or shorted. • Front heated oxygen sensor (right bank) • Front heated oxygen sensor heater (right bank)
P0150 0308	• The closed loop control function for left bank does not operate even when vehicle is driving in the specified condition.	• The front heated oxygen sensor (left bank) circuit is open or shorted. • Front heated oxygen sensor (left bank) • Front heated oxygen sensor heater (left bank)



OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed.

1) Start engine and warm it up sufficiently.
2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT, and select "FRO2 MNTR-B1(B2)".
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch "RECORD" on CONSULT screen.
5) Check the following.

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

cycle	1	2	3	4	5
FR O2 MNTR-B1(B2)	R-L-R-L-R	L-R	L-R	L-R	L-R

R = "FR O2 MNTR-B1(B2)", "RICH"
L = "FR O2 MNTR-B1(B2)", "LEAN"

OR

1) Start engine and warm it up sufficiently.
2) Make sure that malfunction indicator lamp comes on more than 5 times within 10 seconds while keeping at 2,000 rpm in Diagnostic Test Mode II (Front heated oxygen sensor monitor).

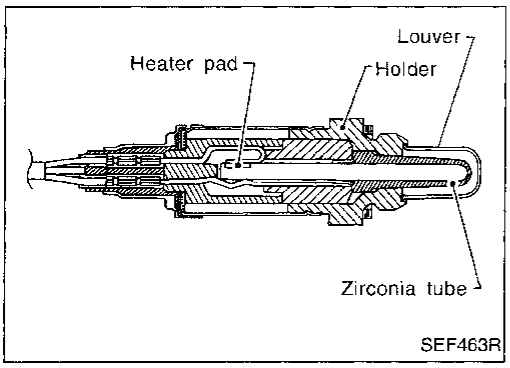
DIAGNOSTIC PROCEDURE

For right bank

Refer to TROUBLE DIAGNOSIS FOR DTC P0130, EC-118.
Refer to TROUBLE DIAGNOSIS FOR DTC P0135, EC-123.

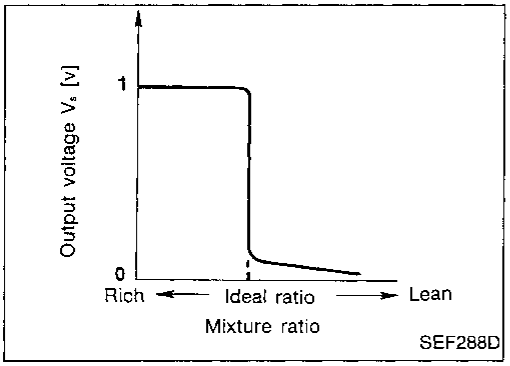
For left bank

Refer to TROUBLE DIAGNOSIS FOR DTC P0150, EC-135.
Refer to TROUBLE DIAGNOSIS FOR DTC P0155, EC-140.

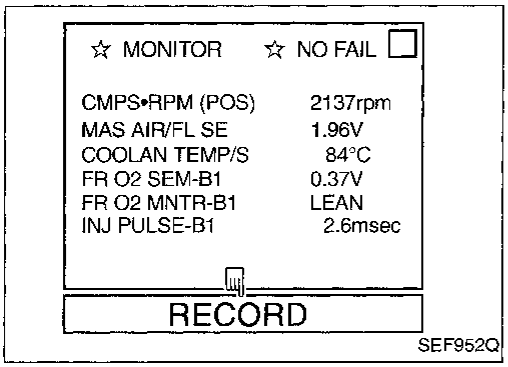


Front Heated Oxygen Sensor (Front HO2S) (Right bank) (DTC: 0503)

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



Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0130 0503	• An excessively high voltage from the sensor is sent to ECM. • The voltage from the sensor is constantly approx. 0.3V. • The maximum and minimum voltages from the sensor are not reached to the specified voltages. • 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.) • Front heated oxygen sensor (right bank) • Fuel pressure • Injectors • Intake air leaks



OVERALL FUNCTION CHECK

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

1) Start engine and warm it up sufficiently.
2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT, and select "FR O2 SEN-B1" and "FR O2 MNTR-B1".
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch "RECORD" on CONSULT screen.
5) Check the following.

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

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

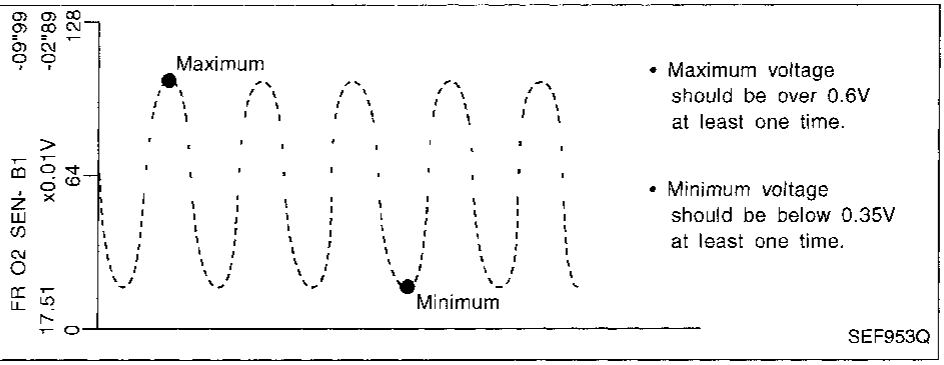
R = "FR O2 MNTR-B1", "RICH"
L = "FR O2 MNTR-B1", "LEAN"

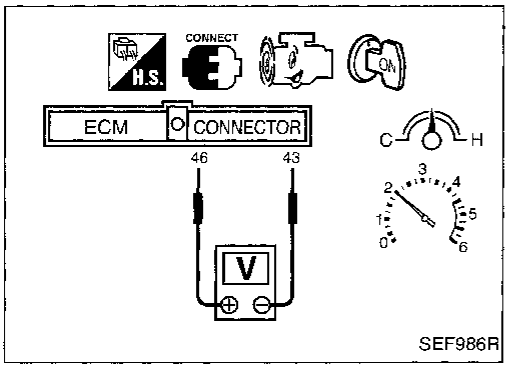
Front Heated Oxygen Sensor (Front HO2S) (Right bank) (DTC: 0503) (Cont'd)

- "FR O2 SEN-B1" voltage goes above 0.6V at least once.
- "FR O2 SEN-B1" voltage goes below 0.35V at least once.
- The voltage never exceeds 1.0V.

17:51	CMPS •RPM (POS) (rpm)	FR O2 SEN -B1 (V)
09"13	2050	0.19
09"11	2050	0.18
09"09	2050	0.18
09"07	2037	0.18
09"05	2037	0.18
09"03	2060	0.23
09"01	2012	0.43

GRAPH





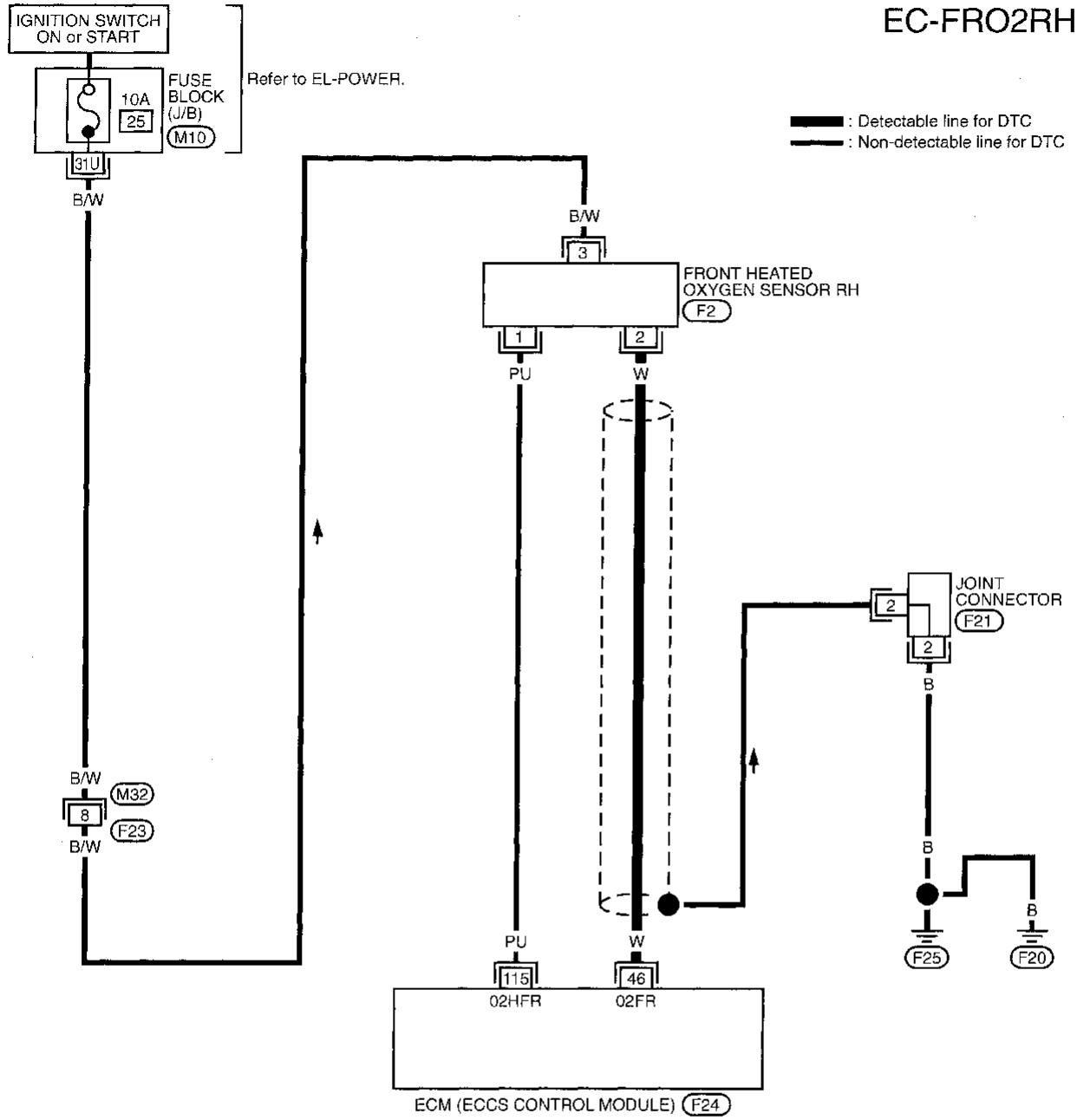
OR

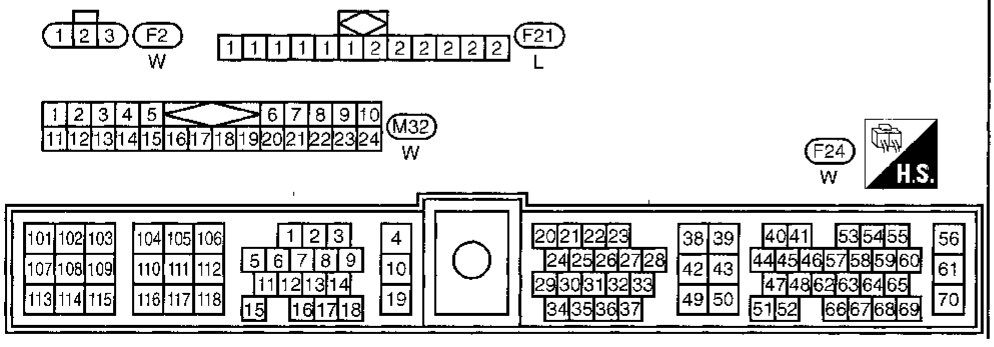
1) Start engine and warm it up sufficiently.
2) Set voltmeter probes between ECM terminal ㊻ (sensor signal) and ㊸ (engine ground).
3) Check the following with engine speed held at 2,000 rpm constant under no load.

- Malfunction indicator lamp goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.35V at least one time.
- The voltage never exceeds 1.0V.

Front Heated Oxygen Sensor (Front HO2S) (Right bank) (DTC: 0503) (Cont'd)

EC-FRO2RH-01



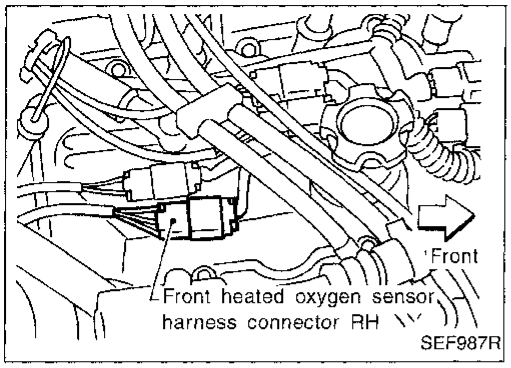


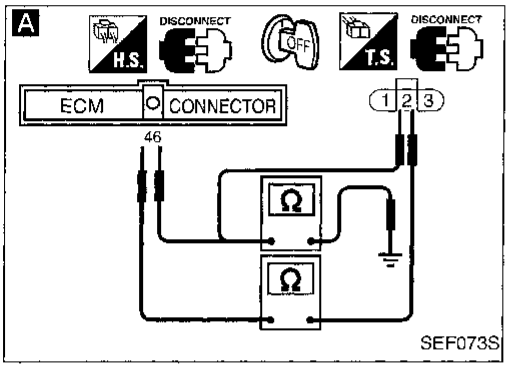
Refer to last page (Foldout page).
M10

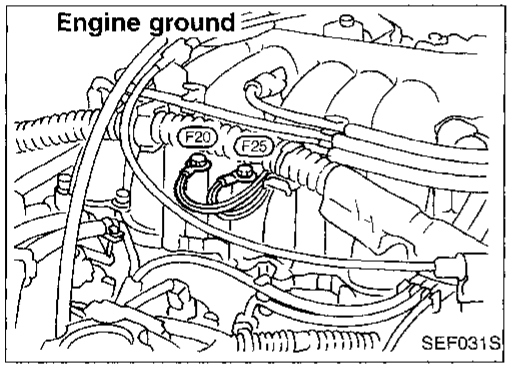
SEF898R

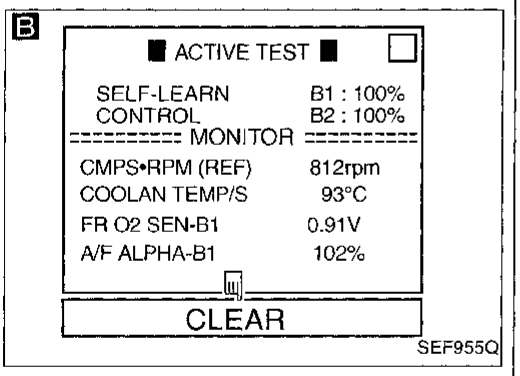
Front Heated Oxygen Sensor (Front HO2S) (Right bank) (DTC: 0503) (Cont'd)

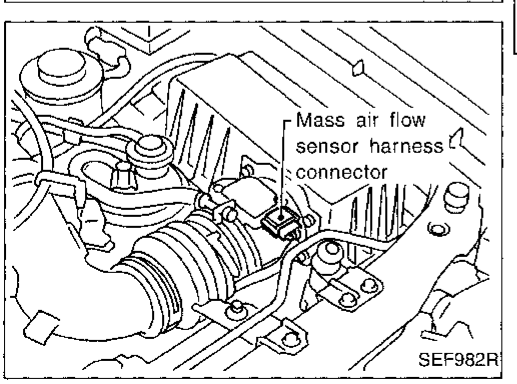
DIAGNOSTIC PROCEDURE











INSPECTION START

A

CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor RH harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal (46) and terminal (2).
   Continuity should exist.
4. Check harness continuity between ECM terminal (46) (or terminal (2)) and ground.
   Continuity should not exist.

If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

Loosen and retighten engine ground screws.

B

CLEAR THE SELF-LEARNING DATA
1. Start engine and warm it up sufficiently.
2. Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode with CONSULT.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.
   Are the DTCs P0171, P0172 detected? Is it difficult to start engine?

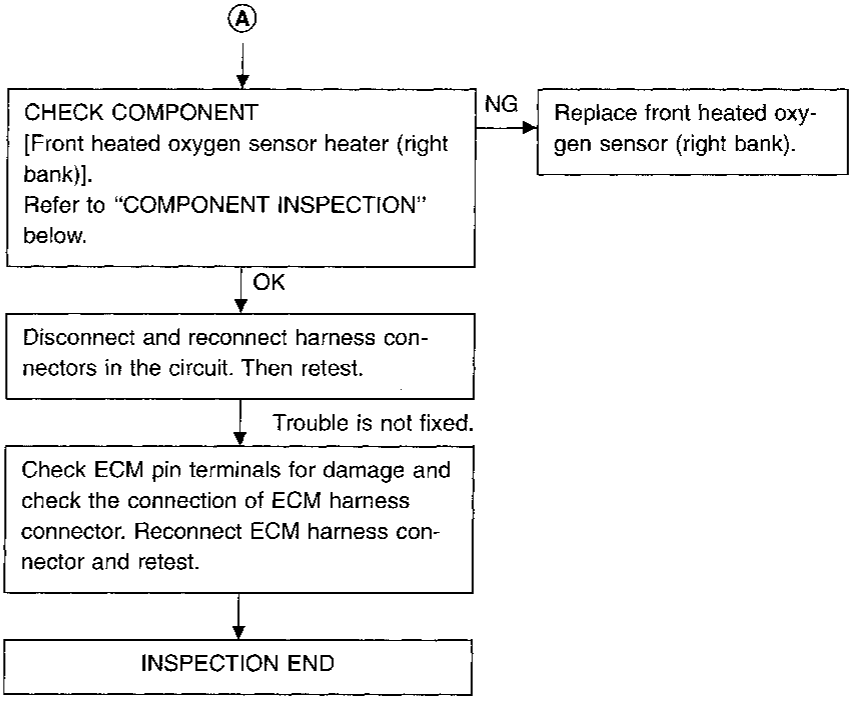
Yes → Go to "TROUBLE DIAGNOSIS FOR DTC P0171, P0172", EC-151, 156.

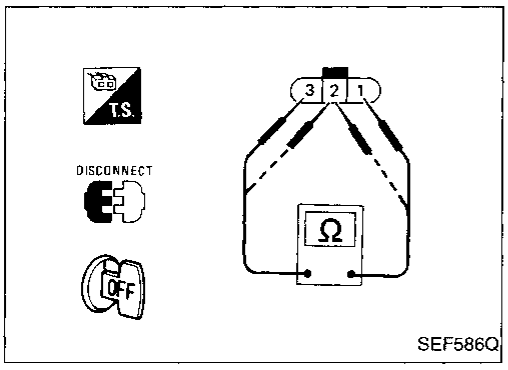
OR

2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure diagnostic trouble code No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Make sure diagnostic trouble code No. 0505 is displayed in Diagnostic Test Mode II.
7. Run engine for at least 10 minutes at idle speed.
   Are the DTCs 0114, 0115 detected? Is it difficult to start engine?

No ↓ (A)

Front Heated Oxygen Sensor (Front HO2S) (Right bank) (DTC: 0503) (Cont'd)





COMPONENT INSPECTION

Front heated oxygen sensor heater

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.

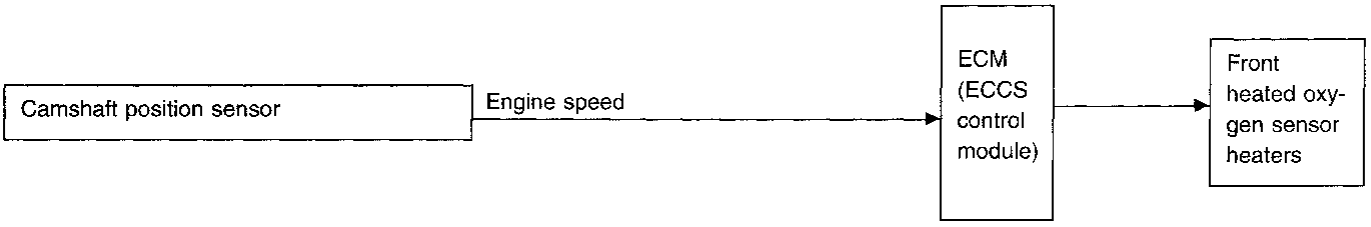
If NG, replace the front heated oxygen sensor.

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.

Front Heated Oxygen Sensor Heater (Right bank) (DTC: 0901)

SYSTEM DESCRIPTION



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

OPERATION

Engine speed rpm	Front heated oxygen sensor heaters
Above 3,200	OFF
Below 3,200	ON

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0135 0901	• The current amperage in the front heated oxygen sensor heater (Right bank) circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the front heated oxygen sensor heater.)	• Harness or connectors (The front heated oxygen sensor heater circuit is open or shorted.) • Front heated oxygen sensor heater (Right bank)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Start engine and run it for at least 5 seconds at idle speed.

OR

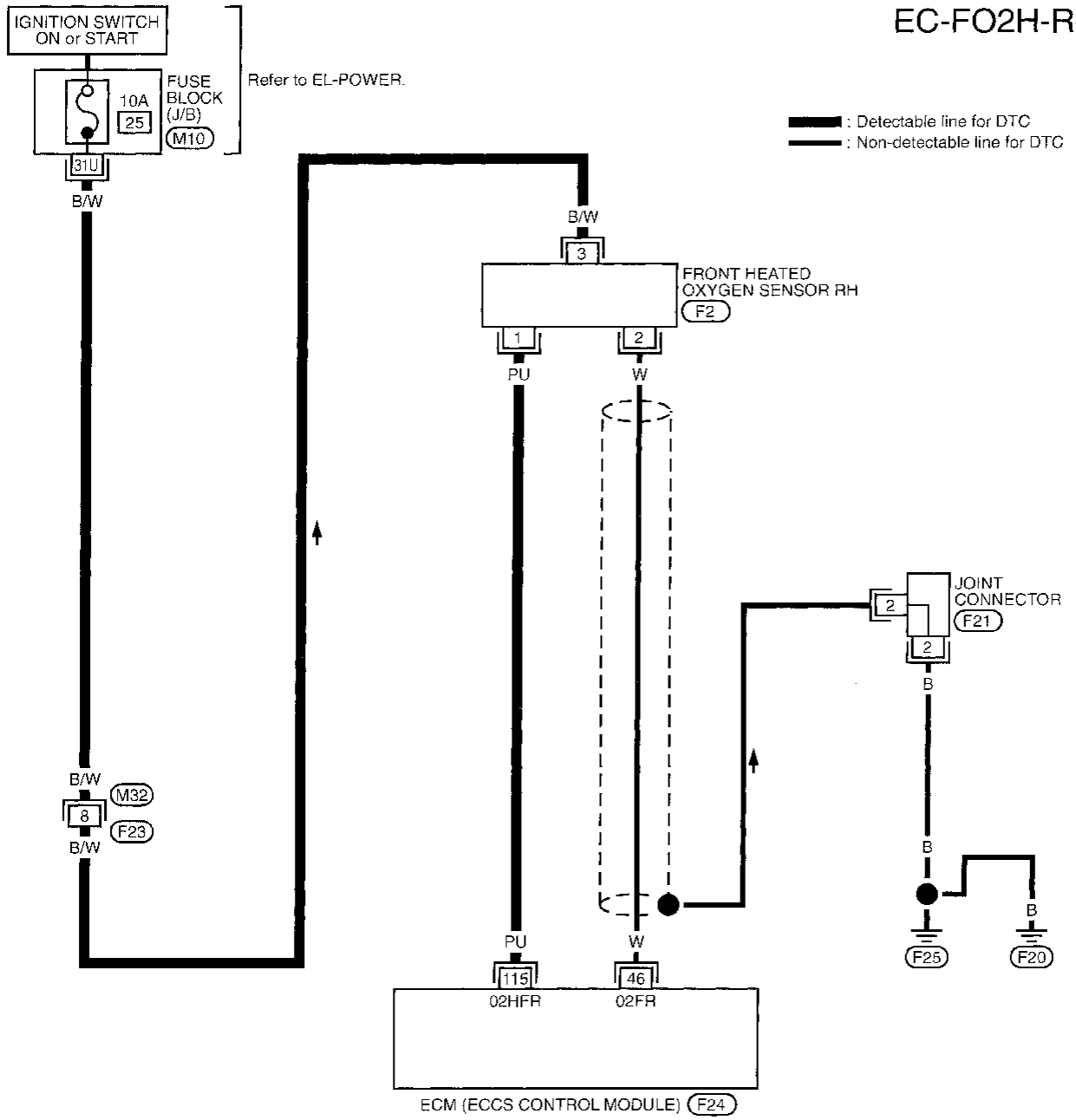
1) Start engine and run it for at least 5 seconds at idle speed.
2) Select "MODE 3" with GST.

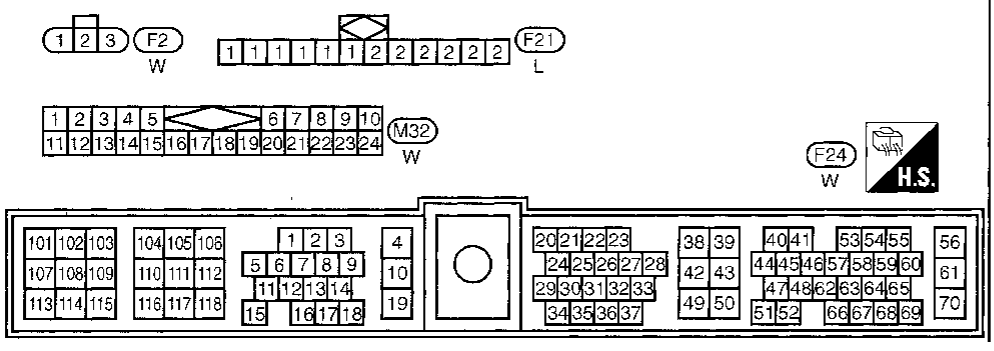
OR

1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

Front Heated Oxygen Sensor Heater (Right bank) (DTC: 0901) (Cont'd)

EC-FO2H-R-01



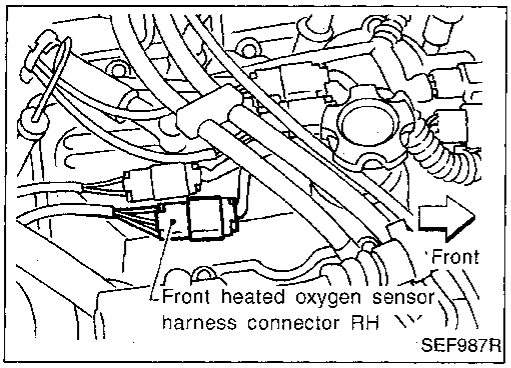


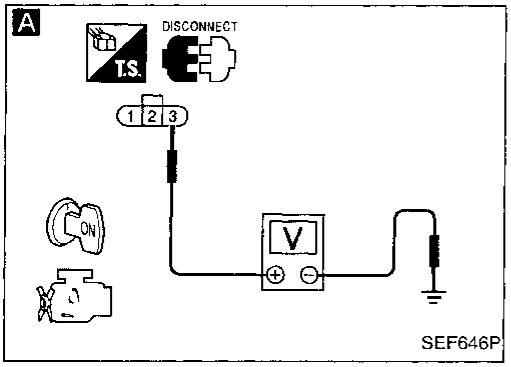
Refer to last page (Foldout page).
M10

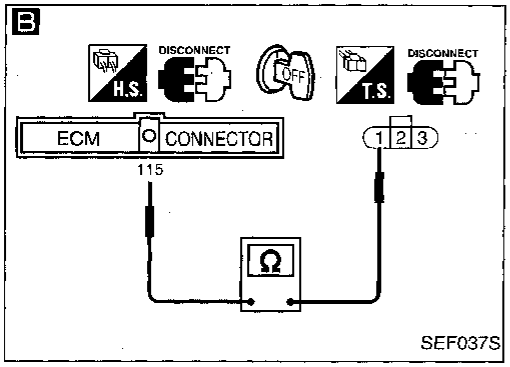
SEF899R

Front Heated Oxygen Sensor Heater (Right bank) (DTC: 0901) (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

A

CHECK POWER SUPPLY.
1. Disconnect front heated oxygen sensor RH harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal ③ and ground.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F23), (M32)
- Harness connector (M10)
- 25A fuse
- Harness for open or short between front heated oxygen sensor RH and fuse

If NG, repair harness or connectors.

OK ↓

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between terminal ① and ECM terminal (115).
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(Front heated oxygen sensor heater).
Refer to "COMPONENT INSPECTION" below.

NG → Replace front heated oxygen sensor (right bank).

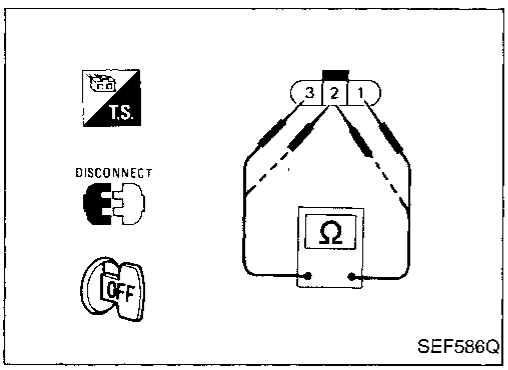
OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END



COMPONENT INSPECTION

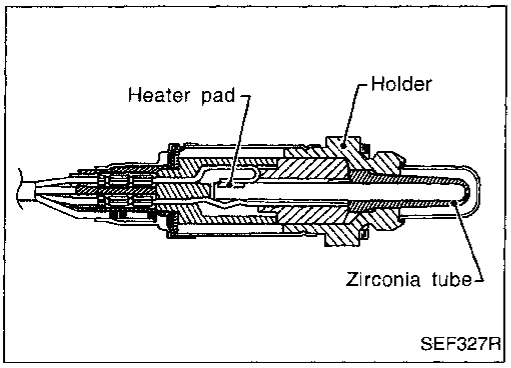
Front heated oxygen sensor heater

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 front heated oxygen sensor.

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.



Rear Heated Oxygen Sensor (Rear HO2S) (Right bank) (DTC: 0707)

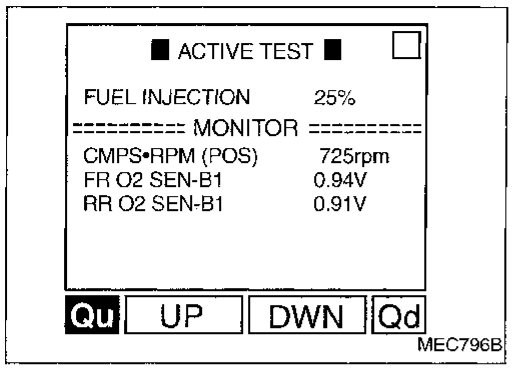
The rear heated oxygen sensor (Rear HO2S), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the front heated oxygen sensor are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the rear heated oxygen sensor.
This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

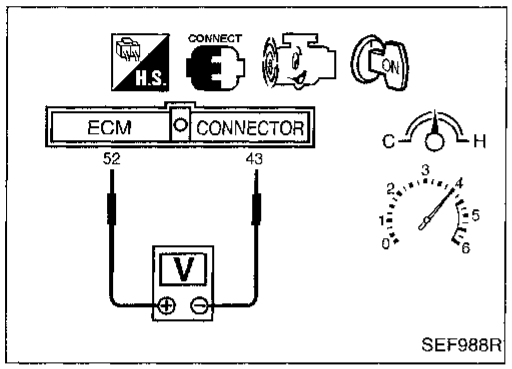
ON BOARD DIAGNOSIS LOGIC

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

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0136 0707	• An excessively high voltage from the sensor is sent to ECM. • The voltage from the sensor is constantly approx. 0.3V. • The maximum and minimum voltages from the sensor are not reached to the specified voltages. • 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.) • Rear heated oxygen sensor (Right bank) • Fuel pressure • Injectors • Intake air leaks

Rear Heated Oxygen Sensor (Rear HO2S) (Right bank) (DTC: 0707) (Cont'd)





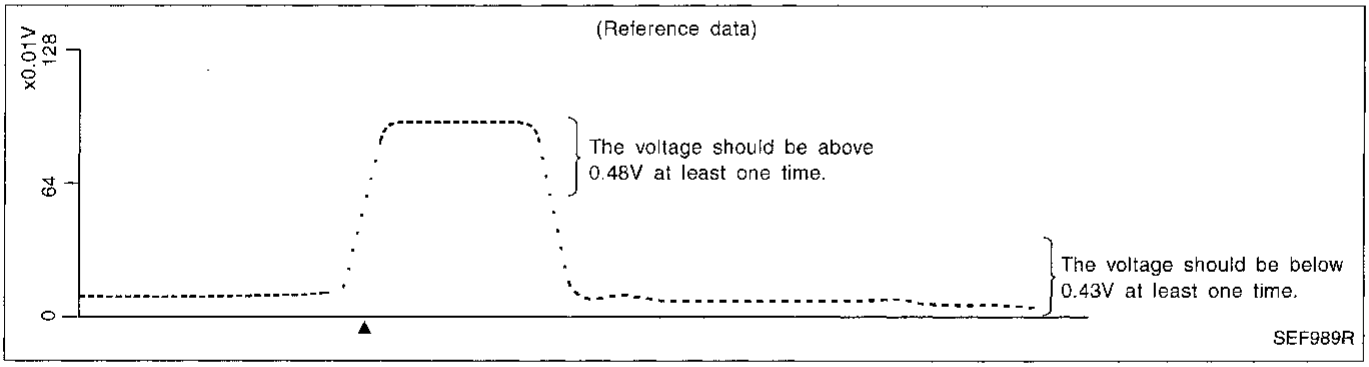
OVERALL FUNCTION CHECK

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

1) Start engine and warm it up sufficiently.
2) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "RR O2 SEN-B1" as the monitor item with CONSULT.
3) Check "RR O2 SEN-B1" at idle speed when adjusting "FUEL INJECTION" to ±25%.
   "RR O2 SEN-B1" should be above 0.48V at least once when the "FUEL INJECTION" is +25%.
   "RR O2 SEN-B1" should be below 0.43V at least once when the "FUEL INJECTION" is −25%.

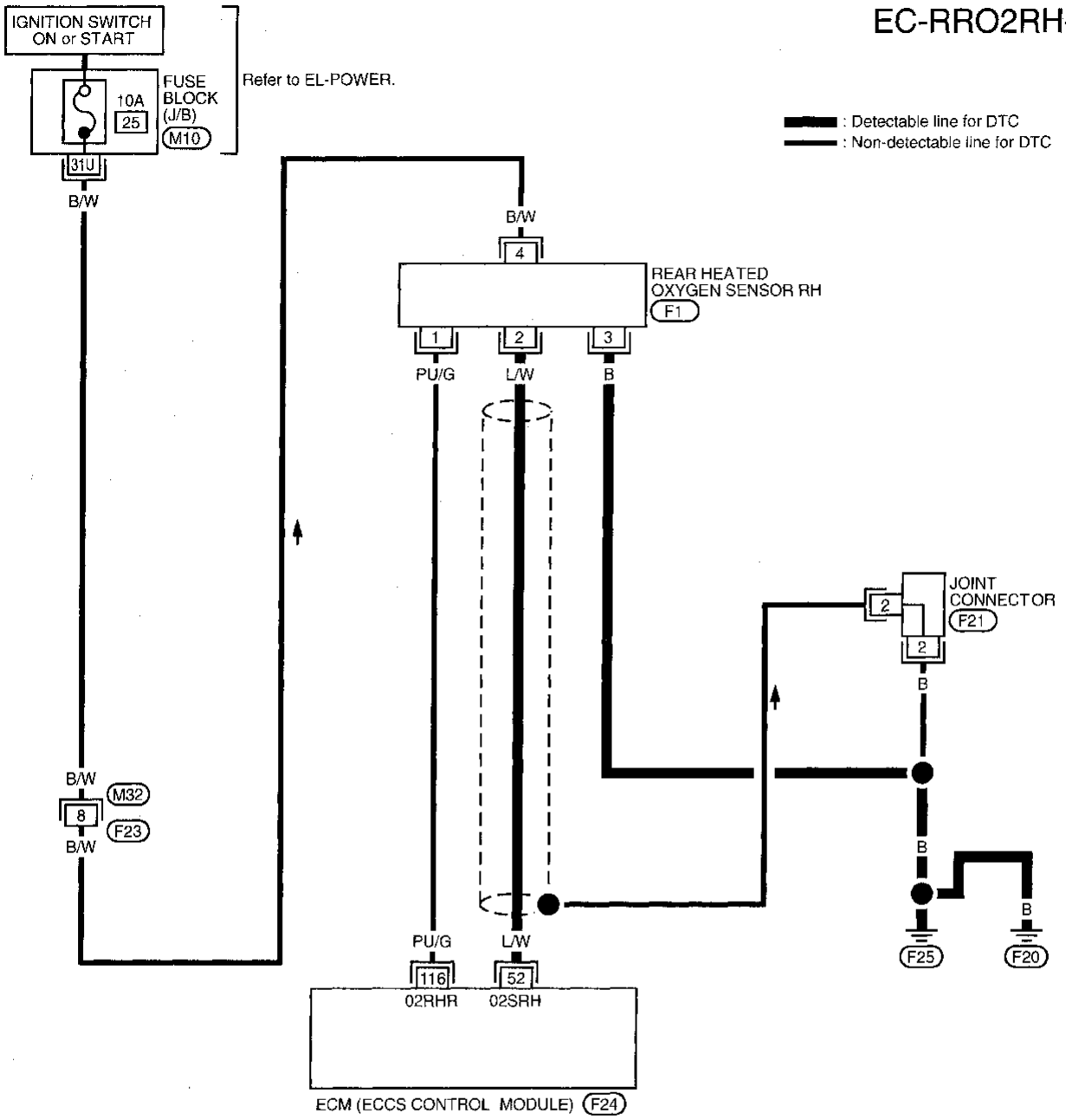
OR

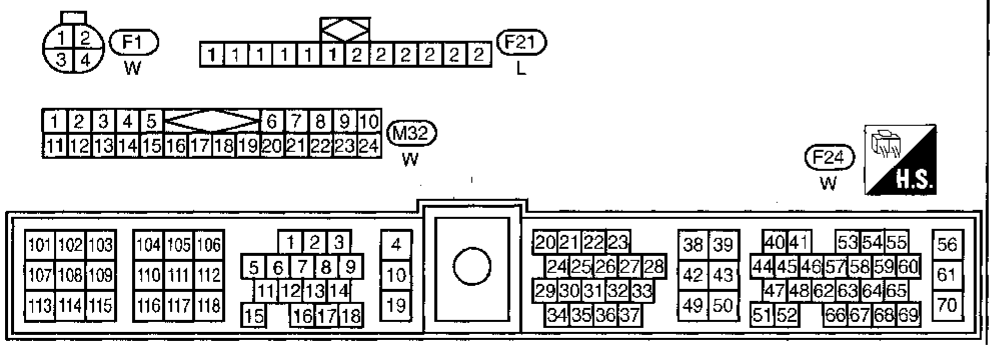
1) Start engine and warm it up sufficiently.
2) Set voltmeter probes between ECM terminals ㊷ (sensor signal) and ㊸ (engine ground).
3) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)
   The voltage should be above 0.48V and below 0.43V at least once during this procedure.
   If the voltage can be confirmed in step 3, step 4 is not necessary.
4) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
   The voltage should be above 0.48V and below 0.43V at least once during this procedure.



Rear Heated Oxygen Sensor (Rear HO2S) (Right bank) (DTC: 0707) (Cont'd)

EC-RRO2RH-01



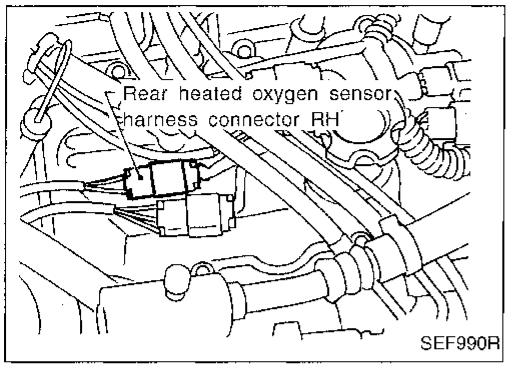


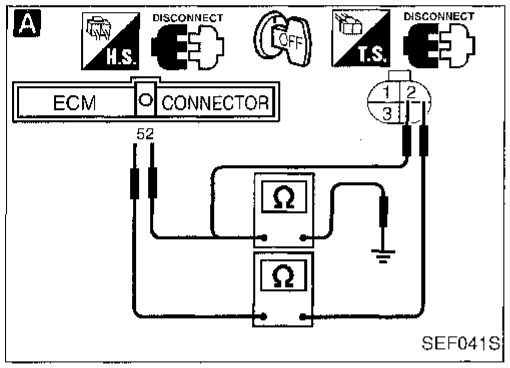
Refer to last page (Foldout page).
M10

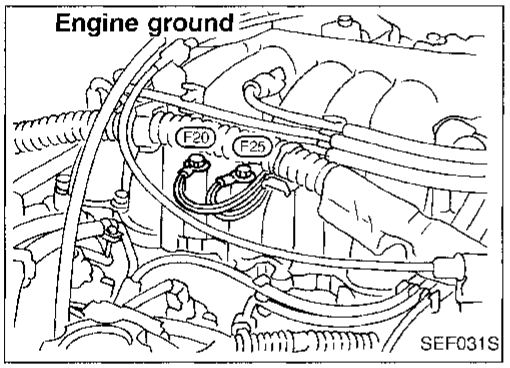
SEF900R

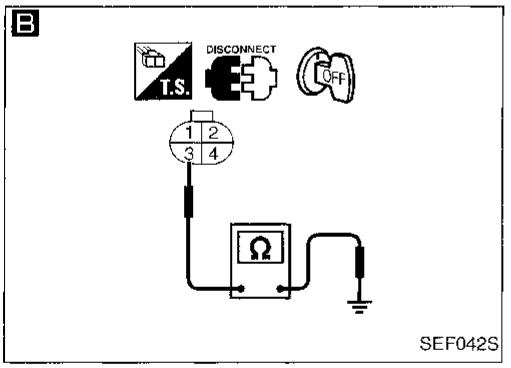
Rear Heated Oxygen Sensor (Rear HO2S) (Right bank) (DTC: 0707) (Cont'd)

DIAGNOSTIC PROCEDURE









INSPECTION START

A

CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Remove lower instrument center panel. Refer to BT section ("INSTRUMENT PANEL").
- Rear heated oxygen sensor harness connectors are located under the lower instrument center panel.
3. Disconnect rear heated oxygen sensor RH harness connector and ECM harness connector.
4. Check harness continuity between ECM terminal (52) and terminal (2).
Continuity should exist.
5. Check harness continuity between ECM terminal (52) (or terminal (2)) and ground.
Continuity should not exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors (F23), (M32)
- Harness for open or short between ECM and rear heated oxygen sensor RH

If NG, repair harness or connectors.

OK ↓

B

CHECK GROUND CIRCUIT.
1. Loosen and retighten engine ground screws.
2. Check harness continuity between terminal (3) and engine ground.
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(Rear heated oxygen sensor heater).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace rear heated oxygen sensor RH.

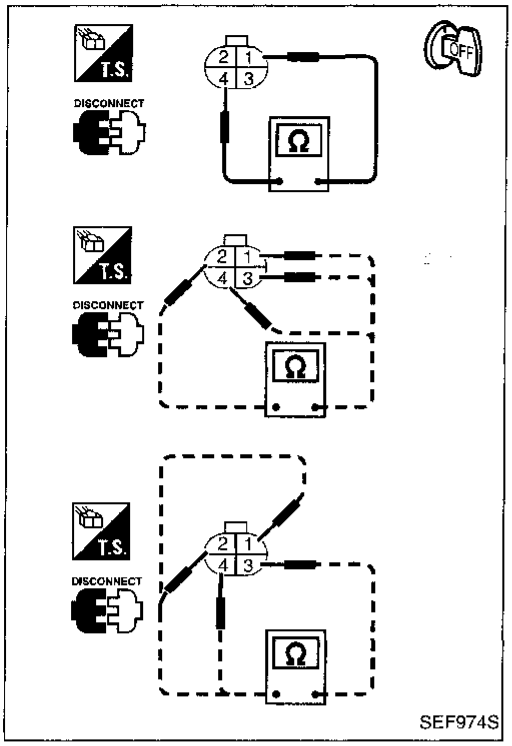
OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END



Rear Heated Oxygen Sensor (Rear HO2S) (Right bank) (DTC: 0707) (Cont'd)

COMPONENT INSPECTION

Rear heated oxygen sensor heater

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	

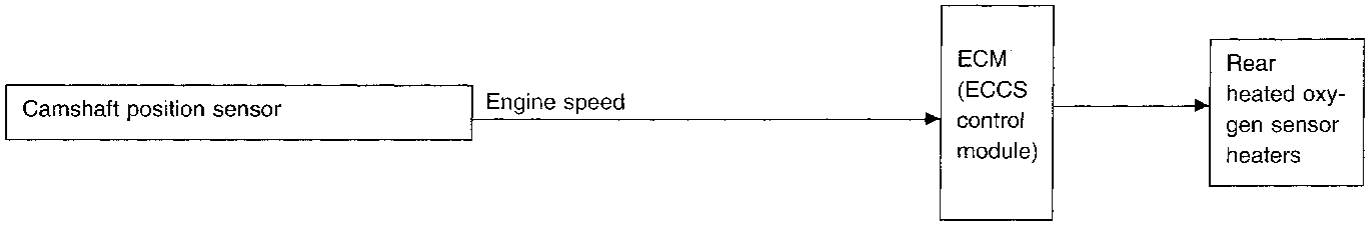
If NG, replace the rear heated oxygen sensor.

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.

Rear Heated Oxygen Sensor Heater (Right bank) (DTC: 0902)

SYSTEM DESCRIPTION



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

OPERATION

Engine speed rpm	Rear heated oxygen sensor heaters
Above 3,200	OFF
Below 3,200	ON

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0141 0902	• The current amperage in the rear heated oxygen sensor heater (Right bank) circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the rear heated oxygen sensor heater.)	• Harness or connectors (The rear heated oxygen sensor heater circuit is open or shorted.) • Rear heated oxygen sensor heater (Right bank)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Start engine and run it for at least 5 seconds at idle speed.

OR

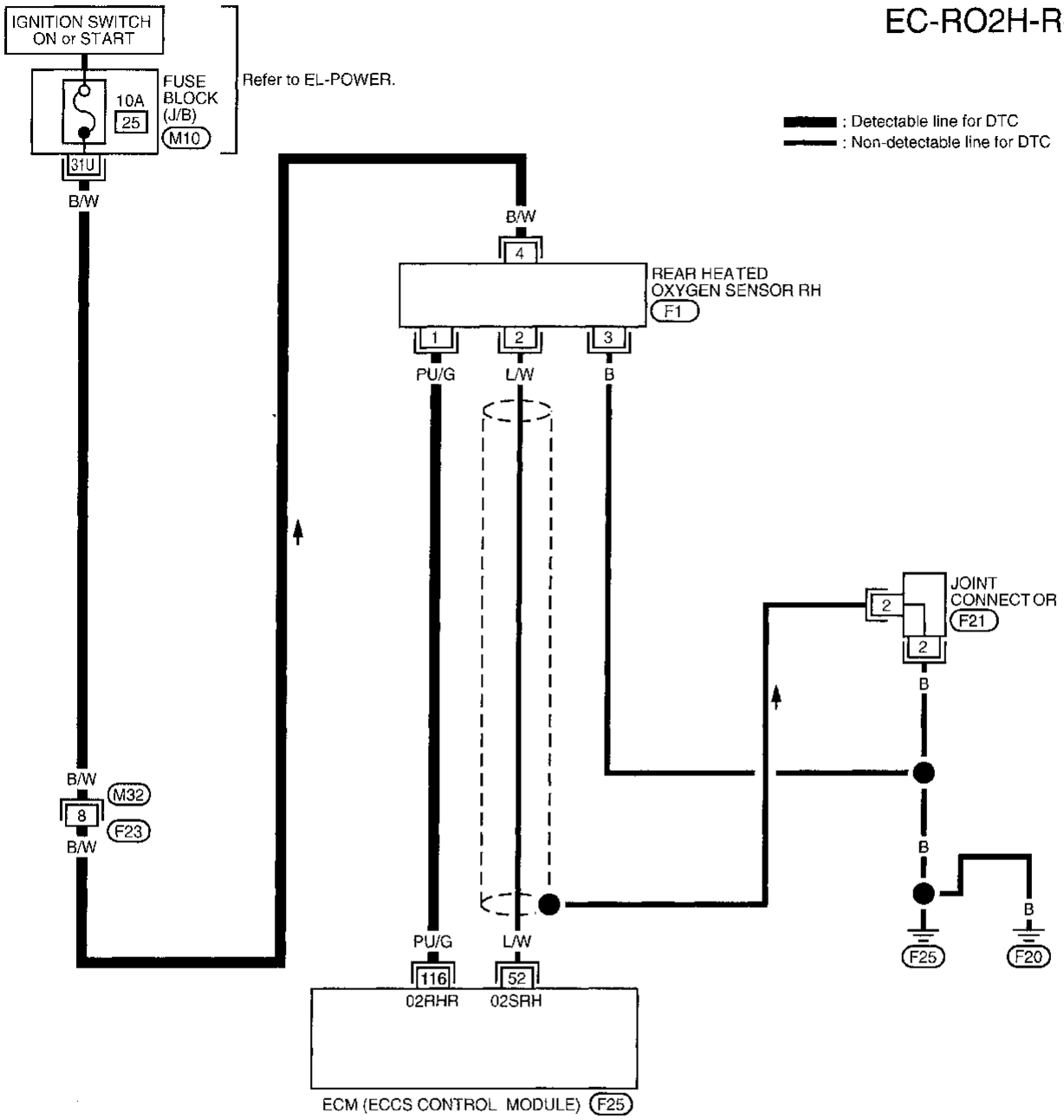
1) Start engine and run it for at least 5 seconds at idle speed.
2) Select "MODE 3" with GST.

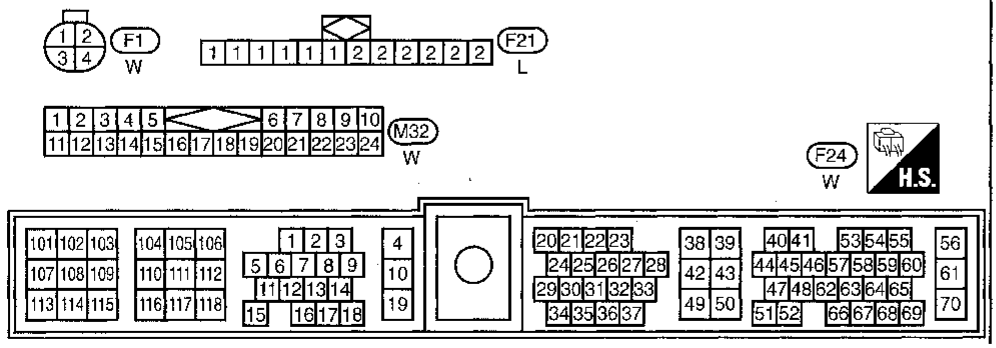
OR

1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

Rear Heated Oxygen Sensor Heater (Right bank) (DTC: 0902) (Cont'd)

EC-RO2H-R-01



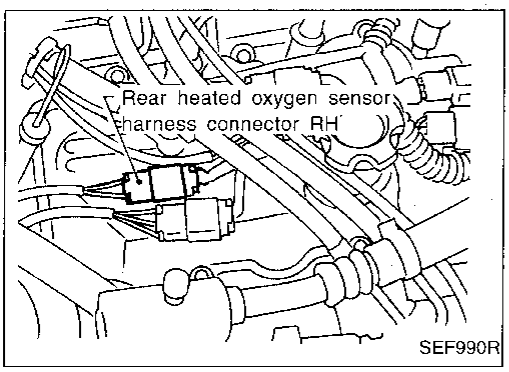


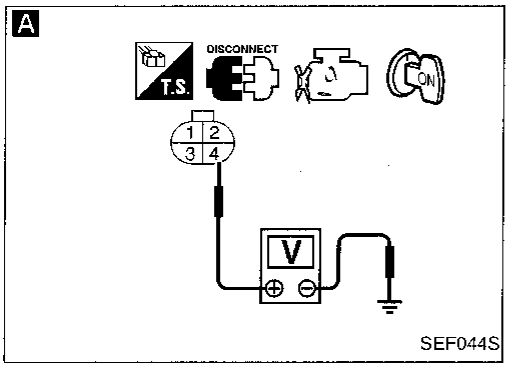
Refer to last page (Foldout page).
M10

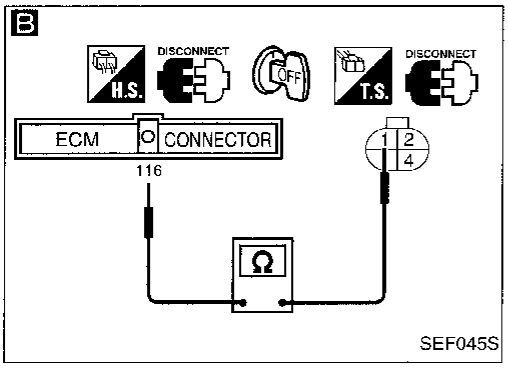
SEF901R

Rear Heated Oxygen Sensor Heater (Right bank) (DTC: 0902) (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

A

CHECK POWER SUPPLY.
1. Disconnect rear heated oxygen sensor (right bank) harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal ④ and ground.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F23), (M32)
- Harness connectors (F22), (B52)
- Harness connector (M10)
- 10A fuse
- Harness for open or short between rear heated oxygen sensor RH and fuse

If NG, repair harness or connectors.

OK ↓

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between terminal ① and ECM terminal (116).
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(Rear heated oxygen sensor heater).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace rear heated oxygen sensor (right bank).

OK ↓

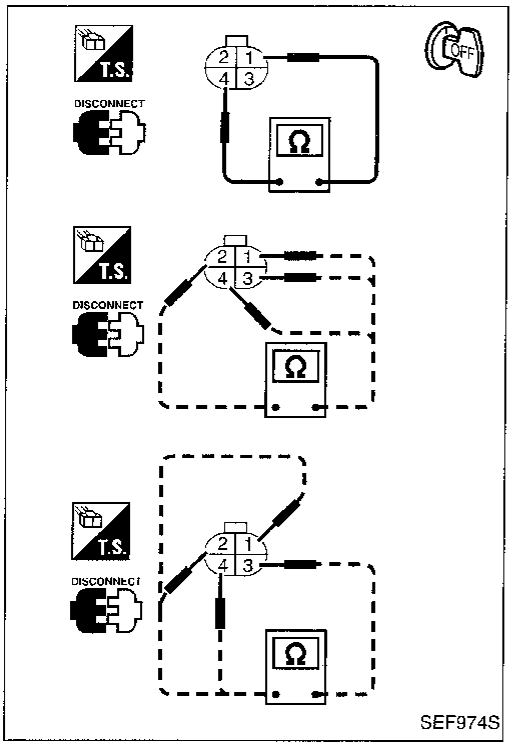
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END



Rear Heated Oxygen Sensor Heater (Right bank) (DTC: 0902) (Cont'd)

COMPONENT INSPECTION

Rear heated oxygen sensor heater

Check the following.

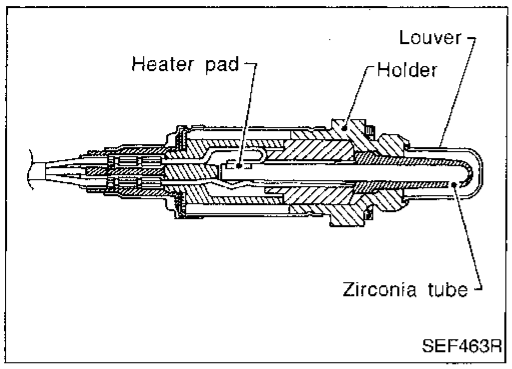
1. Check resistance between terminals ④ and ①.
   Resistance: 2.3 - 4.3Ω at 25°C (77°F)
2. Check continuity.

Terminal No.	Continuity
② and ①, ③, ④	No
③ and ①, ②, ④	

If NG, replace the rear heated oxygen sensor.

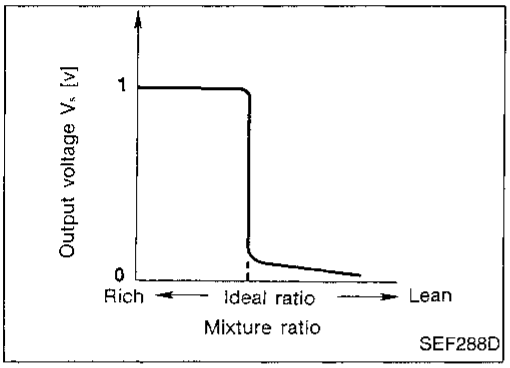
CAUTION:

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.

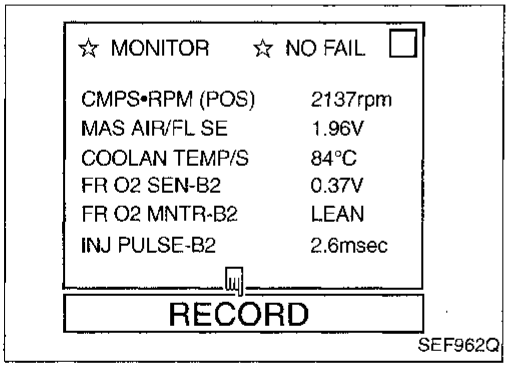


Front Heated Oxygen Sensor (Front HO2S) (Left bank) (DTC: 0303)

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



Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0150 0303	• An excessively high voltage from the sensor is sent to ECM. • The voltage from the sensor is constantly approx. 0.3V. • The maximum and minimum voltages from the sensor are not reached to the specified voltages. • 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.) • Front heated oxygen sensor (left bank) • Fuel pressure • Injectors • Intake air leaks



OVERALL FUNCTION CHECK

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

1) Start engine and warm it up sufficiently.
2) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT, and select "FR O2 SEN-B2" and "FR O2 MNTR-B2".
3) Hold engine speed at 2,000 rpm under no load during the following steps.
4) Touch "RECORD" on CONSULT screen.
5) Check the following.

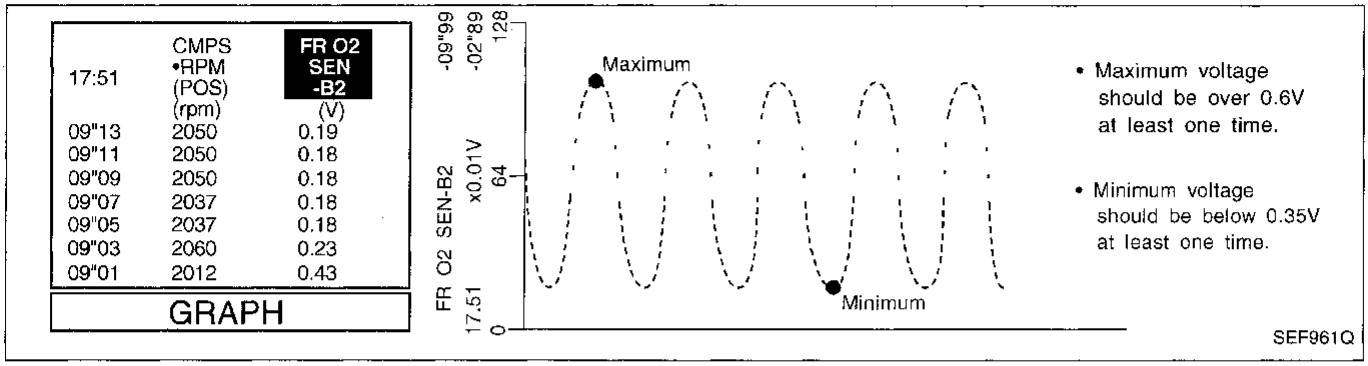
• "FR O2 MNTR-B2" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
5 times (cycles) are counted as shown below:

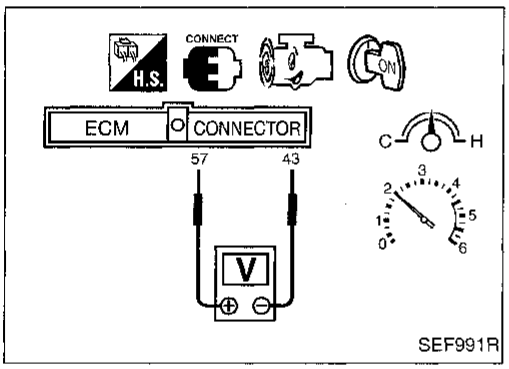
cycle	1	2	3	4	5
FR O2 MNTR-B2	R-L-R-L-R	L-R-L-R-L			

R = "FR O2 MNTR-B2", "RICH"
L = "FR O2 MNTR-B2", "LEAN"

Front Heated Oxygen Sensor (Front HO2S) (Left bank) (DTC: 0303) (Cont'd)

- "FR O2 SEN-B2" voltage goes above 0.6V at least once.
- "FR O2 SEN-B2" voltage goes below 0.35V at least once.
- The voltage never exceeds 1.0V.





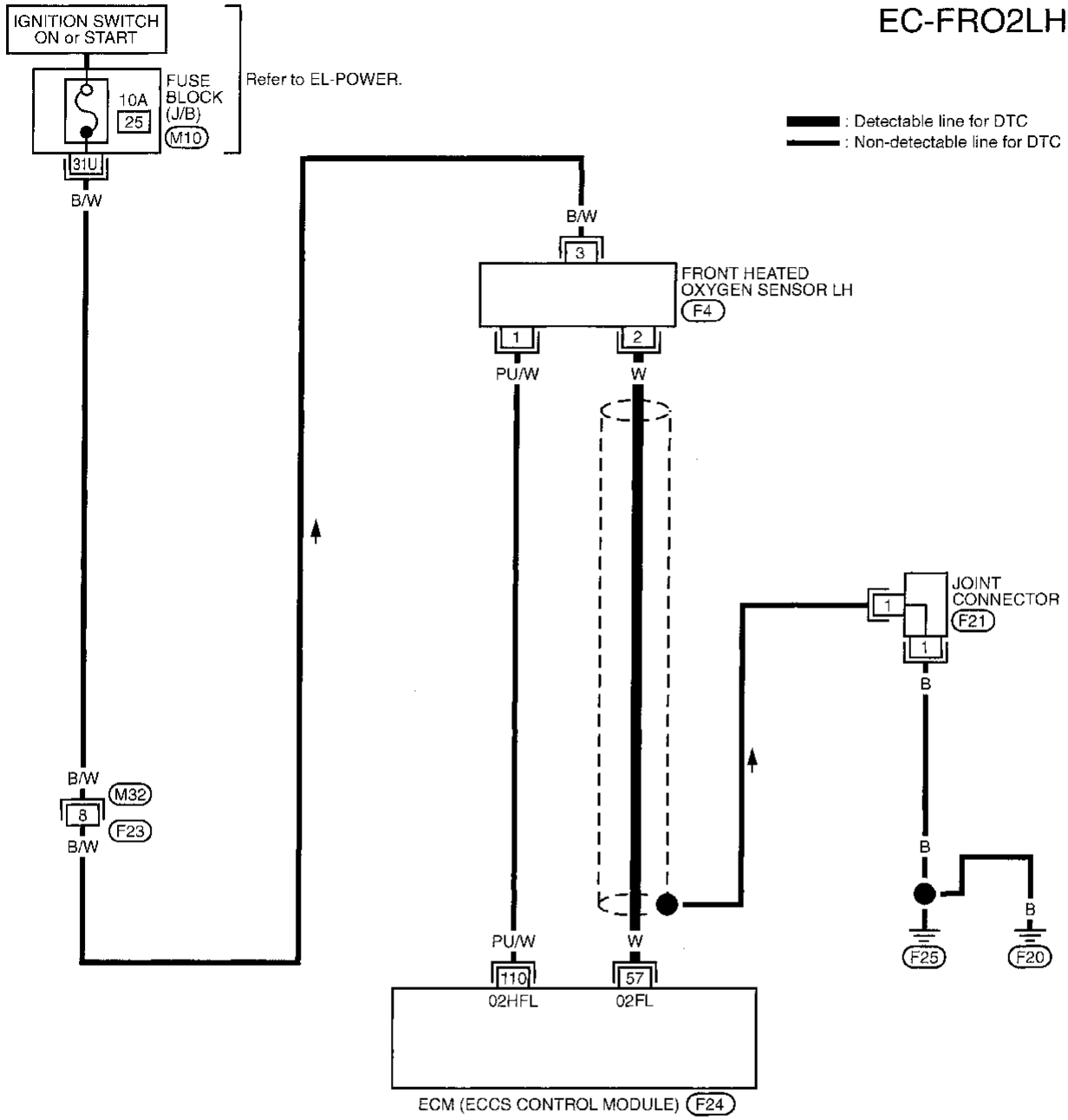
OR

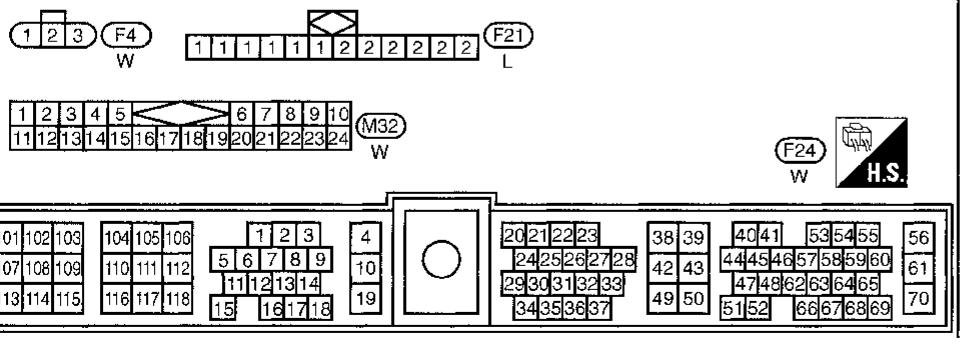
1) Start engine and warm it up sufficiently.
2) Set voltmeter probes between ECM terminal ⑤⑦ (sensor signal) and ④③ (engine ground).
3) Check the following with engine speed held at 2,000 rpm constant under no load.

- Malfunction indicator lamp goes on more than 5 times within 10 seconds in Diagnostic Test Mode II (FRONT HEATED OXYGEN SENSOR MONITOR).
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.35V at least one time.
- The voltage never exceeds 1.0V.

Front Heated Oxygen Sensor (Front HO2S) (Left bank) (DTC: 0303) (Cont'd)

EC-FRO2LH-01



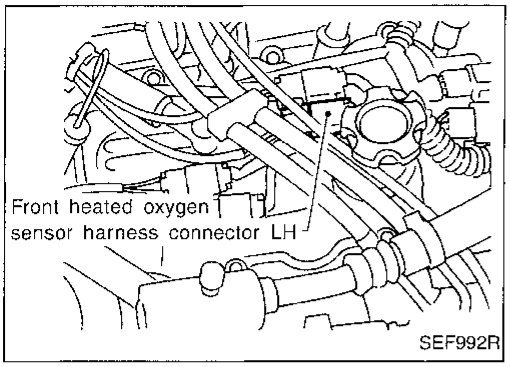


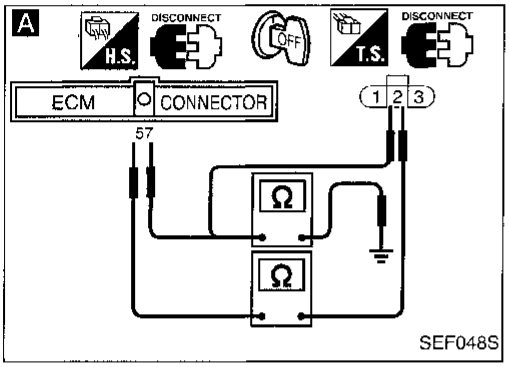
Refer to last page (Foldout page).
M10

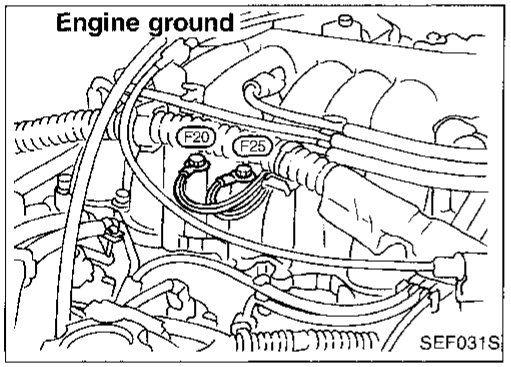
SEF894R

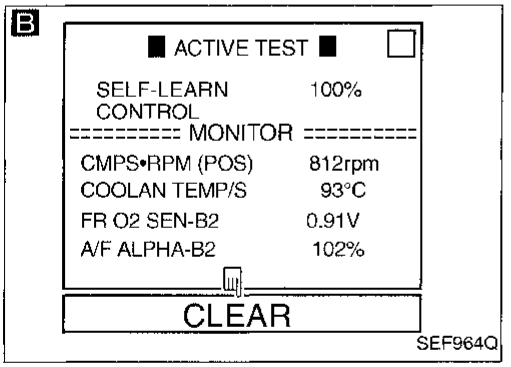
Front Heated Oxygen Sensor (Front HO2S) (Left bank) (DTC: 0303) (Cont'd)

DIAGNOSTIC PROCEDURE









INSPECTION START

A

CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor LH harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal (57) and terminal (2).
   Continuity should exist.
4. Check harness continuity between ECM terminal (57) (or terminal (2)) and ground.
   Continuity should not exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

Loosen and retighten engine ground screws.

B

CLEAR THE SELF-LEARNING DATA.
1. Start engine and warm it up sufficiently.
2. Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode with CONSULT.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.
   Are the DTCs P0174, P0175 detected? Is it difficult to start engine?

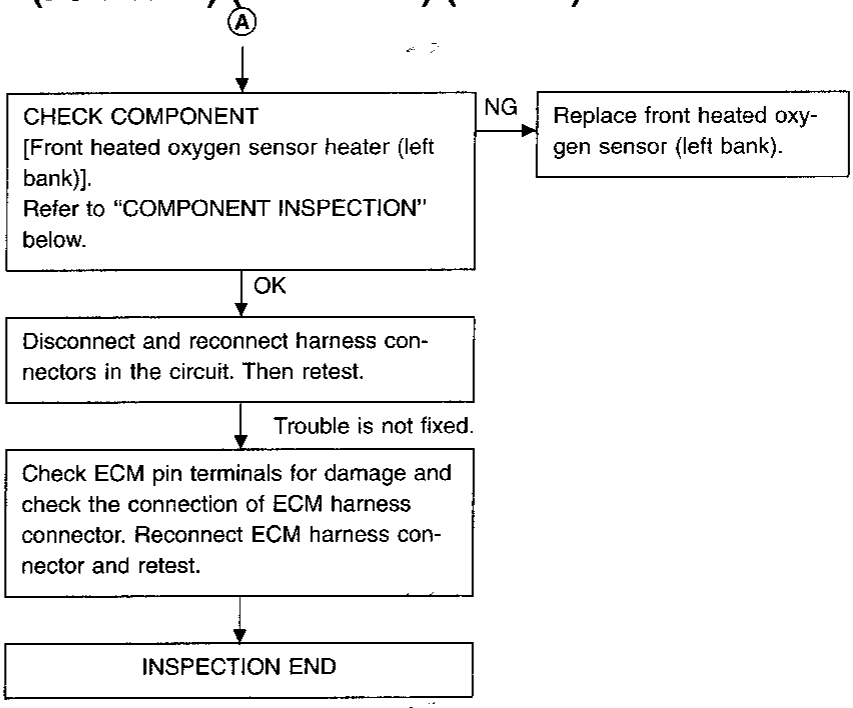
Yes → Go to "TROUBLE DIAGNOSIS FOR DTC P0174, P0175", EC-161, 166.

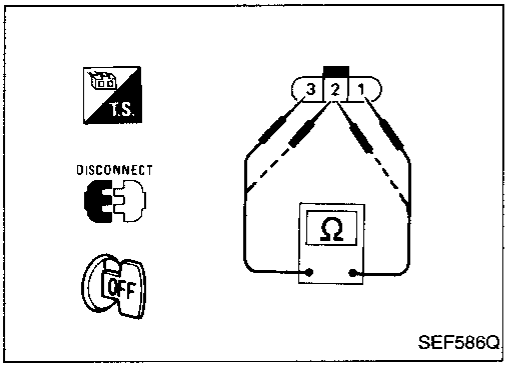
OR

2. Turn ignition switch "OFF".
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure diagnostic trouble code No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Make sure diagnostic trouble code No. 0505 is displayed in Diagnostic Test Mode II.
7. Run engine for at least 10 minutes at idle speed.
   Are the DTCs 0209, 0210 detected? Is it difficult to start engine?

No → (A)

Front Heated Oxygen Sensor (Front HO2S) (Left bank) (DTC: 0303) (Cont'd)





COMPONENT INSPECTION

Front heated oxygen sensor heater

Check resistance between terminals ③ and ①.
Resistance: 2.3 - 4.3Ω at 25°C (77°F)

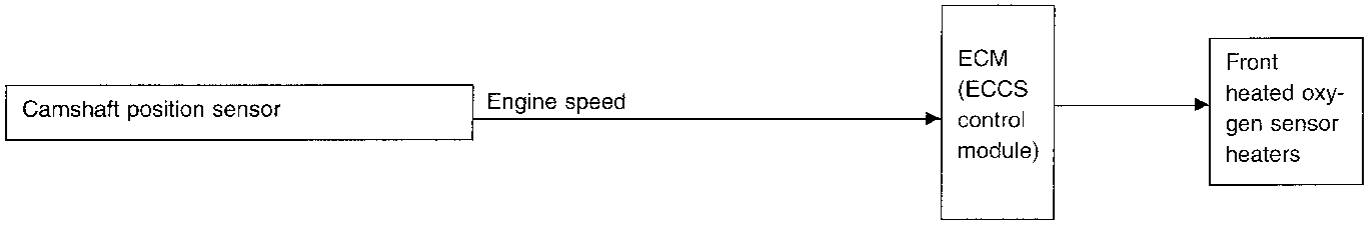
Check continuity between terminals ② and ①, ③ and ②.
Continuity should not exist.

If NG, replace the front heated oxygen sensor.

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.

Front Heated Oxygen Sensor Heater (Left bank) (DTC: 1001)

SYSTEM DESCRIPTION



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

OPERATION

Engine speed rpm	Front heated oxygen sensor heaters
Above 3,200	OFF
Below 3,200	ON

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0155 1001	• The current amperage in the front heated oxygen sensor heater (Left bank) circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the front heated oxygen sensor heater.)	• Harness or connectors (The front heated oxygen sensor heater circuit is open or shorted.) • Front heated oxygen sensor heater (Left bank)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Start engine and run it for at least 5 seconds at idle speed.

OR

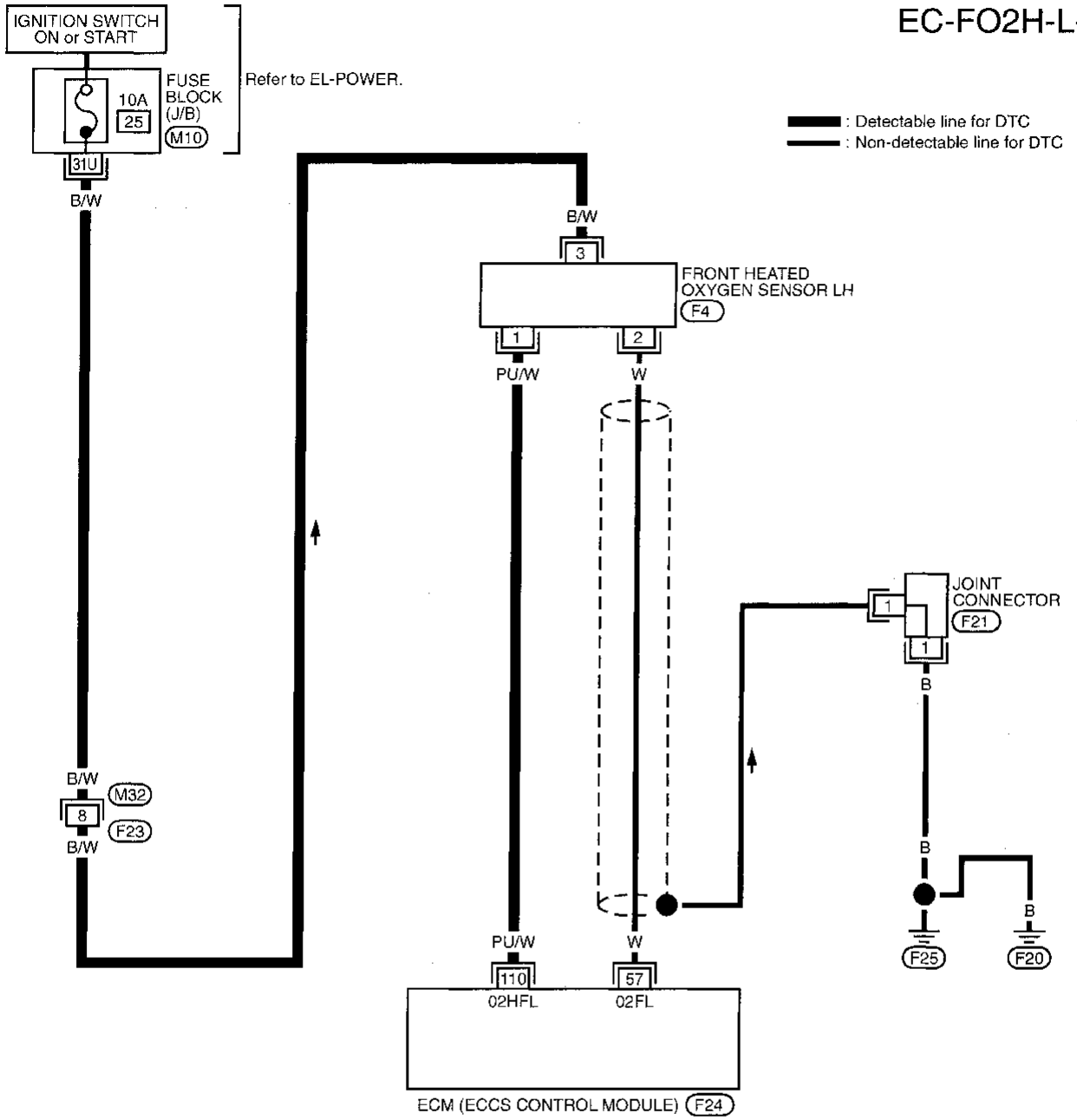
1) Start engine and run it for at least 5 seconds at idle speed.
2) Select "MODE 3" with GST.

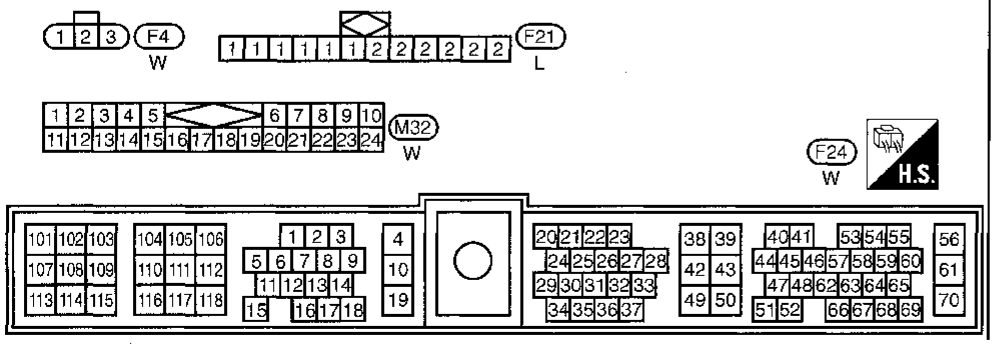
OR

1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

Front Heated Oxygen Sensor Heater (Left bank) (DTC: 1001) (Cont'd)

EC-FO2H-L-01



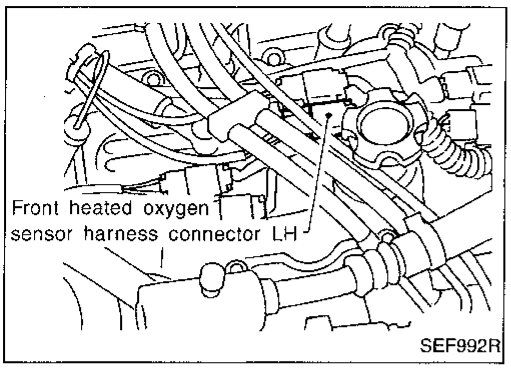


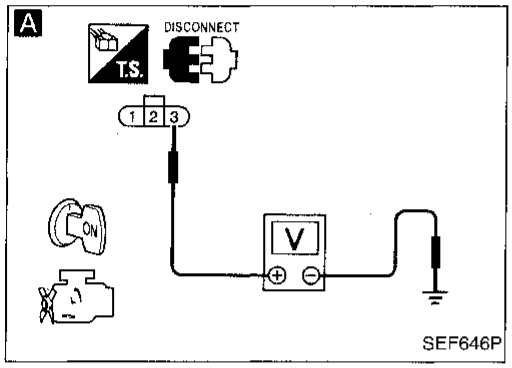
Refer to last page (Foldout page).
M10

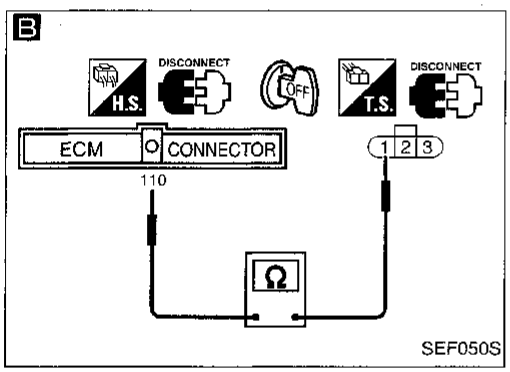
SEF895R

Front Heated Oxygen Sensor Heater (Left bank) (DTC: 1001) (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

A

CHECK POWER SUPPLY.
1. Disconnect front heated oxygen sensor LH harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal ③ and ground.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F23), (M32)
- Harness connector (M10)
- 10A fuse
- Harness for open or short between front heated oxygen sensor LH and fuse

If NG, repair harness or connectors.

OK ↓

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between terminal ① and ECM terminal (110).
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(Front heated oxygen sensor heater).
Refer to "COMPONENT INSPECTION" below.

NG → Replace front heated oxygen sensor (left bank).

OK ↓

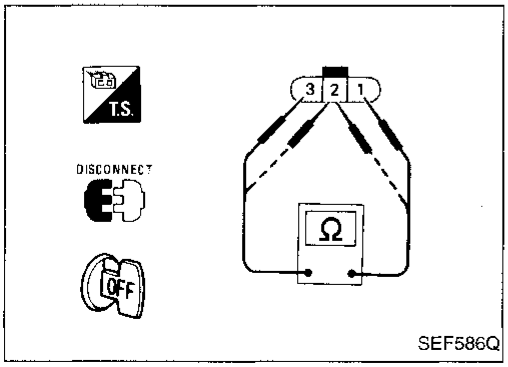
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END



COMPONENT INSPECTION

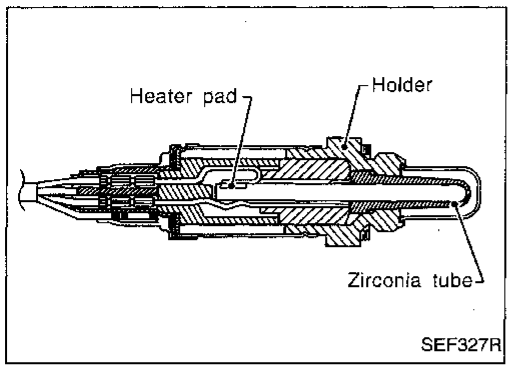
Front heated oxygen sensor heater

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 front heated oxygen sensor.

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.



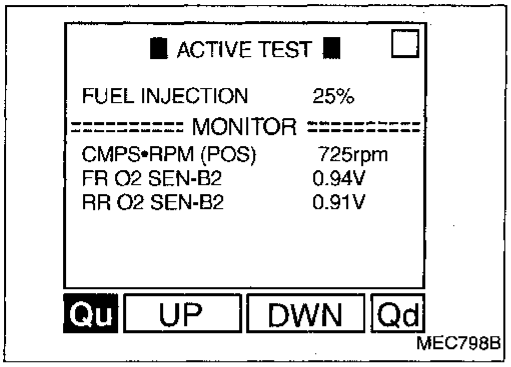
Rear Heated Oxygen Sensor (Rear HO2S) (Left bank) (DTC: 0708)

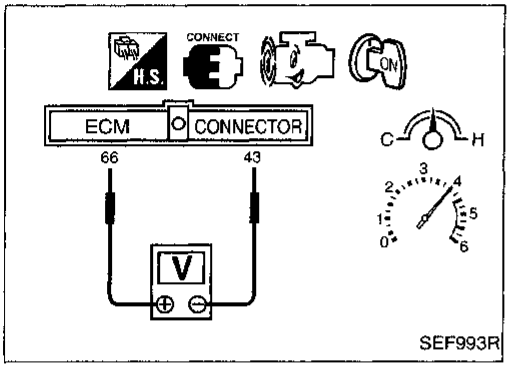
The rear heated oxygen sensor (Rear HO2S), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the front heated oxygen sensor are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the rear heated oxygen sensor.
This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

ON BOARD DIAGNOSIS LOGIC

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

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0156 0708	• An excessively high voltage from the sensor is sent to ECM. • The voltage from the sensor is constantly approx. 0.3V. • The maximum and minimum voltages from the sensor are not reached to the specified voltages. • 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.) • Rear heated oxygen sensor (Left bank) • Fuel pressure • Injectors • Intake air leaks





Rear Heated Oxygen Sensor (Rear HO2S) (Left bank) (DTC: 0708) (Cont'd)

OVERALL FUNCTION CHECK

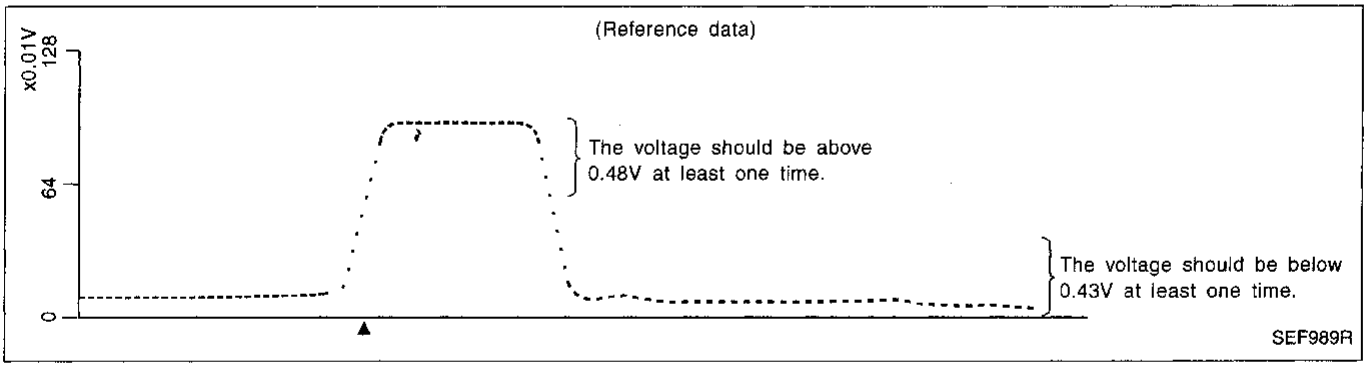
Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a DTC might not be confirmed.

1) Start engine and warm it up sufficiently.
2) Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "RR O2 SEN-B2" as the monitor item with CONSULT.
3) Check "RR O2 SEN-B2" at idle speed when adjusting "FUEL INJECTION" to ±25%.
   "RR O2 SEN-B2" should be above 0.48V at least once when the "FUEL INJECTION" is +25%.
   "RR O2 SEN-B2" should be below 0.43V at least once when the "FUEL INJECTION" is –25%.

OR

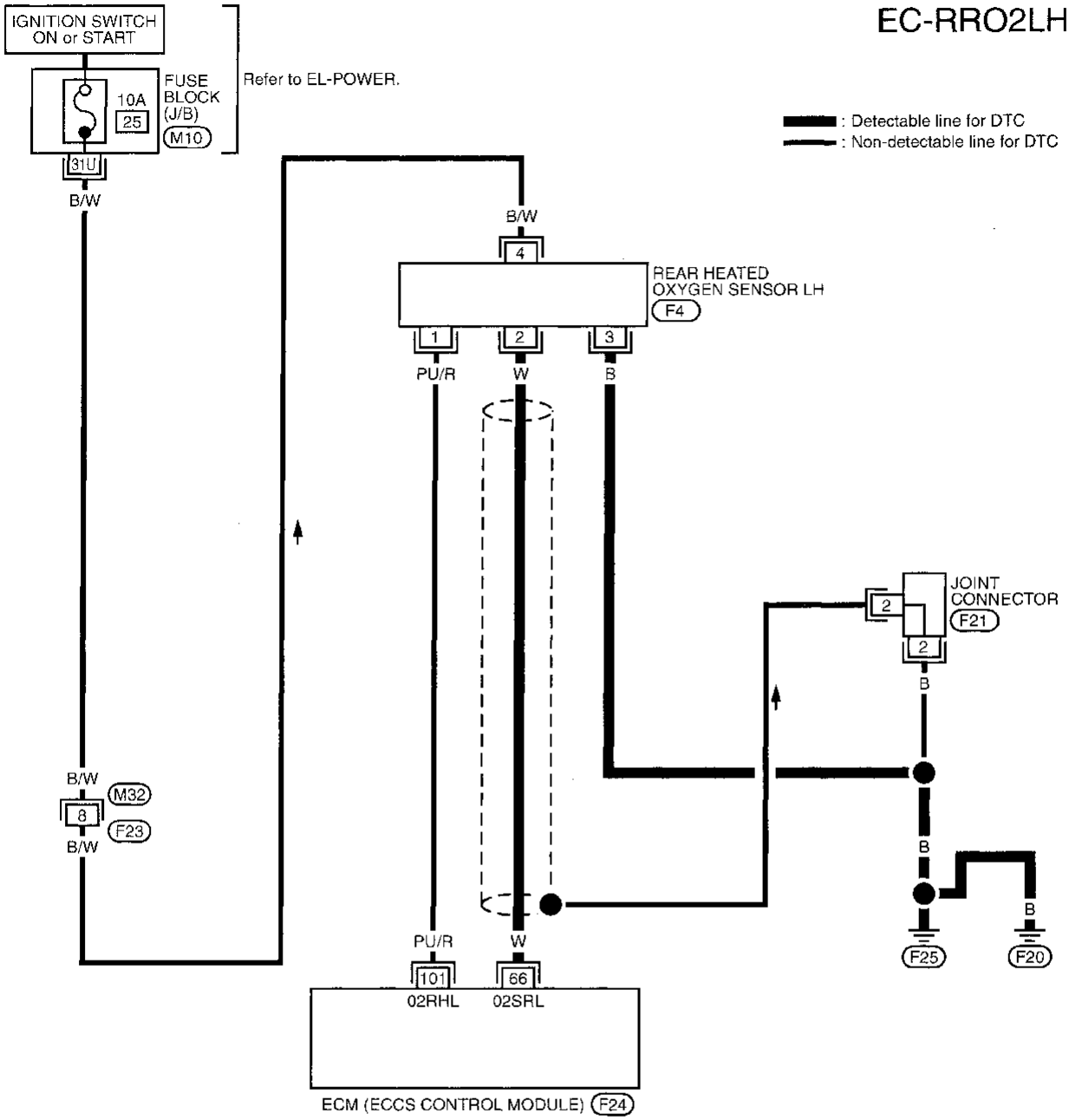
1) Start engine and warm it up sufficiently.
2) Set voltmeter probes between ECM terminals ⑯ (sensor signal) and ㊸ (engine ground).
3) Check the voltage when racing up to 4,000 rpm under no load at least 10 times.
   (depress and release accelerator pedal as soon as possible)
   The voltage should be above 0.48V and below 0.43V at least once during this procedure.
   If the voltage can be confirmed in step 3, step 4 is not necessary.

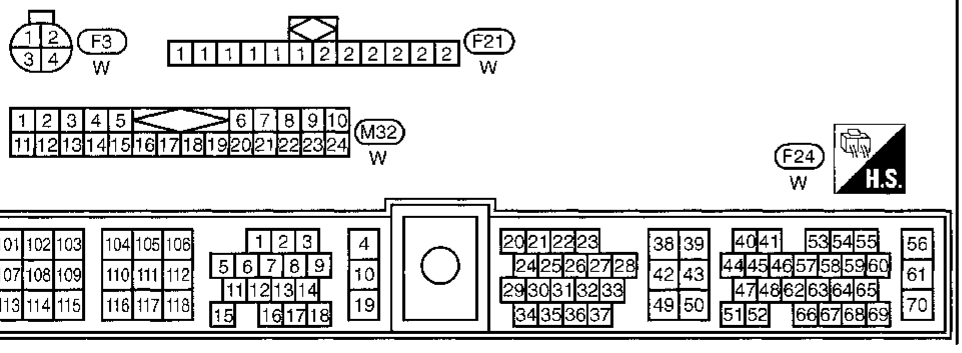
4) Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
   The voltage should be above 0.48V and below 0.43V at least once during this procedure.



Rear Heated Oxygen Sensor (Rear HO2S) (Left bank) (DTC: 0708) (Cont'd)

EC-RRO2LH-01





Refer to last page (Foldout page).
M10

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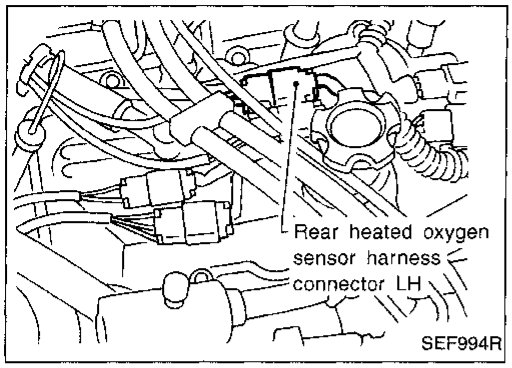
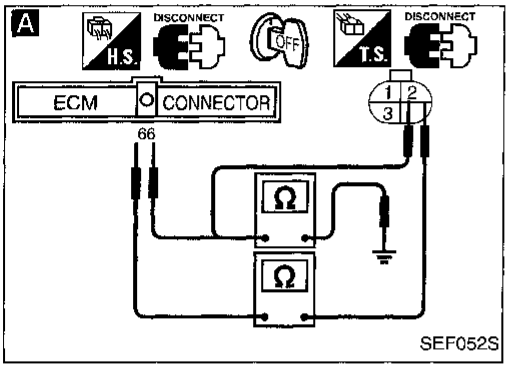
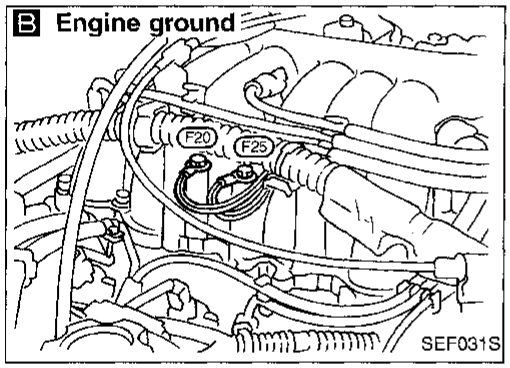
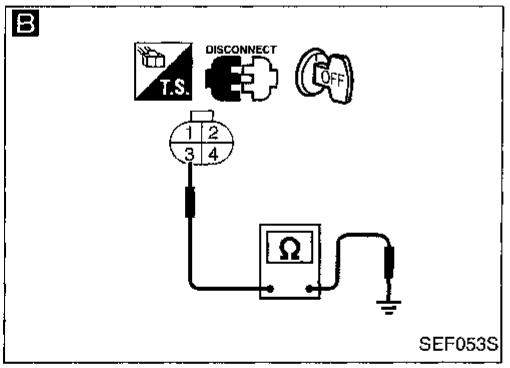
Rear Heated Oxygen Sensor (Rear HO2S) (Left bank) (DTC: 0708) (Cont'd)

DIAGNOSTIC PROCEDURE









INSPECTION START

A

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect rear heated oxygen sensor (left bank) harness connector and ECM harness connector.
2. Check harness continuity between ECM terminal (66) and terminal (2).
   Continuity should exist.
3. Check harness continuity between ECM terminal (66) (or terminal (2)) and ground.
   Continuity should not exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors (F22), (B52)
- Harness for open or short between ECM and rear heated oxygen sensor LH

If NG, repair harness or connectors.

OK ↓

B

CHECK GROUND CIRCUIT.
1. Loosen and retighten engine ground screws.
2. Check harness continuity between terminal (3) and engine ground.
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(Rear heated oxygen sensor heater).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace rear heated oxygen sensor.

OK ↓

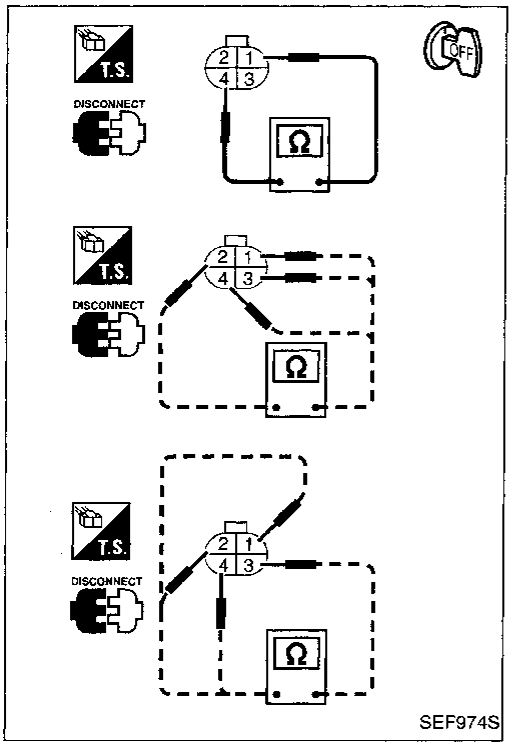
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END



Rear Heated Oxygen Sensor (Rear HO2S) (Left bank) (DTC: 0708) (Cont'd)

COMPONENT INSPECTION

Rear heated oxygen sensor heater

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	

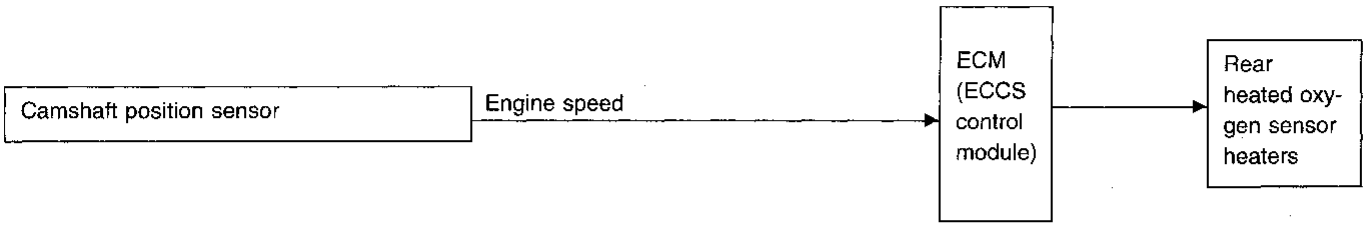
If NG, replace the rear heated oxygen sensor.

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.

Rear Heated Oxygen Sensor Heater (Left bank) (DTC: 1002)

SYSTEM DESCRIPTION



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

OPERATION

Engine speed rpm	Rear heated oxygen sensor heaters
Above 3,200	OFF
Below 3,200	ON

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0161 1002	• The current amperage in the rear heated oxygen sensor heater (Left bank) circuit is out of the normal range. (An improper voltage drop signal is sent to ECM through the rear heated oxygen sensor heater.)	• Harness or connectors (The rear heated oxygen sensor heater circuit is open or shorted.) • Rear heated oxygen sensor heater (Left bank)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Start engine and run it for at least 5 seconds at idle speed.

OR

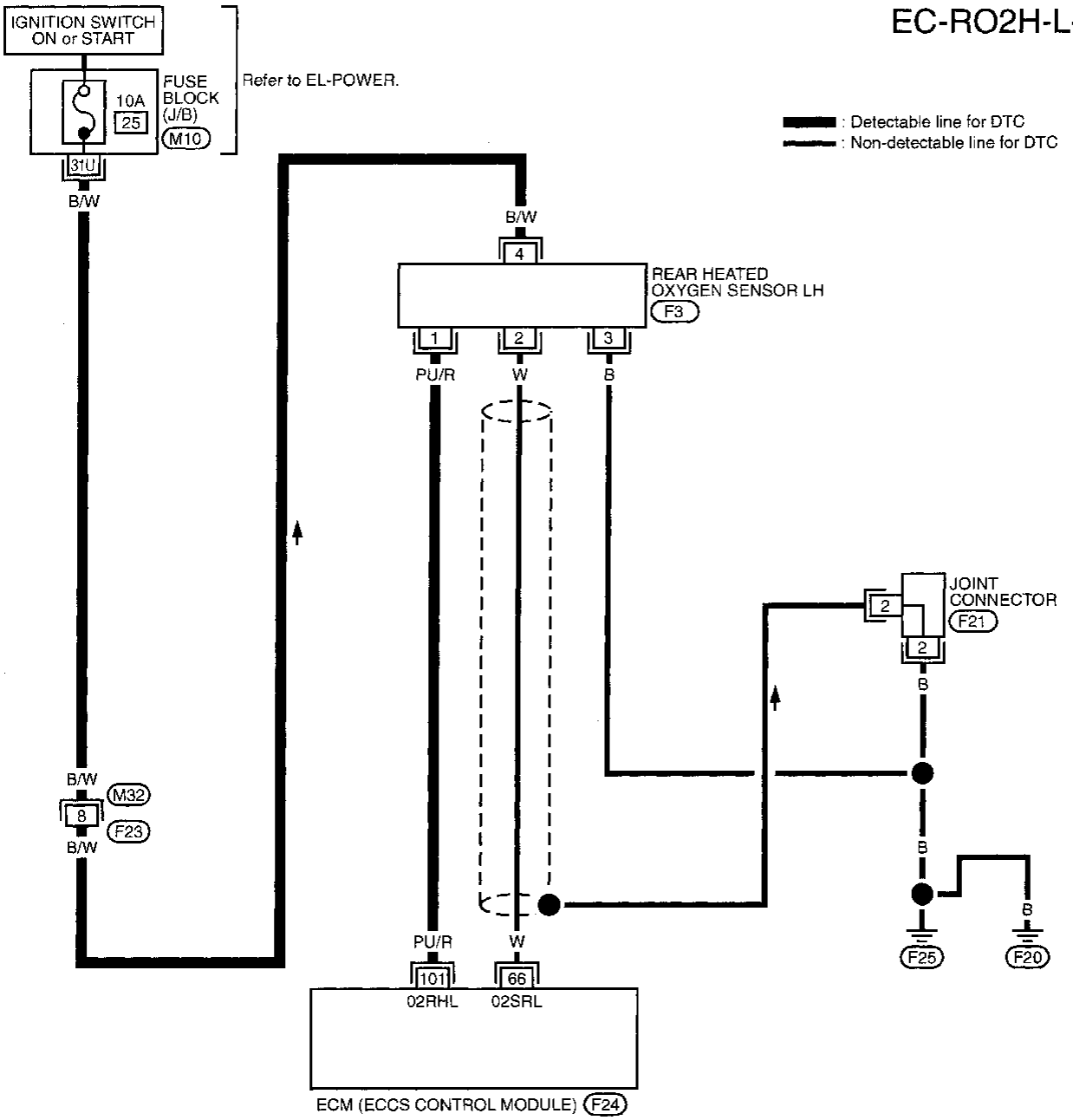
1) Start engine and run it for at least 5 seconds at idle speed.
2) Select "MODE 3" with GST.

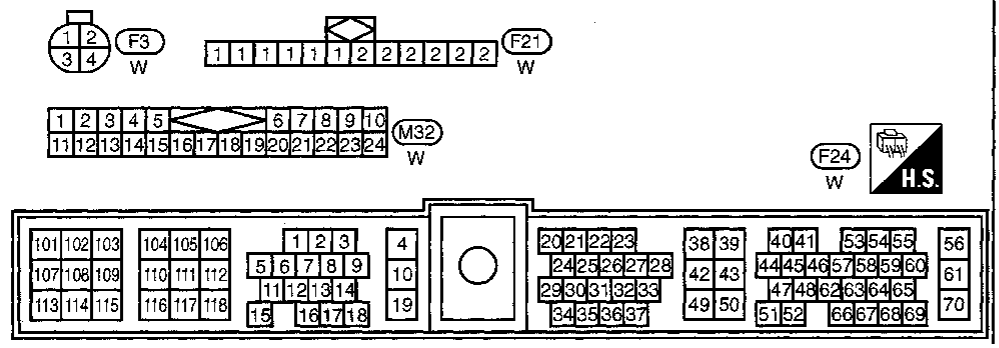
OR

1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

Rear Heated Oxygen Sensor Heater (Left bank) (DTC: 1002) (Cont'd)

EC-RO2H-L-01





Refer to last page (Foldout page).
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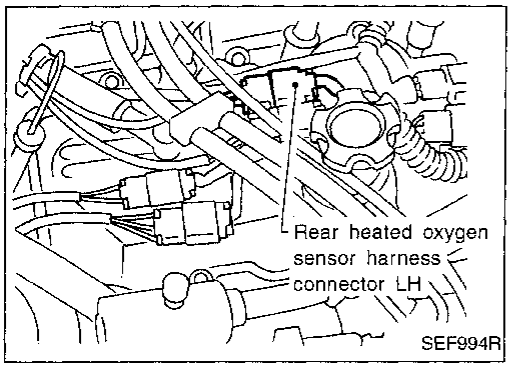
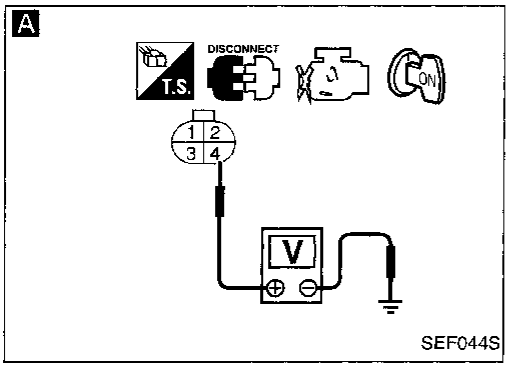
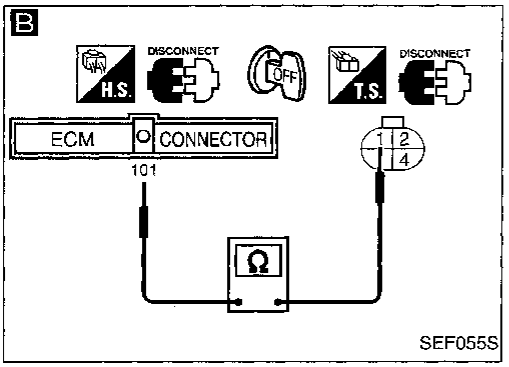
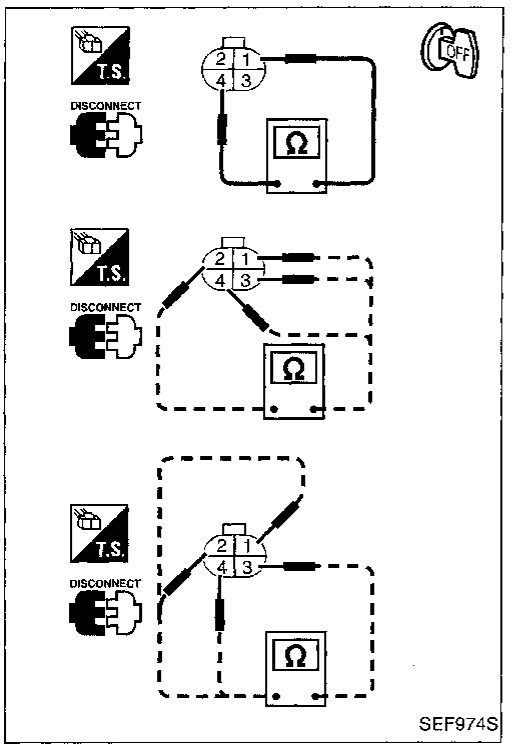
Rear Heated Oxygen Sensor Heater (Left bank) (DTC: 1002) (Cont'd)

DIAGNOSTIC PROCEDURE









INSPECTION START

A

CHECK POWER SUPPLY.
1. Disconnect rear heated oxygen sensor LH harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal ④ and ground.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F23), (M32)
- Harness connectors (M10)
- 10A fuse
- Harness for open or short between rear heated oxygen sensor LH and fuse

If NG, repair harness or connectors.

OK ↓

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between terminal ① and ECM terminal (101).
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(Rear heated oxygen sensor heater).
Refer to "COMPONENT INSPECTION" below.

NG → Replace rear heated oxygen sensor (left bank).

OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

COMPONENT INSPECTION

Rear heated oxygen sensor heater

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	

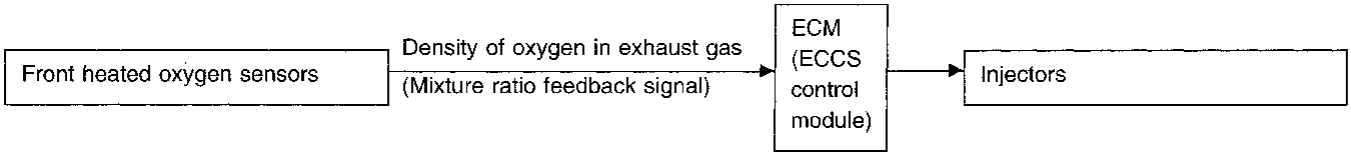
If NG, replace the rear heated oxygen sensor.

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.

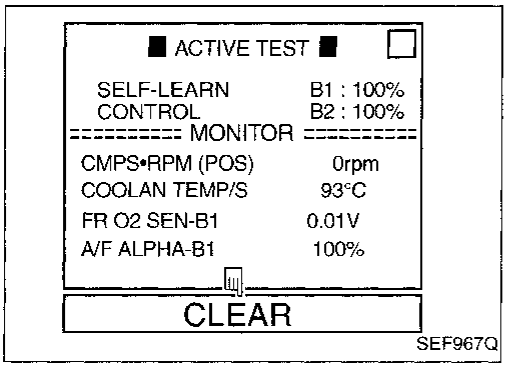
Fuel Injection System Function (Right bank) (Lean side) (DTC: 0115)

ON BOARD DIAGNOSIS LOGIC

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



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

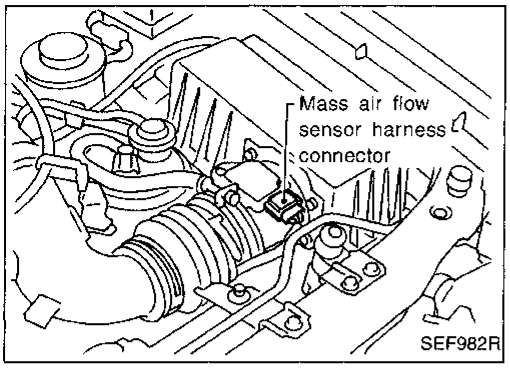


DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE (Overall)

1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "SELF-LEARN CONTROL" in "ACTIVE TEST" mode with CONSULT.
4) Clear the self-learning control coefficient by touching "CLEAR".
5) Select "DATA MONITOR" mode with CONSULT.
6) Start engine again and run it for at least 10 minutes at idle speed.
   The DTC P0171 should be detected at this stage, if a malfunction exists.
7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.

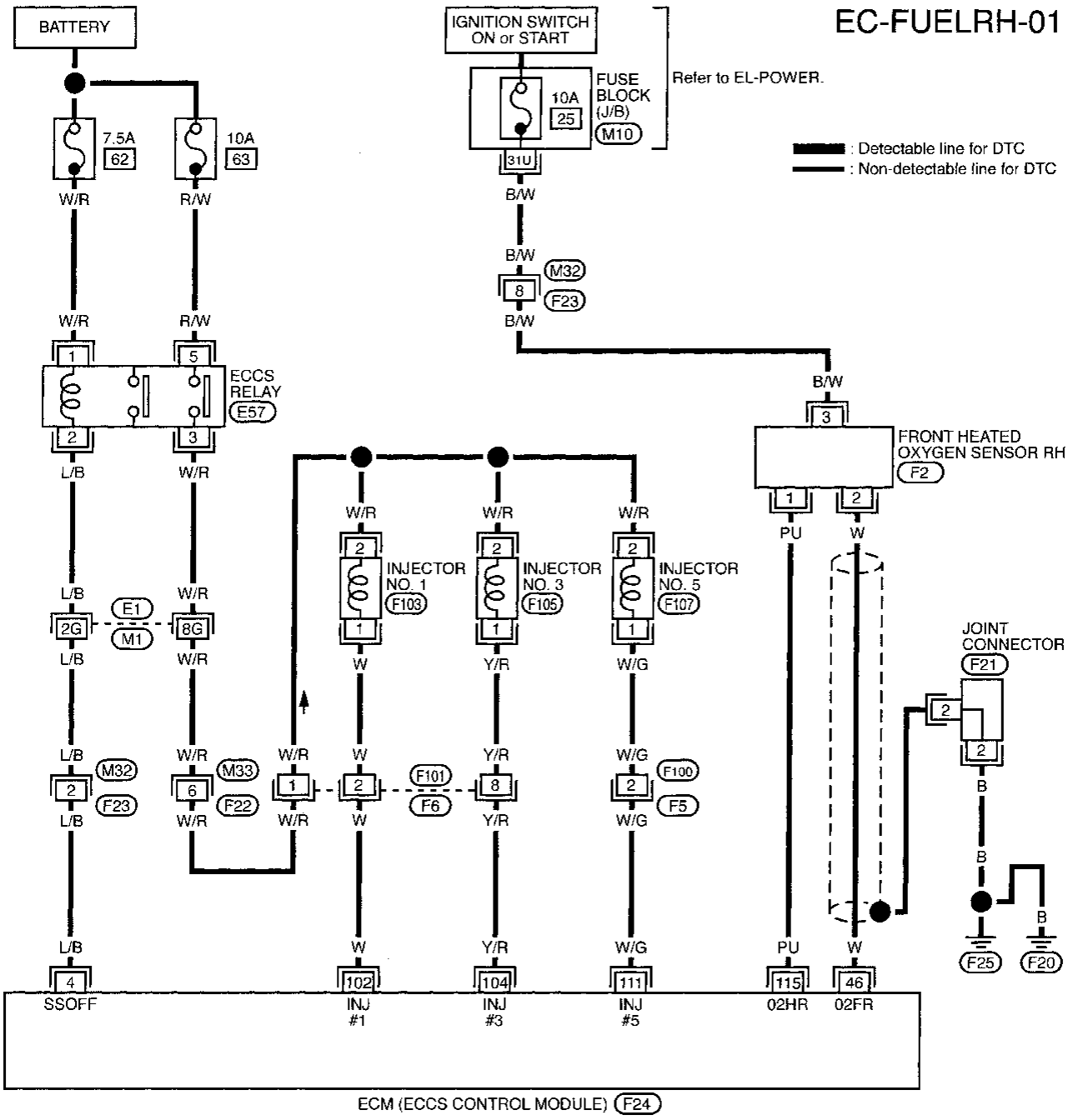
OR

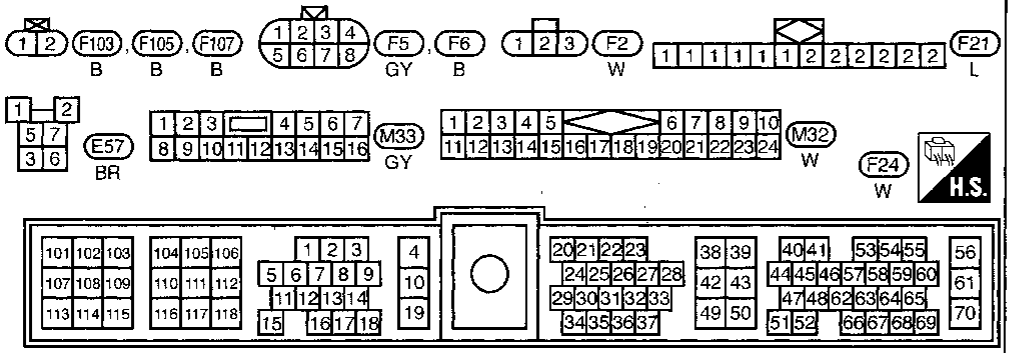
Fuel Injection System Function (Right bank) (Lean side) (DTC: 0115) (Cont'd)



1) Disconnect mass air flow sensor harness connector.
2) Start engine and run it for at least 3 seconds at idle speed.
3) Stop engine and reconnect mass air flow sensor harness connector.
4) Turn ignition switch "ON".
5) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure DTC 0102 is detected.
6) Erase the DTC 0102 by changing from Diagnostic Test Mode II to Diagnostic Test Mode I.
7) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure DTC 0505 is detected.
8) Start engine again and run it for at least 10 minutes at idle speed.
   The DTC 0115 should be detected at this stage, if a malfunction exists.
9) If it is difficult to start engine at step 8, the fuel injection system also has a malfunction.

Fuel Injection System Function (Right bank) (Lean side) (DTC: 0115) (Cont'd)





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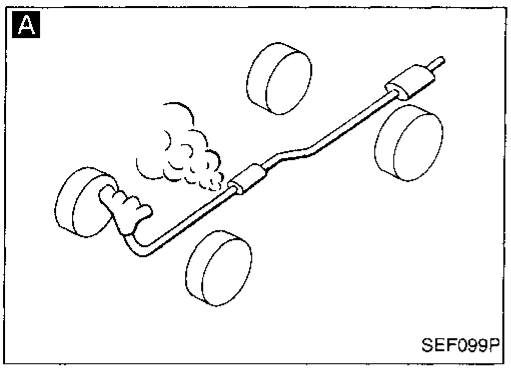
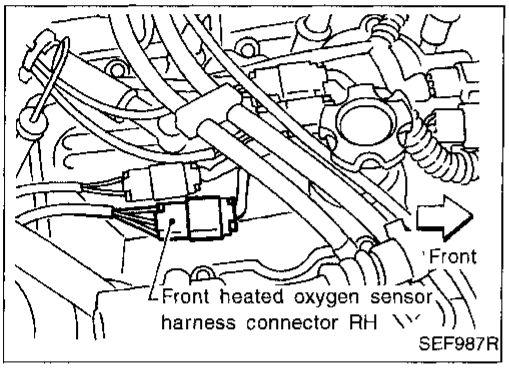
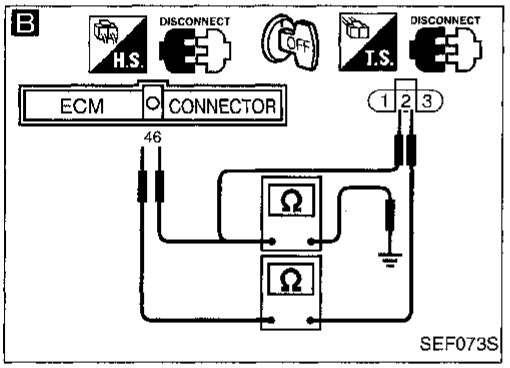
Fuel Injection System Function (Right bank) (Lean side) (DTC: 0115) (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

A

CHECK EXHAUST AIR LEAK.
Start engine and run it at idle. Listen for an exhaust air leak before three way catalyst.

NG → Repair or replace.

OK ↓

CHECK FOR INTAKE AIR LEAK.
Start engine and run it at idle. Listen for an intake air leak after the mass air flow sensor.

NG → Repair or replace.

OK ↓

B

CHECK FRONT HEATED OXYGEN SENSOR (RIGHT BANK).
1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor RH harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal (46) and terminal (2).
   Continuity should exist.
4. Check harness continuity between ECM terminal (46) (or terminal (2)) and ground.
   Continuity should not exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. Refer to EC-21.
2. Install fuel pressure gauge and check fuel pressure.
   At idling:
   When fuel pressure regulator valve vacuum hose is connected.
   Approximately 250.1 kPa (2.55 kg/cm^2, 36.3 psi)
   When fuel pressure regulator valve vacuum hose is disconnected.
   Approximately 299.1 kPa (3.05 kg/cm^2, 43.4 psi)

NG → Check fuel pump and circuit. Refer to EC-244.

OK ↓

CHECK MASS AIR FLOW SENSOR.
Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.
3.3 - 4.8 g·m/sec: at idling
12.0 - 14.9 g·m/sec: at 2,500 rpm

OR

Check "mass air flow" 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

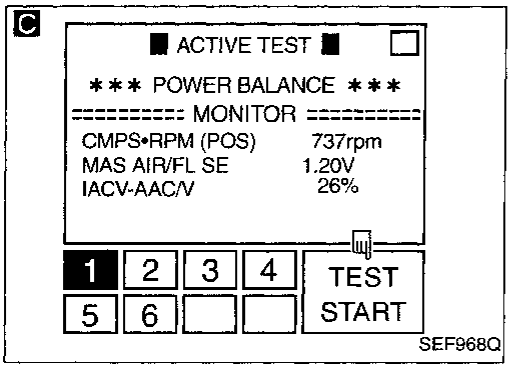
NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-93.

OK ↓

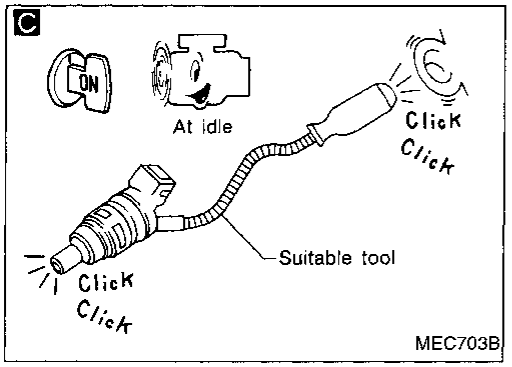
Ⓐ

Fuel Injection System Function (Right bank) (Lean side) (DTC: 0115) (Cont'd)

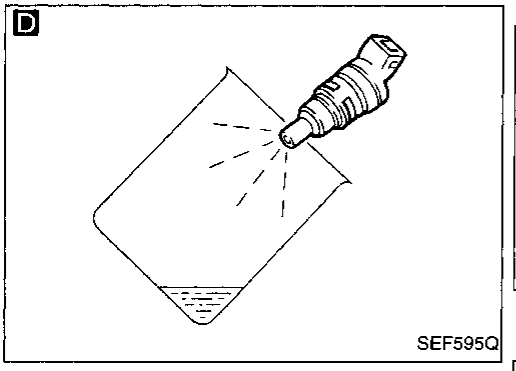
C



C



D



Ⓐ

C

CHECK FUNCTION OF INJECTORS (RIGHT BANK).

1. Install all parts removed.
2. Start engine.
3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
4. Make sure that each circuit produces a momentary engine speed drop.

NG → Perform TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS, "Injectors", EC-239. Repair harness or connectors.

OR

3. Listen to each injector operating sound.
   Clicking noise should be heard.

OK ↓

Confirm that the engine is cooled down and there are no fire hazards near the vehicle.

1. Turn ignition switch "OFF".
2. Disconnect injector harness connectors on left bank.
3. Remove injector gallery on right bank. Refer to EC-22.
   Keep fuel hose and all injectors connected to injector gallery.
   The injector harness connectors on right bank should remain connected.

D

1. Disconnect all ignition coil harness connectors.
2. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.

NG → Replace injectors from which fuel does not spray out.

OK ↓

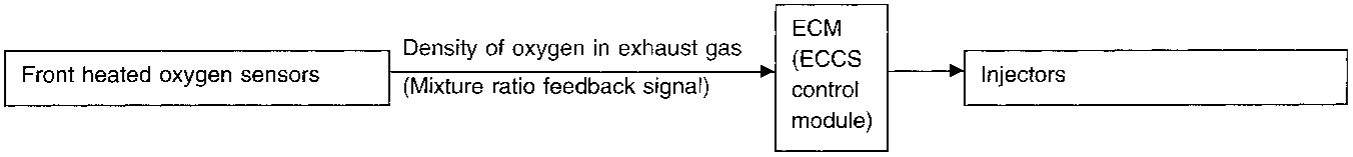
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

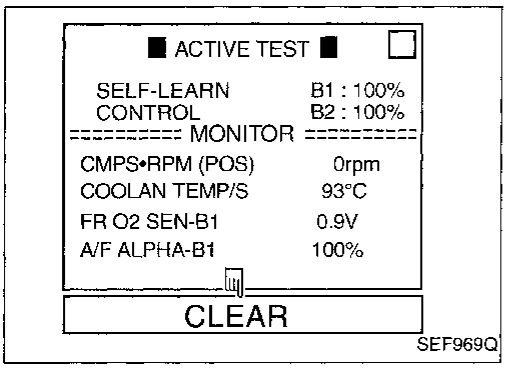
Fuel Injection System Function (Right bank) (Rich side) (DTC: 0114)

ON BOARD DIAGNOSIS LOGIC

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



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

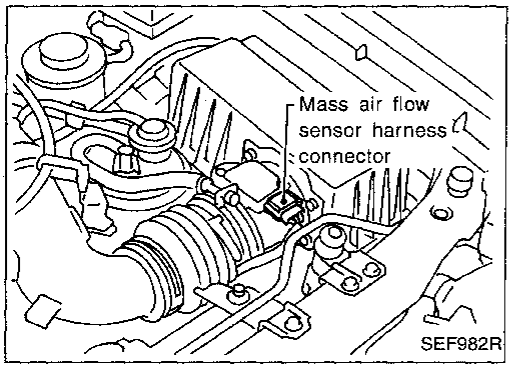


DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE (Overall)

1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "SELF-LEARN CONTROL" in "ACTIVE TEST" mode with CONSULT.
4) Clear the self-learning control coefficient by touching "CLEAR".
5) Select "DATA MONITOR" mode with CONSULT.
6) Start engine again and run it for at least 10 minutes at idle speed.
   The DTC P0172 should be detected at this stage, if a malfunction exists.
7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.

OR

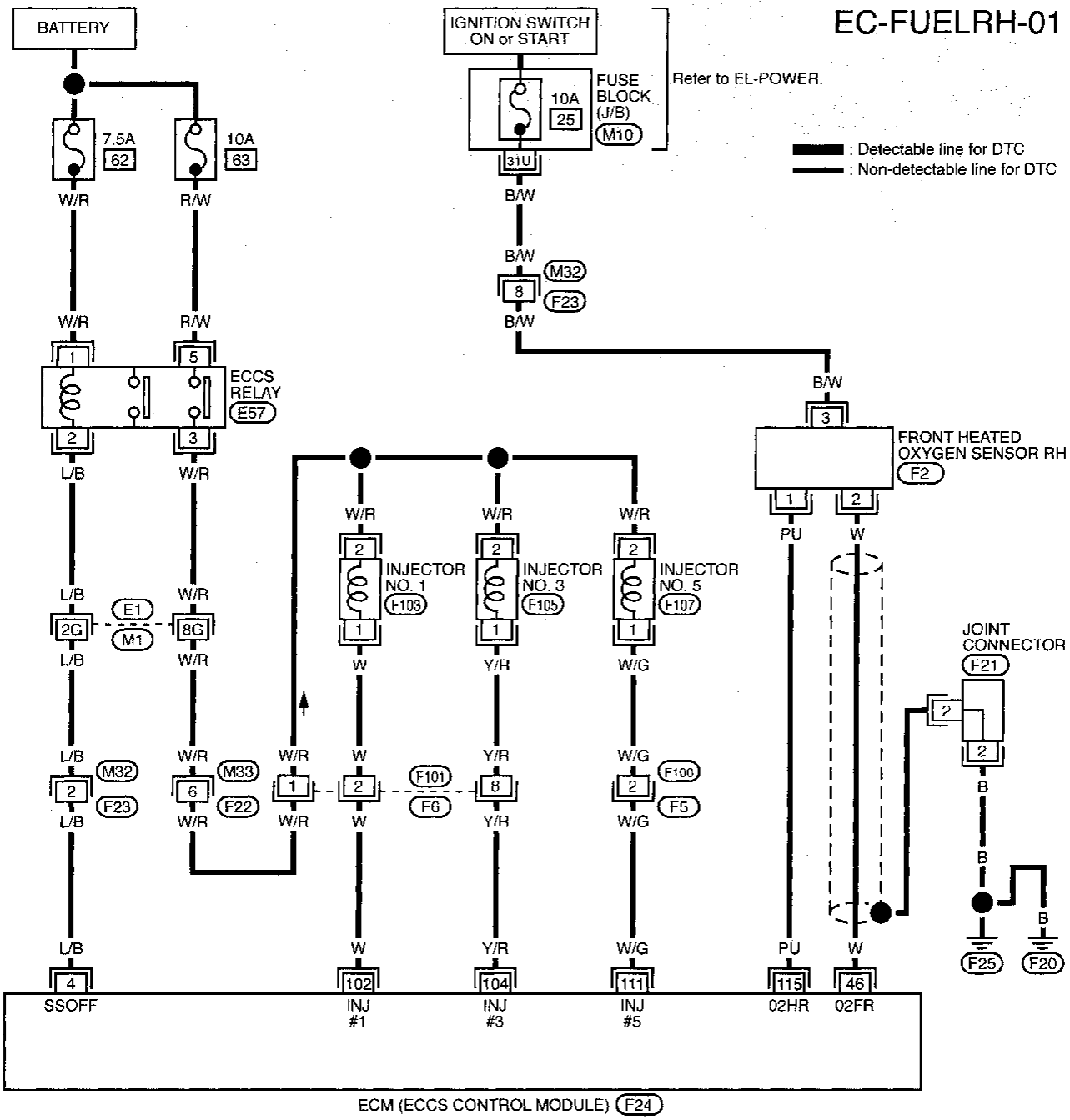
Fuel Injection System Function (Right bank) (Rich side) (DTC: 0114) (Cont'd)

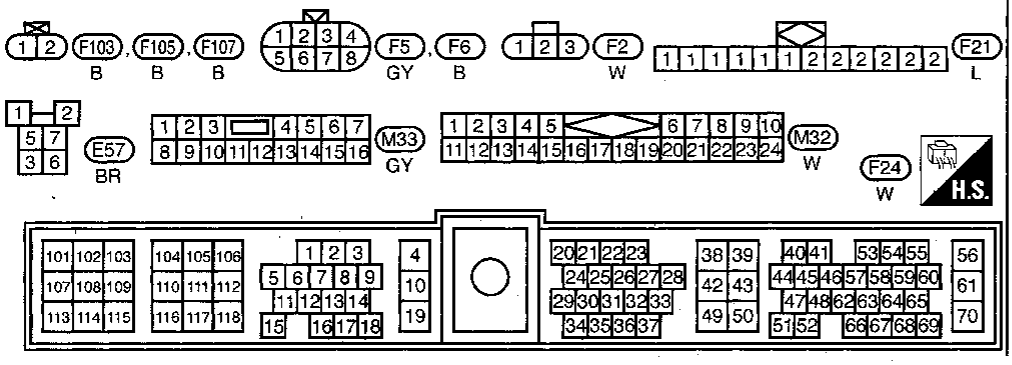


1) Disconnect mass air flow sensor harness connector.
2) Start engine and run it for at least 3 seconds at idle speed.
3) Stop engine and reconnect mass air flow sensor harness connector.
4) Turn ignition switch "ON".
5) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure DTC 0102 is detected.
6) Erase the DTC 0102 by changing from Diagnostic Test Mode II to Diagnostic Test Mode I.
7) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure DTC 0505 is detected.
8) Start engine again and run it for at least 10 minutes at idle speed.
   The DTC 0114 should be detected at this stage, if a malfunction exists.
9) If it is difficult to start engine at step 8, the fuel injection system also has a malfunction.

Fuel Injection System Function (Right bank) (Rich side) (DTC: 0114) (Cont'd)

EC-FUELRH-01

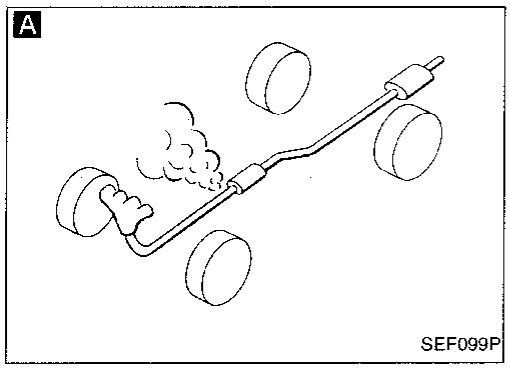


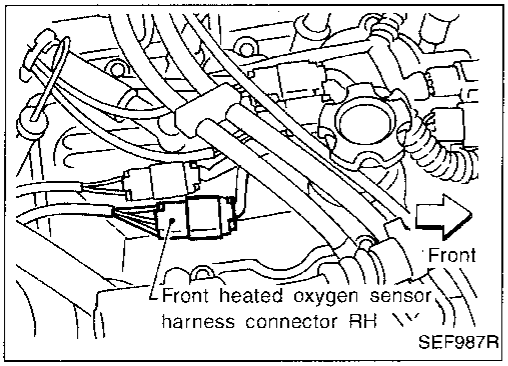


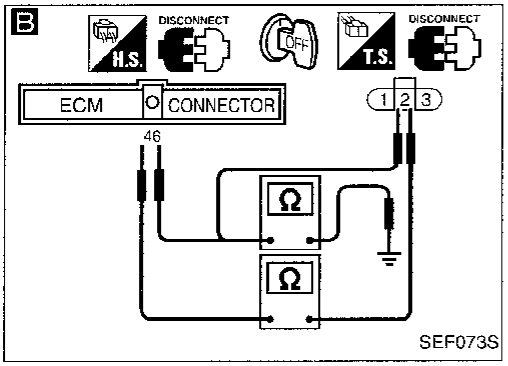
SEF902R

Fuel Injection System Function (Right bank) (Rich side) (DTC: 0114) (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

A

CHECK FOR EXHAUST AIR LEAK.
Start engine and run it at idle. Listen for an exhaust air leak before the three way catalyst.

NG → Repair or replace.

OK

B

CHECK FRONT HEATED OXYGEN SENSOR (RIGHT BANK).
1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor RH harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal (46) and terminal (2).
   Continuity should exist.
4. Check harness continuity between ECM terminal (46) (or terminal (2)) and ground.
   Continuity should not exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

OK

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. Refer to EC-21.
2. Install fuel pressure gauge and check fuel pressure.
   At idling:
   When fuel pressure regulator valve vacuum hose is connected.
   Approximately 250.1 kPa (2.55 kg/cm², 36.3 psi)
   When fuel pressure regulator valve vacuum hose is disconnected.
   Approximately 299.1 kPa (3.05 kg/cm², 43.4 psi)

NG → Check fuel pump and circuit. Refer to EC-244.

OK

CHECK MASS AIR FLOW SENSOR.
Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.
3.3 - 4.8 g·m/sec: at idling
12.0 - 14.9 g·m/sec: at 2,500 rpm

OR

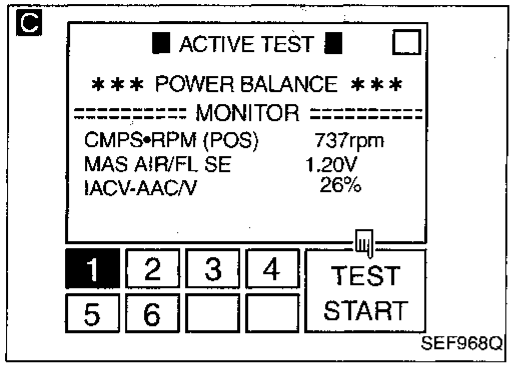
Check "mass air flow" in MODE 1 with GST.
3.3 - 4.8 g·m/sec: at idling
12.0 - 14.9 g·m/sec: at 2,500 rpm

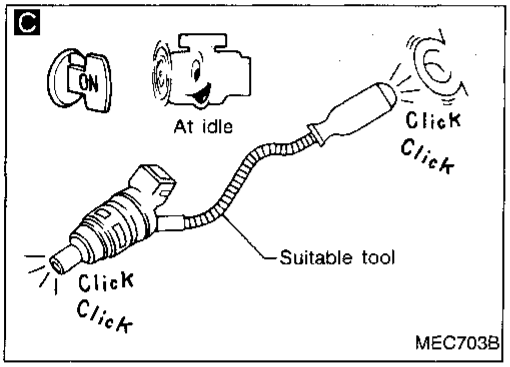
NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-93.

OK

Ⓐ

Fuel Injection System Function (Right bank) (Rich side) (DTC: 0114) (Cont'd)





Ⓐ

C

CHECK FUNCTION OF INJECTORS (RIGHT BANK).
1. Install all parts removed.
2. Start engine.
3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
4. Make sure that each circuit produces a momentary engine speed drop.

NG → Perform TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS, "Injectors", EC-239. Repair harness or connectors.

OR

3. Listen to each injector operating sound.
Clicking noise should be heard.

OK ↓

Remove injector assembly.
Refer to EC-22.
Keep fuel hose and all injectors connected to injector gallery.

↓

Confirm that the engine is cooled down and there are no fire hazards near the vehicle.

↓

1. Disconnect all injector harness connectors.
2. Disconnect all ignition coil harness connectors.
3. Crank engine for about 3 seconds. Make sure fuel does not drip from injector.

Drips → Replace the injectors from which fuel is dripping.

Does not drip. ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

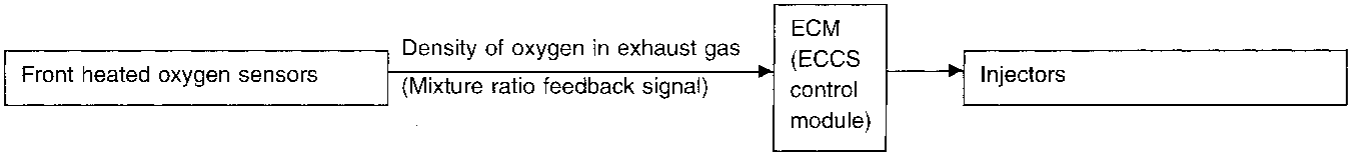
↓

INSPECTION END

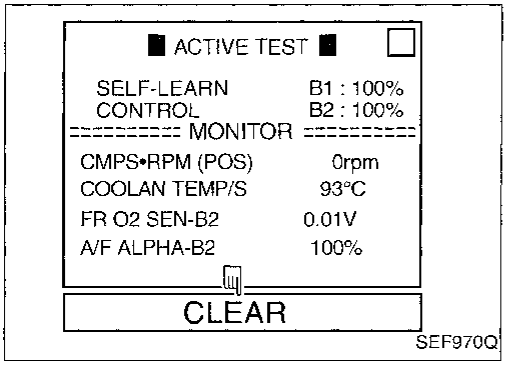
Fuel Injection System Function (Left bank) (Lean side) (DTC: 0210)

ON BOARD DIAGNOSIS LOGIC

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



Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0174 0210	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	• Intake air leaks • Front heated oxygen sensor (left bank) • Injectors (left bank) • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor

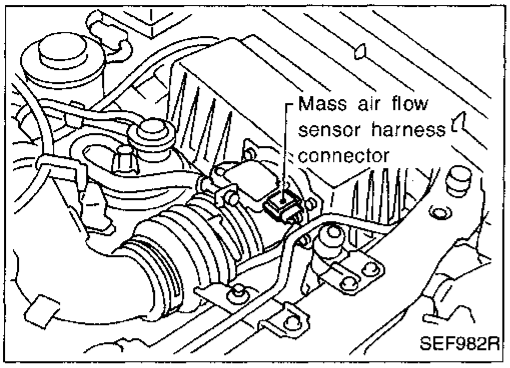


DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE (Overall)

1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "SELF-LEARN CONTROL" in "ACTIVE TEST" mode with CONSULT.
4) Clear the self-learning control coefficient by touching "CLEAR".
5) Select "DATA MONITOR" mode with CONSULT.
6) Start engine again and run it for at least 10 minutes at idle speed.
   The DTC P0174 should be detected at this stage, if a malfunction exists.
7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.

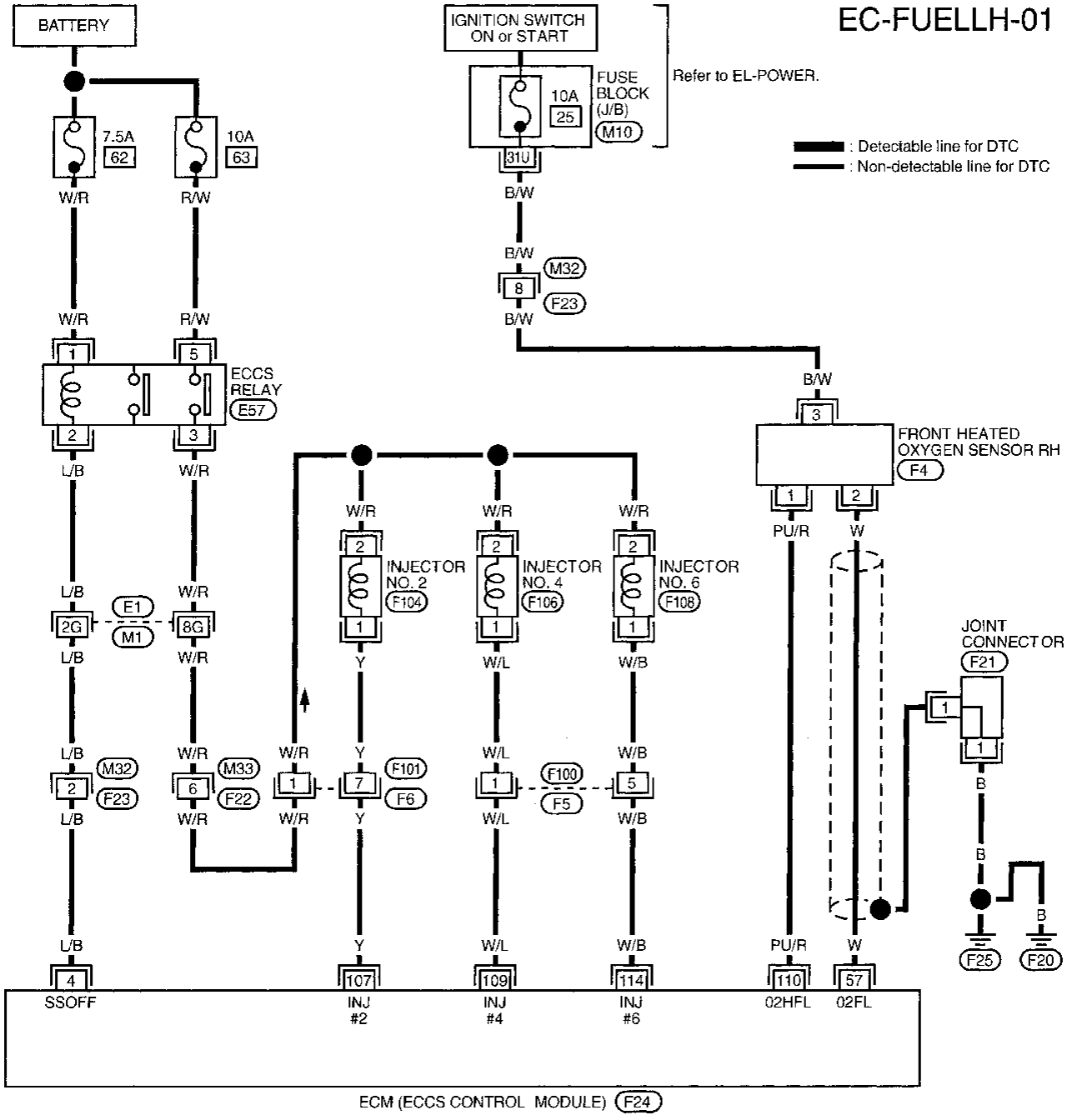
OR

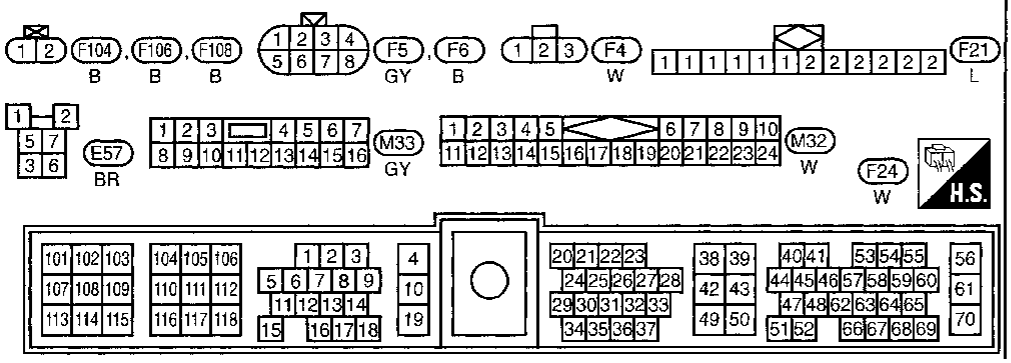
Fuel Injection System Function (Left bank) (Lean side) (DTC: 0210) (Cont'd)



1) Disconnect mass air flow sensor harness connector.
2) Start engine and run it for at least 3 seconds at idle speed.
3) Stop engine and reconnect mass air flow sensor harness connector.
4) Turn ignition switch "ON".
5) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure DTC 0102 is detected.
6) Erase the DTC 0102 by changing from Diagnostic Test Mode II to Diagnostic Test Mode I.
7) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure DTC 0505 is detected.
8) Start engine again and run it for at least 10 minutes at idle speed.
   The DTC 0210 should be detected at this stage, if a malfunction exists.
9) If it is difficult to start engine at step 8, the fuel injection system also has a malfunction.

Fuel Injection System Function (Left bank) (Lean side) (DTC: 0210) (Cont'd)



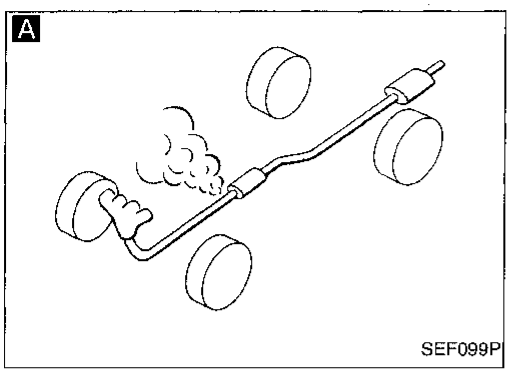


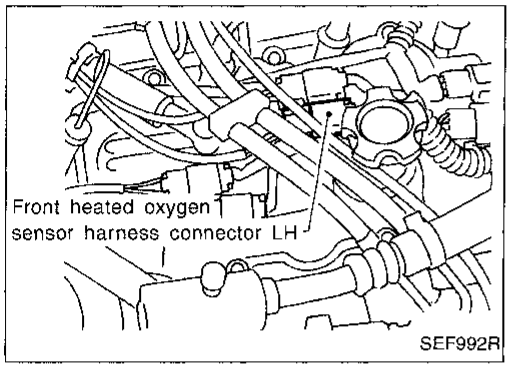
Refer to last page (Foldout page).
E1, M1
M10

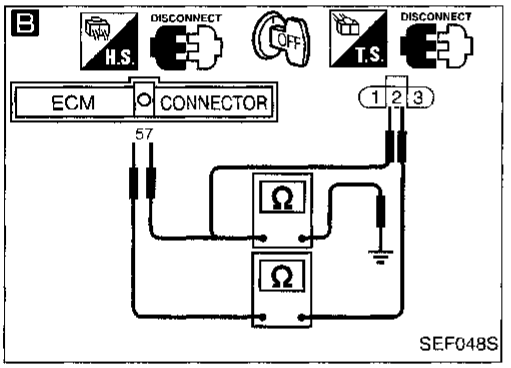
SEF903R

Fuel Injection System Function (Left bank) (Lean side) (DTC: 0210) (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

A

CHECK EXHAUST AIR LEAK.
Start engine and run it at idle. Listen for an exhaust air leak before three way catalyst.
- NG → Repair or replace.
- OK ↓

CHECK FOR INTAKE AIR LEAK.
Start engine and run it at idle. Listen for an intake air leak after mass air flow sensor.
- NG → Repair or replace.
- OK ↓

B

CHECK FRONT HEATED OXYGEN SENSOR (LEFT BANK).
1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor LH harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal (57) and terminal (2).
   Continuity should exist.
4. Check harness continuity between ECM terminal (57) (or terminal (2)) and ground.
   Continuity should not exist.
   If OK, check harness for short.

- NG → Repair harness or connectors.
- OK ↓

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. Refer to EC-21.
2. Install fuel pressure gauge and check fuel pressure.
   At idling:
   When fuel pressure regulator valve vacuum hose is connected.
   Approximately 250.1 kPa (2.55 kg/cm^2, 36.3 psi)
   When fuel pressure regulator valve vacuum hose is disconnected.
   Approximately 299.1 kPa (3.05 kg/cm^2, 43.4 psi)

- NG → Check fuel pump and circuit. Refer to EC-244.
- OK ↓

CHECK MASS AIR FLOW SENSOR.
Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.
2.5 - 6.0 g·m/sec: at idling
9.5 - 19.0 g·m/sec: at 2,500 rpm

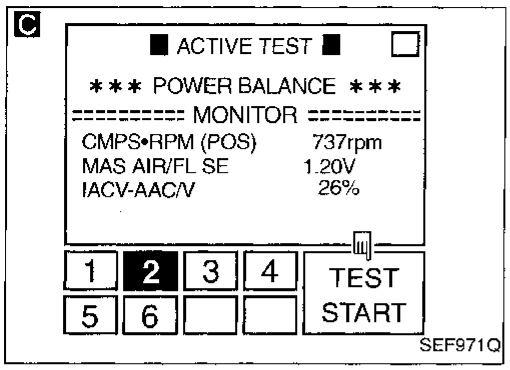
OR

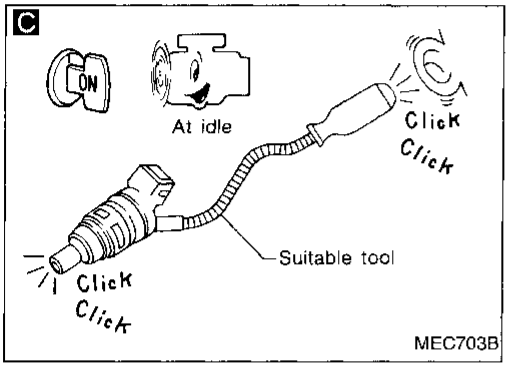
Check "mass air flow" in MODE 1 with GST.
2.5 - 6.0 g·m/sec: at idling
9.5 - 19.0 g·m/sec: at 2,500 rpm

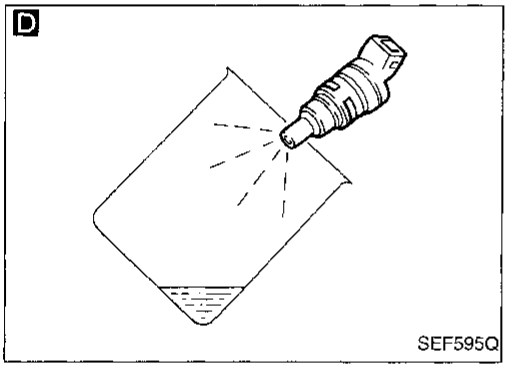
- NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-93.
- OK ↓

Ⓐ

Fuel Injection System Function (Left bank) (Lean side) (DTC: 0210) (Cont'd)







Ⓐ

C

CHECK FUNCTION OF INJECTORS (LEFT BANK).

1. Install all parts removed.
2. Start engine.
3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
4. Make sure that each circuit produces a momentary engine speed drop.

NG → Perform TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS, "Injectors", EC-239. Repair harness or connectors.

OR

3. Listen to each injector operating sound.
   Clicking noise should be heard.

OK ↓

Confirm that the engine is cooled down and there are no fire hazards near the vehicle.

1. Turn ignition switch "OFF".
2. Disconnect injector harness connectors on right bank.
3. Remove injector gallery on left bank. Refer to EC-22.
   Keep fuel hose and all injectors connected to injector gallery.
   The injector harness connectors on left bank should remain connected.

D

1. Disconnect all ignition coil harness connectors.
2. Crank engine for about 3 seconds. Make sure that fuel sprays out from injector.

NG → Replace injectors from which fuel does not spray out.

OK ↓

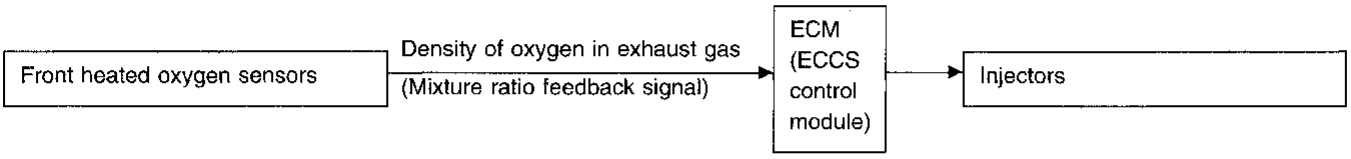
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

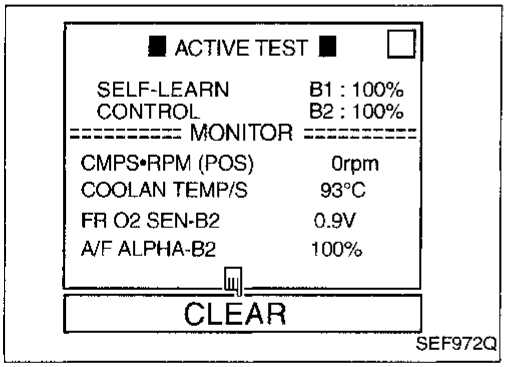
Fuel Injection System Function (Left bank) (Rich side) (DTC: 0209)

ON BOARD DIAGNOSIS LOGIC

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



Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0175 0209	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	• Front heated oxygen sensor (left bank) • Injectors (left bank) • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor

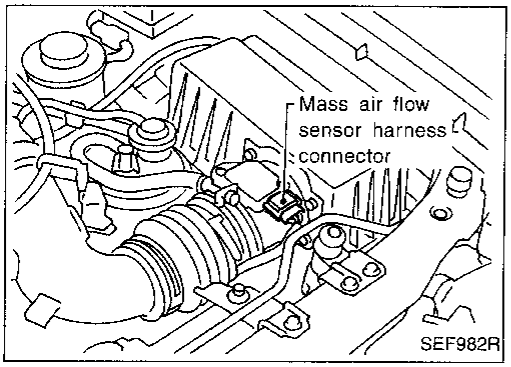


DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE (Overall)

1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" and select "SELF-LEARN CONTROL" in "ACTIVE TEST" mode with CONSULT.
4) Clear the self-learning control coefficient by touching "CLEAR".
5) Select "DATA MONITOR" mode with CONSULT.
6) Start engine again and run it for at least 10 minutes at idle speed.
   The DTC P0175 should be detected at this stage, if a malfunction exists.
7) If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.

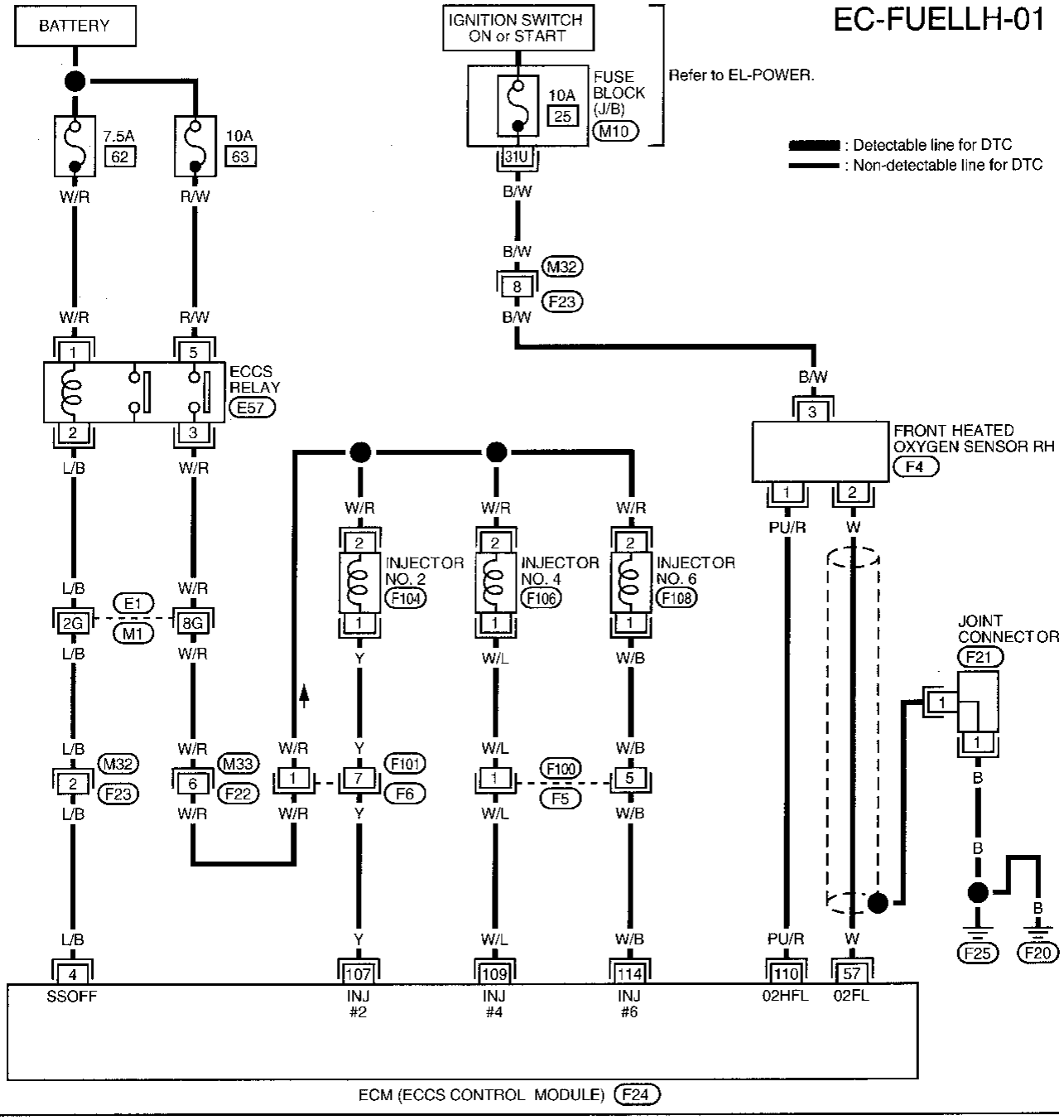
OR

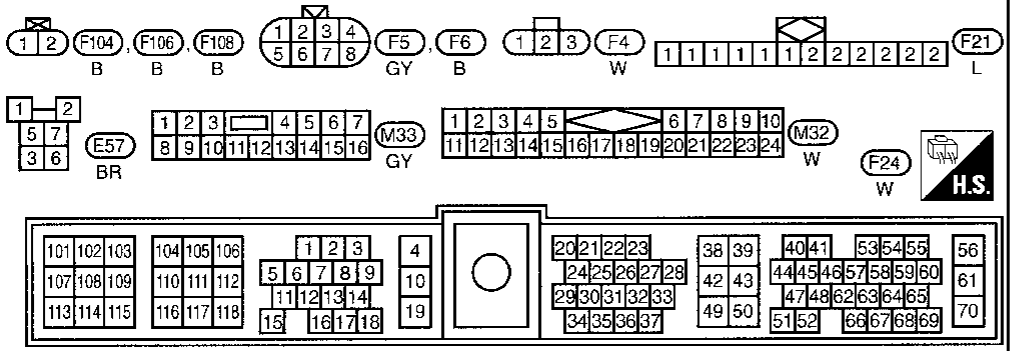
Fuel Injection System Function (Left bank) (Rich side) (DTC: 0209) (Cont'd)



1) Disconnect mass air flow sensor harness connector.
2) Start engine and run it for at least 3 seconds at idle speed.
3) Stop engine and reconnect mass air flow sensor harness connector.
4) Turn ignition switch "ON".
5) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure DTC 0102 is detected.
6) Erase the DTC 0102 by changing from Diagnostic Test Mode II to Diagnostic Test Mode I.
7) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure DTC 0505 is detected.
8) Start engine again and run it for at least 10 minutes at idle speed.
   The DTC 0209 should be detected at this stage, if a malfunction exists.
9) If it is difficult to start engine at step 8, the fuel injection system also has a malfunction.

Fuel Injection System Function (Left bank) (Rich side) (DTC: 0209) (Cont'd)

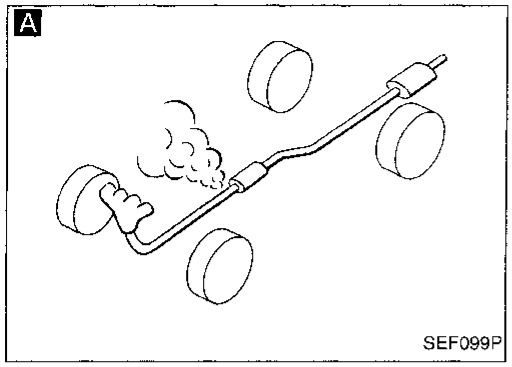


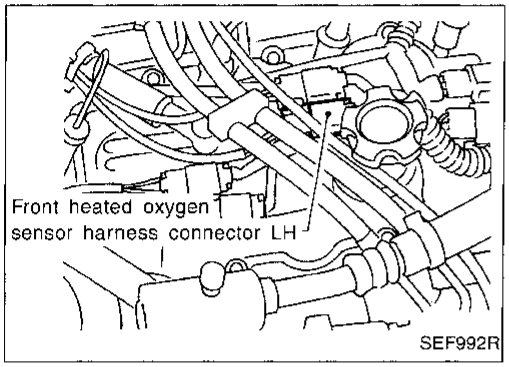


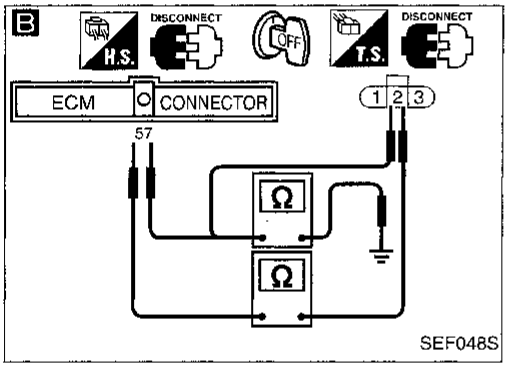
Refer to last page (Foldout page).
E1 , M1
M10

Fuel Injection System Function (Left bank) (Rich side) (DTC: 0209) (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

A

CHECK FOR EXHAUST AIR LEAK.
Start engine and run it at idle. Listen for an exhaust air leak before the three way catalyst.

NG → Repair or replace.

OK

B

CHECK FRONT HEATED OXYGEN SENSOR (LEFT BANK).
1. Turn ignition switch "OFF".
2. Disconnect front heated oxygen sensor LH harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal (57) and terminal (2).
   Continuity should exist.
4. Check harness continuity between ECM terminal (57) (or terminal (2)) and ground.
   Continuity should not exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

OK

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. Refer to EC-21.
2. Install fuel pressure gauge and check fuel pressure.
   At idling:
   When fuel pressure regulator valve vacuum hose is connected.
   Approximately 250.1 kPa (2.55 kg/cm², 36.3 psi)
   When fuel pressure regulator valve vacuum hose is disconnected.
   Approximately 299.1 kPa (3.05 kg/cm², 43.4 psi)

NG → Check fuel pump and circuit. Refer to EC-244.

OK

CHECK MASS AIR FLOW SENSOR.
Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.
3.3 - 4.8 g·m/sec: at idling
12.0 - 14.9 g·m/sec: at 2,500 rpm

OR

Check "mass air flow" 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

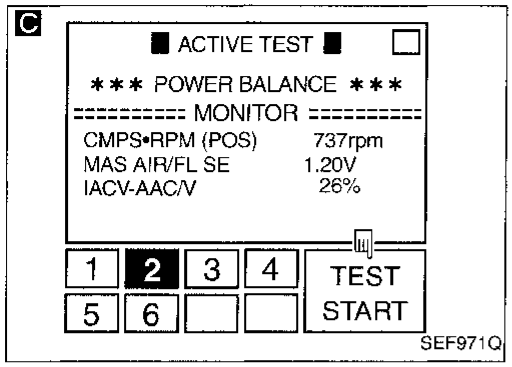
NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-93.

OK

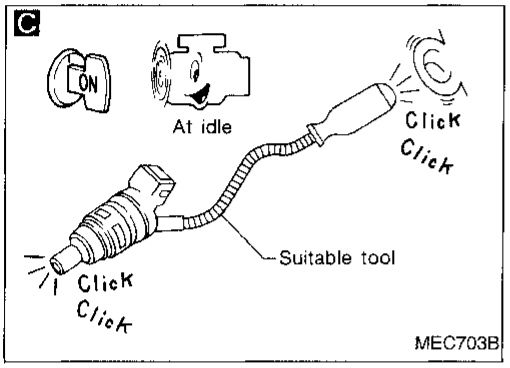
Ⓐ

Fuel Injection System Function (Left bank) (Rich side) (DTC: 0209) (Cont'd)

C



C



Ⓐ

C

CHECK FUNCTION OF INJECTORS (LEFT BANK).
1. Install all parts removed.
2. Start engine.
3. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
4. Make sure that each circuit produces a momentary engine speed drop.

OR

3. Listen to each injector operating sound.
Clicking noise should be heard.

NG → Perform TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS, "Injectors", EC-239. Repair harness or connectors.

OK ↓

Remove injector assembly.
Refer to EC-22.
Keep fuel hose and all injectors connected to injector gallery.

↓

Confirm that the engine is cooled down and there are no fire hazards near the vehicle.

↓

1. Disconnect all injector harness connectors.
2. Disconnect all ignition coil harness connectors.
3. Crank engine for about 3 seconds. Make sure fuel does not drip from injector.

Drips → Replace the injectors from which fuel is dripping.

Does not drip. ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

No. 6 - 1 Cylinder Misfire, Multiple Cylinder Misfire (DTC: 0701 - 0603)

ON BOARD DIAGNOSIS LOGIC

If a misfire occurs, the engine speed will fluctuate. If the fluctuation is detected by the crankshaft position sensor (OBD), the misfire is diagnosed.
The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   When a misfire is detected which will overheat and damage the three way catalyst, the malfunction indicator lamp (MIL) will start blinking; even during the first trip. In this condition, ECM monitors the misfire every 200 revolutions.
   If the misfire frequency decreases to a level that will not damage the three way catalyst, the MIL will change from blinking to lighting up.
   (After the first trip detection, the MIL will light up from engine starting. If a misfire is detected that will cause three way catalyst damage, the MIL will start blinking.)
2. Two Trip Detection Logic (Exhaust quality deterioration)
   When a misfire that will not damage the three way catalyst (but will affect exhaust emission) occurs, the malfunction indicator lamp will light up based on the second consecutive trip detection logic. In this condition, ECM monitors the misfire for each 1,000 revolutions of the engine.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0300 (0701)	• Multiple cylinders misfire.	• Improper spark plug • Insufficient compression • Incorrect fuel pressure • EGR valve • Injector circuit is open or shorted • Injectors • Intake air leak • Ignition secondary circuit is open or shorted • Lack of fuel • Magnetized flywheel (drive plate)
P0301 (0608)	• No. 1 cylinder misfires.	
P0302 (0607)	• No. 2 cylinder misfires.	
P0303 (0606)	• No. 3 cylinder misfires.	
P0304 (0605)	• No. 4 cylinder misfires.	
P0305 (0604)	• No. 5 cylinder misfires.	
P0306 (0603)	• No. 6 cylinder misfires.	

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE (Overall)

1) Turn ignition switch "ON", and select "DATA MONITOR" mode with CONSULT.
2) Start engine and warm it up sufficiently.
3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Start engine again and drive at 1,500 - 4,000 rpm for at least 8 minutes.

OR

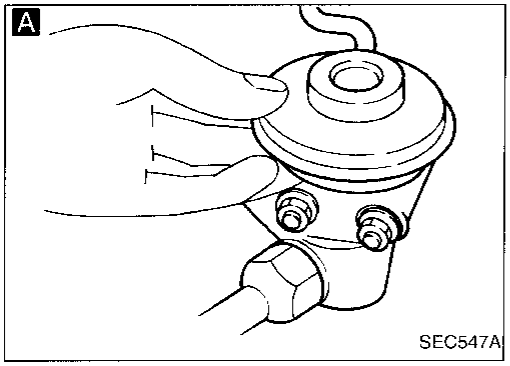
1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine again and drive at 1,500 - 4,000 rpm for at least 8 minutes.
4) Select "MODE 3" with GST.

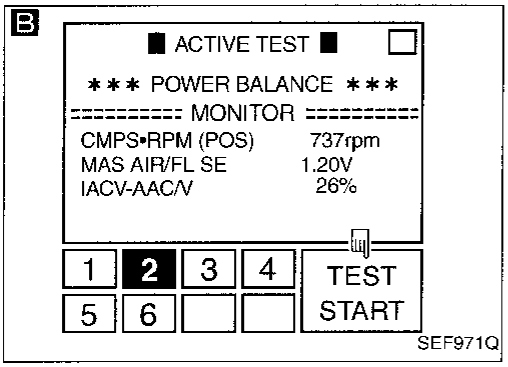
OR

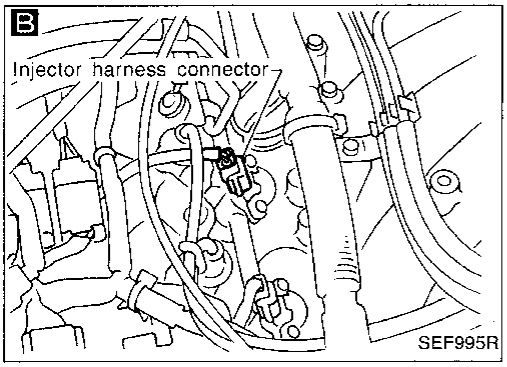
1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine again and drive at 1,500 - 4,000 rpm for at least 8 minutes.
4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

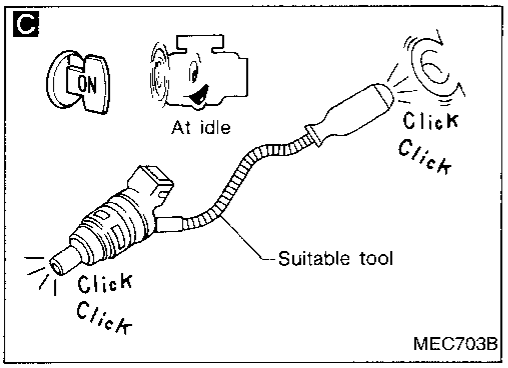
No. 6 - 1 Cylinder Misfire, Multiple Cylinder Misfire (DTC: 0701 - 0603) (Cont'd)

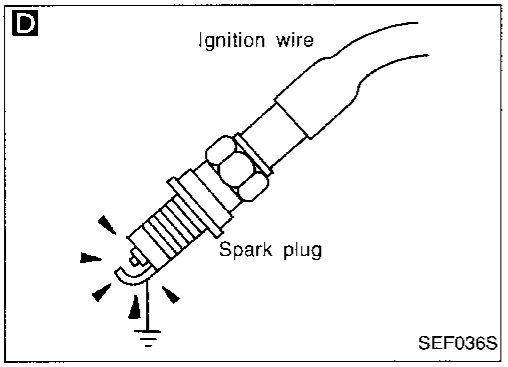
DIAGNOSTIC PROCEDURE











INSPECTION START

CHECK FOR INTAKE AIR LEAK.
Start engine and run it at idle speed. Listen for the sound of the intake air leak.
NG → Discover air leak location and repair.
OK

CHECK FOR EXHAUST SYSTEM CLOGGING.
Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.
NG → Repair or replace it.
OK

A

CHECK EGR FUNCTION.
Perform OVERALL FUNCTION CHECK (Procedure for malfunction B) for EGR Function.
Refer to EC-187.
NG → Repair EGR system.
OK

B

PERFORM POWER BALANCE TEST.
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

OR

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?

No → Go to E on next page.
Yes

C

CHECK INJECTOR.
Does each injector make an operating sound at idle?
No → Check injector(s) and circuit(s). Refer to EC-239.
Yes

D

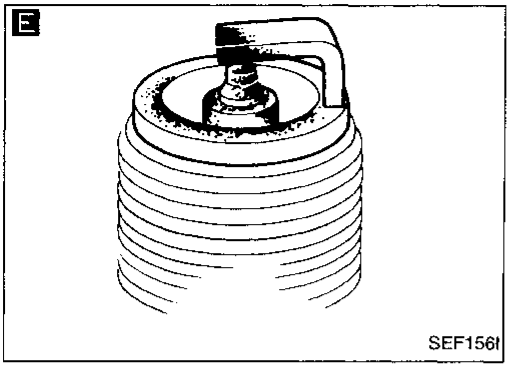
CHECK IGNITION SPARK.
1. Disconnect ignition wire from spark plug.
2. Connect a known good spark plug to the ignition wire.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

NG → CHECK COMPONENT (Ignition wires).
Refer to "COMPONENT INSPECTION", EC-174.
OK → Check ignition coil, power transistor and their circuits. Refer to EC-219.
NG → Replace.
OK

(Go to Ⓐ on next page.)

No. 6 - 1 Cylinder Misfire, Multiple Cylinder Misfire (DTC: 0701 - 0603) (Cont'd)

E



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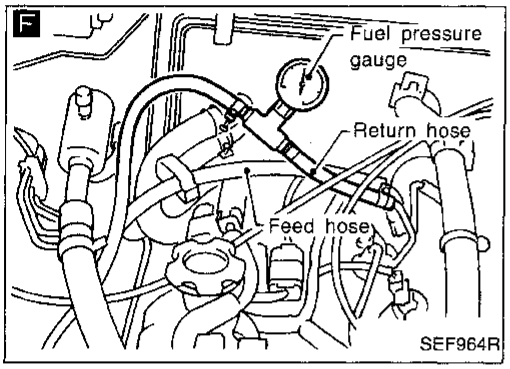
F



SEF964R

Ⓐ

E

CHECK SPARK PLUGS.
Remove the spark plugs and check for fouling, etc.

NG → Repair or replace spark plug(s).

OK ↓

F

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. Refer to EC-21.
2. Install fuel pressure gauge and check fuel pressure.
   At idle:
   Approx. 235 kPa
   (2.4 kg/cm², 34 psi)

NG → Check fuel pump and circuit.

OK ↓

CHECK COMPRESSION PRESSURE.
Refer to EM section.
- Check compression pressure.
  Standard:
  kPa (kg/cm², psi)/300 rpm
  1,196 (12.2, 173)
  Minimum:
  kPa (kg/cm², psi)/300 rpm
  883 (9.0, 128)
  Difference between each cylinder:
  kPa (kg/cm², psi)/300 rpm
  98 (1.0, 14)

NG → Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

OK ↓

CHECK IGNITION TIMING.
Perform "Basic Inspection", EC-60.

NG → Adjust ignition timing.

OK ↓

CHECK MASS AIR FLOW SENSOR.
Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT.

OR

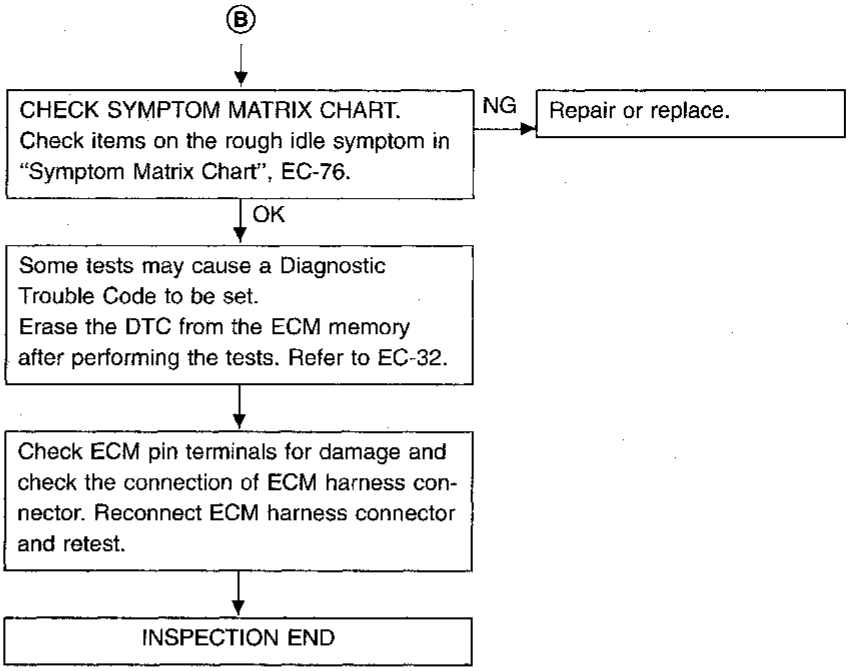
Check "MASS AIR FLOW" in MODE 1 with GST.
3.3 - 4.8 g·m/sec: at idling
12.0 - 14.9 g·m/sec: at 2,500 rpm

NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds.
Refer to EC-93.
If NG, repair or replace it.

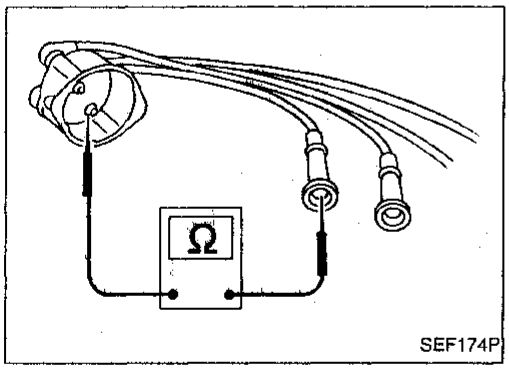
OK ↓

(Go to Ⓑ on next page.)

No. 6 - 1 Cylinder Misfire, Multiple Cylinder Misfire (DTC: 0701 - 0603) (Cont'd)



*: ECM may be the cause of a problem, but this is rarely the case.



COMPONENT INSPECTION

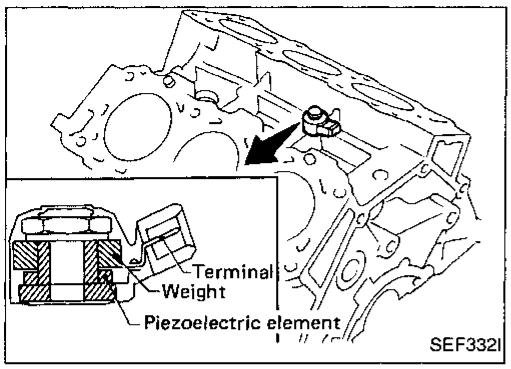
Ignition wires

1. Inspect wires for cracks, damage, burned terminals and for improper fit.
2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks.

Resistance:

Cylinder No.	Resistance kΩ [at 25°C (77°F)]
1	Approximately 6.5
2	Approximately 10.0
3	Approximately 8.5
4	Approximately 12.5
5	Approximately 9
6	Approximately 11.0

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.



Knock Sensor (KS) (DTC: 0304)

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.**

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0325 0304	• An excessively low or high voltage from the knock sensor is sent to ECM.	• Harness or connectors (The knock sensor circuit is open or shorted.) • Knock sensor

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Start engine and run it for at least 5 seconds at idle speed.

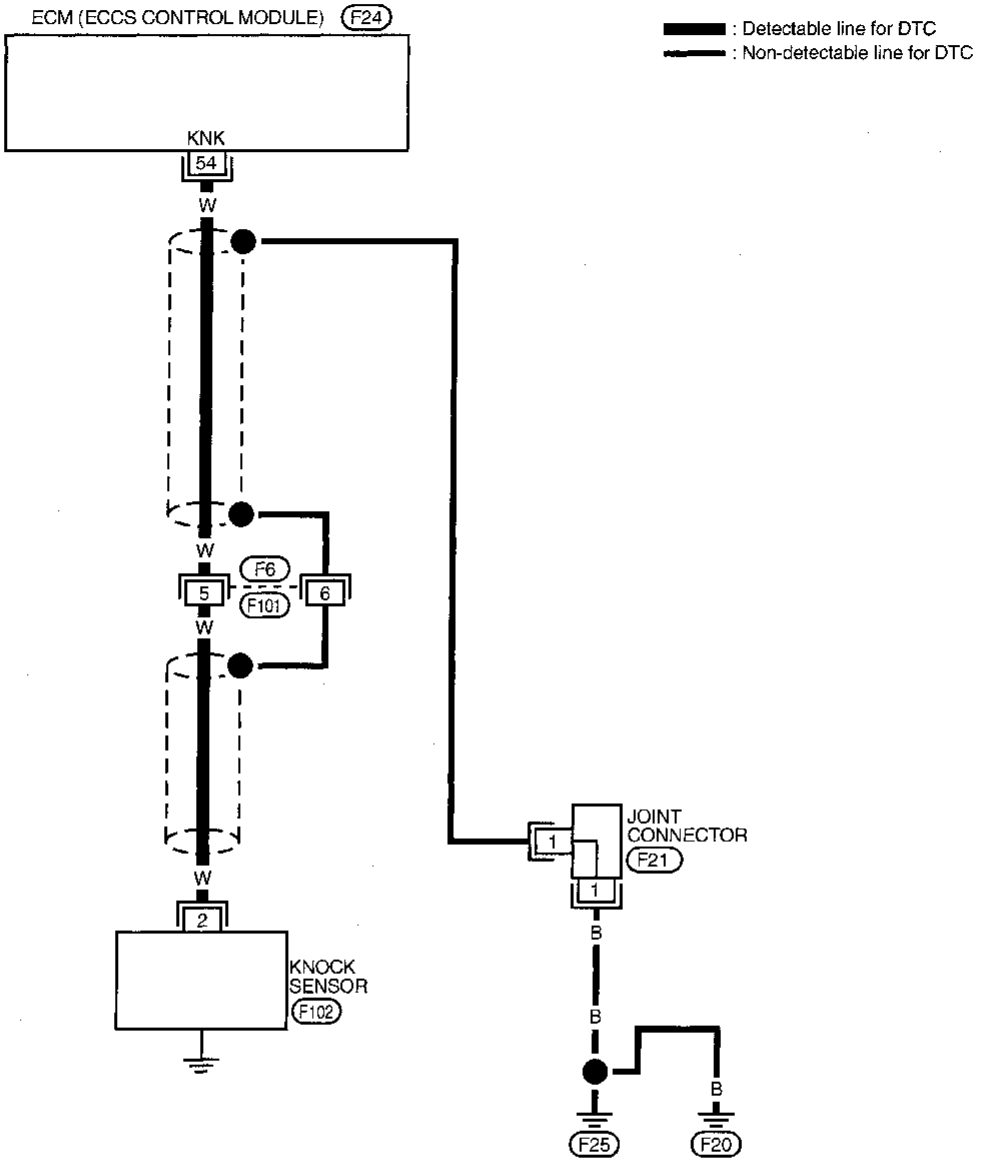
OR

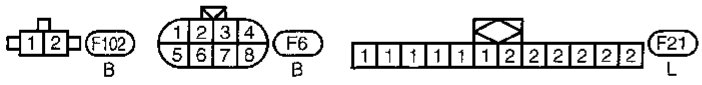
1) Start engine and run it for at least 5 seconds at idle speed.
2) Select "MODE 3" with GST.

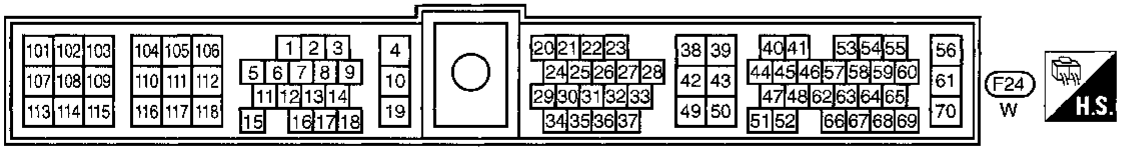
OR

1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

EC-KS-01







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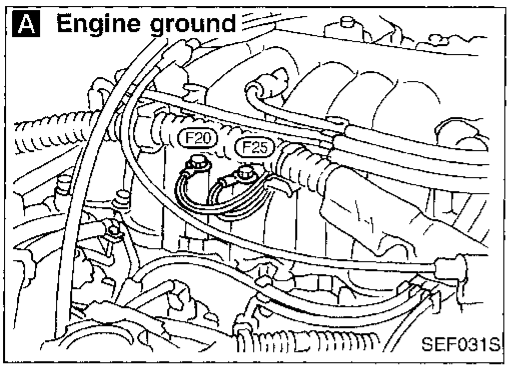
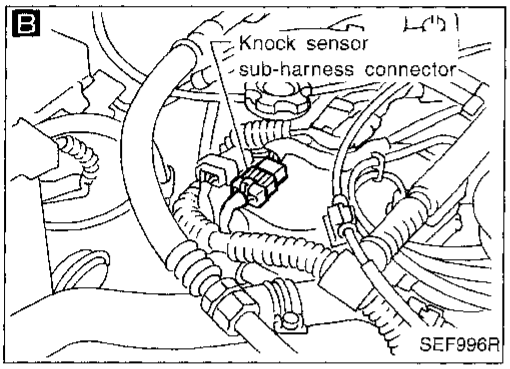
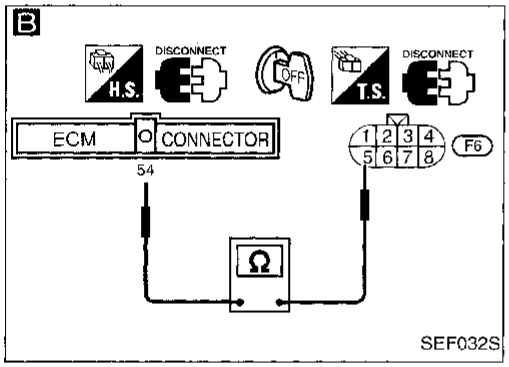
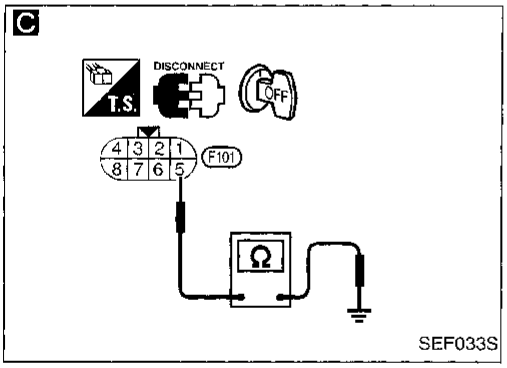
Knock Sensor (KS) (DTC: 0304) (Cont'd)

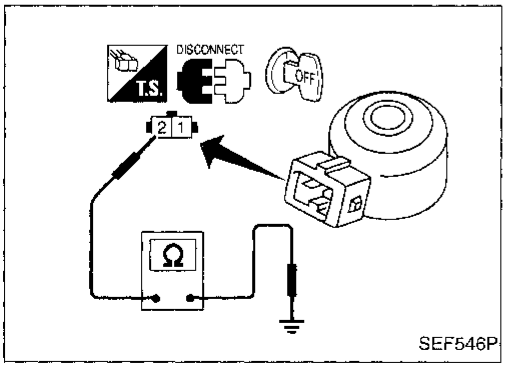
DIAGNOSTIC PROCEDURE











INSPECTION START

A

Loosen and retighten engine ground screws.

B

CHECK INPUT SIGNAL CIRCUIT-1.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector and knock sensor sub-harness connector.
3. Check harness continuity between sub-harness connector terminal ⑤ and ECM terminal ㊹ .
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK

C

CHECK INPUT SIGNAL CIRCUIT-2.
Check resistance between terminal ⑤ and engine ground.
Resistance:
500 - 620 kΩ [at 25°C (77°F)]
If OK, check harness for short.
It is necessary to use an ohmmeter which can measure more than 10 MΩ.

NG → Check the following.
- Harness for open or short between knock sensor sub-harness connector and knock sensor

If NG, repair harness or connectors.
- Knock sensor (Component inspection)

If NG, replace knock sensor.

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

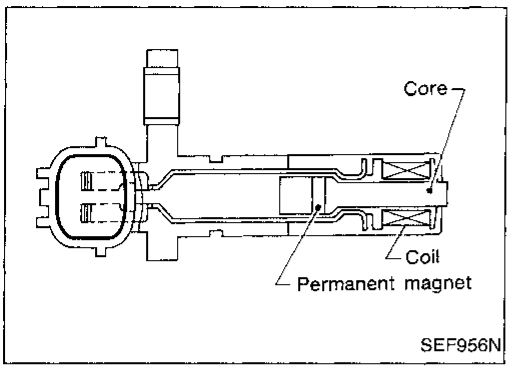
COMPONENT INSPECTION

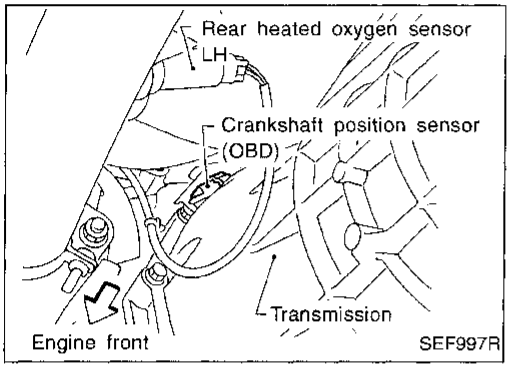
Knock sensor

- Use an ohmmeter which can measure more than 10 MΩ.

1. Disconnect knock sensor harness connector.
2. Check resistance between terminal ② and ground.
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.





Crankshaft Position Sensor (CKPS) (OBD) (DTC: 0802)

The crankshaft position sensor (OBD) is located on the transaxle housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet, core and coil.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.
This sensor is not directly used to control the engine system. It is used only for the on board diagnosis of misfire.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0335 0802	• The proper pulse signal from the crankshaft position sensor (OBD) is not sent to ECM while the engine is running at the specified engine speed.	• Harness or connectors (The crankshaft position sensor (OBD) circuit is open.) • Crankshaft position sensor (OBD)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Start engine and run it for at least 15 seconds at idle speed.

OR

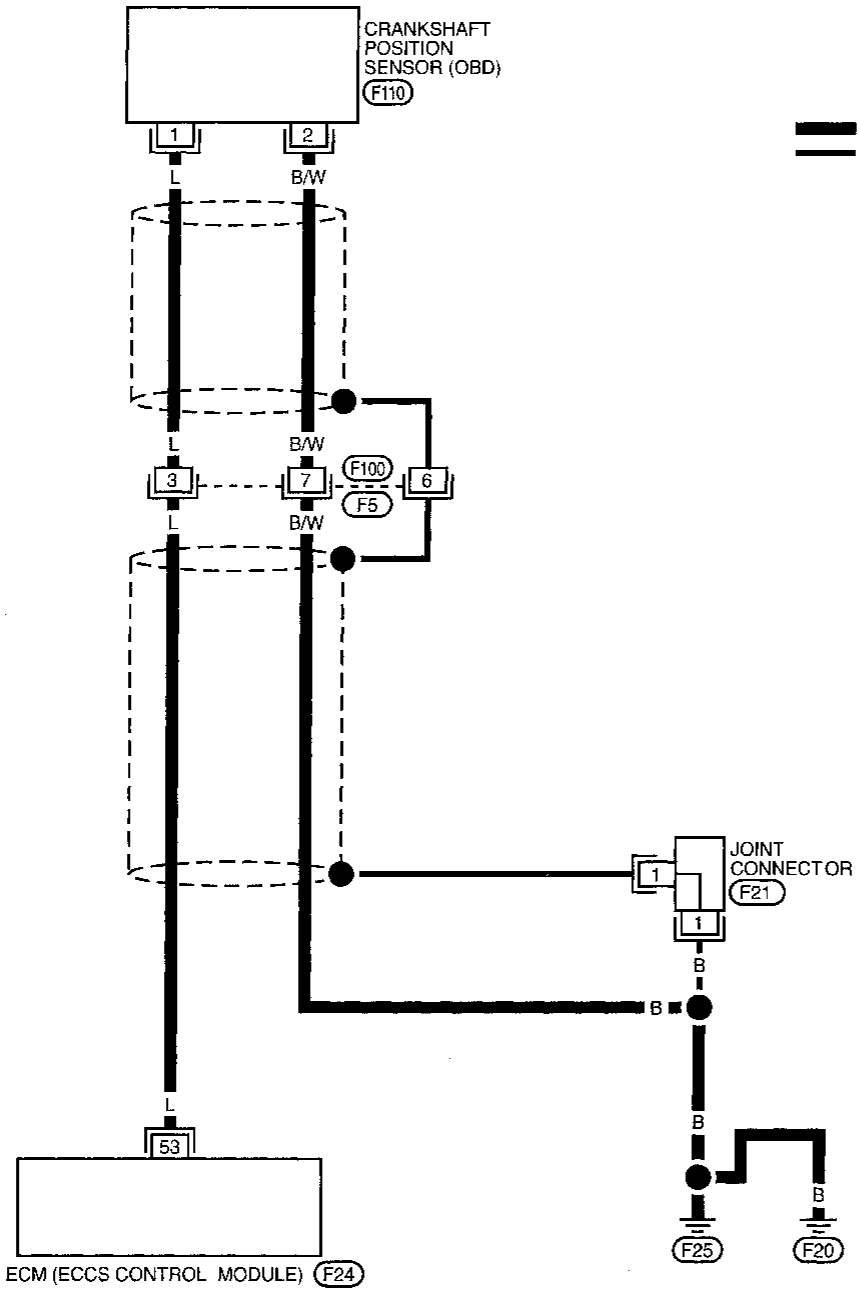
1) Start engine and run it for at least 15 seconds at idle speed.
2) Select "MODE 3" with GST.

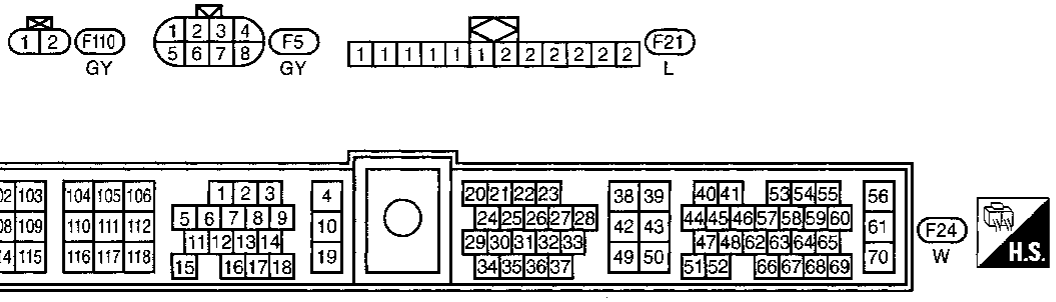
OR

1) Start engine and run it for at least 15 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

Crankshaft Position Sensor (CKPS) (OBD) (DTC: 0802) (Cont'd)

EC-CKPS-01





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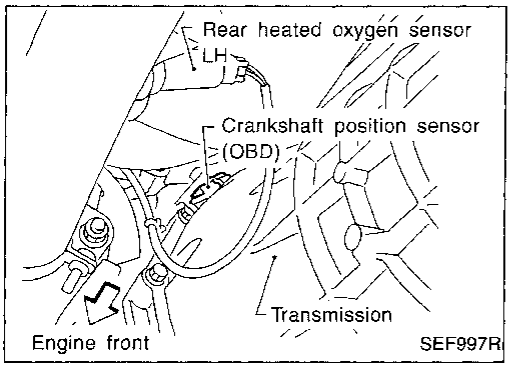
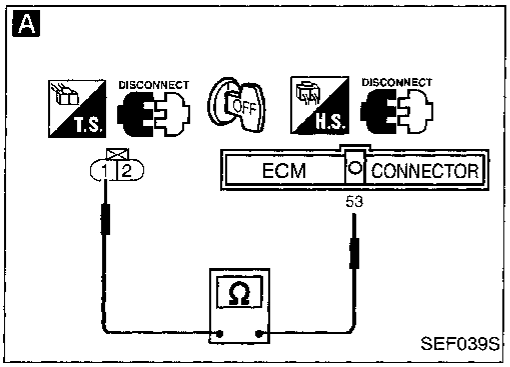
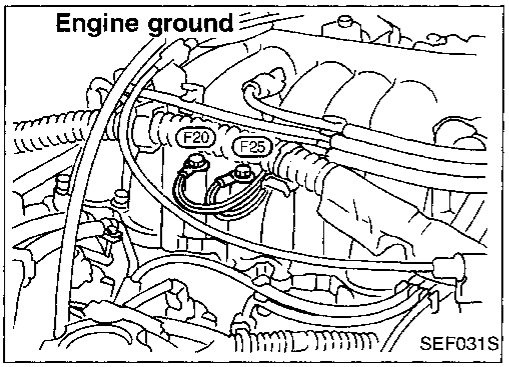
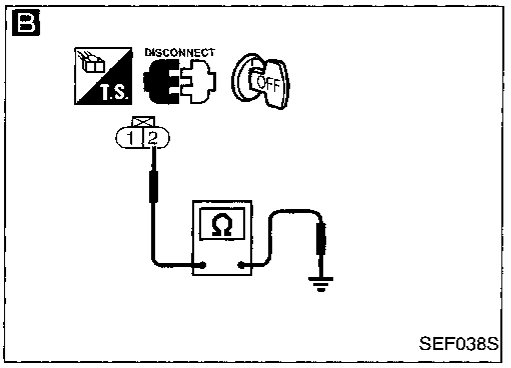
Crankshaft Position Sensor (CKPS) (OBD) (DTC: 0802) (Cont'd)

DIAGNOSTIC PROCEDURE









INSPECTION START

A

CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.
3. Check continuity between ECM terminal (53) and terminal (1).
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors (F5), (F100)
- Harness for open or short between ECM and crankshaft position sensor (OBD)

If NG, repair harness or connectors.

OK ↓

B

CHECK GROUND CIRCUIT.
1. Loosen and retighten engine ground screws.
2. Check harness continuity between terminal (2) and engine ground.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors (F5), (F100)
- Harness for open or short between crankshaft position sensor (OBD) harness connector and engine ground

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT
[Crankshaft position sensor (OBD)].
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace crankshaft position sensor (OBD).

OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

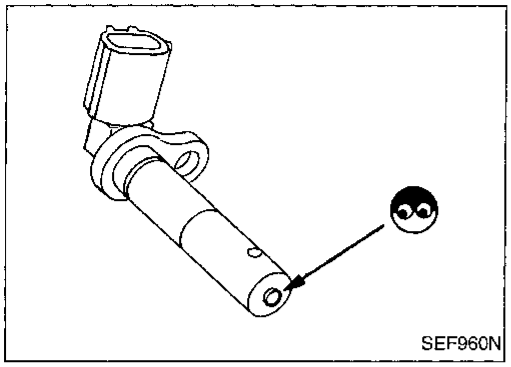
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

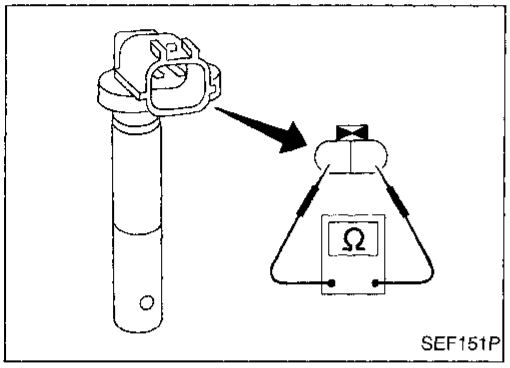
Crankshaft Position Sensor (CKPS) (OBD) (DTC: 0802) (Cont'd)

COMPONENT INSPECTION

Crankshaft position sensor (OBD)

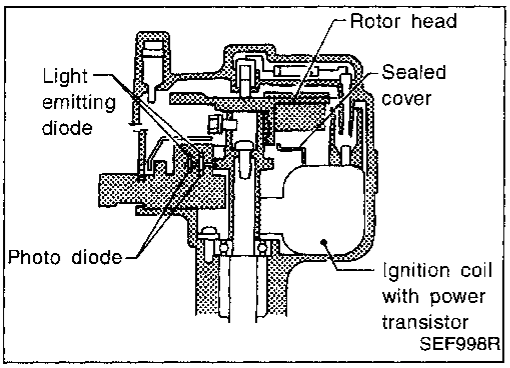

SEF960N

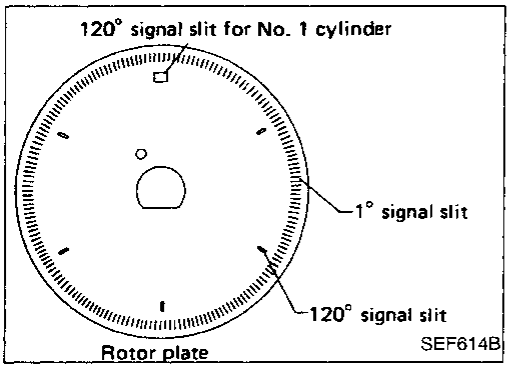
1. Disconnect crankshaft position sensor (OBD) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.



SEF151P

5. Check resistance as shown in the figure.
   Resistance: Approximately 432 - 528Ω
   [at 25°C (77°F)]
   If NG, replace crankshaft position sensor (OBD).





Camshaft Position Sensor (CMPS)(DTC: 0101)

The camshaft position sensor is a basic component of the ECCS. 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.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0340 0101	A) Either 1° or 120° signal is not sent to ECM for the first few seconds during engine cranking. 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.	• Harness or connectors (The camshaft position sensor circuit is open or shorted.) • Camshaft position sensor • Starter motor (Refer to EL section.) • Starting system circuit (Refer to EL section.) • Dead (Weak) battery

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Before performing the following procedure, confirm that battery voltage is more than 10.5V.

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

Procedure for malfunction A

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Crank engine for at least 2 seconds.

OR

1) Crank engine for at least 2 seconds.
2) Select "MODE 3" with GST.

OR

1) Crank engine for at least 2 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

Camshaft Position Sensor (CMPS)(DTC: 0101) (Cont'd)

Procedure for malfunction B and C

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and run it for at least 2 seconds at idle speed.

OR

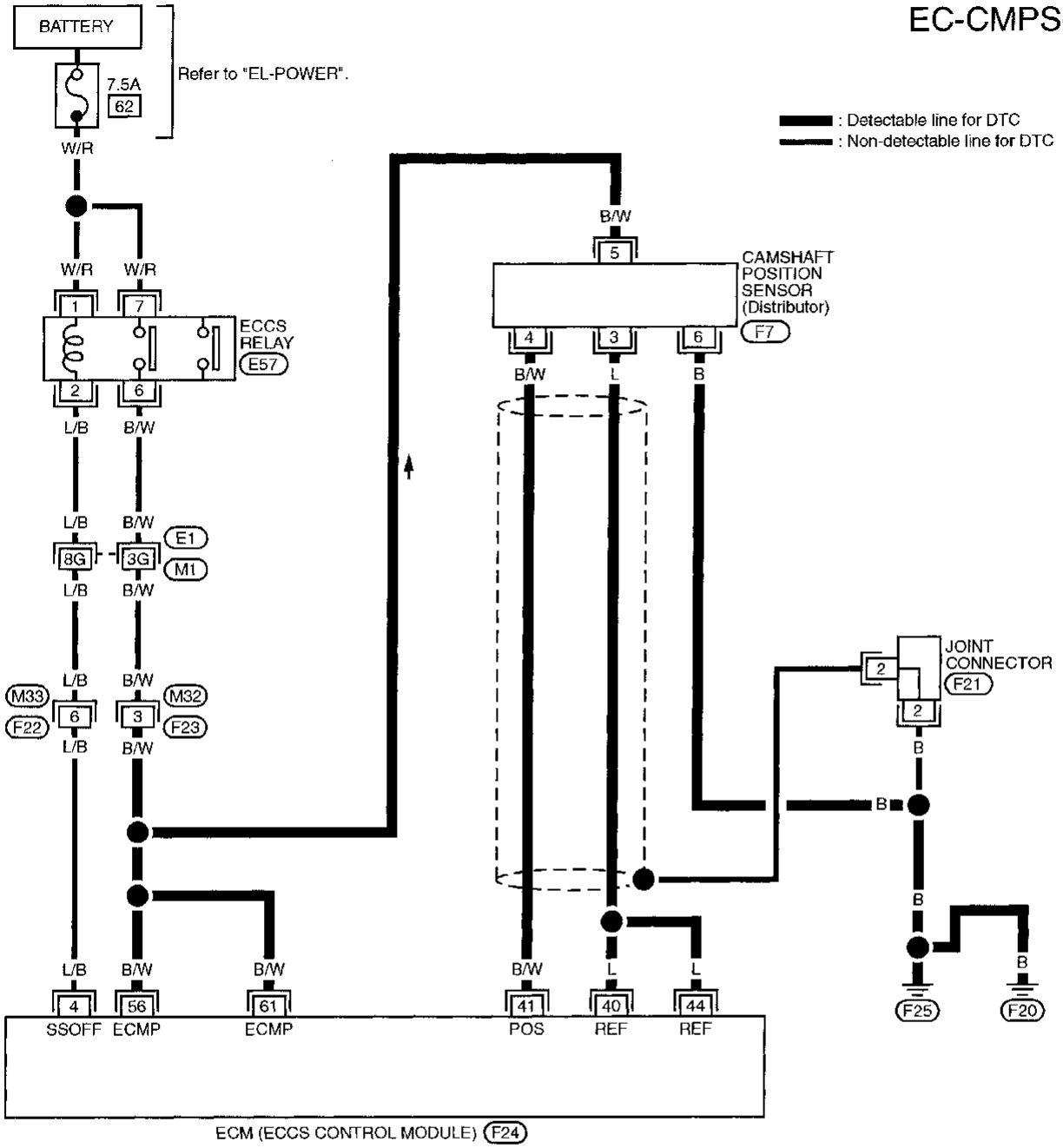
1) Start engine and run it for at least 2 seconds at idle speed.
2) Select "MODE 3" with GST.

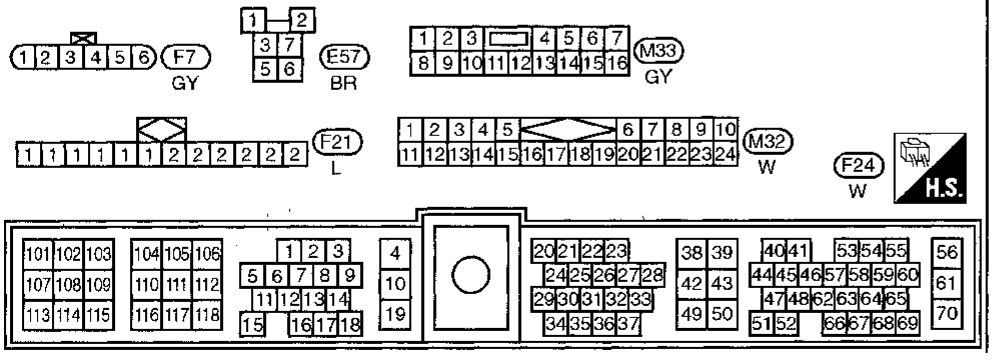
OR

1) Start engine and run it for at least 2 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

Camshaft Position Sensor (CMPS)(DTC: 0101) (Cont'd)

EC-CMPS-01



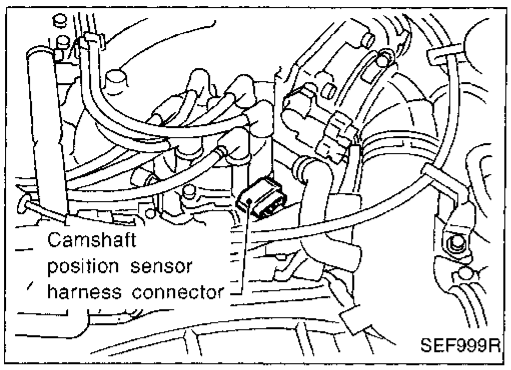


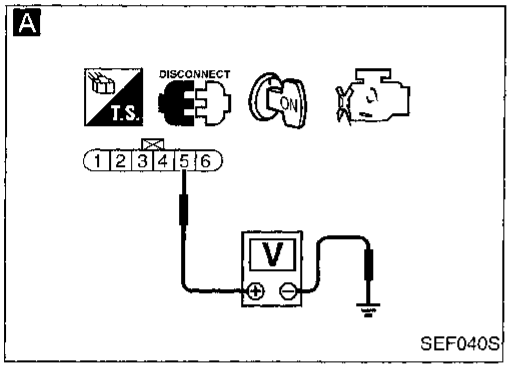
Refer to last page (Foldout page).
E1 , M1

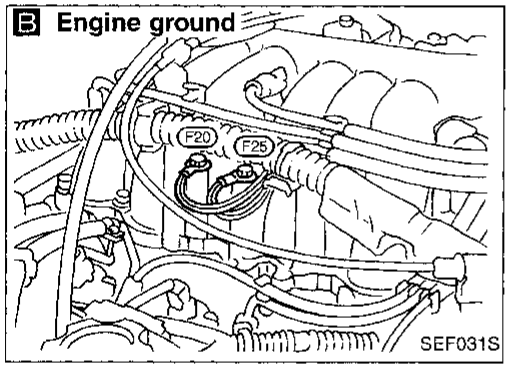
SEF906R

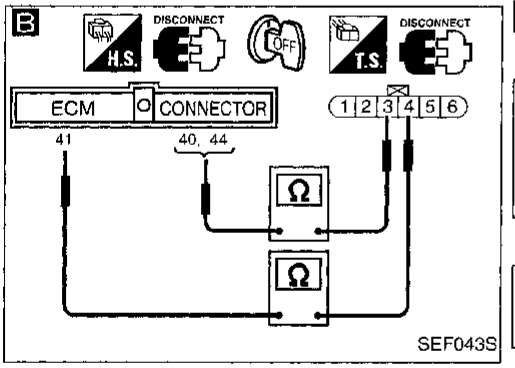
Camshaft Position Sensor (CMPS)(DTC: 0101) (Cont'd)

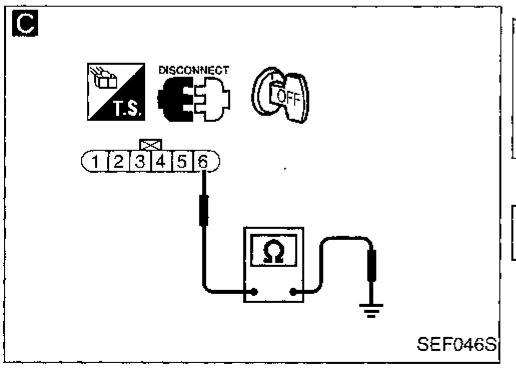
DIAGNOSTIC PROCEDURE (DETECTABLE CIRCUIT)











INSPECTION START

A

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect camshaft position sensor harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal (5) and ground with CONSULT or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F23), (M32)
- Harness connectors (M1), (E1)
- Harness for open or short between camshaft position sensor and ECCS relay

If NG, repair harness or connectors.

OK ↓

B

CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between sensor terminal (4) and ECM terminals (41), sensor terminal (3) and ECM terminals (40), (44).
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

C

CHECK GROUND CIRCUIT.
1. Loosen and retighten engine ground screws.
2. Check harness continuity between sensor terminal (6) and engine ground.
   Continuity should exist.
   If OK, check harness for short.

NG → If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT
(Camshaft position sensor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace camshaft position sensor.

OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

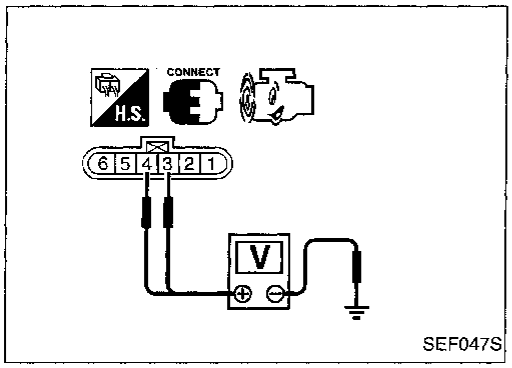
Trouble is not fixed. ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

Camshaft Position Sensor (CMPS)(DTC: 0101) (Cont'd)



COMPONENT INSPECTION

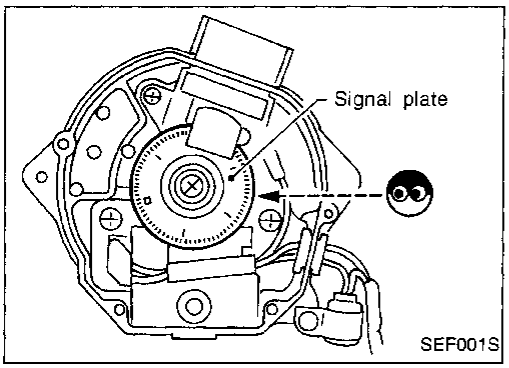
Camshaft position sensor

1. Start engine.
2. Check voltage between camshaft position sensor terminals ③, ④ and ground with AC range.

Condition	Terminal	Voltage
Engine running at idle	③ and ground	Approximately 1.0V* (AC)
	④ and ground	Approximately 2.4V* (AC)

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

If NG, replace distributor assembly with camshaft position sensor.

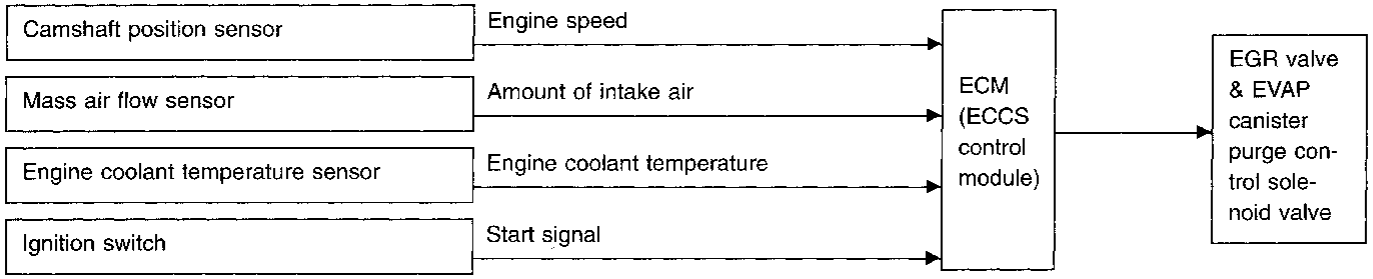


3. Remove distributor cap. Visually check signal plate for damage or dust.

After this inspection, DTC P0340 (0101) might be displayed with camshaft position sensor functioning properly. Erase the stored memory.

EGR Function (DTC: 0302)

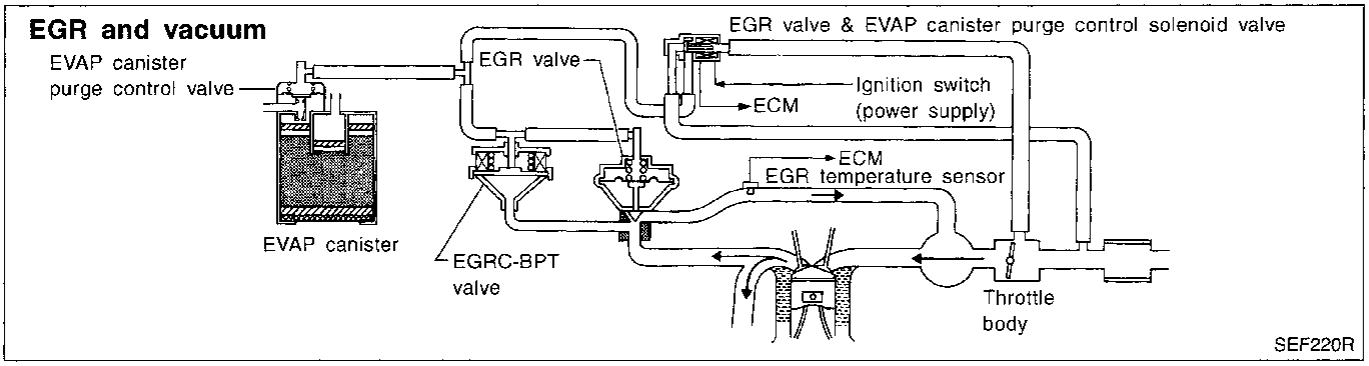
SYSTEM DESCRIPTION

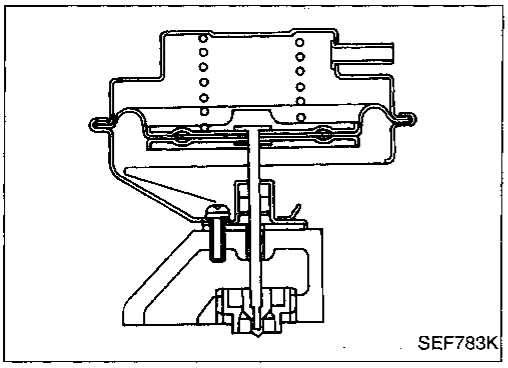


This system cuts and controls vacuum applied to the EGR valve and EVAP canister to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM and the EGR valve & EVAP canister purge control solenoid valve. When the ECM detects any of the following conditions, current flows through the solenoid valve. This causes the port vacuum to be discharged into the atmosphere. The EGR valve and EVAP canister remain closed.

- Low engine coolant temperature
- Engine starting
- High-speed engine operation
- Engine idling
- Excessively high engine coolant temperature
- Mass air flow sensor malfunction

EGR and vacuum

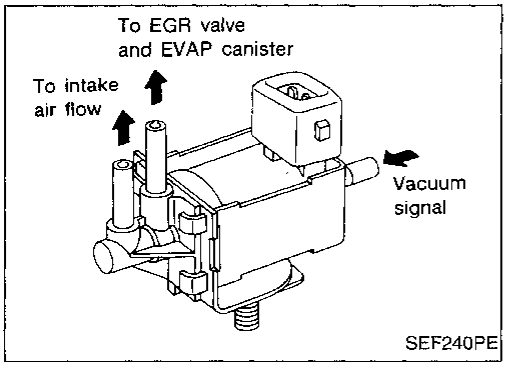




COMPONENT DESCRIPTION

Exhaust gas recirculation (EGR) valve

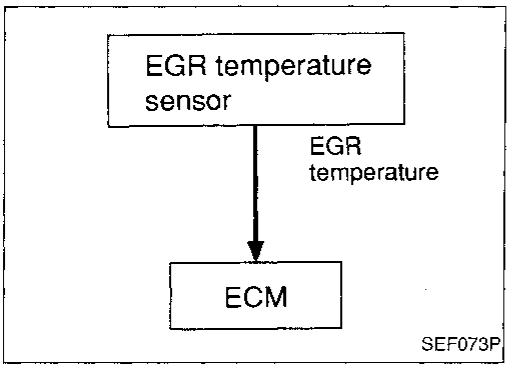
The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.



EGR valve and EVAP canister purge control solenoid valve

The EGR valve and EVAP canister purge control solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. A plunger will then move to cut the vacuum signal (from the throttle body to the EGR valve and EVAP canister).
When the ECM sends an OFF signal, the vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve and EVAP canister.

EGR Function (DTC: 0302) (Cont'd)



ON BOARD DIAGNOSIS LOGIC

If the absence of EGR flow is detected by EGR temperature sensor under the condition that calls for EGR, a low-flow malfunction is diagnosed.
If EGR temperature sensor detects EGR flow under the condition that does not call for EGR, a high-flow malfunction is diagnosed.

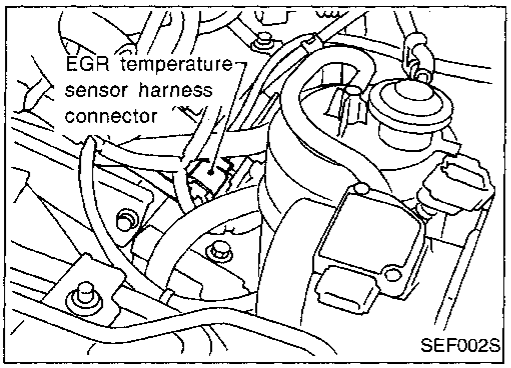
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0400 0302	A) The exhaust gas recirculation (EGR) flow is excessively low during the specified driving condition.	• EGR valve stuck closed • EGRC-BPT valve leaking • Passage blocked • EGR valve & EVAP canister purge control solenoid valve • Tube leaking for EGR valve • EGR temperature sensor
	B) The exhaust gas recirculation (EGR) flow is excessively high during the specified driving condition.	• EGR valve & EVAP canister purge control solenoid valve • EGR valve leaking or stuck open • EGR temperature sensor

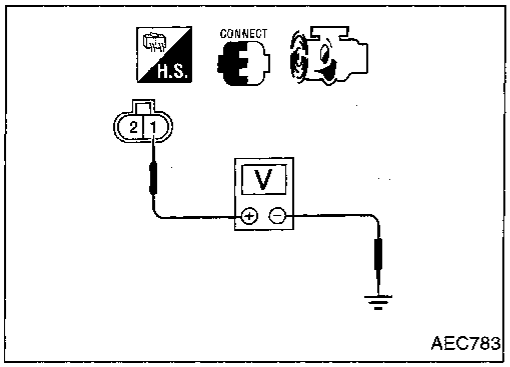
OVERALL FUNCTION CHECK

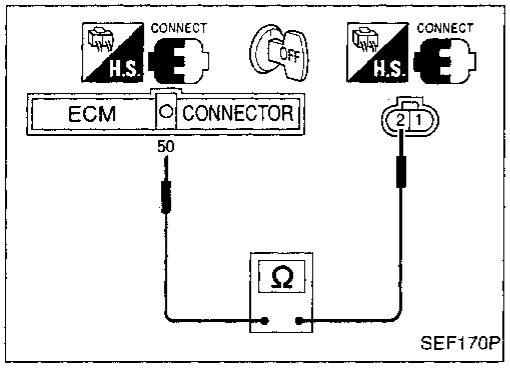
Use this procedure to check the overall EGR function. During this check, a DTC might not be confirmed.

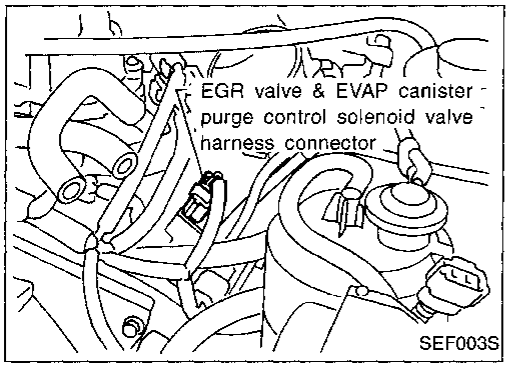
Before starting with the following procedure, check the engine coolant temperature of the freeze frame data with CONSULT or Generic Scan Tool.
If the engine coolant temperature is higher than or equal to 75°C (167°F), perform only "Procedure for malfunction A".
If the engine coolant temperature is lower than 75°C (167°F), perform both "Procedure for malfunction A" and "Procedure for malfunction B".

EGR Function (DTC: 0302) (Cont'd)









Procedure for malfunction A

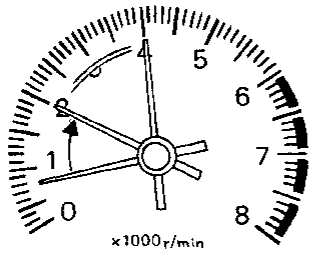
1) Start engine and warm it up sufficiently.
2) Check the EGR valve lifting when revving from 2,000 rpm up to 4,000 rpm under no load.
   EGR valve should lift up and down without sticking.

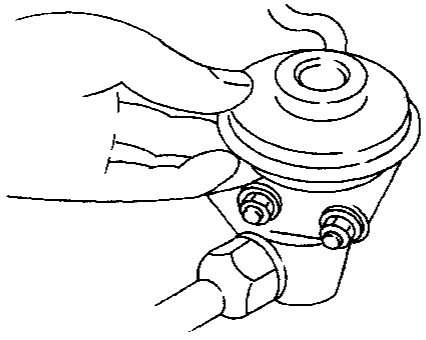
If EGR valve does not lift up and down, try again with either of the following methods:

- Select "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT and turn the solenoid valve "OFF".
- Disconnect EGR valve & EVAP canister purge control solenoid valve harness connector.
  (The DTC for EGR valve & EVAP canister purge control solenoid valve will be displayed, however, ignore it.)

3) Check voltage between EGR temperature sensor harness connector terminal ① and ground at idle speed.
   Less than 4.5V should exist.
4) Turn ignition switch "OFF".
   Check harness continuity between EGR temperature sensor harness connector terminal ② and ECM terminal ⑤⓪.
   Continuity should exist.
5) Perform "COMPONENTS INSPECTION", "EGR temperature sensor". Refer to EC-194.

Overall function check

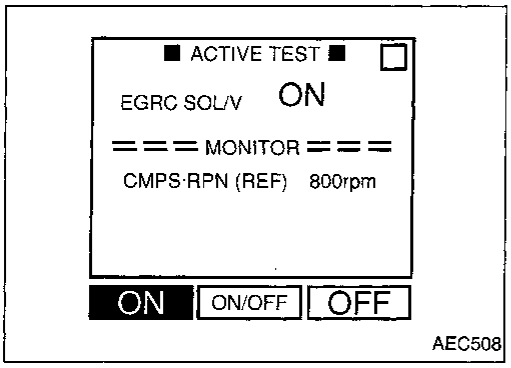


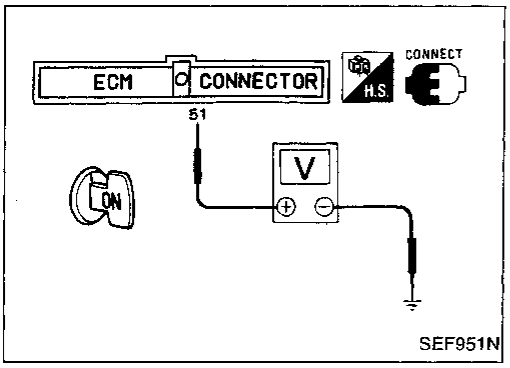


Check the EGR valve lifting when revving engine from 2,000 rpm up to 4,000 rpm.

SEF642Q

EGR Function (DTC: 0302) (Cont'd)





Procedure for malfunction B

1) Start engine.
2) Select "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT and turn the solenoid valve "ON".
3) Check for the EGR valve lifting when revving from 2,000 rpm up to 4,000 rpm under no load.

EGR valve should be closed and should not lift up.

OR

1) Confirm the engine coolant temperature is lower than 75°C (167°F) in "Mode 1" with generic scan tool.
   Perform the following steps before its temperature becomes higher than 75°C (167°F).
2) Start engine.
3) Check for the EGR valve lifting when revving from 2,000 rpm up to 4,000 rpm under no load.

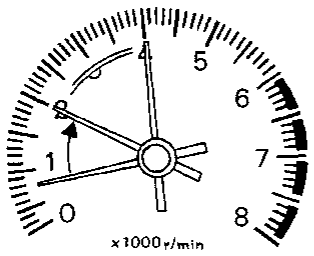
EGR valve should be closed and should not lift up.

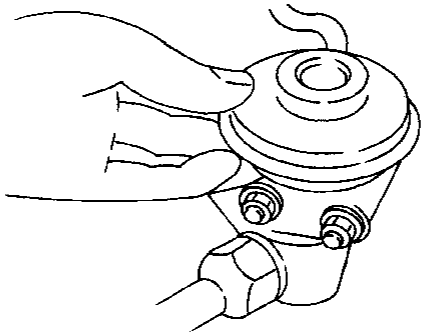
OR

1) Confirm the voltage between ECM terminal (51) and ground is higher than 1.44V.
   Perform the following steps before the voltage becomes lower than 1.44V.
2) Start engine.
3) Check for the EGR valve lifting when revving from 2,000 rpm up to 4,000 rpm under no load.

EGR valve should be closed and should not lift up.

Overall function check



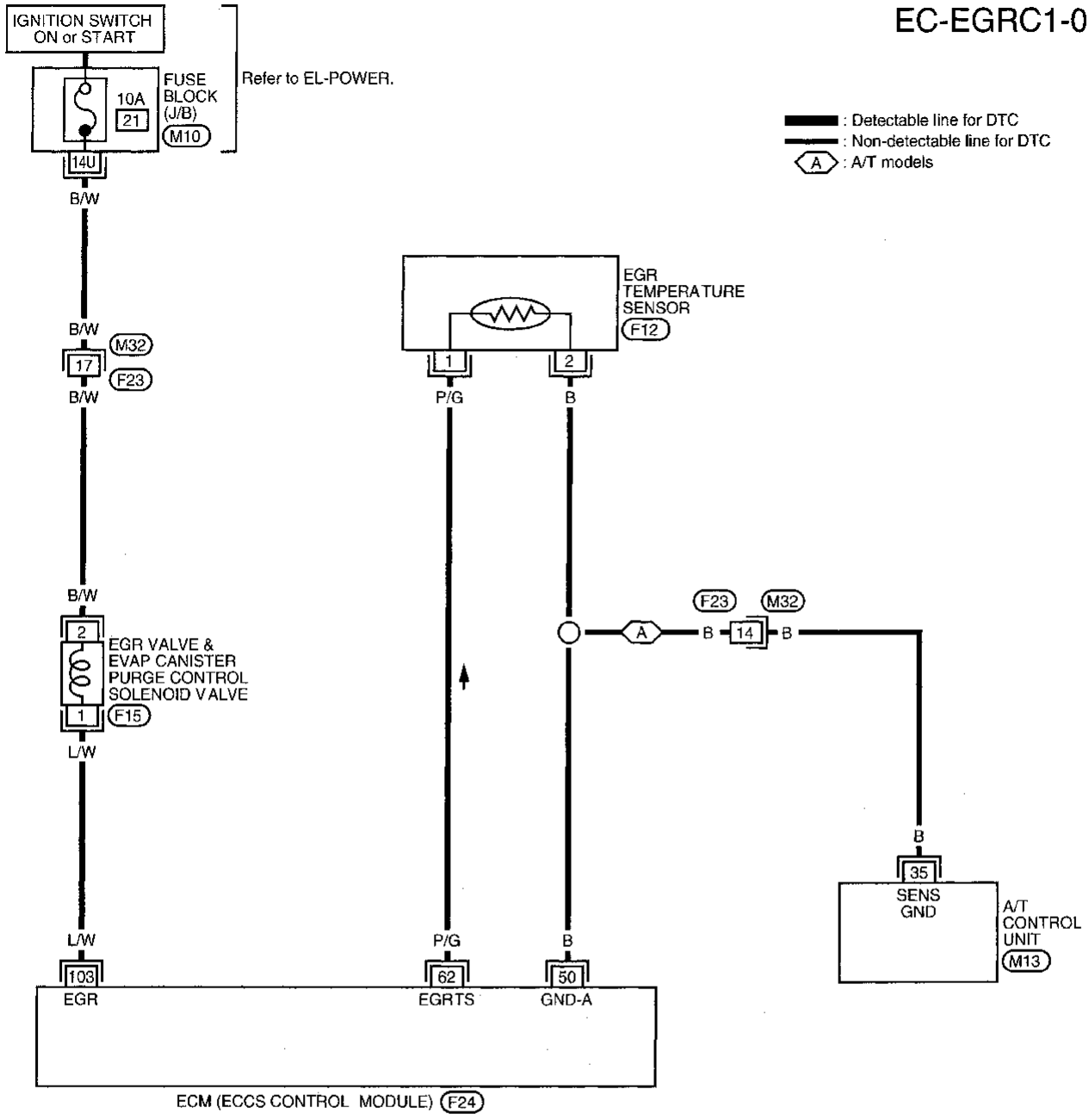


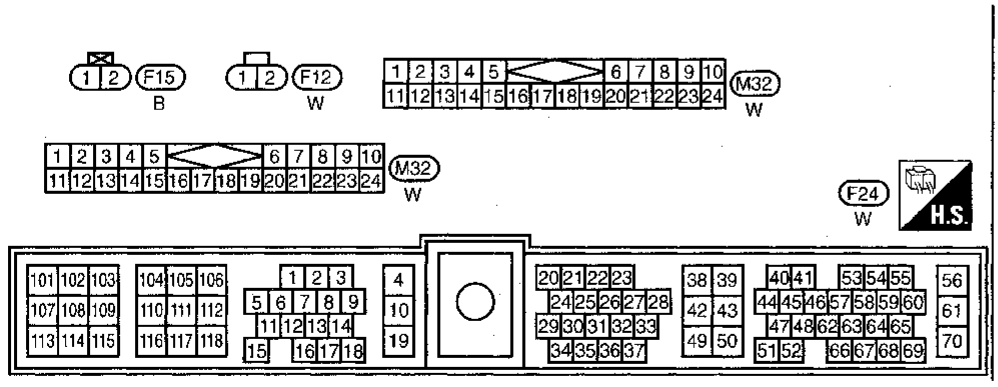
Check the EGR valve lifting when revving engine from 2,000 rpm up to 4,000 rpm.

SEF642Q

EGR Function (DTC: 0302) (Cont'd)

EC-EGRC1-01



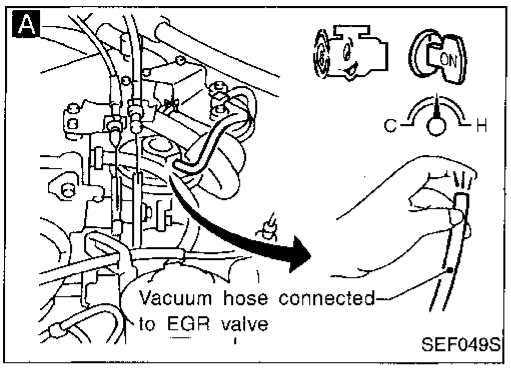


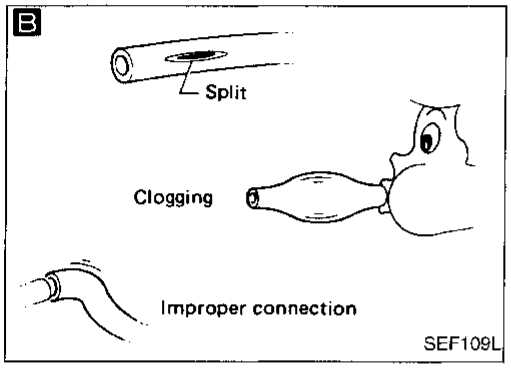
Refer to last page (Foldout page).
M10

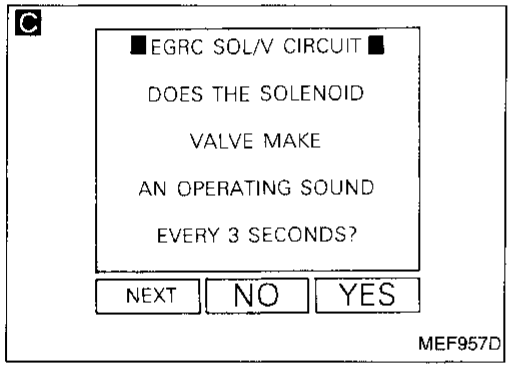
SEF907R

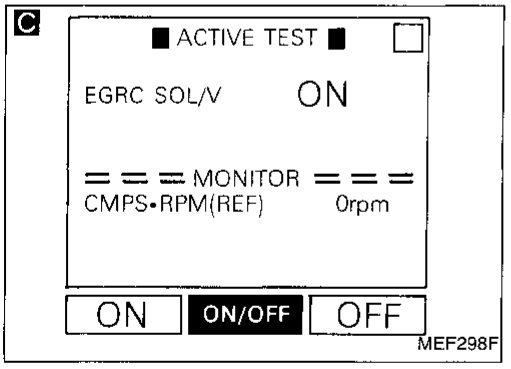
EGR Function (DTC: 0302) (Cont'd)

DIAGNOSTIC PROCEDURE









INSPECTION START

A

CHECK VACUUM SOURCE TO EGR VALVE.
1. Start engine and warm it up sufficiently.
2. Rev engine speed at about 2,000 - 4,000 rpm.
3. Disconnect vacuum hose to EGR valve.
4. Make sure that vacuum exists.
   Vacuum should exist.

OK → CHECK COMPONENTS (EGR valve). Refer to "COMPONENTS INSPECTION", EC-194.
NG → Replace EGR valve.

NG

B

CHECK VACUUM HOSE.
Check vacuum hose for clogging, cracks or improper connection.

NG → Repair or replace vacuum hose.

OK

C

CHECK COMPONENT
(EGR valve & EVAP canister purge control solenoid valve).

1. Turn ignition switch "ON".
2. Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

1. Turn ignition switch "ON".
2. Turn EGR valve & EVAP canister purge control solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.

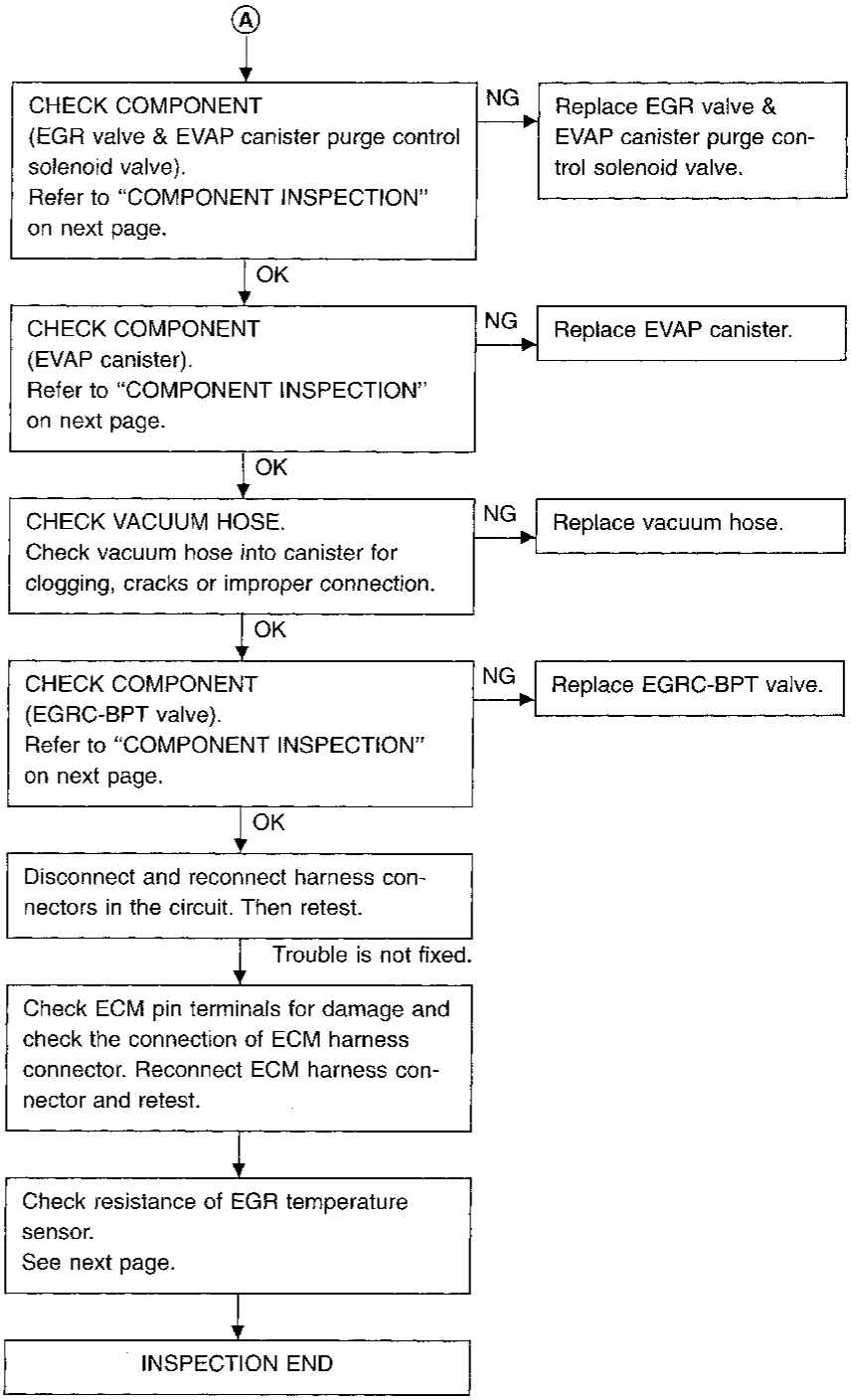
OR

1. Warm up engine sufficiently.
2. Turn ignition switch "OFF" and wait at least 5 seconds.
3. Turn ignition switch "ON".
4. Check operating sound of the solenoid valve when disconnecting and reconnecting EGR valve & EVAP canister purge control solenoid valve harness connector.

NG → Repair or replace EGR valve & EVAP canister purge control solenoid valve circuit.

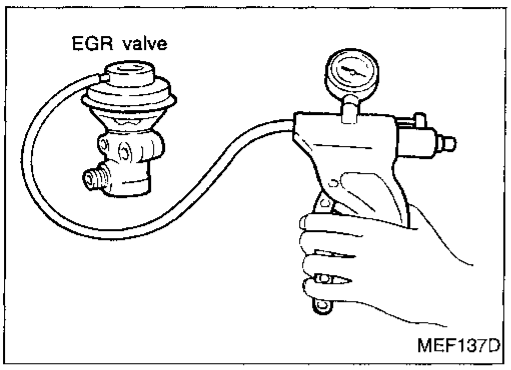
OK
Ⓐ

EGR Function (DTC: 0302) (Cont'd)



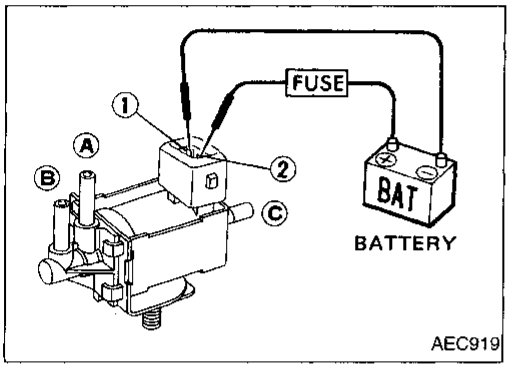
EGR Function (DTC: 0302) (Cont'd)

COMPONENT INSPECTION



EGR valve

Apply vacuum to EGR vacuum port with a hand vacuum pump.
EGR valve spring should lift.
If NG, replace EGR valve.

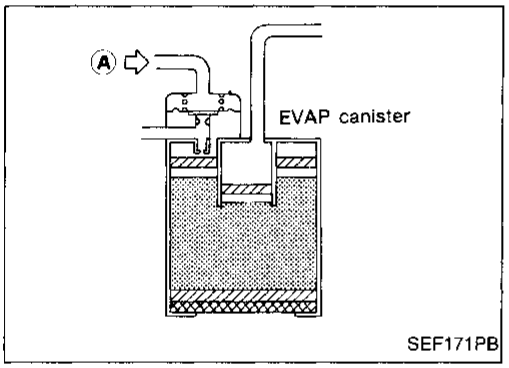


EGR valve & EVAP canister purge control solenoid valve

Check solenoid valve, following the table as shown below:

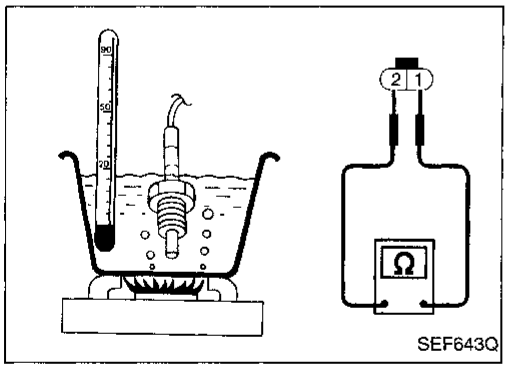
Conditions	Air passage continuity between Ⓐ and Ⓑ	Air passage continuity between Ⓐ and Ⓒ
12V direct current supply between terminals ① and ②	Yes	No
No supply	No	Yes

If NG, replace EGR valve & EVAP canister control solenoid valve.



EVAP canister

Gently blow air from Ⓐ.
No leakage should exist.

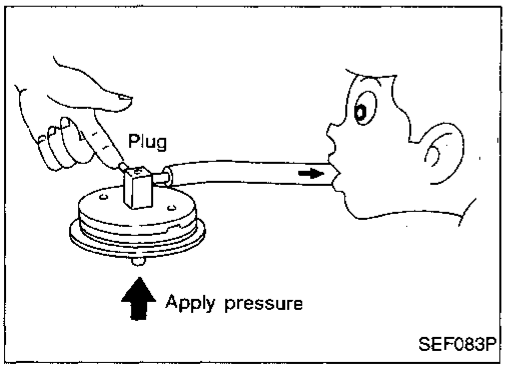


EGR temperature sensor

Check resistance change and resistance value.
⟨Reference data⟩

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

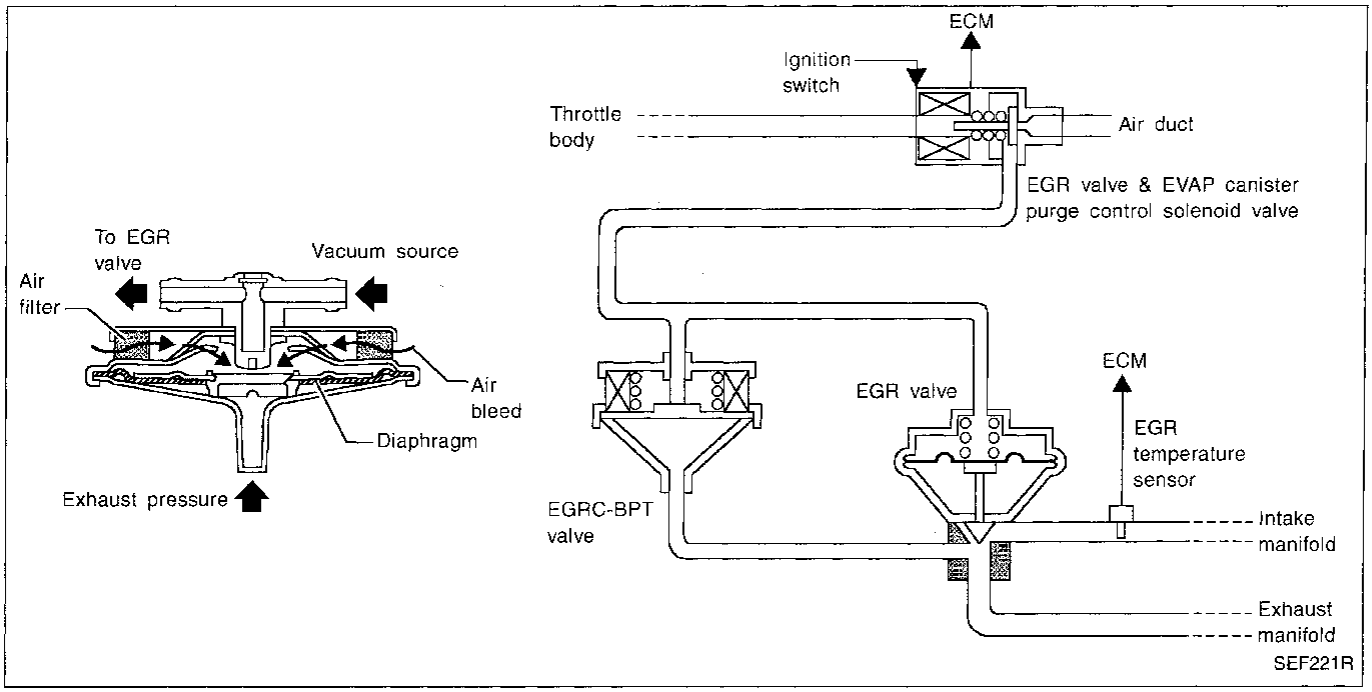
If NG, replace EGR temperature sensor.



EGRC-BPT valve

1. Plug one of two ports of EGRC-BPT valve.
2. Vacuum from the other port and check for leakage while applying a pressure above 0.981 kPa (100 mmH_2O, 3.94 inH_2O) from under EGRC-BPT valve.
3. If a leakage is noted, replace the valve.

EGRC-BPT Valve Function (DTC: 0306)



SYSTEM DESCRIPTION

The EGRC-BPT valve monitors exhaust pressure to activate the diaphragm, controlling throttle body vacuum applied to the EGR valve. In other words, recirculated exhaust gas is controlled in response to positioning of the EGR valve or to engine operation.

ON BOARD DIAGNOSIS LOGIC

If too much EGR flow exists due to an EGRC-BPT valve malfunction, off idle engine roughness will increase. If the roughness is large, then the vacuum to the EGR valve is interrupted through the EGR & EVAP canister purge control solenoid valve. If the engine roughness is reduced at that time, the EGRC-BPT valve malfunction is indicated.

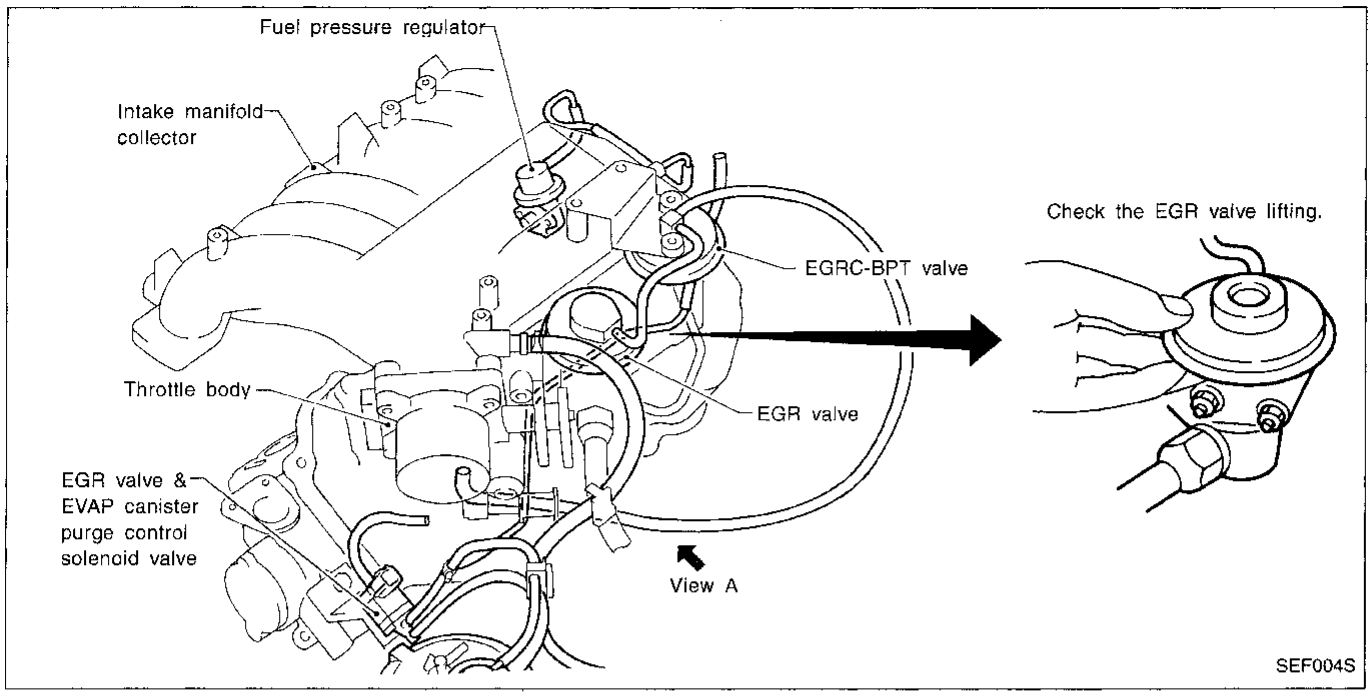
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0402 0306	• The EGRC-BPT valve does not operate properly.	• EGRC-BPT valve • Misconnected rubber tube • Blocked rubber tube

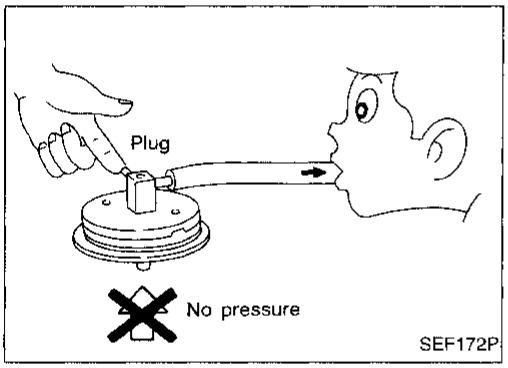
OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the EGRC-BPT valve. During this check, a DTC might not be confirmed.

1. Disconnect the rubber tube to the EGR valve and EVAP canister purge control solenoid valve at the EGRC-BPT valve.
2. Disconnect the rubber tube to the EGR valve & EVAP canister purge control solenoid valve at the throttle body.
   Connect the throttle body and the EGRC-BPT valve with a rubber tube.
3. Start engine.
4. Check for the EGR valve lifting with engine at less than 1,500 rpm under no load.
   EGR valve should remain closed.
5. Check the EGR valve lifting when revving from 2,000 rpm up to 4,000 rpm under no load.
   EGR valve should lift up, and go down without sticking when the engine is returned to idle.
6. Check rubber tube between EGR valve & EVAP canister purge control solenoid valve and throttle body for misconnection, cracks or blockages.

EGRC-BPT Valve Function (DTC: 0306) (Cont'd)





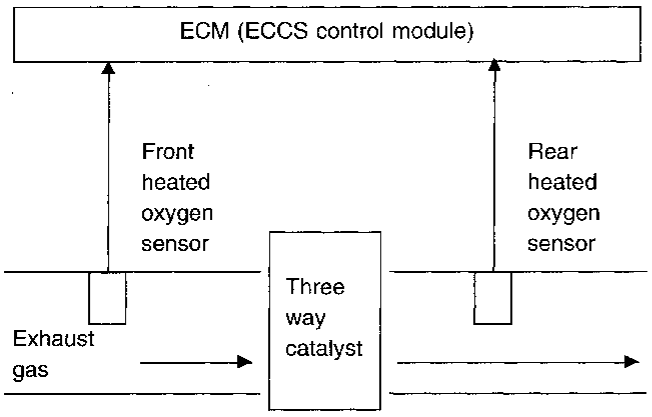
COMPONENT INSPECTION

EGRC-BPT valve

1. Plug one of two ports of EGRC-BPT valve.
2. Vacuum from the other port and check leakage without applying any pressure from under EGR-BPT valve.
   Leakage should exist.

Three Way Catalyst Function (DTC: 0702, 0703)

ON BOARD DIAGNOSIS LOGIC



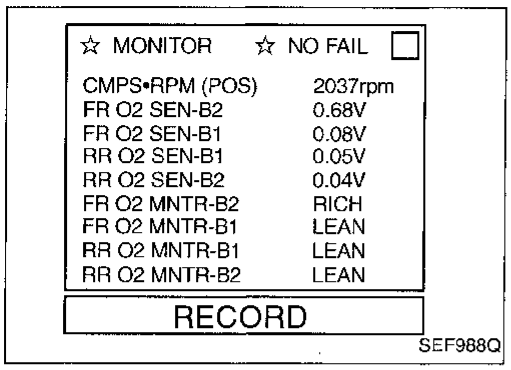
The ECM monitors the switching frequency ratio of front and rear heated oxygen sensors.
A three way catalyst with high oxygen storage capacity will indicate a low switching frequency of rear heated oxygen sensor. As oxygen storage capacity decreases, the rear heated oxygen sensor switching frequency will increase.
When the frequency ratio of front and rear heated oxygen sensors approaches a specified limit value, the second stage diagnosis is applied.
The second stage diagnosis switches the mixture ratio feedback control using front heated oxygen sensor to rear heated oxygen sensor.
Then the ECM measures the switching lag time between front and rear heated oxygen sensors.
The longer lag time indicates the greater oxygen storage capacity. If the lag time is within the specified level, the three way catalyst malfunction is diagnosed.

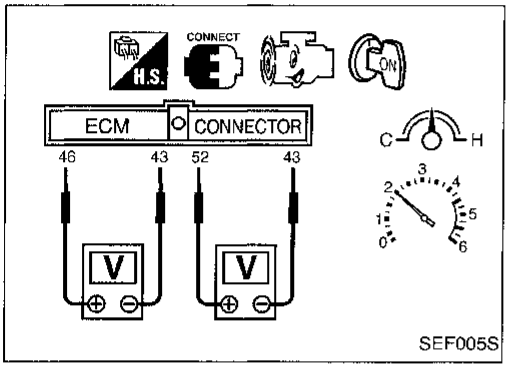
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
For right bank P0420 0702	• Three way catalyst does not operate properly. • Three way catalyst does not have enough oxygen storage capacity.	• Three way catalyst • Exhaust tube • Intake air leaks • Injectors • Injector leaks
For left bank P0430 0703		

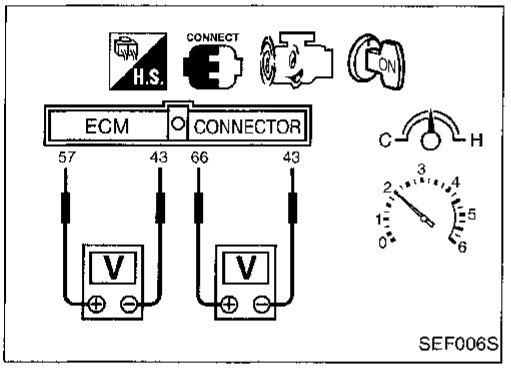
OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the three way catalyst.
During this check, a DTC might not be confirmed.

Three Way Catalyst Function (DTC: 0702, 0703) (Cont'd)







1) Start engine and warm it up sufficiently.
2) Set "MANU TRIG" and "HI SPEED", then select "FR O2 SEN-B1", "FR O2 SEN-B2", "RR O2 SEN-B1", "RR O2 SEN-B2", "FR O2 MNTR-B2", "FR O2 MNTR-B1", "RR O2 MNTR-B1", "RR O2 MNTR-B2" in "DATA MONITOR" mode with CONSULT.
3) Touch "RECORD" on CONSULT screen with engine speed held at 2,000 rpm constant under no load.
4) Make sure that the switching frequency between "RICH" and "LEAN" of "RR O2 MNTR-B1" or "RR O2 MNTR-B2" is very less than that of "FR O2 MNTR-B1" or "FR O2 MNTR-B2".

Switching frequency ratio =

$$\frac{\text{Rear heated oxygen sensor switching frequency}}{\text{Front heated oxygen sensor switching frequency}}$$

This ratio should be less than 0.7.

If the ratio is greater than above, the three way catalyst is not operating properly.

Note: If the "FR O2 MNTR-B1" or "FR O2 MNTR-B2" does not indicate "RICH" and "LEAN" periodically more than 5 times within 10 seconds at step 3, perform TROUBLE DIAGNOSIS FOR DTC P0130 or P0150 first. (See EC-118 or EC-135.)

OR

1) Start engine and warm it up sufficiently.
2) Set voltmeters probes between ECM terminals ㊻ [front heated oxygen sensor (right bank) signal], ㊼ [front heated oxygen sensor (left bank) signal] and ㊸ (engine ground), and ECM terminals ㊷ [rear heated oxygen sensor (right bank) signal], ㊻ [rear heated oxygen sensor (left bank) signal] and ㊸ (engine ground).
3) Keep engine speed at 2,000 rpm constant under no load.
4) Make sure that the voltage switching frequency (high & low) between ECM terminals ㊷ and ㊸, or ㊻ and ㊸ is very less than that of ECM terminals ㊻ and ㊸, or ㊼ and ㊸.

Switching frequency ratio =

$$\frac{\text{Rear heated oxygen sensor voltage switching frequency}}{\text{Front heated oxygen sensor voltage switching frequency}}$$

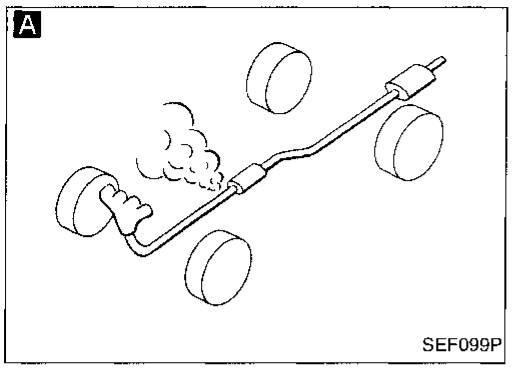
This ratio should be less than 0.7.

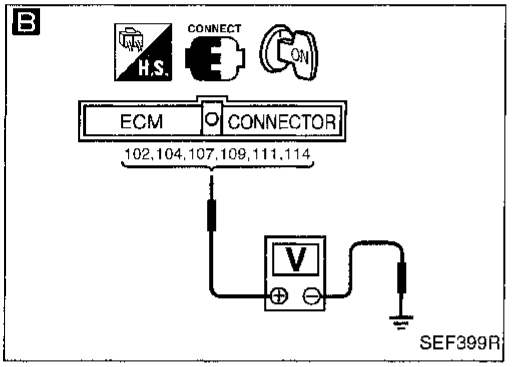
If the ratio is greater than above, it means three way catalyst does not operate properly.

Note: If the voltage at terminal ㊻ or ㊼ does not switch periodically more than 5 times within 10 seconds at step 3, perform TROUBLE DIAGNOSIS FOR DTC P0130 or P0150 first. (See EC-118 or EC-135.)

Three Way Catalyst Function (DTC: 0702, 0703) (Cont'd)

DIAGNOSTIC PROCEDURE





INSPECTION START

CHECK EXHAUST SYSTEM.
Visually check exhaust tubes and muffler for dent.
NG → Repair or replace it.
OK

A

CHECK EXHAUST AIR LEAK.
Start engine and run it at idle. Listen for an exhaust air leak before the three way catalyst.
NG → Repair or replace.
OK

CHECK INTAKE AIR LEAK.
Start engine and run it at idle. Listen for an intake air leak after the mass air flow sensor.
NG → Repair or replace.
OK

B

CHECK INJECTORS.
1. Refer to WIRING DIAGRAM for Injectors, EC-239.
2. Check voltage between ECM terminals (102), (104), (107), (109), (111) and (114) and ground with CONSULT or tester.
   Battery voltage should exist.
3. Turn ignition switch "OFF".

NG → Perform TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS, "Injector", EC-239. Repair harness or connectors.
OK

Remove injector assembly.
Refer to EC-22.
Keep fuel hose and all injectors connected to injector gallery.

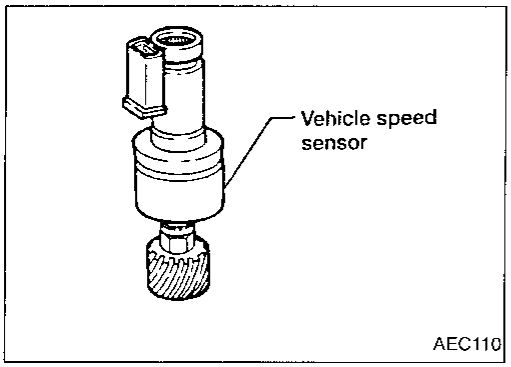
1. Disconnect camshaft position sensor harness connector.
2. Turn ignition switch "ON".
   Make sure fuel does not drip from injector.

Drips → Replace the injector(s) from which fuel is dripping.
Does not drip

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Trouble is not fixed → Replace three way catalyst.
Trouble is fixed

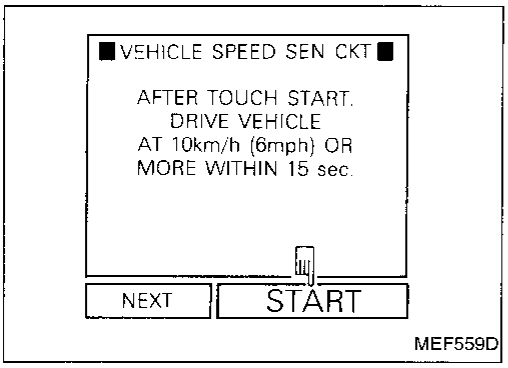
INSPECTION END

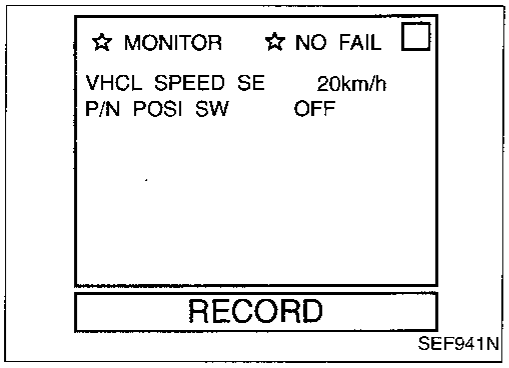


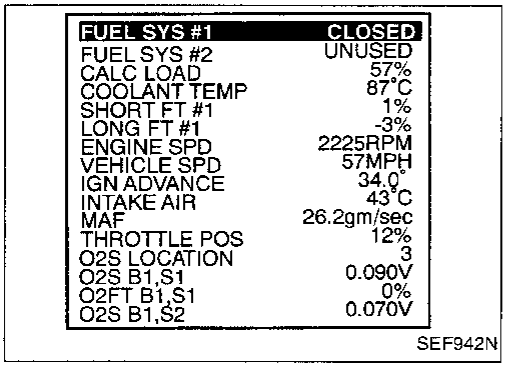
Vehicle Speed Sensor (VSS) (DTC: 0104)

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.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0500 0104	• The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	• Harness or connector (The vehicle speed sensor circuit is open or shorted.) • Vehicle speed sensor







OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the vehicle speed sensor circuit. During this check, a DTC might not be confirmed.

1) Jack up drive wheels.
2) Start engine.
3) Perform "VEHICLE SPEED SEN CKT" in "FUNCTION TEST" mode with CONSULT.

OR

1) Jack up drive wheels.
2) Start engine.
3) Read vehicle speed sensor signal in "DATA MONITOR" mode with CONSULT.

The vehicle speed on CONSULT should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

OR

1) Jack up drive wheels.
2) Start engine.
3) Read vehicle speed sensor signal in "MODE 1" with GST.

The vehicle speed on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

OR

Vehicle Speed Sensor (VSS) (DTC: 0104) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

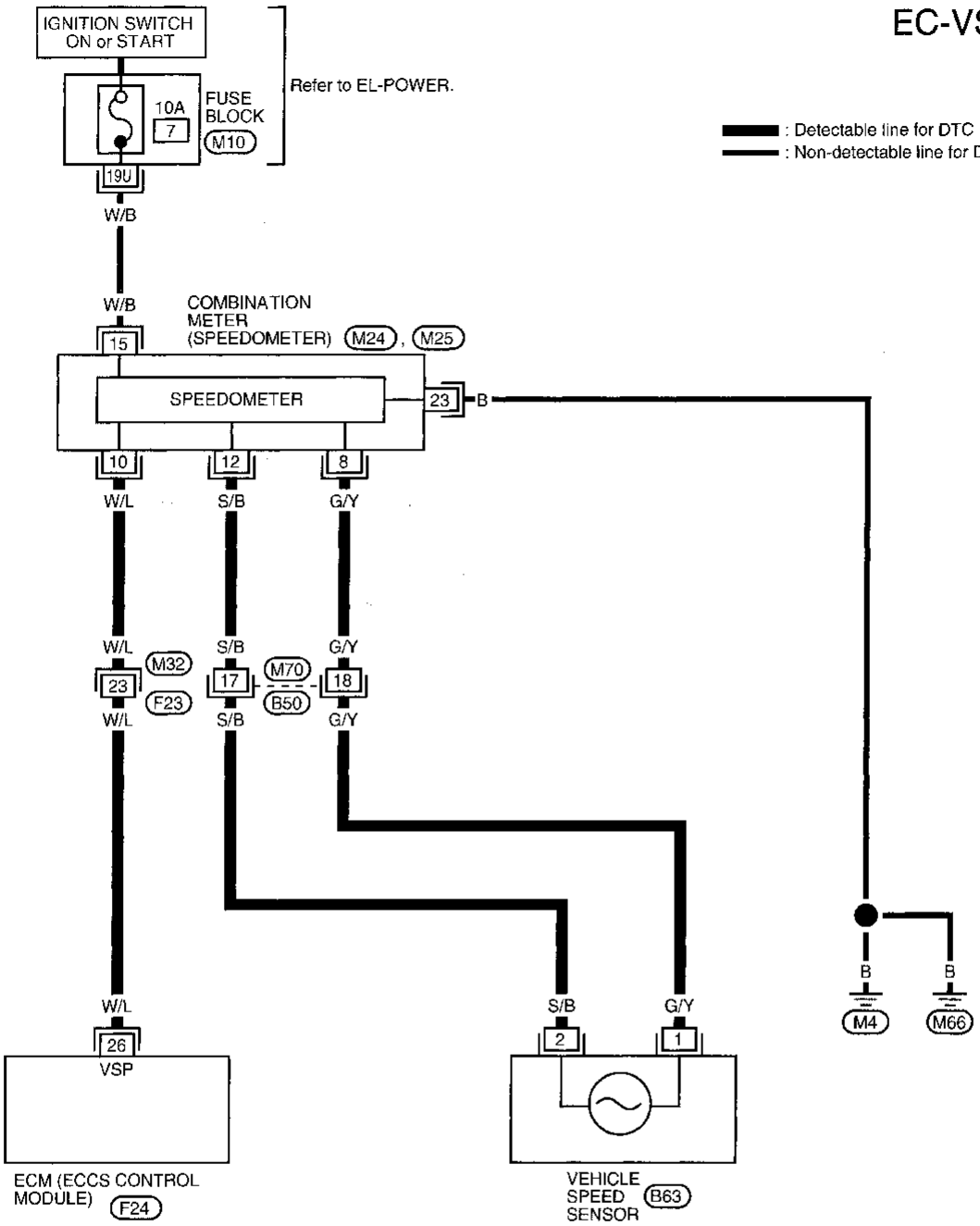
NO TOOLS

1) Start engine and warm it up sufficiently.
2) Perform test drive for at least 10 seconds continuously under the following recommended condition.
   - Engine speed : 1,800 - 2,600 rpm (M/T models)
     1,400 - 2,800 rpm (A/T models)
   - Intake manifold vacuum : M/T −53.3 to −40.0 kPa (−400 to −300 mmHg, −15.75 to −11.81 inHg)
     A/T −53.3 to −33.3 kPa (−400 to −250 mmHg, −15.75 to −9.84 inHg)
   - Gear position : Suitable position (except "N" or "P" position)
3) Stop the vehicle, turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
4) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

Even though Diagnostic Trouble Code is not detected, perform the above test drive at least one more time.

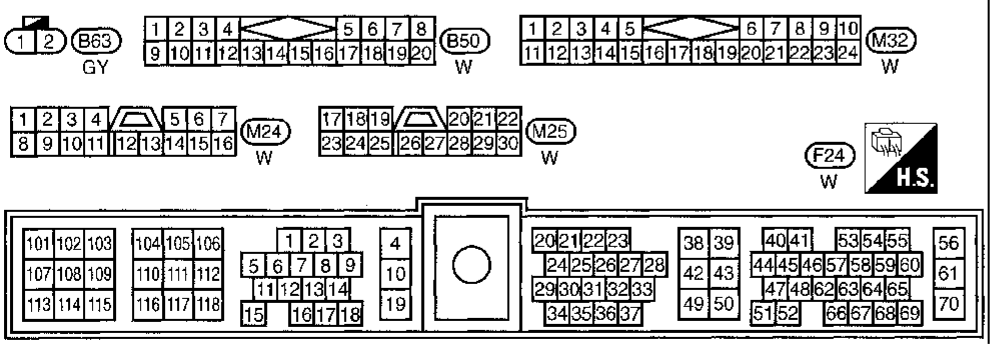
Vehicle Speed Sensor (VSS) (DTC: 0104) (Cont'd)

EC-VSS-01



Refer to last page (Foldout page).

M10



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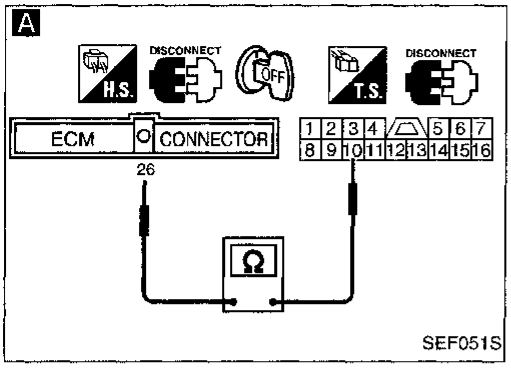
Vehicle Speed Sensor (VSS) (DTC: 0104) (Cont'd)



DIAGNOSTIC PROCEDURE

INSPECTION START

A

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 (26) and meter terminal (10).
   Continuity should exist.
   If OK, check harness for short.

NG →
Check the following.
- Harness connectors (M32), (F23)
- Harness for open or short between ECM and combination meter

If NG, repair harness or connectors.

OK ↓

CHECK SPEEDOMETER FUNCTION.
Make sure that speedometer functions properly.

NG →
Check the following.
- Harness connectors (M70), (B50)
- Harness for open or short between combination meter and vehicle speed sensor

If NG, repair harness or connectors.
Check vehicle speed sensor and its circuit.
Refer to EL section.

OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

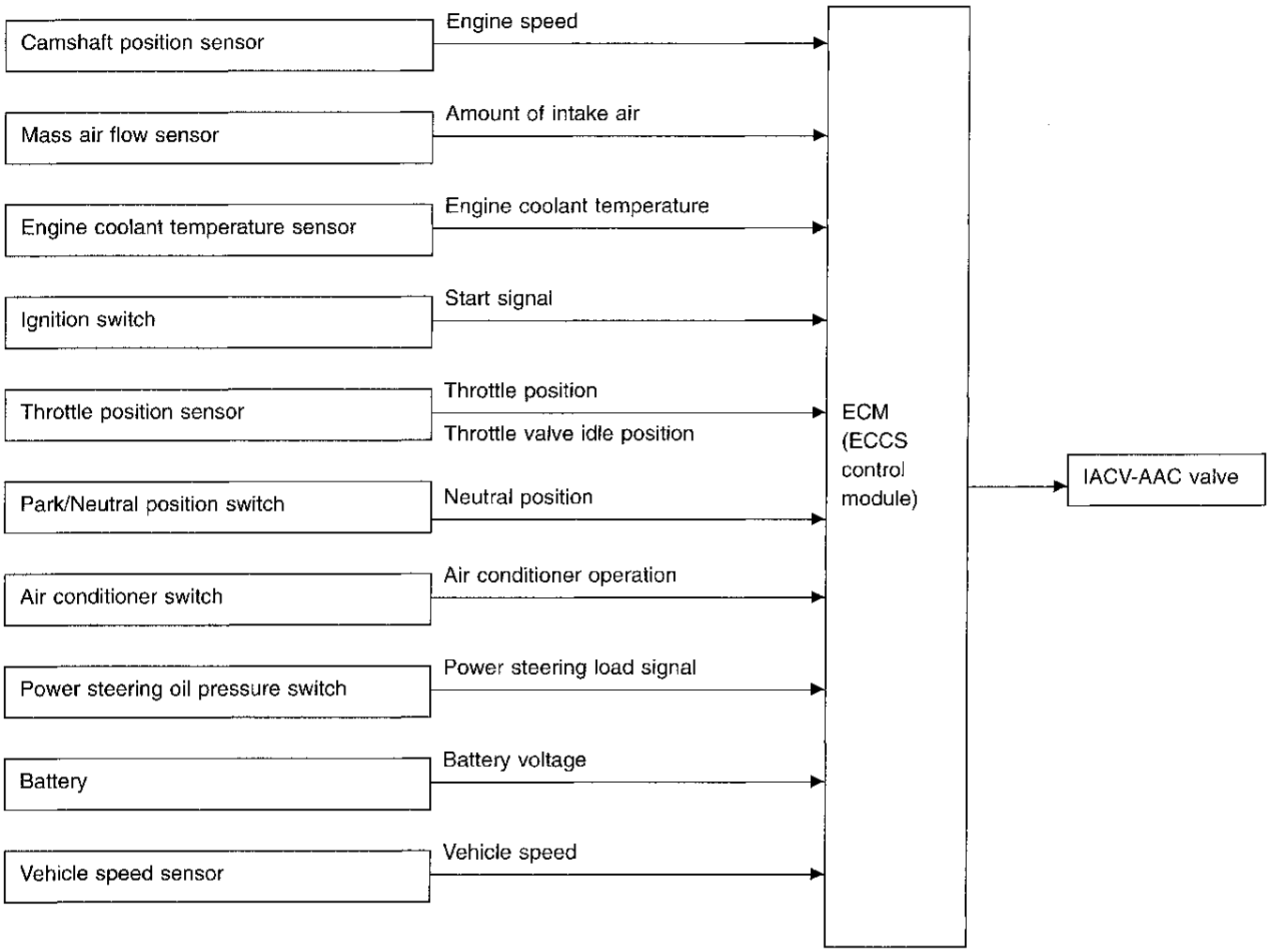
Trouble is not fixed. ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

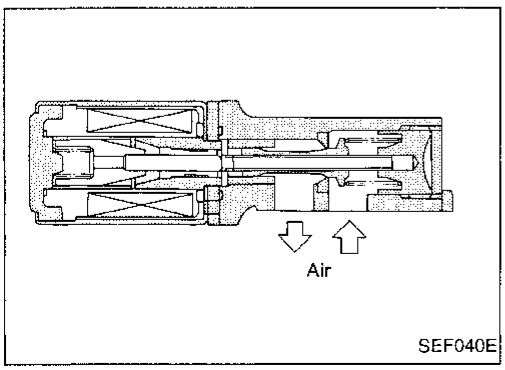
INSPECTION END

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (DTC: 0205)

SYSTEM DESCRIPTION



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).



COMPONENT DESCRIPTION

IACV-AAC valve

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.

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (DTC: 0205) (Cont'd)

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0505 0205	A) The IACV-AAC valve does not operate properly.	• Harness or connectors (The IACV-AAC valve circuit is open.) • IACV-AAC valve
	B) The IACV-AAC valve does not operate properly.	• Harness or connectors (The IACV-AAC valve circuit is shorted.) • IACV-AAC valve

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

Procedure for malfunction A

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 2 seconds.

OR

1) Turn ignition switch "ON" and wait at least 2 seconds.
2) Select "MODE 3" with GST.

OR

1) Turn ignition switch "ON" and wait at least 2 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

Procedure for malfunction B

1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON" again and select "DATA MONITOR" mode with CONSULT.
4) Start engine and run it for at least 1 minute at idle speed.

OR

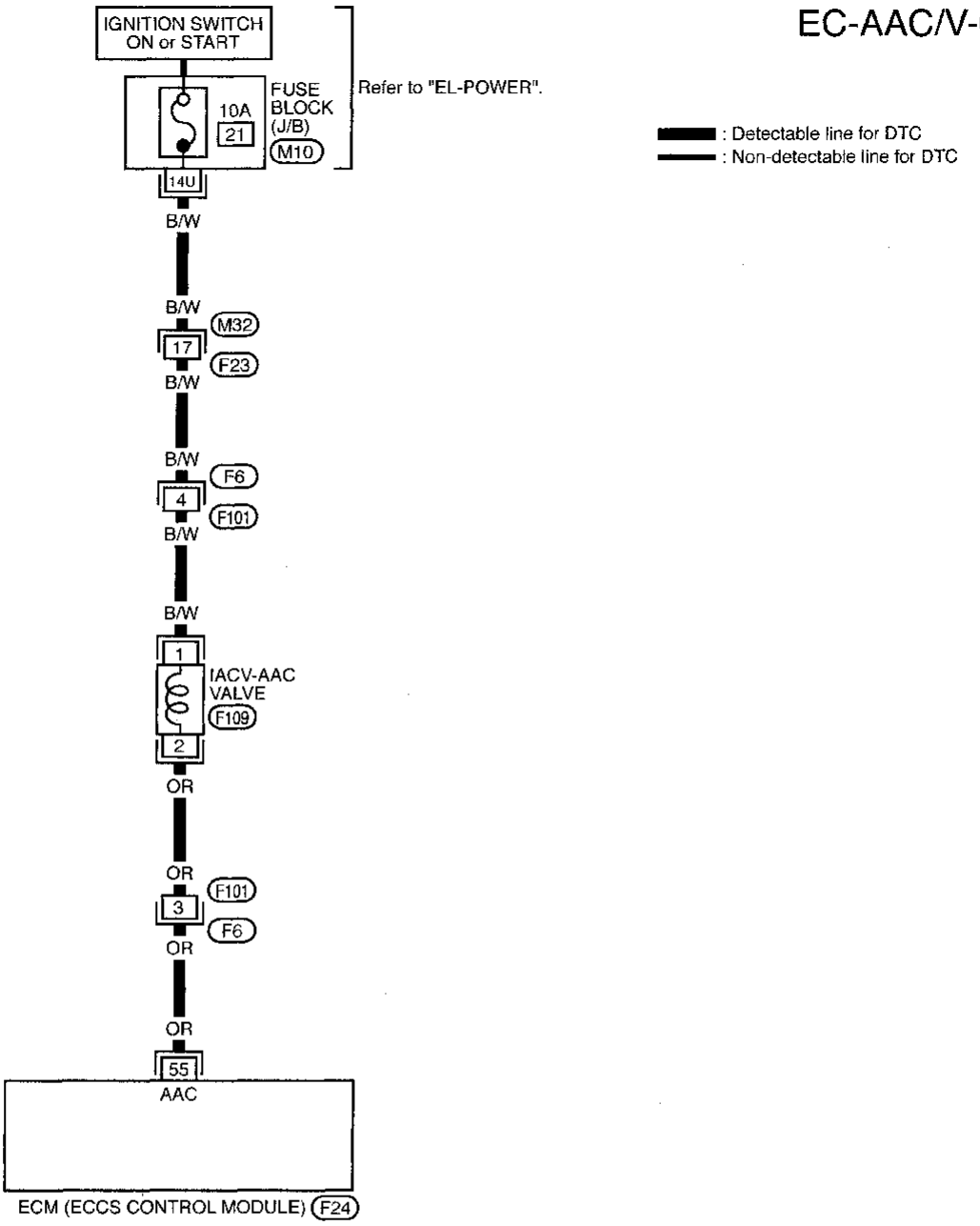
1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine again and run it for at least 1 minute at idle speed.
4) Select "MODE 3" with GST.

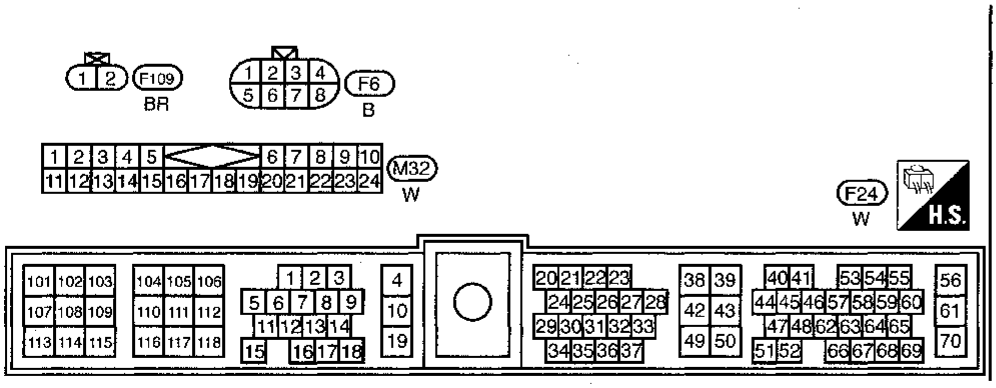
OR

1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine again and run it for at least 1 minute at idle speed.
4) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
5) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (DTC: 0205) (Cont'd)

EC-AAC/V-01





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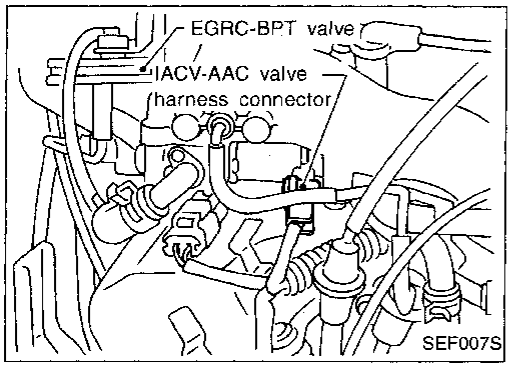
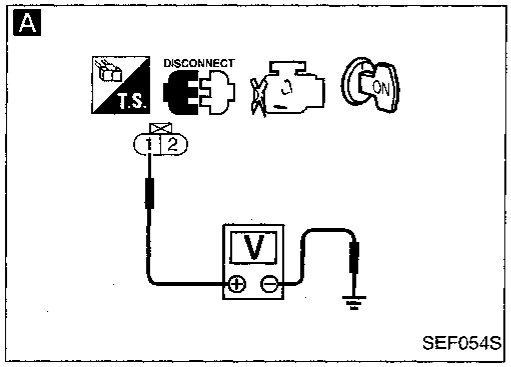
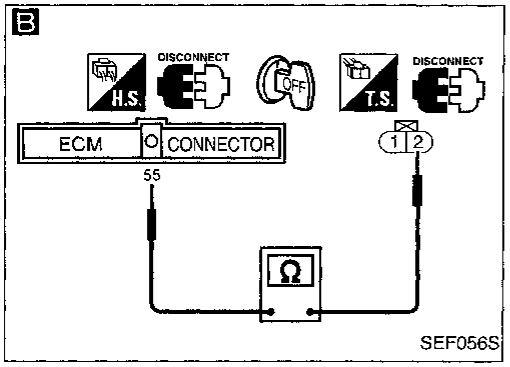
Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (DTC: 0205) (Cont'd)



DIAGNOSTIC PROCEDURE





INSPECTION START

A

CHECK POWER SUPPLY.
1. Stop engine.
2. Disconnect IACV-AAC valve harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ① and ground with CONSULT or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F101), (F6)
- Harness connectors (F23), (M32)
- 10A fuse
- Harness for open or short between IACV-AAC valve harness connector and fuse

If NG, repair harness or connectors.

OK ↓

B

CHECK OUTPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal (55) and terminal ②.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors (F6), (F101)
- Harness for open or short between IACV-AAC valve and ECM

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT (IACV-AAC valve).
Refer to "COMPONENT INSPECTION" below.

NG → Replace IACV-AAC valve.

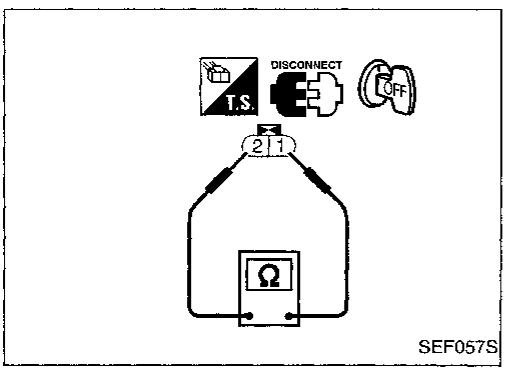
OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END



COMPONENT INSPECTION

IACV-AAC valve

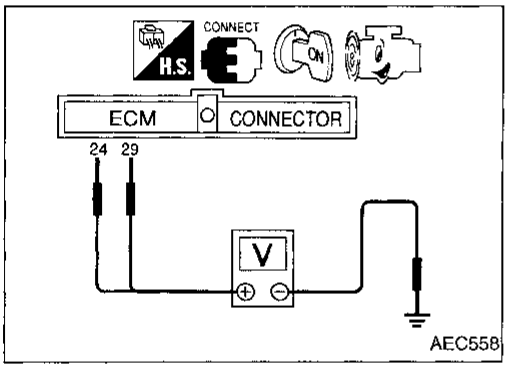
Disconnect IACV-AAC valve harness connector.
- Check IACV-AAC valve resistance.
  Resistance:
  Approximately 10Ω [at 25°C (77°F)]
- Check plunger for seizing or sticking.
- Check for broken spring.

A/T Control (DTC: 0504)

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 A/T control unit.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Item (Possible Cause)
P0600 0504	• ECM receives incorrect voltage from A/T control unit continuously.	• Harness or connectors (The circuit between ECM and A/T control unit is open or shorted.)

*: This DTC can be detected only by "DATA MONITOR (AUTO TRIG)" with CONSULT.



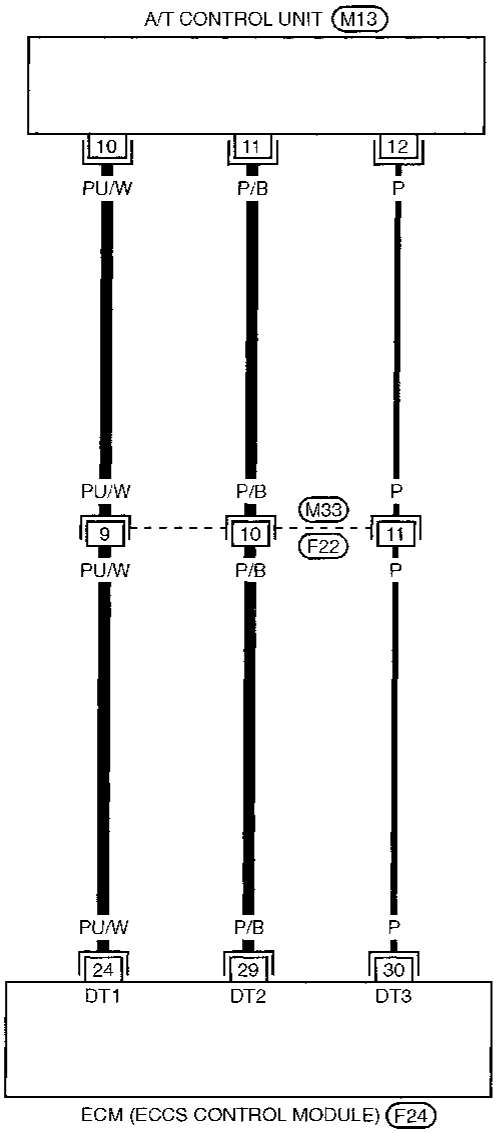
OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the A/T control.
During this check, a DTC might not be confirmed.

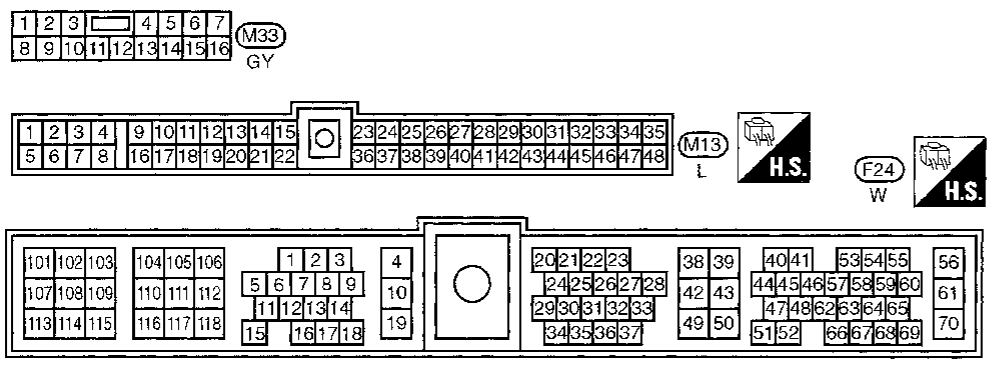
1) Turn ignition switch "ON".
2) Start engine.
3) Check voltage between
   ECM terminal ㉔ and ground.
   ECM terminal ㉙ and ground.
   Voltage: Approximately 7V

A/T Control (DTC: 0504) (Cont'd)

EC-AT/C-01



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



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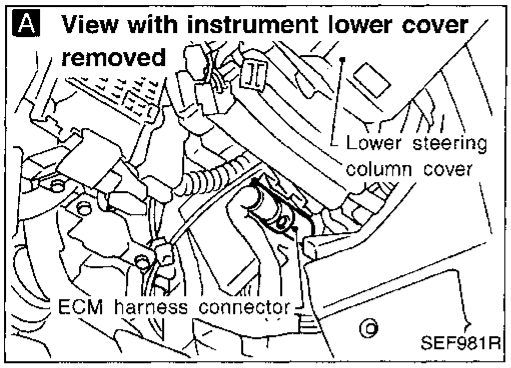
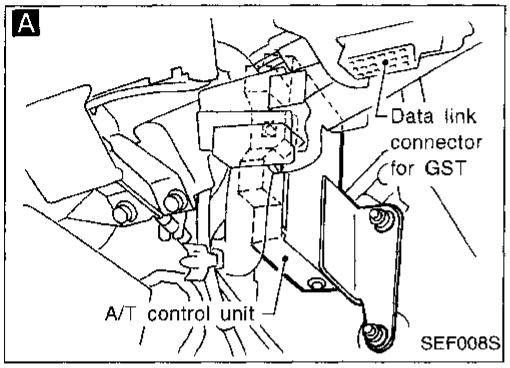
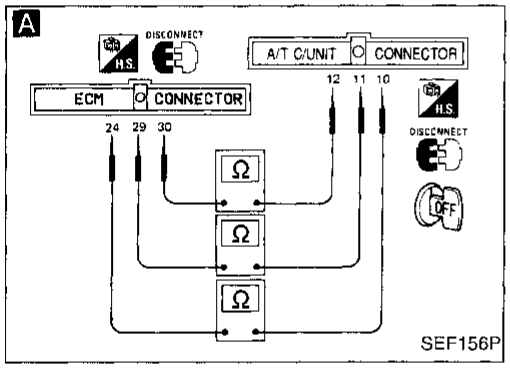
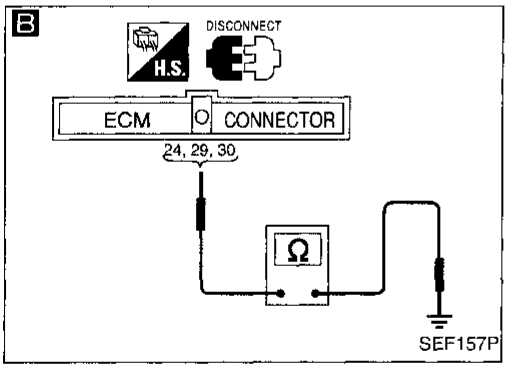
A/T Control (DTC: 0504) (Cont'd)

DIAGNOSTIC PROCEDURE









INSPECTION START

A

CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector and A/T control unit harness connector.
3. Check harness continuity between ECM terminal (24) and terminal (10), ECM terminal (29) and terminal (11), ECM terminal (30) and terminal (12).

Continuity should exist.

NG → Check the following.
- Harness connectors (F22), (M33)
- Harness for open or short between ECM and A/T control unit.

If NG, repair harness or connectors.

OK ↓

B

CHECK INPUT SIGNAL CIRCUIT.
Check harness continuity between ECM terminal (24) and ground, ECM terminal (29) and ground, ECM terminal (30) and ground.

Continuity should not exist.

NG → Check the harness for open or short between ECM and A/T control unit. If NG, repair harness.

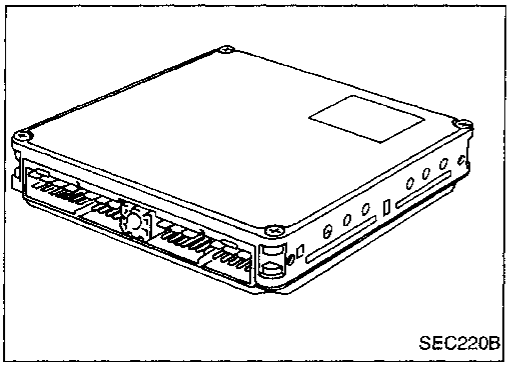
OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

Check ECM pin terminals and A/T control unit pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END


SEC220B

Engine Control Module (ECM)-ECCS Control Module (DTC: 0301)

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.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Item (Possible Cause)
P0605 0301	• ECM calculation function is malfunctioning.	• ECM (ECCS control module)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 2 seconds.

OR

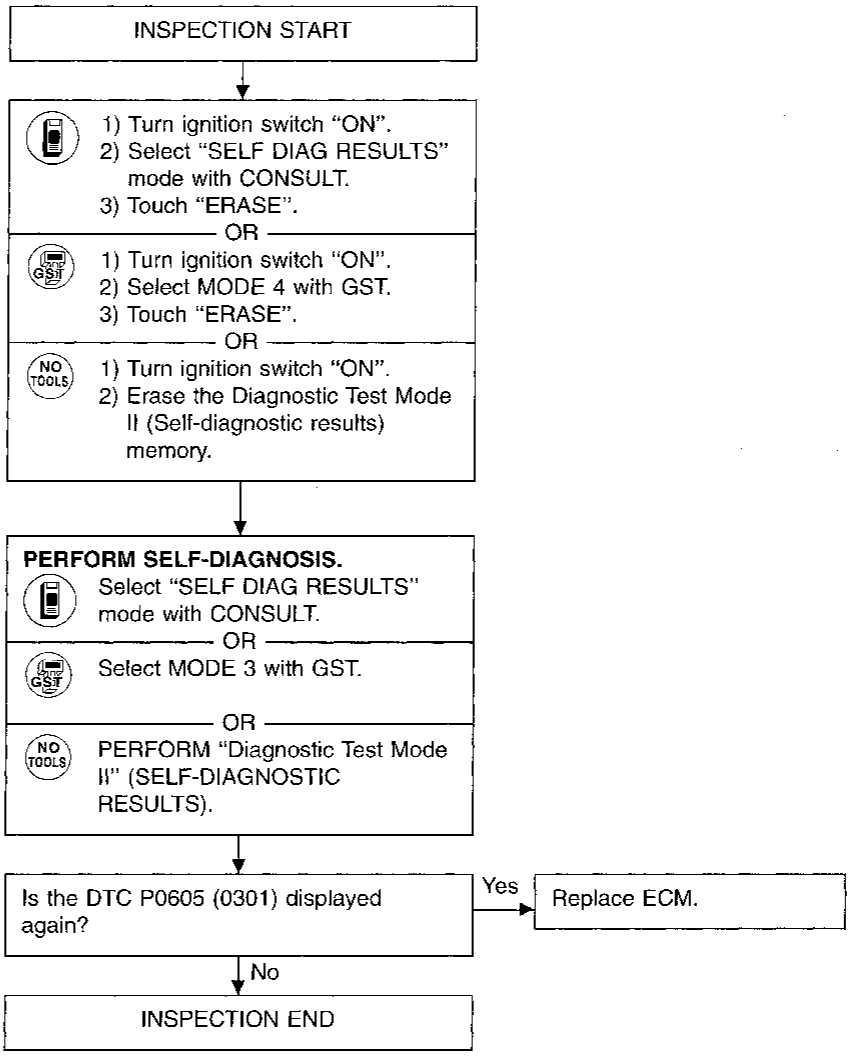
1) Turn ignition switch "ON".
2) Select "Mode 3" with GST.
3) Wait at least 2 seconds.

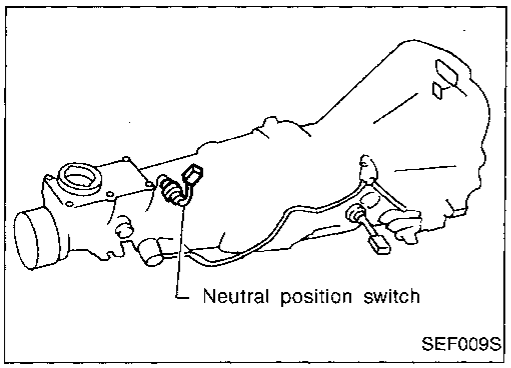
OR

1) Turn ignition switch "ON".
2) Wait at least 2 seconds.
3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
4) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

Engine Control Module (ECM)-ECCS Control Module (DTC: 0301) (Cont'd)

DIAGNOSTIC PROCEDURE

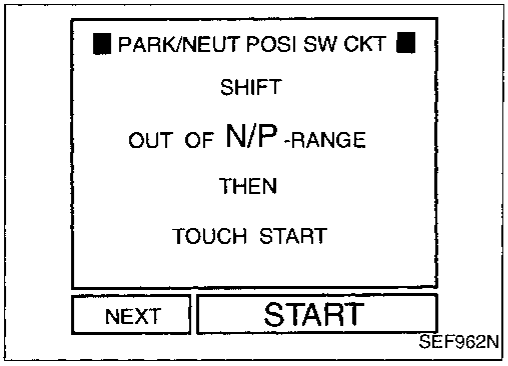


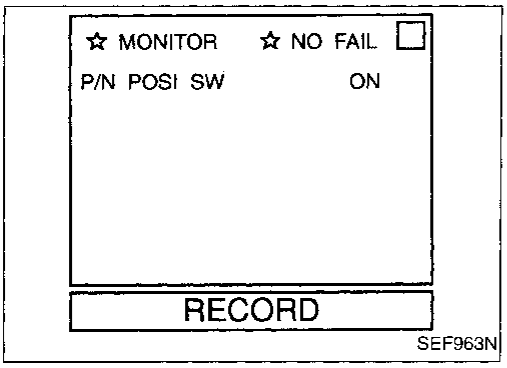


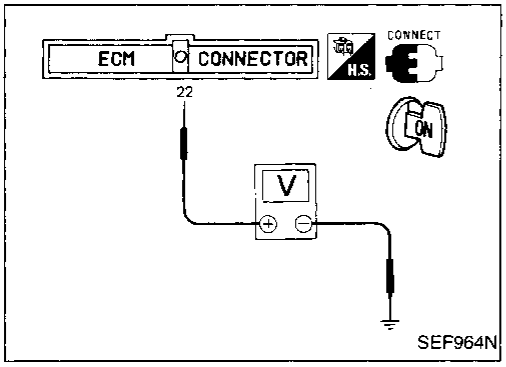
Park/Neutral Position Switch (DTC: 1003)

When the gear position is "P" (A/T models only) or "N", park/neutral position switch is "ON".
ECM detects the park/neutral position when continuity with ground exists.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0705 1003	• The signal of the park/neutral position switch is not changed in the process of engine starting and driving.	• Harness or connectors (The neutral position switch or inhibitor switch circuit is open or shorted.) • Inhibitor switch







OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the park/neutral position switch circuit. During this check, a DTC might not be confirmed.

1) Turn ignition switch "ON".
2) Perform "PARK/NEUT POSI SW CKT" in "FUNCTION TEST" mode with CONSULT.

OR

2) Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT.
3) Check the "P/N POSI SW" signal under the following conditions.

Condition (Gear position)	Signal
"P" and "N" position	ON
Except the above position	OFF

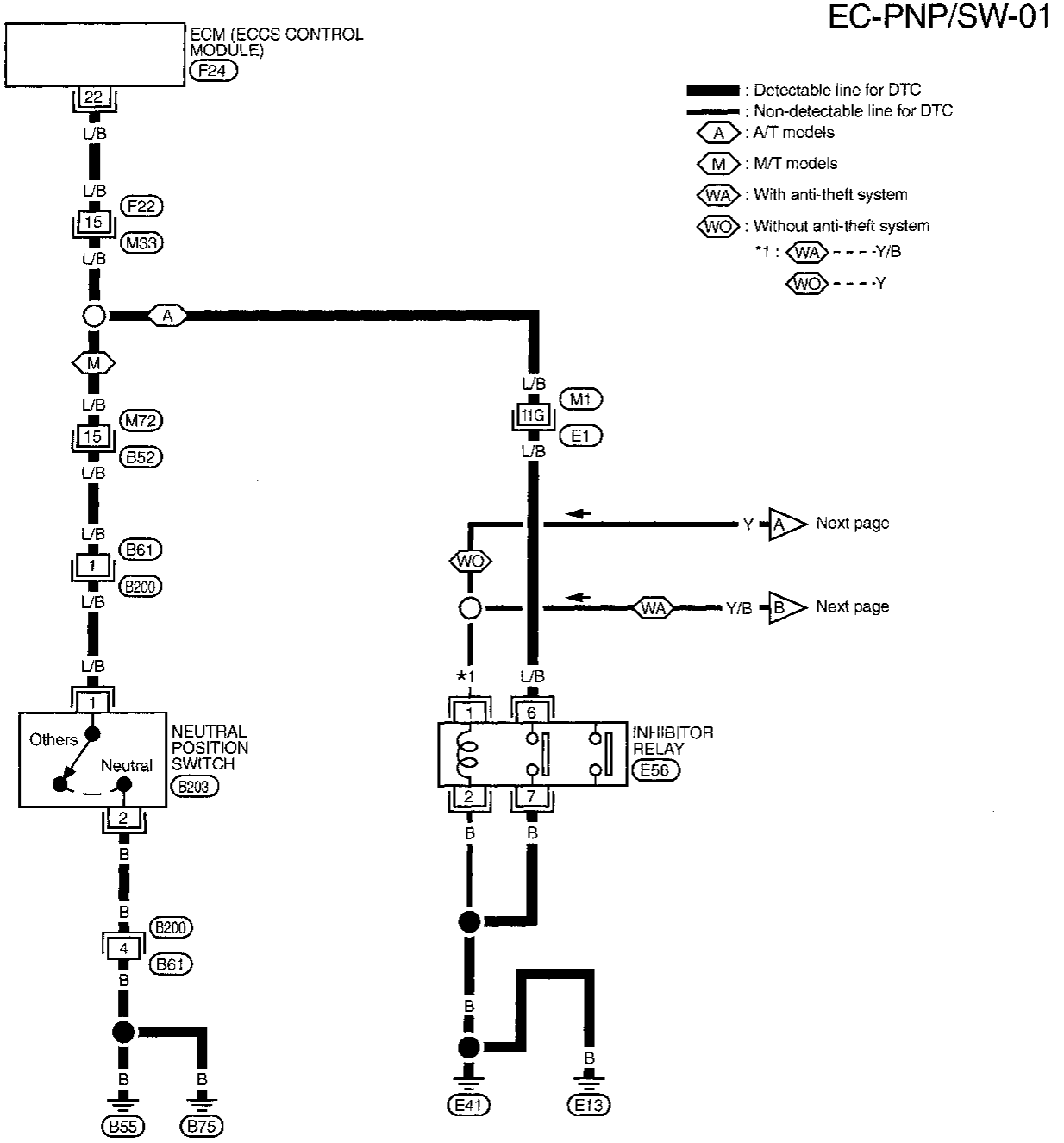
OR

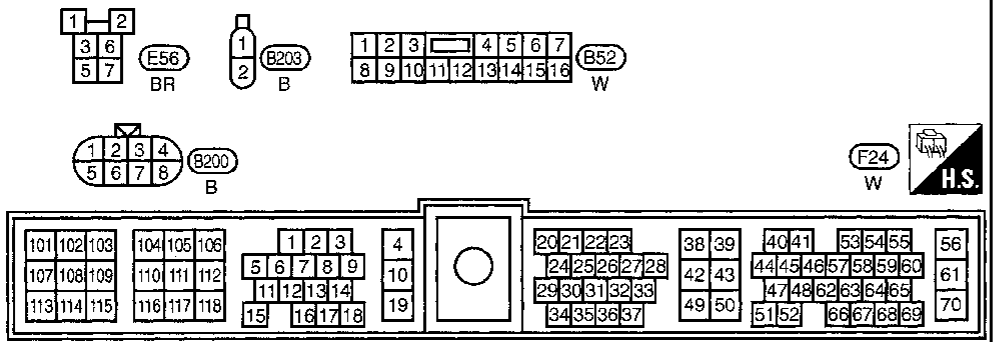
1) Turn ignition switch "ON".
2) Check voltage between ECM terminal ㉒ and body ground under the following conditions.

Condition (Gear position)	Voltage (V)
"P" and "N" position	Approximately 0
Except the above position	Approximately 5

Park/Neutral Position Switch (DTC: 1003) (Cont'd)

EC-PNP/SW-01



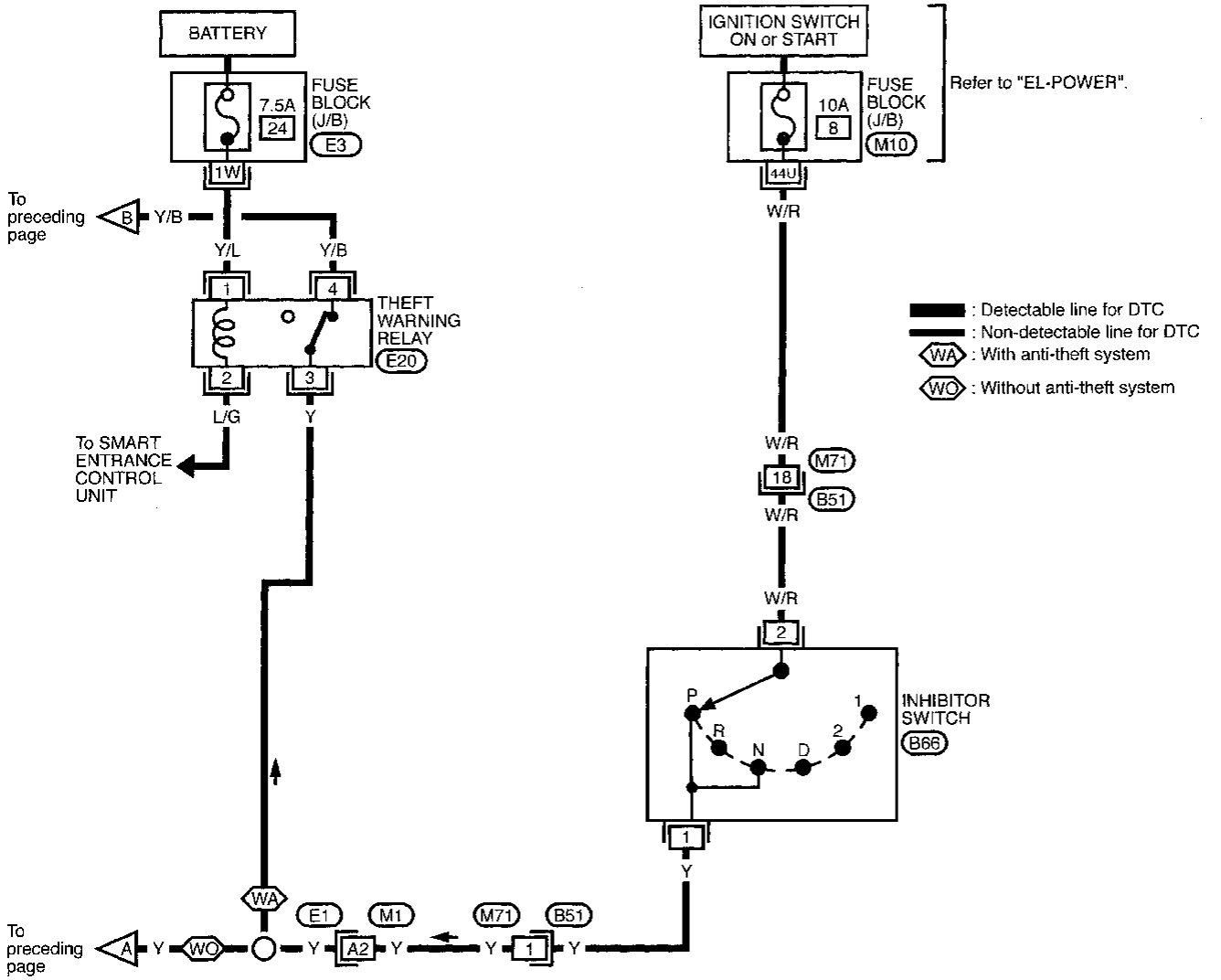


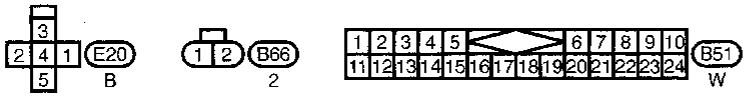
Refer to last page (Foldout page).
E1 , M1

SEF911R

Park/Neutral Position Switch (DTC: 1003) (Cont'd)

EC-PNP/SW-02



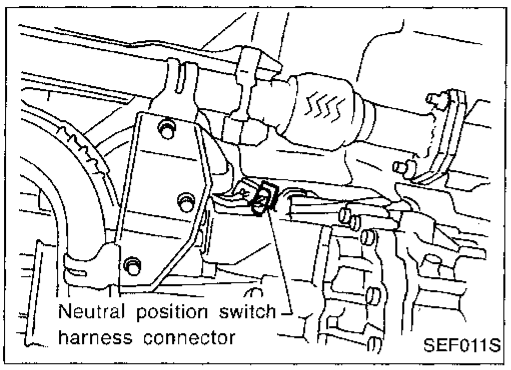


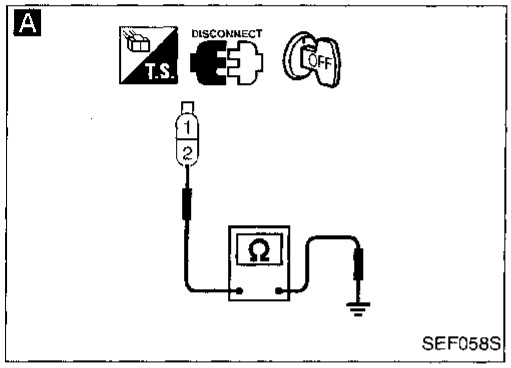
Refer to last page (Foldout page).
M10 , E3
M1 , E1

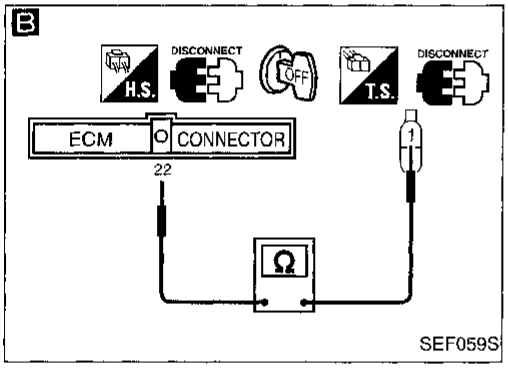
SEF912R

Park/Neutral Position Switch (DTC: 1003) (Cont'd)

DIAGNOSTIC PROCEDURE







Neutral position switch (M/T models)

INSPECTION START

A

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect neutral position switch harness connector.
3. Check harness continuity between terminal (2) and body ground.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors (B200), (B61)
- Harness for open or short between neutral position switch and body ground

If NG, repair harness or connectors.

OK ↓

B

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal (22) and terminal (1).
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors (B61), (B200)
- Harness connectors (B52), (M72)
- Harness connectors (M33), (F22)
- Harness for open or short between ECM and neutral position switch

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT
(Neutral position switch).
Refer to MT section.

NG → Replace neutral position switch.

OK ↓

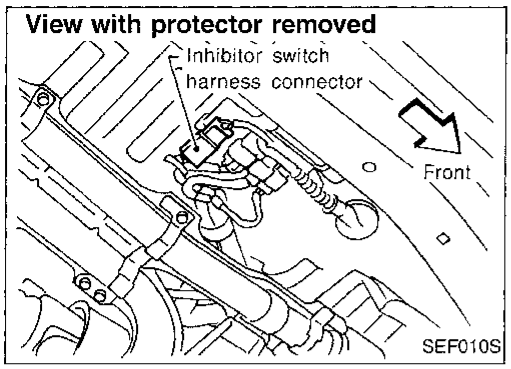
Disconnect and reconnect harness connectors in the circuit. Then retest.

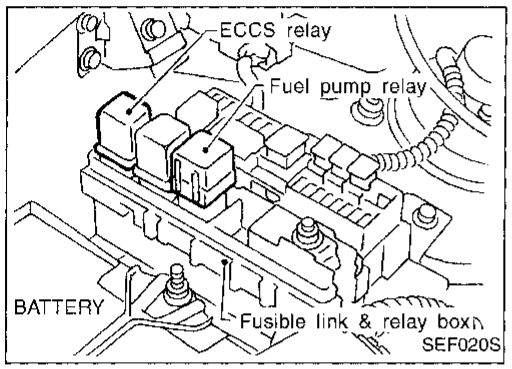
Trouble is not fixed. ↓

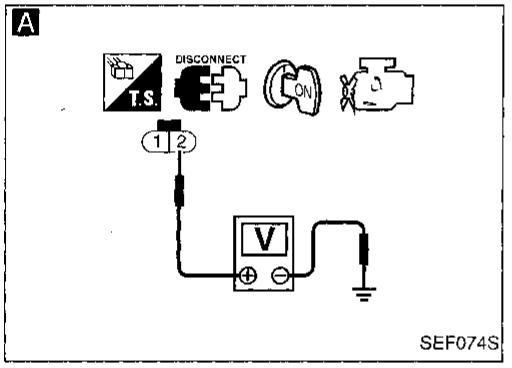
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

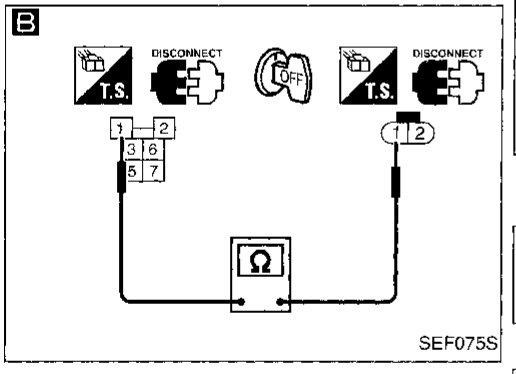
INSPECTION END

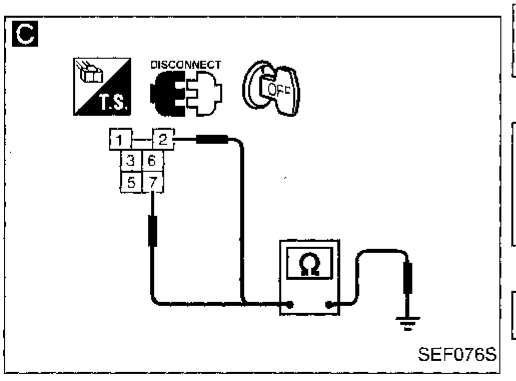
Park/Neutral Position Switch (DTC: 1003) (Cont'd)











Inhibitor switch (A/T models)

INSPECTION START

A

CHECK POWER SUPPLY.
1. Disconnect inhibitor switch harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal (2) and ground with CONSULT or tester.
   Voltage: Battery voltage

NG → Check the following.
- 10A fuse
- Harness for open or short between inhibitor switch and fuse

If NG, repair harness or connectors.

OK ↓

B

CHECK OUTPUT SIGNAL CIRCUIT-I.
1. Turn ignition switch "OFF".
2. Disconnect park/neutral position relay harness connector.
3. Check harness continuity between relay terminal (1) and park/neutral position switch terminal (1).
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Theft warning relay (With anti-theft system)
- Harness for open or short between position switch and relay

If NG, repair harness or connectors.

OK ↓

C

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect inhibitor relay harness connector.
3. Check harness continuity between terminals (7), (2) and body ground.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness for open or short between inhibitor relay and body ground

If NG, repair harness or connectors.

OK ↓

D

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal (22) and terminal (6).
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors (M1), (E1)
- Harness for open or short between ECM and inhibitor relay

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT (Inhibitor switch).
Refer to AT section.

NG → Replace inhibitor switch.

OK ↓

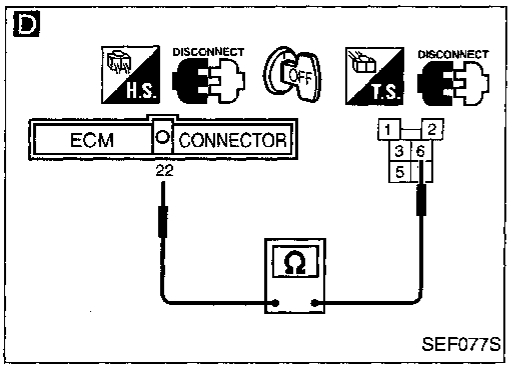
Disconnect and reconnect harness connectors in the circuit. Then retest.

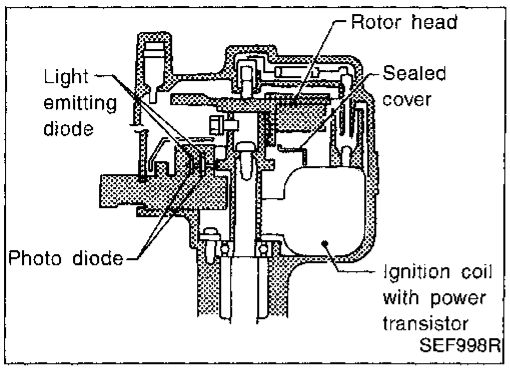
Trouble is not fixed. ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

Park/Neutral Position Switch (DTC: 1003) (Cont'd)





Ignition Signal (DTC: 0201)

COMPONENT DESCRIPTION

Ignition coil & power transistor

The ignition signal from the ECM is sent to the power transistor. The power transistor switches on and off the ignition coil primary circuit. As the primary circuit is turned on and off, the proper high voltage is induced in the coil secondary circuit.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1320 0201	• The ignition signal in the primary circuit is not sent to ECM during engine cranking or running.	• Harness or connectors (The ignition primary circuit is open or shorted.) • Power transistor unit. • Resistor • Camshaft position sensor • Camshaft position sensor circuit

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Note: If both DTC P0340 (0101) and P1320 (0201) are displayed, perform TROUBLE DIAGNOSIS FOR DTC P0340 first. Refer to EC-182.

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine. (If engine does not run, turn ignition switch to "START" for at least 5 seconds.)

OR

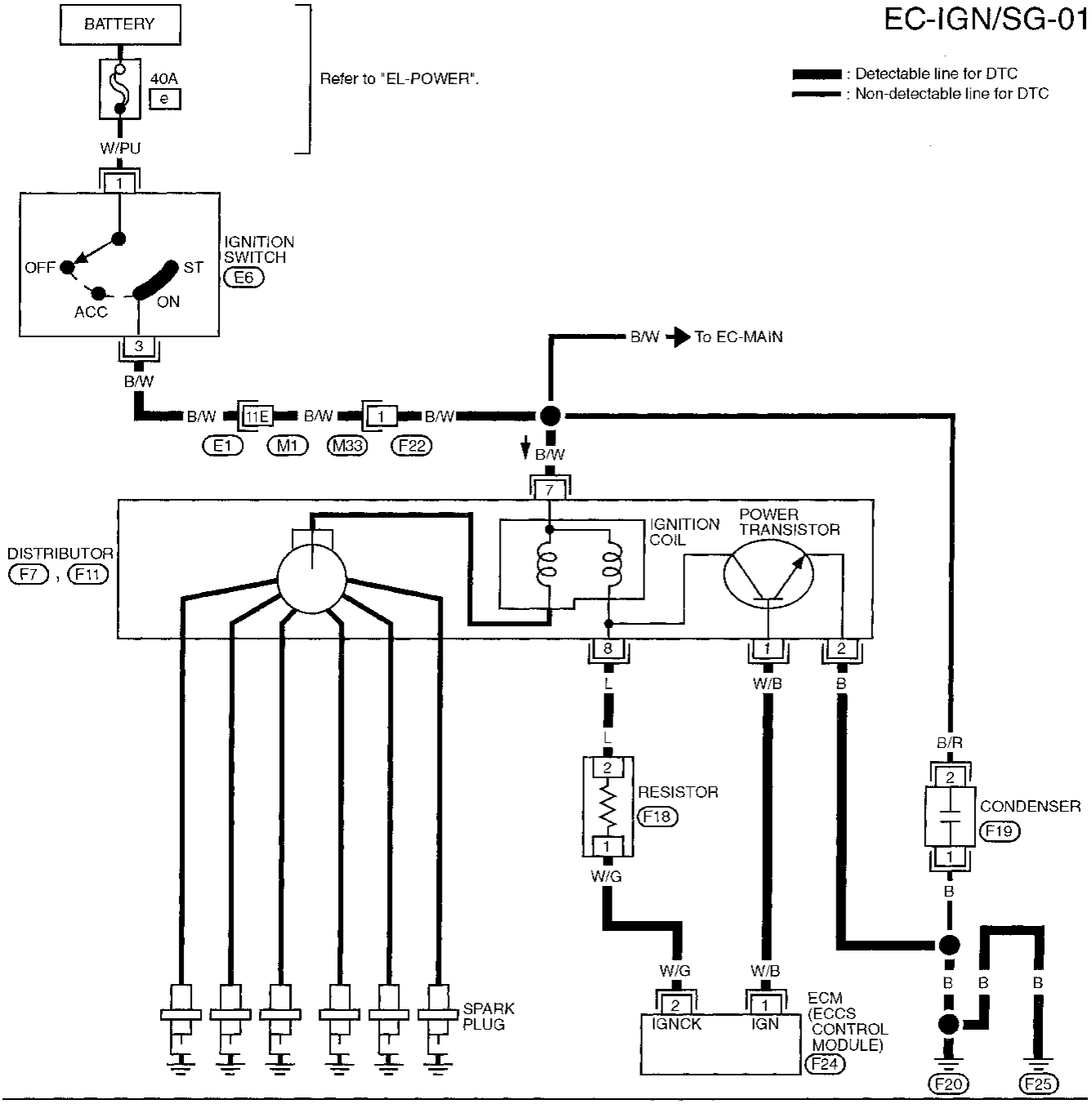
1) Turn ignition switch "ON".
2) Start engine. (If engine does not run, turn ignition switch to "START" for at least 5 seconds.)
3) Select MODE 3 with GST.

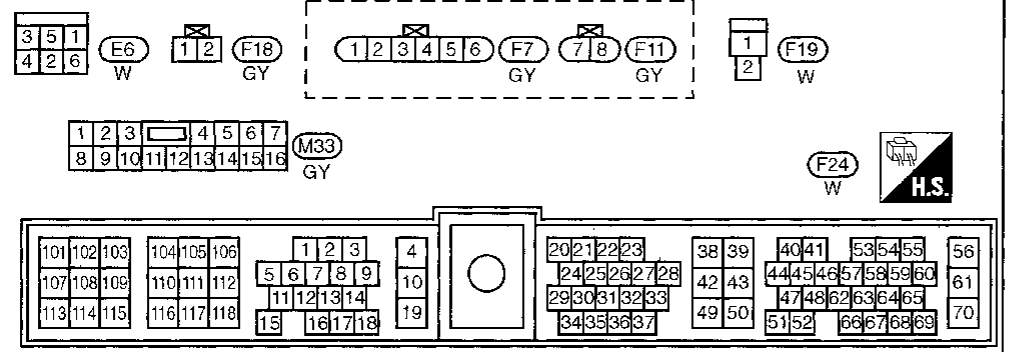
OR

1) Turn ignition switch "ON".
2) Start engine. (If engine does not run, turn ignition switch to "START" for at least 5 seconds.)
3) Turn ignition switch "OFF" and wait at least 5 seconds, then turn "ON".
4) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

Ignition Signal (DTC: 0201) (Cont'd)

EC-IGN/SG-01



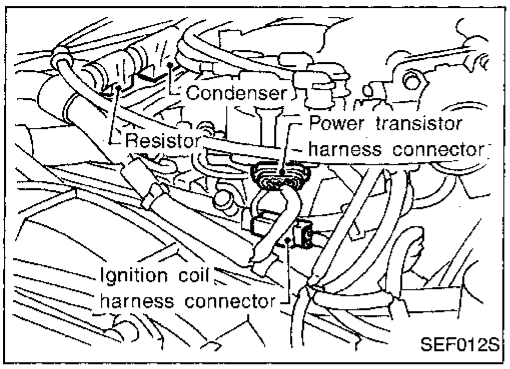


Refer to last page (Foldout page).
E1 , M1

SEF915R

Ignition Signal (DTC: 0201) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

Turn ignition switch "OFF", and restart engine.
Is engine running?

Yes → (A)

No

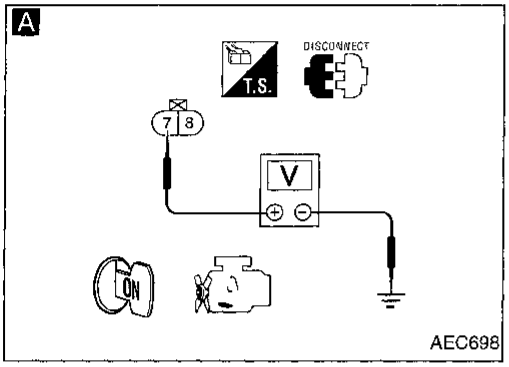
A

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect ignition coil harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal (7) and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F22), (M33)
- Harness connectors (M1), (E1)
- Harness continuity between ignition coil and ignition switch

If NG, repair harness or connectors.

OK

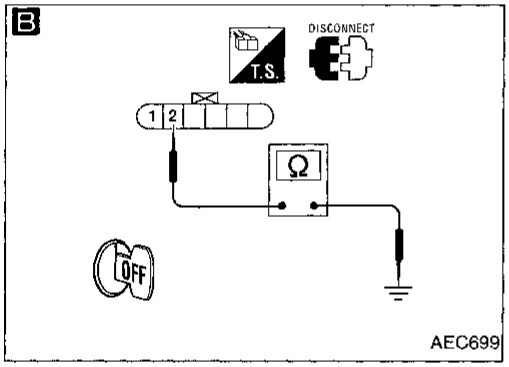


B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect power transistor harness connector.
3. Check harness continuity between terminal (2) and engine ground.
Continuity should exist.

NG → Repair harness or connectors.

OK

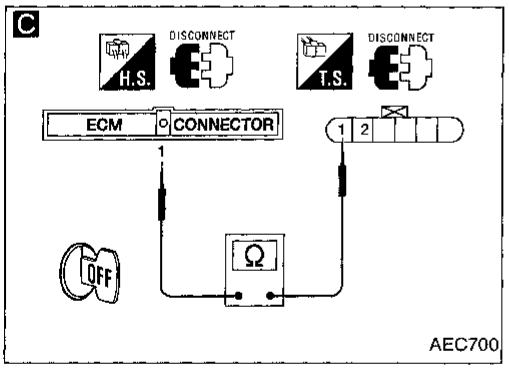


C

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal (1) and power transistor terminal (1).
Continuity should exist.

NG → Repair harness or connectors.

OK



CHECK COMPONENTS
(Ignition coil, power transistor).
Refer to "COMPONENT INSPECTION", EC-223.

NG → Replace malfunctioning component(s).

OK

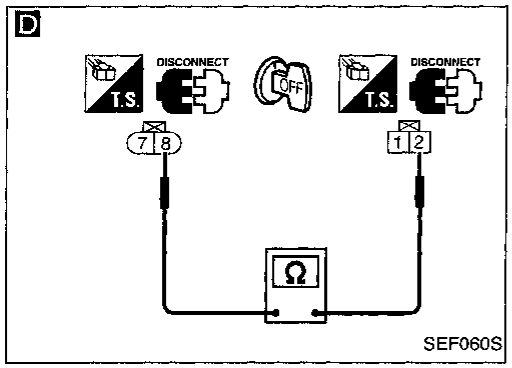
Disconnect and reconnect harness connectors in the circuit. Then retest.

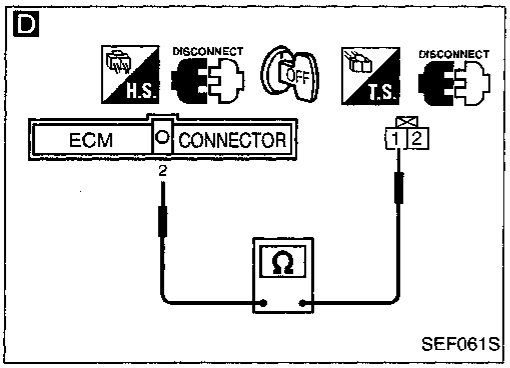
Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

Ignition Signal (DTC: 0201) (Cont'd)





(A)

D

CHECK INPUT SIGNAL CIRCUIT.
1. Stop engine.
2. Disconnect ignition coil harness connector.
3. Strip tape covering resistor.
4. Disconnect ECM harness connector.
5. Check harness continuity between ignition coil terminal (8) and resistor terminal (2), resistor terminal (1) and ECM terminal (2).

Continuity should exist.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENTS (Resistor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace resistor.

OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

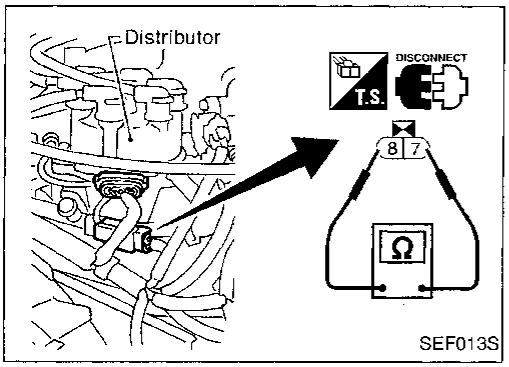
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

Ignition Signal (DTC: 0201) (Cont'd)

COMPONENT INSPECTION



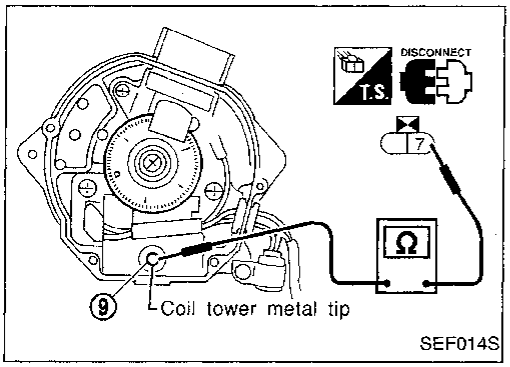
Ignition coil

1. Disconnect ignition coil harness connector.
2. Check resistance as shown in the figure.

Terminal	Resistance [at 25°C (77°F)]
⑦ - ⑧ (Primary coil)	0.5 - 1.0 Ω
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.

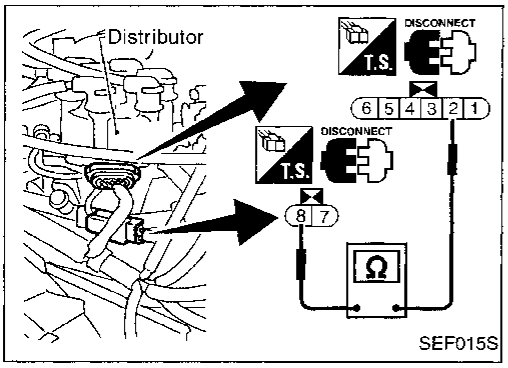


Power transistor

1. Disconnect camshaft position sensor & power transistor harness connector and ignition coil 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.

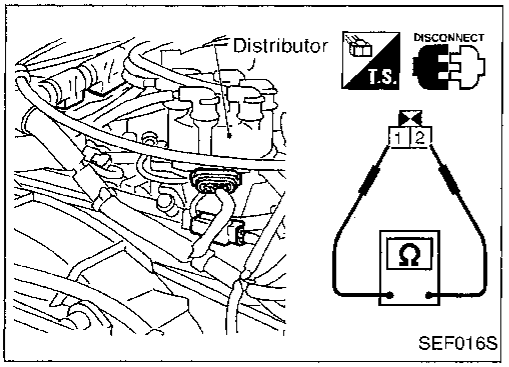


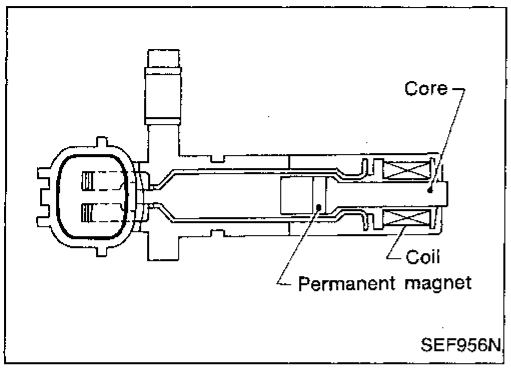
Resistor

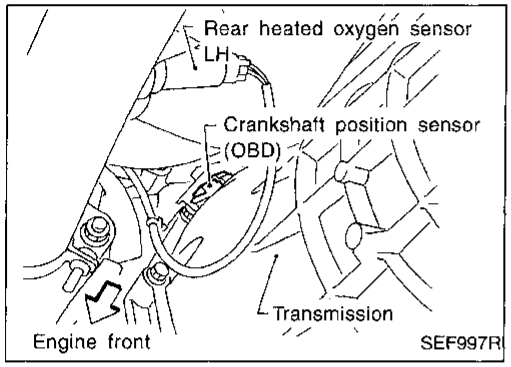
1. Disconnect resistor harness connector.
2. Check resistance between terminals ① and ②

Resistance: Approximately 2.2 kΩ [at 25°C (77°F)]

If NG, replace resistor.







Crankshaft Position Sensor (CKPS) (OBD) (COG) (DTC: 0905)

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 directly used to control the engine system.
It is used only for the on board diagnosis of misfire.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1336 0905	• A chipping of the flywheel or drive plate gear tooth (cog) is detected by the ECM.	• Harness or connectors • Crankshaft position sensor (OBD) • Flywheel (Drive plate)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Start engine and run it for at least 4 minutes at idle speed.

OR

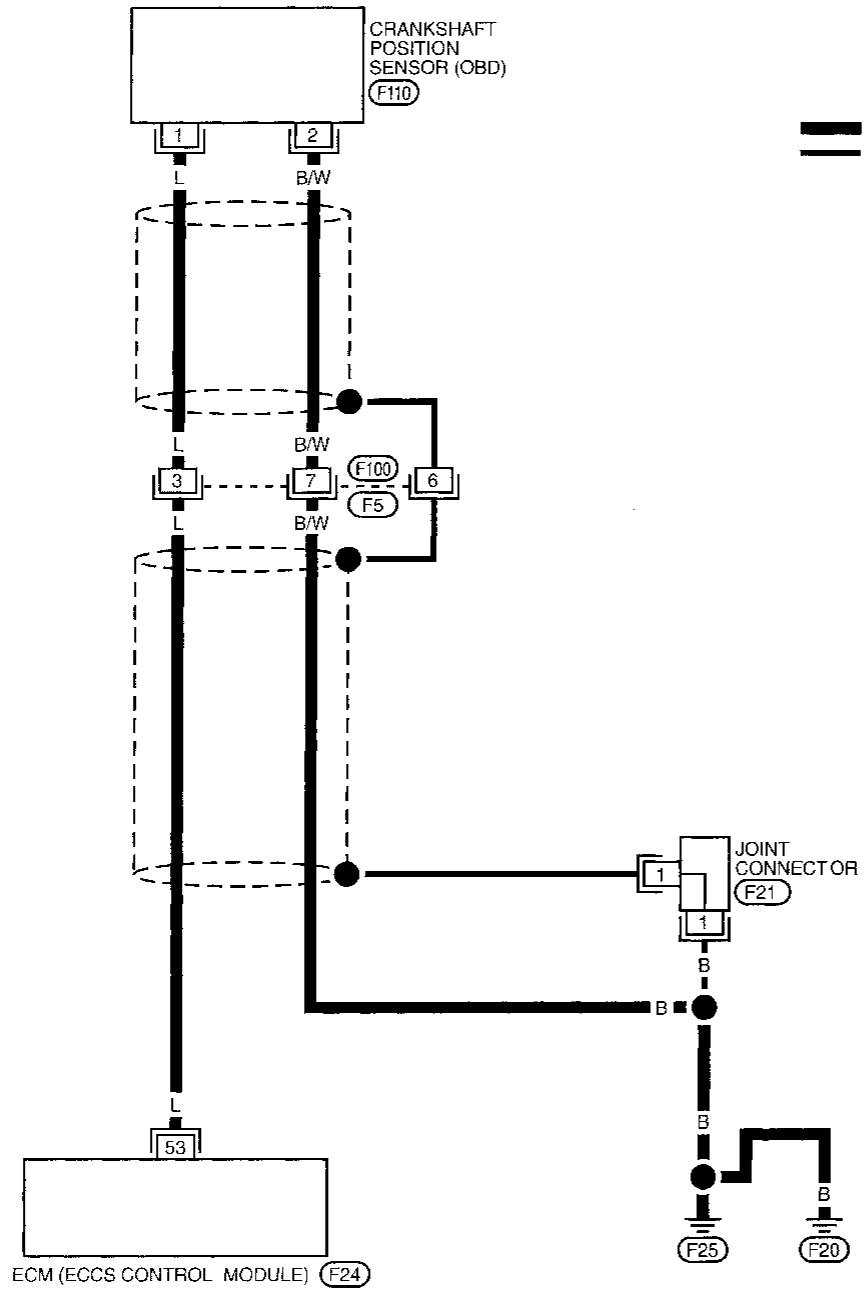
1) Start engine and run it for at least 4 minutes at idle speed.
2) Select "MODE 3" with GST.

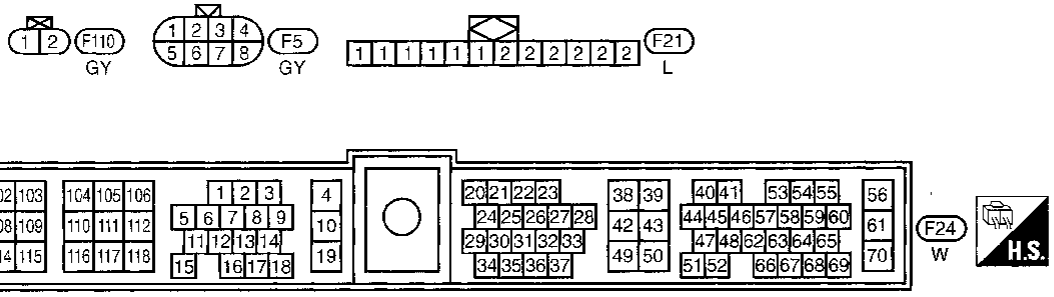
OR

1) Start engine and run it for at least 4 minutes at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

Crankshaft Position Sensor (CKPS) (OBD) (COG) (DTC: 0905) (Cont'd)

EC-CKPS-01

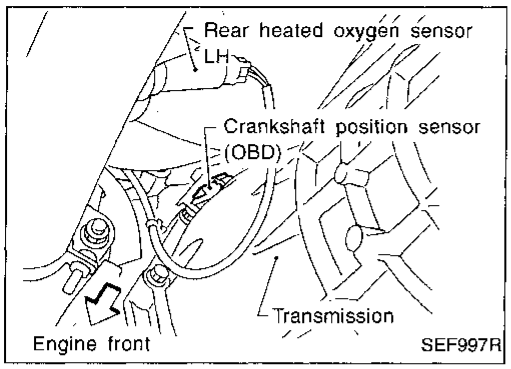


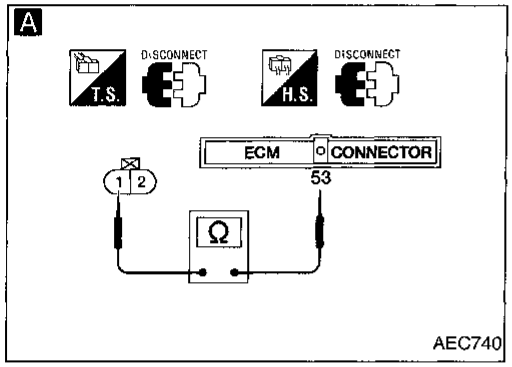


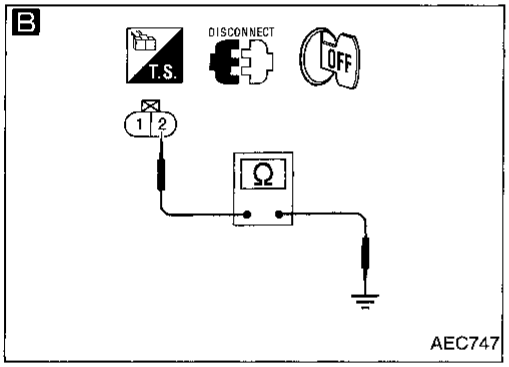
SEF905R

Crankshaft Position Sensor (CKPS) (OBD) (COG) (DTC: 0905) (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

A

CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.
3. Check continuity between ECM terminal (53) and terminal (1).
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors (F100), (F5)
- Harness for open or short between ECM and crankshaft position sensor (OBD) harness connector

If NG, repair harness or connectors.

OK ↓

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Check harness continuity between terminal (2) and engine ground.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors (F100), (F5)
- Harness for open or short between ECM and crankshaft position sensor (OBD) harness connector

If NG, repair harness or connectors.

OK ↓

Loosen and retighten the fixing bolt of the crankshaft position sensor (OBD). Then retest.

Trouble is not fixed. ↓

CHECK COMPONENT [Crankshaft position sensor (OBD)]. Refer to "COMPONENT INSPECTION" on next page.

NG → Replace crankshaft position sensor (OBD).

OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

Visually check for chipping flywheel or drive plate gear tooth (cog).

NG → Replace the flywheel or drive plate.

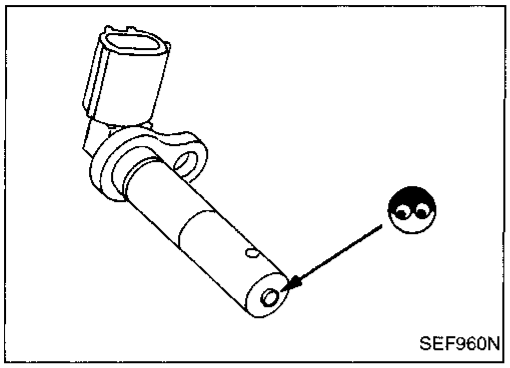
OK ↓

INSPECTION END

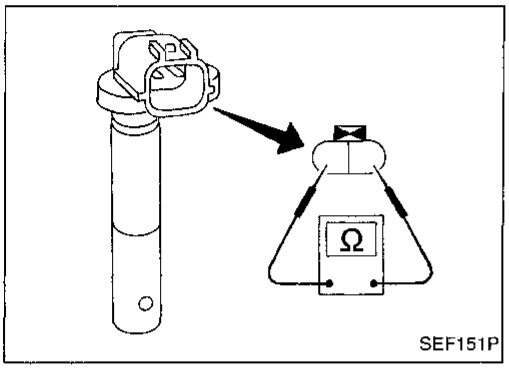
Crankshaft Position Sensor (CKPS) (OBD) (COG) (DTC: 0905) (Cont'd)

COMPONENT INSPECTION

Crankshaft position sensor (OBD)

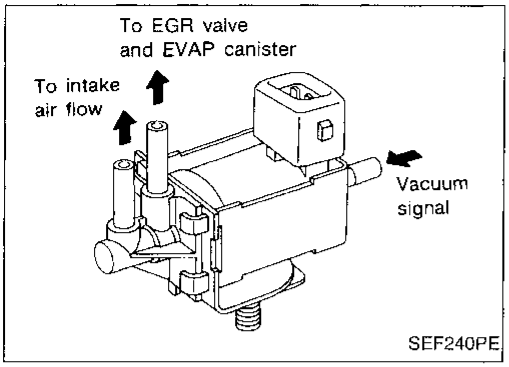

SEF960N

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.



SEF151P

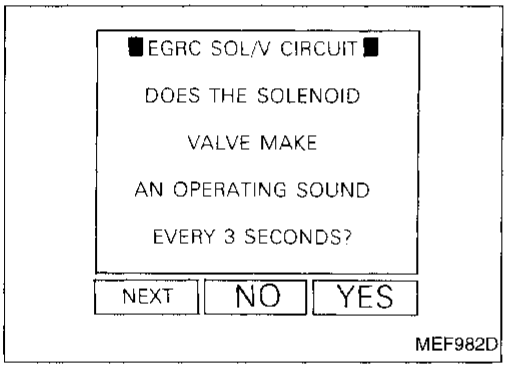
5. Check resistance as shown in the figure.
   Resistance: Approximately 166.5 - 203.5Ω [at 20°C (68°F)]

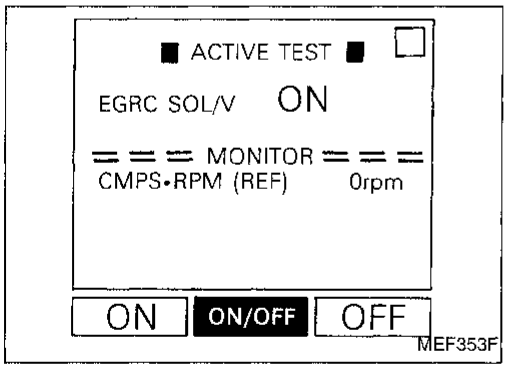


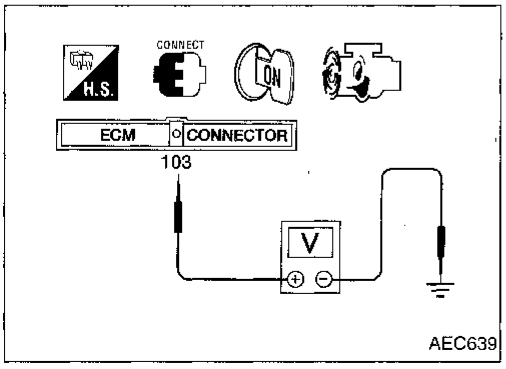
EGR Valve and EVAP Canister Purge Control Solenoid Valve (DTC: 1005)

The EGR valve and EVAP canister purge control solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. A plunger will then move to cut the vacuum signal from the throttle body to the EGR valve and EVAP canister purge valve.
When the ECM sends an OFF signal, the vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve and EVAP canister.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1400 1005	• An improper voltage signal is sent to ECM through EGR valve & EVAP canister purge control solenoid valve.	• Harness or connectors (The EGR valve & EVAP canister purge control solenoid valve circuit is open or shorted.) • EGR valve & EVAP canister purge control solenoid valve







OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the EGR valve and EVAP canister purge control solenoid valve circuit. During this check, a DTC might not be confirmed.

1) Turn ignition switch "ON".
2) Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

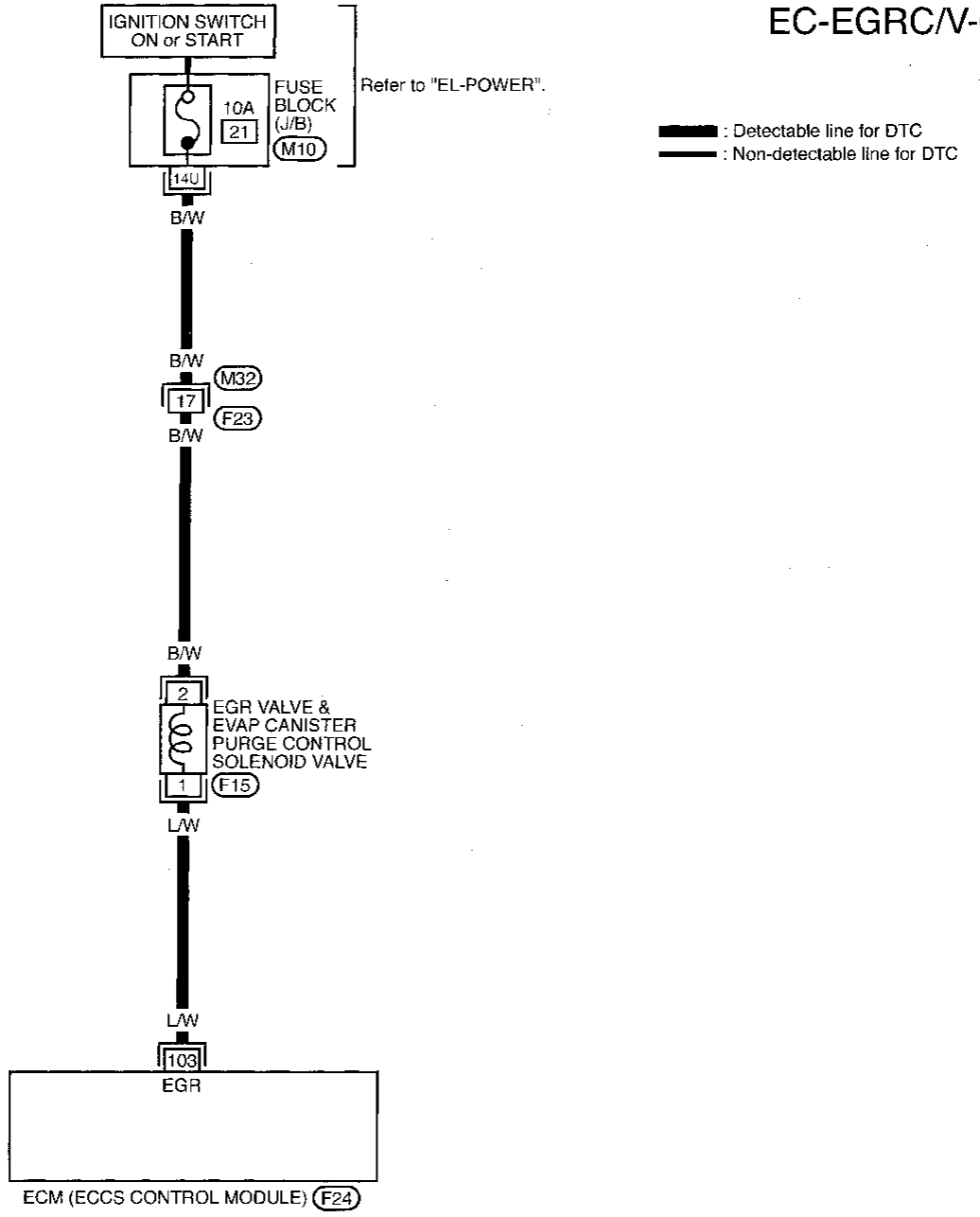
1) Turn ignition switch "ON".
2) Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT and check the operating sound, according to ON/OFF switching.

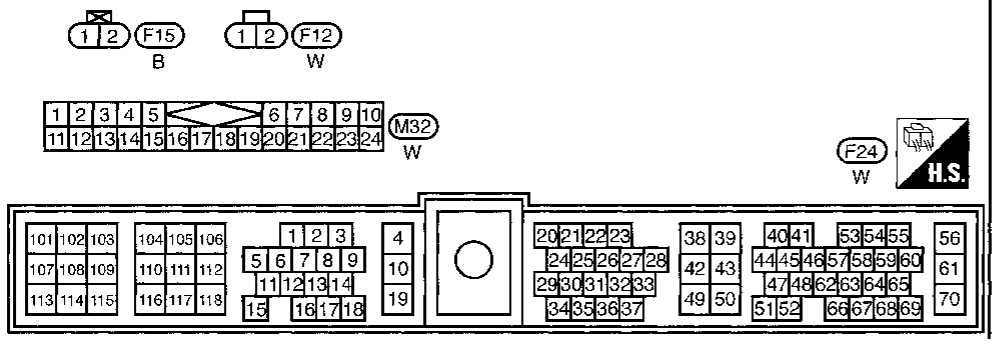
OR

1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine again.
4) Check the voltage between ECM terminal (103) and ground at idle speed.
   Voltage: 0.8 - 0.9V
5) Check that the voltage changes to battery voltage and returns to 0.8 - 0.9V when the engine speed increases to about 3,600 rpm.

EGR Valve and EVAP Canister Purge Control Solenoid Valve (DTC: 1005) (Cont'd)

EC-EGRC/V-01



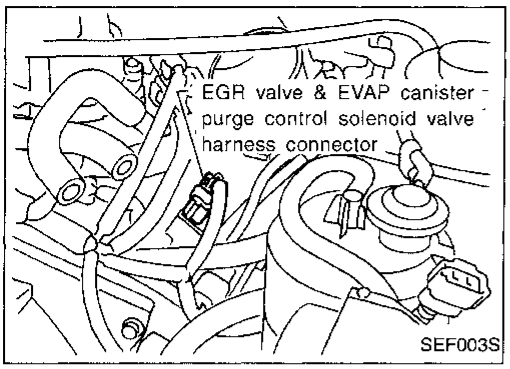


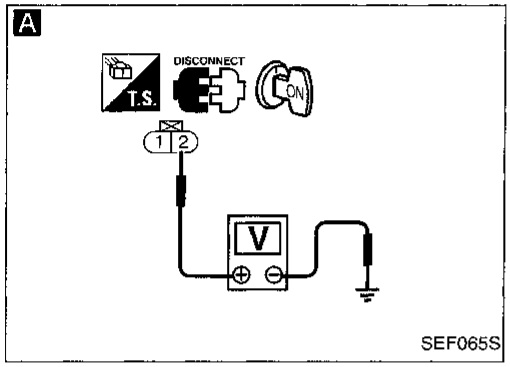
Refer to last page (Foldout page).
M10

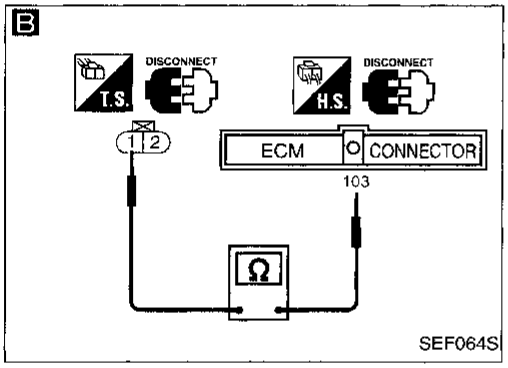
SEF916R

EGR Valve and EVAP Canister Purge Control Solenoid Valve (DTC: 1005) (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

A

CHECK POWER SUPPLY.
1. Disconnect EGR valve & EVAP canister purge control solenoid valve harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal (2) and ground with CONSULT or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F23), (M32)
- 10A fuse
- Harness for open or short between EGR valve & EVAP canister purge control solenoid valve harness connector and fuse

If NG, repair harness or connectors.

OK ↓

B

CHECK OUTPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal (103) and terminal (1).
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(EGR valve & EVAP canister purge control solenoid valve).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace EGR valve & EVAP canister purge control solenoid valve.

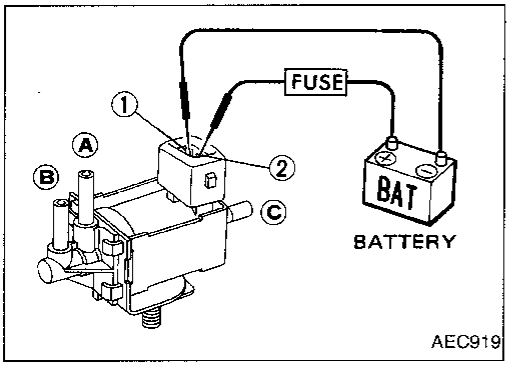
OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END



EGR Valve and EVAP Canister Purge Control Solenoid Valve (DTC: 1005) (Cont'd)

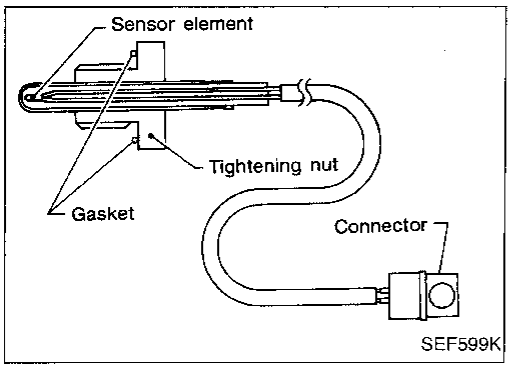
COMPONENT INSPECTION

EGR valve and EVAP canister purge control solenoid valve

Check air passage continuity.

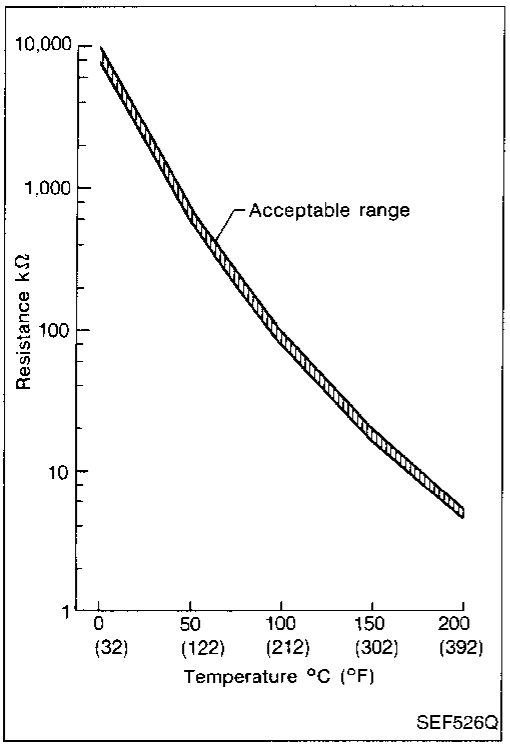
Condition	Air passage continuity between Ⓐ and Ⓑ	Air passage continuity between Ⓐ and Ⓒ
12V direct current supply between terminals ① and ②	Yes	No
No supply	No	Yes

If NG, replace solenoid valve.



EGR Temperature Sensor (DTC: 0305)

The EGR temperature sensor detects temperature changes in the EGR passage way. When the EGR valve opens, hot exhaust gases flow, and the temperature in the passage way changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases. This sensor is not directly used to control the engine system.



〈Reference data〉

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

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1401 0305	A) An excessively low voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is low.	• Harness or connectors (The EGR temperature sensor circuit is shorted.) • EGR temperature sensor • Malfunction of EGR function, EGRC-BPT valve or EGR valve & EVAP canister purge control solenoid valve
	B) An excessively high voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is high.	• Harness or connectors (The EGR temperature sensor circuit is open.) • EGR temperature sensor • Malfunction of EGR function, EGRC-BPT valve or EGR valve & EVAP canister purge control solenoid valve

EGR Temperature Sensor (DTC: 0305) (Cont'd)

OVERALL FUNCTION CHECK

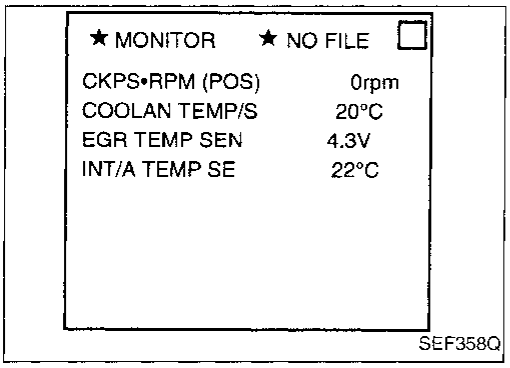
Use this procedure to check the overall function of the EGR temperature sensor. During this check, a DTC might not be confirmed.

Procedure for malfunction A and B

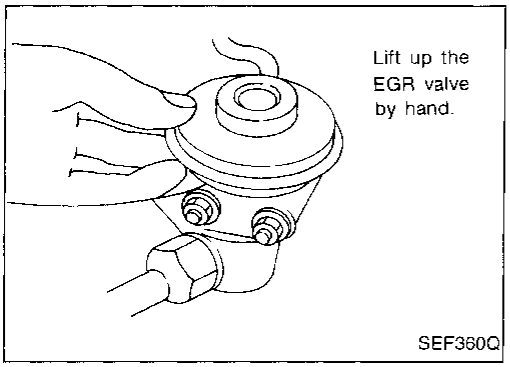
1) Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT.
2) Confirm that engine coolant temperature and intake air temperature are lower than 40°C (104°F). (If necessary, wait until the temperatures equal atmospheric temperature.)
3) Confirm that "EGR TEMP SEN" reading is between 3.45V and 5.0V.
4) Start engine and warm it up sufficiently.
5) Run engine at idle for at least 2 minutes.
6) Confirm that EGR valve is not lifting. If NG, go to TROUBLE DIAGNOSES FOR DTC P0400 and P0402, EC-187 and 195.
7) Read "EGR TEMP SEN" at about 1,500 rpm with EGR valve lifted up to the full position by hand.
   Voltage should decrease to less than 1.0V.
8) If step 7 is OK, perform TROUBLE DIAGNOSES FOR DTC P0400, P0402 and P1400, EC-187, 195 and 228.

OR

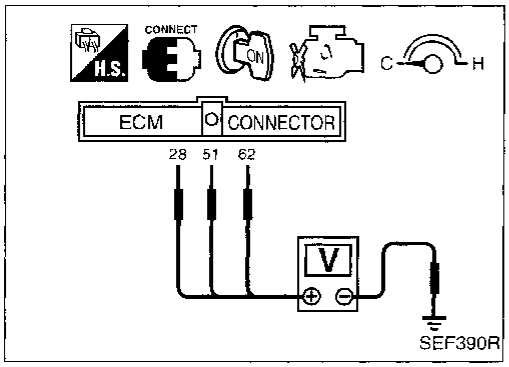
1) Turn ignition switch "ON".
2) Confirm that voltage between ECM terminals ㉘, ㊿ and ground are more than 2.72V. (If necessary, wait until engine coolant temperature and intake air temperature equal atmospheric temperature.)
3) Confirm that voltage between ECM terminal ㊷ and ground is between 3.45V and 5.0V.
4) Start engine and warm it up sufficiently.
5) Run engine at idle for at least 2 minutes.
6) Confirm that EGR valve is not lifting. If NG, go to TROUBLE DIAGNOSES FOR DTC P0400 and P0402, EC-187 and 195.
7) Check voltage between ECM terminal ㊷ and ground at about 1,500 rpm with EGR valve lifted up to the full position by hand.
   Voltage should decrease to less than 1.0V.
8) If step 7 is OK, perform TROUBLE DIAGNOSES FOR DTC P0400, P0402 and P1400, EC-187, 195 and 228.



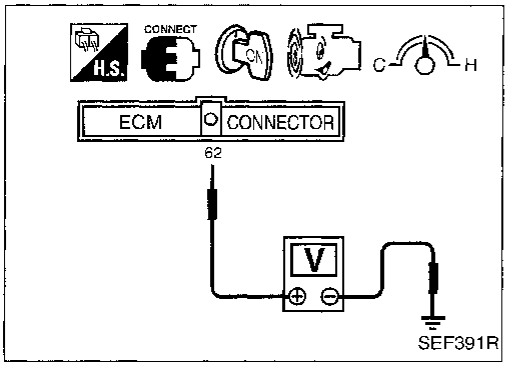
SEF358Q



SEF360Q



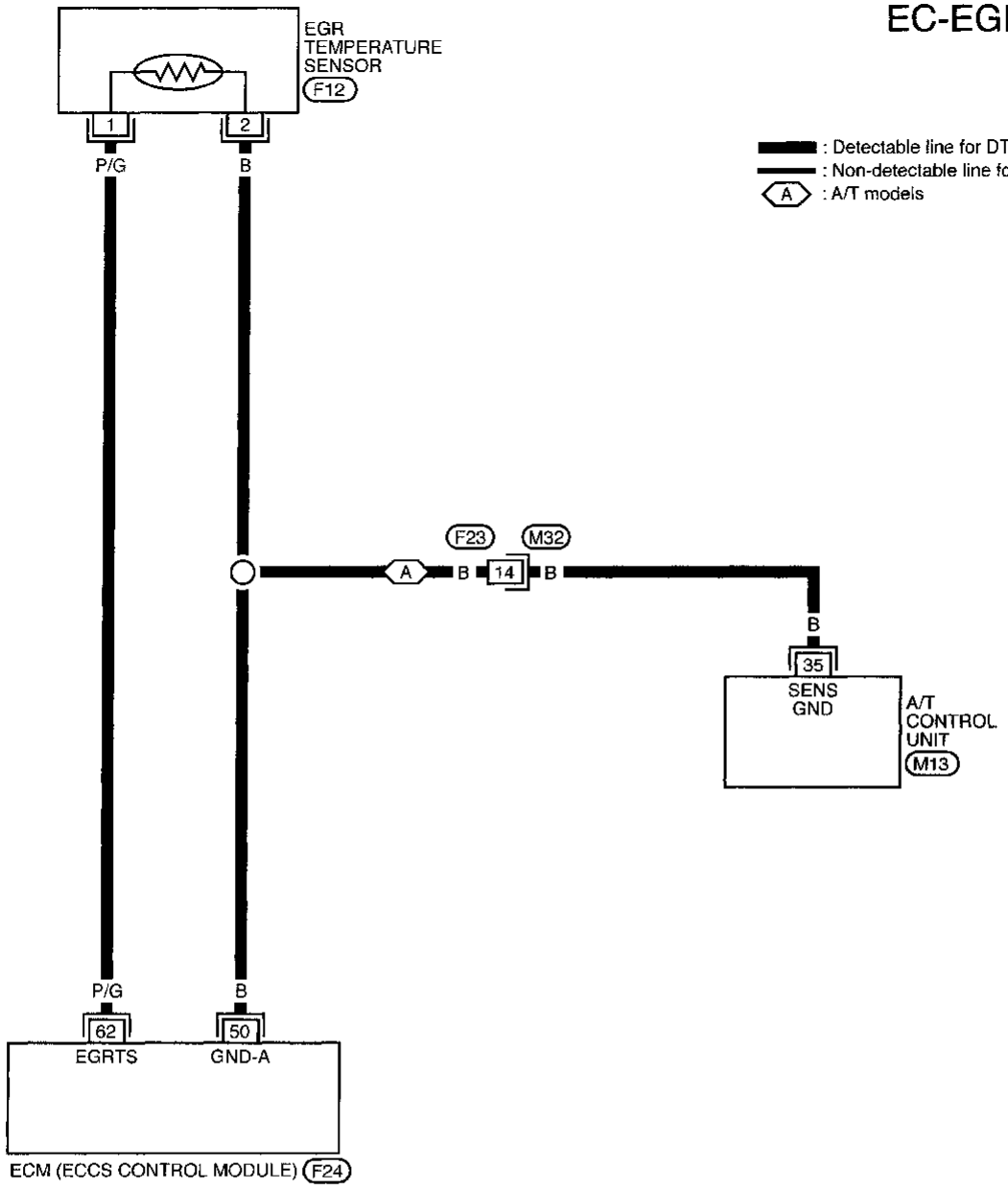
SEF390R

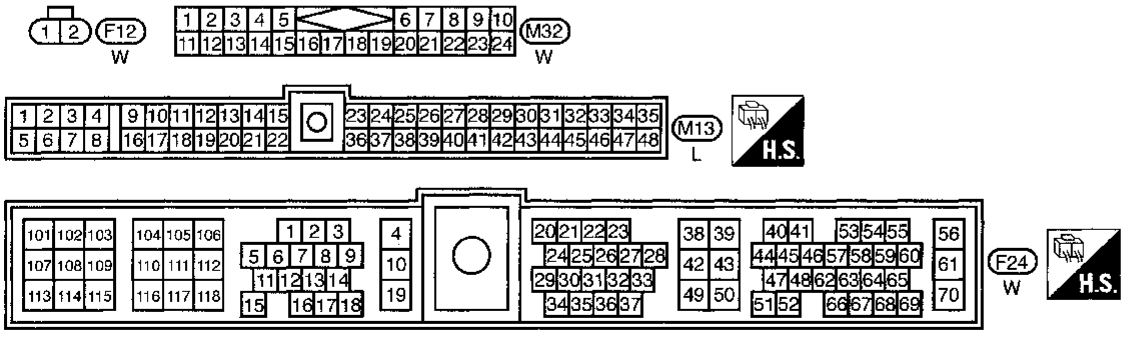


SEF391R

EGR Temperature Sensor (DTC: 0305) (Cont'd)

EC-EGR/TS-01

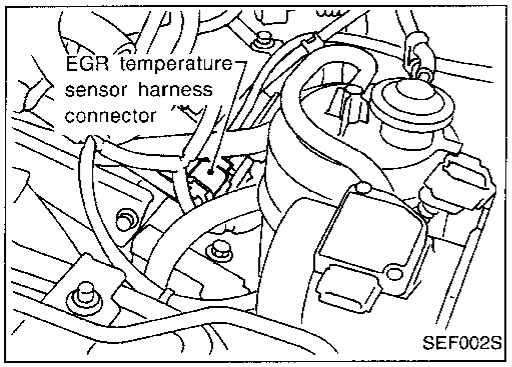


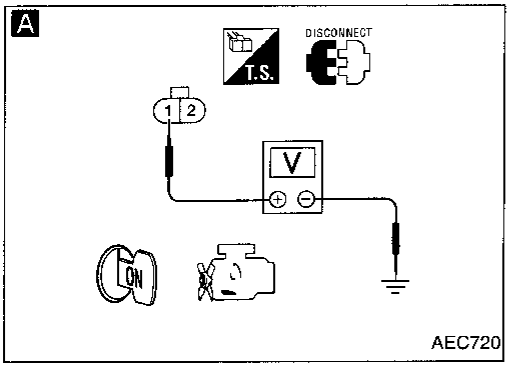


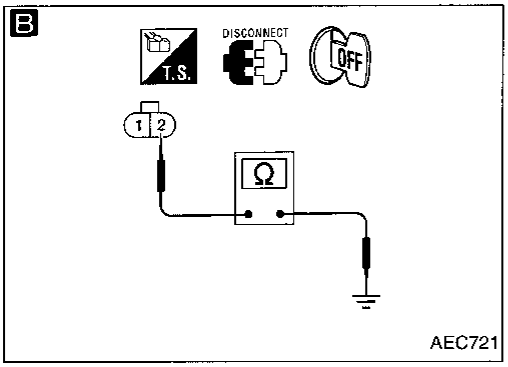
SEF917R

EGR Temperature Sensor (DTC: 0305) (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

A

CHECK POWER SUPPLY.
1. Disconnect EGR temperature sensor harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal ① and ground with CONSULT or tester.
Voltage: Approximately 5V

NG → Repair harness or connectors.

OK

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Check harness continuity between terminal ② and engine ground.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors (F23), (M32) (A/T models)
- Harness for open or short between ECM and EGR temperature sensor harness connector
- Harness for open or short between A/T control unit and EGR temperature sensor

If NG, repair harness or connector.

OK

CHECK COMPONENT
(EGR temperature sensor).
Refer to "COMPONENT INSPECTION" below.

NG → Replace EGR temperature sensor.

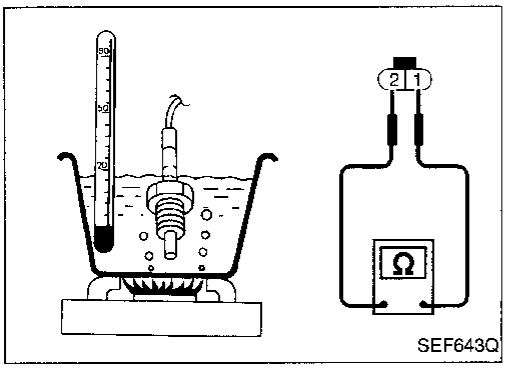
OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END



COMPONENT INSPECTION

EGR temperature sensor

Check resistance change and resistance value.
⟨Reference data⟩

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

If NG, replace EGR temperature sensor.

A/T Diagnosis Communication Line (DTC: 0804)

The malfunction information related to A/T (Automatic Transaxle) is transferred through the line (circuit) from A/T control unit to ECM. Therefore, be sure to erase the malfunction information such as DTC not only in A/T control unit but also ECM after the A/T related repair.

Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1605 0804	• An incorrect signal from A/T control units is sent to ECM.	• Harness or connectors (The communication line circuit between ECM and A/T control unit is open or shorted.) • Dead (Weak) battery • A/T control unit

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and wait at least 40 seconds.

OR

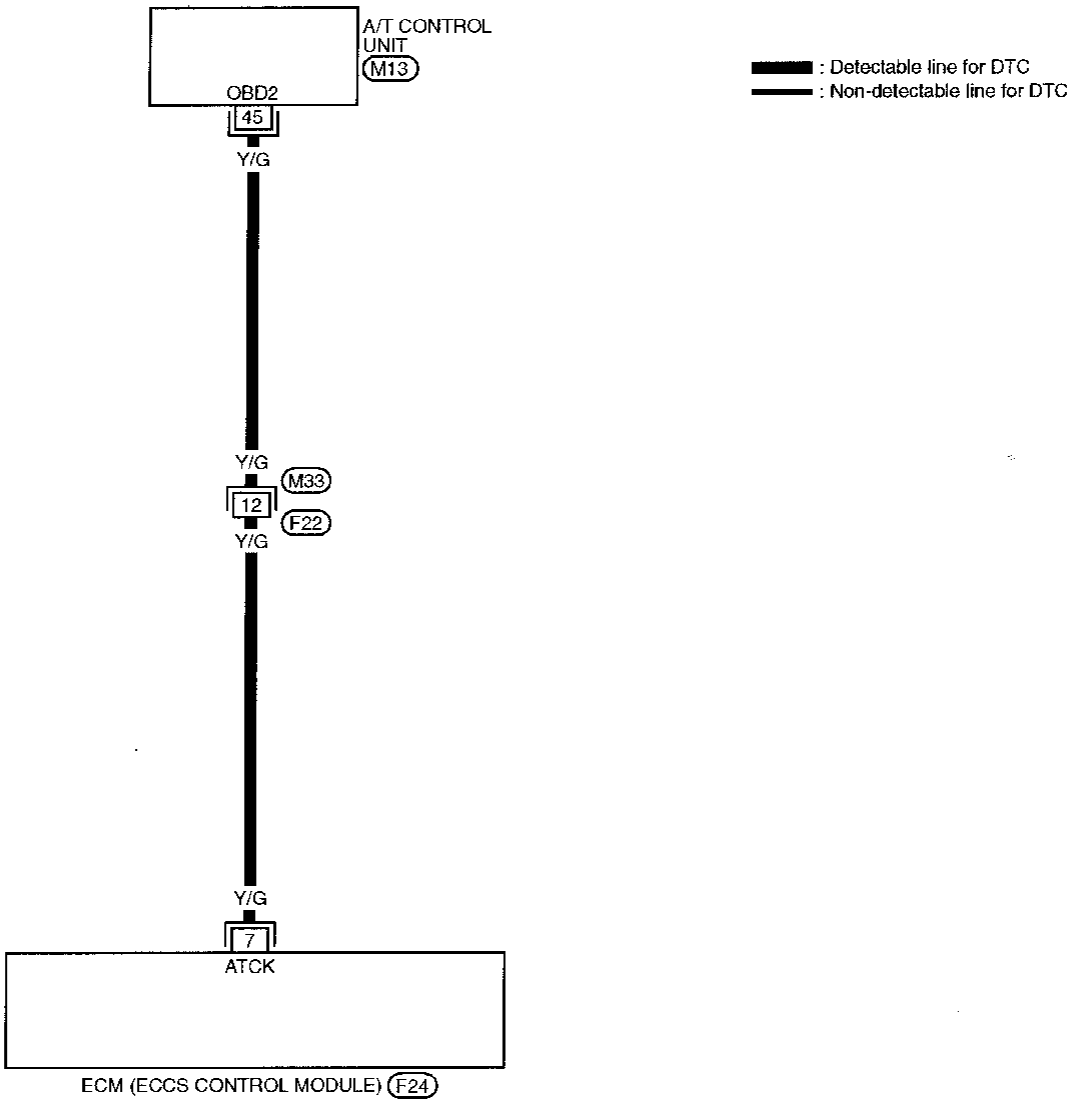
1) Turn ignition switch "ON".
2) Start engine and wait at least 40 seconds.
3) Select "MODE 3" with GST.

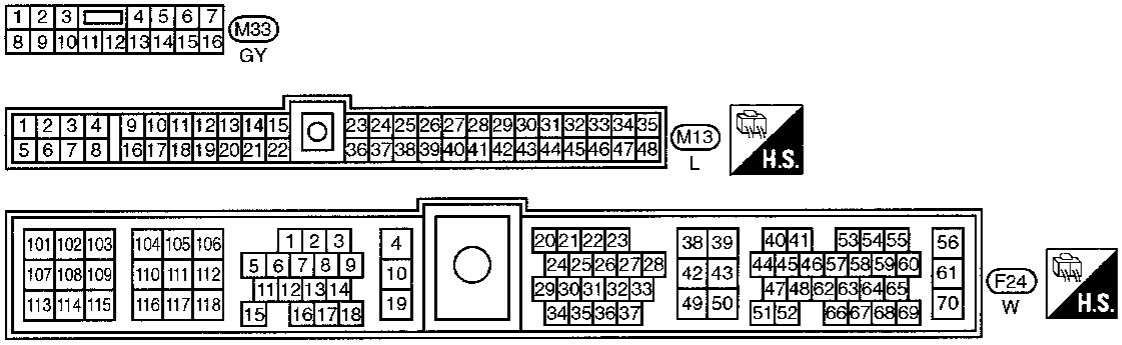
OR

1) Turn ignition switch "ON".
2) Start engine and wait at least 40 seconds.
3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
4) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

A/T Diagnosis Communication Line (DTC: 0804) (Cont'd)

EC-ATDIAG-01

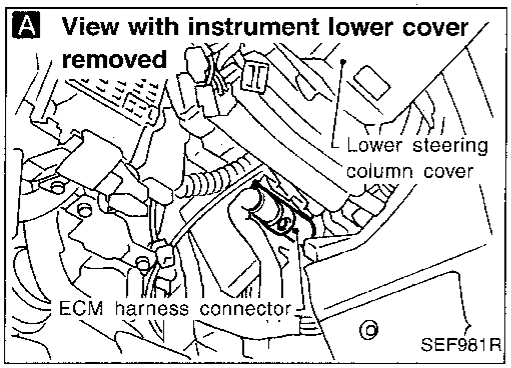


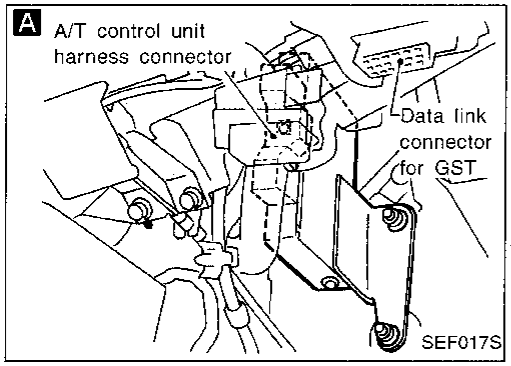


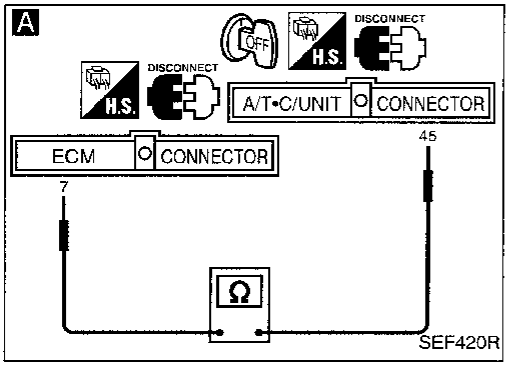
SEF924R

A/T Diagnosis Communication Line (DTC: 0804) (Cont'd)

DIAGNOSTIC PROCEDURE







INSPECTION START

A

CHECK INPUT SIGNAL CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector and A/T control unit harness connector.
3. Check harness continuity between ECM terminal (7) and A/T control unit terminal (45).

Continuity should exist.

If OK, check harness for short.

NG →

Check the following.

- Harness connectors (M33), (F22)
- Harness for open or short between ECM and A/T control unit.

If NG, repair harness or connectors.

OK ↓

Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

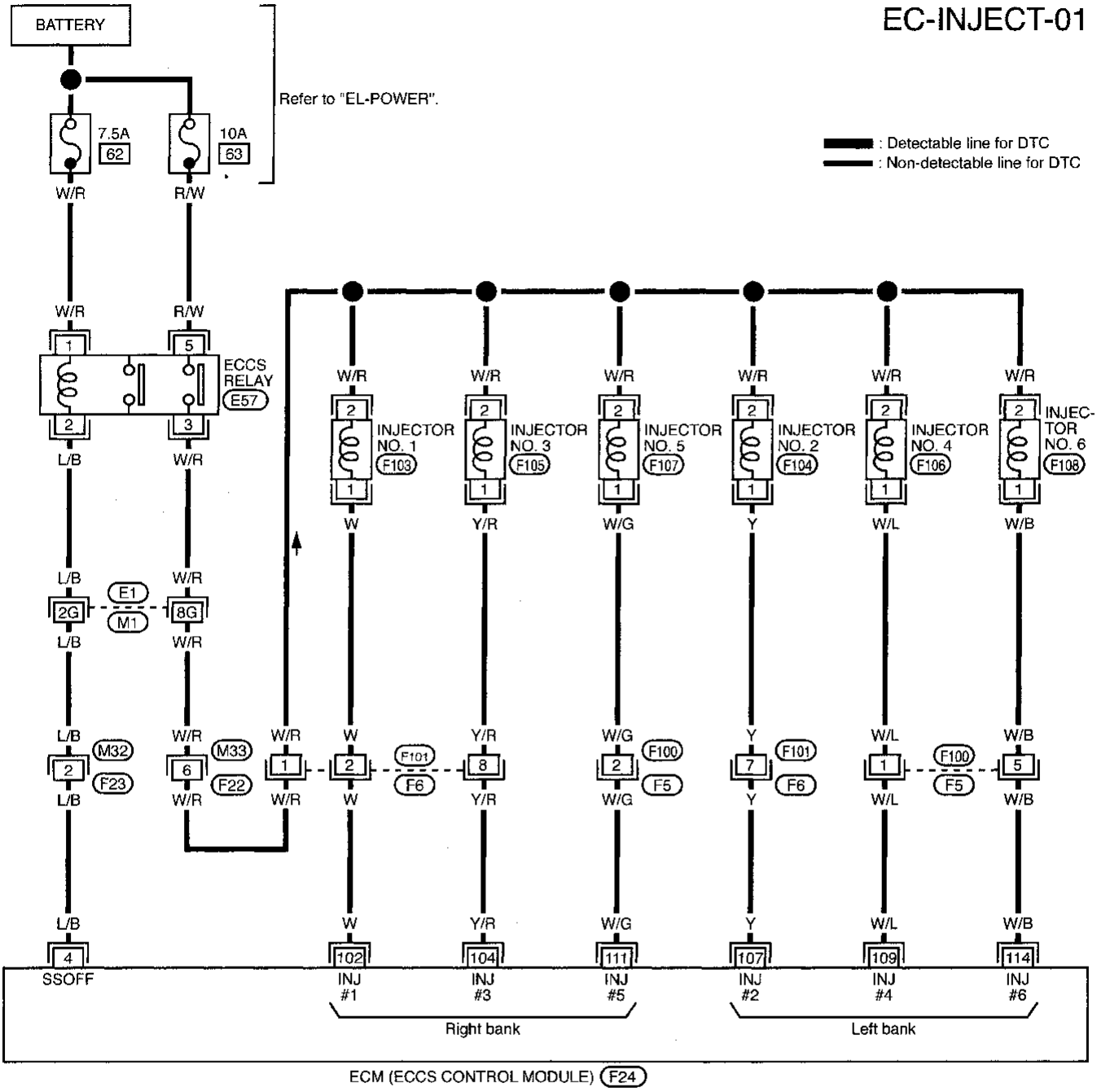
Check ECM pin terminals and A/T control unit pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

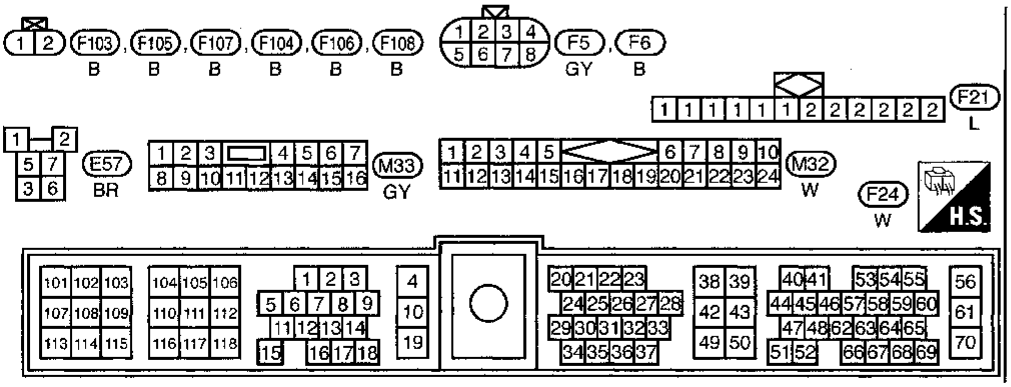
↓

INSPECTION END

Injector

EC-INJECT-01



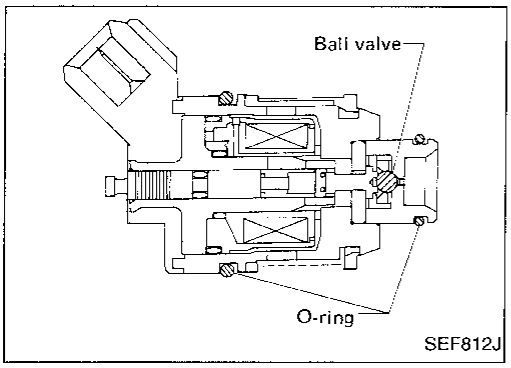


Refer to last page (Foldout page).
E1, M1

SEF918R

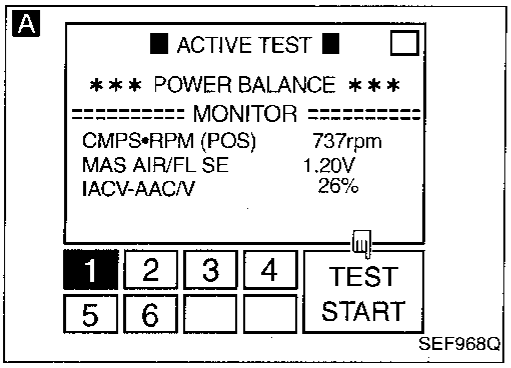
Injector (Cont'd)

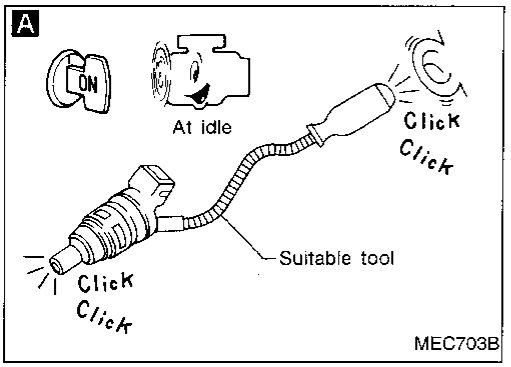
COMPONENT DESCRIPTION

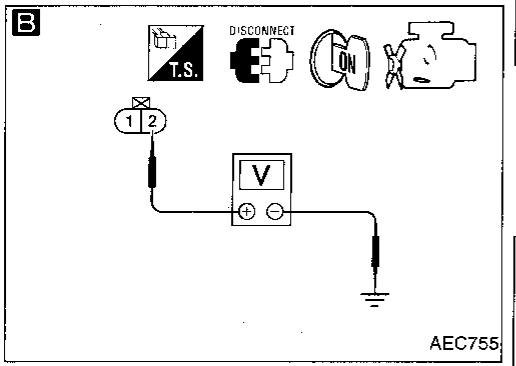


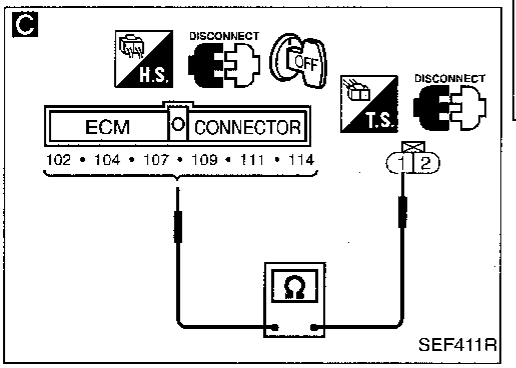
The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends 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.

DIAGNOSTIC PROCEDURE









INSPECTION START

A

CHECK OVERALL FUNCTION.

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
3. Make sure that each circuit produces a momentary engine speed drop.

OR

1. Start engine.
2. Listen to each injector operating sound.
   Clicking noise should be heard.

OK → INSPECTION END

NG

B

CHECK POWER SUPPLY.

1. Stop engine.
2. Disconnect injector harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ② and ground with CONSULT or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F22), (M33)
- Harness connectors (M1), (E1)
- ECCS relay (E57)
- 10A fuse
- Harness for open or short between injector and battery

If NG, repair harness or connectors.

OK

C

CHECK OUTPUT SIGNAL CIRCUIT.

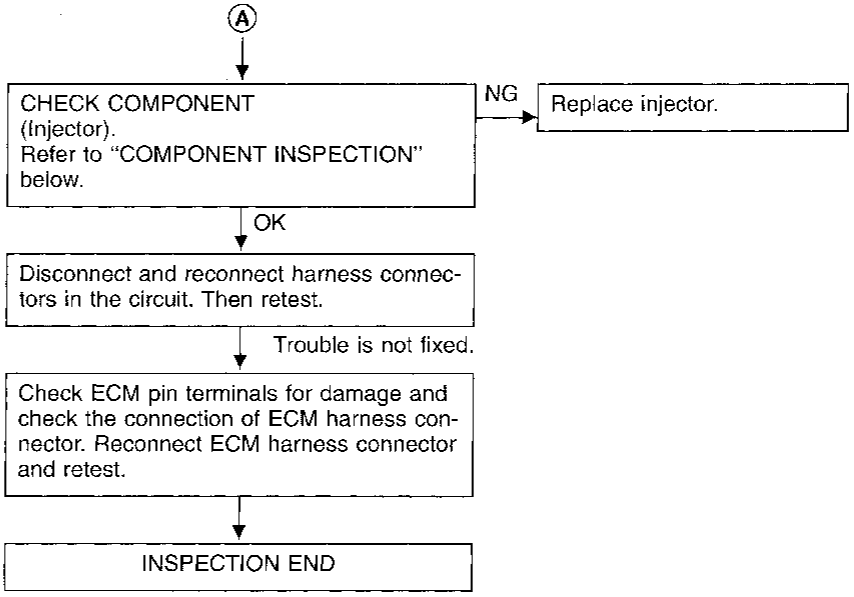
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between injector harness connector terminal ① and ECM terminals (102), (104), (107), (109), (111), (114).
   Continuity should exist.
   If OK, check harness for short.

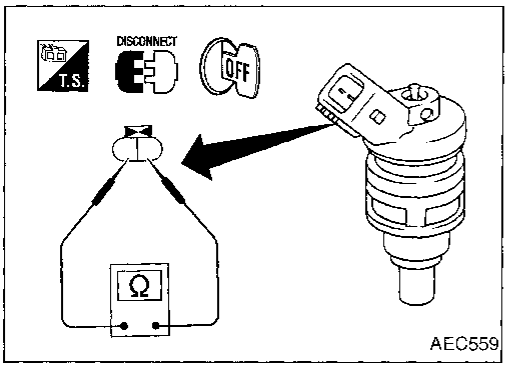
NG → Check the following.
- Harness connectors (F100), (F5)
- Harness connectors (F101), (F6)
- Harness for open or short between ECM and injector

If NG, repair harness or connectors.

OK → Ⓐ

Injector (Cont'd)





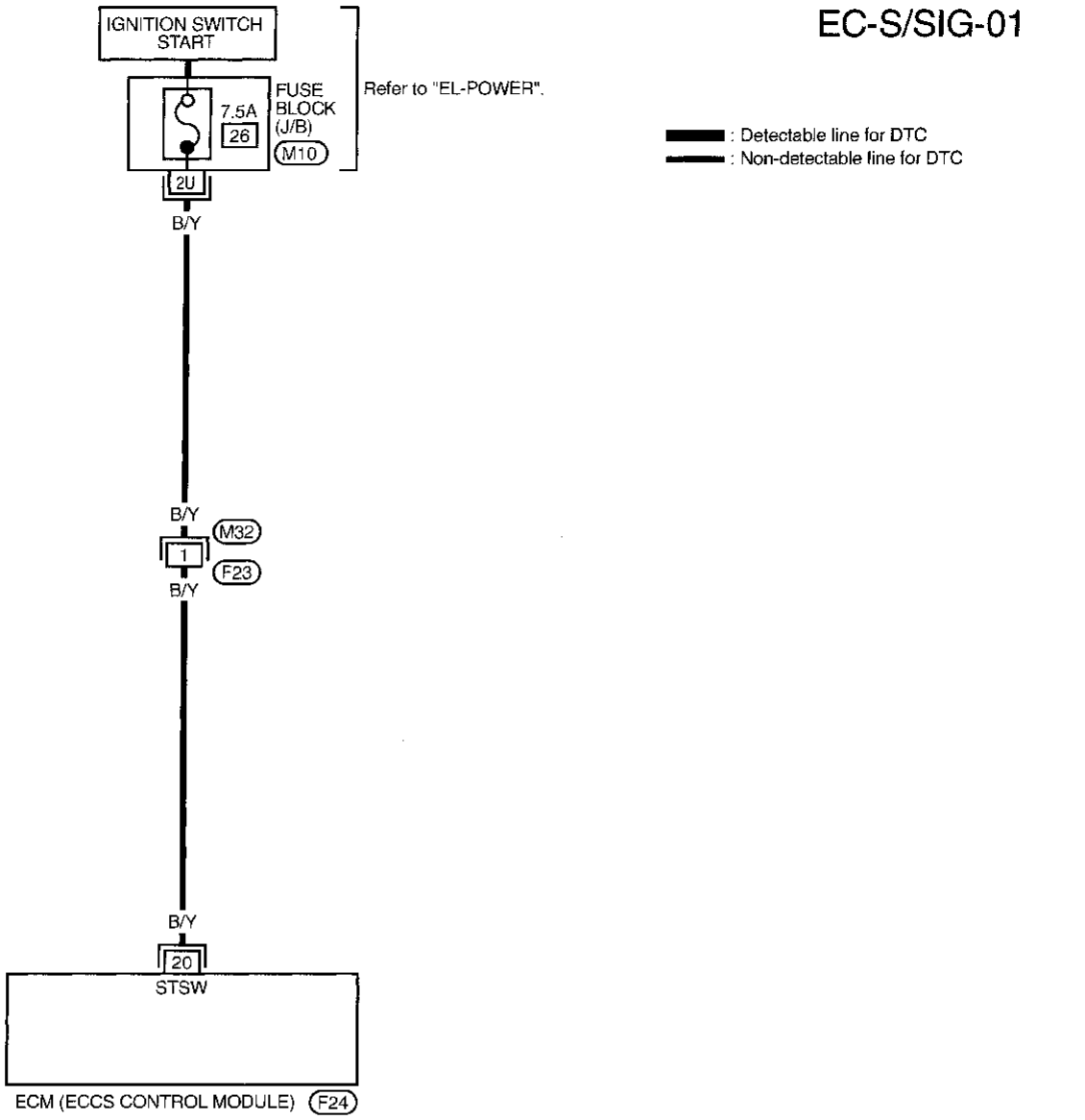
COMPONENT INSPECTION

Injector

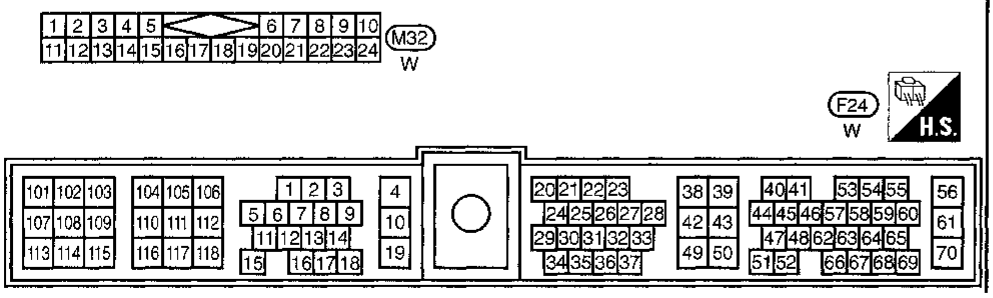
1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.
   Resistance: 10 - 14Ω [at 25°C (77°F)]
   If NG, replace injector.

Start Signal

EC-S/SIG-01



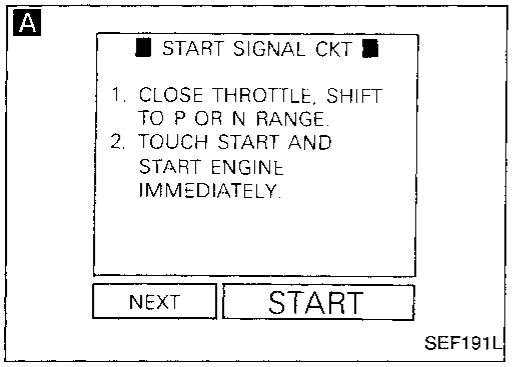
Refer to last page (Foldout page).
M10

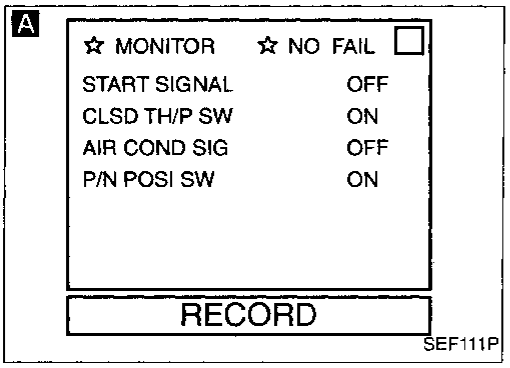


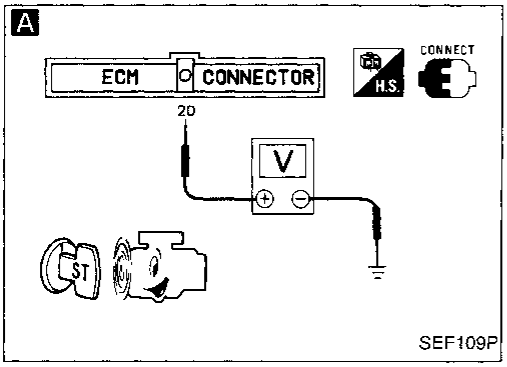
SEF919R

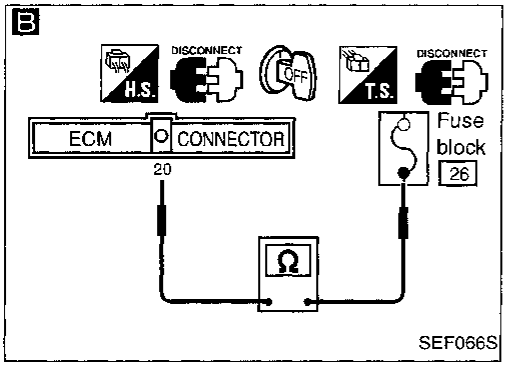
Start Signal (Cont'd)

DIAGNOSTIC PROCEDURE









INSPECTION START

A

CHECK OVERALL FUNCTION.

1. Turn ignition switch "ON".
2. Perform "START SIGNAL CKT" in "FUNCTION TEST" mode with CONSULT.

OK → INSPECTION END

OR

1. Turn ignition switch "ON".
2. Check "START SIGNAL" in "DATA MONITOR" mode with CONSULT.

IGN "ON"	OFF
IGN "START"	ON

OR

1. Turn ignition switch to "START".
2. Check voltage between ECM terminal (20) and ground.

Voltage:
Ignition switch "START"
5V
Except above
Approximately 0V

NG

Check if 7.5A fuse is OK. — NG → Replace 7.5A fuse.

OK

B

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector and 7.5A fuse.
3) Check harness continuity between ECM terminal (20) and fuse block.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors (M32), (F23)
- Harness for open or short between ECM and fuse block

If NG, repair harness or connectors.

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

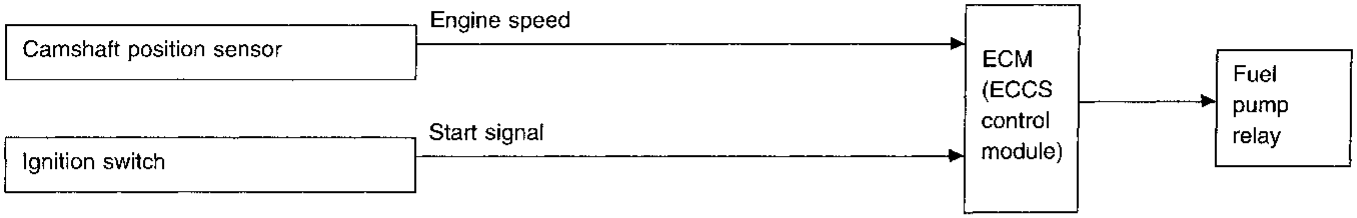
Trouble is not fixed.

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

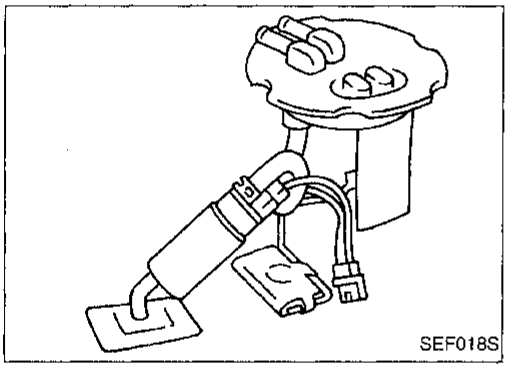
Fuel Pump

SYSTEM DESCRIPTION



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 perform. 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

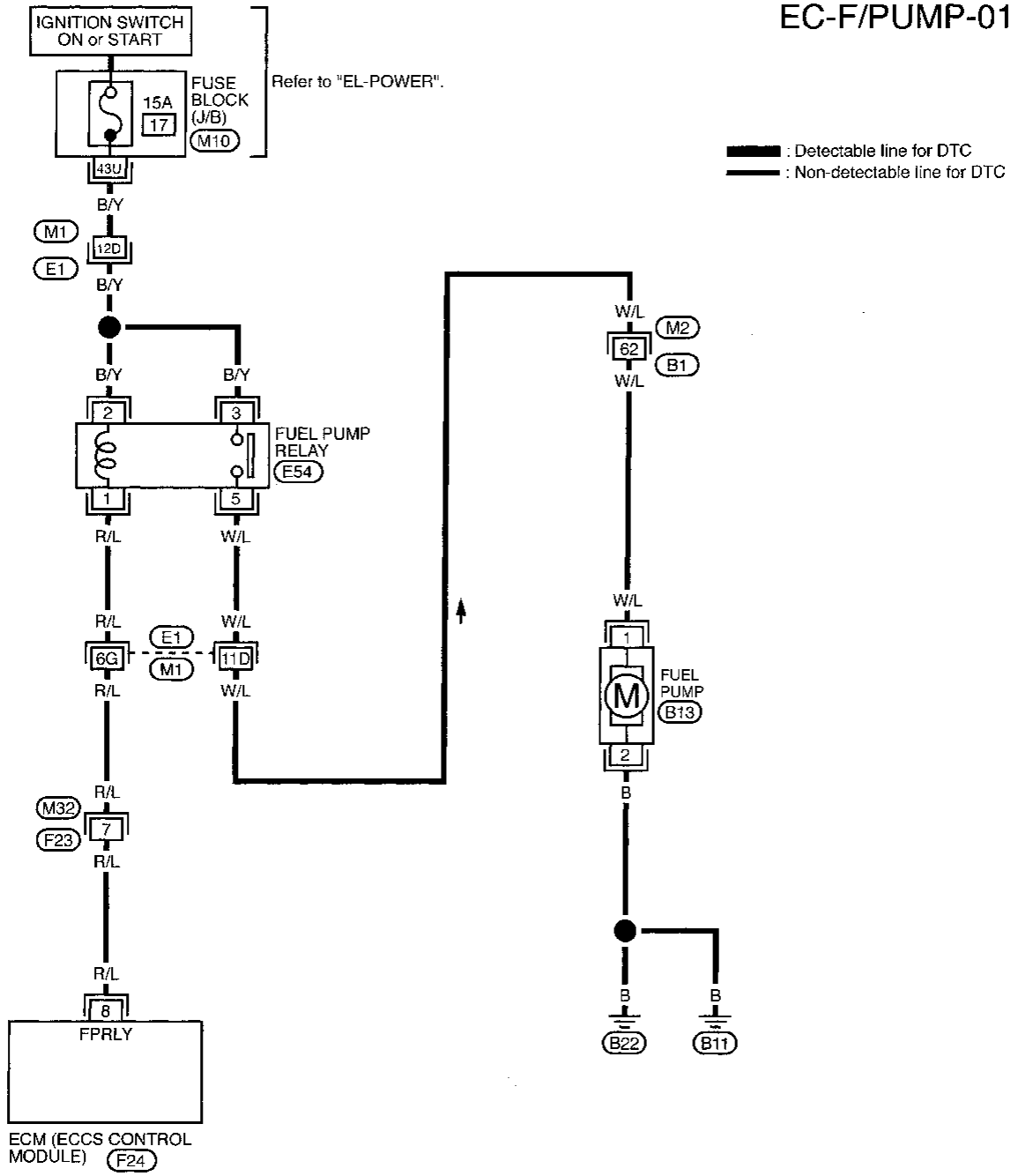


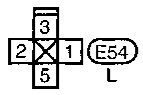
COMPONENT DESCRIPTION

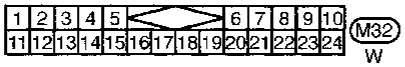
The fuel pump with a fuel damper is an in-tank type (the pump and damper are located in the fuel tank).

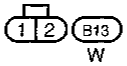
Fuel Pump (Cont'd)

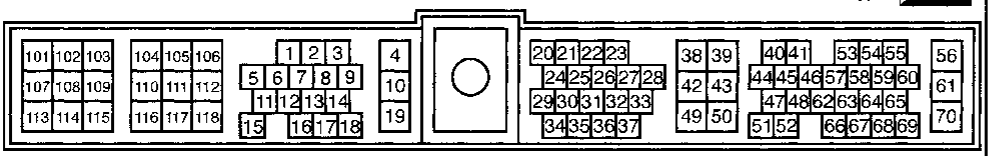
EC-F/PUMP-01









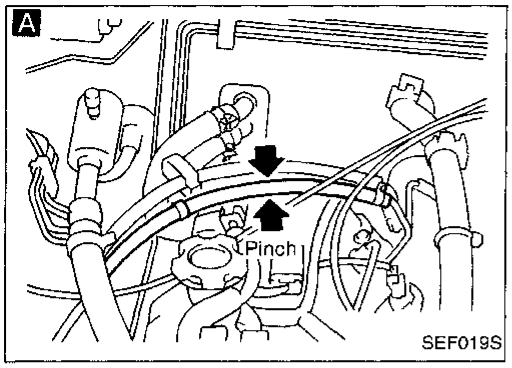


Refer to last page (Foldout page).
M10 , E1 , M1
M2 , B1

SEF920R

Fuel Pump (Cont'd)

DIAGNOSTIC PROCEDURE



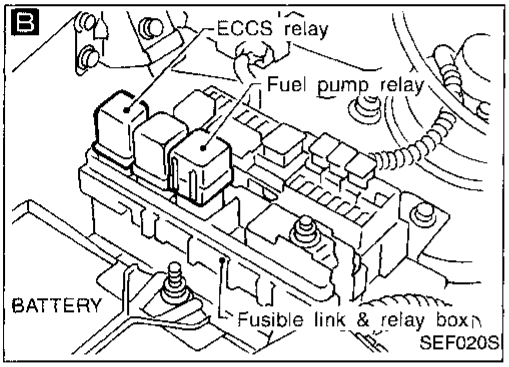
INSPECTION START

A

CHECK OVERALL FUNCTION.
1. Turn ignition switch "ON".
2. Pinch fuel feed hose with fingers.
   Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned "ON".

OK → INSPECTION END

NG



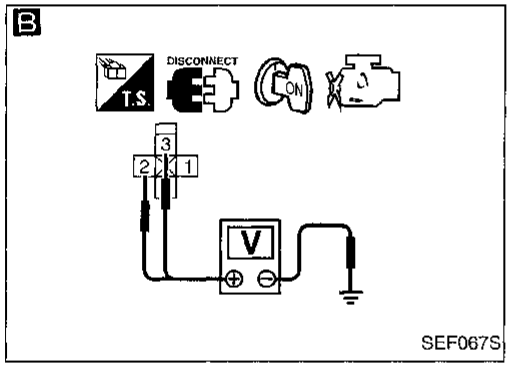
B

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect fuel pump relay.
3. Turn ignition switch "ON".
4. Check voltage between terminals ②, ③ and ground with CONSULT or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness connectors (E1), (M1)
- 15A fuse
- Harness continuity between fuse and fuel pump relay

If NG, repair harness or connectors.

OK



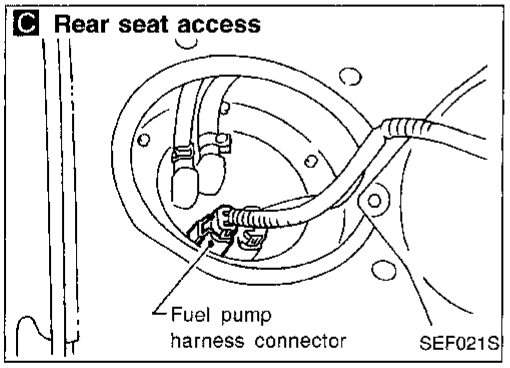
C

CHECK POWER AND GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect fuel pump harness connector.
3. Check harness continuity between terminal ② and body ground, terminal ① and fuel pump relay connector terminal ⑤.
   Continuity should exist.

NG → Check the following.
- Harness connectors (M2), (B1)
- Harness continuity between fuel pump and body ground
- Harness continuity between fuel pump and fuel pump relay

If NG, repair harness or connectors.

OK



D

CHECK OUTPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ⑧ and fuel pump relay connector terminal ①.
   Continuity should exist.

NG → Check the following.
- Harness connectors (F23), (M32)
- Harness connectors (M1), (E1)
- Harness continuity between ECM and fuel pump relay

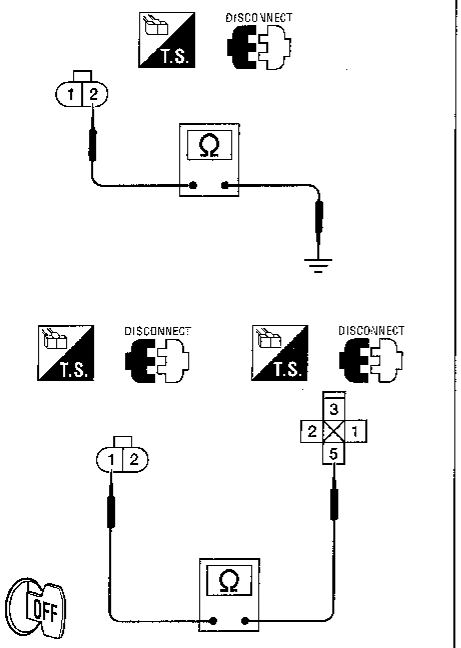
If NG, repair harness or connectors.

OK

Ⓐ

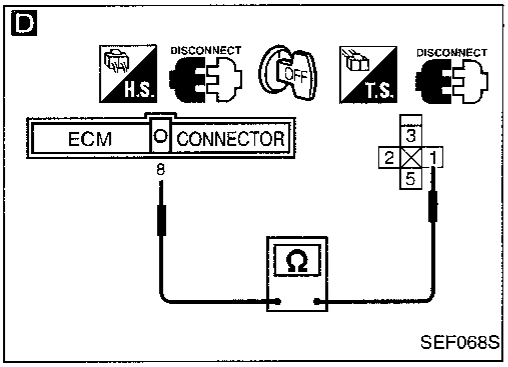
Fuel Pump (Cont'd)

C



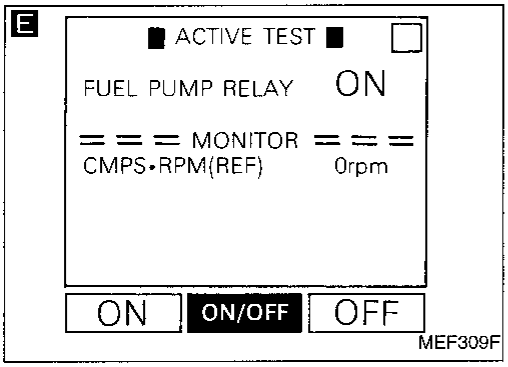
AEC758

D



SEF068S

E



MEF309F

Ⓐ

E

CHECK COMPONENT
(Fuel pump relay).

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 and check operating sound.

NG → Replace fuel pump relay.

OR

Refer to "COMPONENT INSPECTION" on next page.

OK

CHECK COMPONENT
(Fuel pump).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace fuel pump.

OK

Disconnect and reconnect harness connectors in the circuit. Then retest.

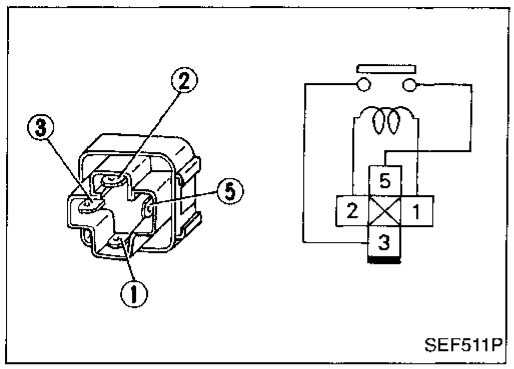
Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

INSPECTION END

Fuel Pump (Cont'd)

COMPONENT INSPECTION

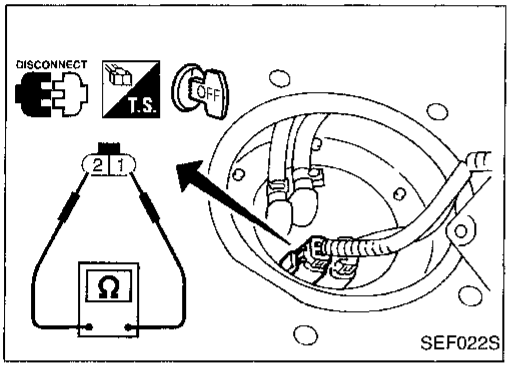


Fuel pump relay

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.

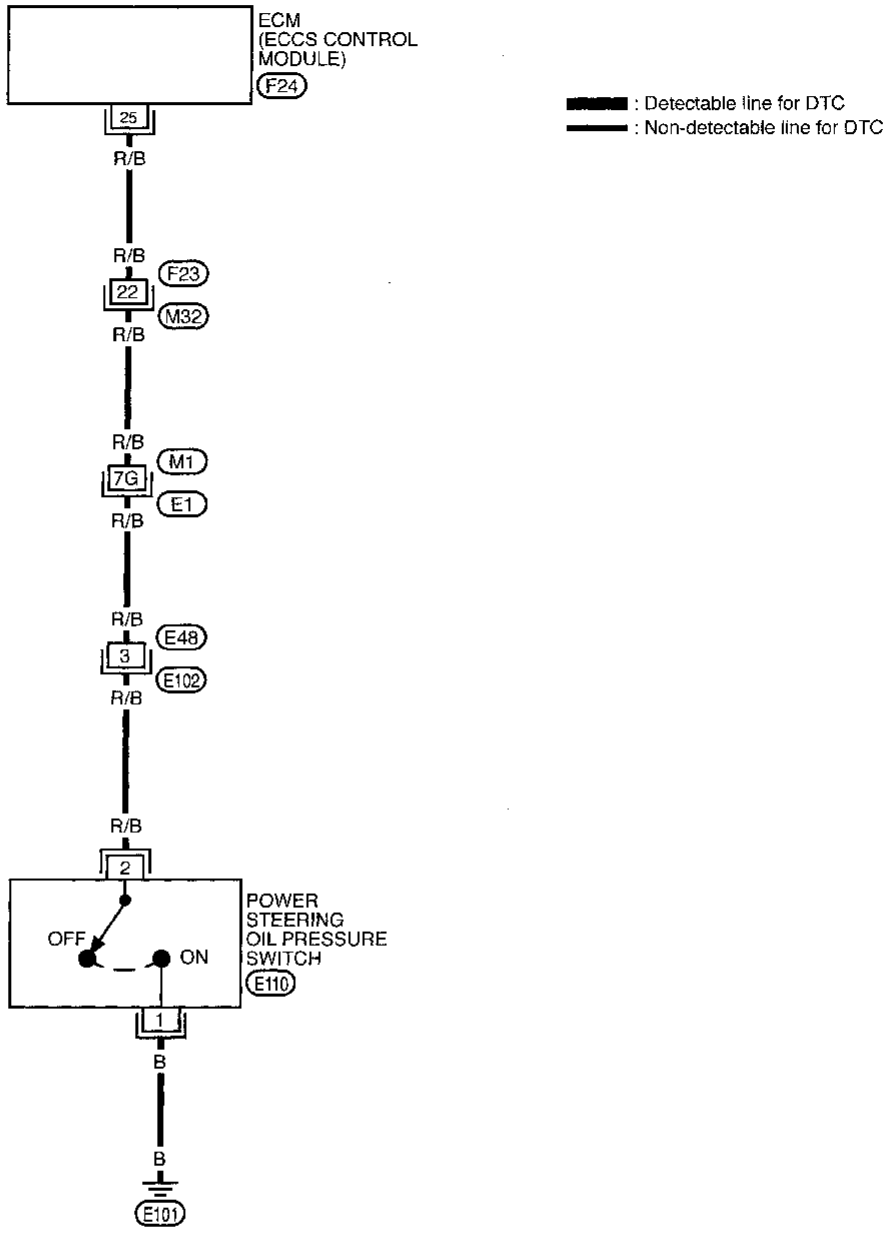


Fuel pump

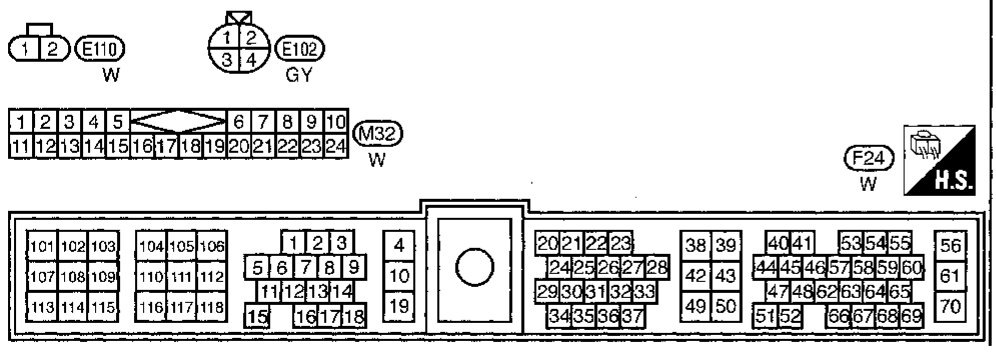
1. Disconnect fuel pump harness connector.
2. Check resistance between terminals ① and ②.
   Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]
   If NG, replace fuel pump.

Power Steering Oil Pressure Switch

EC-PST/SW-01



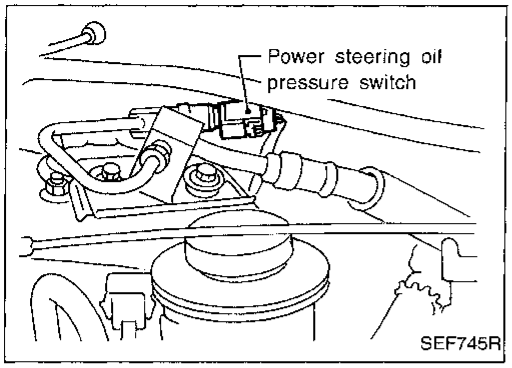
Refer to last page (Foldout page).
M1 , E1



SEF921R

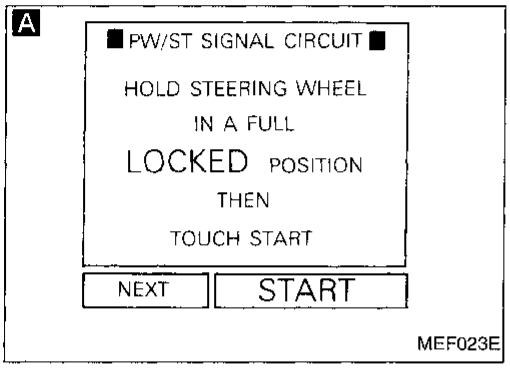
Power Steering Oil Pressure Switch (Cont'd)

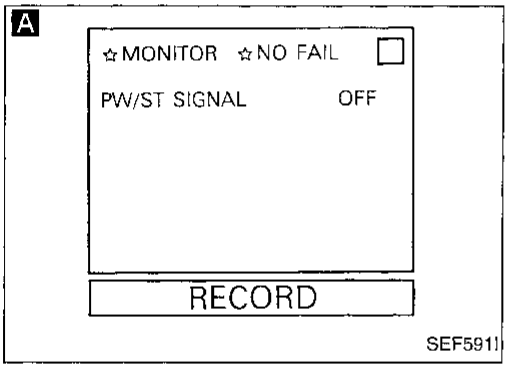
COMPONENT DESCRIPTION

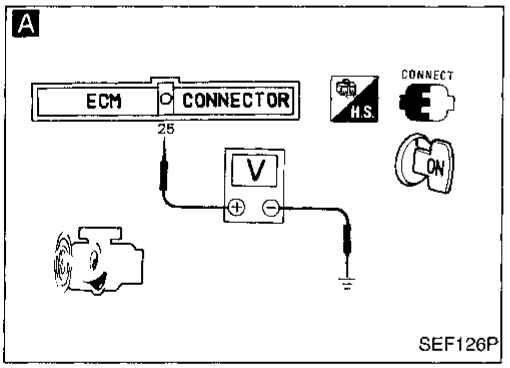


The power steering oil pressure switch is attached to the power steering high-pressure tube and detects a power steering load. When a power steering load is detected, it signals the ECM. The ECM adjusts the IACV-AAC valve to increase the idle speed and adjust for the increased load.

DIAGNOSTIC PROCEDURE







INSPECTION START

A

CHECK OVERALL FUNCTION.

1. Turn ignition switch "ON".
2. Perform "PW/ST SIGNAL CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OK → INSPECTION END

OR

1. Start engine.
2. Check "PW/ST SIGNAL" in "DATA MONITOR" mode with CONSULT.

Steering is in neutral position:
OFF
Steering is turned:
ON

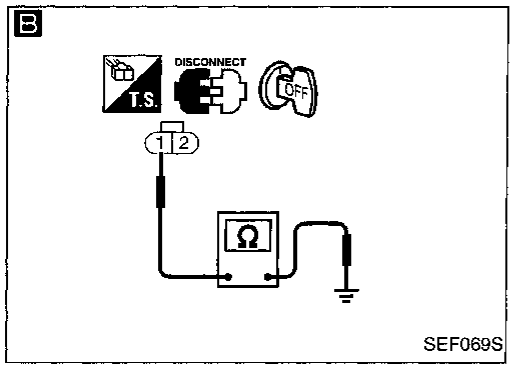
OR

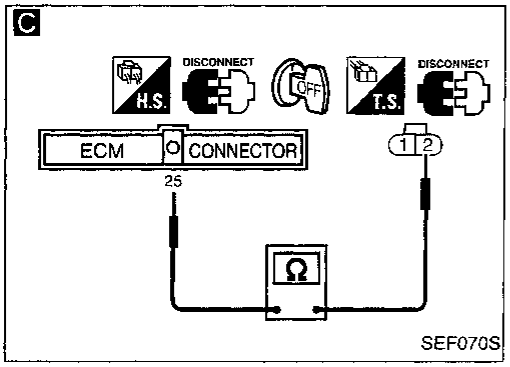
1. Start engine.
2. Check voltage between ECM terminal (25) and ground.

Voltage:
When steering wheel is turned quickly.
Approximately 0V
Except above
Approximately 5V

NG → (A)

Power Steering Oil Pressure Switch (Cont'd)





Ⓐ

B

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect power steering oil pressure switch harness connector.
3. Check harness continuity between terminal ① and engine ground.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

C

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ㉕ and terminal ②.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(Power steering oil pressure switch).
Refer to "COMPONENT INSPECTION" below.

NG → Replace power steering oil pressure switch.

OK ↓

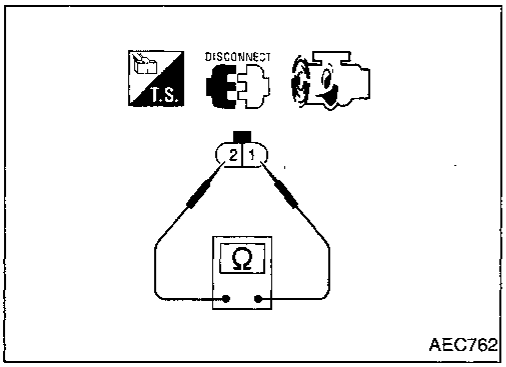
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END



COMPONENT INSPECTION

Power steering oil pressure switch

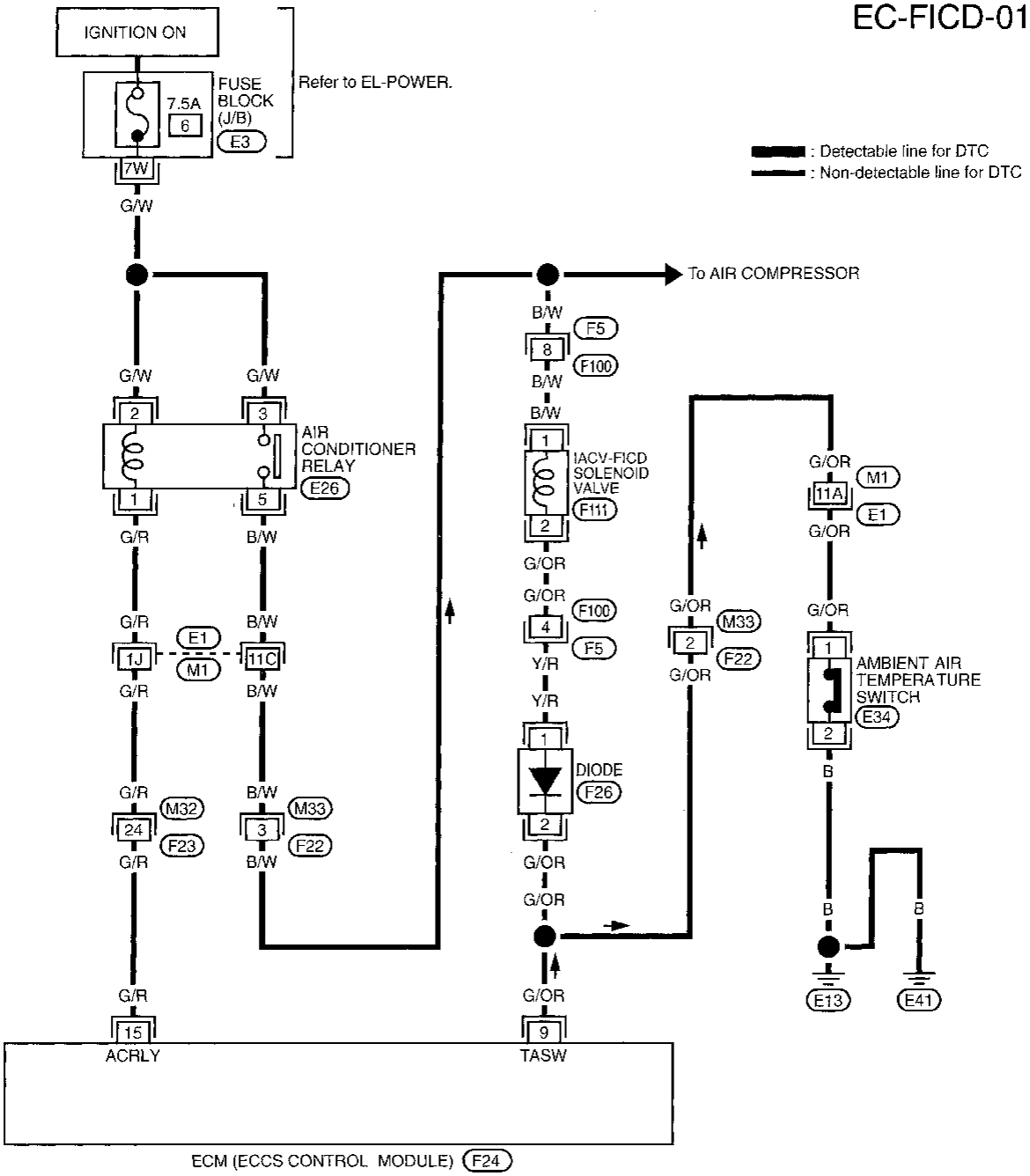
1. Disconnect power steering oil pressure switch harness connector then start engine.
2. Check continuity between terminals ① and ②.

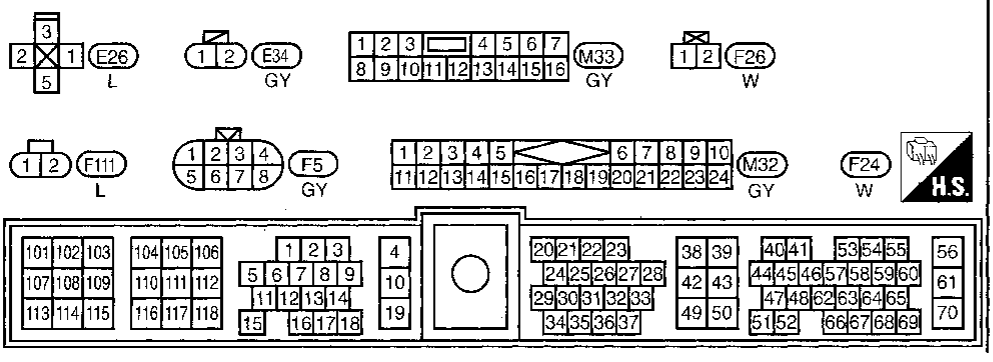
Conditions	Continuity
Steering wheel is being turned	Yes
Steering wheel is not being turned	No

If NG, replace power steering oil pressure switch.

IACV-FICD Solenoid Valve

EC-FICD-01





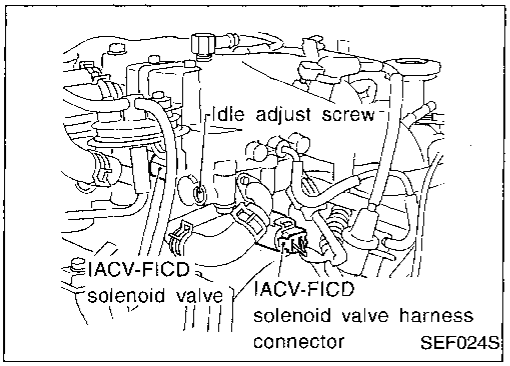
Refer to last page (Foldout page).
E3 , E1 , M1

SEF923R

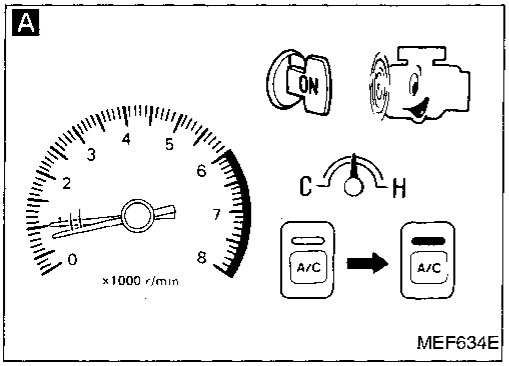
IACV-FICD Solenoid Valve (Cont'd)

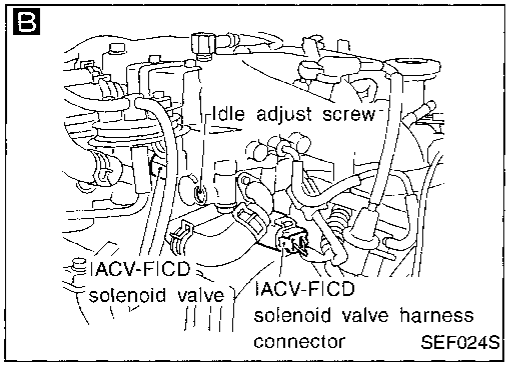
COMPONENT DESCRIPTION

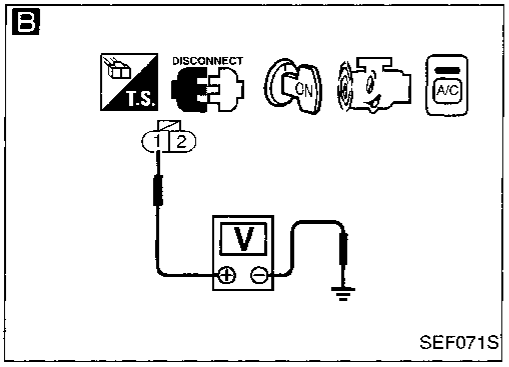
When the air conditioner is on, the IACV-FICD solenoid valve supplies additional air to adjust to the increased load.



DIAGNOSTIC PROCEDURE







INSPECTION START

A

CHECK OVERALL FUNCTION.
1. Start engine and warm it up sufficiently.
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.
   800 rpm or more (in "N" position)

OK → INSPECTION END

NG

Check if air conditioner compressor functions normally.

NG → Refer to HA section ("TROUBLE DIAGNOSES").

OK

B

CHECK POWER SUPPLY.
1. Stop engine.
2. Disconnect IACV-FICD solenoid valve harness connector.
3. Start engine, then turn air conditioner switch and blower fan "ON".
4. Check voltage between terminal ① and ground with CONSULT or tester.
   Voltage: Battery voltage

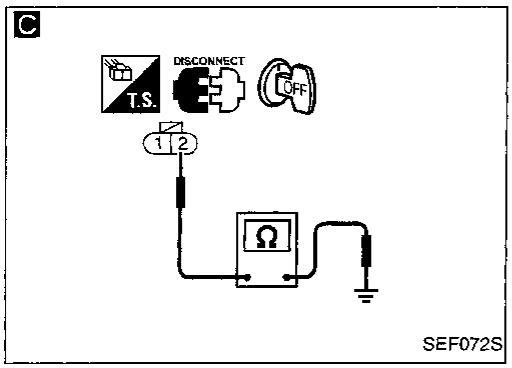
NG → Check the following.
- 7.5A fuse
- Harness connectors (F5), (F100)
- Harness connectors (F22), (M33)
- Harness connectors (E1), (M1)
- Harness for open or short between IACV-FICD solenoid valve harness connector and air conditioner relay

If NG, repair harness or connectors.

OK

Ⓐ

IACV-FICD Solenoid Valve (Cont'd)



Ⓐ

C

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Check harness continuity between terminal ② and body ground.
   Continuity should exist.

NG → Check the following.
- Harness connectors (F100), (F5)
- Harness connectors (F22), (M33)
- Harness connectors (M1), (E1)
- Ambient air temperature switch (E34)
- Diode (F26)
- Harness for open or short between IACV-FICD solenoid valve and ground

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT
(IACV-FICD solenoid valve).
Refer to "COMPONENT INSPECTION" below.

NG → Replace IACV-FICD solenoid valve.

OK ↓

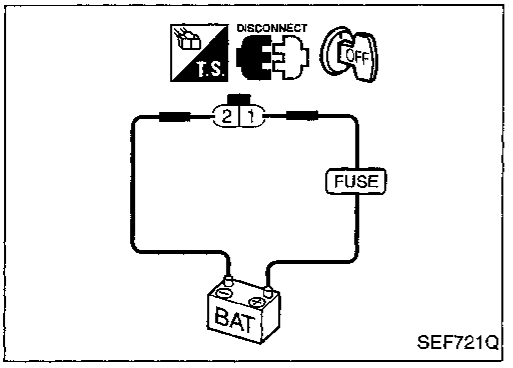
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed. ↓

Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector. Then retest.

↓

INSPECTION END

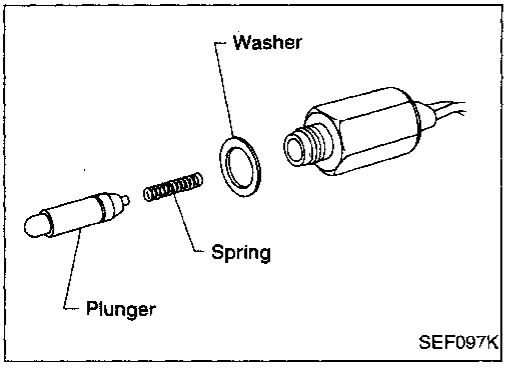


COMPONENT INSPECTION

IACV-FICD solenoid valve

Disconnect IACV-FICD solenoid valve harness connector.

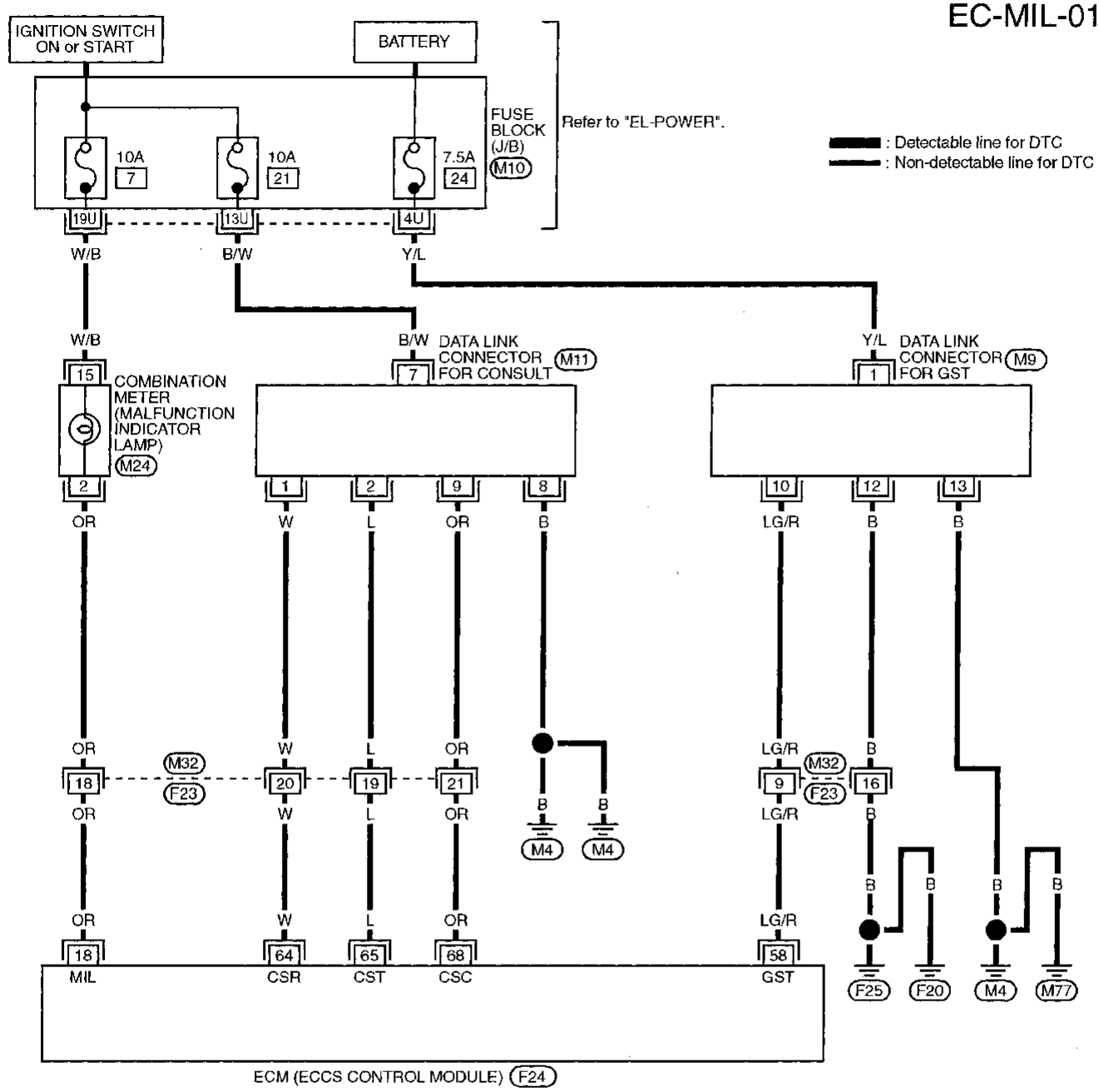
- Check for clicking sound when applying 12V direct current to terminals.

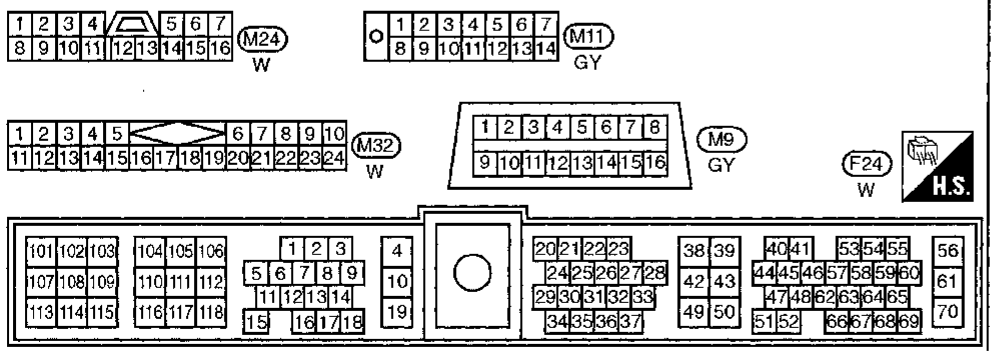


- Check plunger for seizing or sticking.
- Check for broken spring.

MIL & Data Link Connectors

EC-MIL-01





Refer to last page (Foldout page).
M10

SEF922R

Alphabetical & P No. Index for DTC

ALPHABETICAL INDEX FOR DTC

Items (CONSULT screen terms)	DTC MIL*1	DTC CONSULT GST*2	Reference page
A/T 1ST SIGNAL	1103	P0731	AT section
A/T 2ND SIGNAL	1104	P0732	AT section
A/T 3RD SIGNAL	1105	P0733	AT section
A/T 4TH SIG OR TCC	1106	P0734	AT section
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A/T DIAG COMM LINE	0804	P1605	EC-236
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CLOSED LOOP-B2	0308	P0150*3	EC-117
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*COOLANT TEMP SEN	0908	P0125	EC-112
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CRANK POS SEN (OBD)	0802	P0335	EC-178
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CYL 2 MISFIRE	0607	P0302	EC-171
CYL 3 MISFIRE	0606	P0303	EC-171
CYL 4 MISFIRE	0605	P0304	EC-171
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EGRC SOLENOID/V	1005	P1400	EC-228
EGRC-BPT VALVE	0306	P0402	EC-195
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FLUID TEMP SENSOR	1208	P0710	AT section
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FR O2 SEN HTR-B2	1001	P0155	EC-140
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FRONT O2 SENSOR-B2	0303	P0150	EC-135
FUEL SYS LEAN/BK1	0115	P0171	EC-151
FUEL SYS LEAN/BK2	0210	P0174	EC-161
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PARK/NEUT POSI SW	1003	P0705	EC-213
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REAR O2 SENSOR-B2	0708	P0156	EC-143
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RR O2 SEN HTR-B2	1002	P0161	EC-148
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VHCL SPEED SEN A/T	1102	P0720	AT section

*1: These are controlled by NISSAN.

P NO. INDEX FOR DTC

DTC CONSULT GST*2	DTC MIL*1	Items (CONSULT screen terms)	Reference page
P0000	**0505**	**NO SELF DIAGNOSTIC FAILURE INDICATED**	—
P0100	0102	MASS AIR FLOW SEN	EC-93
P0110	0401	INT AIR TEMP SEN	EC-98
P0115	0103	COOLANT TEMP SEN	EC-103
P0120	0403	THROTTLE POSI SEN	EC-107
P0125	0908	*COOLANT TEMP SEN	EC-112
P0130	0307	CLOSED LOOP-B1	EC-117
P0130	0503	FRONT O2 SENSOR-B1	EC-118
P0135	0901	FR O2 SEN HTR-B1	EC-123
P0136	0707	REAR O2 SENSOR-B1	EC-126
P0141	0902	RR O2 SEN HTR-B1	EC-131
P0150*3	0308	CLOSED LOOP-B2	EC-117
P0150	0303	FRONT O2 SENSOR-B2	EC-135
P0155	1001	FR O2 SEN HTR-B2	EC-140
P0156	0708	REAR O2 SENSOR-B2	EC-143
P0161	1002	RR O2 SEN HTR-B2	EC-148
P0171	0115	FUEL SYS LEAN/BK1	EC-151
P0172	0114	FUEL SYS RICH/BK1	EC-156
P0174	0210	FUEL SYS LEAN/BK2	EC-161
P0175	0209	FUEL SYS RICH/BK2	EC-166
P0300	0701	MULTI CYL MISFIRE	EC-171
P0301	0608	CYL 1 MISFIRE	EC-171
P0302	0607	CYL 2 MISFIRE	EC-171
P0303	0606	CYL 3 MISFIRE	EC-171
P0304	0605	CYL 4 MISFIRE	EC-171
P0305	0604	CYL 5 MISFIRE	EC-171
P0306	0603	CYL 6 MISFIRE	EC-171
P0325	0304	KNOCK SENSOR	EC-175
P0335	0802	CRANK POS SEN (OBD)	EC-178
P0340	0101	CAMSHAFT POSI SEN	EC-182
P0400	0302	EGR SYSTEM	EC-187
P0402	0306	EGRC-BPT VALVE	EC-195
P0420 P0430	0702 0703	TW CATALYST SYSTEM	EC-197
P0500	0104	VEHICLE SPEED SEN	EC-200
P0505	0205	IACV-AAC VALVE	EC-204
P0600	0504	A/T COMM LINE	EC-208
P0605	0301	ECM	EC-211
P0705	1003	PARK/NEUT POSI SW	EC-213
P0705	1101	INHIBITOR SWITCH	AT section
P0710	1208	FLUID TEMP SENSOR	AT section
P0720	1102	VHCL SPEED SEN A/T	AT section
P0725	1207	ENGINE SPEED SIG	AT section
P0731	1103	A/T 1ST SIGNAL	AT section
P0732	1104	A/T 2ND SIGNAL	AT section
P0733	1105	A/T 3RD SIGNAL	AT section
P0734	1106	A/T 4TH SIG OR TCC	AT section
P0740	1204	TOR CONV CLUTCH SV	AT section
P0745	1205	LINE PRESSURE S/V	AT section
P0750	1108	SHIFT SOLENOID/V A	AT section
P0755	1201	SHIFT SOLENOID/V B	AT section
P1320	0201	IGN SIGNAL-PRIMARY	EC-219
P1336	0905	CRANK P/S (OBD) COG	EC-224
P1400	1005	EGRC SOLENOID/V	EC-228
P1401	0305	EGR TEMP SENSOR	EC-232
P1605	0804	A/T DIAG COMM LINE	EC-236
P1705	1206	THRTL POSI SEN A/T	AT section
P1760	1203	OVERRUN CLUTCH S/V	AT section
P1900	0208	OVER HEAT	EC-62

*2: These are prescribed by SAE J2012.

General Specifications

FUEL PRESSURE REGULATOR 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)

Inspection and Adjustment

Idle speed*1 rpm No-load*2 (in "N" position)	750±50 (700*3)
Air conditioner: ON (in "N" position)	800 or more
Ignition timing	15°±2° BTDC
Closed throttle position switch touch speed ("OFF" to "ON") (in "N" position) rpm	950±150

*1: Feedback controlled and needs no adjustments
*2: Under the following conditions:
- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear defogger)
- Steering wheel: Kept in straight-ahead position

*3: Disconnect throttle position sensor

IGNITION COIL

Primary voltage	V	12
Primary resistance [at 20°C (68°F)]	Ω	Approximately 1.0
Secondary resistance [at 20°C (68°F)]	kΩ	Approximately 10

MASS AIR FLOW SENSOR

Supply voltage	V	Battery voltage (11 - 14)
Output voltage at idle	V	1.3 - 1.7*
Mass air flow (Using CONSULT or GST)	g·m/sec	3.3 - 4.8 at idle* 12.0 - 14.9 at 2,500 rpm*

*: Engine is warmed up sufficiently and running under no-load.

ENGINE COOLANT TEMPERATURE SENSOR

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

EGR TEMPERATURE SENSOR

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

FRONT HEATED OXYGEN SENSOR HEATER

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

FUEL PUMP

Resistance [at 25°C (77°F)]	Ω	0.2 - 5.0

IACV-AAC VALVE

Resistance [at 25°C (77°F)]	Ω	Approximately 10.0

INJECTOR

Resistance [at 25°C (77°F)]	Ω	10 - 14

RESISTOR

Resistance [at 25°C (77°F)]	kΩ	Approximately 2.2

THROTTLE POSITION SENSOR

Throttle valve conditions	Resistance kΩ [at 25°C (77°F)]
Completely closed	Approximately 0.5
Partially open	0.5 - 4.0
Completely open	Approximately 4.0

Inspection and Adjustment (Cont'd)

CALCULATED LOAD VALUE

	Calculated load value % (Using CONSULT or GST)
At idle	18.0 - 26.0
At 2,500 rpm	18.0 - 21.0

INTAKE AIR TEMPERATURE SENSOR

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

REAR HEATED OXYGEN SENSOR HEATER

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

CRANKSHAFT POSITION SENSOR (OBD)

Resistance [at 20°C (68°F)]	Ω	166.5 - 203.5