ENGINE CONTROL SYSTEM

SECTION EC

CONTENTS

CONTENTS (Cont'd)

CONTENTS (Cont'd)

When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See 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".

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

The Supplemental Restraint System "Air Bag" and "Seat Belt Pre-tensioner", used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **RS section** in 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 INFINITI 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.

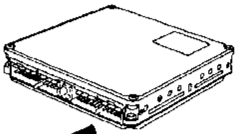
CAUTION:

- **Be sure to turn the ignition switch "OFF" and disconnect the negative battery terminal before the repair or inspection work. The open/short circuit of the related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after the work. The loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure to connect the connector without water, grease, dirt, bent terminals, etc. in it.)**
- **Be sure to route and clamp 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 the work. The misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EGR system or the fuel injection system, etc.**
- **Be sure to erase the unnecessary (already fixed) malfunction information in the ECM or A/T control unit before returning the vehicle to the customer.**

Engine Fuel & Emission Control System

ECM

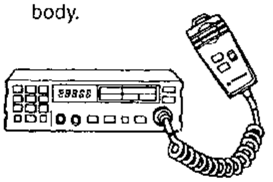
- Do not disassembly ECM (ECCS control module).
- Do not turn diagnosis mode selector forcibly.
- If a battery terminal is disconnected, the memory will return to the ECM value.
  The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected.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



WIRELESS EQUIPMENT

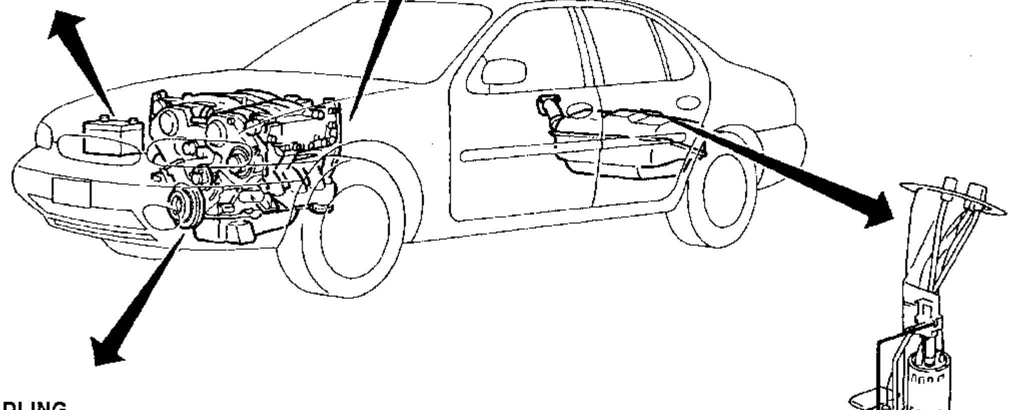
- When installing CB ham radio or a mobile phone, be sure to observe the following. Failure to do so may adversely affect electronic control systems depending on its installation location.

1) Keep the antenna as far as possible away from the electronic control units.
2) Keep the antenna feeder line more the 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.



ECCS 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.

WHEN STARTING

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

FUEL PUMP

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

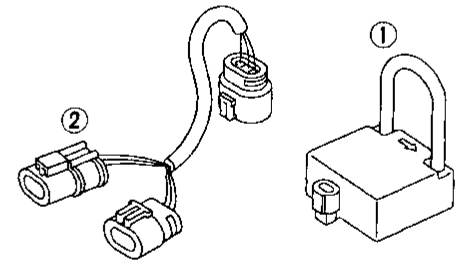
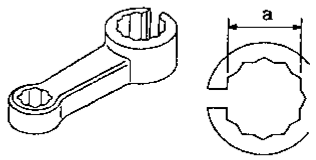
ECM HARNESS HANDLING

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

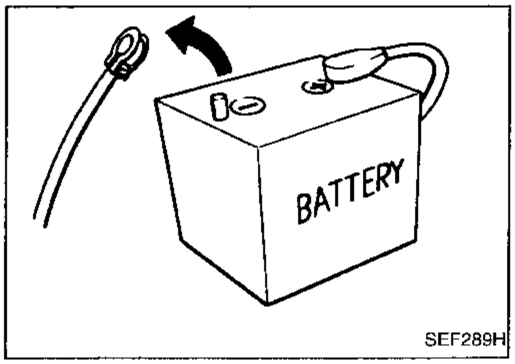
SEF677RA

Special Service Tools

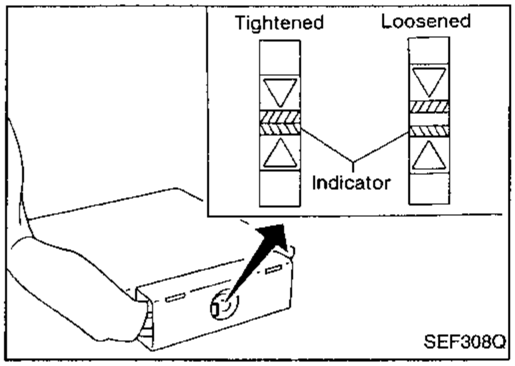
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
① KV109D0010 (J-36777-1) Ignition timing adapter coil ② KV10114200 (J-36777-4) Adapter harness	Measuring ignition timing  NT054
KV10114400 (J-38365) Heated oxygen sensor wrench	Loosening or tightening heated oxygen sensor  NT636 **a: 22 mm (0.87 in)**

Precautions


SEF289H

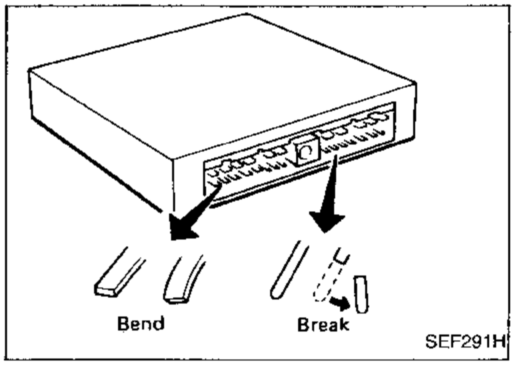
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the ECM. Because battery voltage is applied to ECM even if ignition switch is turned off.



SEF308Q

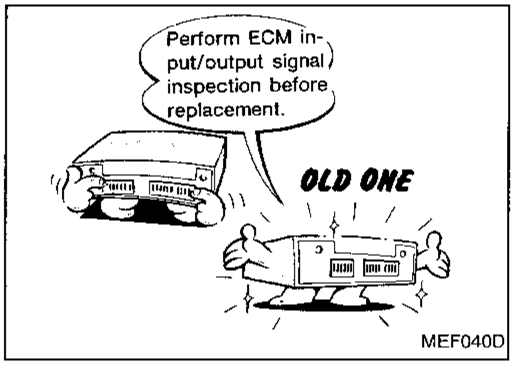
- When connecting ECM harness connector, tighten securing bolt until the gap between the orange indicators disappears.

  🔧 : 3.0 - 5.0 N·m (0.3 - 0.5 kg-m, 26 - 43 in-lb)



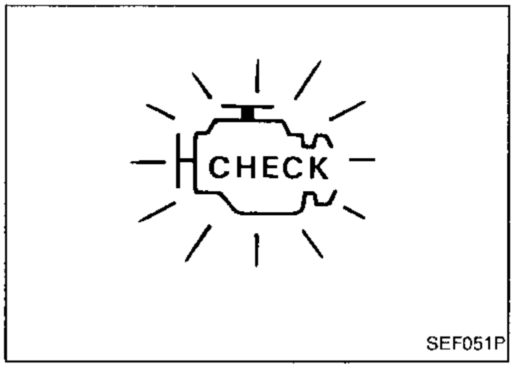
SEF291H

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



MEF040D

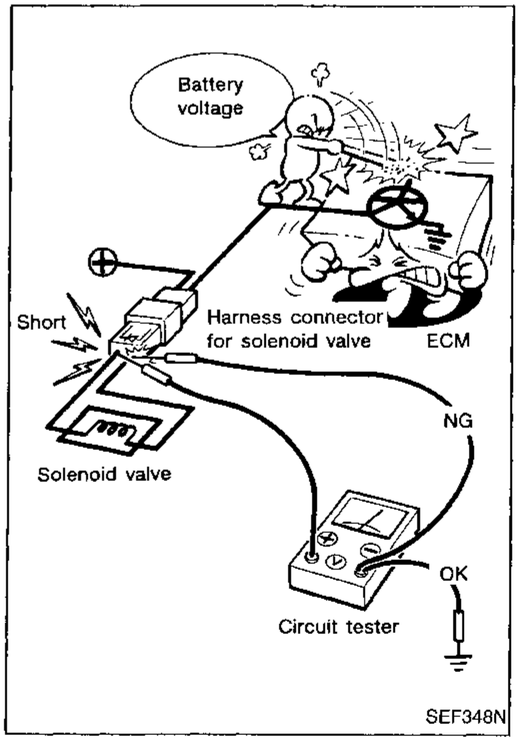
- Before replacing ECM, perform ECM input/output signal inspection and make sure whether ECM functions properly or not. (See page EC-99.)



SEF051P

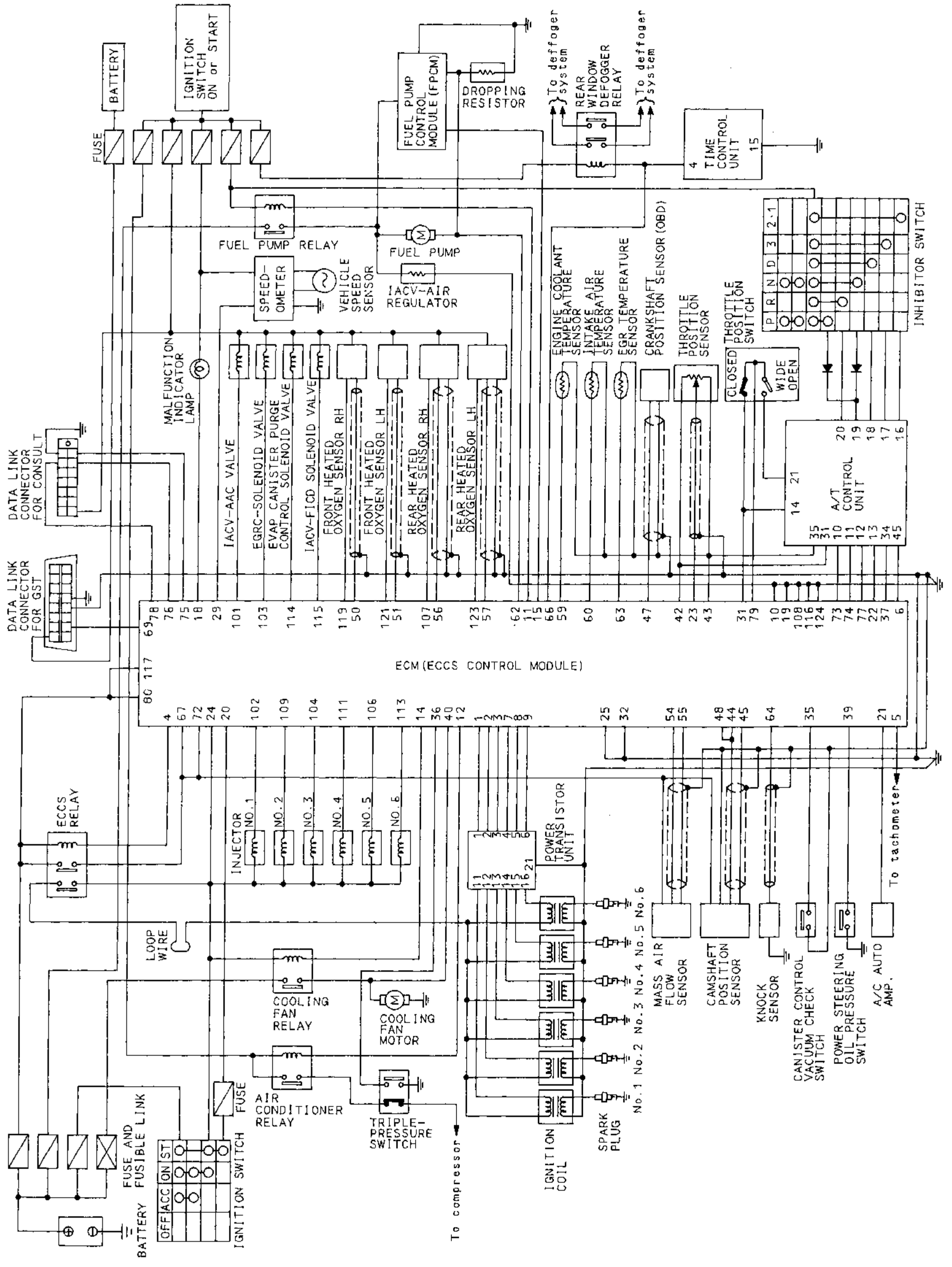
- After performing each TROUBLE DIAGNOSIS, perform "OVERALL FUNCTION CHECK" or "DTC (Diagnostic Trouble Code) CONFIRMATION PROCEDURE".
  The DTC or 1st trip DTC should not be displayed in the "DTC CONFIRMATION PROCEDURE" if the repair is completed. The "OVERALL FUNCTION CHECK" should be a good result if the repair is completed.

Precautions (Cont'd)



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

Circuit Diagram



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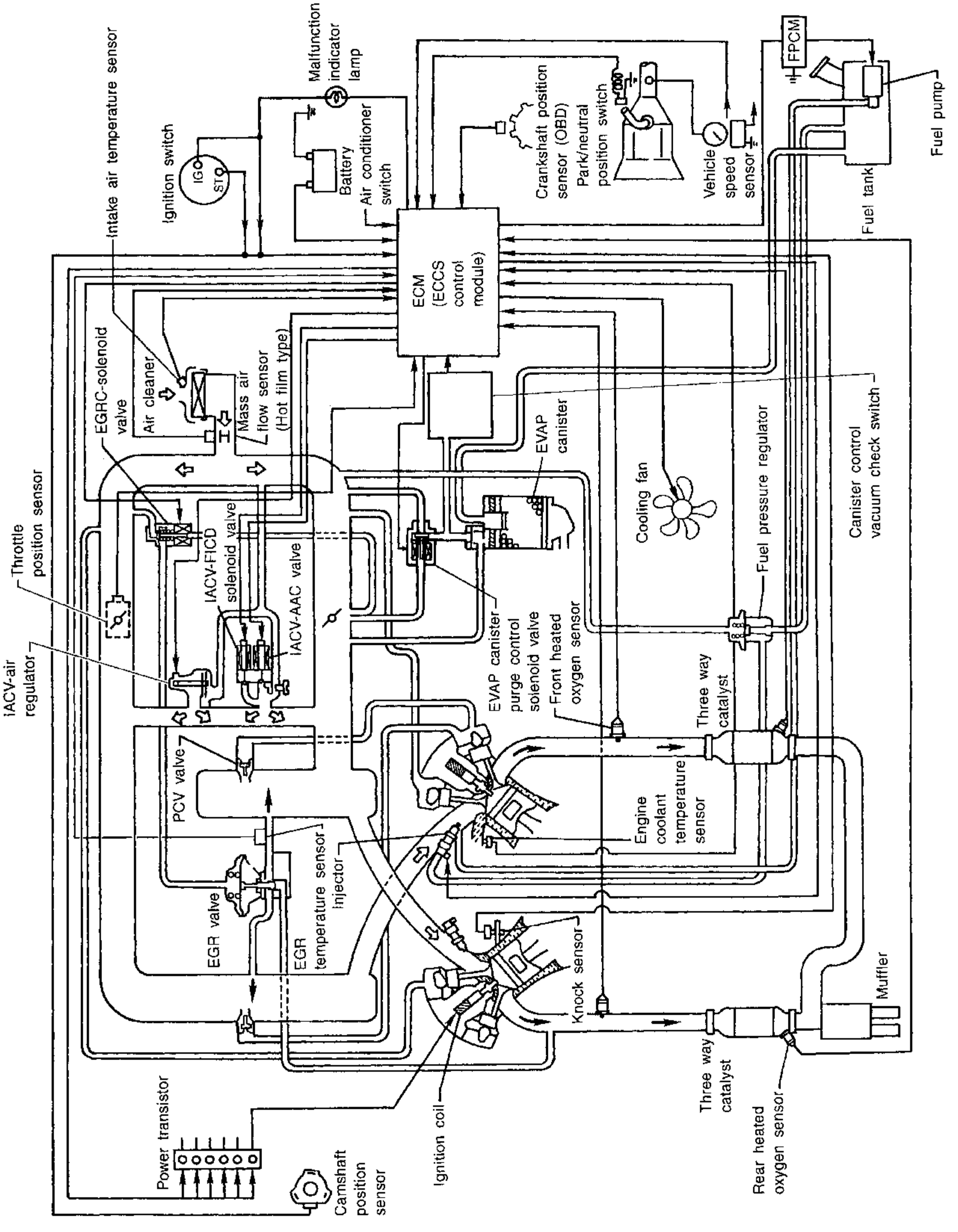
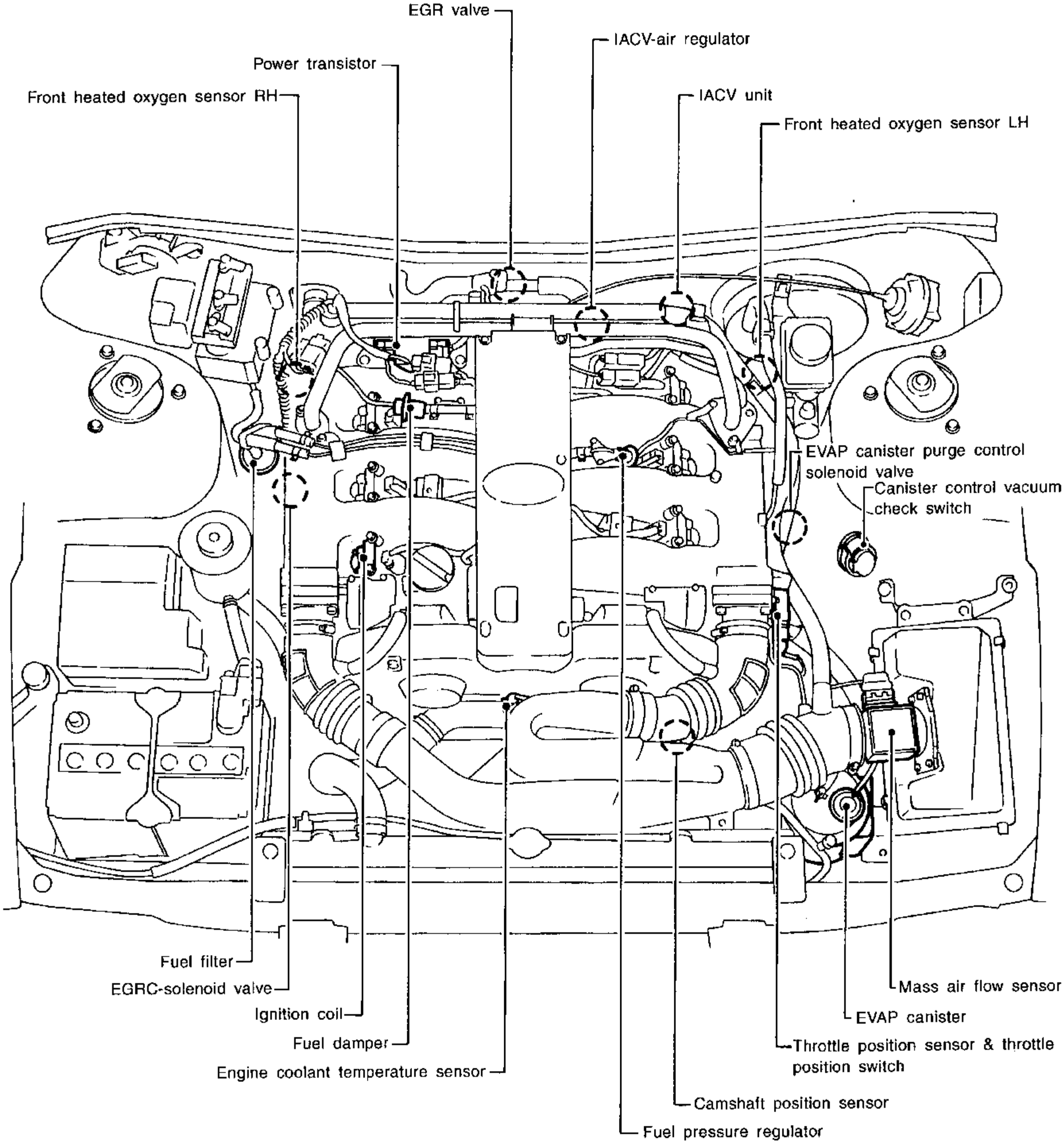
System Diagram



SEF913Q

ECCS Component Parts Location



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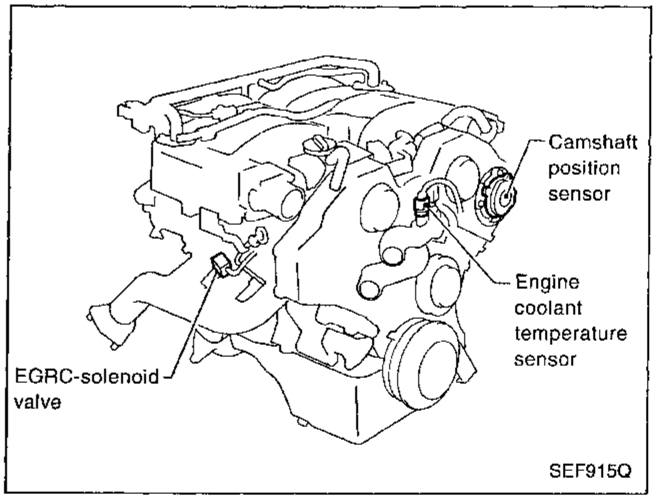
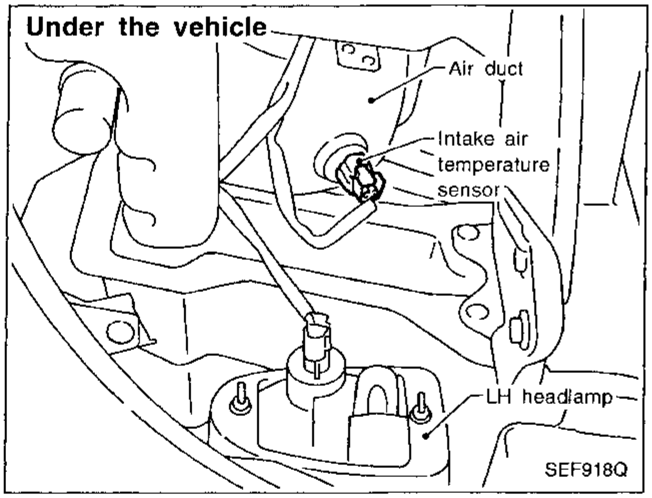
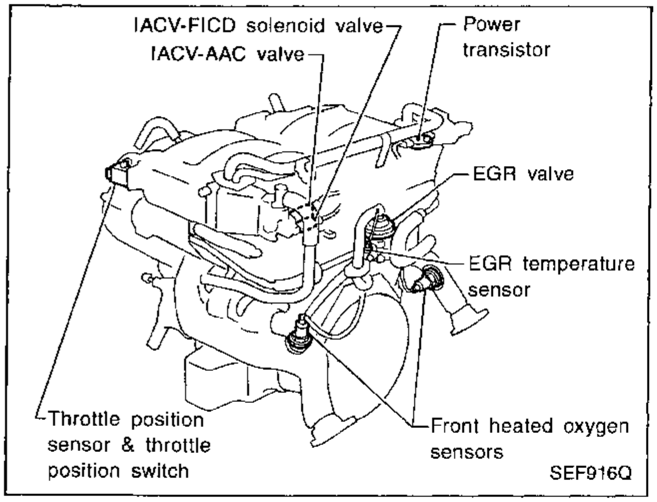
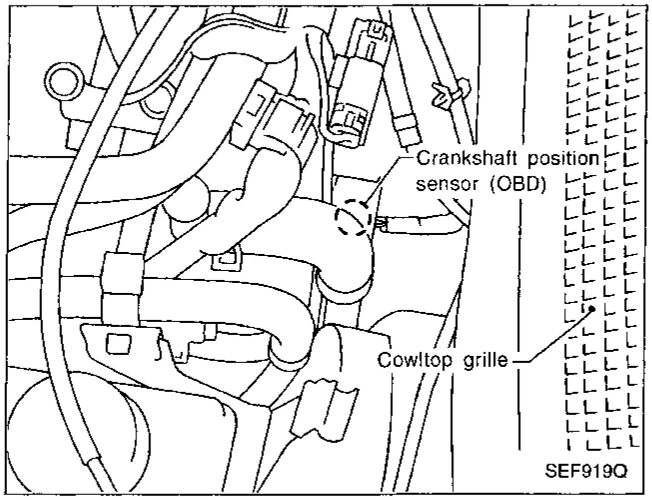
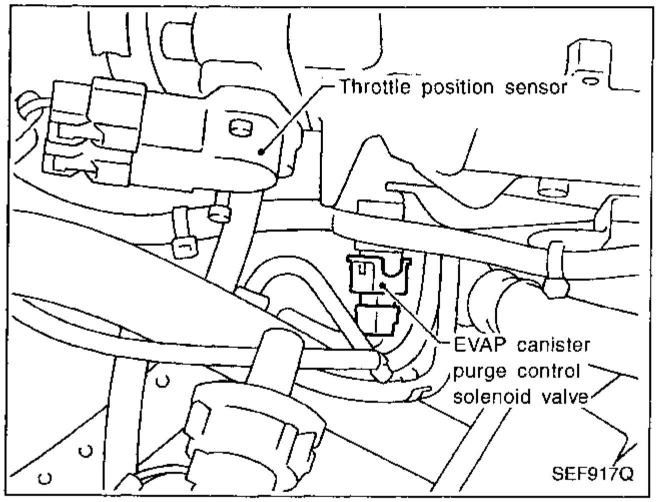
ECCS Component Parts Location (Cont'd)

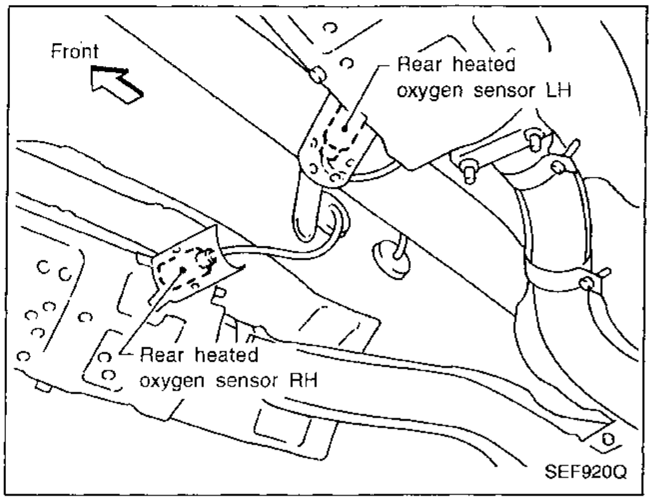




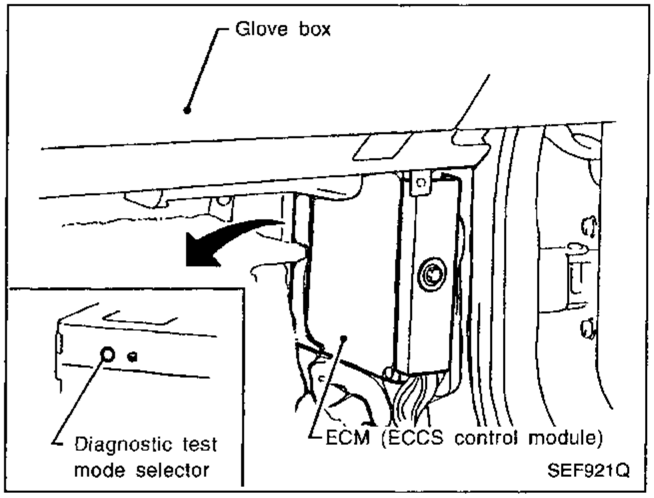


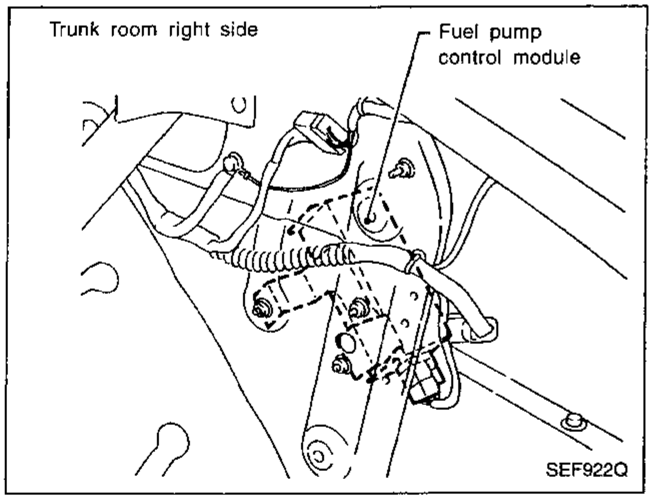






ECCS Component Parts Location (Cont'd)





GI
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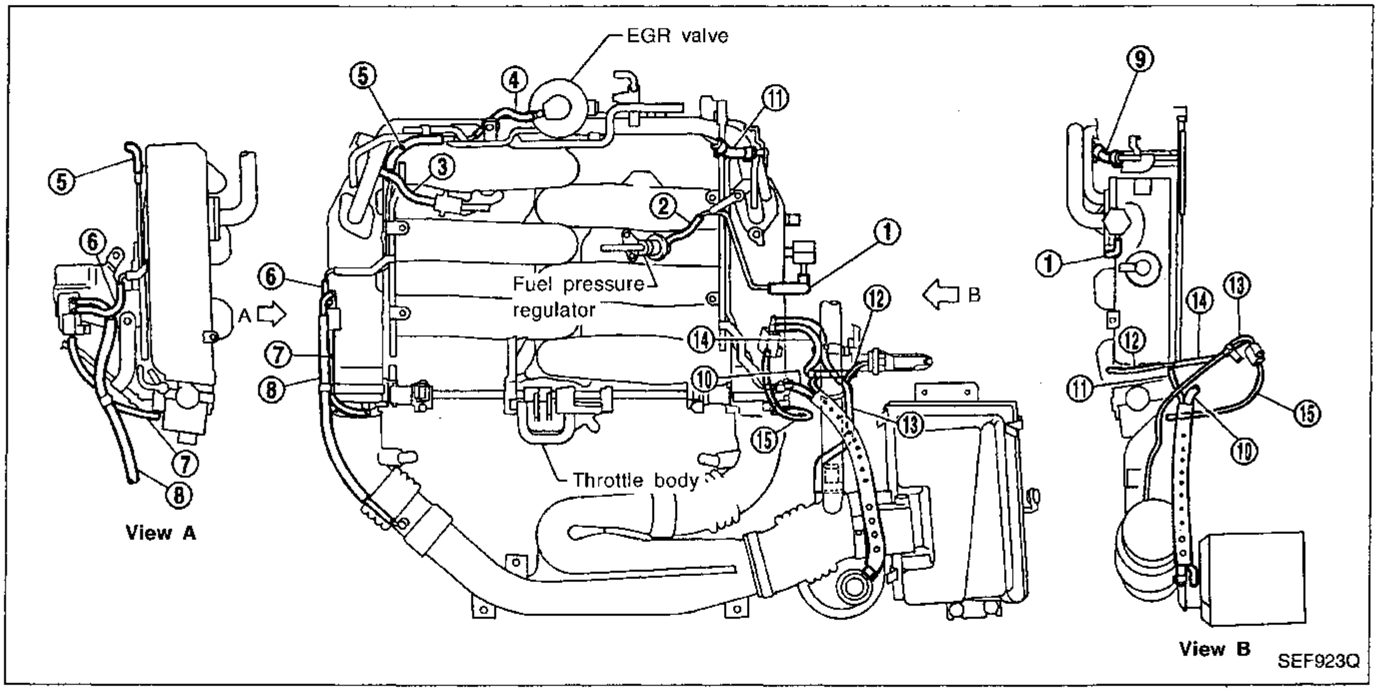
Vacuum Hose Drawing



① Fuel pressure regulator to Intake manifold collector

② Fuel pressure regulator to Vacuum gallery

③ Fuel damper to Balance tube

④ EGR valve to Rear side vacuum gallery

⑤ Rear side vacuum gallery to Right side vacuum gallery

⑥ EGRC-solenoid valve to Right side vacuum gallery

⑦ Throttle body to EGRC-solenoid valve

⑧ Air gallery to EGRC-solenoid valve

⑨ Left side vacuum gallery to Balance tube

⑩ EVAP canister (purge port) to Purge tube

⑪ EVAP canister (vacuum port) to Three-way connector

⑫ Canister control vacuum check switch to Three-way connector

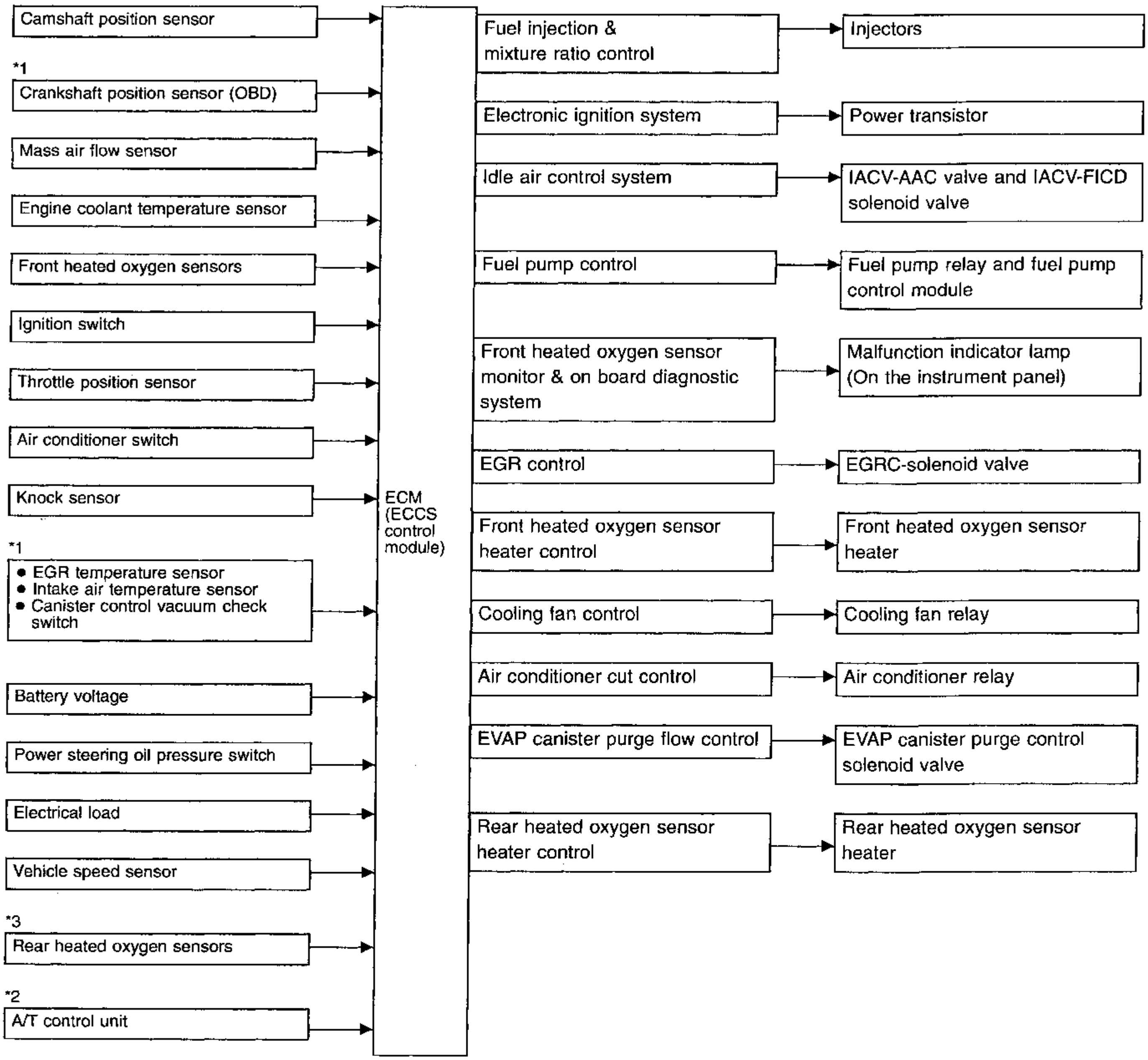
⑬ EVAP canister purge control solenoid valve to Air duct

⑭ EVAP canister purge control solenoid valve to Three-way connector

⑮ EVAP canister purge control solenoid valve to Throttle body

Refer to "System Diagram" in ENGINE AND EMISSION CONTROL SYSTEM for vacuum control system.

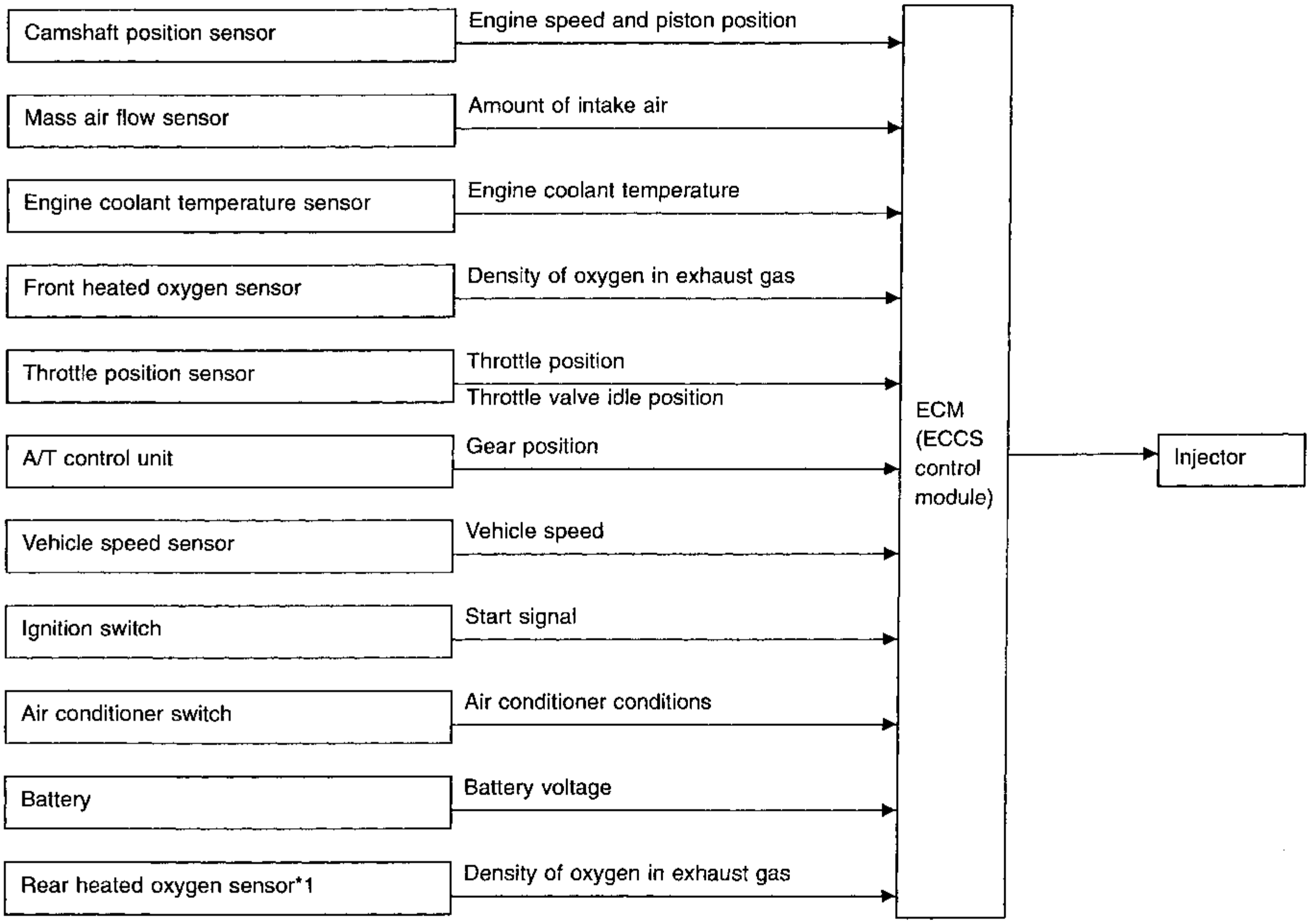
System Chart



*1: These sensors are not used to control the engine system. They are used only for the on board diagnosis.
*2: The DTC related to A/T and gear position will be sent to ECM.
*3: This sensor is not used to control the engine system under normal conditions.

Multiport Fuel Injection (MFI) System

INPUT/OUTPUT SIGNAL LINE



*1: This sensor is not used to control the engine system under normal conditions.

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

The amount of fuel injected is compensated for to improve engine performance. This will be made under various operating conditions as listed below.

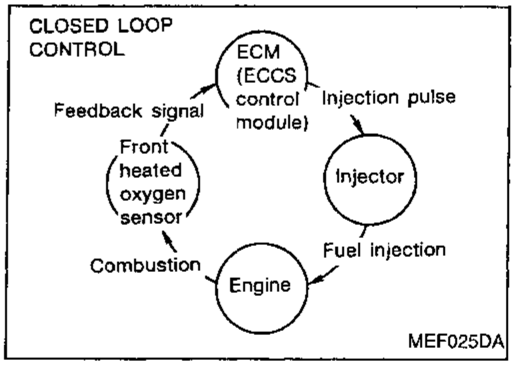
⟨Fuel increase⟩

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

⟨Fuel decrease⟩

- During deceleration
- During high speed operation

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



MIXTURE RATIO FEEDBACK 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 is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about front heated oxygen sensor, refer to EC-136, 153. 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
- High-engine coolant temperature
- During warm-up
- After shifting from "N" to "D"
- 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 film) and characteristic changes during operation (i.e. injector clogging) directly affect mixture ratio.

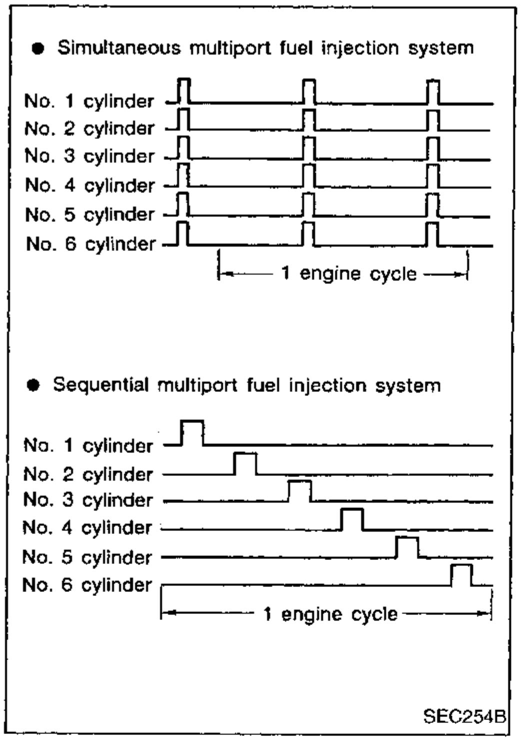
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short-term fuel trim and long-term fuel trim.

"Short-term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from the front heated oxygen sensor indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.

"Long-term fuel trim" is overall fuel compensation carried out long-term to compensate for continual deviation of the short-term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

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



FUEL INJECTION SYSTEM

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.

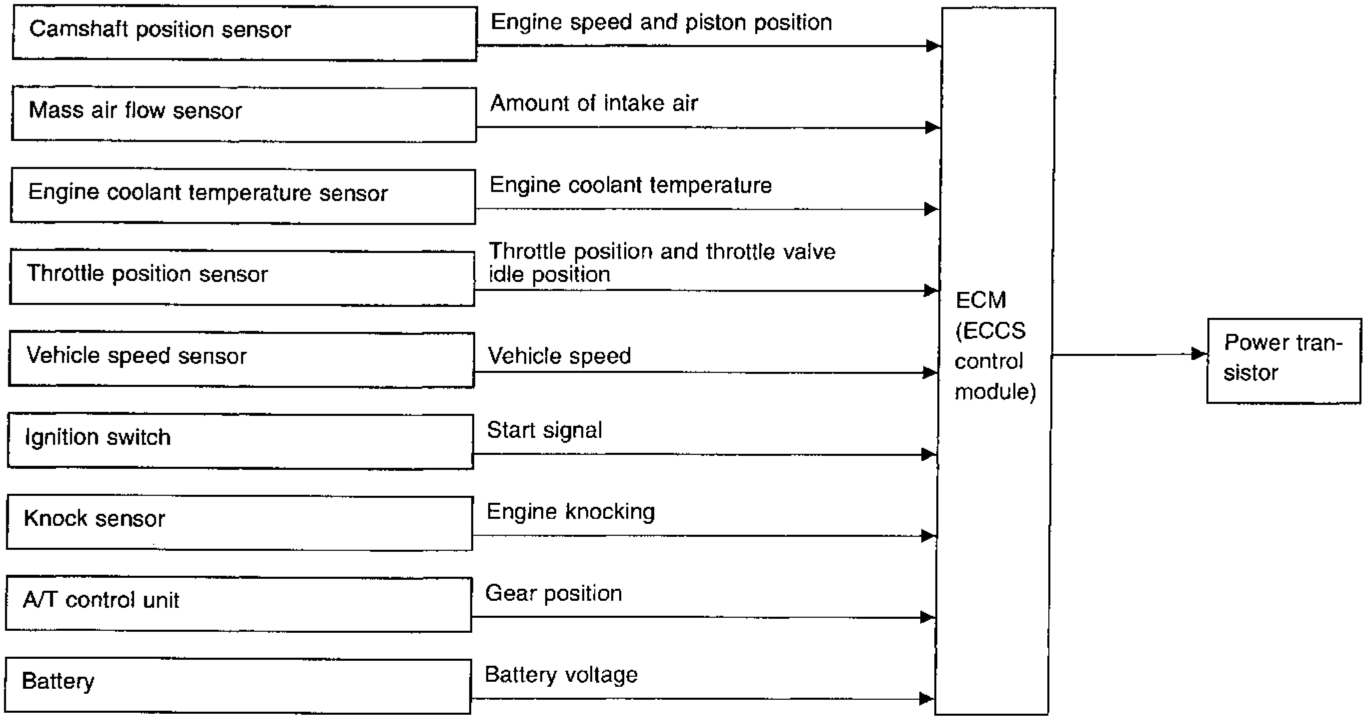
This system is used when the engine is being started and/or if the fail-safe mode (CPU) is operating.

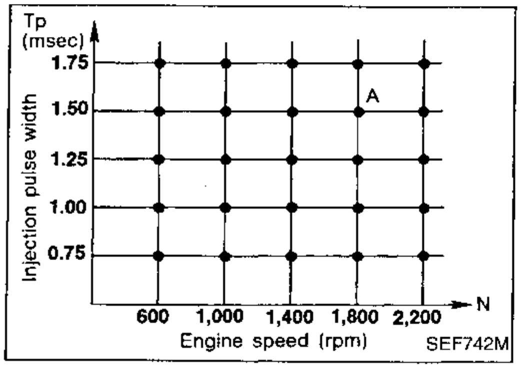
FUEL SHUT-OFF

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

Electronic Ignition (EI) System

INPUT/OUTPUT SIGNAL LINE





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 detects information such as the injection pulse width and camshaft position sensor signal. Responding to 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.

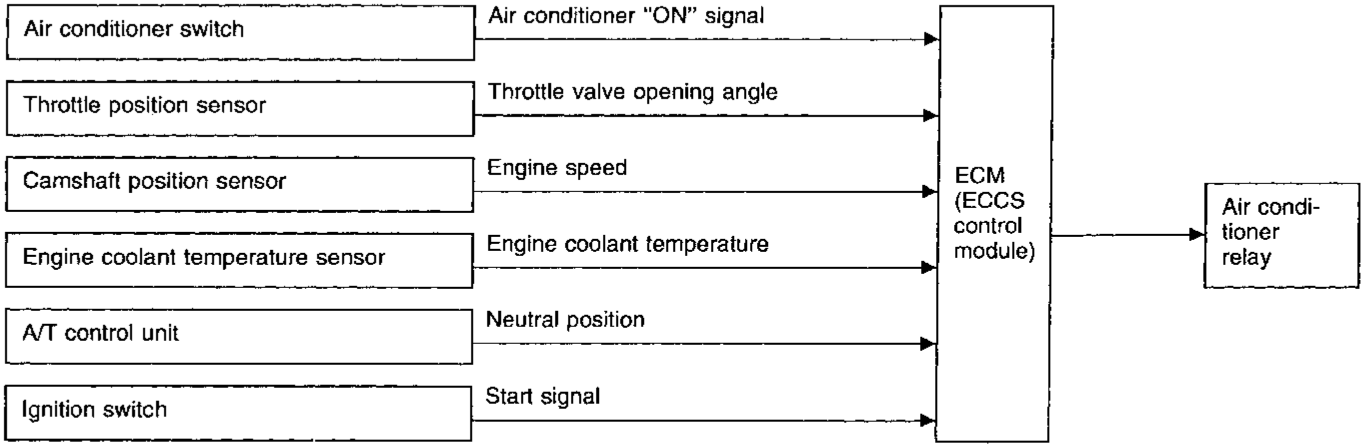
1 At starting
2 During warm-up
3 At idle
4 Hot engine operation
5 At acceleration

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions.

If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM (ECCS control module). The ECM retards the ignition timing to eliminate the knocking condition.

Air Conditioning Cut Control

INPUT/OUTPUT SIGNAL LINE



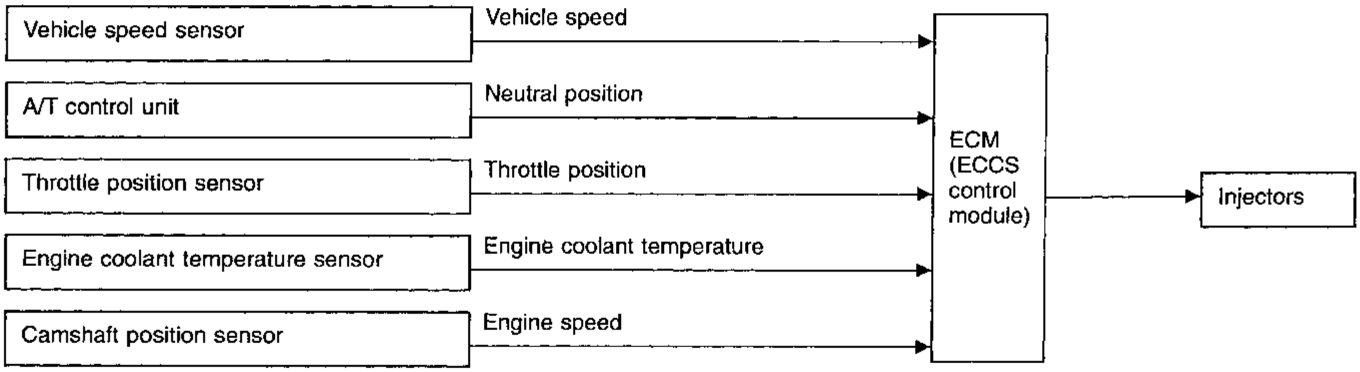
SYSTEM DESCRIPTION

This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When engine coolant temperature is excessively high.

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

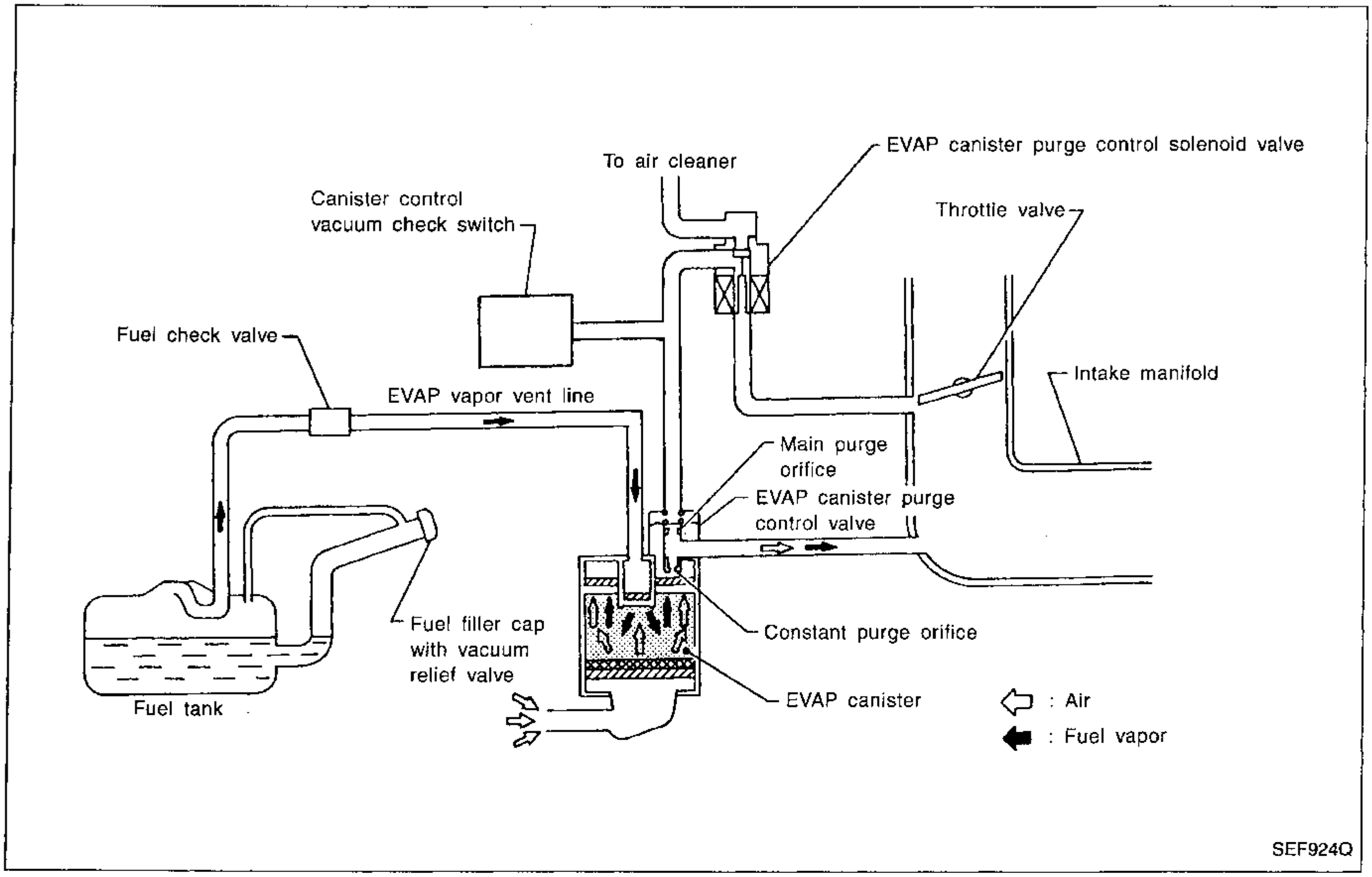
INPUT/OUTPUT SIGNAL LINE



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

NOTE:
This function is different than deceleration control listed under multiport fuel injection on EC-15.

Description



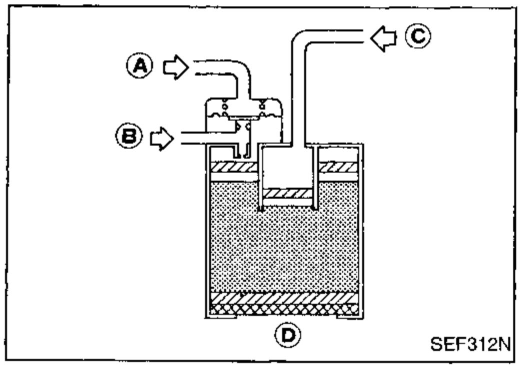
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

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

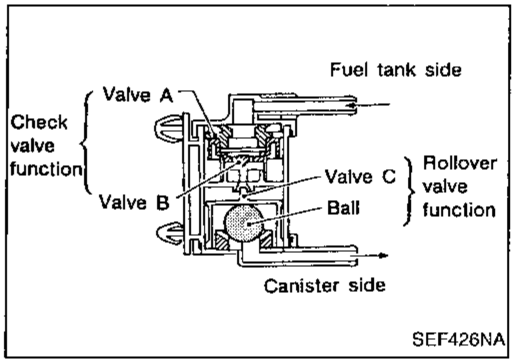
Check EVAP canister as follows:

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)]
- Cover port Ⓓ by hand.
- Blow air in port Ⓒ and check that it flows freely out of port Ⓑ.

Inspection (Cont'd)

FUEL CHECK VALVE (With rollover valve)

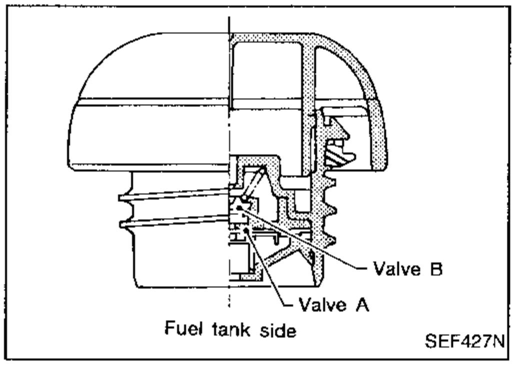


Check valve operation

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.

Rollover valve operation

Ensure that continuity of air passage does not exist when the installed rollover valve is tilted to 90° or 180°.



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.

EVAP CANISTER PURGE CONTROL SOLENOID VALVE

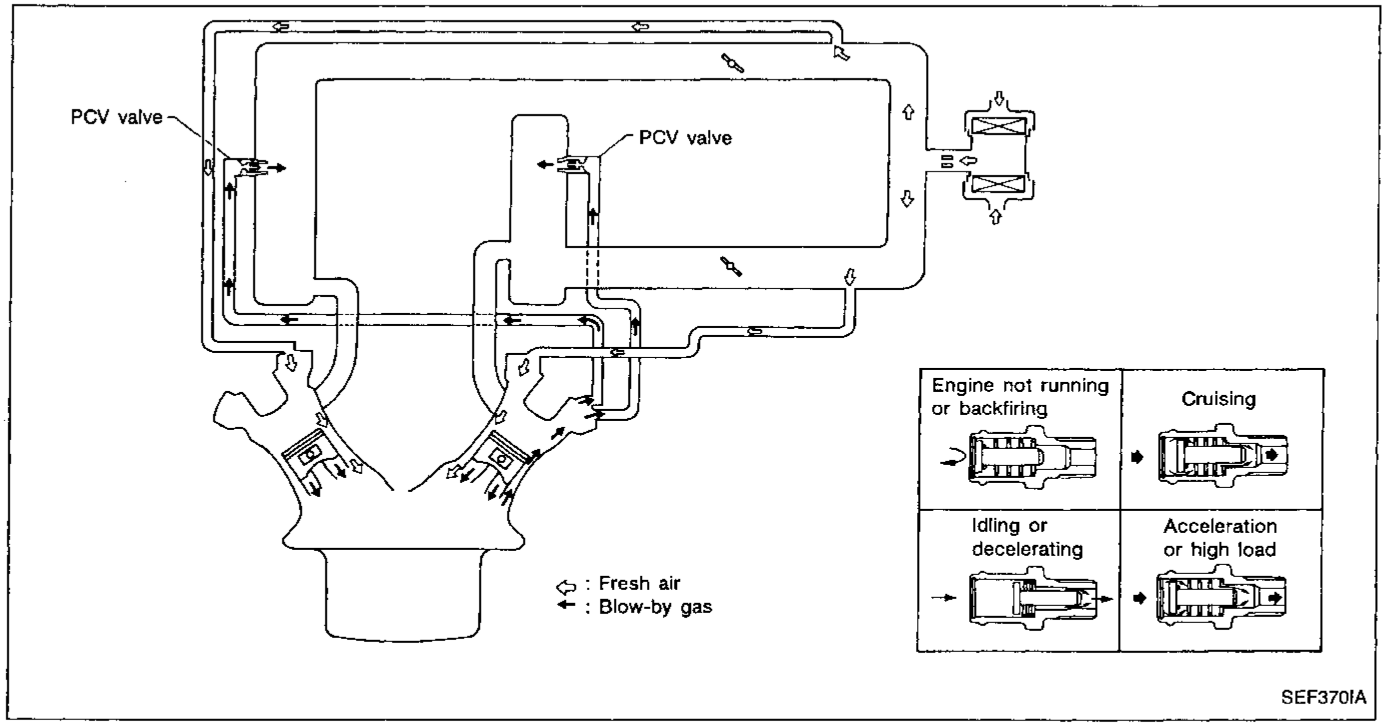
Refer to EC-228.

CANISTER CONTROL VACUUM CHECK SWITCH

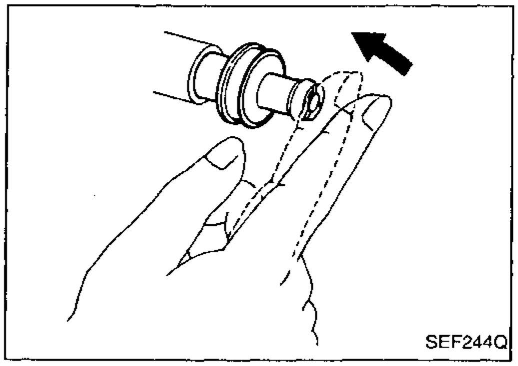
Refer to EC-277.

Description

This system returns blow-by gas to both the intake manifold and air inlet tubes.
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 air inlet tubes into crankcase through a hose. The hose connects the air inlet tubes and the rocker cover.
Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. Flow then goes through the hose connection in the reverse direction.
Under any condition, some of the flow goes through the hose connection to the air inlet tubes. This will occur on vehicles with an excessively high blow-by.



SEF370IA

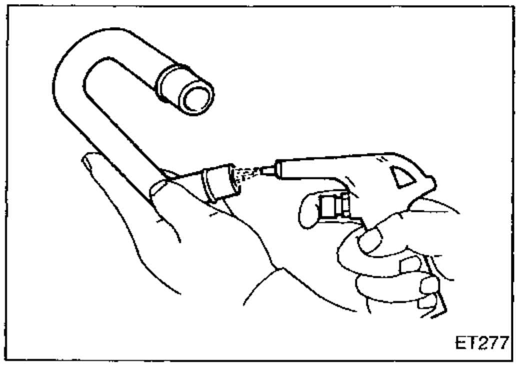


SEF244Q

Inspection

PCV (Positive Crankcase Ventilation) VALVE

With engine running at idle, remove ventilation hose from PCV valve; if 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.



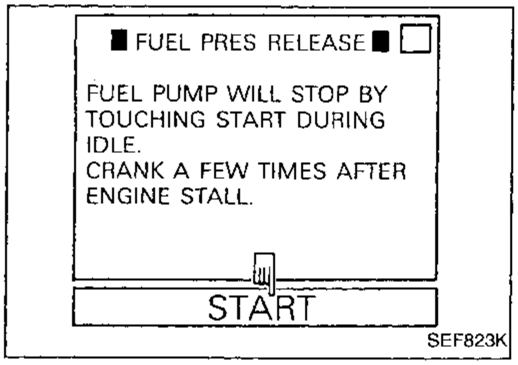
ET277

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.

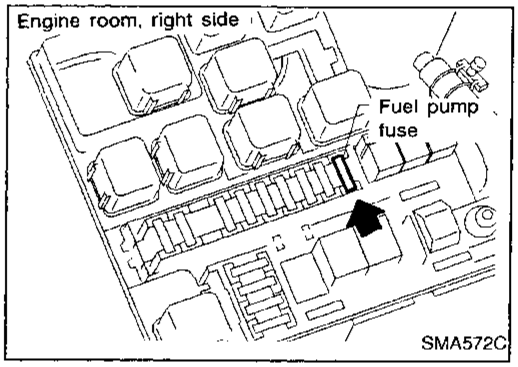


■ FUEL PRES RELEASE ■ ☐

FUEL PUMP WILL STOP BY
TOUCHING START DURING
IDLE.
CRANK A FEW TIMES AFTER
ENGINE STALL.

SEF823K

1. Start engine.
2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT.
   (Touch "START" and after engine stalls, crank it two or three times to release all fuel pressure.)
3. Turn ignition switch off.



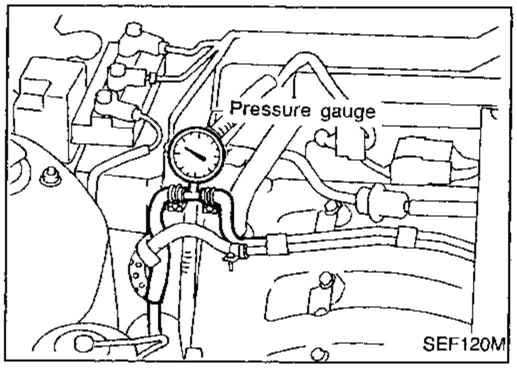
SMA572C

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

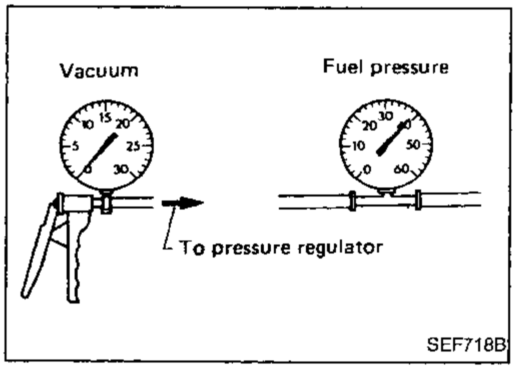
Fuel Pressure Check

- **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.**

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.



SEF120M

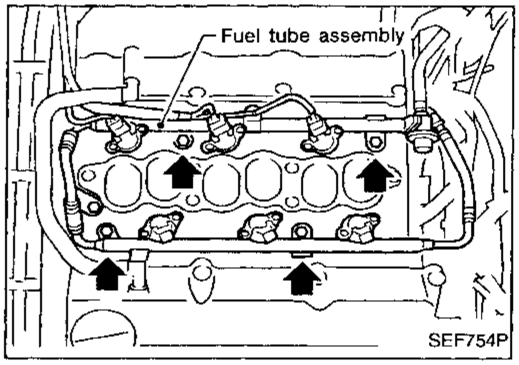


SEF718B

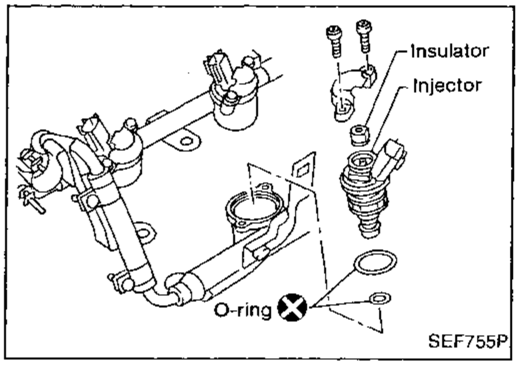
5. Read the indication of fuel pressure gauge.
   At idling:
   When fuel pressure regulator valve vacuum hose is connected.
   Approximately 250.1 kPa (2.55 kg/cm^2, 36.3 psi)
   When fuel pressure regulator valve vacuum hose is disconnected.
   Approximately 299.1 kPa (3.05 kg/cm^2, 43.4 psi)
6. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
7. Plug intake manifold with a rubber cap.
8. Connect variable vacuum source to fuel pressure regulator.
9. 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



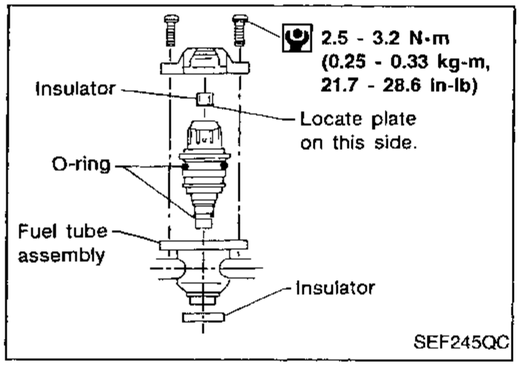
1. Release fuel pressure to zero.
2. Remove intake manifold collector (Refer to TIMING CHAIN in EM section).
3. Disconnect vacuum hose from pressure regulator.
4. Disconnect fuel hoses from fuel tube assembly.
5. Disconnect injector harness connectors.
6. Remove injectors with fuel tube assembly.



7. Push out any malfunctioning injector from fuel tube assembly.

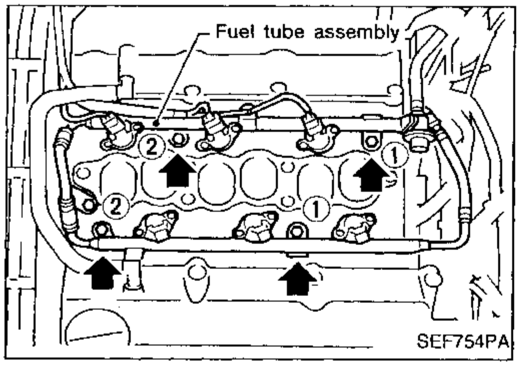
Do not extract injector by pinching connector.

8. Replace or clean injector as necessary.



9. Install injector to fuel tube assembly.

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



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

Tighten in numerical order shown in the figure.

a) First, tighten all bolts to 9.3 to 10.8 N·m (0.95 to 1.1 kg-m, 6.9 to 8.0 ft-lb).

b) Then, tighten all bolts to 16 to 20 N·m (1.6 to 2.0 kg-m, 12 to 14 ft-lb).

11. Install fuel hoses to fuel tube assembly.

Lubricate fuel hoses with a smear of engine oil.

12. Reinstall any parts removed in reverse order of removal.

CAUTION:

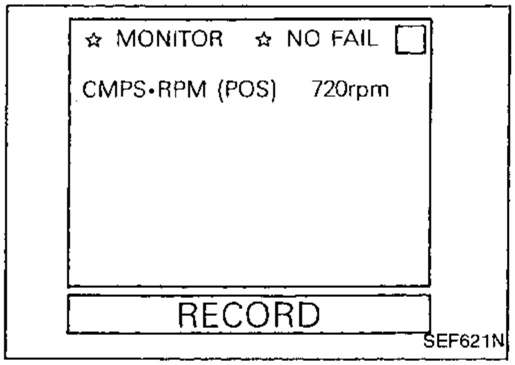
After properly connecting fuel hose to injector and fuel tube assembly, check connection for fuel leakage.

Direct Ignition System — How to Check Idle Speed and Ignition Timing

IDLE SPEED

- **Using CONSULT**

Check idle speed in “DATA MONITOR” mode with CONSULT.



☆ MONITOR ☆ NO FAIL ☐

CMPS•RPM (POS) 720rpm

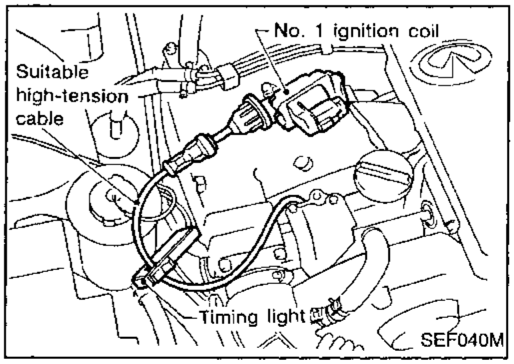
RECORD

IGNITION TIMING

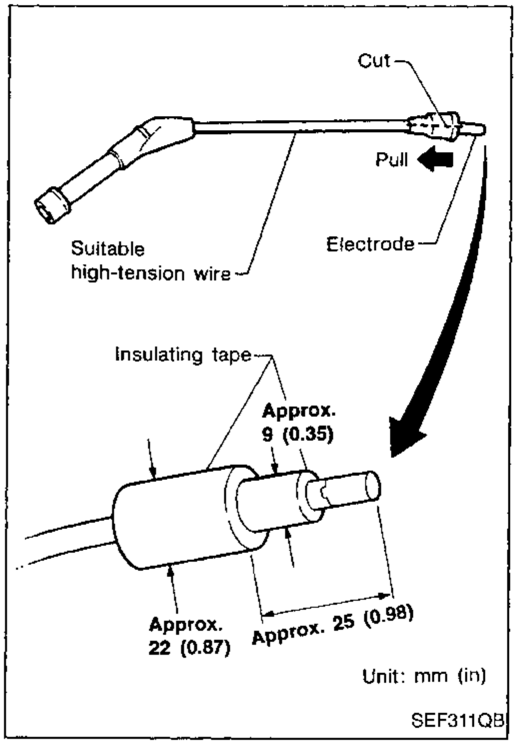
Any of following three methods may be used.

- **Method A (Without SST)**

1. Remove No. 1 or No. 6 ignition coil.
2. Connect No. 1 or No. 6 ignition coil and No. 1 or No. 6 spark plug with a suitable high-tension wire. Attach timing light as in the above procedures. Enlarge the end of the suitable high-tension wire with insulating tape as shown.
3. Check ignition timing.

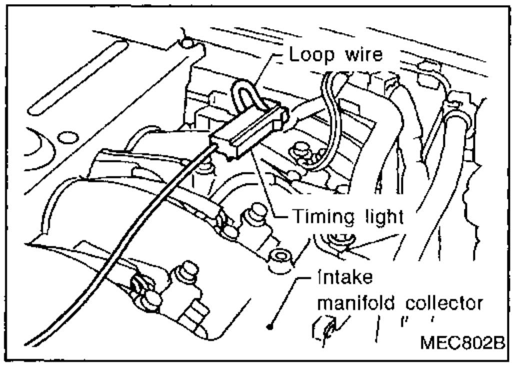


4. For the above procedures, enlarge the end of a suitable high-tension wire with insulating tape as shown.



- **Method B (Without SST)**

1. Attach timing light to loop wire as shown.
2. Check ignition timing.



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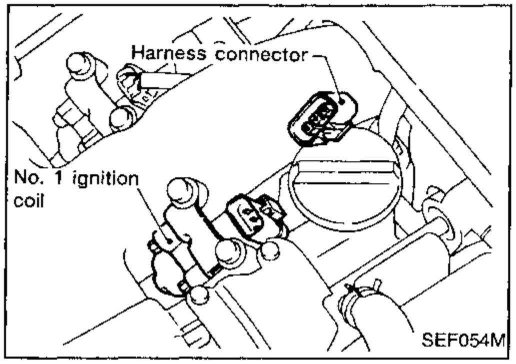
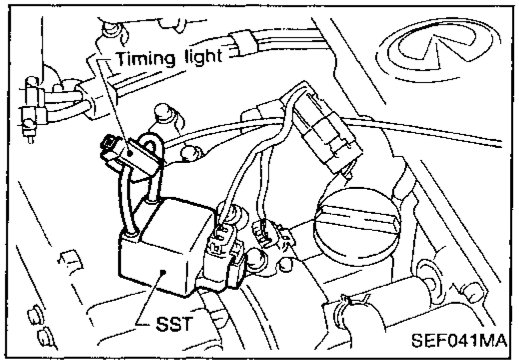
IDX

Direct Ignition System — How to Check Idle Speed and Ignition Timing (Cont'd)

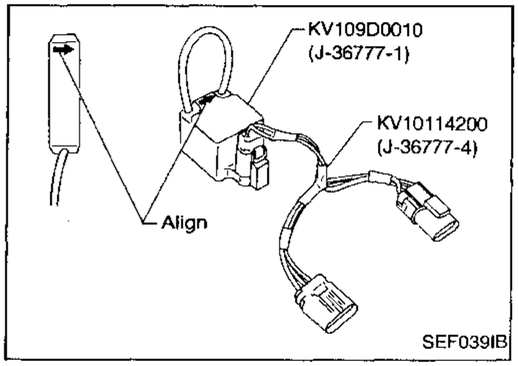


- **Method C (With SST)**

1. Disconnect No. 1 ignition coil harness connector.



2. Connect SST and clamp wire with timing light as shown.
3. Check ignition timing.



Align direction marks on SST and timing light clamp if aligning mark is punched.

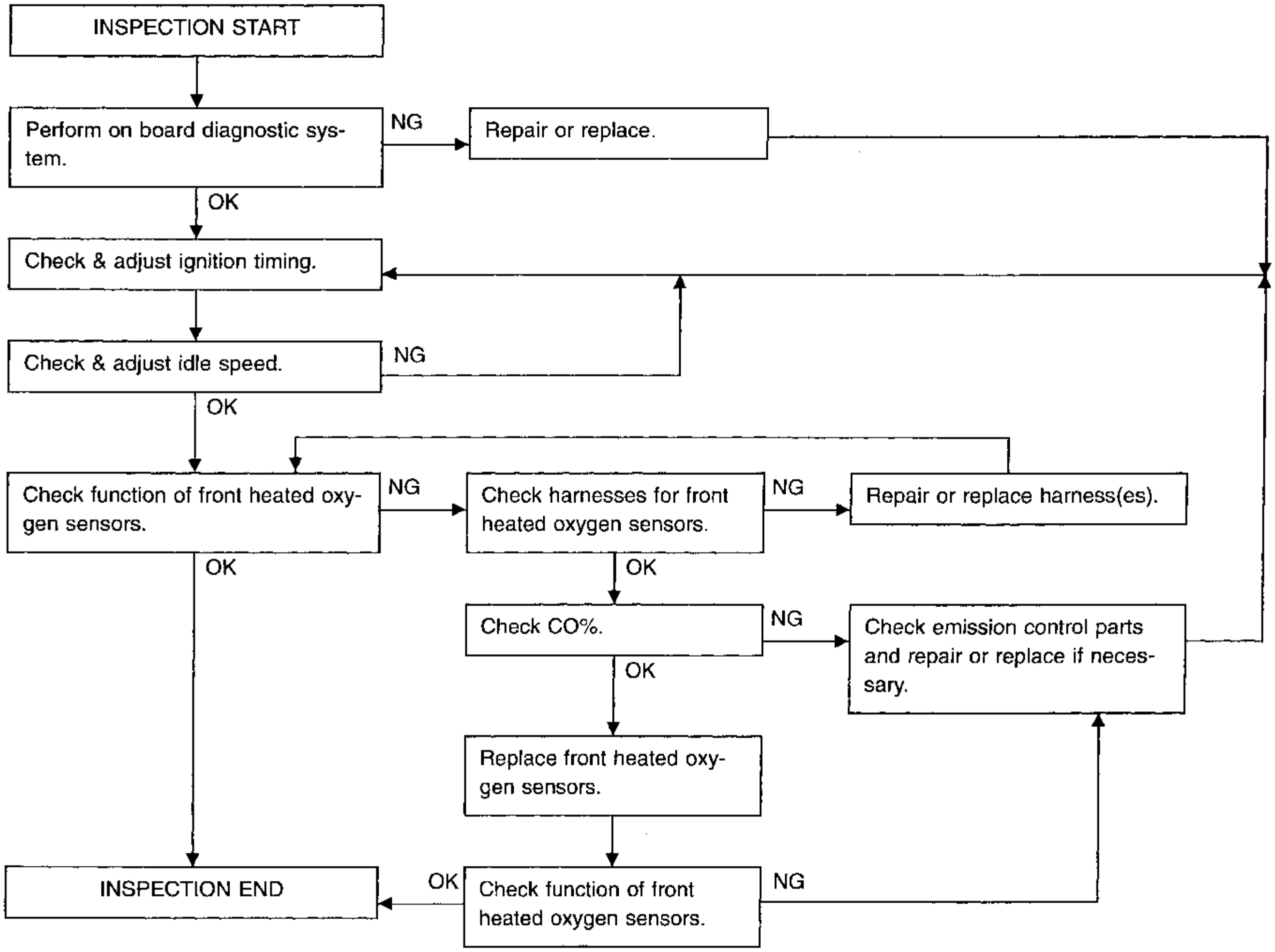
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

PREPARATION

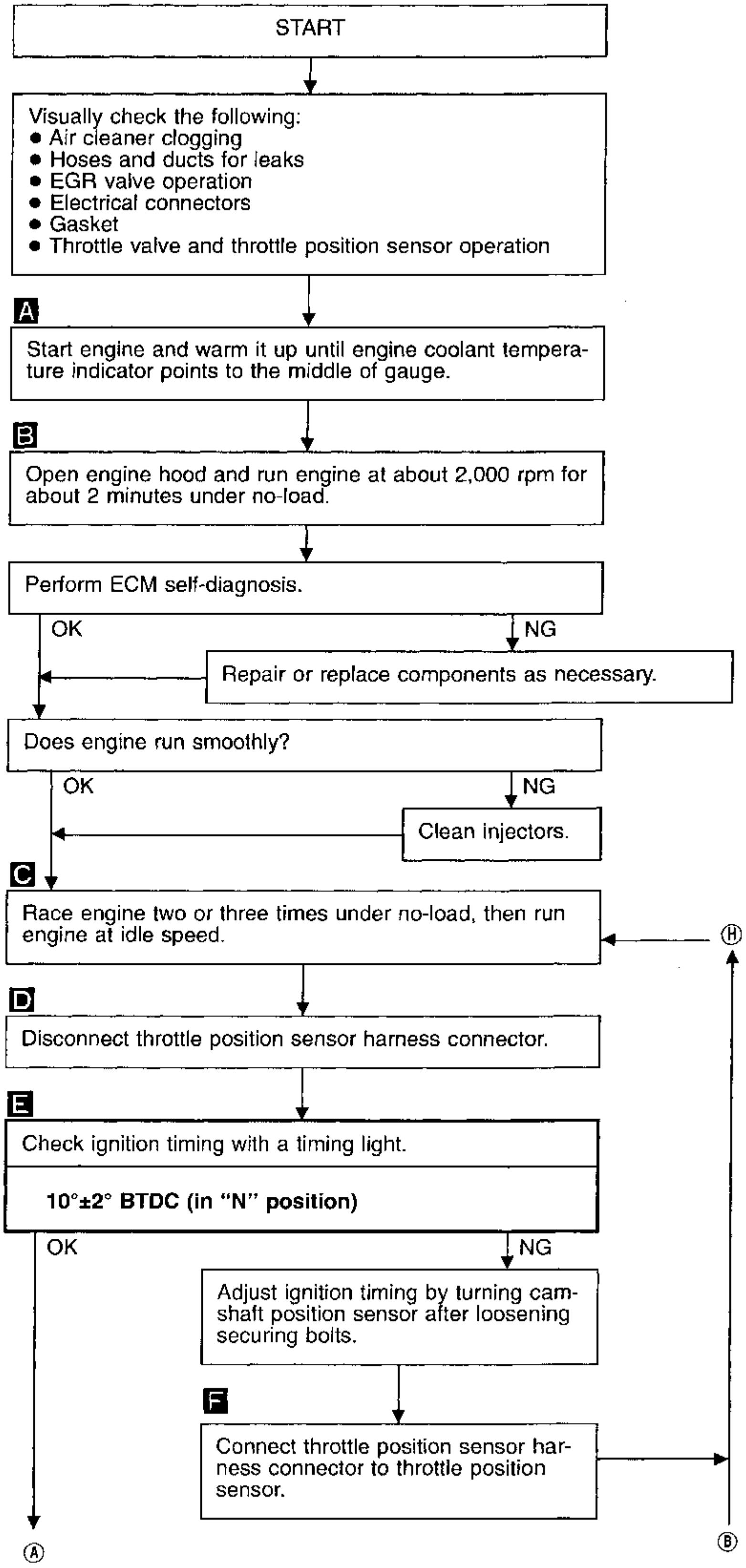
1. Make sure that the following parts are in good order.
- Battery
- Ignition system
- Engine oil and coolant levels
- Fuses
- ECM harness connector
- Vacuum hoses
- Air intake system
  (Oil filler cap, oil level gauge, etc.)
- Fuel pressure
- Engine compression
- EGR valve operation
- Throttle valve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



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.

B

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

Perform ECM self-diagnosis.

OK

NG

Repair or replace components as necessary.

Does engine run smoothly?

OK

NG

Clean injectors.

C

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

Ⓗ

D

Disconnect throttle position sensor harness connector.

E

Check ignition timing with a timing light.

10°±2° BTDC (in "N" position)

OK

NG

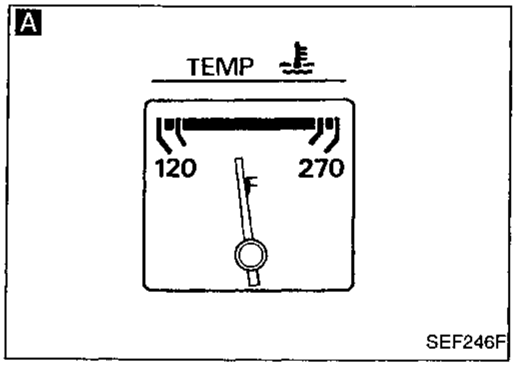
Adjust ignition timing by turning camshaft position sensor after loosening securing bolts.

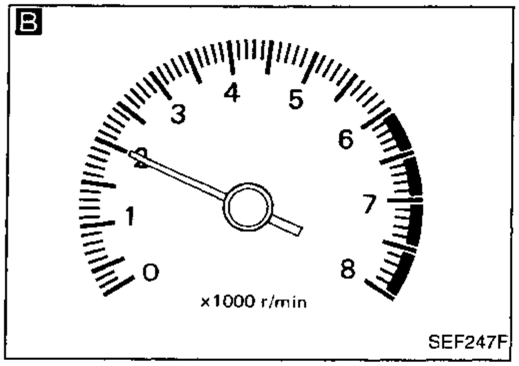
F

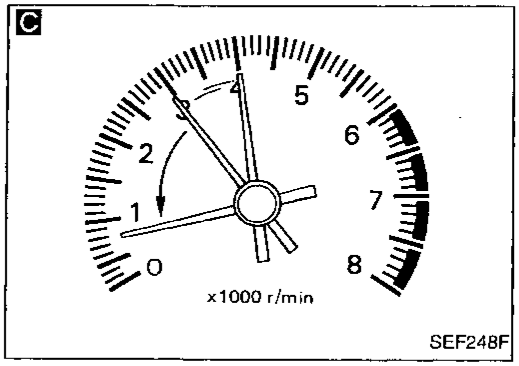
Connect throttle position sensor harness connector to throttle position sensor.

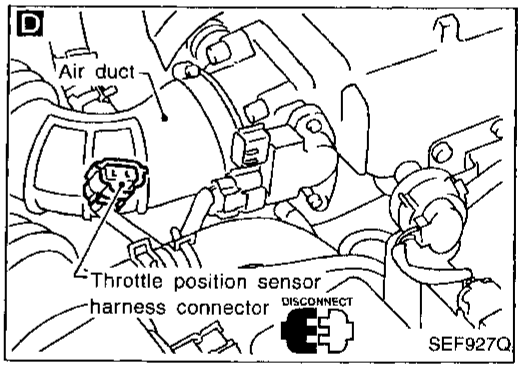
Ⓐ

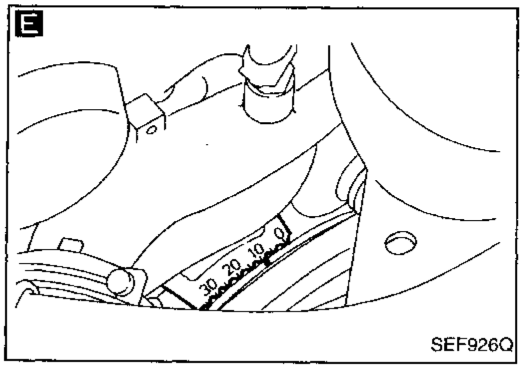
Ⓑ



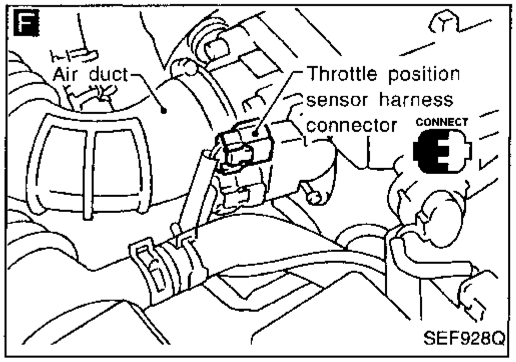


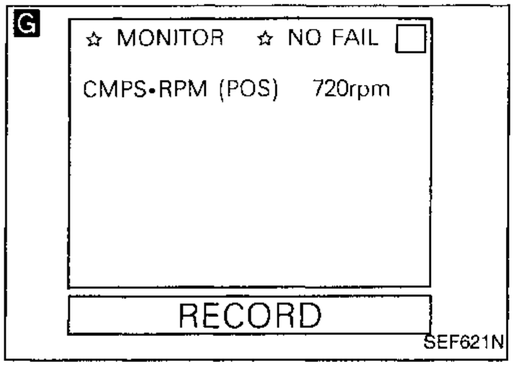






Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

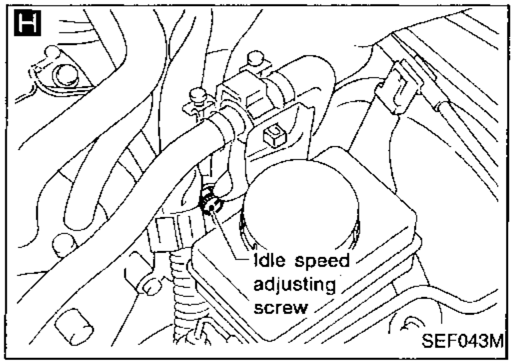


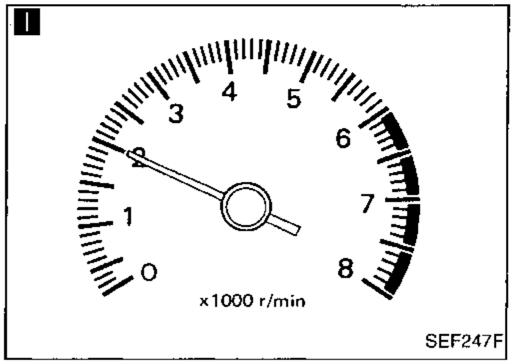


☆ MONITOR ☆ NO FAIL ☐

CMPS•RPM (POS) 720rpm

RECORD





Ⓐ

↓

Connect throttle position sensor harness connector.

↓

G

Check idle speed.

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

OR

Check idle speed.

720±50 rpm (in "N" position)

OK → **I**

NG ↓

Disconnect throttle position sensor harness connector.

↓

H

Adjust idle speed by turning idle speed adjusting screw.

670±50 rpm (in "N" position)

↓

Connect throttle position sensor harness connector.

→ Ⓑ

I

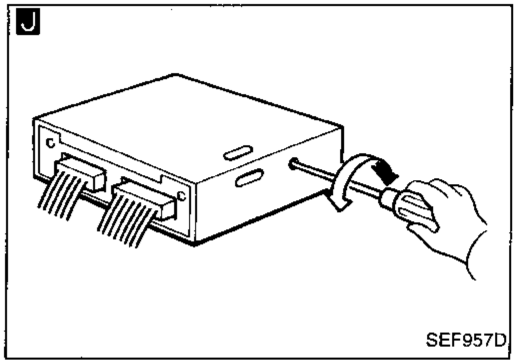
Run engine at about 2,000 rpm for about 2 minutes under no-load. ← Ⓘ

↓

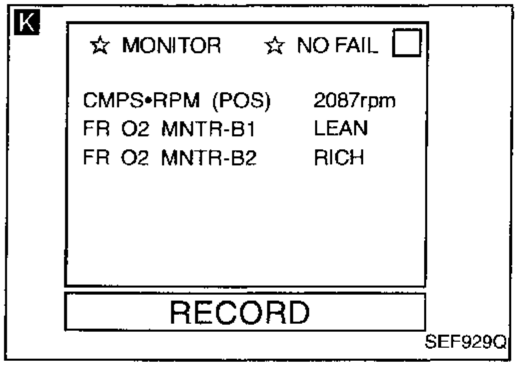
Ⓓ

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

J


SEF957D

K

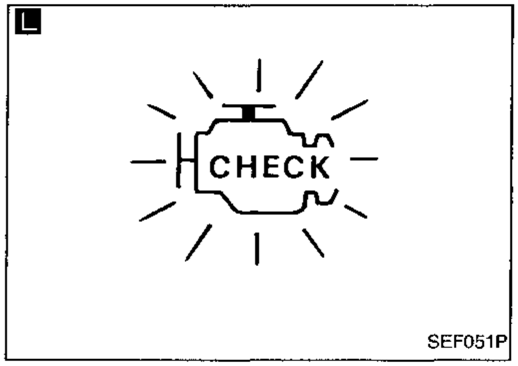

☆ MONITOR ☆ NO FAIL ☐

CMPS•RPM (POS) 2087rpm
FR O2 MNTR-B1 LEAN
FR O2 MNTR-B2 RICH

RECORD

SEF929Q

L



SEF051P

Ⓓ

J

Set the diagnosis mode of ECM to Diagnostic Test Mode II (Front heated oxygen sensor monitor).

K **L**

Check front heated oxygen sensor LH signal.

1) See "FR O2 MNTR-B2" 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

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 → Ⓛ

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) 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

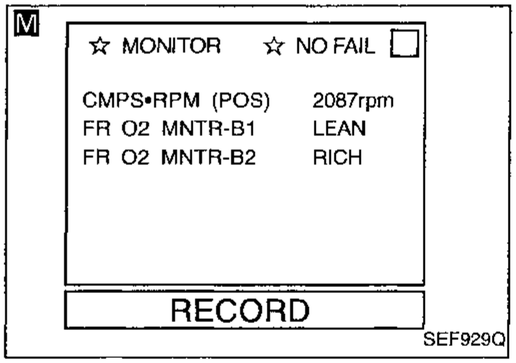
Make sure that malfunction indicator lamp goes on more than 5 times during 10 seconds at 2,000 rpm.

OK → Ⓛ

NG → Ⓚ

Ⓔ

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

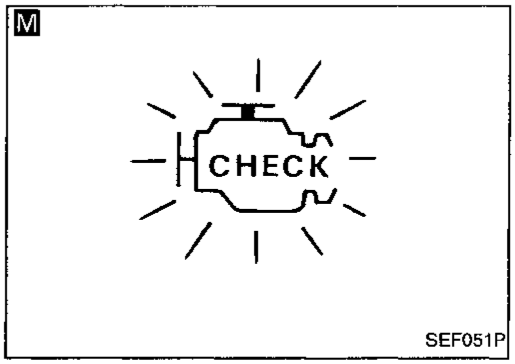


☆ MONITOR ☆ NO FAIL ☐

CMPS•RPM (POS)	2087rpm
FR O2 MNTR-B1	LEAN
FR O2 MNTR-B2	RICH

RECORD

SEF929Q



SEF051P

Ⓛ

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

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

Make sure that malfunction indicator lamp goes on more than 5 times during 10 seconds at 2,000 rpm.

NG → Ⓔ

OK → END

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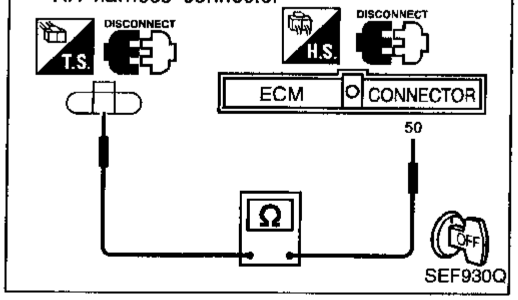
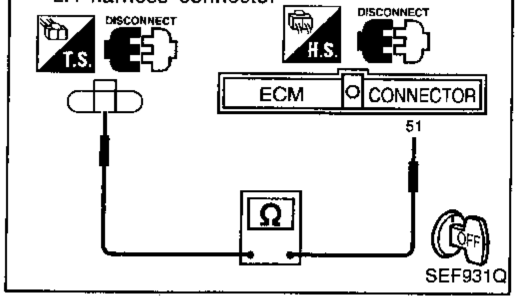
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment (Cont'd)

N Front heated oxygen sensor RH harness connector



SEF930Q

O Front heated oxygen sensor LH harness connector



SEF931Q

N Ⓒ

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. 50 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. → Ⓘ

Connect ECM SMJ harness connector to ECM.

O Ⓕ

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. 51 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.

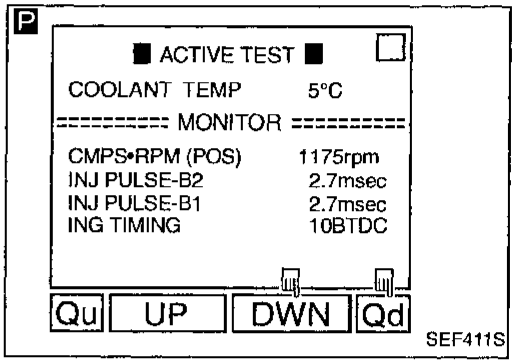
NG → Repair or replace harness. → Ⓘ

Connect ECM SMJ harness connector to ECM.

Ⓖ

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

P



■ ACTIVE TEST ■ ☐

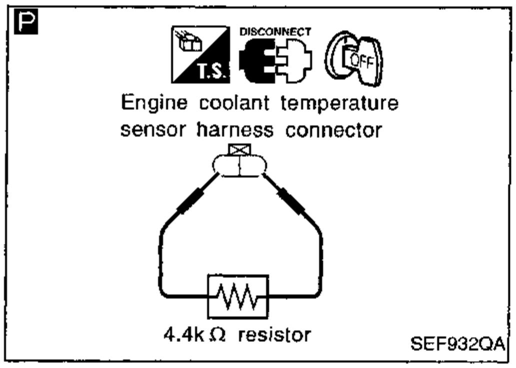
COOLANT TEMP 5°C

========== MONITOR ==========

CMPS•RPM (POS)	1175rpm
INJ PULSE-B2	2.7msec
INJ PULSE-B1	2.7msec
ING TIMING	10BTDC

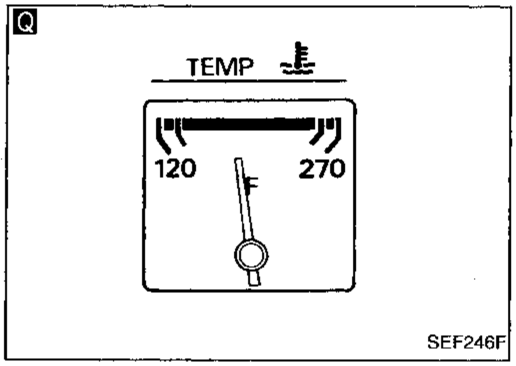
SEF411S

P



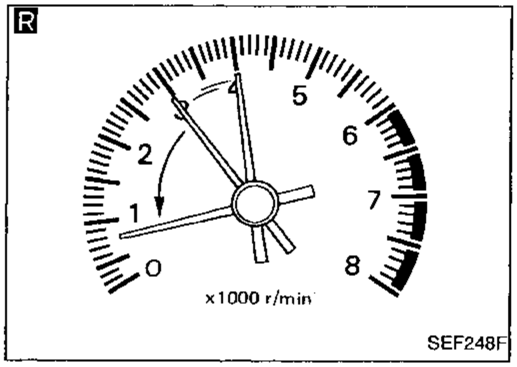
SEF932QA

Q



SEF246F

R



SEF248F

Ⓖ

P

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

OR

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

Q

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

R

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

Check "CO" %.

Idle CO: 3.5 - 11.5%

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.

OK → Ⓙ

NG

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

Check fuel pressure regulator. ← Ⓚ

Check mass air flow sensor.

Check injector.
Clean or replace if necessary.

Check engine coolant temperature sensor.

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

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

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

Introduction

The ECM (ECCS control module) has an on board diagnostic system, which detects engine system malfunctions related to sensors or actuators. The ECM also has a memory function which detects various emission-related diagnostic information. This includes:

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

These data can be verified using procedures listed in the table below.

	DTC	1st trip DTC	F.F. data	1st trip F.F. data	SRT code	Test value
Diagnostic test mode II (Self-diagnostic results) of ECM	○	○*1				
CONSULT	○	○	○	○	○	○
GST	○	○*2	○		○	○

*1: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.
*2: 1st trip DTCs for self-diagnoses concerning SRT items cannot be shown on the GST display.

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode (Refer to EC-91.).

Two Trip Detection Logic

When a malfunction is detected for the first time, 1st trip DTC and 1st trip F.F. data are stored in the ECM memory. The MIL will not light up at this stage.〈1st trip〉

If the same malfunction is detected again during the next drive, the DTC and F.F. data are stored in the ECM memory, and the MIL lights up. The MIL lights up simultaneously when the DTC is stored.〈2nd trip〉

The "trip" in the "Two Trip Detection Logic" means performing of the "DTC CONFIRMATION PROCEDURE".

Specific on board diagnostic items will cause the MIL to light up or blink, even in the 1st trip, as shown below.

Items	MIL			DTC		1st trip DTC	
	1st trip		2nd trip lighting up	1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up					
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 (0701 - 0603) is being detected	X			X		X	
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 (0701 - 0603) has been detected		X		X		X	
Closed loop control — DTC: P0130 (0307), P0150 (0308)		X		X		X	
Fail-safe items (Refer to EC-91.)		X		X*1		X*1	
Except above			X		X	X	X

*1: Except "ECM".

Emission-related Diagnostic Information

DTC AND 1ST TRIP DTC

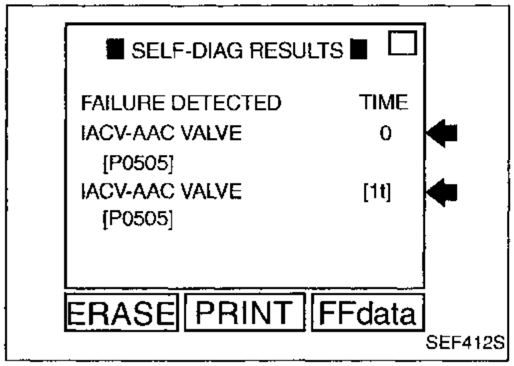
The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained after the ECM memory is cleared. When the self-diagnosis results in "NG" for the 1st trip, the 1st trip DTC is stored in the ECM memory. If the self-diagnosis results in "OK" for the 2nd trip, the 1st trip DTC will be cleared from the ECM memory. If, on the other hand, the self-diagnosis results in "NG" for the 2nd trip, both the DTC and the 1st trip DTC will be stored in the ECM memory and the MIL will illuminate. In other words, the DTC is stored in the ECM memory and the MIL illuminates when the self-diagnosis results in "NG" in two consecutive trips. If a non-diagnostic operation (For example: Driving pattern A. Refer to EC-46.) is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored in the ECM memory. For items whose diagnosis results in "NG" after only one trip (the MIL illuminates), both the DTC and the 1st trip DTC will be stored in the ECM memory. The 1st trip DTC is also cleared if diagnosis is not performed, but two driving pattern A are performed after the MIL has illuminated. (Refer to EC-46.)
The 1st trip DTC, along with the DTC, is cleared from the ECM memory in a method outlined later. (Refer to EC-44.) For items whose 1st trip DTCs are displayed, refer to EC-42. These items are prescribed by legal regulations to continuously monitored system/components. However, other items also can be displayed on the CONSULT screen or with the ECM set in Diagnostic Test Mode II (Self-diagnostic results).
1st trip DTC detection is performed without causing the MIL to light up. This does not warn the driver of a problem. Also, the result of the 1st trip DTC detection does not bring the vehicle owner any disadvantage when the vehicle is taken in for the I/M test. When the 1st trip DTC is detected, Nissan first clears it and then tries to perform "DTC confirmation procedure" or "Overall function check" to analyze the problem. If the problem is duplicated, Nissan determines the problem as a malfunctioning item, requiring repair.
The 1st trip DTC is specified in Mode 7 of SAE J1979.

How to read DTC and 1st trip DTC

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

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

- **1st trip DTC No. is the same as DTC No.**
- **Output of the diagnostic trouble code indicates 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 as shown below. Therefore, using CONSULT (if available) is recommended.



■ SELF-DIAG RESULTS ■ ☐

FAILURE DETECTED TIME
IACV-AAC VALVE 0
[P0505]
IACV-AAC VALVE [1t]
[P0505]

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Time data which is pointed by "◆" indicates how many times the vehicle was driven after the last detection of a DTC.
If the DTC is being detected currently, the time data will be "0". On the other hand, if the 1st trip DTC is stored in the ECM, the time data will be "[1t]".

GI
MA
EM
LC
EC
FE
AT
PD
FA
RA
BR
ST
RS
BT
HA
EL
IDX

Emission-related Diagnostic Information (Cont'd)

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM has a memory function, which stores the driving condition such as fuel system status, calculated load value, engine coolant temperature, short fuel trim, long fuel trim, engine speed, vehicle speed at the moment the ECM detects a malfunction.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data, and these data, stored together with the DTC data, are called freeze frame data. The 1st trip freeze frame data can only be displayed on the CONSULT screen, not on the GST.

The data can be displayed for only one item. Therefore, the ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — 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 related items)
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected in two consecutive trips and the freeze frame data was stored. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction for the misfire. If data already stored in the ECM memory and data which occurs later have the same priority, the preceding freeze frame data remains unchanged in the ECM memory while the 1st trip freeze frame data is replaced by the most recent data. Both the freeze frame data and 1st trip freeze frame data are cleared from the ECM memory, along with DTC using procedures explained later. (Refer to EC-44.)

SYSTEM READINESS TEST (SRT) CODE

Inspection/Maintenance (I/M) tests of the on board diagnostic (OBD) II system may become the legal requirements in some states/areas. All SRT codes must be set in this case. Unless all SRT codes are set, conducting the I/M test may no longer be allowed.

SRT codes are set after diagnosis has been performed more than two times. This occurs regardless of whether the diagnosis results in "OK" or "NG", and whether or not the diagnosis is performed in consecutive trips. The table below lists the four SRT items (11 diagnoses) for the ECCS used in Y32 models.

SRT items	Self-diagnostic test items
Catalyst monitoring	• Three way catalyst function (right bank) P0420 (0720) • Three way catalyst function (left bank) P0430 (0703)
Oxygen sensor monitoring	• Front heated oxygen sensor (right bank) P0130 (0503) • Rear heated oxygen sensor (right bank) P0136 (0707) • Front heated oxygen sensor (left bank) P0150 (0303) • Rear heated oxygen sensor (left bank) P0156 (0708)
Oxygen sensor heater monitoring	• Front heated oxygen sensor heater (right bank) P0135 (0901) • Rear heated oxygen sensor heater (right bank) P0141 (0902) • Front heated oxygen sensor heater (left bank) P0155 (1001) • Rear heated oxygen sensor heater (left bank) P0161 (1002)
EGR system monitoring	• EGR function P0400 (0302)

Together with the DTC, the SRT code is cleared from the ECM memory using the method described later (Refer to EC-44). This means that after ECCS components/system are repaired or after battery terminals remain disconnected for more than 24 hours, all SRT codes are possibly cleared from the ECM memory.

Emission-related Diagnostic Information (Cont'd)

How to display SRT code

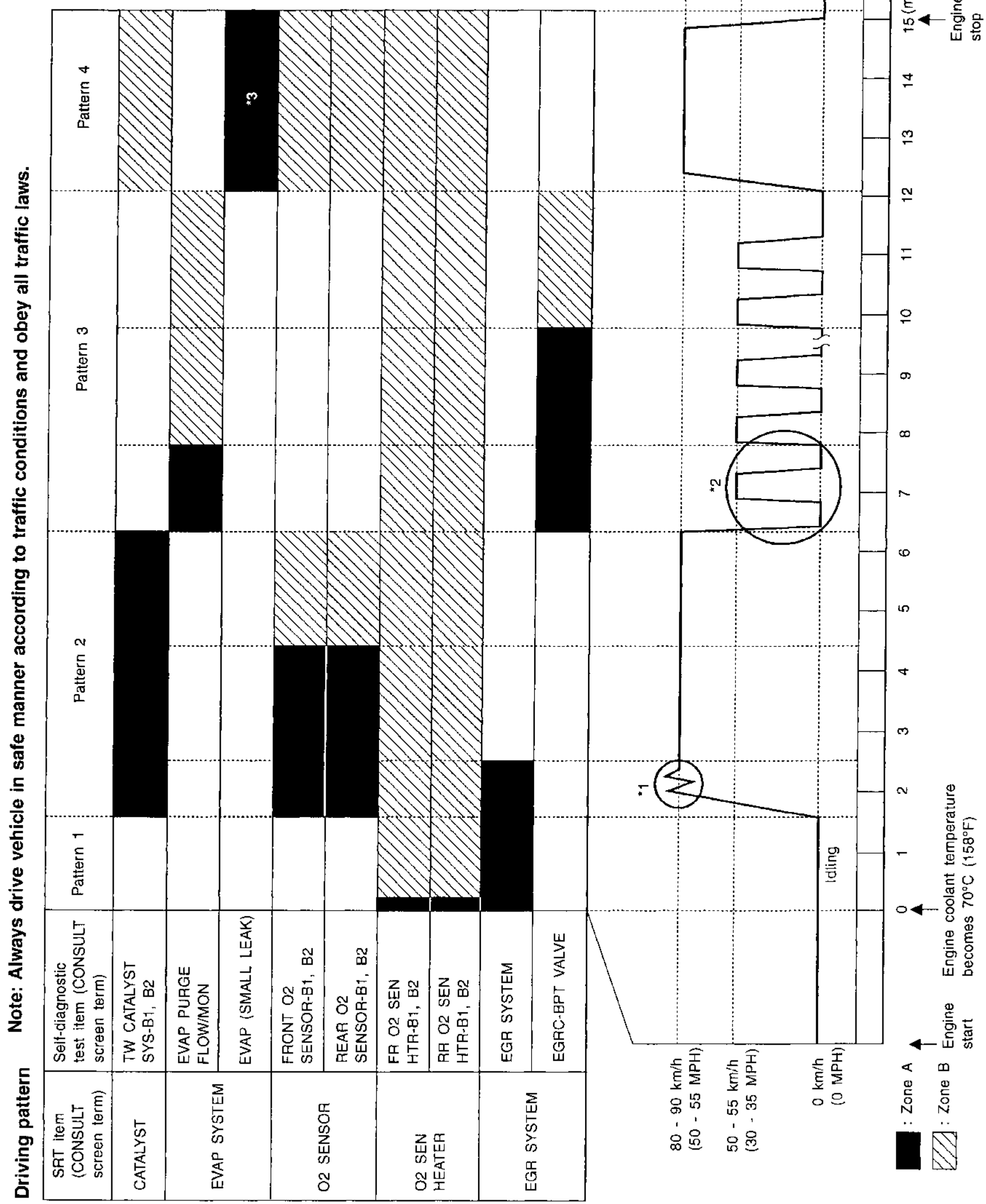
1. Selecting "SRT" in "SRT·OBT TEST VALUE" mode with CONSULT
   For items whose SRT codes are set, a "CMPLT" is displayed on the CONSULT screen; for items whose SRT codes are not set, "INCMP" is displayed.
2. Selecting Mode 1 with GST (Generic Scan Tool)

How to set SRT code

To set all SRT codes, all diagnoses indicated on the previous page must be performed at least two times. Each diagnosis may require a long period of actual driving under various conditions. The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. This type of driving pattern should be performed two times or more to set all SRT codes.
Self-diagnoses of "EVAP PURGE FLOW/MON", "EVAP (SMALL LEAK)" and "EGRC-BPT VALVE" are not provided for Y32 models. (Refer to EC-36.) Using driving patterns 1 through 3 are adequate.

Emission-related Diagnostic Information (Cont'd)

Driving pattern



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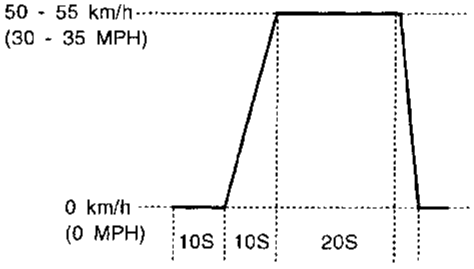
Emission-related Diagnostic Information (Cont'd)

*1: Depress the accelerator pedal until vehicle speed is 80 km/h (50 MPH), then release the accelerator pedal. Depress the accelerator pedal until vehicle speed is 80 km/h (50 MPH) again.

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



SEF414S

*3: The driving pattern may be omitted when EVAP (SMALL LEAK) checks are performed using the FUNCTION TEST mode of CONSULT.

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

*: Normal conditions refer to the following:

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

Pattern 1:
- The engine is started at the engine coolant temperature of −10 to 35°C (14 to 95°F) (where the voltage between the ECM terminals (59) and ㉕ is 3.0 - 4.3 V.)
- The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminals (59) and ㉕ is lower than 1.4 V.)

Pattern 2:
- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Pattern 3:
- The driving pattern outlined in *2 must be repeated at least 3 times.
  On M/T models, shift gears following "Suggested upshift speeds" schedule at right.

Pattern 4:
- Tests are performed after the engine has been operated for at least 12 minutes.
- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

- The driving pattern must be started from pattern 1 and performed in the numerical order of the pattern.
- Any driving condition without stopping engine is permitted between the patterns, for example, between the pattern 1 and pattern 2.

Suggested transmission gear position for A/T models.

Set the selector lever in the "D" position with the overdrive on-off switch turned on.

Suggested upshift speeds for M/T models

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

For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:

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

For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]:

Gear change	km/h (MPH)
1st to 2nd	24 (15)
2nd to 3rd	40 (25)
3rd to 4th	64 (40)
4th to 5th	72 (45)

Suggested maximum speed in each gear

Downshift to a lower gear if the engine is not running smoothly, or if you need to accelerate.

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

Gear	km/h (MPH)
1st	50 (30)
2nd	95 (60)
3rd	145 (90)
4th	—
5th	—

Emission-related Diagnostic Information (Cont'd)

TEST VALUE AND TEST LIMIT

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

Items for which these data (test value and test limit) are displayed are the same as SRT code items (11 diagnoses).

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

SRT item (CONSULT display)	Self-diagnostic test item	TID*1	CID*1	Test value	Test limit	Display
CATALYST	Three way catalyst function (Right bank)	01H	01H	Parameter 1	Max.	○
	Three way catalyst function (Left bank)	03H	02H	Parameter 1	Max.	○
EVAP SYSTEM	EVAP control system (Small leak)	05H	03H	Parameter 1	Max.	—
	EVAP control system purge flow monitoring	06H	83H	Parameter 2	Min.	—
O2 SENSOR	Front heated oxygen sensor (Right bank)	09H	04H	Parameter 1	Max.	○
		0AH	84H	Parameter 2	Min.	○
		0BH	04H	Parameter 3	Max.	○
		0CH	04H	Parameter 4	Max.	○
		0DH	04H	Parameter 5	Max.	○
	Front heated oxygen sensor (Left bank)	11H	05H	Parameter 1	Max.	○
		12H	85H	Parameter 2	Min.	○
		13H	05H	Parameter 3	Max.	○
		14H	05H	Parameter 4	Max.	○
		15H	05H	Parameter 5	Max.	○
	Rear heated oxygen sensor (Right bank)	19H	86H	Parameter 6	Min.	○
		1AH	86H	Parameter 7	Min.	○
		1BH	06H	Parameter 8	Max.	○
		1CH	06H	Parameter 9	Max.	○
	Rear heated oxygen sensor (Left bank)	21H	87H	Parameter 6	Min.	○
		22H	87H	Parameter 7	Min.	○
		23H	07H	Parameter 8	Max.	○
		24H	07H	Parameter 9	Max.	○

Emission-related Diagnostic Information (Cont'd)

SRT item (CONSULT display)	Self-diagnostic test item	TID*1	CID*1	Test value	Test limit	Display
O2 SENSOR HEATER	Front heated oxygen sensor heater (Right bank)	29H	08H	Parameter 1	Max.	○
		2AH	88H	Parameter 1	Min.	○
	Front heated oxygen sensor heater (Left bank)	2BH	09H	Parameter 1	Max.	○
		2CH	89H	Parameter 1	Min.	○
	Rear heated oxygen sensor heater (Right bank)	2DH	0AH	Parameter 1	Max.	○
		2EH	8AH	Parameter 1	Min.	○
	Rear heated oxygen sensor heater (Left bank)	2FH	0BH	Parameter 1	Max.	○
		30H	8BH	Parameter 1	Min.	○
EGR SYSTEM	EGR function	31H	8CH	Parameter 1	Min.	○
		32H	8CH	Parameter 2	Min.	○
		33H	8CH	Parameter 3	Min.	○
		34H	8CH	Parameter 4	Min.	○
		35H	0CH	Parameter 5	Max.	○
	EGRC-BPT valve function	36H	0CH	Parameter 6	Max.	—
		37H	8CH	Parameter 7	Min.	—

*1: TID and CID are hexadecimals and are shown only on GST.

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

X: Applicable
—: Not applicable

Items (CONSULT screen terms)	DTC*4		SRT code	Test value	1st trip DTC	Reference page
	CONSULT GST*2	ECM*1				
NO SELF-DIAGNOSTIC FAILURE INDICATED	**P0000**	**0505**	—	—	—	—
MASS AIR FLOW SEN	P0100	0102	—	—	X	EC-111
INT AIR TEMP SEN	P0110	0401	—	—	X	EC-116
COOLANT TEMP SEN	P0115	0103	—	—	X	EC-121
THROTTLE POSI SEN	P0120	0403	—	—	X	EC-125
*COOLANT TEMP SEN	P0125	0908	—	—	X	EC-130
CLOSED LOOP-B1	P0130	0307	—	—	X	EC-135
FRONT O2 SENSOR-B1	P0130	0503	X	X	X*3	EC-136
FR O2 SEN HTR-B1	P0135	0901	X	X	X*3	EC-141
REAR O2 SENSOR-B1	P0136	0707	X	X	X*3	EC-144
RR O2 SEN HTR-B1	P0141	0902	X	X	X*3	EC-149
CLOSED LOOP-B2	P0150	0308	—	—	X	EC-135
FRONT O2 SENSOR-B2	P0150	0303	X	X	X*3	EC-153
FR O2 SEN HTR-B2	P0155	1001	X	X	X*3	EC-158
REAR O2 SENSOR-B2	P0156	0708	X	X	X*3	EC-161
RR O2 SEN HTR-B2	P0161	1002	X	X	X*3	EC-166
FUEL SYS LEAN/BK1	P0171	0115	—	—	X	EC-170
FUEL SYS RICH/BK1	P0172	0114	—	—	X	EC-175
FUEL SYS LEAN/BK2	P0174	0210	—	—	X	EC-180
FUEL SYS RICH/BK2	P0175	0209	—	—	X	EC-185
MULTI CYL MISFIRE	P0300	0701	—	—	X	EC-190
CYL 1 MISFIRE	P0301	0608	—	—	X	EC-190
CYL 2 MISFIRE	P0302	0607	—	—	X	EC-190
CYL 3 MISFIRE	P0303	0606	—	—	X	EC-190
CYL 4 MISFIRE	P0304	0605	—	—	X	EC-190
CYL 5 MISFIRE	P0305	0604	—	—	X	EC-190
CYL 6 MISFIRE	P0306	0603	—	—	X	EC-190
KNOCK SENSOR	P0325	0304	—	—	X	EC-194
CRANK POS SEN (OBD)	P0335	0802	—	—	X	EC-197
CAMSHAFT POSI SEN	P0340	0101	—	—	X	EC-201
EGR SYSTEM	P0400	0302	X	X	X*3	EC-207
TW CATALYST SYS-B1	P0420	0702	X	X	X*3	EC-216
TW CATALYST SYS-B2	P0430	0703	X	X	X*3	EC-216

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

Emission-related Diagnostic Information (Cont'd)

X: Applicable
—: Not applicable

Items (CONSULT screen terms)	DTC*3		SRT code	Test value	1st trip DTC	Reference page
	CONSULT GST*2	ECM*1				
PURG CONT/V & S/V	P0443	0807	—	—	X	EC-219
VEHICLE SPEED SEN	P0500	0104	—	—	X	EC-229
IACV-AAC VALVE	P0505	0205	—	—	X	EC-233
A/T COMM LINE	P0600	—	—	—	—	EC-237
ECM	P0605	0301	—	—	X	EC-240
PARK/NEUT POSI SW	P0705	1003	—	—	X	EC-242
INHIBITOR SWITCH	P0705	1101	—	—	X	AT section
FLUID TEMP SENSOR	P0710	1208	—	—	X	AT section
VHCL SPEED SEN A/T	P0720	1102	—	—	X	AT section
ENGINE SPEED SIG	P0725	1207	—	—	X	AT section
A/T 1ST SIGNAL	P0731	1103	—	—	X	AT section
A/T 2ND SIGNAL	P0732	1104	—	—	X	AT section
A/T 3RD SIGNAL	P0733	1105	—	—	X	AT section
A/T 4TH SIG OR TCC	P0734	1106	—	—	X	AT section
TOR CONV CLUTCH SV	P0740	1204	—	—	X	AT section
LINE PRESSURE S/V	P0745	1205	—	—	X	AT section
SHIFT SOLENOID/V A	P0750	1108	—	—	X	AT section
SHIFT SOLENOID/V B	P0755	1201	—	—	X	AT section
FPCM	P1220	1305	—	—	X	EC-245
IGN SIGNAL-PRIMARY	P1320	0201	—	—	X	EC-251
CRANK P/S (OBD) COG	P1336	0905	—	—	X	EC-260
EGRC SOLENOID/V	P1400	1005	—	—	X	EC-264
EGR TEMP SENSOR	P1401	0305	—	—	X	EC-268
CAN CONT VC CHK SW	P1443	0113	—	—	X	EC-273
A/T DIAG COMM LINE	P1605	0804	—	—	X	EC-278
THRTL POSI SEN A/T	P1705	1206	—	—	X	AT section
OVERRUN CLUTCH S/V	P1760	1203	—	—	X	AT section
COOLING FAN	P1900	1308	—	—	X	EC-281

*1: In Diagnostic Test Mode II (Self-diagnostic results). These numbers are controlled by NISSAN.
*2: These numbers are prescribed by SAE J2012.
*3: 1st trip DTC No. is the same as DTC No.

Emission-related Diagnostic Information (Cont'd)

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

The emission-related diagnostic information 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 by turning the mode selector on the ECM (Refer to EC-52.)

- **If the battery terminal is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **When you erase the emission-related diagnostic information, using CONSULT or GST is easier and quicker than switching the mode selector on the ECM.**

The following data are cleared from the ECM memory in the mode obtained.

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

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

How to erase DTC (With CONSULT)

Note: If the diagnostic trouble code is not for A/T related items (see EC-88), skip steps 2 through 4.

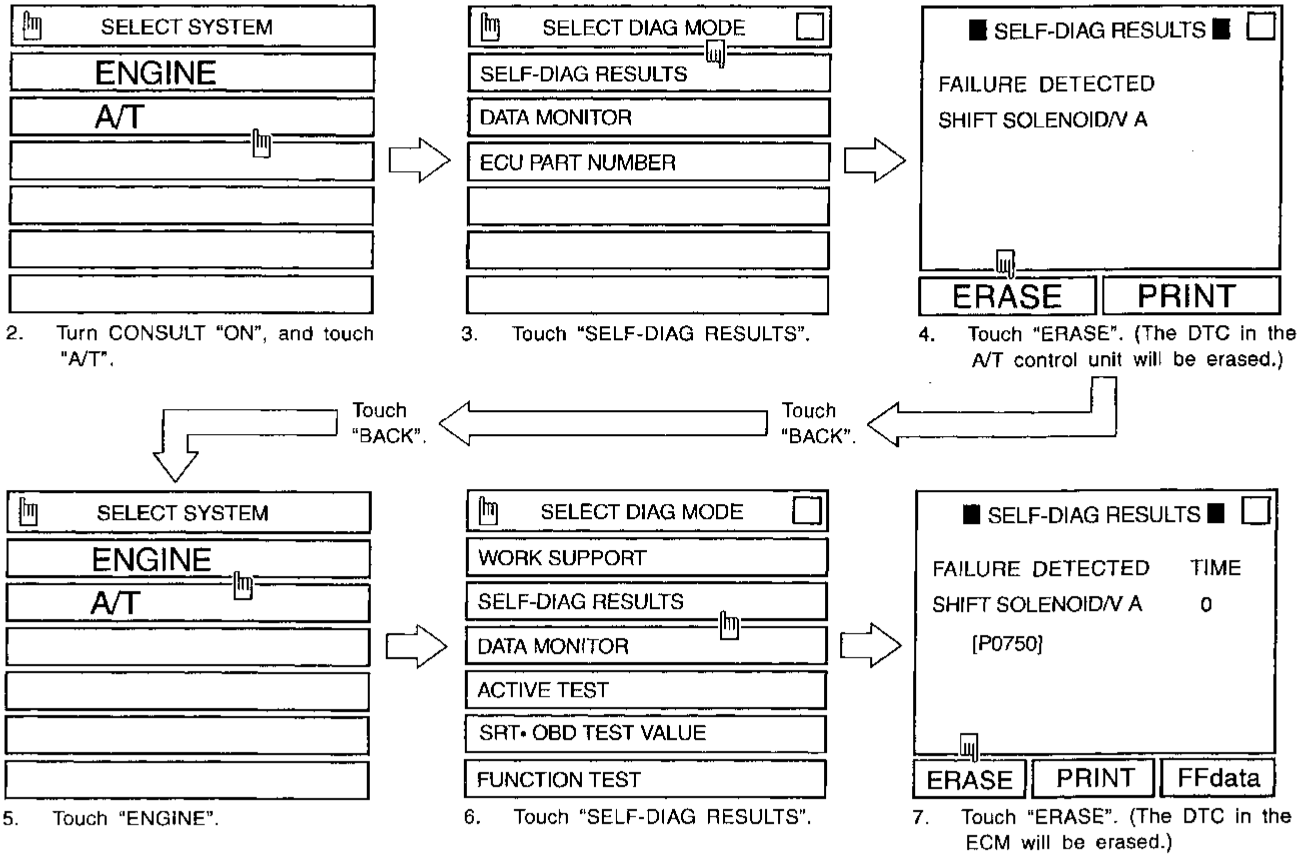
1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.
2. Turn CONSULT "ON" and touch "A/T".
3. Touch "SELF-DIAG RESULTS".
4. Touch "ERASE". (The DTC in the A/T control unit will be erased.)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

- If DTCs are displayed for both ECM and A/T control unit, they need to be erased individually for both ECM and A/T control unit.

Emission-related Diagnostic Information (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)

Note: If the diagnostic trouble code is not for A/T related items (see page EC-88), 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)

Note: If the diagnostic trouble code is not for A/T related items (see EC-88), 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 titled "TROUBLE DIAGNOSIS", "Self-diagnosis". (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Change the diagnostic test mode from Mode II to Mode I by turning the mode selector on the ECM. (See EC-52.)

OBD System Operation Chart

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

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to "Two Trip Detection Logic" on EC-34.
- The MIL will go off after the vehicle is driven 3 times with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset. The MIL will remain on until the vehicle is driven (in the recorded driving pattern) 3 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.
- The 1st trip DTC is not displayed when the following conditions are met.

i) Diagnosis is not performed but two driving pattern A's are performed after the MIL has illuminated.
ii) The self-diagnosis results in "OK" for the 2nd trip.

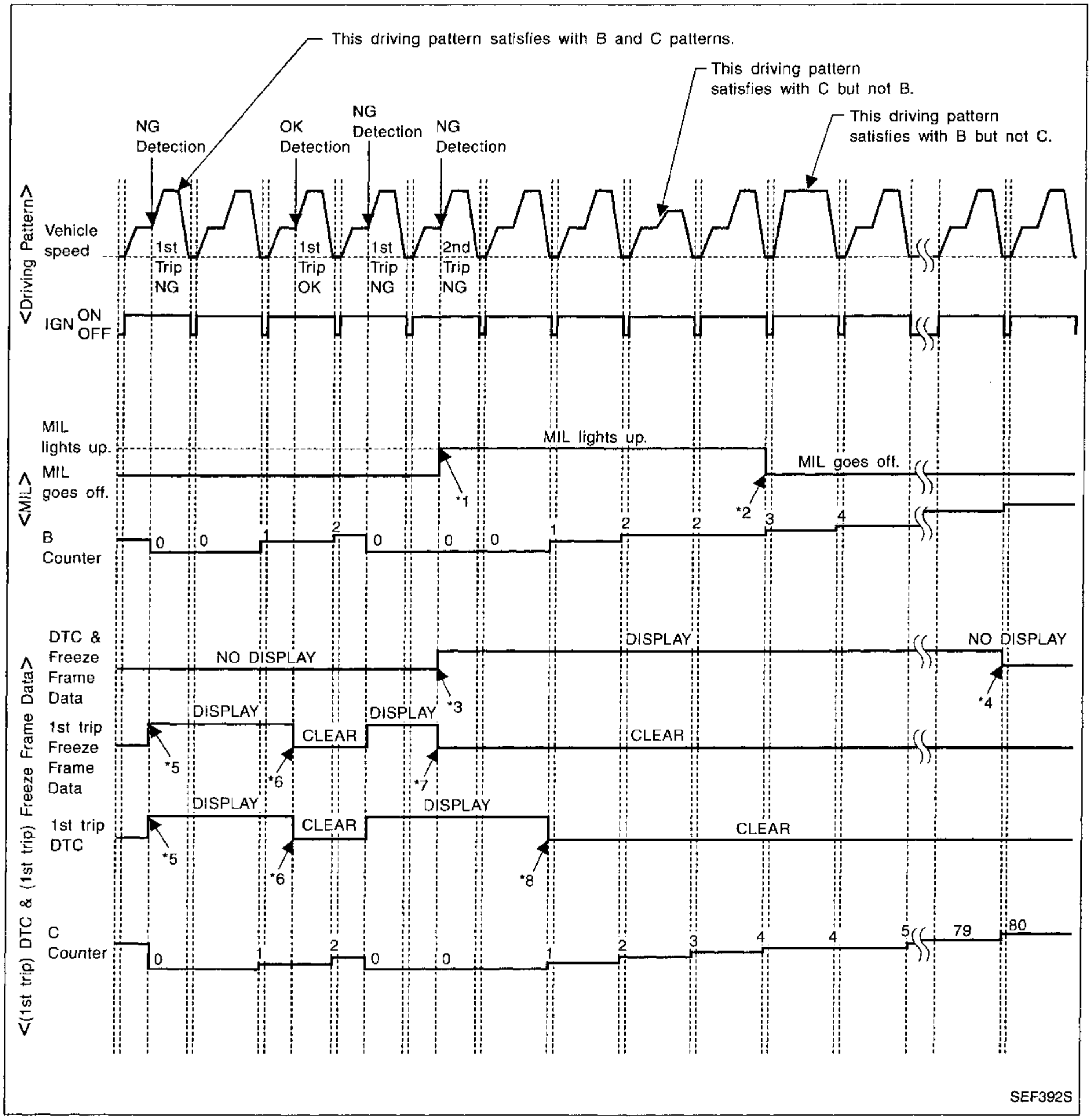
SUMMARY CHART

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

Details about patterns "A", "B", and "C" are on EC-50.
*1: Clear timing is at the moment OK is detected.
*2: Clear timing is when the same malfunction is detected in the 2nd trip.

OBD System Operation Chart (Cont'd)

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS 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 3 times (pattern B) without any malfunctions.

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

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

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

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

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

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

OBD System Operation Chart (Cont'd)

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

⟨Driving pattern B⟩

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

- The B counter will 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 MIL will go off when the B counter reaches 3. (*2 in "OBD SYSTEM OPERATION CHART")

⟨Driving pattern C⟩

Driving pattern C means the vehicle operation as follows:

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

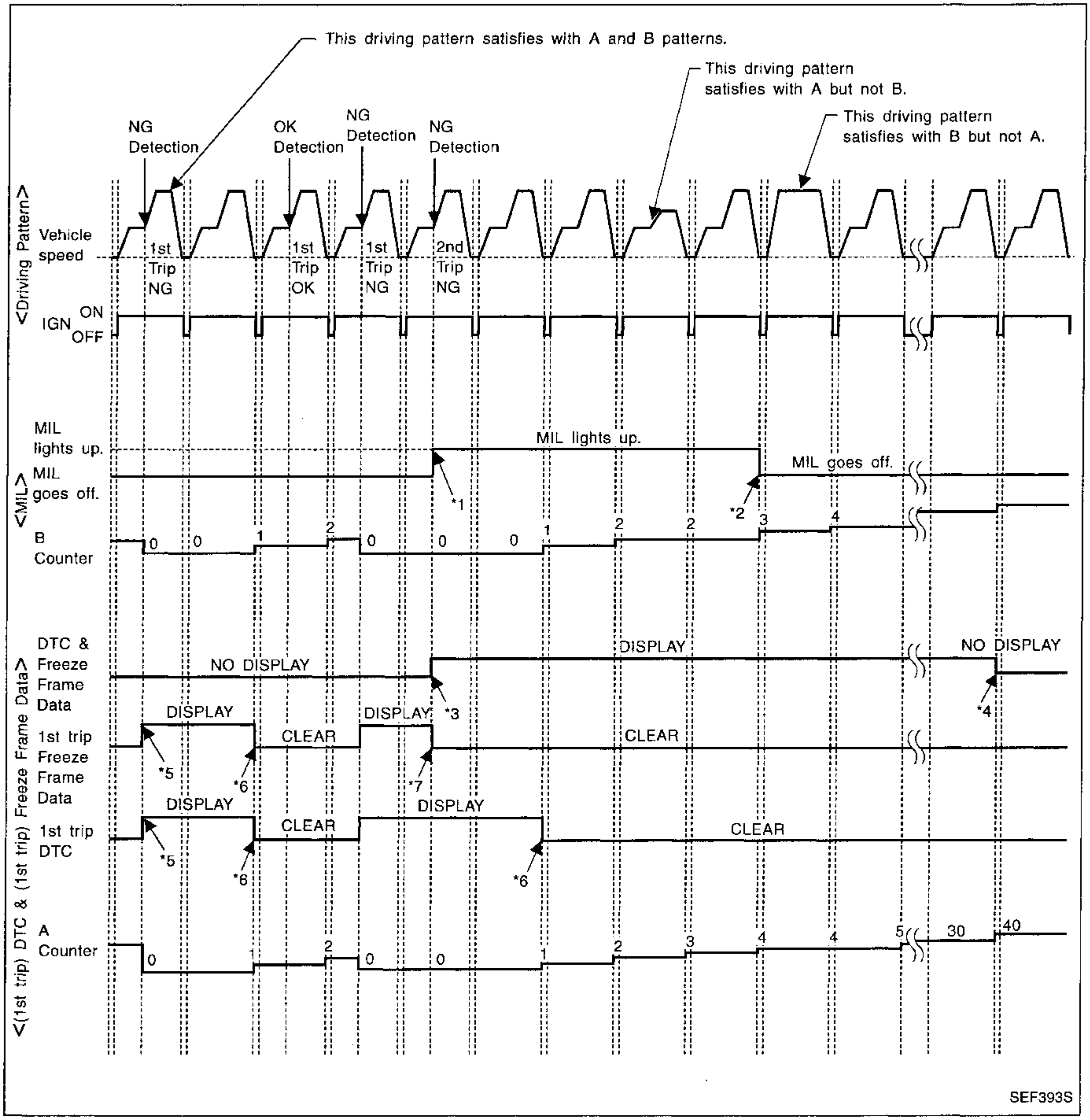
- When the freeze frame data shows lower than 70°C (158°F), "T" should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), "T" should be higher than or equal to 70°C (158°F).

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

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

OBD System Operation Chart (Cont'd)

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC 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 3 times (pattern B) without any malfunctions.

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

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

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

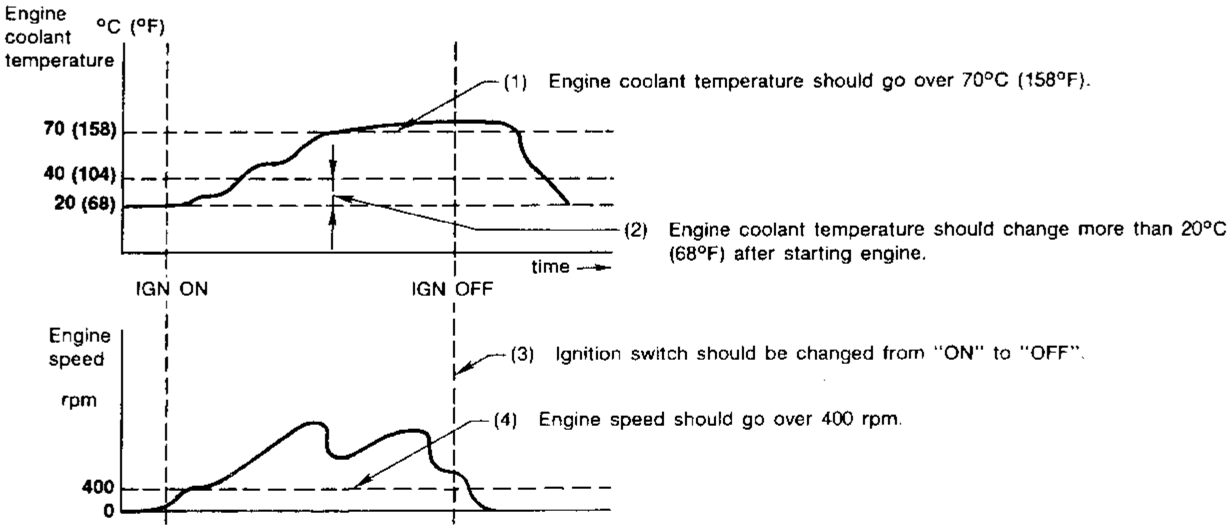
*6: 1st trip DTC will be cleared after vehicle is driven a time (pattern A) without the same malfunction.

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

OBD System Operation Chart (Cont'd)

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

⟨Driving pattern A⟩



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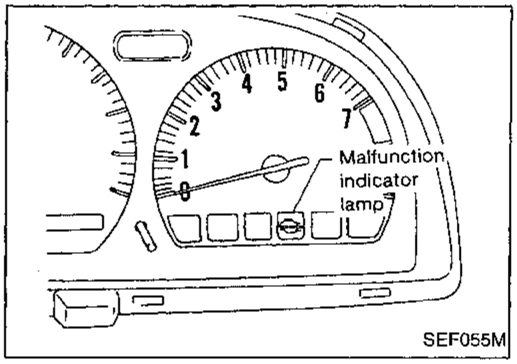
- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

⟨Driving pattern B⟩

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

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



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 for checking the blown lamp.
   - If the malfunction indicator lamp does not light up, see the WARNING LAMPS in the EL section.
     (Or see EC-310.)
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.

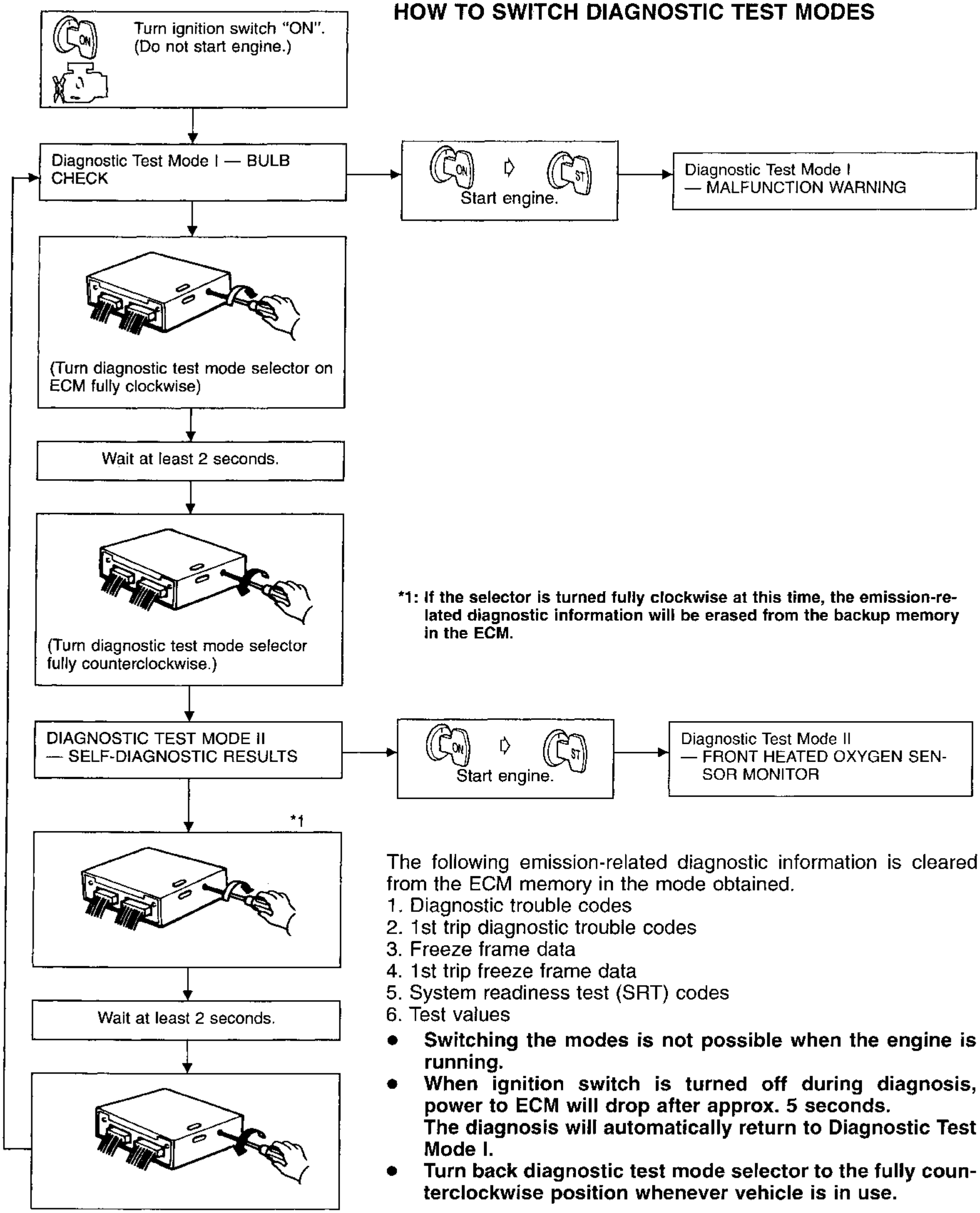
1. BULB CHECK	: This function checks the bulb for damage (blown, open circuit, etc.) of the malfunction indicator lamp.
2. MALFUNCTION WARNING	: This is a usual driving condition. When a malfunction is detected twice in two consecutive trips (2 trip detection logic), the malfunction indicator lamp will 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)" ● "Closed loop control" ● Fail-safe item (except "START SIGNAL CIRCUIT") (Refer to EC-91.)
3. SELF-DIAGNOSTIC RESULTS	: By using this function, the DTCs and 1st trip DTCs can be read.
4. FRONT HEATED OXYGEN SENSOR MONITOR	: In this mode, the fuel mixture condition (lean or rich) monitored by front heated oxygen sensor can be read.

How to switch the diagnostic test (function) modes and details of the above functions are described 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 emission-related diagnostic information will be erased from the backup memory in the ECM.**

The following emission-related diagnostic information is cleared from the ECM memory in the mode obtained.

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

- **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.**

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. (See the WARNING LAMPS in the EL section. Or see EC-310.)

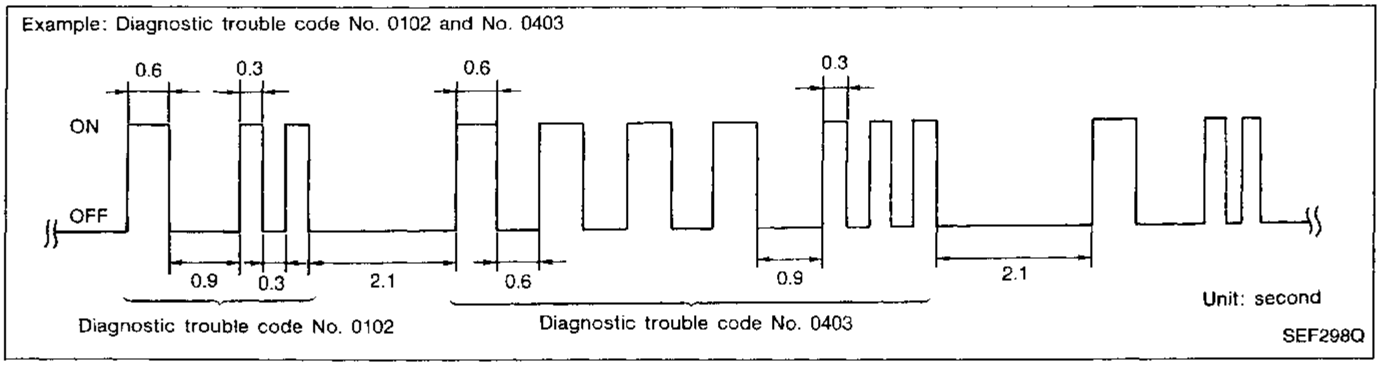
DIAGNOSTIC TEST MODE I—MALFUNCTION WARNING

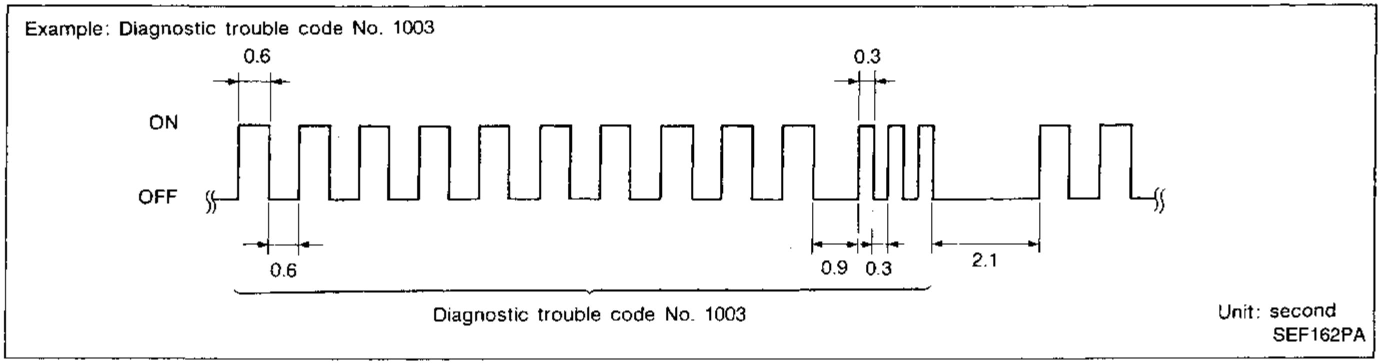
MALFUNCTION INDICATOR LAMP	Condition
ON	When the malfunction (The "1 trip" or "2 trip" is shown in the "MIL Illumination" of the "DTC Chart". See EC-76.) is detected or the ECM enters fail-safe mode (See EC-91).
OFF	No malfunction

- 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, the DTC and 1st trip DTC are indicated by the number of blinks of the MALFUNCTION INDICATOR LAMP. The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTC's. If two or more codes are displayed, they may be either DTC's or 1st trip DTC's. DTC No. is the same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT or GST. A DTC will be used as an example for how to read a code.





Long (0.6 second) blinking indicates the two LH digits of number and short (0.3 second) blinking indicates the two RH digits of number. For example, the malfunction indicator lamp blinks 10 times for 6 seconds (0.6 sec x 10 times) and then it blinks three times for about 1 second (0.3 sec x 3 times). This indicates the DTC "1003" and refers to the malfunction of the park/neutral position 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-76.)

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

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

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

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 control
OFF	Rich	
*Remains ON or OFF	Any condition	Open loop control

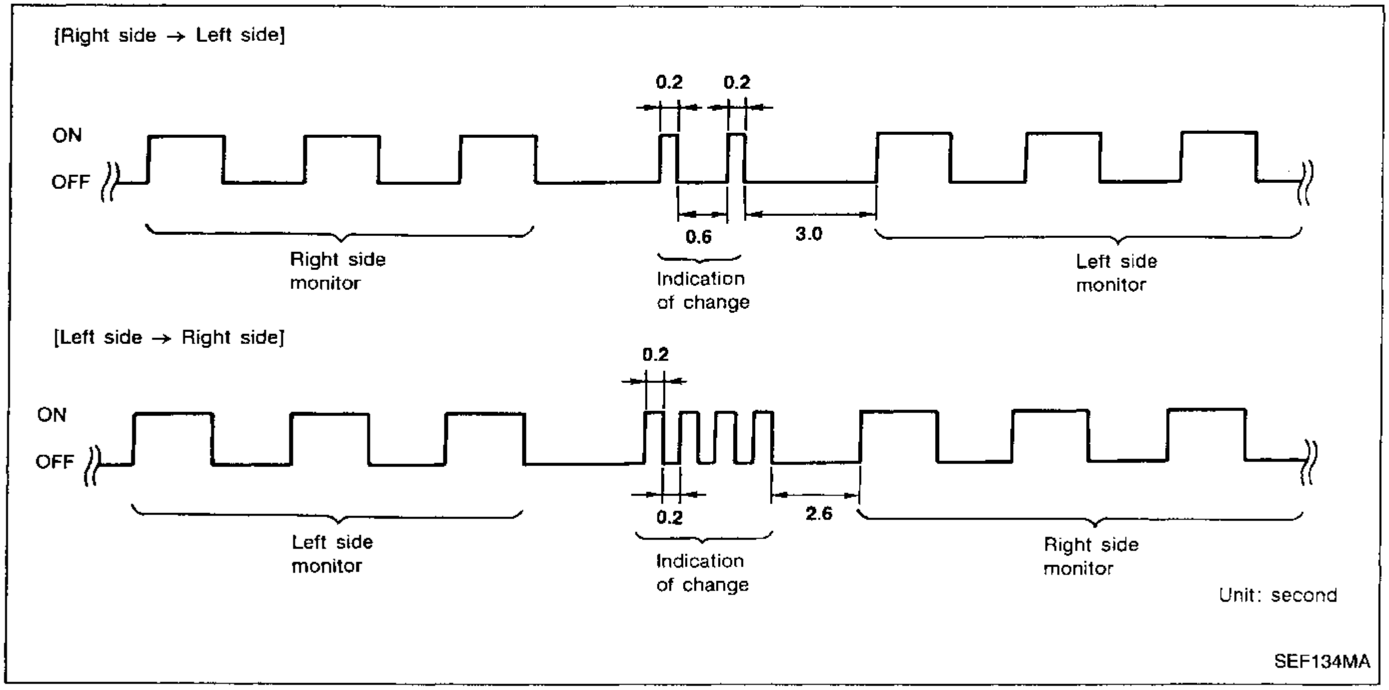
*: Maintains conditions just before switching to open loop.

To check the front heated oxygen sensor function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.
Next run engine at about 2,000 rpm for about 2 minutes under no-load conditions. Then make sure that the MALFUNCTION INDICATOR LAMP comes ON more than 5 times every 10 seconds when measured at 2,000 rpm under no-load. The ECM now starts monitoring from the right bank sensor.

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

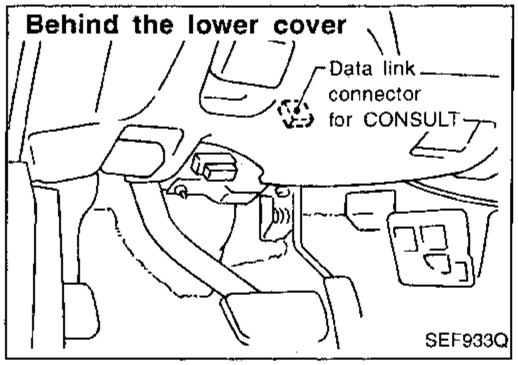
- **The following procedure should be performed while the engine is running.**

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.

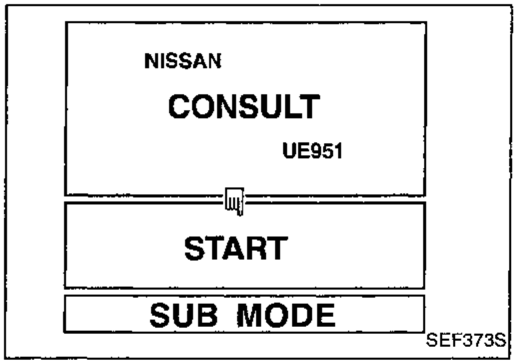


CONSULT

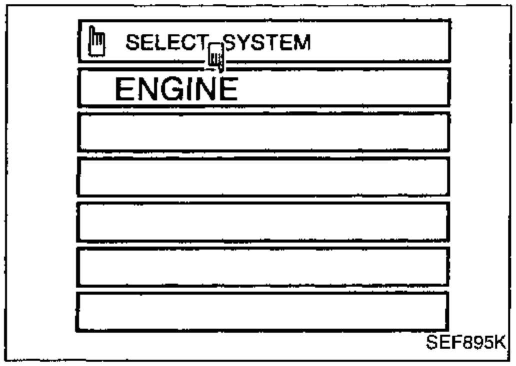
CONSULT INSPECTION PROCEDURE



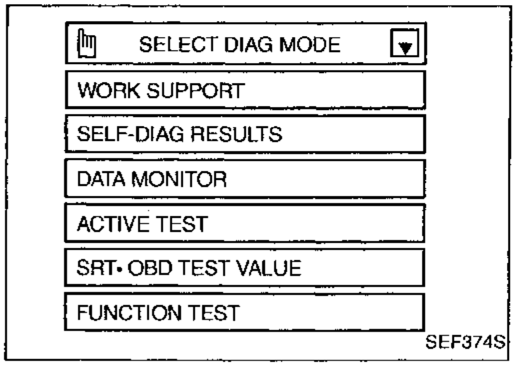
1. Turn off ignition switch.
2. Connect "CONSULT" to data link connector for CONSULT. (Data link connector for CONSULT is located behind the lower cover.)



3. Turn on ignition switch.
4. Touch "START".

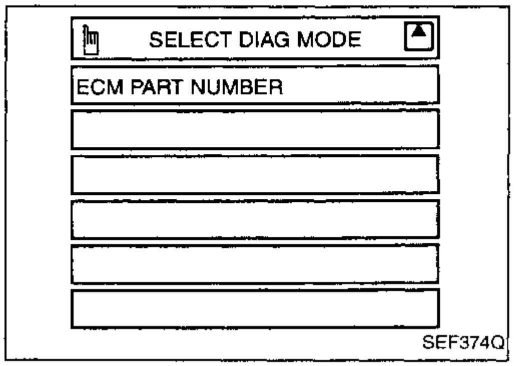


5. Touch "ENGINE".



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

For further information, see the CONSULT Operation Manual.



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CONSULT (Cont'd)

ECCS COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

Item			DIAGNOSTIC TEST MODE						
			WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS*1		DATA MONITOR	ACTIVE TEST	SRT·OBD TEST VALUE	FUNC-TION TEST
					FREEZE FRAME DATA*2				
ECCS COMPONENT PARTS	INPUT	Crankshaft position sensor (OBD)		X					
		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	X
		Rear heated oxygen sensors		X		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			
		Knock sensor		X					
		Ignition switch (start signal)				X			X
		Closed throttle position (throttle position sensor signal)				X			X
		Air conditioner switch				X			
		Park/Neutral position switch		X		X			X
		Power steering oil pressure switch				X			X
		Electrical load				X			
		Canister control vacuum check switch		X		X			
		Battery voltage				X			
	OUTPUT	Injectors				X	X		
		Power transistor (Ignition timing)		X (Ignition signal)		X	X		X
		IACV-AAC valve	X	X		X	X		X
		IACV-FICD solenoid valve				X	X		X
		Air conditioner relay				X			
		Fuel pump relay	X			X	X		X
		Cooling fan		X		X	X		X
		EGRC-solenoid valve		X		X	X		X
		Front heated oxygen sensor heaters		X		X		X	
		EVAP canister purge control solenoid valve		X		X	X		
		Rear heated oxygen sensor heaters		X		X		X	
		FPCM		X		X	X		
		Calculated load value			X	X			

X: Applicable

*1: This item includes 1st trip DTCs.

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

CONSULT (Cont'd)

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*1
Data monitor	Input/Output data in the ECM can be read.
Active test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
SRT-OBD test value	The status of system monitoring tests and the test values/test limits can be read.
Function test	Conducted by CONSULT instead of a technician to determine whether each system is "OK" or "NG".
ECM part numbers	ECM part numbers can be read.

*1 The following emission-related diagnostic information is cleared from the ECM memory in the mode obtained.

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

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/V 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

SELF-DIAGNOSTIC MODE

DTC and 1st trip DTC

Regarding items of "DTC and 1st trip DTC", refer to "Diagnostic Trouble Code (DTC) Chart (See EC-76.)

Freeze frame data and 1st trip freeze frame data

Freeze frame data item*2	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-311).]
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 Y32 model, "B1" indicates right bank and "B2" indicates left bank.
*2: The items are the same as those of 1st trip freeze frame data.

CONSULT (Cont'd)

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.	
CMPS·RPM (REF) [rpm]	○		• Indicates the engine speed computed from the REF signal (120° signal) of the camshaft position sensor.	• The accuracy of detection becomes poor if engine speed drops below the idle rpm. • If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS AIR/FL SE [V]	○	○	• The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a certain value is indicated.
COOLAN TEMP/S [°C] or [°F]	○	○	• The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	• When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
FR O2 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.	
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.

NOTE:
Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
Regarding Y32 model, "B1" indicates right bank and "B2" indicates left bank.

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CONSULT (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
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.	
LOAD SIGNAL [ON/OFF]	○	○	• Indicates [ON/OFF] condition from the electrical load signal. ON ... rear defogger is operating. OFF ... rear defogger is not operating.	
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.	
COOLING FAN [HI/LOW/OFF]		○	• The control condition of the cooling fan (determined by ECM according to the input signal) is indicated. HI ... Operation LOW ... Operation OFF ... Stop	• The cooling fan control system carries out the 2-step control [ON/OFF] while "HI", "LOW" and "OFF" are displayed on the CONSULT screen.
IACV-FICD S/V [ON/OFF]			• Indicates [ON/OFF] condition of IACV-FICD solenoid valve determined by ECM according to the input signal.	
EGRC SOL/V [ON/OFF]			• The control condition of the EGRC-solenoid valve (determined by ECM according to the input signal) is indicated. • ON ... EGR operation is cut-off OFF ... EGR is operational	

CONSULT (Cont'd)

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
PURG CONT S/V [ON/OFF]			• The control condition of the EVAP canister purge control solenoid valve (computed by ECM according to the input signals) is indicated. • ON ... Canister purge is operational OFF ... Canister purge operation is cut-off	
FR O2 HTR-B1 [ON/OFF]			• Indicates [ON/OFF] condition of front heated oxygen sensor heater determined by ECM according to the input signals.	
FR O2 HTR-B2 [ON/OFF]				
RR O2 HTR-B1 [ON/OFF]			• Indicates [ON/OFF] condition of rear heated oxygen sensor heater determined by ECM according to the input signals.	
RR O2 HTR-B2 [ON/OFF]				
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.	
FPCM DR VOLT [V]			• The voltage between fuel pump and dropping resistor is displayed.	
FPCM [HI/LOW]			• The control condition of the fuel pump control module (FPCM) (determined by ECM according to the input signal) is indicated. HI ... High amount of fuel flow LOW ... Low amount of fuel flow	
CAN CON VC SW [ON/OFF]			• Indicates [ON/OFF] condition of the canister control vacuum check switch • ON: Canister purge operation is cut-off OFF: Canister purge is operational	
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.

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
COOLING FAN	• Ignition switch: ON • Turn the cooling fan "ON" and "OFF" using CONSULT.	Cooling fan moves and stops.	• Harness and connector • Cooling fan motor
IACV-FICD SOL/V	• Engine: After warming up, idle the engine. • A/C switch "OFF" • Shift lever "N" • Turn the IACV-FICD solenoid valve "ON" with the CONSULT.	Engine speed will increase momentarily by approx. 200 rpm.	• Harness and connector • IACV-FICD solenoid valve
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.		
PURG CONT S/V	• Start engine. • Turn the EVAP canister purge control solenoid valve "ON" and "OFF" using CONSULT and listen to operating sound.	EVAP canister purge control solenoid valve makes an operating sound. Check vacuum signal for EVAP canister purge control valve. S/V ON ... Vacuum does not exist. S/V OFF ... Vacuum exists.	• Harness and connector • EVAP canister purge control solenoid valve • Vacuum hose
FPCM	• Start engine. • Turn the FPCM between "LOW" and "HI" using CONSULT and check that "FPCM DR VOLT" of CONSULT changes.	"FPCM DR VOLT" of CONSULT changes as follows; HI ... Approx. 0V LOW ... Approx. 3.7V	• Harness and connector • FPCM • Dropping resistor

SRT·OBT TEST VALUE MODE

Items	Description
SRT	• SRT items and SRT codes are shown. "CMPLT" ... SRT code is set. "INCMP" ... No SRT code is set.
CATALYST	• Self-diagnostic test values and test limits for SRT item (CATALYST) are shown. • Test values are shown to the left of the unequality/equality sign with test limits on the right. • Test values are either judgement values which are used for the previous self-diagnosis or the initial value when self-diagnosis has never been performed. • SRT code also appears on the display.
O2 SENSOR	• Self-diagnostic test values and test limits for the SRT item (O2 SENSOR) are shown. • Test values are shown to the left of the unequality/equality sign with test limits on the right. • Test values are either judgement values which are used for the previous self-diagnosis or the initial value when self-diagnosis has never been performed. • SRT code also appears on the display.
O2 SENSOR HEATER	• Self-diagnostic test values and test limits for the SRT item (O2 SEN HEATER) are shown. • Test values are shown to the left of the unequality/equality sign with test limits on the right. • Test values are either judgement values which are used for the previous self-diagnosis or the initial value when self-diagnosis has never been performed. • SRT code also appears on the display.
EGR SYSTEM	• Self-diagnostic test values and test limits for the SRT item (EGR SYSTEM) are shown. • Test values are shown to the left of the unequality/equality sign with test limits on the right. • Test values are either judgement values which are used for the previous self-diagnosis or the initial value when self-diagnosis has never been performed. • SRT code also appears on the display.

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) • EGRC-solenoid valve circuit is tested by checking solenoid valve operating noise.	The solenoid valve makes an operating sound every 3 seconds.		• Harness and connector • EGRC-solenoid valve
COOLING FAN CIRCUIT	• Ignition switch: ON (Engine stopped) • Cooling fan circuit is tested when cooling fan is rotated.	The cooling fan rotates and stops every 3 seconds.		• Harness and connector • Cooling fan motor • Cooling fan relay
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

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
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, power transistor, ignition coil, harness or connector) • Compression • Valve timing
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
IACV-FICD S/V SYSTEM	• After warming up, idle the engine. A/C switch: OFF Light switch: OFF • FICD system is tested by detecting change in engine speed when IACV-FICD solenoid valve is ON and OFF.	Difference in engine speed is greater than 50 rpm between IACV-FICD solenoid valve "ON" and "OFF".		• Harness and connector • IACV-FICD solenoid valve • Air passage

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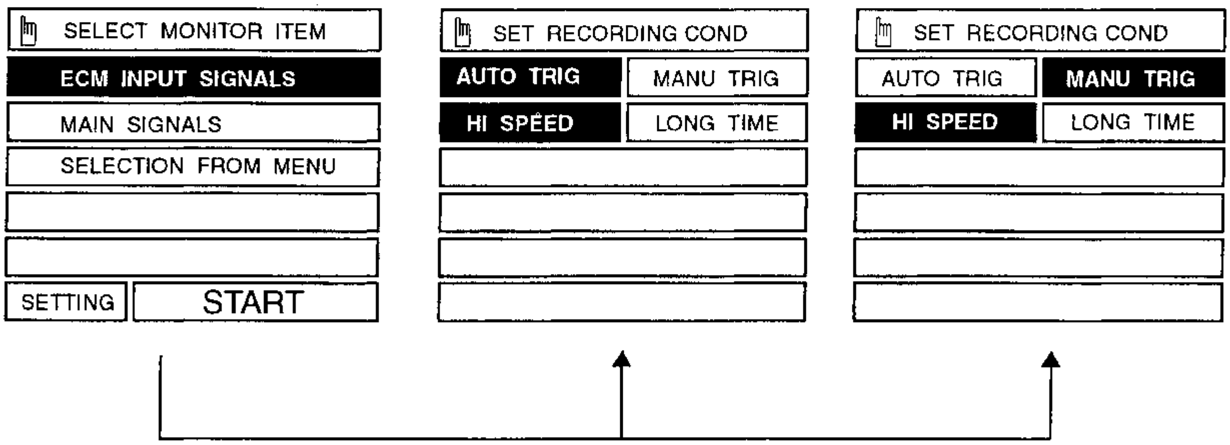
REAL TIME DIAGNOSIS IN DATA MONITOR MODE

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/1st trip DTC and malfunction item will be displayed at the moment the malfunction is detected by ECM.
     DATA MONITOR can be performed continuously until a malfunction is detected. However, DATA MONITOR cannot continue any longer after the malfunction detection.
2. "MANU TRIG" (Manual trigger):
   - DTC/1st trip DTC and malfunction item will not be displayed automatically on CONSULT screen even though a malfunction is detected by ECM.
     DATA MONITOR can be performed continuously even though a malfunction is detected.

Use these triggers as follows:

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



"SETTING"

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

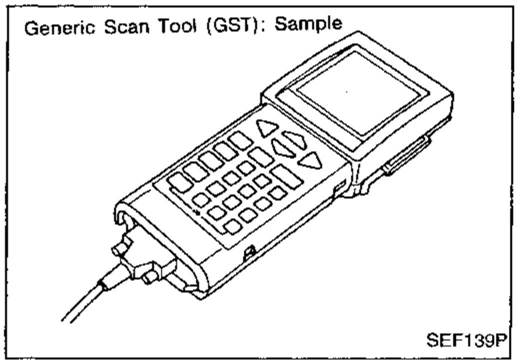
"MANU TRIG"
A malfunction can not be displayed on "DATA MONITOR" screen automatically even if detected.

SEF529Q

Generic Scan Tool (GST)

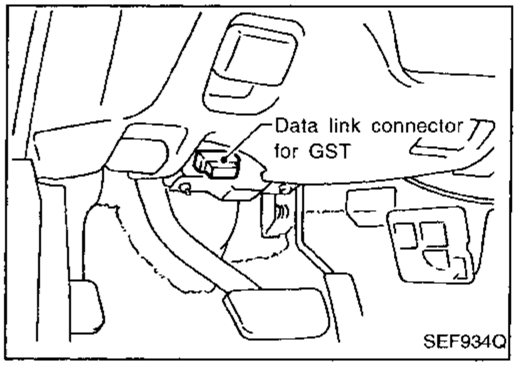
DESCRIPTION

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.



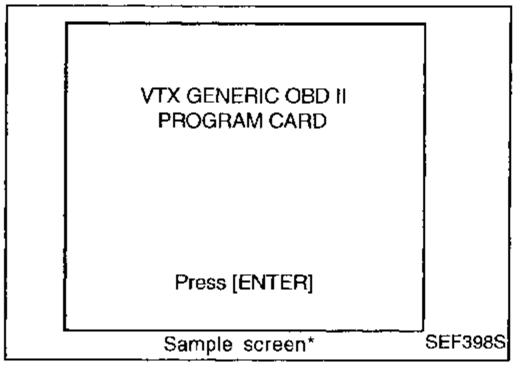
GST INSPECTION PROCEDURE

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.)



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.)



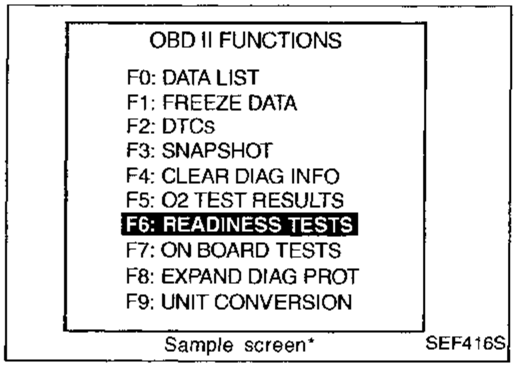
VTX GENERIC OBD II
PROGRAM CARD

Press [ENTER]

Sample screen* SEF398S

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

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



OBD II FUNCTIONS
F0: DATA LIST
F1: FREEZE DATA
F2: DTCs
F3: SNAPSHOT
F4: CLEAR DIAG INFO
F5: O2 TEST RESULTS
F6: READINESS TESTS
F7: ON BOARD TESTS
F8: EXPAND DIAG PROT
F9: UNIT CONVERSION

Sample screen* SEF416S

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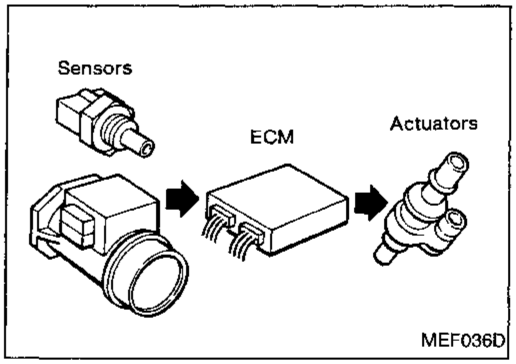
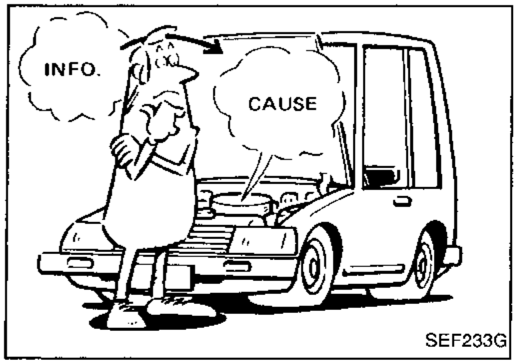
FUNCTION

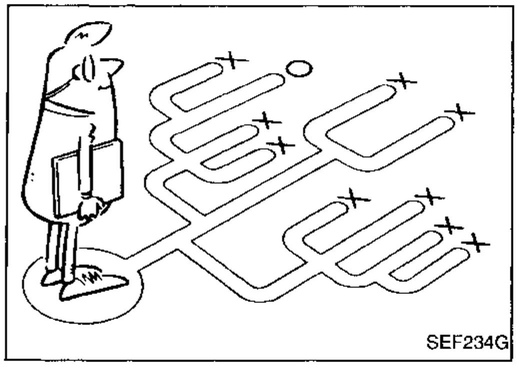
Diagnostic test mode		Function
MODE 1	(READINESS TESTS)	This mode accesses to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
MODE 2	(FREEZE DATA)	This mode accesses to emission-related data value which were stored by ECM during the freeze frame. [For details, refer to "Freeze Frame Data" (EC-58).]
MODE 3	(DTC's)	This mode accesses to emission-related power train trouble codes which were stored by ECM.
MODE 4	(CLEAR DIAG INFO)	This mode can clear all emission-related diagnostic information. This includes: ● Clear number of diagnostic trouble codes (MODE 1) ● Clear diagnostic trouble codes (MODE 3) ● Clear trouble code for freeze frame data (MODE 1) ● Clear freeze frame data (MODE 2) ● Clear heated oxygen sensor test data (MODE 5) ● Reset status of system monitoring test (MODE 1) ● Clear on board monitoring test results (MODE 6 and 7)
MODE 5	(O2 TEST RESULTS)	This mode accesses to the on board heated oxygen sensor monitoring test results.
MODE 6	(ON BOARD TESTS)	This mode accesses the results of on board diagnostic monitoring tests for specific components/systems which are not continuously monitored.
MODE 7	(ON BOARD TESTS)	This mode enables the off board test device to obtain test results of emission-related powertrain components/systems which are continuously monitored under normal driving conditions.



MEF036D



SEF233G



SEF234G

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

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

KEY POINTS

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

SEF907L

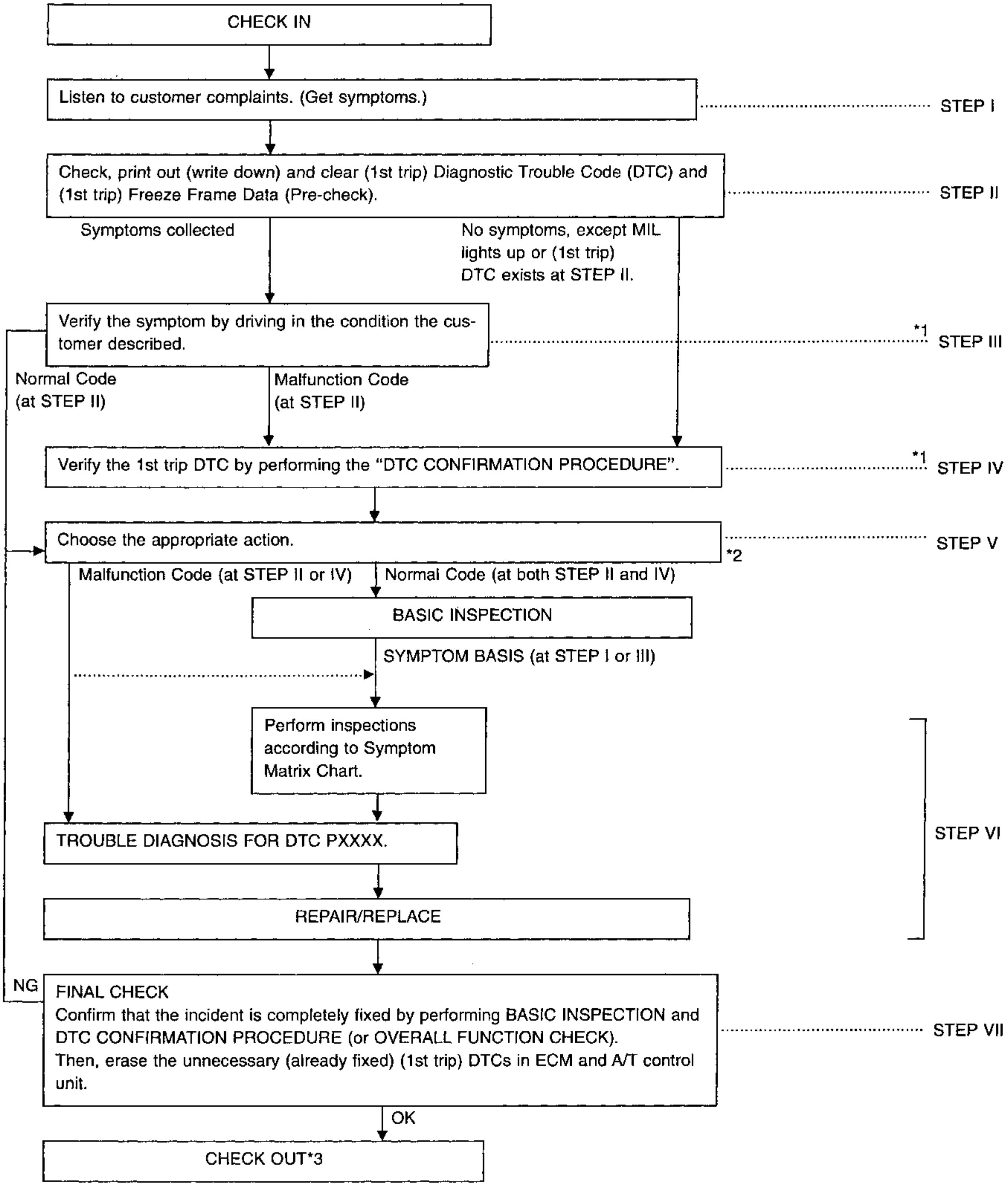
Diagnostic Worksheet

There are many operating conditions that lead to the malfunctions of engine components.
A good knowledge of such conditions can make trouble-shooting faster and more accurate.
In general, each customer may feel differently about a given 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 [ ]
	☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]
	☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [ ]
	☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime
Frequency		☐ All the time ☐ Under certain conditions ☐ Sometimes
Weather conditions		☐ Not affected
	Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F
Engine conditions		☐ Cold ☐ During warm-up ☐ After warm-up Engine speed **0 2,000 4,000 6,000 8,000 rpm**
Road conditions		☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)
Driving conditions		☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed **0 10 20 30 40 50 60 MPH**
Malfunction indicator lamp		☐ Turned on ☐ Not turned on

Work Flow



***1: If the incident cannot be duplicated, see "Incident Simulation Tests" of "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT" in GI section.**

***2: If the on board diagnostic system cannot be performed, check main power supply and ground circuit (See TROUBLE DIAGNOSIS FOR POWER SUPPLY, EC-106.).**

***3: If completion of SRT is needed, drive the vehicle under the specific pattern. Refer to EC-38.**

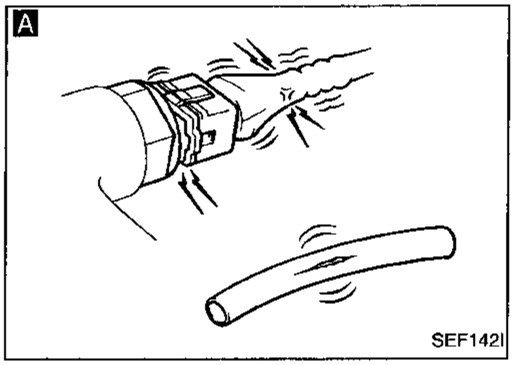
Description for Work Flow

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", EC-70.
STEP II	Before confirming the concern, check and write down (print out using CONSULT or Generic Scan Tool) the (1st trip) Diagnostic Trouble Code (DTC) and the (1st trip) freeze frame data, then erase the code and the data. (Refer to EC-44.) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The "Symptom Matrix Chart" will be useful. See EC-92.)
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 (1st trip) Diagnostic Trouble Code by driving in (or performing) the "DTC CONFIRMATION PROCEDURE". Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT or Generic Scan Tool. During the (1st trip) 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 (1st trip) DTC cannot be displayed by this check, however, this simplified "check" is an effective alternative. The "NG" result of the "OVERALL FUNCTION CHECK" is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-73.) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-92.)
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-95. The "DIAGNOSTIC PROCEDURE" in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the DIAGNOSTIC PROCEDURE. For details, refer to GI section ("HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT", "Circuit Inspection"). Repair or replace the malfunction parts.
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. P0000 or 0505] is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and A/T control unit. (Refer to EC-44.)

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.**

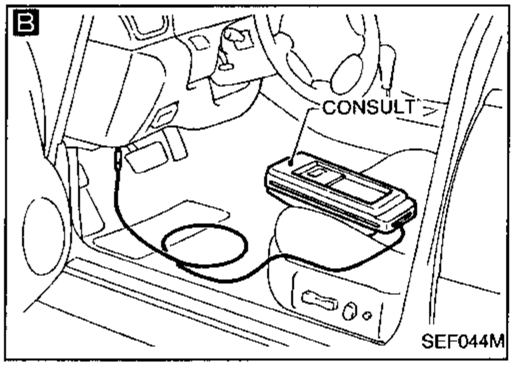


A

BEFORE STARTING

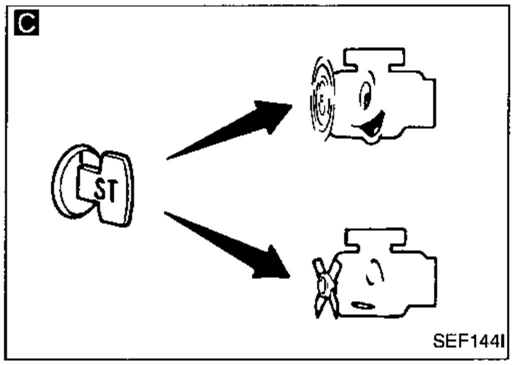
1. Check service records for any recent repairs of related problems, or the current need for scheduled maintenance.
2. Open engine hood and check the following:

- 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 page EC-55.)

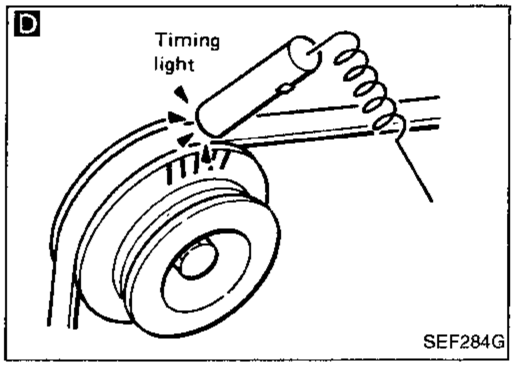


C

DOES ENGINE START?

No → Go to **F** .

Yes ↓

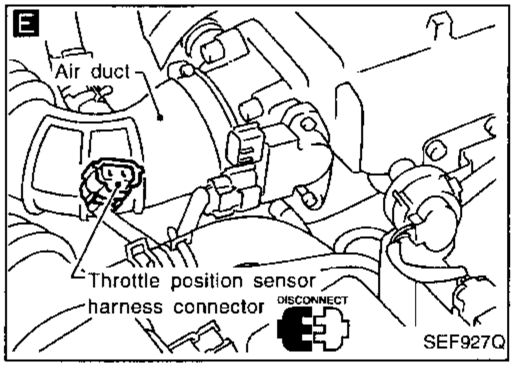


D

CHECK IGNITION TIMING.
Warm up engine sufficiently and check ignition timing at idle using timing light.
(Refer to page EC-25.)
Ignition timing: 10°±2° BTDC

NG → Adjust ignition timing by turning camshaft position sensor.

OK ↓



E

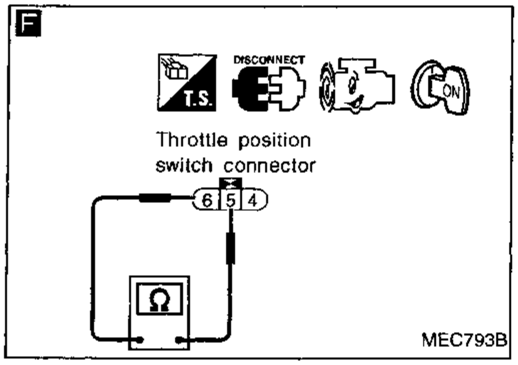
CHECK IDLE ADJ. SCREW INITIAL SET RPM.
When disconnecting throttle position sensor harness connector, does engine speed fall to the following speed?
(Refer to EC-25.)
670±50 rpm (in "N" position)

No → Adjust engine speed by turning idle adjusting screw.

Yes ↓

(Go to Ⓐ on next page.)

Basic Inspection (Cont'd)



Ⓐ

F

CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION.

1. Disconnect throttle position sensor harness connector and throttle position switch harness connector.
2. Check engine speed with circuit tester probing throttle position switch while gradually releasing accelerator pedal.

Engine speed at the point throttle position switch OFF (No continuity) → ON (Continuity exists.):
920±150 rpm ("N" position)

NG →

1. Adjust continuity signal by rotating throttle position sensor body.
2. Disconnect throttle position sensor harness connector for a few seconds and then reconnect it.
3. Confirm that "CLSD THL/P SW" stays "ON" using CONSULT.

↓ OK

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

↓

RESET IDLE POSITION MEMORY.

1. Warm up engine sufficiently.
2. Turn ignition switch "OFF" and wait at least 5 seconds.
3. Disconnect throttle position sensor harness connector.
4. Start engine and wait at least 5 seconds in "N" position.
5. Reconnect throttle position sensor harness connector while running engine.

↓

CHECK IDLE SPEED

Read the engine idle speed in "DATA MONITOR" mode with CONSULT.
720±50 rpm (in "N" position)

OR

Check idle speed.
720±50 rpm (in "N" position)

NG →

Adjust idle speed. (See EC-27.)

↓ OK

After this inspection, unnecessary DTC or 1st trip DTC might be displayed.
Erase the stored memory in ECM and A/T control unit.
Refer to "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" (EC-34) and "HOW TO ERASE DTC" in AT section.

↓ OK

INSPECTION END

NOTE

Diagnostic Trouble Code (DTC) Chart

ENGINE RELATED ITEMS

Diagnostic trouble code No.*4		Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" mode)	Malfunction is detected when ...
CONSULT GST	ECM*3		
(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).
*3: In Diagnostic Test Mode II (Self-diagnostic results)
*4: 1st trip DTC No. is the same as DTC No.

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

X: Applicable
—: Not applicable

Check Items (Possible Cause)	"DTC CONFIRMATION PROCEDURE" Quick Ref. *1	*2 "OVERALL FUNCTION CHECK" Quick Ref.	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-111
• Harness or connectors (The sensor circuit is open or shorted.) • Intake air temperature sensor	IGN: ON	—	—	2 trip	EC-116
• Intake air temperature sensor	LIFTING				
• Harness or connectors (The sensor circuit is open or shorted.) • Engine coolant temperature sensor	IGN: ON	—	X	2 trip	EC-121
• Harness or connectors (The sensor circuit is open or shorted.) • Throttle position sensor	—	IGN: ON	X	2 trip	EC-125
• Harness or connectors (High resistance in the sensor circuit) • Engine coolant temperature sensor • Thermostat	—	RUNNING	—	2 trip	EC-130
• 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-135
• 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-136
• Harness or connectors (The heater circuit is open or shorted.) • Front heated oxygen sensor heater (right bank)	RUNNING	—	—	2 trip	EC-141

*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 or 1st trip 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.*4		Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" mode)	Malfunction is detected when ...
CONSULT GST	ECM*3		
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).
*3: In Diagnostic Test Mode II (Self-diagnostic results)
*4: 1st trip DTC No. is the same as DTC No.

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-144
● Harness or connectors (The heater circuit is open or shorted.) ● Rear heated oxygen sensor heater (right bank)	RUNNING	—	—	2 trip	EC-149
● 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-153
● 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-135
● Harness or connectors (The heater circuit is open or shorted.) ● Front heated oxygen sensor heater (left bank)	RUNNING	—	—	2 trip	EC-158
● 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-161
● Harness or connectors (The heater circuit is open or shorted.) ● Rear heated oxygen sensor heater (left bank)	RUNNING	—	—	2 trip	EC-166
● 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-170

*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 or 1st trip 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.*4		Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" mode)	Malfunction is detected when ...	
CONSULT GST	ECM*3			
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 (*5)	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).

*3: In Diagnostic Test Mode II (Self-diagnostic results)
*4: 1st trip DTC No. is the same as DTC No.
*5: 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	*2 "OVERALL FUNCTION CHECK" Quick Ref.	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-175
• 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-180
• Front heated oxygen sensor (left bank) • Injectors (left bank) • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor	RUNNING	—	—	2 trip	EC-185
• 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-190
• Harness or connectors (The sensor circuit is open or shorted.) • Knock sensor	RUNNING	—	—	—	EC-194
• Harness or connectors (The sensor circuit is open or shorted.) • Crankshaft position sensor (OBD) • Dead (Weak) battery	RUNNING	—	—	2 trip	EC-197
• 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-201

*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 or 1st trip 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.*4		Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" mode)	Malfunction is detected when ...
CONSULT GST	ECM*3		
P0400	0302	EGR function (EGR SYSTEM)	• The EGR flow is excessively low or high during the specified driving condition.
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.
P0443	0807	EVAP canister purge control solenoid valve circuit (PURG CONT/V & S/V)	• An improper voltage signal is sent to ECM through the EVAP canister purge control solenoid valve. • The vacuum signal is not sent to EVAP canister purge control valve under the specified driving condition even though EVAP canister purge control solenoid valve is OFF. • The vacuum signal is sent to EVAP canister purge control valve even though EVAP canister purge control solenoid valve is ON.

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).
*3: In Diagnostic Test Mode II (Self-diagnostic results)
*4: 1st trip DTC No. is the same as DTC No.

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
• EGR valve stuck closed, open or leak • Passage obstructed • EGRC-solenoid valve • EGR valve vacuum tube leaks • EGR temperature sensor	—	RUNNING	—	2 trip	EC-207
• Three way catalyst • Exhaust tube • Injectors • Injector leaks • Intake air leaks	—	RUNNING	—	2 trip	EC-216
• Three way catalyst • Exhaust tube • Injectors • Injector leaks • Intake air leaks	—	RUNNING	—	2 trip	EC-216
• Harness or connectors (The EVAP canister purge control solenoid valve circuit is open or shorted.)	IGN: ON	—	—	2 trip	EC-219
• Harness or connectors (The EVAP canister purge control solenoid valve circuit is shorted.) • EVAP canister purge control solenoid valve • Mass air flow sensor • Throttle position sensor • Engine coolant temperature sensor • EGR valve • Intake air system (Intake air leaks) • Hoses • EVAP canister purge control valve (built into EVAP canister) • Canister control vacuum check switch	RUNNING				
• Harness or connectors (The EVAP canister purge control solenoid valve circuit is open.) • EVAP canister purge control solenoid valve • Hoses (Hoses are connected incorrectly.) • Canister control vacuum check switch	—	RUNNING			

*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 or 1st trip DTC might not be confirmed.
• This is Quick Reference of "OVERALL FUNCTION CHECK".
Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

GI
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EM
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EC
FE
AT
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FA
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ST
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BT
HA
EL
IDX

ENGINE RELATED ITEMS

Diagnostic trouble code No.*4		Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" mode)	Malfunction is detected when ...
CONSULT GST	ECM*3		
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 (*6)	—	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.
P1220	1305	FPCM circuit (FPCM)	• An improper voltage signal from the FPCM, which is supplied to a point between the fuel pump and the dropping resistor, is detected by ECM.
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.
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	EGRC-solenoid valve (EGRC SOLENOID/V)	• The improper voltage signal is sent to ECM through the solenoid valve.

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).

*3: In Diagnostic Test Mode II (Self-diagnostic results)
*4: 1st trip DTC No. is the same as DTC No.
*6: 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 (The sensor circuit is open or shorted.) • Vehicle speed sensor	DRIVING	LIFTING	—	2 trip	EC-229
• Harness or connectors (The IACV-AAC valve circuit is shorted.) • IACV-AAC valve	IGN: ON	—	—	2 trip	EC-233
• Harness or connectors (The IACV-AAC valve circuit is open.) • IACV-AAC valve	RUNNING				
• Harness or connectors (The circuit between ECM and A/T control unit is open or shorted.) • A/T control unit	—	RUNNING	—	—	EC-237
• ECM (ECCS control module)	RUNNING	—	X	2 trip	EC-240
• 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-242
• Harness or connectors (The FPCM circuit is open or shorted.) • Dropping resistor • FPCM	—	RUNNING	—	2 trip	EC-245
• 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-251
• Harness or connectors • Crankshaft position sensor (OBD) • Drive plate	RUNNING	—	—	2 trip	EC-260
• Harness or connectors (The EGRC-solenoid valve circuit is open or shorted.) • EGRC-solenoid valve	—	IGN: ON	—	2 trip	EC-264

*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 or 1st trip 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.*4		Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" mode)	Malfunction is detected when ...
CONSULT GST	ECM*3		
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.
P1443	0113	Canister control vacuum check switch circuit (CAN CONT VC CHK SW)	• The canister control vacuum check switch remains "OFF" even though no vacuum is supplied to the EVAP canister purge control valve.
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	1308	Cooling fan circuit (COOLING FAN)	• Cooling fan does not operate properly. (Overheat) • Cooling system does not operate properly. (Overheat) • Engine coolant was not added to the system using the proper filling method.

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).
*3: In Diagnostic Test Mode II (Self-diagnostic results)
*4: 1st trip DTC No. is the same as DTC No.

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 EGR temperature sensor circuit is open or shorted.) • EGR temperature sensor • Malfunction of EGR or EGRC-solenoid valve	—	RUNNING	—	2 trip	EC-268
• Harness or connectors (The canister control vacuum check switch circuit is open.) • Hoses (Hoses are connected incorrectly.) • Throttle position sensor • Engine coolant temperature sensor • EVAP canister purge control solenoid valve • Canister control vacuum check switch	RUNNING	—	—	2 trip	EC-273
• Harness or connectors (The communication line circuit is open or shorted.) • A/T control unit • Dead (Weak) battery	IGN: ON	—	—	2 trip	EC-278
• Harness or connectors. (The cooling fan circuit is open or shorted.) • Cooling fan • Radiator hose • Radiator • Radiator cap • Water pump • Thermostat For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", (EC-286).	—	IGN: ON (RUNNING)	—	2 trip	EC-281

*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 or 1st trip DTC might not be confirmed.
- This is Quick Reference of "OVERALL FUNCTION CHECK".
Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

GI
MA
EM
LC
EC
FE
AT
PD
FA
RA
BR
ST
RS
BT
HA
EL
IDX

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.*4		Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" mode)	Malfunction is detected when ...
CONSULT GST	ECM*3		
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.
*3: In Diagnostic Test Mode II (Self-diagnostic results)
*4: 1st trip DTC No. is the same as DTC No.

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 *8	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 DIAG-NOSES" 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*7	2 trip	
• Harness or connectors (The signal circuit is open or shorted.)	DRIVING (pattern 5)	—	X*7	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*7	2 trip	
• Harness or connectors (The solenoid circuit is open or shorted.) • Shift solenoid valve B	IGN: ON	—	X*7	2 trip	
• Harness or connectors (The sensor circuit is open or shorted.) • Throttle position sensor • Throttle position switch	DRIVING (pattern 4)	—	X*7	2 trip	
• Harness or connectors (The solenoid circuit is open or shorted.) • Overrun clutch solenoid valve	IGN: ON	—	X	2 trip	

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*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 or 1st trip DTC might not be confirmed.
• This is Quick Reference of "OVERALL FUNCTION CHECK".
Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

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

*8: • The MIL illuminates after A/T control unit enters the fail-safe mode in two consecutive trips, if both the "Revolution sensor" and the "Engine speed signal" meet the fail-safe condition at the same time.

INSPECTION PRIORITY

If some 1st trip DTCs or 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)
	• EGRC-solenoid valve circuit (P1400, 1005)	• Knock sensor circuit (P0325, 0304)	• Canister control vacuum check switch circuit (P1443, 1505)
	• 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)
	• EVAP canister purge control solenoid valve circuit (P0443, 0807)	• Cooling fan circuit (P1900, 1308)	• Rear heated oxygen sensor circuit (P0136, 0707) (P0156, 0708)
	• 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 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)
	• IACV-AAC valve circuit (P0505, 0205)	• Closed loop control (P0130, 0307) (P0150, 0308)	• Three way catalyst function (P0420, 0702) (P0430, 0703)
		• Improper shifting (P0731 - P0734, 1103 - 1106)	• Signal circuit from A/T control unit to ECM (P0600)
		• Fuel pump control module (FPCM) circuit (P1220, 1305)	

Fail-Safe Chart

The ECM enters fail-safe mode, if any of the following malfunctions is detected due to the open or short circuit. When the ECM enters the fail-safe mode, the MIL illuminates. However, the MIL will not illuminate if the "start signal circuit" malfunctions.

<table>
<tr><th colspan="2">DTC No.</th><th rowspan="2">Detected items</th><th rowspan="2">Engine operating condition in fail-safe mode</th></tr>
<tr><th>CONSULT GST</th><th>ECM*1</th></tr>
<tr><td>P0100</td><td>0102</td><td>Mass air flow sensor circuit</td><td>Engine speed will not rise more than 2,400 rpm due to the fuel cut.</td></tr>
<tr><td>P0115</td><td>0103</td><td>Engine coolant temperature sensor circuit</td><td>Engine coolant temperature will be determined based on the time after turning ignition switch "ON" or "START".
<table>
<tr><th>Condition</th><th>Engine coolant temperature decided</th></tr>
<tr><td>Just as ignition switch is turned ON or Start</td><td>40°C (104°F)</td></tr>
<tr><td>More than 4 minutes after ignition Start</td><td>80°C (176°F)</td></tr>
<tr><td>Except as shown above</td><td>40 - 80°C (104 - 176°F)
(Depends on the time)</td></tr>
</table></td></tr>
<tr><td>P0120</td><td>0403</td><td>Throttle position sensor circuit</td><td>Throttle position will be determined based on the amount of mass air flow and the engine speed.
Therefore, acceleration will be poor.
<table>
<tr><th></th><th>Driving condition</th></tr>
<tr><td>When engine is idling</td><td>Normal</td></tr>
<tr><td>When accelerating</td><td>Poor acceleration</td></tr>
</table></td></tr>
<tr><td>—</td><td>—</td><td>Start signal circuit</td><td>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.</td></tr>
<tr><td>—</td><td>—</td><td>ECM</td><td>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, IACV-AAC valve operation and cooling fan operation are controlled under certain limitations.
<table>
<tr><th></th><th>Operation</th></tr>
<tr><td>Engine speed</td><td>Engine speed will not rise more than 3,000 rpm.</td></tr>
<tr><td>Fuel injection</td><td>Simultaneous multiport fuel injection system</td></tr>
<tr><td>Ignition timing</td><td>Ignition timing is fixed at the preset value.</td></tr>
<tr><td>Fuel pump</td><td>Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls.</td></tr>
<tr><td>IACV-AAC valve</td><td>Fully open</td></tr>
<tr><td>Cooling fan</td><td>Cooling fan relay "ON" when engine is running, and "OFF" when engine stalls.</td></tr>
</table></td></tr>
</table>

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

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-245, 294
	Fuel pressure regulator system	●	●	○	○	○	○	○	○	○		○			EC-23
	Injector circuit	●	●	●	○	●		●	●			●			EC-289
	Evaporative emission system	○	○	○	○	○	○	○	○	○		○			EC-20
Air	Positive crankcase ventilation system	○	○	○	○	○	○	○	○	○		○	○		EC-22
	Incorrect idle speed adjustment	○	○				●	○	○	●		○			EC-27
	IACV-AAC valve circuit	●	●				●	●	●	●					EC-233
	IACV-FICD solenoid valve circuit		○				●	○	○	●					EC-304
Ignition	Incorrect ignition timing adjustment	○	○	●	●	●		●	●			●			EC-27
	Ignition circuit	●	●	●	●	●		●	●			●			EC-251
EGR	EGR control solenoid valve circuit		○	●	○	○						○			EC-264
	EGR system	○	○	●	●	○	○	●	●	○		○			EC-207
Main power supply and ground circuit		●	○	○	○	○		●	●		○	○		○	EC-106
Cooling	Cooling fan circuit	○	○	○	○	○	○	○	○	○	●	○		○	EC-281
Air conditioner circuit		○	○	○	○	○	○	○	○	○		○		○	HA section

● ; High Possibility Item
○; Low Possibility Item

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-201
	Mass air flow sensor circuit	●	●	●	○	●		●	●			●			EC-111
	Front heated oxygen sensor circuit		○	●	○	●		●	●			●			EC-136, 153
	Engine coolant temperature sensor circuit	●	●	●	○	○	○	●	●	○		○			EC-121, 130
	Throttle position sensor circuit		●	●		●	○	●	●	○		●			EC-125
	Incorrect throttle position sensor adjustment		●	○		○	●	○	○	●		○			EC-73
	Vehicle speed sensor circuit		○	○		○						○			EC-229
	Knock sensor circuit			●	○	○						○			EC-194
	ECM	○	○	○	○	○	○	○	○	○	○	○			EC-91, 240
	Start signal circuit	○													EC-292
	Park/Neutral position switch circuit			○		○		○	○			○			EC-242
	Power steering oil pressure switch circuit		○					○	○						EC-301
	Electrical load signal circuit							○	○						EC-308

● ; High Possibility Item
○; Low Possibility Item

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	○	○	○		○		○	○			○		○	EL section
	Alternator circuit	○	○	○		○		○	○			○		○	
	Starter circuit	●													
	Drive plate	◉													—
	Inhibitor switch	●													AT section
	Theft warning circuit	○													EL section
Engine	Cylinder head	●	○	●	○	●		●	●			○			—
	Cylinder head gasket	○	○	●	●	●		●	●		○	○	○		
	Cylinder block	●	●	○	○	○		○	○			○	○		
	Piston	●	○	○	○	○		○	○			○	○		
	Piston ring	●	○	○	○	○		○	○			○	○		
	Connecting rod	○	○	○	○	○		○	○			○			
	Bearing	●	●	○	○	○		○	○			○			
	Crankshaft	●	●	○	○	●		●	●			○			
Valve mechanism	Timing chain	●	●	●	○	●		●	●			○			
	Camshaft	○	●	●	○	●		●	●			○			
	Intake valve	●	○	○	○	●		●	●			○	○		
	Exhaust valve	○	○	○	○	○		○	○			○	○		
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) CMPS·RPM (REF)	• 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
LOAD SIGNAL	• Engine: Running	Rear window defogger: "ON"	ON
		Rear window defogger: "OFF"	OFF

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

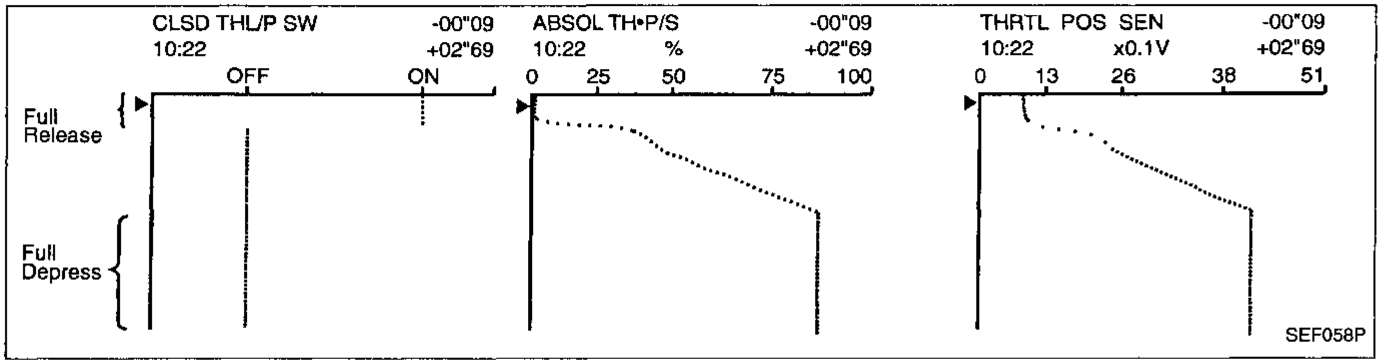
MONITOR ITEM	CONDITION		SPECIFICATION
IGNITION SW	● Ignition switch: ON → OFF		ON → OFF
INJ PULSE-B2 INJ PULSE-B1	● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load	Idle	2.4 - 3.2 msec.
		2,000 rpm	1.9 - 2.8 msec.
B/FUEL SCHDL	ditto	Idle	1.0 - 1.6 msec
		2,000 rpm	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	50 - 159%
AIR COND RLY	● Air conditioner switch: OFF → ON		OFF → ON
FUEL PUMP RLY	● Ignition switch is turned to ON (Operates for 5 seconds) ● Engine running and cranking		ON
	Except as shown above		OFF
COOLING FAN	● After warming up engine, idle the engine. ● Air conditioner switch: "OFF"	Engine coolant temperature is 104°C (219°F) or less	OFF
		Engine coolant temperature is 105°C (221°F) or more	ON
IACV FICD S/V	Engine: Running	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
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
CAN CON VC SW	● Engine: After warming up	Idle	ON
		4,000 rpm	OFF
PURG CONT S/V	● Ignition switch: ON		OFF
FR O2 HTR-B1 FR O2 HTR-B2	● Engine speed: Idle		ON
	● Engine speed: Above 2,900 rpm		OFF
RR O2 HTR-B1 RR O2 HTR-B2	● Engine speed: Idle		ON
	● Engine speed: Above 3,600 rpm		OFF
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load	Idle	17.0 - 35.5%
		2,500 rpm	15.0 - 30.0%
ABSOL TH·P/S	● Ignition switch: ON (Engine stopped)	Throttle valve: fully closed	0.0%
		Throttle valve: fully opened	Approx. 88%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: "OFF" ● Shift lever: "N" ● No-load	Idle	2.5 - 6.0 g·m/s
		2,500 rpm	9.5 - 19.0 g·m/s
FPCM DR VOLT	ditto	Within 30 seconds of starting engine	Approx. 0V
		More than 30 seconds after starting engine	Approx. 4.2V
FPCM	ditto	Within 30 seconds of starting engine	HI
		More than 30 seconds after starting engine	LOW

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

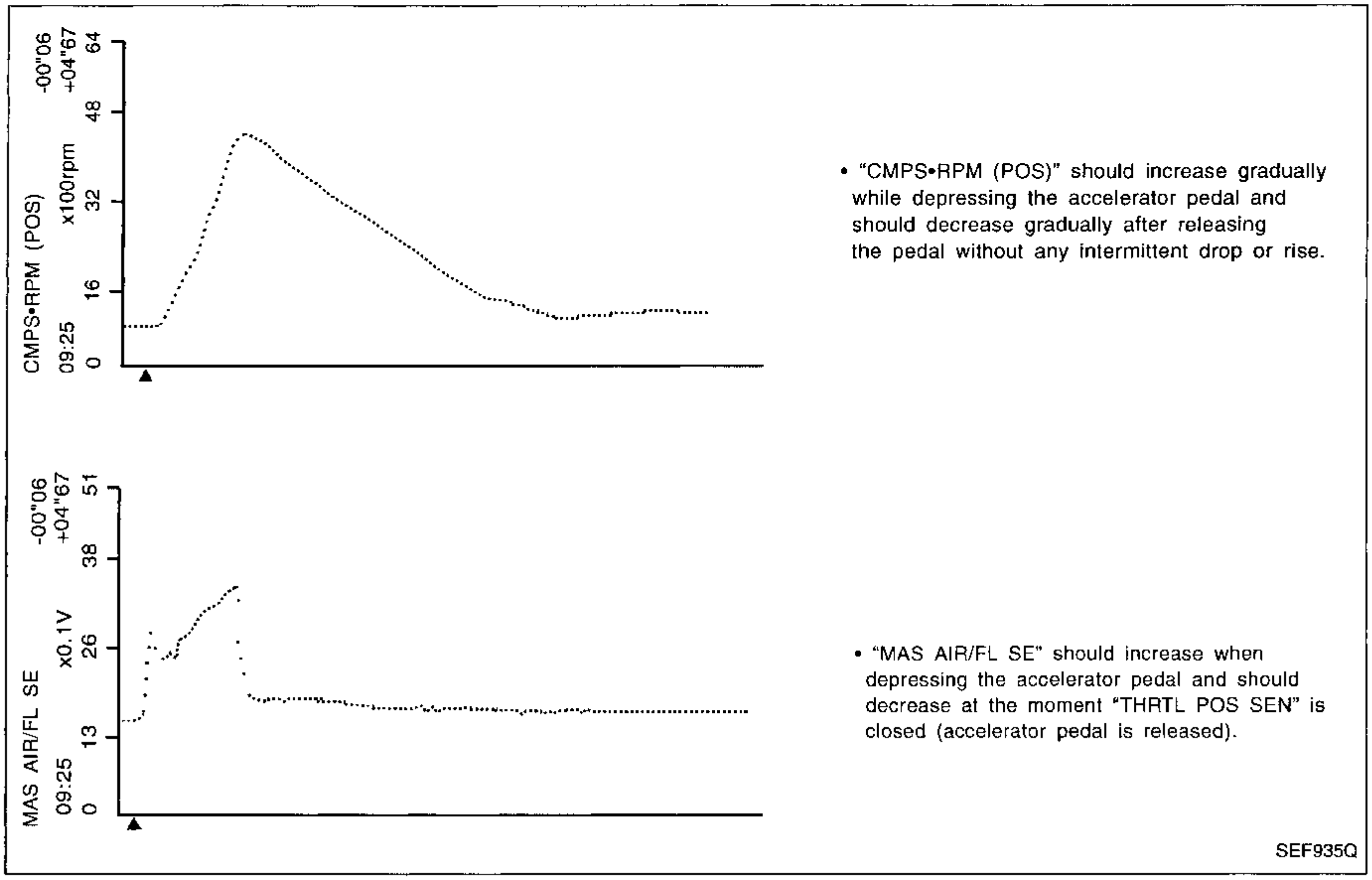
Below is the data for “THRTL POS SEN”, “ABSOL TH·P/S” and “CLSD THL/P SW” when depressing the accelerator pedal with the ignition switch “ON”.
The signal of “THRTL POS SEN” and “ABSOL TH·P/S” should rise gradually without any intermittent drop or rise after “CLSD THL/P SW” is changed from “ON” to “OFF”.



SEF058P

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.

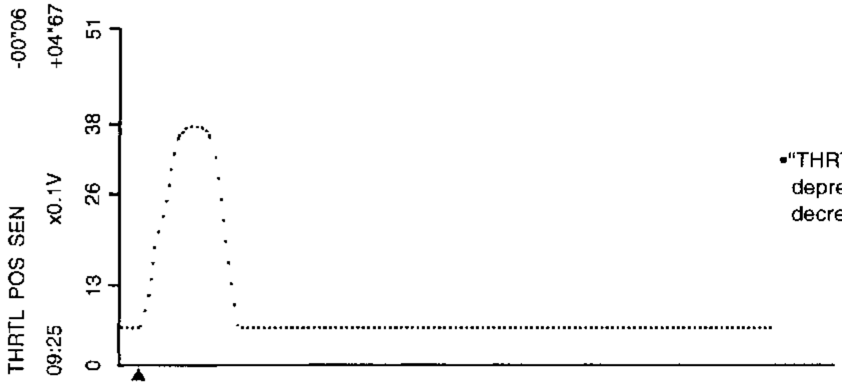


- “CMPS•RPM (POS)” should increase gradually while depressing the accelerator pedal and should decrease gradually after releasing the pedal without any intermittent drop or rise.

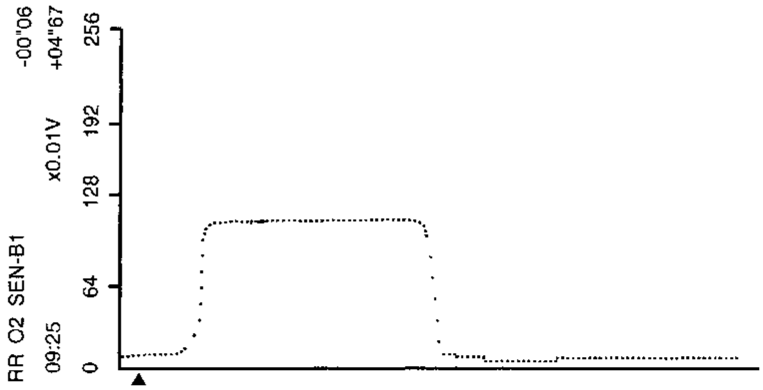
- “MAS AIR/FL SE” should increase when depressing the accelerator pedal and should decrease at the moment “THRTL POS SEN” is closed (accelerator pedal is released).

SEF935Q

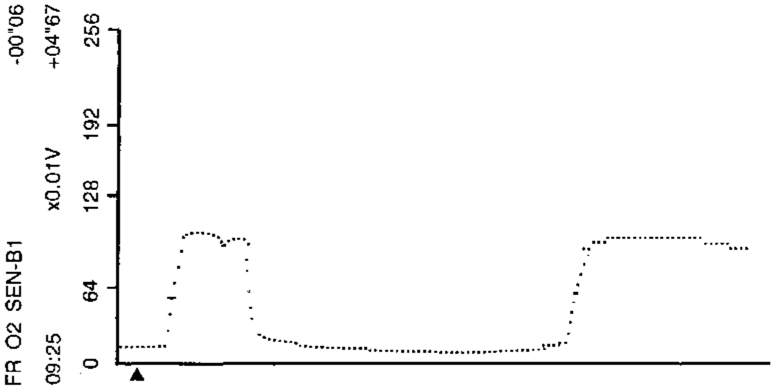
Major Sensor Reference Graph in Data Monitor Mode (Cont'd)



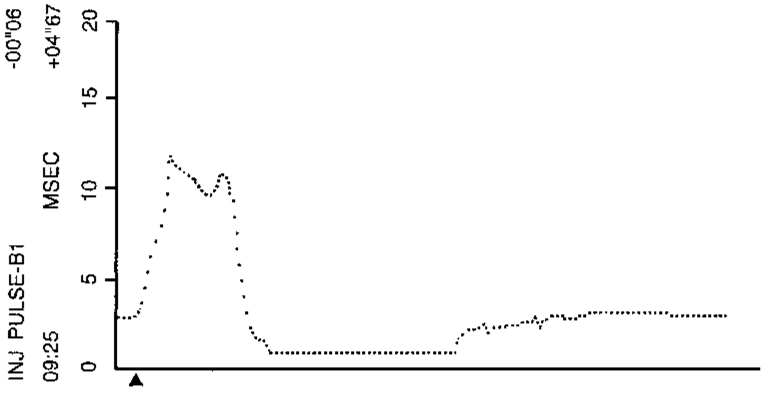
- "THRTL POS SEN" should increase while depressing the accelerator pedel and should decrease while releasing it.



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

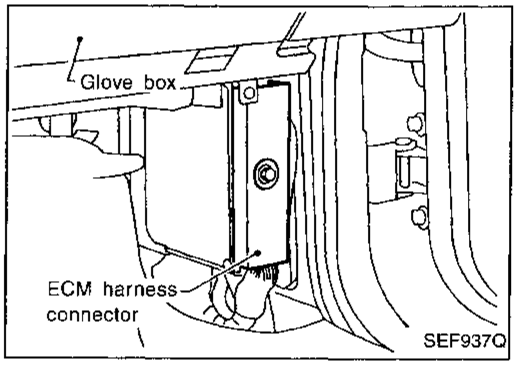


- "FR O2 SEN-B1" may increase immediately after depressing the accelerator pedel and may decrease after releasing the pedal.



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

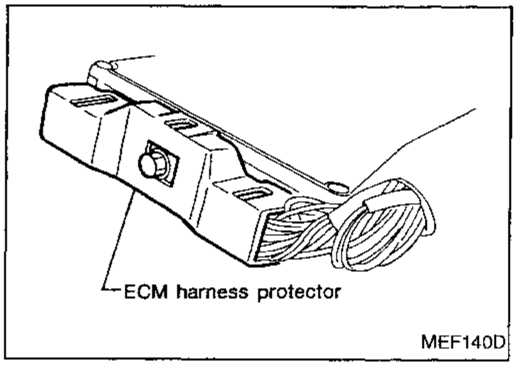
SEF936Q



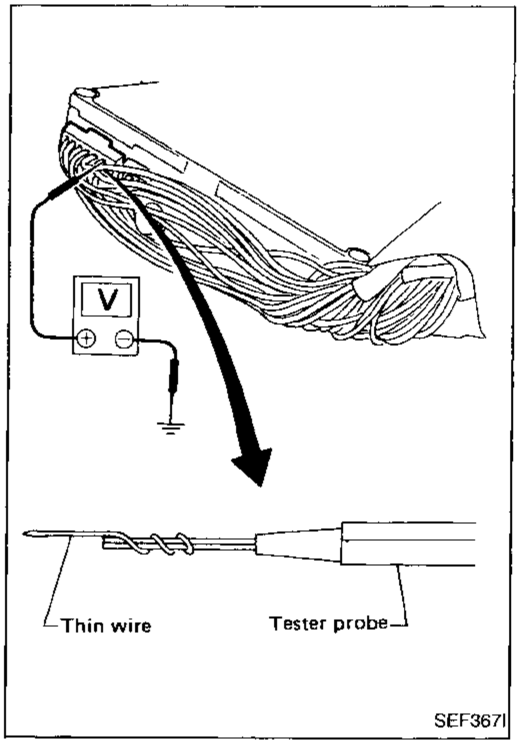
ECM Terminals and Reference Value

PREPARATION

1. ECM is located behind the front passenger side dash. For this inspection, remove the front passenger side dash.

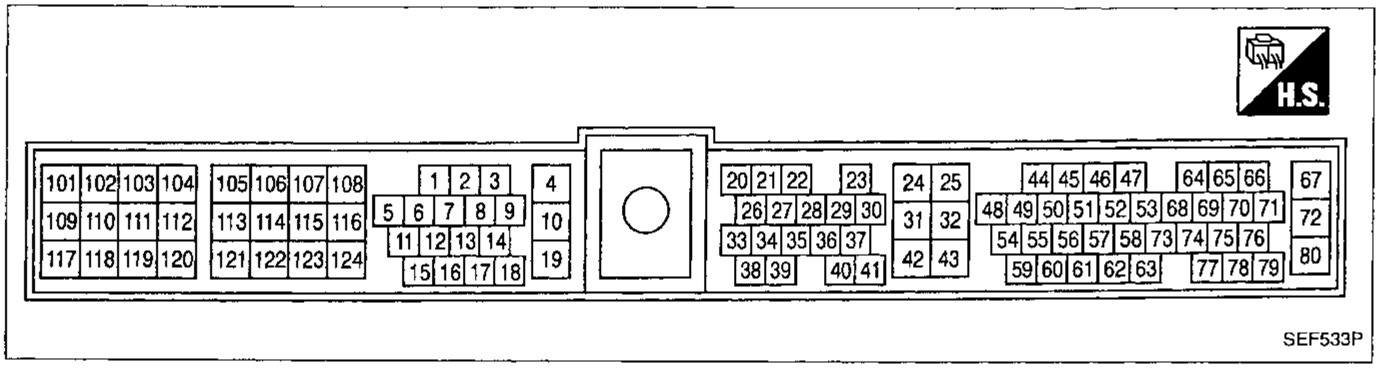


2. Remove ECM harness protector.



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

ECM HARNESS CONNECTOR TERMINAL LAYOUT



GI
MA
EM
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HA
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IDX

ECM INSPECTION TABLE

Remarks: Specification data are reference values, and are measured between each terminal and ㉕ (ECCS ground) with a voltmeter.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
1 2 3	Y LG/B W	Ignition signal (No. 1) Ignition signal (No. 2) Ignition signal (No. 3)	Engine is running. └ Idle speed	Approximately 0.4V★ (AC voltage)
			Engine is running. └ Engine speed is 2,000 rpm.	Approximately 0.5V★ (AC voltage)
4	GY/R	ECCS relay (Self-shutoff)	Engine is running. Ignition switch "OFF" └ For a few seconds after turning ignition switch "OFF"	0 - 1V
			Ignition switch "OFF" └ A few seconds passed after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
5	L/W	Tachometer	Engine is running. └ Idle speed	Approximately 1V★
6	R/W	A/T diagnosis signal	Ignition switch "ON" Engine is running.	0 - 3.0V
7 8 9	P/B R/L GY	Ignition signal (No. 4) Ignition signal (No. 5) Ignition signal (No. 6)	Engine is running. └ Idle speed	Approximately 0.4V★ (AC voltage)
			Engine is running. └ Engine speed is 2,000 rpm	Approximately 0.5V★ (AC voltage)
10	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
11	B/R	Fuel pump relay	Ignition switch "ON" └ For 5 seconds after turning ignition switch "ON" Engine is running.	0 - 1V
			Ignition switch "ON" └ 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
12	SB	Air conditioner relay	Engine is running. └ Air conditioner switch is "ON".	0 - 1V
			Engine is running. └ Air conditioner switch is "OFF".	BATTERY VOLTAGE (11 - 14V)

★: 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)
14	P	Cooling fan relay	Engine is running. Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)
			Engine is running. Cooling fan is operating.	0 - 1V
15	OR/L	Fuel pump control module (FPCM)	Engine is running. (Warm-up condition) Idle speed (within 30 seconds after starting engine)	Approximately 0V
			Engine is running. (Warm-up condition) Idle speed (30 seconds after starting engine and thereafter)	Approximately 10V
18	G/OR	Malfunction indicator lamp	Ignition switch "ON"	Approximately 0V
			Engine is running. Idle speed	BATTERY VOLTAGE (11 - 14V)
19	B	ECCS ground	Engine is running. Idle speed	Engine ground
20	Y/R	Start signal	Ignition switch "ON"	Approximately 0V
			Ignition switch "START"	BATTERY VOLTAGE (11 - 14V)
21	B/P	Air conditioner switch	Engine is running. Air conditioner switch is "ON". (Compressor operates.)	Approximately 0.5V
			Engine is running. Air conditioner switch is "OFF".	Approximately 5V
22	R/G	Inhibitor switch	Ignition switch "ON" Gear position is "N" or "P".	Approximately 0V
			Ignition switch "ON" Except the above gear position	Approximately 5V
23	B	Throttle position sensor	Ignition switch "ON" (Warm-up condition) Accelerator pedal released	0.35 - 0.65V
			Ignition switch "ON" Accelerator pedal fully depressed	Approximately 4V
24	W/B	Ignition switch	Ignition switch "OFF"	0V
			Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
25	B	ECCS ground	Engine is running. Idle speed	Engine ground

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
29	B/Y	Vehicle speed sensor	Engine is running. └ Jack up front wheels and run engine at idle in "1" position.	Approximately 2.5V★ (AC voltage)
31	GY/L	Throttle position switch (Closed position)	Ignition switch "ON" └ Accelerator pedal released	Approximately 8V
			Ignition switch "ON" └ Accelerator pedal depressed	Approximately 0V
32	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
35	B/Y	Canister control vacuum check switch	Engine is running. └ Engine speed is 2,000 rpm.	Approximately 8.5V
			Engine is running. └ Idle speed	0V
37	P/G	Throttle position sensor signal	Ignition switch "ON" (Warm-up condition) └ Accelerator pedal released	Approximately 0.4V
			Ignition switch "ON" └ Accelerator pedal fully depressed	Approximately 3V
39	G/W	Power steering oil pressure switch	Engine is running. └ Steering wheel is being turned.	0V
			Engine is running. └ Steering wheel is not being turned.	Approximately 5V
42	G	Sensor's power supply	Ignition switch "ON"	Approximately 5V
43	B	Sensor's ground	Engine is running. (Warm-up condition) └ Idle speed	0V
44 48	L/Y G/B	Camshaft position sensor (REF)	Engine is running. └ Idle speed	Approximately 2.1V★ (AC voltage)
45	L/G	Camshaft position sensor (POS)	Engine is running. └ Idle speed	Approximately 2.5V★ (AC voltage)
47	B/W	Crankshaft position sensor (OBD)	Engine is running. └ Idle speed	Approximately 0.3V★ (AC voltage)
50 51	W W	Front heated oxygen sensor (Right bank) Front heated oxygen sensor (Left bank)	Engine is running. └ After warming up sufficiently and engine speed is 2,000 rpm.	0 - Approximately 1.0V (periodically change)

★: 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)
54	W	Mass air flow sensor	Engine is running. (Warm-up condition) └ Idle speed	1.0 - 1.7V
			Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm.	1.5 - 2.1V
55	OR	Mass air flow sensor ground	Engine is running. (Warm-up condition) └ Idle speed	Approximately 0V
56 57	W L	Rear heated oxygen sensor (Right bank) Rear heated oxygen sensor (Left bank)	Engine is running. └ After warming up sufficiently and engine speed is 2,000 rpm.	0 - Approximately 1.0V
59	Y/G	Engine coolant temperature sensor	Engine is running.	0 - 5.0V Output voltage varies with engine coolant temperature.
60	G/R	Intake air temperature sensor	Engine is running.	0 - 5.0V Output voltage varies with intake air temperature.
62	L	Fuel pump control module (FPCM) check	Engine is running. (Warm-up condition) └ Idle speed (within 30 seconds after starting engine)	0 - 0.4V
			Engine is running. (Warm-up condition) └ Idle speed (30 seconds after starting engine and thereafter)	Approximately 4V
63	BR	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 - 1.0V
64	W	Knock sensor	Engine is running. └ Idle speed	2.0 - 3.0V
66	R/L	Electrical load signal	Ignition switch "ON" └ Rear window defogger switch is "OFF".	BATTERY VOLTAGE (11 - 14V)
			Ignition switch "ON" └ Rear window defogger switch is "ON".	0 - 1V
67 72	B/W B/W	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
69	BR	Data link connector for GST	Ignition switch "ON" └ GST is disconnected.	6 - 10V

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

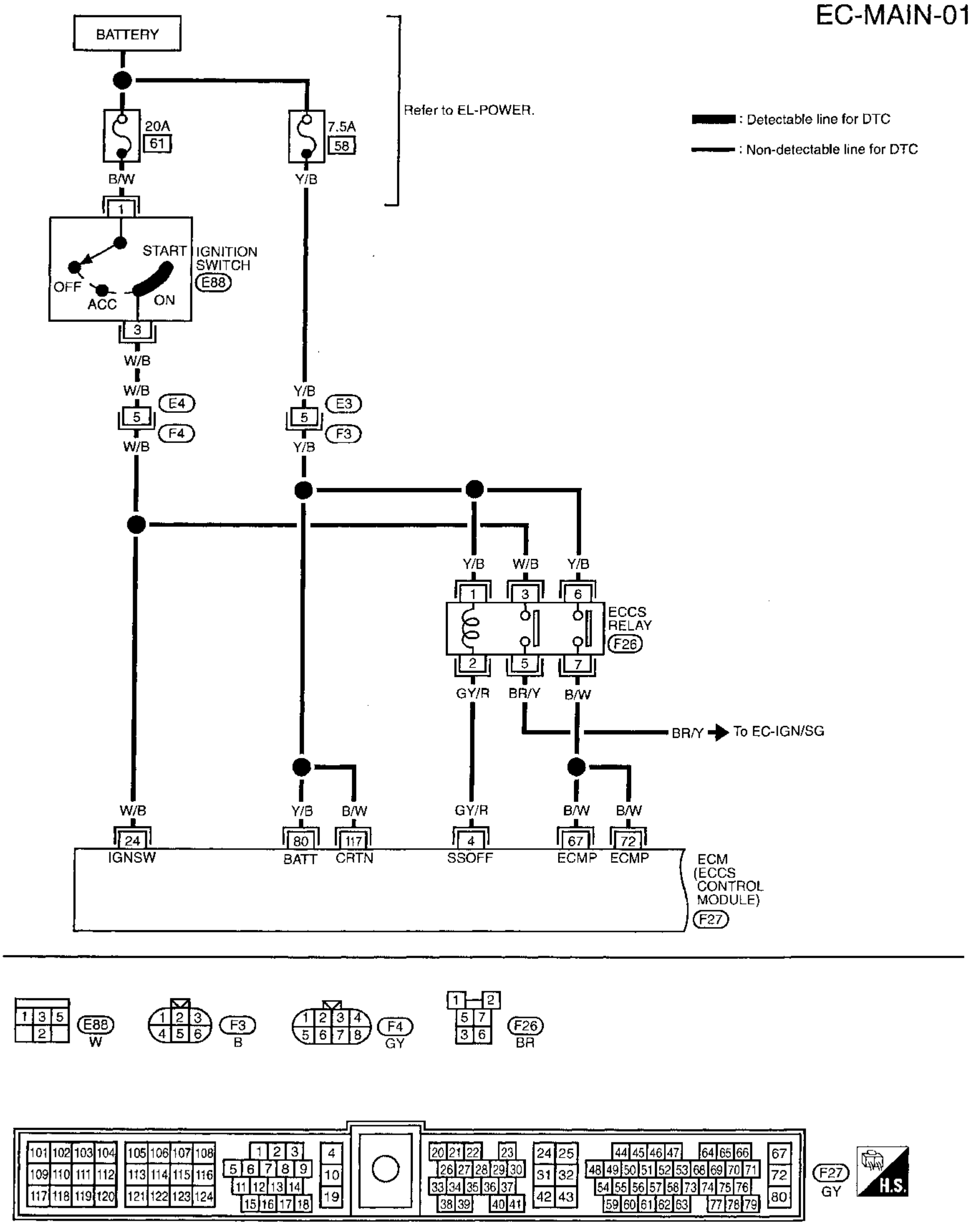
ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
73	L/B	A/T signal No. 1	Ignition switch "ON"	6 - 8V
74	P/L	A/T signal No. 2	Ignition switch "ON"	6 - 8V
75	BR/Y	Data link connector for CONSULT	Engine is running. └ Idle speed └ Connect CONSULT and select DATA MONITOR mode.	Approximately 0V
76	R/W			Approximately 5V
78	BR/W			Approximately 3.5V
77	L/R	A/T signal No. 3	Ignition switch "ON"	0V
79	G/R	Throttle position switch power supply	Ignition switch "ON" └ Accelerator pedal released	Approximately 8V
			Ignition switch "ON" └ Accelerator pedal depressed	0V
80	Y/B	Power supply (Back-up)	Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
101	L	IACV-AAC valve	Engine is running. └ Idle speed	9 - 14V
			Engine is running. └ Steering wheel is being turned. └ Air conditioner is operating. └ Rear window defogger is "ON". └ Headlamps are "ON".	4 - 10V
102	Y	Injector No. 1	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
104	W	Injector No. 3		
106	R/L	Injector No. 5		
109	LG/B	Injector No. 2		
111	P/B	Injector No. 4		
113	GY	Injector No. 6		
103	R/B	EGRC-solenoid valve	Engine is running. └ Idle speed	0 - 0.5V
			Engine is running. └ Engine speed is 2,000 rpm.	BATTERY VOLTAGE (11 - 14V)
107	Y/G	Rear heated oxygen sensor heater (Right bank)	Engine is running. └ Engine speed is below 3,600 rpm.	0 - 0.5V
			Engine is running. └ Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
108	B	ECCS ground	Engine is running. └ Idle speed	Engine ground

ECM Terminals and Reference Value (Cont'd)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC voltage)
114	LG	EVAP canister purge control solenoid valve	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
115	LG	IACV-FICD solenoid valve	Engine is running. └ Air conditioner switch is "ON". (Compressor operates.)	0 - 0.5V
			Engine is running. └ Air conditioner switch is "OFF".	BATTERY VOLTAGE (11 - 14V)
116	B	ECCS ground	Engine is running. └ Idle speed	Engine ground
117	B/W	Counter current return	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
119	B/Y	Front heated oxygen sensor heater (Right bank)	Engine is running. └ Engine speed is below 2,900 rpm.	0 - 0.5V
			Engine is running. └ Engine speed is above 2,900 rpm.	BATTERY VOLTAGE (11 - 14V)
121	B/Y	Front heated oxygen sensor heater (Left bank)	Engine is running. └ Engine speed is below 2,900 rpm.	0 - 0.5V
			Engine is running. └ Engine speed is above 2,900 rpm.	BATTERY VOLTAGE (11 - 14V)
123	R/W	Rear heated oxygen sensor heater (Left bank)	Engine is running. └ Engine speed is below 3,600 rpm.	0 - 0.5V
			Engine is running. └ Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
124	B	ECCS ground	Engine is running. └ Idle speed	Engine ground

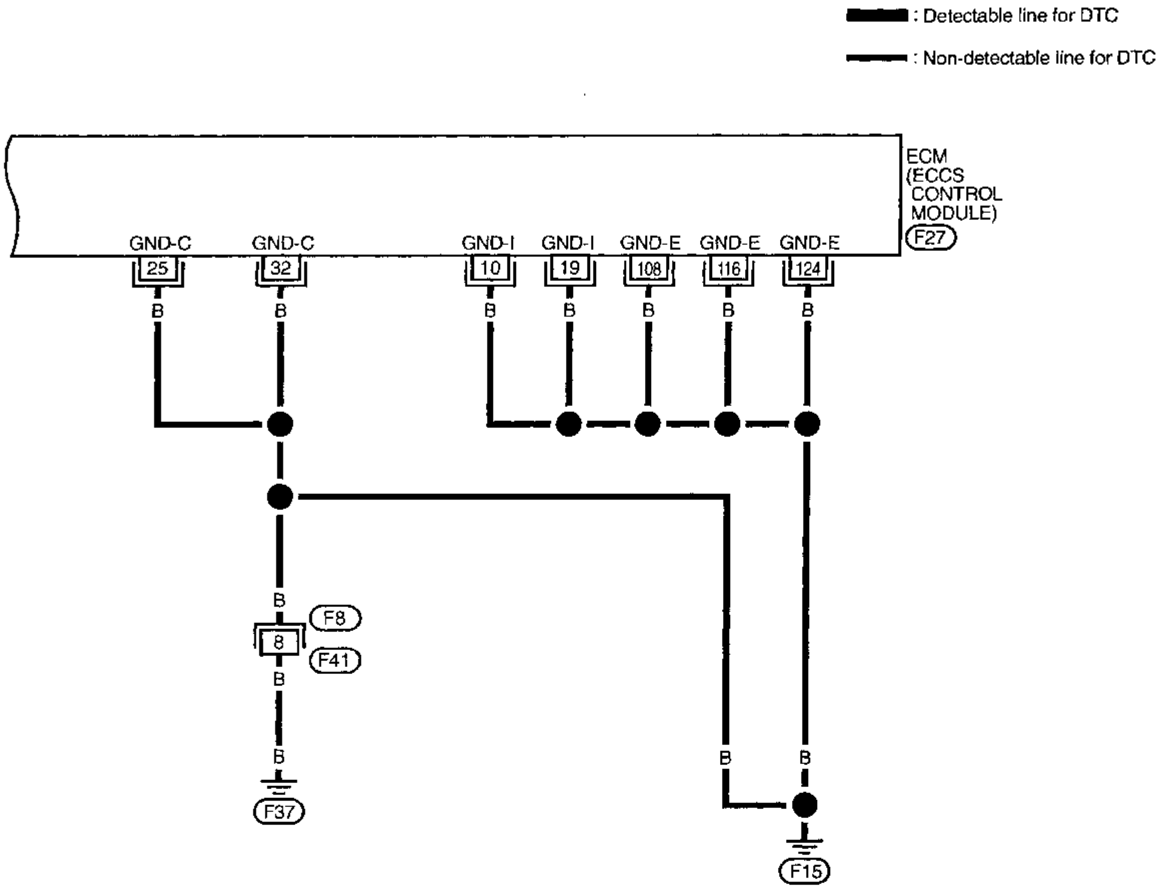
Main Power Supply and Ground Circuit

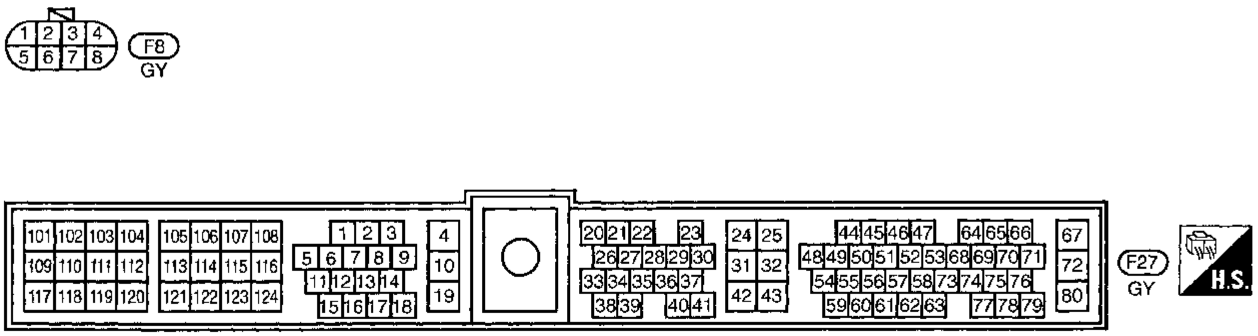


TEC132

Main Power Supply and Ground Circuit (Cont'd)

EC-MAIN-02





SEF679Q

Main Power Supply and Ground Circuit (Cont'd)

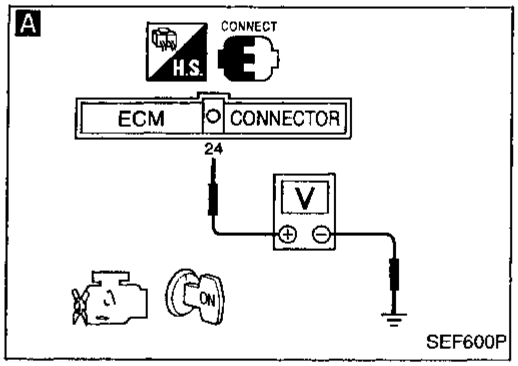
DIAGNOSTIC PROCEDURE

INSPECTION START

Start engine.
Is engine running?

Yes → Go to "**CHECK POWER SUPPLY-III**" on next page.

No ↓

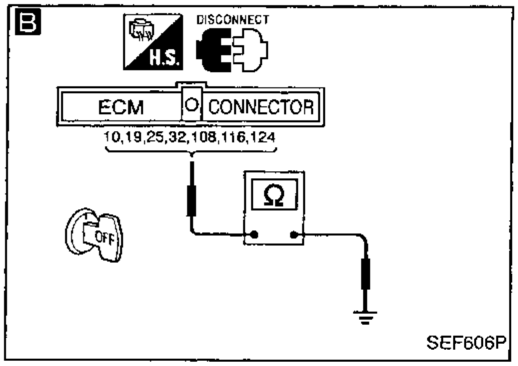


A **CHECK POWER SUPPLY-I.**
1. Turn ignition switch "ON".
2. Check voltage between ECM terminal ㉔ and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors F4, E4
- Harness for open or short between ECM and ignition switch

If NG, repair harness or connectors.

OK ↓

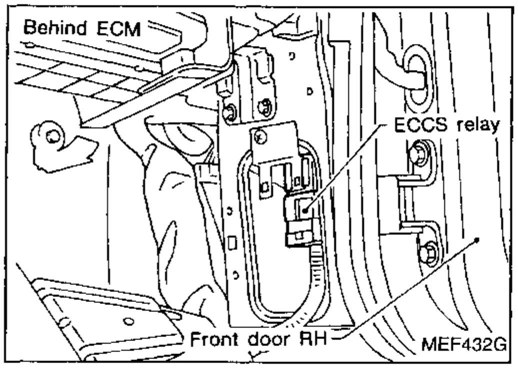


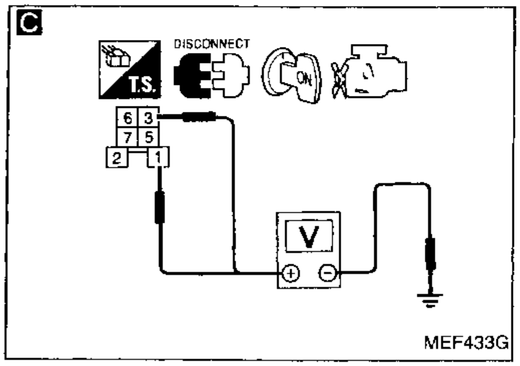
B **CHECK GROUND CIRCUIT-I.**
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals ⑩, ⑲, ㉕, ㉜, (108), (116), (124) and engine ground.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors F8, F41
- Harness for open or short between ECM and engine ground

If NG, repair harness or connectors.

OK ↓



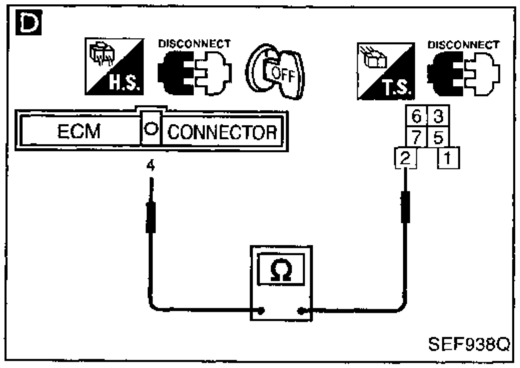


C **CHECK POWER SUPPLY-II.**
1. Disconnect ECCS relay.
2. Turn ignition switch "ON".
3. Check voltage between terminals ①, ③ and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors F3, E3
- 7.5A fuse
- Harness for open or short between ECCS relay and battery
- Harness for open or short between ECCS relay and harness connector F4

If NG, repair harness or connectors.

OK ↓



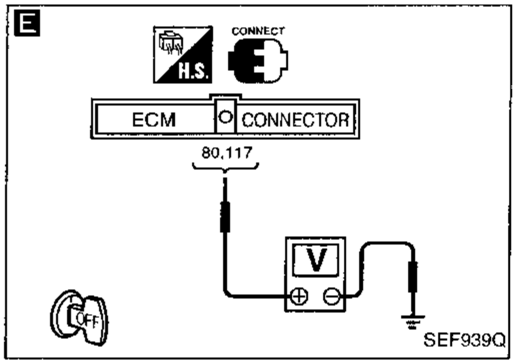
D **CHECK OUTPUT SIGNAL CIRCUIT.**
1. Turn ignition switch "OFF".
2. Check harness continuity between ECM terminal ④ and terminal ②.
Continuity should exist.
If OK, check harness for short.

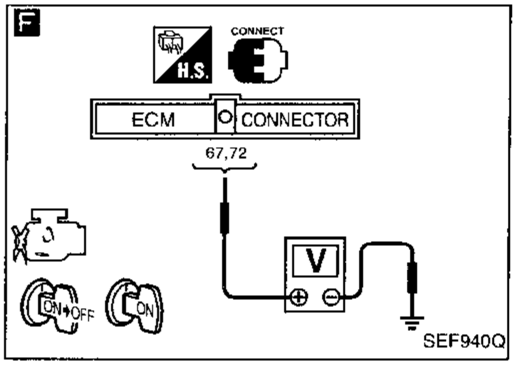
NG → Repair harness or connectors.

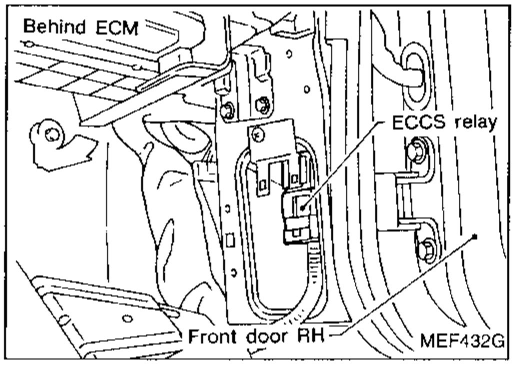
OK ↓

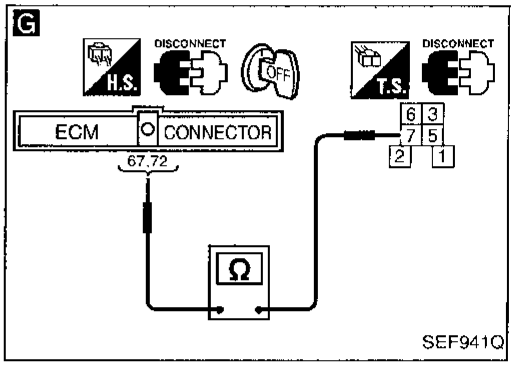
Go to "TROUBLE DIAGNOSIS FOR DTC P1320", EC-251.

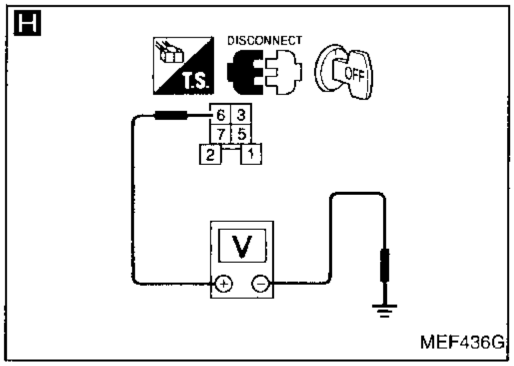
Main Power Supply and Ground Circuit (Cont'd)











E

CHECK POWER SUPPLY-III.
1. Stop engine.
2. Check voltage between ECM terminals (80), (117) and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness for open or short between ECM and harness connector (F3)

If NG, repair harness or connectors.

OK ↓

F

CHECK POWER SUPPLY-IV.
1. Turn ignition switch "ON" and then "OFF".
2. Check voltage between ECM terminals (67), (72) 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 "**CHECK GROUND CIRCUIT-II**" on next page.

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

NG ↓

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

Case-1 ↓

G

CHECK HARNESS CONTINUITY BETWEEN ECCS RELAY AND ECM.
1. Disconnect ECM harness connector.
2. Disconnect ECCS relay.
3. Check harness continuity between ECM terminals (67), (72) and terminal ⑦.
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

H

CHECK VOLTAGE BETWEEN ECCS RELAY AND GROUND.
Check voltage between terminal ⑥ and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness for open or short between ECCS relay and harness connector (F3)

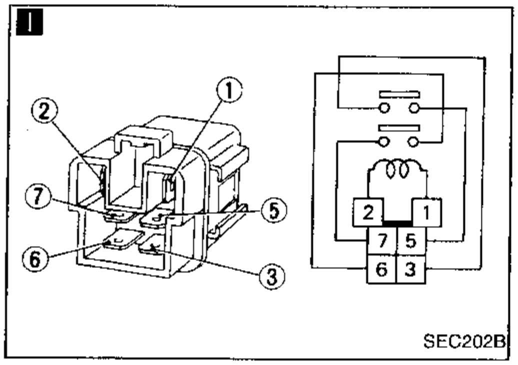
If NG, repair harness or connectors.

OK ↓

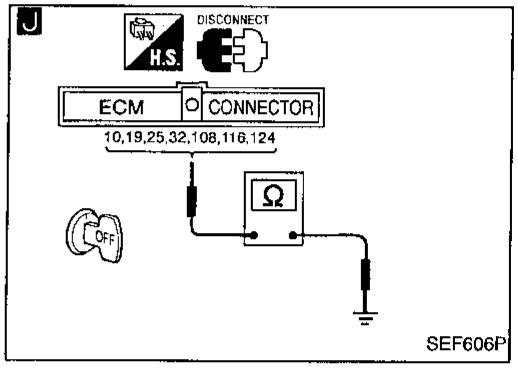
Ⓐ

Main Power Supply and Ground Circuit (Cont'd)

I



J



Ⓐ

I

CHECK ECCS RELAY.

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

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

NG → Replace ECCS relay.

OK ↓

J

CHECK GROUND CIRCUIT-II.

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminals ⑩, ⑲, ㉕, ㉜, (108), (116), (124) and engine ground.

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

NG → Check the following.
- Harness connectors (F8), (F41)
- Harness for open or short between ECM and engine ground.

If NG, repair harness or connectors.

OK ↓

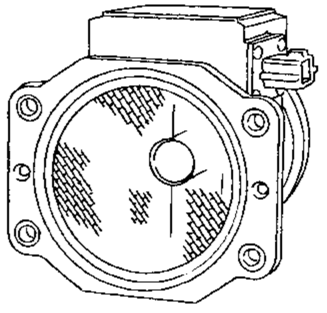
Disconnect and reconnect harness connectors in the circuit. Then retest.

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



SEF260Q

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 film that is supplied with electric current from the ECM. The temperature of the hot film is controlled by the ECM a certain amount. The heat generated by the hot film is reduced as the intake air flows around it. The more air, the greater the heat loss.

Therefore, the ECM must supply more electric current to the hot film as air flow increases. This maintains the temperature of the hot film. 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

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

GST

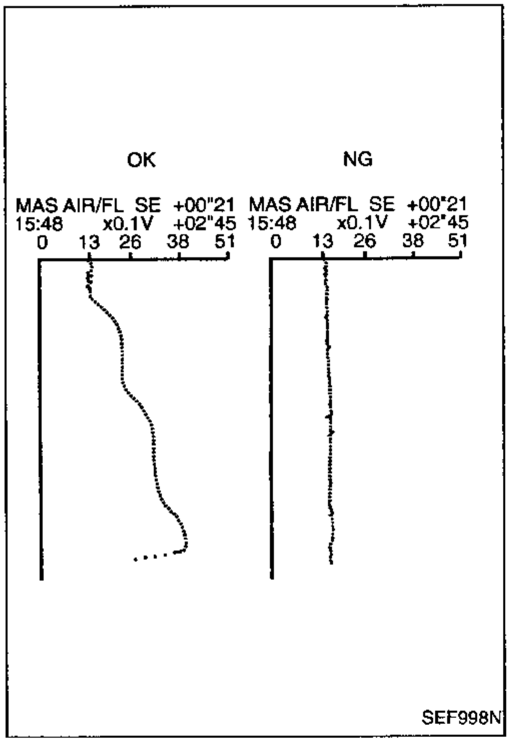
1) Turn ignition switch "ON", and wait at least 6 seconds.
2) Start engine and wait at least 3 seconds.
3) Select "MODE 7" with GST.

OR

NO TOOLS

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)



SEF998N

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) Wait at least 10 seconds at idle speed.

OR

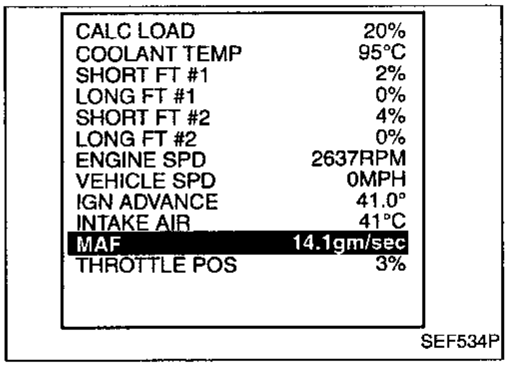
1) Turn ignition switch "ON".
2) Start engine and warm it up sufficiently.
3) Wait at least 10 seconds at idle speed.
4) Select "MODE 7" with GST.

OR

1) Turn ignition switch "ON".
2) Start engine and warm it up sufficiently.
3) Wait 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 1st trip DTC might not be confirmed.



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

SEF534P

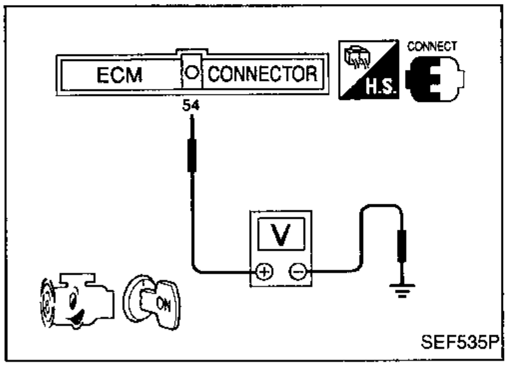
Procedure for malfunction C

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and warm it up sufficiently.
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.

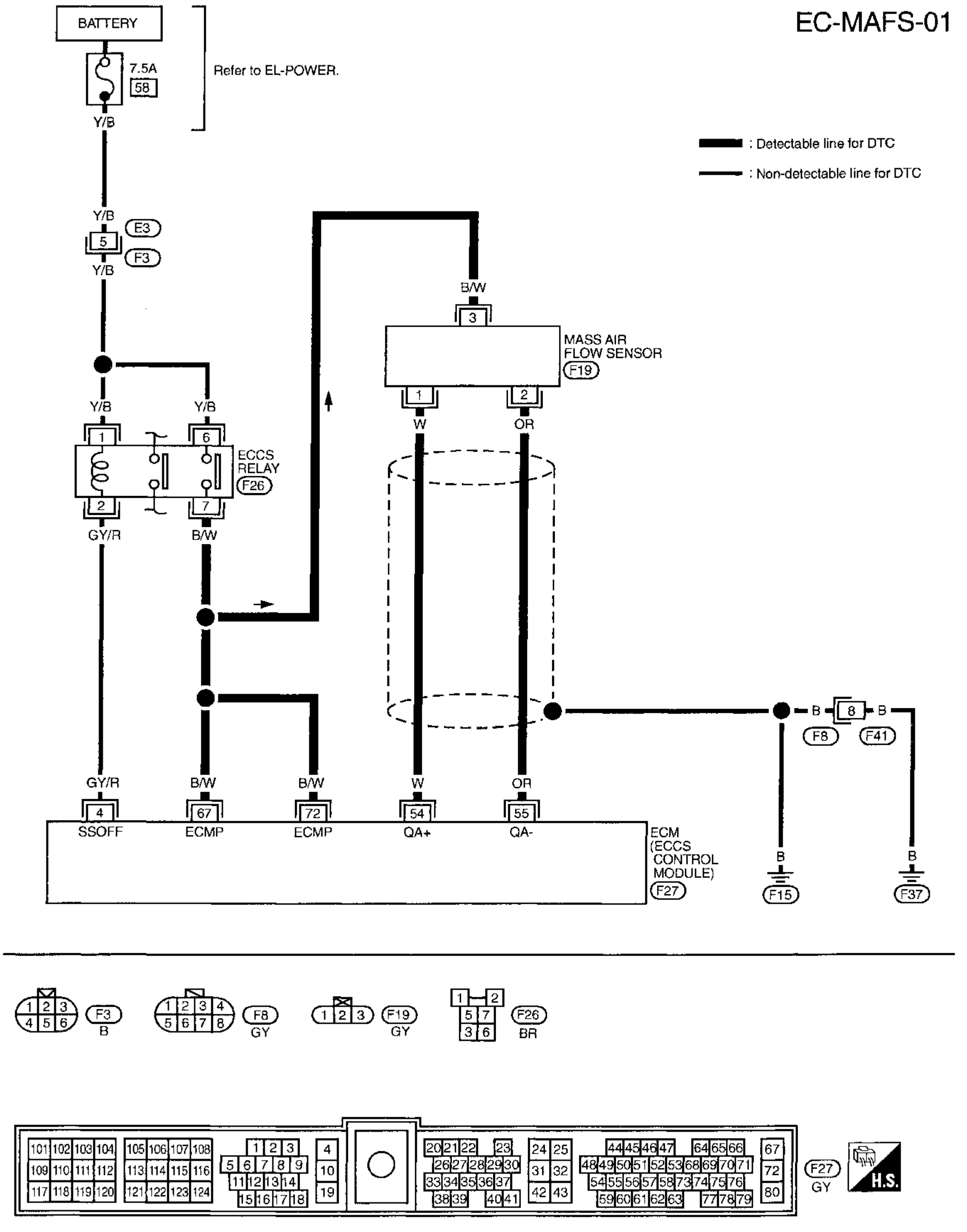
OR



SEF535P

1) Turn ignition switch "ON".
2) Start engine and warm it up sufficiently.
3) Check the voltage between ECM terminal (54) 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)



SEF680Q

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

DIAGNOSTIC PROCEDURE

INSPECTION START

A

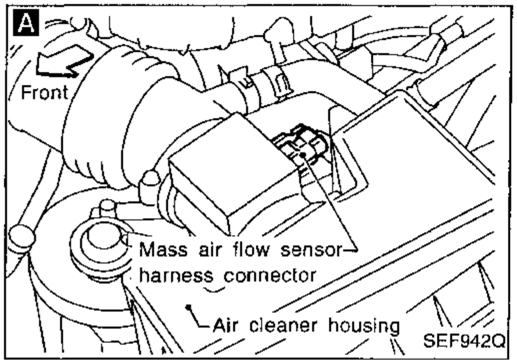
CHECK POWER SUPPLY.

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 voltage

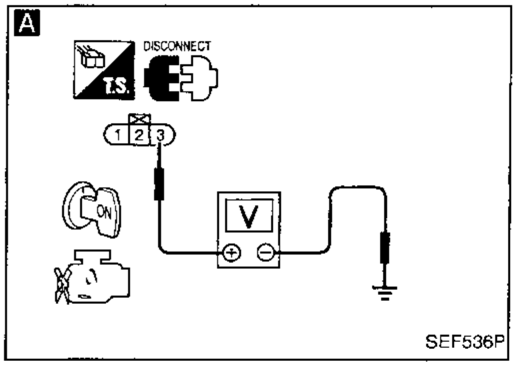
NG → Check the following.
- Harness for open or short between mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and ECCS relay

If NG, repair harness or connector.

OK



SEF942Q



SEF536P

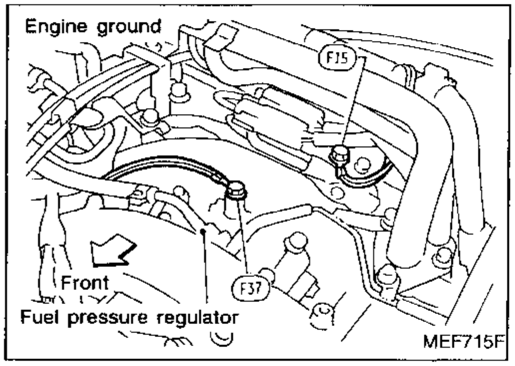
B

CHECK GROUND CIRCUIT.

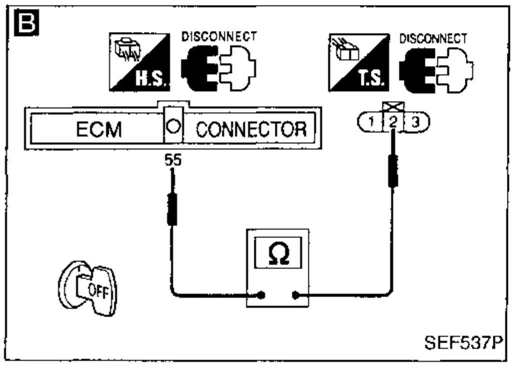
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Loosen and retighten engine ground screws.
4. Check harness continuity between terminal ② and ECM terminal (55).
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK



MEF715F



SEF537P

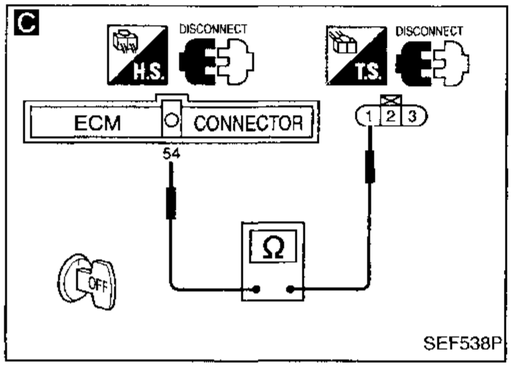
C

CHECK INPUT SIGNAL CIRCUIT.

Check harness continuity between terminal ① and ECM terminal (54).
Continuity should exist.
If OK, check harness for short.

NG → Repair harness or connectors.

OK



SEF538P

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

NG → Replace mass air flow sensor.

OK

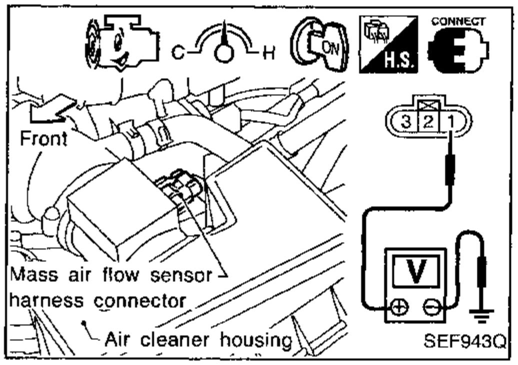
Disconnect and reconnect harness connectors in the circuits. Then retest.

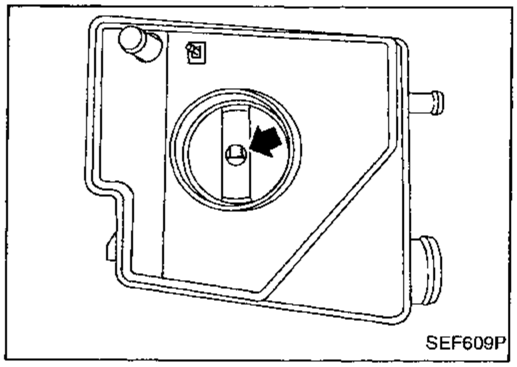
Trouble is not fixed.

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.)	1.0 - 1.7
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

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

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

GI
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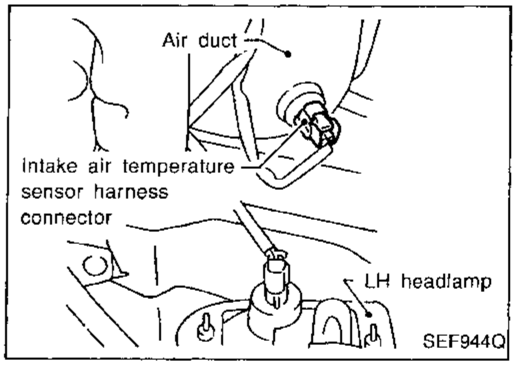
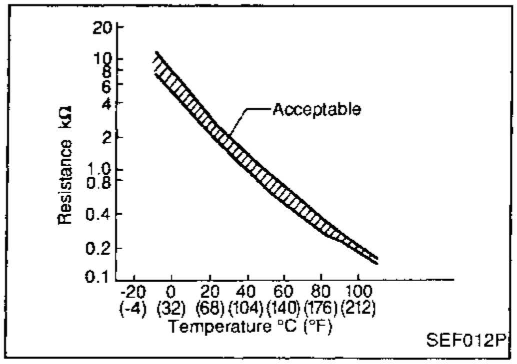


Intake Air Temperature Sensor (DTC: 0401)

The intake air temperature sensor is mounted to the air duct (behind headlamp LH). 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.

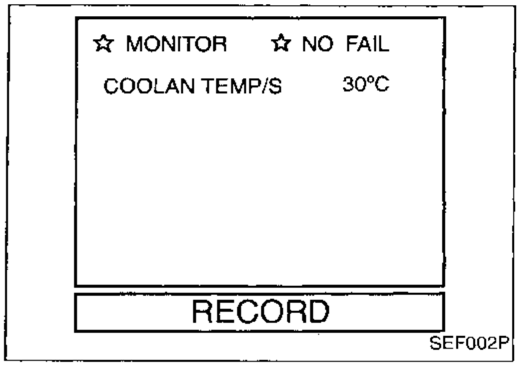
This sensor is not used to control the engine system. It is used only for the on board diagnosis.



⟨Reference data⟩

Intake air temperature °C (°F)	Resistance (kΩ)
−10 (14)	7.0 - 11.4
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

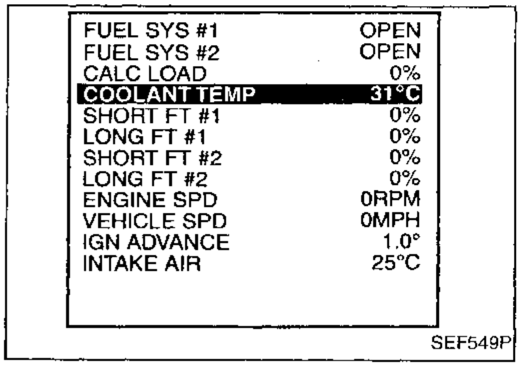
Diagnostic Trouble Code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P0110 0401	A) An excessively low or high voltage from the sensor is sent to ECM. B) Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.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



```
☆ MONITOR     ☆ NO FAIL
 COOLAN TEMP/S     30°C

        RECORD
```

SEF002P



```
FUEL SYS #1         OPEN
FUEL SYS #2         OPEN
CALC LOAD             0%
COOLANT TEMP        31°C
SHORT FT #1           0%
LONG FT #1            0%
SHORT FT #2           0%
LONG FT #2            0%
ENGINE SPD          0RPM
VEHICLE SPD         0MPH
IGN ADVANCE         1.0°
INTAKE AIR          25°C
```

SEF549P

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Procedure for malfunction A

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

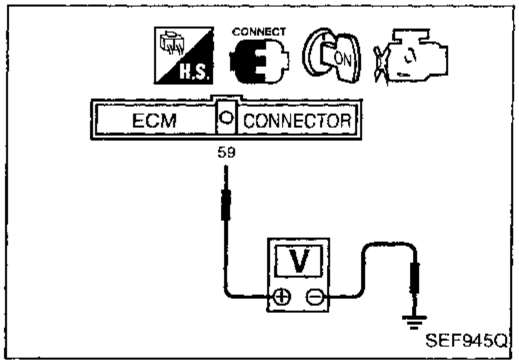
OR

1) Turn ignition switch "ON" and wait at least 5 seconds.
2) Select MODE 7 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 to 80 km/h (43 to 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 to 80 km/h (43 to 50 MPH) for 2 minutes.
6) Select MODE 7 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 (59) 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 to 80 km/h (43 to 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.

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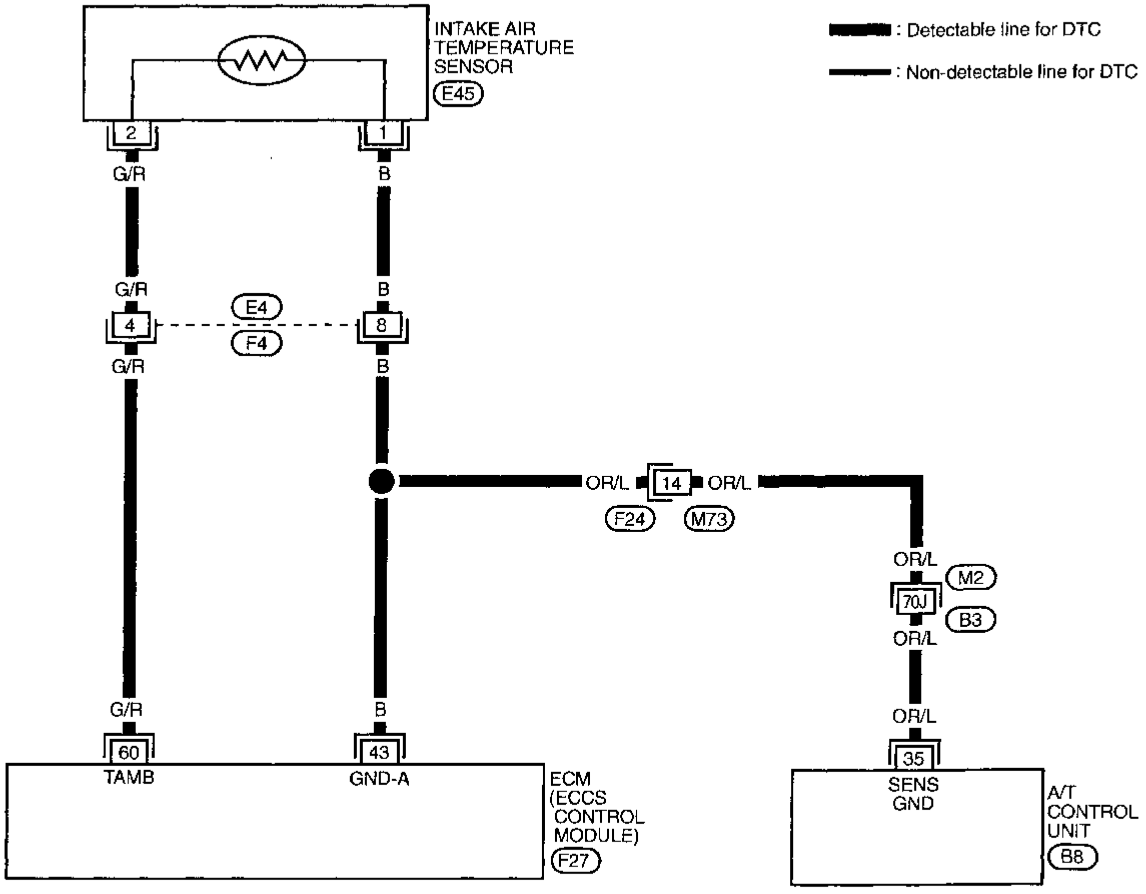
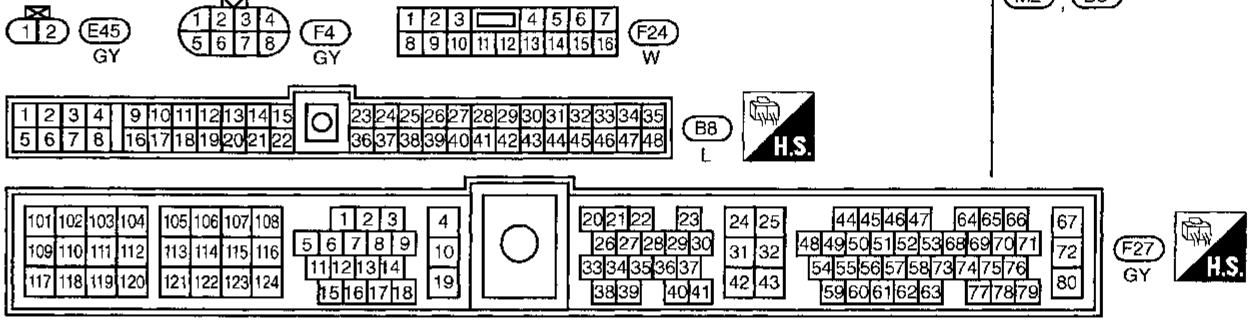
EC-IATS-01

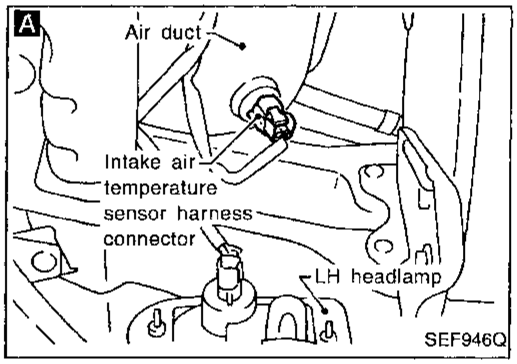


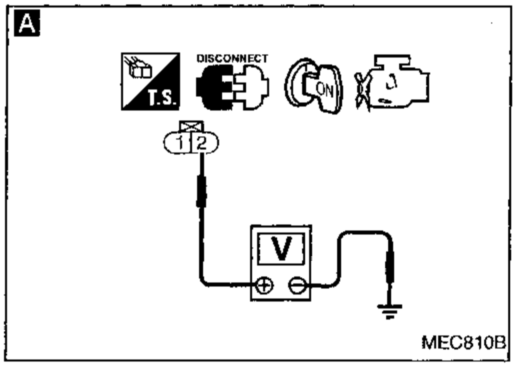
Refer to last page (Foldout page).
M2, B3

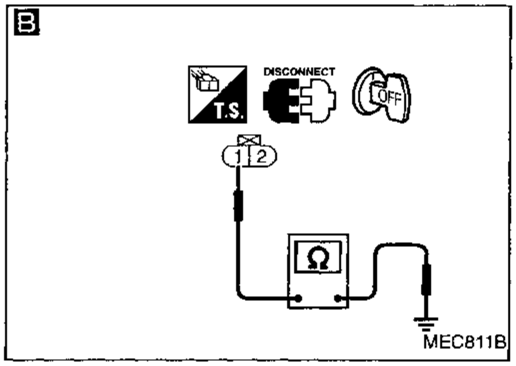


SEF681Q

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 F4, E4
- 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 F4, E4
- Harness connectors F24, M73
- Harness connectors M2, B3
- 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.

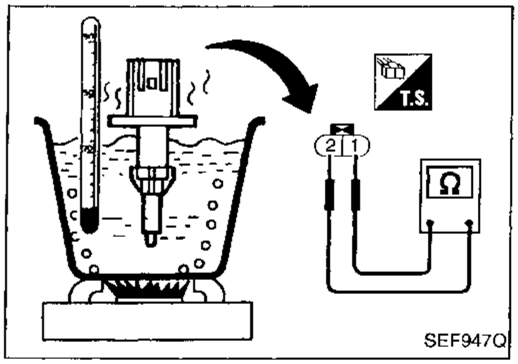
INSPECTION END

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

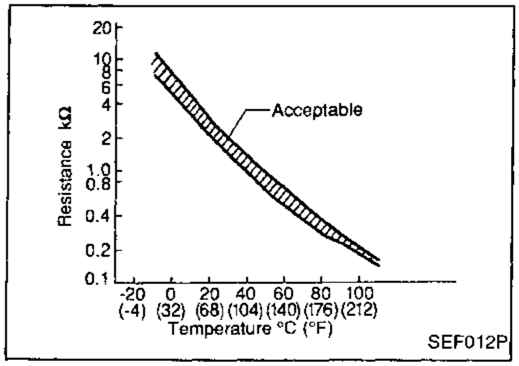
COMPONENT INSPECTION

Intake air temperature sensor

Check resistance as shown in the figure.



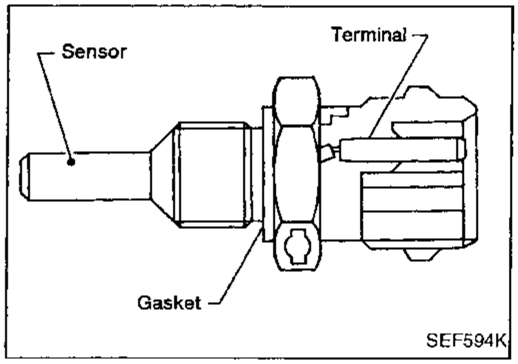
SEF947Q



SEF012P

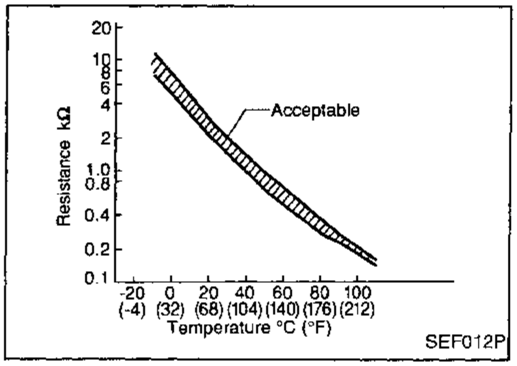
⟨Reference data⟩

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



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)	0.98	0.236 - 0.260
110 (230)	0.64	0.143 - 0.153

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

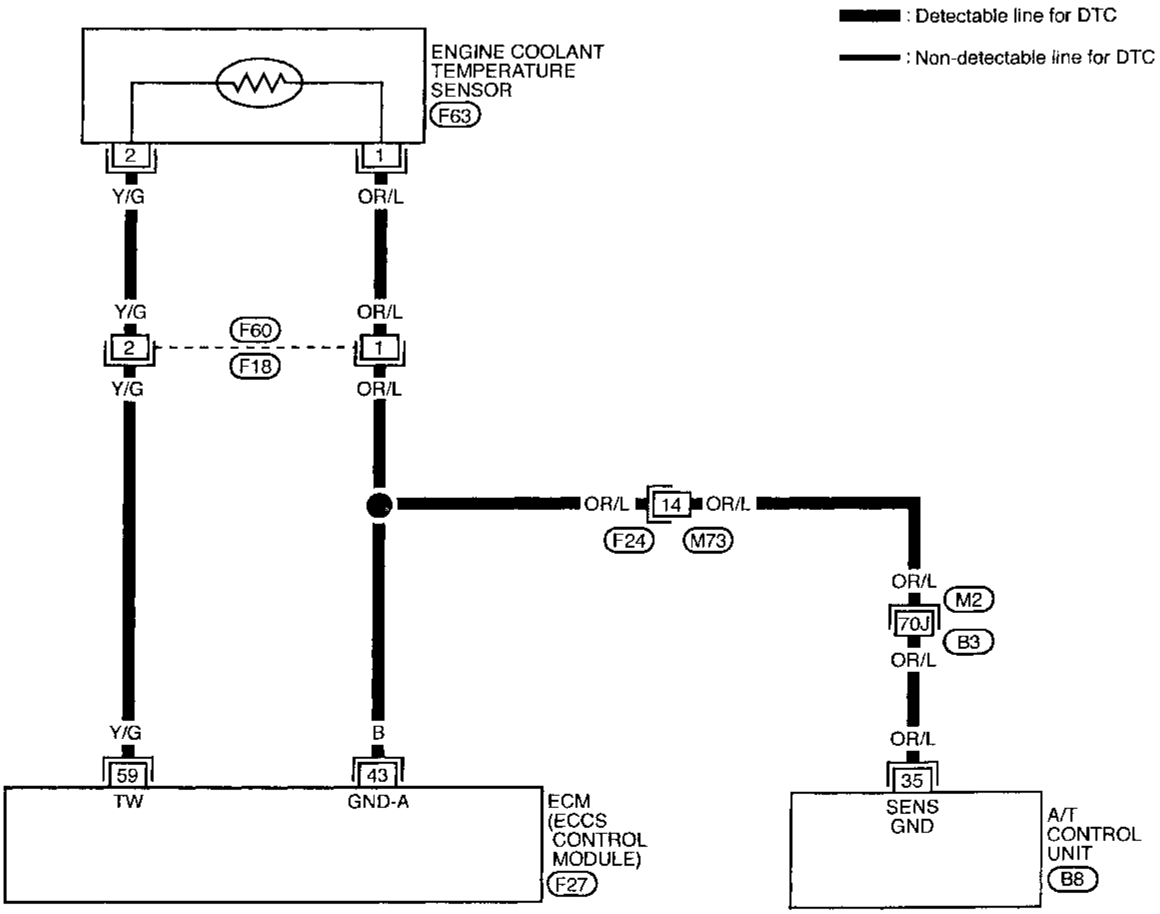
GST
1) Turn ignition switch “ON” and wait at least 5 seconds.
2) Select “MODE 7” with GST.

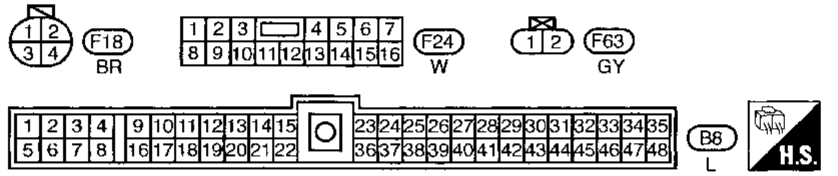
OR

NO TOOLS
1) Turn ignition switch “ON” and wait at least 5 seconds.
2) Turn ignition switch “OFF”, wait at least 5 seconds and then turn “ON”.
3) Perform diagnostic test mode II (Self-diagnostic results) with ECM.

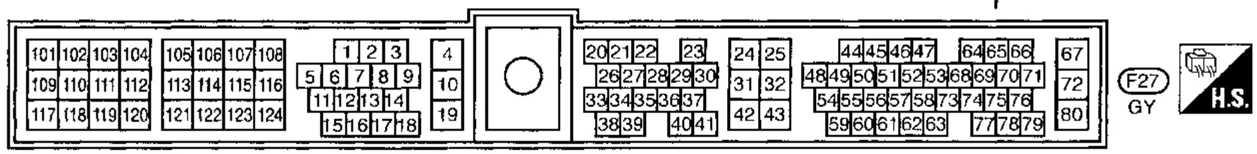
Engine Coolant Temperature Sensor (ECTS) (DTC: 0103) (Cont'd)

EC-ECTS-01



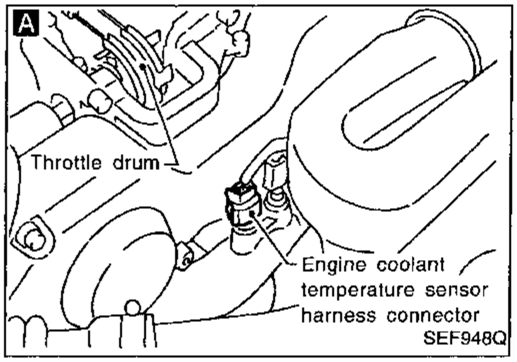


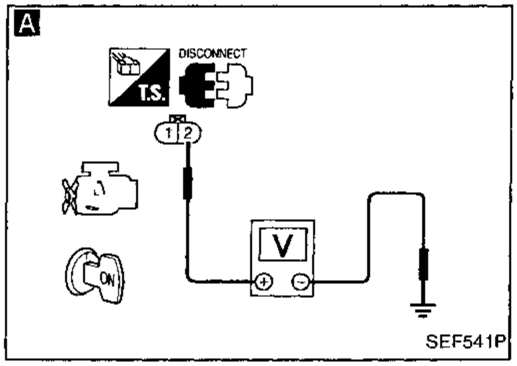
Refer to last page (Foldout page).
(M2), (B3)

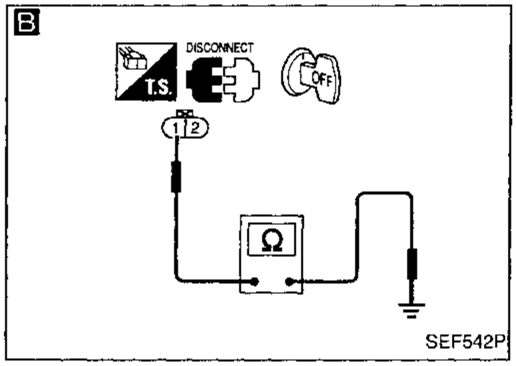


SEF682Q

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 → Check the following.

- Harness connectors F18, F60
- Harness for open or short between ECM and engine coolant 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 F18, F60
- Harness connectors F24, M73
- Harness connectors M2, B3
- 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 circuit. Then retest.

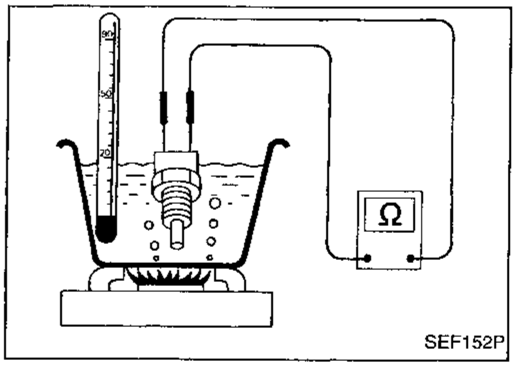
↓ Trouble is not fixed.

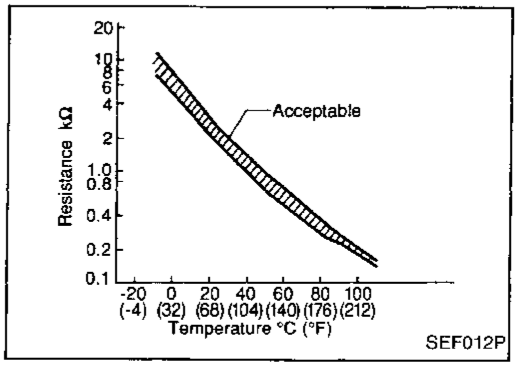
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

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





COMPONENT INSPECTION

Engine coolant temperature sensor

Check resistance as shown in the figure.
⟨Reference data⟩

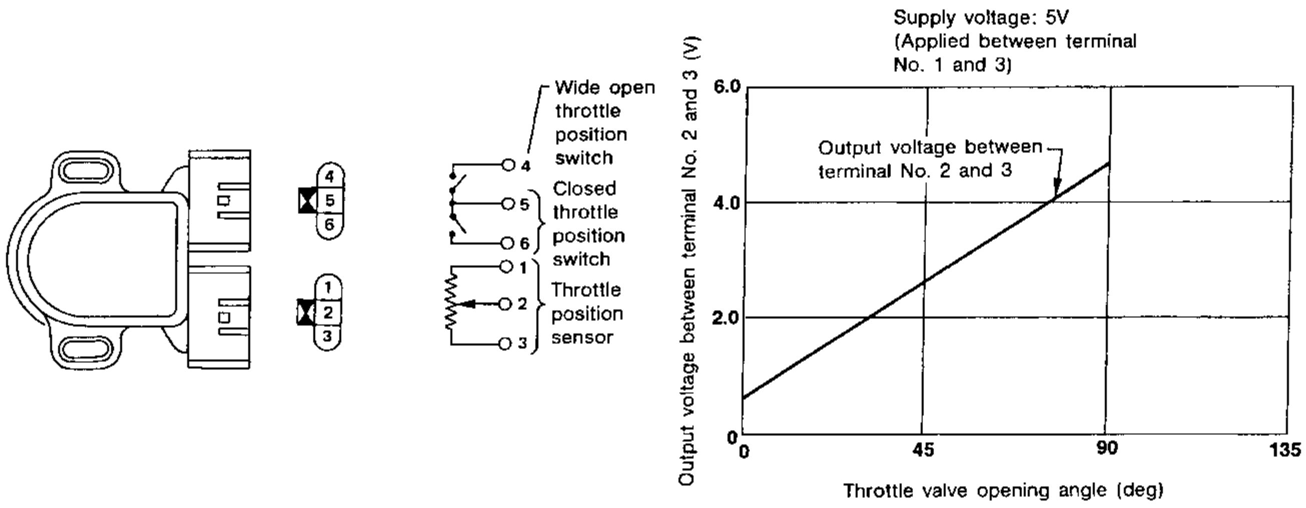
Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

If NG, replace engine coolant temperature sensor.

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.

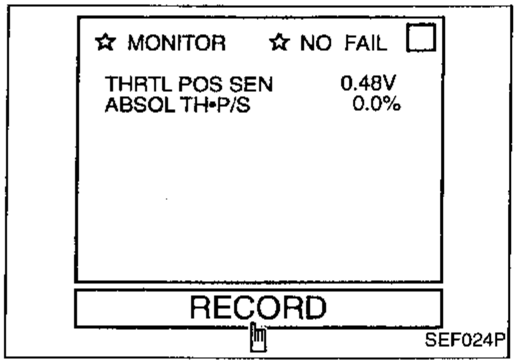
Idle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This one controls engine operation such as fuel cut. In addition, a "Wide open and closed throttle position switch" is built into the throttle position sensor unit.



MEC693BA

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. • Rationally incorrect voltage is sent to ECM compared with the signals from mass air flow sensor, camshaft position sensor and IACV-AAC valve.	• Harness or connectors (The sensor circuit is open or shorted.) • Throttle position sensor

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

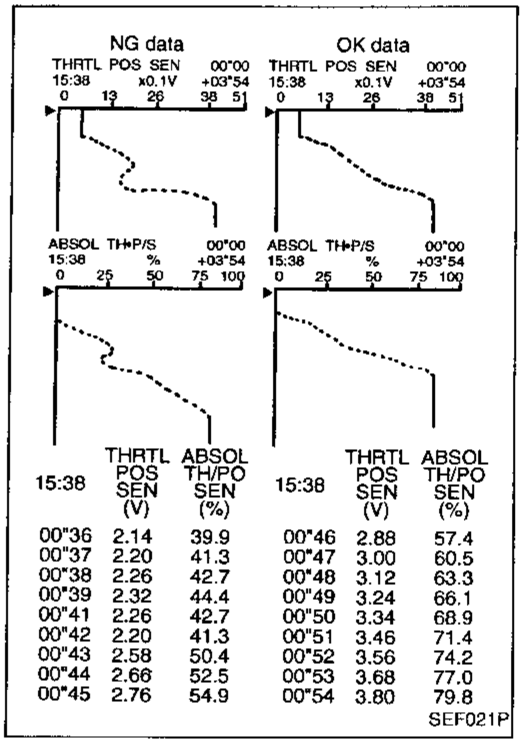


☆ MONITOR ☆ NO FAIL ☐

THRTL POS SEN 0.48V
ABSOL TH•P/S 0.0%

RECORD

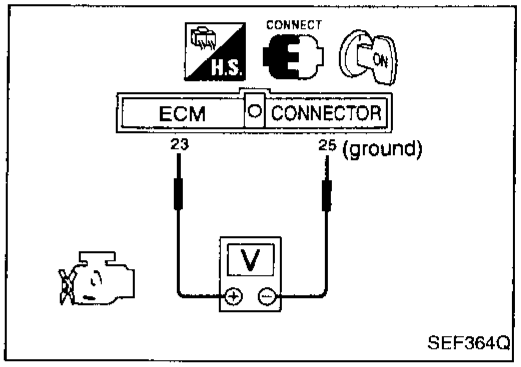
SEF024P



15:38	THRTL POS SEN (V)	ABSOL TH/PO SEN (%)
00"36	2.14	39.9
00"37	2.20	41.3
00"38	2.26	42.7
00"39	2.32	44.4
00"41	2.26	42.7
00"42	2.20	41.3
00"43	2.58	50.4
00"44	2.66	52.5
00"45	2.76	54.9

15:38	THRTL POS SEN (V)	ABSOL TH/PO SEN (%)
00"46	2.88	57.4
00"47	3.00	60.5
00"48	3.12	63.3
00"49	3.24	66.1
00"50	3.34	68.9
00"51	3.46	71.4
00"52	3.56	74.2
00"53	3.68	77.0
00"54	3.80	79.8

SEF021P



SEF364Q

OVERALL FUNCTION CHECK

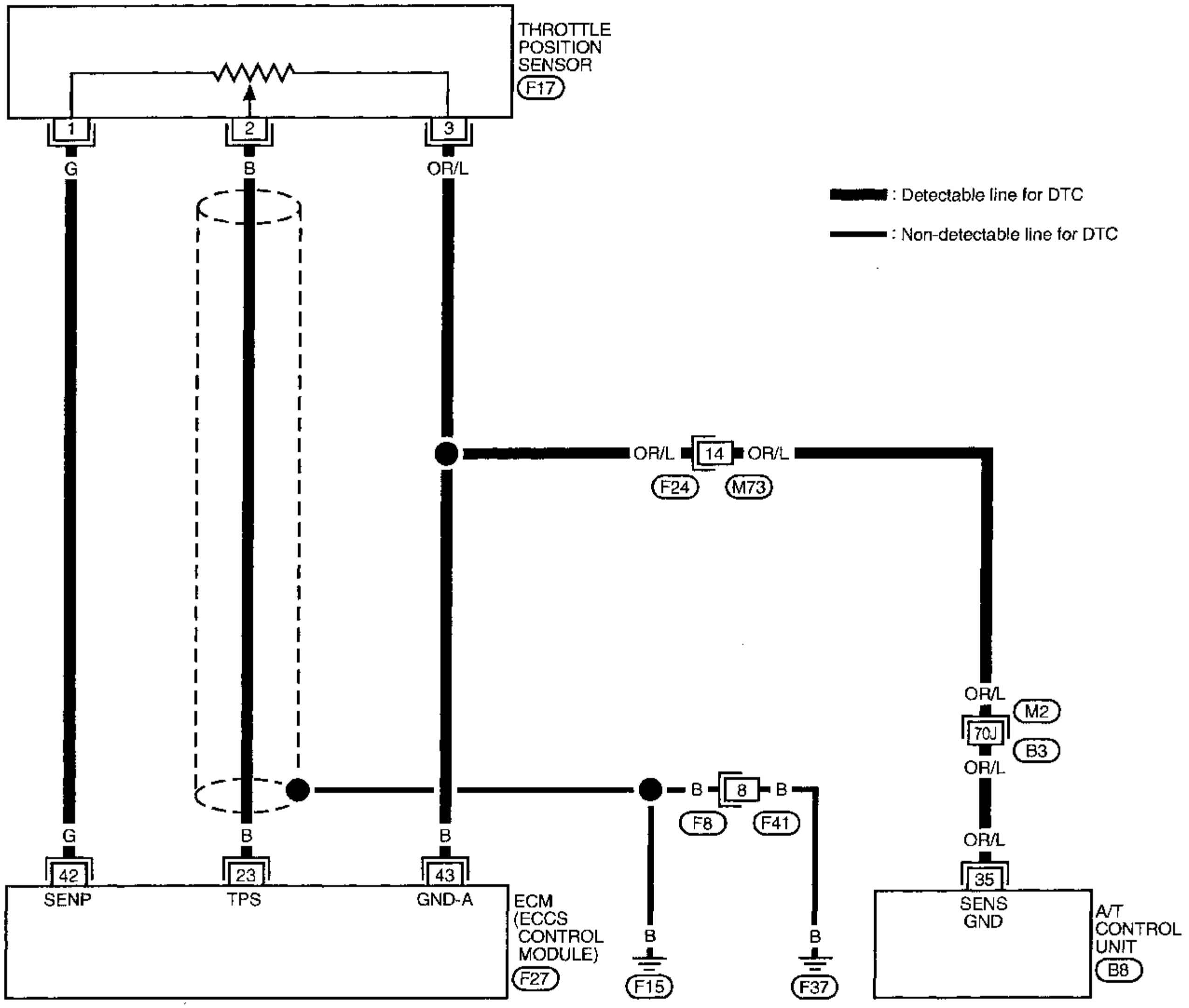
Use this procedure to check the overall function of the throttle position sensor circuit. During this check, a 1st trip DTC might not be confirmed.

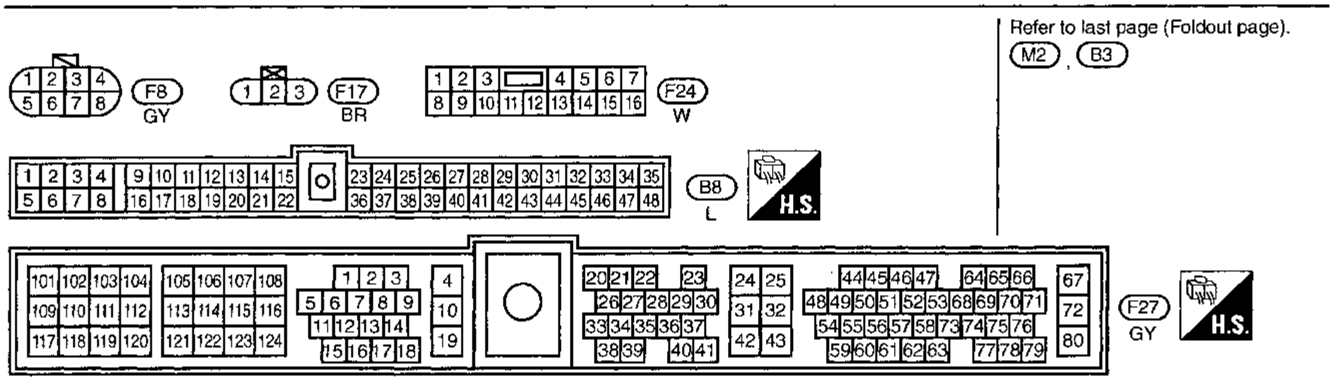
1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON".
4) Select "MANU TRIG" and "HI SPEED" in "DATA MONITOR" mode with CONSULT.
5) Select "THRTL POS SEN" and "ABSOL TH·P/S" in "DATA MONITOR" mode with CONSULT.
6) Press RECORD on CONSULT SCREEN at the same time accelerator pedal is depressed.
7) Print out the recorded data and check the following:
   - The voltage when accelerator pedal fully released is approximately 0.35 - 0.65V.
   - The voltage rise is linear in response to accelerator pedal depression.
   - The voltage when accelerator pedal fully depressed is approximately 4V.

OR

1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON".
4) Check the voltage between ECM terminal ㉓ and ㉕ (ground) and check the following:
   - The voltage when accelerator pedal fully released is approximately 0.35 - 0.65V.
   - The voltage rise is linear in response to accelerator pedal depression.
   - The voltage when accelerator pedal fully depressed is approximately 4V.

EC-TPS-01





Refer to last page (Foldout page).
M2, B3

SEF683Q

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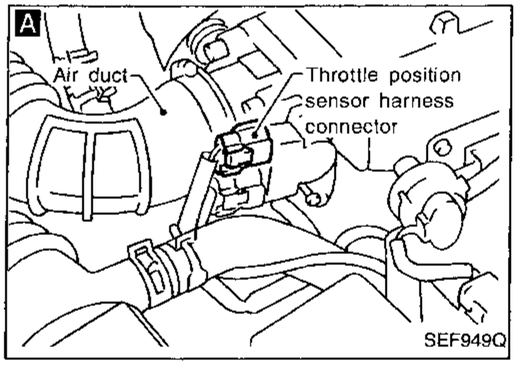
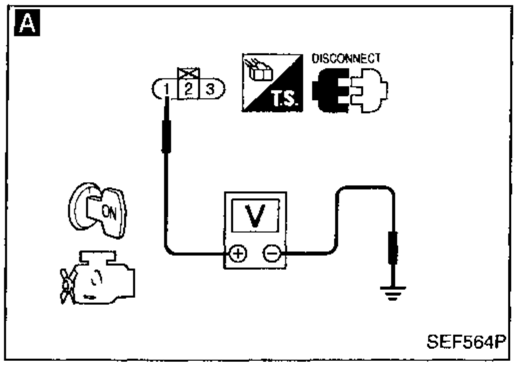
Throttle Position Sensor (DTC: 0403) (Cont'd)

DIAGNOSTIC PROCEDURE

INSPECTION START



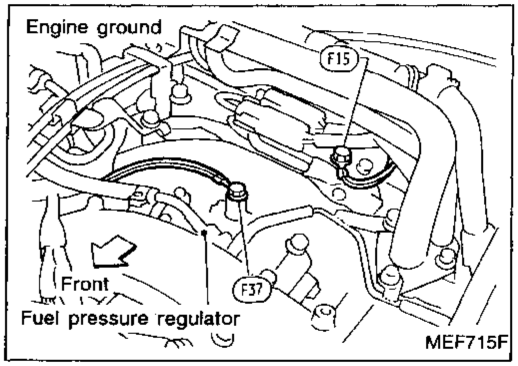


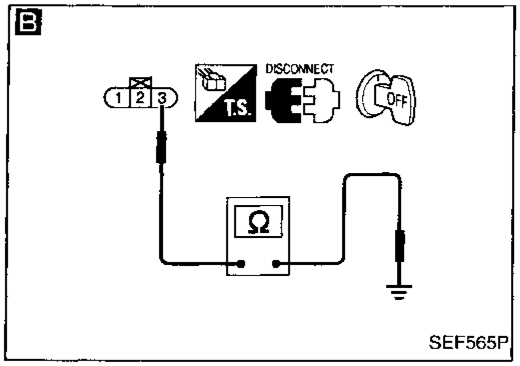
A

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 ① and ground with CONSULT or tester.
   Voltage: Approximately 5V

NG → Repair harness or connectors.

OK ↓





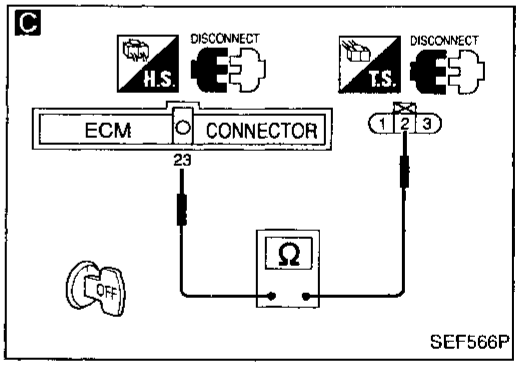
B

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

NG → Check the following.
- Harness connectors F24, M73
- Harness connectors M2, B3
- Harness for open or short between throttle position sensor and ECM
- Harness for open or short between throttle position sensor and A/T control unit

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-73.

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-73.

OK ↓

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

↓ Trouble is not fixed.

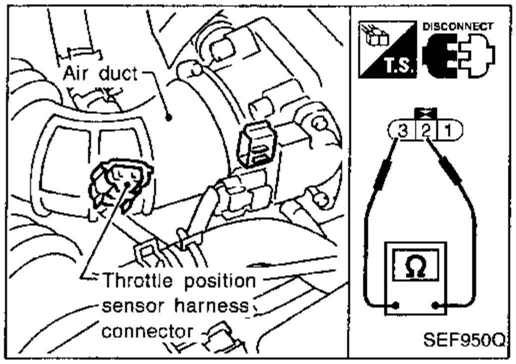
Check ECM pin terminals for damage and check the connection of ECM harness connector.
Reconnect ECM harness connector and retest.

↓

INSPECTION END

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

COMPONENT INSPECTION

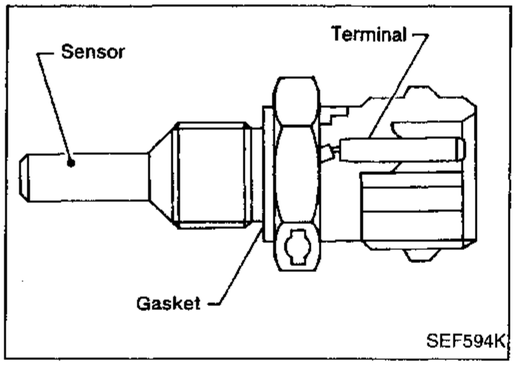


Throttle position sensor

1. Start engine and warm it up sufficiently.
2. Turn ignition switch "OFF".
3. Disconnect throttle position sensor harness connector.
4. 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 - 4.0 kΩ
Completely open	Approximately 4.0 kΩ

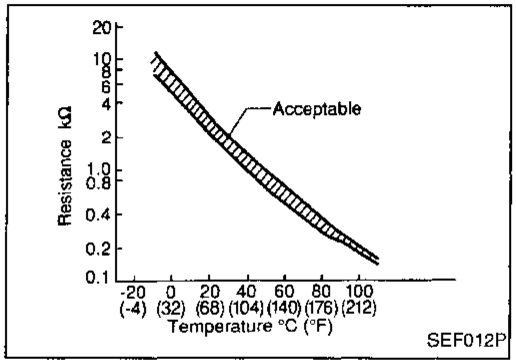
If NG, replace throttle position sensor.
To adjust throttle position sensor, perform "BASIC INSPECTION", EC-73.



SEF594K

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.

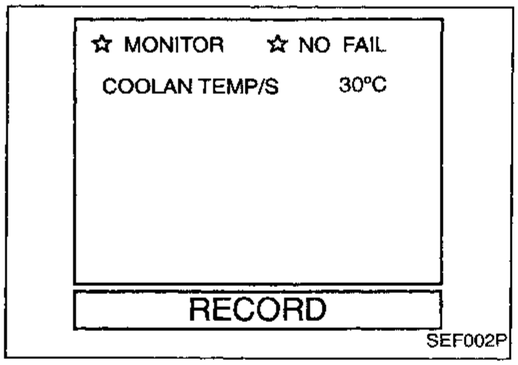


SEF012P

⟨Reference data⟩

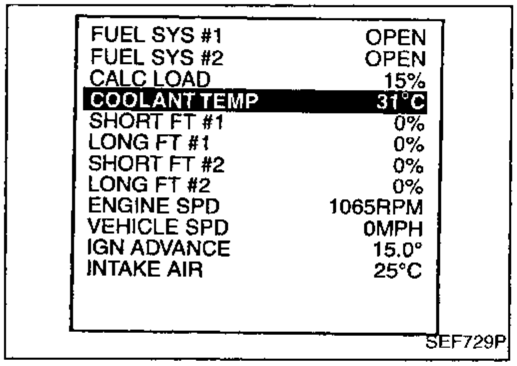
Engine coolant temperature °C (°F)	Voltage (V)	Resistance (kΩ)
−10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.98	0.236 - 0.260
110 (230)	0.64	0.143 - 0.153

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



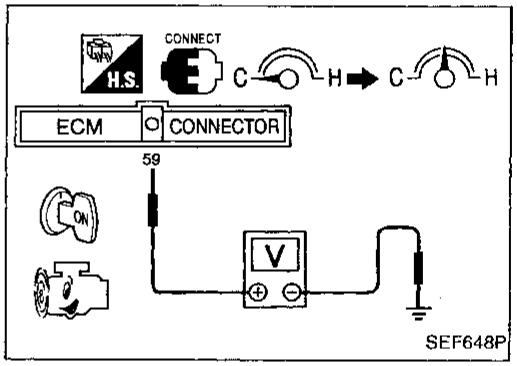
```
☆ MONITOR    ☆ NO FAIL
 COOLAN TEMP/S    30°C

       RECORD
```

SEF002P



```
FUEL SYS #1          OPEN
FUEL SYS #2          OPEN
CALC LOAD             15%
COOLANT TEMP         31°C
SHORT FT #1            0%
LONG FT #1             0%
SHORT FT #2            0%
LONG FT #2             0%
ENGINE SPD        1065RPM
VEHICLE SPD          0MPH
IGN ADVANCE         15.0°
INTAKE AIR           25°C
```

SEF729P



SEF648P

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 1st trip DTC might not be confirmed.

Note: If both DTC P0115 (0103) and P0125 (0908) are displayed, first perform TROUBLE DIAGNOSIS FOR DTC P0115 (0103), EC-121.

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

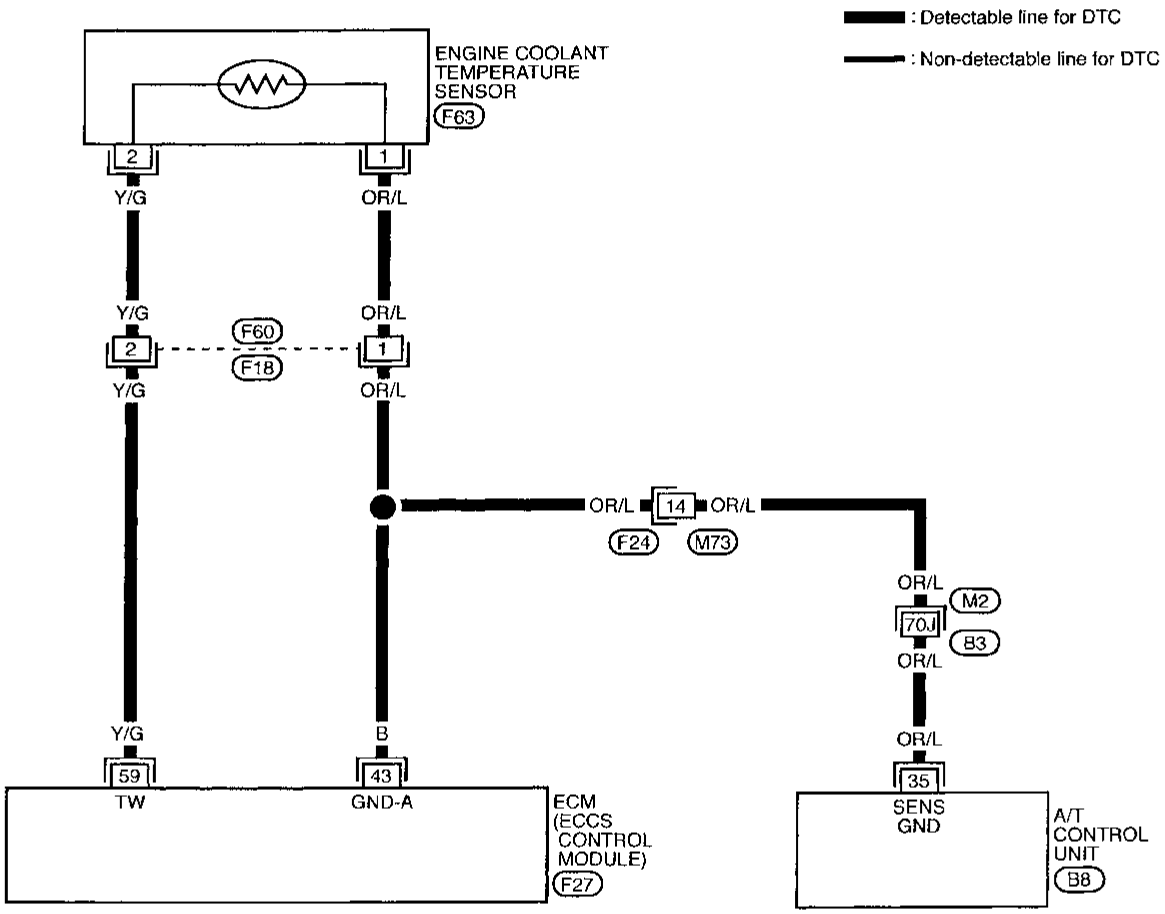
1) Turn ignition switch "ON".
2) Select "MODE 1" with GST.
3) Start engine and run it at idle speed.
4) Check that the engine coolant temperature rises to 25°C (77°F) or more. within 15 minutes. (Be careful not to overheat engine.)

OR

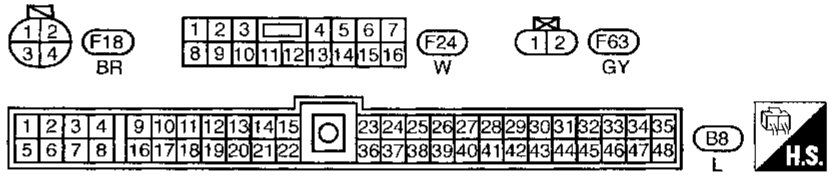
1) Turn ignition switch "ON".
2) Probe voltage meter between ECM terminal (59) and ground.
3) Start engine and run it at idle speed.
4) Check that voltage of engine coolant temperature changes to less than 3.3 (V) within 15 minutes. (Be careful not to overheat engine.)

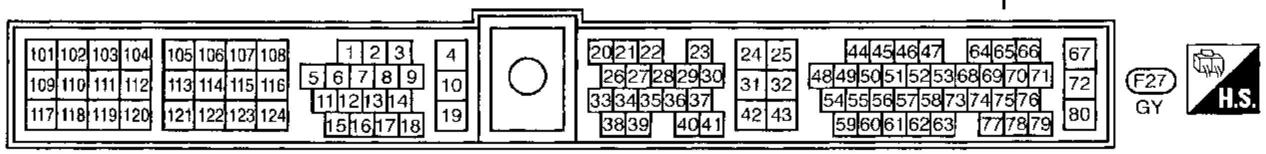
Engine Coolant Temperature (ECT) Sensor (DTC: 0908) (Cont'd)

EC-ECTS-01



Refer to last page (Foldout page).
M2, B3

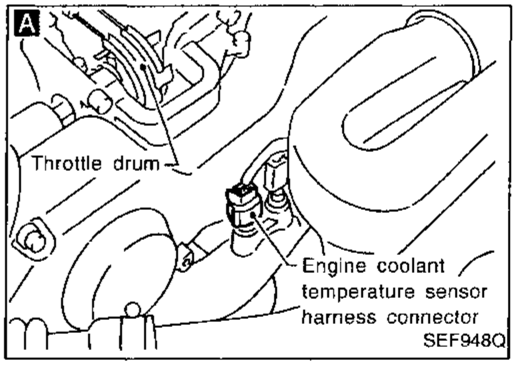




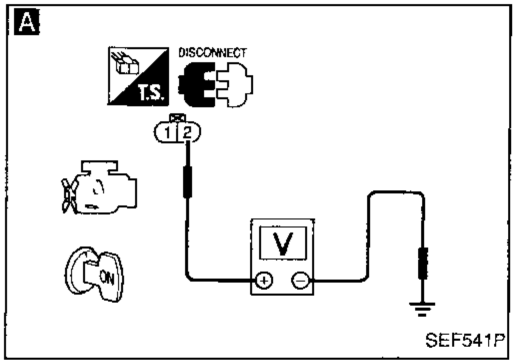
SEF682Q

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

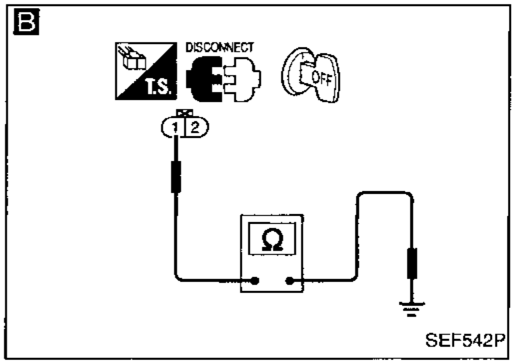
DIAGNOSTIC PROCEDURE



SEF948Q



SEF541P



SEF542P

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 → Check the following.
- Harness connectors F18, F60
- Harness for open or short between ECM and engine coolant 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 F18, F60
- Harness connectors F24, M73
- Harness connectors M2, B3
- 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)], grasp lower radiator hose and confirm the engine coolant does not flow.

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

↓ OK

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

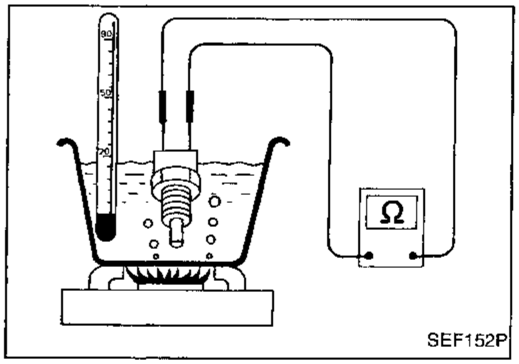
↓ Trouble is not fixed.

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

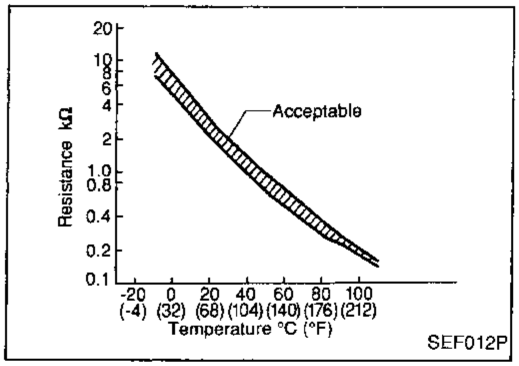
↓

INSPECTION END

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



SEF152P



SEF012P

COMPONENT INSPECTION

Engine coolant temperature sensor

Check resistance as shown in the figure.
⟨Reference data⟩

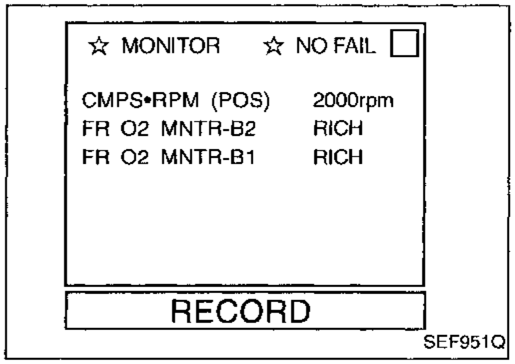
Temperature °C (°F)	Resistance (kΩ)
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.0
90 (194)	0.236 - 0.260

If NG, replace engine coolant temperature sensor.

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)



☆ MONITOR ☆ NO FAIL ☐

CMPS•RPM (POS)	2000rpm
FR O2 MNTR-B2	RICH
FR O2 MNTR-B1	RICH

SEF951Q

OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the closed loop control. During this check, a 1st trip 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
```

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 goes on more than 5 times within 10 seconds while keeping at 2,000 rpm in Diagnostic Test Mode II (Front heated oxygen sensor monitor).

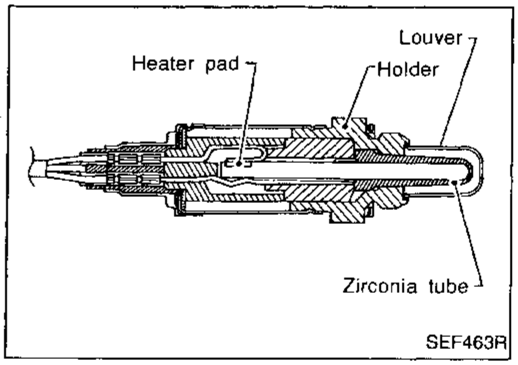
DIAGNOSTIC PROCEDURE

For right bank

Refer to TROUBLE DIAGNOSIS FOR DTC P0130, EC-136.
Refer to TROUBLE DIAGNOSIS FOR DTC P0135, EC-141.

For left bank

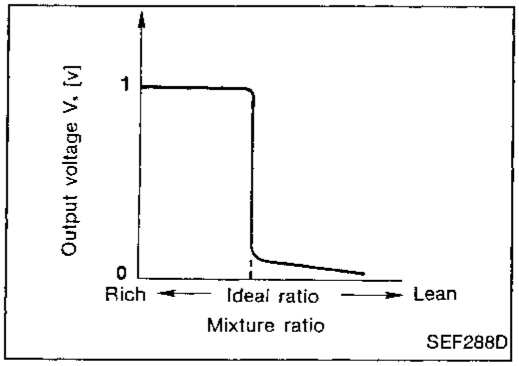
Refer to TROUBLE DIAGNOSIS FOR DTC P0150, EC-153.
Refer to TROUBLE DIAGNOSIS FOR DTC P0155, EC-158.



SEF463R

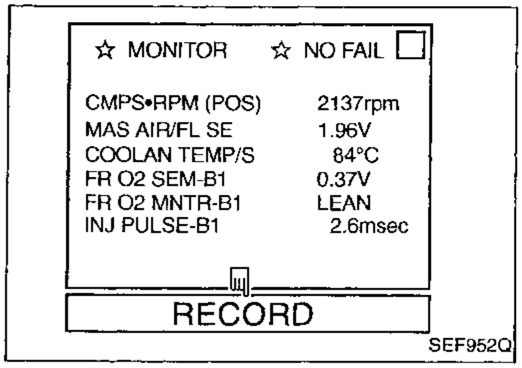
Front Heated Oxygen Sensor (Front HO2S) (Right bank) (DTC: 0503)

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.



SEF288D

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



```
☆ MONITOR      ☆ NO FAIL ☐

CMPS•RPM (POS)     2137rpm
MAS AIR/FL SE      1.96V
COOLAN TEMP/S       84°C
FR O2 SEM-B1       0.37V
FR O2 MNTR-B1      LEAN
INJ PULSE-B1        2.6msec

         RECORD
```

SEF952Q

OVERALL FUNCTION CHECK

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

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.

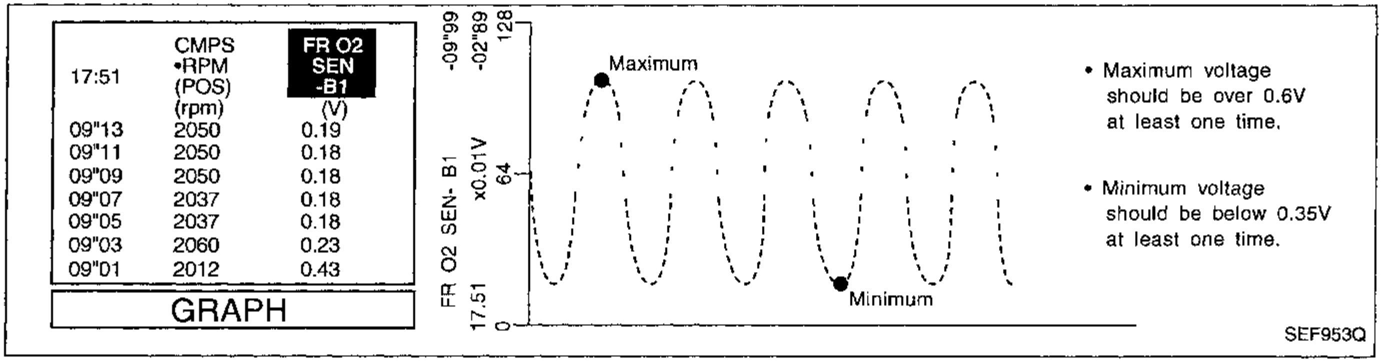
  5 times (cycles) are counted as shown below:

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

  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.

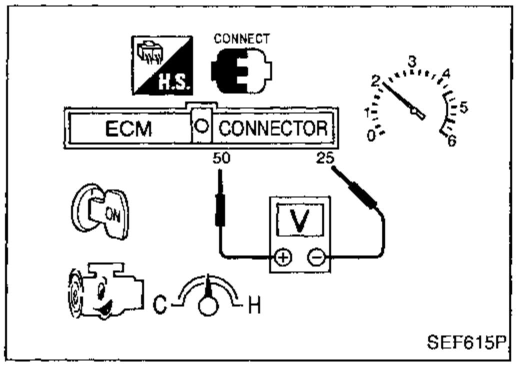


17:51	CMPS •RPM (POS) (rpm)	FR O2 SEN -B1 (V)
09"13	2050	0.19
09"11	2050	0.18
09"09	2050	0.18
09"07	2037	0.18
09"05	2037	0.18
09"03	2060	0.23
09"01	2012	0.43

GRAPH

- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.35V at least one time.

SEF953Q



SEF615P

OR

1) Start engine and warm it up sufficiently.
2) Set voltmeter probes between ECM terminal ㊿ (sensor signal) and ㉕ (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.

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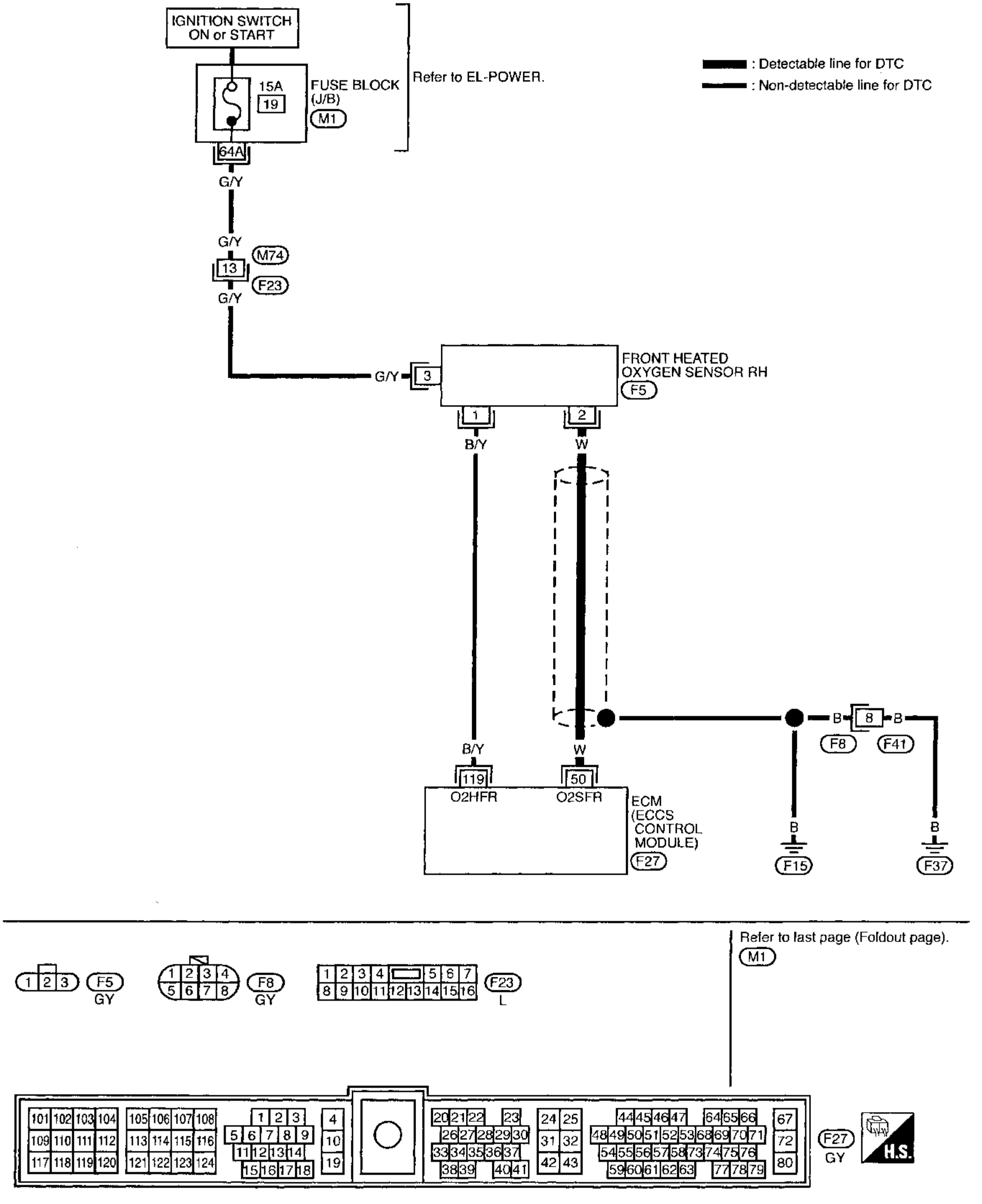
Front Heated Oxygen Sensor (Front HO2S) (Right bank) (DTC: 0503) (Cont'd)

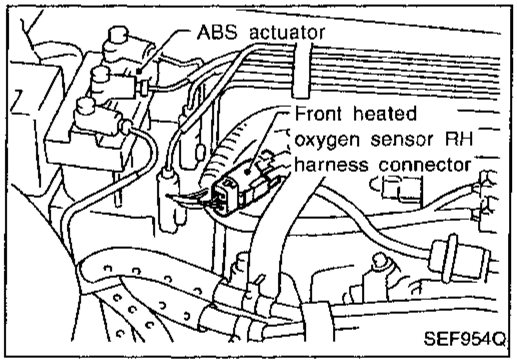
EC-FRO2RH-01



SEF684Q

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

DIAGNOSTIC PROCEDURE



INSPECTION START

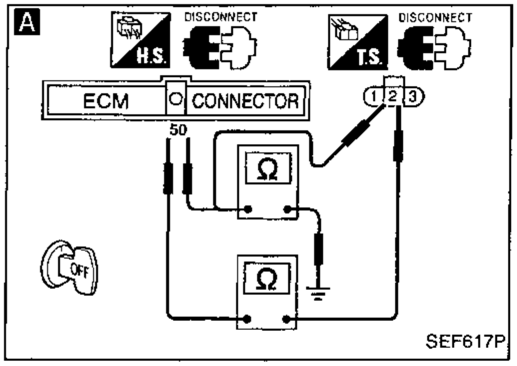
↓

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 ㊿ and terminal ② .
Continuity should exist.
4. Check harness continuity between ECM terminal ㊿ (or terminal ②) and ground.
Continuity should not exist.

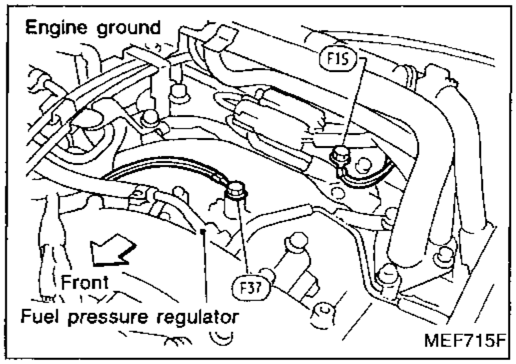
If OK, check harness for short.

NG → Repair harness or connectors.



↓ OK

Loosen and retighten engine ground screws.



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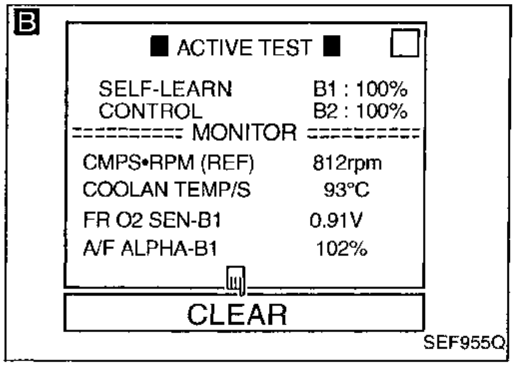
B

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 1st trip DTCs P0171, P0172 detected? Is it difficult to start engine?

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 1st trip DTC No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Make sure DTC No. 0505 is displayed in Diagnostic Test Mode II.
7. Run engine for at least 10 minutes at idle speed.
Are the 1st trip DTCs 0114, 0115 detected? Is it difficult to start engine?

Yes → Go to "TROUBLE DIAGNOSIS FOR DTC P0171, P0172", EC-170, 175.



■ ACTIVE TEST ■ ☐

SELF-LEARN CONTROL B1 : 100% B2 : 100%

========== MONITOR ==========

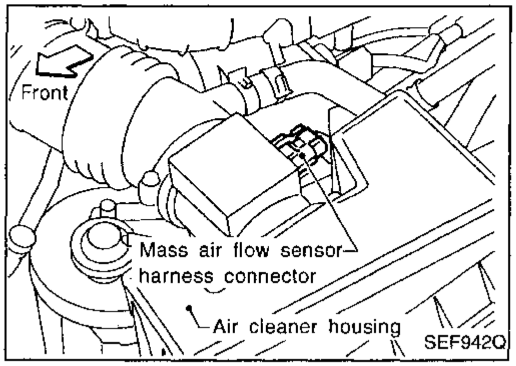
CMPS•RPM (REF) 812rpm

COOLAN TEMP/S 93°C

FR O2 SEN-B1 0.91V

A/F ALPHA-B1 102%

CLEAR



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

Ⓐ

CHECK COMPONENT
[Front heated oxygen sensor heater (right bank)].
Refer to "COMPONENT INSPECTION" below.

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

OK ↓

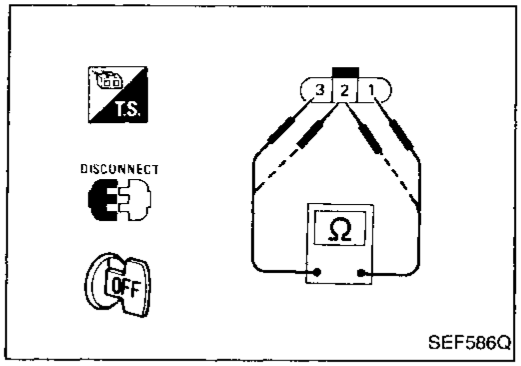
Disconnect and reconnect harness connectors in the circuit. Then retest.

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.

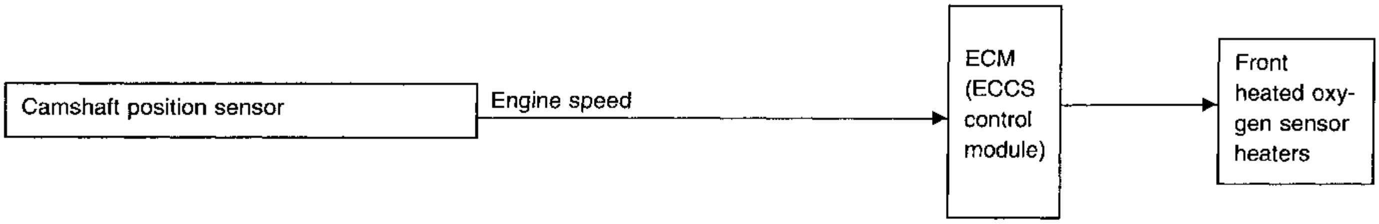
If NG, replace the front heated oxygen sensor.

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.

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 2,900	OFF
Below 2,900	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

GST

1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and run it for at least 5 seconds at idle speed.
4) Select "Mode 3" with GST.

OR

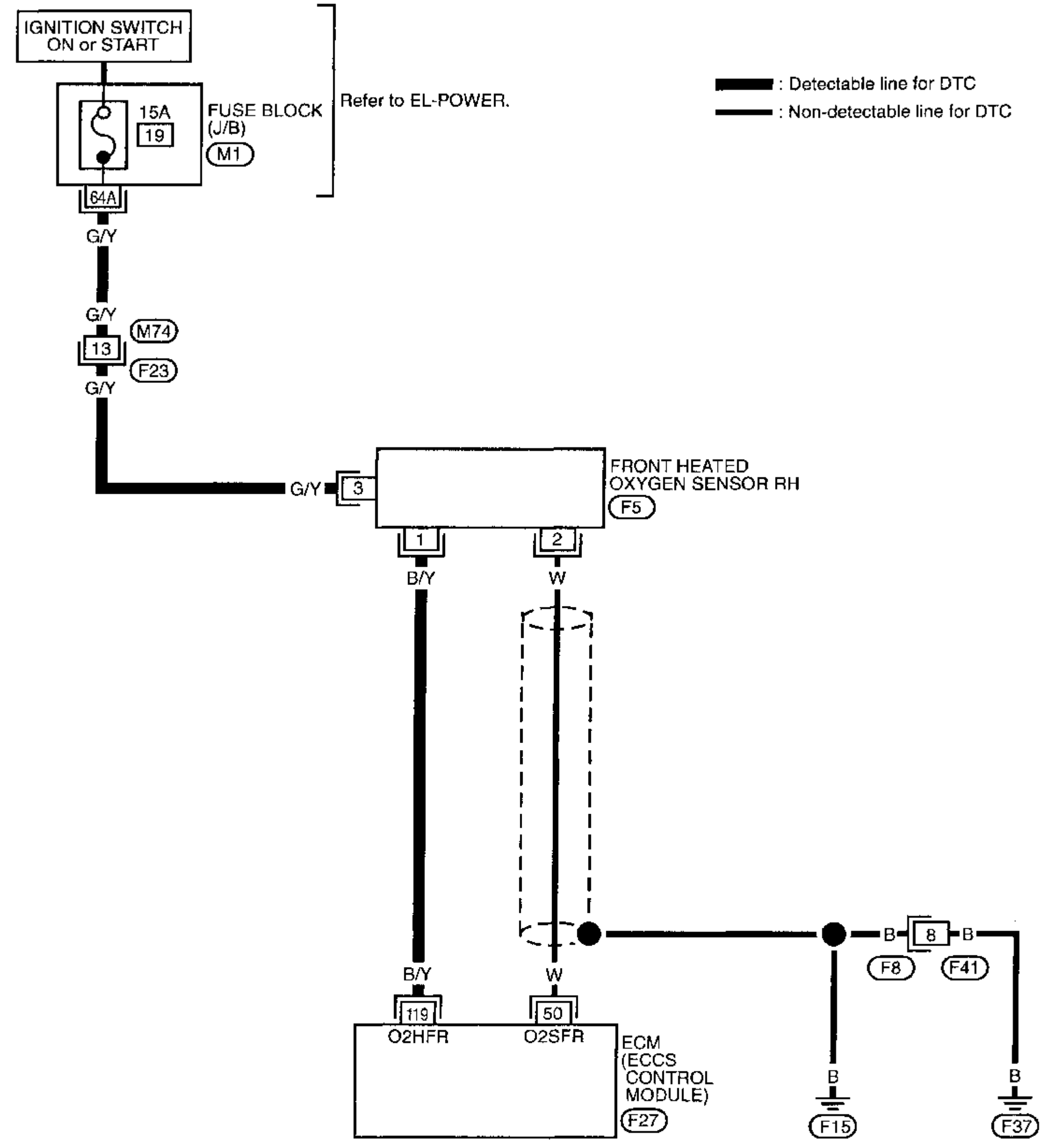
NO TOOLS

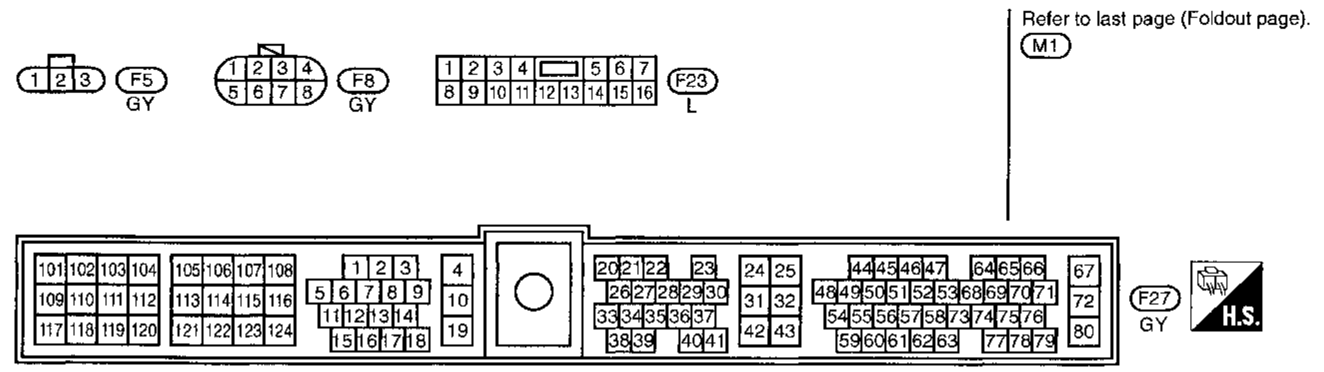
1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

- **When using GST, "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" should be performed twice as much as when using CONSULT or ECM (Diagnostic Test Mode II) because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT or ECM (Diagnostic Test Mode II) is recommended.**

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

EC-FO2H-R-01

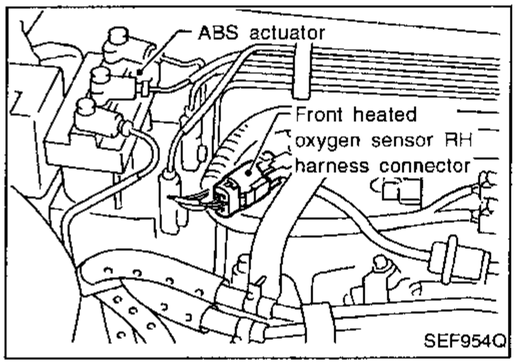


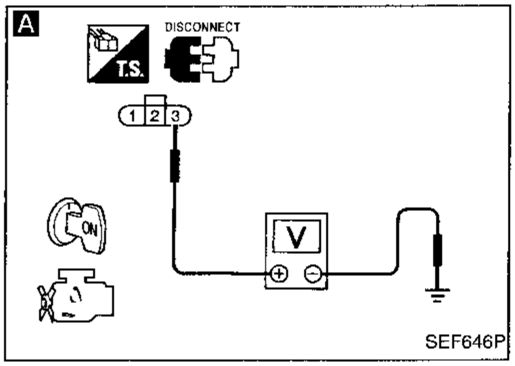


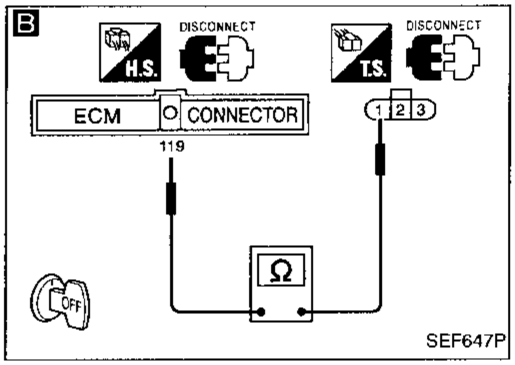
SEF685Q

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), (M74)
- Harness connector (M1)
- 15A 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 (119).
   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

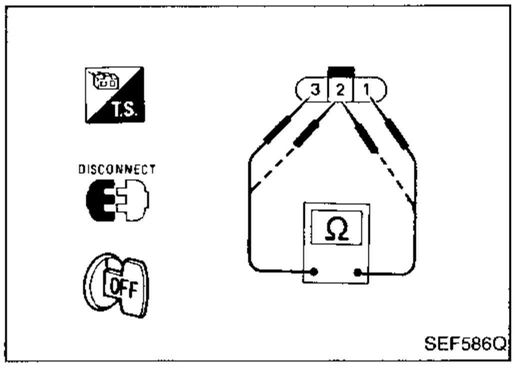
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ 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)

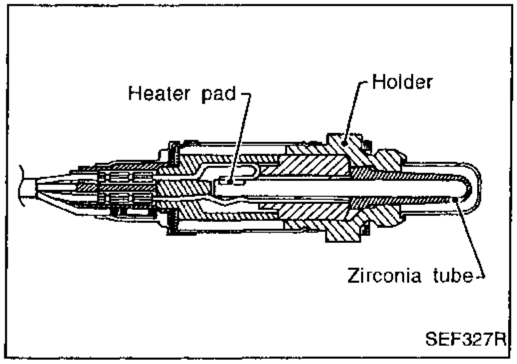
Check continuity between terminals ② and ①, ③ and ②.

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)

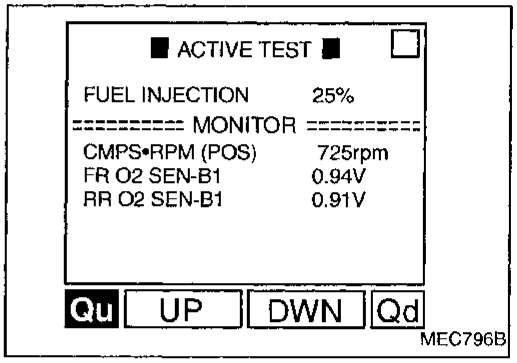
The rear heated oxygen sensor (Rear HO2S), after three way catalyst, monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the front heated oxygen sensor are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the rear heated oxygen sensor.
This 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)



■ ACTIVE TEST ■ ☐

FUEL INJECTION 25%

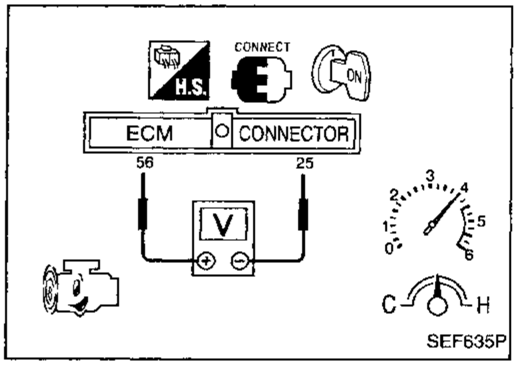
========== MONITOR ==========

CMPS•RPM (POS) 725rpm

FR O2 SEN-B1 0.94V

RR O2 SEN-B1 0.91V

MEC796B



SEF635P

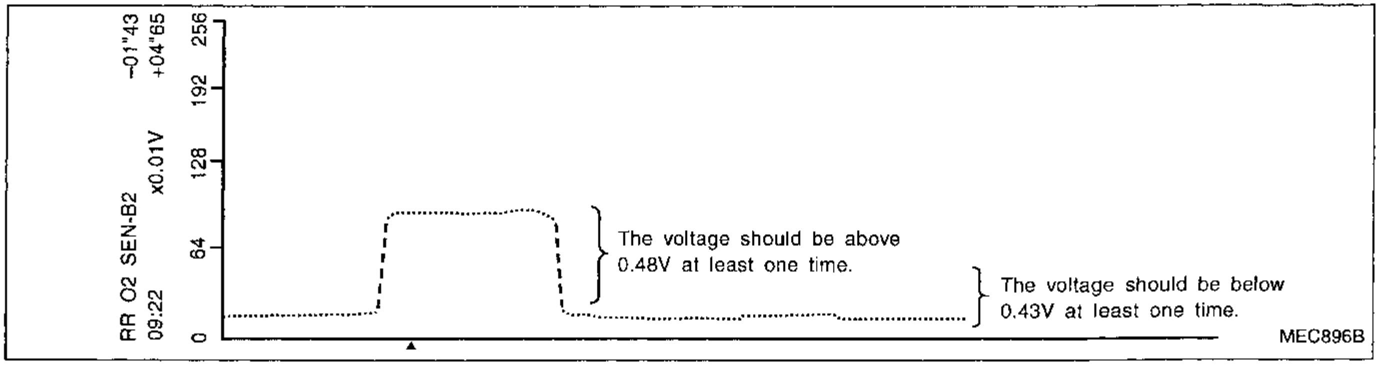
OVERALL FUNCTION CHECK

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

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 (56) (sensor signal) and ㉕ (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.



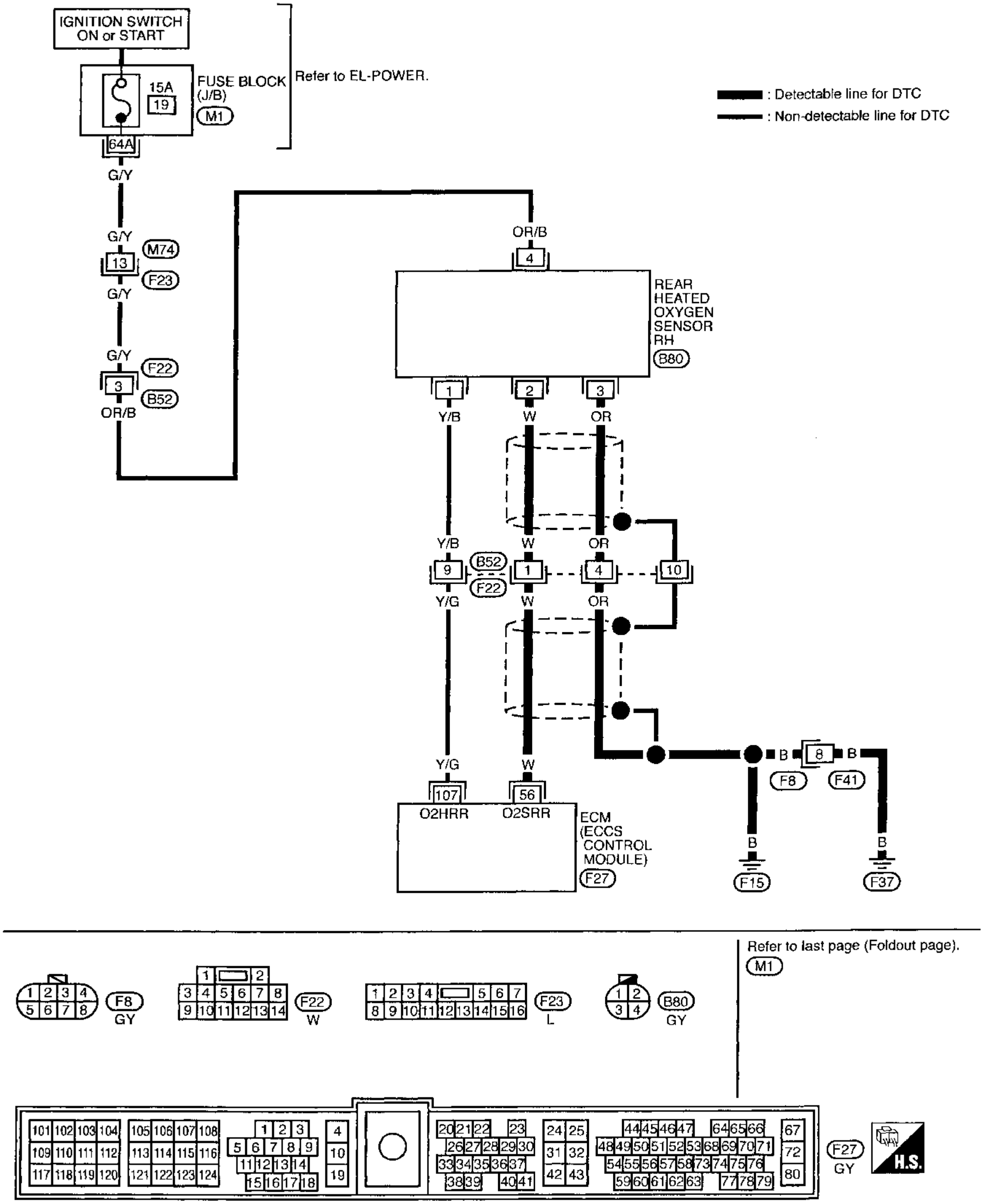
The voltage should be above 0.48V at least one time.

The voltage should be below 0.43V at least one time.

MEC896B

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

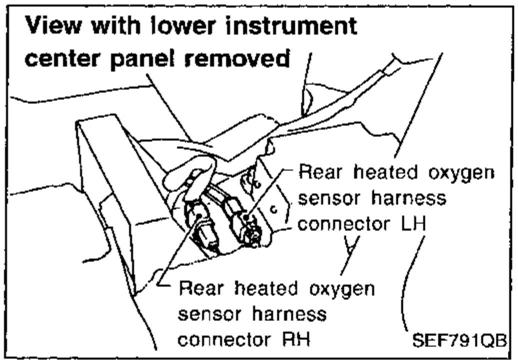
EC-RRO2RH-01

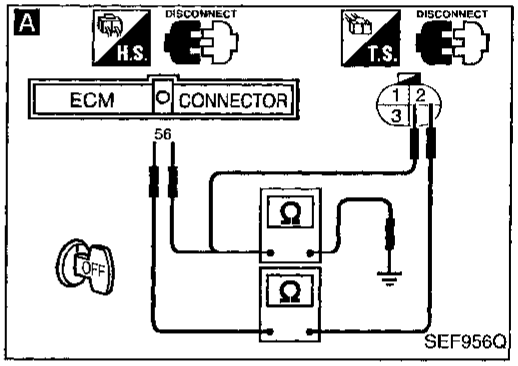


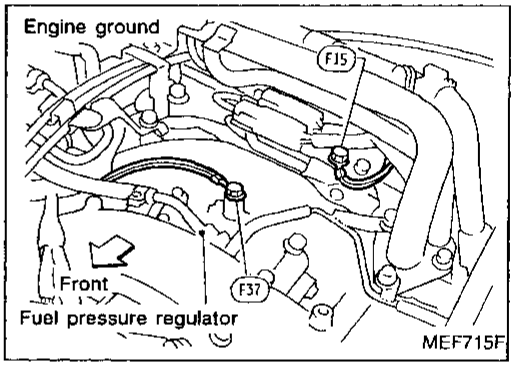
SEF686Q

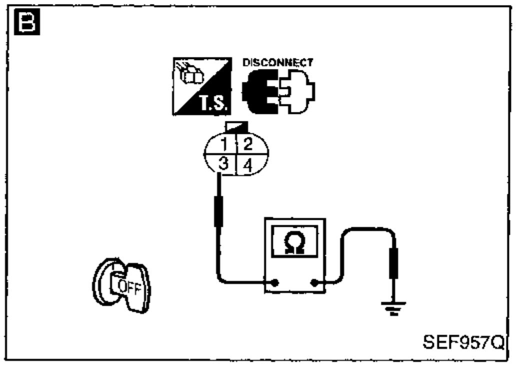
Rear Heated Oxygen Sensor (Rear HO2S) (Right bank) (DTC: 0707) (Cont'd)

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 (56) and terminal ②.
   Continuity should exist.
5. Check harness continuity between ECM terminal (56) (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 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 → Check the following.
- Harness connectors F22, B52
- Harness connectors F8, F41
- Harness for open or short between rear heated oxygen sensor RH and engine ground

If 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.

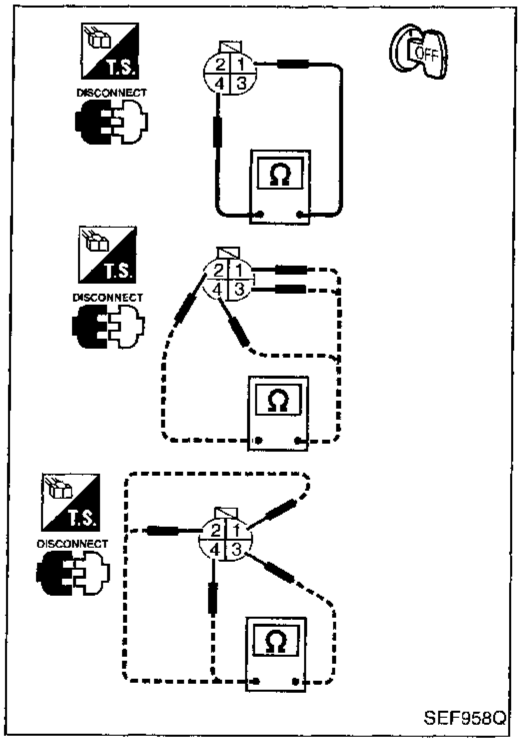
OK

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	

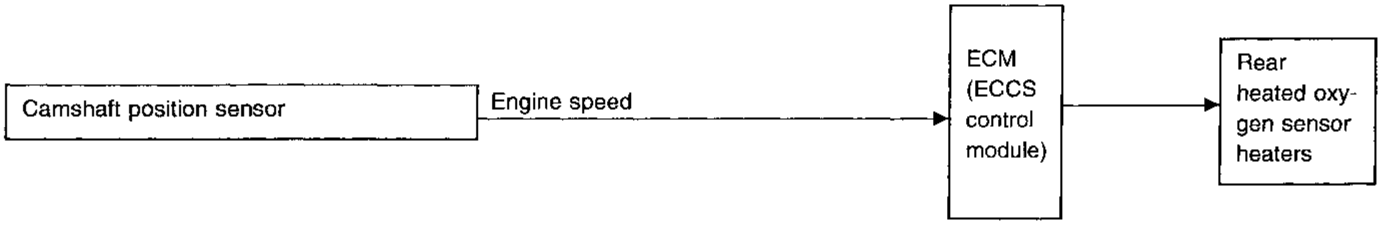
If NG, replace the rear heated oxygen sensor.

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 3,600	OFF
Below 3,600	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

GST

1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and run it for at least 5 seconds at idle speed.
4) Select "Mode 3" with GST.

OR

NO TOOLS

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.

- **When using GST, "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" should be performed twice as much as when using CONSULT or ECM (Diagnostic Test Mode II) because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT or ECM (Diagnostic Test Mode II) is recommended.**

GI
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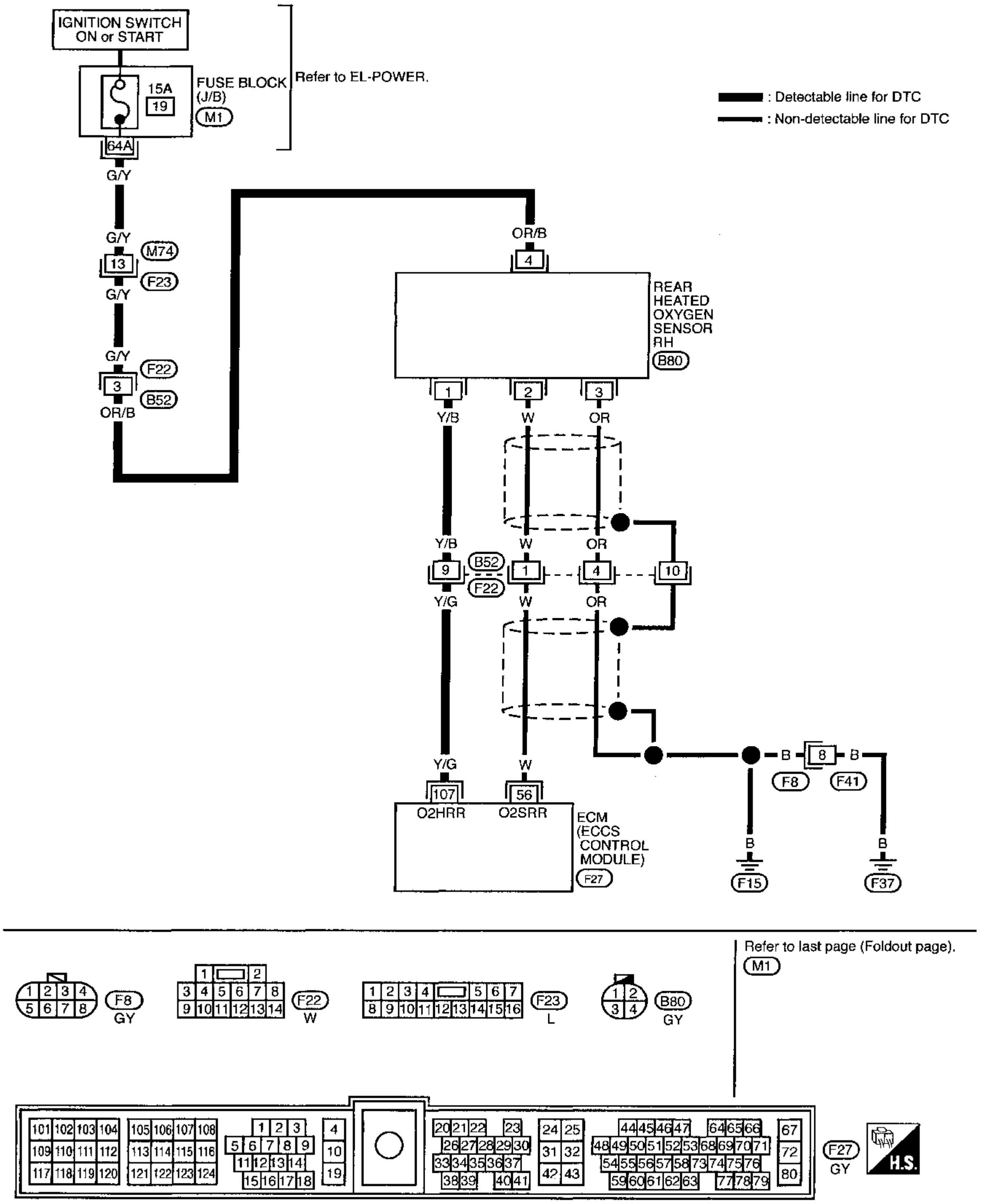
TROUBLE DIAGNOSIS FOR DTC P0141

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

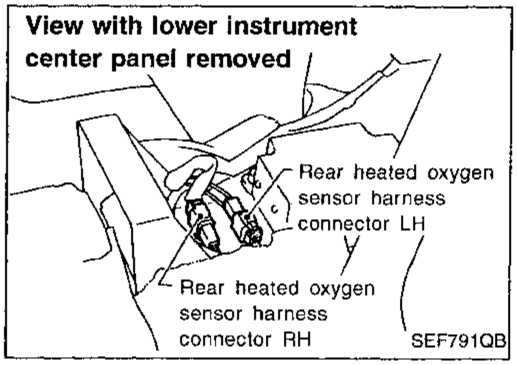
EC-RO2H-R-01

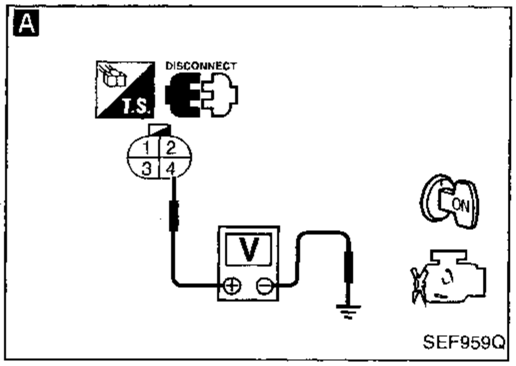


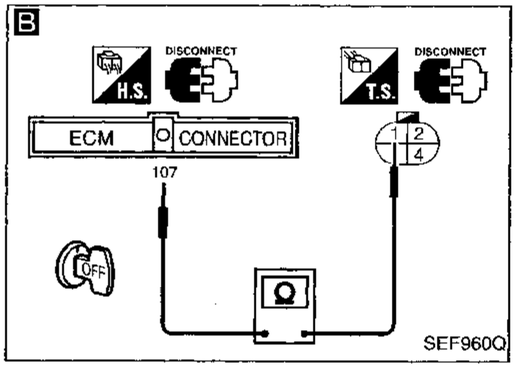
SEF687Q

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

DIAGNOSTIC PROCEDURE







INSPECTION START

A

CHECK POWER SUPPLY.

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

Voltage: Battery voltage

NG → Check the following.
- Harness connectors (M74), (F23)
- Harness connectors (F22), (B52)
- Harness connector (M1)
- 15A 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 (107).

Continuity should 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 RH

If 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.

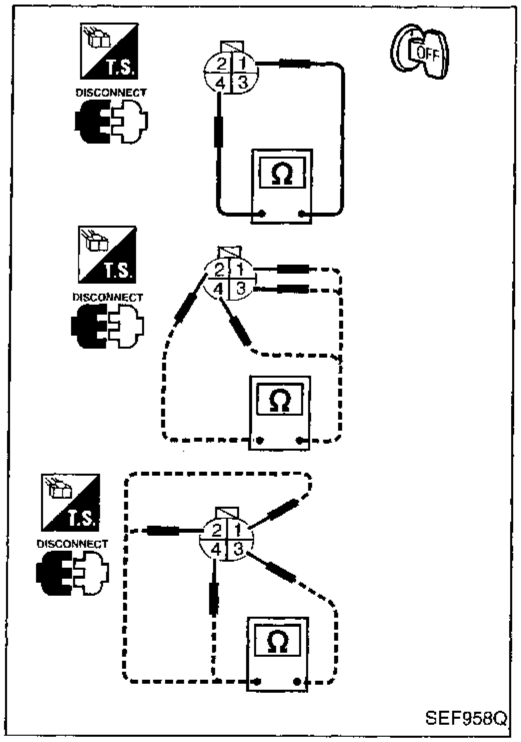
↓ Trouble is not fixed.

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.

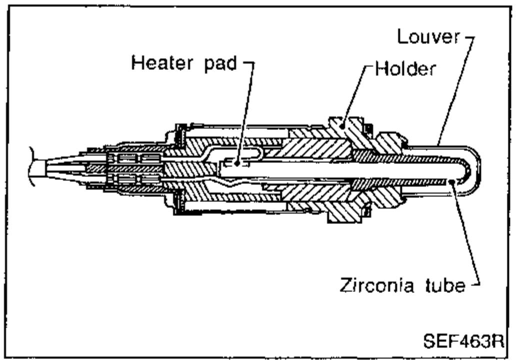
1. Check resistance between terminals ④ and ①.
   Resistance: 2.3 - 4.3Ω at 25°C (77°F)
2. Check continuity.

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

If NG, replace the rear heated oxygen sensor.

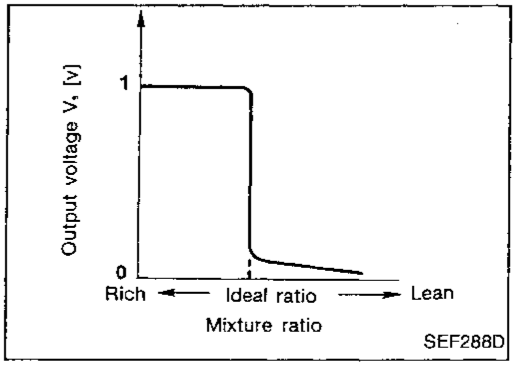
CAUTION:

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.

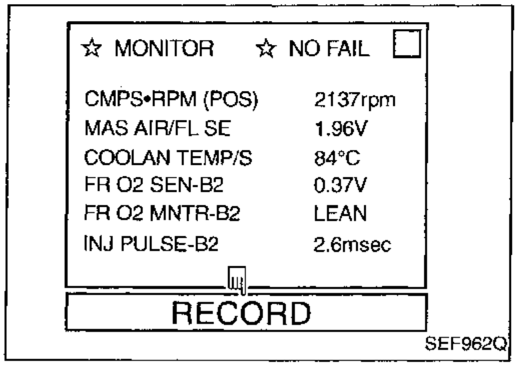


Front Heated Oxygen Sensor (Front HO2S) (Left bank) (DTC: 0303)

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



```
☆ MONITOR      ☆ NO FAIL ☐

CMPS•RPM (POS)     2137rpm
MAS AIR/FL SE      1.96V
COOLAN TEMP/S      84°C
FR O2 SEN-B2       0.37V
FR O2 MNTR-B2      LEAN
INJ PULSE-B2       2.6msec
```

OVERALL FUNCTION CHECK

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

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.

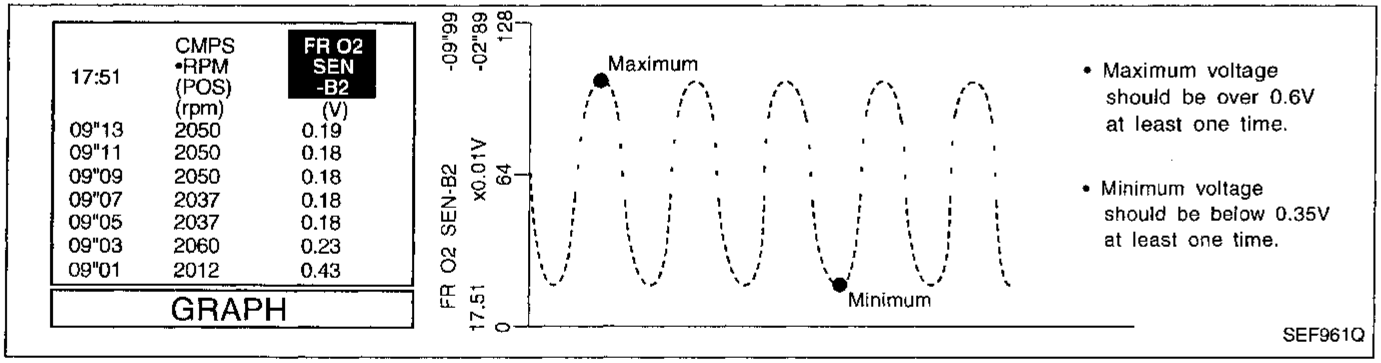
- "FR O2 MNTR-B2" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds.
  5 times (cycles) are counted as shown below:

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

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

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

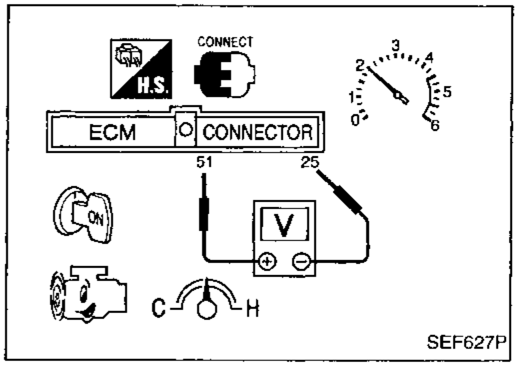
- "FR O2 SEN-B2" voltage goes above 0.6V at least once.
- "FR O2 SEN-B2" voltage goes below 0.35V at least once.
- The voltage never exceeds 1.0V.



17:51	CMPS •RPM (POS) (rpm)	FR O2 SEN -B2 (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

- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.35V at least one time.

SEF961Q



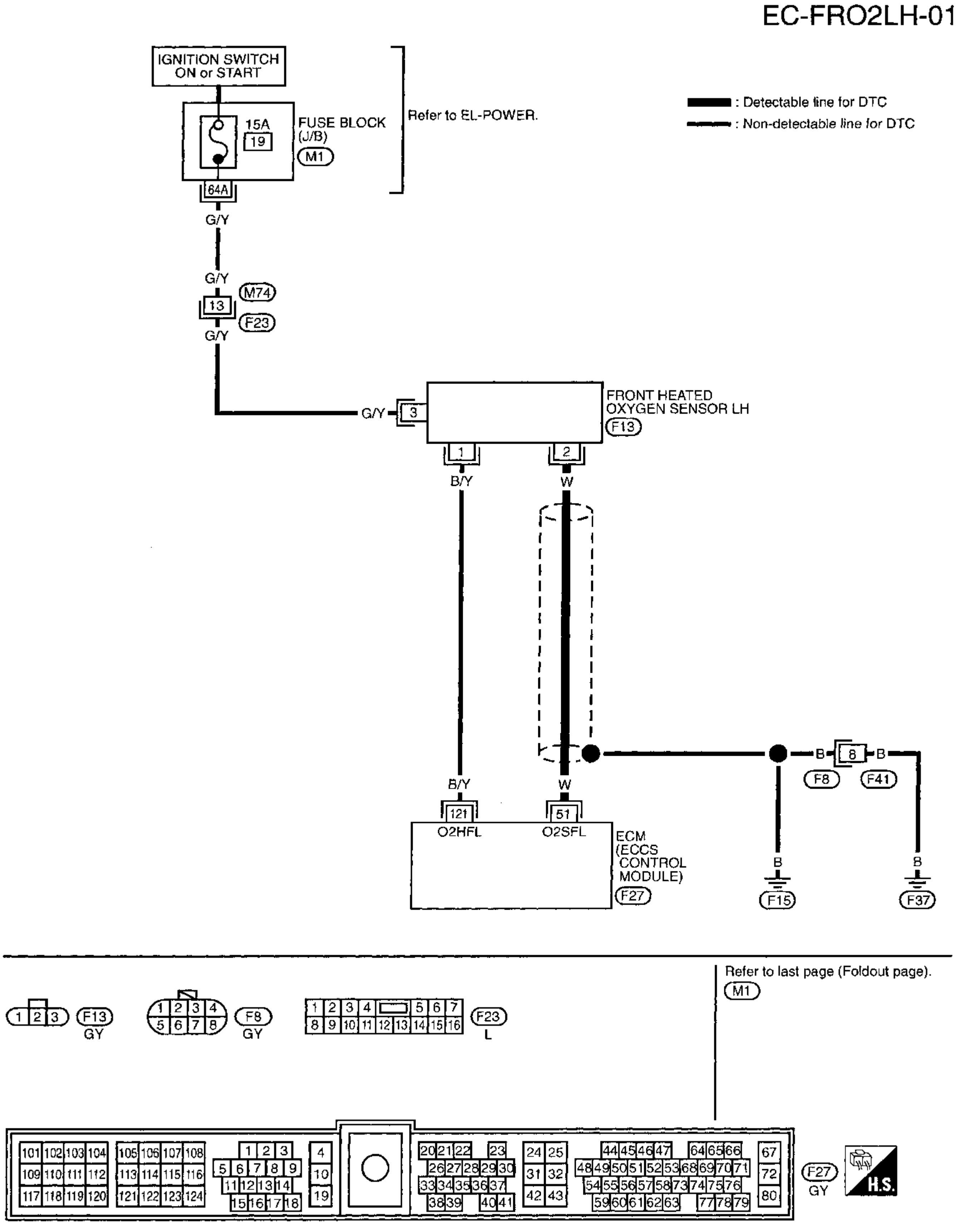
SEF627P

OR

1) Start engine and warm it up sufficiently.
2) Set voltmeter probes between ECM terminal (51) (sensor signal) and ㉕ (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.

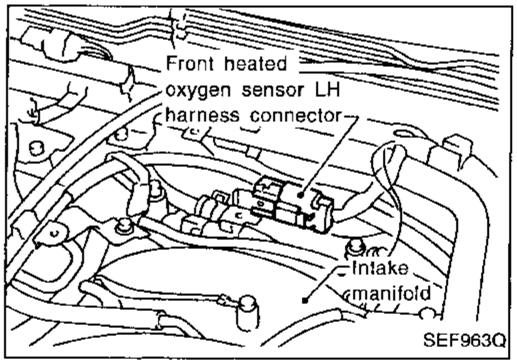
Front Heated Oxygen Sensor (Front HO2S) (Left bank) (DTC: 0303) (Cont'd)

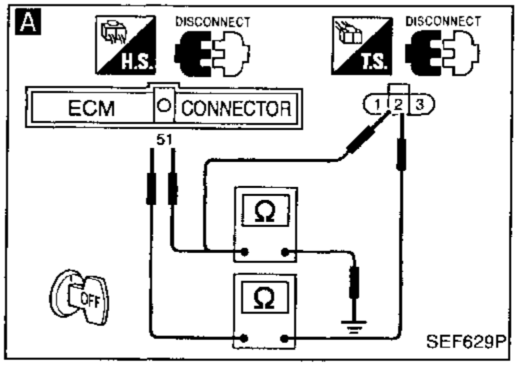


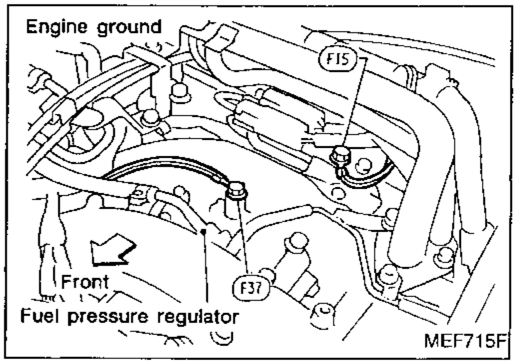
SEF688Q

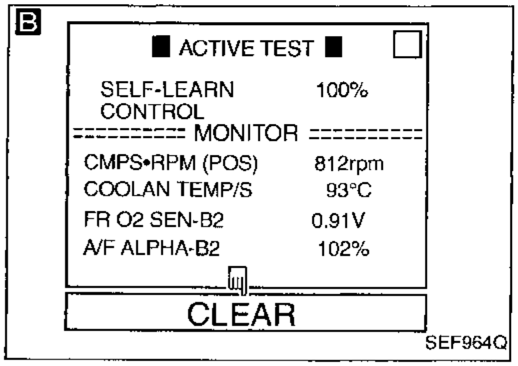
Front Heated Oxygen Sensor (Front HO2S) (Left bank) (DTC: 0303) (Cont'd)

DIAGNOSTIC PROCEDURE









■ ACTIVE TEST ■ ☐

SELF-LEARN CONTROL	100%
========== MONITOR ==========	
CMPS•RPM (POS)	812rpm
COOLAN TEMP/S	93°C
FR O2 SEN-B2	0.91V
A/F ALPHA-B2	102%

CLEAR

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 (51) and terminal ② .
Continuity should exist.
4. Check harness continuity between ECM terminal (51) (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 1st trip DTCs P0174, P0175 detected? Is it difficult to start engine?

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 1st trip DTC No. 0102 is displayed in Diagnostic Test Mode II.
6. Erase the diagnostic test mode II (Self-diagnostic results) memory. Make sure DTC No. 0505 is displayed in Diagnostic Test Mode II.
7. Run engine for at least 10 minutes at idle speed.
Are the 1st trip DTCs 0209, 0210 detected? Is it difficult to start engine?

Yes → Go to "TROUBLE DIAGNOSIS FOR DTC P0174, P0175", EC-180, 185.

No

Ⓐ

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

Ⓐ

CHECK COMPONENT
[Front heated oxygen sensor heater (left bank)].
Refer to "COMPONENT INSPECTION" below.

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

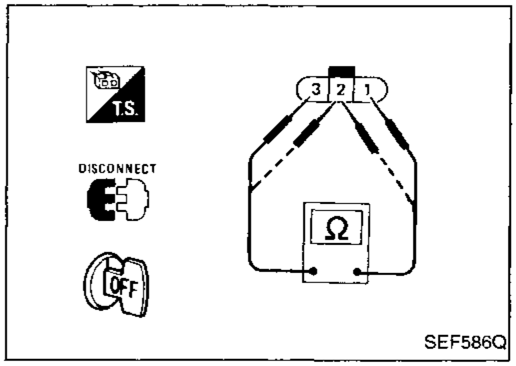
OK

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



SEF586Q

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.

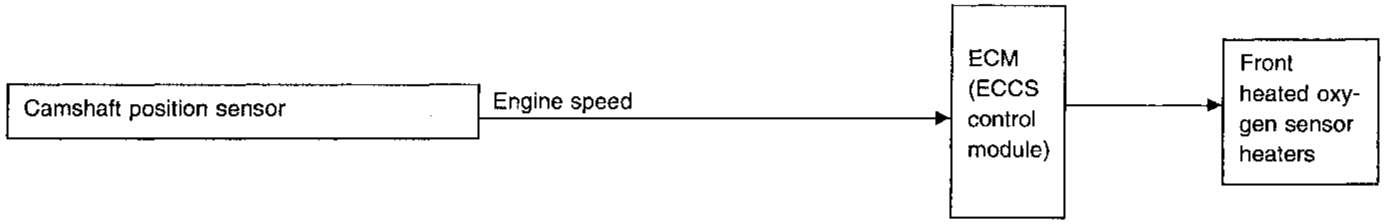
If NG, replace the front heated oxygen sensor.

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 2,900	OFF
Below 2,900	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 TRUBLE 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

GST

1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and run it for at least 5 seconds at idle speed.
4) Select "Mode 3" with GST.

OR

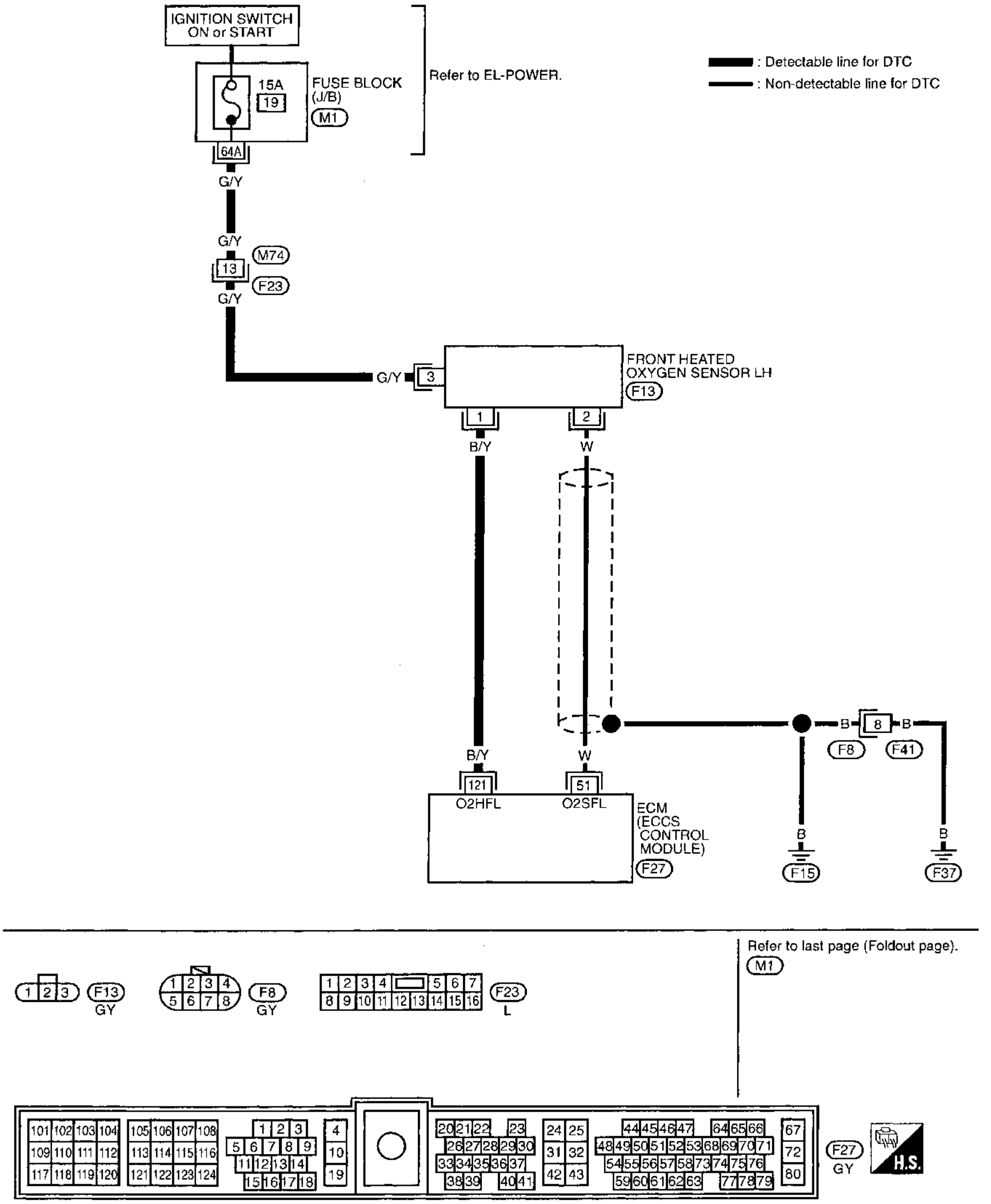
NO TOOLS

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.

- **When using GST, "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" should be performed twice as much as when using CONSULT or ECM (Diagnostic Test Mode II) because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT or ECM (Diagnostic Test Mode II) is recommended.**

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

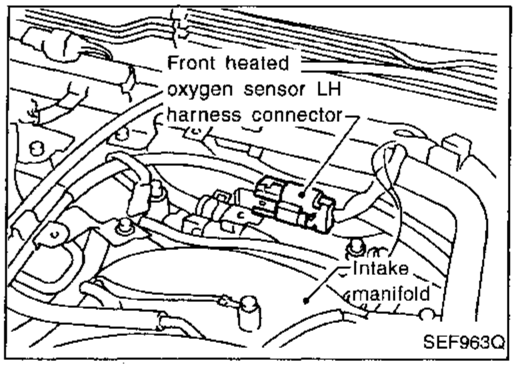
EC-FO2H-L-01

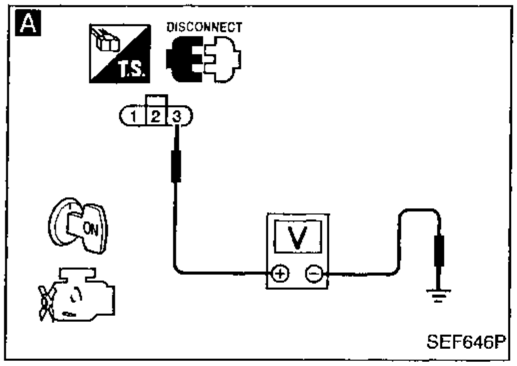


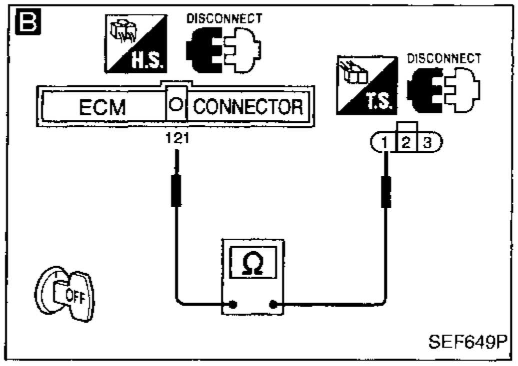
SEF689Q

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 (M74), (F23)
- Harness connector (M1)
- 15A 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 (121).

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 ↓

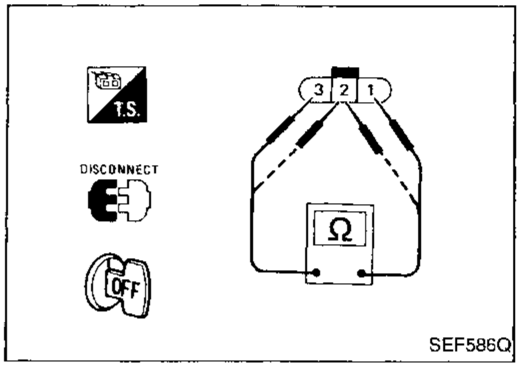
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ 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)

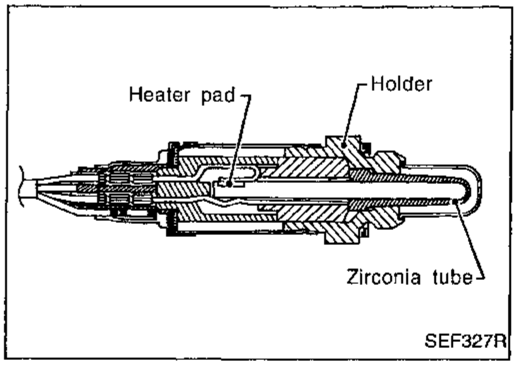
Check continuity between terminals ② and ①, ③ and ②.

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.



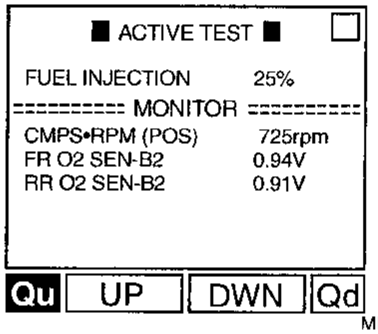
Rear Heated Oxygen Sensor (Rear HO2S) (Left bank) (DTC: 0708)

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.

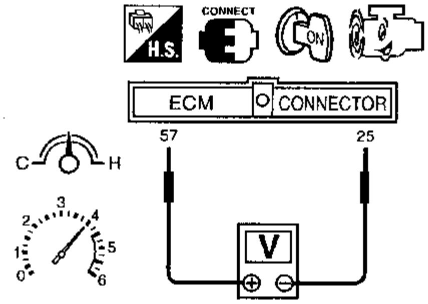
ON BOARD DIAGNOSIS LOGIC

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 entered 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


```
■ ACTIVE TEST ■            ☐
FUEL INJECTION        25%
========= MONITOR =========
CMPS•RPM (POS)        725rpm
FR O2 SEN-B2          0.94V
RR O2 SEN-B2          0.91V
```

MEC798B



MEC799B

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

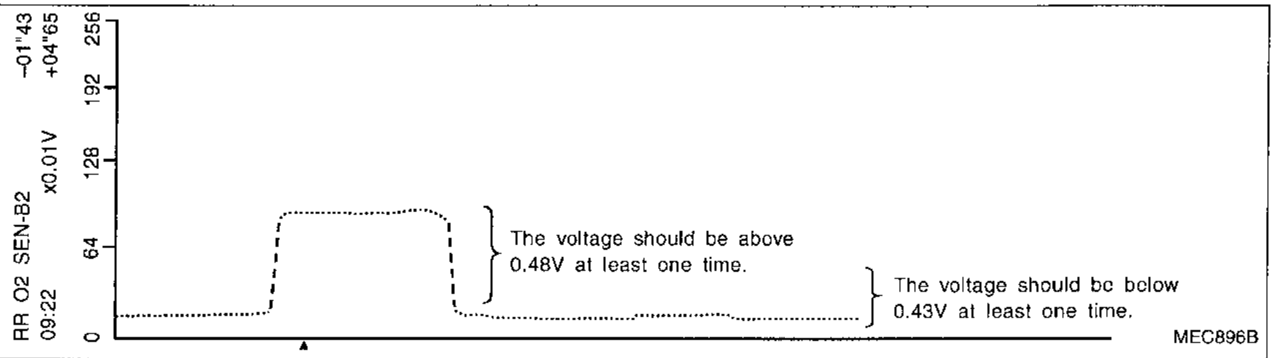
OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip 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 (57) (sensor signal) and ㉕ (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.



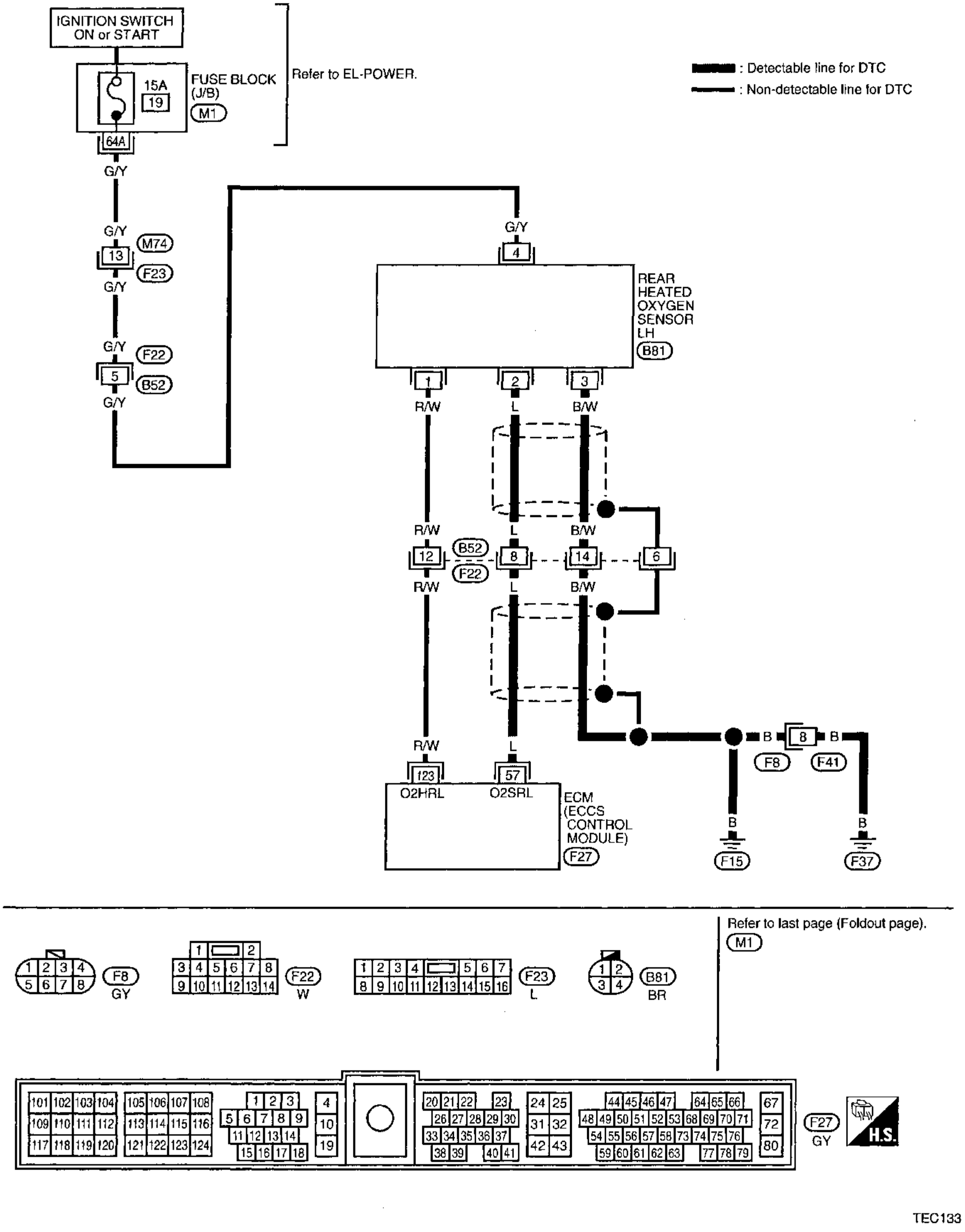
The voltage should be above 0.48V at least one time.

The voltage should be below 0.43V at least one time.

MEC896B

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

EC-RRO2LH-01



TEC133

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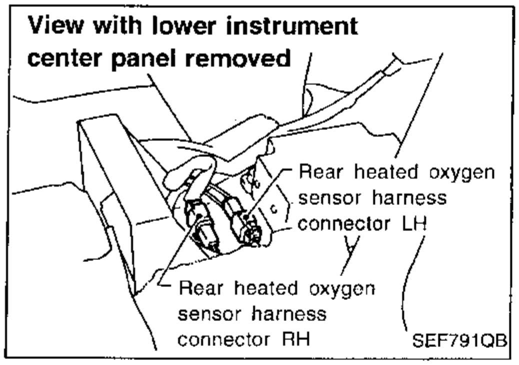
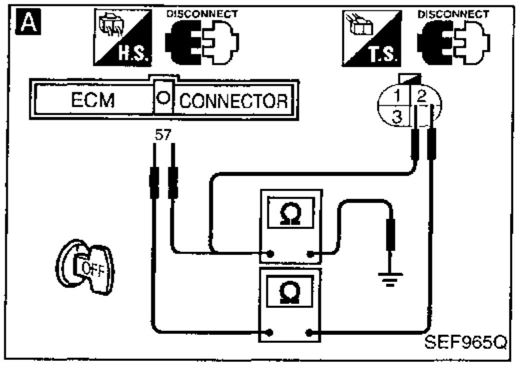
Rear Heated Oxygen Sensor (Rear HO2S) (Left bank) (DTC: 0708) (Cont'd)

DIAGNOSTIC PROCEDURE





INSPECTION START

A

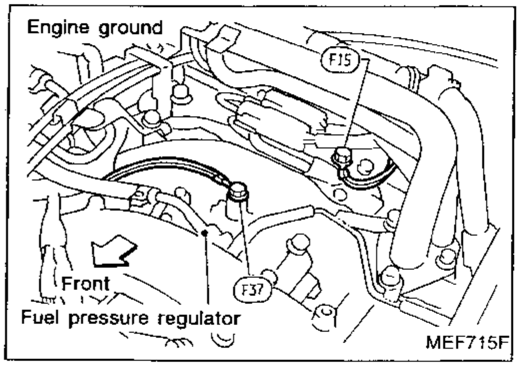
CHECK INPUT SIGNAL CIRCUIT.

1. 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 (left bank) harness connector and ECM harness connector.
4. Check harness continuity between ECM terminal (57) and terminal ②.
   Continuity should exist.
5. Check harness continuity between ECM terminal (57) (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

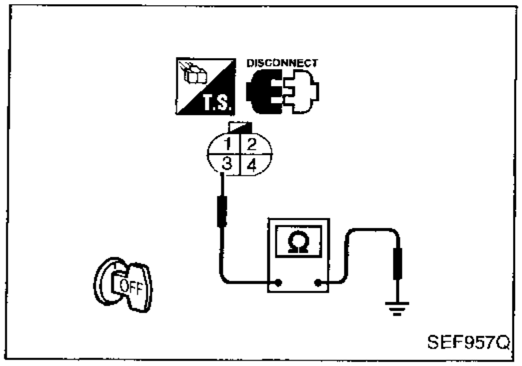
CHECK GROUND CIRCUIT.

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 → Check the following.
- Harness connectors F22, B52
- Harness connectors F8, F41
- Harness for open or short between rear heated oxygen sensor LH and engine ground

If 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 ↓

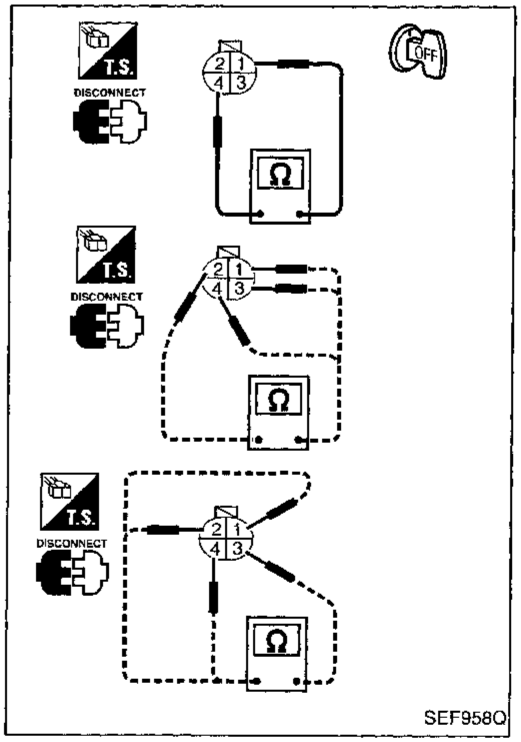
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ 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



SEF958Q

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	

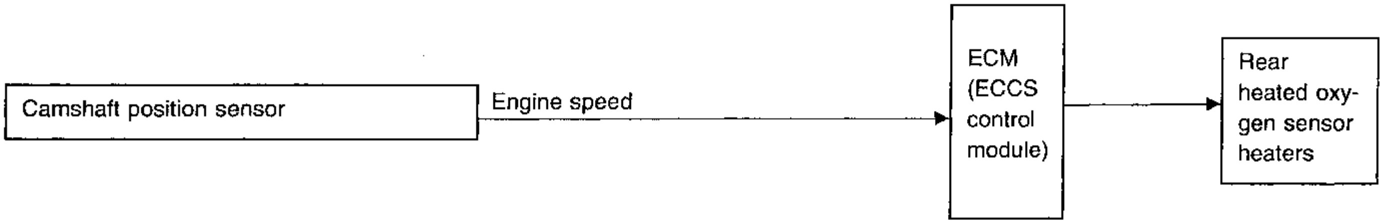
If NG, replace the rear heated oxygen sensor.

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 3,600	OFF
Below 3,600	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

GST

1) Start engine and run it for at least 5 seconds at idle speed.
2) Turn ignition switch “OFF” and wait at least 5 seconds.
3) Start engine and run it for at least 5 seconds at idle speed.
4) Select “Mode 3” with GST.

OR

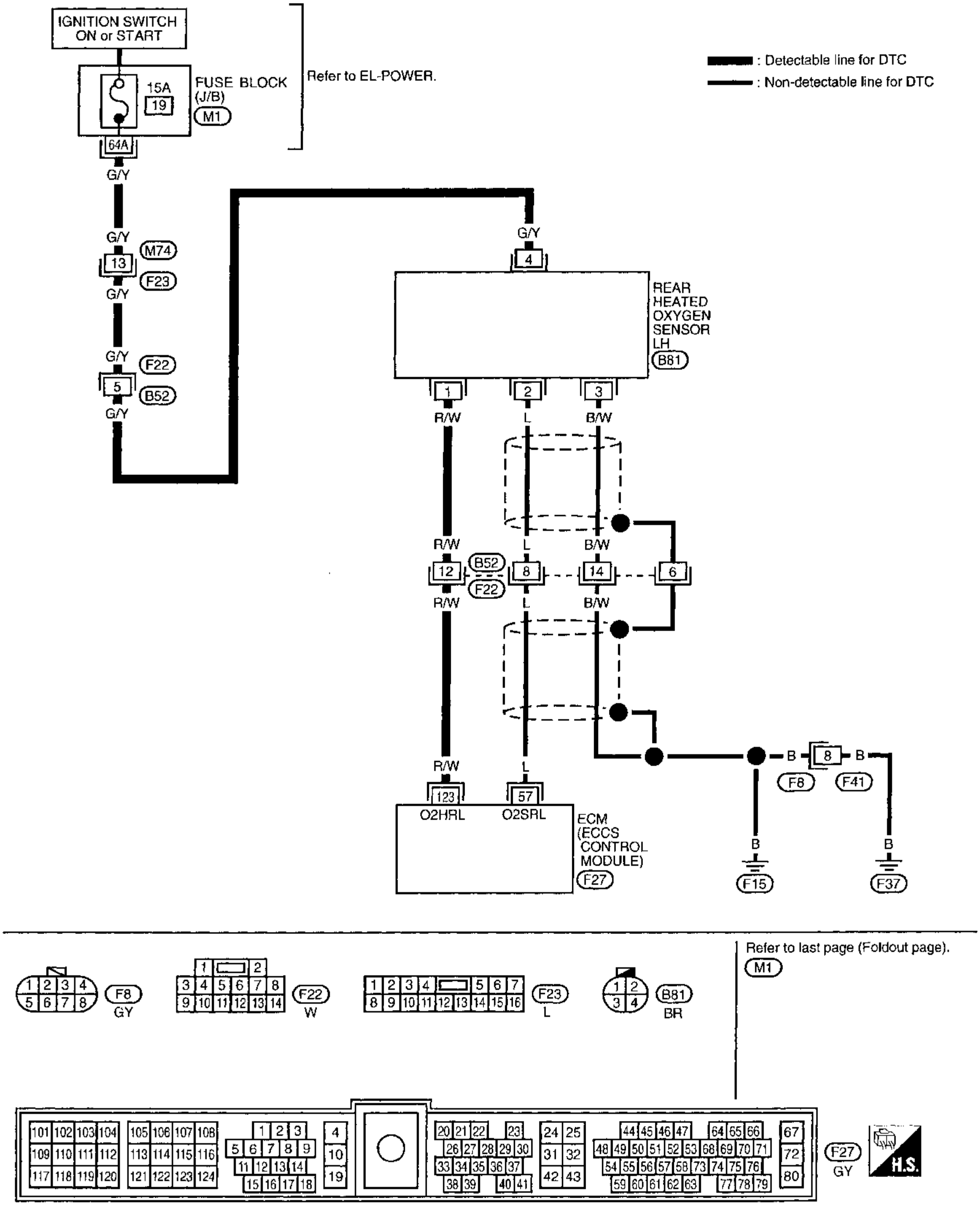
NO TOOLS

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.

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

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

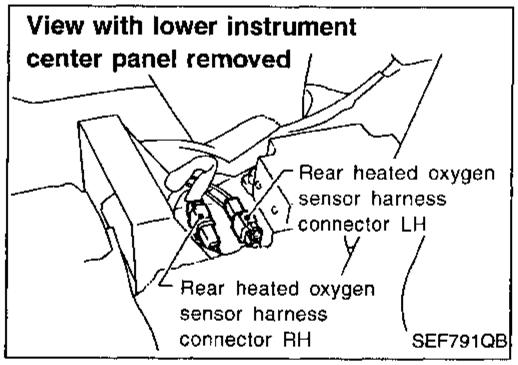
EC-RO2H-L-01

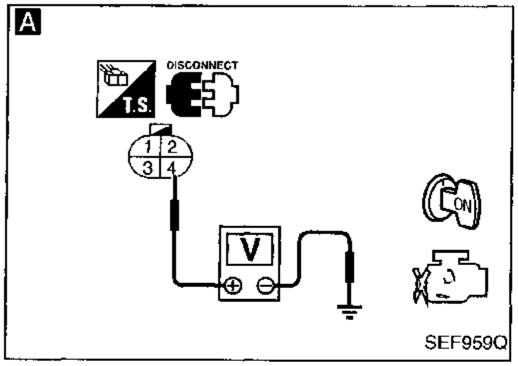


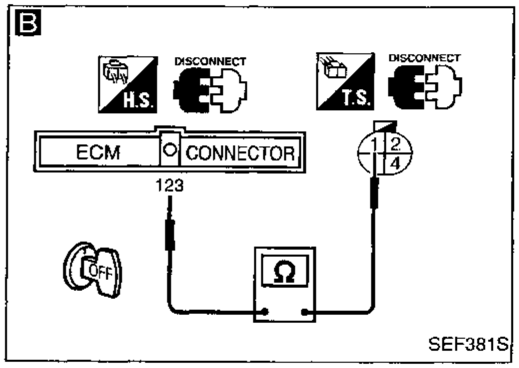
TEC134

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

DIAGNOSTIC PROCEDURE







INSPECTION START

A

CHECK POWER SUPPLY.

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

NG → Check the following.
- Harness connectors M74, F23
- Harness connectors F22, B52
- Harness connectors M1
- 15A 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 123.
Continuity should 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

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

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

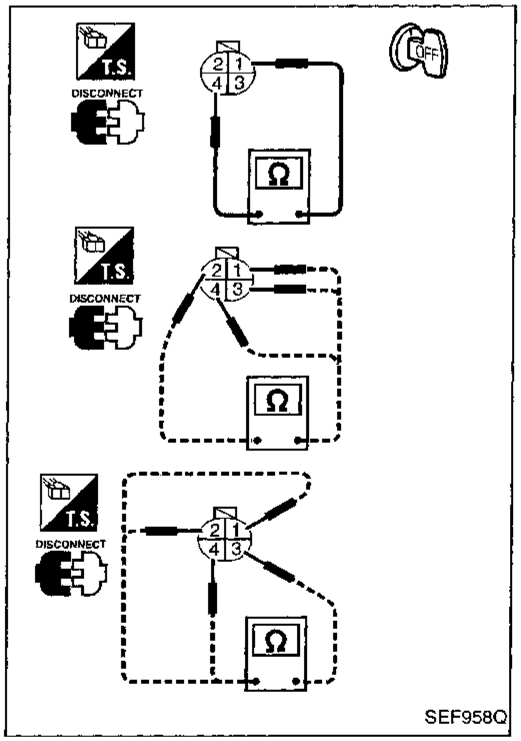
OK

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



SEF958Q

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

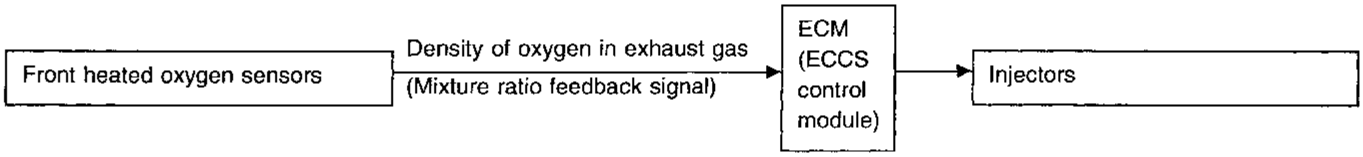
CAUTION:

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.

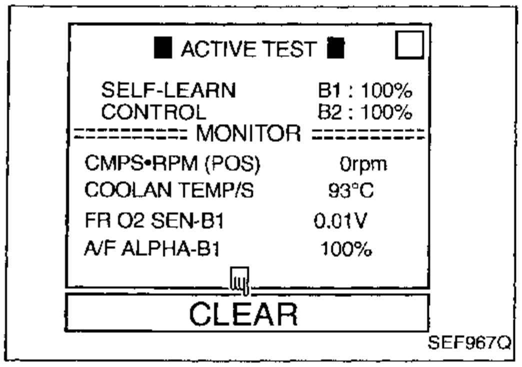
Fuel Injection System Function (Right bank) (Lean side) (DTC: 0115)

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



SELF-LEARN CONTROL B1 : 100% B2 : 100%

========== MONITOR ==========

CMPS•RPM (POS) 0rpm

COOLAN TEMP/S 93°C

FR O2 SEN-B1 0.01V

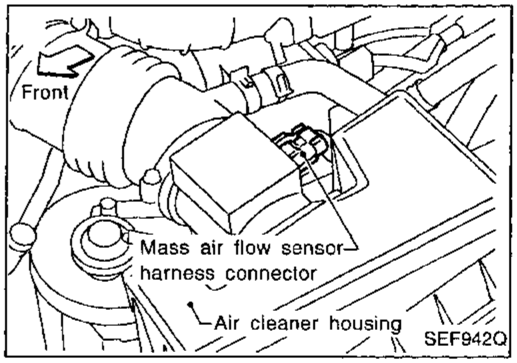
A/F ALPHA-B1 100%

SEF967Q

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 1st trip 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.

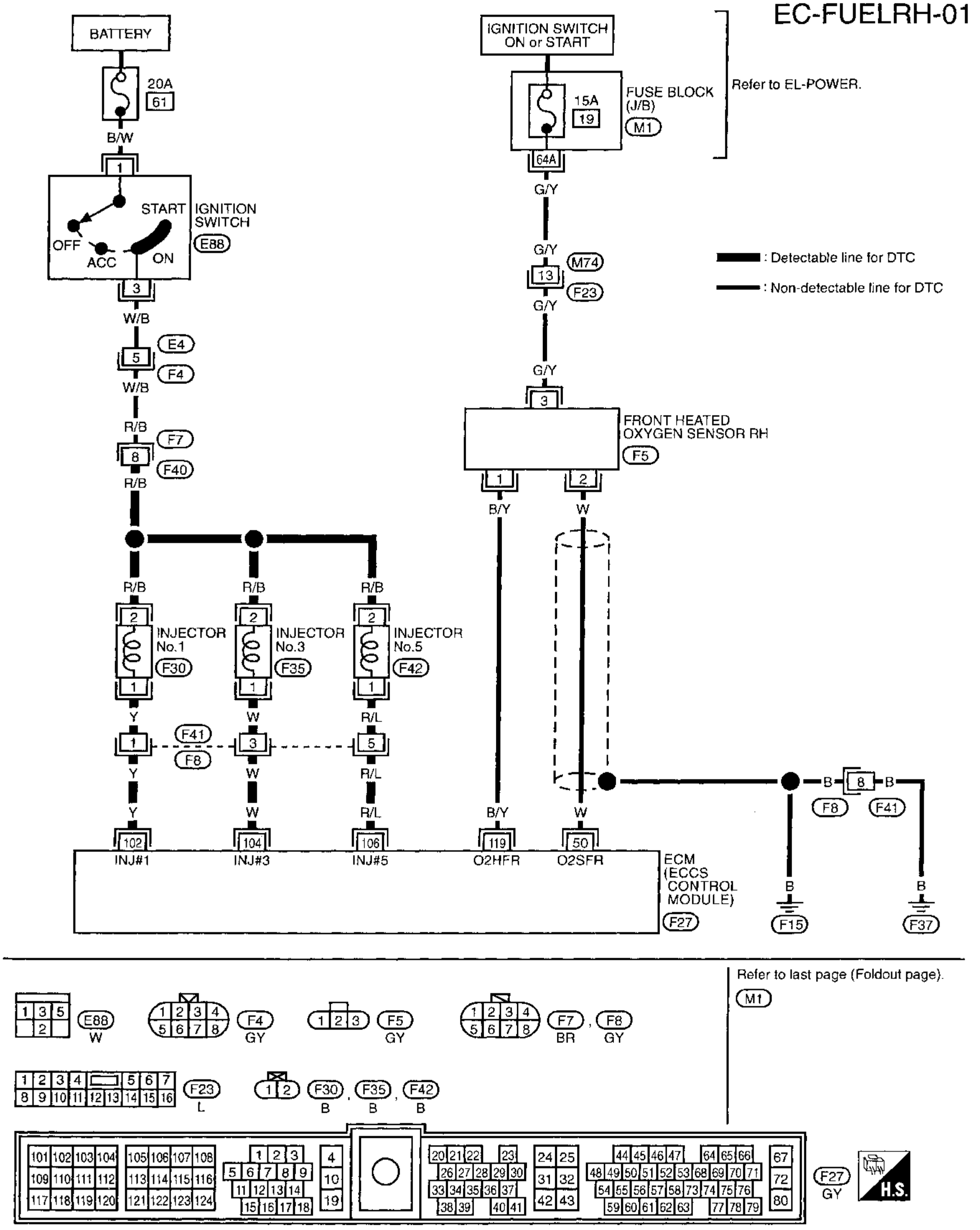
OR



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 1st trip DTC 0102 is detected.
6) Erase the 1st trip 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 1st trip 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.

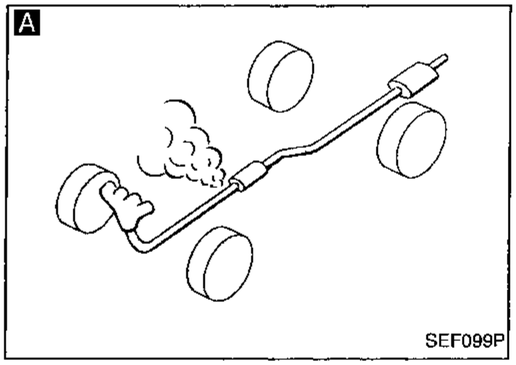
Fuel Injection System Function (Right bank) (Lean side) (DTC: 0115) (Cont'd)

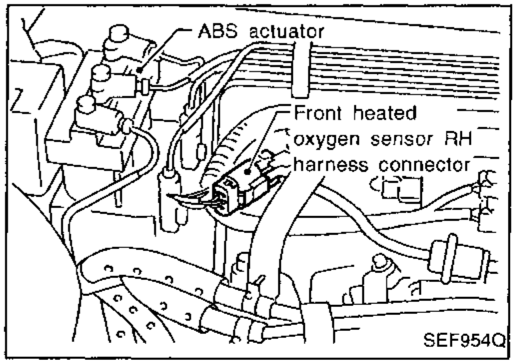


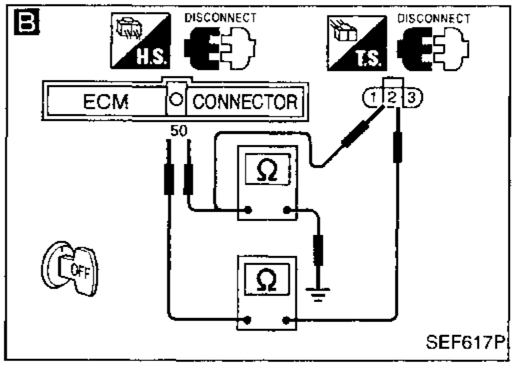
TEC135

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 ㊿ and terminal ② .
   Continuity should exist.
4. Check harness continuity between ECM terminal ㊿ (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-23.
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-245, 294.

↓ 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

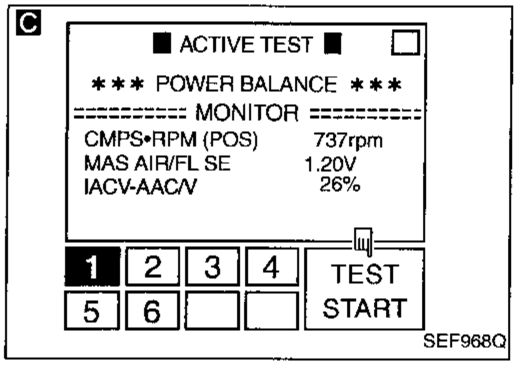
Check "mass air flow" in MODE 1 with GST.
2.5 - 6.0 g·m/sec: at idling
9.5 - 19.0 g·m/sec: at 2,500 rpm

NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds.
Refer to EC-111.

↓ OK

Ⓐ

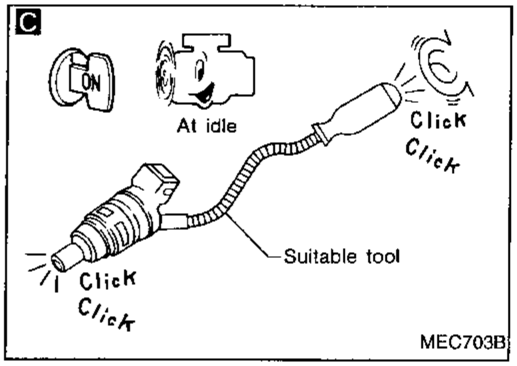
Fuel Injection System Function (Right bank) (Lean side) (DTC: 0115) (Cont'd)



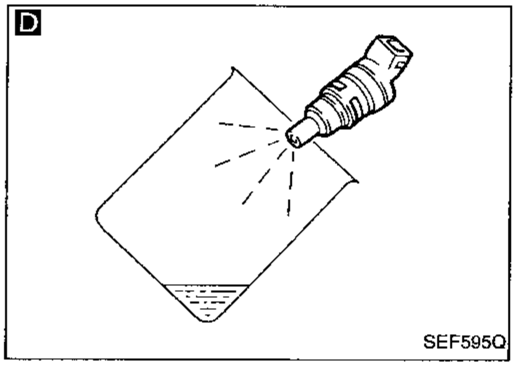
```
■ ACTIVE TEST ■          ☐
 *** POWER BALANCE ***
========== MONITOR ==========
CMPS•RPM (POS)      737rpm
MAS AIR/FL SE       1.20V
IACV-AAC/V           26%

[1] [2] [3] [4]   TEST
[5] [6] [ ] [ ]   START
```

SEF968Q



MEC703B



SEF595Q

Ⓐ

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.

OR

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

NG → Perform TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS, "Injectors", EC-289. Repair harness or connectors.

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-24.
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.

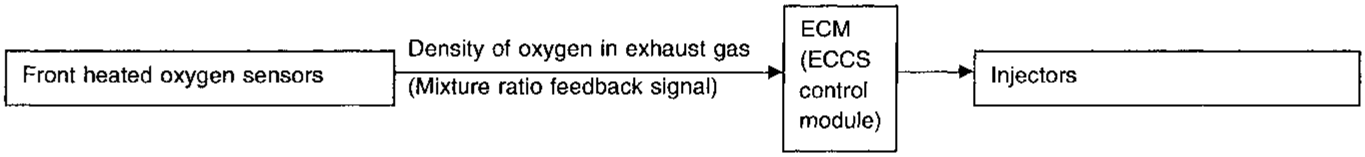
↓

INSPECTION END

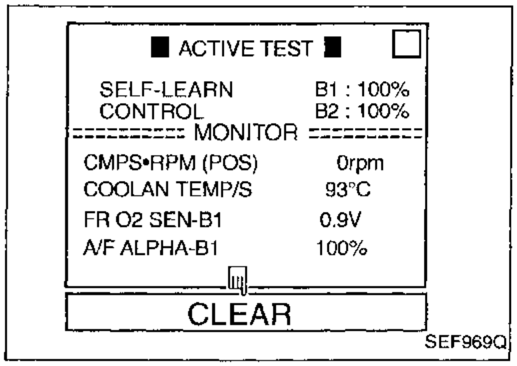
Fuel Injection System Function (Right bank) (Rich side) (DTC: 0114)

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



■ ACTIVE TEST ■ ☐

SELF-LEARN CONTROL B1 : 100% B2 : 100%

MONITOR

CMPS•RPM (POS) 0rpm

COOLAN TEMP/S 93°C

FR O2 SEN-B1 0.9V

A/F ALPHA-B1 100%

CLEAR

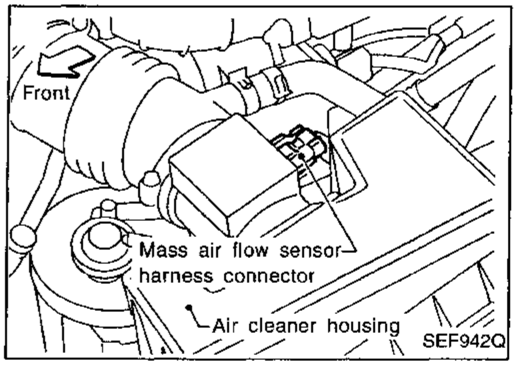
SEF969Q

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 1st trip 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.

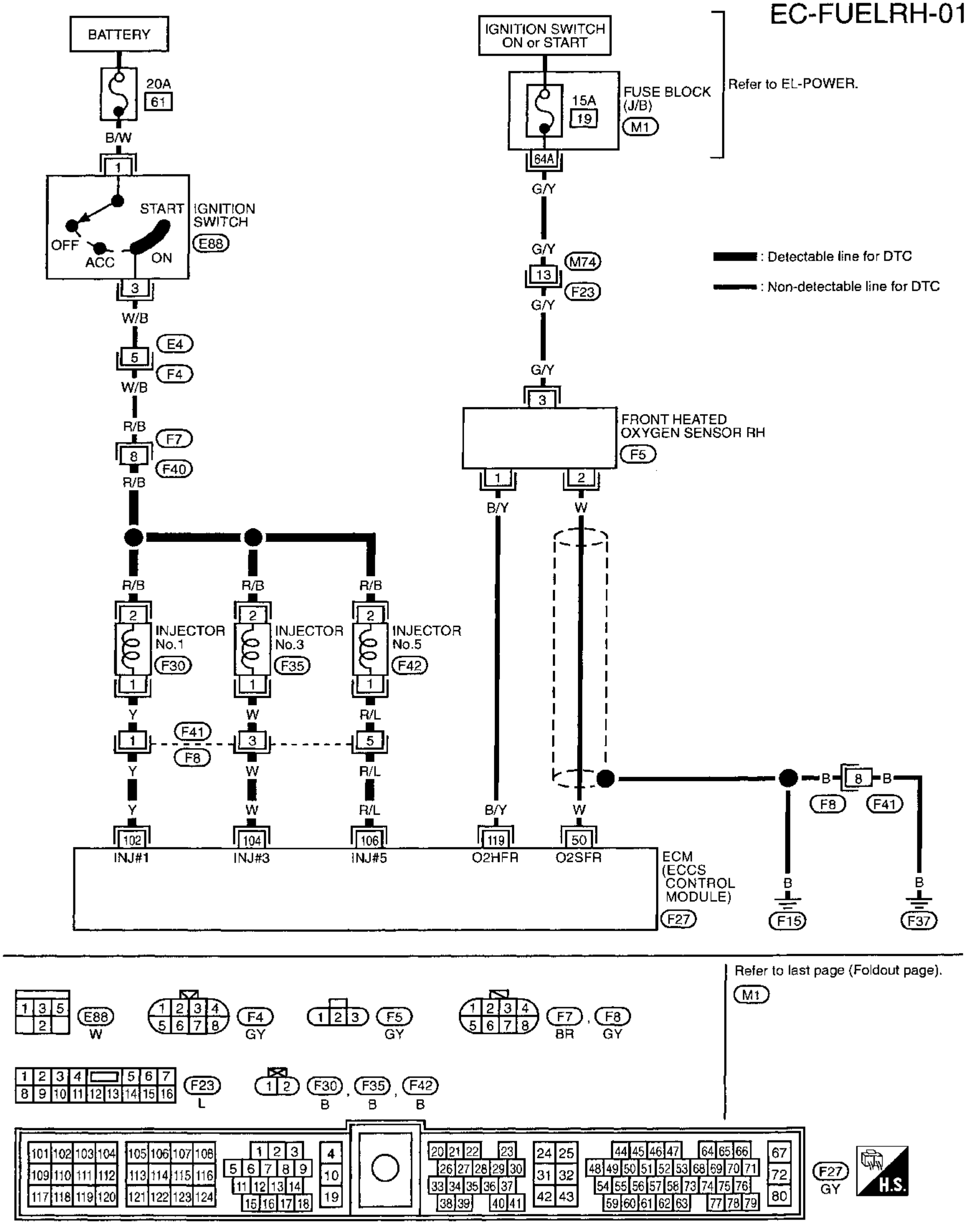
OR

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 1st trip DTC 0102 is detected.
6) Erase the 1st trip 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 1st trip 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.

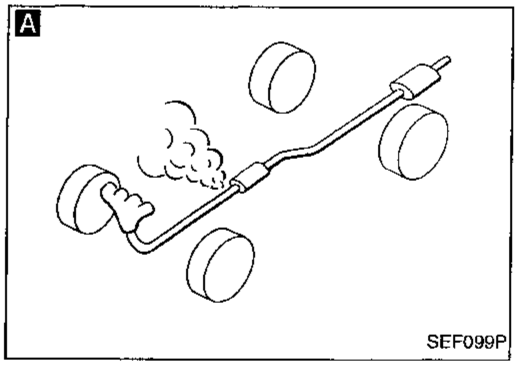
Fuel Injection System Function (Right bank) (Rich side) (DTC: 0114) (Cont'd)



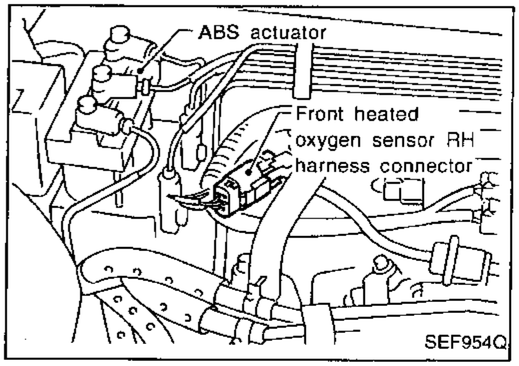
TEC135

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

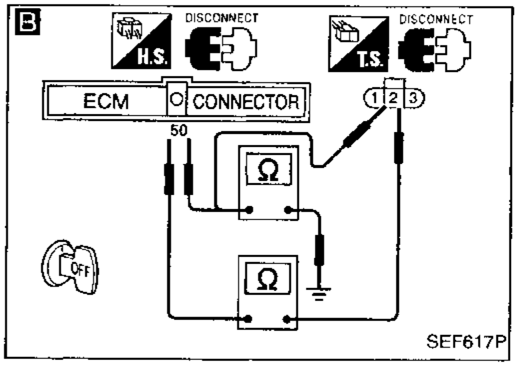
DIAGNOSTIC PROCEDURE



SEF099P



SEF954Q



SEF617P

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 ㊿ and terminal ②.
   Continuity should exist.
4. Check harness continuity between ECM terminal ㊿ (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-23.
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-245, 294.

↓ 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

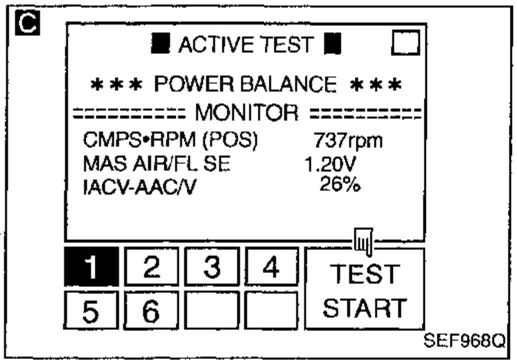
Check "mass air flow" in MODE 1 with GST.
2.5 - 6.0 g·m/sec: at idling
9.5 - 19.0 g·m/sec: at 2,500 rpm

NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds.
Refer to EC-111.

↓ OK

Ⓐ

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



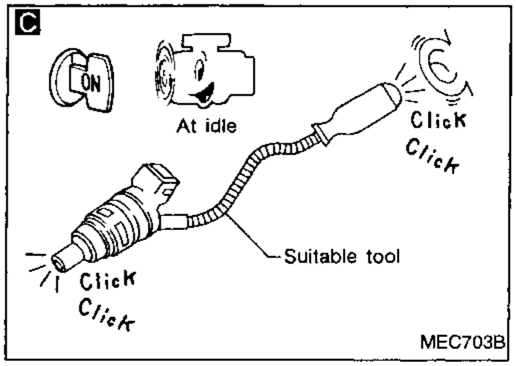
■ ACTIVE TEST ■ ☐

*** POWER BALANCE ***

========== MONITOR ==========

CMPS•RPM (POS)	737rpm
MAS AIR/FL SE	1.20V
IACV-AAC/V	26%

SEF968Q



MEC703B

Ⓐ

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.

OR

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

NG → Perform TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS, "Injectors", EC-289. Repair harness or connectors.

OK ↓

Remove injector assembly. Refer to EC-24. 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.

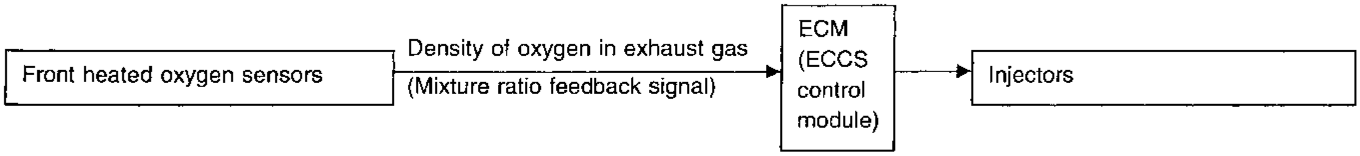
↓

INSPECTION END

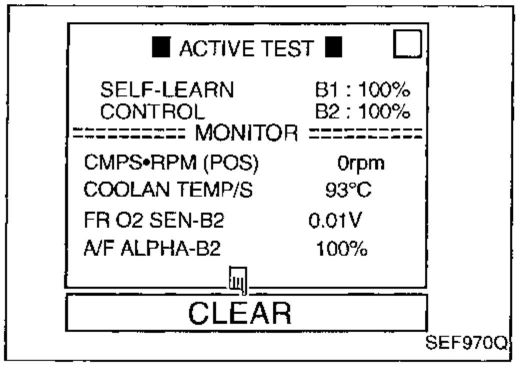
Fuel Injection System Function (Left bank) (Lean side) (DTC: 0210)

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



■ ACTIVE TEST ■ ☐

SELF-LEARN CONTROL B1 : 100% B2 : 100%

========== MONITOR ==========

CMPS•RPM (POS) 0rpm
COOLAN TEMP/S 93°C
FR O2 SEN-B2 0.01V
A/F ALPHA-B2 100%

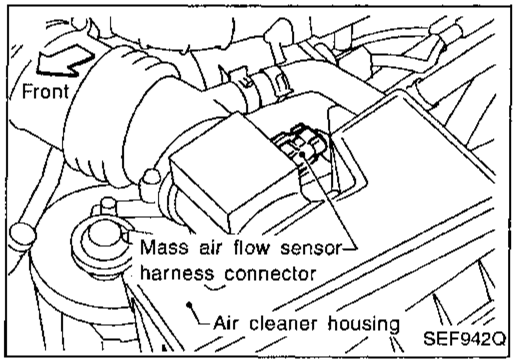
CLEAR

SEF970Q

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 1st trip 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.

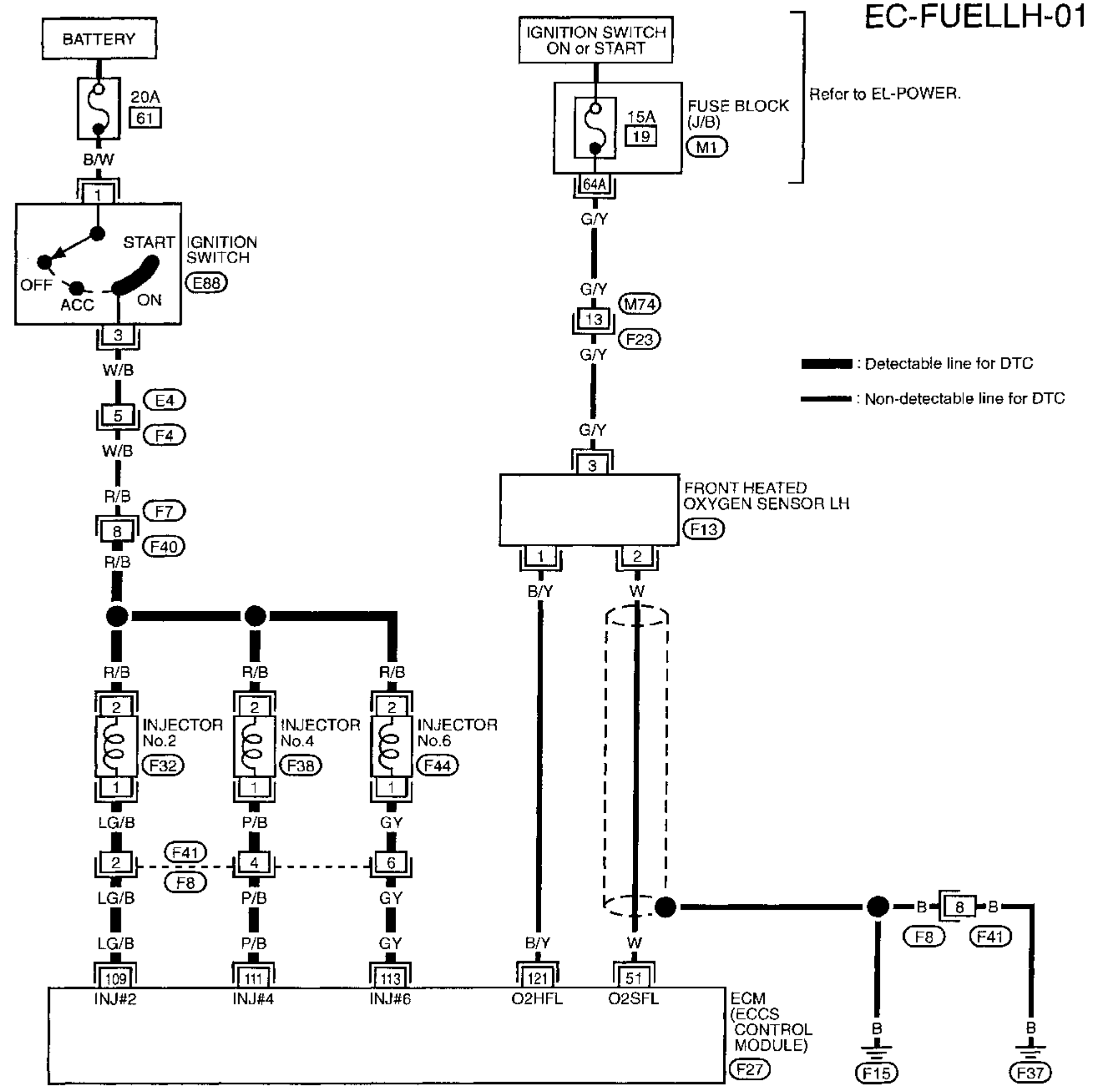
OR



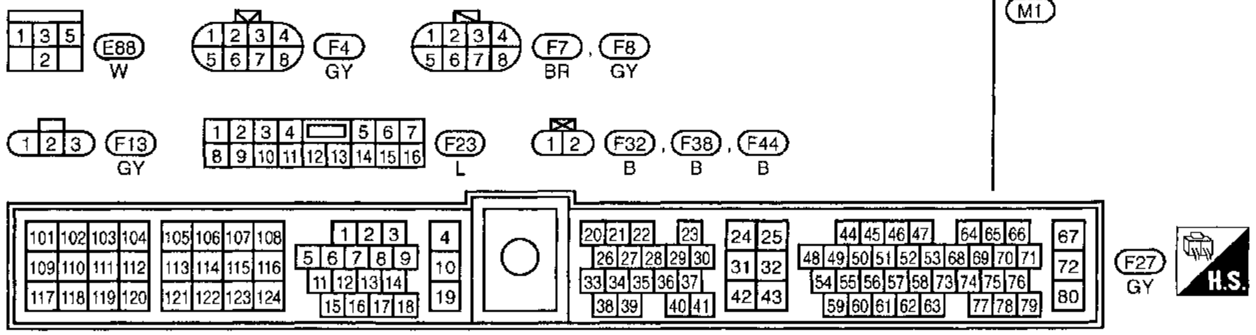
Fuel Injection System Function (Left bank) (Lean side) (DTC: 0210) (Cont'd)

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 1st trip DTC 0102 is detected.
6) Erase the 1st trip 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 1st trip 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)



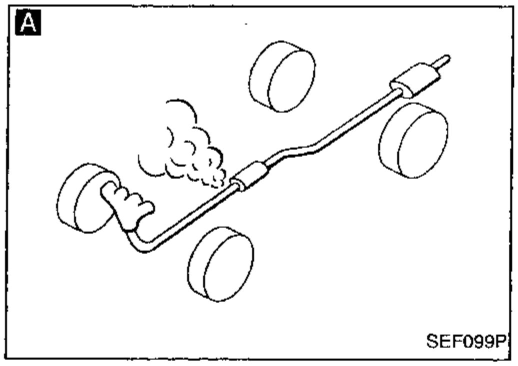
Refer to last page (Foldout page).

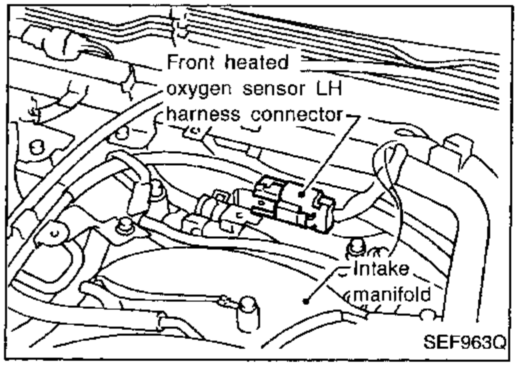


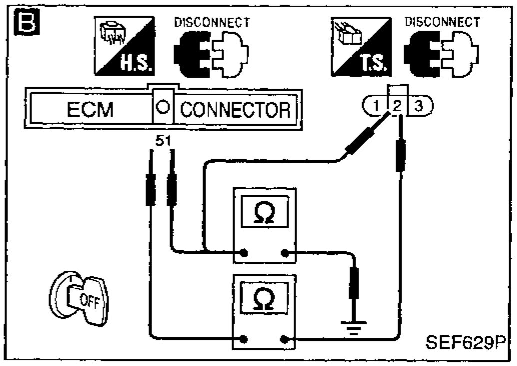
TEC136

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 (51) and terminal ②.
   Continuity should exist.
4. Check harness continuity between ECM terminal (51) (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-23.
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-245, 294.

↓ 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

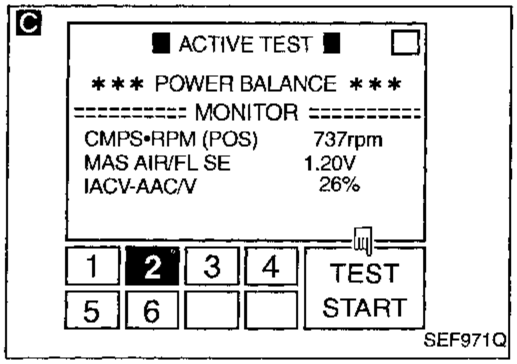
Check "mass air flow" in MODE 1 with GST.
2.5 - 6.0 g·m/sec: at idling
9.5 - 19.0 g·m/sec: at 2,500 rpm

NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds.
Refer to EC-111.

↓ OK

Ⓐ

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



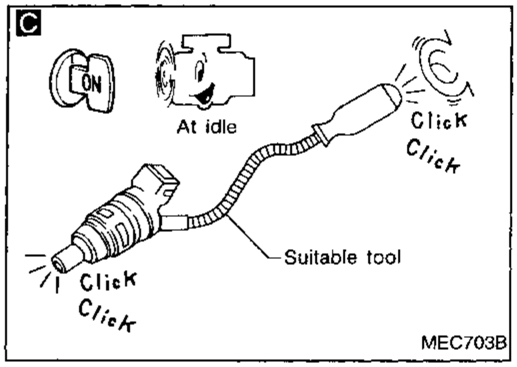
■ ACTIVE TEST ■ ☐

*** POWER BALANCE ***

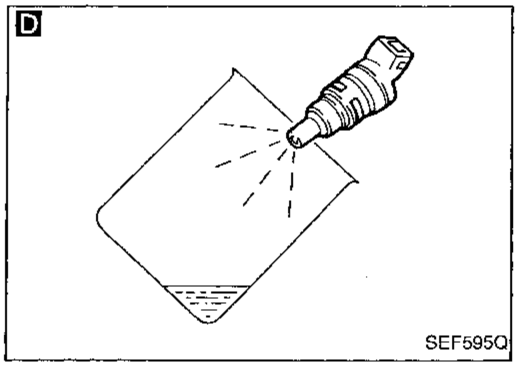
========== MONITOR ==========

CMPS•RPM (POS)	737rpm
MAS AIR/FL SE	1.20V
IACV-AAC/V	26%

SEF971Q



MEC703B



SEF595Q

Ⓐ

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-289. Repair harness or connectors.

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-24.
   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.

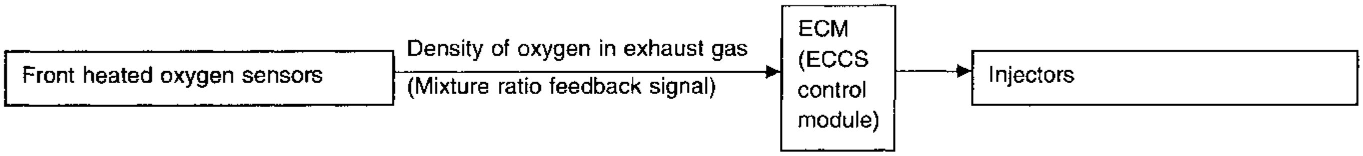
↓

INSPECTION END

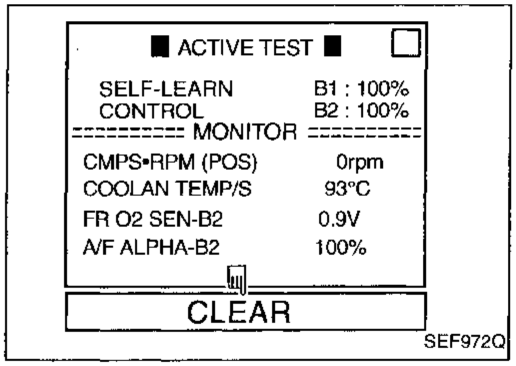
Fuel Injection System Function (Left bank) (Rich side) (DTC: 0209)

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



■ ACTIVE TEST ■ ☐

SELF-LEARN CONTROL B1 : 100% B2 : 100%

========== MONITOR ==========

CMPS•RPM (POS) 0rpm

COOLAN TEMP/S 93°C

FR O2 SEN-B2 0.9V

A/F ALPHA-B2 100%

CLEAR

SEF972Q

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 1st trip 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

GI
MA
EM
LC
EC
FE
AT
PD
FA
RA
BR
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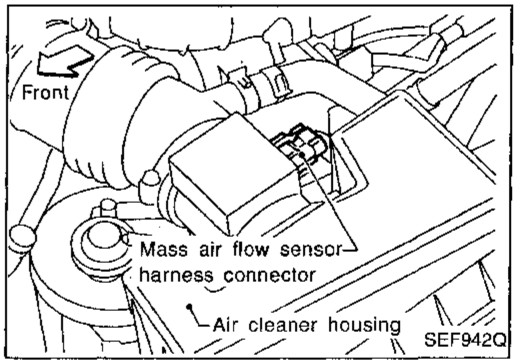
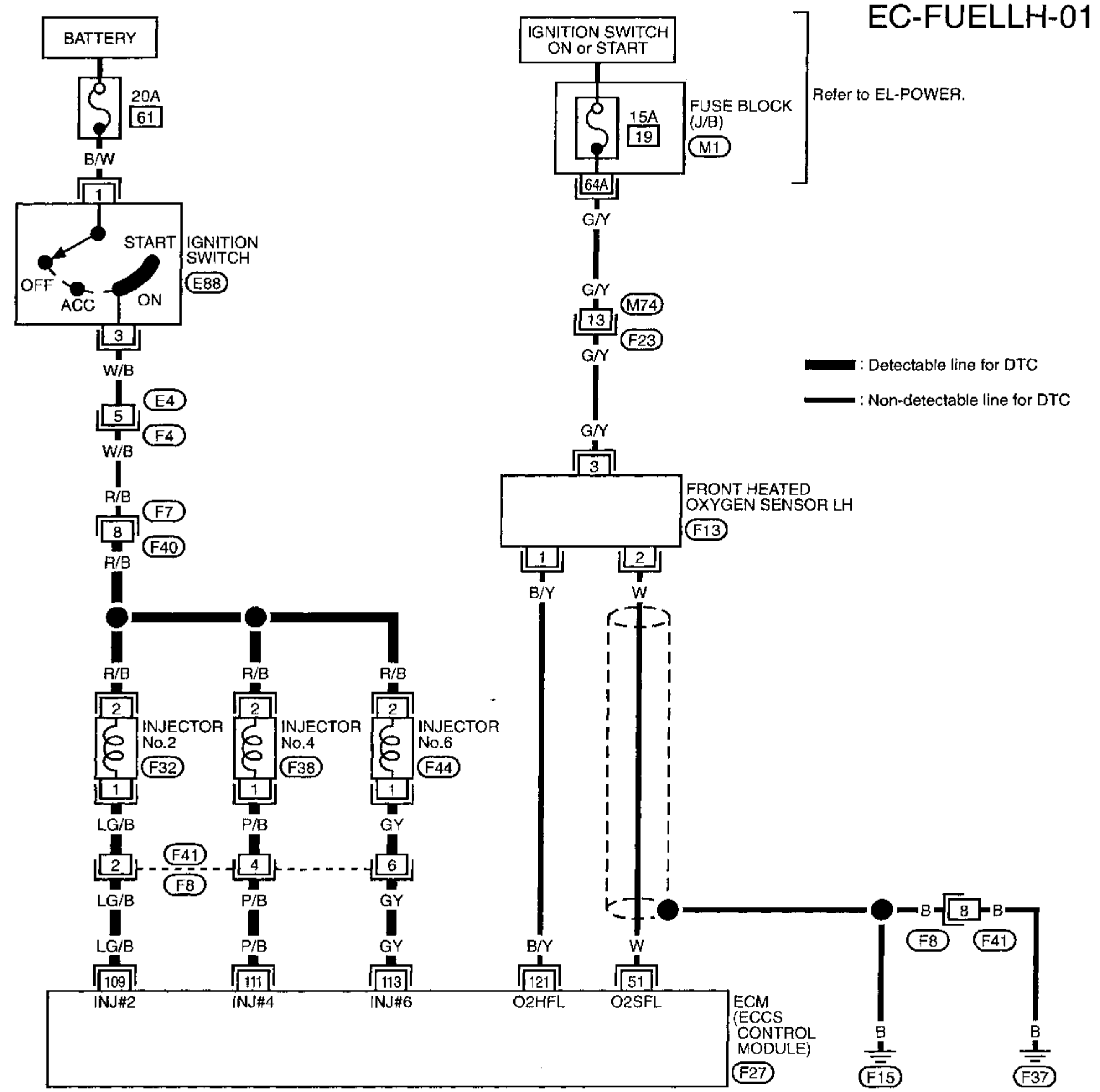
EL
IDX

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

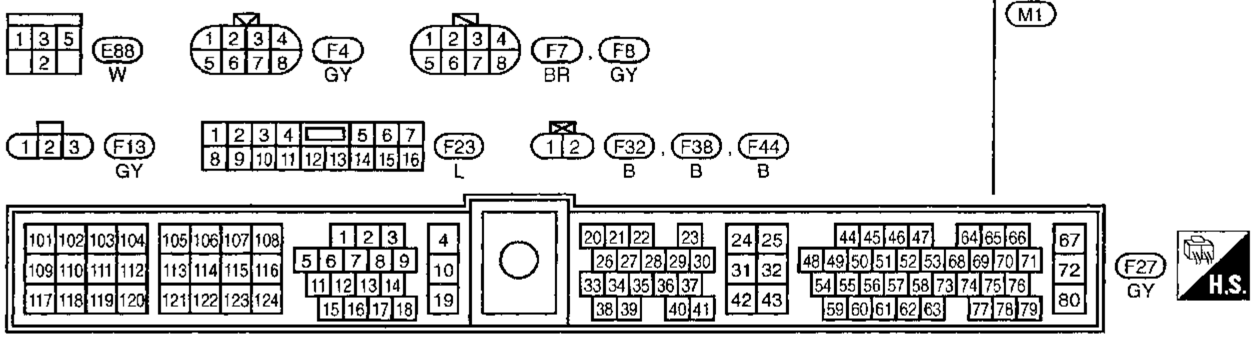


1) Disconnect mass air flow sensor harness connector.
2) Start engine and run it for at least 3 seconds at idle speed.
3) Stop engine and reconnect mass air flow sensor harness connector.
4) Turn ignition switch "ON".
5) Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM. Make sure 1st trip DTC 0102 is detected.
6) Erase the 1st trip 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 1st trip 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)



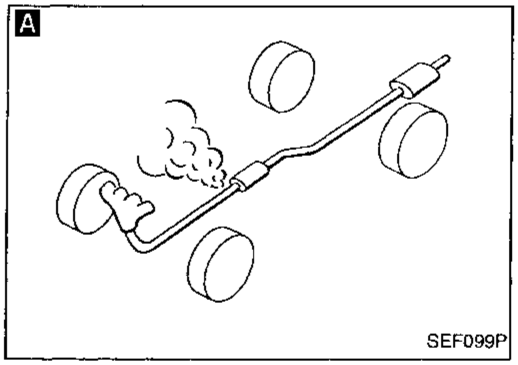
Refer to last page (Foldout page).
M1

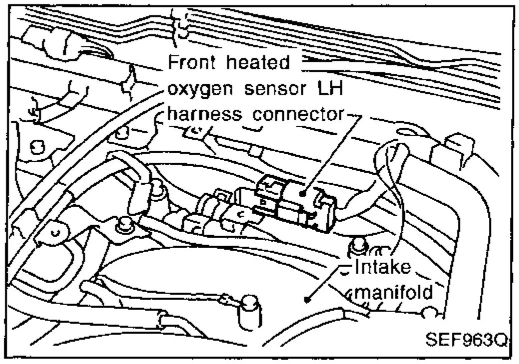


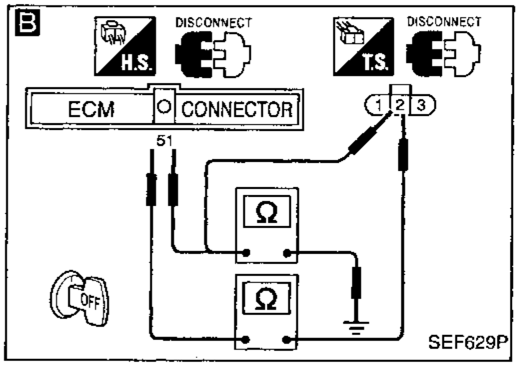
TEC136

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 (51) and terminal ② .
   Continuity should exist.
4. Check harness continuity between ECM terminal (51) (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-23.
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-245, 294.

↓ 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

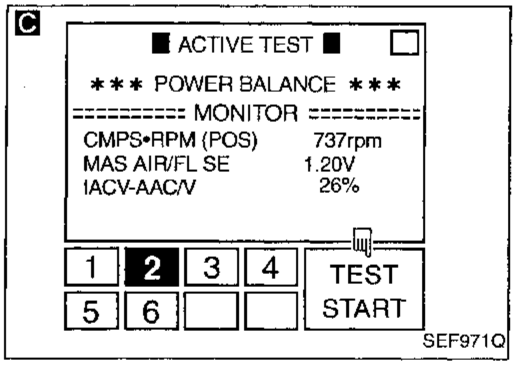
Check "mass air flow" in MODE 1 with GST.
2.5 - 6.0 g·m/sec: at idling
9.5 - 19.0 g·m/sec: at 2,500 rpm

NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds.
Refer to EC-111.

↓ OK

Ⓐ

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



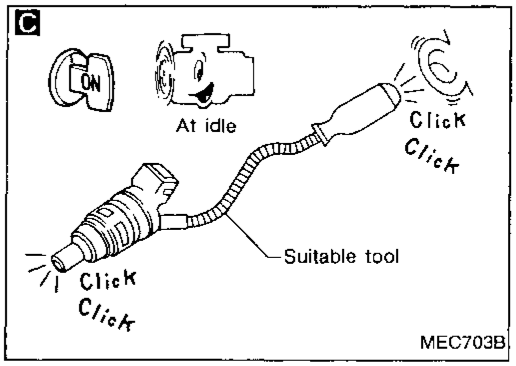
■ ACTIVE TEST ■ ☐

*** POWER BALANCE ***

========== MONITOR ==========

CMPS•RPM (POS)	737rpm
MAS AIR/FL SE	1.20V
IACV-AAC/V	26%

SEF971Q



MEC703B

Ⓐ

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-289. Repair harness or connectors.

↓ OK

Remove injector assembly.
Refer to EC-24.
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.

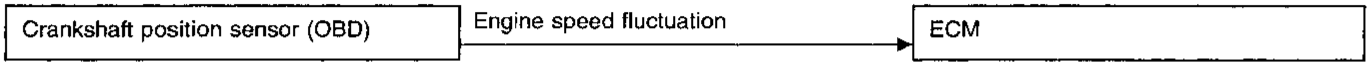
↓

INSPECTION END

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

ON BOARD DIAGNOSIS LOGIC

If 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 engine 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 • The injector circuit is open or shorted. • Injectors • Intake air leaks • The secondary ignition control circuit is open or shorted. • Lack of fuel • Magnetized 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 - 3,000 rpm for at least 5 minutes.

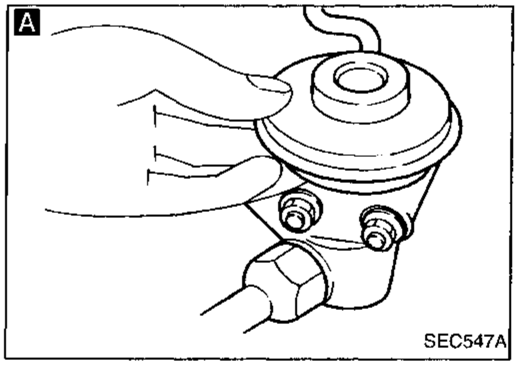
OR

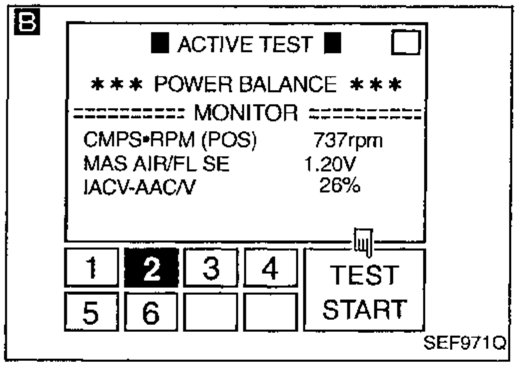
1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine again and drive at 1,500 - 3,000 rpm for at least 5 minutes.
4) Select "MODE 7" with GST.

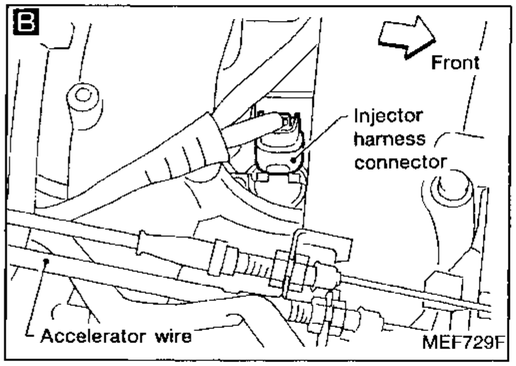
OR

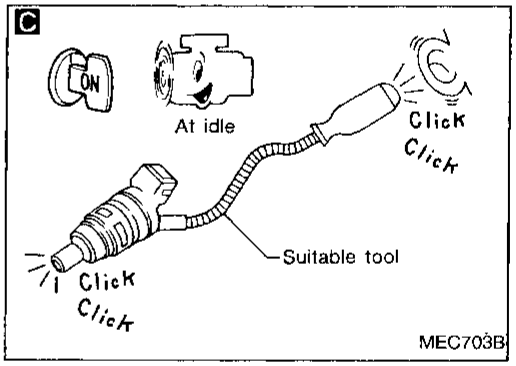
1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine again and drive at 1,500 - 3,000 rpm for at least 5 minutes.
4) Turn ignition switch "OFF", wait at least 5 seconds, and then turn "ON".
5) Perform "Diagnostic Test Mode II (Self-diagnostic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

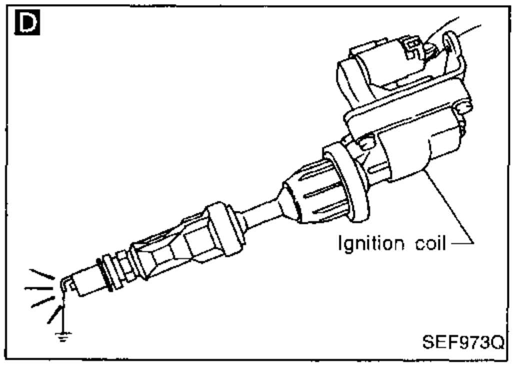
Multiple Cylinder Misfire, No. 1 - 6 Cylinder Misfire (DTC: 0701 - 0603) (Cont'd)



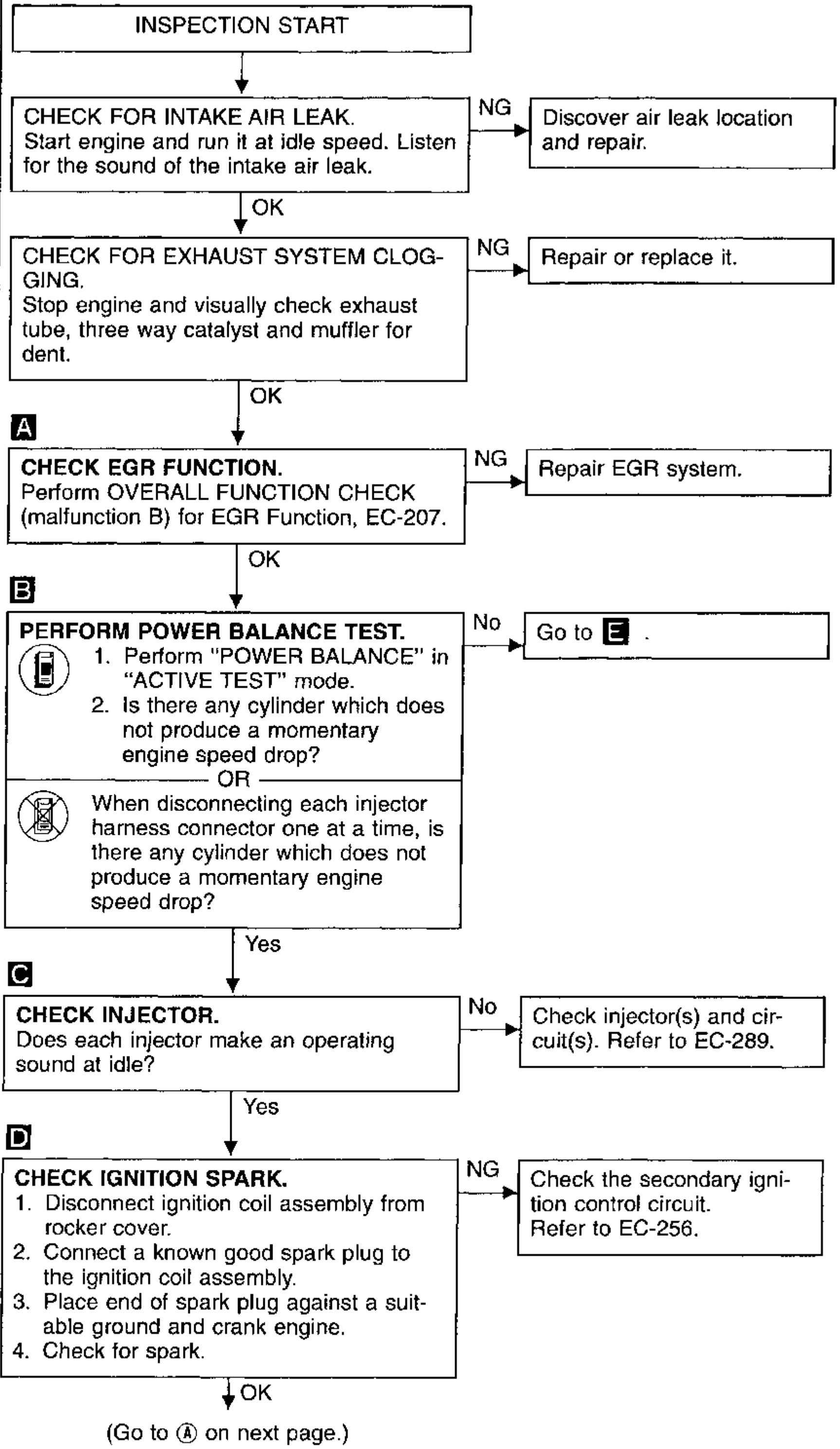








DIAGNOSTIC PROCEDURE



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 dent.

NG → Repair or replace it.

OK

A

CHECK EGR FUNCTION.
Perform OVERALL FUNCTION CHECK (malfunction B) for EGR Function, EC-207.

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**.

Yes

C

CHECK INJECTOR.
Does each injector make an operating sound at idle?

No → Check injector(s) and circuit(s). Refer to EC-289.

Yes

D

CHECK IGNITION SPARK.

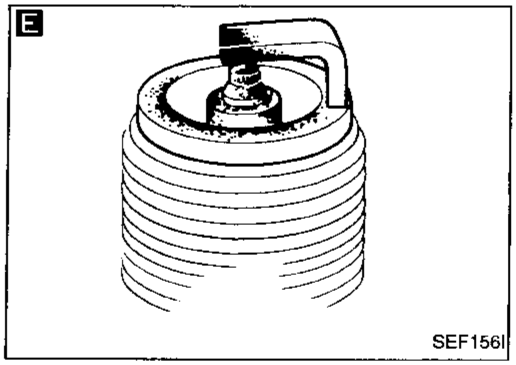
1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

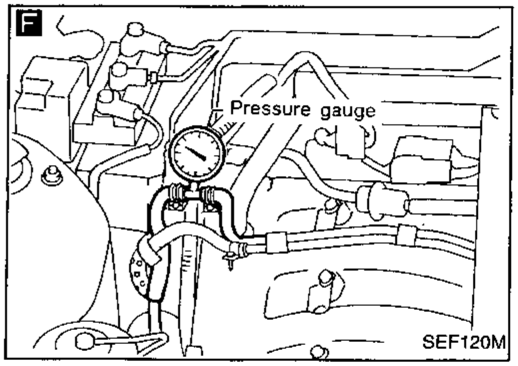
NG → Check the secondary ignition control circuit. Refer to EC-256.

OK

(Go to Ⓐ on next page.)

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





Ⓐ

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-23.
2. Install fuel pressure gauge and check fuel pressure.

At idle:
Approx. 250.1 kPa
($2.55\ kg/cm^2$, 36.3 psi)

NG → Check fuel pump and circuit.

OK

CHECK COMPRESSION PRESSURE.
- Check compression pressure.

Standard:
kPa (kg/cm^2, psi)/300 rpm
1,285 (13.1, 186)
Minimum:
kPa (kg/cm^2, psi)/300 rpm
981 (10.0, 142)
Difference between each cylinder:
kPa (kg/cm^2, 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-73.

NG → Adjust ignition timing.

OK

CHECK MASS AIR FLOW SENSOR.

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

OR

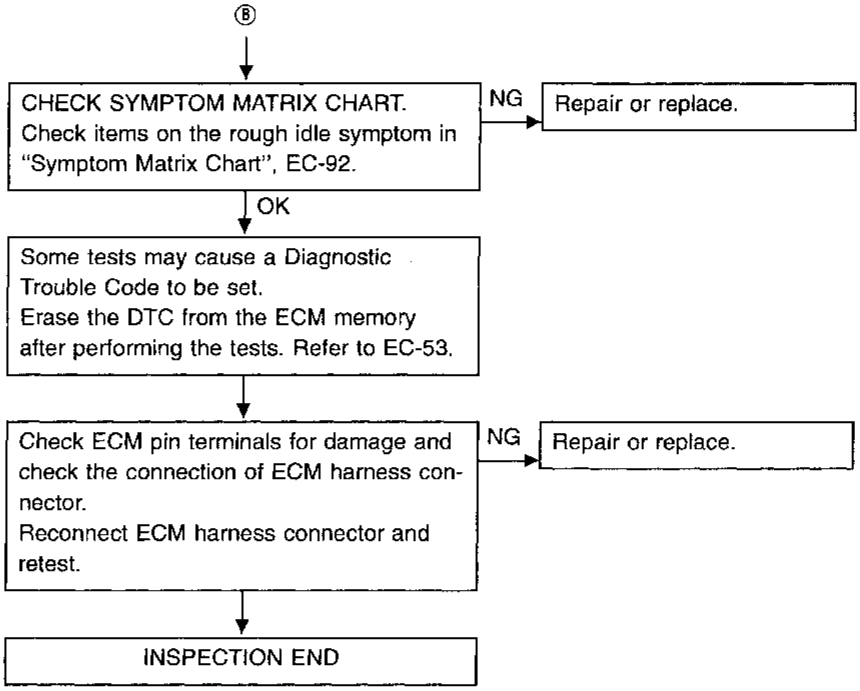
Check "mass air flow" in MODE 1 with GST.
2.5 - 6.0 gm/sec: at idling
9.5 - 19.0 gm/sec: at 2,500 rpm

NG → Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds.
Refer to EC-111.
If NG, repair or replace it.

OK

(Go to Ⓑ on next page.)

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



CHECK SYMPTOM MATRIX CHART.
Check items on the rough idle symptom in "Symptom Matrix Chart", EC-92.

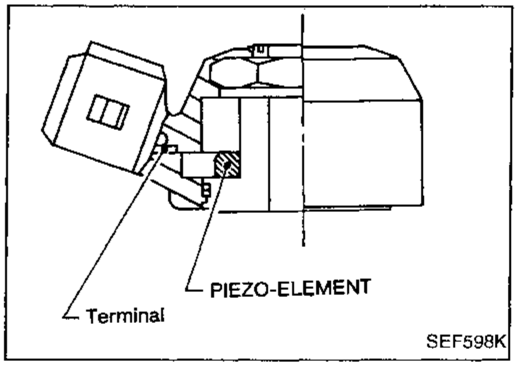
Repair or replace.

Some tests may cause a Diagnostic Trouble Code to be set.
Erase the DTC from the ECM memory after performing the tests. Refer to EC-53.

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

Repair or replace.

INSPECTION END



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 is not 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

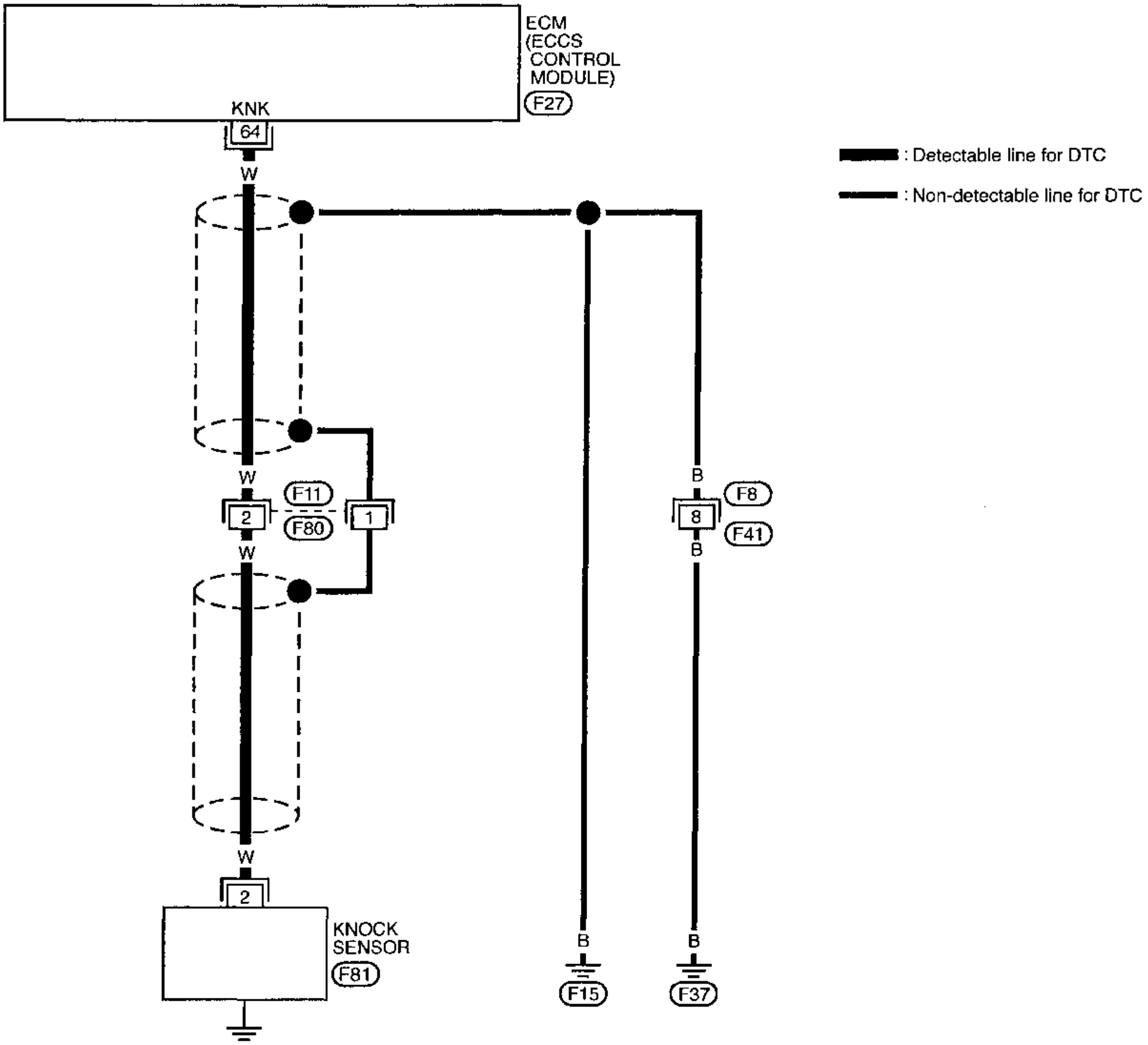
1) Start engine and run it for at least 5 seconds at idle speed.
2) Select "MODE 7" with GST.

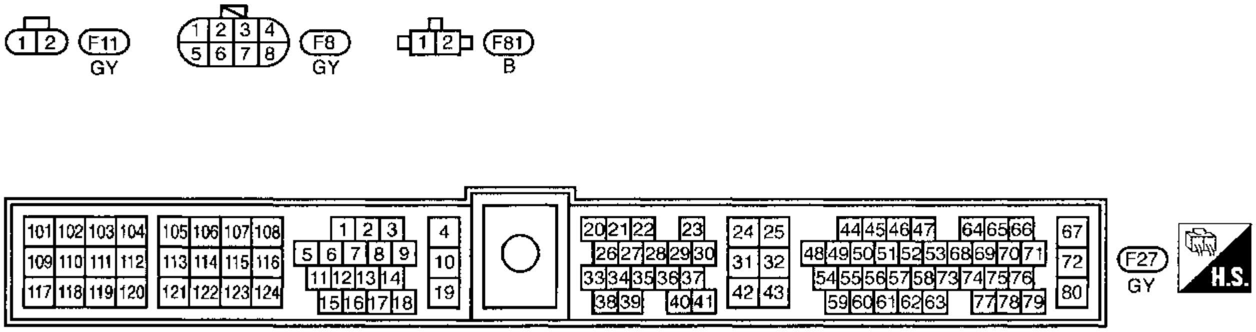
OR

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.

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

EC-KS-01

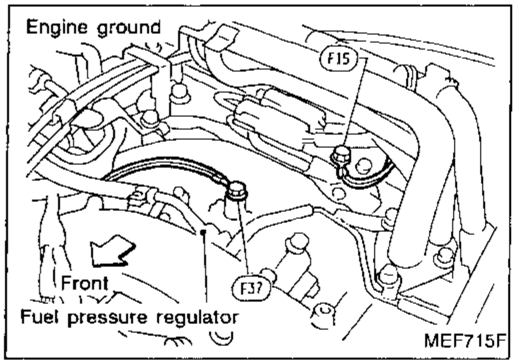




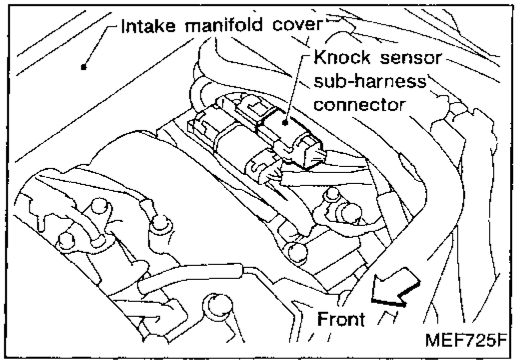
SEF694Q

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

DIAGNOSTIC PROCEDURE



MEF715F



MEF725F

INSPECTION START

Loosen and retighten engine ground screws.

A

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 terminal ② and ECM terminal (64) .
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

OK

B

CHECK INPUT SIGNAL CIRCUIT-2.

Check harness continuity between terminal ② and engine ground.

Continuity should exist.

If OK, check harness for short.

It is necessary to use an ohmmeter which can measure more than 10 MΩ.

NG →

- Check harness for open or short between knock sensor sub-harness connector and knock sensor.
  If NG, repair harness or connectors.
- Check component (Knock sensor).
  Refer to "COMPONENT INSPECTION" below.
  If NG, replace knock sensor.

OK

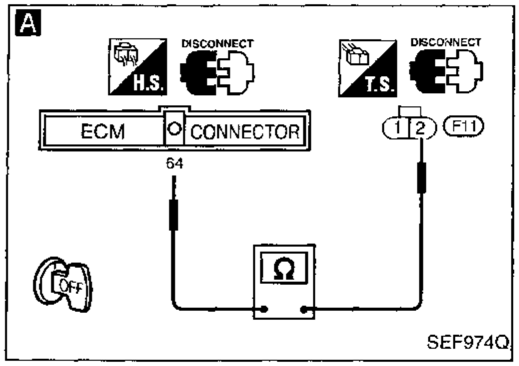
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

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

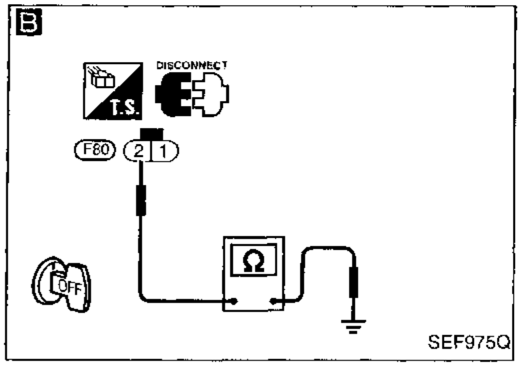
INSPECTION END

A

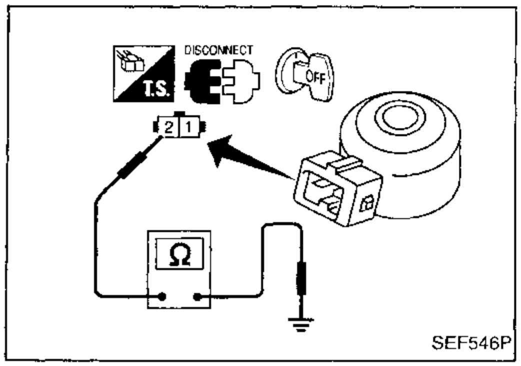


SEF974Q

B



SEF975Q



SEF546P

COMPONENT INSPECTION

Knock sensor

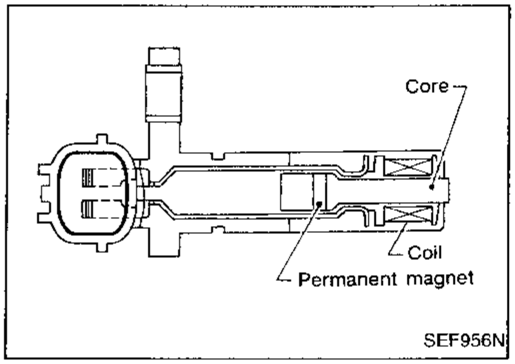
1. Disconnect knock sensor harness connector.
2. Check resistance between terminal ② and ground.

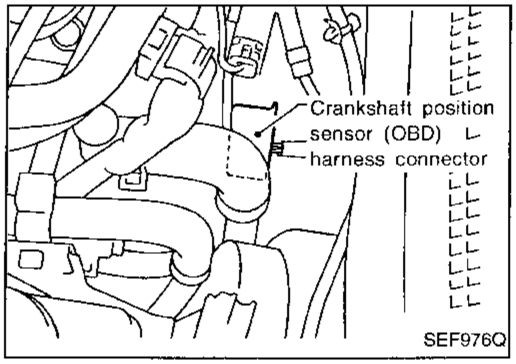
Approximately 500 - 620 kΩ [at 25°C (77°F)]

- It is necessary to use an ohmmeter which can measure more than 10 MΩ.

CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use a new one.





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

The crankshaft position sensor (OBD) is located on the transmission housing facing the gear teeth (cogs) of the drive plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet, core and coil.

When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

This sensor is not used to control the engine system. It is used only for the on board diagnosis 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) • Dead (Weak) battery

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

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

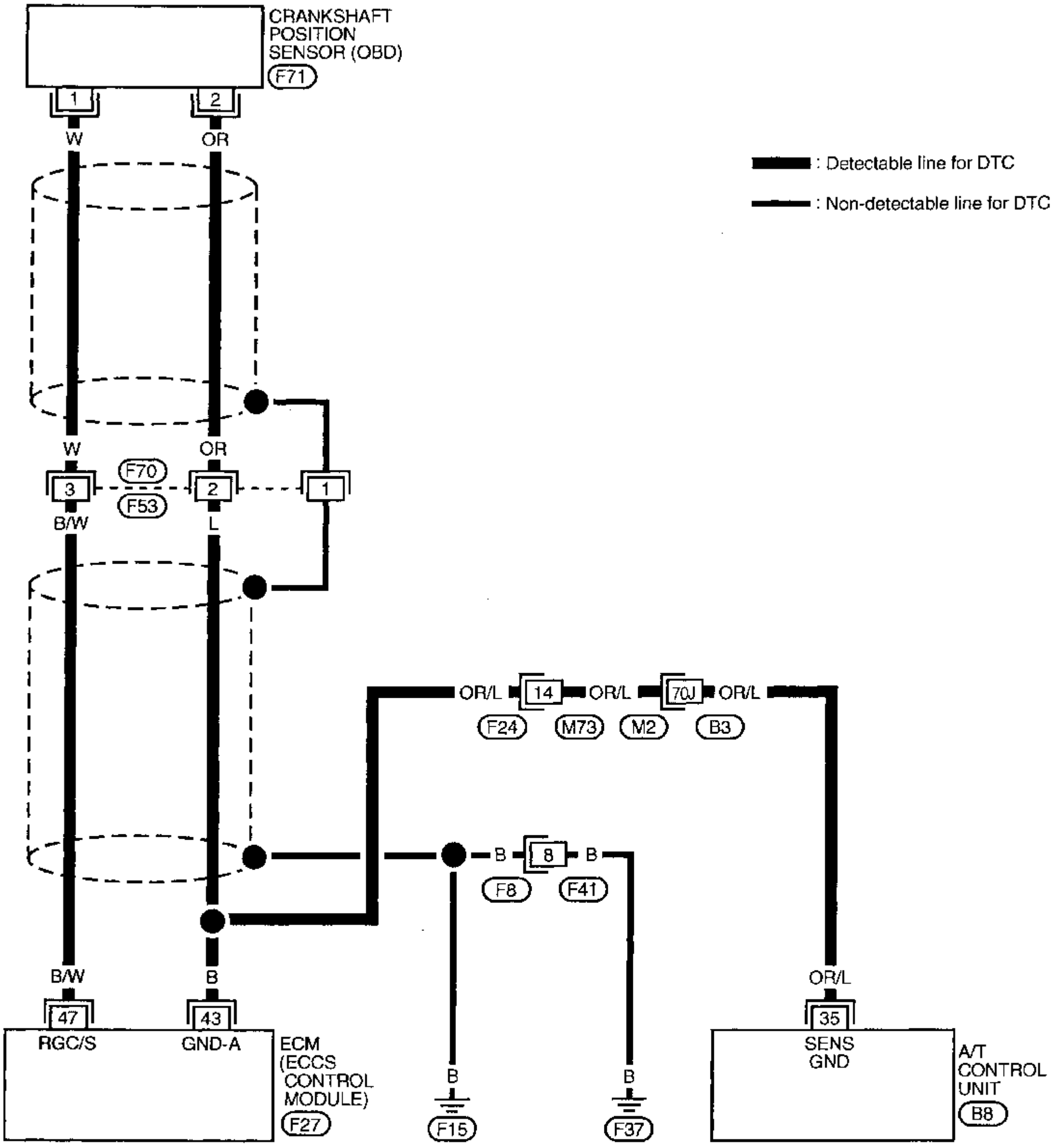
1) Start engine and run it for at least 15 seconds at idle speed.
2) Select “MODE 7” with GST.

OR

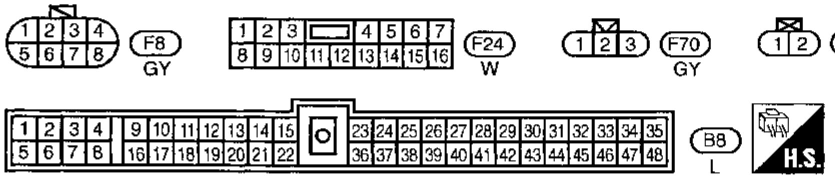
1) Start engine and run it for at least 15 seconds at idle speed.
2) Turn ignition switch “OFF”, wait at least 5 seconds and then turn “ON”.
3) Perform “Diagnostic Test Mode II” (Self-diagnostic results) with ECM.

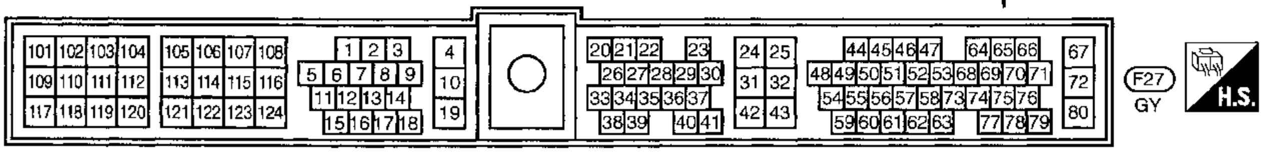
Crankshaft Position Sensor (CKPS) (OBD) (DTC: 0802) (Cont'd)

EC-CKPS-01



Refer to last page (Foldout page).
M2, B3

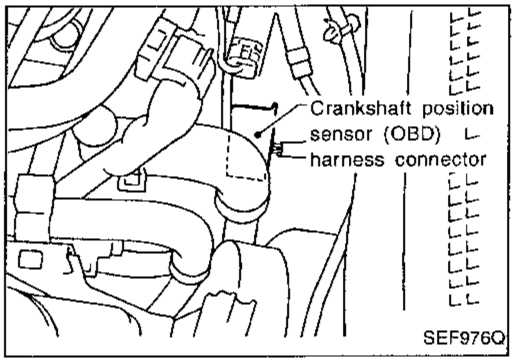


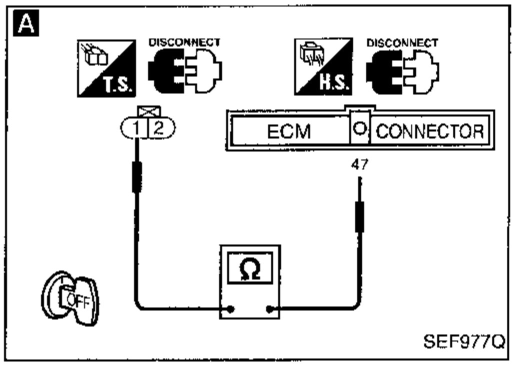


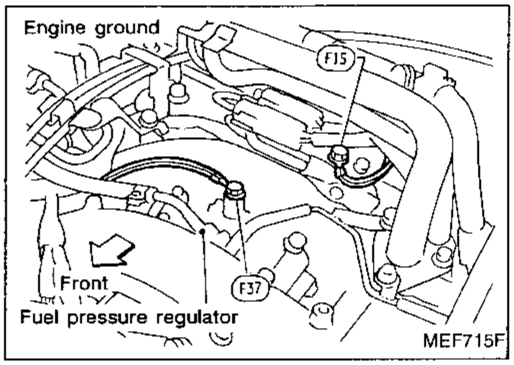
SEF695Q

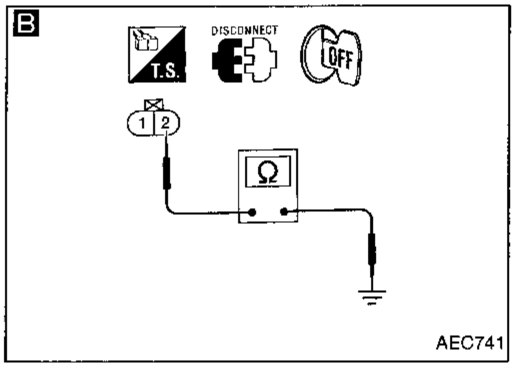
Crankshaft Position Sensor (CKPS) (OBD) (DTC: 0802) (Cont'd)

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 ㊼ and terminal ① .

Continuity should exist.

If OK, check harness for short.

NG → Check the following.

- Harness connectors F53 , F70
- 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 F53 , F70
- Harness connectors F24 , M73
- Harness connectors M2 , B3
- Harness for open or short between ECM and crankshaft position sensor (OBD)
- Harness for open or short between A/T control unit and crankshaft position sensor (OBD)

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.

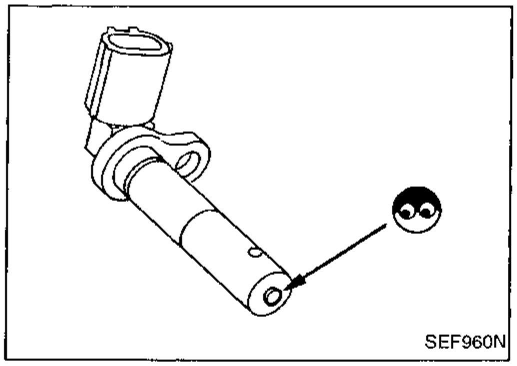
↓

INSPECTION END

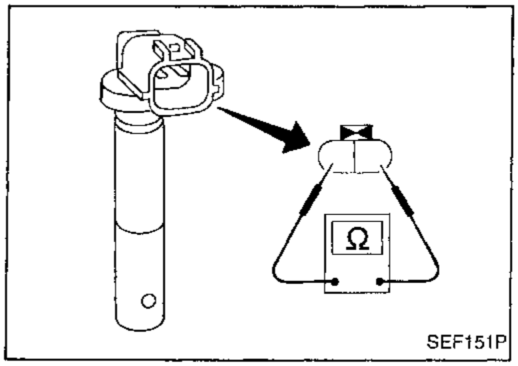
Crankshaft Position Sensor (CKPS) (OBD) (DTC: 0802) (Cont'd)

COMPONENT INSPECTION

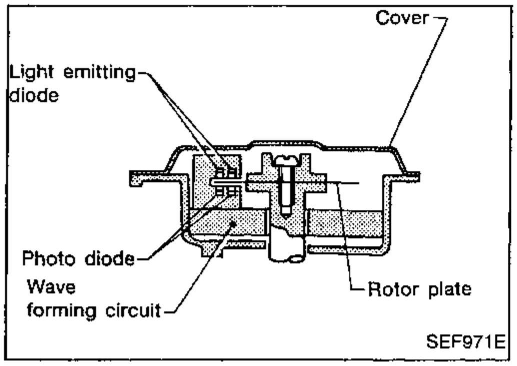
Crankshaft position sensor (OBD)

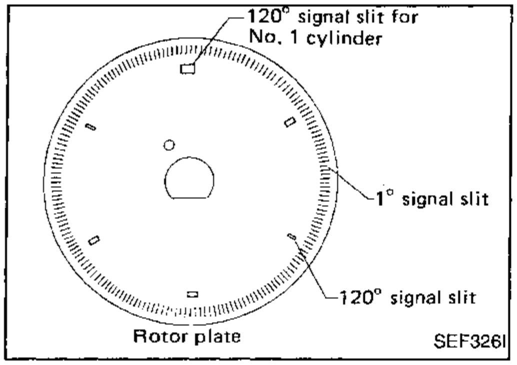


1. Disconnect crankshaft position sensor (OBD) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.
   Resistance: Approximately 166 - 204Ω
   [at 20°C (68°F)]





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.

GI
MA
EM
LC
EC
FE
AT
PD
FA
RA
BR
ST
RS
BT
HA
EL
IDX

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.	• Harness or connectors (The camshaft position sensor circuit is open or shorted.) • Camshaft position sensor • Starter motor (Refer to EL section.) • Starting system circuit (Refer to EL section.) • Dead (Weak) battery
	B) Either 1° or 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.	

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

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 7" 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

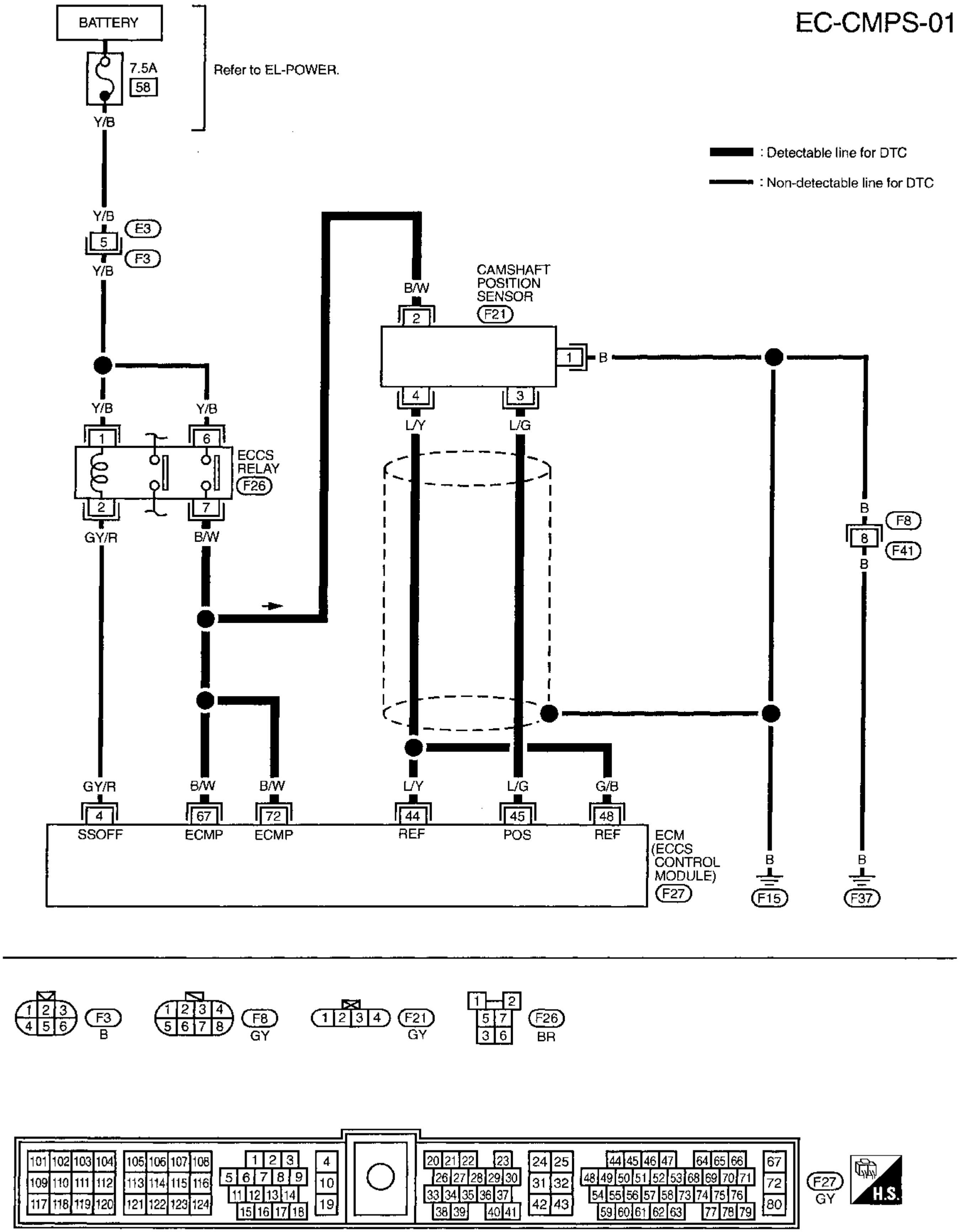
1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and run it for at least 2 seconds at idle speed.

OR

1) Start engine and run it for at least 2 seconds at idle speed.
2) Select "MODE 7" with GST.

OR

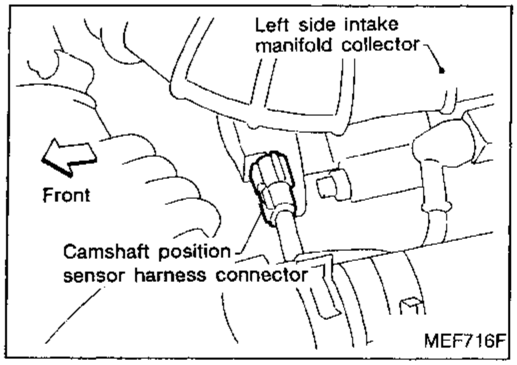
1) Start engine and run it for at least 2 seconds at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II" (Self-diagnostic results) with ECM.

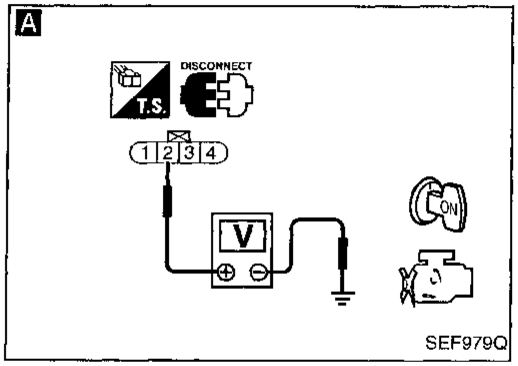

EC-CMPS-01
BATTERY
7.5A
58
Refer to EL-POWER.
■ : Detectable line for DTC
— : Non-detectable line for DTC
Y/B
E3
5
F3
Y/B
B/W
CAMSHAFT POSITION SENSOR
F21
2
1
B
4
3
L/Y
L/G
Y/B
Y/B
1
6
ECCS RELAY
F26
2
7
GY/R
B/W
B
F8
8
F41
B
GY/R
B/W
B/W
L/Y
L/G
G/B
4
67
72
44
45
48
SSOFF
ECMP
ECMP
REF
POS
REF
ECM (ECCS CONTROL MODULE)
F27
B
B
F15
F37
1 2 3 4 5 6
F3
B
1 2 3 4 5 6 7 8
F8
GY
1 2 3 4
F21
GY
1 2 5 7 3 6
F26
BR
101 102 103 104 105 106 107 108 1 2 3 4 109 110 111 112 113 114 115 116 5 6 7 8 9 10 117 118 119 120 121 122 123 124 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 44 45 46 47 64 65 66 67 26 27 28 29 30 31 32 48 49 50 51 52 53 68 69 70 71 72 33 34 35 36 37 42 43 54 55 56 57 58 73 74 75 76 38 39 40 41 59 60 61 62 63 77 78 79 80
F27
GY
H.S.

TEC137

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

DIAGNOSTIC PROCEDURE (DETECTABLE CIRCUIT)





INSPECTION START

↓

A

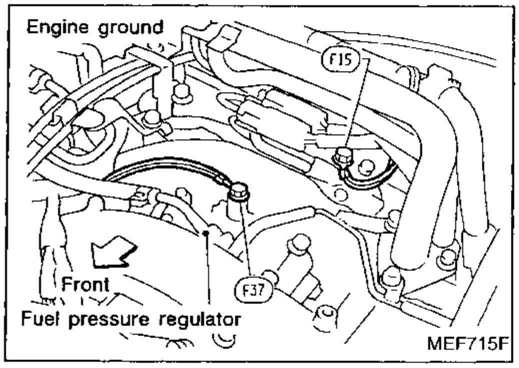
CHECK POWER SUPPLY.

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

NG → Check the following.
- Harness for open or short between camshaft position sensor and ECCS relay
- Harness for open or short between camshaft position sensor and ECM

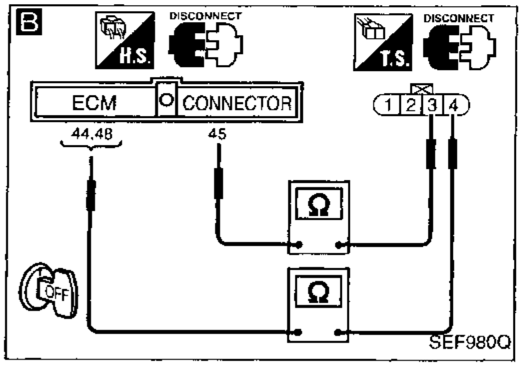
If NG, repair harness or connectors.

↓ OK



Loosen and retighten engine ground screws.

↓



B

CHECK INPUT SIGNAL CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between terminal ③ and ECM terminal ㊺, terminal ④ and ECM terminals ㊹, ㊽.
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

↓ OK

CHECK COMPONENT
(Camshaft position sensor).
Refer to "COMPONENTS INSPECTION", EC-206.

NG → Replace camshaft position sensor.

↓ OK

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

↓ Trouble is not fixed.

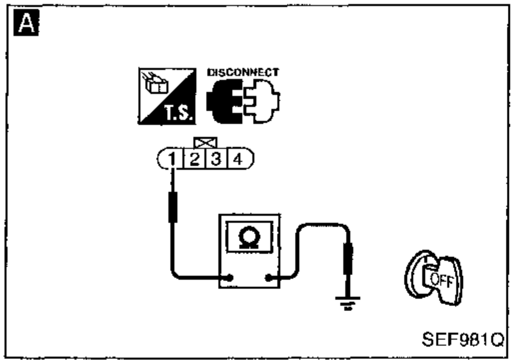
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

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

DIAGNOSTIC PROCEDURE (NON-DETECTABLE CIRCUIT)



INSPECTION START

↓

A

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect camshaft position sensor harness connector.
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 (F8), (F41)
- Harness for open or short between camshaft position sensor and engine ground

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

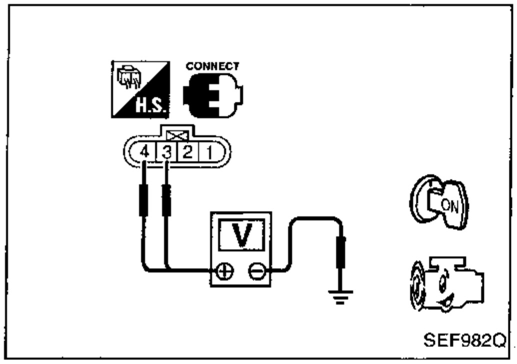
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ 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



SEF982Q

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

COMPONENT INSPECTION

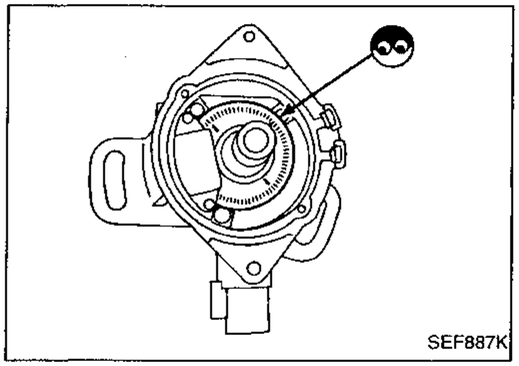
Camshaft position sensor

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 2.5V* (AC)
	④ and ground	Approximately 2.1V* (AC)

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

If NG, replace camshaft position sensor.



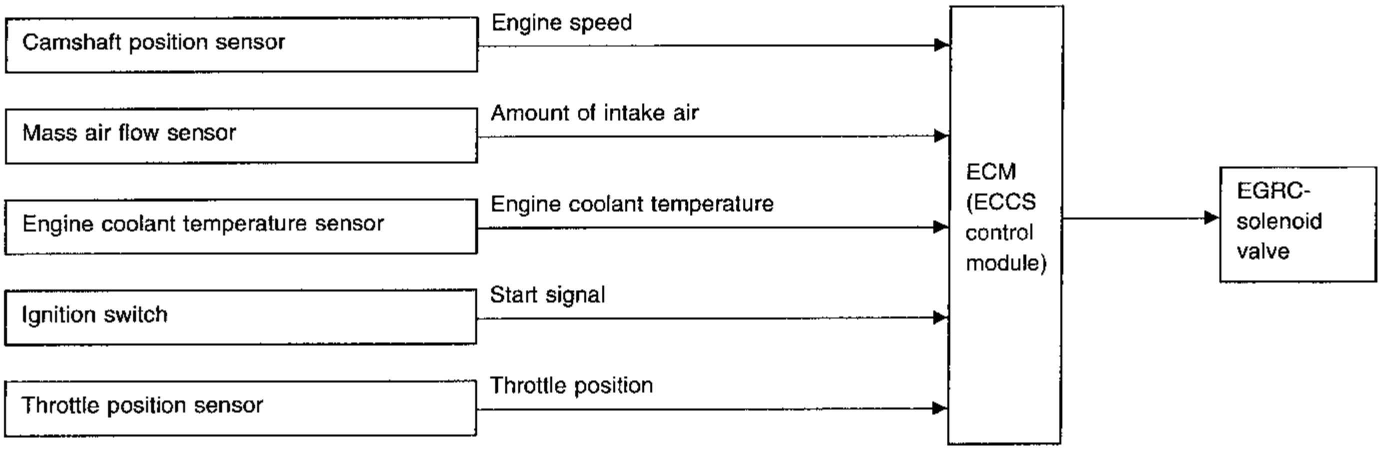
SEF887K

3. Remove camshaft position sensor cap. Visually check signal plate for damage or dust.

After this inspection, diagnostic trouble code No. P0340 might be displayed with camshaft position sensor functioning properly. Erase the stored memory.

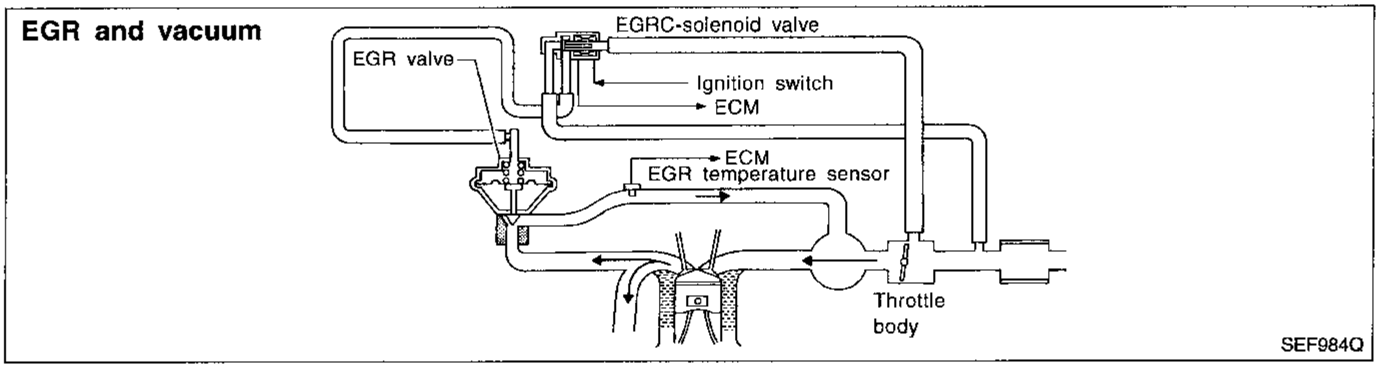
EGR Function (DTC: 0302)

SYSTEM DESCRIPTION

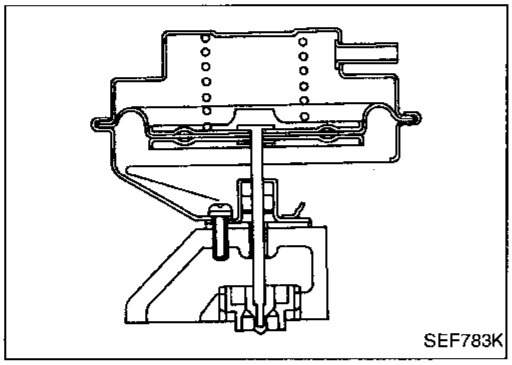


This system cuts and controls vacuum applied to the EGR valve to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM and the EGRC-solenoid valve. When the ECM detects any of the following conditions, current flows through the solenoid valve. This causes the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

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



SEF984Q



SEF783K

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.

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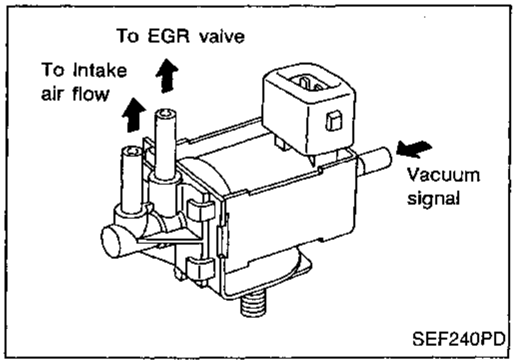
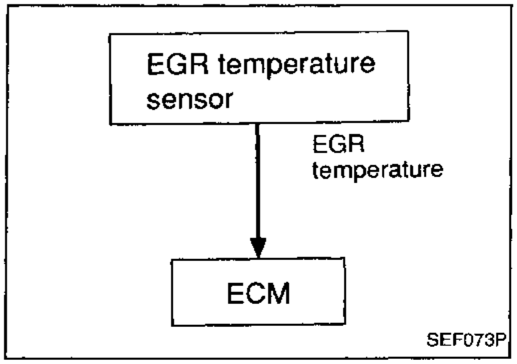
EGR Function (DTC: 0302) (Cont'd)



EGRC-solenoid valve

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



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 • Passage blocked • EGRC-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.	• EGRC-solenoid valve • EGR valve leaking or stuck open • EGR temperature sensor

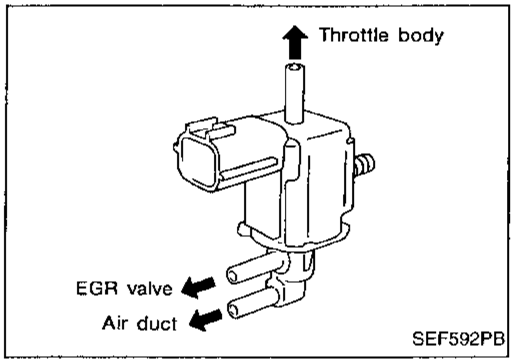
OVERALL FUNCTION CHECK

Use this procedure to check the overall EGR function. During this check, a 1st trip 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".
If the 1st trip freeze frame data or the freeze frame data for another malfunction is stored in the ECM, perform both "Procedure for malfunction A" and "Procedure for malfunction B". In this case, check 1st trip DTCs and/or DTCs in the ECM and perform inspections one by one based on "INSPECTION PRIORITY", EC-90.

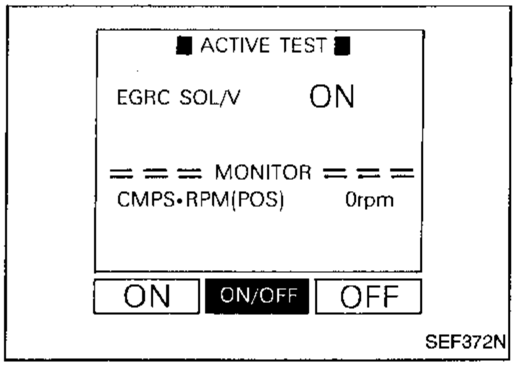
EGR Function (DTC: 0302) (Cont'd)

Procedure for malfunction A



SEF592PB

1) Start engine and warm it up sufficiently.
2) Select "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT and turn the solenoid valve "OFF".
3) Check the EGR valve lifting when revving engine from 2,000 rpm up to 3,000 rpm under no load.
   EGR valve should lift up and down without sticking.
4) Check voltage between EGR temperature sensor harness connector terminal ① and ground at idle speed.
   Less than 4.5V should exist.


■ ACTIVE TEST ■

EGRC SOL/V ON

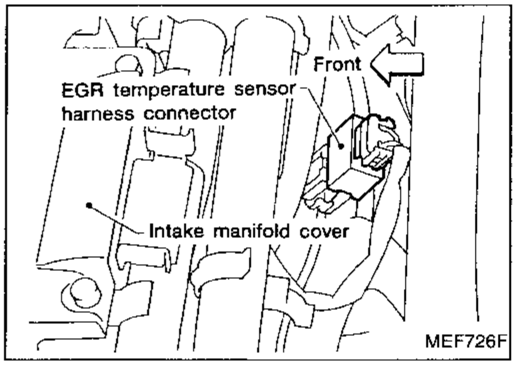
=== MONITOR ===

CMPS•RPM(POS) 0rpm

SEF372N

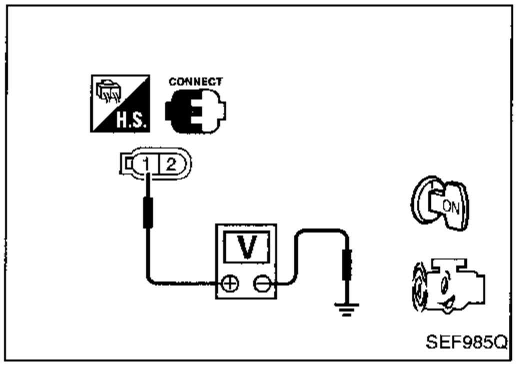
5) Turn ignition switch "OFF".
6) Check harness continuity between EGR temperature sensor harness connector terminal ② and ECM terminal ㊸.
   Continuity should exist.
7) Perform "COMPONENT CHECK", "EGR temperature sensor", EC-215.

OR

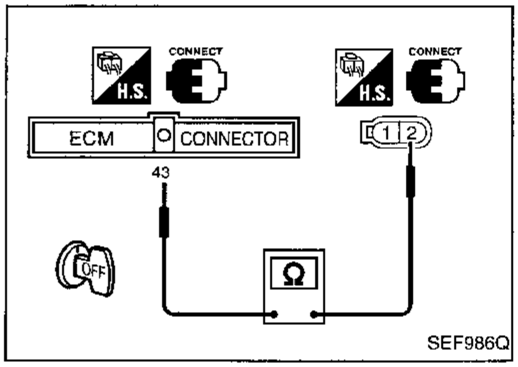


MEF726F

1) Disconnect EGRC-solenoid valve harness connector. (The DTC for EGRC-solenoid valve will be displayed, however, ignore it.)
2) Start engine and warm it up sufficiently.
3) Check the EGR valve lifting when revving engine from 2,000 rpm up to 3,000 rpm under no load.
   EGR valve should lift up and down without sticking.
4) Reconnect EGRC-solenoid valve harness connector.
5) Check voltage between EGR temperature sensor harness connector terminal ① and ground at idle speed.
   Less than 4.5V should exist.
6) Turn ignition switch "OFF".
7) Check harness continuity between EGR temperature sensor harness connector terminal ② and ECM terminal ㊸.
   Continuity should exist.
8) Perform "COMPONENT CHECK", "EGR temperature sensor", EC-215.

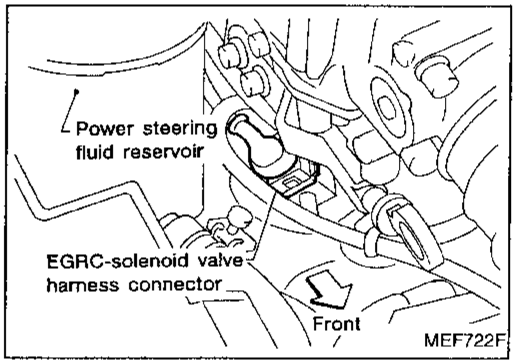


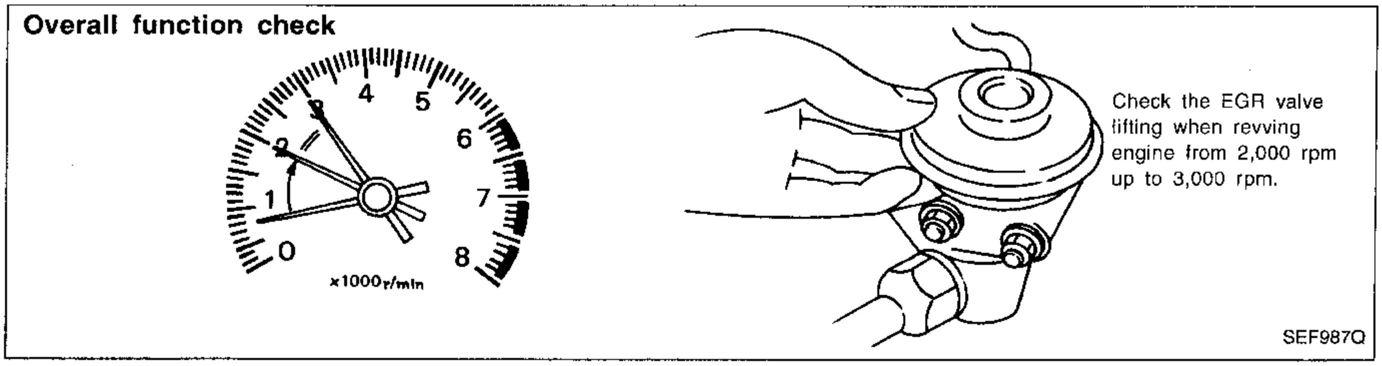
SEF985Q



SEF986Q

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




Overall function check

Check the EGR valve lifting when revving engine from 2,000 rpm up to 3,000 rpm.

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

Procedure for malfunction B

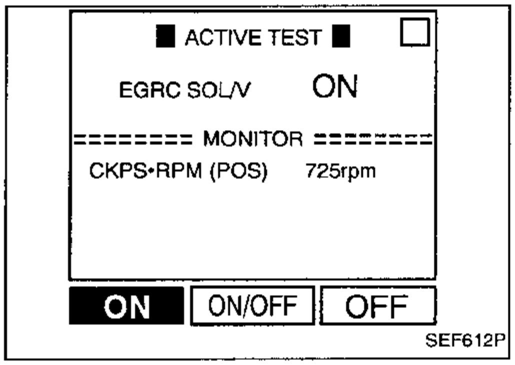
1) Start engine.
2) Select "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT and turn the solenoid valve "ON".
3) Check for the EGR valve lifting when revving engine from 2,000 rpm up to 3,000 rpm under no load.
   EGR valve should be closed and should not lift up.

OR

1) Turn ignition switch "ON".
2) Confirm the engine coolant temperature is lower than 55°C (131°F) in "Mode 1" with GST.
   Perform the following steps before its temperature becomes higher than 55°C (131°F).
3) Start engine.
4) Check for the EGR valve lifting when revving engine from 2,000 rpm up to 3,000 rpm under no load.
   EGR valve should be closed and should not lift up.

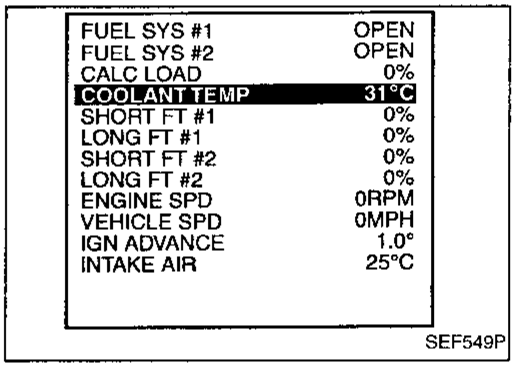
OR

1) Turn ignition switch "ON".
2) Confirm the voltage between ECM terminals (59) and ㉕ is higher than 2.1V.
   Perform the following steps before the voltage becomes lower than 2.1V.
3) Start engine.
4) Check for the EGR valve lifting when revving engine from 2,000 rpm up to 3,000 rpm under no load.
   EGR valve should be closed and should not lift up.



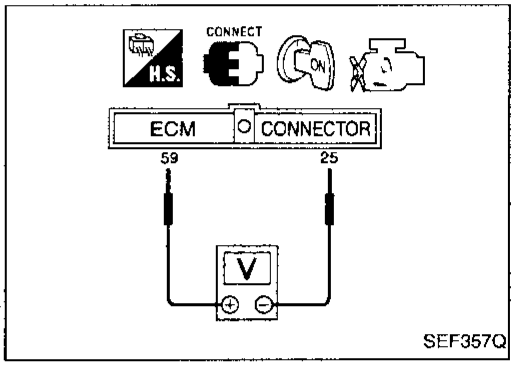
```
■ ACTIVE TEST ■ ☐
EGRC SOL/V        ON
======== MONITOR ========
CKPS•RPM (POS)    725rpm
```

SEF612P

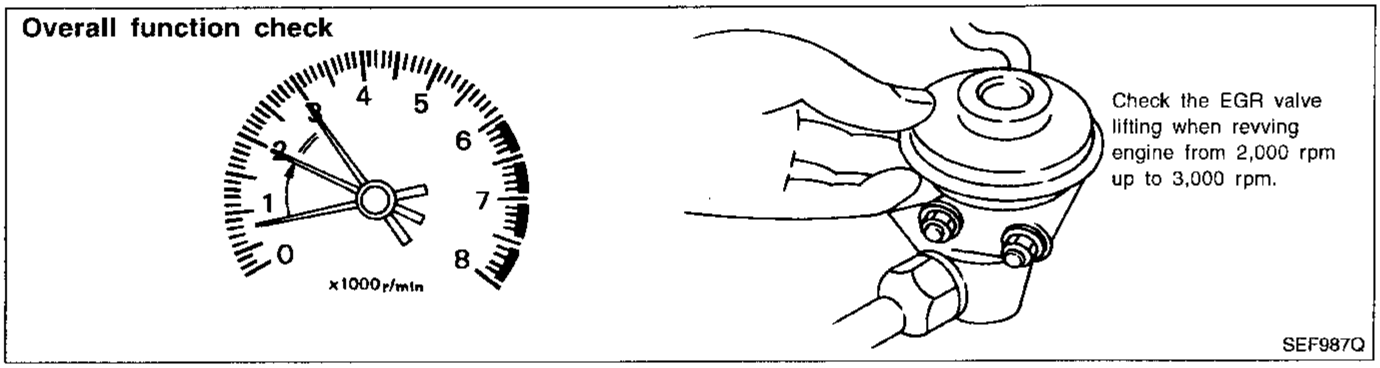


```
FUEL SYS #1      OPEN
FUEL SYS #2      OPEN
CALC LOAD          0%
COOLANT TEMP     31°C
SHORT FT #1        0%
LONG FT #1         0%
SHORT FT #2        0%
LONG FT #2         0%
ENGINE SPD       0RPM
VEHICLE SPD      0MPH
IGN ADVANCE      1.0°
INTAKE AIR       25°C
```

SEF549P



SEF357Q



Overall function check

Check the EGR valve lifting when revving engine from 2,000 rpm up to 3,000 rpm.

SEF987Q

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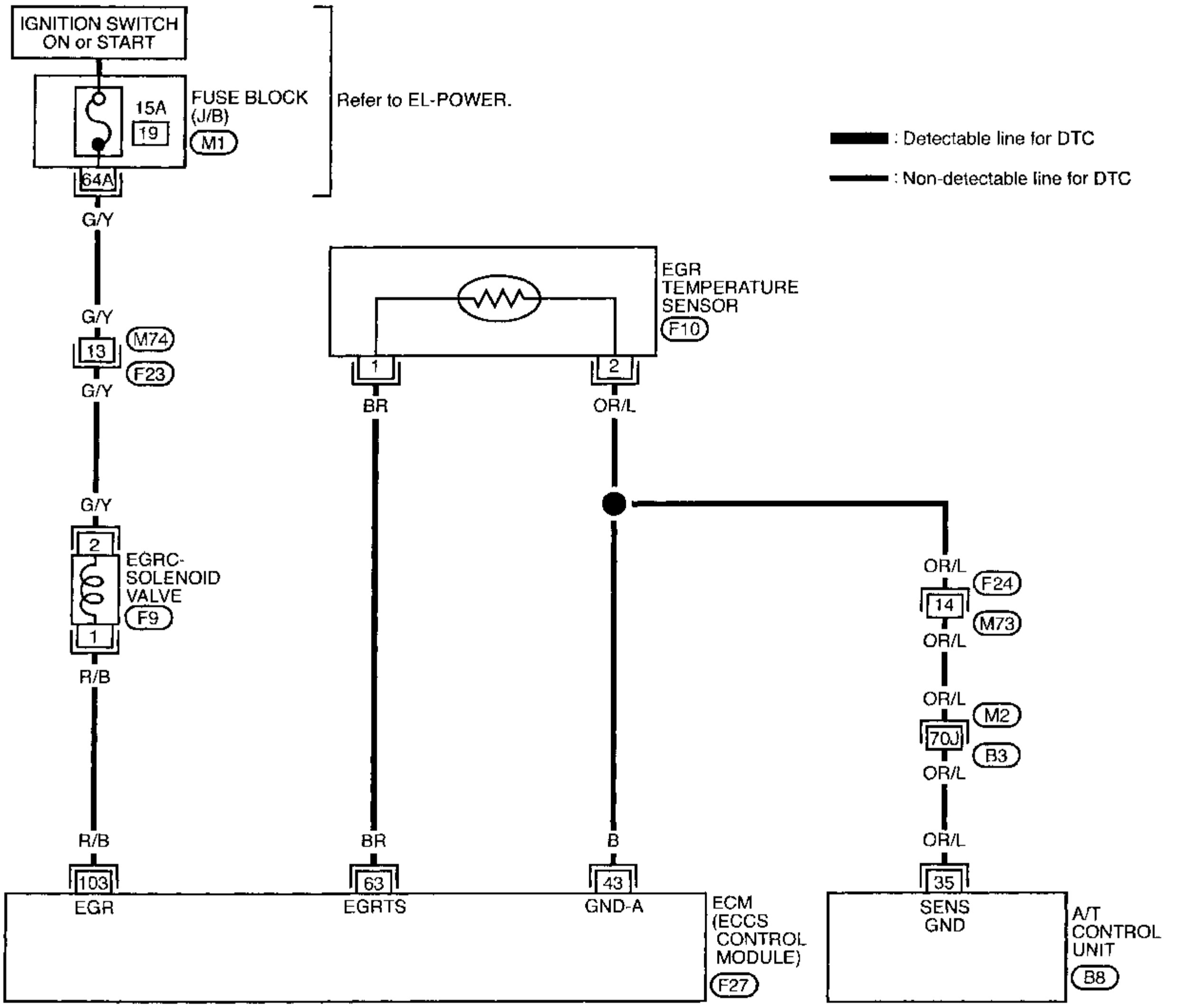
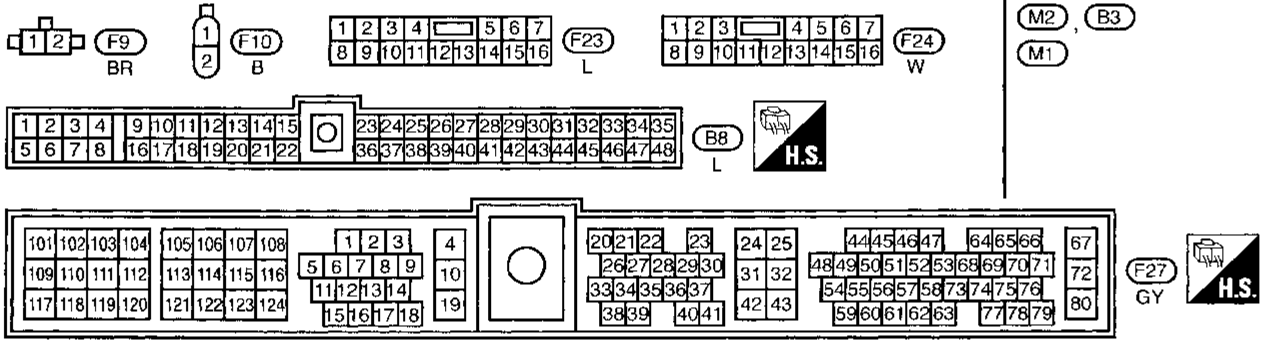
EGR Function (DTC: 0302) (Cont'd)

EC-EGRC1-01



Refer to last page (Foldout page).
M2, B3
M1



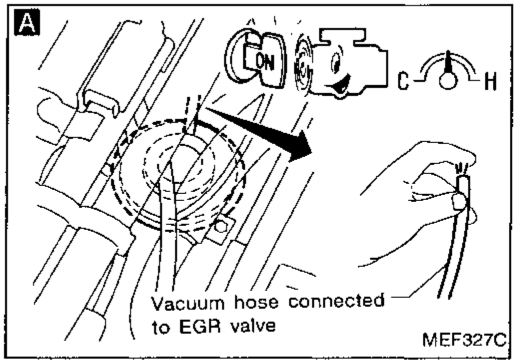
SEF697Q

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

DIAGNOSTIC PROCEDURE

INSPECTION START

A



CHECK VACUUM SOURCE TO EGR VALVE.

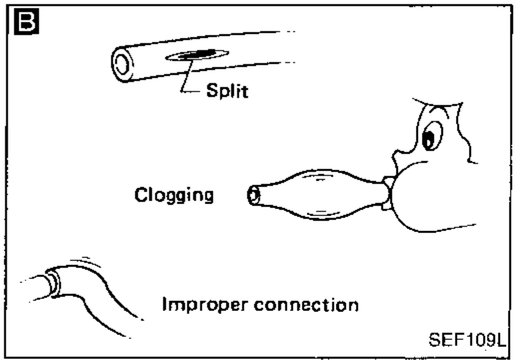
1. Start engine and warm it up sufficiently.
2. Rev engine to about 2,000 - 3,000 rpm.
3. Disconnect vacuum hose to EGR valve.
4. Make sure that vacuum exists.
   Vacuum should exist.

OK → CHECK COMPONENT (EGR valve). Refer to "COMPONENT INSPECTION", EC-215.

NG → Replace EGR valve.

NG ↓

B

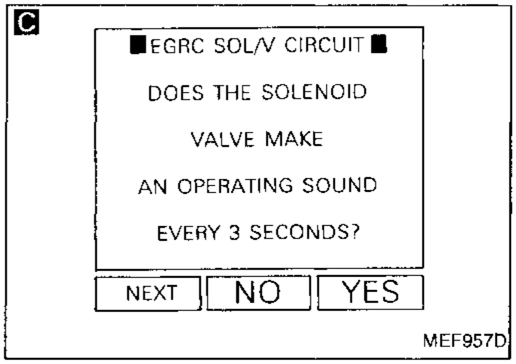


CHECK VACUUM HOSE.
Check vacuum hose for clogging, cracks or improper connection.

NG → Repair it.

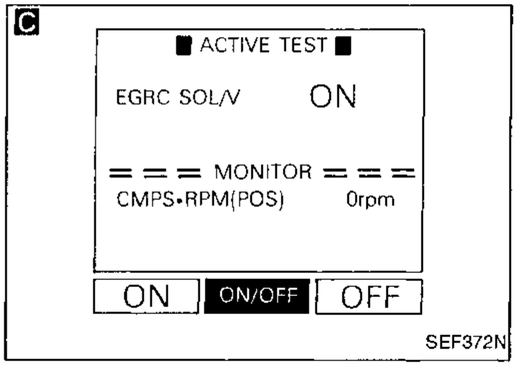
OK ↓

C



■EGRC SOL/V CIRCUIT■

DOES THE SOLENOID VALVE MAKE AN OPERATING SOUND EVERY 3 SECONDS?



■ ACTIVE TEST ■

EGRC SOL/V ON

=== MONITOR ===

CMPS•RPM(POS) 0rpm

CHECK COMPONENT
(EGRC-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 EGRC-solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.

OR

1. Turn ignition switch "ON".
2. When disconnecting and reconnecting the solenoid valve harness connector, make sure that the solenoid valve makes operating sound. (The DTC or the 1st trip DTC for the solenoid valve will be displayed, however, ignore it.)

NG → Repair or replace EGRC-solenoid valve or repair circuit.

OK ↓

Ⓐ

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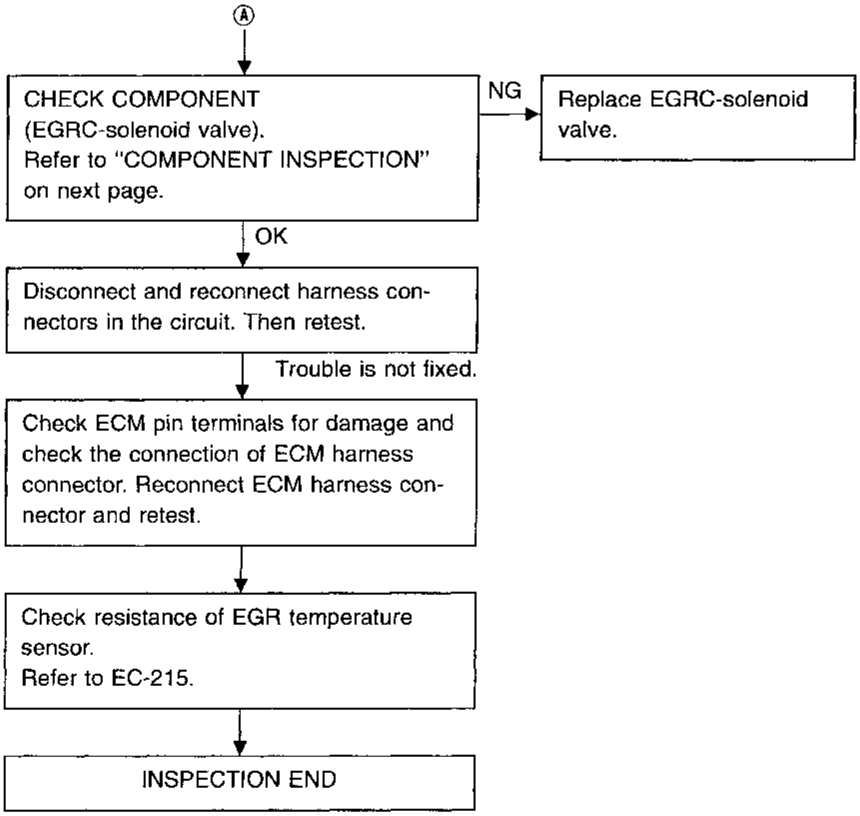
EGR Function (DTC: 0302) (Cont'd)



CHECK COMPONENT (EGRC-solenoid valve).
Refer to "COMPONENT INSPECTION" on next page.

Replace EGRC-solenoid valve.

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

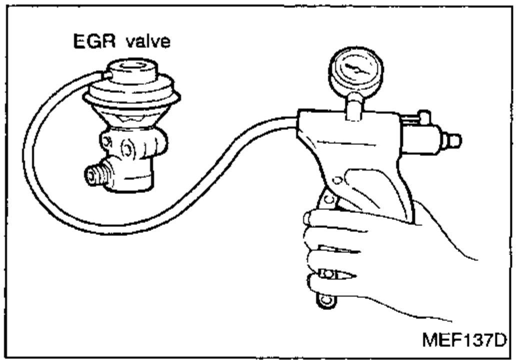
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Check resistance of EGR temperature sensor.
Refer to EC-215.

INSPECTION END

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

COMPONENT INSPECTION

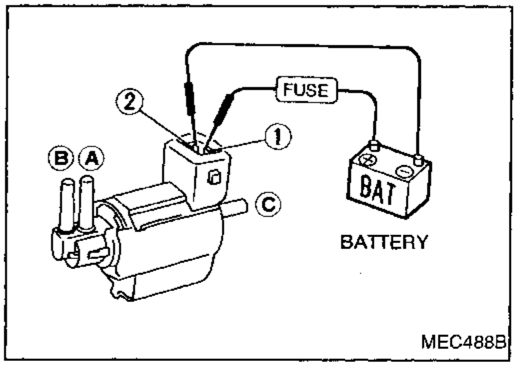


EGR valve

Apply vacuum to EGR valve vacuum port with a hand vacuum pump.

EGR valve spring should lift.

If NG, replace EGR valve.

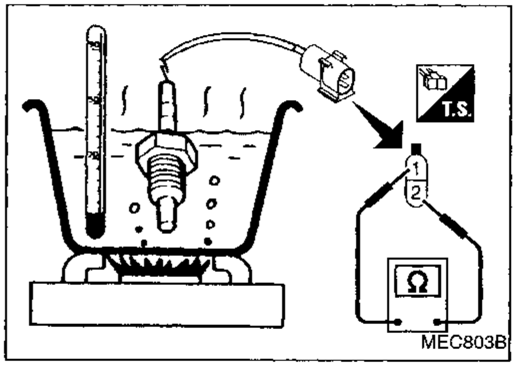


EGRC-solenoid valve

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 the solenoid valve.

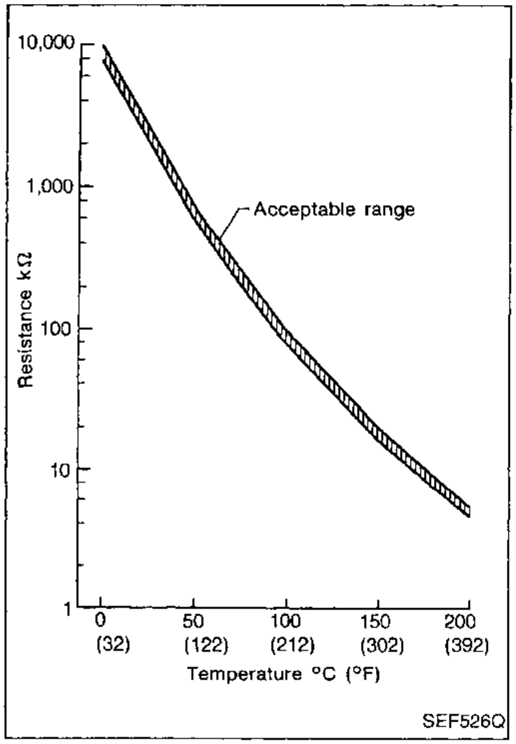


EGR temperature sensor

Check resistance as shown in the figure.
⟨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.



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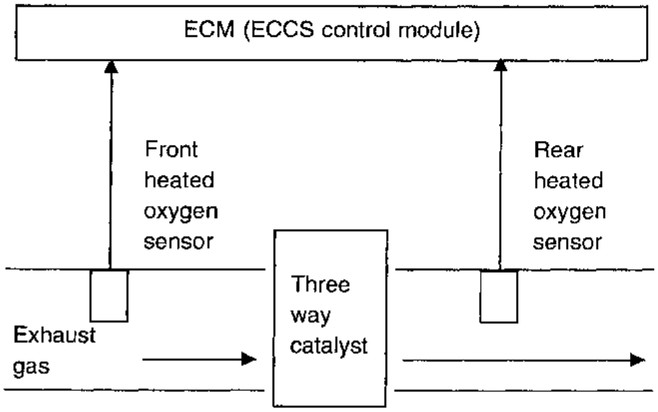
Three Way Catalyst Function (DTC: 0702, 0703)

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.

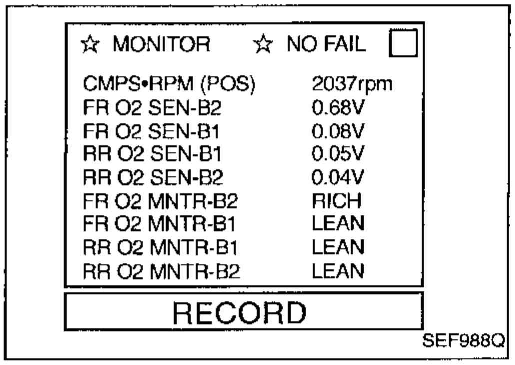
When the frequency ratio of front and rear heated oxygen sensors approaches a specified limit value, the three way catalyst malfunction is diagnosed.

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 1st trip DTC might not be confirmed.

Three Way Catalyst Function (DTC: 0702, 0703) (Cont'd)



```
☆ MONITOR     ☆ NO FAIL  ☐
CMPS•RPM (POS)     2037rpm
FR O2 SEN-B2       0.68V
FR O2 SEN-B1       0.08V
RR O2 SEN-B1       0.05V
RR O2 SEN-B2       0.04V
FR O2 MNTR-B2      RICH
FR O2 MNTR-B1      LEAN
RR O2 MNTR-B1      LEAN
RR O2 MNTR-B2      LEAN
RECORD
```

SEF988Q

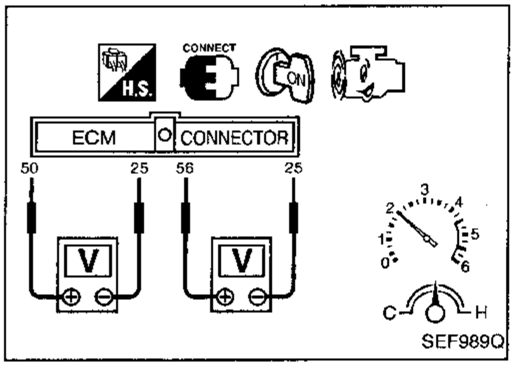
1) Start engine and warm it up sufficiently.
2) Set "MANU TRIG" and "HI SPEED", then select "FR O2 SEN-B1", "FR O2 SEN-B2", "RR O2 SEN-B1", "RR O2 SEN-B2", "FR O2 MNTR-B2", "FR O2 MNTR-B1", "RR O2 MNTR-B1", "RR O2 MNTR-B2" in "DATA MONITOR" mode with CONSULT.
3) Touch "RECORD" on CONSULT screen with 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 =

$$\frac{\textbf{Rear heated oxygen sensor switching frequency}}{\textbf{Front heated oxygen sensor switching frequency}}$$

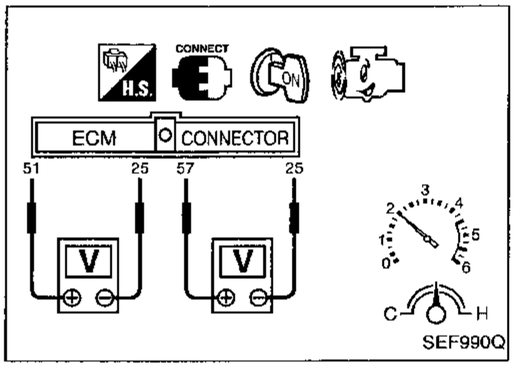
This ratio should be less than 0.7.
If the ratio is greater than above, the three way catalyst is not operating properly.

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-136 or EC-153.)



SEF989Q

OR



SEF990Q

1) Start engine and warm it up sufficiently.
2) Set voltmeters probes between ECM terminals ㊿ [front heated oxygen sensor (right bank) signal], (51) [front heated oxygen sensor (left bank) signal] and ㉕ (engine ground), and ECM terminals (56) [rear heated oxygen sensor (right bank) signal], (57) [rear heated oxygen sensor (left bank) signal] and ㉕ (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 (56) and ㉕, or (57) and ㉕ is very less than that of ECM terminals ㊿ and ㉕, or (51) and ㉕.

Switching frequency ratio =

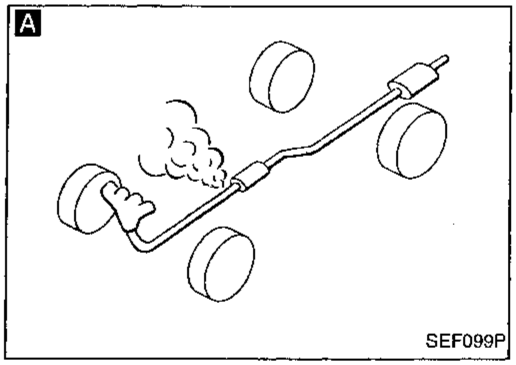
$$\frac{\textbf{Rear heated oxygen sensor voltage switching frequency}}{\textbf{Front heated oxygen sensor voltage switching frequency}}$$

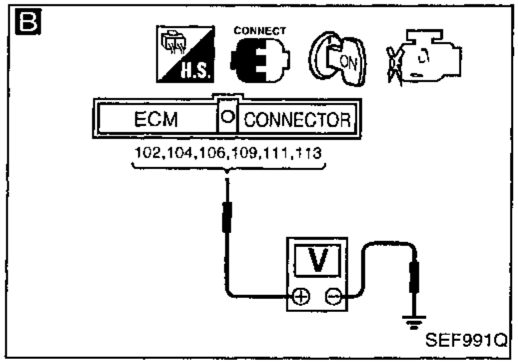
This ratio should be less than 0.7.
If the ratio is greater than above, it means three way catalyst does not operate properly.

Note: If the voltage at terminal ㊿ or (51) 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-136 or EC-153.)

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 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

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 INJECTORS.**
1. Refer to WIRING DIAGRAM for Injectors, EC-289.
2. Turn ignition switch "ON".
3. Check voltage between ECM terminals (102), (104), (106), (109), (111) or (113) and ground with CONSULT or tester.
Battery voltage should exist.

NG → Perform TROUBLE DIAGNOSIS FOR NON-DETECTABLE ITEMS, "Injectors", EC-289.
Repair harness or connectors.

↓ OK

1. Turn ignition switch "OFF".
2. Remove injector assembly.
Refer to EC-24.
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 injectors from which fuel is dripping.

↓ Does not drip.

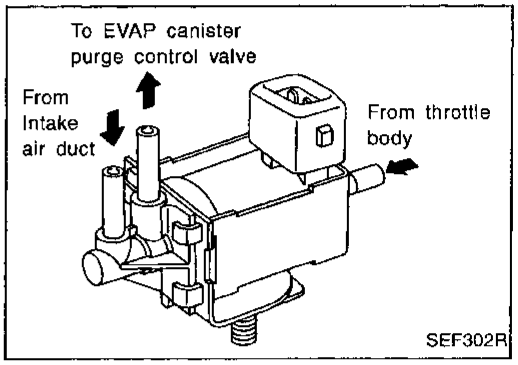
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

Replace three way catalyst.

↓

INSPECTION END

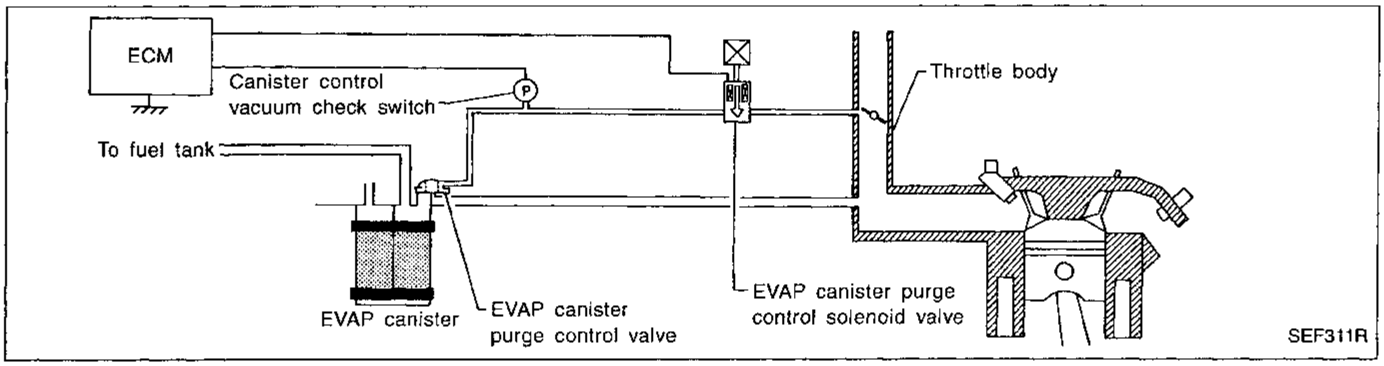


Evaporative Emission (EVAP) Canister Purge Control Solenoid Valve (DTC: 0807)

COMPONENT DESCRIPTION

EVAP canister purge control solenoid valve

The EVAP canister purge control solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the vacuum signal (from the throttle body to the EVAP canister purge control valve) is cut.
When the ECM sends an OFF signal, the vacuum signal passes through the EVAP canister purge control solenoid valve. The signal then reaches the EVAP canister purge control valve.
The EVAP canister purge control solenoid valve is not used to control the engine system. It is used only for on board diagnosis.



Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0443 0807	A) An improper voltage signal is sent to ECM through EVAP canister purge control solenoid valve.	• Harness or connector (The EVAP canister purge control solenoid valve circuit is open or shorted.)
	B) The vacuum signal is not sent to EVAP canister purge control valve under the specified driving condition, even though EVAP canister purge control solenoid valve is OFF.	• Harness or connector (The EVAP canister purge control solenoid valve circuit is shorted.) • EVAP canister purge control solenoid valve • Mass air flow sensor • Throttle position sensor • Engine coolant temperature sensor • EGR valve • Intake air system (Intake air leaks) • Hoses • EVAP canister purge control valve (built into EVAP canister) • Canister control vacuum check switch
	C) The vacuum signal is sent to EVAP canister purge control valve even though EVAP canister purge control solenoid valve is ON.	• Harness or connector (The EVAP canister purge control solenoid valve circuit is open.) • EVAP canister purge control solenoid valve • Hoses (Hoses are connected incorrectly.) • Canister control vacuum check switch

Evaporative Emission (EVAP) Canister Purge Control Solenoid Valve (DTC: 0807) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Perform "Procedure for malfunction A" first. If the 1st trip DTC cannot be confirmed, perform "Procedure for malfunction B". If there is no problem on "Procedure for malfunction B", perform "OVERALL FUNCTION CHECK", "Procedure for malfunction C".

Procedure for malfunction A

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Wait at least 6 seconds.

OR

GST
1) Turn ignition switch "ON" and wait at least 6 seconds.
2) Select "MODE 7" with GST.

OR

NO TOOLS
1) Turn ignition switch "ON" and wait at least 6 seconds.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

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" and select "DATA MONITOR" mode with CONSULT.
4) Start engine and run it for at least 11 seconds at idle speed.
5) Maintain the following conditions for at least 6 seconds.
Air conditioner switch: ON
Steering wheel: Fully turned
Headlamp switch: ON
Rear window defogger switch: ON
Engine speed: 2,900 - 3,300 rpm
Gear position: "P" or "N"

OR

GST
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 "MODE 1" with GST.
4) Start engine and run it for at least 11 seconds at idle speed.
5) Maintain the following conditions for at least 6 seconds.
Air conditioner switch: ON
Steering wheel: Fully turned
Headlamp switch: ON
Rear window defogger switch: ON
Engine speed: 2,900 - 3,300 rpm
Gear position: "P" or "N"
6) Select "MODE 7" with GST.

OR

NO TOOLS
1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and run it for at least 11 seconds at idle speed.
4) Maintain the following conditions for at least 6 seconds.
Air conditioner switch: ON

Evaporative Emission (EVAP) Canister Purge Control Solenoid Valve (DTC: 0807) (Cont'd)

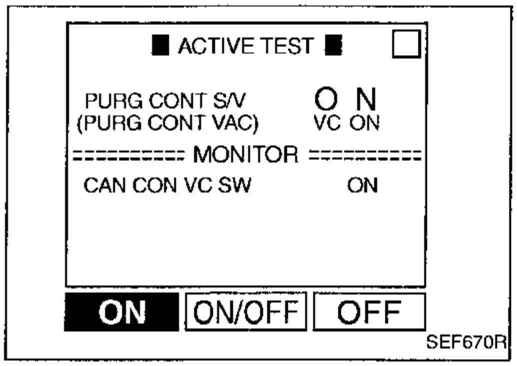
Steering wheel: Fully turned
Headlamp switch: ON
Rear window defogger switch: ON
Engine speed: 2,900 - 3,300 rpm
Gear position: "P" or "N"

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

OVERALL FUNCTION CHECK

Use this procedure to check the overall monitoring function of the EVAP canister purge control solenoid valve. During this check, a 1st trip DTC might not be confirmed.

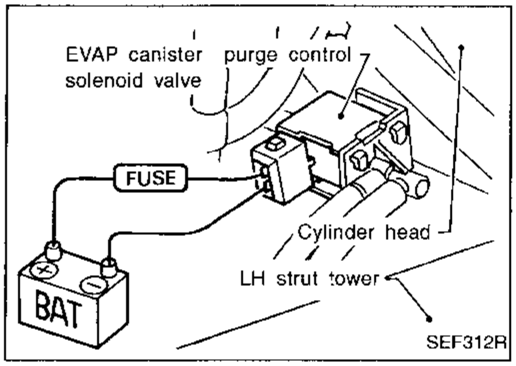
Procedure for malfunction C


■ ACTIVE TEST ■ ☐
PURG CONT S/V ON
(PURG CONT VAC) VC ON
========== MONITOR ==========
CAN CON VC SW ON

SEF670R

1) Start engine and warm it up sufficiently.
2) Select "PURG CONT S/V" in "ACTIVE TEST" mode, and select "CAN CON VC SW" as the monitor item with CONSULT.
3) Touch "ON" and check "CAN CON VC SW" is now "ON".

OR



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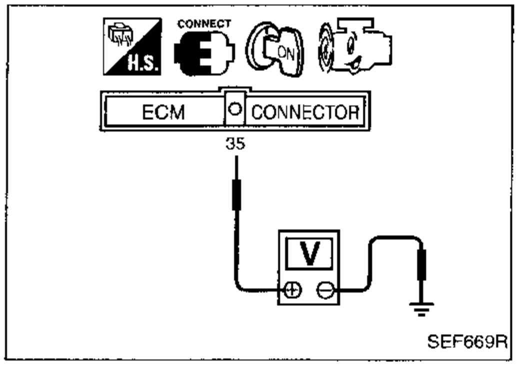
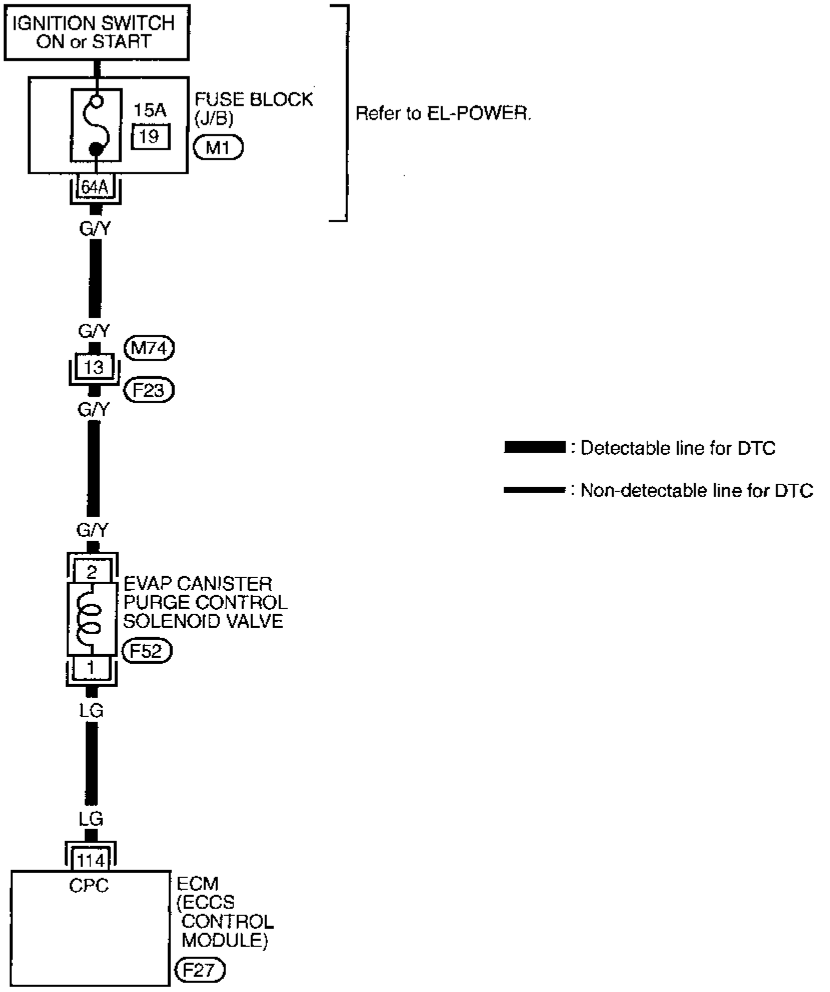


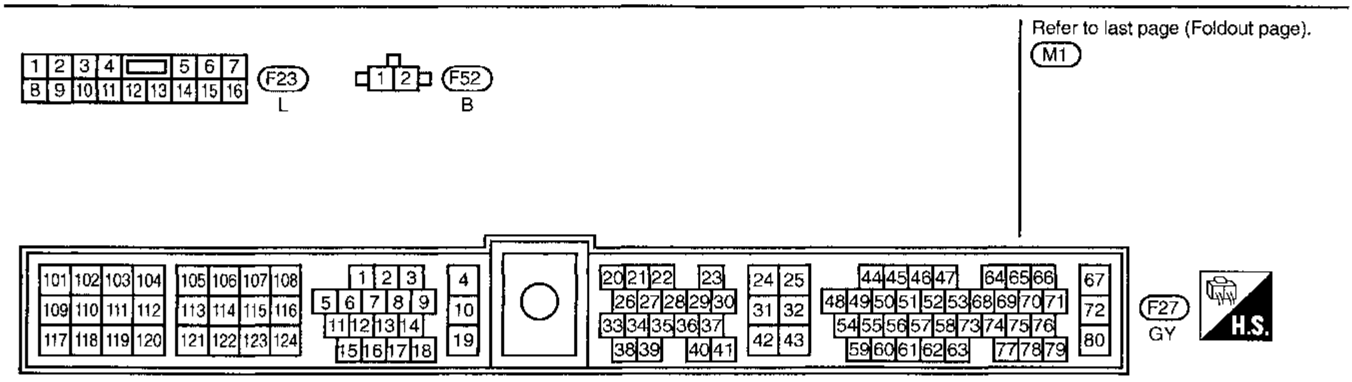
SEF669R

1) Start engine.
2) Supply battery voltage between EVAP canister purge control solenoid valve terminals ① and ②.
3) Check voltage between ECM terminal ㉟ and engine ground.
Voltage: Battery voltage

Evaporative Emission (EVAP) Canister Purge Control Solenoid Valve (DTC: 0807) (Cont'd)

EC-CANI/V-01





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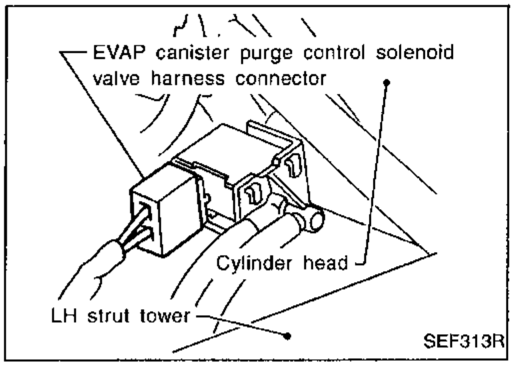
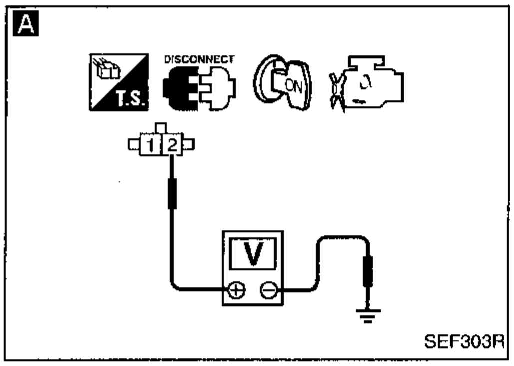
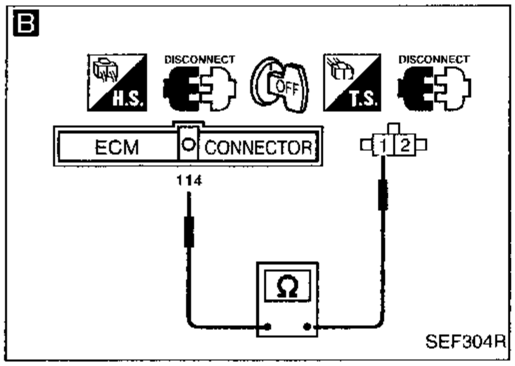
Evaporative Emission (EVAP) Canister Purge Control Solenoid Valve (DTC: 0807) (Cont'd)







DIAGNOSTIC PROCEDURE

If the trouble is duplicated after "Procedure for malfunction A", perform "Procedure A" below. If the trouble is duplicated after "Procedure for malfunction B", perform "Procedure B" on next page. If the trouble is duplicated after "Procedure for malfunction C", perform "Procedure C" on EC-226.

Procedure A

INSPECTION START

↓

A

CHECK POWER SUPPLY.

1. Turn ignition switch "OFF".
2. Disconnect EVAP canister purge control solenoid valve harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ② and engine ground with CONSULT or tester.
   Voltage: Battery voltage

NG → Check the following.

- Harness connectors (F23), (M74)
- Harness connector (M1)
- 15A fuse
- Harness for open or short between EVAP canister purge control solenoid valve 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 (114) and terminal ①.
   Continuity should exist.
   If OK, check harness for short.

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

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Evaporative Emission (EVAP) Canister Purge Control Solenoid Valve (DTC: 0807) (Cont'd)

Procedure B

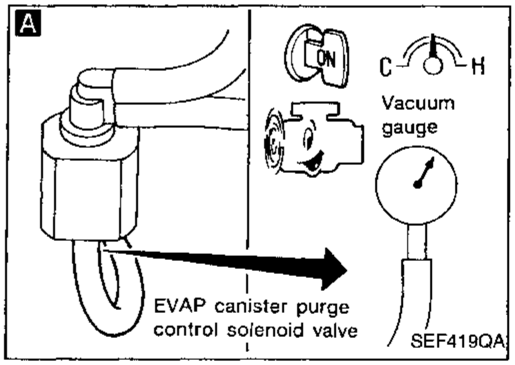
INSPECTION START

↓

CHECK INTAKE SYSTEM.
Check intake system for air leaks.

NG → Repair intake system.

↓ OK



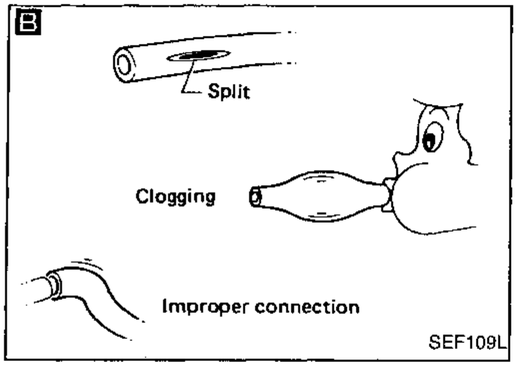
A

CHECK VACUUM SOURCE TO EVAP CANISTER PURGE CONTROL SOLENOID VALVE.

1. Start engine and warm it up sufficiently.
2. Disconnect vacuum hose connected to the solenoid valve.
3. Check the vacuum pressure with vacuum gauge with engine at 4,000 rpm under no load.
   Vacuum pressure:
   Less than –14.7 kPa
   (–110 mmHg, –4.33 inHg)

NG → Repair vacuum hose.

↓ OK



B

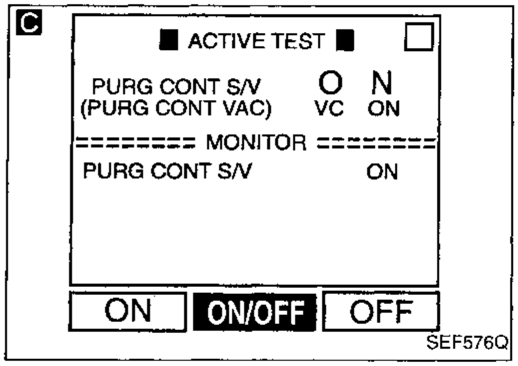
CHECK HOSES BETWEEN EVAP CANISTER PURGE CONTROL SOLENOID VALVE, CANISTER CONTROL VACUUM CHECK SWITCH AND EVAP CANISTER.

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

NG → Repair or reconnect the hose.

OK (without 📱) → Ⓐ

OK (with 📱) → C



■ ACTIVE TEST ■ ☐

PURG CONT S/V O N
(PURG CONT VAC) VC ON

======== MONITOR ========

PURG CONT S/V ON

C

📱 **CHECK POWER SUPPLY AND OUTPUT SIGNAL CIRCUIT.**

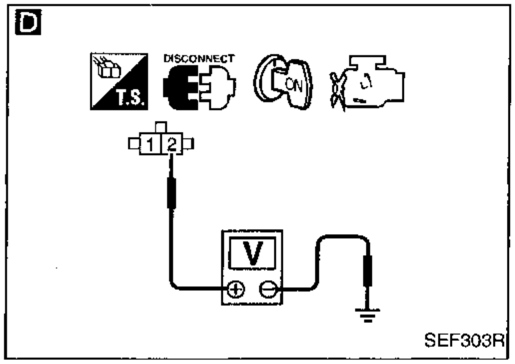
1. Turn ignition switch "ON".
2. Select "PURG CONT S/V" in "ACTIVE TEST" mode with CONSULT.
3. Touch "ON" and "OFF" alternately.
4. Check that operating sound is emitted.

NG → Ⓐ

↓ OK

Ⓑ

Evaporative Emission (EVAP) Canister Purge Control Solenoid Valve (DTC: 0807) (Cont'd)



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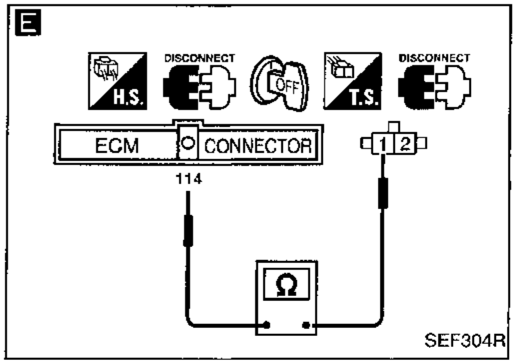

SEF304R

Ⓐ

D

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect EVAP canister purge control solenoid valve harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ② and engine ground with CONSULT or tester.
   Voltage: Battery voltage
   If OK, check harness for short.

NG → Check the following.
- Harness connectors (M74), (F23)
- Harness connector (M1)
- 15A fuse
- Harness for open or short between EVAP canister purge control solenoid valve and fuse

If NG, repair harness or connectors.

OK ↓

E

CHECK OUTPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal (114) and terminal ① .
   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", "TROUBLE DIAGNOSIS FOR DTC P0100", EC-115.

NG → Replace mass air flow sensor.

OK ↓

CHECK COMPONENT
(Throttle position sensor).
Refer to "COMPONENT INSPECTION", "TROUBLE DIAGNOSIS FOR DTC P0120", EC-129.

NG → Replace throttle position sensor.

OK ↓

CHECK COMPONENT
(Engine coolant temperature sensor).
Refer to "COMPONENT INSPECTION", "TROUBLE DIAGNOSIS FOR DTC P0115", EC-124.

NG → Replace engine coolant temperature sensor.

OK ↓

Ⓒ

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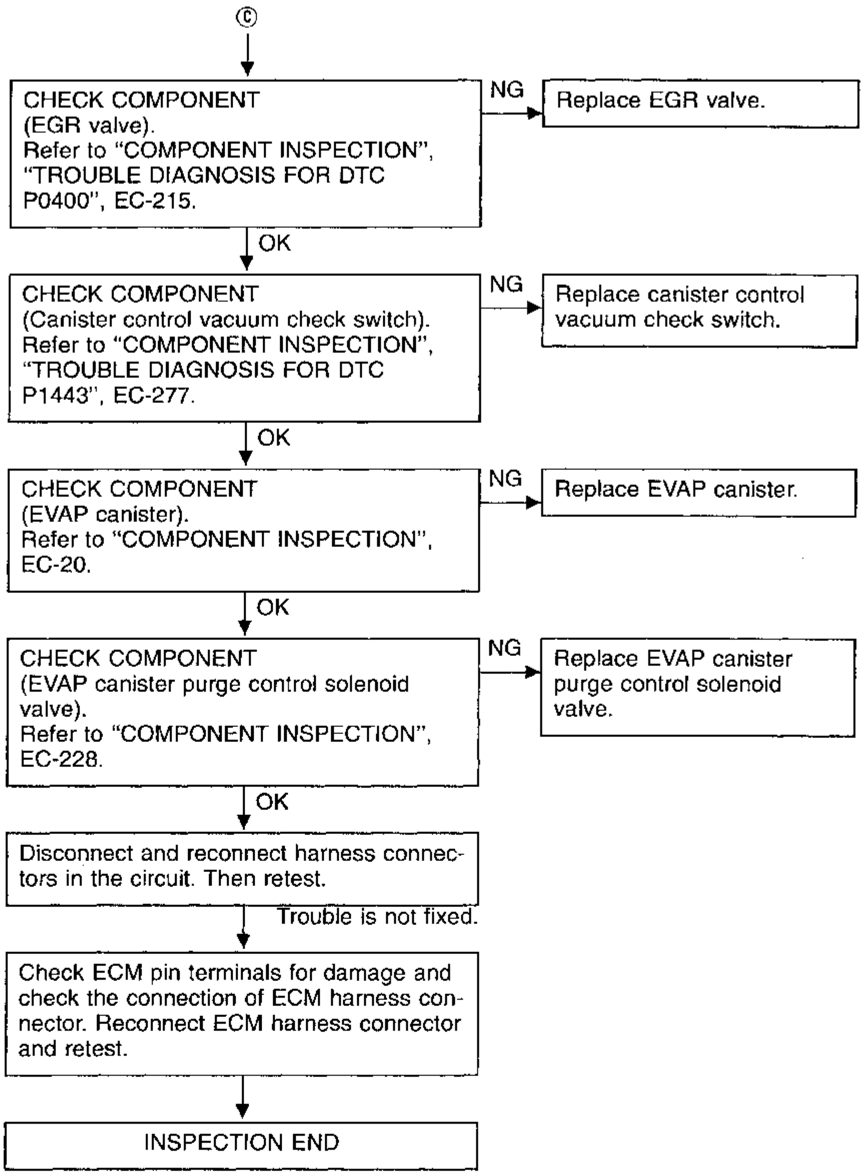
Evaporative Emission (EVAP) Canister Purge Control Solenoid Valve (DTC: 0807) (Cont'd)



CHECK COMPONENT
(EGR valve).
Refer to "COMPONENT INSPECTION", "TROUBLE DIAGNOSIS FOR DTC P0400", EC-215.

Replace EGR valve.

CHECK COMPONENT
(Canister control vacuum check switch).
Refer to "COMPONENT INSPECTION", "TROUBLE DIAGNOSIS FOR DTC P1443", EC-277.

Replace canister control vacuum check switch.

CHECK COMPONENT
(EVAP canister).
Refer to "COMPONENT INSPECTION", EC-20.

Replace EVAP canister.

CHECK COMPONENT
(EVAP canister purge control solenoid valve).
Refer to "COMPONENT INSPECTION", EC-228.

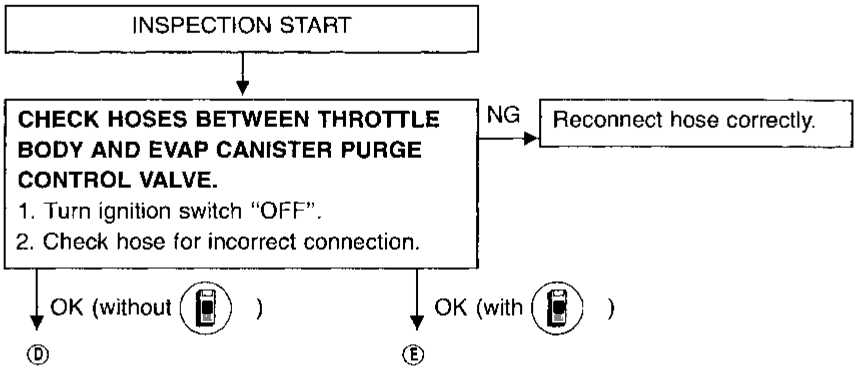
Replace EVAP canister purge control solenoid valve.

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

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

INSPECTION END

Procedure C

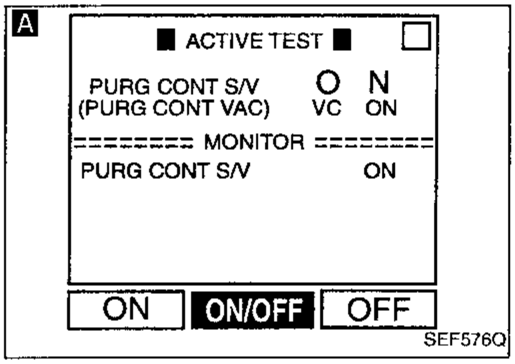


INSPECTION START

CHECK HOSES BETWEEN THROTTLE BODY AND EVAP CANISTER PURGE CONTROL VALVE.
1. Turn ignition switch "OFF".
2. Check hose for incorrect connection.

Reconnect hose correctly.

Evaporative Emission (EVAP) Canister Purge Control Solenoid Valve (DTC: 0807) (Cont'd)

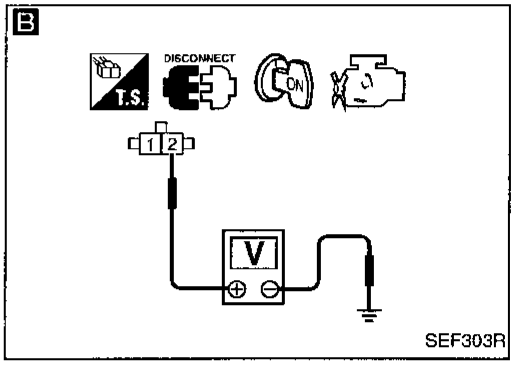

A

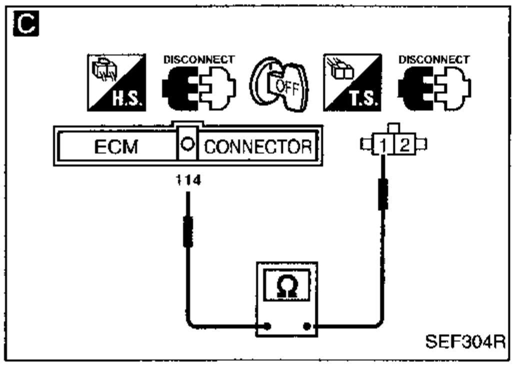
■ ACTIVE TEST ■ ☐

PURG CONT S/V (PURG CONT VAC)	O VC	N ON

======== MONITOR ========

PURG CONT S/V ON





Ⓓ Ⓔ

A

CHECK POWER SUPPLY AND OUTPUT SIGNAL CIRCUIT.

1. Turn ignition switch "ON".
2. Select "PURG CONT S/V" in "ACTIVE TEST" mode with CONSULT.
3. Touch "ON" and "OFF" alternately.
4. Check that operating sound is emitted.

NG → Ⓓ

B

CHECK POWER SUPPLY.

1. Turn ignition switch "OFF".
2. Disconnect EVAP canister purge control solenoid valve harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ② and engine ground with CONSULT or tester.

Voltage: Battery voltage

If OK, check harness for short.

NG → Check the following.

- Harness connectors (M74), (F23)
- Harness connector (M1)
- 15A fuse
- Harness for open or short between EVAP canister purge control solenoid valve and fuse

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 ECM terminal (114) and terminal ①.

Continuity should exist.

If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT (Canister control vacuum check switch). Refer to "COMPONENT INSPECTION", "TROUBLE DIAGNOSIS FOR DTC P1443", EC-277.

NG → Replace canister control vacuum check switch.

OK ↓

CHECK COMPONENT (EVAP canister purge control solenoid valve). Refer to "COMPONENT INSPECTION" on next page.

NG → Replace EVAP canister purge control solenoid valve.

OK ↓

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

↓ Trouble is not fixed.

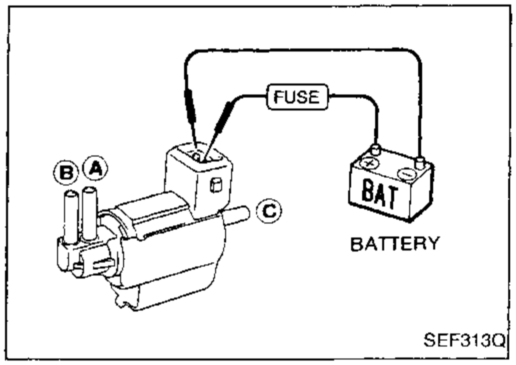
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

Evaporative Emission (EVAP) Canister Purge Control Solenoid Valve (DTC: 0807) (Cont'd)

COMPONENT INSPECTION

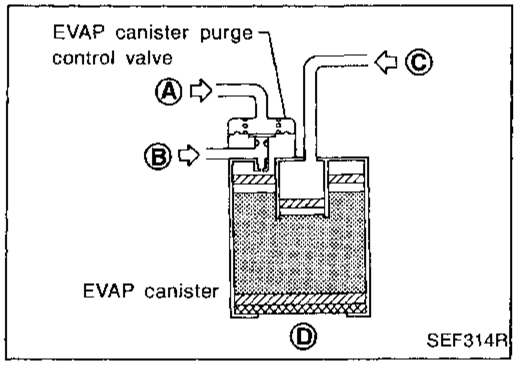


EVAP canister purge control solenoid valve

Check air passage continuity.

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

If NG, replace solenoid valve.

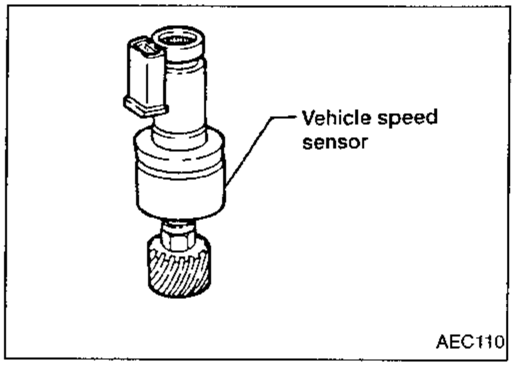


EVAP canister purge control valve (built into EVAP canister)

Check EVAP canister purge control valve as follows:

1. Blow air in port Ⓐ and check that there is no leakage.
2.

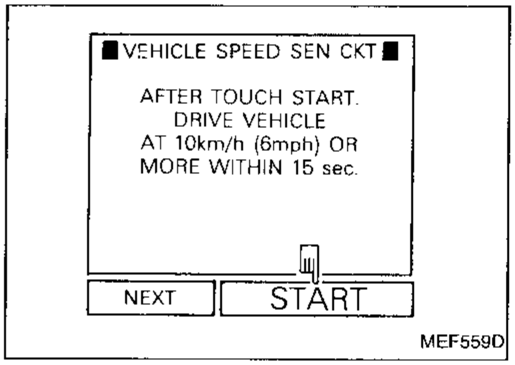
- Apply vacuum to port Ⓐ. [Approximately −13.3 to −20.0 kPa (−100 to −150 mmHg, −3.94 to −5.91 inHg)]
- Cover port Ⓓ by hand.
- Blow air in port Ⓒ and check that if flows freely out of port Ⓑ.



Vehicle Speed Sensor (VSS) (DTC: 0104)

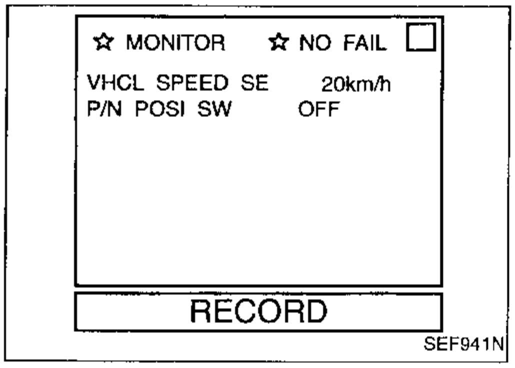
The vehicle speed sensor is installed in the transmission. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P0500 0104	• The almost 0 km/h (0 MPH) signal from the vehicle speed sensor is sent to ECM even when the vehicle is driving.	• Harness or connector (The vehicle speed sensor circuit is open or shorted.) • Vehicle speed sensor



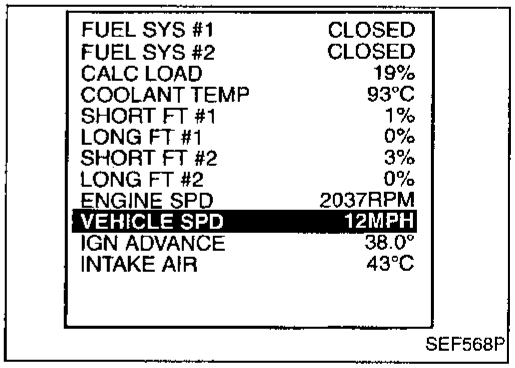
■VEHICLE SPEED SEN CKT■

AFTER TOUCH START.
DRIVE VEHICLE
AT 10km/h (6mph) OR
MORE WITHIN 15 sec.



☆ MONITOR ☆ NO FAIL ☐

```
VHCL SPEED SE     20km/h
P/N POSI SW       OFF
```



```
FUEL SYS #1        CLOSED
FUEL SYS #2        CLOSED
CALC LOAD             19%
COOLANT TEMP         93°C
SHORT FT #1            1%
LONG FT #1             0%
SHORT FT #2            3%
LONG FT #2             0%
ENGINE SPD        2037RPM
VEHICLE SPD         12MPH
IGN ADVANCE         38.0°
INTAKE AIR           43°C
```

OVERALL FUNCTION CHECK

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

1) Jack up drive wheels.

2) Start engine.
3) Perform "VEHICLE SPEED SEN CKT" in "FUNCTION TEST" mode with CONSULT.

OR

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

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

GI
MA
EM
LC
EC
FE
AT
PD
FA
RA
BR
ST
RS
BT
HA
EL
IDX

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 conditions.

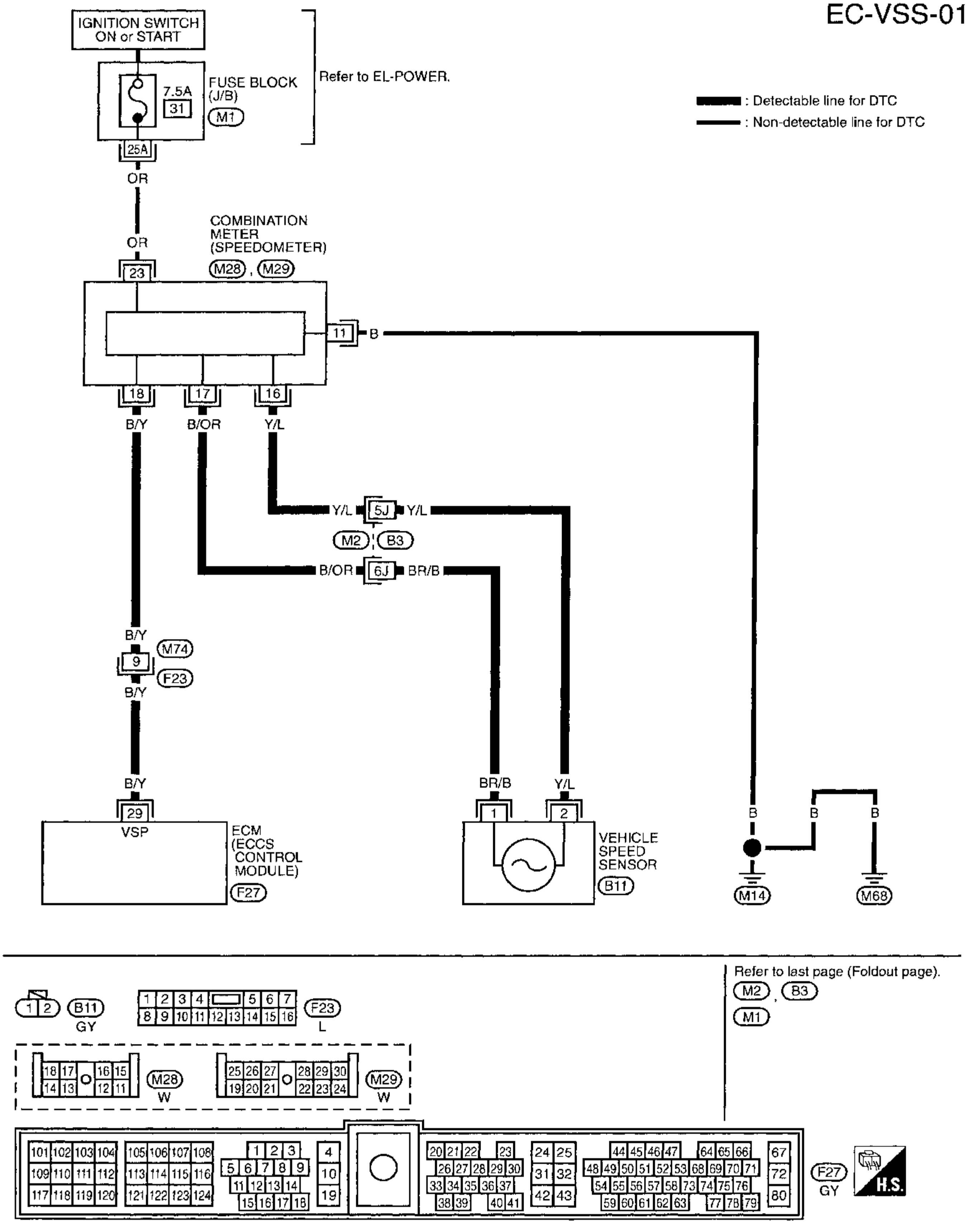
   Engine speed : 1,600 - 2,400 rpm
   Intake manifold vacuum: –66.7 to –53.3 kPa (–500 to –400 mmHg, –19.69 to –15.75 inHg)
   Gear position : Suitable position (except "N" or "P" position)

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 if a 1st trip DTC is not detected, perform the above test drive at least one more time.

Vehicle Speed Sensor (VSS) (DTC: 0104) (Cont'd)

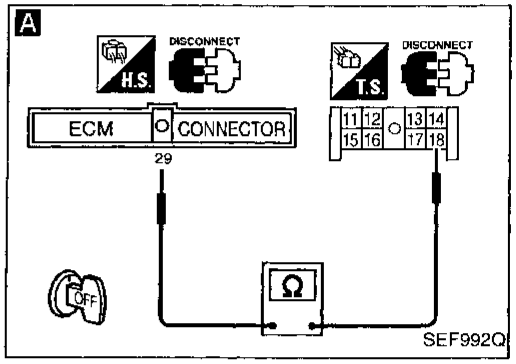
EC-VSS-01



TEC138

Vehicle Speed Sensor (VSS) (DTC: 0104) (Cont'd)

DIAGNOSTIC PROCEDURE



SEF992Q

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 ㉙ and terminal ⑱.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors F23, M74
- 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 M2, B3
- Harness for open or short between combination meter and vehicle speed sensor

If NG, repair harness or connectors.
- 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.

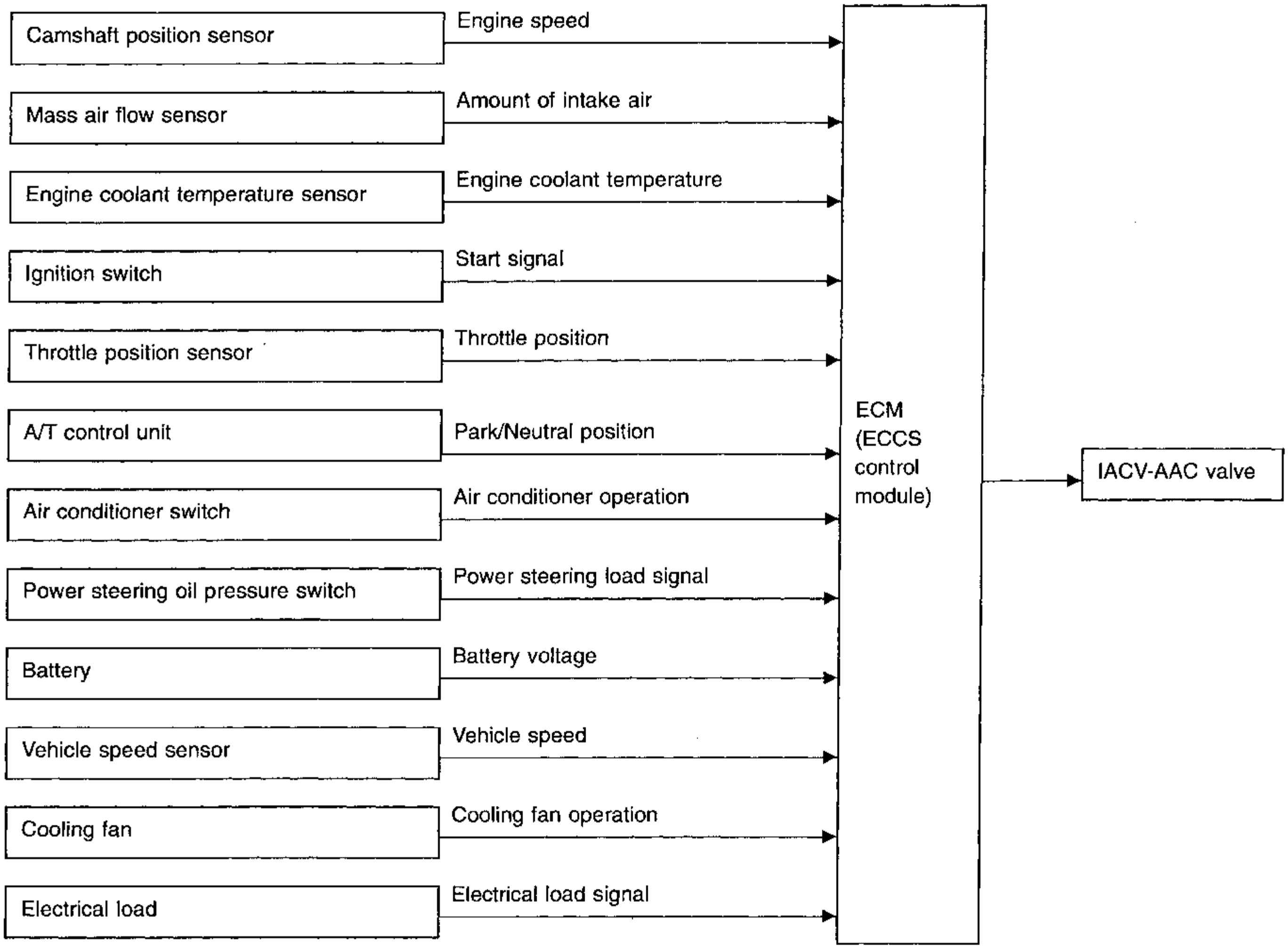
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

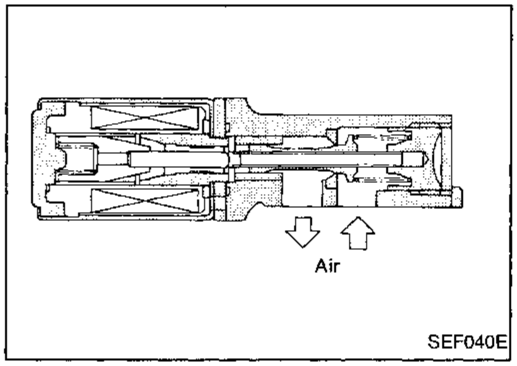
INSPECTION END

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 by-passes the throttle valve via IACV-AAC valve. The IACV-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the ON/OFF time of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warm up, deceleration, and engine load (air conditioner, power steering and cooling fan operation).



COMPONENT DESCRIPTION

IACV-ACC 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

Procedure for malfunction A

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

OR

GST

1) Turn ignition switch "ON" and wait at least 2 seconds.
2) Select "MODE 7" with GST.

OR

NO TOOLS

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

GST

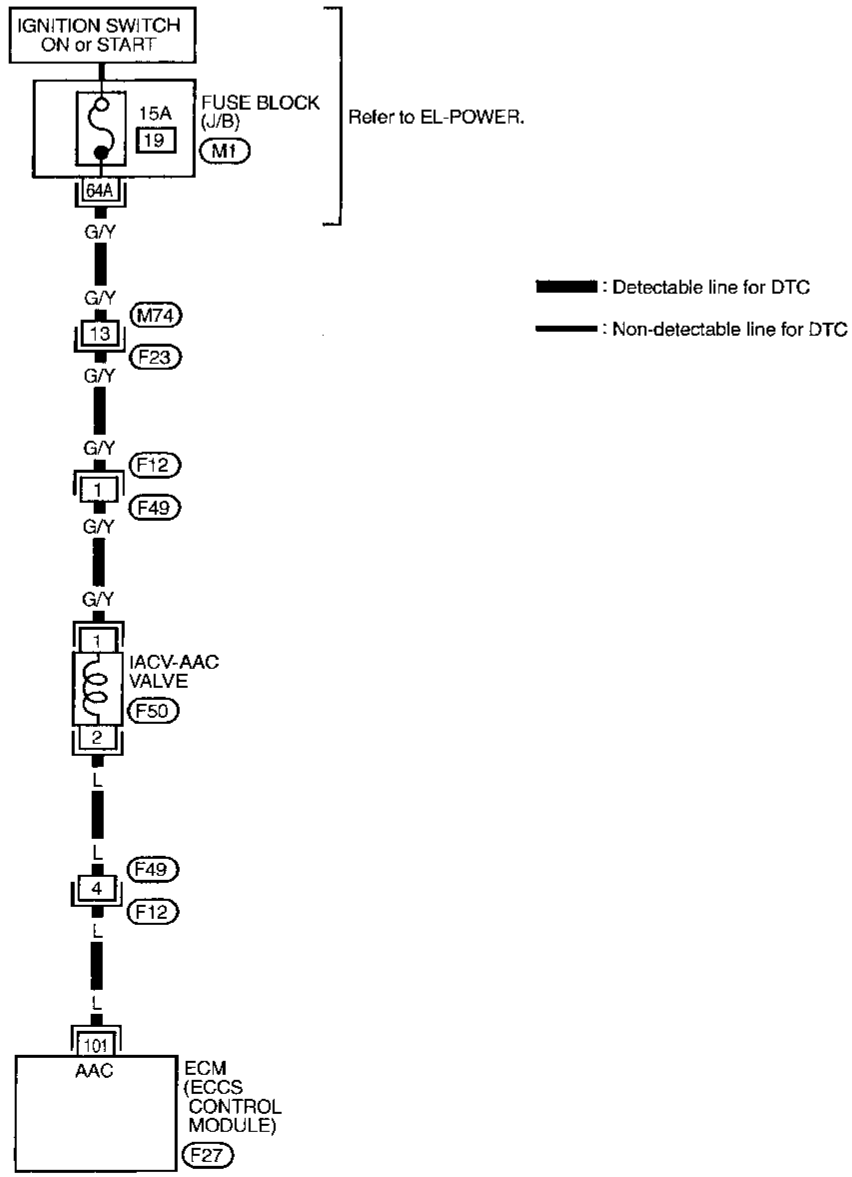
1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine again and run it for at least 1 minute at idle speed.
4) Select "MODE 7" with GST.

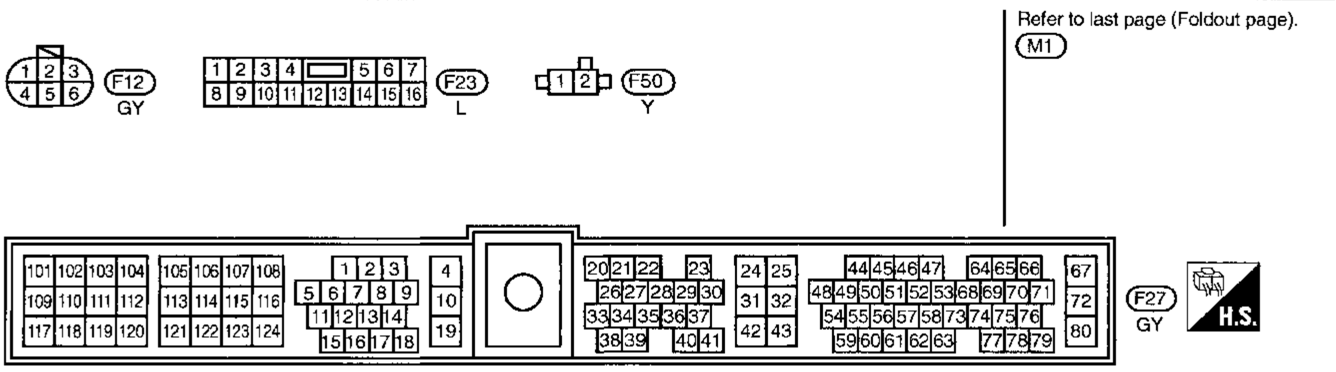
OR

NO TOOLS

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.

EC-AAC/V-01

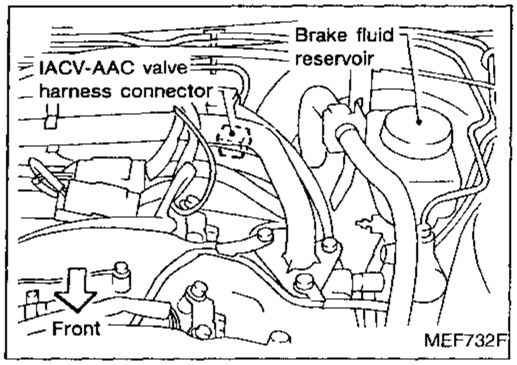


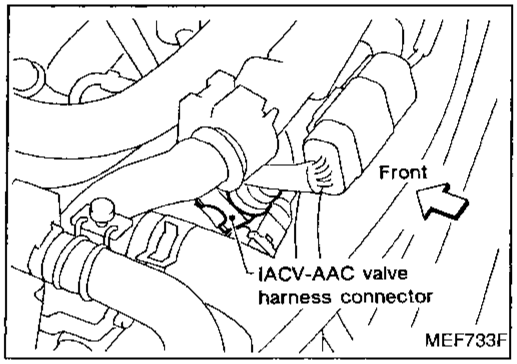


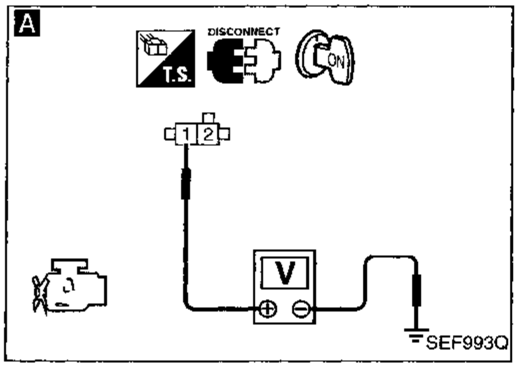
SEF700Q

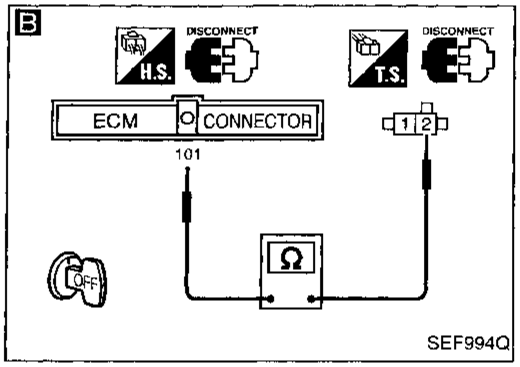
Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve (DTC: 0205) (Cont'd)

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 M74, F23
- Harness connectors F12, F49
- Harness connector M1
- 15A fuse
- Harness for open or short between IACV-AAC valve 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 101 and terminal ② .
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors F12, F49
- Harness for open or short between ECM and IACV-AAC valve

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT (IACV-AAC valve).
Refer to "COMPONENT INSPECTION" below.

NG → Replace IACV-AAC valve.

OK ↓

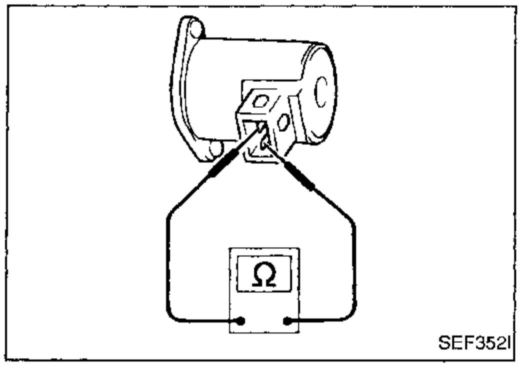
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ 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.

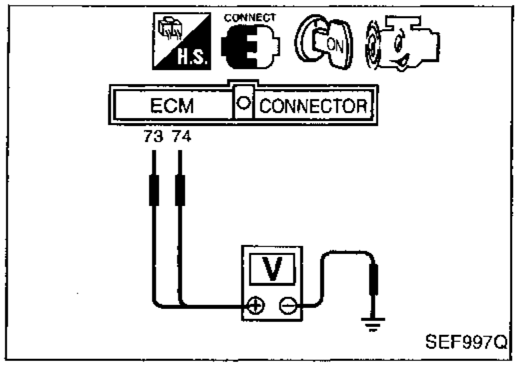
- Check IACV-AAC valve resistance.
  Resistance:
  Approximately 10Ω [at 25°C (77°F)]
- Check plunger for seizing or sticking.
- Check for broken spring.

A/T Control (DTC: P0600)

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 Items (Possible Cause)
P0600	• 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.) • A/T control unit

*: This DTC can be detected only by "DATA MONITOR (AUTO TRIG)" with CONSULT.



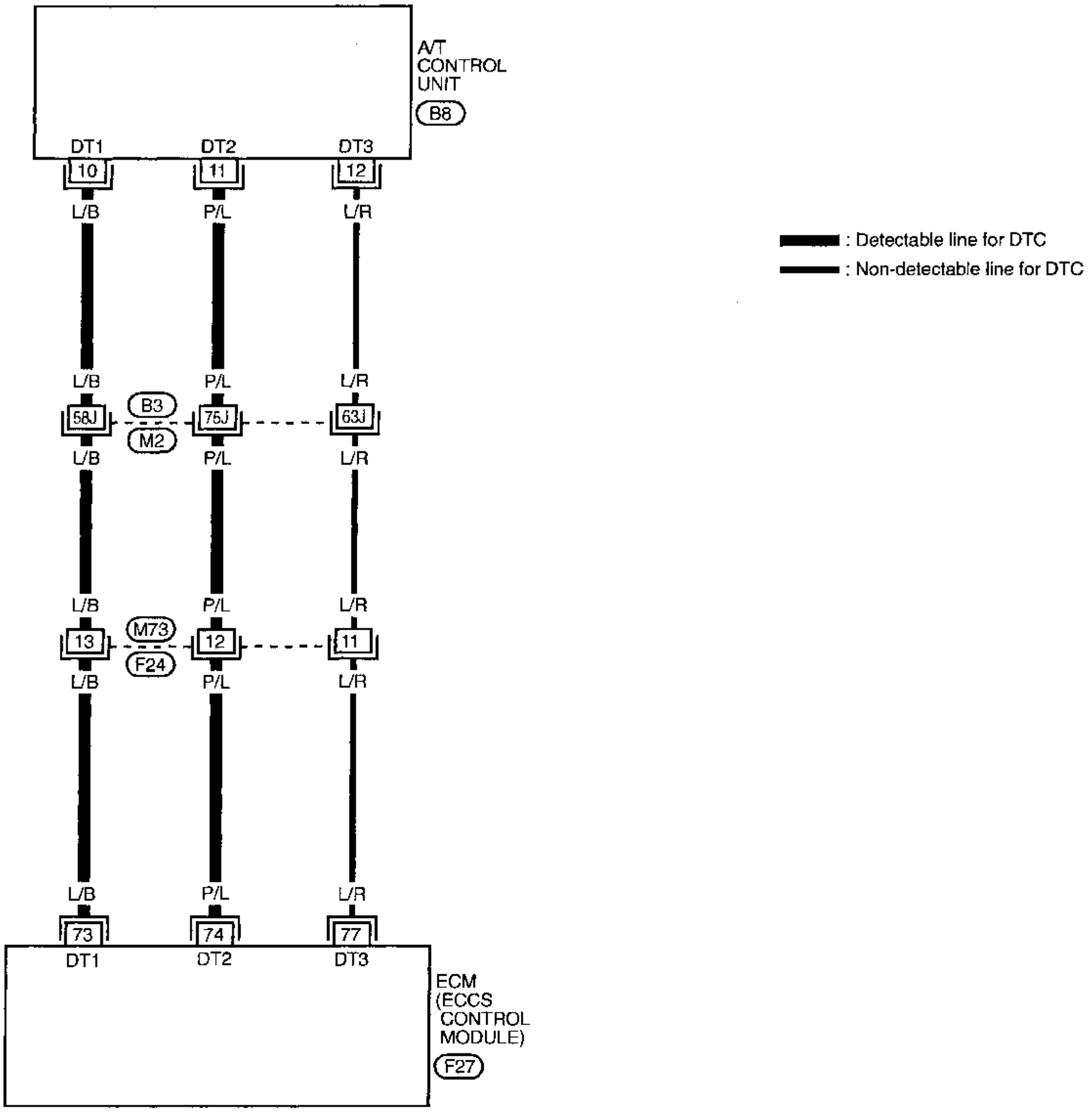
OVERALL FUNCTION CHECK

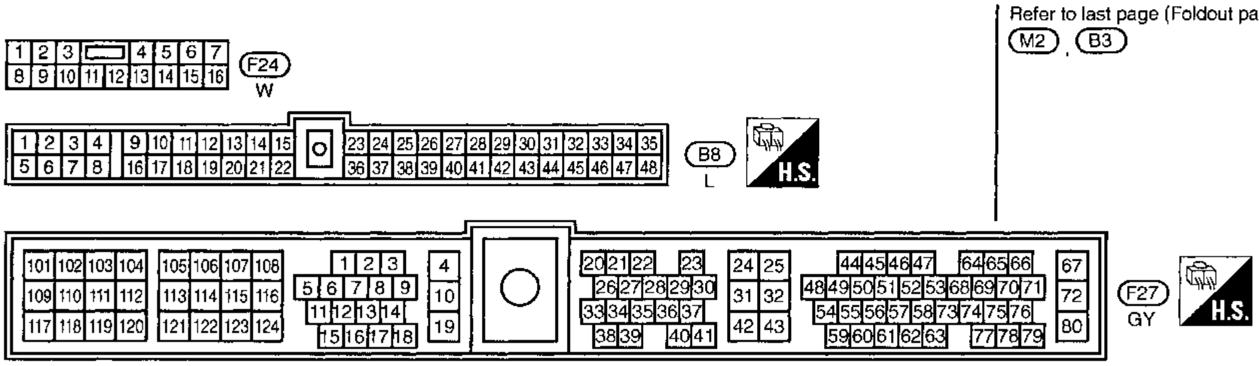
Use this procedure to check the overall function of the A/T control. During this check, a 1st trip DTC might not be confirmed.

1) Turn ignition switch "ON".
2) Start engine and let it idle.
3) Check voltage between
   ECM terminal ⑬ and ground.
   ECM terminal ⑭ and ground.
   Voltage: Approximately 7V

A/T Control (DTC: P0600) (Cont'd)

EC-AT/C-01



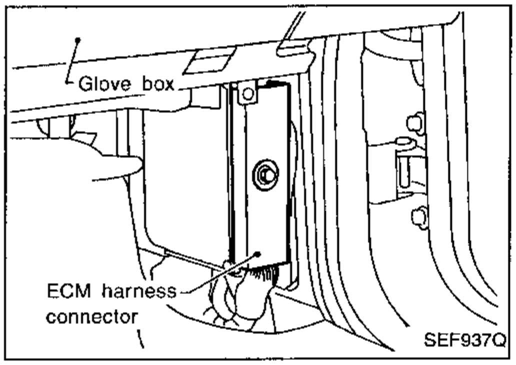


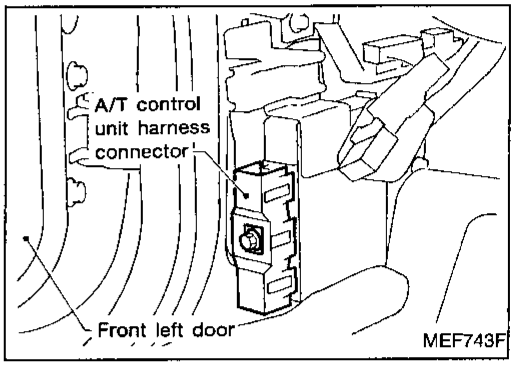
Refer to last page (Foldout page).
M2, B3

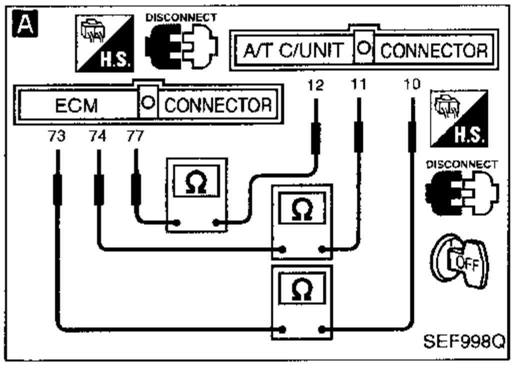
SEF702Q

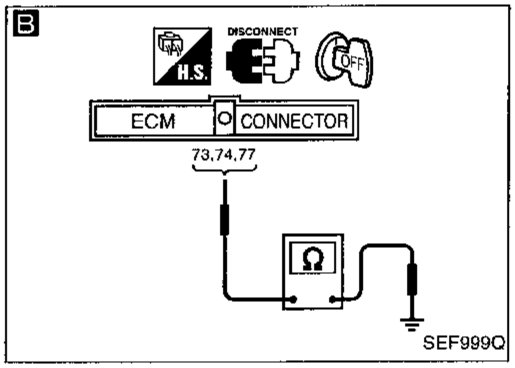
A/T Control (DTC: P0600) (Cont'd)

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 (73) and terminal ⑩, ECM terminal (74) and terminal ⑪, ECM terminal (77) and terminal ⑫.

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

NG → Check the following.
- Harness connectors F24, M73
- Harness connectors M2, B3
- 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 (73) and ground, ECM terminal (74) and ground, ECM terminal (77) and ground.
Continuity should not exist.
If OK, check harness for short.

NG → Repair harness or connectors.

↓ OK

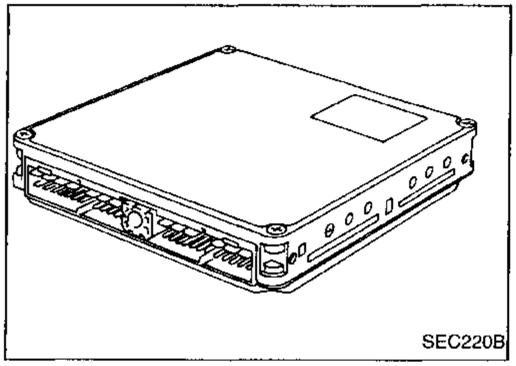
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

Check ECM and A/T control unit pin terminals for damage and check the connection of ECM and A/T control unit harness connectors. Reconnect ECM and A/T control unit harness connectors and retest.

↓

INSPECTION END



Engine Control Module (ECM)-ECCS Control Module (DTC: 0301)

The ECM consists of a microcomputer, diagnostic test mode selector, and connector 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) Start engine and wait at least 30 seconds.

OR

GST
1) Turn ignition switch "ON".
2) Select "Mode 7" with GST.
3) Start engine and wait at least 30 seconds.

OR

NO TOOLS
1) Turn ignition switch "ON".
2) Start engine and wait at least 30 seconds.
3) Turn ignition switch "OFF" and wait at least 5 seconds.
4) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

DIAGNOSTIC PROCEDURE

INSPECTION START

↓

1) Turn ignition switch "ON".
2) Select "SELF-DIAG RESULTS" mode with CONSULT.
3) Touch "ERASE".

OR

GST
1) Turn ignition switch "ON".
2) Select MODE 4 with GST.
3) Touch "ERASE".

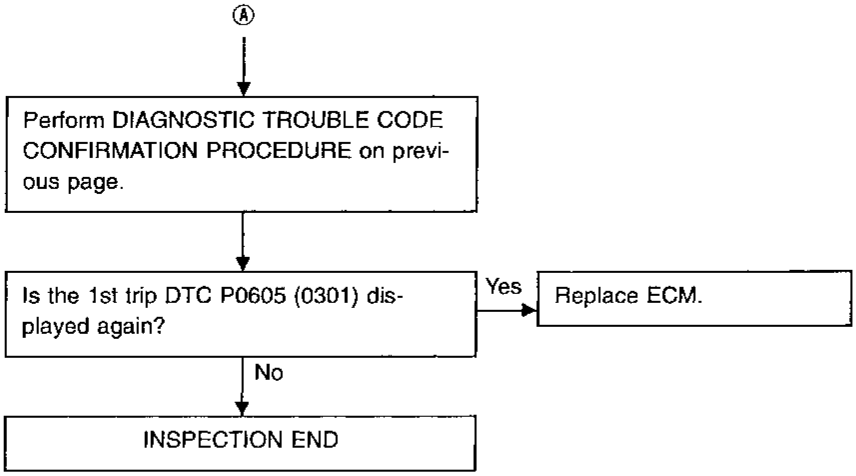
OR

NO TOOLS
1) Turn ignition switch "ON".
2) Erase the Diagnostic Test Mode II (Self-diagnostic results) memory.

↓

Ⓐ

Engine Control Module (ECM)-ECCS Control Module (DTC: 0301) (Cont'd)



Perform DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE on previous page.

Is the 1st trip DTC P0605 (0301) displayed again?

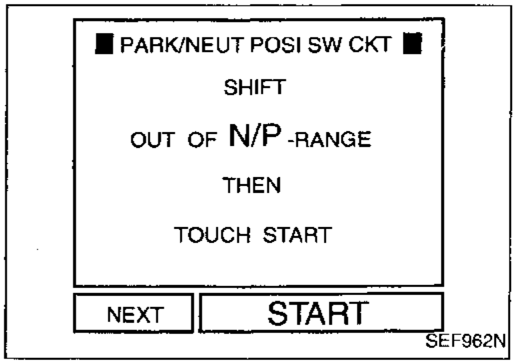
Replace ECM.

INSPECTION END

Park/Neutral Position Switch (DTC: 1003)

When the gear position is in "P" or "N", park/neutral position is "ON". The A/T control unit detects the position because the continuity of the line (the "ON" signal) exists. A/T control unit sends the park/neutral signal to ECM.

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 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



■ PARK/NEUT POSI SW CKT ■

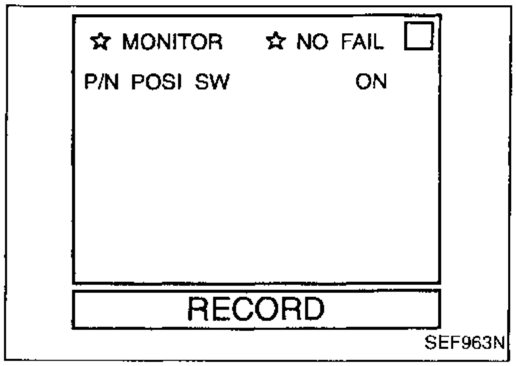
SHIFT

OUT OF N/P-RANGE

THEN

TOUCH START

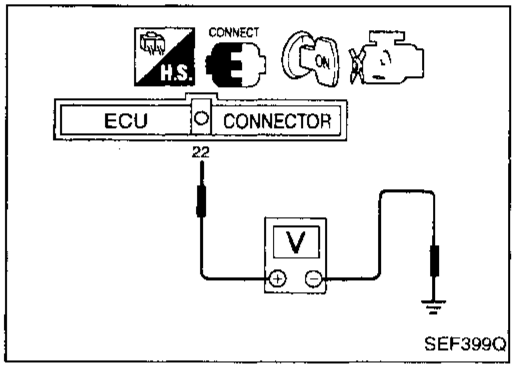
SEF962N



☆ MONITOR ☆ NO FAIL ☐

P/N POSI SW ON

SEF963N



SEF399Q

OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the park/neutral position switch circuit. During this check, a 1st trip DTC might not be confirmed.

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 in the following conditions.

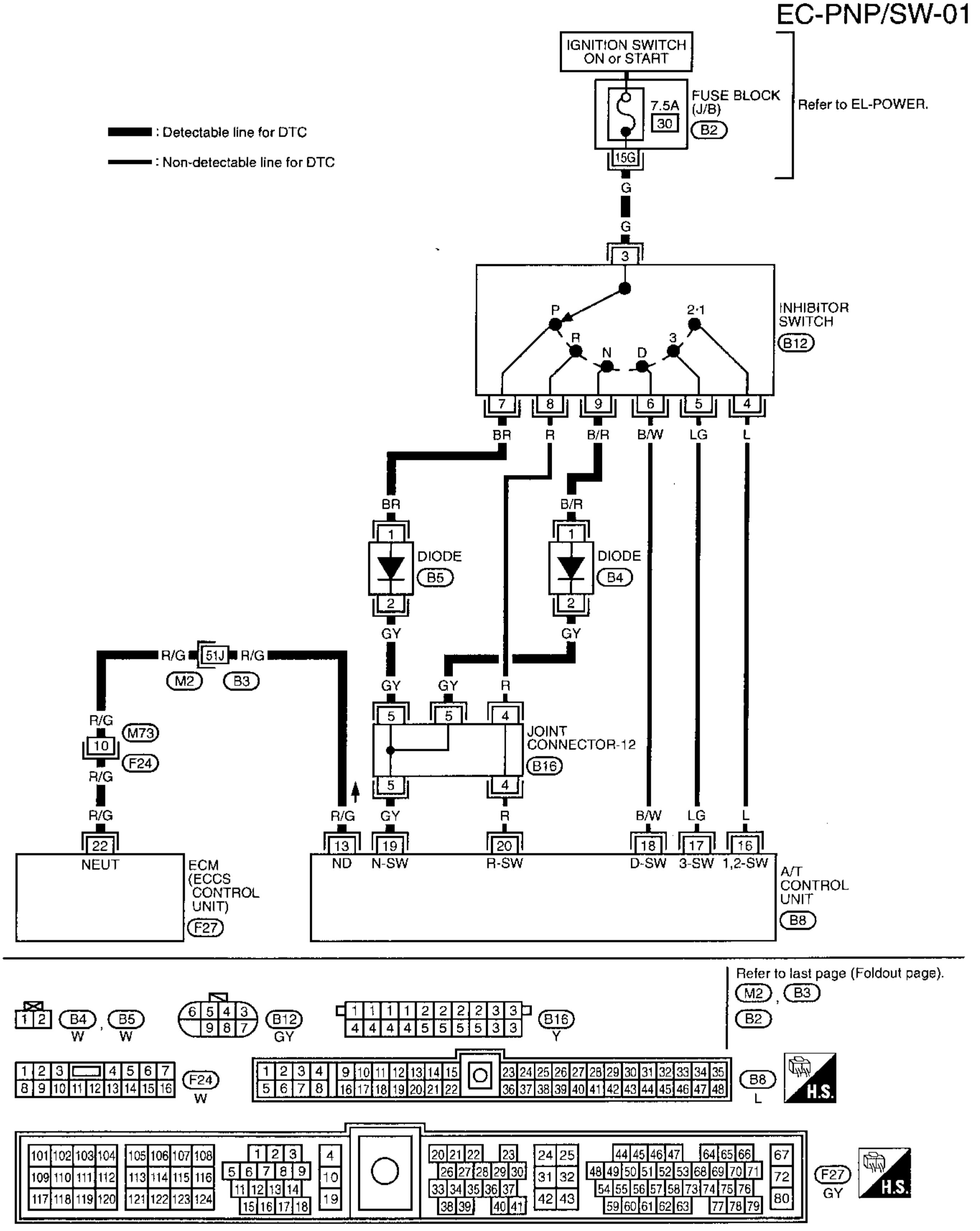
Condition (Gear position)	Known good signal
"P" and "N" position	ON
Except the above position	OFF

OR

1) Turn ignition switch "ON".
2) Check voltage between ECM terminal ㉒ and body ground in the following conditions.

Condition (Gear position)	Voltage (V) (Known good data)
"P" and "N" position	Approx. 0
Except the above position	Approx. 5

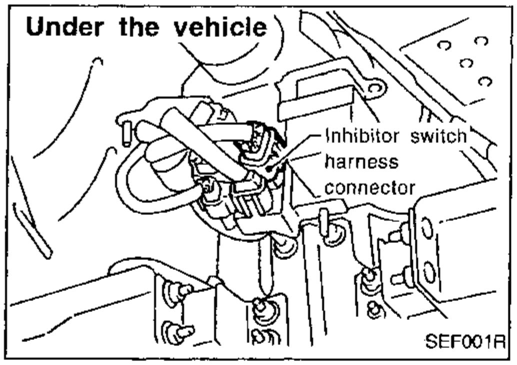
Park/Neutral Position Switch (DTC: 1003) (Cont'd)



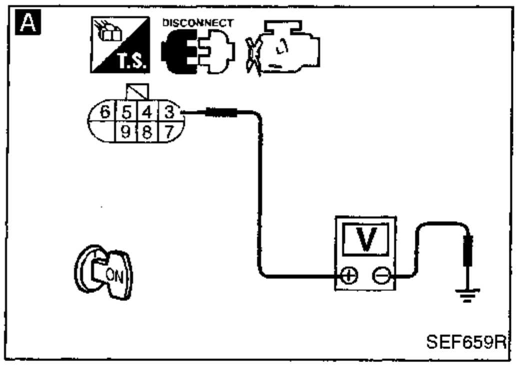
TEC139

Park/Neutral Position Switch (DTC: 1003) (Cont'd)

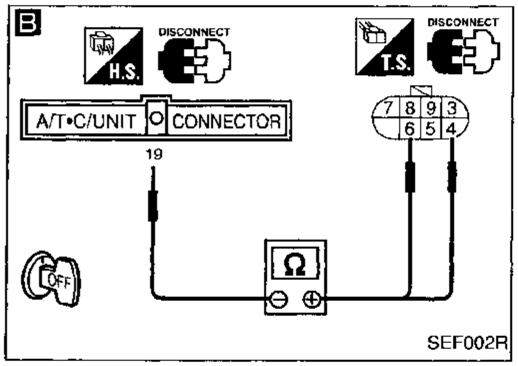
DIAGNOSTIC PROCEDURE



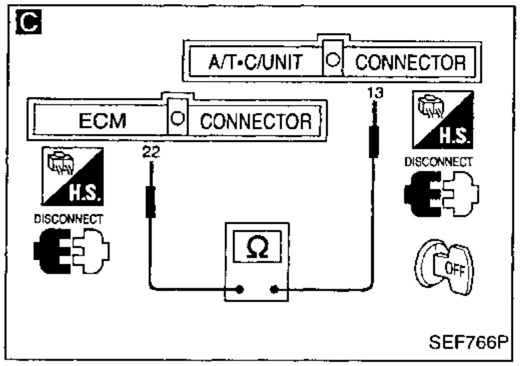
SEF001R



SEF659R



SEF002R



SEF766P

INSPECTION START

↓

A

CHECK POWER SUPPLY.

1. Disconnect inhibitor switch harness connector.
2. Turn ignition switch "ON".
3. Check voltage between terminal ③ and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness connector B2
- 7.5A fuse
- Harness for open or short between inhibitor switch and fuse

If NG, repair harness or connectors.

OK ↓

B

CHECK INPUT SIGNAL CIRCUIT-I.

1. Turn ignition switch "OFF".
2. Disconnect A/T control unit harness connector.
3. Check harness continuity between A/T control unit terminal ⑲ and terminals ⑦, ⑨.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Joint connector-12
- Diodes B4, B5
- Harness for open or short between inhibitor switch and A/T control unit

If NG, repair harness or connectors.

OK ↓

C

CHECK INPUT SIGNAL CIRCUIT-II.

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ㉒ and terminal ⑬.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors F24, M73
- Harness connectors M2, B3
- Harness for open or short between ECM and A/T control unit

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.

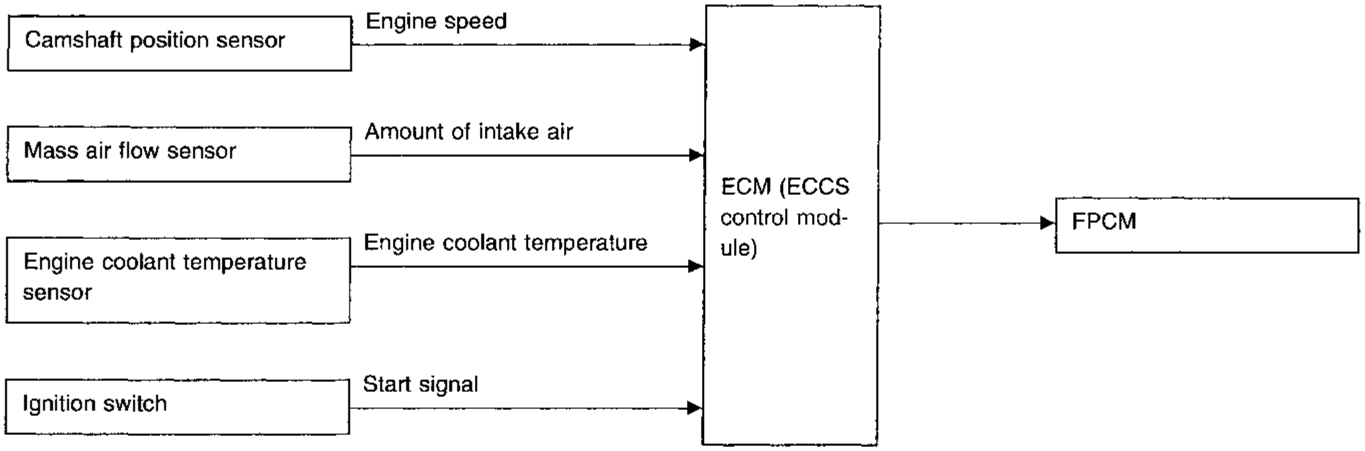
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

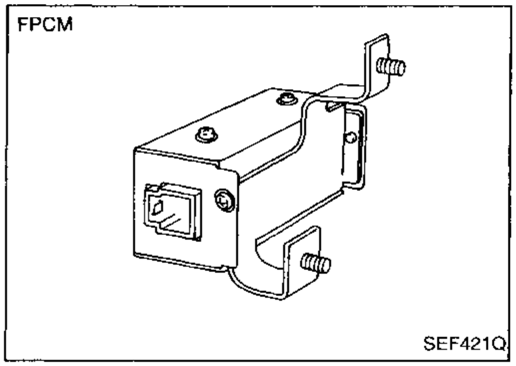
Fuel Pump Control Module (FPCM) (DTC: 1305)

SYSTEM DESCRIPTION



This system controls the fuel pump operation. The amount of fuel flow delivered from the fuel pump is altered between two flow rates by the FPCM operation. The FPCM determines the voltage supplied to the fuel pump (and therefore fuel flow) according to the following conditions.

Conditions	Amount of fuel flow	Supplied voltage
• Engine cranking • Engine coolant temperature below 10°C (50°F) • Within 30 seconds after starting engine [above 50°C (122°F)] • Engine is running under heavy load and high speed conditions	high	Battery voltage (11 - 14V)
Except the above	low	Approximately 9.5V



COMPONENT DESCRIPTION

The FPCM adjusts the voltage supplied to the fuel pump to control the amount of fuel flow. When the FPCM increases the voltage supplied to the fuel pump, the fuel flow is increased. When the FPCM decreases the voltage, the fuel flow is decreased.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1220 1305	• An improper voltage signal from the FPCM, which is supplied to a point between the fuel pump and the dropping resistor, is detected by ECM.	• Harness or connectors (FPCM circuit is open or shorted.) • Dropping resistor • FPCM

GI
MA
EM
LC
EC
FE
AT
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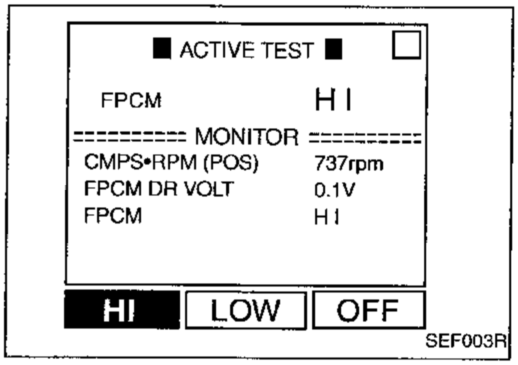
FA
RA
BR
ST
RS
BT
HA
EL
IDX

Fuel Pump Control Module (FPCM) (DTC: 1305) (Cont'd)



FPCM HI

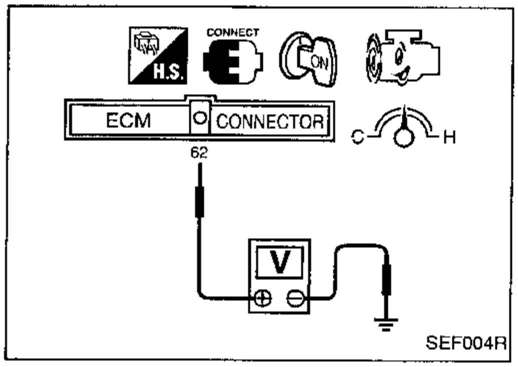
MONITOR

CMPS•RPM (POS) 737rpm

FPCM DR VOLT 0.1V

FPCM HI

SEF003R



SEF004R

OVERALL FUNCTION CHECK

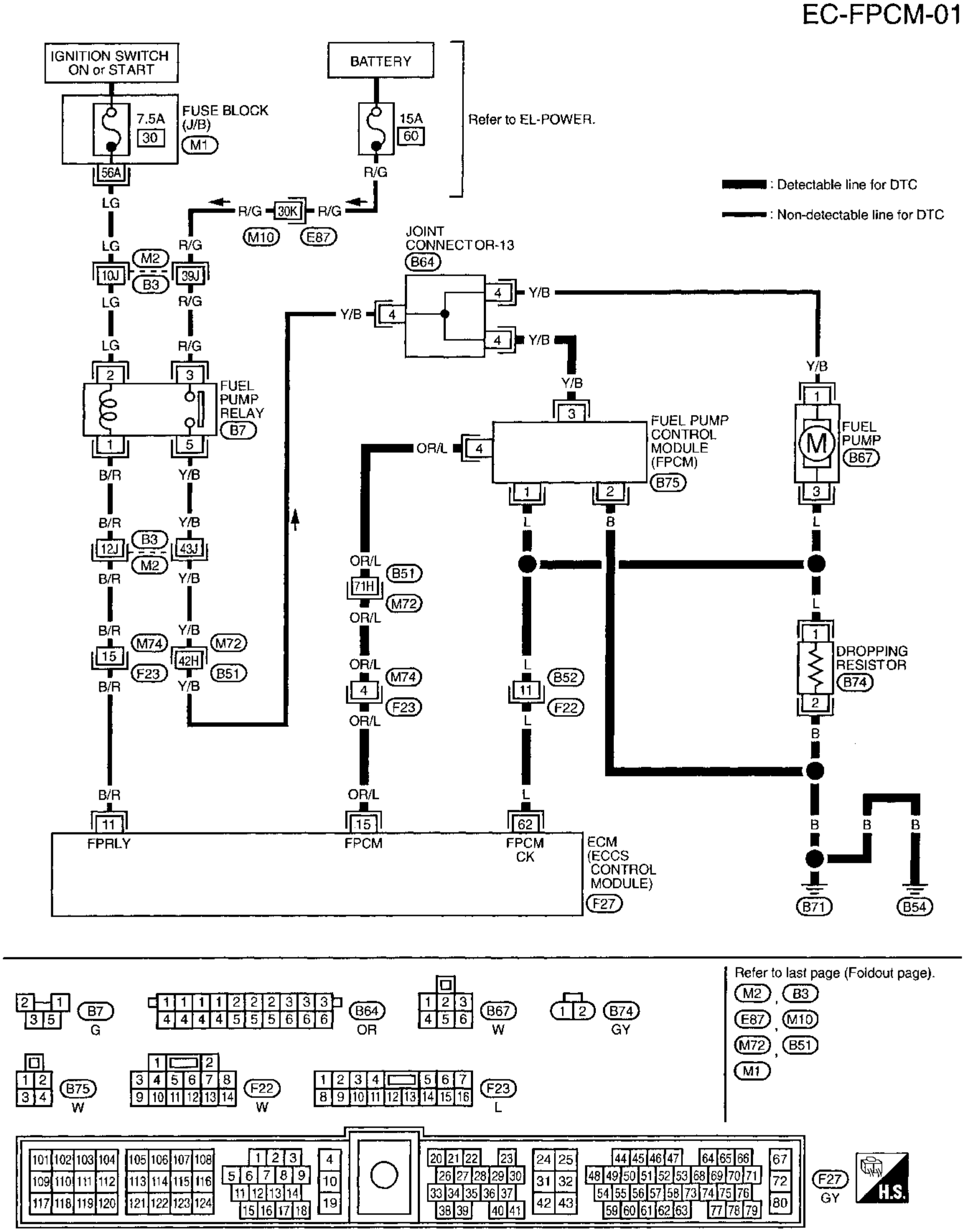
Use this procedure to check the overall function of the FPCM circuit. During this check, a 1st trip DTC might not be confirmed.

1) Start engine.
2) Select "FPCM" in "ACTIVE TEST" mode with CONSULT.
3) Touch "HI" then "LOW" respectively.
4) Check voltage between ECM terminal (62) and ground.
   HI: Approximately 0V
   LOW: Approximately 4.2V

OR

1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and let it idle.
4) Check voltage between ECM terminal (62) and ground.
   Within 30 seconds of starting engine:
   Approximately 0V
   More than 30 seconds after starting engine:
   Approximately 4.2V

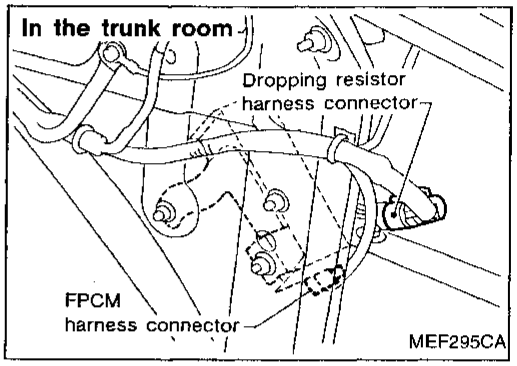
Fuel Pump Control Module (FPCM) (DTC: 1305) (Cont'd)

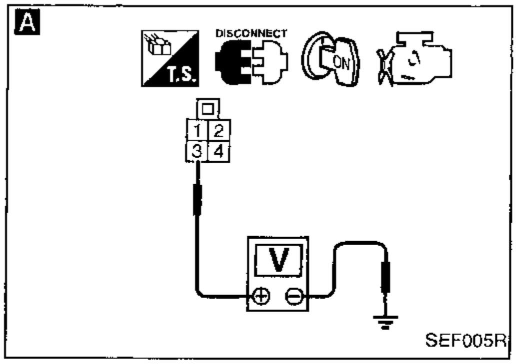


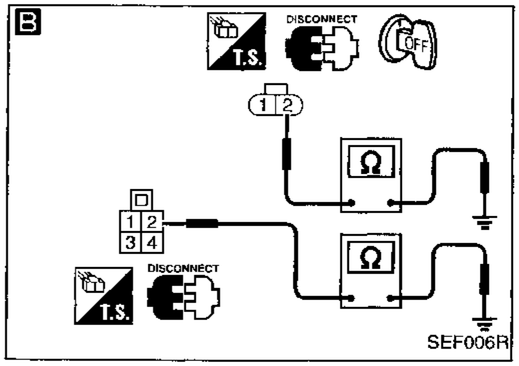
TEC140

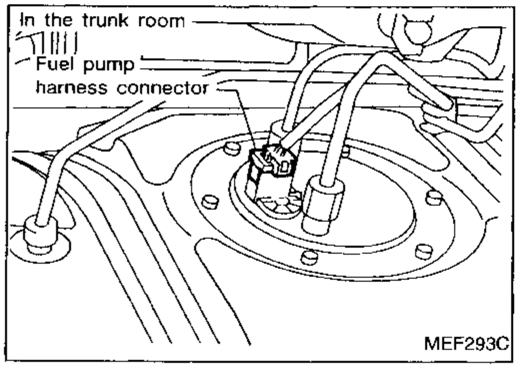
Fuel Pump Control Module (FPCM) (DTC: 1305) (Cont'd)

DIAGNOSTIC PROCEDURE









INSPECTION START

↓

A

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

NG → Check the following.
- Joint connector-13
- Harness for open or short between FPCM and joint connector-13

If NG, repair harness or connectors.

↓ OK

B

CHECK GROUND CIRCUIT-I.
1. Turn ignition switch "OFF".
2. Disconnect dropping resistor harness connector.
3. Check harness continuity between each terminal ② and engine ground.
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

↓ OK

C

CHECK GROUND CIRCUIT-II.
1. Disconnect fuel pump harness connector.
2. Check harness continuity between terminal ③ and terminal ①, terminal ① and terminal ①.
   Continuity should exist.
3. Check harness continuity between terminal ① and engine ground, terminal ③ and engine ground.
   Continuity should not exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

↓ OK

D

CHECK OUTPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ⑮ and terminal ④.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors (F23), (M74)
- Harness connectors (M72), (B51)
- Harness for open or short between ECM and FPCM

If NG, repair harness or connectors.

↓ OK

E

CHECK INPUT SIGNAL CIRCUIT.
1. Check harness continuity between ECM terminal (62) and terminal ① (or terminal ③).
   Continuity should exist.
2. Check harness continuity between ECM terminal (62) and engine ground.
   Continuity should not exist.
   If OK, check harness for short.

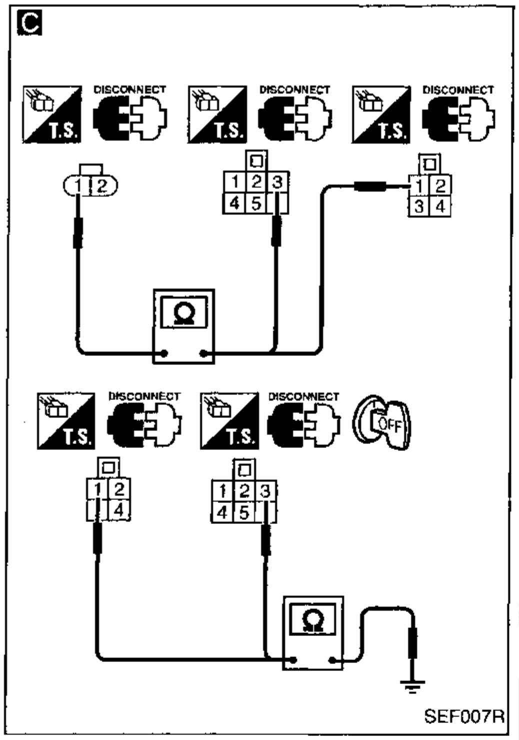
NG → Check the following.
- Harness connectors (F22), (B52)
- Harness for open or short between ECM and FPCM (or fuel pump)

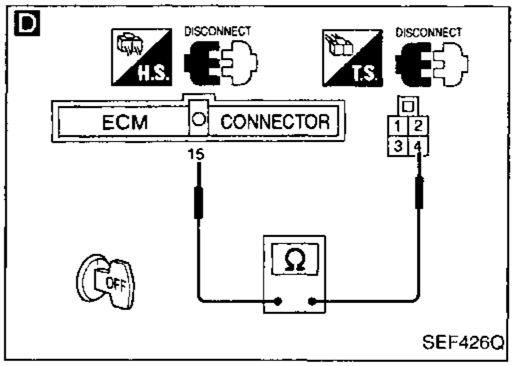
If NG, repair harness or connectors.

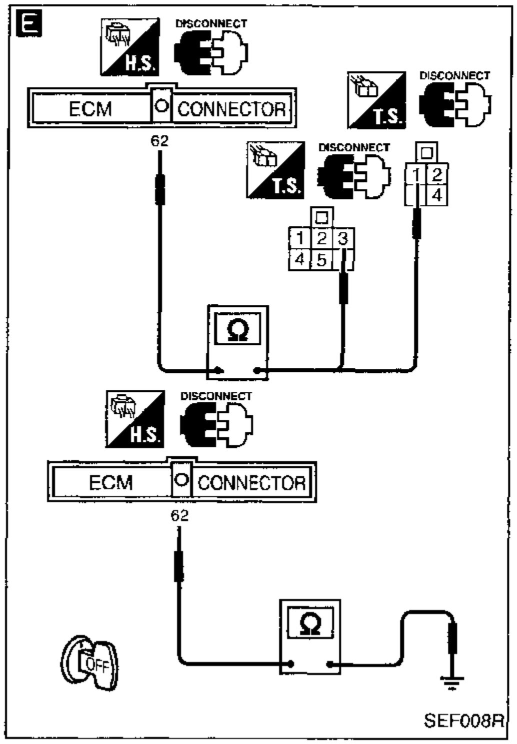
↓ OK

Ⓐ

Fuel Pump Control Module (FPCM) (DTC: 1305) (Cont'd)







Ⓐ

↓

CHECK COMPONENT
(Dropping resistor).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace dropping resistor.

↓ OK

CHECK COMPONENT
(FPCM).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace FPCM.

↓ 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.

↓

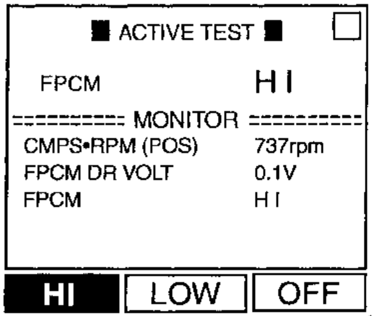
INSPECTION END

Fuel Pump Control Module (FPCM) (DTC: 1305) (Cont'd)

COMPONENT INSPECTION

FPCM

1. Start engine and let it idle.
2. Perform "FPCM" in "ACTIVE TEST" mode with CONSULT.
3. Check the following.
   - When selecting "HI", "FPCM DR VOLT" indicates approximately 0V.
   - When selecting "LOW", "FPCM DR VOLT" indicates approximately 4.2V.
4. If NG, replace FPCM.



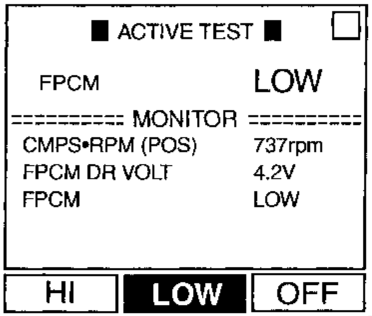
■ ACTIVE TEST ■ ☐

FPCM HI

========== MONITOR ==========

CMPS•RPM (POS)	737rpm
FPCM DR VOLT	0.1V
FPCM	HI

SEF009R



■ ACTIVE TEST ■ ☐

FPCM LOW

========== MONITOR ==========

CMPS•RPM (POS)	737rpm
FPCM DR VOLT	4.2V
FPCM	LOW

SEF010R

OR

1. Start engine and warm it up sufficiently.
2. Turn ignition switch "OFF" and wait at least 5 seconds.
3. Start engine and let it idle.
4. Check voltage between terminals ① and ②.

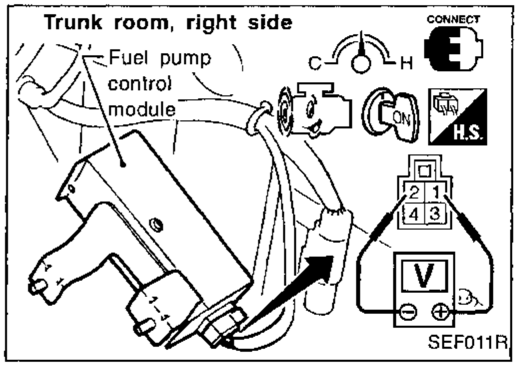
Within 30 seconds of starting engine:

Approximately 0V

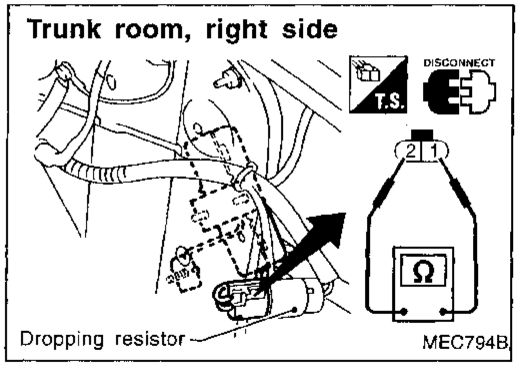
More than 30 seconds after starting engine:

Approximately 4.2V

5. If NG, replace FPCM.



SEF011R

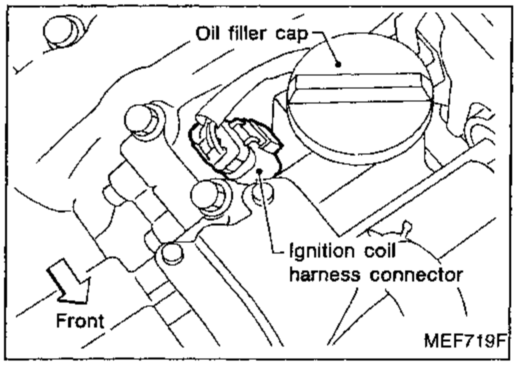


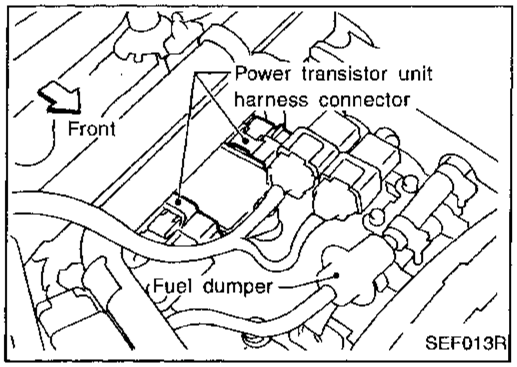
MEC794B

Dropping resistor

Check resistance between terminals ① and ②.

Resistance: Approximately 0.9Ω at 25°C (77°F)





Ignition Signal (DTC: 0201)

COMPONENT DESCRIPTION

Ignition coil & power transistor

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns on and off the ignition coil primary circuit. This on-off operation induces the proper high voltage in the coil secondary circuit.

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 primary ignition control circuit is open or shorted.) • Power transistor unit • Camshaft position sensor • Camshaft position sensor circuit

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

Note: If both (1st trip) DTC P1320 (0201) and DTC P0335 (0802), P0340 (0101) or P1336 (0905) are displayed, perform TROUBLE DIAGNOSIS FOR DTC P0335, P0340 or P1336 first. (See EC-197, 201 or 260.)

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and wait at least 3 seconds. (If engine does not run, turn ignition switch to "START" for at least 5 seconds.)

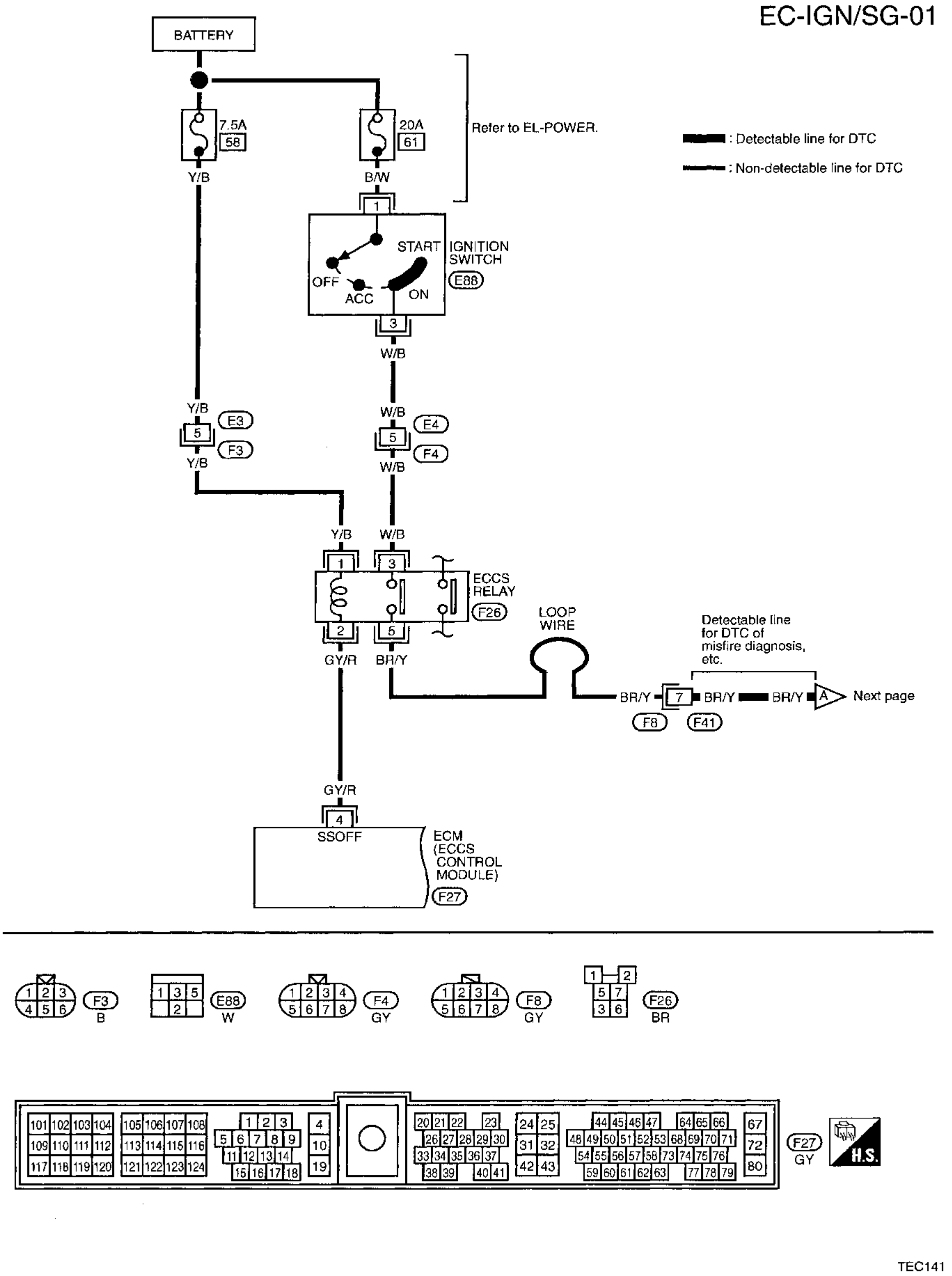
OR

GST
1) Turn ignition switch "ON".
2) Start engine and wait at least 3 seconds. (If engine does not run, turn ignition switch to "START" for at least 5 seconds.)
3) Select MODE 7 with GST.

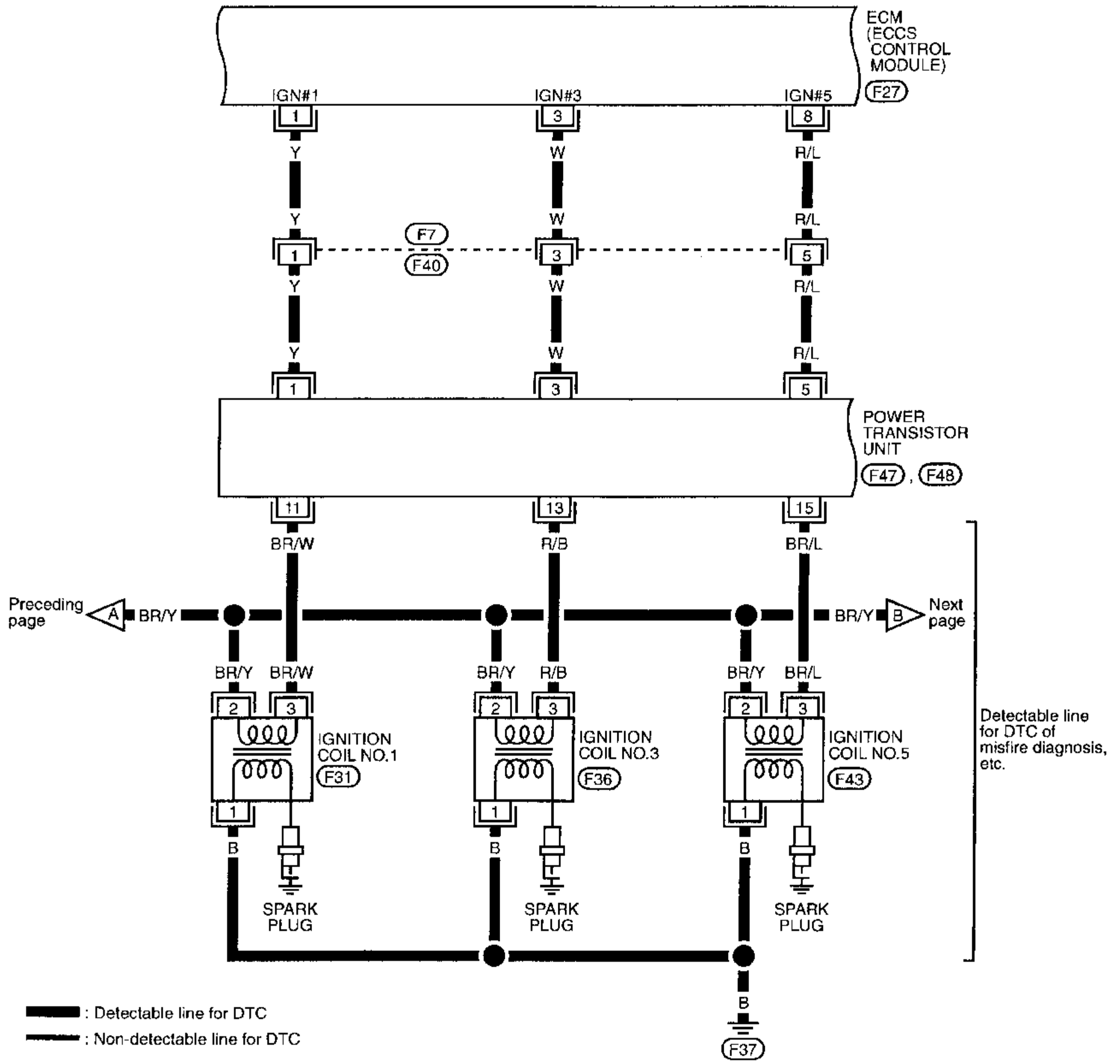
OR

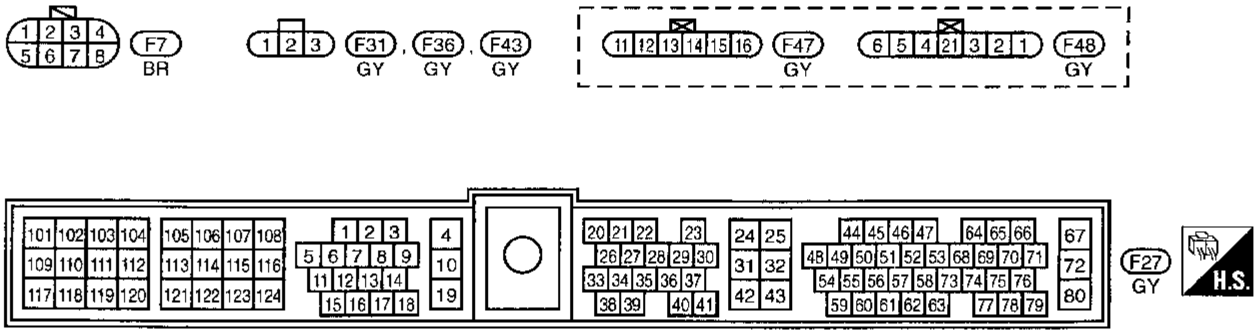
NO TOOLS
1) Turn ignition switch "ON".
2) Start engine and wait at least 3 seconds. (If engine does not run, turn ignition switch to "START" for at least 5 seconds.)
3) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
4) Perform diagnostic test mode II (Self-diagnostic results) with ECM.

Ignition Signal (DTC: 0201) (Cont'd)



EC-IGN/SG-02

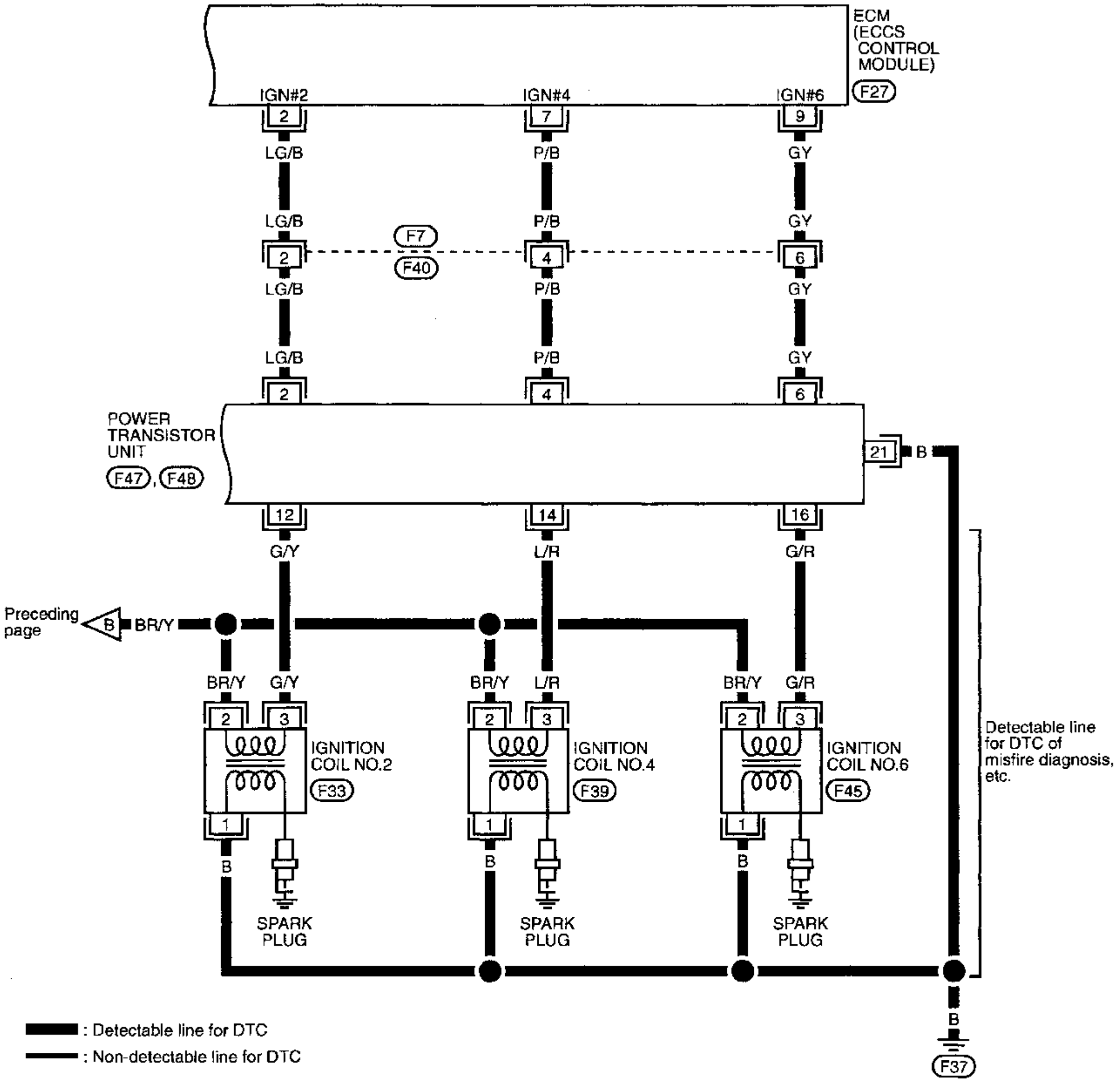


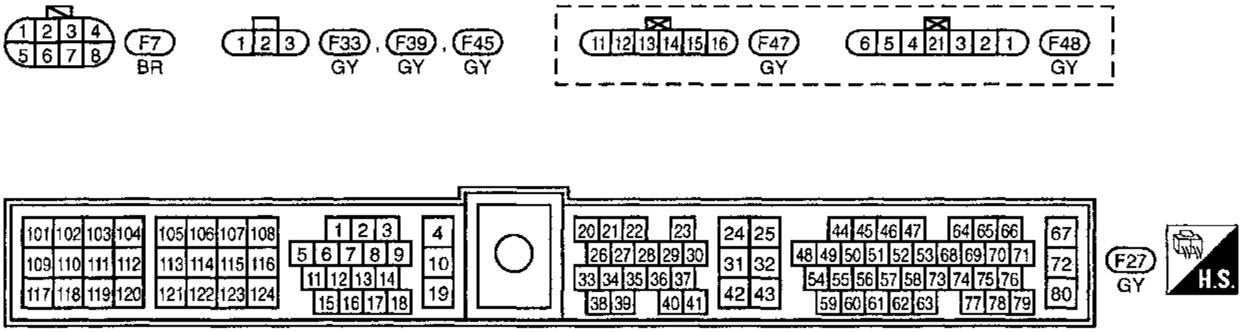


TEC146

Ignition Signal (DTC: 0201) (Cont'd)

EC-IGN/SG-03

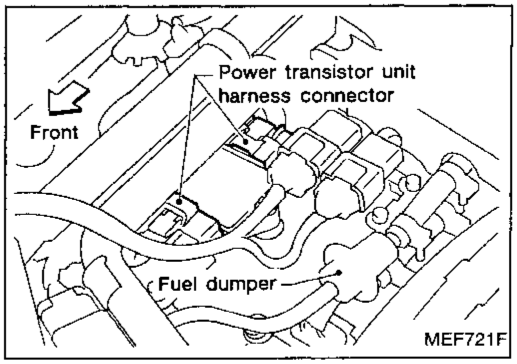




TEC147

Ignition Signal (DTC: 0201) (Cont'd)

DIAGNOSTIC PROCEDURE (THE PRIMARY IGNITION CONTROL CIRCUIT)



INSPECTION START

↓

Turn ignition switch "OFF" and then turn to "START".
Is engine running?

No → **A**

Yes ↓

B

SEARCH FOR MALFUNCTIONING CIRCUIT.
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
2. Search for circuit which does not produce a momentary engine speed drop.

↓

A

CHECK GROUND CIRCUIT-I.
1. Turn ignition switch "OFF".
2. Disconnect power transistor unit harness connector (F48).
3. Check harness continuity between terminal ㉑ and engine ground.
   Continuity should exist.
   If OK, check harness for short.

If NG, repair harness or connectors.

OK ↓

C

CHECK OUTPUT SIGNAL CIRCUIT-I.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector and power transistor unit harness connector (F48).
3. Check harness continuity between ECM terminal ① and terminal ①, ECM terminal ② and terminal ②, ECM terminal ③ and terminal ③, ECM terminal ⑦ and terminal ④, ECM terminal ⑧ and terminal ⑤, ECM terminal ⑨ and terminal ⑥.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors (F7), (F40)
- Harness for open or short between ECM and power transistor unit

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT
(Power transistor unit).
Refer to "COMPONENT INSPECTION", EC-259.

NG → Replace power transistor unit.

OK ↓

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

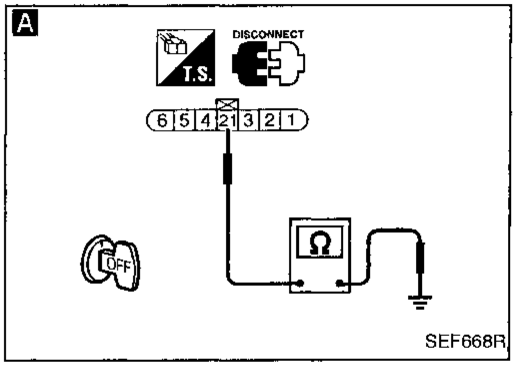
↓ Trouble is not fixed.

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

↓

INSPECTION END

A



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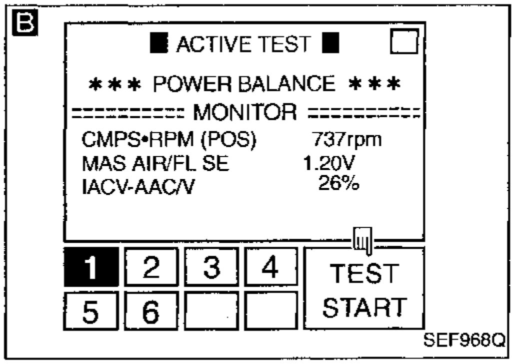


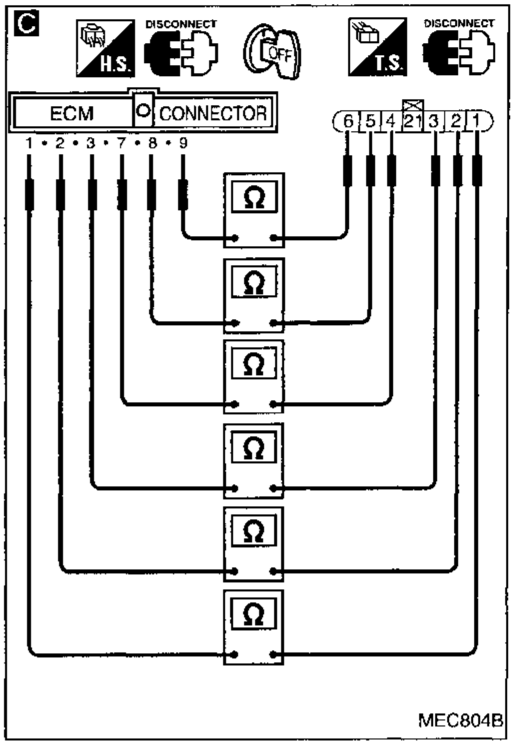
■ ACTIVE TEST ■

*** POWER BALANCE ***

========== MONITOR ==========

CMPS•RPM (POS) 737rpm
MAS AIR/FL SE 1.20V
IACV-AAC/V 26%

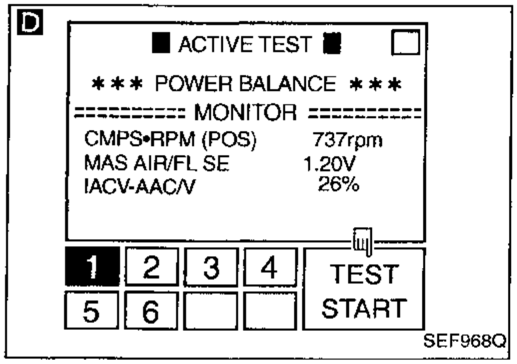
C



Ignition Signal (DTC: 0201) (Cont'd)

DIAGNOSTIC PROCEDURE (THE SECONDARY IGNITION CONTROL CIRCUIT)

D


■ ACTIVE TEST ■

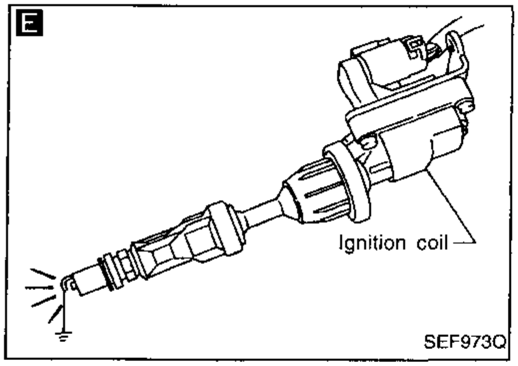
*** POWER BALANCE ***

========== MONITOR ==========

CMPS•RPM (POS)	737rpm
MAS AIR/FL SE	1.20V
IACV-AAC/V	26%

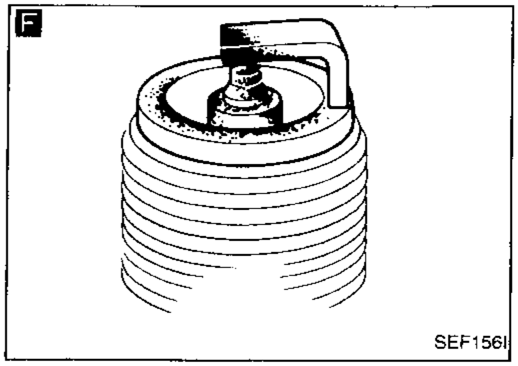
SEF968Q

E



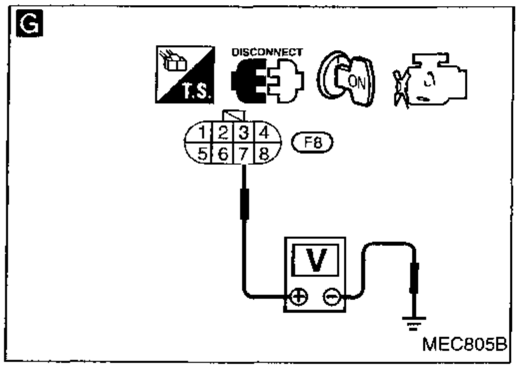
SEF973Q

F



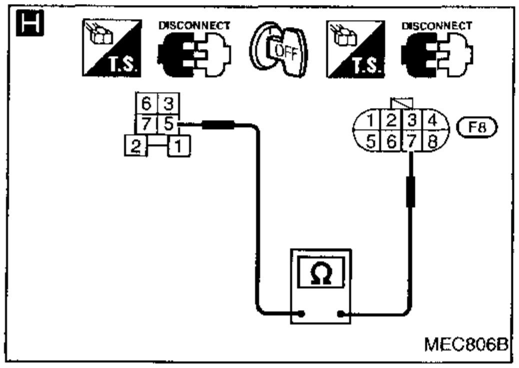
SEF156I

G



MEC805B

H



MEC806B

INSPECTION START

↓

Turn ignition switch to "START".
Is engine running?

Yes (with CONSULT) → **D**

Yes (without CONSULT) → **E**

No ↓

E

CHECK OVERALL FUNCTION.
1. Turn ignition switch "OFF".
2. Disconnect ignition coil assembly from rocker cover.
3. Place the end of spark plug against a suitable ground and crank engine.
4. Make sure that all spark plugs spark.

OK → INSPECTION END

NG ↓

D

CHECK OVERALL FUNCTION.
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
2. Make sure that all circuits produce a momentary engine speed drop.

If NG, go to **"CHECK SPARK PLUG"** after performing the following procedure.
1. Turn ignition switch "OFF".
2. Disconnect ignition coil assembly from rocker cover.

OK ↓

INSPECTION END

F

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

NG → Repair or replace spark plug(s) and then perform **"CHECK OVERALL FUNCTION"** again.

OK ↓

G

CHECK POWER SUPPLY-I.
1. Disconnect harness connectors (F8), (F41).
2. Turn ignition switch "ON".
3. Check voltage between terminal ⑦ and ground with CONSULT or tester.
Voltage: Battery voltage

OK → Go to **"CHECK POWER SUPPLY-IV"** on EC-258.

NG ↓

H

CHECK POWER SUPPLY-II.
1. Turn ignition switch "OFF".
2. Disconnect ECCS relay.
3. Check harness continuity between terminal ⑦ and terminal ⑤.
Continuity should exist.
If OK, check harness for short.

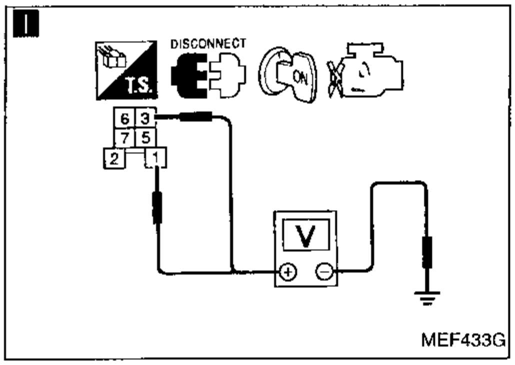
NG → Repair harness or connectors.

OK ↓

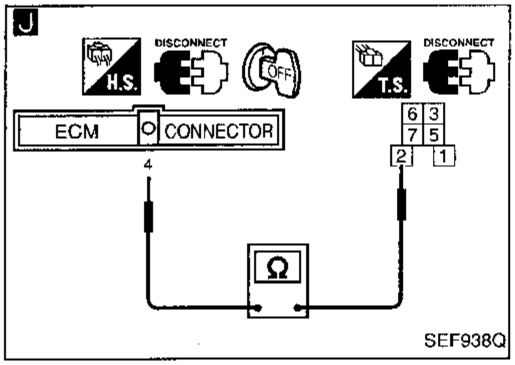
Ⓐ

Ignition Signal (DTC: 0201) (Cont'd)

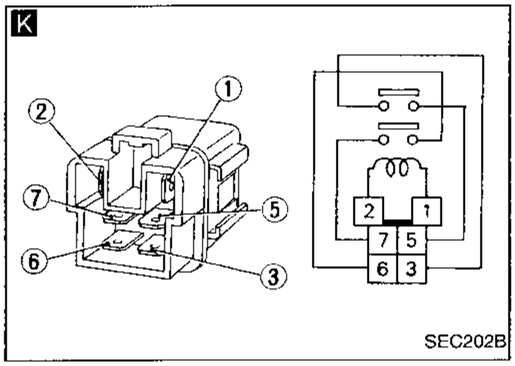
I



J



K



Ⓐ

I

CHECK POWER SUPPLY-III.

1. Turn ignition switch "ON".
2. Check voltage between terminals ①, ③ and ground with CONSULT or tester.

   Voltage: Battery voltage

NG → Check the following.

- Harness connectors (E3), (F3)
- Harness connectors (E4), (F4)
- 7.5A fuse
- Harness for open or short between ECCS relay and fuse
- Harness for open or short between ECCS relay and ignition switch

If NG, repair harness or connectors.

OK ↓

J

CHECK OUTPUT SIGNAL CIRCUIT-II.

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal ④ and terminal ②.

   Continuity should exist.

   If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

K

CHECK ECCS RELAY.

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

   12V (① - ②) applied:

   Continuity exists.

   No voltage applied:

   No continuity

NG → Replace ECCS relay.

OK ↓

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

↓ Trouble is not fixed.

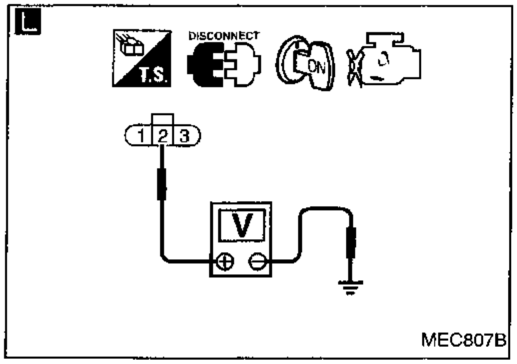
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

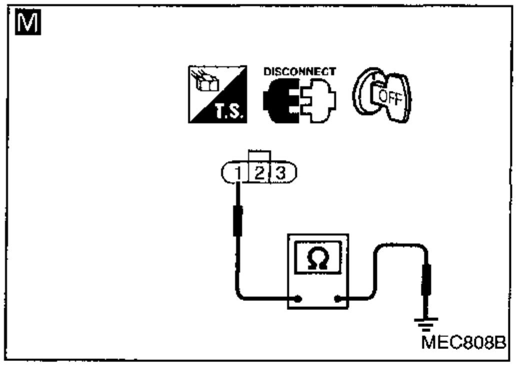
Ignition Signal (DTC: 0201) (Cont'd)

L



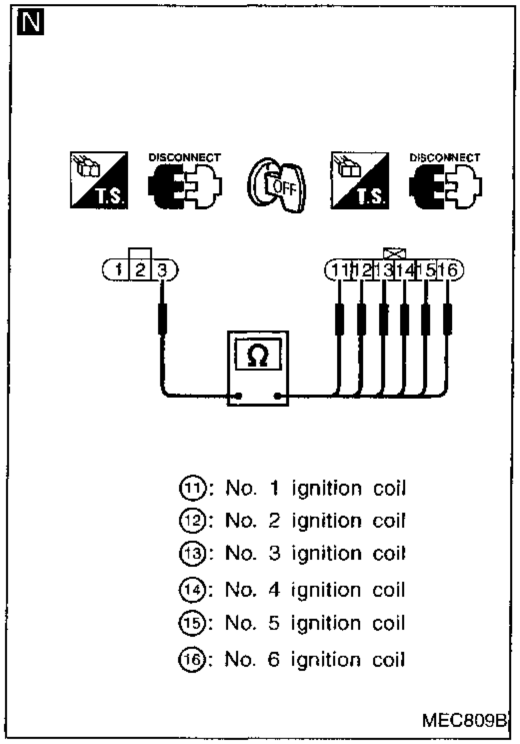
MEC807B

M



MEC808B

N



MEC809B

L

CHECK POWER SUPPLY-IV.

1. Turn ignition switch "OFF".
2. Disconnect ignition coil harness connector.
3. Reconnect harness connectors F8, F41.
4. Turn ignition switch "ON".
5. Check voltage between terminal ② and ground with CONSULT or tester.
   Voltage: Battery voltage

NG → Check the following.
- Harness for open or short between ignition coil and harness connector F41

If NG, repair harness or connectors.

OK ↓

M

CHECK GROUND CIRCUIT-II.

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

NG → Repair harness or connectors.

OK ↓

N

CHECK OUTPUT SIGNAL CIRCUIT-III.

1. Disconnect power transistor unit harness connector F47.
2. Check harness continuity between terminal ③ and terminals ⑪, ⑫, ⑬, ⑭, ⑮, ⑯.
   Continuity should exist.
   If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(Ignition coil).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace ignition coil.

OK ↓

CHECK COMPONENT
(Power transistor unit).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace power transistor unit.

OK ↓

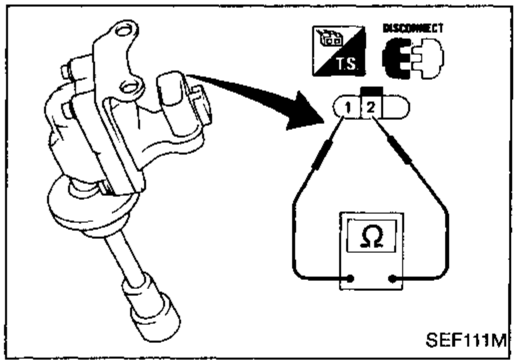
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓

INSPECTION END

Ignition Signal (DTC: 0201) (Cont'd)

COMPONENT INSPECTION



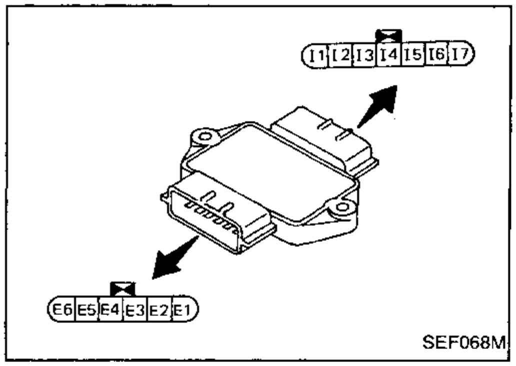
SEF111M

Ignition coil

1. Disconnect ignition coil harness connector.
2. Check resistance as shown in the figure.

Terminal	Resistance [At 20°C (68°F)]
① - ②	Approximately 0.9Ω

If NG, replace ignition coil.



SEF068M

Power transistor

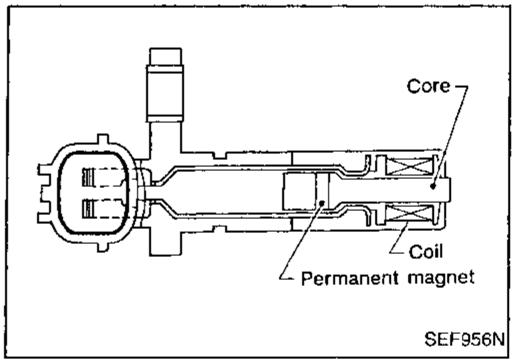
1. Disconnect power transistor harness connector.
2. Check power transistor continuity between terminals as shown in the figure.

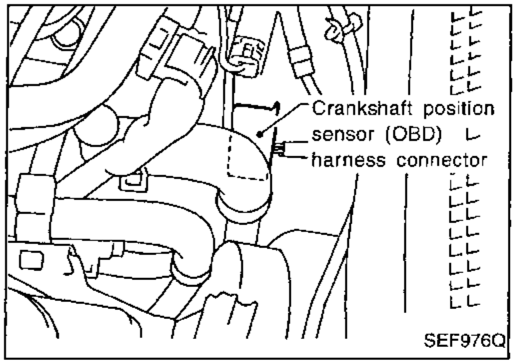
Terminal combination						Tester polarity	Continuity	Tester polarity	Continuity
G E1	G E2	G E3	G E4	G E5	G E6	⊕ ⊖	No	⊖ ⊕	Yes
G I1	G I2	G I3	G I4	G I5	G I6	⊕ ⊖	Yes	⊖ ⊕	Yes
E1 I1	E2 I2	E3 I3	E4 I4	E5 I5	E6 I6	⊕ ⊖	Yes	⊖ ⊕	No

If NG, replace power transistor.

GI
MA
EM
LC
EC
FE
AT
PD
FA
RA
BR
ST
RS
BT
HA
EL
IDX

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 drive plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet, core and coil.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.
This sensor is not used to control the engine system.
It is used only for the on board diagnosis of misfire.

Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1336 0905	• A chipping of the drive plate gear tooth (cog) is detected by the ECM.	• Harness or connectors • Crankshaft position sensor (OBD) • 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 2 minutes at idle speed.

OR

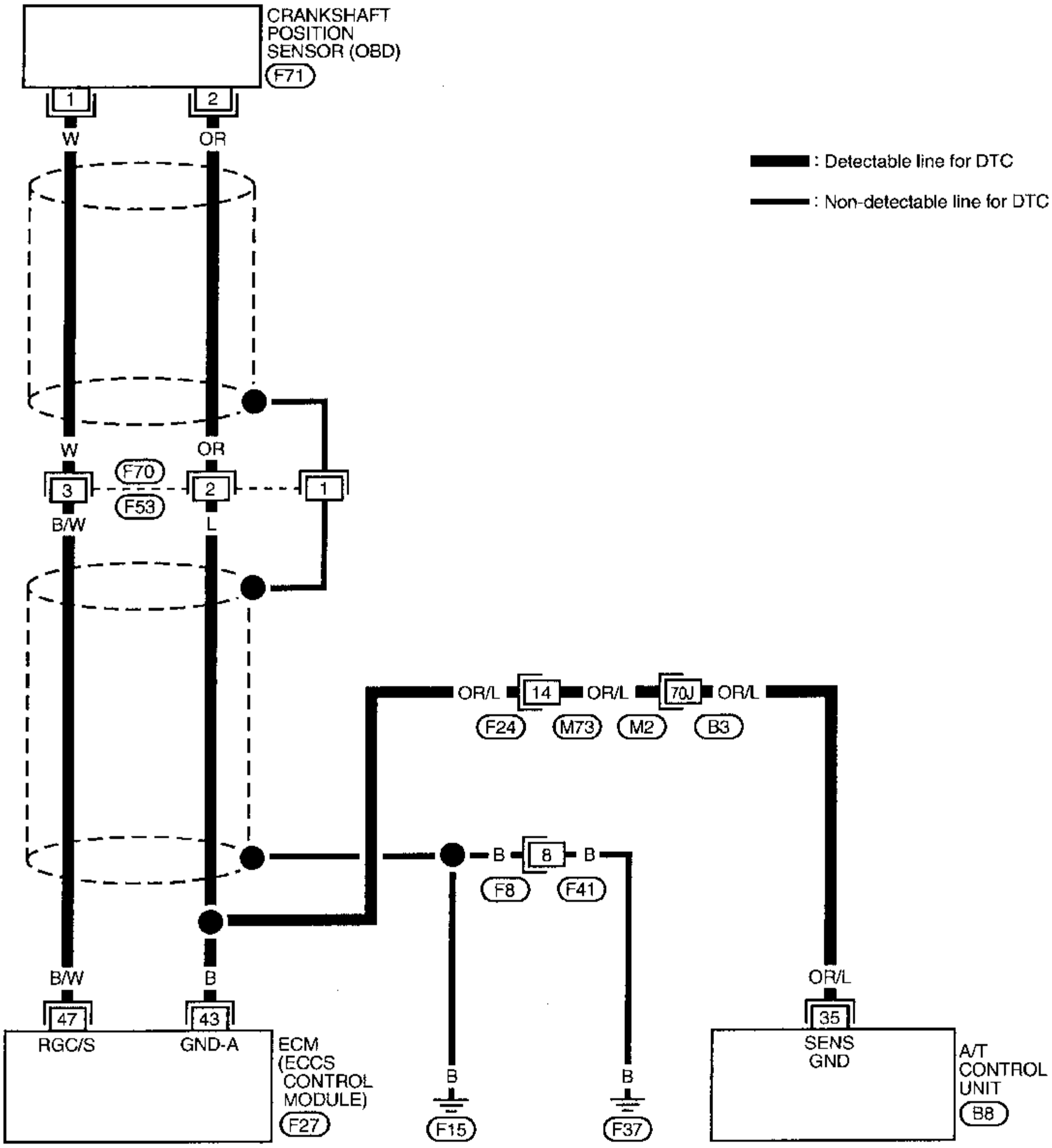
GST
1) Start engine and run it for at least 2 minutes at idle speed.
2) Select "MODE 7" with GST.

OR

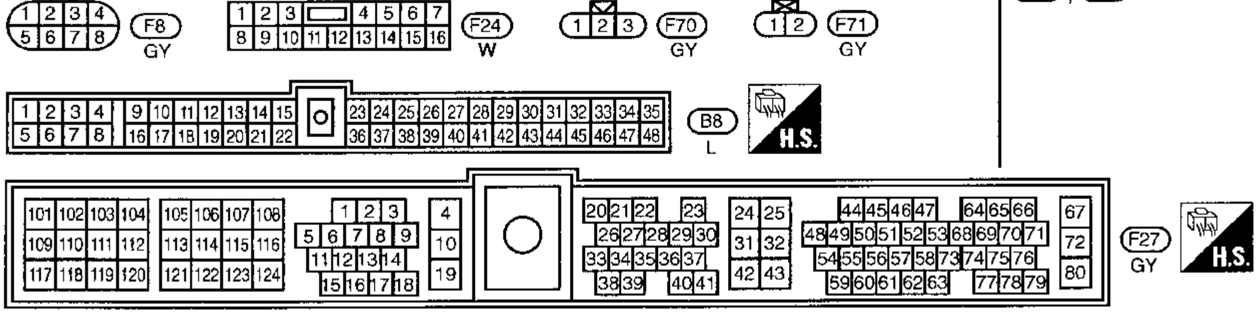
NO TOOLS
1) Start engine and run it for at least 2 minutes at idle speed.
2) Turn ignition switch "OFF", wait at least 5 seconds and then turn "ON".
3) Perform "Diagnostic Test Mode II (Self-diagnostic results)" with ECM.

Crankshaft Position Sensor (CKPS) (OBD) (COG) (DTC: 0905) (Cont'd)

EC-CKPS-01



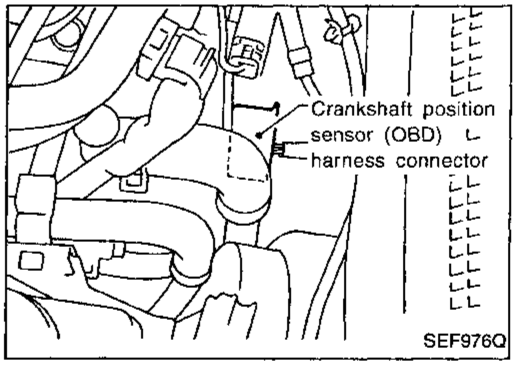
Refer to last page (Foldout page).
M2, B3



SEF695Q

Crankshaft Position Sensor (CKPS) (OBD) (COG) (DTC: 0905) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

↓

A

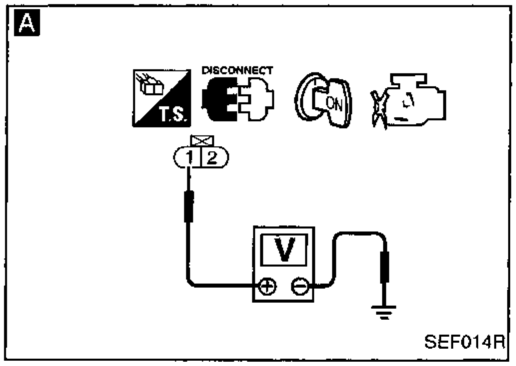
CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect crankshaft position sensor (OBD) harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ① and ground with CONSULT or tester.
Voltage: Approximately 5V

NG → Check the following.
- Harness connectors (F53), (F70)
- Harness for open or short between ECM and crankshaft position sensor (OBD)

If NG, repair harness or connectors.

OK ↓

A

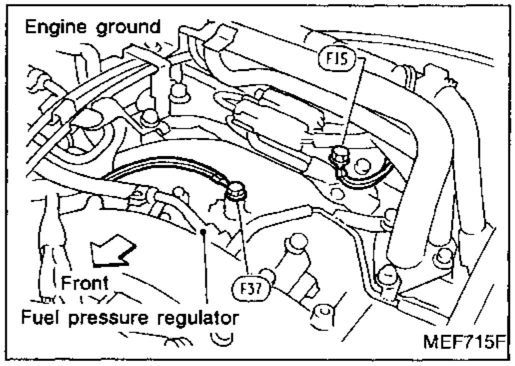


B

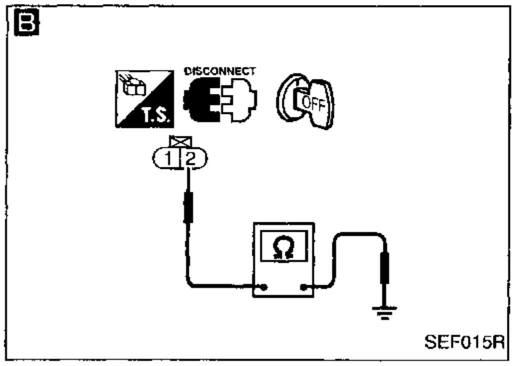
CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.
3. Check harness continuity between terminal ② and engine ground.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors (F53), (F70)
- Harness connectors (F24), (M73)
- Harness connectors (M2), (B3)
- Harness for open or short between ECM and crankshaft position sensor (OBD)
- Harness for open or short between A/T control unit and crankshaft position sensor (OBD)

If NG, repair harness or connectors.



B



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 drive plate gear tooth (cog).

NG → Replace drive plate.

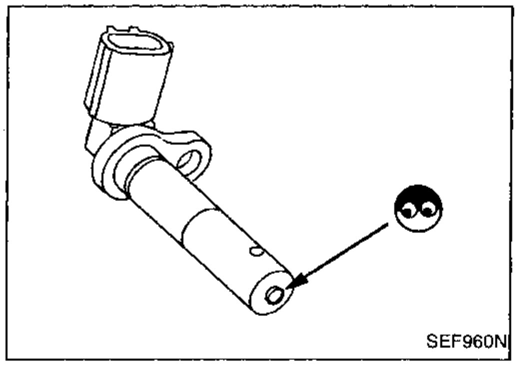
OK ↓

INSPECTION END

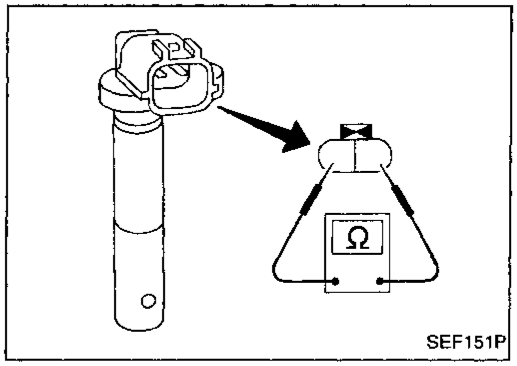
Crankshaft Position Sensor (CKPS) (OBD) (COG) (DTC: 0905) (Cont'd)

COMPONENT INSPECTION

Crankshaft position sensor (OBD)

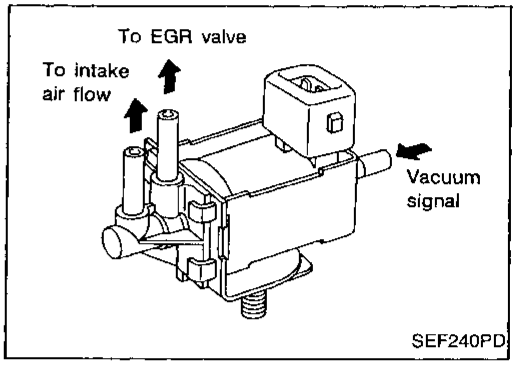


1. Disconnect crankshaft position sensor (OBD) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.
   Resistance: Approximately 166 - 204Ω
   [at 20°C (68°F)]

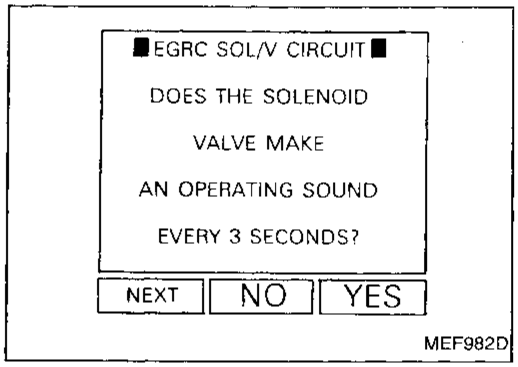
EGRC-Solenoid Valve (DTC: 1005)



SEF240PD

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

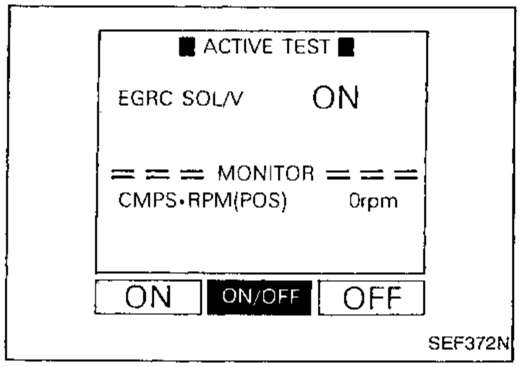
Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1400 1005	• An improper voltage signal is sent to ECM through EGRC-solenoid valve.	• Harness or connectors (The EGRC-solenoid valve circuit is open or shorted.) • EGRC-solenoid valve



■ EGRC SOL/V CIRCUIT ■

DOES THE SOLENOID VALVE MAKE AN OPERATING SOUND EVERY 3 SECONDS?

MEF982D



■ ACTIVE TEST ■

EGRC SOL/V ON

=== MONITOR ===

CMPS·RPM(POS) 0rpm

SEF372N

OVERALL FUNCTION CHECK

Use this procedure to check the overall function of the EGRC-solenoid valve circuit.
During this check, a 1st trip DTC might not be confirmed.

1) Turn ignition switch "ON".
2) Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

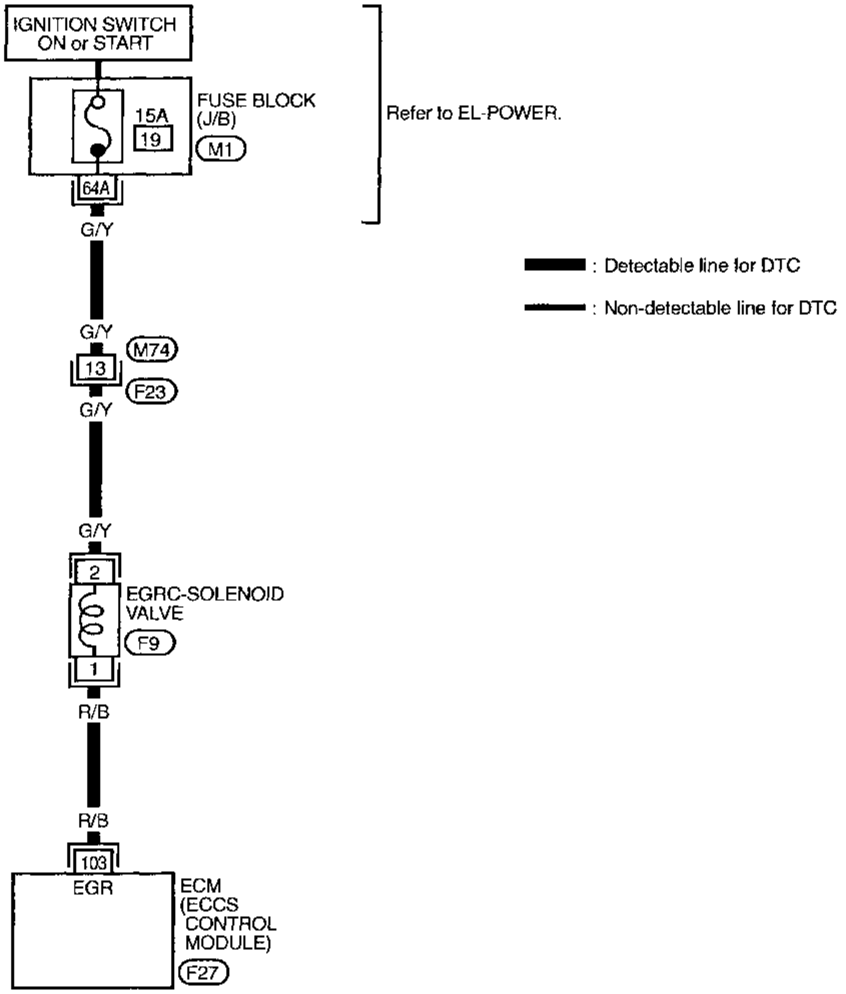
1) Turn ignition switch "ON".
2) Perform "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT and check the operating sound, according to ON/OFF switching.

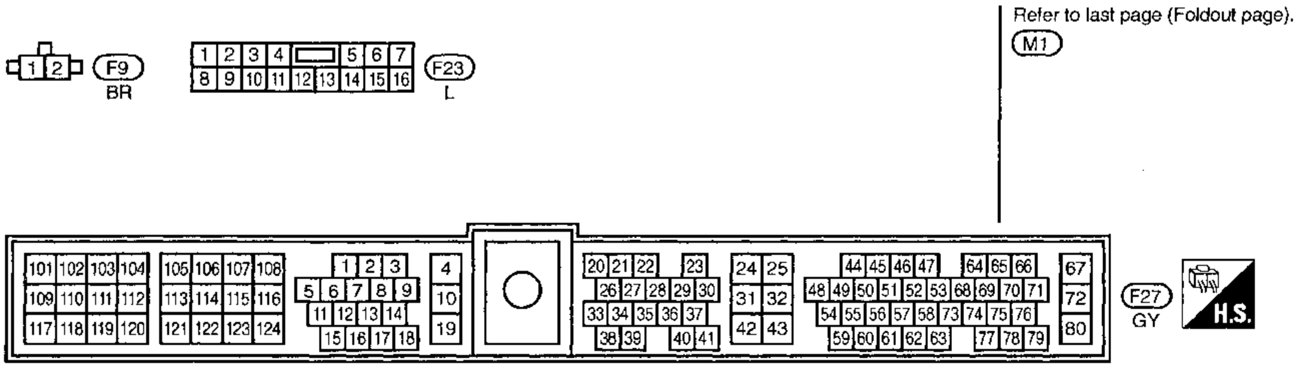
OR

1) Turn ignition switch "ON".
2) When disconnecting and reconnecting the EGRC-solenoid valve harness connector, make sure that the solenoid valve makes operating sound.

EGRC-Solenoid Valve (DTC: 1005) (Cont'd)

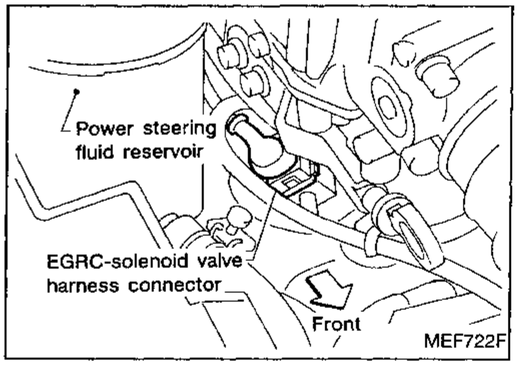
EC-EGRC/V-01



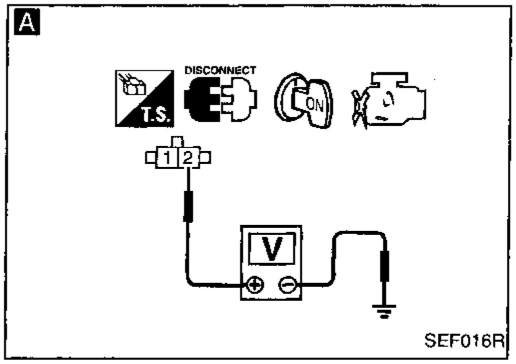


EGRC-Solenoid Valve (DTC: 1005) (Cont'd)

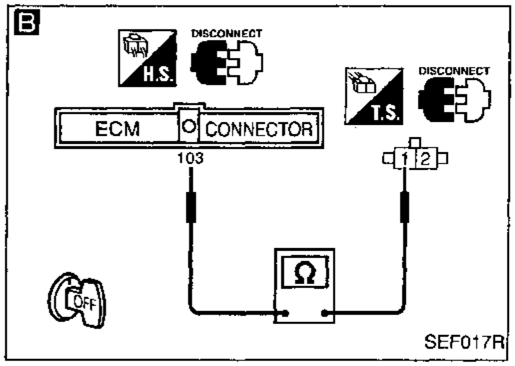
DIAGNOSTIC PROCEDURE



MEF722F



SEF016R



SEF017R

INSPECTION START

↓

A

CHECK POWER SUPPLY.

1. Disconnect EGRC-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), (M74)
- Harness connector (M1)
- 15A fuse
- Harness for open or short between EGRC-solenoid valve 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 (EGRC-solenoid valve).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace EGRC-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.

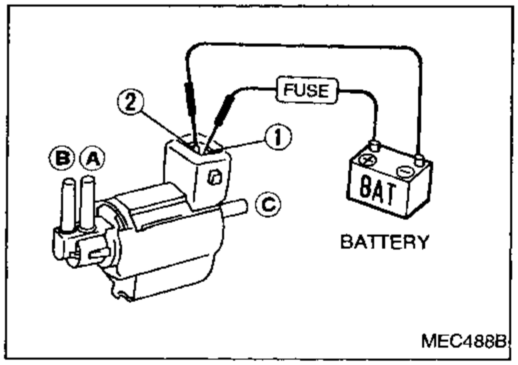
↓

INSPECTION END

EGRC-Solenoid Valve (DTC: 1005) (Cont'd)

COMPONENT INSPECTION

EGRC-solenoid valve

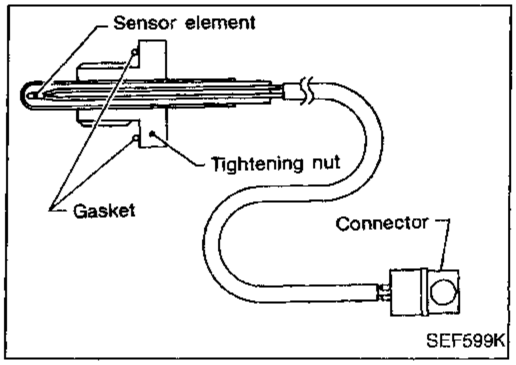


Check air passage continuity.

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

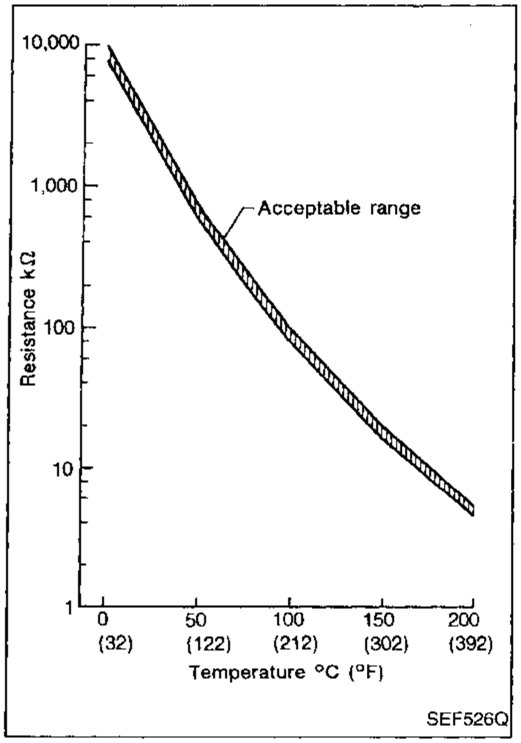
If NG, replace solenoid valve.

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 used to control the engine system. It is used only for the on board diagnosis.



⟨Reference data⟩

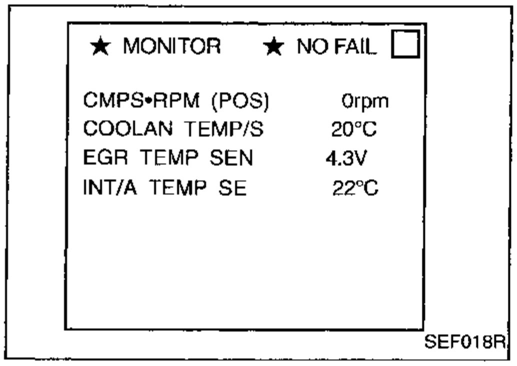
EGR temperature °C (°F)	Voltage (V)	Resistance (MΩ)
0 (32)	4.81	7.9 - 9.7
50 (122)	2.82	0.57 - 0.70
100 (212)	0.8	0.08 - 0.10
150 (302)	0.16	0.01 - 0.02

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 or EGRC-solenoid valve
	B) An excessively high voltage from the EGR temperature sensor is sent to ECM, even when engine coolant temperature is high.	• Harness or connectors (The EGR temperature sensor circuit is open.) • EGR temperature sensor • Malfunction of EGR function or EGRC-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 1st trip DTC might not be confirmed.

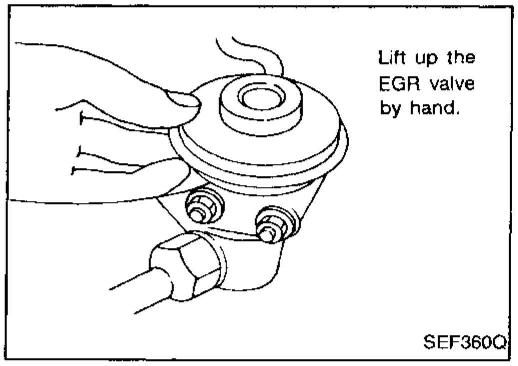

★ MONITOR ★ NO FAIL ☐

CMPS•RPM (POS)	0rpm
COOLAN TEMP/S	20°C
EGR TEMP SEN	4.3V
INT/A TEMP SE	22°C

SEF018R

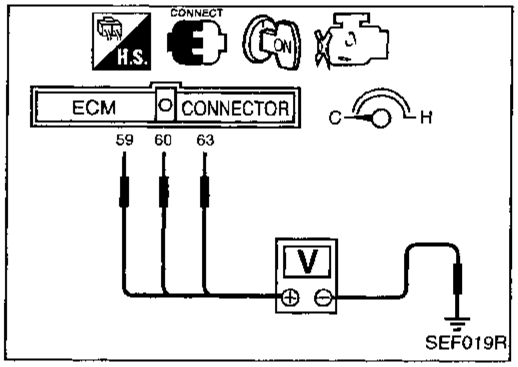
Procedure for malfunctions A and B

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, EC-207.
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 and P1400, EC-207 and 264.



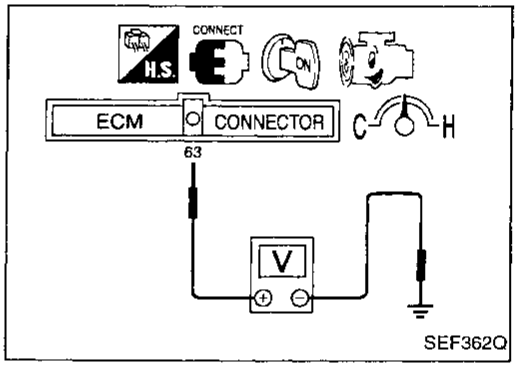
SEF360Q

OR



SEF019R

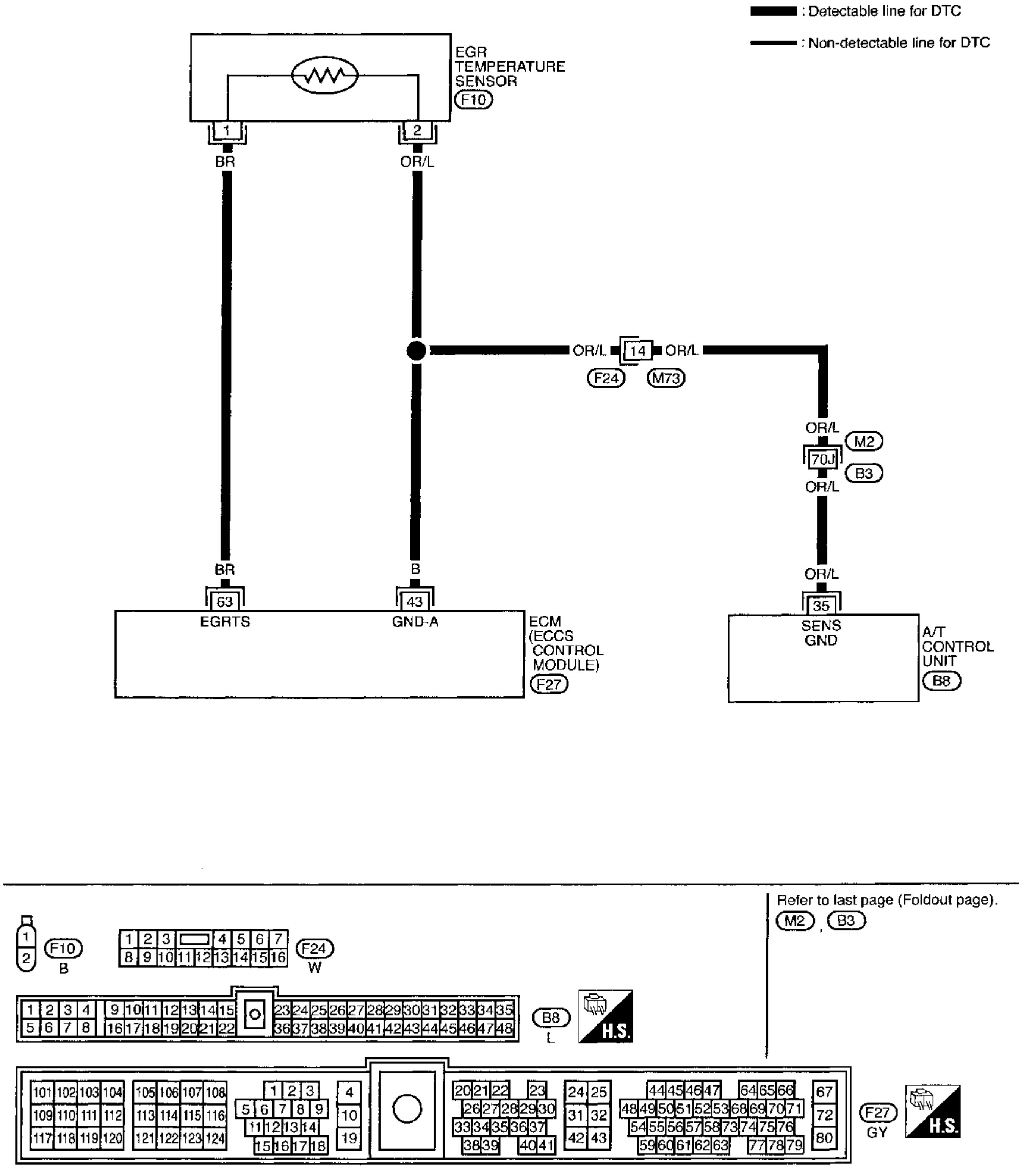
1) Turn ignition switch "ON".
2) Confirm that voltage between ECM terminals (59), (60) and ground are more than 2.72V. (If necessary, wait until engine coolant temperature and intake air temperature equal atmospheric temperature.)
3) Confirm that voltage between ECM terminal (63) and ground is between 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, EC-207.
7) Check voltage between ECM terminal (63) 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 and P1400, EC-207 and 264.



SEF362Q

EGR Temperature Sensor (DTC: 0305) (Cont'd)

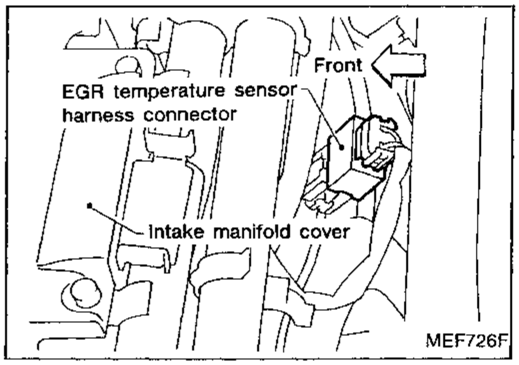
EC-EGR/TS-01

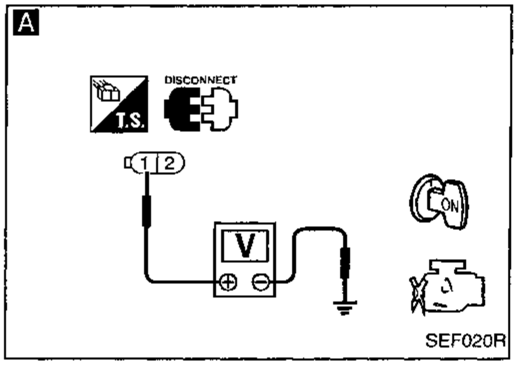


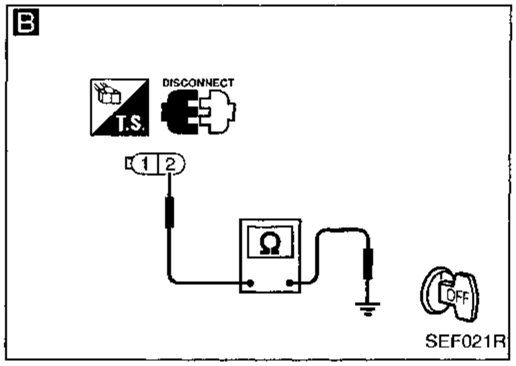
SEF709Q

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 F24, M73
- Harness connectors M2, B3
- Harness for open or short between ECM and EGR temperature sensor
- 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" on next page.

NG → Replace EGR temperature sensor.

↓ OK

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

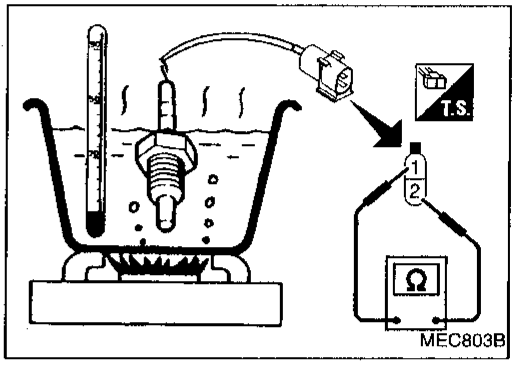
↓ Trouble is not fixed.

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

↓

INSPECTION END

EGR Temperature Sensor (DTC: 0305) (Cont'd)



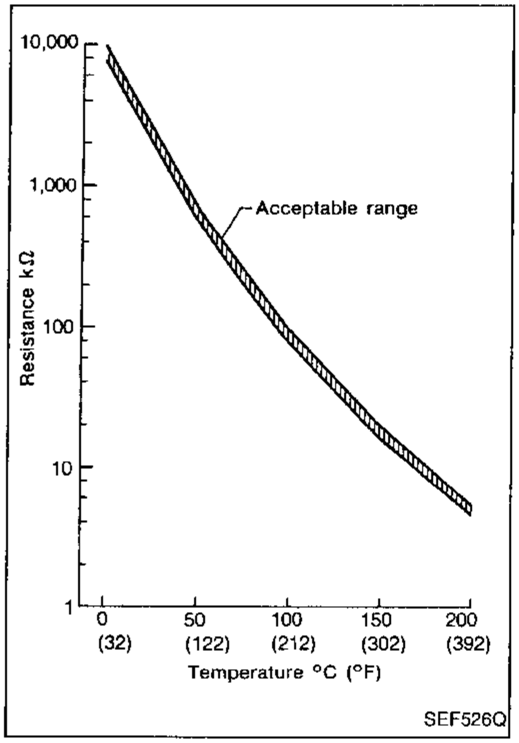
COMPONENT INSPECTION

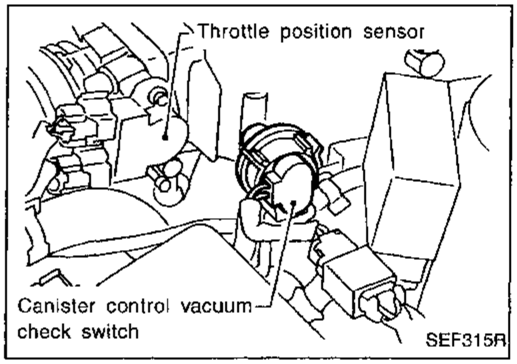
EGR temperature sensor

Check resistance as shown in the figure.
⟨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.





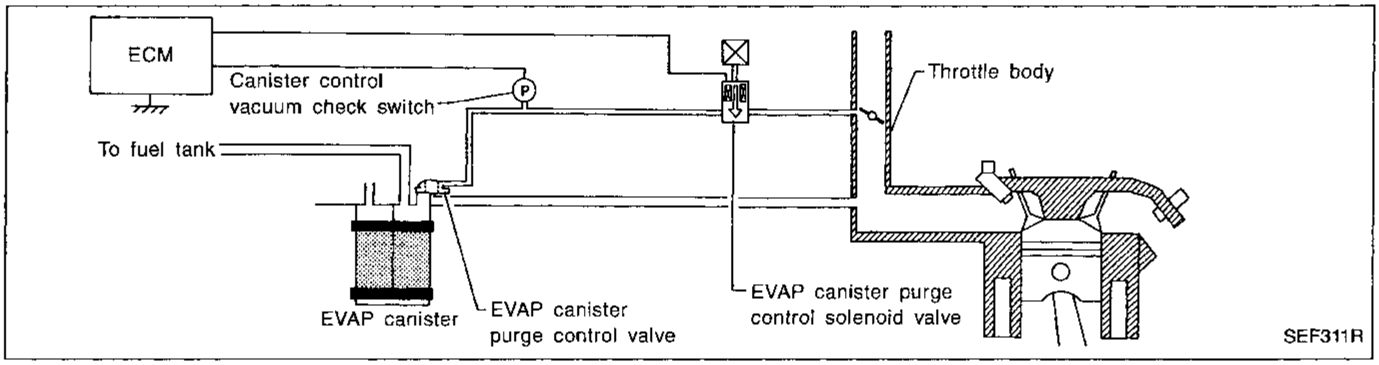
Canister Control Vacuum Check Switch (DTC: 0113)

COMPONENT DESCRIPTION

Canister control vacuum check switch

The canister control vacuum check switch is installed in the vacuum line between EVAP canister purge control solenoid valve and EVAP canister purge control valve (built into EVAP canister). The switch detects vacuum signal to the EVAP canister purge control valve, and sends an "ON" or "OFF" signal to the ECM. When no vacuum is supplied to the valve, the canister control vacuum check switch sends an "ON" signal to the ECM. When vacuum is supplied to the valve, canister control vacuum check switch sends "OFF" signal to the ECM.

The canister control vacuum check switch is not used to control the engine system. It is used only for on board diagnosis.



Diagnostic Trouble Code No.	Malfunction is detected when	Check Items (Possible Cause)
P1443 0113	The canister control vacuum check switch remains "OFF" even though no vacuum is supplied to the EVAP canister purge control valve.	• Harness or connectors (The canister control vacuum check switch circuit is open.) • Hoses (Hoses are connected incorrectly.) • Throttle position sensor • Engine coolant temperature sensor • EVAP canister purge control solenoid valve • Canister control vacuum check switch

Canister Control Vacuum Check Switch (DTC: 0113) (Cont'd)

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Turn ignition switch "ON".
4) Select "DATA MONITOR" mode with CONSULT.
5) Start engine and warm it up sufficiently.
6) Wait at least 6 seconds.

OR

GST

1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF" and wait at least 5 seconds.
3) Start engine and warm it up sufficiently.
4) Wait at least 6 seconds.
5) Select "MODE 7" with GST.

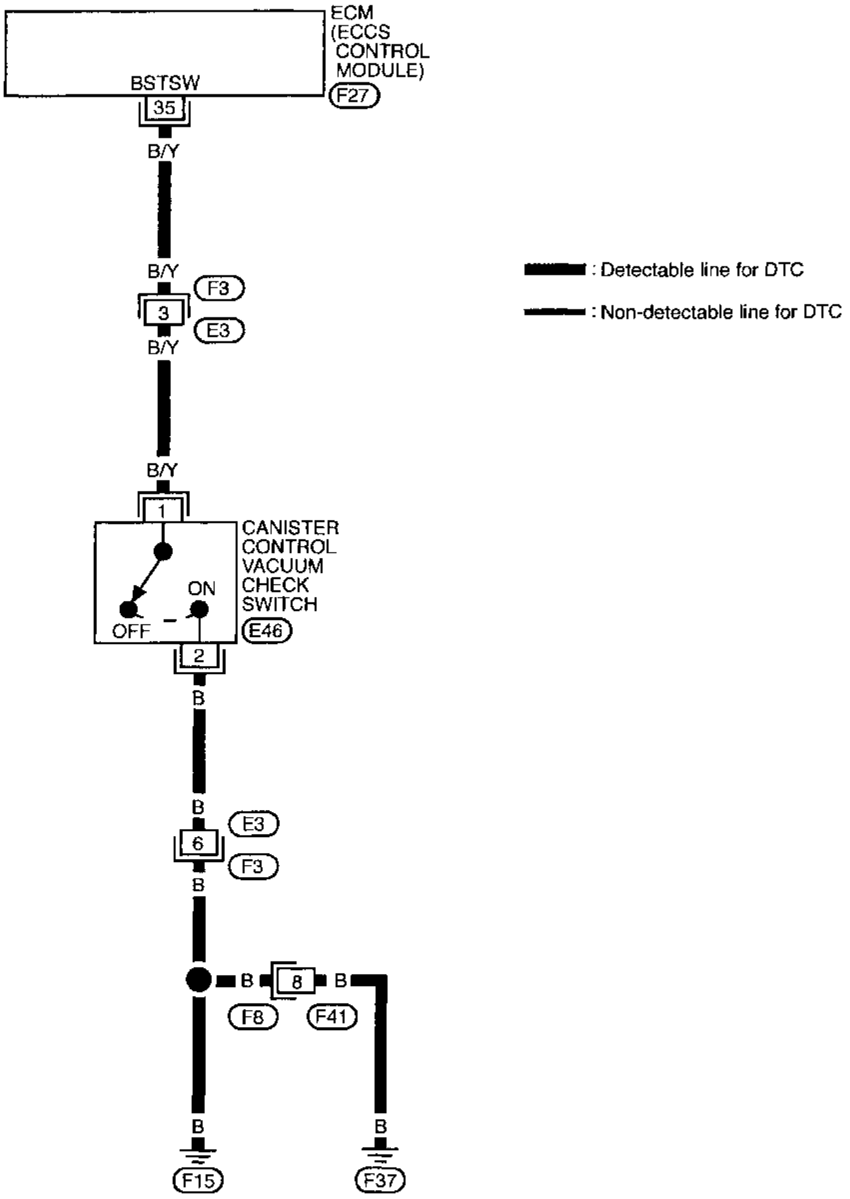
OR

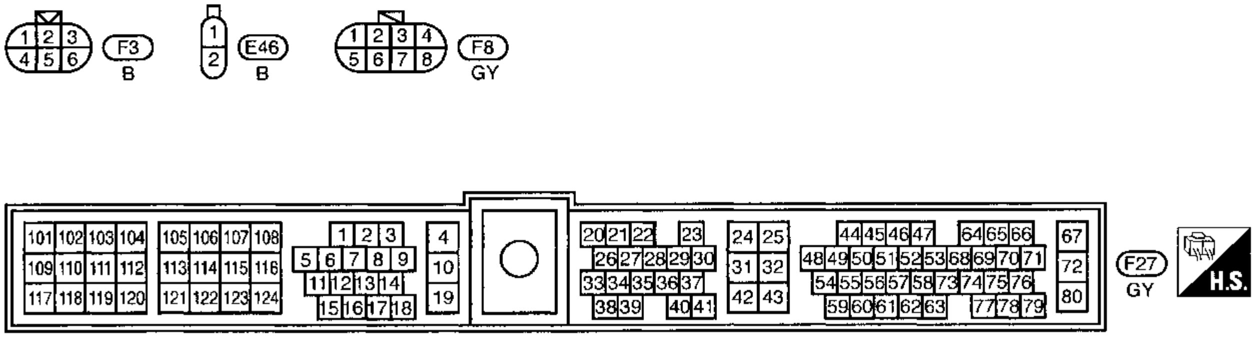
NO TOOLS

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

Canister Control Vacuum Check Switch (DTC: 0113) (Cont'd)

EC-C/VCSW-01





SEF710Q

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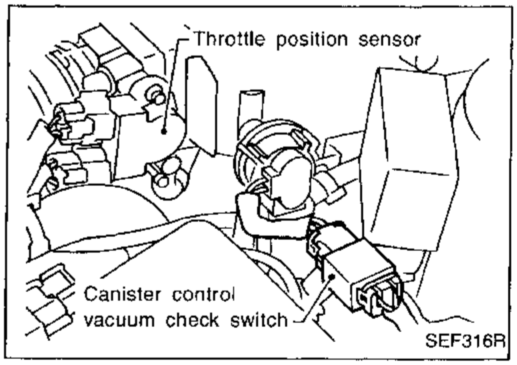
Canister Control Vacuum Check Switch (DTC: 0113) (Cont'd)

DIAGNOSTIC PROCEDURE



SEF316R

INSPECTION START

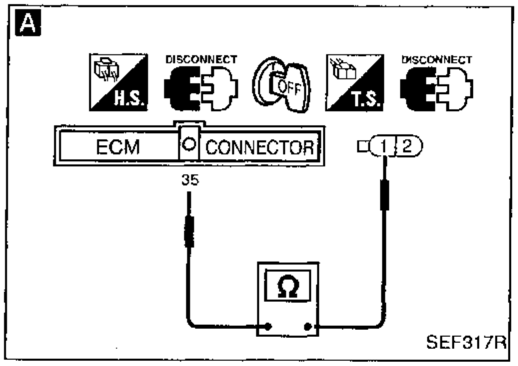
↓

CHECK HOSE BETWEEN THROTTLE BODY AND EVAP CANISTER PURGE CONTROL VALVE.
1. Turn ignition switch "OFF".
2. Check hose for improper connection.

NG → Reconnect hose correctly.

OK ↓

A



SEF317R

CHECK INPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect canister control vacuum check switch harness connector and ECM harness connector.
3. Check harness continuity between terminal ① and ECM terminal ㉟.

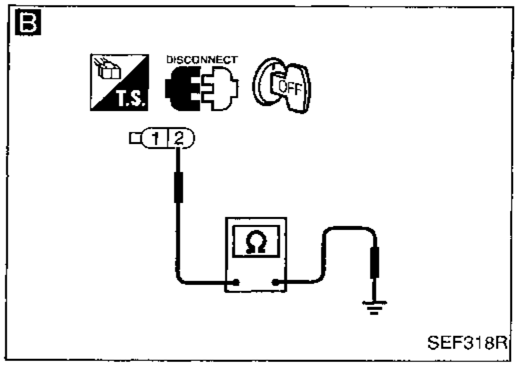
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors E3, F3
- Harness for open or short between ECM and canister control vacuum check switch

If NG, repair harness or connectors.

OK ↓

B



SEF318R

CHECK GROUND CIRCUIT.
Check harness continuity between terminal ② and engine ground.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors E3, F3
- Harness connectors F8, F41
- Harness for open or short between canister control vacuum check switch and engine ground

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT
(Throttle position sensor).
Refer to "COMPONENT INSPECTION", "TROUBLE DIAGNOSIS FOR DTC P0120", EC-129.

NG → Replace throttle position sensor.

OK ↓

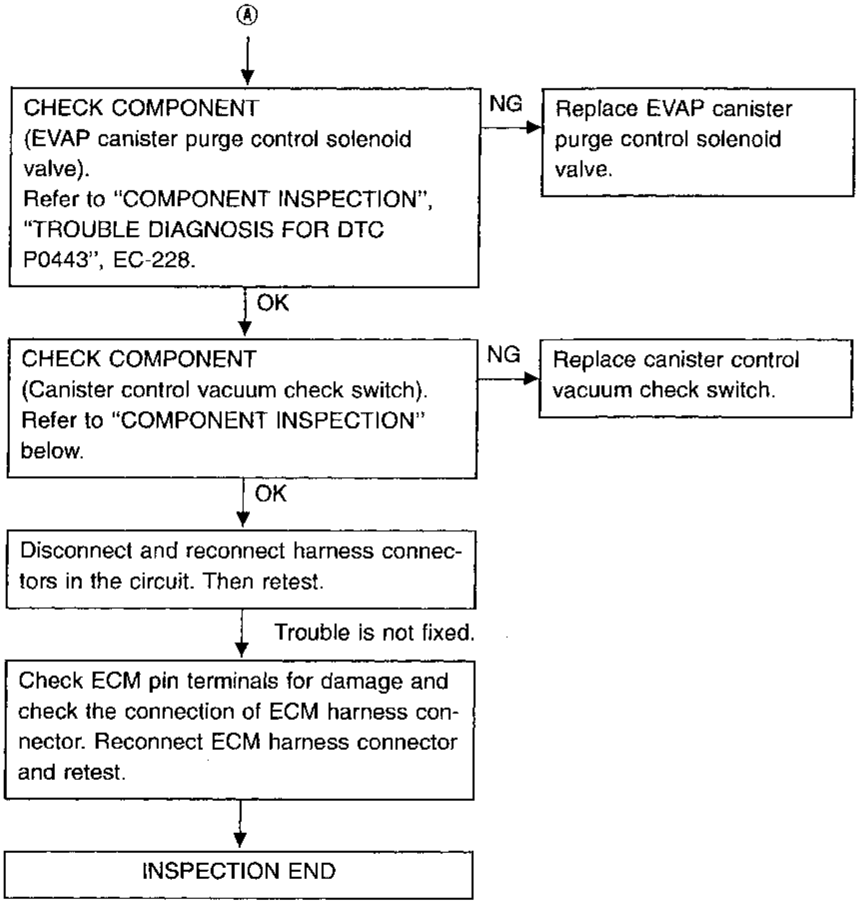
CHECK COMPONENT
(Engine coolant temperature sensor).
Refer to "COMPONENT INSPECTION", "TROUBLE DIAGNOSIS FOR DTC P0115", EC-124.

NG → Replace engine coolant temperature sensor.

OK ↓

Ⓐ

Canister Control Vacuum Check Switch (DTC: 0113) (Cont'd)



CHECK COMPONENT
(EVAP canister purge control solenoid valve).
Refer to "COMPONENT INSPECTION", "TROUBLE DIAGNOSIS FOR DTC P0443", EC-228.

NG → Replace EVAP canister purge control solenoid valve.

OK ↓

CHECK COMPONENT
(Canister control vacuum check switch).
Refer to "COMPONENT INSPECTION" below.

NG → Replace canister control vacuum check switch.

OK ↓

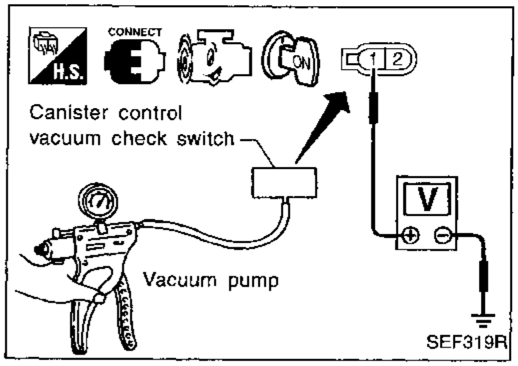
Disconnect and reconnect harness connectors in the circuit. Then retest.

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

Canister control vacuum check switch

1. Disconnect hose from canister control vacuum check switch.
2. Use vacuum pump to apply vacuum to canister control vacuum check switch as shown in figure.
3. Start engine.
4. Check voltage between terminal ① and engine ground with CONSULT or tester.

Pressure	Voltage (V)
More than −10.7 kPa (−80 mmHg, −3.15 inHg)	Engine ground
−10.7 to −14.7 kPa (−80 to −110 mmHg, −3.15 to −4.33 inHg)	Engine ground or Approx. 8.5
Less than −14.7 kPa (−110 mmHg, −4.33 inHg)	Approx. 8.5

5. If NG, replace canister control vacuum check switch.

A/T Diagnosis Communication Line (DTC: 0804)

The malfunction information related to A/T (Automatic Transmission) 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 unit is sent to ECM.	• Harness or connectors (The communication line circuit between ECM and A/T control unit is open or shorted.) • A/T control unit • Dead (Weak) battery

DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE

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

1) Turn ignition switch "ON".
2) Select "DATA MONITOR" mode with CONSULT.
3) Start engine and let it idle for at least 40 seconds.

OR

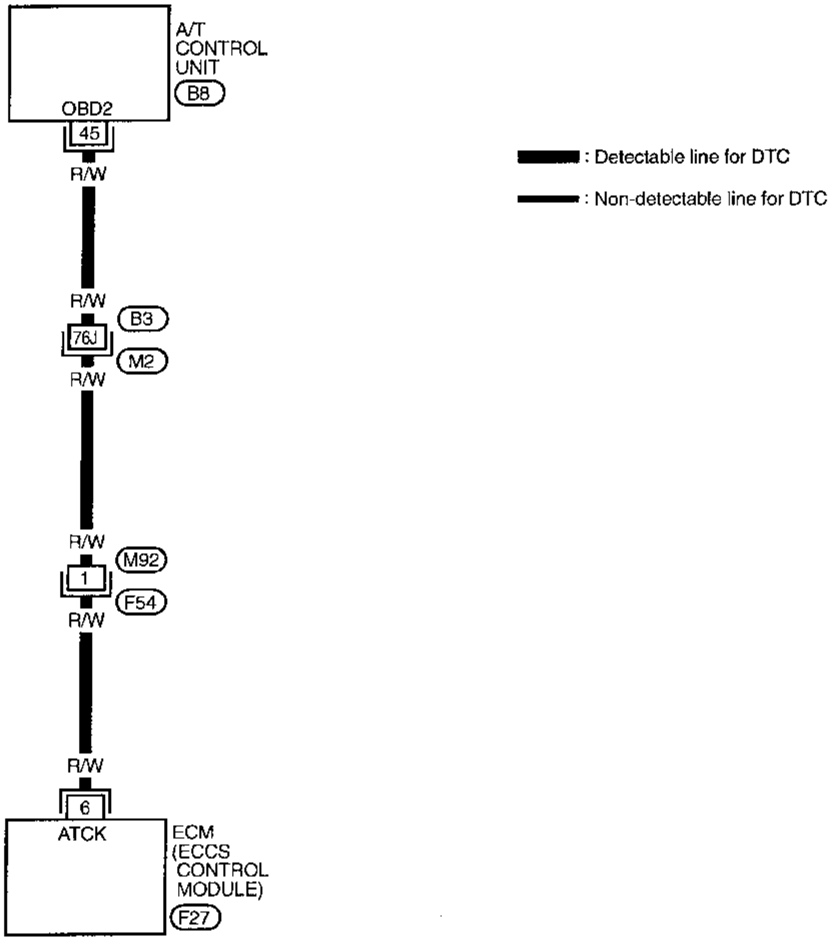
GST
1) Start engine and let it idle for at least 40 seconds.
2) Select "MODE 7" with GST.

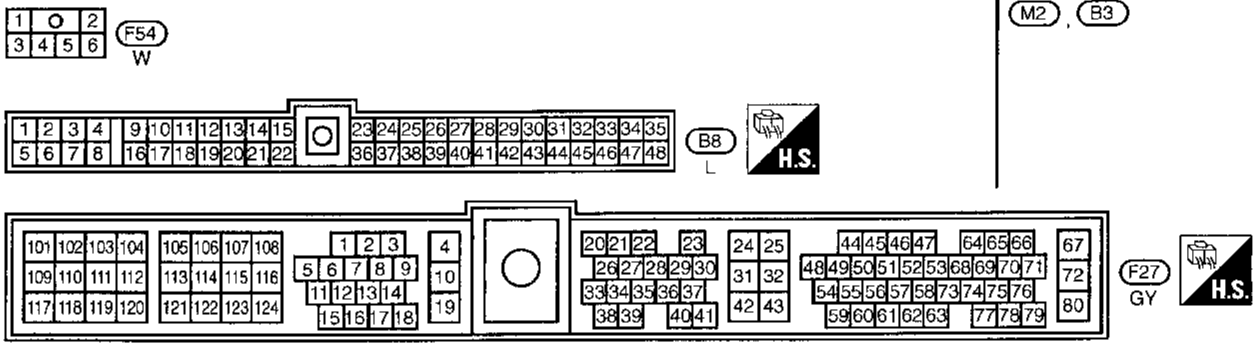
OR

NO TOOLS
1) Start engine and let it idle for at least 40 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.

A/T Diagnosis Communication Line (DTC: 0804) (Cont'd)

EC-ATDIAG-01





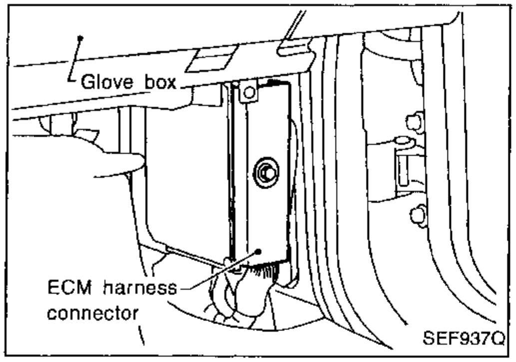
Refer to last page (Foldout page).

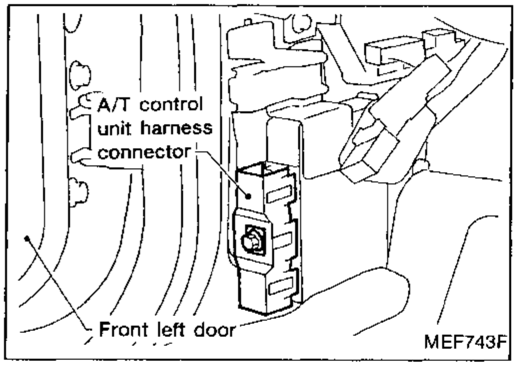
M2, B3

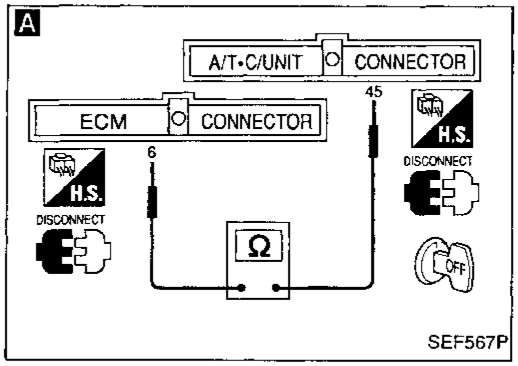
SEF711Q

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 ⑥ and terminal ㊺.
   Continuity should exist.
   If OK, check harness for short.

NG →

Check the following.
- Harness connectors F54, M92
- Harness connectors M2, B3
- 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.

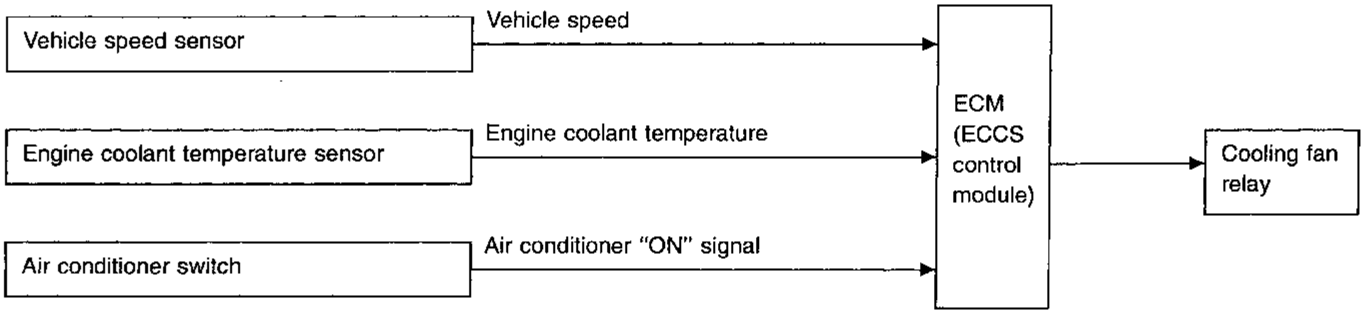
Check ECM and A/T control unit pin terminals for damage and check the connection of ECM and A/T control unit harness connectors. Reconnect ECM and A/T control unit harness connectors and retest.

↓

INSPECTION END

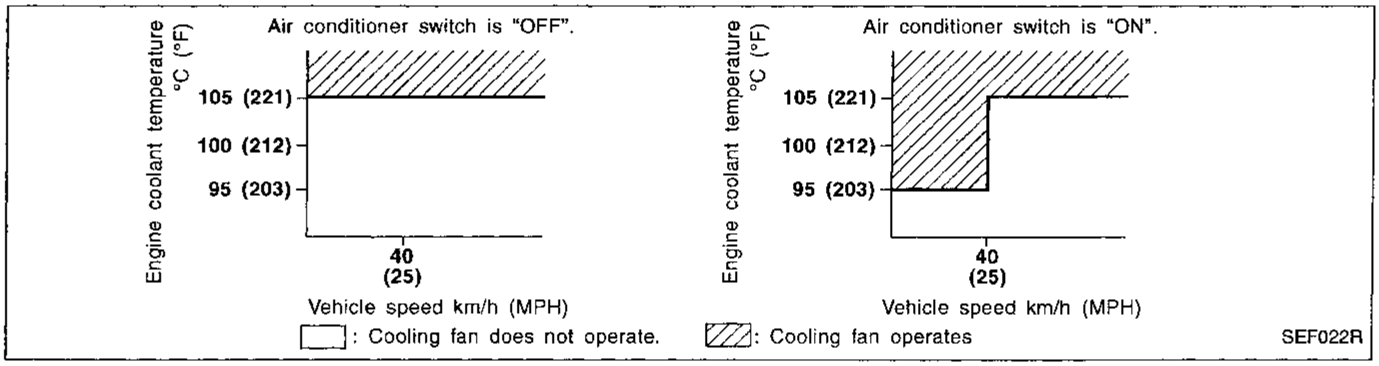
Cooling Fan (DTC: 1308)

SYSTEM DESCRIPTION



The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature and air conditioner ON signal. The control system has 2-step control [ON/OFF].

Operation



ON BOARD DIAGNOSIS LOGIC

This diagnosis continuously monitors the engine coolant temperature.
If the cooling fan or another component in the cooling system malfunctions, the engine coolant temperature will rise.
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

Diagnostic trouble code No.	Malfunction is detected when ...	Check Items (Possible Cause)
P1900 1308	• Cooling fan does not operate properly (Overheat). • Cooling system does not operate properly (Overheat). • Engine coolant was not added to the system using the proper filling method.	• Harness or connectors. (The cooling fan circuit is open or shorted.) • Cooling fan • Radiator hose • Radiator • Radiator cap • Water pump • Thermostat For more information, refer to "MAIN 12 CAUSES OF OVERHEATING", EC-286.

CAUTION:
When a malfunction is indicated, be sure to replace the coolant following the procedure in the MA section ("Changing Engine Coolant", "ENGINE MAINTENANCE"). Also, replace the engine oil.

a. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA section ("Anti-freeze Coolant Mixture Ratio", "RECOMMENDED FLUIDS AND LUBRICANTS").

b. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

Cooling Fan (DTC: 1308) (Cont'd)

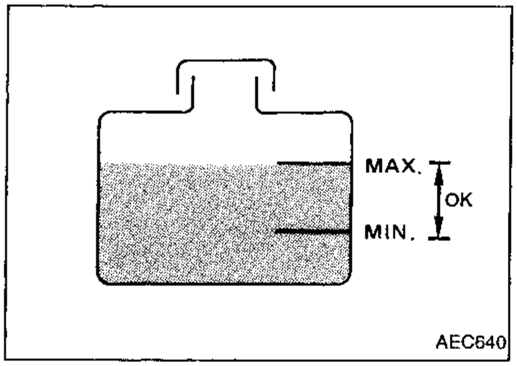
OVERALL FUNCTION CHECK

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

WARNING:

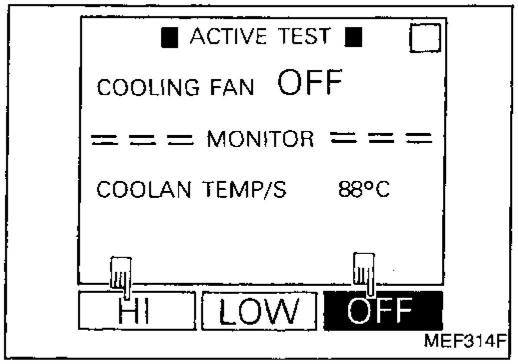
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.



AEC640

1) Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to "DIAGNOSTIC PROCEDURE", EC-284.
2) Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to "DIAGNOSTIC PROCEDURE", EC-284.



■ ACTIVE TEST ■ ☐

COOLING FAN OFF

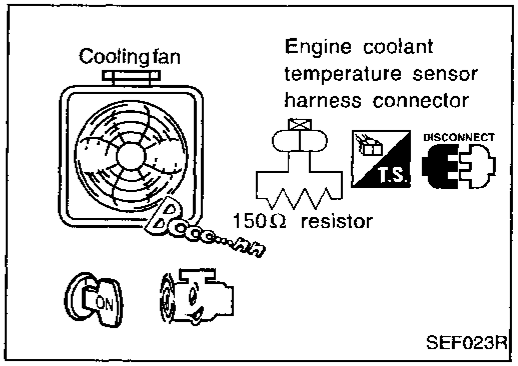
=== MONITOR ===

COOLAN TEMP/S 88°C

MEF314F

3) Turn ignition switch "ON".
4) Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT (LOW speed and HI speed).

OR

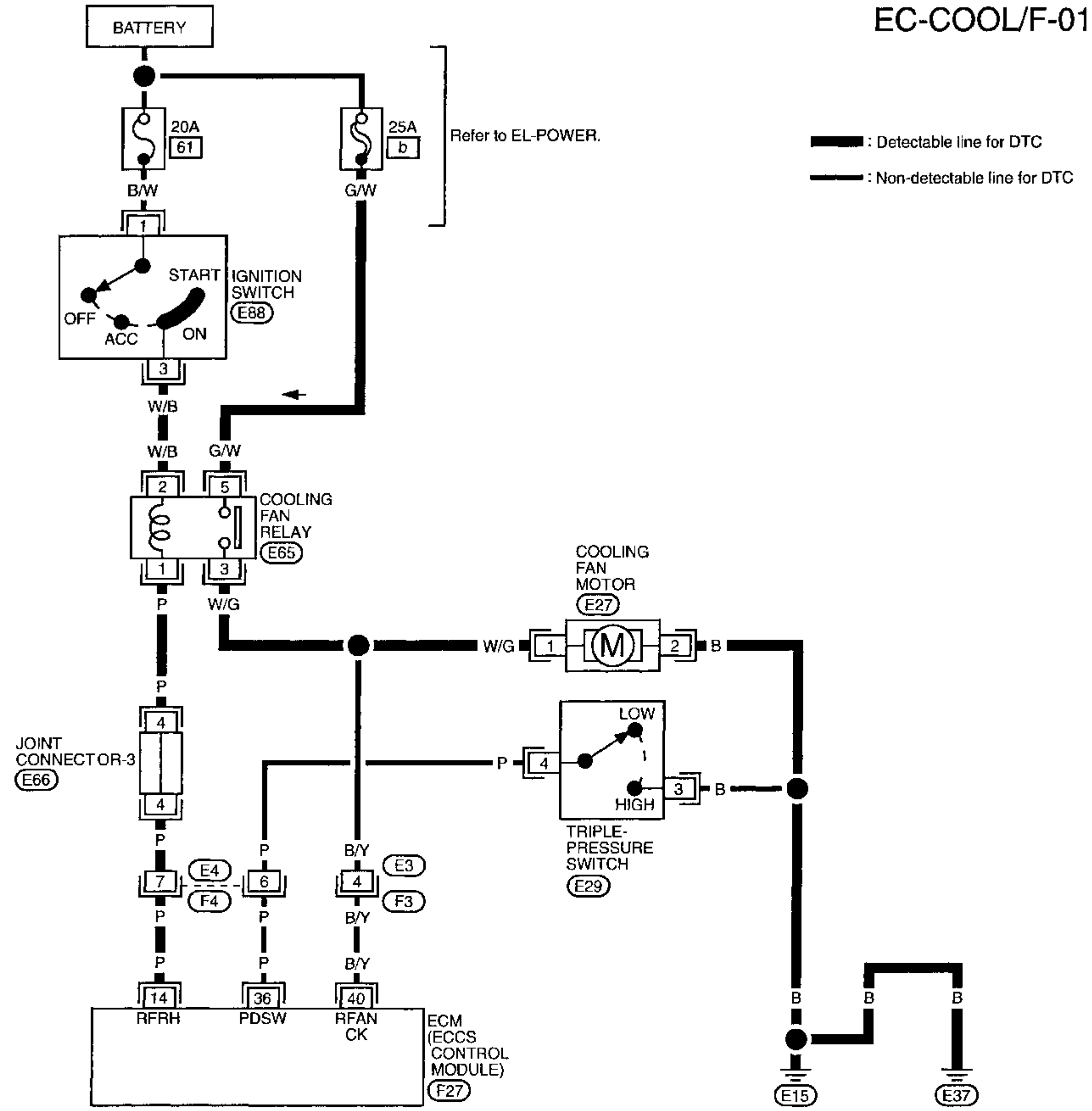


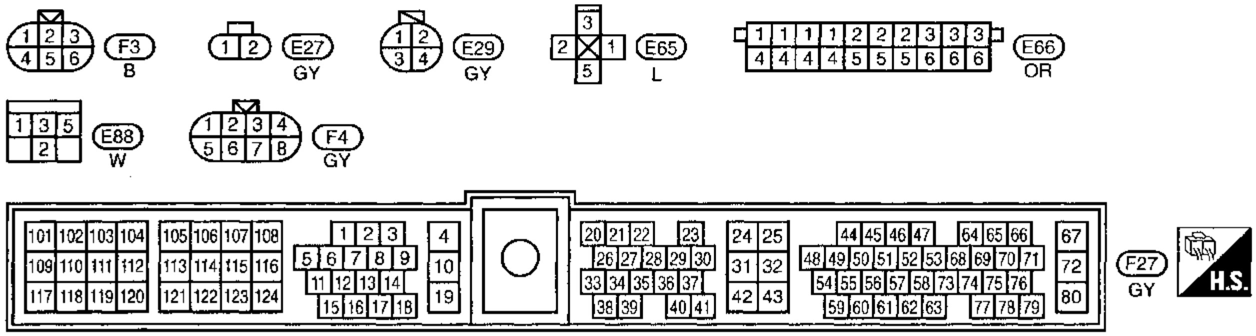
SEF023R

3) Disconnect engine coolant temperature sensor harness connector.
4) Connect 150Ω resistor to engine coolant temperature sensor harness connector.
5) Start engine and make sure that cooling fan operates.
   Be careful not to overheat engine.

Cooling Fan (DTC: 1308) (Cont'd)

EC-COOL/F-01





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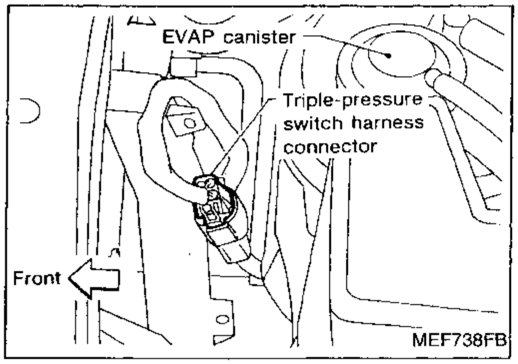
Cooling Fan (DTC: 1308) (Cont'd)

DIAGNOSTIC PROCEDURE



INSPECTION START

A

CHECK COOLING FAN OPERATION.

1. Disconnect triple-pressure switch harness connector.
2. Turn ignition switch "ON".
3. Perform "COOLING FAN CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

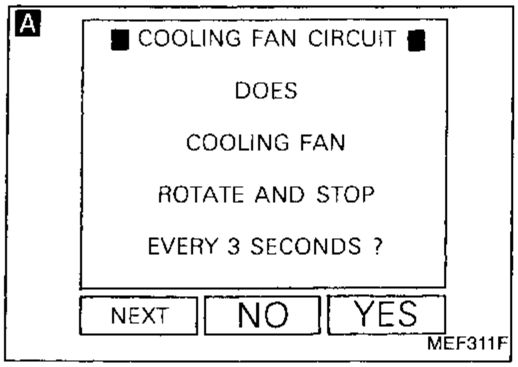
2. Turn ignition switch "ON".
3. Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.
   - **The cooling fan control system carries out the 2-step control [ON/OFF] while "OFF", "LOW" and "HI" are being displayed on the CONSULT screen.**
4. Select "OFF" or "HI" and check the cooling fan operation.

OR

2. Disconnect engine coolant temperature sensor harness connector.
3. Connect 150Ω resistor to engine coolant temperature harness connector.
4. Start engine and make sure that cooling fan operates.

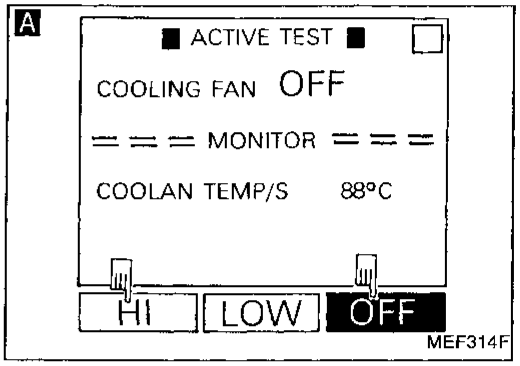
NG → Check cooling fan control circuit. (Go to PROCEDURE A.)

OK ↓



■ COOLING FAN CIRCUIT ■

DOES COOLING FAN ROTATE AND STOP EVERY 3 SECONDS ?

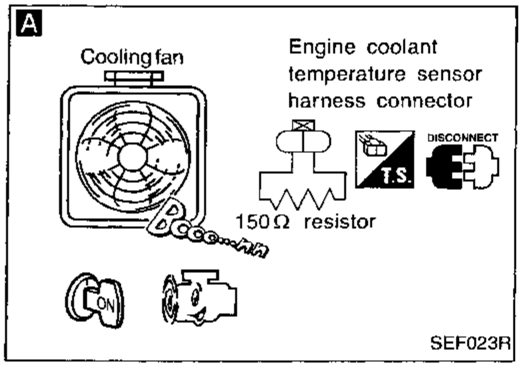


■ ACTIVE TEST ■

COOLING FAN OFF

=== MONITOR ===

COOLAN TEMP/S 88°C



B

CHECK TRIPLE-PRESSURE SWITCH CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal ㊱ and terminal ④, terminal ③ and body ground.

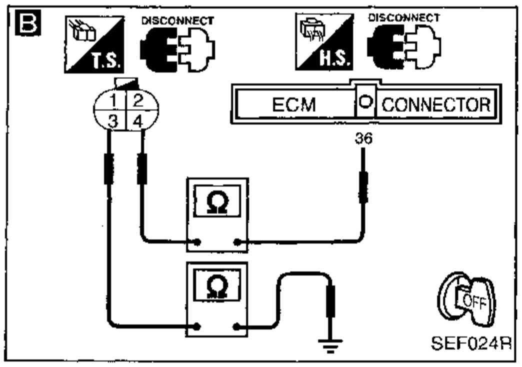
Continuity should exist.

If OK, check harness for short.

NG → Check the following.
- Harness connectors F4, E4
- Harness for open or short between ECM and triple-pressure switch
- Harness for open or short between triple-pressure switch and body ground

If NG, repair harness or connectors.

OK ↓



CHECK COMPONENT (Triple-pressure switch).

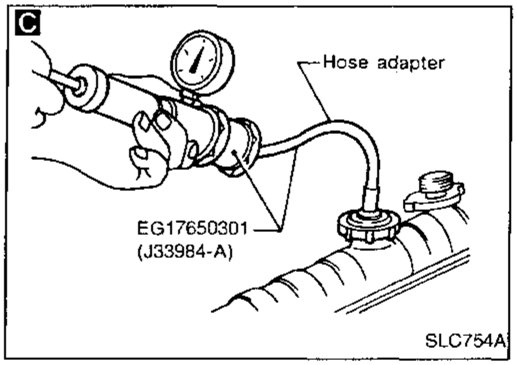
Refer to HA section ("Electrical Components Inspection", "TROUBLE DIAGNOSES").

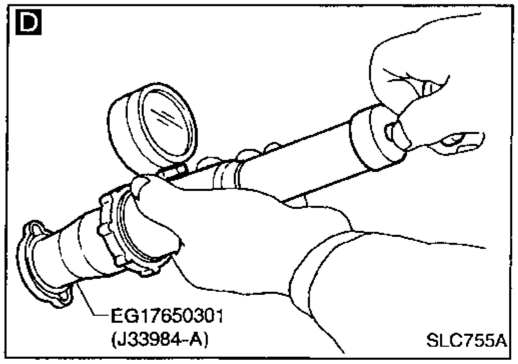
NG → Replace triple-pressure switch.

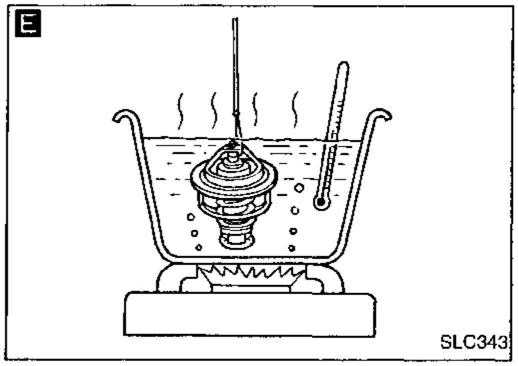
OK ↓

Ⓐ

Cooling Fan (DTC: 1308) (Cont'd)







Ⓐ

C

CHECK COOLING SYSTEM FOR LEAK.
Apply pressure to the cooling system with a tester, and check if the pressure drops.
Testing pressure:
157 kPa (1.6 kg/cm², 23 psi)
Pressure should not drop.
CAUTION:
Higher than the specified pressure may cause radiator damage.

NG → Check the following for leak.
- Hose
- Radiator
- Water pump

Refer to LC section ("Water Pump").

OK

D

CHECK RADIATOR CAP.
Apply pressure to cap with a tester.
Radiator cap relief pressure:
78 - 98 kPa (0.8 - 1.0 kg/cm², 11 - 14 psi)

NG → Replace radiator cap.

OK

E

CHECK THERMOSTAT.
1. Check valve seating condition at normal room temperatures.
   It should seat tightly.
2. Check valve opening temperature and maximum valve lift.
   Valve opening temperature:
   76.5°C (170°F) [standard]
   Maximum valve lift:
   More than 10 mm/90°C (0.39 in/194°F)
3. Check if valve is closed at 5°C (41°F) below valve opening temperature.

For details, refer to LC section ("Thermostat").

NG → Replace thermostat

OK

Check engine coolant temperature sensor. Refer to "COMPONENT INSPECTION", EC-124.

NG → Replace engine coolant temperature sensor.

↓

If the cause can not be isolated, go to "MAIN 12 CAUSES OF OVERHEATING" on next page.

↓

INSPECTION END

Perform FINAL CHECK by the following procedure after repair is completed.

1. Warn up engine. Run the vehicle for at least 20 minutes. Pay attention to engine coolant temperature gauge on the instrument panel. If the reading shows an abnormally high temperature, another part may be malfunctioning.
2. Stop vehicle and let engine idle. Check the intake and exhaust systems for leaks by listening for noise or visually inspecting the components.
3. Allow engine to cool and visually check for oil and coolant leaks. Then, perform "OVERALL FUNCTION CHECK".

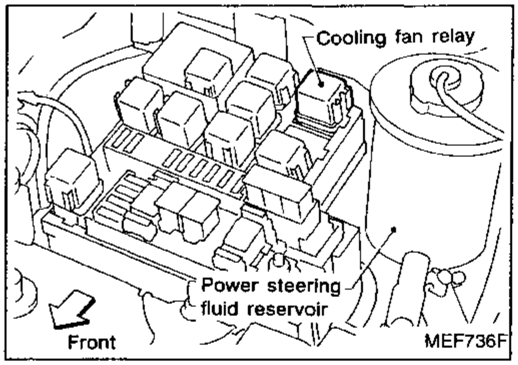
Cooling Fan (DTC: 1308) (Cont'd)

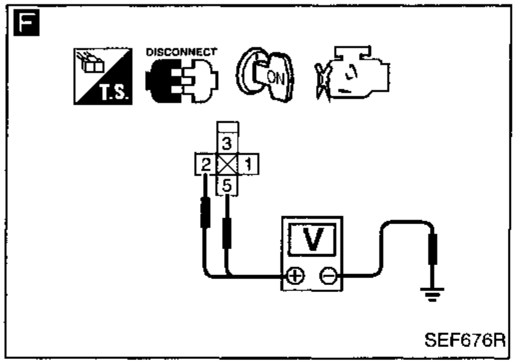
MAIN 12 CAUSES OF OVERHEATING

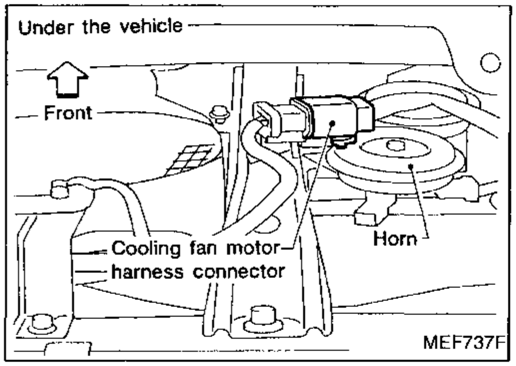
Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	See "RECOMMENDED FLUIDS AND LUBRICANTS" in MA section
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See "Changing Engine Coolant", "ENGINE MAINTENANCE" in MA section
	4	• Radiator cap	• Pressure tester	78 - 98 kPa (0.8 - 1.0 kg/cm^2, 11 - 14 psi) 59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	See "System Check" "ENGINE COOLING SYSTEM" in LC section
ON*2	5	• Coolant leaks	• Visual	No leaks	See "System Check" "ENGINE COOLING SYSTEM" in LC section
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See "Thermostat" and "Radiator", "ENGINE COOLING SYSTEM" in LC section
ON*1	7	• Cooling fan	• CONSULT	Operating	See "TROUBLE DIAGNOSIS FOR DTC P1900", EC-281.
OFF	8	• Combustion gas leak	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	See "Changing Engine Coolant", "ENGINE MAINTENANCE" in MA section
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See "ENGINE MAINTENANCE" in MA section
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1mm (0.004 in) Maximum distortion (warping)	See "Inspection", "CYLINDER HEAD" in EM section
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See "Inspection", "CYLINDER BLOCK" in EM section

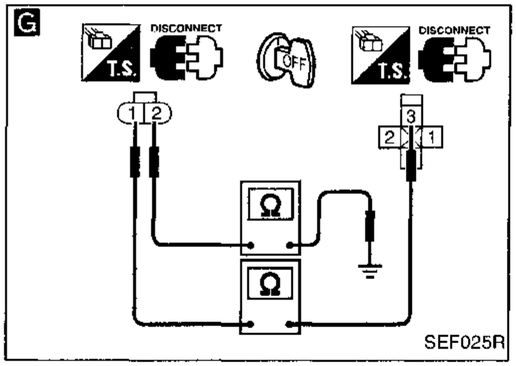
*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.
*4: After 60 minutes of cool down time.
For more information, refer to "OVERHEATING CAUSE ANALYSIS" in LC section.

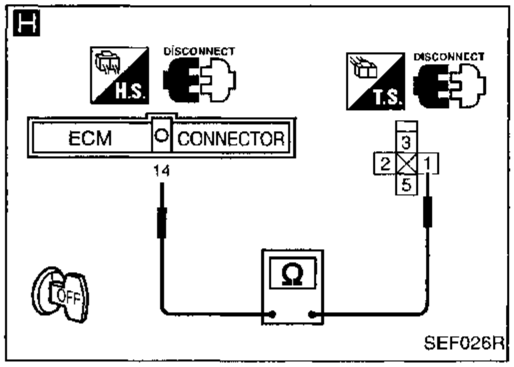
Cooling Fan (DTC: 1308) (Cont'd)











PROCEDURE A

INSPECTION START

↓

F

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect cooling fan relay.
3. Turn ignition switch "ON".
4. Check voltage between terminals ②, ⑤ and ground with CONSULT or tester.

Voltage: Battery voltage

NG → Check the following.
- 25A fusible link
- Harness continuity between cooling fan relay and fusible link
- Harness continuity between cooling fan relay and ignition switch

If NG, repair harness or connectors.

OK ↓

G

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect cooling fan motor harness connector.
3. Check harness continuity between terminal ③ and terminal ①, terminal ② and body ground.

Continuity should exist.

If OK, check harness for short.

NG → Repair harness or connectors.

OK ↓

H

CHECK OUTPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ⑭ and terminal ①.

Continuity should exist.

If OK, check harness for short.

NG → Check the following.
- Harness connectors (F4), (E4)
- Joint connector-3
- Harness for open or short between cooling fan relay and ECM

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT (Cooling fan relay).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace cooling fan relay.

OK ↓

Ⓑ

Cooling Fan (DTC: 1308) (Cont'd)

Ⓑ

CHECK COMPONENT
(Cooling fan motor).
Refer to "COMPONENT INSPECTION" below.

NG → Replace cooling fan motor.

↓ OK

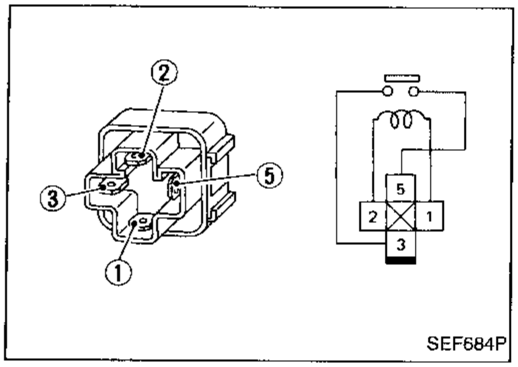
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ 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



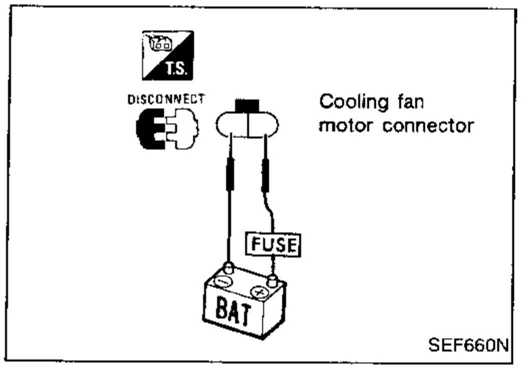
SEF684P

COMPONENT INSPECTION

Cooling fan relay

Check continuity between terminals ③ and ⑤.

Conditions	Continuity
12V direct current supply between terminals ① and ②	Yes
No current supply	No



SEF660N

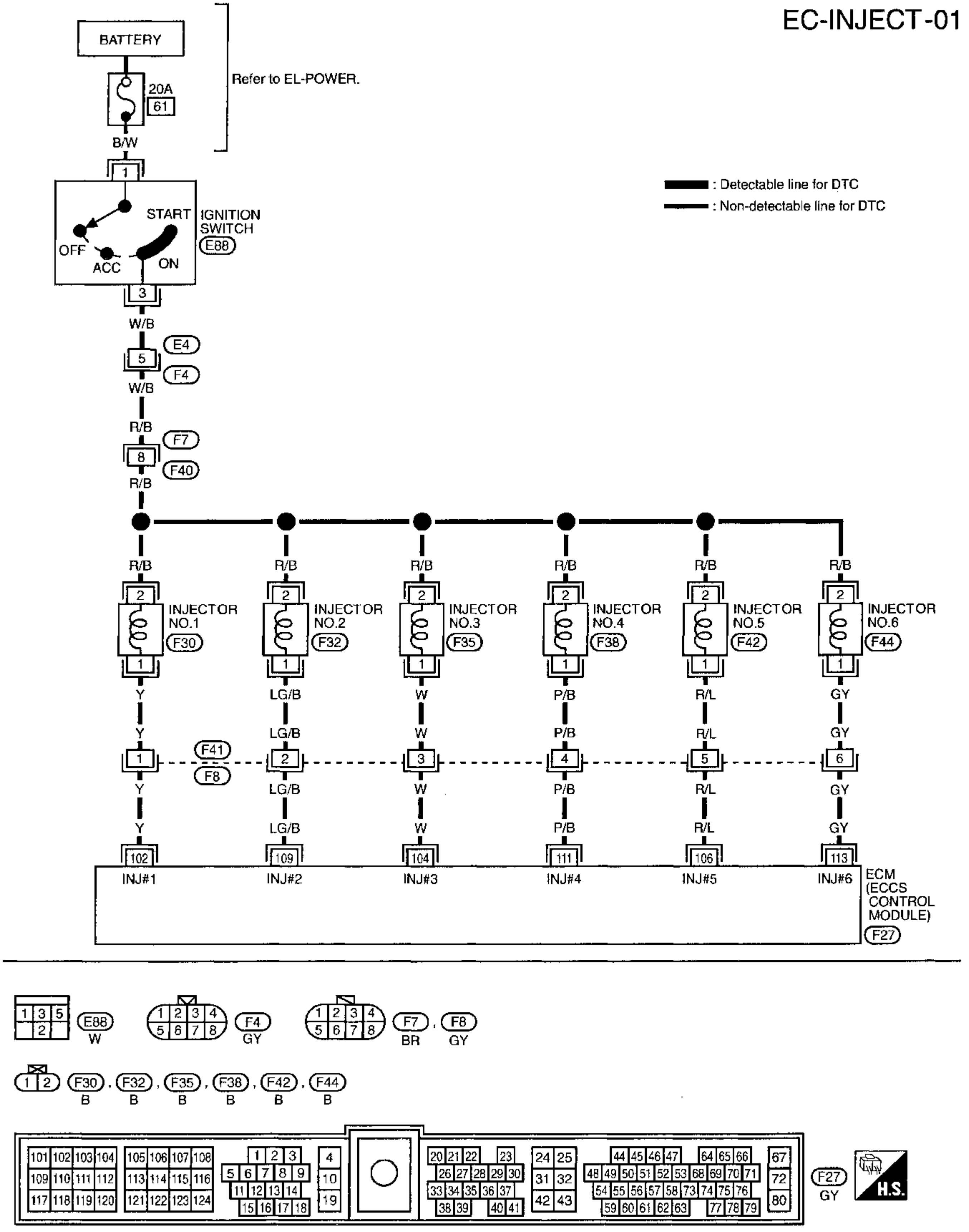
Cooling fan motor

1. Disconnect cooling fan motor harness connector.
2. Supply cooling fan motor terminals with battery voltage and check operation.

Cooling fan motor should operate.

If NG, replace cooling fan motor.

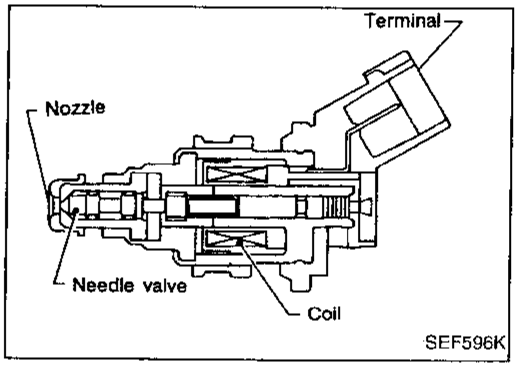
Injector



TEC144

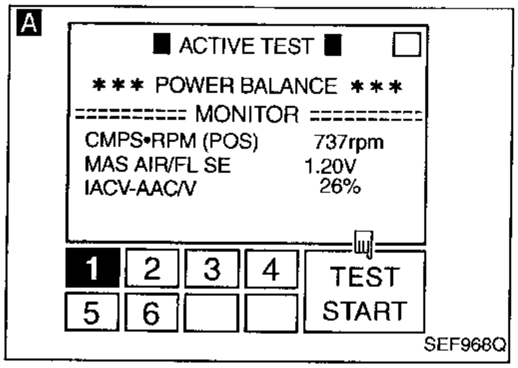
Injector (Cont'd)

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

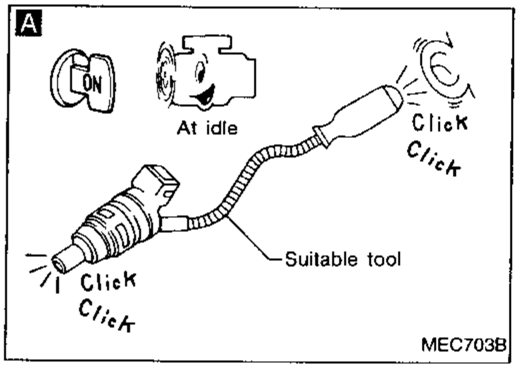


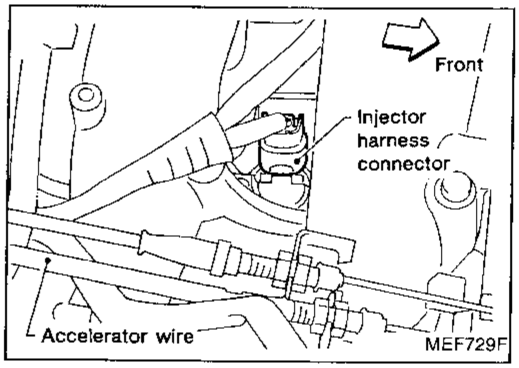
■ ACTIVE TEST ■ ☐

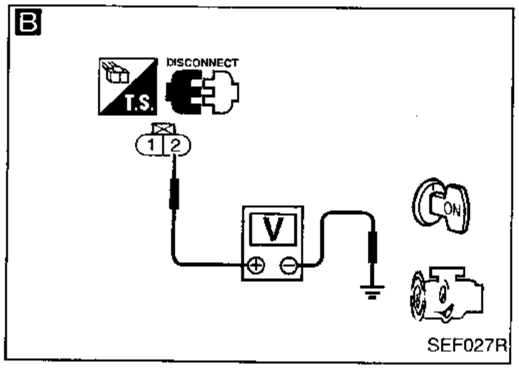
*** POWER BALANCE ***

========== MONITOR ==========

CMPS•RPM (POS)	737rpm
MAS AIR/FL SE	1.20V
IACV-AAC/V	26%







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

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 connectors.
3. Turn ignition switch "ON".
4. Check voltage between terminal ② and ground with CONSULT or tester.
Voltage: Battery voltage

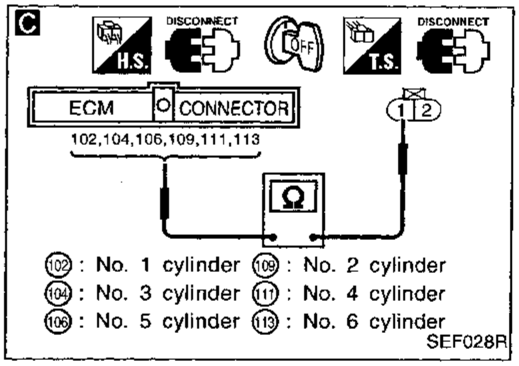
NG → Check the following.
- Harness connectors E4, F4
- Harness connectors F7, F40
- Harness for open or short between injector and ignition switch

If NG, repair harness or connectors.

OK ↓

Ⓐ

Injector (Cont'd)



SEF028R

Ⓐ

C

CHECK OUTPUT SIGNAL CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals (102), (104), (106), (109), (111), (113) and terminal ①.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors (F8), (F41)
- Harness for open or short between ECM and injector

If NG, repair harness or connectors.

↓ OK

CHECK COMPONENT (Injector).
Refer to "COMPONENT INSPECTION" below.

NG → Replace injector.

↓ OK

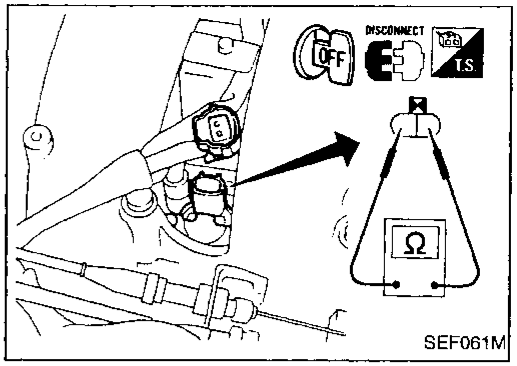
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ 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



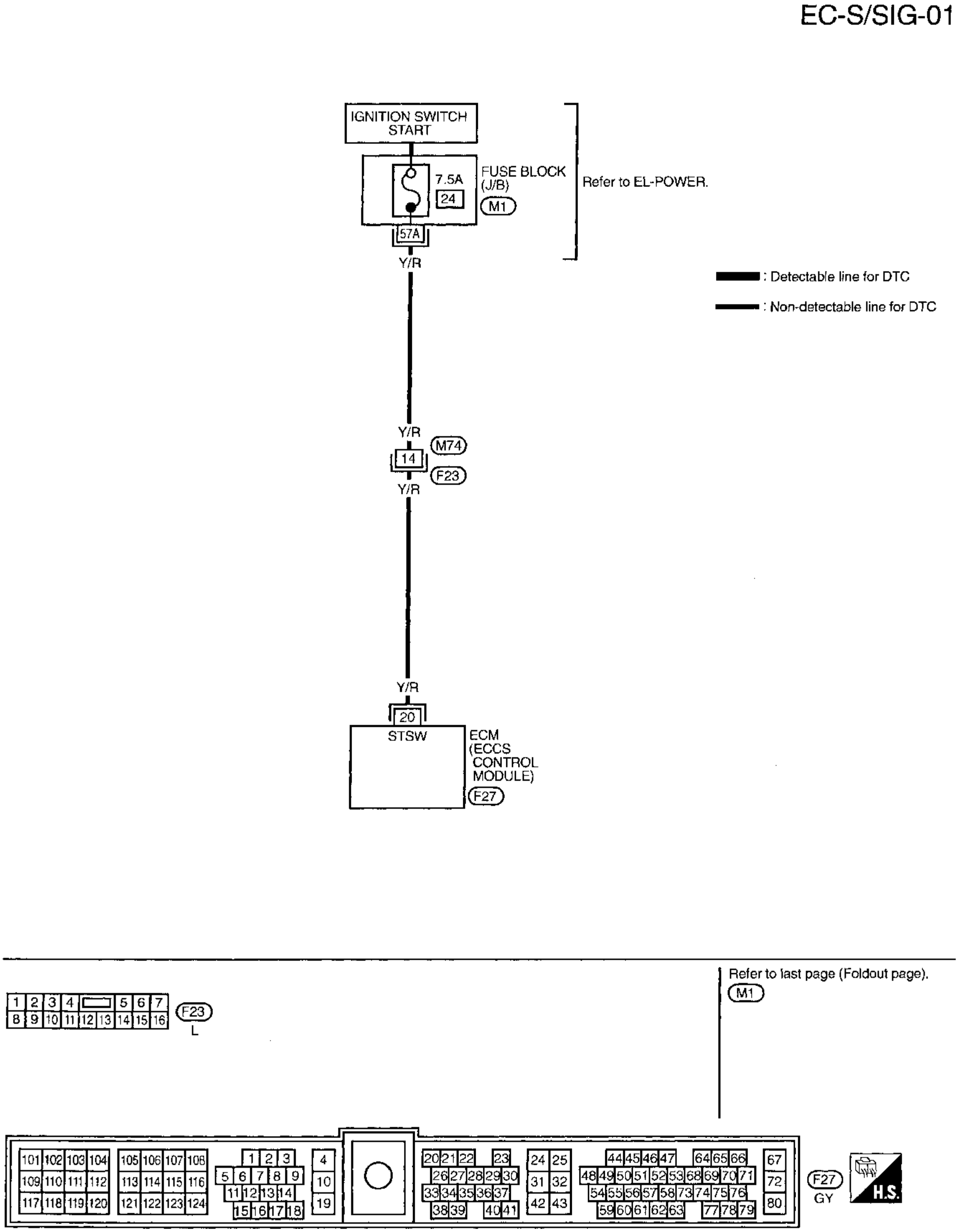
SEF061M

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



SEF714Q

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.

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"
Battery voltage
Except above
Approximately 0V

OK → INSPECTION END

↓ 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 (F23), (M74)
- Harness connector (M1)
- Harness for open or short between ECM and fuse block

If NG, repair harness or connectors.

↓ OK

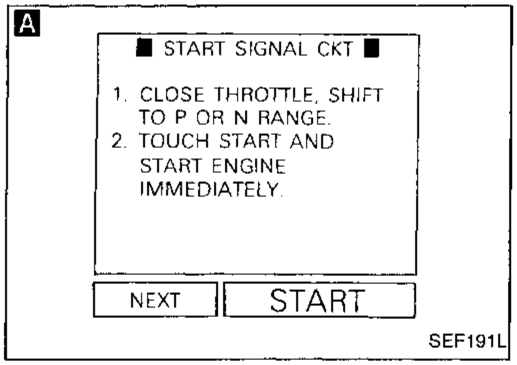
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ Trouble is not fixed.

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

↓

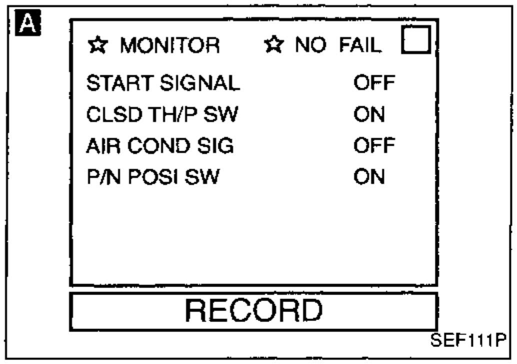
INSPECTION END



■ START SIGNAL CKT ■

1. CLOSE THROTTLE, SHIFT TO P OR N RANGE.
2. TOUCH START AND START ENGINE IMMEDIATELY.

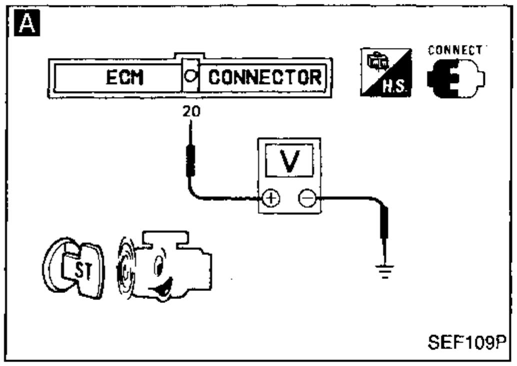
SEF191L



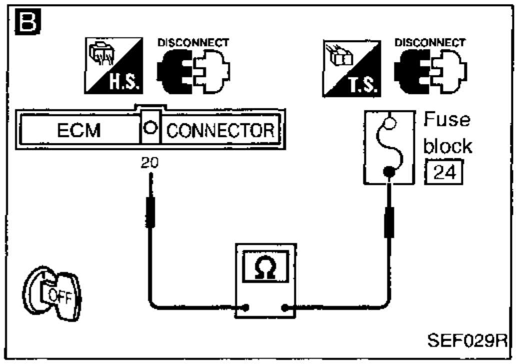
☆ MONITOR ☆ NO FAIL ☐

START SIGNAL	OFF
CLSD TH/P SW	ON
AIR COND SIG	OFF
P/N POSI SW	ON

SEF111P



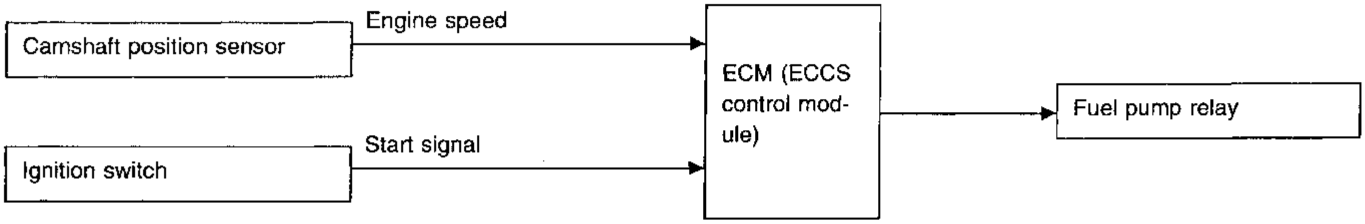
SEF109P



SEF029R

Fuel Pump Control

SYSTEM DESCRIPTION

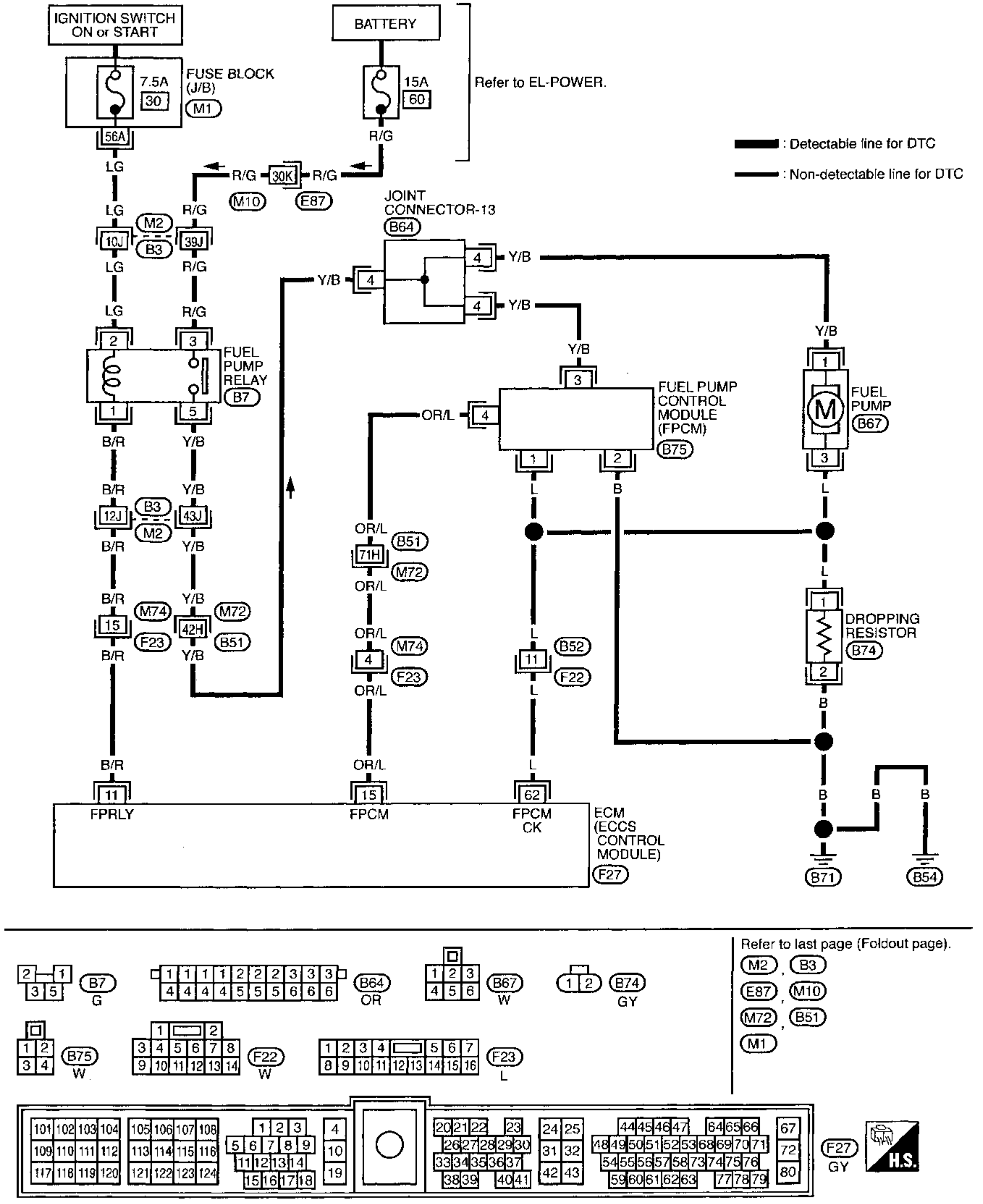


Fuel pump ON-OFF control

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine start-up. If the ECM receives a 120° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to activate. If the 120° signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents the battery from 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

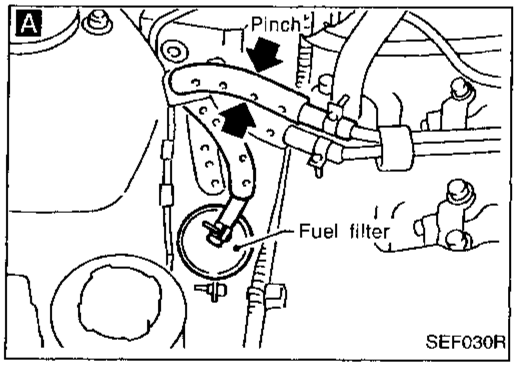
EC-F/PUMP-01

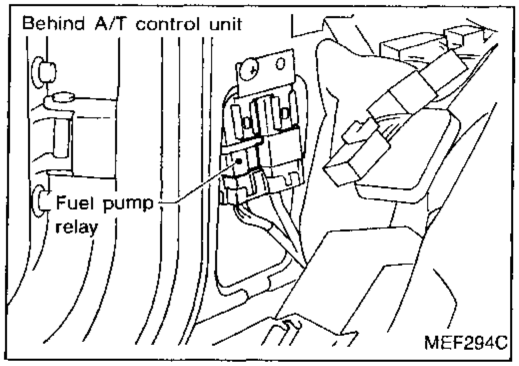


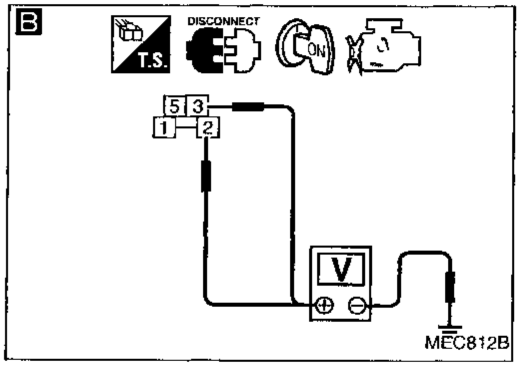
SEF715Q

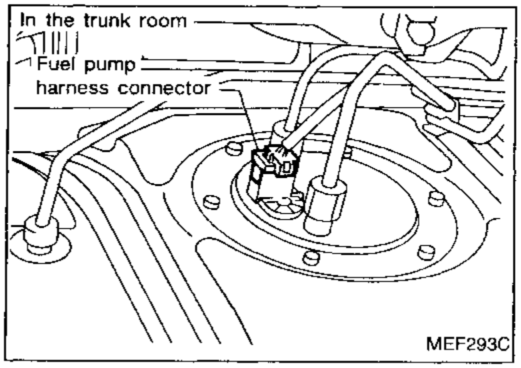
Fuel Pump Control (Cont'd)

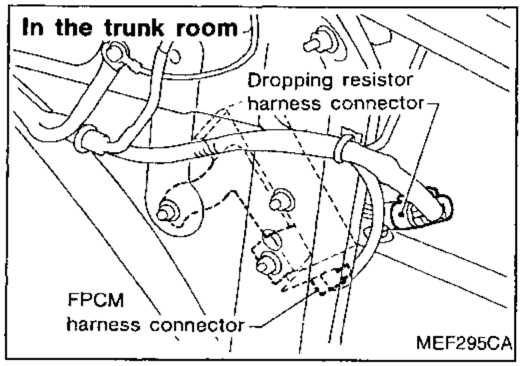
DIAGNOSTIC PROCEDURE











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 (E87), (M10)
- Harness connectors (M2), (B3)
- Harness connector (M1)
- 15A fuse
- 7.5A fuse
- Harness continuity between fuel pump relay and fuses

If NG, repair harness or connectors.

OK ↓

C

CHECK GROUND CIRCUIT.
1. Turn ignition switch "OFF".
2. Disconnect fuel pump harness connector and dropping resistor harness connector.
3. Check harness continuity between terminal ⑤ and terminal ①, terminal ③ and terminal ①, terminal ② and body ground.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors (B3), (M2)
- Harness connectors (M72), (B51)
- Joint connector-13
- Harness for open or short between fuel pump relay and fuel pump
- Harness for open or short between fuel pump and dropping resistor
- Harness for open or short between dropping resistor and body ground.

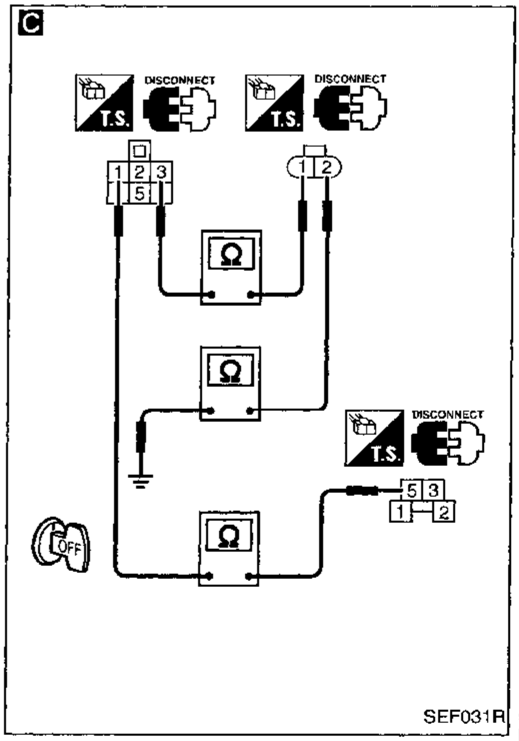
If NG, repair harness or connectors.

OK ↓

Ⓐ

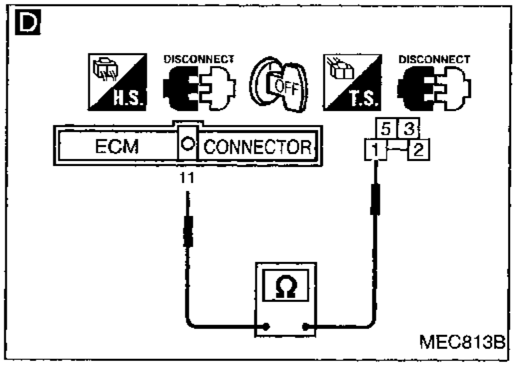
Fuel Pump Control (Cont'd)

C

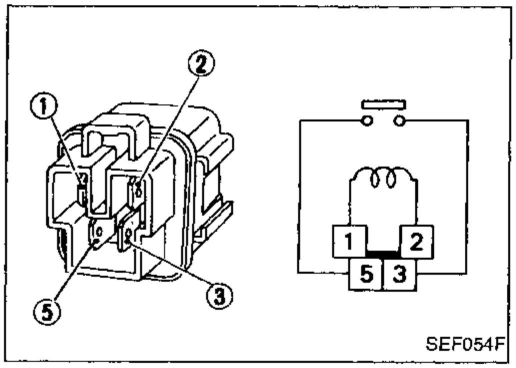


SEF031R

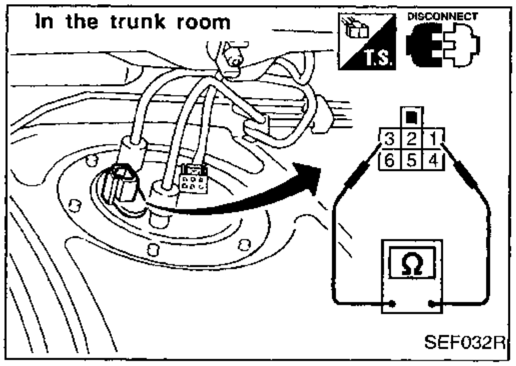
D



MEC813B



SEF054F



SEF032R

Ⓐ

D

CHECK OUTPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ⑪ and terminal ①.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors (B3), (M2)
- Harness connectors (M74), (F23)
- Harness for open or short between fuel pump relay and ECM

If NG, repair harness or connector.

OK ↓

CHECK COMPONENT
(Fuel pump relay).
Refer to "COMPONENT INSPECTION" below.

NG → Replace fuel pump relay.

OK ↓

CHECK COMPONENT
(Fuel pump).
Refer to "COMPONENT INSPECTION" below.

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 and check the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

INSPECTION END

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

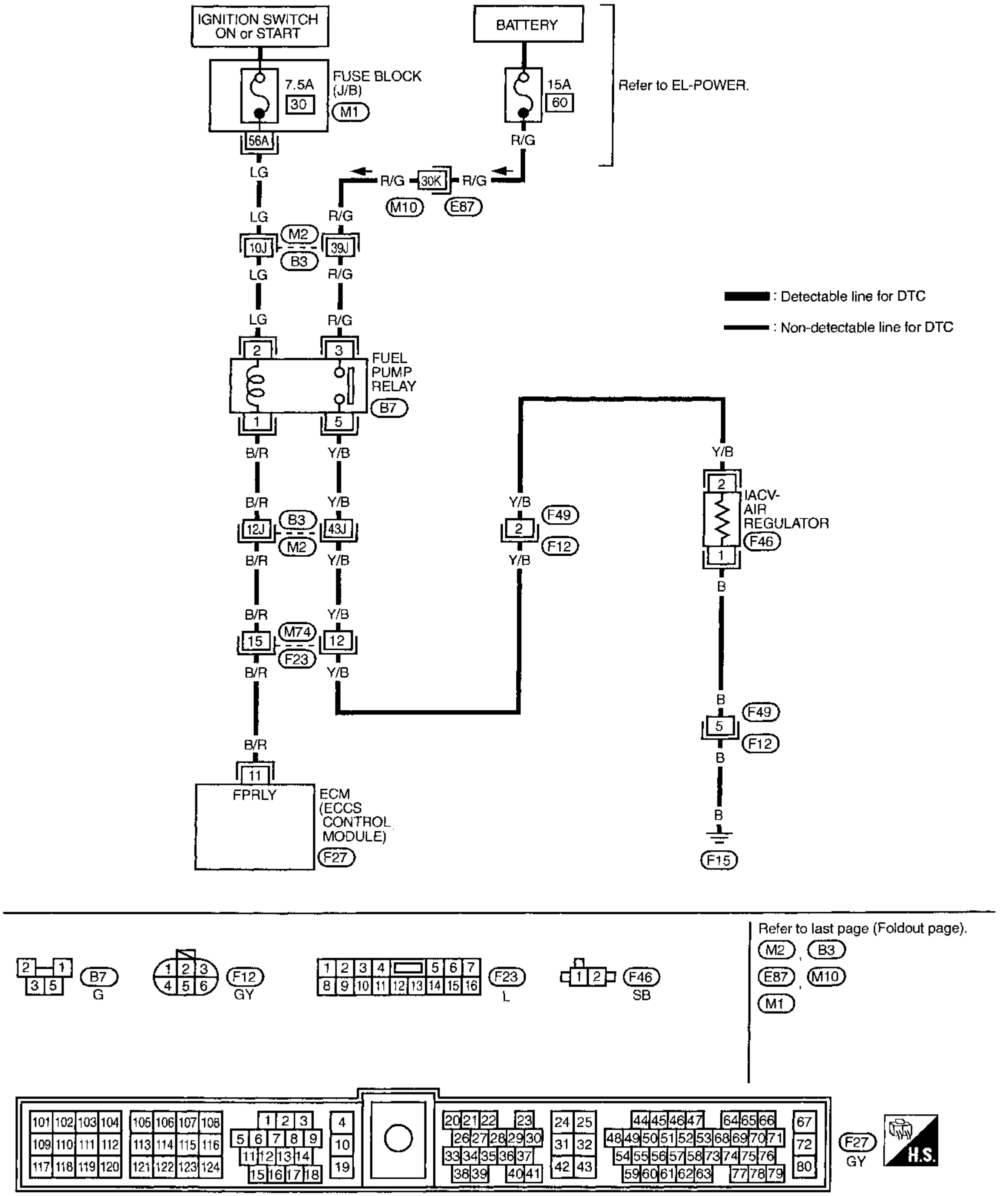
If NG, replace relay.

Fuel pump

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals ① and ③.
   Resistance: 0.2 - 5.0Ω at 25°C (77°F)
   If NG, replace fuel pump.

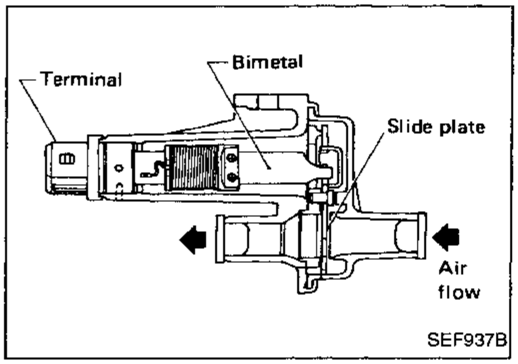
IACV-Air Regulator

EC-AIRREG-01



SEF716Q

IACV-Air Regulator (Cont'd)

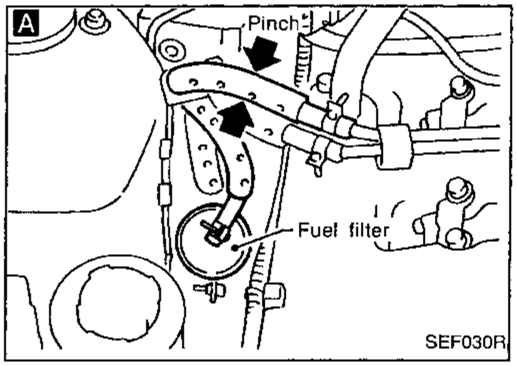


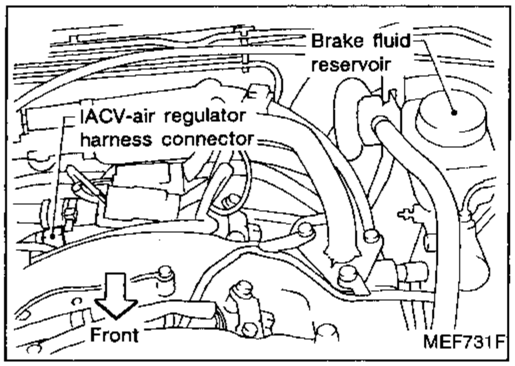
COMPONENT DESCRIPTION

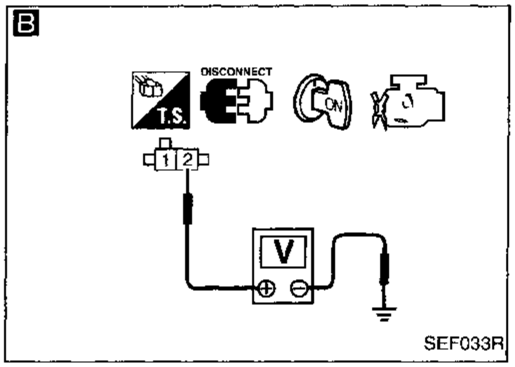
The IACV-air regulator provides an air by-pass when the engine is cold for a fast idle during warm-up.

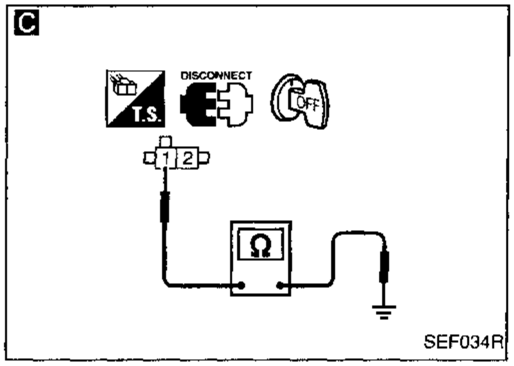
A bimetal, heater and rotary shutter are built into the IACV-air regulator. When the bimetal temperature is low, the air by-pass port opens. As the engine starts and electric current flows through a heater, the bimetal begins to turn the shutter to close the by-pass port. The air passage remains closed until the engine stops and the bimetal temperature drops.

DIAGNOSTIC PROCEDURE









INSPECTION START

↓

A

CHECK CONTROL 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".

NG → Check fuel pump control circuit. (See EC-294.)

↓ OK

B

CHECK POWER SUPPLY.
1. Turn ignition switch "OFF".
2. Disconnect IACV-air regulator harness connector.
3. Turn ignition switch "ON".
4. Check voltage between terminal ② and ground with CONSULT or tester.
   Battery voltage should exist for 5 seconds after ignition switch is turned "ON".

NG → Check the following.
- Harness connectors F49, F12
- Harness connectors F23, M74
- Harness connectors M2, B3
- Harness for open or short between IACV-air regulator and fuel pump relay

If NG, repair harness or connectors.

↓ OK

C

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 F49, F12
- Harness continuity between IACV-air regulator and engine ground

If NG, repair harness or connectors.

↓ OK

CHECK COMPONENT
(IACV-air regulator).
Refer to "COMPONENT INSPECTION" on next page.

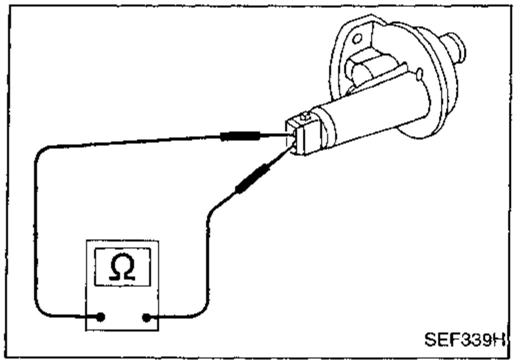
NG → Replace IACV-air regulator.

↓ OK

INSPECTION END

IACV-Air Regulator (Cont'd)

COMPONENT INSPECTION

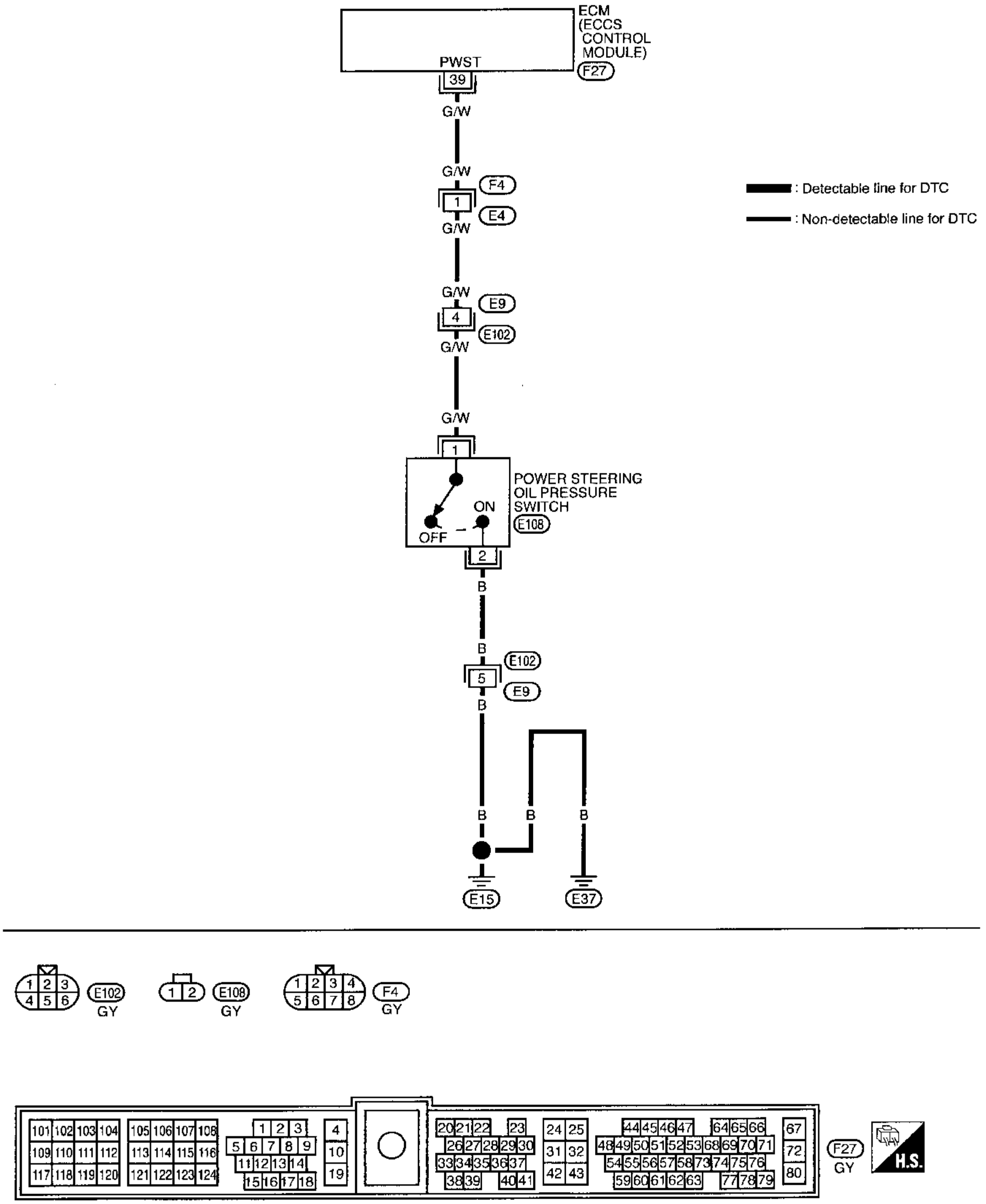


IACV-air regulator

- Check IACV-air regulator resistance.
  Resistance:
  Approximately 70 - 80Ω [at 20°C (68°F)]
- Check IACV-air regulator for clogging.

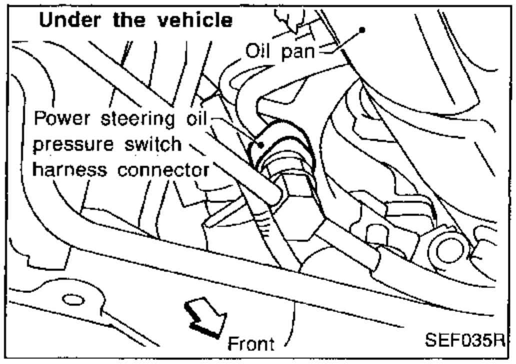
Power Steering Oil Pressure Switch

EC-PST/SW-01



SEF717Q

Power Steering Oil Pressure Switch (Cont'd)

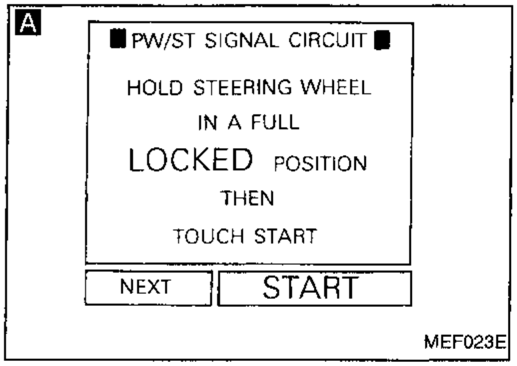


SEF035R

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.

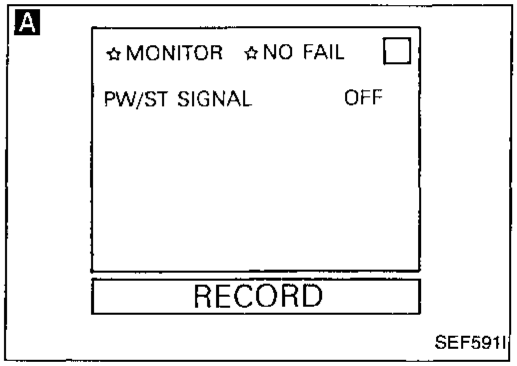
DIAGNOSTIC PROCEDURE


A

■ PW/ST SIGNAL CIRCUIT ■

HOLD STEERING WHEEL IN A FULL LOCKED POSITION THEN TOUCH START

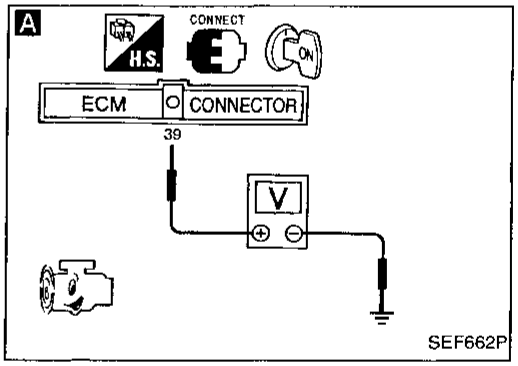
MEF023E


A

☆MONITOR ☆NO FAIL ☐

PW/ST SIGNAL OFF

SEF591I



SEF662P

INSPECTION START

↓

A

CHECK OVERALL FUNCTION.

1. Turn ignition switch "ON".
2. Perform "PW/ST SIGNAL CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

1. Start engine.
2. Check "PW/ST SIGNAL" in "DATA MONITOR" mode with CONSULT.

Steering is neutral position: OFF
Steering is turned: ON

OR

1. Start engine.
2. Check voltage between ECM terminal ㊴ and ground under the following conditions.

Voltage:
When steering wheel is turned quickly.
Approximately 0V
Except above
Approximately 5V

OK → INSPECTION END

↓ NG

B

CHECK GROUND CIRCUIT.

1. Turn ignition switch "OFF".
2. Disconnect power steering oil pressure switch harness connector.
3. Check harness continuity between terminal ② and body ground.

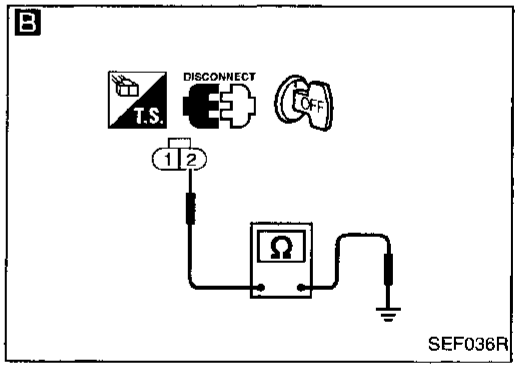
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors E102, E9
- Harness for open or short between power steering oil pressure switch and body ground

If NG, repair harness or connectors.

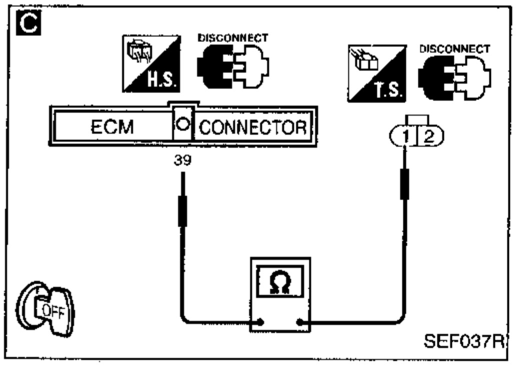
↓ OK

Ⓐ



SEF036R

Power Steering Oil Pressure Switch (Cont'd)



SEF037R

Ⓐ

C

CHECK INPUT SIGNAL CIRCUIT.
1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal ㊴ and terminal ①.
Continuity should exist.
If OK, check harness for short.

NG → Check the following.
- Harness connectors F4, E4
- Harness connectors E9, E102
- Harness for open or short between ECM and power steering oil pressure switch

If 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

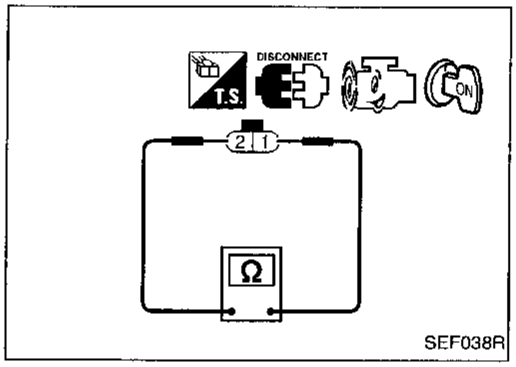
Disconnect and reconnect harness connectors in the circuit. Then retest.

↓ 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



SEF038R

COMPONENT INSPECTION

Power steering oil pressure switch

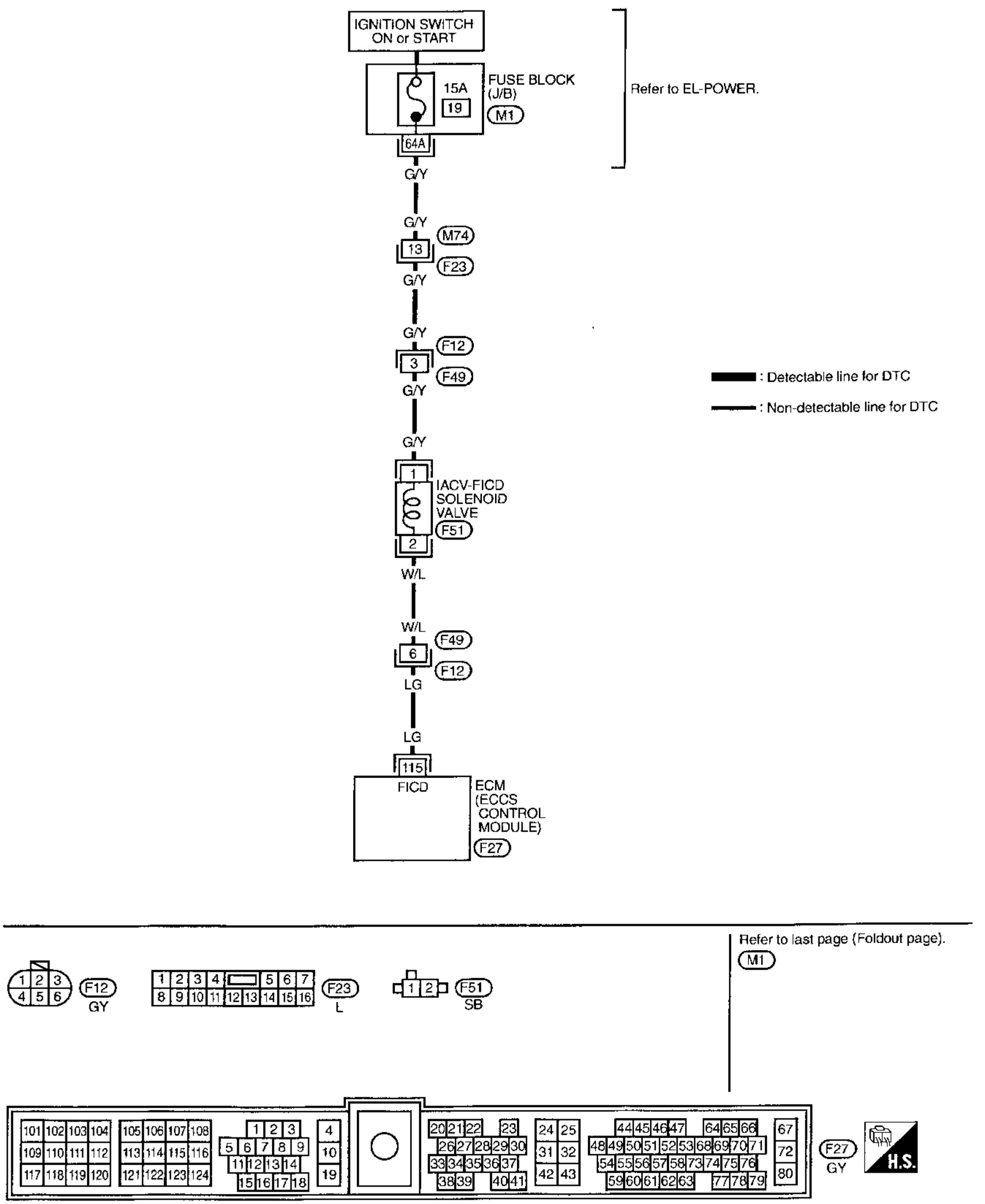
1. Disconnect power steering oil pressure switch harness connector then start engine.
2. Check continuity between terminals ① and ②.

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

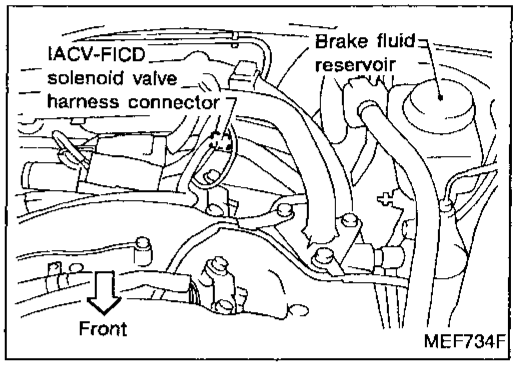


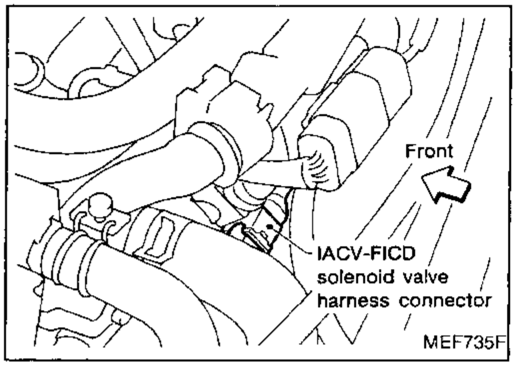
SEF718Q

IACV-FICD Solenoid Valve (Cont'd)

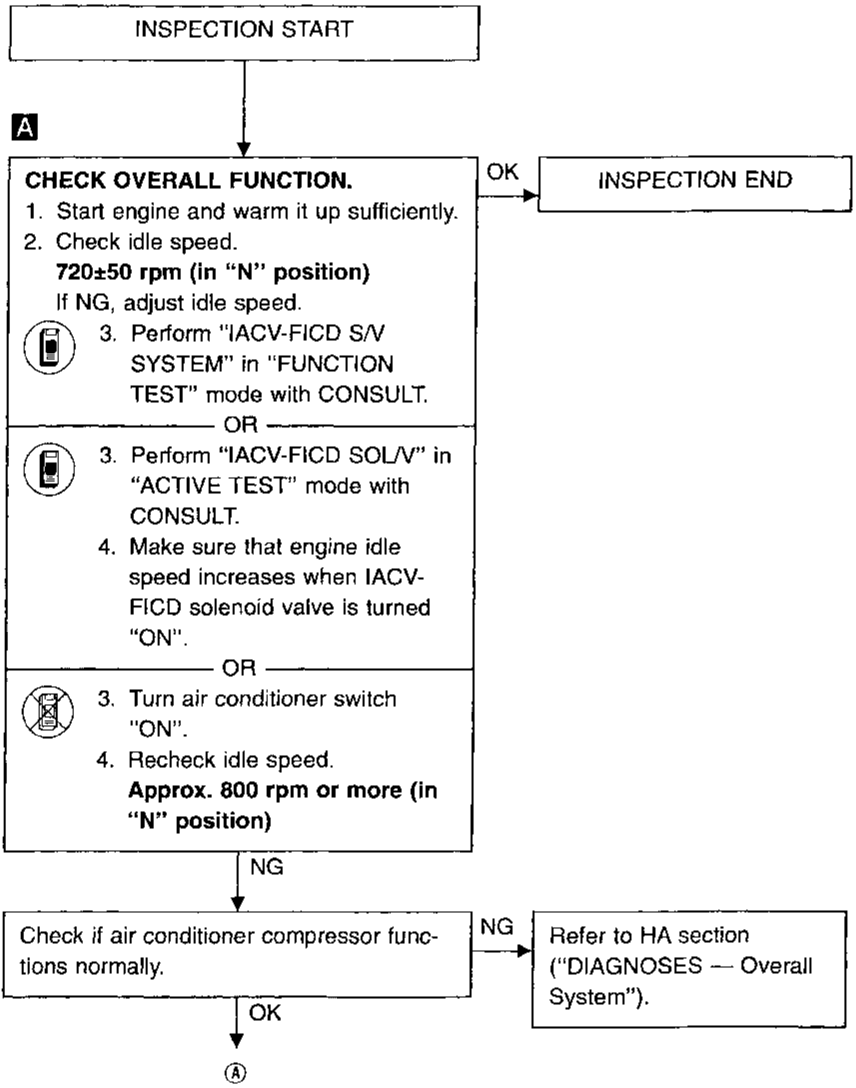
COMPONENT DESCRIPTION

The idle air adjusting (IAA) unit is made up of the IACV-AAC valve, IACV-FICD solenoid valve and idle adjusting screw. It receives the signal from the ECM and controls the idle speed at the preset value.





DIAGNOSTIC PROCEDURE



INSPECTION START

A

CHECK OVERALL FUNCTION.
1. Start engine and warm it up sufficiently.
2. Check idle speed.
   720±50 rpm (in "N" position)
   If NG, adjust idle speed.
3. Perform "IACV-FICD S/V SYSTEM" in "FUNCTION TEST" mode with CONSULT.

OR

3. Perform "IACV-FICD SOL/V" in "ACTIVE TEST" mode with CONSULT.
4. Make sure that engine idle speed increases when IACV-FICD solenoid valve is turned "ON".

OR

3. Turn air conditioner switch "ON".
4. Recheck idle speed.
   Approx. 800 rpm or more (in "N" position)

OK → INSPECTION END

↓ NG

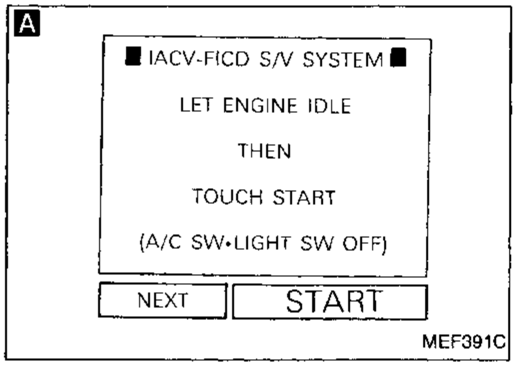
Check if air conditioner compressor functions normally.

NG → Refer to HA section ("DIAGNOSES — Overall System").

↓ OK

Ⓐ

A



■ IACV-FICD S/V SYSTEM ■

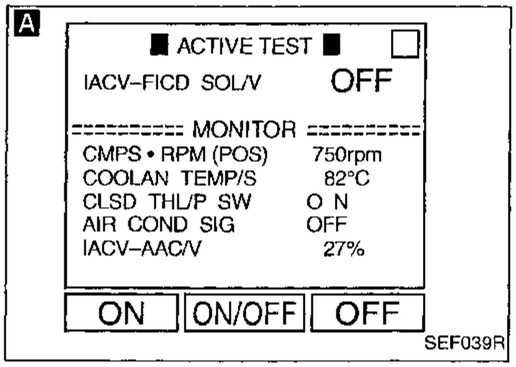
LET ENGINE IDLE

THEN

TOUCH START

(A/C SW•LIGHT SW OFF)

A



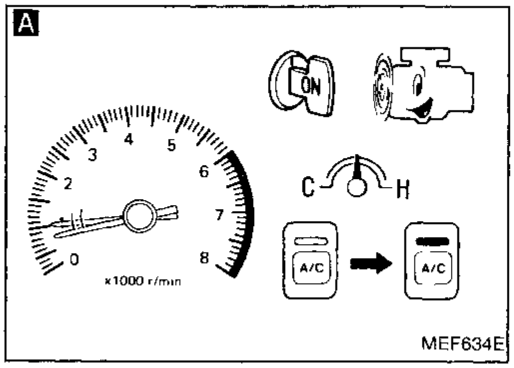
■ ACTIVE TEST ■ ☐

IACV-FICD SOL/V OFF

========== MONITOR ==========

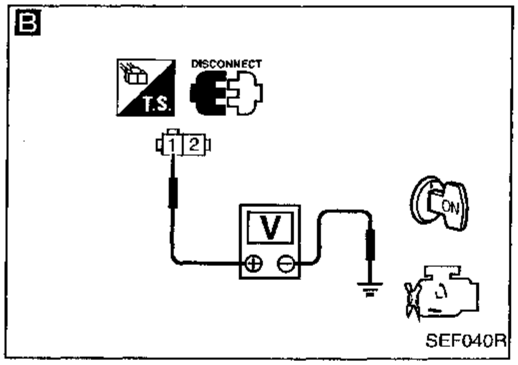
CMPS • RPM (POS)	750rpm
COOLAN TEMP/S	82°C
CLSD THL/P SW	O N
AIR COND SIG	OFF
IACV-AAC/V	27%

A



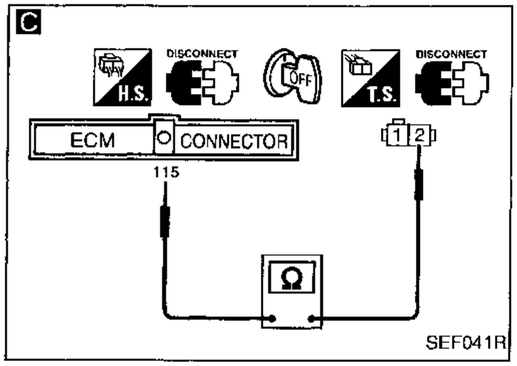
IACV-FICD Solenoid Valve (Cont'd)

B

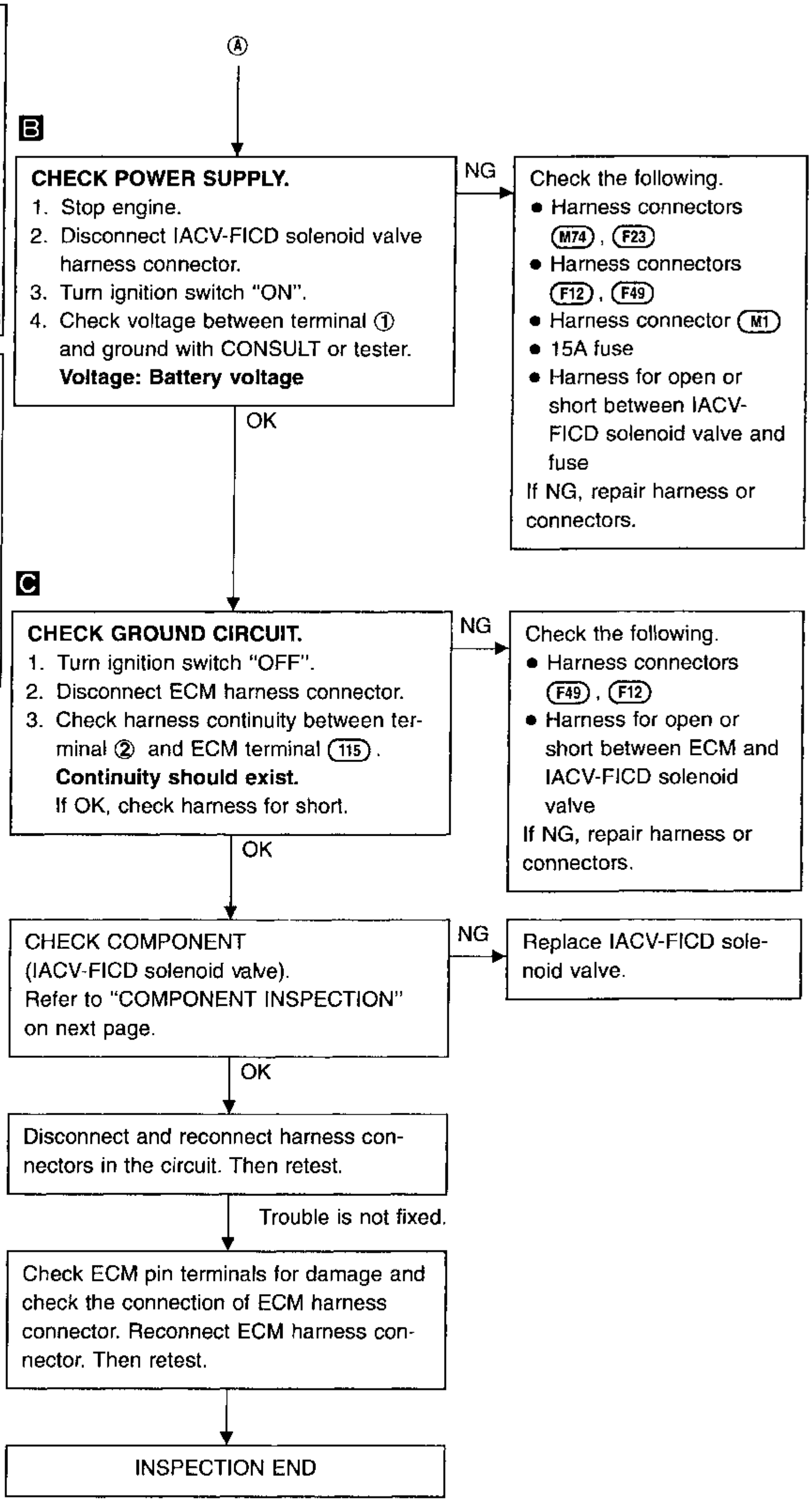


SEF040R

C



SEF041R



CHECK POWER SUPPLY.
1. Stop engine.
2. Disconnect IACV-FICD solenoid 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 M74, F23
- Harness connectors F12, F49
- Harness connector M1
- 15A fuse
- Harness for open or short between IACV-FICD solenoid valve and fuse

If NG, repair harness or connectors.

OK ↓

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

NG → Check the following.
- Harness connectors F49, F12
- Harness for open or short between ECM and IACV-FICD solenoid valve

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT (IACV-FICD solenoid valve).
Refer to "COMPONENT INSPECTION" on next page.

NG → Replace IACV-FICD solenoid valve.

OK ↓

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

Trouble is not fixed. ↓

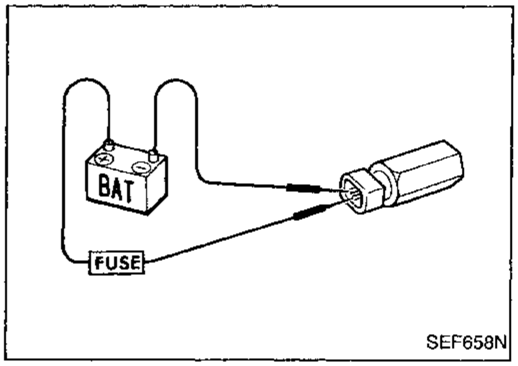
Check ECM pin terminals for damage and check the connection of ECM harness connector. Reconnect ECM harness connector. Then retest.

↓

INSPECTION END

IACV-FICD Solenoid Valve (Cont'd)

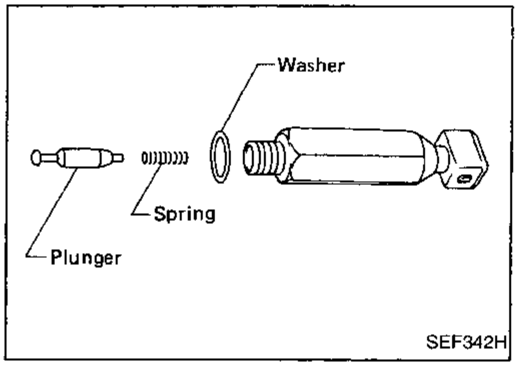
COMPONENT INSPECTION



IACV-FICD solenoid valve

Disconnect IACV-FICD solenoid valve harness connector.

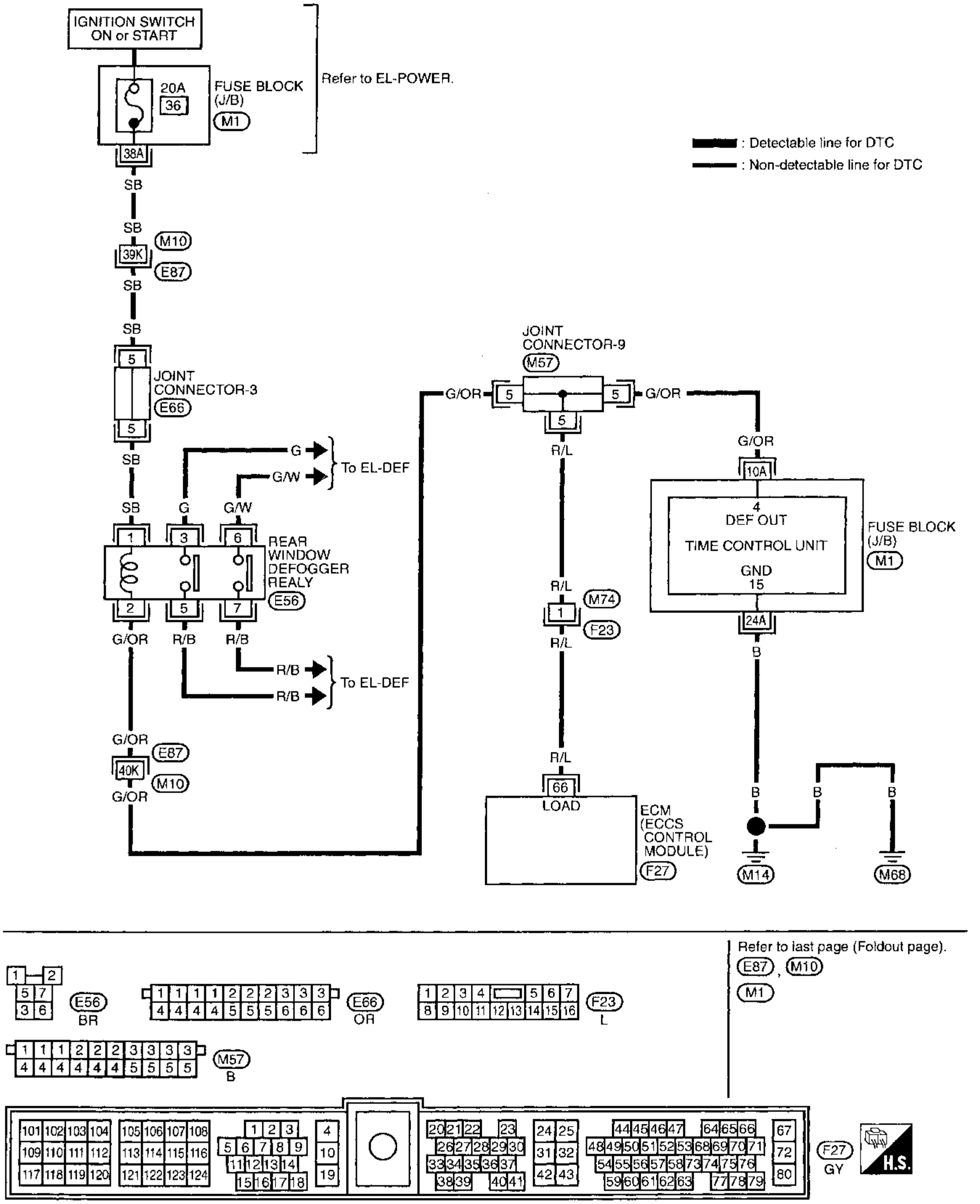
- Check for clicking sound when applying 12V direct current to terminals.



- Check plunger for seizing or sticking.
- Check for broken spring.

Electrical Load Signal

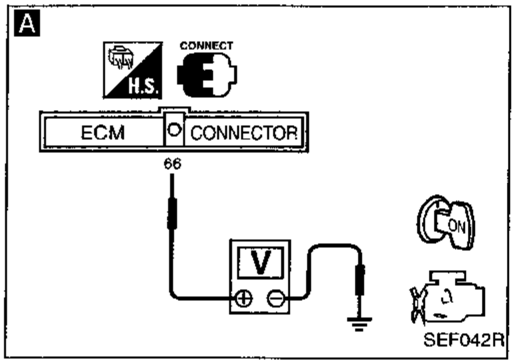
EC-LD/SIG-01



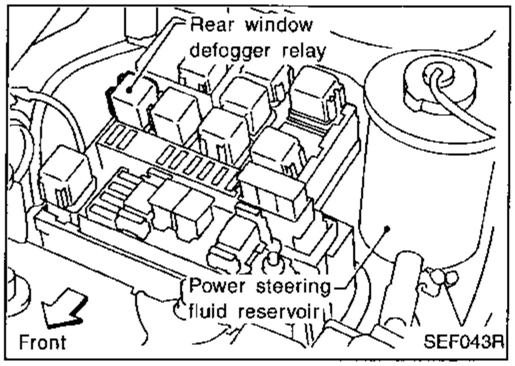
SEF719Q

Electrical Load Signal (Cont'd)

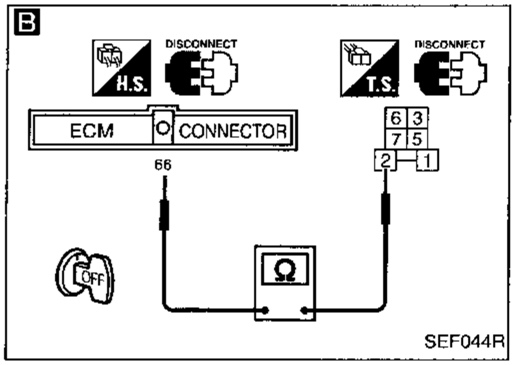
DIAGNOSTIC PROCEDURE



SEF042R



SEF043R



SEF044R

INSPECTION START

↓

A

CHECK OVERALL FUNCTION.

1. Turn ignition switch "ON".
2. Turn rear window defogger switch "ON".
3. Check voltage between ECM terminal (66) and ground with CONSULT or tester.

Voltage:

Rear window defogger switch "OFF"
Battery voltage
Rear window defogger switch "ON"
Approximately 0V

OK → INSPECTION END

NG ↓

Check if rear window defogger functions properly.

NG → Refer to EL section ("REAR WINDOW DEFOGGER").

OK ↓

B

CHECK INPUT SIGNAL CIRCUIT.

1. Turn rear window defogger switch "OFF".
2. Turn ignition switch "OFF".
3. Disconnect rear window defogger relay.
4. Disconnect ECM harness connector.
5. Check harness continuity between ECM terminal (66) and terminal ②.
   Continuity should exist.
   If OK, check harness for short.

NG → Check the following.
- Harness connectors M74, F23
- Joint connector-9
- Harness for open or short between ECM and joint connector-9

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.

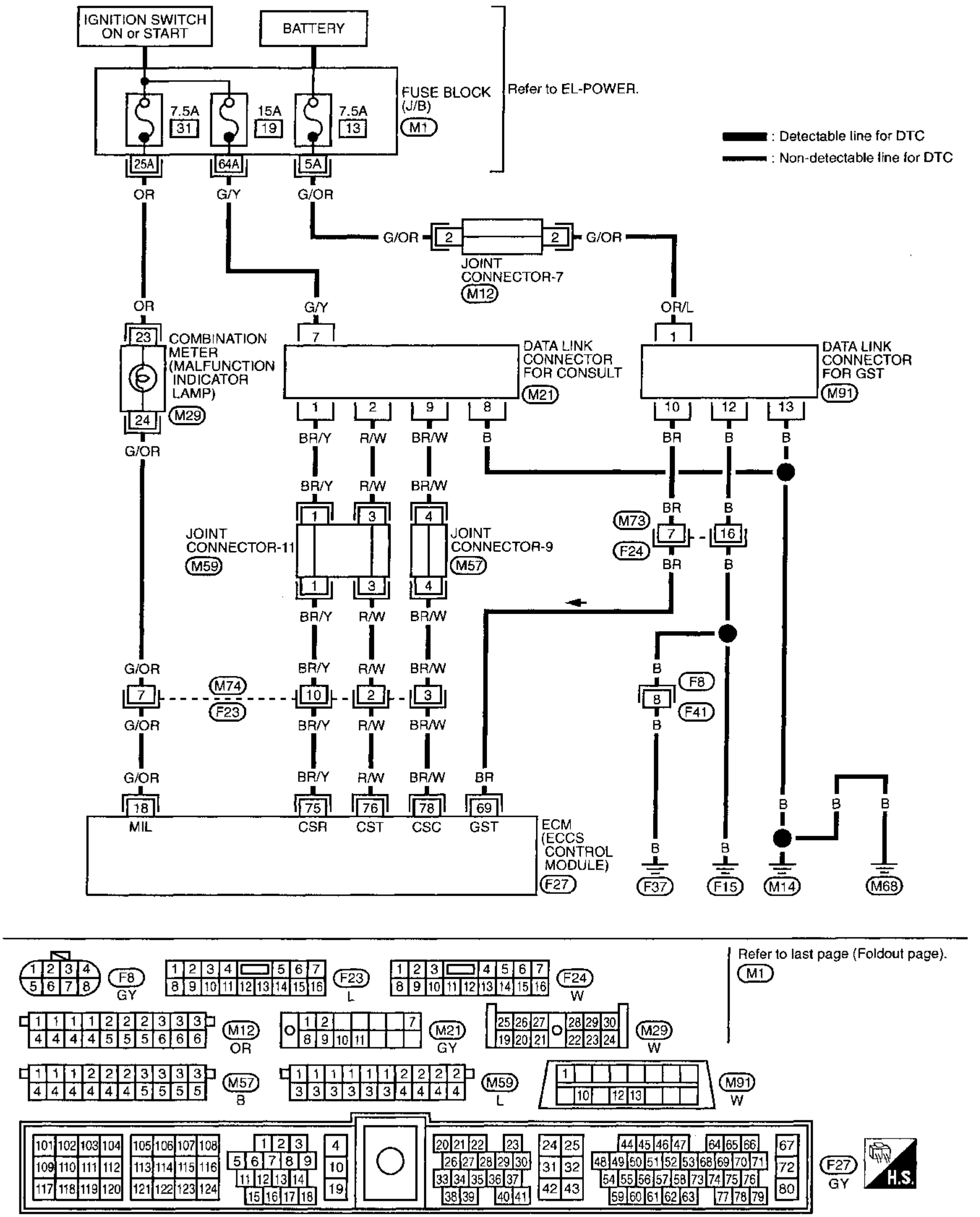
↓

INSPECTION END

GI
MA
EM
LC
EC
FE
AT
PD
FA
RA
BR
ST
RS
BT
HA
EL
IDX

MIL & Data Link Connectors

EC-MIL-01



TEC145

Alphabetical & P No. Index for DTC

ALPHABETICAL INDEX FOR DTC

Items (CONSULT screen terms)	DTC*3		Reference page
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*COOLANT TEMP SEN	0908	P0125	EC-130
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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
A/T COMM LINE	—	P0600	EC-237
A/T DIAG COMM LINE	0804	P1605	EC-278
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CAN CONT VC CHK SW	0113	P1443	EC-273
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CLOSED LOOP-B2	0308	P0150	EC-135
COOLANT TEMP SEN	0103	P0115	EC-121
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CRANK POS SEN (OBD)	0802	P0335	EC-197
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CYL 2 MISFIRE	0607	P0302	EC-190
CYL 3 MISFIRE	0606	P0303	EC-190
CYL 4 MISFIRE	0605	P0304	EC-190
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EGRC SOLENOID/V	1005	P1400	EC-264
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FRONT O2 SENSOR-B2	0303	P0150	EC-153
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IGN SIGNAL-PRIMARY	0201	P1320	EC-251
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KNOCK SENSOR	0304	P0325	EC-194
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MASS AIR FLOW SEN	0102	P0100	EC-111
OVERRUN CLUTCH S/V	1203	P1760	AT section
PARK/NEUT POSI SW	1003	P0705	EC-242
PURG CONT/V & S/V	0807	P0443	EC-219
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REAR O2 SENSOR-B1	0707	P0136	EC-144
REAR O2 SENSOR-B2	0708	P0156	EC-161
RR O2 SEN HTR-B1	0902	P0141	EC-149
RR O2 SEN HTR-B2	1002	P0161	EC-166
SHIFT SOLENOID/V A	1108	P0750	AT section
SHIFT SOLENOID/V B	1201	P0755	AT section
THROTTLE POSI SEN	0403	P0120	EC-125
THRTL POSI SEN A/T	1206	P1705	AT section
TOR CONV CLUTCH SV	1204	P0740	AT section
TW CATALYST SYS-B1	0702	P0420	EC-216
TW CATALYST SYS-B2	0703	P0430	EC-216
VEHICLE SPEED SEN	0104	P0500	EC-229
VHCL SPEED SEN A/T	1102	P0720	AT section

*1: In Diagnostic Test Mode II (Self-diagnostic results). These numbers are controlled by NISSAN.
*2: These numbers are prescribed by SAE J2012.
*3: DTC No. is the same as that of 1st trip DTC.

P NO. INDEX FOR DTC

*1: In Diagnostic Test Mode II (Self-diagnostic results). These numbers are controlled by NISSAN.
*2: These numbers are prescribed by SAE J2012.
*3: DTC No. is the same as that of 1st trip DTC.

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

PRESSURE REGULATOR Fuel pressure at idling kPa (kg/cm², psi)	
Vacuum hose is connected	Approximately 250.1 (2.55, 36.3)
Vacuum hose is disconnected	Approximately 299.1 (3.05, 43.4)

Inspection and Adjustment

Idle speed*1 rpm No-load*2 (in "N" position)	720±50
Air conditioner: ON (in "N" position)	800 or more
Ignition timing	10°±2° BTDC
Throttle position sensor idle position V	0.35 - 0.65

*1: Feedback controlled and needs no adjustments

*2: Under the following conditions:
- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater, fan & rear defogger)

MASS AIR FLOW SENSOR

Supply voltage V	Battery voltage (11 - 14)
Output voltage V	1.0 - 1.7 at idle*
Mass air flow (Using CONSULT or GST) g·m/sec	2.5 - 6.0 at idle* 9.5 - 19.0 at 2,500 rpm*

*: Engine is warmed up sufficiently and idling under no-load.

ENGINE COOLANT TEMPERATURE SENSOR

Temperature °C (°F)	Resistance
−10 (14)	7.0 - 11.4 kΩ
20 (68)	2.1 - 2.9 kΩ
50 (122)	0.68 - 1.00 kΩ
90 (194)	0.236 - 0.260 kΩ
110 (230)	0.143 - 0.153 kΩ

IGNITION COIL

Primary voltage V	12
Primary resistance [at 20°C (68°F)] Ω	Approximately 0.9
Secondary resistance [at 20°C (68°F)] Ω	Approximately 8

EGR TEMPERATURE SENSOR

Temperature °C (°F)	Resistance
0 (32)	7.9 - 9.7 MΩ
50 (122)	0.57 - 0.70 MΩ
100 (212)	0.08 - 0.10 MΩ
150 (302)	0.01 - 0.02 MΩ

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

INJECTOR

Resistance [at 25°C (77°F)] Ω	10 - 14

THROTTLE POSITION SENSOR

Accelerator pedal conditions	Resistance [at 25°C (77°F)]
Completely released	Approximately 0.5 kΩ
Partially released	0.5 - 4.0 kΩ
Completely depressed	Approximately 4.0 kΩ

CALCULATED LOAD VALUE

	Calculated load value % (Using CONSULT or GST)
At idle	17.0 - 35.5
At 2,500 rpm	15.0 - 30.0

INTAKE AIR TEMPERATURE SENSOR

Temperature °C (°F)	Resistance
−10 (14)	7.0 - 11.4 kΩ
20 (68)	2.1 - 2.9 kΩ
80 (176)	0.27 - 0.38 kΩ

IACV-AIR REGULATOR

Resistance [at 20°C (68°F)] Ω	70 - 80

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 - 204