ENGINE FUEL & EMISSION CONTROL SYSTEM

SECTION EF & EC

CONTENTS

CONTENTS (Cont'd.)

For assistance with 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".

Supplemental Restraint System "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** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
- **All SRS electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS.**

Engine Fuel & Emission Control System

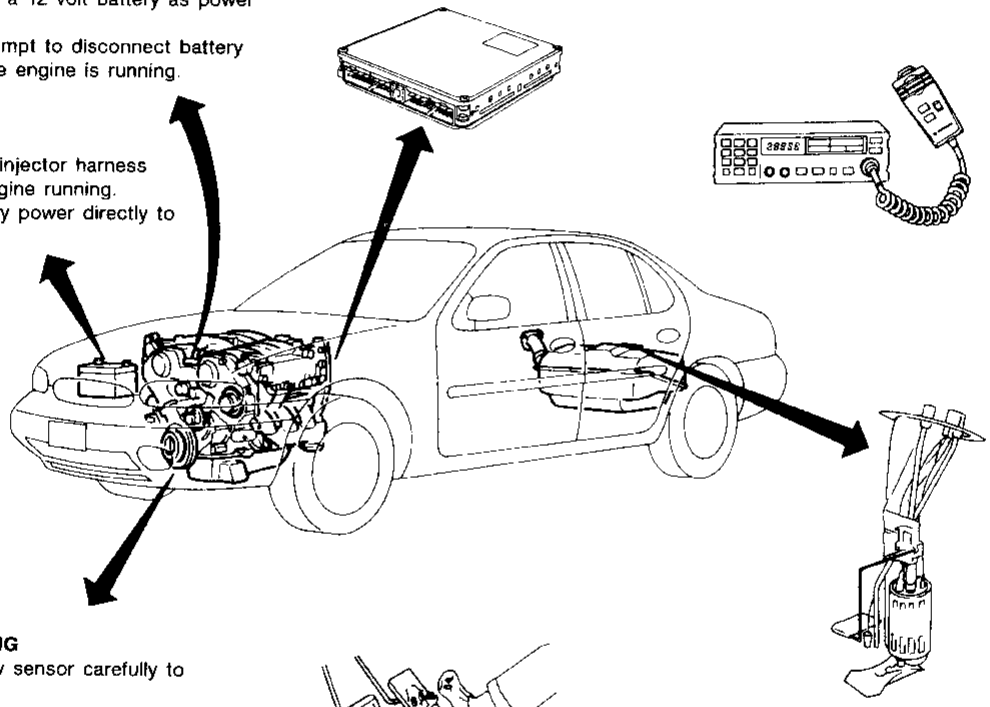
WIRELESS EQUIPMENT
- When installing CB ham radio or a mobile phone, be sure to observe the following. Failure to do so may affect electronic control systems depending on its installation location.

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.

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

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

INJECTOR
- Do not disconnect injector harness connectors with engine running.
- Do not apply battery power directly to injectors.



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.

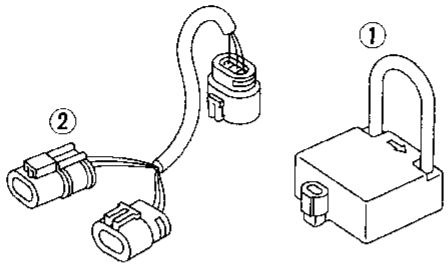
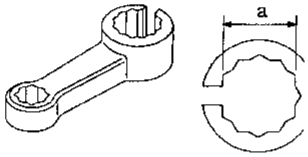
WHEN STARTING
- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.

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

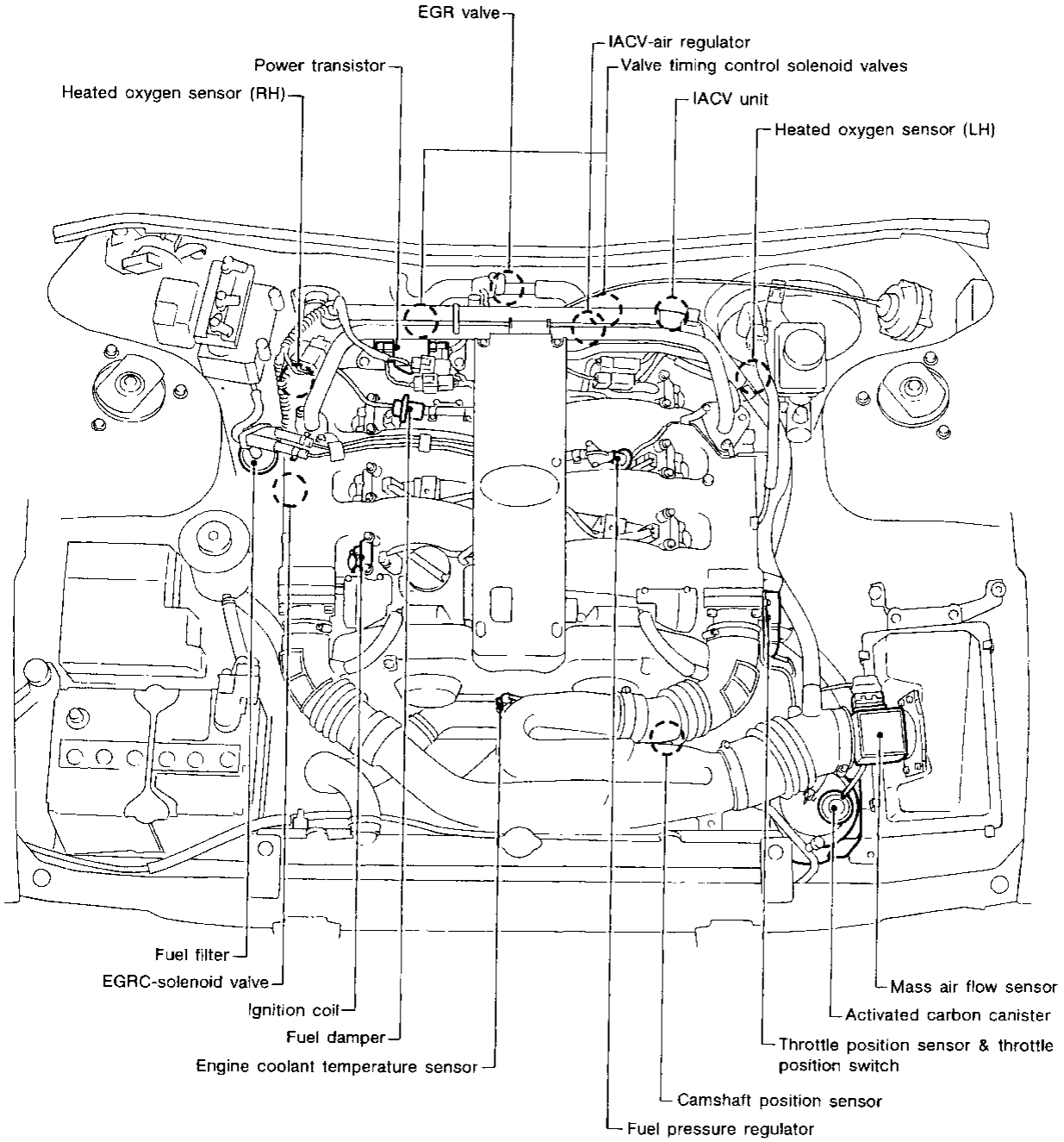
ECM HARNESS HANDLING
- Securely connect ECM harness connectors.
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep ECM harness at least 10 cm (3.9 in) away from adjacent harnesses. This will prevent from an ECM system 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.

SEF116MB

SPECIAL SERVICE TOOLS

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)**

ECCS Component Parts Location



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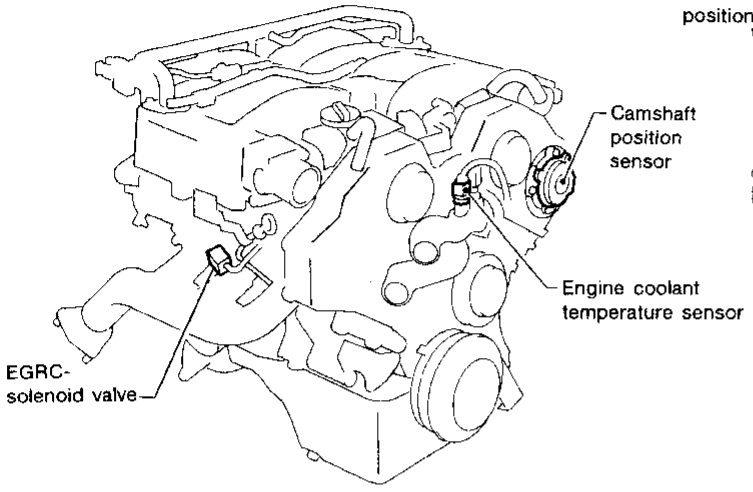
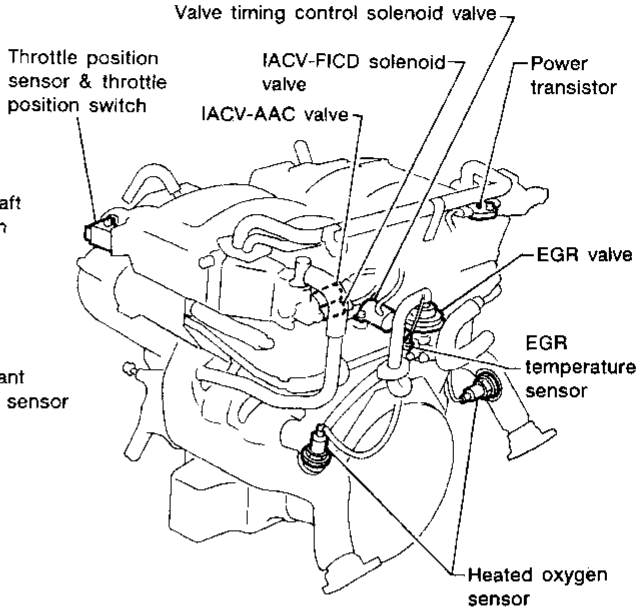
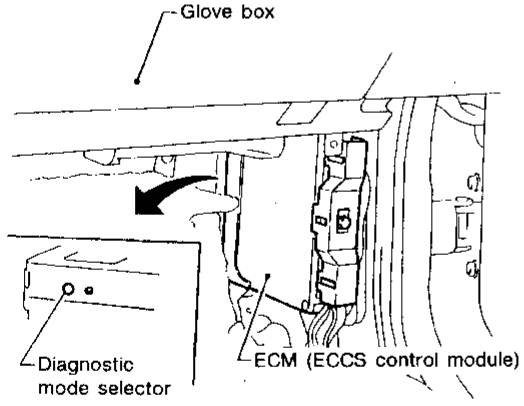
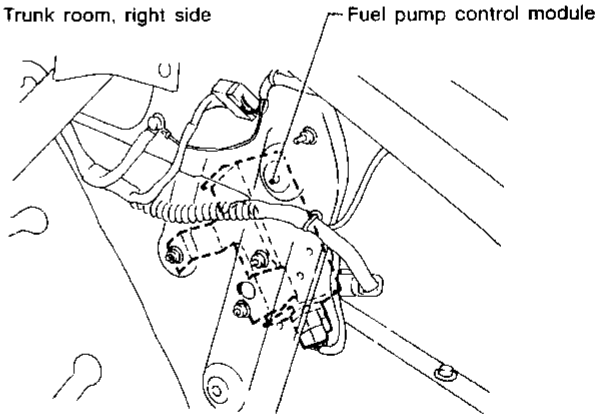
ECCS Component Parts Location (Cont'd)









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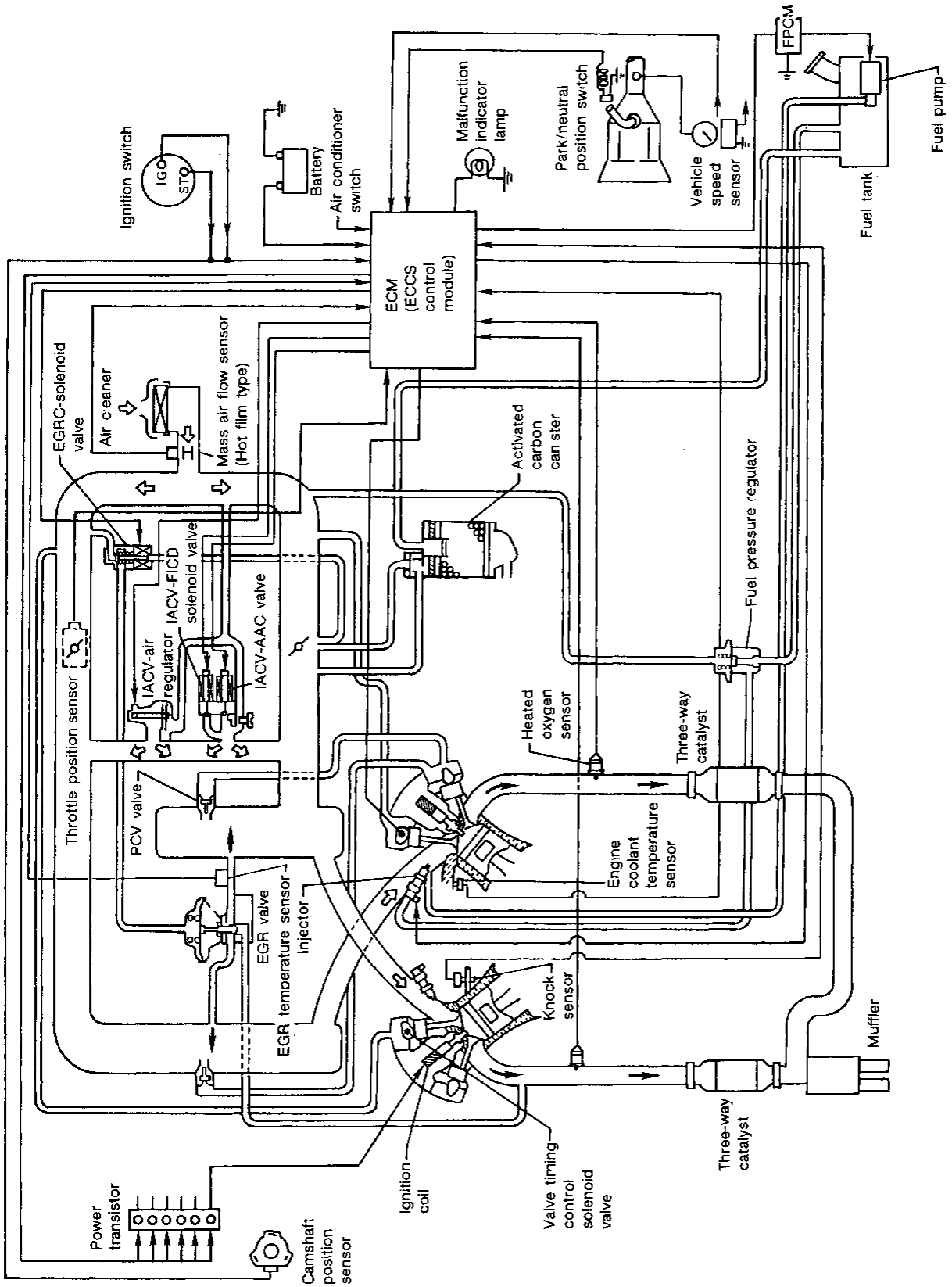
System Diagram



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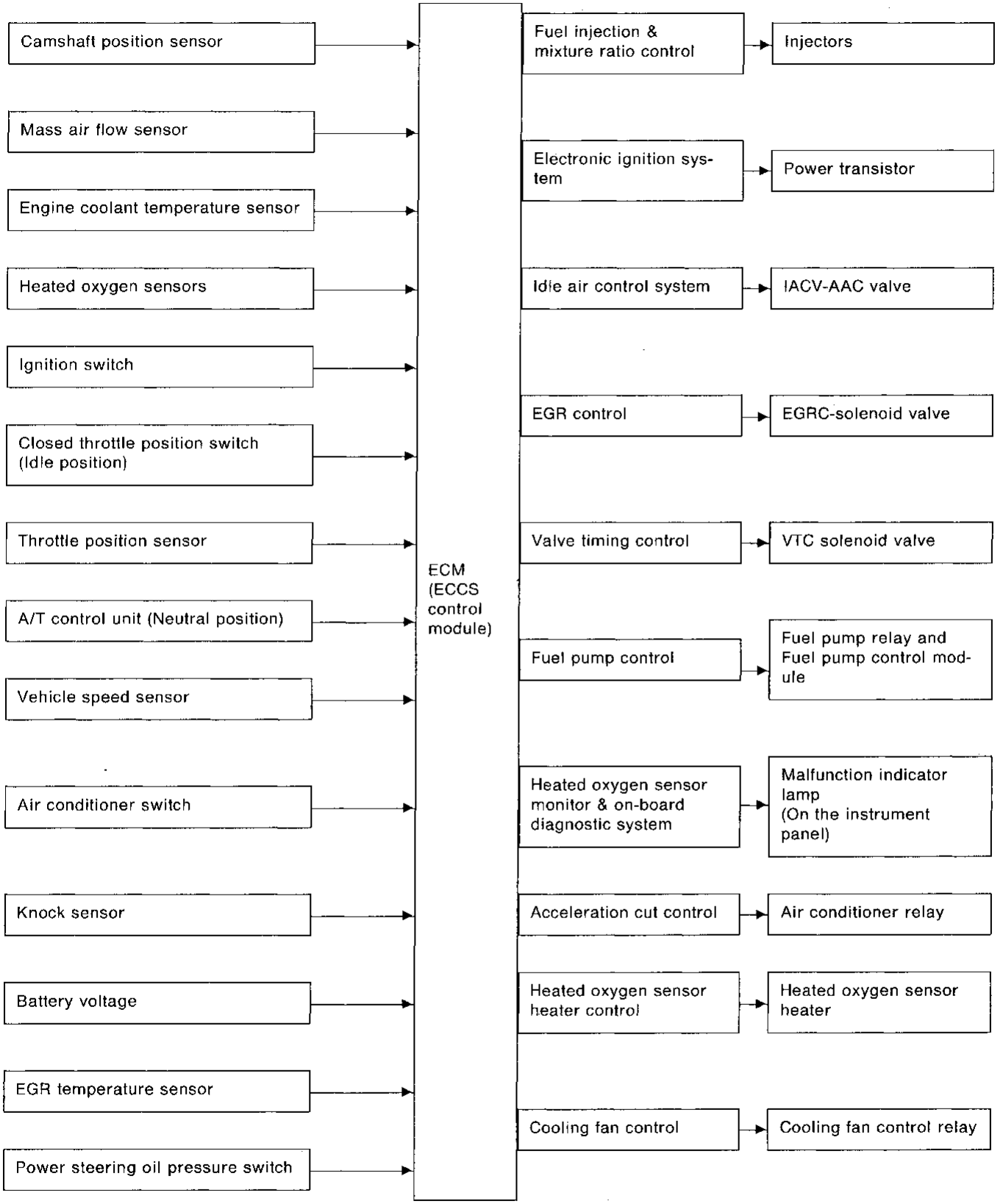
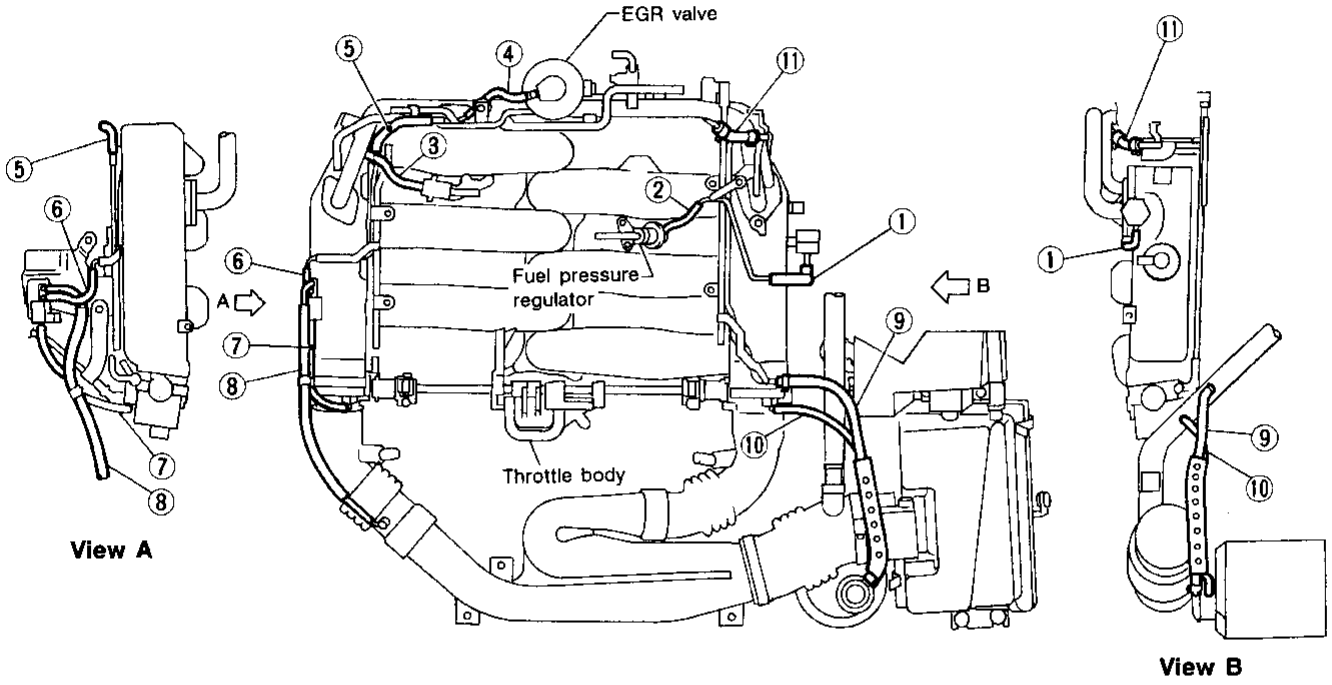
System Chart



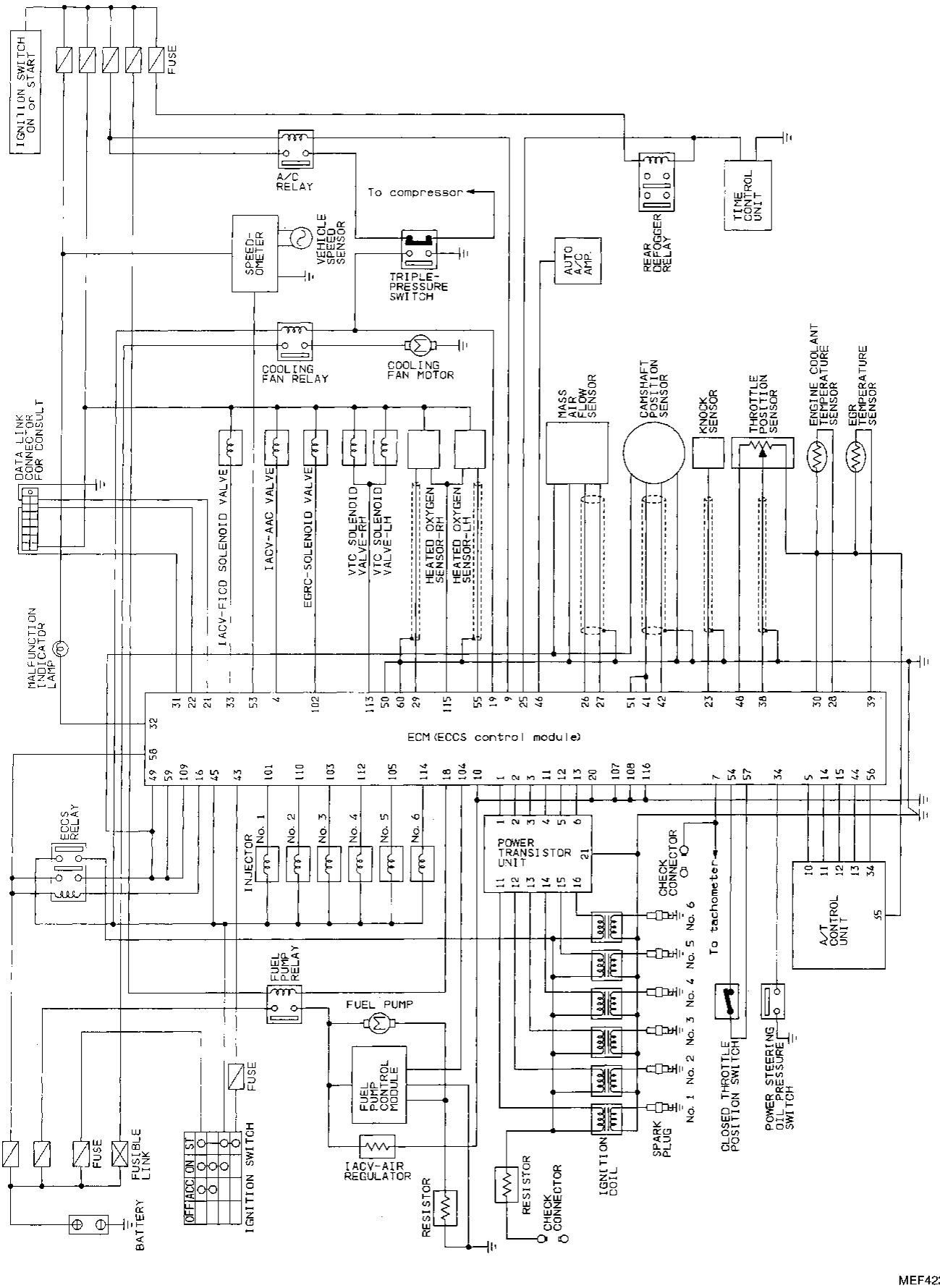
Vacuum Hose Drawing



MEF445G

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 Activated carbon canister (purge port) to Purge tube
⑩ Activated carbon canister (vacuum port) to Throttle body
⑪ Left side vacuum gallery to Balance tube

Circuit Diagram



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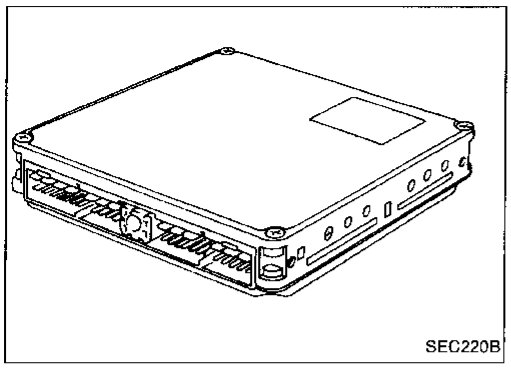
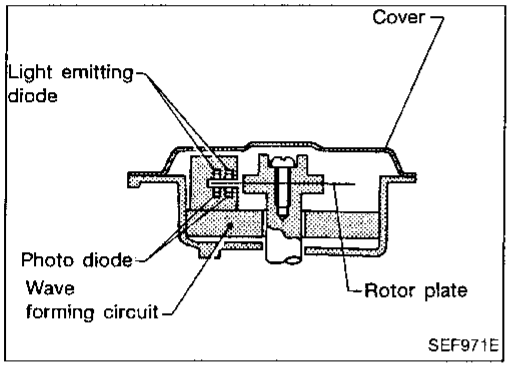

SEC220B

Engine Control Module (ECM)-ECCS Control Module

The ECM consists of a microcomputer, an inspection lamp, a diagnostic test mode selector, and connectors for signal input and output and for power supply. The module controls the engine.



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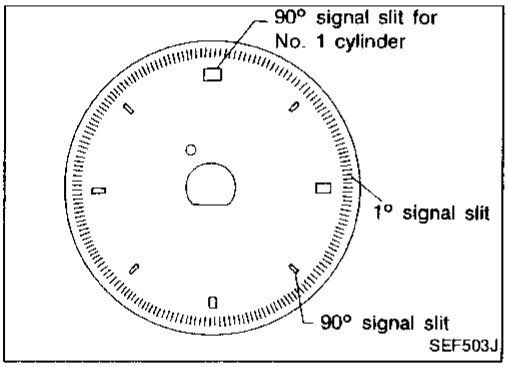
Camshaft Position Sensor (CMPS)

The camshaft position sensor is a basic component of the ECCS. It monitors engine speed and piston position, and sends signals to the ECM 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 1° signal and 8 slits for 90° signal. Light Emitting Diodes (LED) and photo diodes are built in the wave-forming circuit.

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.



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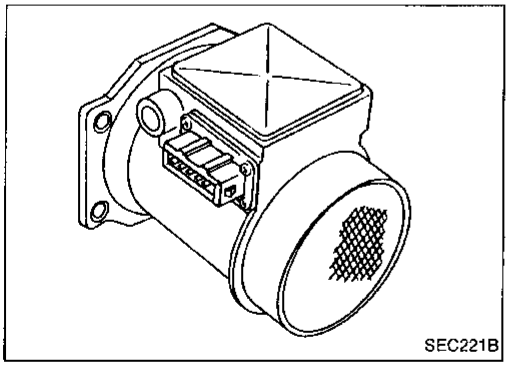
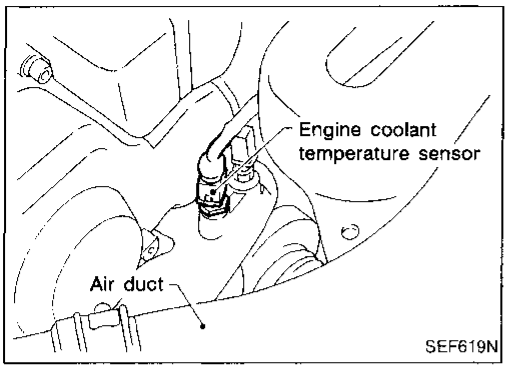

SEC221B

Mass Air Flow Sensor (MAFS)

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.

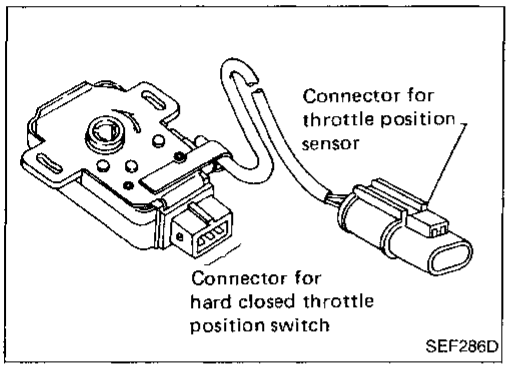
Therefore, the ECM must supply more electric current to the hot film as air flow increases. This maintains the temperature of the hot film. The ECM detects the air flow by means of this current change.



Engine Coolant Temperature Sensor (ECTS)

The engine coolant temperature sensor, located on the top of thermostat housing, detects engine coolant temperature and transmits a signal to the ECM.

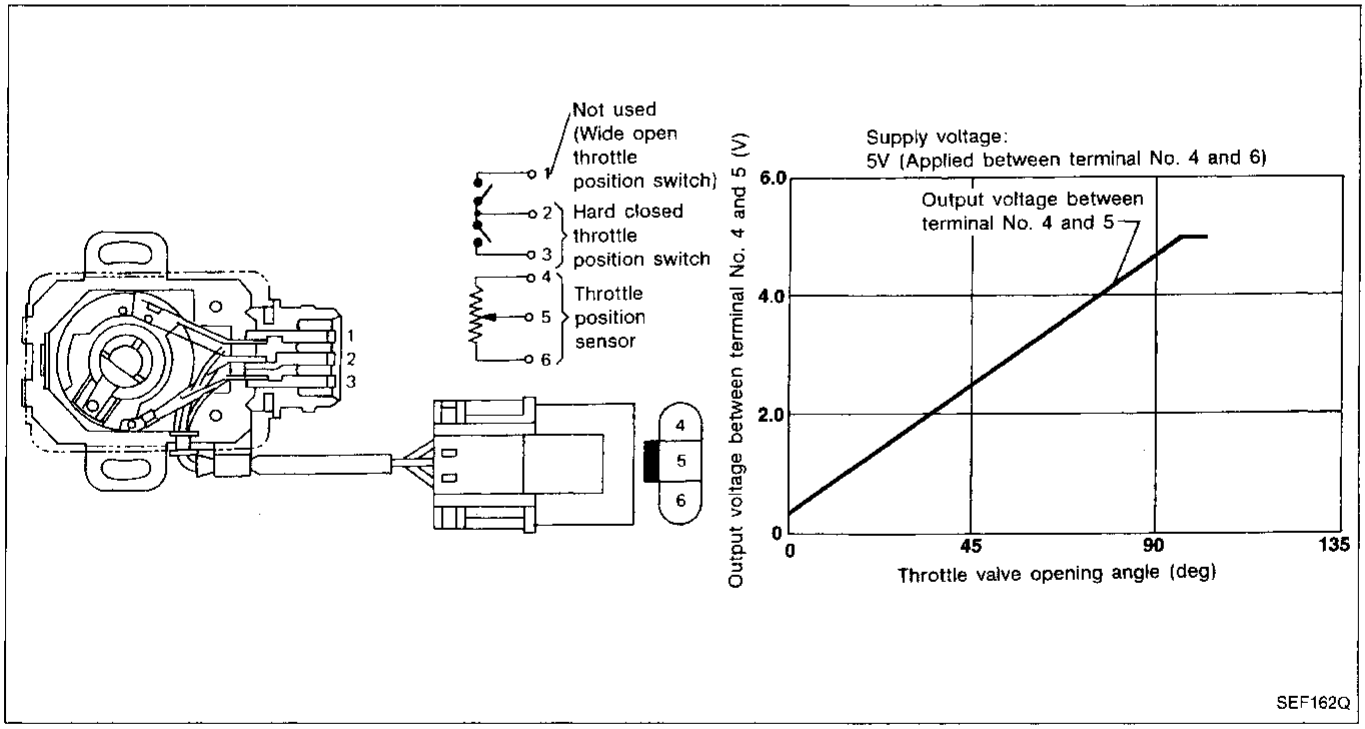
The temperature sensing unit employs a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

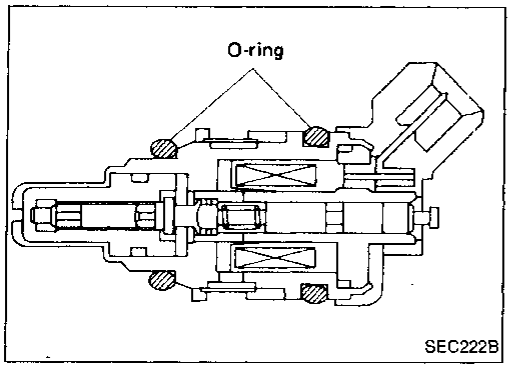


Throttle Position Sensor (TPS) & Soft/Hard Closed Throttle Position (CTP) Switch

The throttle position sensor responds to 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.

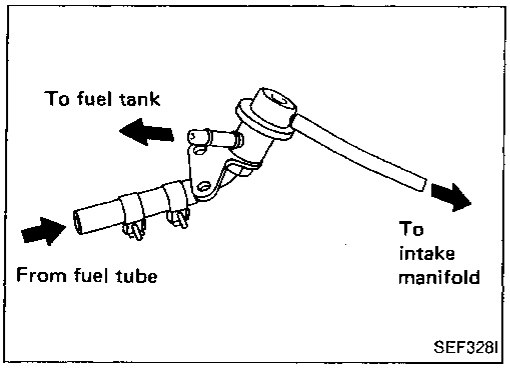
Idle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This system is called "soft closed throttle position switch". It controls engine operation such as fuel cut. Also, "hard closed throttle position switch" is built into the throttle position sensor unit. It is used for engine control when soft closed throttle position switch is malfunctioning.





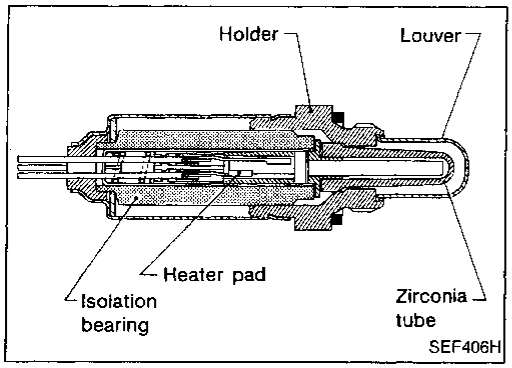
Fuel Injector

The fuel injector is a small, elaborate solenoid valve. As the ECM sends injection signals to the injector, the coil in the injector pulls the needle valve back. Then, fuel is released into the intake manifold through the nozzle. The injected fuel is controlled by the ECM in terms of injection pulse duration.



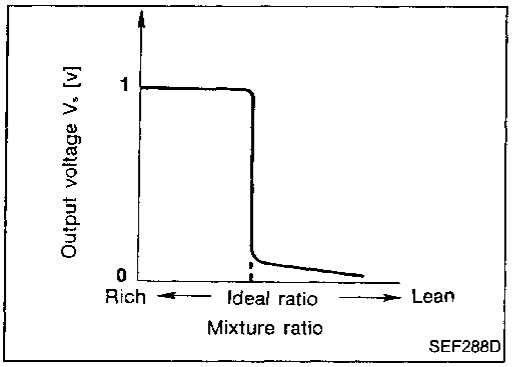
Fuel Pressure Regulator

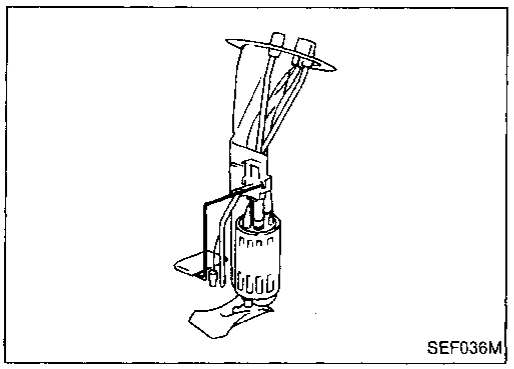
The fuel pressure regulator maintains the fuel pressure at 299.1 kPa (3.05 kg/cm^2, 43.4 psi). Since the injected fuel amount depends on injection pulse duration, it is necessary to maintain the pressure at the above value.



Heated Oxygen Sensor (HO2S)

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

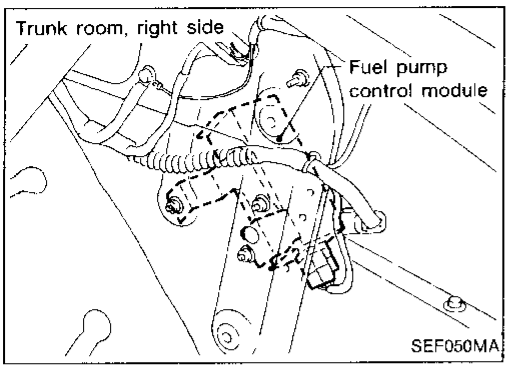




Fuel Pump

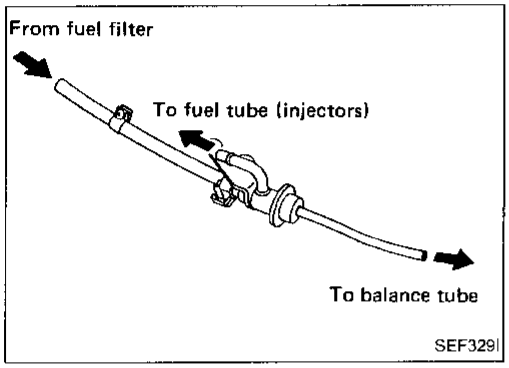
The fuel pump is an in-tank type with a fuel damper. Both the pump and damper are located in the fuel tank.

Fuel Pump (Cont'd)



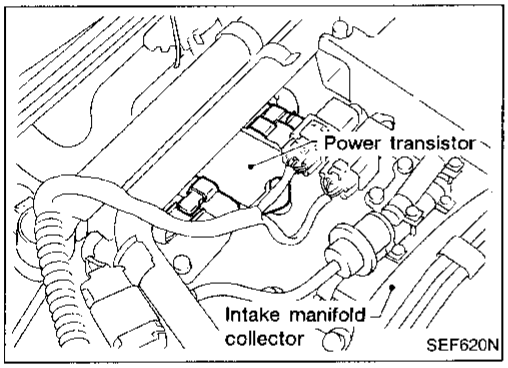
FUEL PUMP CONTROL MODULE (FPCM)

The fuel pump control module adjusts the voltage supplied to the fuel pump to control the fuel quantity.



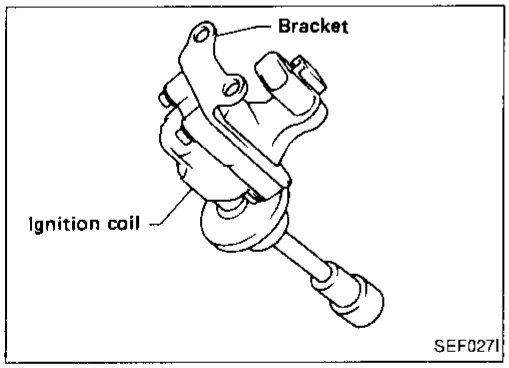
Fuel Damper

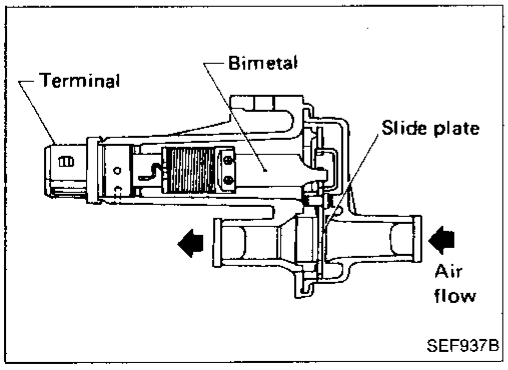
The fuel damper, which consists of a diagram, reduces fuel pressure pulsation in the fuel feed line between the fuel filter and injectors.



Power Transistor Unit & Ignition Coil

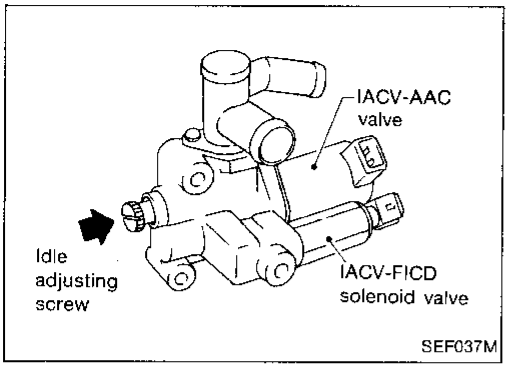
The ignition signal from the ECM is amplified by the two power transistors, which turn the ignition coil primary circuit on and off, inducing the proper high voltage in the secondary circuit. The ignition coil is a small, molded type.





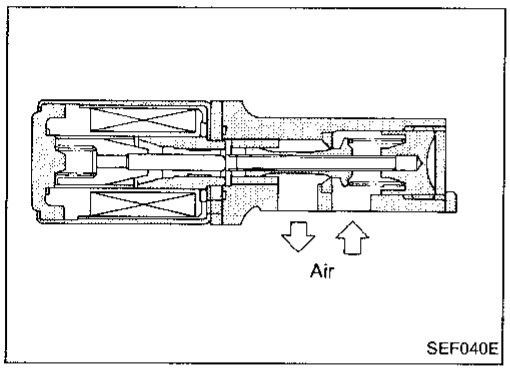
Idle Air Control Valve (IACV)-Air Regulator

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.



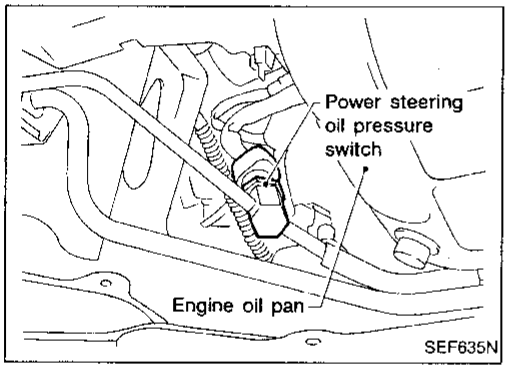
Idle Air Control Valve (IACV) Unit

The IACV 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. The IACV-FICD solenoid valve compensates for changes in idle speed caused by the operation of the air compressor.



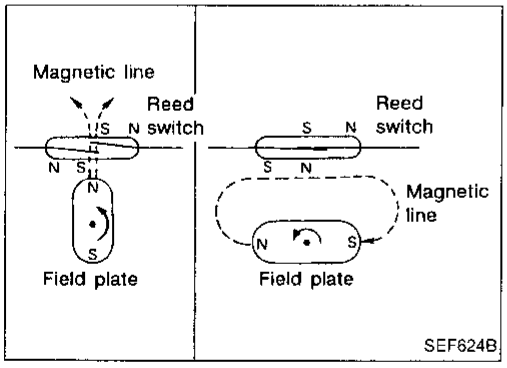
Idle Air Control Valve (IACV)-Auxiliary Air Control (AAC) Valve

The ECM actuates the IACV-AAC valve by an ON/OFF pulse. The longer that ON duty is left on, the larger the amount of air that will flow through the IACV-AAC valve.



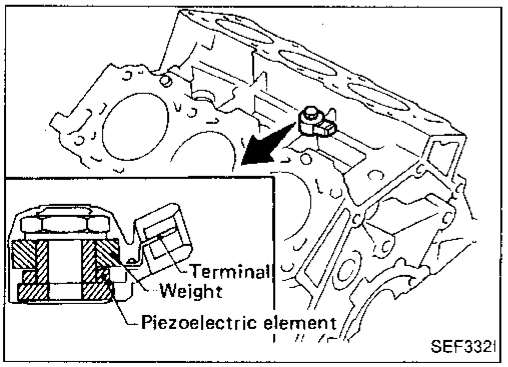
Power Steering Oil Pressure Switch

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects the power steering load, sending the load signal to the ECM. The ECM then sends the idle-up signal to the IACV-AAC valve.



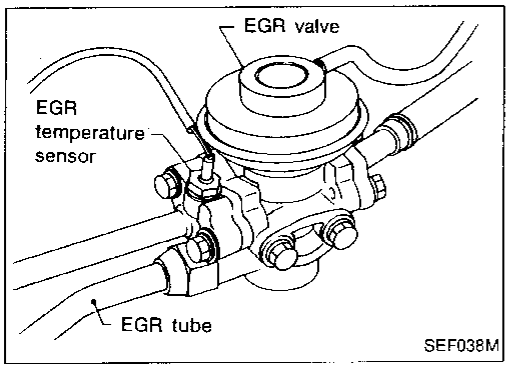
Vehicle Speed Sensor (VSS)

The vehicle speed sensor provides a vehicle speed signal to the ECM.
The speed sensor consists of a reed switch, which is installed in the speedometer unit and transforms vehicle speed into a pulse signal.



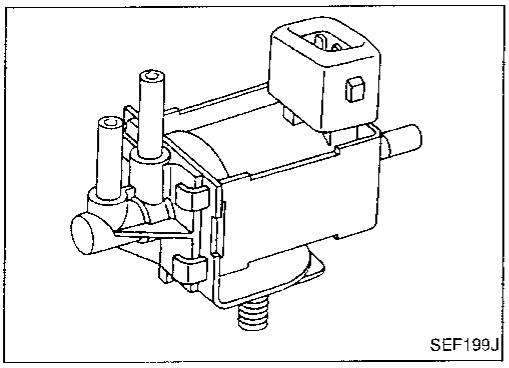
Knock Sensor (KS)

The two knock sensors are attached to the cylinder block and sense engine knocking conditions.
A knocking vibration from the cylinder block is applied as pressure to the piezoelectric element. This vibrational pressure is then converted into a voltage signal which is sent to the ECM.



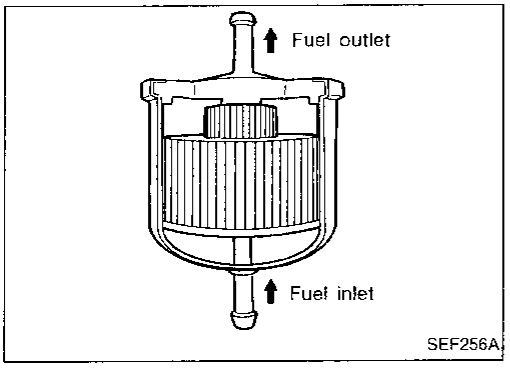
Exhaust Gas Recirculation (EGR) Valve

The EGR valve controls the quantity of exhaust gas to be diverted to the intake manifold through vertical movement of a taper valve connected to the diaphragm. Vacuum is applied to the diaphragm in response to the opening of the throttle valve.



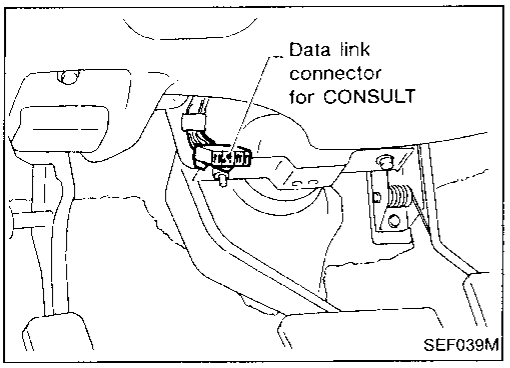
EGR Control (EGRC)-Solenoid Valve

The solenoid valve responds to the ON/OFF signal from the ECM. When it is off, a vacuum signal from the throttle body is fed into the EGR valve. When the ECM sends an ON signal, the coil pulls the plunger downward and cuts the vacuum signal.



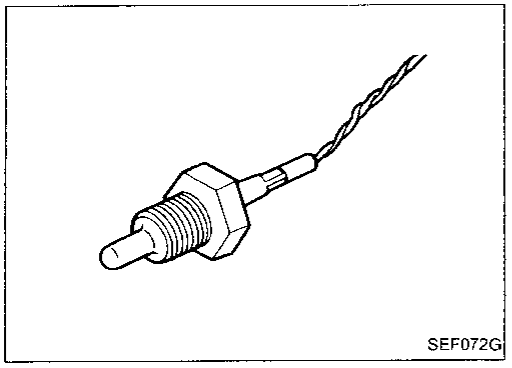
Fuel Filter

The specially designed fuel filter has a metal case in order to withstand high fuel pressure.



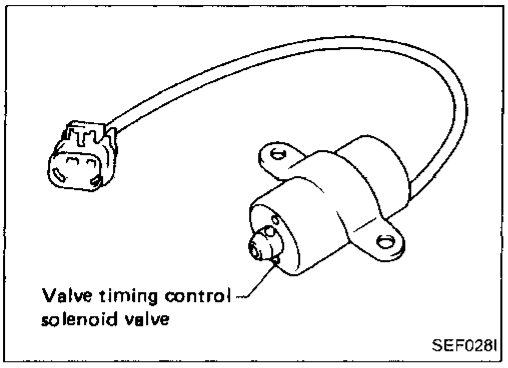
Data Link Connector For CONSULT

The data link connector for CONSULT is located behind the fuse lid.



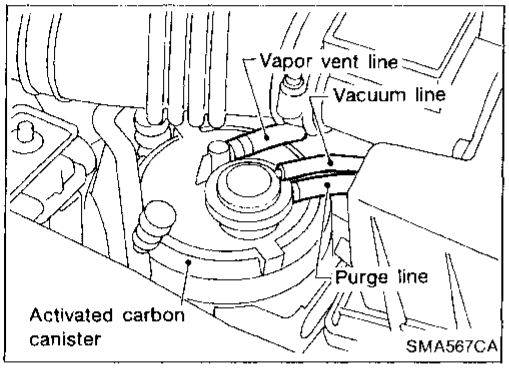
EGR Temperature Sensor

The EGR temperature sensor monitors the exhaust gas temperature and transmits a signal to the ECM. The temperature sensing unit employs a thermistor which is sensitive to the change in temperature. Electric resistance of the thermistor decreases in response to the temperature rise.



Valve Timing Control Solenoid Valve

The valve timing control solenoids are installed at the front of the intake camshafts, and control oil pressure which regulates the position of the intake camshafts.

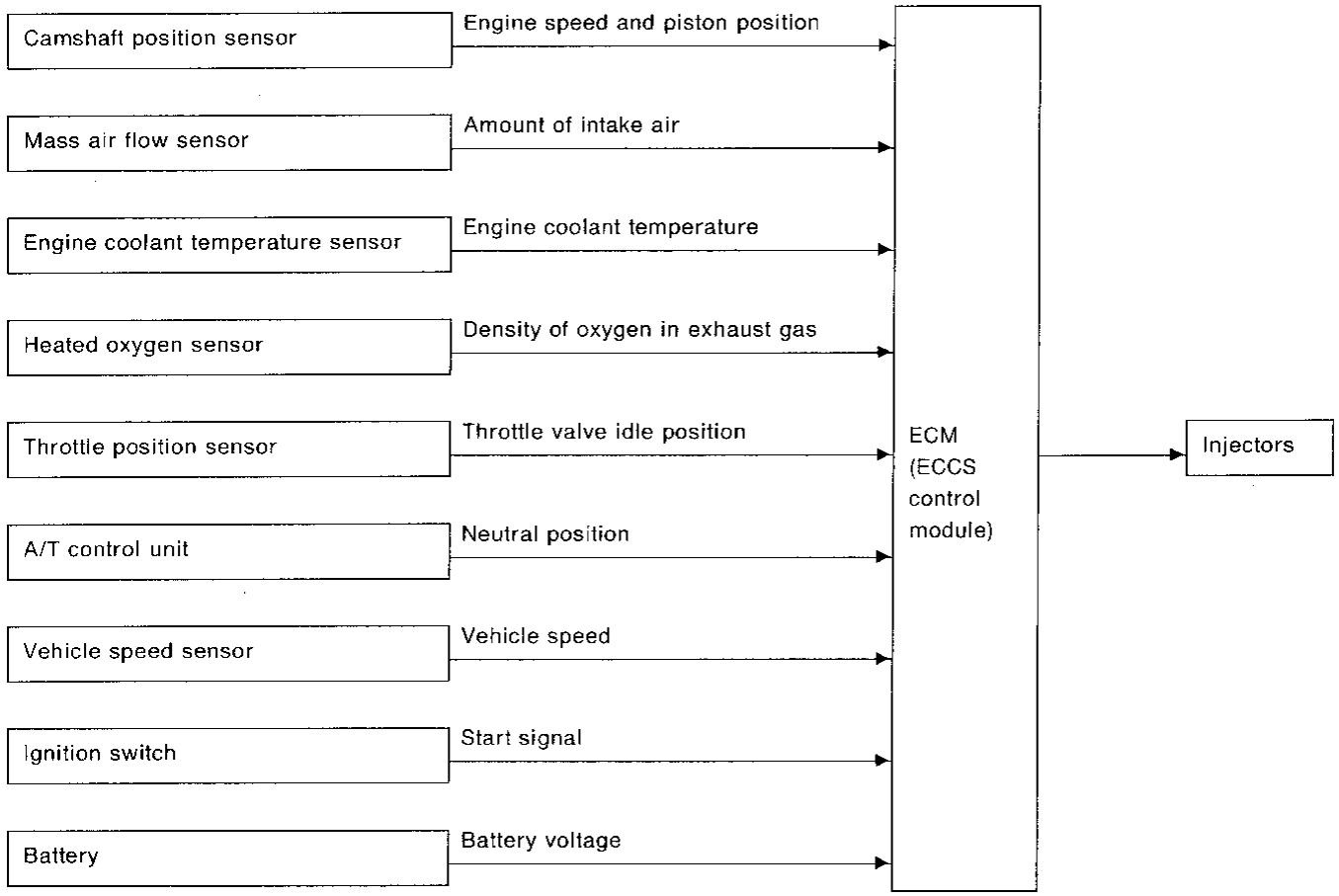


Activated Carbon Canister

The activated carbon canister is filled with active charcoal to absorb evaporative gases produced in the fuel tank. These absorbed gases are then delivered to the intake manifold by manifold vacuum for combustion purposes.

Multiport Fuel Injection (MFI) System

INPUT/OUTPUT SIGNAL LINE



BASIC MULTIPORT FUEL INJECTION SYSTEM

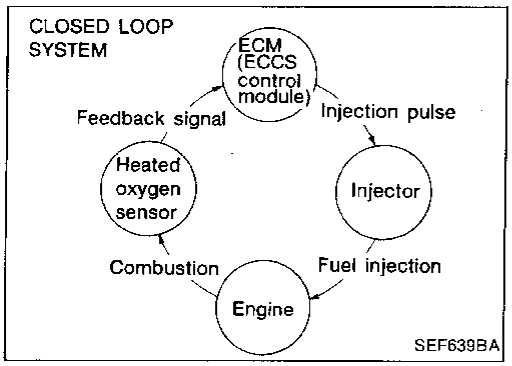
The amount of fuel injected from the fuel injector, or the length of time the valve remains open, is determined by the ECM. The basic amount of fuel injected is a program value mapped in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and air intake) from both the camshaft position sensor and the mass air flow sensor.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

<Fuel increase>
1) During warm-up
2) When starting the engine
3) During acceleration
4) Hot-engine operation

<Fuel decrease>
1) During deceleration
2) During high-speed operation



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

MIXTURE RATIO FEEDBACK CONTROL

The mixture ratio feedback system is used for precise control of the mixture ratio to the stoichiometric point. This is to enable the three way catalyst to reduce CO, HC and NOx emissions. This system uses an heated oxygen sensor in the exhaust manifold to check the air-fuel ratio. The ECM adjusts the injection pulse width according to the sensor voltage. Therefore, the mixture ratio is kept within the range of the stoichiometric air-fuel ratio.

This stage refers to the closed loop control condition. Under the open-loop control condition, the ECM detects any of the following conditions. Then, the ECM feedback control stops to maintain stabilized fuel combustion.

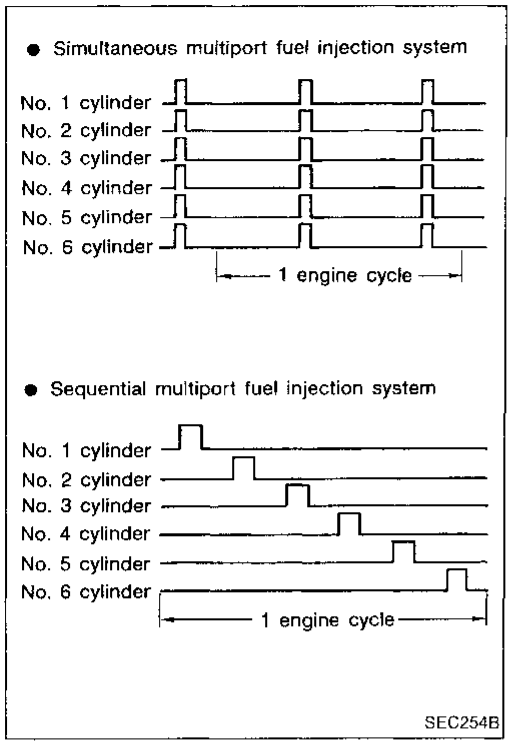
1) Deceleration
2) High-load, high-speed operation
3) Engine idling
4) Malfunction of heated oxygen sensor or its circuit
5) Insufficient activation of heated oxygen sensor at low engine coolant temperature
6) Engine starting
7) Heated oxygen sensor high output voltage

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the heated oxygen sensor. This feedback signal is then sent to the ECM to control the amount of fuel injection. This is to provide a basic mixture ratio as close to the stoichiometric mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. This is due to manufacturing errors (e.g., mass air flow sensor hot wire) and changes during operation (injector clogging, etc.) of ECCS parts which directly affect the mixture ratio.

Accordingly, a difference between the basic and stoichiometric mixture ratios is monitored in this system. It is then computed in terms of "fuel injection duration" to automatically compensate for the difference between the two ratios.

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



FUEL INJECTION TIMING

Two types of systems are used — sequential multiport fuel injection system and simultaneous multiport fuel injection system.

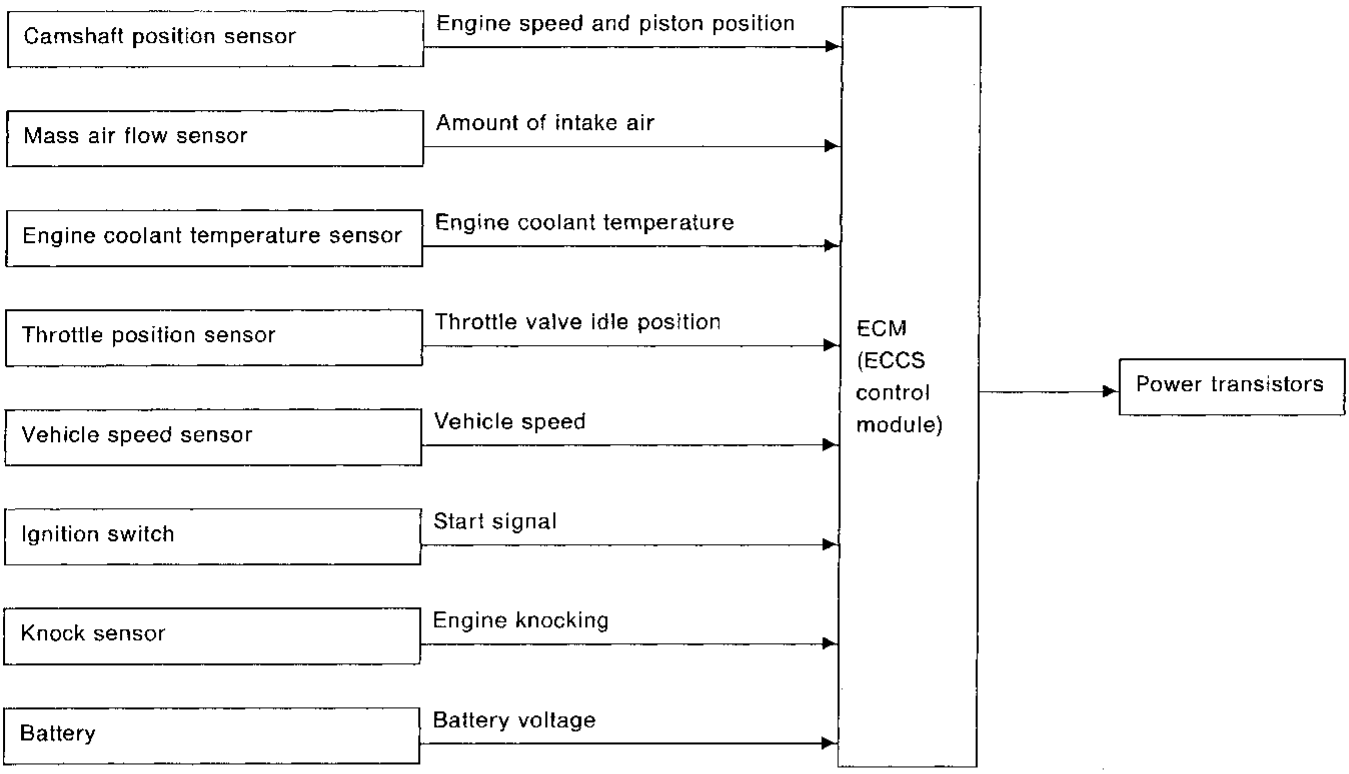
1) Sequential multiport fuel injection system
   Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.
2) Simultaneous multiport fuel injection system
   Fuel is injected simultaneously into all six cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM. The six injectors will then receive the signals two times for each engine cycle.
   This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

Fuel to each cylinder is cut off during deceleration or high-speed operation.

Electronic Ignition System (EI)

INPUT/OUTPUT SIGNAL LINE



Electronic Ignition System (EI) (Cont'd)

SYSTEM DESCRIPTION

The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine.

The ignition timing data is stored in the ECM located in the ECM. This data forms the map shown below.

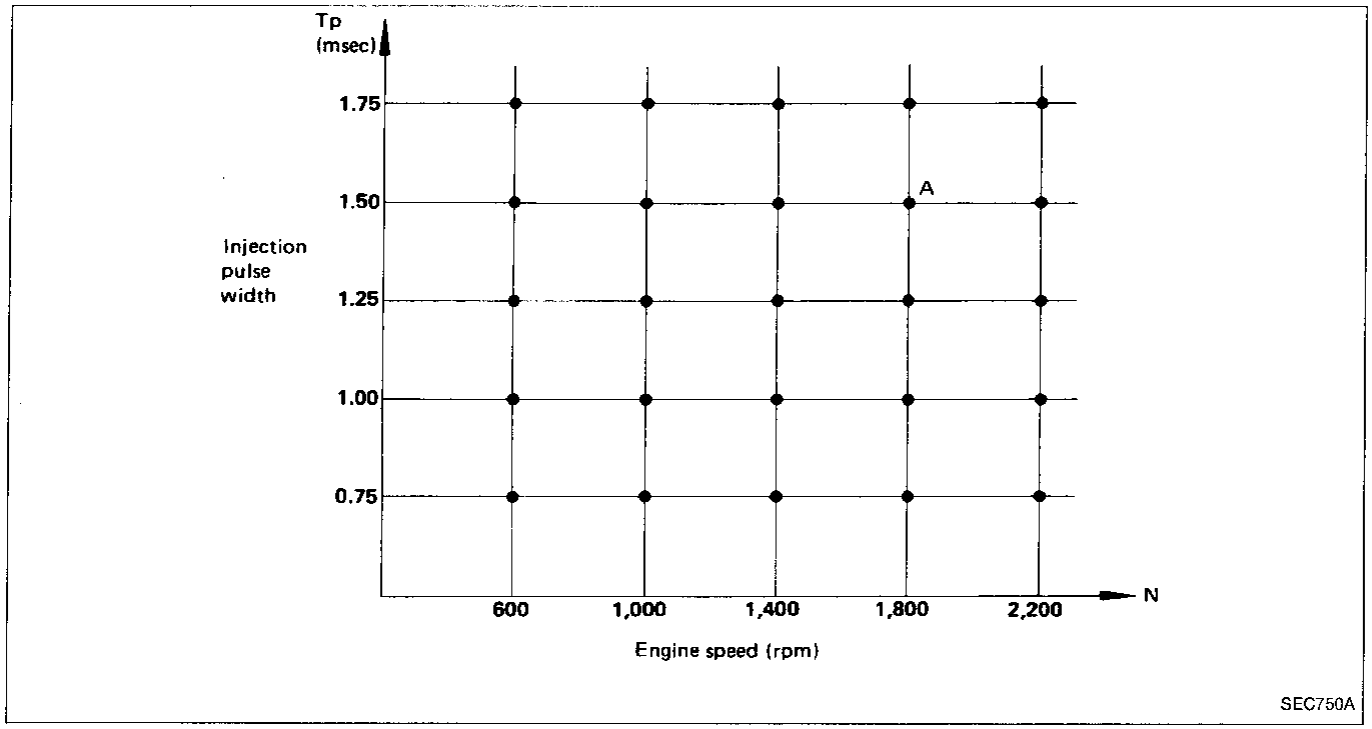
The ECM detects information such as the injection pulse width and camshaft position sensor signal which varies every moment. Then responding to this information, ignition signals are transmitted to the power transistor.

e.g. N: 1,800 rpm, Tp: 1.50 msec
A °BTDC

In addition to this,

1) At starting
2) During warm-up
3) At idle
4) At low battery voltage

the ignition timing is revised by the ECM according to the other data stored in the ECM.

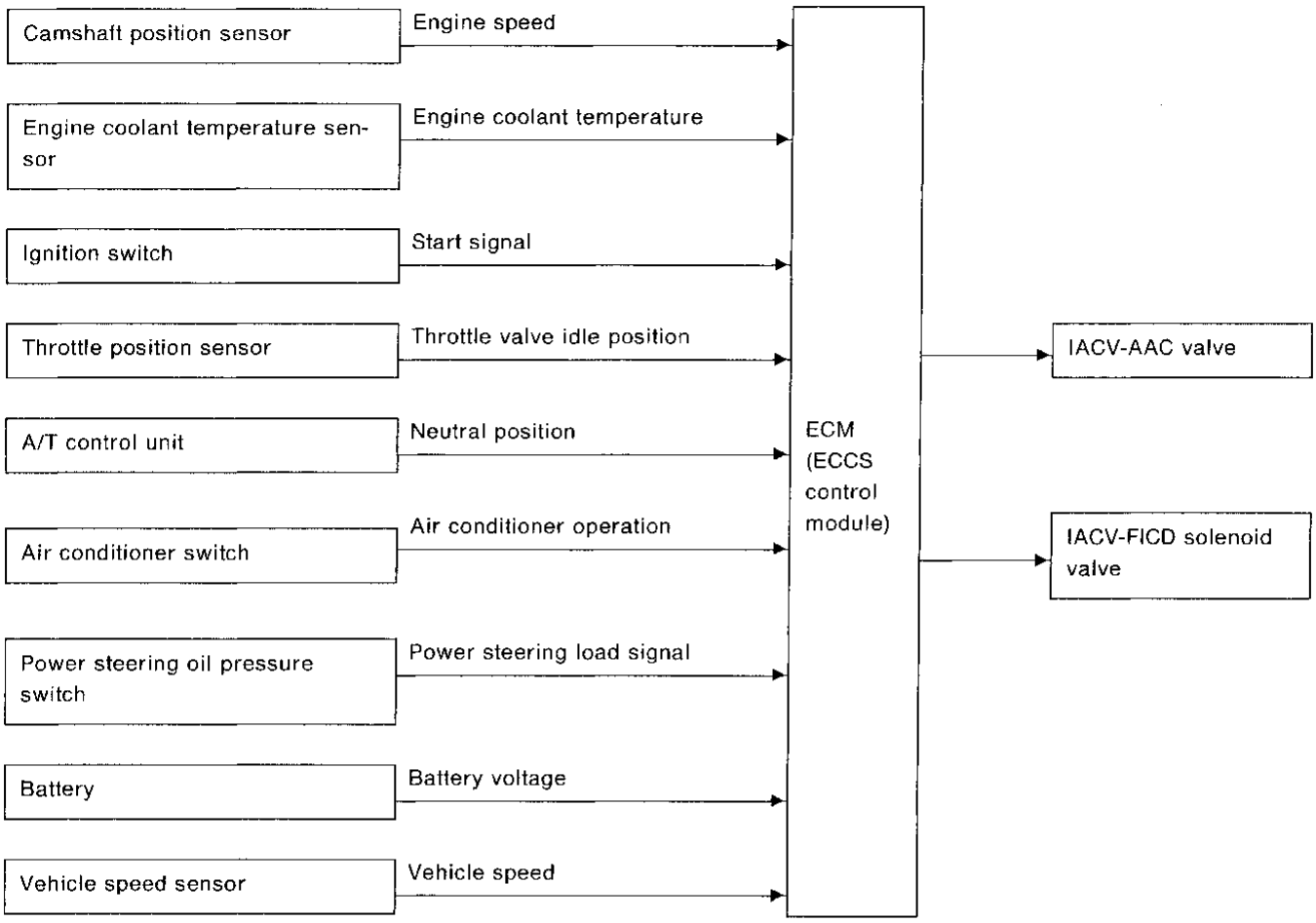


The retard system, actuated by the knock sensor, is designed only for emergencies. The basic ignition timing is pre-programmed within the anti-knocking zone, even if recommended fuel is used under dry conditions. Consequently, the retard system does not operate under normal driving conditions.

However, if engine knocking occurs, the knock sensor monitors the condition and the signal is transmitted to the ECM (ECCS control module). After receiving it, the ECM retards the ignition timing to eliminate the knocking condition.

Idle Air Control (IAC) System

INPUT/OUTPUT SIGNAL LINE



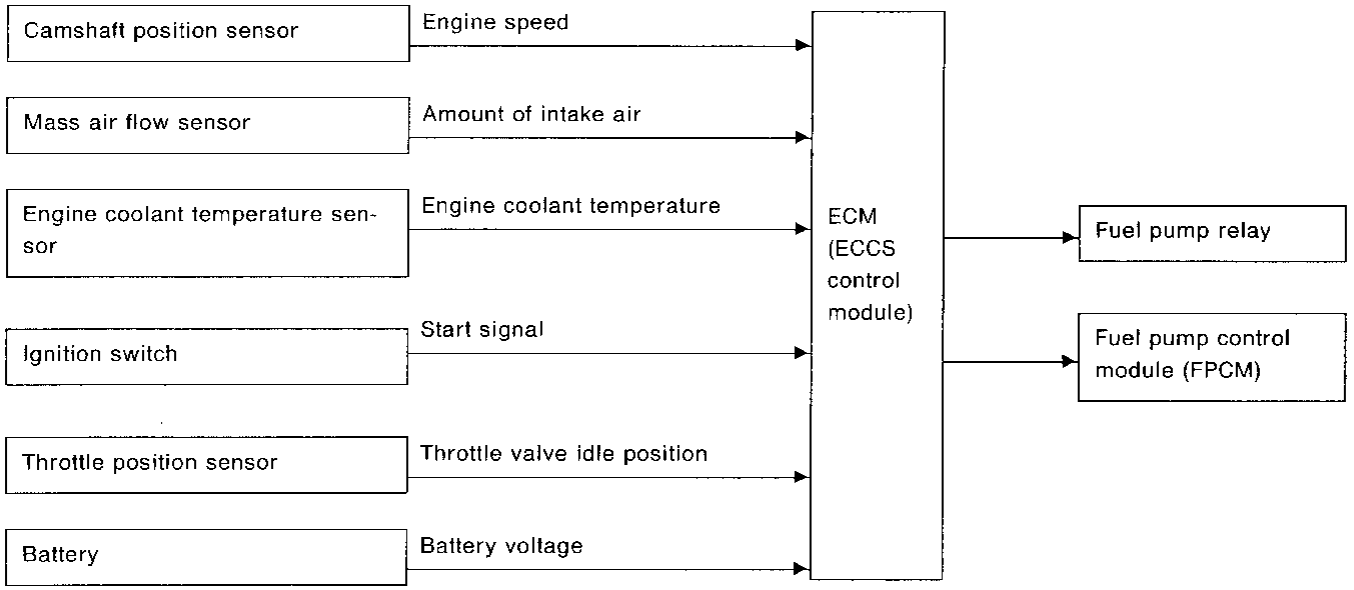
SYSTEM DESCRIPTION

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. Then, the ECM 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 considering various engine conditions. Such conditions include noise and vibration transmitted to the vehicle interior, fuel consumption, and engine load.

Fuel Pump Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

Fuel pump and IACV-air regulator ON-OFF control

The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine start-up. Upon receiving a 1° signal from the camshaft position sensor, the ECM detects engine rotation and causes the pump to activate. If the 1° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1.5 seconds
Engine running and cranking	Operates
When engine is stopped	Stops in 1.5 seconds
Except as shown above	Stops

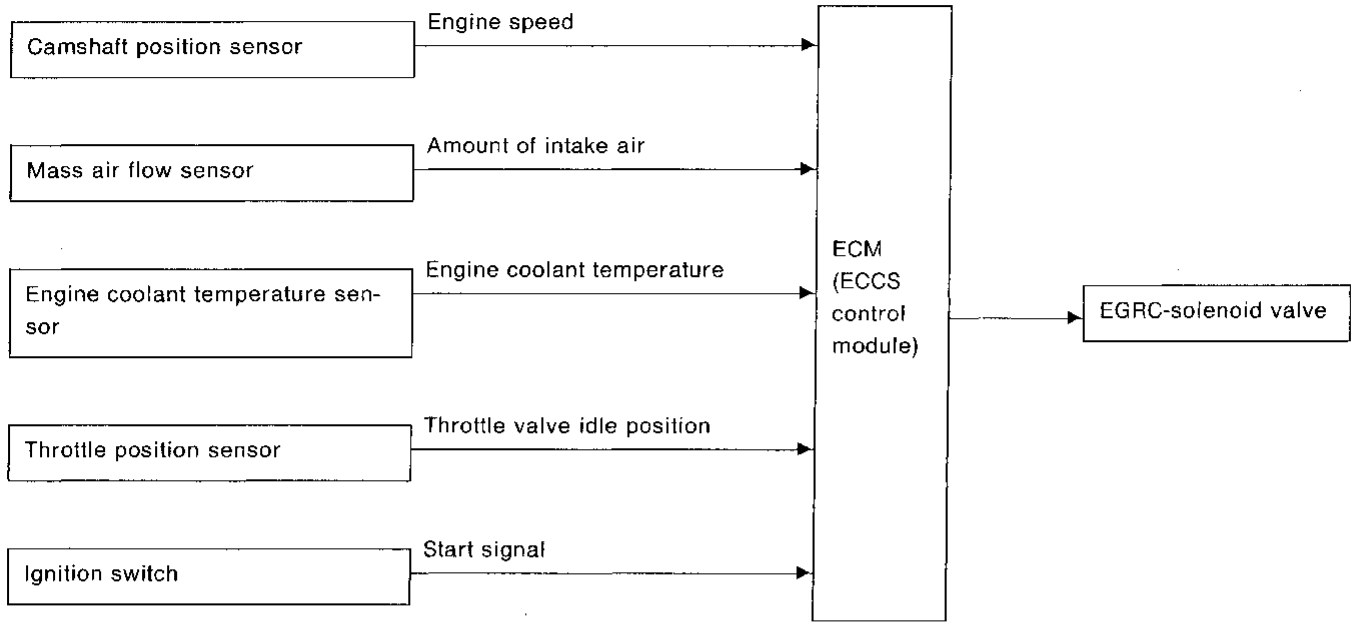
Fuel pump voltage control

The fuel pump is controlled by the fuel pump control module adjusting the voltage supplied to the fuel pump.

Conditions	Supplied voltage
• 1 second after ignition switch is turned ON • Engine cranking • 30 seconds after engine start [above 50°C (122°F)] • Engine coolant temperature below 10°C (50°F) • Engine is running under heavy load conditions • Engine is running under middle load conditions	Battery voltage
• Except the above	Approx. 8V

Exhaust Gas Recirculation (EGR) System

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

This system cuts and controls vacuum applied to EGR valve and canister to suit engine operating conditions.

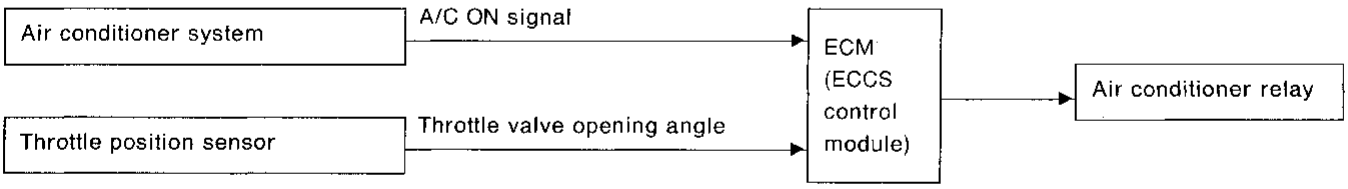
This cut-and-control operation is accomplished through the ECM. When the ECM detects any of the following conditions, current flows through the solenoid valve in the EGR control vacuum line.

This causes the port vacuum to be discharged into the atmosphere so that the EGR valve remains closed.

1) Low engine coolant temperature
2) Engine starting
3) High-speed engine operation
4) Engine idling
5) Excessively high engine coolant temperature

Acceleration Cut Control

INPUT/OUTPUT SIGNAL LINE



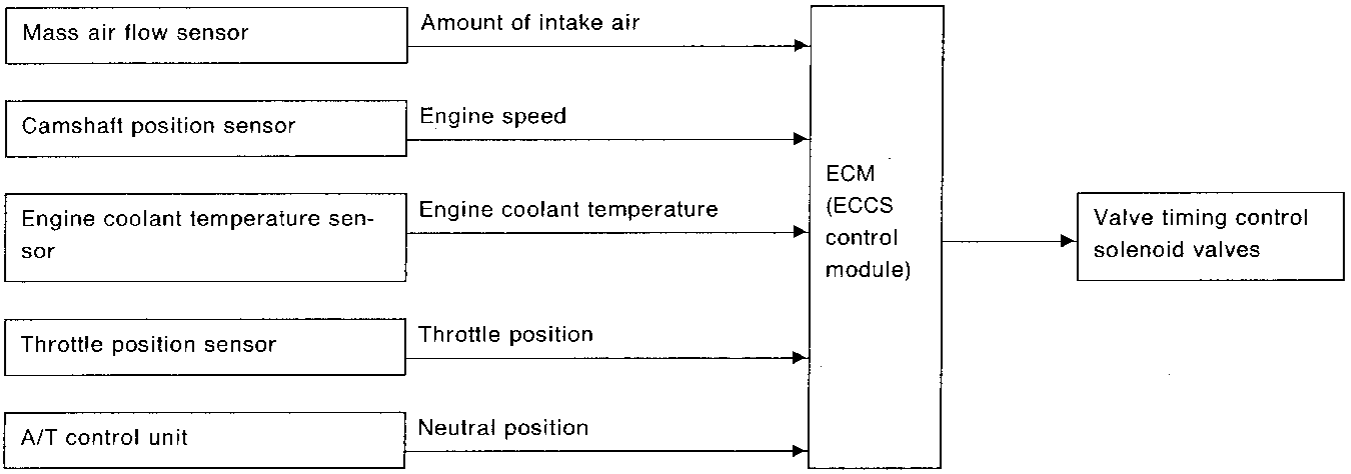
SYSTEM DESCRIPTION

When the accelerator pedal is fully depressed, the air conditioner is turned off for a few seconds.

This system improves acceleration when the air conditioner is used.

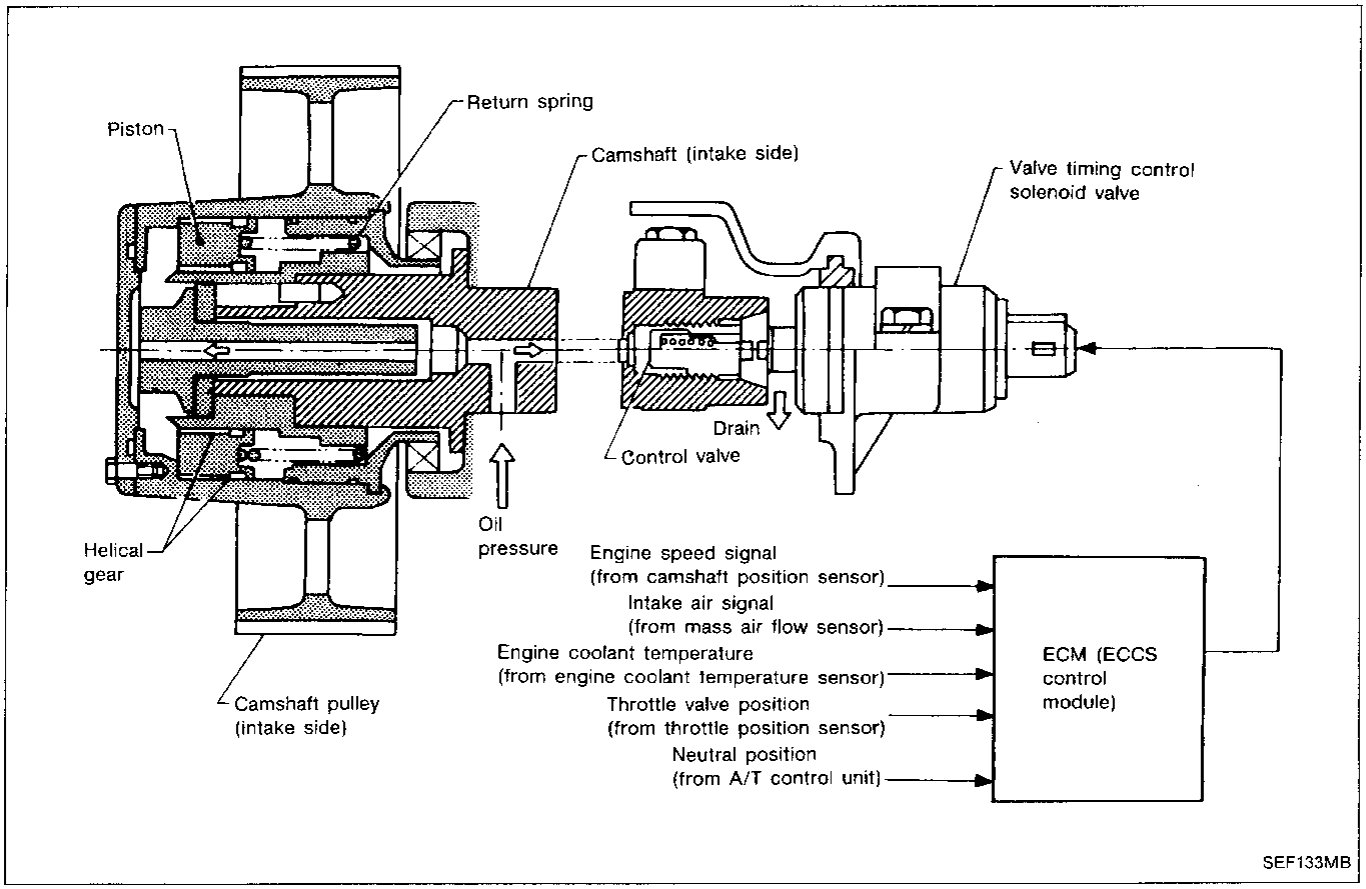
Valve Timing Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

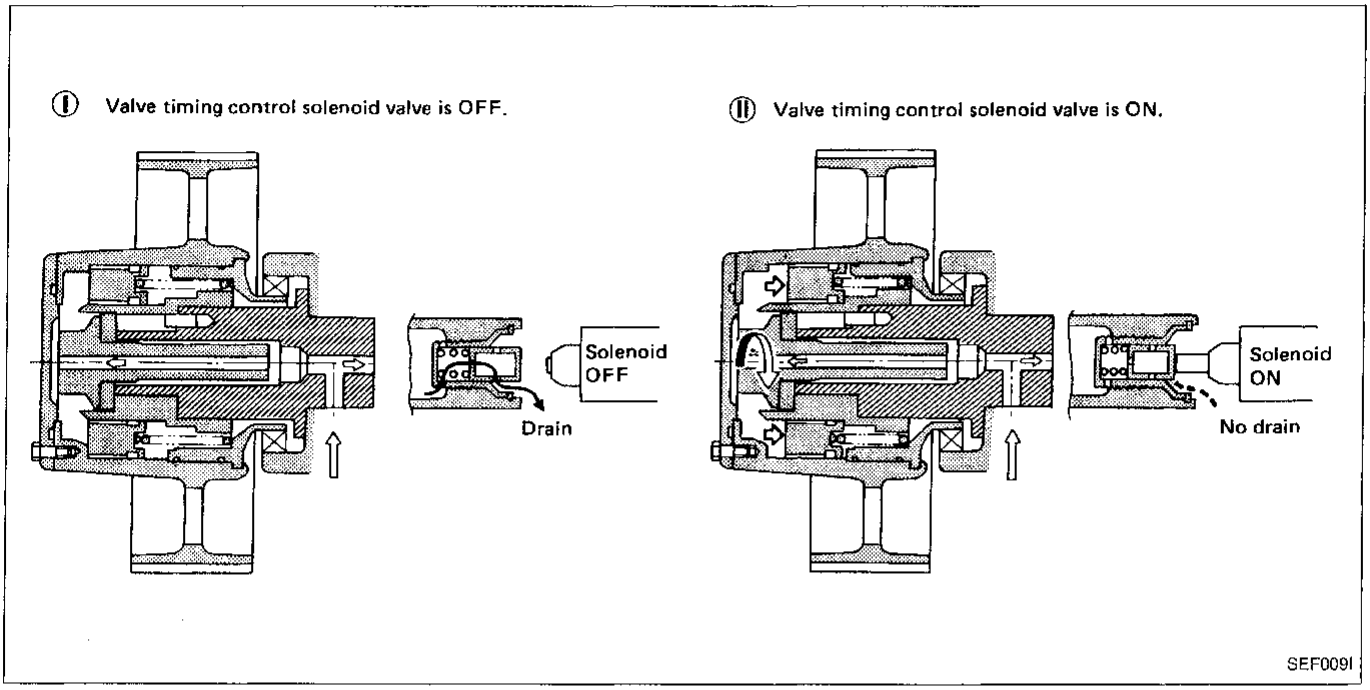
The valve timing control system is utilized to increase engine performance. Intake valve opening and closing time is controlled, according to the engine operating conditions, by the ECM.
Engine coolant temperature signals, engine speed, amount of intake air, throttle position and gear position are used to determine intake valve timing.
The intake camshaft pulley position is regulated by oil pressure, which is controlled by the valve timing control solenoid valve.

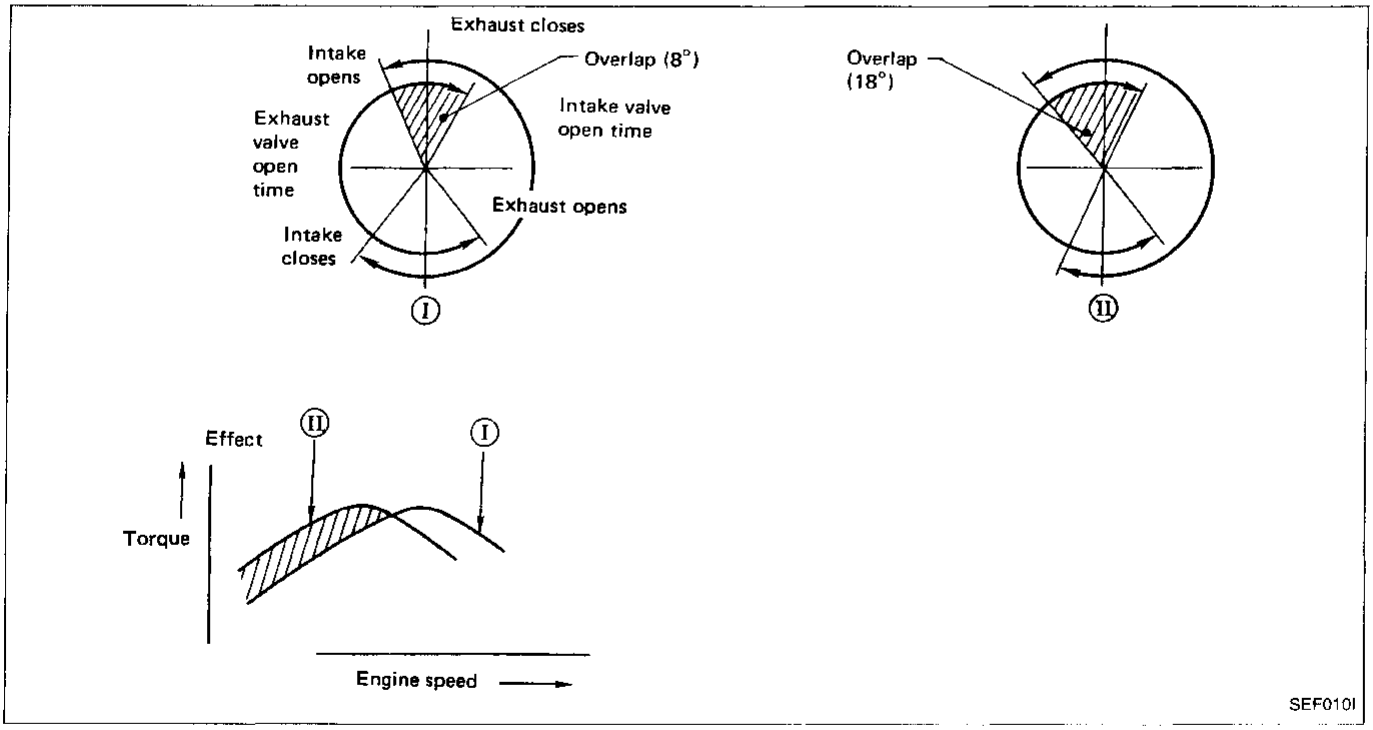


Valve Timing Control (Cont'd)

OPERATION

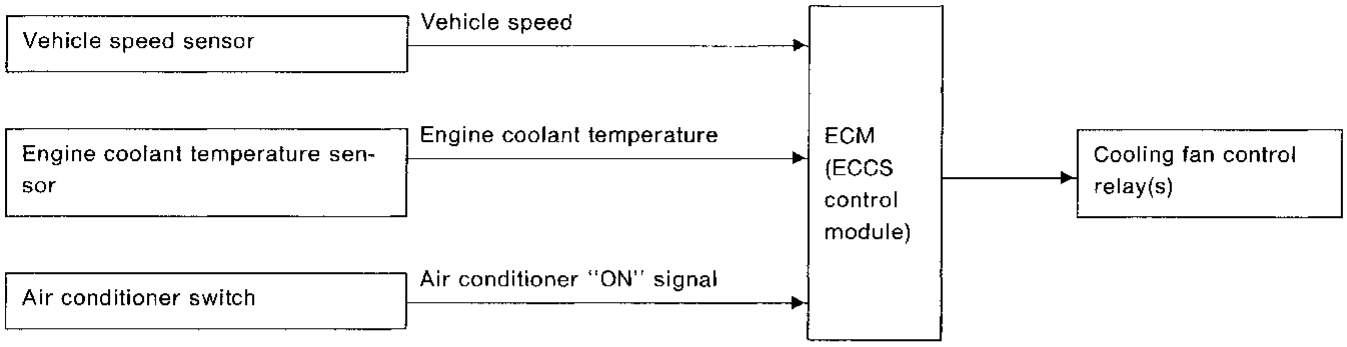
Engine operating condition	Valve timing control solenoid valve	Intake valve opening and closing time	Valve overlap	Engine torque curve
Idling, high speed	OFF	Retard	Decreased	Ⓘ
Low to medium speed	ON	Advance	Increased	Ⓘⓘ





Cooling Fan Control

INPUT/OUTPUT SIGNAL LINE



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 (HIGH)/OFF].

OPERATION

Air conditioner switch is "OFF"

Engine coolant temperature °C (°F)	Cooling fan
Below 104 (219)	OFF
Above 105 (221)	ON

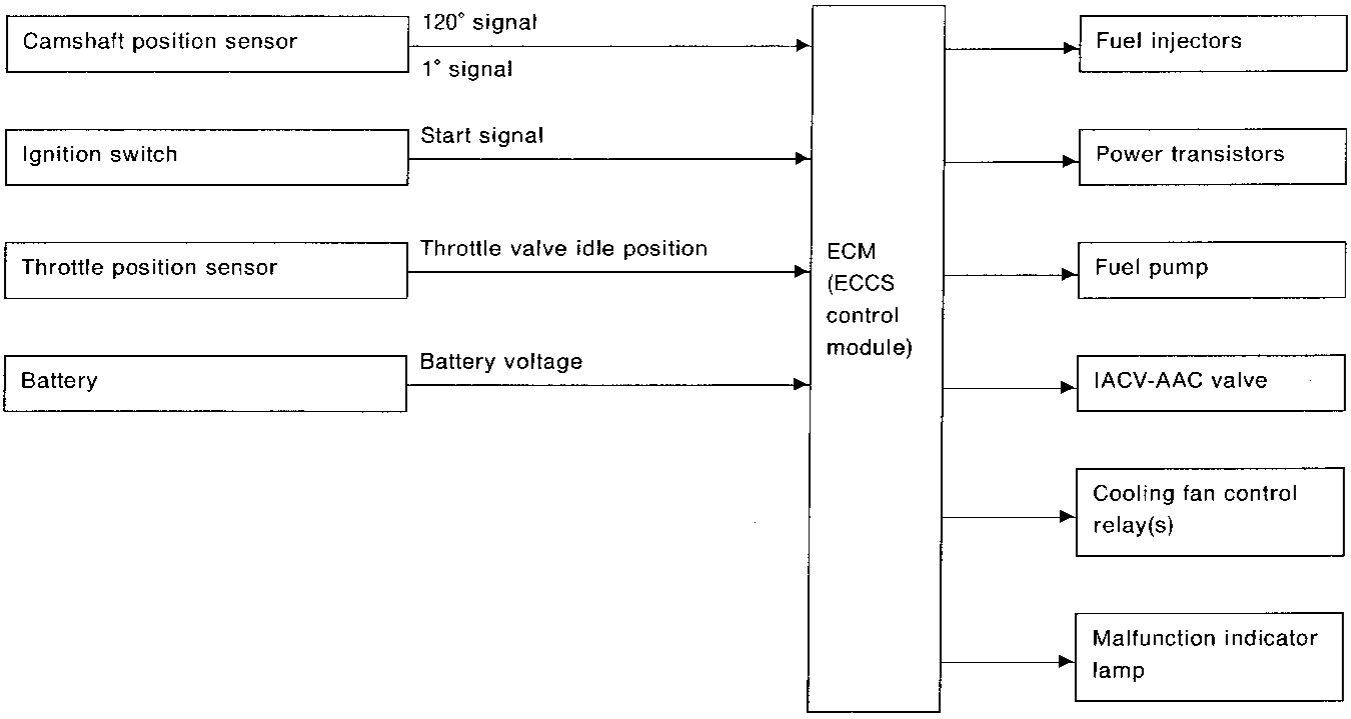
Air conditioner switch is "ON"

Vehicle speed km/h (MPH)	Engine coolant temperature °C (°F)	Cooling fan
Below 39 (24)	Below 94 (201)	OFF
	Above 95 (203)	ON
Above 40 (25)	Below 104 (219)	OFF
	Above 105 (221)	ON

Fail-safe System

CPU MALFUNCTION OF ECM

Input/output signal line



Outline

The fail-safe system makes engine starting possible if there is something malfunctioning in the ECM's CPU circuit.
In general, engine starting was difficult under the previously mentioned conditions. But with the provisions in this fail-safe system, it is possible to start the engine.

Fail-safe system activating condition when ECM is malfunctioning

The fail-safe mode operation starts when the computing function of the ECM is judged to be malfunctioning.
When the fail-safe system activates, the MALFUNCTION INDICATOR LAMP on the instrument panel lights to warn the driver. The system activates upon detection of a malfunction in the CPU of the ECM.

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, engine idle speed, EGR operation, and so on are controlled under certain limitations.

Cancellation of fail-safe system when ECM is malfunctioning

Activation of the fail-safe system is canceled each time the ignition switch is turned OFF. The system is reactivated if all of the activating conditions are satisfied after turning the ignition switch from OFF to ON.

MASS AIR FLOW SENSOR MALFUNCTION

If the mass air flow sensor output voltage is above or below the specified value, the ECM senses an mass air flow sensor malfunction. In case of a malfunction, the throttle position sensor substitutes for the mass air flow sensor.
Although the mass air flow sensor is malfunctioning, it is possible to start the engine and drive the vehicle. But engine speed will not rise more than 2,400 rpm in order to inform the driver of fail-safe system operation while driving.

Fail-safe System (Cont'd)

Operation

Engine condition	Starter switch	Fail-safe system	Fail-safe functioning
Stopped	ANY	Does not operate	—
Cranking	ON	Operates	Engine will be started by a pre-determined injection pulse on ECM.
Running	OFF		Engine speed will not rise above 2,400 rpm.

ENGINE COOLANT TEMPERATURE SENSOR MALFUNCTION

When engine coolant temperature sensor output voltage is below or above the specified value, engine coolant temperature signal is fixed at the preset value as follows:

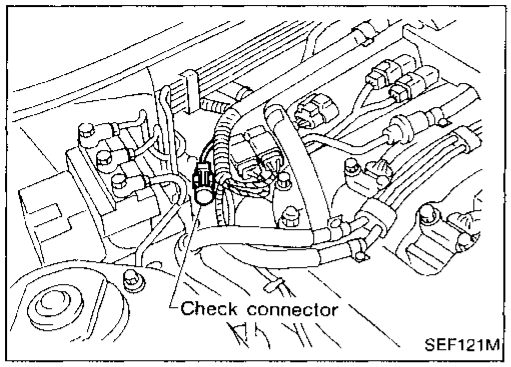
Engine condition	Engine coolant temperature preset value °C (°F)
Start	40 (104)
Running	80 (176)

KNOCK SENSOR MALFUNCTION

When the output signal of the knock sensor is abnormal, the ECM judges it to be malfunctioning. When knock sensor is malfunctioning, ignition timing will retard or advance according to operating conditions.

THROTTLE POSITION SENSOR MALFUNCTION

When the output signal of throttle position sensor is abnormal, the ECM judges it as a malfunctioning of throttle position sensor. The ECM does not use the throttle position sensor signal but uses a closed throttle position switch signal.

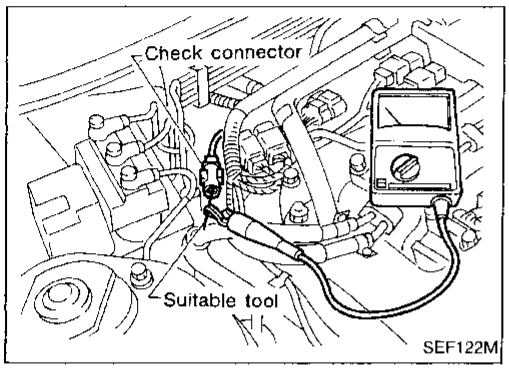


Direct Ignition System

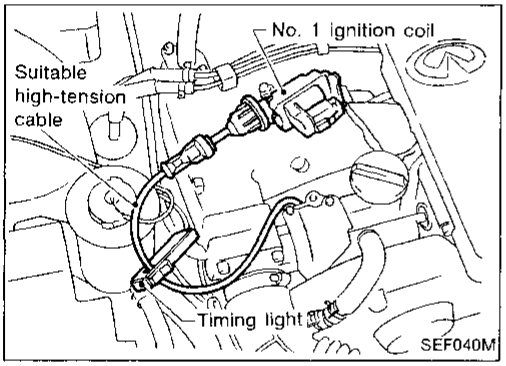
CHECKING IDLE SPEED AND IGNITION TIMING

Idle speed

1. Disconnect check connector for voltage type tachometer.



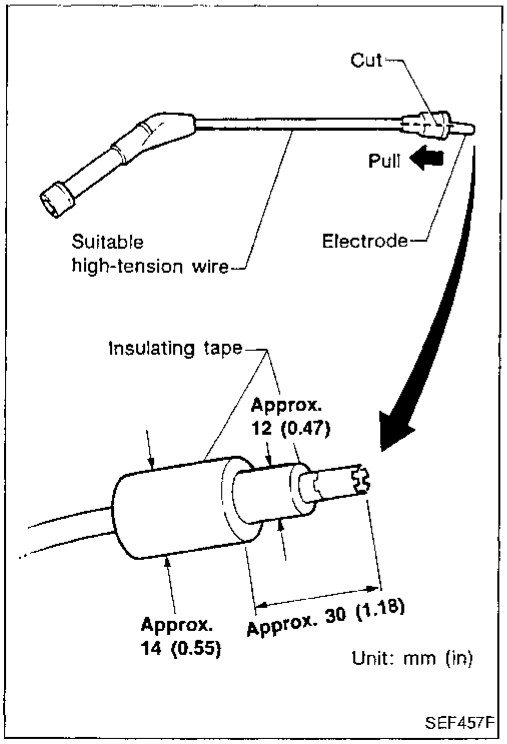
2. Connect tachometer using a suitable tool.



Ignition timing

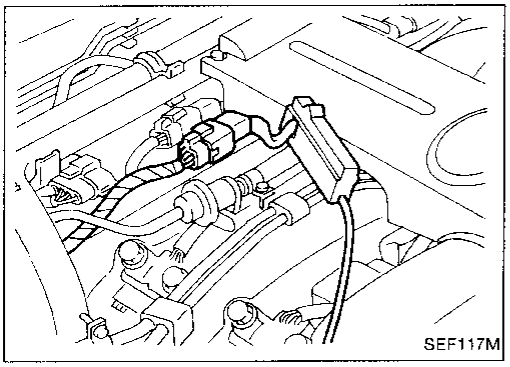
- **Method A (Without SST)**

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.



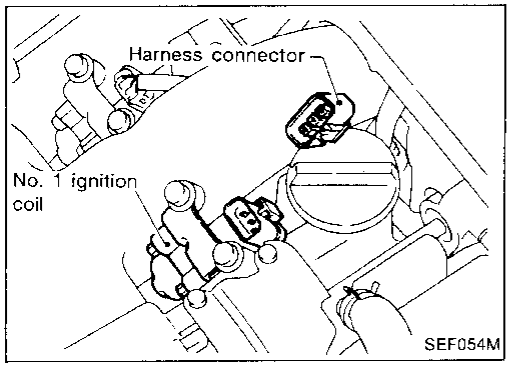
4. For the above procedures, enlarge the end of a suitable high-tension wire with insulating tape as shown.

Direct Ignition System (Cont'd)



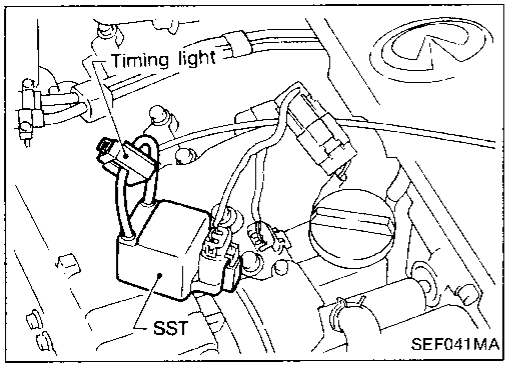
- **Method B (Without SST)**

Clamp wire as shown.
This connector is installed at the lower end of the left bank power transistor on some models, and the right bank power transistor on other models.

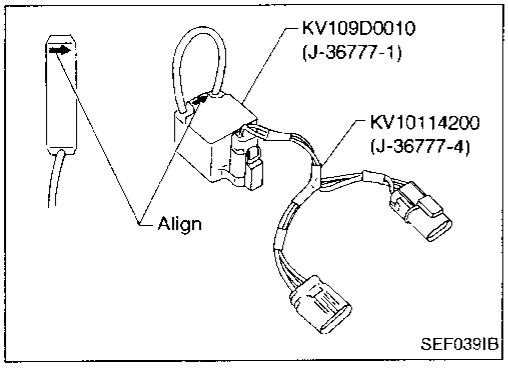


- **Method C (With SST)**

1. Disconnect No. 1 ignition coil 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.

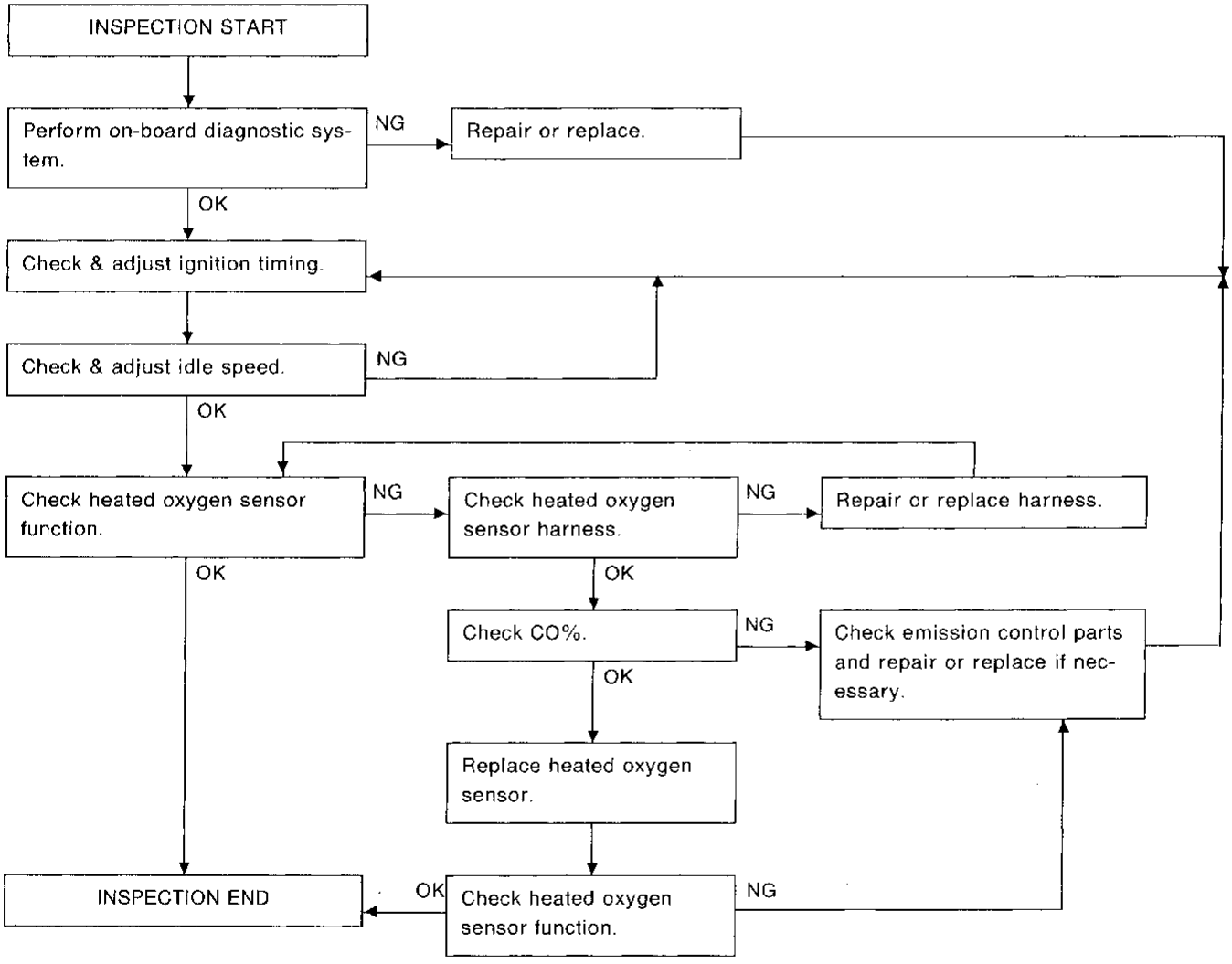
PREPARATION

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

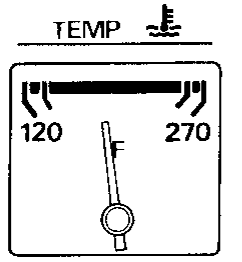
- Battery
- Ignition system
- Engine oil and coolant levels
- Fuses
- ECM harness connector
- Vacuum hoses
- Air intake system
  (Oil filler cap, oil level gauge, etc.)
- Fuel pressure
- Engine compression
- EGR valve operation
- Throttle valve

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



A



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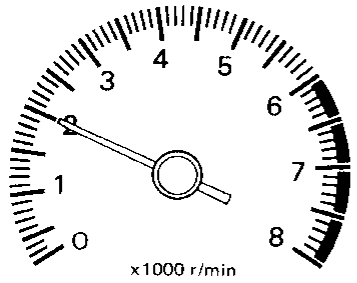
B



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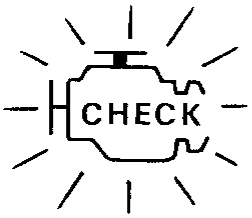
C



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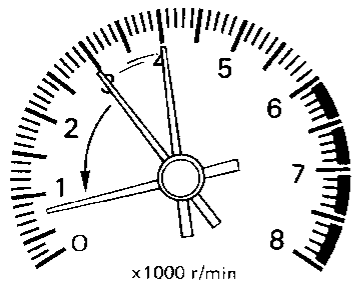
D



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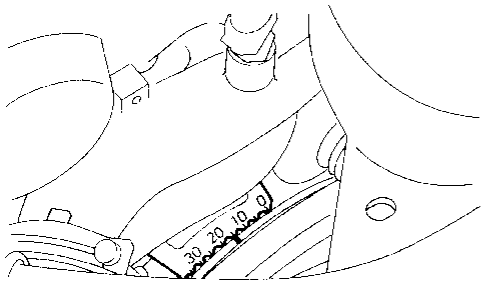
E



SEF042M

START

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

A

Start engine and warm it up until water 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.

C

Perform ECCS on-board diagnostic system.

OK

NG

Repair or replace components as necessary.

Does engine run smoothly?

OK

NG

Clean injectors.

D

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

E

Check ignition timing with a timing light.

15° ± 2° BTDC

OK

NG

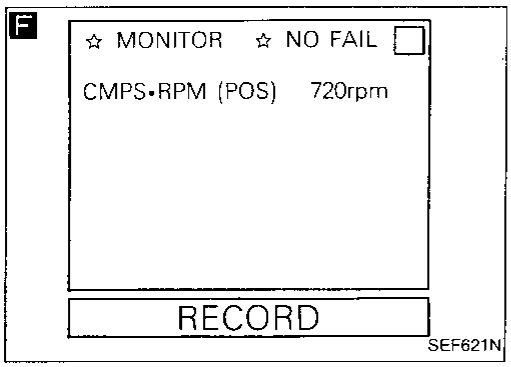
Adjust ignition timing by turning camshaft position sensor after loosening securing bolts.

Ⓐ

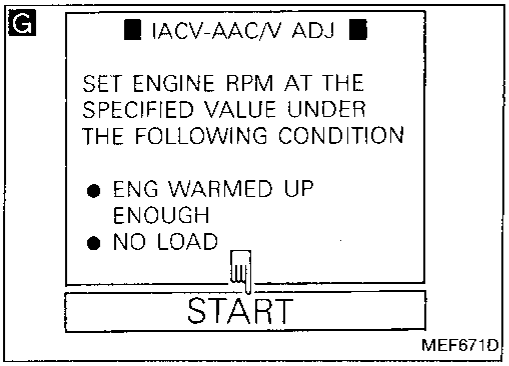
Ⓑ

Ⓗ

F



G



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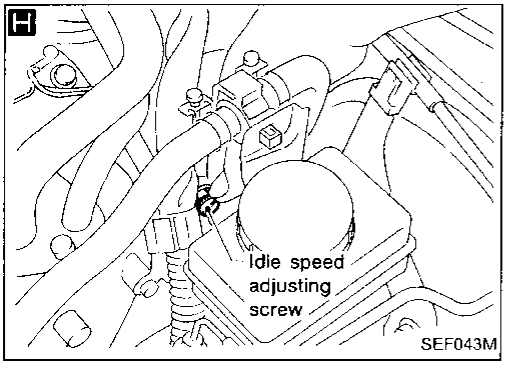

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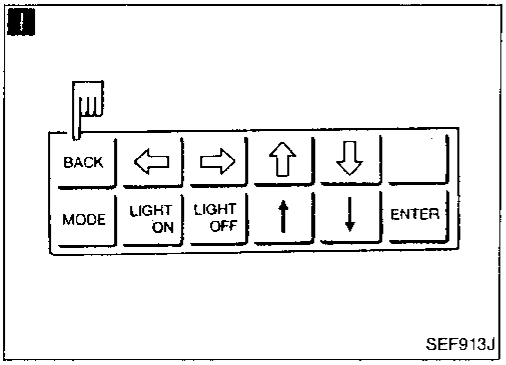

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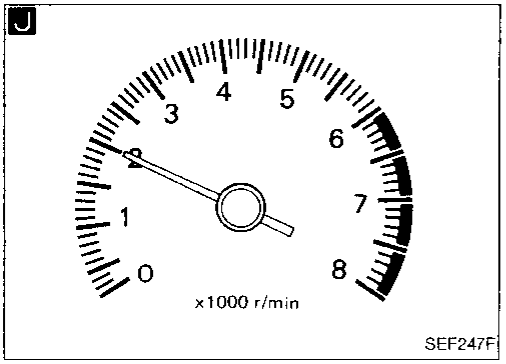


Ⓐ

F

Check idle speed.

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

OR

Check idle speed.

720 ± 50 rpm (in "N" position)

OK

NG

G

1) Select "IACV-AAC/V ADJ" in "WORK SUPPORT" mode.
2) Touch "START".

OR

Disconnect IACV-AAC valve harness connector.

H

Adjust idle speed by turning idle speed adjusting screw.

670 ± 25 rpm (in "N" position)

I

1) Touch "BACK".

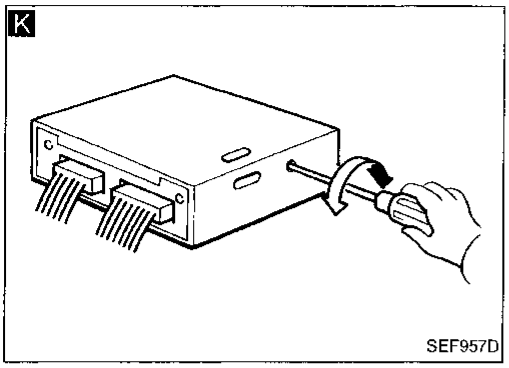
1) Connect IACV-AAC valve harness connector.

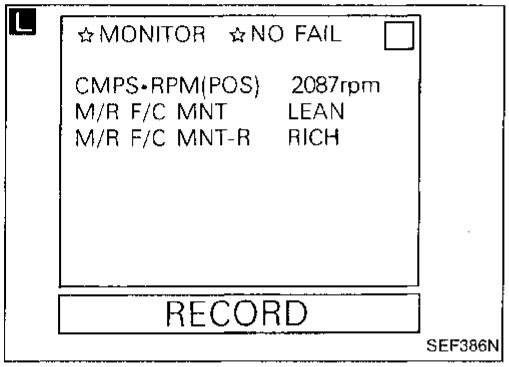
Ⓑ

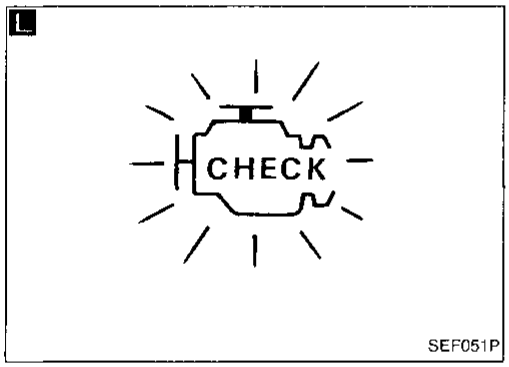
J

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

Ⓓ







Ⓓ

K

Set the diagnosis mode of ECM to Diagnostic Test Mode II.

Ⓘ

L

Check left bank heated oxygen sensor signal.

1) See "M/R F/C MNT (right and left sides)" 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

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

OR

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

OK

Less than 5 times

Replace left bank heated oxygen sensor. ← Ⓙ

OK ← Check left bank heated oxygen sensor signal. → NG → Ⓚ

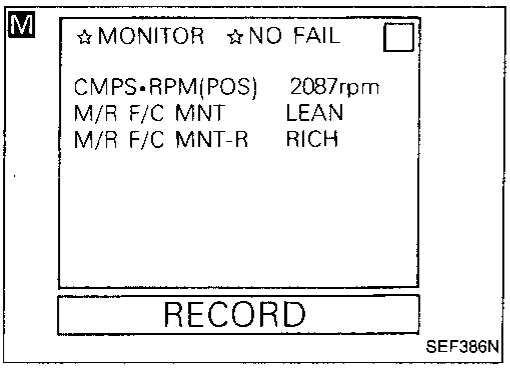
1) See "M/R F/C MNT (right and left sides)" in "DATA MONITOR" mode.
2) Maintaining engine at 2,000 rpm under no-load (engine is warmed up sufficiently.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.
   1 time: RICH → LEAN → RICH
   2 times: RICH → LEAN → RICH → LEAN → RICH

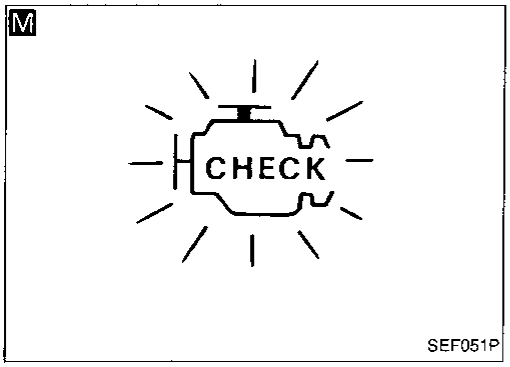
OR

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

Ⓛ

Ⓔ





Ⓛ

Check right bank heated oxygen sensor signal.

1) See "M/R F/C MNT (right and left sides)" 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 and off 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 right bank heated oxygen sensor.

Check right bank heated oxygen sensor signal.

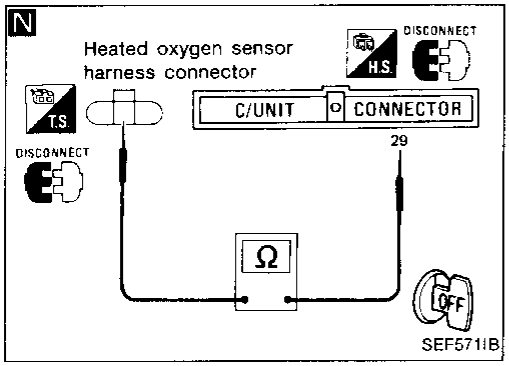
1) See "M/R F/C MNT (right and left sides)" in "DATA MONITOR" mode.
2) Maintaining engine at 2,000 rpm under no-load (engine is warmed up sufficiently.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.
   1 time: RICH → LEAN → RICH
   2 times: RICH → LEAN → RICH → LEAN → RICH

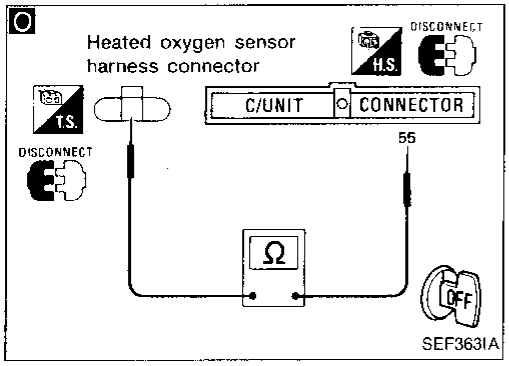
OR

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

NG → Ⓔ

OK → END





N

Check right bank heated oxygen sensor harness:
1) Turn off engine and disconnect battery ground cable.
2) Disconnect 76-pin connector from ECM.
3) Disconnect right bank heated oxygen sensor harness connector.
4) Check for continuity between terminal No. 29 of 76-pin connector and harness connector for heated oxygen sensor.

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

OK / NG

NG → Repair or replace harness. → ⓘ

OK → Connect 76-pin connector to ECM.

O

Check left bank heated oxygen sensor harness:
1) Turn off engine and disconnect battery ground cable.
2) Disconnect 76-pin connector from ECM.
3) Disconnect left bank heated oxygen sensor harness connector.
4) Check for continuity between terminal No. 55 of 76-pin connector and harness connector for heated oxygen sensor.

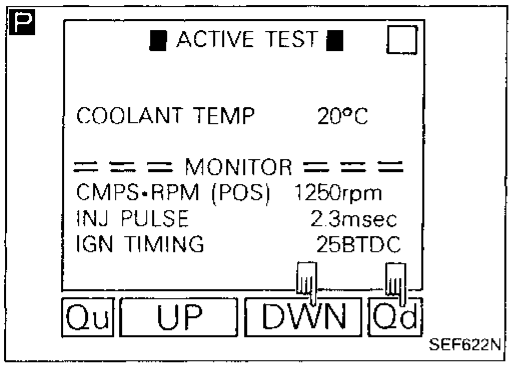
Continuity exists. ..... OK
Continuily does not exist. ..... NG

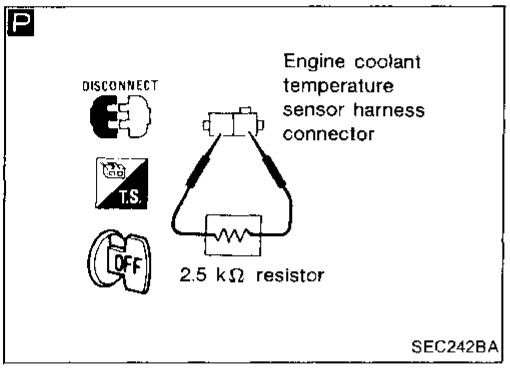
OK / NG

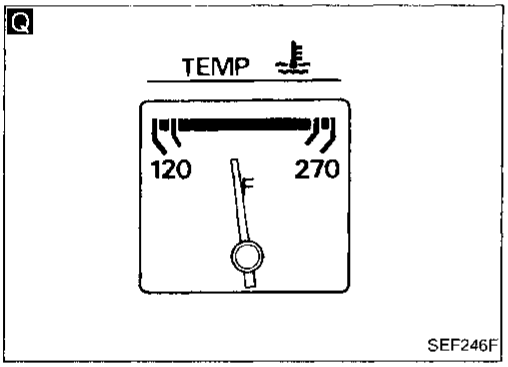
NG → Repair or replace harness. → ⓘ

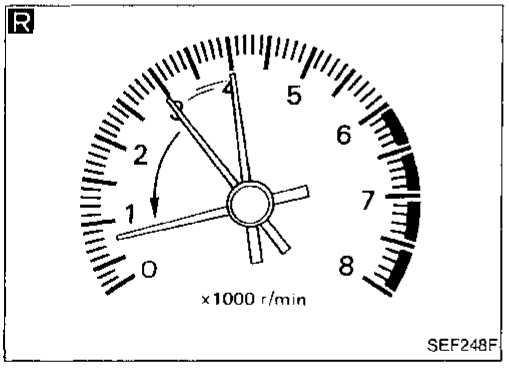
OK → Connect 76-pin connector to ECM.

Connect 76-pin connector to ECM. → ⓖ









Ⓖ

P

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

OR

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

Q

Start engine and warm it up until water 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" %. — OK → Ⓙ

Idle CO: 0.2 - 8%

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

NG

Connect heated oxygen sensor harness connector to heated oxygen sensor.

Check fuel pressure regulator. ← Ⓚ

Check mass air flow sensor.

Check injector.
Clean or replace if necessary.

Check engine coolant temperature sensor.

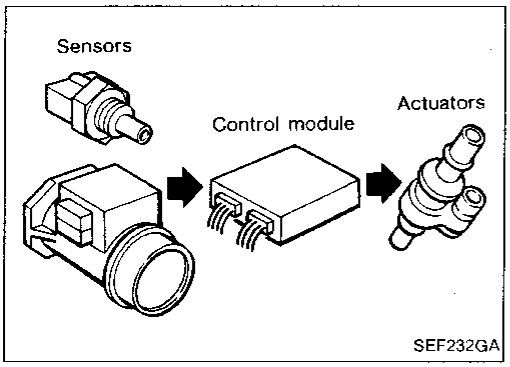
Check ECM function* by substituting another known good ECM. → Ⓗ

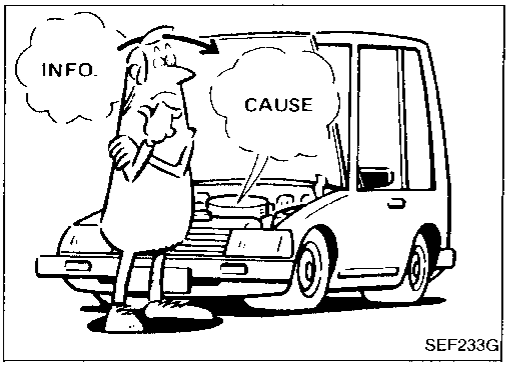
*: ECM may be the cause of a problem, but this is rarely the case.

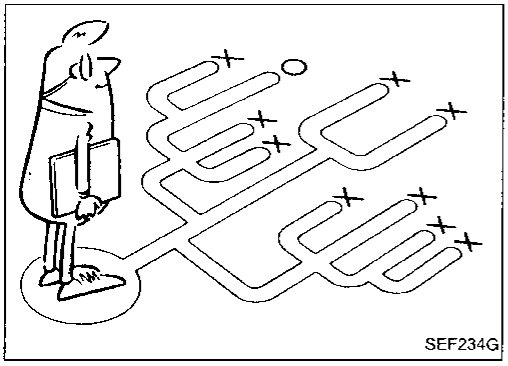
Contents

Contents (Cont'd)

Contents (Cont'd)







How to Perform Trouble Diagnoses for Quick and Accurate Repair

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 kinds of signals are proper and stable. At the same time, it is important that there are no conventional 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.

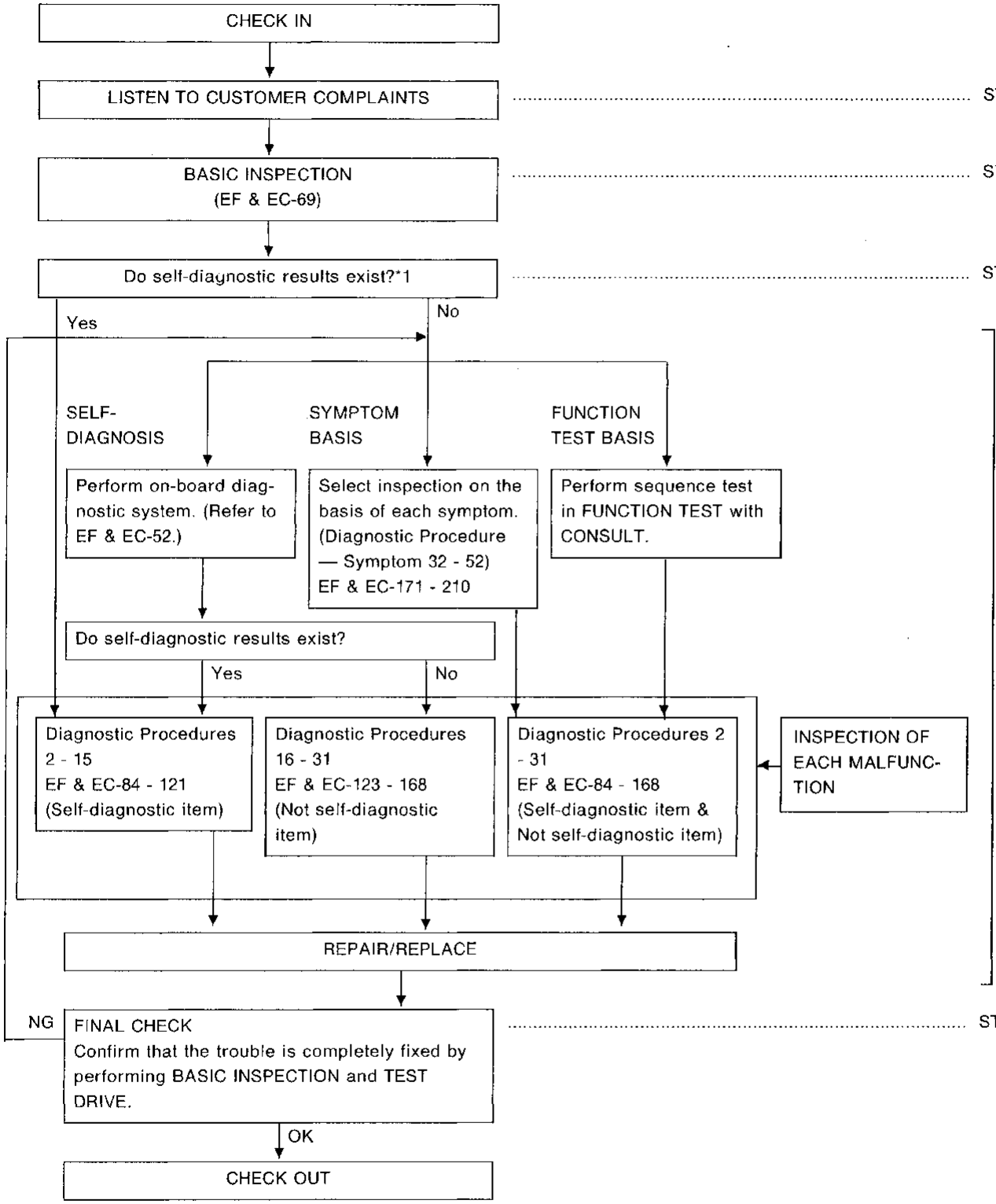
A visual check only may not find the cause of the problems, so a road test with a circuit tester connected to a suspected circuit should be performed.

Before undertaking actual checks, take just a few minutes to talk with a customer who approaches with a driveability complaint. The customer is a very good supplier of information on such problems, especially intermittent ones. Through interaction with the customer, find out what symptoms are present and under what conditions they occur.

Start your diagnosis by looking for "conventional" problems first. This is one of the best ways to troubleshoot driveability problems on an electronically controlled engine vehicle.

How to Perform Trouble Diagnoses for Quick and Accurate Repair (Cont'd)

WORK FLOW



***1: If the on-board diagnostic system cannot be performed, check main power supply and ground circuit. (See Diagnostic Procedure 1)**

***2: If the trouble is not duplicated, see INTERMITTENT PROBLEM SIMULATION (EF & EC-48).**

How to Perform Trouble Diagnoses for Quick and Accurate Repair (Cont'd)

DESCRIPTION FOR WORK FLOW

STEP	DESCRIPTION
STEP I	Identify the trouble using the "DIAGNOSTIC WORKSHEET" as shown on the next page.
STEP II	Be sure to carry out the Basic Inspection, or the results of inspections thereafter may be misinterpreted.
STEP III	Check the self-diagnostic results stored in the ECM of the failed vehicle.
STEP IV	Perform inspection often selecting from the following three tests according to the trouble observed. 1. ON-BOARD DIAGNOSTIC SYSTEM Follow the self-diagnostic procedure for each item described in "How to Execute On-board diagnostic system in Diagnostic Test Mode II". Non-self-diagnostic procedures described for some items will also provide results which are equal to the self-diagnostic results. 2. SYMPTOM BASIS This inspection is of a simplified method. When performing inspection of a part, the corresponding system must be checked thoroughly by selecting the appropriate check item from Diagnostic Procedures 32 - 52. 3. FUNCTION TEST BASIS (Sequence test) In this inspection, the CONSULT judges "OK" or "NG" on each system in place of a technician. When performing inspection of a part, the corresponding system must be checked thoroughly by selecting the appropriate check item from Diagnostic Procedures 2 - 31. 4. Diagnostic Procedure ● This inspection program is prepared using the data obtained when disconnection of harness or connectors has occurred in the respective circuit. ● Inspection of the "Not self-diagnostic item" does not actually start with the execution of on-board diagnostic system. However, inspection is started by assuming that the on-board diagnostic system has already been performed. ● A system with on-board diagnostic system function may contain any circuit placed outside its range of diagnostic function. In that case, it is arranged that "Not on-board diagnostic system item" of the system will be performed when the self-diagnostic results is OK. Example: CAMSHAFT POSITION SENSOR
STEP V	1. FINAL CHECK item is not described in the "Not self-diagnostic item". However, this FINAL CHECK must be performed without fail to ensure that the trouble has been repaired. The FINAL CHECK is also important to ensure the correct reassembly of the parts disassembled during the repair. 2. If the same trouble phenomenon is observed again in the final check: Go back to STEP IV, and perform the inspection using a method which is different from the previous method. 3. If the cause of the trouble is still unknown even after conducting step 2 above, check the circuit of each system for a short by using the voltage available at the "ECM INPUT/OUTPUT SIGNAL INSPECTION" terminal.

How to Perform Trouble Diagnoses for Quick and Accurate Repair (Cont'd)

KEY POINTS

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

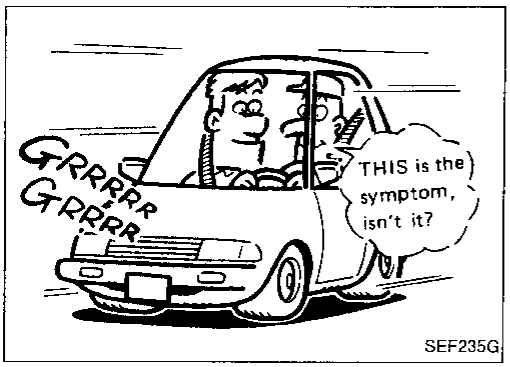
SEF907L

DIAGNOSTIC WORKSHEET

There are many kinds of operating conditions that lead to malfunctions on engine components.
A good grasp of such conditions can make trouble-shooting faster and more accurate.
In general, feelings for a problem depend on each customer. It is important to fully understand the symptoms or under what conditions a customer complains.
Make good use of a worksheet like below in order to utilize all the complaints for trouble-shooting.

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	



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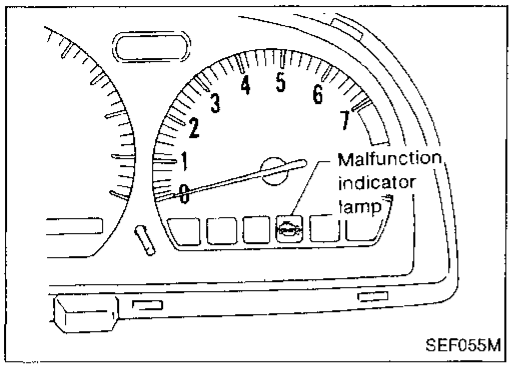
How to Perform Trouble Diagnoses for Quick and Accurate Repair (Cont'd)

INTERMITTENT PROBLEM SIMULATION

It is recommended to create similar conditions for component parts to find causes of problems that might occur intermittently. Perform the activity listed under Service procedure and note the result.

	Variable factor	Influential part	Target condition	Service procedure
1	Mixture ratio	Pressure regulator	Made lean	Remove vacuum hose and apply vacuum.
			Made rich	Remove vacuum hose and apply pressure.
2	Ignition timing	Camshaft position sensor	Advanced	Rotate distributor counter clockwise.
			Retarded	Rotate distributor clockwise.
3	Mixture ratio feedback control	Heated oxygen sensor	Suspended	Disconnect heated oxygen sensor harness connector.
		ECM	Operation check	Perform on-board diagnostic system (Diagnostic Test Mode II) at 2,000 rpm.
4	Idle speed	IACV-AAC valve	Raised	Turn idle adjusting screw counterclockwise.
			Lowered	Turn idle adjusting screw clockwise.
5	Electrical connection (Electric continuity)	Harness connectors and wires	Poor electrical connection or improper wiring	Tap or wiggle.
				Race engine rapidly. See if the torque reaction of the engine unit causes electric breaks.
6	Temperature	ECM	Cooled	Cool with an icing spray or similar device.
			Warmed	Heat with a hair drier. **[WARNING: Do not overheat the unit.]**
7	Moisture	Electric parts	Damp	Wet. **[WARNING: Do not directly pour water on components. Use a mist sprayer.]**
8	Electric loads	Load switches	Loaded	Turn on headlamps, air conditioner, rear defogger, etc.
9	Closed throttle position switch condition	ECM	ON-OFF switching	Rotate throttle position sensor body.
10	Ignition spark position	Timing light	Spark power check	Try to flash timing light for each cylinder using ignition coil adapter (SST).



On-board Diagnostic System

MALFUNCTION INDICATOR LAMP (MIL)

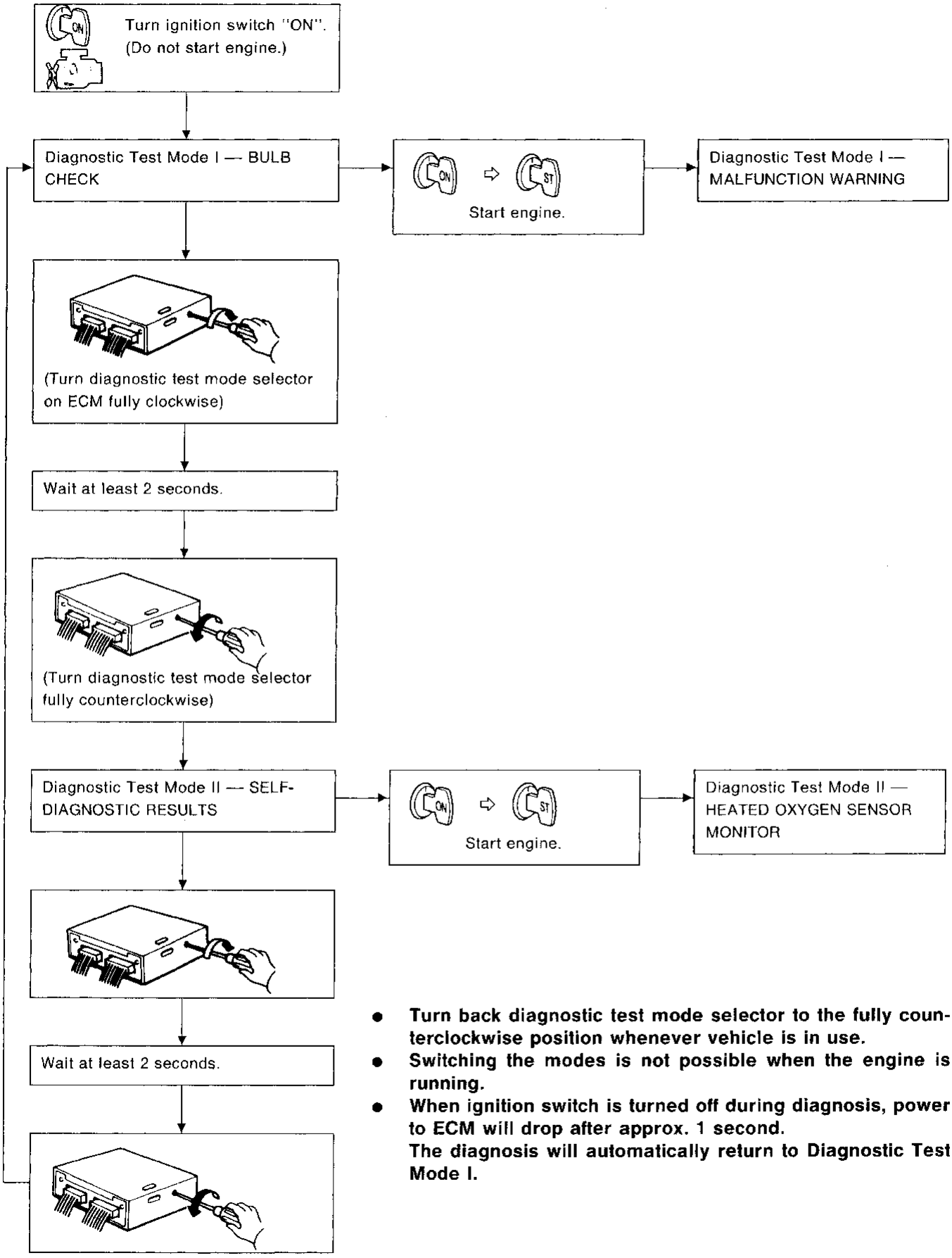
A malfunction indicator lamp has been adopted on all models.

SELF-DIAGNOSTIC FUNCTION

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

On-board Diagnostic System (Cont'd)

HOW TO SWITCH DIAGNOSTIC TEST MODES



- **Turn back diagnostic test mode selector to the fully counterclockwise position whenever vehicle is in use.**
- **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. 1 second.**
  The diagnosis will automatically return to Diagnostic Test Mode I.

On-board Diagnostic System — Diagnostic Test Mode I

DIAGNOSTIC TEST MODE I — BULB CHECK

In this mode, the MALFUNCTION INDICATOR LAMP in the instrument panel stay "ON".
If either remain "OFF", check the bulb in the MALFUNCTION INDICATOR LAMP.

DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

MALFUNCTION INDICATOR LAMP	Condition
ON	When the following malfunction (malfunction indicator lamp item) is detected or the ECM's CPU or camshaft position sensor is malfunctioning.
OFF	OK

Diagnostic trouble code No.	Malfunction
12	Mass air flow sensor circuit
13	Engine coolant temperature sensor circuit
14	Vehicle speed sensor circuit
31	ECM (ECCS control module)
32	EGR function
33	Heated oxygen sensor circuit (Left bank)
35	EGR temperature sensor circuit
43	Throttle position sensor circuit
45	Injector leak
51	Injector circuit
53	Heated oxygen sensor circuit (Right bank)

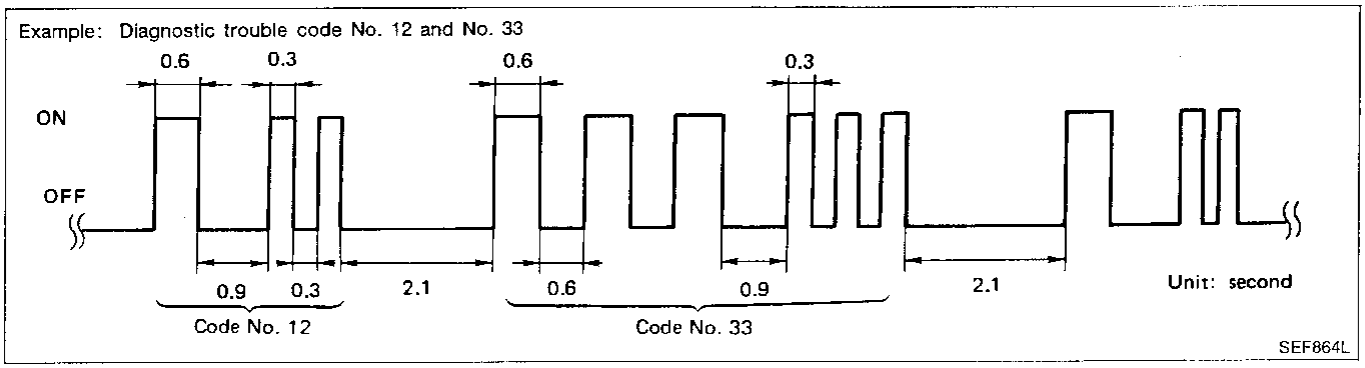
- **These Diagnostic trouble code numbers are clarified in Diagnostic Test Mode II — SELF- DIAGNOSTIC RESULTS.**
- **The MALFUNCTION INDICATOR LAMP will turn off when the normal condition is detected. At this time, the Diagnostic Test Mode II — SELF-DIAGNOSTIC RESULTS memory must be cleared as the contents remain stored.**

On-board Diagnostic System — Diagnostic Test Mode II (Self-diagnostic results)

CAUTION:
The mode selector on the ECM must be returned to the fully counterclockwise position, except when switching the modes.

DESCRIPTION

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



Long (0.6 second) blinking indicates the first digit of the number and short (0.3 second) blinking indicates the 2nd digit of the number.
For example, the malfunction indicator lamp flashes for 0.6 seconds once and then it flashes for 0.3 seconds twice. This indicates the number "12" and refers to a malfunction in the mass air flow sensor. In this way, all the problems are classified by their diagnostic trouble code numbers.
The diagnostic results will remain in the ECM memory.

Display diagnostic trouble code table

Diagnostic trouble code No.	Detected items
11*1)	Camshaft position sensor circuit
12 CHECK	Mass air flow sensor circuit
13 CHECK	Engine coolant temperature sensor circuit
14 CHECK	Vehicle speed sensor circuit
21*1)	Ignition signal circuit
31 CHECK	ECM
32 CHECK	EGR function
33 CHECK	Heated oxygen sensor circuit (Left bank)
34	Knock sensor circuit
35 CHECK	EGR temperature sensor circuit
43 CHECK	Throttle position sensor circuit
45 CHECK	Injector leak
51 CHECK	Injector circuit
53 CHECK	Heated oxygen sensor circuit (Right bank)
54	Signal circuit from A/T control unit to ECM
55	No malfunction in the above circuits

CHECK : Malfunction indicator lamp item.
*1): Check items causing a malfunction of camshaft position sensor circuit first, if both "CAMSHAFT POSITION SENSOR (No. 11)" and "IGN SIGNAL-PRIMARY (No. 21)" are displayed one after the other.

On-board Diagnostic System — Diagnostic Test Mode II (Self-diagnostic results) (Cont'd)

Diagnostic trouble code No.	Detected items	Malfunction is detected when ...	Check item (remedy)
11*1)	Camshaft position sensor circuit	• Either 1° or 90° signal is not entered for the first few seconds during engine cranking. • Either 1° or 90° signal is not input often enough while the engine speed is higher than the specified rpm.	• Harness and connector (If harness and connector are normal, replace camshaft position sensor.)
12	Mass air flow sensor circuit	• The mass air flow sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector (If harness and connector are normal, replace mass air flow sensor.)
13	Engine coolant temperature sensor circuit	• The engine coolant temperature sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Engine coolant temperature sensor
14	Vehicle speed sensor circuit	• The vehicle speed sensor circuit is open or shorted.	• Harness and connector • Vehicle speed sensor (reed switch)
21*1)	Ignition signal circuit	• The ignition signal in the primary circuit is not entered during engine cranking or running.	• Harness and connector • Power transistor unit
31	ECM	• ECM calculation function is malfunctioning.	[Replace ECM (ECCS control module).]
32	EGR function	• EGR valve does not operate. (EGR valve spring does not lift.)	• EGR valve • EGRC-solenoid valve
33	Heated oxygen sensor circuit (Left bank)	• The heated oxygen sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Heated oxygen sensor • Fuel pressure • Injectors • Intake air leaks
53	Heated oxygen sensor circuit (Right bank)		
34	Knock sensor circuit	• The knock sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Knock sensor
35	EGR temperature sensor circuit	• The EGR temperature sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • EGR temperature sensor
43	Throttle position sensor circuit	• The throttle position sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Throttle position sensor
45	Injector leak	• Fuel leaks from injector.	• Injector
51	Injector circuit	• The injector circuit is open or shorted.	• Injector
54	Signal circuit from A/T control unit to ECM	• The A/T communication line is open or shorted.	• Harness and connector

*1): Check items causing a malfunction of camshaft position sensor circuit first, if both "CAMSHAFT POSITION SENSOR (No. 11)" and "IGN SIGNAL-PRIMARY (No. 21)" are displayed one after the other.

On-board Diagnostic System — Diagnostic Test Mode II (Self-diagnostic results) (Cont'd)

HOW TO ERASE SELF-DIAGNOSTIC RESULTS

The ECM backup memory is erased when Diagnostic Test Mode II is changed to Diagnostic Test Mode I. (Refer to "HOW TO SWITCH DIAGNOSTIC TEST MODES".)

- **When the battery terminal is disconnected, the diagnostic trouble code will be lost from the backup memory within 24 hours.**
- **Do not erase the stored memory before beginning self-diagnosis.**

On-board Diagnostic System — Diagnostic Test Mode II (Heated oxygen sensor monitor)

DESCRIPTION

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

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

*: Maintain conditions just before switching to open loop.

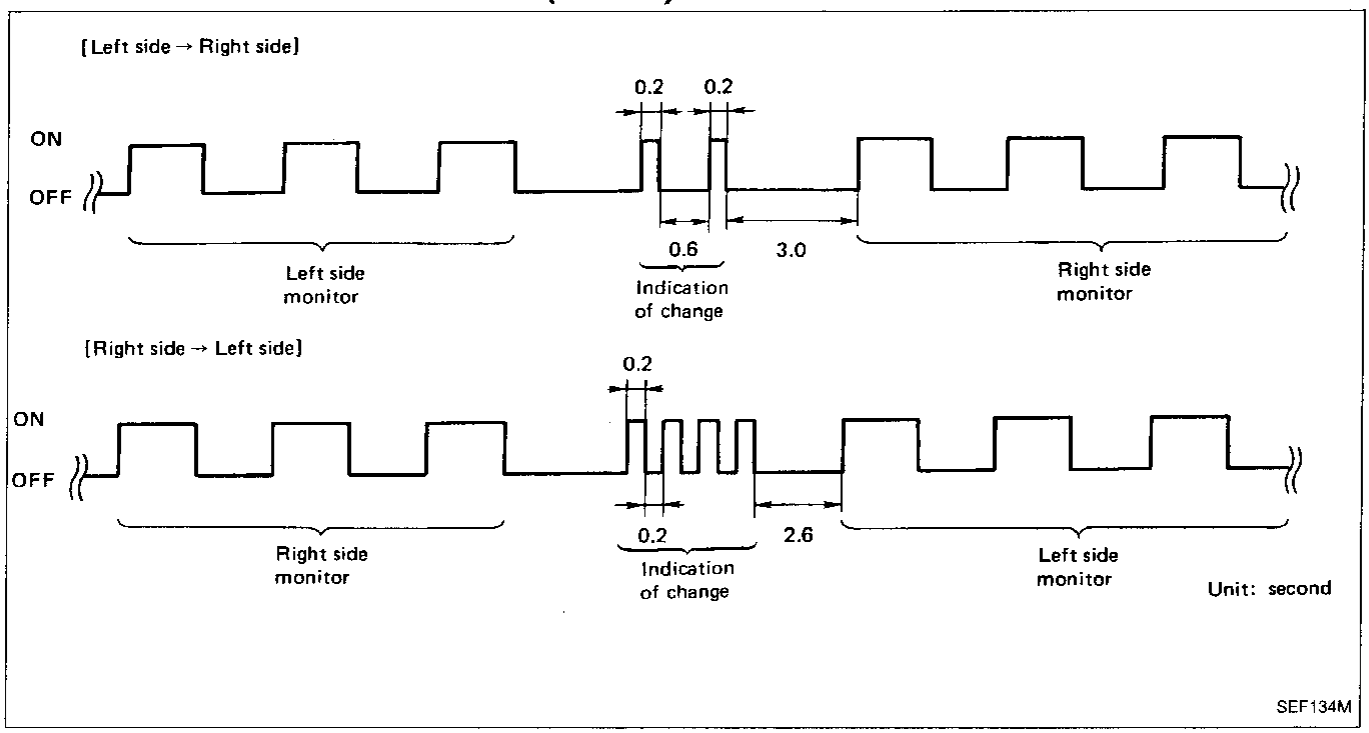
If two heated oxygen sensors (right bank and left bank) are fitted on the engine, the left bank heated oxygen sensor monitor operates first, when selecting this mode.

HOW TO CHANGE MONITOR FROM LEFT BANK (Right bank) TO RIGHT BANK (Left bank)

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.

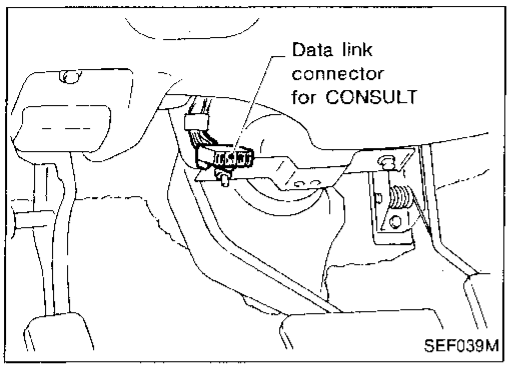
- These procedures should be carried out when the engine is running.

On-board Diagnostic System — Diagnostic Test Mode II (Heated oxygen sensor monitor) (Cont'd)



HOW TO CHECK HEATED OXYGEN SENSOR

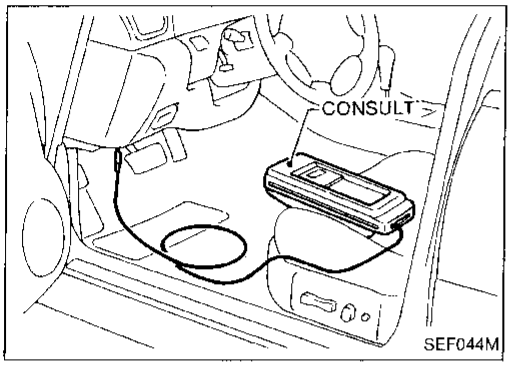
1. Set Diagnostic Test Mode II. (Refer to "HOW TO SWITCH DIAGNOSTIC TEST MODES" EF & EC-50.)
2. Start engine and warm it up until engine coolant temperature indicator points to the middle of the gauge.
3. Run engine at about 2,000 rpm for about 2 minutes under no-load conditions.
4. Make sure MALFUNCTION INDICATOR LAMP goes ON and OFF more than 5 times every 10 seconds; measured at 2,000 rpm under no-load.

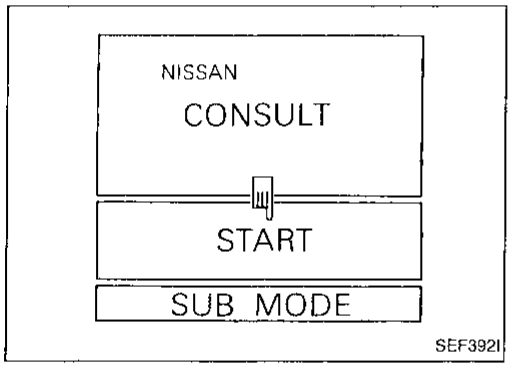


Consult

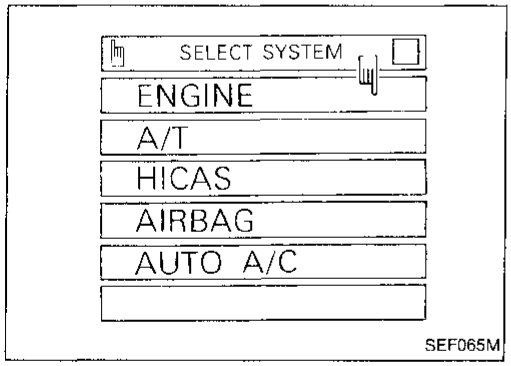
CONSULT INSPECTION PROCEDURE

1. Turn off ignition switch.
2. Connect "CONSULT" to data link connector for CONSULT. (Data link connector for CONSULT is located in left dash side panel.)

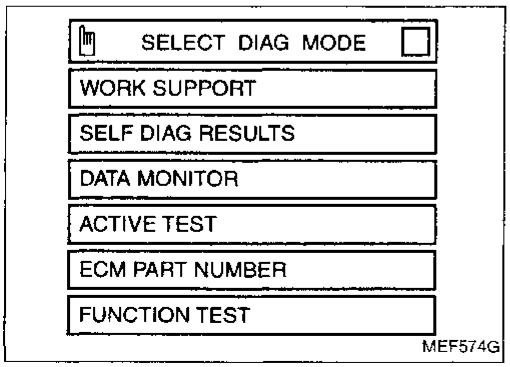




3. Turn on ignition switch.
4. Touch "START".



5. Touch "ENGINE".



6. Perform each diagnostic test mode according to the inspection sheet as follows:

For further information, read the CONSULT Operation Manual.

Consult (Cont'd)

ECCS COMPONENT PARTS APPLICATION

	DIAGNOSTIC TEST MODE / ECCS COMPONENT PARTS	WORK SUPPORT	SELF-DIAGNOSTIC RESULTS	DATA MONITOR	ACTIVE TEST	FUNCTION TEST
INPUT	Camshaft position sensor		X	X		
	Mass air flow sensor		X	X		
	Engine coolant temperature sensor		X	X	X	
	Heated oxygen sensors		X	X		X
	Vehicle speed sensor		X	X		X
	Throttle position sensor	X	X	X		X
	EGR temperature sensor		X	X		
	Knock sensor		X			
	Ignition switch (start signal)			X		X
	Air conditioner switch			X		
	Neutral position switch			X		
	Power steering oil pressure switch			X		X
	Battery			X		
	A/T signal		X			
OUTPUT	Injectors		X	X	X	X
	Power transistors (ignition timing)		X (Ignition signal)	X	X	X
	IACV-AAC valve	X		X	X	X
	IACV-FICD solenoid valve			X	X	X
	Valve timing control solenoid valve			X	X	X
	EGRC-solenoid valve			X	X	X
	Air conditioner relay			X		
	Fuel pump relay	X		X	X	X
	Cooling fan			X	X	X

X: Applicable

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables technicians to adjust devices faster and accurately through indications on the CONSULT unit.
Self-diagnostic results	Self-diagnostic results can be read and erased quickly.
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. In this mode, CONSULT also shifts some parameters in a specified range.
ECM part number	ECM part number can be read.
Function test	Conducted by CONSULT instead of a technician to determine whether each system is "OK" or "NG".

WORK SUPPORT DIAGNOSTIC TEST MODE

WORK ITEM	CONDITION	USAGE
THROTTLE POSITION SENSOR ADJUSTMENT	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,
IGNITION TIMING ADJUSTMENT	• IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING "START" AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CAMSHAFT POSITION SENSOR.	When adjusting initial ignition timing,
IACV-AAC VALVE ADJUSTMENT	SET ENGINE SPEED AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS. • ENGINE WARMED UP • NO-LOAD	When adjusting idle speed,
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line,

Consult (Cont'd)

SELF-DIAGNOSTIC RESULTS DIAGNOSTIC TEST MODE

DIAGNOSTIC ITEM	DIAGNOSTIC ITEM IS DETECTED WHEN ...	CHECK ITEM (REMEDY)
CAMSHAFT POSITION SENSOR*	• Either 1° or 120° signal is not entered for the first few seconds during engine cranking. • Either 1° or 120° signal is not input often enough while the engine speed is higher than the specified rpm.	• Harness and connector (If harness and connector are normal, replace camshaft position sensor.)
MASS AIR FLOW SENSOR	• The mass air flow sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector (If harness and connector are normal, replace mass air flow sensor.)
ENGINE COOLANT TEMPERATURE SENSOR	• The engine coolant temperature sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Engine coolant temperature sensor
VEHICLE SPEED SENSOR	• The vehicle speed sensor circuit is open or shorted.	• Harness and connector • Vehicle speed sensor (reed switch)
IGN SIGNAL—PRIMARY*	• The ignition signal in primary circuit is not entered during engine cranking or running.	• Harness and connector • Power transistor unit
ECM	• ECM calculation function is malfunctioning.	[Replace ECM (ECCS control module).]
EGR SYSTEM	• EGR valve does not operate. (EGR valve spring does not lift.)	• EGR valve • EGRC-solenoid valve
HEATED OXYGEN SENSOR HEATED OXYGEN SENSOR-R	• The heated oxygen sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Heated oxygen sensor • Fuel pressure • Injectors • Intake air leaks
KNOCK SENSOR	• The knock sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Knock sensor
EGR TEMP SENSOR	• The EGR temperature sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • EGR temperature sensor
THROTTLE POSITION SENSOR	• The throttle position sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Throttle position sensor
INJECTION FUEL LEAK	• Fuel leaks from injector.	• Injector
INJECTOR OPEN	• The injector circuit is open.	• Injector
A/T COMM LINE	• The A/T communication line is open or shorted.	• Harness and connector

*: Check items causing a malfunction of camshaft position sensor circuit first, if both "CAMSHAFT POSITION SENSOR" and "IGN SIGNAL—PRIMARY" are displayed at the same time.

Consult (Cont'd)

DATA MONITOR DIAGNOSTIC TEST MODE

Remarks : • Specification data are reference values.
- Specification data are output/input values which are detected or supplied by ECM at the connector.
  *Specification data may not be directly related to their components signals/values/operations.
  ie. 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 being not adjusted to the specification data. The IGN TIMING monitors the calculated data by ECM. The monitoring is made according to the input signals from 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	CHECK ITEM WHEN OUTSIDE SPEC.
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.	• Harness and connector • Camshaft position sensor
MAS AIR/FL SE	• Engine: After warming up, idle the engine • A/C switch "OFF" • Shift lever "N" • No-load	Idle	1.0 - 1.4V	• Harness and connector • Mass air flow sensor
		2,000 rpm	1.4 - 1.9V	
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)	• Harness and connector • Engine coolant temperature sensor
O2 SEN O2 SEN-R	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V → 0.6 - 1.0V	• Harness and connector • Heated oxygen sensor • Intake air leaks • Injectors
M/R F/C MNT M/R F/C MNT-R			LEAN → RICH Changes more than 5 times during 10 seconds.	
VHCL SPEED SE	• Turn drive wheels and compare speedometer indication with the CONSULT value		Almost the same speed as the CONSULT value	• Harness and connector • Vehicle speed sensor
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V	• Battery • ECM power supply circuit
THRTL POS SEN	• Ignition switch: ON (Engine stopped)	Throttle valve fully closed (Engine: After warming up)	0.4 - 0.5V	• Harness and connector • Throttle position sensor • Throttle position sensor adjustment
		Throttle valve fully open	Approx. 4.0V	
EGR TEMP SEN	• Engine: After warming up		Less than 4.5V	• Harness and connector • EGR temperature sensor
START SIGNAL	• Ignition switch: ON → START		OFF → ON	• Harness and connector • Starter switch

Consult (Cont'd)

MONITOR ITEM	CONDITION		SPECIFICATION	CHECK ITEM WHEN OUTSIDE SPEC.
CLOSED TH/POS	• Ignition switch: ON (Engine stopped)	Throttle valve: Idle position (Engine: After warming up)	ON	• Harness and connector • Throttle position sensor • Throttle position sensor adjustment • Closed throttle position switch
		Throttle valve: Slightly open	OFF	
AIR COND SIG	• Engine: After warming up, idle the engine	A/C switch "OFF"	OFF	• Harness and connector • Air conditioner switch
		A/C switch "ON"	ON	
NEUTRAL POSITION SW	• Ignition switch: ON	Shift lever "P" or "N"	ON	• Harness and connector • Neutral position switch
		Except above	OFF	
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF	• Harness and connector • Power steering oil pressure switch
		The steering wheel is turned	ON	
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger is operating.	ON	• Harness and connector • Rear window defogger system (Refer to "REAR WINDOW DEFOGGER" in EL section.)
		Rear window defogger is not operating.	OFF	
INJ PULSE	• Engine: After warming up • A/C switch "OFF" • Shift lever "N" • No-load	Idle	1.8 - 2.5 msec.	• Harness and connector • Injector • Mass air flow sensor • Intake air system
INJ PULSE-R		2,000 rpm	1.7 - 2.4 msec.	
IGN TIMING	ditto	Idle	15° BTDC	• Harness and connector • Camshaft position sensor
		2,000 rpm	More than 25° BTDC	
IACV-AAC/V	ditto	Idle	15 - 40%	• Harness and connector • IACV-AAC valve
		2,000 rpm	—	
A/F ALPHA	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	75 - 125%	• Harness and connector • Injectors • Mass air flow sensor • Heated oxygen sensor • Canister purge line • Intake air system
A/F ALPHA-R				
AIR COND RLY	Engine: After warming up, idle the engine Air conditioner switch OFF → ON		OFF → ON	• Harness and connector • Air conditioner switch • Air conditioner relay
FUEL PUMP RLY	• Ignition switch is turned to ON (Operates for 5 seconds) • Engine running and cranking • When engine is stopped (stops in 1.5 seconds)		ON	• Harness and connector • Fuel pump relay
	Except as shown above		OFF	

Consult (Cont'd)

MONITOR ITEM	CONDITION		SPECIFICATION	CHECK ITEM WHEN OUTSIDE SPEC.
VALVE T/M SOL	• Jack up rear wheel • Engine: After warming up	• Idle	OFF	• Harness and connector • Valve timing solenoid valve
		• Shift select lever to any position except "N" or "P" position • Quickly depress accelerator pedal, then quickly release it	OFF → ON → OFF	
COOLING FAN	• After warming up engine, idle the engine. • A/C switch "OFF"	Engine coolant temperature is 94°C (201°F) or less	OFF	• Harness and connector • Cooling fan relay • Cooling fan
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F)	LOW	
		Engine coolant temperature is 105°C (221°F) or more	HIGH	
FICD S/V	• Engine: After warming up, idle the engine	Air conditioner switch and fan switch "ON"	ON	• Harness and connector • IACV-FICD solenoid valve
		Air conditioner switch and fan switch "OFF"	OFF	
EGRC SOL/V	• Engine: After warming up • A/C switch "OFF" • Shift lever "N" • No-load	Idle	ON	• Harness and connector • EGRC-solenoid valve
		2,000 rpm	OFF	

Consult (Cont'd)

ACTIVE TEST DIAGNOSTIC TEST MODE

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION TEST	• Engine: Return to the original trouble condition • Change the amount of fuel injection with the CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Fuel injectors • Heated oxygen sensors
IACV-AAC/V OPENING TEST	• Engine: After warming up, idle the engine. • Change the IACV-AAC valve opening percent with the CONSULT.	Engine speed changes according to the opening percent.	• Harness and connector • IACV-AAC valve
ENG COOLANT TEMP TEST	• Engine: Return to the original trouble condition • Change the engine coolant temperature with the CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Engine coolant temperature sensor • Fuel injectors
IGN TIMING TEST	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing with the CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Adjust initial ignition timing
POWER BALANCE TEST	• Engine: After warming up, idle the engine. • A/C switch "OFF" • Shift lever "N" • Cut off each injector signal one at a time with the CONSULT.	Engine runs rough or dies.	• Harness and connector • Compression • Injectors • Power transistor • Spark plugs • Ignition coils
COOLING FAN TEST	• Ignition switch: ON • Turn the cooling fan "ON" and "OFF" using CONSULT.	Cooling fan moves and stops.	• Harness and connector • Cooling fan motor
FICD SOL/V TEST	• 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 RLY TEST	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay "ON" and "OFF" with the CONSULT and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connector • Fuel pump relay
EGRC SOLENOID VALVE TEST VALVE TIM SOL TEST	• Ignition switch: ON • Turn solenoid valve "ON" and "OFF" with the CONSULT and listen to operating sound.	Each solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve
SELF-LEARN CONT TEST	• In this test, the coefficient of self-learning control mixture ratio returns to the original coefficient by touching "CLEAR" on the screen.		
FICD S/V	• Engine: After warming up, idle the engine.	Air conditioner switch and fan switch "ON"	ON	• Harness and connector • IACV-FICD solenoid valve
		Air conditioner switch and fan switch "OFF"	OFF	

Consult (Cont'd)

FUNCTION TEST DIAGNOSTIC TEST MODE

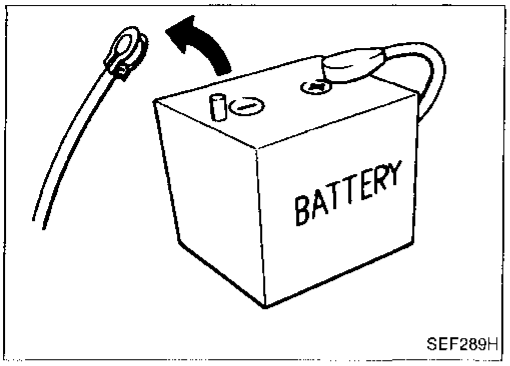
FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
SELF-DIAG RESULTS	• Ignition switch: ON (Engine stopped) • Displays the results of on-board diagnostic system.	—		Objective system
CLOSED THROTTLE POSI (CLOSED THROTTLE POSITION SWITCH CIRCUIT)	• Ignition switch: ON (Engine stopped) • Closed throttle position switch 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 switch) • Throttle position sensor (Closed throttle position switch) 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.
NEUTRAL POSI SW CKT	• Ignition switch: ON (Engine stopped) • Neutral position switch circuit is tested when shift lever is manipulated.	OUT OF N/P-RANGE	OFF	• Harness and connector • Neutral position switch/ Inhibitor switch • Linkage + Inhibitor switch adjustment
		IN N-RANGE	ON	
FUEL PUMP CIRCUIT	• Ignition switch: ON (Engine stopped) • Fuel pump circuit is tested by checking the pulsation in fuel pressure when fuel tube is pinched.	There is pressure pulsation on the fuel feed hose.		• Harness and connector • Fuel pump • Fuel pump relay • Fuel filter clogging • Fuel level
EGRC SOL/V CIRCUIT	• Ignition switch: ON (Engine stopped) • EGR control S/V 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
VALVE TIMING S/V CKT	• Ignition switch: ON (Engine stopped) • Valve timing S/V circuit is tested by checking solenoid valve operating noise.	The solenoid valve makes an operating sound every 3 seconds.		• Harness and connector • Valve timing solenoid valve
COOLING FAN CIRCUIT	• Ignition switch: ON (Engine stopped) • Cooling fan circuit is tested by checking cooling fan operation	• The cooling fan rotates and stops every 3 seconds.		• Harness and connector • Cooling fan motor • Cooling fan relay

Consult (Cont'd)

FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
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
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 • Electric speedometer
IGN TIMING ADJ	• After warming up, idle the engine. • Ignition timing adjustment 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 heated oxygen sensor output at 2,000 rpm under non-loaded state.	• Heated oxygen SEN COUNT: More than 5 times during 10 seconds (O_2 SEN-R 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) • Heated oxygen sensor circuit • Heated oxygen sensor operation • Fuel pressure high or low • Mass air flow sensor

Consult (Cont'd)

FUNCTION TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
POWER BALANCE	• After warming up, idle the engine. • Injector operation of each cylinder is stopped one after another. The 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 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% (102 steps) and at 20% (25 steps).	• Harness and connector • IACV-AAC valve • Air passage restriction between air inlet and IACV-AAC valve • IAS (Idle adjusting screw) adjustment
FICD 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

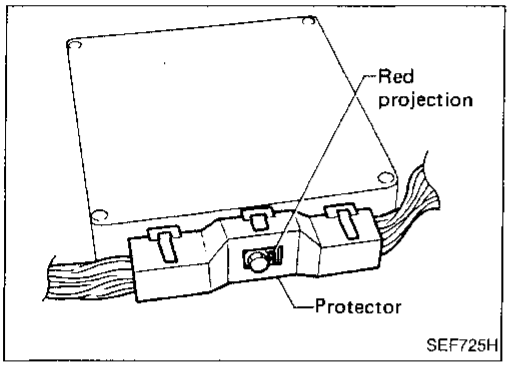


SEF289H

Diagnostic Procedure

CAUTION:

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



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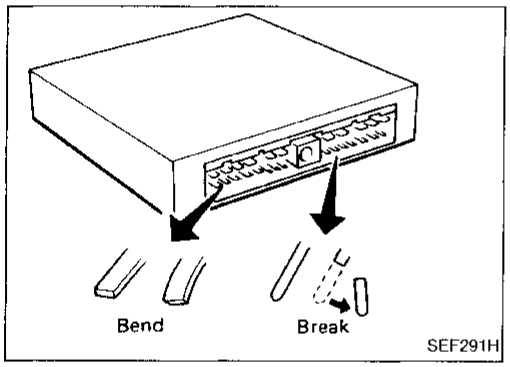
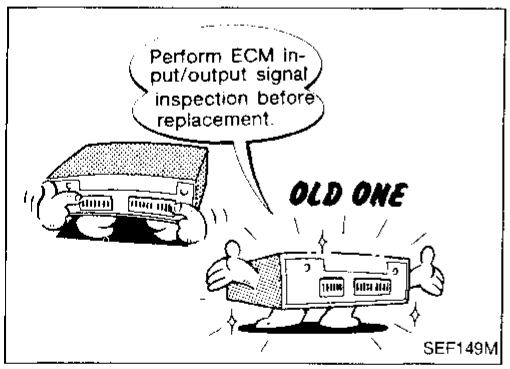
2. **When connecting ECM harness connector, tighten securing bolt until red projection is in line with connector face.**



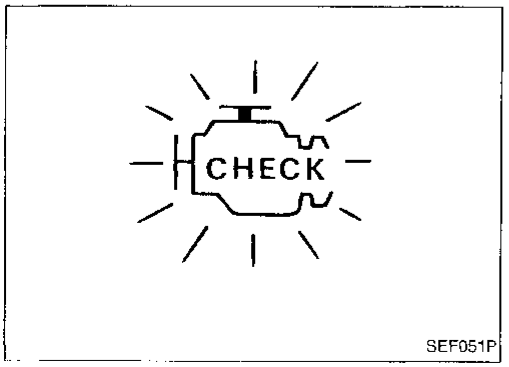
SEF291H

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



SEF149M

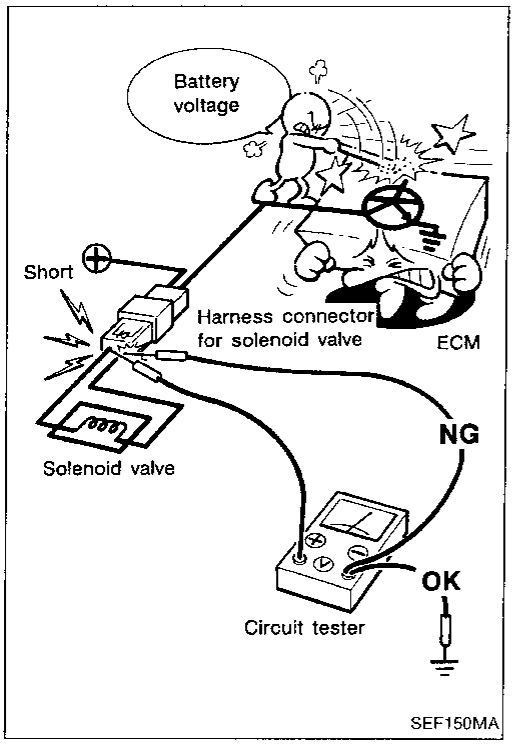
5. **Before replacing ECM, perform ECM input/output signal inspection and make sure whether ECM functions properly or not. (See page EF & EC-211.)**



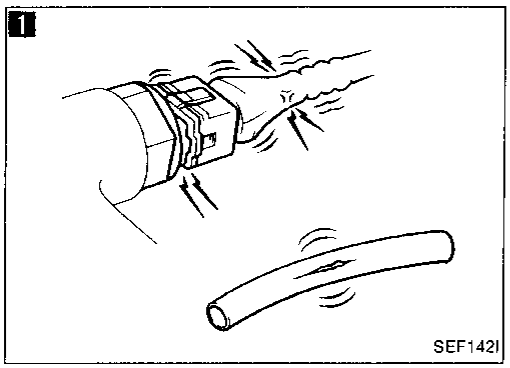
SEF051P

6. **After performing this "Diagnostic Procedure", perform ECCS on-board diagnostic system and driving test.**

Diagnostic Procedure (Cont'd)



7. **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.



Basic Inspection

1

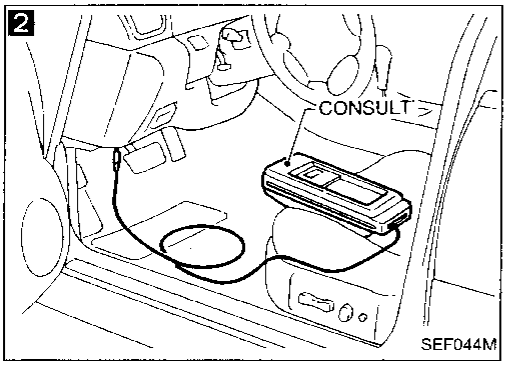
BEFORE STARTING

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

- Harness connectors for proper connections
- Vacuum hoses for splits, kinks, and proper connections
- Wiring for proper connections, pinches, and cuts

2

CONNECT CONSULT TO THE VEHICLE.
Connect "CONSULT" to the data link connector for CONSULT and select "ENGINE" from the menu. (Refer to page EF & EC-56.)



3

DOES ENGINE START? — No → GO TO 6.

Yes

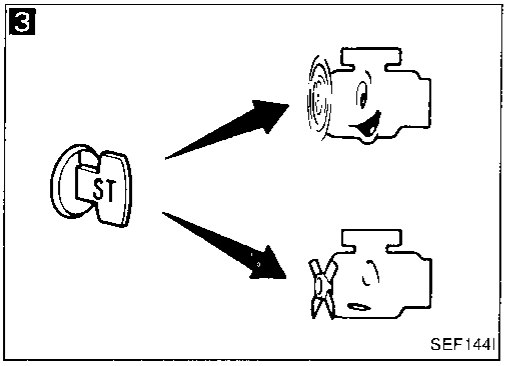
4

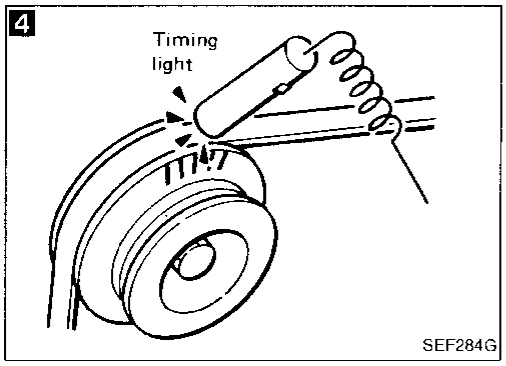
CHECK IGNITION TIMING.
Warm up engine sufficiently and check ignition timing at idle using timing light. (Refer to page EF & EC-32.)
Ignition timing: 15° ± 2° BTDC

NG → Adjust ignition timing by turning camshaft position sensor.

OK

(Go to Ⓐ on next page.)





Basic Inspection (Cont'd)

5

■ IACV-AAC/V ADJ ■

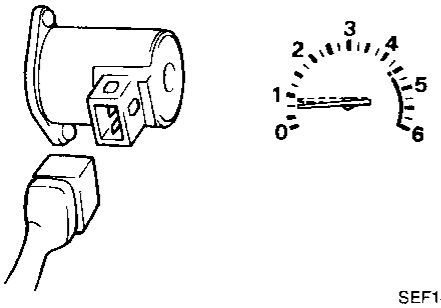
SET ENGINE RPM AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITION

- ENG WARMED UP ENOUGH
- NO LOAD

START

MEF671D

5



SEF146I

6

■ THRTL POS SEN ADJ ■

*** ADJ MONITOR ***

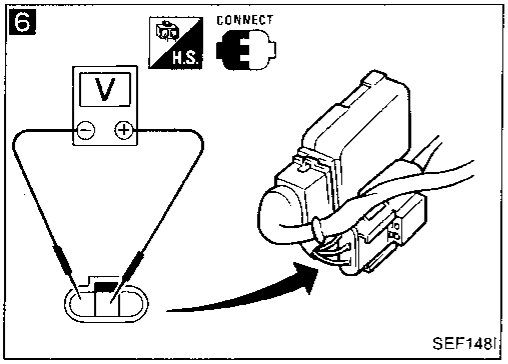
THRTL POS SEN 0.46V

=== MONITOR ===

CMPS•RPM (POS) 800rpm
IDLE POSITION ON

SEF624N

6



SEF148I

Ⓐ

5

CHECK IDLE ADJ. SCREW INITIAL SET RPM.

1. Select "IACV-AAC/V ADJ" in "WORK SUPPORT" mode.
2. When touching "START", does engine speed fall to 670±25 rpm (in "N" position)?

NG → Adjust engine speed by turning idle adjusting screw.

OR

When disconnecting IACV-AAC valve harness connector, does engine speed fall to 670±25 rpm (in "N" position)?

OK ↓

6

CHECK THROTTLE POSITION SENSOR IDLE POSITION.

1. Perform "THRTL POS SEN ADJ" in "WORK SUPPORT" mode.
2. Check that output voltage of throttle position sensor is approx. 0.4 to 0.5V. (Throttle valve fully closes.) and "IDLE POSITION" stays "ON".

NG →
1. Adjust output voltage by rotating throttle position sensor body.
2. Disconnect throttle position sensor harness connector for a few seconds and then reconnect it.
3. Confirm that "IDLE POSITION" stays "ON".

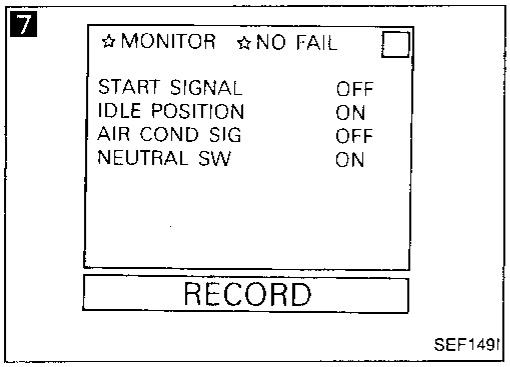
OR

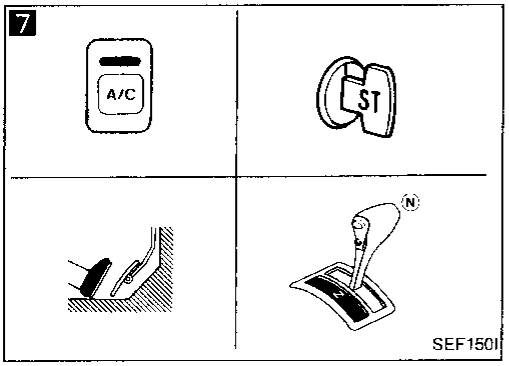
Measure output voltage of throttle position sensor using voltmeter, and check that it is approx. 0.4 to 0.5V. (Throttle valve fully closed.)

OK ↓

(Go to Ⓑ on next page.)

Basic Inspection (Cont'd)





⑧

7

CHECK SWITCH INPUT SIGNAL.

Select the following switches in "DATA MONITOR" mode,
a) Start signal,
b) Idle position,
c) Air conditioner signal,
d) Neutral position (Parking) switch, and check the switches' ON-OFF operation.

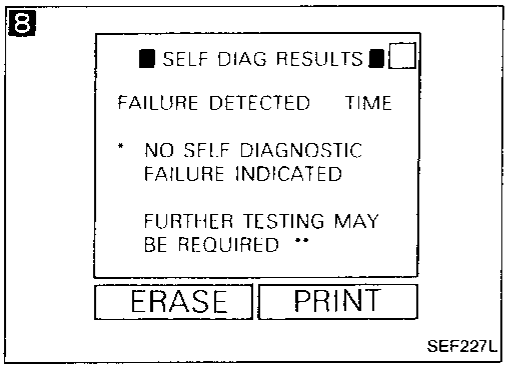
OR

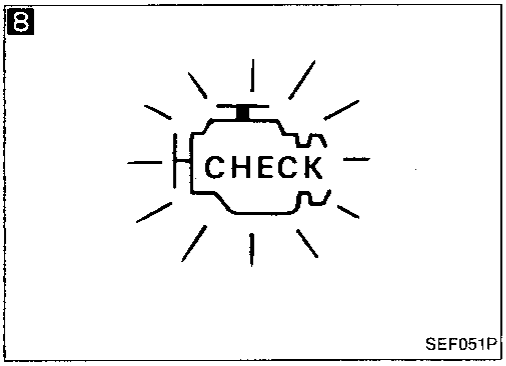
Remove ECM from front floor panel and check the above switches' ON-OFF operation using voltmeter at each ECM terminal.

Switch	Condition	Voltage (V)
Start signal	IGN ON → IGN START	0 → Battery voltage
Idle position	Engine warmed up sufficiently Idle position → Depress the accelerator pedal.	Battery voltage → 0
A/C signal	A/C OFF → A/C ON (Engine running)	7.0 - 10.0 → 0.5 - 0.7
Neutral position (Parking) switch	Shift lever is "N" or "P" position → Except "N" and "P"	0 → 8.0 - 10.0

NG → Repair or replace the malfunctioning switch or its circuit.

OK





8

READ SELF-DIAGNOSTIC RESULTS.

1. Perform "SELF-DIAG RESULTS" mode.
2. Read out self-diagnostic results.
3. Is a failure detected?

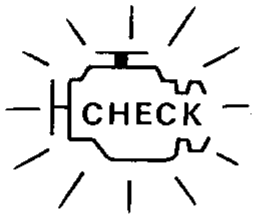
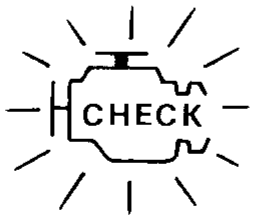
OR

1. Set "Self-diagnostic results mode" in Diagnostic Test Mode II. (Refer to page EF & EC-52.)
2. Count the number of malfunction indicator lamp flashes and read out the diagnostic trouble codes.
3. Are the diagnostic trouble codes being output?

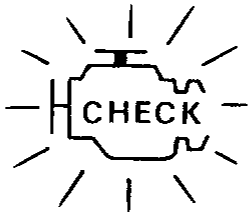
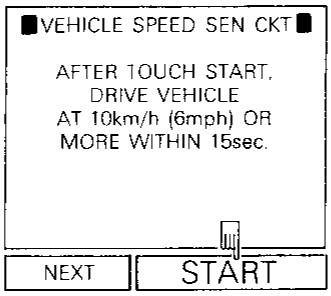
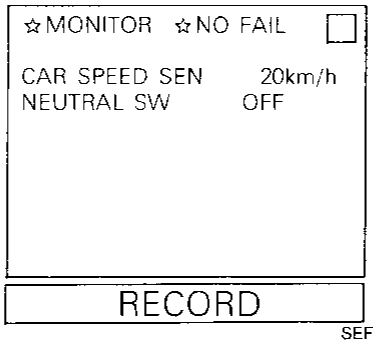
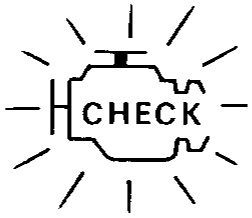
Yes → Go to the relevant inspection procedure.

No → INSPECTION END

How to Execute On-board Diagnostic System in Diagnostic Test Mode II

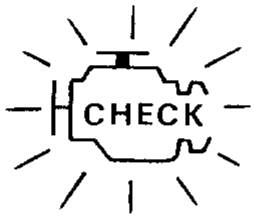
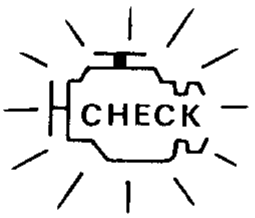
Detected items	Display Diagnostic trouble code No.	How to perform on-board diagnostic system judgement	
		Illustration	Method
Camshaft position	11	☆MONITOR ☆NO FAIL CMPS•RPM(POS) 720rpm CMPS•RPM(REF) 720rpm MAS AIR/FL SE 1.15V COOLAN TEMP/S 81°C O_2 SEN 0.06V O_2 SEN-R 0.05V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD SEF625N  SEF051P	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Start engine. 2) Select "DATA MONITOR" mode with CONSULT. ☆ **NO FAIL** OR 2) Turn ignition switch "OFF" and then "ON". 3) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp displays diagnostic trouble code No. 55.**
Mass air flow sensor circuit	12	☆MONITOR ☆NO FAIL CMPS•RPM(POS) 720rpm CMPS•RPM(REF) 720rpm MAS AIR/FL SE 1.15V COOLAN TEMP/S 81°C O_2 SEN 0.06V O_2 SEN-R 0.05V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD SEF625N  SEF051P	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Turn ignition switch "ON" wait for at least 5 seconds and then start engine. 2) Select "DATA MONITOR" mode with CONSULT. ☆ **NO FAIL** OR 2) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp displays diagnostic trouble code No. 55.**

How to Execute On-board Diagnostic System in Diagnostic Test Mode II (Cont'd)

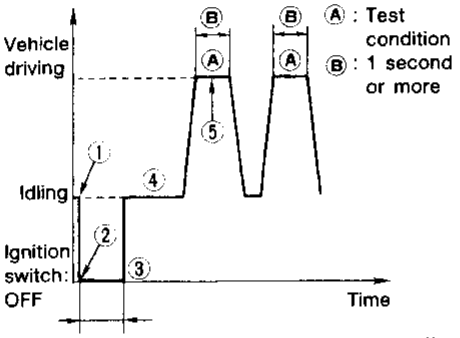
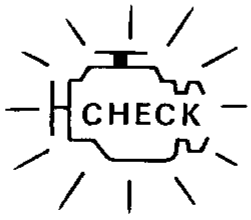
Detected items	Display Diagnostic trouble code No.	How to perform on-board diagnostic system judgement	
		Illustration	Method
Engine coolant temperature sensor circuit	13	 SEF051P	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Turn ignition switch "ON" or start engine. 2) Select "SELF-DIAG RESULTS" mode with CONSULT. ☆ **NO FAIL** OR 2) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp displays diagnostic trouble code No. 55.**
Vehicle speed sensor circuit*	14	 SEF678D  SEF091L  SEF051P	**CHECK OVERALL FUNCTION.** 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. **CONSULT value should be the same as the speedometer indication.** OR 1) Start engine and warm it up sufficiently. 2) Shift to a suitable gear position and maintain the following test drive conditions for at least 5 seconds. Driving conditions (1) Engine speed: 2,200 ± 350 rpm (2) Intake manifold vacuum: –45.3 ± 4.0 kPa (–340 ± 30 mmHg, 13.39 ± 1.18 inHg) (3) Vehicle speed 5 km/h (3 MPH) or more 3) If malfunction indicator lamp comes on during test drive, perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp displays diagnostic trouble code No. 55.**

*: On-board diagnostic system is not performed but this method provides results which are equal to the self-diagnostic results.

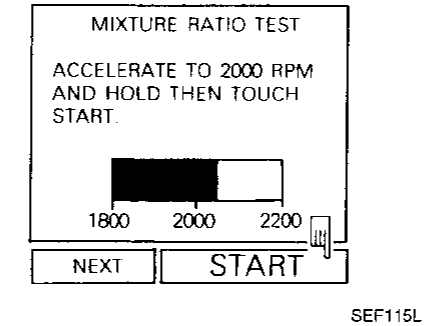
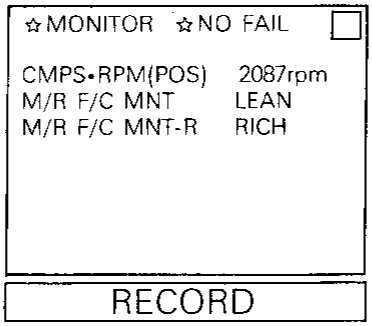
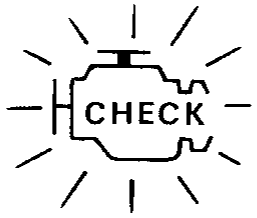
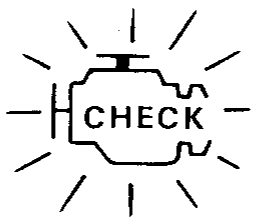
How to Execute On-board Diagnostic System in Diagnostic Test Mode II (Cont'd)

Detected items	Display Diagnostic trouble code No.	How to perform on-board diagnostic system judgement	
		Illustration	Method
Ignition signal circuit	21	☆MONITOR ☆NO FAIL CMPS•RPM(POS) 720rpm CMPS•RPM(REF) 720rpm MAS AIR/FL SE 1.15V COOLAN TEMP/S 81°C O_2 SEN 0.06V O_2 SEN-R 0.05V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD SEF626N  SEF051P	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Start engine. 2) Select "DATA MONITOR" mode with CONSULT. ☆ **NO FAIL** — OR — 2) Turn ignition switch "OFF" and then "ON". 3) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp displays diagnostic trouble code No. 55.**
ECM	31	 SEF051P	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Turn ignition switch "ON". 2) Select "SELF-DIAG RESULTS" mode with CONSULT. ☆ **NO FAIL** — OR — 2) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp displays diagnostic trouble code No. 55.**

How to Execute On-board Diagnostic System in Diagnostic Test Mode II (Cont'd)

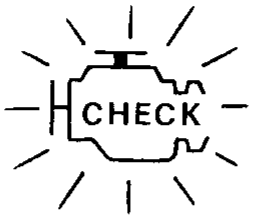
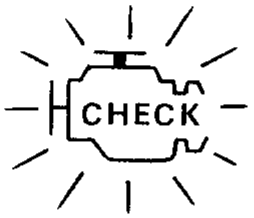
Detected items	Display Diagnostic trouble code No.	How to perform on-board diagnostic system judgement	
		Illustration	Method
EGR function	32	**A** **ROAD TEST** **Test condition** **Drive vehicle under the following conditions with a suitable shift position.** (1) Engine speed: 2,550 ± 150 rpm (2) Intake manifold vacuum: −39.3 ± 1.3 kPa (−295 ± 10 mmHg, −11.61 ± 0.39 inHg) **Driving mode**  Until malfunction indicator lamp goes off. ① Start engine and warm it up sufficiently. ② Turn off ignition switch and keep it off until malfunction indicator lamp goes off. ③ Start engine and make sure that air conditioner switch and rear defogger are turned "OFF" during test drive. ④ Keep engine running for at least 120 seconds. ⑤ Shift to suitable gear position and drive in "Test condition" for at least 1 second. ⑥ Repeat step ⑤ at least 11 times. SEF669NA **B**  SEF051P	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Turn ignition switch "ON". 2) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. Make sure that diagnostic trouble code No. 11 or 12 is not displayed. 3) Perform test drive under the following conditions. (1) Warm up engine sufficiently. (2) Use test driving modes indicated in figure **A** . 4) If malfunction indicator lamp comes on during test drive, perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **B** **Malfunction indicator lamp displays diagnostic trouble code No. 55.**

How to Execute On-board Diagnostic System in Diagnostic Test Mode II (Cont'd)

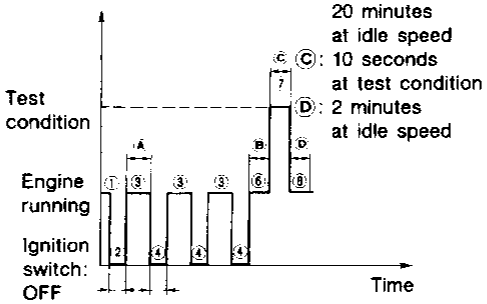
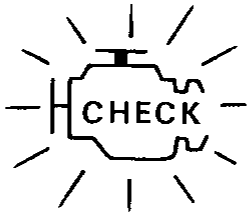
Detected items	Display Diagnostic trouble code No.	How to perform on-board diagnostic system judgement	
		Illustration	Method
Heated oxygen sensor circuit (Left bank)*	33	 SEF115L  SEF386N	**CHECK OVERALL FUNCTION.** 1) Start engine and warm it up sufficiently. 2) Perform "MIXTURE RATIO TEST" in "FUNCTION TEST" mode with CONSULT. OR 2) Make sure that "M/R F/C MNT-R" in "DATA MONITOR" mode indicates "RICH" and "LEAN" periodically more than 5 times during 10 seconds at 2,000 rpm OR 2) Make sure that malfunction indicator lamp goes on and off periodically more than 5 times during 10 seconds at 2,000 rpm in on-board diagnostic system Diagnostic Test Mode II.
Heated oxygen sensor circuit (Right bank)*	53		
		 SEF051P	
Knock sensor circuit	34	 SEF051P	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Start engine. 2) Select "SELF-DIAG RESULTS" mode with CONSULT. ☆ **NO FAIL** OR 2) Turn ignition switch "OFF" and then "ON". 3) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp displays diagnostic trouble code No. 55.**

*: On-board diagnostic system is not performed but this method provides results which are equal to the self-diagnostic results.

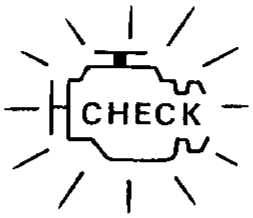
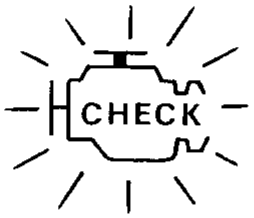
How to Execute On-board Diagnostic System in Diagnostic Test Mode II (Cont'd)

Detected items	Display Diagnostic trouble code No.	How to perform on-board diagnostic system judgement	
		Illustration	Method
EGR temperature sensor circuit	35	 SEF051P	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Start engine and warm it up sufficiently. 2) Perform test drive more than 15 minutes. 3) Select "SELF-DIAG RESULTS" mode with CONSULT. ☆ **NO FAIL** OR 3) Turn ignition switch "OFF" and then "ON". 4) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp displays diagnostic trouble code No. 55.**
Throttle position sensor circuit	43	 SEF051P	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Jack up drive wheels 2) Start engine. 3) Shift to a suitable gear position (Except "P" or "N"), and run engine at vehicle speed of 5 km/h (3 MPH) or higher for at least 10 seconds. 4) Select "SELF-DIAG RESULTS" mode with CONSULT. ☆ **NO FAIL** OR 4) Turn ignition switch "OFF" and then "ON". 5) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp displays diagnostic trouble code No. 55.**

How to Execute On-board Diagnostic System in Diagnostic Test Mode II (Cont'd)

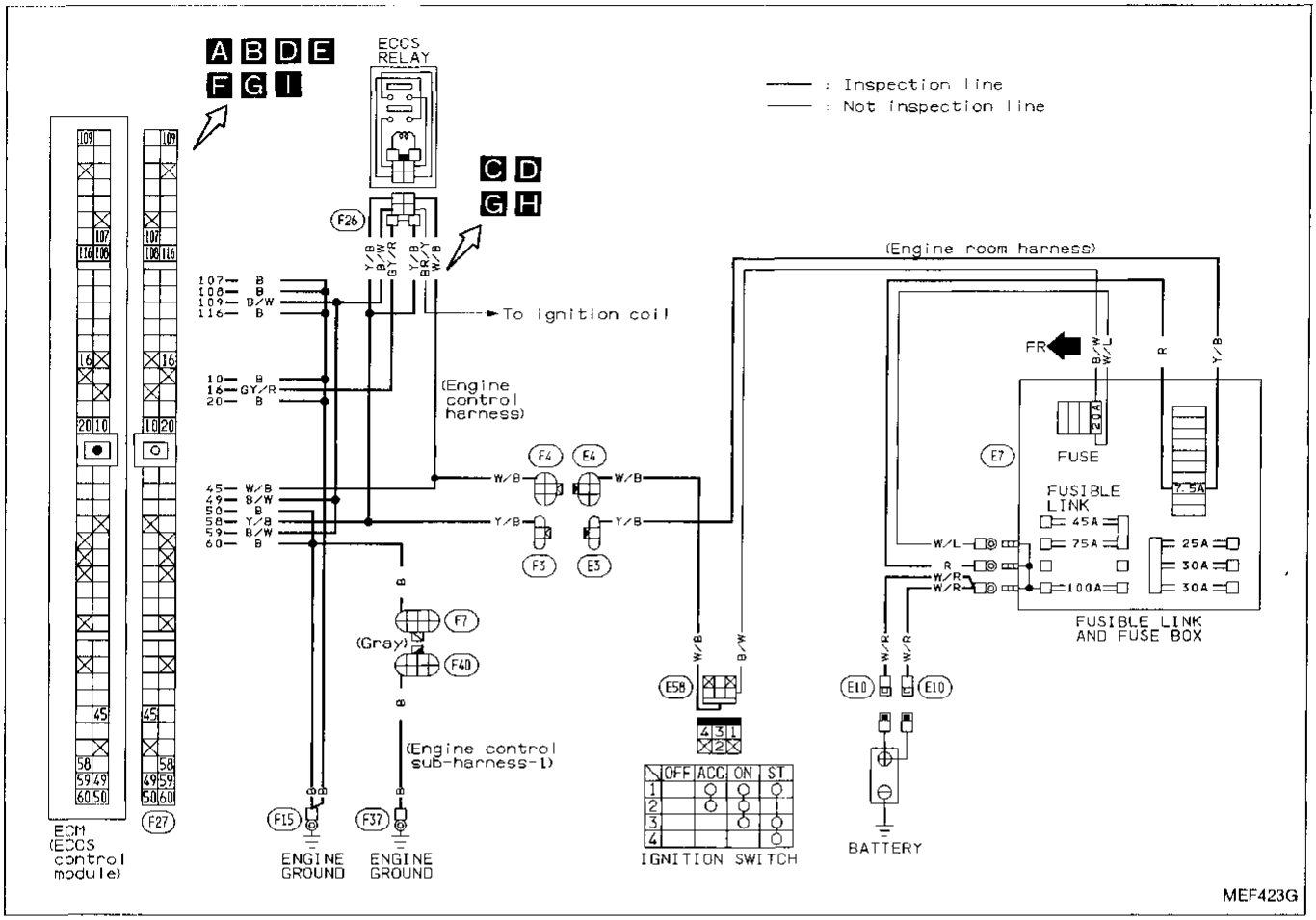
Detected items	Display Diagnostic trouble code No.	How to perform on-board diagnostic system judgement	
		Illustration	Method
Injector leak	45	**A** **ROAD TEST** **Test conditions** Drive vehicle under the following conditions with suitable gear position. (1) Engine speed: 2,250 ± 400 rpm (2) Intake manifold vacuum: −46.7 ± 13.3 kPa (−350 ± 100 mmHg, −13.78 ± 3.94 inHg) **Driving mode** Ⓐ: More than 13 minutes Ⓑ: More than 20 minutes at idle speed Ⓒ: 10 seconds at test condition Ⓓ: 2 minutes at idle speed  Until malfunction indicator lamp goes off. ① Start engine and warm it up sufficiently. ② Turn off ignition switch and keep it off until malfunction indicator lamp goes off. ③ Start engine and keep it running for more than 13 minutes. ④ Turn off ignition switch and keep it off until malfunction indicator lamp goes off. ⑤ Repeat steps ③ through ④ for a total of 3 times. ⑥ Start engine and keep it at idle for more than 20 minutes. If engine stalls or ignition turns off within 13 minutes after engine is started, return to step ②. If over 13 minutes, restart step ⑥. ⑦ Shift to suitable gear position and drive in "Test condition" for at least 10 seconds. If the following conditions occur during step ⑦, return to step ⑥. ● Engine races over 4,000 rpm or hardly accelerates for more than 10 seconds. ● Engine stalls or ignition turns off. ⑧ Keep engine at idle speed for more than 2 minutes. **B** SEF562ND  SEF051P	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Perform test drive as indicated in figure **A**. 2) If malfunction indicator lamp comes on during test drive, perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **B** **Malfunction indicator lamp displays diagnostic trouble code No. 55.**

How to Execute On-board Diagnostic System in Diagnostic Test Mode II (Cont'd)

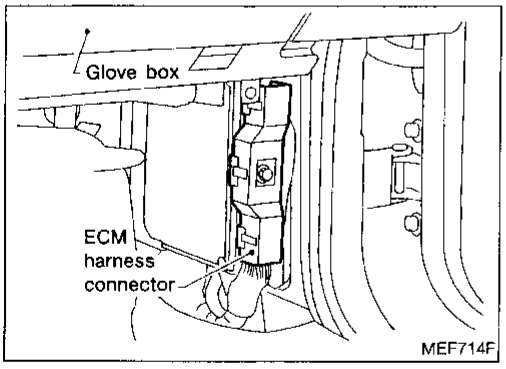
Detected items	Display Diagnostic trouble code No.	How to perform on-board diagnostic system judgement	
		Illustration	Method
Injector circuit	51	 SEF051P	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Start engine. 2) Select "SELF-DIAG RESULTS" mode with CONSULT. ☆ **NO FAIL** OR 2) Turn ignition switch "OFF" and then "ON". 3) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp displays diagnostic trouble code No. 55.**
Signal circuit from A/T control unit to ECM	54	 SEF051P	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Start engine. 2) Select "SELF-DIAG RESULTS" mode with CONSULT. ☆ **NO FAIL** OR 2) Perform on-board diagnostic system (Diagnostic Test Mode II) with ECM. **Malfunction indicator lamp displays diagnostic trouble code No. 55.**

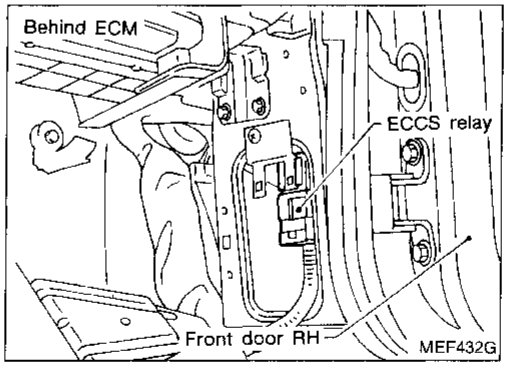
Diagnostic Procedure 1

MAIN POWER SUPPLY AND GROUND CIRCUIT (Not self-diagnostic item)

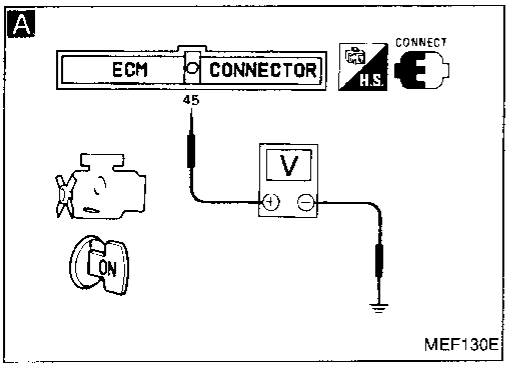


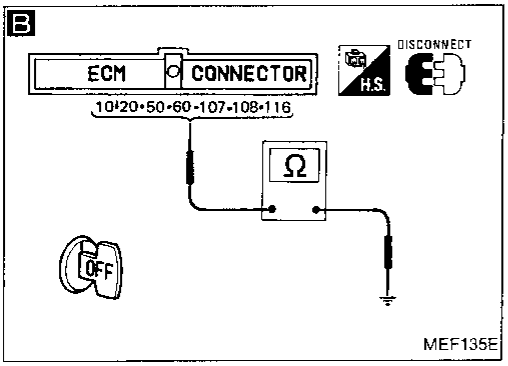
Harness layout

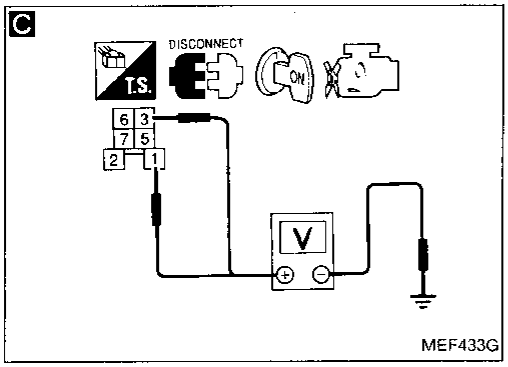


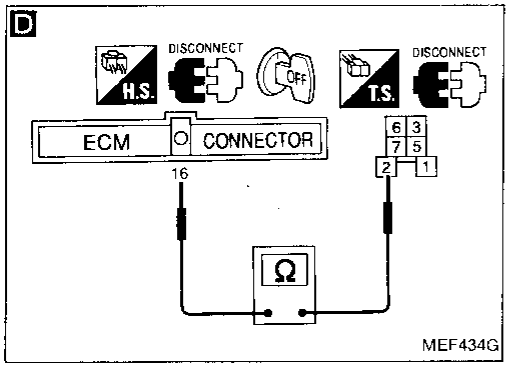


MAIN POWER SUPPLY AND GROUND CIRCUIT (Not self-diagnostic item)









INSPECTION START

Start engine.
Is engine running?

Yes → Go to "CHECK POWER SUPPLY-III".

No

A

CHECK POWER SUPPLY-I.
1) Turn ignition switch "ON".
2) Check voltage between ECM terminal ⑮ and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F4), (E4)
- Harness continuity 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, ⑳, ㊿, ㊿, (107), (108), (116) and engine ground.
Continuity should exist.

NG → Check the following.
- Harness connectors (F7), (F40)
- Harness continuity 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 continuity between ECCS relay and battery
- Harness continuity 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 ⑯ and terminal ②.
Continuity should exist.

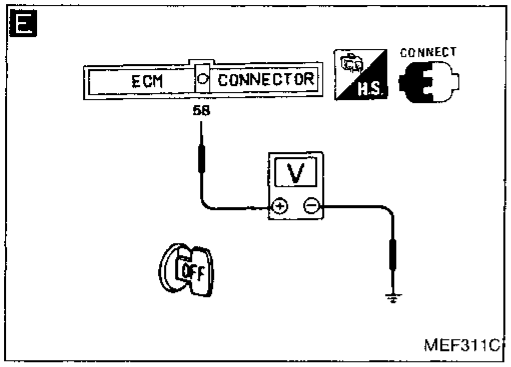
NG → Repair harness or connectors.

OK

Go to "IGNITION SIGNAL (Not self-diagnostic item)".

MAIN POWER SUPPLY AND GROUND CIRCUIT (Not self-diagnostic item)

E



MEF311C

E

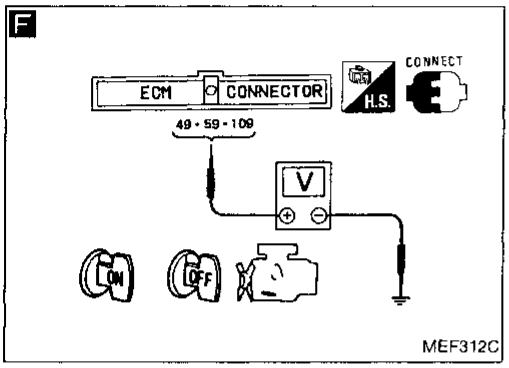
CHECK POWER SUPPLY-III.
1) Stop engine.
2) Check voltage between ECM terminal (58) and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness continuity between ECM and harness connector (F3)

If NG, repair harness or connectors.

OK ↓

F



MEF312C

F

CHECK POWER SUPPLY-IV.
1) Turn ignition switch "ON" and then "OFF".
2) Check voltage between ECM terminals (49), (59), (109) and ground with CONSULT or tester.
Voltage:
Ignition switch "ON" and for a few seconds after turning ignition switch "OFF"
Battery voltage
A few seconds after turning ignition switch "OFF"
Approximately 0V

OK → Go to "CHECK GROUND CIRCUIT-II".

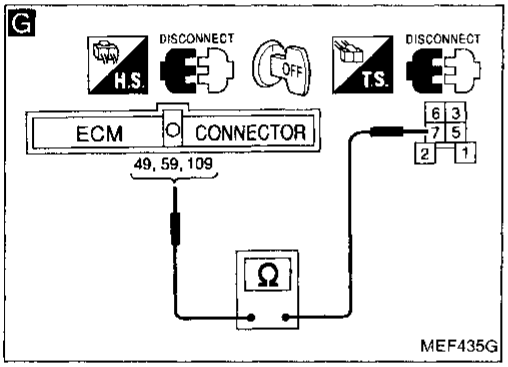
Case-1: Battery voltage does not exist for a few seconds.
Case-2: Battery voltage exists for more than a few seconds.

NG ↓

Case-2 → Go to "CHECK COMPONENT" (ECCS relay).

Case-1 ↓

G



MEF435G

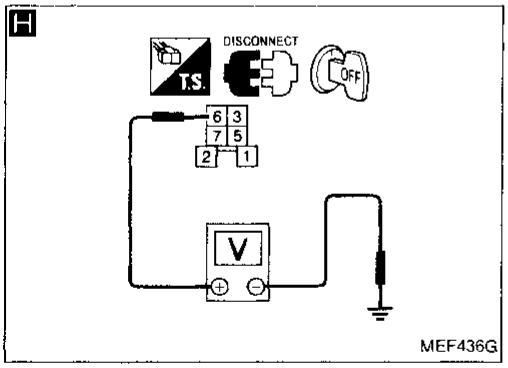
G

CHECK HARNESS CONTINUITY BETWEEN ECCS RELAY AND ECM.
1) Disconnect ECM harness connector.
2) Disconnect ECCS relay.
3) Check harness continuity between ECM terminals (49), (59), (109) and terminal (7).
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

H



MEF436G

H

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

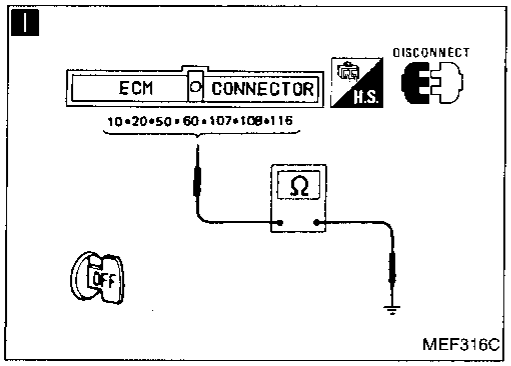
NG → Check the following.
- Harness continuity between ECCS relay and harness connector (F3)

If NG, repair harness or connectors.

OK ↓

Ⓐ

MAIN POWER SUPPLY AND GROUND CIRCUIT (Not self-diagnostic item)



Ⓐ

CHECK COMPONENT
(ECCS relay).
Refer to "Electrical Components Inspection". (See page EF & EC-222.)

NG → Replace ECCS relay.

OK ↓

I

CHECK GROUND CIRCUIT-II.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminals ⑩, ⑳, ㊿, ⑥⓪, ⑩⑦, ⑩⑧, ⑪⑥ and engine ground.
Continuity should exist.

NG → Check the following.
- Harness connectors (F7), (F40)
- Harness continuity 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. ↓

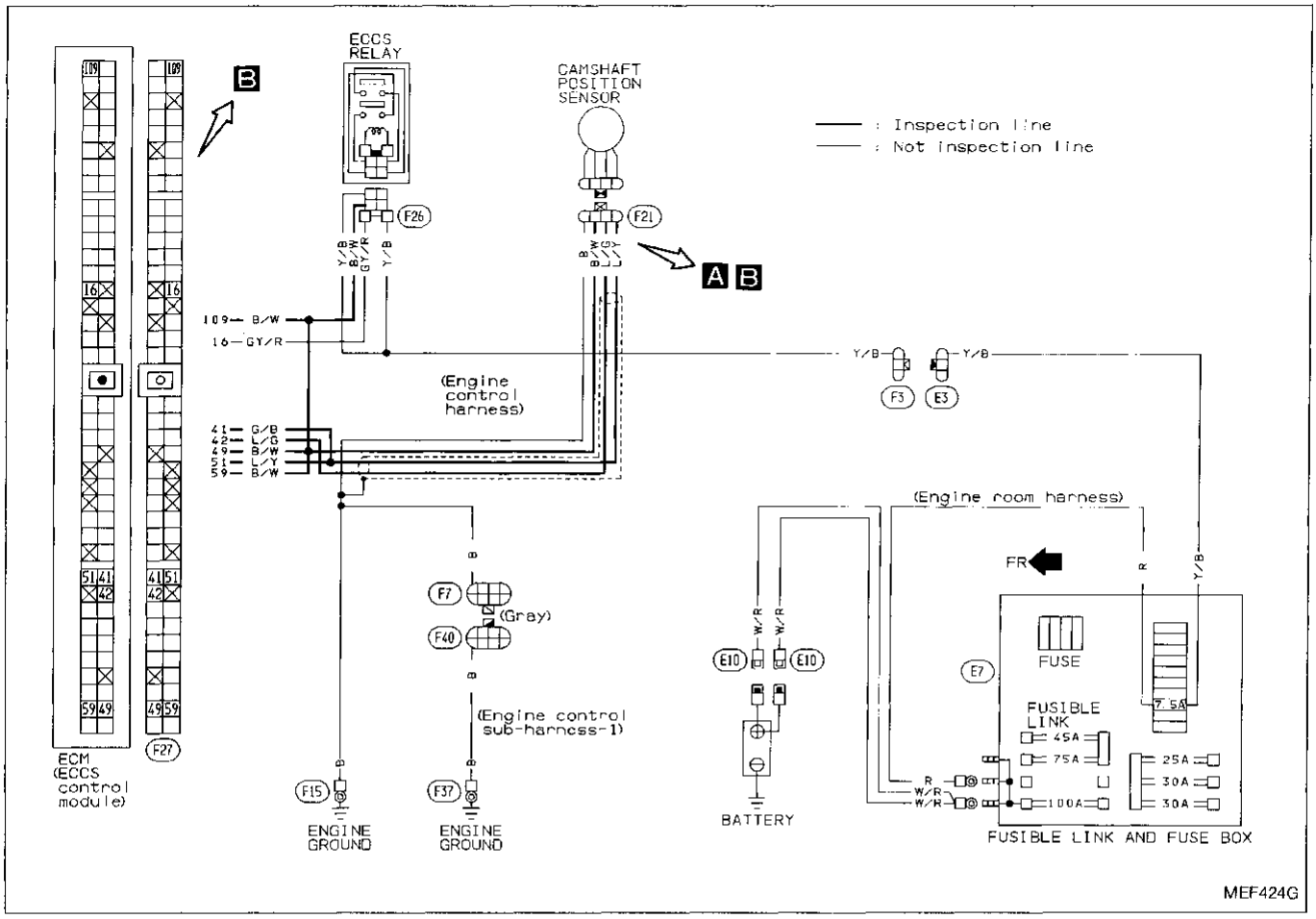
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

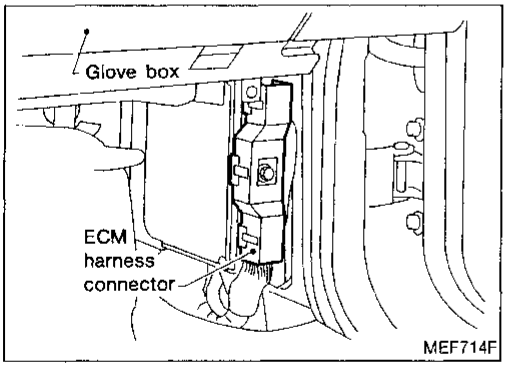
INSPECTION END

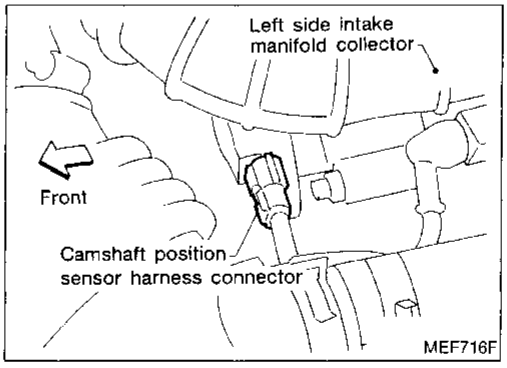
Diagnostic Procedure 2

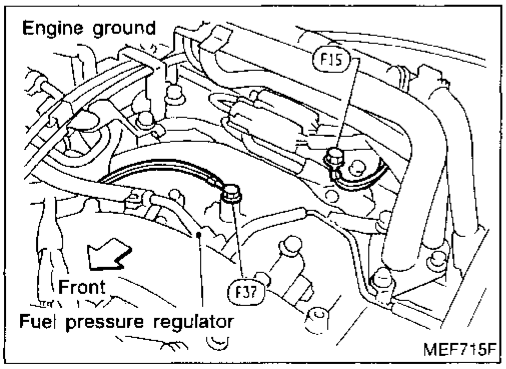
CAMSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)



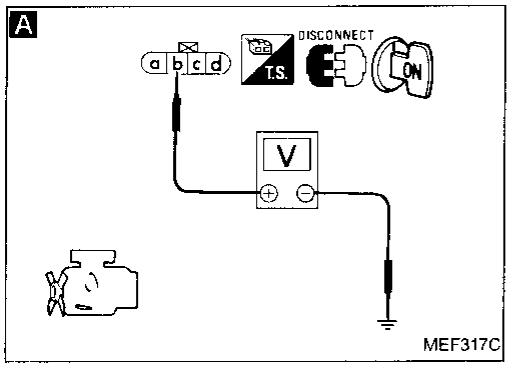
Harness layout

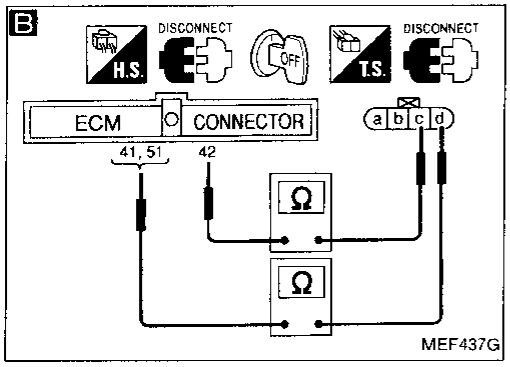






CAMSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)





INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-72.

OK → Go to "CAMSHAFT POSITION SENSOR (Not self-diagnostic item)".

NG

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 ⓑ and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness continuity between camshaft position sensor and ECCS relay
- Harness continuity between camshaft position sensor and ECM

If NG, repair harness or connectors.

OK

Loosen and retighten ground screws.

B

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between terminal ⓓ and ECM terminals ㊶, ㊺ (120° signal), terminal ⓒ and ECM terminal ㊷ (1° signal).
Continuity should exist.

NG → Repair harness or connectors.

OK

CHECK COMPONENT (Camshaft position sensor).
Refer to "Electrical Components Inspection". (See page EF & EC-216.)

NG → Replace camshaft position sensor.

OK

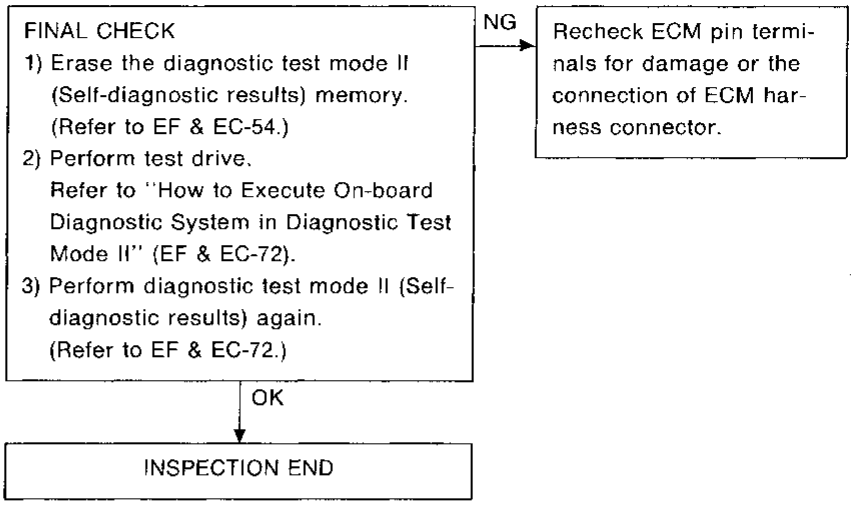
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

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

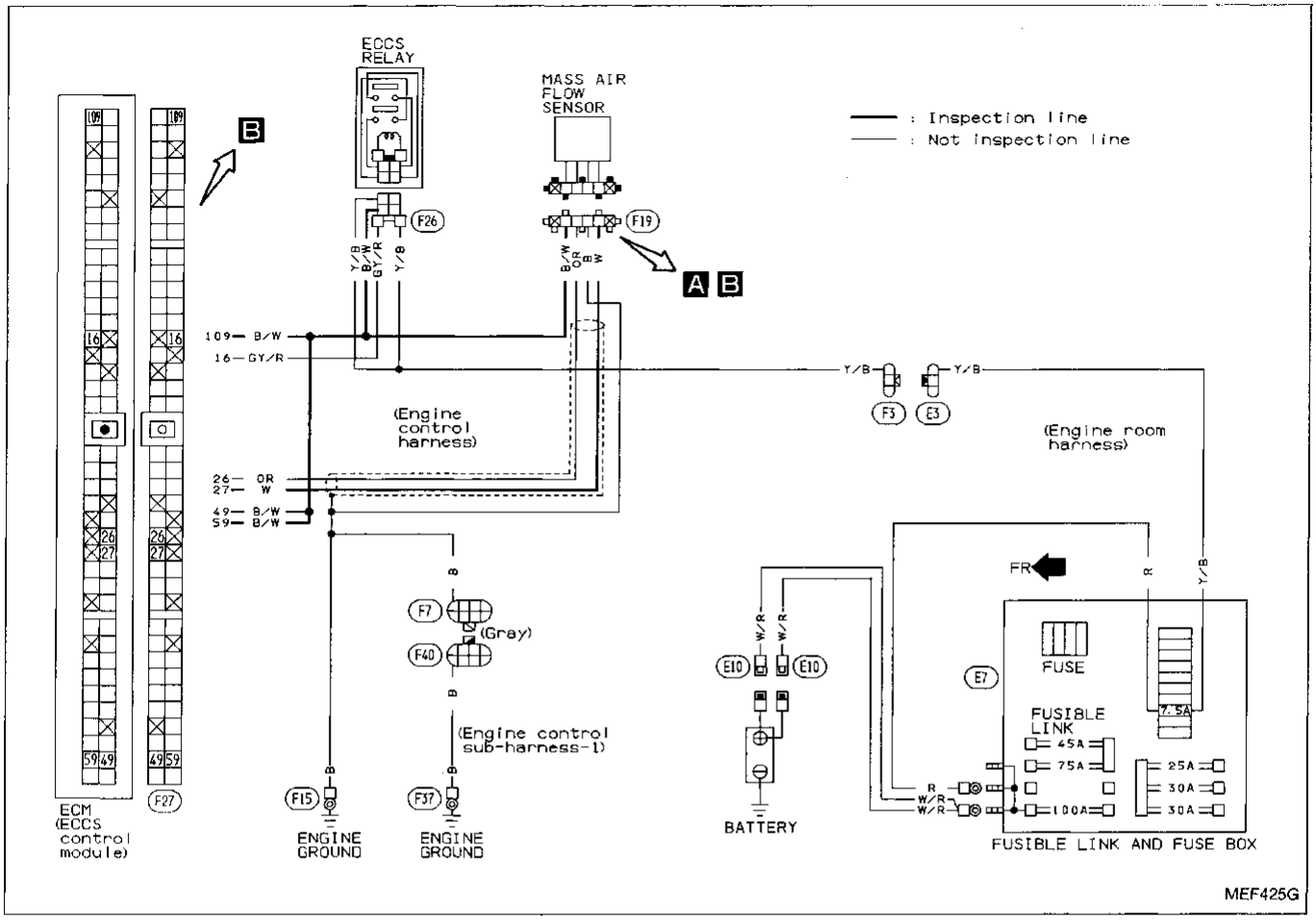
CAMSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)

Perform FINAL CHECK by the following procedure after repair is completed.

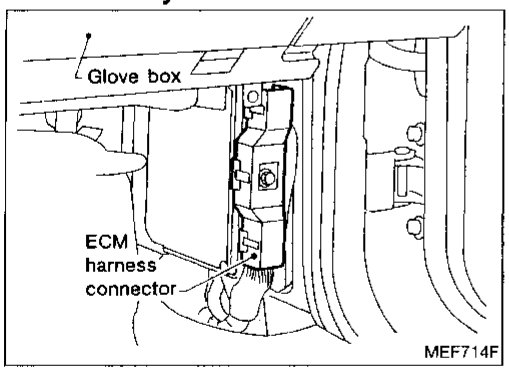


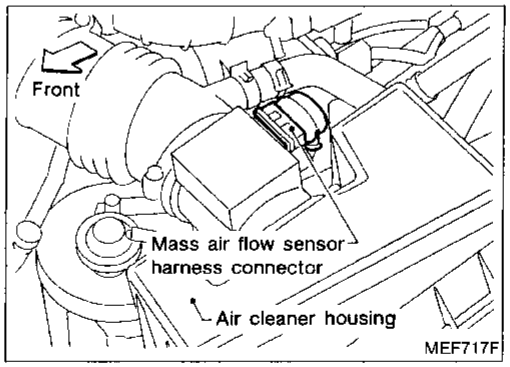
Diagnostic Procedure 3

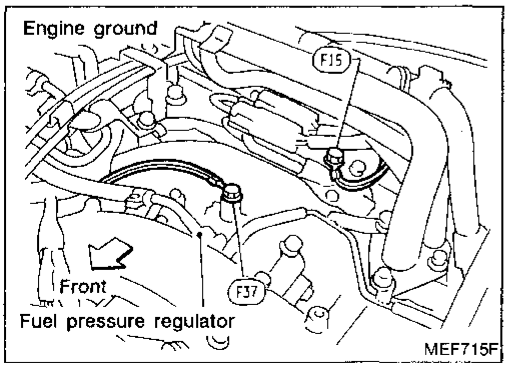
MASS AIR FLOW SENSOR (Diagnostic trouble code No. 12) (CHECK) (Malfunction indicator lamp item)



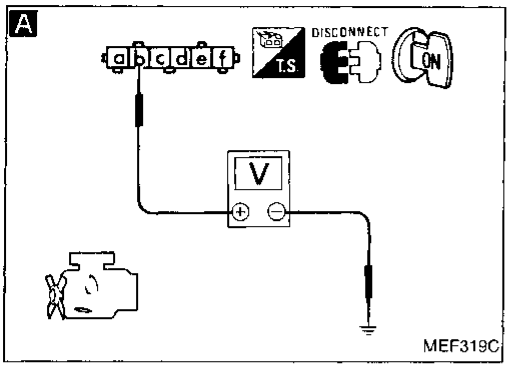
Harness layout

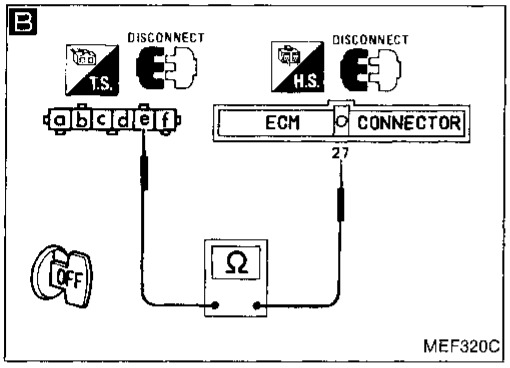






MASS AIR FLOW SENSOR (Diagnostic trouble code No. 12) CHECK (Malfunction indicator lamp item)





INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-72.

OK → Go to "MASS AIR FLOW SENSOR (Not self-diagnostic item)".

NG

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 ⓑ and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness continuity between mass air flow sensor and ECCS relay
- Harness continuity between mass air flow sensor and ECM

If NG, repair harness or connectors.

OK

Loosen and retighten ground screws.

B

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between terminal ⓔ and ECM terminal ㉗.
Continuity should exist.

NG → Repair harness or connectors.

OK

CHECK COMPONENT (Mass air flow sensor). Refer to "Electrical Components Inspection". (See page EF & EC-216.)

NG → Replace mass air flow sensor.

OK

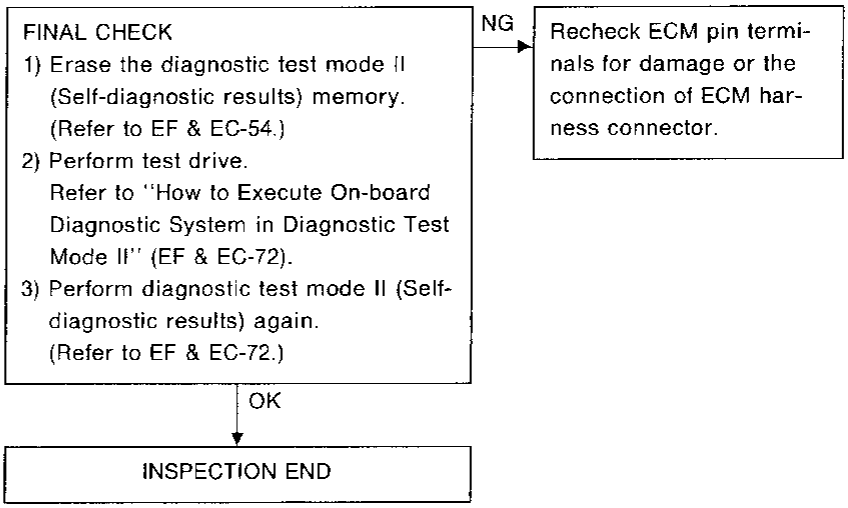
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

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

MASS AIR FLOW SENSOR (Diagnostic trouble code No. 12) (CHECK) (Malfunction indicator lamp item)

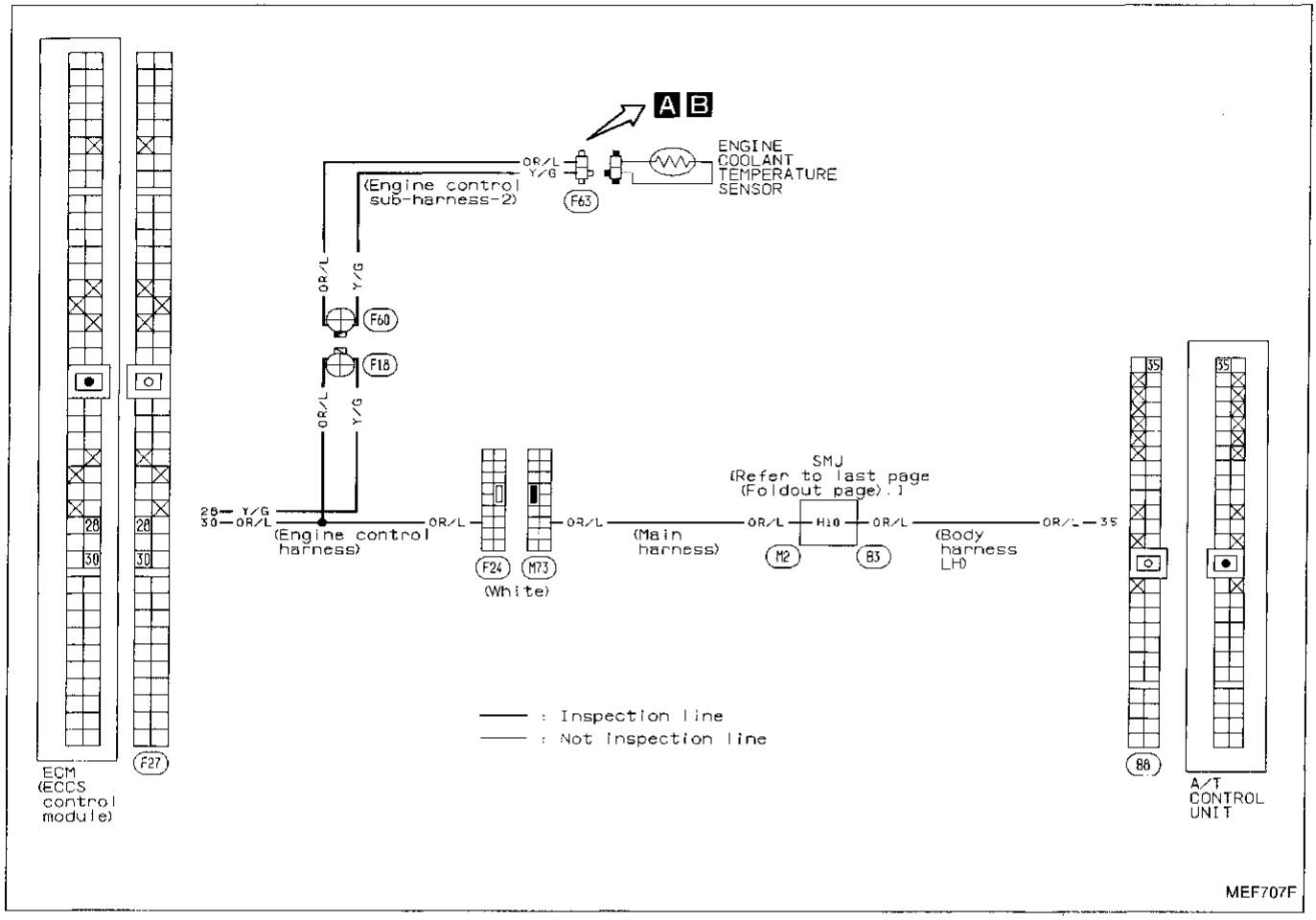
Perform FINAL CHECK by the following procedure after repair is completed.



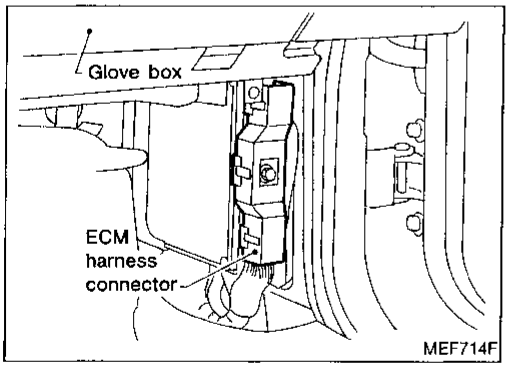
Diagnostic Procedure 4

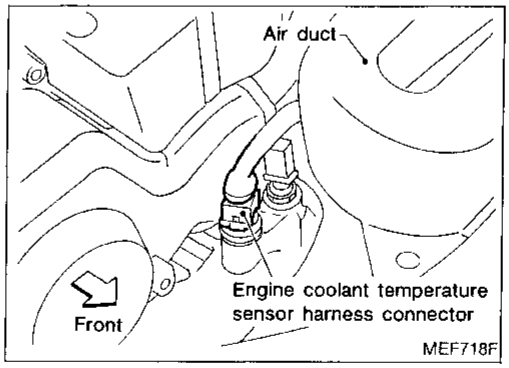
ENGINE COOLANT TEMPERATURE SENSOR (Diagnostic trouble code No. 13)

CHECK (Malfunction indicator lamp item)



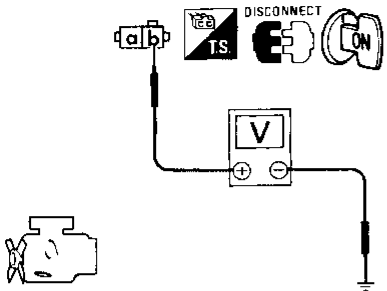
Harness layout





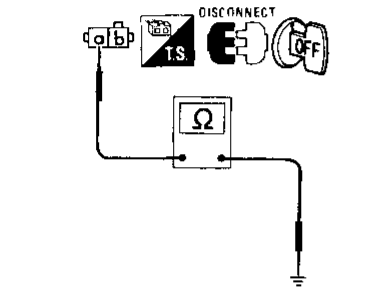
ENGINE COOLANT TEMPERATURE SENSOR (Diagnostic trouble code No. 13) (Malfunction indicator lamp item)

A



MEF321C

B



MEF322C

INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-73.

OK → INSPECTION END

NG

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

NG → Check the following.
- Harness connectors (F18), (F60)
- Harness continuity 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 ⓐ and engine ground.
Continuity should exist.

NG → Check the following.
- Harness connectors (F18), (F60)
- Harness connectors (F24), (M73)
- Harness connectors (M2), (B3)
- Harness continuity between ECM and engine coolant temperature sensor
- Harness continuity 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 "Electrical Components Inspection". (See page EF & EC-216.)

NG → Replace engine coolant temperature sensor.

OK

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

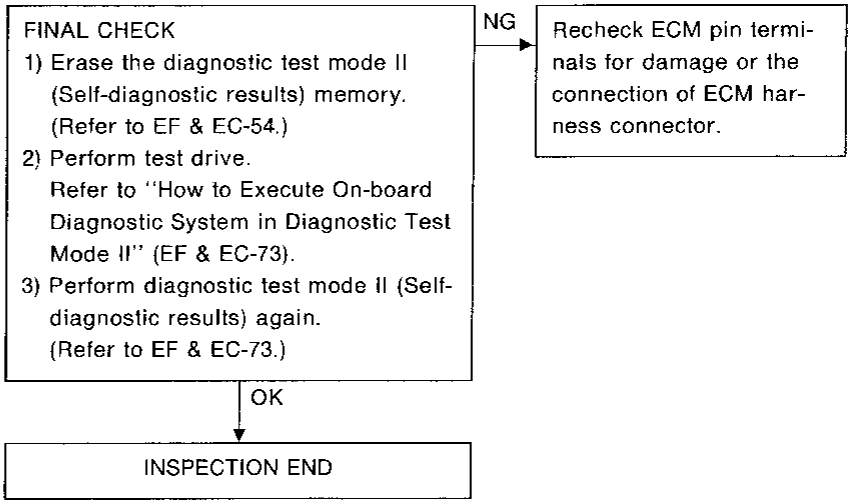
Trouble is not fixed.

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

ENGINE COOLANT TEMPERATURE SENSOR (Diagnostic trouble code No. 13)

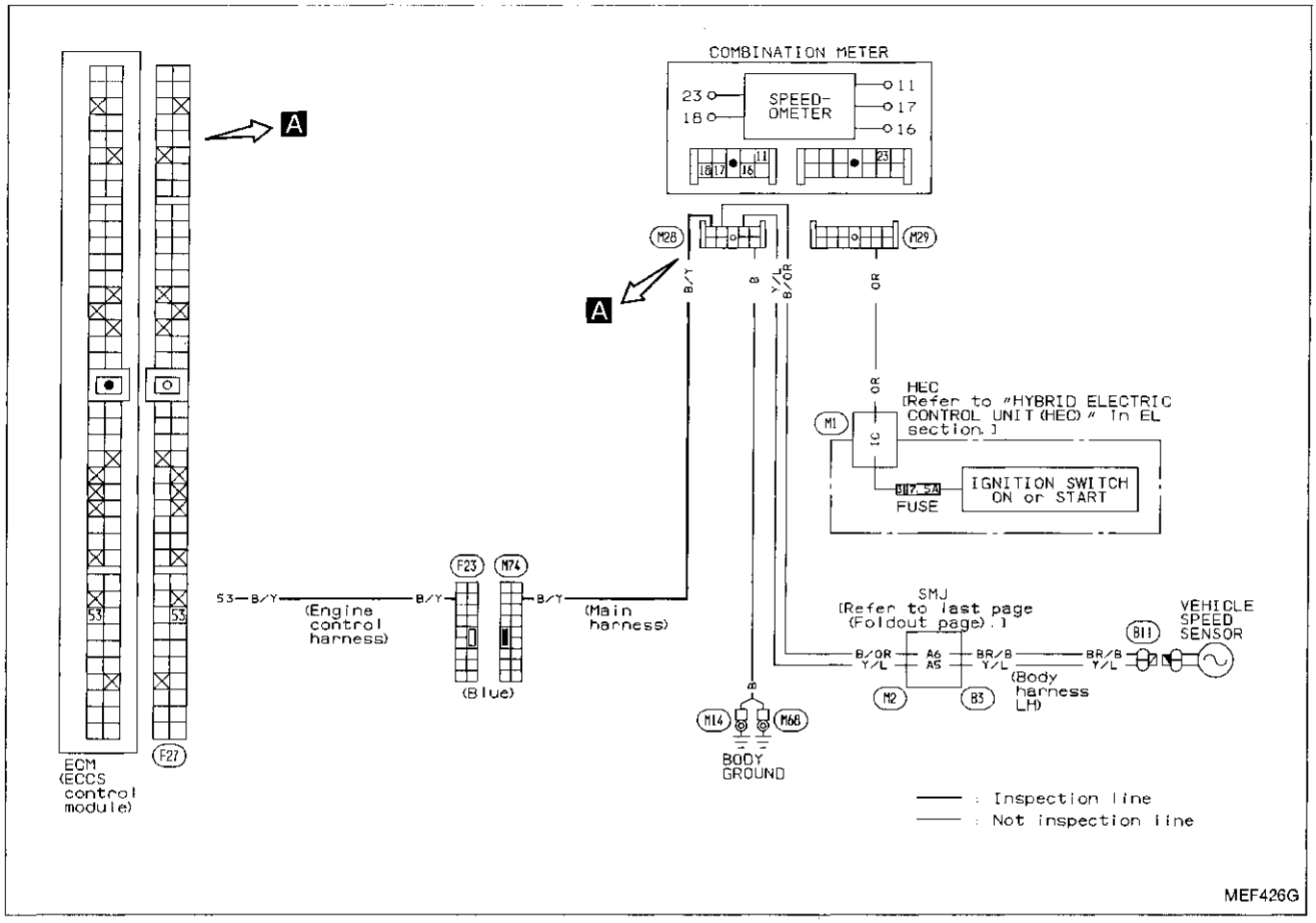
CHECK (Malfunction indicator lamp item)

Perform FINAL CHECK by the following procedure after repair is completed.

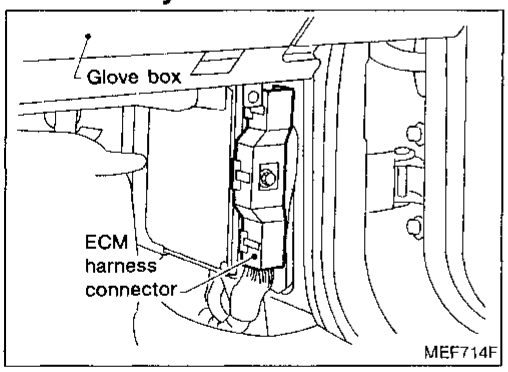


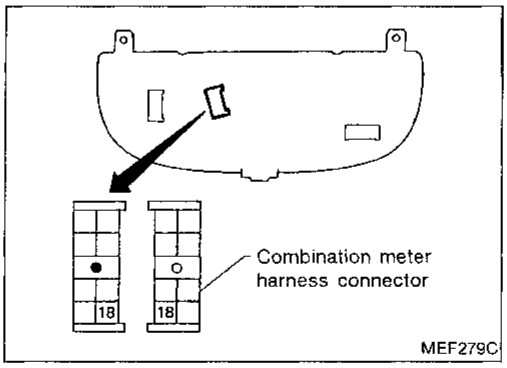
Diagnostic Procedure 5

VEHICLE SPEED SENSOR (Diagnostic trouble code No. 14) CHECK (Malfunction indicator lamp item)

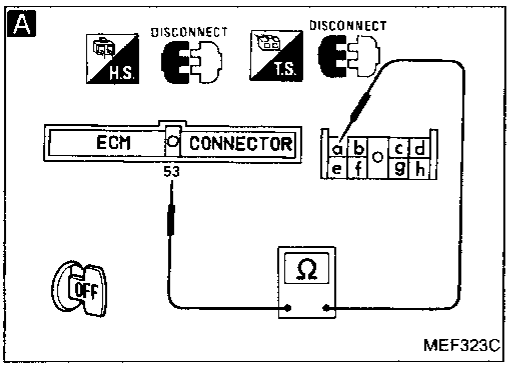


Harness layout





VEHICLE SPEED SENSOR (Diagnostic trouble code No. 14) (Malfunction indicator lamp item)



INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-73.
- OK → INSPECTION END
- NG ↓

CHECK SPEEDOMETER FUNCTION. Make sure that speedometer functions properly.
- NG → Check vehicle speed sensor and its circuit. (Refer to "Vehicle Speed Sensor Signal Check" of "METER AND GAUGES" in EL section.)
- OK ↓

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 (53) and terminal (a). **Continuity should exist.**

- NG → Check the following.
  - Harness connectors (F23), (M74)
  - Harness continuity between ECM and combination meter

  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 or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Perform FINAL CHECK by the following procedure after repair is completed.

FINAL CHECK

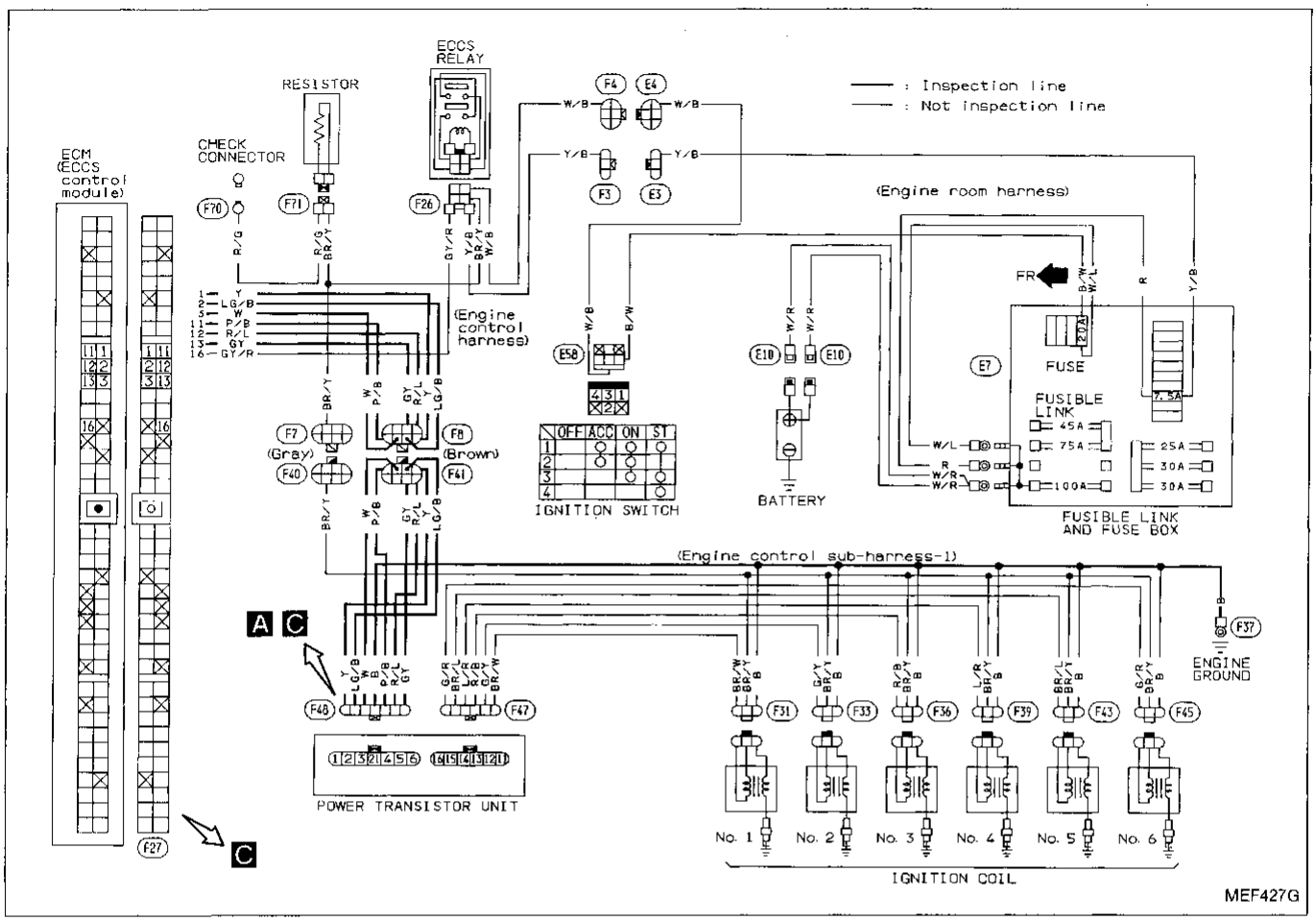
1) Erase the diagnostic test mode II (Self-diagnostic results) memory. (Refer to EF & EC-54.)
2) Perform test drive. Refer to "How to Execute On-board Diagnostic System in Diagnostic Test Mode II" (EF & EC-73).
3) Check overall function again.

- NG → Recheck ECM pin terminals for damage or the connection of ECM harness connector.
- OK ↓

INSPECTION END

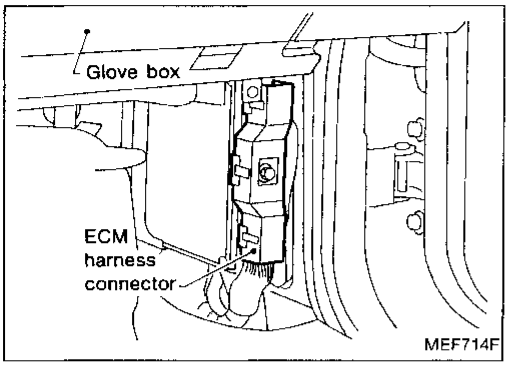
Diagnostic Procedure 6

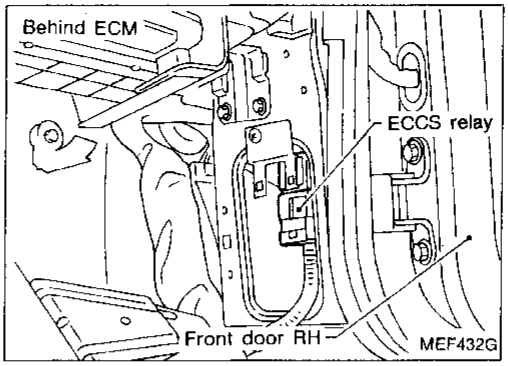
IGNITION SIGNAL (Diagnostic trouble code No. 21)

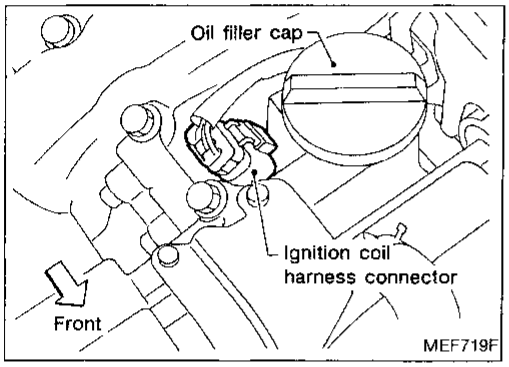


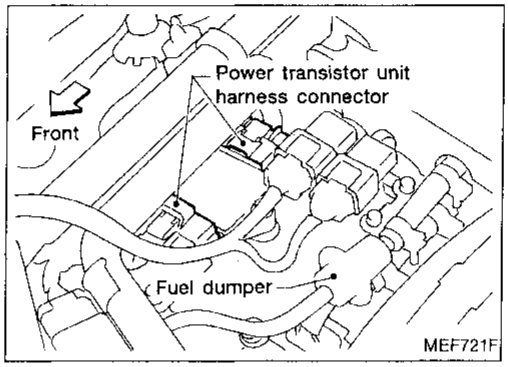
IGNITION SIGNAL (Diagnostic trouble code No. 21)

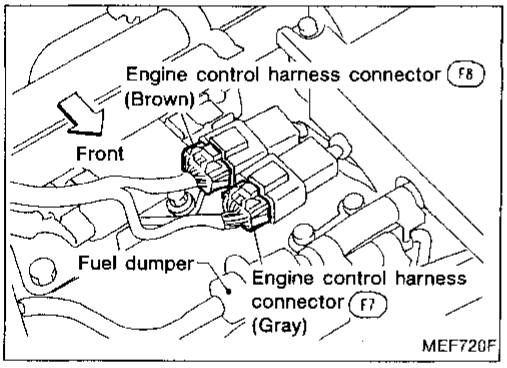
Harness layout



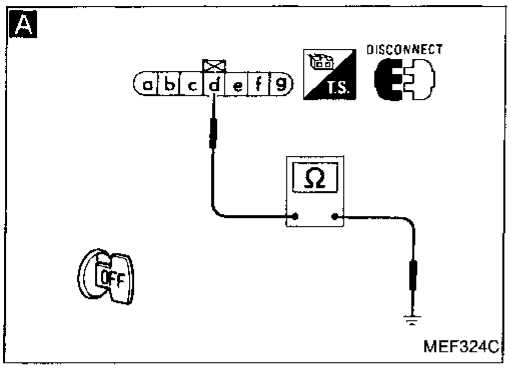


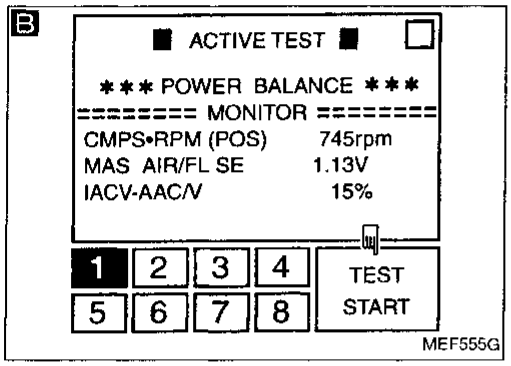


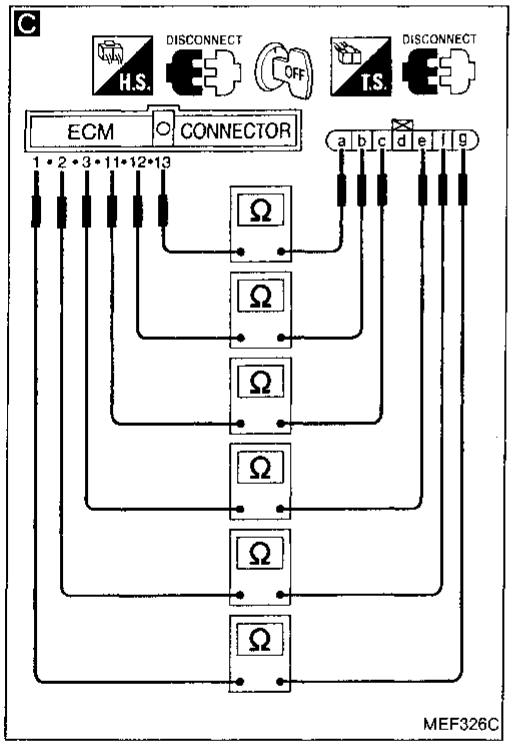




IGNITION SIGNAL (Diagnostic trouble code No. 21)







INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-74.

OK → Go to "IGNITION SIGNAL (Not self-diagnostic item)".

NG

Turn ignition switch to "START". **Is any cylinder ignited?**

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.
1) Turn ignition switch "OFF".
2) Disconnect power transistor unit harness connector.
3) Check harness continuity between terminal ⓓ and engine ground. **Continuity should exist.**

If NG, repair harness or connectors.

OK

C

CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector and power transistor unit harness connector.
3) Check harness continuity between
ECM terminal ① and terminal ⓖ,
ECM terminal ② and terminal ⓕ,
ECM terminal ③ and terminal ⓔ,
ECM terminal ⑪ and terminal ⓒ,
ECM terminal ⑫ and terminal ⓑ,
ECM terminal ⑬ and terminal ⓐ.
Continuity should exist.

NG → Check the following.
- Harness connectors (F8), (F41)
- Harness continuity between ECM and power transistor unit

If NG, repair harness or connectors.

OK

CHECK COMPONENT (Power transistor unit). Refer to "Electrical Components Inspection". (See page EF & EC-217.)

NG → Replace power transistor unit.

OK

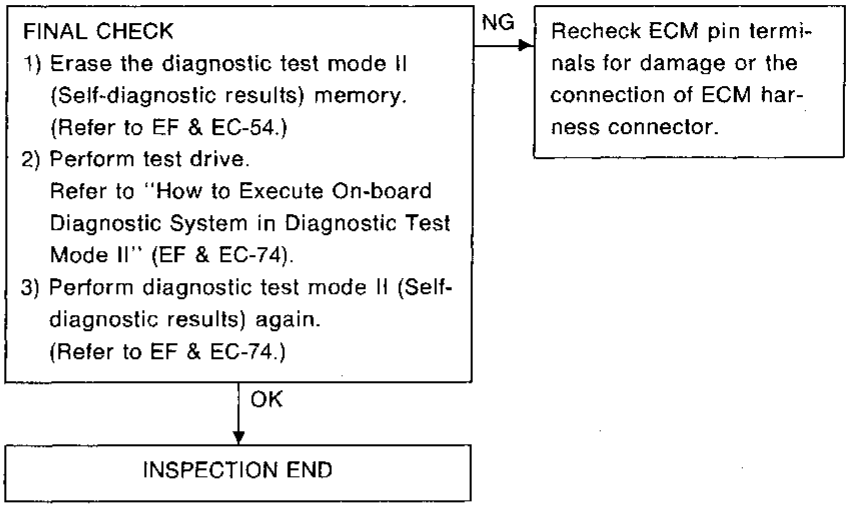
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

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

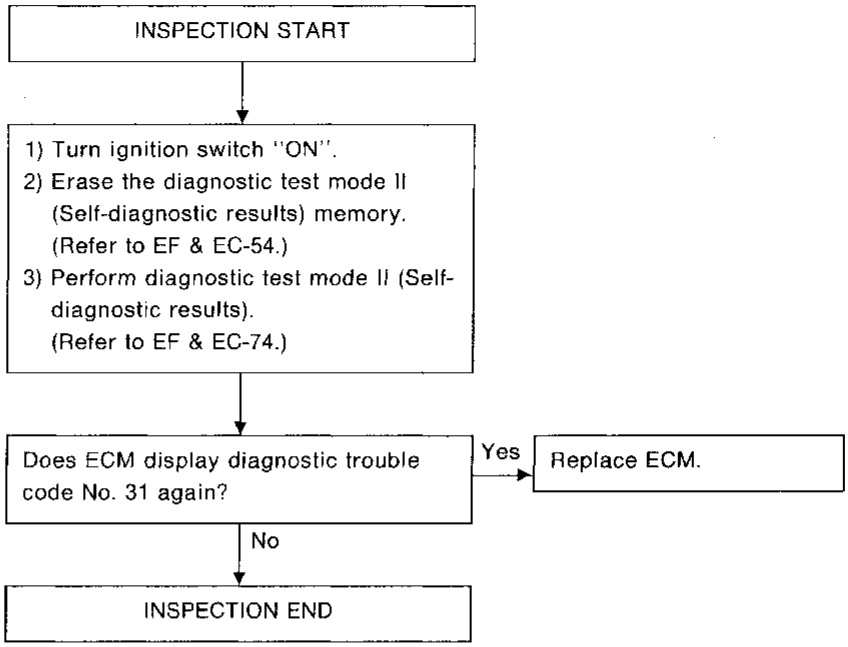
IGNITION SIGNAL (Diagnostic trouble code No. 21)

Perform FINAL CHECK by the following procedure after repair is completed.



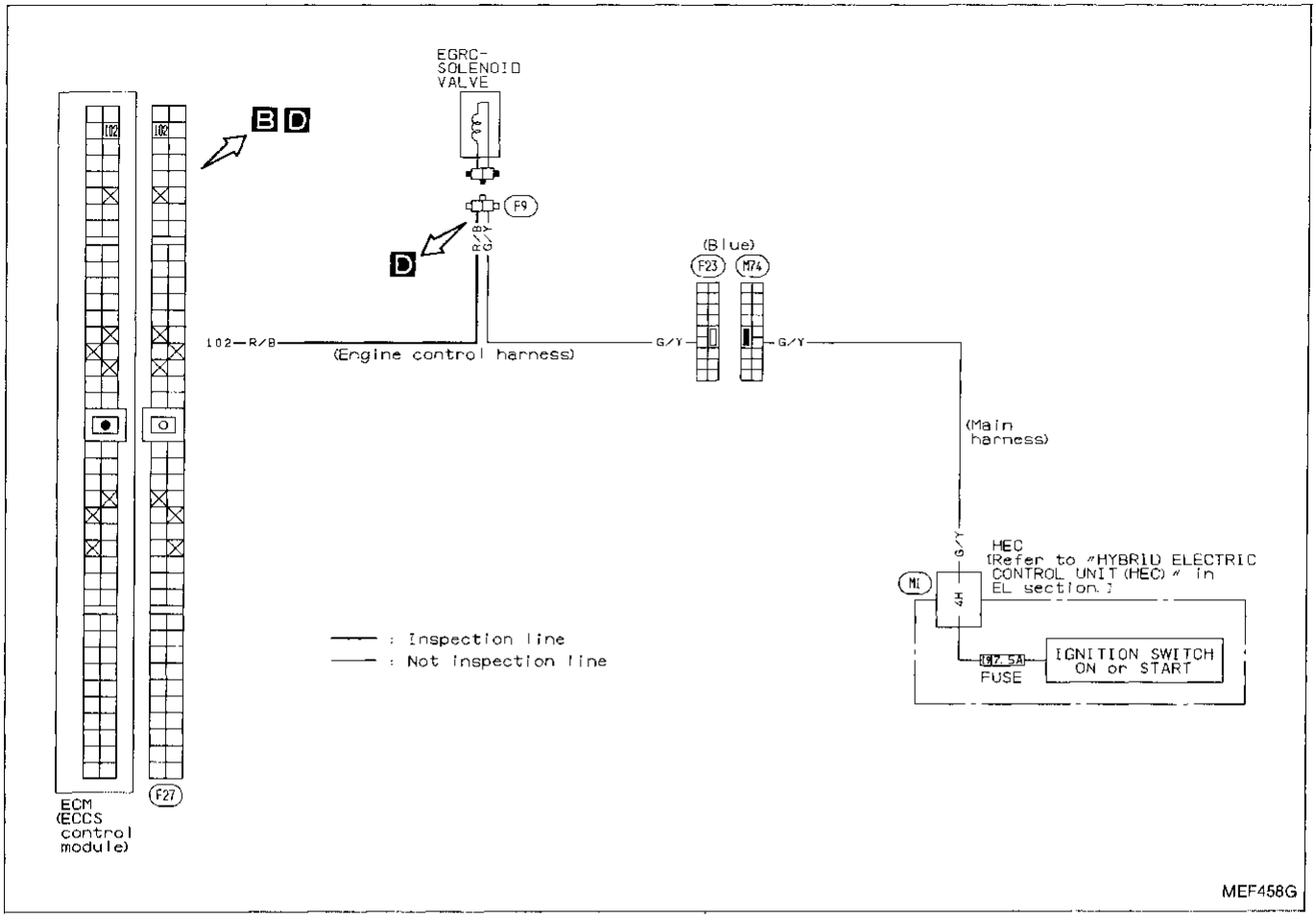
Diagnostic Procedure 7

ECM (ECCS CONTROL MODULE) (Diagnostic trouble code No. 31) (Malfunction indicator lamp item)

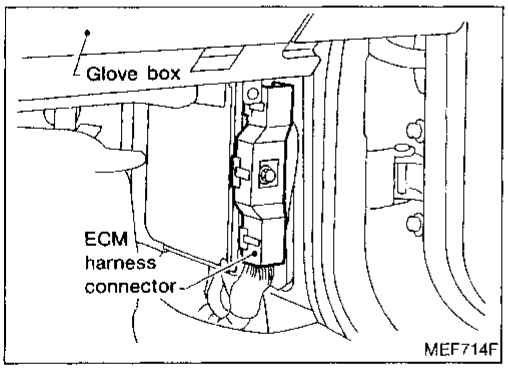


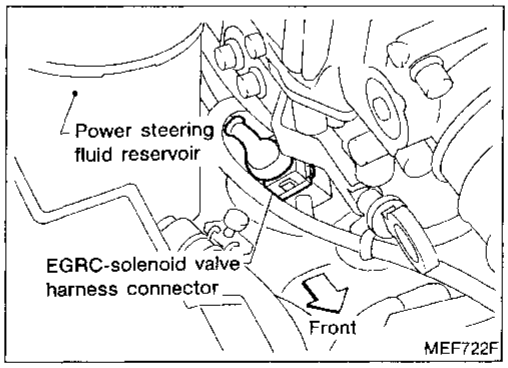
Diagnostic Procedure 8

EGR FUNCTION (Diagnostic trouble code No. 32) (CHECK) (Malfunction indicator lamp item)



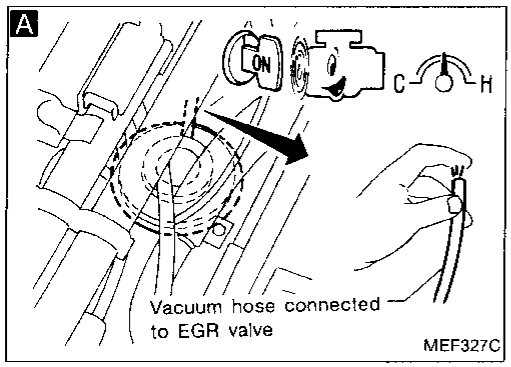
Harness layout





EGR FUNCTION (Diagnostic trouble code No. 32) (CHECK) (Malfunction indicator lamp item)

A



INSPECTION START

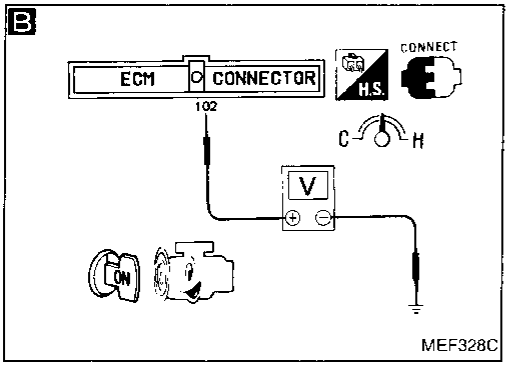
PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
See page EF & EC-75.

OK → Go to EGR CONTROL (Not self-diagnostic item). Refer to EF & EC-133.

NG

A

B



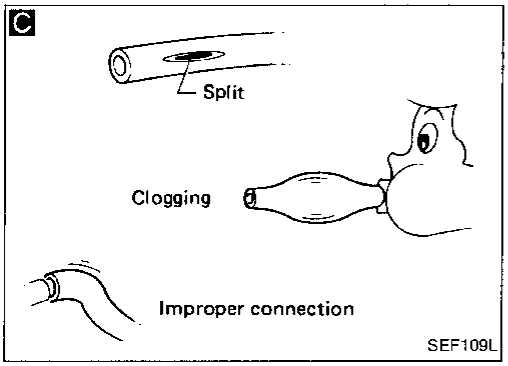
CHECK VACUUM SOURCE TO EGR VALVE.
1) Start engine and warm it up sufficiently.
2) Keep engine speed at about 2,000 rpm.
3) Disconnect vacuum hose to EGR valve.
4) Make sure that vacuum exists.
Vacuum should exist.

OK → CHECK COMPONENT (EGR valve).
Refer to "Electrical Components Inspection".
(See page EF & EC-218.)

NG → Replace EGR valve.

NG

C



B

CHECK CONTROL FUNCTION.
1) Check voltage between ECM terminal (102) and ground under the following conditions with CONSULT or tester.
Voltage:
At idle
Approximately 0V
Engine speed is 2,000 rpm.
Battery voltage

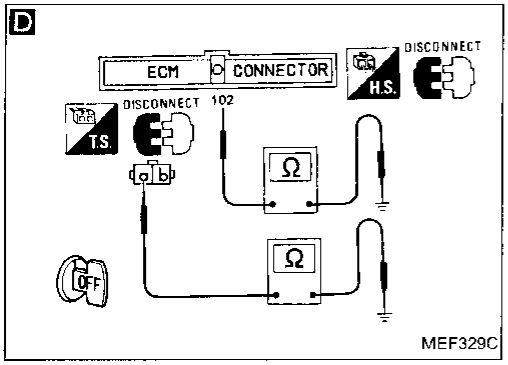
OK → C

C

CHECK VACUUM HOSE.
Check vacuum hose for clogging, cracks and proper connection.

NG

D



D

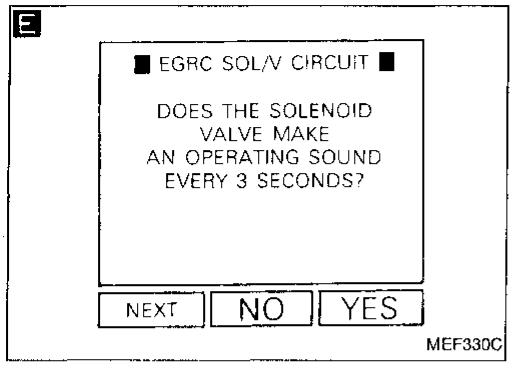
CHECK OUTPUT SIGNAL CIRCUIT.
1) Stop engine.
2) Disconnect ECM harness connector.
3) Disconnect EGRC-solenoid valve harness connector.
4) Check harness continuity between ECM terminal (102) and ground, terminal ⓐ and ground.
Continuity should not exist.

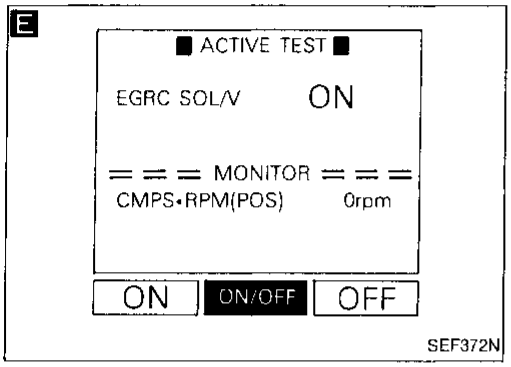
NG → Repair harness or connectors between ECM and EGRC-solenoid valve.

OK

Ⓐ

EGR FUNCTION (Diagnostic trouble code No. 32) (Malfunction indicator lamp item)





Ⓐ

E

CHECK COMPONENT (EGRC-solenoid valve).

1) Reconnect ECM harness connector and EGRC-solenoid valve harness connector.
2) Turn ignition switch "ON".
3) Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

NG → Replace EGRC-solenoid valve.

OR

3) Turn EGRC-solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.

OR

Refer to "Electrical Components Inspection". (See page EF & EC-218.)

OK ↓

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

Trouble is not fixed. ↓

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

↓

Check resistance of EGR temperature sensor. (See page EF & EC-219.)

Perform FINAL CHECK by the following procedure after repair is completed.

FINAL CHECK

1) Erase the diagnostic test mode II (Self-diagnostic results) memory. (Refer to EF & EC-54.)
2) Perform test drive. Refer to "How to Execute On-board Diagnostic System in Diagnostic Test Mode II" (EF & EC-75).
3) Perform diagnostic test mode II (Self-diagnostic results) again. (Refer to EF & EC-75.)

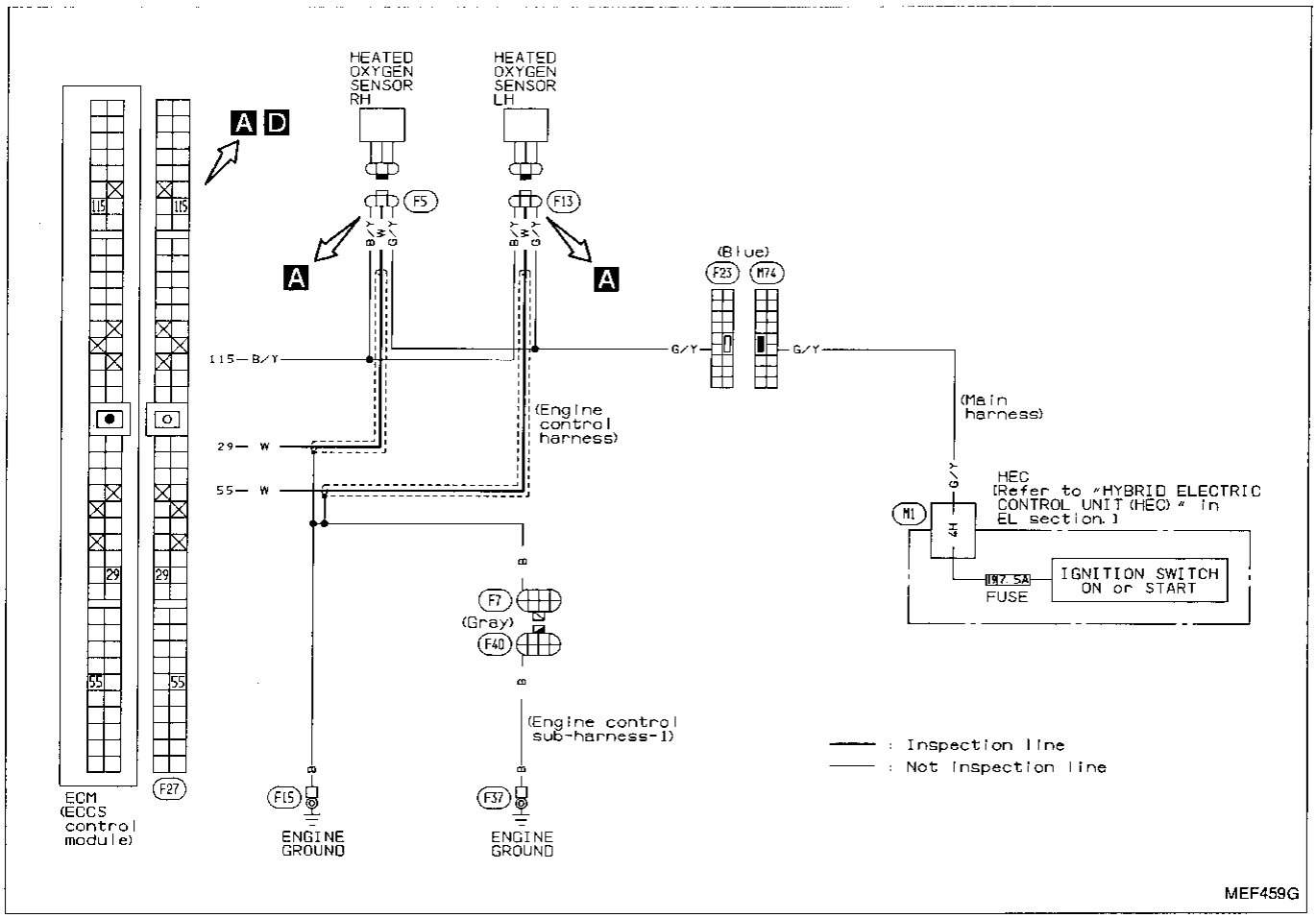
NG → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

OK ↓

INSPECTION END

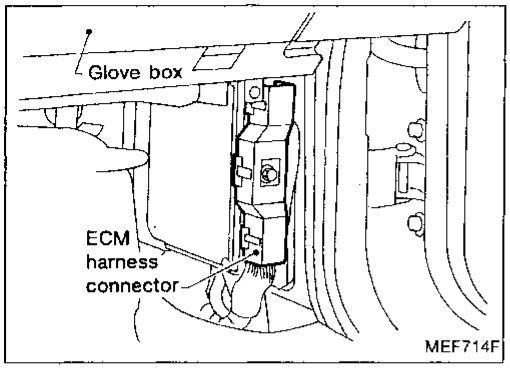
Diagnostic Procedure 9

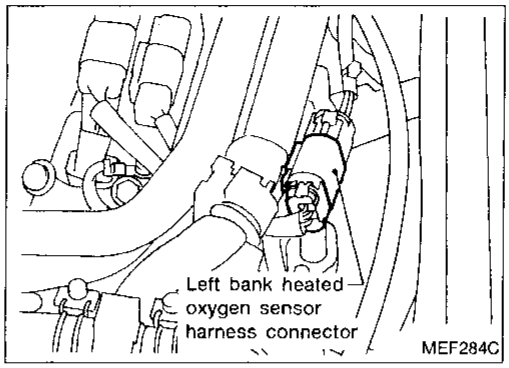
HEATED OXYGEN SENSOR LH (Diagnostic trouble code No. 33) HEATED OXYGEN SENSOR RH (Diagnostic trouble code No. 53) CHECK (Malfunction indicator lamp item)

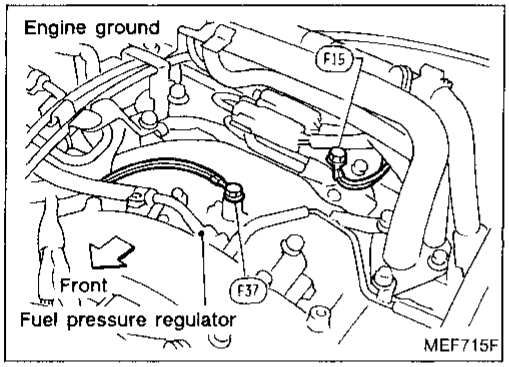


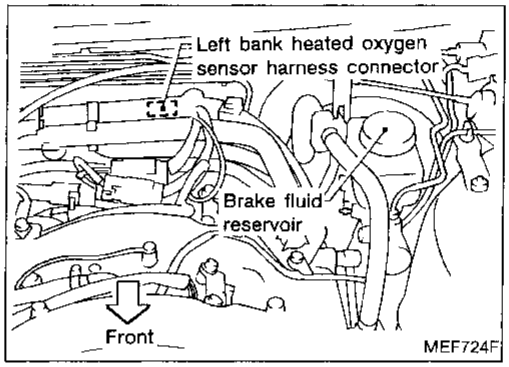
HEATED OXYGEN SENSOR LH (Diagnostic trouble code No. 33) HEATED OXYGEN SENSOR RH (Diagnostic trouble code No. 53) CHECK (Malfunction indicator lamp item)

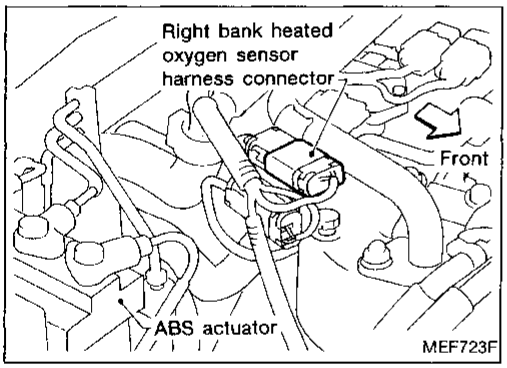
Harness layout





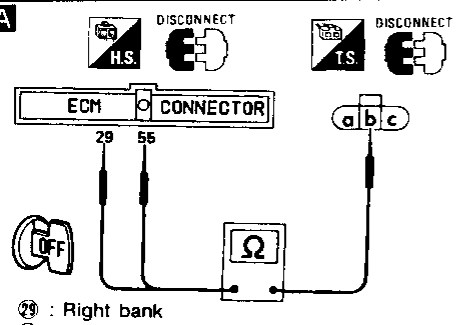






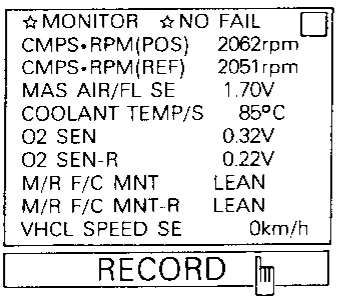
HEATED OXYGEN SENSOR LH (Diagnostic trouble code No. 33) HEATED OXYGEN SENSOR RH (Diagnostic trouble code No. 53) (Malfunction indicator lamp item)

A



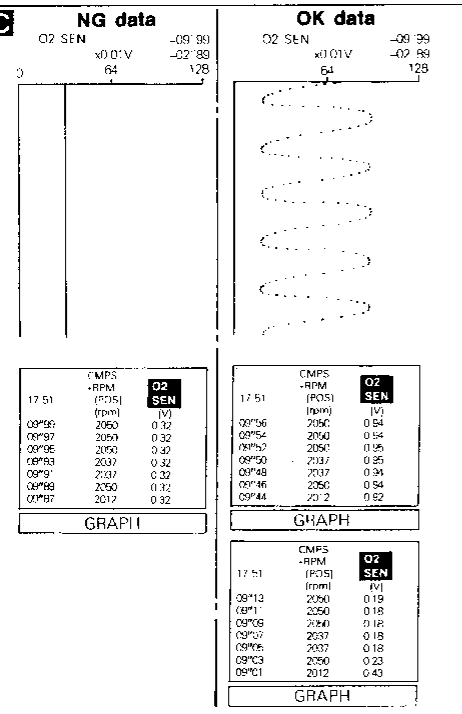
MEF461C

B



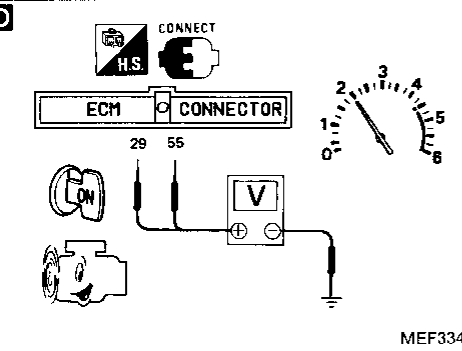
SEF388N

C



SEF373N

D



MEF334C

INSPECTION START

CHECK OVERALL FUNCTION.
See page EF & EC-76.

OK → INSPECTION END

NG

Loosen and retighten ground screws.

A

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect heated oxygen sensor harness connector and ECM harness connector.
3) Check harness continuity between ECM terminals ㉙, ㊺ and terminal ⓑ.
Continuity should exist.

NG → Repair harness or connectors.

OK

CHECK VOLTAGE.
1) Reconnect heated oxygen sensor harness connector and ECM harness connector.
2) Start engine and warm it up sufficiently.

B 3) Select "DATA MONITOR" mode with CONSULT.
4) Touch "RECORD" on CONSULT with engine speed held at approximately 2,000 rpm.

C 5) Check "O_2 SEN (–R)" voltage.
① **Approx. 0.3V (No voltage fluctuations) ... NG**
② **Other than ① above ... OK**

NG → Replace heated oxygen sensor.

OR

D 3) Check voltage between ECM terminals ㉙, ㊺ and ground, with engine speed held at approximately 2,000 rpm.
① **Approx. 0.3 V (No voltage fluctuations) ... NG**
② **Other than ① above ... OK**

OK

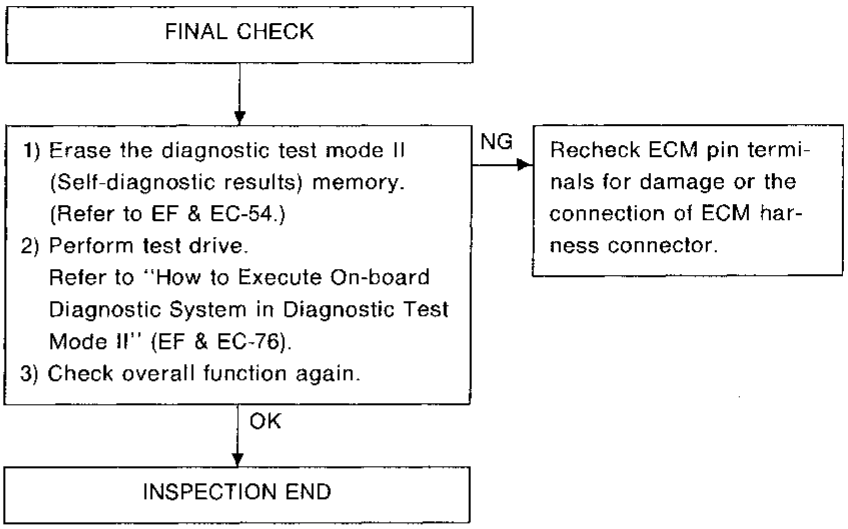
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

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

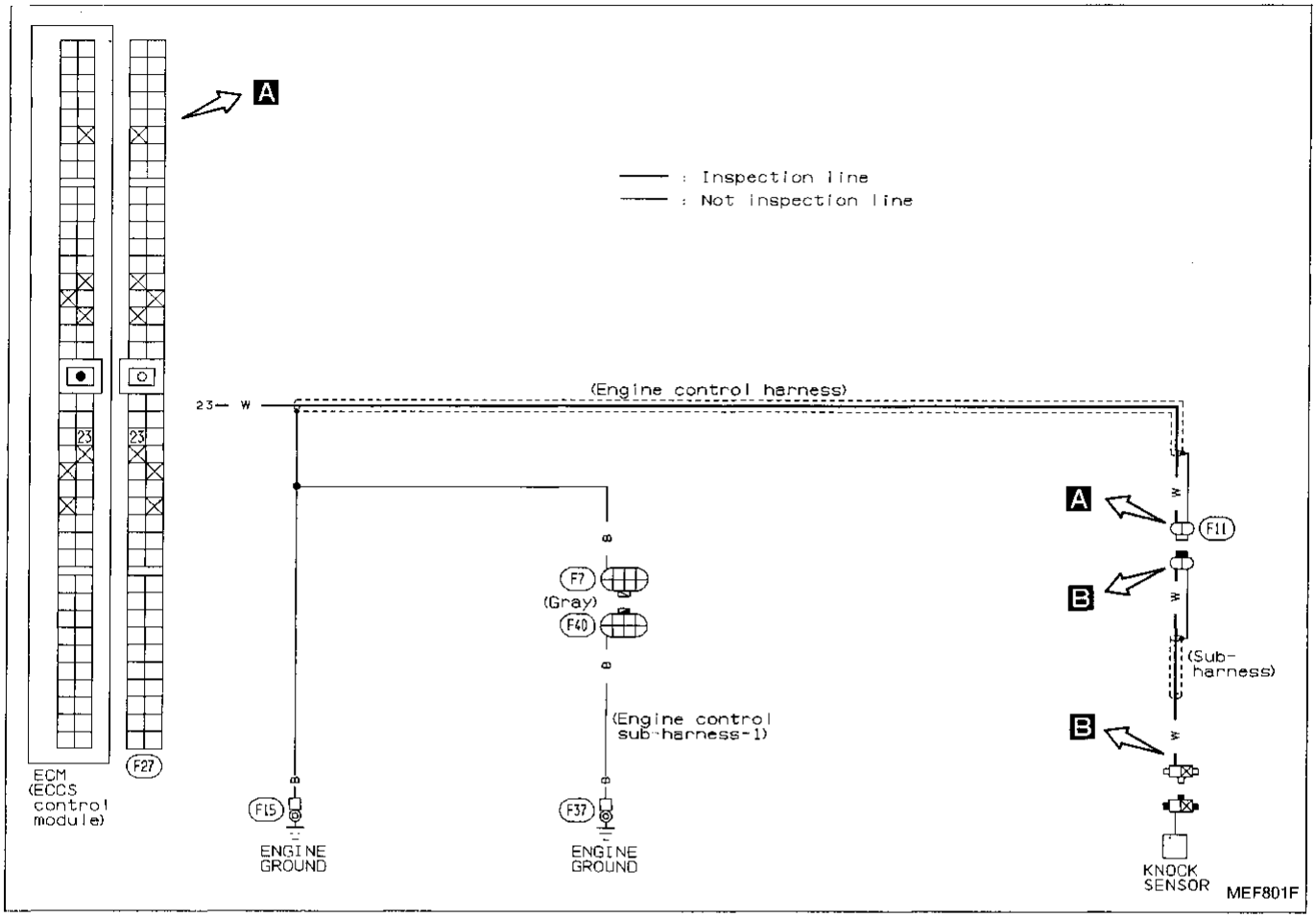
HEATED OXYGEN SENSOR LH (Diagnostic trouble code No. 33) HEATED OXYGEN SENSOR RH (Diagnostic trouble code No. 53) (Malfunction indicator lamp item)

Perform FINAL CHECK by the following procedure after repair is completed.

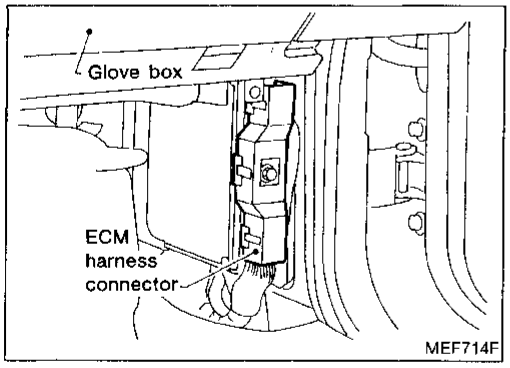


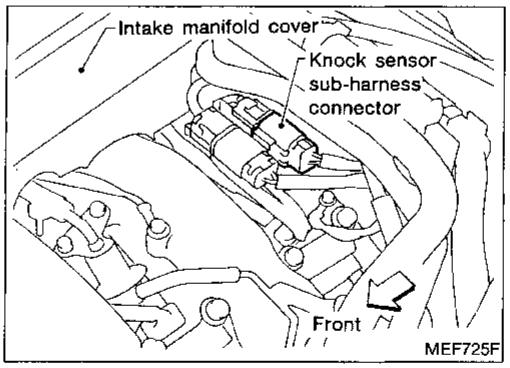
Diagnostic Procedure 10

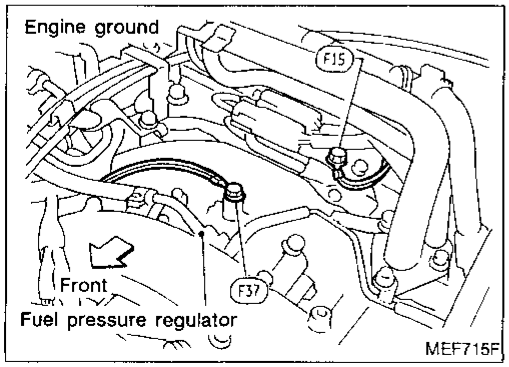
KNOCK SENSOR (Diagnostic trouble code No. 34)



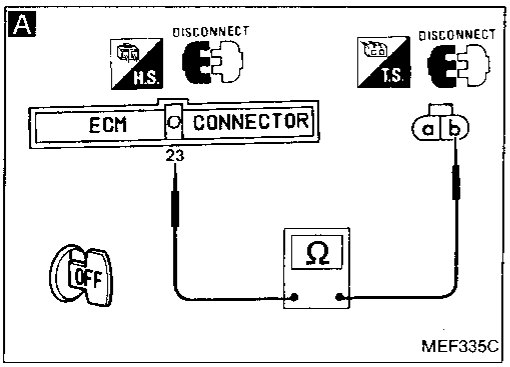
Harness layout

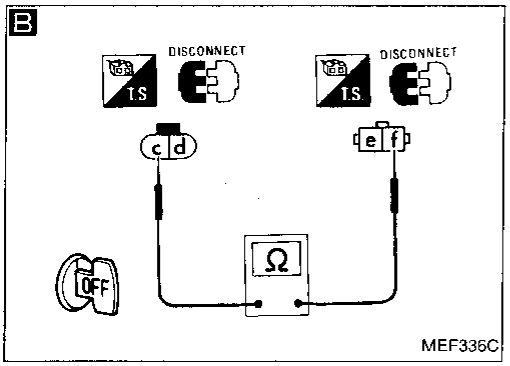






KNOCK SENSOR (Diagnostic trouble code No. 34)





INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-76.

OK → INSPECTION END

NG

Loosen and retighten ground screws.

A

CHECK INPUT SIGNAL CIRCUIT-I.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector and knock sensor sub-harness connector.
3) Check harness continuity between terminal ⓑ and ECM terminal ㉓.
Continuity should exist.

NG → Repair harness or connectors.

OK

B

CHECK INPUT SIGNAL CIRCUIT-II.
1) Disconnect knock sensor harness connector.
2) Check harness continuity between terminals ⓒ and ⓕ.
Continuity should exist.

NG → Repair harness or connectors.

OK

CHECK COMPONENT (Knock sensor). Refer to "Electrical Components Inspection". (See page EF & EC-221.)

NG → Replace knock sensor.

OK

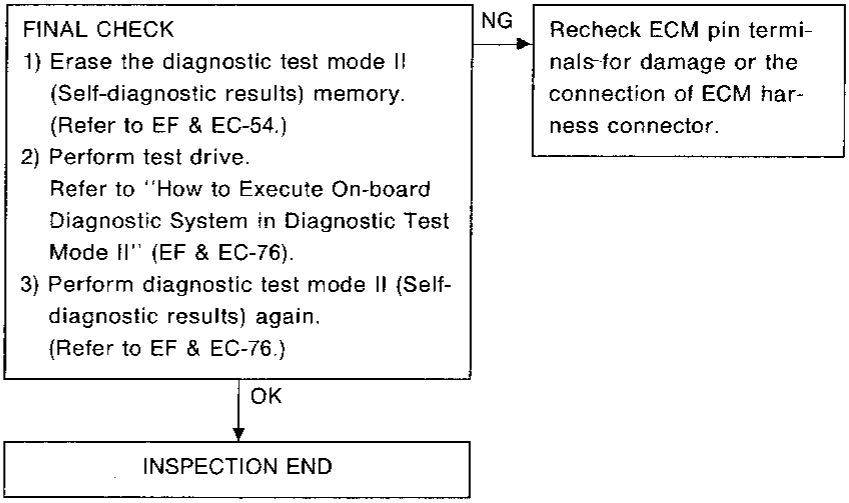
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

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

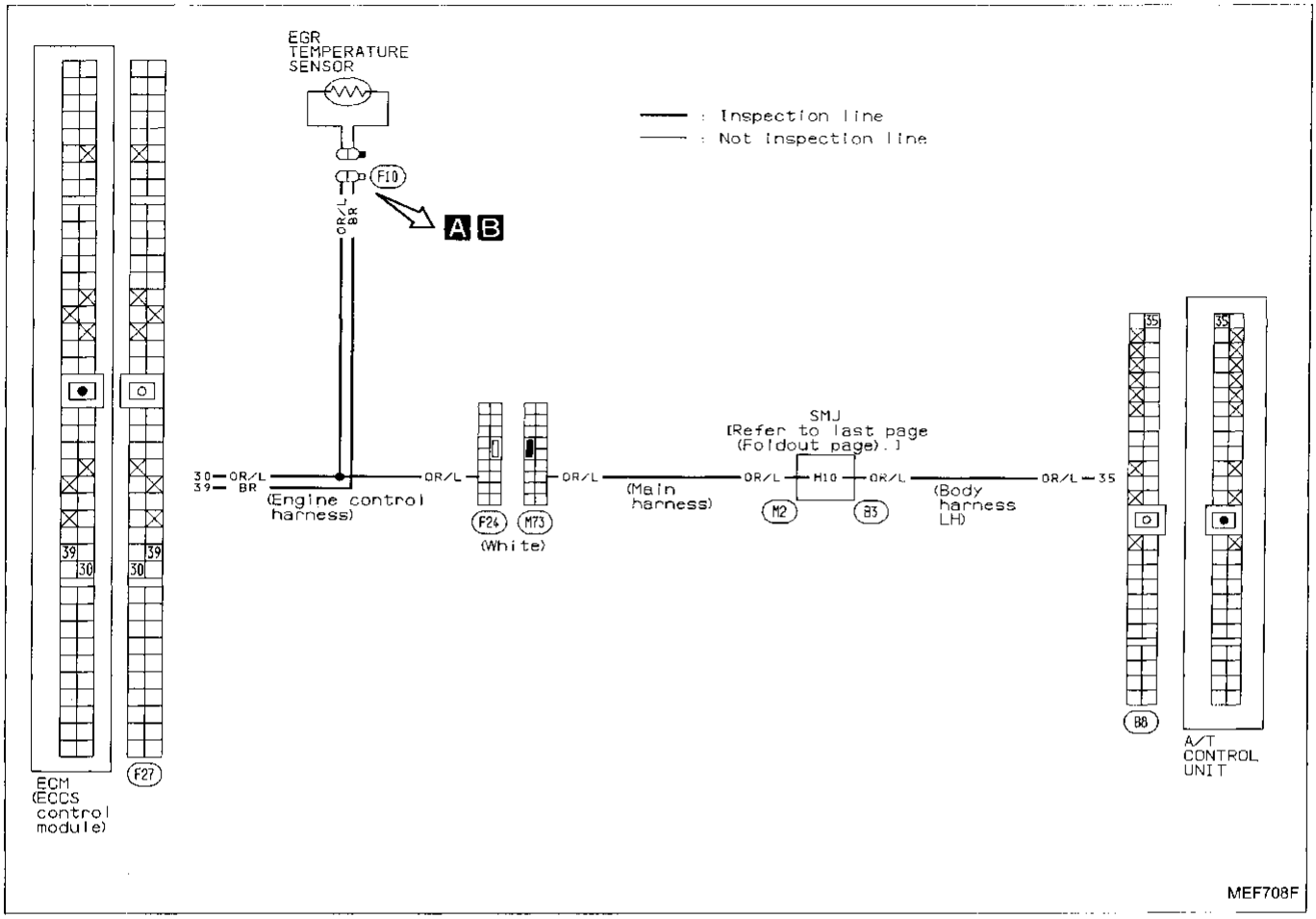
KNOCK SENSOR (Diagnostic trouble code No. 34)

Perform FINAL CHECK by the following procedure after repair is completed.

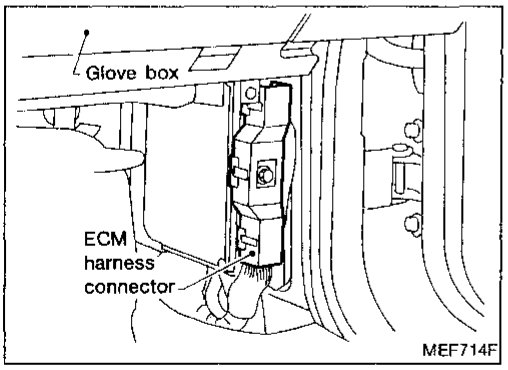


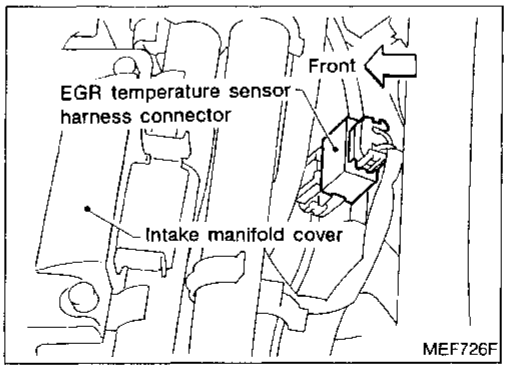
Diagnostic Procedure 11

EGR TEMPERATURE SENSOR (Diagnostic trouble code No. 35) (Malfunction indicator lamp item)



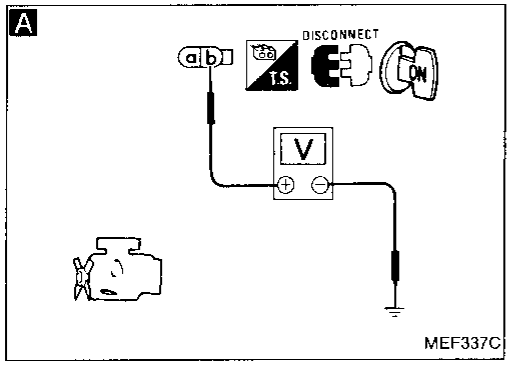
Harness layout





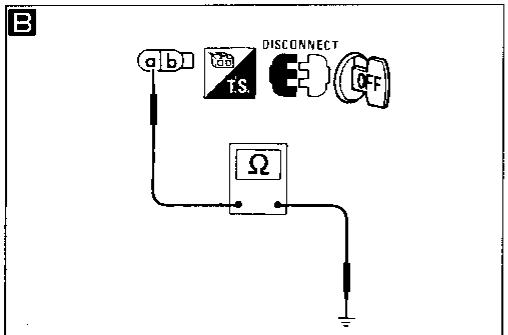
EGR TEMPERATURE SENSOR (Diagnostic trouble code No. 35) (Malfunction indicator lamp item)

A



MEF337C

B



MEF338C

INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
See page EF & EC-77.

OK → INSPECTION END

NG

A

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect EGR temperature sensor harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓑ 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 ⓐ and engine ground.
Continuity should exist.

NG → Check the following.
- Harness connectors (F24), (M73)
- Harness connectors (M2), (B3)
- Harness continuity between EGR temperature sensor and ECM
- Harness continuity between EGR temperature sensor and A/T control unit

If NG, repair harness or connectors.

OK

CHECK COMPONENT
(EGR temperature sensor).
Refer to "Electrical Components Inspection". (See page EF & EC-219.)

NG → Replace EGR temperature sensor.

OK

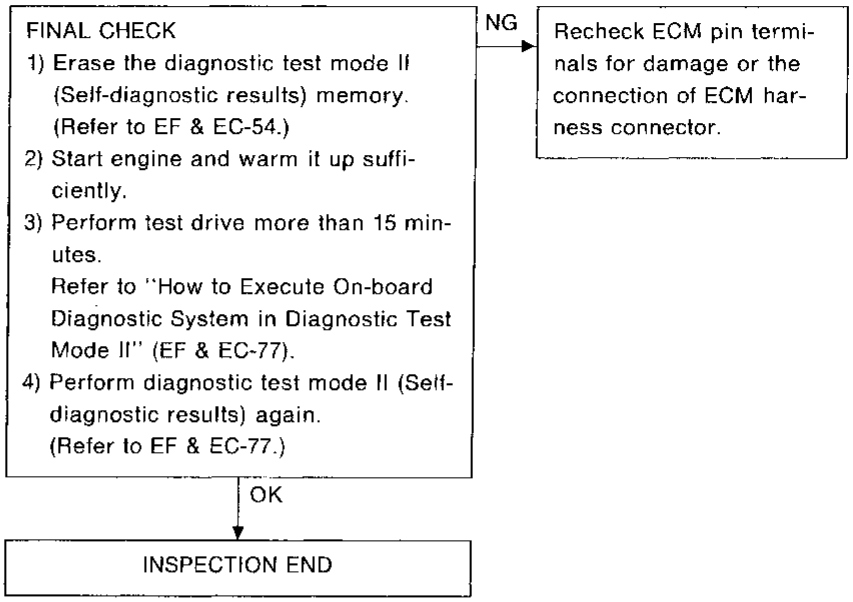
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

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

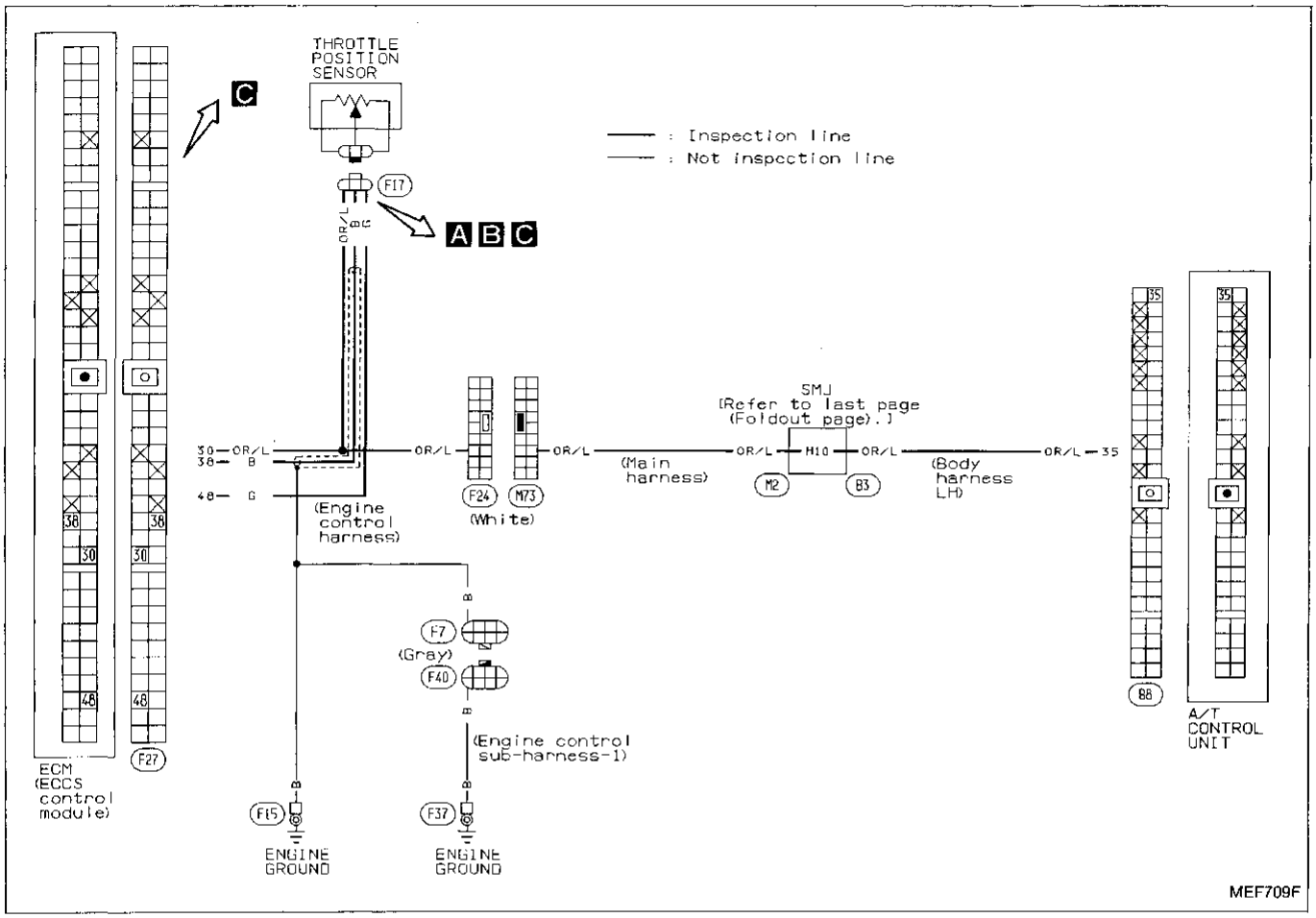
EGR TEMPERATURE SENSOR (Diagnostic trouble code No. 35) (Malfunction indicator lamp item)

Perform FINAL CHECK by the following procedure after repair is completed.

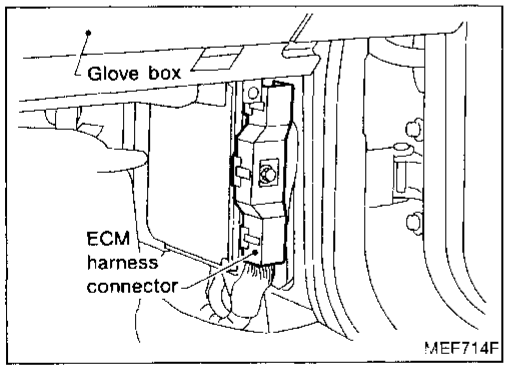


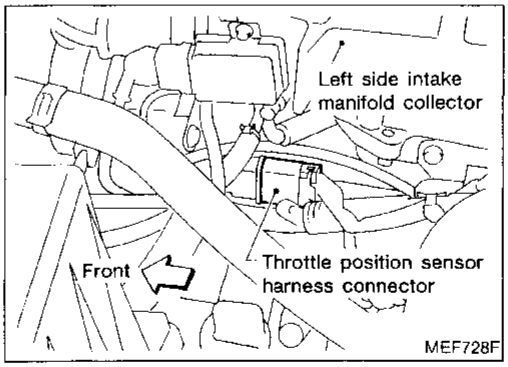
Diagnostic Procedure 12

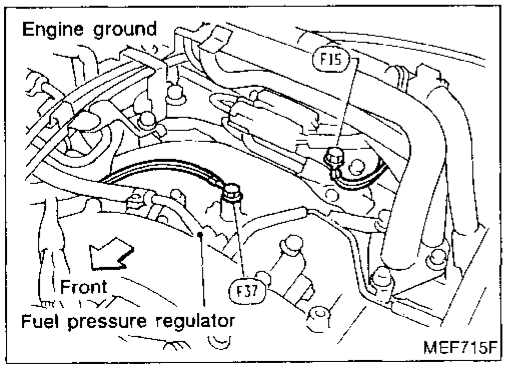
THROTTLE POSITION SENSOR (Diagnostic trouble code No. 43) (Malfunction indicator lamp item)



Harness layout

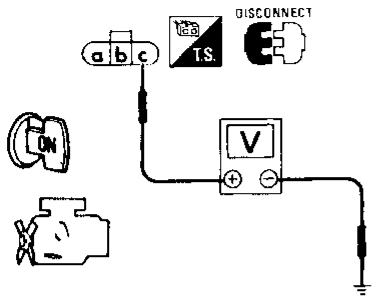






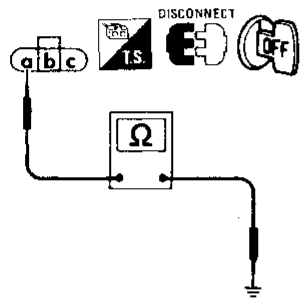
THROTTLE POSITION SENSOR (Diagnostic trouble code No. 43) (CHECK) (Malfunction indicator lamp item)

A



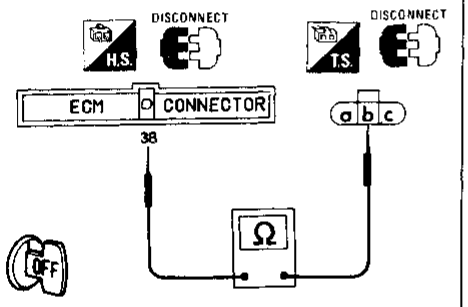
SEF129L

B



SEF130L

C



MEF462C

INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-77.

OK → INSPECTION END

NG

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 ⓒ 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 ground screws.
3) Check harness continuity between terminal ⓐ and engine ground.
Continuity should exist.

NG → Check the following.
- Harness connectors (F24), (M73)
- Harness connectors (M2), (B3)
- Harness continuity between ECM and throttle position sensor
- Harness continuity between A/T control unit and throttle position sensor

If NG, repair harness or connectors.

OK

C

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ㊳ and terminal ⓑ.
Continuity should exist.

NG → Repair harness or connectors.

OK

CHECK COMPONENT (Throttle position sensor).
Refer to "Electrical Components Inspection". (See page EF & EC-219.)

NG → Replace throttle position sensor.

OK

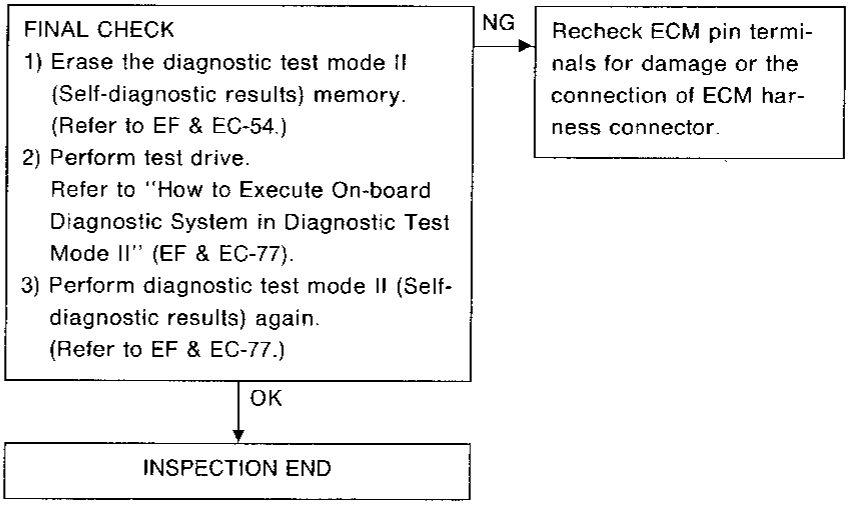
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

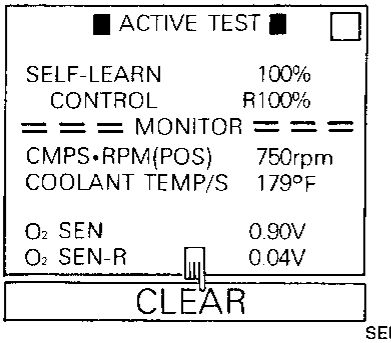
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

THROTTLE POSITION SENSOR (Diagnostic trouble code No. 43) (Malfunction indicator lamp item)

Perform FINAL CHECK by the following procedure after repair is completed.

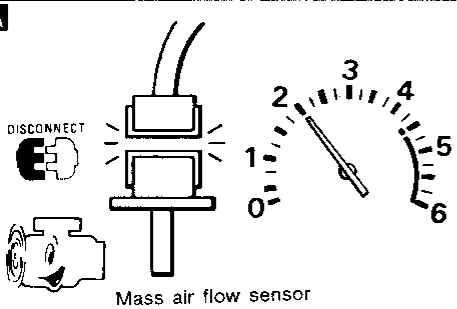


A



SEF627N

A



Mass air flow sensor

MEF463C

Diagnostic Procedure 13

INJECTOR LEAK (Diagnostic trouble code No. 45)

(Malfunction indicator lamp item)

INSPECTION START

A

Clear the self-learning data
1) Start engine and warm it up sufficiently.
2) Select "SELF-LEARN CONT" in "ACTIVE TEST" mode with CONSULT.
3) Clear the self-learning control coefficient by touching "CLEAR".

OR

2) Disconnect mass air flow sensor connector, and restart and run engine for at least 30 seconds at 2,000 rpm.
3) Stop engine and reconnect mass air flow sensor connector.
4) Make sure diagnostic trouble code No. 12 is displayed in Diagnostic Test Mode II.
5) Erase the diagnostic test mode II (Self-diagnostic results) memory. Make sure diagnostic trouble code No. 55 is displayed in Diagnostic Test Mode II.

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-78.

OK → INSPECTION END

NG

Remove injector assembly. (See page EF & EC-224.) Keep fuel hose and all injectors connected to injector gallery.

Turn ignition switch "ON". Make sure fuel does not drip from injector.

Drips → Replace the injectors from which fuel is dripping.

Does not drip

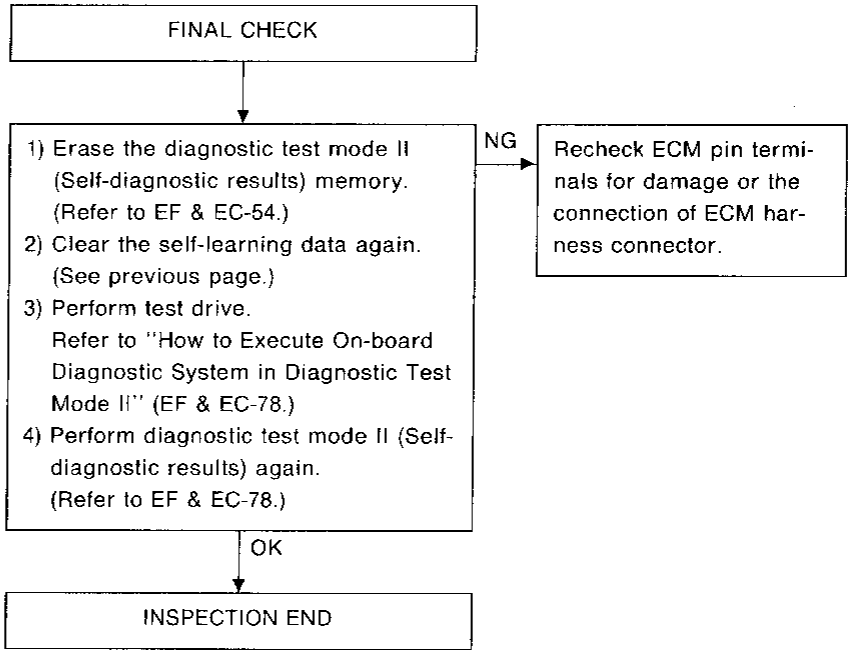
Disconnect and reconnect harness connectors in the injector circuit. Then retest.

Trouble is not fixed.

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

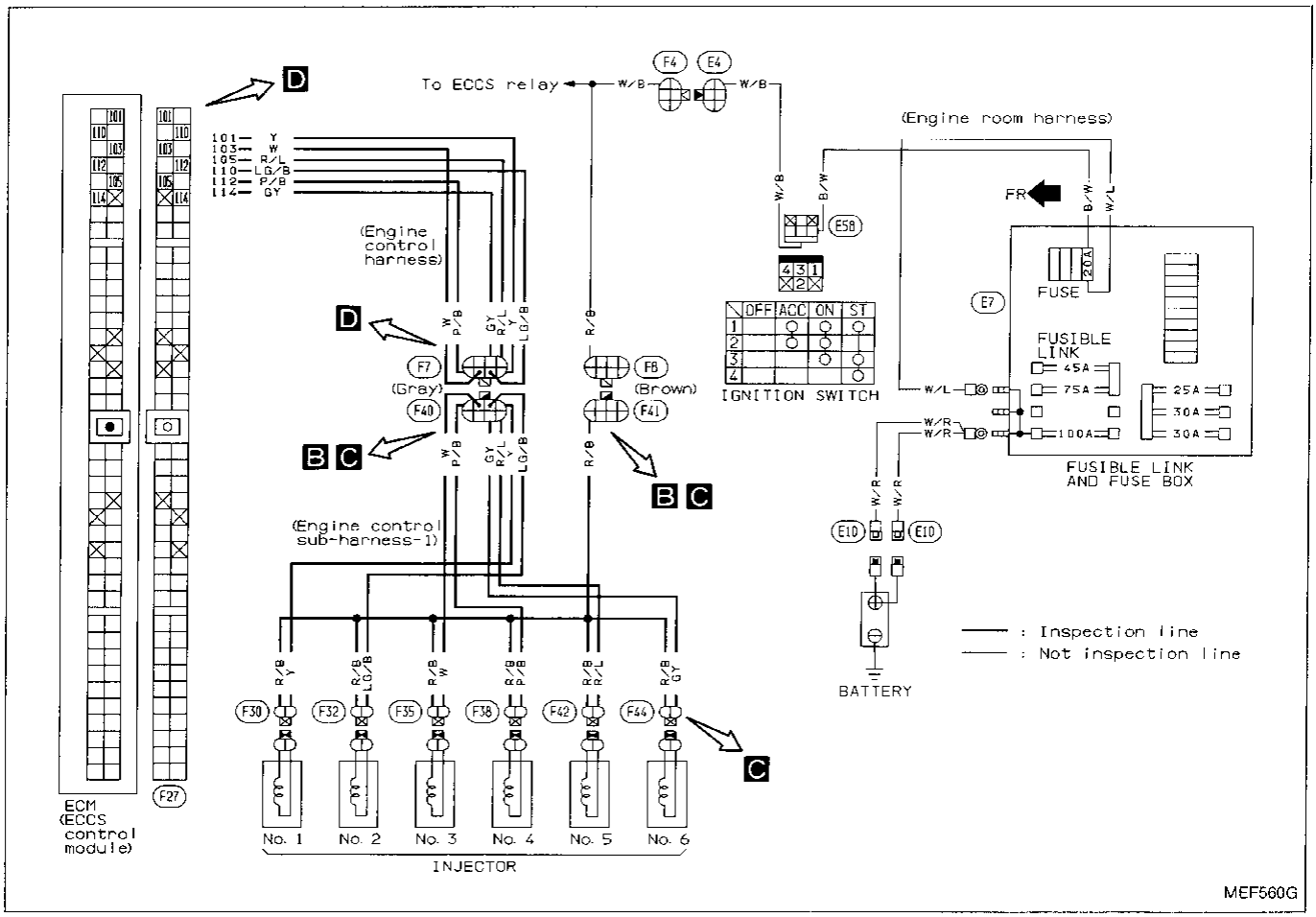
INJECTOR LEAK (Diagnostic trouble code No. 45)
(CHECK) (Malfunction indicator lamp item)

Perform FINAL CHECK by the following procedure after repair is completed.

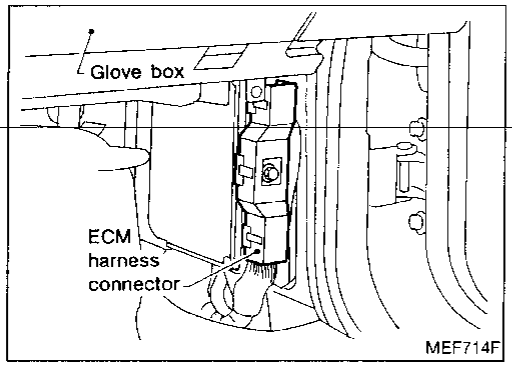


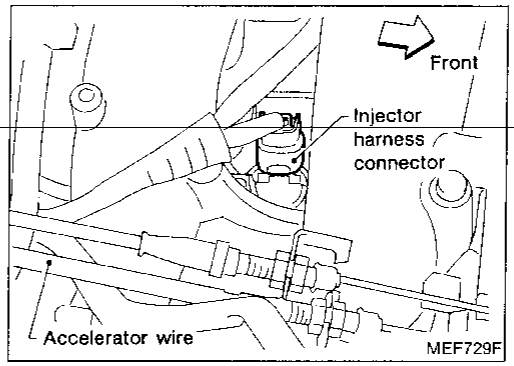
Diagnostic Procedure 14

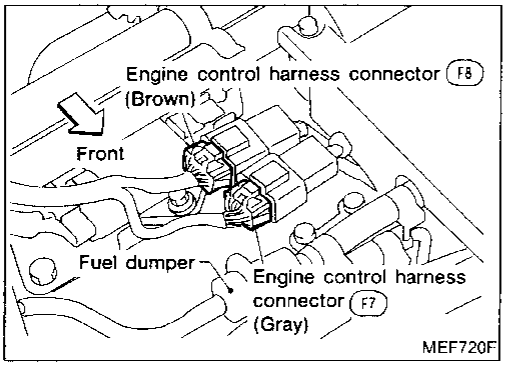
INJECTOR (Diagnostic trouble code No. 51) CHECK (Malfunction indicator lamp item)



Harness layout

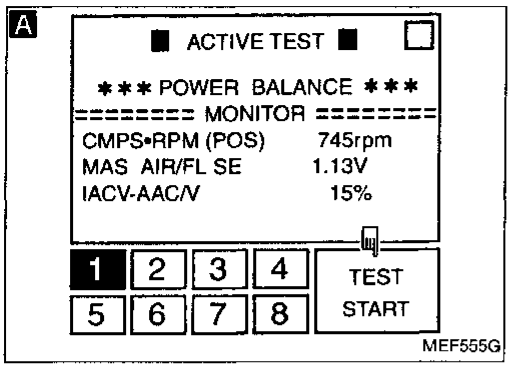






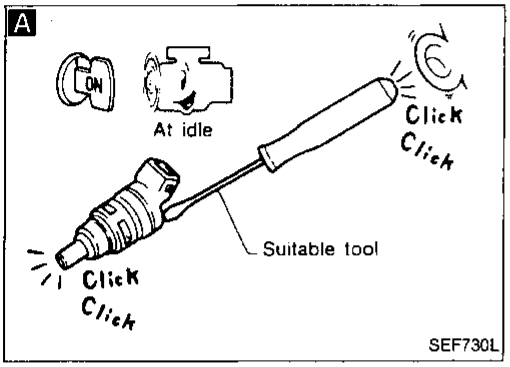
INJECTOR (Diagnostic trouble code No. 51) (Malfunction indicator lamp item)

A



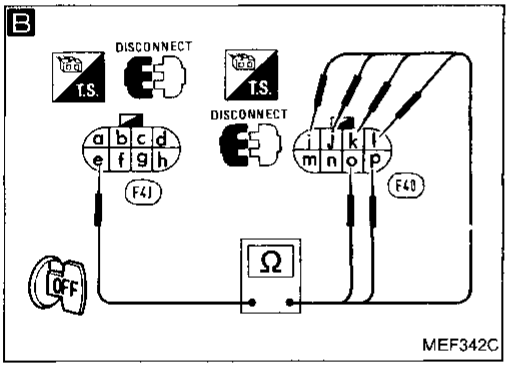
MEF555G

A



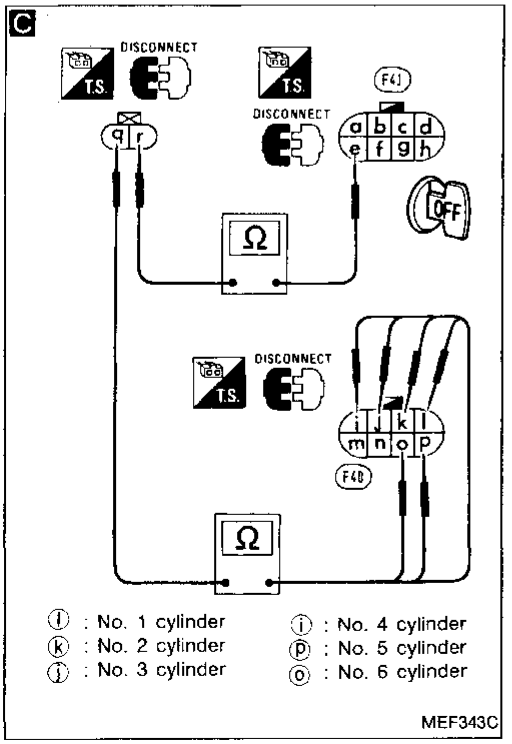
SEF730L

B



MEF342C

C



ⓘ : No. 1 cylinder
ⓚ : No. 2 cylinder
ⓙ : No. 3 cylinder
ⓗ : No. 4 cylinder
ⓟ : No. 5 cylinder
ⓞ : No. 6 cylinder

MEF343C

INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
See page EF & EC-79.

OK → INSPECTION END

If engine speed does not exceed the idle speed or engine idle is unstable.

Go to "INJECTOR (Not self-diagnostic item)".

NG

A

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.

OR

1) Search for circuit which does not produce injector operating sound at idle.

B

CHECK CIRCUIT CONTINUITY-I.

1) Turn ignition switch "OFF".
2) Disconnect engine control sub-harness-I connectors (F40), (F41).
3) Check harness continuity between terminal ⓔ and terminals ⓘ, ⓗ, ⓚ, ⓛ, ⓞ, ⓟ.

Continuity should exist.

NG → C

C

CHECK CIRCUIT CONTINUITY-II.

1) Disconnect injector harness connectors.
2) Check harness continuity between terminal ⓔ and terminal ⓡ, terminal ⓠ and terminals ⓘ, ⓗ, ⓚ, ⓛ, ⓞ, ⓟ.

Continuity should exist.

If NG, repair harness or connectors.

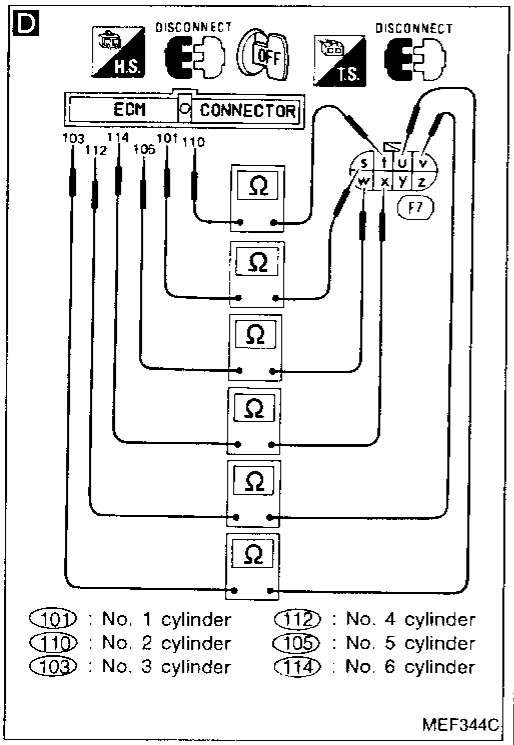
OK

CHECK COMPONENT (Injector).
Refer to "Electrical Components Inspection".
(See page EF & EC-221.)
If NG, replace injector.

OK

Ⓐ

INJECTOR (Diagnostic trouble code No. 51) (Malfunction indicator lamp item)



Ⓐ

D

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between
ECM terminal (101) and terminal (S),
ECM terminal (103) and terminal (U),
ECM terminal (105) and terminal (W),
ECM terminal (110) and terminal (T),
ECM terminal (112) and terminal (V),
ECM terminal (114) and terminal (X).
Continuity should exist.

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 or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Perform FINAL CHECK by the following procedure after repair is completed.

FINAL CHECK
1) Erase the diagnostic test mode II (Self-diagnostic results) memory. (Refer to EF & EC-54.)
2) Perform test drive.
Refer to "How to Execute On-board Diagnostic System in Diagnostic Test Mode II" (EF & EC-79).
3) Perform diagnostic test mode II (Self-diagnostic results) again. (Refer to EF & EC-79.)

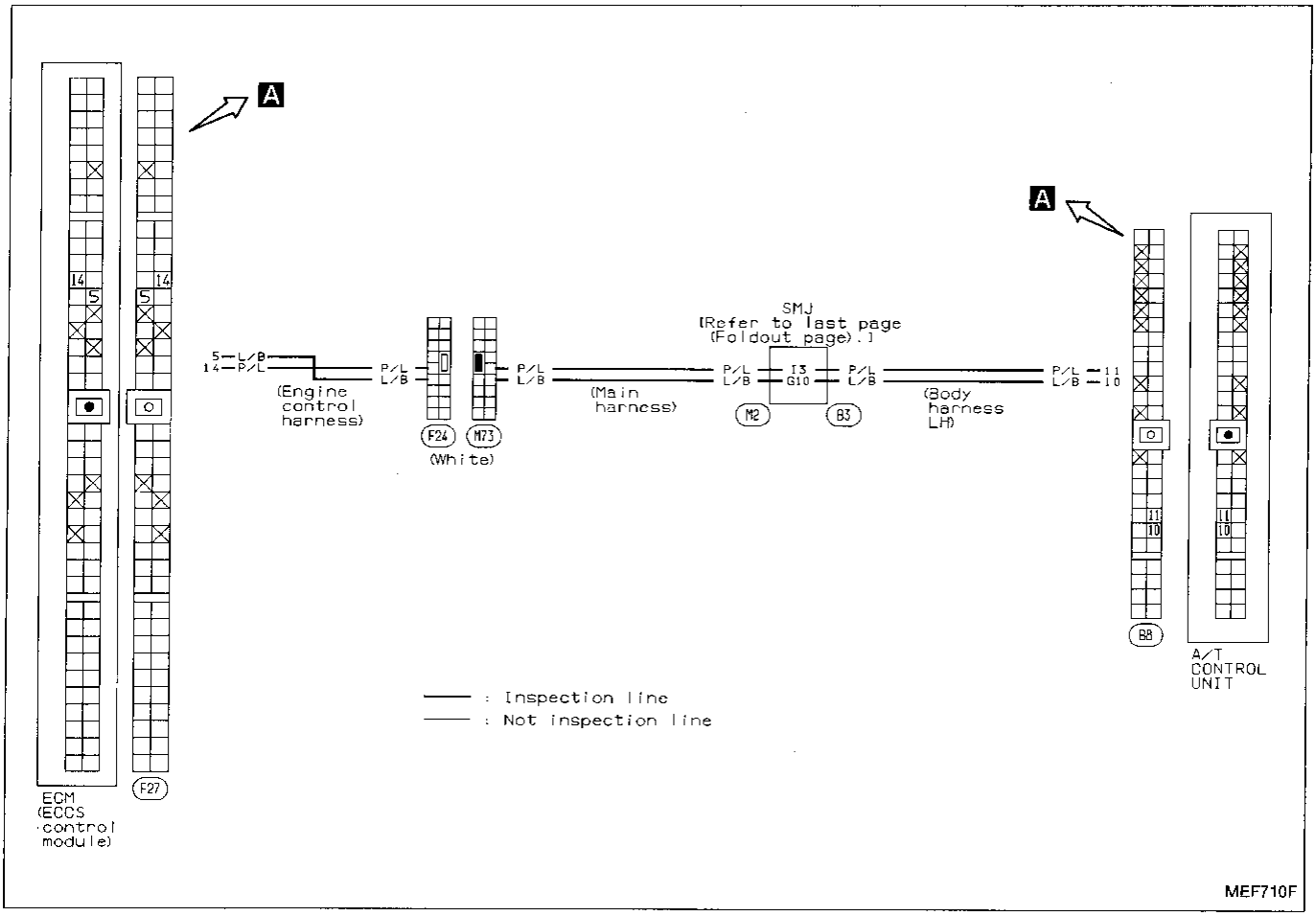
NG → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

OK ↓

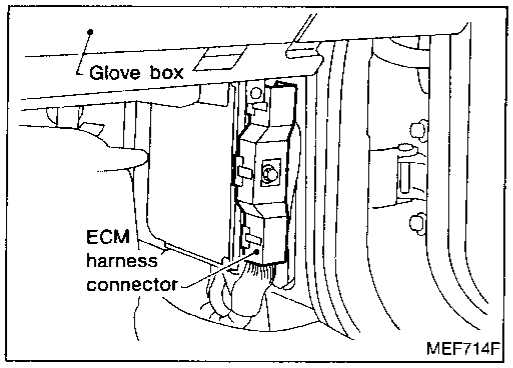
INSPECTION END

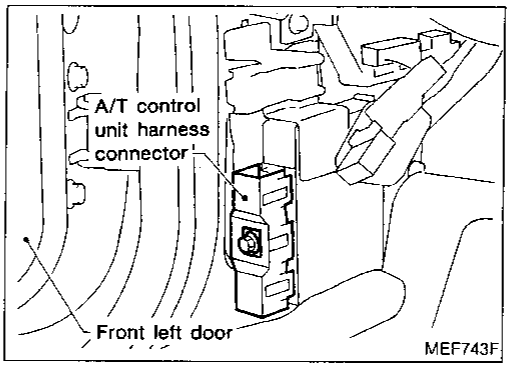
Diagnostic Procedure 15

A/T CONTROL (Diagnostic trouble code No. 54)

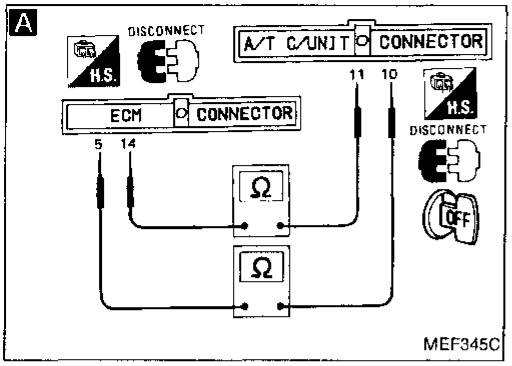


Harness layout





A/T CONTROL (Diagnostic trouble code No. 54)



INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-79.

OK → INSPECTION END

NG

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 ⑤ and terminal ⑩, ECM terminal ⑭ and terminal ⑪.
Continuity should exist.

NG → Check the following.
- Harness connectors (F24), (M73)
- Harness connectors (M2), (B3)
- Harness continuity between ECM and A/T control unit

If NG, repair harness or connectors.

OK

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

Trouble is not fixed.

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

Perform FINAL CHECK by the following procedure after repair is completed.

FINAL CHECK
1) Erase the diagnostic test mode II (Self-diagnostic results) memory. (Refer to EF & EC-54.)
2) Perform test drive.
Refer to "How to Execute On-board Diagnostic System in Diagnostic Test Mode II" (EF & EC-79).
3) Perform diagnostic test mode II (Self-diagnostic results) again. (Refer to EF & EC-79.)

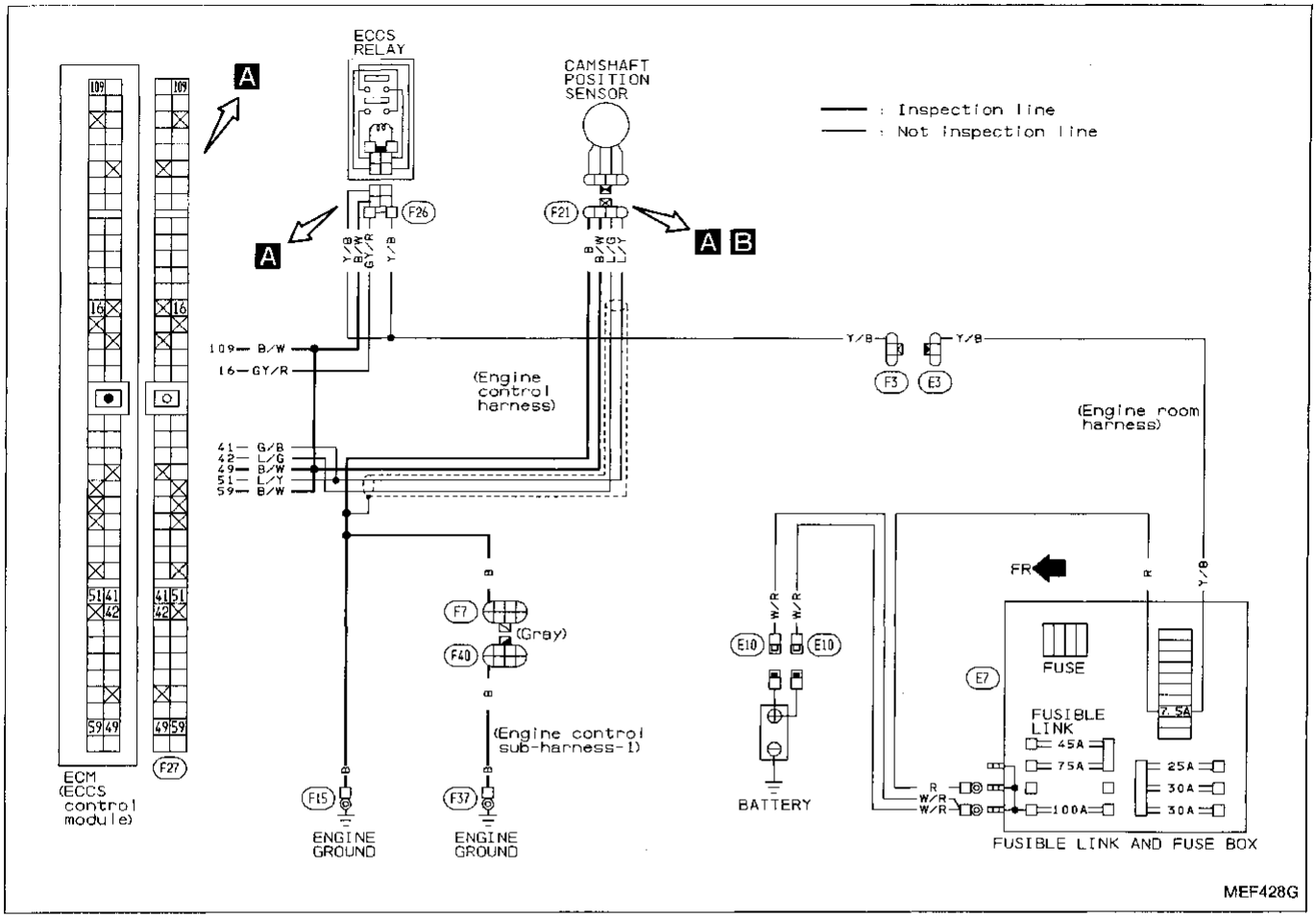
NG → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

OK

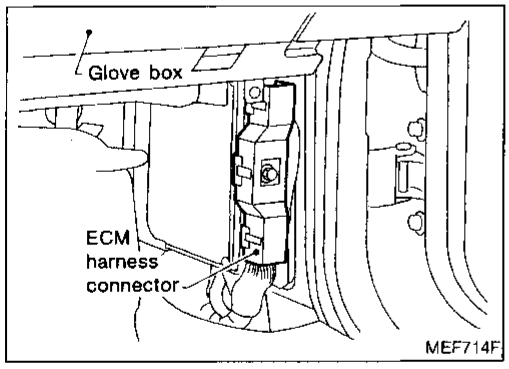
INSPECTION END

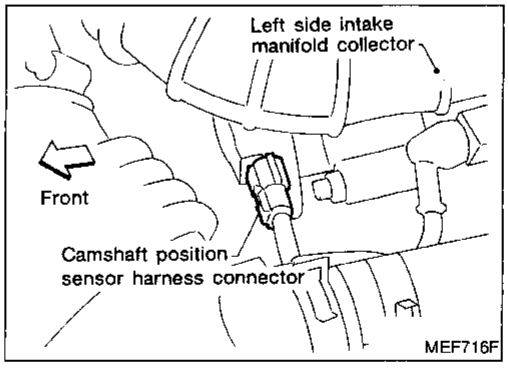
Diagnostic Procedure 16

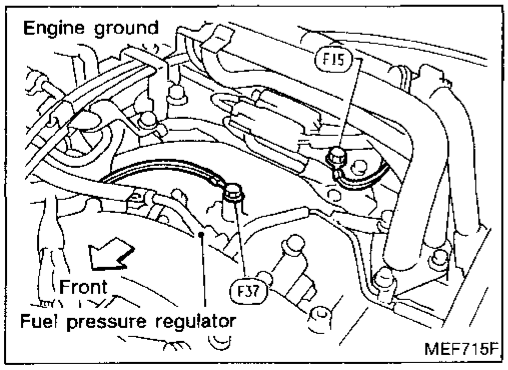
CAMSHAFT POSITION SENSOR (Not self-diagnostic item)



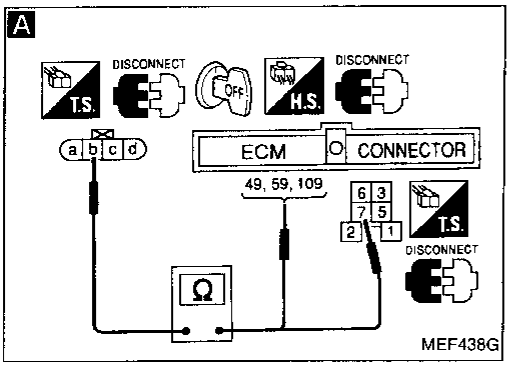
Harness layout

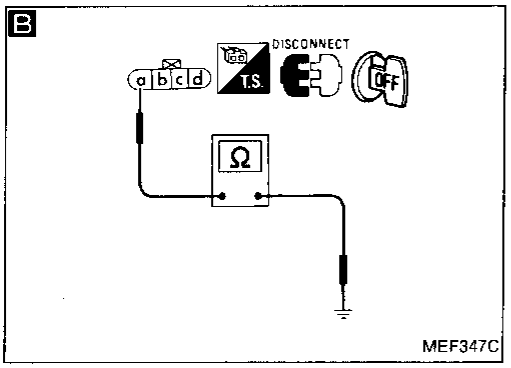






CAMSHAFT POSITION SENSOR (Not self-diagnostic item)





INSPECTION START

A

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect camshaft position sensor harness connector.
3) Disconnect ECM harness connector and ECCS relay.
4) Check harness continuity between terminal ⓑ and terminal ⑦, ECM terminals ㊾, ㊾, (109).
Continuity should exist.

NG → Repair harness or connectors.

OK

B

CHECK GROUND CIRCUIT.
1) Loosen and retighten ground screws.
2) Check harness continuity between terminal ⓐ and engine ground.
Continuity should exist.

NG → Check the following.
- Harness connectors (F7), (F40)
- Harness continuity between camshaft position sensor and engine ground

If NG, repair harness or connectors.

OK

CHECK COMPONENT
(Camshaft position sensor).
Refer to "Electrical Components Inspection". (See page EF & EC-216.)

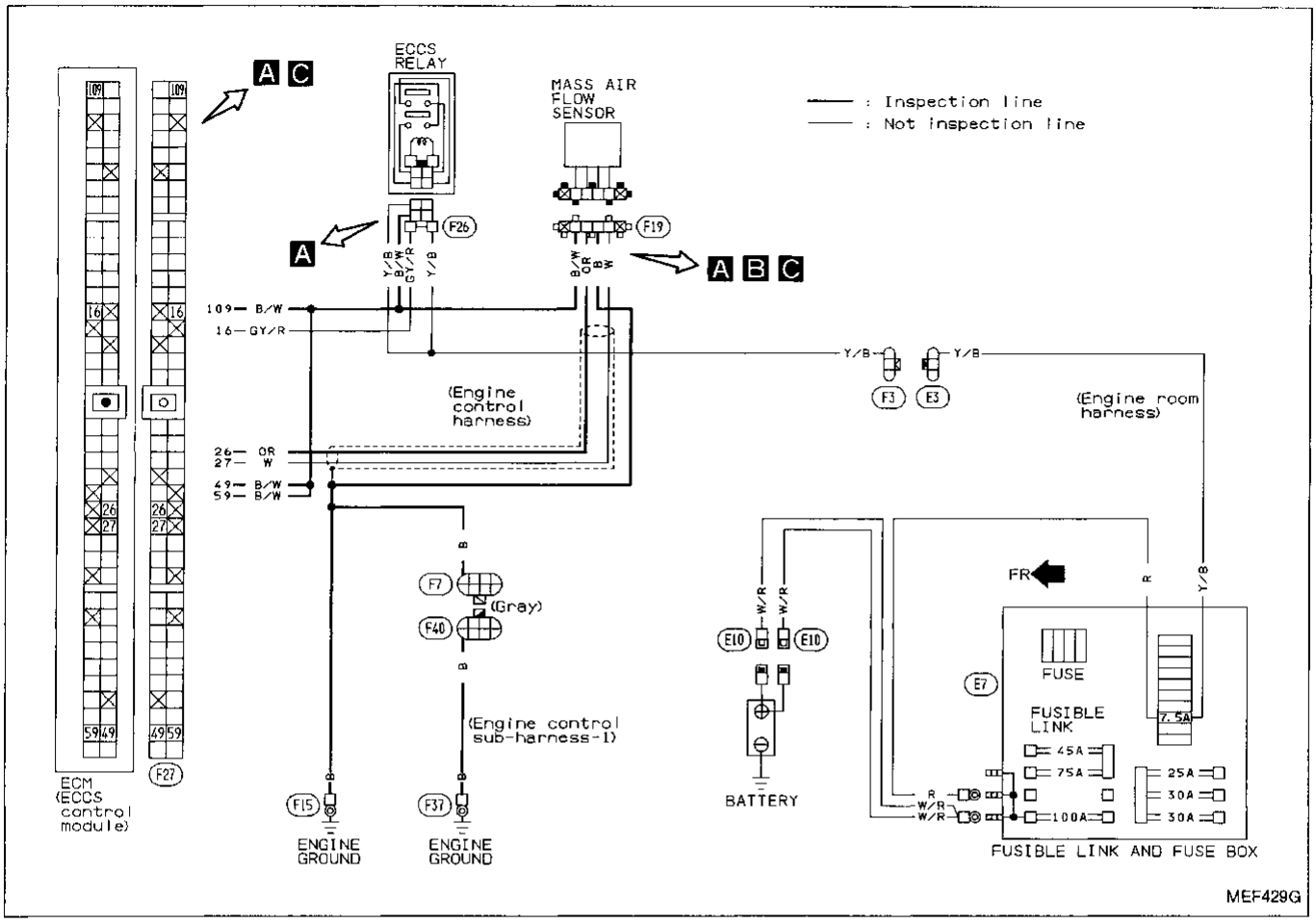
NG → Replace camshaft position sensor.

OK

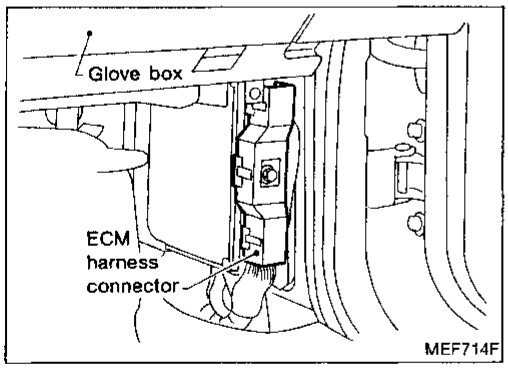
INSPECTION END

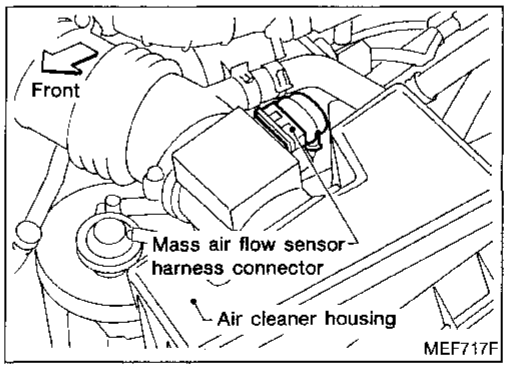
Diagnostic Procedure 17

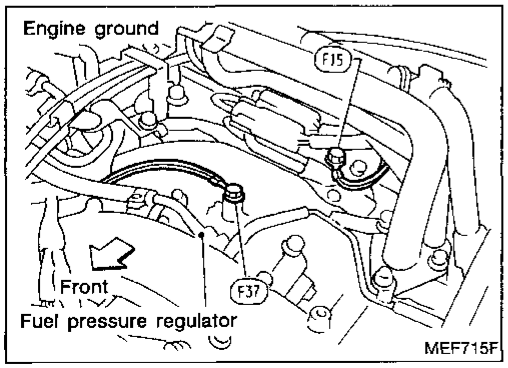
MASS AIR FLOW SENSOR (Not self-diagnostic item)



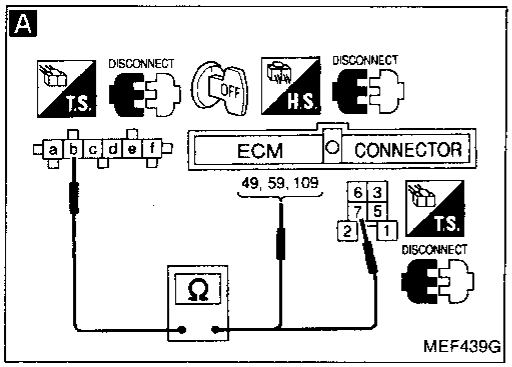
Harness layout

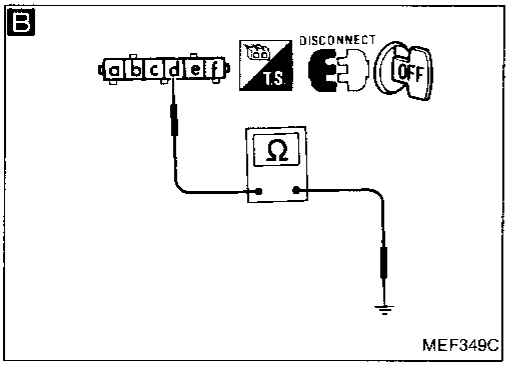


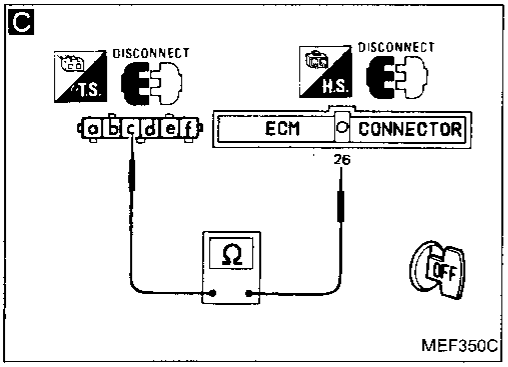




MASS AIR FLOW SENSOR (Not self-diagnostic item)







INSPECTION START

A

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect mass air flow sensor harness connector.
3) Disconnect ECM harness connector and ECCS relay.
4) Check harness continuity between terminal ⓑ and terminal ⑦, ECM terminals ㊾, ㊾, (109).
Continuity should exist.

NG → Repair harness or connectors.

OK

B

CHECK GROUND CIRCUIT.
1) Loosen and retighten ground screws.
2) Check harness continuity between terminal ⓓ and engine ground.
Continuity should exist.

NG → Check the following.
- Harness connectors (F7), (F40)
- Harness continuity between mass air flow sensor and engine ground

If NG, repair harness or connectors.

OK

C

CHECK INPUT SIGNAL CIRCUIT.
1) Check harness continuity between terminal ⓒ and ECM terminal ㉖.
Continuity should exist.

NG → Repair harness or connectors.

OK

CHECK COMPONENT
(Mass air flow sensor).
Refer to "Electrical Components Inspection". (See page EF & EC-216.)

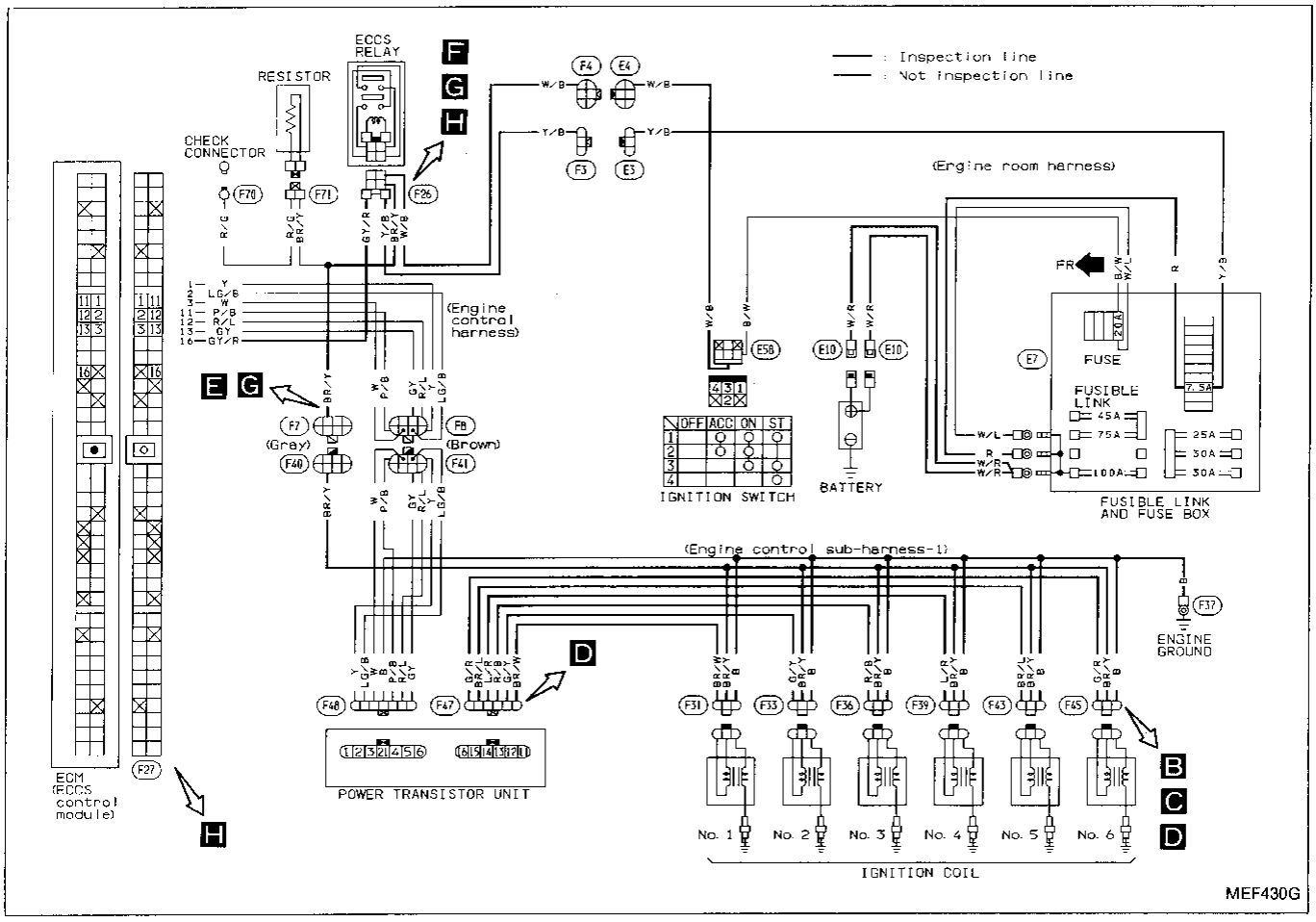
NG → Replace mass air flow sensor.

OK

INSPECTION END

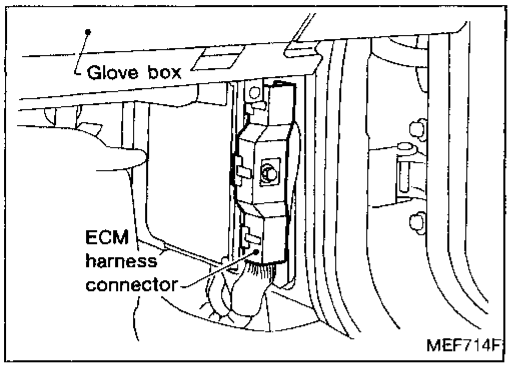
Diagnostic Procedure 18

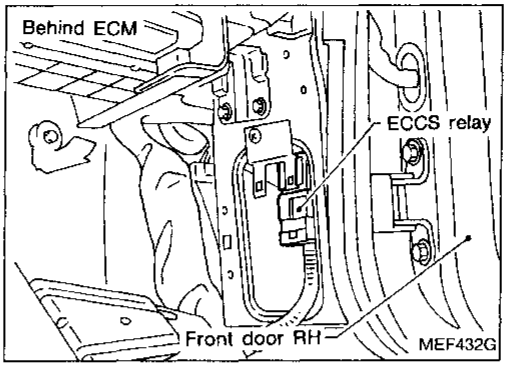
IGNITION SIGNAL (Not self-diagnostic item)

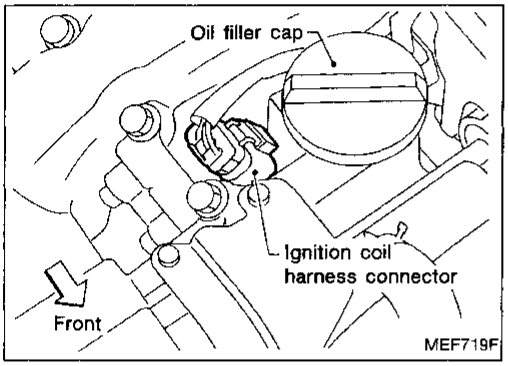


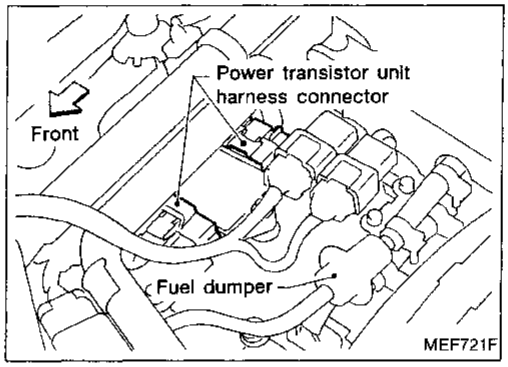
IGNITION SIGNAL (Not self-diagnostic item)

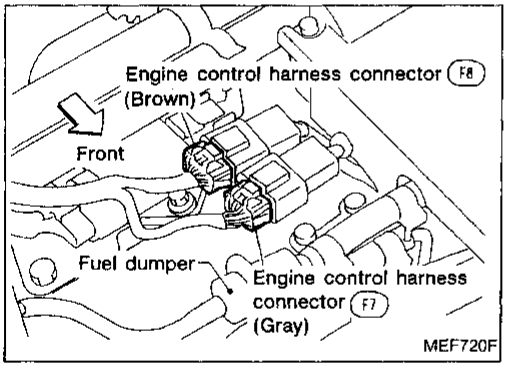
Harness layout





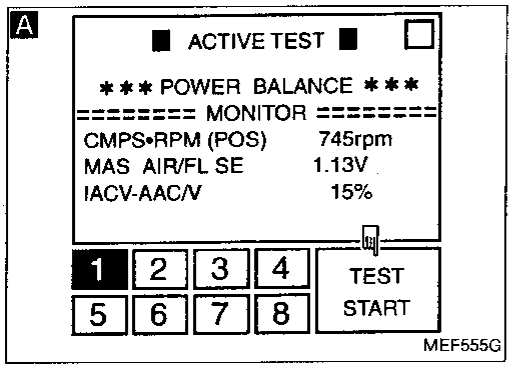




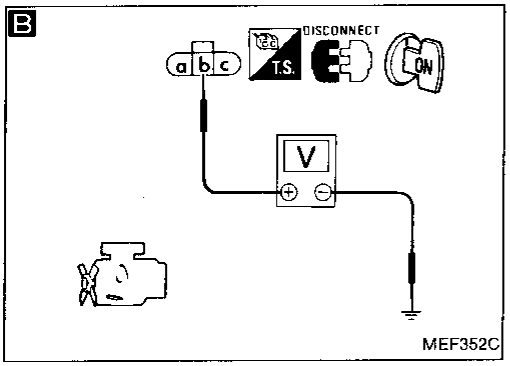


IGNITION SIGNAL (Not self-diagnostic item-I)

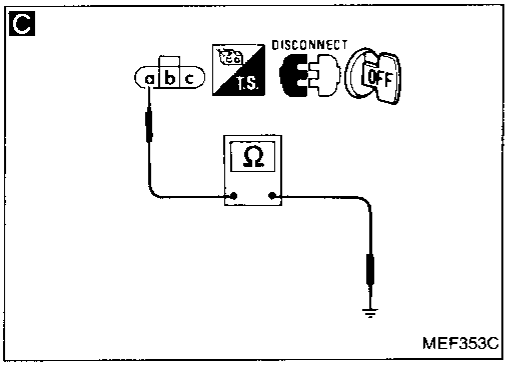
A



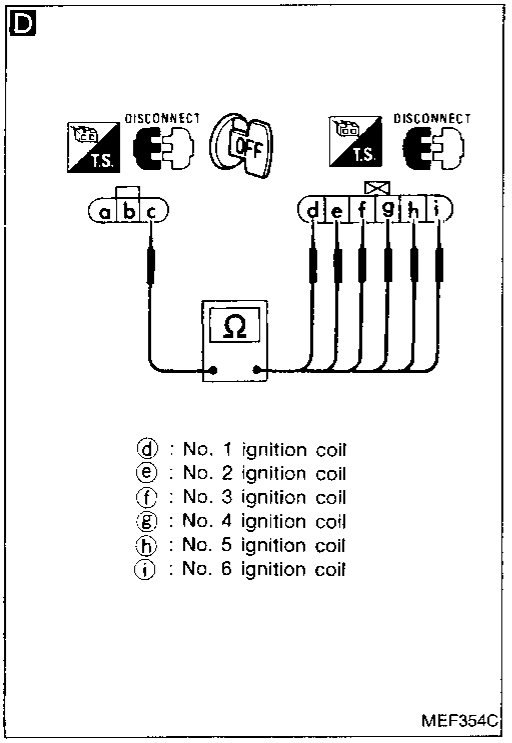
B



C



D



ⓓ : No. 1 ignition coil
ⓔ : No. 2 ignition coil
ⓕ : No. 3 ignition coil
ⓖ : No. 4 ignition coil
ⓗ : No. 5 ignition coil
ⓘ : No. 6 ignition coil

INSPECTION START

CHECK OVERALL FUNCTION.
1) Turn ignition switch to "START".
Is any cylinder ignited?

No → Go to "IGNITION SIGNAL (Not self-diagnostic item-II)".

Yes

A

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.

B

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

NG → Check the following.
- Harness continuity between ignition coil and sub-harness-1 connector (F40)

If NG, repair harness or connectors.

OK

C

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminal ⓐ and engine ground.
Continuity should exist.

NG → Repair harness or connectors.

OK

D

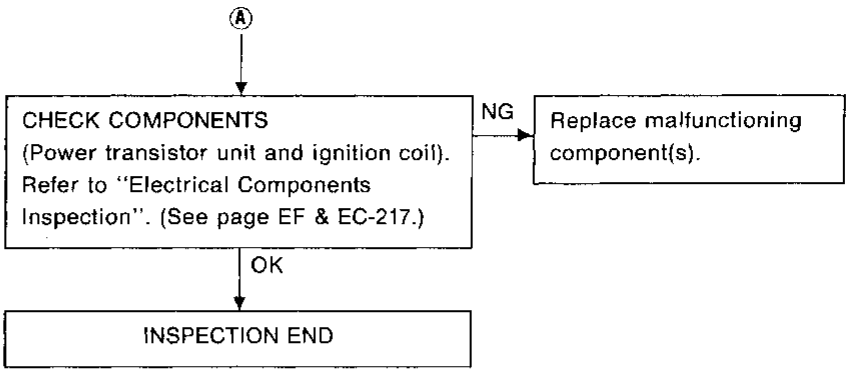
CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect power transistor unit harness connector.
2) Check harness continuity between terminal ⓒ and terminals ⓓ, ⓔ, ⓕ, ⓖ, ⓗ, ⓘ.
Continuity should exist.

NG → Repair harness or connectors.

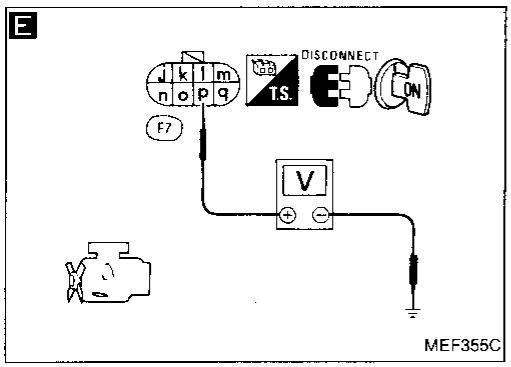
OK

Ⓐ

IGNITION SIGNAL (Not self-diagnostic item-I)



IGNITION SIGNAL (Not self-diagnostic item-II)



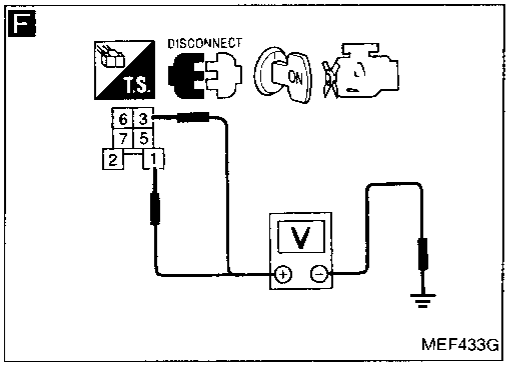
From "IGNITION SIGNAL (Not self-diagnostic item-I)".

E

CHECK OVERALL FUNCTION.
1) Turn ignition switch "OFF".
2) Disconnect engine control harness connector (F7).
3) Turn ignition switch "ON".
4) Check voltage between terminal (p) and ground with CONSULT or tester.
Voltage: Battery voltage

OK → Go to "CHECK POWER SUPPLY" in "IGNITION SIGNAL (Not self-diagnostic item-I)".

NG



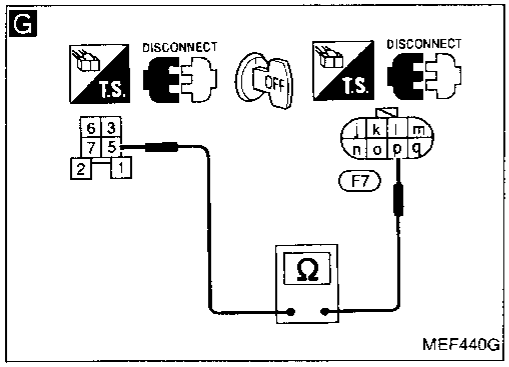
F

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

NG → Check the following.
- Harness connectors (F3), (E3)
- Harness connectors (F4), (E4)
- 7.5A fuse
- Harness continuity between ECCS relay and ignition switch
- Harness continuity between ECCS relay and battery

If NG, repair harness or connectors.

OK

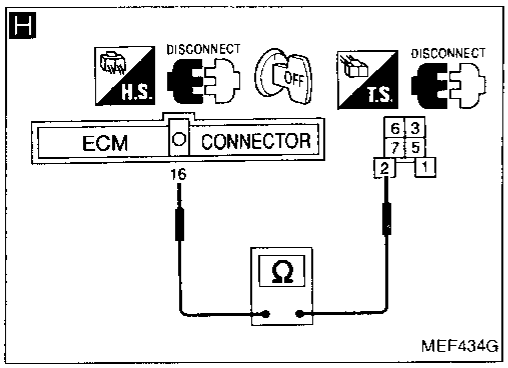


G

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminal ⑤ and terminal (p).
Continuity should exist.

NG → Repair harness or connectors.

OK



H

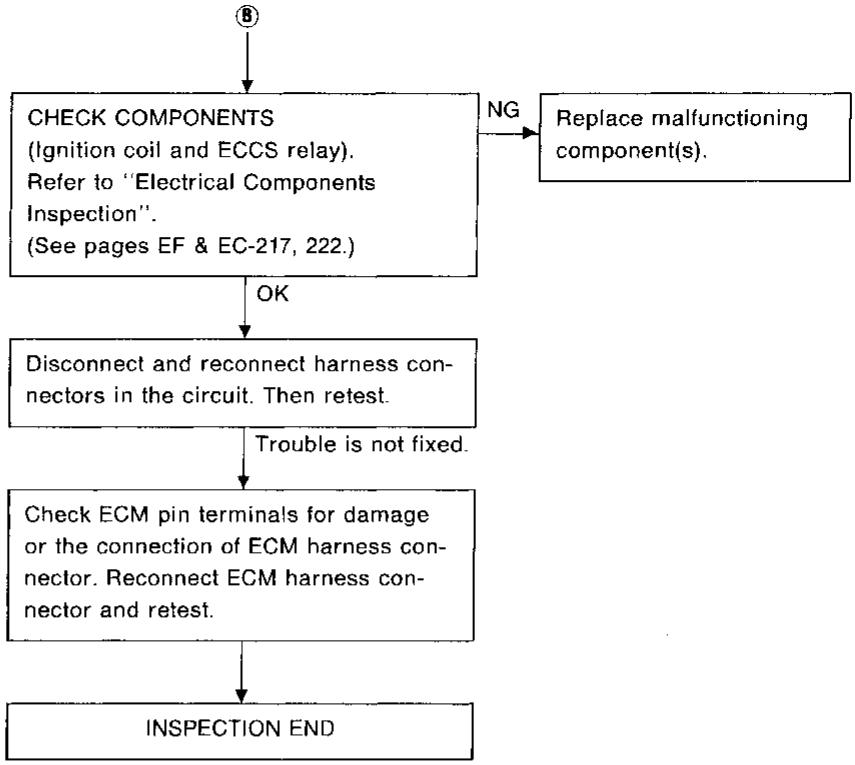
CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ⑯ and terminal ②.
Continuity should exist.

NG → Repair harness or connectors.

OK

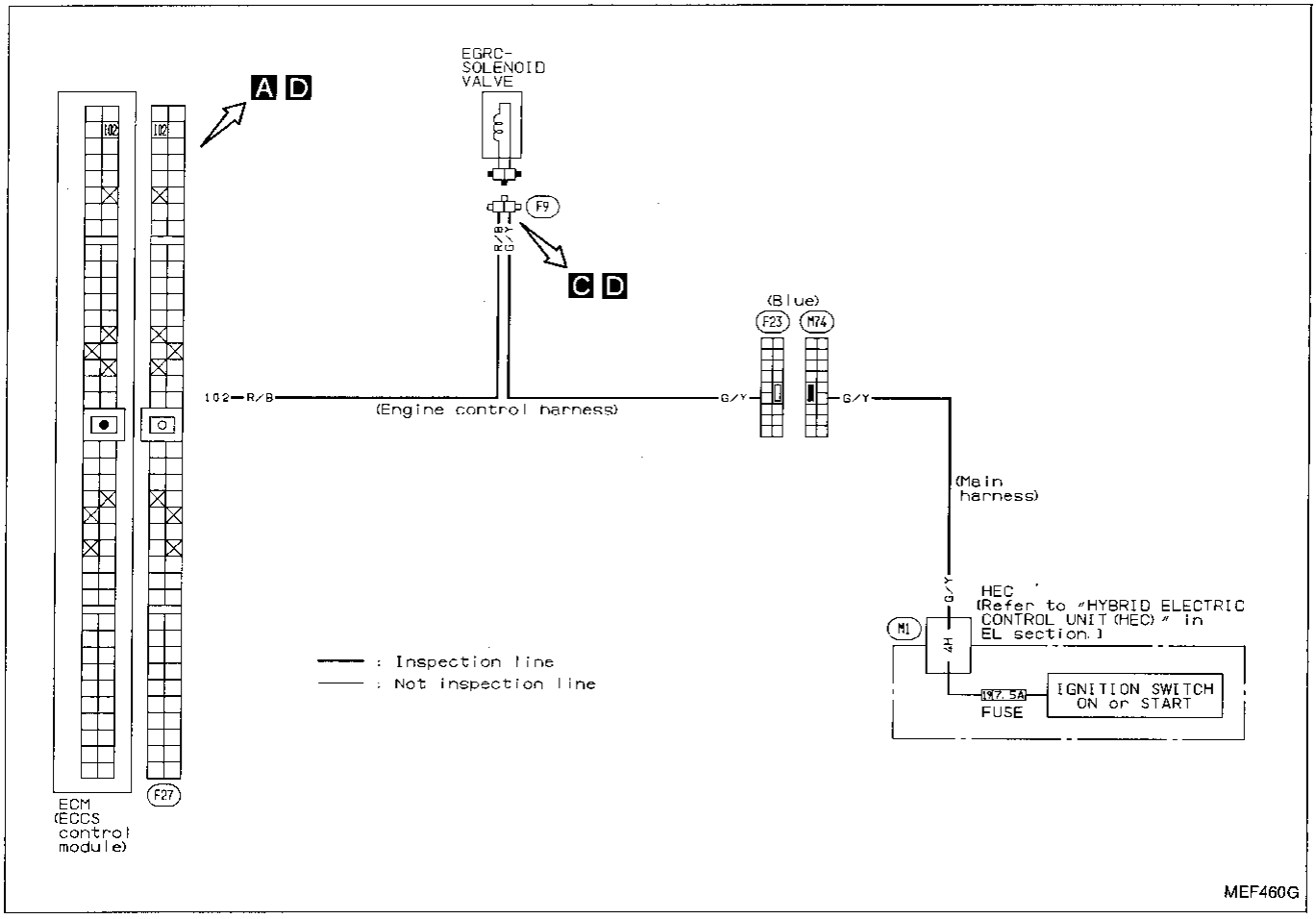
Ⓑ

IGNITION SIGNAL (Not self-diagnostic item-II)

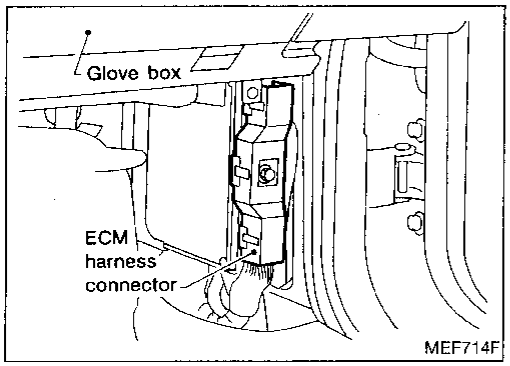


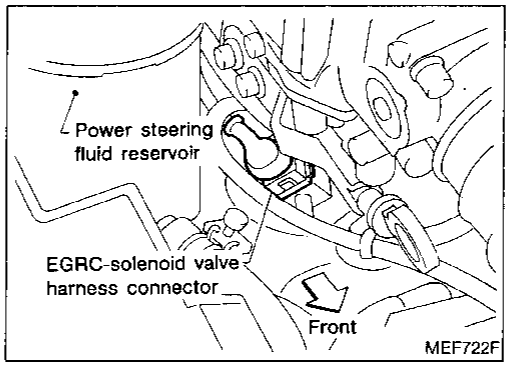
Diagnostic Procedure 19

EGR CONTROL (Not self-diagnostic item)

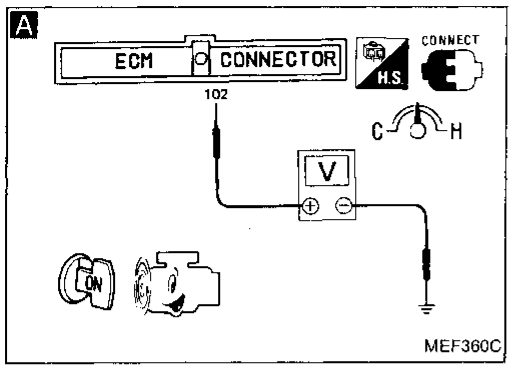


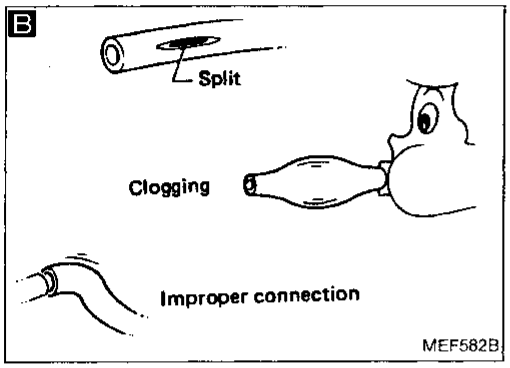
Harness layout

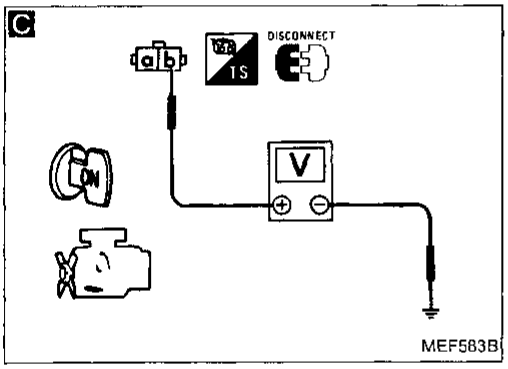


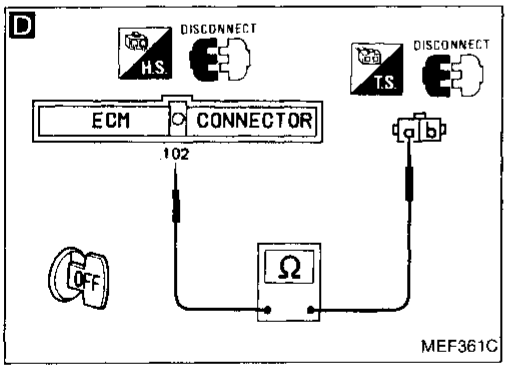


EGR CONTROL (Not self-diagnostic item)









INSPECTION START

A

CHECK CONTROL FUNCTION.
1) Check voltage between ECM terminal (102) and ground under the following conditions with CONSULT or tester.
Voltage:
At idle
Approximately 0V
Engine speed is 2,000 rpm
Battery voltage

OK → **B**: Go to "CHECK COMPONENT (EGRC-solenoid valve)".

NG ↓

C

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect EGRC-solenoid valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓑ and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F23), (M74)
- HEC harness connector (M1)
- 7.5A fuse
- Harness continuity between EGRC-solenoid valve and HEC

If NG, repair harness or connectors.

OK ↓

D

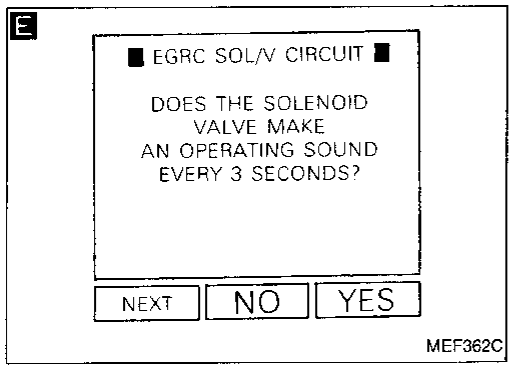
CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal (102) and terminal ⓐ.
Continuity should exist.

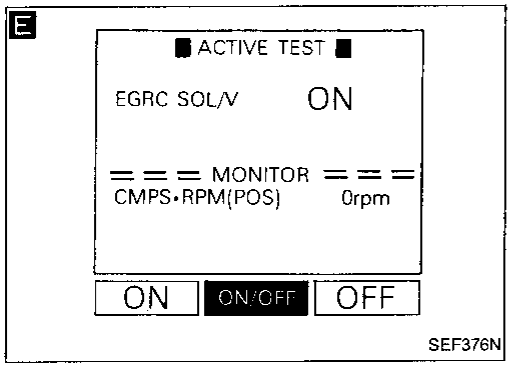
NG → Repair harness or connectors.

OK ↓

Ⓐ

EGR CONTROL (Not self-diagnostic item)





Ⓐ

E

CHECK COMPONENT (EGRC-solenoid valve).

1) Reconnect ECM harness connector and EGRC-solenoid valve harness connector.
2) Turn ignition switch "ON".
3) Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

NG → Replace EGRC-solenoid valve.

OR

3) Turn EGRC-solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.

OR

Refer to "Electrical Components Inspection". (See page EF & EC-218.)

OK

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

Trouble is not fixed.

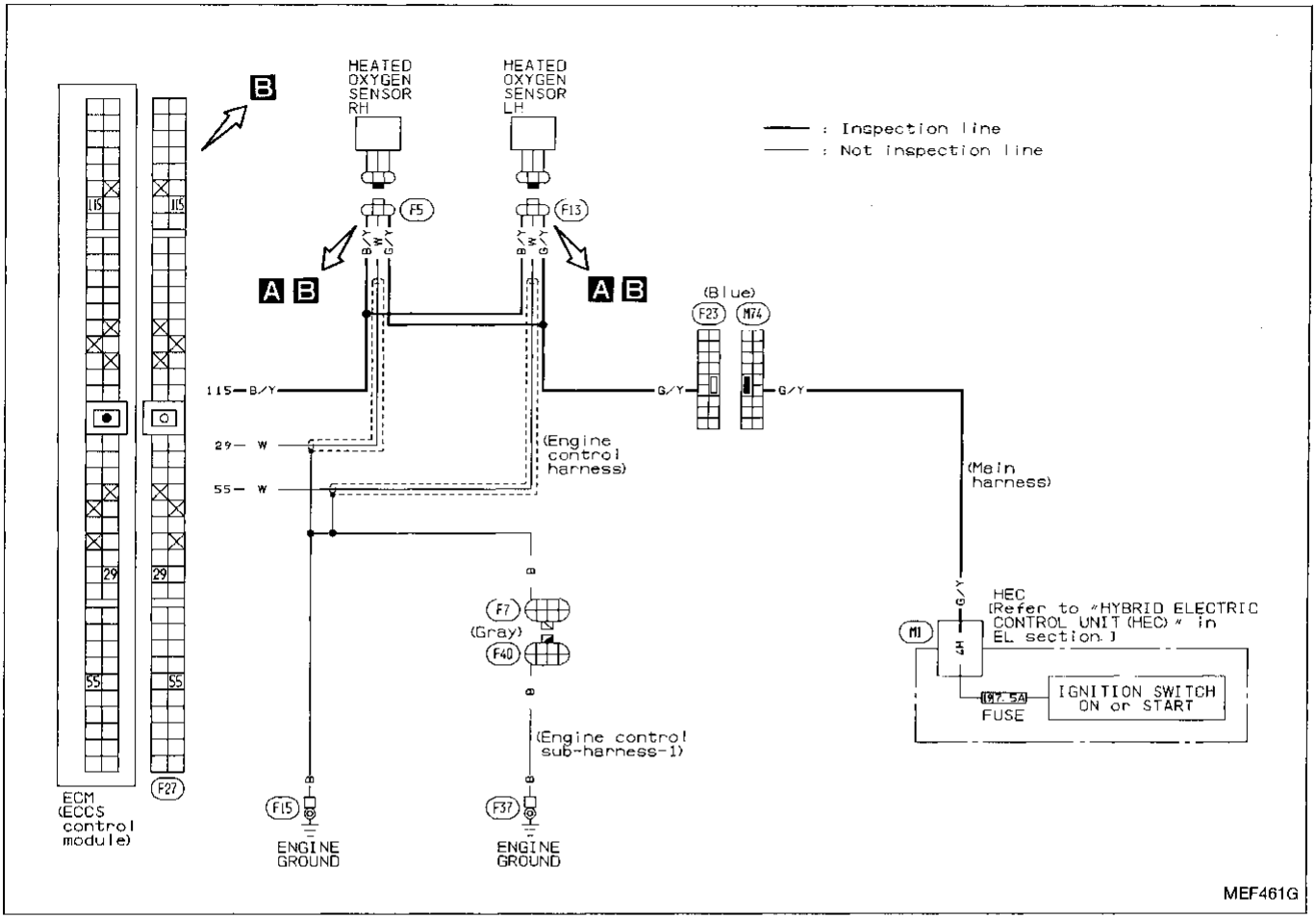
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Check resistance of EGR temperature sensor. (See page EF & EC-219.)

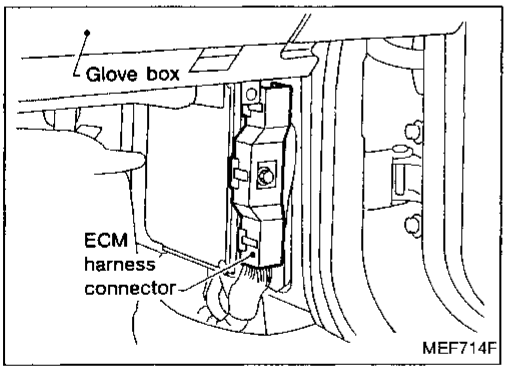
INSPECTION END

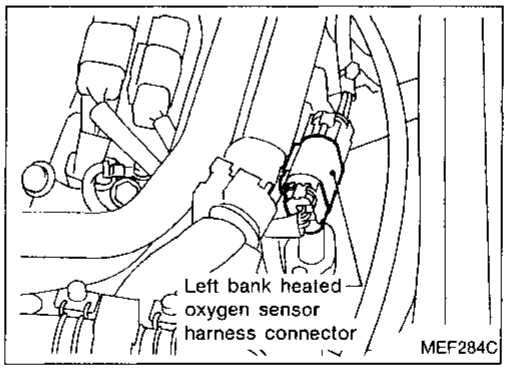
Diagnostic Procedure 20

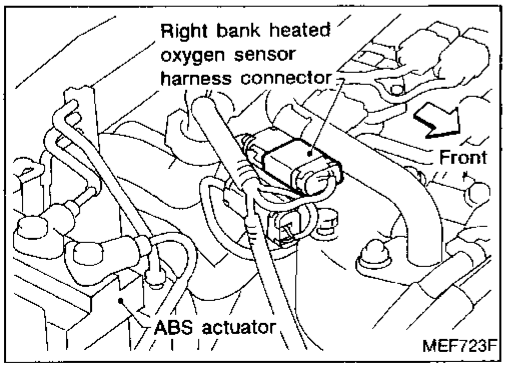
HEATED OXYGEN SENSOR HEATER LH and RH (Not self-diagnostic item)

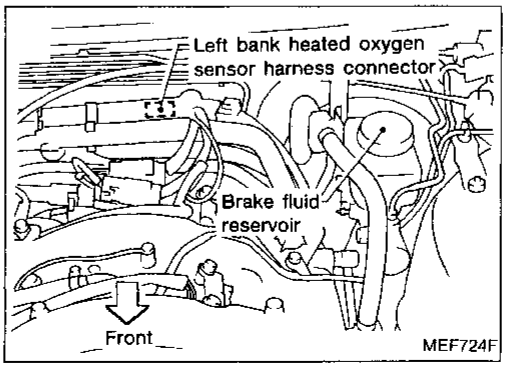


Harness layout

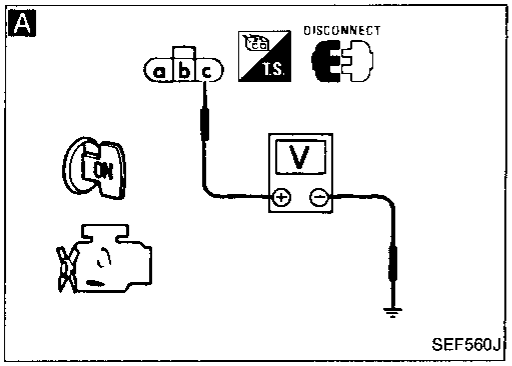


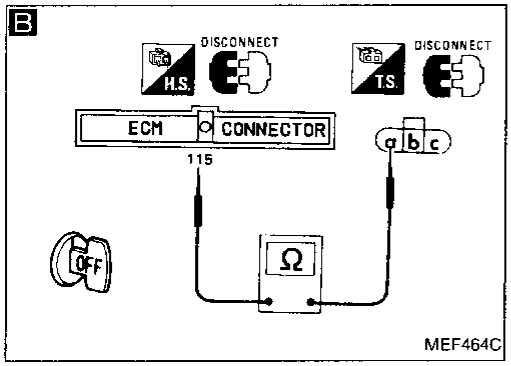






HEATED OXYGEN SENSOR HEATER LH and RH (Not self-diagnostic item)





INSPECTION START

A

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

NG → Check the following.
- Harness connectors (F23), (M74)
- HEC harness connector (M1)
- 7.5A fuse
- Harness continuity between heated oxygen sensor and HEC

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 ⓐ and ECM terminal (115).
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(Heated oxygen sensor heater).
Refer to "Electrical Components Inspection". (See page EF & EC-218.)

NG → Replace heated oxygen sensor.

OK ↓

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

Trouble is not fixed. ↓

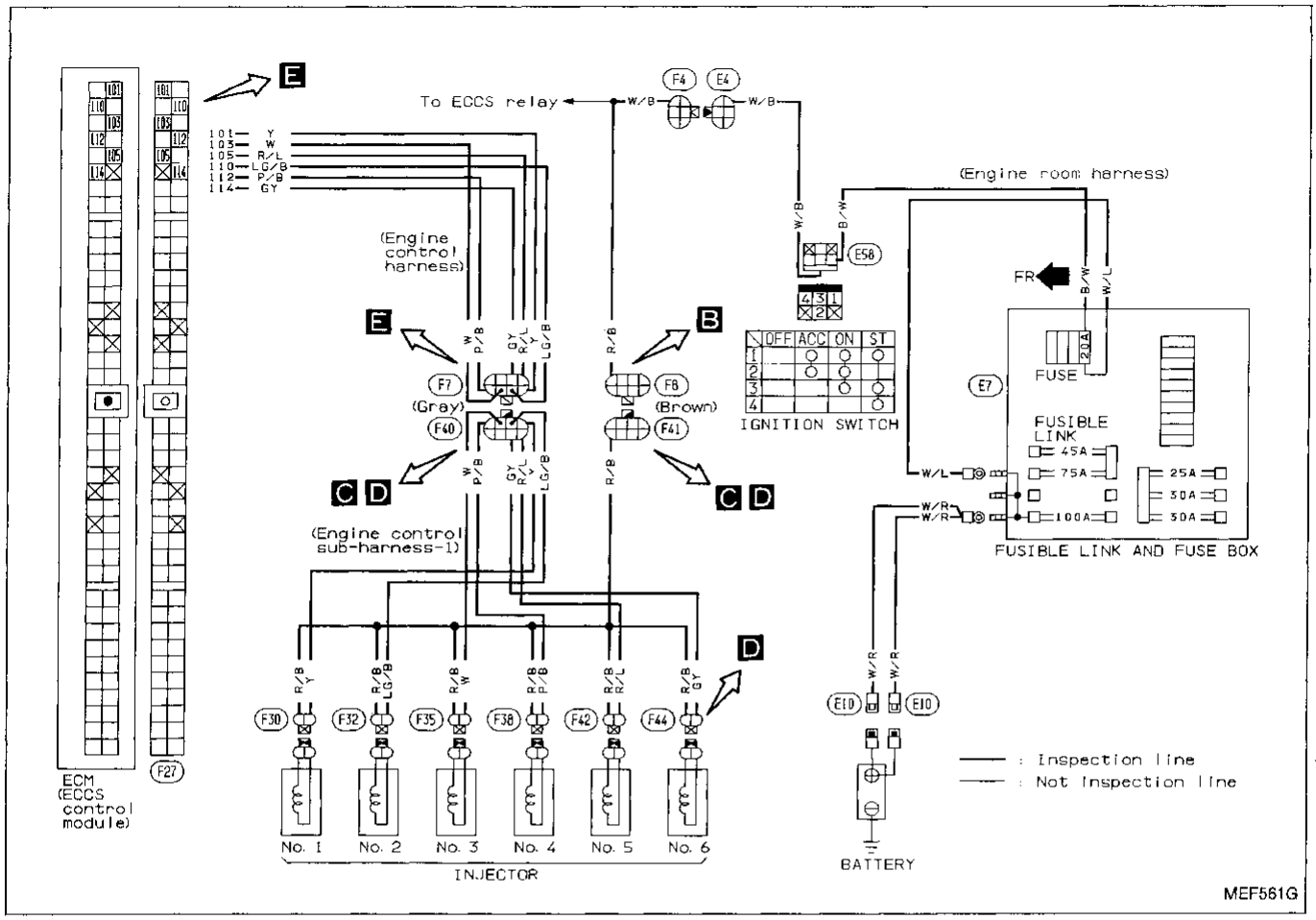
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

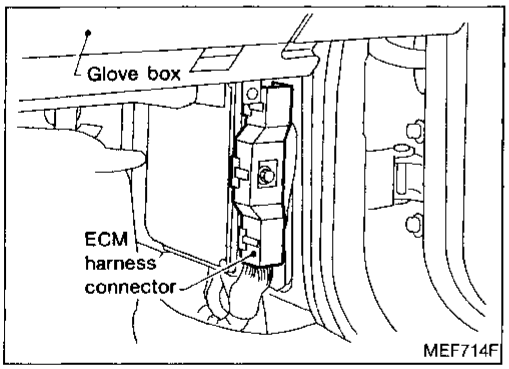
INSPECTION END

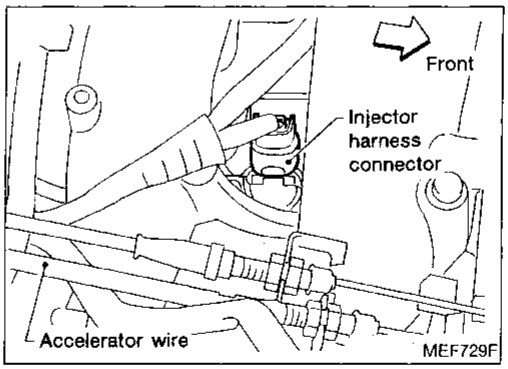
Diagnostic Procedure 21

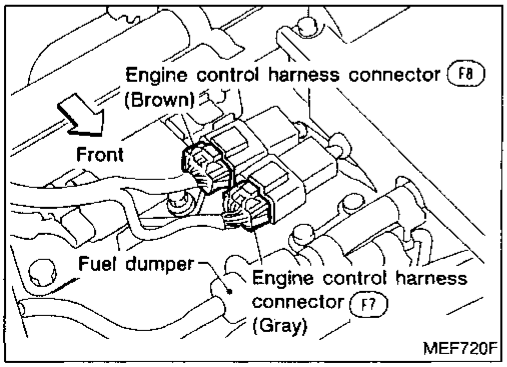
INJECTOR (Not self-diagnostic item)



Harness layout

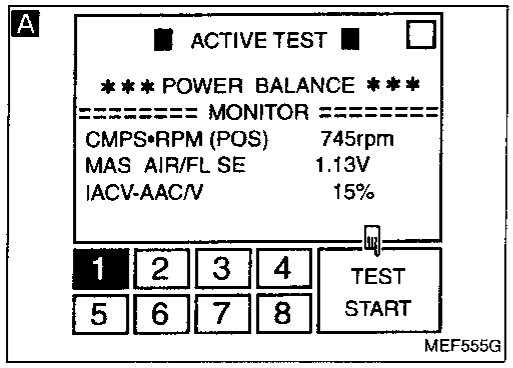






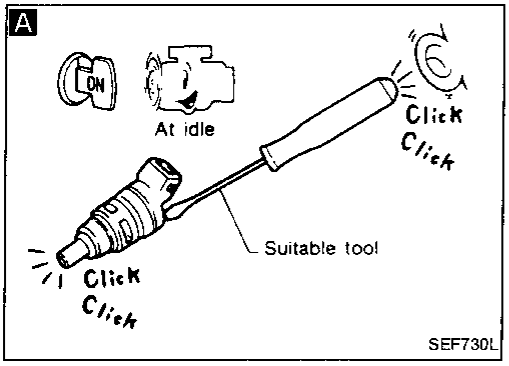
INJECTOR (Not self-diagnostic item)

A



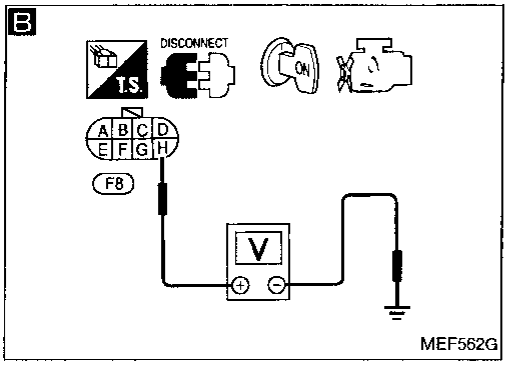
MEF555G

A



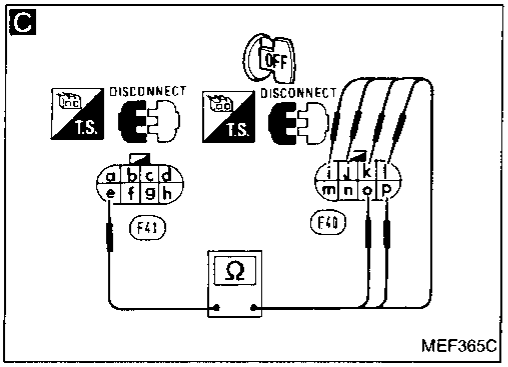
SEF730L

B



MEF562G

C



MEF365C

INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Start engine.
2) Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
3) Search for circuit which does not produce a momentary engine speed drop.

OR

2) Search for circuit which does not produce injector operating sound at idle.

OK → INSPECTION END

NG ↓

B

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect engine control harness connector (F8).
3) Turn ignition switch "ON".
4) Check voltage between terminal Ⓗ and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F4) (E4)
- Harness continuity between engine control harness connector (F8) and ignition switch

If NG, repair harness or connectors.

OK ↓

C

CHECK CIRCUIT CONTINUITY-I.
1) Turn ignition switch "OFF".
2) Disconnect engine control harness connector (F7).
3) Check harness continuity between terminal ⓔ and terminals ⓘ, ⓙ, ⓚ, ⓛ, ⓞ, ⓟ.
Continuity should exist.

NG → D

CHECK CIRCUIT CONTINUITY-II.
1) Disconnect injector harness connectors.
2) Check harness continuity between terminals ⓔ and ⓡ, and terminal ⓠ and terminals ⓘ, ⓙ, ⓚ, ⓛ, ⓞ, ⓟ.
Continuity should exist.

If NG, repair harness or connectors.

OK ↓

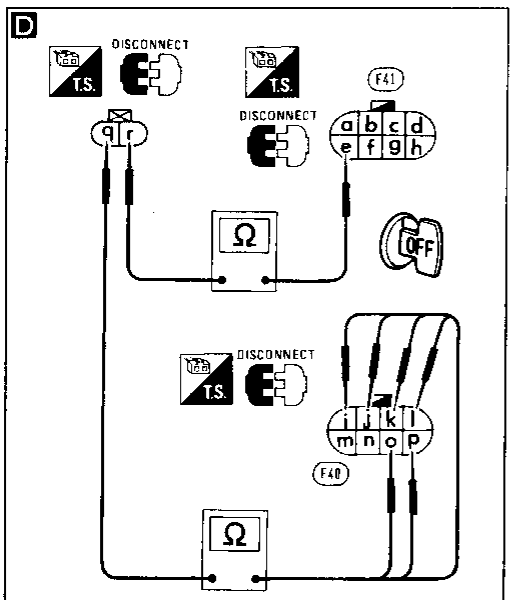
CHECK COMPONENT (Injector).
Refer to "Electrical Components Inspection".
(See page EF & EC-221.)
If NG, replace injector.

OK ↓

Ⓐ

INJECTOR (Not self-diagnostic item)

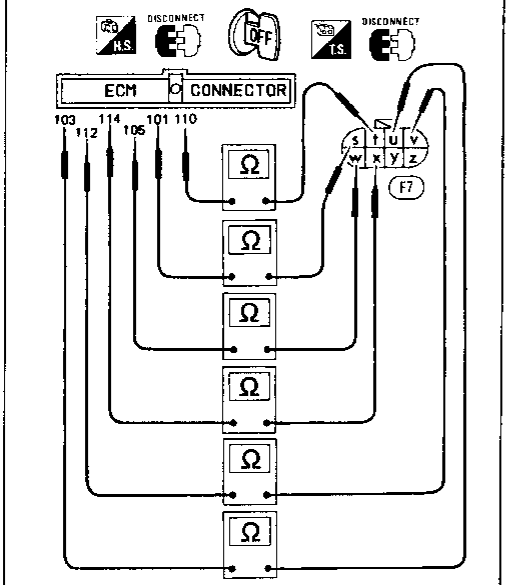
D



① : No. 1 cylinder
ⓚ : No. 2 cylinder
ⓙ : No. 3 cylinder
ⓘ : No. 4 cylinder
ⓟ : No. 5 cylinder
ⓞ : No. 6 cylinder

MEF366C

E



101 : No. 1 cylinder
110 : No. 2 cylinder
103 : No. 3 cylinder
112 : No. 4 cylinder
105 : No. 5 cylinder
114 : No. 6 cylinder

MEF367C

Ⓐ

E

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between
ECM terminal 101 and terminal ⓢ,
ECM terminal 103 and terminal ⓤ,
ECM terminal 105 and terminal ⓦ,
ECM terminal 110 and terminal ⓘ,
ECM terminal 112 and terminal ⓥ,
ECM terminal 114 and terminal ⓧ.
Continuity should exist.

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 or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

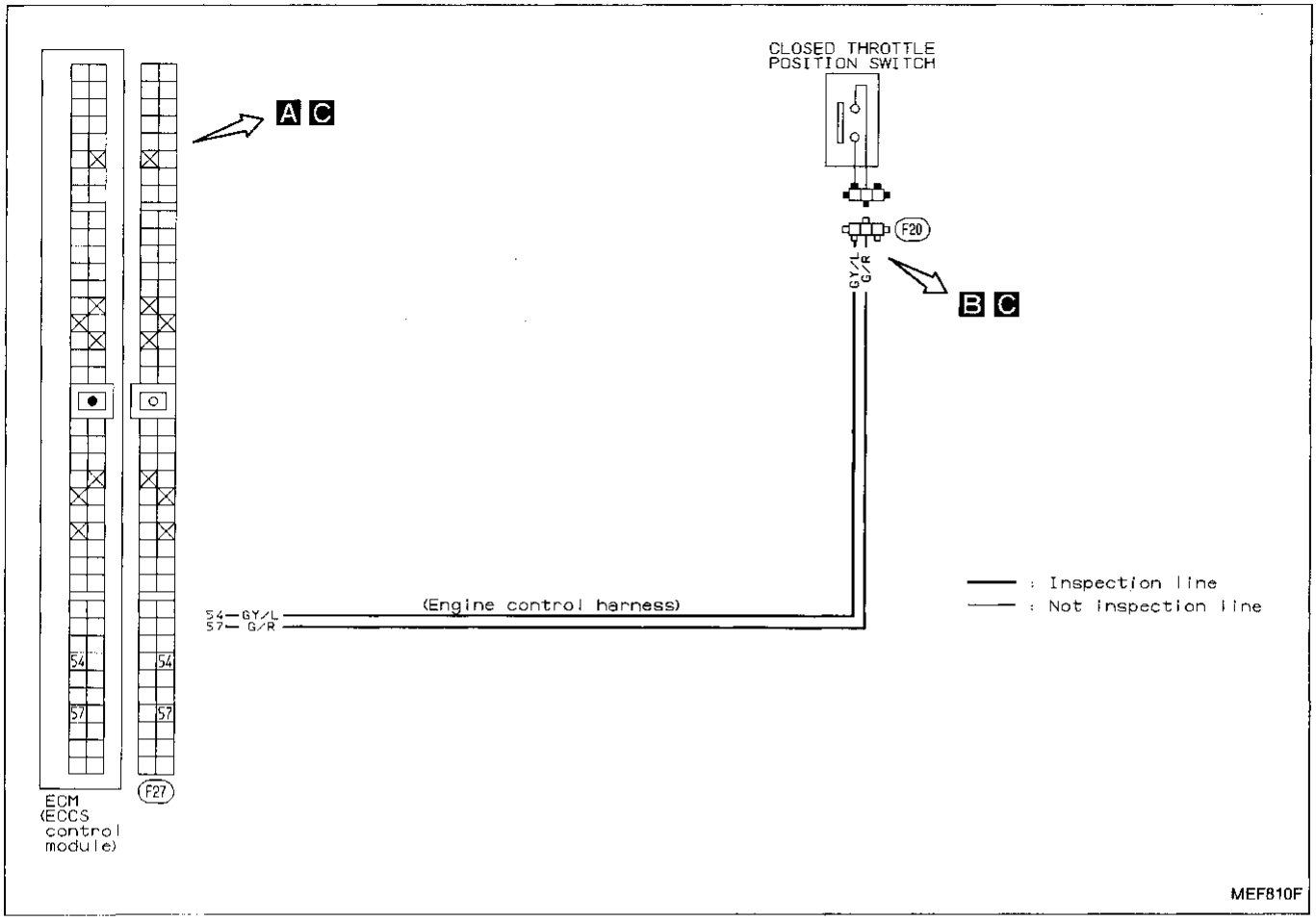
↓

INSPECTION END*

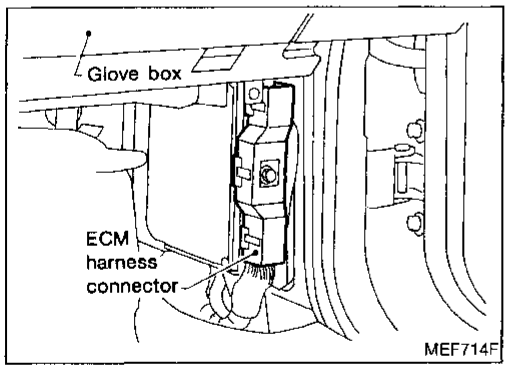
***: If idle is still unstable, go to "CHECK POWER SUPPLY-III" in "Diagnostic Procedure 1" (See page EF & EC-80.) after repair is completed.**

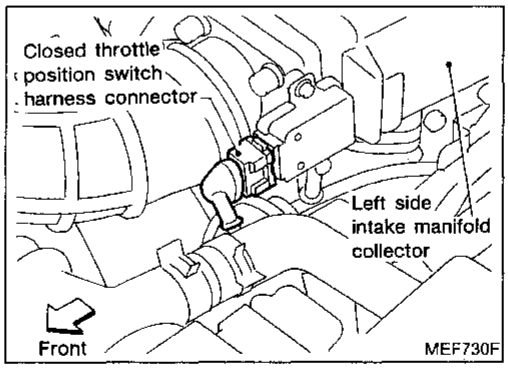
Diagnostic Procedure 22

CLOSED THROTTLE POSITION SWITCH (Not self-diagnostic item)



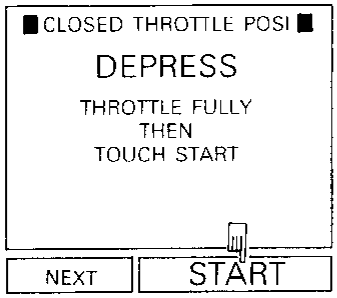
Harness layout





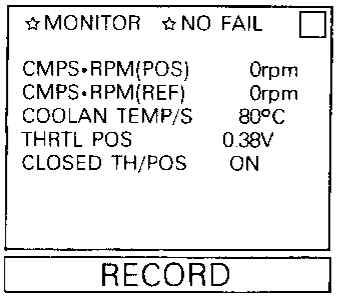
CLOSED THROTTLE POSITION SWITCH (Not self-diagnostic item)

A



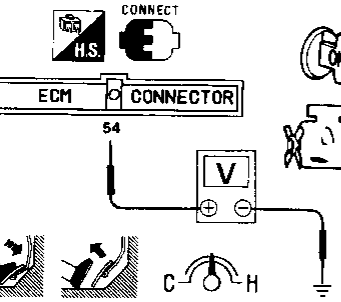
MEF368C

A



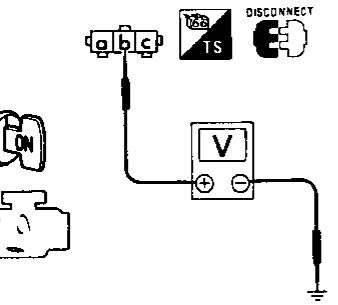
SEF377N

A



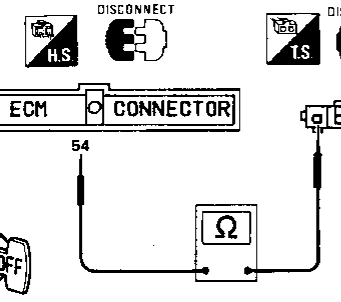
MEF465C

B



SEF594J

C



MEF370C

INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Start engine and warm it up sufficiently.
2) Turn ignition switch "OFF".
3) Disconnect throttle position sensor harness connector.
4) Turn ignition switch "ON".
5) Perform "CLOSED THROTTLE POSI" in "FUNCTION TEST" mode with CONSULT.

OR

3) Disconnect throttle position sensor harness connector.
4) Turn ignition switch "ON".
5) Check "CLOSED TH/POS" in "DATA MONITOR" mode with CONSULT.
Accelerator pedal is released ... ON
Accelerator pedal is depressed ... OFF

OR

3) Turn ignition switch "ON".
4) Check voltage between ECM terminal ⑭ and ground under the following conditions.
Voltage:
Accelerator pedal is released
Approximately 7 - 10V
Accelerator pedal is depressed
Approximately 0V

OK → INSPECTION END

NG

B

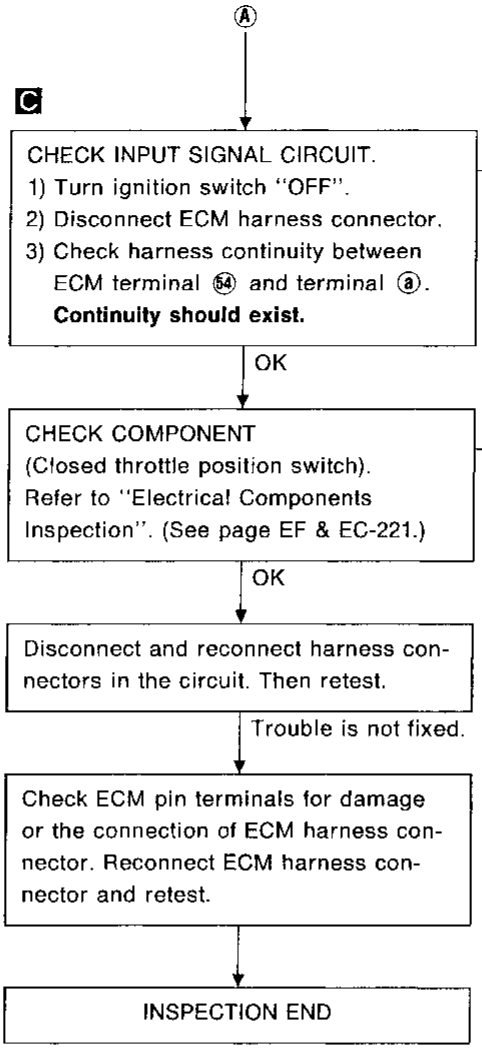
CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect closed throttle position switch harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓑ and ground with CONSULT or tester.
Voltage: Approximately 7 - 10V

NG → Repair harness or connectors.

OK

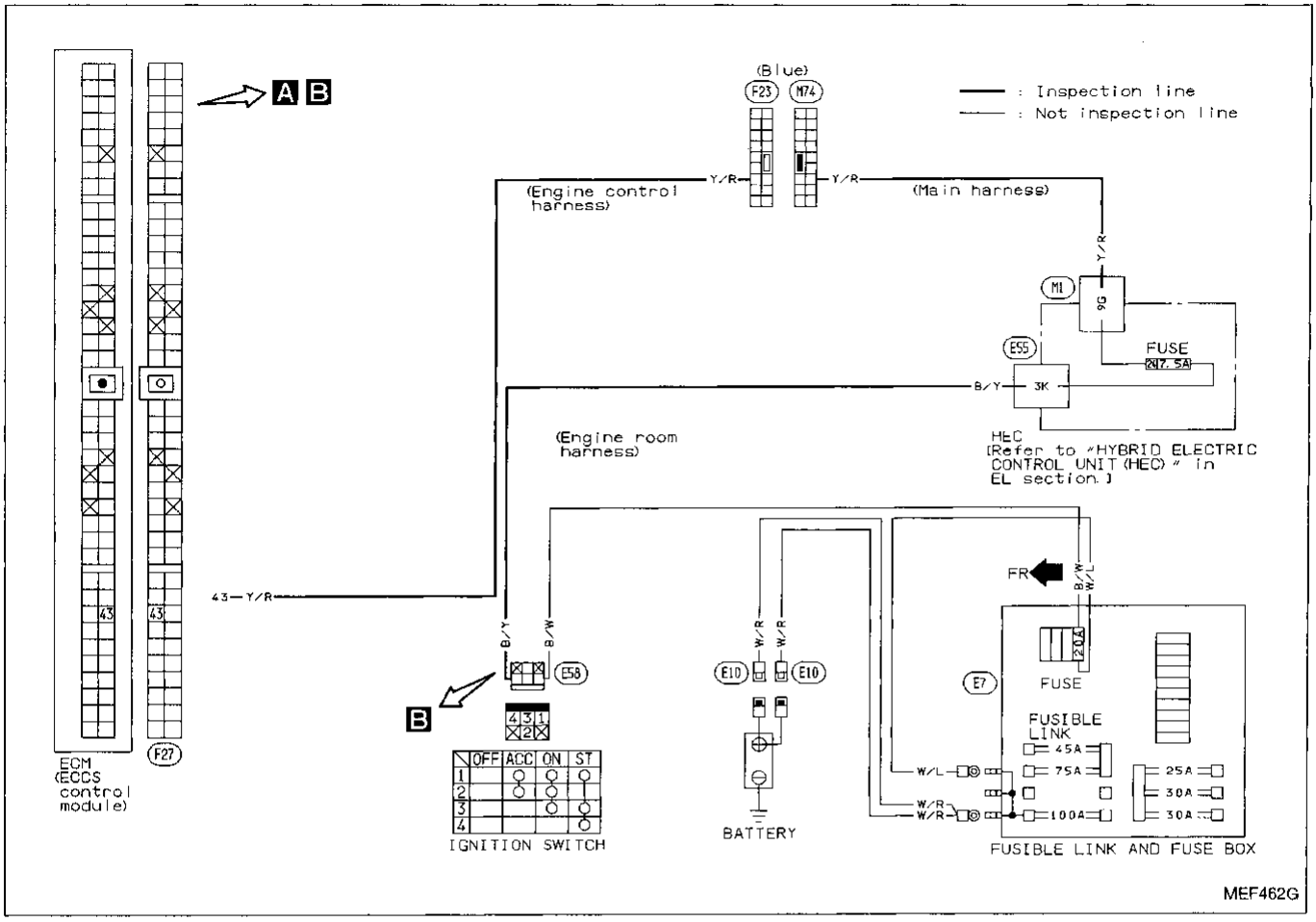
Ⓐ

CLOSED THROTTLE POSITION SWITCH (Not self-diagnostic item)

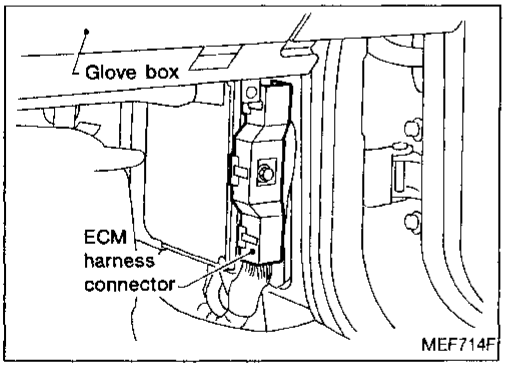


Diagnostic Procedure 23

START SIGNAL (Not self-diagnostic item)

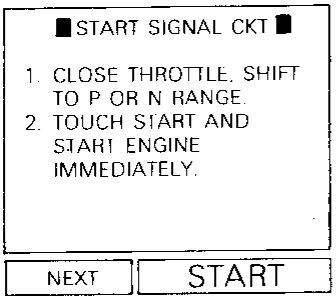


Harness layout



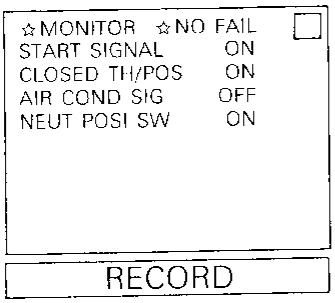
START SIGNAL (Not self-diagnostic item)

A



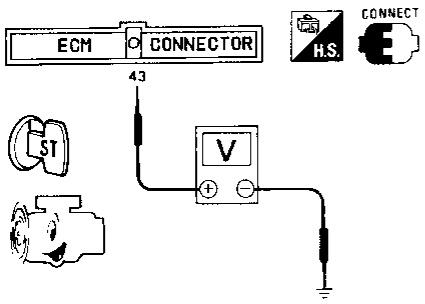
MEF371C

A



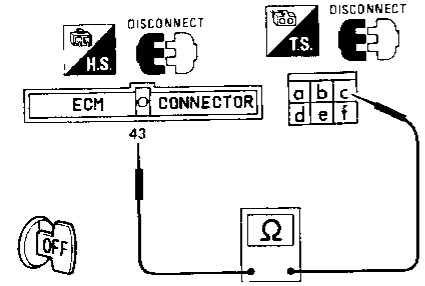
MEF372C

A



MEF466C

B



MEF373C

INSPECTION START

A

CHECK OVERALL FUNCTION.

1) Turn ignition switch "ON".
2) Perform "START SIGNAL CKT" in "FUNCTION TEST" mode with CONSULT.

OK → INSPECTION END

OR

1) Turn ignition switch "ON".
2) Check "START SIGNAL" in "DATA MONITOR" mode with CONSULT.

IGN "ON"	OFF
IGN "START"	ON

OR

1) Turn ignition switch to "START".
2) Check voltage between ECM terminal ㊸ and ground.

Voltage:
Ignition switch "START"
Battery voltage
Except above
Approximately 0V

NG

B

CHECK INPUT SIGNAL CIRCUIT.

1) Turn ignition switch "OFF"
2) Disconnect ECM harness connector and ignition switch harness connector.
3) Check harness continuity between ECM terminal ㊸ and terminal ⓒ.
Continuity should exist.

NG → Check the following.
- Harness connectors (F23), (M74)
- HEC harness connectors (M1), (E55)
- 7.5A fuse
- Harness continuity between ECM and ignition switch

If NG, repair harness or connectors.

OK

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

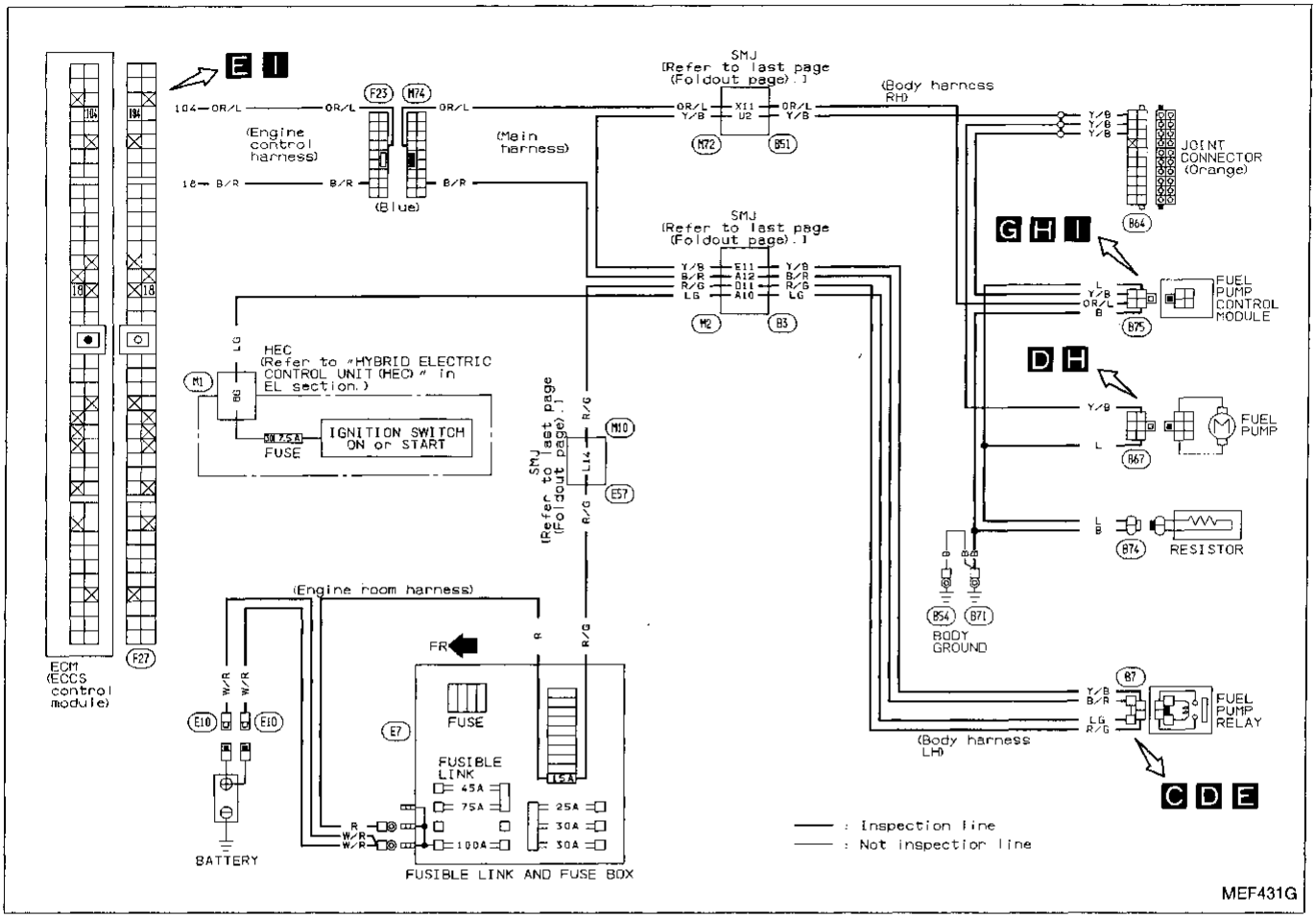
Trouble is not fixed.

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

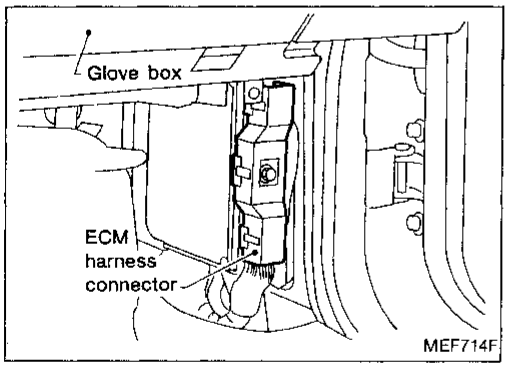
INSPECTION END

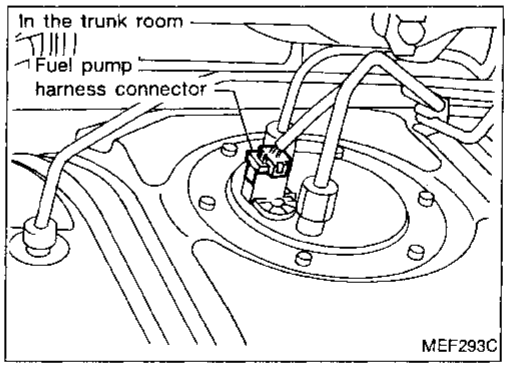
Diagnostic Procedure 24

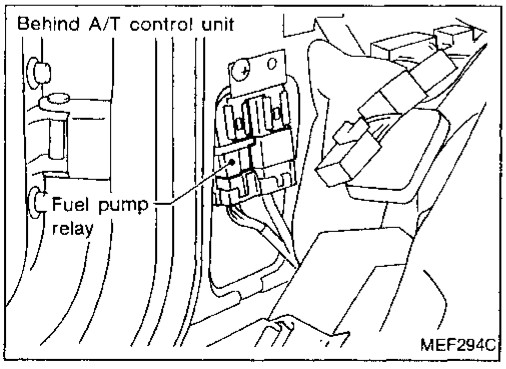
FUEL PUMP CONTROL (Not self-diagnostic item)

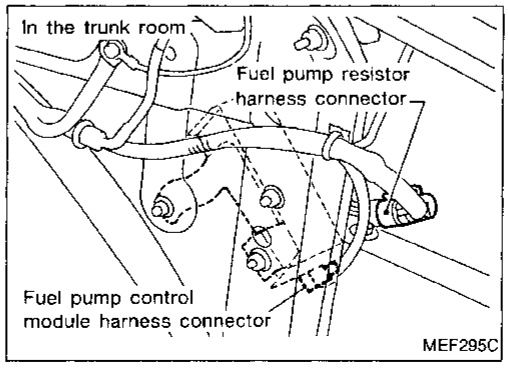


Harness layout



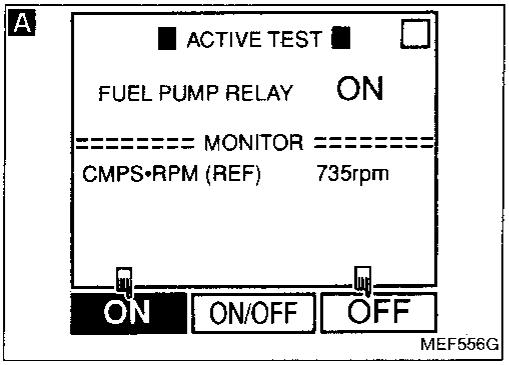






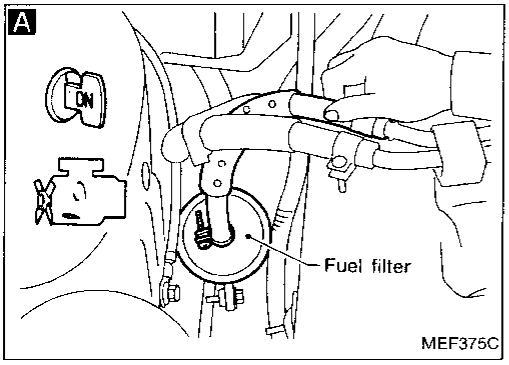
FUEL PUMP CONTROL (Not self-diagnostic item)

A



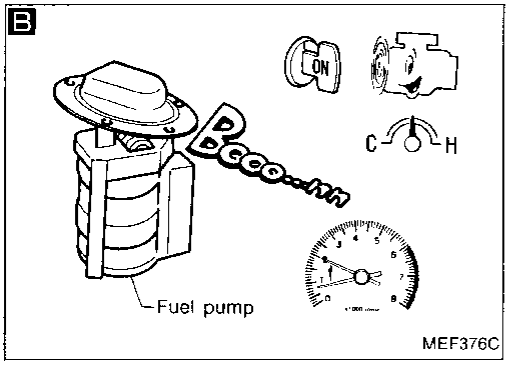
MEF556G

A



MEF375C

B



MEF376C

INSPECTION START

A

CHECK OVERALL FUNCTION-I.
1) Turn ignition switch "ON".
2) Perform "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT.
3) Pinch fuel feed hose with fingers.
Fuel pressure pulsation should be felt on the fuel feed hose.

NG → Check fuel pump relay circuit. (Go to Procedure A .)

OR

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

B

CHECK OVERALL FUNCTION-II.
1) Start engine and warm it up sufficiently.
2) Listen to fuel pump operating sound while racing engine from idle to about 2,000 rpm.
Operating sound at 2,000 rpm should be greater than it is at idle.

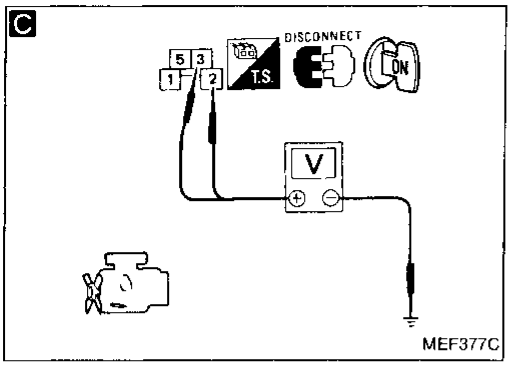
NG → Check fuel pump control module circuit. (Go to Procedure B .)

OK

INSPECTION END

FUEL PUMP CONTROL (Not self-diagnostic item)

C



Procedure A

C

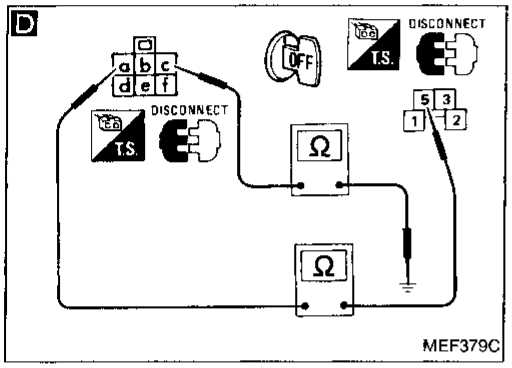
CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect fuel pump relay.
3) Turn ignition switch "ON".
4) Check voltage between terminals ②, ③ and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors (M2), (B3)
- Harness connectors (M10), (E57)
- HEC harness connector (M1)
- 7.5A fuse
- 15A fuse
- Harness continuity between fuel pump relay and HEC
- Harness continuity between fuel pump relay and battery

If NG, repair harness or connectors.

OK ↓

D



D

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect fuel pump harness connector.
3) Check harness continuity between terminals ⑤ and ⑧, and terminal ⑥ and body ground.
Continuity should exist.

NG → CHECK COMPONENT (Resistor).
Refer to "Electrical Components Inspection". (See page EF & EC-218.)
If NG, replace resistor.

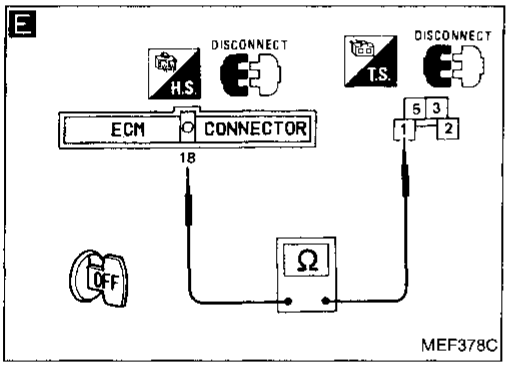
OK ↓

Check the following.
- Harness connectors (M2), (B3)
- Harness connectors (M72), (B51)
- Joint connector (B64)
- Harness continuity between fuel pump relay and fuel pump
- Harness continuity between fuel pump and body ground

If NG, repair harness or connectors.

OK ↓

E



E

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ⑱ and terminal ①.
Continuity should exist.

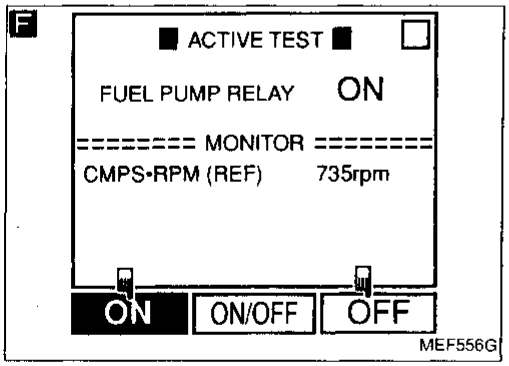
NG → Check the following.
- Harness connectors (F23), (M74)
- Harness connectors (M2), (B3)
- Harness continuity between ECM and fuel pump relay

If NG, repair harness or connectors.

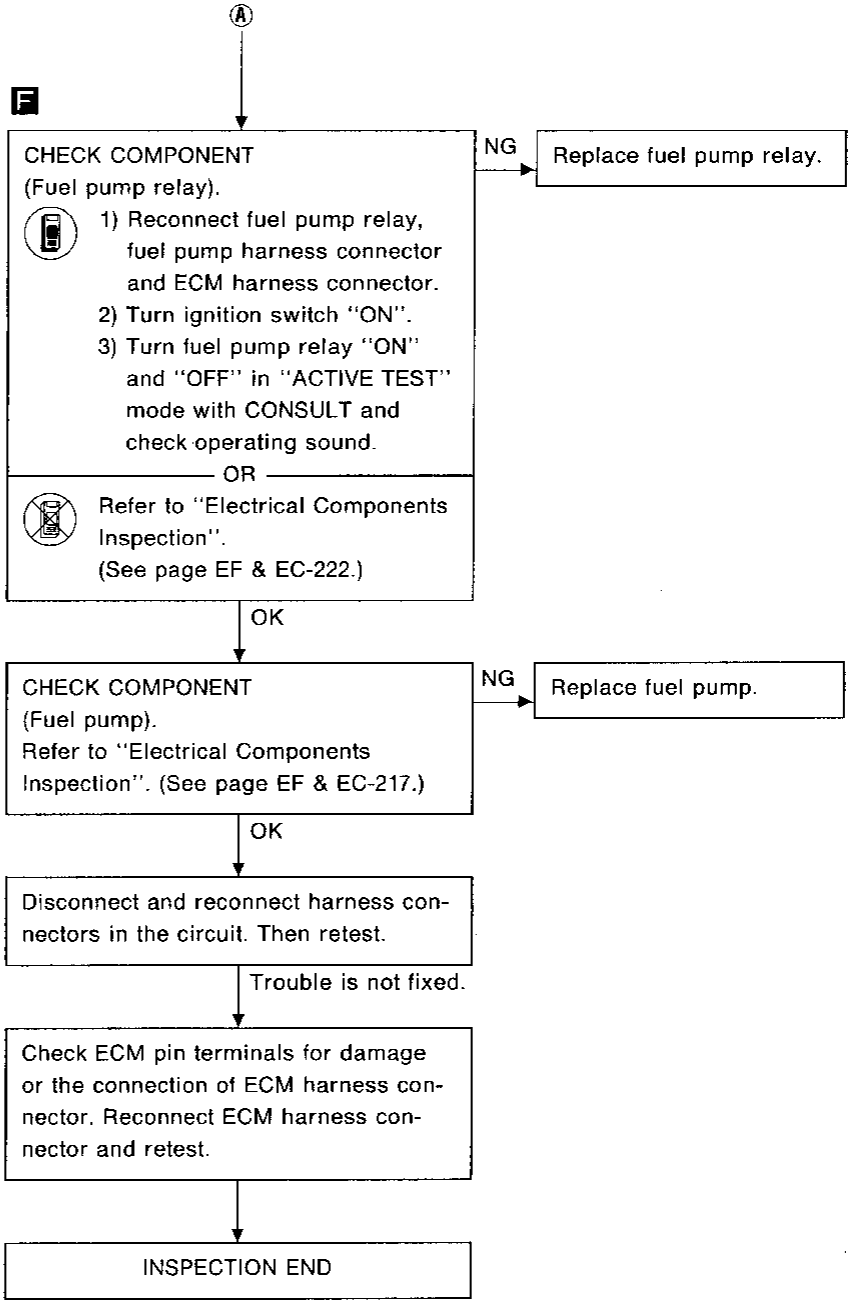
OK ↓

Ⓐ

F

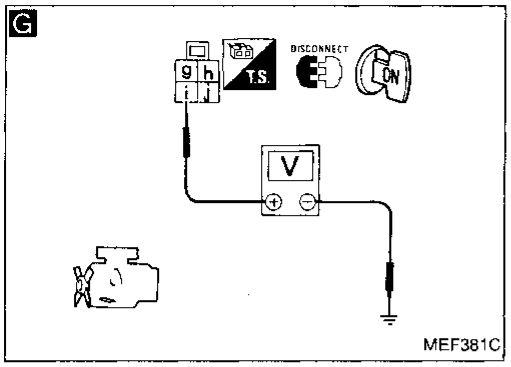


FUEL PUMP CONTROL (Not self-diagnostic item)

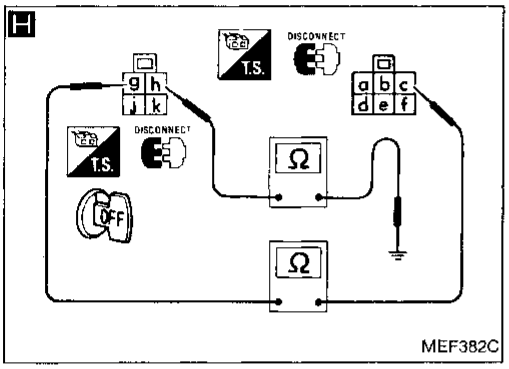


FUEL PUMP CONTROL (Not self-diagnostic item)

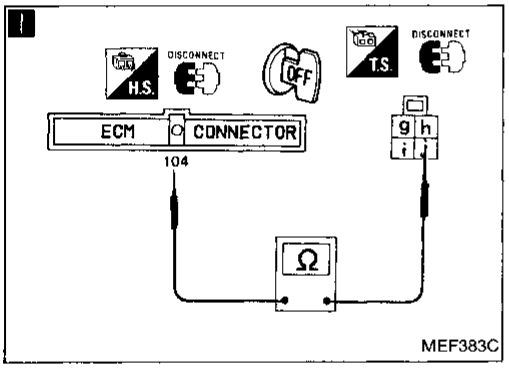
G



H



I



Procedure B

G

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect fuel pump control module harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓘ and ground with CONSULT or tester.
Voltage:
Battery voltage should exist for 5 seconds after ignition switch is turned "ON".

NG → Check the following.
- Joint connector (B64)
- Harness continuity between fuel pump control module and joint connector (B64)

If NG, repair harness or connectors.

OK ↓

H

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect fuel pump harness connector.
3) Check harness continuity between terminal ⓖ and terminal ⓒ, terminal ⓗ and body ground.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

I

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal (104) and terminal ⓘ.
Continuity should exist.

NG → Check the following.
- Harness connectors (F23), (M74)
- Harness connectors (M72), (B51)
- Harness continuity between ECM and fuel pump control module

If NG, repair harness or connectors.

OK ↓

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

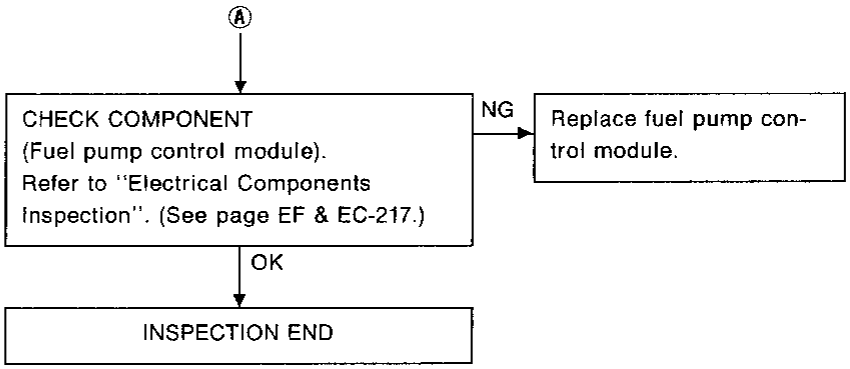
Trouble is not fixed. ↓

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

↓

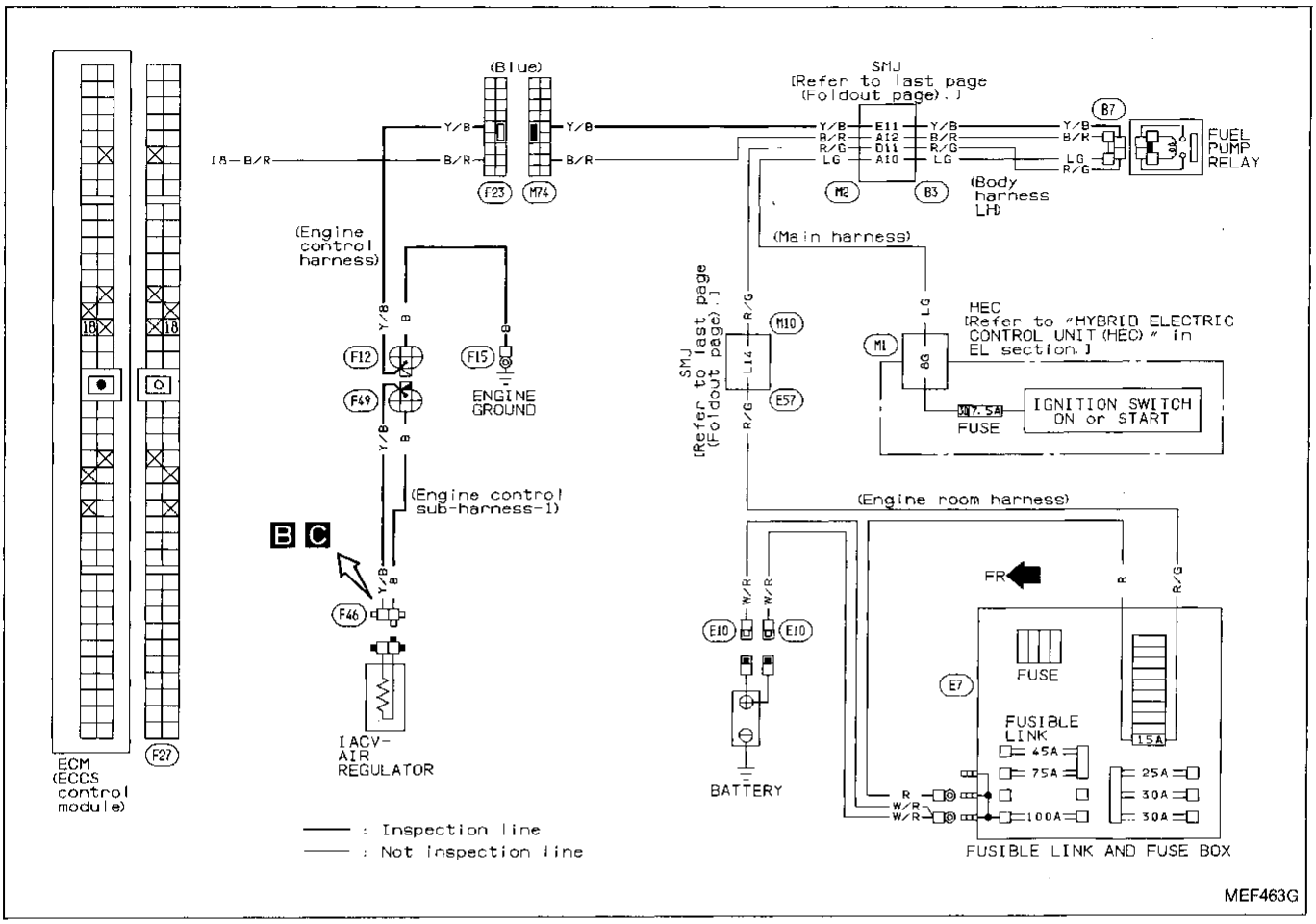
Ⓐ

FUEL PUMP CONTROL (Not self-diagnostic item)

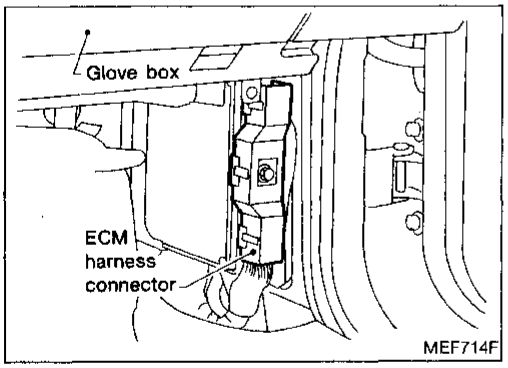


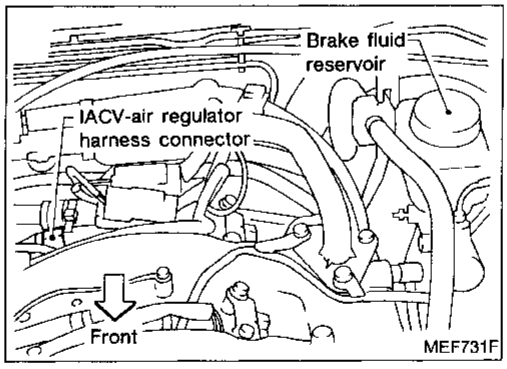
Diagnostic Procedure 25

IACV-AIR REGULATOR (Not self-diagnostic item)



Harness layout





IACV-AIR REGULATOR (Not self-diagnostic item)

A

■ FUEL PUMP CIRCUIT ■
PINCH FUEL FEED HOSE WITH FINGERS. IS THERE ANY PRESSURE PULSATION ON THE FUEL FEED HOSE?
OR
DOES THE FUEL PUMP RELAY MAKE AN OPERATING SOUND EVERY 3 SECONDS?

NEXT | NO | YES

MEF384C

A

■ ACTIVE TEST ■

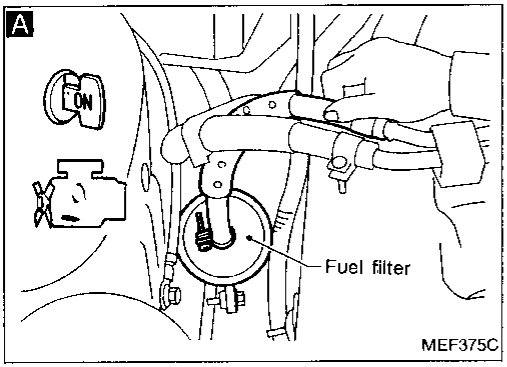
FUEL PUMP RELAY ON

======== MONITOR ========
CMPS•RPM (REF) 735rpm

ON | ON/OFF | OFF

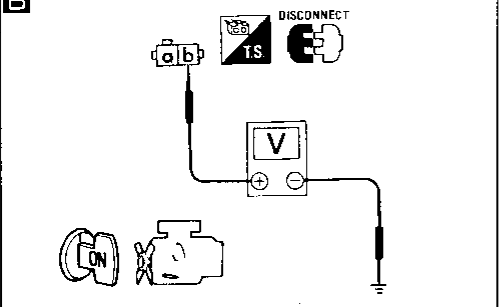
MEF556G

A



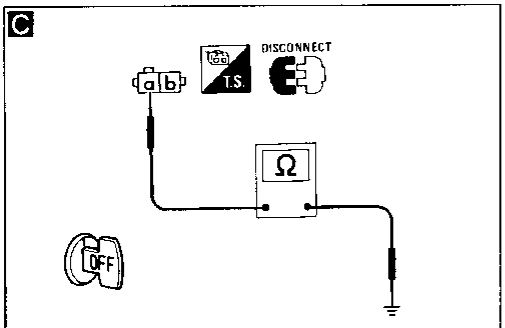
MEF375C

B



MEF462A

C



MEF463A

INSPECTION START

A

CHECK CONTROL FUNCTION.
1) Turn ignition switch "ON".
2) Perform "FUEL PUMP CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

2) Turn fuel pump relay "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.

OR

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 page EF & EC-146.)

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 ⓑ 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 continuity 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 ⓐ and body ground.
Continuity should exist.

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 "Electrical Components Inspection". (See page EF & EC-220.)

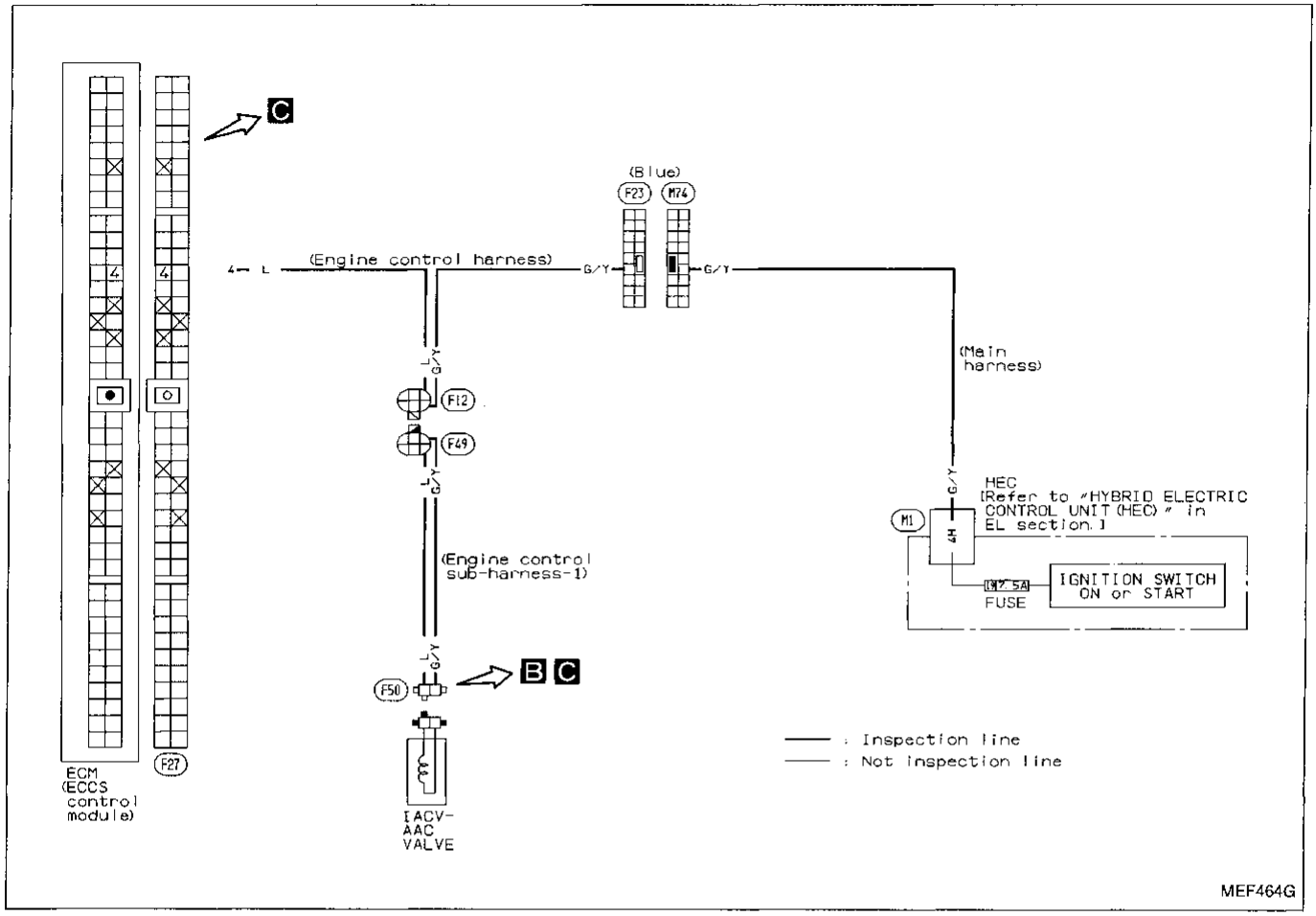
NG → Replace IACV-air regulator.

OK

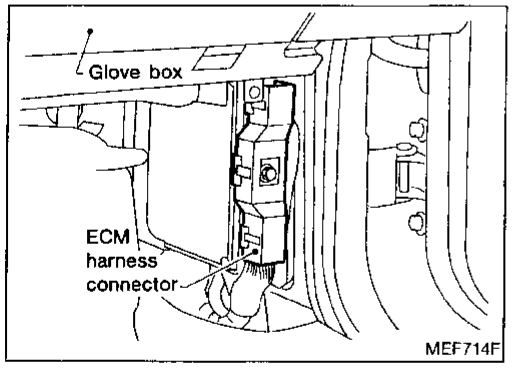
INSPECTION END

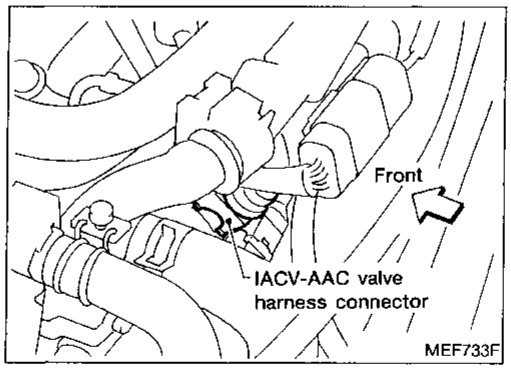
Diagnostic Procedure 26

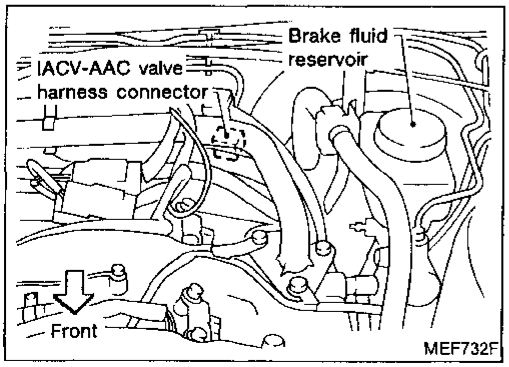
IACV-AAC VALVE (Not self-diagnostic item)



Harness layout

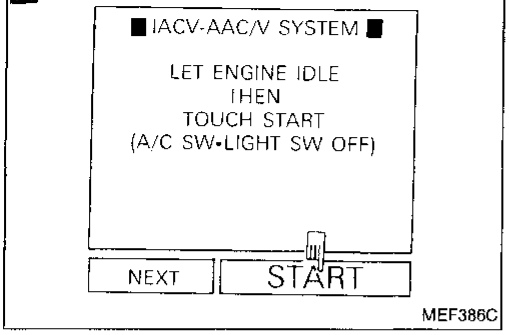




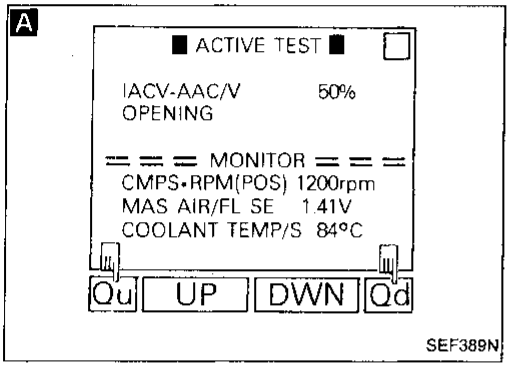


IACV-AAC VALVE (Not self-diagnostic item)

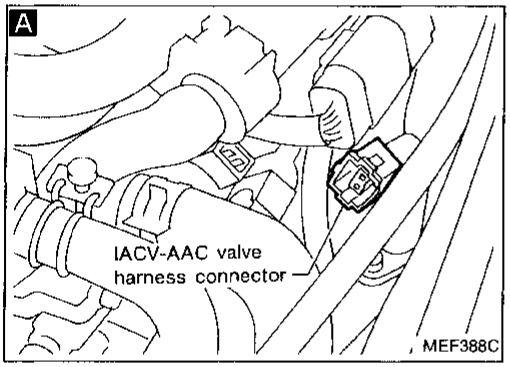
A



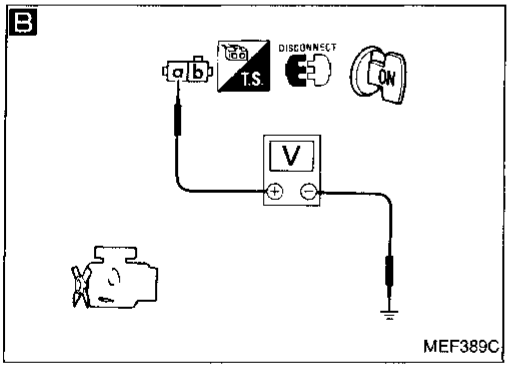
A



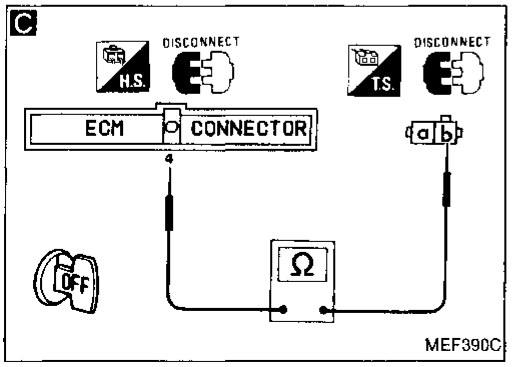
A



B



C



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-AAC/V SYSTEM" in "FUNCTION TEST" mode with CONSULT.

OR

3) Select "IACV-AAC/V OPENING" in "ACTIVE TEST" mode with CONSULT.
4) When touching "Qu" and "Qd", check that engine speed changes according to the IACV-AAC valve opening percentage.

OR

3) Disconnect IACV-AAC valve harness connector.
4) Make sure that idle speed drops.

OK → INSPECTION END

NG

B

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect IACV-AAC valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓐ and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F49), (F12)
- Harness connectors (F23), (M74)
- HEC harness connector (M1)
- 7.5A fuse
- Harness continuity between IACV-AAC valve and HEC

If NG, repair harness or connectors.

OK

C

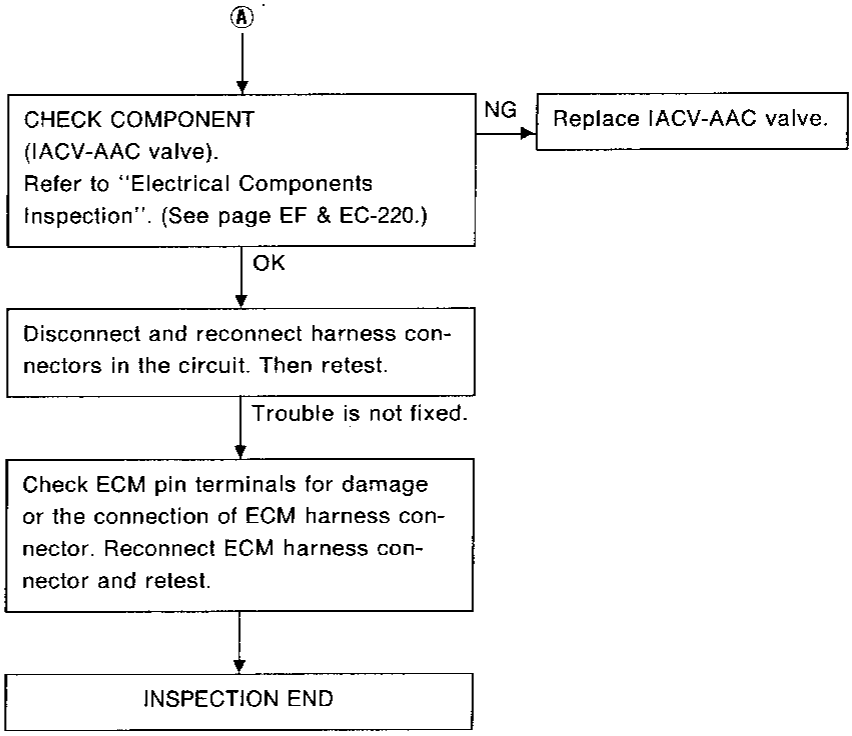
CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal ④ and terminal ⓑ.
Continuity should exist.

NG → Check the following.
- Harness connectors (F49), (F12)
- Harness continuity between ECM and IACV-AAC valve

If NG, repair harness or connectors.

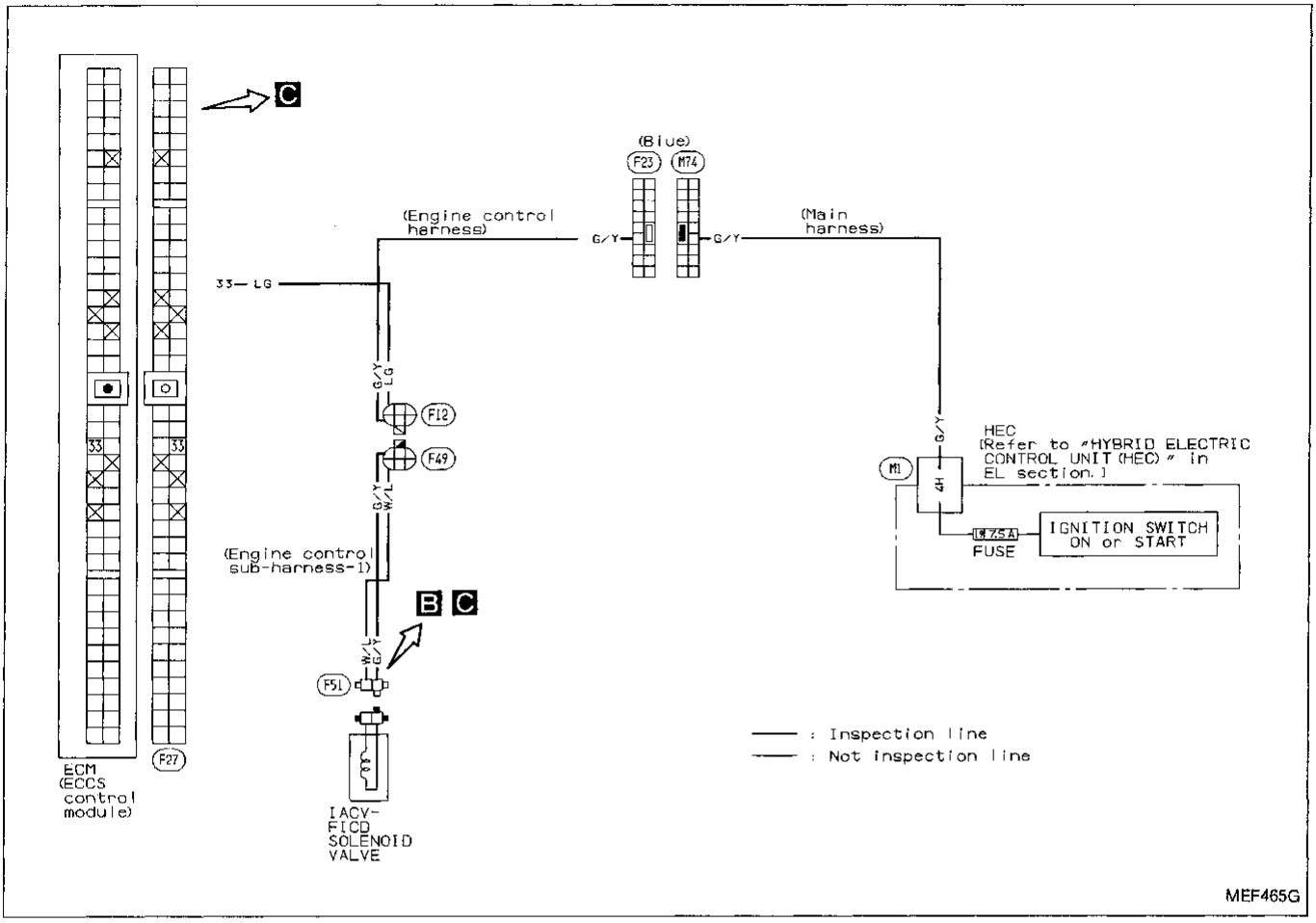
OK → Ⓐ

IACV-AAC VALVE (Not self-diagnostic item)

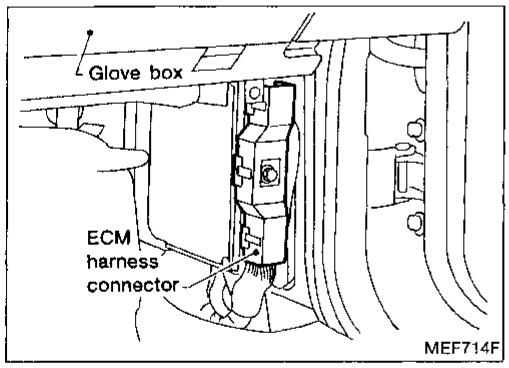


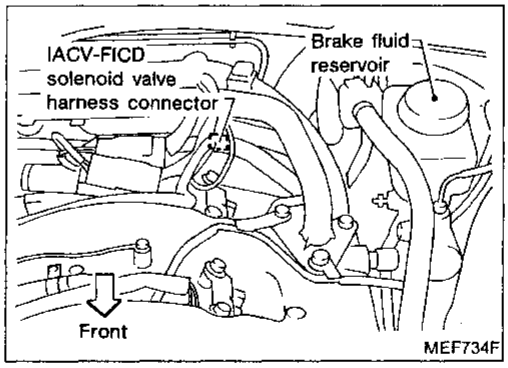
Diagnostic Procedure 27

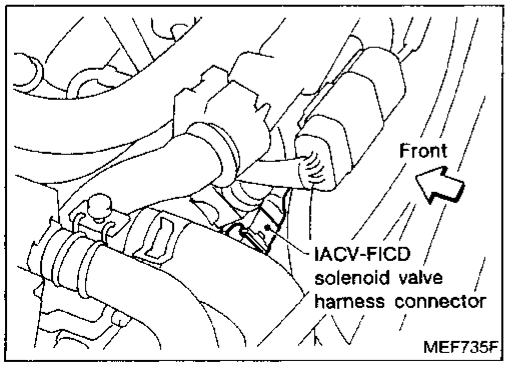
IACV-FICD SOLENOID VALVE (Not self-diagnostic item)



Harness layout

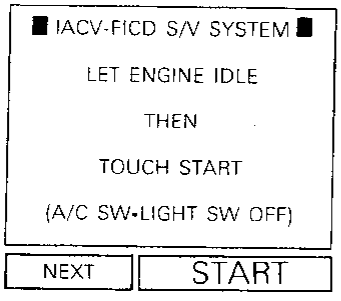






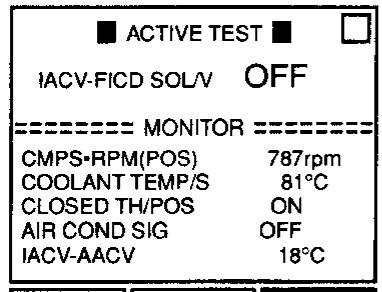
IACV-FICD SOLENOID VALVE (Not self-diagnostic item)

A



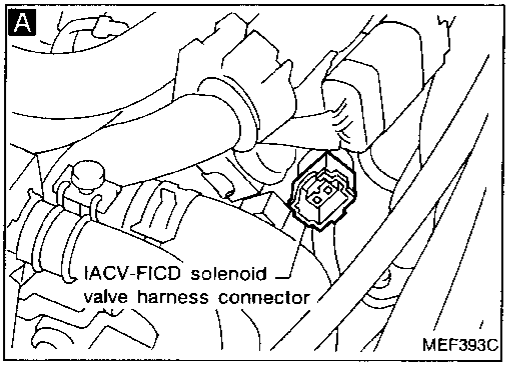
MEF391C

A



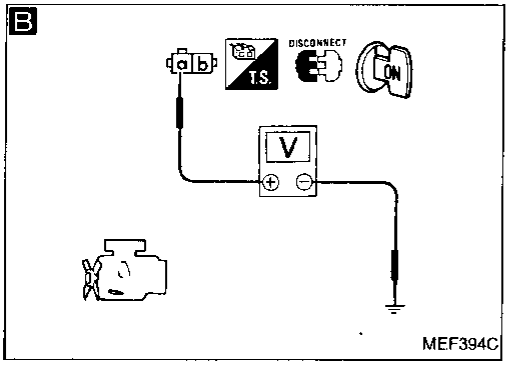
MEF557G

A



MEF393C

B



MEF394C

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 drops when IACV-FICD solenoid valve is turned "OFF".

OR

3) Turn both A/C switch and blower fan switch "ON".
4) Make sure that engine idle speed drops when IACV-FICD solenoid valve harness connector is disconnected.

OK → INSPECTION END

NG

Check if air conditioner compressor functions normally.

NG → Refer to "DIAGNOSES — Overall System" in HA section.

OK

B

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect IACV-FICD solenoid valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓐ and ground with CONSULT or tester.
Voltage: Battery voltage

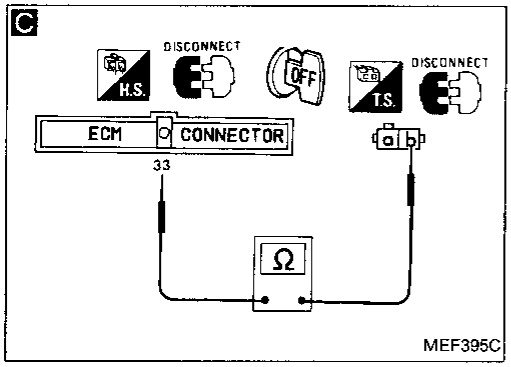
NG → Check the following.
- Harness connectors (F49), (F12)
- Harness connectors (F23), (M74)
- HEC harness connector (M1)
- 7.5A fuse
- Harness continuity between IACV-FICD solenoid valve and HEC

If NG, repair harness or connectors.

OK

Ⓐ

IACV-FICD SOLENOID VALVE (Not self-diagnostic item)



Ⓐ

C

CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal ㉝ and terminal ⓑ.
Continuity should exist.

NG → Check the following.
- Harness connectors (F49), (F12)
- Harness continuity between ECM and IACV-FICD solenoid valve

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT
(IACV-FICD solenoid valve).
Refer to "Electrical Components Inspection". (See page EF & EC-220.)

NG → Replace IACV-FICD solenoid valve.

OK ↓

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

Trouble is not fixed. ↓

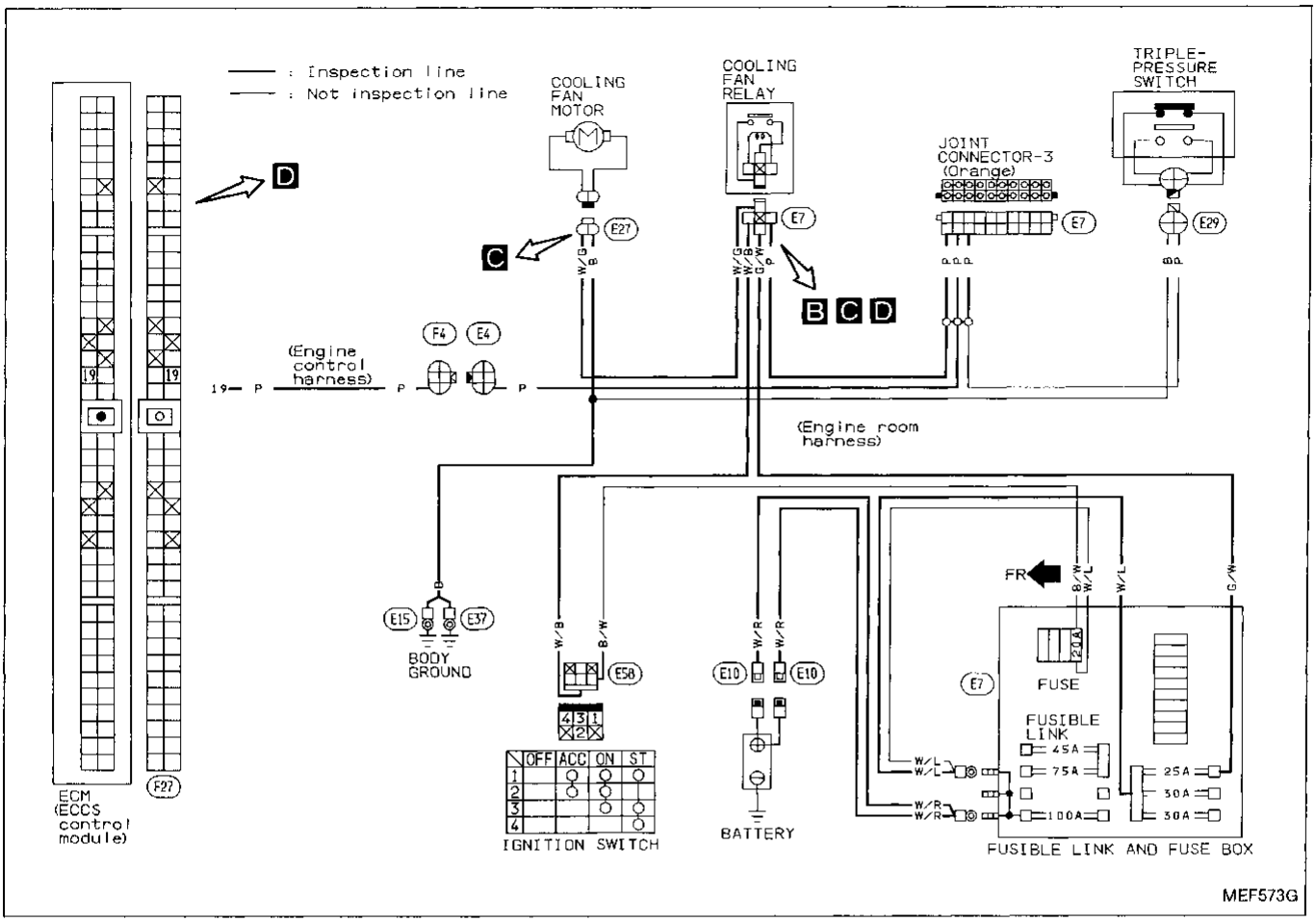
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

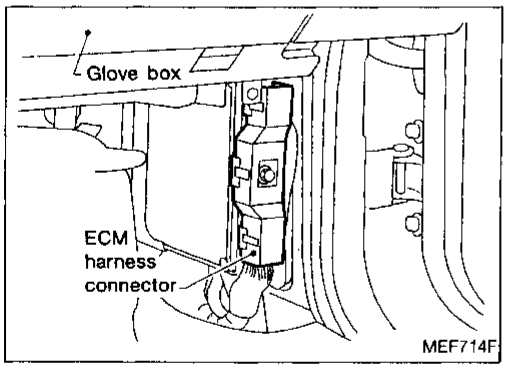
INSPECTION END

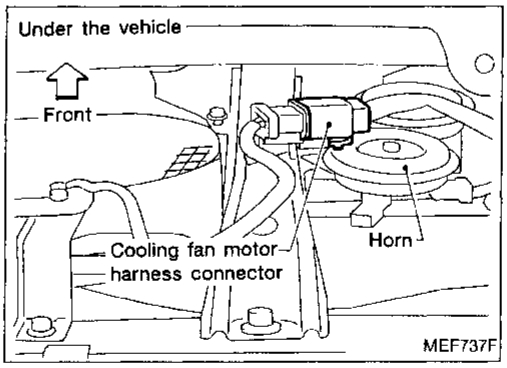
Diagnostic Procedure 28

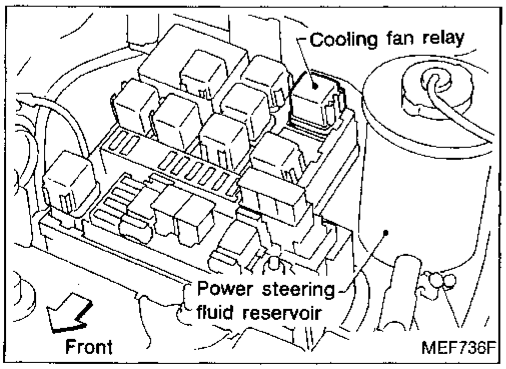
COOLING FAN CONTROL (Not self-diagnostic item)

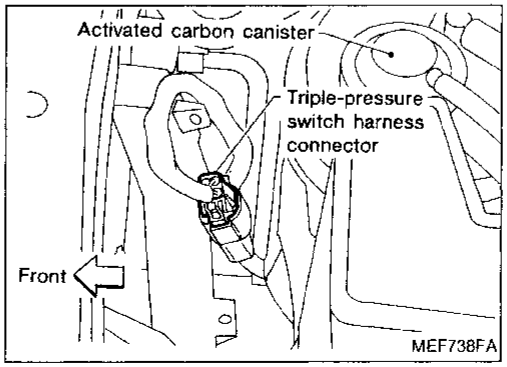


Harness layout



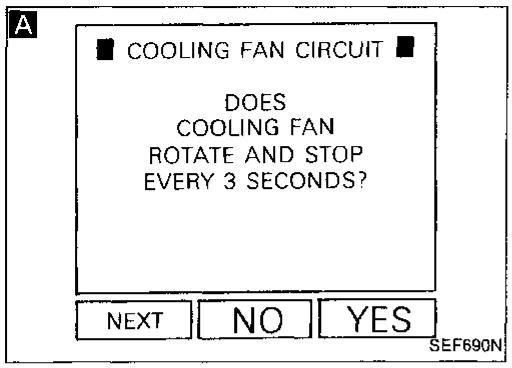




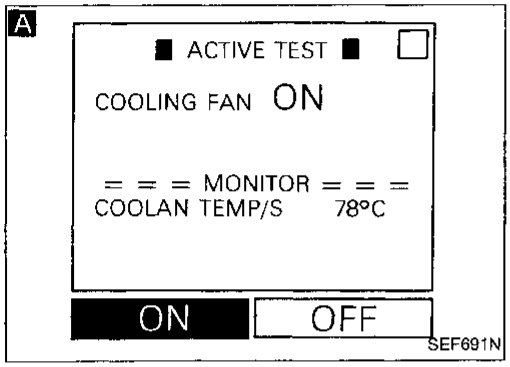


COOLING FAN CONTROL (Not self-diagnostic item)

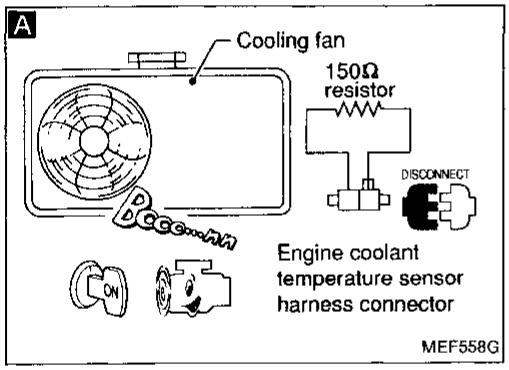
A



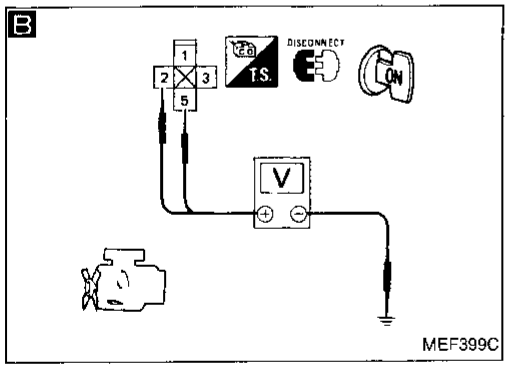
A



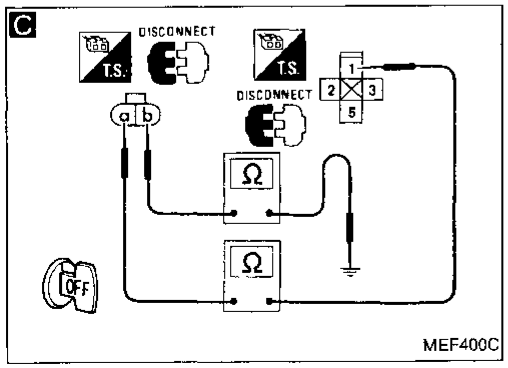
A



B



C



INSPECTION START

A

CHECK OVERALL FUNCTION.

1) Turn ignition switch "ON".
2) Perform "COOLING FAN CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

1) Turn ignition switch "ON".
2) Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.

OR

1) Disconnect triple-pressure switch harness connector.
2) Disconnect engine coolant temperature sensor harness connector.
3) Connect 150Ω resistor between engine coolant temperature sensor harness connector terminals.
4) Start engine and let it idle.
5) Make sure that cooling fan motor operates.

OK → INSPECTION END

NG

B

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 battery
- Harness continuity between cooling fan relay and ignition switch

If NG, repair harness or connectors.

OK

C

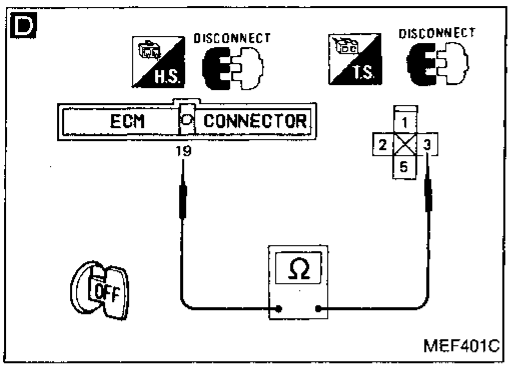
CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect cooling fan motor harness connector.
3) Check harness continuity between terminal ① and terminal ⓐ, terminal ⓑ and body ground.
Continuity should exist.

NG → Repair harness or connectors.

OK

Ⓐ

COOLING FAN CONTROL (Not self-diagnostic item)



Ⓐ

D

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ⑲ and terminal ③.
Continuity should exist.

NG → Check the following.
- Harness connectors (F4), (E4)
- Joint connector (E7)
- Harness continuity between ECM and cooling fan relay

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT
(Cooling fan relay).
Refer to "Electrical Components Inspection". (See page EF & EC-222.)

NG → Replace cooling fan relay.

OK ↓

CHECK COMPONENT
(Cooling fan motor).
Refer to "Electrical Components Inspection". (See page EF & EC-222.)

NG → Replace cooling fan motor.

OK ↓

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

Trouble is not fixed. ↓

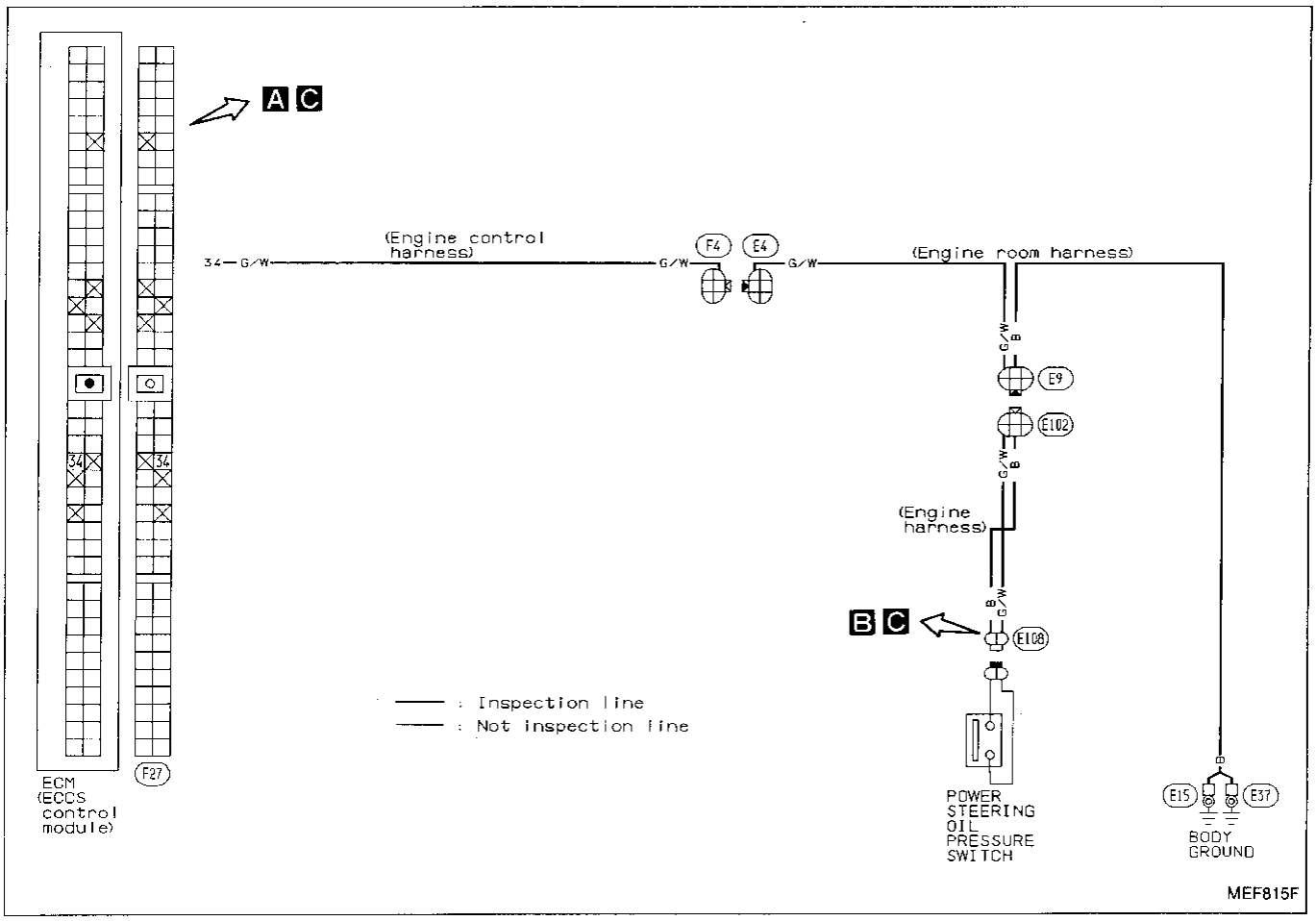
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

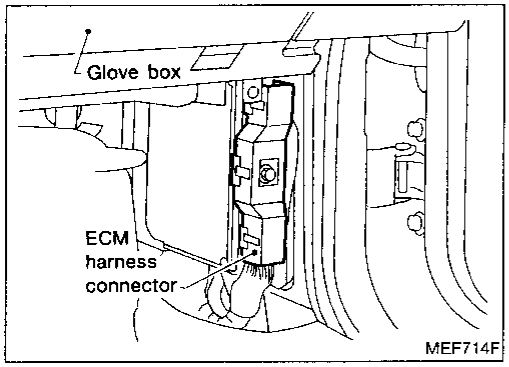
INSPECTION END

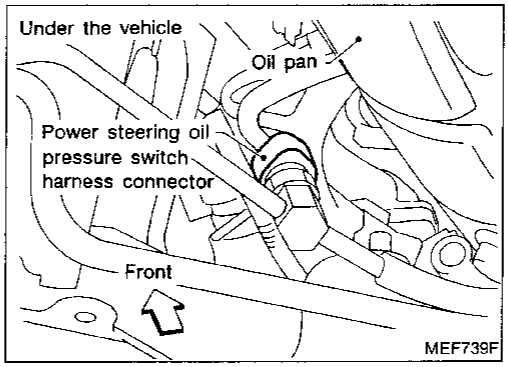
Diagnostic Procedure 29

POWER STEERING OIL PRESSURE SWITCH (Not self-diagnostic item)

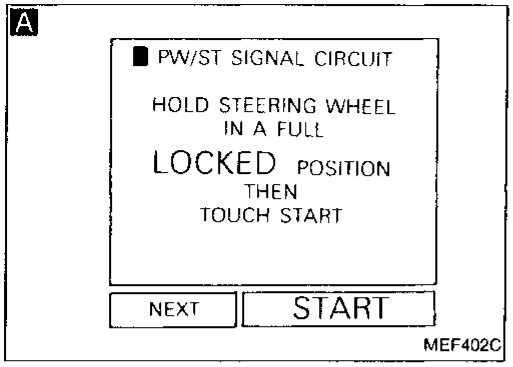


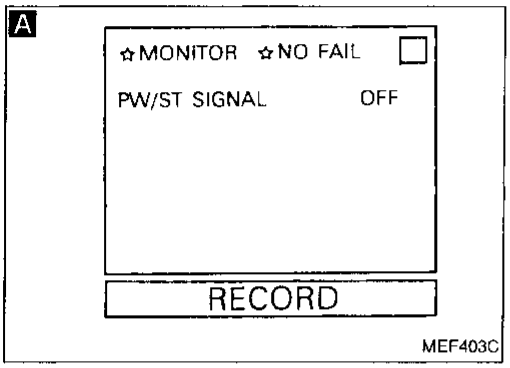
Harness layout

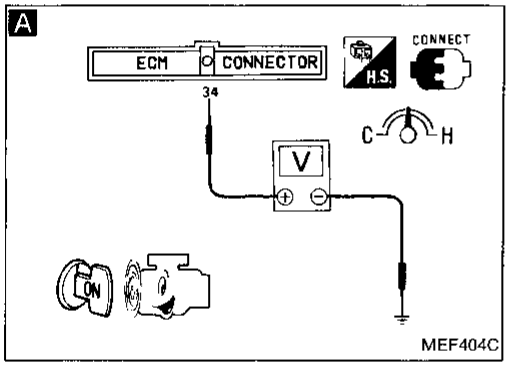


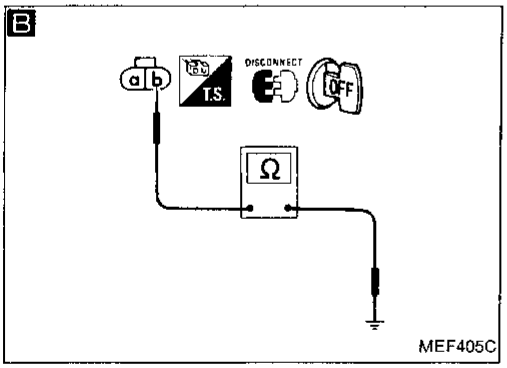


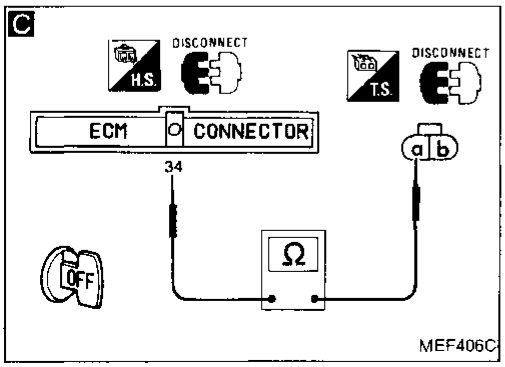
POWER STEERING OIL PRESSURE SWITCH (Not self-diagnostic item)











INSPECTION START

A

CHECK OVERALL FUNCTION.

1) Turn ignition switch "ON".
2) Perform "PW/ST SIGNAL CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OK → INSPECTION END

OR

1) Start engine.
2) Check "PW/ST SIGNAL" in "DATA MONITOR" mode with CONSULT.

Steering is neutral position: OFF
Steering is turned: ON

OR

1) Start engine.
2) Check voltage between ECM terminal ㉞ and ground.

Voltage:
When steering wheel is turned quickly.
Approximately 0V
Except above
Approximately 5V

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 ⓑ and body ground.

Continuity should exist.

NG → Check the following.
- Harness connectors E9, E102
- Harness continuity between power steering oil pressure switch and body ground

If NG, repair harness or connectors.

OK

C

CHECK INPUT SIGNAL CIRCUIT.

1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ㉞ and terminal ⓐ.

Continuity should exist.

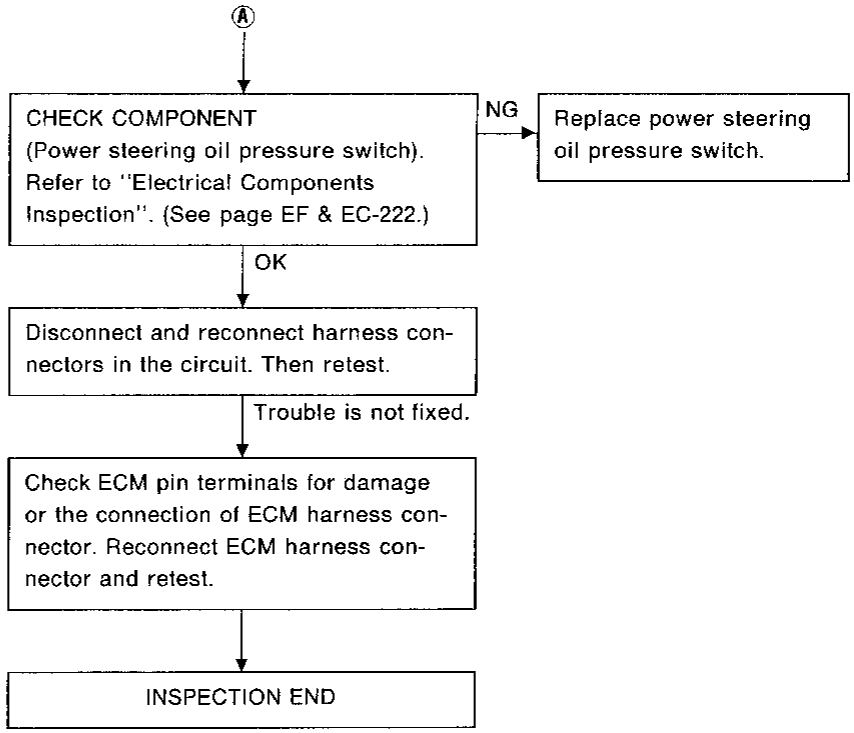
NG → Check the following.
- Harness connectors F4, E4
- Harness connectors E9, E102
- Harness continuity between ECM and power steering oil pressure switch

If NG, repair harness or connectors.

OK

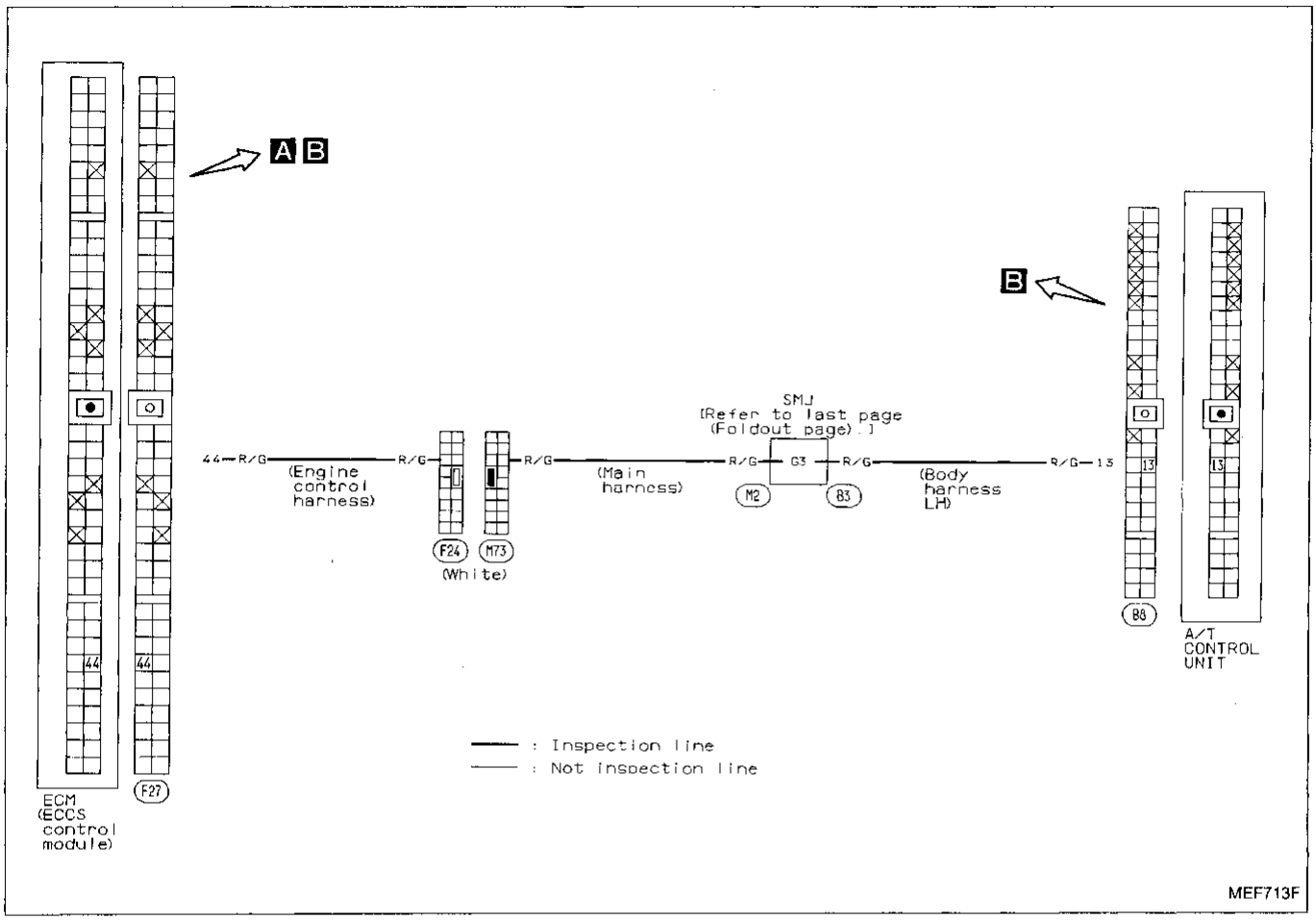
Ⓐ

POWER STEERING OIL PRESSURE SWITCH (Not self-diagnostic item)

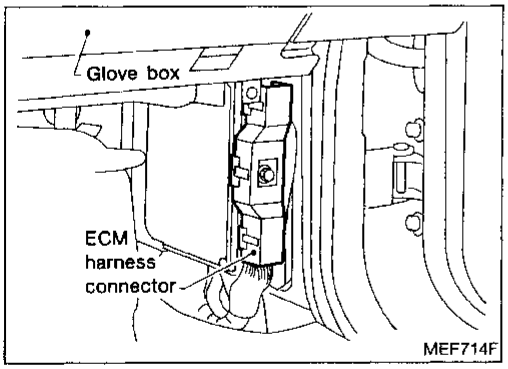


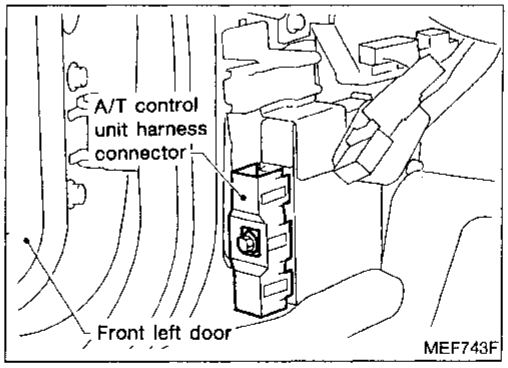
Diagnostic Procedure 30

A/T CONTROL UNIT (Neutral position signal) (Not self-diagnostic item)

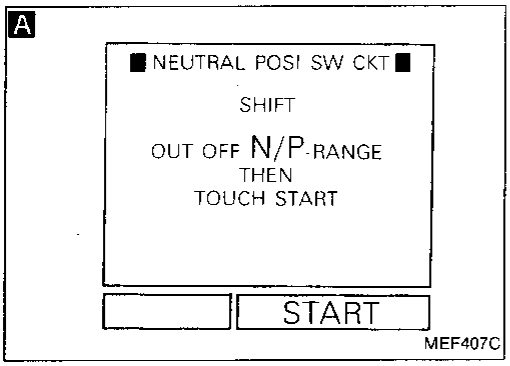


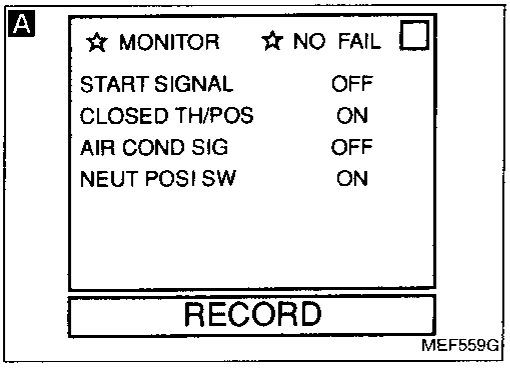
Harness layout

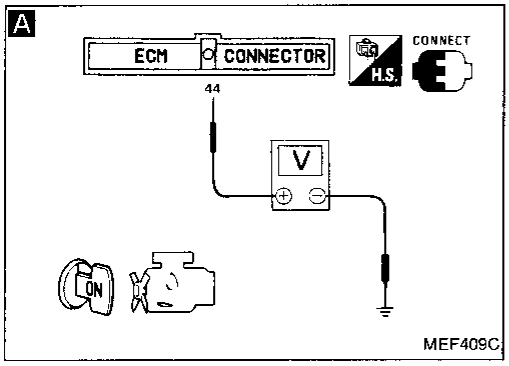


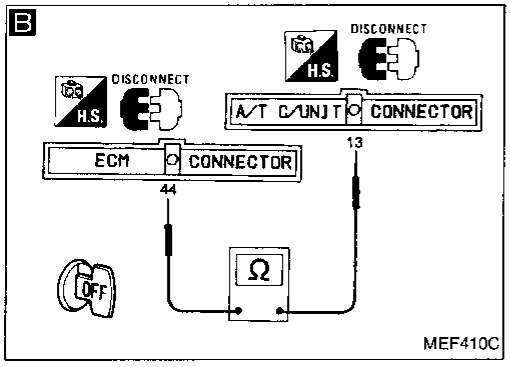


A/T CONTROL UNIT (Neutral position signal) (Not self-diagnostic item)









INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Turn ignition switch "ON".
2) Perform "NEUTRAL POSI SW CKT" in "FUNCTION TEST" mode with CONSULT.

OR

2) Check "NEUT POSI SW" signal in "DATA MONITOR" mode with CONSULT.
"N" or "P": ON
Except above: OFF

OR

2) Check voltage between ECM terminal ㊹ and ground with CONSULT or tester.
Voltage:
"N" or "P"
Approximately 0V
Except above
Approximately 5V

OK → INSPECTION END

NG

B

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Disconnect A/T control unit harness connector.
4) Check harness continuity between ECM terminal ㊹ and terminal ⑬.
Continuity should exist.

NG → Check the following.
- Harness connectors (F24), (M73)
- Harness connectors (M2), (B3)
- Harness continuity between ECM and A/T control unit

If NG, repair harness or connectors.

OK

CHECK INHIBITOR SWITCH FUNCTION.
Make sure that inhibitor switch functions properly. (Refer to "TROUBLE DIAGNOSES" in AT section).

NG → Check inhibitor switch and circuit.
(Refer to "TROUBLE DIAGNOSES" in AT section.)

OK

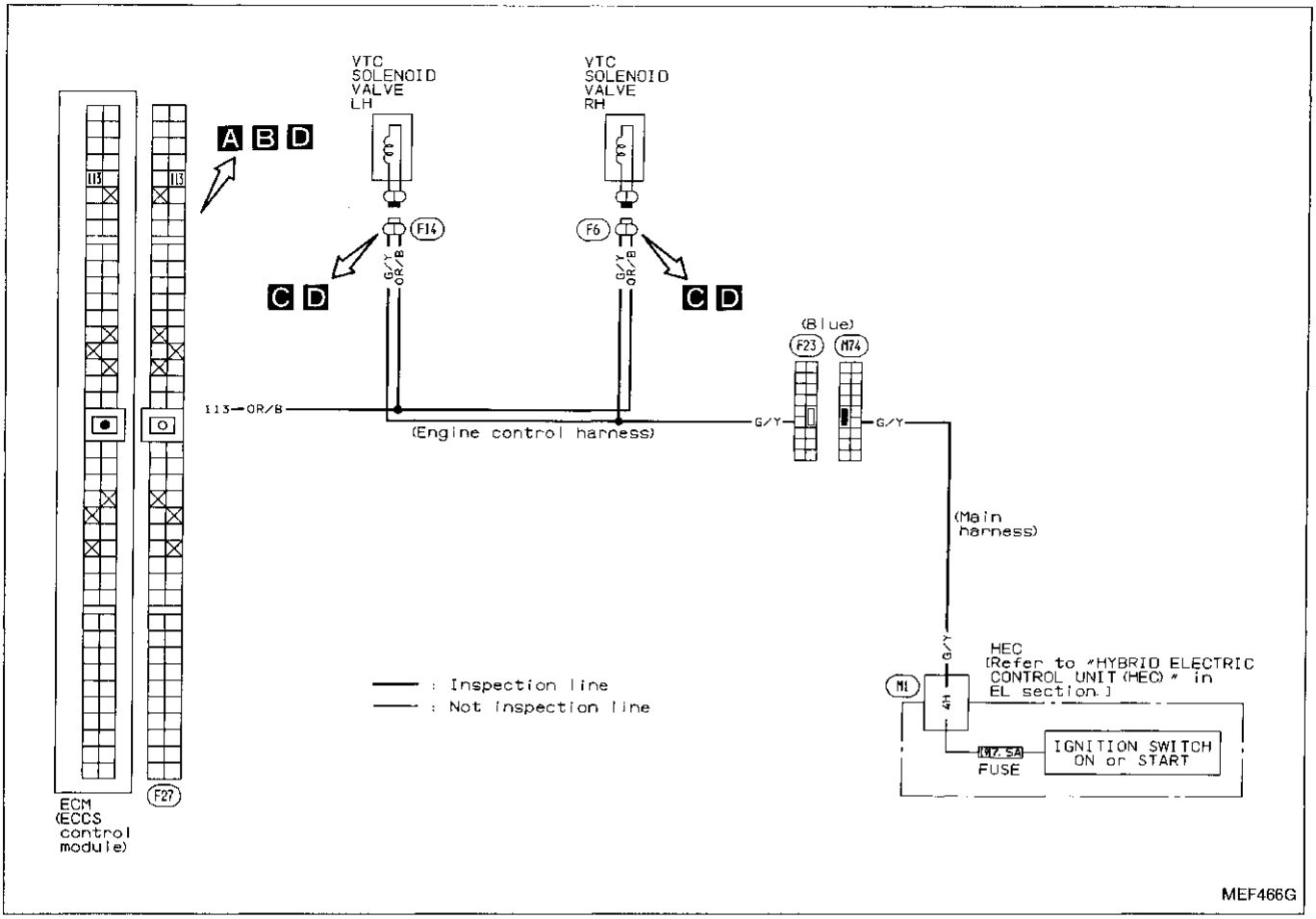
Disconnect and reconnect harness connectors in the circuit. Then retest.

Trouble is not fixed.

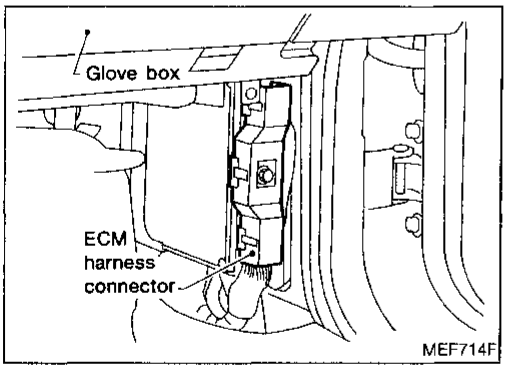
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

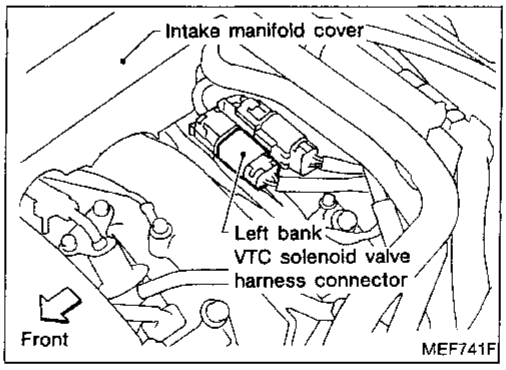
Diagnostic Procedure 31

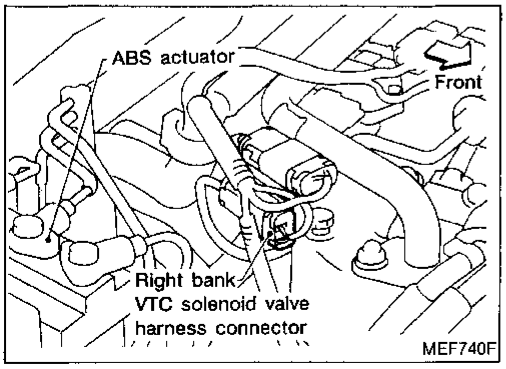
VALVE TIMING CONTROL (Not self-diagnostic item)



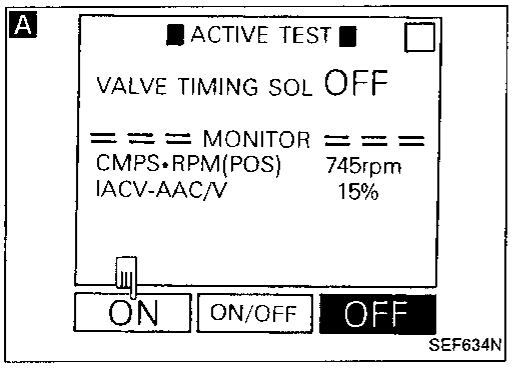
Harness layout

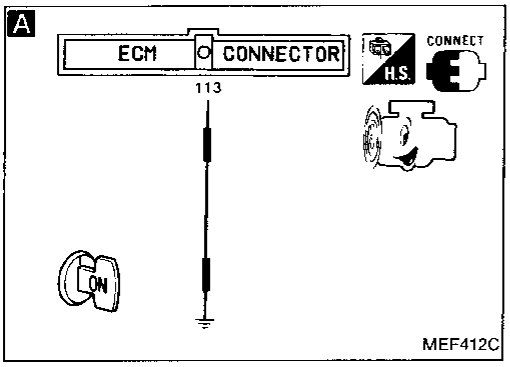


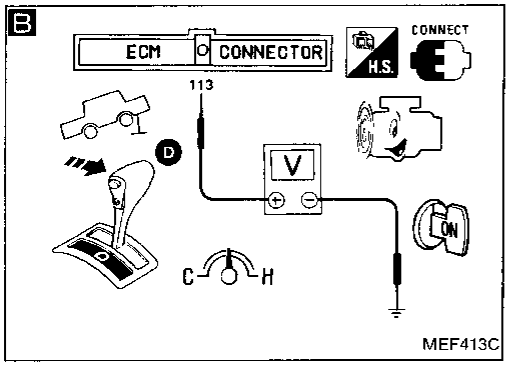


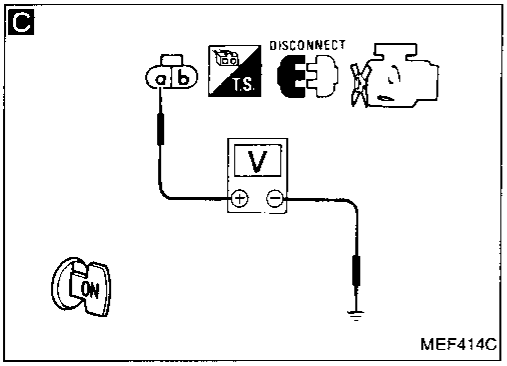


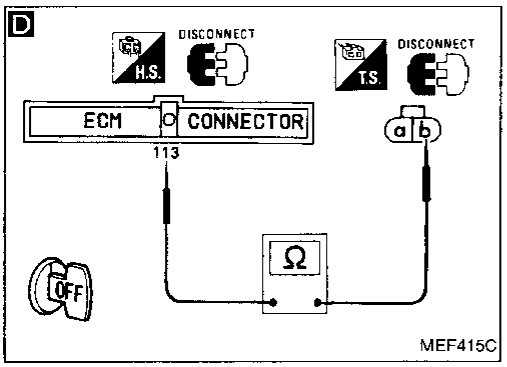
VALVE TIMING CONTROL (Not self-diagnostic item)











INSPECTION START

A

CHECK MECHANICAL FUNCTION.

1) Start engine and run it at idle.
2) Perform "VALVE TIMING SOL" in "ACTIVE TEST" mode with CONSULT and make sure that improper idle condition occurs.

OR

1) Connect a suitable jumper wire between ECM terminal (113) and body ground.
2) Start engine and make sure that improper idle condition occurs.

Occurs. → INSPECTION END

Does not occur.

B

CHECK ELECTRICAL CONTROL FUNCTION.

1) Stop engine.
2) Jack up drive wheel.
3) Start engine and warm it up sufficiently.
4) Shift select lever to any position except "N" or "P" position.
5) Check voltage between ECM terminal (113) and ground under the following conditions with CONSULT or tester.

Voltage:

Engine speed is about 2,000 rpm
Approximately 0V
At idle
Battery voltage

OK → CHECK COMPONENT (VTC solenoid valve and VTC valve).
Refer to "Electrical Components Inspection". (See page EF & EC-221.)

NG → Replace malfunctioning component(s).

NG

C

CHECK POWER SUPPLY.

1) Stop engine.
2) Disconnect VTC solenoid valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓐ and ground with CONSULT or tester.

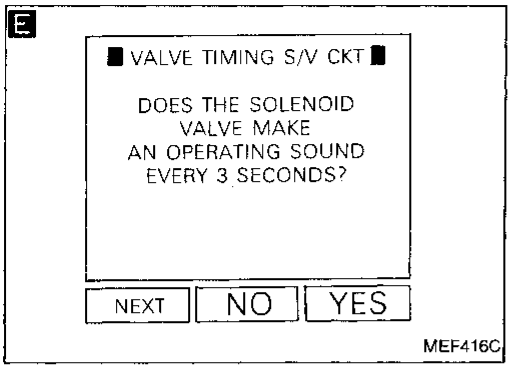
Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F23), (M74)
- HEC harness connector (M1)
- 7.5A fuse
- Harness continuity between VTC solenoid valve and HEC

If NG, repair harness or connectors.

OK → Ⓐ

VALVE TIMING CONTROL (Not self-diagnostic item)



Ⓐ

D

CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal (113) and terminal ⓑ.
Continuity should exist.

NG → Repair harness or connectors.

OK

E

CHECK COMPONENT
(VTC solenoid valve).

Perform "VALVE TIMING S/V CKT" in "FUNCTION TEST" mode with CONSULT.

OR

Refer to "Electrical Components Inspection".
(See page EF & EC-221.)

NG → Replace VTC solenoid valve.

OK

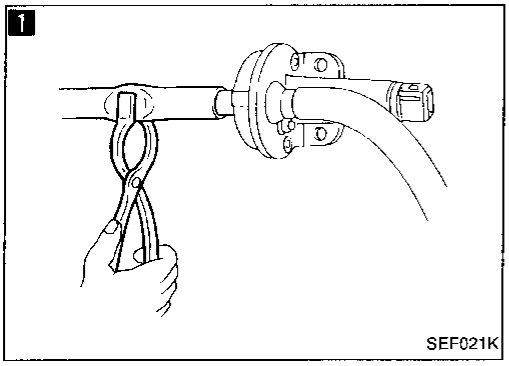
Disconnect and reconnect harness connectors in the circuit. Then retest.

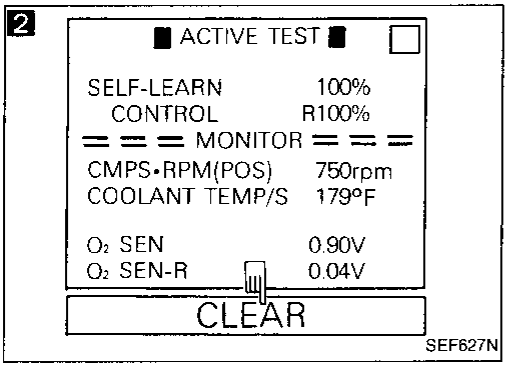
Trouble is not fixed.

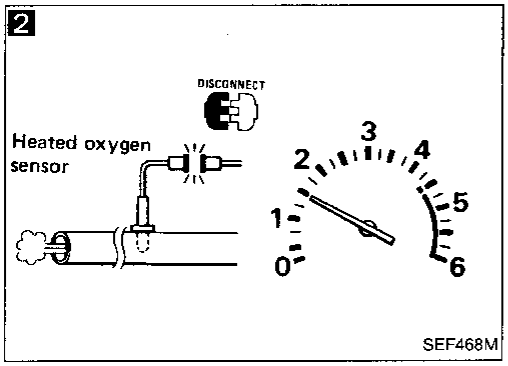
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

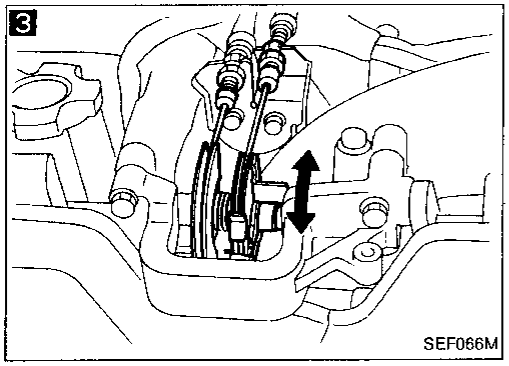
INSPECTION END

Diagnostic Procedure 32 — High Idling after Warm-up









1

CHECK IACV-AIR REGULATOR.
When pinching the IACV-air regulator hose, does the engine speed drop?

Yes → Check IACV-air regulator and circuit.

No ↓

2

CHECK INTAKE AIR LEAK.

1. Select "SELF-LEARN CONT" in "ACTIVE TEST" mode.
2. Clear the self-learning control coefficient by touching "CLEAR".
3. Does the engine speed drop?

Yes → Discover air leak location and repair.

OR

1. Disconnect heated oxygen sensor harness connectors.
2. After racing engine at 1,500 rpm under no load for about 30 seconds, does the engine speed drop?

No ↓

3

CHECK THROTTLE LINKAGE.

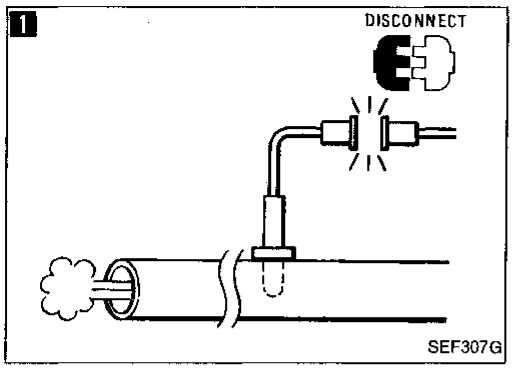
1. Check that throttle linkage moves smoothly.
2. Confirm that throttle valve both fully opens and fully closes.

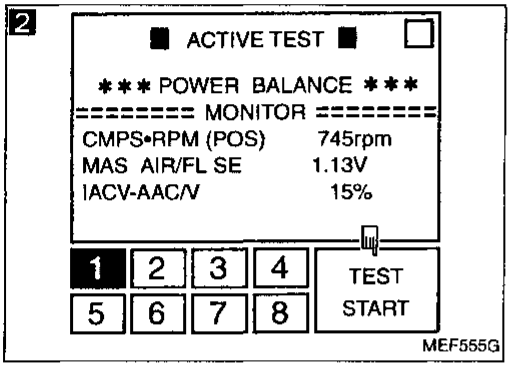
NG → Repair throttle linkage or sticking of throttle valve.

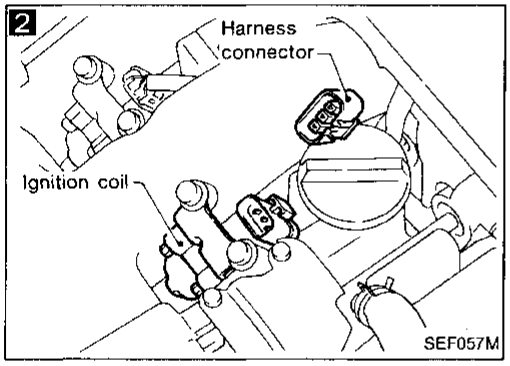
OK ↓

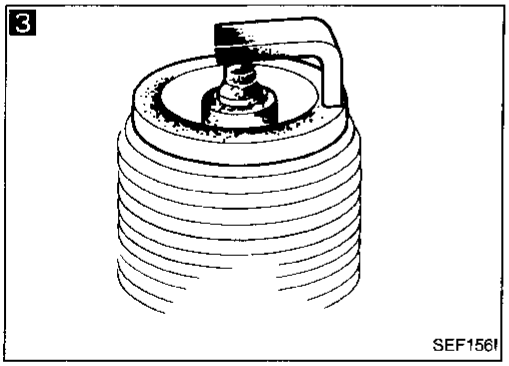
INSPECTION END

Diagnostic Procedure 33 — Hunting









1

CHECK HEATED OXYGEN SENSORS.
When disconnecting heated oxygen sensor harness connectors, is the hunting fixed?

Yes → Check heated oxygen sensor(s). (See pages EF & EC-103, 136.)

No ↓

2

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 ignition coil harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?

No → Go to **4** .

Yes ↓

3

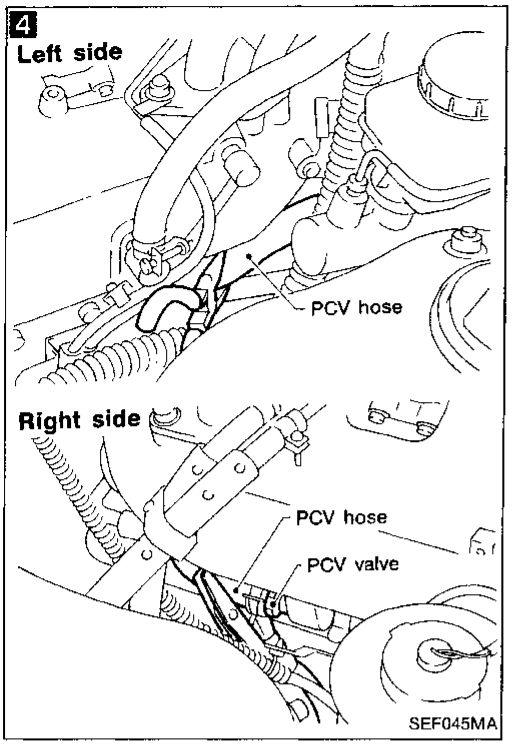
CHECK SPARK PLUGS.
Remove the spark plugs and check for fouling, etc.

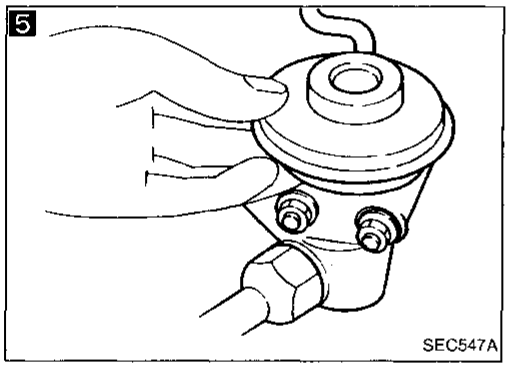
NG → Repair or replace spark plug(s).

OK ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 33 — Hunting (Cont'd)





Ⓐ

4

CHECK FOR INTAKE AIR LEAK.
When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

Yes → Discover air leak location and repair.

No

5

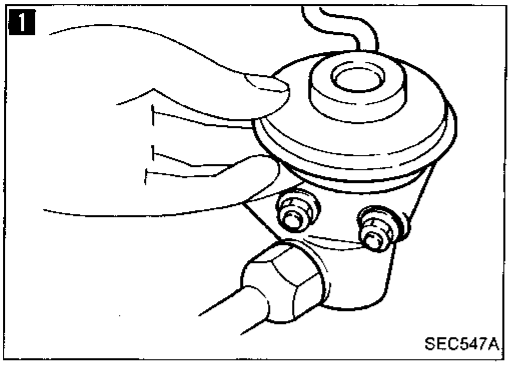
CHECK EGR VALVE.
Check EGR valve for sticking.

NG → Repair or replace.

OK

INSPECTION END

Diagnostic Procedure 34 — Unstable Idle



1

CHECK EGR VALVE.
Check EGR valve for sticking.

NG → Repair or replace.

OK ↓

2

PERFORM POWER BALANCE TEST.

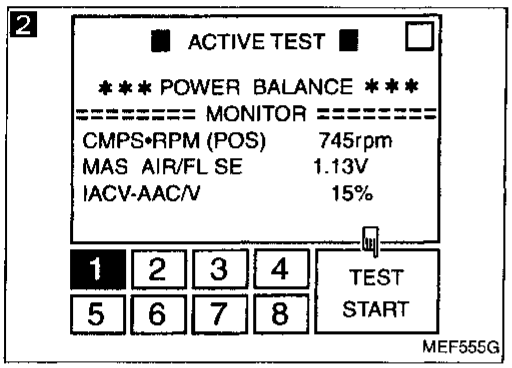
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

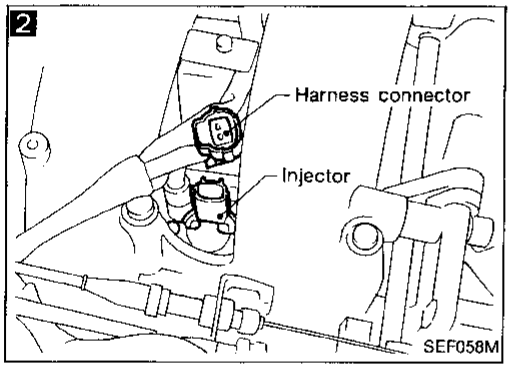
No → Go to 6 .

OR

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

Yes ↓





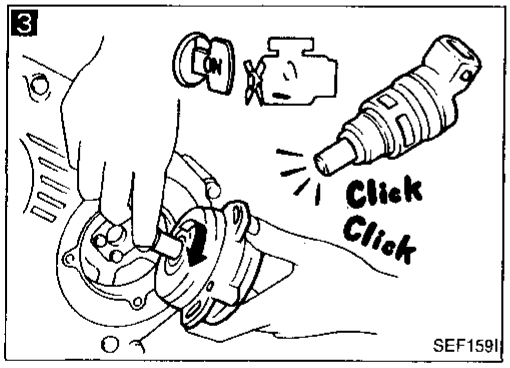
3

CHECK INJECTOR.

1. Remove camshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating camshaft position sensor shaft, does each injector make an operating sound?

No → Check injector(s) and circuit(s).

Yes ↓



4

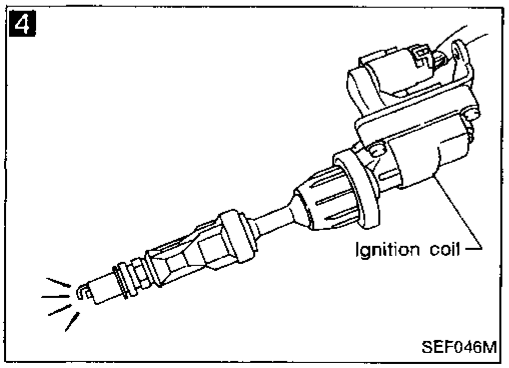
CHECK IGNITION SPARK.

1. Disconnect ignition coil assembly from collector.
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 ignition coil, power transistor unit and their circuits. (See page EF & EC-95.)

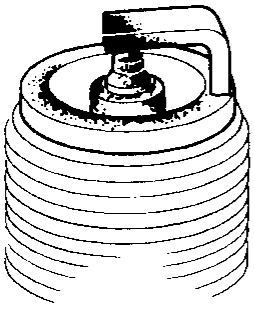
OK ↓

(Go to Ⓐ on next page.)



Diagnostic Procedure 34 — Unstable Idle (Cont'd)

5



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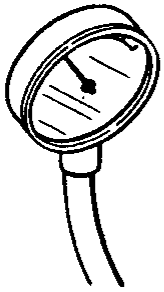
6

■ FUEL PRES RELEASE ■

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

START



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Ⓐ

5

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

NG → Repair or replace spark plug(s).

OK

6

CHECK FUEL PRESSURE.

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.
   At idle:
   Approx. 255 kPa
   (2.6 kg/cm², 37 psi)

NG → Check fuel pump and circuit.

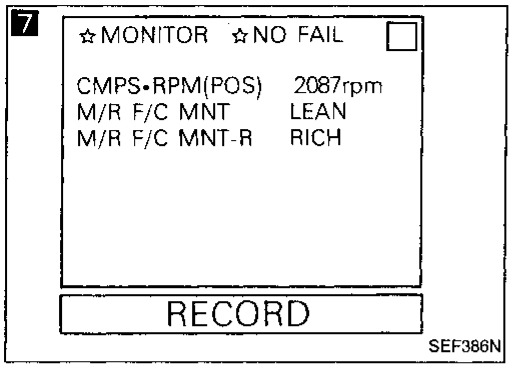
OR

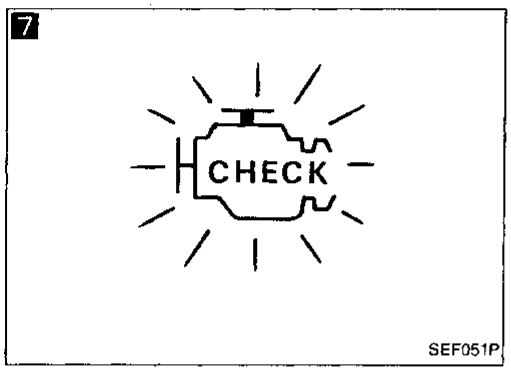
1. Release fuel pressure to zero. (Refer to page EF & EC-223)
2. Install fuel pressure gauge and check fuel pressure.

OK

(Go to Ⓑ on next page.)

Diagnostic Procedure 34 — Unstable Idle (Cont'd)





Ⓑ

7

CHECK HEATED OXYGEN SENSOR.

1. See "M/R F/C MNT (right and left sides)" 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

NG → Replace heated oxygen sensor(s).

OR

1. Set "Heated oxygen sensor monitor" in On-board Diagnostic System — Diagnostic Test Mode II. (See page EF & EC-54.)
2. Maintaining engine at 2,000 rpm under no-load, check that the malfunction indicator lamp goes ON and OFF more than 5 times during 10 seconds.

OK ↓

8

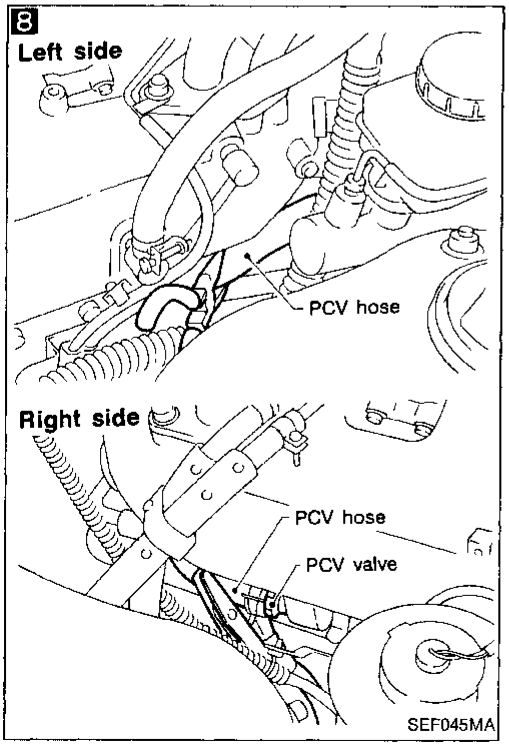
CHECK FOR INTAKE AIR LEAK.

When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

Yes → Discover air leak location and repair.

No ↓

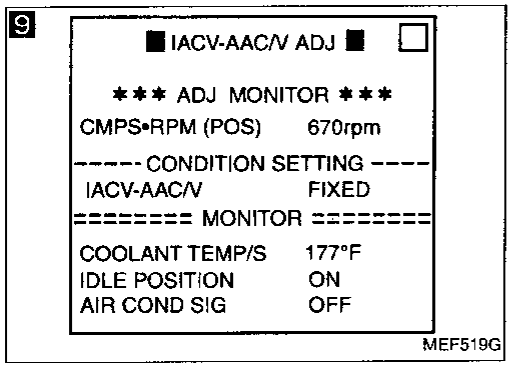
(Go to Ⓒ on next page.)



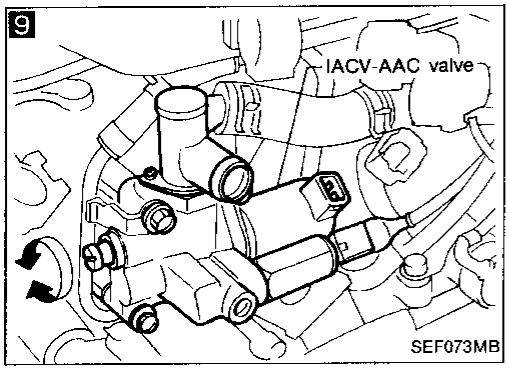
Diagnostic Procedure 34 — Unstable Idle (Cont'd)

©

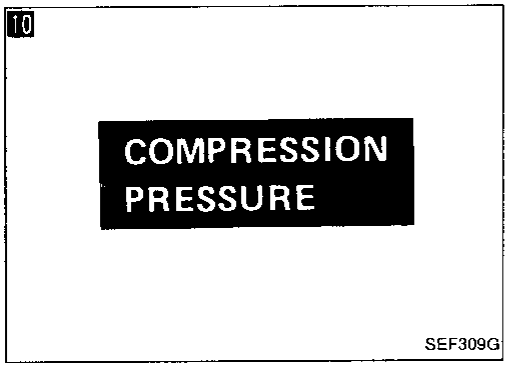
9



9



10



9

CHECK IDLE ADJ. SCREW CLOGGING.

1. Perform "IACV-AAC/V ADJ" in "WORK SUPPORT" mode.
2. Can you set engine speed as follows by turning idle adjusting screw?
   670±25 rpm
   (in "N" position)

No → Check for IAS clogging or throttle valve clogging.

OR

1. Disconnect IACV-AAC valve harness connector.
2. Can you set engine speed as follows by turning idle adjusting screw?
   670±25 rpm
   (in "N" position)

Yes

10

CHECK COMPRESSION PRESSURE.

- Check compression pressure.

Standard: kPa (kg/cm², psi)/300 rpm
1,285 (13.1, 186)
Minimum: kPa (kg/cm², psi)/300 rpm
981 (10.0, 142)
Difference between each cylinder: kPa (kg/cm², psi)/300 rpm
98 (1.0, 14)

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

OK

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector.

NG → Repair or replace.

OK

Reconnect ECM harness connector and retest.

Trouble is not fixed.

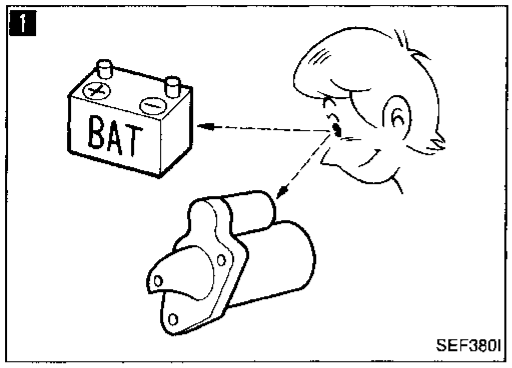
TRY A KNOWN GOOD ECM*

OK

INSPECTION END

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

Diagnostic Procedure 35 — Hard to Start or Impossible to Start when the Engine is Cold

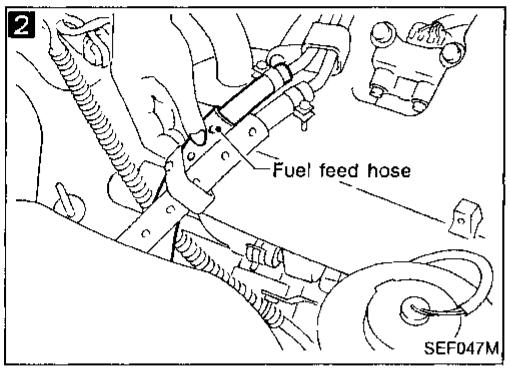


1

CHECK BATTERY AND STARTER.
Check battery and starter condition.
(Refer to "BATTERY" and "STARTING SYSTEM" in EL section.)

NG → Repair or replace.

OK ↓

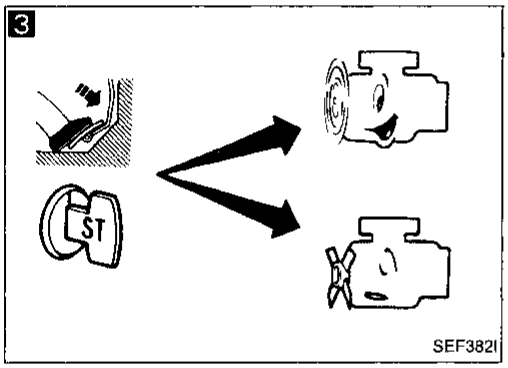


2

CHECK FUEL PRESSURE.
1. Pinch fuel feed hose with fingers.
2. When cranking the engine, is there any pressure on the fuel feed hose?

No → Check fuel pump and circuit. (See page EF & EC-146.)

Yes ↓

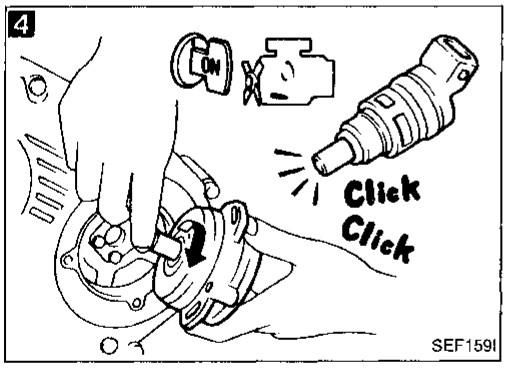


3

CHECK IACV-AIR REGULATOR AND IACV-AAC VALVE.
When pressing accelerator pedal fully, can you start the engine.

Yes → Check IACV-AAC valve, IACV-air regulator and circuits. (See pages EF & EC-152 - 156.)

No ↓

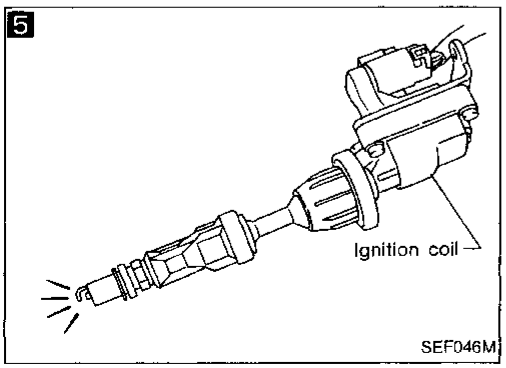


4

CHECK INJECTOR.
1. Remove camshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating camshaft position sensor shaft, does each injector make an operating sound?

No → Check injector(s) and circuit(s).

Yes ↓



5

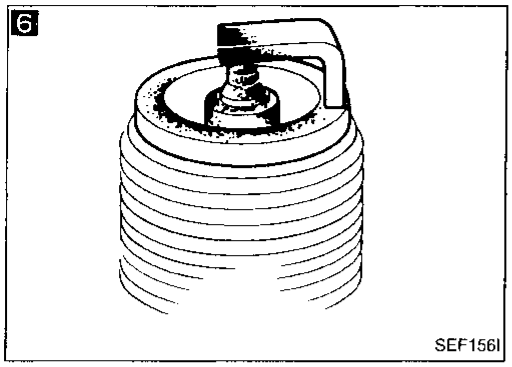
CHECK IGNITION SPARK.
1. Disconnect ignition coil assembly from collector.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

NG → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-95.)

OK ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 35 — Hard to Start or Impossible to Start when the Engine is Cold (Cont'd)



Ⓐ

6

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

NG → Repair or replace spark plug(s).

OK ↓

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector.

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-80.

NG → Repair or replace.

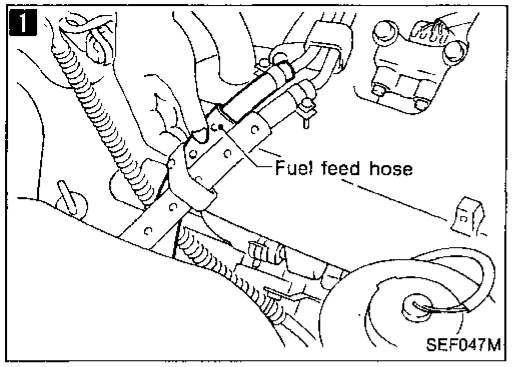
OK ↓

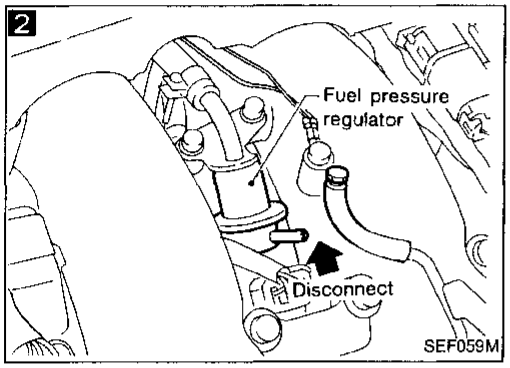
TRY A KNOWN GOOD ECM*

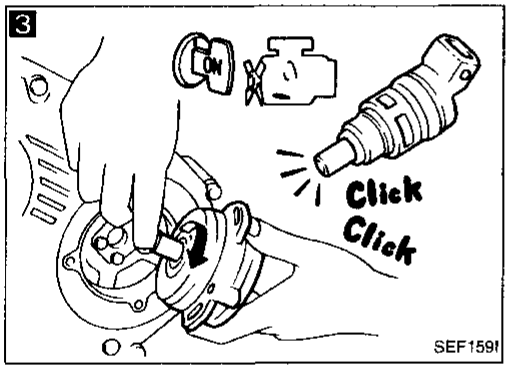
INSPECTION END

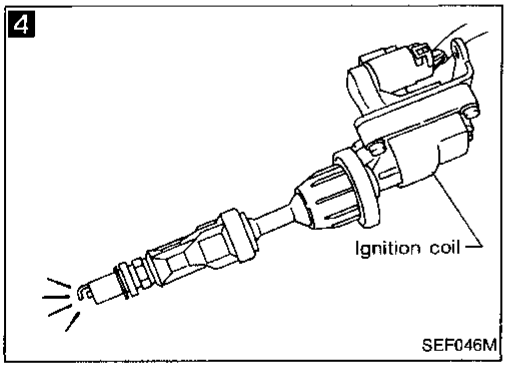
*: ECM may be the cause of a problem, but this is rarely the case.

Diagnostic Procedure 36 — Hard to Start or Impossible to Start when the Engine is Hot









1

CHECK FUEL PRESSURE.
1. Pinch fuel feed hose with fingers.
2. When cranking the engine, is there any pressure on the fuel feed hose?

No → Check fuel pump and circuit. (See page EF & EC-146.)

Yes ↓

2

CHECK FUEL VAPOR.
1. Disconnect fuel pressure regulator vacuum hose and plug hose.
2. Can you start engine?

Yes → Check fuel properties.

No ↓

3

CHECK INJECTOR.
1. Remove camshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating camshaft position sensor shaft, does each injector make an operating sound?

No → Check injector(s) and circuit(s).

Yes ↓

4

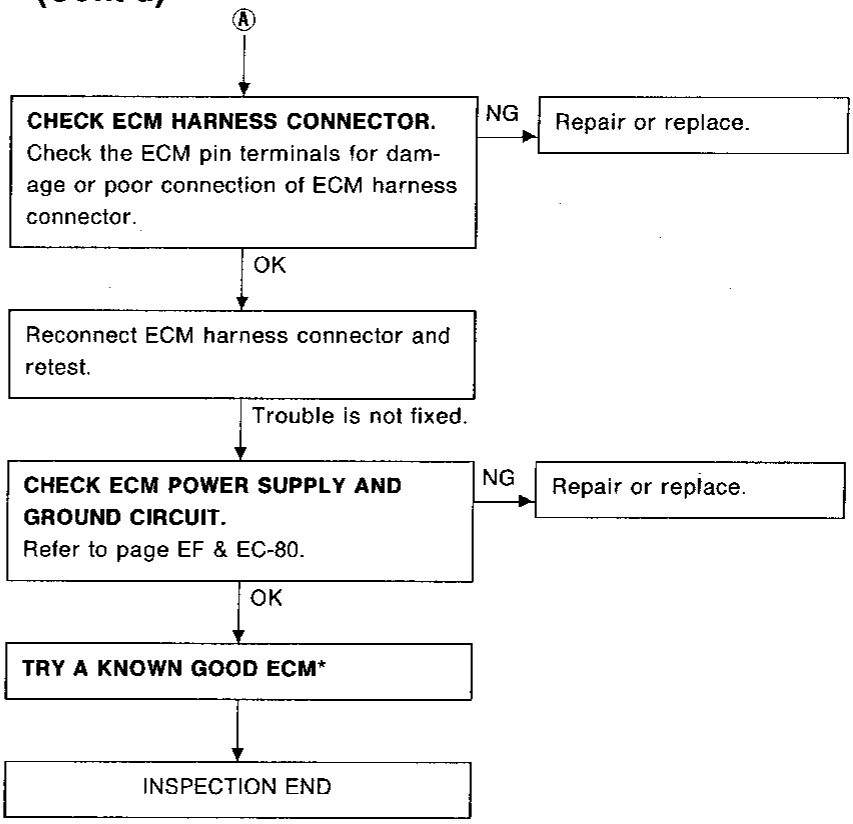
CHECK IGNITION SPARK.
1. Disconnect ignition coil assembly from collector.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

NG → Check ignition coil, power transistor unit and circuits. (See page EF & EC-95.)

OK ↓

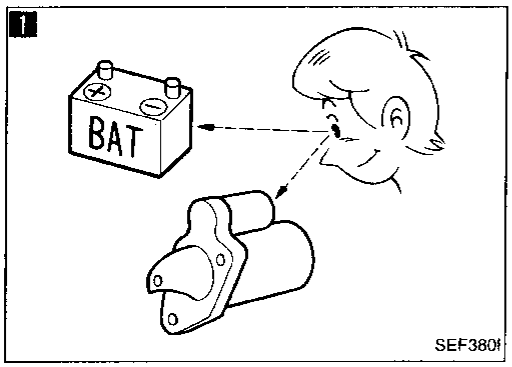
(Go to Ⓐ on next page.)

Diagnostic Procedure 36 — Hard to Start or Impossible to Start when the Engine is Hot (Cont'd)



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

Diagnostic Procedure 37 — Hard to Start or Impossible to Start under Normal Conditions

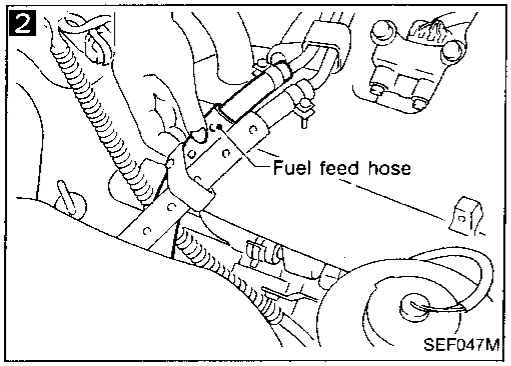


1

CHECK BATTERY AND STARTER.
Check battery and starter operation.
(Refer to "BATTERY" and "STARTING SYSTEM" in EL section.)

NG → Repair or replace.

OK ↓

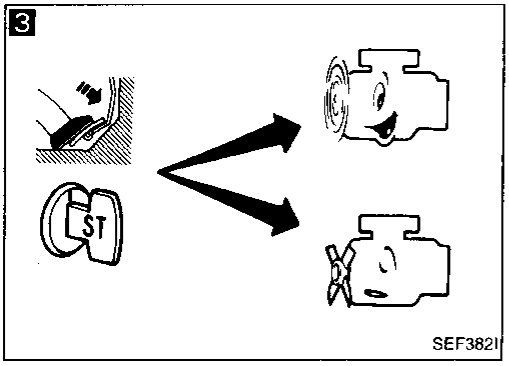


2

CHECK FUEL PRESSURE.
1. Pinch fuel feed hose with fingers.
2. When cranking the engine, is there any pressure on the fuel feed hose?

No → Check fuel pump and circuit. (See page EF & EC-146.)

Yes ↓

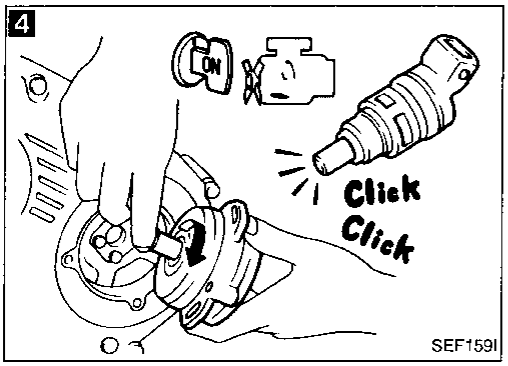


3

CHECK INJECTOR FOR LEAKAGE.
When pressing accelerator pedal fully, can you start the engine.

Yes → Check injector(s) for leakage.

No ↓

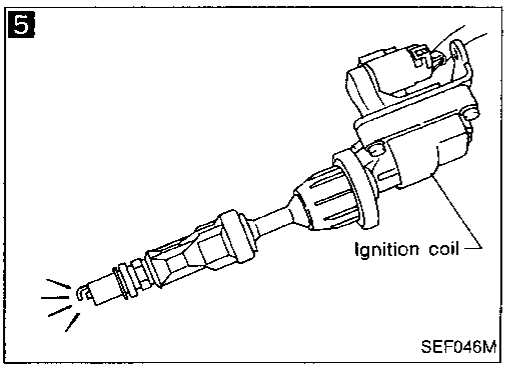


4

CHECK INJECTOR.
1. Remove camshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating camshaft position sensor shaft, does each injector make an operating sound?

No → Check injectors and circuits.

Yes ↓



5

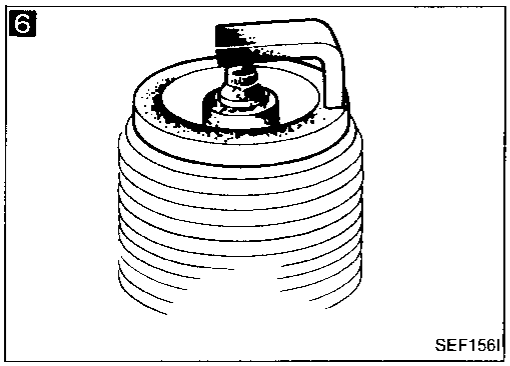
CHECK IGNITION SPARK.
1. Disconnect ignition coil assembly from collector.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

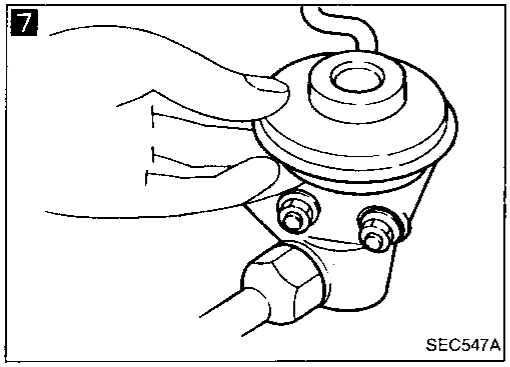
NG → Check ignition coil, power transistor unit and circuits. (See page EF & EC-95.)

OK ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 37 — Hard to Start or Impossible to Start under Normal Conditions (Cont'd)





Ⓐ

6

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

NG → Repair or replace spark plug(s).

OK ↓

7

CHECK EGR VALVE.
Check EGR valve for sticking.

NG → Repair or replace.

OK ↓

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector.

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-80.

NG → Repair or replace.

OK ↓

TRY A KNOWN GOOD ECM*

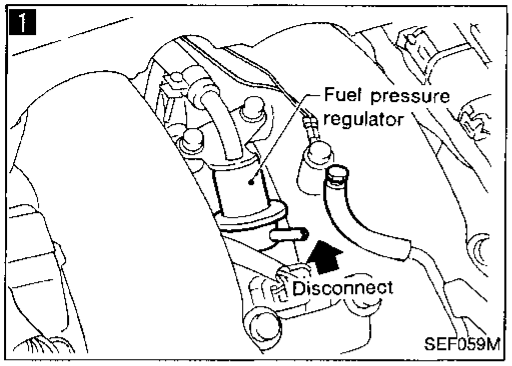
CHECK TIMING BELT FOR PROPER INSTALLATION.

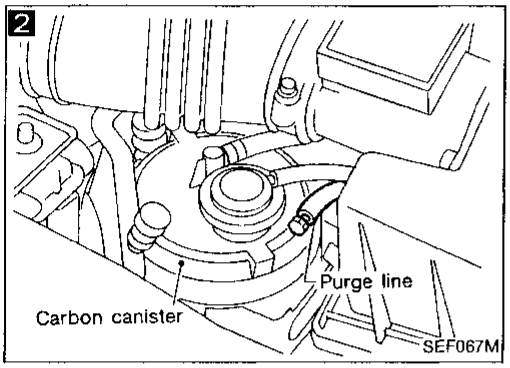
NG → Replace timing belt.

OK ↓

INSPECTION END

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





Diagnostic Procedure 38 — Hesitation when the Engine is Hot

1

CHECK FUEL VAPOR.
1. Disconnect fuel pressure regulator vacuum hose and plug hose.
2. Perform cruise test.
3. Does the hesitation disappear?

Yes → Check fuel properties.

No ↓

2

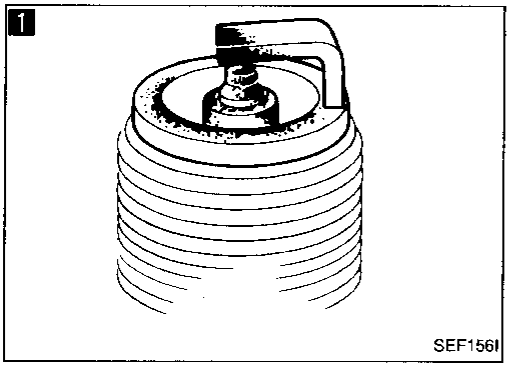
CHECK CANISTER PURGE.
1. Disconnect canister purge line hose and plug hose.
2. Perform cruise test.
3. Does the hesitation disappear?

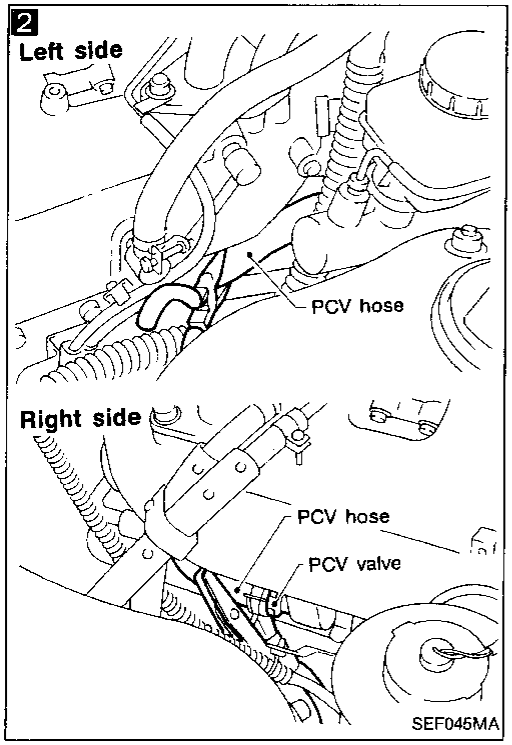
Yes → Check purge and vacuum lines.

No ↓

INSPECTION END

Diagnostic Procedure 39 — Hesitation when the Engine is Cold





1

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

NG → Repair or replace spark plug(s).

OK ↓

2

CHECK FOR INTAKE AIR LEAK.
When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

Yes → Discover air leak location and repair.

No ↓

TRY A KNOWN GOOD MASS AIR FLOW SENSOR.

Trouble is fixed. → Replace mass air flow sensor.

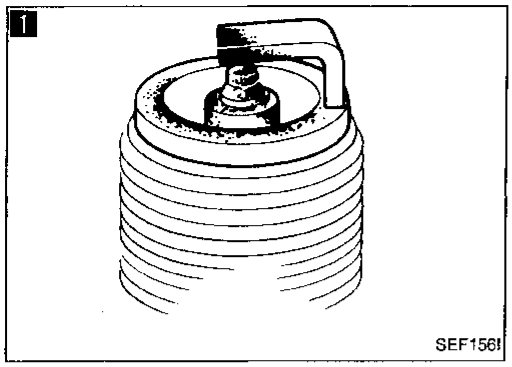
Trouble is not fixed. ↓

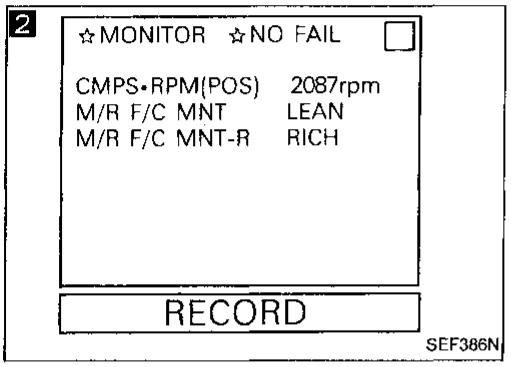
CHECK FOR INTAKE VALVE DEPOSITS.
If there are deposits on intake valves, remove them.

↓

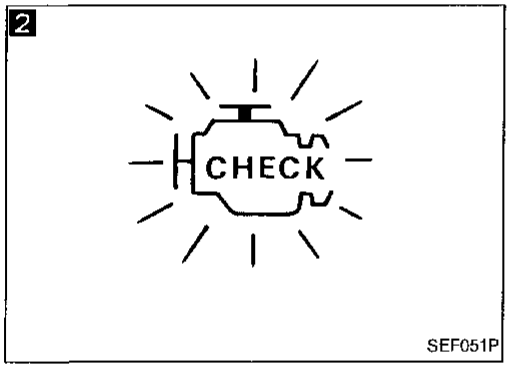
INSPECTION END

Diagnostic Procedure 40 — Hesitation under Normal Conditions

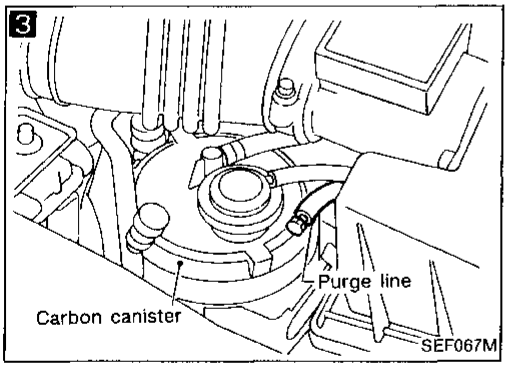

SEF156I



SEF386N



SEF051P



SEF067M

1

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

NG → Repair or replace spark plug(s).

OK ↓

2

CHECK HEATED OXYGEN SENSOR.

1. See "M/R F/C MNT (right and left sides)" in "DATA MONITOR" mode.
2. Maintaining engine at 2,000 rpm under no-load (with engine 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

Yes → Replace heated oxygen sensor(s).

OR

1. Set "Heated oxygen sensor monitor" in On-board Diagnostic System — Diagnostic Test Mode II. (See page EF & EC-54.)
2. Maintaining engine at 2,000 rpm under no load, check that the malfunction indicator lamp goes ON and OFF more than 5 times during 10 seconds.

No ↓

3

CHECK CANISTER PURGE.

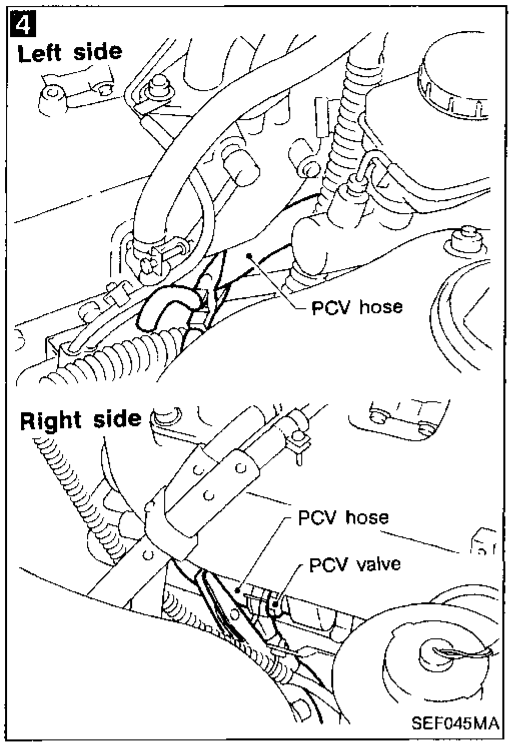
1. Disconnect canister purge line hose and plug hose.
2. Perform cruise test.
3. Does the hesitation disappear?

Yes → Check purge and vacuum lines.

No ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 40 — Hesitation under Normal Conditions (Cont'd)



Ⓐ

4

CHECK FOR INTAKE AIR LEAK.
When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

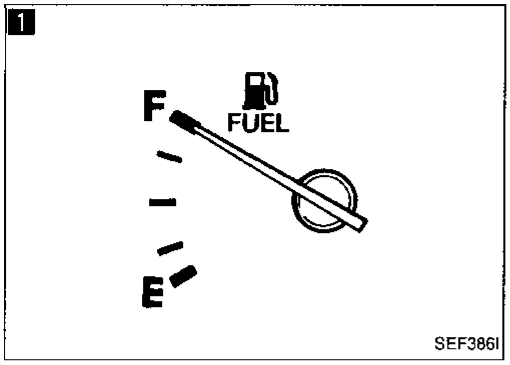
Yes → Discover air leak location and repair.

No ↓

INSPECTION END

Diagnostic Procedure 41 — Engine Stalls when Turning

1

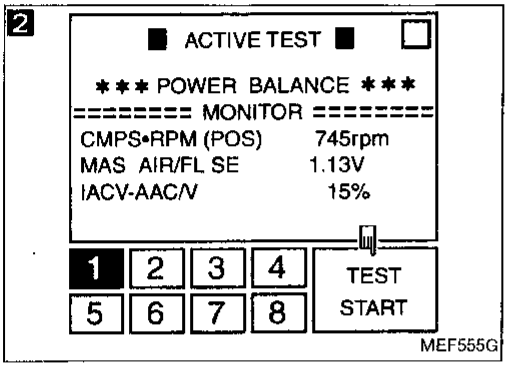


CHECK FUEL LEVEL.
Check to see that there is enough fuel in tank.

NG → Fill fuel tank with fuel.

OK ↓

2



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?

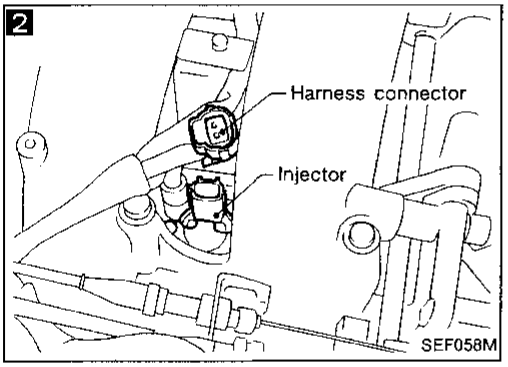
OR

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 5 .

Yes ↓

2



3

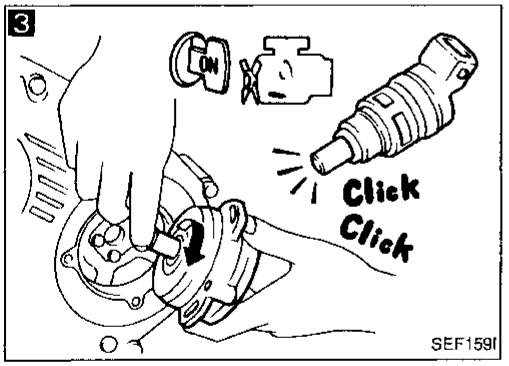
CHECK INJECTOR.

1. Remove camshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating camshaft position sensor shaft, does each injector make an operating sound?

No → Check injector(s) and circuit(s).

Yes ↓

3



4

CHECK IGNITION SPARK.

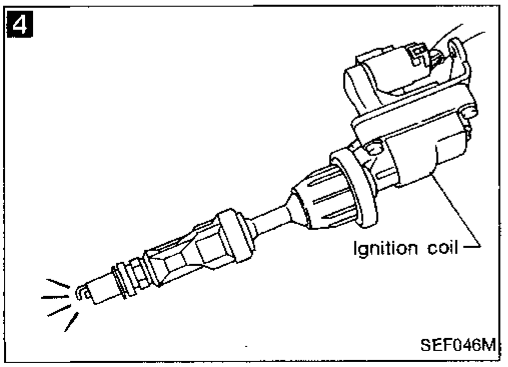
1. Disconnect ignition coil assembly from collector.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

NG → Check ignition coil, power transistor unit and circuits. (See page EF & EC-95.)

OK ↓

(Go to Ⓐ on next page.)

4



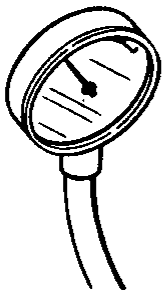
Diagnostic Procedure 41 — Engine Stalls when Turning (Cont'd)

5

■ FUEL PRES RELEASE ■

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

START



SEF204J

Ⓐ

5

CHECK FUEL PRESSURE.

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.

At idle:
Approx. 255 kPa (2.6 kg/cm², 37 psi)
The moment throttle valve is fully open:
Approx. 304 kPa (3.1 kg/cm², 44 psi)

NG → Check fuel pressure regulator diaphragm.

— OR —

1. Release fuel pressure to zero. (Refer to page EF & EC-223.)
2. Install fuel pressure gauge and check fuel pressure.

OK ↓

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector.

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-80.

NG → Repair or replace.

OK ↓

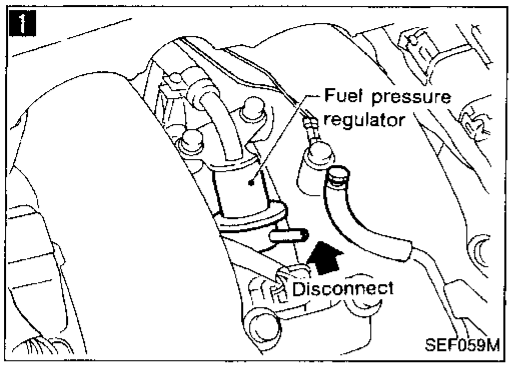
TRY A KNOWN GOOD ECM*

INSPECTION END

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

Diagnostic Procedure 42 — Engine Stalls when the Engine is Hot

1

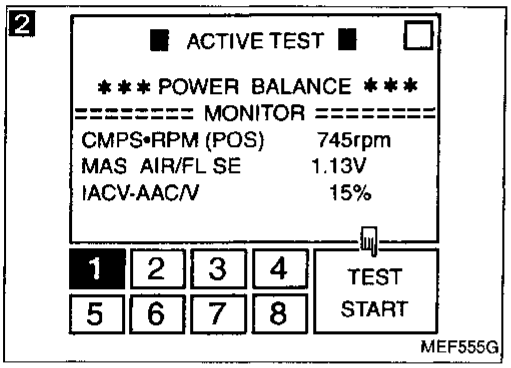


CHECK FUEL VAPOR.
1. Disconnect fuel pressure regulator vacuum hose and plug hose.
2. Perform cruise test.
3. Does the engine stall disappear?

Yes → Check fuel properties.

No ↓

2



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?

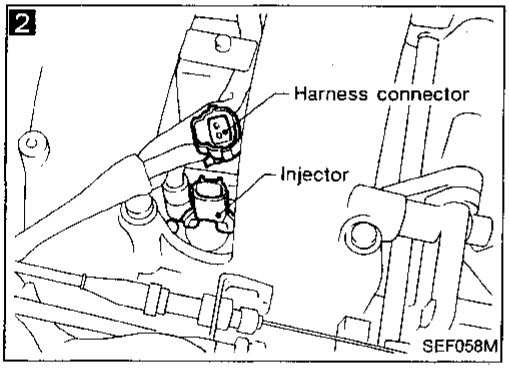
— OR —

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 5.

Yes ↓

2



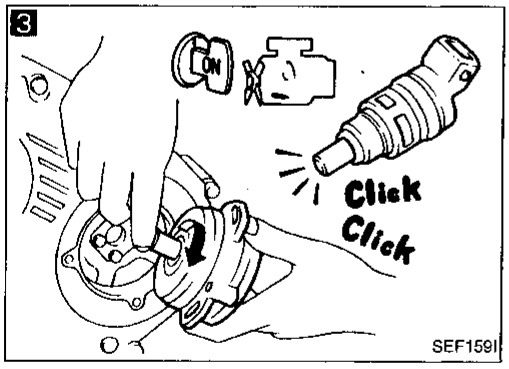
3

CHECK INJECTOR.
1. Remove camshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating camshaft position sensor shaft, does each injector make an operating sound?

No → Check injector(s) and circuit(s).

Yes ↓

3



4

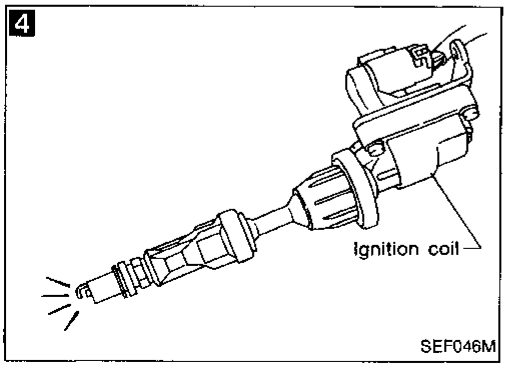
CHECK IGNITION SPARK.
1. Disconnect ignition coil assembly from collector.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

NG → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-95.)

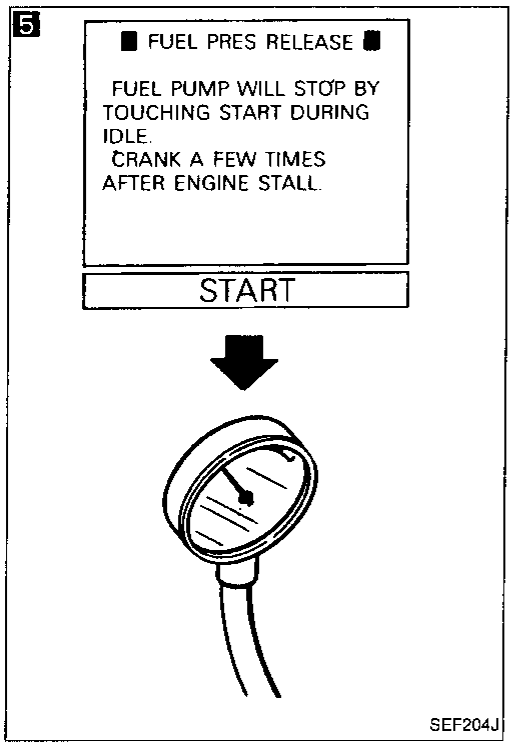
Yes ↓

(Go to Ⓐ on next page.)

4



Diagnostic Procedure 42 — Engine Stalls when the Engine is Hot (Cont'd)



Ⓐ

5

CHECK FUEL PRESSURE.

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.

At idle:
Approx. 255 kPa (2.6 kg/cm², 37 psi)
The moment throttle valve is fully open:
Approx. 304 kPa (3.1 kg/cm², 44 psi)

NG → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-223.)
2. Install fuel pressure gauge and check fuel pressure.

OK ↓

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector.

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-80.

NG → Repair or replace.

OK ↓

TRY A KNOWN GOOD ECM*

CHECK TIMING BELT FOR PROPER INSTALLATION.

NG → Replace timing belt.

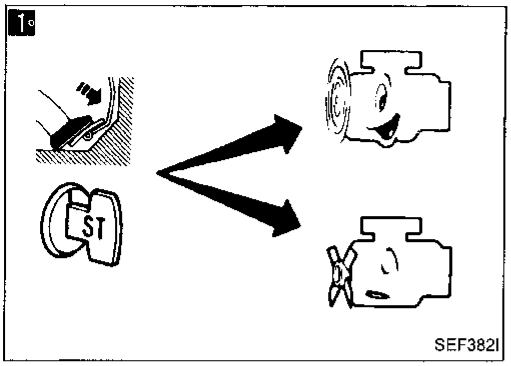
OK ↓

INSPECTION END

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

Diagnostic Procedure 43 — Engine Stalls when the Engine is Cold

1

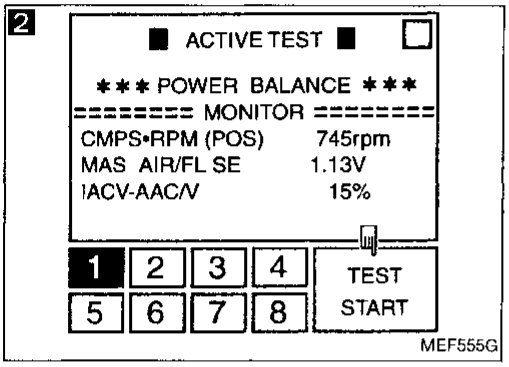


CHECK IACV-AIR REGULATOR AND IACV-AAC VALVE.
When the engine is cold, can you start the engine when pressing accelerator pedal fully?

NG → Check IACV-AAC valve, IACV-air regulator and circuits. (See pages EF & EC-152 - 156.)

OK ↓

2



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?

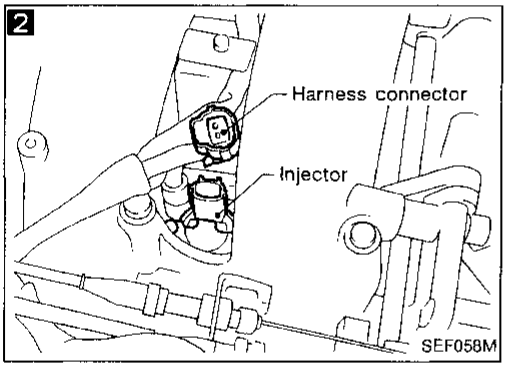
— OR —

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

NG → Go to 6 .

OK ↓

2



3

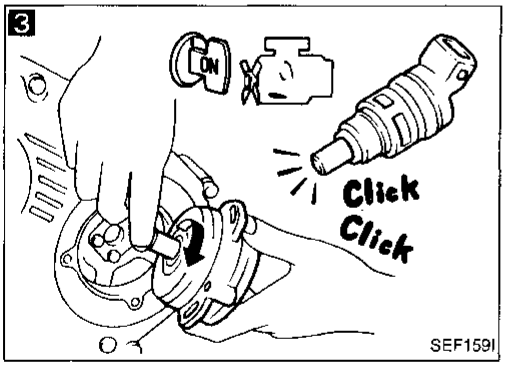
CHECK INJECTOR.

1. Remove camshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating camshaft position sensor shaft, does each injector make an operating sound?

NG → Check injector(s) and circuit(s).

OK ↓

3



4

CHECK IGNITION SPARK.

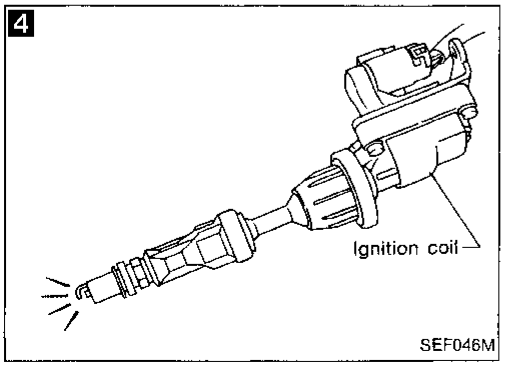
1. Disconnect ignition coil assembly from collector.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

NG → Check ignition coil, power transistor unit and circuits. (See page EF & EC-95.)

OK ↓

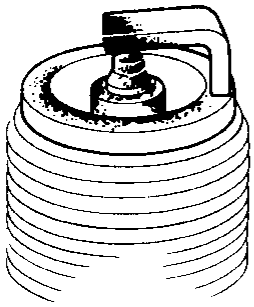
(Go to Ⓐ on next page.)

4



Diagnostic Procedure 43 — Engine Stalls when the Engine is Cold (Cont'd)

5



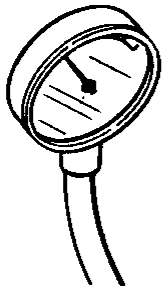
SEF156I

6

■ FUEL PRES RELEASE ■

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

START



SEF204J

Ⓐ

5

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

NG → Repair or replace spark plug(s).

OK

6

CHECK FUEL PRESSURE.

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.
   At idle:
   Approx. 255 kPa (2.6 kg/cm², 37 psi)
   The moment throttle valve is fully open:
   Approx. 304 kPa (3.1 kg/cm², 44 psi)

NG → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-223.)
2. Install fuel pressure gauge and check fuel pressure.

OK

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector.

NG → Repair or replace.

OK

Reconnect ECM harness connector and retest.

Trouble is not fixed.

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-80.

NG → Repair or replace.

OK

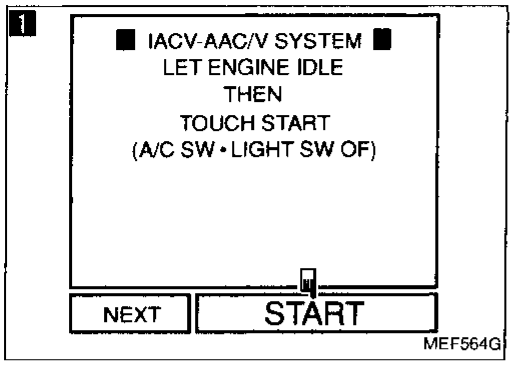
TRY A KNOWN GOOD ECM*

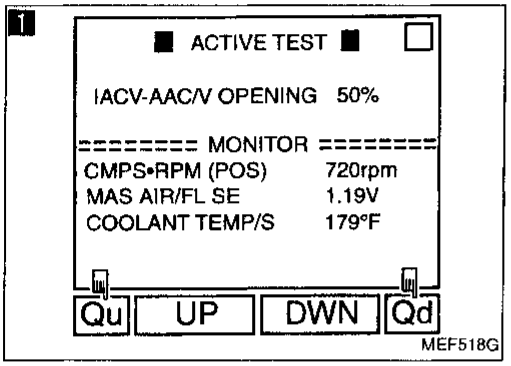
INSPECTION END

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

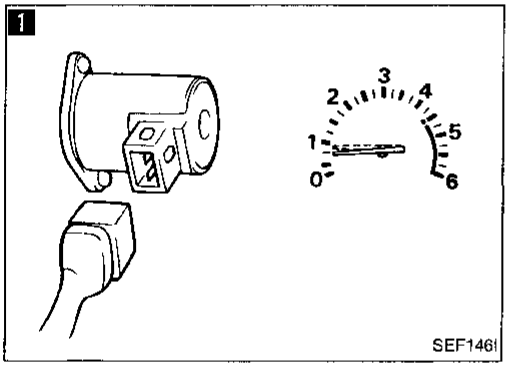
Diagnostic Procedure 44 — Engine Stalls when Stepping on the Accelerator Momentarily

1

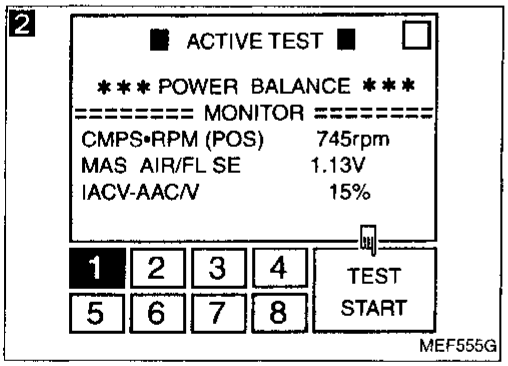




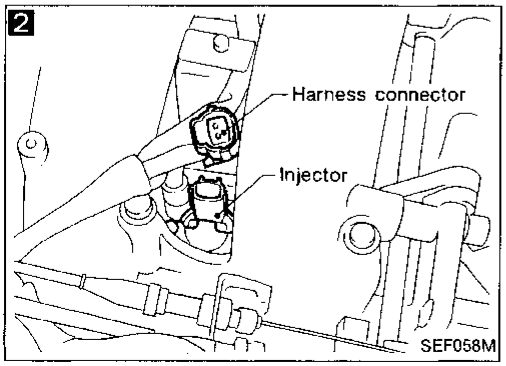
1



2



2



1

CHECK OVERALL FUNCTION.

1. Start engine and warm it up sufficiently.
2. Check idle speed.
   720 ± 50 rpm
   (in "N" position)
3. Perform "IACV-AAC/V SYSTEM" in "FUNCTION TEST" mode with CONSULT.

No → Check IACV-AAC valve and circuit. (See page EF & EC-154.)

OR

1. Select "IACV-AAC/V OPENING" in "ACTIVE TEST" mode.
2. When touching "Qu" and "Qd", does the engine speed change according to the percent of IACV-AAC valve opening?

OR

When disconnecting IACV-AAC valve harness connector, does the engine speed drop?

Yes

2

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?

No → Go to 5 .

OR

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

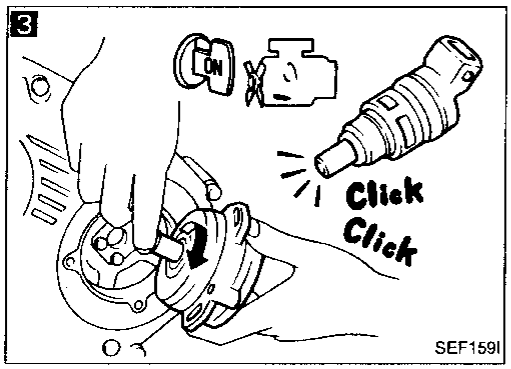
Yes

(Go to Ⓐ on next page.)

Diagnostic Procedure 44 — Engine Stalls when Stepping on the Accelerator Momentarily (Cont'd)

Ⓐ

3



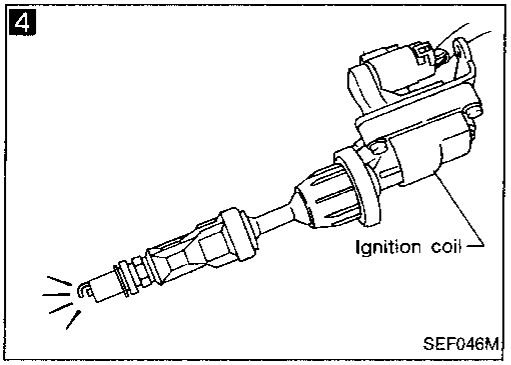
CHECK INJECTOR.

1. Remove camshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating camshaft position sensor shaft, does each injector make an operating sound?

No → Check injector(s) and their circuit(s).

Yes ↓

4



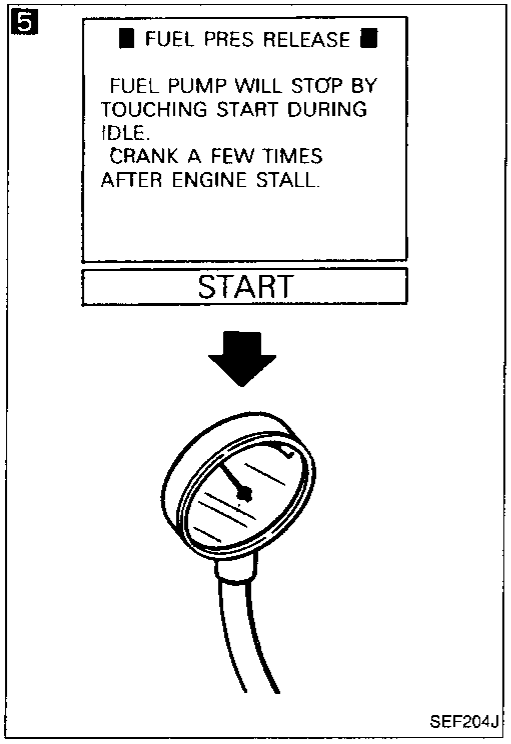
CHECK IGNITION SPARK.

1. Disconnect ignition coil assembly from collector.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against an earth point with engine cranking.
4. Check for spark.

NG → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-95.)

OK ↓

5



CHECK FUEL PRESSURE.

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.

At idle:
Approx. 255 kPa (2.6 kg/cm², 37 psi)
The moment throttle valve is fully open:
Approx. 304 kPa (3.1 kg/cm², 44 psi)

NG → Check fuel pressure regulator diaphragm.

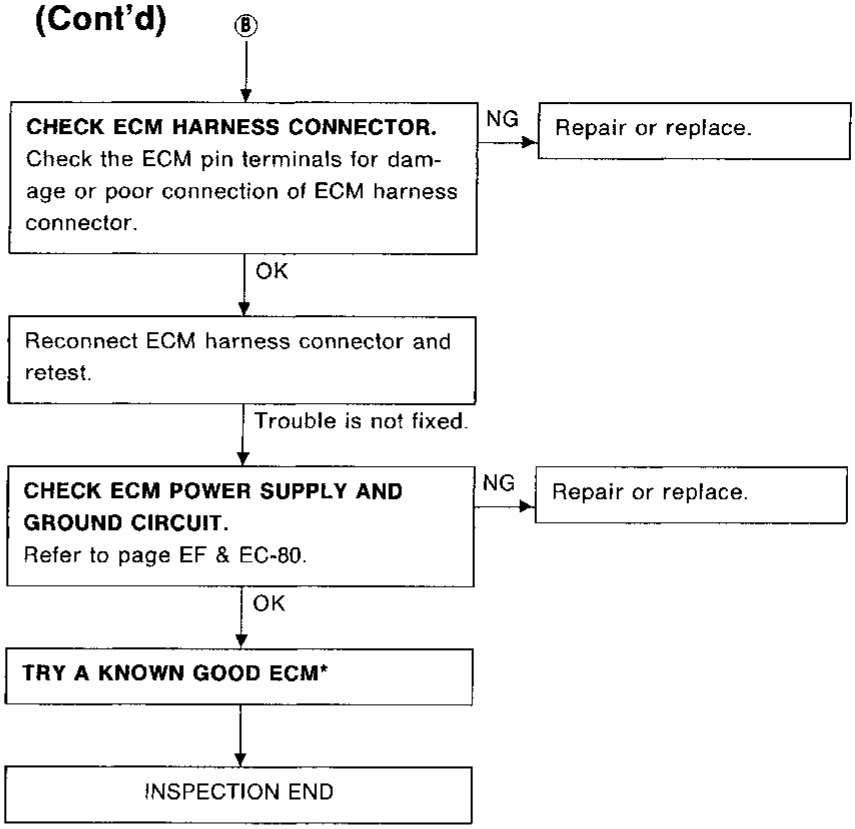
OR

1. Release fuel pressure to zero. (Refer to page EF & EC-223.)
2. Install fuel pressure gauge and check fuel pressure.

OK ↓

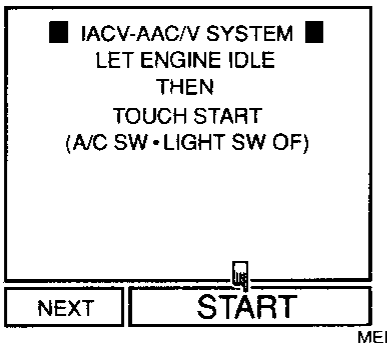
(Go to Ⓑ on next page.)

Diagnostic Procedure 44 — Engine Stalls when Stepping on the Accelerator Momentarily (Cont'd)



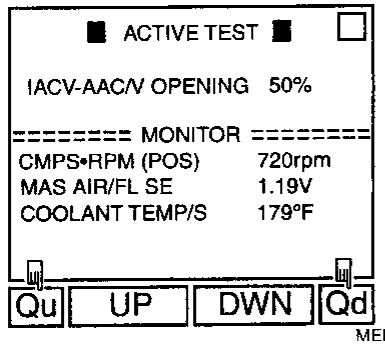
*: ECM may be the cause of a problem, but this is rarely the case.

1



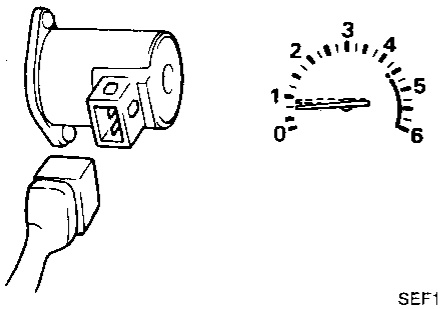
MEF564G

1



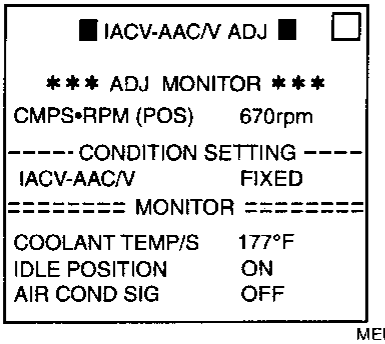
MEF518G

1



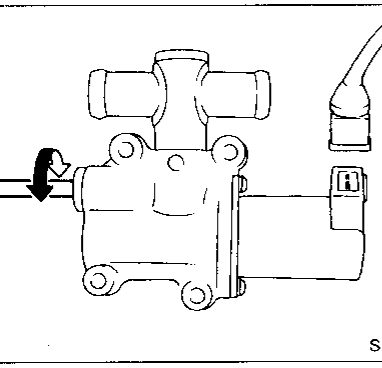
SEF146I

2



MEF519G

2



SEF161I

Diagnostic Procedure 45 — Engine Stalls after Decelerating

1

CHECK OVERALL FUNCTION.

1. Start engine and warm it up sufficiently.
2. Check idle speed.
   720 ± 50 rpm
   (in "N" position)
3. Perform "IACV-AAC/V SYSTEM" in "FUNCTION TEST" mode with CONSULT.

OR

1. Select "IACV-AAC/V OPENING" in "ACTIVE TEST" mode.
2. When touching "Qu" and "Qd", does the engine speed change according to the percent of IACV-AAC valve opening?

OR

When disconnecting IACV-AAC valve harness connector, does the engine speed drop?

No → Check IACV-AAC valve and circuit. (See page EF & EC-154.)

Yes

2

CHECK IDLE ADJ. SCREW CLOGGING.

1. Perform "IACV-AAC/V ADJ" in "WORK SUPPORT" mode.
2. Can you set engine speed as follows by turning idle adjusting screw?
   670 ± 25 rpm
   (in "N" position)

OR

1. Disconnect IACV-AAC valve harness connector
2. Can you set engine speed as follows by turning idle adjusting screw?
   670 ± 25 rpm
   (in "N" position)

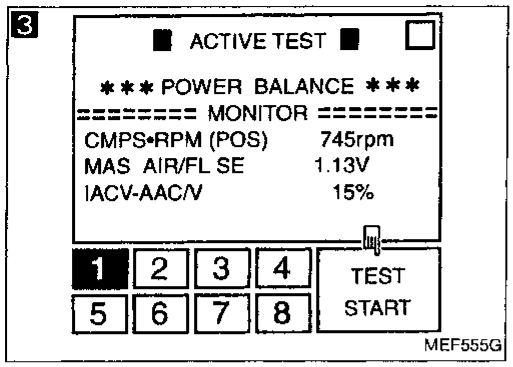
No → Check for IAS clogging or throttle body clogging.

Yes

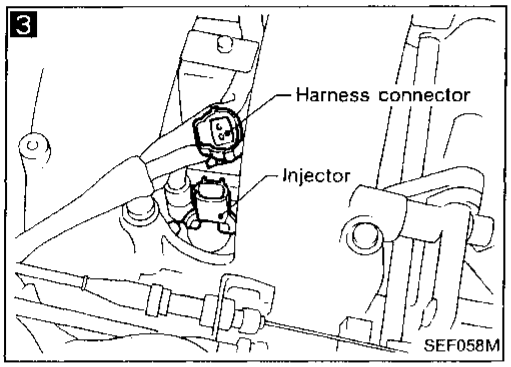
(Go to Ⓐ on next page.)

Diagnostic Procedure 45 — Engine Stalls after Decelerating (Cont'd)

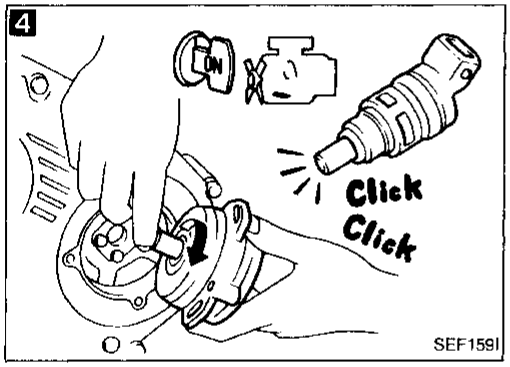
3



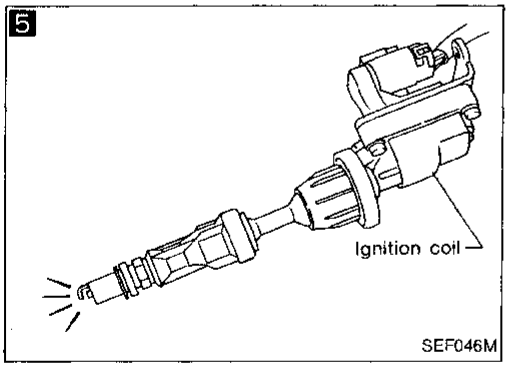
3



4



5



Ⓐ

3

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?

No → Go to **6**.

OR

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

Yes

4

CHECK INJECTOR.

1. Remove camshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating camshaft position sensor shaft, does each injector make an operating sound?

No → Check injector(s) and circuit(s).

Yes

5

CHECK IGNITION SPARK.

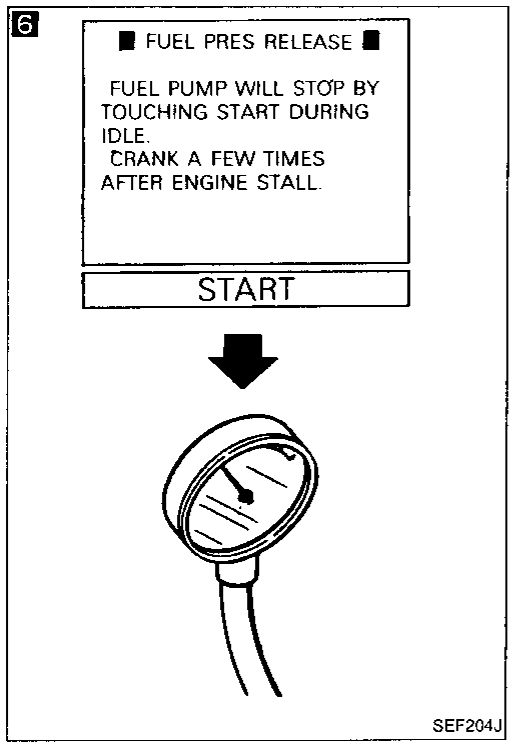
1. Disconnect ignition coil assembly from collector.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

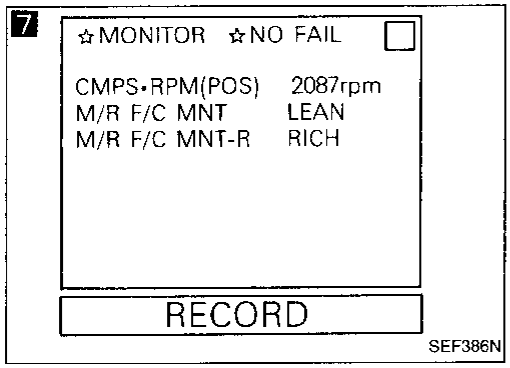
NG → Check ignition coil, power transistor unit and circuits. (See page EF & EC-95.)

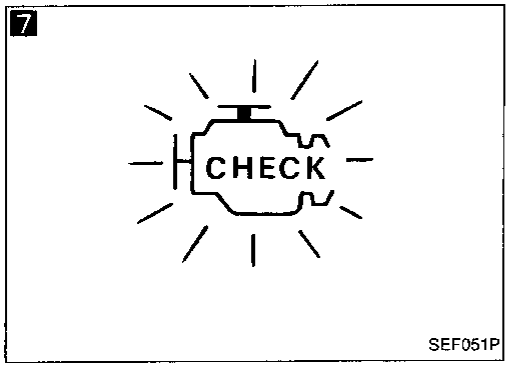
OK

(Go to Ⓑ on next page.)

Diagnostic Procedure 45 — Engine Stalls after Decelerating (Cont'd)







Ⓑ

6

CHECK FUEL PRESSURE.

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.
   At idle:
   Approx. 255 kPa (2.6 kg/cm², 37 psi)
   The moment throttle valve is fully open:
   Approx. 304 kPa (3.1 kg/cm², 44 psi)

NG → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-223.)
2. Install fuel pressure gauge and check fuel pressure.

OK ↓

7

CHECK HEATED OXYGEN SENSOR.

1. See "M/R F/C MNT (right and left sides)" in "DATA MONITOR" mode.
2. Maintaining engine at 2,000 rpm under no-load (with engine 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

NG → Replace heated oxygen sensor(s).

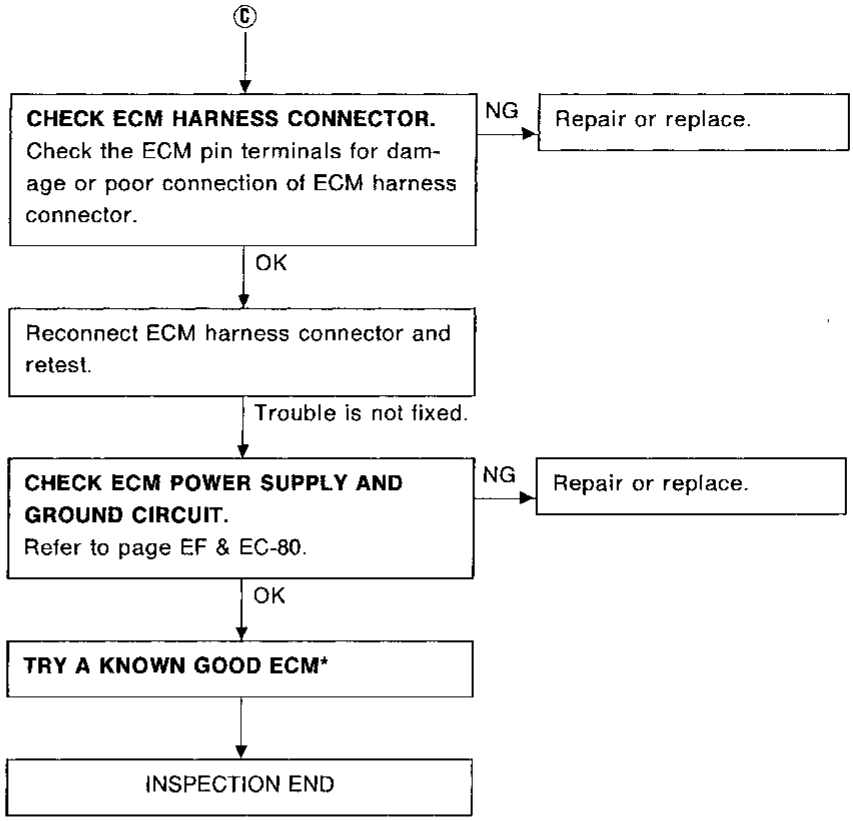
OR

1. Set "Heated oxygen sensor monitor" in On-board Diagnostic System — Diagnostic Test Mode II. (See page EF & EC-54.)
2. Maintaining engine at 2,000 rpm under no load, check that the malfunction indicator lamp goes ON and OFF more than 5 times during 10 seconds.

OK ↓

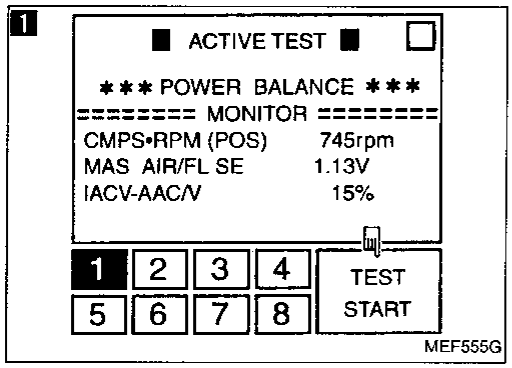
(Go to Ⓒ on next page.)

Diagnostic Procedure 45 — Engine Stalls after Decelerating (Cont'd)

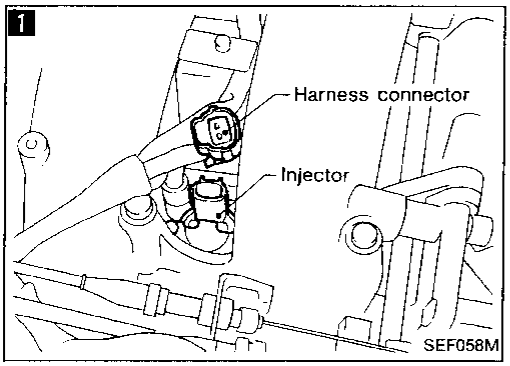


*: ECM may be the cause of a problem, but this is rarely the case.

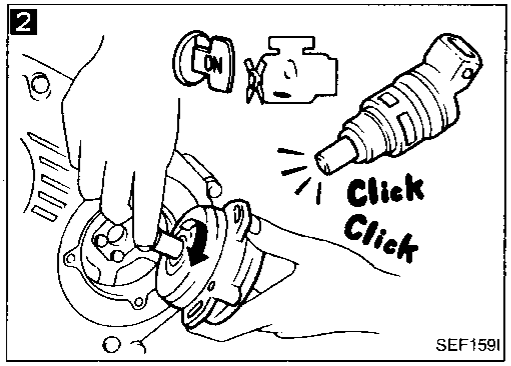
1



1



2



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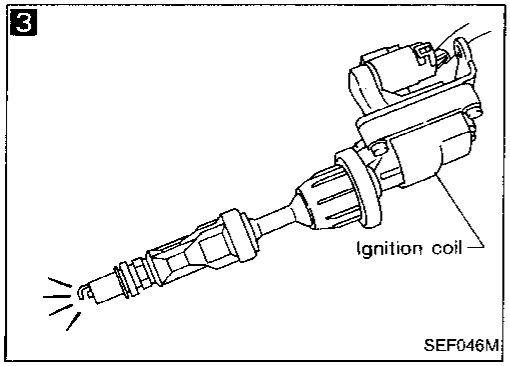


Diagnostic Procedure 46 — Engine Stalls when Accelerating or Cruising

1

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?

No → Go to **4** .

OR

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

Yes ↓

2

CHECK INJECTOR.

1. Remove camshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating camshaft position sensor shaft, does each injector make an operating sound?

No → Check injector(s) and circuit(s).

Yes ↓

3

CHECK IGNITION SPARK.

1. Disconnect ignition coil assembly from collector.
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 ignition coil, power transistor unit and circuits. (See page EF & EC-95.)

OK ↓

(Go to Ⓐ on next page.)

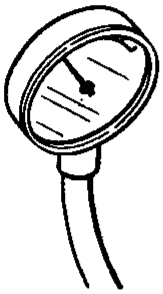
Diagnostic Procedure 46 — Engine Stalls when Accelerating or Cruising (Cont'd)

4

■ FUEL PRES RELEASE ■

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

START



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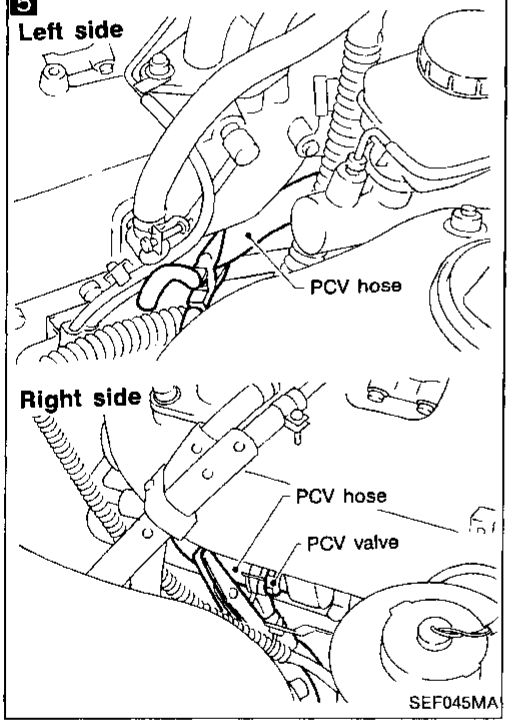

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Ⓐ

4

CHECK FUEL PRESSURE.

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.

At idle:
Approx. 255 kPa (2.6 kg/cm², 37 psi)
The moment throttle valve is fully open:
Approx. 304 kPa (3.1 kg/cm², 44 psi)

NG → Check fuel pump, circuit and fuel pressure regulator.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-223.)
2. Install fuel pressure gauge and check fuel pressure.

OK

5

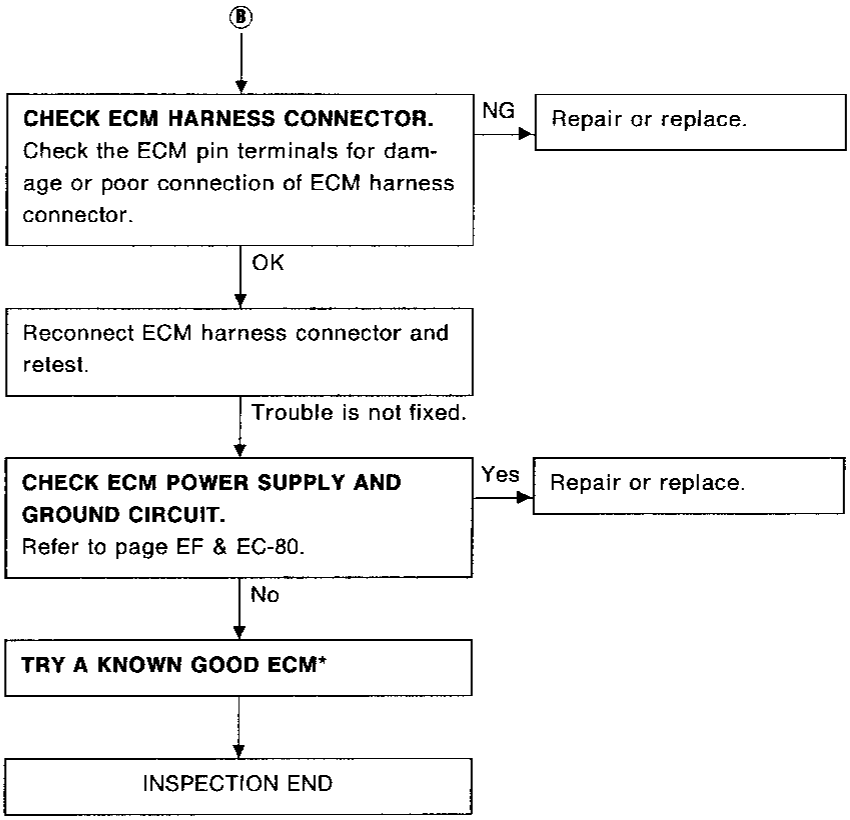
CHECK FOR INTAKE AIR LEAK.
When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

Yes → Discover air leak location and repair.

No

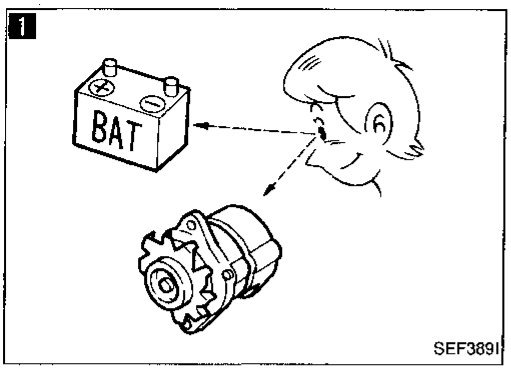
(Go to Ⓑ on next page.)

Diagnostic Procedure 46 — Engine Stalls when Accelerating or Cruising (Cont'd)



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

Diagnostic Procedure 47 — Engine Stalls when the Electrical Load is Heavy



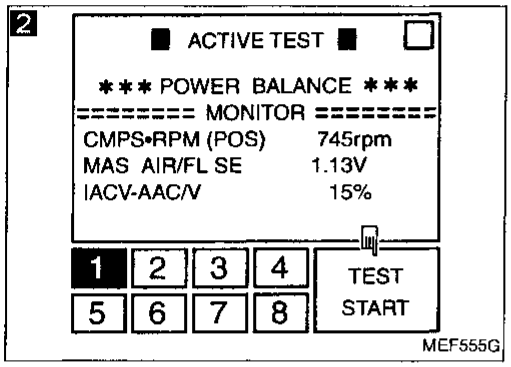
1

CHECK BATTERY AND ALTERNATOR.
Check battery and alternator condition. (Refer to "BATTERY" and "STARTING SYSTEM" in EL section.)

NG → Repair or replace.

OK ↓

2



PERFORM POWER BALANCE TEST.

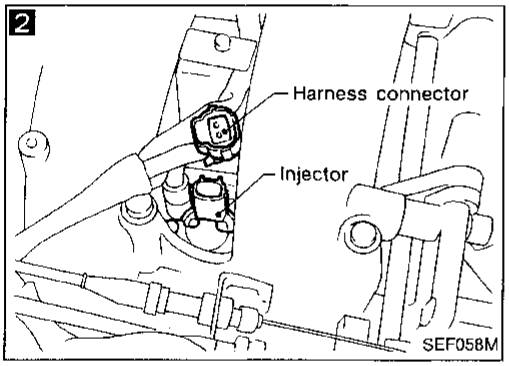
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

No → Go to 5 .

OR

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

Yes ↓



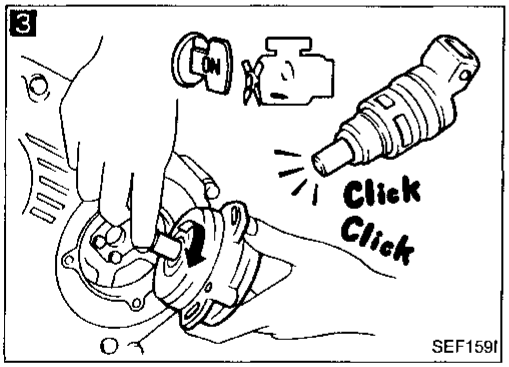
3

CHECK INJECTOR.

1. Remove camshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating camshaft position sensor shaft, does each injector make an operating sound?

No → Check injector(s) and circuit(s).

Yes ↓



4

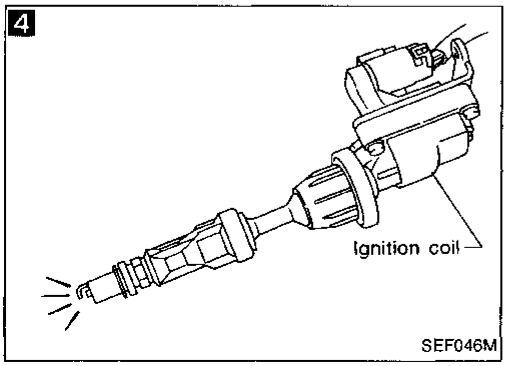
CHECK IGNITION SPARK.

1. Disconnect ignition coil assembly from collector.
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 ignition coil, power transistor unit and circuits. (See page EF & EC-95.)

OK ↓

(Go to Ⓐ on next page.)



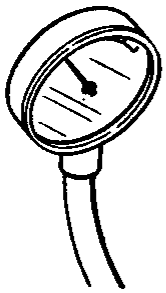
Diagnostic Procedure 47 — Engine Stalls when the Electrical Load is Heavy (Cont'd)

5

■ FUEL PRES RELEASE ■

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

START



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5

CHECK FUEL PRESSURE.

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.

At idle:
Approx. 255 kPa (2.6 kg/cm², 37 psi)
The moment throttle valve is fully open:
Approx. 304 kPa (3.1 kg/cm², 44 psi)

NG → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-223.)
2. Install fuel pressure gauge and check fuel pressure.

OK ↓

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector.

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-80.

NG → Repair or replace.

OK ↓

TRY A KNOWN GOOD ECM*

↓

INSPECTION END

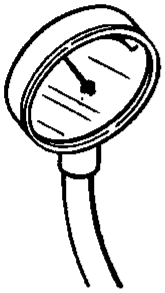
*: ECM may be the cause of a problem, but this is rarely the case.

1

■ FUEL PRES RELEASE ■

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

START



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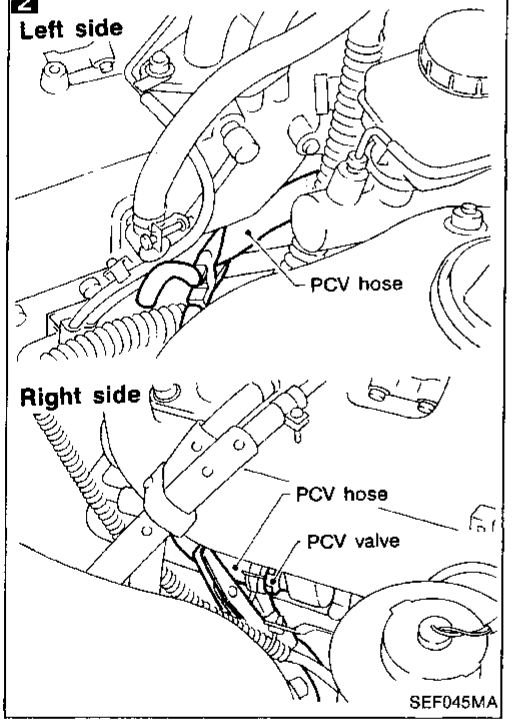
2



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Diagnostic Procedure 48 — Lack of Power and Stumble

1

CHECK FUEL PRESSURE.

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.

At idle:
Approx. 255 kPa (2.6 kg/cm², 37 psi)
The moment throttle valve is fully open:
Approx. 304 kPa (3.1 kg/cm², 44 psi)

NG → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-223.)
2. Install fuel pressure gauge and check fuel pressure.

OK ↓

2

CHECK FOR INTAKE AIR LEAK.
When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

Yes → Discover air leak location and repair.

No ↓

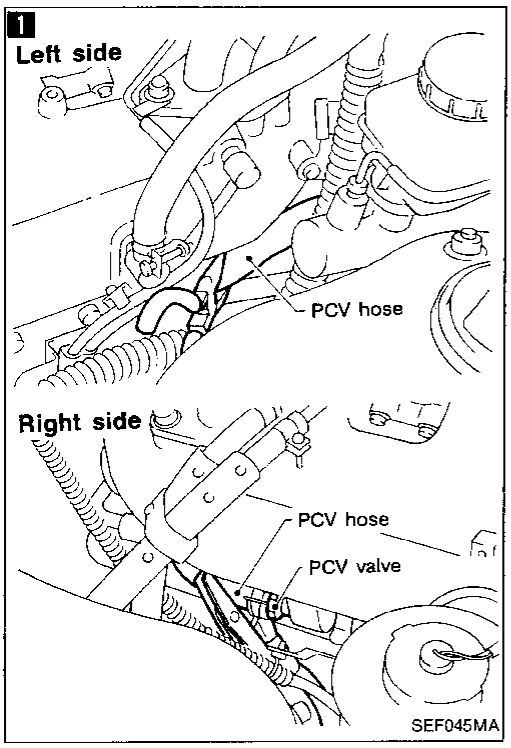
CHECK TIMING BELT FOR PROPER INSTALLATION.

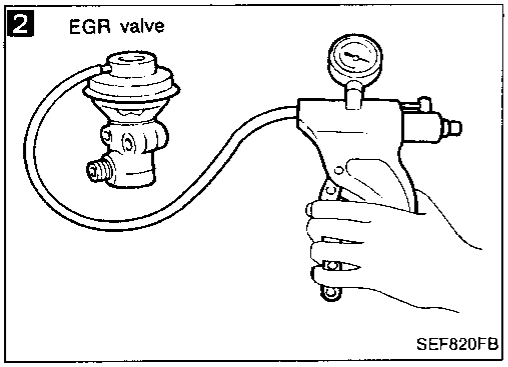
NG → Replace timing belt.

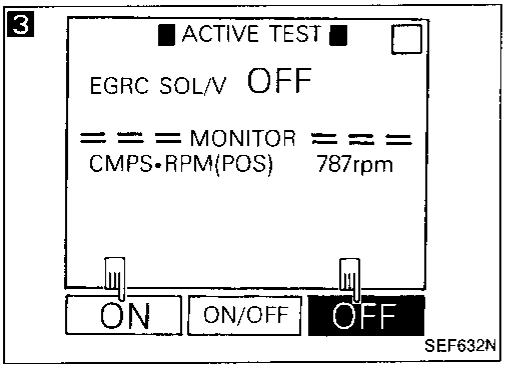
OK ↓

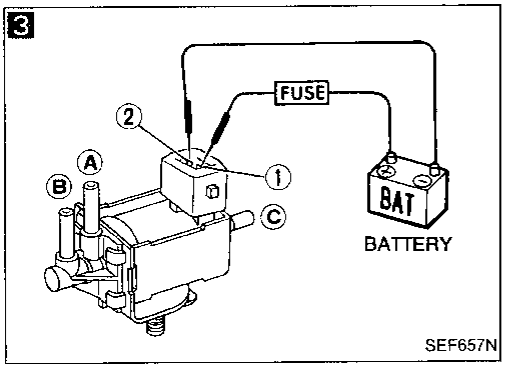
INSPECTION END

Diagnostic Procedure 49 — Knock









1

CHECK FOR INTAKE AIR LEAK.
When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

Yes → Discover air leak location and repair.

No ↓

2

CHECK EGR OPERATION.
1. Apply vacuum directly to the EGR valve using a handy vacuum pump.
2. Check to see that the engine runs rough or dies.

No → Check EGR valve for sticking.

Yes ↓

3

CHECK EGRC-SOLENOID VALVE.

1. Select "EGRC SOL/V" in "ACTIVE TEST" mode.
2. Turn EGRC-solenoid valve ON and OFF.
3. Check operating sound.

OR

1. Disconnect EGRC-solenoid valve harness connector.
2. Supply EGRC-solenoid valve terminals with battery current and check operating sound.

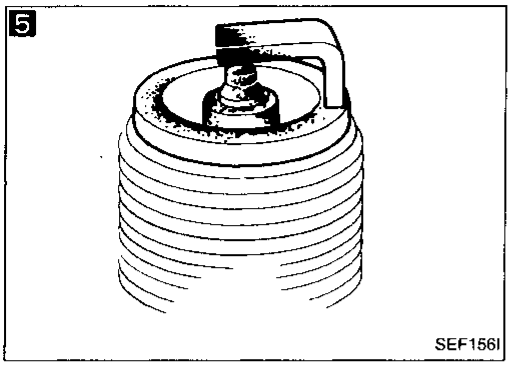
NG → Check solenoid valve and circuit.

OK ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 49 — Knock (Cont'd)

5



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4

CHECK VACUUM HOSES.
Check the following vacuum hoses for clogging, cracks and poor connection.
a) Vacuum hose between EGR valve and EGRC-solenoid valve.
b) Vacuum hose between EGRC-solenoid valve and throttle body port.
c) Vacuum hose between EGRC-solenoid valve and air duct.

NG → Repair or replace.

OK ↓

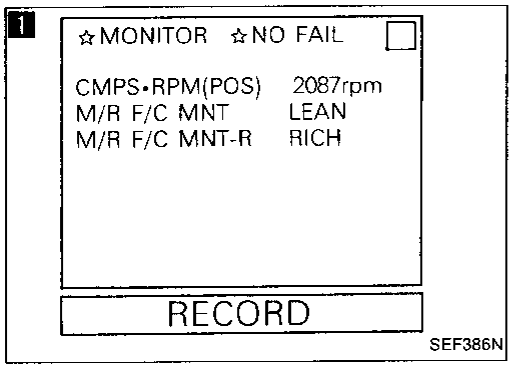
5

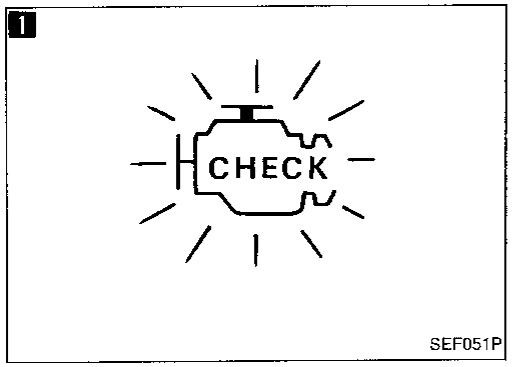
CHECK FOR OIL LEAK TO COMBUSTION CHAMBER.
Remove spark plugs and check for fouling with oil.

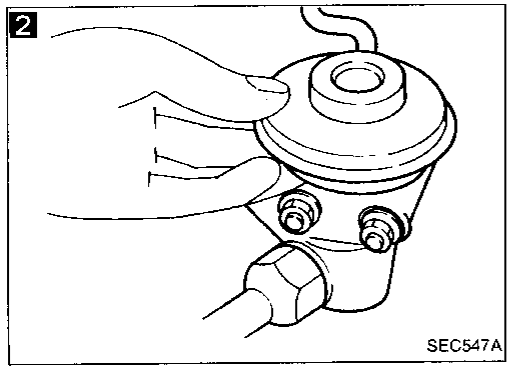
Yes → Check pistons, piston rings, valves, valve seats, valve oil seal, engine oil level, etc.

No ↓

INSPECTION END







Diagnostic Procedure 50 — Surge

1

CHECK HEATED OXYGEN SENSOR.

1. See "M/R F/C MNT (right and left sides)" in "DATA MONITOR" mode.
2. Maintaining engine at 2,000 rpm under no-load (with engine 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

NG → Replace heated oxygen sensor(s).

— OR —

1. Set "Heated oxygen sensor monitor" in On-board Diagnostic System — Diagnostic Test Mode II. (See page EF & EC-54.)
2. Maintaining engine at 2,000 rpm under no load, check that the malfunction indicator lamp goes ON and OFF more than 5 times during 10 seconds.

OK ↓

2

CHECK EGR VALVE.
Check EGR valve for sticking.

NG → Repair or replace.

OK ↓

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector.

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

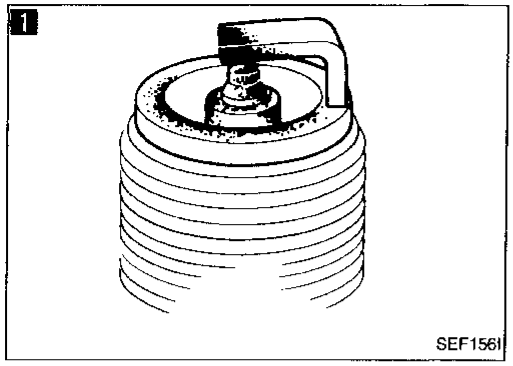
Trouble is not fixed. ↓

TRY A KNOWN GOOD ECM*

OK ↓

INSPECTION END

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



Diagnostic Procedure 51 — Backfire through the Intake

1

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

NG → Repair or replace spark plug(s).

OK ↓

2

CHECK INTAKE AIR LEAK.
When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

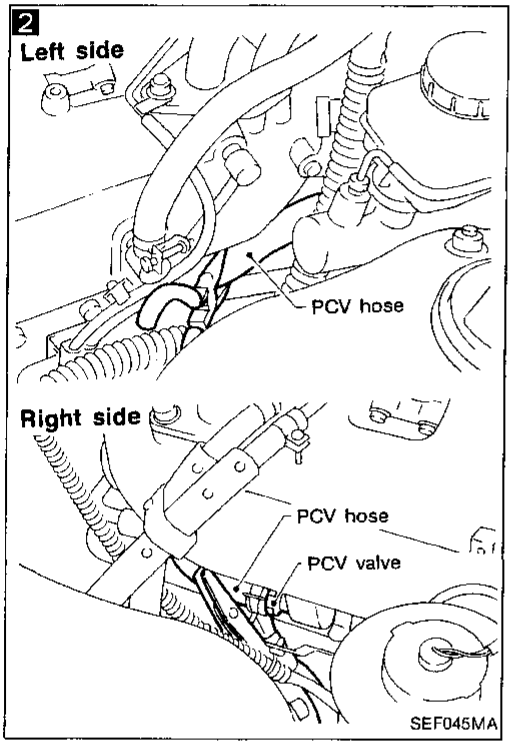
Yes → Discover air leak location and repair.

No ↓

CHECK FOR INTAKE VALVE DEPOSITS.
If there are deposits on intake valves, remove them.

↓

INSPECTION END



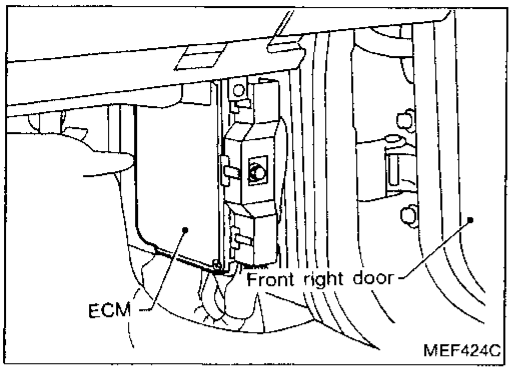
Diagnostic Procedure 52 — Backfire through the Exhaust

CHECK ENGINE COOLANT TEMPERATURE SENSOR.
Check engine coolant temperature sensor and its circuit. (See page EF & EC-90.)

NG → Replace or repair.

OK ↓

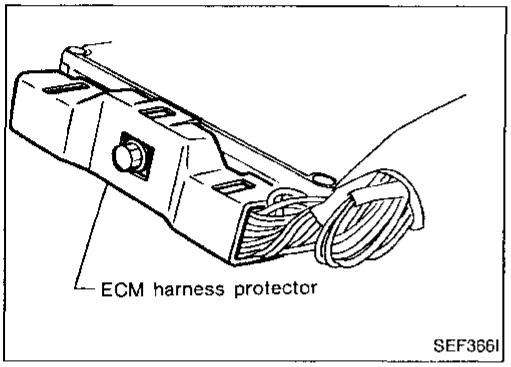
INSPECTION END



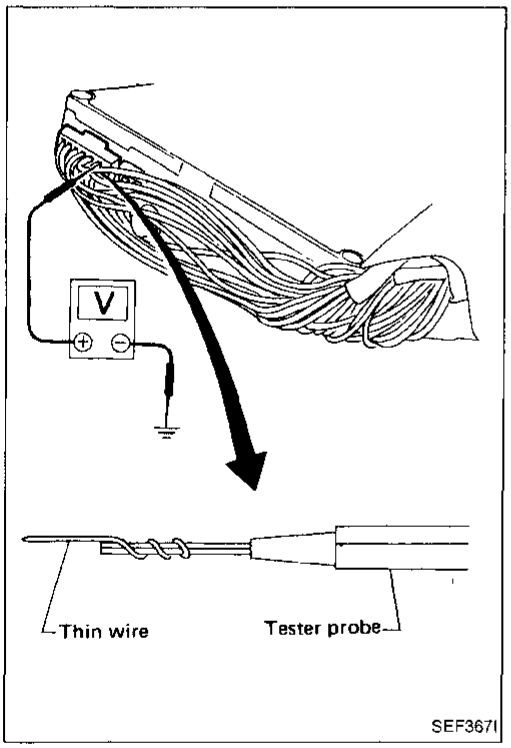
Electrical Components Inspection

ECM INPUT/OUTPUT SIGNAL INSPECTION

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

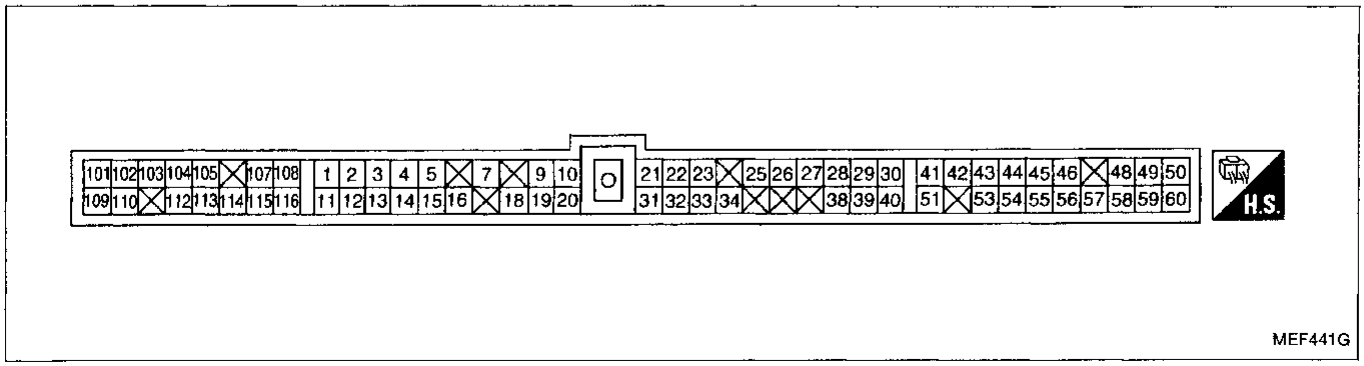


2. Remove ECM harness protector.



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

ECM HARNESS CONNECTOR TERMINAL LAYOUT



Electrical Components Inspection (Cont'd)

ECM inspection table

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
1 2 3 11 12 13	Ignition signal	Engine is running. └ Idle speed	Approximately 0 - 100 mV
		Engine is running. └ Engine speed is 2,000 rpm.	Approximately 70 - 120 mV
4	IACV-AAC valve	Engine is running. └ Idle speed	10 - 12V
		Engine is running. ├ Steering wheel is being turned. ├ Air conditioner is operating. ├ Rear defogger is "ON". └ Headlamps are "ON".	6 - 10V
7	Tachometer	Engine is running. └ Idle speed	Approximately 0.9V
		Engine is running. └ Engine speed is 2,000 rpm.	Approximately 2.0V
9	Air conditioner relay	Engine is running. └ A/C switch is "ON".	Approximately 0V
		Engine is running. └ A/C switch is "OFF".	BATTERY VOLTAGE (11 - 14V)
16	ECCS relay (Self-shut off)	Ignition switch "ON" ↓ Ignition switch "OFF" └ For a few seconds after turning ignition switch "OFF".	0 - 1V
		Ignition switch "OFF" └ A few seconds after turning ignition switch "OFF" and thereafter.	BATTERY VOLTAGE (11 - 14V)
18	Fuel pump relay	Ignition switch "ON" └ For 5 seconds after turning ignition switch "ON".	0.7 - 0.9V
		Ignition switch "ON" └ 5 seconds after turning ignition switch "ON" and thereafter.	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Idle speed	0.7 - 0.9V
19	Cooling fan relay	Engine is running. └ Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Cooling fan is operating.	Approximately 0V
23	Knock sensor	Engine is running. └ Idle speed	Approximately 2.5V

Electrical Components Inspection (Cont'd)

ECM inspection table

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
25	Rear defogger switch	Ignition switch "ON" └ Rear defogger is "OFF".	BATTERY VOLTAGE (11 - 14V)
		Ignition switch "ON" └ Rear defogger is "ON".	Approximately 0V
27	Mass air flow sensor	Engine is running. (Warm-up condition) └ Idle speed	1.0 - 1.4V
		Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm	1.4 - 1.9V
28	Engine coolant temperature sensor	Engine is running.	0 - 5.0V Output voltage varies with engine coolant temperature.
29	Heated oxygen sensor RH	Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm	0 - Approximately 1.0V
55	Heated oxygen sensor LH		
33	IACV-FICD solenoid valve	Engine is running. └ Air conditioner is not operating.	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Air conditioner is operating.	Approximately 0V
34	Power steering oil pressure switch	Engine is running. └ Steering wheel is in the "straight ahead" position.	Approximately 5V
		Engine is running. └ Steering wheel is turned.	Approximately 0V
38	Throttle position sensor	Ignition switch "ON" (Warm-up condition)	Approximately 0.4 - 4V Output voltage varies with the throttle valve opening angle.
39	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
41 51	Camshaft position sensor (Reference signal)	Engine is running. Do not run engine at high speed under no-load.	1.0 - 1.5V
42	Camshaft position sensor (Position signal)	Engine is running. Do not run engine at high speed under no-load.	2.0 - 2.4V Output voltage varies slightly with engine speed.

Electrical Components Inspection (Cont'd)

ECM inspection table

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
43	Start signal	Ignition switch "ON"	Approximately 0V
		Ignition switch "START"	BATTERY VOLTAGE (11 - 14V)
44	A/T control unit (Neutral position signal)	Ignition switch "ON" └ Gear position is "N" or "P".	Approximately 0V
		Ignition switch "ON" └ Except the above gear position	Approximately 5V
45	Ignition switch	Ignition switch "OFF"	Approximately 0V
		Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
46	Air conditioner switch	Engine is running. └ A/C switch is "ON".	0.3 - 0.6V
		Engine is running. └ A/C switch is "OFF".	Approximately 5V
48	Power source for sensors	Ignition switch "ON"	Approximately 5V
49 59	Power supply	Ignition switch "ON" └ Engine is running.	BATTERY VOLTAGE (11 - 14V)
54	Closed throttle position switch	Engine is running. (Warm-up condition) └ Accelerator pedal is fully released.	7.0 - 10.0V
		Engine is running. (Warm-up condition) └ Accelerator pedal is depressed.	Approximately 0V
57	Power source for closed throttle position switch	Ignition switch "ON"	7.0 - 10.0V
56	Throttle opening signal	Ignition switch "ON"	0.3 - Approximately 3.3V Output voltage varies with the throttle valve opening angle.
58	Battery	Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
101 103 105 110 112 114	Injectors	Engine is running.	BATTERY VOLTAGE (11 - 14V)

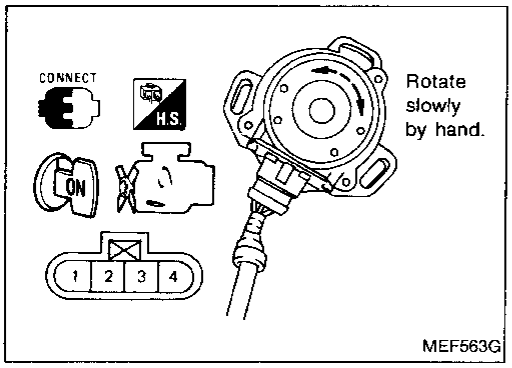
Electrical Components Inspection (Cont'd)

ECM inspection table

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
102	EGRC-solenoid valve	Engine is running. (Warm-up condition) — Idle speed — Engine speed is above 3,100 rpm	Approximately 0V
		Engine is running. (Warm-up condition) — Engine speed is about 2,000 rpm.	BATTERY VOLTAGE (11 - 14V)
104	Fuel pump voltage control	Engine is running. — Idle speed (At 30 seconds after starting engine)	Approximately 5V
		Engine is running. — For 30 seconds after starting engine. — Engine speed is 2,000 rpm.	Approximately 0V
113	VTC solenoid valve	Engine is running. (Jack up drive wheel and shift select lever to any position except "N" or "P" position.) — Idle speed	BATTERY VOLTAGE (11 - 14V)
		Engine is running. (Jack up drive wheel and shift select lever to any position except "N" or "P" position.) — Engine speed is 2,000 rpm.	0.2 - 0.5V
115	Heated oxygen sensor heater	Engine is running. — Engine speed is below 2,900 rpm.	Approximately 0V
		Engine is running. — Engine speed is above 2,900 rpm.	BATTERY VOLTAGE (11 - 14V)

Electrical Components Inspection (Cont'd)



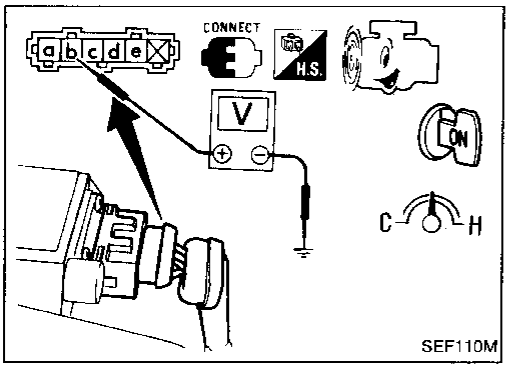
CAMSHAFT POSITION SENSOR

1. Remove camshaft position sensor from engine. (Camshaft position sensor harness connector should remain connected.)
2. Turn ignition switch "ON".
3. Rotate camshaft position sensor shaft slowly by hand and check voltage between terminals ①, ② and ground.

Terminal	Voltage
② (120° signal)	Voltage fluctuates between 5V and 0V.
① (1° signal)	

If NG, replace camshaft position sensor.

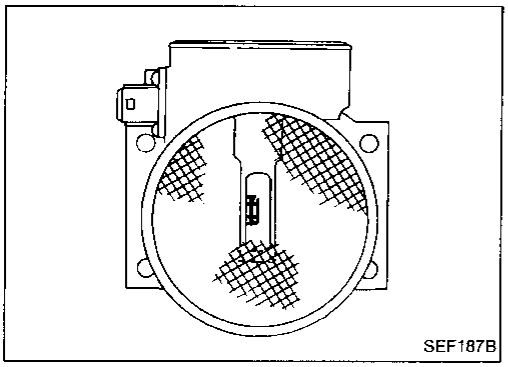
After this inspection, diagnostic trouble code No. 11 might be displayed though the camshaft position sensor is functioning properly. In this case erase the stored memory.



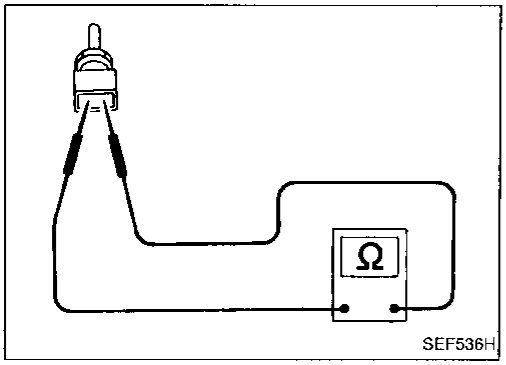
MASS AIR FLOW SENSOR

1. Fold back mass air flow sensor harness connector rubber as shown in the figure if the harness connector is connected.
2. Turn ignition switch "ON".
3. Start engine and warm it up sufficiently.
4. Check voltage between terminal ⓑ and ground.

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Approximately 0.8
Idle (Engine is warm-up sufficiently.)	Approximately 0.8 - 1.5



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



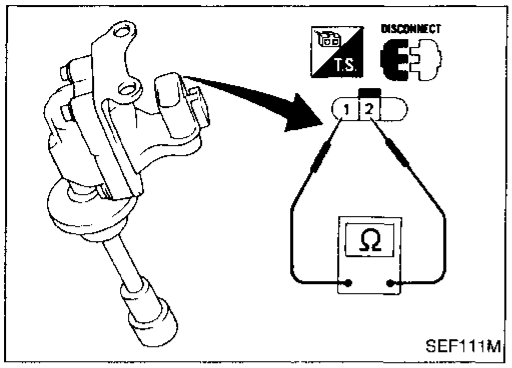
ENGINE COOLANT TEMPERATURE SENSOR

1. Disconnect engine coolant temperature sensor harness connector.
2. Check resistance as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
80 (176)	0.30 - 0.33

If NG, replace engine coolant temperature sensor.

Electrical Components Inspection (Cont'd)

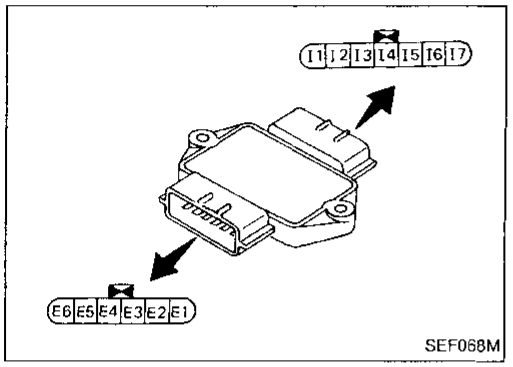


IGNITION COIL

1. Disconnect ignition coil harness connector.
2. Check resistance as shown in the figure.

Terminal	Resistance
① - ②	Approximately 0.9Ω

If NG, replace ignition coil.

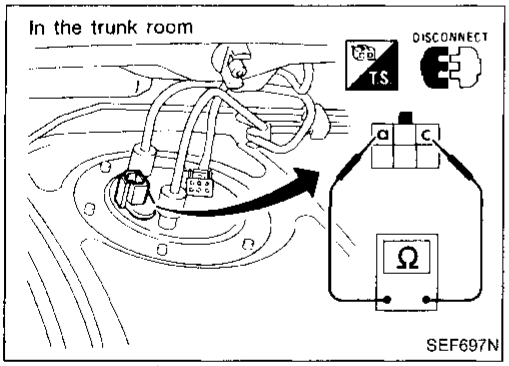


POWER TRANSISTOR

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

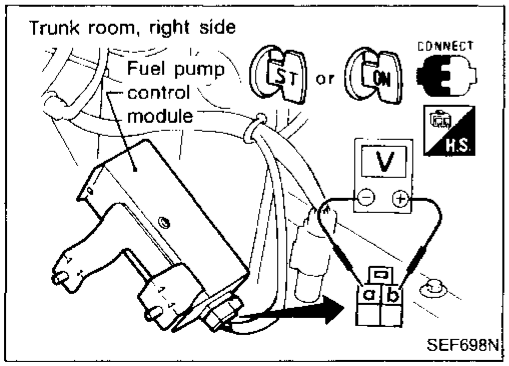
If NG, replace power transistor.



FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals ⓐ and ⓒ.
   Resistance: Approximately 0.2 - 5.0Ω

If NG, replace fuel pump.

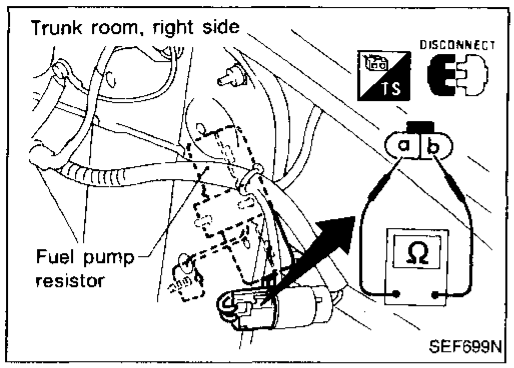


FUEL PUMP CONTROL MODULE

1. Start engine and warm it up sufficiently.
2. Check voltage between terminals ⓐ and ⓑ.

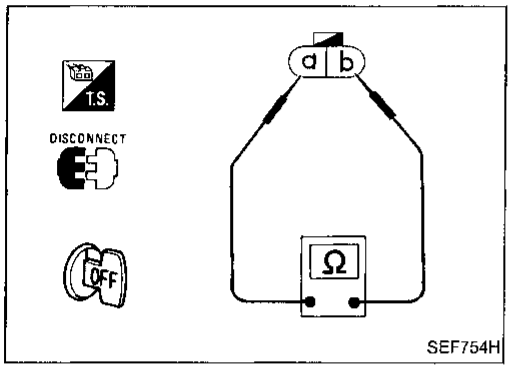
Engine speed	Voltage
Idling	4.2V
1,500 rpm	0V

Electrical Components Inspection (Cont'd)



DROPPING RESISTOR FOR FUEL PUMP

1. Check resistance between terminals ⓐ and ⓑ.
   Resistance: Approximately 2.2 kΩ

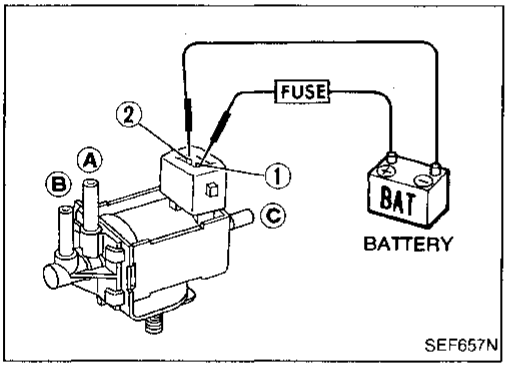


VEHICLE SPEED SENSOR

1. Jack up rear wheels. Use stands to support vehicle.
2. Disconnect vehicle speed sensor harness connector.
3. Check continuity between terminals ⓐ and ⓑ while rotating rear wheel by hand.

Continuity should come and go.

If NG replace vehicle speed sensor.

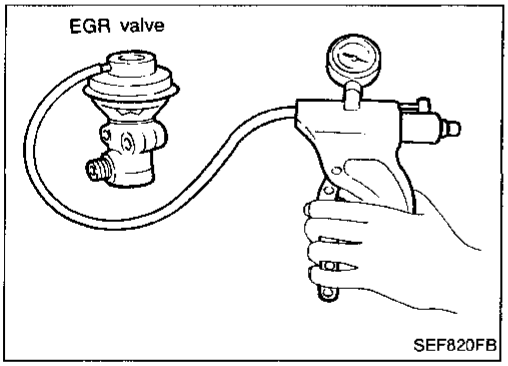


EGRC-SOLENOID VALVE

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.

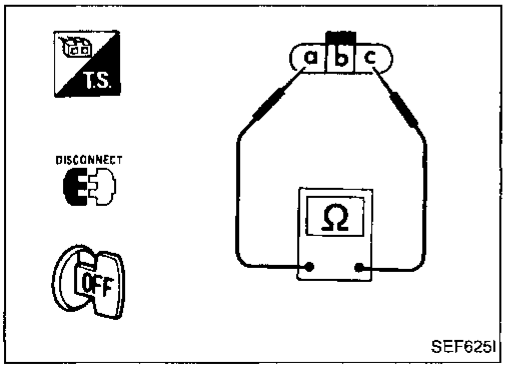


EGR VALVE

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

EGR valve spring should lift.

If NG, replace EGR valve.



HEATED OXYGEN SENSOR

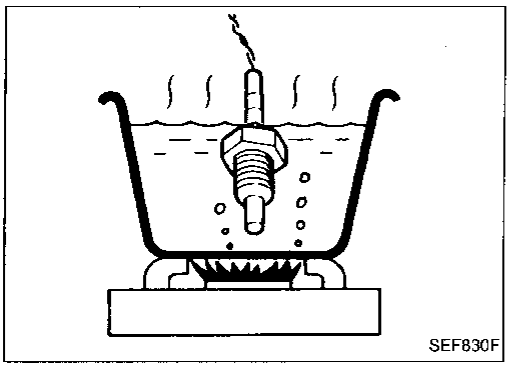
Refer to "Diagnostic Procedure 9".
(See page EF & EC-103.)

HEATED OXYGEN SENSOR HEATER

Check resistance between terminals ⓐ and ⓒ.
Resistance: 3 - 1,000Ω

If NG, replace heated oxygen sensor.

Electrical Components Inspection (Cont'd)



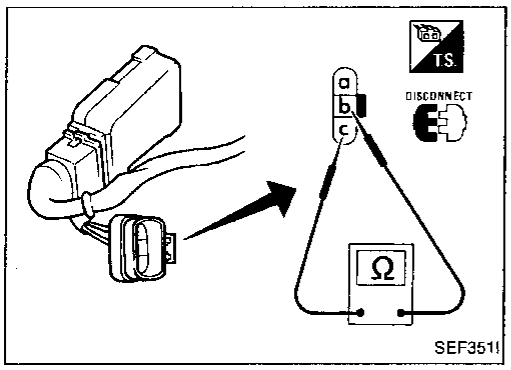
EGR TEMPERATURE SENSOR

Check resistance change and resistance value at 100°C (212°F).

- **Resistance should decrease in response to temperature increase.**

  Resistance: 100°C (212°F)
  85.3 ± 8.53 kΩ

If NG, replace EGR temperature sensor.



THROTTLE POSITION SENSOR

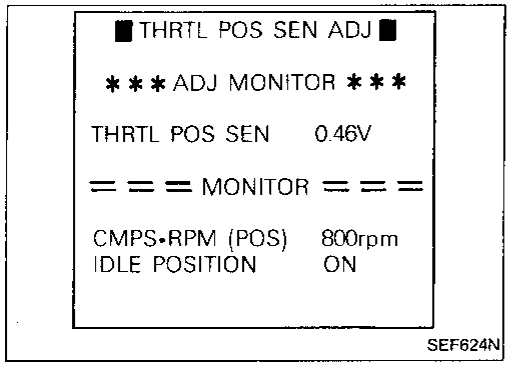
1. Disconnect throttle position sensor harness connector.
2. Make sure that resistance between terminals ⓑ and ⓒ changes when opening throttle valve manually.

Accelerator pedal conditions	Resistance kΩ
Completely released	Approximately 1.7
Partially released	1 - 10.5
Completely depressed	Approximately 10.5

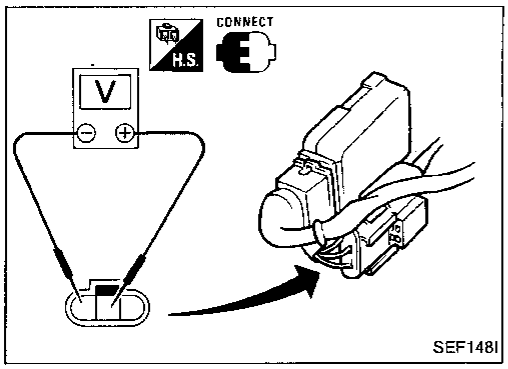
If NG, replace throttle position sensor.

Adjustment

If throttle position sensor is replaced or removed, it is necessary to install it in the proper position, by following the procedure as shown below:

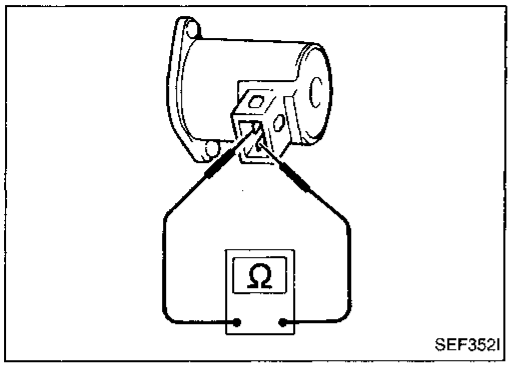


1. Install throttle position sensor body in throttle body. Do not tighten bolts.
2. Connect throttle position sensor and closed throttle position switch harness connector.
3. Start engine and warm it up sufficiently.
4. Perform "THRTL POS SEN ADJ" in "WORK SUPPORT" mode.
   Measure output voltage of throttle position sensor using voltmeter.



5. Adjust by rotating throttle position sensor body so that output voltage is 0.4 to 0.5V.
6. Tighten mounting bolts.
7. Disconnect throttle position sensor harness connector for a few seconds and then reconnect it.

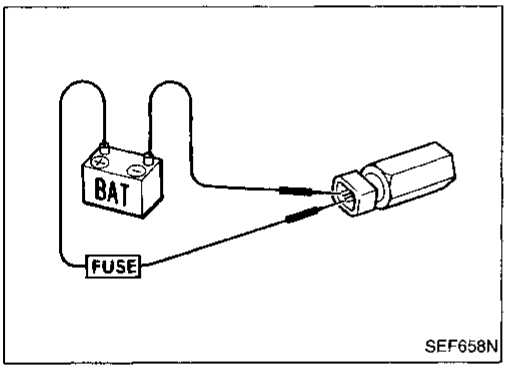
Electrical Components Inspection (Cont'd)



IACV-AAC VALVE

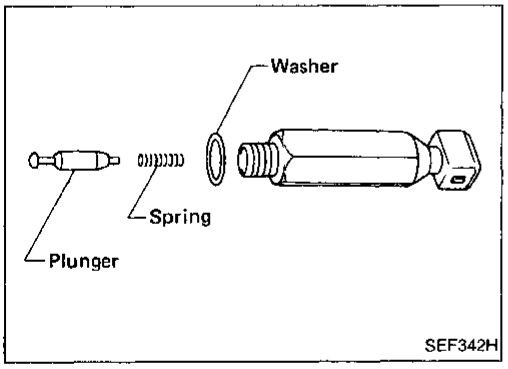
- Check IACV-AAC valve resistance.
  Resistance:
  Approximately 10Ω

- Check plunger for seizing or sticking.
- Check for broken spring.

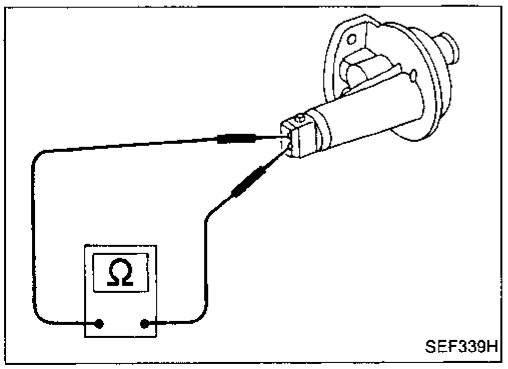


IACV-FICD SOLENOID VALVE

- Check for clicking sound when applying 12V direct current to terminals.



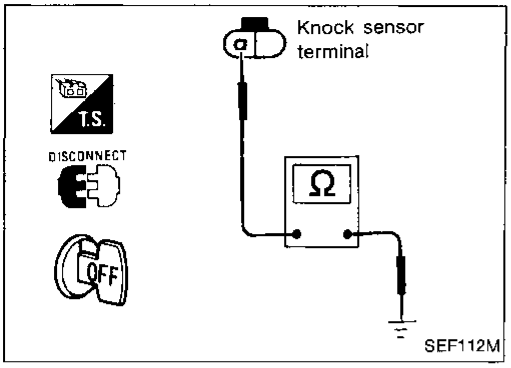
- Check plunger for seizing or sticking.
- Check for broken spring.



IACV-AIR REGULATOR

- Check IACV-air regulator resistance.
  Resistance:
  Approximately 70 - 80Ω
- Check IACV-air regulator for clogging.

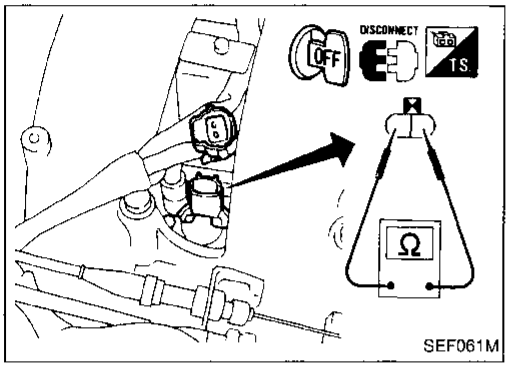
Electrical Components Inspection (Cont'd)



KNOCK SENSOR

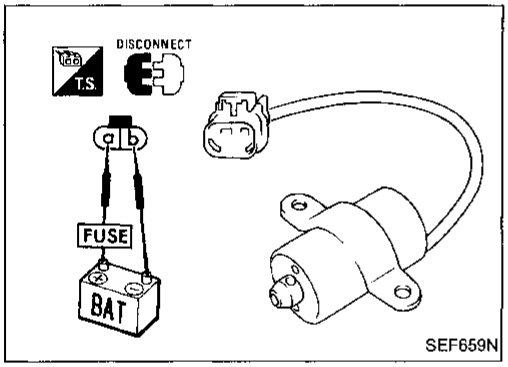
1. Disconnect knock sensor sub-harness connector.
2. Check continuity between terminal ⓐ and ground.

Continuity should exist.



INJECTOR

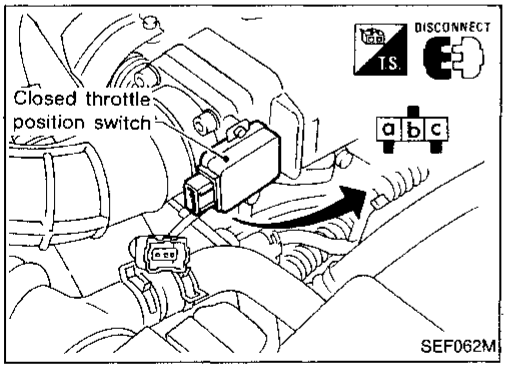
1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.
   Resistance: 10 - 14Ω
   If NG, replace injector.



VALVE TIMING CONTROL SOLENOID VALVE

Check valve timing control solenoid valve for normal operation by supplying it with battery voltage between terminals ⓐ and ⓑ.

If NG, replace solenoid valve.

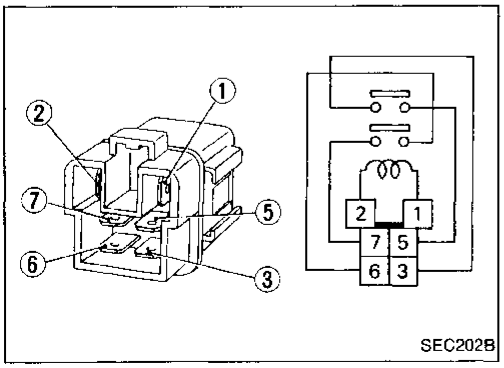


CLOSED THROTTLE POSITION SWITCH (Idle position)

1. Disconnect closed throttle position switch harness connector.
2. Check continuity between terminals ⓐ and ⓑ.

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

If NG, replace closed throttle position switch.



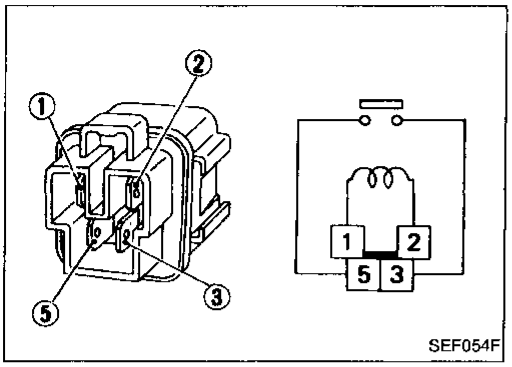
ECCS RELAY

Check continuity between terminals ③ and ⑤, ⑥ and ⑦.

Conditions	Continuity
12V direct current supply between terminals ① and ②	Yes
No current supply	No

If NG, replace relay.

Electrical Components Inspection (Cont'd)

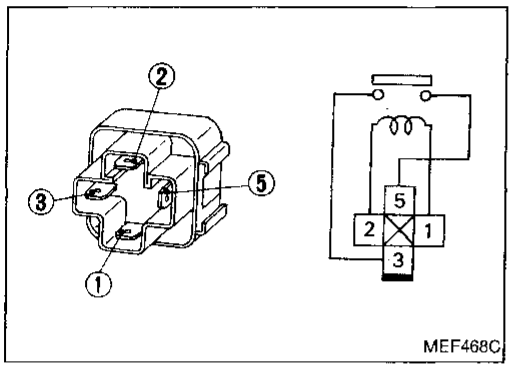


FUEL PUMP RELAY

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.



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

If NG, replace relay.

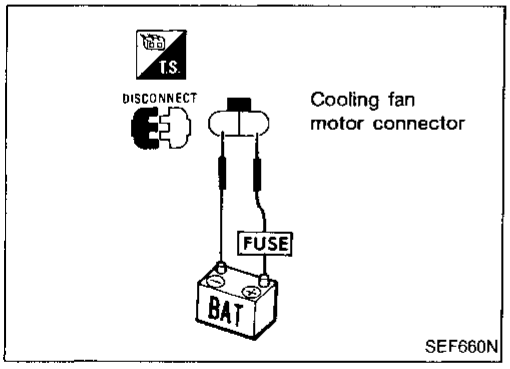
POWER STEERING OIL PRESSURE SWITCH

1. Disconnect power steering oil pressure switch harness connector.
2. Check resistance between terminals while engine running.

Resistance:

① When steering wheel is not turned: ∞

② When steering wheel is turned: Approximately 0.45Ω

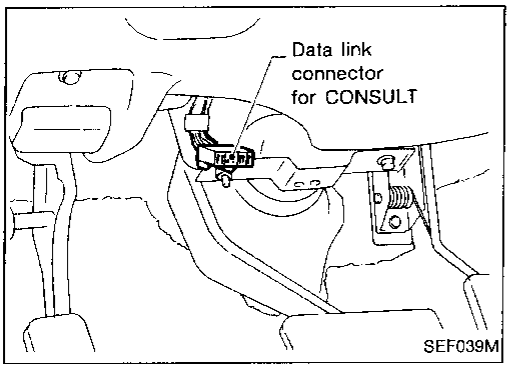


COOLING FAN MOTOR

1. Disconnect cooling fan motor harness connector.
2. Supply cooling fan motor terminals with battery voltage and check operation.

Cooling fan motor should operate.

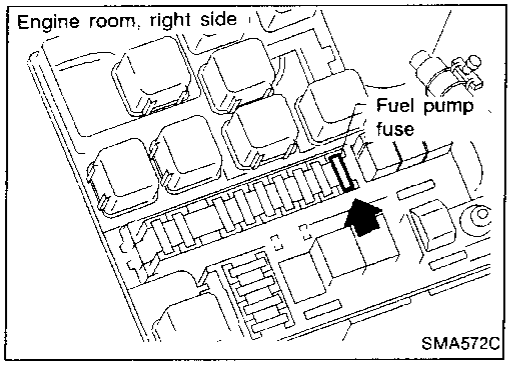
If NG, replace cooling fan motor.



Releasing Fuel Pressure

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

Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT.



1. Remove fuel pump fuse.
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 relay or fuel pump connector.

Fuel Pressure Check

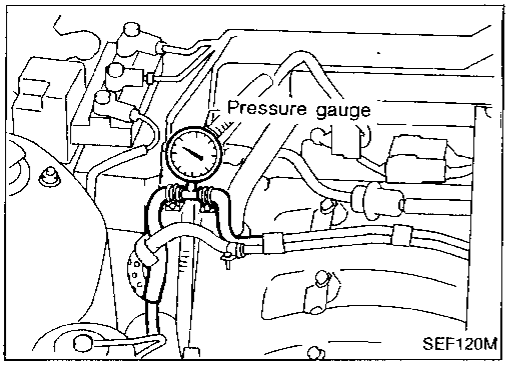
a. When reconnecting fuel line, always use new clamps.
b. Make sure that clamp screw does not contact adjacent parts.
c. Use a torque driver to tighten clamps.
d. Use Pressure Gauge to check fuel pressure.

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.
5. Read the indication of fuel pressure gauge.

At idling:

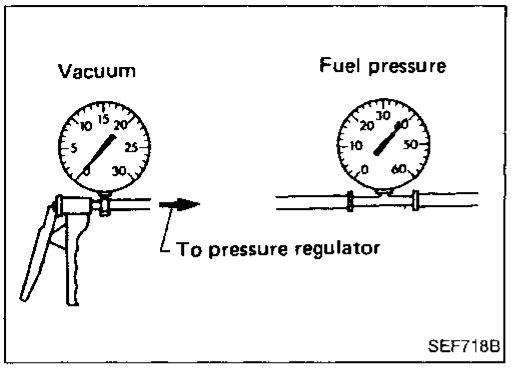
When fuel pressure regulator valve vacuum hose is connected.
Approximately 250.1 kPa (2.55 kg/cm^2, 36.3 psi)

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.

Fuel Pressure Check (Cont'd)



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.

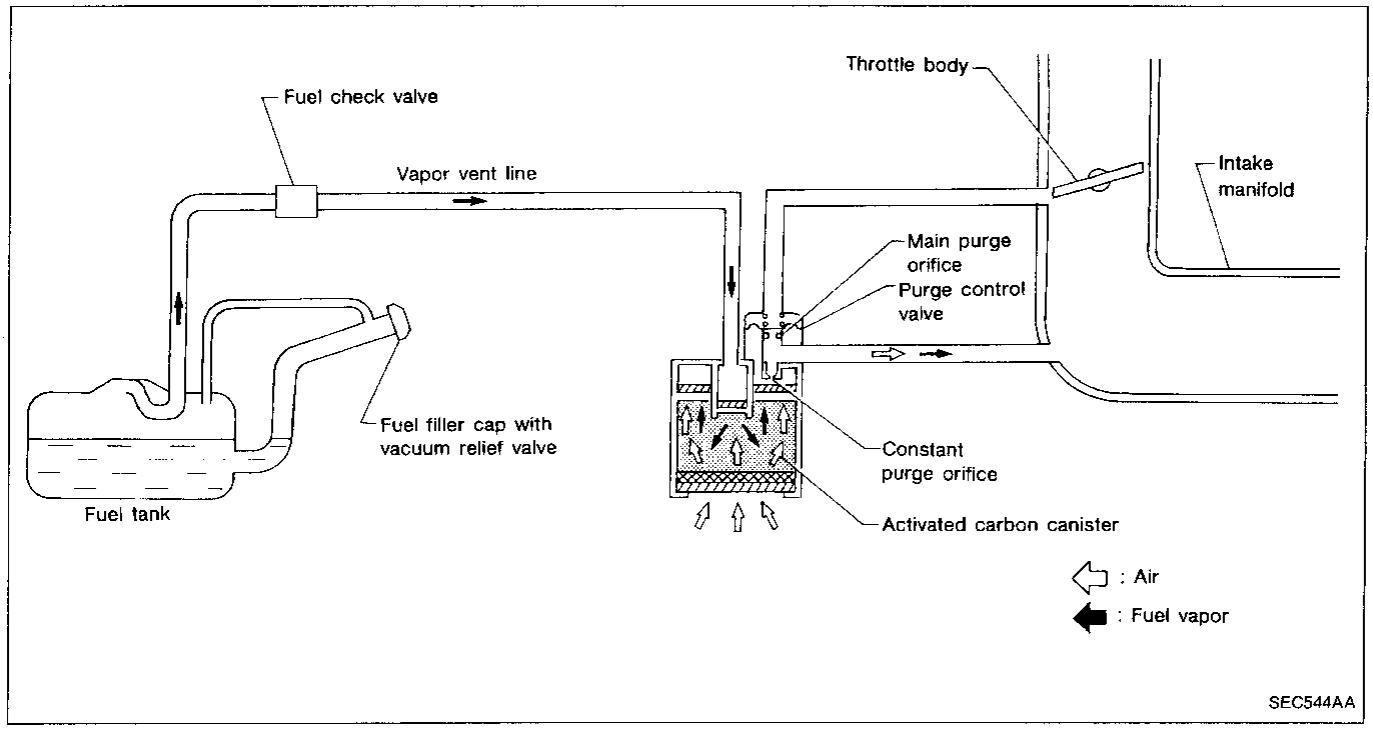
Injector Removal and Installation

1. Release fuel pressure to zero.
2. Drain coolant from radiator drain cock.
3. Remove or disconnect the following:
- Related harnesses, wires and tubes
- Intake manifold collector
  For details, refer to EM section.
4. Remove injectors with fuel tube assembly.
5. Remove injectors from fuel tube assembly.
6. Install injectors as follows:
1) Clean exterior of injector tail piece.
2) Use new O-rings.

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

7. Assemble injectors with fuel tube assembly to intake manifold.

Description



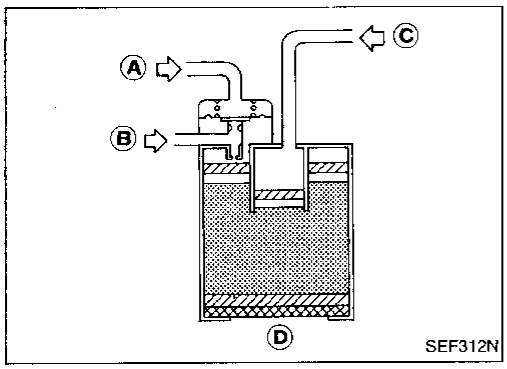
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the carbon canister.

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

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

When the engine runs at idle, the 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 purge control valve opens. The vapor is sucked through both main purge and constant purge orifices.



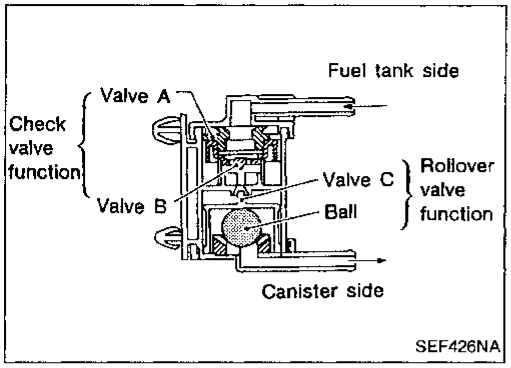
Inspection

ACTIVATED CARBON CANISTER

Check carbon canister as follows:

1. Blow air in port Ⓐ and ensure that there is no leakage.
2.
- Apply vacuum to port Ⓐ.
- Cover port Ⓓ with hand.
- Blow air in port Ⓒ and ensure free flow out of port Ⓑ.

Inspection (Cont'd)



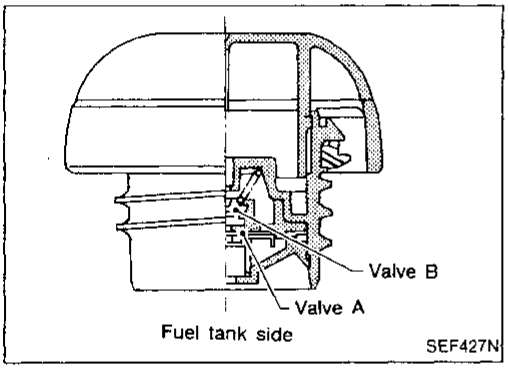
FUEL CHECK VALVE (With rollover valve)

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 canister side.
2. Blow air through connector on 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°.



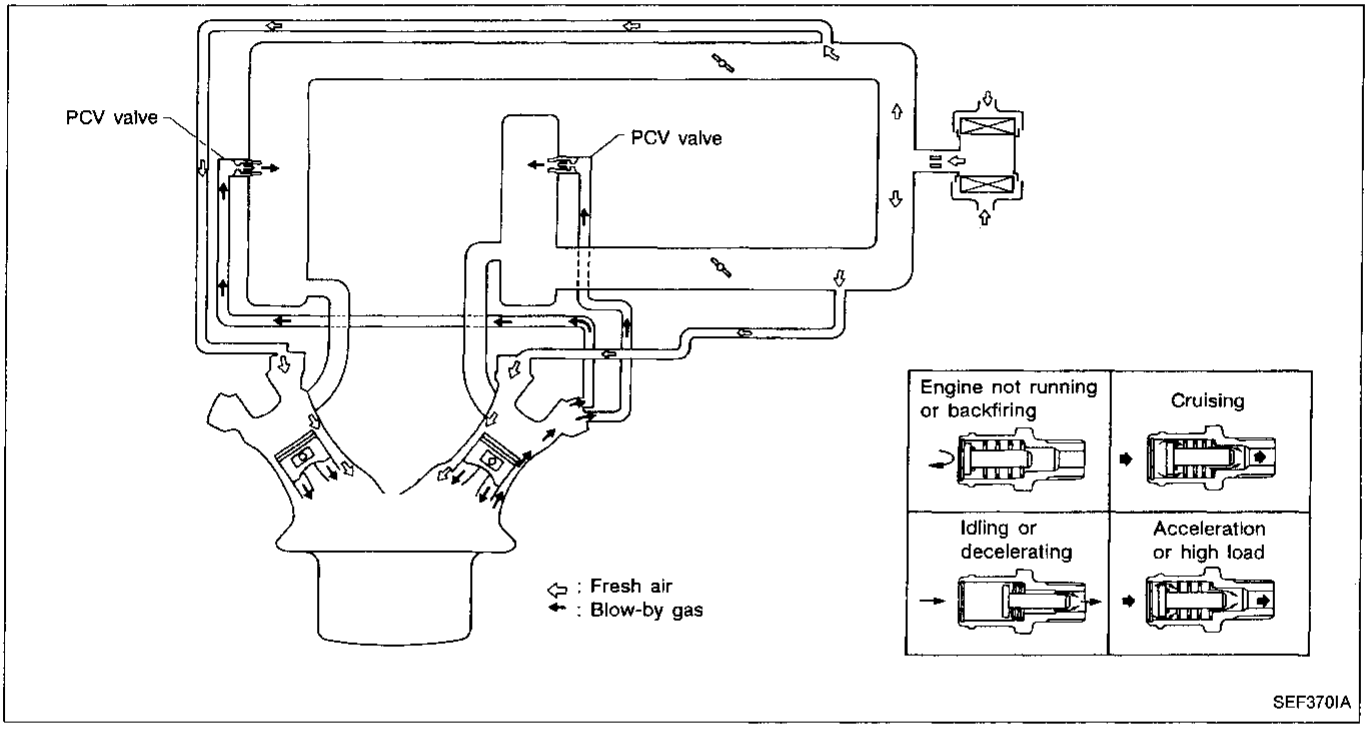
FUEL TANK VACUUM RELIEF VALVE

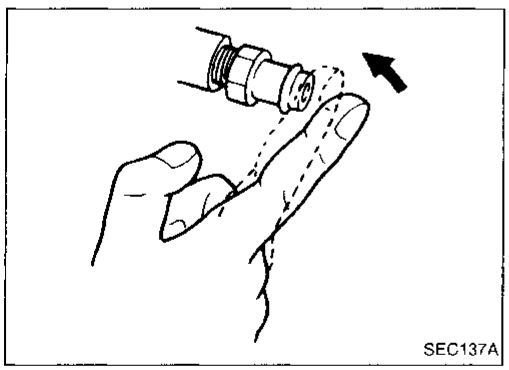
1. Wipe clean valve housing.
2. Suck air through the cap. A slight resistance accompanied by valve clicks indicates that valve A is in good mechanical condition. Note also that, by further sucking air, the resistance should disappear with valve clicks.
3. Blow air on fuel tank side and ensure that continuity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

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.

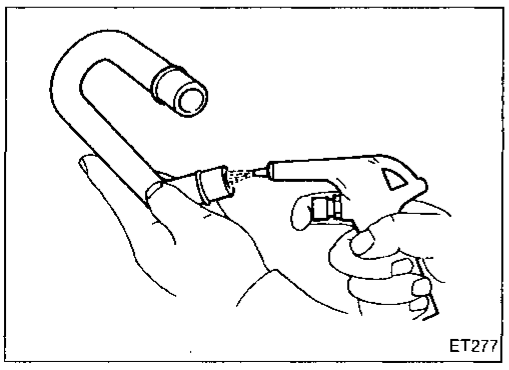




Inspection

PCV (Positive Crankcase Ventilation)

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



VENTILATION 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.

General Specifications

FUEL PRESSURE REGULATOR	
Regulated pressure kPa (kg/cm^2, psi)	299.1 (3.05, 43.4)

Inspection and Adjustment

Idle speed*1	rpm	
No-load*2		
A/T (in "N" position)		720 ± 50
Air conditioner: ON		800 ± 50
Ignition timing	degree	15 ± 2 BTDC
Throttle position sensor idle position	V	0.4 - 0.5

*1: Feedback controlled and needs no adjustments
*2: Under the following conditions:
- Air conditioner switch: OFF
- Steering wheel: Kept straight
- Electric load: OFF (Lights, heater, fan & rear defogger)
- Cooling fan: OFF

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

ENGINE COOLANT TEMPERATURE SENSOR

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
80 (176)	0.30 - 0.33

FUEL PUMP

Resistance	Ω	Approximately 0.2 - 5.0

EGR TEMPERATURE SENSOR

Resistance [at 100°C (212°F)]	kΩ	85.3 ± 8.53

HEATED OXYGEN SENSOR HEATER

Resistance	Ω	3 - 1,000

IACV-AAC VALVE

Resistance	Ω	Approximately 10

INJECTOR

Resistance	Ω	10 - 14

THROTTLE POSITION SENSOR

Accelerator pedal conditions	Resistance kΩ
Completely released	Approximately 1.7
Partially released	1 - 10.5
Completely depressed	Approximately 10.5

IACV-AIR REGULATOR

Resistance	Ω	70 - 80

RESISTOR

Resistance	kΩ	Approximately 2.2