ENGINE FUEL & EMISSION CONTROL SYSTEM

SECTION EF & EC

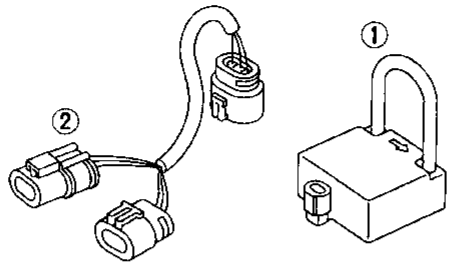
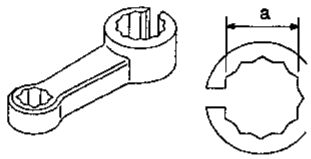
CONTENTS

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".

Special Service Tools

Tool number (Kent-Moore No.) Tool name	Description
① KV109D0010 (J36777-1) Ignition timing adapter coil ② KV109D0015 (J36777-3) Adapter harness	Measuring ignition timing  NT054
KV10114400 (J38365) Heated oxygen sensor wrench	Loosening or tightening heated oxygen sensor  NT636 a: 22 mm (0.87 in)

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

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

WARNING:

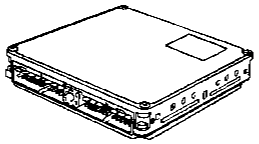
- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation 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

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

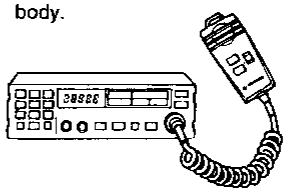
INJECTOR
- Do not disconnect injector harness connectors with engine running.
- Do not apply battery power directly to injectors.

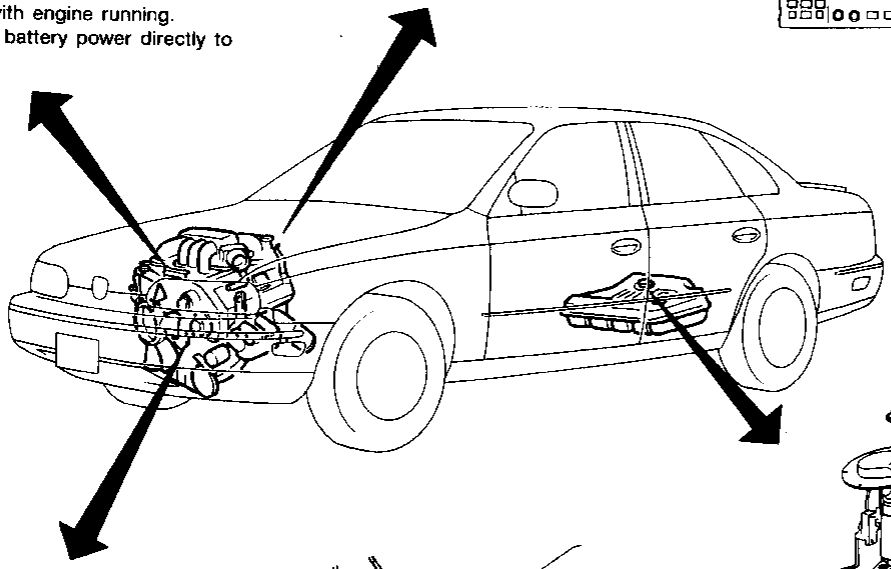
ECM
- Do not disassemble ECM (ECCS control module).
- Do not turn diagnosis mode selector forcibly.
- If a battery terminal is disconnected, the memory will return to the ECM value. The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected.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



WIRELESS EQUIPMENT
- When installing C.B. ham radio or a mobile phone, be sure to observe the following. These may adversely affect electronic control systems depending on installation location.

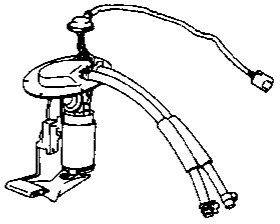
1) Keep the antenna as far away as possible from the electronic control units.
2) Keep the antenna feeder line more than 20 cm (7.9 in) away from the harness of electronic controls.
   Do not let them run parallel for a long distance.
3) Adjust the antenna and feeder line so that the standing-wave ratio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





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 crankshaft 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.
  Poor connections can cause extremely high (surge) voltage in coil and condenser, resulting in damage to ICs.
- Keep ECM harness at least 10 cm (3.9 in) from adjacent harnesses. This prevents ECM system malfunctions due to receiving external noise, degraded operation of ICs, etc.
- Keep ECM parts and harness dry.
- Before removing parts, turn off ignition switch and then disconnect battery ground cable.

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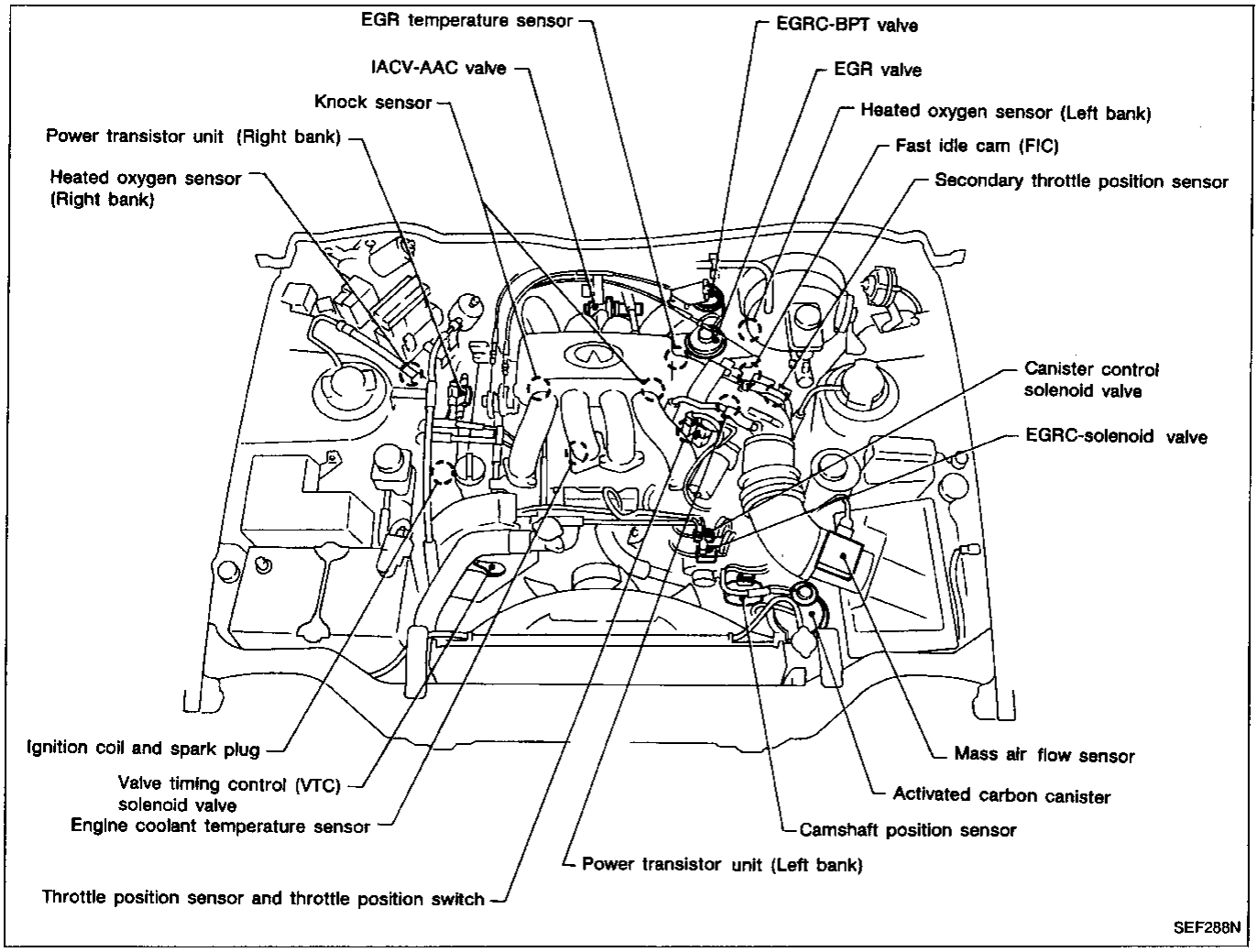
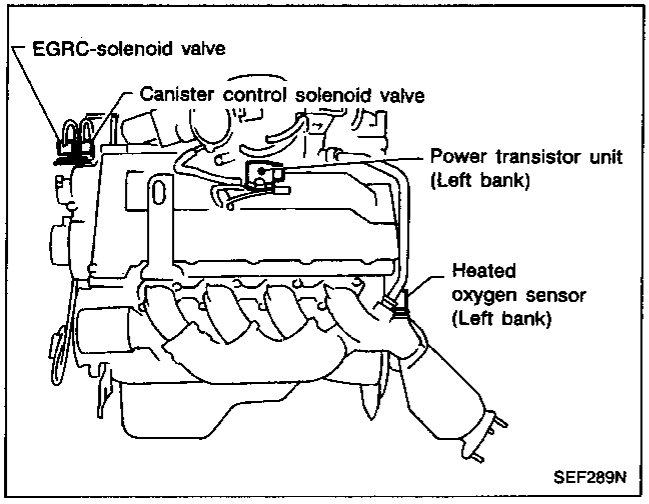
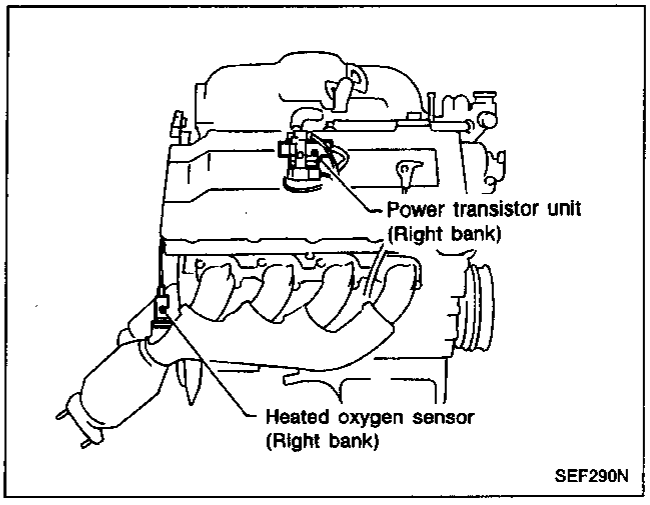
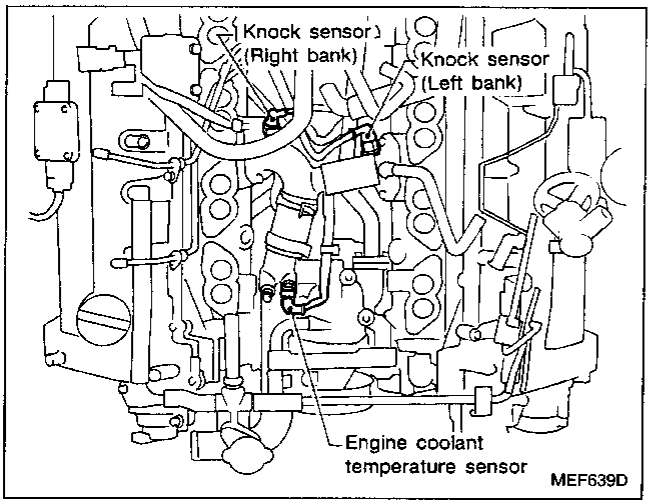
ECCS Component Parts Location

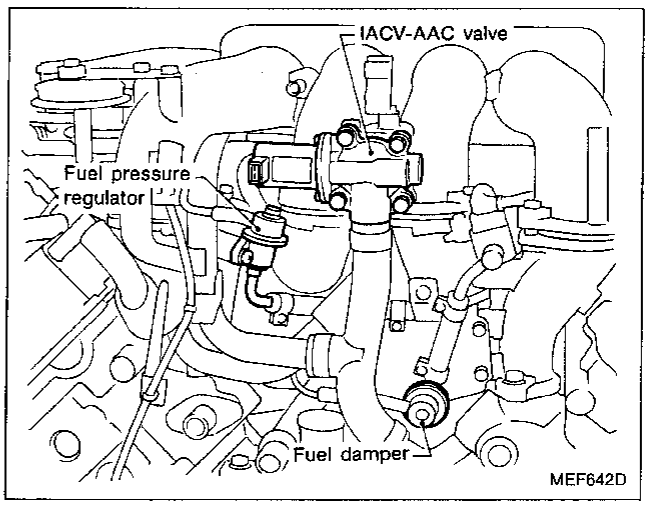


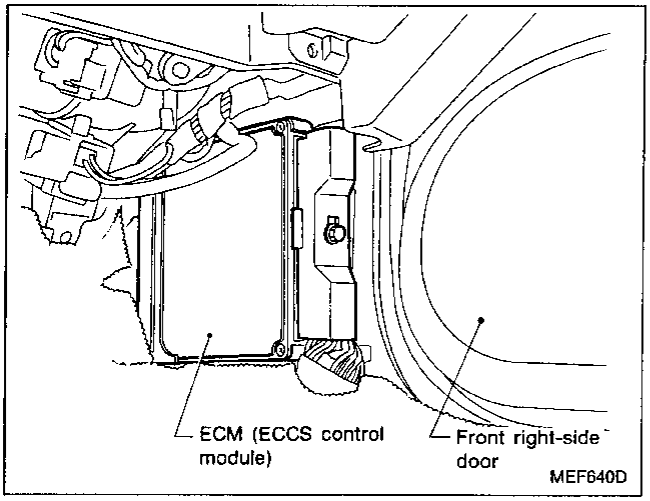


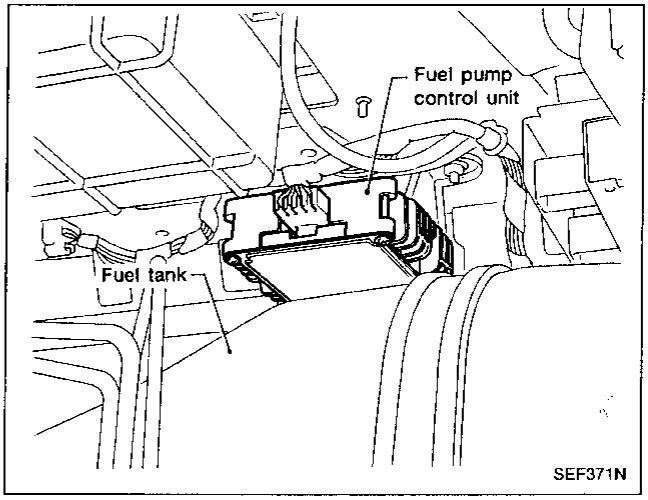


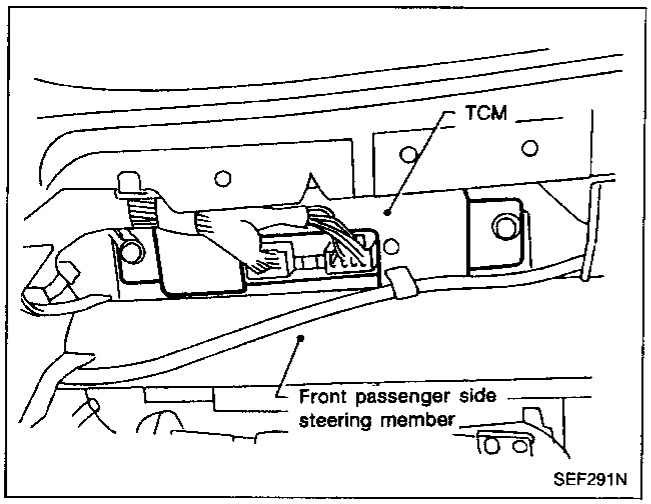
ECCS Component Parts Location (Cont'd)

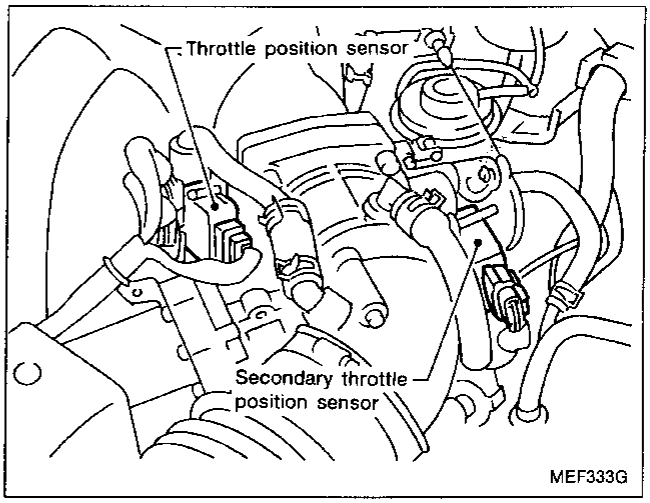




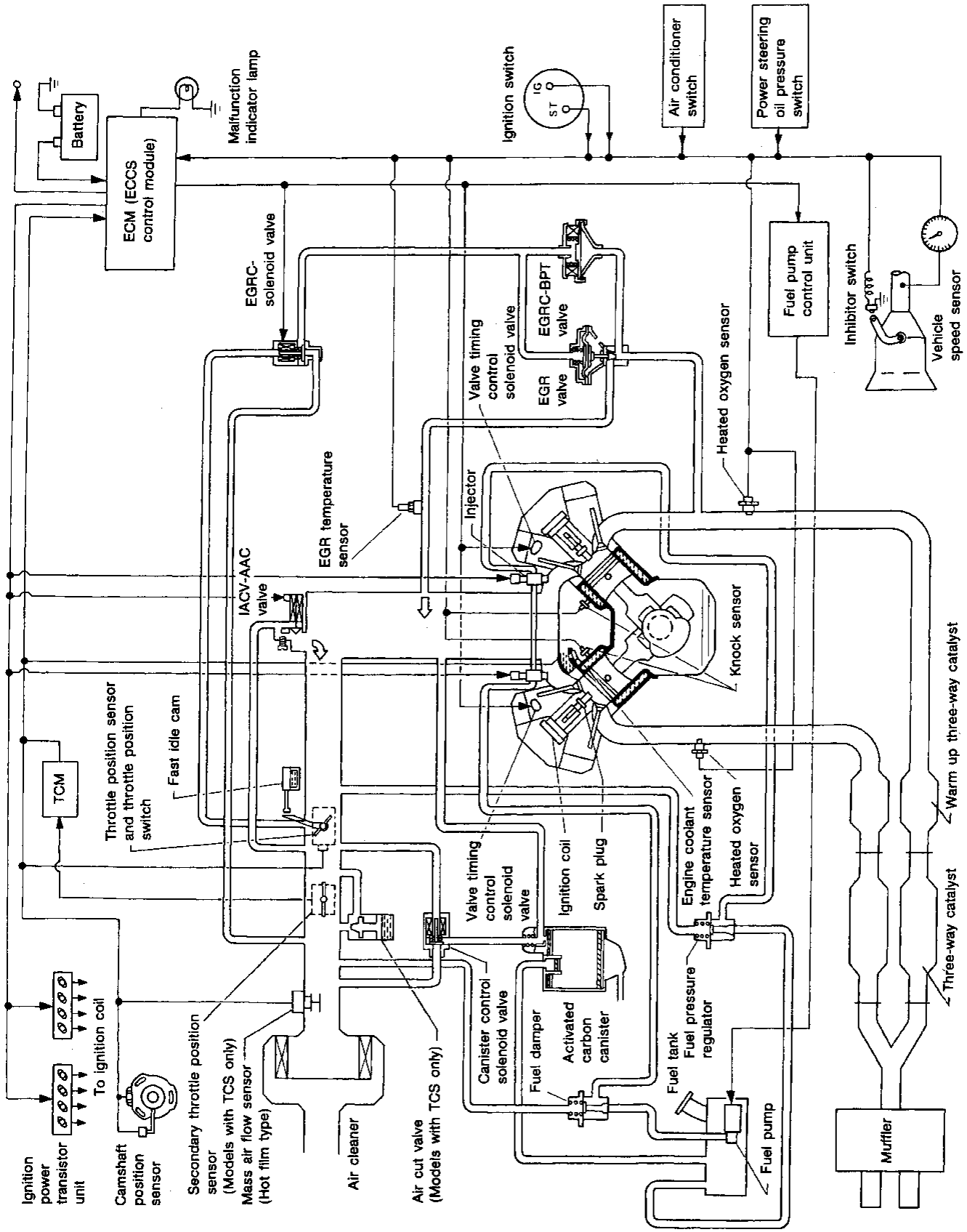








System Diagram



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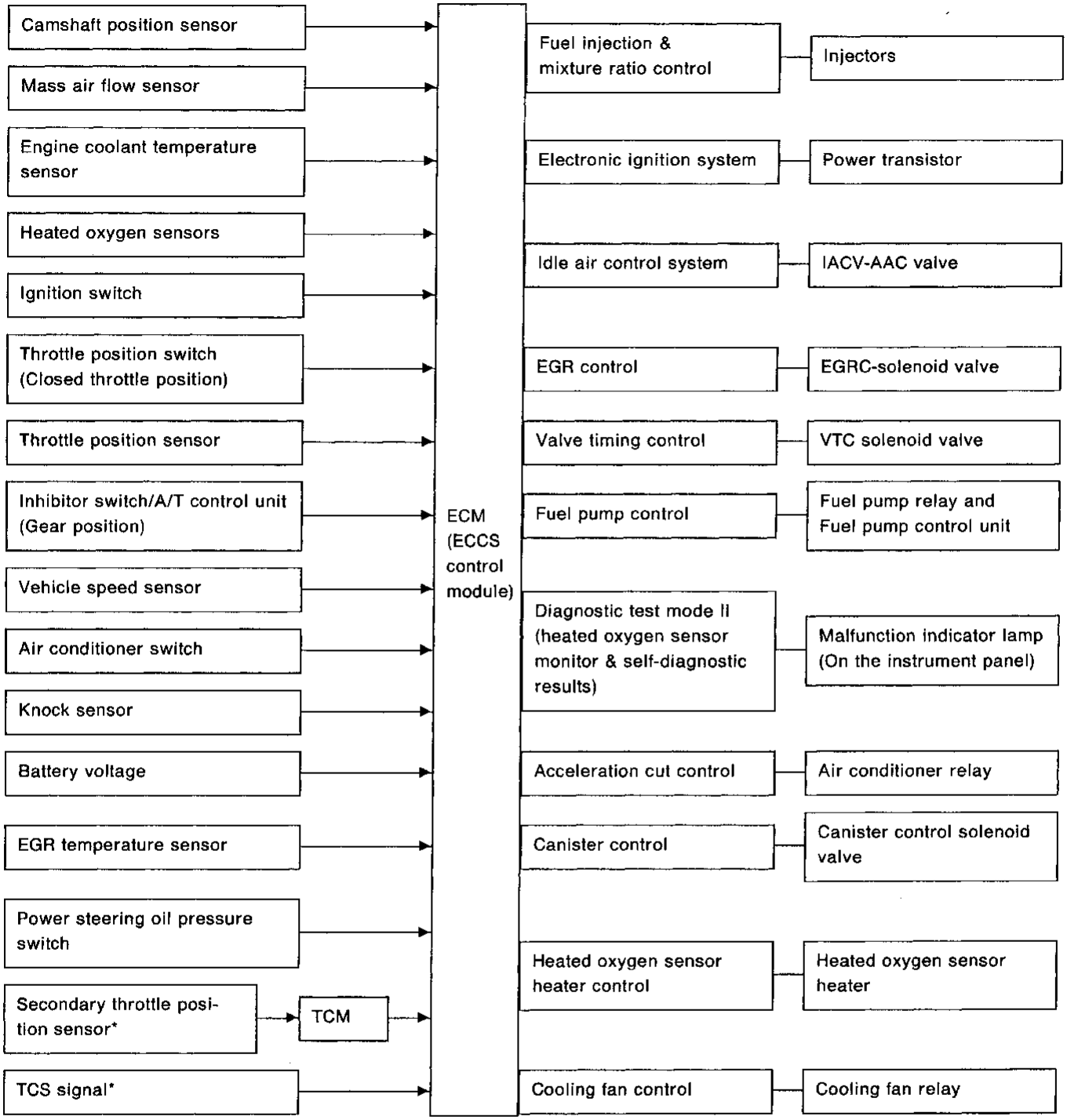
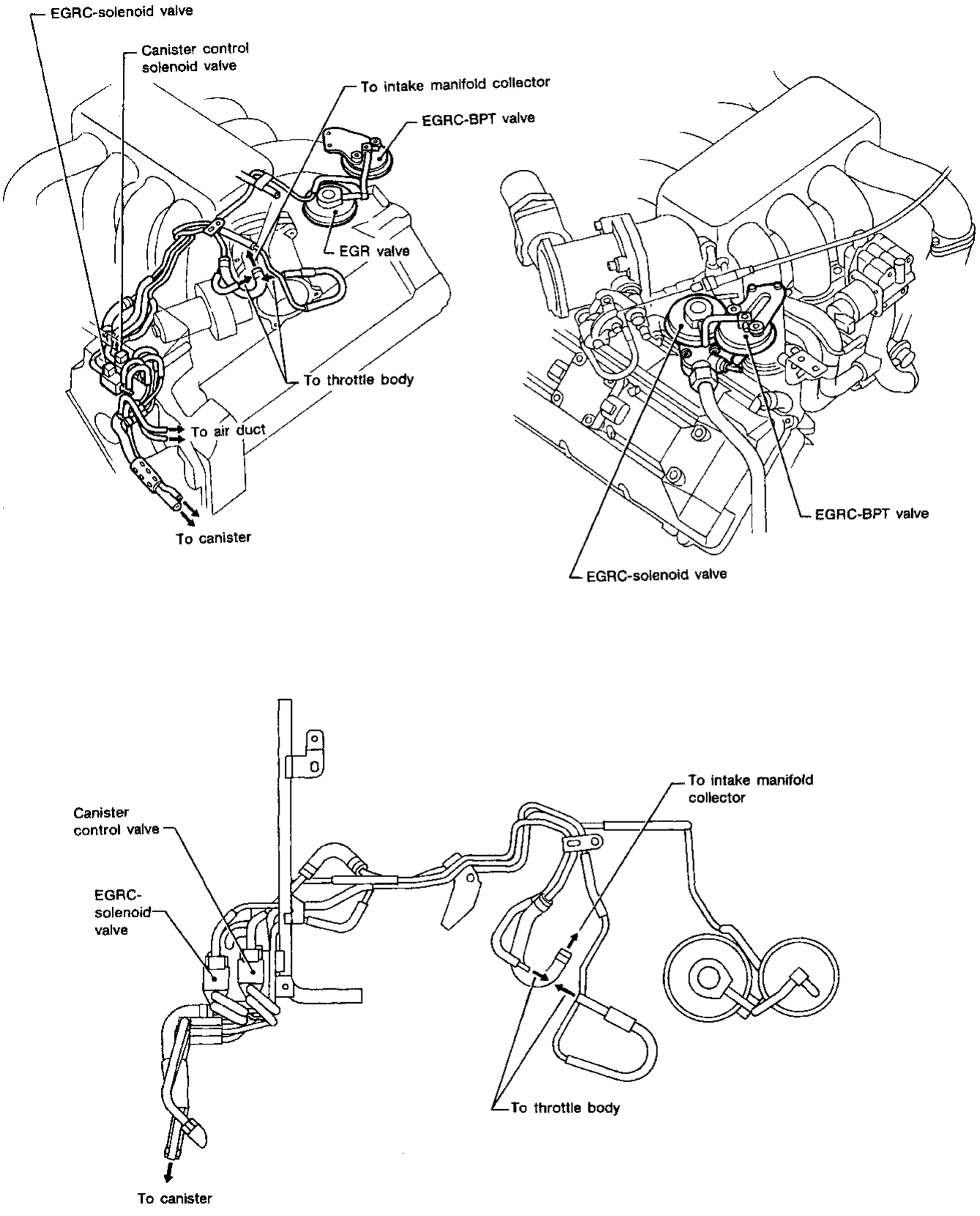
System Chart



*: Models with TCS only

Vacuum Hose Drawing



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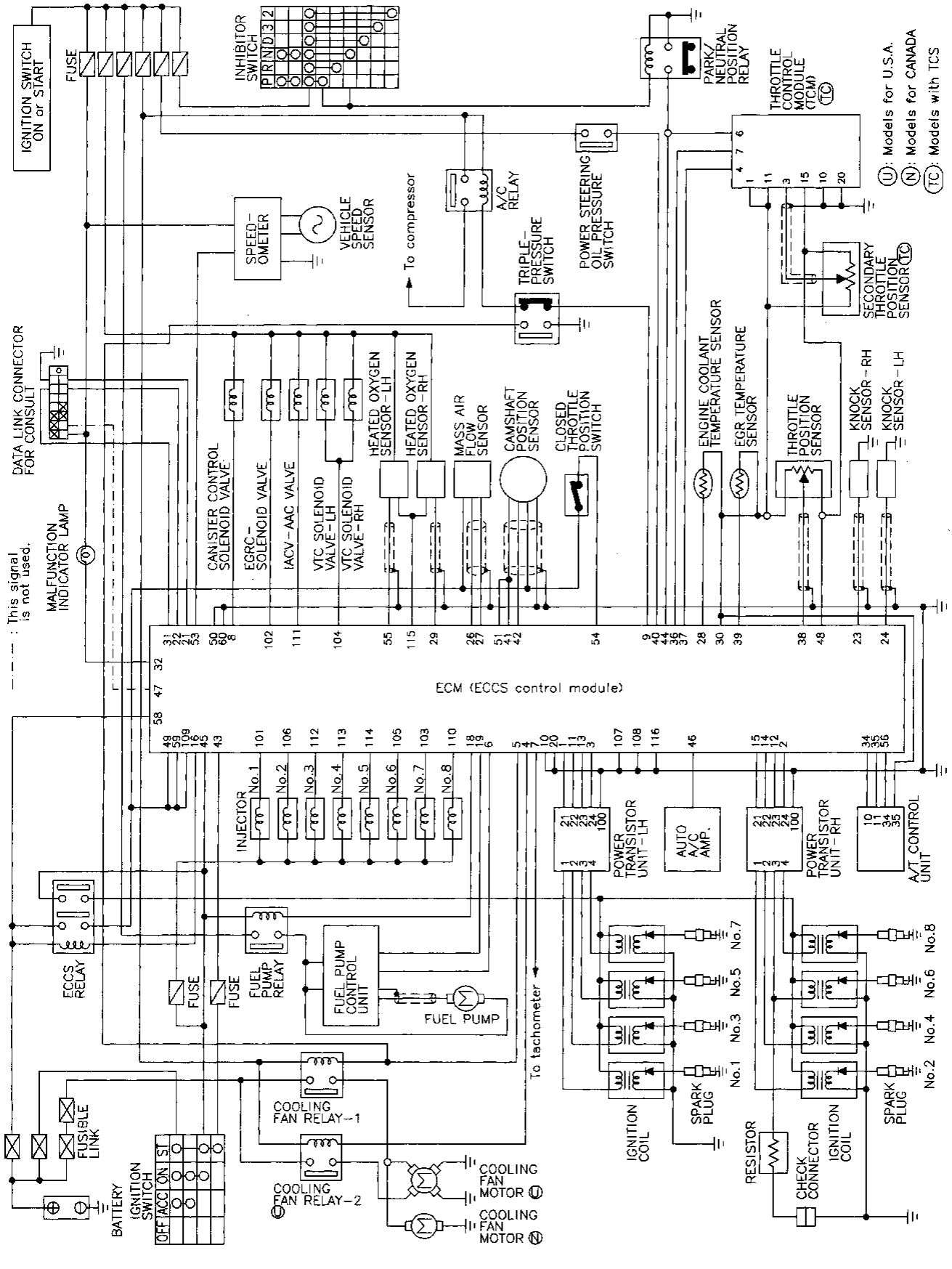
Circuit Diagram



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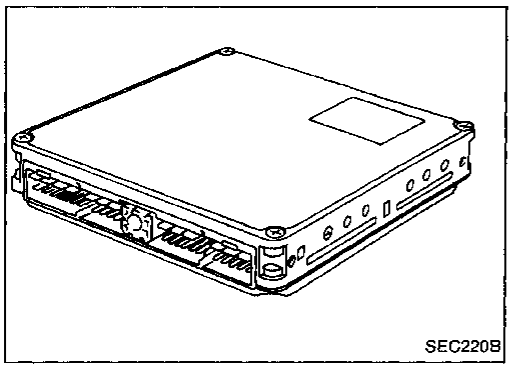
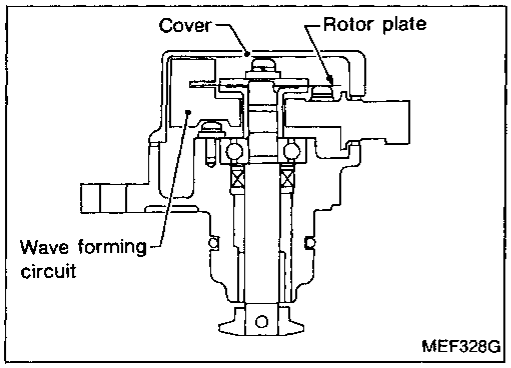

SEC220B

Engine Control Module (ECM)-ECCS Control Module

The ECM consists of a microcomputer, 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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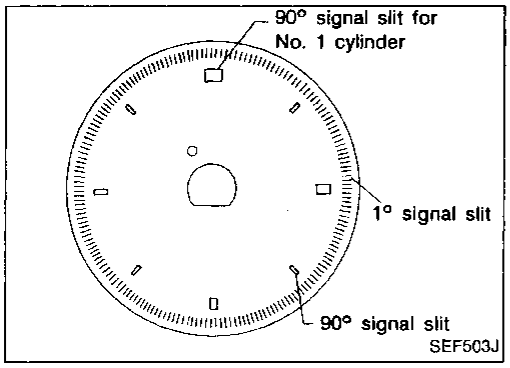
Camshaft Position Sensor (CMPS)

The camshaft position sensor is a basic component of the ECCS. It monitors engine speed and piston position. It 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.

When the rotor plate passes between the LED and the photo diode, the following happens:

Slits in the rotor plate continually cut the transmitted light to the photo diode from the LED. This generates rough-shaped pulses converted into on-off pulses by the wave forming circuit sent to the ECM. For diagnosis, refer to EF & EC-82, 125.



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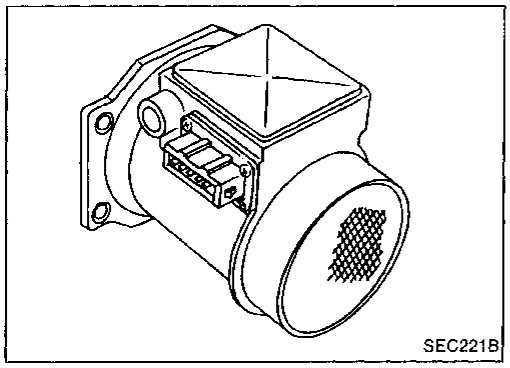
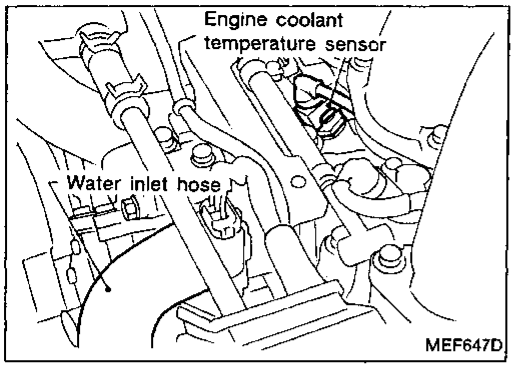

SEC221B

Mass Air Flow Sensor (MAFS)

The mass air flow sensor measures the intake air flow rate by measuring a part of the entire flow. Measurements are made in such a way that the ECM receives electrical output signals. Those signals are varied by the heat emitting from the hot film placed in the intake air stream.

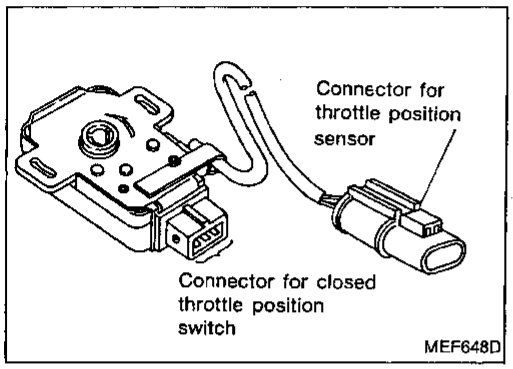
The intake air flows into the intake manifold through a route around the hot film. The heat generated from the hot film is then taken away by the air. The amount of heat reduction depends on the air flow. The temperature of the hot film is automatically controlled to a certain number of degrees.

Therefore, supplying the hot film with more electric current will maintain the temperature of the hot film. The ECM detects the air flow by means of this current change. For diagnosis, refer to EF & EC-85.



Engine Coolant Temperature Sensor (ECTS)

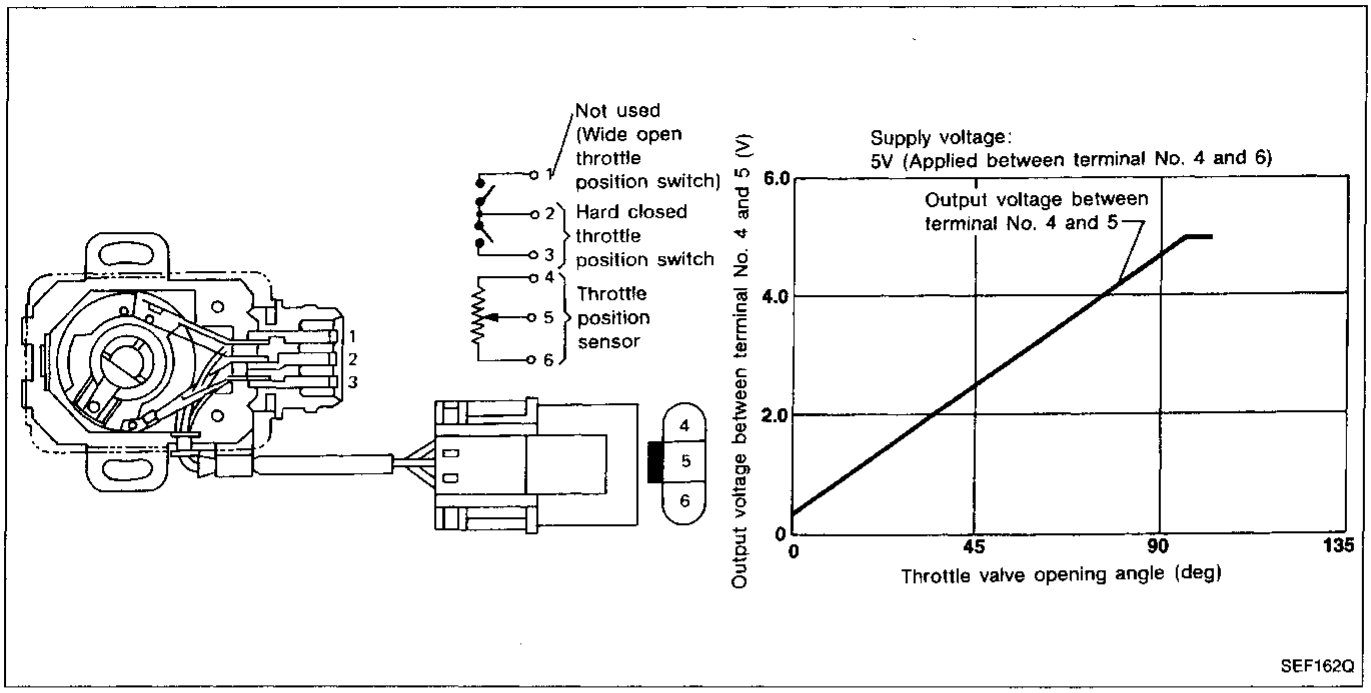
The engine coolant temperature sensor, located on the top of thermostat housing, detects engine coolant temperature and transmits a signal to the ECM.
The temperature sensing unit employs a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise. For diagnosis, refer to EF & EC-88.

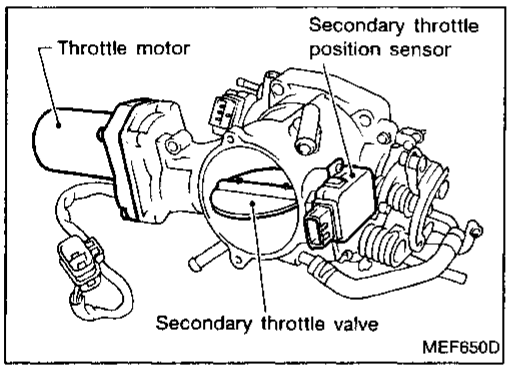


Throttle Position Sensor (TPS) & Soft/Hard Closed Throttle Position (CTP) Switch

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.
Closed throttle 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. On the other hand, "hard closed throttle position switch", which is built in the throttle position sensor unit, is used for engine control when soft closed throttle position switch is malfunctioning. For diagnosis, refer to EF & EC-111, 141.

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

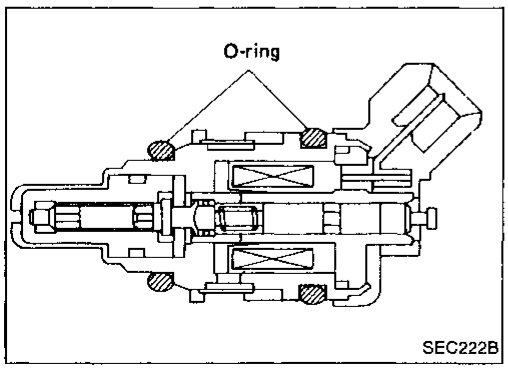




Secondary Throttle Position Sensor (TPS) (Models with TCS only)

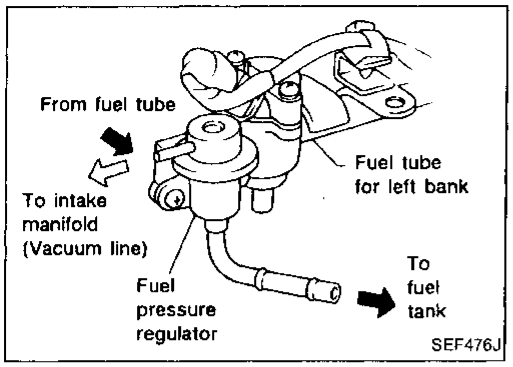
The secondary throttle position sensor responds to the movement of the throttle motor which is controlled by the TCM.
This sensor is a kind of potentiometer which transforms the secondary throttle position into output voltage, and emits the voltage signal to the TCM. In addition, the sensor detects the opening and closing speed and position of the secondary throttle valve and feeds the voltage signal to the TCM.
Another case is when the secondary throttle valve opening becomes smaller than the ordinary throttle valve opening due to TCS operation. In this case, the signal from the secondary throttle valve is used for engine control. This replaces the signal from the ordinary throttle position sensor. The signal of the secondary throttle valve first enters the TCM, from where it is sent to the ECM. For diagnosis, refer to EF & EC-116.

WARNING:
Before touching the secondary throttle valve, be sure to disconnect the throttle motor connector; otherwise, injury may occur due to accidental actuation of the valve.



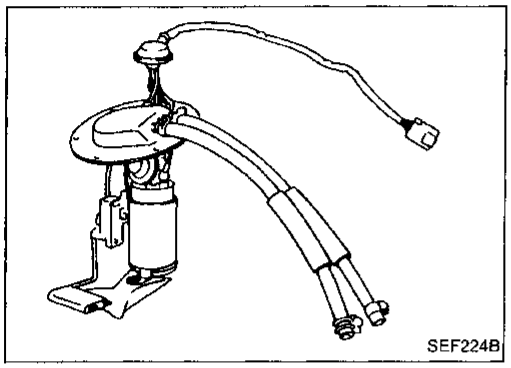
Fuel Injector

The fuel injector is a small, elaborate solenoid valve. The ECM sends injection signals to the injector. Then, the injector's coil pulls back the needle valve, fuel is then released into the intake manifold through the nozzle. The injected fuel is controlled by the ECM in terms of injection pulse duration. For diagnosis, refer to EF & EC-114, 119, 138.



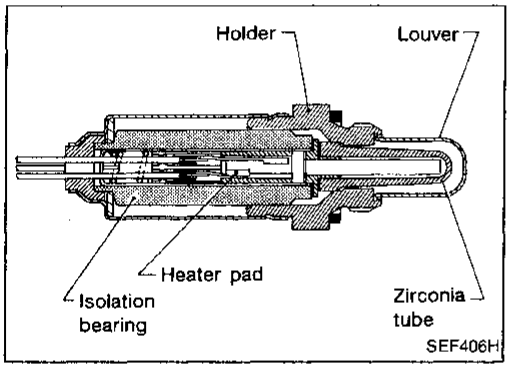
Fuel Pressure Regulator

The 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, maintain the pressure at the above value. For diagnosis, refer to EF & EC-226.



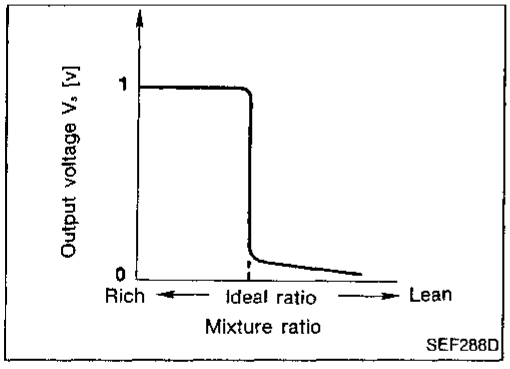
Fuel Pump

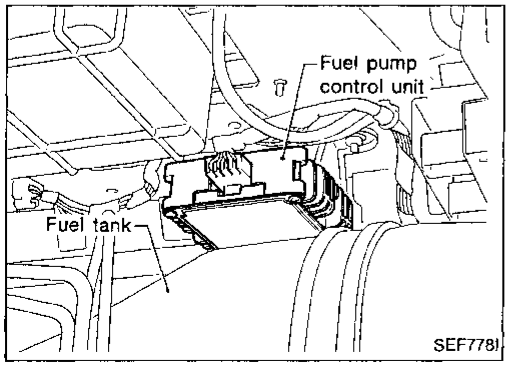
The fuel pump is an in-tank type with a fuel damper. Both the pump and damper are located in the fuel tank. For diagnosis, refer to EF & EC-215.



Heated Oxygen Sensor (HO2S)

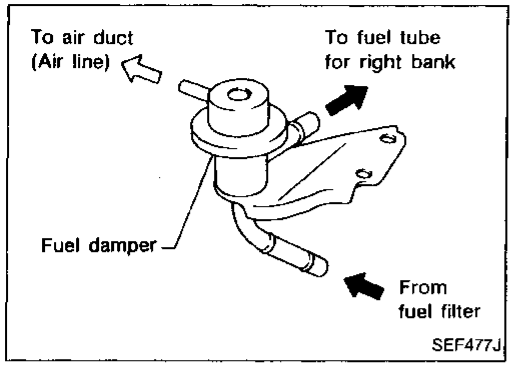
The heated oxygen sensor, which is placed into the exhaust outlet, monitors the amount of oxygen in the exhaust gas.
The sensor has a closed-end tube made of ceramic zirconia. The outer surface of the tube is exposed to exhaust gas, and the inner surface to atmosphere. The zirconia of the tube compares the oxygen density of exhaust gas with that of atmosphere, and generates electricity. In order to improve generating power of the zirconia, its tube is coated with platinum. The voltage is approximately 1V richer in a mixture ratio than the ideal air-fuel ratio. It is approximately 0V in leaner conditions. The radical change from 1V to 0V occurs at around the ideal mixture ratio. In this way, the heated oxygen sensor detects the amount of oxygen in the exhaust gas. Then it sends the signal of approximately 1V or 0V to the ECM. A heater is used to activate the sensor. For diagnosis, refer to EF & EC-102, 136.





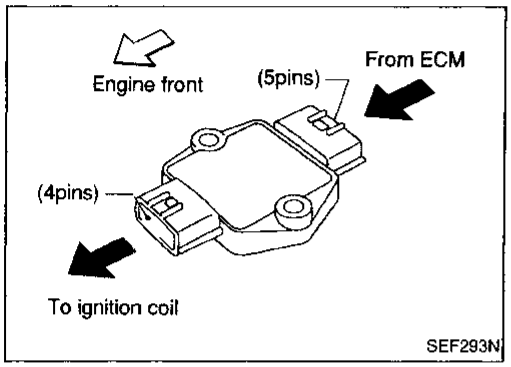
Fuel Pump Control Unit

The fuel pump control unit adjusts the voltage supplied to the fuel pump to control the fuel quantity. For diagnosis, refer to EF & EC-146, 215.



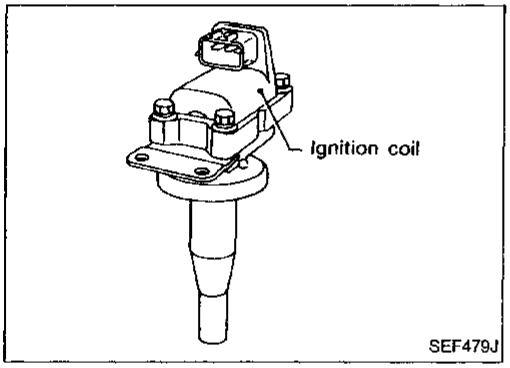
Fuel Damper

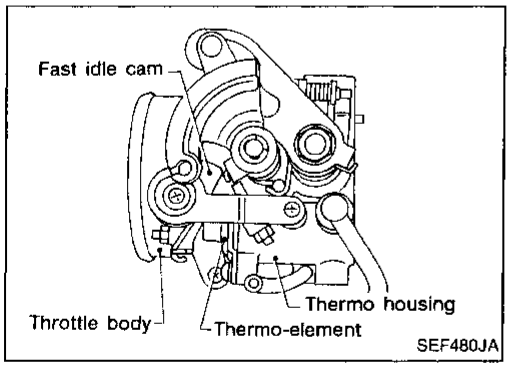
The fuel damper, which consists of a diagram, reduces fuel pressure pulsation in the fuel feed line between the fuel filter and injectors. For diagnosis, refer to EF & EC-226.



Power Transistor Unit & Ignition Coil

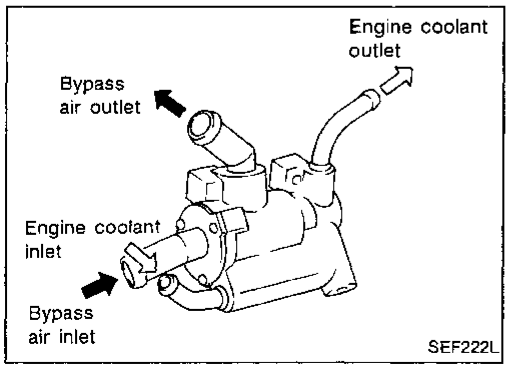
The ignition signal from the ECM is amplified by the two power transistors. These turn the ignition coil primary circuit on and off, inducing the secondary circuit's proper high voltage. The ignition coil is a small, molded type.
For diagnosis, refer to EF & EC-95, 127.





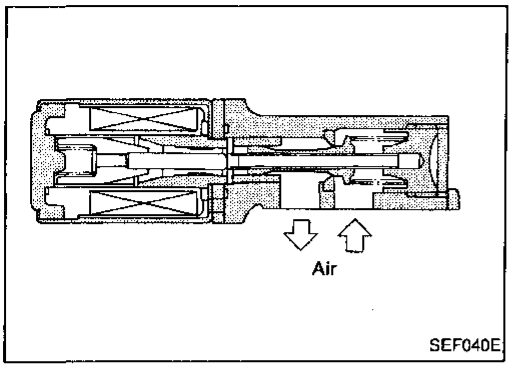
Fast Idle Cam (FIC)

The FIC is installed on the throttle body to maintain adequate engine speed while the engine is cold. It is operated by a volumetric change in wax located inside the thermo-element. The thermo-element is controlled by engine coolant temperature. For diagnosis, refer to EF & EF & EC-223.



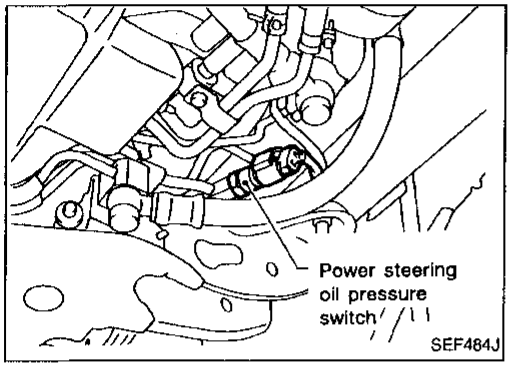
Air Cut Valve (Models with TCS only)

The function is the same as for the FIC. This valve is used to adjust the quantity of air which bypasses the secondary throttle valve. The air cut valve is operated by a volumetric change in wax located inside the thermo-element. The thermo-element is controlled by engine coolant temperature.
Accordingly, the quantity of bypass air is larger before engine warm up than after warm up. For diagnosis, refer to EF & EC-219.



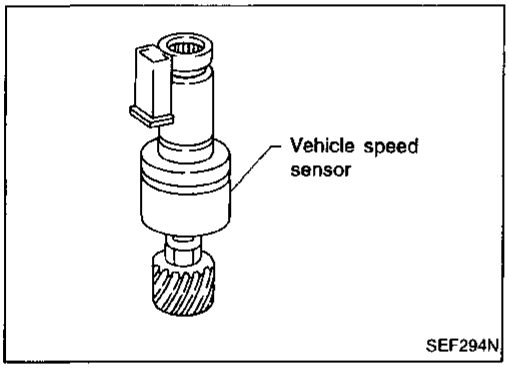
Idle Air Control Valve (IACV)-Auxiliary Air Control (AAC) Valve

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. For diagnosis, refer to EF & EC-149.



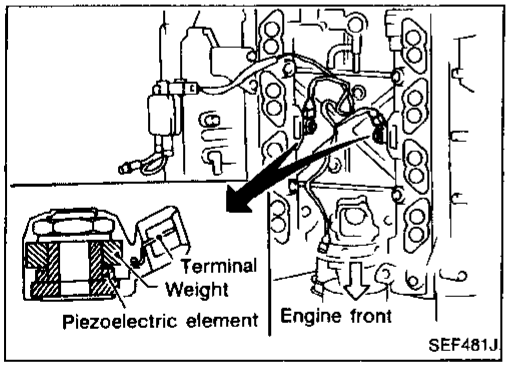
Power Steering Oil Pressure Switch

The power steering oil pressure switch is attached to the power steering high-pressure tube. It 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. For diagnosis, refer to EF & EC-152.



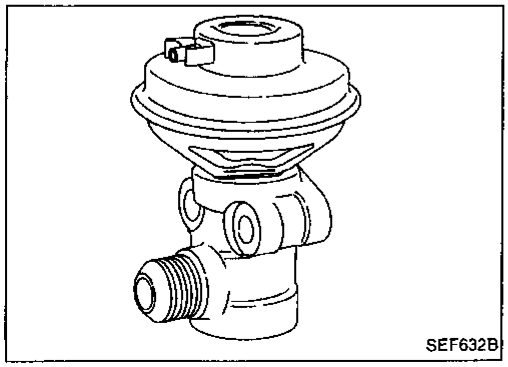
Vehicle Speed Sensor (VSS)

The vehicle speed sensor provides a vehicle speed signal to the speedometer and the speedometer sends a signal to the ECM.
The speed sensor consists of a pulse generator which is installed in the transmission. For diagnosis, refer to EF & EC-91.



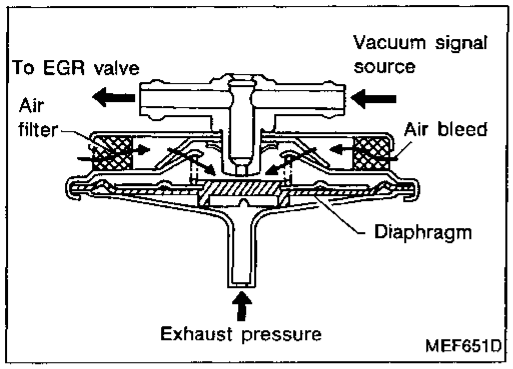
Knock Sensor (KS)

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. For diagnosis, refer to EF & EC-105.



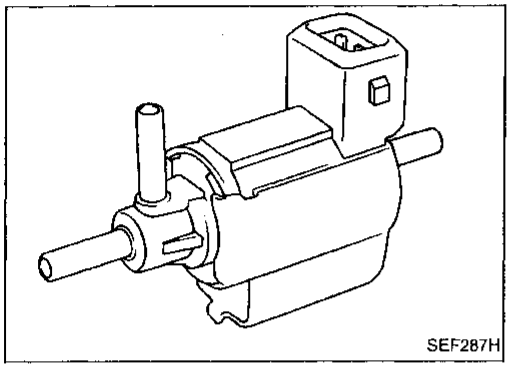
Exhaust Gas Recirculation (EGR) Valve

The EGR valve controls the quantity of exhaust gas to be diverted to the intake manifold. The action is created by 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. For diagnosis, refer to EF & EC-133, 217.



EGR Control (EGRC)-BPT Valve

The EGRC-BPT valve monitors exhaust pressure to activate the diaphragm, controlling throttle body vacuum applied to the EGR valve. In other words, recirculated exhaust gas is controlled in response to positioning of the EGR valve or to engine operation. For diagnosis, refer to EF & EC-133, 217.

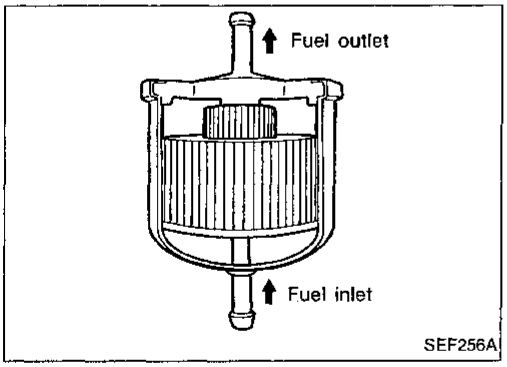


EGR Control (EGRC)-Solenoid Valve

The EGR and canister control solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. A plunger will then move to cut the vacuum signal (from the throttle body to the EGR valve and canister purge valve).
When the ECM sends an OFF signal, the vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve and carbon canister. For diagnosis, refer to EF & EC-99, 133, 217.

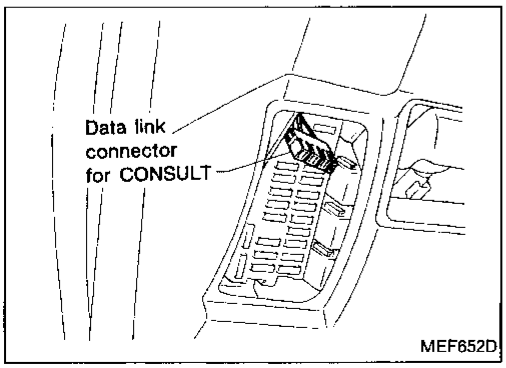
Canister Control Solenoid Valve

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 canister. The fuel vapor is then lead to the intake manifold. When the ECM sends an ON signal, the coil pulls the plunger downward and cuts the vacuum signal. For diagnosis, refer to EF & EC-161, 217.



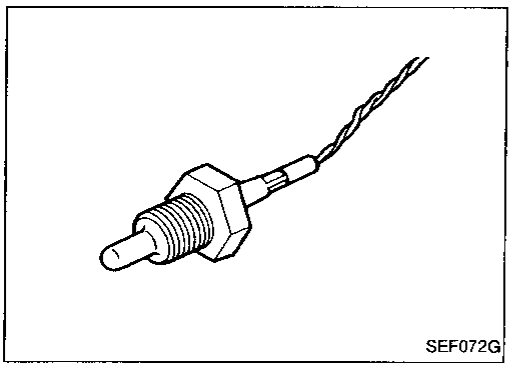
Fuel Filter

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



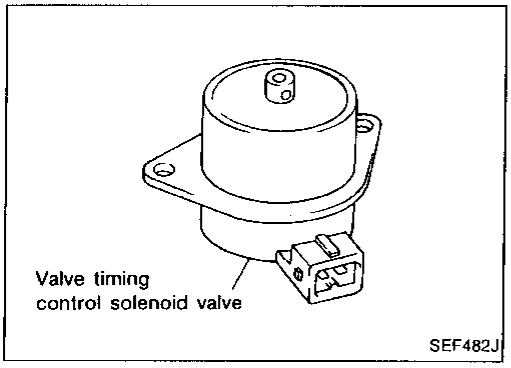
Data Link Connector for CONSULT

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



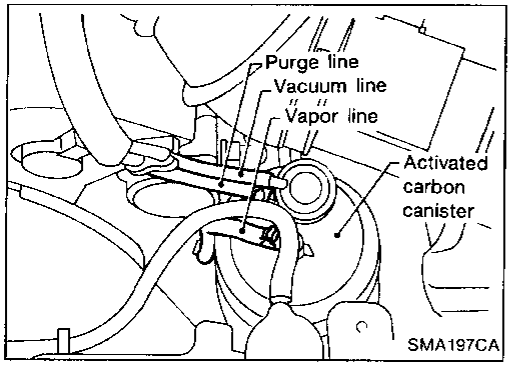
EGR Temperature Sensor

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. For diagnosis, refer to EF & EC-108, 218.



Valve Timing Control (VTC) 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. For diagnosis, refer to EF & EC-158, 220.

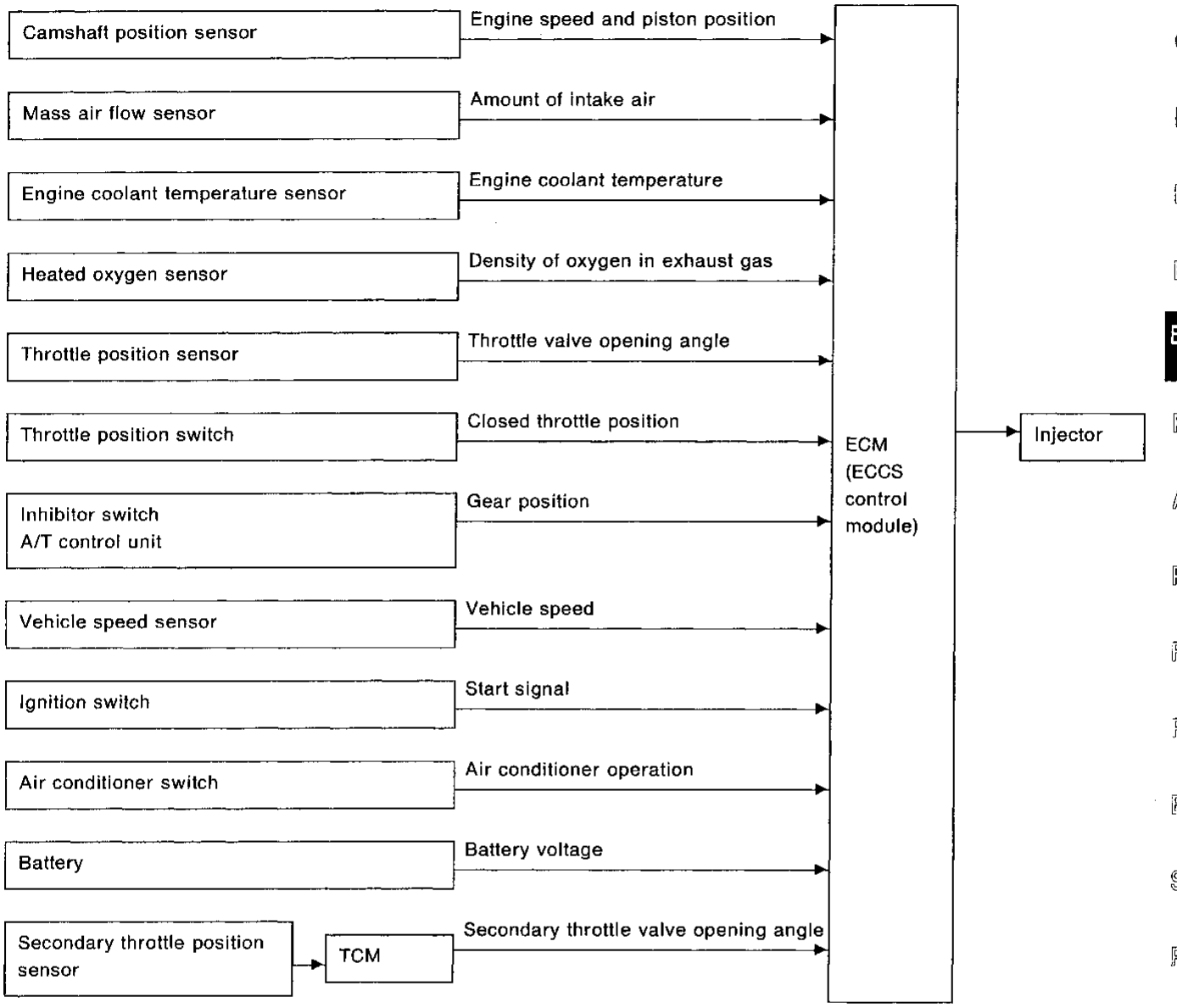


Carbon Canister

The 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. For diagnosis, refer to EF & EC-228.

Multiport Fuel Injection (MFI) System

INPUT/OUTPUT SIGNAL LINE



BASIC MULTIPORT FUEL INJECTION SYSTEM

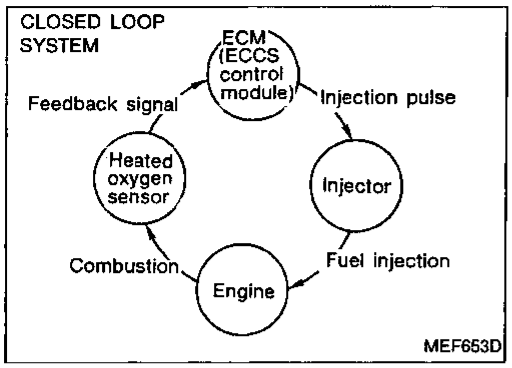
The amount of fuel injected from the fuel injector, or the length of time the valve remains open, is determined by the ECM. The amount of fuel injected is a program value mapped in the ECM memory. In other words, the program value is preset by engine operating conditions determined by input signals (for engine speed and air intake). The signals come 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



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

MIXTURE RATIO FEEDBACK CONTROL

The mixture ratio feedback system is used for precise control of mixture ratio to the stoichiometric point. The three way catalyst can reduce CO, HC and NOx emissions. This system uses a 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.
Doing so, the mixture ratio will be within the range of the stoichiometric mixture ratio.
This stage refers to the closed loop control condition.

OPEN LOOP CONTROL

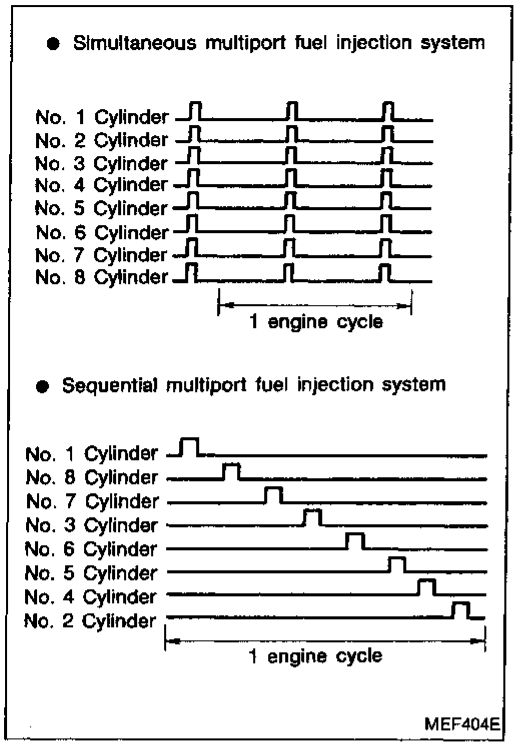
The open loop control condition refers to the ECM for detecting any of the following conditions when feedbacking control stops. Doing so it will maintain stabilized fuel combustion.

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

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 provides a basic mixture ratio as close as possible to the stoichiometric mixture ratio. However, the basic mixture ratio is not necessarily controlled as originally designed. Both Manufacturing differences (i.e. mass air flow sensor hot wire) and characteristic changes during operation (i.e. injector clogging) directly affect mixture ratio.
Accordingly, the difference between the basic and stoichiometric mixture ratios is monitored in this system. This 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 SYSTEM

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

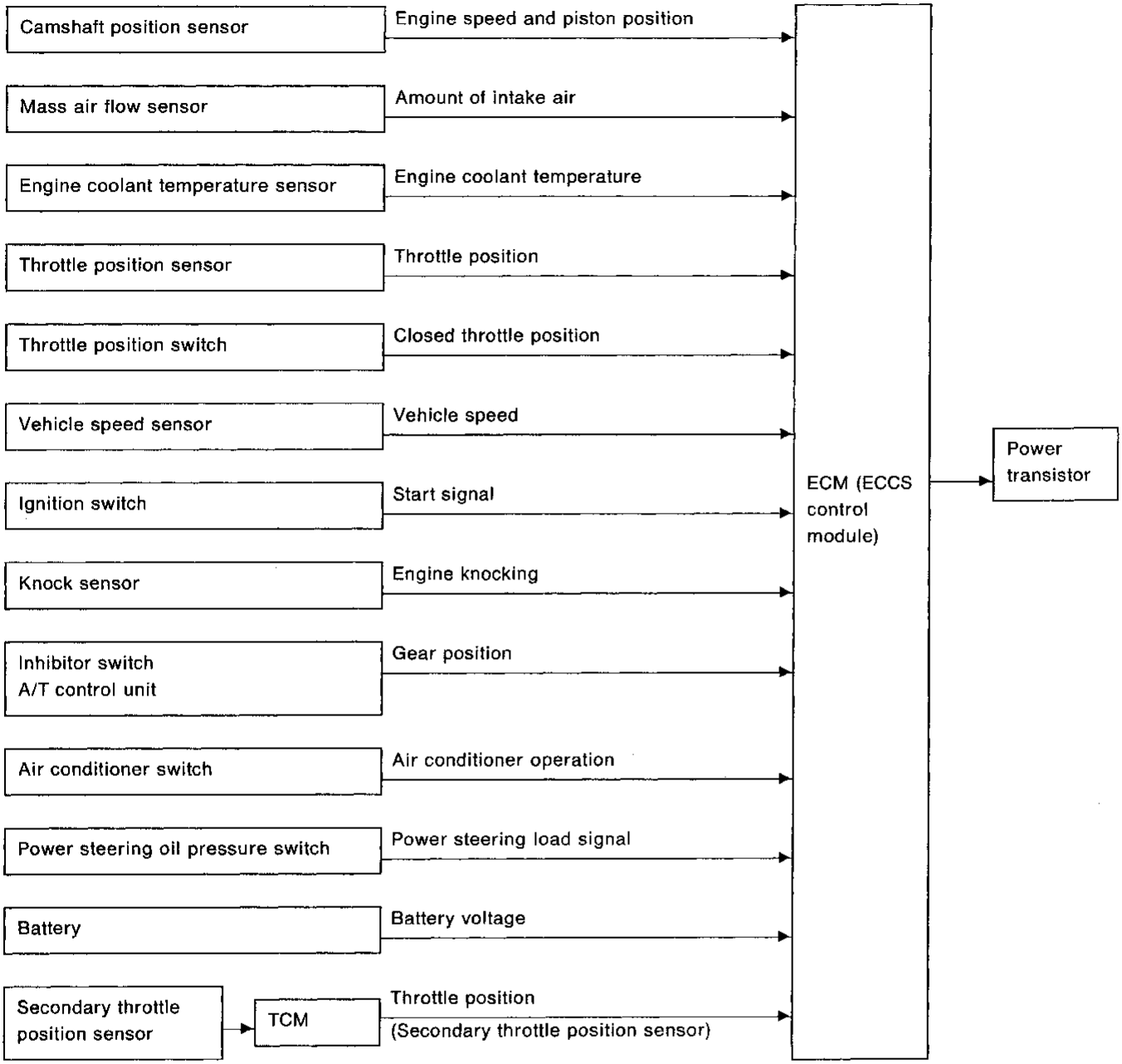
1) Sequential multiport fuel injection system
   Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.
2) Simultaneous multiport fuel injection system
   Fuel is injected simultaneously into all four cylinders twice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

FUEL SHUT-OFF

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

Electronic Ignition (EI) System

INPUT/OUTPUT SIGNAL LINE



Electronic Ignition (EI) System (Cont'd)

SYSTEM DESCRIPTION

Ignition timing is controlled by the ECM to ensure the best air-fuel ratio for every running condition of the engine.

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

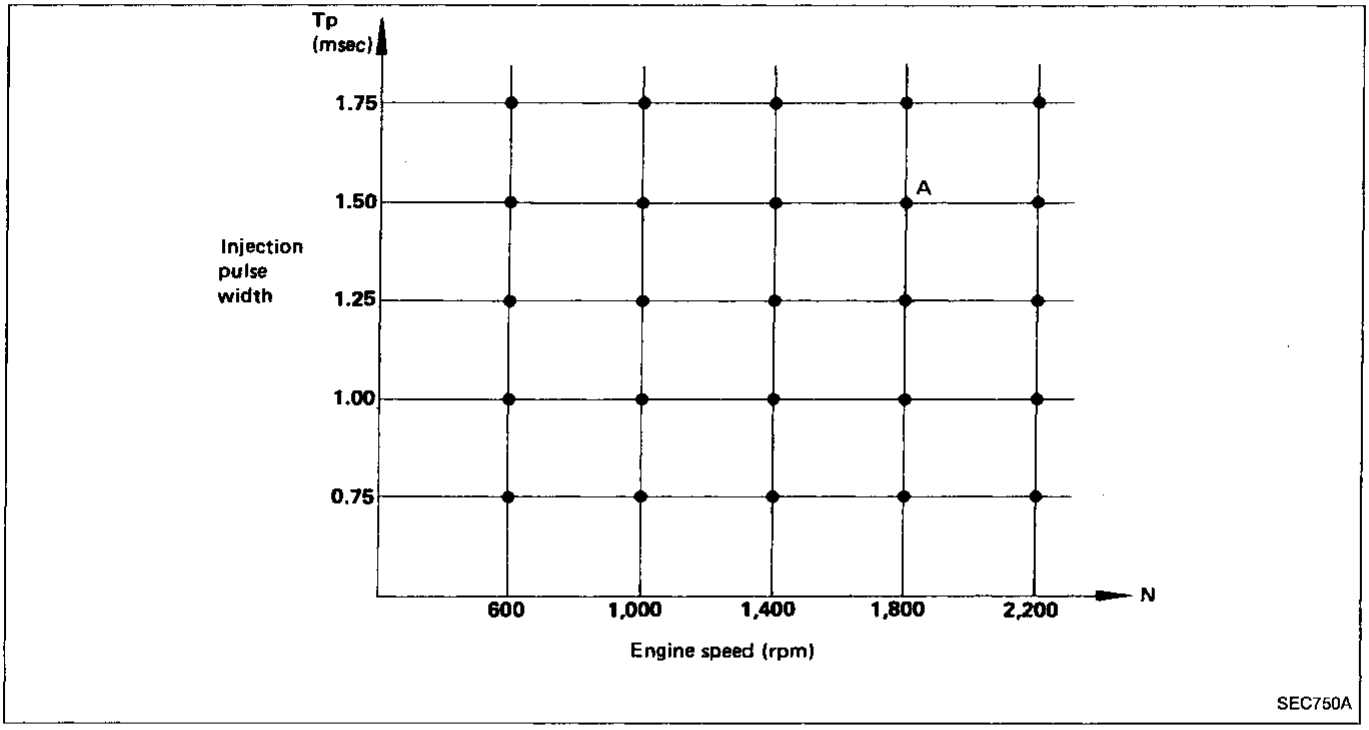
The ECM detects information such as the injection pulse width and camshaft position sensor signal which varies every moment. Then responding to this information, ignition signals are transmitted to the power transistor.

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.

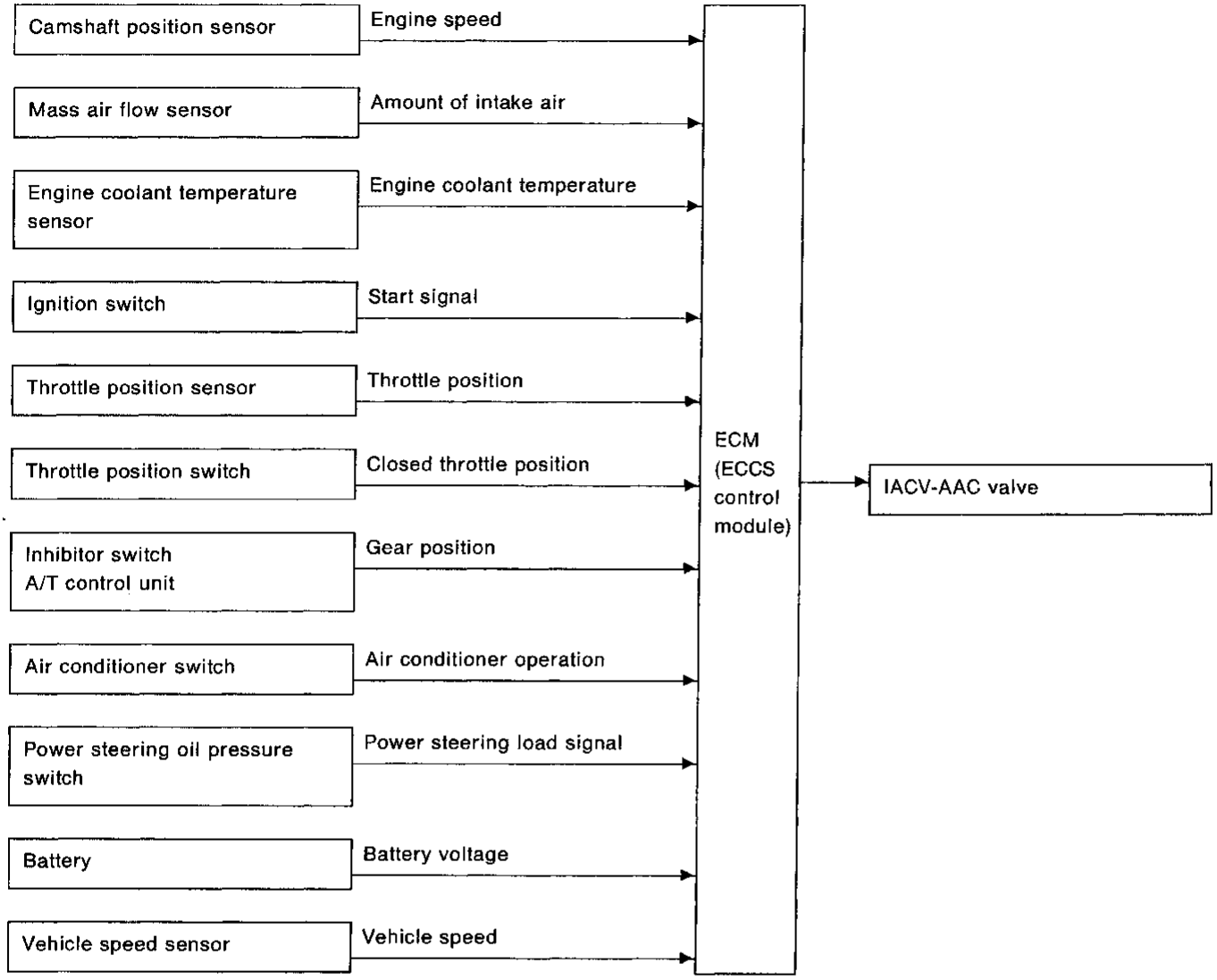


The retard system, actuated by the knock sensor, is designed only for emergencies. The basic ignition timing is pre-programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. Consequently, the retard system does not operate under normal driving conditions.

However, if engine knocking occurs, the knock sensor monitors the condition and transmits the signal 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



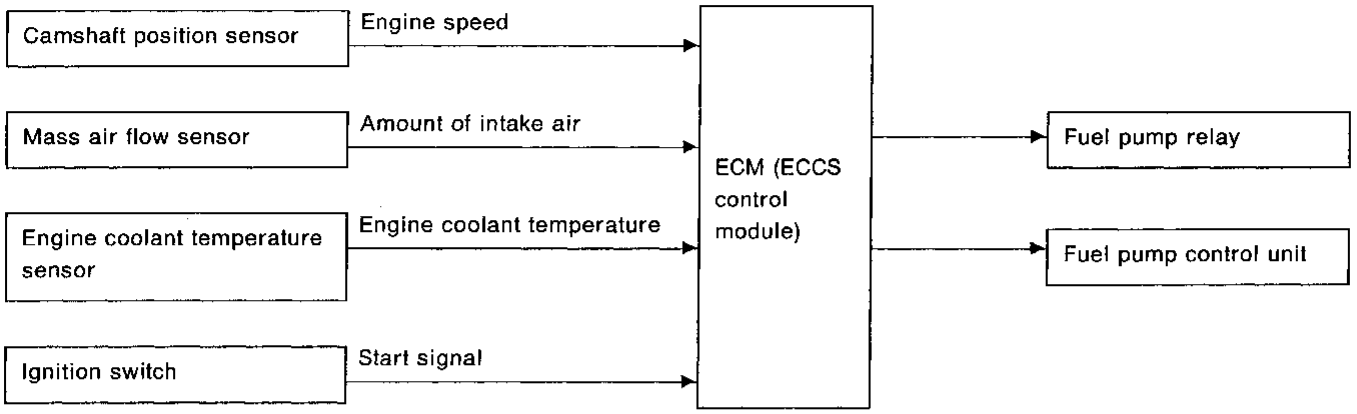
SYSTEM DESCRIPTION

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 the IACV-AAC valve. The IACV-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM.

The ECM then controls the IACV-AAC valve ON/OFF time, ensuring that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions (noise and vibration transmitted to the vehicle interior, fuel consumption, and engine load.)

Fuel Pump Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

Fuel pump ON-OFF control

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

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 5 seconds
Engine running and cranking	Operates
When engine is stopped	Stops in 1.5 seconds
Except as shown above	Stops

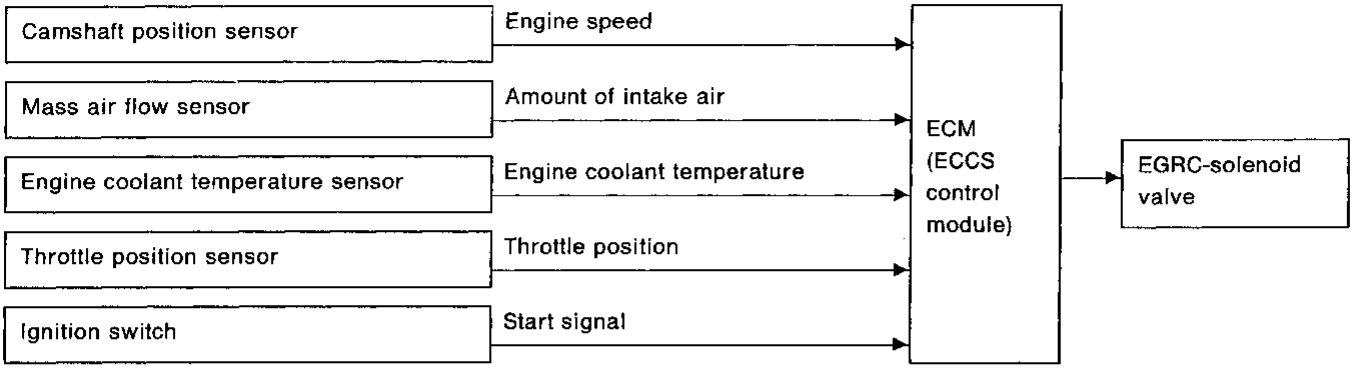
Fuel pump voltage control

The fuel pump is controlled in 3-steps by the fuel pump control unit which adjusts the voltage supplied to the fuel pump.

Conditions	Amount of fuel flow	Supplied voltage
• Engine cranking • Engine coolant temperature below 0°C (32°F) • Engine is running under heavy load and high speed conditions	high	Battery voltage (11 - 14V)
• Engine is running under middle load and middle speed conditions	middle	Approximately 7.8V
Those other than above	low	Approximately 5.6V

Exhaust Gas Recirculation (EGR) System

INPUT/OUTPUT SIGNAL LINE



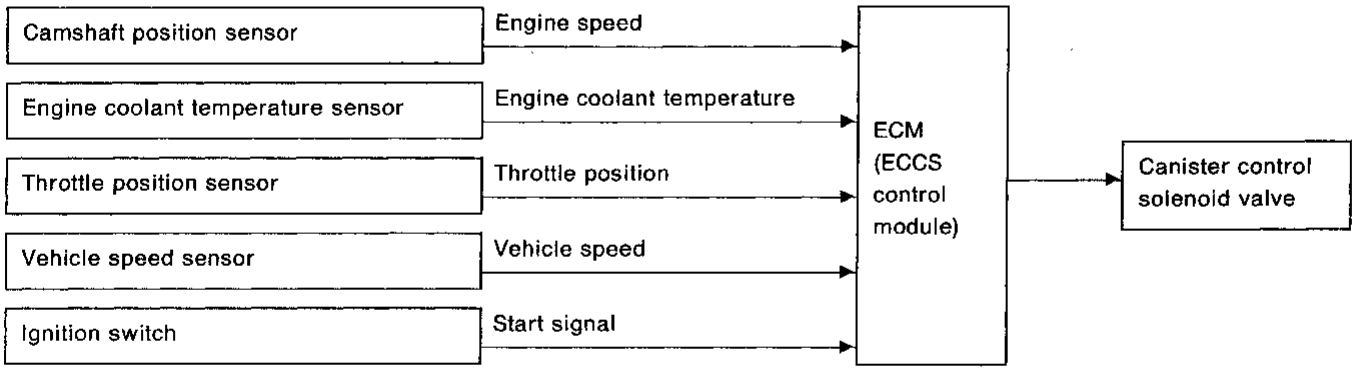
SYSTEM DESCRIPTION

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 and the EGR & canister control solenoid valve. When the ECM detects any of the following conditions, current flows through the solenoid valve. This causes the port vacuum to be discharged into the atmosphere. The EGR valve and canister remain closed.

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

Canister Control

INPUT/OUTPUT SIGNAL LINE



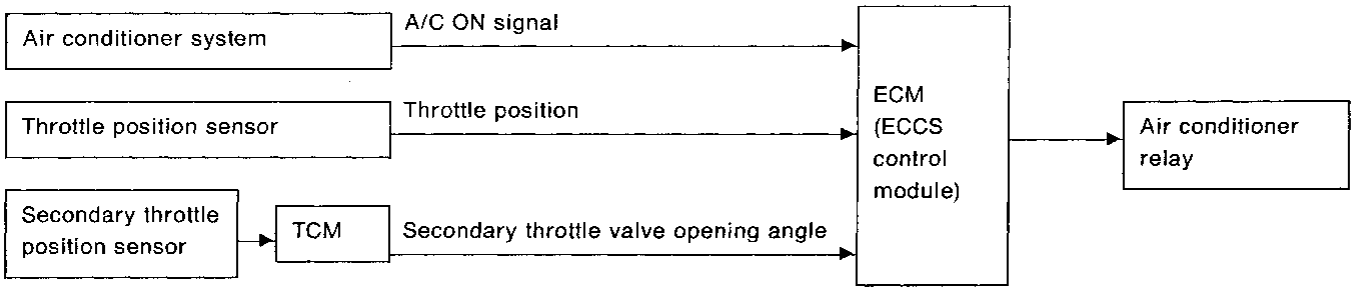
SYSTEM DESCRIPTION

Also, a system is provided which precisely cuts and controls the port vacuum applied to the canister. This suits 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 canister control vacuum line.
This causes the port vacuum to be discharged into the atmosphere so that the canister remains closed.

1) Start switch "ON"
2) Closed throttle position
3) Low and high engine coolant temperature
4) During deceleration
5) Engine stopped
6) Vehicle speed: below 20 km/h (12MPH)

Air Conditioner Cut Control

INPUT/OUTPUT SIGNAL LINE



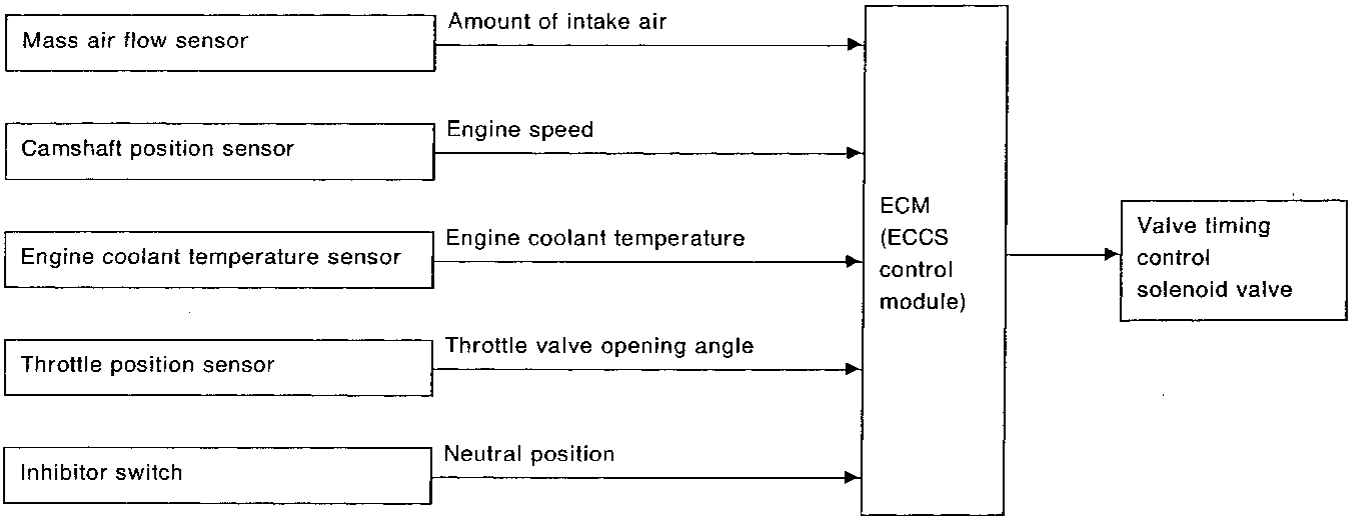
SYSTEM DESCRIPTION

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 (VTC)

INPUT/OUTPUT SIGNAL LINE



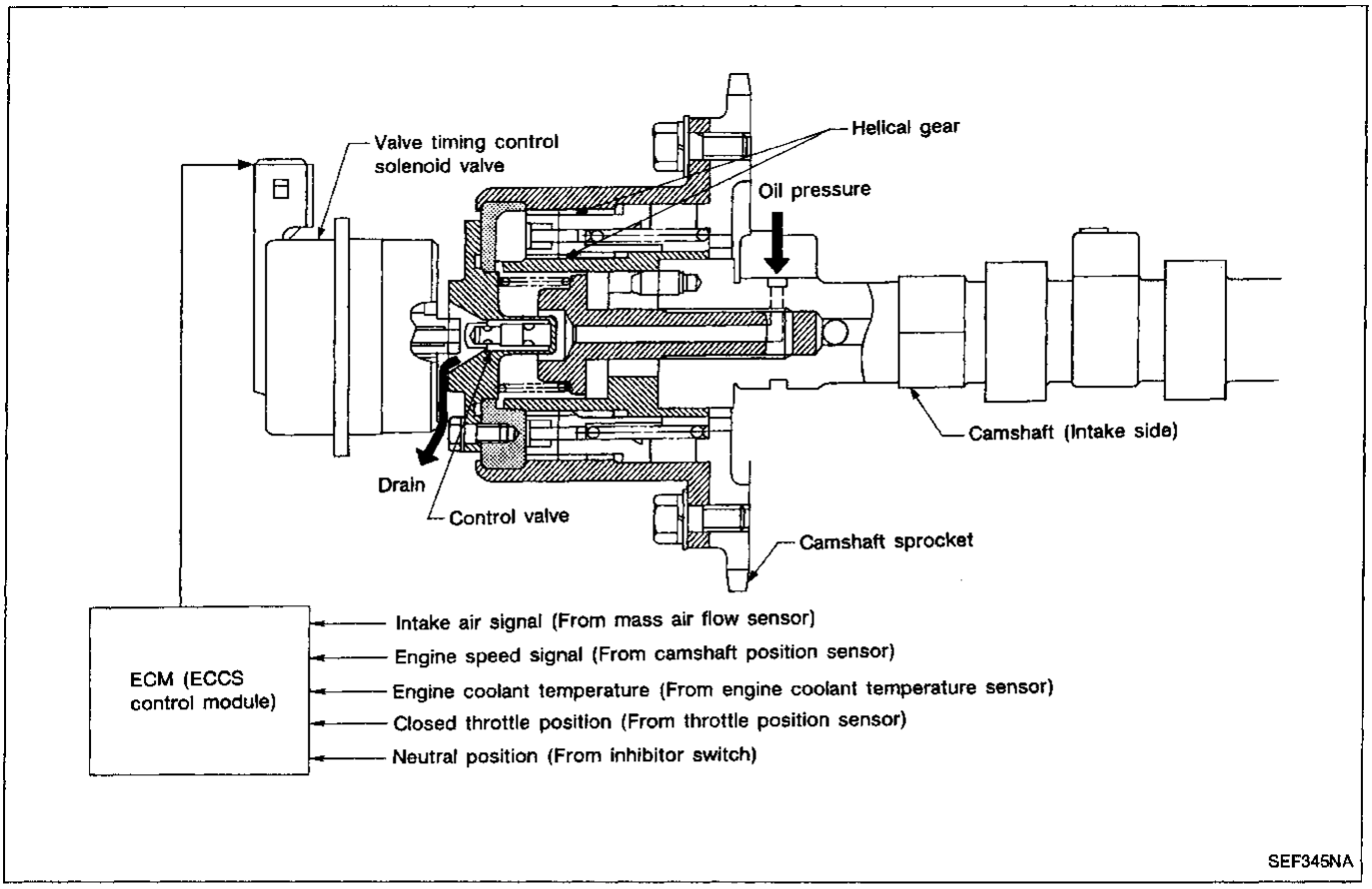
SYSTEM DESCRIPTION

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, vehicle speed 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.

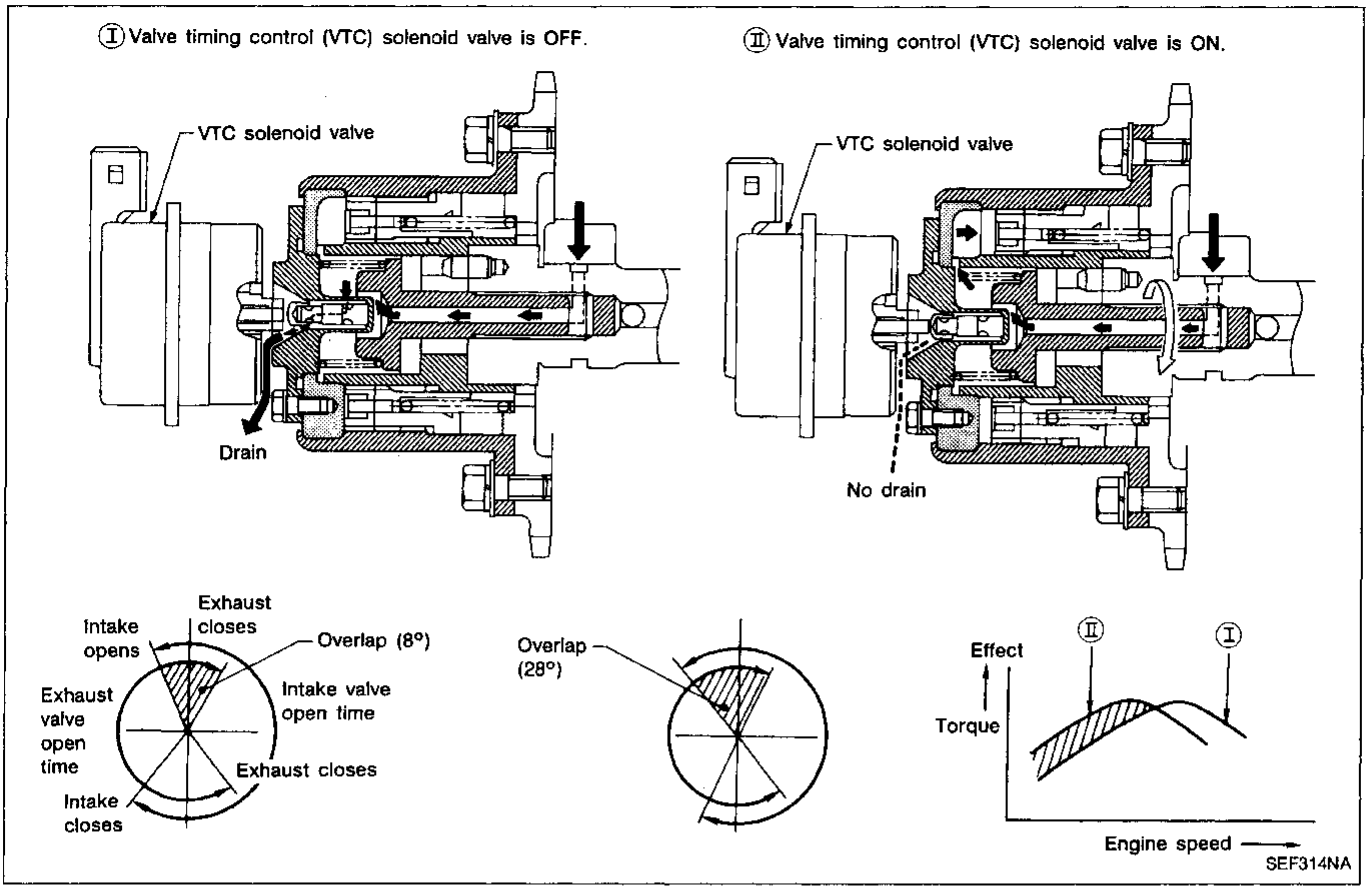
Valve Timing Control (VTC) (Cont'd)



OPERATION

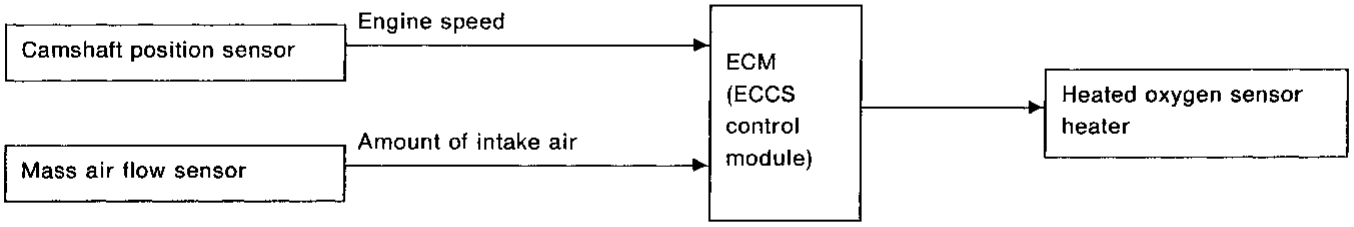
Engine operating condition	Valve timing control solenoid valve	Intake valve opening and closing time	Valve overlap	Engine torque curve
• Except at idle • Engine coolant temperature is between 70°C (158°F) and 110°C (230°F). • Engine speed is below 4,600 rpm. • Engine load is high. • Inhibitor switch is OFF.	ON	Advance	Increased	Ⅱ
Those other than above	OFF	Retard	Decreased	Ⅰ

Valve Timing Control (VTC) (Cont'd)



Heated Oxygen Sensor (HO2S) Heater Control

INPUT/OUTPUT SIGNAL LINE



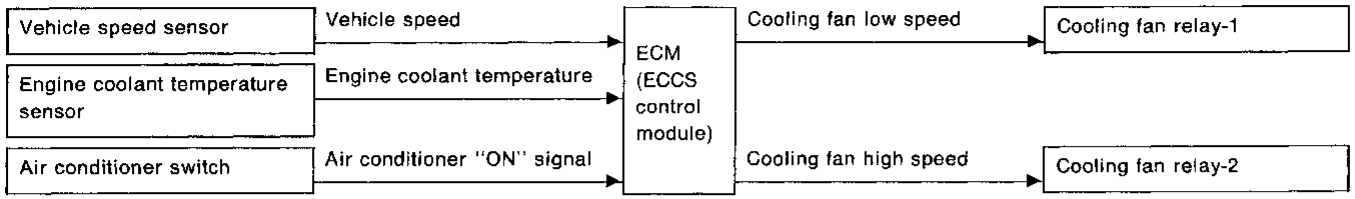
The ECM performs ON/OFF control of the heated oxygen sensor heater corresponding to the engine speed and engine load.

OPERATION

Engine speed rpm	Engine load	Heated oxygen sensor heater
Above 2,250	Heavy load	OFF
	Middle or light load	OFF
Below 2,250	Heavy load	OFF
	Middle or light load	ON

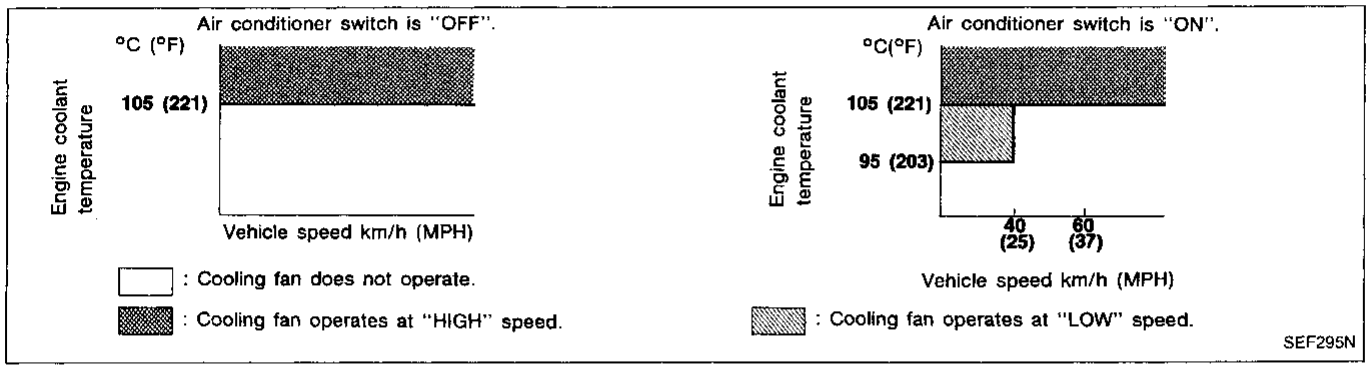
Cooling Fan Control (For U.S.A. models)

INPUT/OUTPUT SIGNAL LINE



The ECM controls the cooling fan corresponding to vehicle speed, engine coolant temperature and air conditioner ON signal. The control system has a 2-step control [HIGH/LOW/OFF].

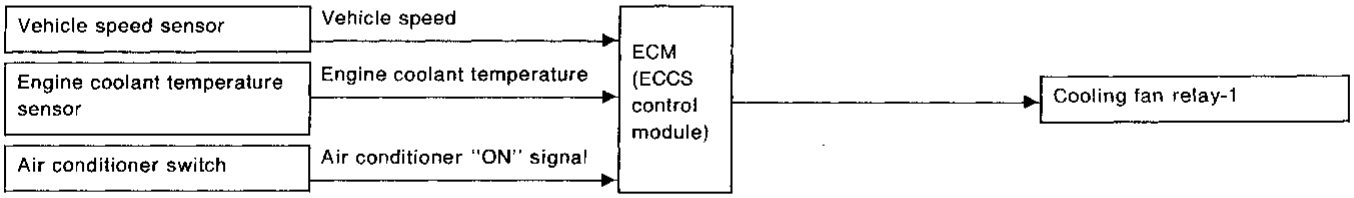
OPERATION



The cooling fan operates at HIGH if diagnostic test mode II (self-diagnostic results) for engine coolant temperature sensor is "NG".

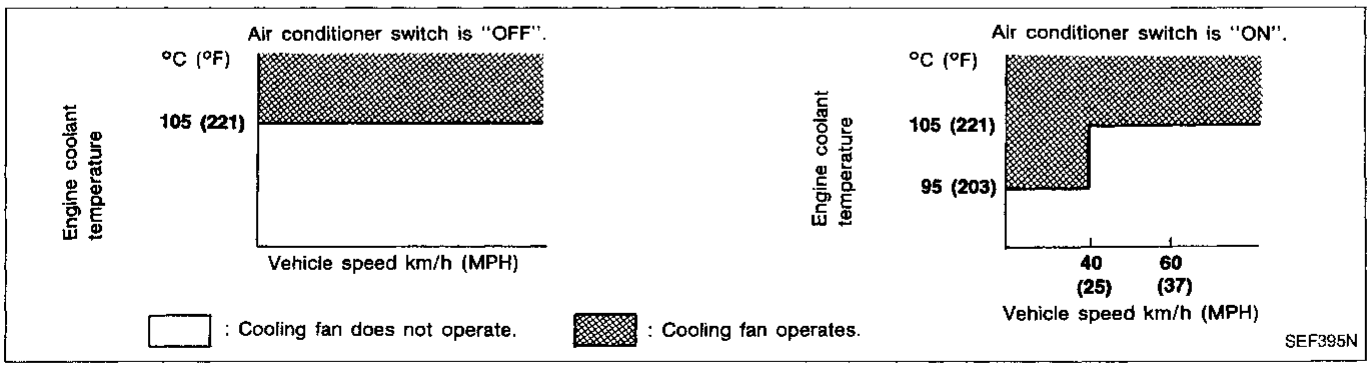
Cooling Fan Control (For Canada models)

INPUT/OUTPUT SIGNAL LINE



The ECM controls the cooling fan corresponding to vehicle speed, engine coolant temperature and air conditioner ON signal. The control system has a 1-step control [ON/OFF].

OPERATION

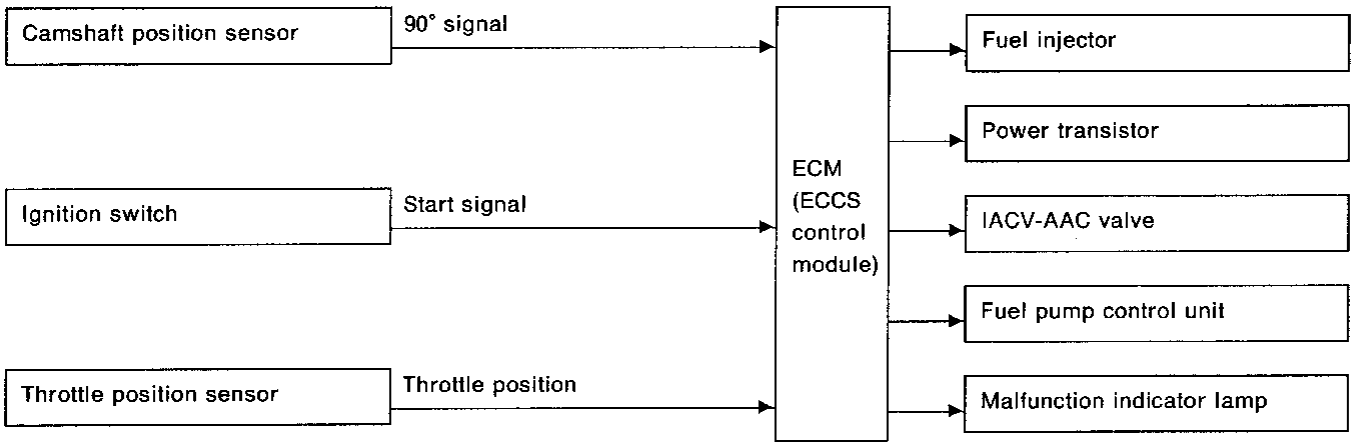


The cooling fan operates if diagnostic test mode II (self-diagnostic results) for engine coolant temperature sensor is "NG".

Fail-safe System

CPU MALFUNCTION

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 former models, 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 operates when the computing function of the ECM is judged to be malfunctioning.
When the fail-safe system activates (i.e. if a malfunction condition is detected in the CPU of the ECM), the MALFUNCTION INDICATOR LAMP on the instrument panel lights to warn the driver.

Engine control with fail-safe system, operates when ECM is malfunctioning

When the fail-safe system is operating, fuel injection, ignition timing, fuel pump operation, engine idle speed, 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. This occurs after turning the ignition switch from OFF to ON.

Fail-safe System (Cont'd)

MASS AIR FLOW SENSOR MALFUNCTION

If the mass air flow sensor output voltage is below the specified value, the ECM senses an mass air flow sensor malfunction. In the 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 2,000 rpm in order to inform immediately the driver of fail-safe system operation.

Operation (Mass air flow sensor malfunction)

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 2,000 rpm

ENGINE COOLANT TEMPERATURE SENSOR MALFUNCTION

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

Engine condition	Engine coolant temperature preset value °C (°F)
Start	20 (68)
Running	80 (176)

THROTTLE POSITION SENSOR MALFUNCTION

Description

When the output signal of throttle position sensor is abnormal the ECM judges it as a malfunctioning of throttle position sensor.
The ECM do not use the throttle position sensor signal.

Operation

	Driving condition
Just as closed throttle position switch is turned ON.	Normal
Just as closed throttle position switch is turned OFF.	Poor acceleration

KNOCK SENSOR MALFUNCTION

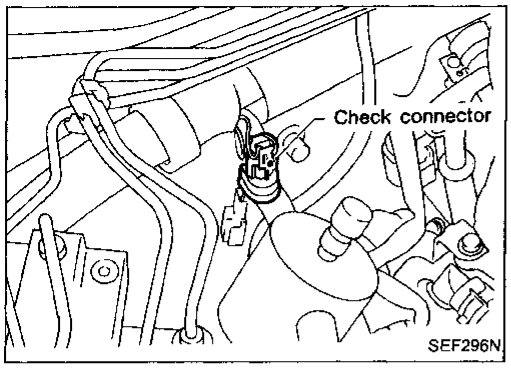
When ECM (ECCS control module) judged to be malfunctioning, ignition timing is controlled numerical value for regular gasoline.

SECONDARY THROTTLE POSITION SENSOR MALFUNCTION

If the secondary throttle position sensor circuit, located between the ECM and the TCM, malfunctions, the ECM will receive a TCS output (ON-OFF) signal. This in turn activates the TCS to control engine operation. In other words, while the TCS is operating with the engine in a fail-safe mode, vehicle acceleration will decrease only slightly.

START SIGNAL FOR MALFUNCTION

If the ECM always receives a start signal, the ECM will judge the start signal "OFF". This occurs when engine speed is above 1,000 rpm to prevent extra enrichment.
After the engine speed is below 200 rpm, start-up enrichment will be allowed until the engine speed reaches 1,000 rpm.

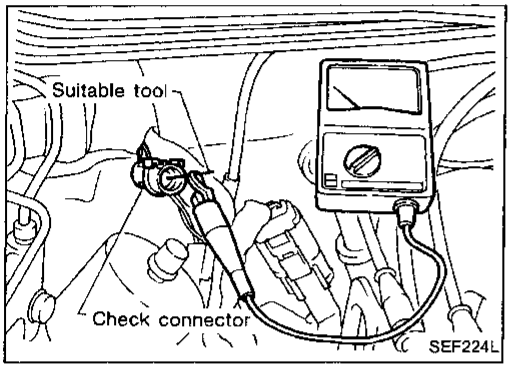


Direct Ignition System

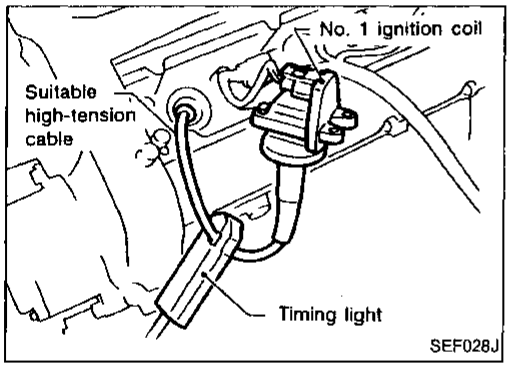
CHECKING IDLE SPEED AND IGNITION TIMING

Idle speed

1. Disconnect check connector for voltage type tachometer.



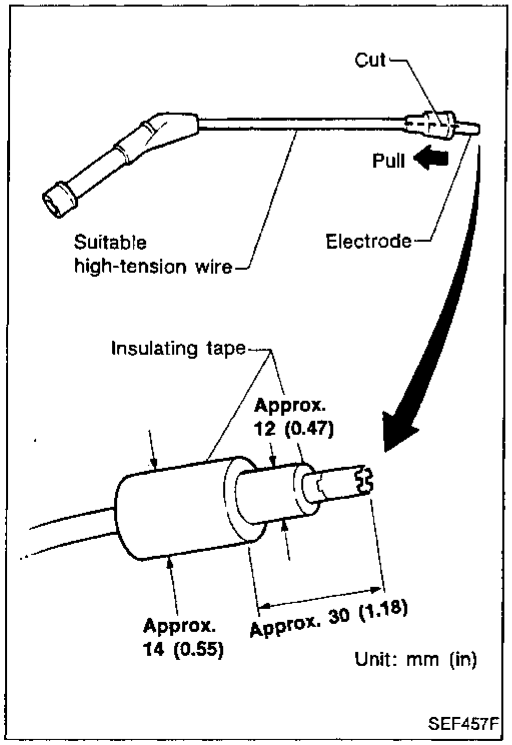
2. Connect tachometer using a suitable tool.



Ignition timing

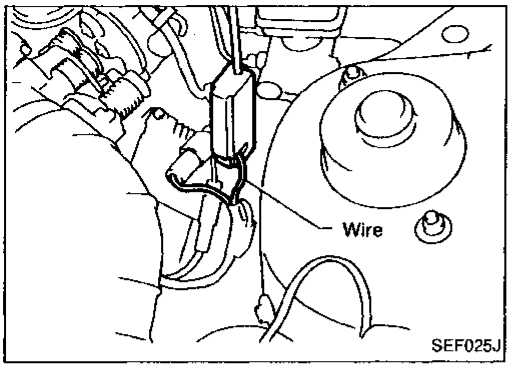
- **Method A (Without SST)**

1. Remove No. 1 or No. 6 ignition coil.
2. Connect No. 1 or No. 6 ignition coil and spark plug with a suitable high-tension wire as shown and attach a timing light.
3. Check ignition timing.



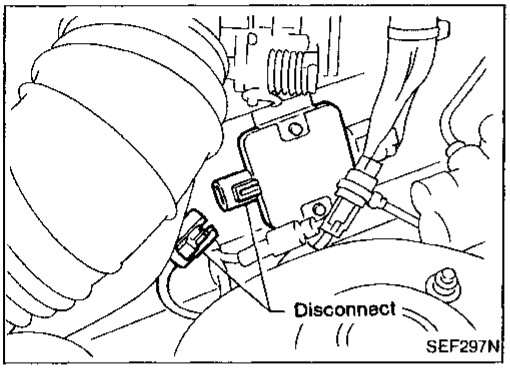
4. For the above procedures, enlarge the end of a suitable high-tension wire with insulating tape as shown.

Direct Ignition System (Cont'd)



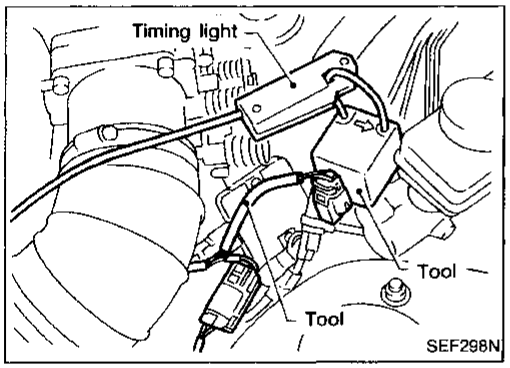
- **Method B (Without SST)**

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.

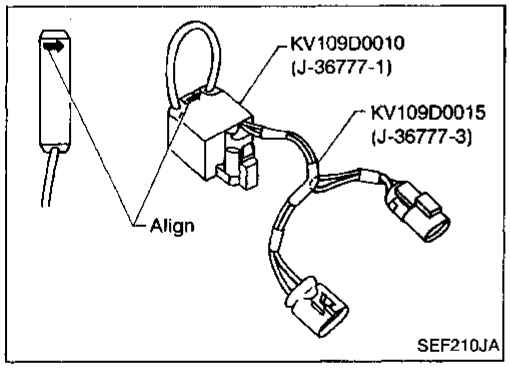


- **Method C (With SST)**

1. Disconnect No. 1 ignition coil connector.



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



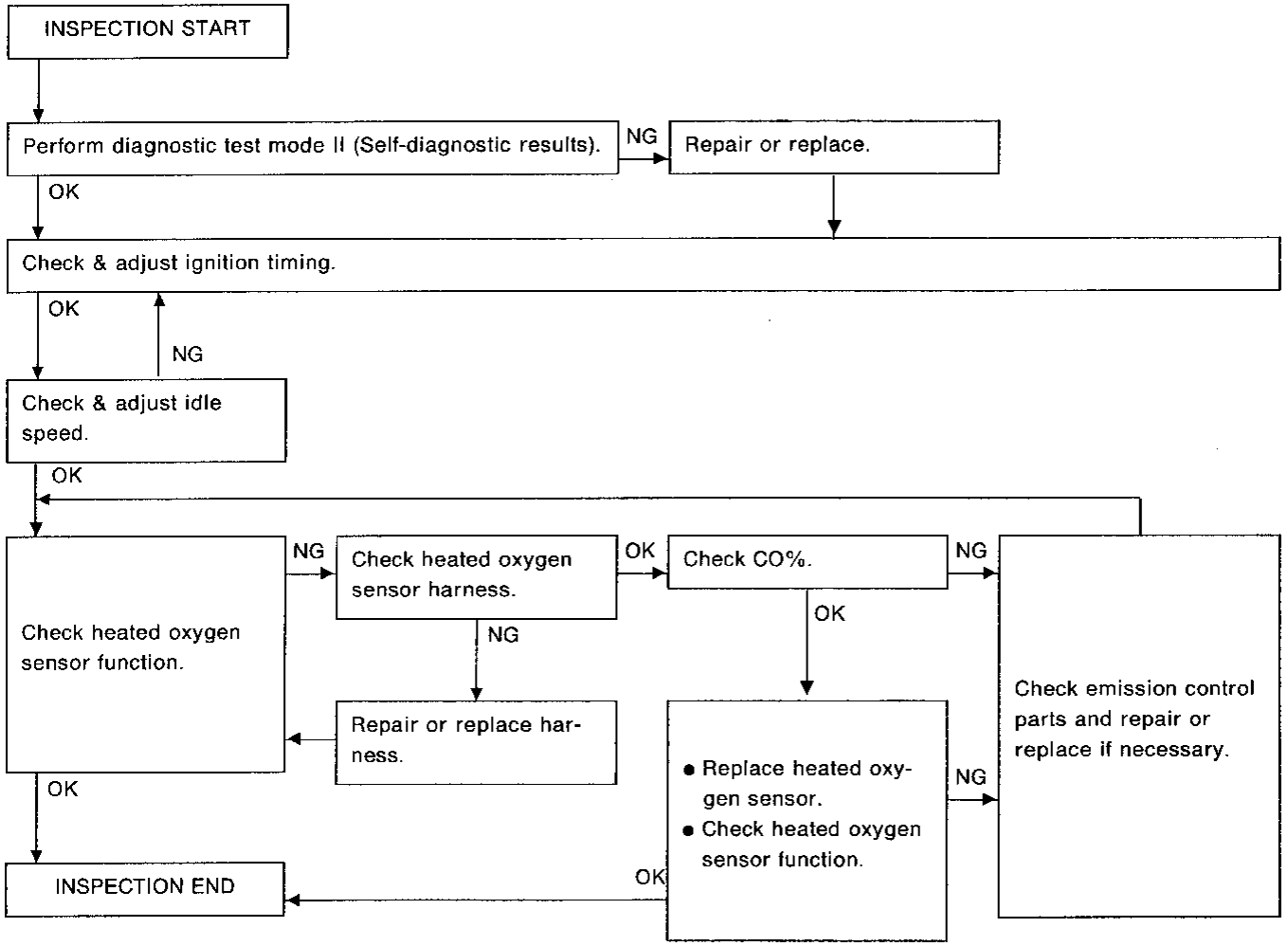
Align direction marks on SST and timing light clamp if aligning mark is punched.

PREPARATION

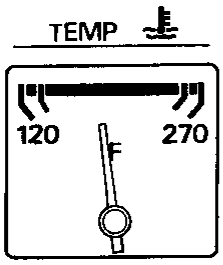
1. Make sure that the following parts are in good order.
- Battery
- Ignition system
- Engine oil and coolant levels
- Fuses
- ECM harness connector
- Vacuum hoses
- Air intake system
  (Oil filler cap, oil level gauge, etc.)
- Fuel pressure
- Engine compression
- EGR valve operation
- Throttle valve

2. On air conditioner equipped models, checks should be carried out while the air conditioner is "OFF".
3. On automatic transmission equipped models, checks (idle rpm, ignition timing and mixture ratio), should be carried out while gear 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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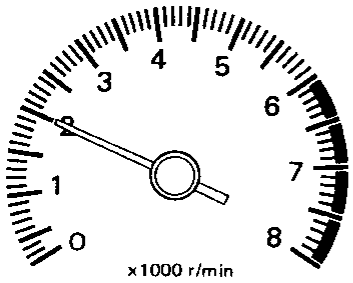

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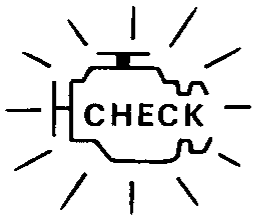

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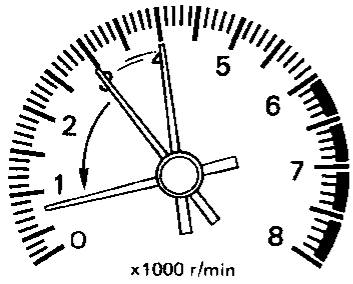

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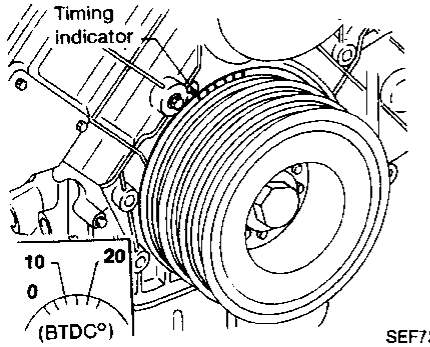
E



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START

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

A

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

B

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

C

Perform diagnostic test mode II (Self-diagnostic results).

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 (In "N" position)

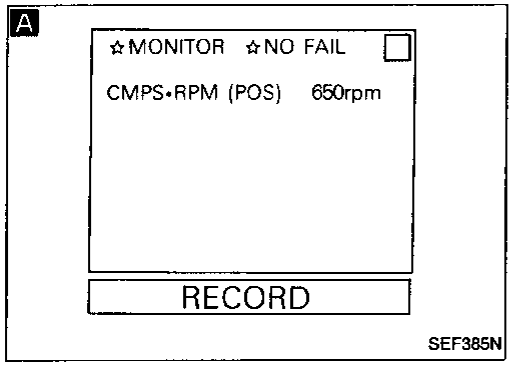
OK

NG

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

Ⓐ

A



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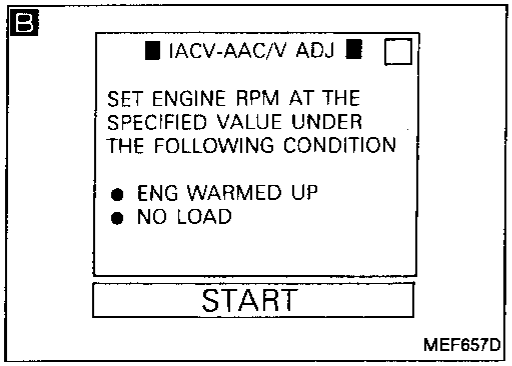

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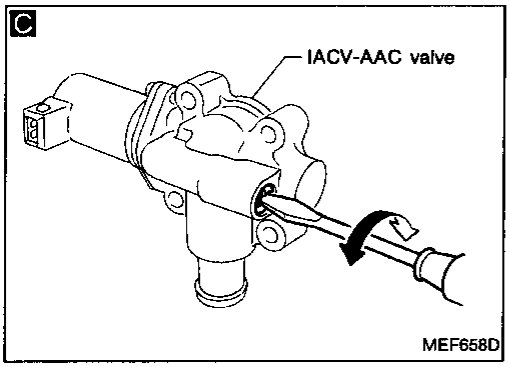

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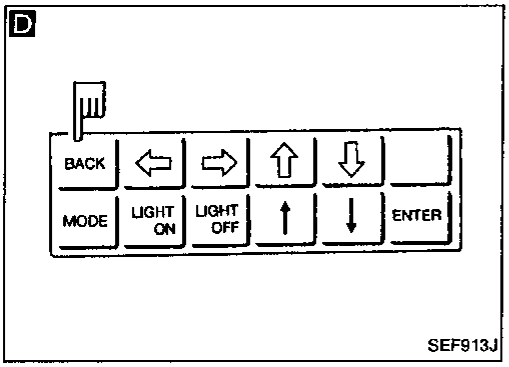

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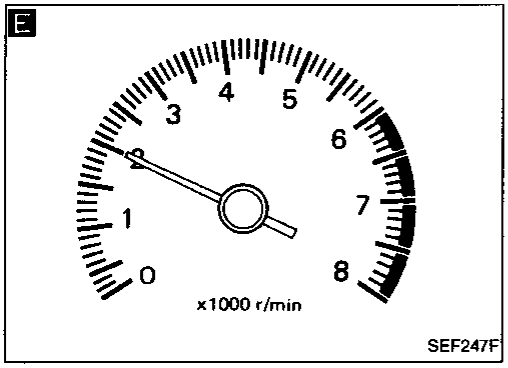


Ⓐ

A

Check idle speed.

Read idle speed in "DATA MONITOR" mode with CONSULT

OR

Check idle speed.

650 ± 50 rpm (In "N" position)

OK

NG

B

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

OR

Disconnect IACV-AAC valve harness connector.

C

Adjust idle speed by turning idle speed adjusting screw.

600 ± 25 rpm (In "N" position)

D

1) Touch "BACK".

1) Connect IACV-AAC valve harness connector.

Ⓑ

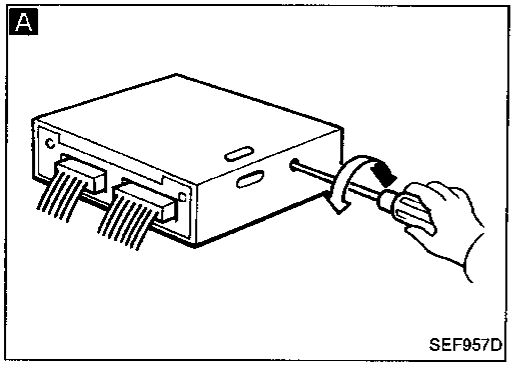
E

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

Ⓗ

Ⓓ

A



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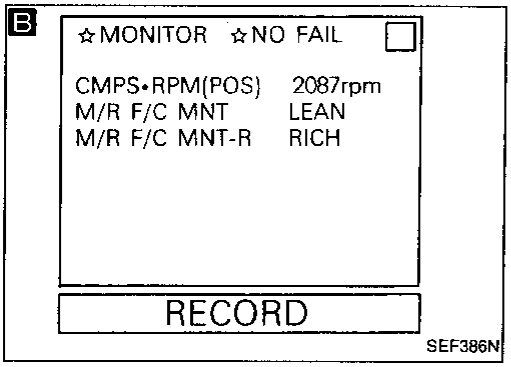
B



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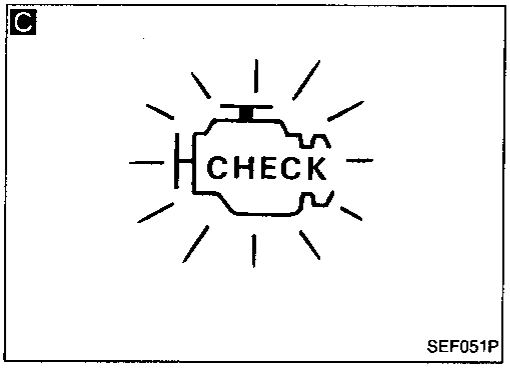
C



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Ⓓ

A

Set on-board diagnostic system of ECM to Diagnostic Test Mode II (heated oxygen sensor monitor). ← Ⓘ

B C

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 cycle: RICH → LEAN → RICH
   2 cycles: 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. Inspection lamp does not blink. → Ⓕ

OK

Less than 5 times

Replace left bank heated oxygen sensor. ← Ⓙ

OK

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

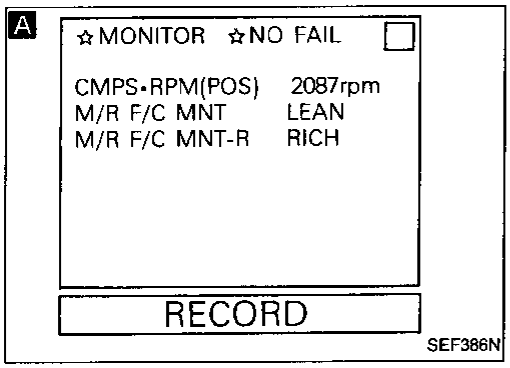
OR

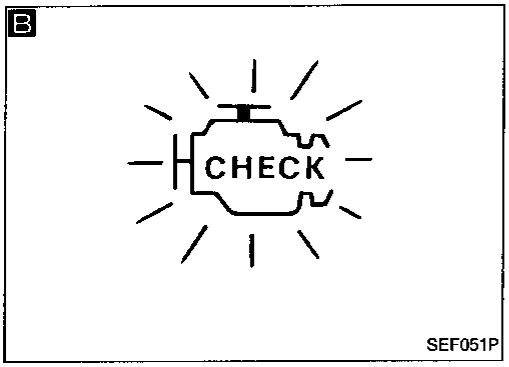
Make sure that malfunction indicator lamp goes on and off more than 5 times during 10 seconds at 2,000 rpm.

NG → Ⓚ

Ⓛ

Ⓔ





Ⓛ

A B

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

Monitor does not fluctuate. Inspection 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 → END

Less than 5 times → Replace right bank heated oxygen sensor.

Check right bank heated oxygen sensor signal.

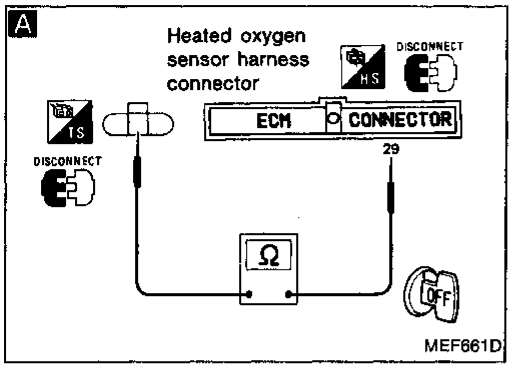
1) See "M/R F/C MNT (right and left sides)" in "Data monitor" mode.
2) Maintaining engine at 2,000 rpm under no-load (engine is warmed up sufficiently.), check that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.
   1 cycle: RICH → LEAN → RICH
   2 cycles: RICH →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

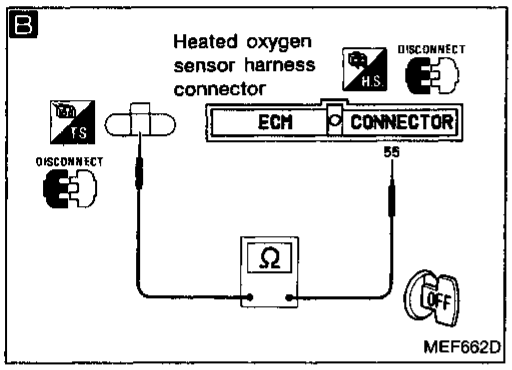
NG → Ⓔ

OR

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

OK → END





A

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

Repair or replace harness.

Connect 76-pin connector to ECM.

B

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
Continuity does not exist. .....NG

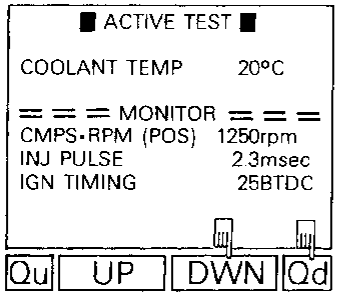
OK

NG

Repair or replace harness.

Connect 76-pin connector to ECM.

A



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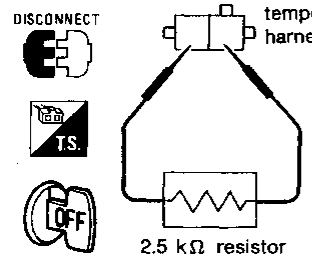

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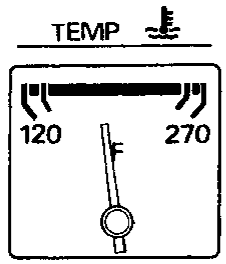

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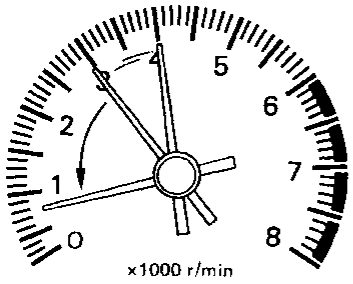

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Ⓖ

A B

1) Select "ENG 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.

C

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

D

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

Check "CO" %.

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.

OK → Ⓙ

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.

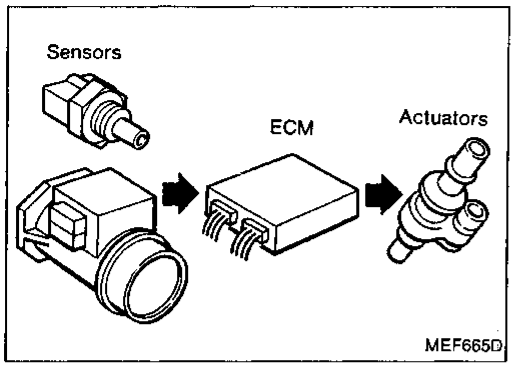
Check engine coolant temperature sensor. → Ⓗ

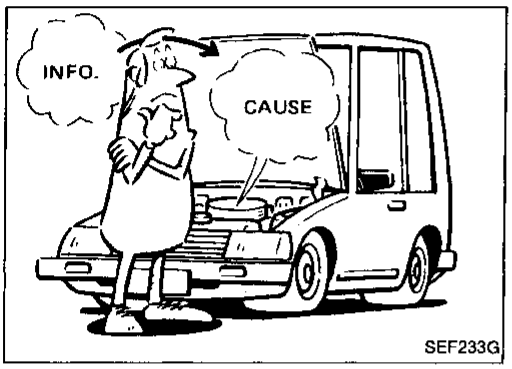
Check ECM function* by substituting another known good ECM.

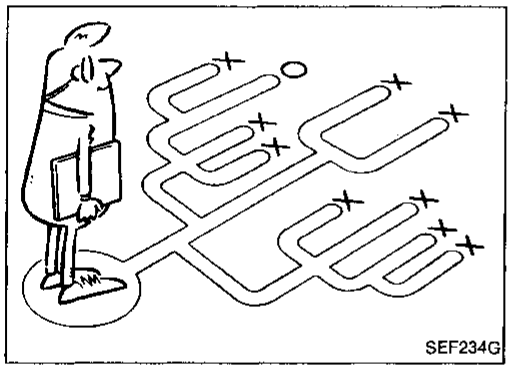
*: ECM may be the cause of a problem, but this is rarely the case.

Contents

Contents (Cont'd)







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 (vacuum leaks, fouled spark plugs, etc.) 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 may not find the cause of the problems. A road test with a circuit tester connected to a suspected circuit should be performed.

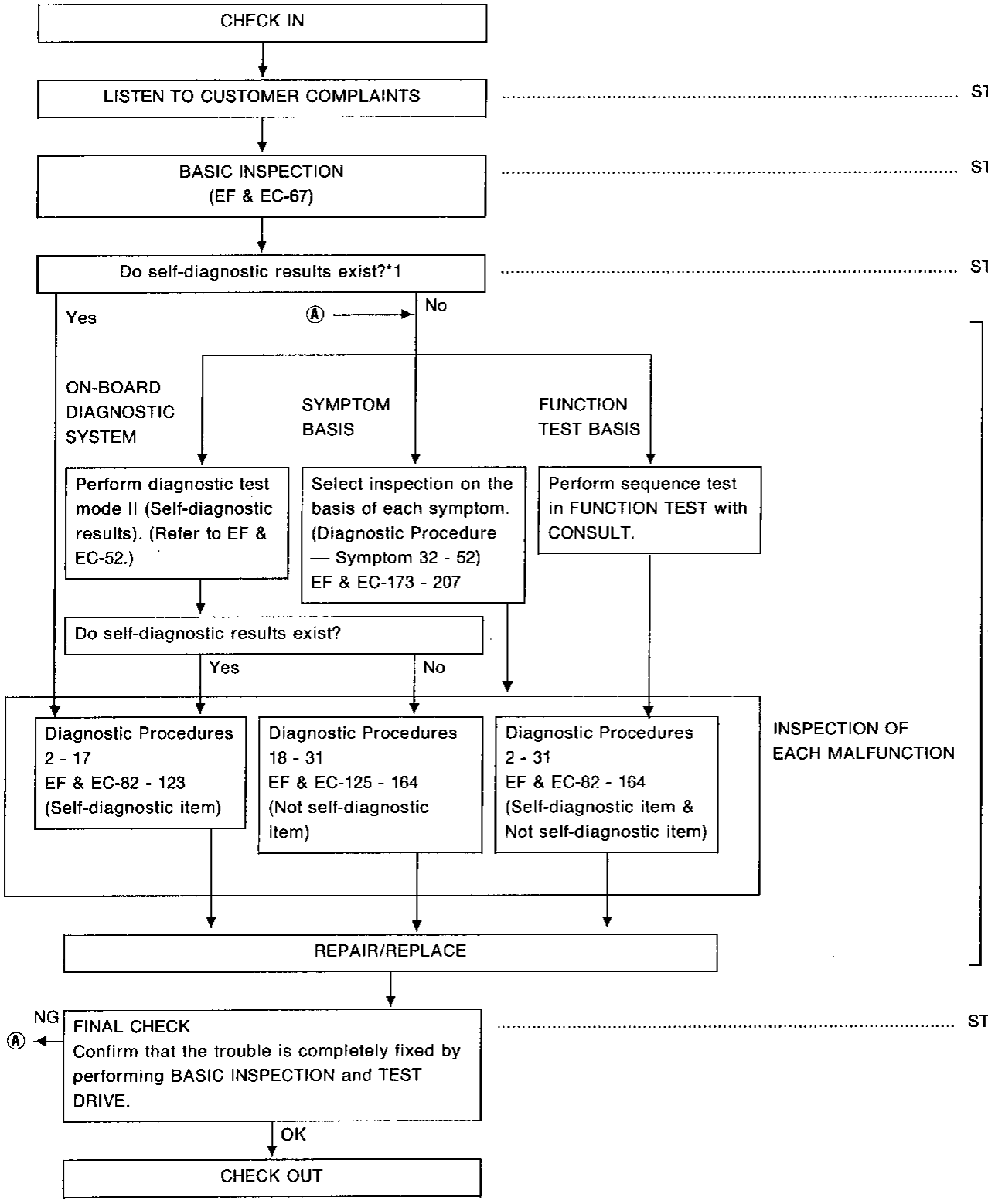
Before checking, talk with the customer about driveability complaints. The customer is a very good supplier of information on such problems, especially intermittent ones. Through interaction with the customer, find out what symptoms are present and under what conditions they occur.

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.

1. Verify the complaint.
2. Isolate the cause.
3. Repair
4. Recheck and be sure no new symptoms have been caused.

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 2 - 31. 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 diagnostic test mode II (self-diagnostic results). However, inspection is started by assuming that the diagnostic test mode II (self-diagnostic results) has already been performed. • When a system having the diagnostic test mode II (self-diagnostic results) function containing any circuit placed outside, it is arranged that the "Not self-diagnostic item" will be performed when the self-diagnostic result 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. Also ensure that the unit disassembled in the course of the repair work has been reassembled correctly. 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. Use 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

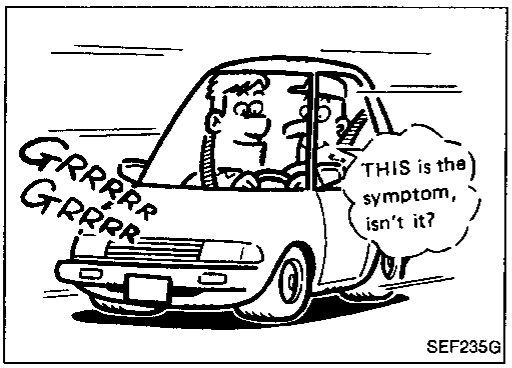
SEF907L

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



SEF235G

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

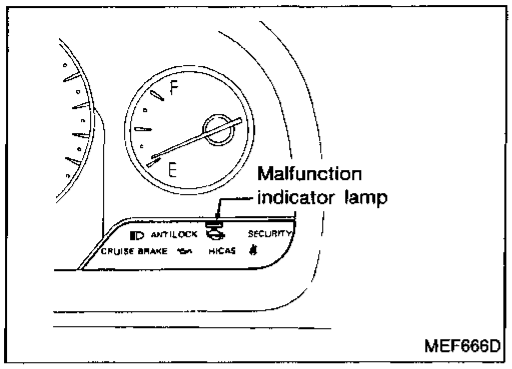
INTERMITTENT PROBLEM SIMULATION

In order to duplicate an intermittent problem:

a. Create similar conditions for component parts, under which the problem might occur.
b. 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 diagnostic test mode II (Self-diagnostic results) 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	Throttle position sensor condition	ECM	ON-OFF switching	Rotate throttle position sensor body.
10	Ignition spark	Timing light	Spark power check	Try to flash timing light for each cylinder using ignition coil adapter (SST).

- **Select the "Variable factor" when the symptom occurs.**
  Perform the "Service procedure" to try to simulate the intermittent.



On-board Diagnostic System

MALFUNCTION INDICATOR LAMP (MIL)

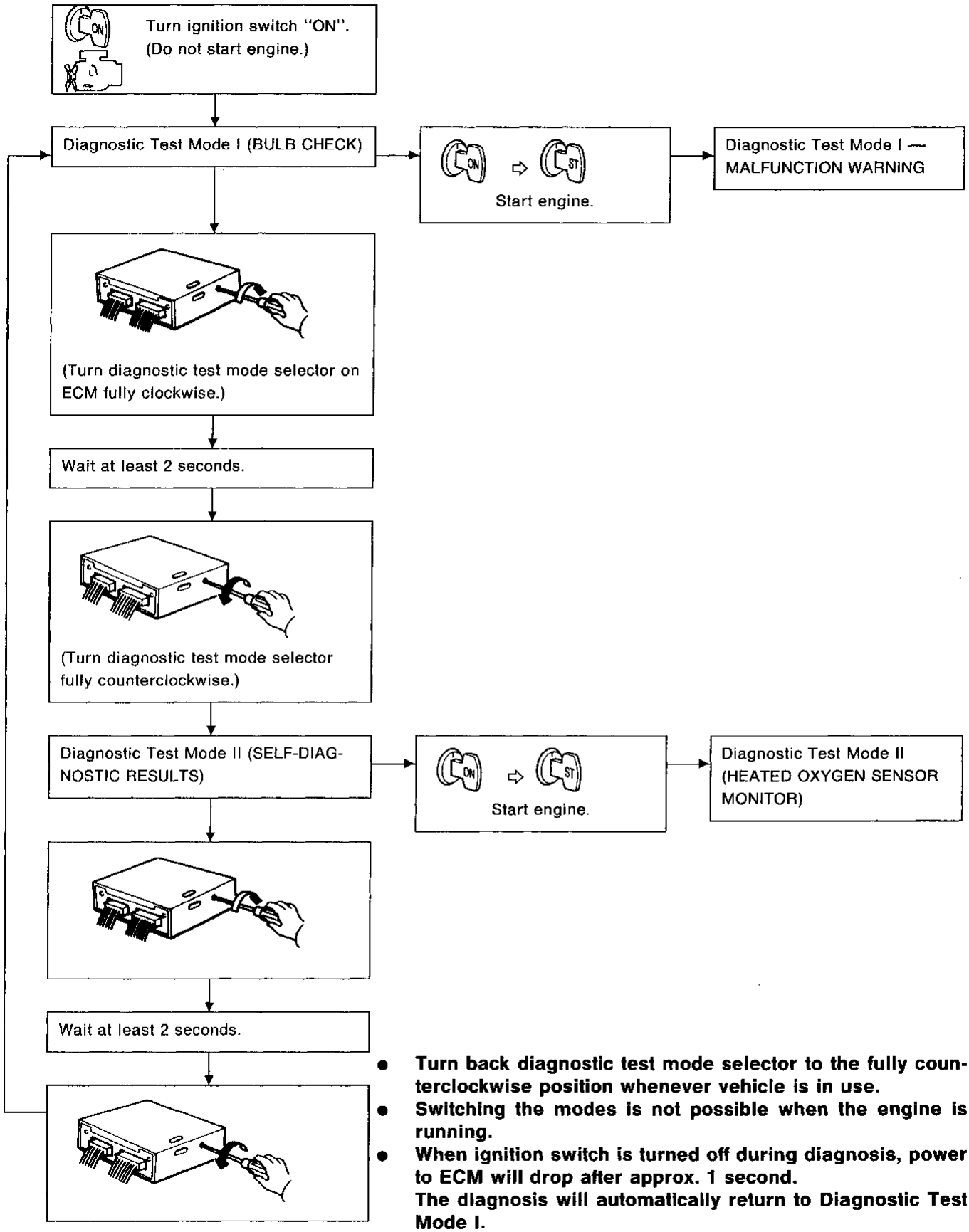
A malfunction indicator lamp has been adopted on all models.

ON-BOARD DIAGNOSTIC SYSTEM 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 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 stays "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)

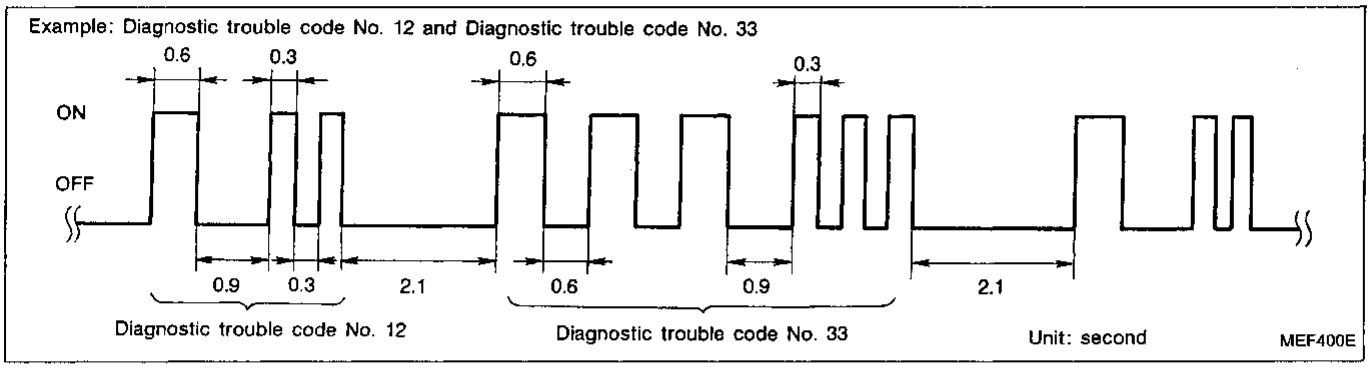
- **These Diagnostic Trouble Code Numbers are clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS).**
- **The MALFUNCTION INDICATOR LAMP will turn OFF when operation returns to normal. But, the On-board Diagnostic Test Mode II — SELF-DIAGNOSTIC RESULTS memory will hold the diagnostic trouble code until the memory is cleared. To clear SELF-DIAGNOSTIC RESULTS memory, refer to EF & EC-54 (without CONSULT). To clear SELF-DIAGNOSTIC RESULTS memory (with CONSULT), refer to CONSULT Operation Manual — Engine.**

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

CAUTION:
The diagnostic test 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
16*2)	TCS signal 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
46*2)	Secondary throttle position sensor circuit
51 CHECK	Injector circuit
53 CHECK	Heated oxygen sensor circuit (Right bank)
54	Signal circuit from A/T control unit to ECM
55 CHECK	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.
*2): Models with TCS only

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)
16*2)	TCS signal circuit	• The TCS signal circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • TCM
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
46*2)	Secondary throttle position sensor circuit	• The secondary throttle position sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Secondary throttle position sensor • TCM
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.

*2): Models with TCS only

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

HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

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

- **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 diagnostic test mode II (Self-diagnostic results).**

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.

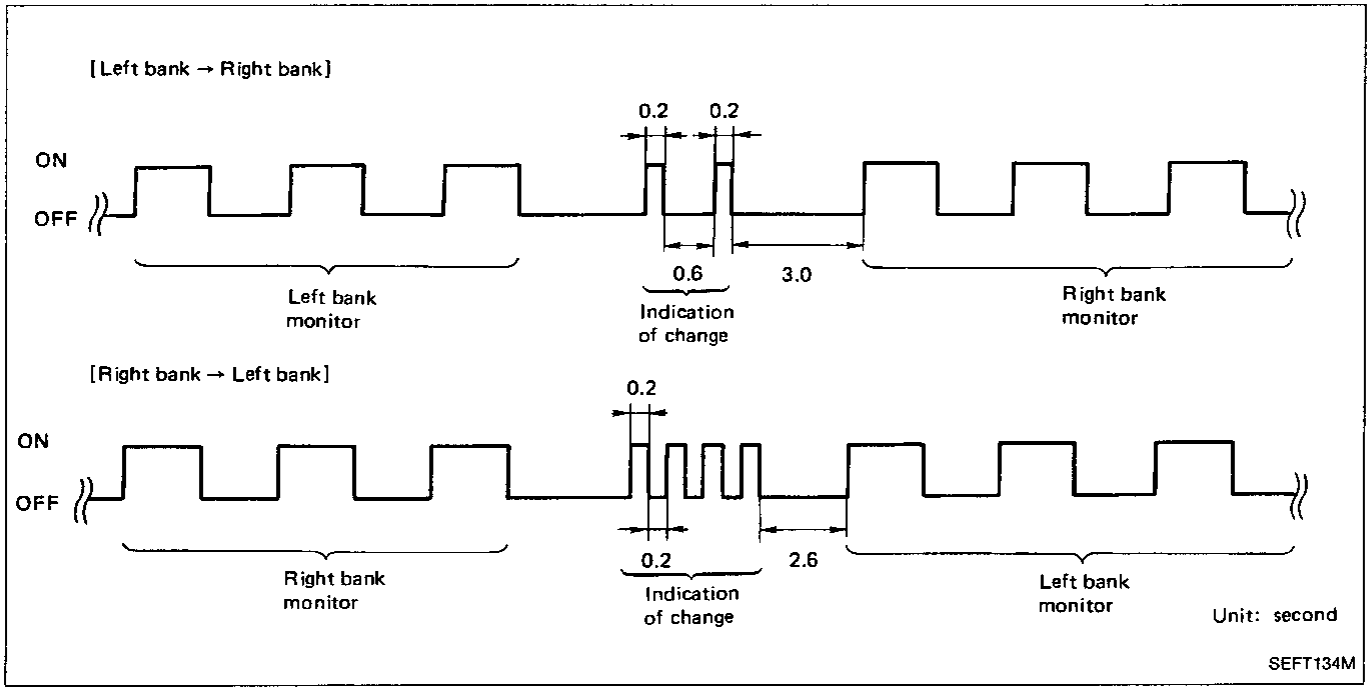
If two heated oxygen sensors (right bank and left bank) are fitted on the engine, the left bank heated oxygen sensor monitor operates first, when selecting this mode.

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.

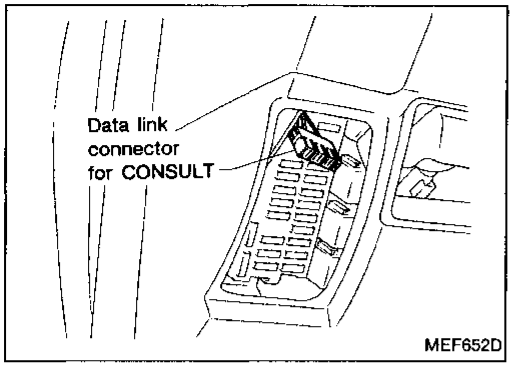
- These procedures should be carried out when the engine is running.

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



HOW TO CHECK HEATED OXYGEN SENSOR

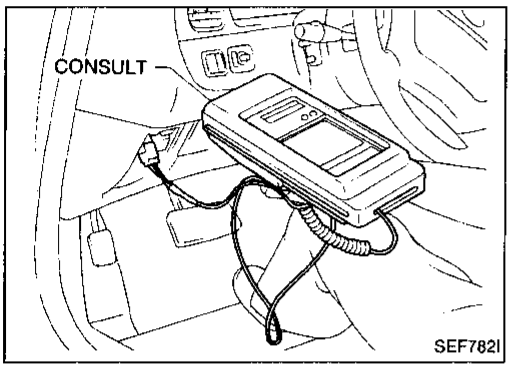
1. Set Diagnostic Test Mode II. (Refer to "HOW TO SWITCH DIAGNOSTIC TEST MODES".)
2. Start engine and warm it up until engine coolant temperature indicator points to the middle of the gauge.
3. Run engine at about 2,000 rpm for about 2 minutes under no-load conditions.
4. Make sure MALFUNCTION INDICATOR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

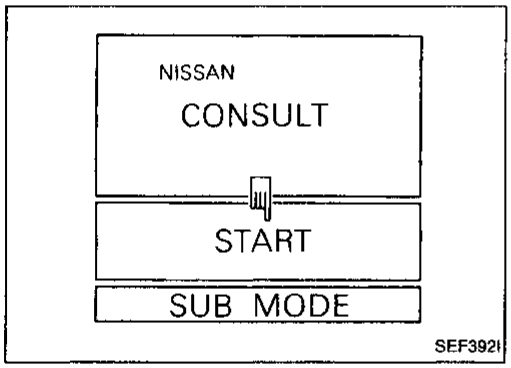


Consult

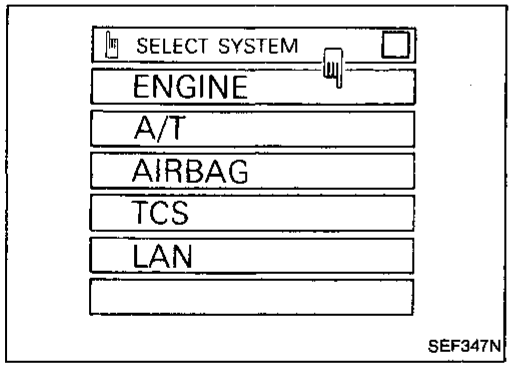
CONSULT INSPECTION PROCEDURE

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.)

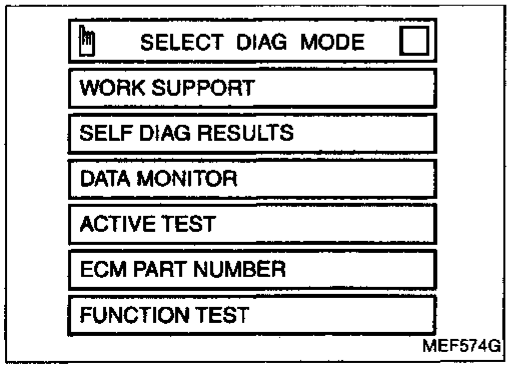




3. Turn on ignition switch.
4. Touch "START".



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

ECCS COMPONENT PARTS		DIAGNOSTIC TEST MODE				
		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 sensors		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		
	Park/neutral position (PNP)			X		X
	Power steering oil pressure switch			X		X
	Battery			X		
	A/T signal		X			
OUTPUT	Injectors		X	X	X	X
	Power transistor (ignition timing)		X (Ignition signal)	X	X	X
	IACV-AAC valve	X		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 relay			X	X	X

X: Applicable

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT unit.
Self-diagnostic results	Self-diagnostic results 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 and 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".

Consult (Cont'd)

WORK SUPPORT MODE

WORK ITEM	CONDITION	USAGE
THRTL POS SEN ADJ	CHECK THE THROTTLE POSITION SENSOR SIGNAL. ADJUST IT TO THE SPECIFIED VALUE BY ROTATING THE SENSOR BODY UNDER THE FOLLOWING CONDITIONS. • IGN SW "ON" • ENG NOT RUNNING • ACC PEDAL NOT PRESSED	When adjusting throttle position sensor initial position
IACV-AAC VALVE ADJ	SET ENGINE RPM 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 IDLE. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line

Consult (Cont'd)

SELF-DIAGNOSTIC RESULTS MODE

DIAGNOSTIC ITEM	DIAGNOSTIC ITEM IS DETECTED WHEN	CHECK ITEM (REMEDY)
CAMSHAFT POSI SEN*	• 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.)
MASS AIR FLOW SEN	• 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.)
COOLANT TEMP SEN	• 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 SEN	• The vehicle speed sensor circuit is open or shorted.	• Harness and connector • Vehicle speed sensor (reed switch)
TCS SIGNAL**	• The TCS signal circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • TCM
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).]
EGRC SOLENOID/V	• EGR valve does not operate. (EGR valve spring does not lift.)	• EGR valve • EGRC-solenoid valve
OXYGEN SEN OXYGEN SEN-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 POSI SEN	• The throttle position sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Throttle position sensor
INJECTOR·LEAK	• Fuel leaks from injector.	• Injector
TCS THRTL POS SEN	• The secondary throttle position sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Secondary throttle position sensor • TCM
INJECTOR · OPEN	• The injector circuit is open or shorted.	• 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 POSI SEN (No. 11)" and "IGN SIGNAL-PRIMARY (No. 21)" are displayed one after the other.
**: Models with TCS only

- **Sensor failures which set a self-diagnosis code are listed as due to an open or short circuit.**
- **A sensor sending a signal which is inaccurate but not open or short will NOT set a self-diagnosis code.**
- **If a driveability symptom is present but no self-diagnosis code is set, perform further inspections using DATA MONITOR.**

Consult (Cont'd)

DATA MONITOR 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. The monitor may show the specification data in spite of the ignition timing being not adjusted to it. This IGN TIMING monitors the calculated data by ECM 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 self-diagnostic 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" • Selector lever "N" position • No-load	Idle	1.0 - 1.4V	• Harness and connector • Mass air flow sensor
		2,000 rpm	1.4 - 1.9V	
COOLANT TEMP/S	• Engine: After warming up		More than 70°C (158°F)	• Harness and connector • Engine coolant temperature sensor
O2 SEN O2 SEN-R M/R F/C MNT M/R F/C MNT-R	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V → 0.6 - 1.0V LEAN → RICH Changes more than 5 times during 10 seconds.	• Harness and connector • Heated oxygen sensor • Intake air leaks • Injectors
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	
THRTL/P SEN2	• Ignition switch: ON (Engine stopped) • Disconnect throttle motor harness connector	Secondary throttle valve fully open	4.0 - 4.7V	• Harness and connector • Secondary throttle position sensor • Secondary throttle position sensor adjustment • TCM
		Secondary throttle valve fully closed	Approx. 0.5V (at least 0.3V)	
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: Closed throttle position (Engine: After warming up)	ON	• Harness and connector • Throttle position sensor • Throttle position sensor adjustment • 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	
NEUT POSI 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	
INJ PULSE	• Engine: After warming up • A/C switch "OFF" • Selector lever "N" position • 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	—	
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	
VALVE TIM SOL	• Jack up rear wheel • Engine: After warming up	• Idle	OFF	• Harness and connector • Valve timing solenoid valve
		• Shift selector lever to any position except "N" or "P" position • Quickly depress accelerator pedal, then quickly release it	OFF → ON → 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	
COOLING FAN	• When cooling fan is stopped.		OFF	• Harness and connector • Cooling fan relay • Cooling fan motor
	• When cooling fan operates at low speed		LOW	
	• When cooling fan operates at high speed		HI	

Consult (Cont'd)

ACTIVE TEST MODE

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	• Engine: Return to the original trouble condition • Change the amount of fuel injection with the CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Fuel injectors • Heated oxygen sensors
IACV-AAC/V OPENING	• 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	• 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
IGNITION TIMING	• 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	• Engine: After warming up, idle the engine. • A/C switch "OFF" • Selector lever "N" position • 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
FUEL PUMP RELAY	• 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 VALVE TIM SOL	• 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
COOLING FAN	• Ignition switch: ON • Turn cooling fan "LOW", "HI" and "OFF" with CONSULT	Cooling fan moves at low and high speed, and stops.	• Harness and connector • Cooling fan relay • Cooling fan motor
SELF-LEARNING CONT	• In this test, the coefficient of self-learning control mixture ratio returns to the original coefficient by touching "CLEAR" on the screen.		

FUNCTION TEST MODE

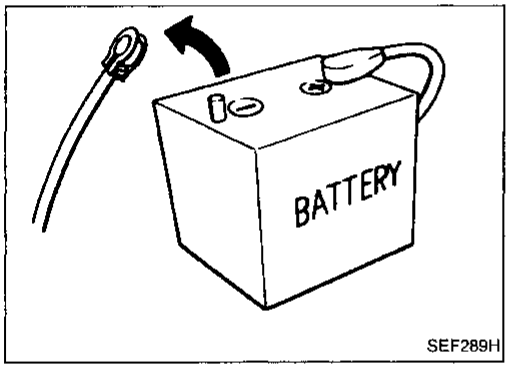
FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
SELF-DIAG RESULTS	• Ignition switch: ON (Engine stopped) • Displays the self-diagnostic results.	—		Objective system
CLOSED THROTTLE POSI (CLOSED THROTTLE POSITION SWITCH CIRCUIT)	• Ignition switch: ON (Engine stopped) • Closed throttle position switch circuit is tested when throttle is opened and closed fully. ("CLOSED THROTTLE POSI" 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) • Park/neutral position (PNP) circuit is tested when shift lever is manipulated.	OUT OF N/P-POSITION	OFF	• Harness and connector • Neutral position switch/ Inhibitor switch • Linkage + Inhibitor switch adjustment
		IN N-POSITION	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 relay • Cooling fan motor

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 water 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.	• O2 SEN COUNT: More than 5 times during 10 seconds (O2 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, and resultant change in engine rotation is examined to evaluate combustion of each cylinder. (This is only displayed for models where a sequential multiport fuel injection system is used.)	Difference in engine speed is greater than 25 rpm before and after cutting off the injector of each cylinder.	• Injector circuit (Injector, harness or connector) • Ignition circuit (Spark plug, power transistor, ignition coil, harness or connector) • Compression • Valve timing
IACV-AAC/V SYSTEM	• After warming up, idle the engine. • IACV-AAC valve system is tested by detecting change in engine speed when IACV-AAC valve opening is changed to 0%, 20% and 80%.	Difference in engine speed is greater than 150 rpm between when valve opening is at 80% (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

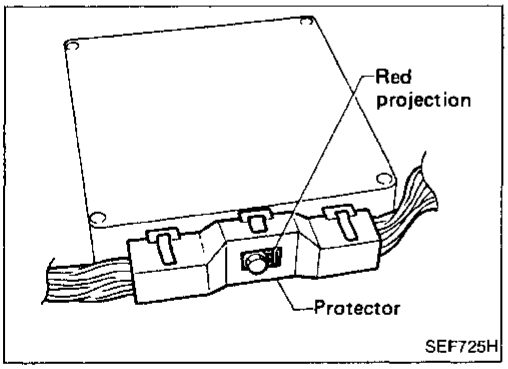


SEF289H

Diagnostic Procedure

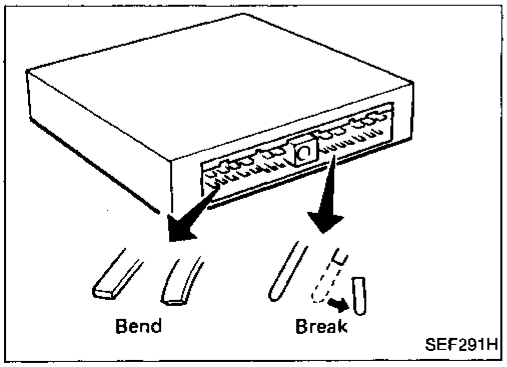
CAUTION:

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.**



SEF725H

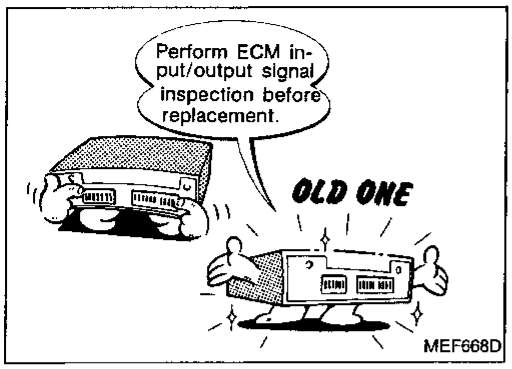
2. **When connecting ECM harness connector, tighten securing bolt until red projection is in line with connector face.**



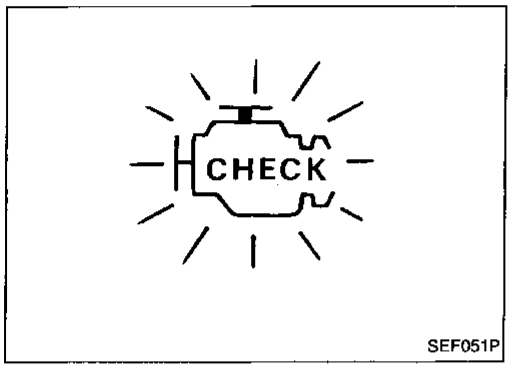
SEF291H

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.**

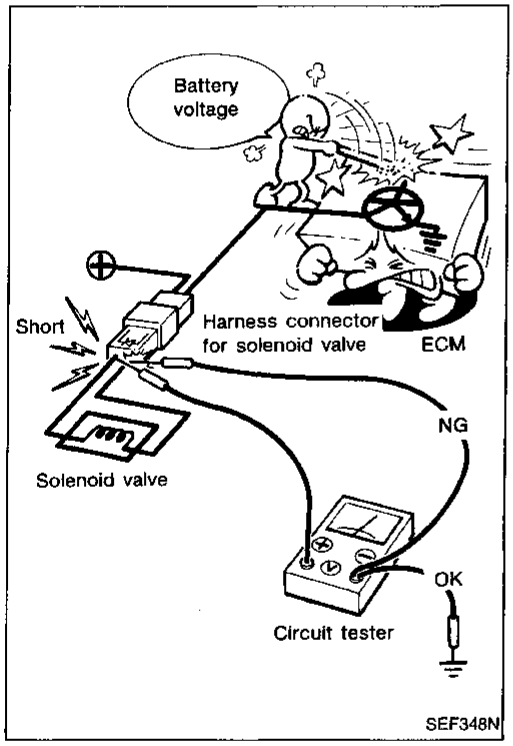
Diagnostic Procedure (Cont'd)



5. **Before replacing ECM, perform ECM input/output signal inspection and make sure whether ECM functions properly or not. (See page EF & EC-208.)**



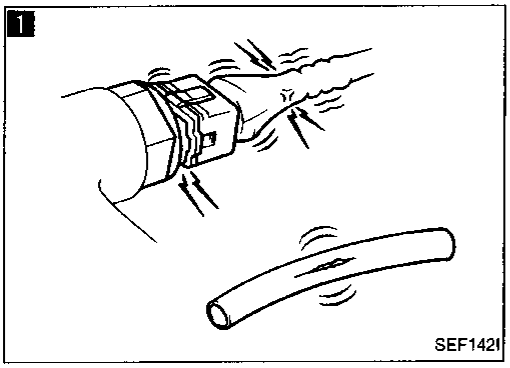
6. **After performing this "Diagnostic Procedure", perform diagnostic test mode II (Self-diagnostic results) and driving test.**



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


SEF142I

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:

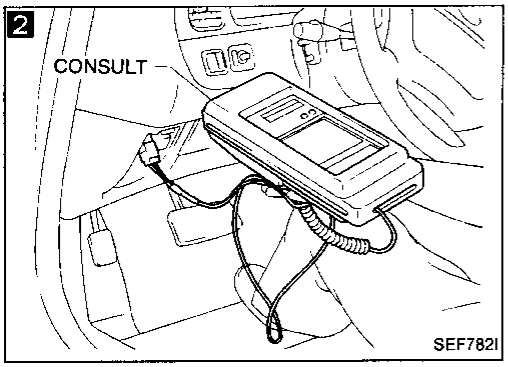
- Harness connectors for proper connections
- Vacuum hoses for splits, kinks, and proper connections
- Wiring for proper connections, pinches, and cuts

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.)

2



SEF782I

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-33.)

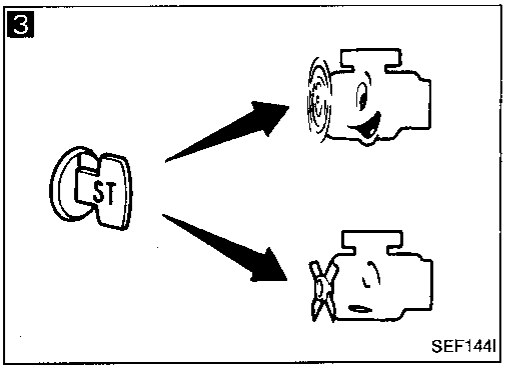
Ignition timing: 15° ± 2° BTDC

NG → Adjust ignition timing by turning camshaft position sensor.

OK

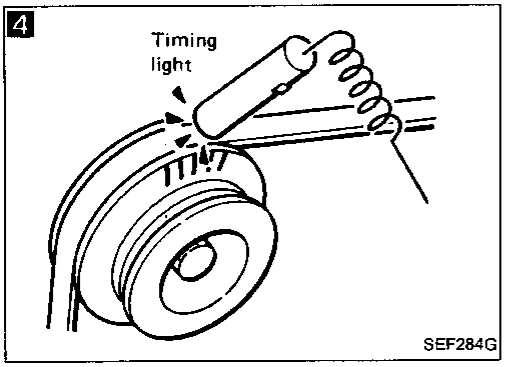
(Go to Ⓐ on next page.)

3



SEF144I

4



SEF284G

Basic Inspection (Cont'd)

5

■ IACV-AAC/V ADJ ■

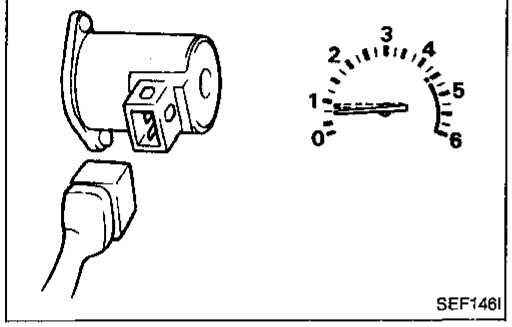
SET ENGINE RPM AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITION

- ENG WARMED UP ENOUGH
- NO LOAD

START

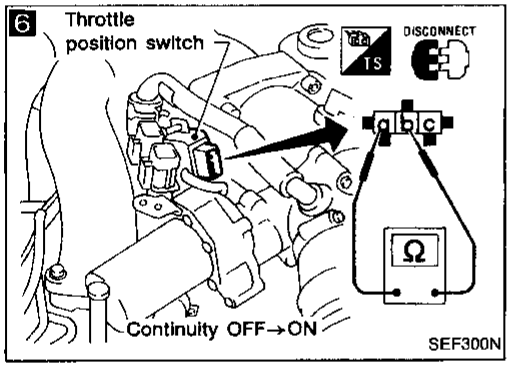
MEF671D

5



SEF146I

6



SEF300N

Ⓐ

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 600±25 rpm ("N" position)?

NG → Adjust engine speed by turning idle adjusting screw.

OR

When disconnecting IACV-AAC valve harness connector, does engine speed fall to 600±25 rpm ("N" position)?

OK

6

CHECK THROTTLE POSITION SENSOR & THROTTLE POSITION SWITCH POSITION.

1. Start engine and warm it up sufficiently.
2. Disconnect throttle position switch harness connector.
3. Check closed throttle position switch OFF → ON speed, closing throttle valve manually.

Closed throttle position switch OFF → ON speed: 810±150 rpm ("N" position)

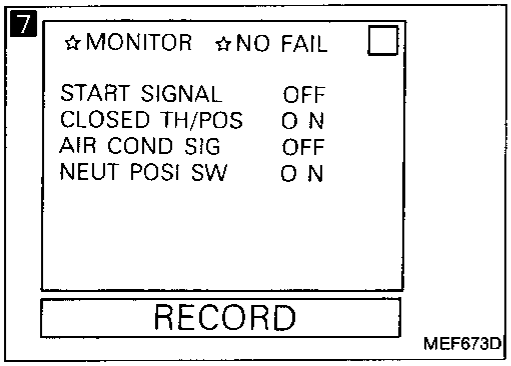
NG → Adjust throttle position sensor & throttle position switch position.

OK

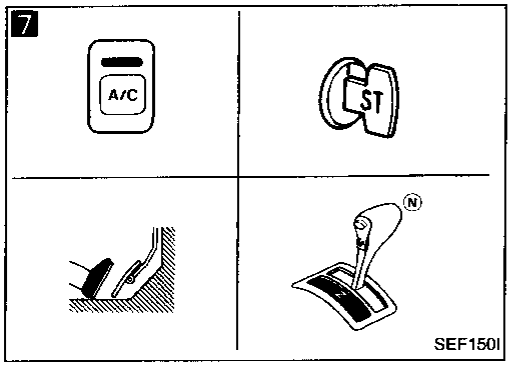
(Go to Ⓑ on next page.)

Basic Inspection (Cont'd)

7



7



Ⓑ

7

CHECK SWITCH INPUT SIGNAL.

Select the following switches in "DATA MONITOR" mode,
a) Start signal,
b) Closed throttle position,
c) Air conditioner signal,
d) Park/neutral position (PNP),
and check the switches' ON-OFF operation.

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

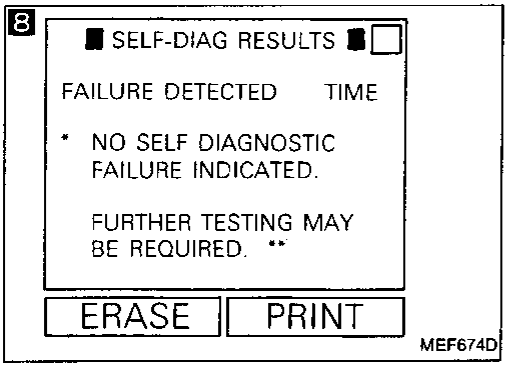
OR

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
Closed throttle position	Engine warmed up sufficiently closed throttle 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
Park/neutral position switch (PNP)	Selector lever is "N" or "P" position → Except "N" and "P" position	0 → 8.0 - 10.0

OK

8



8

READ SELF-DIAGNOSTIC RESULTS.

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

Yes → Go to the relevant inspection procedure.

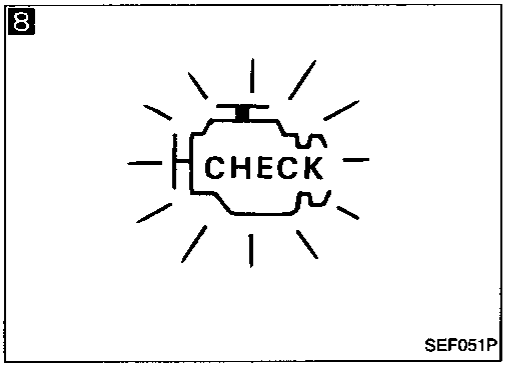
OR

1. Set Diagnostic Test Mode II. (Self-diagnostic results) (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?

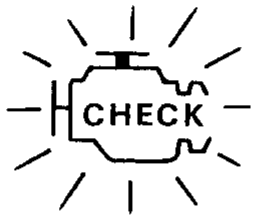
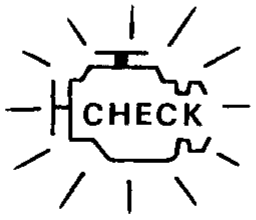
No

INSPECTION END

8



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

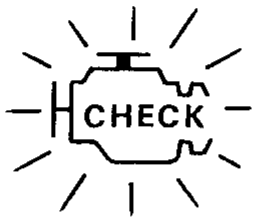
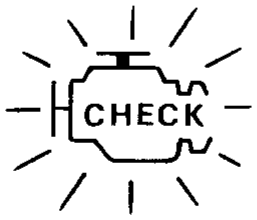
Detected items	Display Diagnostic trouble code No.	How to perform diagnostic test mode II (Self-diagnostic results) judgement	
		Illustration	Method
Camshaft position sensor circuit	11	☆MONITOR ☆NO FAIL CMPS•RPM(POS) 650rpm CMPS•RPM(REF) 650rpm MAS AIR/FL SE 1.15V COOLAN TEMP/S 81°C O2 SEN 0.06V O2 SEN-R 0.05V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD SEF349N  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 diagnostic test mode II (Self-diagnostic results) with ECM. **Malfunction indicator lamp displays diagnostic trouble code No. 55.**
Mass air flow sensor circuit	12	☆MONITOR ☆NO FAIL CMPS•RPM(POS) 650rpm CMPS•RPM(REF) 650rpm MAS AIR/FL SE 1.15V COOLAN TEMP/S 81°C O2 SEN 0.06V O2 SEN-R 0.05V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD SEF349N  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 diagnostic test mode II (Self-diagnostic results) 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)

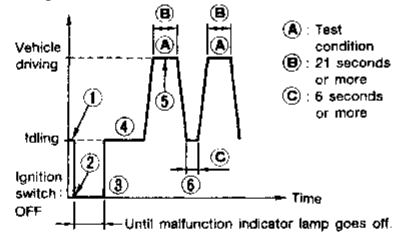
Detected items	Display Diagnostic trouble code No.	How to perform diagnostic test mode II (Self-diagnostic results) judgement	
		Illustration	Method
Engine coolant temperature sensor circuit	13	☆MONITOR ☆NO FAIL CMPS•RPM(POS) 650rpm CMPS•RPM(REF) 650rpm MAS AIR/FL SE 1.15V COOLAN TEMP/S 81°C O2 SEN 0.06V O2 SEN-R 0.05V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD SEF349N CHECK SEF051P	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Turn ignition switch "ON" or start engine. 2) Select "DATA MONITOR" mode with CONSULT. ☆ **NO FAIL** OR 2) Perform diagnostic test mode II (Self-diagnostic results) with ECM. **Malfunction indicator lamp displays diagnostic trouble code No. 55.**
Vehicle speed sensor circuit*	14	VEHICLE SPEED SEN CKT AFTER TOUCH START, DRIVE VEHICLE AT 10km/h (6mph) OR MORE WITHIN 15sec. NEXT START SEF678D ☆MONITOR ☆NO FAIL VHCL SPEED SE 20km/h NEUT POSI SW OFF RECORD SEF679D CHECK SEF051P	**CHECK OVERALL FUNCTION.** 1) Jack up drive wheels. 2) Start engine. 3) Perform "VEHICLE SPEED SEN CIRCUIT" 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: 1,750 ± 150 rpm (2) Intake manifold vacuum: –60.0 ± 6.7 kPa (–450 ± 50 mmHg, –17.72 ± 1.97 inHg) (3) Vehicle speed 5 km/h (3MPH) or more 3) If malfunction indicator lamp comes on during test drive, perform diagnostic test mode II (Self-diagnostic results) with ECM. **Malfunction indicator lamp displays diagnostic trouble code No. 55.**

*: Diagnostic test mode II (Self-diagnostic results) is not performed but this method provides results which are equal to the self-diagnostic results.

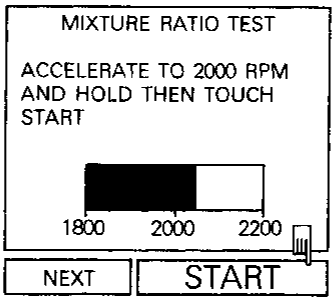
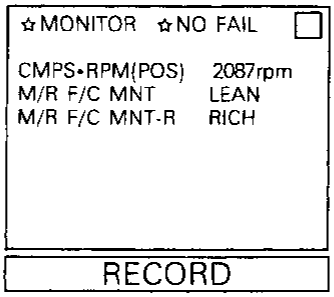
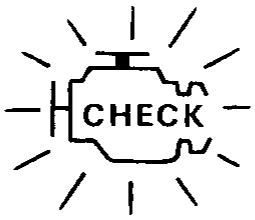
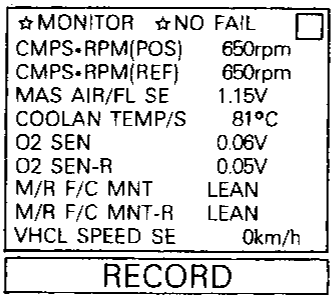
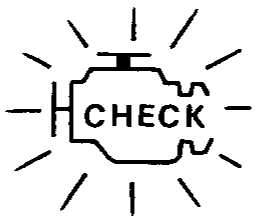
How to Execute On-board Diagnostic System in Diagnostic Test Mode II (Cont'd)

Detected items	Display Diagnostic trouble code No.	How to perform diagnostic test mode II (Self-diagnostic results) judgement	
		Illustration	Method
TCS Signal circuit	16	☆MONITOR ☆NO FAIL CMPS•RPM(POS) 0rpm CMPS•RPM(REF) 0rpm MAS AIR/FL SE 0.08V COOLAN TEMP/S 24°C O2 SEN 0.00V O2 SEN-R 0.00V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD SEF350N  SEF051P	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Turn ignition switch "ON". 2) Select "DATA MONITOR" mode with CONSULT. ☆ **NO FAIL** OR 1) Turn ignition switch "ON". 2) Perform diagnostic test mode II (Self-diagnostic results) with ECM. **Malfunction indicator lamp displays diagnostic trouble code No. 55.**
Ignition signal circuit	21	☆MONITOR ☆NO FAIL CMPS•RPM(POS) 650rpm CMPS•RPM(REF) 650rpm MAS AIR/FL SE 1.15V COOLAN TEMP/S 81°C O2 SEN 0.06V O2 SEN-R 0.05V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD SEF349N  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 diagnostic test mode II (Self-diagnostic results) 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)

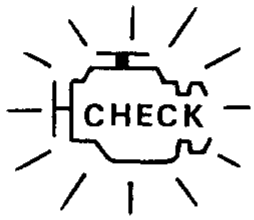
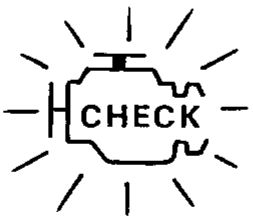
Detected items	Display Diagnostic trouble code No.	How to perform diagnostic test mode II (Self-diagnostic results) judgement	
		Illustration	Method
ECM	31	☆MONITOR ☆NO FAIL CMPS•RPM(POS) 0rpm CMPS•RPM(REF) 0rpm MAS AIR/FL SE 0.08V COOLAN TEMP/S 24°C O2 SEN 0.00V O2 SEN-R 0.00V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD SEF350N CHECK SEF051P	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Turn ignition switch "ON". 2) Select "DATA MONITOR" mode with CONSULT. ☆ **NO FAIL** OR 2) Perform diagnostic test mode II (Self-diagnostic results) with ECM. **Malfunction indicator lamp displays diagnostic trouble code No. 55.**
EGR function	32	A **ROAD TEST** **Test condition** **Drive vehicle under the following conditions with a suitable shift position.** **(1) Engine speed:** **1,700 ± 200 rpm** **(2) Intake manifold vacuum:** **−42.7 ± 10.7 kPa** **(−320 ± 80 mmHg, −12.60 ± 3.15 inHg)** **Driving mode**  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 150 seconds. ⑤ Shift to suitable gear position and drive in "Test condition" for at least 21 seconds. ⑥ Decrease engine revolutions to less than 1,500 rpm for at least 6 seconds. ⑦ Repeat steps ⑤ through ⑥ at least 1 more time. SEF351NA B CHECK SEF051P	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Turn ignition switch "ON". 2) Perform diagnostic test mode II (Self-diagnostic results) 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 diagnostic test mode II (Self-diagnostic results) 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)

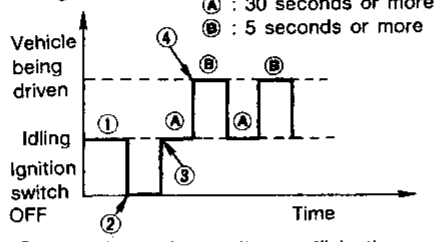
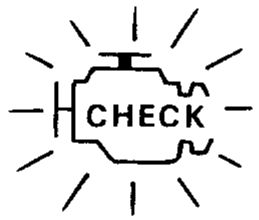
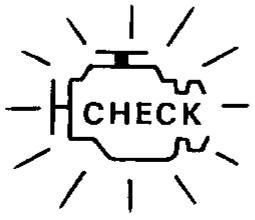
Detected items	Display Diagnostic trouble code No.	How to perform diagnostic test mode II (Self-diagnostic results) judgement	
		Illustration	Method
Heated oxygen sensor circuit (Left bank)*	33	 MEF682D  SEF352N	**CHECK OVERALL FUNCTION.** 1) Start engine and warm it up sufficiently. 2) Perform "MIXTURE 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 diagnostic test mode II (heated oxygen sensor monitor).
Heated oxygen sensor circuit (Right bank)*	53	 SEF051P	
Knock sensor circuit	34	 SEF349N  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 diagnostic test mode II (Self-diagnostic results) with ECM. **Malfunction indicator lamp displays diagnostic trouble code No. 55.**

*: Diagnostic test mode II (Self-diagnostic results) is not performed but this method provides results which are equal to the self-diagnostic results.

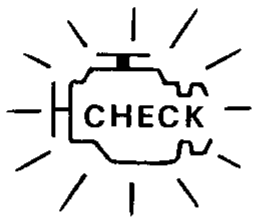
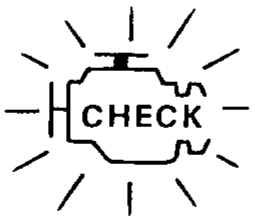
How to Execute On-board Diagnostic System in Diagnostic Test Mode II (Cont'd)

Detected items	Display Diagnostic trouble code No.	How to perform diagnostic test mode II (Self-diagnostic results) judgement	
		Illustration	Method
EGR temperature sensor circuit	35	☆MONITOR ☆NO FAIL CMPS•RPM(POS) 650rpm CMPS•RPM(REF) 650rpm MAS AIR/FL SE 1.15V COOLAN TEMP/S 81°C O2 SEN 0.06V O2 SEN-R 0.05V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD SEF349N  SEF051P	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Start engine and warm it up sufficiently. 2) Select "DATA MONITOR" mode with CONSULT. ☆ **NO FAIL** — OR — 2) Turn ignition switch "OFF" and then "ON". 3) Perform diagnostic test mode II (Self-diagnostic results) with ECM. **Malfunction indicator lamp displays diagnostic trouble code No. 55.**
Throttle position sensor circuit	43	☆MONITOR ☆NO FAIL CMPS•RPM(POS) 650rpm CMPS•RPM(REF) 650rpm MAS AIR/FL SE 1.15V COOLAN TEMP/S 81°C O2 SEN 0.06V O2 SEN-R 0.05V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD SEF349N  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" position), and run engine at vehicle speed of 5 km/h (3 MPH) or higher for at least 10 seconds. 4) Select "DATA MONITOR" mode with CONSULT. ☆ **NO FAIL** — OR — 4) Turn ignition switch "OFF" and then "ON". 5) Perform diagnostic test mode II (Self-diagnostic results) 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)

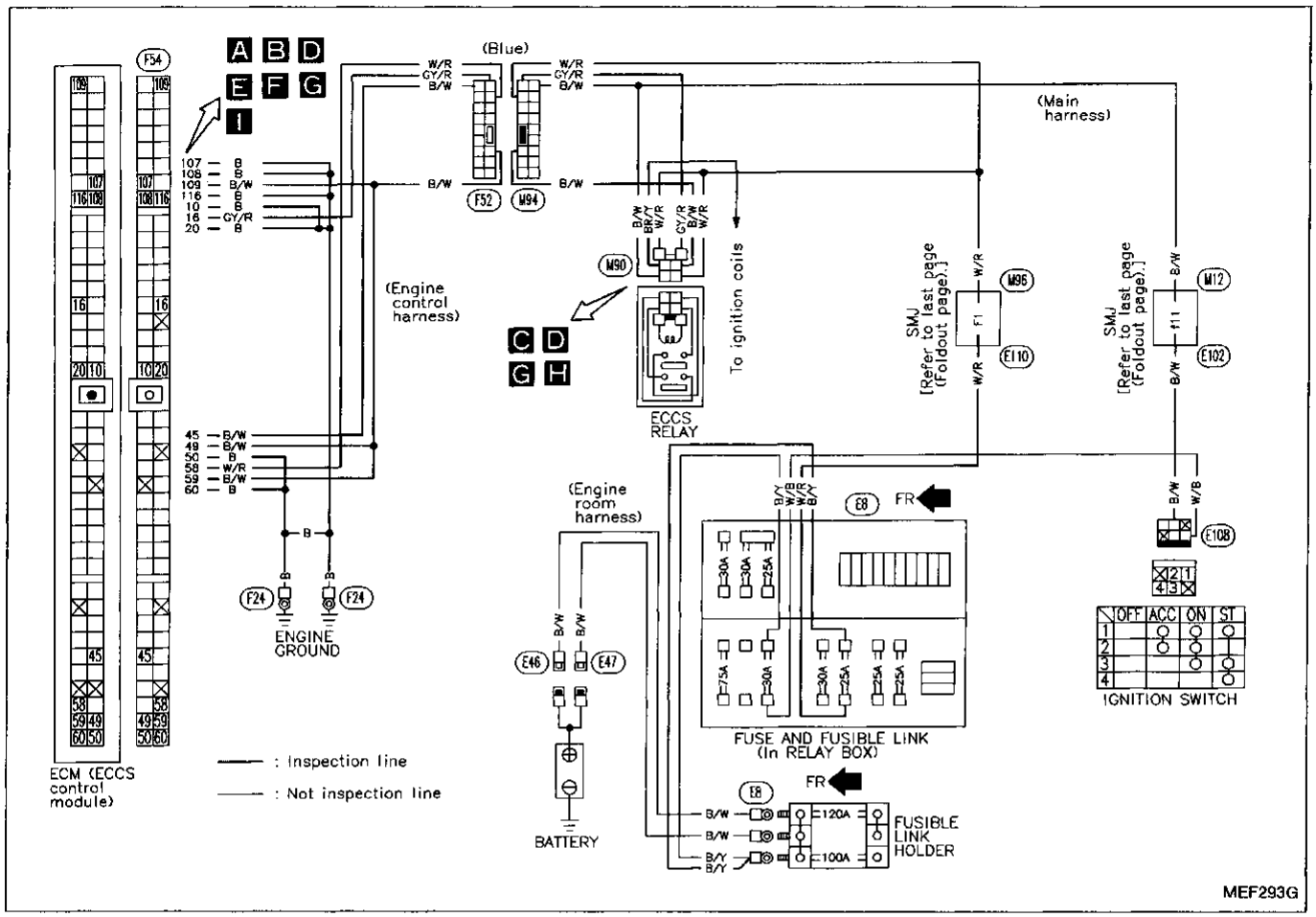
Detected items	Display Diagnostic trouble code No.	How to perform diagnostic test mode II (Self-diagnostic results) judgement	
		Illustration	Method
Injector leak	45	**A** **ROAD TEST** **Test condition** **Drive vehicle under the following conditions with a suitable shift position.** **(1) Engine speed: 2,600 ± 200 rpm** **(2) Intake manifold vacuum:** **−40.0 ± 6.7 kPa** **(−300 ± 50 mmHg, −11.81 ± 1.97 inHg)** **Driving mode** Ⓐ : 30 seconds or more Ⓑ : 5 seconds or more  ① Start engine and warm it up sufficiently. ② Turn ignition switch OFF and wait for at least 10 seconds. ③ Start engine and keep it at idle speed for at least 30 seconds. ④ Shift to suitable gear position and drive in "Test condition" for at least 5 seconds. ⑤ Repeat steps ③ through ④ at least 1 more times. SEF241L **B**  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 diagnostic test mode II (Self-diagnostic results) with ECM. **B** **Malfunction indicator lamp displays diagnostic trouble code No. 55.**
Secondary throttle position sensor circuit	46	☆MONITOR ☆NO FAIL CMPS•RPM(POS) 0rpm CMPS•RPM(REF) 0rpm MAS AIR/FL SE 0.08V COOLAN TEMP/S 24°C O2 SEN 0.00V O2 SEN-R 0.00V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD SEF350N  SEF051P	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Turn ignition switch "ON". 2) Select "DATA MONITOR" mode with CONSULT. ☆ **NO FAIL** — OR — 1) Turn ignition switch "ON". 2) Perform diagnostic test mode II (Self-diagnostic results) 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)

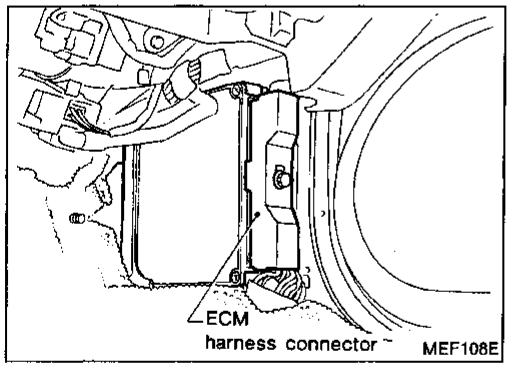
Detected items	Display Diagnostic trouble code No.	How to perform diagnostic test mode II (Self-diagnostic results) judgement	
		Illustration	Method
Injector circuit	51	☆MONITOR ☆NO FAIL CMPS•RPM(POS) 650rpm CMPS•RPM(REF) 650rpm MAS AIR/FL SE 1.15V COOLAN TEMP/S 81°C O2 SEN 0.06V O2 SEN-R 0.05V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD SEF349N  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 diagnostic test mode II (Self-diagnostic results) with ECM. **Malfunction indicator lamp displays diagnostic trouble code No. 55.**
Signal circuit from A/T control unit to ECM	54	☆MONITOR ☆NO FAIL CMPS•RPM(POS) 650rpm CMPS•RPM(REF) 650rpm MAS AIR/FL SE 1.15V COOLAN TEMP/S 81°C O2 SEN 0.06V O2 SEN-R 0.05V M/R F/C MNT LEAN M/R F/C MNT-R LEAN VHCL SPEED SE 0km/h RECORD SEF349N  SEF051P	**PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).** 1) Turn ignition switch "ON" or start engine. 2) Select "DATA MONITOR" mode with CONSULT. ☆ **NO FAIL** — OR — 2) Perform diagnostic test mode II (Self-diagnostic results) with ECM. **Malfunction indicator lamp displays diagnostic trouble code No. 55.**

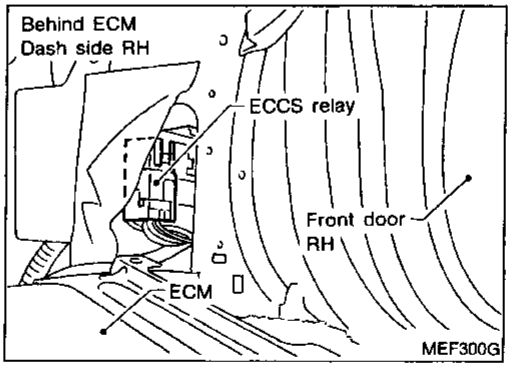
Diagnostic Procedure 1

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

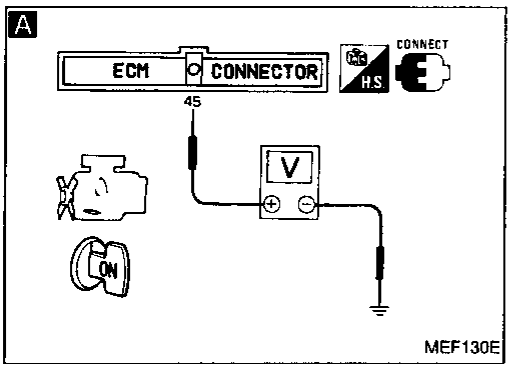


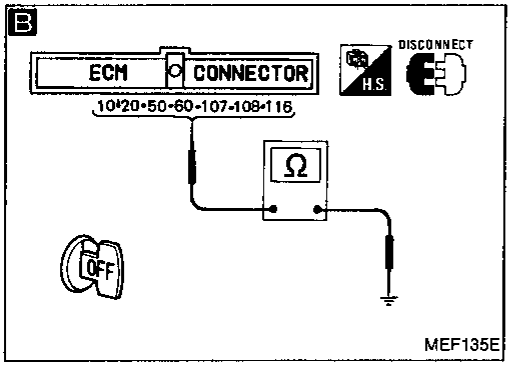
Harness layout

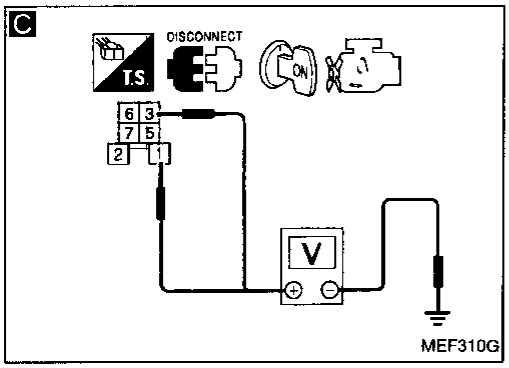


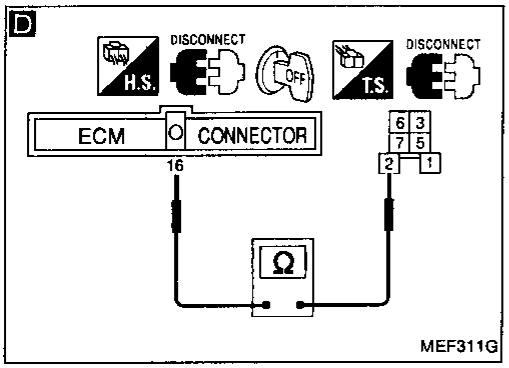


MAIN POWER SUPPLY AND GROUND CIRCUIT
(Not self-diagnostic item)









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 (F52), (M94)
- Harness connectors (M12), (E102)
- 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 → 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 (M96), (E110)
- 25A fusible link
- Harness continuity between ECCS relay and fusible link holder
- Harness continuity between ECCS relay and harness connector (M12)

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.

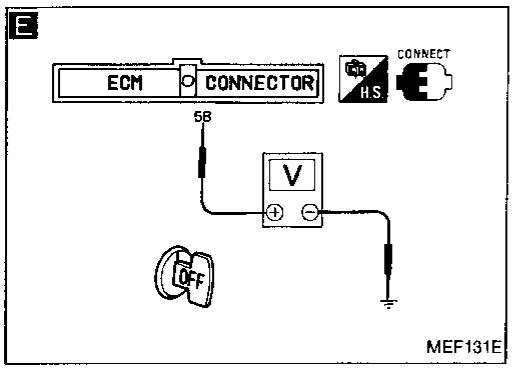
NG → Check the following.
- Harness connectors (F52), (M94)
- Harness continuity between ECM and ECCS relay

If NG, repair harness or connectors.

OK

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

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



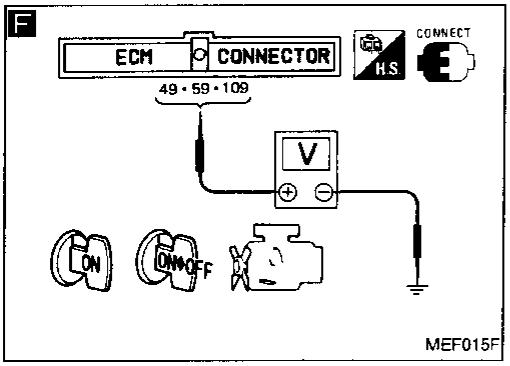
E

CHECK POWER SUPPLY-III.
1) Stop engine.
2) Check voltage between ECM terminal ⑱ and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F52), (M94)
- Harness continuity between ECM and harness connector (M96)

If NG, repair harness or connectors.

OK ↓

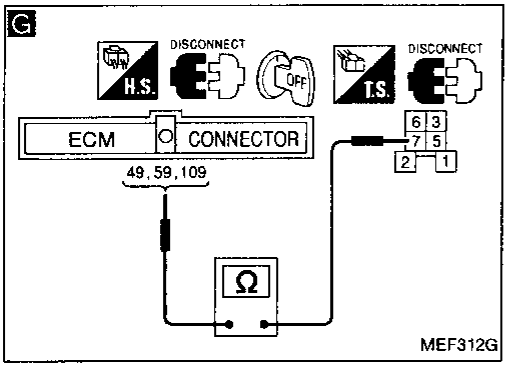


F

CHECK POWER SUPPLY-IV.
1) Turn ignition switch "ON" and then "OFF".
2) Check voltage between ECM terminals ㊾, ㊾, (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".

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 ↓

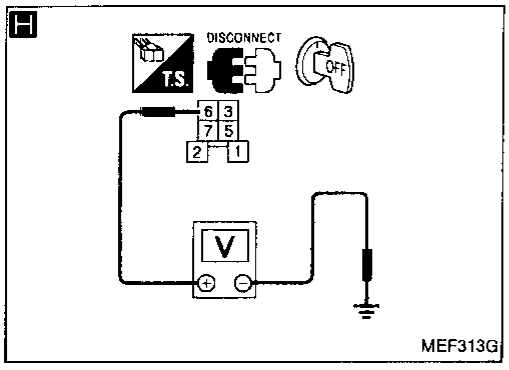
G

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, ㊾, (109) and terminal ⑦.
Continuity should exist.

NG → Check the following.
- Harness connectors (F52), (M94)
- Harness continuity between ECM and ECCS relay

If NG, repair harness or connectors.

OK ↓



H

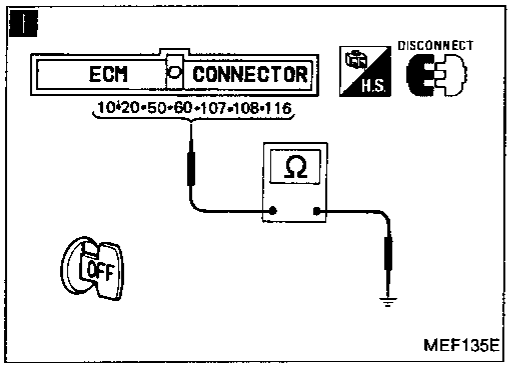
CHECK VOLTAGE BETWEEN ECCS RELAY AND GROUND.
1) Check voltage between terminal ⑥ and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness continuity between ECCS relay and harness connector (M96)

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-221.)

NG → Replace ECCS relay.

OK

CHECK GROUND CIRCUIT-II.
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 → Repair harness or connectors.

OK

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

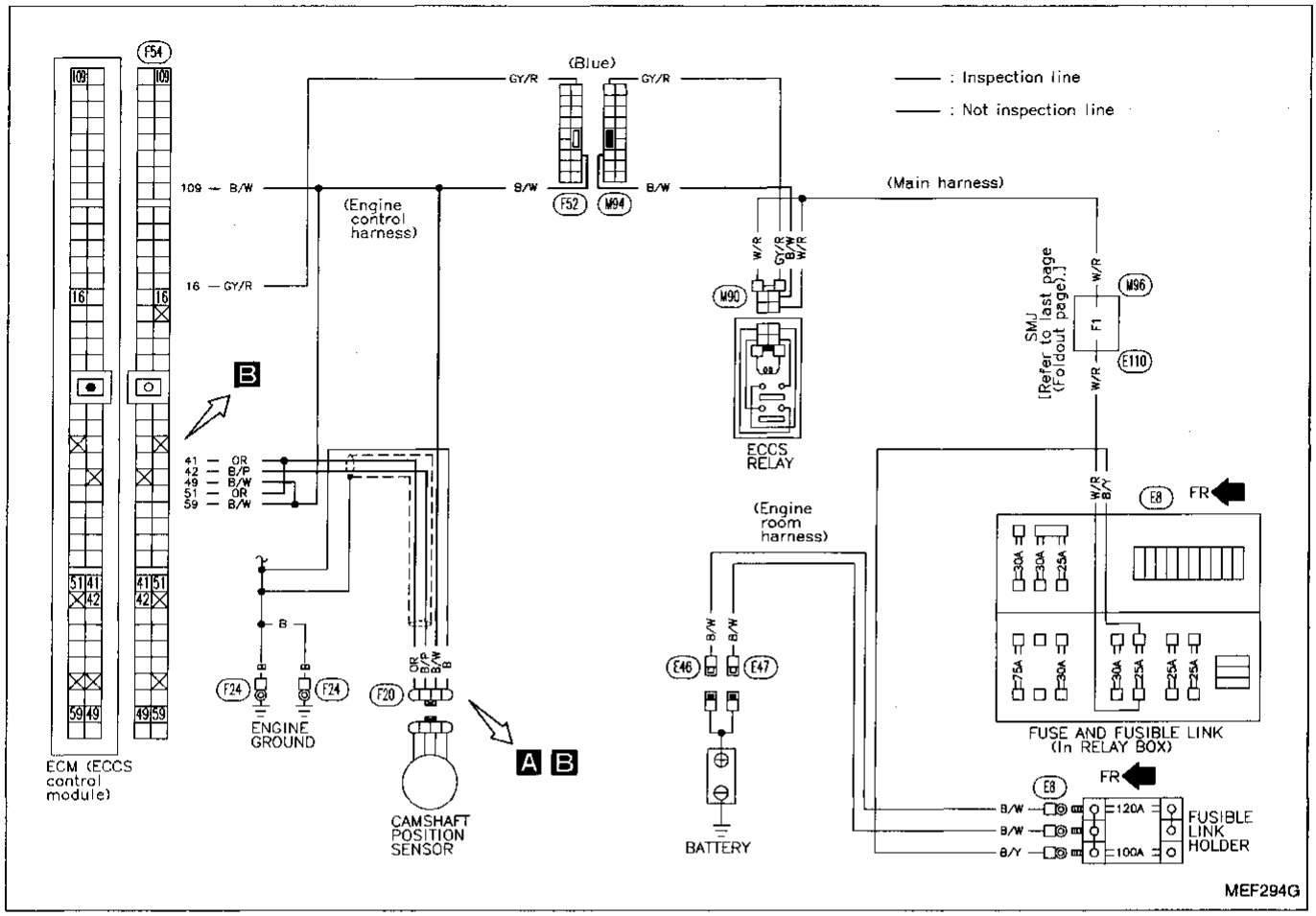
Trouble is not fixed.

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

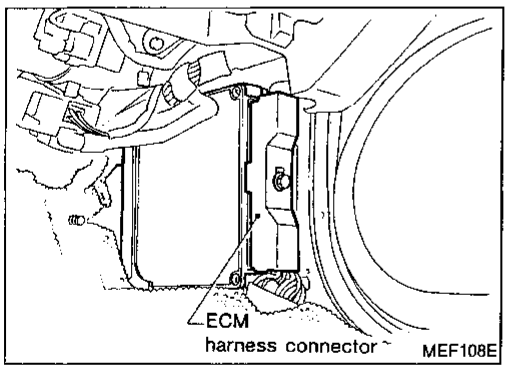
INSPECTION END

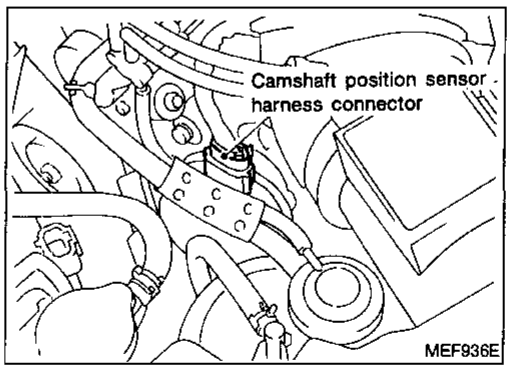
Diagnostic Procedure 2

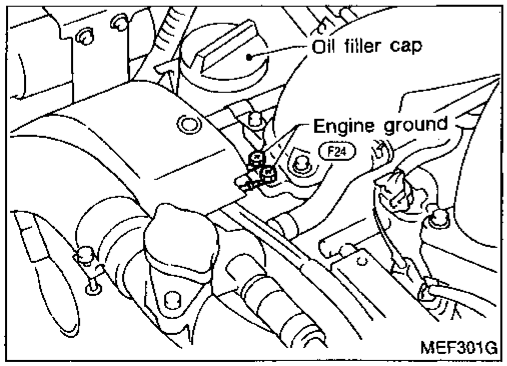
CAMSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)



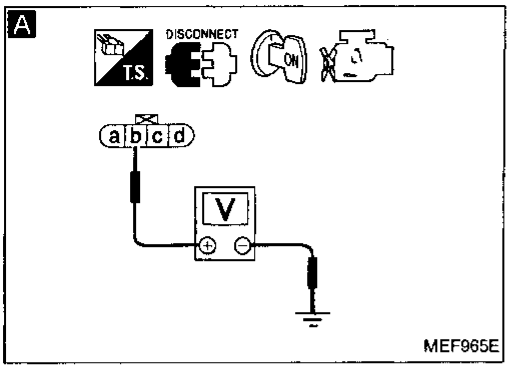
Harness layout

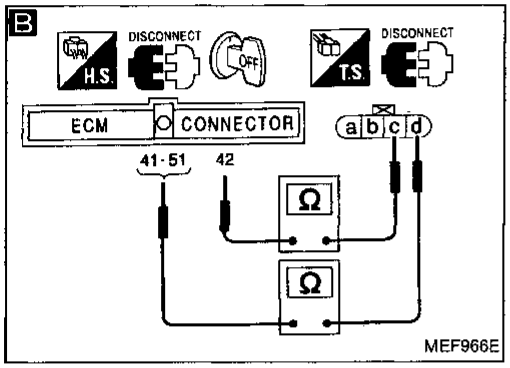






CAMSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)





INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-70.
- 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 connectors (F52), (M94)
  - Harness continuity between camshaft position sensor and ECCS relay
  - Harness continuity between camshaft position sensor and ECM

  If NG, repair harness or connectors.
- OK ↓

B

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Loosen and retighten ground screws.
3) Disconnect ECM harness connector.
4) Check harness continuity between terminal ⓓ and ECM terminals ㊶, ㊺ (90° 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-213.)
- NG → Replace camshaft position sensor.
- OK ↓

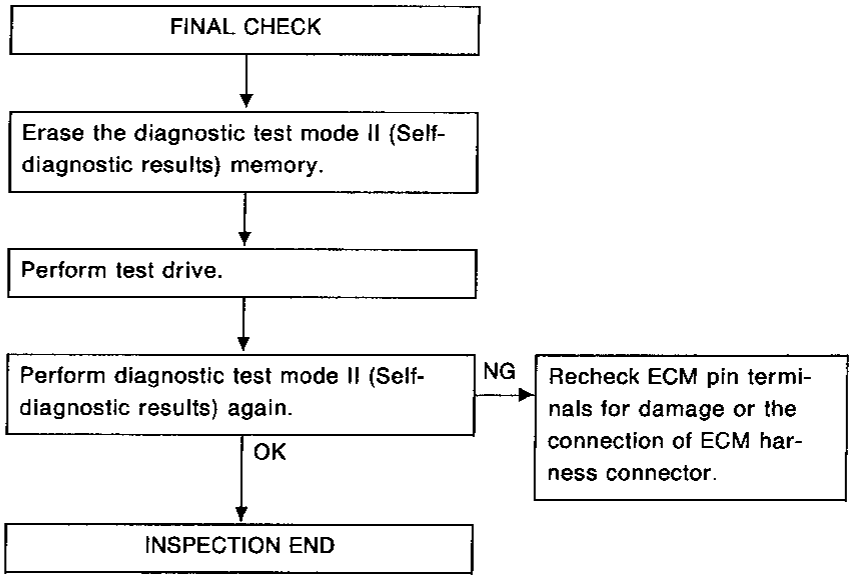
Disconnect and reconnect harness connectors in the circuit. Then retest.

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)

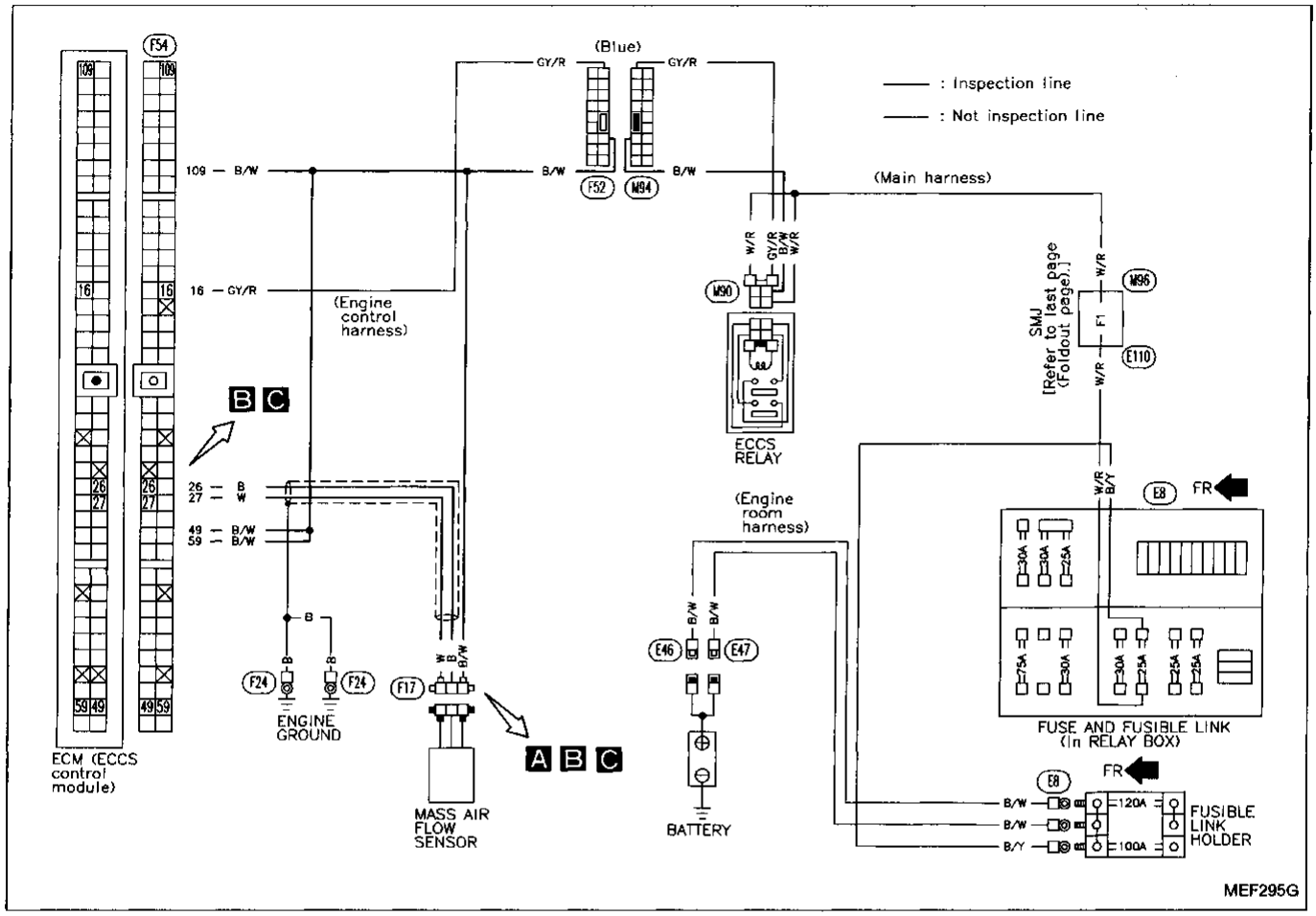
Perform FINAL CHECK by the following procedure after repair is completed.



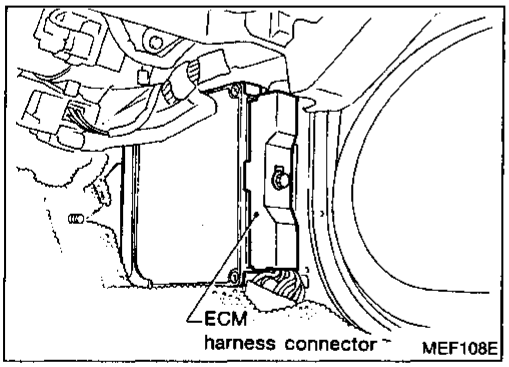
Diagnostic Procedure 3

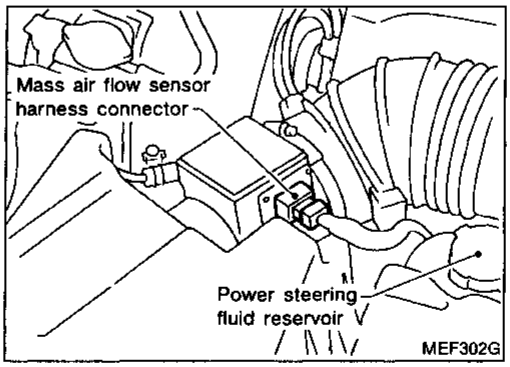
MASS AIR FLOW SENSOR (Diagnostic trouble code No. 12)

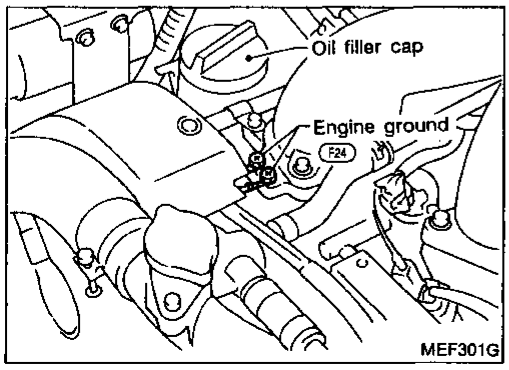
(Malfunction indicator lamp item)



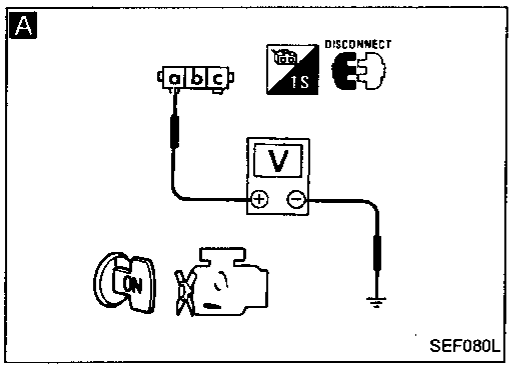
Harness layout

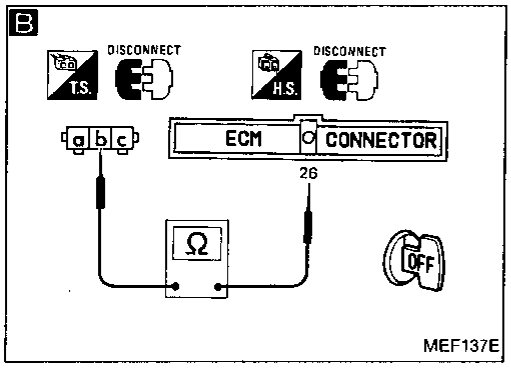


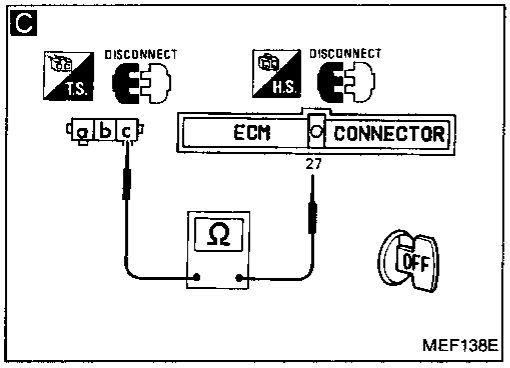




MASS AIR FLOW SENSOR
(Diagnostic trouble code No. 12)
(CHECK) (Malfunction indicator lamp item)







INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-70.
- OK → INSPECTION END
- 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 connectors (F52), (M94)
  - 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 ↓

B

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Loosen and retighten ground screws.
3) Disconnect ECM harness connector.
4) Check harness continuity between terminal ⓑ and ECM terminal ㉖.
Continuity should exist.

- NG → Repair harness or connectors.
- OK ↓

C

CHECK INPUT SIGNAL CIRCUIT.
1) 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-214.)
- NG → Replace mass air flow sensor.
- OK ↓

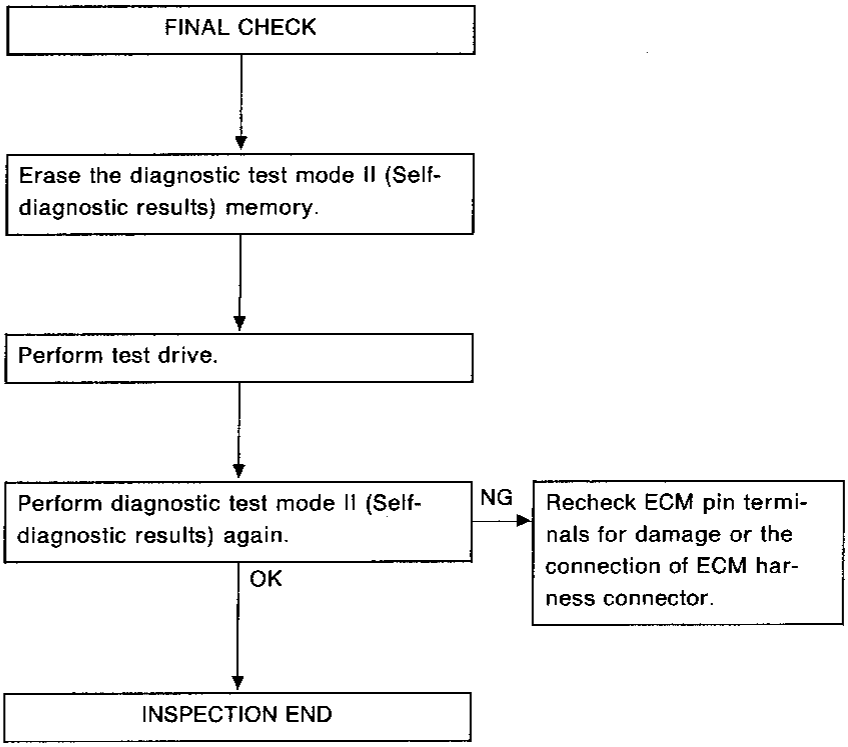
Disconnect and reconnect harness connectors in the circuit. Then retest.

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)
(Malfunction indicator lamp item)

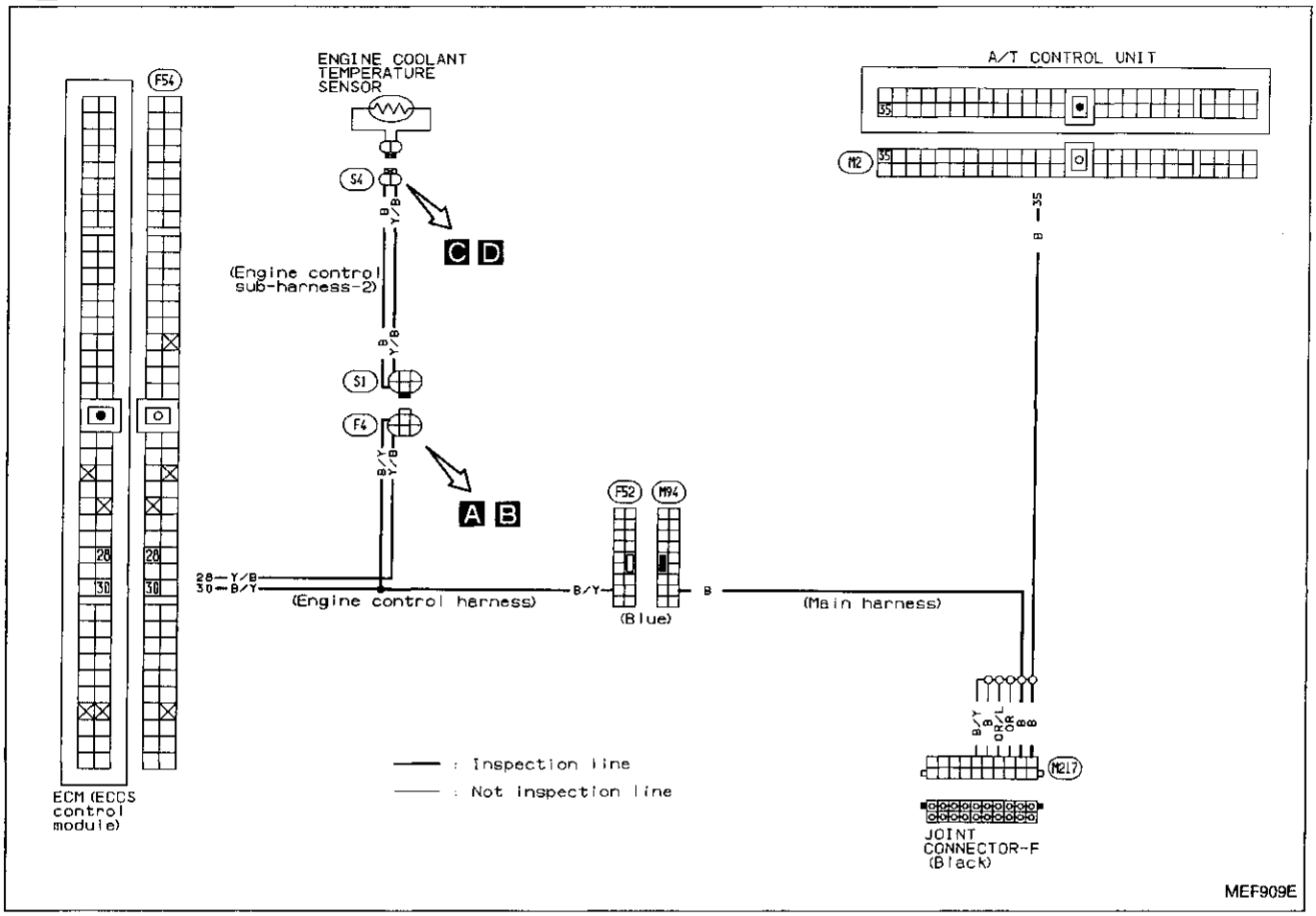
Perform FINAL CHECK by the following procedure after repair is completed.



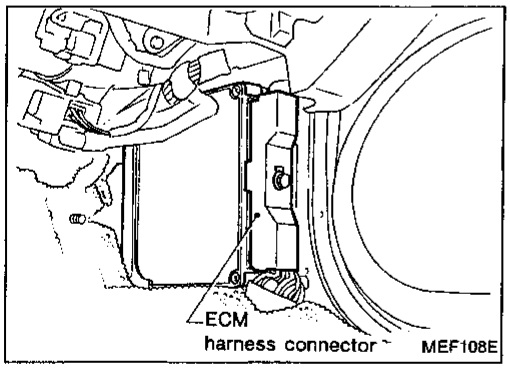
Diagnostic Procedure 4

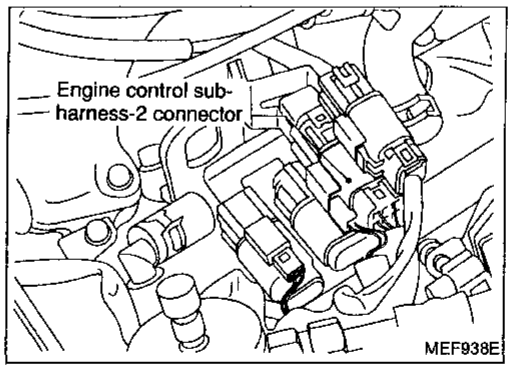
ENGINE COOLANT TEMPERATURE SENSOR (Diagnostic trouble code No. 13)

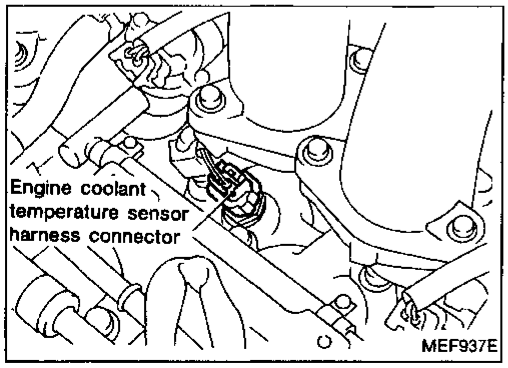
CHECK (Malfunction indicator lamp item)



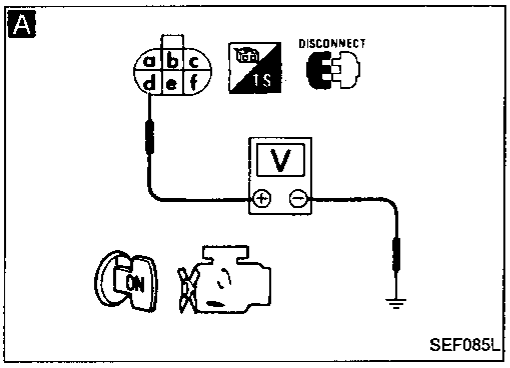
Harness layout

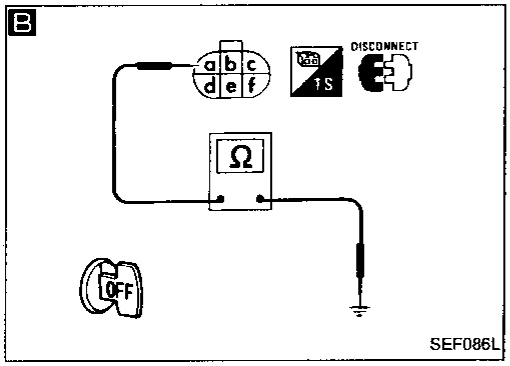


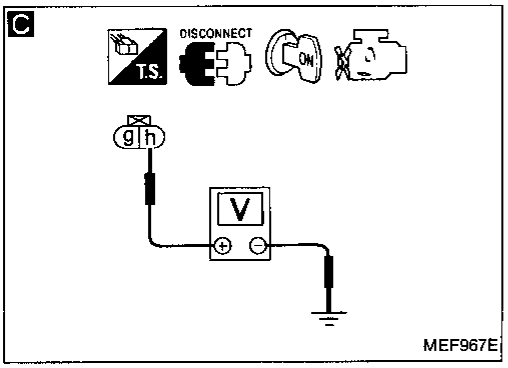


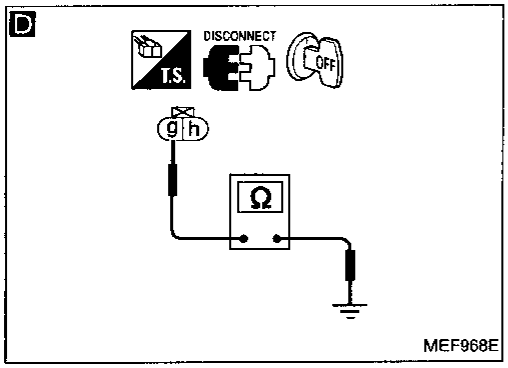


ENGINE COOLANT TEMPERATURE SENSOR
(Diagnostic trouble code No. 13)
(Malfunction indicator lamp item)









INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-71.
- OK → INSPECTION END
- NG ↓

A

CHECK POWER SUPPLY-I.
1) Turn ignition switch "OFF".
2) Disconnect engine control sub-harness-2 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-I.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminal ⓐ and engine ground.
Continuity should exist.

- NG → Check the following.
  - Harness connectors (F52), (M94)
  - Joint connector (M217)
  - Harness continuity between engine control sub-harness-2 connector and ECM
  - Harness continuity between engine control sub-harness-2 connector and A/T control unit

  If NG, repair harness or connectors.
- OK ↓

C

CHECK POWER SUPPLY-II.
1) Reconnect engine control sub-harness-2 connector.
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 → Repair harness or connectors.
- OK ↓

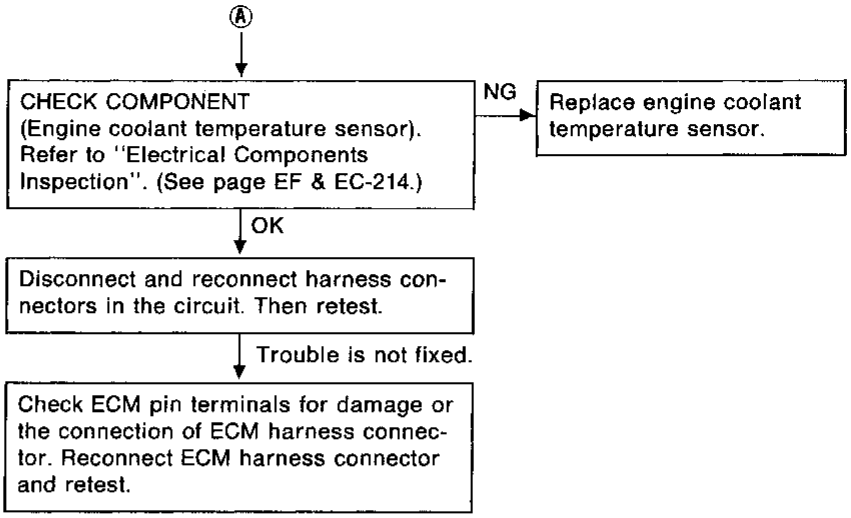
D

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

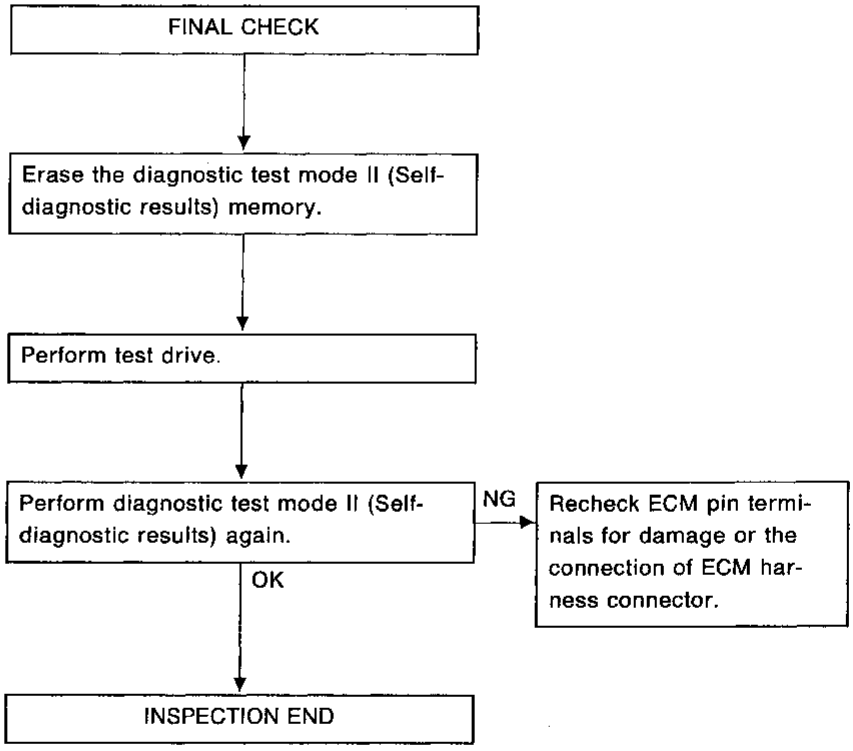
- NG → Repair harness or connectors.
- OK ↓

Ⓐ

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



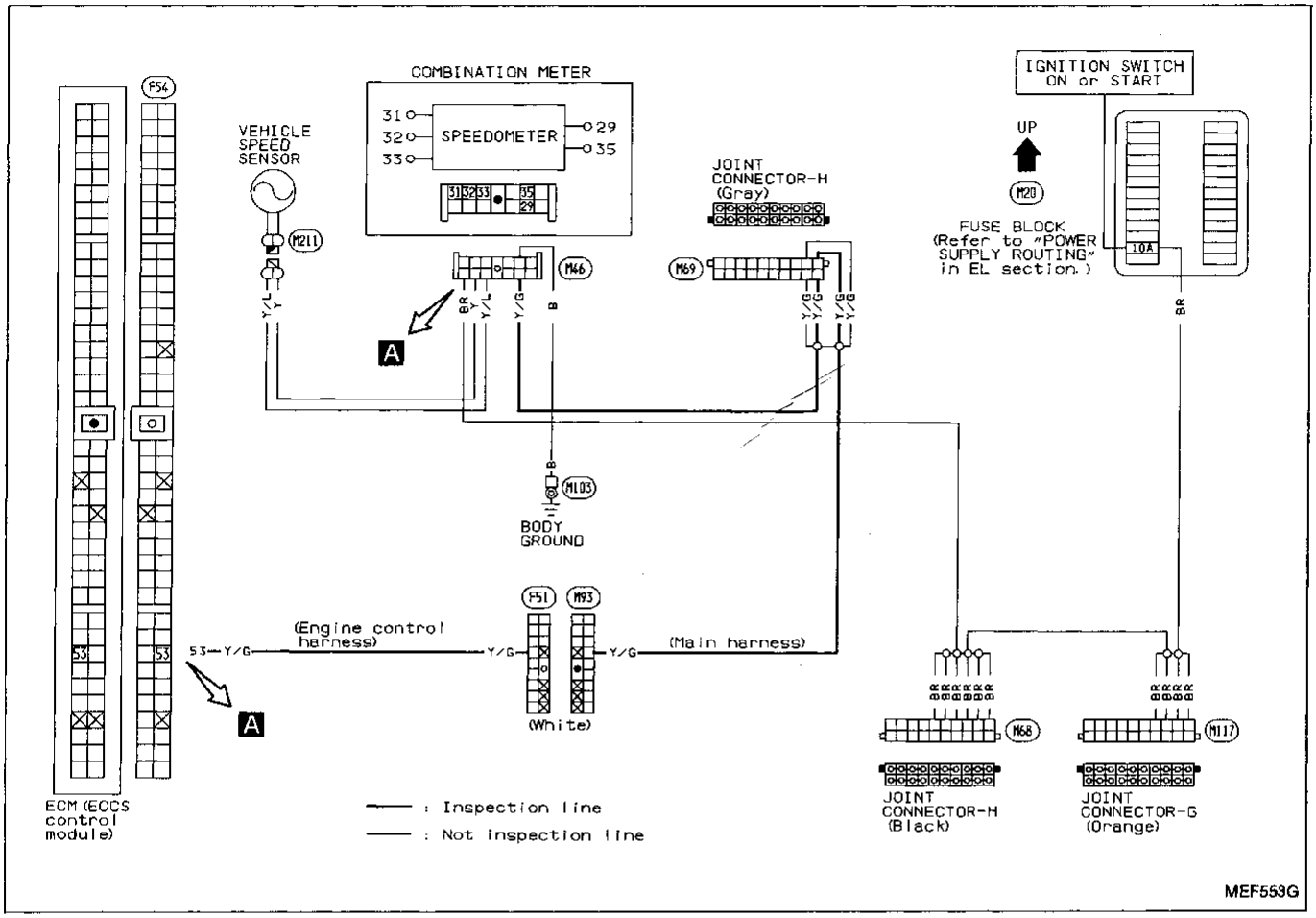
Perform FINAL CHECK by the following procedure after repair is completed.



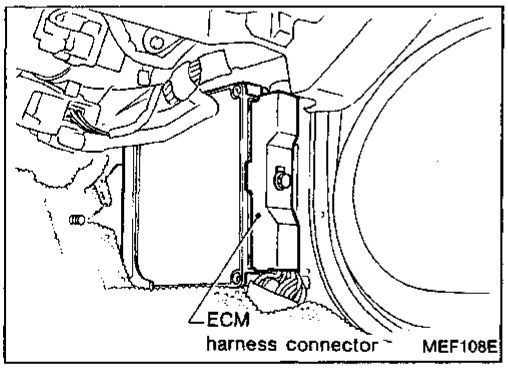
Diagnostic Procedure 5

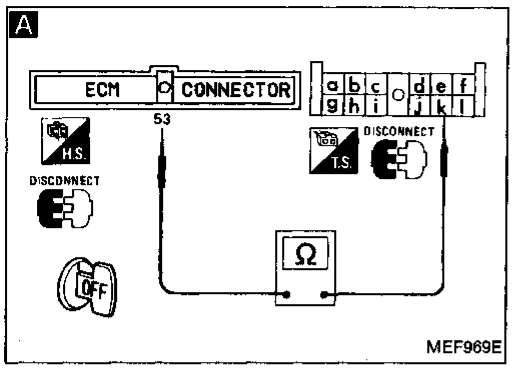
VEHICLE SPEED SENSOR (Diagnostic trouble code No.14)

CHECK (Malfunction indicator lamp item)



Harness layout





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

INSPECTION START

CHECK OVERALL FUNCTION.
See page EF & EC-71.
- OK → INSPECTION END
- NG ↓

CHECK SPEEDOMETER FUNCTION.
Make sure that speedometer functions properly.
- NG → Check vehicle speed sensor and its circuit. (Refer to "Inspection/ Vehicle Speed Sensor Signal Circuit" 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 (K). **Continuity should exist.**
- NG → Check the following.
  - Harness connectors (F51), (M93)
  - Joint connector (M69)
  - 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

Erase the diagnostic test mode II (Self-diagnostic results) memory.

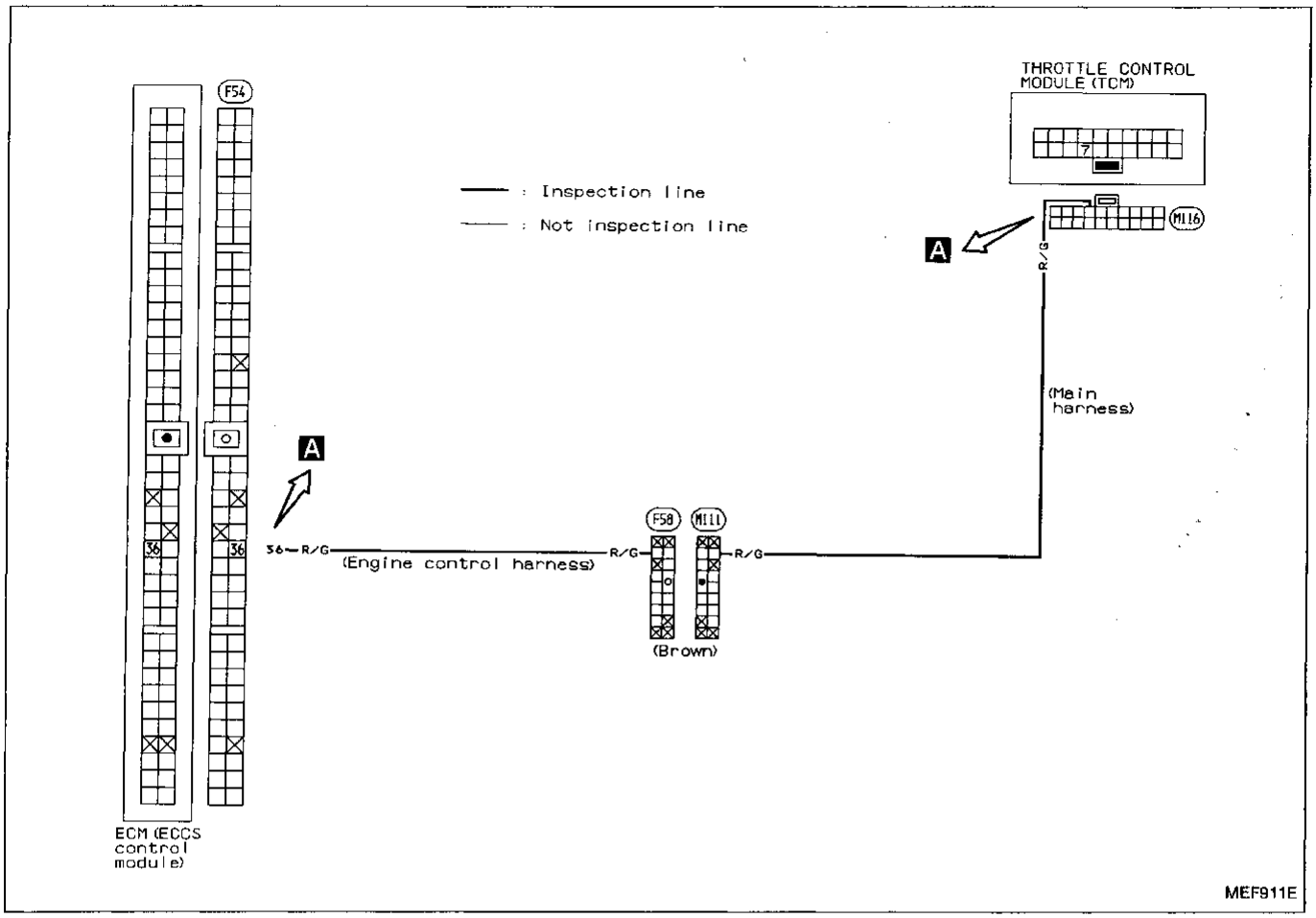
Perform test drive.

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

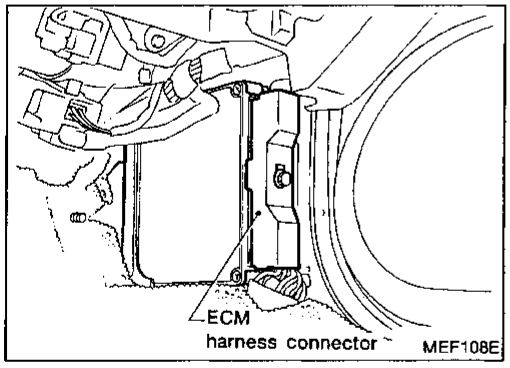
INSPECTION END

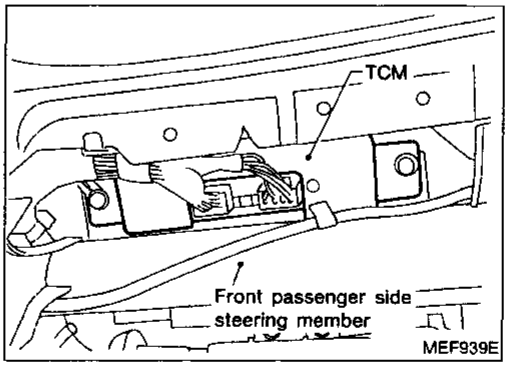
Diagnostic Procedure 6

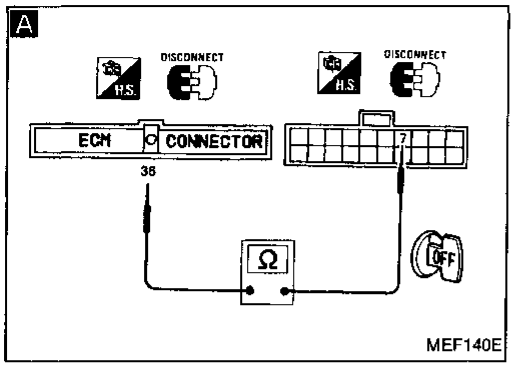
TCS SIGNAL (Diagnostic trouble code No. 16): TCS models



Harness layout







TCS SIGNAL (Diagnostic trouble code No. 16): TCS models

INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
See page EF & EC-72.
→ OK → INSPECTION END
↓ NG

A

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector and TCM 20-pin harness connector.
3) Check harness continuity between ECM terminal ㊱ and TCM terminal ⑦.
Continuity should exist.
→ NG → Check the following.
- Harness connectors (F58), (M111)
- Harness continuity between ECM and TCM

If NG, repair harness or connectors.

↓ OK

CHECK TCM FUNCTION.
Make sure that TCM and circuit function properly. (Refer to "Self-diagnoses for TCM" of "TROUBLE DIAGNOSES FOR TCS" in BR section.)
→ NG → Repair malfunctioning parts.

↓ 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

↓

Erase the diagnostic test mode II (Self-diagnostic results) memory.

↓

Perform test drive.

↓

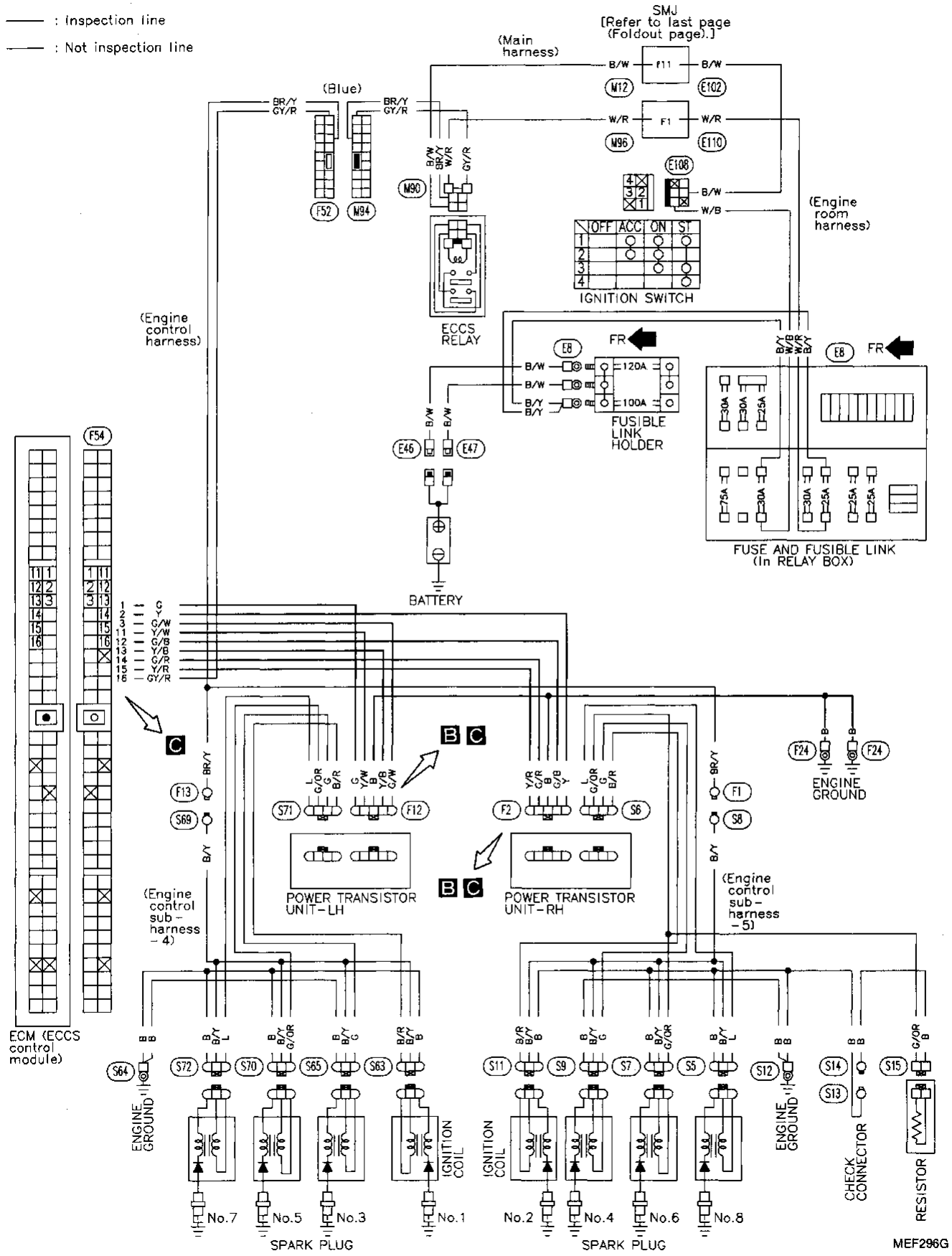
Perform diagnostic test mode II (Self-diagnostic results) again.
→ NG → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

↓ OK

INSPECTION END

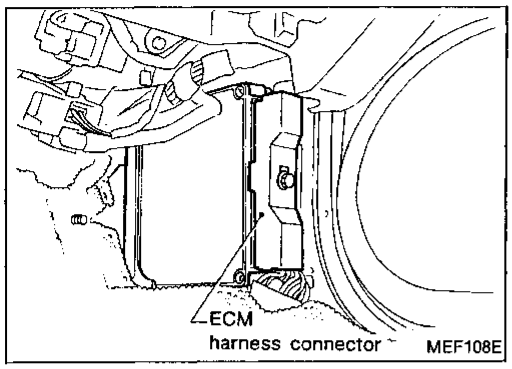
Diagnostic Procedure 7

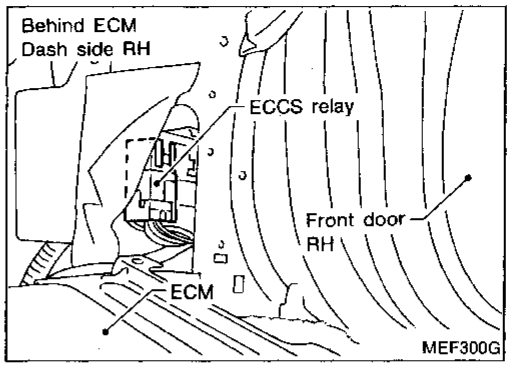
IGNITION SIGNAL (Diagnostic trouble code No. 21)

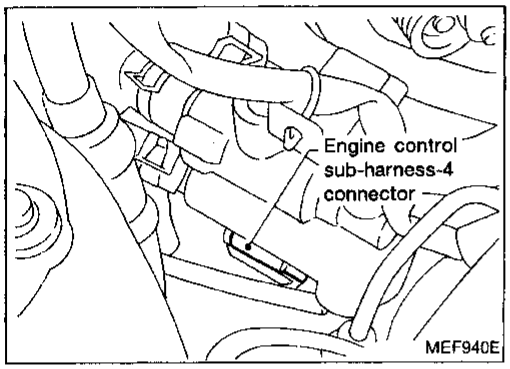


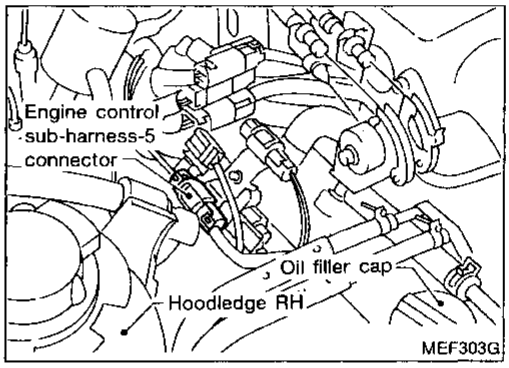
IGNITION SIGNAL (Diagnostic trouble code No. 21)

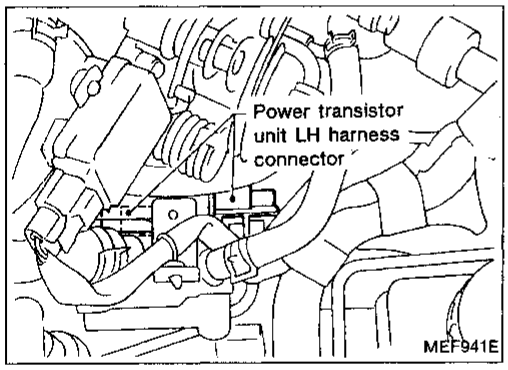
Harness layout

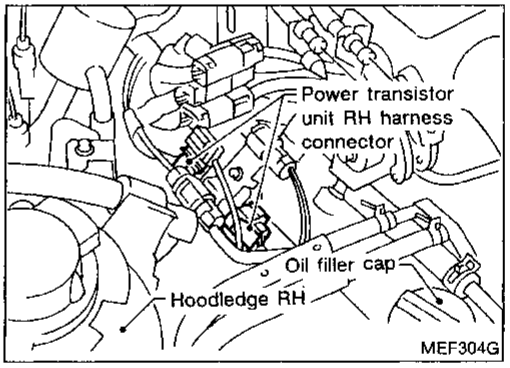


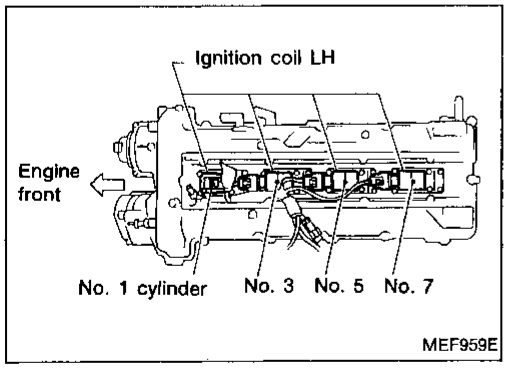


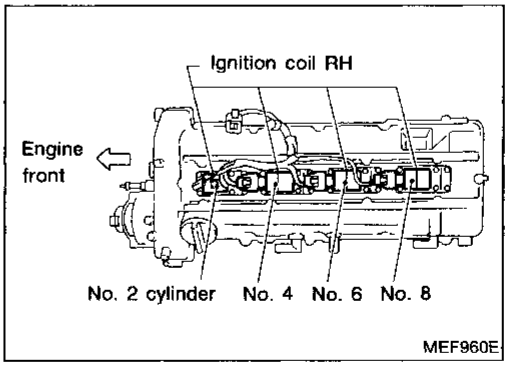




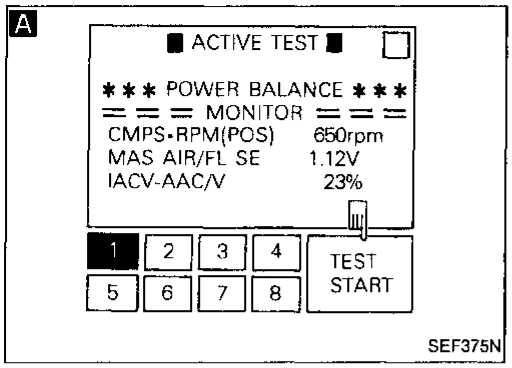


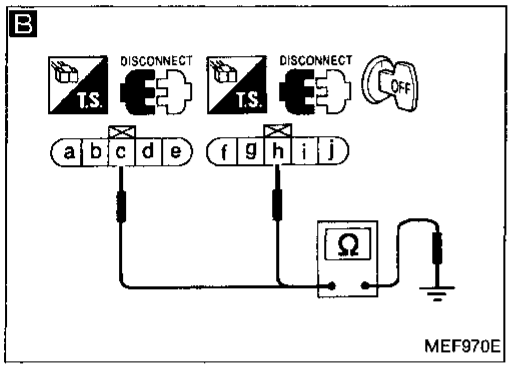


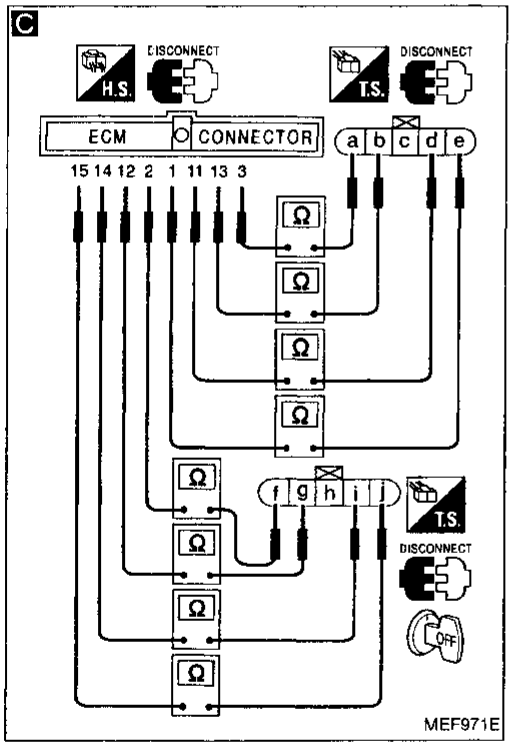




IGNITION SIGNAL (Diagnostic trouble code No. 21)







INSPECTION START

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

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

NG

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.

Case 1:
When either cylinders Nos. 1, 3, 5 and 7 or Nos. 2, 4, 6 and 8 are all NG

Case 2:
Except case 1

B

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect power transistor unit harness connector.
3) Check harness continuity between terminals ⓒ, ⓗ and engine ground.
Continuity should exist.

OK

NG

OK

C

CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM 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 ⓑ,
ECM terminal ⑭ and terminal ⓘ,
ECM terminal ⑮ and terminal ⓙ.
Continuity should exist.

NG → Repair harness or connectors.

OK

CHECK COMPONENT (Power transistor unit).
Refer to "Electrical Components Inspection". (See pages EF & EC-215.)

NG → Replace power transistor.

OK

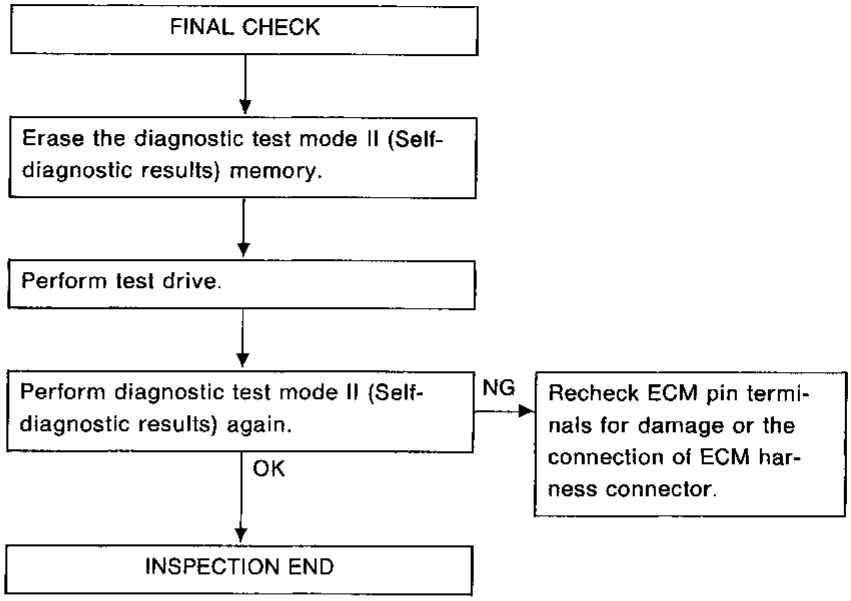
Disconnect and reconnect harness connectors in the circuit. Then retest.

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)

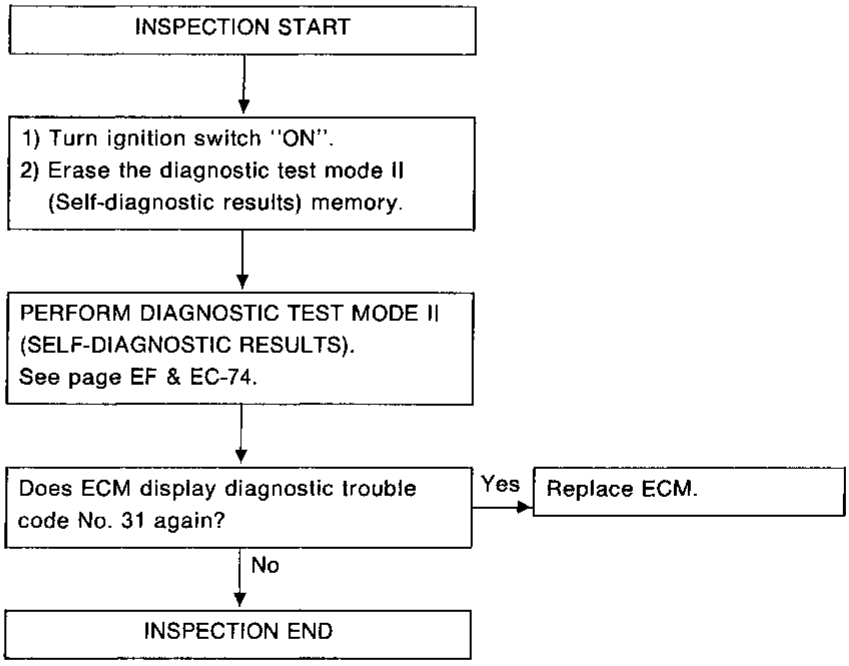
Perform FINAL CHECK by the following procedure after repair is completed.



Diagnostic Procedure 8

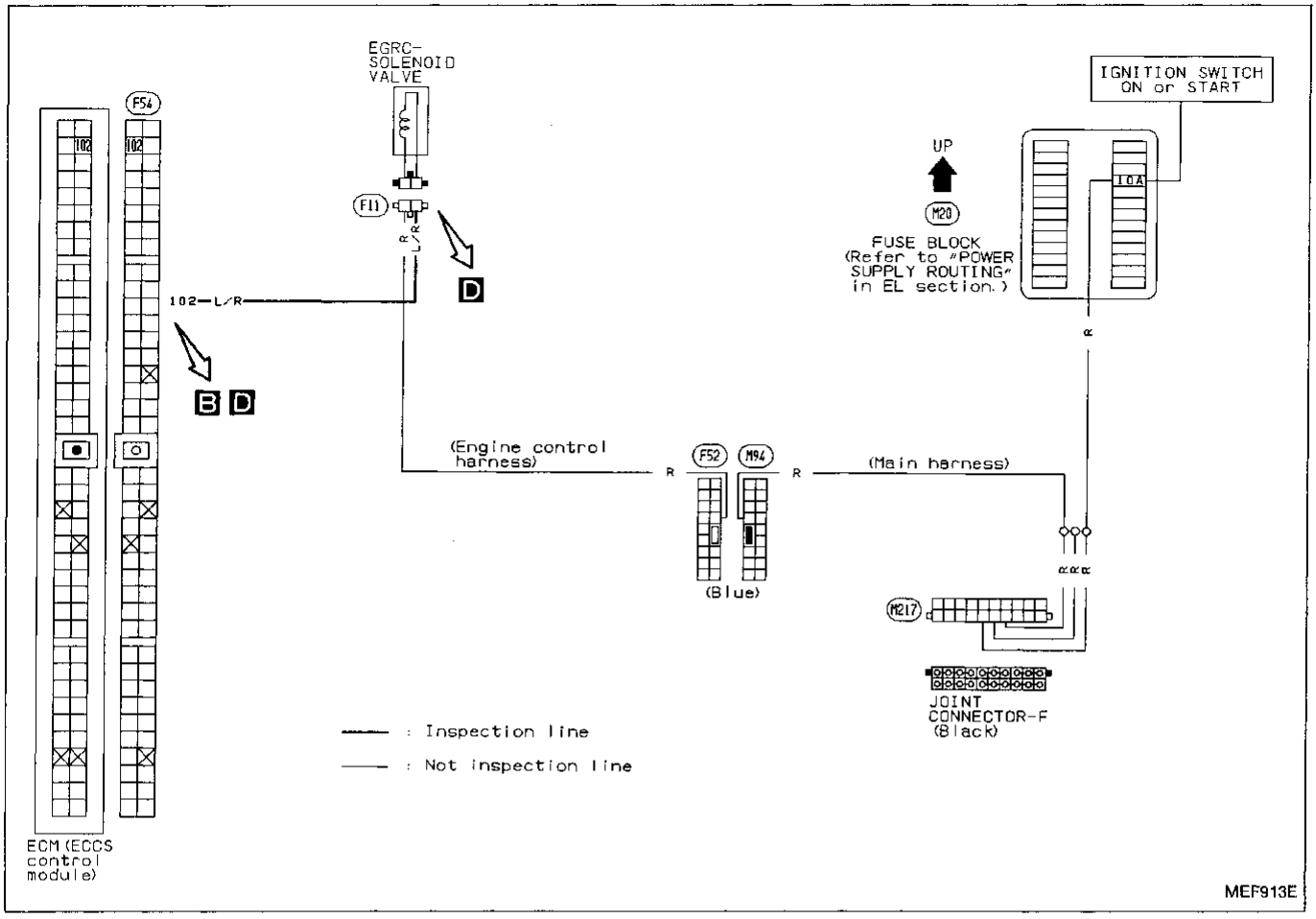
ECM (ECCS CONTROL MODULE) (Diagnostic trouble code No. 31)

CHECK (Malfunction indicator lamp item)

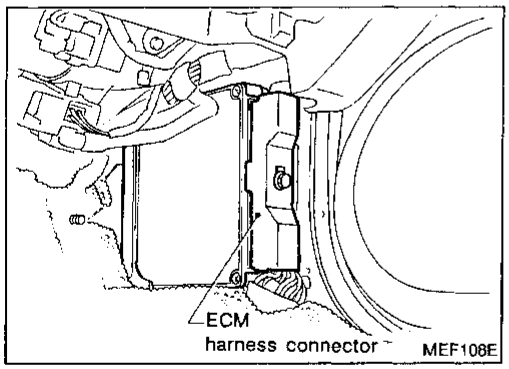


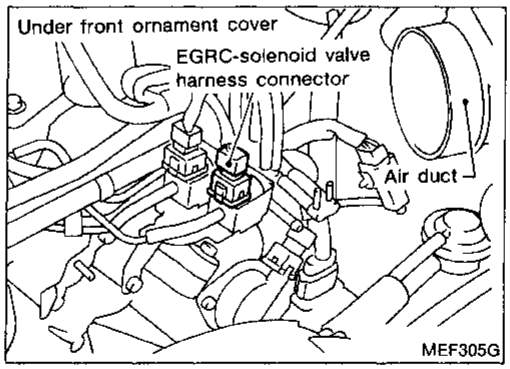
Diagnostic Procedure 9

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

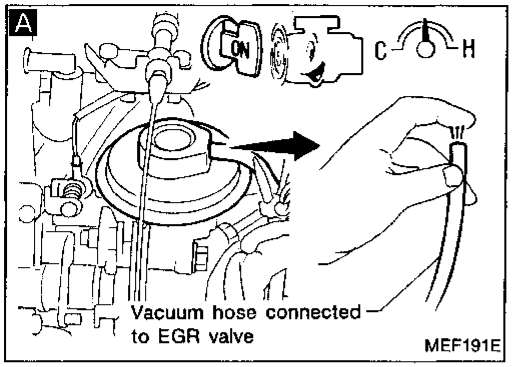


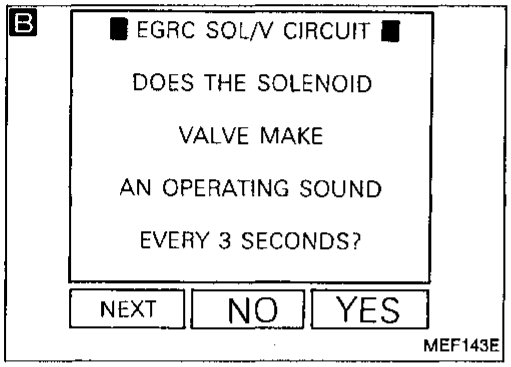
Harness layout

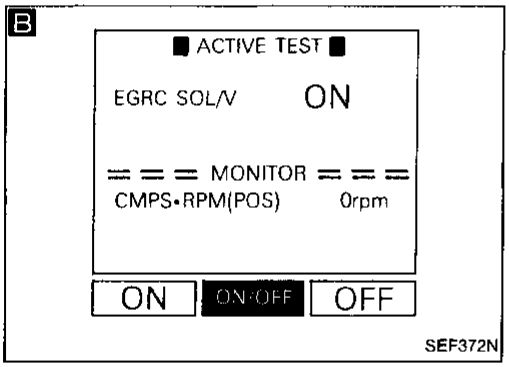


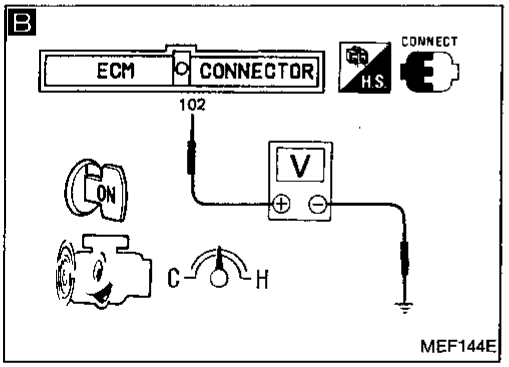


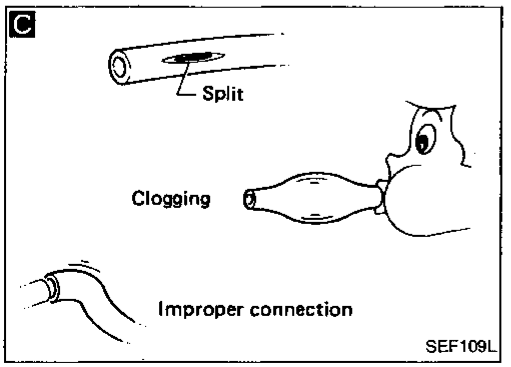
EGR FUNCTION (Diagnostic trouble code No. 32)
(Malfunction indicator lamp item)











INSPECTION START

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

OK → Go to "EGR CONTROL (Not self-diagnostic item)".

NG

A

CHECK VACUUM SOURCE TO EGR VALVE.
1) Start engine and warm it up sufficiently.
2) Perform diagnostic test mode II (Self-diagnostic results).
   Make sure that diagnostic trouble code No. 11 and 12 are not displayed.
3) Keep engine speed at about 2,000 rpm.
4) Disconnect vacuum hose to EGR valve.
5) Make sure that vacuum exists.
   Vacuum should exist.

OK → CHECK COMPONENTS (EGR valve, and EGRC-BPT valve).
Refer to "Electrical Components Inspection".
(See page EF & EC-217.)

NG → Replace malfunctioning component(s).

NG

B

CHECK CONTROL FUNCTION.

1) Stop engine.
2) Turn ignition switch "ON".
3) Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

1) Stop engine.
2) Turn ignition switch "ON".
3) Turn EGRC-solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.

OR

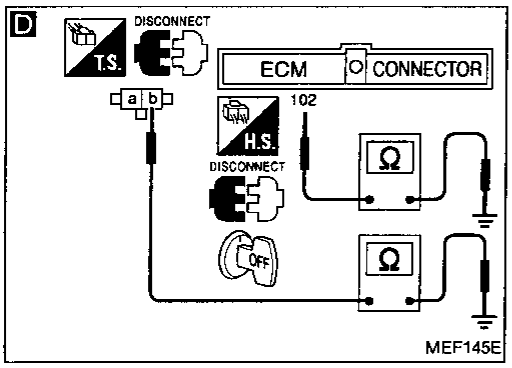
1) Check voltage between ECM terminal (102) and ground under the following conditions.
   Voltage:
   At idle
   Approximately 0V
   Engine speed is about 2,000 rpm.
   Battery voltage

OK → **C**

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

NG

Ⓐ



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

Ⓐ

D

CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
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 ↓

CHECK COMPONENT (EGRC-solenoid valve).
Refer to "Electrical Components Inspection". (See page EF & EC-217.)

NG → Replace EGRC-solenoid valve.

OK ↓

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

Trouble is not fixed. ↓

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

↓

Check resistance of EGR temperature sensor. (See page EF & EC-218.)

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

FINAL CHECK

↓

Erase the diagnostic test mode II (Self-diagnostic results) memory.

↓

Perform test drive.

↓

Perform diagnostic test mode II (Self-diagnostic results) again.

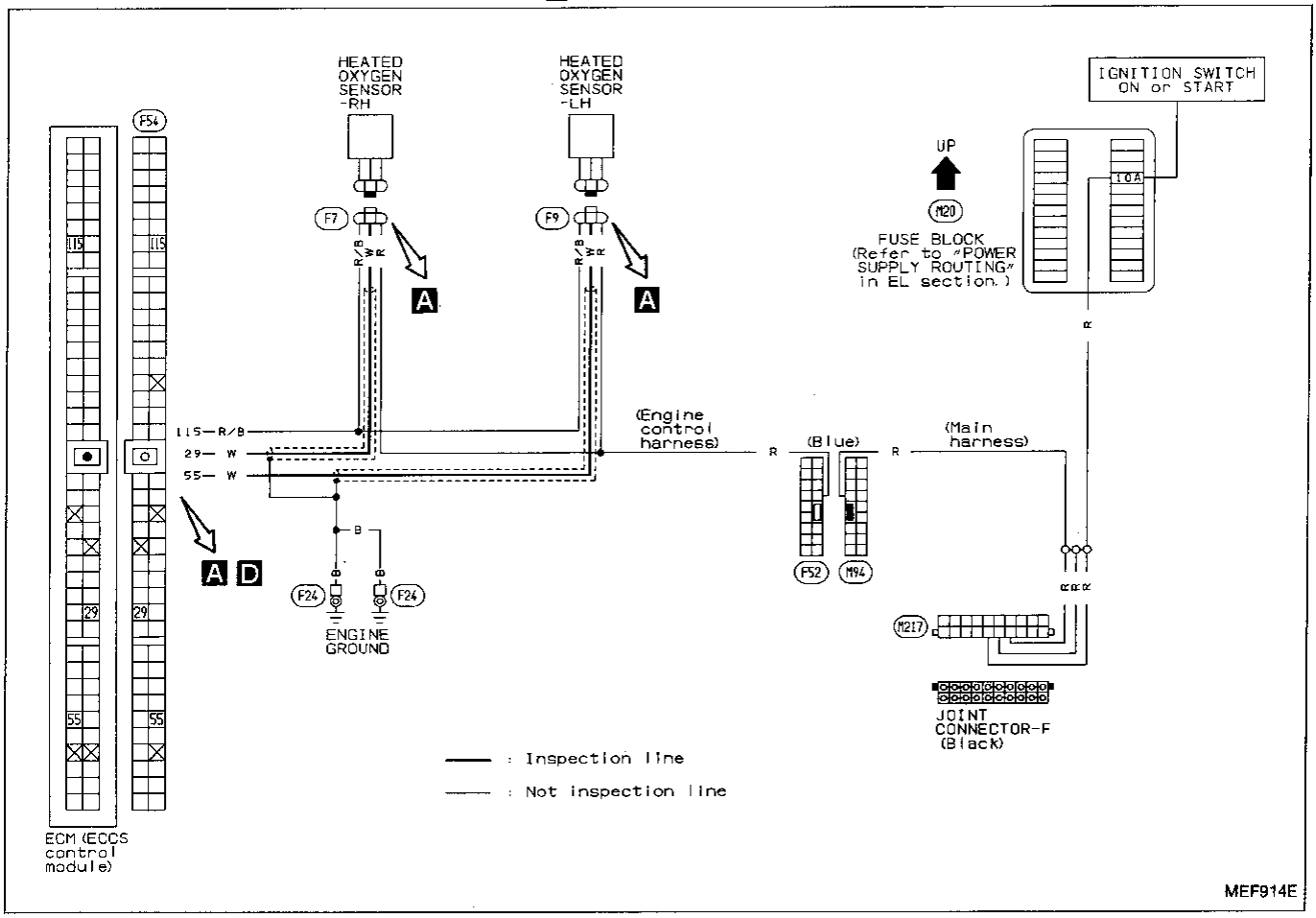
NG → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

OK ↓

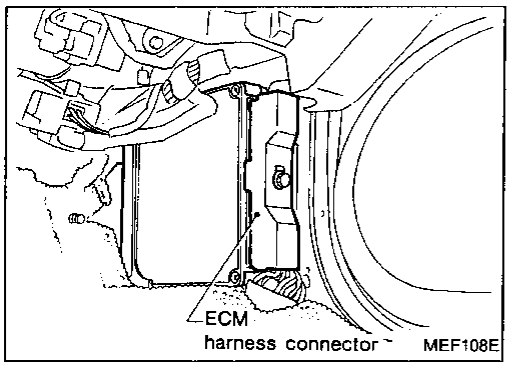
INSPECTION END

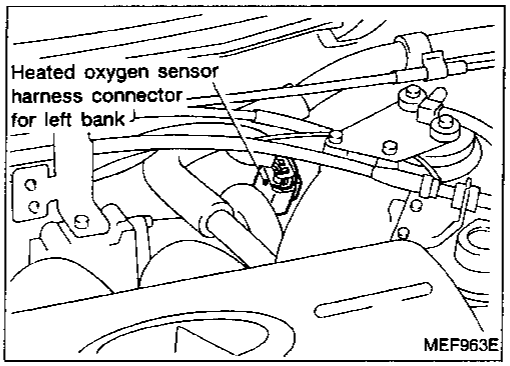
Diagnostic Procedure 10

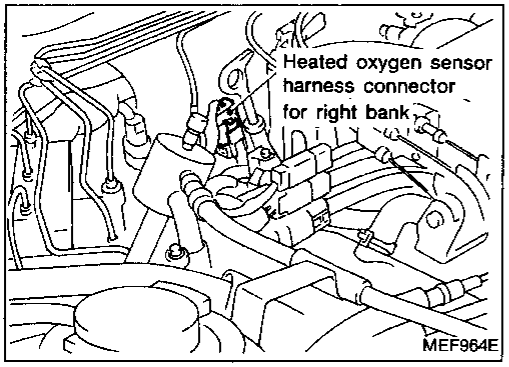
HEATED OXYGEN SENSOR LH (Diagnostic trouble code No. 33) HEATED OXYGEN SENSOR RH (Diagnostic trouble code No. 53) CHECK (Malfunction indicator lamp item)

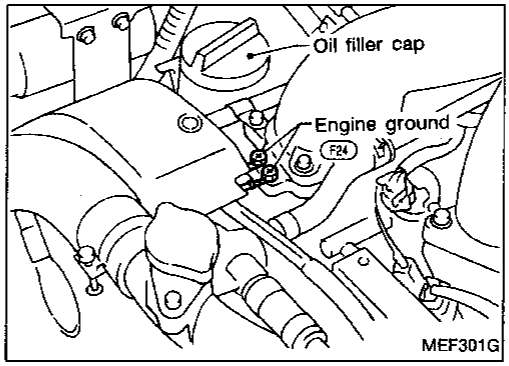


Harness layout

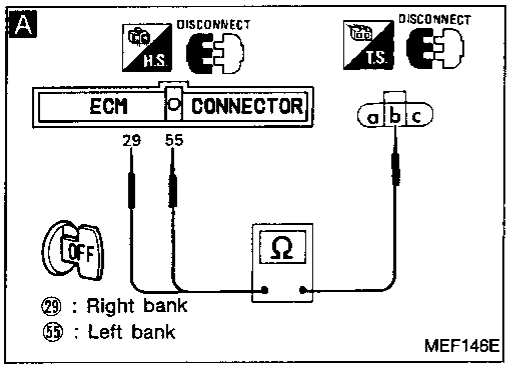


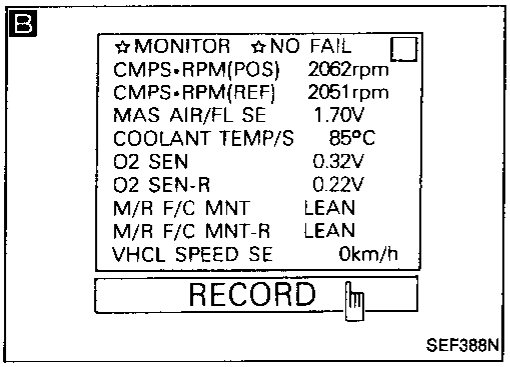


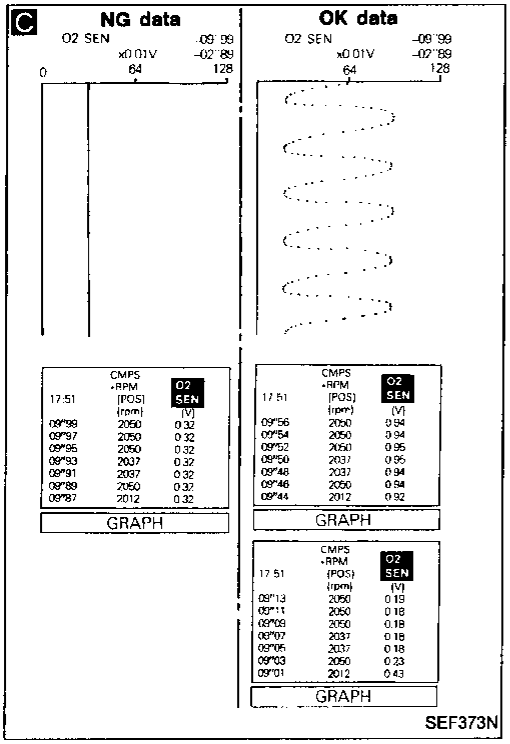


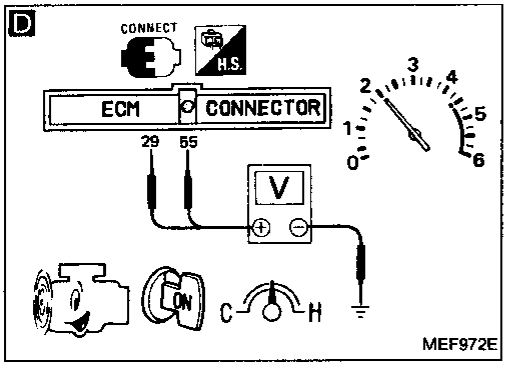


HEATED OXYGEN SENSOR LH (Diagnostic trouble code No. 33) HEATED OXYGEN SENSOR RH (Diagnostic trouble code No. 53) (CHECK) (Malfunction indicator lamp item)









INSPECTION START

CHECK OVERALL FUNCTION.
See page EF & EC-74.
OK → INSPECTION END

NG

A

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Loosen and retighten ground screws.
3) Disconnect heated oxygen sensor harness connector and ECM harness connector.
4) 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 "O2 SEN(-R)" voltage.
① **Approx. 0.3 volts (No voltage fluctuations) ... NG**
② **Other than ① above ... OK**

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 volts (No voltage fluctuations) ... NG**
② **Other than ① above ... OK**

NG → Replace heated oxygen sensor.

OK

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

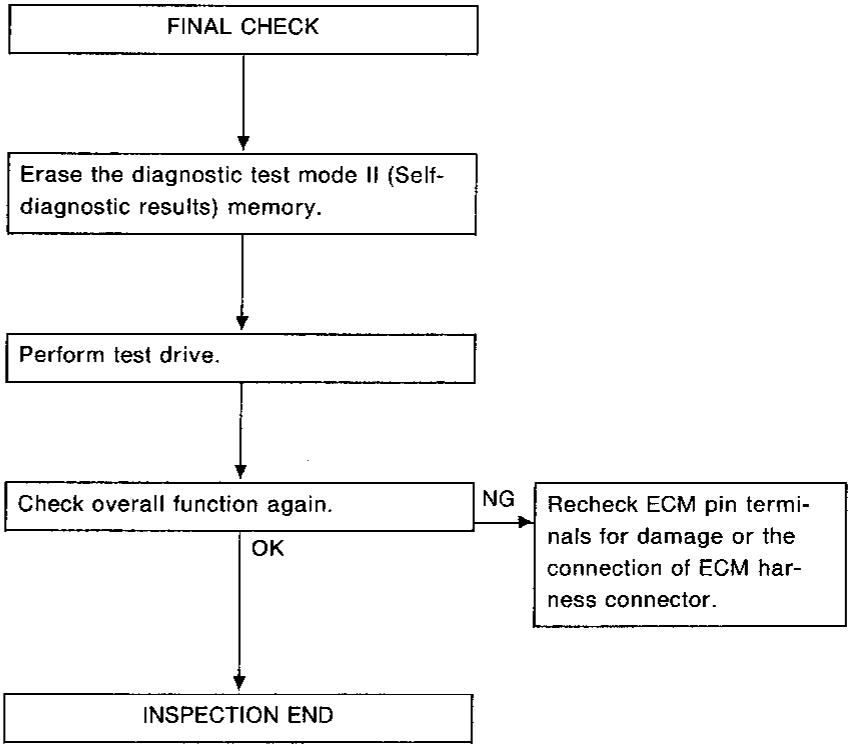
Trouble is not fixed.

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

HEATED OXYGEN SENSOR LH (Diagnostic trouble code No. 33) HEATED OXYGEN SENSOR RH (Diagnostic trouble code No. 53)

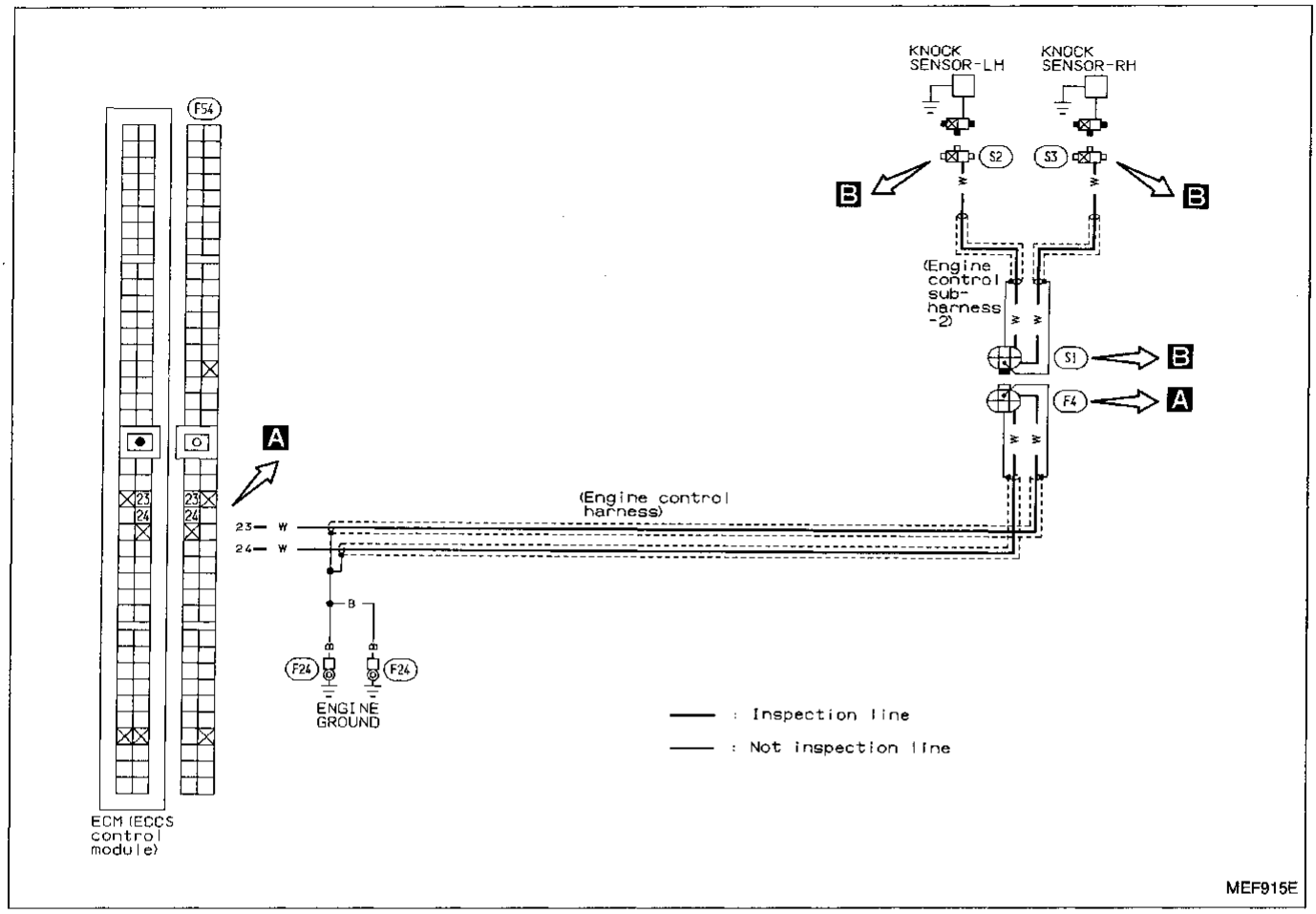
(Malfunction indicator lamp item)

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

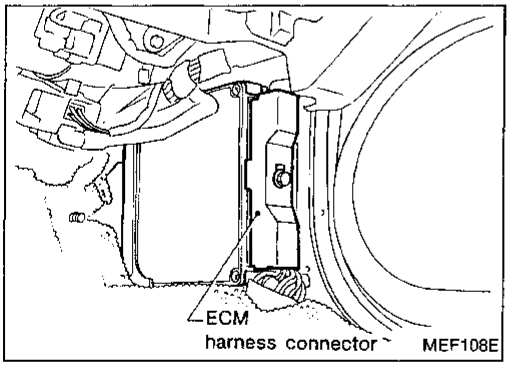


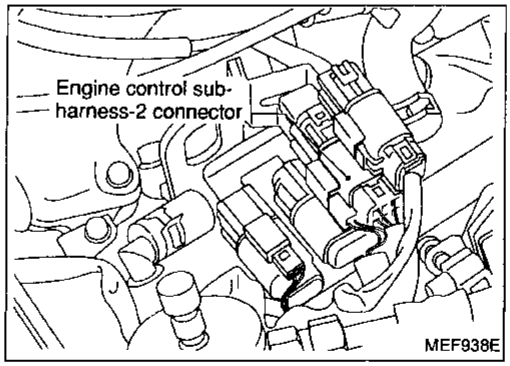
Diagnostic Procedure 11

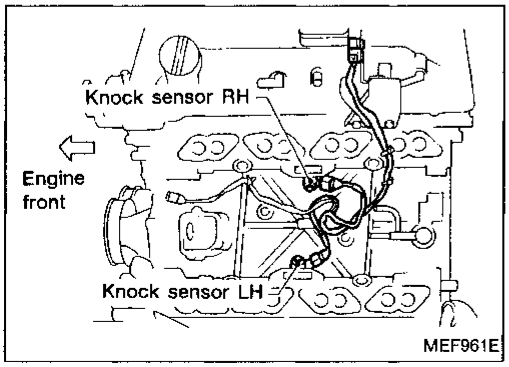
KNOCK SENSOR (Diagnostic trouble code No. 34)

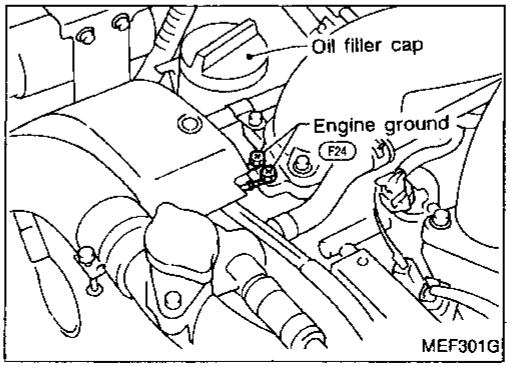


Harness layout

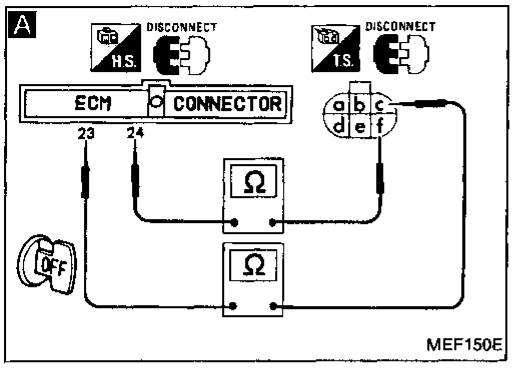


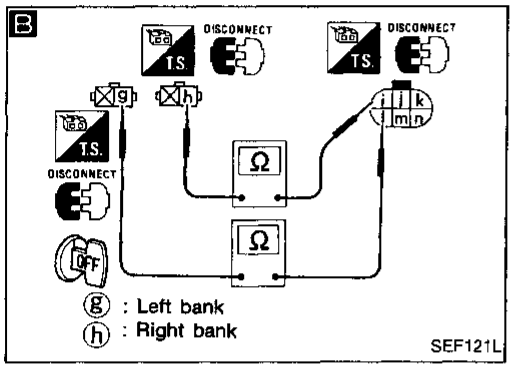






KNOCK SENSOR (Diagnostic trouble code No. 34)





INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-74.
- OK → INSPECTION END
- NG → A

A

CHECK INPUT SIGNAL CIRCUIT-I.
1) Turn ignition switch "OFF".
2) Loosen and retighten ground screws.
3) Disconnect ECM harness connector and engine control sub-harness-2 connector.
4) Check harness continuity between terminal ⓒ and ECM terminal ㉓, terminal ⓕ and ECM terminal ㉔.
Continuity should exist.
- NG → Repair harness or connectors.
- OK → B

B

CHECK INPUT SIGNAL CIRCUIT-II.
1) Disconnect knock sensor-LH & RH harness connectors.
2) Check harness continuity between the following terminals.
- ⓖ and ⓘ
- ⓗ and ⓙ

Continuity should exist.
- NG → Repair harness or connectors.
- OK →

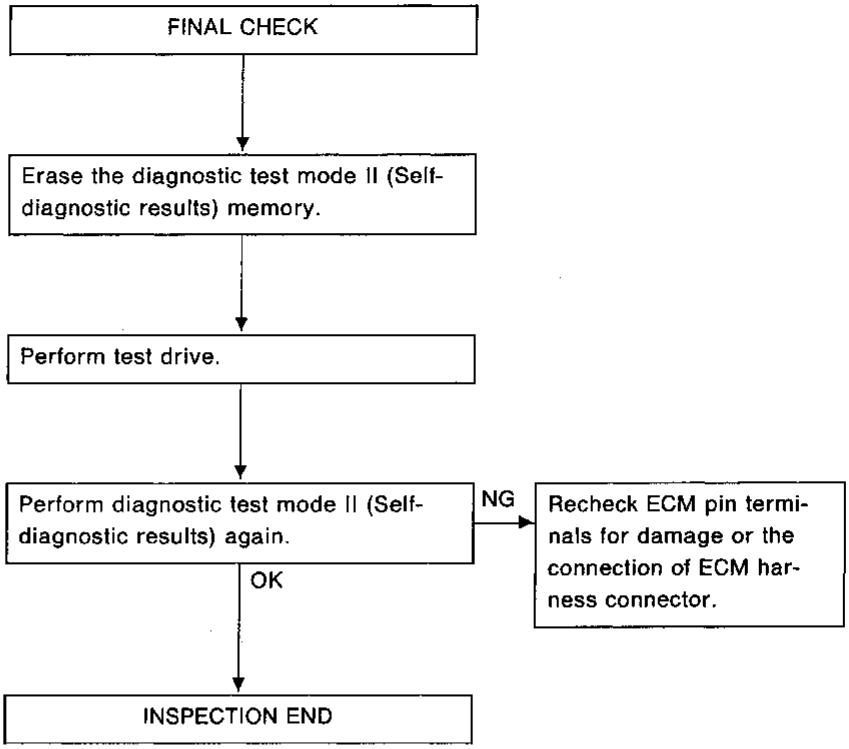
CHECK COMPONENT (Knock sensor). Refer to "Electrical Components Inspection". (See page EF & EC-220.)
- NG → Replace knock sensor.
- OK →

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)

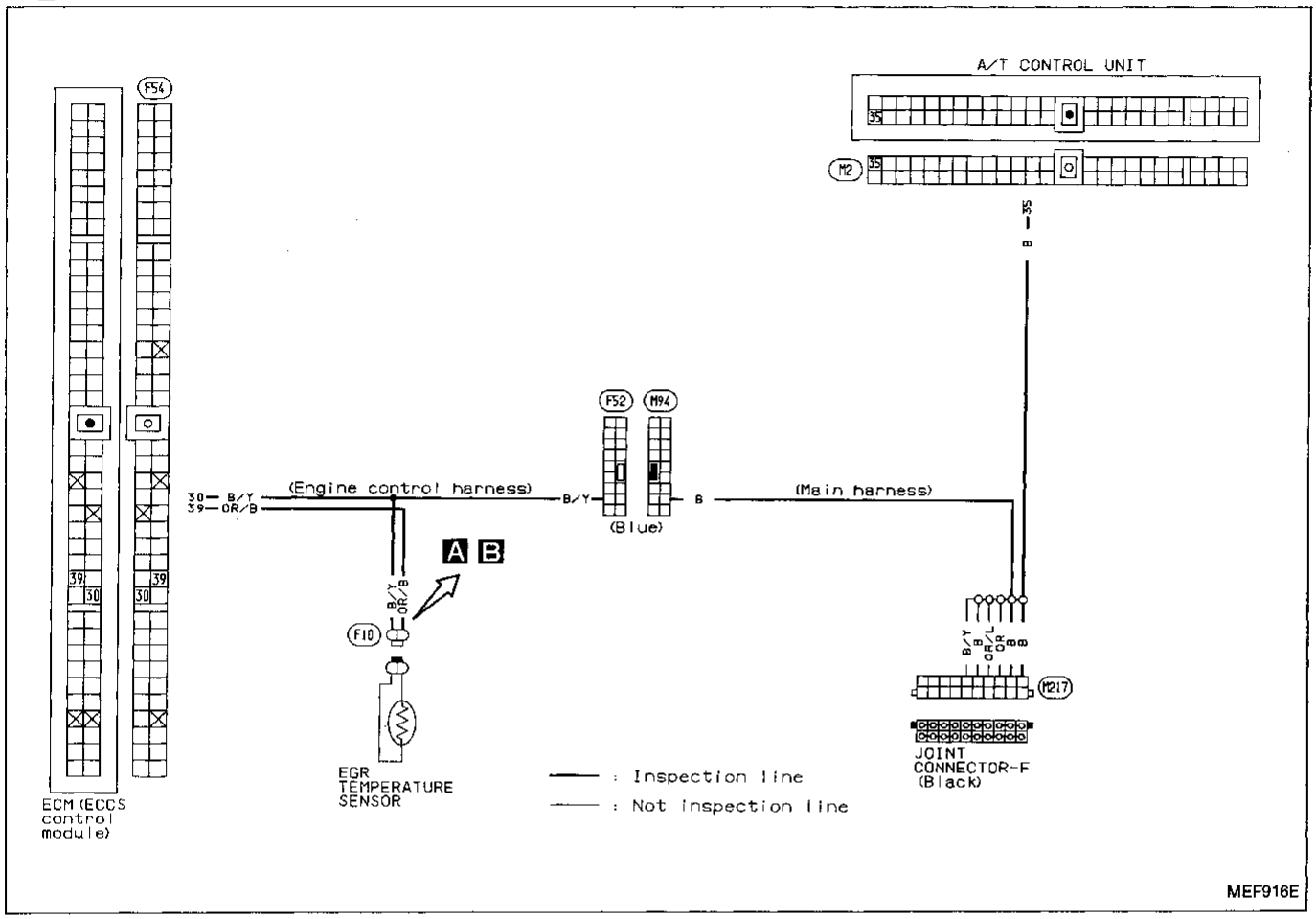
Perform FINAL CHECK by the following procedure after repair is completed.



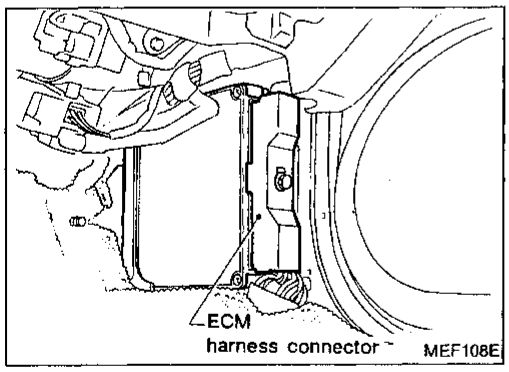
Diagnostic Procedure 12

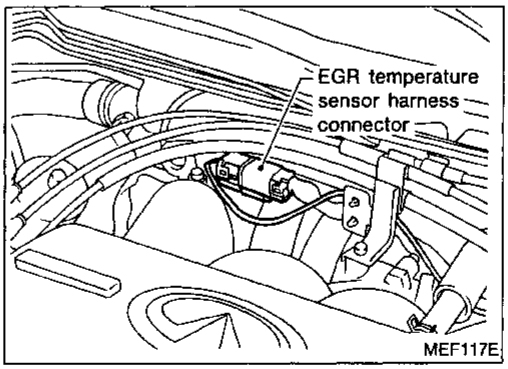
EGR TEMPERATURE SENSOR (Diagnostic trouble code No. 35)

CHECK (Malfunction indicator lamp item)

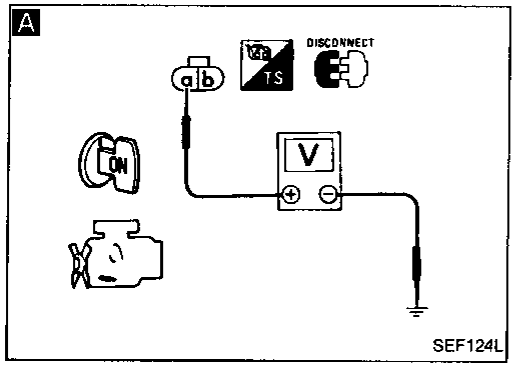


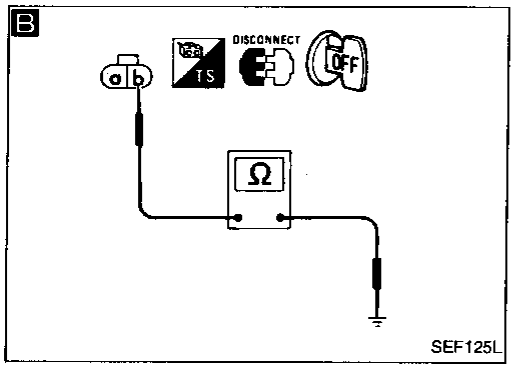
Harness layout





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





INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-75.
- OK → INSPECTION END
- NG → A

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

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 (F52), (M94)
  - Joint connector (M217)
  - 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-218.)
- NG → Replace EGR temperature sensor.
- OK →

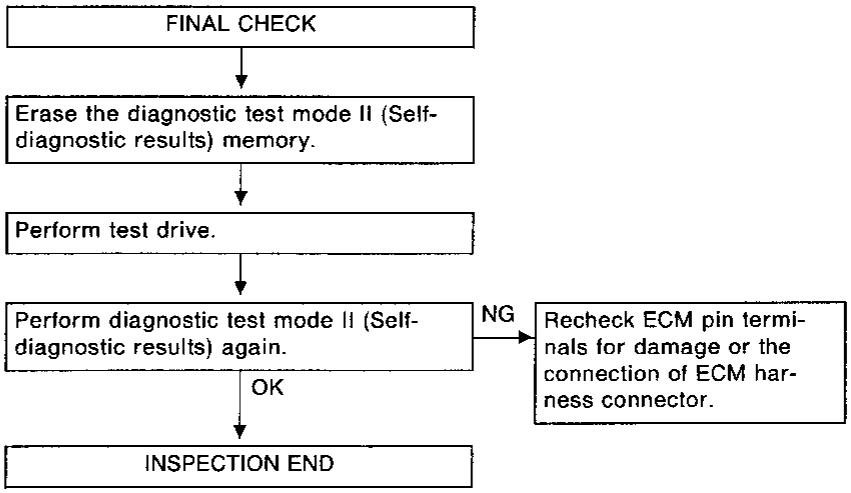
Disconnect and reconnect harness connectors in the circuit. Then retest.

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)

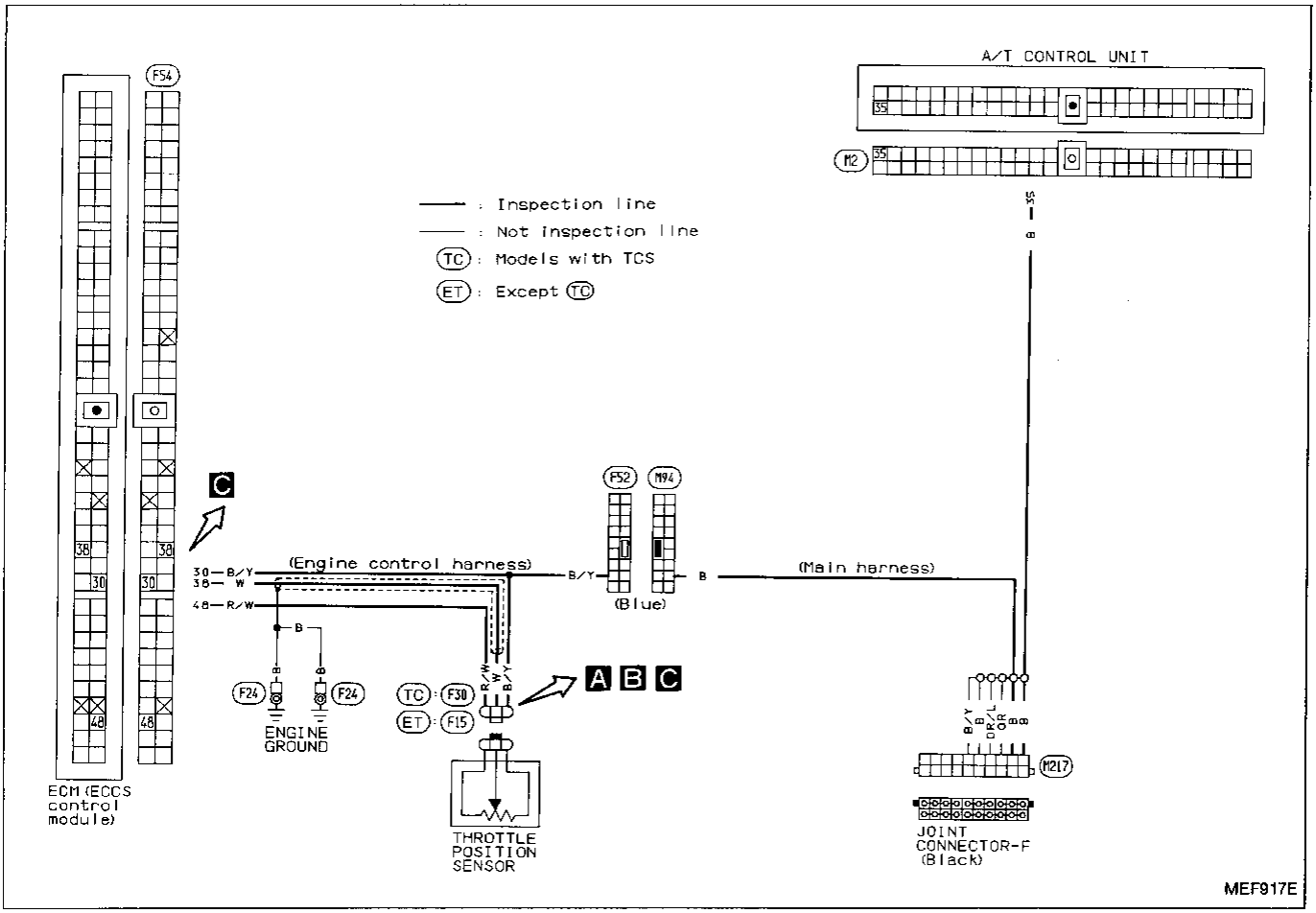
Perform FINAL CHECK by the following procedure after repair is completed.



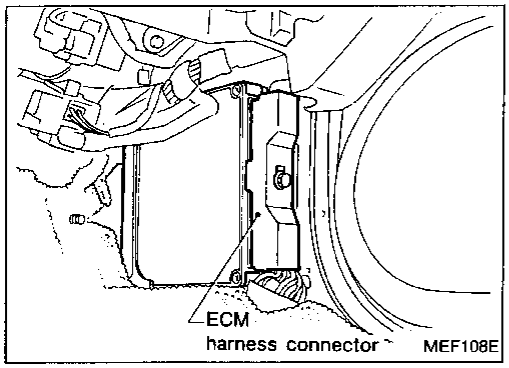
Diagnostic Procedure 13

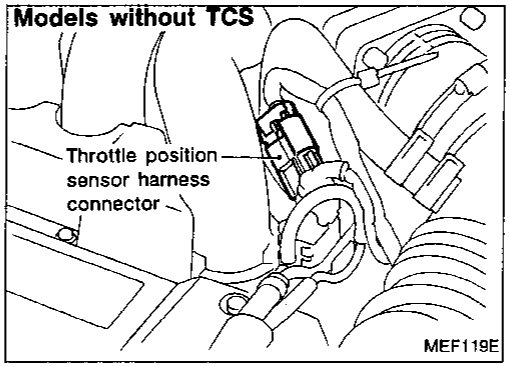
THROTTLE POSITION SENSOR (Diagnostic trouble code No. 43)

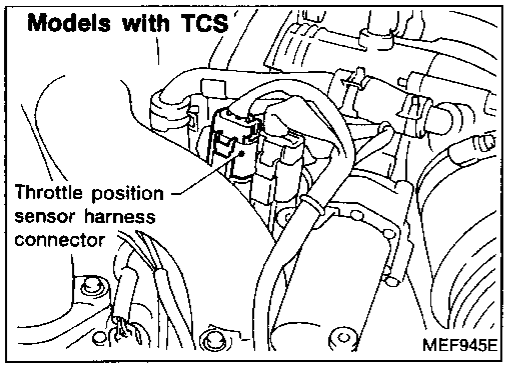
CHECK (Malfunction indicator lamp item)

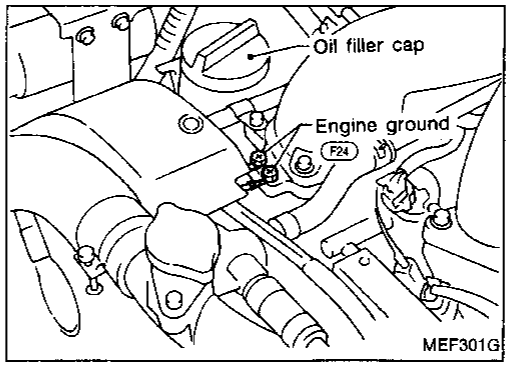


Harness layout

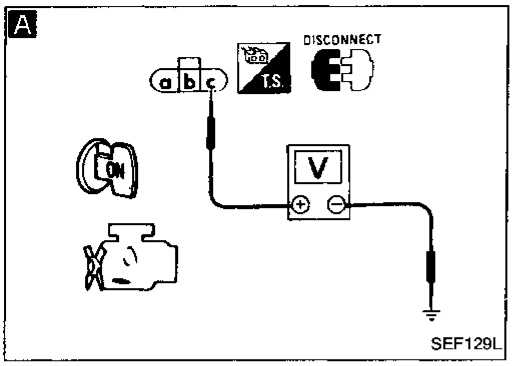


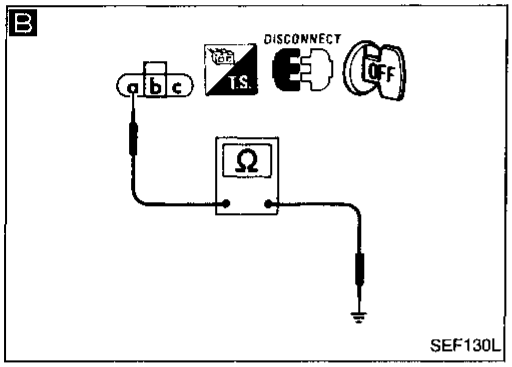


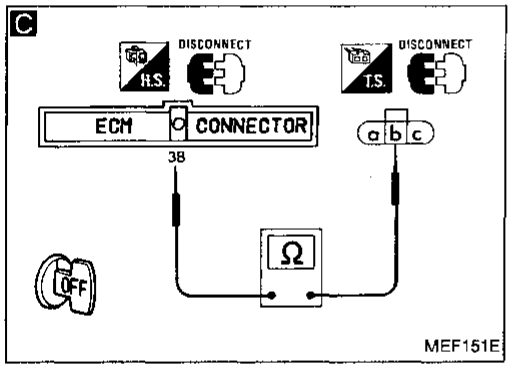




THROTTLE POSITION SENSOR (Diagnostic trouble code No. 43) (Malfunction indicator lamp item)







INSPECTION START

PERFORM DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS). See page EF & EC-75.
- 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 (F52), (M94)
  - Joint connector (M217)
  - Harness continuity between throttle position sensor and ECM
  - Harness continuity between throttle position sensor and A/T control unit

  If NG, repair harness or connectors.
- OK ↓

C

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal (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 ↓

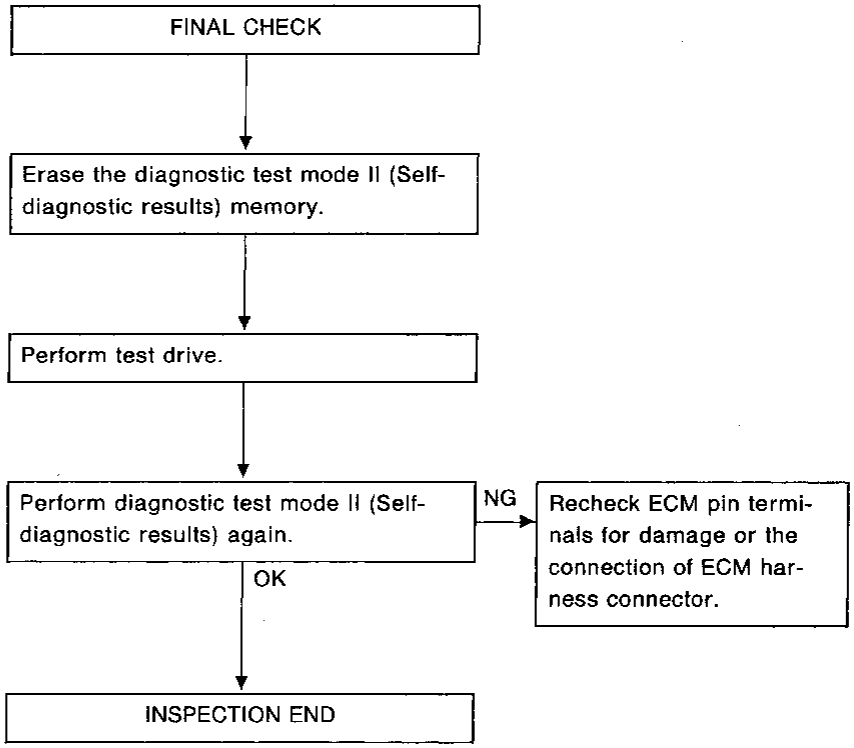
Disconnect and reconnect harness connectors in the circuit. Then retest.

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) CHECK (Malfunction indicator lamp item)

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



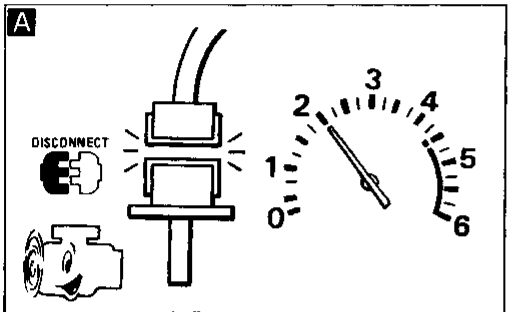
A

ACTIVE TEST	
SELF-LEAN CONTROL	100% R100%
MONITOR	
CMPS•RPM(POS)	650rpm
COOLAN TEMP/S	82°C
O2 SEN	0.16V
O2 SEN-R	0.17V
A/F ALPHA	92%
A/F ALPHA-R	96%

CLEAR

SEF374N

A



Mass air flow sensor

MEF012F

Diagnostic Procedure 14

INJECTOR LEAK (Diagnostic trouble code No. 45)

(CHECK) (Malfunction indicator lamp item)

INSPECTION START

A

Clear the self-learning data.
1) Start engine and warm it up sufficiently.
2) Select "SELF-LEAN CONTROL" 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 (self-diagnostic results).
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 (self-diagnostic results).

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

OK → INSPECTION END

NG

Remove injector assembly. (See page EF & EC-227.) 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 circuit. Then retest.

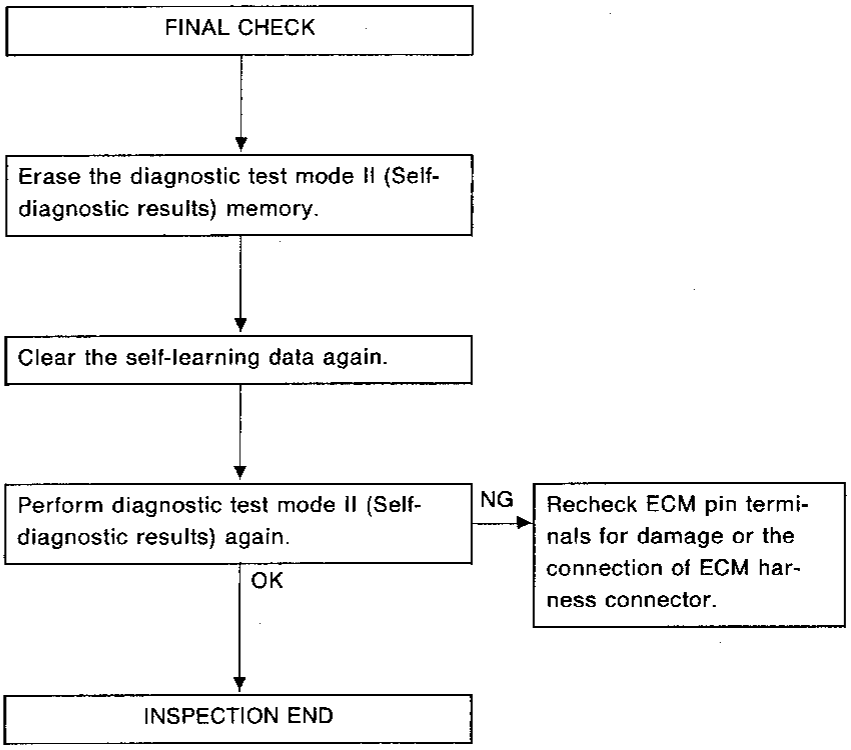
Trouble is not fixed.

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)

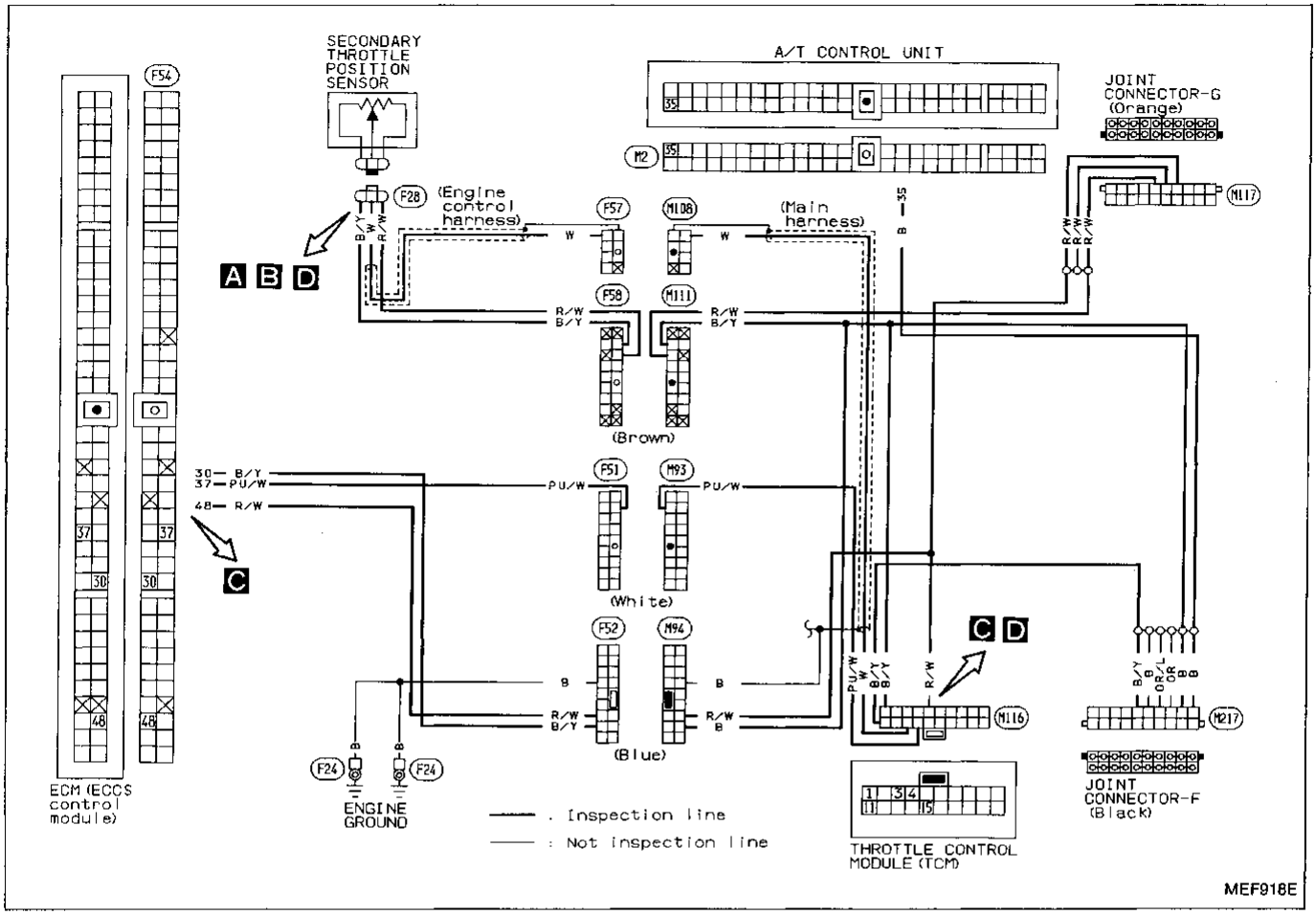
CHECK (Malfunction indicator lamp item)

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

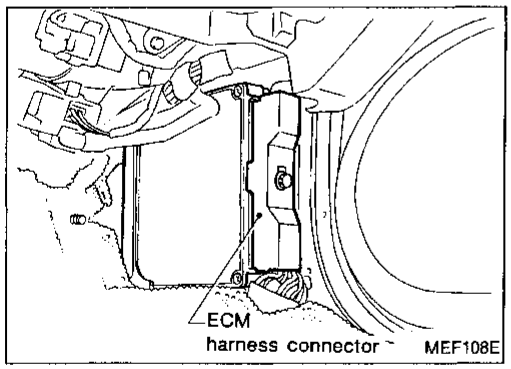


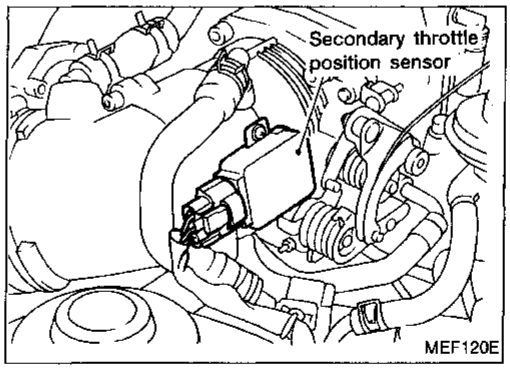
Diagnostic Procedure 15

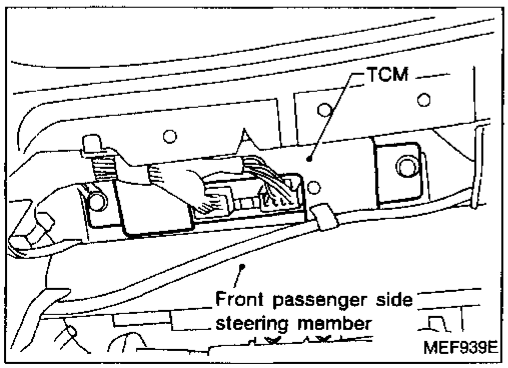
SECONDARY THROTTLE POSITION SENSOR (Diagnostic trouble code No. 46): TCS models

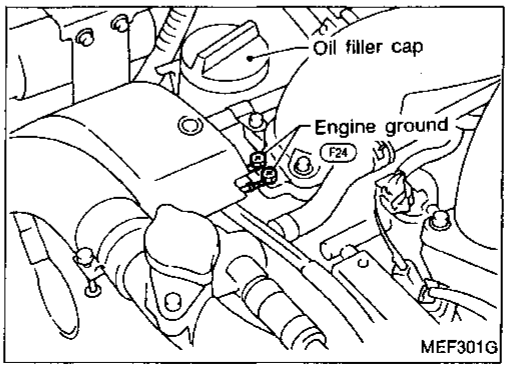


Harness layout

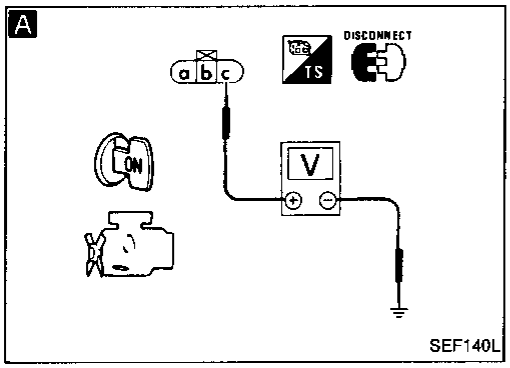


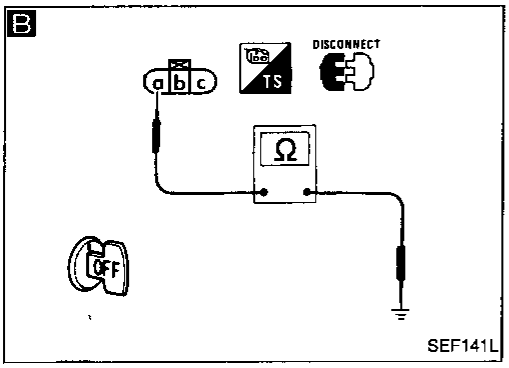


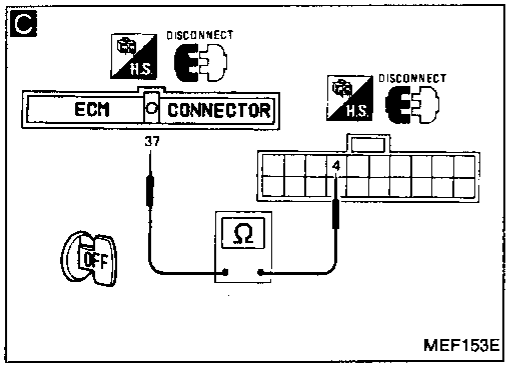




SECONDARY THROTTLE POSITION SENSOR (Diagnostic trouble code No. 46): TCS models







INSPECTION START

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

OK → INSPECTION END

NG

A

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect secondary 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 → Check the following.
- Harness connectors (F58), (M111)
- Harness connectors (M94), (F52)
- Joint connector (M117)
- Harness continuity between secondary throttle position sensor and ECM

If 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 ground.
Continuity should exist.

NG → Check the following.
- Harness connectors (F58), (M111)
- Harness connectors (M94), (F52)
- Joint connector (M217)
- Harness continuity between secondary throttle position sensor and ECM
- Harness continuity between secondary throttle position sensor and A/T control unit
- Harness continuity between secondary throttle position sensor and TCM

If NG, repair harness or connectors.

OK

C

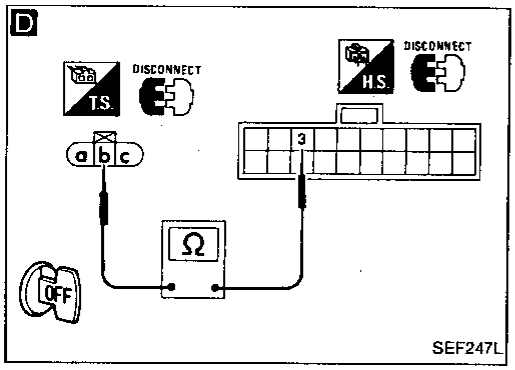
CHECK INPUT SIGNAL CIRCUIT-I.
1) Disconnect ECM harness connector and TCM harness connector.
2) Check harness continuity between ECM terminal (37) and TCM terminal ④.
Continuity should exist.

NG → Check the following.
- Harness connectors (F51), (M93)
- Harness continuity between ECM and TCM

If NG, repair harness or connectors.

OK

Ⓐ



SECONDARY THROTTLE POSITION SENSOR (Diagnostic trouble code No. 46): TCS models

Ⓐ

D

CHECK INPUT SIGNAL CIRCUIT-II.
1) Check harness continuity between TCM terminal ③ and terminal ⓑ.
Continuity should exist.

NG → Check the following.
- Harness connectors (F57), (M108)
- Harness continuity between TCM and secondary throttle position sensor.

If NG, repair harness or connectors.

OK ↓

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

NG → Replace secondary throttle position sensor.

OK ↓

CHECK TCM FUNCTION.
Make sure that TCM functions properly. (Refer to "Self-diagnoses for TCM" of "TROUBLE DIAGNOSES FOR TCS" in BR section.)

NG → Replace TCM.

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 ↓

Erase the diagnostic test mode II (Self-diagnostic results) memory. ↓

Perform test drive. ↓

Perform diagnostic test mode II (Self-diagnostic results) again.

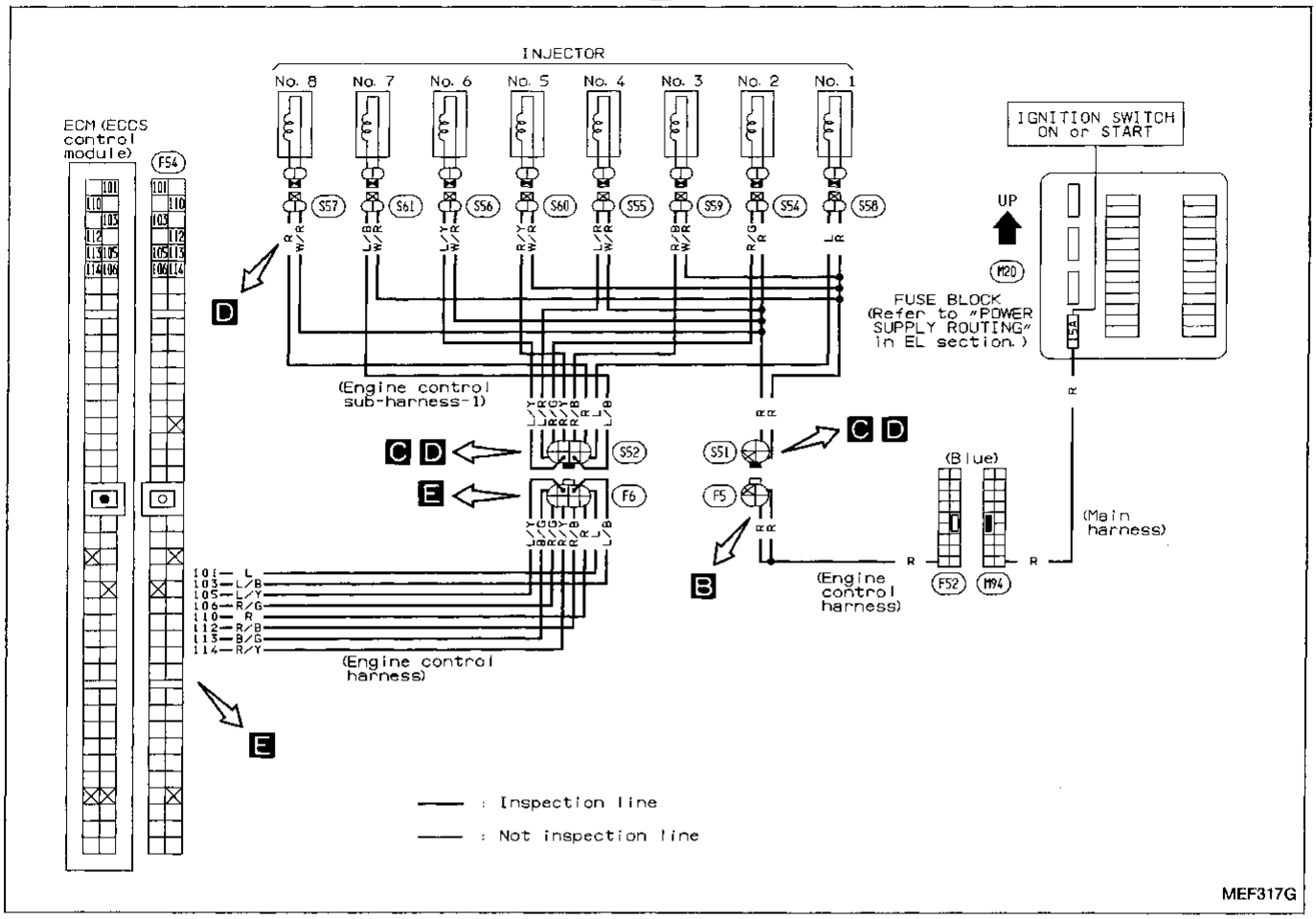
NG → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

OK ↓

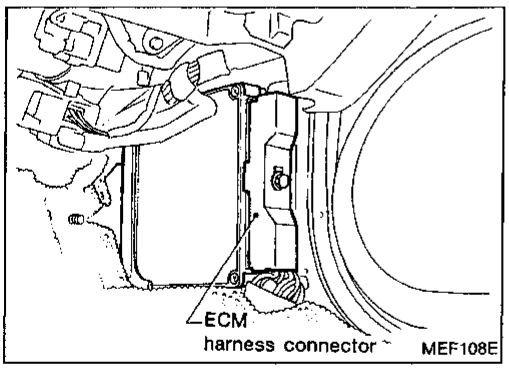
INSPECTION END

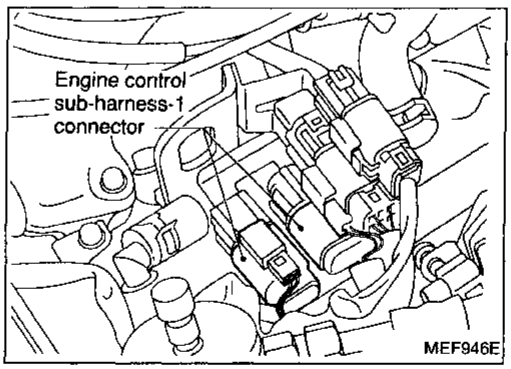
Diagnostic Procedure 16

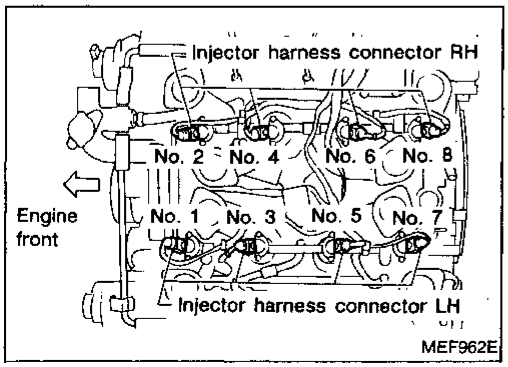
INJECTOR (Diagnostic trouble code No. 51) CHECK (Malfunction indicator lamp item)



Harness layout

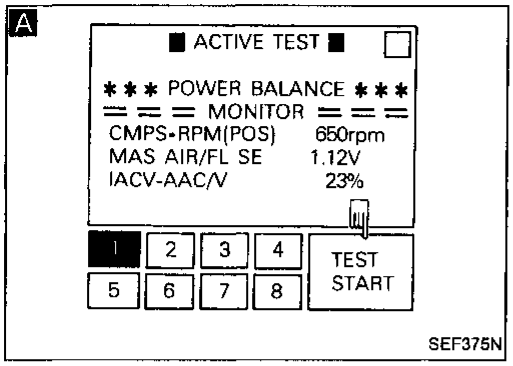






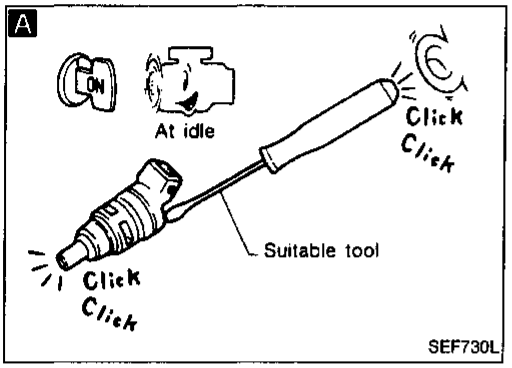
INJECTOR (Diagnostic trouble code No. 51)
(Malfunction indicator lamp item)

A



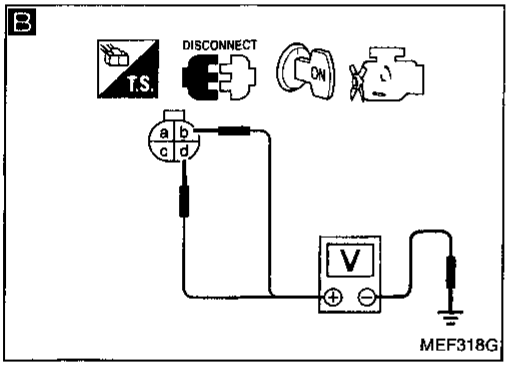
SEF375N

A



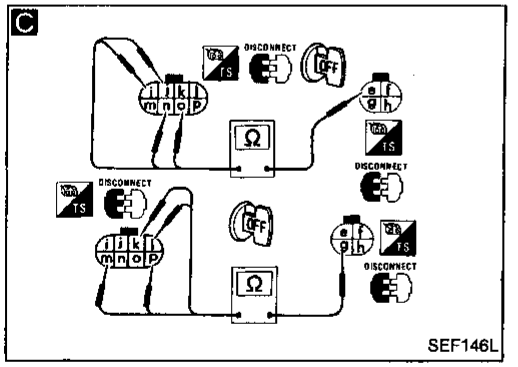
SEF730L

B



MEF318G

C



SEF146L

INSPECTION START

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

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) 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.

Case 1:
When either cylinders Nos. 1, 3, 5 and 7 or Nos. 2, 4, 6 and 8 are all NG.

B

CHECK POWER SUPPLY-I.
1) Turn ignition switch "OFF".
2) Disconnect engine control sub-harness-1 connector (F5).
3) Turn ignition switch "ON".
4) Check voltage between terminals ⓑ, ⓓ and ground with CONSULT or tester.
Voltage: Battery voltage

OK

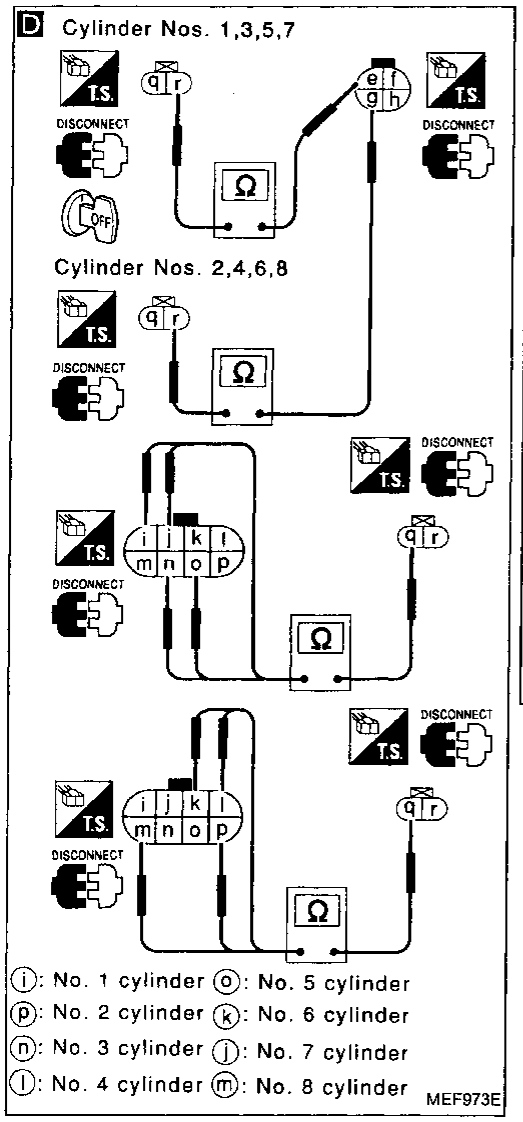
NG

Check the following.
- Harness connectors (F52), (M94)
- Harness continuity between engine control sub-harness-1 connector (F5) and harness connector (F52)

If NG, repair harness or connectors.

Case 2:
Except case 1

Ⓐ



INJECTOR (Diagnostic trouble code No. 51)

CHECK (Malfunction indicator lamp item)

Ⓐ

C

CHECK POWER SUPPLY-II.
1) Turn ignition switch "OFF".
2) Disconnect engine control sub-harness-1 connectors.
3) Check circuit continuity between the following terminals.
- ⓔ and ⓘ
- ⓔ and ⓙ
- ⓔ and ⓝ
- ⓔ and ⓞ
- ⓖ and ⓚ
- ⓖ and ⓛ
- ⓖ and ⓜ
- ⓖ and ⓟ

Continuity should exist.

NG → **D**

Check the following.
1) Disconnect injector harness connectors.
2) Check harness continuity between the following terminals.
- ⓔ and ⓡ
- ⓖ and ⓡ
- ⓘ and ⓠ
- ⓛ and ⓠ
- ⓚ and ⓠ
- ⓛ and ⓠ
- ⓜ and ⓠ
- ⓝ and ⓠ
- ⓞ and ⓠ
- ⓟ and ⓠ

Continuity should exist.

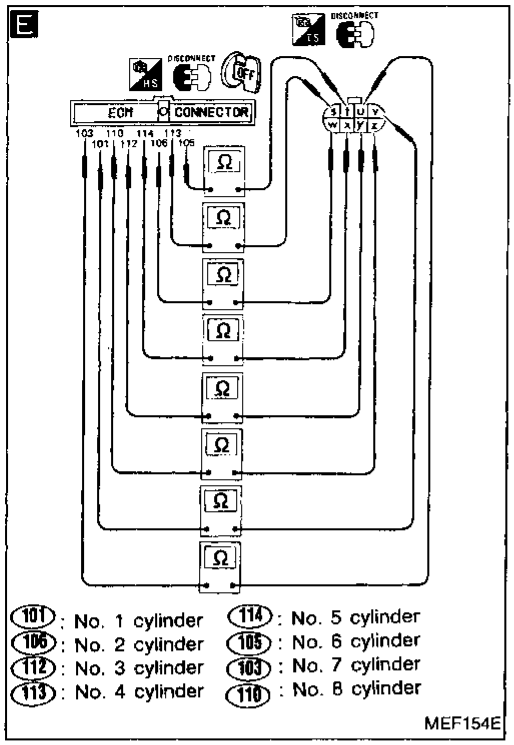
If NG, repair harness or connectors.

OK

CHECK COMPONENT (Injector).
Refer to "Electrical Components Inspection".
(See page EF & EC-220.)
If NG, replace injector.

OK

Ⓑ



INJECTOR (Diagnostic trouble code No. 51)

(CHECK) (Malfunction indicator lamp item)

Ⓑ

E

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check continuity between the following terminals.
- Ⓢ and 113
- Ⓣ and 105
- Ⓤ and 103
- Ⓥ and 101
- Ⓦ and 106
- Ⓧ and 114
- Ⓨ and 112
- Ⓩ and 110

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 ↓

Erase the diagnostic test mode II (Self-diagnostic results) memory. ↓

Perform test drive. ↓

Perform diagnostic test mode II (Self-diagnostic results) again.

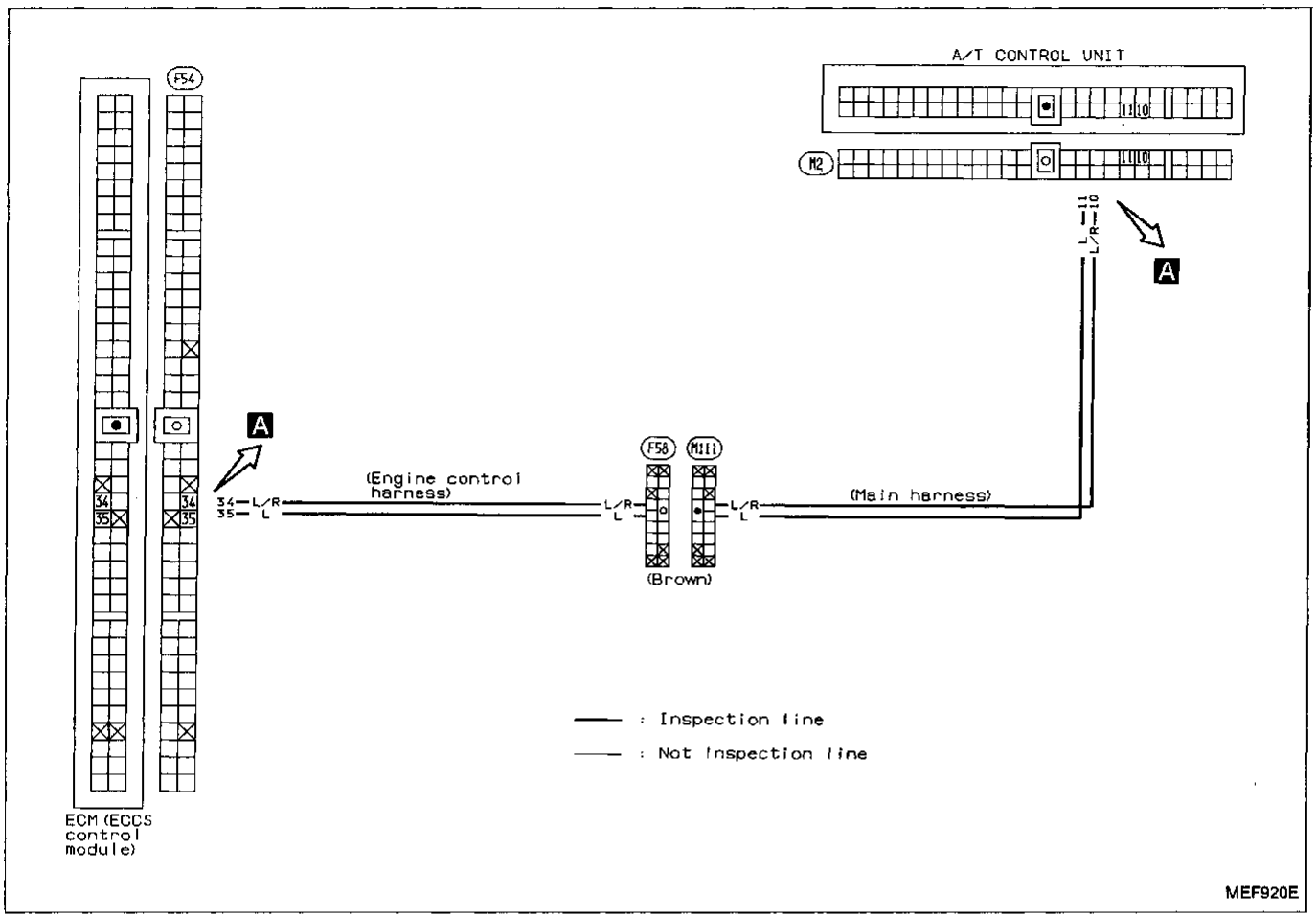
NG → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

OK ↓

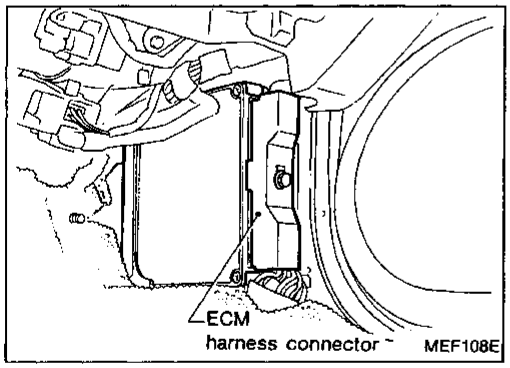
INSPECTION END

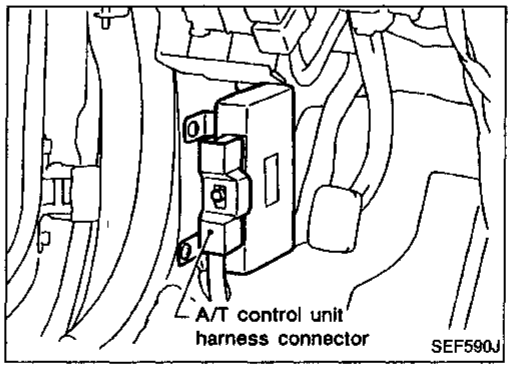
Diagnostic Procedure 17

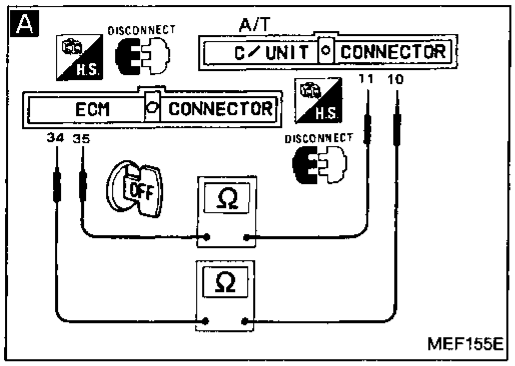
A/T CONTROL (Diagnostic trouble code No. 54)



Harness layout







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

INSPECTION START

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

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 ㉞ and terminal ⑩, ECM terminal ㉟ and terminal ⑪.
Continuity should exist.

NG → Check the following.
- Harness connectors (F58), (M111)
- 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

Erase the diagnostic test mode II (Self-diagnostic results) memory.

Perform test drive.

Perform diagnostic test mode II (Self-diagnostic results) again.

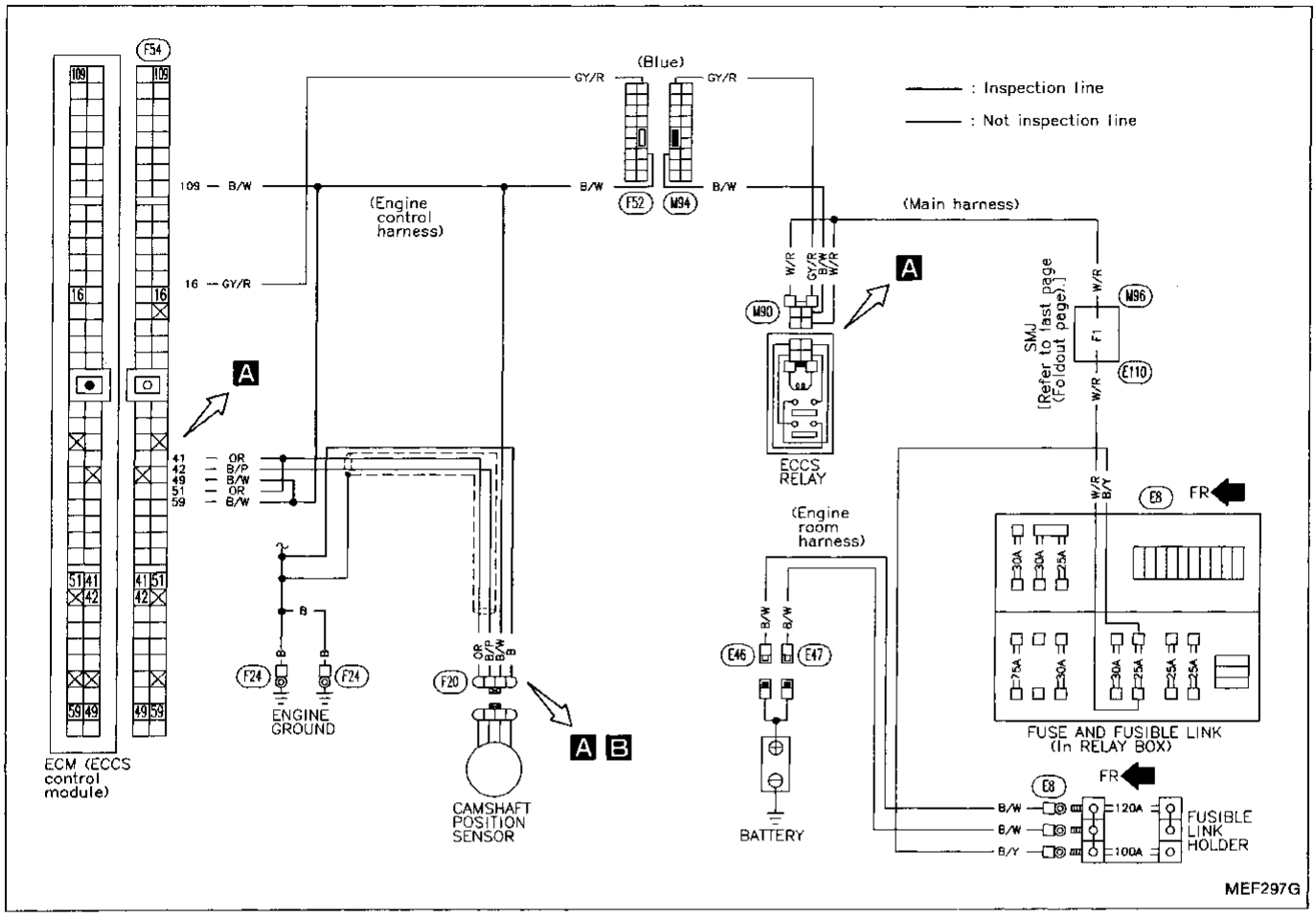
NG → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

OK

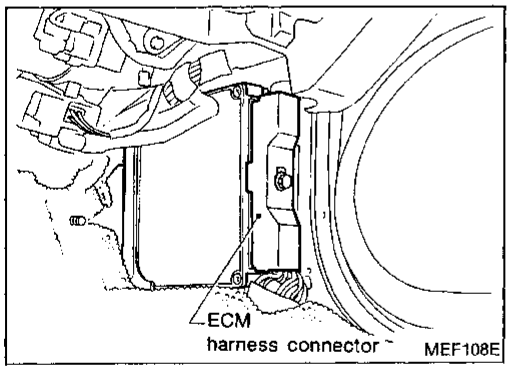
INSPECTION END

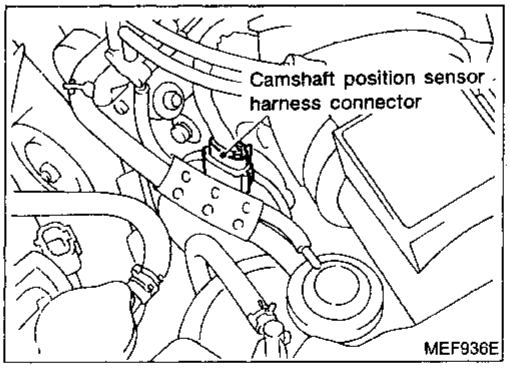
Diagnostic Procedure 18

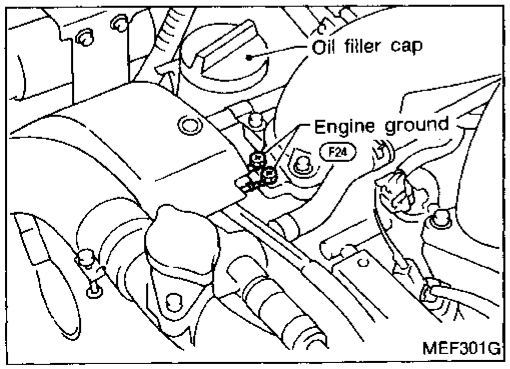
CAMSHAFT POSITION SENSOR (Not self-diagnostic item)



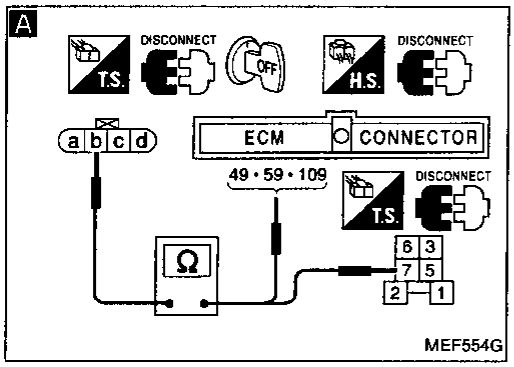
Harness layout

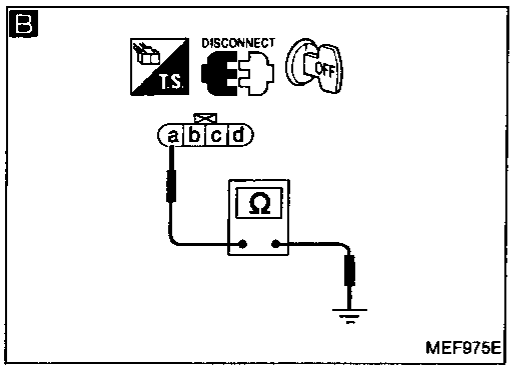






CAMSHAFT POSITION SENSOR (Not self-diagnostic item)





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 → Check the following.
- Harness connectors (F52), (M94)
- Harness continuity between camshaft position sensor and ECCS relay
- Harness continuity between camshaft position sensor and ECM

If 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 → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(Camshaft position sensor).
Refer to "Electrical Components Inspection". (See page EF & EC-213.)

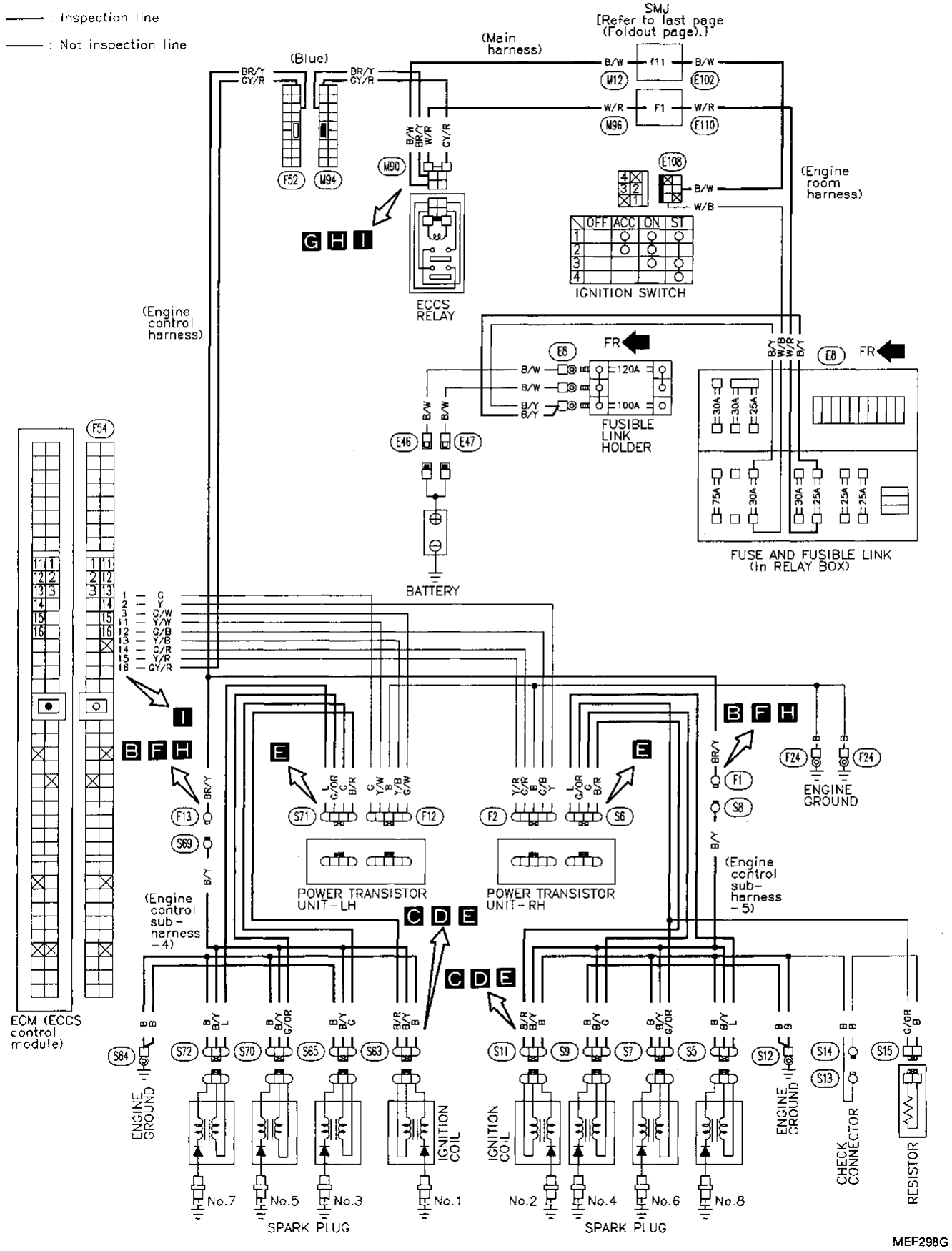
NG → Replace camshaft position sensor.

OK ↓

INSPECTION END

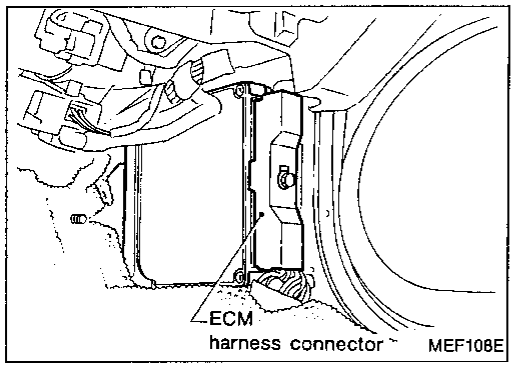
Diagnostic Procedure 19

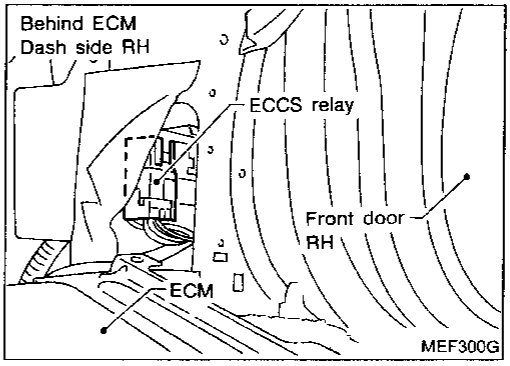
IGNITION SIGNAL (Not self-diagnostic item)

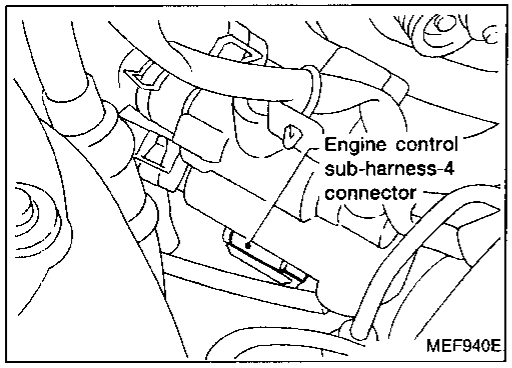


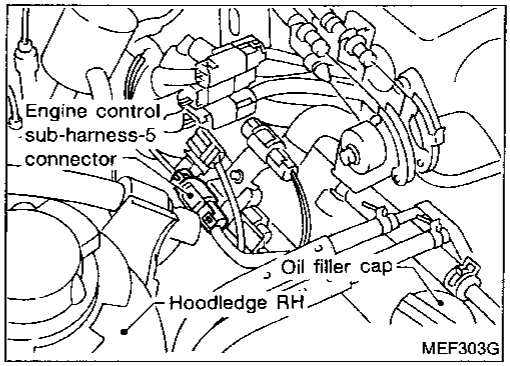
IGNITION SIGNAL (Not self-diagnostic item)

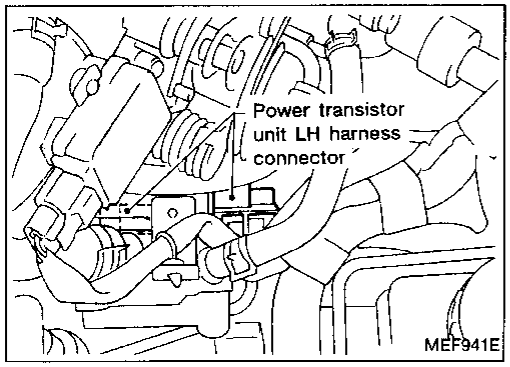
Harness layout

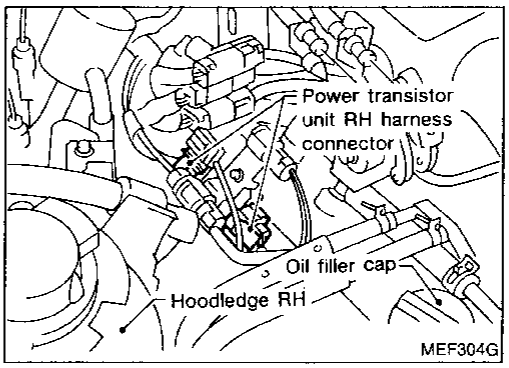


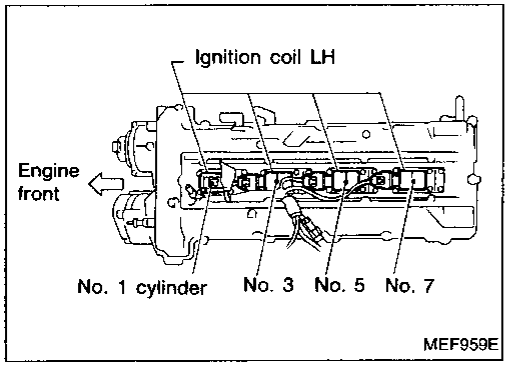


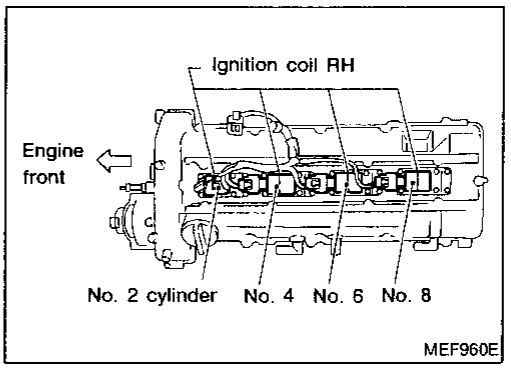




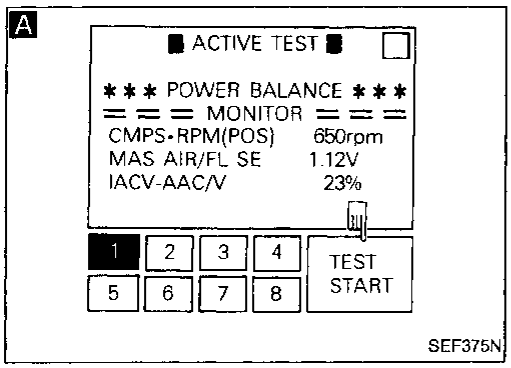


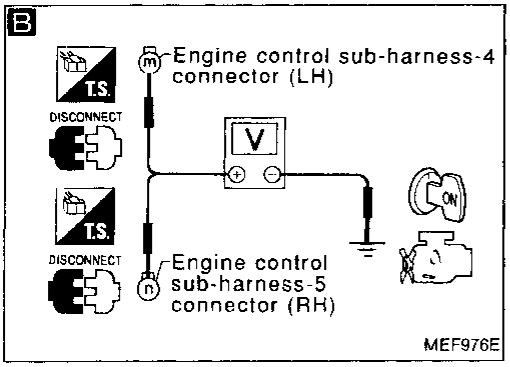


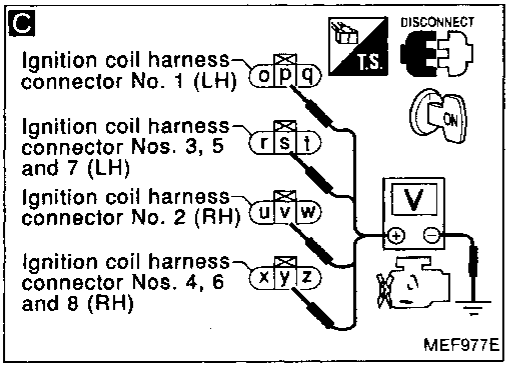


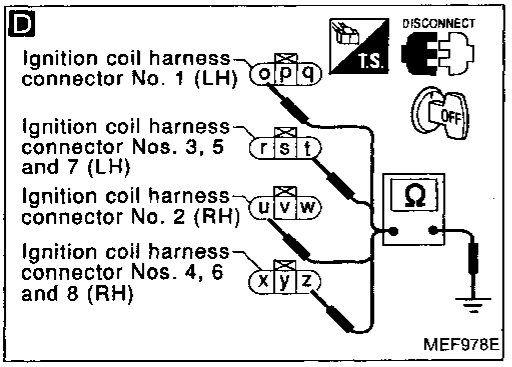


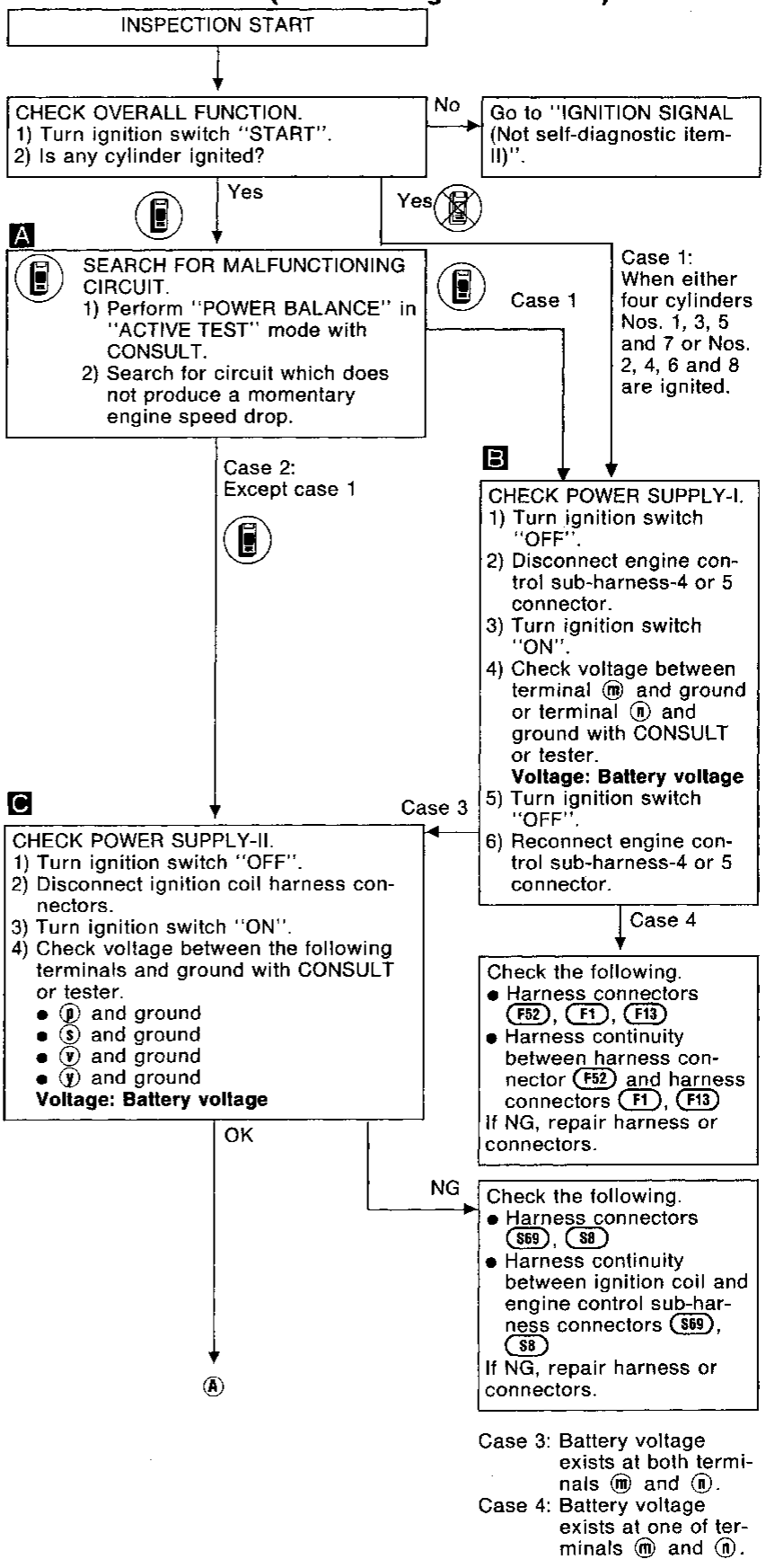
IGNITION SIGNAL (Not self-diagnostic item-I)



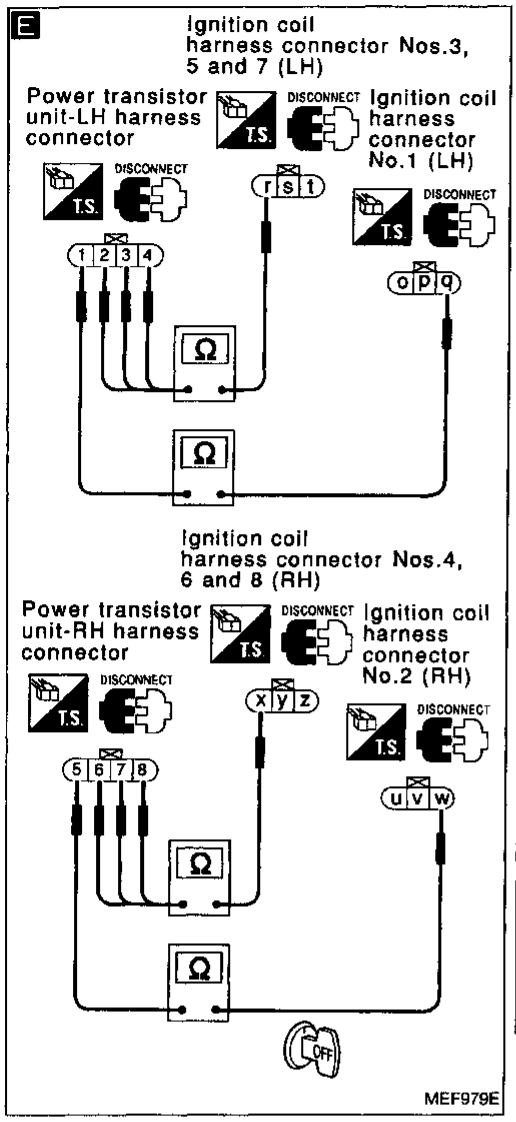








Case 3: Battery voltage exists at both terminals (m) and (n).
Case 4: Battery voltage exists at one of terminals (m) and (n).



IGNITION SIGNAL (Not self-diagnostic item-I)

Ⓐ

D

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between the following terminals and ground.
- ⓠ and ground
- ⓘ and ground
- ⓤ and ground
- ⓩ and ground

Continuity should exist.

NG → Repair harness or connectors.

OK ↓

E

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect power transistor unit harness connectors.
2) Check harness continuity between the following terminals.
- ⓠ and ①
- ⓡ and ②
- ⓡ and ③
- ⓡ and ④
- ⓦ and ⑤
- ⓧ and ⑥
- ⓧ and ⑦
- ⓧ and ⑧

Continuity should exist.

NG → Repair harness or connectors.

OK ↓

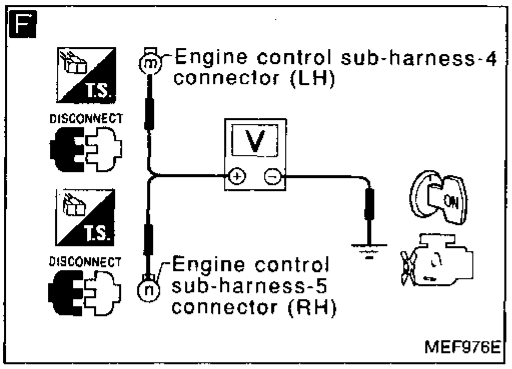
CHECK COMPONENTS
(Power transistor unit and ignition coil).
Refer to "Electrical Components Inspection". (See pages EF & EC-215.)

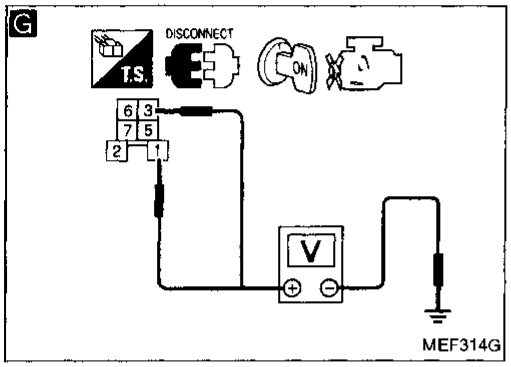
NG → Replace malfunctioning component(s).

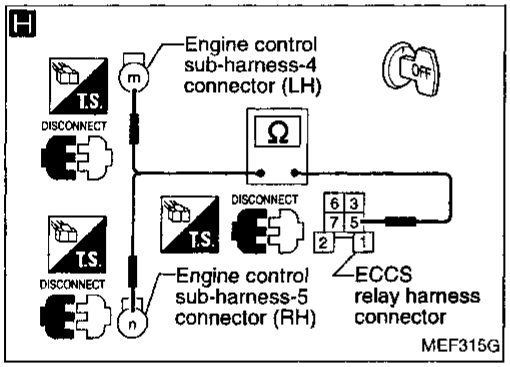
OK ↓

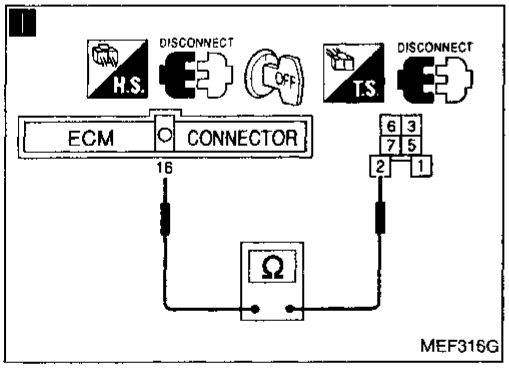
INSPECTION END

IGNITION SIGNAL (Not self-diagnostic item-II)









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

F CHECK OVERALL FUNCTION.
1) Turn ignition switch "OFF".
2) Disconnect engine control sub-harness-4 and 5 connectors.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓜ and ground, terminal ⓝ and ground with CONSULT or tester.
Voltage: Battery voltage

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

NG ↓

G 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 (M12), (E102)
- Harness connectors (M95), (E110)
- 25A fusible link
- Harness continuity between ECCS relay and ignition switch
- Harness continuity between ECCS relay and battery

If NG, repair harness or connectors.

OK ↓

H CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminal ⓜ and terminal ⑤, terminal ⓝ and terminal ⑤.
Continuity should exist.

NG → Check the following.
- Harness connectors (F52), (M94)
- Harness continuity between ECCS relay and engine control sub-harness-4 and 5

If NG, repair harness or connectors.

OK ↓

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

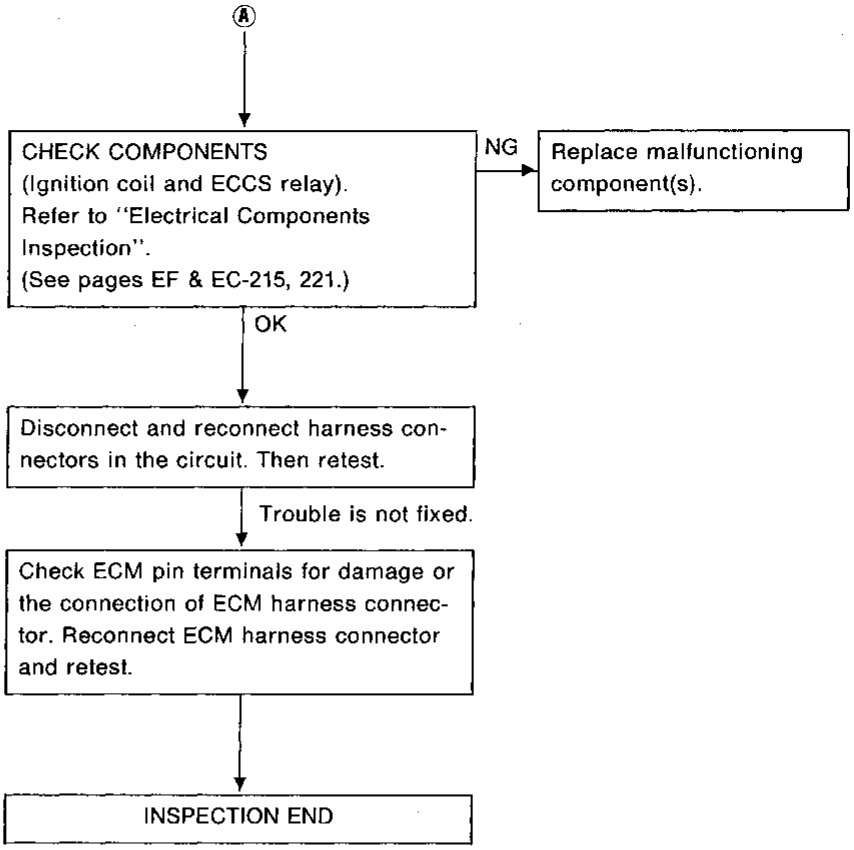
NG → Check the following.
- Harness connectors (F52), (M94)
- Harness continuity between ECM and ECCS relay

If NG, repair harness or connectors.

OK ↓

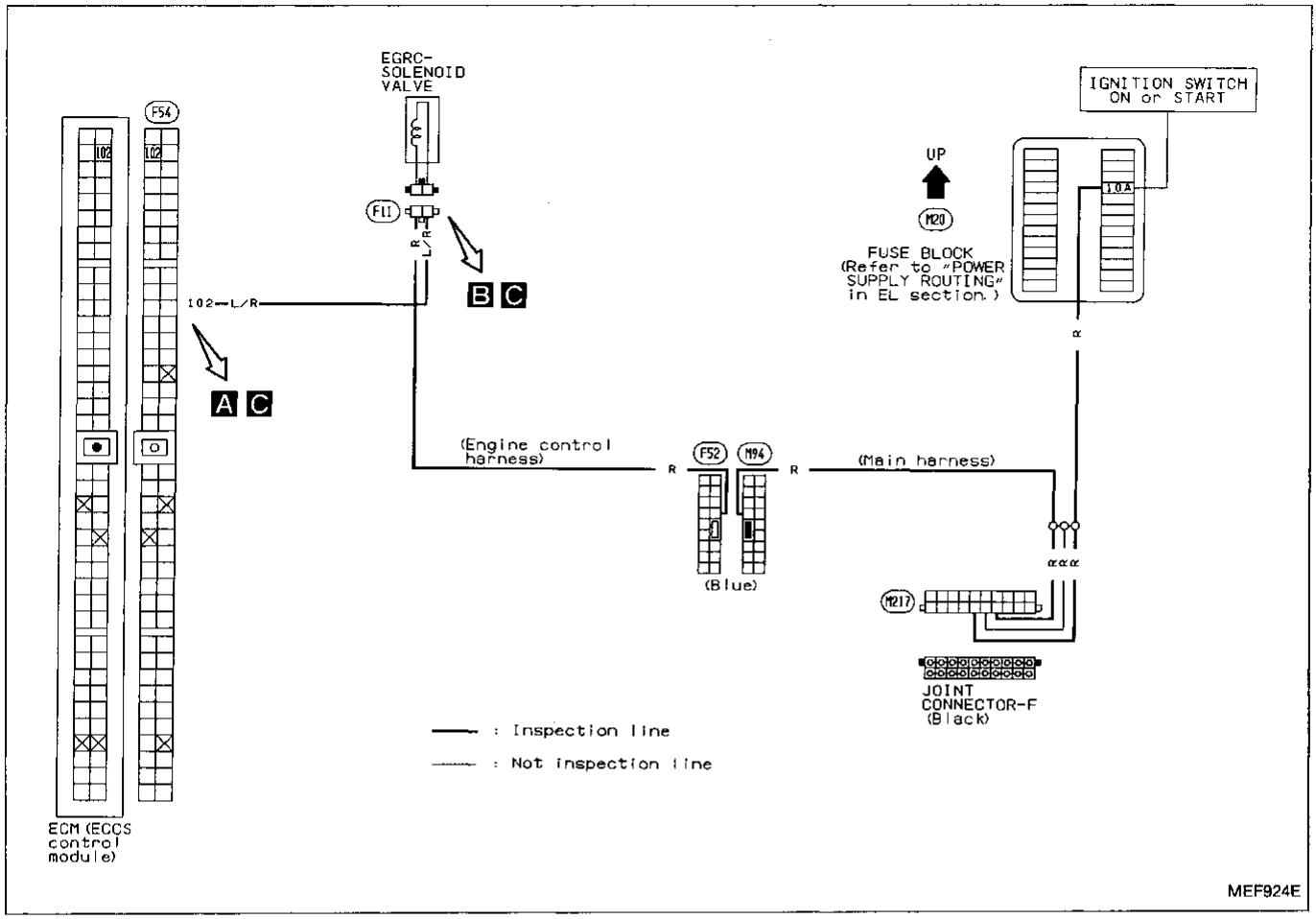
Ⓐ

IGNITION SIGNAL (Not self-diagnostic item-II)

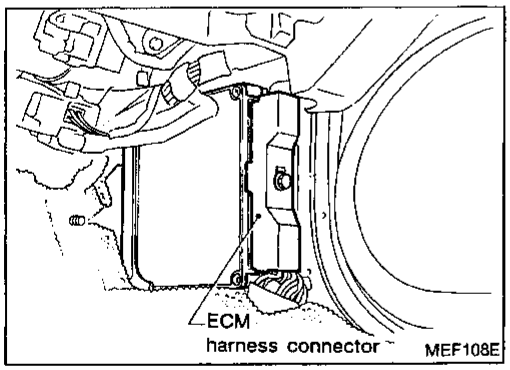


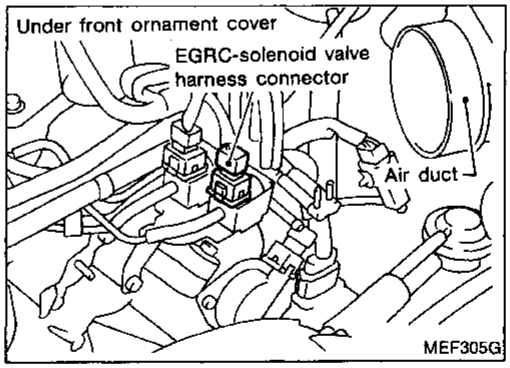
Diagnostic Procedure 20

EGR CONTROL (Not self-diagnostic item)

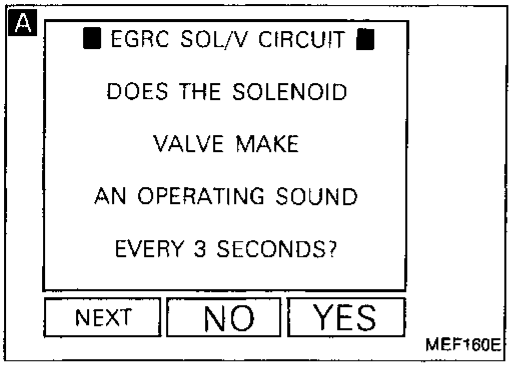


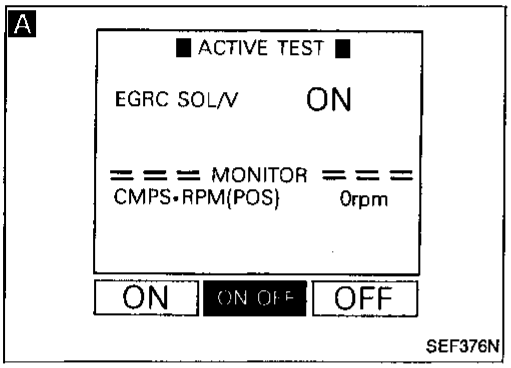
Harness layout

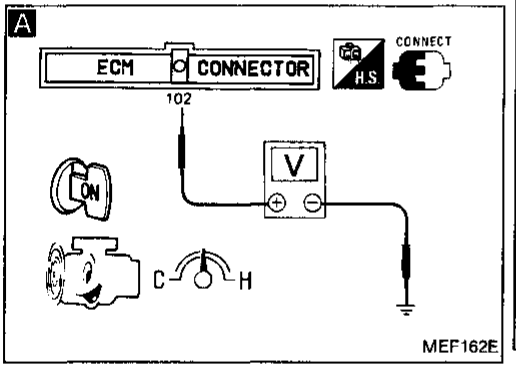


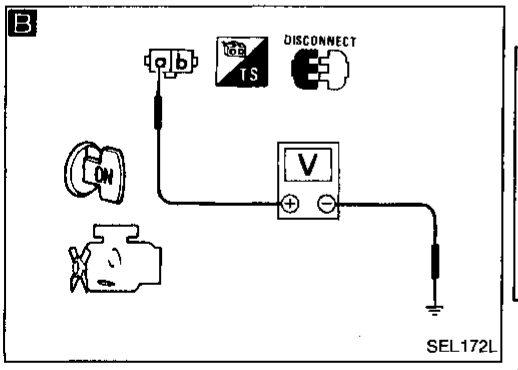


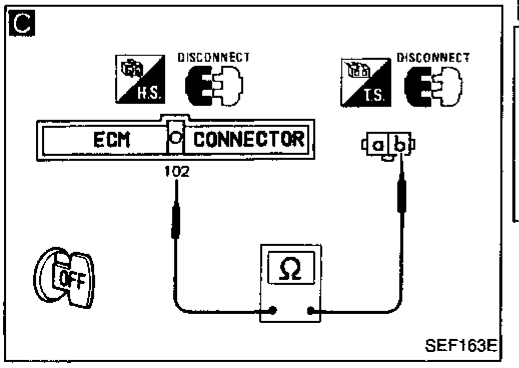
EGR CONTROL (Not self-diagnostic item)











INSPECTION START

A

CHECK CONTROL FUNCTION.

1) Turn ignition switch "OFF" and then "ON".
2) Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

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

OR

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

OR

1) Start engine and warm it up sufficiently.
2) Perform diagnostic test mode II (self-diagnostic results) with ECM (Refer to page EF & EC-52.).
   Make sure that diagnostic trouble codes No. 11 and 12 are not displayed.
3) Check voltage between ECM terminal (102) and ground under the following conditions.
   Voltage:
   At idle
   Approximately 0V
   Engine speed is about 2,000 rpm.
   Battery voltage

NG

B

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
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 (F52), (M94)
- Joint connector (M217)
- 10A fuse
- Harness continuity between EGRC-solenoid valve and fuse

If NG, repair harness or connectors.

OK

C

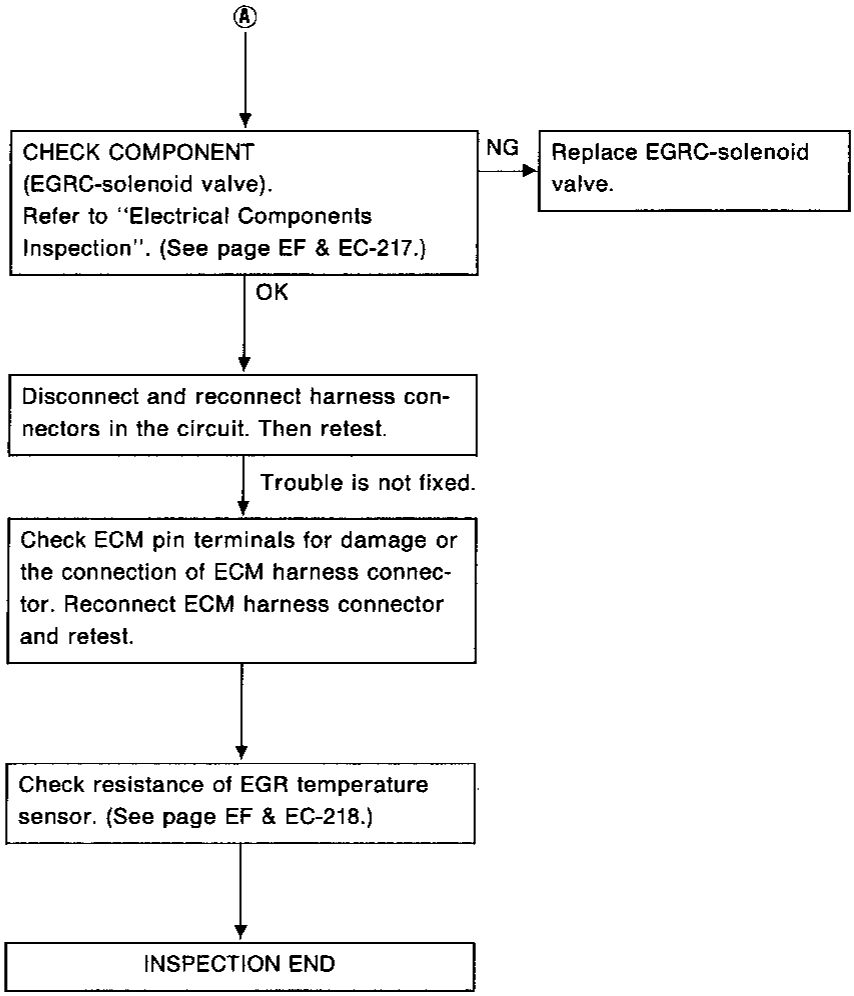
CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal (102) and terminal ⓑ.
   Continuity should exist.

NG → Repair harness or connectors.

OK

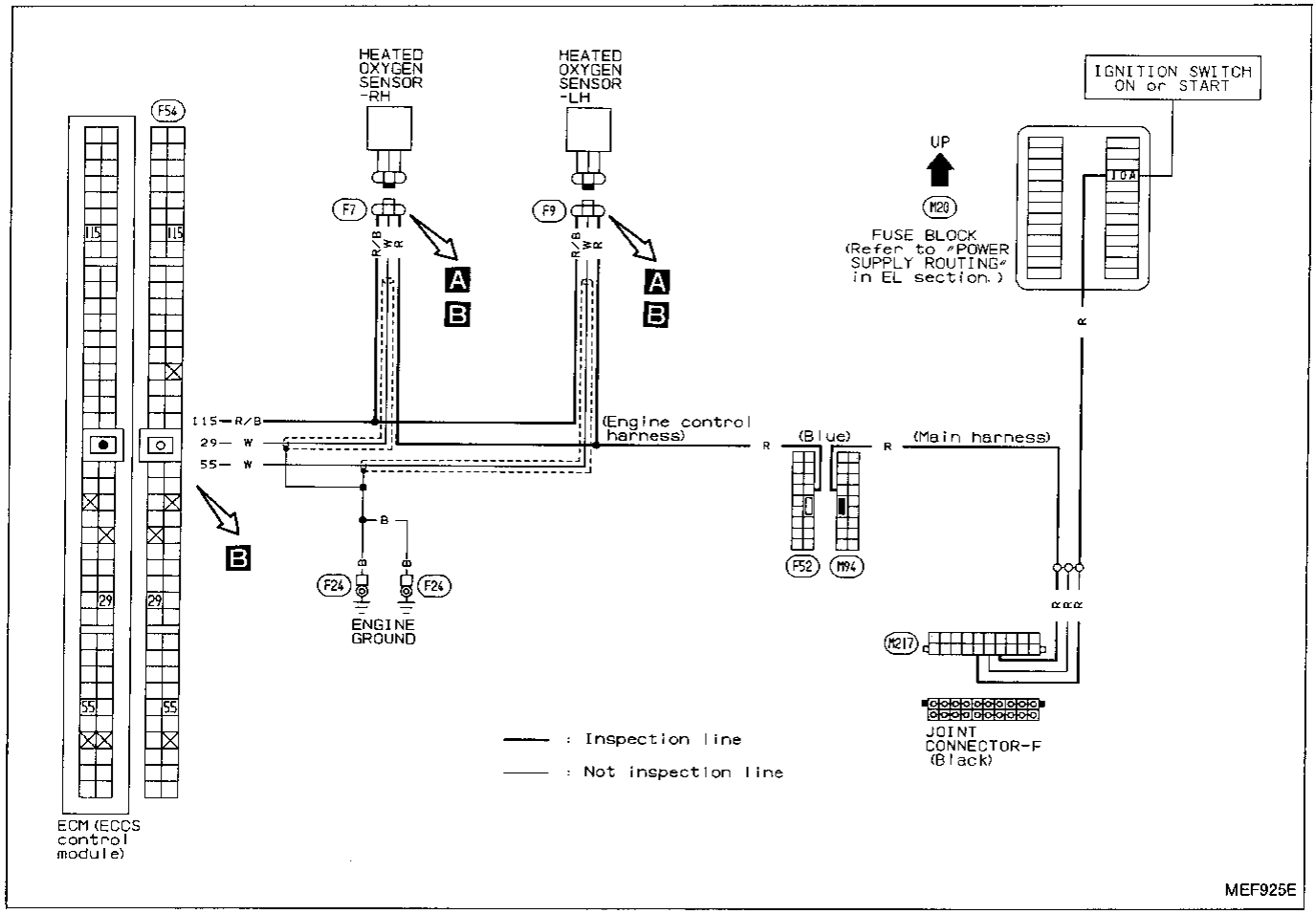
Ⓐ

EGR CONTROL (Not self-diagnostic item)

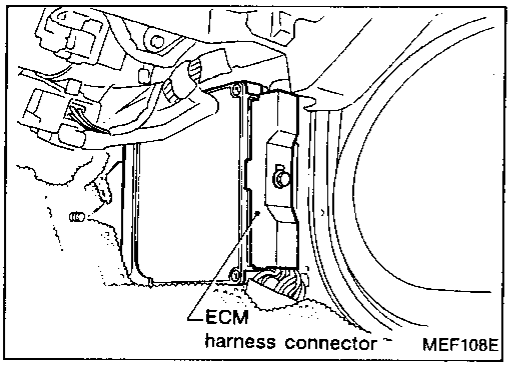


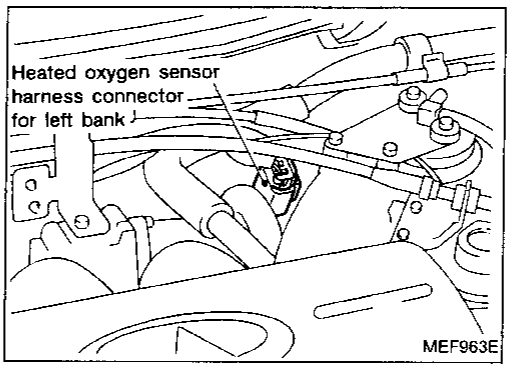
Diagnostic Procedure 21

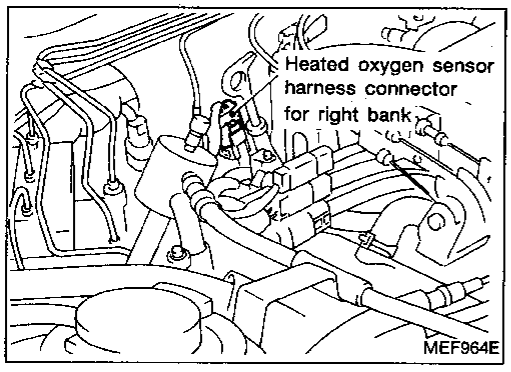
HEATED OXYGEN SENSOR HEATER LH and RH (Not self-diagnostic item)

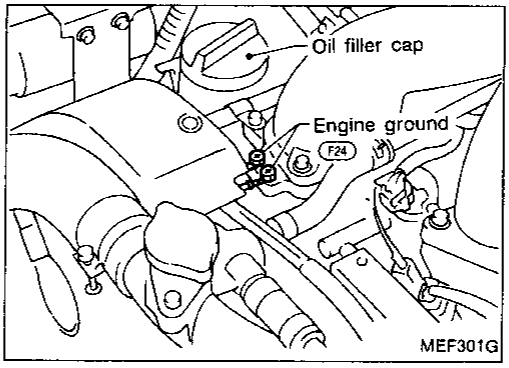


Harness layout

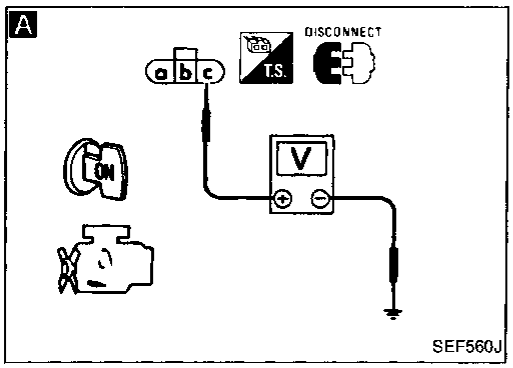


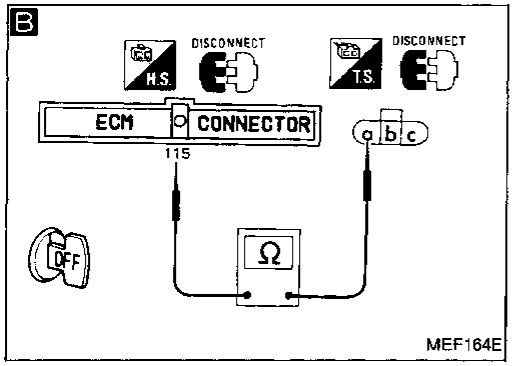






HEATED OXYGEN SENSOR HEATER LH and RH
(Not self-diagnostic item)





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 (F52), (M94)
- Joint connector (M217)
- 10A fuse
- Harness continuity between heated oxygen sensor and fuse

If NG, repair harness or connectors.

OK ↓

B

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Loosen and retighten ground screws.
3) Disconnect ECM harness connector.
4) 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-217.)

NG → Replace heated oxygen sensor.

OK ↓

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

Trouble is not fixed. ↓

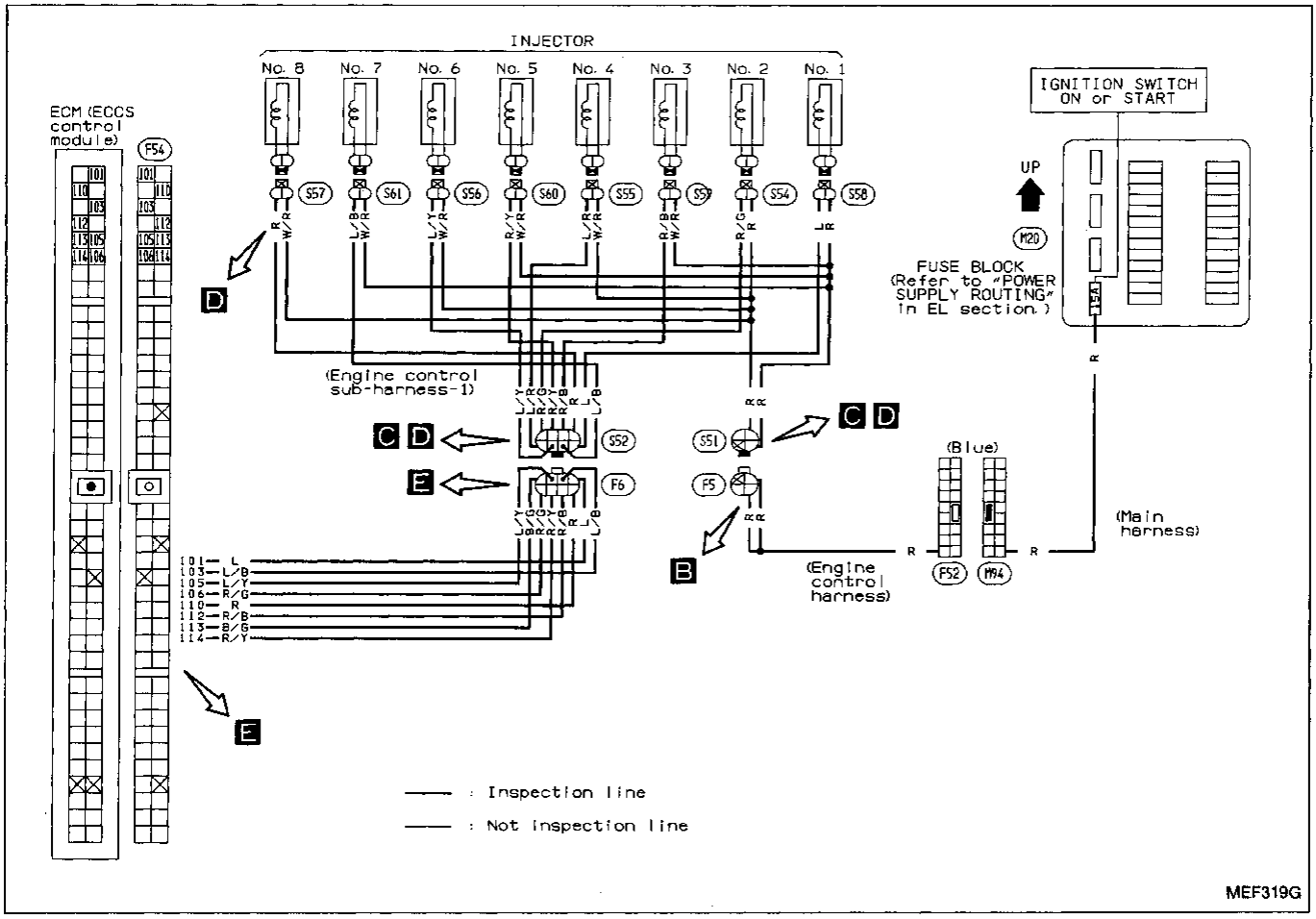
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

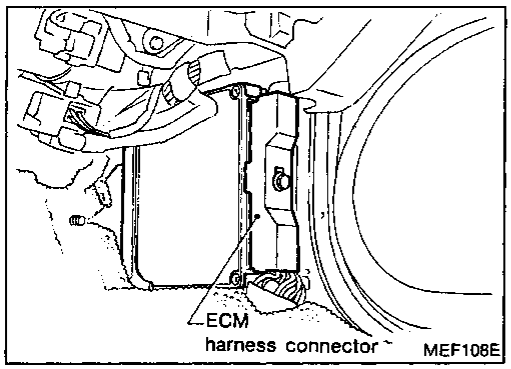
INSPECTION END

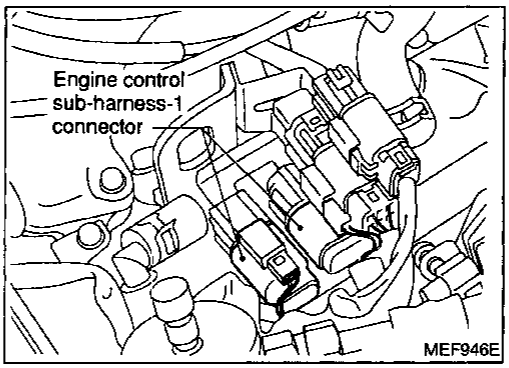
Diagnostic Procedure 22

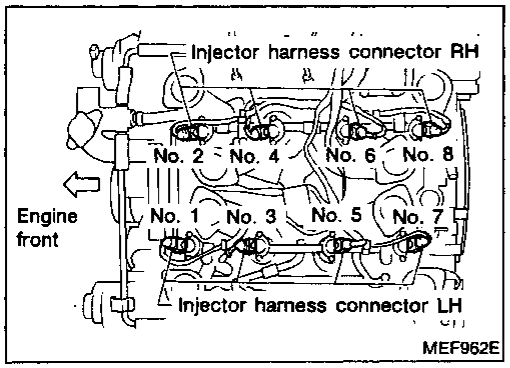
INJECTOR (Not self-diagnostic item)



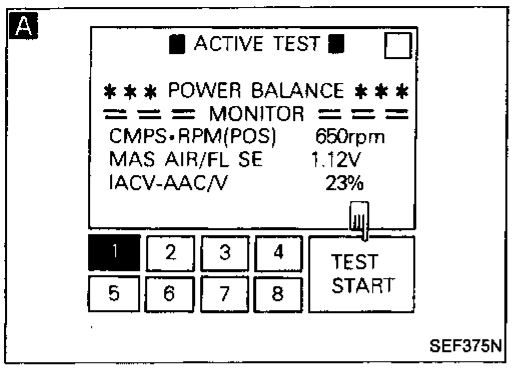
Harness layout

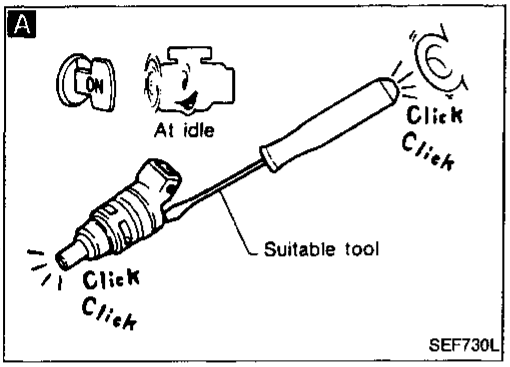


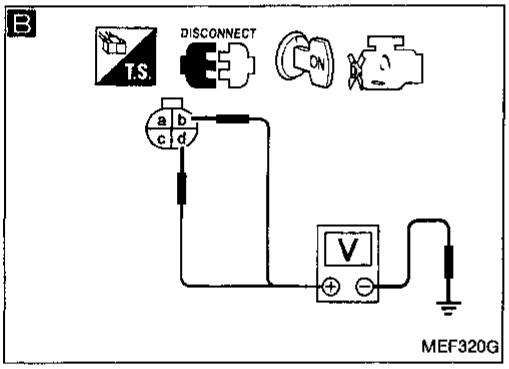


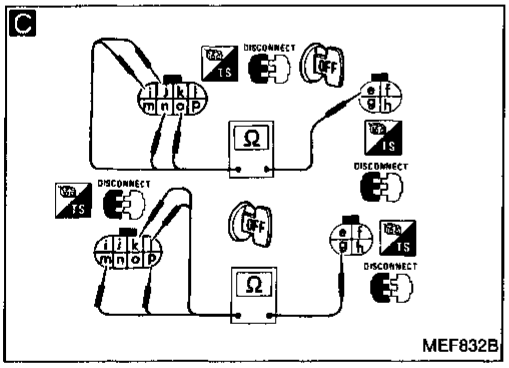


INJECTOR (Not self-diagnostic item)









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.

Case 1: When either cylinders Nos. 1, 3, 5 and 7 or Nos. 2, 4, 6 and 8 are all NG, or no ignition occurs in any cylinder.

B

CHECK POWER SUPPLY-I.
1) Turn ignition switch "OFF".
2) Disconnect engine control sub-harness-1 connector (F5).
3) Turn ignition switch "ON".
4) Check voltage between terminals ⓑ, ⓓ and ground with CONSULT or tester.
Voltage: Battery voltage

OK

NG

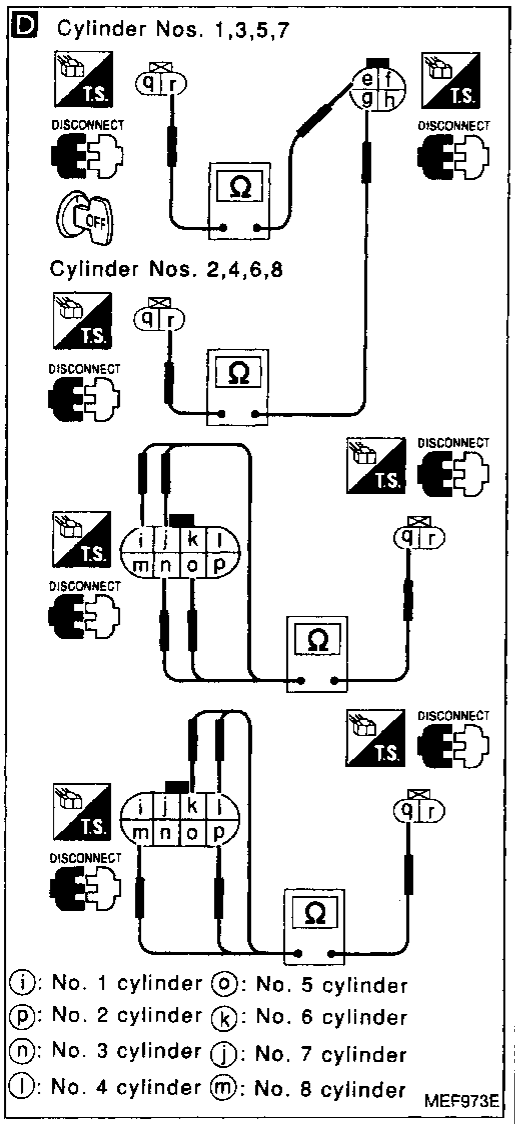
Case: 2
Except case 1

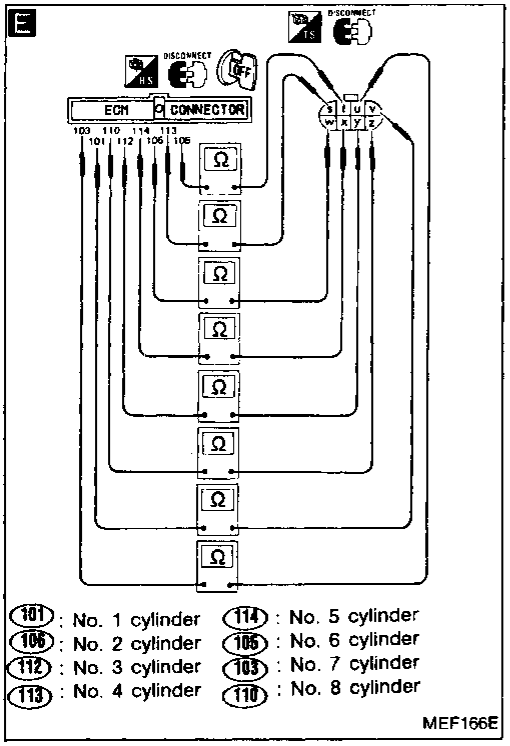
Ⓐ

Check the following.
- Harness connectors (F52), (M94)
- 15A fuse
- Harness continuity between engine control sub-harness-1 connector and fuse

If NG, repair harness or connectors.

INJECTOR (Not self-diagnostic item)





Ⓐ

C

CHECK POWER SUPPLY-II.
1) Turn ignition switch "OFF".
2) Disconnect engine control sub-harness-1 connectors.
3) Check circuit continuity between the following terminals.
- ⓔ and ⓘ
- ⓔ and ⓙ
- ⓔ and ⓝ
- ⓔ and ⓞ
- ⓖ and ⓚ
- ⓖ and ⓛ
- ⓖ and ⓜ
- ⓖ and ⓟ

Continuity should exist.

NG → **D**

Check the following.
1) Disconnect injector harness connectors.
2) Check harness continuity between the following terminals.
- ⓔ and ⓡ
- ⓖ and ⓡ
- ⓘ and ⓠ
- ⓙ and ⓠ
- ⓚ and ⓠ
- ⓛ and ⓠ
- ⓜ and ⓠ
- ⓝ and ⓠ
- ⓞ and ⓠ
- ⓟ and ⓠ

Continuity should exist.

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT (Injector).
Refer to "Electrical Components Inspection". (See page EF & EC-220.)
If NG, replace injector.

OK ↓

E

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check continuity between the following terminals.
- ⓢ and (113)
- ⓣ and (105)
- ⓤ and (103)
- ⓥ and (101)
- ⓦ and (106)
- ⓧ and (114)
- ⓨ and (112)
- ⓩ and (110)

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.

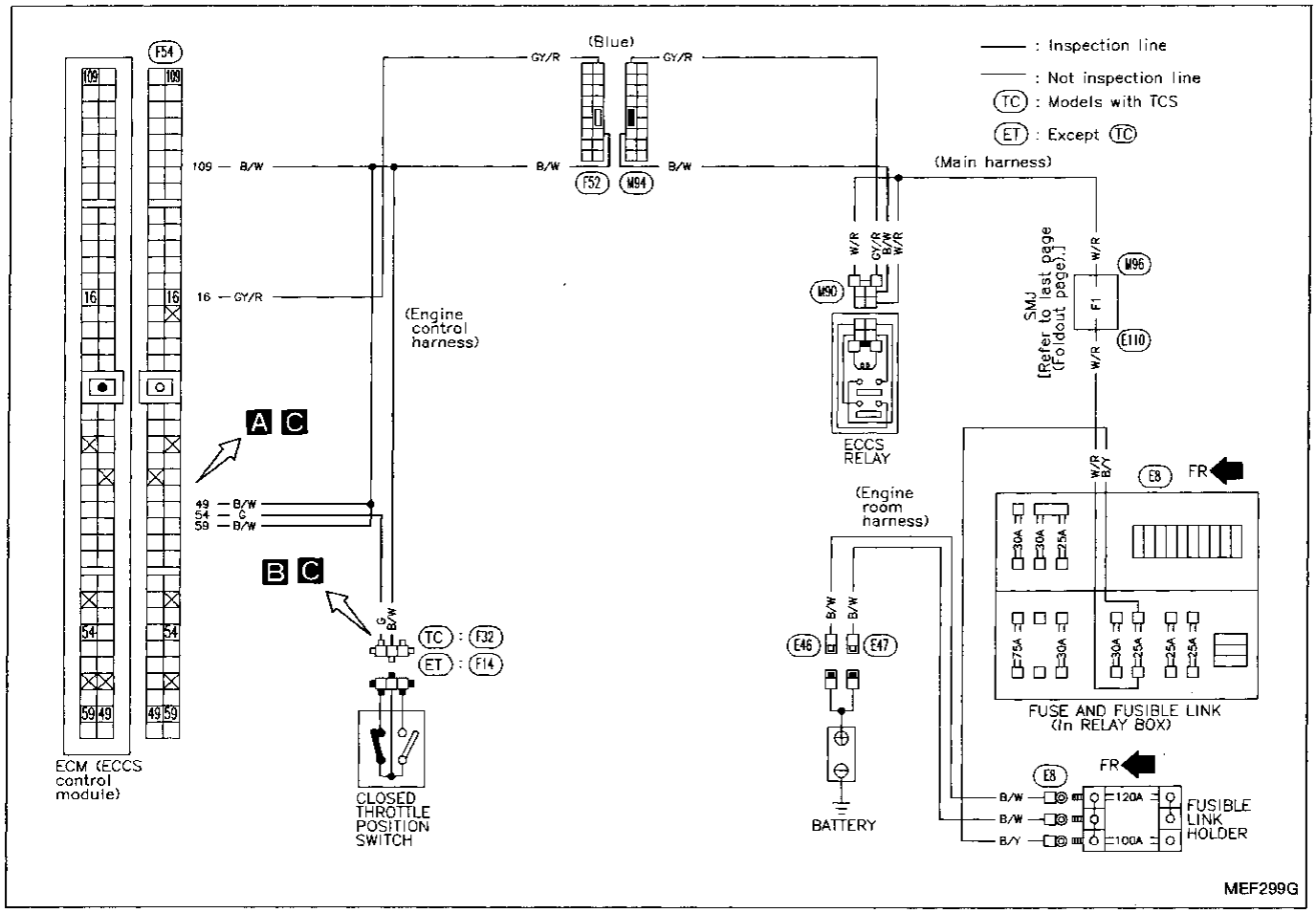
↓

INSPECTION END*

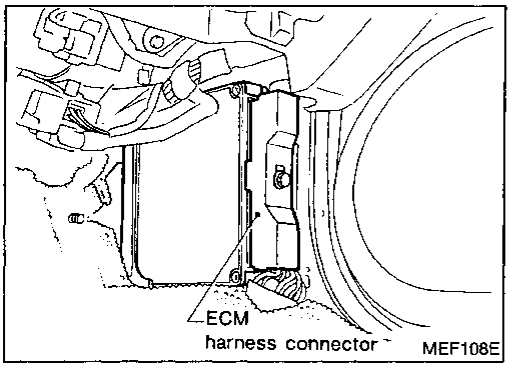
***: If idle is still unstable, go to "CHECK OVERALL FUNCTION". Then, perform "CHECK POWER SUPPLY-III" in "Diagnostic Procedure 1" (See page EF & EC-78.) after repair is completed.**

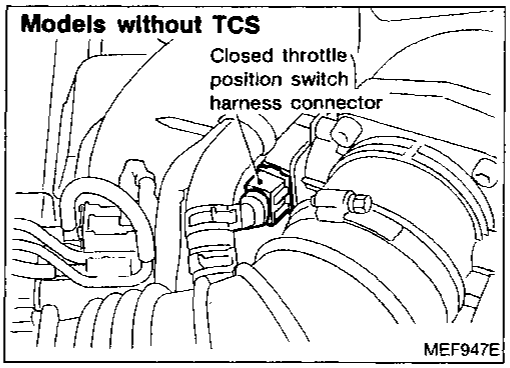
Diagnostic Procedure 23

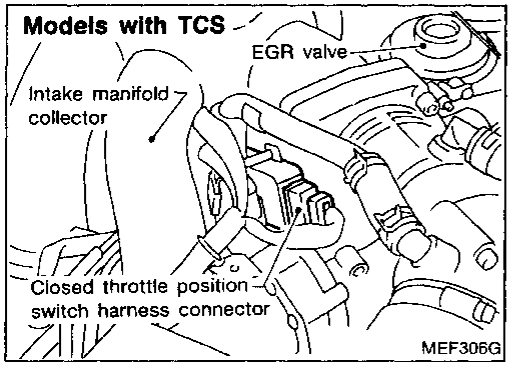
CLOSED THROTTLE POSITION SWITCH (Not self-diagnostic item)

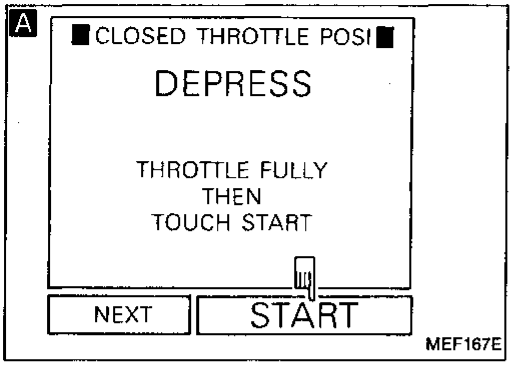


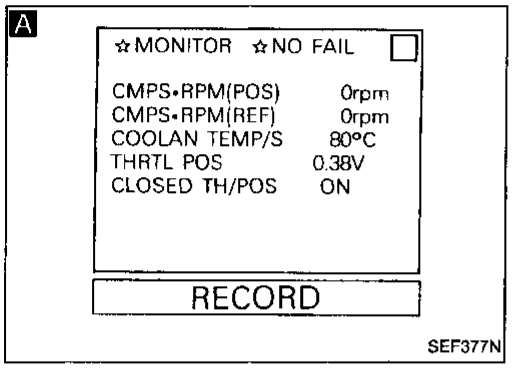
Harness layout

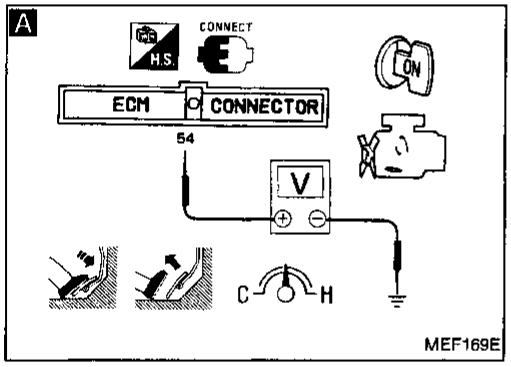












CLOSED THROTTLE POSITION SWITCH (Not self-diagnostic item)

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.

OK → INSPECTION END

OR

3) Disconnect throttle position sensor harness connector.
4) Turn ignition switch "ON".
5) Check "CLOSED TH/POS" signal in "DATA MONITOR" mode with CONSULT.

Accelerator pedal is released ... ON
Accelerator pedal is depressed ... OFF

OR

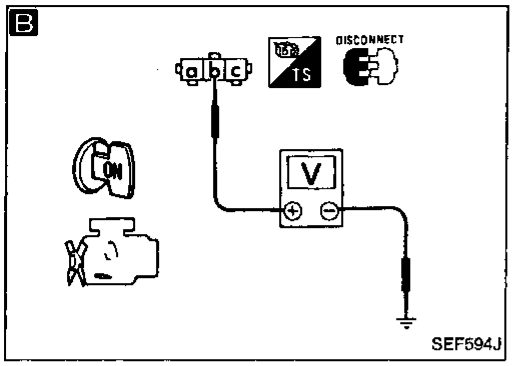
3) Turn ignition switch "ON".
4) Check voltage between ECM terminal ⑤④ and ground under the following conditions.

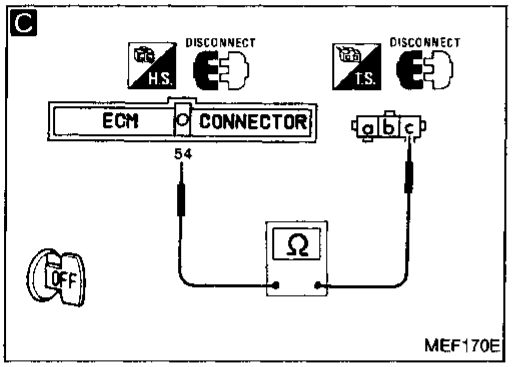
Voltage:
Accelerator pedal is released
Battery voltage
Accelerator pedal is depressed
Approximately 0V

NG

Ⓐ

CLOSED THROTTLE POSITION SWITCH (Not self-diagnostic item)





Ⓐ

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: Battery voltage

NG → Check the following.
- Harness connectors (F52), (M94)
- Harness continuity between closed throttle position switch and ECCS relay
- Harness continuity between closed throttle position switch and ECM

If NG, repair harness or connectors.

OK ↓

C

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal (54) and terminal ⓒ.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(Throttle position switch).
Refer to "Electrical Components Inspection". (See page EF & EC-218.)

NG → Replace throttle position switch.

OK ↓

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

Trouble is not fixed. ↓

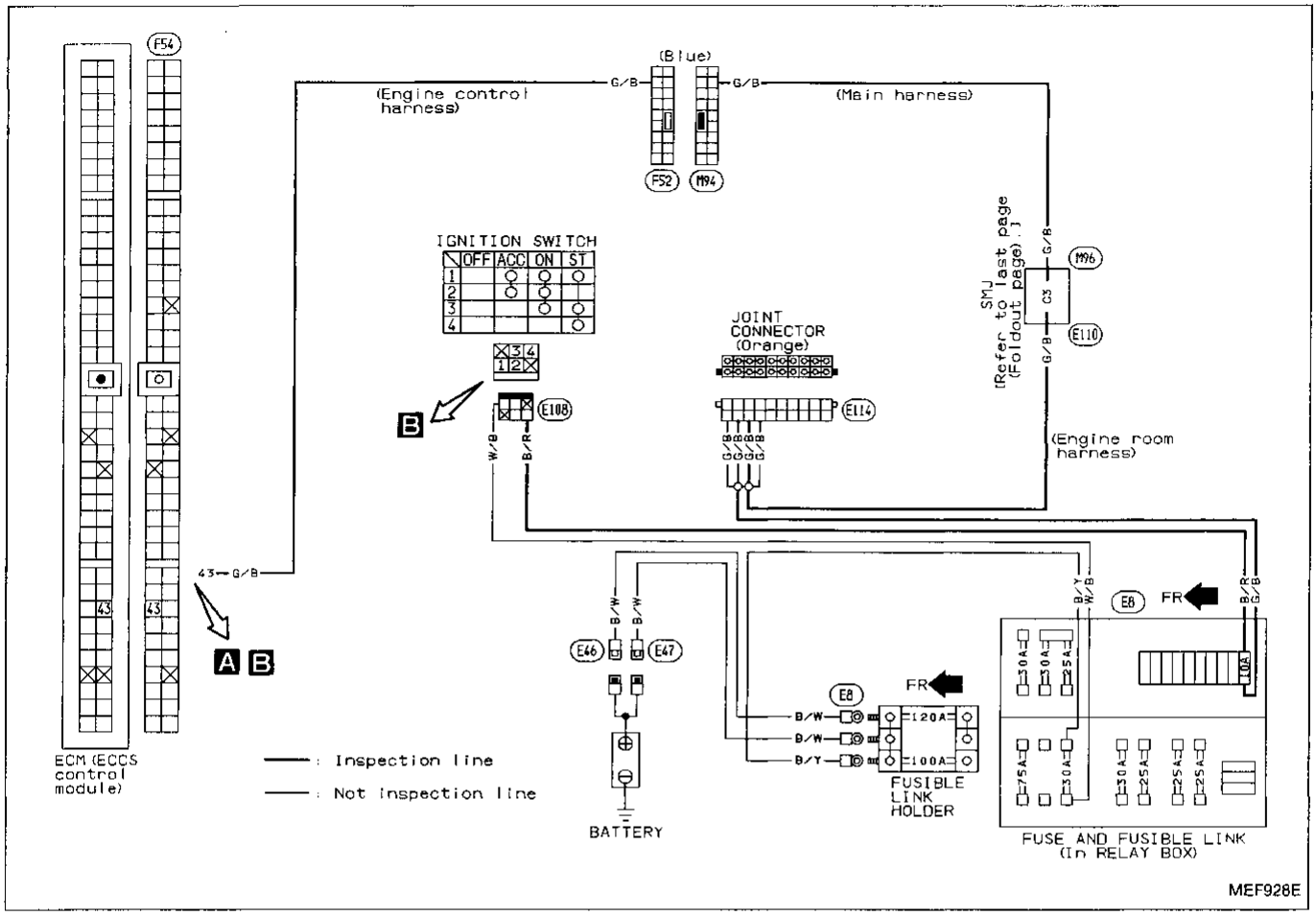
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

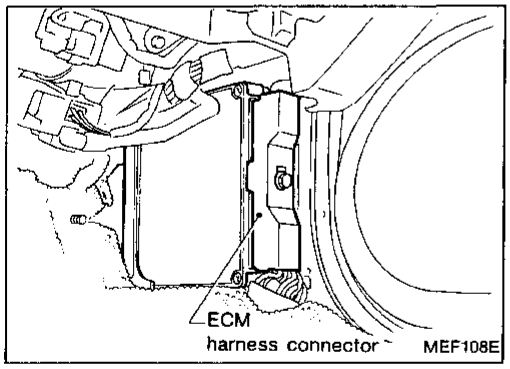
INSPECTION END

Diagnostic Procedure 24

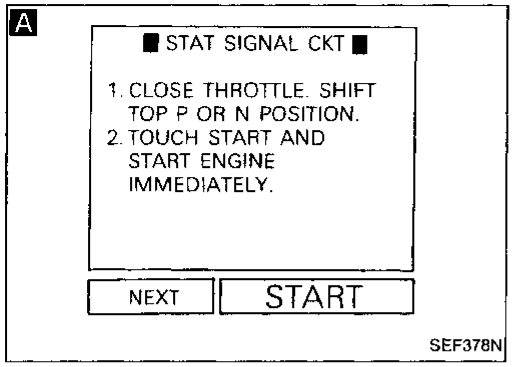
START SIGNAL (Not self-diagnostic item)

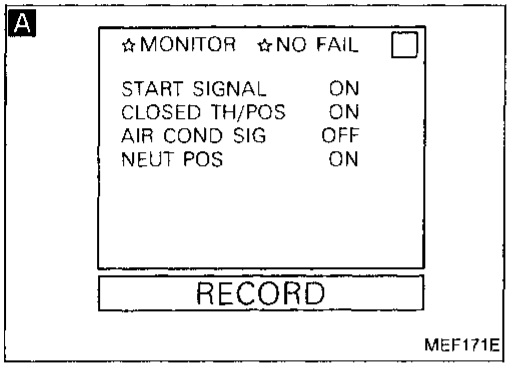


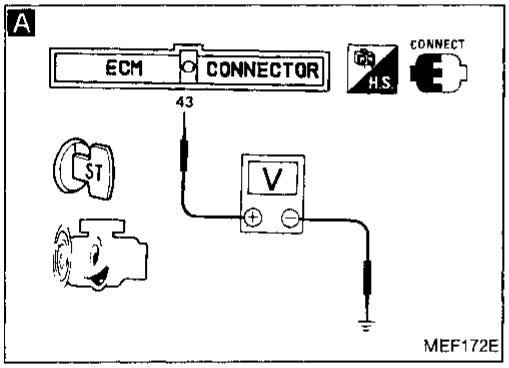
Harness layout

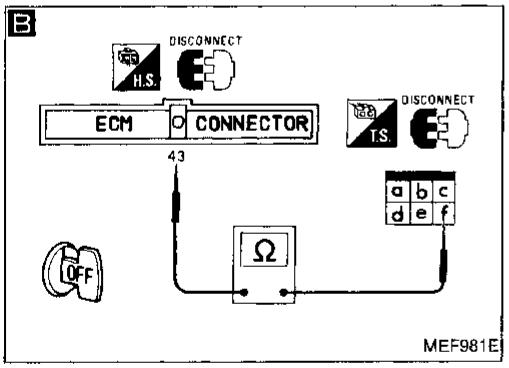


START SIGNAL (Not self-diagnostic item)









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 (F52), (M94)
- Harness connectors (M96), (E110)
- Joint connector (E114)
- 10A 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.

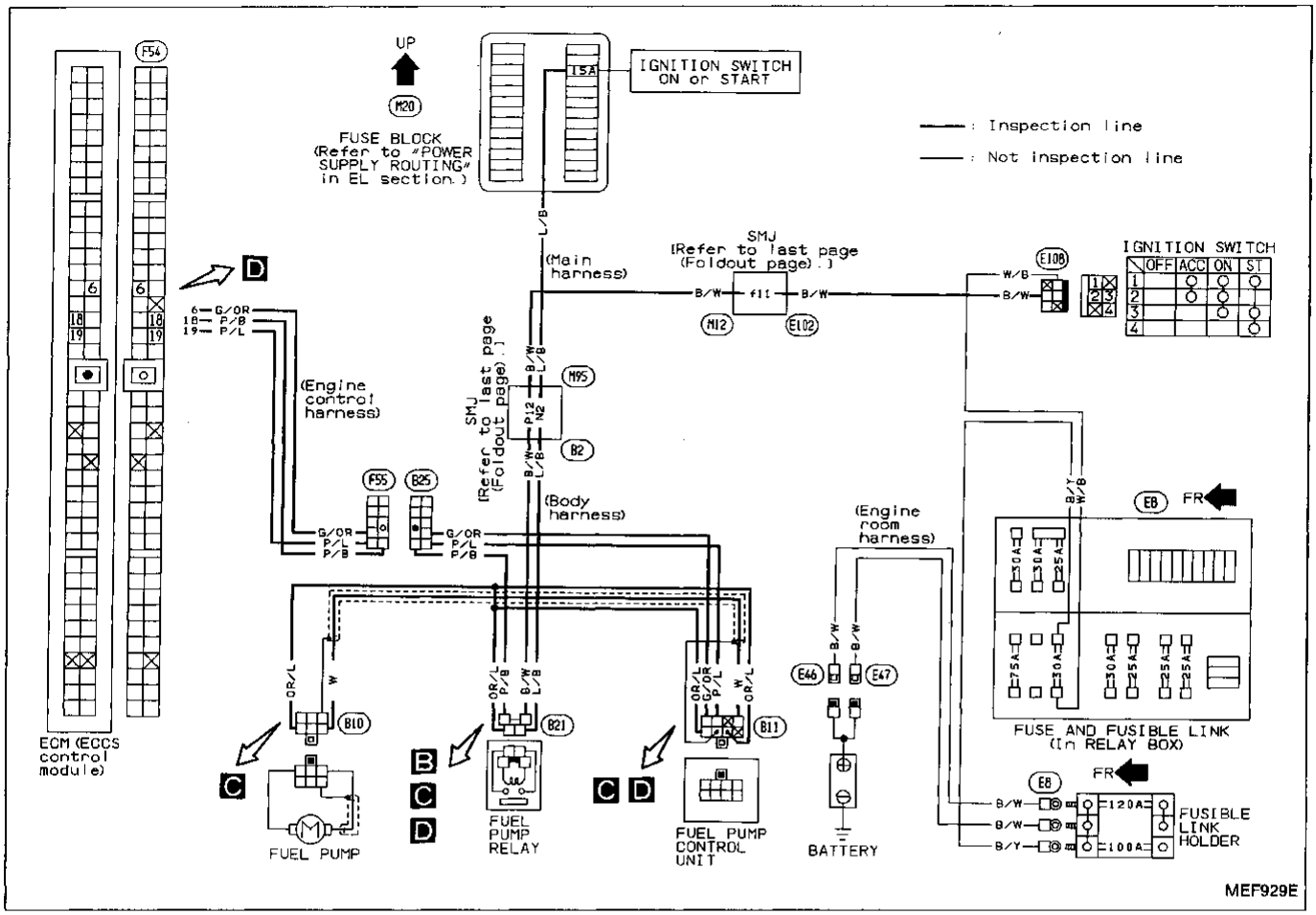
Trouble is not fixed.

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

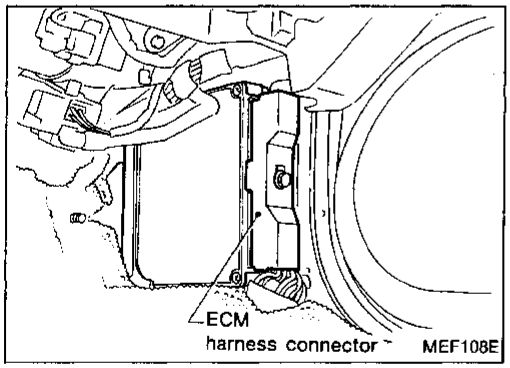
INSPECTION END

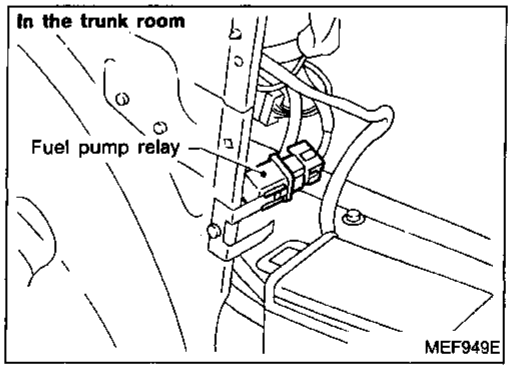
Diagnostic Procedure 25

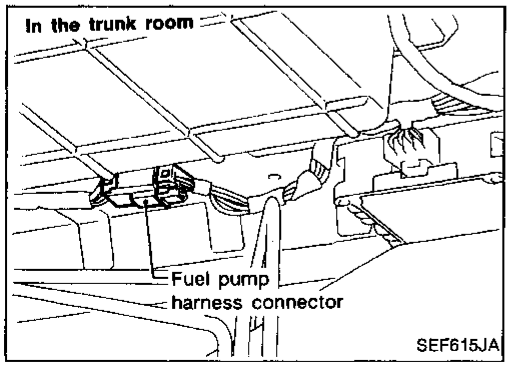
FUEL PUMP CONTROL (Not self-diagnostic item)

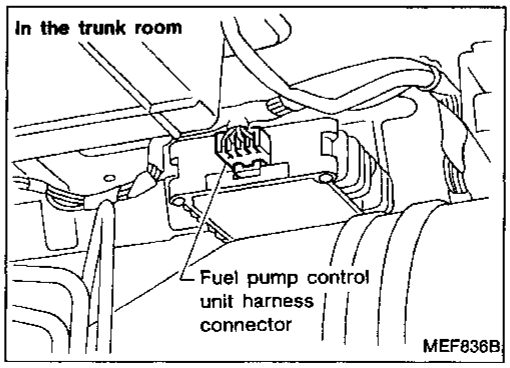


Harness layout

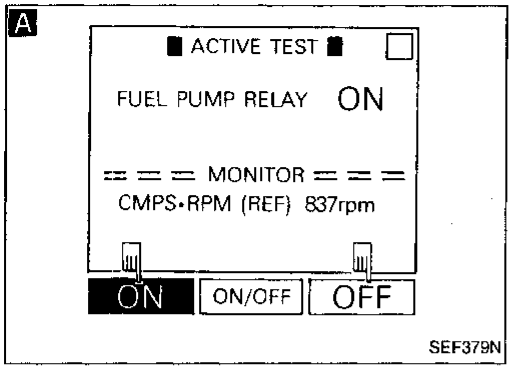


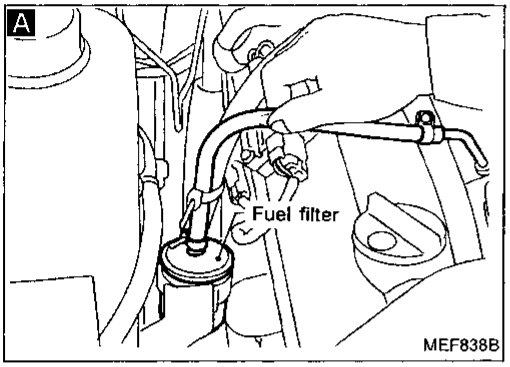


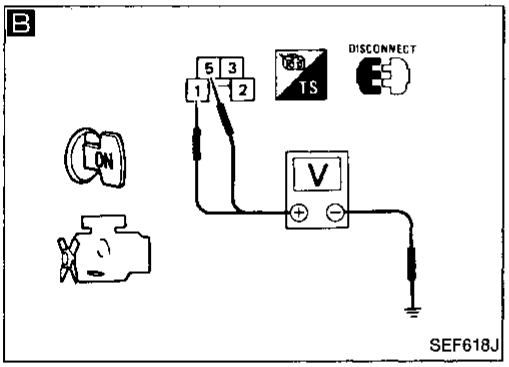


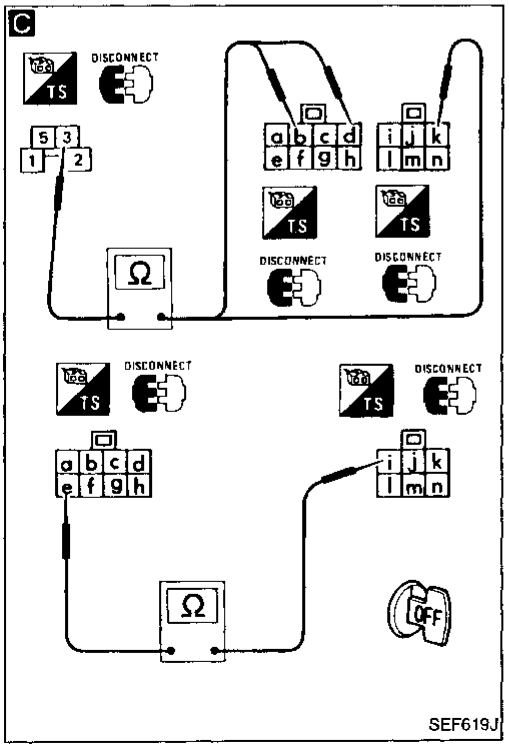


FUEL PUMP CONTROL (Not self-diagnostic item)









INSPECTION START

A

CHECK OVERALL FUNCTION.
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.

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 → *INSPECTION END

* If fuel pump noise is greater than normal during idling after completing warm-up, then go to "CHECK GROUND CIRCUIT".

NG

B

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect fuel pump relay.
3) Turn ignition switch "ON".
4) Check voltage between terminals ①, ⑤ and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors (B2), (M95)
- Harness connectors (M12), (E102)
- 15A fuse
- Harness continuity between fuel pump relay and fuse
- Harness continuity between fuel pump relay and ignition switch

If NG, repair harness or connectors.

OK

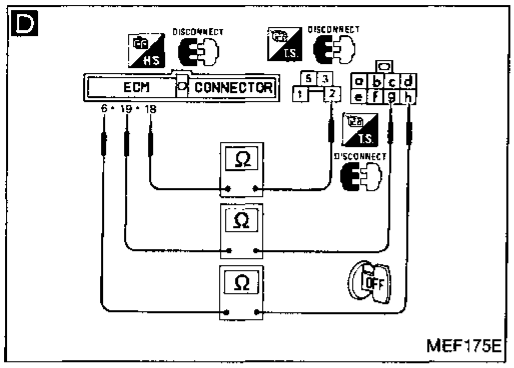
C

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect fuel pump harness connector and fuel pump control unit harness connector.
3) Check harness continuity between terminal ③ and ⓑ, ⓓ, ⓚ, terminal ⑧ and ⓘ.
Continuity should exist.

NG → Repair harness or connectors.

OK

Ⓐ



FUEL PUMP CONTROL (Not self-diagnostic item)

Ⓐ

D

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between
ECM terminal ⑱ and terminal ②,
ECM terminal ⑥ and terminal ⓗ,
ECM terminal ⑲ and terminal ⓖ.
Continuity should exist.

NG → Check the following.
- Harness connectors (F55), (B25)
- Harness continuity between ECM and fuel pump relay
- Harness continuity between ECM and fuel pump control unit

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT
(Fuel pump relay).
Refer to "Electrical Components Inspection". (See page EF & EC-221.)

NG → Replace fuel pump relay.

OK ↓

CHECK COMPONENT
(Fuel pump).
Refer to "Electrical Components Inspection". (See page EF & EC-215.)

NG → Replace fuel pump.

OK ↓

CHECK COMPONENT
(Fuel pump control unit).
Refer to "Electrical Components Inspection". (See page EF & EC-215.)

NG → Replace fuel pump control unit.

OK ↓

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

Trouble is not fixed. ↓

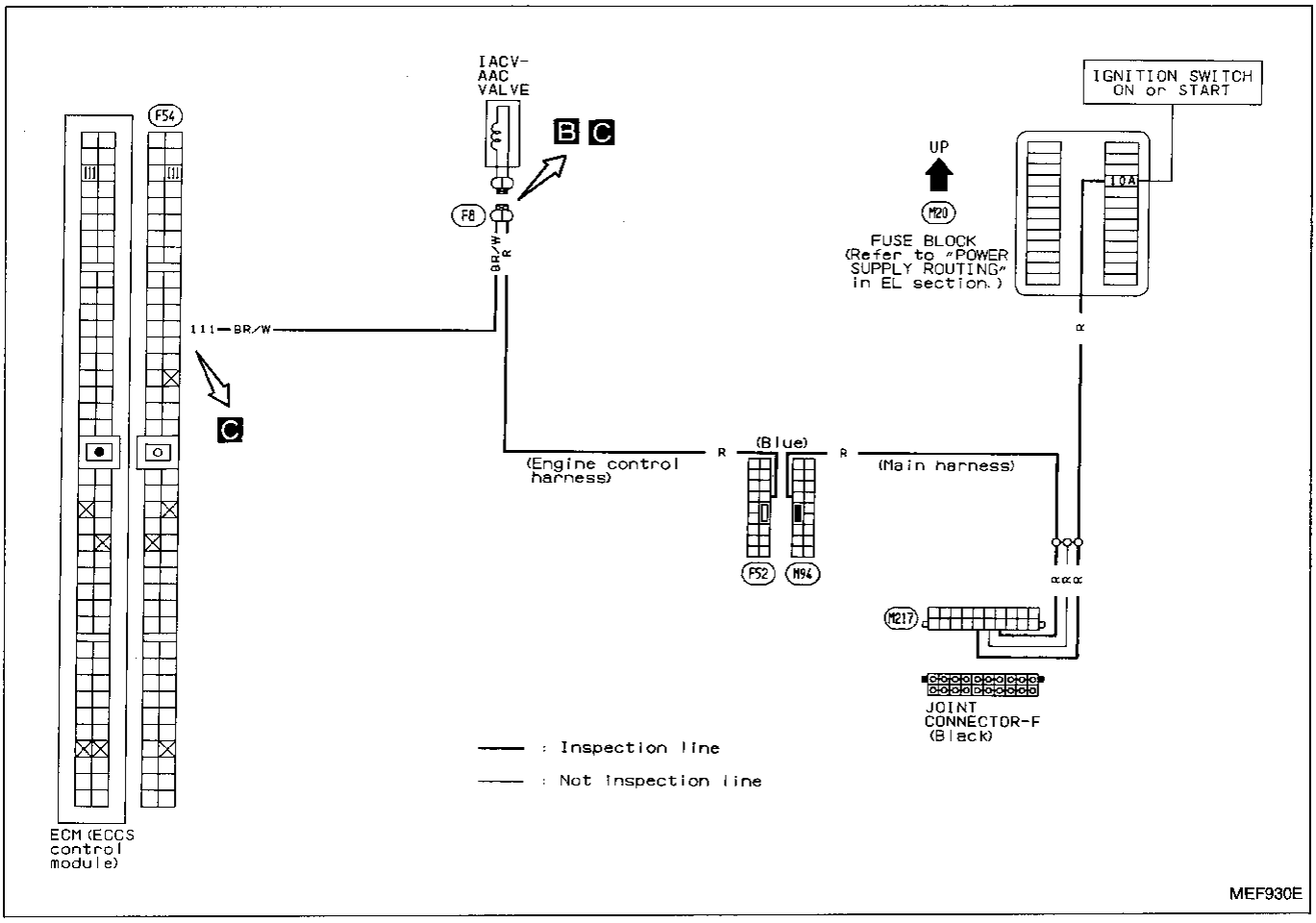
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

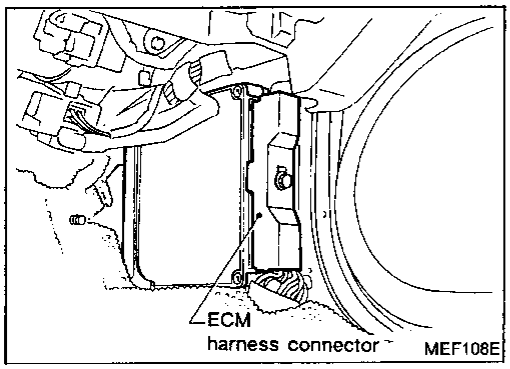
INSPECTION END

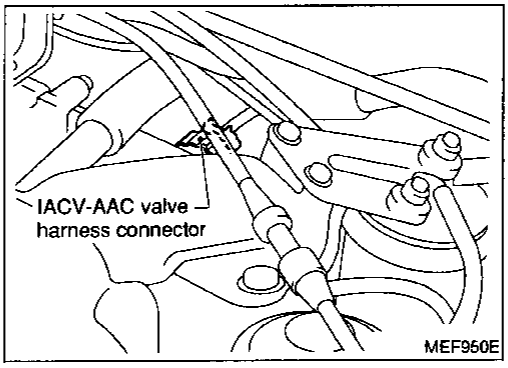
Diagnostic Procedure 26

IACV-AAC VALVE (Not self-diagnostic item)

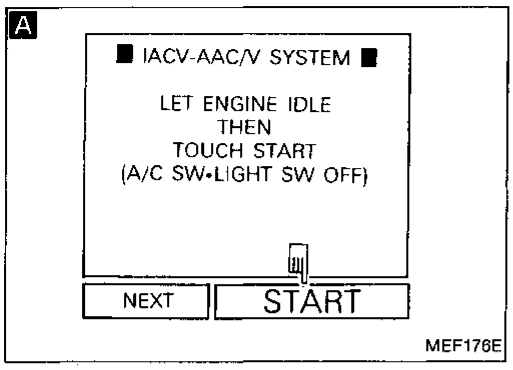


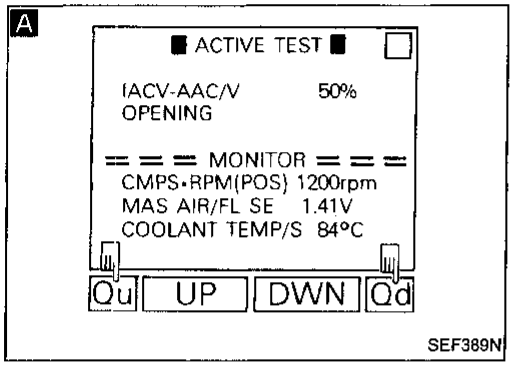
Harness layout

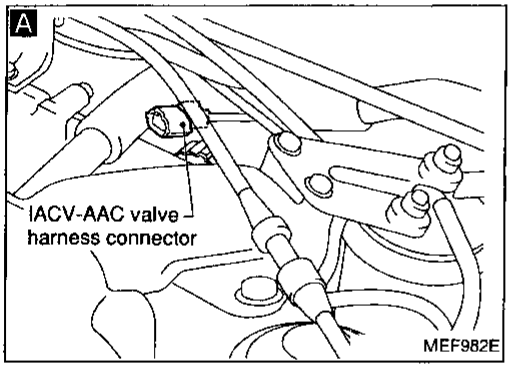


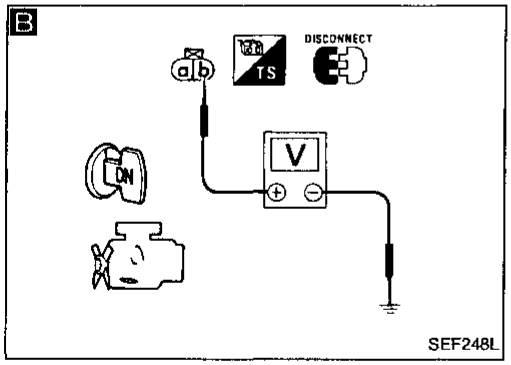


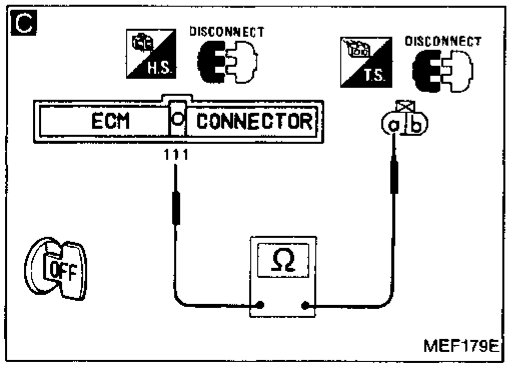
IACV-AAC VALVE (Not self-diagnostic item)











INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Start engine and warm it up sufficiently.
2) Check idle speed.
650 ± 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 (F52), (M94)
- Joint connector (M217)
- 10A fuse
- Harness continuity between IACV-AAC valve and fuse

If NG, repair harness or connectors.

OK ↓

C

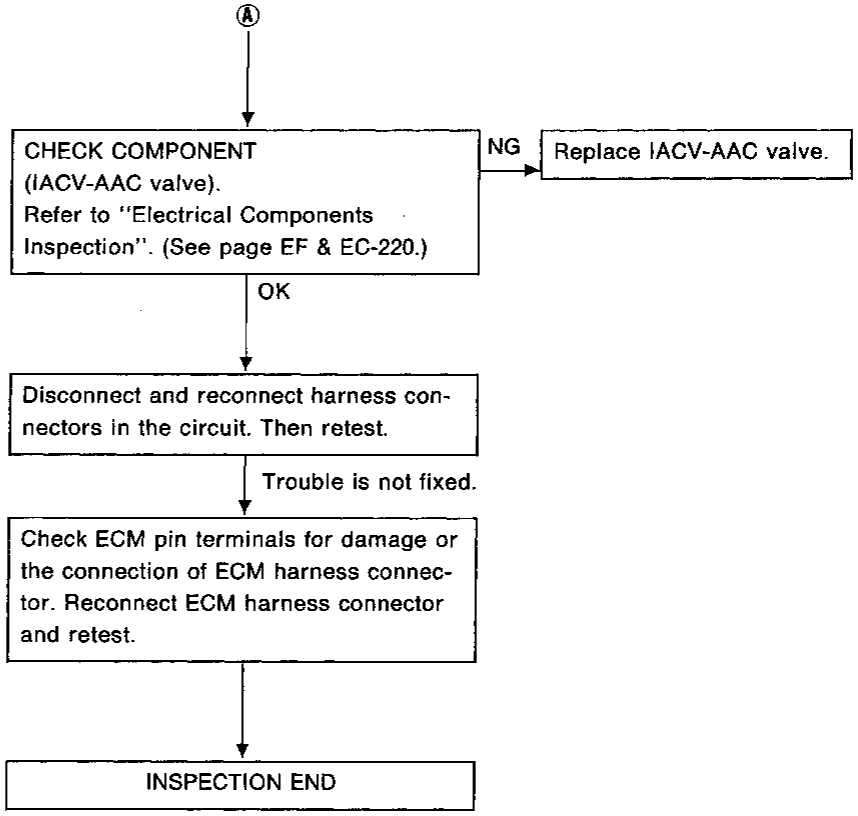
CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal (111) and terminal ⓐ.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

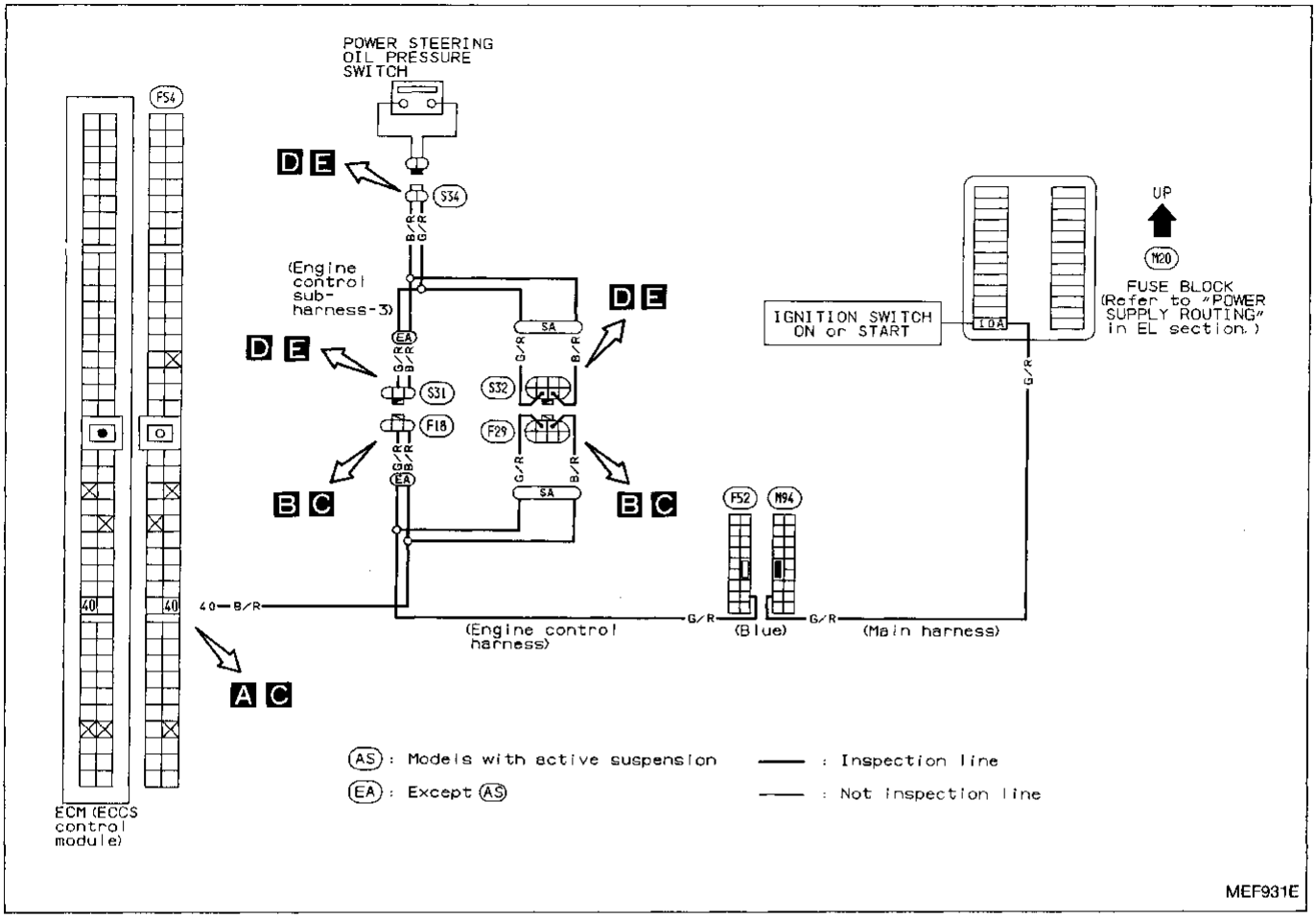
Ⓐ

IACV-AAC VALVE (Not self-diagnostic item)

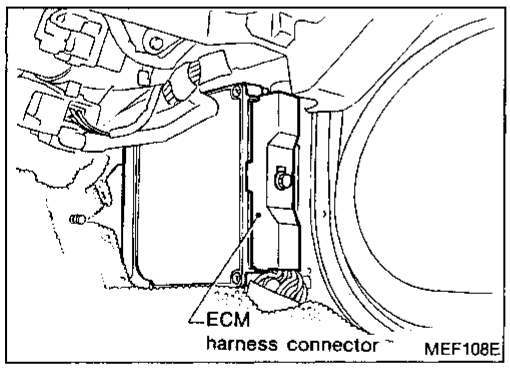


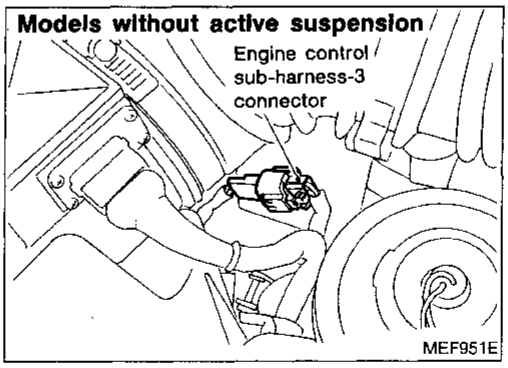
Diagnostic Procedure 27

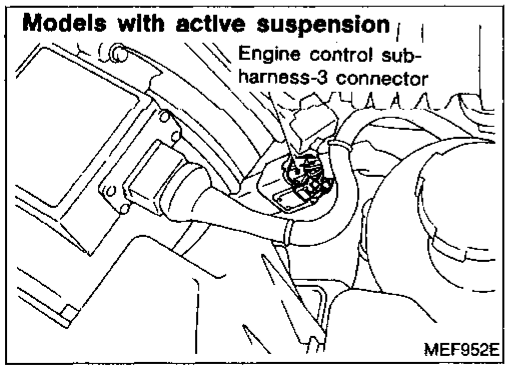
POWER STEERING OIL PRESSURE SWITCH (Not self-diagnostic item)



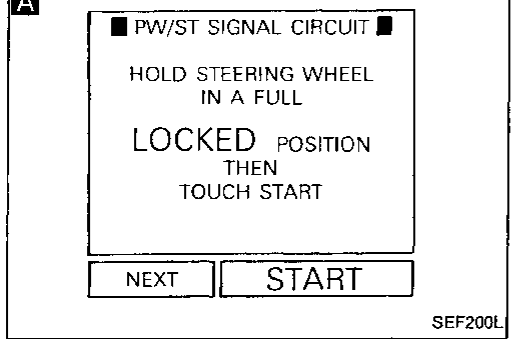
Harness layout





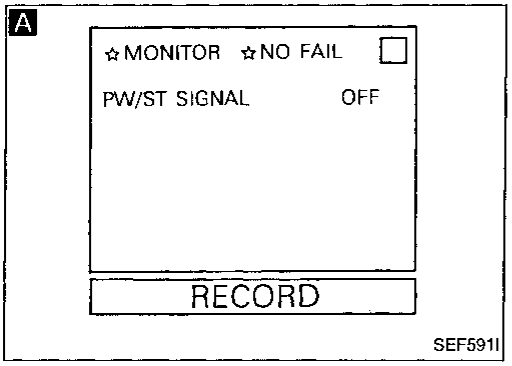


A



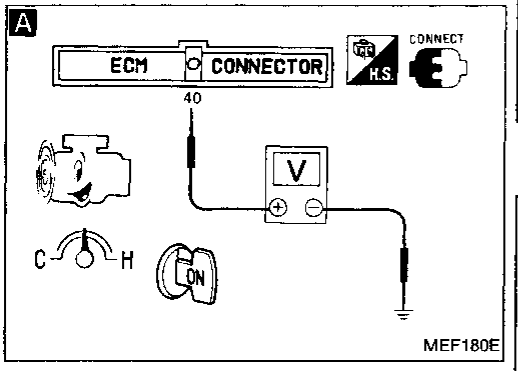
SEF200L

A



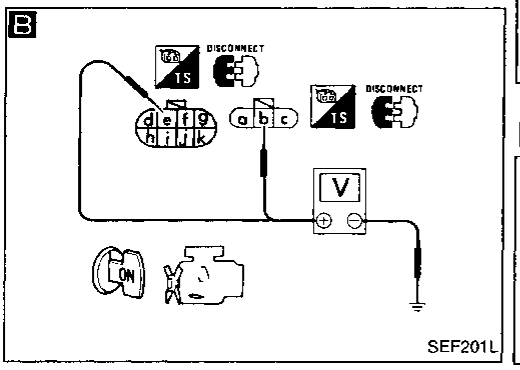
SEF591I

A



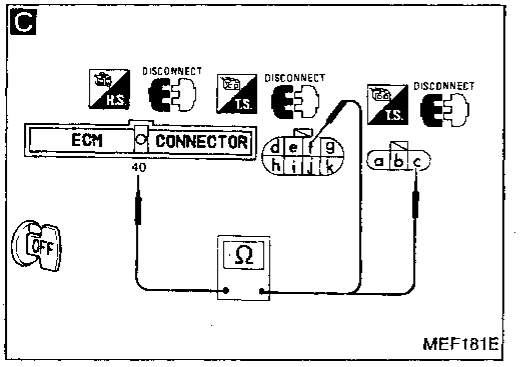
MEF180E

B



SEF201L

C



MEF181E

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: OFF
Steering is turned: ON

OR

1) Start engine.
2) Check voltage between ECM terminal (40) and ground under the following conditions.
Voltage:
When steering wheel is turned quickly.
Battery voltage
Except above
Approximately 0V

NG

B

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

NG → Check the following.
- Harness connectors (F52), (M94)
- 10A fuse
- Harness continuity between engine control sub-harness-3 connector and fuse

If NG, repair harness or connectors.

OK

C

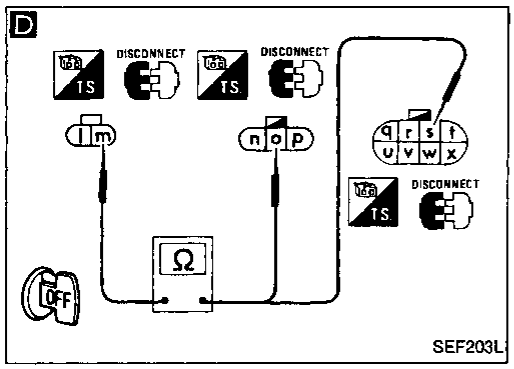
CHECK INPUT SIGNAL CIRCUIT-I.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal (40) and terminal (c) or (f).
Continuity should exist.

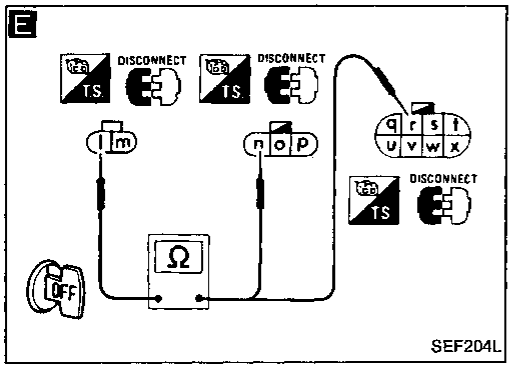
NG → Repair harness or connectors.

OK

Ⓐ

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





Ⓐ

D

CHECK POWER SUPPLY-II.
1) Disconnect power steering oil pressure switch harness connector.
2) Check harness continuity between terminal ⓜ and terminal ⓠ or ⓢ.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

E

CHECK INPUT SIGNAL CIRCUIT-II.
1) Check harness continuity between terminal ① and terminal ⓝ or ⓡ.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(Power steering oil pressure switch).
Refer to "Electrical Components Inspection". (See page EF & EC-222.)

NG → Replace power steering oil pressure switch.

OK ↓

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

Trouble is not fixed. ↓

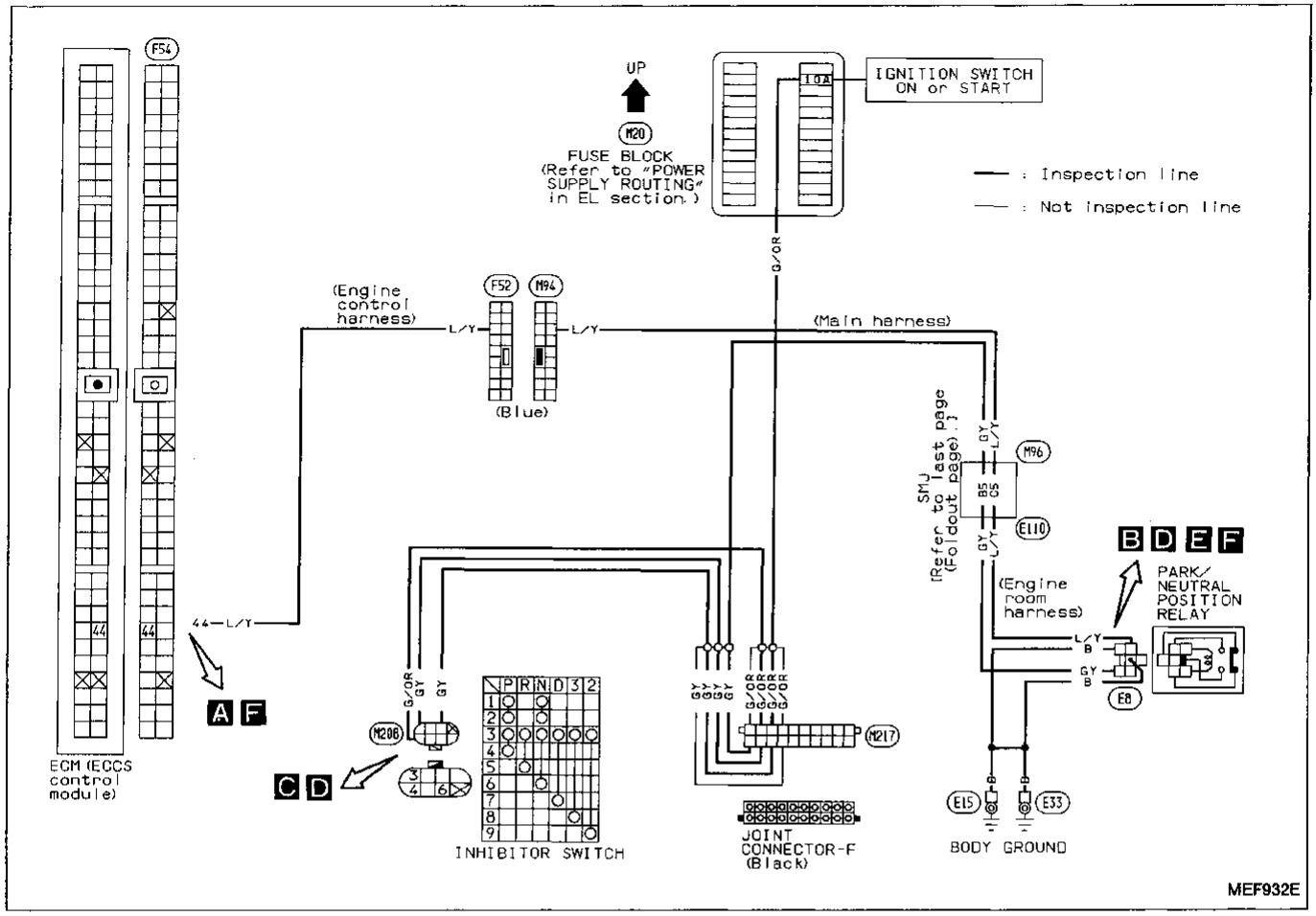
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

↓

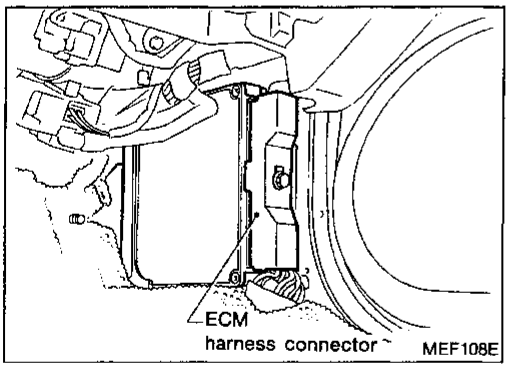
INSPECTION END

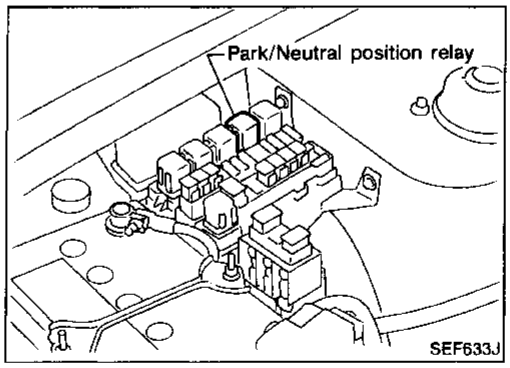
Diagnostic Procedure 28

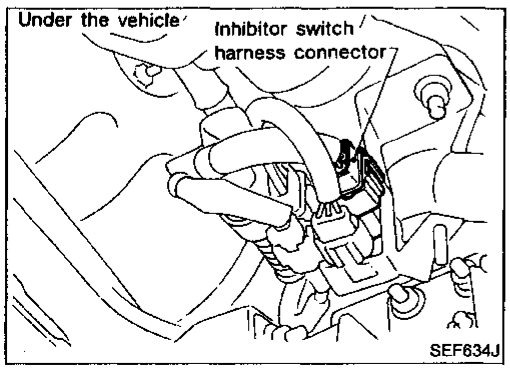
INHIBITOR SWITCH (Not self-diagnostic item)



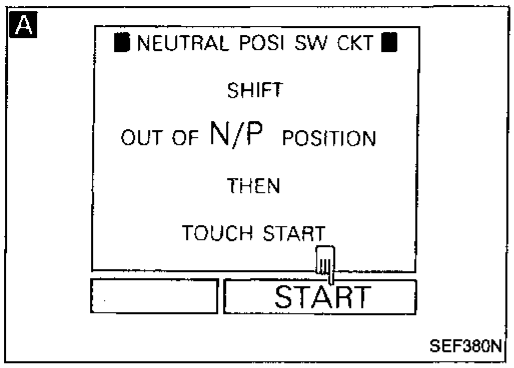
Harness layout

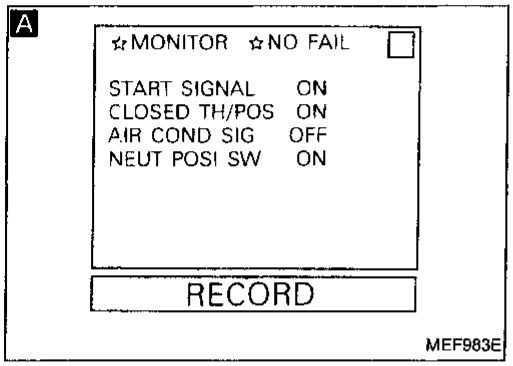


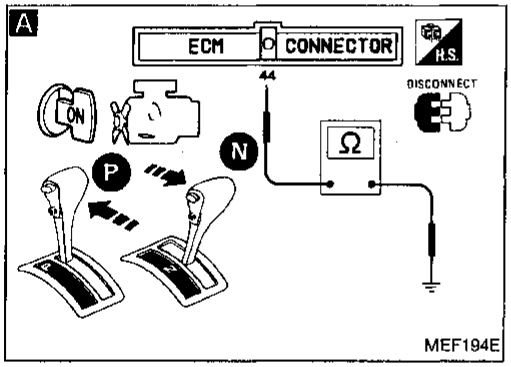


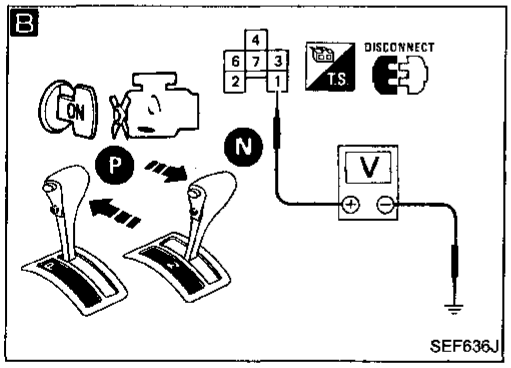


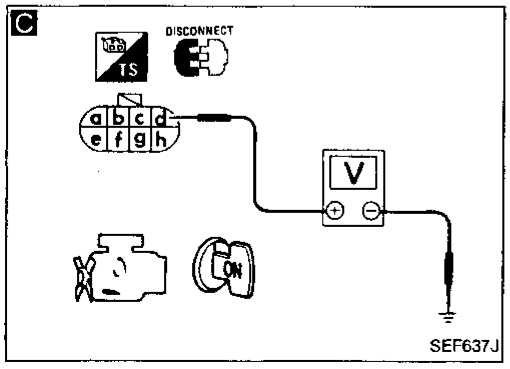
INHIBITOR SWITCH (Not self-diagnostic item)











INSPECTION START

A

CHECK OVERALL FUNCTION.

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

OR

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

OR

1) Shift selector lever to "P" position.
2) Disconnect ECM harness connector.
3) Turn ignition switch "ON".
4) Check harness continuity between ECM terminal ㊹ and body ground.
Continuity should exist.
5) Shift selector lever to "N" position.
6) Check harness continuity between ECM terminal ㊹ and body ground.
Continuity should exist.

OK → INSPECTION END

NG ↓

B

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect Park/Neutral position relay.
3) Make sure that selector lever is in "N" position.
4) Turn ignition switch "ON".
5) Check voltage between terminal ① and ground with CONSULT or tester.
Voltage: Battery voltage
6) Shift selector lever into "P" position.
7) Check voltage between terminal ① and ground with CONSULT or tester.
Voltage: Battery voltage

NG →

OK ↓

Ⓐ

Check the following.

C CHECK HARNESS CONTINUITY BETWEEN INHIBITOR SWITCH AND FUSE.
1) Turn ignition switch "OFF".
2) Disconnect inhibitor switch harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓓ and ground with CONSULT or tester.
Voltage: Battery voltage
If NG, check the following.
- Joint connector (M217)
- 10A fuse
- Harness continuity between fuse and inhibitor switch

If NG, repair harness or connectors.

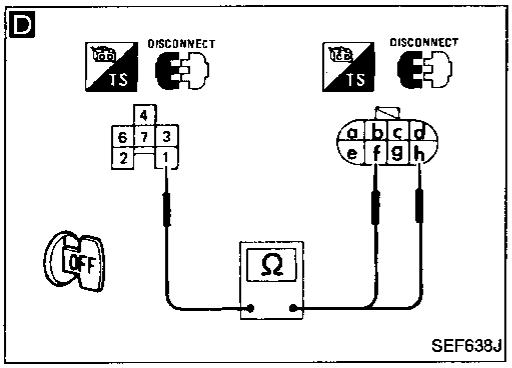
D CHECK HARNESS CONTINUITY BETWEEN INHIBITOR SWITCH AND PARK/NEUTRAL POSITION RELAY.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminal ① and ⓕ ("N" position), terminal ① and ⓗ ("P" position).
Continuity should exist.
If NG, check the following.
- Joint connector (M217)
- Harness connectors (M96), (E110)
- Harness continuity between inhibitor switch and Park/Neutral position relay

If NG, repair harness or connectors.

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

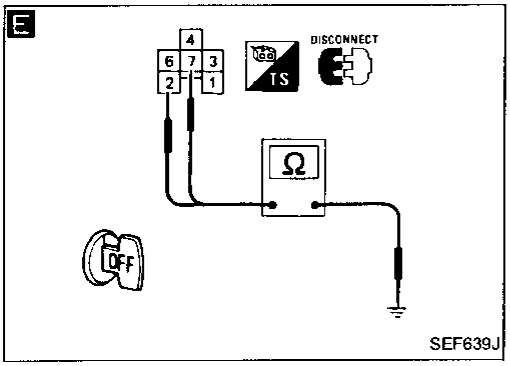
INHIBITOR SWITCH (Not self-diagnostic item)

D



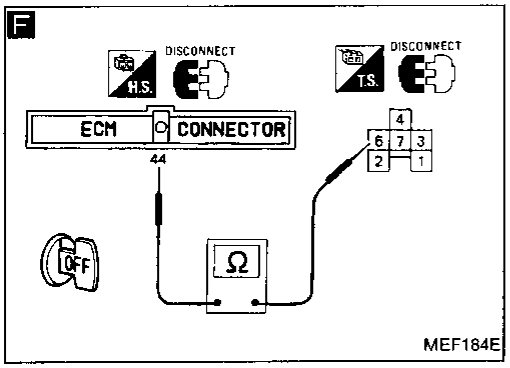
SEF638J

E



SEF639J

F



MEF184E

Ⓐ

E

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminals ②, ⑦ and body ground.
Continuity should exist.

NG → Repair harness or connectors.

OK

F

CHECK INPUT SIGNAL CIRCUIT.
1) Check harness continuity between ECM terminal ㊹ and terminal ⑥.
Continuity should exist.

NG → Check the following.
- Harness connectors (F52), (M94)
- Harness connectors (M96), (E110)
- Harness continuity between ECM and Park/Neutral position relay

If NG, repair harness or connectors.

OK

CHECK COMPONENT
(Park/Neutral position relay).
Refer to "Electrical Components Inspection". (See page EF & EC-222.)

NG → Replace Park/Neutral position relay.

OK

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

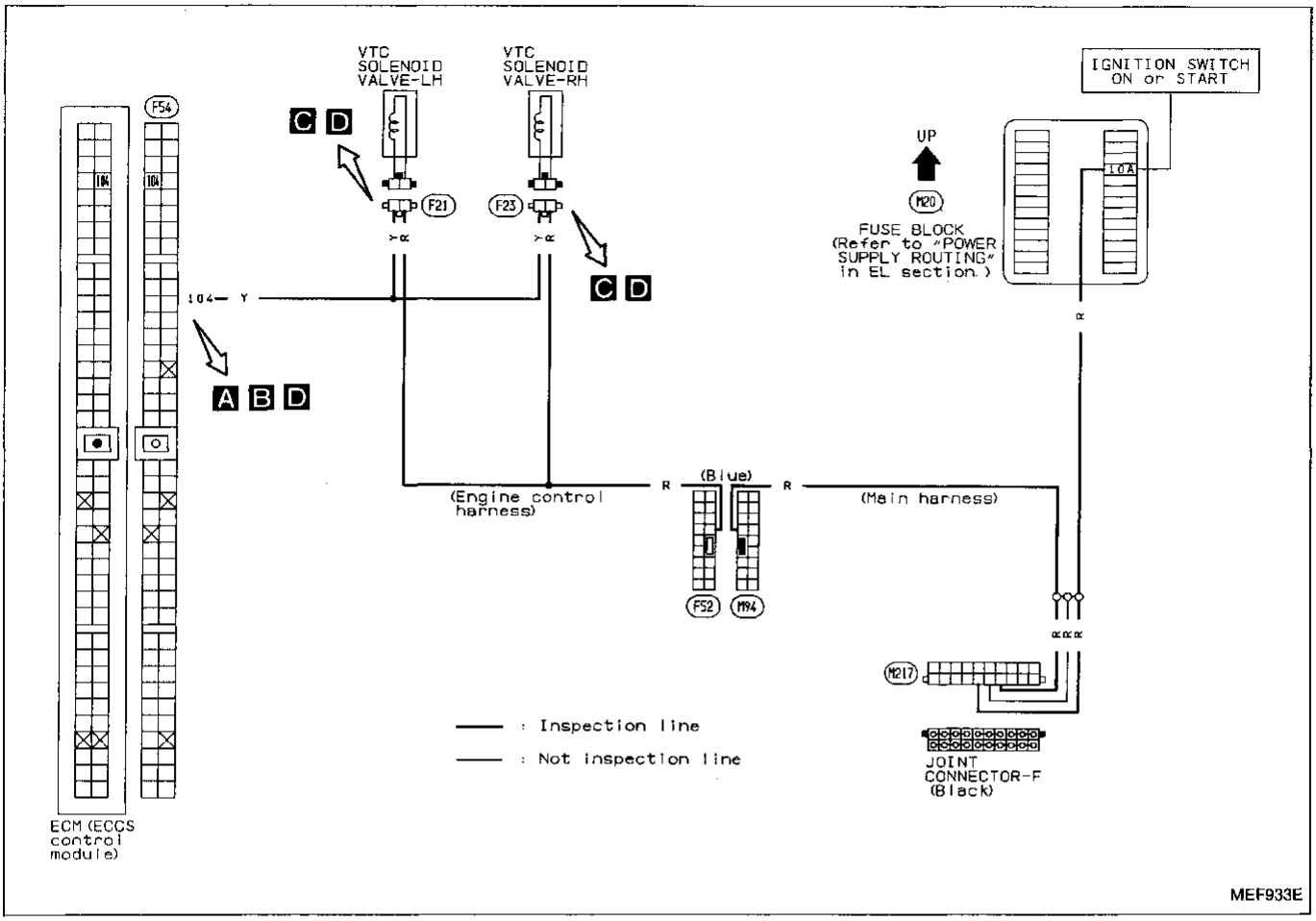
Trouble is not fixed.

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

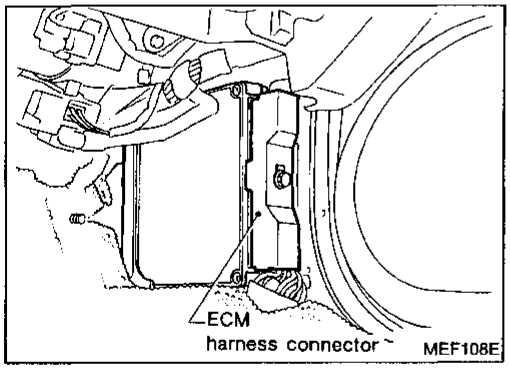
INSPECTION END

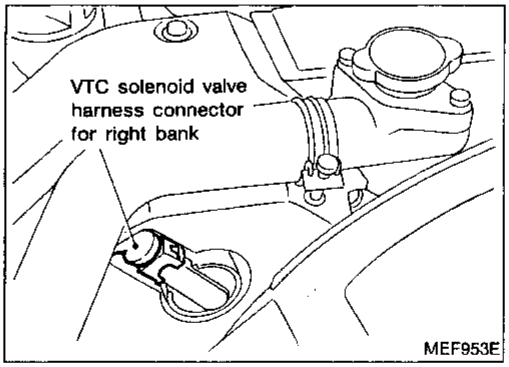
Diagnostic Procedure 29

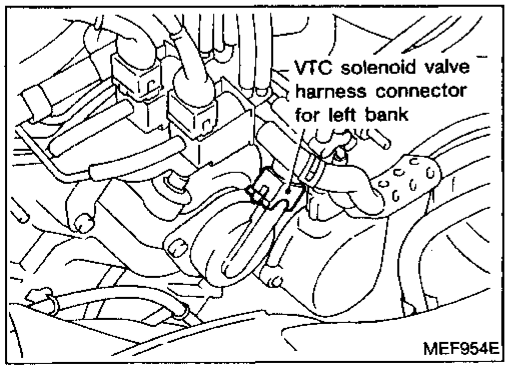
VALVE TIMING CONTROL (Not self-diagnostic item)



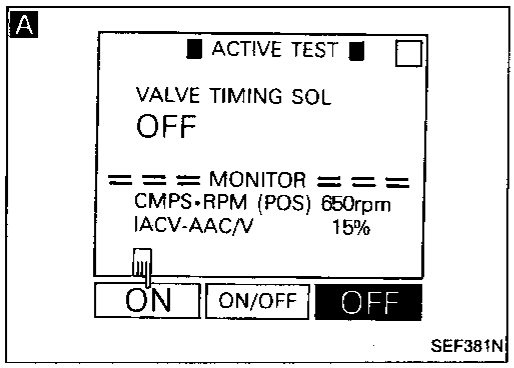
Harness layout

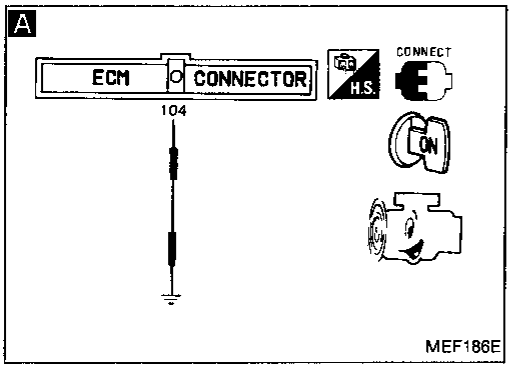


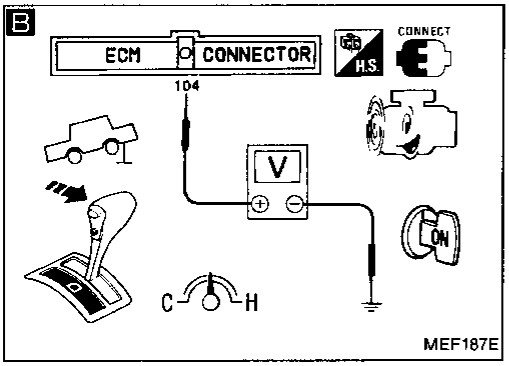


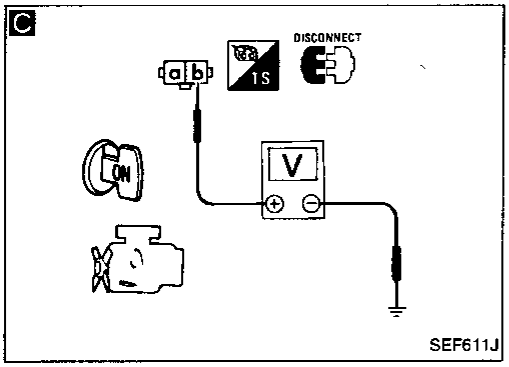


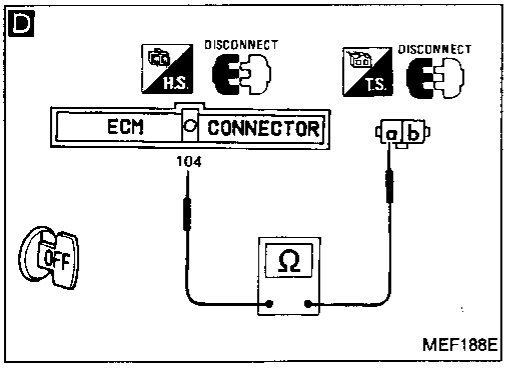
VALVE TIMING CONTROL (Not self-diagnostic item)











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.

Occurs → INSPECTION END

OR

1) Connect a suitable jumper wire between ECM terminal (104) and body ground.
2) Start engine and make sure that improper idle condition occurs.

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 selector lever to any position except "N" or "P" position.
5) Check voltage between ECM terminal (104) and ground under the following conditions with CONSULT or tester.

Voltage:

Quickly depress accelerator pedal, then quickly release it.
Approximately 0V

At idle
Battery voltage

OK → CHECK COMPONENT (VTC solenoid valve and VTC valve).
Refer to "Electrical Components Inspection". (See page EF & EC-220, 221.)

NG → Replace malfunctioning component(s).

NG

C

CHECK POWER SUPPLY.

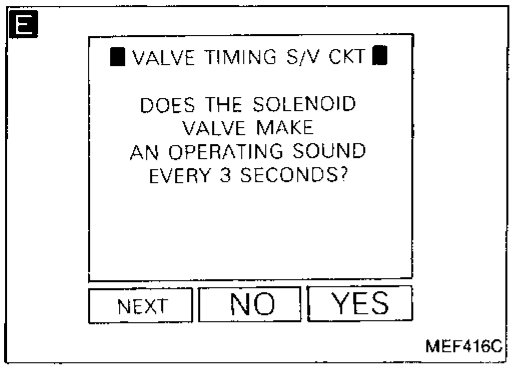
1) Stop engine.
2) Disconnect VTC solenoid valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal (b) and ground with CONSULT or tester.

Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F52), (M94)
- Joint connector (M217)
- 10A fuse
- Harness continuity between VTC solenoid valve and fuse

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 (104) 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-220.)

NG → Replace VTC solenoid valve.

OK

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

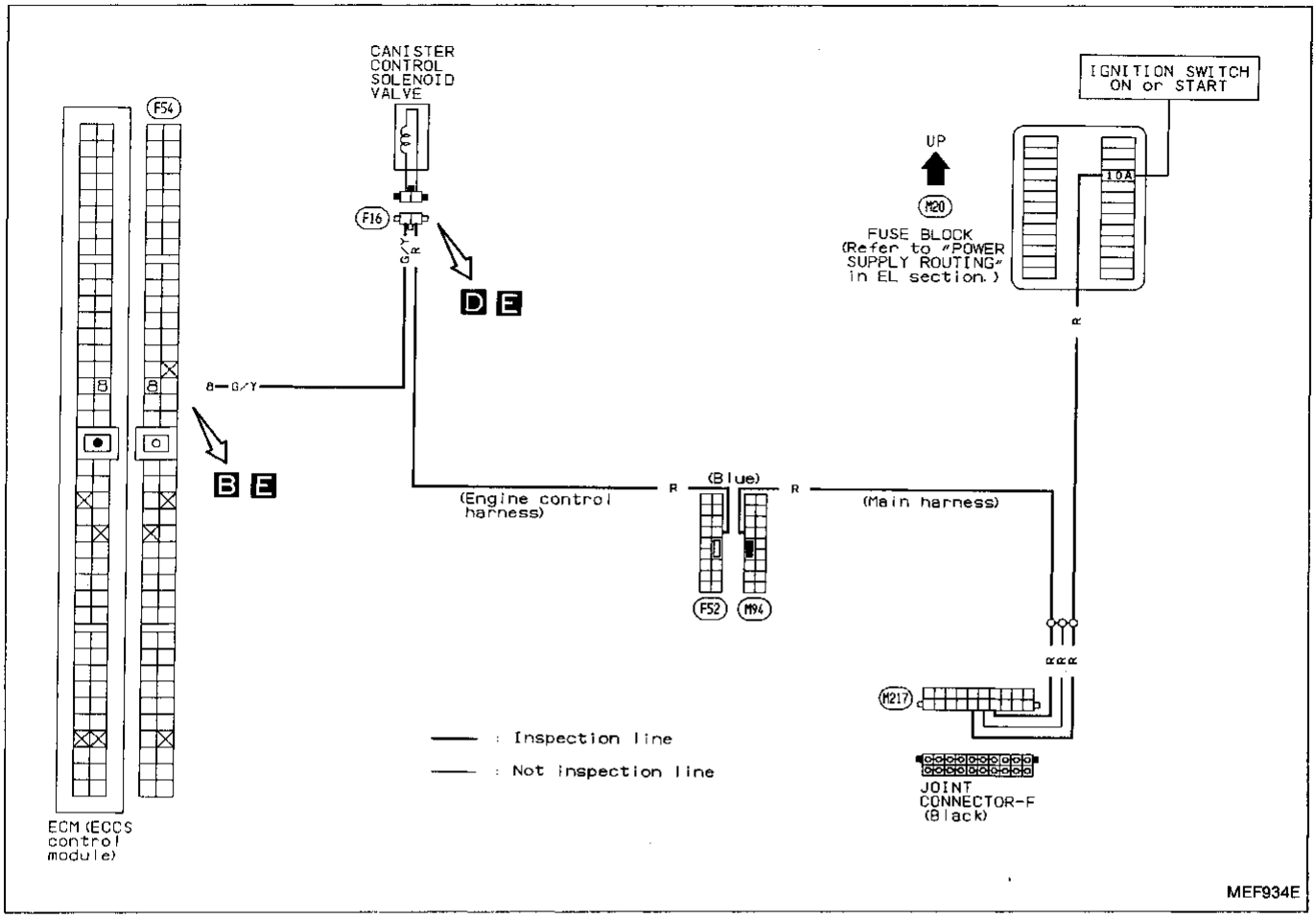
Trouble is not fixed.

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

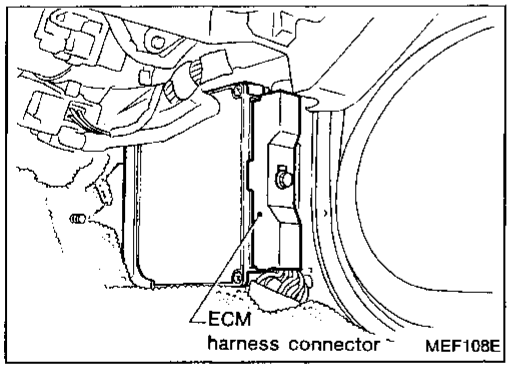
INSPECTION END

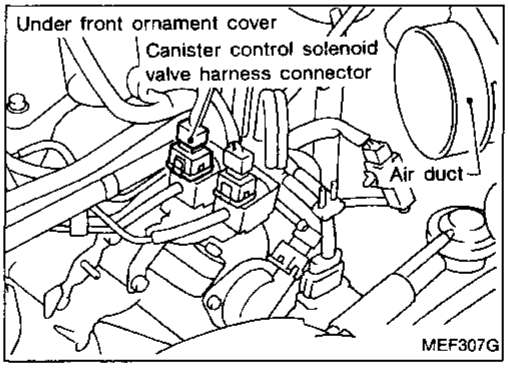
Diagnostic Procedure 30

CANISTER PURGE CONTROL (Not self-diagnostic item)

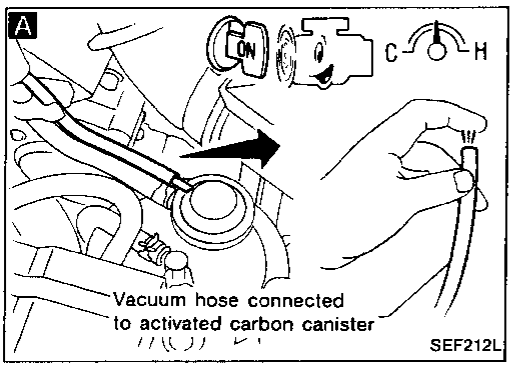


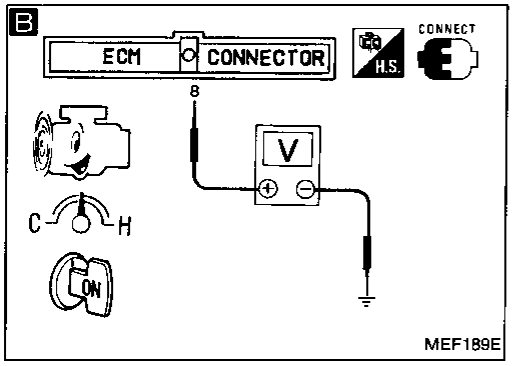
Harness layout

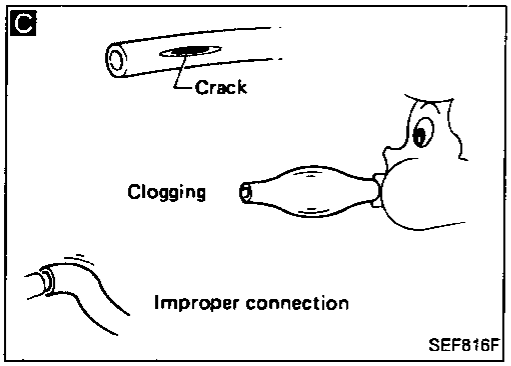


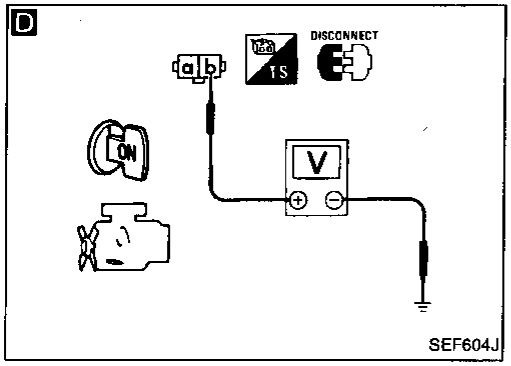


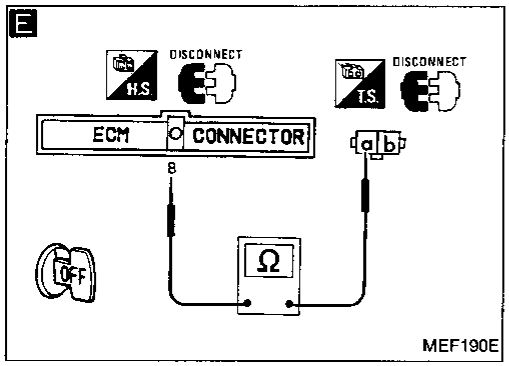
CANISTER PURGE CONTROL (Not self-diagnostic item)











INSPECTION START

A

CHECK VACUUM SOURCE TO ACTIVATED CARBON CANISTER.
1) Start engine and warm it up sufficiently.
2) Perform diagnostic test mode II (Self-diagnostic results). Make sure that diagnostic trouble code No. 11 and 12 are not displayed.
3) Stop engine and jack up drive wheels.
4) Disconnect vacuum hose to activated carbon canister and restart engine.
5) Make sure that vacuum exists under the following conditions.
   At idle:
   Vacuum should not exist.
   Engine speed is about 2,000 rpm (In "1" position)
   Vacuum should exist.

OK → CHECK COMPONENT.
(Activated carbon canister)
(See page EF & EC-228.)
If NG, replace activated carbon canister.

NG ↓

B

CHECK CONTROL FUNCTION.
1) Check voltage between ECM terminal ⑧ and ground with CONSULT or tester under the following conditions.
   Voltage:
   At idle
   Approximately 0V
   Engine speed is about 2,000 rpm (In "1" position)
   Battery voltage

OK → **C** Check vacuum hose for clogging, cracks and proper connection.

NG ↓

D

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

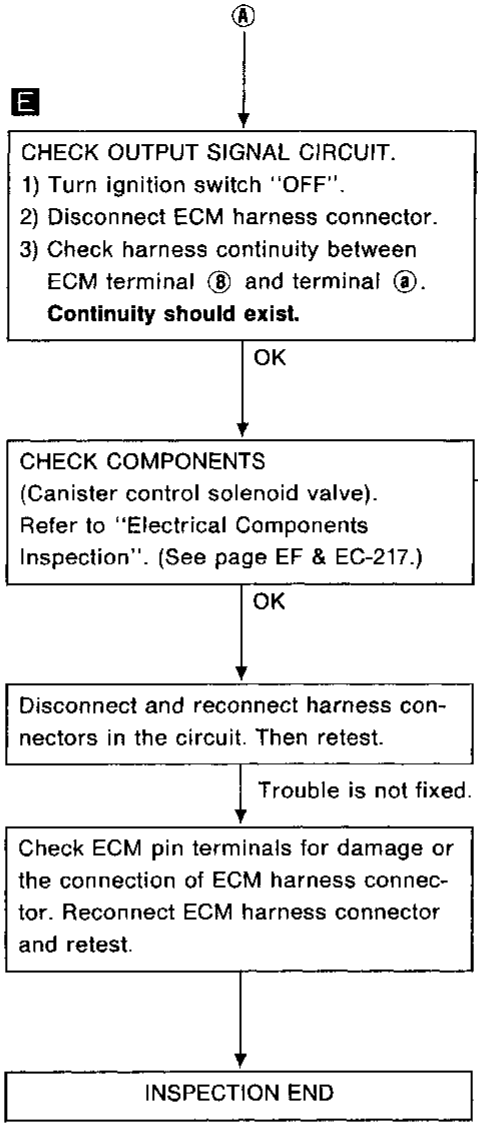
NG → Check the following.
- Harness connectors (F52), (M94)
- Joint connector (M217)
- 10A fuse
- Harness continuity between canister control solenoid valve and fuse

If NG, repair harness or connectors.

OK ↓

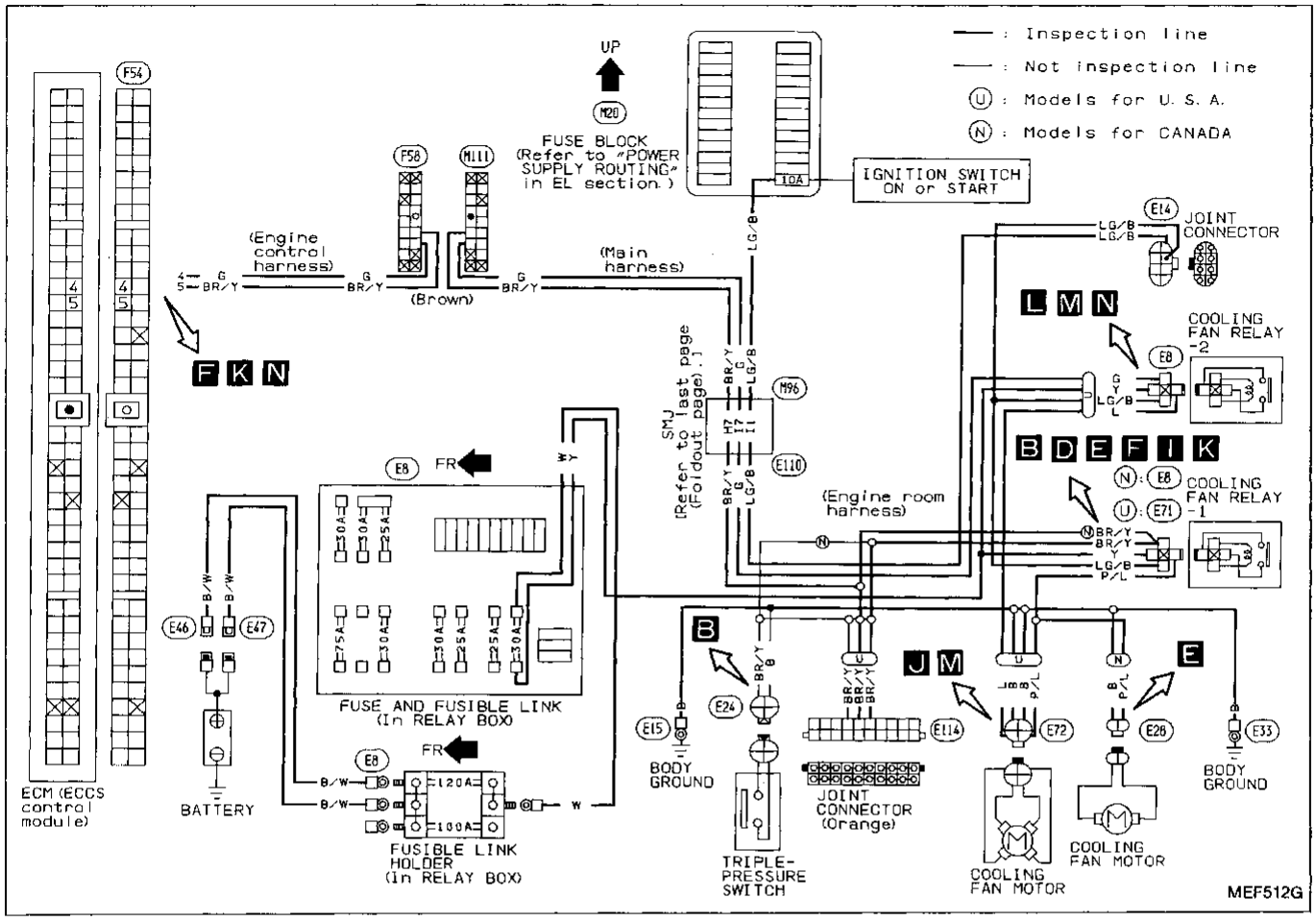
Ⓐ

CANISTER PURGE CONTROL (Not self-diagnostic item)

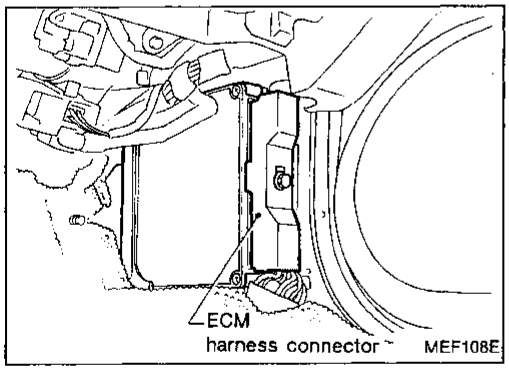


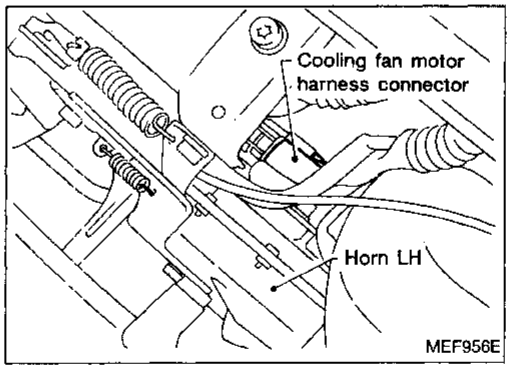
Diagnostic Procedure 31

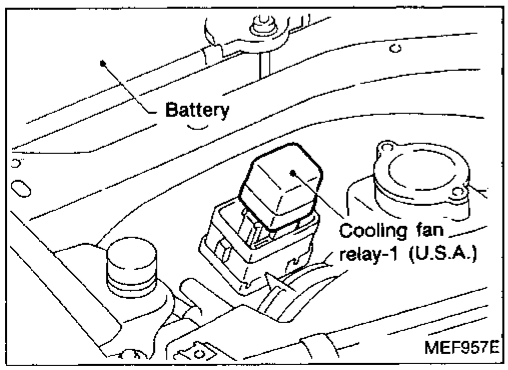
COOLING FAN CONTROL (Not self-diagnostic item)

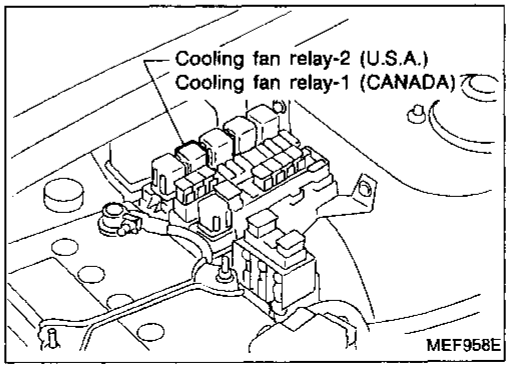


Harness layout

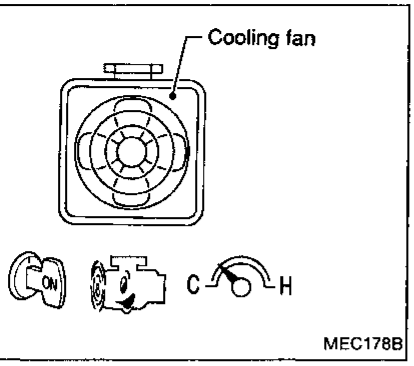






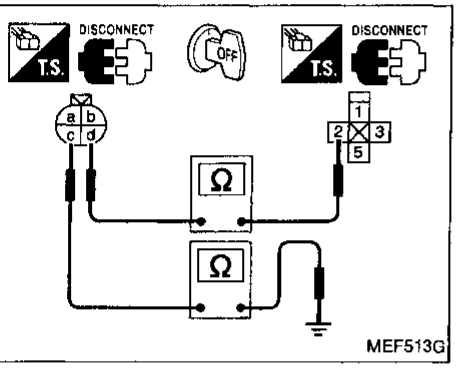


A



MEC178B

B



MEF513G

COOLING FAN CONTROL (Not self-diagnostic item)

INSPECTION START

A

CHECK OVERALL FUNCTION-I.
1) Turn ignition switch "ON".
2) Make sure that engine coolant temperature is low.
3) Start engine.
4) Make sure that cooling fan is not operating.

OK → Go to "CHECK OVERALL FUNCTION-II".

NG

B

CHECK HARNESS CONTINUITY BETWEEN COOLING FAN RELAY-1 AND GROUND.
1) Stop engine.
2) Disconnect cooling fan relay-1.
3) Disconnect triple-pressure switch harness connector.
4) Check harness continuity between terminal ② and terminal ⓓ, terminal ⓒ and body ground.
Continuity should exist.

NG → Check the following.
- Joint connector (E114) (Models for U.S.A.)
- Harness continuity between cooling fan relay-1 and triple-pressure switch
- Harness continuity between triple-pressure switch and body ground

If NG, repair harness or connectors.

OK

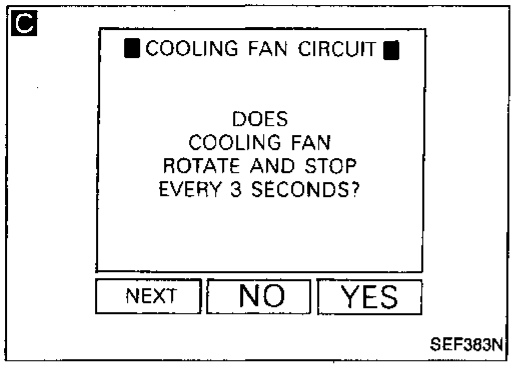
CHECK COMPONENT (Triple-pressure switch).
Refer to "Electrical Components Inspection" of "TROUBLE DIAGNOSES" in HA section.

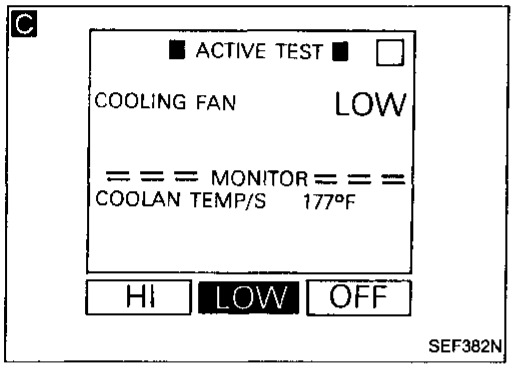
NG → Replace triple-pressure switch.

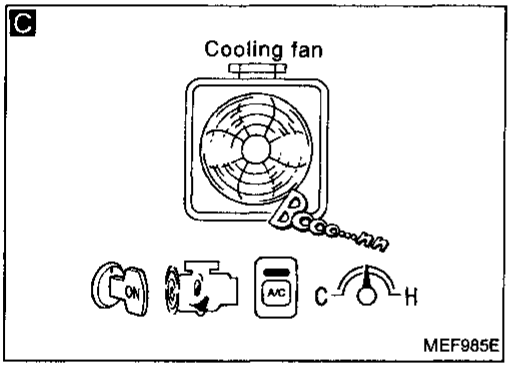
OK

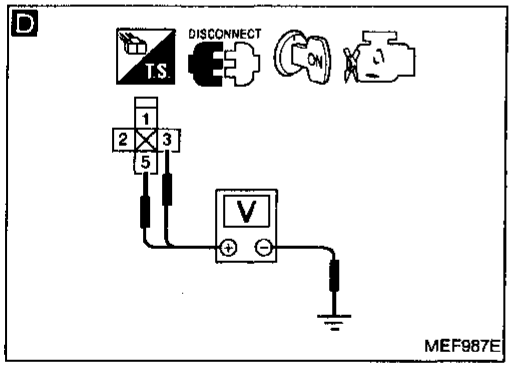
Go to "CHECK OUTPUT SIGNAL CIRCUIT" in "CHECK OVERALL FUNCTION-II".

COOLING FAN CONTROL (Not self-diagnostic item)









Models for CANADA

CHECK OVERALL FUNCTION-II.

C

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

OR

3) Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.
- **The cooling fan control system for Canada carries out the 1-step control [OFF/ON] while "OFF", "LOW" and "HI" are being displayed on the CONSULT screen.**

OR

2) Start engine.
3) Set temperature lever at full cold position.
4) Turn both A/C switch and blower fan switch "ON".
5) Run engine at idle for a while with air conditioner operating.
6) Make sure that cooling fan begins to operate.

OK → INSPECTION END

NG

D

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect cooling fan relay-1.
3) Turn ignition switch "ON".
4) Check voltage between terminals ③, ⑤ and ground with CONSULT or tester.
Voltage: Battery voltage

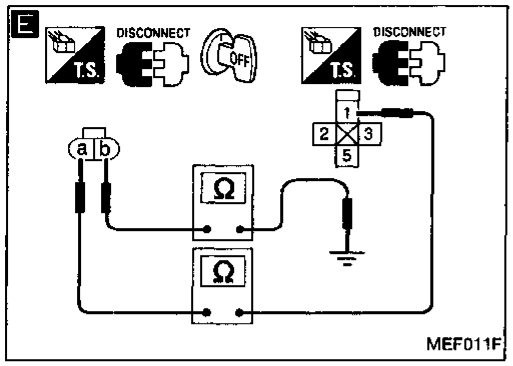
NG → Check the following.
- Harness connectors (M96), (E110)
- Joint connector (E14)
- 10A fuse
- 30A fusible link
- Fusible link holder
- Harness continuity between cooling fan relay-1 and fuse
- Harness continuity between cooling fan relay-1 and battery

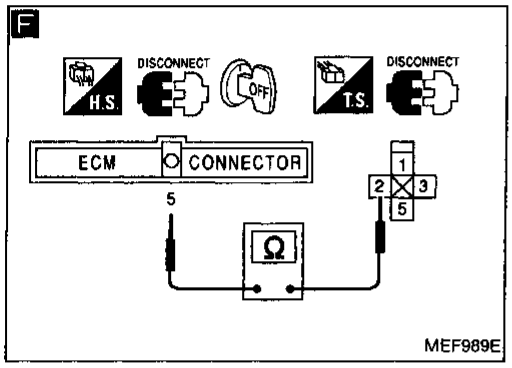
If NG, repair harness or connectors.

OK

Ⓐ

COOLING FAN CONTROL (Not self-diagnostic item)





Ⓐ

E

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

NG → Repair harness or connectors.

OK ↓

F

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ⑤ and terminal ②.
Continuity should exist.

NG → Check the following.
- Harness connectors (F56), (M111)
- Harness connectors (M96), (E110)
- Harness continuity between cooling fan relay-1 and ECM

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT
(Cooling fan relay-1).
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.

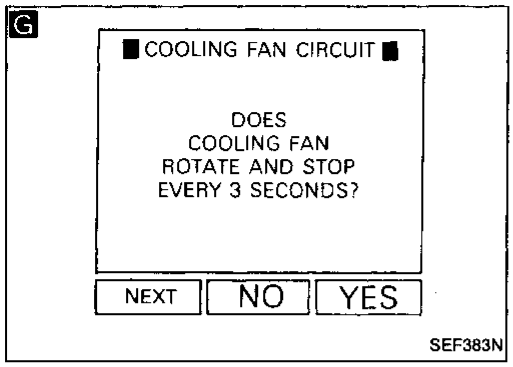
Trouble is not fixed. ↓

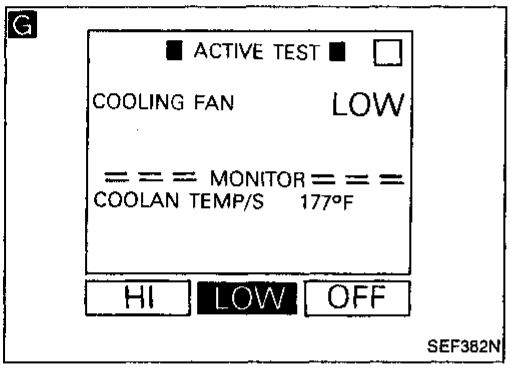
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

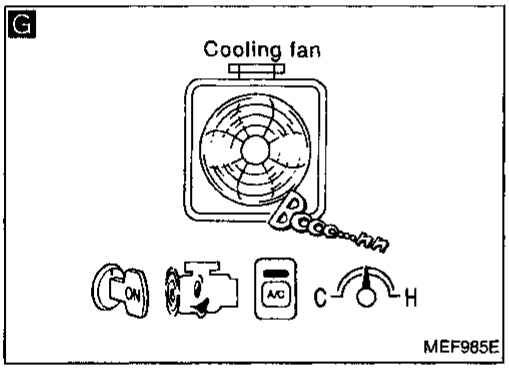
↓

INSPECTION END

COOLING FAN CONTROL (Not self-diagnostic item)







Models for U.S.A.

CHECK OVERALL FUNCTION-II.

G

CHECK COOLING FAN LOW SPEED OPERATION.

1) Turn ignition switch "OFF".
2) Disconnect cooling fan relay-2.
3) Turn ignition switch "ON".
4) Perform "COOLING FAN CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

4) Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.

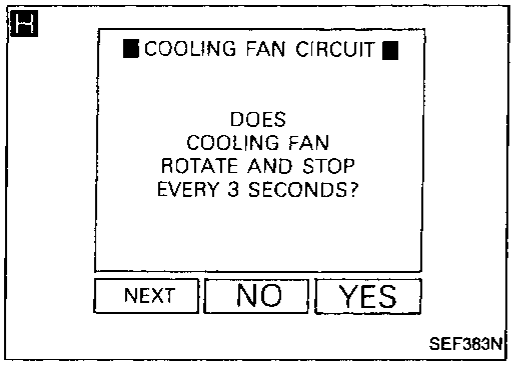
OR

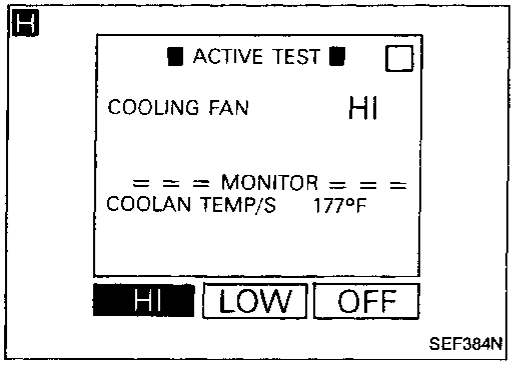
3) Start engine.
4) Set temperature lever at full cold position.
5) Turn both A/C switch and blower fan switch "ON".
6) Run engine at idle for a while with air conditioner operating.
7) Make sure that cooling fan begins to operate at low speed.

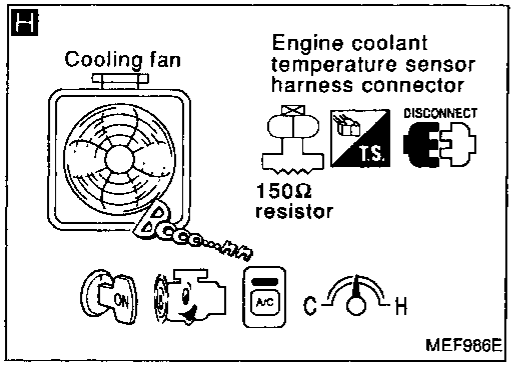
NG → Check cooling fan low speed control circuit. (Go to PROCEDURE A.)

OK → Ⓒ

COOLING FAN CONTROL (Not self-diagnostic item)







Ⓒ

CHECK COOLING FAN HIGH SPEED OPERATION.

1) Turn ignition switch "OFF".
2) Reconnect cooling fan relay-2.
3) Turn ignition switch "ON".
4) Perform "COOLING FAN CIRCUIT" in "FUNCTION TEST" mode with CONSULT and make sure that cooling fan operates at high speed.

OR

4) Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT and make sure that cooling fan operates at high speed.

OR

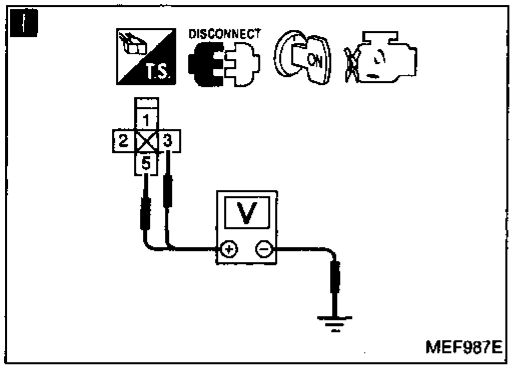
3) Disconnect engine coolant temperature sensor harness connector.
4) Connect 150Ω resistor to engine coolant temperature sensor harness connector.
5) Restart engine and make sure that cooling fan operates at high speed.

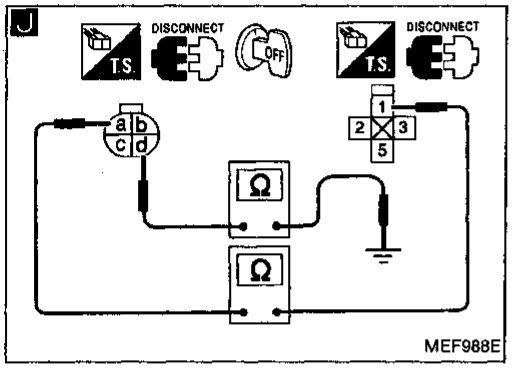
NG → Check cooling fan high speed control circuit. (Go to PROCEDURE B.)

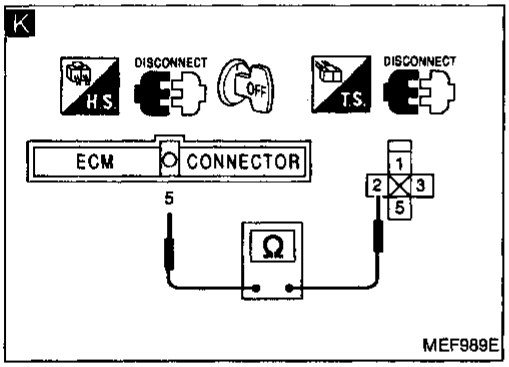
OK ↓

INSPECTION END

COOLING FAN CONTROL (Not self-diagnostic item)







PROCEDURE A

INSPECTION START

I

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect cooling fan relay-1.
3) Turn ignition switch "ON".
4) Check voltage between terminals ③, ⑤ and ground with CONSULT or tester.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors (M96), (E110)
- Joint connector (E14)
- 10A fuse
- 30A fusible link
- Fusible link holder
- Harness continuity between cooling fan relay-1 and fuse
- Harness continuity between cooling fan relay-1 and battery

If NG, repair harness or connectors.

OK ↓

J

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

NG → Repair harness or connectors.

OK ↓

K

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ⑤ and terminal ②.
Continuity should exist.

NG → Check the following.
- Harness connectors (F58), (M111)
- Harness connectors (M96), (E110)
- Joint connectors (E114)
- Harness continuity between cooling fan relay-1 and ECM

If NG, repair harness or connectors.

OK ↓

Ⓓ

COOLING FAN CONTROL (Not self-diagnostic item)

Ⓓ

CHECK COMPONENT
(Cooling fan relay-1).
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.

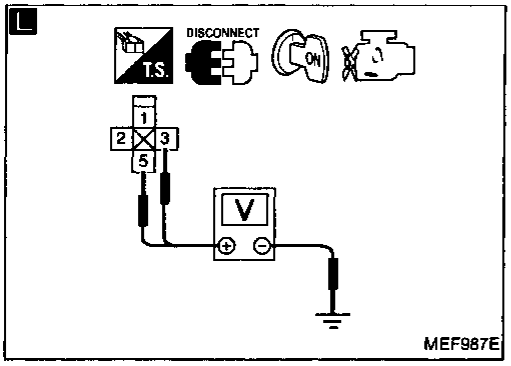
OK

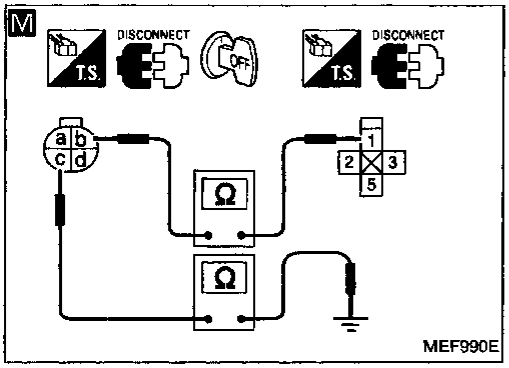
Disconnect and reconnect harness connectors in the circuit. Then retest.

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





PROCEDURE B

INSPECTION START

L

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect cooling fan relay-2.
3) Turn ignition switch "ON".
4) Check voltage between terminals ③, ⑤ and ground with CONSULT or tester.
Voltage: Battery voltage

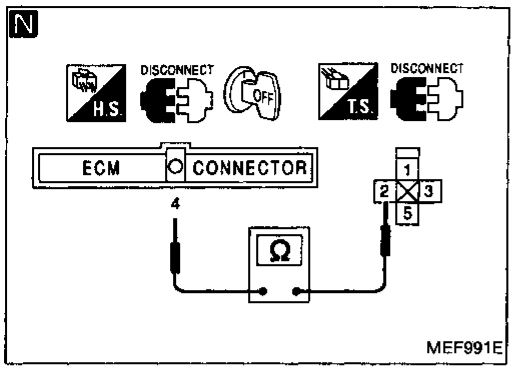
NG → Check the following.
- Harness continuity between cooling fan relay-2 and joint connector (E14)
- Harness continuity between cooling fan relay-2 and 30A fusible link

If NG, repair harness or connectors.

OK

Ⓔ

COOLING FAN CONTROL (Not self-diagnostic item)



Ⓔ

M

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

NG → Repair harness or connectors.

OK ↓

N

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ④ and terminal ②.
Continuity should exist.

NG → Check the following.
- Harness connectors (F58), (M111)
- Harness connectors (M96), (E110)
- Harness continuity between cooling fan relay-2 and ECM

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT
(Cooling fan relay-2).
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.

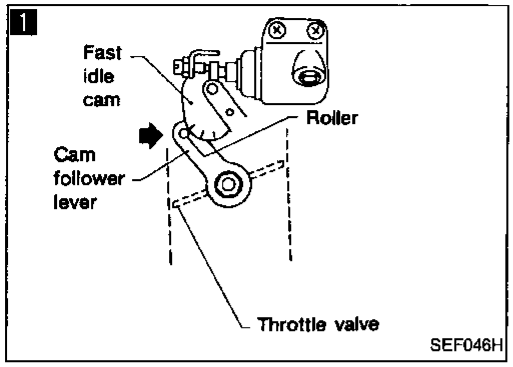
Trouble is not fixed. ↓

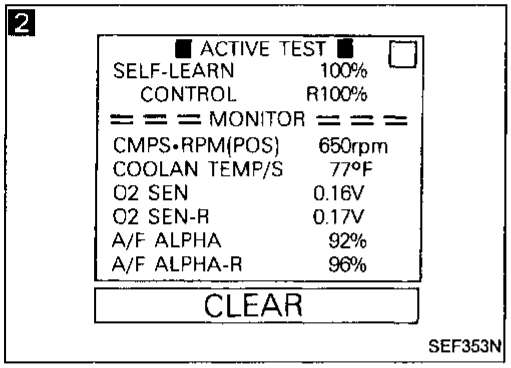
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

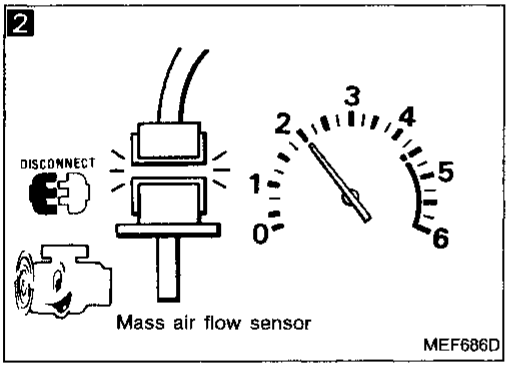
↓

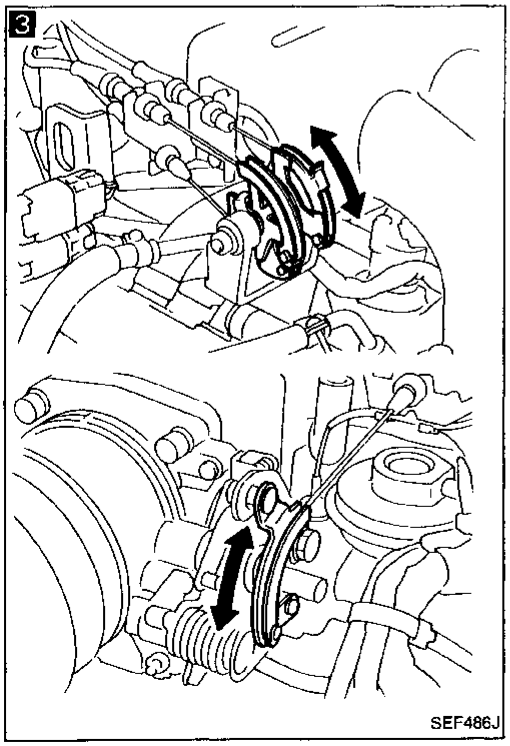
INSPECTION END

Diagnostic Procedure 32 — Symptom — High Idling after Warm-up









1

CHECK FAST IDLE CAM.
Does fast idle cam keep cam follower lever released?

No → Check fast idle cam adjustment. (See page EF & EC-223.)

Yes ↓

2

CHECK INTAKE AIR LEAK.

1. Select "SELF-LEARNING 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 mass air flow sensor harness connectors.
2. After starting and running engine for at least 30 seconds at 2,000 rpm, does the engine speed drop?

No ↓

3

CHECK THROTTLE LINKAGE.

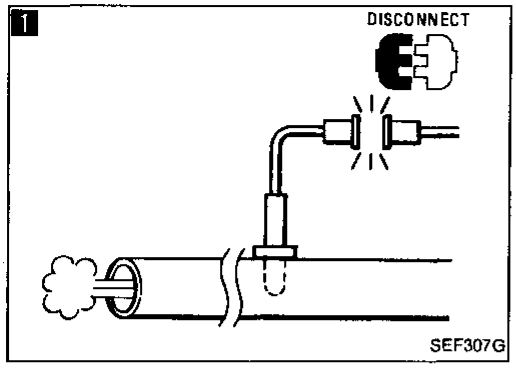
1. Check that throttle linkage moves smoothly.
2. Confirm that throttle valve both fully opens and fully closes.

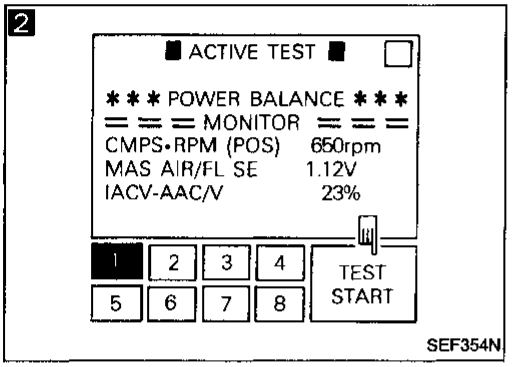
NG → Repair throttle linkage or sticking of throttle valve.

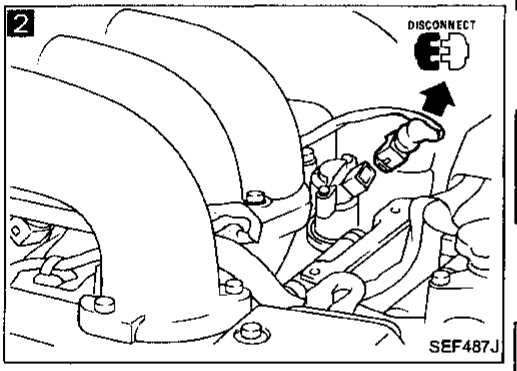
OK ↓

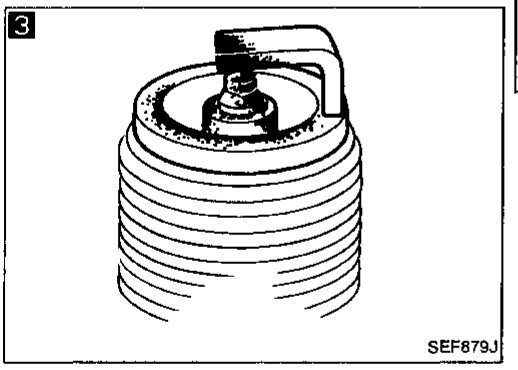
INSPECTION END

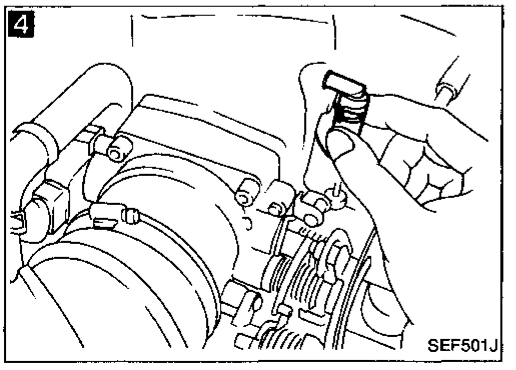
Diagnostic Procedure 33 — Symptom — Hunting











1

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

Yes → Check heated oxygen sensor(s). (See page EF & EC-102, 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 injector 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 ↓

4

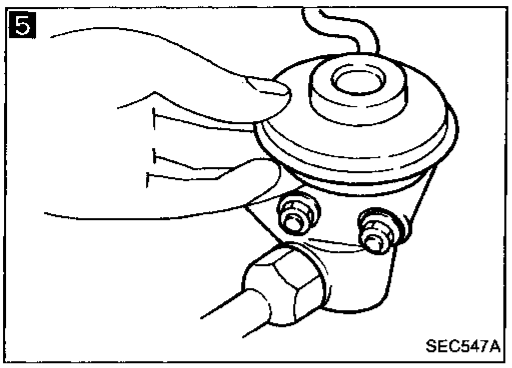
CHECK FOR INTAKE AIR LEAK.
When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

Yes → Discover air leak location and repair.

No ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 33 — Symptom — Hunting (Cont'd)



Ⓐ

5

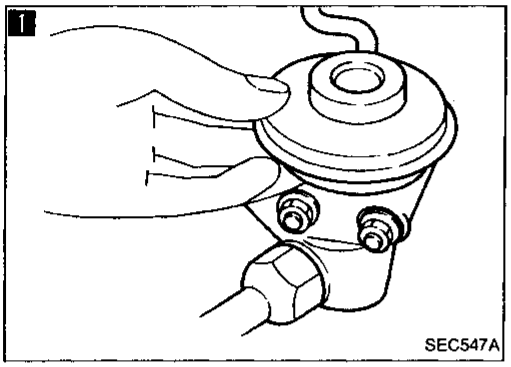
CHECK EGR VALVE.
Check EGR valve for sticking.

NG → Repair or replace.

OK ↓

INSPECTION END

Diagnostic Procedure 34 — Symptom — Unstable Idle

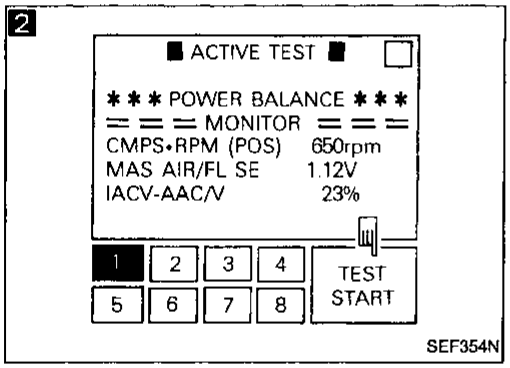


1

CHECK EGR VALVE.
Check EGR valve for sticking.

NG → Repair or replace.

OK ↓



2

PERFORM POWER BALANCE TEST.

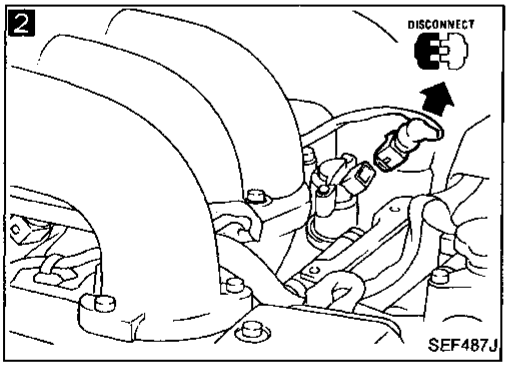
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

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 ↓



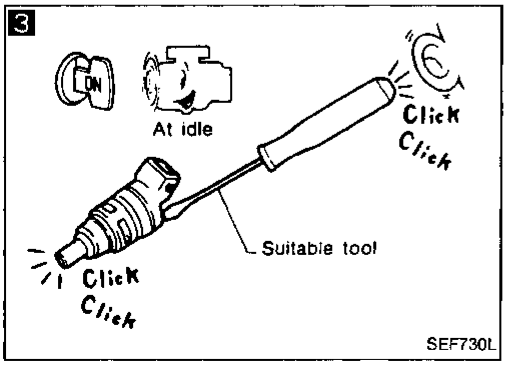
3

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

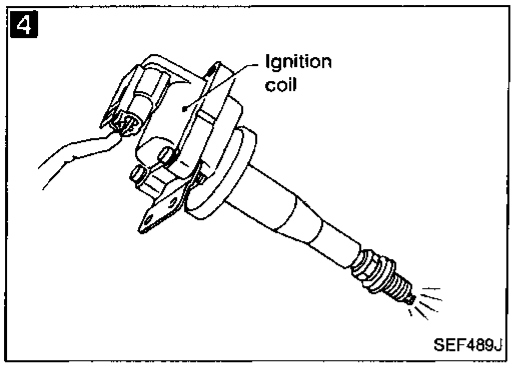
No → Check injector(s) and circuit(s).

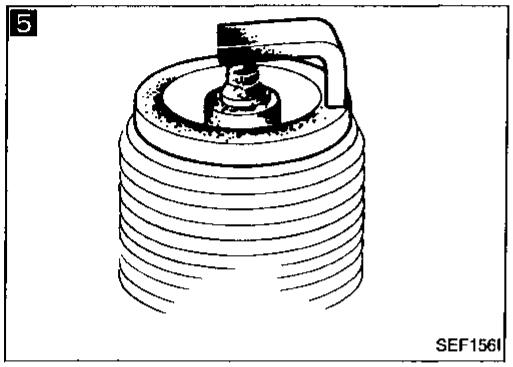
Yes ↓

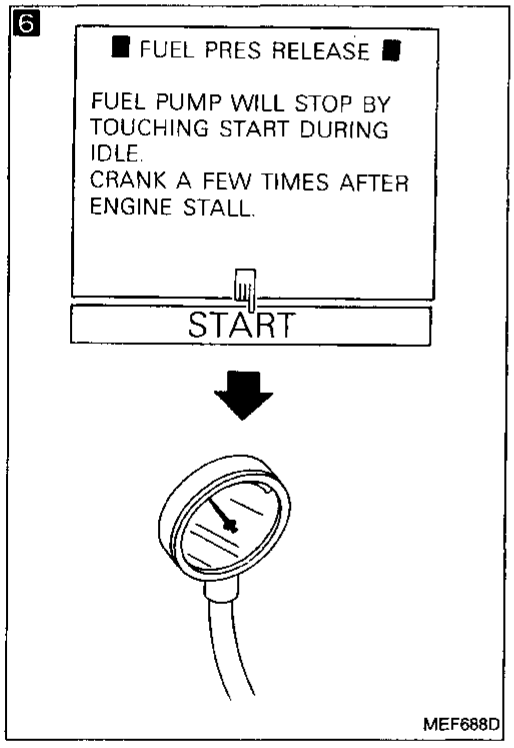
(Go to Ⓐ on next page.)



Diagnostic Procedure 34 — Symptom — Unstable Idle (Cont'd)







Ⓐ

4

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

NG → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-95, 127.)

OK ↓

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. 235 kPa (2.4 kg/cm², 34 psi)

OR

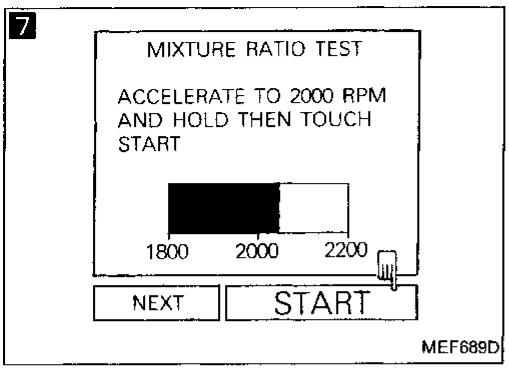
1. Release fuel pressure to zero. (Refer to page EF & EC-226.)
2. Install fuel pressure gauge and check fuel pressure.

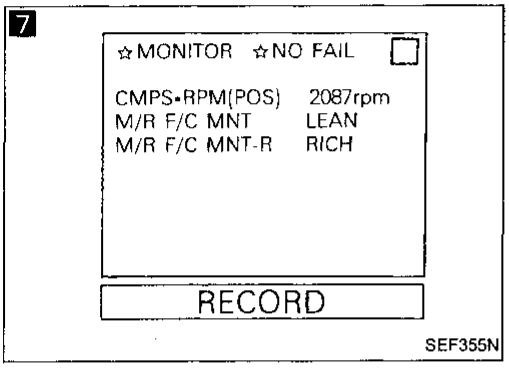
NG → Check fuel pump and circuit.

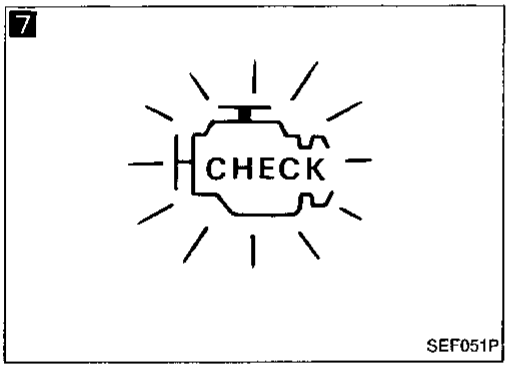
OK ↓

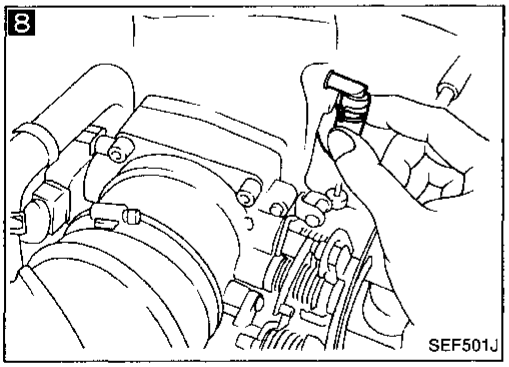
(Go to Ⓑ on next page.)

Diagnostic Procedure 34 — Symptom — Unstable Idle (Cont'd)









Ⓑ

7

CHECK HEATED OXYGEN SENSOR.

1. Start engine and warm it up sufficiently.
2. Perform "MIXTURE RATIO TEST" in "FUNCTION TEST" mode.

NG → Replace heated oxygen sensor(s).

OR

2. See "M/R F/C MNT (right and left sides)" in "DATA MONITOR" mode.
3. 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 cycle: RICH → LEAN → RICH
   2 cycles: RICH → LEAN → RICH → LEAN → RICH

OR

2. Set "Heated oxygen sensor monitor" in Diagnostic Test Mode II. (See page EF & EC-54.)
3. Maintaining engine at 2,000 rpm under no-load, check to make sure that 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?

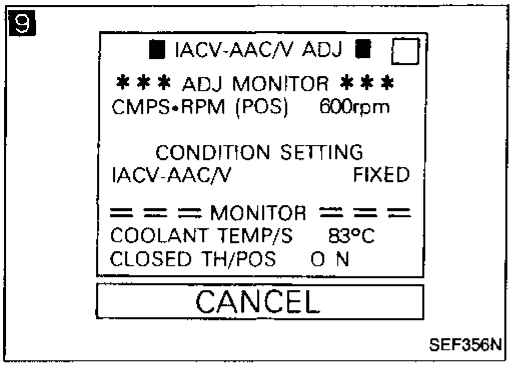
Yes → Discover air leak location and repair.

No ↓

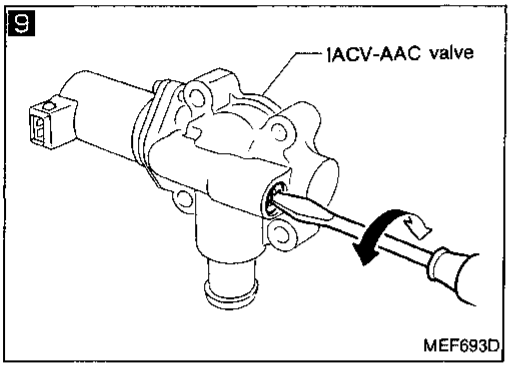
(Go to Ⓒ on next page.)

Diagnostic Procedure 34 — Symptom — Unstable Idle (Cont'd)

9



9



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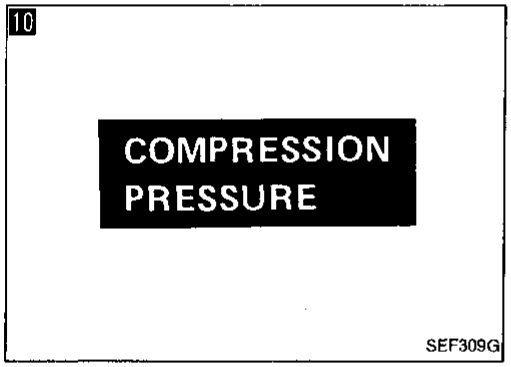


Ⓒ

9 **CHECK IDLE ADJ. SCREW CLOGGING.**

1. Perform "IACV-AAC/V ADJ" in "WORK SUPPORT" mode.
2. Can you set engine speed at 600±25 rpm ("N" position) by turning idle adjusting screw?

No → Check for IACV-AAC valve clogging or throttle valve clogging.

OR

1. Disconnect IACV-AAC valve harness connector.
2. Can you set engine speed at 600±25 rpm ("N" position) by turning idle adjusting screw?

Yes ↓

10 **CHECK COMPRESSION PRESSURE.**

- Check compression pressure.

Standard: kPa (kg/cm², psi)/300 rpm
1,275 (13.0, 185)
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 ↓

11 **CHECK ECM HARNESS CONNECTOR.**

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

NG → Repair or replace.

OK ↓

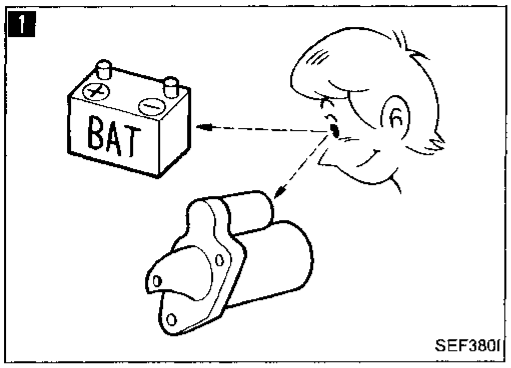
12 **TRY A KNOWN GOOD ECM*.**

↓

INSPECTION END

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

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

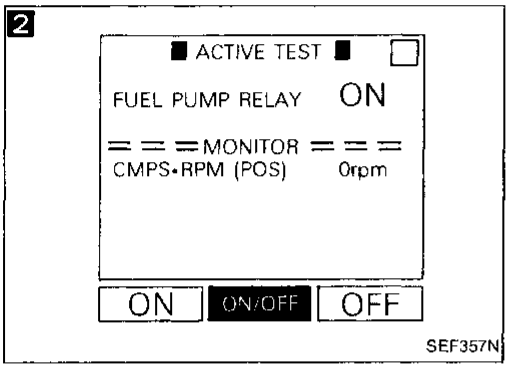


1

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

NG → Repair or replace.

OK ↓



2

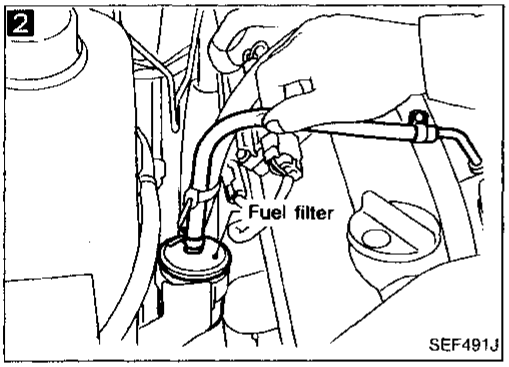
CHECK FUEL PRESSURE.

1. Turn ignition switch "ON".
2. Perform "FUEL PUMP RELAY" in "ACTIVE TEST" mode.
3. Pinch fuel feed hose with fingers.
   Is fuel pressure pulsation felt on the fuel feed hose?

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

OR

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



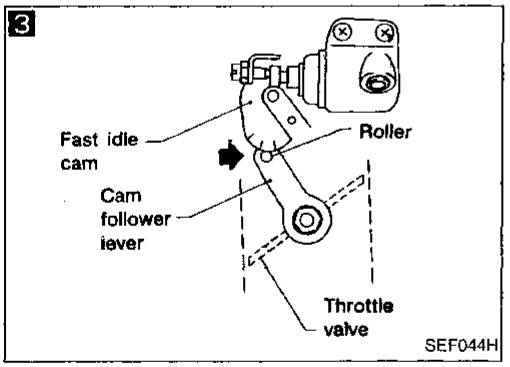
Yes ↓

3

CHECK FAST IDLE CAM.
When the engine is cold, does fast idle cam keep cam follower lever in position?

No → Check fast idle cam adjustment. (See page EF & EC-223.)

Yes ↓



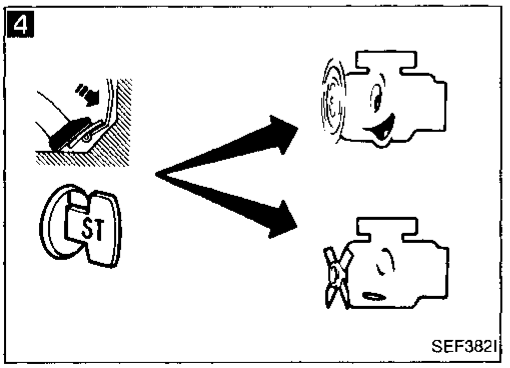
4

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

Yes → Check IACV-AAC valve and circuit. (See page EF & EC-149.)

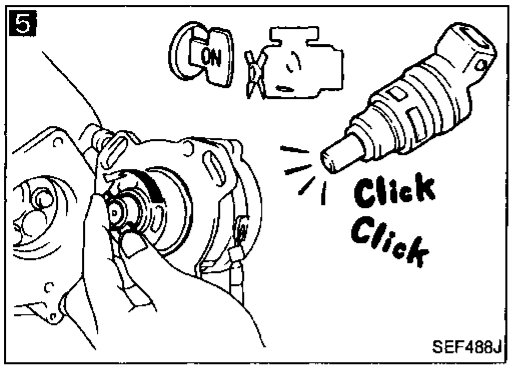
No ↓

(Go to Ⓐ on next page.)



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

5



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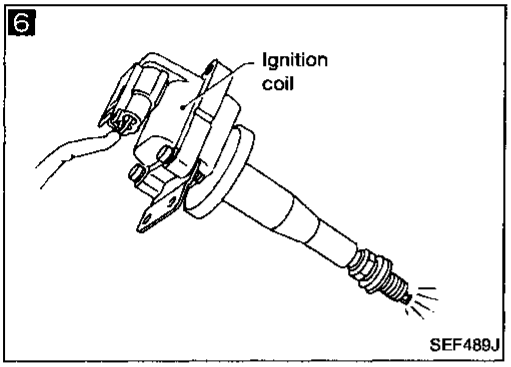
6



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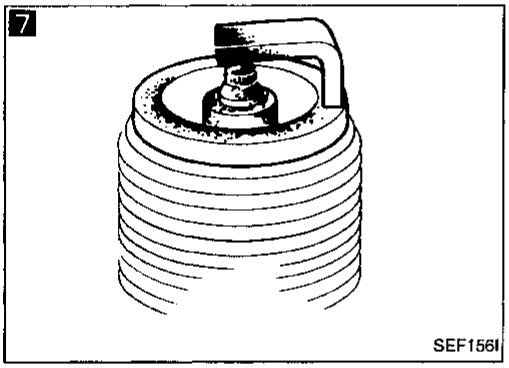
7



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Ⓐ

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

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

Yes ↓

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

NG → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-95, 127.)

OK ↓

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

NG → Repair or replace spark plug(s).

OK ↓

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

NG → Repair or replace.

OK ↓

9 **CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.**
Refer to page EF & EC-78.

NG → Repair or replace.

OK ↓

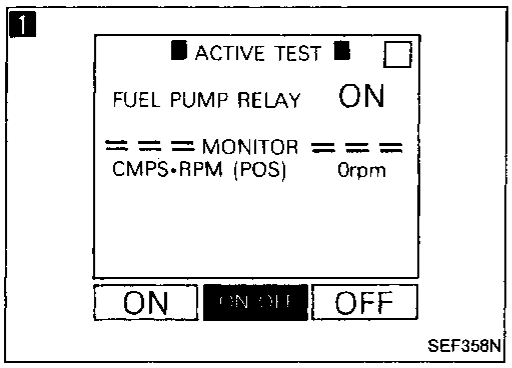
10 **TRY A KNOWN GOOD ECM***

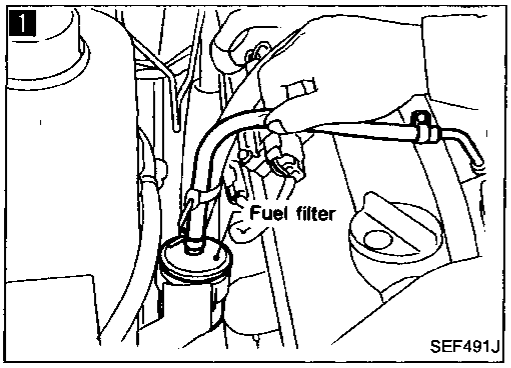
↓

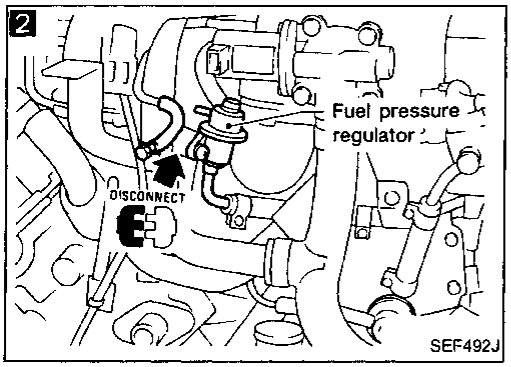
INSPECTION END

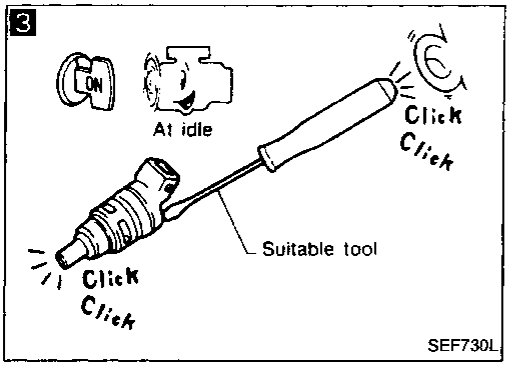
*: ECM may be the cause of a problem, but this is rarely the case.

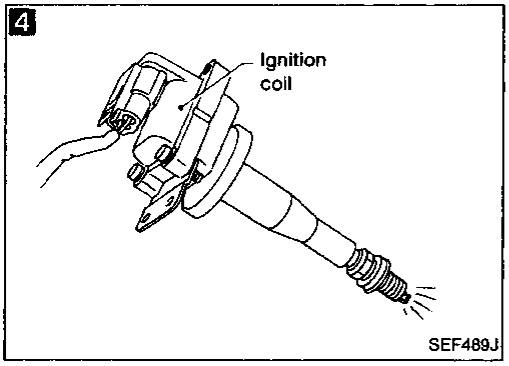
Diagnostic Procedure 36 — Symptom — Hard to Start or Impossible to Start when the Engine is Hot











1

CHECK FUEL PRESSURE.

1. Turn ignition switch "ON".
2. Perform "FUEL PUMP RELAY" in "ACTIVE TEST" mode.
3. Pinch fuel feed hose with fingers.

Is fuel pressure pulsation felt on the fuel feed hose?

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

OR

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

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.

Does each injector make an operating sound at idle?

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

Yes

4

CHECK IGNITION SPARK.

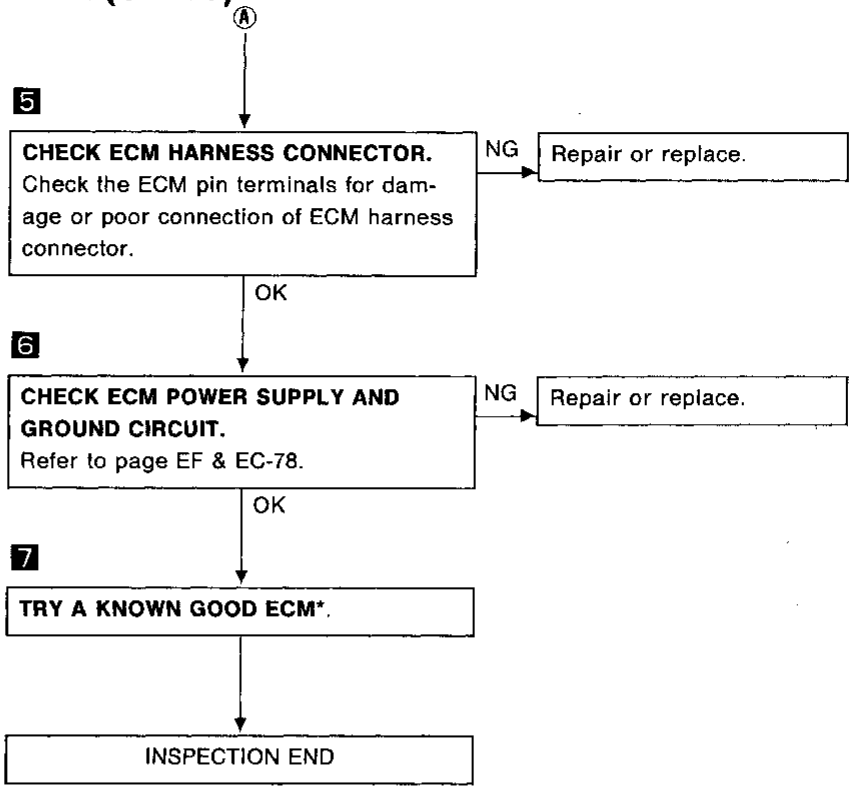
1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

NG → Check ignition coil, power transistor unit and circuits. (See page EF & EC-95, 127.)

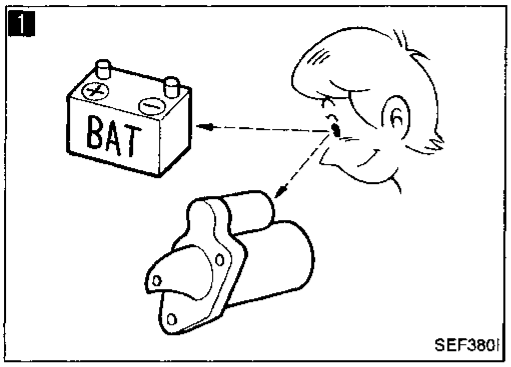
OK

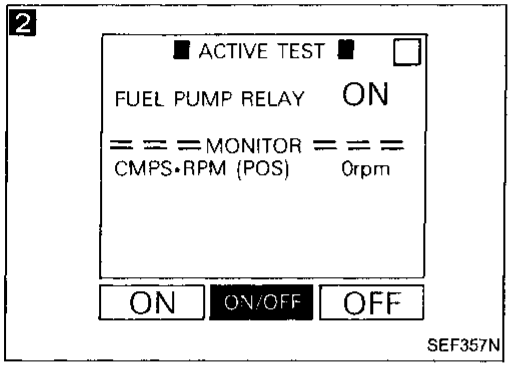
(Go to Ⓐ on next page.)

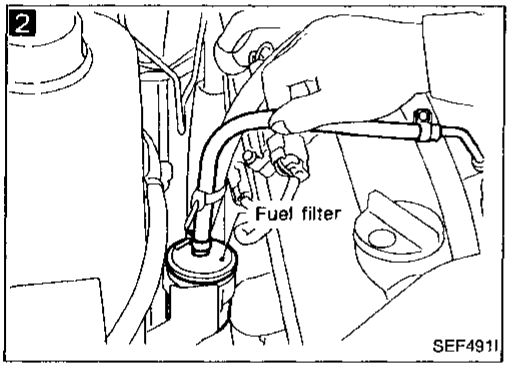
Diagnostic Procedure 36 — Symptom — Hard to Start or Impossible to Start when the Engine is Hot (Cont'd)

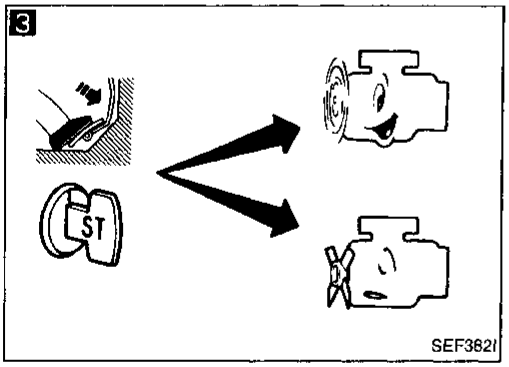


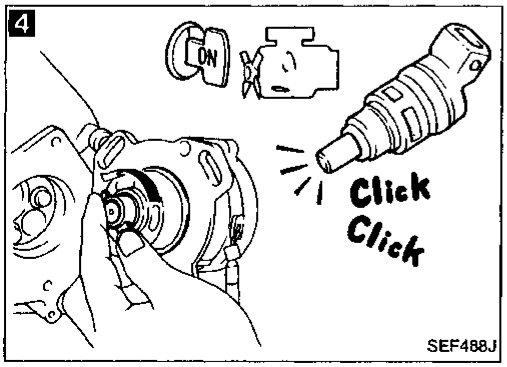
*: ECM may be the cause of a problem, but this is rarely the case.











Diagnostic Procedure 37 — Symptom — 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. Turn ignition switch "ON".
2. Perform "FUEL PUMP RELAY" in "ACTIVE TEST" mode.
3. Pinch fuel feed hose with fingers.
   Is fuel pressure pulsation felt on the fuel feed hose?

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

OR

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

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. Disconnect power transistor harness connector.
3. Turn ignition switch ON. (Do not start engine.)
4. When rotating camshaft position sensor shaft, does each injector make an operating sound?

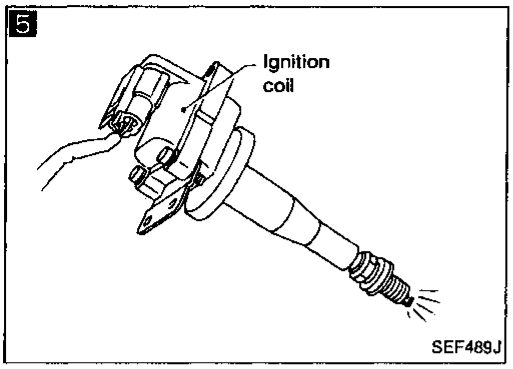
No → Check injectors and circuits.

Yes ↓

(Go to Ⓐ on next page.)

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

5



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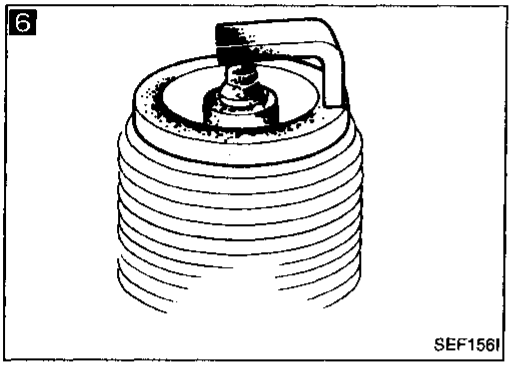

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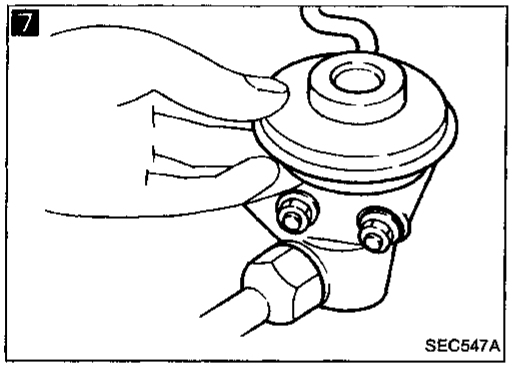


Ⓐ

5

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

NG → Check ignition coil, power transistor unit and circuits. (See page EF & EC-95, 127.)

OK ↓

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 ↓

8

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

NG → Repair or replace.

OK ↓

9

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-78.

NG → Repair or replace.

OK ↓

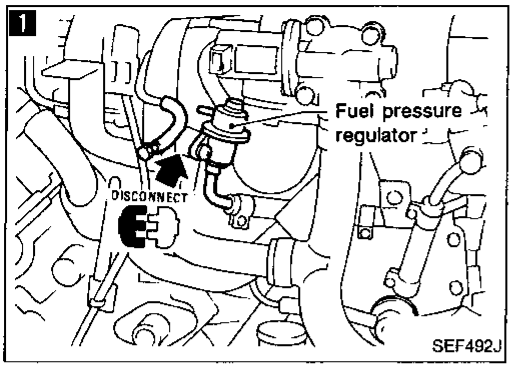
10

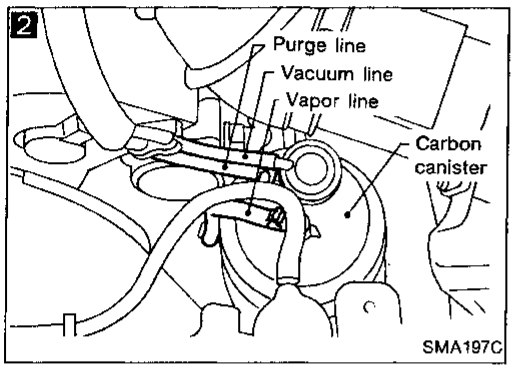
TRY A KNOWN GOOD ECM*.

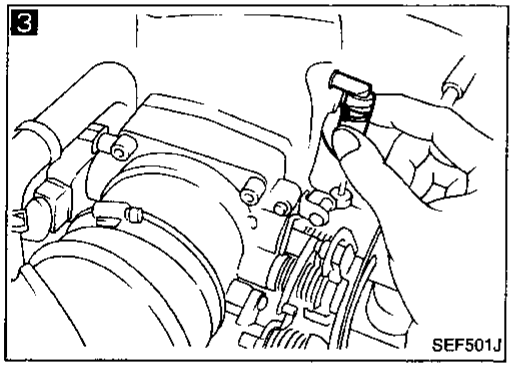
↓

INSPECTION END

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







Diagnostic Procedure 38 — Symptom — 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 ↓

3

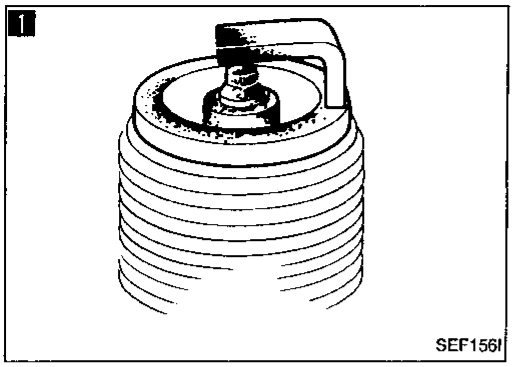
CHECK FOR INTAKE AIR LEAK
When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

Yes → Discover air leak location and repair

No ↓

INSPECTION END

1



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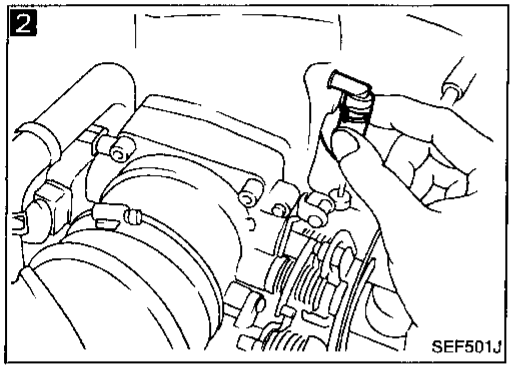
2



SEF501J

Diagnostic Procedure 39 — Symptom — 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 ↓

3

TRY A KNOWN GOOD MASS AIR FLOW SENSOR.

Trouble is fixed. → Replace mass air flow sensor.

Trouble is not fixed. ↓

4

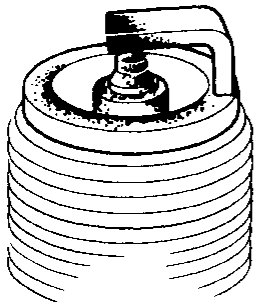
CHECK FOR INTAKE VALVE DEPOSITS.
If there are deposits on intake valves, remove them.

↓

INSPECTION END

Diagnostic Procedure 40 — Symptom — Hesitation under Normal Conditions

1



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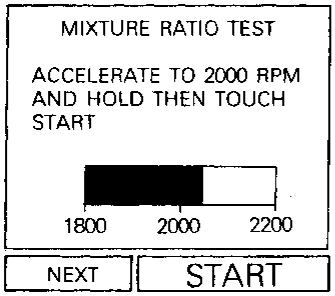
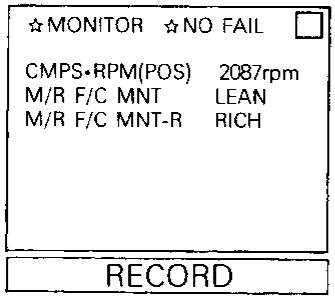


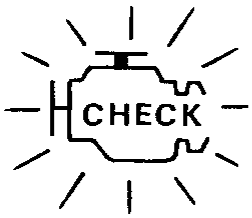
MEF696D

2



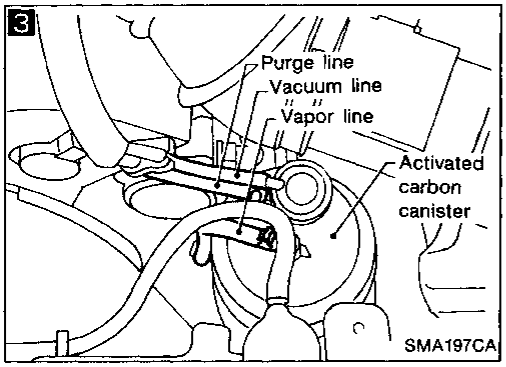
SEF359N

2



SEF051P

3



SMA197CA

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. Start engine and warm it up sufficiently.
2. Perform "MIXTURE RATIO TEST" in "FUNCTION TEST" mode.

OR

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

OR

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

Yes → Replace heated oxygen sensor(s).

No ↓

3

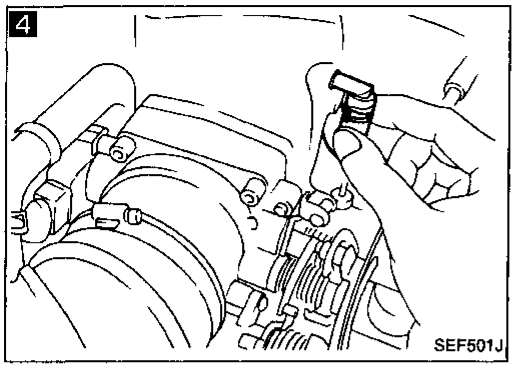
CHECK CANISTER PURGE.
1. Disconnect canister purge line hose and plug hose.
2. Perform cruise test.
3. Does the hesitation disappear?

Yes → Check purge and vacuum lines.

No ↓

(Go to Ⓐ on next page.)

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



Ⓐ

4

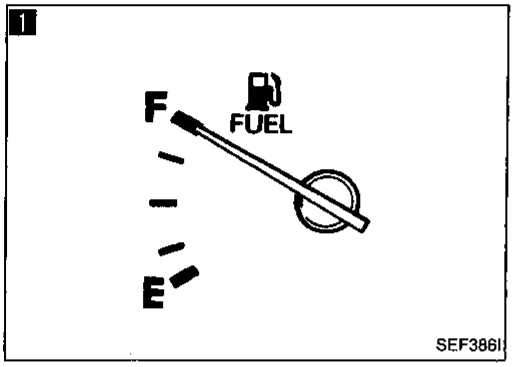
CHECK FOR INTAKE AIR LEAK.
When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

Yes → Discover air leak location and repair.

No ↓

INSPECTION END

Diagnostic Procedure 41 — Symptom — Engine Stalls when Turning

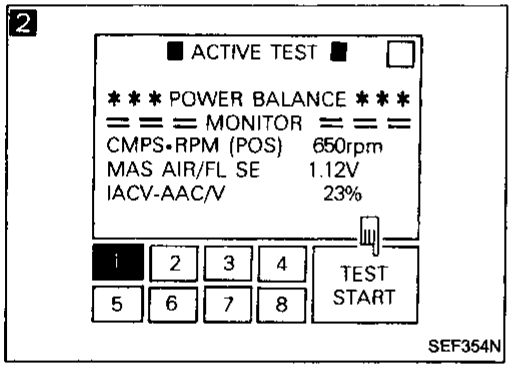


1

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.

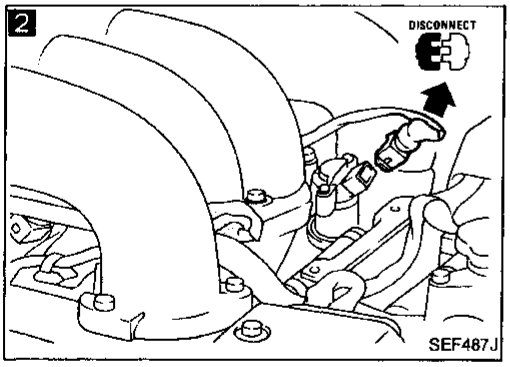
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

— 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 ↓



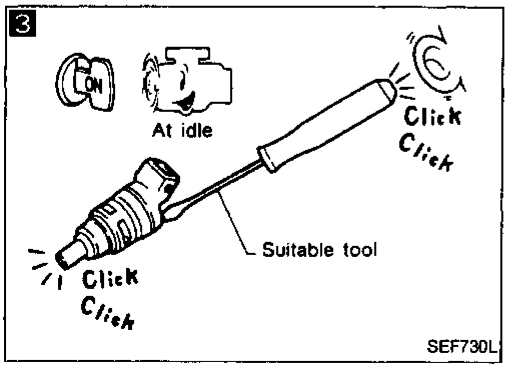
3

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

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

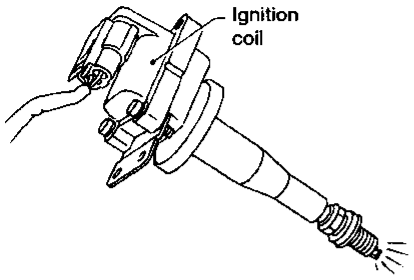
Yes ↓

(Go to Ⓐ on next page.)



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

4



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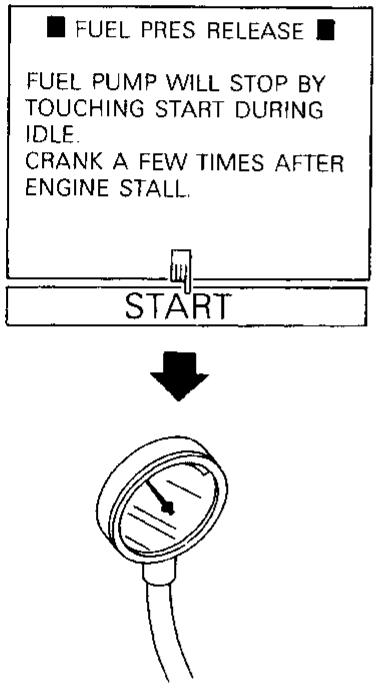
5



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Ⓐ

4 **CHECK IGNITION SPARK.**

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

NG → Check ignition coil, power transistor unit and circuits. (See page EF & EC-95, 127.)

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. 235 kPa (2.4 kg/cm², 34 psi)
   The moment throttle valve is fully open:
   approx. 294 kPa (3.0 kg/cm², 43 psi)

NG → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-226.)
2. Install fuel pressure gauge and check fuel pressure.

OK ↓

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

NG → Repair or replace.

OK ↓

7 **CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.**
Refer to page EF & EC-78.

NG → Repair or replace.

OK ↓

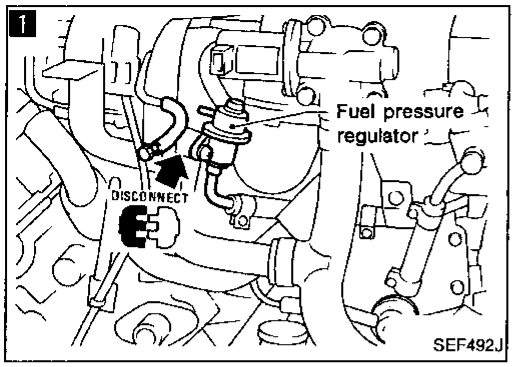
8 **TRY A KNOWN GOOD ECM*.**

↓

INSPECTION END

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

Diagnostic Procedure 42 — Symptom — Engine Stalls when the Engine is Hot

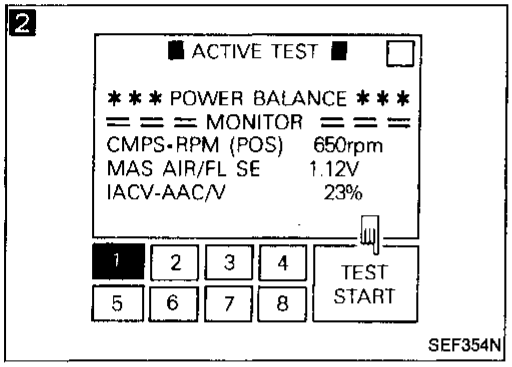


1

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

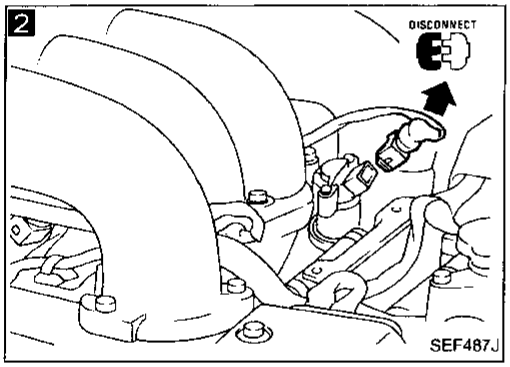
PERFORM POWER BALANCE TEST.
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

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 ↓

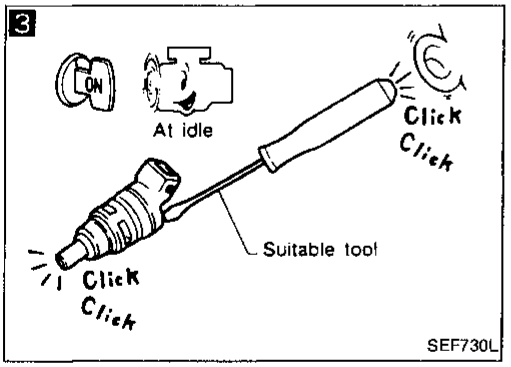


3

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

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

Yes ↓



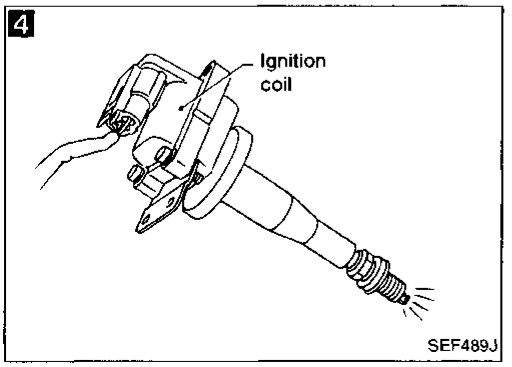
4

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

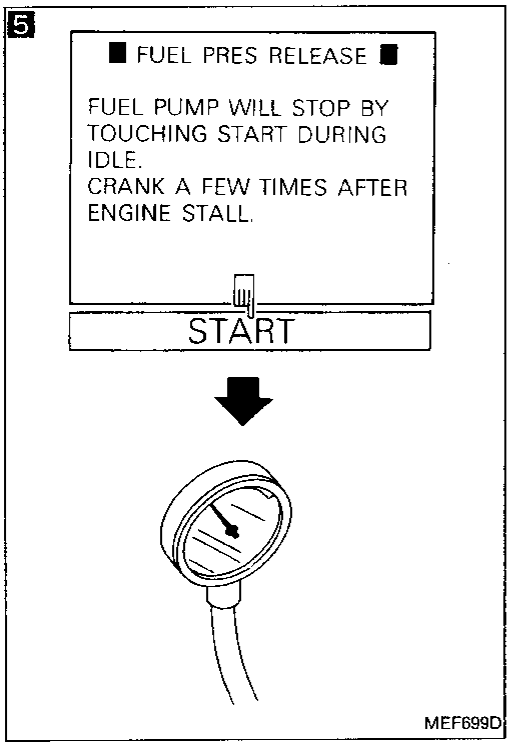
NG → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-95, 127.)

OK ↓

(Go to Ⓐ on next page.)



Diagnostic Procedure 42 — Symptom — 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. 235 kPa (2.4 kg/cm², 34 psi)

The moment throttle valve is fully open:

approx. 294 kPa (3.0 kg/cm², 43 psi)

NG → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-226.)
2. Install fuel pressure gauge and check fuel pressure.

OK ↓

6

CHECK ECM HARNESS CONNECTOR.

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

NG → Repair or replace.

OK ↓

7

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.

Refer to page EF & EC-78.

NG → Repair or replace.

OK ↓

8

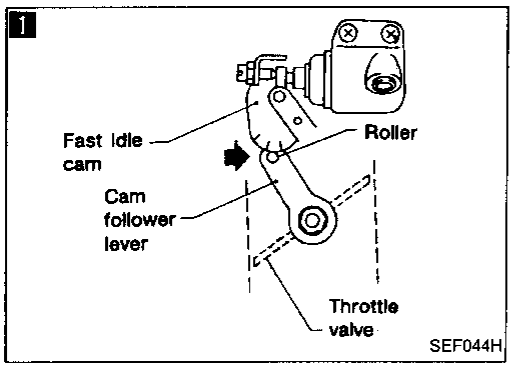
TRY A KNOWN GOOD ECM*.

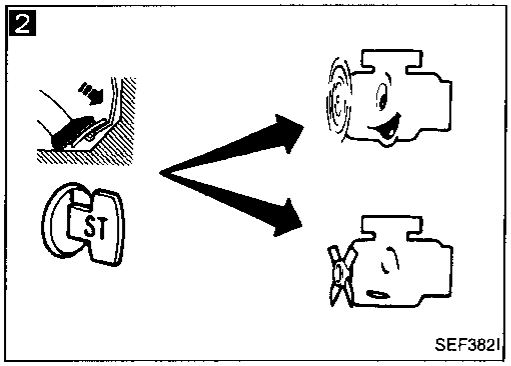
↓

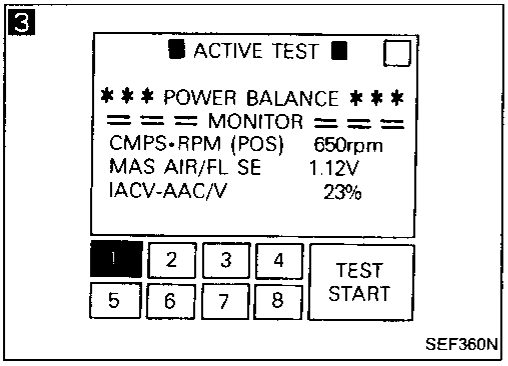
INSPECTION END

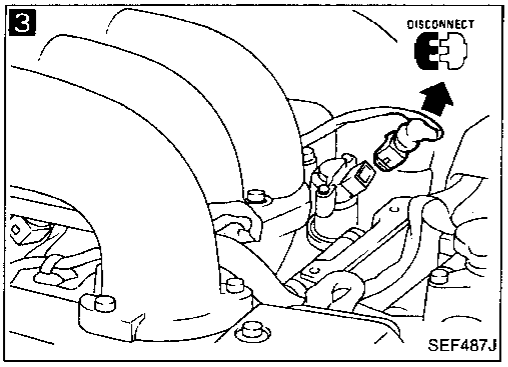
*: ECM may be the cause of a problem, but this is rarely the case.

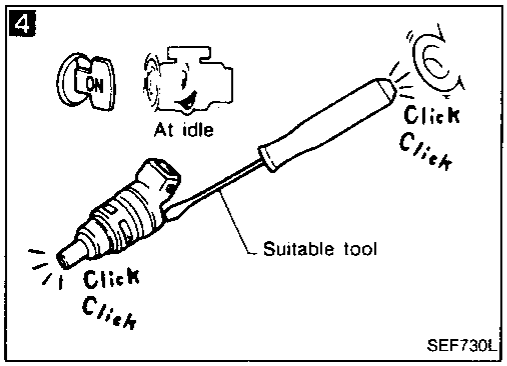
Diagnostic Procedure 43 — Symptom — Engine Stalls when the Engine is Cold











1

CHECK FAST IDLE CAM.
When the engine is cold, does fast idle cam keep cam follower lever in position?

No → Check fast idle cam adjustment. (See page EF & EC-223.)

Yes ↓

2

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

Yes → Check IACV-AAC valve and circuits. (See page EF & EC-149.)

No ↓

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?

— 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 **7** .

OK ↓

4

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

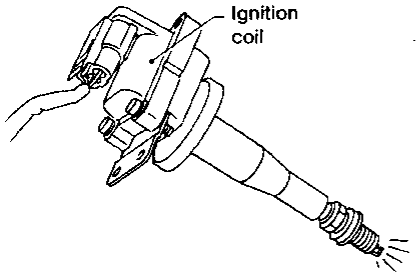
NG → Check injector(s) and circuit(s).

OK ↓

(Go to Ⓐ on next page.)

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

5



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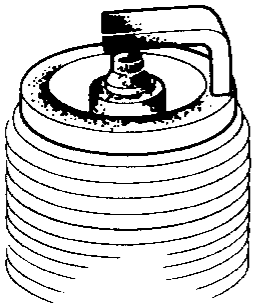
6



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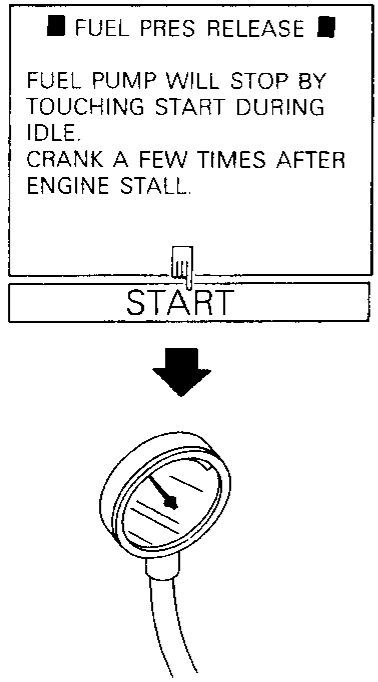
7



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Ⓐ

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

NG → Check ignition coil, power transistor unit and circuits. (See page EF & EC-95, 127.)

OK ↓

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

NG → Repair or replace spark plug(s).

OK ↓

7 **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. 235 kPa (2.4 kg/cm², 34 psi)
   The moment throttle valve is fully open:
   approx. 294 kPa (3.0 kg/cm², 43 psi)

NG → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-226.)
2. Install fuel pressure gauge and check fuel pressure.

OK ↓

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

NG → Repair or replace.

OK ↓

9 **CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.**
Refer to page EF & EC-78.

NG → Repair or replace.

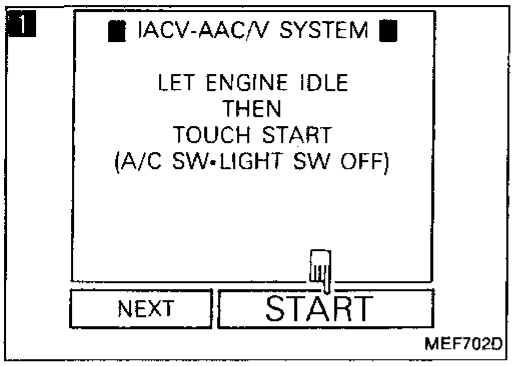
OK ↓

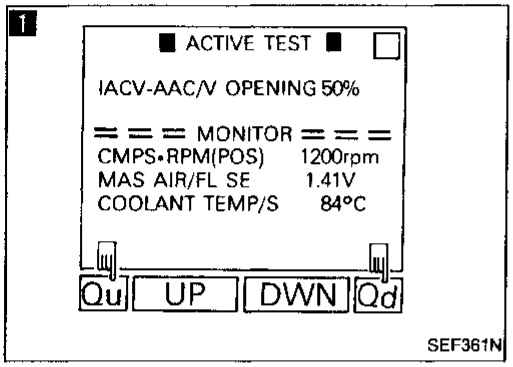
10 **TRY A KNOWN GOOD ECM***.

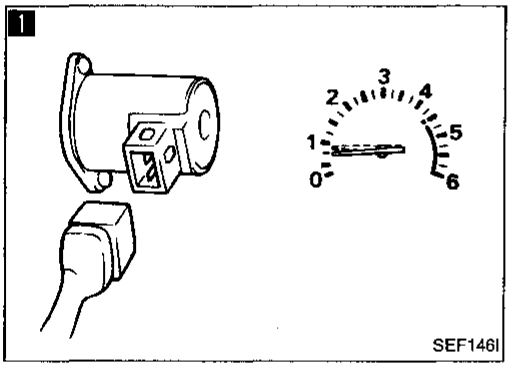
INSPECTION END

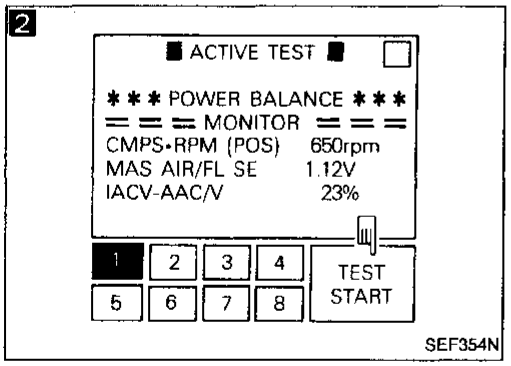
*: ECM may be the cause of a problem, but this is rarely the case.

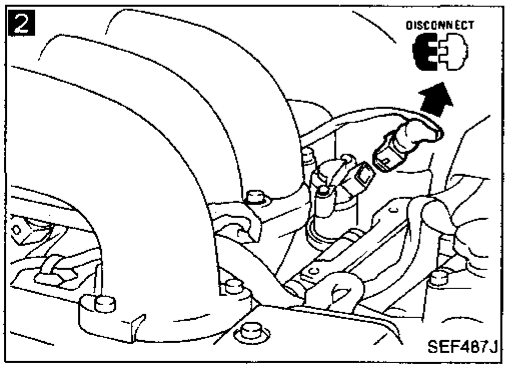
Diagnostic Procedure 44 — Symptom — Engine Stalls when Stepping on the Accelerator Momentarily











1

CHECK IACV-AAC VALVE.

1. Start engine and warm it up sufficiently.
2. Perform "IACV-AAC/V SYSTEM " in "FUNCTION TEST" mode.

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-149.)

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?

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

3

CHECK INJECTOR.

Does each injector make an operating sound at idle?

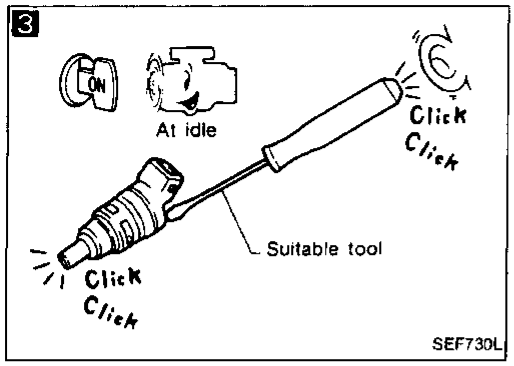
No → Check injector(s) and their circuit(s).

Yes

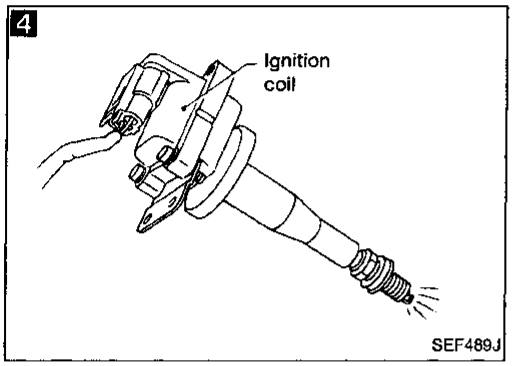
(Go to Ⓐ on next page.)

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

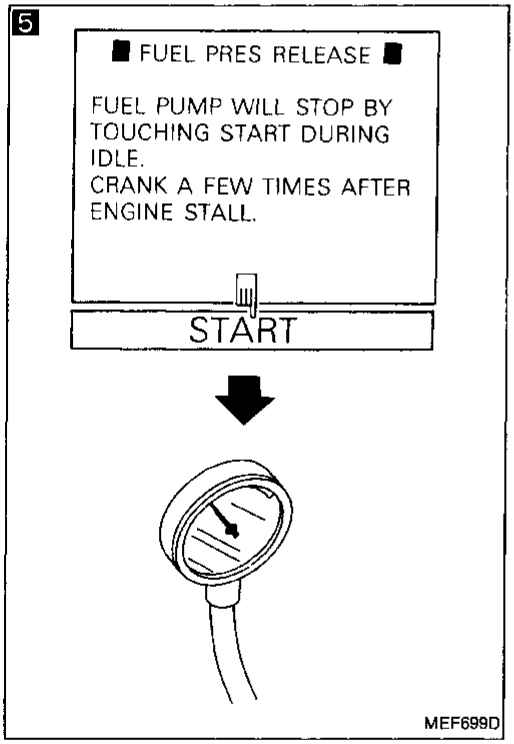
3



4



5



Ⓐ

4 **CHECK IGNITION SPARK.**
1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against 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, 127.)

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. 235 kPa (2.4 kg/cm², 34 psi)
   The moment throttle valve is fully open:
   approx. 294 kPa (3.0 kg/cm², 43 psi)

NG → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-226.)
2. Install fuel pressure gauge and check fuel pressure.

OK ↓

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

NG → Repair or replace.

OK ↓

7 **CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.**
Refer to page EF & EC-78.

NG → Repair or replace.

OK ↓

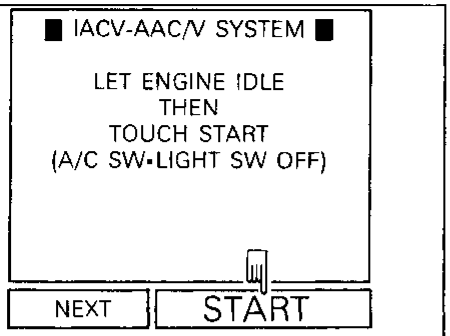
8 **TRY A KNOWN GOOD ECM*.**

↓

INSPECTION END

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

1



MEF702D

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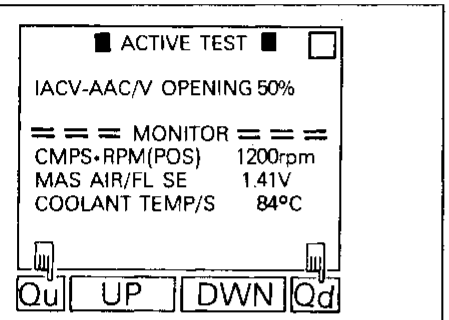

SEF361N

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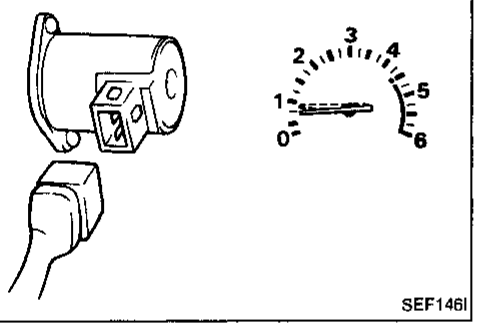

SEF146I

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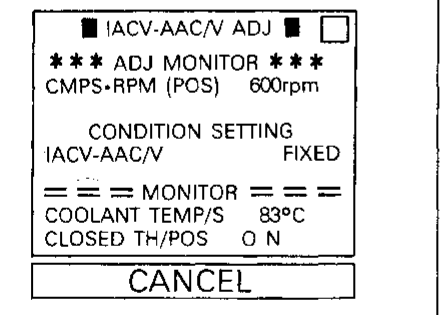

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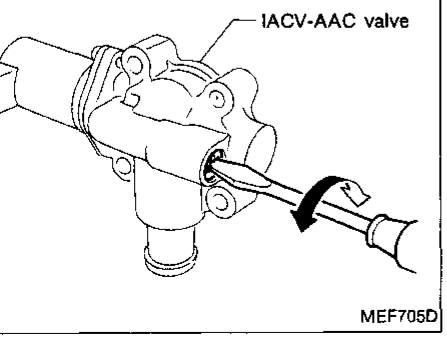


MEF705D

Diagnostic Procedure 45 — Symptom — Engine Stalls after Decelerating

1

CHECK IACV-AAC VALVE.

1. Start engine and warm it up sufficiently.
2. Perform "IACV-AAC/V SYSTEM" in "FUNCTION TEST" mode.

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-149.)

Yes

2

CHECK IDLE ADJ. SCREW CLOGGING.

1. Perform "IACV-AAC/V ADJ" in "WORK SUPPORT" mode.
2. Can you set engine speed at 600 ± 25 rpm ("N" position) by turning idle adjusting screw?

OR

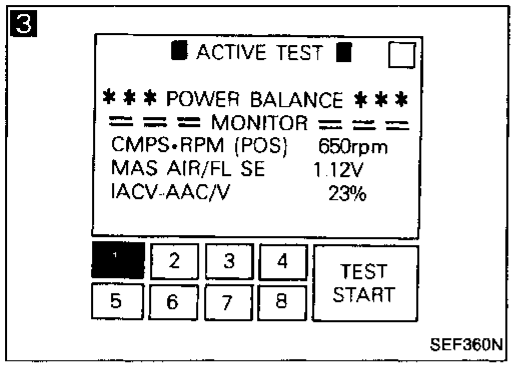
1. Disconnect IACV-AAC valve harness connector.
2. Can you set engine speed at 600 ± 25 rpm ("N" position) by turning idle adjusting screw?

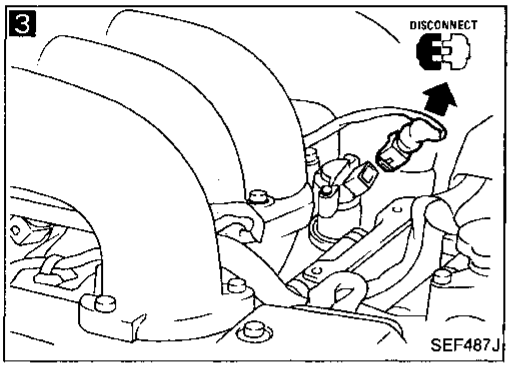
No → Check for IACV-AAC valve clogging or throttle body clogging.

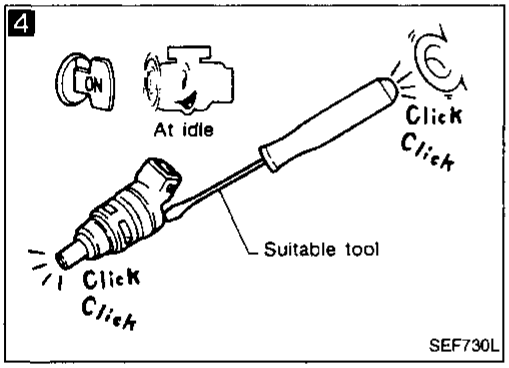
Yes

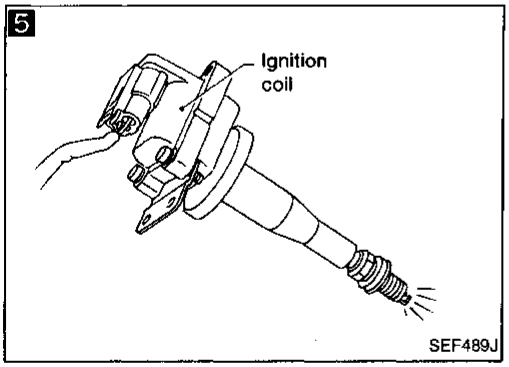
(Go to Ⓐ on next page.)

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









Ⓐ

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. Does each injector make an operating sound at idle?

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

Yes ↓

5

CHECK IGNITION SPARK.

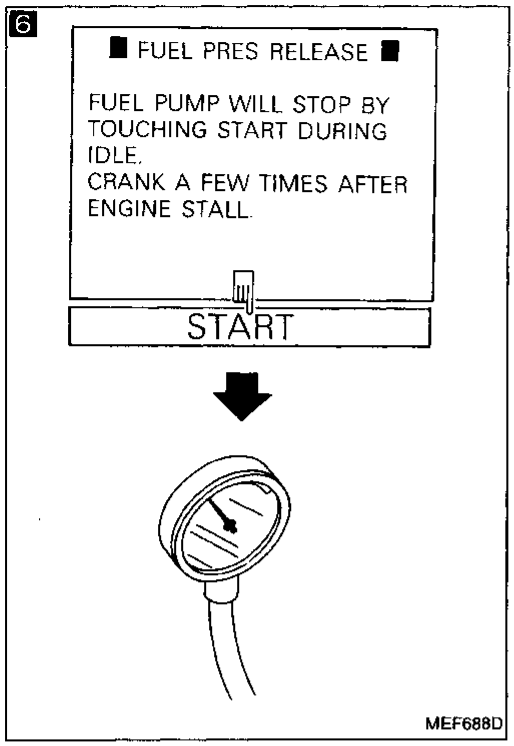
1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

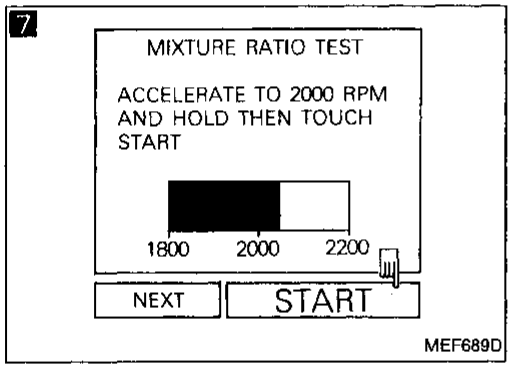
NG → Check ignition coil, power transistor unit and circuits. (See page EF & EC-95, 127.)

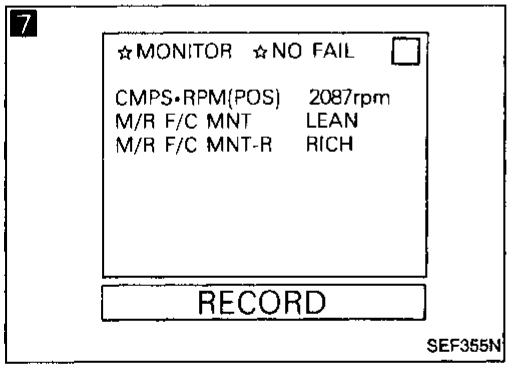
OK ↓

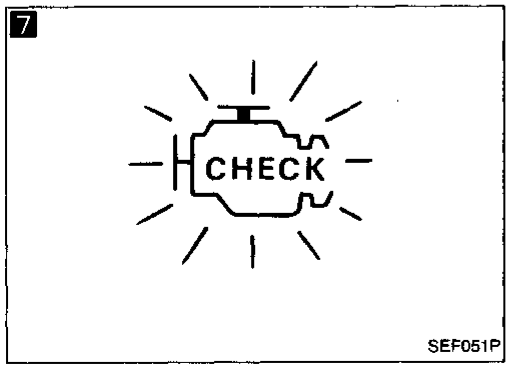
(Go to Ⓑ on next page.)

Diagnostic Procedure 45 — Symptom — 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. 235 kPa (2.4 kg/cm², 34 psi)
   The moment throttle valve is fully open:
   approx. 294 kPa (3.0 kg/cm², 43 psi)

NG → Check fuel pressure regulator diaphragm.

— OR —

1. Release fuel pressure to zero. (Refer to page EF & EC-226.)
2. Install fuel pressure gauge and check fuel pressure.

OK ↓

7

CHECK HEATED OXYGEN SENSOR.

1. Start engine and warm it up sufficiently.
2. Perform "MIXTURE RATIO TEST" in "FUNCTION TEST" mode.

NG → Replace heated oxygen sensor(s).

— OR —

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

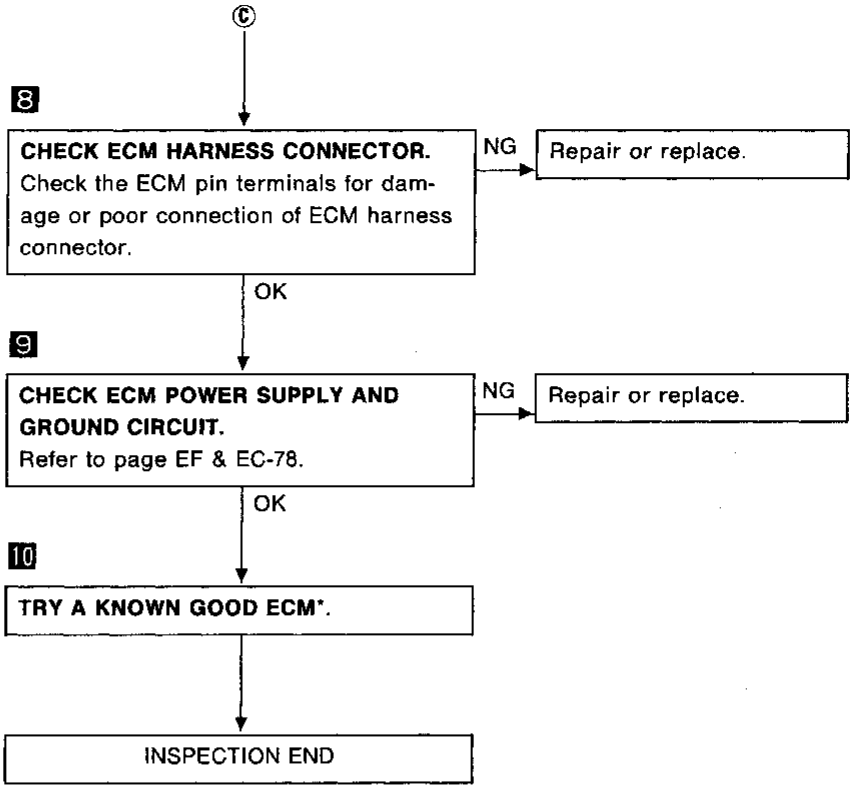
— OR —

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

OK ↓

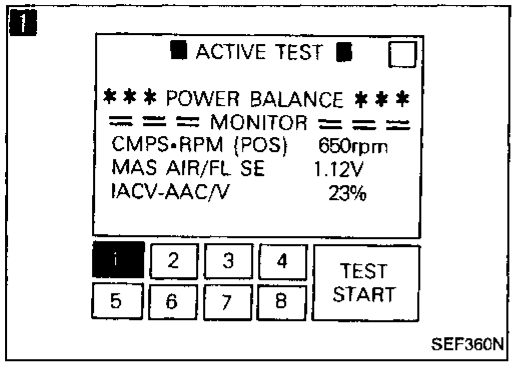
(Go to Ⓒ on next page.)

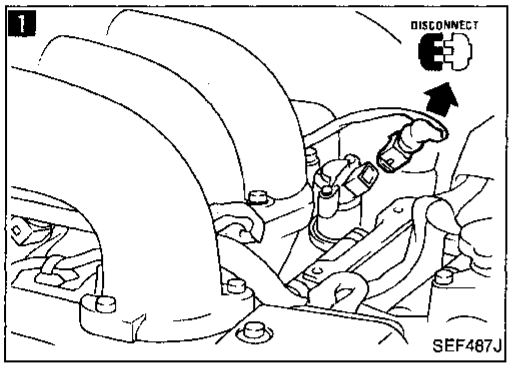
Diagnostic Procedure 45 — Symptom — Engine Stalls after Decelerating (Cont'd)

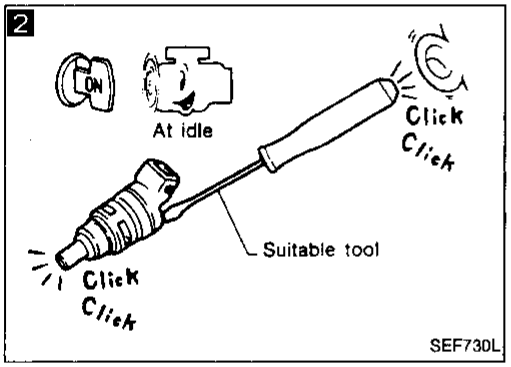


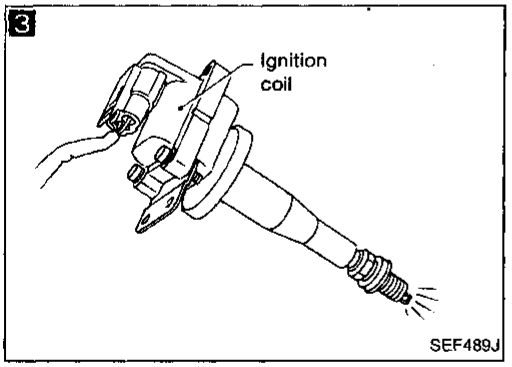
*: ECM may be the cause of a problem, but this is rarely the case.

Diagnostic Procedure 46 — Symptom — Engine Stalls when Accelerating or when Driving at Constant Speed









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?

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 **4** .

Yes ↓

2

CHECK INJECTOR.

Does each injector make an operating sound at idle?

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

Yes ↓

3

CHECK IGNITION SPARK.

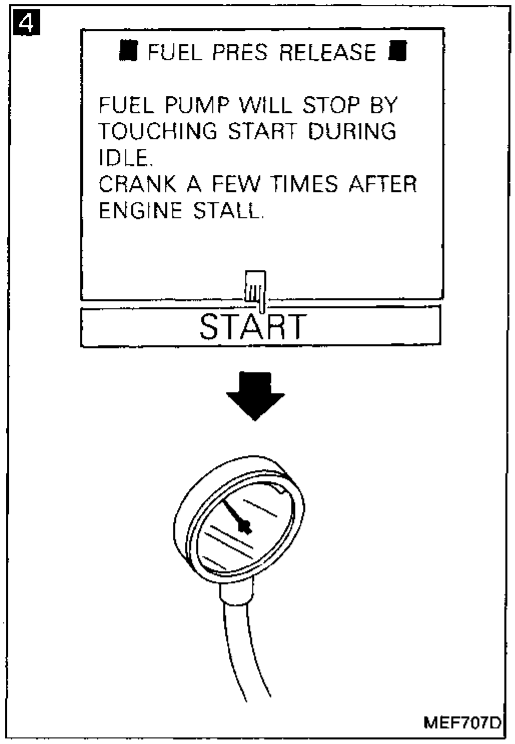
1. Disconnect ignition coil assembly from rocker cover.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

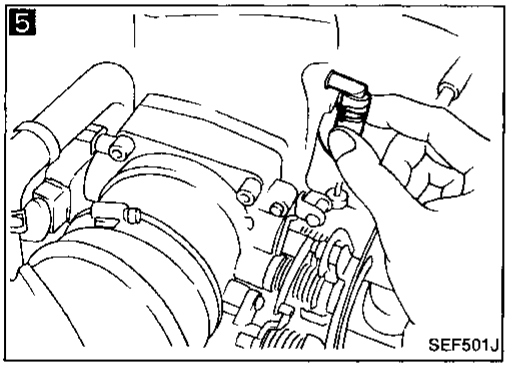
NG → Check ignition coil, power transistor unit and circuits. (See page EF & EC-95, 127.)

OK ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 46 — Symptom — Engine Stalls when Accelerating or when Driving at Constant Speed (Cont'd)





Ⓐ

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. 235 kPa (2.4 kg/cm², 34 psi)
   The moment throttle valve is fully open:
   approx. 294 kPa (3.0 kg/cm², 43 psi)

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

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-226.)
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 ↓

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

NG → Repair or replace.

OK ↓

7 **CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.**
Refer to page EF & EC-78.

Yes → Repair or replace.

No ↓

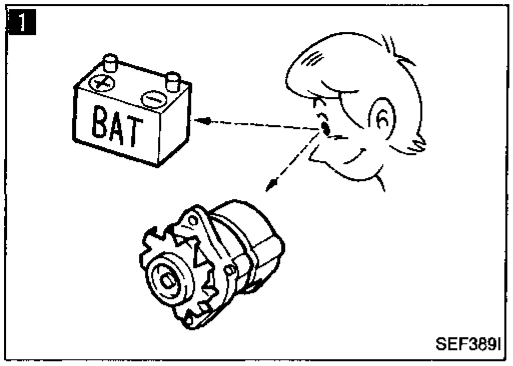
8 **TRY A KNOWN GOOD ECM*.**

↓

INSPECTION END

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

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

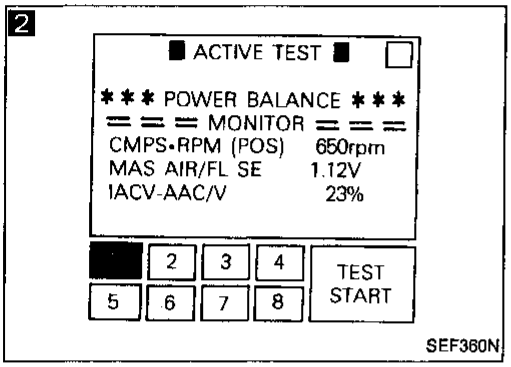


1

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

NG → Repair or replace.

OK ↓



2

PERFORM POWER BALANCE TEST.

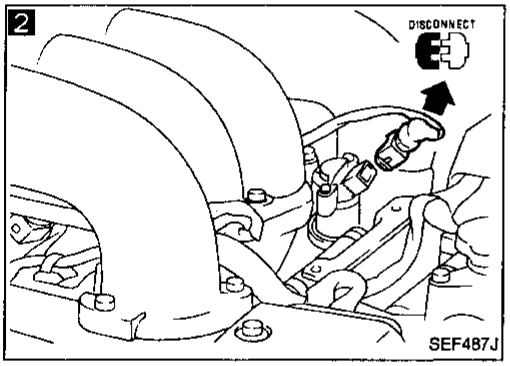
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

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 ↓

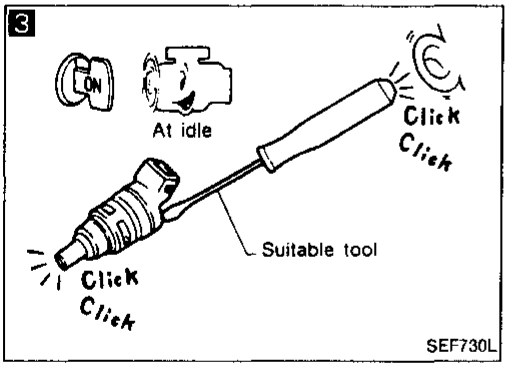


3

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

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

Yes ↓



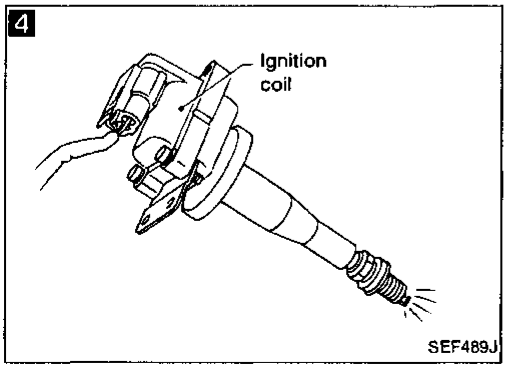
4

CHECK IGNITION SPARK.

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

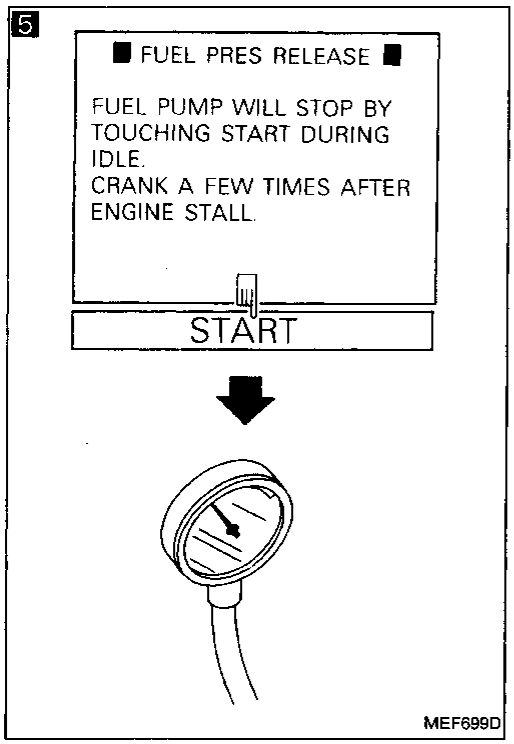
NG → Check ignition coil, power transistor unit and circuits. (See page EF & EC-95, 127.)

OK ↓



(Go to Ⓐ on next page.)

Diagnostic Procedure 47 — Symptom — Engine Stalls when the Electrical Load is Heavy (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. 235 kPa (2.4 kg/cm², 34 psi)

The moment throttle valve is fully open:

approx. 294 kPa (3.0 kg/cm², 43 psi)

NG → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-226.)
2. Install fuel pressure gauge and check fuel pressure.

OK ↓

6

CHECK ECM HARNESS CONNECTOR.

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

NG → Repair or replace.

OK ↓

7

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.

Refer to page EF & EC-78.

NG → Repair or replace.

OK ↓

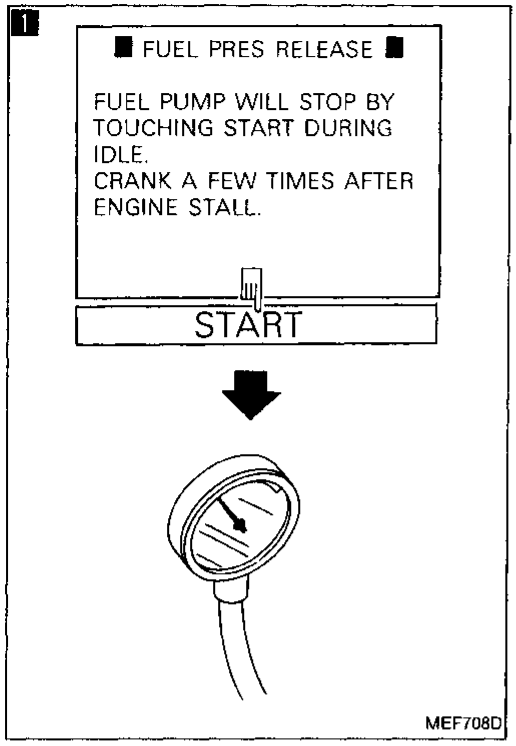
8

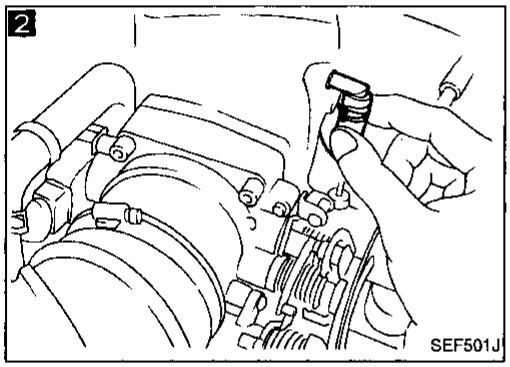
TRY A KNOWN GOOD ECM*.

INSPECTION END

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

Diagnostic Procedure 48 — Symptom — 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. 235 kPa (2.4 kg/cm², 34 psi)
The moment throttle valve is fully open:
approx. 294 kPa (3.0 kg/cm², 43 psi)

NG → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-226.)
2. Install fuel pressure gauge and check fuel pressure.

OK ↓

2

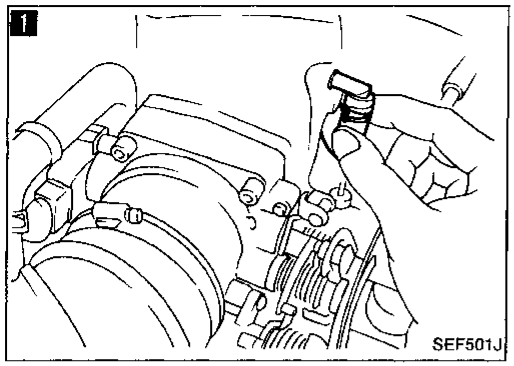
CHECK FOR INTAKE AIR LEAK.
When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

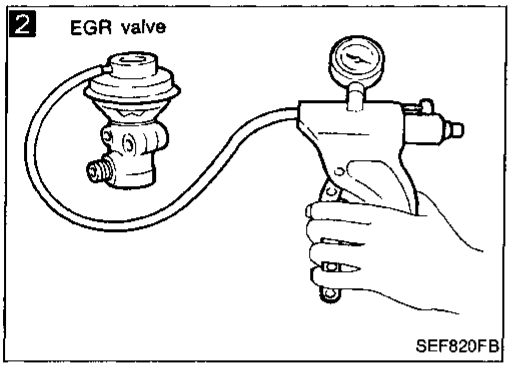
Yes → Discover air leak location and repair.

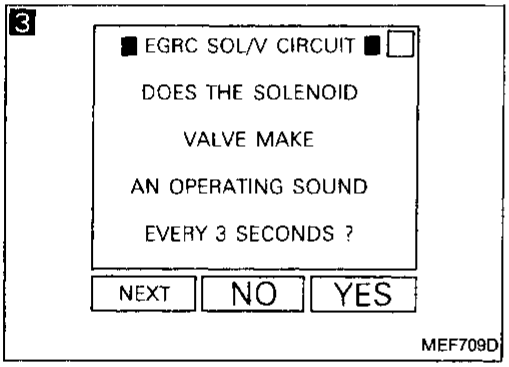
No ↓

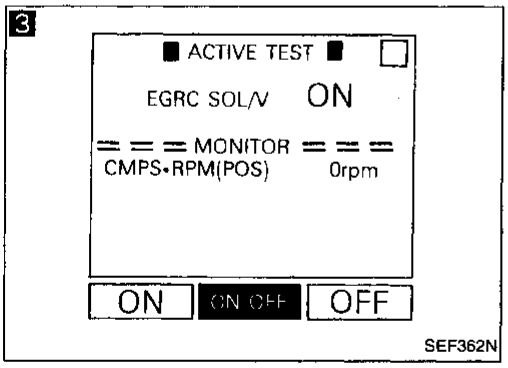
INSPECTION END

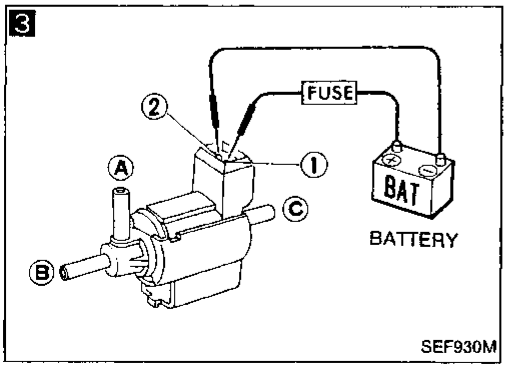
Diagnostic Procedure 49 — Symptom — Knock











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. Turn ignition switch "ON".
2. Perform "EGRC S/V CIRCUIT" in "FUNCTION TEST" mode.

— OR —

1. Turn ignition switch "ON".
2. Select "EGRC SOL VALVE" in "ACTIVE TEST" mode.
3. Turn EGRC-solenoid valve ON and OFF.
4. 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 ↓

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.

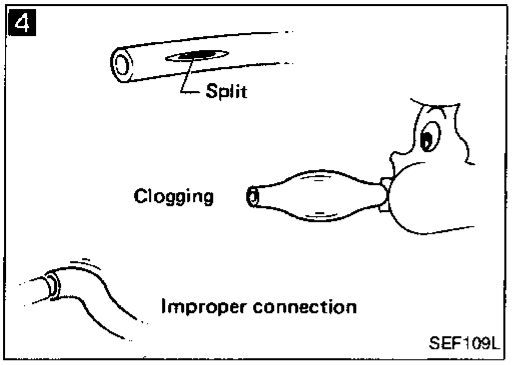
NG → Repair or replace.

OK ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 49 — Symptom — Knock (Cont'd)

4



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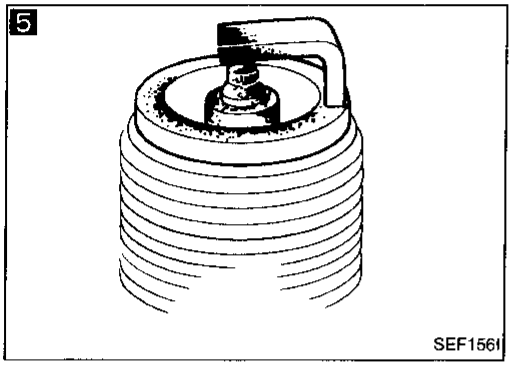


Ⓐ

5

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

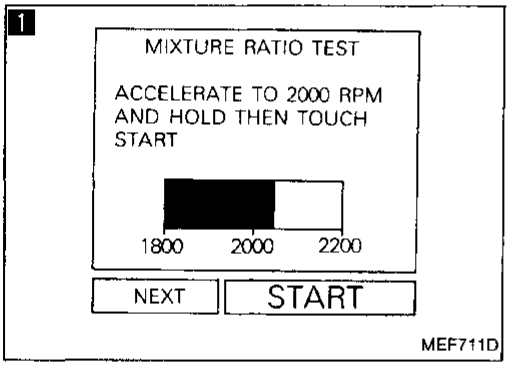
Yes → Check pistons, piston rings, valves, valve seats, valve oil seal, engine oil level, etc.

No ↓

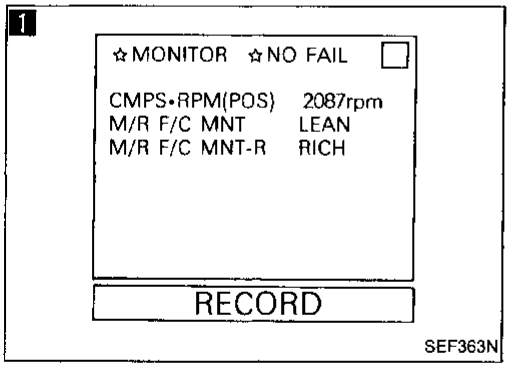
INSPECTION END

Diagnostic Procedure 50 — Symptom — Surge

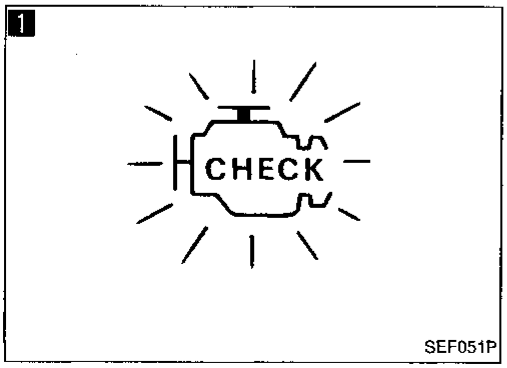
1



1



1



1

CHECK HEATED OXYGEN SENSOR.
1. Start engine and warm it up sufficiently.
2. Perform "MIXTURE RATIO TEST" in "FUNCTION TEST" mode.

NG → Replace heated oxygen sensor(s).

— OR —

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

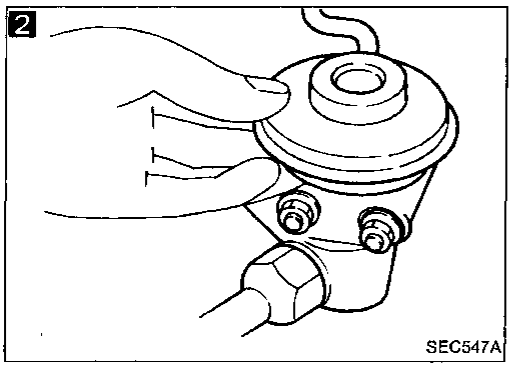
— OR —

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

OK ↓

Ⓐ

Diagnostic Procedure 50 — Symptom — Surge (Cont'd)



Ⓐ

2

CHECK EGR VALVE.
Check EGR valve for sticking.

NG → Repair or replace.

OK

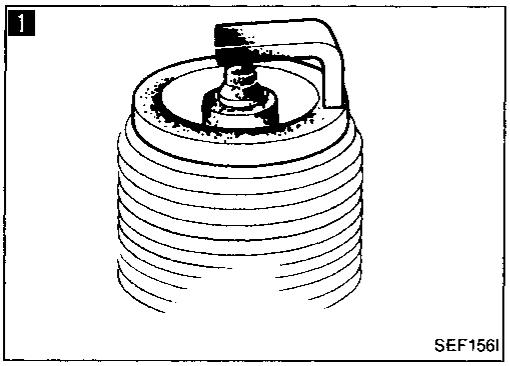
3

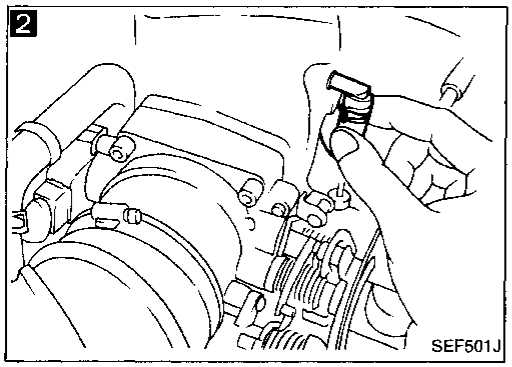
TRY A KNOWN GOOD ECM*

OK

INSPECTION END

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





Diagnostic Procedure 51 — Symptom — 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

3

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

INSPECTION END

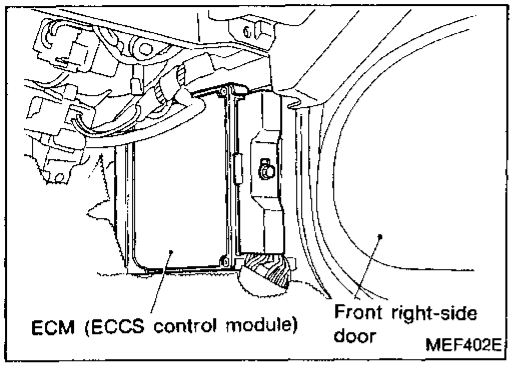
Diagnostic Procedure 52 — Symptom — Backfire through the Exhaust

CHECK ENGINE COOLANT TEMPERATURE SENSOR.
Check engine coolant temperature sensor and its circuit. (See page EF & EC-88.)

NG → Replace or repair.

OK

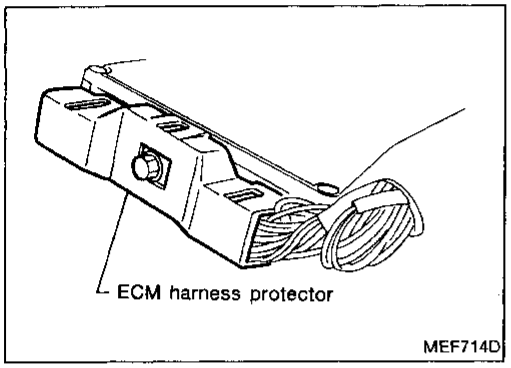
INSPECTION END



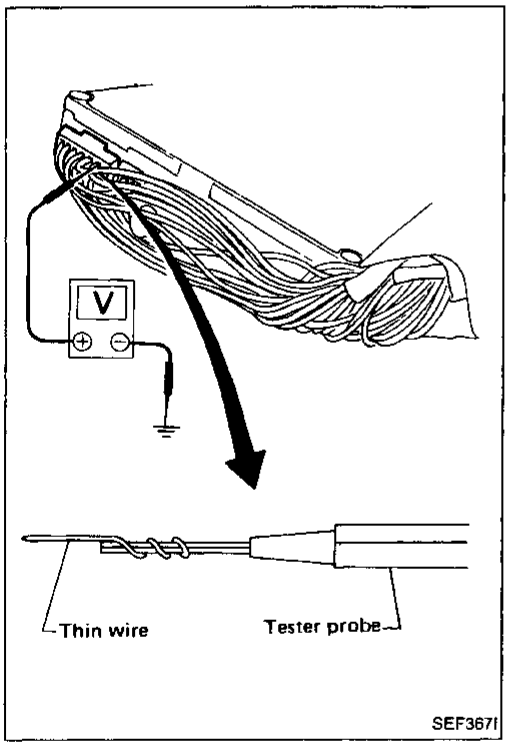
Electrical Components Inspection

ECM INPUT/OUTPUT SIGNAL INSPECTION

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

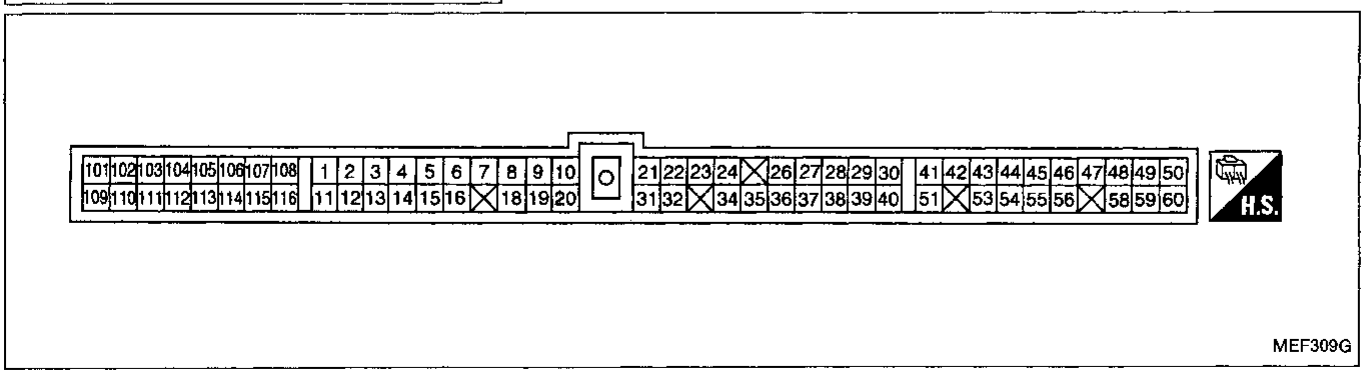


2. Remove ECM harness protector.



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

ECM HARNESS CONNECTOR TERMINAL LAYOUT



ECM inspection table

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
1 2 3 11 12 13 14 15	Ignition signal	Engine is running. └ Idle speed	Approximately 70 mV
		Engine is running. └ Engine speed is 2,000 rpm.	Approximately 0.14V
4	Cooling fan relay (High speed)	Engine is running. ├ Cooling fan is not operating. └ Cooling fan is operating at low speed.	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Cooling fan is operating at high speed.	Approximately 0V
5	Cooling fan relay (Low speed)	Engine is running. └ Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Cooling fan is operating.	Approximately 0V
6 19	Fuel pump voltage control	Ignition switch "ON" └ For 5 seconds after turning ignition switch "ON"	Approximately 1.9V
		Ignition switch "ON" └ 5 seconds after turning ignition switch "ON" and thereafter	Approximately 0V
		Engine is running. (Warm-up condition) └ Idle speed	1.8 - 2.0V
7	Tachometer	Engine is running. └ Idle speed	1.0 - 1.5V
		Engine is running. └ Engine speed is 2,000 rpm.	2.5 - 3.0V
8	Canister control solenoid valve	Ignition switch "ON"	Approximately 0.8V
		Engine is running. └ Idle speed	
		Engine is running. (Warm-up condition) └ Engine speed is about 2,000 rpm. In "1" position	BATTERY VOLTAGE (11 - 14V)

Electrical Components Inspection (Cont'd)

***Data are reference values.**

TERMINAL NO.	ITEM	CONDITION	*DATA
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)	Engine is running. ↓ 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".	Approximately 0.8V
		Ignition switch "ON" └ 5 seconds after turning ignition switch "ON" and thereafter	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Idle speed	Approximately 0.9V
23 24	Knock sensor	Engine is running. └ Idle speed	Approximately 2.5V
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 55	Heated oxygen sensor RH Heated oxygen sensor LH	Engine is running. (Warm-up condition) └ Engine speed is 2,000 rpm	0 - Approximately 1.0V

Electrical Components Inspection (Cont'd)

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
36*	TCS signal	Ignition switch "ON"	Approximately 5V
		Ignition switch "ON" — Disconnect throttle motor harness connector. — Fully close secondary throttle valve by hand.	Approximately 0V
37*	Secondary throttle position sensor	Ignition switch "ON" — Approximately 3 seconds after ignition switch "ON"	Approximately 3.4V
		Ignition switch "ON" — Disconnect throttle motor harness connector. — Fully close secondary throttle valve by hand.	Approximately 0.4V
38	Throttle position sensor	Engine is running. (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
40	Power steering oil pressure switch	Engine is running. — Steering wheel is in the "straight ahead" position.	Approximately 0V
		Engine is running. — Steering wheel is turned.	BATTERY VOLTAGE (11 - 14V)
41 51	Camshaft position sensor (Reference signal)	Engine is running. Do not run engine at high speed under no-load.	0.4 - 1.0V
42	Camshaft position sensor (Position signal)	Engine is running. Do not run engine at high speed under no-load.	2.0 - 2.7V Output voltage varies slightly with engine speed.
43	Start signal	Ignition switch "ON"	Approximately 0V
		Ignition switch "START"	BATTERY VOLTAGE (11 - 14V)
44	Inhibitor switch	Ignition switch "ON" — Gear position is "N" or "P" position.	Approximately 0V
		Ignition switch "ON" — Except the above gear position	BATTERY VOLTAGE (11 - 14V)

***WARNING:**
Before touching the secondary throttle valve, be sure to disconnect the throttle motor connector; otherwise, injury may occur due to accidental actuation of the valve.

Electrical Components Inspection (Cont'd)

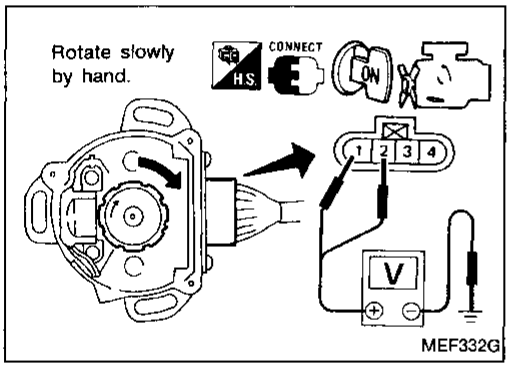
*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
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".	Approximately 0V
		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.	BATTERY VOLTAGE (11 - 14V)
		Engine is running. (Warm-up condition) └ Accelerator pedal is depressed.	Approximately 0V
56	Throttle position 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)
101 103 105 106 110 112 113 114	Injectors	Engine is running.	BATTERY VOLTAGE (11 - 14V)
102	EGRC-solenoid valve	Engine is running. (Warm-up condition) └ Idle speed	Approximately 0V
		Engine is running. (Warm-up condition) └ Engine speed is about 2,000 rpm.	BATTERY VOLTAGE (11 - 14V)
104	VTC solenoid valve	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Quickly depress accelerator pedal, then quickly release it.	Approximately 0V

Electrical Components Inspection (Cont'd)

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
111	IACV-AAC valve	Engine is running. └ Idle speed	10 - 11V
		Engine is running. ├ Steering wheel is being turned. ├ Air conditioner is operating. ├ Rear defogger is "ON". └ Head lamps are in high position.	6 - 9V
115	Heated oxygen sensor heater	Engine is running. └ Engine speed is below 2,250 rpm.	Approximately 0V
		Engine is running. └ Engine speed is above 2,250 rpm.	BATTERY VOLTAGE (11 - 14V)



CAMSHAFT POSITION SENSOR

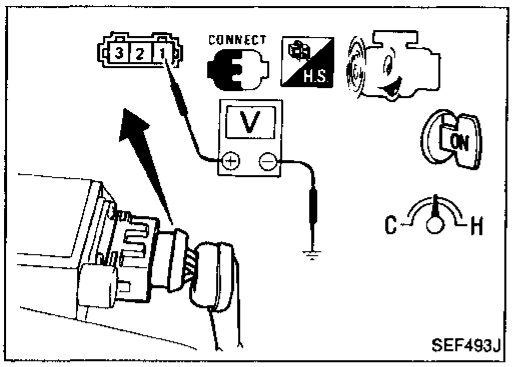
1. Remove camshaft position sensor from engine. (Camshaft position sensor harness connector should remain connected.)
2. Turn ignition switch "ON".
3. Rotate camshaft position sensor shaft slowly by hand and check voltage between terminals ①, ② and ground.

Terminal	Voltage
① (90° signal)	Voltage fluctuates between 5V and 0V.
② (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.

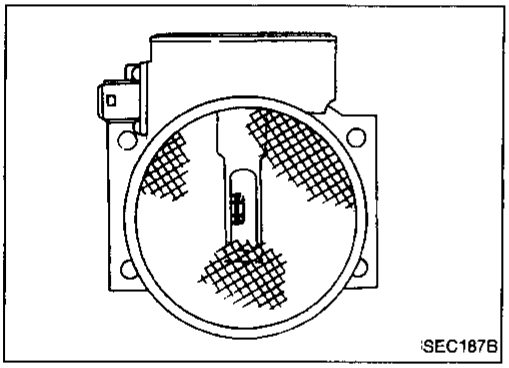
Electrical Components Inspection (Cont'd)



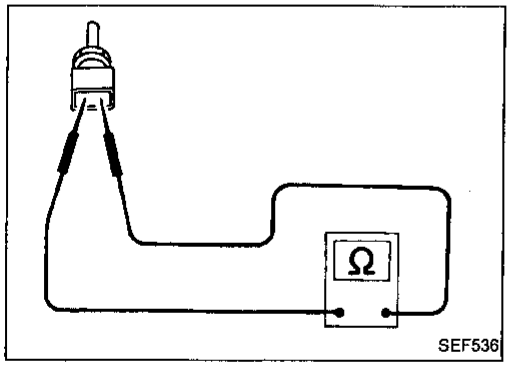
MASS AIR FLOW SENSOR

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 ① and ground.

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Approximately 0.2
Idle speed (Engine is warmed-up sufficiently.)	Approximately 1.0 - 1.4



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



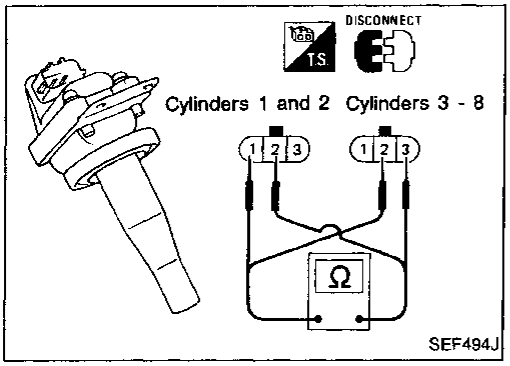
ENGINE COOLANT TEMPERATURE SENSOR

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)

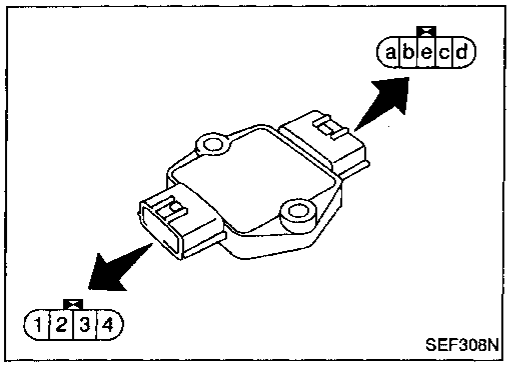


IGNITION COIL

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

Cylinder No.	Terminal	Resistance
1, 2	① - ②	Approximately 0.7Ω
3 - 8	② - ③	

If NG, replace ignition coil.

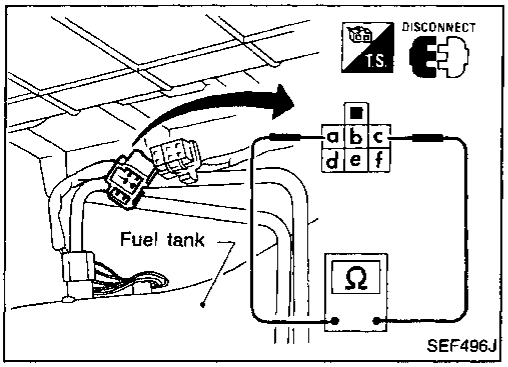


POWER TRANSISTOR

1. Disconnect power transistor harness connector.
2. Check power transistor continuity between terminals with analog tester as shown in the figure.

Terminal combination				Tester polarity	Continuity	Tester polarity	Continuity
e 1	e 2	e 3	e 4	⊕ ⊖	No	⊖ ⊕	Yes
e a	e b	e c	e d	⊕ ⊖	Yes	⊖ ⊕	Yes
1 a	2 b	3 c	4 d	⊕ ⊖	Yes	⊖ ⊕	No

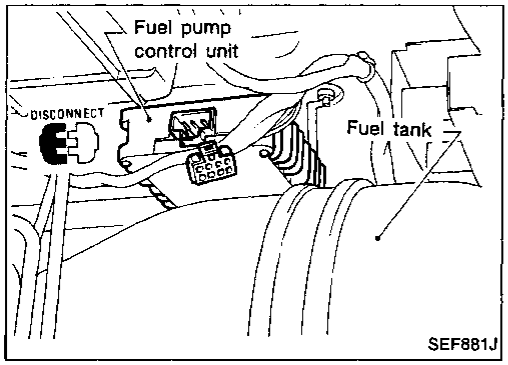
If NG, replace power transistor.



FUEL PUMP

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

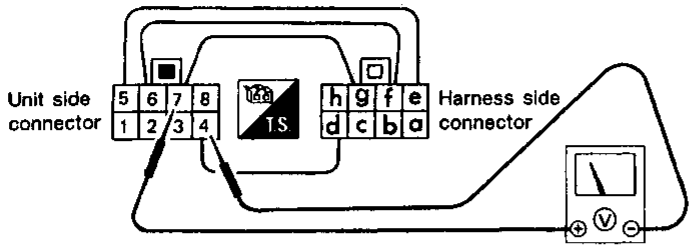
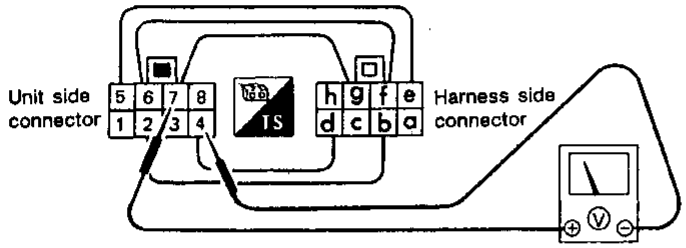
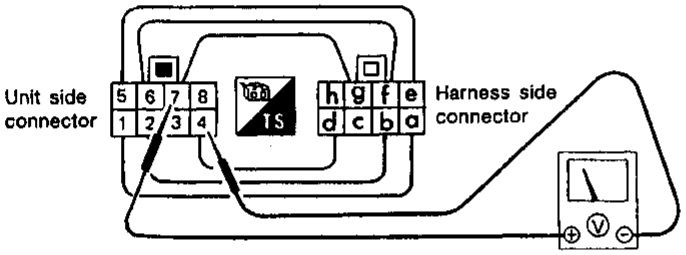
If NG, replace fuel pump.



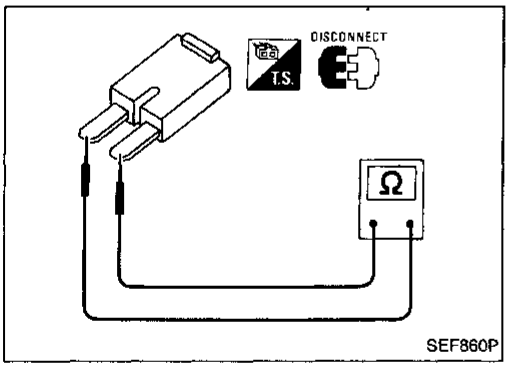
FUEL PUMP CONTROL UNIT

1. Turn off engine and disconnect fuel pump control unit harness connector.
2. Connect proper wires between the fuel pump control unit harness terminals.
3. Start engine and check voltage between terminal ⑦ and terminal ④ on fuel pump control unit.

Electrical Components Inspection (Cont'd)

Connected terminal connections and measured terminals	Voltage
 SEF882J	Battery voltage
 SEF883J	7.5 - 8.1V
 SEF884J	5.4 - 5.8V

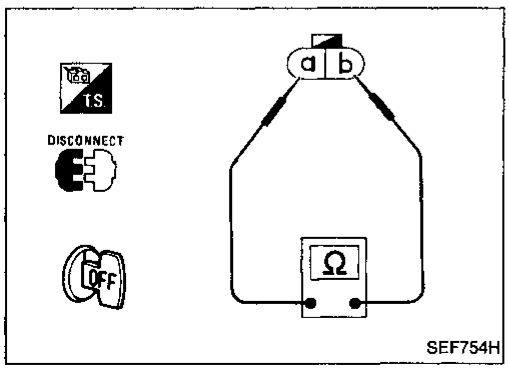
If NG, replace fuel pump control unit.



SEF860P

RESISTOR

1. Disconnect resistor harness connector.
2. Check resistance between terminals.
   Resistance: Approximately 2.2 kΩ
   If NG, replace resistor.



SEF754H

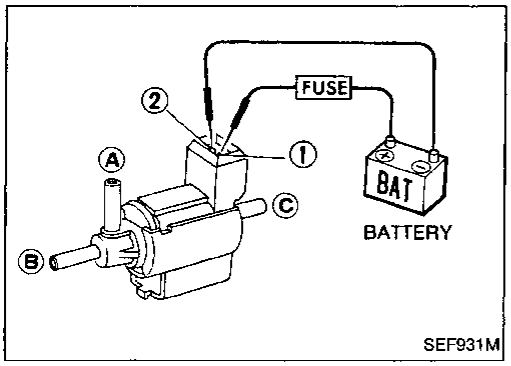
VEHICLE SPEED SENSOR

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.

Electrical Components Inspection (Cont'd)

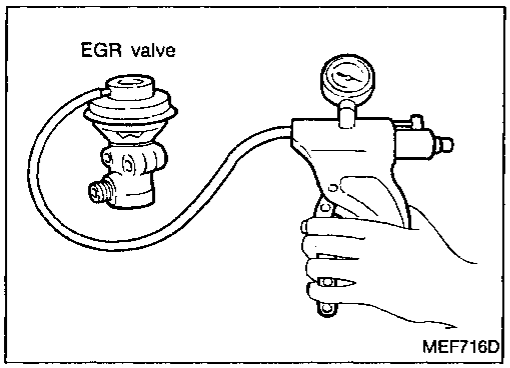


SEF931M

EGRC-SOLENOID VALVE AND CANISTER CONTROL SOLENOID VALVE

Check air passage continuity.

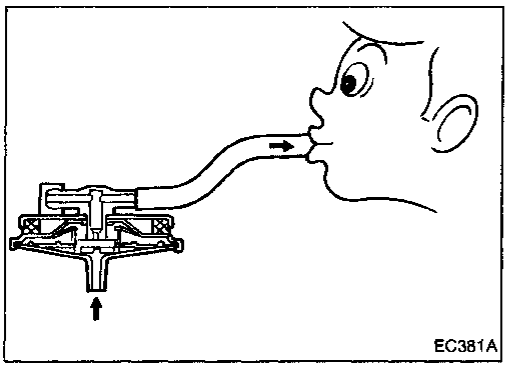
Condition	Air passage continuity between Ⓐ and Ⓑ	Air passage continuity between Ⓐ and Ⓒ
12V direct current supply between terminals ① and ②	Yes	No
No supply	No	Yes



MEF716D

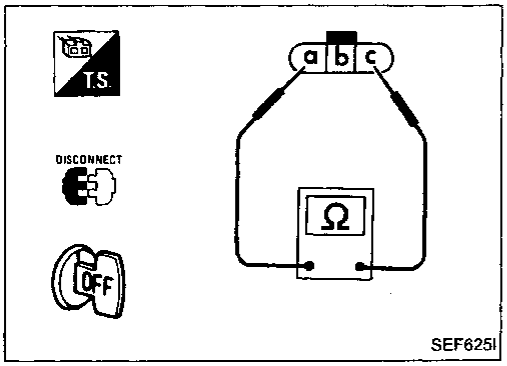
EGR VALVE

Apply vacuum to EGR vacuum port with a hand vacuum pump.
EGR valve spring should lift.
If NG, replace EGR valve.


EC381A

EGRC-BPT VALVE

Plug one of two ports of EGRC-BPT valve.
Apply a pressure above 0.490 kPa (50 mmH_2O, 1.97 inH_2O) to check for leakage. If a leak is noted, replace valve.

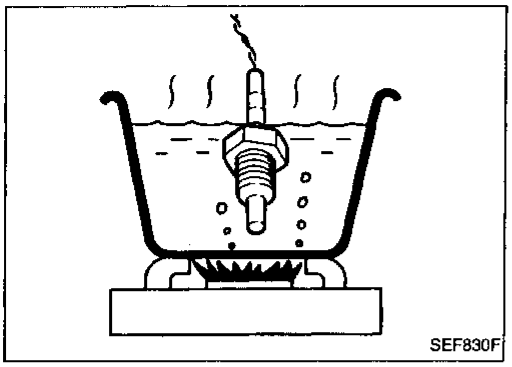


SEF625I

HEATED OXYGEN SENSOR HEATER

Check resistance between terminals ⓐ and ⓒ.
Resistance: 3 - 1,000Ω
If NG, replace heated oxygen sensor.

Electrical Components Inspection (Cont'd)



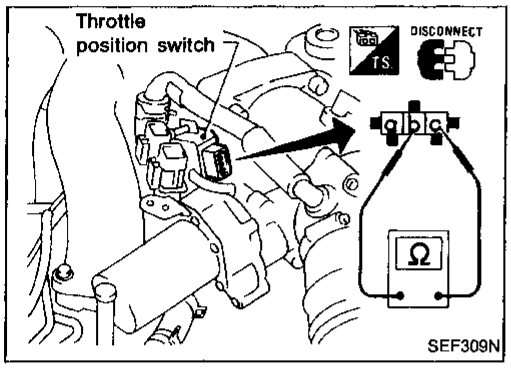
EGR TEMPERATURE SENSOR

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.

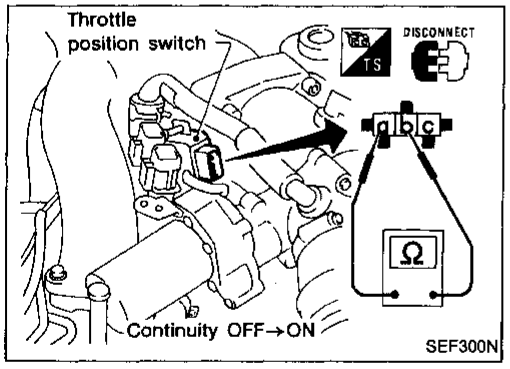


THROTTLE POSITION SWITCH (Wide open throttle position switch)

1. Warm up engine sufficiently.
- Make sure fast idle cam holds cam follower lever released.
2. Disconnect throttle position switch harness connector.
3. Check continuity between terminals ⓑ and ⓒ.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes

If NG, replace throttle position switch.



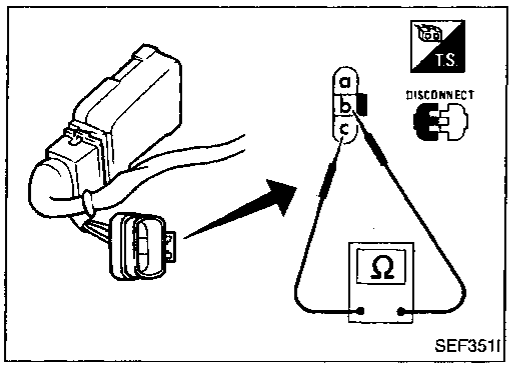
THROTTLE POSITION SWITCH (Closed throttle position switch)

1. Warm up engine sufficiently.
- Make sure fast idle cam holds cam follower lever released.
2. Disconnect throttle position switch harness connector.
3. Check continuity between terminals ⓐ and ⓑ.

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

If NG, replace throttle position switch.

Electrical Components Inspection (Cont'd)



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 condition	Resistance kΩ
Completely released	Approximately 0.7
Partially released	0.7 - 5
Completely depressed	Approximately 5

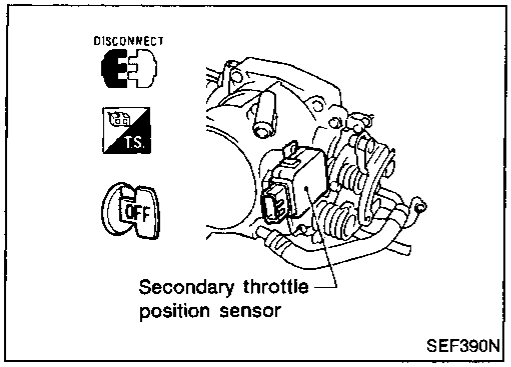
If NG, replace throttle position sensor.

Adjustment for throttle position sensor and throttle position switch

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

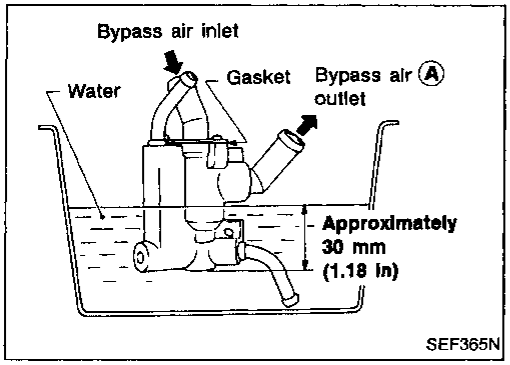
1. Install throttle position sensor body in throttle body. Do not tighten bolts.
2. Connect throttle position sensor and closed throttle position switch harness connector.
3. Start engine and warm it up sufficiently.
4. Disconnect throttle position switch harness connector.
5. Check closed throttle position switch OFF → ON speed with circuit tester, closing throttle valve manually.

Closed throttle position switch OFF → ON speed:
Engine speed in "N" position
810 ± 150 rpm



SECONDARY THROTTLE POSITION SENSOR

Refer to "Adjustment for Secondary Throttle Position" of "TRACTION CONTROL SYSTEM — TCS—" in BR section.



AIR CUT VALVE

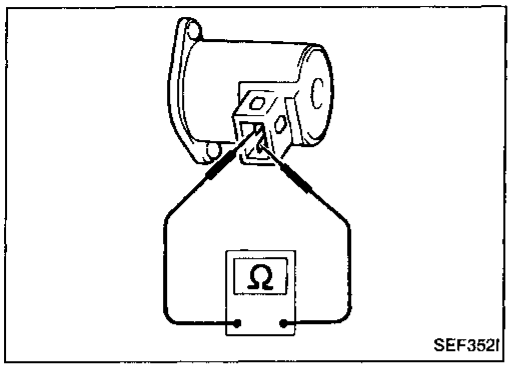
1. Remove air cut valve from engine.
2. Immerse air cut valve in cold or hot water as shown, and check air flow.

- Do not wet gasket portion or air chamber.

Water temperature	When blowing from portion Ⓐ
0°C (32°F)	Air flows
Above 50°C (122°F)	Almost no air flows

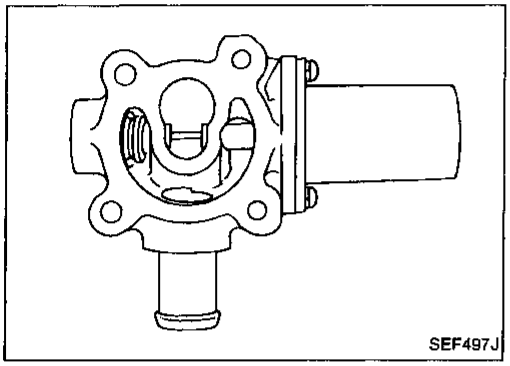
If NG, replace air cut valve.

Electrical Components Inspection (Cont'd)

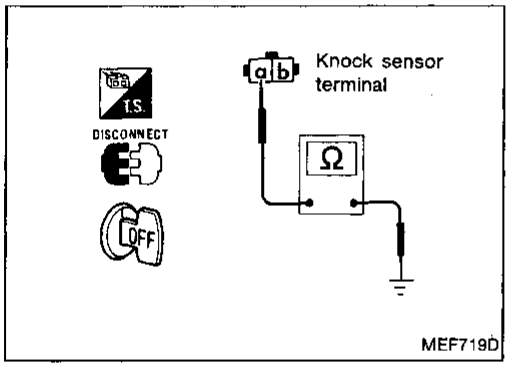


IACV-AAC VALVE

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



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

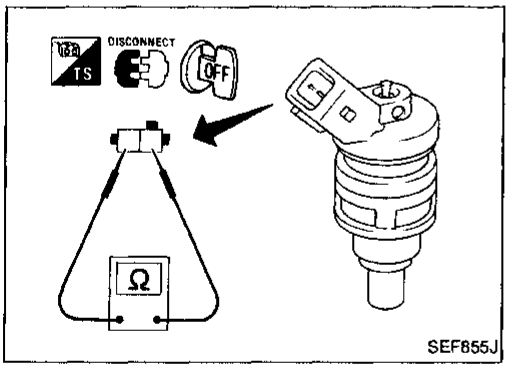


KNOCK SENSOR

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

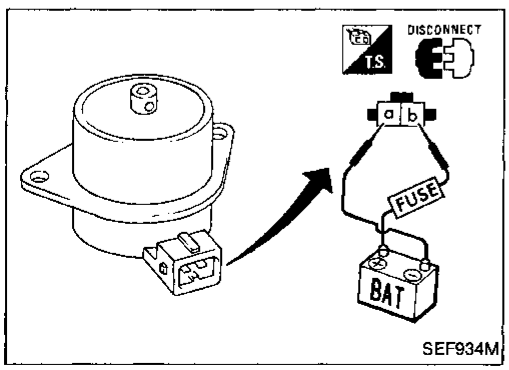
Continuity should exist.

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



INJECTOR

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

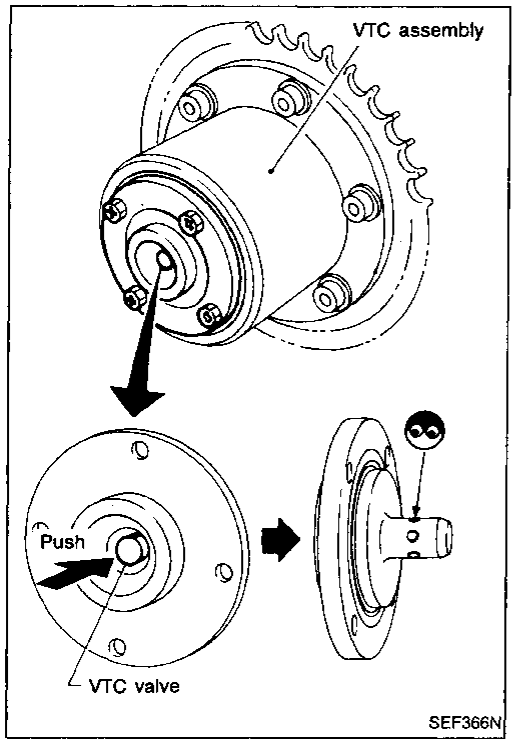


VALVE TIMING CONTROL (VTC) SOLENOID VALVE

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

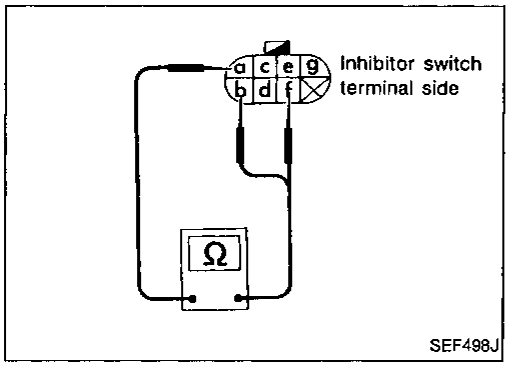
If NG, replace solenoid valve.

Electrical Components Inspection (Cont'd)



VALVE TIMING CONTROL (VTC) VALVE

1. Remove VTC valve.
2. Press VTC valve to check for smooth operation.
3. Check VTC valve hole for foreign matter.
   If NG, repair or replace VTC valve.

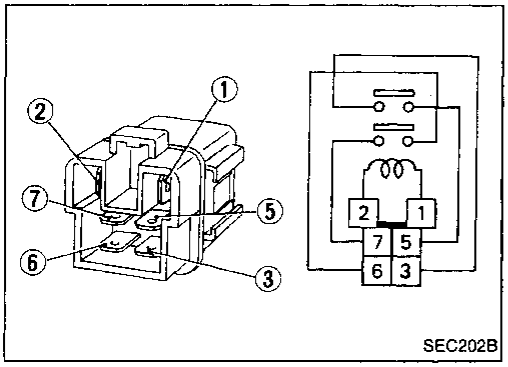


INHIBITOR SWITCH

Check continuity between terminals ⓐ and ⓑ, ⓕ.

Conditions	Continuity between terminals ⓐ and ⓑ	Continuity between terminals ⓐ and ⓕ
Shift to "P" position	Yes	No
Shift to "N" position	No	Yes
Shift to positions other than "P" and "N" positions	No	No

If NG, replace inhibitor switch.

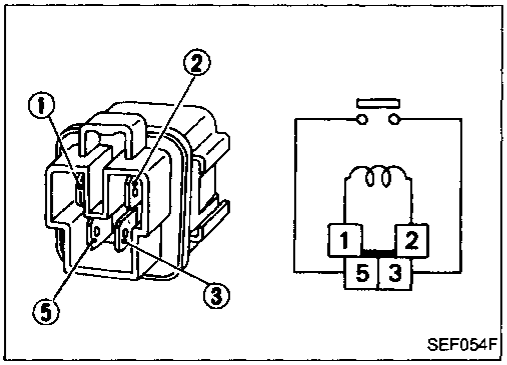


ECCS RELAY

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.



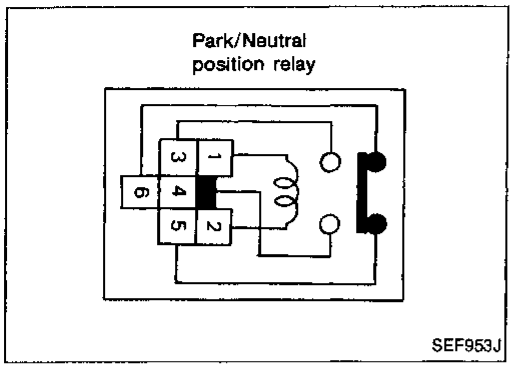
FUEL PUMP RELAY

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.

Electrical Components Inspection (Cont'd)



PARK/NEUTRAL POSITION (PNP) RELAY

Check continuity between terminals ③ and ④.

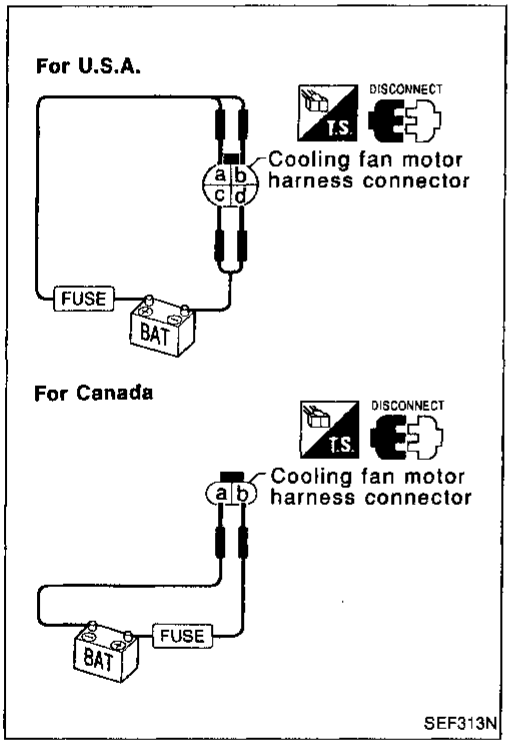
Conditions	Continuity
12V direct current supply between terminals ① and ②.	Yes
No current supply	No

If NG, replace relay.

POWER STEERING OIL PRESSURE SWITCH

1. Disconnect power steering oil pressure switch harness connector.
2. Check continuity between terminals.

Conditions	Continuity
Steering wheel is being turned	Yes
Steering wheel is not being turned	No



COOLING FAN MOTOR

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

For U.S.A.

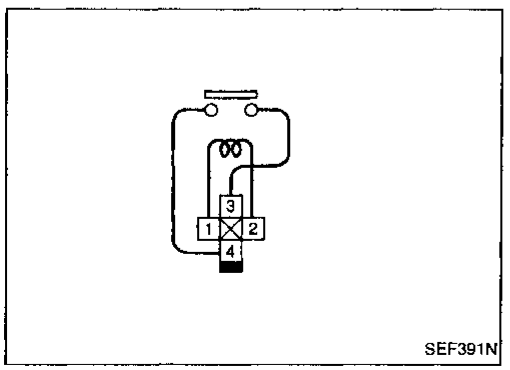
Fan speed	Terminal	
	⊕	⊖
Low	ⓐ	ⓓ
High	ⓐ, ⓑ	ⓒ, ⓓ

For Canada

Fan operation	Terminal	
	⊕	⊖
Yes	ⓑ	ⓐ

Cooling fan motor should operate.

If NG, replace cooling fan motor.



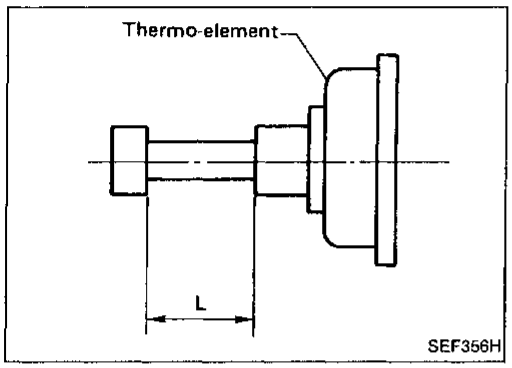
COOLING FAN RELAY 1·2

Check continuity between terminals ③ and ④.

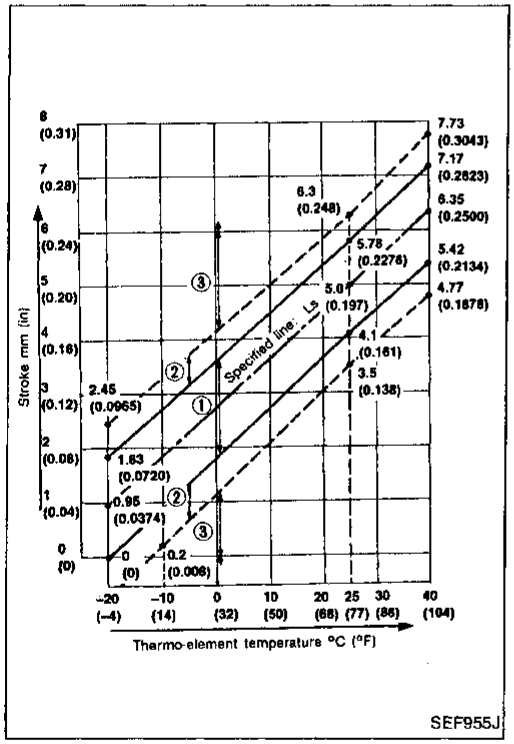
Conditions	Continuity
12V direct current supply between terminals ① and ②	Yes
No current supply	No

Fast Idle Cam (FIC) Inspection and Adjustment

1. Remove throttle body from engine.
2. Wait for at least 3 hours.
   (This step is necessary to bring the temperature of the thermo-element to the room temperature



3. Measure thermo-element stroke (L) and room temperature.



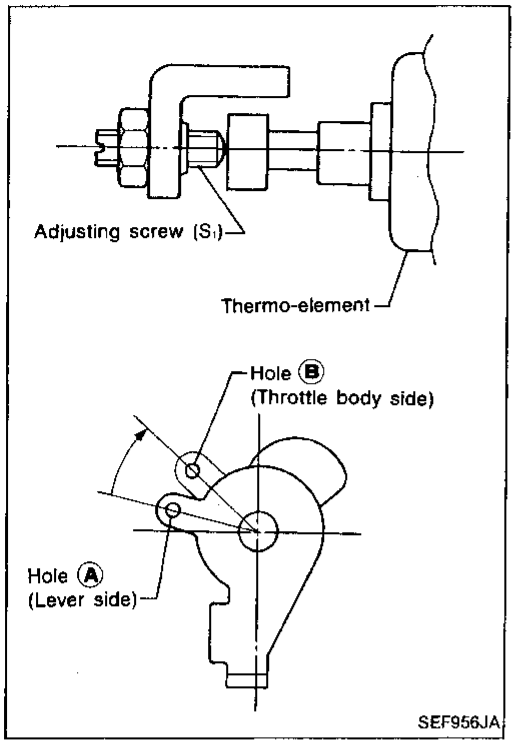
4. Check thermo-element stroke (L) as shown in the figure.

L: Thermo-element stroke	①	②	③
Go to step	—*	5	2**

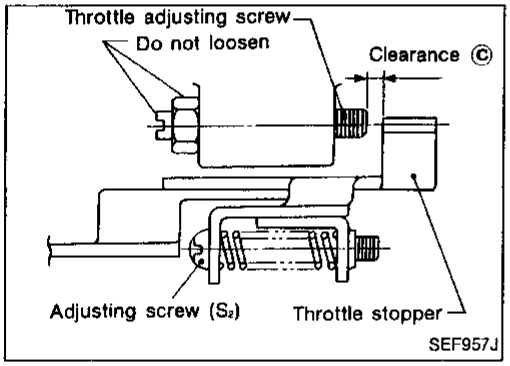
*: No adjustment is needed.

**: Thermo-element is malfunctioning. Replace thermo-element, and perform inspection beginning with step 2.

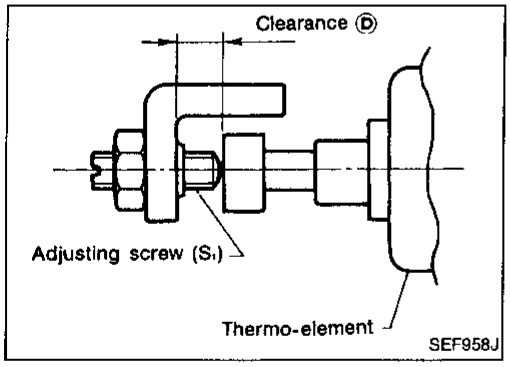
Fast Idle Cam (FIC) Inspection and Adjustment (Cont'd)



5. Align hole Ⓐ with hole Ⓑ by turning adjusting screw (S_1), and insert pin through holes Ⓐ and Ⓑ so that the position of hole Ⓐ will not be changed.



6. Adjust clearance Ⓒ between throttle stopper and throttle adjusting screw to specification by turning adjusting screw (S_2).
   Clearance Ⓒ:
   0.62 - 0.74 mm (0.0244 - 0.0291 in)
7. Remove pin from holes Ⓐ and Ⓑ.



8. Adjust clearance Ⓓ to the specified value by turning adjusting screw (S_1).
   Clearance Ⓓ:
   3.8 mm (0.150 in)
9. Rotate adjusting screw (S_1) clockwise or counterclockwise by Z turns according to the following equation, then tighten the adjusting screw lock nut.

$$Z = \frac{L\ (mm) - LS^*\ (mm)}{0.50\ (mm)} \quad / \quad Z = \frac{L\ (in) - LS^*\ (IN)}{0.0197\ (in)}$$

*: Value of the specified line (Ls) at the temperature of thermo-element actually measured.

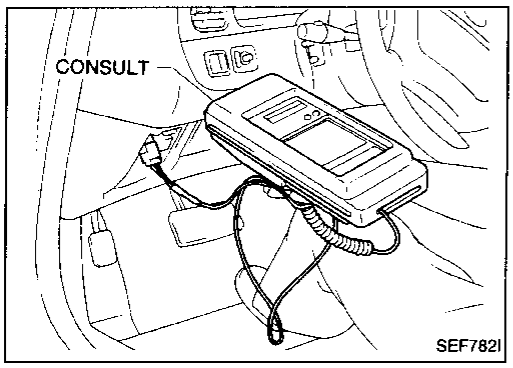
- Direction of adjusting screw (S_1) rotation

(1) Positive (+) Z: Counterclockwise
(2) Negative (−) Z: Clockwise

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

For example:

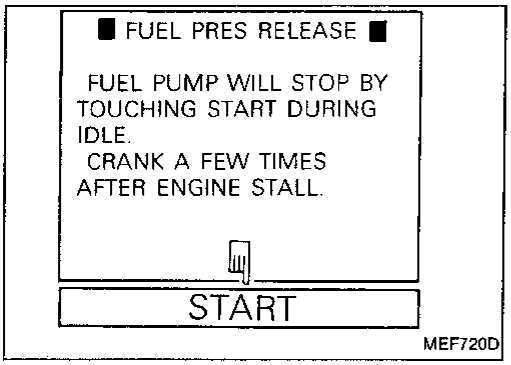
	Case I	Case II
Thermo-element temperature °C (°F)	25 (77)	0 (32)
Thermo-element specified stroke (Ls) mm (in)	5.0 (0.197)	2.75 (0.1083)
Thermo-element stroke (L) mm (in)	5.5 (0.217)	2.00 (0.0787)
Revolutions of adjusting screw (Z) mm/in	$Z = \frac{5.5 - 5.0}{0.50} = 1.0$ / $\frac{0.217 - 0.197}{0.0197} = 1.0$	$Z = \frac{2.00 - 2.75}{0.50} = -1.5$ / $\frac{0.0787 - 0.1083}{0.0197} = -1.5$
Direction of revolution	Counterclockwise	Clockwise

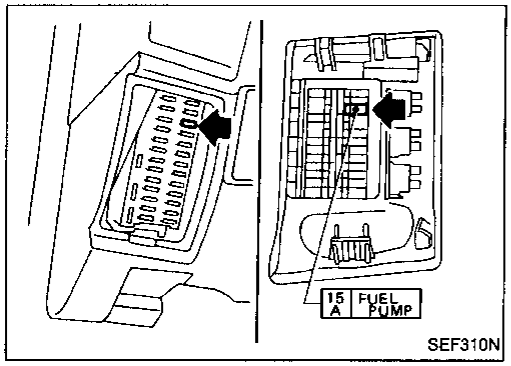


Releasing Fuel Pressure

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

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





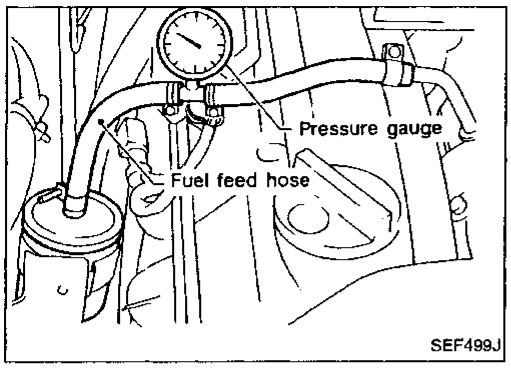
1. Remove fuse for fuel pump.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch off and reconnect fuse for fuel pump.

Fuel Pressure Check

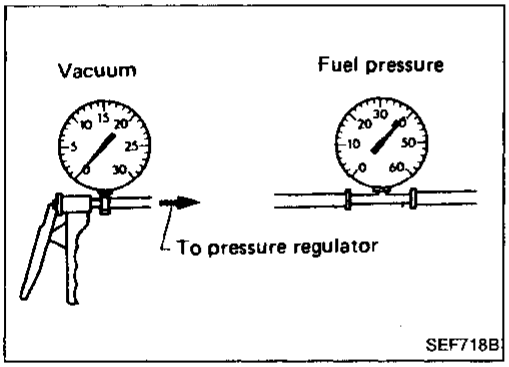
a. Make sure that clamp screw does not contact adjacent parts.
b. Use a torque driver to tighten clamps.
c. Use Pressure Gauge to check fuel pressure.
d. Do not perform fuel pressure check while fuel pressure regulator control system is operating; otherwise, fuel pressure gauge might indicate incorrect readings.

1. Release fuel pressure to zero.
2. Disconnect fuel hose between fuel filter and fuel tube (engine side).
3. Install pressure gauge between fuel filter and fuel tube.
4. Start engine and check for fuel leakage.

Fuel Pressure Check (Cont'd)



5. Read the indication of fuel pressure gauge.
   At idling:
   When fuel pressure regulator valve vacuum hose is connected.
   Approximately 235 kPa (2.4 kg/cm^2, 34 psi)
   When fuel pressure regulator valve vacuum hose is disconnected.
   Approximately 299.1 kPa (3.05 kg/cm^2, 43.4 psi)
6. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
7. Plug intake manifold with a rubber cap.
8. Connect variable vacuum source to fuel pressure regulator.

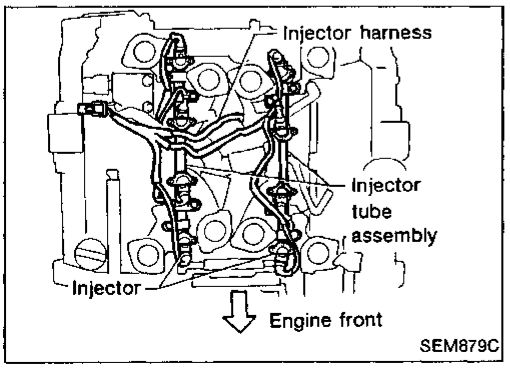


9. Start engine and read indication of fuel pressure gauge as vacuum is changed.

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

Injector Removal and Installation

1. Release fuel pressure to zero.
2. Drain coolant from radiator drain cock.
3. Remove or disconnect the following:
- Related harnesses, wires and tubes
- EGR valve
- Intake manifold collector

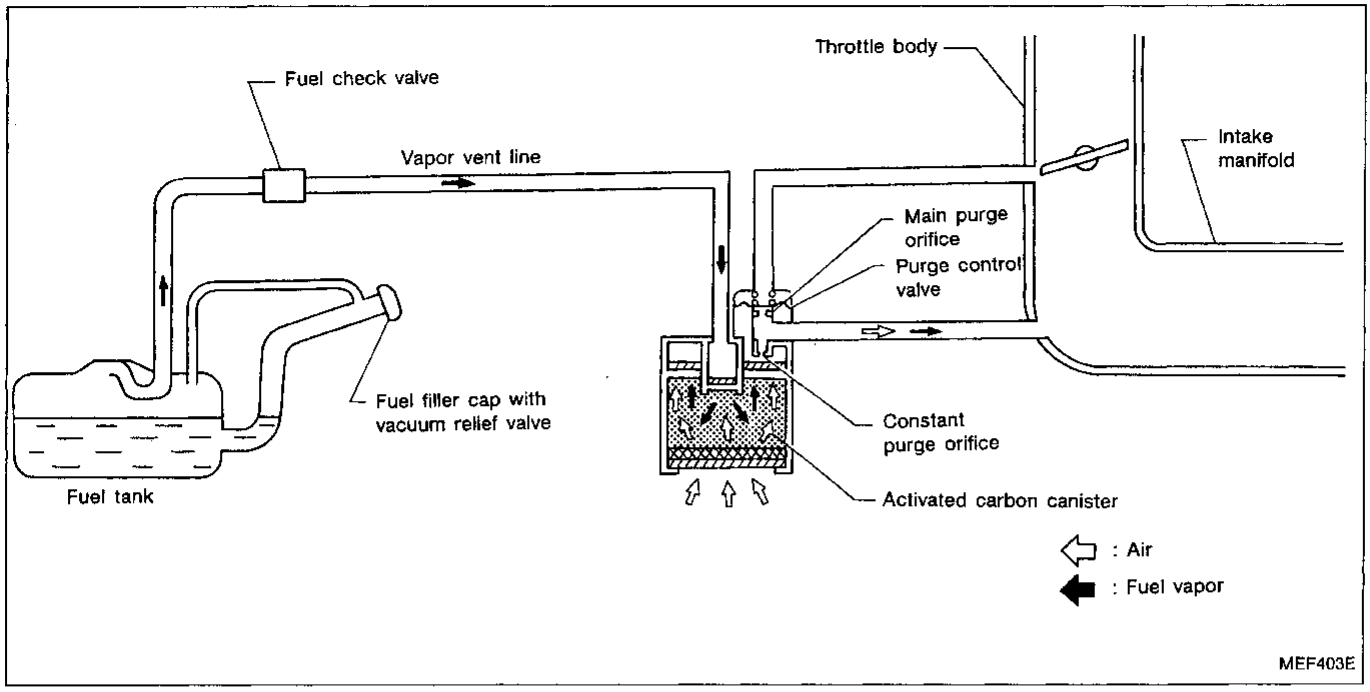


4. Remove injectors from injector tube assembly.
5. Install injectors as follows:
1) Clean exterior of injector tail piece.
2) Use new O-rings

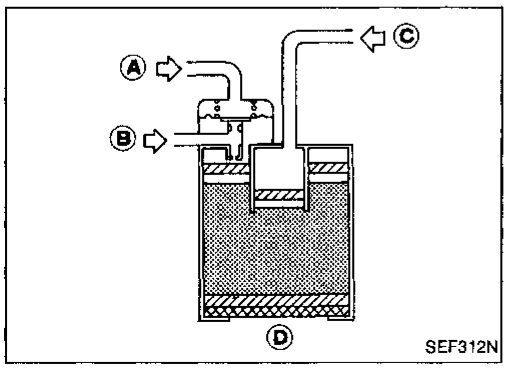
CAUTION:
After properly connecting injectors to fuel tube assembly, check connections for fuel leakage.

6. Assemble injectors to injector tube assembly.

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.

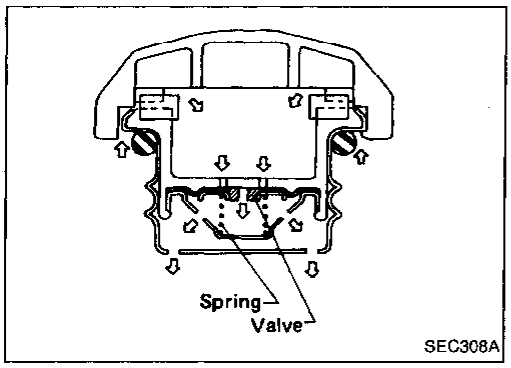


Inspection

ACTIVATED CARBON CANISTER

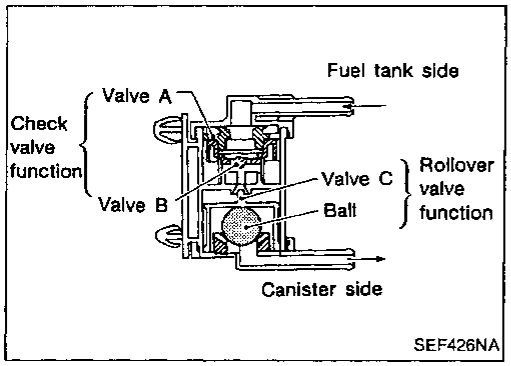
Check carbon canister as follows:
1. Blow air in port Ⓐ and ensure that there is no leakage.
2.
- Apply vacuum to port Ⓐ.
- Cover port Ⓓ with hand.
- Blow air in port Ⓒ and ensure free flow out of port Ⓑ.

Inspection (Cont'd)



FUEL 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 is in good mechanical condition. Note also that, by further sucking air, the resistance should disappear with valve clicks.
3. If valve is clogged or if no resistance is felt, replace cap as an assembly.



FUEL CHECK VALVE (With rollover valve)

Check valve operation

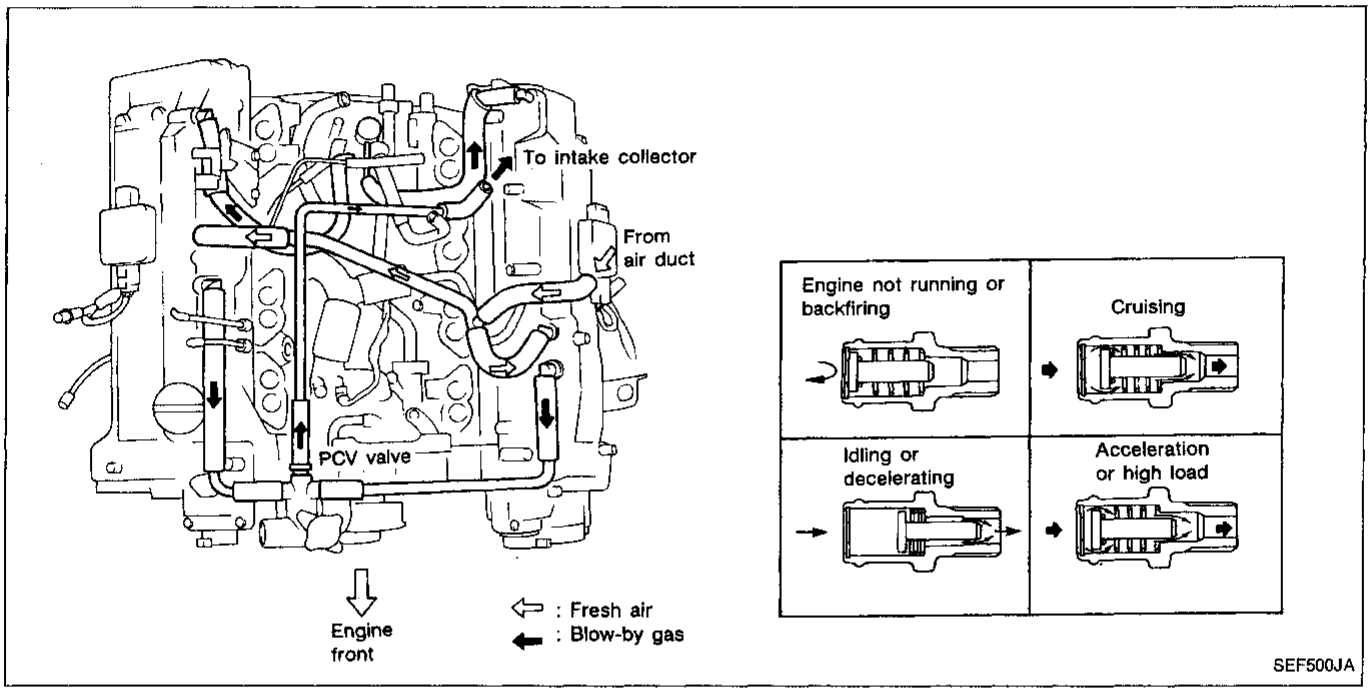
1. Blow air through connector on fuel tank side.
   A considerable resistance should be felt and a portion of air flow should be directed toward the canister side.
2. Blow air through connector on canister side.
   Air flow should be smoothly directed toward fuel tank side.
3. If fuel check valve is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

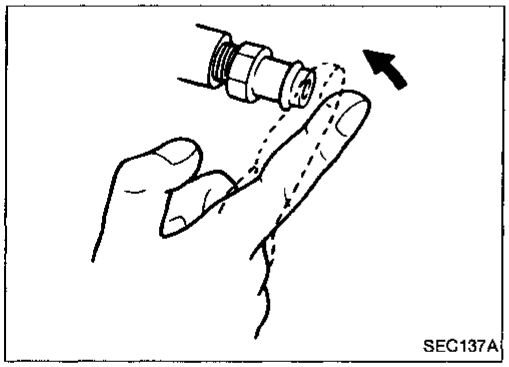
Rollover valve operation

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

Description

This system returns blow-by gas to the intake collector.
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.
The ventilating air is then drawn from the air duct, through the hose connecting air inlet tubes to rocker cover, into the crankcase.
Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. And its flow goes through the hose connection in the reverse direction.
For vehicles with an excessively high blow-by: some of the flow will go through the hose connection to the intake collector under all conditions.

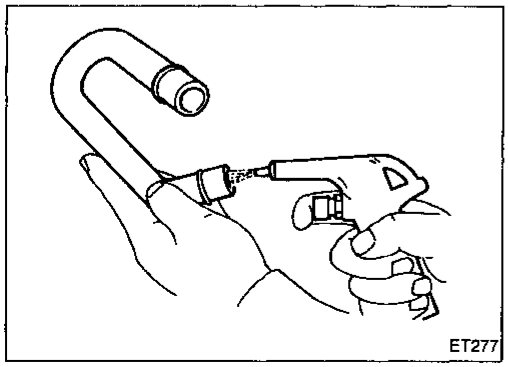




Inspection

PCV (Positive Crankcase Ventilation) VALVE

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



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

PRESSURE REGULATOR	
Fuel pressure at idling kPa (kg/cm^2, psi)	
Vacuum hose is connected	Approximately 235 (2.4, 34)
Vacuum hose is disconnected	Approximately 299.1 (3.05, 43.4)

Inspection and Adjustment

Idle speed*1 rpm	
No-load*2 (in "N" position)	650 ± 50
Air conditioner: ON (in "N" position)	650 ± 50
Ignition timing	15° ± 2° BTDC

*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)
- Radiator fan: OFF

IGNITION COIL

Primary voltage	V	12
Primary resistance [at 20°C (68°F)]	Ω	Approximately 0.7
Secondary resistance [at 20°C (68°F)]	kΩ	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 0.7
Partially released	0.7 - 5
Completely depressed	Approximately 5

RESISTOR

Resistance	kΩ	Approximately 2.2