ENGINE FUEL & EMISSION CONTROL SYSTEM

SECTION EF & EC

CONTENTS

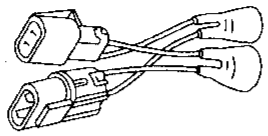
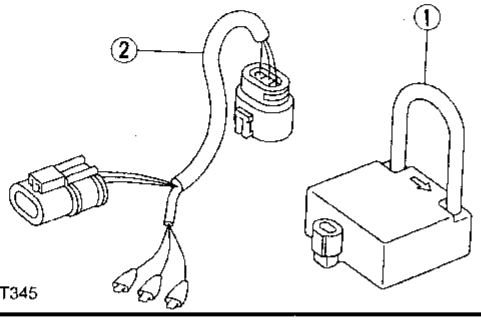
CONTENTS (Cont'd)

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

When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES".

Note: Refer to Foldout page for "ECCS WIRING DIAGRAM".

Special Service Tools

Tool number (Kent-Moore No.) Tool name	Description
EG11160000 (—) Adapter harness	 NT056 Measuring engine speed
① KV109D0010 (J-36777-1) Ignition timing adapter coil ② (J39387) Adapter harness	 NT345 Measuring ignition timing

Supplemental Restraint System "AIR BAG"

The Supplemental Restraint System "Air Bag" helps to reduce the risk or severity of injury to the driver in a frontal collision. The Supplemental Restraint System consists of an air bag (located in the center of the steering wheel), sensors, a diagnostic unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **BF section** of this Service Manual.

WARNING:

a. **To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized NISSAN dealer.**

b. **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**

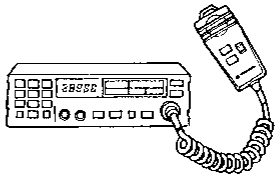
c. **All SRS electrical wiring harnesses and connectors are covered with yellow outer insulation . Do not use electrical test equipment on any circuit related to the SRS "Air Bag".**

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

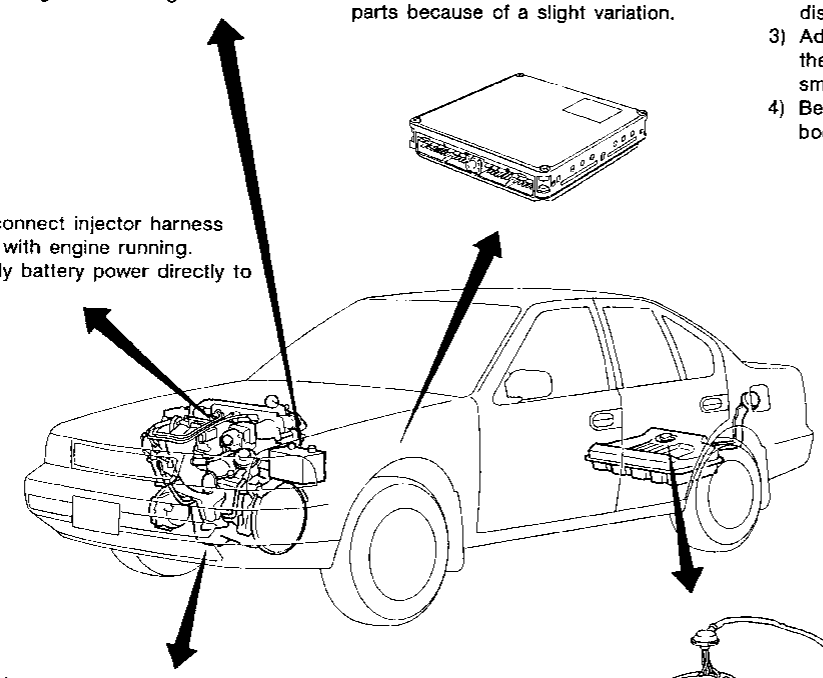
ECM
- Do not disassemble ECM (ECCS control module).
- Do not turn diagnosis test mode selector forcibly.
- If a battery terminal is disconnected, the memory will return to ECM value. The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. 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 as it may adversely affect electronic control systems depending on its installation location.

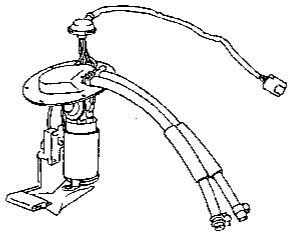
1) Keep the antenna as far as possible away from the ECM.
2) Keep the antenna feeder line more than 20 cm (7.9 in) away from the harness of electronic controls.
   Do not let them run parallel for a long distance.
3) Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.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



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



ECCS PARTS HANDLING
- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble IACV-AAC valve.
- Even a slight leak in the air intake system can cause serious problems.
- Do not shock or jar the 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.
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep ECM harness at least 10 cm (3.9 in) away from adjacent harnesses, to prevent an ECM system malfunction due to external noise, degraded operation of ICs, etc.
- Keep ECCS parts and harnesses dry.
- Before removing parts, turn off ignition switch and then disconnect battery ground cable.

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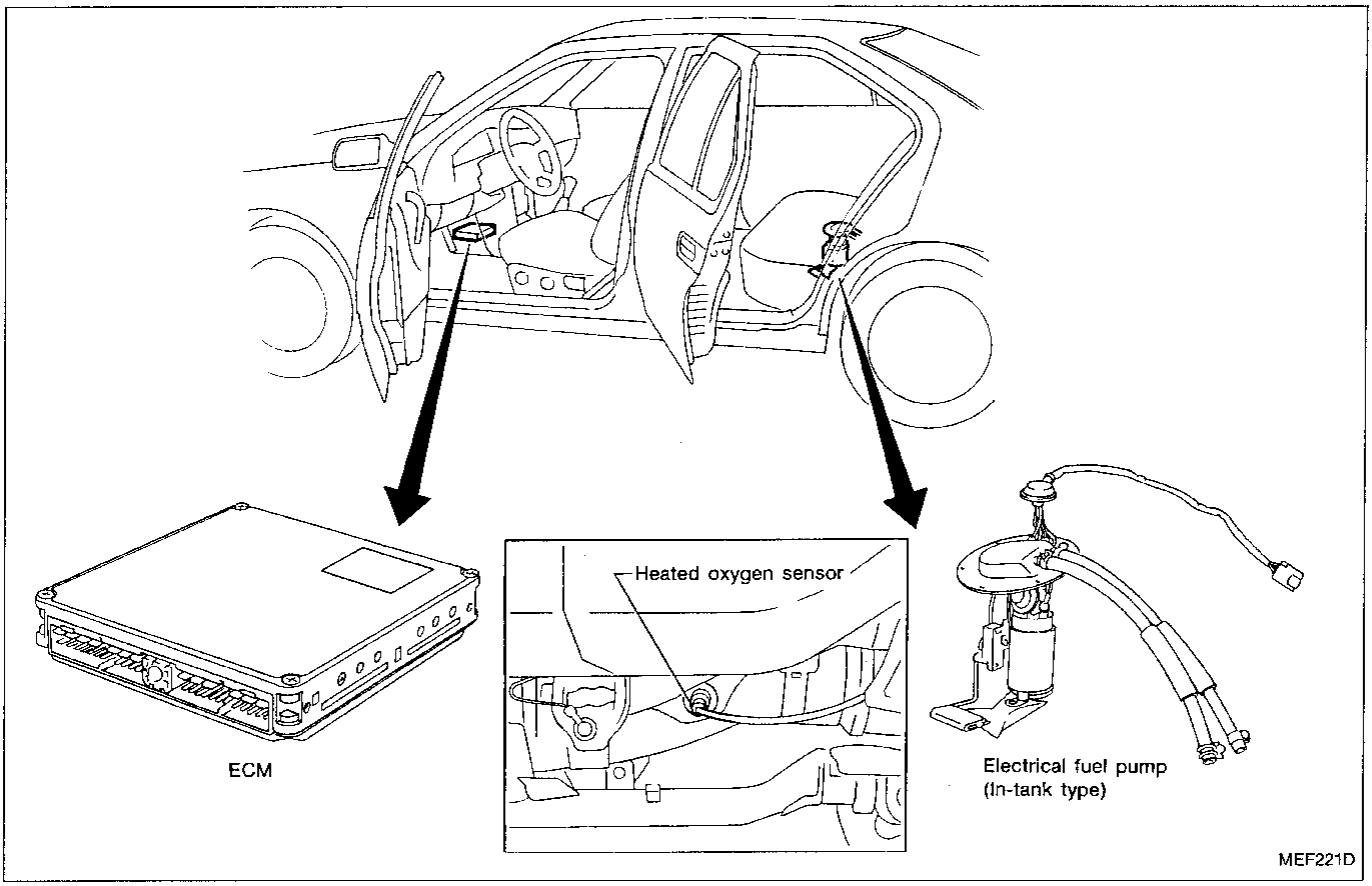
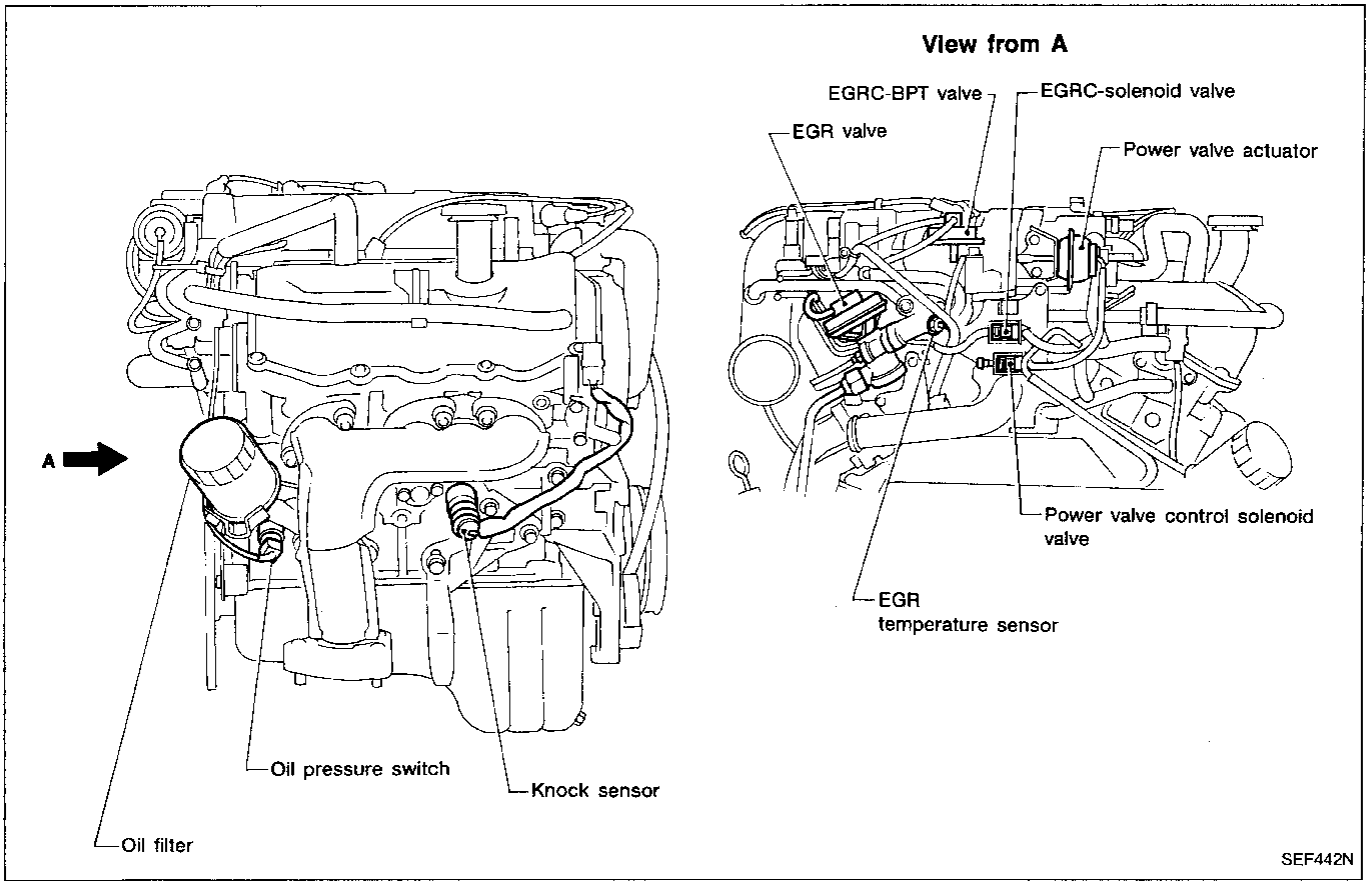
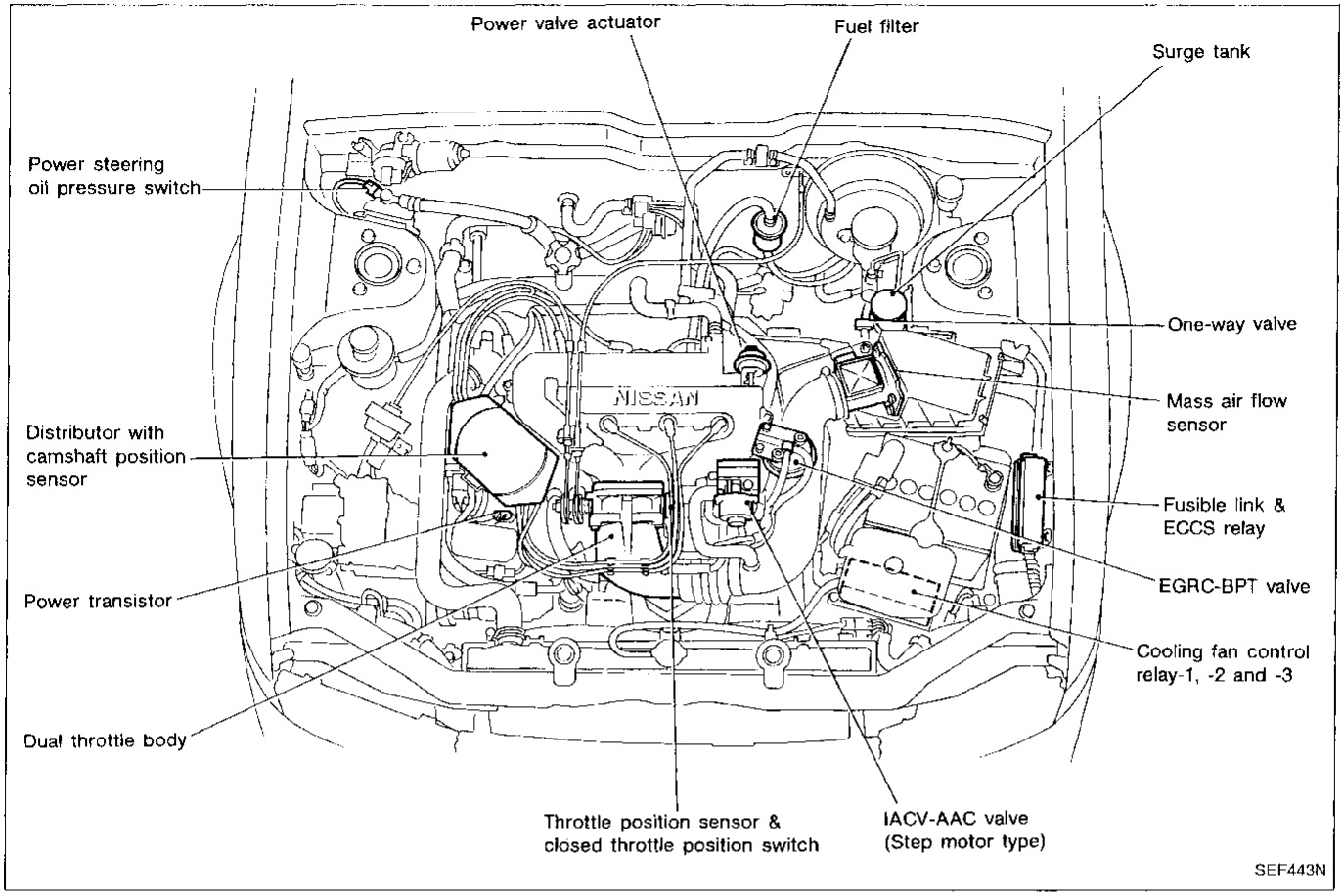
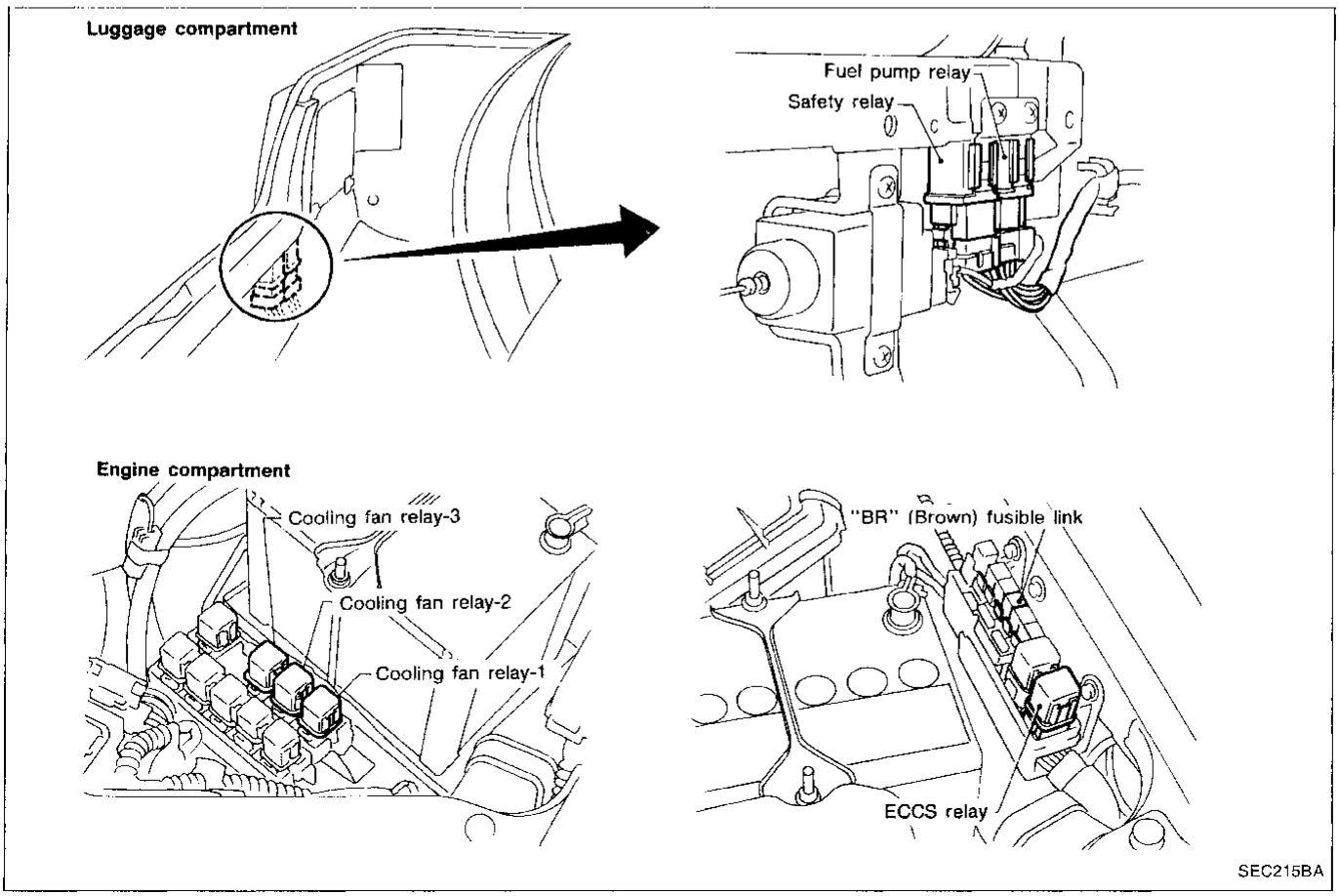
ECCS Component Parts Location



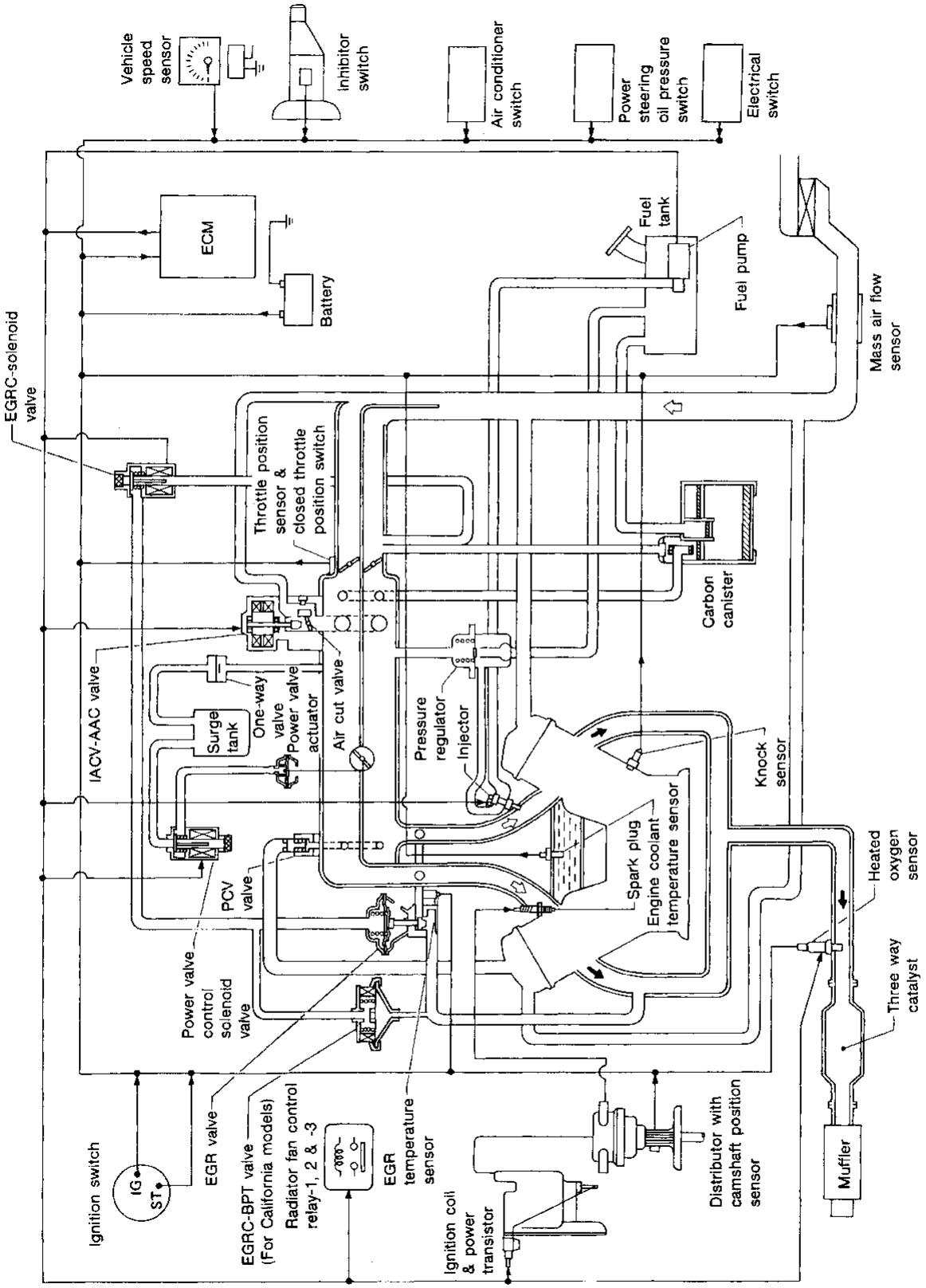


ECCS Component Parts Location (Cont'd)





System Diagram



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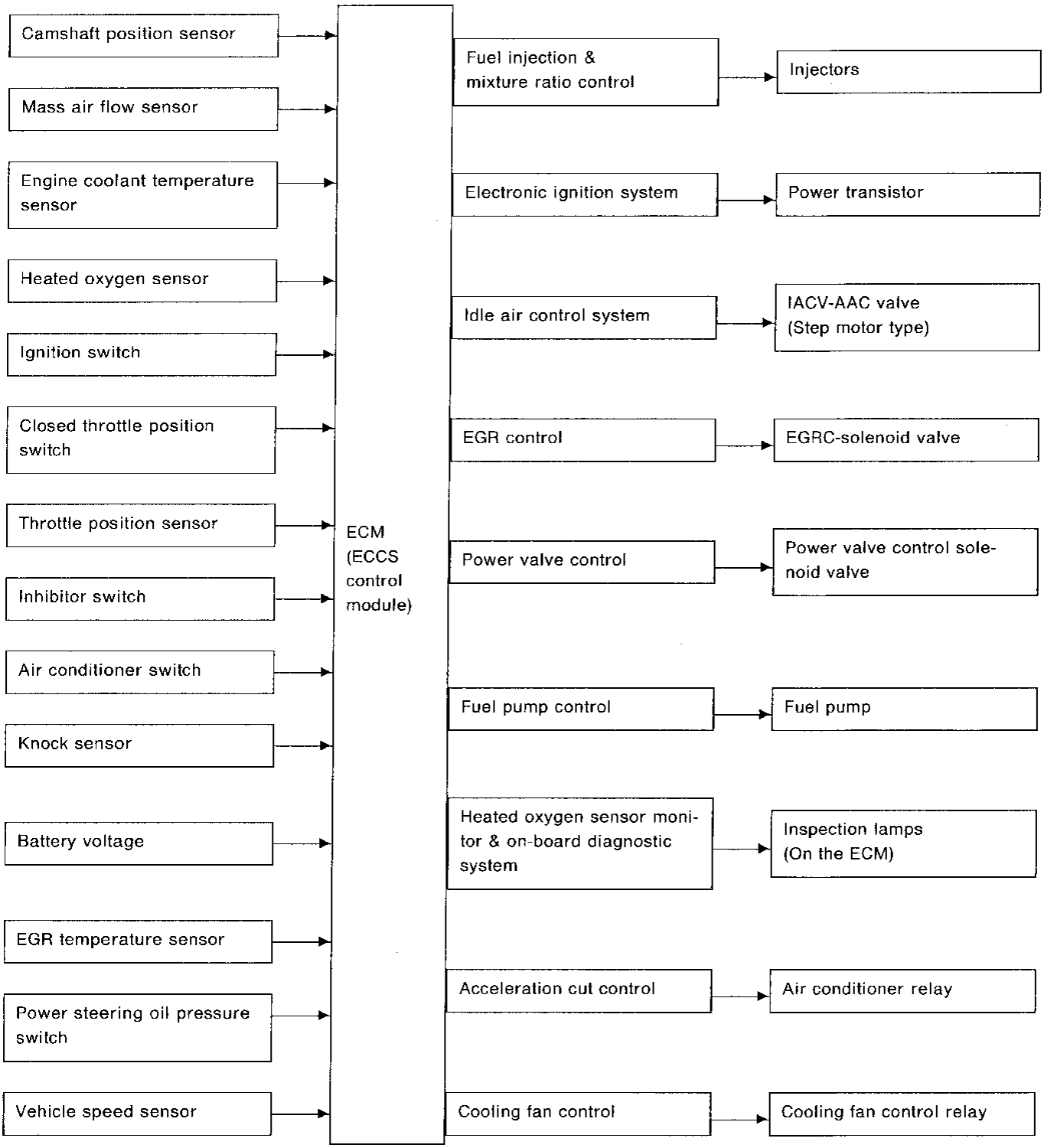
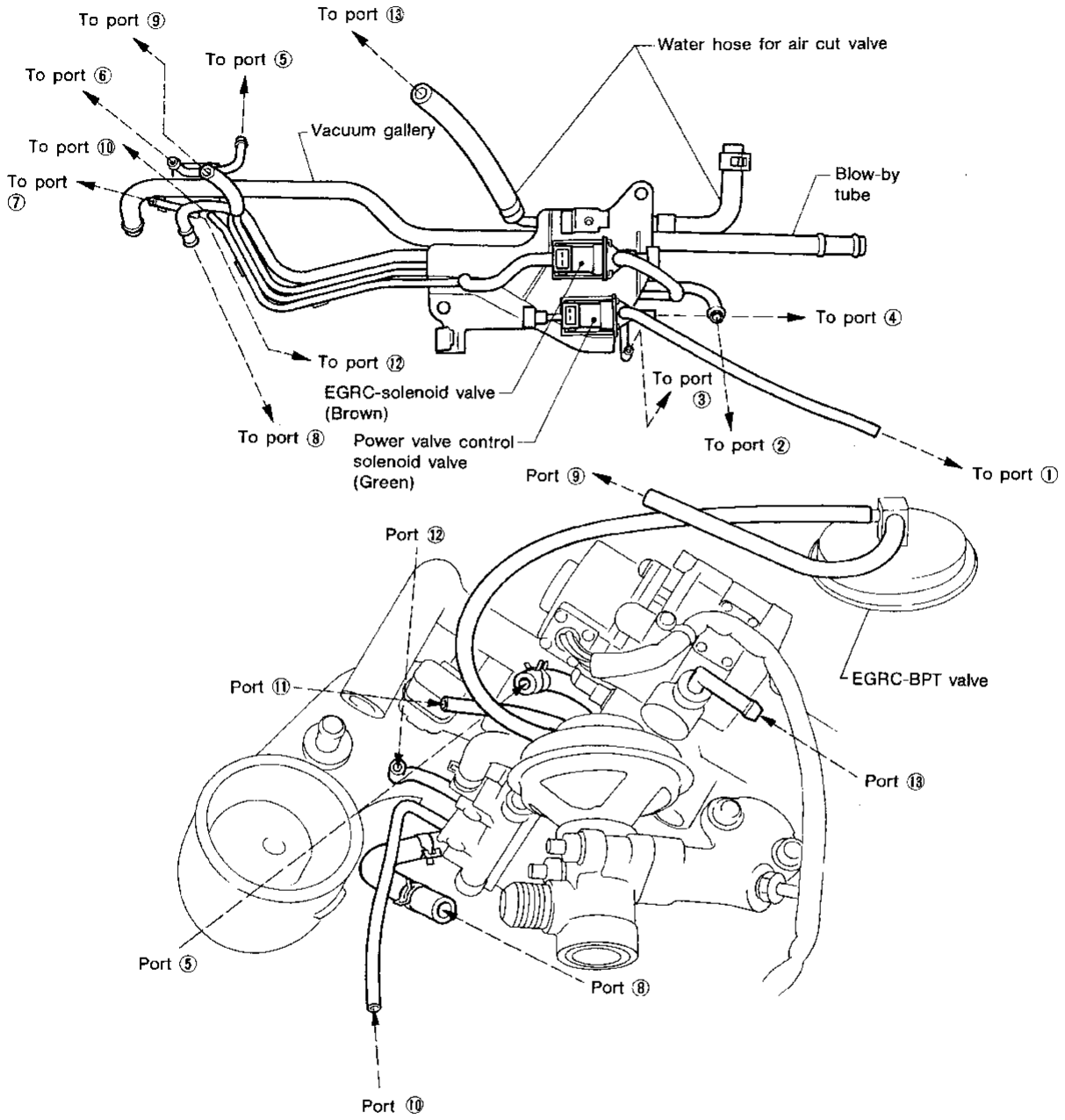
System Chart



Vacuum Hose Drawing



Port ①	Power valve actuator	Port ⑧	Water hose for throttle body
Port ②	Heater hose	Port ⑨	EGRC-BPT valve
Port ③	One-way valve	Port ⑩	Throttle body vacuum port
Port ④	Surge tank	Port ⑪	Intake manifold vacuum port
Port ⑤	Air cut valve	Port ⑫	Throttle body vacuum port
Port ⑥	Canister purge port	Port ⑬	Air cut valve
Port ⑦	Canister control vacuum port		

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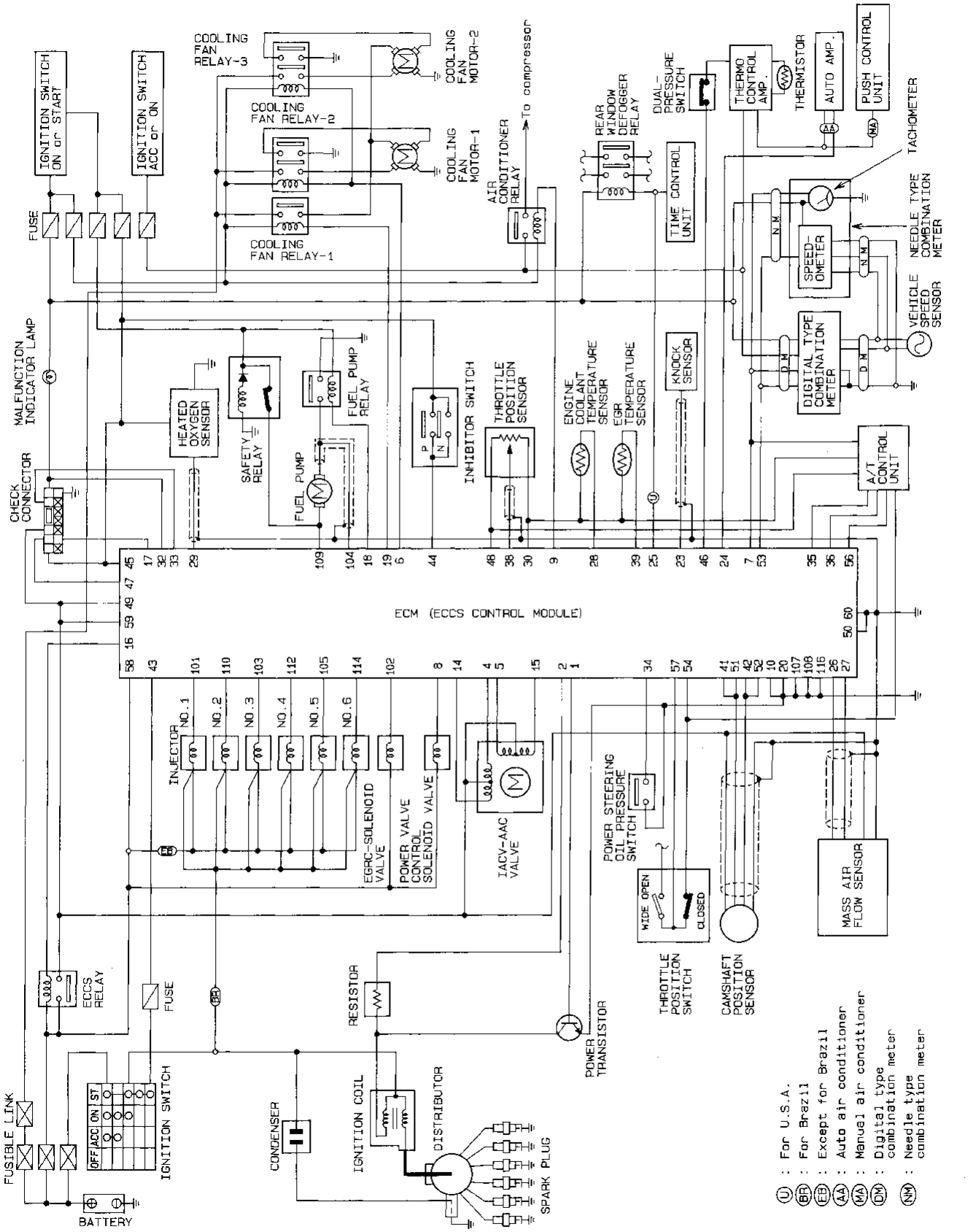
Circuit Diagram



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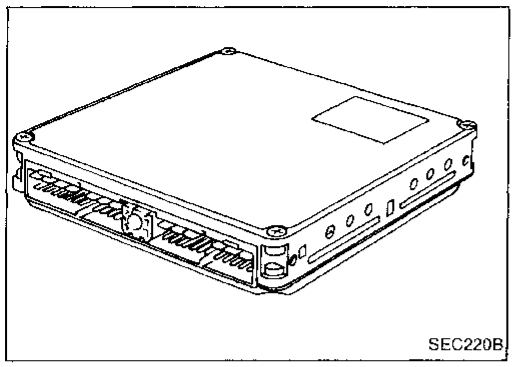
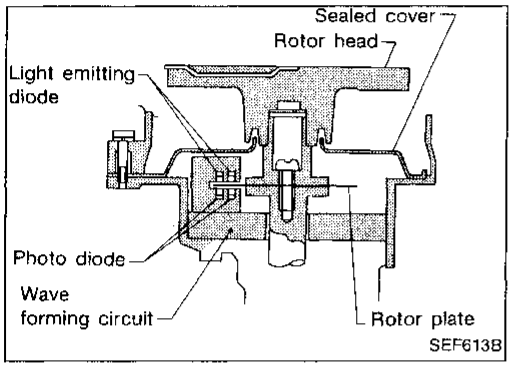

SEC220B

Engine Control Module (ECM)-ECCS Control Module

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



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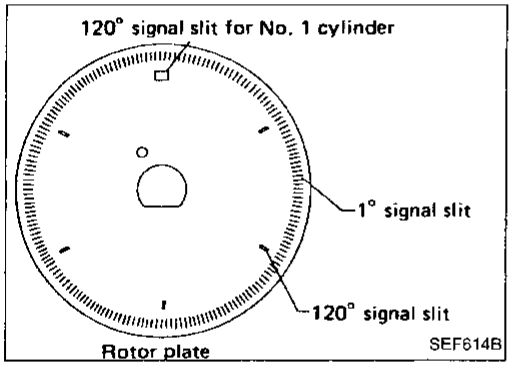
Camshaft Position Sensor (CMPS)

The camshaft position sensor is a basic component of the entire ECCS. It monitors engine speed and piston position, and sends signals to the ECM to control fuel injection, ignition timing and other functions.

The camshaft position sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for 1° signal and 6 slits for 120° signal. Light Emitting Diodes (LED) and photo diodes are built in the wave-forming circuit.



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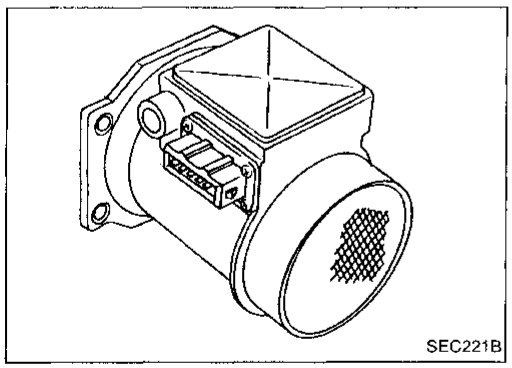
When the rotor plate passes between the LED and the photo diode, the slits in the rotor plate continually cut the light being transmitted to the photo diode from the LED. This generates rough-shaped pulses which are converted into on-off pulses by the wave-forming circuit, which are sent to the ECM.

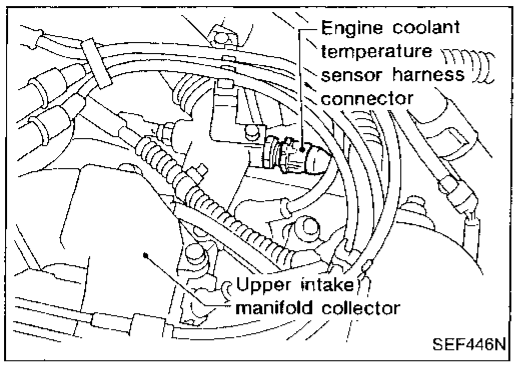

SEC221B

Mass Air Flow Sensor (MAFS)

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

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

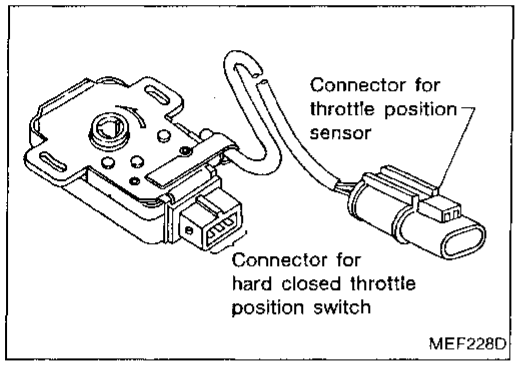
Therefore, it is necessary to supply the hot film with more electric current in order to maintain the temperature of the hot film. The ECM knows the air flow by means of the electric change.



Engine Coolant Temperature Sensor (ECTS)

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

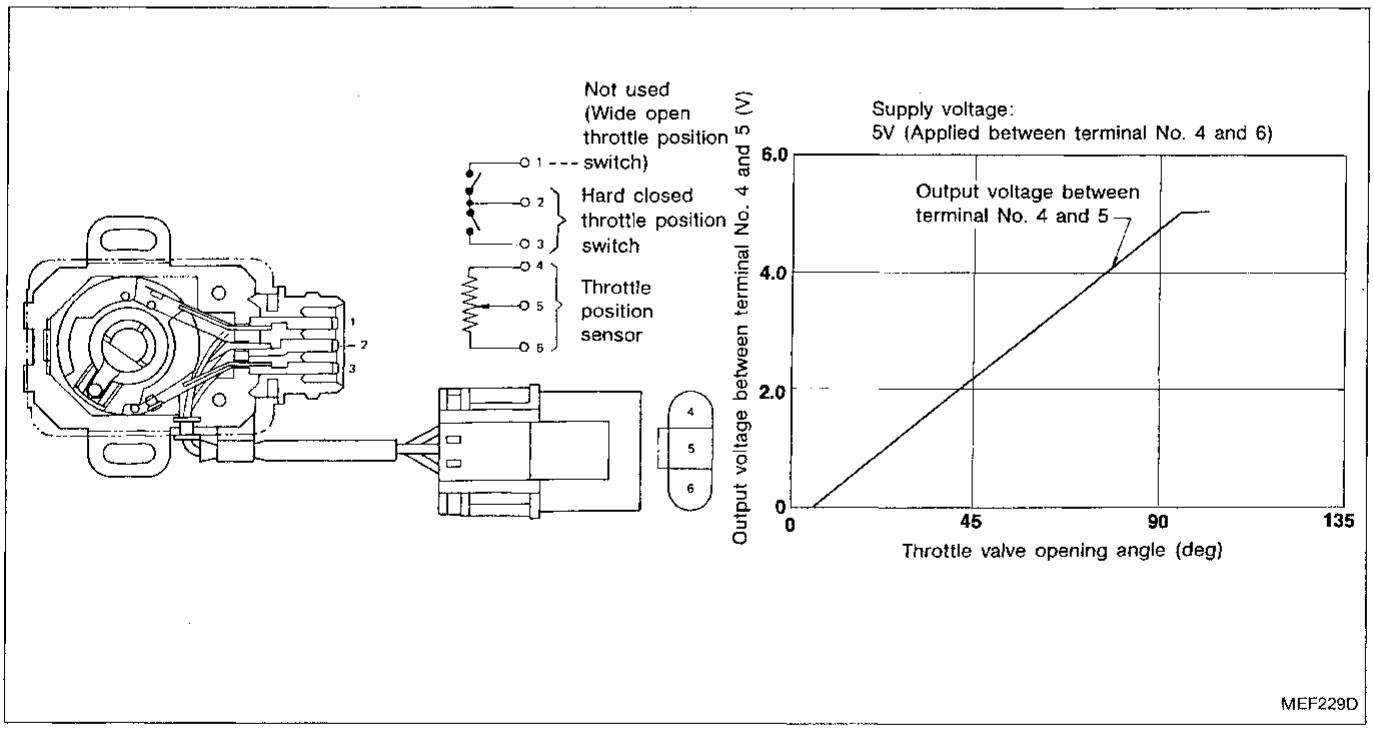
The temperature sensing unit employs a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

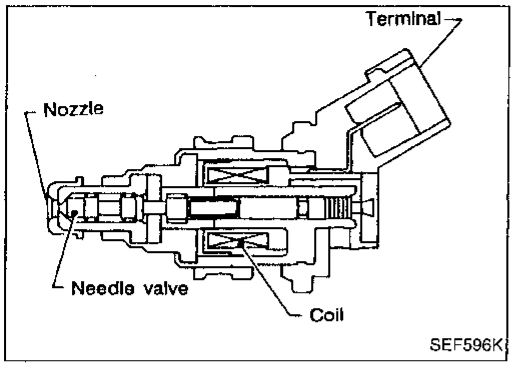


Throttle Position Sensor (TPS) & Soft/Hard Closed Throttle Position (CTP) Switch

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

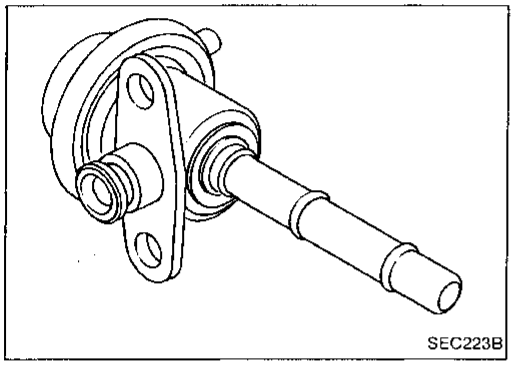
Idle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This system is called "soft closed throttle position switch". This one controls engine operation such as fuel cut. On the other hand, "hard closed throttle position switch", which is built in the throttle position sensor unit, is used not for engine control but for on-board diagnostic system.





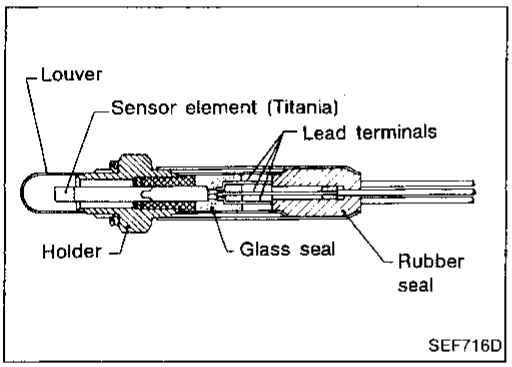
Fuel Injector

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



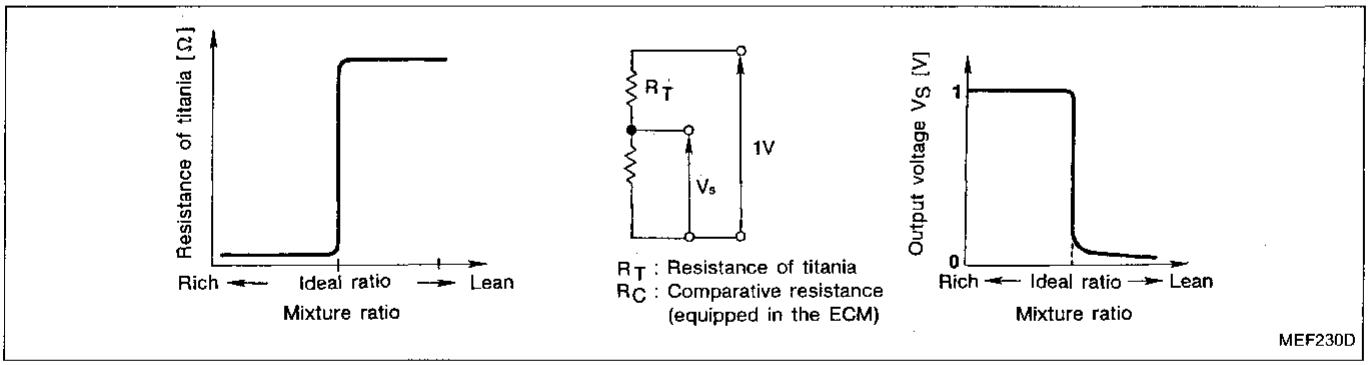
Pressure Regulator

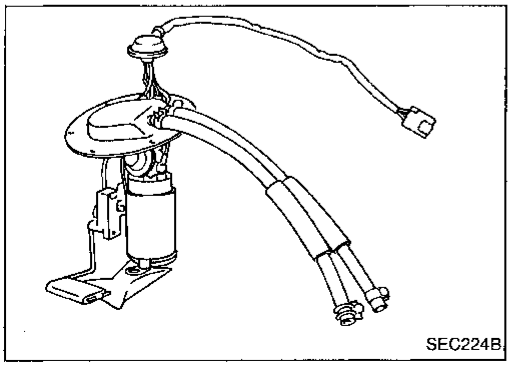
The pressure regulator maintains the fuel pressure at 299.1 kPa (3.05 kg/cm^2, 43.4 psi). Since the injected fuel amount depends on injection pulse duration, it is necessary to maintain the pressure at the above value.



Heated Oxygen Sensor (HO2S)

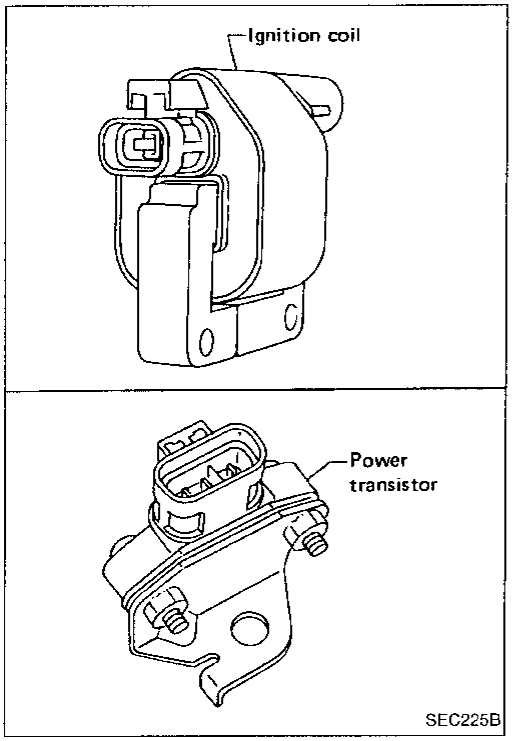
The heated oxygen sensor, located in the exhaust manifold, monitors the oxygen level in the exhaust gas.
This sensor is made of ceramic titania, the electric resistance of which drastically changes at the ideal air-fuel ratio.
The ECM supplies the sensor with approximately 1V and then measures the output voltage depending on its resistance.





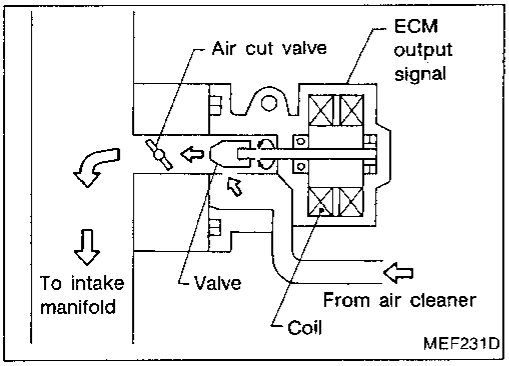
Fuel Pump

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



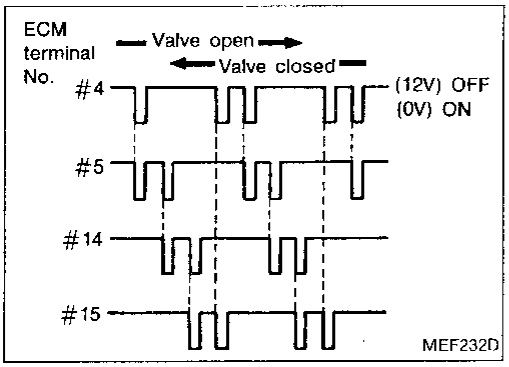
Power Transistor & Ignition Coil

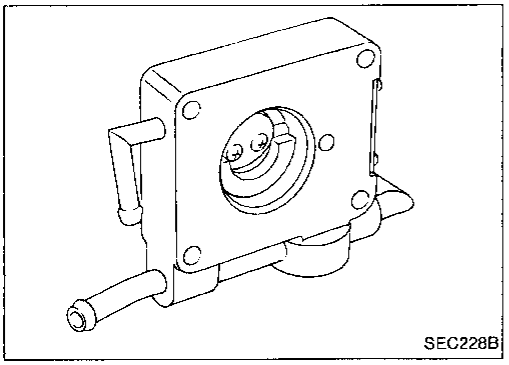
The ignition signal from the ECM is amplified by the power transistor, which turns the ignition coil primary circuit on and off, inducing the proper high voltage in the secondary circuit. The ignition coil is a small, molded type.



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

The IACV-AAC valve is operated by a step motor for centralized control of auxiliary air supply. This motor has four winding phases and is actuated by the output pulse signal of ECM which turns ON and OFF two windings each in sequence. Each time the IACV-AAC valve opens or closes to change the auxiliary air quantity, an ON pulse is issued. When no change in the auxiliary air quantity is needed, the valve remains at a certain opening, hence no pulse signal output is issued.



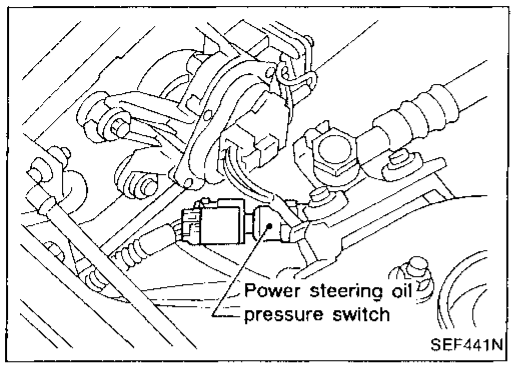


Air Cut Valve

The air cut valve closes gradually as the cooling water temperature rises. This valve restricts the auxiliary air flow after the engine has warmed up and limits the maximum air flow even when there is trouble in the IACV-AAC valve, so that engine overrunning can be avoided.

CAUTION:

Do not forcibly push valve as this may cause damage.

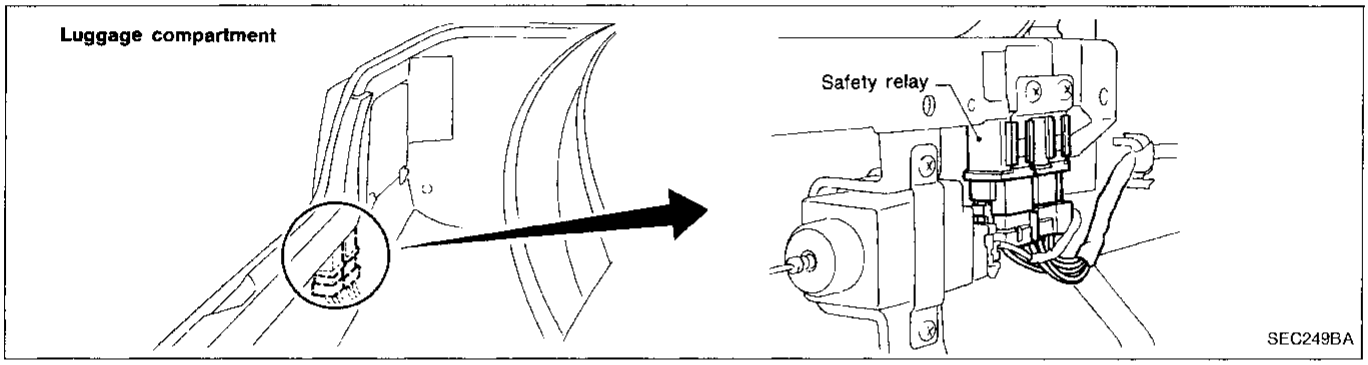


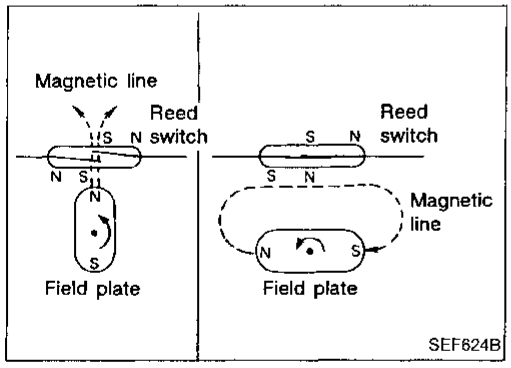
Power Steering Oil Pressure Switch

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

Safety Relay

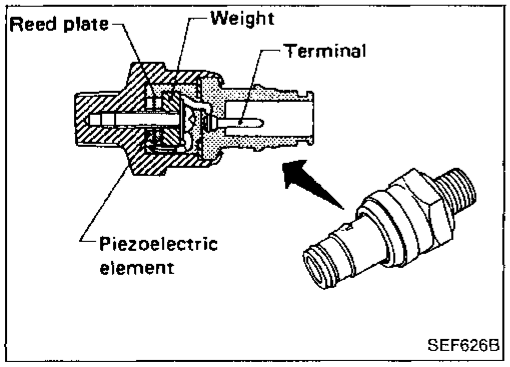
The safety relay prevents electrical damage to the ECM and injectors when battery terminals are connected in reverse. The safety relay is built into the fuel pump control circuit.





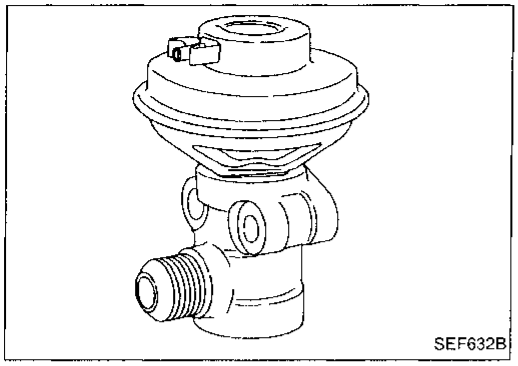
Vehicle Speed Sensor (VSS)

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



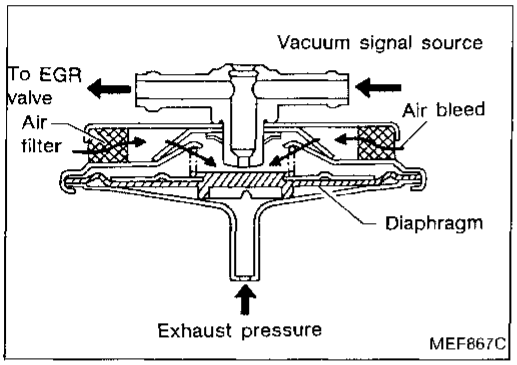
Knock Sensor (KS)

The knock sensor is attached to the cylinder block and senses 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 delivered as output.


SEF632B

Exhaust Gas Recirculation (EGR) Valve

The EGR valve controls the quantity of exhaust gas to be led to the intake manifold through vertical movement of the taper valve connected to the diaphragm, to which vacuum is applied in response to the opening of the throttle valve.



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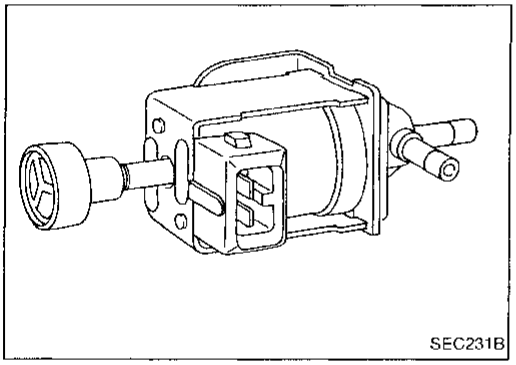
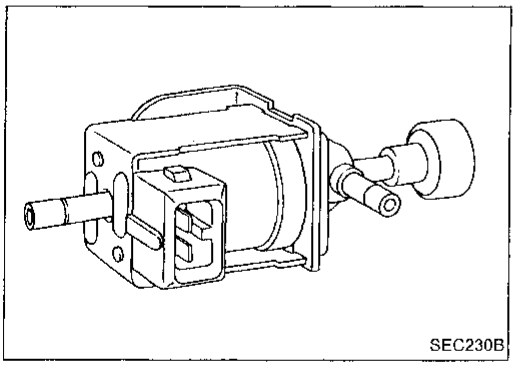
EGR Control (EGRC)-BPT Valve

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.


SEC231B

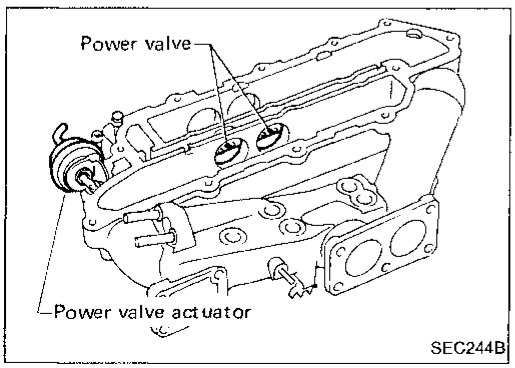
EGR Control (EGRC)-Solenoid Valve

The EGR system is controlled only by the ECM. At both low- and high-speed revolutions of engine, the solenoid valve turns on and accordingly the EGR valve cuts the exhaust gas leading to the intake manifold.


SEC230B

Power Valve Control Solenoid Valve

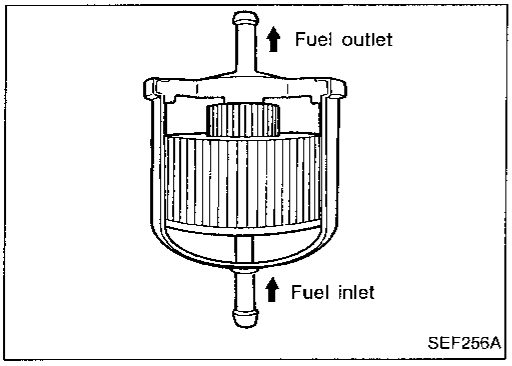
The power valve control solenoid valve cuts the intake manifold vacuum signal for power valve control. It responds to the ON/OFF signal from the ECM. When the solenoid is off, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger downward and feeds the vacuum signal to the power valve actuator.



SEC244B

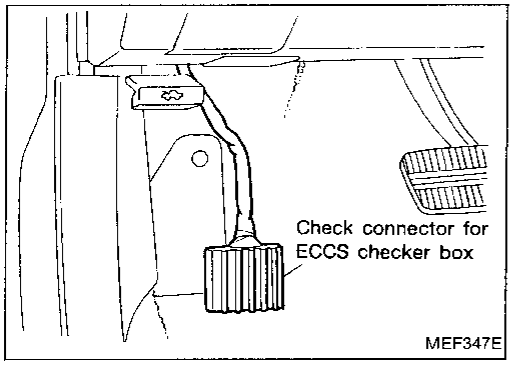
Power Valve

The power valve is used to change over the suction passage of the power valve control system. It is set in the fully closed or fully opened position by the power valve actuator operated by the vacuum stored in the surge tank. The vacuum in the surge tank is controlled by the power valve control solenoid valve.



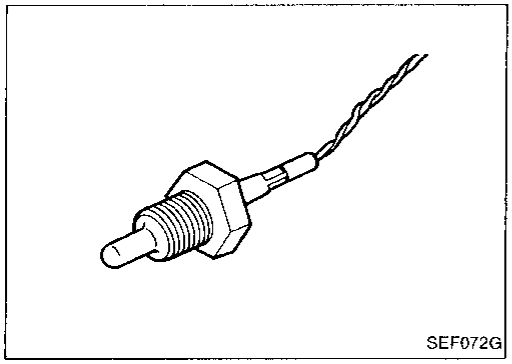
Fuel Filter

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



Check Connector for ECCS Checker Box

The check connector for ECCS checker box is located in the instrument panel to the rear of the hood opener.

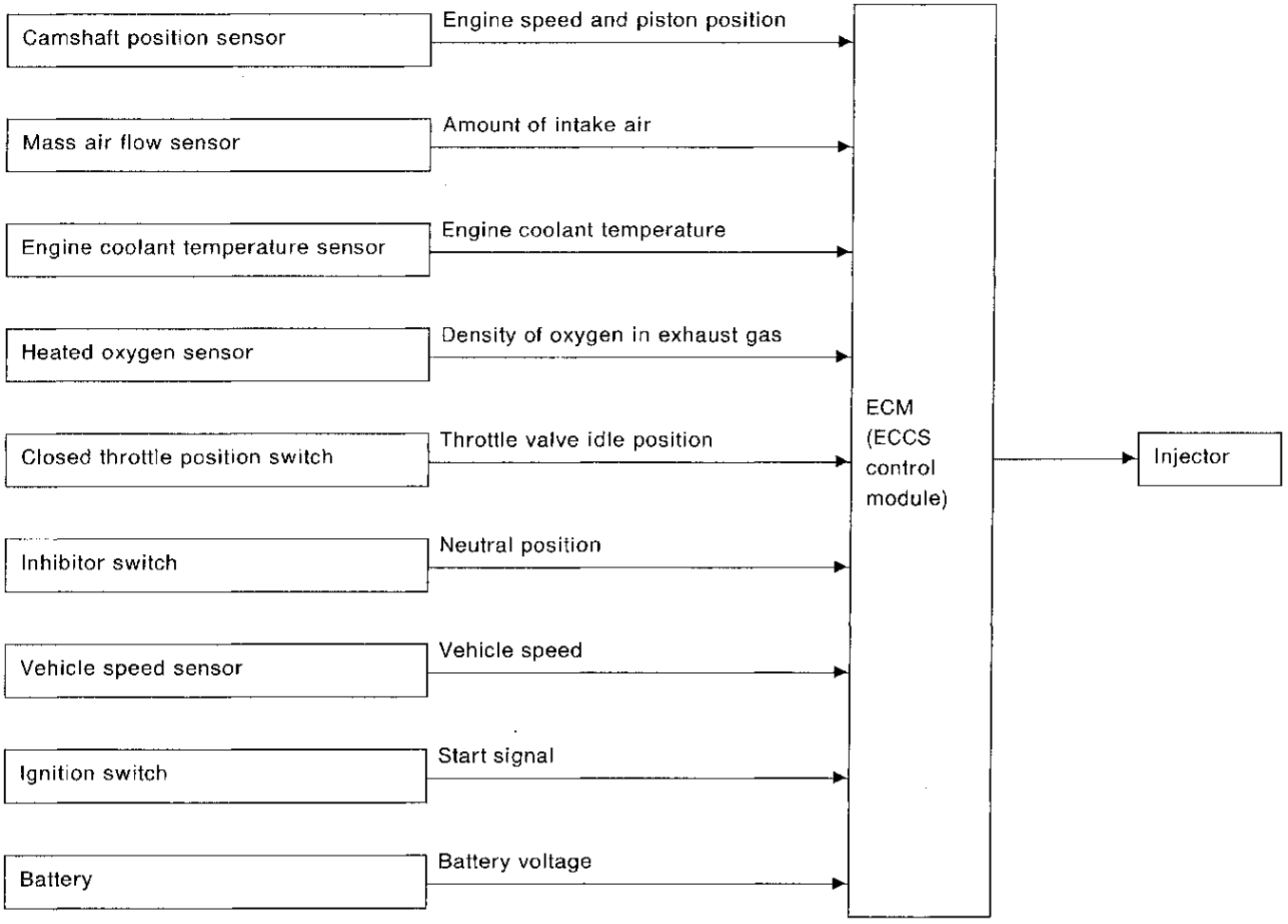


EGR Temperature Sensor

The EGR temperature sensor monitors in 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.

Multiport Fuel Injection (MFI) System

INPUT/OUTPUT SIGNAL LINE



BASIC MULTIPORT FUEL INJECTION SYSTEM

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

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

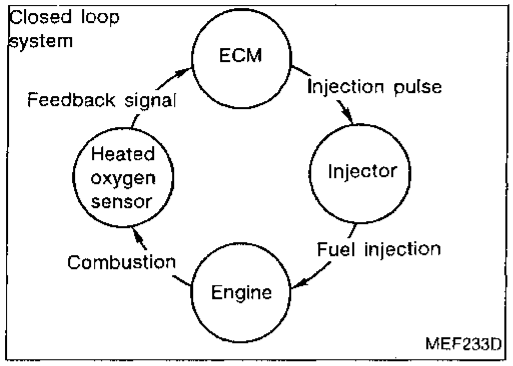
<Fuel increase>

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

Mixture ratio feedback system is designed to precisely control the mixture ratio to the stoichiometric point so that the three way catalyst can reduce CO, HC and NOx emissions. This system uses an heated oxygen sensor in the exhaust manifold to check the air-fuel ratio. The ECM adjusts the injection pulse width according to the sensor voltage so the mixture ratio will be within the range of the stoichiometric air-fuel ratio.

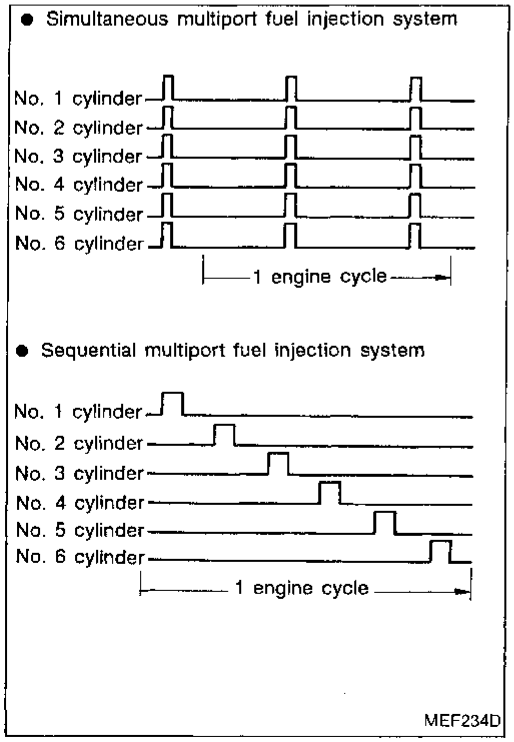
This stage refers to the closed loop control condition. The open loop control condition refers to that under which the ECM detects any of the following conditions and feedback control stops in order to maintain stabilized fuel combustion.

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

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 to provide a basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. This is due to manufacturing errors (e.g., mass air flow sensor hot wire) and changes during operation (injector clogging, etc.) of ECCS parts which directly affect the mixture ratio.

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



FUEL INJECTION TIMING

Two types of fuel injection systems are used — simultaneous multiport fuel injection system and sequential multiport fuel injection system. In the former, fuel is injected into all six cylinders simultaneously twice each engine cycle.

In other words, pulse signals of the same width are simultaneously transmitted from the ECM to the six injectors two times for each engine cycle.

In the sequential multiport fuel injection system, fuel is injected into each cylinder during each engine cycle according to the firing order.

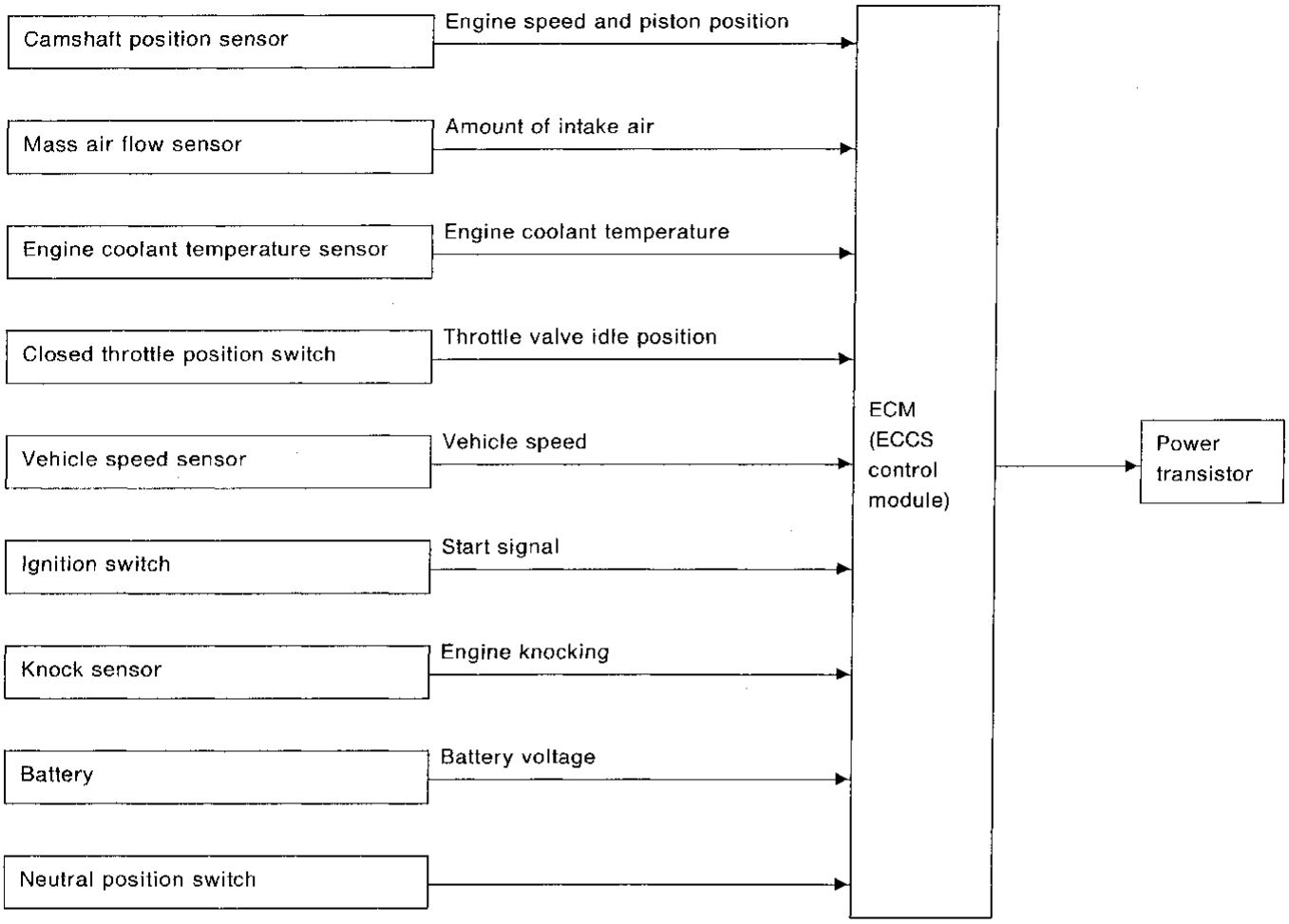
When engine is starting, fuel is injected into all six cylinders simultaneously twice a cycle.

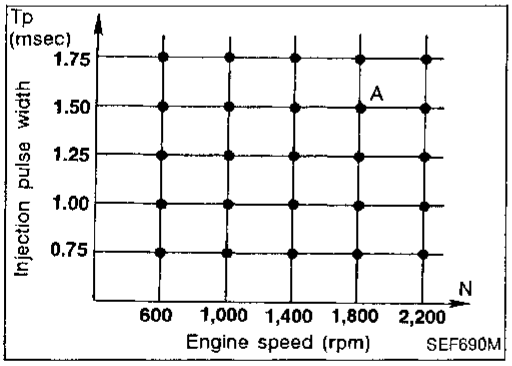
FUEL SHUT-OFF

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

Electronic Ignition (EI) System

INPUT/OUTPUT SIGNAL LINE





SYSTEM DESCRIPTION

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

The ignition timing data is stored in the ECM, in the form of the map as shown.

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 according to the other data stored in the ECM.

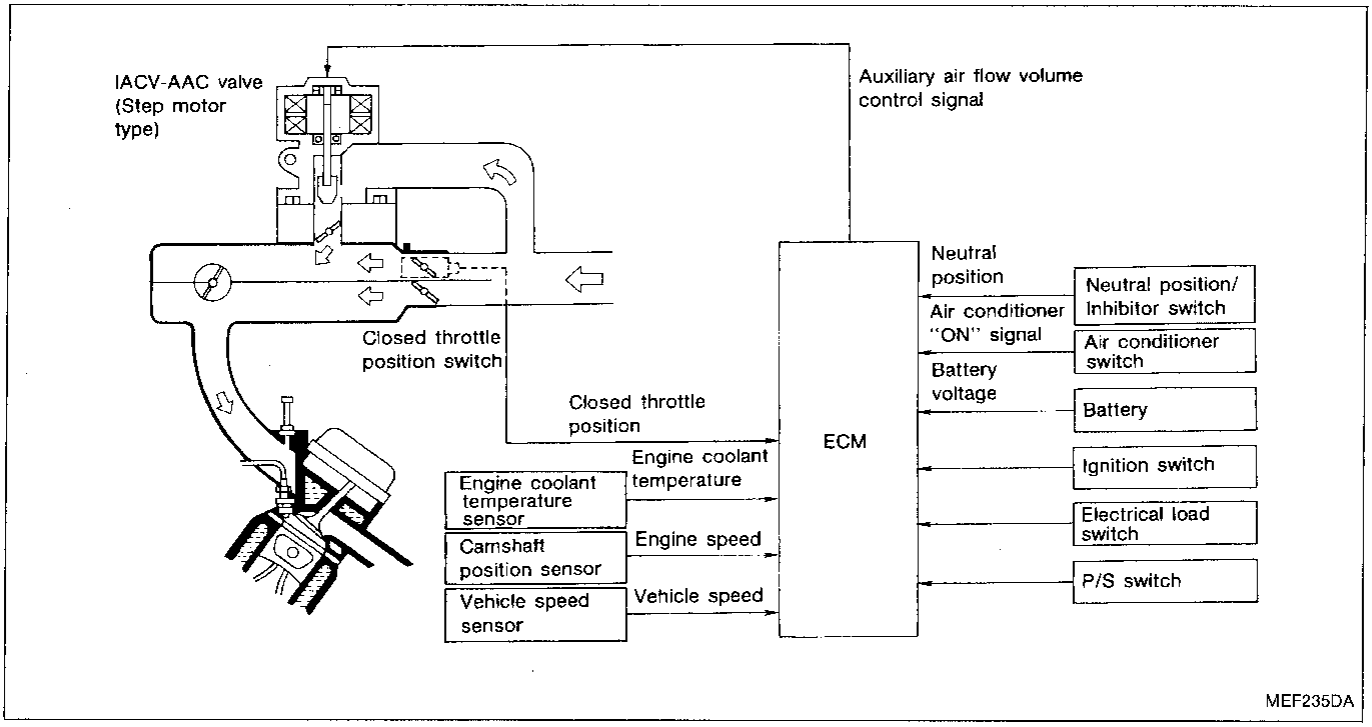
Electronic Ignition (EI) System (Cont'd)

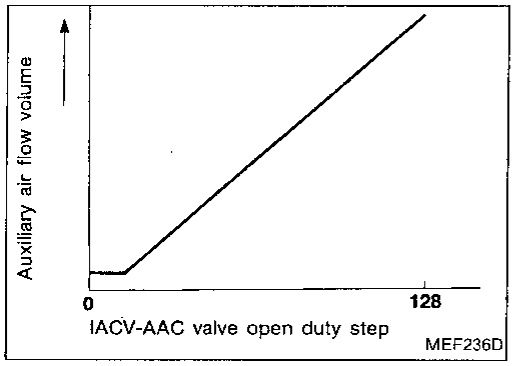
The retard system by knock sensor is designed only for emergencies. The basic ignition timing is pre-programmed within the anti-knocking zone, even if recommended fuel is used under dry conditions. Consequently, the retard system does not operate under normal driving conditions.

However, if engine knocking occurs, the knock sensor monitors the condition and the signal is transmitted to the ECM. After receiving it, the ECM retards the ignition timing to avoid the knocking condition.

Idle Air Control (IAC) System

INPUT/OUTPUT SIGNAL LINE

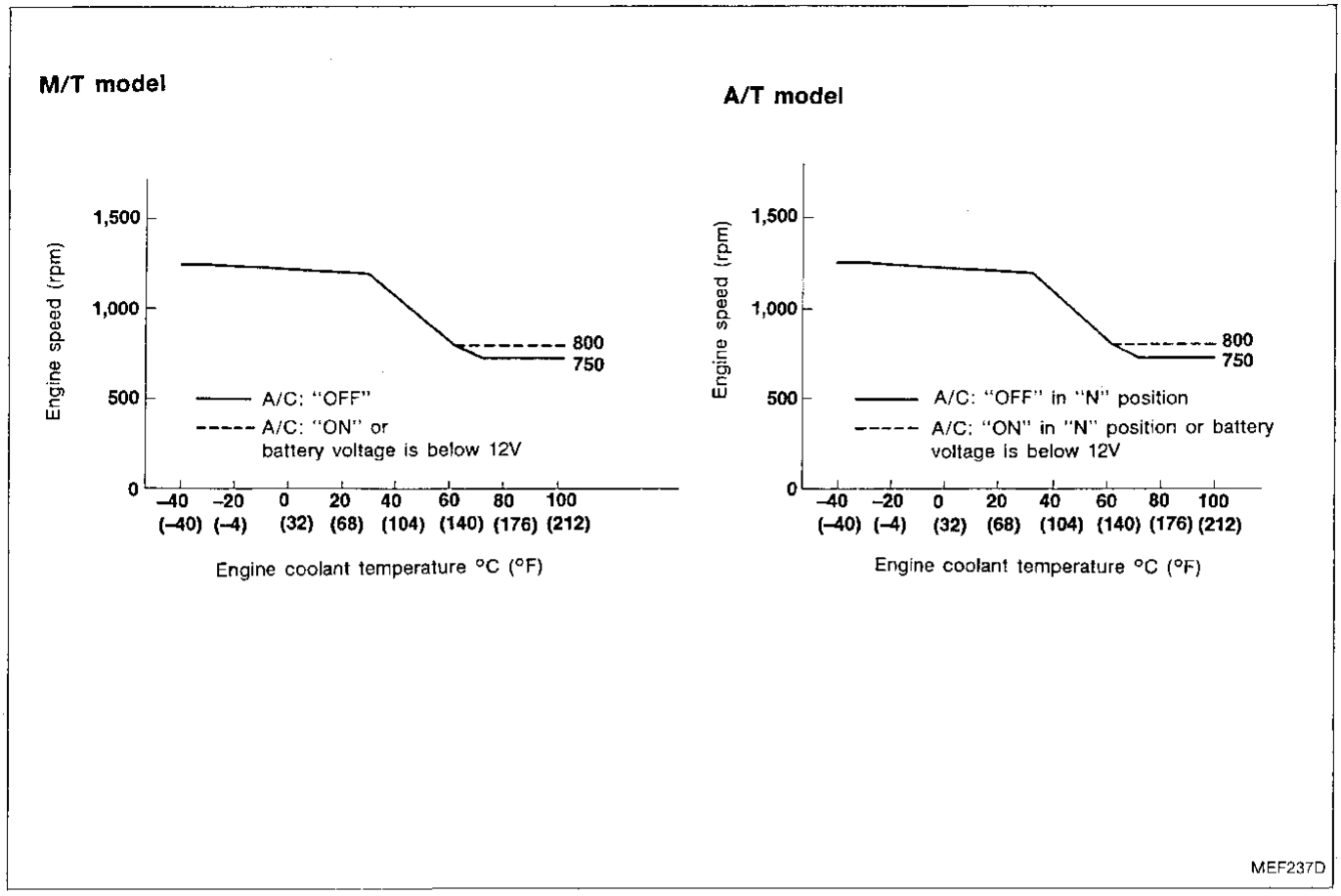




SYSTEM DESCRIPTION

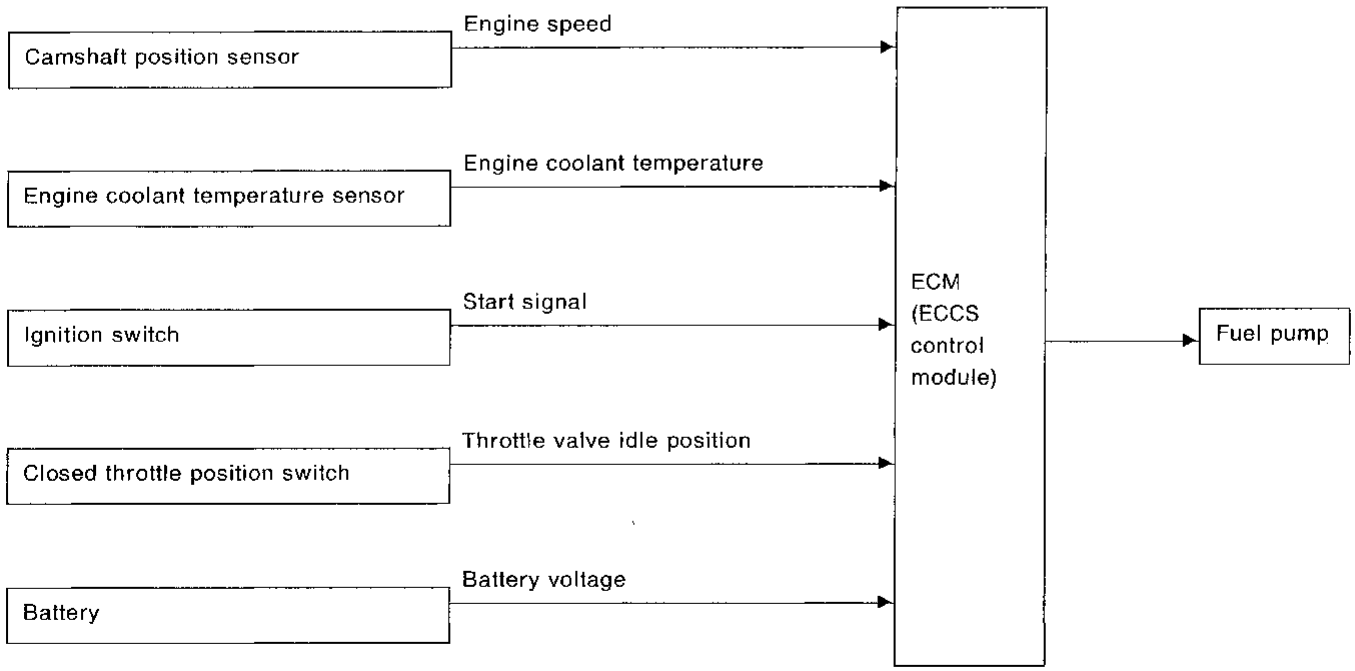
This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which by-passes the throttle valve via IACV-AAC valve. The IACV-AAC valve changes the opening of the air by-pass passage to control the amount of auxiliary air. This valve is actuated by a step motor built into the valve, which moves the valve in the axial direction in steps corresponding to the ECM output pulses, the opening of the valve is varied to allow for optimum control of the engine idling speed. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the ON/OFF time of the IACV-AAC valve so that engine speed coincides with the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as warming up and during deceleration, fuel consumption, and engine load (air conditioner, electrical load).

Idle Air Control (IAC) System (Cont'd)



Fuel Pump Control

INPUT/OUTPUT SIGNAL LINE



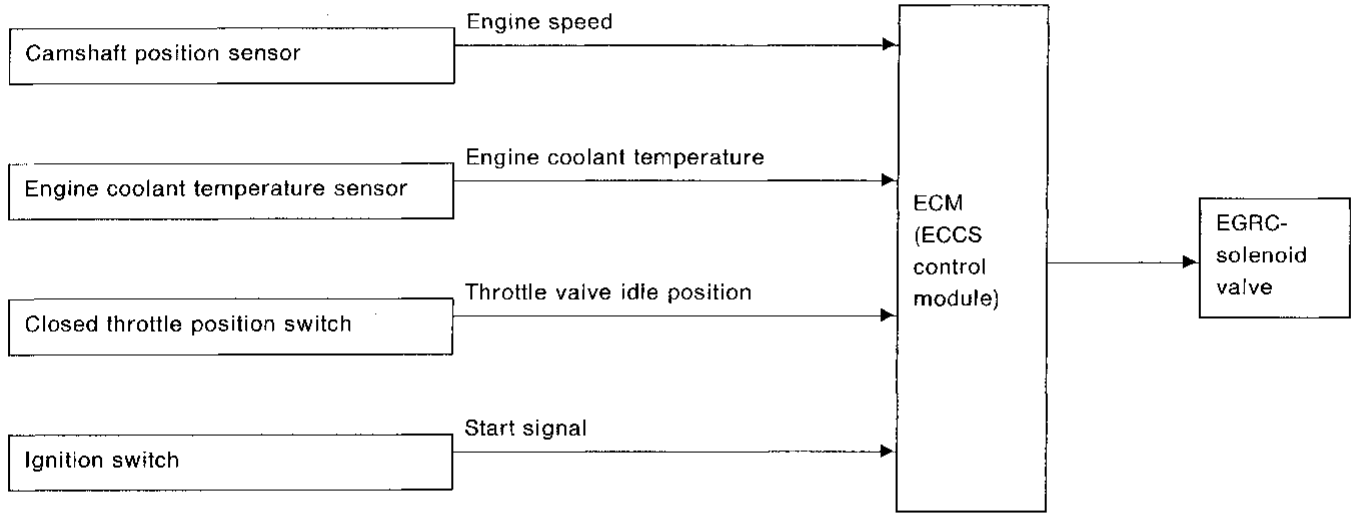
Fuel Pump Control (Cont'd)

SYSTEM DESCRIPTION

When the fuel pump terminal voltage drops, pump speed, current consumption and fuel discharge decrease. This terminal voltage therefore is finely controlled corresponding to engine operating conditions in order to reduce power consumption and compartment noise level. The ECM receives various signals from sensors and switches and determines operating conditions of the engine. It then transmits a 20 Hz pulse signal to turn ON/OFF the grounding circuit of the fuel pump. The voltage is controlled by changing the mean voltage applied to the pump terminal by varying this on/off time ratio. That is, the longer the on-time in a cycle, the higher the mean voltage becomes, and vice versa. If the on-time reaches 100%, battery voltage is applied directly to the pump. The pump is driven directly by this battery voltage for several seconds after turning on the ignition switch when the engine is cold, when starting, and when the engine is hot.

Exhaust Gas Recirculation (EGR) System

INPUT/OUTPUT SIGNAL LINE



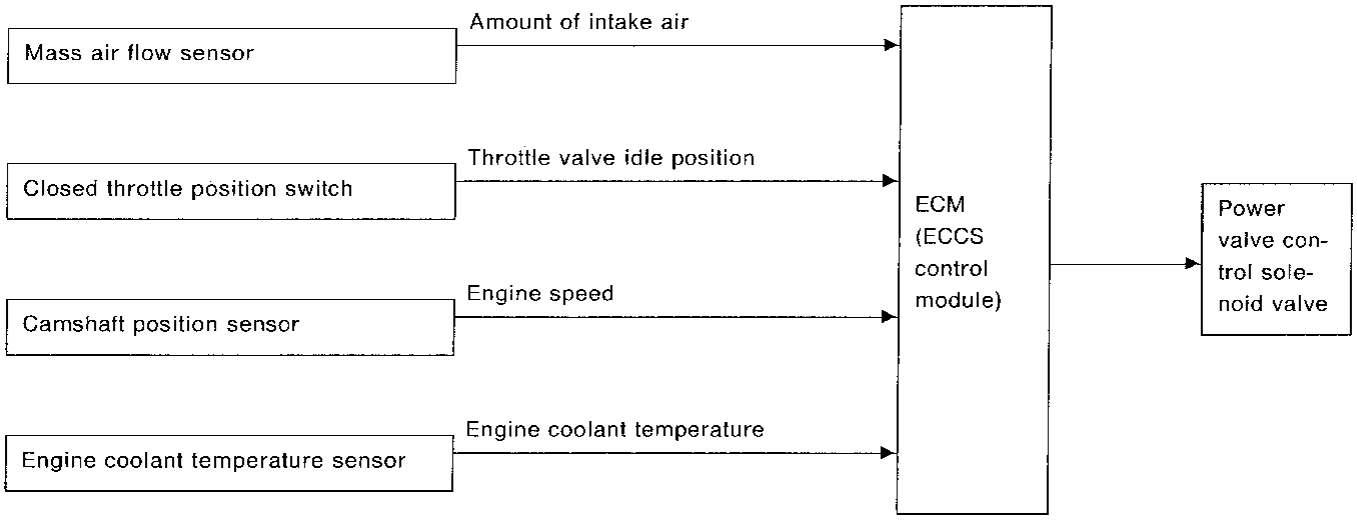
SYSTEM DESCRIPTION

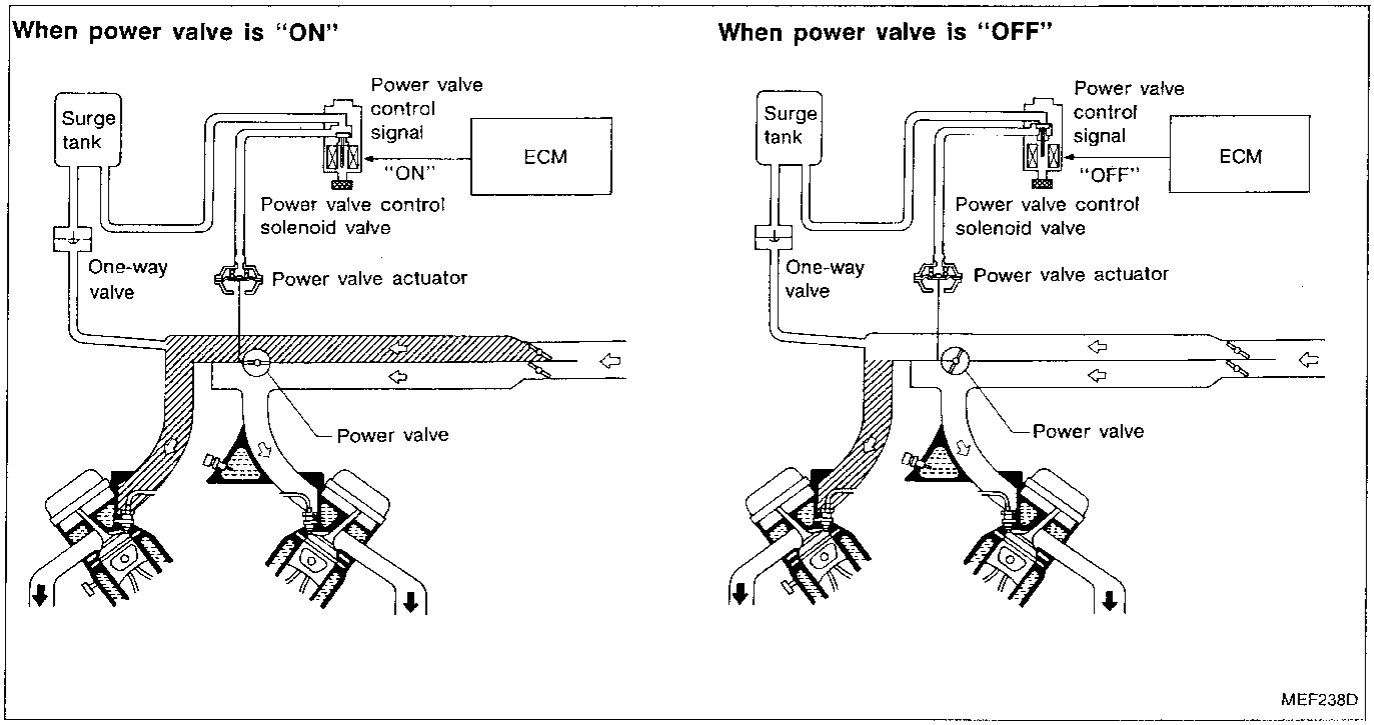
In addition, a system is provided which precisely cuts and controls port vacuum applied to the EGR valve to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM. When the ECM detects any of the following conditions, current flows through the solenoid valve in the EGR control vacuum line. This causes the port vacuum to be discharged into the atmosphere so that the EGR valve remains closed.

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

Power Valve Control

INPUT/OUTPUT SIGNAL LINE





SYSTEM DESCRIPTION

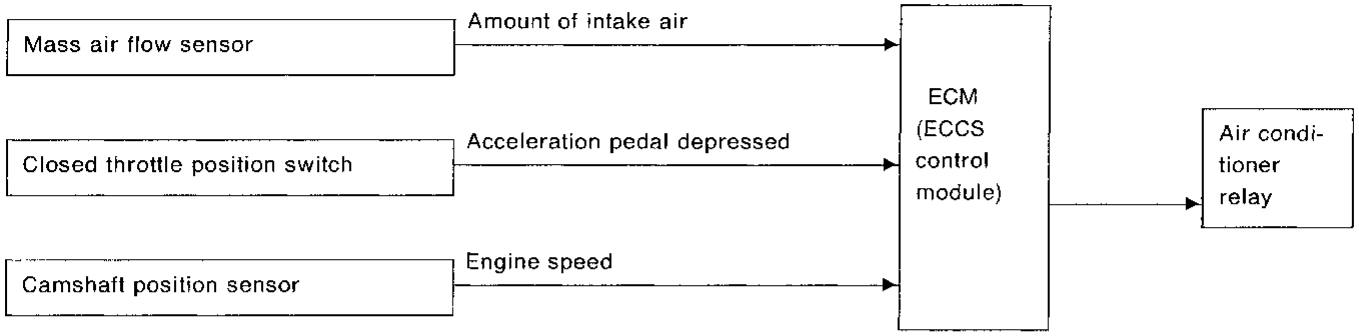
When the engine is running at low or medium speed under a heavy load, the power valve control solenoid valve is energized by a signal from the ECM. This signal introduces the intake manifold vacuum into the power valve actuator to close the power valve. Under this condition, the effective suction port length is equivalent to the total length of the intake manifold collector's suction port including the intake valve. This long suction port provides increased air intake which results in improved suction efficiency and higher torque generation.

The surge tank and one-way valve are provided so that the power valve can be maintained in the fully closed position under heavy loads when the manifold vacuum is insufficient. In other conditions, the power valve control solenoid valve is de-energized, and the power valve actuator is vented to the atmosphere. This opens the power valve to two suction passages together in the collector.

Under this condition, the effective port length is equivalent to the length of the suction port provided independently for each cylinder. This shortened port length results in enhanced engine output with reduced suction resistance under high speeds.

Acceleration Cut Control

INPUT/OUTPUT SIGNAL LINE



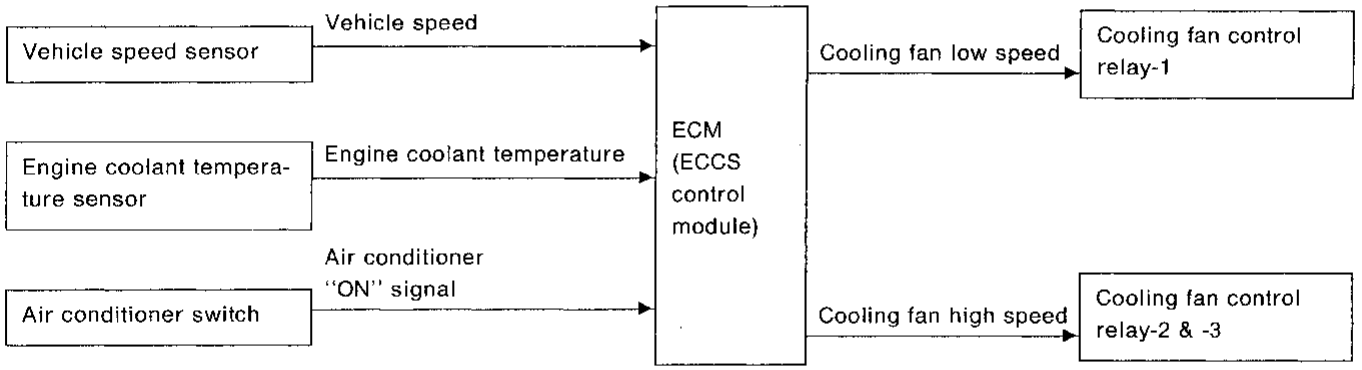
SYSTEM DESCRIPTION

Air conditioner is turned off for a few seconds during accelerating condition.

This system improves acceleration when air conditioner is used.

Cooling Fan Control

INPUT/OUTPUT SIGNAL LINE



The ECM performs ON/OFF control and LOW/HIGH speed control of the cooling fan corresponding to the vehicle speed, engine coolant temperature, and air conditioner ON signal.

OPERATION

Air conditioner switch is "OFF".

Engine coolant temperature °C (°F)	Cooling fan	Cooling fan control relay		Remarks
Below 96 (205)	OFF	Relay-1	OFF	—
		Relay-2 & -3	OFF	
Between 97 (207) and 106 (223)	*LOW	Relay-1	ON	* OFF if vehicle speed is below 20 km/h (12 MPH).
		Relay-2 & -3	OFF	
Above 107 (225)	HIGH	Relay-1	ON	—
		Relay-2 & -3	ON	

Cooling Fan Control (Cont'd)

Air conditioner switch is "ON".

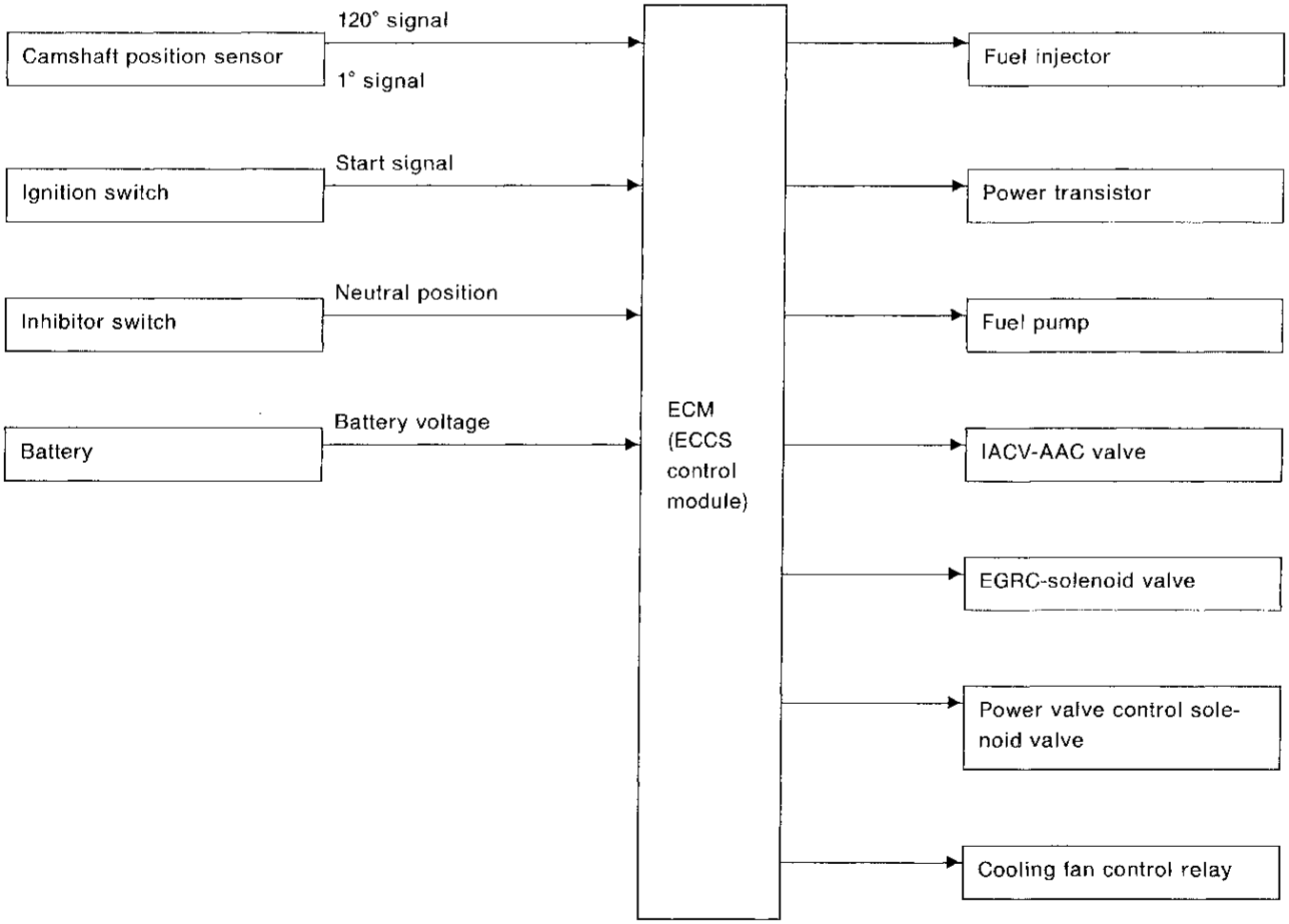
Engine coolant temperature °C (°F)	Cooling fan	Cooling fan control relay		Remarks
Below 94 (201)	*LOW	Relay-1	ON	* OFF if vehicle speed is above 80 km/h (50 MPH).
		Relay-2 & -3	OFF	
Between 95 (203) and 104 (219)	*HIGH	Relay-1	ON	* LOW if vehicle speed is below 20 km/h (12 MPH).
		Relay-2 & -3	ON	
Above 105 (221)	HIGH	Relay-1	ON	—
		Relay-2 & -3	ON	

The cooling fan operates at HIGH if the self-diagnosing engine coolant temperature sensor system results in "NG".

Fail-safe System

CPU MALFUNCTION OF ECM AND CAMSHAFT POSITION SENSOR MALFUNCTION

Input/output signal line



Fail-safe System (Cont'd)

Outline

The fail-safe system makes engine starting possible if there is something malfunctioning in the ECM's CPU circuit, or if there is a disconnection or short/open circuit in the camshaft position sensor circuit. In former models, engine starting was difficult under the conditions mentioned above. But with the provisions provided 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, and so on are controlled under certain limitations.

Cancellation of fail-safe system when ECM is malfunctioning

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

Fail-safe system activating condition when camshaft position sensor is malfunctioning

The fail-safe mode operation starts immediately after all of the following conditions have been satisfied for several seconds.

(1) No pulse of 120° signal (reference signal) detected for several seconds, or 1° signal (position signal) is equivalent to 0 rpm.
(2) Ignition switch in START
(3) Battery voltage is greater than 10 volts with ignition switch ON.
(4) The neutral position switch is ON, or the inhibitor switch is in the "P" or "N" position.
(5) When ignition switch is in START, battery voltage is at least 1 volt lower than when ignition switch is ON.

When the camshaft position sensor fail-safe system activates, the MALFUNCTION INDICATOR LAMP on the instrument panel lights to warn the driver.

Engine control with fail-safe system when camshaft position sensor is malfunctioning

When the fail-safe system is operating, fuel injection, ignition timing, fuel pump operation, engine idle speed, EGR operation, cooling fan operation, and power valve operation are controlled under certain limitations.

Cancellation of fail-safe system when camshaft position sensor 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 above-mentioned activating conditions are satisfied 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 above or below the specified value, the ECM senses a mass air flow sensor malfunction. In case of a malfunction, the throttle position sensor substitutes for the mass air flow sensor.
Though mass air flow sensor is malfunctioning, it is possible to drive the vehicle and start the engine. But engine speed will not rise more than 2,000 rpm in order to inform the driver of fail-safe system operation while driving.

Operation

Engine condition	Starter switch	Fail-safe system	Fail-safe functioning
Stopped	ANY	Does not operate	—
Cranking	ON	Operates	Engine will be started by a pre-determined injection pulse on ECM.
Running	OFF		Engine speed will not rise above 2,000 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:

Operation

Condition	Engine coolant temperature decided
Just as ignition switch is turned ON or Start	20°C (68°F)
More than 6 minutes after ignition ON or Start	80°C (176°F)
Except as shown above	20 - 80°C (68 - 176°F) (Depends on the time)

FUEL PUMP MALFUNCTION

When the ECM detects a malfunction (discontinuity, short-circuit, etc.) in the fuel pump voltage control circuit, the fuel pump relay turns ON and 12 volts are applied to the fuel pump.

KNOCK SENSOR MALFUNCTION

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

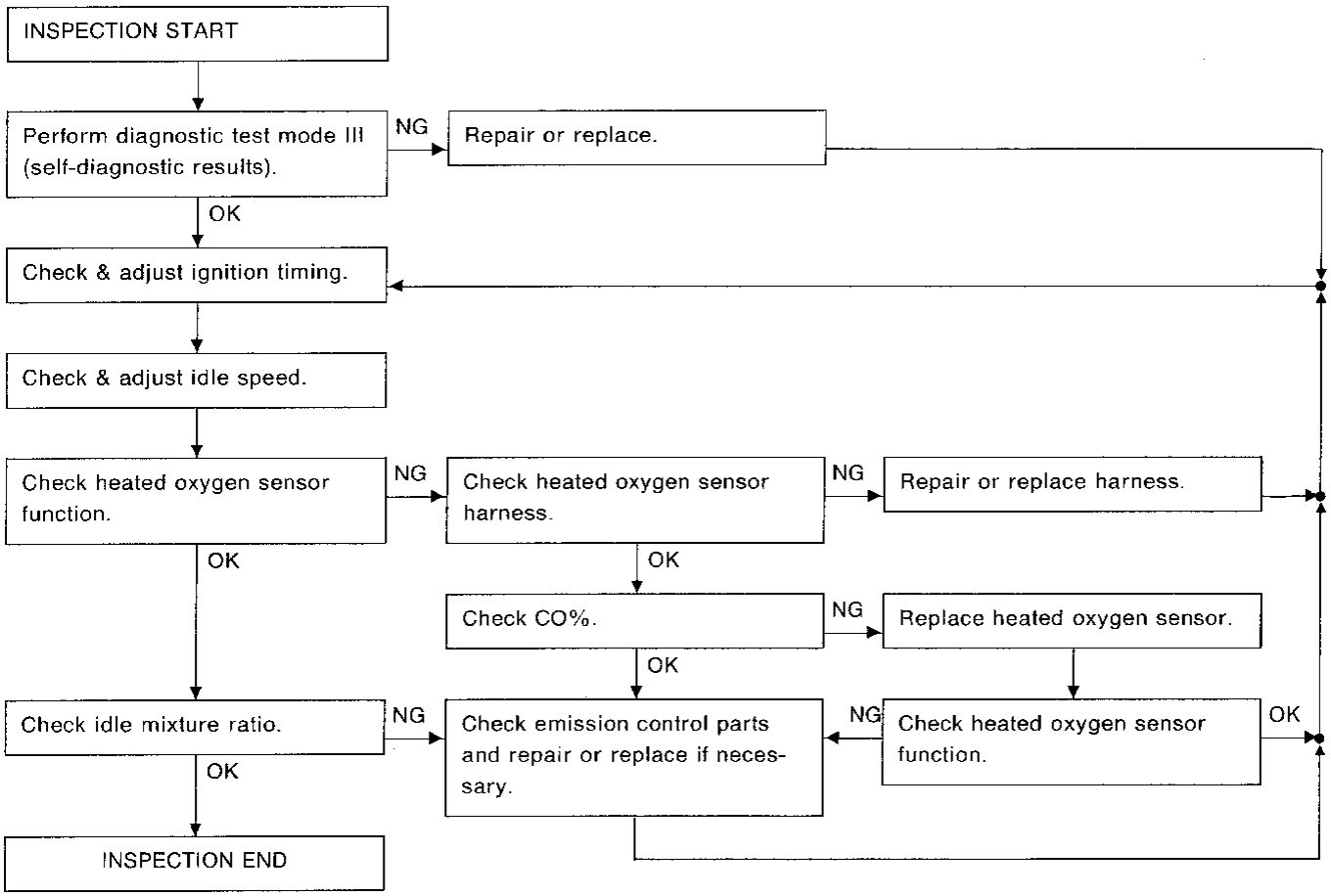
PREPARATION

1. Make sure that the following parts are in good order.
- Battery
- Ignition system
- Engine oil and coolant levels
- Fuses
- ECM SMJ 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 transaxle equipped models, when checking idle rpm, ignition timing and mixture ratio, checks should be carried out while shift lever is in "N" position.
4. When measuring "CO" percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
5. Turn off headlamps, heater blower, rear defogger.
6. Keep front wheels pointed straight ahead.
7. Make the check after the cooling fan has stopped.

WARNING:
Apply parking brake and block both front and rear wheels with chocks.

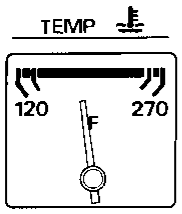
Overall inspection sequence



Idle check and set procedure

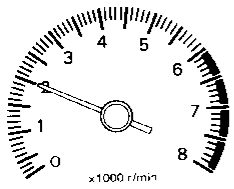
INSPECTION START

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



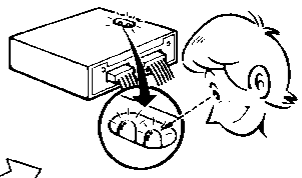
SEF246F

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



SEF247F

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


SEF332D

Perform diagnostic test mode III (self-diagnostic results).

OK

NG

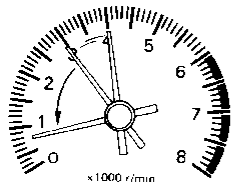
Repair or replace components as necessary.

Does engine run smoothly?

Yes

No

Clean injectors.



SEF248F

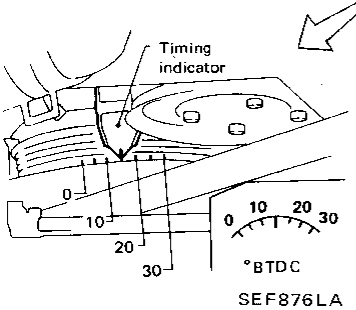
Race engine two or three times under no-load and run engine for about one minute at idle speed.

Check ignition timing.

A/T: 15° ± 2° BTDC (A/T: in "N" position)

OK

NG



SEF876LA

Adjust ignition timing by turning distributor after loosening bolt which secures distributor.

Ⓐ

Ⓑ

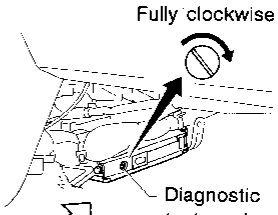
Ⓐ

Check idle speed (A/T: in "N" position).

A/T: 750 ± 50 rpm

OK

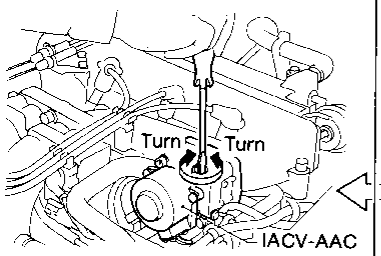
NG



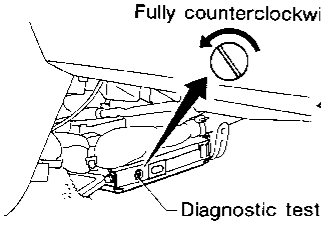
Close IACV-AAC valve completely by turning diagnostic test mode selector on ECM fully clockwise.

Adjust engine speed by turning idle speed adjusting screw (A/T: in "N" position).

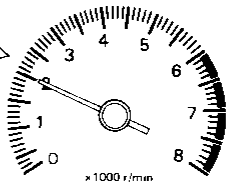
A/T: 700 rpm



Operate IACV-AAC valve by turning diagnostic test mode selector on ECM fully counterclockwise.

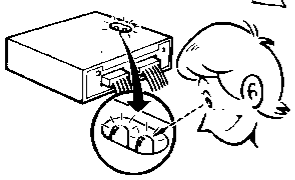


Run engine at about 2,000 rpm for about 2 minutes under no-load.



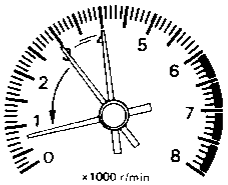
Keep engine speed at 2,000 rpm and make sure that green inspection lamp on ECM goes ON and OFF more than 5 times during 10 seconds.

NG

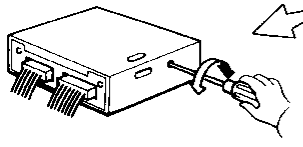


OK

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



Set the diagnosis mode selector on ECM to Diagnostic Test Mode II.



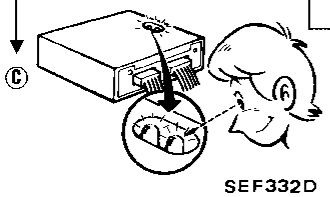
Make sure that inspection lamps (red and green) go on and off more than 5 times simultaneously at 2,000 rpm under no-load during 10 seconds.

NG

OK

INSPECTION END

Ⓒ



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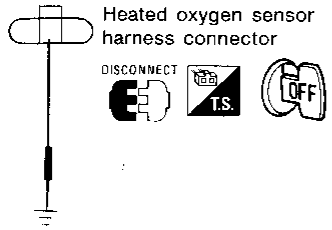
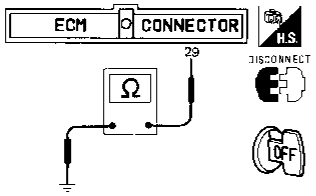


MEF242D

Check heated oxygen sensor harness:
1) Turn off engine and disconnect battery ground cable.
2) Disconnect ECM SMJ harness connector from ECM
3) Disconnect heated oxygen sensor harness connector and connect main harness side terminal for heated oxygen sensor to ground with a jumper wire.
(For the location, refer to EF & EC-105.)
4) Check for continuity between terminal No. 29 of ECM SMJ harness connector and body ground.

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



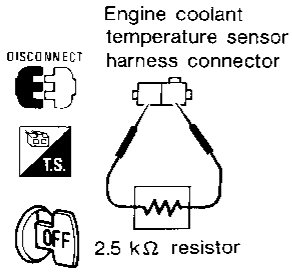
MEF243D

OK

NG

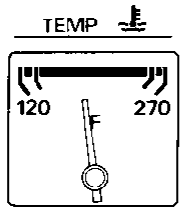
Repair or replace harness.

Connect SMJ harness connector to ECM.



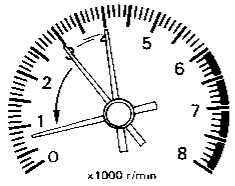
MEF244D

1) Disconnect engine coolant temperature sensor harness connector.
2) Connect a resistor (2.5 kΩ) between terminals of engine coolant temperature sensor harness connector.
3) Disconnect a jumper wire connected to heated oxygen sensor harness connector (main harness side).



SEF246F

Connect battery ground cable, start engine and warm it up until water temperature indicator points to middle of gauge.



SEF248F

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

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Check CO%.

Idle CO: 0.2 - 8.0%

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

NG

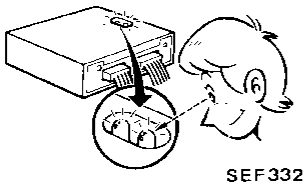
OK

Replace heated oxygen sensor.

Run engine at 2,000 rpm and make sure that green inspection lamp on ECM goes ON and OFF more than 5 times during 10 seconds.

OK

NG



SEF332D

Connect heated oxygen sensor harness connector to heated oxygen sensor.

Check fuel pressure regulator.
(See page EF & EC-150.)

Check mass air flow sensor and its circuit.
(See page EF & EC-88.)

Check injector and its circuit.
(See page EF & EC-117.)
Clean or replace if necessary.

Check engine coolant temperature sensor and its circuit.
(See page EF & EC-91.)

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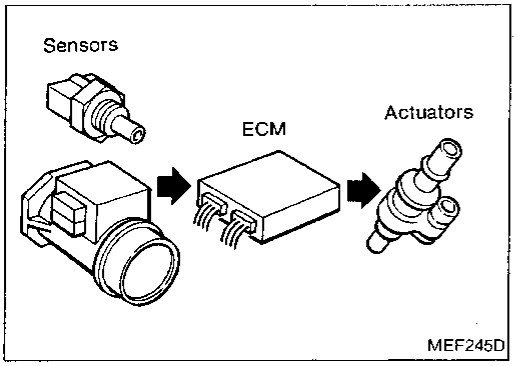
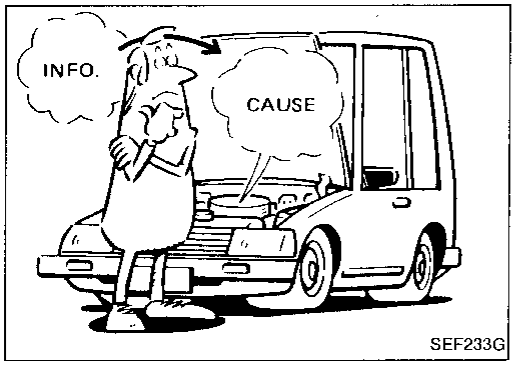
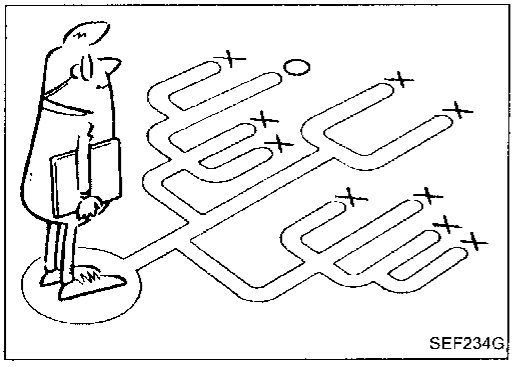
Contents

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 such as vacuum leaks, fouled spark plugs, or other problems with the engine.

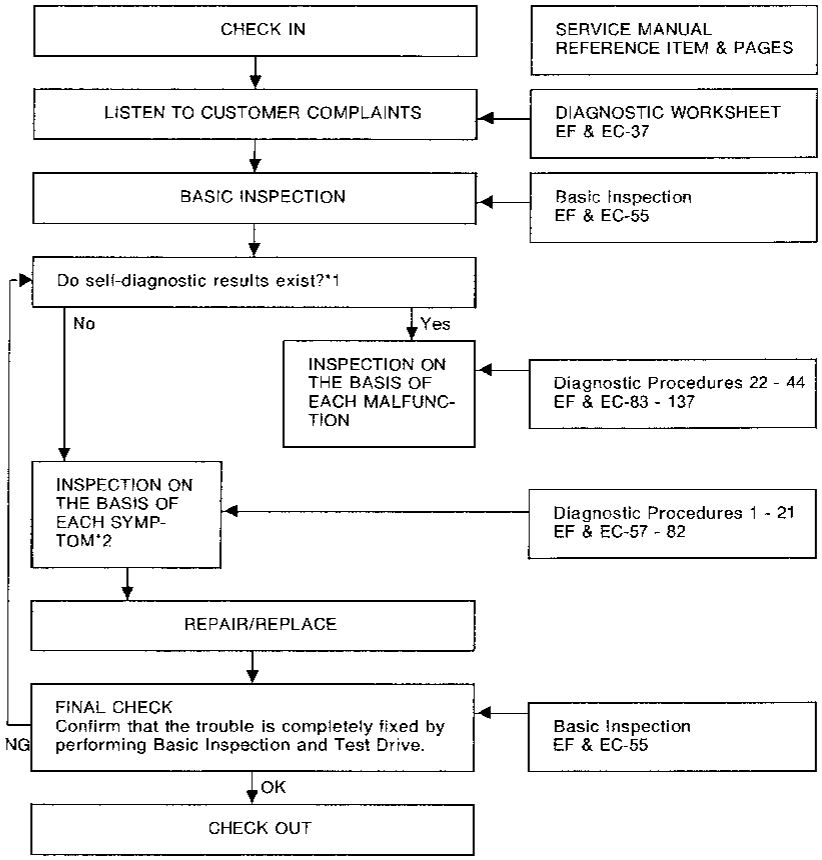
It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.

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

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

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

WORK FLOW



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

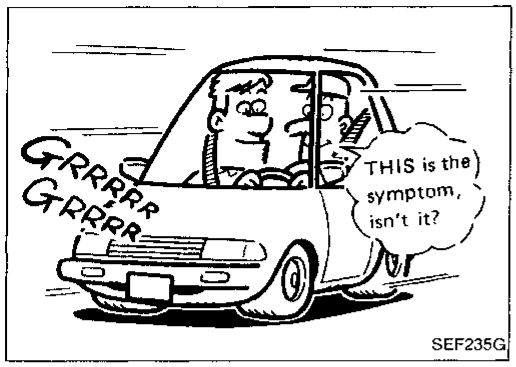
DIAGNOSTIC WORKSHEET

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 diagnostic worksheet such as the one shown 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 effected
	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

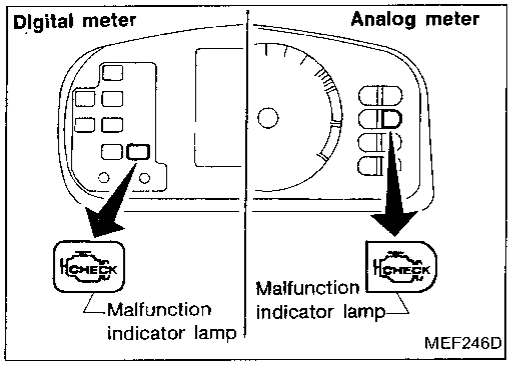


How to Perform Trouble Diagnoses for Quick and Accurate Repair (Cont'd)

INTERMITTENT PROBLEM SIMULATION

In order to duplicate an intermittent problem, it is effective to create similar conditions for component parts, under which the problem might occur.
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	Distributor	Advanced	Rotate distributor clockwise.
			Retarded	Rotate distributor counterclockwise.
3	Mixture ratio feedback control	Heated oxygen sensor	Suspended	Disconnect heated oxygen sensor harness connector.
		ECM	Operation check	Perform on-board diagnostic system (Diagnostic Test Mode I/II) at 2,000 rpm.
4	Idle speed	IACV-AAC valve	Raised	Turn idle adjusting screw counterclockwise.
			Lowered	Turn idle adjusting screw clockwise.
5	Electric connection (Electric continuity)	Harness connectors and wires	Poor electric connection or faulty 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 head lights, air conditioner, rear defogger, etc.
9	Closed throttle position switch condition	ECM	ON-OFF switching	Perform on-board diagnostic system (Diagnostic Test Mode IV).
10	Ignition spark	Timing light	Spark power check	Try to flash timing light for each cylinder.



On-board Diagnostic System

MALFUNCTION INDICATOR LAMP

A malfunction indicator lamp has been adopted. This light blinks under the following conditions:

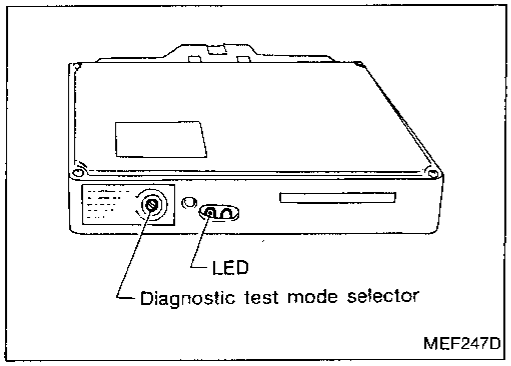
	California model	Non-California model
Condition	Light illuminates when any one of conditions 1), 2), 3) and 4) is satisfied.	Light illuminates when any one of conditions 1), 2) and 4) is satisfied.

1) When ignition switch is turned "ON" (for bulb check).
2) When systems related to emission performance malfunction in Diagnostic Test Mode I (with engine running).
- **This malfunction indicator lamp always illuminates and is synchronous with red LED.**

3) When a malfunction is detected regarding the following self-diagnostic items.

Malfunction	On-board diagnostic system diagnostic trouble code No.
Mass air flow sensor circuit	12
Engine coolant temperature sensor circuit	13
Vehicle speed sensor circuit	14
ECM (ECCS control module)	31
EGR function	32

Malfunction	On-board diagnostic system diagnostic trouble code No.
Heated oxygen sensor circuit	33
EGR temperature sensor circuit	35
Throttle position sensor circuit	43
Injector leak	45
Injector circuit	51



- The malfunction indicator lamp will turn off when normal operation is resumed. Diagnostic Test Mode III memory must be cleared as the contents remain stored.

4) When camshaft position sensor or CPU of ECM malfunctions and fail-safe system operates during engine rotation.

ECM LED

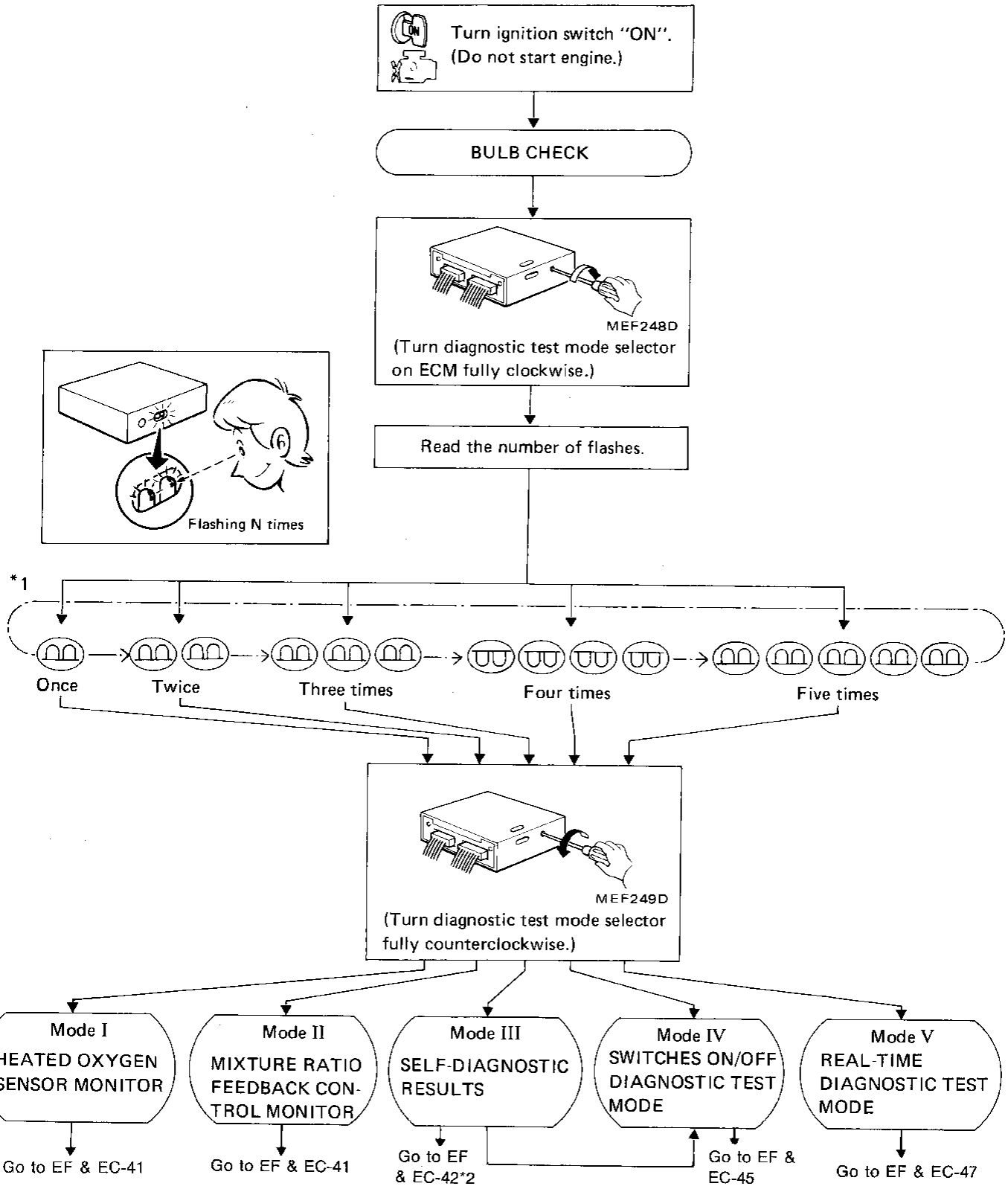
In the ECM, Green and Red LED's have been adopted to monitor the self-diagnostic functions.

ON-BOARD DIAGNOSTIC SYSTEM FUNCTION

Diagnostic Test Mode	Function
Diagnostic Test Mode I	HEATED OXYGEN SENSOR MONITOR
Diagnostic Test Mode II	MIXTURE RATIO FEEDBACK CONTROL MONITOR
Diagnostic Test Mode III	SELF-DIAGNOSTIC RESULTS
Diagnostic Test Mode IV	SWITCHES ON/OFF DIAGNOSTIC TEST MODE
Diagnostic Test Mode V	REAL-TIME DIAGNOSTIC TEST MODE

On-board Diagnostic System (Cont'd)

HOW TO SWITCH DIAGNOSTIC TEST MODES



***1 While the diagnostic test mode selector is kept turned fully clockwise, it will continue to change in the order of Diagnostic Test Mode I → II → III → IV → V → I ...**

***2 The diagnostic trouble code is erased from the backup memory of the ECM.**

- **Return the diagnostic test mode selector to the original position so as not to disturb the idle speed.**
- **Refer to EF & EC-42.**

On-board Diagnostic System — Diagnostic Test Mode I

Heated oxygen sensor monitor

This mode checks the heated oxygen sensor for proper functioning. The operation of the ECM LED in this mode differs with mixture ratio control conditions as follows:

Diagnostic Test Mode	LED	Engine stopped (Ignition switch "ON")	Engine running	
			Open loop condition	Closed loop condition
Diagnostic Test Mode I	Green	ON	*Remains ON or OFF	Blinks
	Red	ON	Except for California model ● ON: When fail-safe system is operating	For California model ● ON: a. when the MALFUNCTION INDICATOR LAMP ITEMS are stored in the ECM b. when fail-safe system is operating ● OFF: except for the above conditions

*: Maintains conditions just before switching to open loop

HEATED OXYGEN SENSOR FUNCTION CHECK

If the number of LED blinks is less than that specified, replace the heated oxygen sensor.
If the LED does not blink, check heated oxygen sensor circuit.

HEATED OXYGEN SENSOR CIRCUIT CHECK

See page EF & EC-104.

On-board Diagnostic System — Diagnostic Test Mode II

Mixture ratio feedback control monitor

This mode checks, through the ECM LED, optimum control of the mixture ratio. The operation of the LED, as shown below, differs with the control conditions of the mixture ratio (for example, richer or leaner mixture ratios, etc., which are controlled by the ECM).

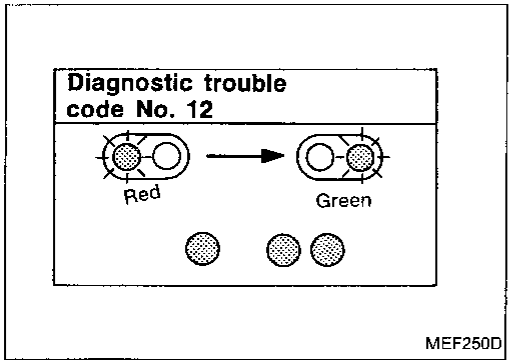
Diagnostic Test Mode	LED	Engine stopped (Ignition switch "ON")	Engine running			
			Open loop condition	Closed loop condition		
Diagnostic Test Mode II	Green	ON	*Remains ON or OFF	Blinks		
	Red	OFF	*Remains ON or OFF	Compensating mixture ratio		
				More than 5% rich	Between 5% lean and 5% rich	More
				OFF	Synchronized with green LED	Remains ON

*: Maintains conditions just before switching to open loop

If the red LED remains on or off during the closed loop operation, the mixture ratio may not be controlled properly. Using the following procedures, check the related components or adjust the mixture ratio.

COMPONENT CHECK OR MIXTURE RATIO ADJUSTMENT

— See page EF & EC-29.



On-board Diagnostic System — Diagnostic Test Mode III

Self-diagnostic results

The ECM constantly monitors the function of these sensors and actuators, regardless of ignition key position. If a malfunction occurs, the information is stored in the ECM and can be retrieved from the memory by turning on the diagnostic test mode selector, located on the side of the ECM. When activated, the malfunction is indicated by flashing a red and a green LED (Light Emitting Diode), also located on the ECM. Since all the self-diagnostic results are stored in the ECM's memory even intermittent malfunctions can be diagnosed.

A malfunction is indicated by the number of both red and green flashing LEDs. First, the red LED flashes and the green flashes follow. The red LED corresponds to units of ten and the green LED corresponds to units of one. For example, when the red LED flashes once and the green LED flashes twice, this signifies the number "12", showing that the mass air flow sensor signal is malfunctioning. All problems are classified by diagnostic trouble code numbers in this way.

- **When the engine fails to start, crank it two or more seconds before beginning on-board diagnostic system.**
- **Read out self-diagnostic results first and then erase the malfunction records which are stored in the ECM memory. If it is erased, the on-board diagnostic system function for intermittent malfunctions will be lost.**

DISPLAY DIAGNOSTIC TROUBLE CODE TABLE

Diagnostic trouble code No.	Detected items	
11	Camshaft position sensor circuit	X
12	Mass air flow sensor circuit	X
13	Engine coolant temperature sensor circuit	X
14	Vehicle speed sensor circuit	X
21	Ignition signal missing in primary coil	X
22	Fuel pump circuit	X
31	ECM (ECCS control module)	X

Diagnostic trouble code No.	Detected items	
32	EGR function	X
33	Heated oxygen sensor circuit	X
34	Knock sensor circuit	X
35	EGR temperature sensor circuit	X
43	Throttle position sensor circuit	X
45	Injector leak	X
51	Injector circuit	X
54	A/T control circuit	X
55	No malfunction in the above circuit	X

X: Available

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

The diagnostic trouble code is erased from the backup memory of the ECM by the following;

- **when the battery terminal is disconnected, the diagnostic trouble code will be lost from the backup memory within 24 hours.**
- **when mode IV is selected after selecting mode III.**

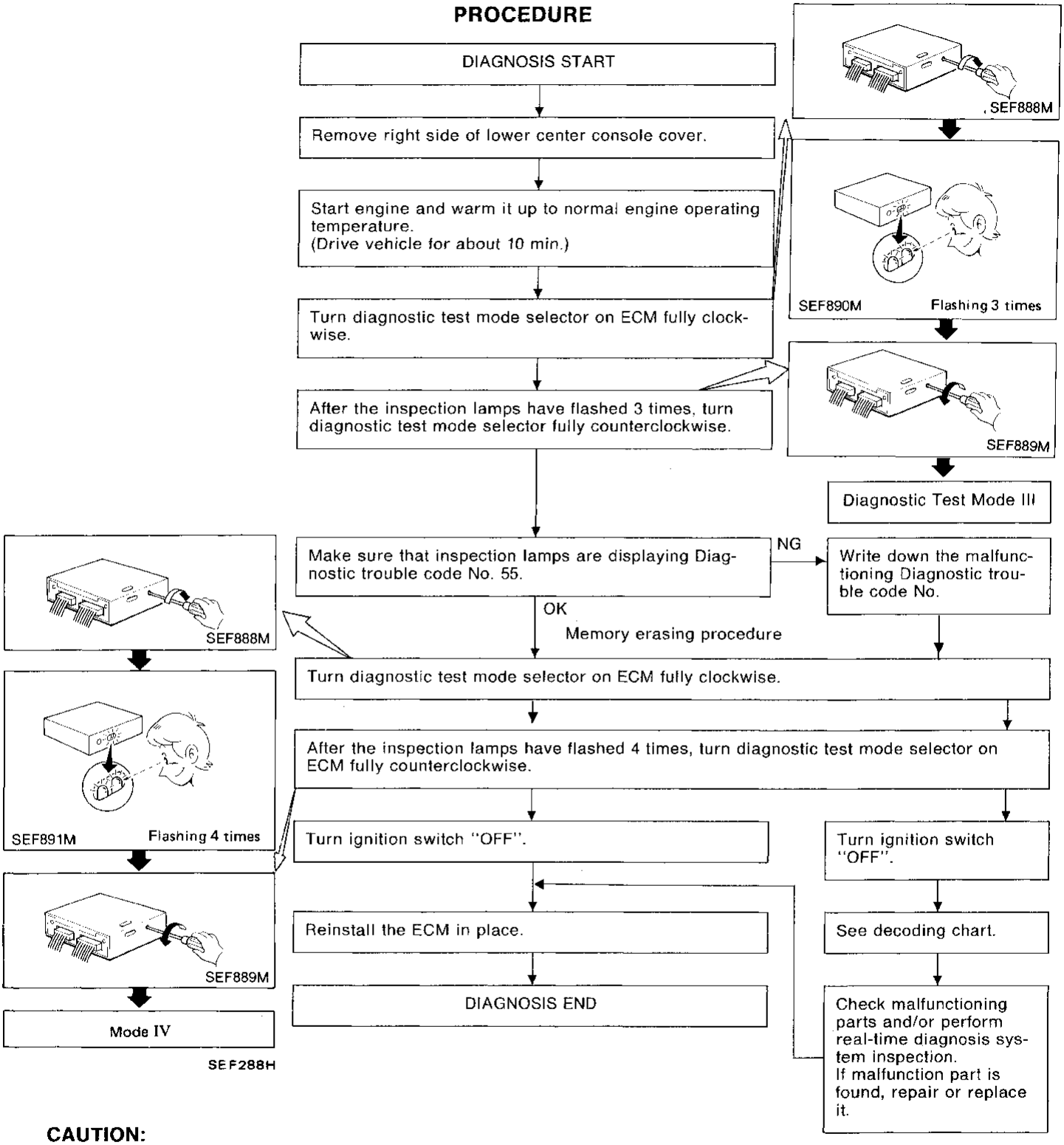
On-board Diagnostic System — Diagnostic Test Mode III
Self-diagnostic results (Cont'd)

Diagnostic trouble code No.	Detected items	Malfunction is detected when ...	Check item (remedy)
*11	Camshaft position sensor circuit	• Either 1° or 120° signal is not entered for the first few seconds during engine cranking. • Either 1° or 120° signal is not input often enough while the engine speed is higher than the specified rpm.	• Harness and connector (If harness and connector are normal, replace camshaft position sensor.)
12	Mass air flow sensor circuit	• The mass air flow sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector (If harness and connector are normal, replace mass air flow sensor.)
13	Engine coolant temperature sensor circuit	• The engine coolant temperature sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Engine coolant temperature sensor
14	Vehicle speed sensor circuit	• The vehicle speed sensor circuit is open or shorted.	• Harness and connector • Vehicle speed sensor (reed switch)
*21	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	• 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
34	Knock sensor circuit	• The knock sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Knock sensor
35	EGR temperature sensor circuit	• The EGR temperature sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • EGR temperature sensor
43	Throttle position sensor circuit	• The throttle position sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Throttle position sensor
45	Injector leak	• Fuel leaks from injector.	• Injector
51	Injector circuit	• The injector circuit is open.	• Harness and connector • Injector

*: Check items causing a malfunction of camshaft position sensor circuit first, if both diagnostic trouble code No. 11 and 21 are displayed at the same time.

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

PROCEDURE



CAUTION:

- **During display of a Diagnostic trouble code No. in on-board diagnostic system mode (Diagnostic Test Mode III), if another diagnostic test mode is to be performed, be sure to note the malfunction Diagnostic trouble code No. before turning diagnostic test mode selector on ECM fully clockwise. When selecting an alternative, select the diagnosis mode after turning switch "OFF". Otherwise, on-board diagnostic system information in the ECM memory will be lost.**

On-board Diagnostic System — Diagnostic Test Mode IV

Switches ON/OFF diagnostic test mode

In switches ON/OFF diagnostic system, ON/OFF operation of the following switches can be detected continuously.

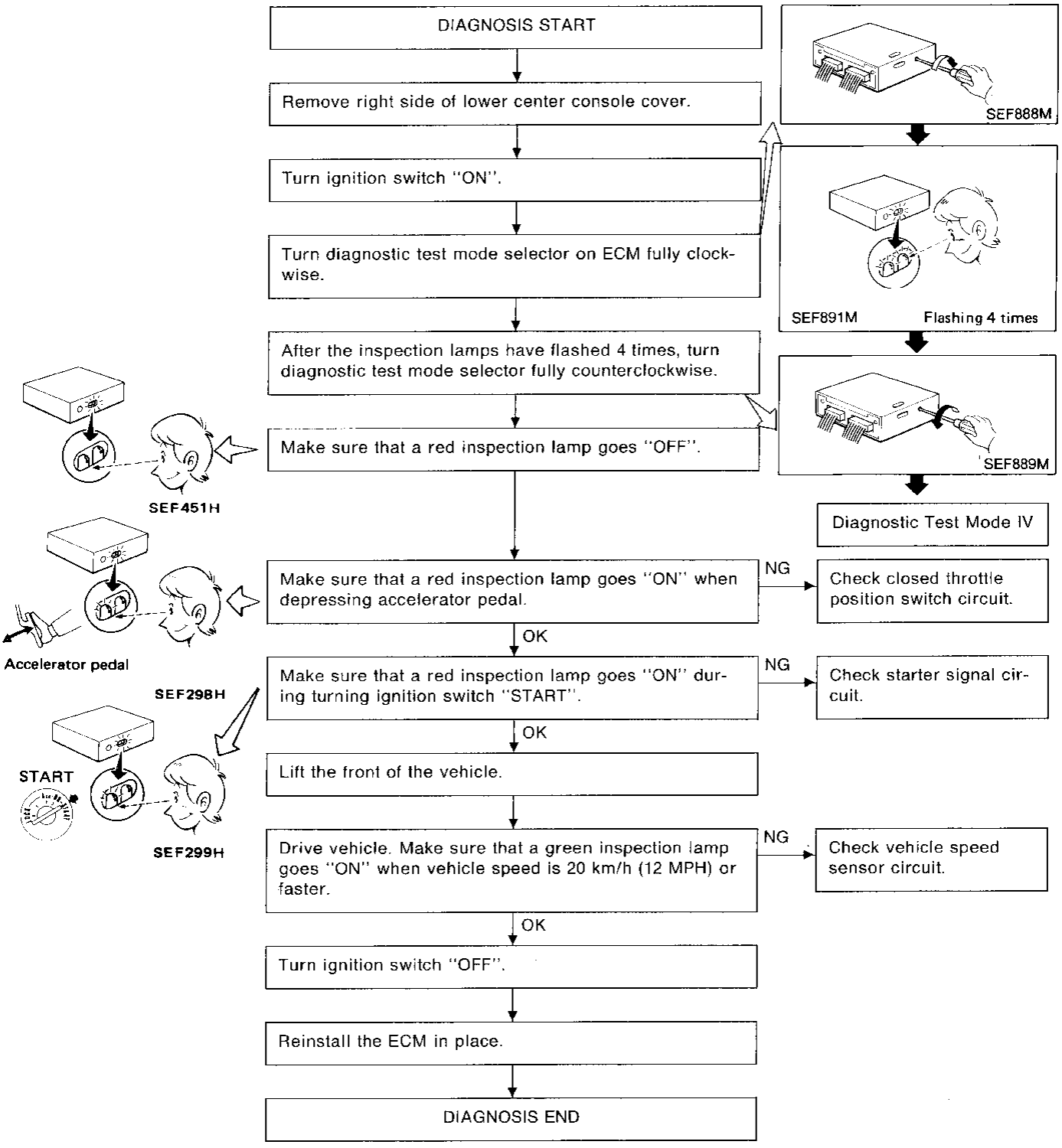
- Closed throttle position switch
- Starter switch
- Vehicle speed sensor

(1) Closed throttle position switch & Starter switch
The switches ON/OFF status in Diagnostic Test Mode IV is stored in ECM memory. When either switch is turned from "ON" to "OFF" or "OFF" to "ON", the red LED on ECM alternately comes on and goes off each time switching is performed.

(2) Vehicle Speed Sensor
The switches ON/OFF status in Diagnostic Test Mode IV is stored in ECM memory. The green LED on ECM remains off when vehicle speed is 20 km/h (12 MPH) or below, and comes ON at higher speeds.

On-board Diagnostic System — Diagnostic Test Mode IV
Switches ON/OFF diagnostic test mode (Cont'd)

PROCEDURE



CAUTION:

- **For safety, do not drive rear wheels at higher speed than required.**

On-board Diagnostic System — Diagnostic Test Mode V

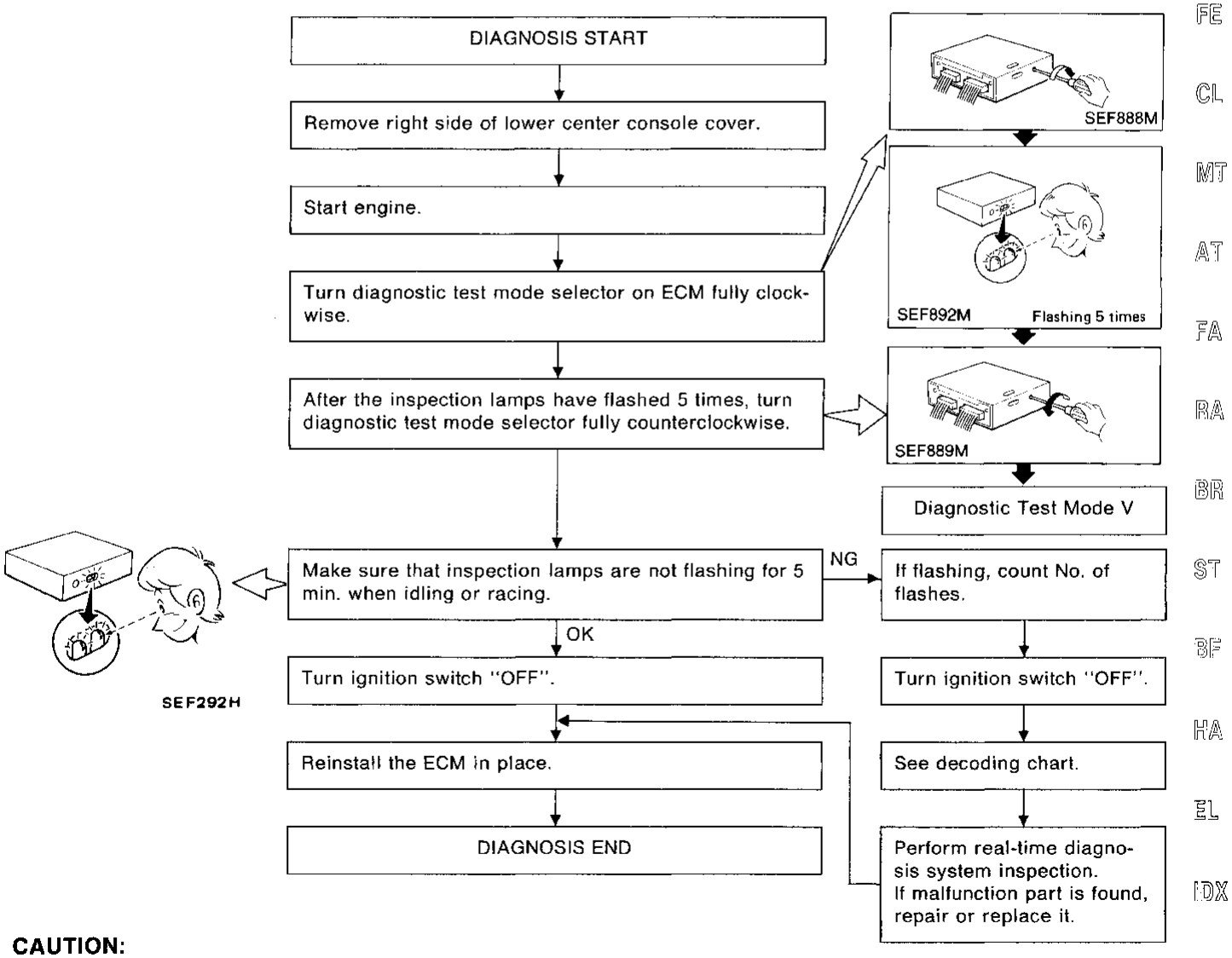
Real-time diagnostic test mode

In real-time diagnosis, if the following items are judged to be working incorrectly, a malfunction will be indicated immediately.

- Camshaft position sensor (120° signal & 1° signal) output signal
- Ignition signal
- Mass air flow sensor output signal
- Fuel pump

Consequently, this diagnosis very effectively determines whether the above systems cause the malfunction, during driving test. Compared with on-board diagnostic system, real-time diagnosis is very sensitive and can detect malfunctions instantly. However, items regarded as malfunctions in this diagnosis are not stored in ECM memory.

PROCEDURE

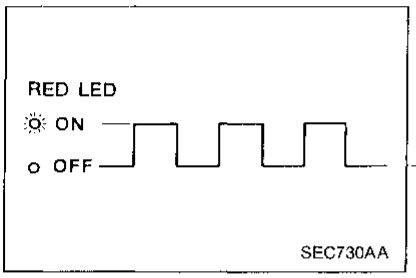
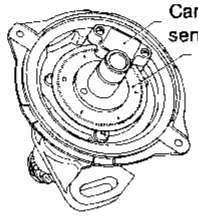
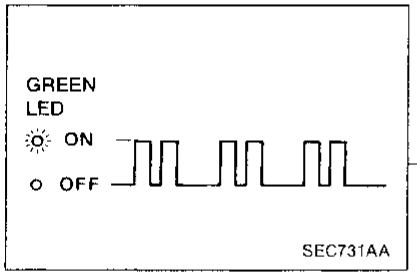
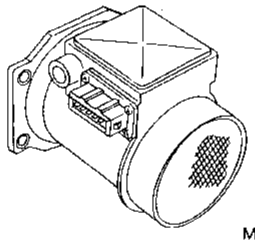
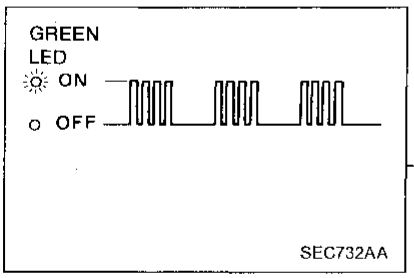
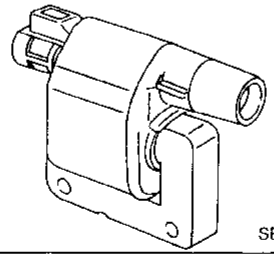
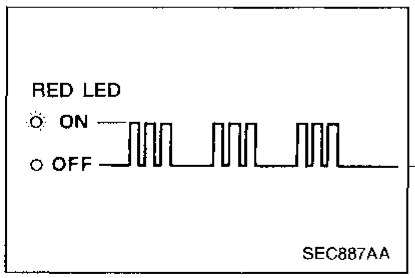
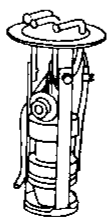


CAUTION:

In real-time diagnosis, pay attention to inspection lamp flashing. ECM displays the diagnostic trouble code only once and does not memorize the inspection.

On-board Diagnostic System — Diagnostic Test Mode V
Real-time diagnostic test mode (Cont'd)

DECODING CHART

Display presentation	Malfunction circuit or parts	ECM shows a malfunction signal when the following conditions are detected. (Compare with On-board diagnostic system —Diagnostic Test Mode III.)
CAMSHAFT POSITION SENSOR		
	Camshaft position sensor circuit is malfunctioning. 	The 1° or 120° signal is momentarily missing, or, multiple, momentary noise signals enter. REAL TIME DIAGNOSTIC INSPECTION See page EF & EC-49.
MASS AIR FLOW SENSOR		
	Mass air flow sensor circuit is malfunctioning. 	Abnormal, momentary increase in mass air flow sensor output signal. REAL TIME DIAGNOSTIC INSPECTION See page EF & EC-50.
IGNITION SIGNAL		
	Ignition signal is malfunctioning. 	Signal from the primary ignition coil momentarily drops off. REAL TIME DIAGNOSTIC INSPECTION See page EF & EC-51.
FUEL PUMP		
	Fuel pump circuit is malfunctioning. 	Fuel pump circuit is momentarily open or shorted. REAL TIME DIAGNOSTIC INSPECTION See page EF & EC-52.

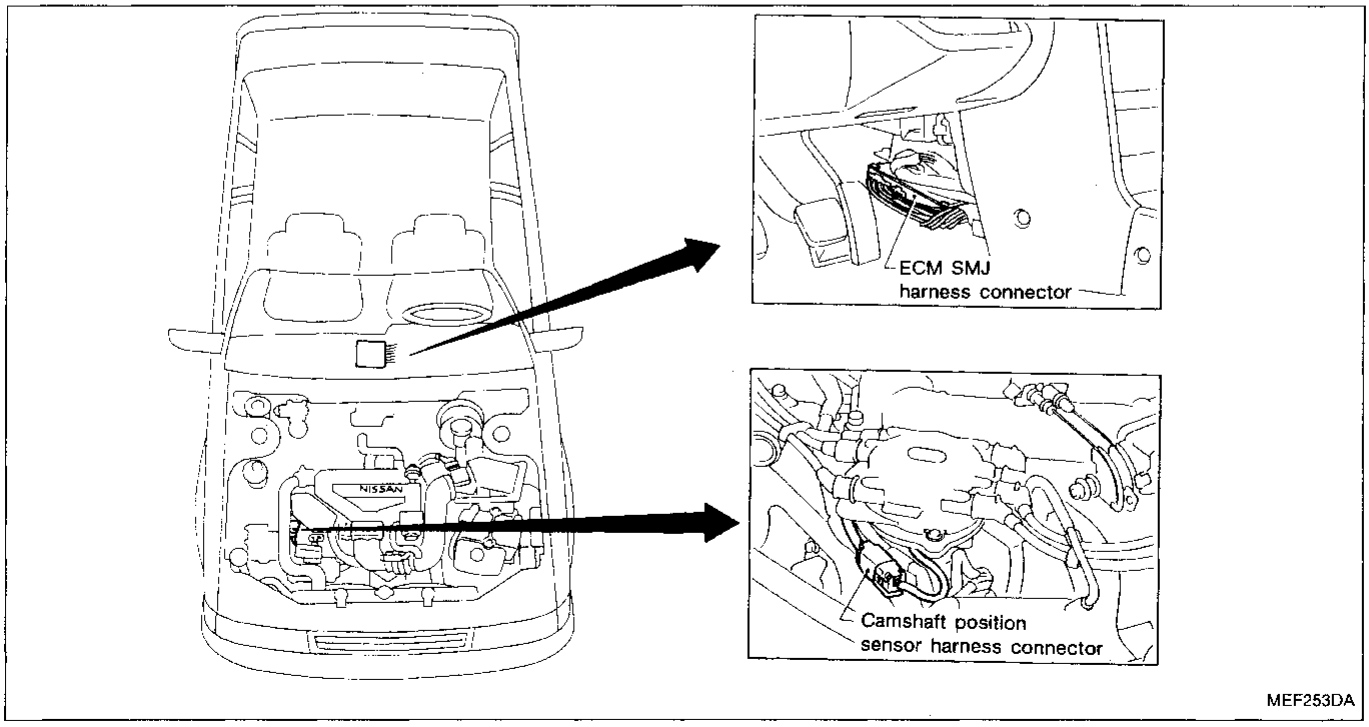
On-board Diagnostic System — Diagnostic Test Mode V
Real-time diagnostic test mode (Cont'd)

REAL-TIME DIAGNOSTIC INSPECTION

Camshaft Position Sensor

X: Available
—: Not available

Check sequence	Check items	Check conditions	Check parts			If malfunction, perform the following items.
			Camshaft position sensor harness connector	Sensor & actuator	ECM SMJ harness connector	
1	Tap and wiggle harness connector or component during real-time diagnosis.	During real-time diagnosis	X	X	X	Go to check item 2.
2	Check harness continuity at connector.	Engine stopped	X	—	—	Go to check item 3.
3	Disconnect harness connector, and then check dust adhesion to harness connector.	Engine stopped	X	—	X	Clean terminal surface.
4	Check pin terminal bend.	Engine stopped	—	—	X	Take out bend.
5	Reconnect harness connector and then recheck harness continuity at connector.	Engine stopped	X	—	—	Replace terminal.
6	Tap and wiggle harness connector or component during real-time diagnosis.	During real-time diagnosis	X	X	X	If diagnostic trouble codes are displayed during real-time diagnosis, replace terminal.

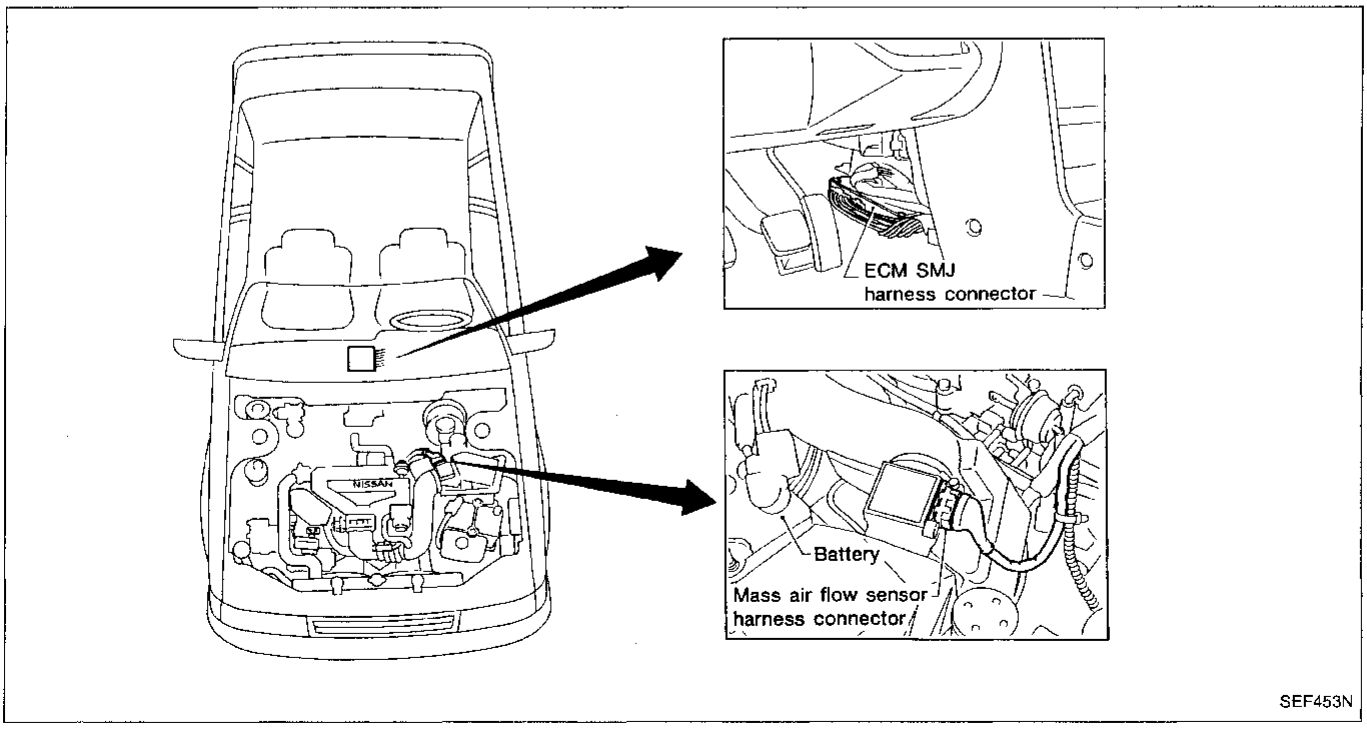


On-board Diagnostic System — Diagnostic Test Mode V
Real-time diagnostic test mode (Cont'd)

Mass Air Flow Sensor

X: Available
—: Not available

Check sequence	Check items	Check conditions	Check parts			If malfunction, perform the following items.
			Mass air flow sensor harness connector	Sensor & actuator	ECM SMJ harness connector	
1	Tap and wiggle harness connector or component during real-time diagnosis.	During real-time diagnosis	X	X	X	Go to check item 2.
2	Check harness continuity at connector.	Engine stopped	X	—	—	Go to check item 3.
3	Disconnect harness connector, and then check dust adhesion to harness connector.	Engine stopped	X	—	X	Clean terminal surface.
4	Check pin terminal bend.	Engine stopped	—	—	X	Take out bend.
5	Reconnect harness connector and then recheck harness continuity at connector.	Engine stopped	X	—	—	Replace terminal.
6	Tap and wiggle harness connector or component during real-time diagnosis.	During real-time diagnosis	X	X	X	If diagnostic trouble codes are displayed during real-time diagnosis, replace terminal.

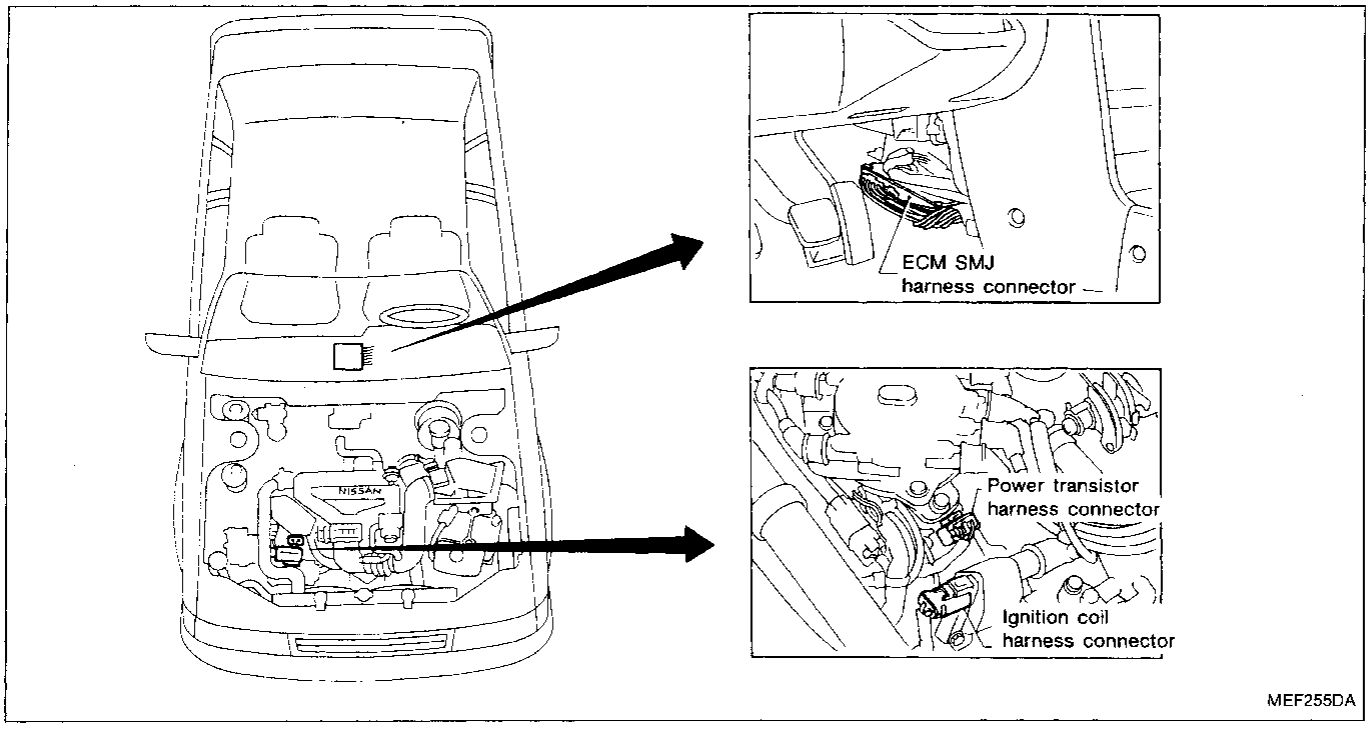


On-board Diagnostic System — Diagnostic Test Mode V
Real-time diagnostic test mode (Cont'd)

Ignition Signal

X: Available
—: Not available

Check sequence	Check items	Check conditions	Check parts			If malfunction, perform the following items.
			Ignition signal harness connector	Sensor & actuator	ECM SMJ harness connector	
1	Tap and wiggle harness connector or component during real-time diagnosis.	During real-time diagnosis	X	X	X	Go to check item 2.
2	Check harness continuity at connector.	Engine stopped	X	—	—	Go to check item 3.
3	Disconnect harness connector, and then check dust adhesion to harness connector.	Engine stopped	X	—	X	Clean terminal surface.
4	Check pin terminal bend.	Engine stopped	—	—	X	Take out bend.
5	Reconnect harness connector and then recheck harness continuity at connector.	Engine stopped	X	—	—	Replace terminal.
6	Tap and wiggle harness connector or component during real-time diagnosis.	During real-time diagnosis	X	X	X	If diagnostic trouble codes are displayed during real-time diagnosis, replace terminal.

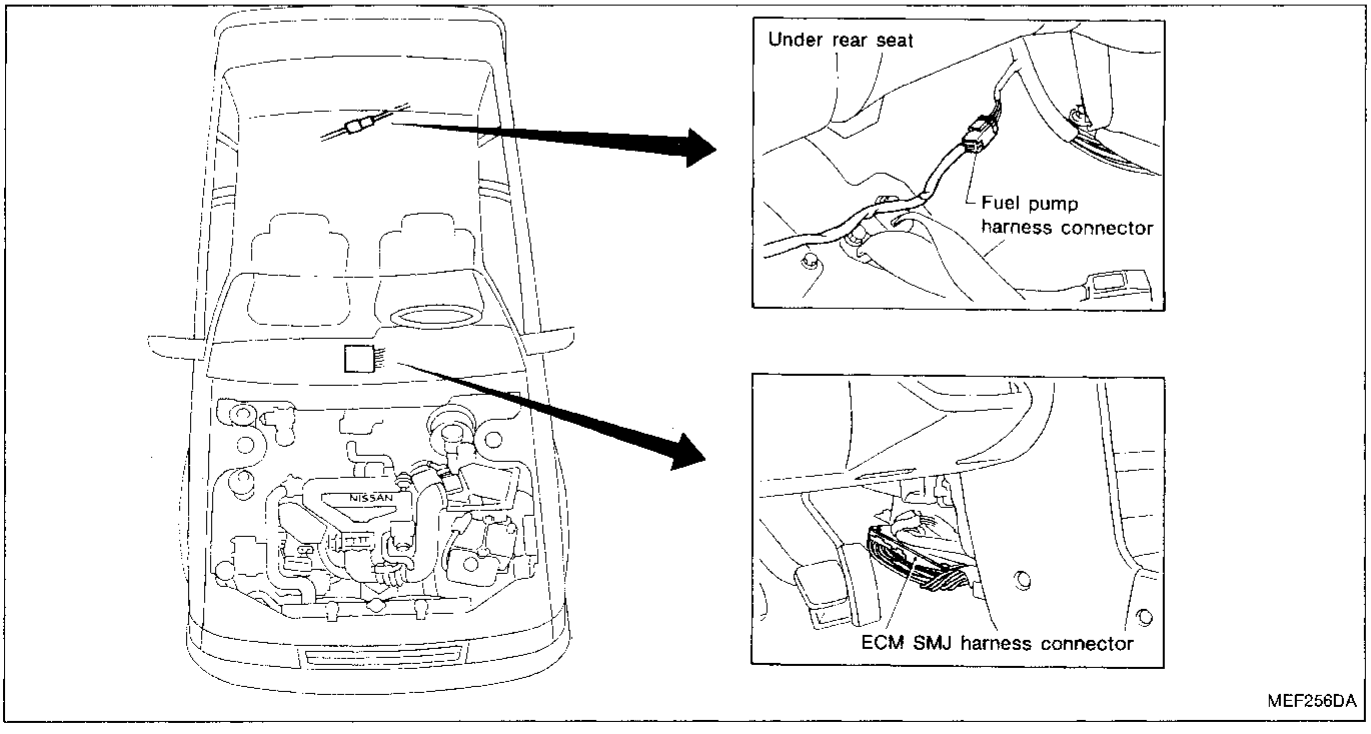


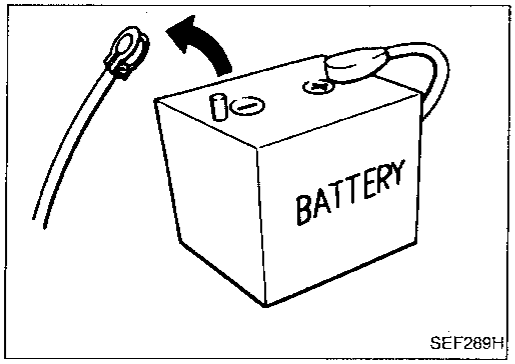
On-board Diagnostic System — Diagnostic Test Mode V
Real-time diagnostic test mode (Cont'd)

Fuel pump

X: Available
—: Not available

Check sequence	Check items	Check conditions	Check parts			If malfunction, perform the following items.
			Fuel pump harness connector	Sensor & actuator	ECM SMJ harness connector	
1	Tap and wiggle harness connector or component during real-time diagnosis.	During real-time diagnosis	X	X	X	Go to check item 2.
2	Check harness continuity at connector.	Engine stopped	X	—	—	Go to check item 3.
3	Disconnect harness connector, and then check dust adhesion to harness connector.	Engine stopped	X	—	X	Clean terminal surface.
4	Check pin terminal bend.	Engine stopped	—	—	X	Take out bend.
5	Reconnect harness connector and then recheck harness continuity at connector.	Engine stopped	X	—	—	Replace terminal.
6	Tap and wiggle harness connector or component during real-time diagnosis.	During real-time diagnosis	X	X	X	If diagnostic trouble codes are displayed during real-time diagnosis, replace terminal.



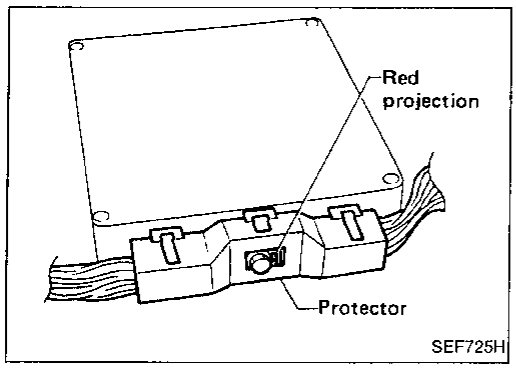


SEF289H

Diagnostic Procedure

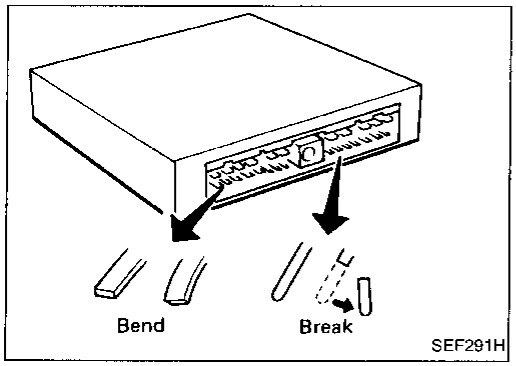
CAUTION:

1. **Before connecting or disconnecting the ECM harness connector to or from any ECM, be sure to turn the ignition switch to the "OFF" position and disconnect the negative battery terminal in order not to damage ECM as battery voltage is applied to ECM even if ignition switch is turned off. Failure to do so may damage the ECM.**



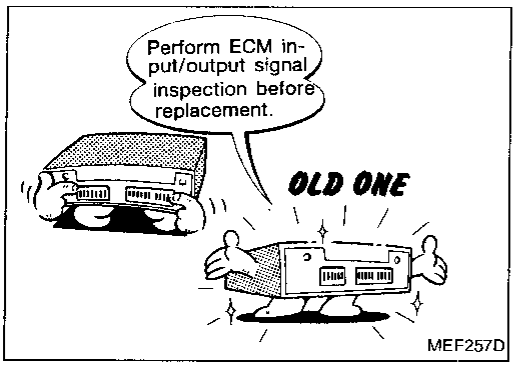
SEF725H

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



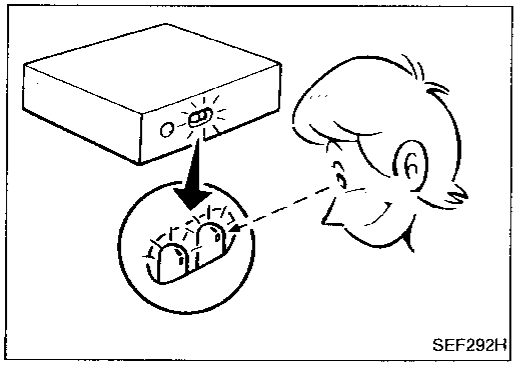
SEF291H

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.**



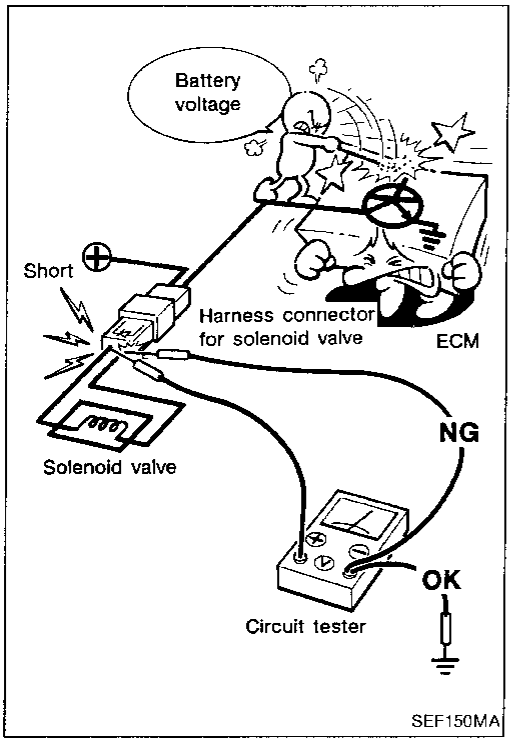
MEF257D

5. **Before replacing ECM, perform ECM input/output signal inspection and make sure whether ECM functions properly or not. (See page EF & EC-138.)**


SEF292H

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

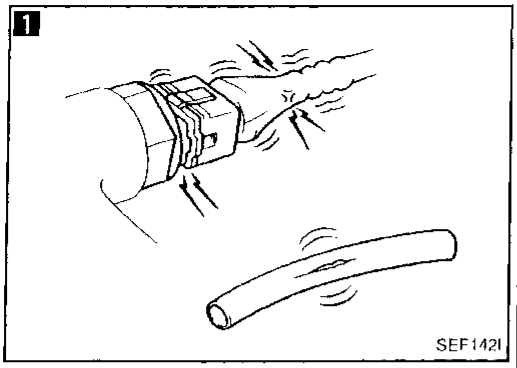
Diagnostic Procedure (Cont'd)



7. **When measuring ECM controlled components supply voltage with a circuit tester, separate one tester probe from the other.**
   If the two tester probes accidentally make contact with each other during measurement, the circuit will be shorted, resulting in damage to the ECM power transistor.

Basic Inspection

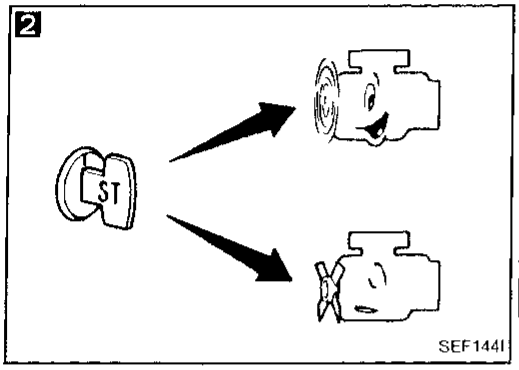
1


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

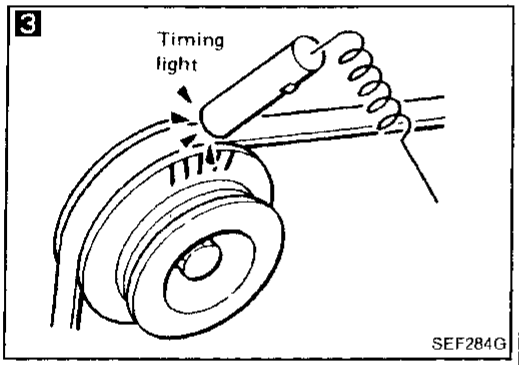


SEF144I

DOES ENGINE START? No → Go to 5.

Yes

3



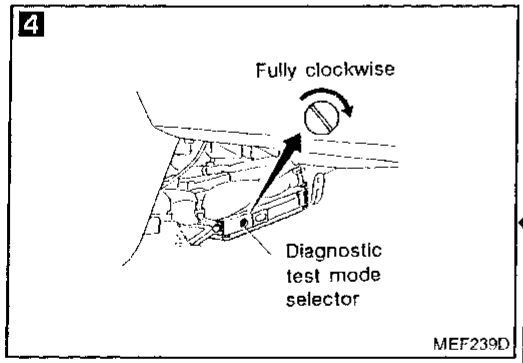
SEF284G

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

NG → Adjust ignition timing by turning camshaft position sensor.

OK

4



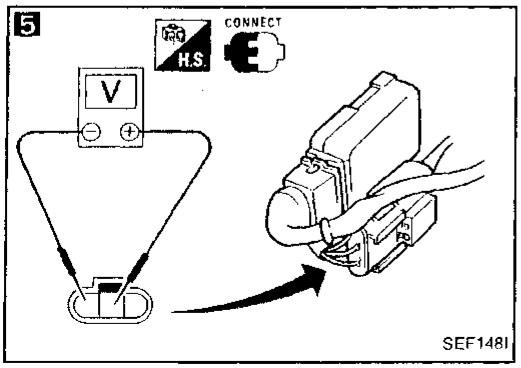
MEF239D

CHECK IDLE ADJ. SCREW INITIAL SET RPM.
1. Close IACV-AAC valve completely by turning diagnostic test mode selector on ECM fully clockwise.
2. Does engine speed fall to;
   700 ± 50 rpm
   [in "N" position]?

No → Adjust engine speed by turning idle adjusting screw.

Yes

5



SEF148I

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

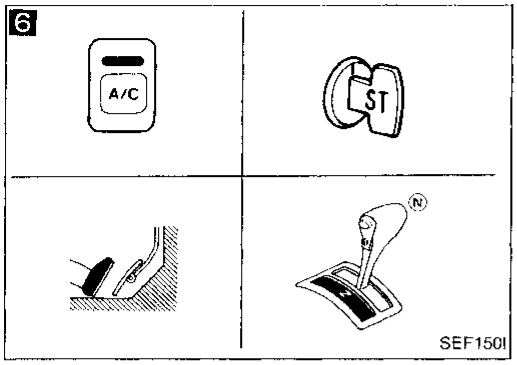
NG →
1. Adjust output voltage by rotating throttle position sensor body.
2. Disconnect throttle position sensor harness connector for a few seconds and then reconnect it.
3. Confirm that "IDLE POSITION" stays "ON".

OK

(Go to Ⓐ on next page.)

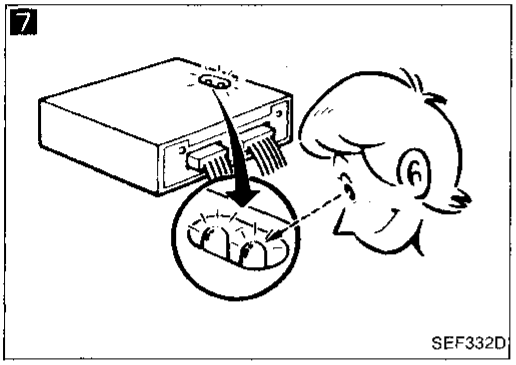
Basic Inspection (Cont'd)

6



SEF150I

7



SEF332D

Ⓐ

6

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

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

Switch	Condition	Voltage (V)
Start signal	IGN ON → IGN START	0 → Battery voltage
Closed throttle position switch signal	Idle position → Half throttle	Battery voltage → 0
A/C signal	A/C OFF → A/C ON (Engine running)	Battery voltage → 0.5 - 0.7
Neutral position (Parking) switch	Shift lever is "N" or "P" position → Except "N" and "P"	0 → 8.0 - 9.0

OK

7

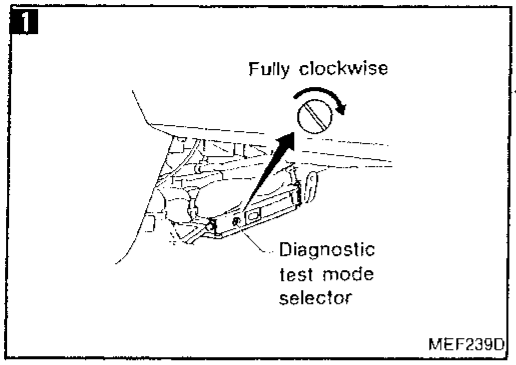
READ SELF-DIAGNOSTIC RESULTS.
1. Set "Self-diagnostic function" in Diagnostic Test Mode III. (Refer to page EF & EC-44.)
2. Count the number of RED LED flashes and read out the diagnostic trouble codes.
3. Are the diagnostic trouble codes being output?

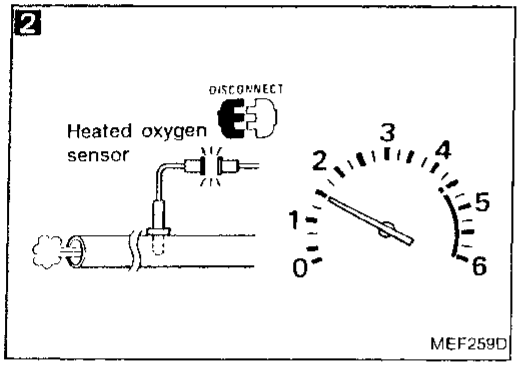
Yes → Go to the relevant inspection procedure.

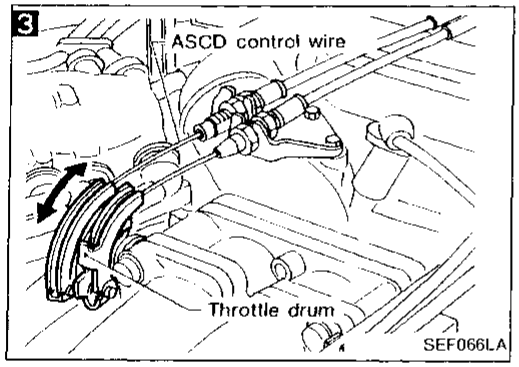
No

INSPECTION END

Diagnostic Procedure 1 — High Idling after Warm-up







1

CHECK IACV-AAC VALVE.
1. Close IACV-AAC valve completely by turning diagnostic test mode selector on ECM fully clockwise.
2. Does the engine speed drop?

Yes → Check IACV-AAC valve and circuit.

No ↓

2

CHECK INTAKE AIR LEAK.
1. Disconnect heated oxygen sensor harness connector.
2. After racing engine at 1,500 rpm under no-load for about 30 seconds, does the engine speed drop?

Yes → Discover air leak location and repair.

No ↓

3

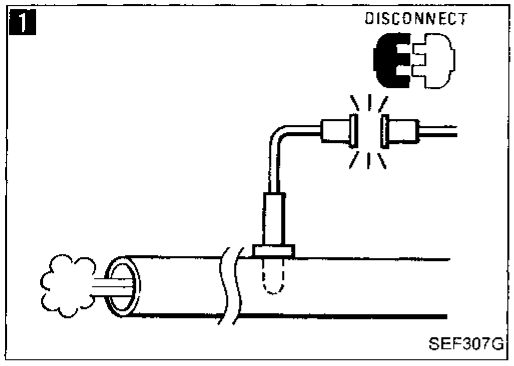
CHECK THROTTLE LINKAGE.
1. Check that throttle linkage moves smoothly.
2. Confirm that throttle valve both fully opens and fully closes.

NG → Repair throttle linkage or sticking of throttle valve.

OK ↓

INSPECTION END

Diagnostic Procedure 2 — Hunting

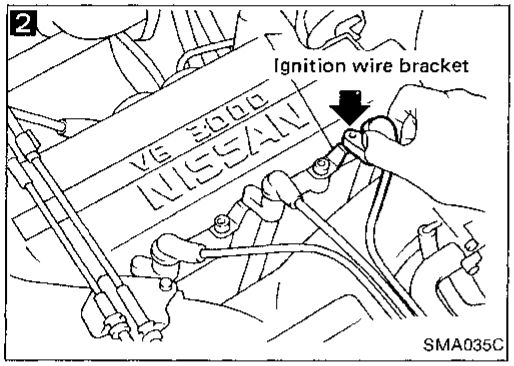


1

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

Yes → Check heated oxygen sensor. (See page EF & EC-105.)

No ↓

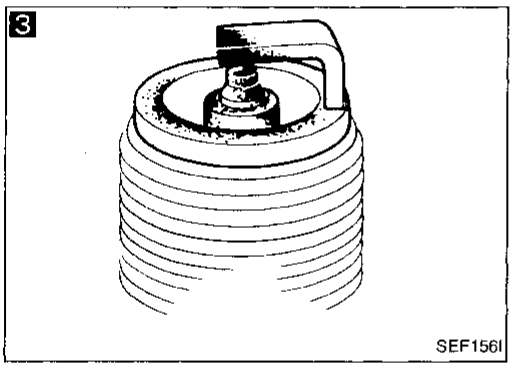


2

PERFORM POWER BALANCE TEST.
When disconnecting each spark plug cord 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).

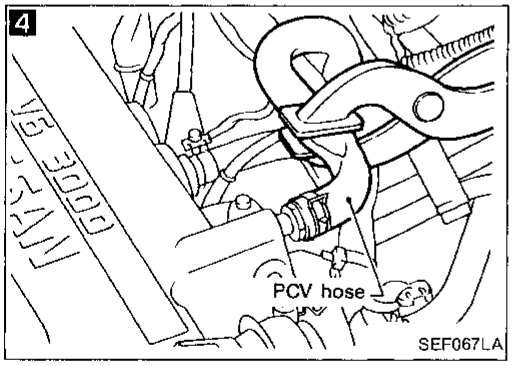
OK ↓

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 ↓



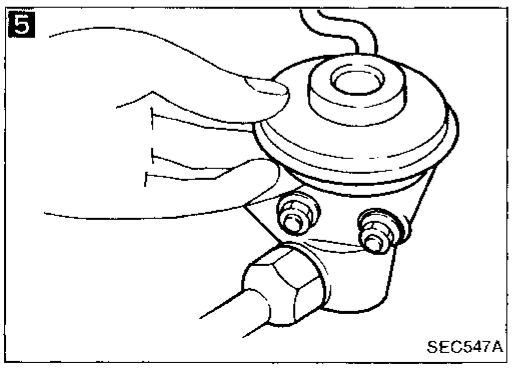
5

CHECK EGR VALVE.
Check EGR valve for sticking.

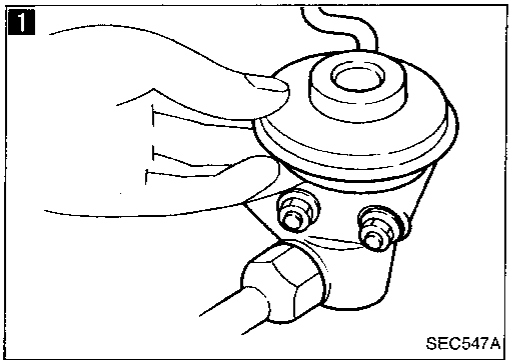
NG → Repair or replace.

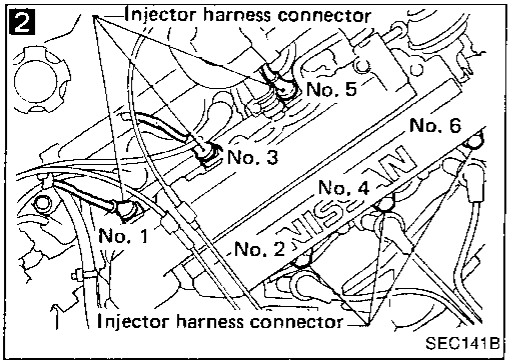
OK ↓

INSPECTION END

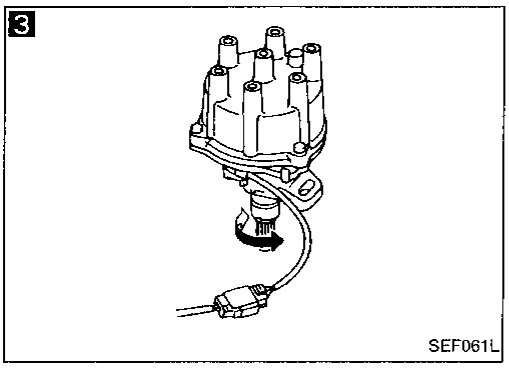


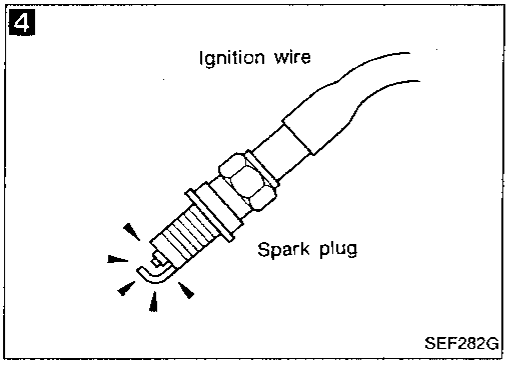
Diagnostic Procedure 3 — Unstable Idle


SEC547A

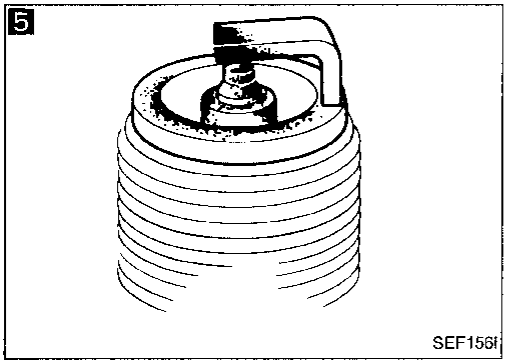


SEC141B


SEF061L



SEF282G


SEF156I

1

CHECK EGR VALVE.
Check EGR valve for sticking.

NG → Repair or replace.

OK ↓

2

PERFORM POWER BALANCE TEST.
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 **6**.

Yes ↓

3

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

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

Yes ↓

4

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

NG → Check ignition coil, ignition wire, power transistor unit and their circuits. (See page EF & EC-96.)

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. Release fuel pressure to zero. (Refer to page EF & EC-150.)
2. Install fuel pressure gauge and check fuel pressure.

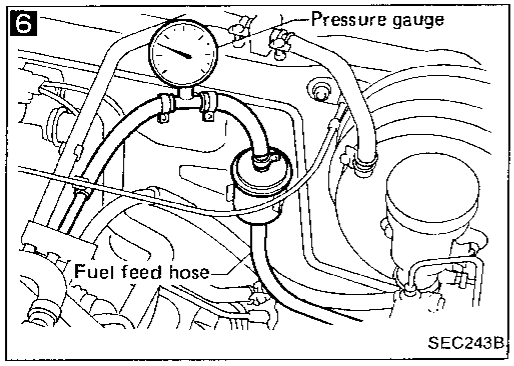
At idle:
Approx. 250.1 kPa
(2.55 kg/cm², 36.3 psi)

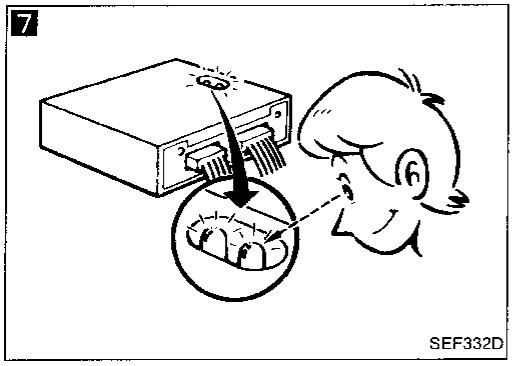
NG → Check fuel pump and circuit.

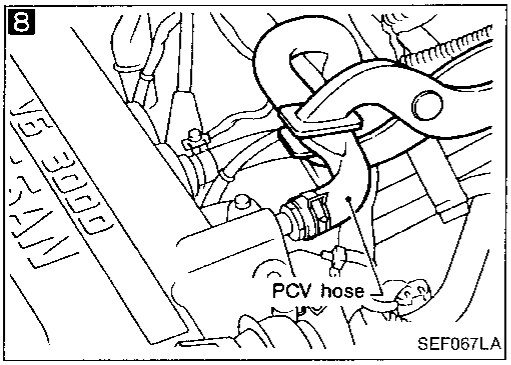
OK ↓

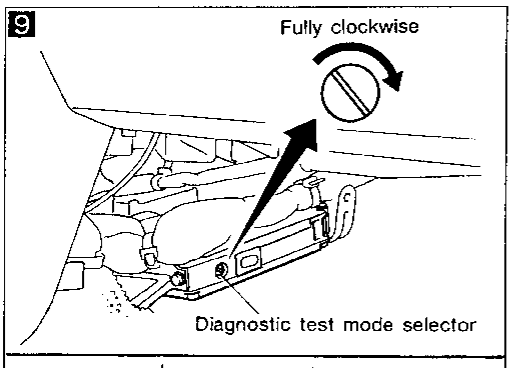
(Go to Ⓐ on next page.)

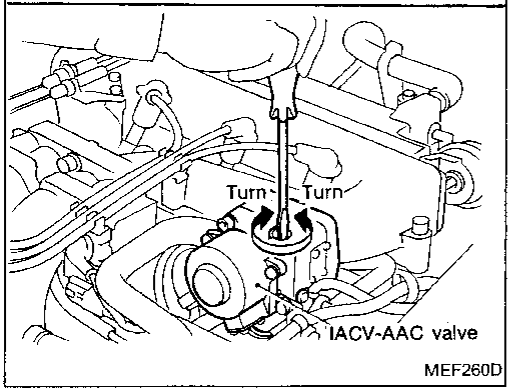
Diagnostic Procedure 3 — Unstable Idle (Cont'd)











Ⓐ

7 **CHECK HEATED OXYGEN SENSOR.**
1. Set "Self-diagnostic function" in Diagnostic Test Mode I. (See page EF & EC-41.)
2. Maintaining engine at 2,000 rpm under no-load, check to make sure that GREEN LED on the ECM goes ON and OFF more than 5 times during 10 seconds.

NG → Replace heated oxygen sensor.

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 ↓

9 **CHECK IDLE ADJ. SCREW CLOGGING.**
1. Set Self-diagnostic test mode selector to fully clockwise position.
2. Can you set engine speed as follows by turning idle adjusting screw?
   700 ± 50 rpm
   [in "N" position]

No → Check for IAS clogging or throttle valve clogging.

Yes ↓

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

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

OK ↓

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

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

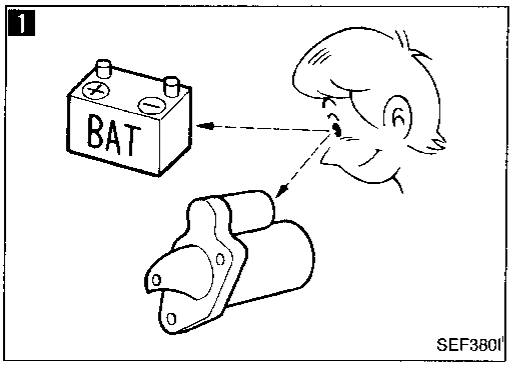
Trouble is not fixed. ↓

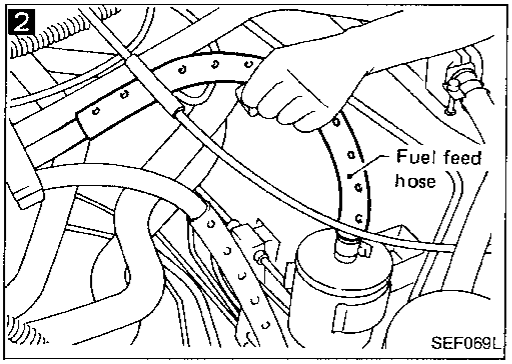
TRY A KNOWN GOOD ECM.

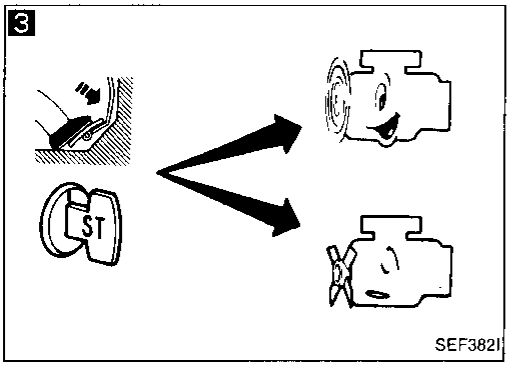
OK ↓

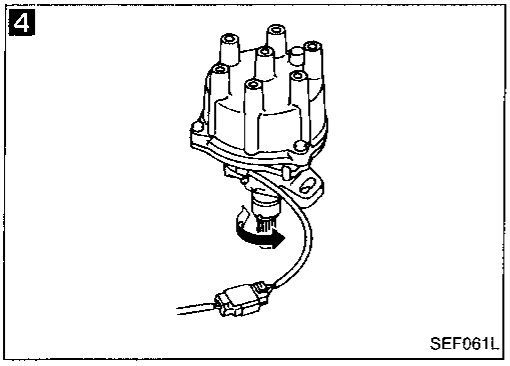
INSPECTION END

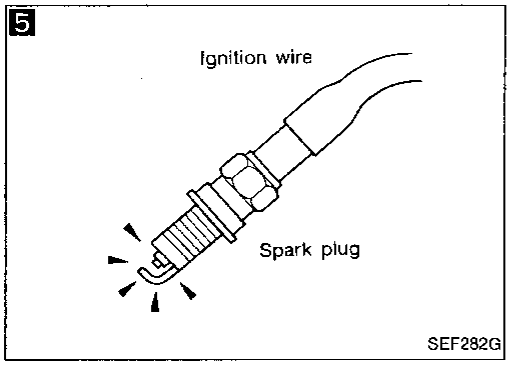
Diagnostic Procedure 4 — Hard to Start or Impossible to Start when the Engine is Cold











1 **CHECK BATTERY AND STARTER.**
Check battery and starter condition. (Refer to EL section.)
NG → Repair or replace.
OK ↓

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

No → Check fuel pump and circuit. (See page EF & EC-99.)
Yes ↓

3 **CHECK IACV-AAC VALVE.**
When pressing accelerator pedal fully, can you start the engine.
Yes → Check IACV-AAC valve and circuit. (See pages EF & EC-126.)
No ↓

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

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

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

NG → Check ignition coil, ignition wire, power transistor unit and their circuits. (See page EF & EC-96.)
OK ↓

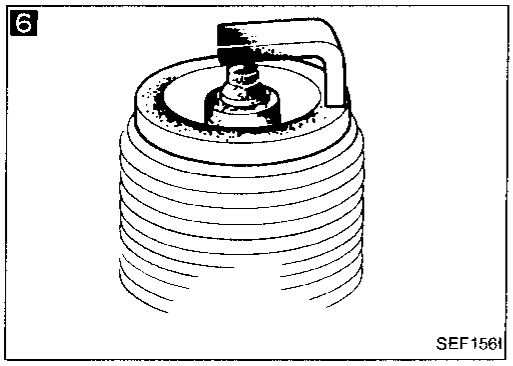
6 **CHECK SPARK PLUGS.**
Remove the spark plugs and check for fouling, etc.
NG → Repair or replace spark plug(s).
OK ↓

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector.
NG → Repair or replace.
OK ↓

Reconnect ECM harness connector and retest.
↓ Trouble is not fixed.

(Go to Ⓐ on next page.)

Diagnostic Procedure 4 — Hard to Start or Impossible to Start when the Engine is Cold (Cont'd)



Ⓐ

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-83.

NG → Repair or replace.

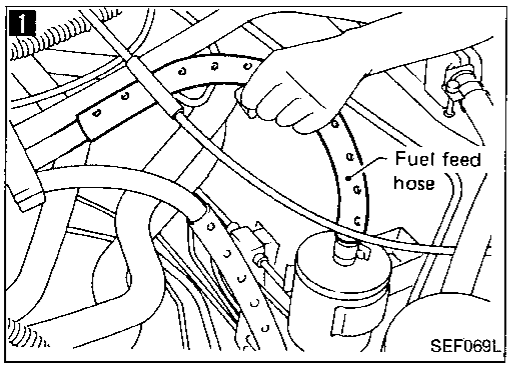
OK ↓

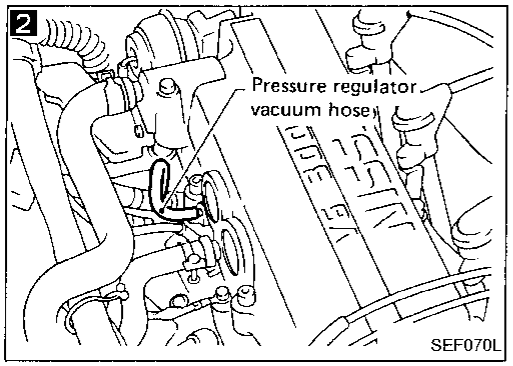
TRY A KNOWN GOOD ECM.

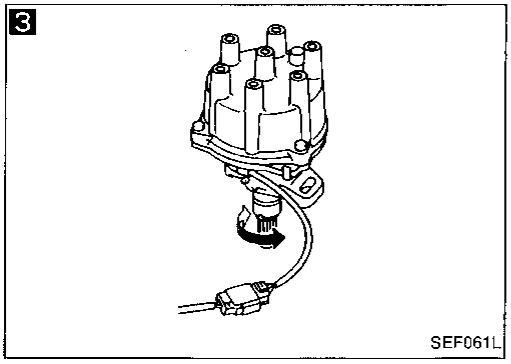
OK ↓

INSPECTION END

Diagnostic Procedure 5 — Hard to Start or Impossible to Start when the Engine is Hot







1

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

No → Check fuel pump and circuit. (See page EF & EC-99.)

Yes ↓

2

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

Yes → Check fuel properties.

No ↓

3

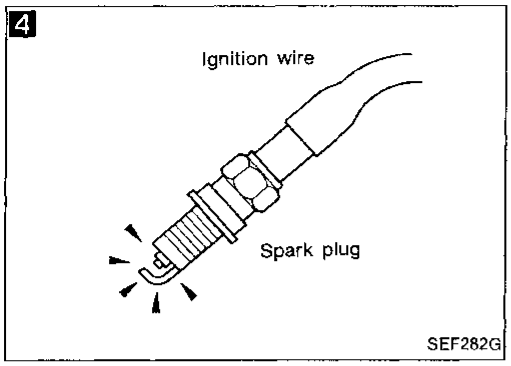
CHECK INJECTOR.
1. Remove camshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating camshaft position sensor shaft, does each injector make an operating sound?

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

Yes ↓

Ⓐ

Diagnostic Procedure 5 — Hard to Start or Impossible to Start when the Engine is Hot (Cont'd)



Ⓐ

4

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

NG → Check ignition coil, ignition wire, power transistor unit and circuits. (See page EF & EC-96.)

OK ↓

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

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-83.

NG → Repair or replace.

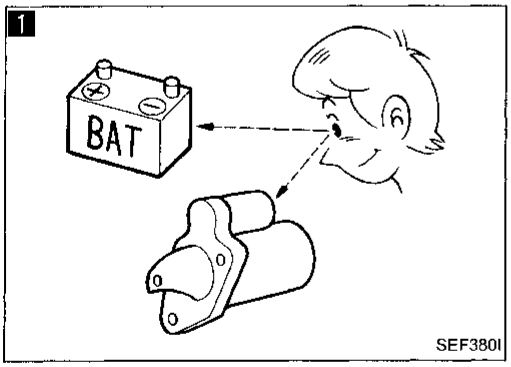
OK ↓

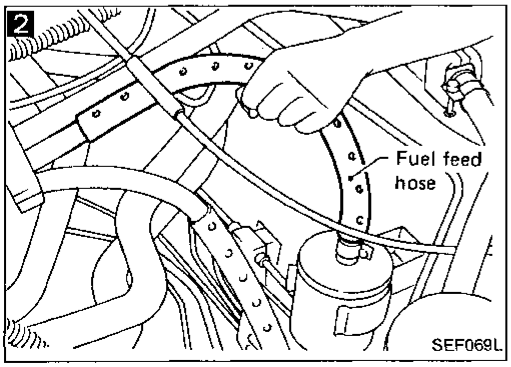
TRY A KNOWN GOOD ECM.

OK ↓

INSPECTION END

Diagnostic Procedure 6 — Hard to Start or Impossible to Start under Normal Conditions





1

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

NG → Repair or replace.

OK ↓

2

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

No → Check fuel pump and circuit. (See page EF & EC-99.)

Yes ↓

3

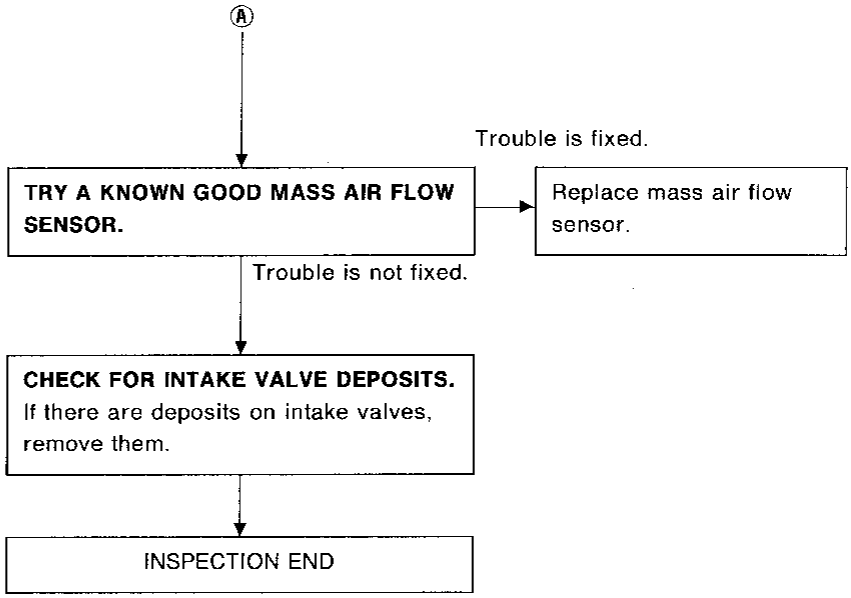
CHECK INJECTOR FOR LEAKAGE.
When pressing accelerator pedal fully, can you start the engine.

Yes → Check injector(s) for leakage.

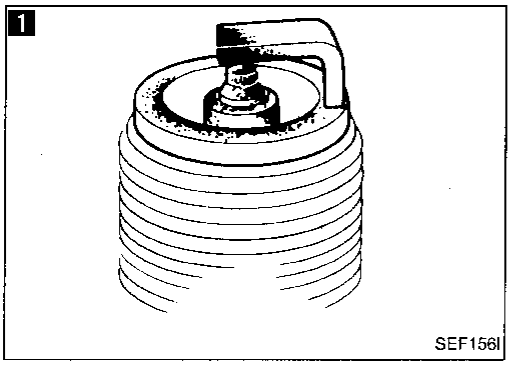
No ↓

Ⓐ

Diagnostic Procedure 8 — Hesitation when the Engine is Cold (Cont'd)



Diagnostic Procedure 9 — Hesitation under Normal Conditions

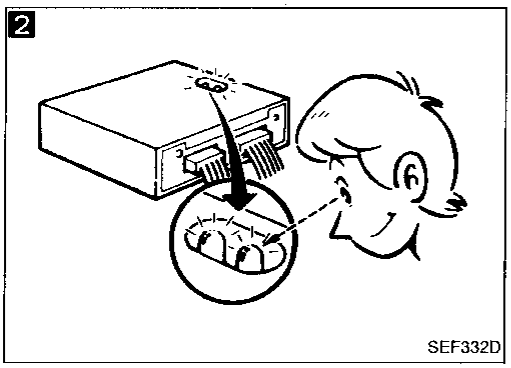

SEF156I

1

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

NG → Repair or replace spark plug(s).

OK ↓

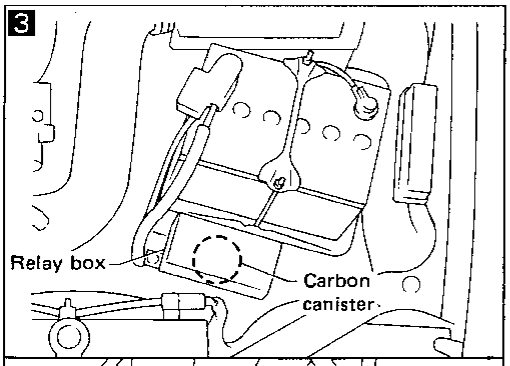

SEF332D

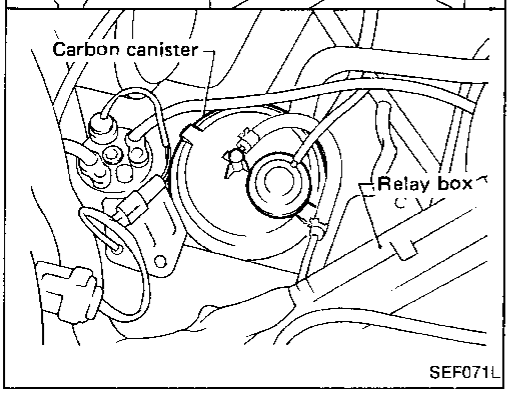
2

CHECK HEATED OXYGEN SENSOR.
1. Set "Self-diagnostic function" in Diagnostic Test Mode I. (See page EF & EC-41.)
2. Maintaining engine at 2,000 rpm under no-load, check that GREEN LED on the ECM goes ON and OFF more than 5 times during 10 seconds.

Yes → Replace heated oxygen sensor.

No ↓





SEF071L

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 ↓

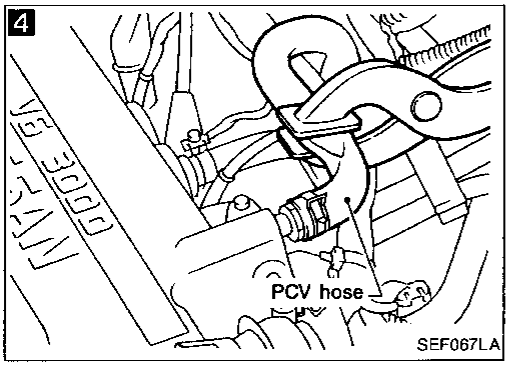
4

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.

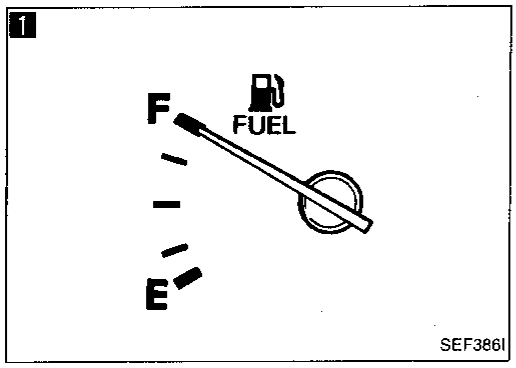
No ↓

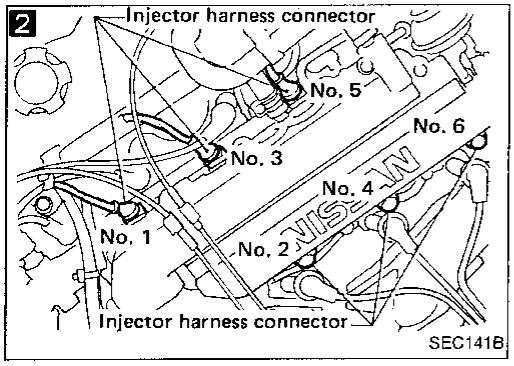
INSPECTION END

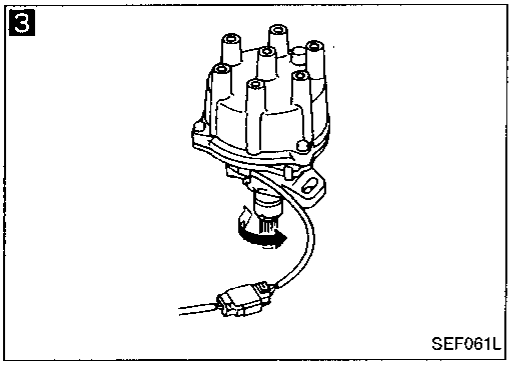


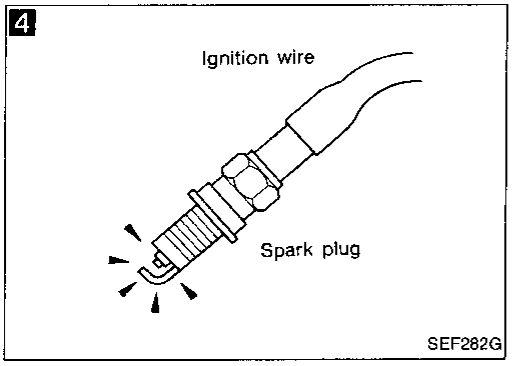
SEF067LA

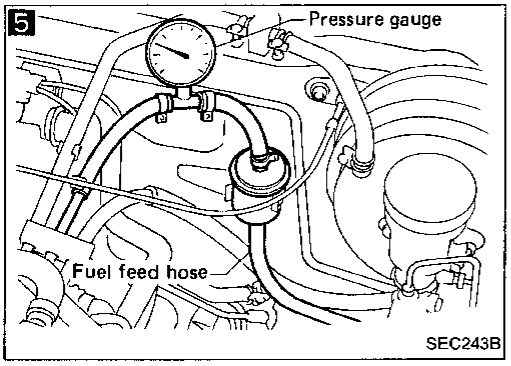
Diagnostic Procedure 10 — Engine Stalls when Turning











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

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

Yes ↓

4

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

NG → Check ignition coil, ignition wire, power transistor unit and circuits. (See page EF & EC-96.)

OK ↓

5

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. (Refer to page EF & EC-150.)
2. Install fuel pressure gauge and check fuel pressure.

At idle:
Approx. 250.1 kPa
(2.55 kg/cm², 36.3 psi)
The moment throttle valve is fully open:
Approx. 299.1 kPa
(3.05 kg/cm², 43.4 psi)

NG → Check fuel pressure regulator diaphragm.

OK ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 10 — Engine Stalls when Turning (Cont'd)

Ⓐ

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

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

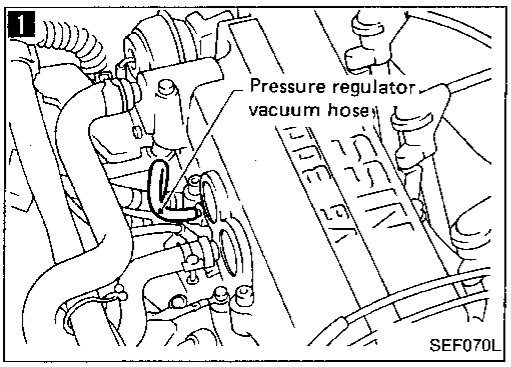
CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-83.
NG → Repair or replace.

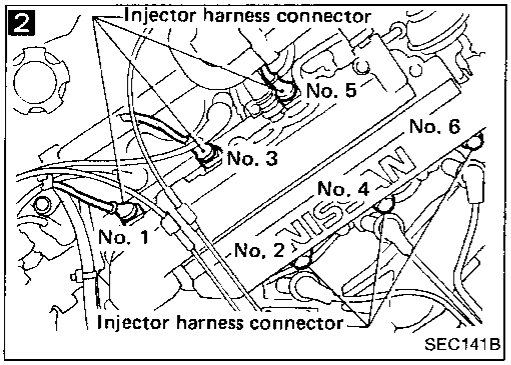
OK ↓

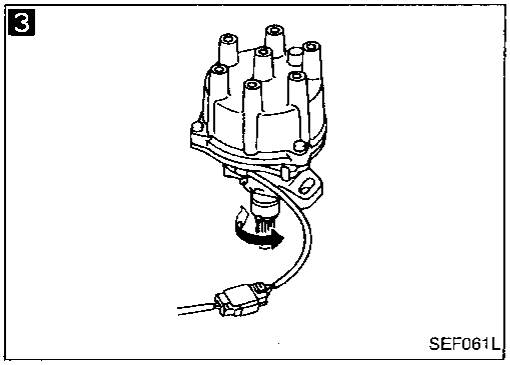
TRY A KNOWN GOOD ECM.

OK ↓

INSPECTION END







Diagnostic Procedure 11 — 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.
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

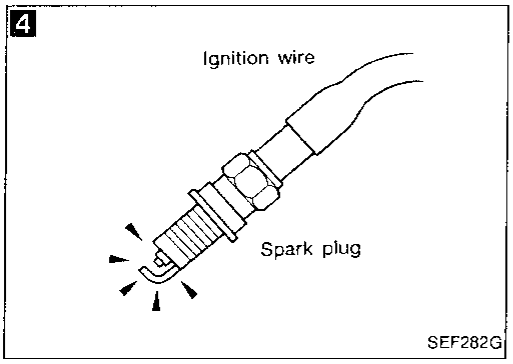
CHECK INJECTOR.
1. Remove camshaft position sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating camshaft position sensor shaft, does each injector make an operating sound?

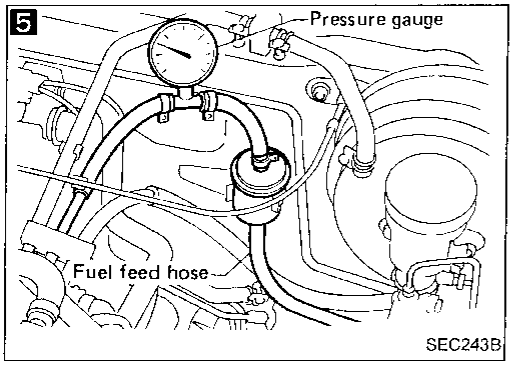
No → Check injector(s) and circuit(s).

Yes ↓

Ⓐ

Diagnostic Procedure 11 — Engine Stalls when the Engine is Hot (Cont'd)





Ⓐ

4

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

NG → Check ignition coil, ignition wire, power transistor unit and their circuits. (See page EF & EC-96.)

OK ↓

5

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. (Refer to page EF & EC-150.)
2. Install fuel pressure gauge and check fuel pressure.
   At idle:
   Approx. 250.1 kPa (2.55 kg/cm^2, 36.3 psi)
   The moment throttle valve is fully open:
   Approx. 299.1 kPa (3.05 kg/cm^2, 43.4 psi)

NG → Check fuel pressure regulator diaphragm.

OK ↓

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

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-83.

NG → Repair or replace.

OK ↓

TRY A KNOWN GOOD ECM.

OK ↓

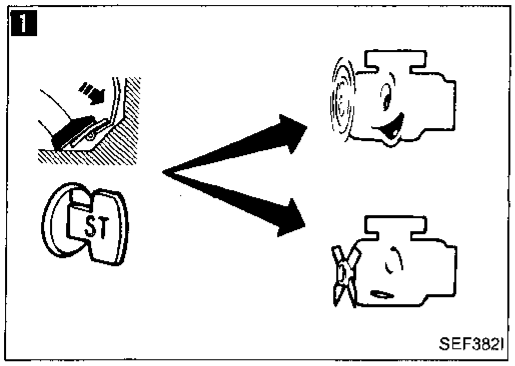
CHECK TIMING BELT FOR PROPER INSTALLATION.

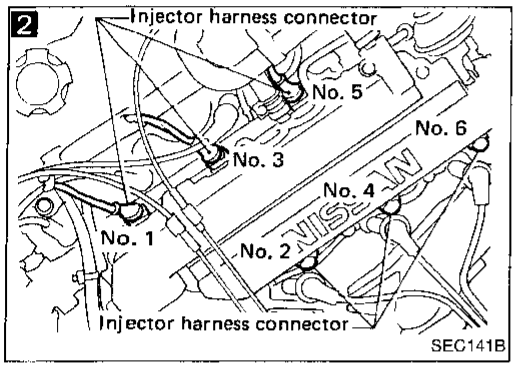
NG → Replace timing belt.

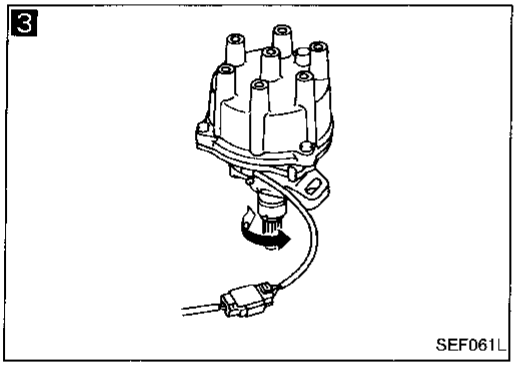
OK ↓

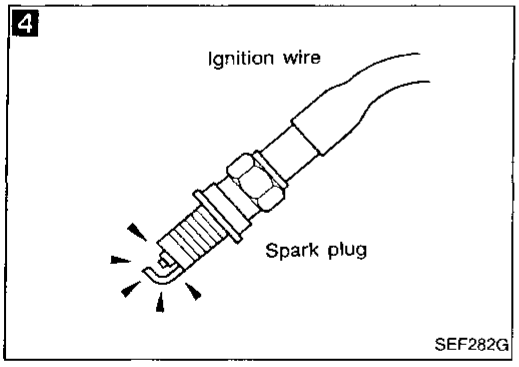
INSPECTION END

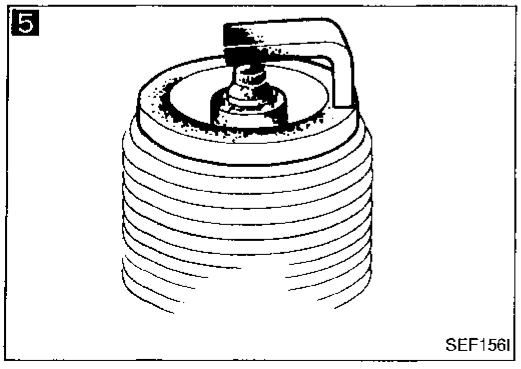
Diagnostic Procedure 12 — Engine Stalls when the Engine is Cold











1

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

NG → Check IACV-AAC valve, and circuits. (See page EF & EC-126.)

OK ↓

2

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

NG → Go to **6** .

OK ↓

3

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

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

OK ↓

4

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

NG → Check ignition coil, ignition wire, power transistor unit and circuits. (See page EF & EC-96.)

OK ↓

5

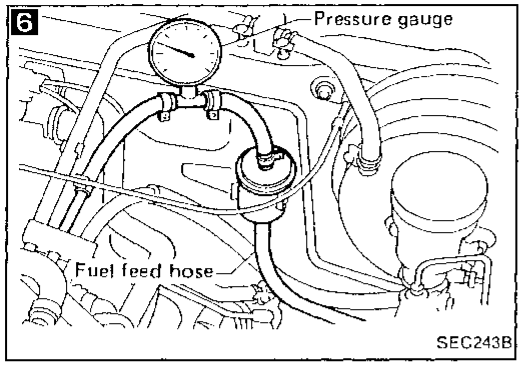
CHECK SPARK PLUGS.
Remove the spark plugs and check for fouling, etc.

NG → Repair or replace spark plug(s).

OK ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 12 — Engine Stalls when the Engine is Cold (Cont'd)



Ⓐ

6

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. (Refer to page EF & EC-xxx.)
2. Install fuel pressure gauge and check fuel pressure.
   At idle:
   Approx. 250.1 kPa (2.55 kg/cm², 36.3 psi)
   The moment throttle valve is fully open:
   Approx. 299.1 kPa (3.05 kg/cm², 43.4 psi)

NG → Check fuel pressure regulator diaphragm.

OK ↓

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

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

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

NG → Repair or replace.

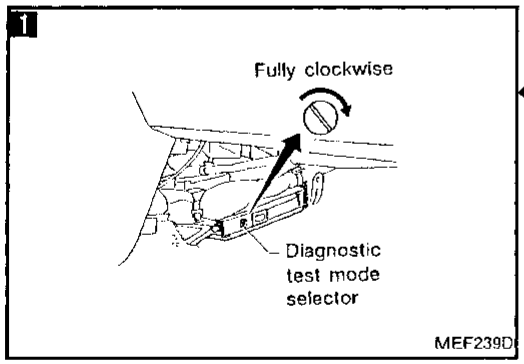
OK ↓

TRY A KNOWN GOOD ECM.

OK ↓

INSPECTION END

Diagnostic Procedure 13 — Engine Stalls when Stepping on the Accelerator Momentarily

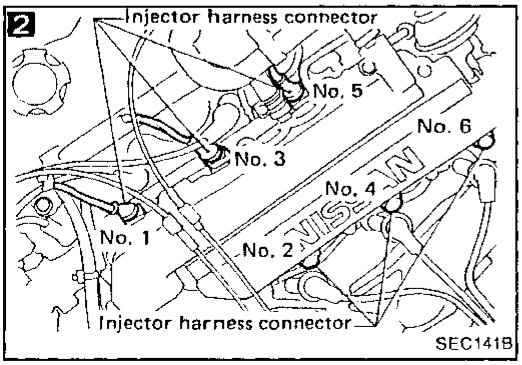


1

CHECK IACV-AAC VALVE.
1. Close IACV-AAC valve completely by turning diagnostic test mode selector on ECM fully clockwise.
2. Does the engine speed drop?

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

Yes ↓



2

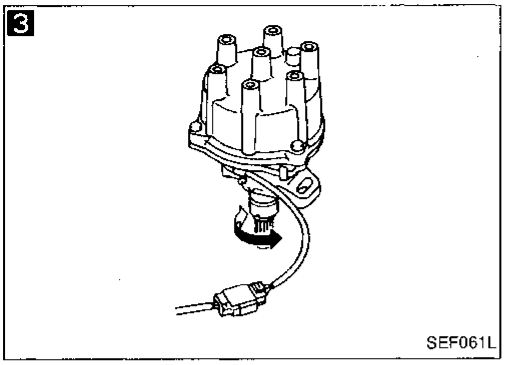
PERFORM POWER BALANCE TEST.
When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?

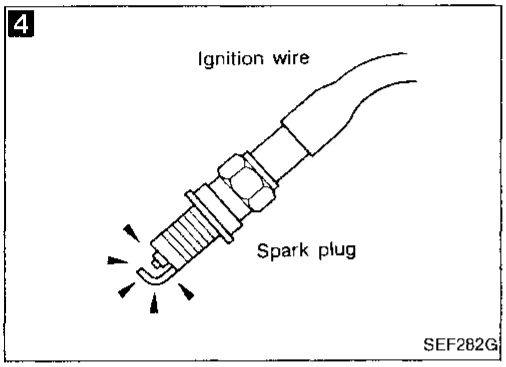
No → Go to **5**

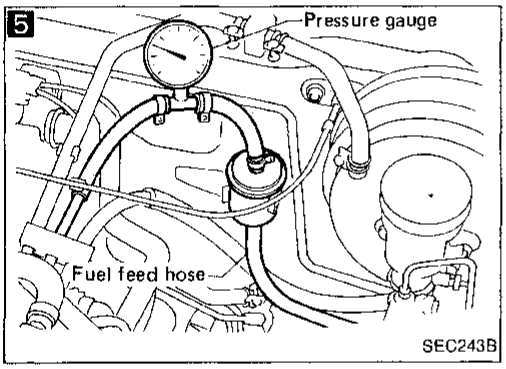
Yes ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 13 — Engine Stalls when Stepping on the Accelerator Momentarily (Cont'd)







Ⓐ

3

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

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

Yes ↓

4

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

NG → Check ignition coil, ignition wire, power transistor unit and their circuits. (See page EF & EC-96.)

OK ↓

5

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. (Refer to page EF & EC-150.)
2. Install fuel pressure gauge and check fuel pressure.

At idle:
Approx. 250.1 kPa (2.55 kg/cm², 36.3 psi)
The moment throttle valve is fully open:
Approx. 299.1 kPa (3.05 kg/cm², 43.4 psi)

NG → Check fuel pressure regulator diaphragm.

OK ↓

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

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-83.

NG → Repair or replace.

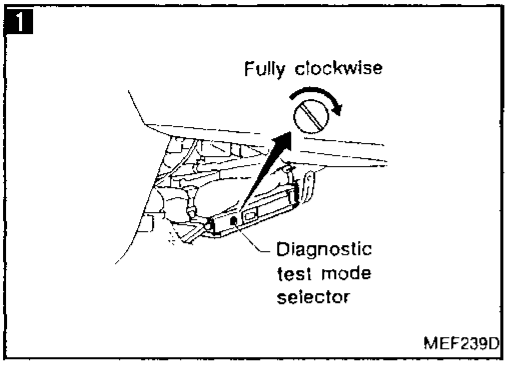
OK ↓

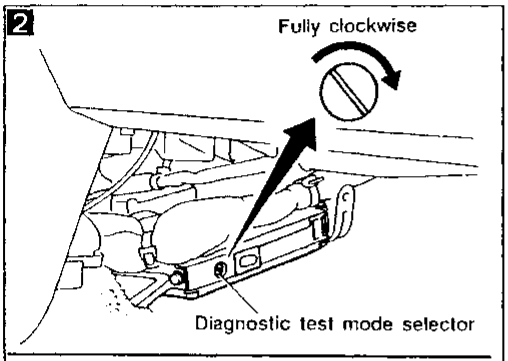
TRY A KNOWN GOOD ECM.

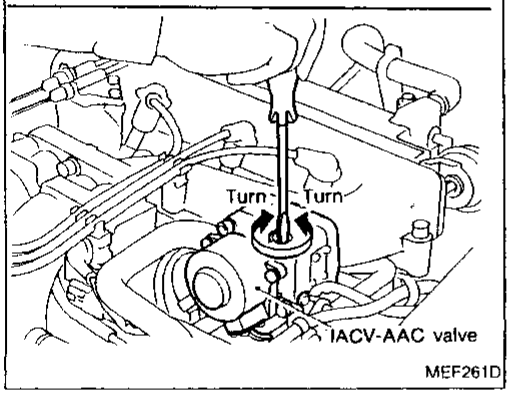
OK ↓

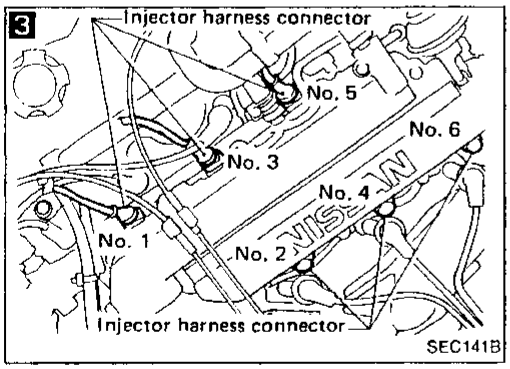
INSPECTION END

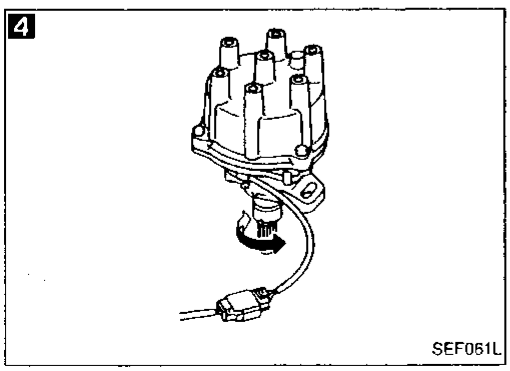
Diagnostic Procedure 14 — Engine Stalls after Decelerating











1

CHECK IACV-AAC VALVE.
1. Close IACV-AAC valve completely by turning diagnostic test mode selector on ECM fully clockwise.
2. Does the engine speed drop?

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

Yes ↓

2

CHECK IDLE ADJ. SCREW CLOGGING.
1. Set Diagnostic test mode selector to fully clockwise position.
2. Can you set engine speed as follows by turning idle adjusting screw?
   700 ± 50 rpm
   [in "N" position]

No → Check for IAS clogging or throttle body clogging.

Yes ↓

3

PERFORM POWER BALANCE TEST.
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 **6**

Yes ↓

4

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

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

Yes ↓

5

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

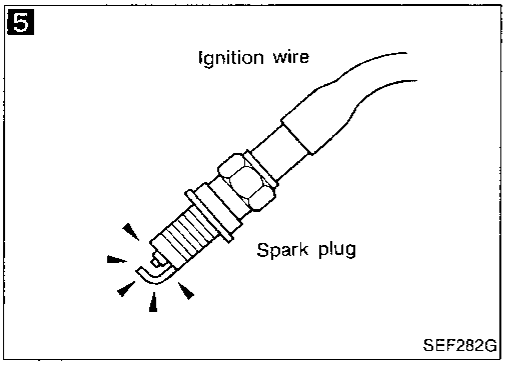
NG → Check ignition coil, ignition wire, power transistor unit and circuits. (See page EF & EC-xx.)

OK ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 14 — Engine Stalls after Decelerating (Cont'd)

5



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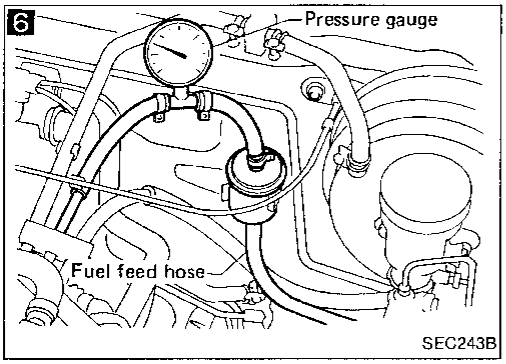

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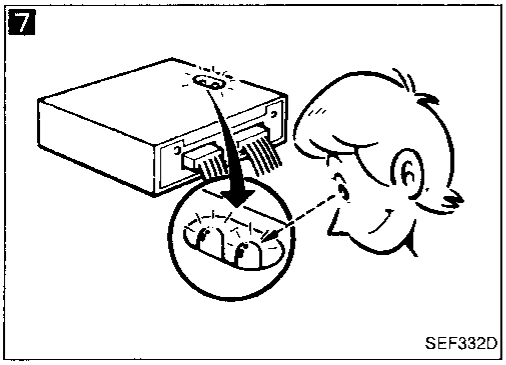


Ⓐ

6

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. (Refer to page EF & EC-150.)
2. Install fuel pressure gauge and check fuel pressure.

At idle:
Approx. 250.1 kPa
(2.55 kg/cm², 36.3 psi)
The moment throttle valve is fully open:
Approx. 299.1 kPa
(3.05 kg/cm², 43.4 psi)

NG → Check fuel pressure regulator diaphragm.

OK ↓

7

CHECK HEATED OXYGEN SENSOR.
1. Set "Self-diagnostic function" in Diagnostic Test Mode I. (See page EF & EC-41.)
2. Maintaining engine at 2,000 rpm under no-load, check that GREEN LED on the ECM goes ON and OFF more than 5 times during 10 seconds.

NG → Replace heated oxygen sensor.

OK ↓

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

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-83.

NG → Repair or replace.

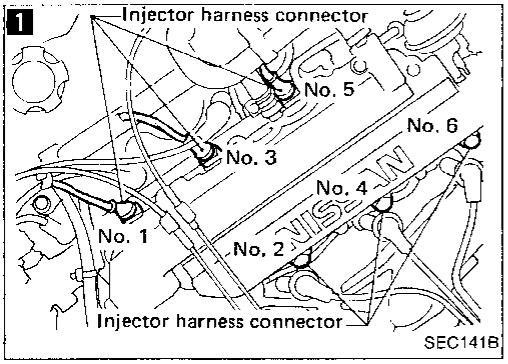
OK ↓

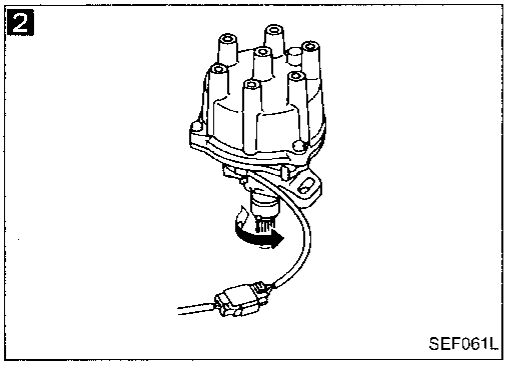
TRY A KNOWN GOOD ECM.

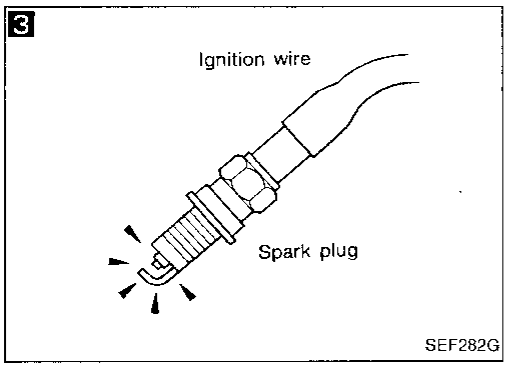
OK ↓

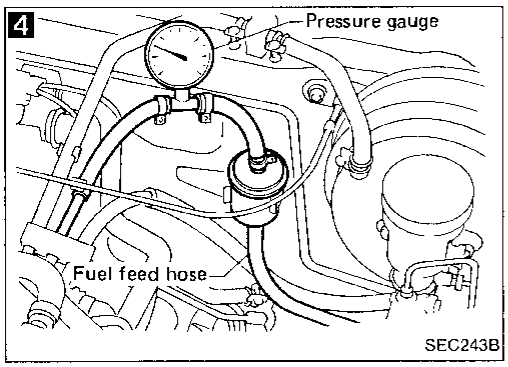
INSPECTION END

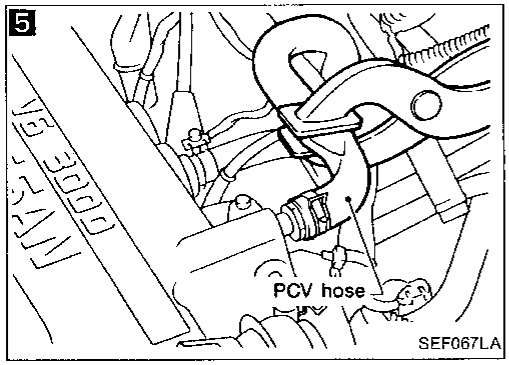
Diagnostic Procedure 15 — Engine Stalls when Accelerating or Cruising











1

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

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

Yes ↓

3

CHECK IGNITION SPARK.
1. Disconnect spark plug cord.
2. Connect a known good spark plug to the spark plug cord.
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-96.)

OK ↓

4

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. (Refer to page EF & EC-150.)
2. Install fuel pressure gauge and check fuel pressure.

At idle:
Approx. 250.1 kPa
(2.55 kg/cm^2, 36.3 psi)
The moment throttle valve is fully open:
Approx. 299.1 kPa
(3.05 kg/cm^2, 43.4 psi)

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

OK ↓

5

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

Yes → Discover air leak location and repair.

No ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 15 — Engine Stalls when Accelerating or Cruising (Cont'd)

Ⓐ

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

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

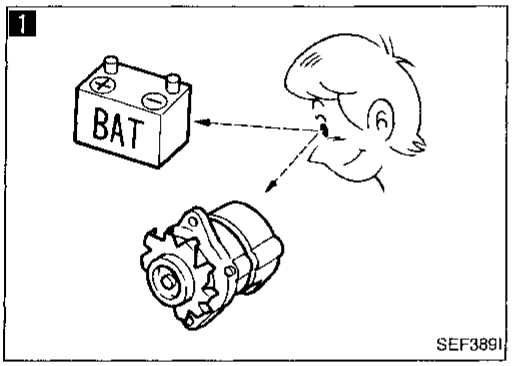
CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-83.
NG → Repair or replace.

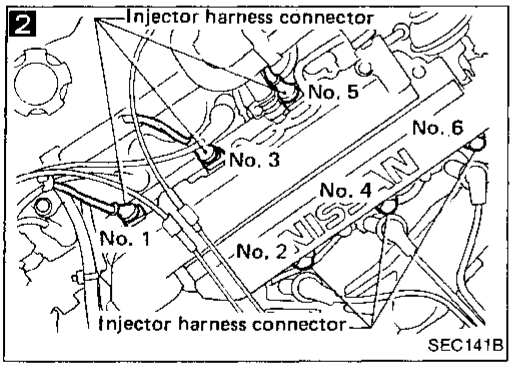
OK ↓

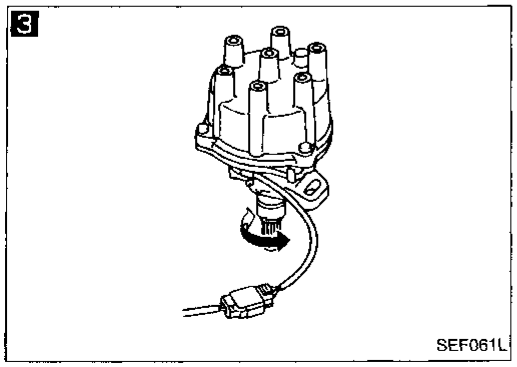
TRY A KNOWN GOOD ECM.

OK ↓

INSPECTION END







Diagnostic Procedure 16 — Engine Stalls when the Electrical Load is Heavy

1
CHECK BATTERY AND ALTERNATOR.
Check battery and alternator condition. (Refer to EL section.)
NG → Repair or replace.

OK ↓

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

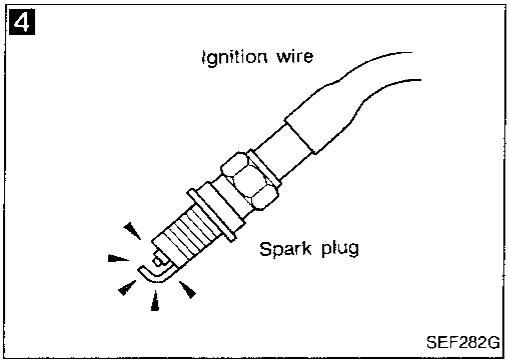
No → Check injector(s) and circuit(s).

Yes ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 16 — Engine Stalls when the Electrical Load is Heavy (Cont'd)

4



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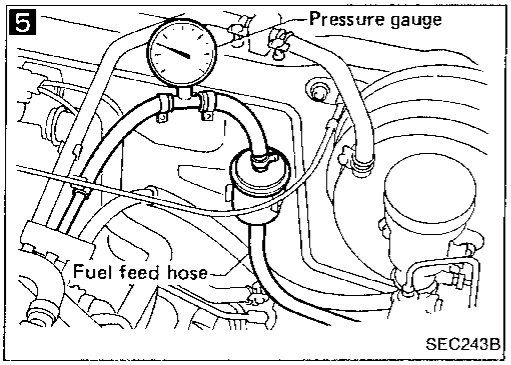


Ⓐ

4

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

NG → Check ignition coil, ignition wire, power transistor unit and circuits. (See page EF & EC-96.)

OK ↓

5

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. (Refer to page EF & EC-150.)
2. Install fuel pressure gauge and check fuel pressure.

At idle:
Approx. 250.1 kPa
(2.55 kg/cm², 36.3 psi)
The moment throttle valve is fully open:
Approx. 299.1 kPa
(3.05 kg/cm², 43.4 psi)

NG → Check fuel pressure regulator diaphragm.

OK ↓

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

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-83.

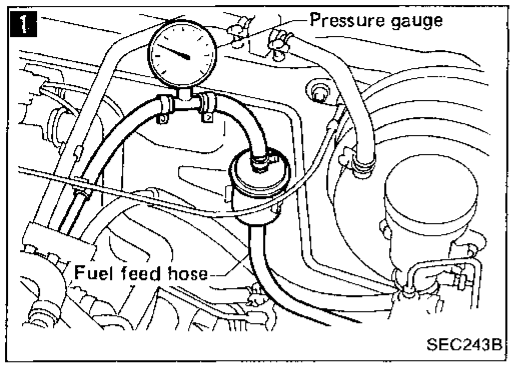
NG → Repair or replace.

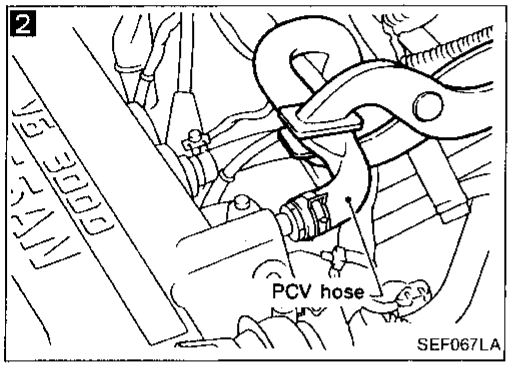
OK ↓

TRY A KNOWN GOOD ECM.

OK ↓

INSPECTION END





Diagnostic Procedure 17 — Lack of Power and Stumble

1

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. (Refer to page EF & EC-150.)
2. Install fuel pressure gauge and check fuel pressure.
   At idle:
   Approx. 250.1 kPa (2.55 kg/cm², 36.3 psi)
   The moment throttle valve is fully open:
   Approx. 299.1 kPa (3.05 kg/cm², 43.4 psi)

NG → Check fuel pressure regulator diaphragm.

OK ↓

2

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

Yes → Discover air leak location and repair.

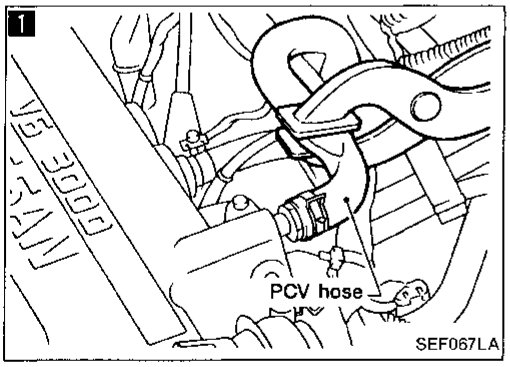
No ↓

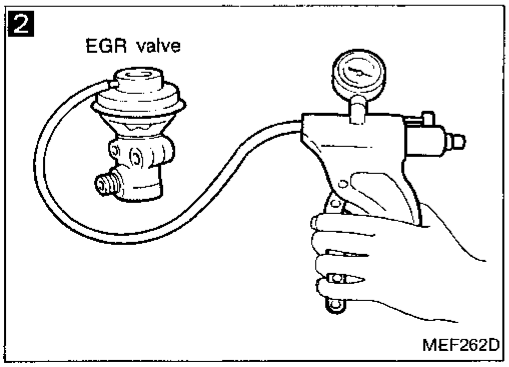
CHECK TIMING BELT FOR PROPER INSTALLATION.

NG → Replace timing belt.

OK ↓

INSPECTION END





Diagnostic Procedure 18 — 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

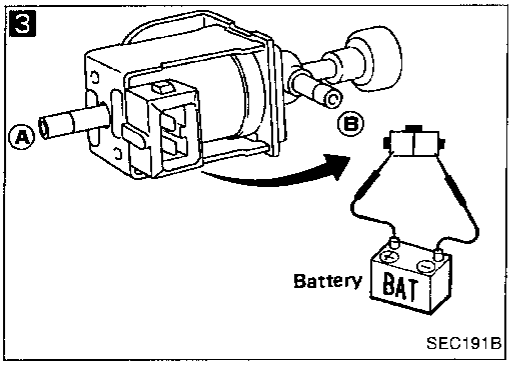
CHECK EGR OPERATION.
1. Apply vacuum directly to the EGR valve using a handy vacuum pump.
2. Check to see that the engine runs rough or dies.

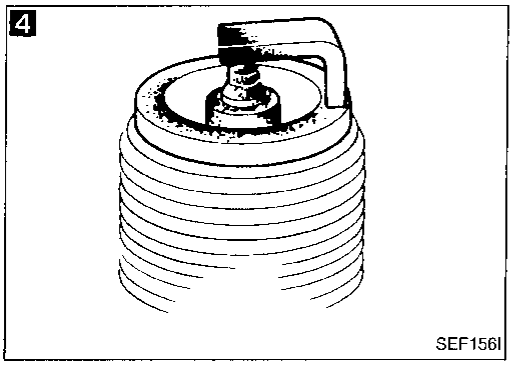
No → Check EGR valve for sticking.

Yes ↓

Ⓐ

Diagnostic Procedure 18 — Knock (Cont'd)





Ⓐ

3 **CHECK EGRC-SOLENOID VALVE.**
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 ↓

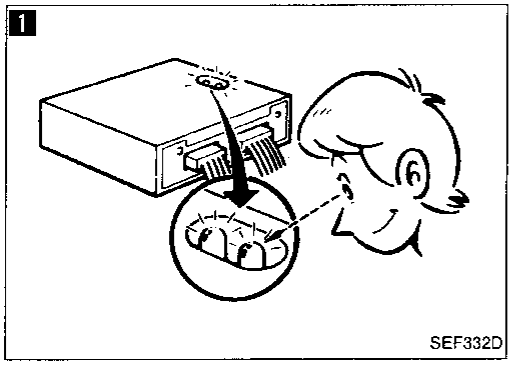
CHECK FOR OIL LEAK TO COMBUSTION CHAMBER.
Remove spark plugs and check for fouling with oil.

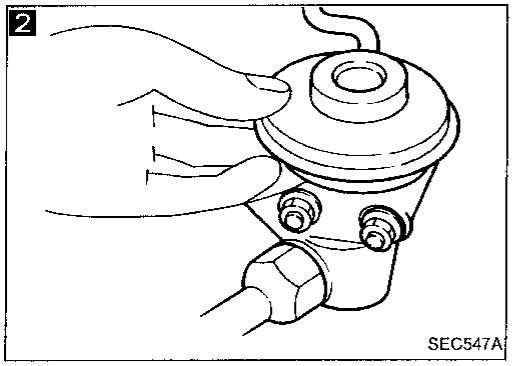
Yes → Check pistons, piston rings, valves, valve seats, valve oil seal, engine oil level, etc.

No ↓

INSPECTION END

Diagnostic Procedure 19 — Surge





1

CHECK HEATED OXYGEN SENSOR.
1. Set "Self-diagnostic function" in Diagnostic Test Mode I. (See page EF & EC-41.)
2. Maintaining engine at 2,000 rpm under no-load, check that GREEN LED on the ECM goes ON and OFF more than 5 times during 10 seconds.

NG → Replace heated oxygen sensor.

OK ↓

2

CHECK EGR VALVE.
Check EGR valve for sticking.

NG → Repair or replace.

OK ↓

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

NG → Repair or replace.

OK ↓

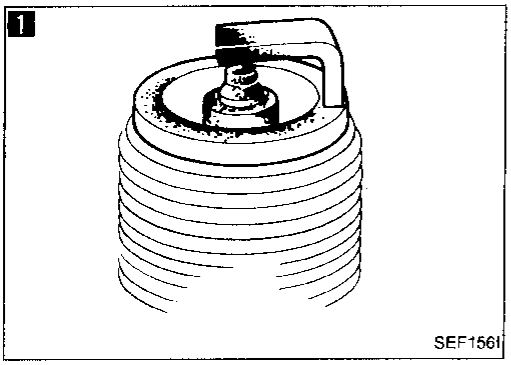
Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

TRY A KNOWN GOOD ECM.

OK ↓

INSPECTION END



Diagnostic Procedure 20 — Backfire through the Intake

1

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

NG → Repair or replace spark plug(s).

OK ↓

2

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

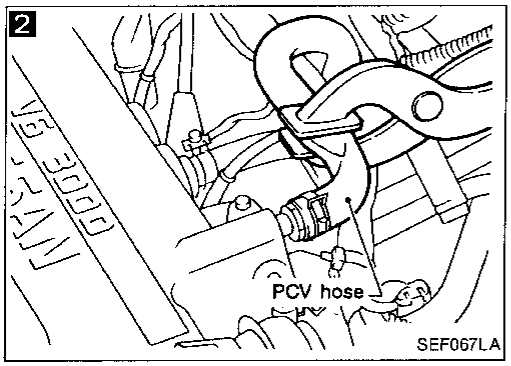
Yes → Discover air leak location and repair.

No ↓

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

↓

INSPECTION END



Diagnostic Procedure 21 — Backfire through the Exhaust

CHECK ENGINE COOLANT TEMPERATURE SENSOR.
Check engine coolant temperature sensor and its circuit. (See page EF & EC-91.)

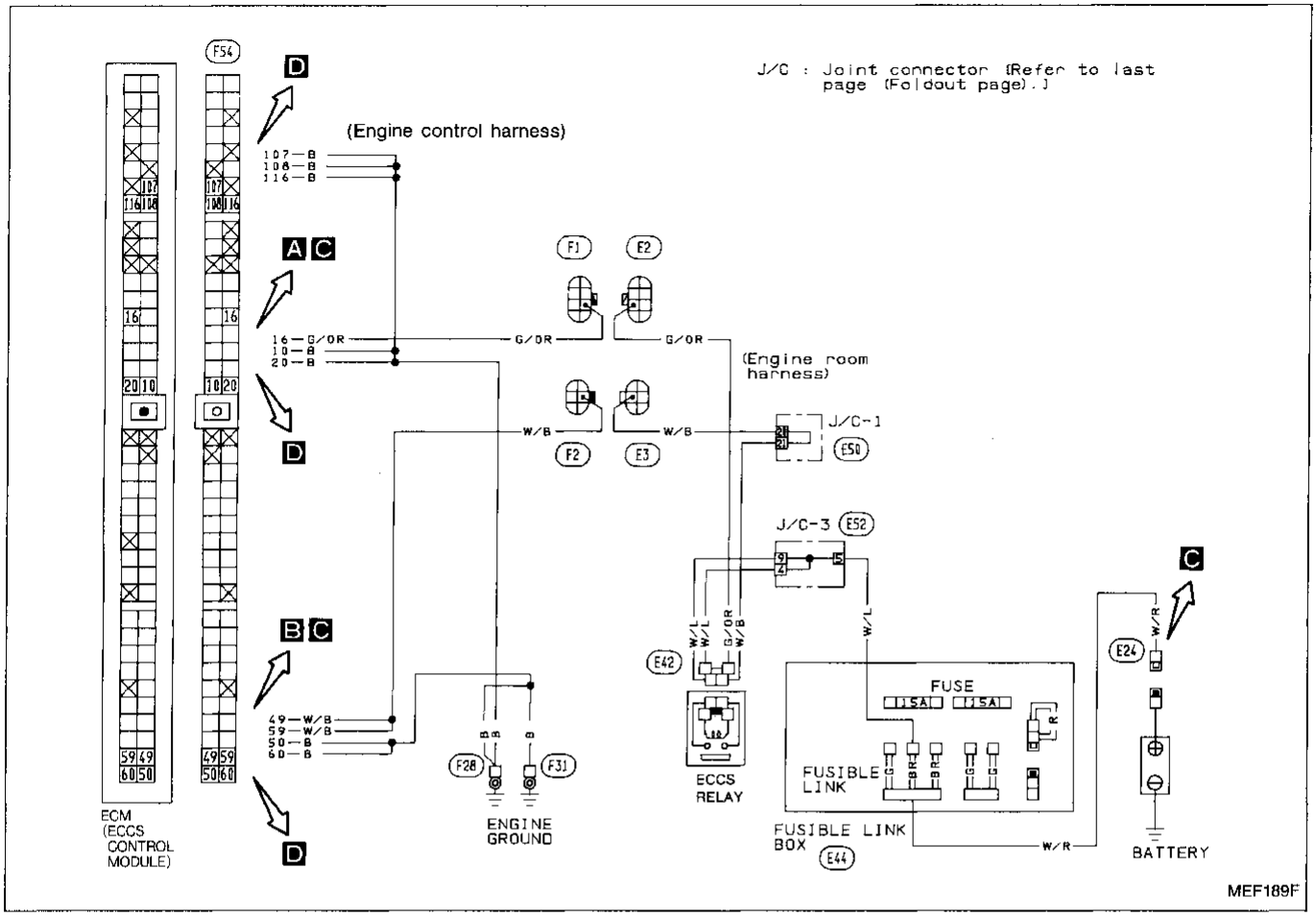
NG → Replace or repair.

OK ↓

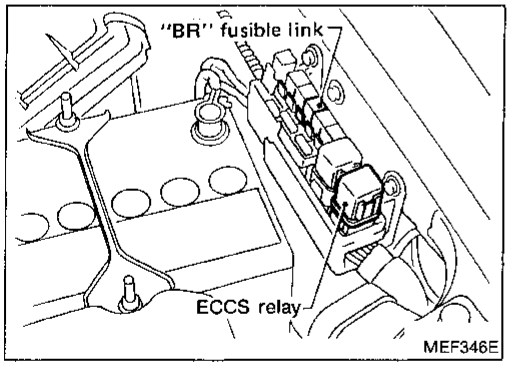
INSPECTION END

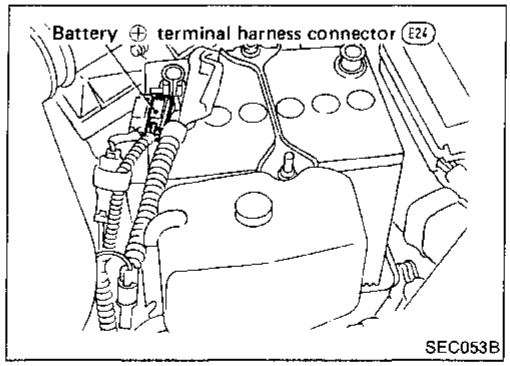
Diagnostic Procedure 22

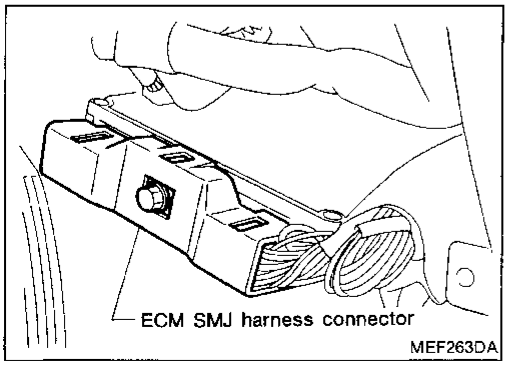
MAIN POWER SUPPLY AND GROUND CIRCUIT



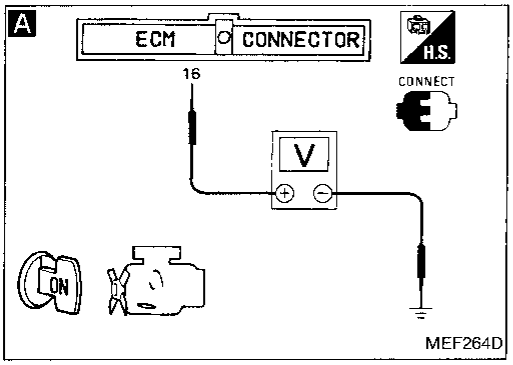
Harness layout

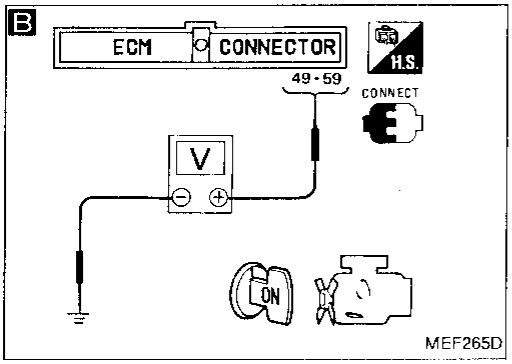


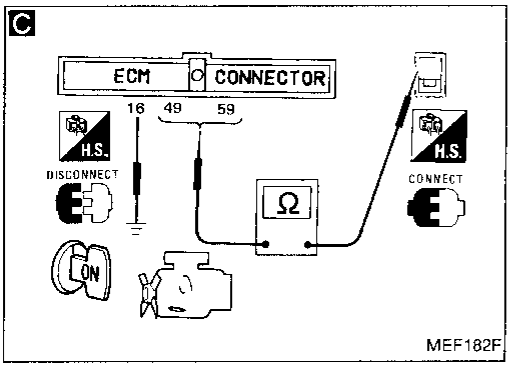


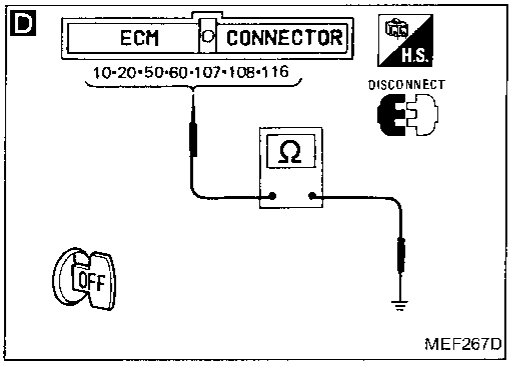


Diagnostic Procedure 22 (Cont'd)









INSPECTION START

CHECK POWER SUPPLY.
1) Turn ignition switch "ON".
A 2) Check voltage between ECM pin terminal (16) and ground.
Voltage:
Approximately 1V
B 3) Check voltage between ECM pin terminals (49), (59) and ground.
Voltage: Battery voltage

NG → C

OK

C

CHECK HARNESS CONTINUITY BETWEEN ECM AND BATTERY.
1) Turn ignition switch "OFF".
2) Disconnect ECM SMJ harness connector.
3) Connect a suitable jumper wire between ECM terminal (16) and ground.
4) Turn ignition switch "ON".
5) Check harness continuity between battery ⊕ terminal harness connector (E24) and ECM pin terminals (49) and (59).
Continuity should exist.

NG

Check the following items.
1) ECCS relay
Refer to "Electrical Components Inspection".
(See page EF & EC-148.)
2) "BR" fusible link
3) Joint connector (E50)
4) Joint connector (E52)
If OK, check harness connectors/harness.

D

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

NG

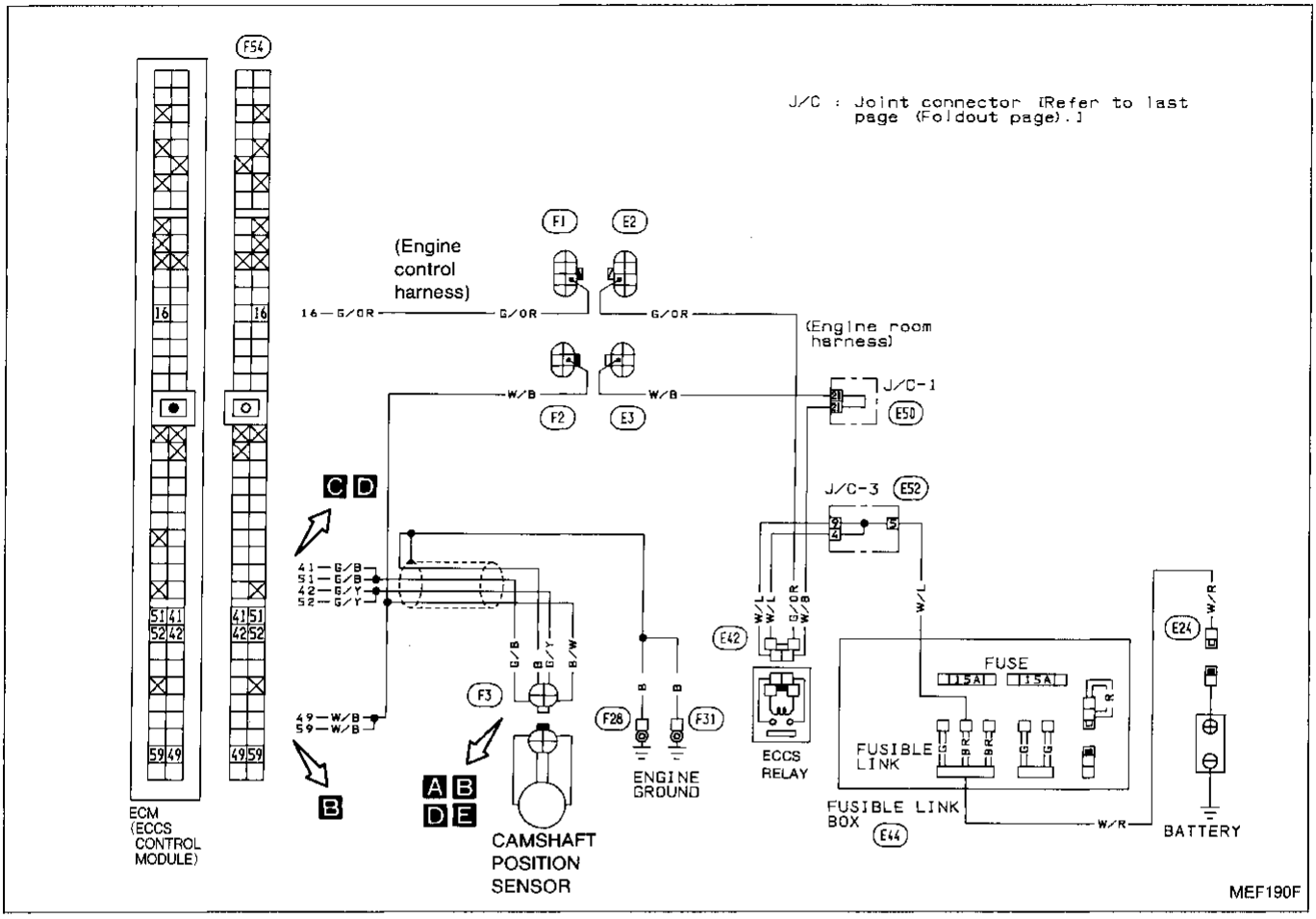
1) Check if engine ground terminal connectors (F28) and (F31) contact with engine body properly.
2) Repair harness or connectors.

OK

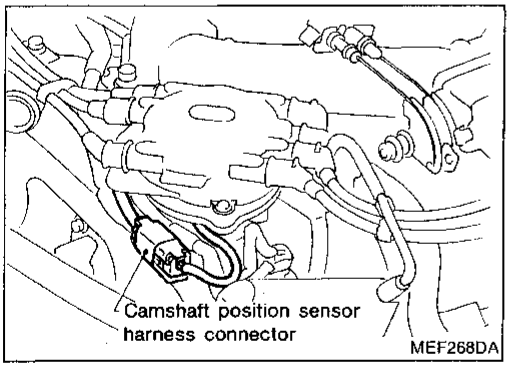
INSPECTION END

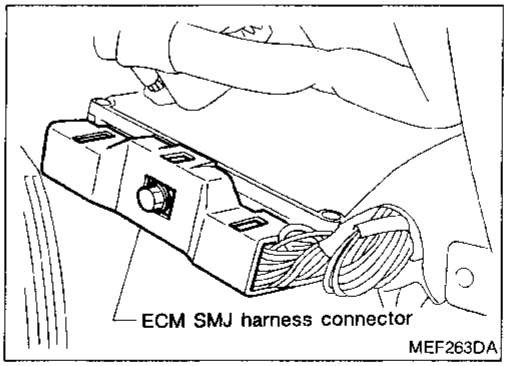
Diagnostic Procedure 23

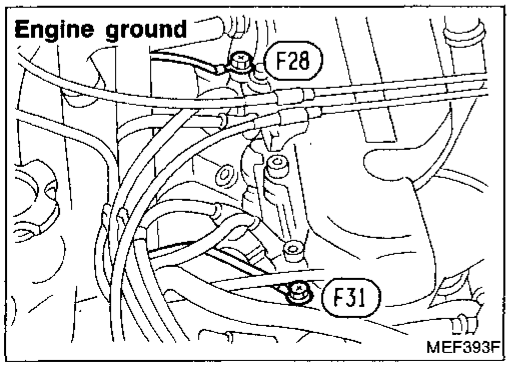
CAMSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)



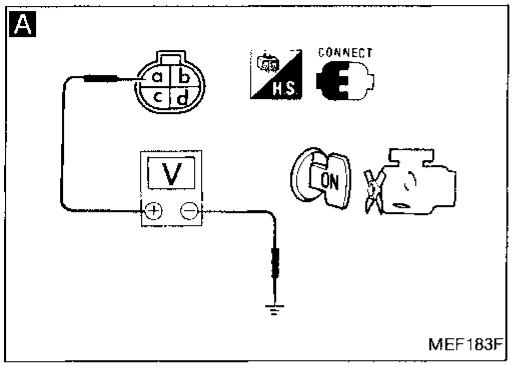
Harness layout

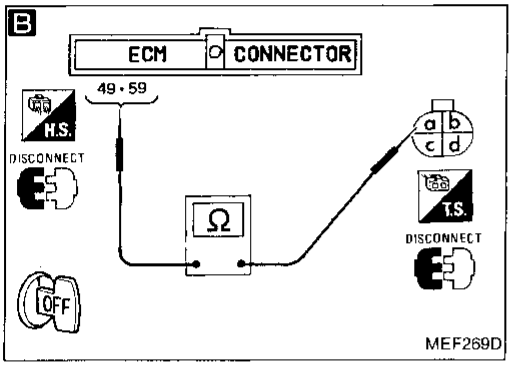


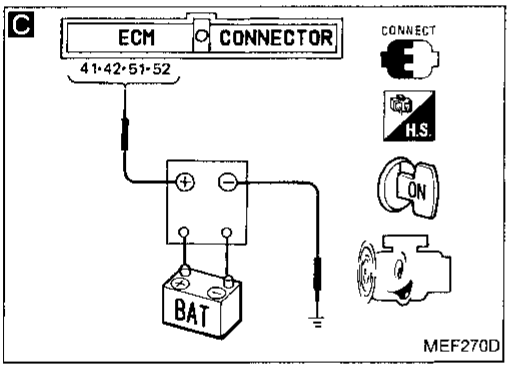


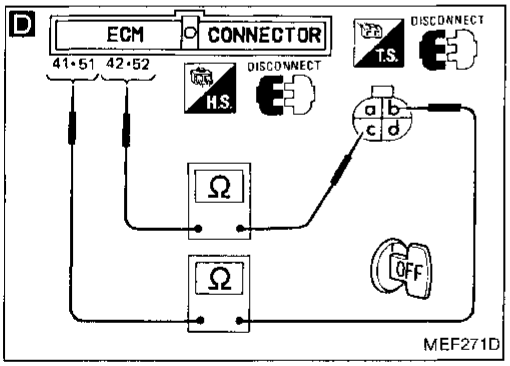


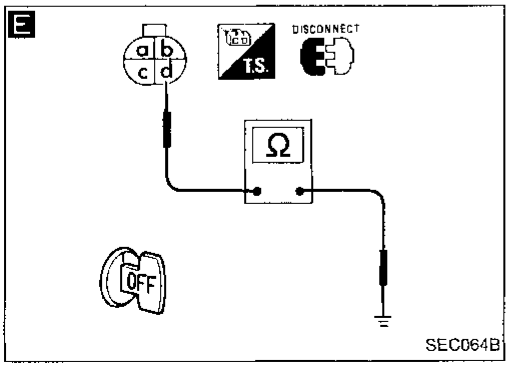
Diagnostic Procedure 23 (Cont'd)











INSPECTION START

A

CHECK POWER SUPPLY.
1) Turn ignition switch "ON".
2) Check voltage between terminal ⓐ and ground.
Voltage: Battery voltage

NG → **B**

CHECK HARNESS CONTINUITY BETWEEN ECM AND CAMSHAFT POSITION SENSOR.
1) Turn ignition switch "OFF".
2) Disconnect camshaft position sensor harness connector.
3) Disconnect ECM SMJ harness connector.
4) Check harness continuity between ECM terminals ㊾, ㊾ and terminal ⓐ.
Continuity should exist.
If NG, repair harness or connectors.

OK

C

CHECK INPUT SIGNAL.
1) Start engine.
2) Check that pulse signals exist in ECM terminals ㊶, ㊶ and ㊷, ㊷ with logic probe.
Pulse signal should exist.
㊶, ㊶: 120° signal
㊷, ㊷: 1° signal

NG → **D**

CHECK HARNESS CONTINUITY BETWEEN ECM AND CAMSHAFT POSITION SENSOR.
1) Stop engine.
2) Disconnect camshaft position sensor harness connector.
3) Disconnect ECM SMJ harness connector.
4) Check harness continuity between ECM terminals ㊶, ㊶ and terminal ⓑ, ECM terminals ㊷, ㊷ and terminal ⓒ.
Continuity should exist.
If NG, repair harness or connectors.

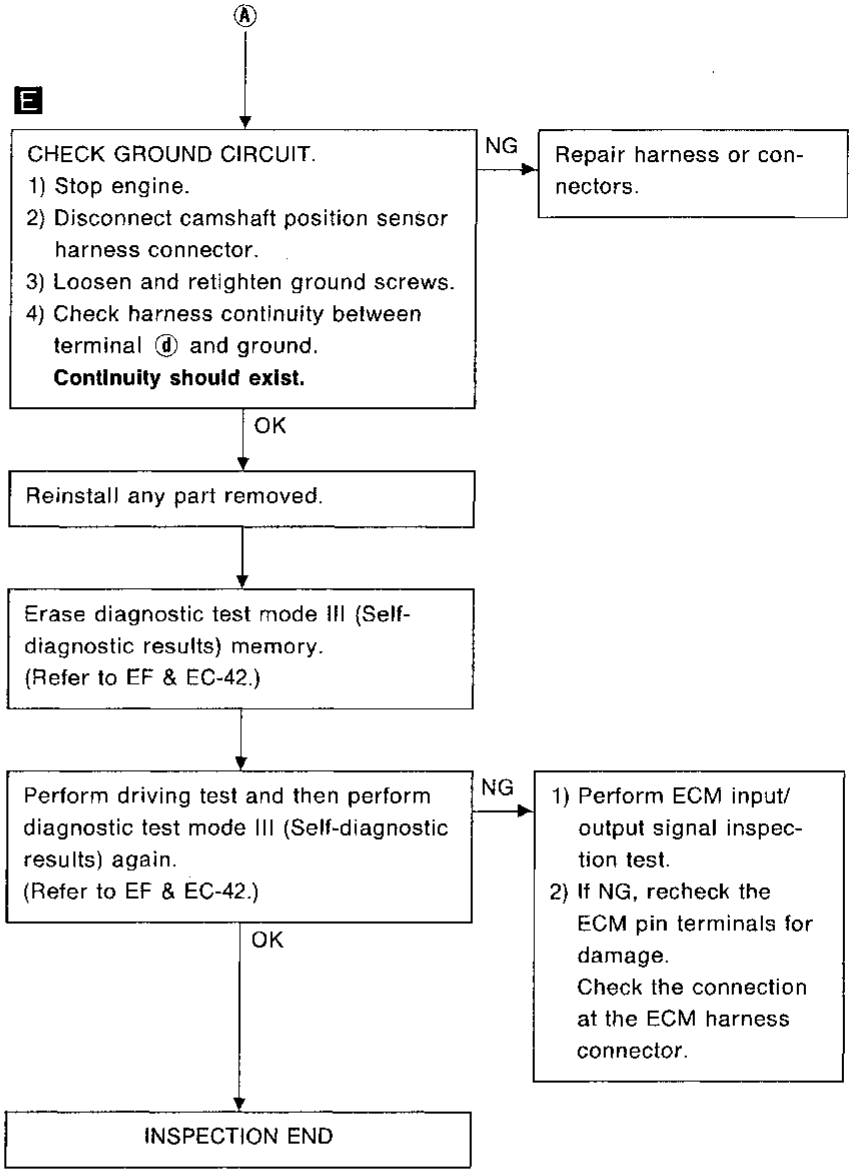
OK

CHECK COMPONENT (Camshaft position sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-143.)

OK

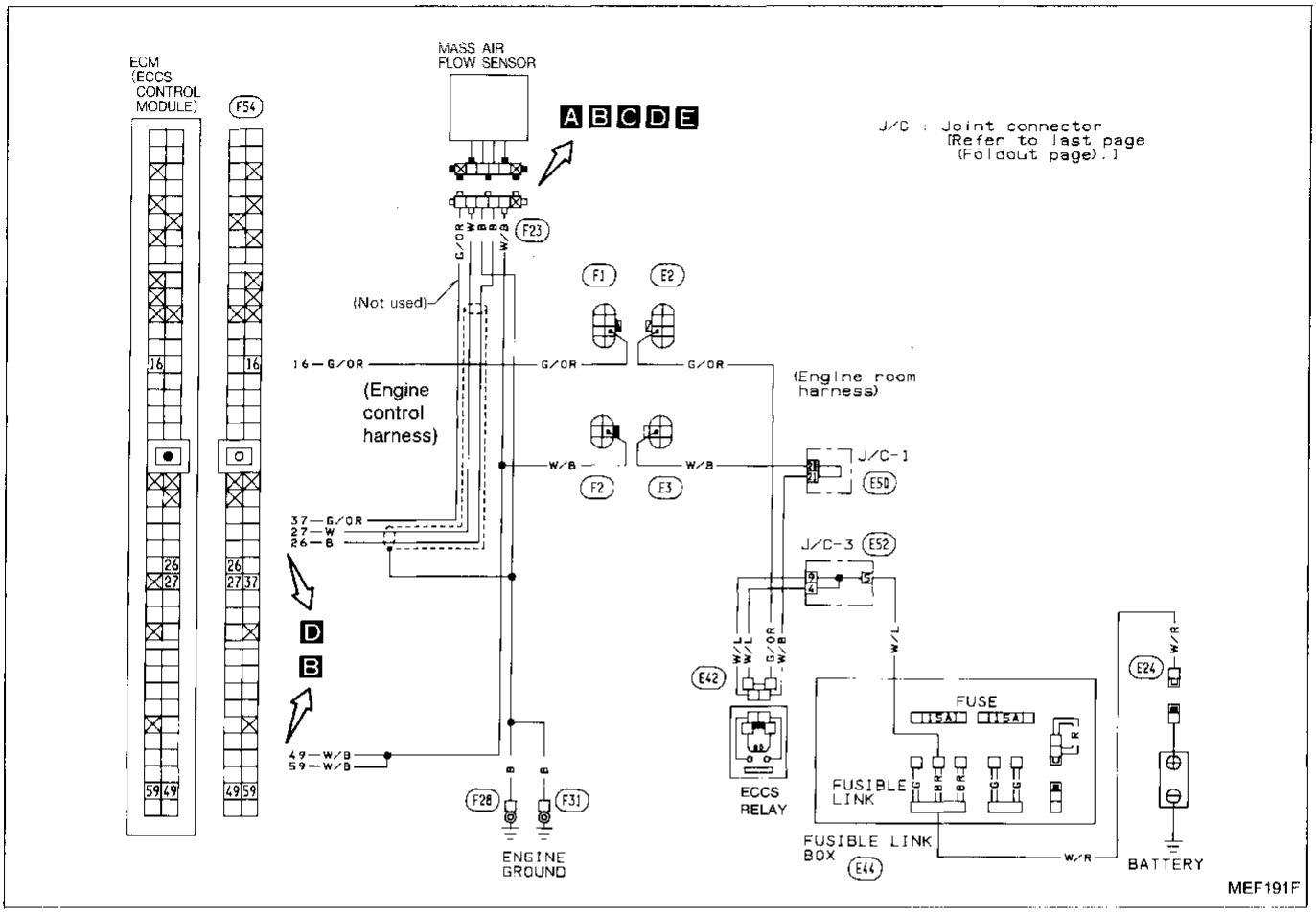
Ⓐ

Diagnostic Procedure 23 (Cont'd)

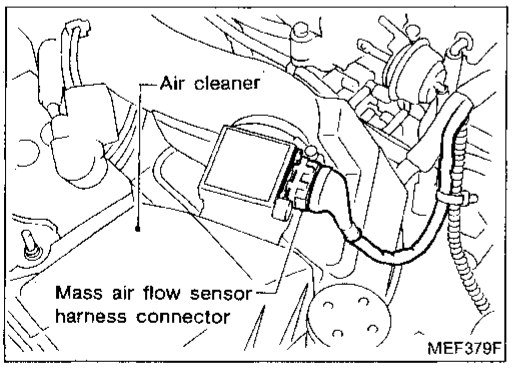


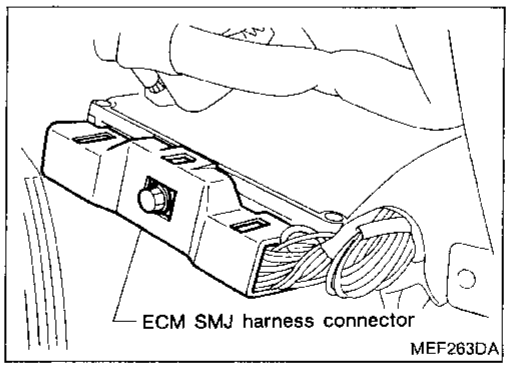
Diagnostic Procedure 24

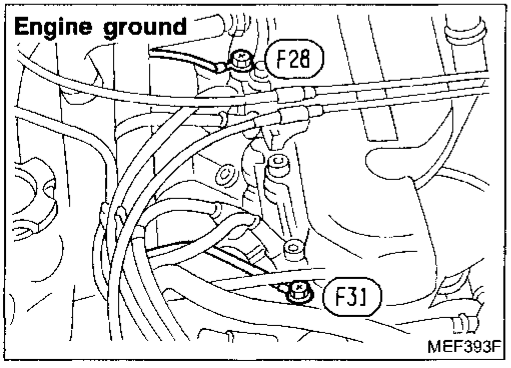
MASS AIR FLOW SENSOR (Diagnostic trouble code No. 12) CHECK (MALFUNCTION INDICATOR LAMP ITEM)



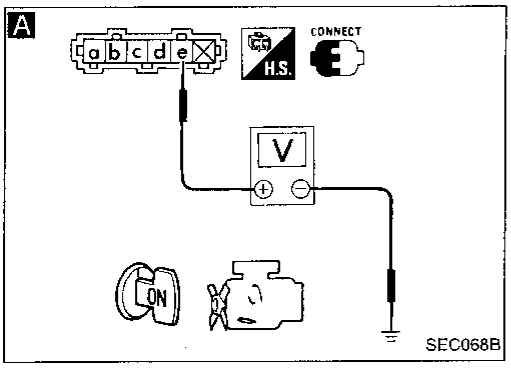
Harness layout

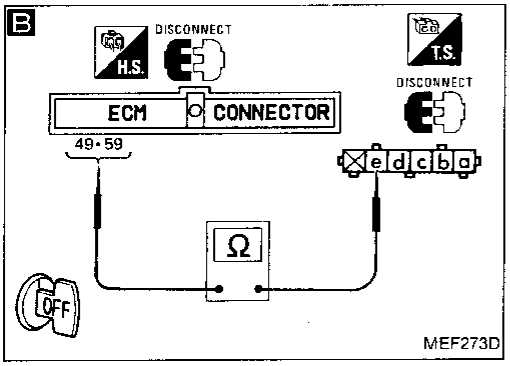


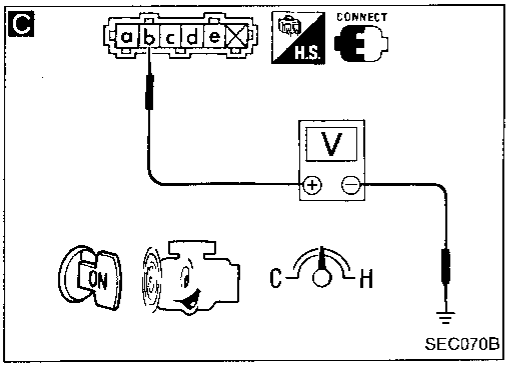


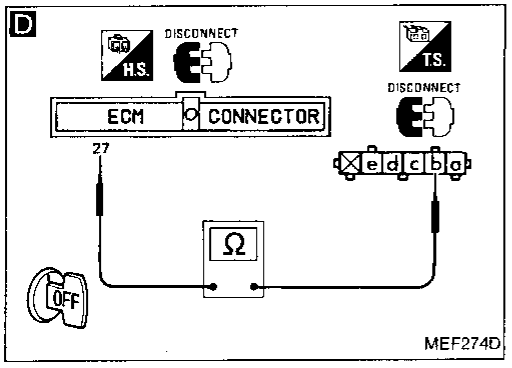


Diagnostic Procedure 24 (Cont'd)









INSPECTION START

A

CHECK POWER SOURCE.
1) Turn ignition switch "ON".
2) Check voltage between terminal ⓔ and ground.
Voltage: Battery voltage

NG → **B**

CHECK HARNESS CONTINUITY BETWEEN MASS AIR FLOW SENSOR AND ECM.
1) Turn ignition switch "OFF".
2) Disconnect mass air flow sensor harness connector.
3) Disconnect ECM SMJ harness connector.
4) Check harness continuity between ECM terminals ㊾, ㊾ and terminal ⓔ.
Continuity should exist.
If NG, repair harness or connectors.

OK

C

CHECK INPUT SIGNAL.
1) Start engine and warm it up sufficiently.
2) Check voltage between terminal ⓑ and ground at idle under no-load.
Voltage: 1.0 - 1.3V

NG → **D**

CHECK HARNESS CONTINUITY BETWEEN MASS AIR FLOW SENSOR AND ECM.
1) Stop engine.
2) Disconnect mass air flow sensor harness connector.
3) Disconnect ECM SMJ harness connector.
4) Check harness continuity between ECM terminal ㉗ and terminal ⓑ.
Continuity should exist.
If NG, repair harness or connectors.

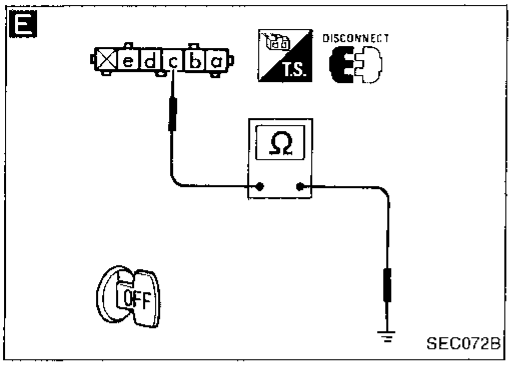
OK

CHECK COMPONENT (Mass air flow sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-143.)

OK

Ⓐ

Diagnostic Procedure 24 (Cont'd)



Ⓐ

E

CHECK GROUND CIRCUIT.
1) Stop engine.
2) Disconnect mass air flow sensor harness connector.
3) Loosen and retighten ground screws.
4) Check harness continuity between terminal ⓒ and ground.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

Reinstall any part removed.

↓

Erase the diagnostic test mode III (Self-diagnostic results) memory.
(Refer to EF & EC-42.)

↓

Perform driving test and then perform diagnostic test mode III (Self-diagnostic results) again.
(Refer to EF & EC-42.)

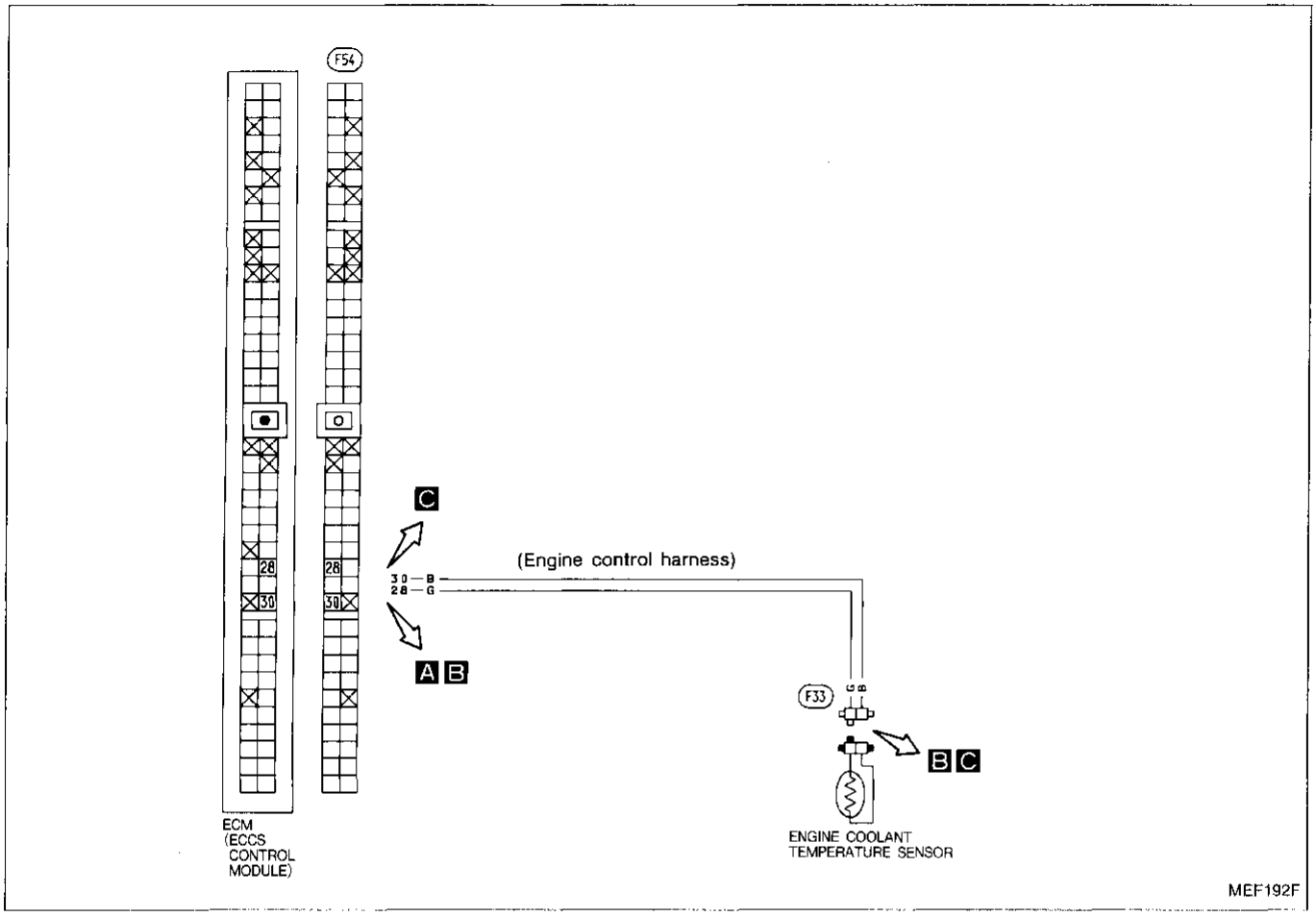
NG → 1) Perform ECM input/output signal inspection test.
2) If NG, recheck the ECM pin terminals for damage.
Check the connection at the ECM harness connector.

OK ↓

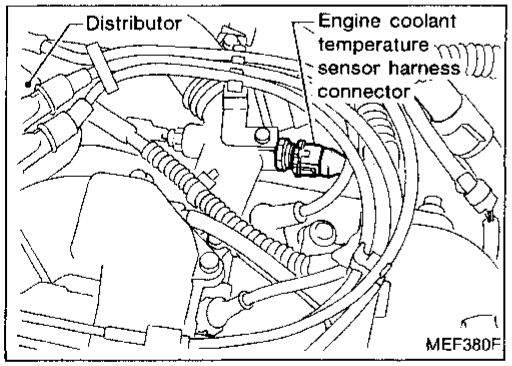
INSPECTION END

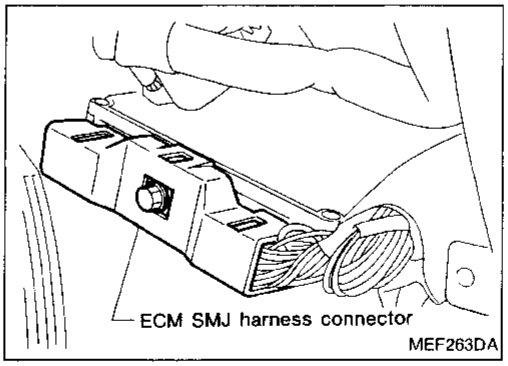
Diagnostic Procedure 25

ENGINE COOLANT TEMPERATURE SENSOR (Diagnostic trouble code No. 13)
(CHECK) (MALFUNCTION INDICATOR LAMP ITEM)

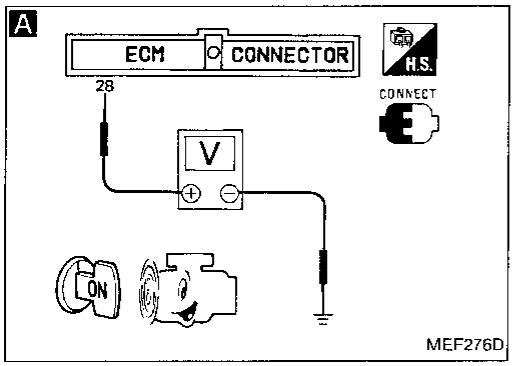


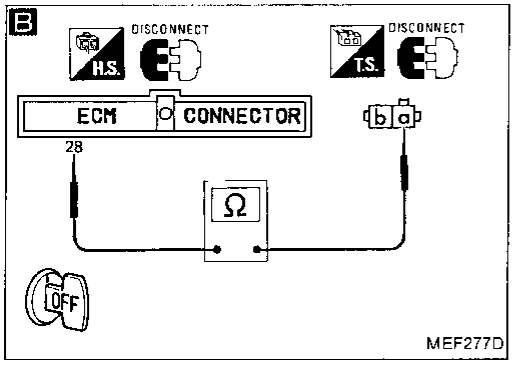
Harness layout

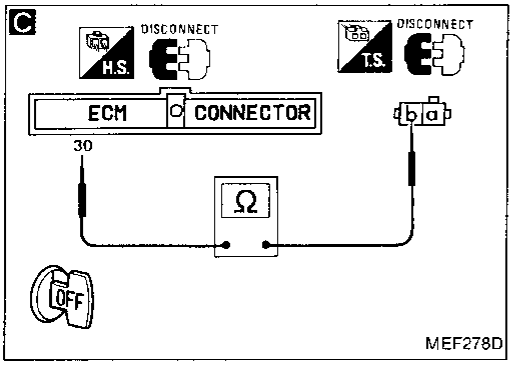




Diagnostic Procedure 25 (Cont'd)







INSPECTION START

A

CHECK INPUT SIGNAL.
1) Start engine.
2) Make sure that voltage between ECM terminal ㉘ and ground changes during engine warm-up.
Cold → Hot:
Approximately 5 - 0V

NG → **B**

B

CHECK HARNESS CONTINUITY BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM.
1) Stop engine.
2) Disconnect engine coolant temperature sensor harness connector.
3) Disconnect ECM SMJ harness connector.
4) Check harness continuity between ECM terminal ㉘ and terminal ⓐ.
Continuity should exist.
If NG, repair harness or connectors.

OK

CHECK COMPONENT (Engine coolant temperature sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-143.)

OK

C

CHECK GROUND CIRCUIT.
1) Stop engine.
2) Disconnect engine coolant temperature sensor harness connector.
3) Disconnect ECM SMJ harness connector.
4) Check harness continuity between ECM terminal ㉚ and terminal ⓑ.
Continuity should exist.

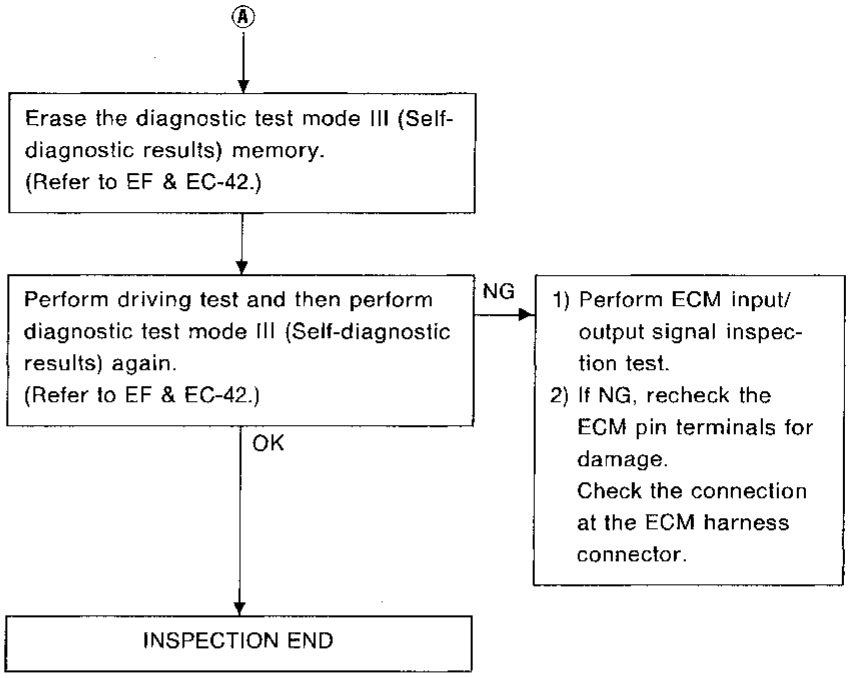
NG → Repair harness or connectors.

OK

Reinstall any part removed.

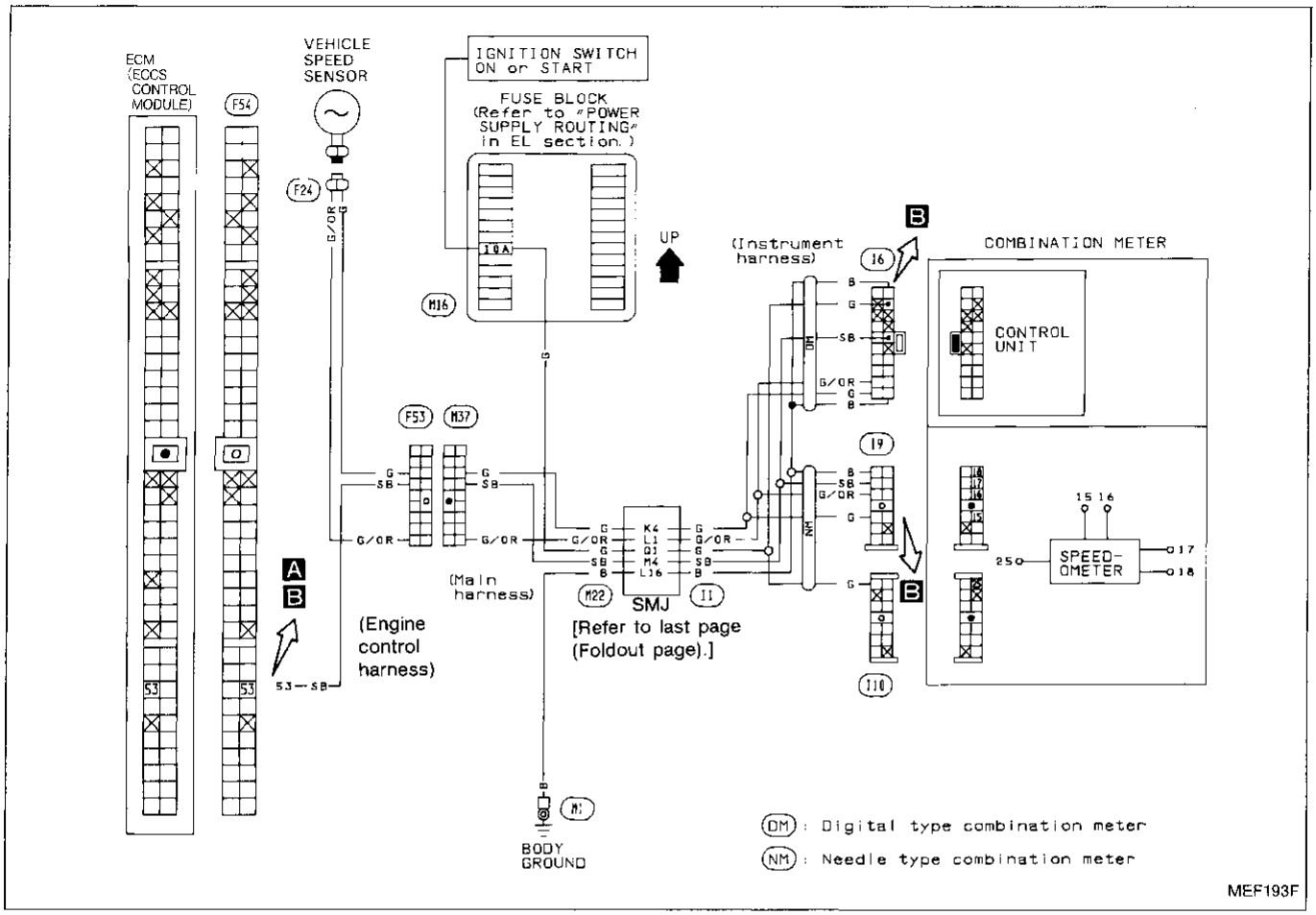
Ⓐ

Diagnostic Procedure 25 (Cont'd)

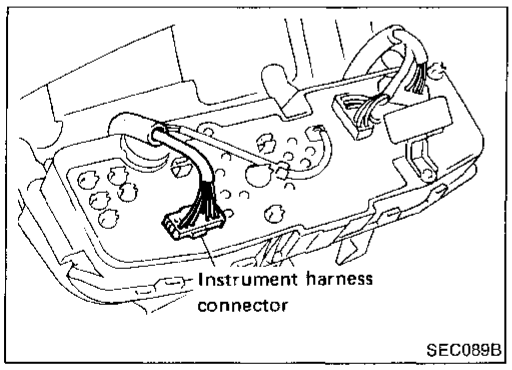


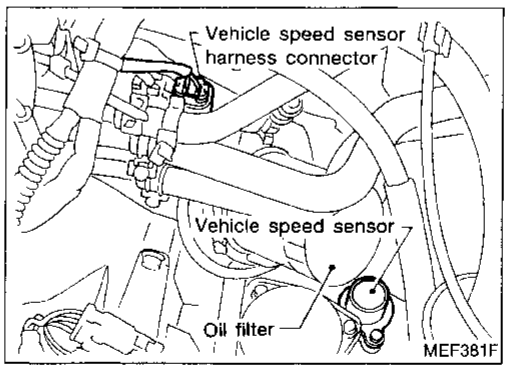
Diagnostic Procedure 26

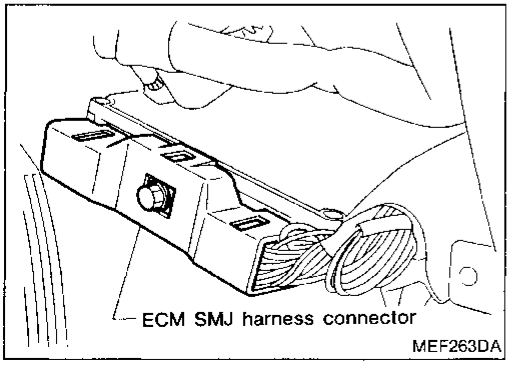
VEHICLE SPEED SENSOR (Diagnostic trouble code No. 14)(Switch ON/OFF diagnosis) (MALFUNCTION INDICATOR LAMP ITEM)



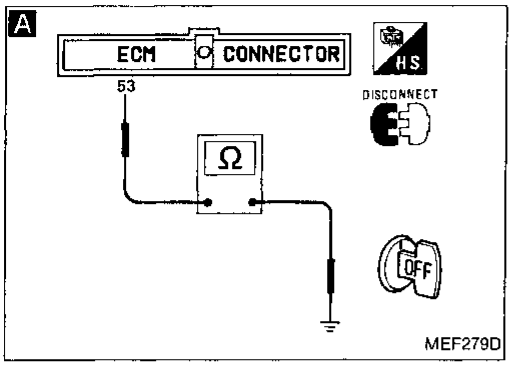
Harness layout

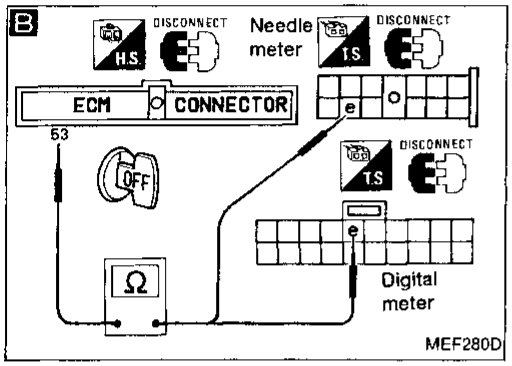






Diagnostic Procedure 26 (Cont'd)





INSPECTION START

Make sure that speedometer in combination meter operates properly.

NG → Check power supply and ground circuit for instrument panel. (See EL section.) If NG, repair harness or connectors.

OK

CHECK COMPONENT (Vehicle speed sensor). Refer to "Electrical Components Inspection". (See page EF & EC-144.)

A

CHECK INPUT SIGNAL.
1) Jack up front wheels.
2) Disconnect ECM SMJ harness connector.
3) Check resistance between ECM terminal (53) and ground.
With transmission in neutral position, turn both front wheels.
Continuity should be intermittent.

NG → B

B

CHECK HARNESS CONTINUITY BETWEEN COMBINATION METER AND ECM.
1) Remove combination meter from instrument panel.
2) Disconnect combination meter harness connectors (16) and (19).
3) Check harness continuity between ECM terminal (53) and terminal (6).
Continuity should exist.
(16) : **Digital meter**
(19) : **Needle meter**

OK

Reinstall any part removed.

Erase the diagnostic test mode III (Self-diagnostic results) memory. (Refer to EF & EC-42.)

Perform switch ON/OFF diagnosis (Diagnostic Test Mode IV). (Refer to EF & EC-45.)

NG → 1) Perform ECM input/output signal inspection test.
2) If NG, recheck the ECM pin terminals for damage.
Check the connection at the ECM harness connector.

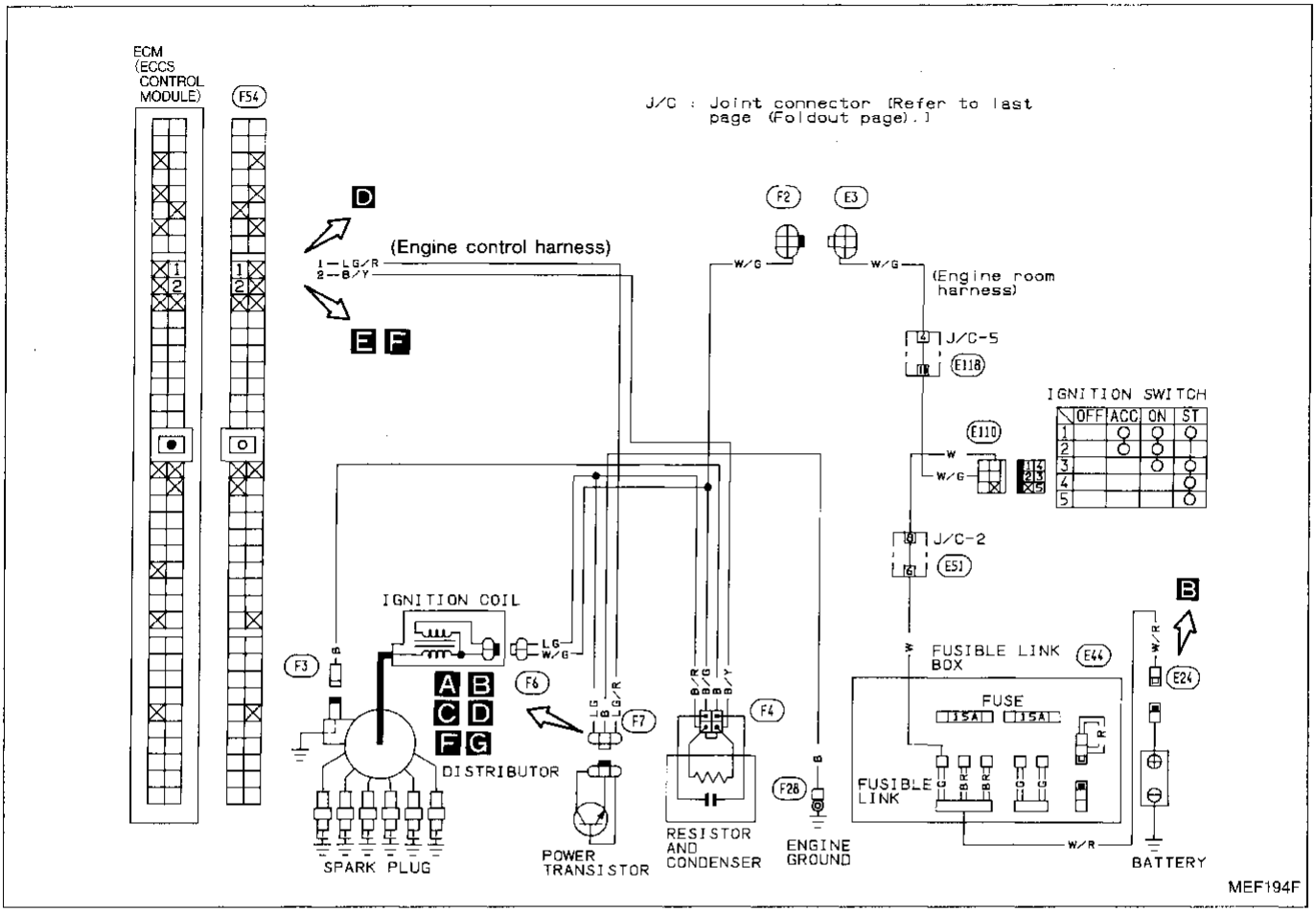
OK

INSPECTION END

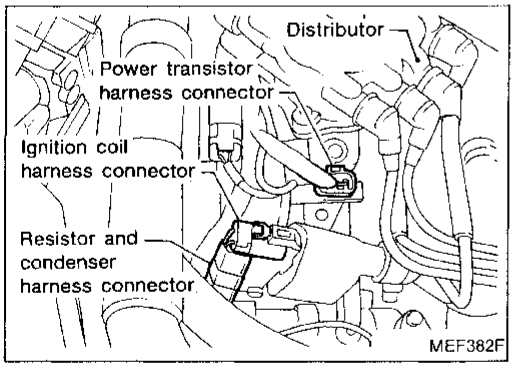
GI MA EM LC EF & EC FE CL MT AT FA RA BR ST BF HA EL IDX

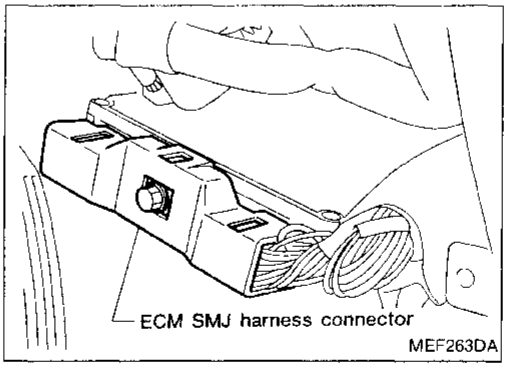
Diagnostic Procedure 27

IGNITION SIGNAL (Diagnostic trouble code No. 21)

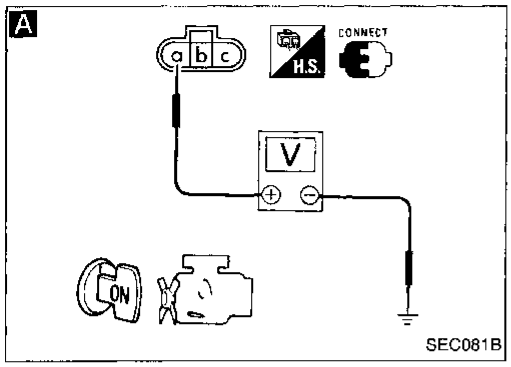


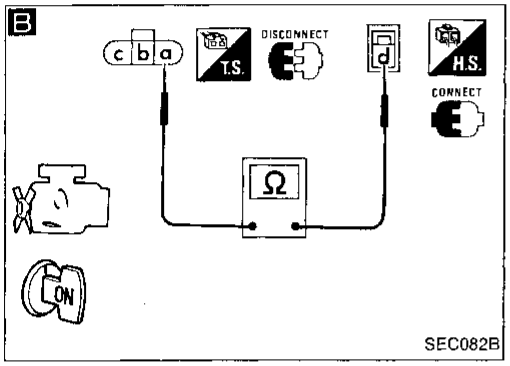
Harness layout

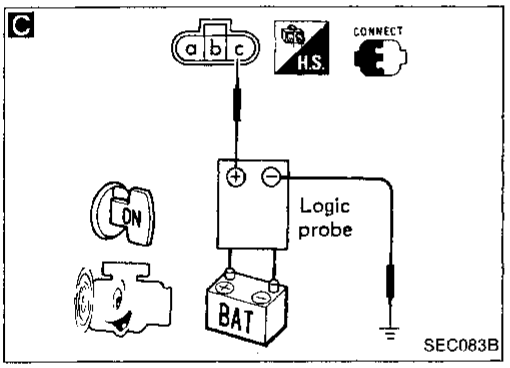


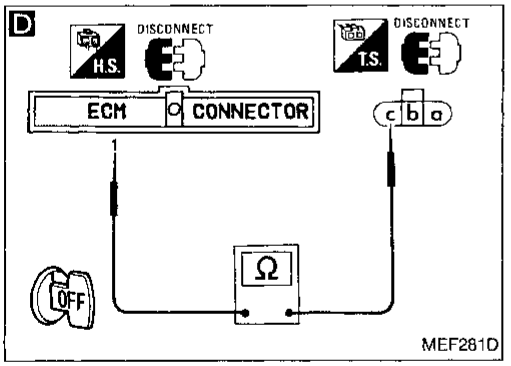


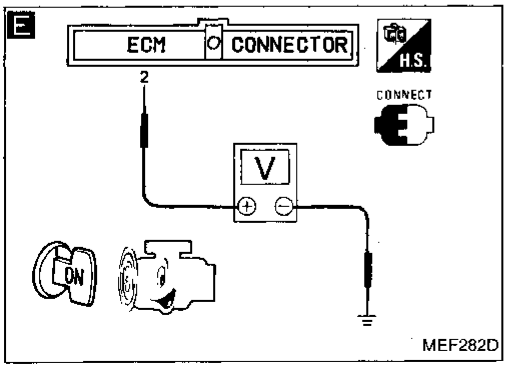
Diagnostic Procedure 27 (Cont'd)











INSPECTION START

A

CHECK POWER SUPPLY.
1) Disconnect resistor and condenser harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal ⓐ and ground.
Voltage:
Approximately battery voltage

NG → **B**

CHECK HARNESS CONTINUITY BETWEEN POWER TRANSISTOR AND ECM.
1) Turn ignition switch "OFF".
2) Disconnect power transistor harness connector.
3) Turn ignition switch "ON".
4) Check continuity between terminal ⓐ and ⓓ.
Continuity should exist.

NG →

CHECK COMPONENT (Ignition coil).
Refer to "Electrical Components Inspection".
(See page EF & EC-144.)

OK →

Repair harness or connectors.

OK

C

CHECK OUTPUT SIGNAL.
1) Reconnect resistor and condenser harness connector.
2) Start or crank engine.
3) With logic probe make sure that pulse signal exists between terminal ⓒ and ground.
Pulse signal should exist.

NG → **D**

CHECK HARNESS CONTINUITY BETWEEN POWER TRANSISTOR AND ECM.
1) Stop engine.
2) Disconnect power transistor harness connector.
3) Disconnect ECM SMJ harness connector.
4) Check harness continuity between terminal ⓒ and ECM terminal ①.

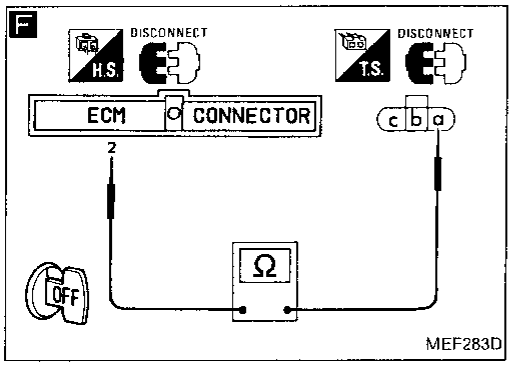
NG →

Check the following items.
1) CHECK COMPONENT (Power transistor).
Refer to "Electrical Components Inspection".
(See page EF & EC-144.)
2) Repair harness or connectors.

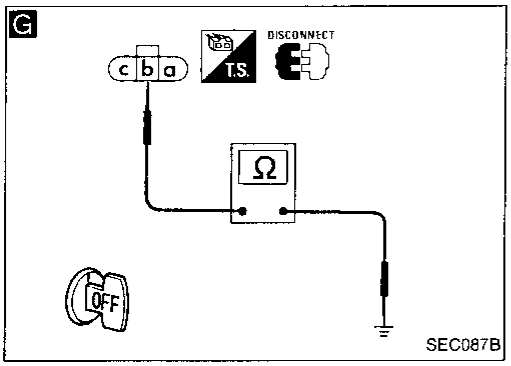
OK → Ⓐ

Diagnostic Procedure 27 (Cont'd)

F



G



Ⓐ

E

CHECK INPUT SIGNAL.
Check voltage between ECM terminal ② and ground.
Voltage:
Approximately battery voltage

NG → F

F

CHECK HARNESS CONTINUITY BETWEEN POWER TRANSISTOR AND ECM.
1) Stop engine.
2) Disconnect power transistor harness connector.
3) Disconnect ECM SMJ harness connector.
4) Check resistance between terminal ⓐ and ECM terminal ②.
Resistance:
Approximately 0Ω

NG →

Check the following items.
1) CHECK COMPONENT (Resistor).
Refer to "Electrical Components Inspection".
(See page EF & EC-149.)
2) Repair harness or connectors.

OK ↓

G

CHECK GROUND CIRCUIT.
1) Stop engine.
2) Disconnect power transistor harness connector.
3) Check harness continuity between terminal ⓑ and ground.
Continuity should exist.

NG → Repair or replace harness.

OK ↓

Reinstall any part removed.

↓

Erase the diagnostic test mode III (Self-diagnostic results) memory.
(Refer to EF & EC-42.)

↓

Perform driving test and then perform diagnostic test mode III (Self-diagnostic results) again.
(Refer to EF & EC-42.)

NG →

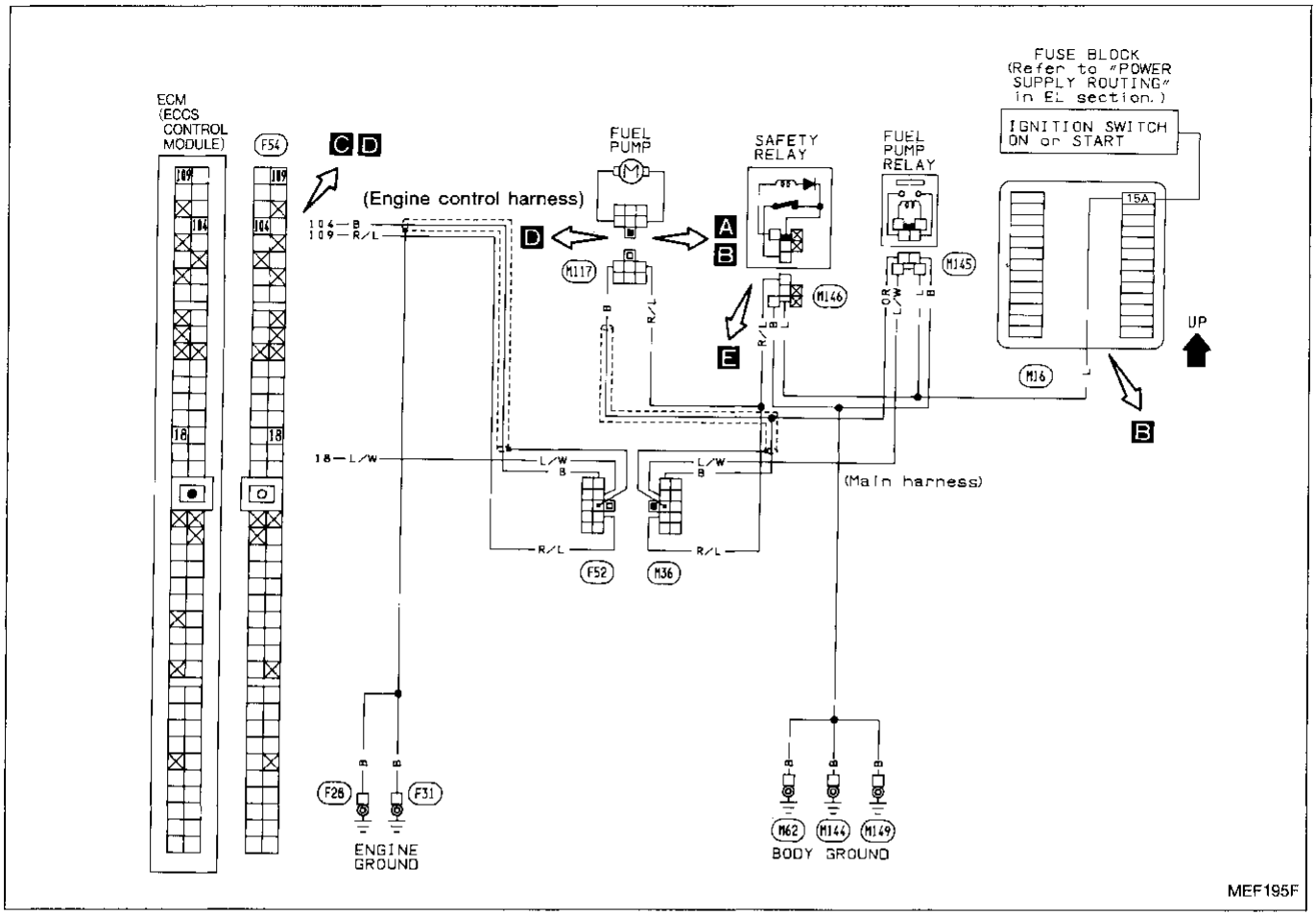
1) Perform ECM input/output signal inspection test.
2) If NG, recheck the ECM pin terminals for damage or the connection of ECM harness connector.

OK ↓

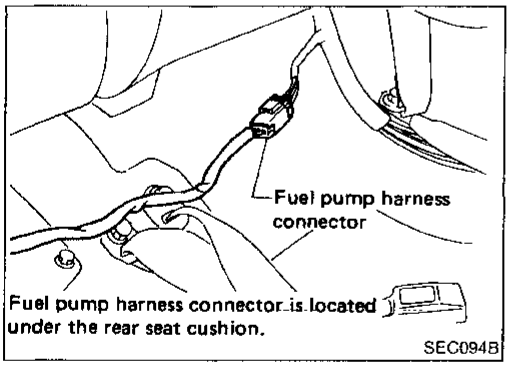
INSPECTION END

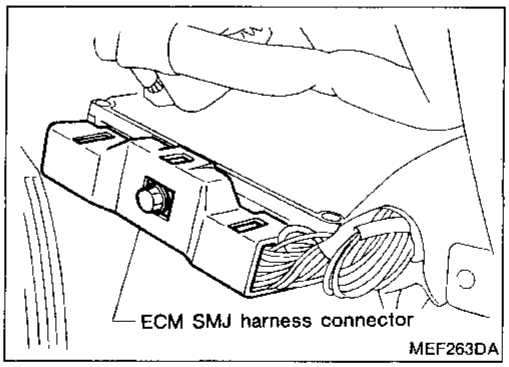
Diagnostic Procedure 28

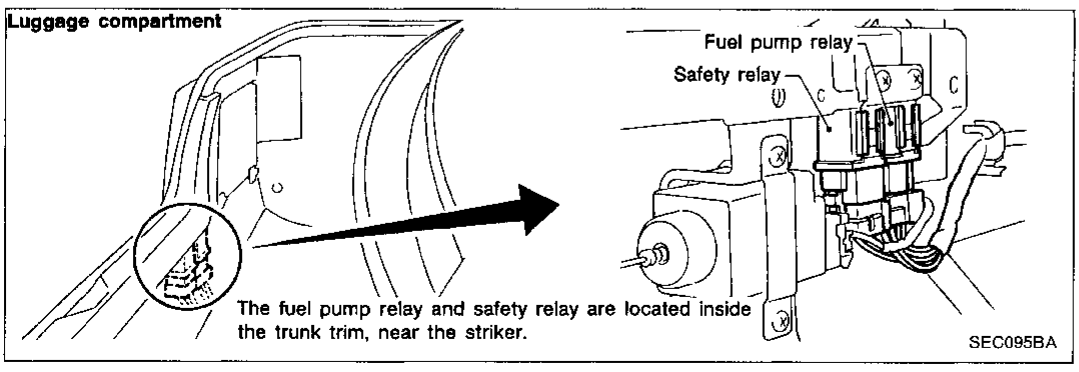
FUEL PUMP (Diagnostic trouble code No. 22)



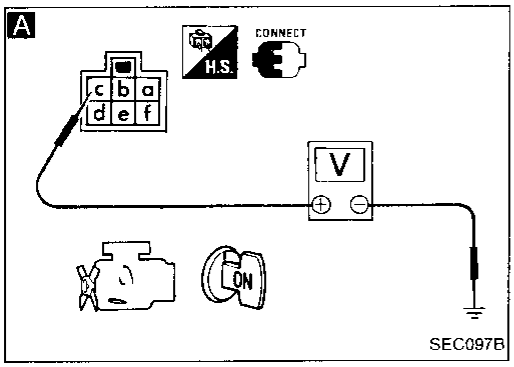
Harness layout

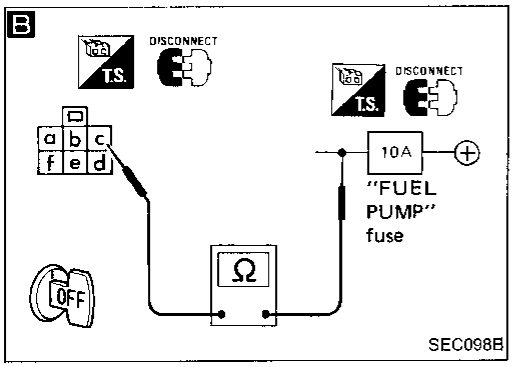


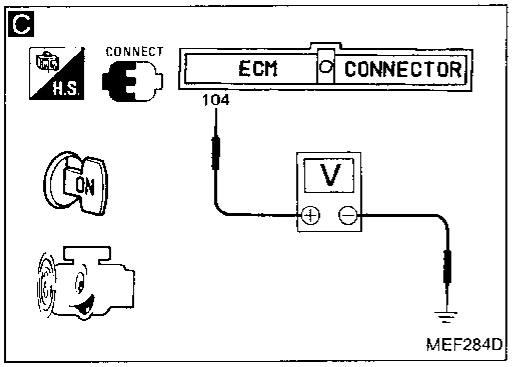


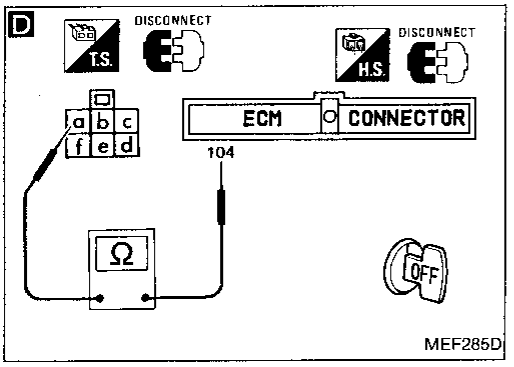


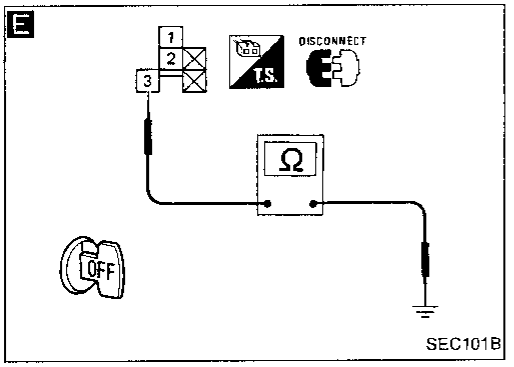
Diagnostic Procedure 28 (Cont'd)











INSPECTION START

A

CHECK POWER SUPPLY.
1) Turn ignition switch "ON".
2) Check voltage between terminal ⓒ and ground.
Battery voltage indication should appear 5 seconds after ignition switch is turned "ON".

NG → **B**

OK

B

CHECK HARNESS CONTINUITY BETWEEN FUSE AND FUEL PUMP.
1) Turn ignition switch "OFF".
2) Disconnect fuel pump harness connector.
3) Disconnect "FUEL PUMP" fuse.
4) Check harness continuity between terminal ⓒ and fuel pump fuse.
Continuity should exist.

NG

CHECK COMPONENT (Safety relay).
Refer to "Electrical Components Inspection". (See page EF & EC-149.)
If OK, repair harness or connectors.

C

CHECK OUTPUT SIGNAL.
1) Turn ignition switch "OFF" and then "ON".
2) Check voltage between ECM terminal (104) and ground.
Voltage:
A voltage indication of approx. 4.0 to 4.5 appears for 5 seconds after ignition switch is turned "ON".

NG → **D**

OK

D

CHECK HARNESS CONTINUITY BETWEEN FUEL PUMP AND ECM.
1) Turn ignition switch "OFF".
2) Disconnect ECM SMJ harness connector.
3) Disconnect fuel pump harness connector.
4) Check harness continuity between ECM terminal (104) and terminal ⓐ.
Continuity should exist.
If NG, repair harness or connectors.

OK

CHECK COMPONENT (Fuel pump).
Refer to "Electrical Components Inspection". (See page EF & EC-144.)

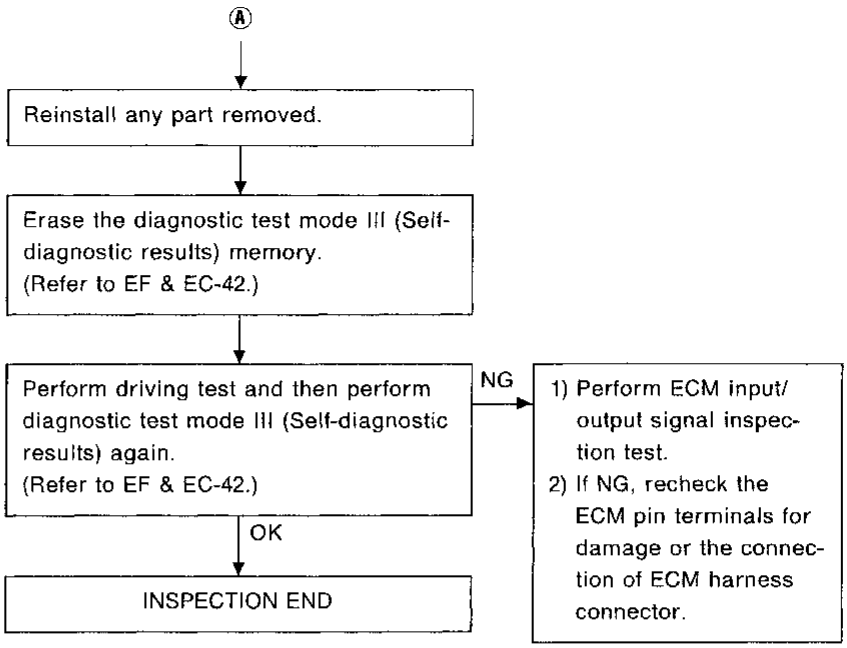
E

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect safety relay.
3) Check resistance between terminal ③ and ground.
Continuity should exist.

NG → Repair or replace harness.

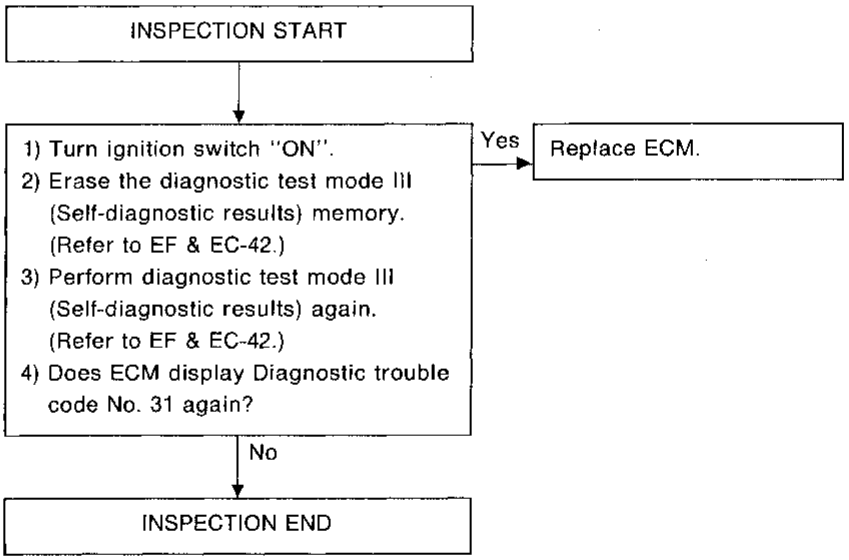
OK
Ⓐ

Diagnostic Procedure 28 (Cont'd)



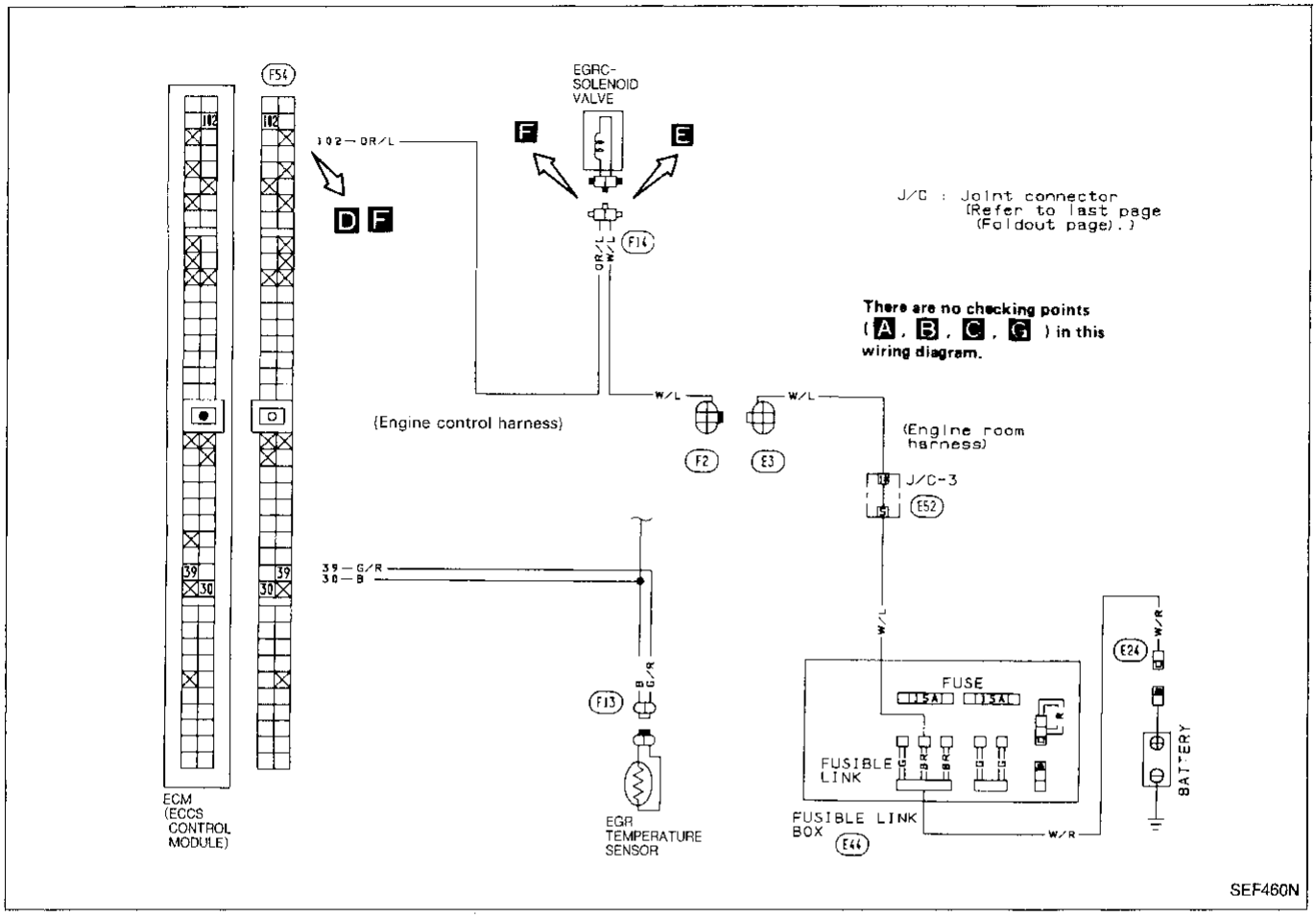
Diagnostic Procedure 29

ENGINE CONTROL MODULE (ECM) (Diagnostic trouble code No. 31) (MALFUNCTION INDICATOR LAMP ITEM)

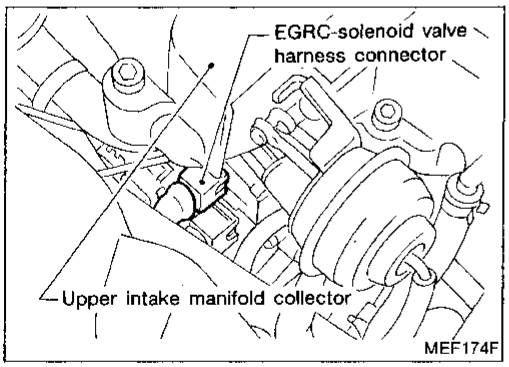


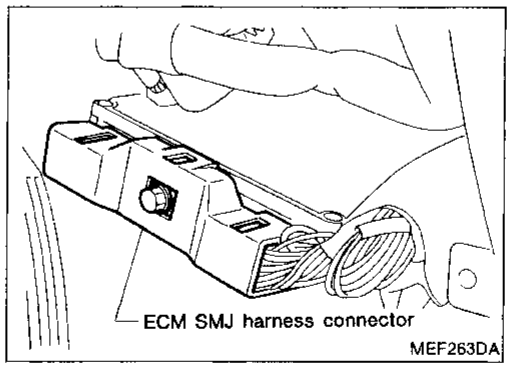
Diagnostic Procedure 30

EGR FUNCTION (Diagnostic trouble code No. 32) CHECK (MALFUNCTION INDICATOR LAMP ITEM)

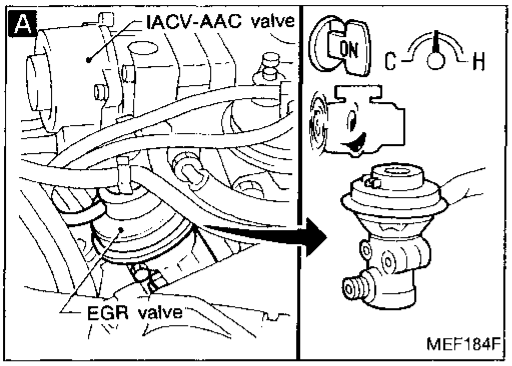


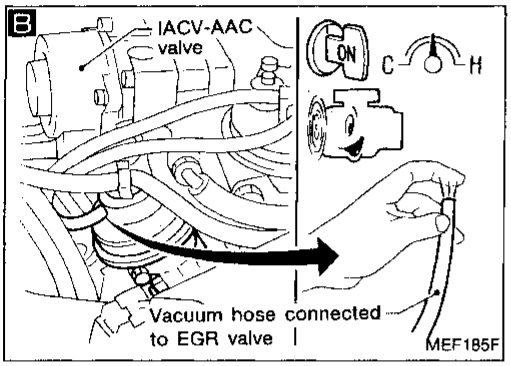
Harness layout

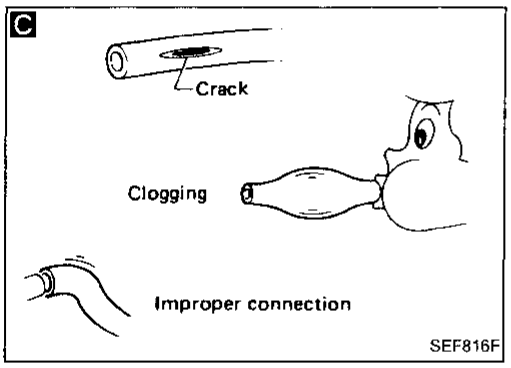


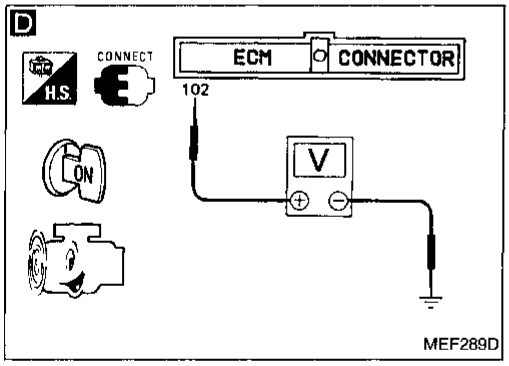


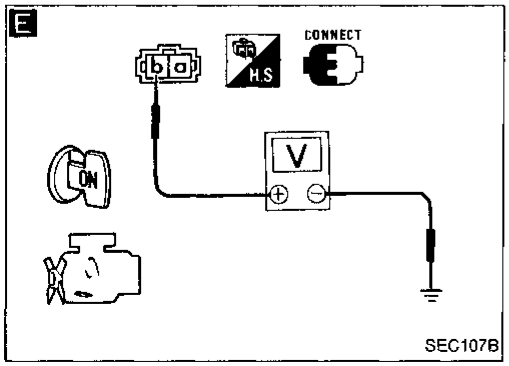
Diagnostic Procedure 30 (Cont'd)











INSPECTION START

A CHECK EGR VALVE OPERATION.
1) Start engine.
2) Make sure engine is warmed up sufficiently.
3) Make sure EGR valve spring responds to your touch (use your fingers) and also when engine is raced.

Responds → INSPECTION END

Does not respond ↓

B CHECK VACUUM SOURCE TO EGR VALVE.
1) Disconnect vacuum hose connected to EGR valve.
2) Make sure vacuum exists when racing engine.

OK → CHECK COMPONENT (EGR valve and EGRC-BPT valve). Refer to "Electrical Components Inspection". (See page EF & EC-145.)

NG ↓

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

NG → If necessary, replace vacuum hose or reconnect vacuum hose firmly.

OK ↓

D CHECK ECM OUTPUT SIGNAL.
1) Check voltage between ECM terminal (102) and ground under the following conditions:

Engine condition	Voltage
Racing	Battery voltage
Idle	Temporarily drops to Approximately 1V

NG → **E** CHECK POWER SOURCE TO EGRC-SOLENOID VALVE.
1) Stop engine.
2) Turn ignition switch "ON".
3) Check voltage between terminal (b) and ground.
Voltage: Battery voltage

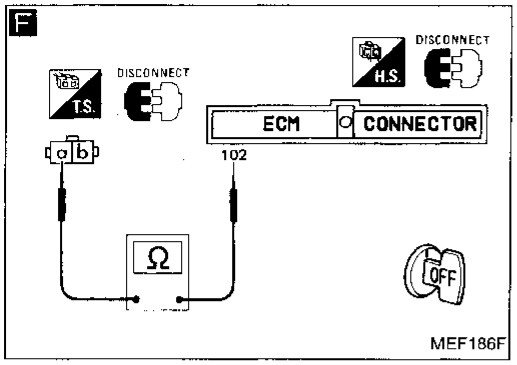
F CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM SMJ harness connector.
3) Disconnect EGRC-solenoid valve harness connector.
4) Check resistance between ECM terminal (102) and terminal (a).
Resistance: Approximately 0Ω
If NG, repair or replace harness.

OK ↓

Ⓐ

Diagnostic Procedure 30 (Cont'd)

F



MEF186F

G **ROAD TEST**

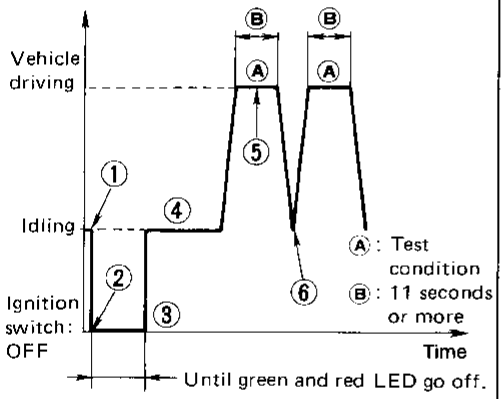
Test condition

Drive vehicle under the following conditions with a suitable shift position.

(1) Engine speed:
2,100±300 rpm

(2) Intake manifold vacuum:
For California:
−14.7±2.7 kPa
(−110±20 mmHg, −4.33±0.79 inHg)
Except for California:
−29.3±0.7 kPa
(−220±5 mmHg, −8.66±0.20 inHg)

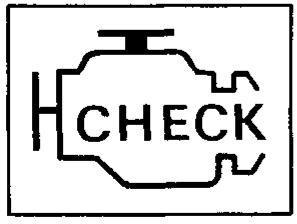
Driving mode



① Start engine and warm it up sufficiently.
② Turn off ignition switch and keep it off until green and red LED go off.
③ Start engine and make sure that air conditioner switch and rear defogger are turned "OFF" during driving test.
④ Keep engine running for at least 3 minutes.
⑤ Shift to suitable gear position and drive in "Test condition" for at least 11 seconds.
⑥ Decrease engine speed to less than 2,000 rpm.
⑦ Repeat steps ⑤ through ⑥ at least 1 time.

MEF441DA

H



MALFUNCTION INDICATOR LAMP

MEF291D

Ⓐ

CHECK COMPONENT (EGRC-solenoid valve).
Refer to "Electrical Components Inspection".
(See page EF & EC-145.)

NG → Replace EGRC-solenoid valve.

OK ↓

Check resistance of EGR temperature sensor.
(See page EF & EC-145.)

↓

Reinstall any part removed.

↓

Erase the diagnostic test mode III (Self-diagnostic results) memory.
Make sure Diagnostic trouble code No. 55 is displayed in Diagnostic Test Mode III. (Refer to EF & EC-42.)

↓

G

Perform driving test under the following conditions:
1) Warm up engine sufficiently.
2) Use test driving modes indicated in figure G .

↓

H

Make sure malfunction indicator lamp does not come "ON" during driving test.

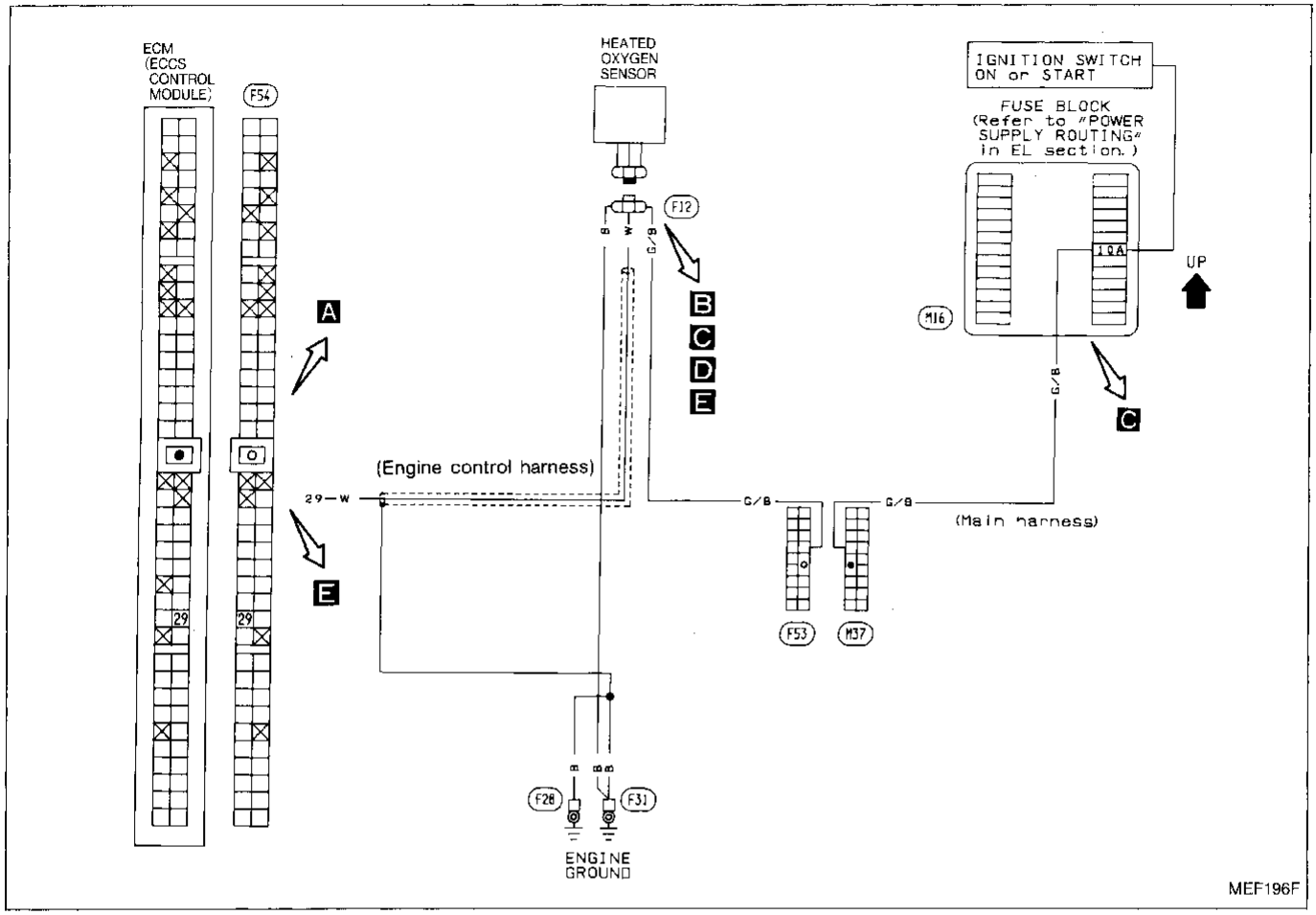
Comes "ON" → Perform diagnostic test mode III (Self-diagnostic results) and find diagnostic trouble code. According to displayed Diagnostic trouble code No., perform electronic control system inspection.

Does not come "ON" ↓

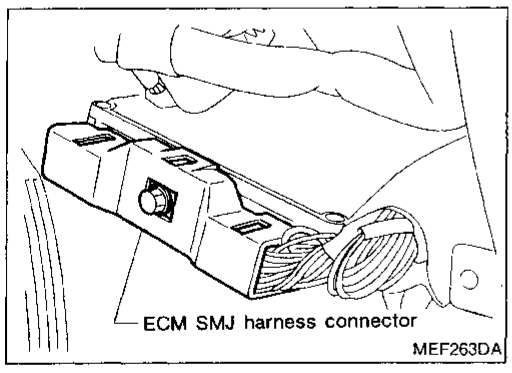
INSPECTION END

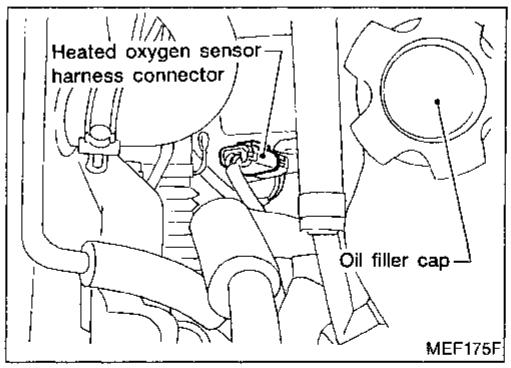
Diagnostic Procedure 31

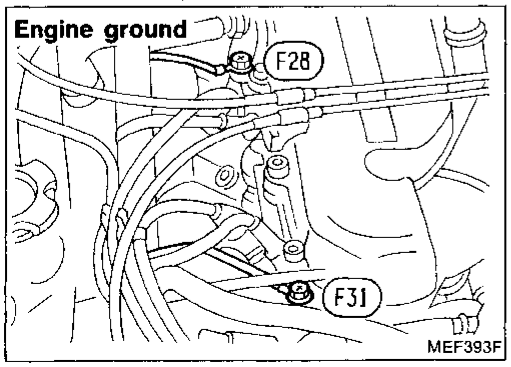
HEATED OXYGEN SENSOR (Diagnostic trouble code No. 33) CHECK (MALFUNCTION INDICATOR LAMP ITEM)



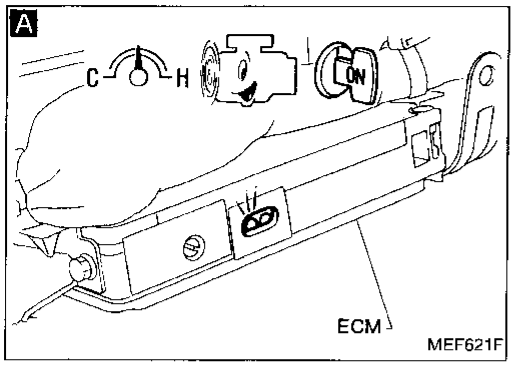
Harness layout

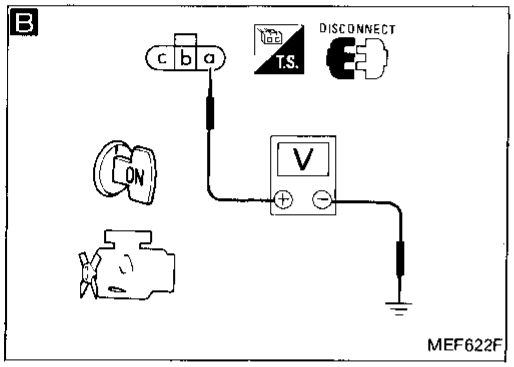


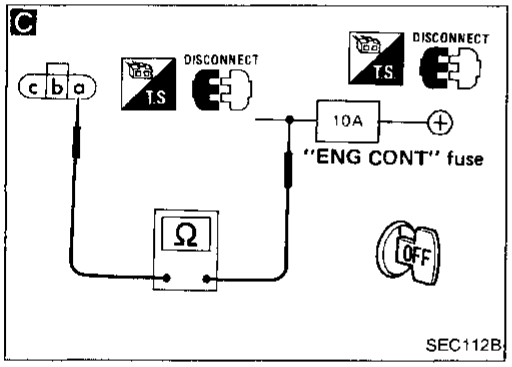


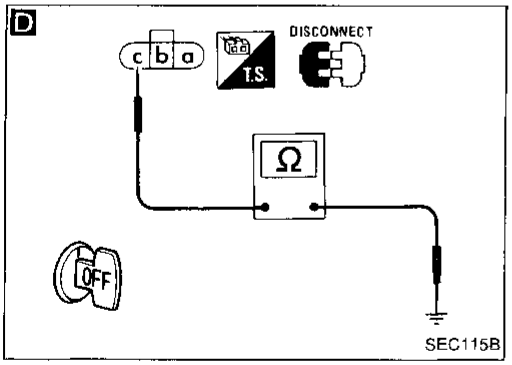


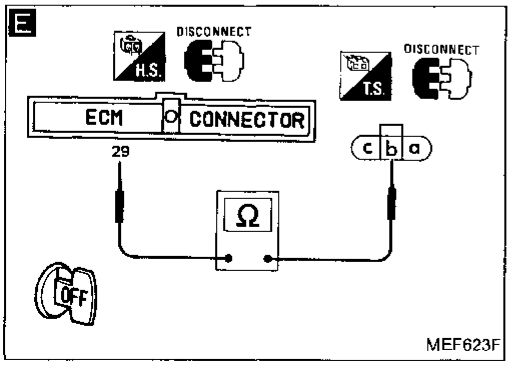
Diagnostic Procedure 31 (Cont'd)











INSPECTION START

A

CHECK HEATED OXYGEN SENSOR CIRCUIT.
1) Start engine and warm it up sufficiently.
2) Run engine at about 2,000 rpm for about 2 minutes under no-load.
3) Keep engine speed at 2,000 rpm and make sure that green LED on ECM goes ON and OFF.

OK → INSPECTION END

NG ↓

B

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

NG → **C**

CHECK HARNESS CONTINUITY BETWEEN HEATED OXYGEN SENSOR AND FUSE.
1) Turn ignition switch "OFF".
2) Disconnect "ENG CONT" fuse.
3) Check harness continuity between terminal ⓐ and the fuse.
Continuity should exist.
If NG, repair harness or connectors.

OK ↓

D

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 → Repair harness or connectors.

OK ↓

E

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ㉙ and terminal ⓑ.
Continuity should exist.

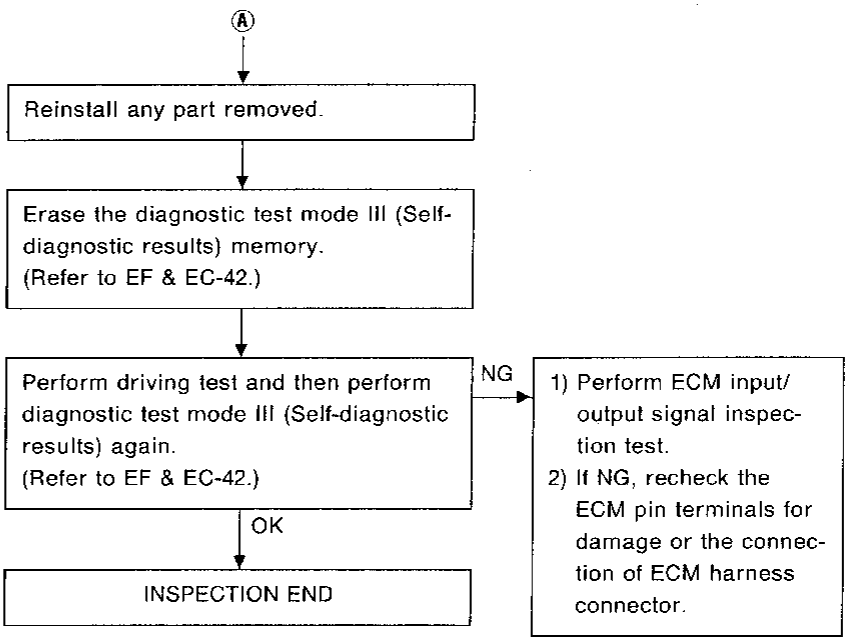
NG → Repair harness or connectors.

OK ↓

Replace heated oxygen sensor.

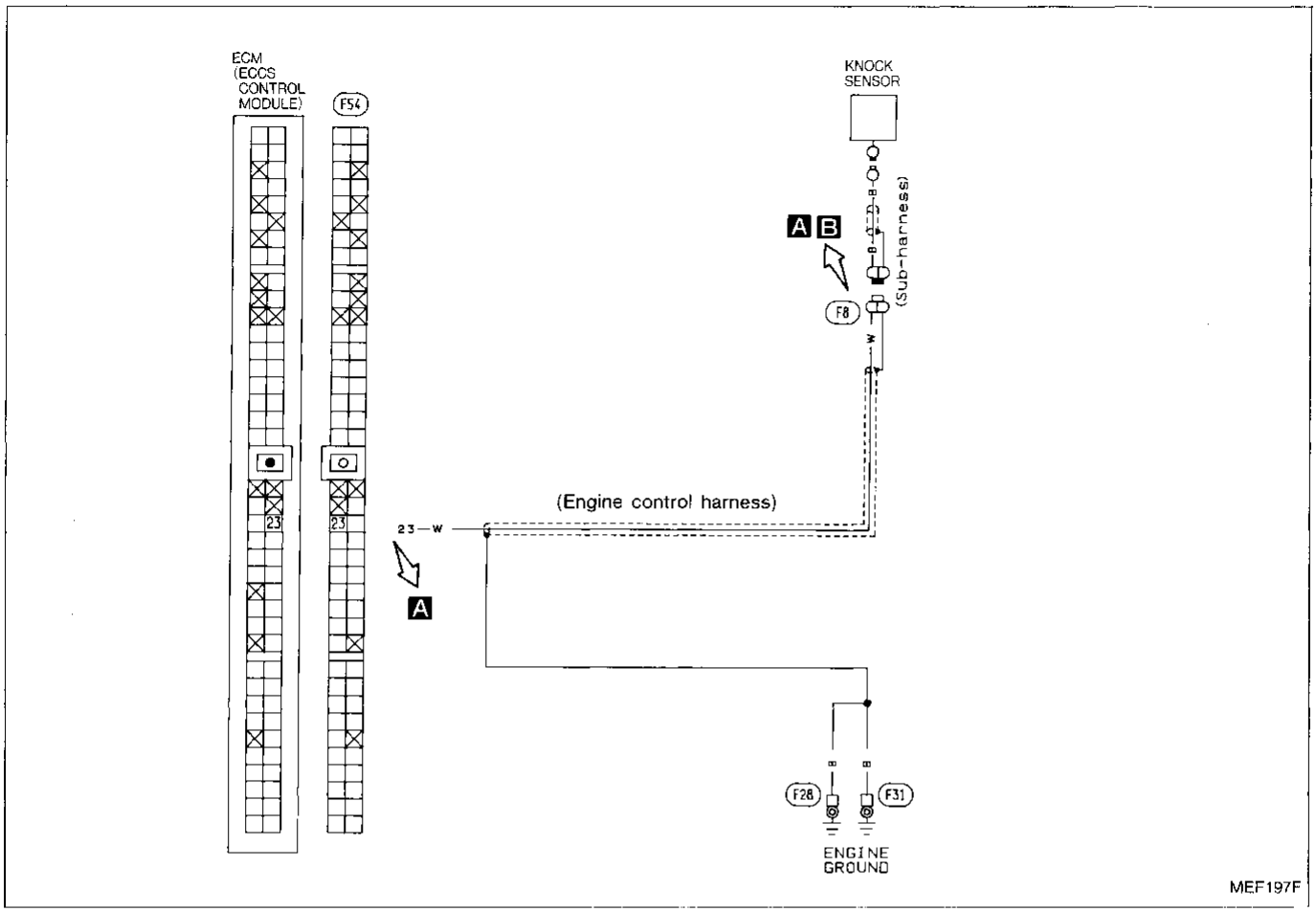
Ⓐ

Diagnostic Procedure 31 (Cont'd)

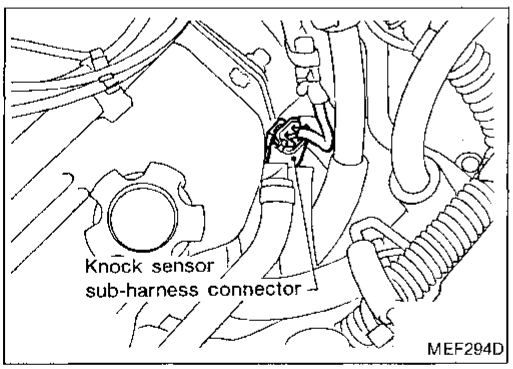


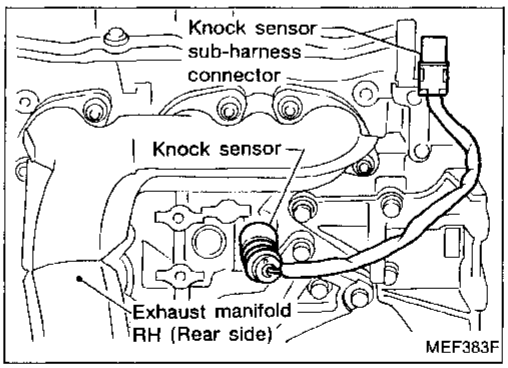
Diagnostic Procedure 32

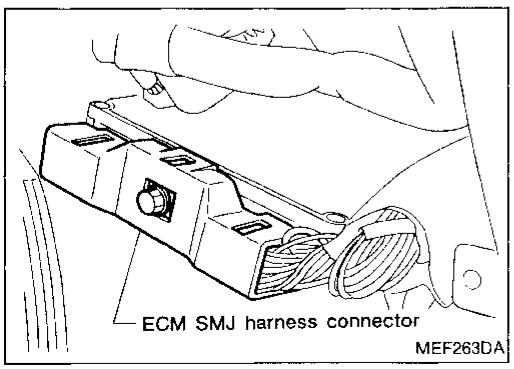
KNOCK SENSOR (Diagnostic trouble code No. 34)

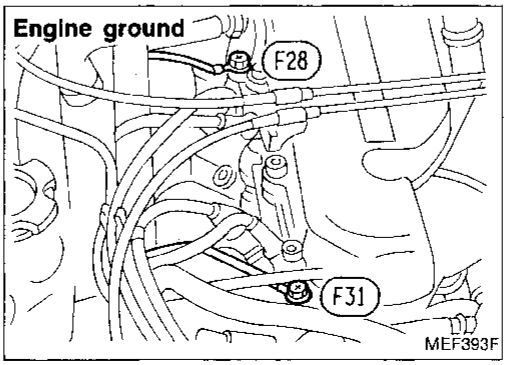


Harness layout

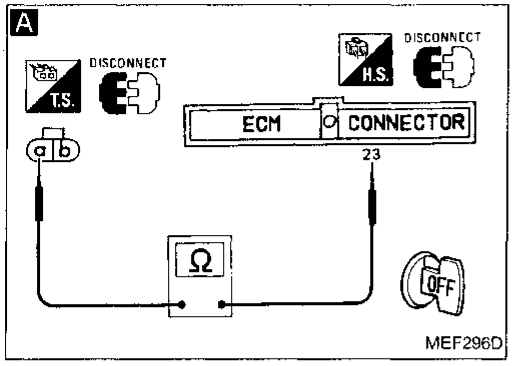


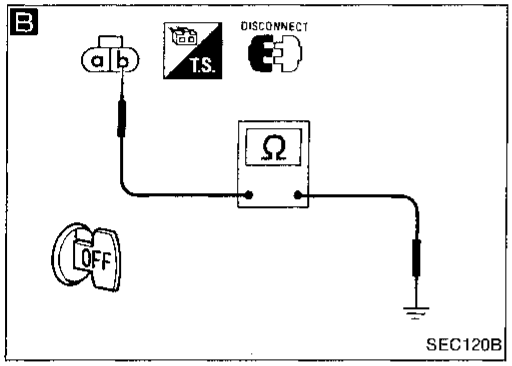






Diagnostic Procedure 32 (Cont'd)





INSPECTION START

A

CHECK INPUT SIGNAL CIRCUIT.
1) Make sure that ignition switch is in "OFF" position.
2) Disconnect knock sensor sub-harness connector.
3) Disconnect ECM SMJ harness connector.
4) Check harness continuity between ECM terminal ㉓ and terminal ⓐ.
Continuity should exist.

NG → Repair harness or connectors.

OK

B

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

NG → Repair harness or connectors.

OK

CHECK COMPONENT
(Knock sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-147.)

OK

Reinstall any part removed.

Erase the diagnostic test mode III (Self-diagnostic results) memory.
(Refer to EF & EC-42.)

Perform driving test and then perform diagnostic test mode III (Self-diagnostic results) again.
(Refer to EF & EC-42.)

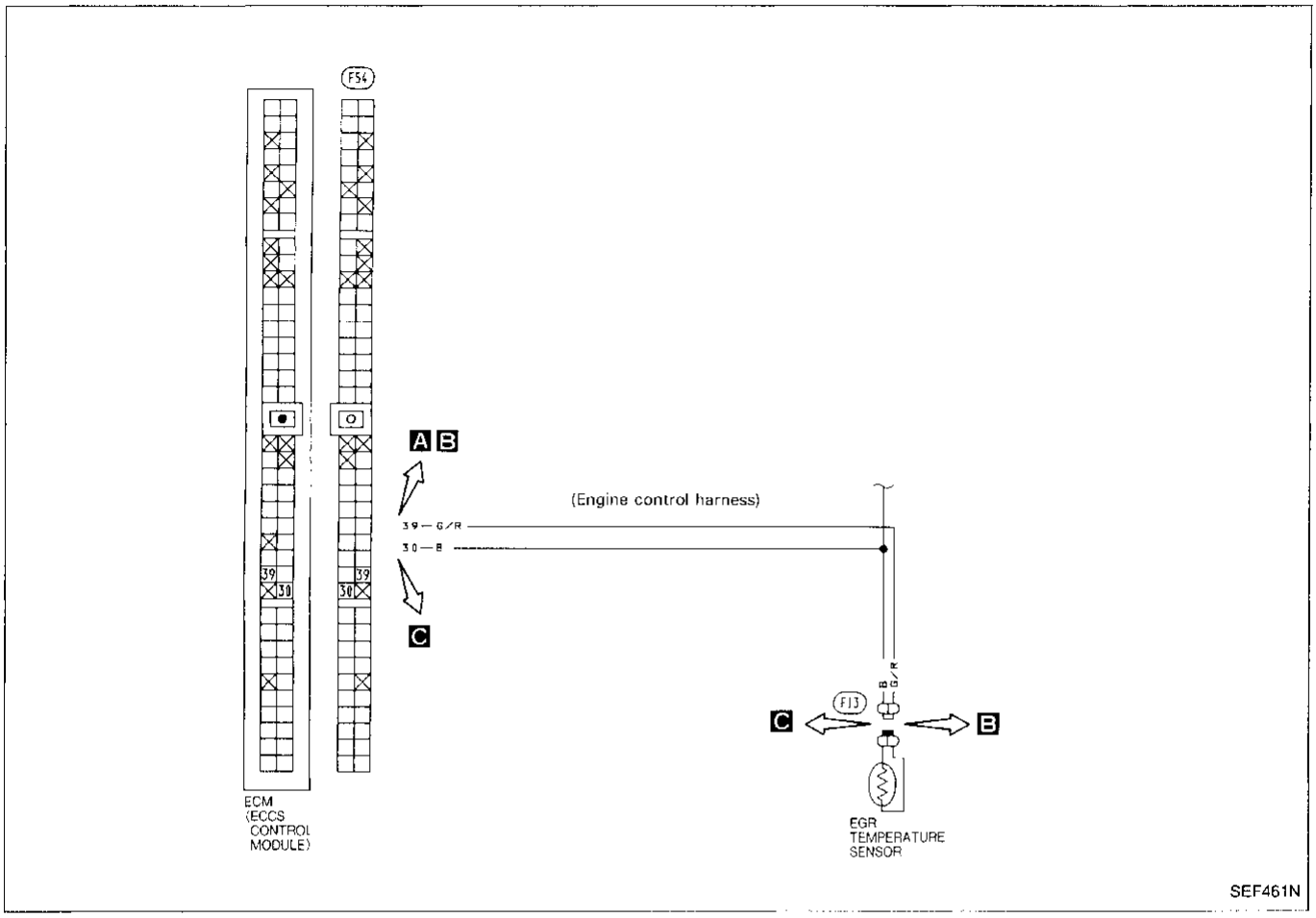
NG →
1) Perform ECM input/output signal inspection test.
2) If NG, recheck the ECM pin terminals for damage or the connection of ECM harness connector.

OK

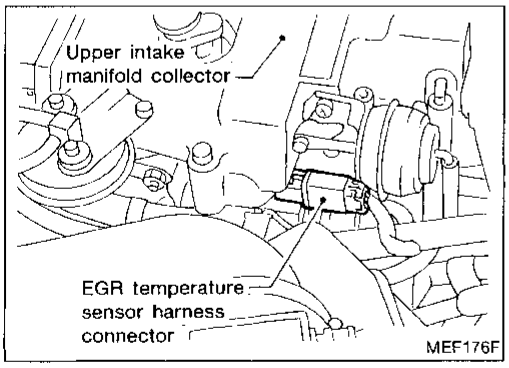
INSPECTION END

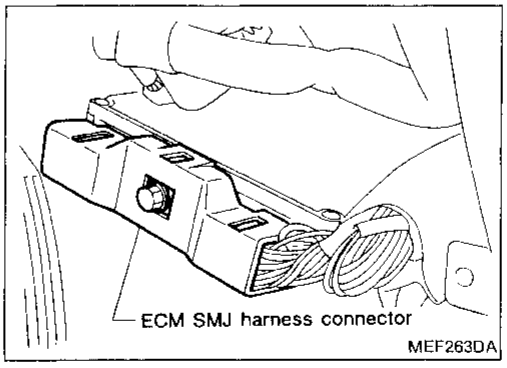
Diagnostic Procedure 33

EGR TEMPERATURE SENSOR (Diagnostic trouble code No. 35) CHECK (MALFUNCTION INDICATOR LAMP ITEM)

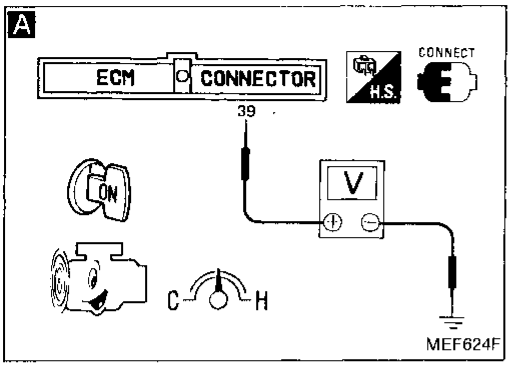


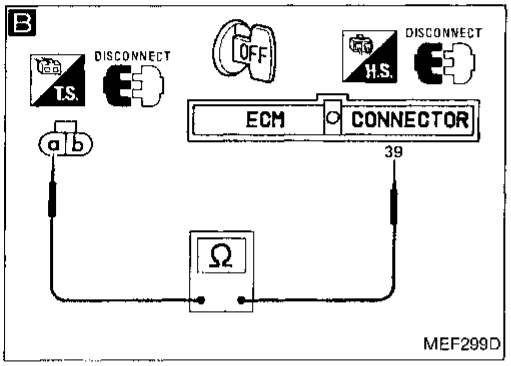
Harness layout

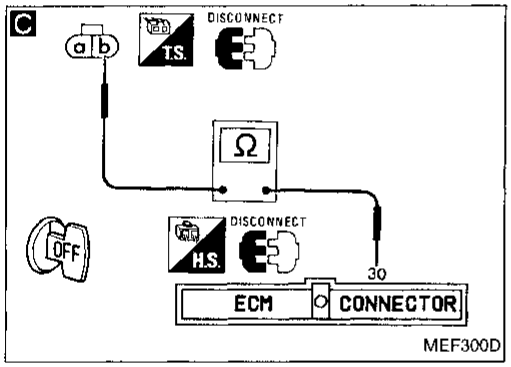




Diagnostic Procedure 33 (Cont'd)







INSPECTION START

A

CHECK INPUT SIGNAL.
1) Start engine and warm it up sufficiently.
2) Keep engine speed at approximately 2,000 rpm.
3) Check voltage between ECM terminal ㊴ and ground under the following conditions:

Condition	Voltage
When vacuum is not applied to EGR valve	1.0V or more
When vacuum is applied to EGR valve	0 - 1.0V

A sufficient vacuum applied with a hand vacuum pump may cause the engine to stall.

OK → **B**

CHECK HARNESS CONTINUITY BETWEEN ECM AND EGR TEMPERATURE SENSOR.
1) Stop engine.
2) Disconnect ECM SMJ harness connector.
3) Disconnect EGR temperature sensor harness connector.
4) Check continuity between ECM terminal ㊴ and terminal ⓐ. **Continuity should exist.**

If NG, repair harness or connector.

OK → CHECK COMPONENT (EGR temperature sensor).
Refer to "Electrical Components Inspection". (See page EF & EC-145.)

NG

C

CHECK GROUND CIRCUIT.
1) Stop engine.
2) Disconnect ECM SMJ harness connector.
3) Disconnect EGR temperature sensor harness connector.
4) Check harness continuity between ECM terminal ㉚ and terminal ⓑ. **Continuity should exist.**

NG → Repair harness or connectors.

OK

Reinstall any part removed.

Erase the diagnostic test mode III (Self-diagnostic results) memory.
(Refer to EF & EC-42.)

1) Start engine and warm it up sufficiently.
2) Perform test drive for more than 15 minutes.
3) Perform diagnostic test mode III (Self-diagnostic results) again.
(Refer to EF & EC-42.)

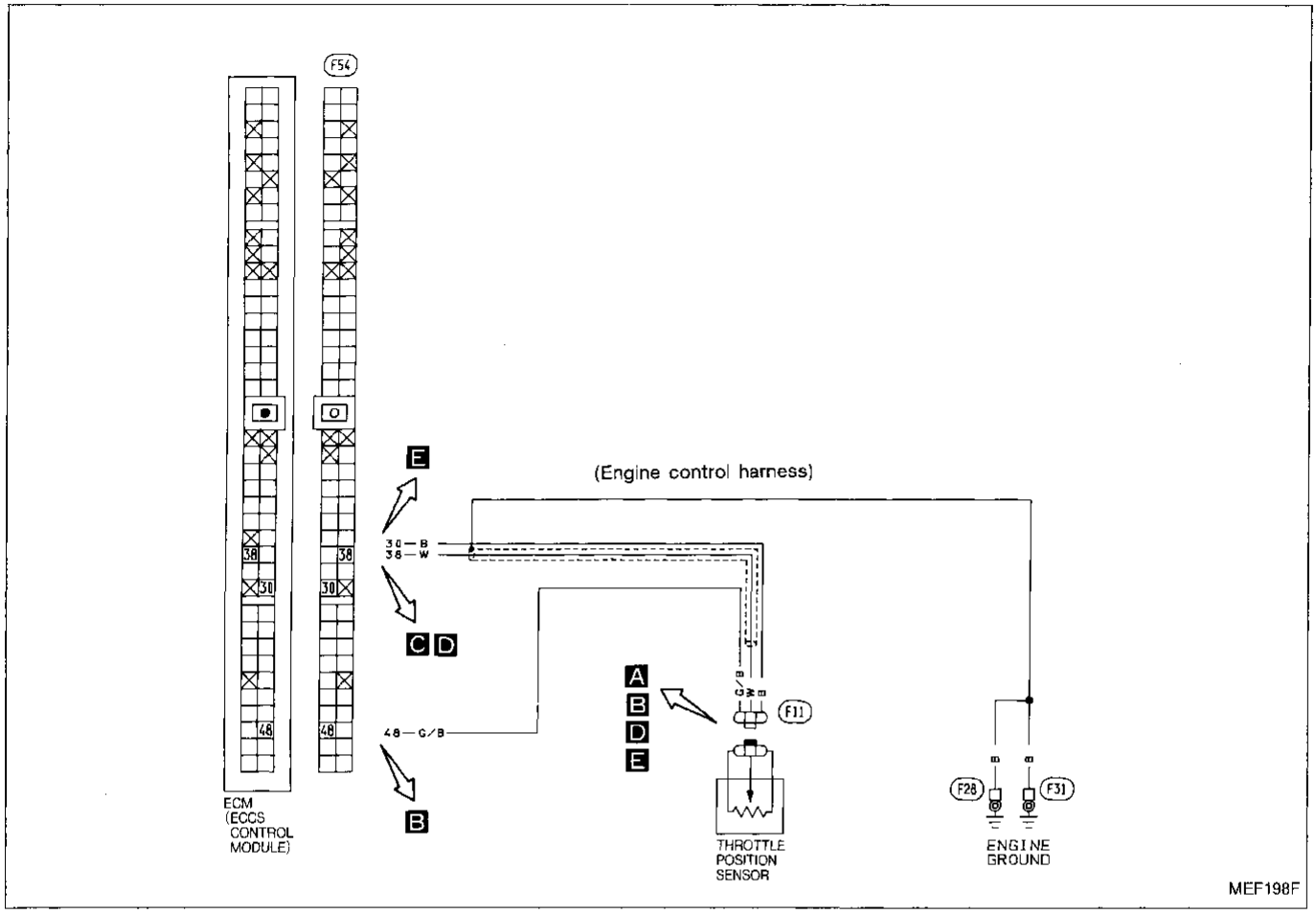
NG → 1) Perform ECM input/output signal inspection test.
2) If NG, recheck the ECM pin terminals for damage or the connection of ECM harness connector.

OK

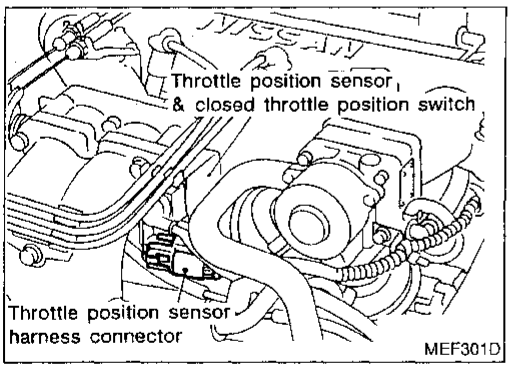
INSPECTION END

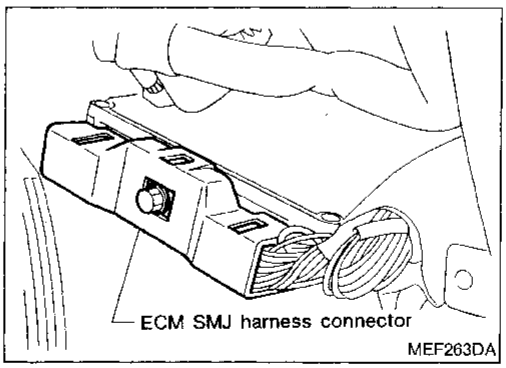
Diagnostic Procedure 34

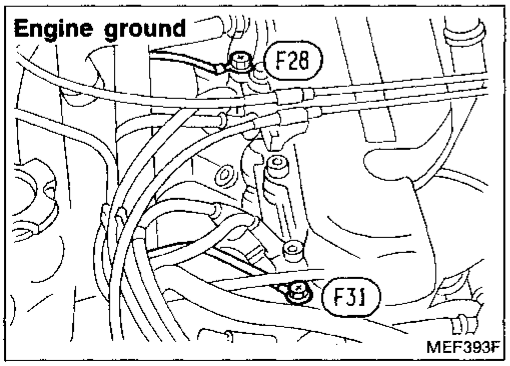
THROTTLE POSITION SENSOR (Diagnostic trouble code No. 43) CHECK (MALFUNCTION INDICATOR LAMP ITEM)



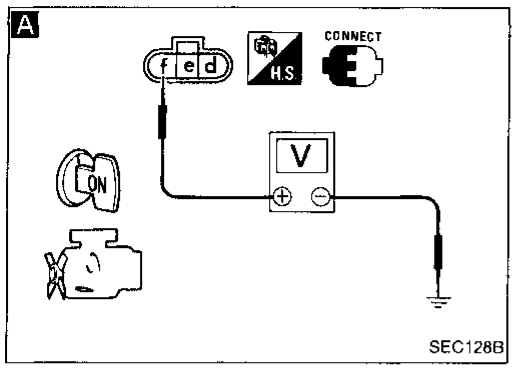
Harness layout

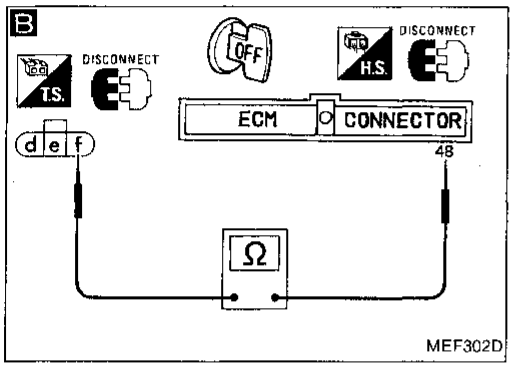


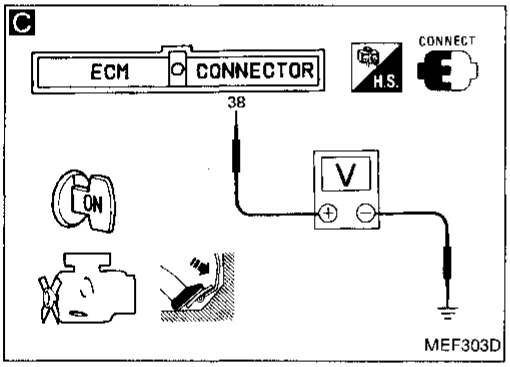


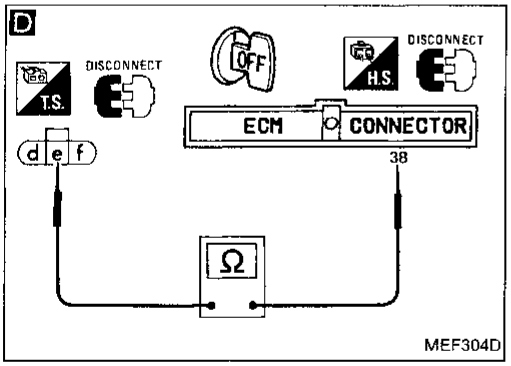


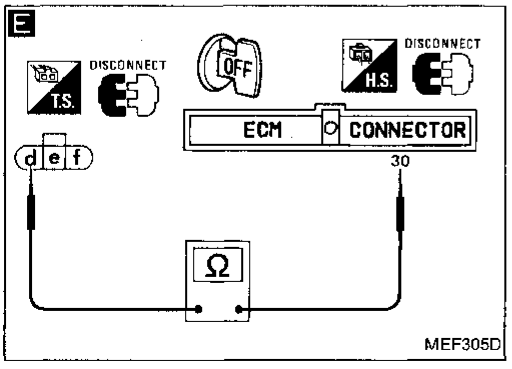
Diagnostic Procedure 34 (Cont'd)











INSPECTION START

A

CHECK POWER SOURCE.
1) Turn ignition switch "ON".
2) Check voltage between terminal ⓕ and ground.
Voltage:
Approximately 5.0V

NG → **B**

CHECK HARNESS CONTINUITY BETWEEN THROTTLE POSITION SENSOR AND ECM.
1) Turn ignition switch "OFF".
2) Disconnect throttle position sensor harness connector.
3) Disconnect ECM SMJ harness connector.
4) Check harness continuity between ECM terminal ㊽ and terminal ⓕ.
Continuity should exist.
If NG, repair harness or connectors.

OK ↓

C

CHECK INPUT SIGNAL.
Make sure that voltage between ECM terminal ㊳ and ground changes when accelerator pedal is depressed.
Voltage:
Approximately 0.5 - 4.2V

NG → **D**

CHECK HARNESS CONTINUITY BETWEEN THROTTLE POSITION SENSOR AND ECM.
1) Turn ignition switch "OFF".
2) Disconnect throttle position sensor harness connector.
3) Disconnect ECM SMJ harness connector.
4) Check harness continuity between ECM terminal ㊳ and terminal ⓔ.
Continuity should exist.
If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT (Throttle position sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-145.)

OK ↓

E

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM SMJ harness connector.
3) Disconnect throttle position sensor harness connector.
4) Loosen and retighten ground screws.
5) Check resistance between ECM terminal ㉚ and terminal ⓓ.
Continuity should exist.

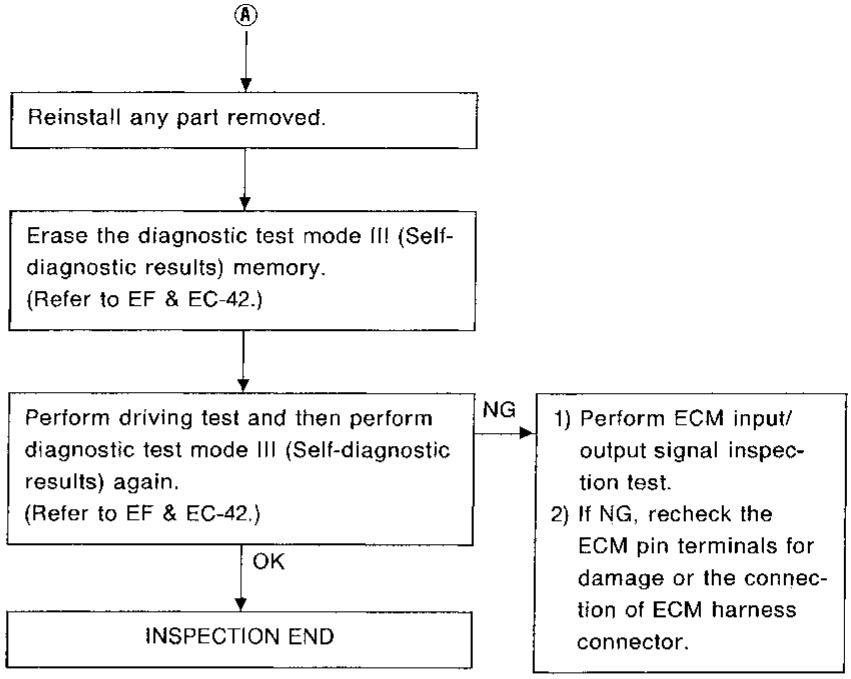
NG →

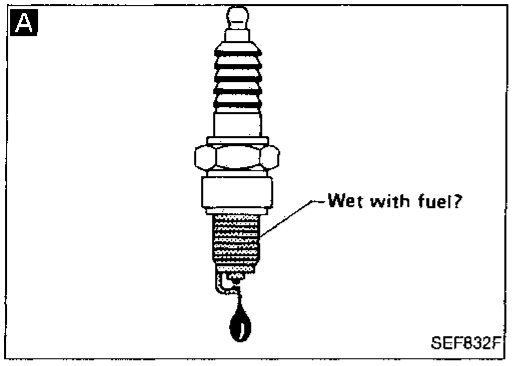
1) Check harness continuity between throttle position sensor and ground.
2) ECM ground circuit.

OK ↓

Ⓐ

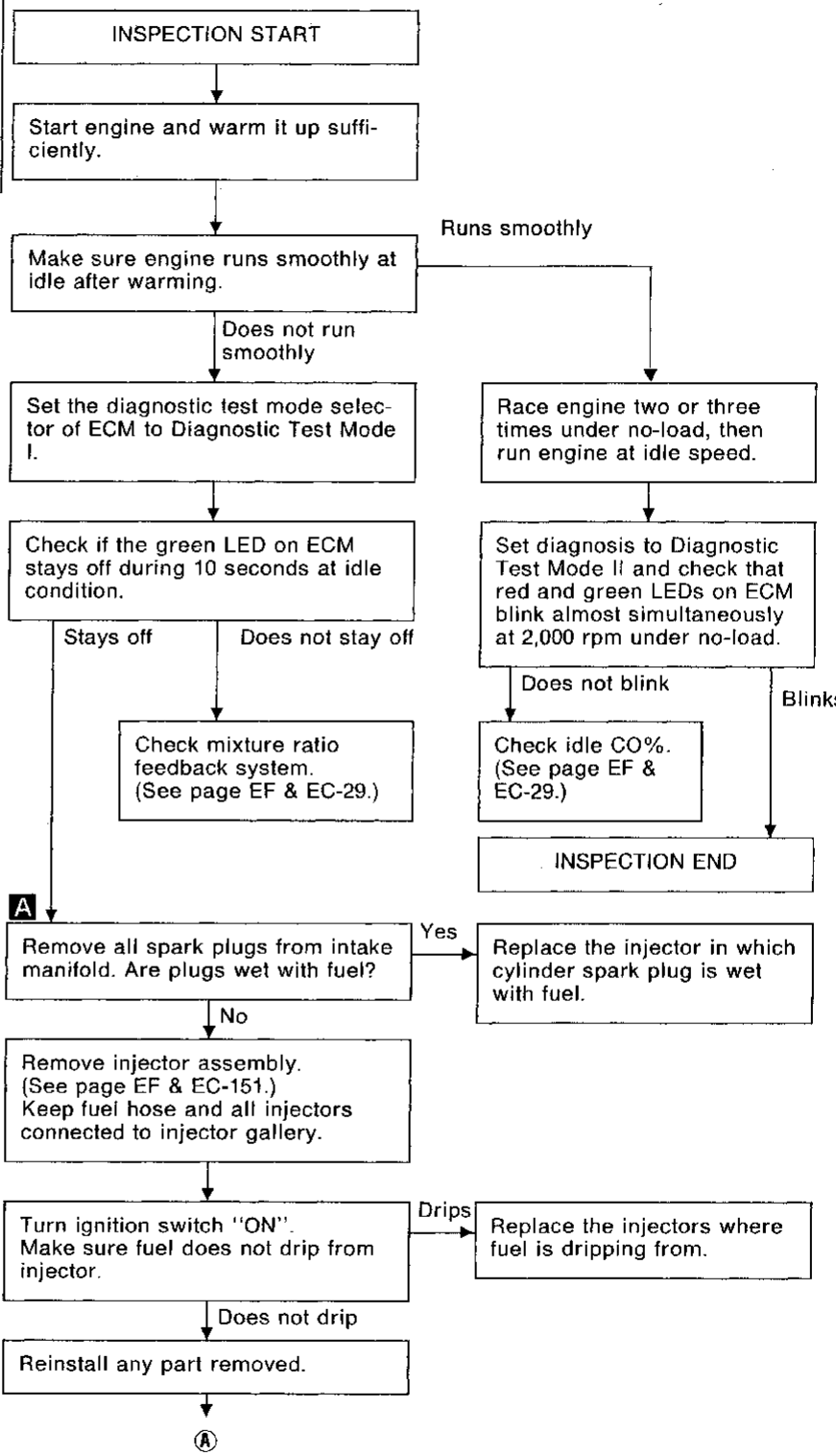
Diagnostic Procedure 34 (Cont'd)





Diagnostic Procedure 35

INJECTOR LEAK (Diagnostic trouble code No. 45)
CHECK (MALFUNCTION INDICATOR LAMP ITEM)

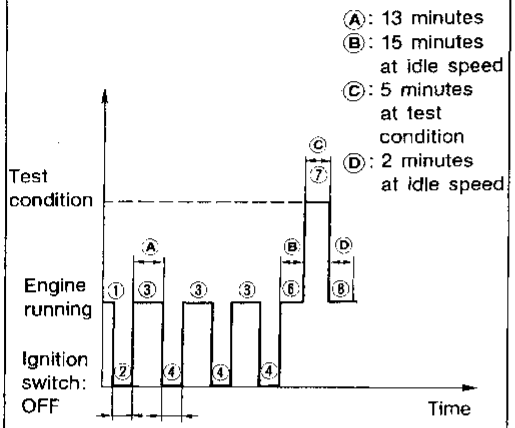


Diagnostic Procedure 35 (Cont'd)

B **ROAD TEST**

Test conditions
Drive vehicle under the following conditions with suitable gear position.
(1) Engine speed:
2,500 ± 700 rpm
(2) Intake manifold vacuum:
−44.7±8.7 kPa
(−335±65 mmHg, −13.19±2.56 inHg)

Driving mode



① Start engine and warm it up sufficiently.
② Turn off ignition switch and keep it off until red LED goes off.
③ Start engine and keep it running for 13 minutes.
④ Turn off ignition switch and keep it off until red LED goes off.
⑤ Repeat steps ③ through ④: total 3 times.
⑥ Start engine and keep it at idle speed for at least 15 minutes.
If engine stalls or ignition is turned off under 13 minutes after starting engine, return to step ②. If over 13 minutes, restart step ⑥.
⑦ Shift to suitable gear position and drive in "Test condition" for at least 5 minutes.
If the following conditions occur during step ⑦, return to step ⑥.
- Engine is raced over 4,000 rpm or hardly accelerated for more than 10 seconds.
- Engine stalls or ignition is turned off.

⑧ Keep engine at idle speed for more than 2 minutes.

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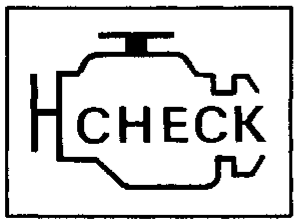
C



MALFUNCTION INDICATOR LAMP

MEF307D

Ⓐ

Erase the diagnostic test mode III (Self-diagnostic results) memory.
Make sure Diagnostic trouble code No. 55 is displayed in Diagnostic Test Mode III.
(Refer to EF & EC-42.)

1) Start engine and warm it up sufficiently.
2) Disconnect heated oxygen sensor harness connector for at least 30 seconds at 2,000 rpm.
3) Stop engine and reconnect heated oxygen sensor connector.

B

Perform test drive under the following conditions:
1) Warm up engine sufficiently.
2) Use test driving modes indicated in figure **B** .

C

Make sure malfunction indicator lamp does not come "ON" during engine racing.

Comes "ON"

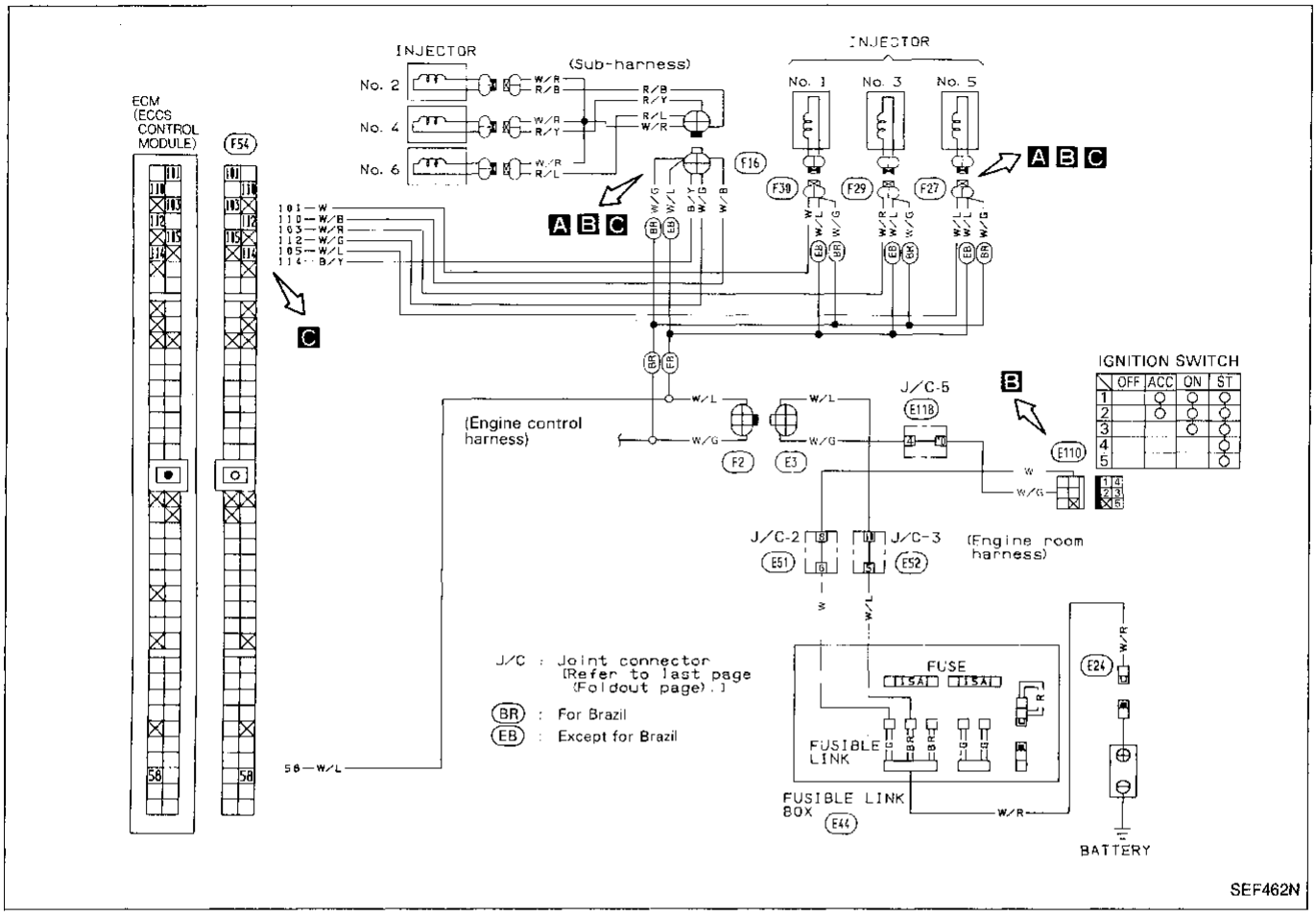
1) Perform diagnostic test mode III (Self-diagnostic results) and find diagnostic trouble code.
2) According to displayed Diagnostic trouble code No., perform "Diagnostic Procedure".
3) If Diagnostic trouble code No. 45 is displayed again, replace all injectors, then perform "Diagnostic Procedure".

Does not come "ON"

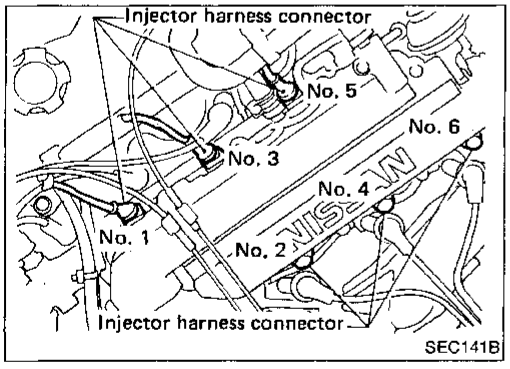
INSPECTION END

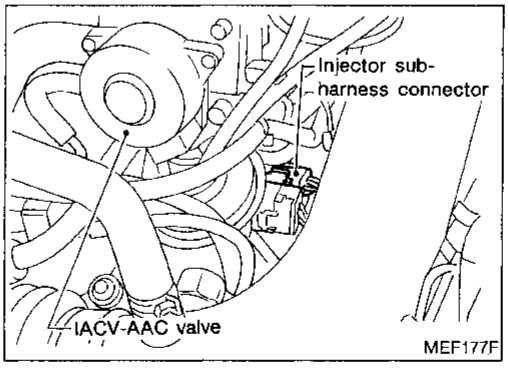
Diagnostic Procedure 36

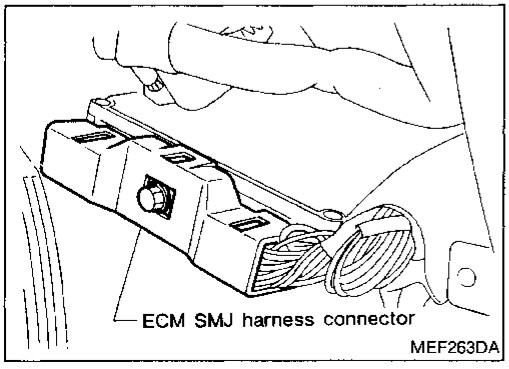
INJECTOR CIRCUIT (Diagnostic trouble code No. 51) CHECK (MALFUNCTION INDICATOR LAMP ITEM)



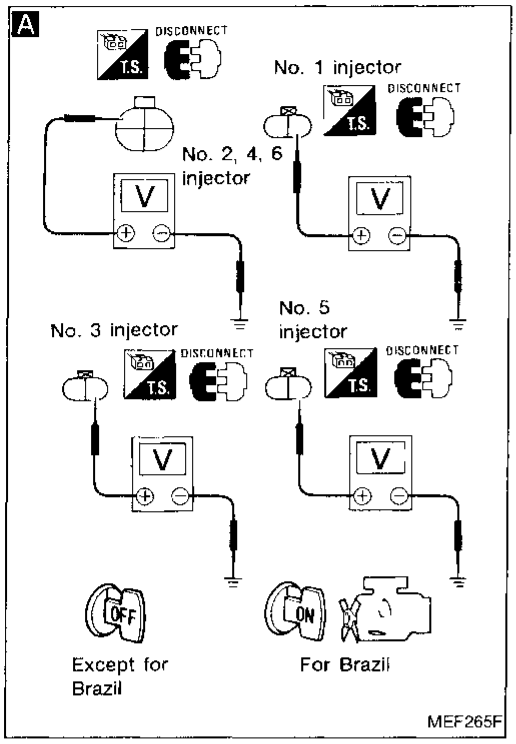
Harness layout

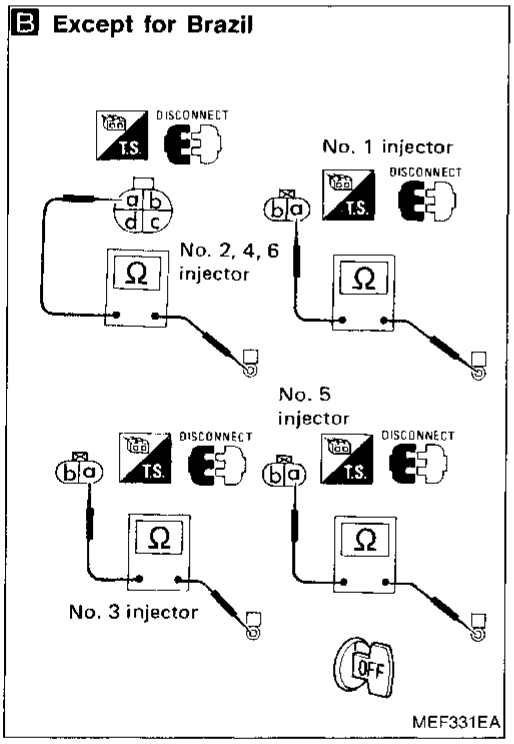






Diagnostic Procedure 36 (Cont'd)





INSPECTION START

A

CHECK POWER SUPPLY.
1) Disconnect harness connectors for No. 1, No. 3 and No. 5 injectors.
2) Disconnect sub-harness connector (F16) for No. 2, No. 4 and No. 6 injectors.
3) Turn ignition switch "ON" (Only models for Brazil).
4) Make sure that battery voltage exist in the terminals shown in figure **A** .

NG → **B**

OK → Ⓐ

B

(Except for Brazil)
CHECK HARNESS CONTINUITY BETWEEN INJECTORS AND BATTERY.
1) Disconnect battery ⊕ terminal.
2) Check harness continuity between terminal ⓐ and battery ⊕ terminal.
Continuity should exist.
3) Check "BR" fusible link.
4) Check joint connector-3.

If NG, replace harness, connector or fusible link.

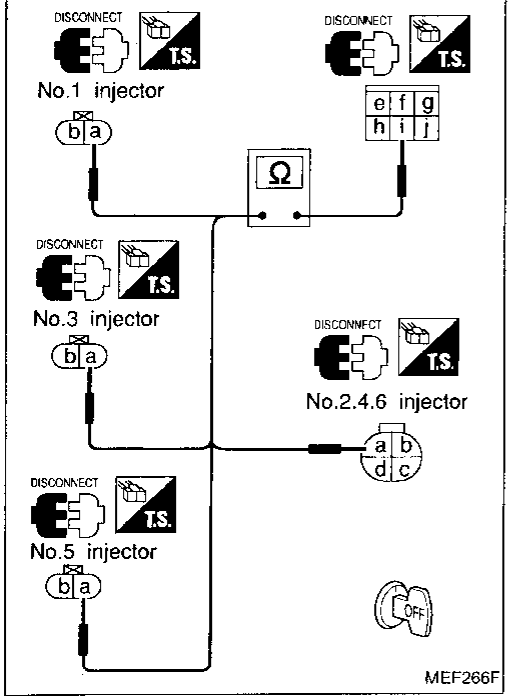
— OR —

(For Brazil)
CHECK HARNESS CONTINUITY BETWEEN INJECTORS AND IGNITION SWITCH.
1) Turn ignition switch "OFF".
2) Disconnect ignition switch harness connector.
3) Check harness continuity between terminal ⓐ and terminal ⓘ.
Continuity should exist.
4) Check joint connector-5.

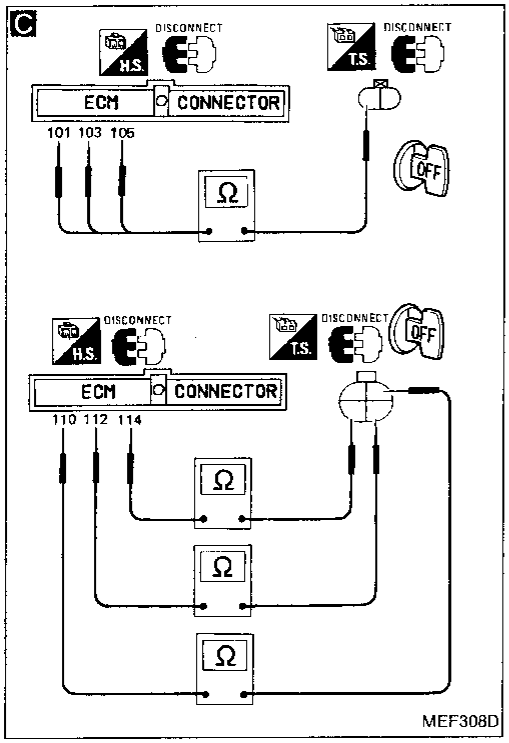
If NG, replace harness, or connector.

Diagnostic Procedure 36 (Cont'd)

B For Brazil



C



Ⓐ

C

CHECK HARNESS CONTINUITY BETWEEN INJECTORS AND ECM.
1) Turn ignition switch "OFF".
2) Disconnect ECM SMJ harness connector.
3) Check harness continuity, following the figure C .
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT (Injector).
Refer to "Electrical Components Inspection".
(See page EF & EC-147.)

NG → Repair or replace injector.

OK ↓

Reinstall any part removed.

↓

Erase the diagnostic test mode III (Self-diagnostic results) memory.
(Refer to EF & EC-42.)

↓

Perform driving test and then perform diagnostic test mode III (Self-diagnostic results) again.
(Refer to EF & EC-42.)

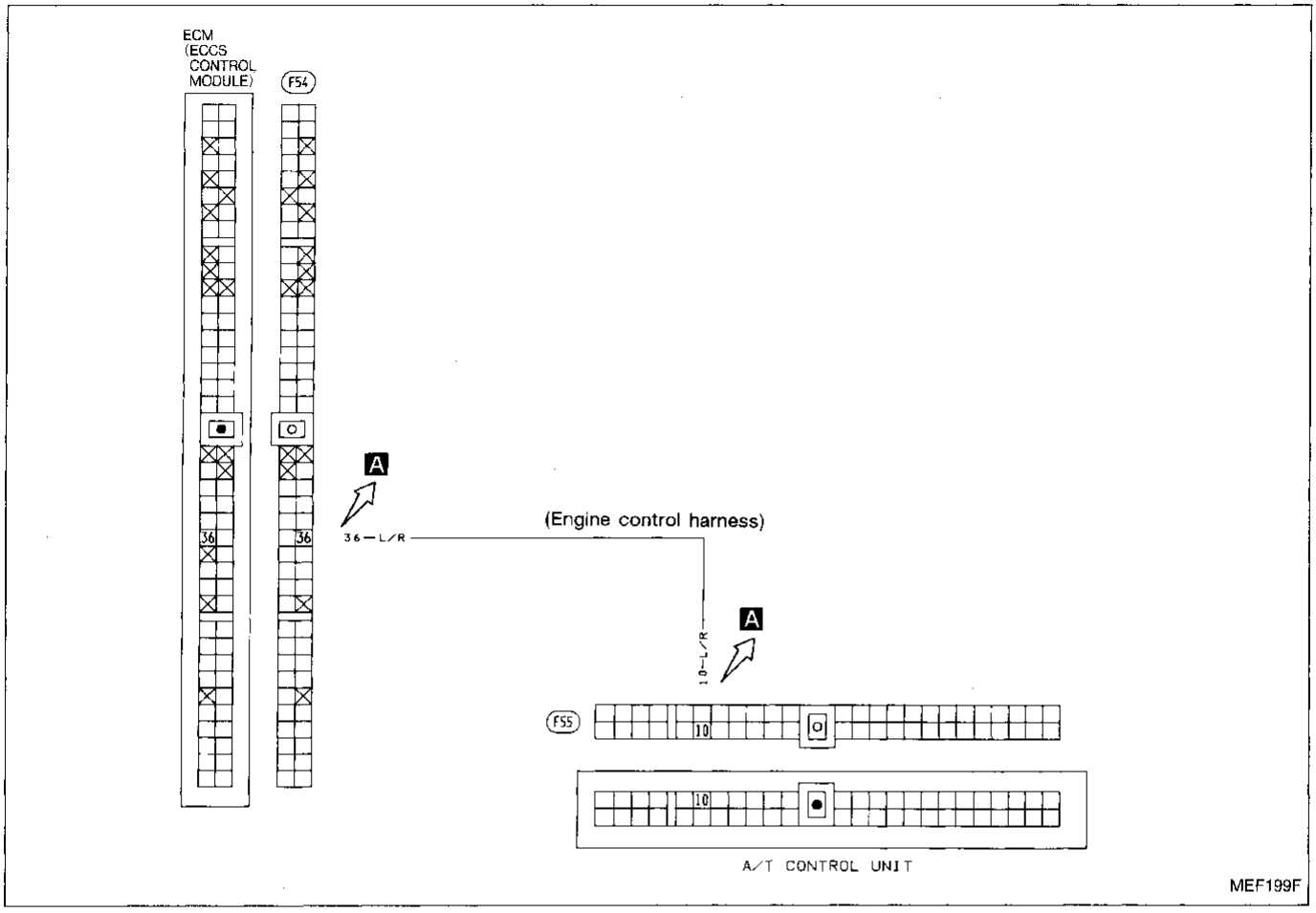
NG → 1) Perform ECM input/output signal inspection test.
2) If NG, recheck the ECM pin terminals for damage or the connection of ECM harness connector.

OK ↓

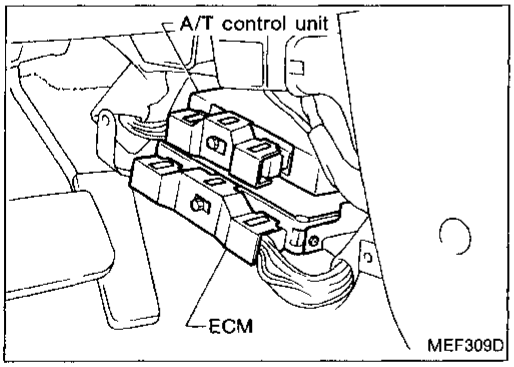
INSPECTION END

Diagnostic Procedure 37

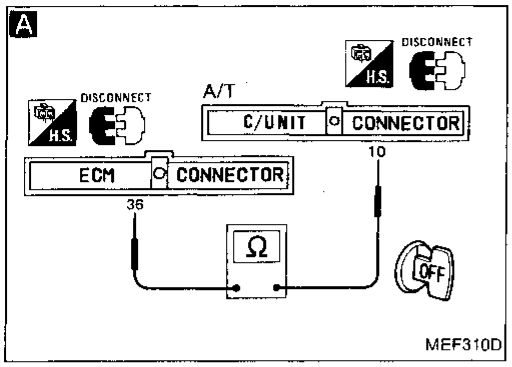
A/T CONTROL (Diagnostic trouble code No. 54)



Harness layout



Diagnostic Procedure 37 (Cont'd)



INSPECTION START

A

CHECK HARNESS CONTINUITY BETWEEN ECM AND A/T CONTROL UNIT.
1) Disconnect ECM SMJ harness connector.
2) Disconnect A/T control unit harness connector.
3) Check harness continuity between ECM terminal ㊱ and A/T control unit terminal ⑩.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

Reinstall any part removed.

Erase the diagnostic test mode III (Self-diagnostic results) memory.
(Refer to EF & EC-42.)

Perform driving test and then perform diagnostic test mode III (Self-diagnostic results) again.
(Refer to EF & EC-42.)

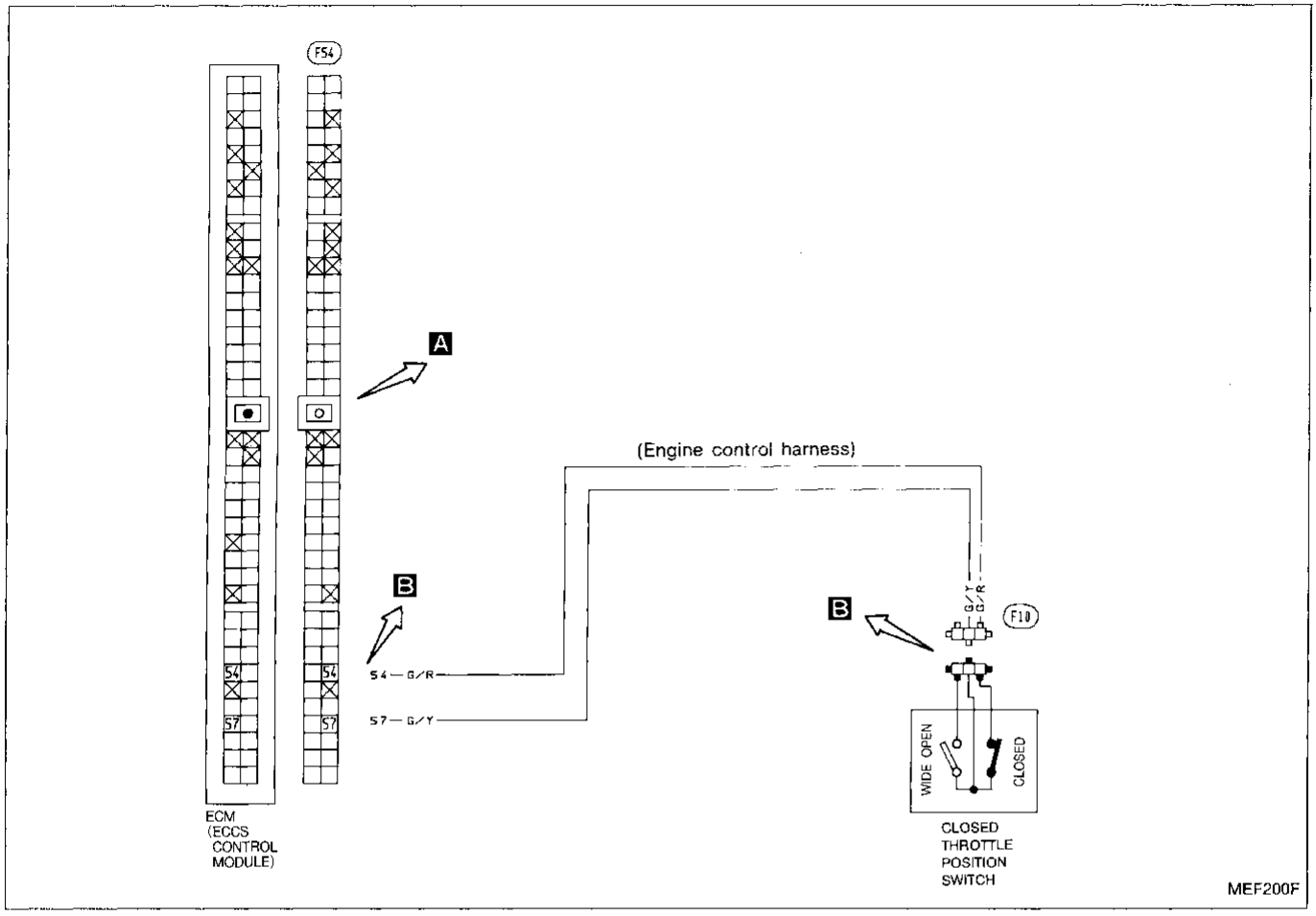
NG → 1) Perform ECM input/output signal inspection test.
2) If NG, recheck the ECM pin terminals for damage.
Check the connection at the ECM harness connector.

OK ↓

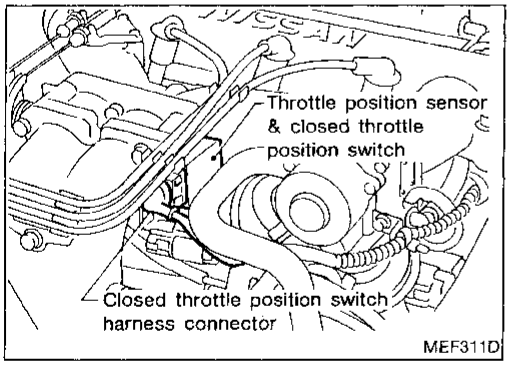
INSPECTION END

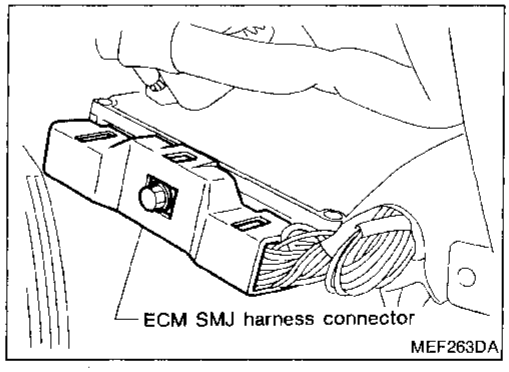
Diagnostic Procedure 38

CLOSED THROTTLE POSITION SWITCH (Switch ON/OFF diagnostic item)

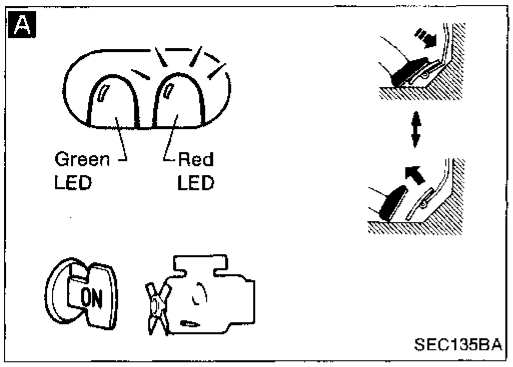


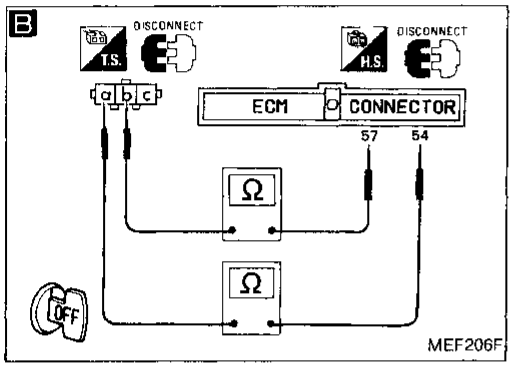
Harness layout





Diagnostic Procedure 38 (Cont'd)





INSPECTION START

A

CHECK INPUT SIGNAL.
1) Turn ignition switch "ON".
2) Perform on-board diagnostic system Diagnostic Test Mode IV (Switch ON/OFF diagnosis).
3) Make sure that red LED on ECM comes "ON" or goes "OFF" when accelerator pedal is depressed or released.

NG → B

OK

INSPECTION END

B

CHECK HARNESS CONTINUITY BETWEEN ECM AND CLOSED THROTTLE POSITION SWITCH.
1) Turn ignition switch "OFF".
2) Disconnect closed throttle position switch harness connector.
3) Disconnect ECM SMJ harness connector.
4) Check harness continuity between ECM terminals ⑭, ⑰ and terminal ⓐ, ⓑ.
Continuity should exist.
If NG, repair harness or connectors.

OK

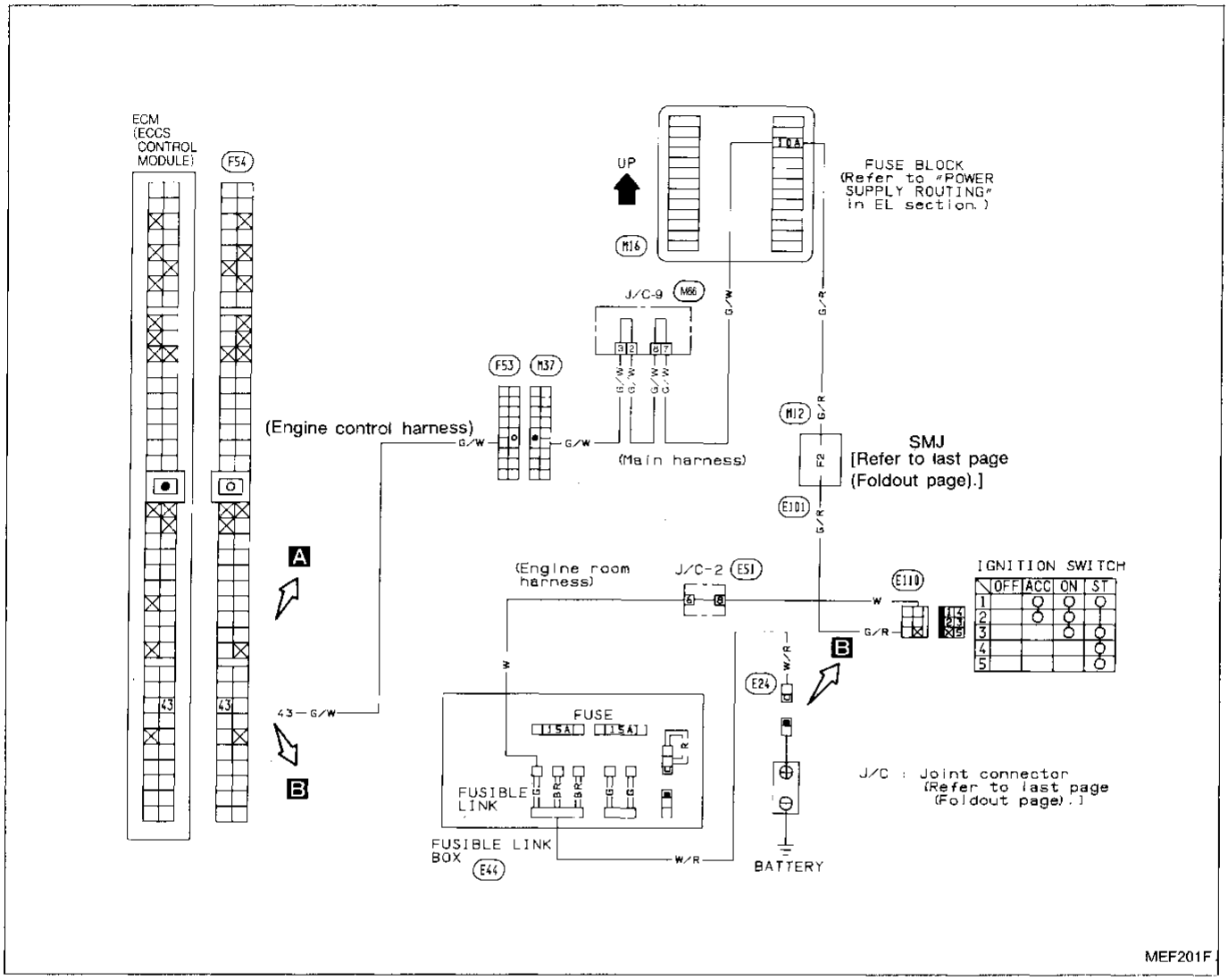
Check if throttle position sensor is installed in proper position.
(See page EF & EC-145.)

OK

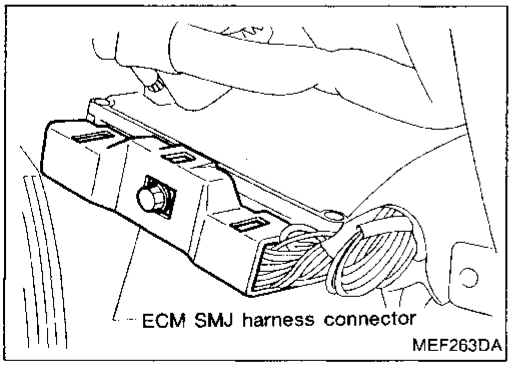
CHECK COMPONENT (Closed throttle position switch).
Refer to "Electrical Components Inspection".
(See page EF & EC-149.)

Diagnostic Procedure 39

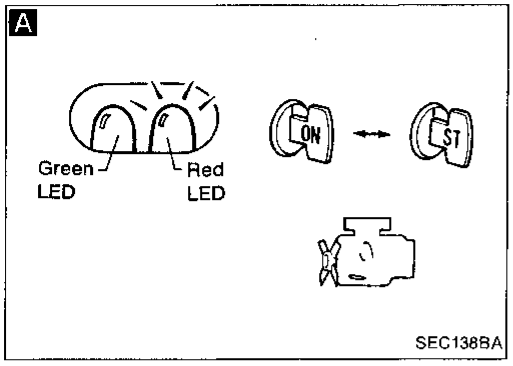
START SIGNAL (Switch ON/OFF diagnostic item)

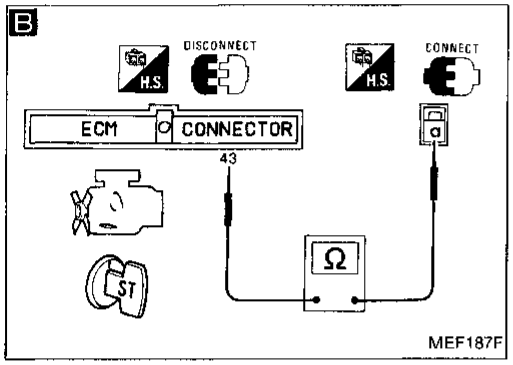


Harness layout



Diagnostic Procedure 39 (Cont'd)





INSPECTION START

A

CHECK INPUT SIGNAL.
1) Turn ignition switch "ON".
2) Perform on-board diagnostic system Diagnostic Test Mode IV (Switch ON/OFF diagnosis).
3) Make sure that red LED on ECM comes "ON" or goes "OFF" when ignition switch is turned to "START".

NG → B

OK

INSPECTION END

B

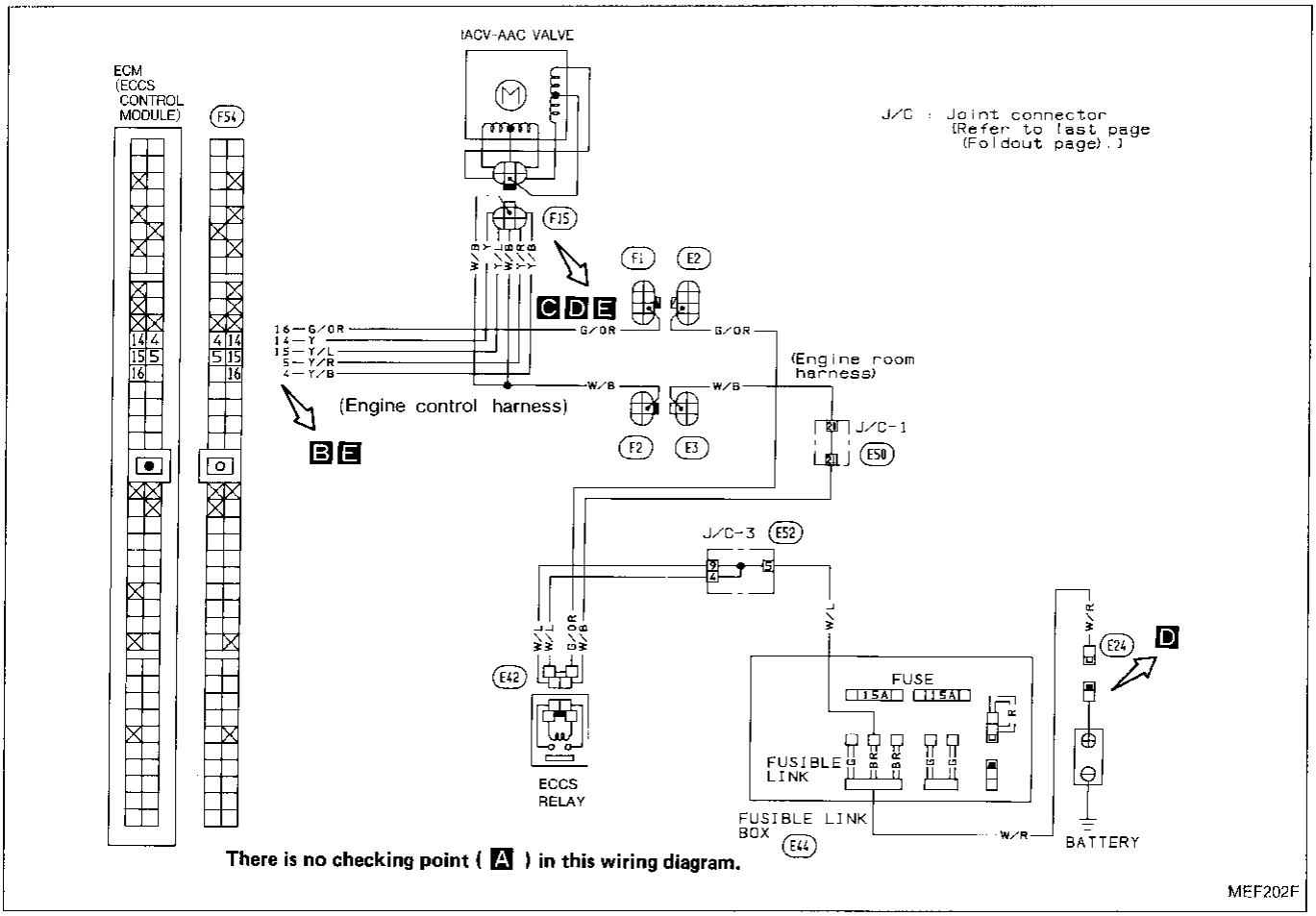
CHECK HARNESS CONTINUITY BETWEEN ECM AND BATTERY.
1) Turn ignition switch "OFF".
2) Disconnect ECM SMJ harness connector.
3) Turn ignition switch to "START".
4) Check harness continuity between ECM terminal (43) and battery harness terminal (a).
Continuity should exist.

NG

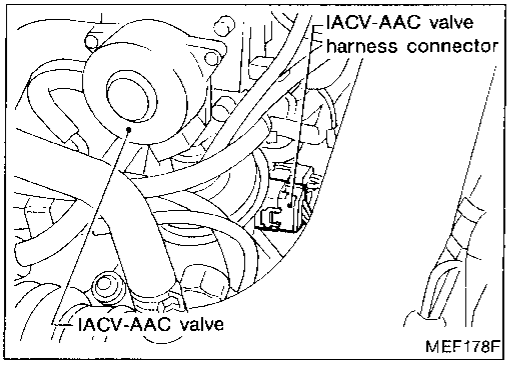
Check the following items.
1) "G" fusible link
2) Ignition switch
3) SMJ
4) "STARTER" fuse
5) Joint connector (E51)
6) Joint connector (M66)
If all items are OK, repair harness or connectors.

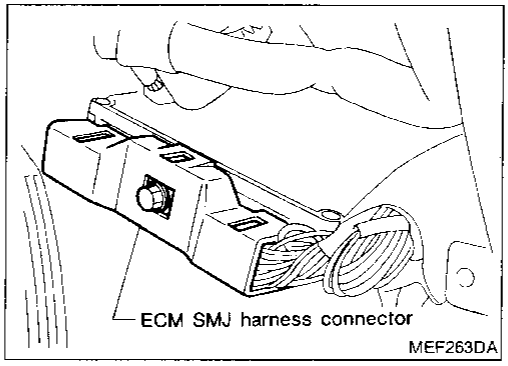
Diagnostic Procedure 40

IACV-AAC VALVE (Not self-diagnostic item)

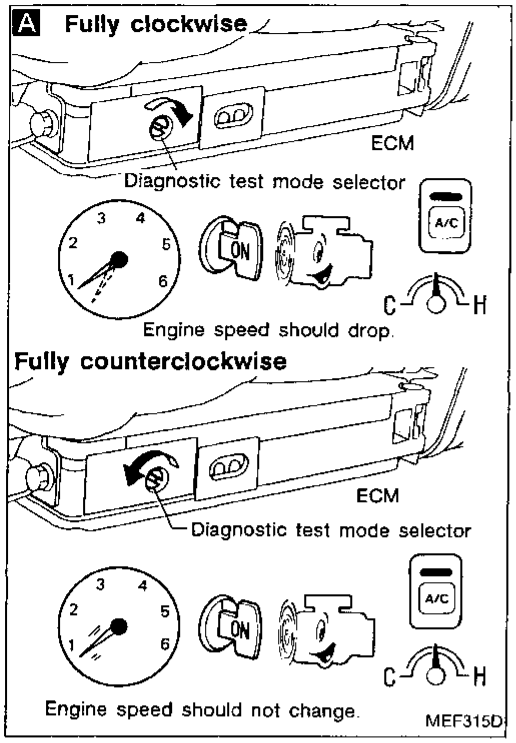


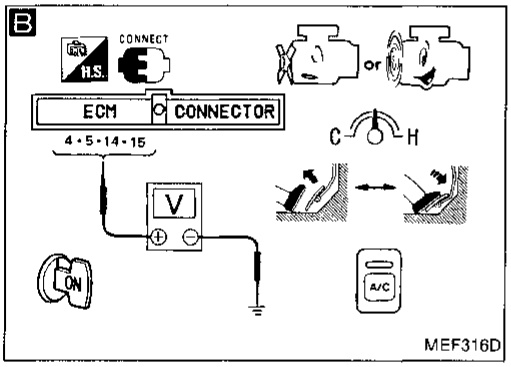
Harness layout

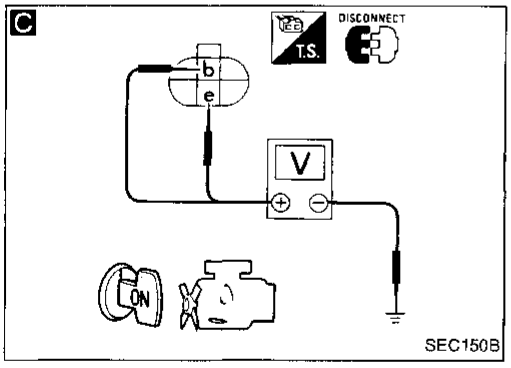


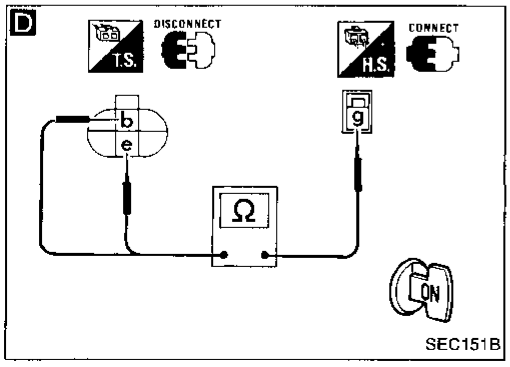


Diagnostic Procedure 40 (Cont'd)









INSPECTION START

A

CHECK IACV-AAC VALVE FUNCTION.
1) Start engine and warm it up sufficiently.
2) Turn diagnostic test mode selector on ECM fully clockwise.
3) Turn air conditioner switch "ON".
4) Make sure that engine speed drops.
5) Turn air conditioner switch "OFF".
6) Turn diagnostic test mode selector on ECM fully counterclockwise.
7) Turn air conditioner switch "ON".
8) Make sure that engine speed does not change.

OK → INSPECTION END

Step 2) provides signal for fully closing IACV-AAC valve.
This signal may be output by an alternative method. (Refer to page EF & EC-128.)

Step 6) provides signal for opening IACV-AAC valve again.
This signal may be output by an alternative method. (Refer to page EF & EC-128.)

NG ↓

B

CHECK OUTPUT SIGNAL.
1) Turn air conditioner switch "OFF".
2) Check voltage between ECM terminals ④, ⑤, ⑭, ⑮ and ground, racing engine under no-load.
Voltage should change when racing engine.
3) Stop engine and turn ignition switch "ON".
4) Check voltage at the above terminals again.
Voltage: Battery voltage

OK → Check if ECM SMJ harness connector is connected properly.

NG ↓

C

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect IACV-AAC valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminals ⓑ, ⓔ and ground.
Voltage: Battery voltage

NG → **D**

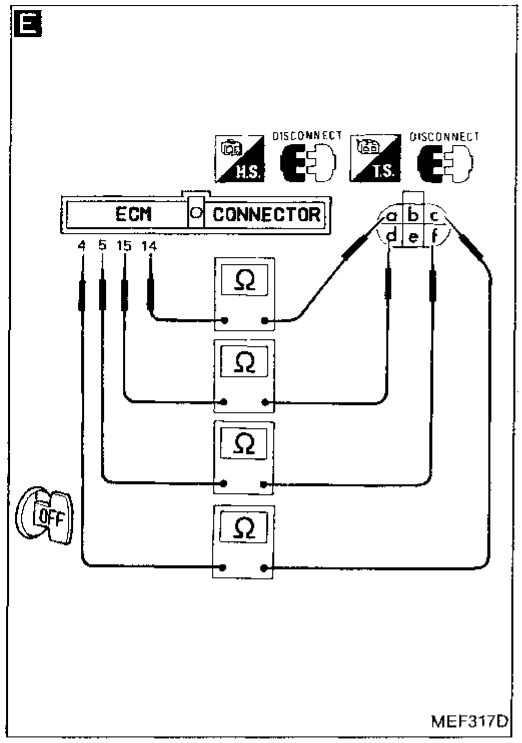
CHECK HARNESS CONTINUITY BETWEEN IACV-AAC VALVE AND BATTERY.
1) Turn ignition switch "OFF".
2) Disconnect IACV-AAC valve harness connector.
3) Turn ignition switch "ON".
4) Check harness continuity between terminals ⓑ, ⓔ and ⓖ.
Continuity should exist.

NG ↓ Ⓑ

OK ↓ Ⓐ

GI MA EM LC EF & EC FE CL MT AT FA RA BR ST BF HA EL IDX

Diagnostic Procedure 40 (Cont'd)



Ⓐ

E

CHECK HARNESS CONTINUITY BETWEEN IACV-AAC VALVE AND ECM.
1) Turn ignition switch "OFF".
2) Check harness continuity between ECM terminals ④, ⑤, ⑭, ⑮ and terminals ⓒ, ⓕ, ⓓ, ⓐ.
Continuity should exist.

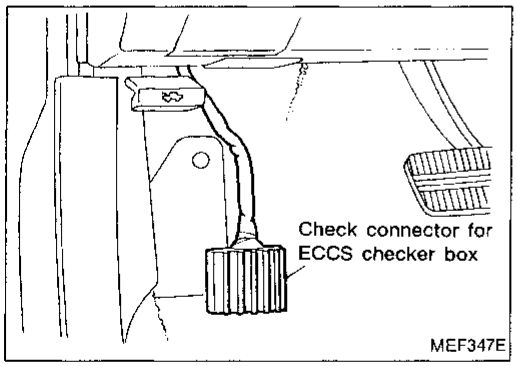
NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT (IACV-AAC valve).
Refer to "Electrical Components Inspection".
(See page EF & EC-146.)

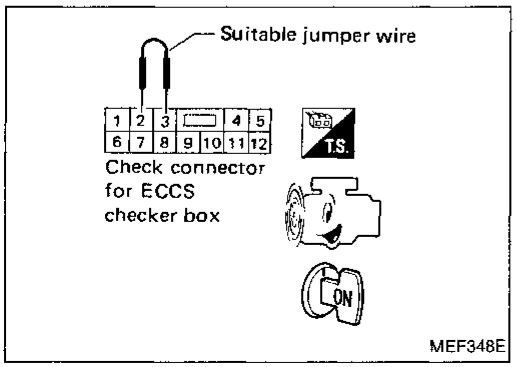
Ⓑ

Check the following items.
1) "BR" fusible link
2) ECCS relay
3) Joint connector
If all items are OK, repair harness or connectors.



Alternative method for providing IACV-AAC valve fully close signal:

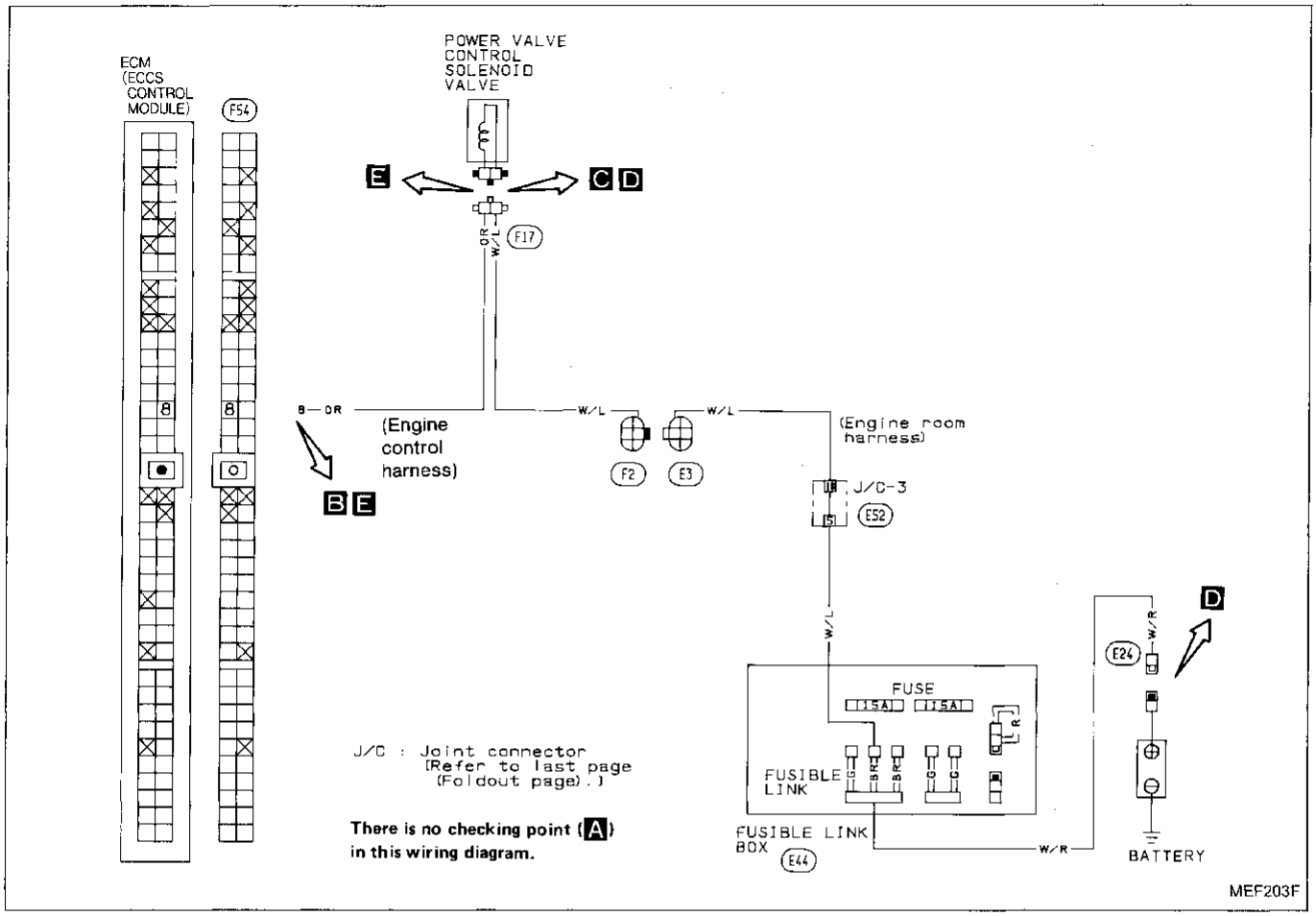
1) Pull out check connector for ECCS checker box.



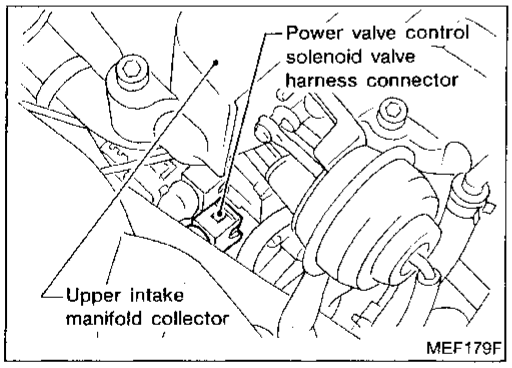
2) Connect check connector terminals No. 2 and 3 with a suitable jumper wire.
3) To open IACV-AAC valve again, simply disconnect jumper wire.

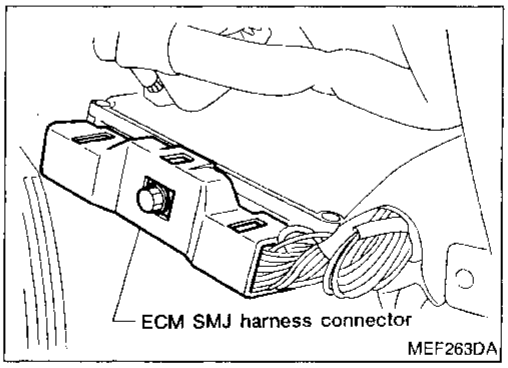
Diagnostic Procedure 41

POWER VALVE CONTROL (Not self-diagnostic item)

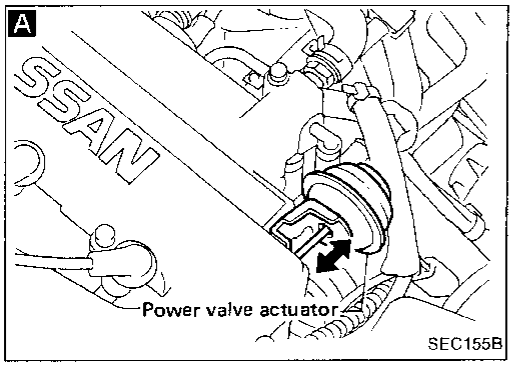


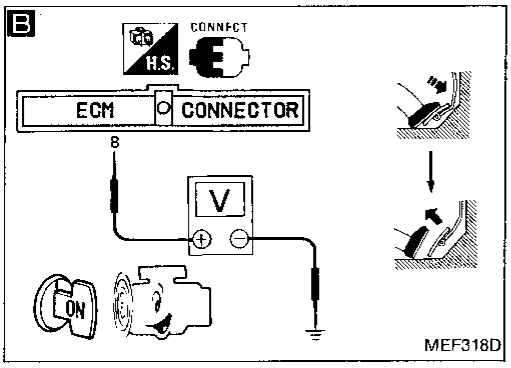
Harness layout

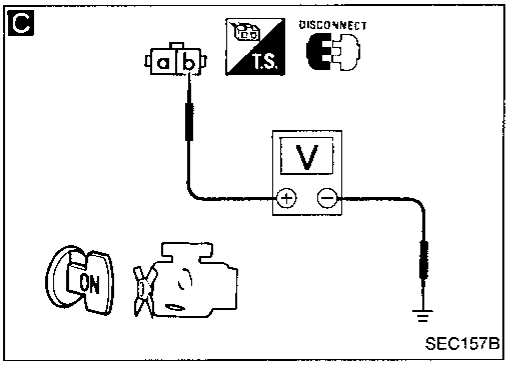


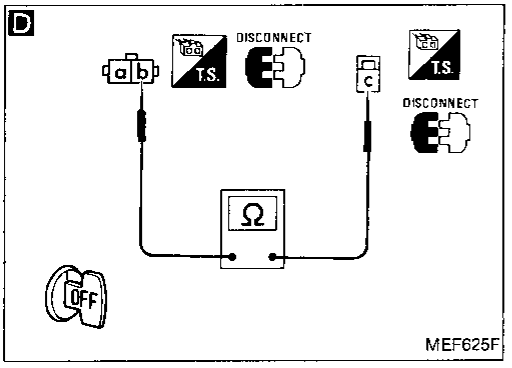


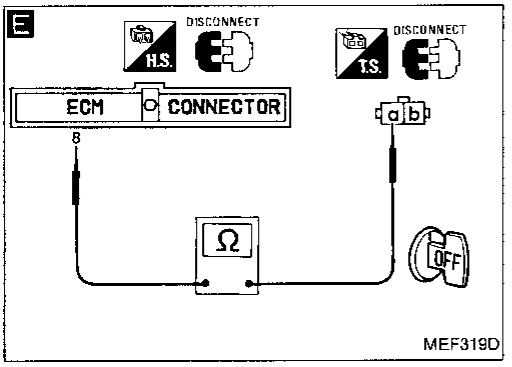
Diagnostic Procedure 41 (Cont'd)











INSPECTION START

A

CHECK POWER VALVE ACTUATOR FUNCTION.
1) Start engine.
2) Race engine a few times under no-load condition.
3) Make sure that power valve actuator rod moves.

OK → INSPECTION END

NG

B

CHECK INPUT SIGNAL.
Check voltage between ECM terminal ⑧ and ground.
Voltage should drops to approximately 1V when accelerator pedal is depressed.

OK → Check the following items.
1) Vacuum hose for improper connection
2) Surge tank for cracks or holes
3) One-way valve for air leakage

NG

C

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

NG → **D**

CHECK HARNESS CONTINUITY BETWEEN BATTERY AND POWER VALVE CONTROL SOLENOID VALVE.
1) Turn ignition switch "OFF".
2) Disconnect battery ⊕ terminal harness connector (E24).
3) Check harness continuity between terminals ⓑ and ⓒ.
Continuity should exist.

NG → Check the following items.
1) "BR" fusible link
2) Joint connector (E52)

OK → Repair harness or connectors.

OK

E

CHECK HARNESS CONTINUITY BETWEEN ECM AND POWER VALVE CONTROL SOLENOID VALVE.
1) Disconnect ECM SMJ harness connector.
2) Check harness continuity between ECM terminal ⑧ and terminal ⓐ.
Continuity should exist.

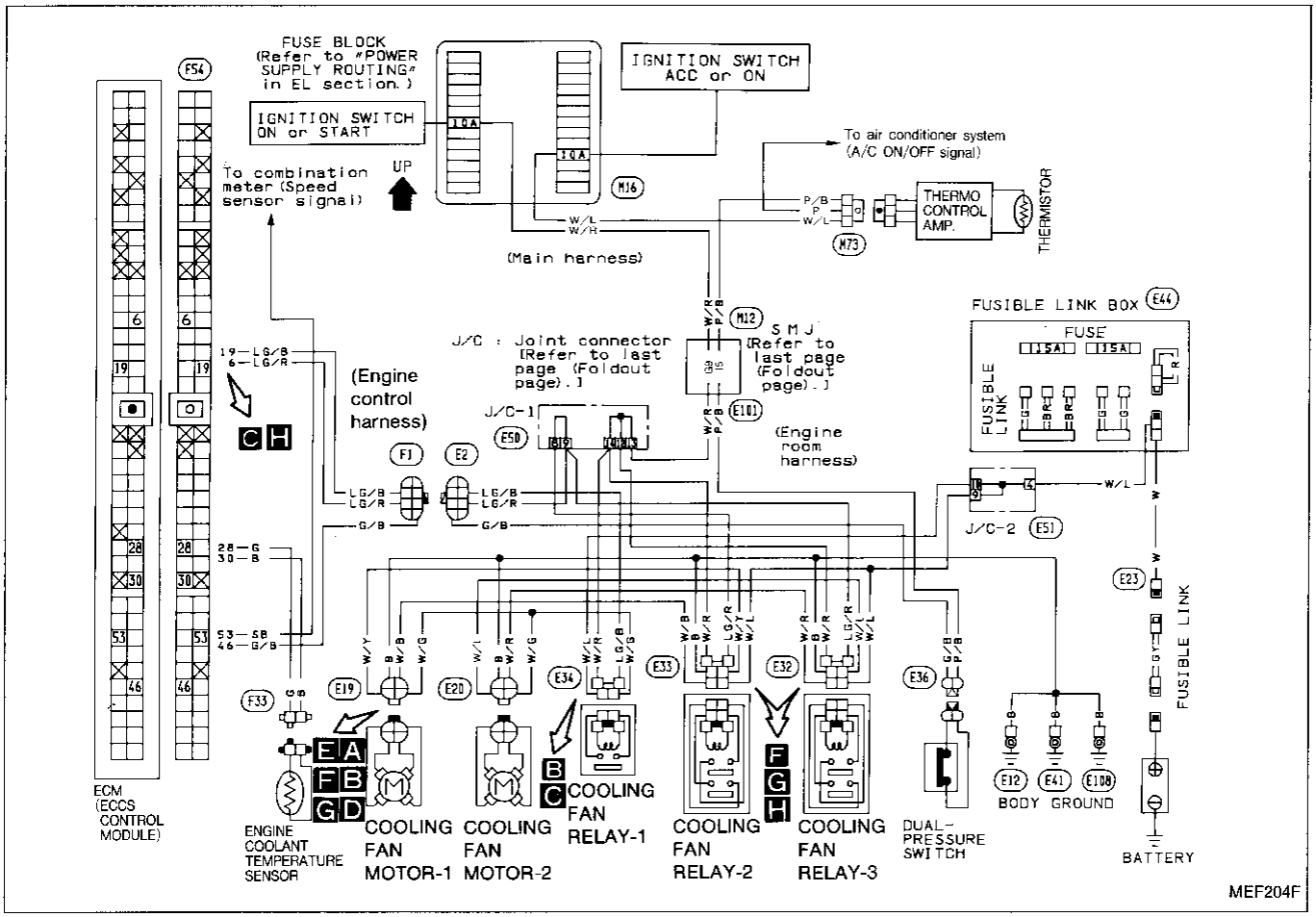
NG → Repair harness or connectors.

OK

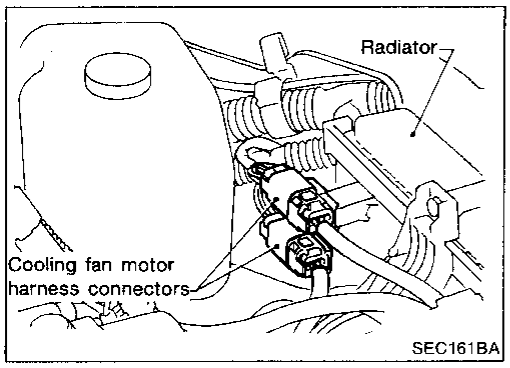
CHECK COMPONENT
(Power valve control solenoid valve).
Refer to "Electrical Components Inspection".
(See page EF & EC-147.)

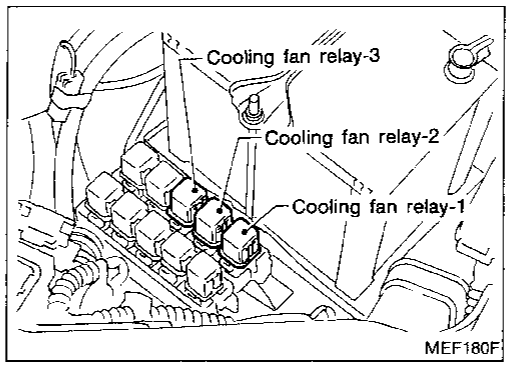
Diagnostic Procedure 42

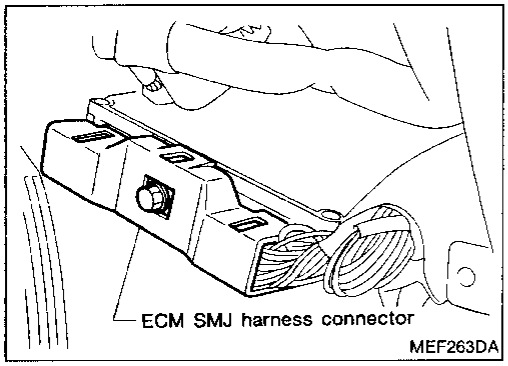
COOLING FAN CONTROL (Not self-diagnostic item)



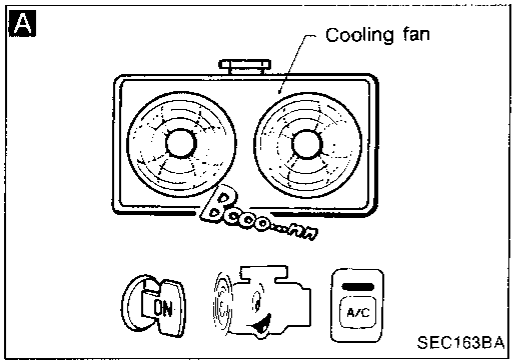
Harness layout

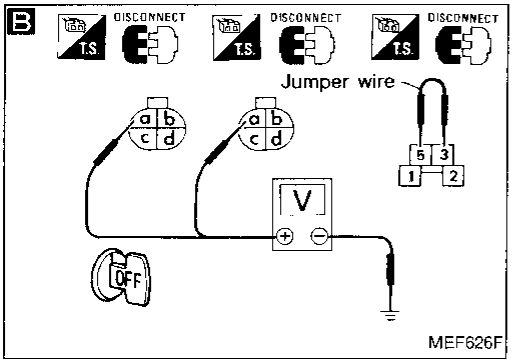


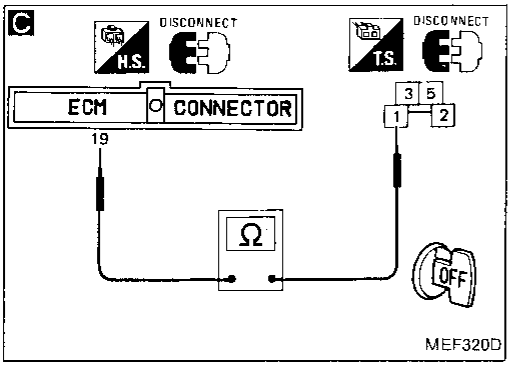


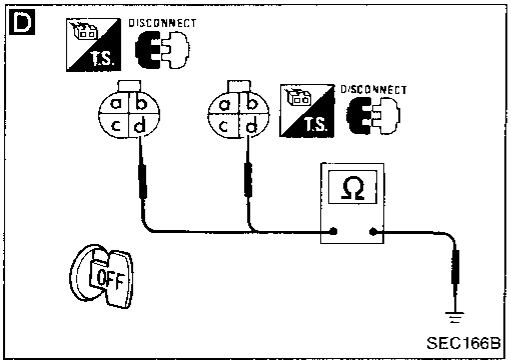


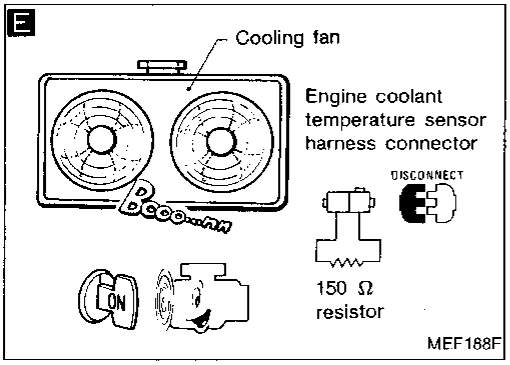
Diagnostic Procedure 42 (Cont'd)











INSPECTION START

A

CHECK COOLING FAN LOW SPEED CIRCUIT.
1) Start engine.
2) Turn air conditioner switch "ON".
3) Make sure that both cooling fan motors operate at low speed.

OK → (B)

NG

B

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect cooling fan relay-1.
3) Disconnect both cooling fan motor harness connectors.
4) Connect jumper wire between terminals ③ and ⑤.
5) Check voltage between terminal ⓐ and ground.
Voltage: Battery voltage

NG → Check the following items.
1) "GY" fusible link
2) "R" fusible link
3) Joint connector E51

OK → Repair harness or connectors.

OK

CHECK COMPONENT
(Cooling fan relay-1).
Refer to "Electrical Components Inspection".
(See page EF & EC-148.)

NG → Replace cooling fan relay-1.

OK

C

CHECK HARNESS CONTINUITY BETWEEN ECM AND COOLING FAN RELAY-1.
1) Turn ignition switch "OFF".
2) Disconnect jumper wire.
3) Disconnect ECM SMJ harness connector.
4) Check harness continuity between ECM terminal ⑲ and terminal ①.
Continuity should exist.

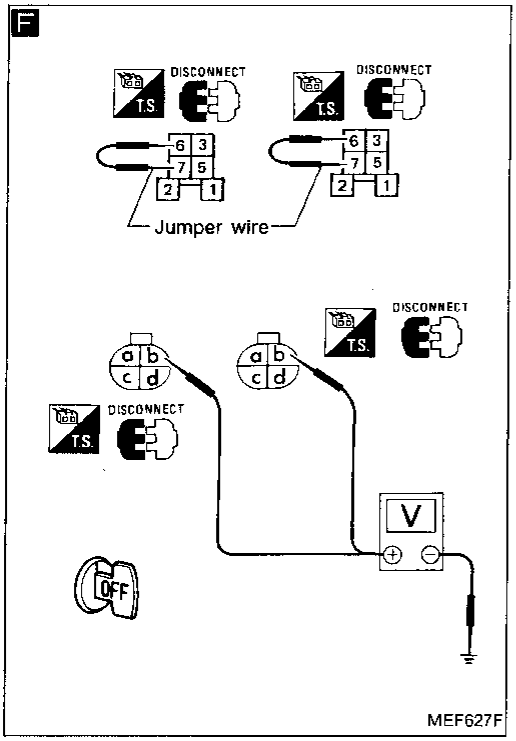
NG → Repair harness or connectors.

OK

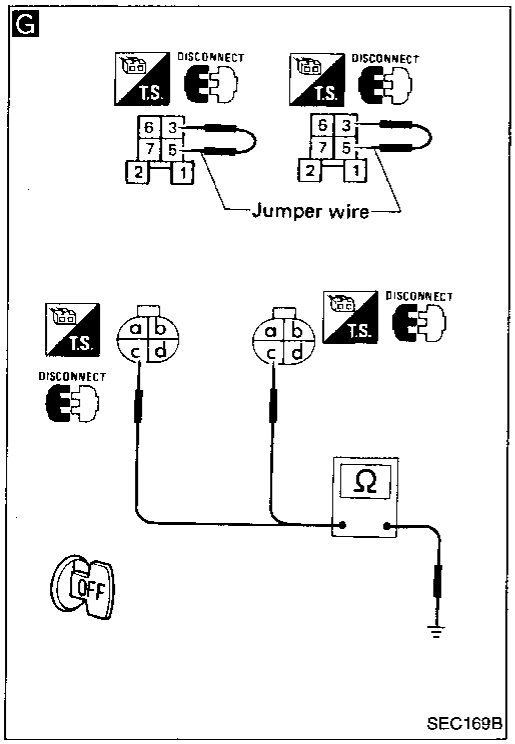
(A)

Diagnostic Procedure 42 (Cont'd)

F



G



Ⓐ

D

CHECK GROUND CIRCUIT.
1) Check harness continuity between terminal ⓓ and ground.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

Replace cooling fan motor.

E

CHECK COOLING FAN HIGH-SPEED CIRCUIT.
1) Stop engine.
2) Disconnect engine coolant temperature sensor harness connector.
3) Connect 150Ω resistor to engine coolant temperature sensor harness connector.
4) Restart engine and make sure that both cooling fans operate at high speed.

Ⓑ

OK → INSPECTION END

NG ↓

F

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect cooling fan relay-2 & -3.
3) Disconnect both cooling fan harness connectors.
4) Connect jumper wire between terminals ⑥ and ⑦.
5) Check voltage between terminal ⓑ and ground.
Voltage: Battery voltage

NG → Check the following items.
1) "GY" fusible link
2) "R" fusible link
3) Joint connector (E51)

OK → Repair harness or connectors.

OK ↓

G

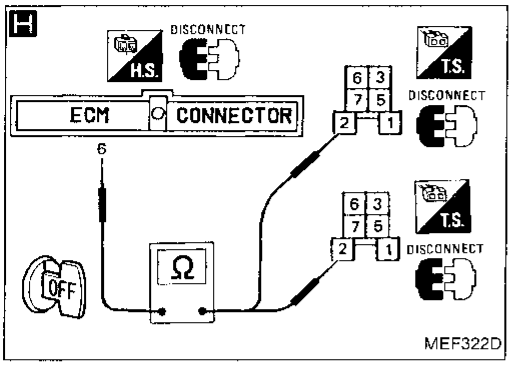
CHECK GROUND CIRCUIT.
1) Disconnect jumper wire between terminals ⑥ and ⑦.
2) Connect jumper wire between terminals ⑤ and ③.
3) Check harness continuity between terminal ⓒ and ground.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

Ⓒ

Diagnostic Procedure 42 (Cont'd)



Ⓒ

H

CHECK HARNESS CONTINUITY BETWEEN ECM AND COOLING FAN RELAY-2 & -3.
1) Disconnect jumper wires between terminals ③ and ⑤.
2) Check harness continuity between ECM terminal ⑥ and terminal ②.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT (Cooling fan relay-2 & -3).
Refer to "Electrical Components Inspection".
(See page EF & EC-149.)

NG → Replace cooling fan relay-2, -3.

OK ↓

Replace cooling fan motor.

Diagnostic Procedure 43

FAIL-SAFE SYSTEM FOR CAMSHAFT POSITION SENSOR AND CPU OF ECM

INSPECTION START

Engine begins to run in a few seconds.

CHECK FAIL-SAFE SYSTEM FUNCTION.
1) Disconnect camshaft position sensor harness connector.
2) Crank engine.

→ INSPECTION END

Engine does not run after a few seconds. ↓

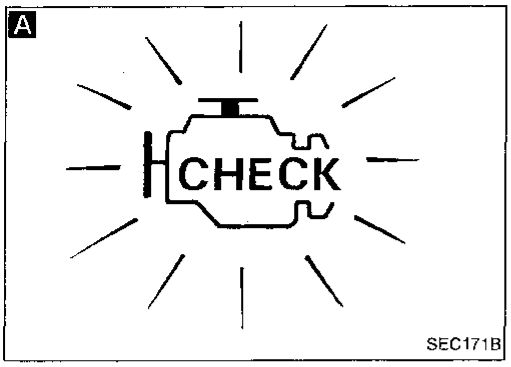
Failure of engine to start may not be due to camshaft position sensor circuit. Determine cause of problem.

Diagnostic Procedure 43 (Cont'd)

TROUBLE DIAGNOSES FOR FAIL-SAFE SYSTEM

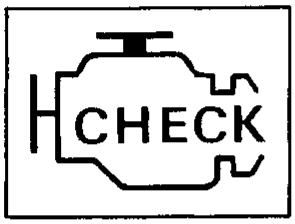
When fail-safe system activates, warning lamp (MALFUNCTION INDICATOR LAMP) in instrument panel blinks. When vehicle with such a problem is brought to dealer for checkup, conduct diagnostic procedures using the following chart as a guide.

A



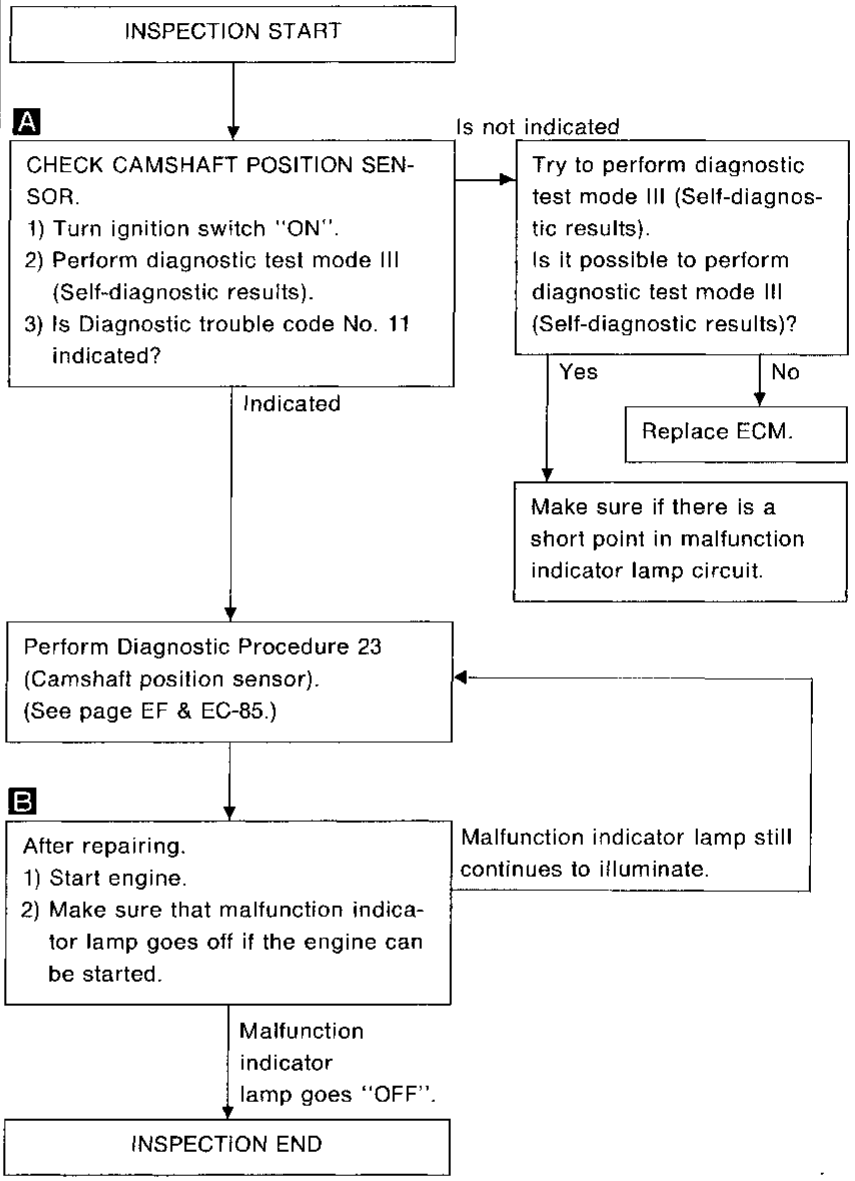
SEC171B

B



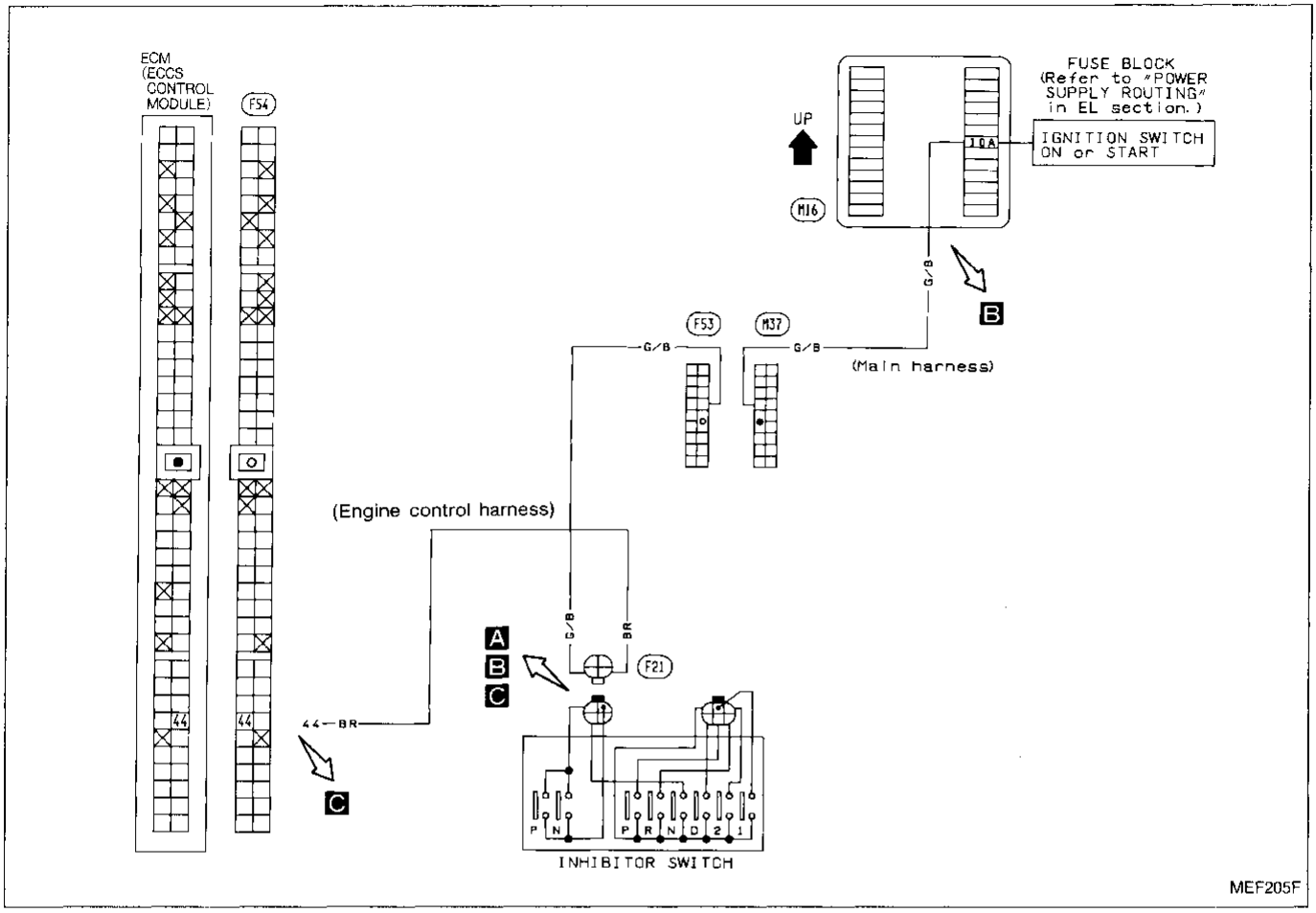
MALFUNCTION INDICATOR LAMP

MEF323D

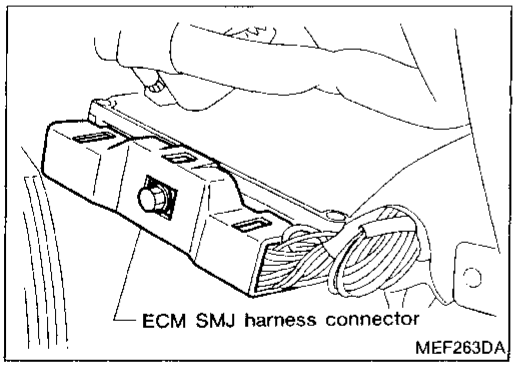


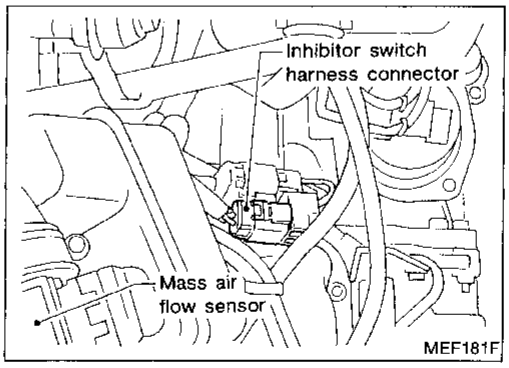
Diagnostic Procedure 44

INHIBITOR SWITCH CIRCUIT (Not self-diagnostic item)

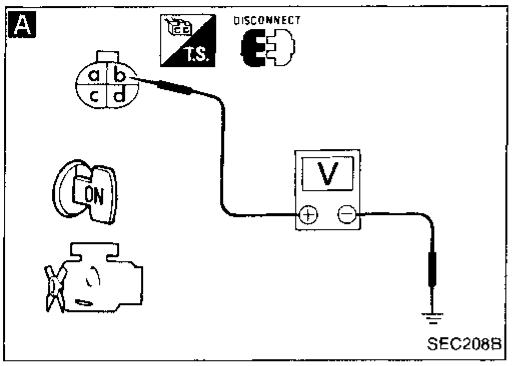


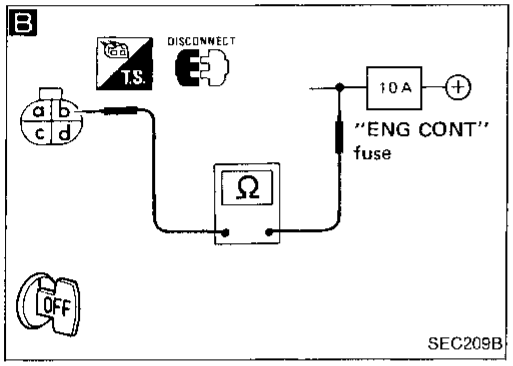
Harness layout

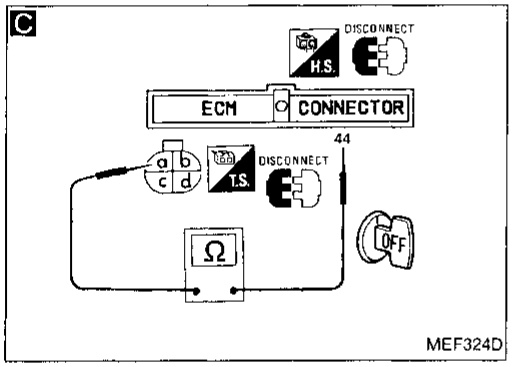




Diagnostic Procedure 44 (Cont'd)







INSPECTION START

A

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

NG → B

B

CHECK HARNESS CONTINUITY BETWEEN FUSE AND INHIBITOR SWITCH.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminal ⓑ and "ENG CONT" fuse.
Continuity should exist.

NG → Repair harness or connectors.

OK

C

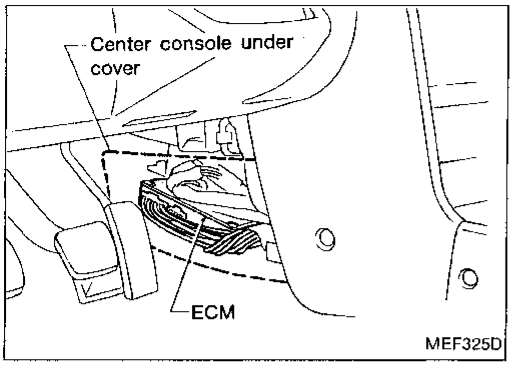
CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM SMJ harness connector.
3) Check harness continuity between terminal ⓐ and ECM terminal ㊹.
Continuity should exist.

NG → Repair harness or connectors.

OK

CHECK COMPONENT
(Inhibitor switch).
Refer to "Electrical Components Inspection".
(See page EF & EC-148.)

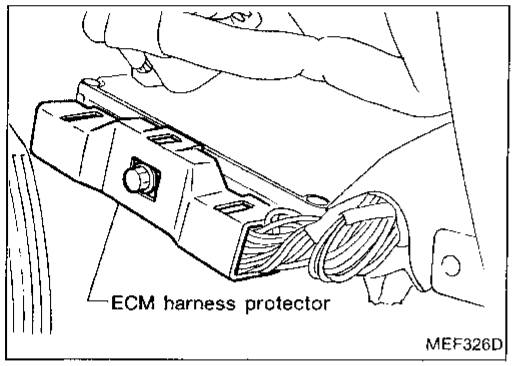
INSPECTION END



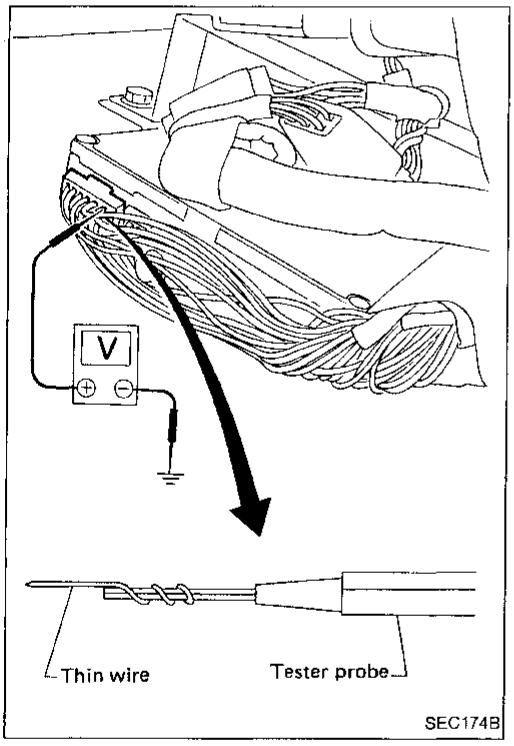
Electrical Components Inspection

ECM INPUT/OUTPUT SIGNAL INSPECTION

1. ECM is located behind center console panel. For this inspection, remove left side of center console under cover.



2. Remove ECM harness protector.



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

Electrical Components Inspection (Cont'd)

ECM inspection table

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
1	Ignition signal	Engine is running. └ Idle speed	0.4 - 0.6V
		Engine is running. └ Engine speed is 4,000 rpm.	1.9 - 2.1V
2	Ignition check	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
4, 5, 14, 15	IACV-AAC valve	Engine is running. └ Racing condition	Voltage briefly decreases from battery voltage (11 - 14V).
6	Cooling fan (High speed)	Engine is running. └ Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Cooling fan is operating.	0.7 - 0.8V
8	Power valve control solenoid valve	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Racing (up to 4,000 rpm) quickly	0.7 - 0.8V
9	Air conditioner relay	Engine is running. └ Air conditioner switch "OFF"	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Air conditioner switch "ON"	0.7 - 0.8V
16	ECM power source (Self-shutoff)	Engine is running. └ Idle speed	0.8 - 1.0V
		Engine is running. └ For a few seconds after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
18	Fuel pump relay	Engine is running. └ Normal condition	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Abnormal condition [Fuel pump voltage control circuit (ECM terminal No. (104)) is inoperative.]	0.7 - 0.8V

Electrical Components Inspection (Cont'd)

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
19	Cooling fan (Low speed)	Engine is running. └ Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Cooling fan is operating.	0.7 - 0.8V
23	Knock sensor	Engine is running.	3.0 - 4.0V
25	Electric load signal	Engine is running. └ Electric load signal is "OFF".	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Electric load signal (Rear defogger switch) is "ON".	0.1 - 0.3V
27	Mass air flow sensor	Engine is running. (Warm-up condition) └ Idle speed	1.0 - 1.3V
		Engine is running. (Warm-up condition) └ Engine speed is 3,000 rpm.	1.8 - 2.0V
28	Engine coolant temperature sensor	Engine is running.	0 - 5.0V Output voltage varies with engine coolant temperature.
34	Power steering oil pressure switch	Engine is running. └ Steering wheel stays straight.	8.0 - 9.0V
		Engine is running. └ Steering wheel is turned.	0 - 0.2V
38	Throttle position sensor	Ignition switch "ON"	0.5 - 4.2V Output voltage varies with throttle valve opening angle.
39	EGR temperature sensor	Engine is running. (Warm-up condition) └ Idle speed	1.0V or more
		Engine is running. (Warm-up condition) └ EGR system is operating.	0 - 1.0V

Electrical Components Inspection (Cont'd)

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
41 51	Camshaft position sensor (Reference signal)	Engine is running. **Do not run engine at high speed under no-load.**	0.2 - 0.4V Output voltage slightly varies with engine speed.
42 52	Camshaft position sensor (Position signal)	Engine is running. **Do not run engine at high speed under no-load.**	2.5 - 2.7V Output voltage slightly varies with engine speed.
43	Start signal	Ignition switch "ON"	0V
		Ignition switch "START"	BATTERY VOLTAGE (11 - 14V)
44	Inhibitor switch	Ignition switch "ON" └ Gear position is "N" or "P"(A/T model).	BATTERY VOLTAGE (11 - 14V)
		Ignition switch "ON" └ Except the above conditions	0V
45	Ignition switch	Ignition switch "ON" └ Engine stopped	BATTERY VOLTAGE (11 - 14V)
46	Air conditioner switch	Engine is running. └ Air conditioner switch "OFF"	8.0 - 9.0V
		Engine is running. └ Air conditioner switch "ON"	0.5 - 0.7V
48	Power source for sensors	Ignition switch "ON" └ Engine stopped	Approximately 5.0V
49	Battery source	Ignition switch "ON" └ Engine stopped	BATTERY VOLTAGE (11 - 14V)
53	Vehicle speed sensor	Ignition switch "ON" └ Engine stopped └ While rotating front wheel by hand	0 or 7.0 - 9.0V
54	Closed throttle position switch	Ignition switch "ON" └ Accelerator pedal is fully released (engine stopped).	9.0 - 10.0V
		Ignition switch "ON" └ Accelerator pedal is depressed (engine stopped).	0V

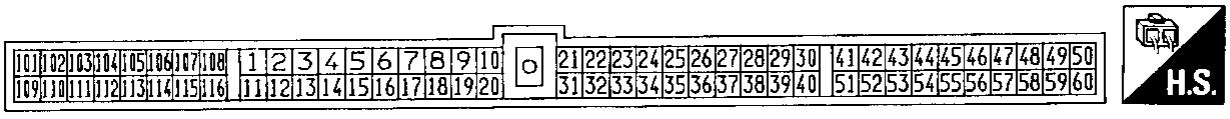
GI MA EM LC EF & EC FE CL MT AT FA RA BR ST BF HA EL IDX

Electrical Components Inspection (Cont'd)

*Data are reference values.

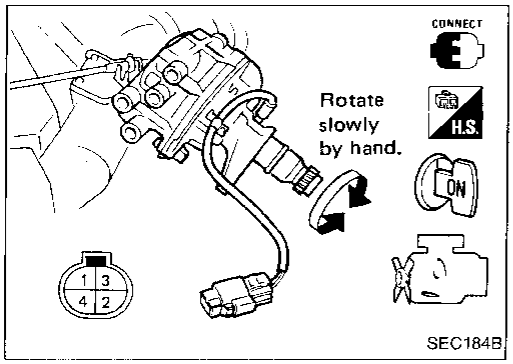
TERMINAL NO.	ITEM	CONDITION	*DATA
57	Power source for closed throttle position switch	Ignition switch "ON" └ Engine stopped	8.0 - 9.0V
59	Power supply	Ignition switch "ON" └ Idle speed	BATTERY VOLTAGE (11 - 14V)
101, 103, 105, 110, 112, 114	Injectors	Engine is running.	BATTERY VOLTAGE (11 - 14V)
102	EGRC-solenoid valve	Engine is running. (Warm-up condition) └ Idle speed └ Engine speed is approximately 3,400 rpm or more.	0.7 - 0.8V
		Engine is running. (Warm-up condition) └ Engine speed is about 2,000 rpm.	BATTERY VOLTAGE (11 - 14V)
104	Fuel pump voltage control	Ignition switch "ON" └ 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ 30 seconds after engine begins to run.	4.0 - 4.5V
		Engine is running. └ Racing (up to 4,000 rpm)	2.0 - 4.5V

ECM SMJ HARNESS CONNECTOR TERMINAL LAYOUT



SEC250B

Electrical Components Inspection (Cont'd)



SEC184B

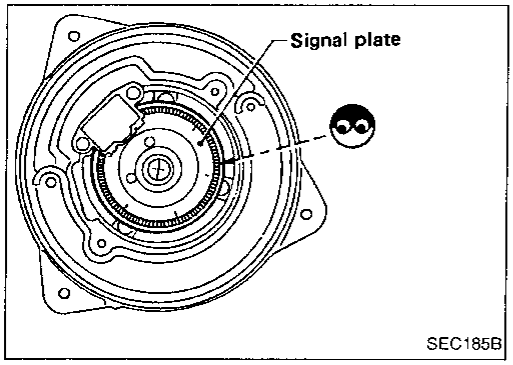
CAMSHAFT POSITION SENSOR

1. Remove distributor from engine. (Camshaft position sensor harness connector should remain connected.)
2. Turn ignition switch "ON".
3. Rotate distributor shaft slowly by hand and check voltage between terminals ③, ④ and ground.

Terminal	Voltage
③ (120° signal)	Tester's pointer fluctuates between 5V and 0V.
④ (1° signal)	

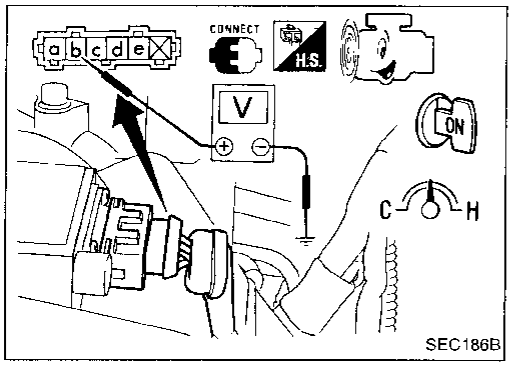
If NG, replace distributor assembly with camshaft position sensor.

4. Visually check signal plate for damage or dust.



SEC185B

MASS AIR FLOW SENSOR

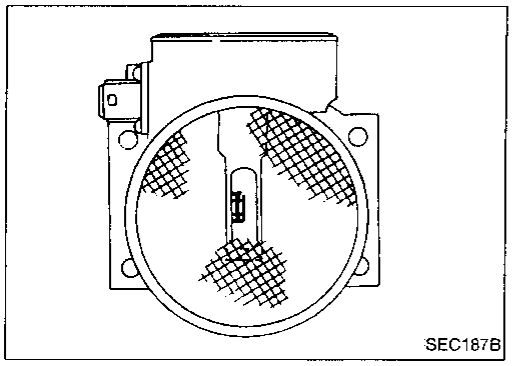


SEC186B

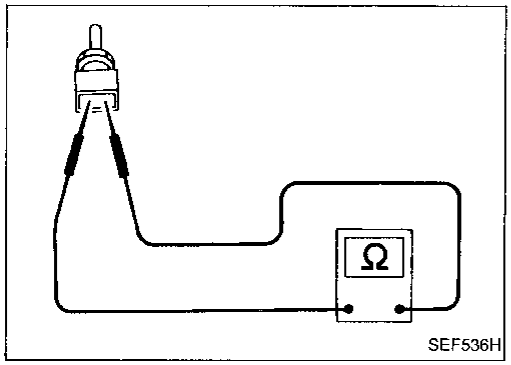
1. Peel mass air flow sensor harness connector rubber as shown in the figure if the harness connector is connected.
2. Turn ignition switch "ON".
3. Start engine and warm it up sufficiently.
4. Check voltage between terminal (b) and ground.

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 0.5
Idle (Engine is warm-up sufficiently.)	Approximately 1.0 - 1.3

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


SEC187B

ENGINE COOLANT TEMPERATURE SENSOR



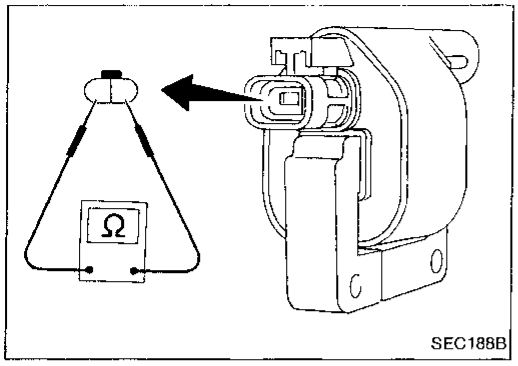
SEF536H

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 - 1.0
80 (176)	0.30 - 0.33

If NG, replace engine coolant temperature sensor.

Electrical Components Inspection (Cont'd)

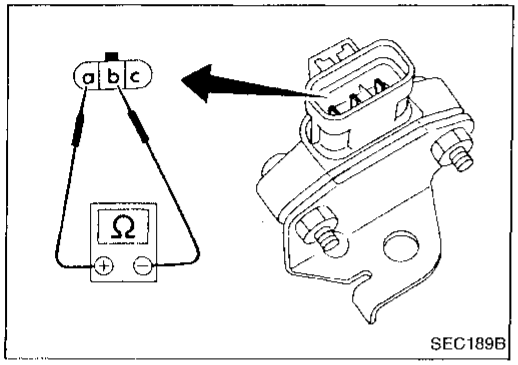


IGNITION COIL

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

Terminal	Resistance
① - ②	Approximately 1.0Ω

If NG, replace ignition coil.



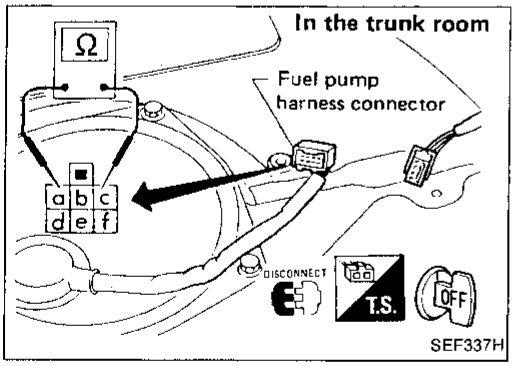
POWER TRANSISTOR

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

Set tester in lower range.

Terminal No.	Tester polarity	Continuity
ⓐ	⊕	Yes
ⓑ	⊖	
ⓐ	⊖	No
ⓑ	⊕	
ⓐ	⊕	Yes
ⓒ	⊖	
ⓐ	⊖	No
ⓒ	⊕	

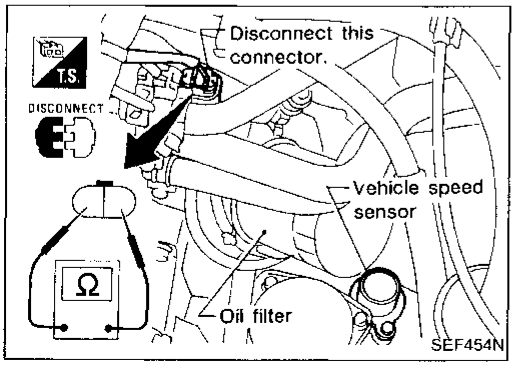
If NG, replace power transistor.



FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals (a) and (c).
   Resistance: Approximately 1.0Ω

If NG, replace fuel pump.



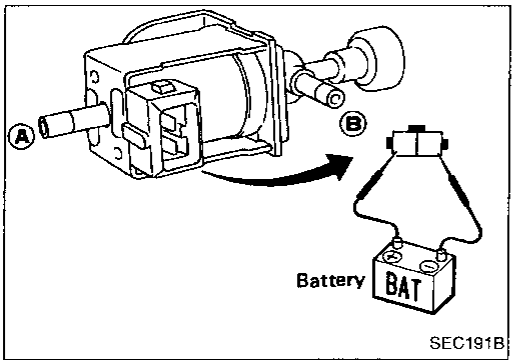
VEHICLE SPEED SENSOR

1. Jack up front wheel.
2. Disconnect vehicle speed sensor harness connector.
3. Check continuity, as shown in the figure, rotating the wheel by hand.

Continuity should come and go.

If NG, replace vehicle speed sensor.

Electrical Components Inspection (Cont'd)

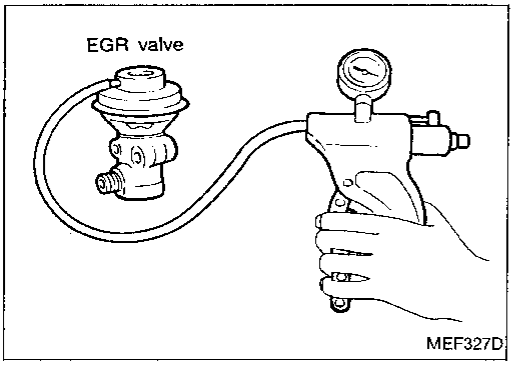


EGRC-SOLENOID VALVE

1. Disconnect EGRC-solenoid valve harness connector.
2. Check solenoid valve, following the table as shown below:

Conditions	Continuity between port Ⓐ and Ⓑ
Supply 12V direct current between terminals ① and ②	Yes
No current supply	No

If NG, replace EGRC-solenoid valve.



EGR VALVE

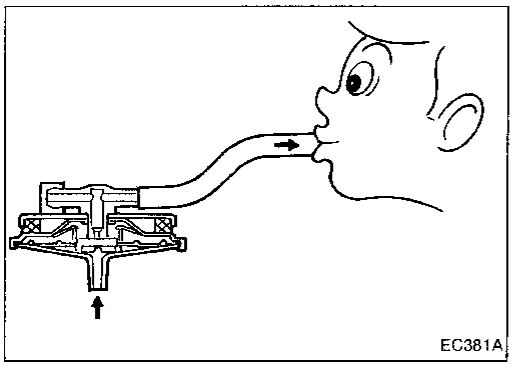
Apply vacuum to EGR vacuum port with a hand vacuum pump.

EGR valve spring should lift.

If NG, replace EGR valve.

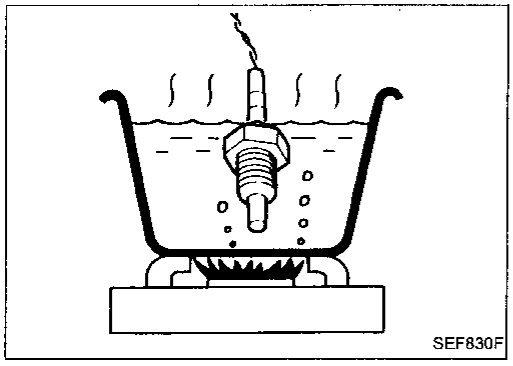
HEATED OXYGEN SENSOR

Refer to "Diagnostic Procedure 31".
(See page EF & EC-104.)



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.



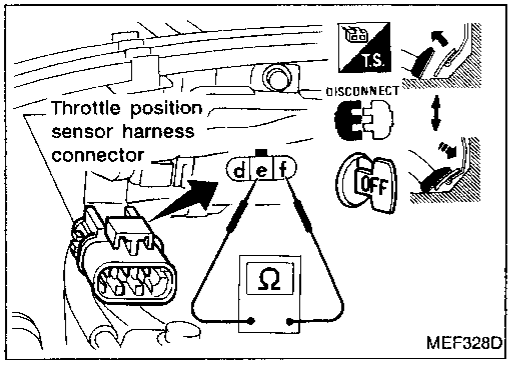
EGR TEMPERATURE SENSOR

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

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

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

  If NG, replace EGR temperature sensor.



THROTTLE POSITION SENSOR

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

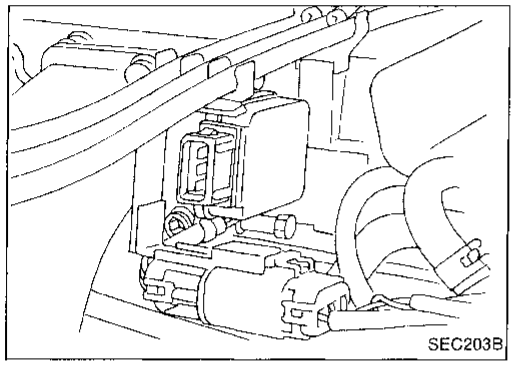
Accelerator pedal conditions	Resistance kΩ
Completely released	Approximately 1
Partially released	1 - 9
Completely depressed	Approximately 9

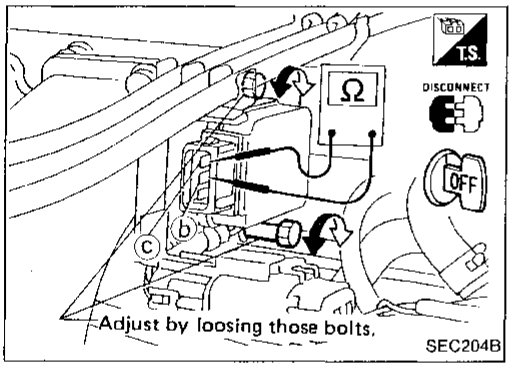
If NG, replace throttle position sensor.

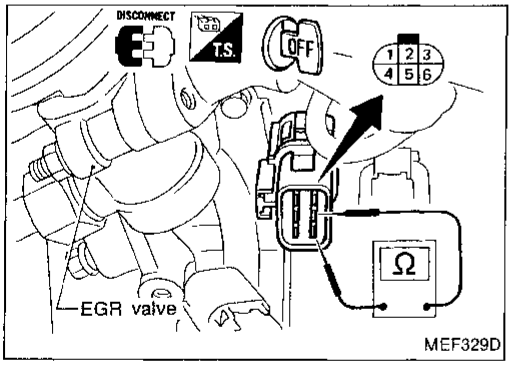
Electrical Components Inspection (Cont'd)

Adjustment

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







1. Install throttle position sensor body in throttle body. Do not tighten bolts. Leave bolts loose.
2. Connect throttle position sensor and closed throttle position switch harness connector.
3. Start engine and warm it up sufficiently.
4. Turn diagnostic test mode selector on ECM fully clockwise.
5. Disconnect closed throttle position switch harness connector.
6. Check closed throttle position switch OFF → ON speed with circuit tester, closing throttle valve manually.
   Closed throttle position switch OFF → ON speed:
   Engine speed (Idle speed in "N" position) + 250 ± 150 rpm
7. If NG, set closed throttle position switch OFF → ON speed to the specified value by turning throttle position sensor body. Connect circuit tester with terminals ⓒ and ⓑ on closed throttle position switch side and find out OFF → ON point.
8. Tighten throttle position sensor installing bolts carefully after setting so that throttle position sensor does not move.

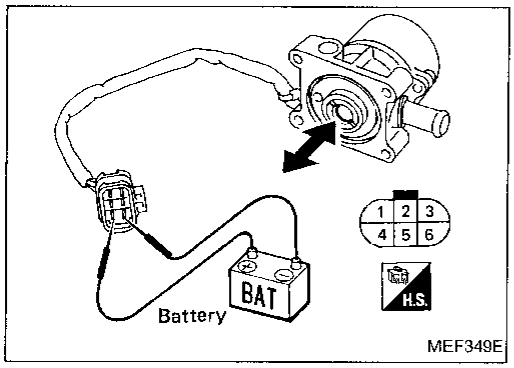
IACV-AAC VALVE

Resistance check

1. Disconnect IACV-AAC valve harness connector.
2. Check resistance between terminals, following the table as shown below:

Terminal No.	Resistance
① - ② ② - ③ ④ - ⑤ ⑤ - ⑥	Approximately 27 - 40Ω

Electrical Components Inspection (Cont'd)



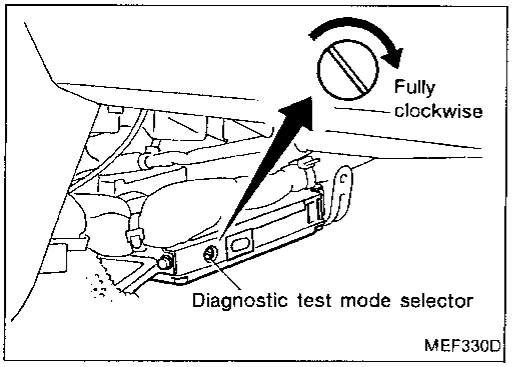
MEF349E

Operation check

1. Remove IACV-AAC valve assembly from intake manifold.
2. Apply battery voltage between terminals one by one in order indicated in the table below:

	⊕ ⊖	Order	
Terminal No.	② - ①	↓	↑
	⑤ - ④		
	② - ③		
	⑤ - ⑥		
Moving direction		a	b

3. Check IACV-AAC valve shaft moves forward and backward.
   If results of both checks are NG, replace IACV-AAC valve.



MEF330D

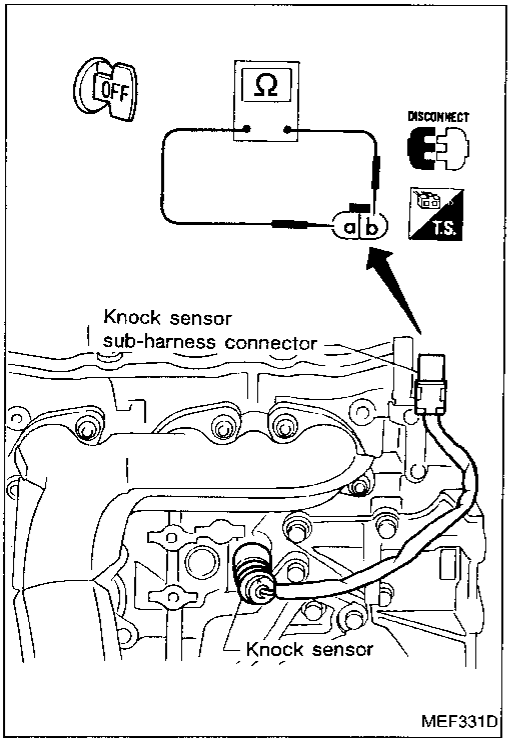
WARNING:

- **IACV-AAC valve shaft movement is hard to see visually, but vibration is felt if IACV-AAC valve can be reached with hand.**
- **When IACV-AAC valve is removed or replaced, IACV-AAC valve should be closed by turning diagnostic test mode selector fully clockwise.**

There is a possibility that IACV-AAC valve opening angle memorized in ECM does not match the actual IACV-AAC valve opening angle.

KNOCK SENSOR

1. Disconnect knock sensor sub-harness connector.
2. Check continuity between terminals (a) and (b).
   Continuity should exist.



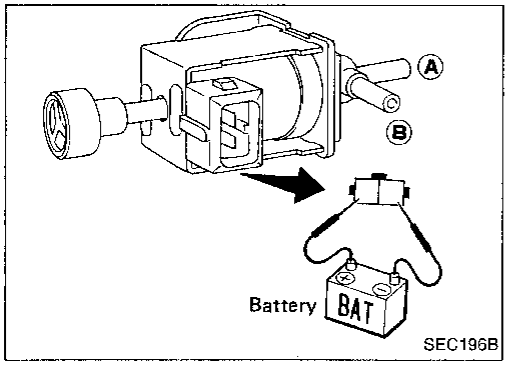
MEF331D

POWER VALVE CONTROL SOLENOID VALVE

1. Disconnect power valve control solenoid valve harness connector.
2. Check solenoid valve, following the table as shown below:

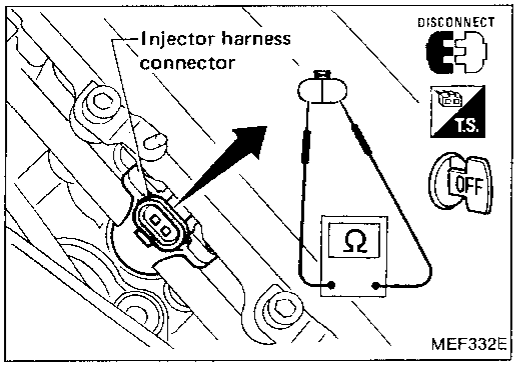
Conditions	Continuity between port Ⓐ and Ⓑ
Supply 12V between terminals ① and ②	Yes
No current supply	No

If NG, replace power valve control solenoid valve.



SEC196B

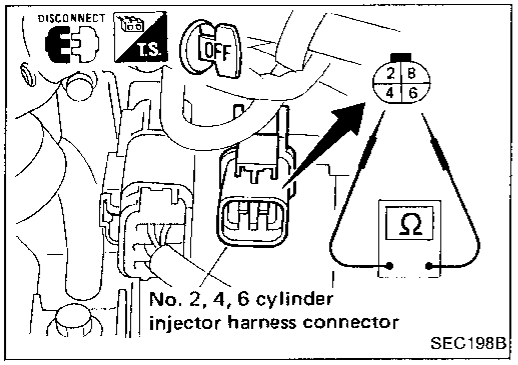
Electrical Components Inspection (Cont'd)



INJECTOR

No. 1, No. 3 and No. 5 cylinders

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

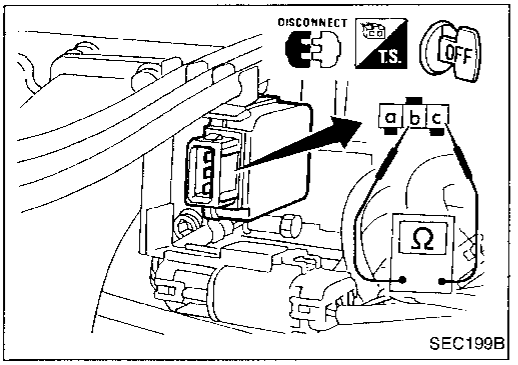


No. 2, No. 4 and No. 6 cylinders

1. Disconnect middle harness connector for injectors.
2. Check resistance between terminals, following the table as shown below:

Cylinder	Terminal No.	Resistance
No. 2	② - ⑧	10 - 14Ω
No. 4	④ - ⑧	
No. 6	⑥ - ⑧	

If NG, replace injector.

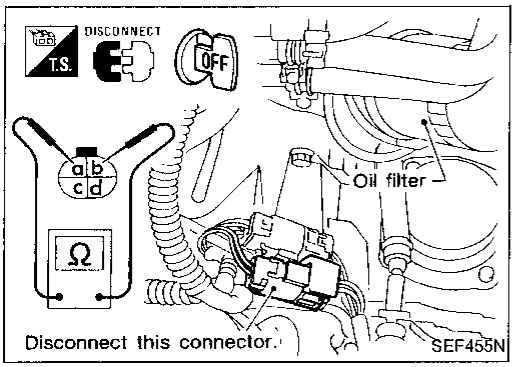


CLOSED THROTTLE POSITION SWITCH

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

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

If NG, replace closed throttle position switch.

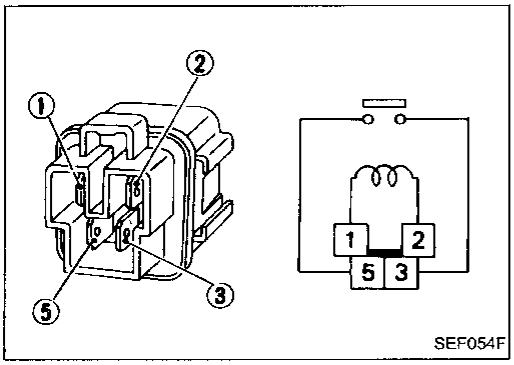


INHIBITOR SWITCH

Check continuity between terminals ⓐ and ⓑ.

Conditions	Continuity
Shift to "P" position	Yes
Shift to "N" position	Yes
Shift to positions other than "P" and "N"	No

If NG, replace inhibitor switch.



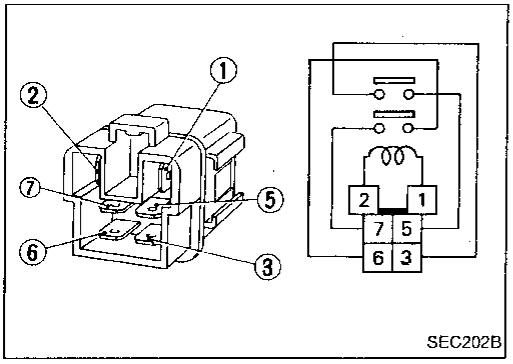
ECCS RELAY, FUEL PUMP RELAY AND COOLING FAN RELAY-1

Check continuity between terminals ③ and ⑤.

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

If NG, replace relay.

Electrical Components Inspection (Cont'd)

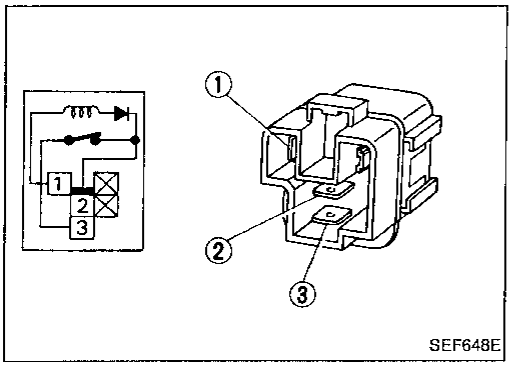


COOLING FAN RELAY-2 AND COOLING FAN RELAY-3

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

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

If NG, replace relay.

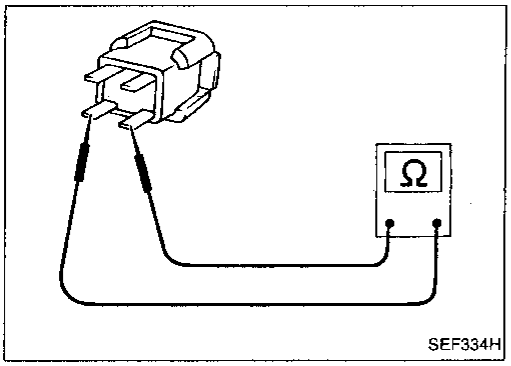


SAFETY RELAY

Check continuity between terminals ② and ③.

Conditions		Continuity between terminals ② and ③
12V supply between terminals ① and ②		
①	②	
–	+	Yes
+	–	No

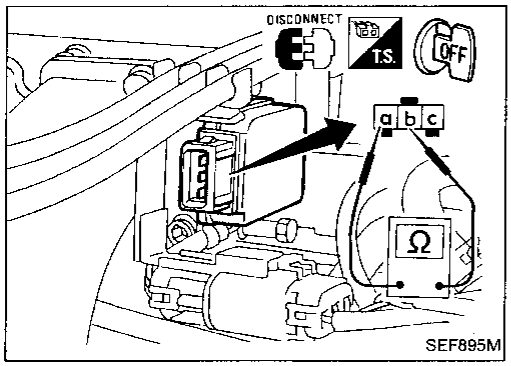
If NG, replace relay.



RESISTOR

1. Disconnect resistor harness connector.
2. Check resistance between terminal ⓐ and ⓑ.
   Resistance: Approximately 2.2Ω

If NG, replace resistor.

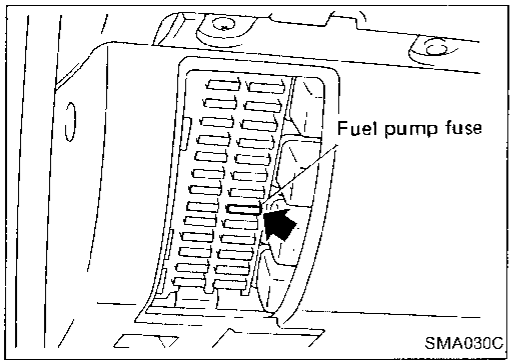


WIDE OPEN THROTTLE POSITION SWITCH

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

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes

If NG, replace throttle position switch.



Releasing Fuel Pressure

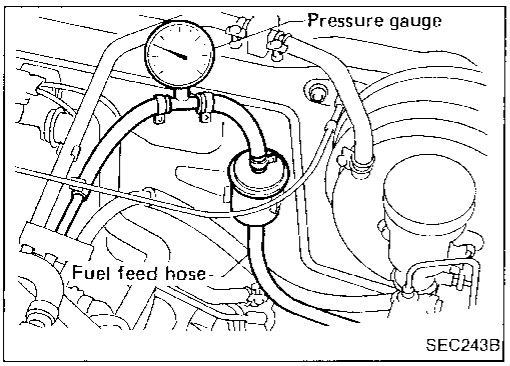
Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

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

Erase the diagnostic test mode III (self-diagnostic results) memory (Diagnostic trouble code No. 22).

Fuel Pressure Check

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

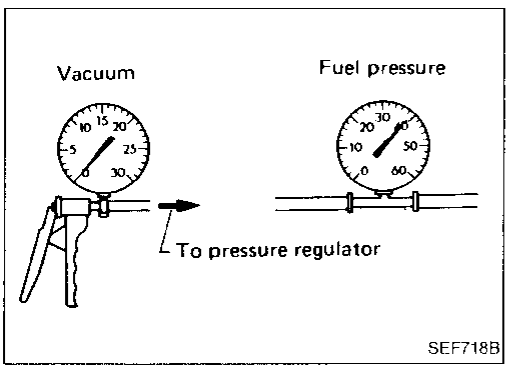


1. Release fuel pressure to zero.
2. Disconnect fuel hose between fuel filter and fuel tube (engine side).
3. Install pressure gauge between fuel filter and fuel tube.
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

At idling:

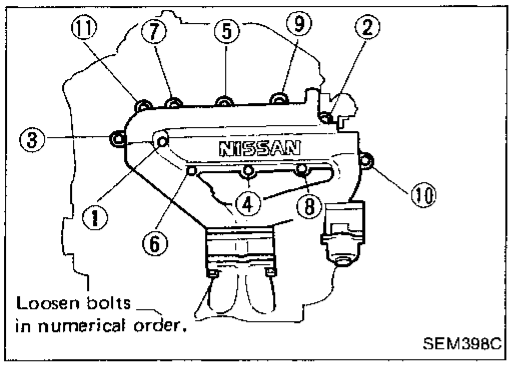
When fuel pressure regulator valve vacuum hose is connected.
Approximately 250.1 kPa (2.55 kg/cm^2, 36.3 psi)
When fuel pressure regulator valve vacuum hose is disconnected.
Approximately 299.1 kPa (3.05 kg/cm^2, 43.4 psi)

6. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
7. Plug intake manifold with a rubber cap.
8. Connect variable vacuum source to fuel pressure regulator.



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

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



Injector Removal

1. Release fuel pressure to zero.
2. Separate ASCD and accelerator control wire from intake manifold collector.
3. Remove intake upper manifold collector from engine.

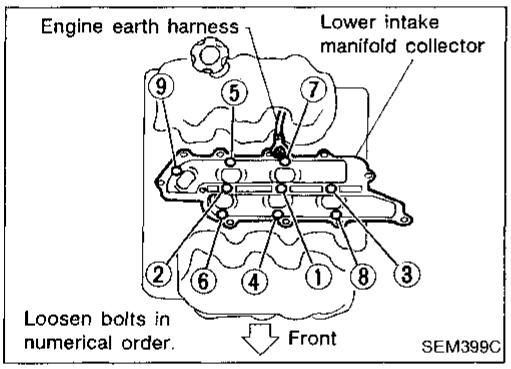
The following parts should be disconnected or removed.

(1) Harness connectors for
- IACV-AAC valve
- Throttle position sensor
- Closed throttle position switch
- Water hose for air cut valve

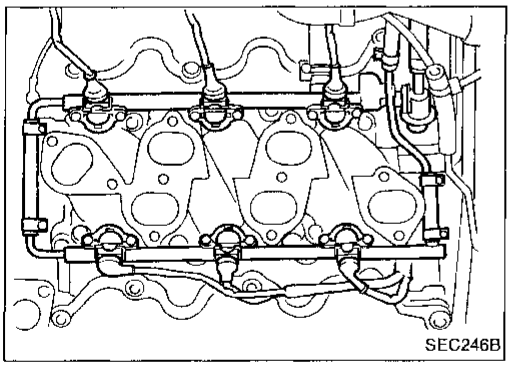
(2) PCV hoses

(3) Vacuum hoses from
- Vacuum gallery
- Power valve actuator
- Master brake cylinder
- EGR valve

(4) EGR flare tube

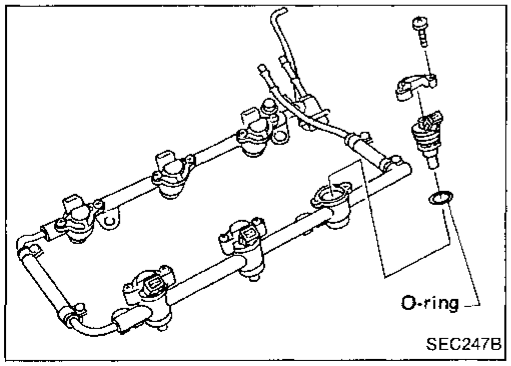


4. Remove intake lower manifold collector from engine.
- Remove engine earth harness.



5. Remove injector fuel tube assembly.

The following parts should be disconnected or removed.
- Vacuum hose for fuel pressure regulator
- Fuel feed and return hose
- All injectors harness connectors



6. Remove any malfunctioning injector from injector fuel tube.
7. Replace or clean injector as necessary.

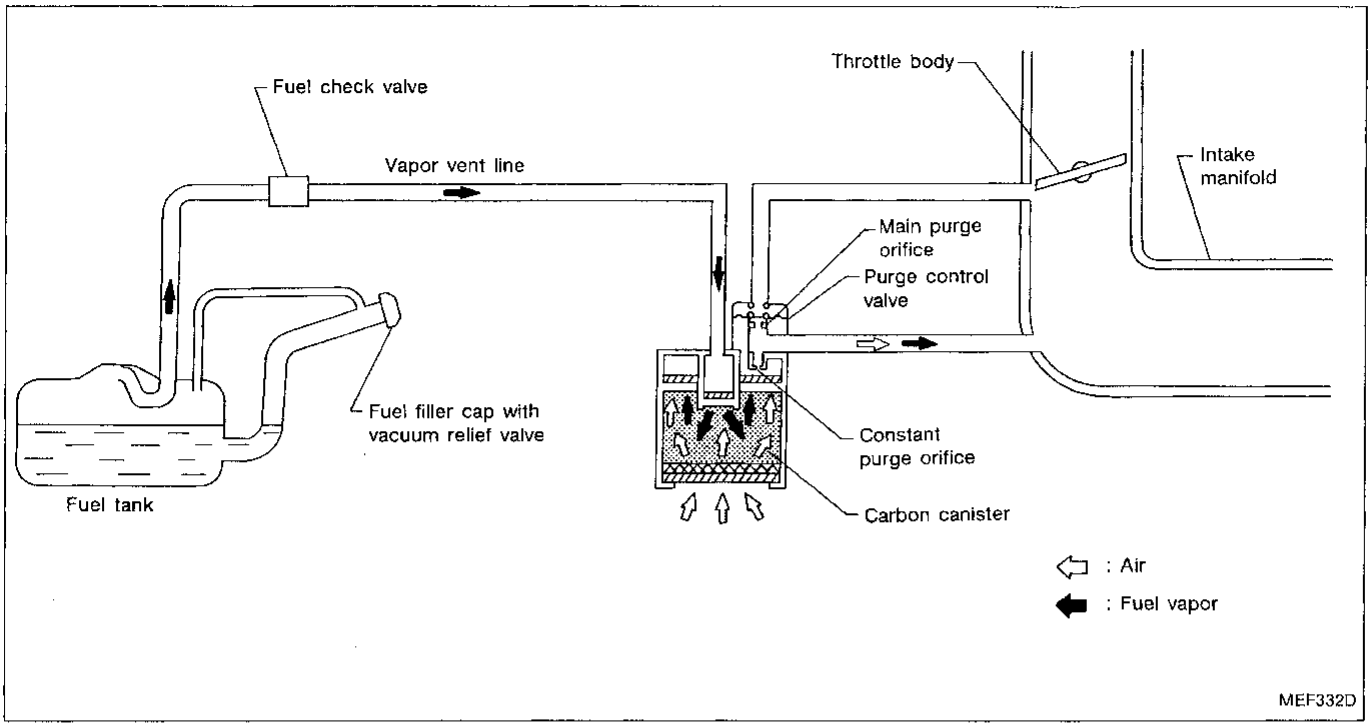
Always replace O-ring with a new one.

8. Connect injector to injector fuel tube.
9. Reinstall any part removed in reverse order of removal.

CAUTION:

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

Description

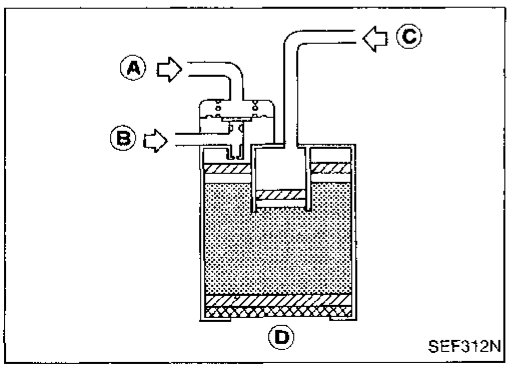


The evaporative emission system is used to reduce hydrocarbons emitted to the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the carbon canister.

The fuel vapor from the sealed fuel tank is led into the canister which contains activated carbon and the vapor is stored there when the engine is not running.

The canister retains the fuel vapor until the canister is purged by the air drawn through the bottom of the canister to the intake manifold when the engine is running. When the engine runs at idle, the purge control valve is closed.

Only a small amount of stored vapor flows into the intake manifold through the constant purge orifice. As the engine speed increases, and the throttle vacuum rises higher, the purge control valve opens and the vapor is sucked into the intake manifold through both the main purge orifice and the constant purge orifice.



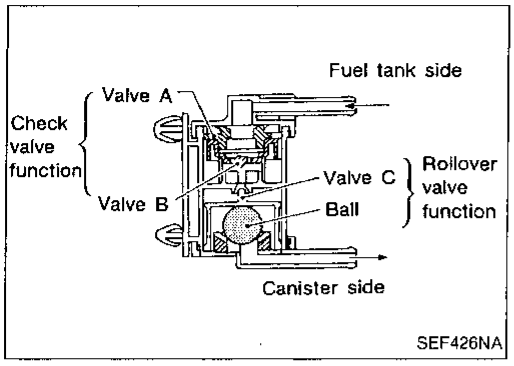
Inspection

ACTIVATED CARBON CANISTER

Check carbon canister as follows:

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

Inspection (Cont'd)



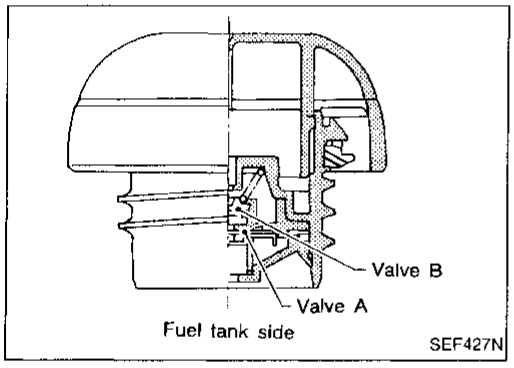
FUEL CHECK VALVE (With rollover valve)

Check valve operation

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

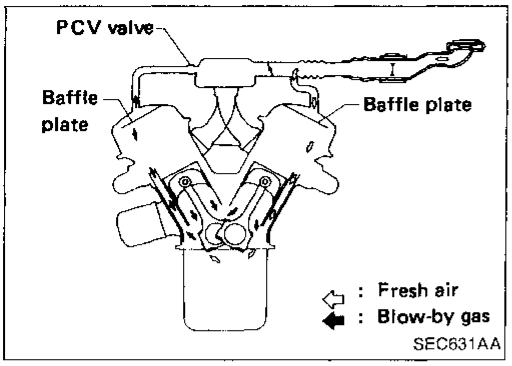
Rollover valve operation

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



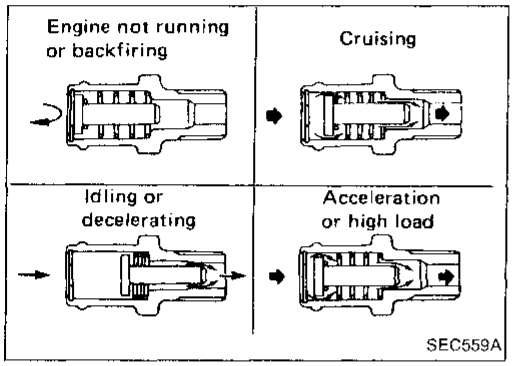
FUEL TANK VACUUM RELIEF VALVE

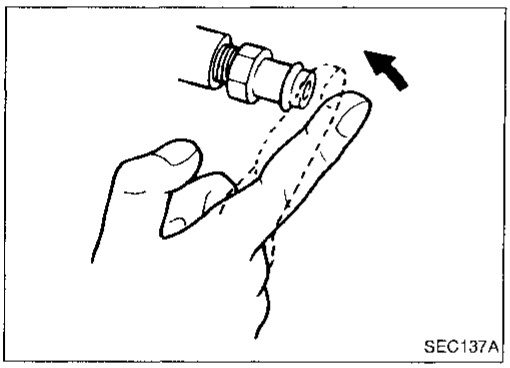
1. Wipe clean valve housing.
2. Suck air through the cap. A slight resistance accompanied by valve clicks indicates that valve A is in good mechanical condition. Note also that, by further sucking air, the resistance should disappear with valve clicks.
3. Blow air on fuel tank side and ensure that continuity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



Description

This system returns blow-by gas to both the intake manifold and air cleaner.
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 cleaner, through the hose connecting air cleaner 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.
On vehicles with an excessively high blow-by some of the flow will go through the hose connection to the air cleaner under all conditions.

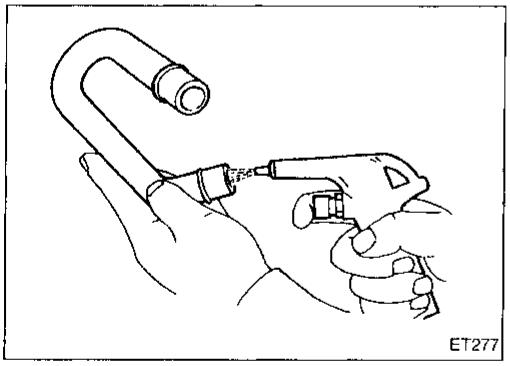




Inspection

PCV (Positive Crankcase Ventilation)

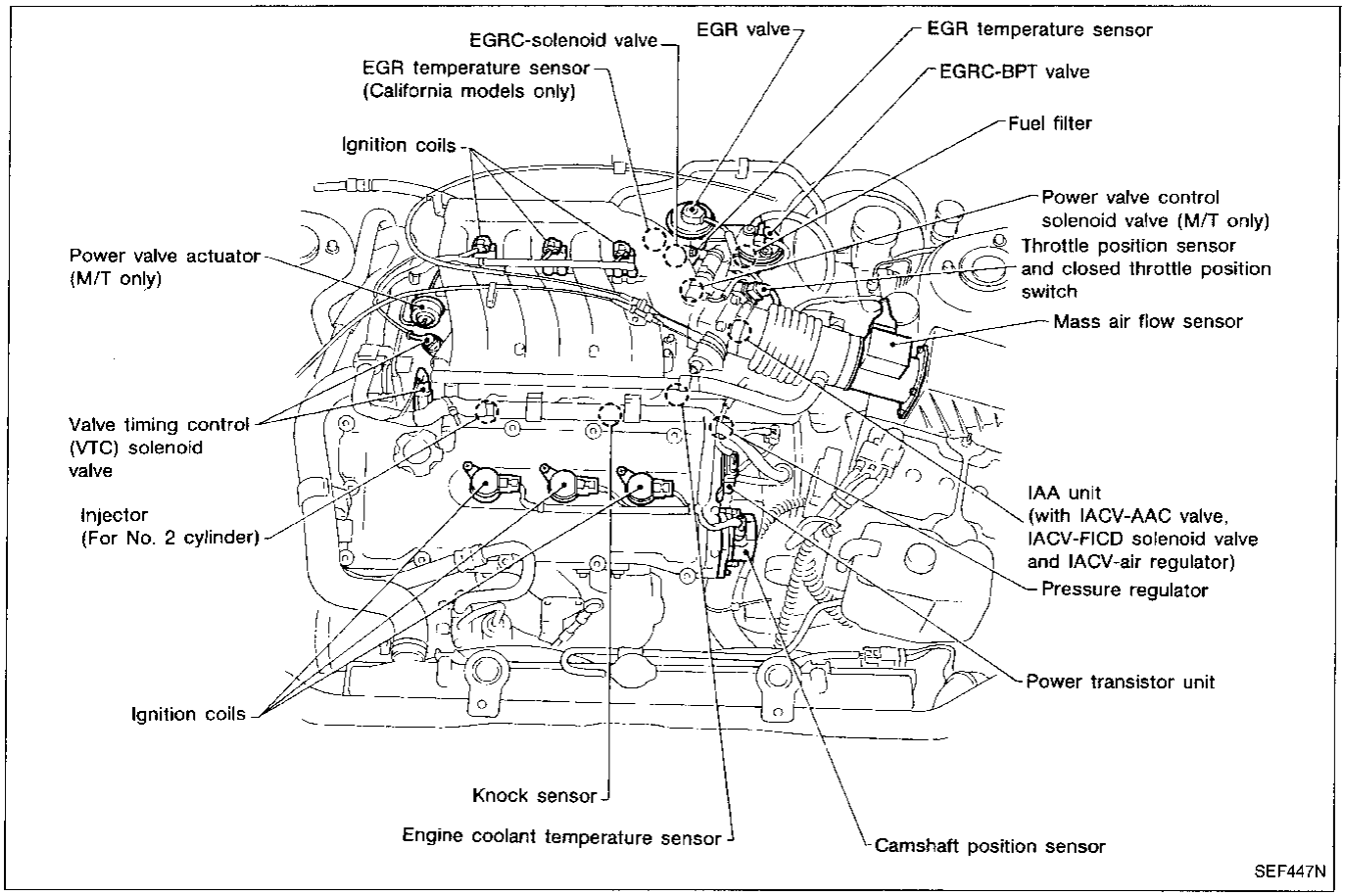
With engine running at idle, remove ventilation hose from PCV valve; if valve is working properly, a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.

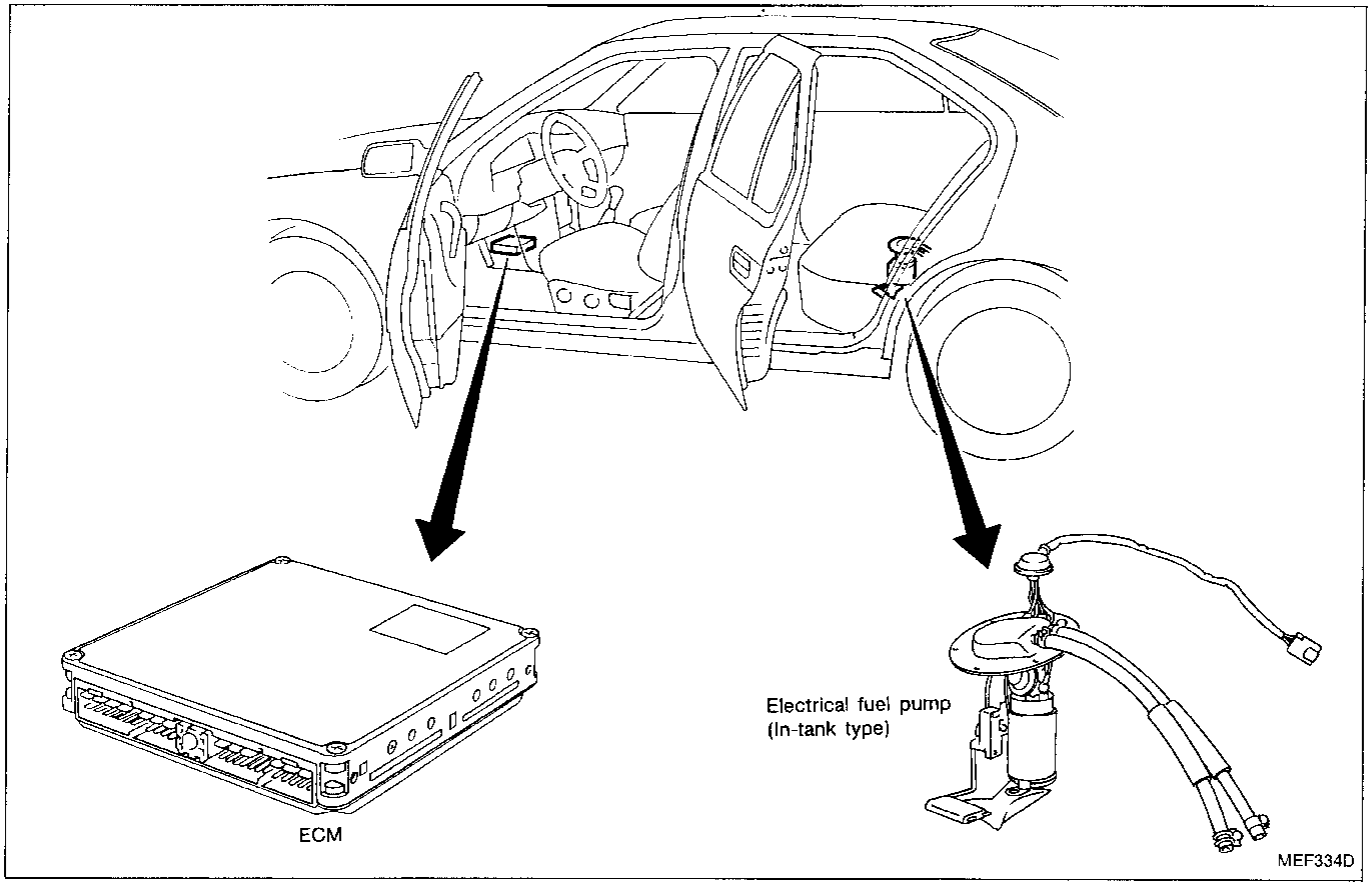


VENTILATION HOSE

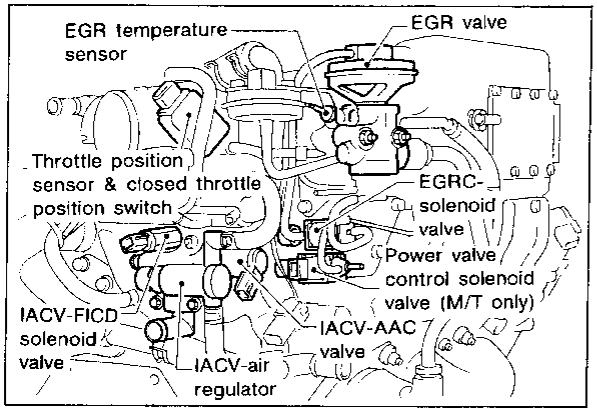
1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.

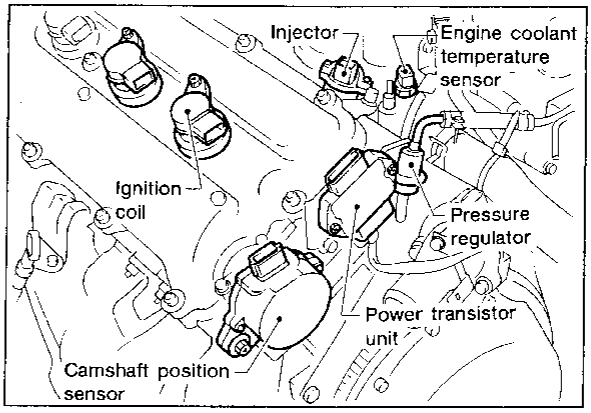
ECCS Component Parts Location

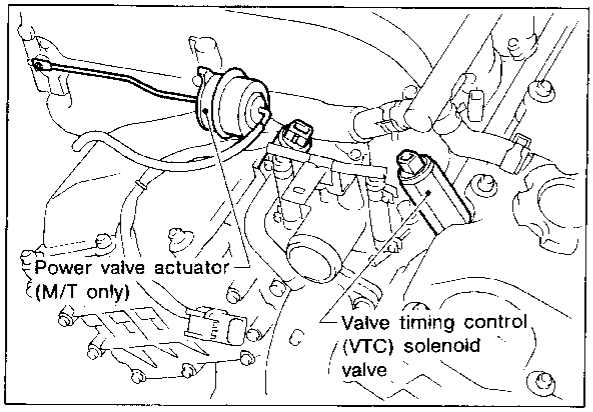


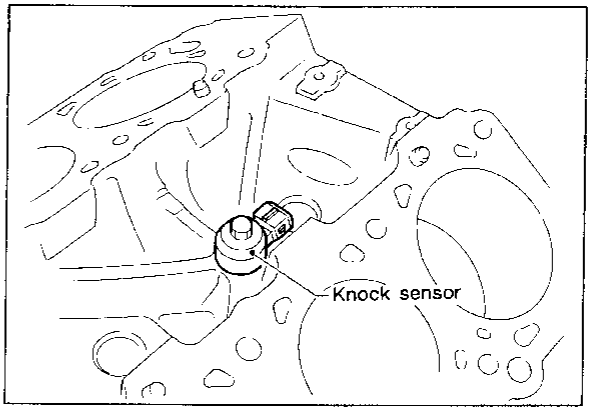


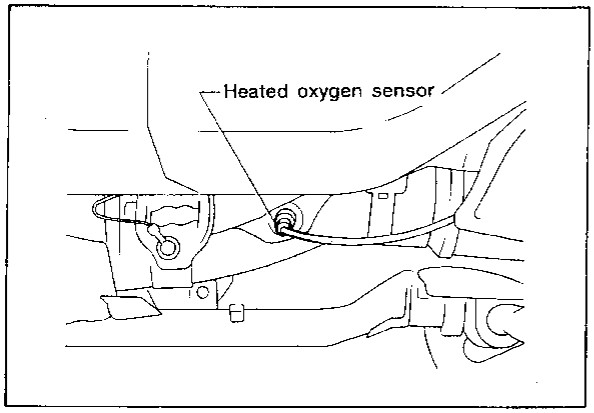
ECCS Component Parts Location (Cont'd)





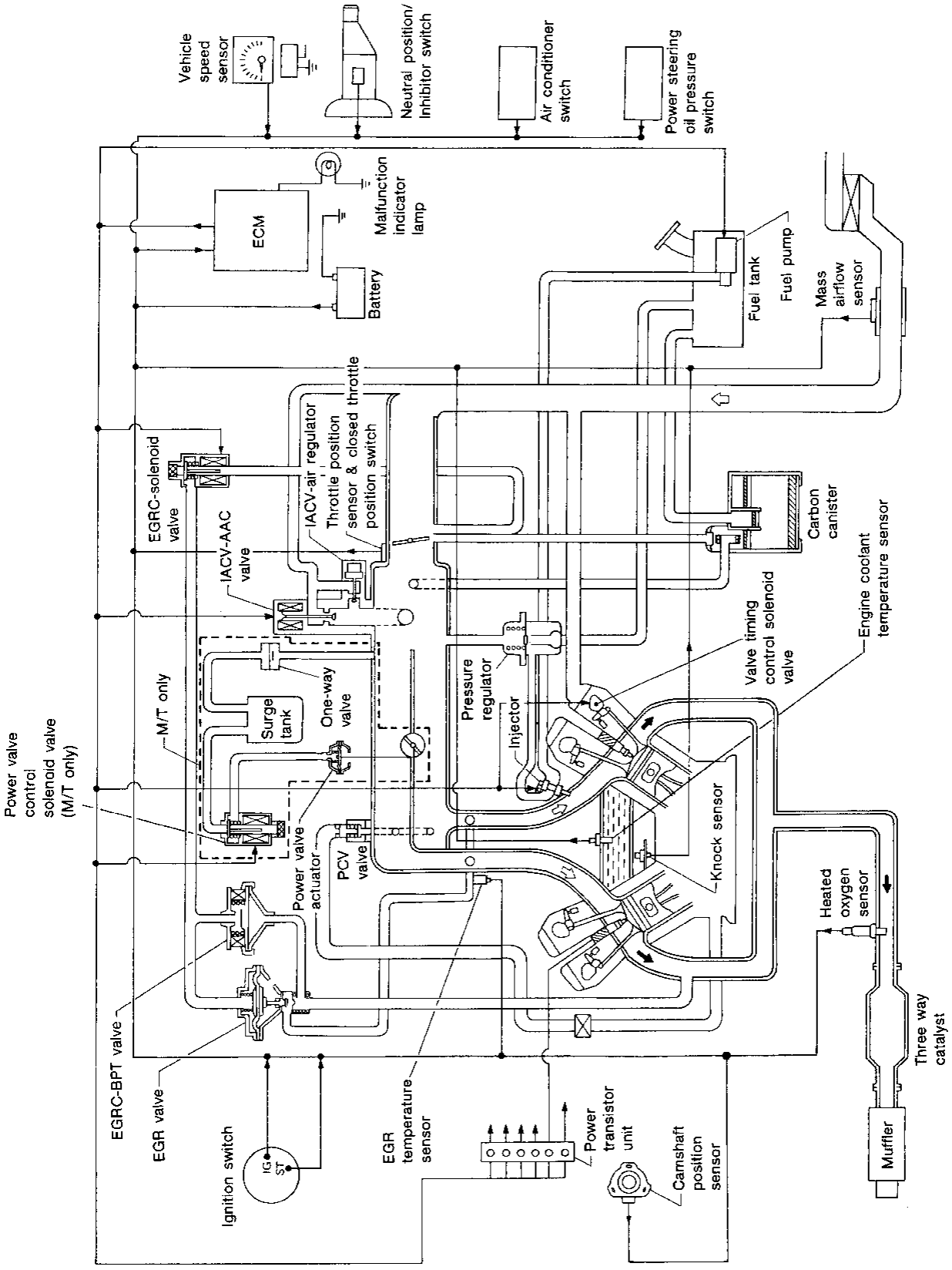






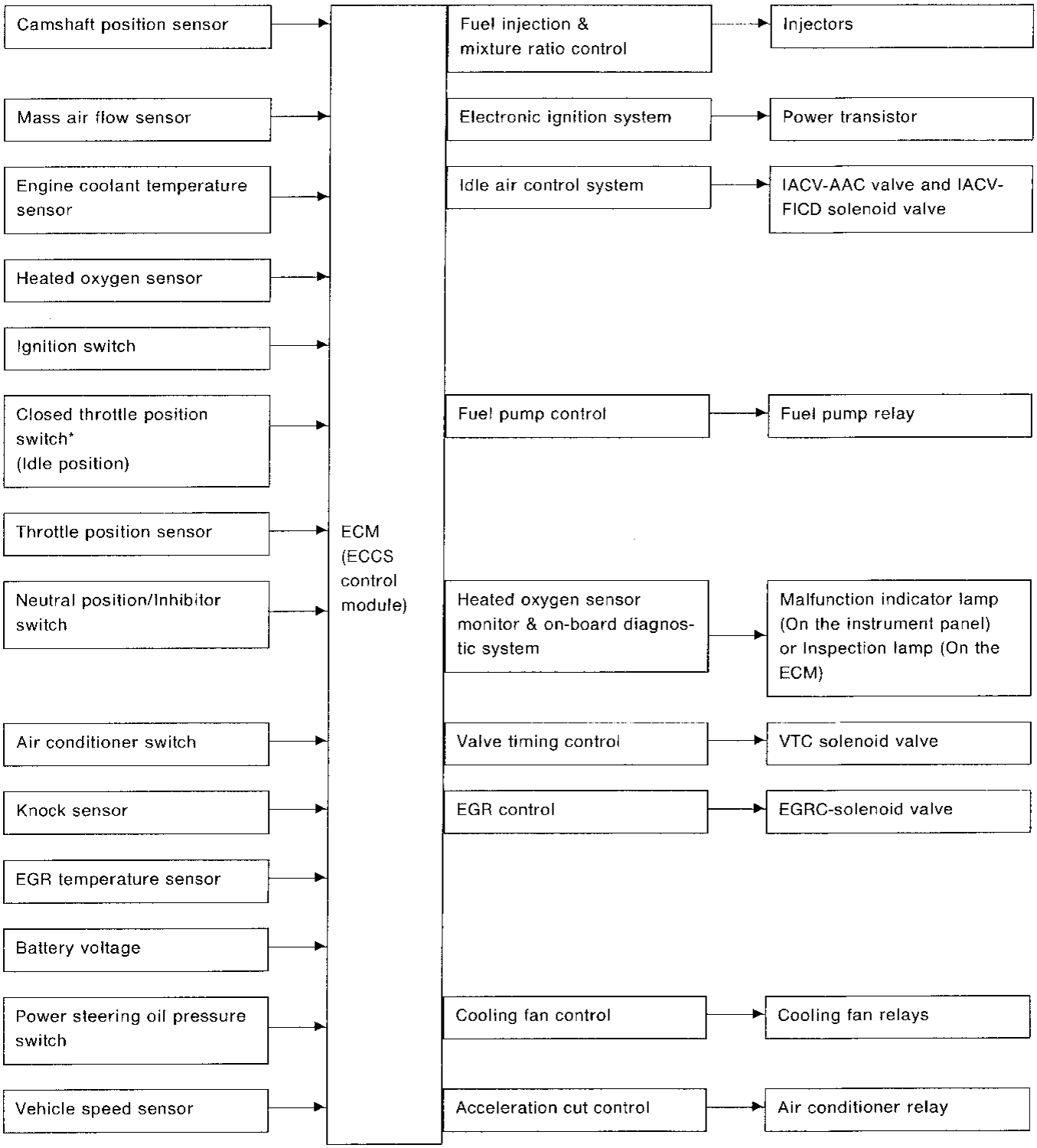
SEF448N

System Diagram



SEF469N

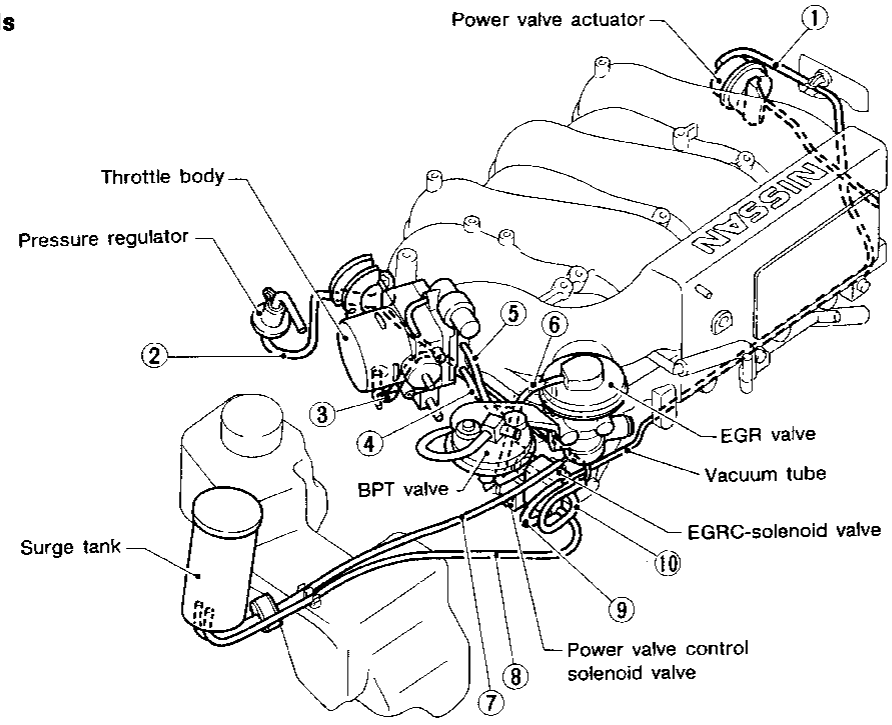
System Chart



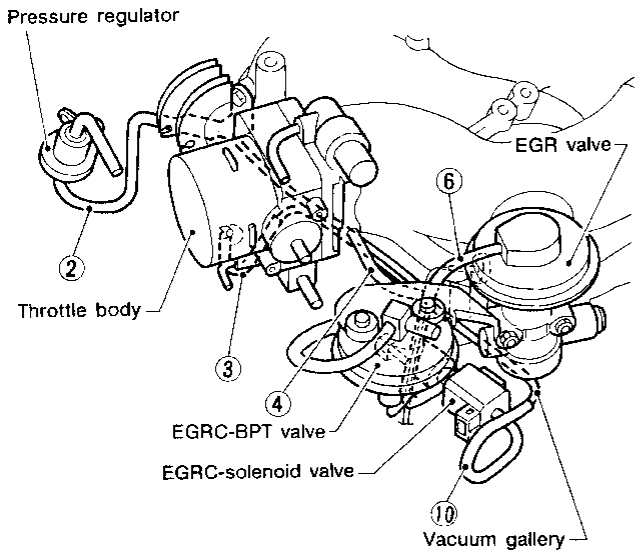
*: When throttle position sensor is malfunctioning, idle position is determined by closed throttle position switch instead.

Vacuum Hose Drawing

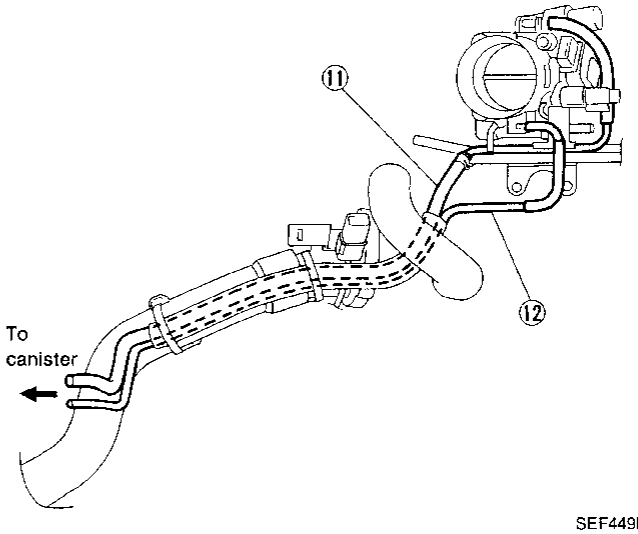
M/T models



A/T models



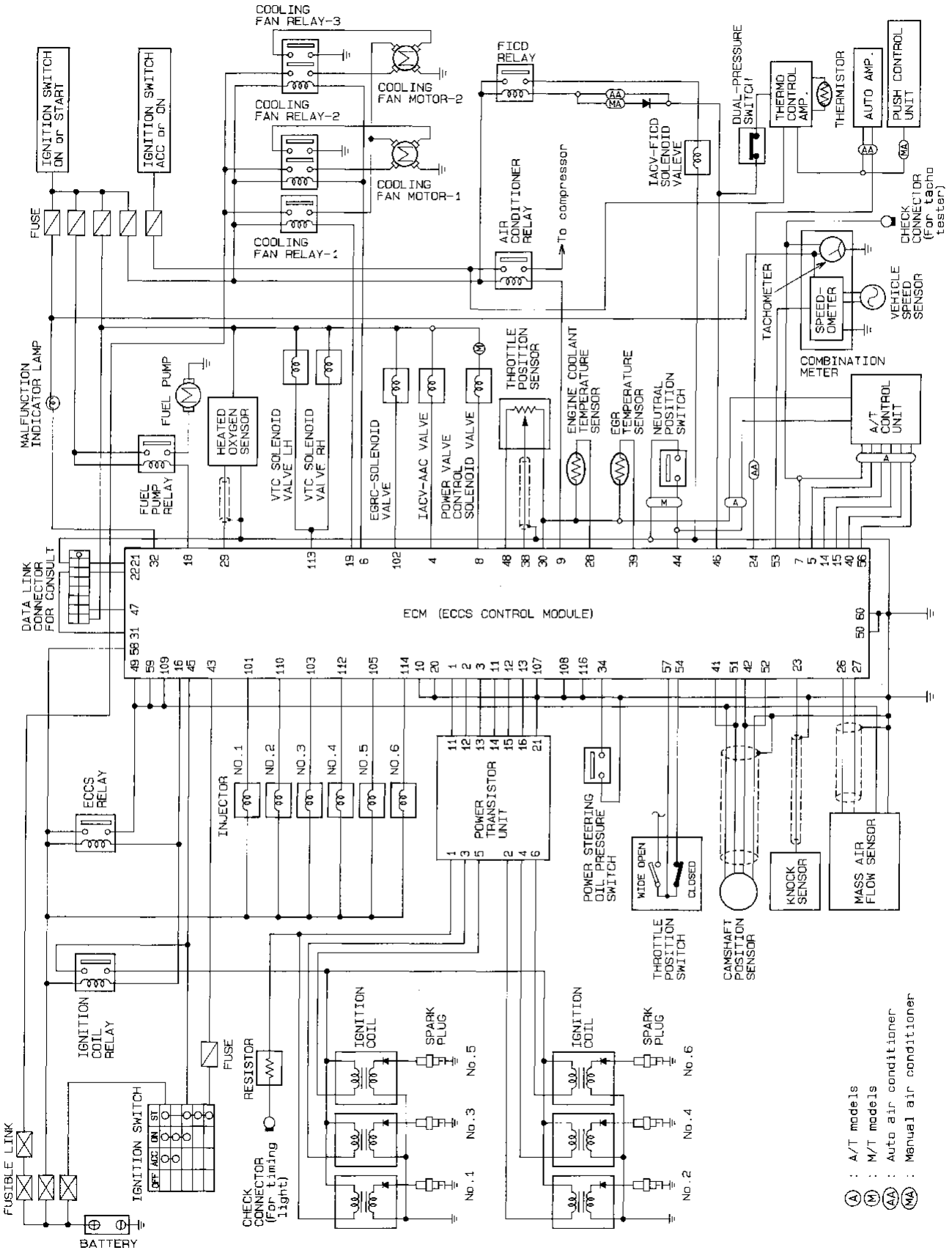
M/T and A/T



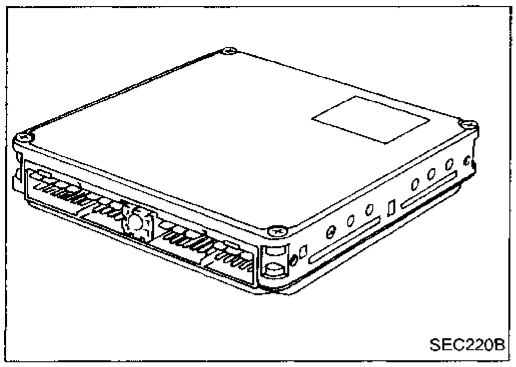
SEF449N

① Power valve actuator to vacuum tube
② Pressure regulator to vacuum gallery
③ Throttle body to vacuum gallery
④ Intake manifold collector to vacuum gallery
⑤ Intake manifold collector to vacuum gallery
⑥ EGR valve to EGRC-solenoid valve
⑦ Surge tank to vacuum gallery
⑧ Surge tank to power valve control solenoid valve
⑨ Power valve control solenoid valve to vacuum tube
⑩ EGRC-solenoid valve to vacuum gallery
⑪ Activated carbon canister (purge line) to sub-fuel tube assembly
⑫ Activated carbon canister (vacuum line) to throttle body

Circuit Diagram

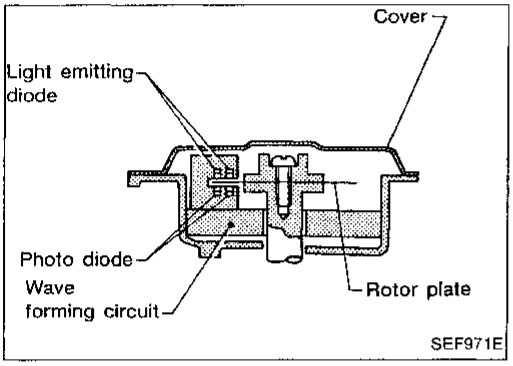


SEF463N


SEC220B

Engine Control Module (ECM)-ECCS Control Module

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

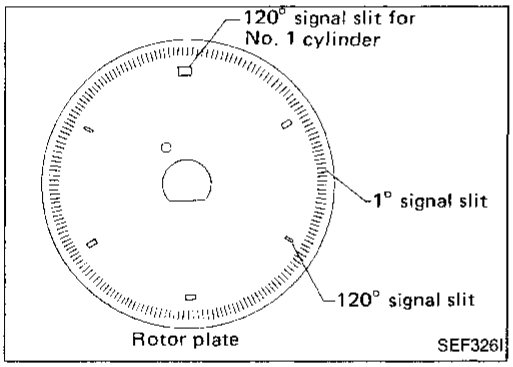


SEF971E

Camshaft Position Sensor (CMPS)

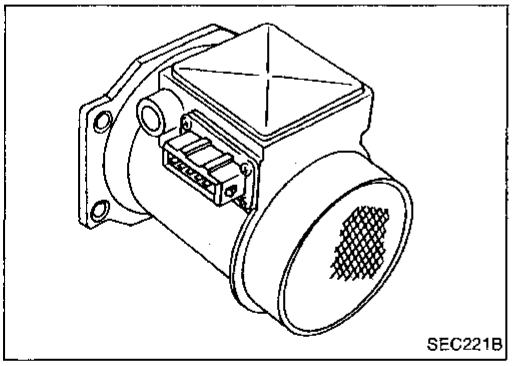
The camshaft position sensor is the basic component of the ECCS. It monitors engine speed and piston position, and sends signals to the ECM to control fuel injection, ignition timing and other functions.

The camshaft position sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for 1° signal and 6 slits for 120° signal. Light Emitting Diodes (LED) and photo diodes are built in the wave-forming circuit.



SEF326I

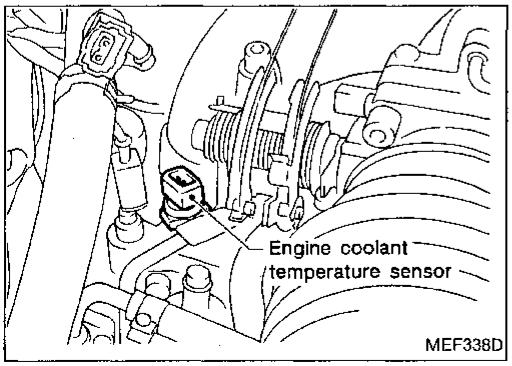
When the rotor plate passes between the LED and the photo diode, the slits in the rotor plate allow light to be transmitted to the photo diode from the LED. This generates rough-shaped pulses which are converted into on-off pulses by the wave-forming circuit, which are sent to the ECM.


SEC221B

Mass Air Flow Sensor (MAFS)

The mass air flow sensor measures the intake air flow by maintaining the temperature of a hot film placed in the air stream. The amount of heat dissipated from the film, and hence the film temperature, depends on the volume of the air flow around the film. The higher the air flow, the more heat is dissipated and thus a higher current is required to maintain the film temperature.

The ECM monitors the amount of current from the output of the mass air flow sensor, and calculates the air flow rate.

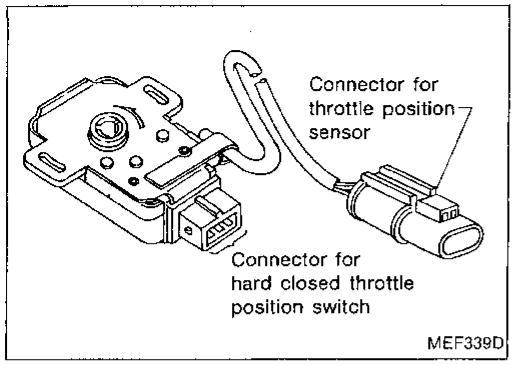


MEF338D

Engine Coolant Temperature Sensor (ECTS)

The engine coolant temperature sensor detects engine coolant temperature and transmits a signal to the ECM.

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

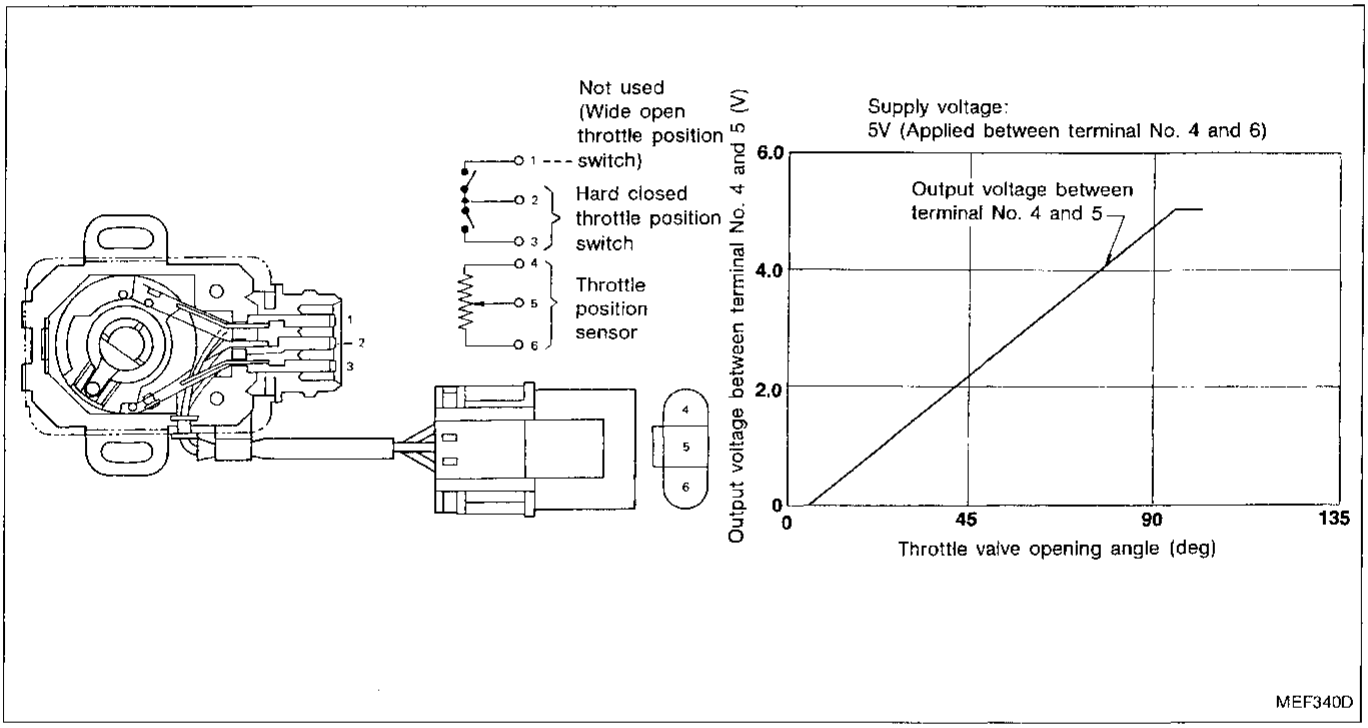


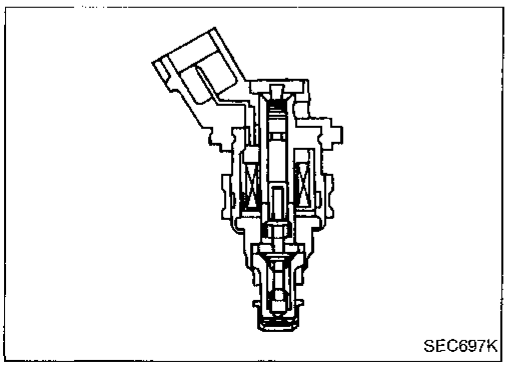
Throttle Position Sensor (TPS) & Soft/Hard Closed Throttle Position (CTP) Switch

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

The ECM sets the throttle valve idle position from the throttle position sensor signal.

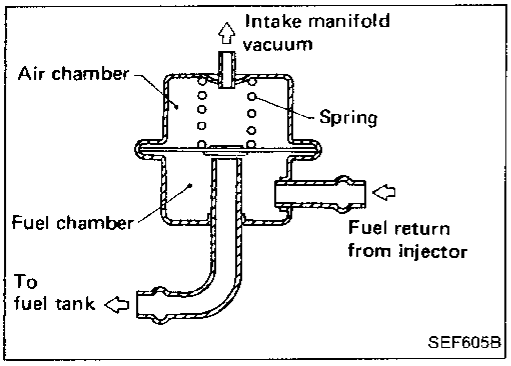
This system is called "soft closed throttle position switch". It controls engine operations such as fuel cut. On the other hand, the "hard closed throttle position switch", which is built into the throttle position sensor unit, is used for engine control when the soft closed throttle position switch is malfunctioning.





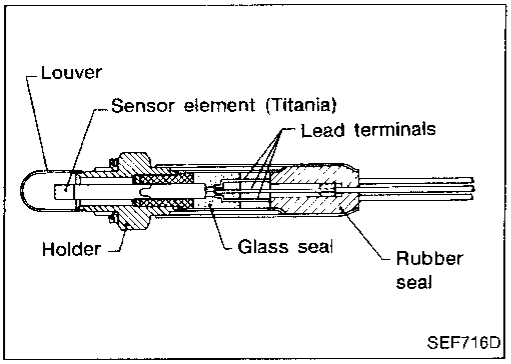
Fuel Injector

The fuel injector is a small, elaborate solenoid valve. As the ECM sends injection signals to the injector, the coil in the injector pulls the needle valve back and fuel is released into the intake manifold through the nozzle. The ECM controls the injection pulse duration which is burn controls the amount of injected fuel.



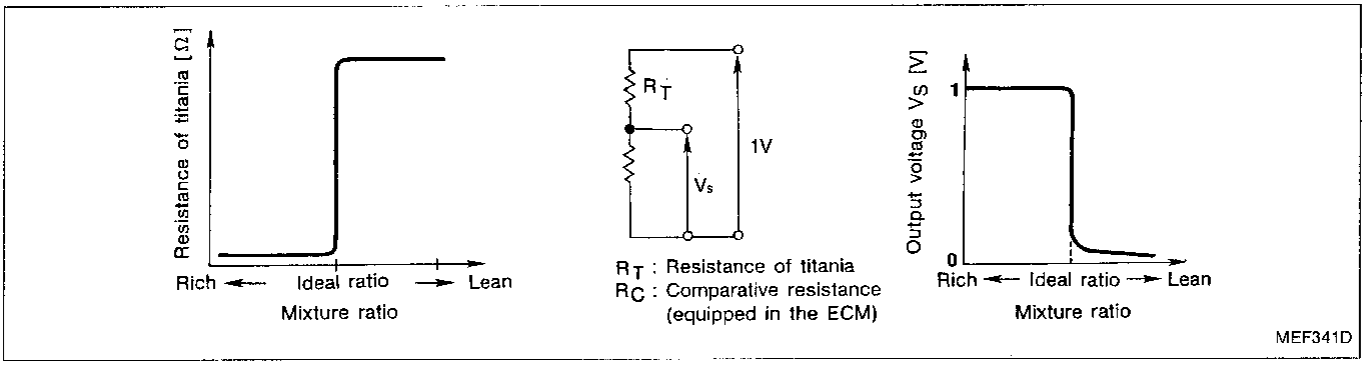
Pressure Regulator

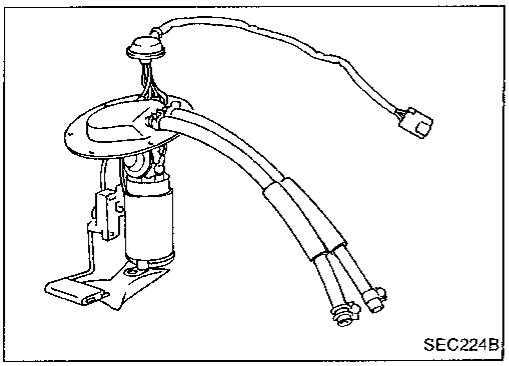
The pressure regulator maintains the fuel pressure at 299.1 kPa (3.05 kg/cm^2, 43.4 psi). Since the injected fuel amount depends on injection pulse duration, it is necessary to maintain the pressure at the above value.



Heated Oxygen Sensor (HO2S)

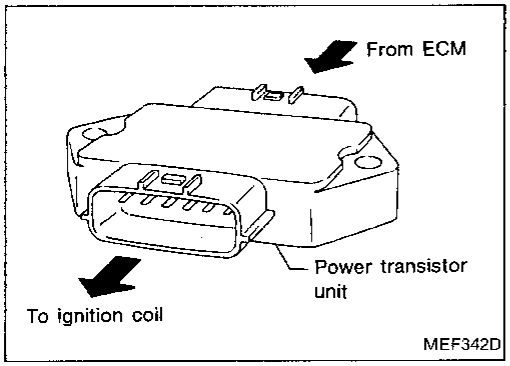
The heated oxygen sensor, located in the exhaust tube, monitors the oxygen level in the exhaust gas.
This sensor is made of ceramic titania, the electric resistance of which drastically changes at the ideal air-fuel ratio.
The ECM supplies the sensor with approximately 1V and then measures the output voltage depending on its resistance. In order to activate the sensor element, it is equipped with a heater.





Fuel Pump

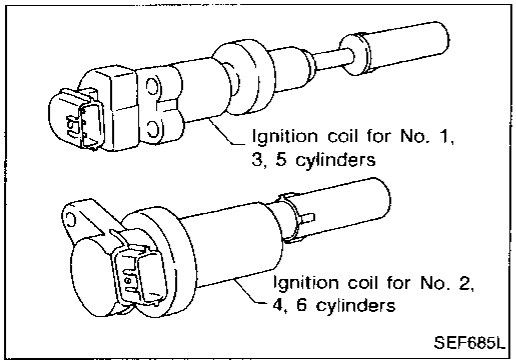
A turbine type design fuel pump is used and is situated in the fuel tank.

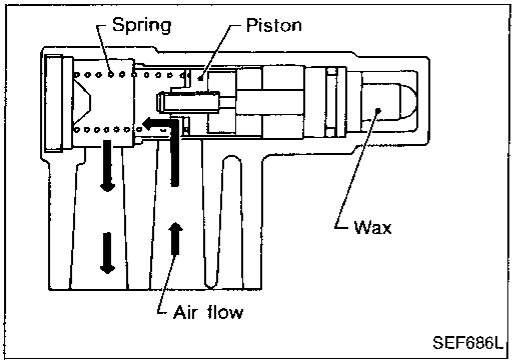


Power Transistor Unit & Ignition Coil

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

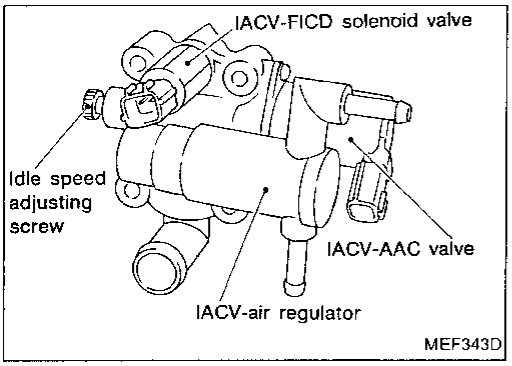
Power Transistor Unit & Ignition Coil (Cont'd)





Idle Air Control Valve (IACV)-Air Regulator

The IACV-air regulator provides an air by-pass when the engine is cold for a fast idle during warm-up.
Wax, piston and spring are built into the IACV-air regulator. When the coolant temperature is low, the air by-pass port opens. When the coolant temperature is high, the wax expands, moving the piston up and closing the air by-pass port, which decreases the idle speed.

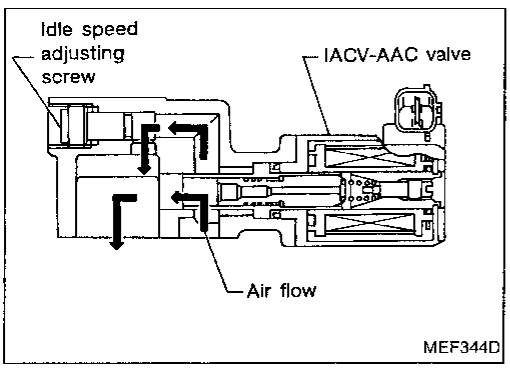


Idle Air Adjusting (IAA) Unit

The IAA unit is made up of the IACV-AAC valve, IACV-FICD solenoid valve, IACV-air regulator and idle adjusting screw. It receives the signal from the ECM and controls the idle speed at the preset value.

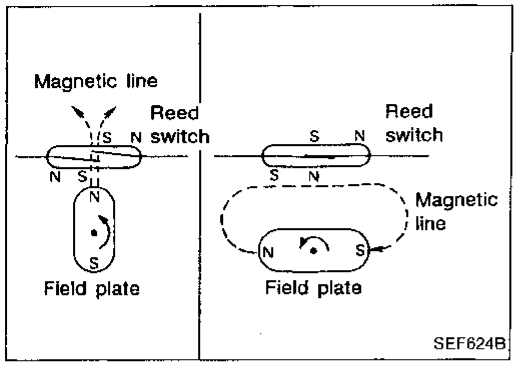
Idle Air Control Valve (IACV)-Fast Idle Control Device (FICD) Solenoid Valve

When the air conditioner switch is on, additional air is supplied by the IACV-FICD solenoid valve.



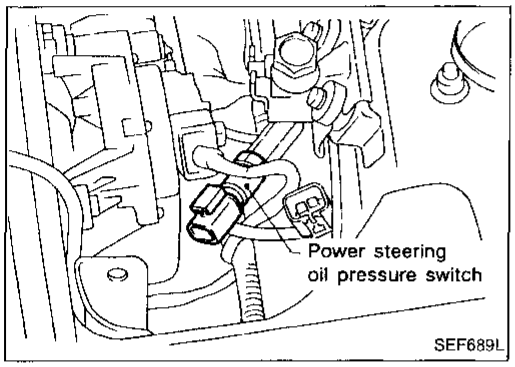
Idle Air Control Valve (IACV)-Auxiliary Air Control (AAC) Valve

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



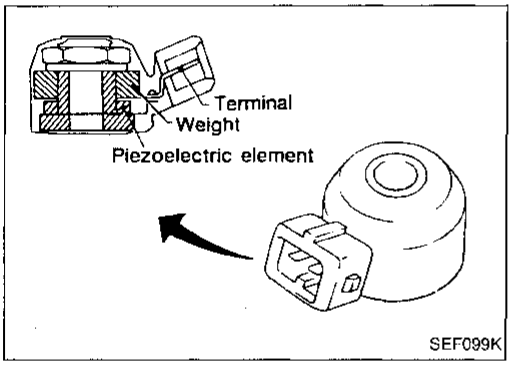
Vehicle Speed Sensor (VSS)

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



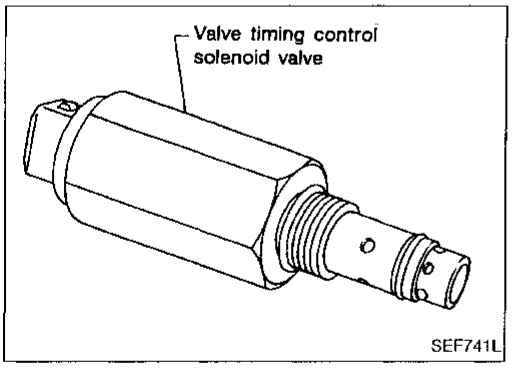
Power Steering Oil Pressure Switch

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



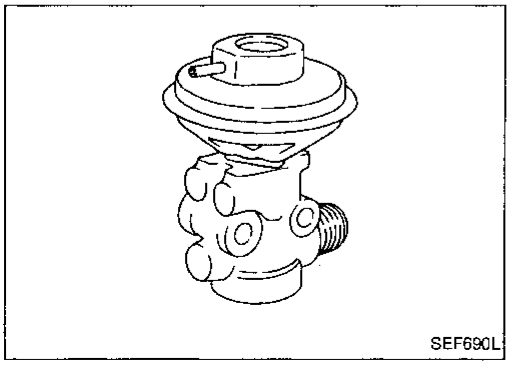
Knock Sensor (KS)

The knock sensor is attached to the cylinder block and senses engine knocking.
A knocking vibration from the cylinder block is transmitted as pressure to the piezoelectric element. This vibrational pressure is then converted into a voltage signal which is delivered as output.



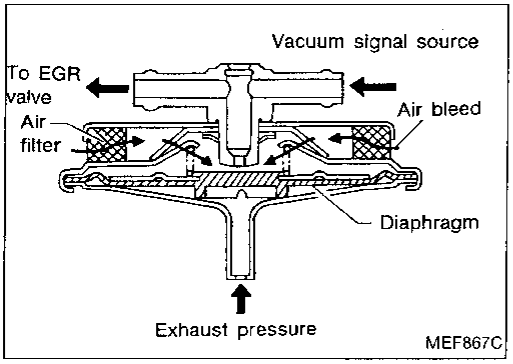
Valve Timing Control Solenoid Valve

The valve timing control solenoids are installed on the cylinder heads, and control oil pressure which regulates the position of the intake camshafts.



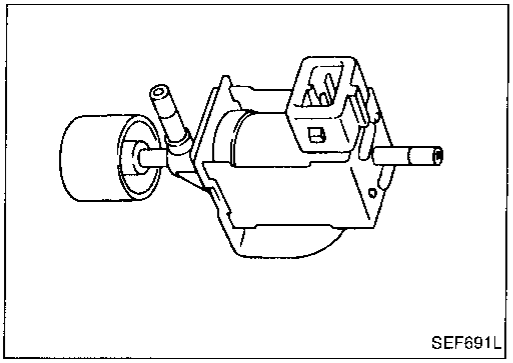
Exhaust Gas Recirculation (EGR) Valve

The EGR valve controls the quantity of exhaust gas to be fed into the intake manifold through vertical movement of the taper valve connected to the diaphragm, to which vacuum is applied in response to the opening of the throttle valve.



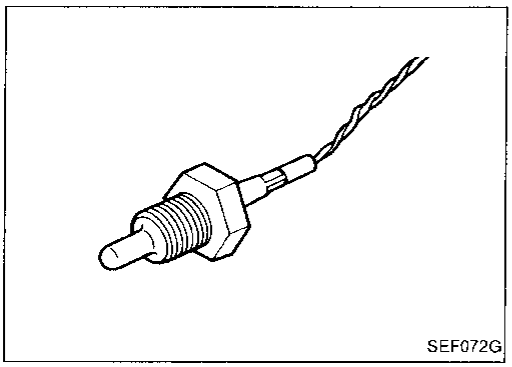
EGR Control (EGRC)-BPT Valve

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.



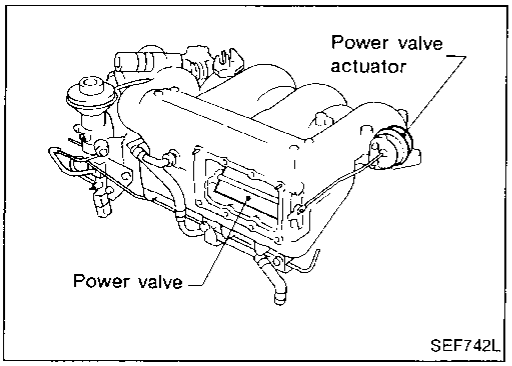
EGR Control (EGRC)-Solenoid Valve

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



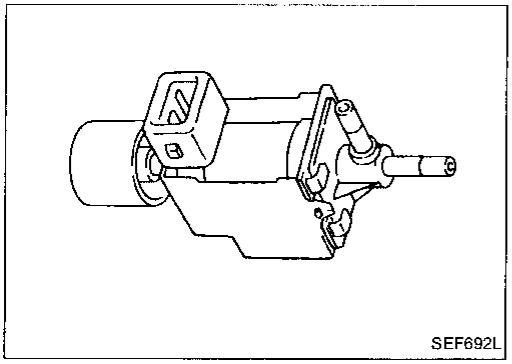
EGR Temperature Sensor

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



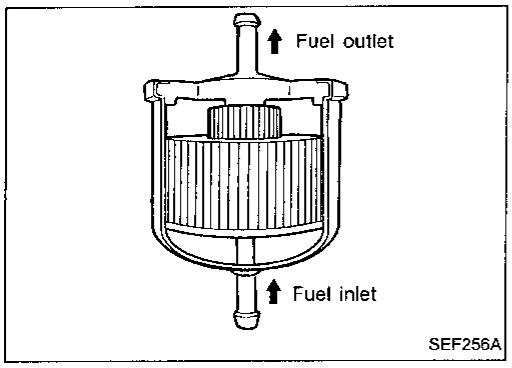
Power Valve

The power valve is used to control the suction passage of the power valve control system. It is set in the fully closed or fully opened position by the power valve actuator operated by the vacuum stored in the surge tank. The vacuum in the surge tank is controlled by the power valve control solenoid valve.



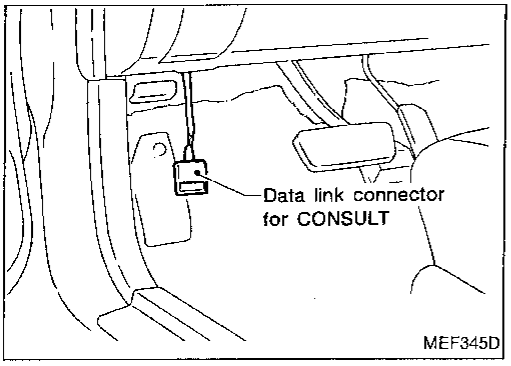
Power Valve Control Solenoid Valve

The power valve control solenoid valve cuts the intake manifold vacuum signal for power valve control. It responds to ON/OFF signals from the ECM. When the solenoid is off, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger downward and feeds the vacuum signal to the power valve actuator.



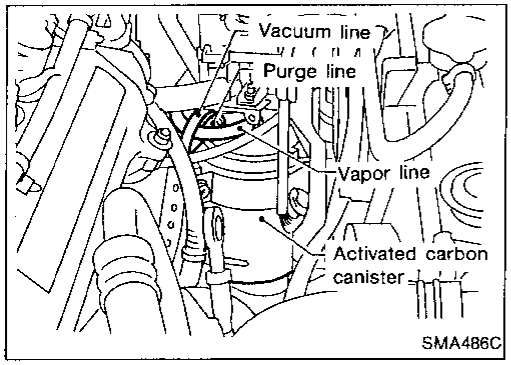
Fuel Filter

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 box cover.

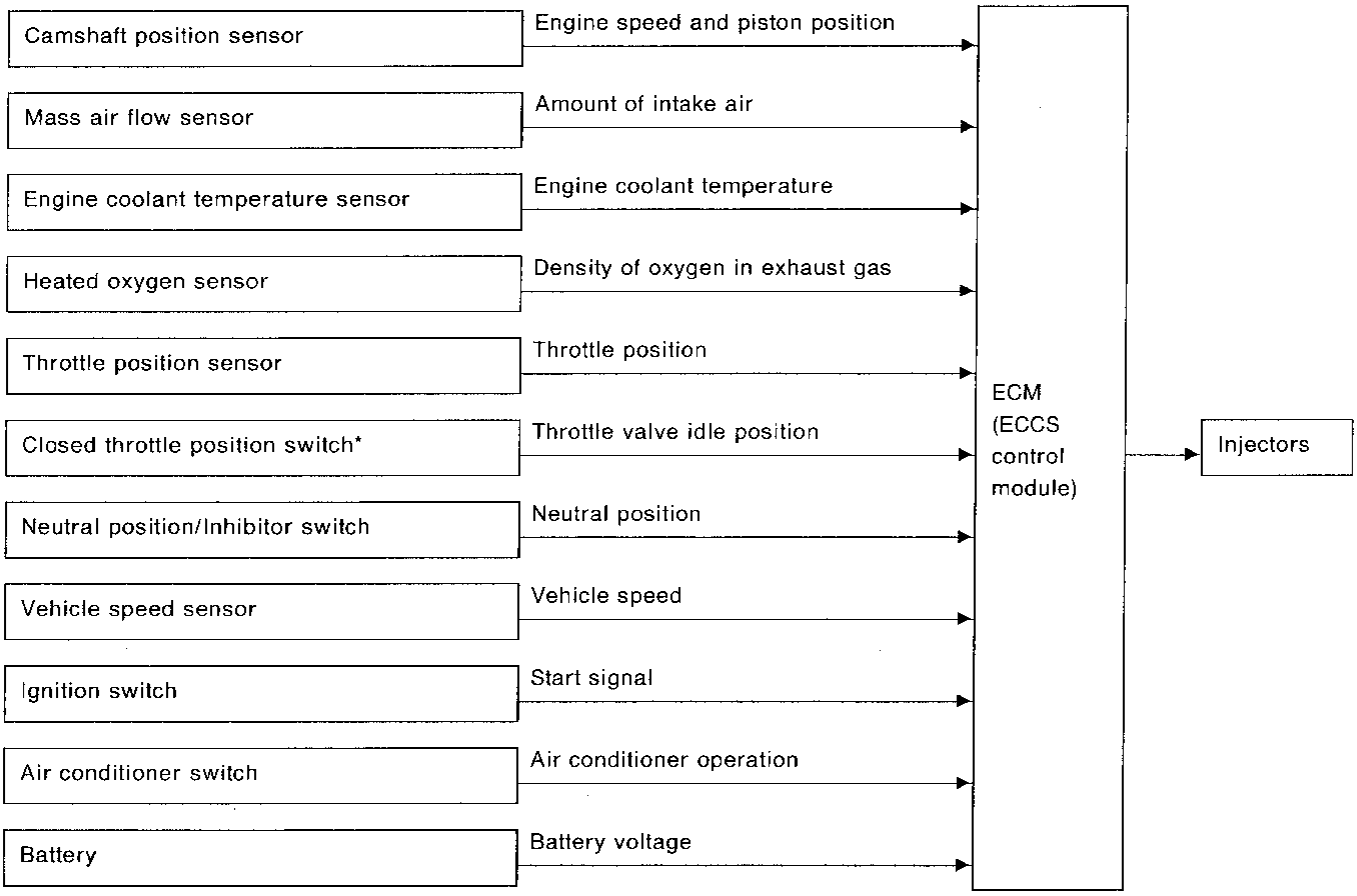


Activated Carbon Canister

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

Multiport Fuel Injection (MFI) System

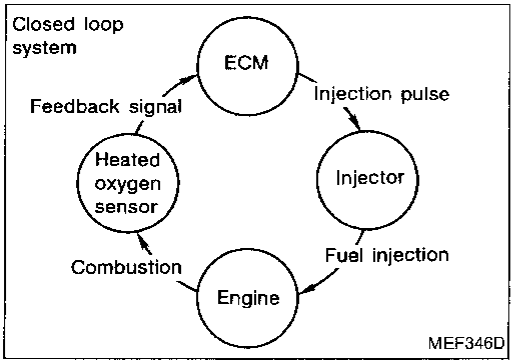
INPUT/OUTPUT SIGNAL LINE



*: When throttle position sensor is malfunctioning, idle position is determined by closed throttle position switch instead.

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) from both the camshaft position sensor and the mass air flow sensor.



FUEL INJECTION INCREASE/DECREASE

In addition, the amount of fuel injection is compensated for to improve engine performance 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

MIXTURE RATIO FEEDBACK CONTROL

The mixture ratio feedback system is designed to precisely control the mixture ratio to the stoichiometric point so that the three way catalyst can reduce CO, HC and NOx emissions. This system uses an heated oxygen sensor in the exhaust manifold to check the air-fuel ratio. The ECM adjusts the injection pulse width according to the sensor voltage so the mixture ratio will be within the range of the stoichiometric air-fuel ratio.

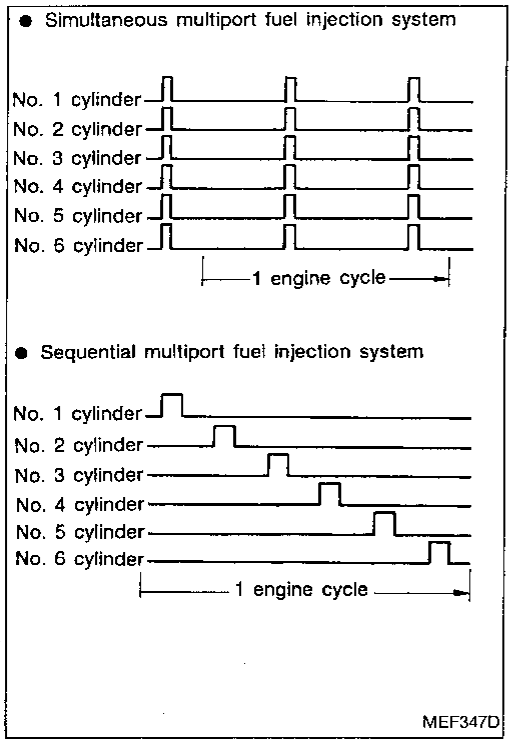
Multiport Fuel Injection (MFI) System (Cont'd)

This stage refers to closed loop control. Open loop control refers to that under which the ECM detects any of the following conditions and feedback control stops in order to maintain stabilized fuel combustion.

1) Deceleration
2) High-load 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 to provide a basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. This is due to manufacturing errors (e.g., mass air flow sensor hot wire) and changes during operation (injector clogging, etc.) of ECCS parts which directly affect the mixture ratio.
Accordingly, a difference between the basic and theoretical mixture ratios is quantitatively monitored in this system. It is then computed in terms of "fuel injection duration" to automatically compensate for the difference between the two ratios.



FUEL INJECTION TIMING

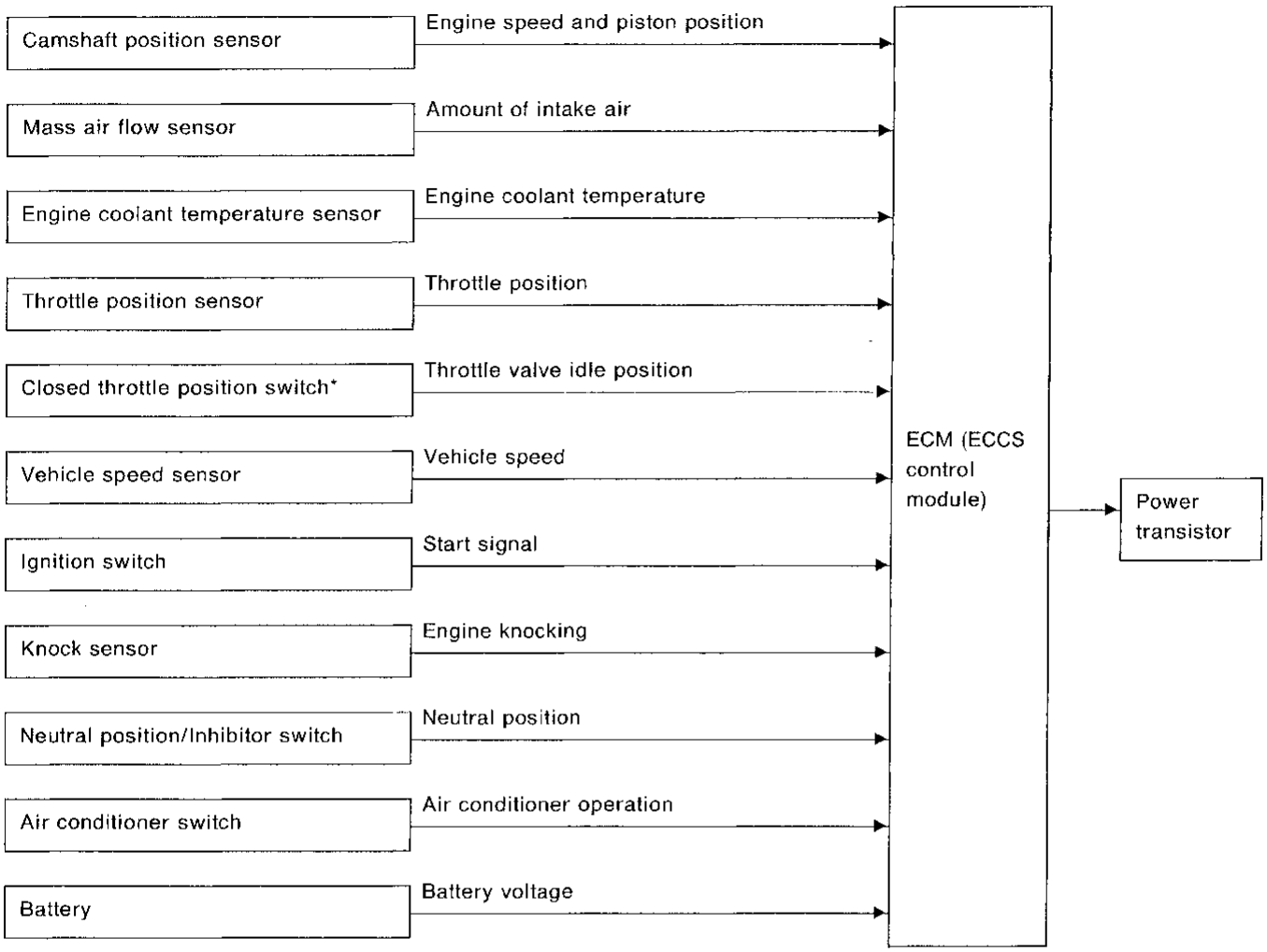
Two types of fuel injection systems are used — simultaneous multiport fuel injection system and sequential multiport fuel injection system. In the former, fuel is injected into all cylinders simultaneously twice each engine cycle.
In other words, pulse signals of the same width are simultaneously transmitted from the ECM to the all injectors two times for each engine cycle.
In the sequential multiport fuel injection system, fuel is injected into each cylinder during each engine cycle according to the firing order.
When the engine is being started and/or if the fail-safe system (CPU of ECM) is operating, simultaneous multiport fuel injection system is used.
When the engine is running sequential multiport fuel injection system is used.

FUEL SHUT-OFF

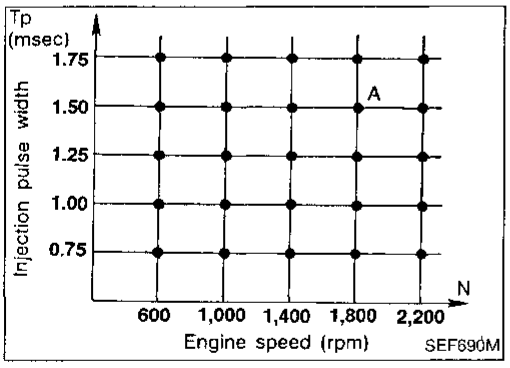
Fuel to each cylinder is cut off during deceleration or operation of the engine at excessively high speeds.

Electronic Ignition (EI) System

INPUT/OUTPUT SIGNAL LINE



*: When throttle position sensor is malfunctioning, idle position is determined by closed throttle position switch instead.



SYSTEM DESCRIPTION

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

The ignition timing data is stored in the ECM, in the form of the map as shown.

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, the ignition timing is revised by the ECM according to the other data stored in the ECM at the following times:

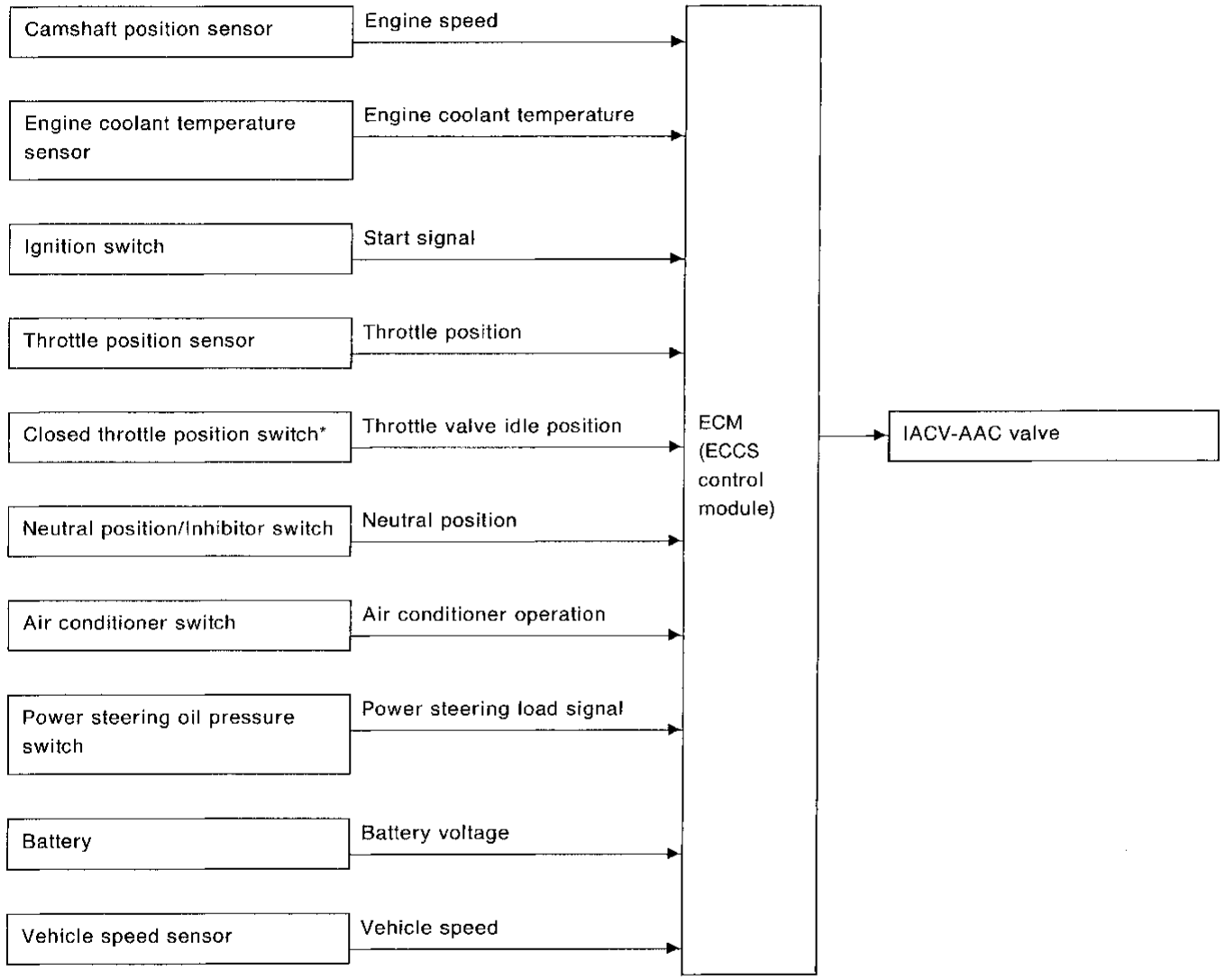
1) At starting
2) During warm-up
3) At idle
4) At acceleration
5) During fuel shut-off

Electronic Ignition (EI) System (Cont'd)

The knock sensor retard system is designed only for emergencies. The basic ignition timing is pre-programmed within the anti-knocking zone, even if recommended fuel is used under dry conditions. Consequently, the retard system does not operate under normal driving conditions. However, if engine knocking occurs, the knock sensor monitors this and a signal is transmitted to the ECM. After receiving it, the ECM retards the ignition timing to avoid engine knocking.

Idle Air Control (IAC) System

INPUT/OUTPUT SIGNAL LINE



*: When throttle position sensor is malfunctioning, idle position is determined by closed throttle position switch instead.

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.

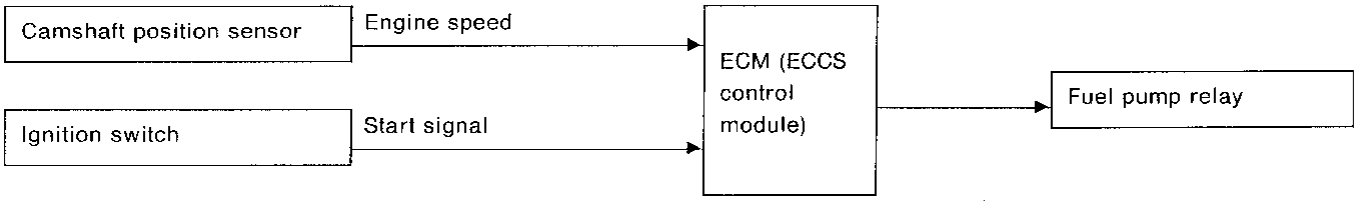
The IACV-AAC valve repeats ON/OFF operation according to signals sent from the ECM.

The camshaft position sensor detects the actual engine speed and sends a signal to the ECM.

The ECM then controls the ON/OFF time of the IACV-AAC valve so that engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as warm-up, during deceleration and engine load.

Fuel Pump Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

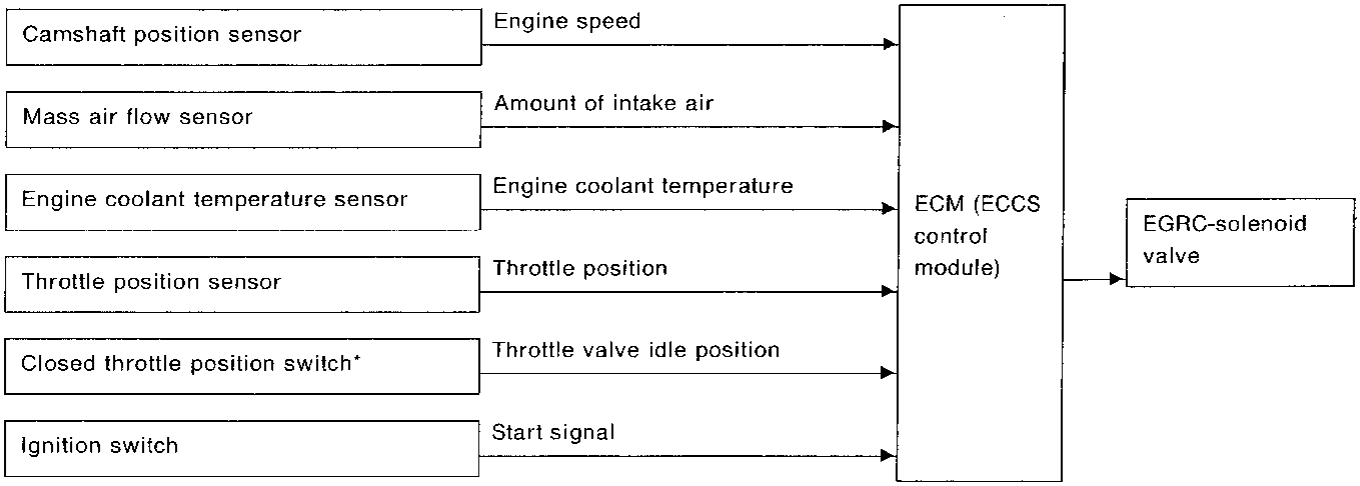
Fuel pump ON-OFF control

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 120° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to activate. If the 120° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents the battery from discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

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

Exhaust Gas Recirculation (EGR) System

INPUT/OUTPUT SIGNAL LINE



*: When throttle position sensor is malfunctioning, idle position is determined by closed throttle position switch instead.

SYSTEM DESCRIPTION

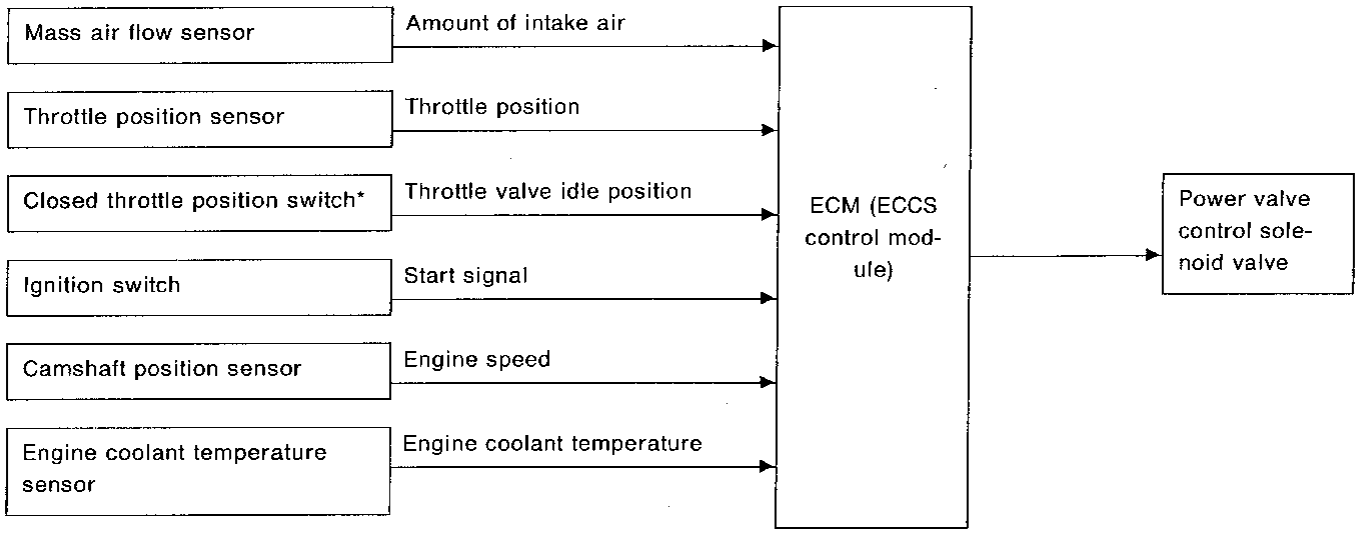
A system is provided which precisely cuts and controls the port vacuum applied to the EGR valve to suit engine operating conditions.
This cut-and-control operation is accomplished through the ECM. When the ECM detects any of the conditions listed below, current flows through the solenoid valve in the EGR control vacuum line.

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

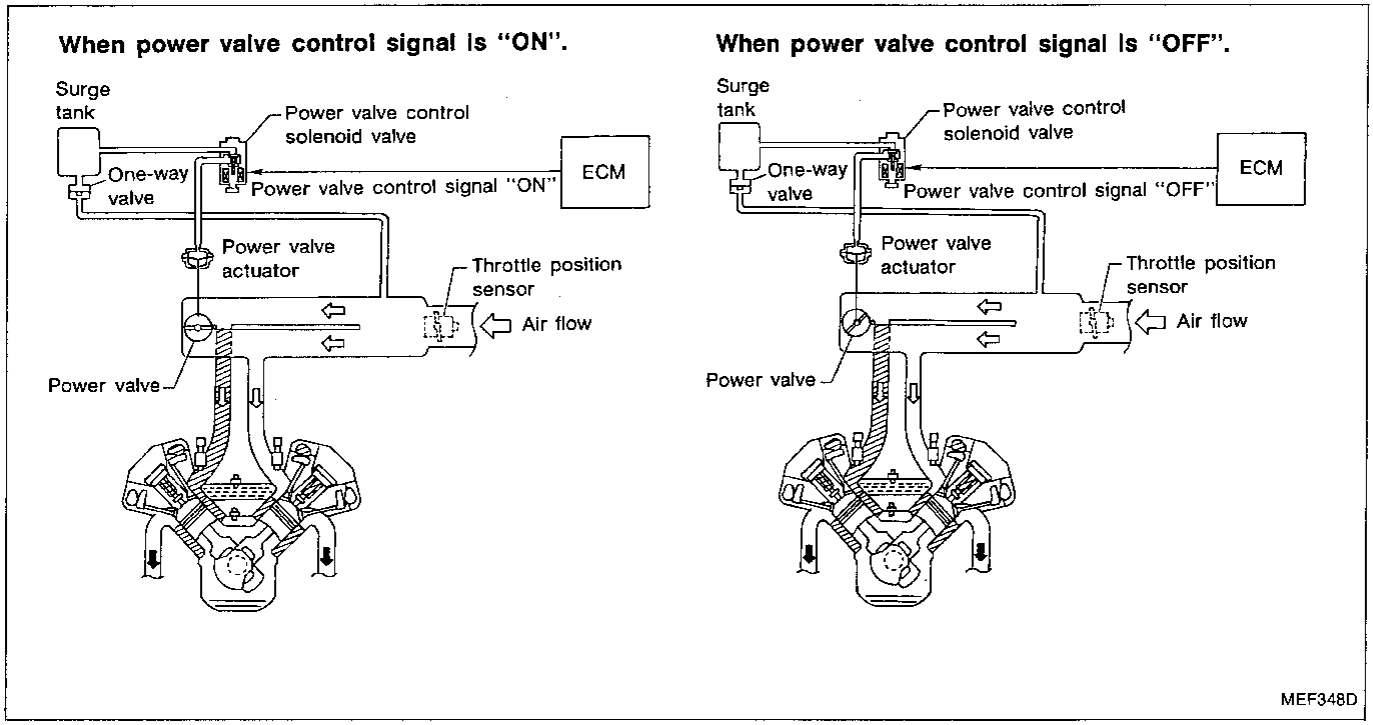
1) Low engine coolant temperature
2) Engine starting
3) High-speed engine operation
4) Engine idling
5) Excessively high engine coolant temperature
6) Mass air flow sensor malfunction

Power Valve Control

INPUT/OUTPUT SIGNAL LINE



*: When throttle position sensor is malfunctioning, idle position is determined by closed throttle position switch instead.



SYSTEM DESCRIPTION

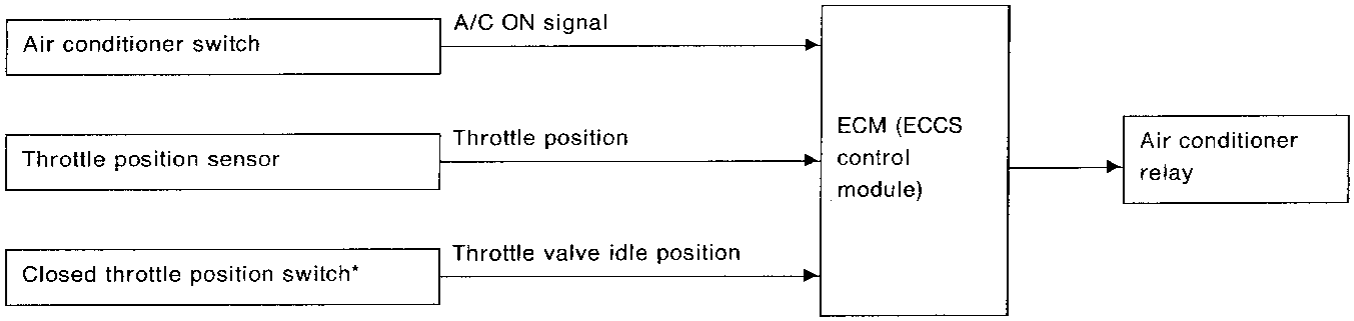
When the engine is running at low or medium speed under a heavy load, the power valve control solenoid valve is energized by a signal from the ECM. This signal introduces the intake manifold vacuum into the power valve actuator to close the power valve. Under this condition, the effective suction port length is equivalent to the total length of the intake manifold collector's suction port including the intake valve. This long suction port provides increased air intake which results in improved suction efficiency and higher torque generation.

The surge tank and one-way valve are provided so that the power valve can be maintained in the fully closed position under heavy loads when the manifold vacuum is insufficient. In other conditions, the power valve control solenoid valve is de-energized, and the power valve actuator is vented to the atmosphere. This opens the power valve to two suction passages together in the collector.

Under this condition, the effective port length is equivalent to the length of the suction port provided independently for each cylinder. This shortened port length results in enhanced engine output with reduced suction resistance under high speeds.

Acceleration Cut Control

INPUT/OUTPUT SIGNAL LINE



*: When throttle position sensor is malfunctioning, idle position is determined by closed throttle position switch instead.

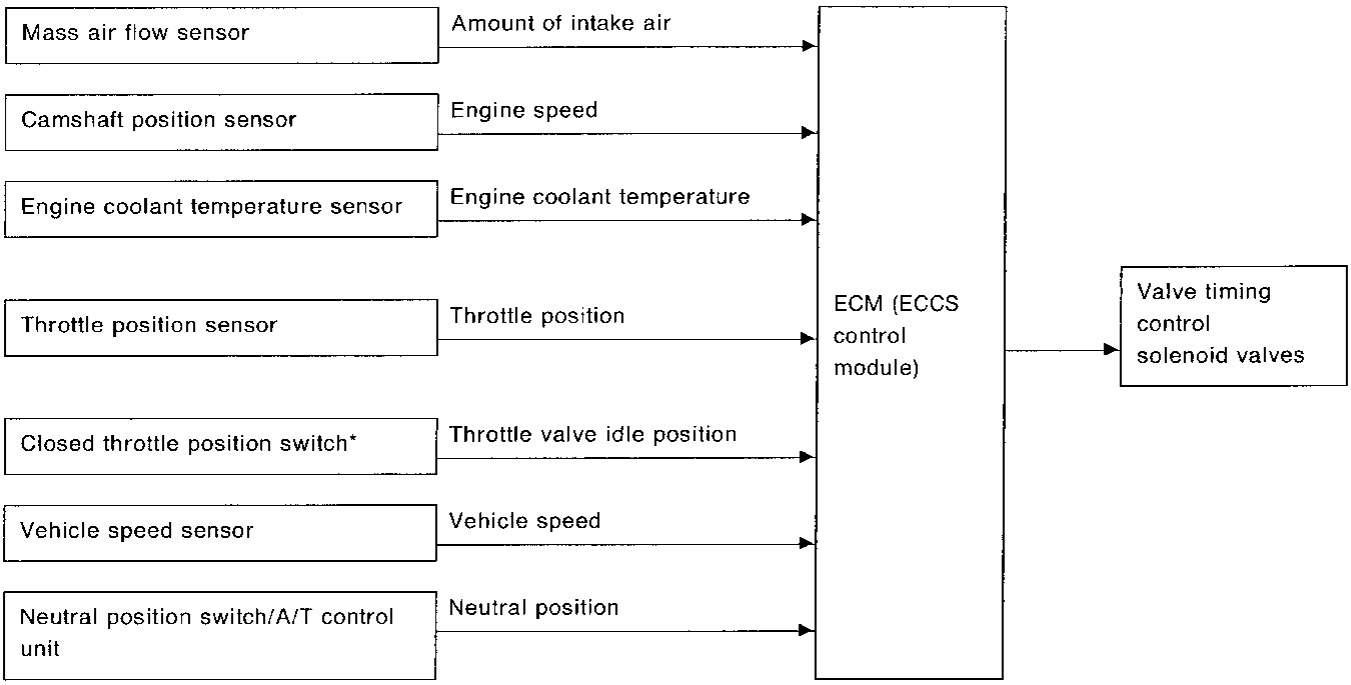
SYSTEM DESCRIPTION

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



*: When throttle position sensor is malfunctioning, idle position is determined by closed throttle position switch instead.

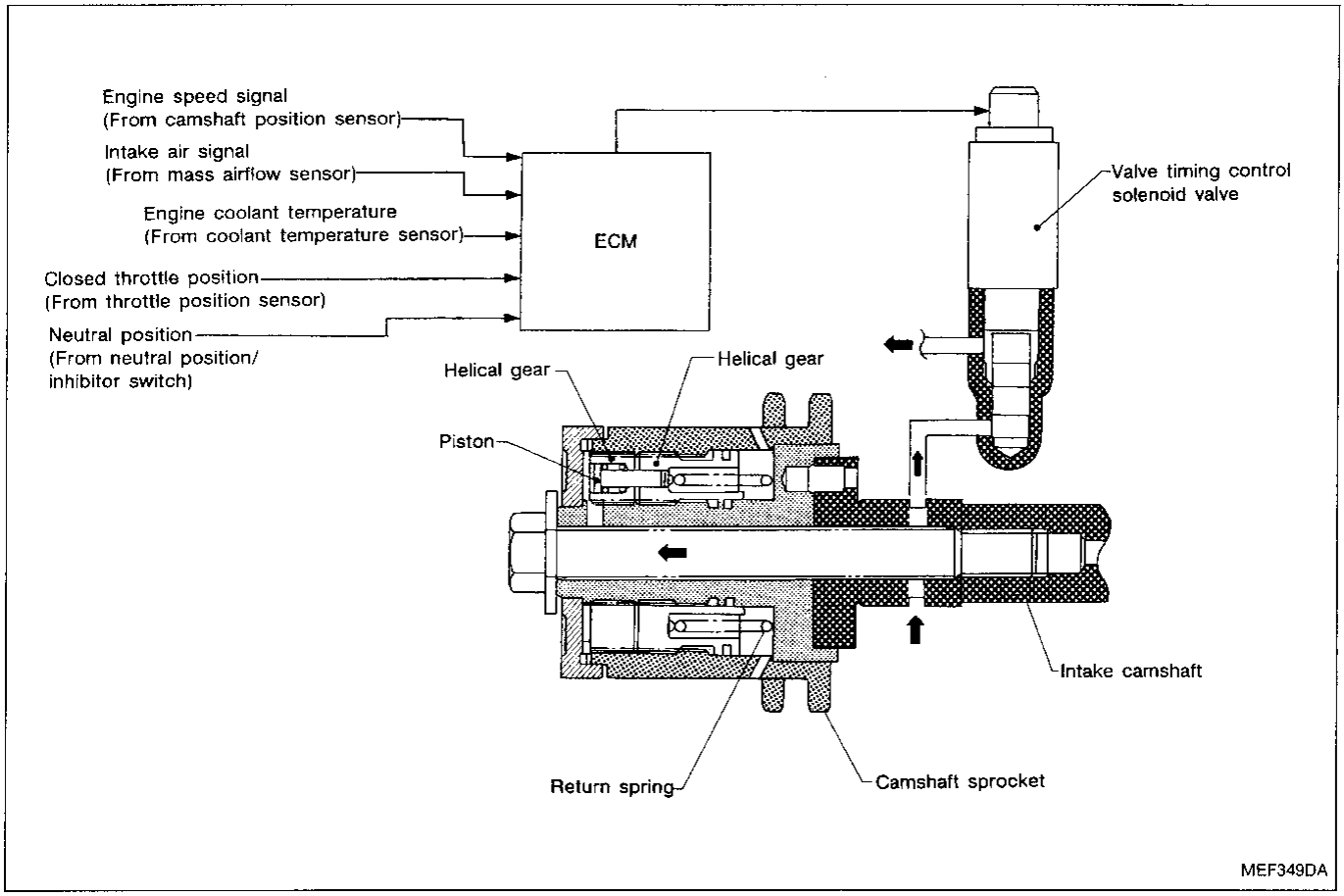
SYSTEM DESCRIPTION

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.

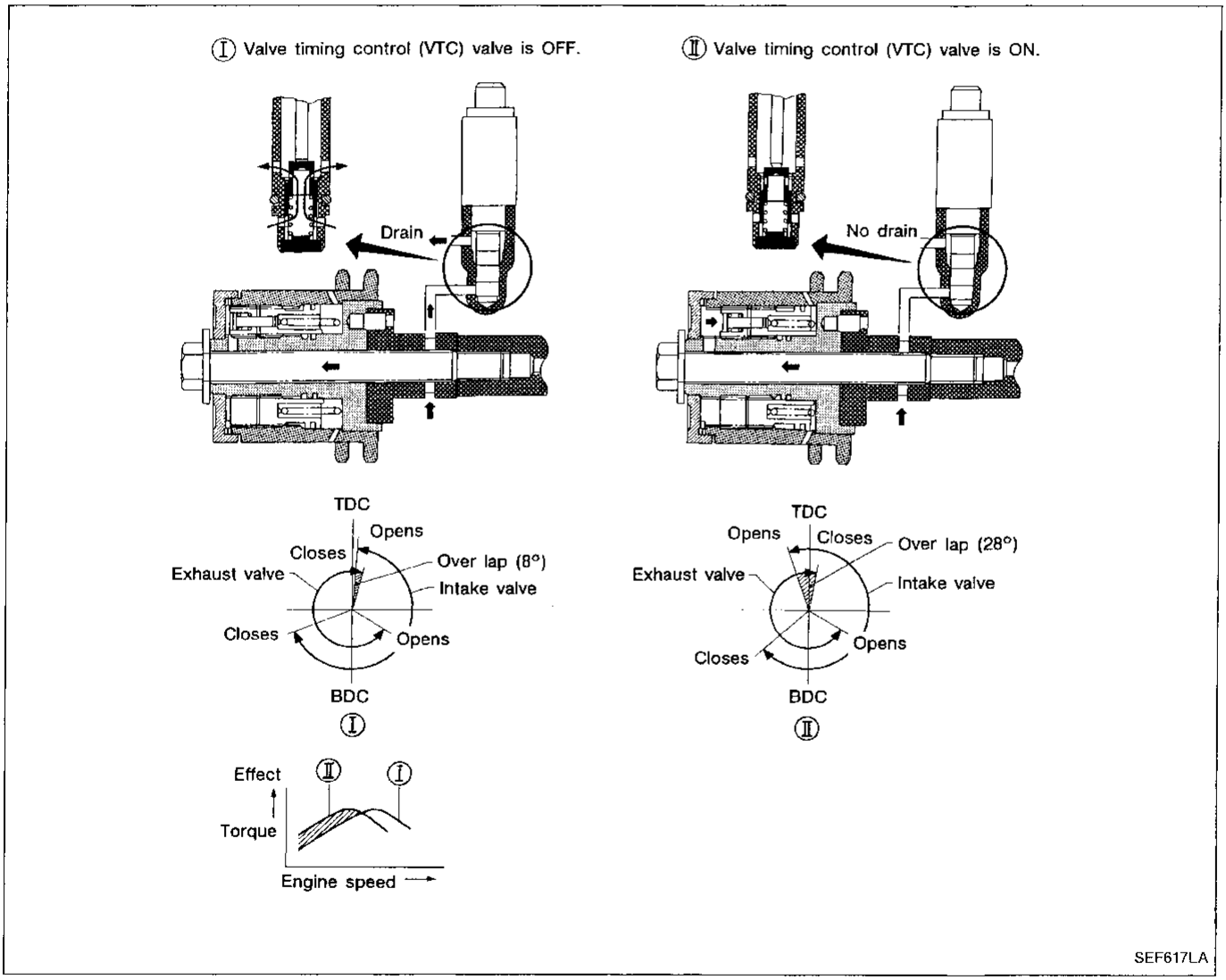
Valve Timing Control (VTC) (Cont'd)



Valve Timing Control (VTC) (Cont'd)

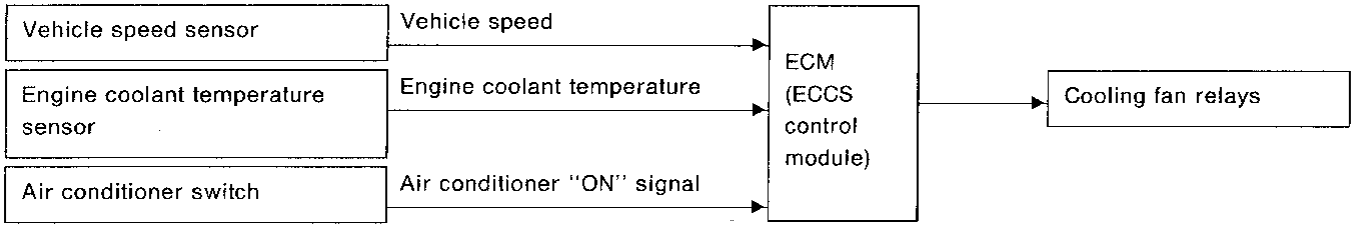
OPERATION

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 below 110°C (230°F). • Engine speed is below 4,600 rpm. • Engine load is high. • Selector lever other than "N" or "P" position.	ON	Advance	Increased	II
Those other than above	OFF	Retard	Decreased	I



Cooling Fan Control

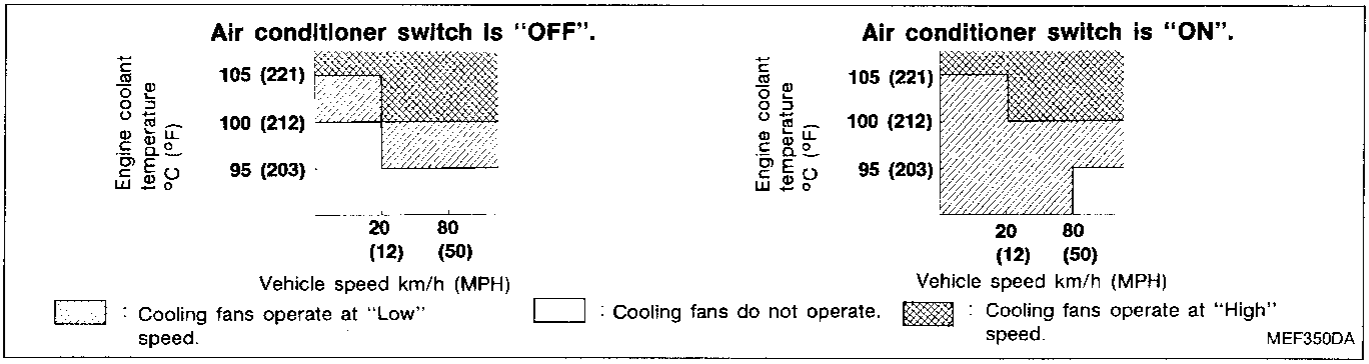
INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, and air conditioner ON signal.
The control system has 3-step control [HIGH/LOW/OFF].

OPERATION



Fail-safe System

CPU MALFUNCTION

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, IACV-AAC valve operation, and so on are controlled under certain limitations.

Operation

	Operation
Fuel injection	Simultaneous multiport fuel injection system
Ignition timing	Ignition timing preset value is fixed at the factory.
Fuel pump	Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls.
IACV-AAC valve	Full open
Cooling fans	Cooling fan relays "ON"

Cancellation of fail-safe system when ECM is malfunctioning

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

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 2,400 rpm in order to inform the driver of fail-safe system operation while driving.

Operation

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

ENGINE COOLANT TEMPERATURE SENSOR MALFUNCTION

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

Operation

Condition	Engine coolant temperature determined by ECM
Just as ignition switch is turned ON or Start	40°C (104°F)
More than 6 minutes after ignition ON or Start	80°C (176°F)
Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)

KNOCK SENSOR MALFUNCTION

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

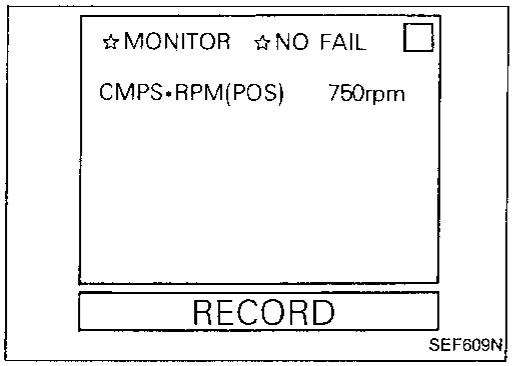
THROTTLE POSITION SENSOR MALFUNCTION

Description

When the output signal of throttle position sensor is abnormal the ECM judges it as a closed throttle position sensor malfunction.
With throttle position switch
The ECM does not use the throttle position sensor signal, but determines the idle position by the closed throttle position switch.

Operation

	Driving condition
When engine is idling	Normal
When accelerating	Poor acceleration

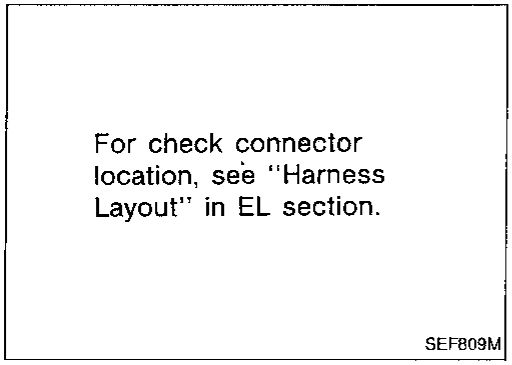


Direct Ignition System

CHECKING IDLE SPEED AND IGNITION TIMING

Idle speed

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



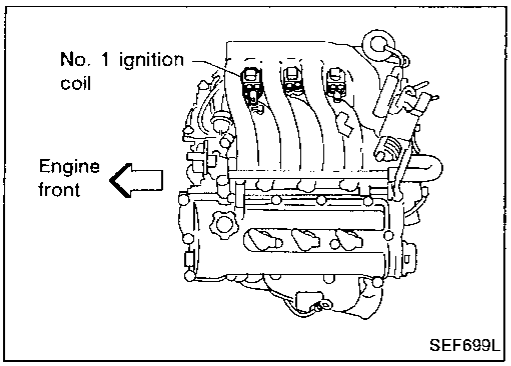
1. Disconnect check connector for voltage type tachometer.
2. Connect tachometer using a suitable tool.

Ignition timing

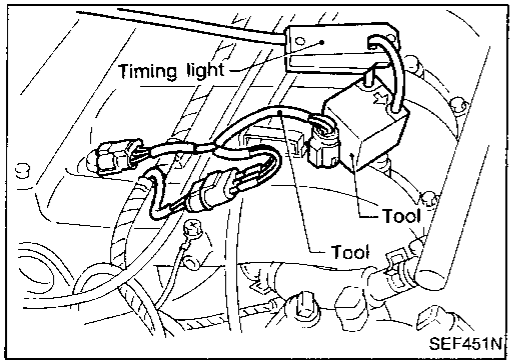
Any of the following three methods may be used, however, methods "A" and "B" give more reliable results and are preferable.

- **Method A (With SST)**

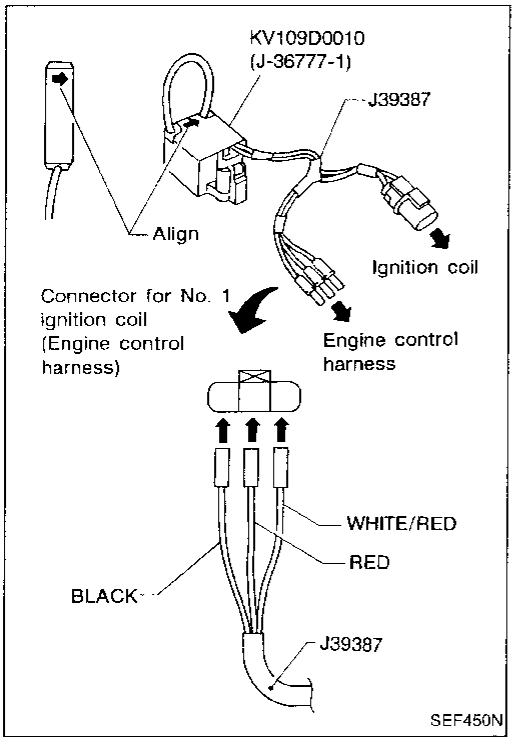
1. Disconnect No. 1 ignition coil harness connector.



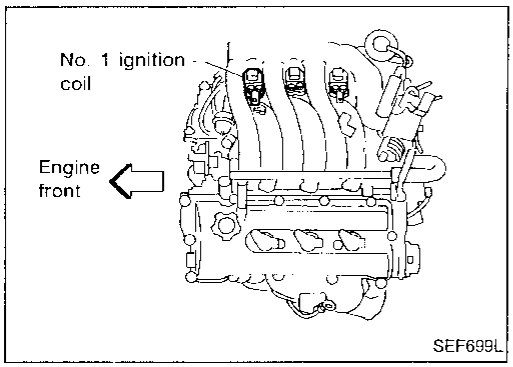
2. Connect SST and clamp wire with timing light as shown.
3. Check ignition timing.



Direct Ignition System (Cont'd)

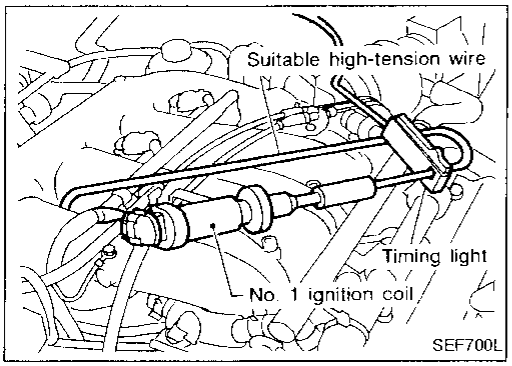


Align direction marks on SST and timing light clamp if aligning mark is punched.



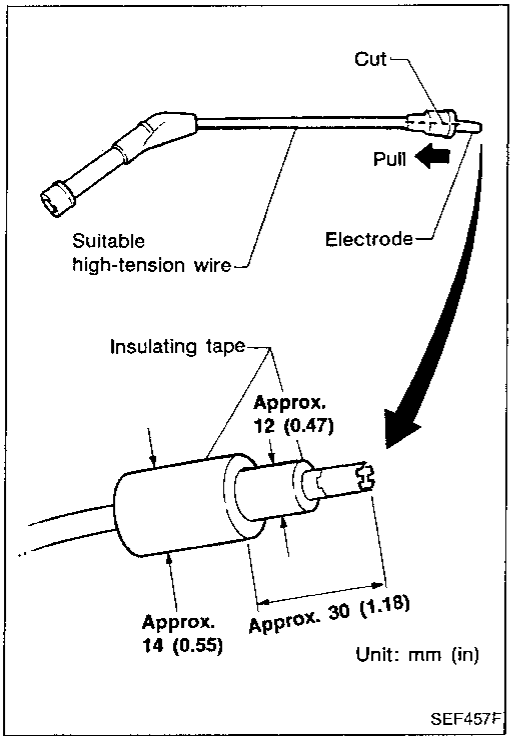
- **Method B (Without SST)**

1. Remove No. 1 ignition coil.

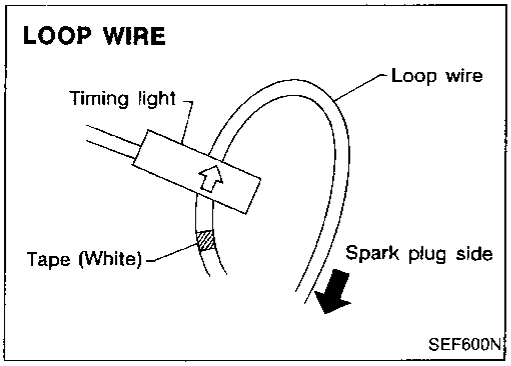


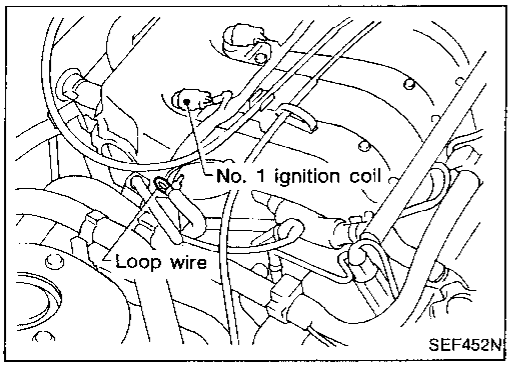
2. Connect No. 1 ignition coil and No. 1 spark plug with suitable high-tension wire as shown, and attach timing light clamp to this wire.
3. Check ignition timing.

Direct Ignition System (Cont'd)



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





- **Method C (Without SST)**

Clamp wire as shown.

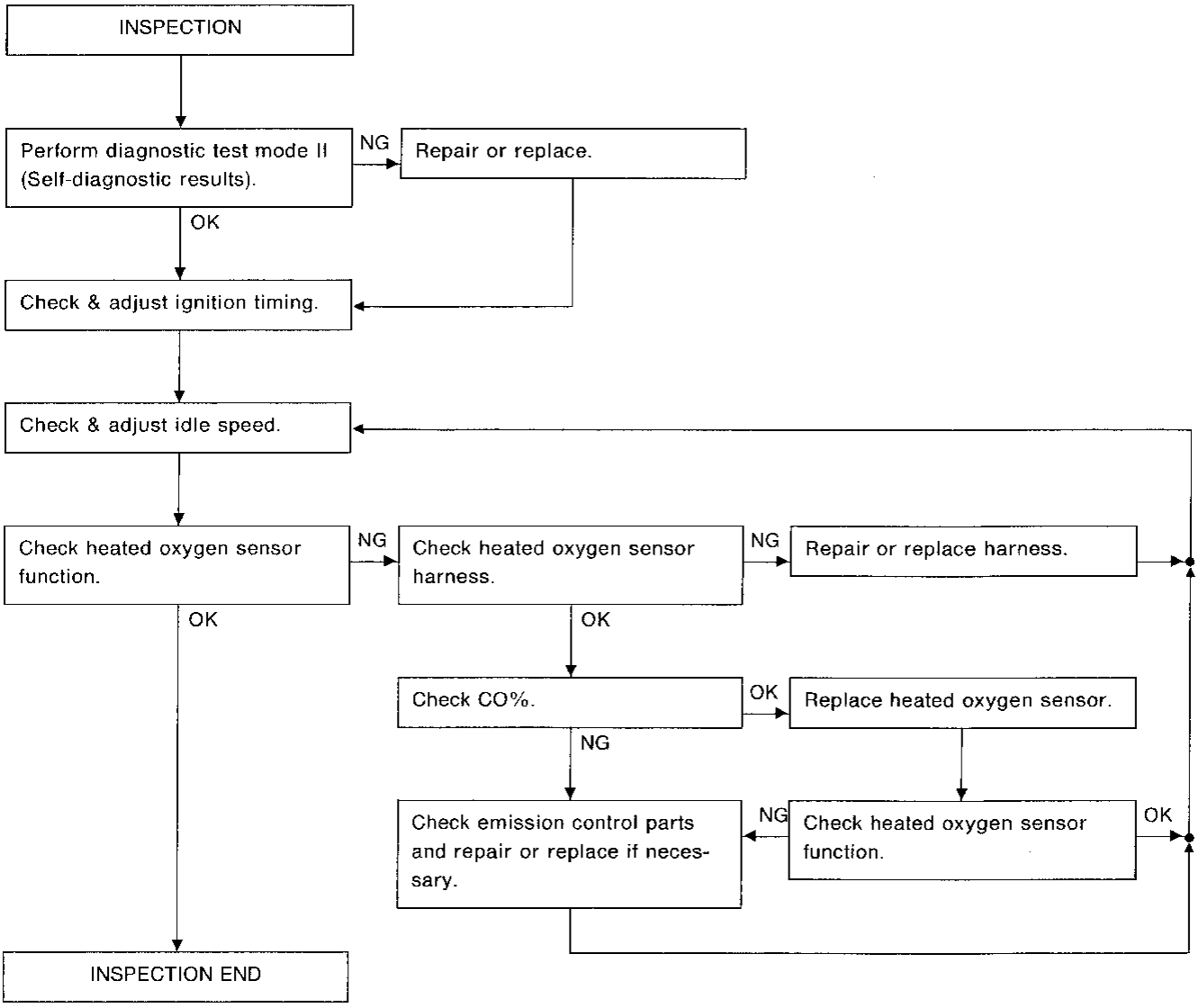
Preparation

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

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

Inspection and Adjustment

OVERALL INSPECTION SEQUENCE

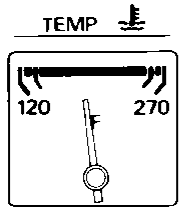


Inspection and Adjustment (Cont'd)

CHECKING AND ADJUSTING IDLE SPEED, IGNITION TIMING AND MIXTURE RATIO

START

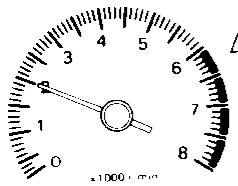
Visually check the following:
- Air cleaner clogging
- Hoses and ducts for leaks
- EGR valve operation
- Electrical connectors
- Gasket
- Throttle valve and throttle position sensor operation

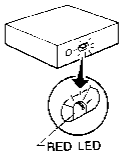


SEF246F

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

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


SEF247F



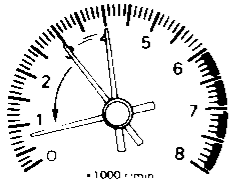
MEF377DA

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

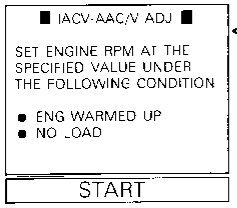
OK

NG

Repair or replace components as necessary.


SEF248F

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



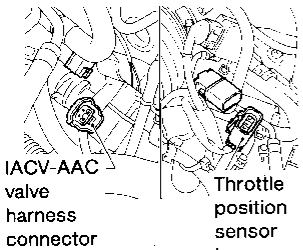
MEF352D

1) Turn off engine and disconnect throttle position sensor harness connector.
2) Start engine.
3) Select "IACV-AAC/V ADJ" in "WORK SUPPORT" mode.
4) Touch "START".

OR

1) Turn off engine and disconnect throttle position sensor harness connector and IACV-AAC valve harness connector.
2) Start engine.

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

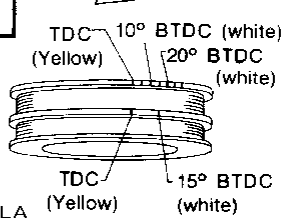


MEF353D

Check ignition timing with a timing light.
M/T: 15° ± 2° BTDC
A/T: 15° ± 2° BTDC (in "N" position)

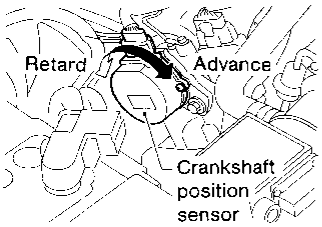
OK Ⓐ

NG Ⓘ



SEF706LA

Inspection and Adjustment (Cont'd)



MEF355D

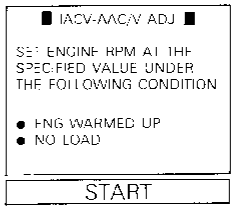
Adjust ignition timing to the specified value by turning camshaft position sensor after loosing bolts which secure camshaft position sensor.

M/T: 15° ± 2° BTDC
A/T: 15° ± 2° BTDC (in "N" position)

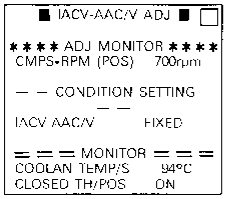
1) Select "IACV-AAC/V ADJ" in "WORK SUPPORT" mode.
2) Touching "START".

OR

1) Turn off engine and disconnect IACV-AAC valve harness connector.
2) Start engine.



MEF357D



SEF603N

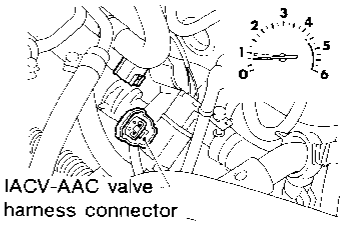
Check idle speed.

- Read idle speed in "IACV-AAC/V ADJ" in "WORK SUPPORT" mode.

OR

- Check idle speed.

M/T: 700 ± 50 rpm
A/T: 700 ± 50 rpm (in "N" position)

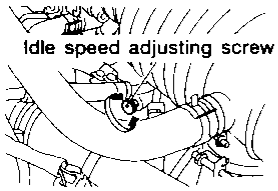


MEF358D

OK

NG

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



SEF694L

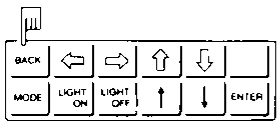
Adjust idle speed by turning idle speed adjusting screw.

M/T: 700 ± 50 rpm
A/T: 700 ± 50 rpm (in "N" position)

1) Touch "BACK".
2) Turn off engine and connect throttle position sensor harness connector.
3) Start engine.

OR

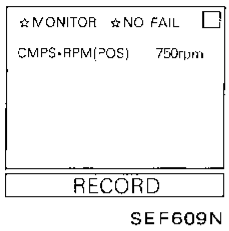
1) Turn off engine and connect throttle position sensor harness connector and IACV-AAC valve harness connector.
2) Start engine.



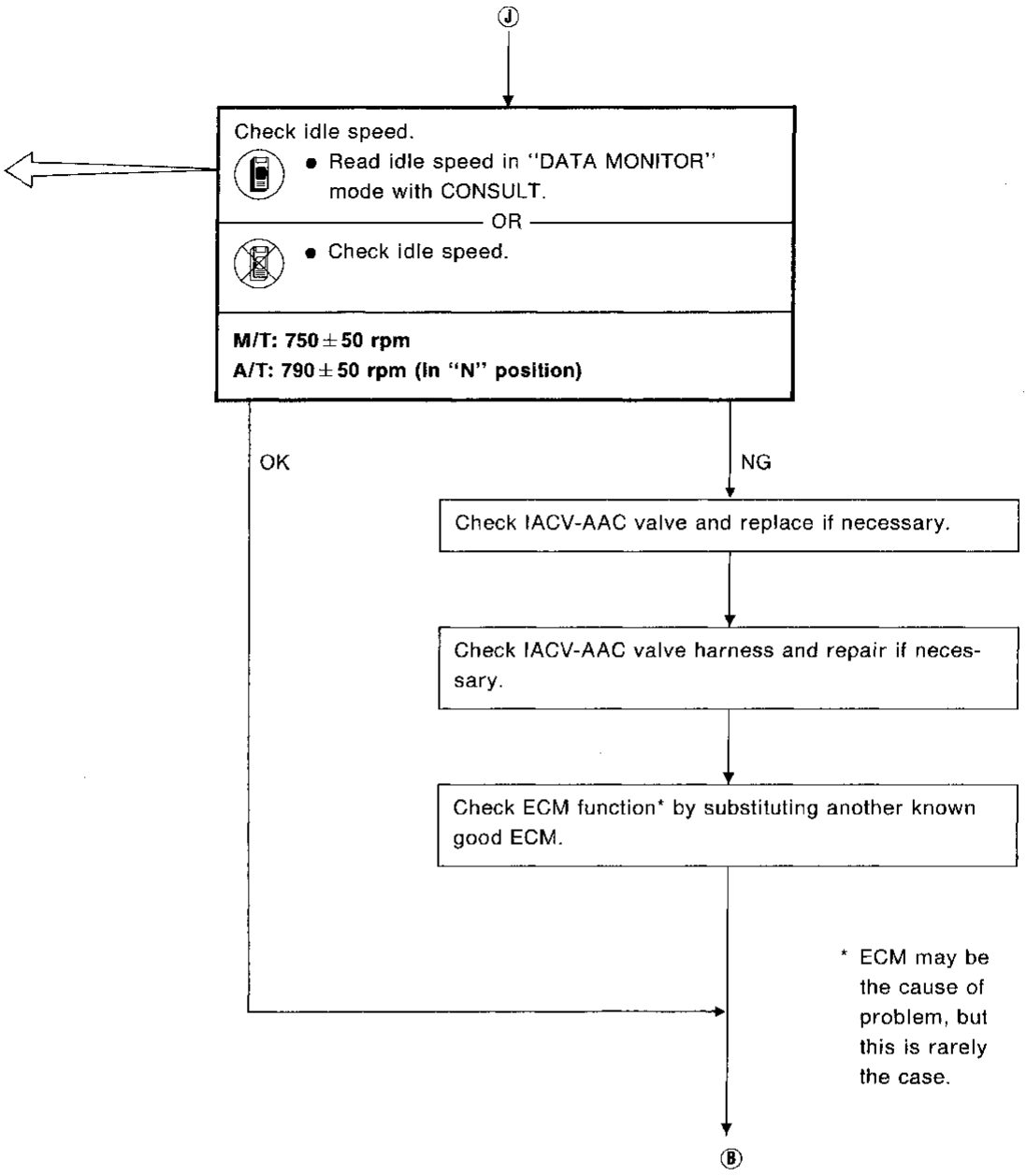
SEF913J

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

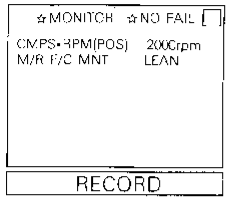
Inspection and Adjustment (Cont'd)



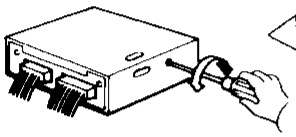
SEF609N



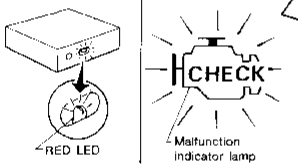
Inspection and Adjustment (Cont'd)



MEF225F



SEF957D



MEF377DA

Ⓑ

1. See "M/R F/C MNT" in "Data monitor" mode.
2. Run engine at about 2,000 rpm for about 2 minutes under no-load.
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.

RICH → LEAN → RICH → (1 time, 2 times)
LEAN → RICH .....

NG → Ⓒ

OR

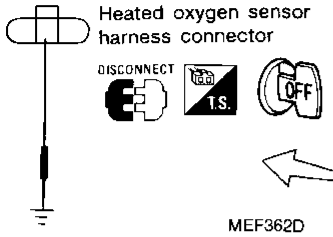
1. Set "Heated oxygen sensor monitor" in the self-diagnostic test mode II. (See page EF & EC-201.)
2. Run engine at about 2,000 rpm for about 2 minutes under no-load.
3. Maintaining engine at 2,000 rpm under no-load, check to make sure that the RED LED on the ECM or the malfunction indicator lamp on the instrument panel goes ON and OFF more than 5 times during 10 seconds.

OK

END

Inspection and Adjustment (Cont'd)

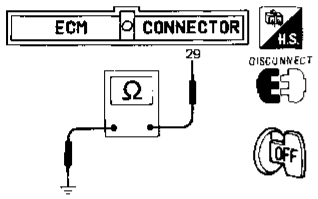
Ⓒ



MEF362D

Check heated oxygen sensor harness:
1) Turn off engine and disconnect battery ground cable.
2) Disconnect ECM SMJ harness connector from ECM.
3) Disconnect heated oxygen sensor harness connector and connect main harness side terminal for heated oxygen sensor to ground with a jumper wire. (For the location, refer to EF & EC-272.)
4) Check for continuity between terminal No. 29 of ECM SMJ harness connector and body ground.

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



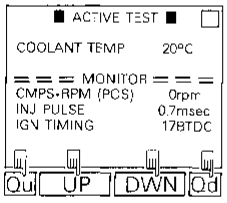
MEF363D

OK

NG

Repair or replace harness. → Ⓔ

Connect ECM SMJ harness connector to ECM.

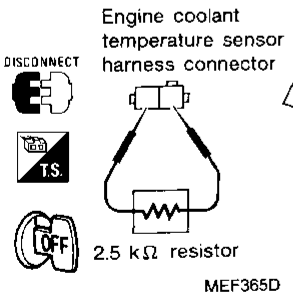


SEF605N

1) Connect battery ground cable.
2) Select "ENG COOLANT TEMP" in "ACTIVE TEST" mode.
3) Set "COOLANT TEMP" to 20°C (68°F) by touching "Qu" and "Qd" and "UP", "DOWN".

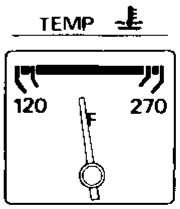
OR

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



MEF365D

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

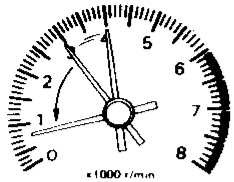


SEF246F

Ⓓ

Inspection and Adjustment (Cont'd)

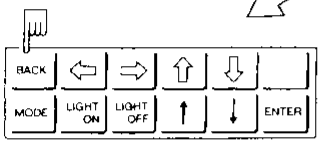
Ⓓ



SEF248F

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

Check "CO"%.
Idle CO: Less than 8%
After checking CO%,
1) Touch "BACK".



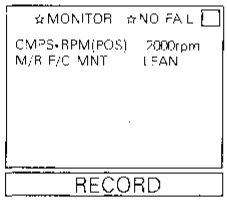
SEF913J

1) Disconnect the resistor from terminals of engine coolant temperature sensor harness connector.
2) Connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.

NG

OK

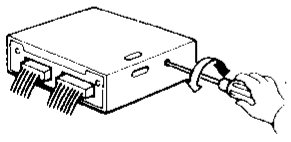
Replace heated oxygen sensor.



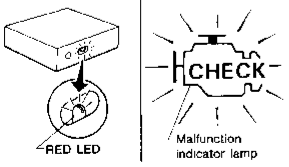
MEF225F

1. See "M/R F/C MNT" 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.
RICH → LEAN → RICH →
1 time 2 times
LEAN → RICH .....

OR


SEF957D

1. Set "Heated oxygen sensor monitor" in the self-diagnostic test mode II.
(See page EF & EC-201.)
2. Maintaining engine at 2,000 rpm under no-load, check to make sure that the RED LED on the ECM or the malfunction indicator lamp on the instrument panel goes ON and OFF more than 5 times during 10 seconds.



MEF377DA

NG

OK

Ⓕ

Ⓔ

Inspection and Adjustment (Cont'd)

Ⓕ

Connect heated oxygen sensor harness connector to heated oxygen sensor.

Check fuel pressure regulator.
(See page EF & EC-333.)

Check mass air flow sensor and its circuit.
(See page EF & EC-256.)

Check injector and its circuit.
(See page EF & EC-287.)
Clean or replace if necessary.

Check engine coolant temperature sensor and its circuit.
(See page EF & EC-259.)

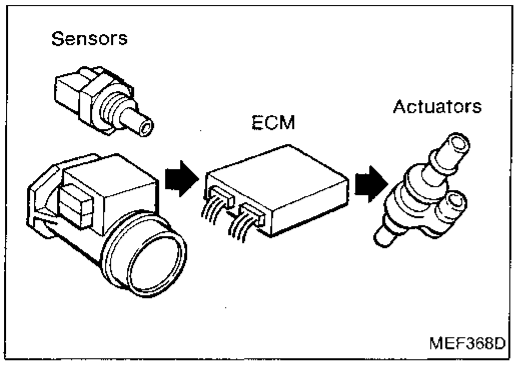
Check ECM function* by substituting another known good ECM.

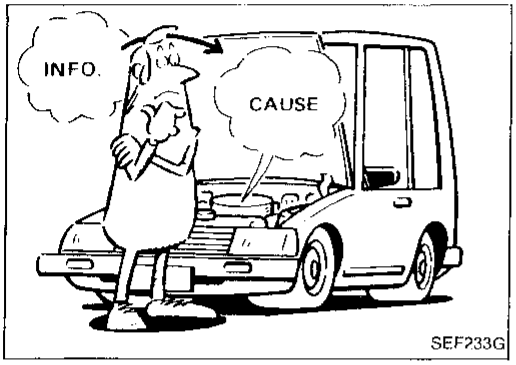
Ⓔ

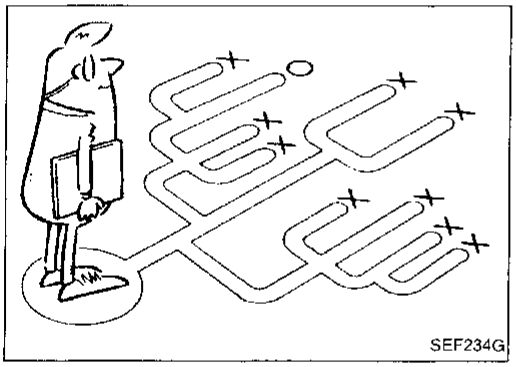
*: ECM may be the cause of a problem, but this is rarely the case.

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 such as vacuum leaks, fouled spark plugs, or other problems with the engine.

It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.

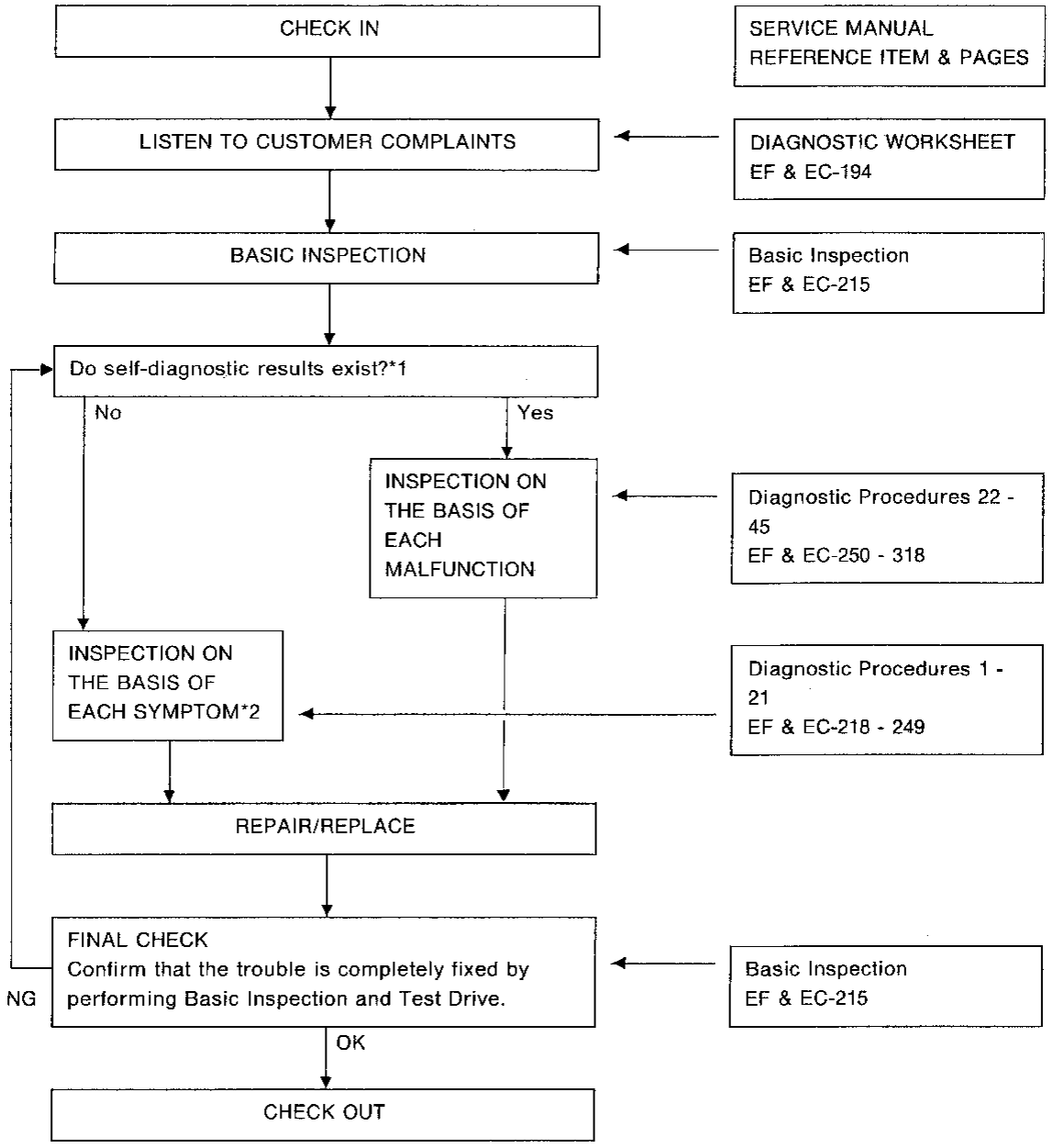
A visual check only may not find the cause of the problems, so a road test with a circuit tester connected to a suspected circuit should be performed.

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

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

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

WORK FLOW



***1: If the on-board diagnostic system cannot be performed, check main power supply and ground circuit. (See Diagnostic Procedure 22.)**

***2: If the trouble is not duplicated, see INTERMITTENT PROBLEM SIMULATION (EF & EC-195).**

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

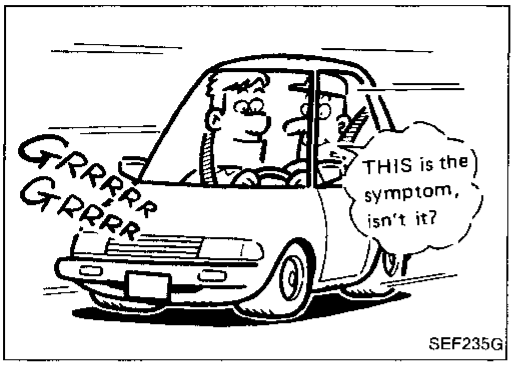
SEF907L

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 diagnostic worksheet such as the one shown 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	

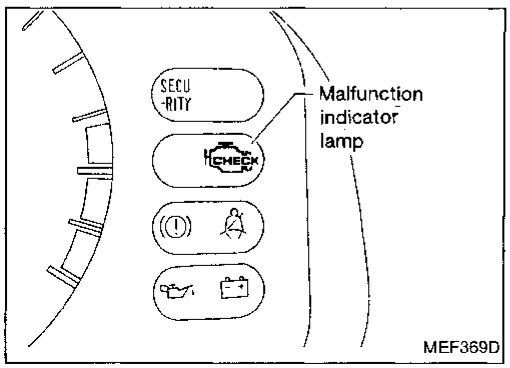


How to Perform Trouble Diagnoses for Quick and Accurate Repair (Cont'd)

INTERMITTENT PROBLEM SIMULATION

In order to duplicate an intermittent problem, it is effective to create similar conditions for component parts, under which the problem might occur.
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 clockwise.
			Retarded	Rotate distributor counterclockwise.
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	Electric connection (Electric continuity)	Harness connectors and wires	Poor electric connection or improper wiring	Tap or wiggle.
				Race engine rapidly. See if the torque reaction of the engine unit causes electric breaks.
6	Temperature	ECM	Cooled	Cool with an icing spray or similar device.
			Warmed	Heat with a hair drier. **[WARNING: Do not overheat the unit.]**
7	Moisture	Electric parts	Damp	Wet. **[WARNING: Do not directly pour water on components. Use a mist sprayer.]**
8	Electric loads	Load switches	Loaded	Turn on headlamps, air conditioner, rear defogger, etc.
9	Closed throttle position switch condition	ECM	ON-OFF switching	Rotate throttle position sensor body.
10	Ignition spark	Timing light	Spark power check	Try to flash timing light for each cylinder using ignition adapter (SST).

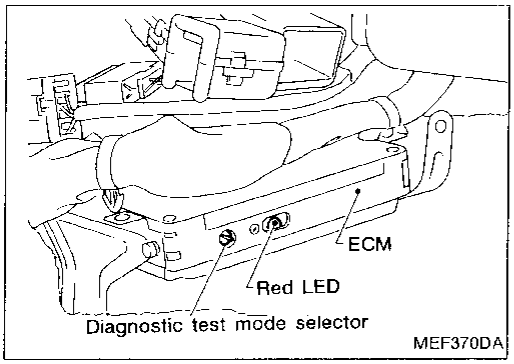


On-board Diagnostic System

MALFUNCTION INDICATOR LAMP

A malfunction indicator lamp has been adopted on all models.
This light blinks simultaneously with the RED LED on the ECM.

On-board Diagnostic System (Cont'd)



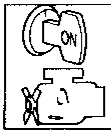
ECM LED

The ECM has only one RED LED.

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)

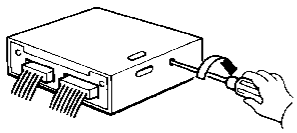


Turn ignition switch "ON".
(Do not start engine.)

Diagnostic Test Mode I —
BULB CHECK

Start engine.

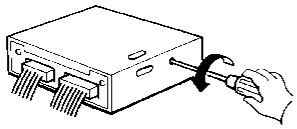
Diagnostic Test Mode I —
MALFUNCTION
WARNING



MEF371D

(Turn diagnostic test mode selector on ECM fully clockwise.)

Wait at least 2 seconds.



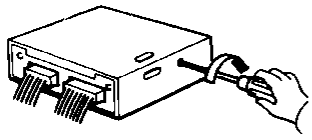
MEF372D

(Turn diagnostic test mode selector fully counterclockwise.)

Diagnostic Test Mode II —
SELF-DIAGNOSTIC RESULTS

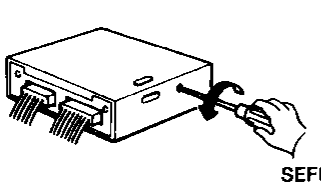
Start engine.

Diagnostic Test Mode II —
HEATED OXYGEN SENSOR
MONITOR



SEF888M

Wait at least 2 seconds.



SEF889M

HOW TO SWITCH DIAGNOSTIC TEST MODES

- **Switching the modes is not possible when the engine is running.**
- **When the ignition switch is turned off during diagnosis in each mode, and then turned back on again after power to the ECM has dropped off completely, the diagnosis will automatically return to Diagnostic Test Mode I.**
- **Turn back diagnostic test mode selector to the fully counterclockwise position whenever vehicle is in use.**

On-board Diagnostic System — Diagnostic Test Mode I

DIAGNOSTIC TEST MODE I — BULB CHECK

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

DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

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

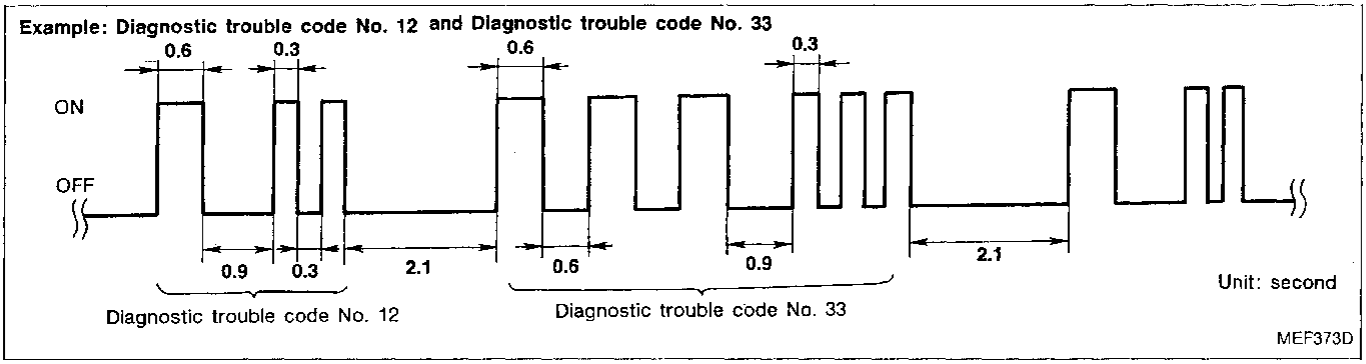
Diagnostic trouble code No.	Malfunction
12	Mass air flow sensor circuit
13	Engine coolant temperature sensor circuit
14	Vehicle speed sensor circuit
31	ECM (ECCS control module)
32	EGR function
33	Heated oxygen sensor circuit
35	EGR temperature sensor circuit
43	Throttle position sensor circuit
45	Injector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

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

On-board Diagnostic System — Diagnostic test mode II (Self-diagnostic results)

DESCRIPTION

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



Long (0.6 second) blinking indicates the number of ten digits and short (0.3 second) blinking indicates the number of single digits.

For example, the red LED flashes once for 0.6 seconds and then it flashes twice for 0.3 seconds. 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 ECM memory.

Display diagnostic trouble code table

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

X: Available

CHECK : Malfunction indicator lamp item

*: Check items causing a malfunction of camshaft position sensor circuit first, if both diagnostic trouble code No. 11 and 21 are displayed at the same time.

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	Camshaft position sensor circuit	• Either 1° or 120° signal is not entered for the first few seconds during engine cranking. • Either 1° or 120° signal is not input often enough while the engine speed is higher than the specified rpm.	• Harness and connector (If harness and connector are normal, replace camshaft position sensor.)
12	Mass air flow sensor circuit	• The mass air flow sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector (If harness and connector are normal, replace mass air flow sensor.)
13	Engine coolant temperature sensor circuit	• The engine coolant temperature sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Engine coolant temperature sensor
14	Vehicle speed sensor circuit	• The vehicle speed sensor circuit is open or shorted.	• Harness and connector • Vehicle speed sensor (reed switch)
*21	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	• 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
34	Knock sensor circuit	• The knock sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Knock sensor
35	EGR temperature sensor circuit	• The EGR temperature sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • EGR temperature sensor
43	Throttle position sensor circuit	• The throttle position sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Throttle position sensor
45	Injector leak	• Fuel leaks from injector.	• Injector
51	Injector circuit	• The injector circuit is open.	• Harness and connector • Injector
54	Signal circuit from A/T control unit to ECM (A/T only)	• 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 diagnostic trouble code No. 11 and 21 are displayed at the same time.

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 on-board diagnostic system.**

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

DESCRIPTION

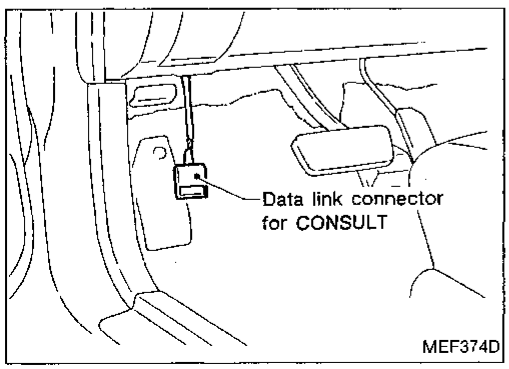
In this mode, the MALFUNCTION INDICATOR LAMP and RED LED display the condition of the fuel mixture (lean or rich) which is monitored by the heated oxygen sensor.

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

*: Maintains conditions just before switching to open loop.

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 RED LED or MALFUNCTION INDICATOR LAMP goes ON and OFF more than 5 times every 10 seconds; measured at 2,000 rpm under no-load.

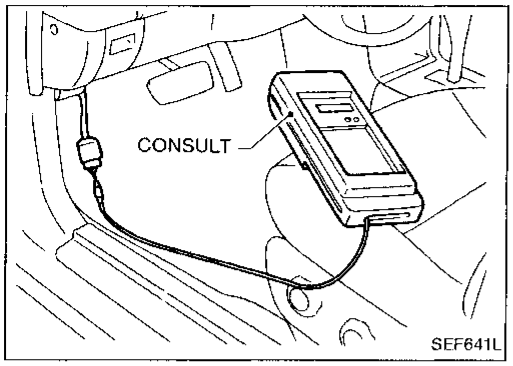


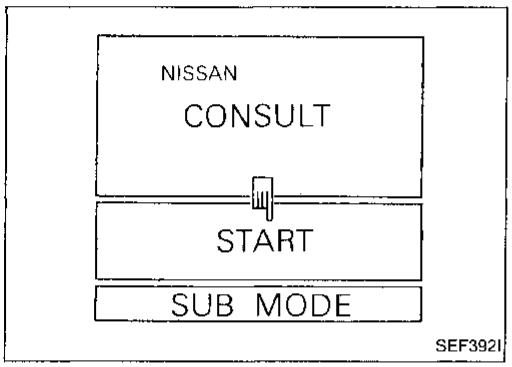
Consult

CONSULT INSPECTION PROCEDURE

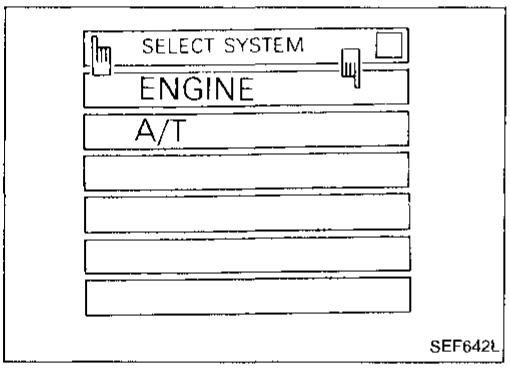
1. Turn off ignition switch.
2. Connect "CONSULT" to data link connector for CONSULT. (Data link connector for CONSULT is located in left dash side panel.)

Consult (Cont'd)

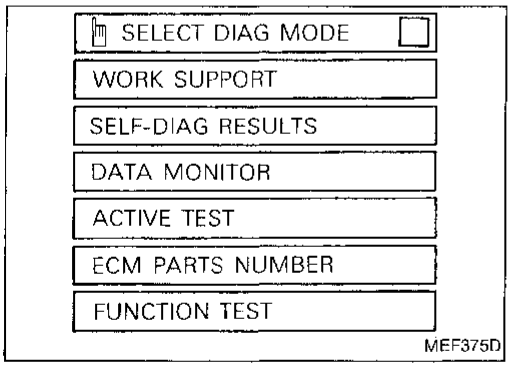




3. Turn on ignition switch.
4. Touch "START".



5. Touch "ENGINE".



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

For further information, see the CONSULT Operation Manual.

Consult (Cont'd)

ECCS COMPONENT PARTS APPLICATION

ECCS COMPONENT PARTS		DIAGNOSTIC TEST MODE				
		WORK SUPPORT	SELF-DIAG-NOSTIC 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 sensor		X	X		
	Vehicle speed sensor		X	X		X
	Throttle position sensor	X	X	X		X
	EGR temperature sensor		X	X		
	Knock sensor		X			
	Ignition switch (start signal)			X		X
	Air conditioner switch			X		
	Neutral position switch			X		X
	Power steering oil pressure switch			X		X
	Battery			X		
	A/T signal		X			
OUTPUT	Injectors		X	X	X	X
	Power transistors (ignition timing)		X (Ignition signal)	X	X	X
	IACV-AAC valve	X		X	X	X
	Valve timing control solenoid valve			X	X	X
	EGRC-solenoid valve			X	X	X
	Power valve control solenoid valve*			X		X
	Air conditioner relay			X		
	Fuel pump relay	X		X	X	X
	Cooling fan			X	X	X

*: M/T models only
X: Applicable

Consult (Cont'd)

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT unit.
Self-diagnostic results	Self-diagnostic results can be read and erased quickly.
Date monitor	Input/Output data in the ECM can be read.
Active test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECM 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".

WORK SUPPORT MODE

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

Consult (Cont'd)

SELF-DIAGNOSTIC RESULTS MODE

DIAGNOSTIC ITEM	DIAGNOSTIC ITEM IS DETECTED WHEN ...	CHECK ITEM (REMEDY)
CRANK POSITION SEN*	• Either 1° or 120° signal is not entered for the first few seconds during engine cranking. • Either 1° or 120° signal is not input often enough while the engine speed is higher than the specified rpm.	• Harness and connector (If harness and connector are normal, replace camshaft position sensor.)
MASS AIR FLOW 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)
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.)
EGRC SOLENOID/V	• EGR valve does not operate. (EGR valve spring does not lift.)	• EGR valve • EGRC-solenoid valve
OXYGEN SEN	• 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
INJECTOR·OPEN	• The injector circuit is open.	• Injector
A/T COMM LINE	• The A/T communication line is open or shorted.	• Harness and connector

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

Consult (Cont'd)

DATA MONITOR MODE

Remarks: ● The monitor item marked "*" is applicable to M/T models only.
● Specification data are reference values.
● Specification data are out-put/in-put values which are detected or supplied by ECM at the connector.
* Specification data may not be directly related to their components signals/values/operations.
ie. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing being not adjusted to the specification data. This IGN TIMING monitors the calculated data by ECM according to the input signals from camshaft position sensor and other ignition timing related sensors.

MONITOR ITEM	CONDITION		SPECIFICATION	CHECK ITEM WHEN OUTSIDE SPEC.
CMPS RPM (POS) CMPS RPM (REF)	● Tachometer: Connect ● Run engine and compare tachometer indication with the CONSULT value.		Almost the same speed as the CONSULT value.	● Harness and connector ● Camshaft position sensor
MAS AIR/FL SE	● Engine: After warming up, idle the engine ● A/C switch "OFF" ● Shift lever "N" ● No-load	Idle	0.8 - 1.5V	● Harness and connector ● Mass air flow sensor
		2,000 rpm	1.4 - 1.8V	
COOLANT TEMP/S	● Engine: After warming up		More than 70°C (158°F)	● Harness and connector ● Engine coolant temperature sensor
OXYGEN SEN	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ 0.6 - 1.0V	● Harness and connector ● Heated oxygen sensor ● Intake air leaks ● Injectors
M/R F/C MNT			LEAN ↔ RICH Changes more than 5 times during 10 seconds.	
VHCL SPEED SE	● Turn drive wheels and compare speedometer indication with the CONSULT value		Almost the same speed as the CONSULT value	● Harness and connector ● Vehicle speed sensor
BATTERY VOLT	● Ignition switch: ON (Engine stopped)		11 - 14V	● Battery ● ECM power supply circuit
THRTL POS SEN	● Ignition switch: ON (Engine stopped)	Throttle valve fully closed	0.4 - 0.5V	● Harness and connector ● Throttle position sensor ● Throttle position sensor adjustment
		Throttle valve fully opened	Approx. 4.0V	
EGR TEMP SEN	● Engine: After warming up		Less than 4.5V	● Harness and connector ● EGR temperature sensor
START SIGNAL	● Ignition switch: ON → START		OFF → ON	● Harness and connector ● Starter switch
CLOSED TH/POS	● Ignition switch: ON (Engine stopped)	Throttle valve: Idle position	ON	● Harness and connector ● Throttle position sensor ● Throttle position sensor adjustment
		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	

Consult (Cont'd)

MONITOR ITEM	CONDITION		SPECIFICATION	CHECK ITEM WHEN OUTSIDE SPEC.
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" • Shift lever "N" • No-load	Idle	2.0 - 3.0 msec.	• Harness and connector • Injector • Mass air flow sensor • Intake air system
		2,000 rpm	1.8 - 2.8 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	—	
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	
COOLING FAN	• After warming up engine, idle the engine. • A/C switch "OFF"	Engine coolant temperature is 94°C (201°F) or less	OFF	• Harness and connector • Cooling fan relay • Cooling fan
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F)	LOW	
		Engine coolant temperature is 105°C (221°F) or more	HIGH	
A/F ALPHA	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	75 - 125%	• Harness and connector • Injectors • Mass air flow sensor • Heated oxygen sensor • Canister purge line • Intake air system
AIR COND RLY	• Air conditioner switch OFF → ON		OFF → ON	• Harness and connector • Air conditioner switch • Air conditioner relay
EGRC SOL/V	• Engine: After warming up • A/C switch: "OFF" • Shift lever "N" • No-load	Idle	ON	• Harness and connector • EGRC-solenoid valve
		2,000 rpm	OFF	

Consult (Cont'd)

MONITOR ITEM	CONDITION		SPECIFICATION	CHECK ITEM WHEN OUTSIDE SPEC.
VALVE TIM SOL	• Jack up front wheel • Engine: After warming up	• Idle	OFF	• Harness and connector • Valve timing control solenoid valve
		• Shift select lever to any range except "N" or "P" range • Quickly depress accelerator pedal, then quickly release it.	OFF → ON → OFF	
VIAS S/V*	• Engine: After warming up	• Idle	OFF	• Harness and connector • Power valve control solenoid valve
		• Quickly depress accelerator pedal, then quickly release it	OFF → ON → OFF	

Consult (Cont'd)

FUNCTION TEST MODE

FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
SELF-DIAG RESULTS	• Ignition switch: ON (Engine stopped) • Displays the results of self-diagnosis.	—		Objective system
CLOSED THROTTLE POSI	• Ignition switch: ON (Engine stopped) • Closed throttle position switch circuit is tested when throttle is opened and closed fully. ("IDLE POSITION" is the test item name for the vehicles in which idle is selected by throttle position sensor.)	Throttle valve: opened	OFF	• Harness and connector • Throttle position sensor (Closed throttle position switch) • Throttle position sensor (Closed throttle position switch) adjustment • Throttle linkage • Verify operation in DATA MONITOR mode.
		Throttle valve: closed	ON	
THROTTLE POSI SEN CKT	• Ignition switch: ON (Engine stopped) • Throttle position sensor circuit is tested when throttle is opened and closed fully.	Range (Throttle valve fully opened — Throttle valve fully closed)	More than 3.0V	• Harness and connector • Throttle position sensor • Throttle position sensor adjustment • Throttle linkage • Verify operation in DATA MONITOR mode.
NEUTRAL POSI SW CKT	• Ignition switch: ON (Engine stopped) • Neutral position switch circuit is tested when shift lever is manipulated.	OUT OF N/P-RANGE	OFF	• Harness and connector • Neutral position switch/ Inhibitor switch • Linkage + Inhibitor switch adjustment
		IN N-RANGE	ON	
FUEL PUMP CIRCUIT	• Ignition switch: ON (Engine stopped) • Fuel pump circuit is tested by checking the pulsation in fuel pressure when fuel tube is pinched.	There is pressure pulsation on the fuel feed hose.		• Harness and connector • Fuel pump • Fuel pump relay • Fuel filter clogging • Fuel level
EGRC SOL/V CIRCUIT	• Ignition switch: ON (Engine stopped) • EGR control S/V circuit is tested by checking solenoid valve operating noise.	The solenoid valve makes an operating sound every 3 seconds.		• Harness and connector • EGRC-solenoid valve
VALVE TIMING S/V CKT	• Ignition switch: ON (Engine stopped) • Valve timing S/V circuit is tested by checking solenoid valve operating noise.	The solenoid valve makes an operating sound every 3 seconds.		• Harness and connector • Valve timing solenoid valve
COOLING FAN CIRCUIT	• Ignition switch: ON (Engine stopped) • Cooling fan circuit is tested by rotating and stopping cooling fan.	The cooling fans rotate and stop every 3 seconds.		• Harness and connector • Cooling fan relays • Cooling fan motors

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 coolant temperature before cranking, and average battery voltage, mass air flow sensor output voltage and cranking speed during cranking are displayed.	Start signal: OFF → ON		• Harness and connector • Ignition switch
PW/ST SIGNAL CIRCUIT	• Ignition switch: ON (Engine running) • Power steering circuit is tested when steering wheel is rotated fully and then set to a straight line running position.	Locked position	ON	• Harness and connector • Power steering oil pressure switch • Power steering oil pump
		Neutral position	OFF	
VIAS S/V CIRCUIT	• Ignition switch: ON (Engine stopped) • Power valve control solenoid valve circuit is tested by checking solenoid valve operating noise.	The solenoid valve makes an operating sound every 3 seconds.		• Harness and connector • Power valve control solenoid valve
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.	• O_2 SEN COUNT: More than 5 times during 10 seconds (O_2 SEN-R COUNT: More than 5 times during 10 seconds)		• INJECTION SYS (Injector, fuel pressure regulator, harness or connector) • IGNITION SYS (Spark plug, power transistor, ignition coil, harness or connector) • VACUUM SYS (Intake air leaks) • Heated oxygen sensor circuit • Heated oxygen sensor operation • Fuel pressure high or low • Mass air flow sensor

Consult (Cont'd)

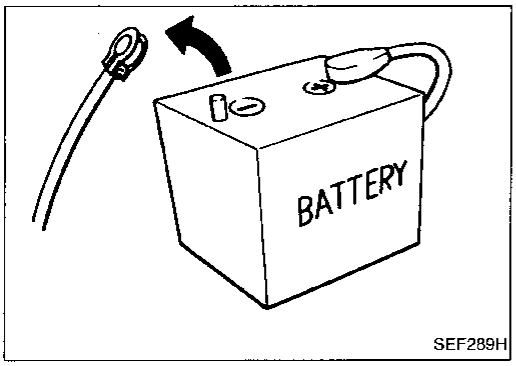
FUNCTION TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
POWER BALANCE	• After warming up, idle the engine. • Injector operation of each cylinder is stopped one after another, and resultant change in engine rotation is examined to evaluate combustion of each cylinder. (This is only displayed for models 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

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
IGN 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" • Shift lever "N" • Cut off each injector signal one at a time with the CONSULT.	Engine runs rough or dies.	• Harness and connector • Compression • Injectors • Power transistor • Spark plugs • Ignition coils
COOLING FAN	• Ignition switch: ON • Turn the cooling fan "ON" and "OFF" with the CONSULT.	Cooling fan moves and stops.	• Harness and connector • Cooling fan motor
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 VIAS SOL VALVE (Power valve)* VALVE TIMING 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
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.		

*: M/T models only

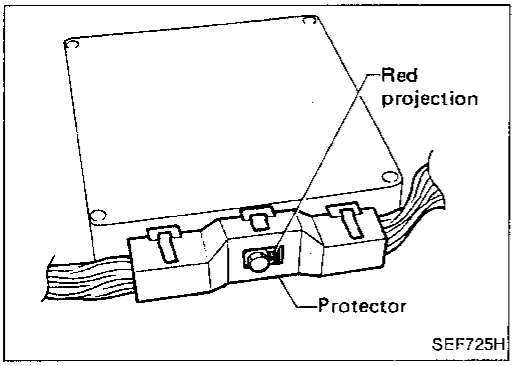


SEF289H

Diagnostic Procedure

CAUTION:

1. **Before connecting or disconnecting the ECM harness connector to or from any ECM, be sure to turn the ignition switch to the "OFF" position and disconnect the negative battery terminal in order not to damage ECM as battery voltage is applied to ECM even if ignition switch is turned off. Failure to do so may damage the ECM.**



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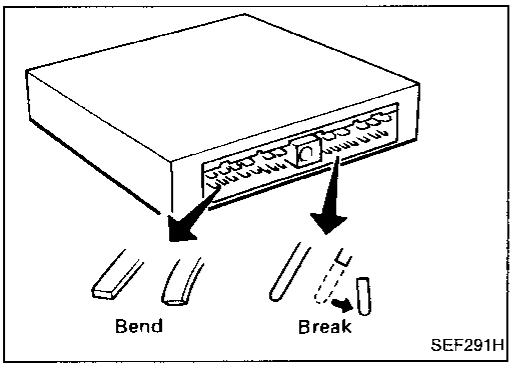
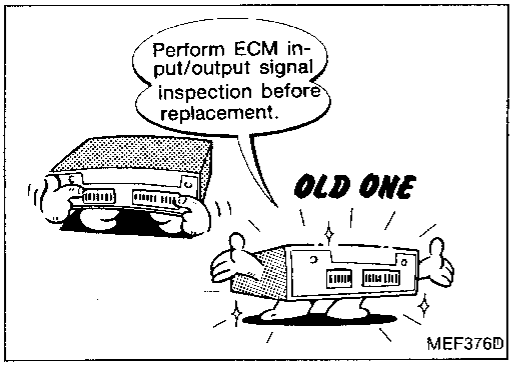
2. **When connecting ECM harness connector, tighten securing bolt until red projection is in line with connector face.**



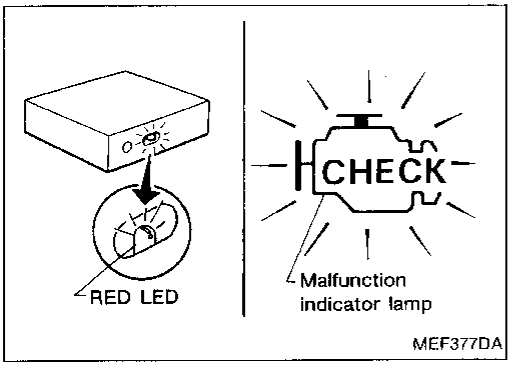
SEF291H

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



MEF376D

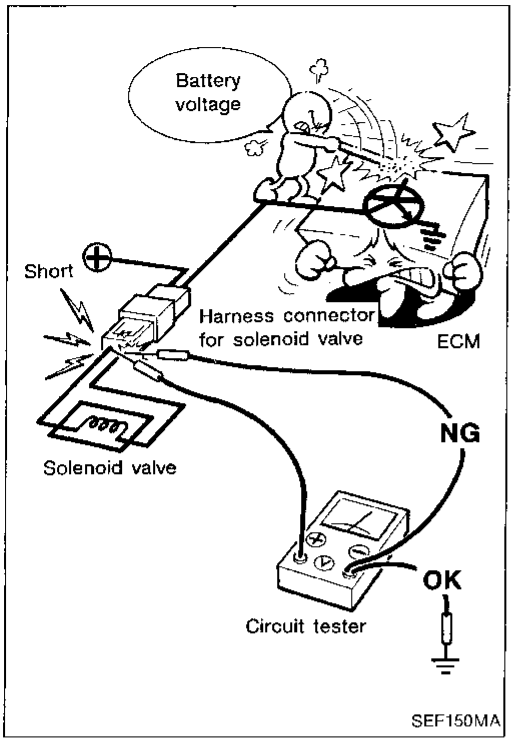
5. **Before replacing ECM, perform ECM input/output signal inspection and make sure whether ECM functions properly or not. (See page EF & EC-319.)**



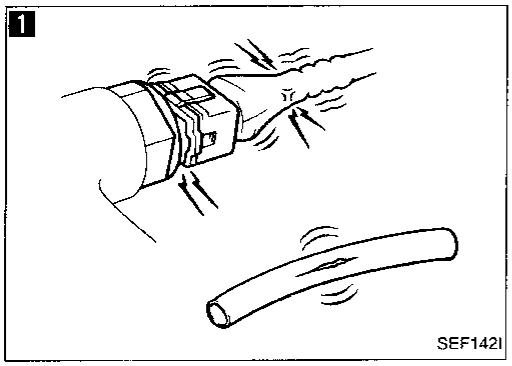
MEF377DA

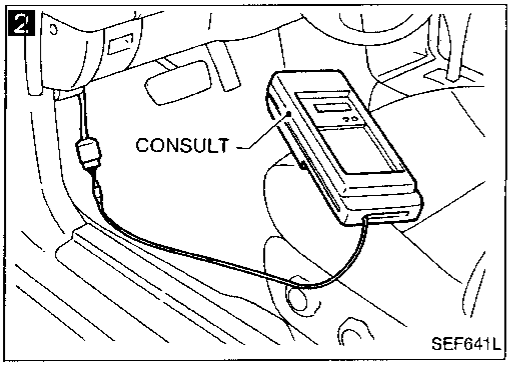
6. **After performing this "Diagnostic Procedure", perform on-board diagnostic system and driving test.**

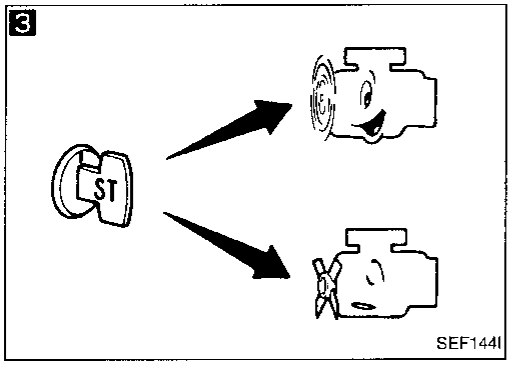
Diagnostic Procedure (Cont'd)

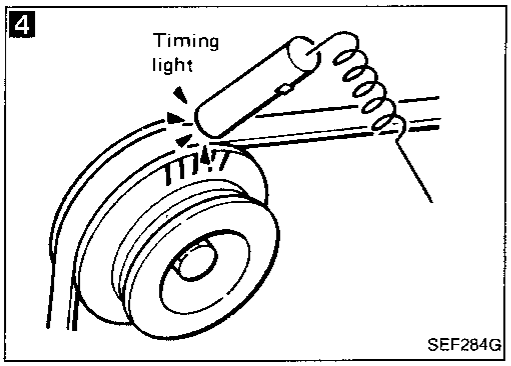


7. **When measuring ECM controlled components supply voltage with a circuit tester, separate one tester probe from the other.**
   If the two tester probes accidentally make contact with each other during measurement, the circuit will be shorted, resulting in damage to the ECM power transistor.









Basic Inspection

1

BEFORE STARTING

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

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

2

CONNECT CONSULT TO THE VEHICLE

Connect "CONSULT" to the data link connector for CONSULT and select "ENGINE" from the menu. (Refer to page EF & EC-201.)

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-182.)

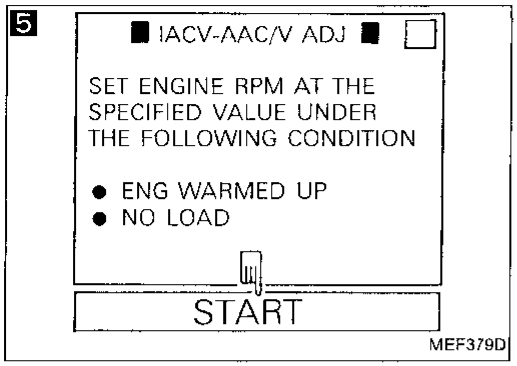
Ignition timing: 15° ± 2° BTDC

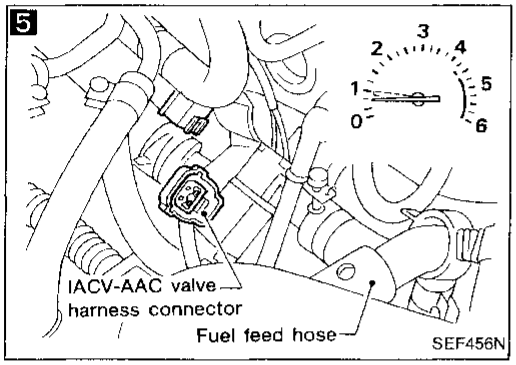
NG → Adjust ignition timing by turning camshaft position sensor.

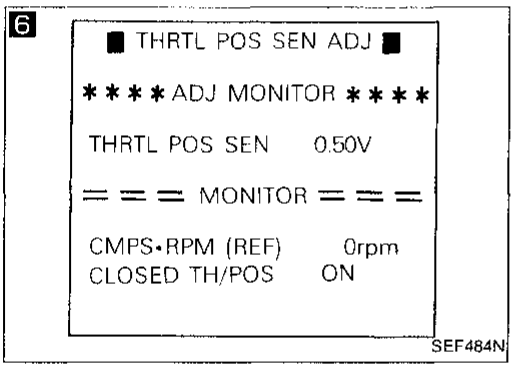
OK

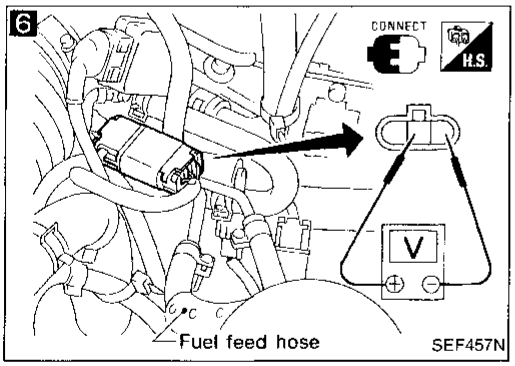
(Go to Ⓐ on next page.)

Basic Inspection (Cont'd)









Ⓐ

5

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 700±50 rpm (in "N" position)?

No → Adjust engine speed by turning idle speed adjusting screw.

OR

When disconnecting IACV-AAC valve harness connector, does engine speed fall to 700±50 rpm (in "N" position)?

Yes

6

CHECK THROTTLE POSITION SENSOR IDLE POSITION.

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

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

OR

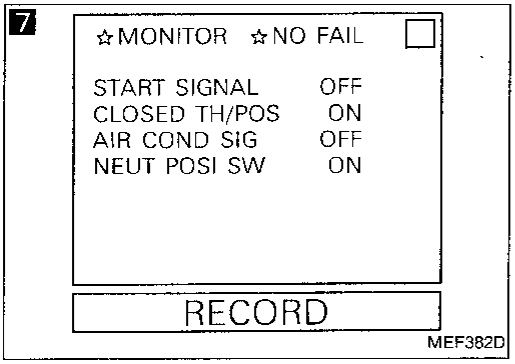
Measure output voltage of throttle position sensor using voltmeter, and check that it is 0.4 to 0.5V. (Throttle valve fully closed.)

OK

(Go to Ⓑ on next page.)

Basic Inspection (Cont'd)

7



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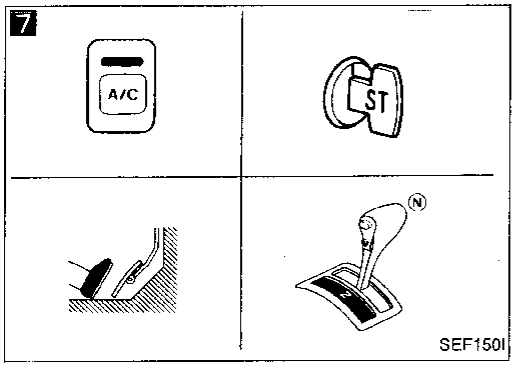

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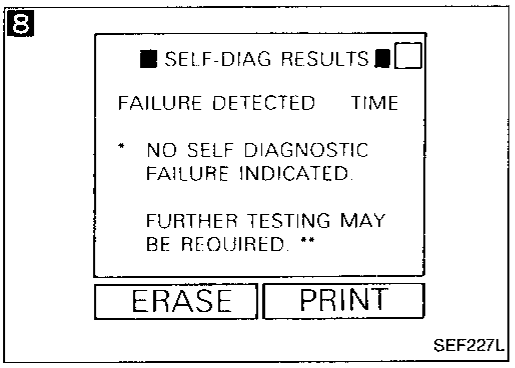

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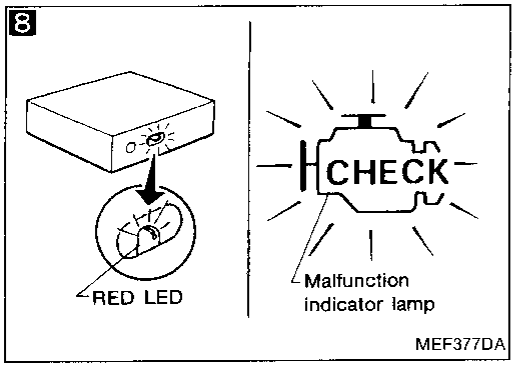


Ⓑ

7

CHECK SWITCH INPUT SIGNAL.

Select the following items in "DATA MONITOR" mode,
a) START SIGNAL,
b) CLOSED TH/POS,
c) AIR COND SIG,
d) NEUT POSI SW,
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
Idle position	Engine warmed up sufficiently Idle position → Depress the accelerator pedal.	0.4 - 0.5 → Approx. 4.0
A/C signal	A/C OFF → A/C ON (Engine running)	Battery voltage → Approx. 0.2
Neutral position (Parking) switch	Shift lever is "N" or "P" position → Except "N" and "P"	0 → 4.0 - 5.0

OK

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.

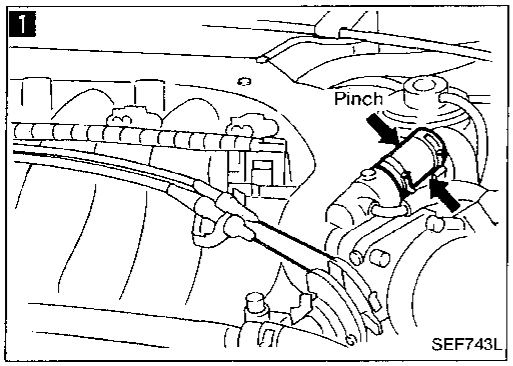
OR

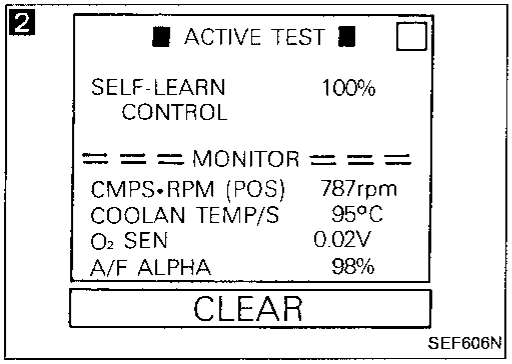
1. Set "Self-diagnostic results mode" in Diagnostic Test Mode II. (Refer to page EF & EC-199.)
2. Count the number of RED LED or malfunction indicator lamp flashes and read out the diagnostic trouble codes.
3. Are the diagnostic trouble codes being output?

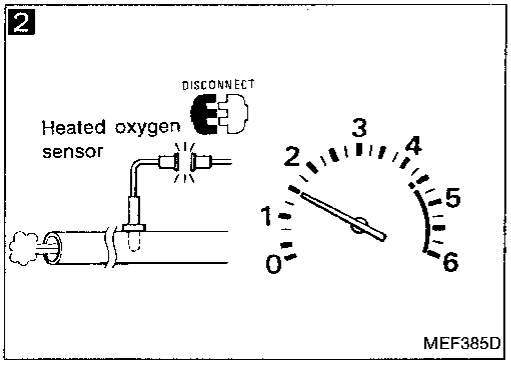
No

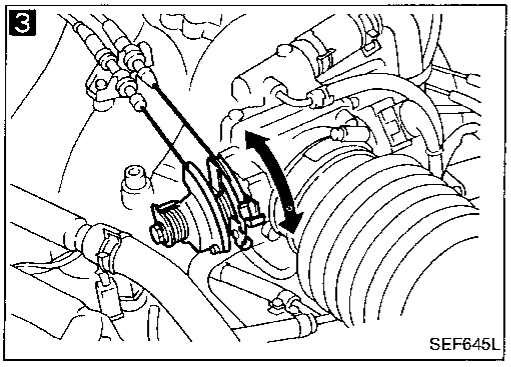
INSPECTION END

Diagnostic Procedure 1 — High Idling after Warm-up









1

CHECK IAA UNIT.
When pinching the IAA unit hose, does the engine speed drop?

Yes → Check IACV-air regulator, IACV-AAC valve and circuit.

No ↓

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

No ↓

3

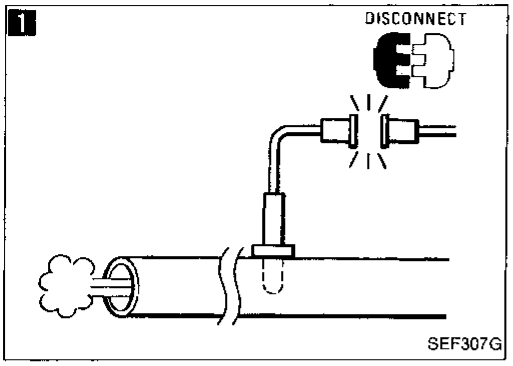
CHECK THROTTLE LINKAGE.

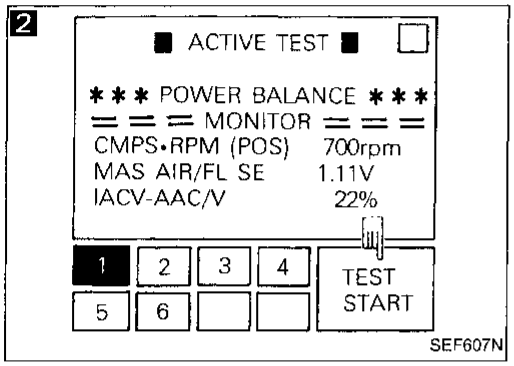
1. Check that throttle linkage moves smoothly.
2. Confirm that throttle valve both fully opens and fully closes.

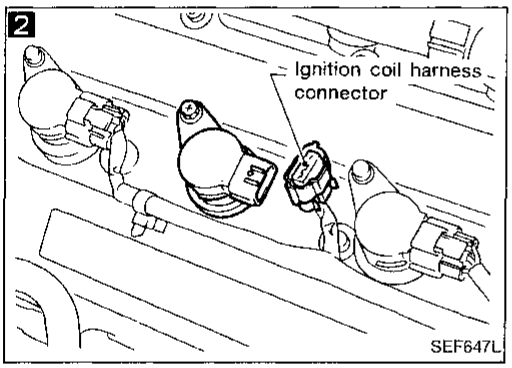
NG → Repair throttle linkage or sticking of throttle valve.

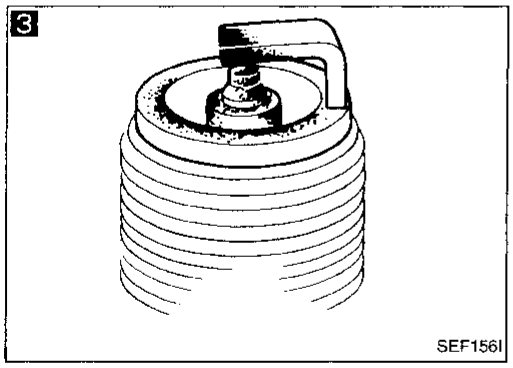
OK ↓

INSPECTION END









Diagnostic Procedure 2 — Hunting

1

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

Yes → Check heated oxygen sensor. (See page EF & EC-272.)

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 **4** .

OR

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

Yes ↓

3

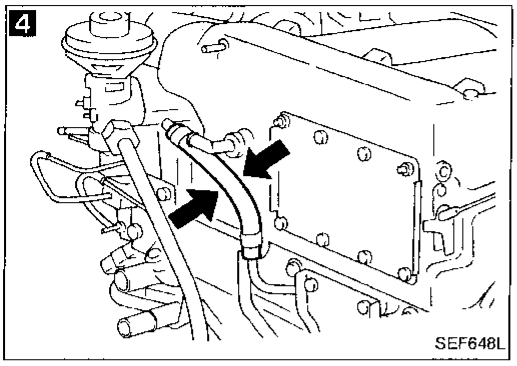
CHECK SPARK PLUGS.
Remove the spark plugs and check for fouling, etc.

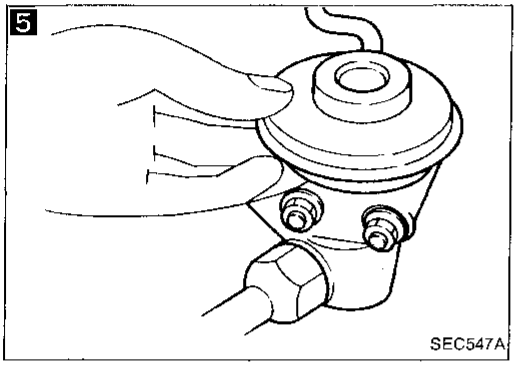
NG → Repair or replace spark plug(s).

OK ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 2 — Hunting (Cont'd)





Ⓐ

4

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

Yes → Discover air leak location and repair.

No

5

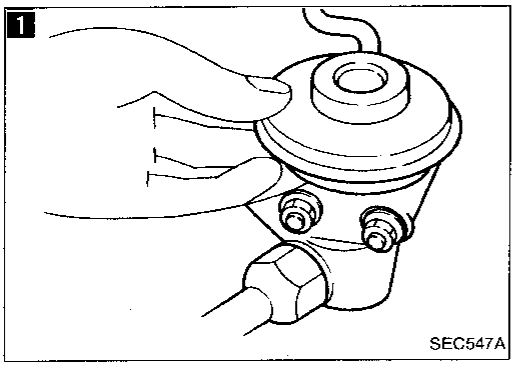
CHECK EGR VALVE
Check EGR valve for sticking.

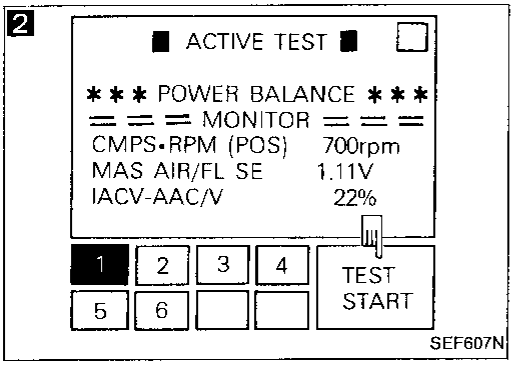
NG → Repair or replace.

OK

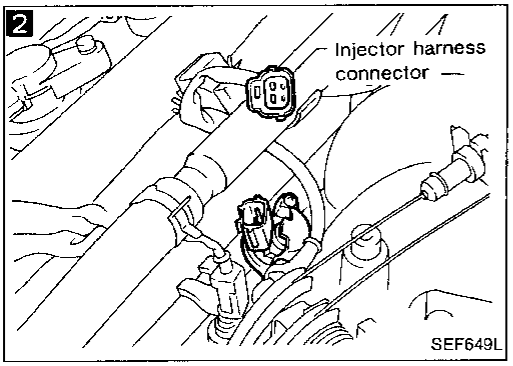
INSPECTION END

Diagnostic Procedure 3 — Unstable Idle

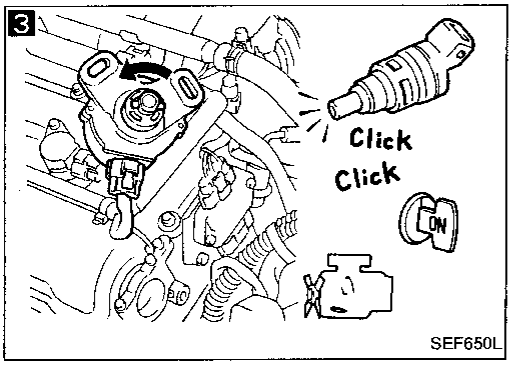

SEC547A



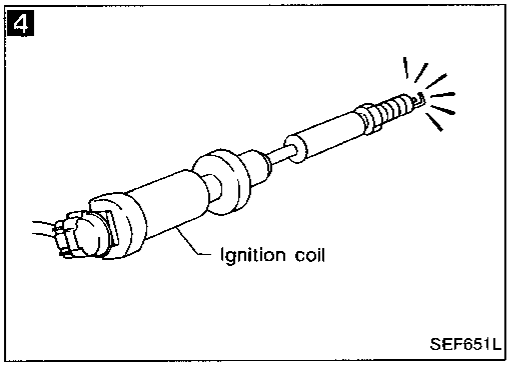
SEF607N



SEF649L



SEF650L



SEF651L

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?

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 **6**.

Yes ↓

3

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 ↓

4

CHECK IGNITION SPARK.

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

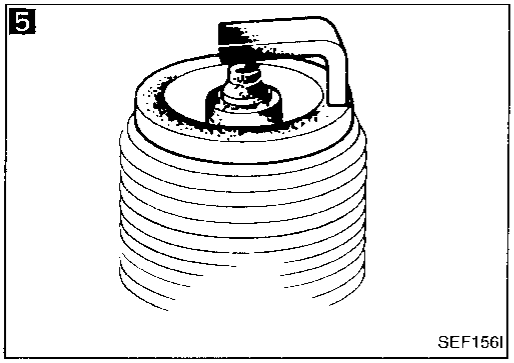
NG → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-264.)

OK ↓

(Go to Ⓐ on next page.)

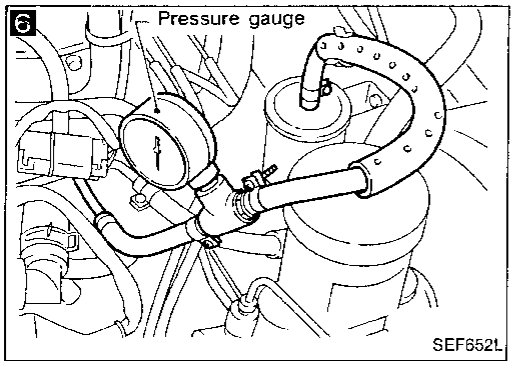
Diagnostic Procedure 3 — Unstable Idle (Cont'd)

5



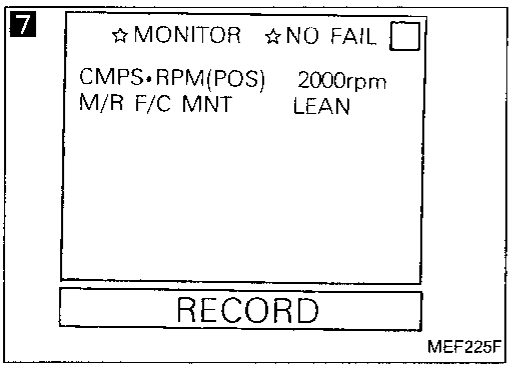
SEF156I

6



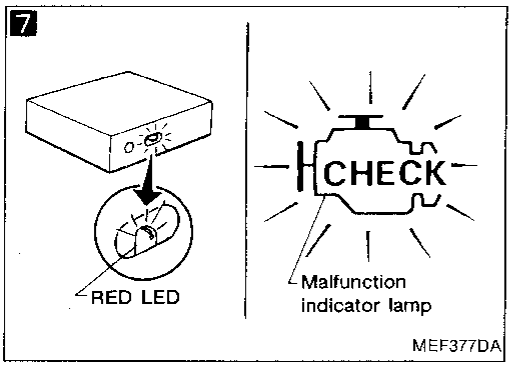
SEF652L

7



MEF225F

7



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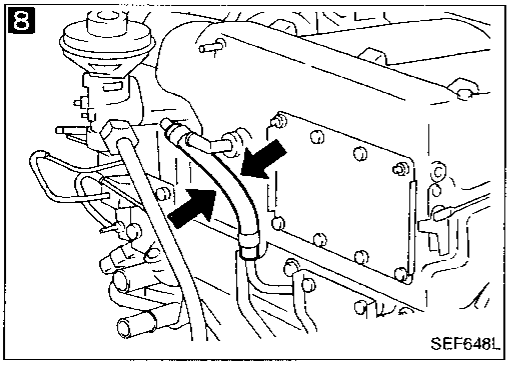
8



SEF648L

Ⓐ

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. Release fuel pressure to zero. (Refer to page EF & EC-333.)
2. Install fuel pressure gauge and check fuel pressure.

At idle:
Approx. 245 kPa
(2.5 kg/cm², 36 psi)

NG → Check fuel pump and circuit.

OK ↓

7 **CHECK HEATED OXYGEN SENSOR.**
1. See "M/R F/C MNT" 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.

RICH→LEAN→RICH→
1 time 2 times
LEAN→RICH.....

NG → Replace heated oxygen sensor.

— OR —

1. Set "Heated oxygen sensor monitor" in the Self-diagnostic Test Mode II. (See page EF & EC-201.)
2. Maintaining engine at 2,000 rpm under no-load, check to make sure that the RED LED on the ECM or the malfunction indicator lamp on the instrument panel goes ON and OFF more than 5 times during 10 seconds.

OK ↓

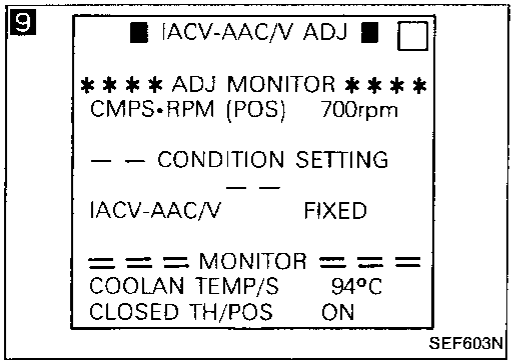
8 **CHECK FOR INTAKE AIR LEAK.**
When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

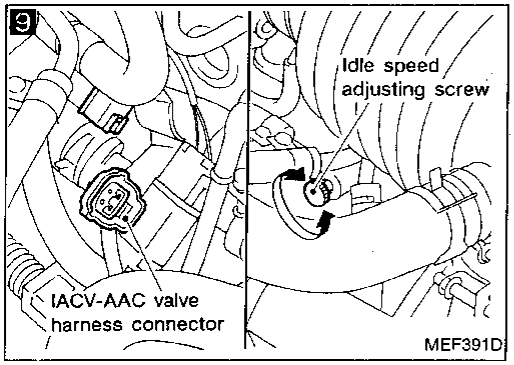
Yes → Discover air leak location and repair.

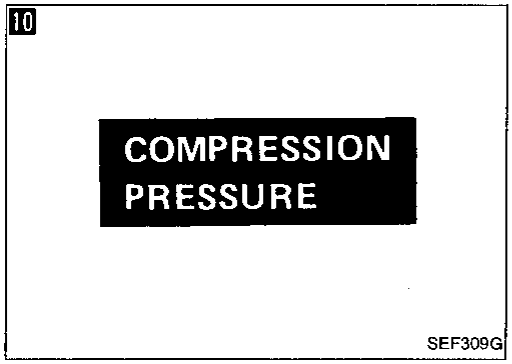
No ↓

(Go to Ⓑ on next page.)

Diagnostic Procedure 3 — Unstable Idle (Cont'd)







Ⓑ

9

CHECK IDLE ADJ. SCREW CLOGGING.

1. Perform "IACV-AAC/V ADJ" in "WORK SUPPORT" mode.
2. Can you set engine speed at 700±50 rpm (in "N" position) by turning idle speed adjusting screw?

No → Check for IAS clogging or throttle valve clogging.

OR

1. Disconnect IACV-AAC valve harness connector.
2. Can you set engine speed at 700±50 rpm (in "N" position) by turning idle speed adjusting screw?

Yes

10

CHECK COMPRESSION PRESSURE.

- Check compression pressure.

Standard:
kPa (kg/cm², psi)/300 rpm
1,265 (12.9, 183)
Minimum:
kPa (kg/cm², psi)/300 rpm
981 (10.0, 142)
Difference between each cylinder:
kPa (kg/cm², psi)/300 rpm
98 (1.0, 14)

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

OK

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

NG → Repair or replace.

OK

Reconnect ECM harness connector and retest.

Trouble is not fixed.

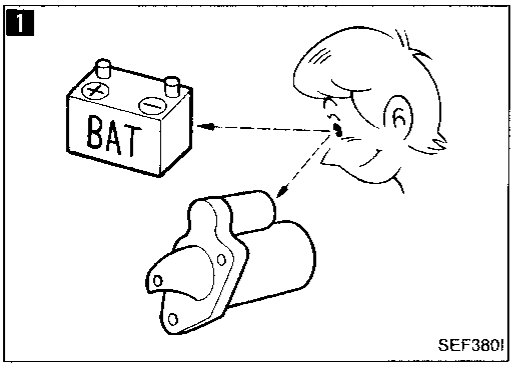
TRY A KNOWN GOOD ECM*

OK

INSPECTION END

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

Diagnostic Procedure 4 — Hard to Start or Impossible to Start when the Engine is Cold

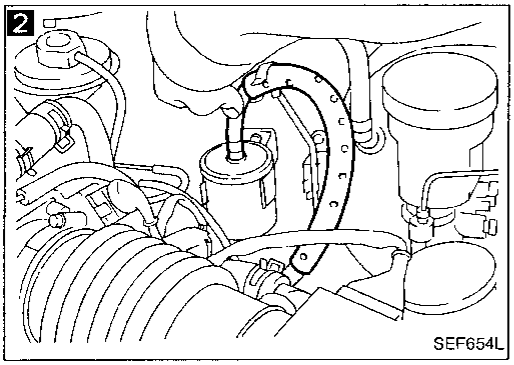


1

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

NG → Repair or replace.

OK ↓

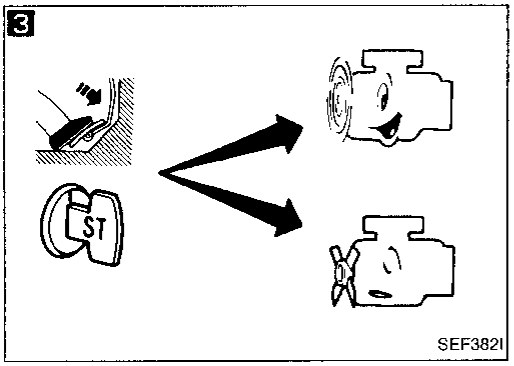


2

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

No → Check fuel pump and circuit. (See page EF & EC-302.)

Yes ↓

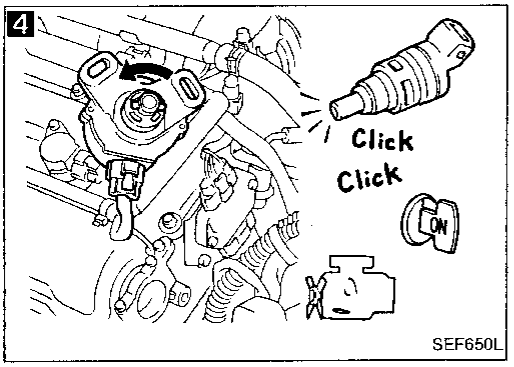


3

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

Yes → Check IACV-AAC valve, IACV-air regulator and circuit. (See pages EF & EC-305.)

No ↓

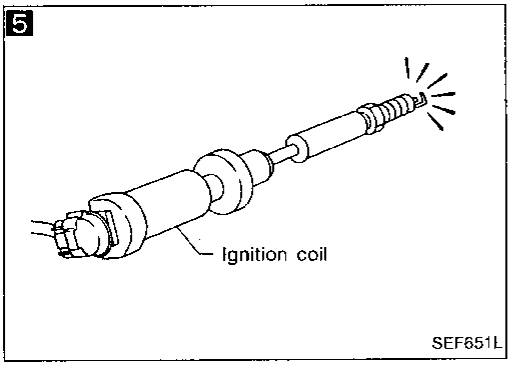


4

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 injector(s) and circuit(s).

Yes ↓



5

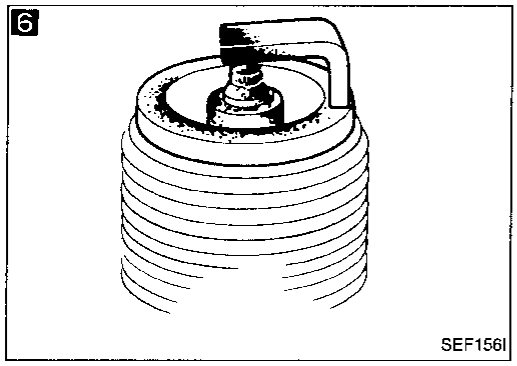
CHECK IGNITION SPARK.
1. Disconnect ignition coil assembly from collector.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

NG → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-264.)

OK ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 4 — Hard to Start or Impossible to Start when the Engine is Cold (Cont'd)



Ⓐ

6

CHECK SPARK PLUGS.
Remove the spark plugs and check for fouling, etc.
NG → Repair or replace spark plug(s).

OK ↓

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

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-250.
NG → Repair or replace.

OK ↓

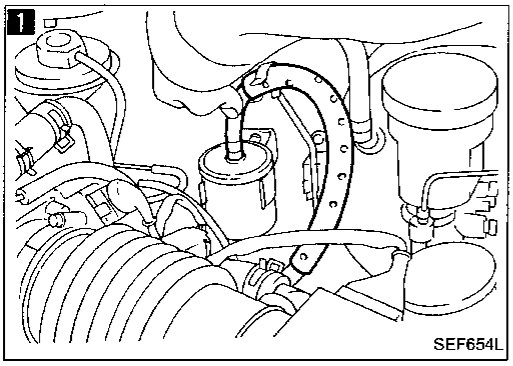
TRY A KNOWN GOOD ECM*

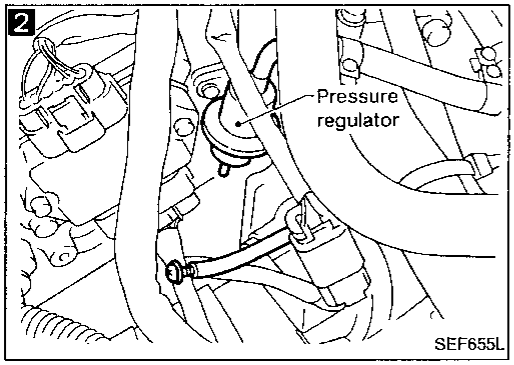
OK ↓

INSPECTION END

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

Diagnostic Procedure 5 — Hard to Start or Impossible to Start when the Engine is Hot





1

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

No → Check fuel pump and circuit. (See page EF & EC-302.)

Yes ↓

2

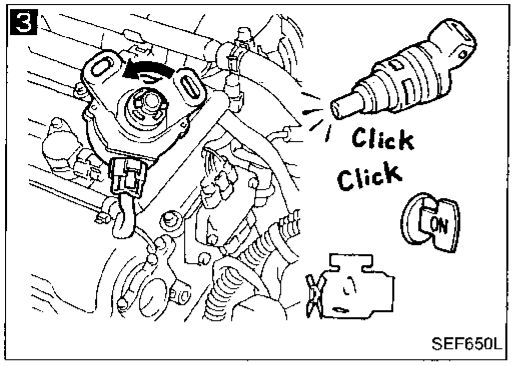
CHECK FUEL VAPOR.
1. Disconnect fuel pressure regulator vacuum hose and plug hose.
2. Can you start engine?

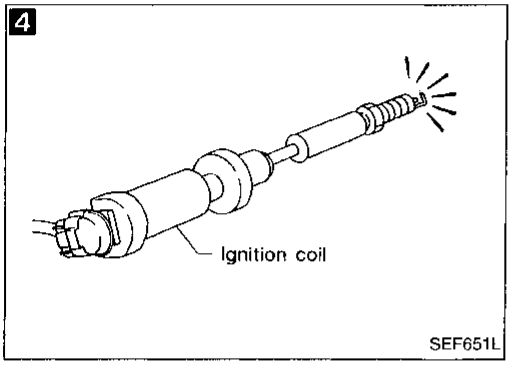
Yes → Check fuel properties.

No ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 5 — Hard to Start or Impossible to Start when the Engine is Hot (Cont'd)





Ⓐ

3 **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

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

NG → Check ignition coil, power transistor unit and circuits. (See page EF & EC-264.)

OK

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

NG → Repair or replace.

OK

Reconnect ECM harness connector and retest.

Trouble is not fixed.

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-250.

NG → Repair or replace.

OK

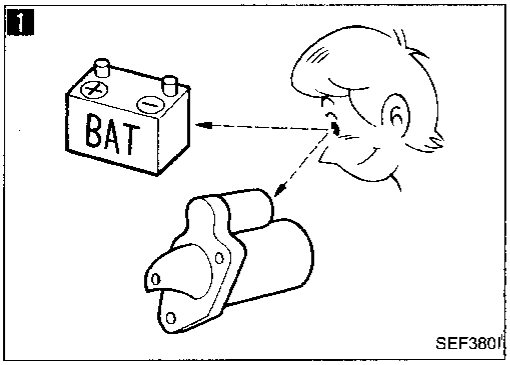
TRY A KNOWN GOOD ECM*

OK

INSPECTION END

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

Diagnostic Procedure 6 — Hard to Start or Impossible to Start under Normal Conditions

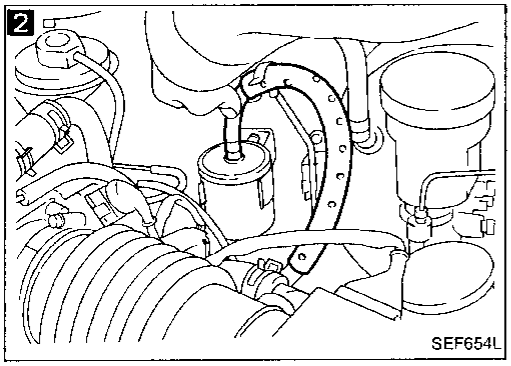


1

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

NG → Repair or replace.

OK ↓

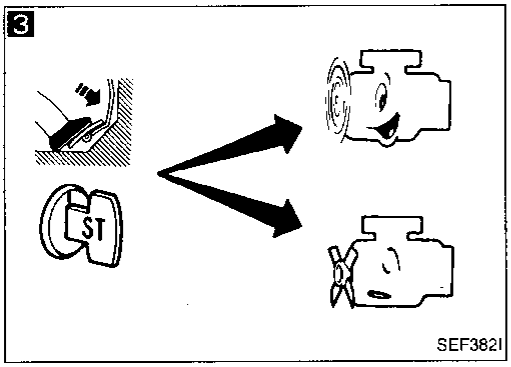


2

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

No → Check fuel pump and circuit. (See page EF & EC-302.)

Yes ↓

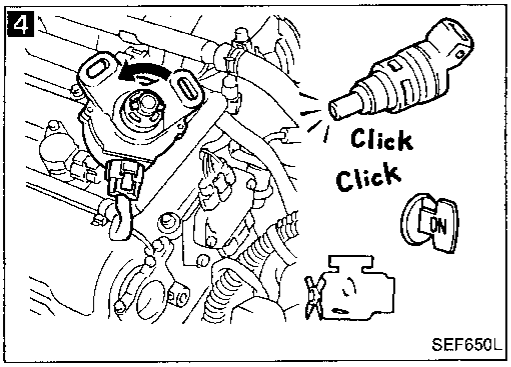


3

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

Yes → Check injector(s) for leakage.

No ↓

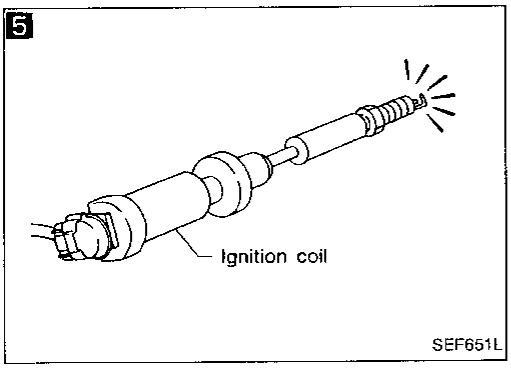


4

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 ↓



5

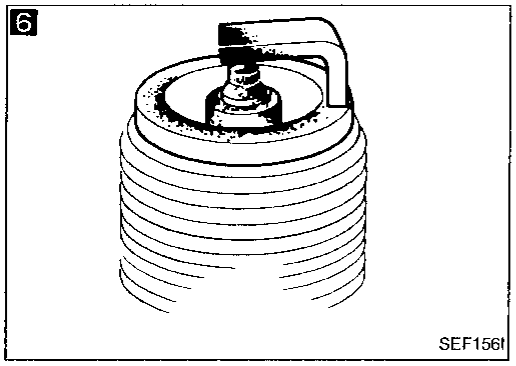
CHECK IGNITION SPARK.
1. Disconnect ignition coil assembly from collector.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

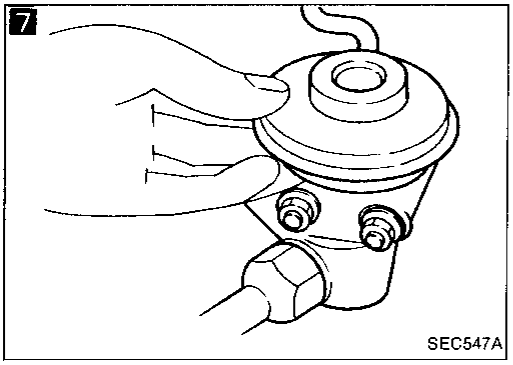
NG → Check ignition coil, power transistor unit and circuits. (See page EF & EC-264.)

OK ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 6 — Hard to Start or Impossible to Start under Normal Conditions (Cont'd)





Ⓐ

6

CHECK SPARK PLUGS.
Remove the spark plugs and check for fouling, etc.
NG → Repair or replace spark plug(s).
OK ↓

7

CHECK EGR VALVE.
Check EGR valve for sticking.
NG → Repair or replace.
OK ↓

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector.
NG → Repair or replace.
OK ↓

Reconnect ECM harness connector and retest.
Trouble is not fixed. ↓

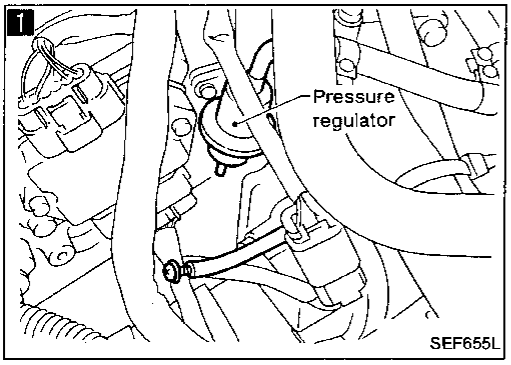
CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-250.
NG → Repair or replace.
OK ↓

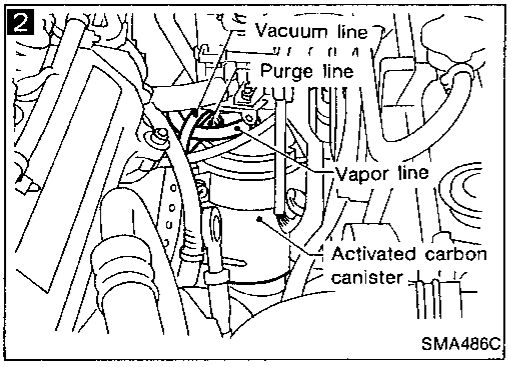
TRY A KNOWN GOOD ECM*
OK ↓

INSPECTION END

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

Diagnostic Procedure 7 — 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 ↓

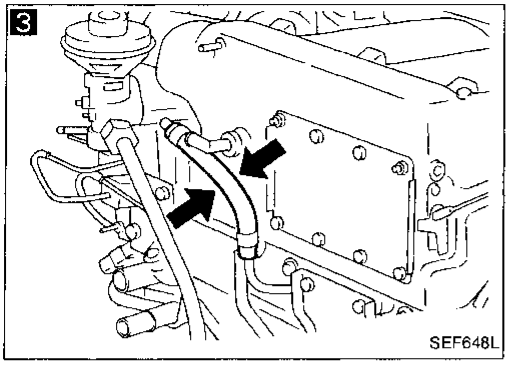
2

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 ↓

Ⓐ

Diagnostic Procedure 7 — Hesitation when the Engine is Hot (Cont'd)



Ⓐ

3

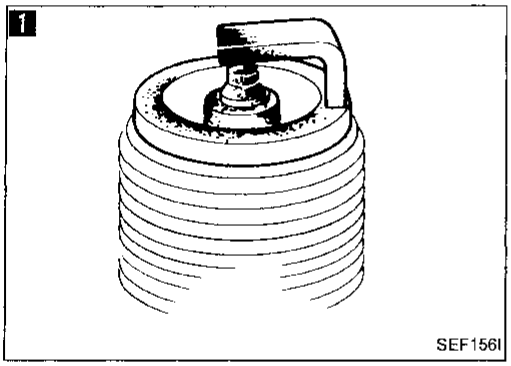
CHECK FOR INTAKE AIR LEAK.
When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

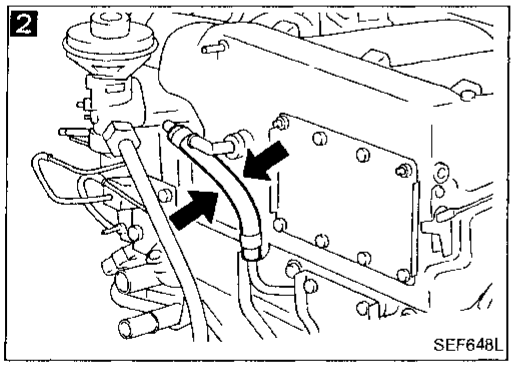
Yes → Discover air leak location and repair.

No ↓

INSPECTION END

Diagnostic Procedure 8 — Hesitation when the Engine is Cold





1

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

NG → Repair or replace spark plug(s).

OK ↓

2

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

Yes → Discover air leak location and repair.

No ↓

TRY A KNOWN GOOD MASS AIR FLOW SENSOR.

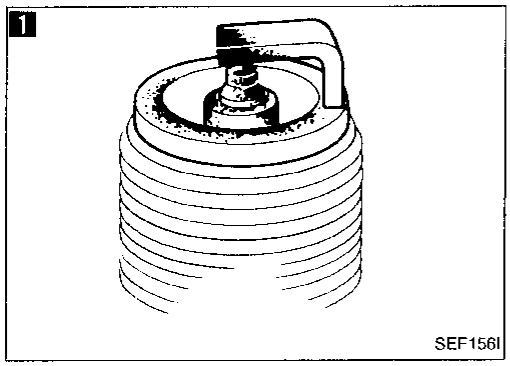
Trouble is fixed. → Replace mass air flow sensor.

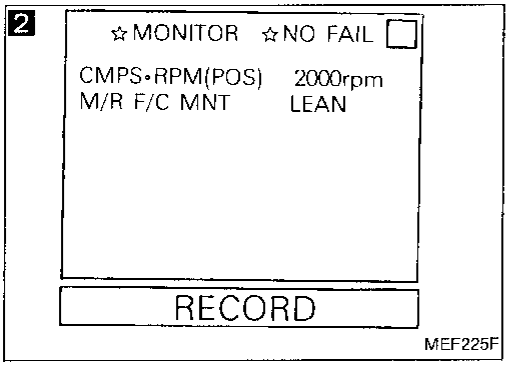
Trouble is not fixed. ↓

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

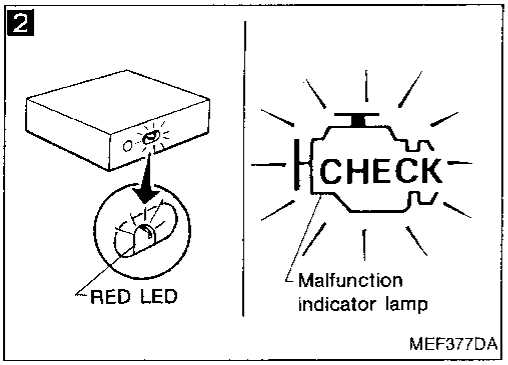
INSPECTION END

Diagnostic Procedure 9 — Hesitation under Normal Conditions

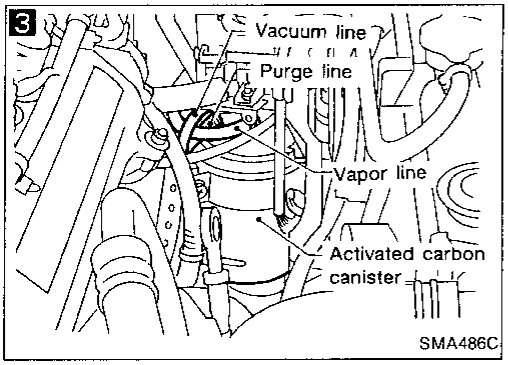

SEF156I



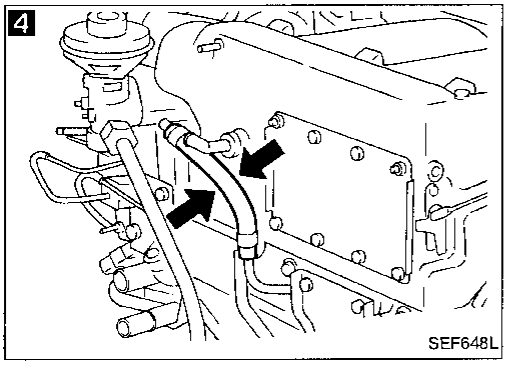
MEF225F



MEF377DA



SMA486C


SEF648L

1

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

NG → Repair or replace spark plug(s).

OK ↓

2

CHECK HEATED OXYGEN SENSOR.

1. See "M/R F/C MNT" in "DATA MONITOR" mode.
2. 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.
   RICH→LEAN→RICH→ (1 time) **LEAN→RICH.....** (2 times)

Yes → Replace heated oxygen sensor.

OR

1. Set "Heated oxygen sensor monitor" in the Self-diagnostic Test Mode II. (See page EF & EC-201.)
2. Maintaining engine at 2,000 rpm under no load, check that the RED LED on the ECM or the malfunction indicator lamp on the instrument panel goes ON and OFF more than 5 times during 10 seconds.

No ↓

3

CHECK CANISTER PURGE.

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

Yes → Check purge and vacuum lines.

No ↓

4

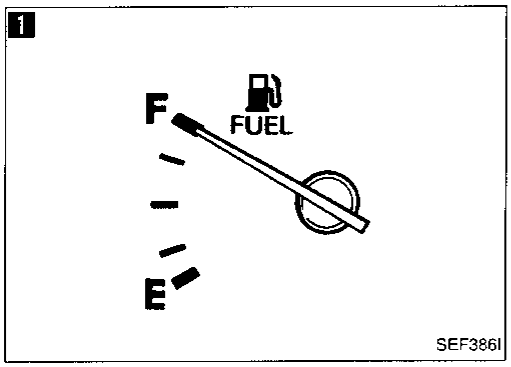
CHECK FOR INTAKE AIR LEAK.
When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

Yes → Discover air leak location and repair.

No ↓

INSPECTION END

Diagnostic Procedure 10 — Engine Stalls when Turning

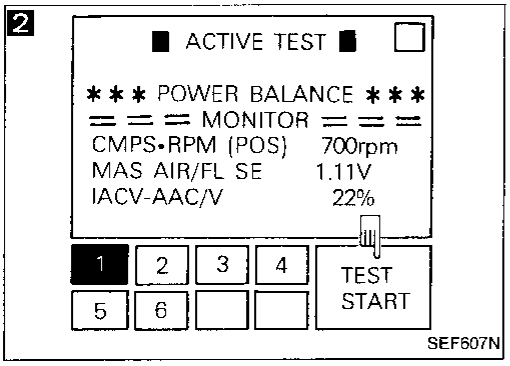


1

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.

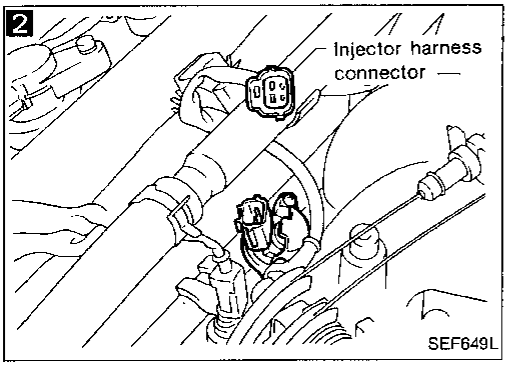
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

No → Go to 5 .

— OR —

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

Yes ↓



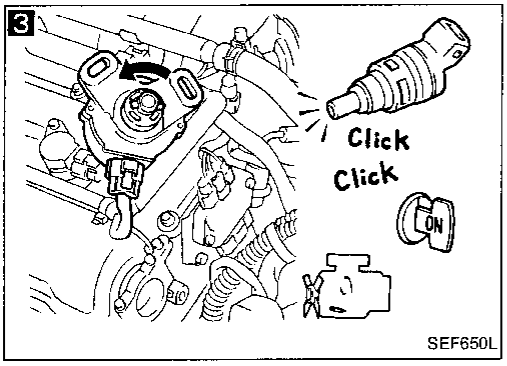
3

CHECK INJECTOR.

1. Remove camshaft position sensor from engine. (Harness connector should remain connected.)
2. 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 ↓



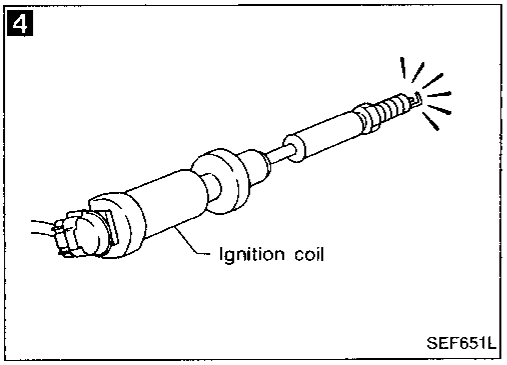
4

CHECK IGNITION SPARK.

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

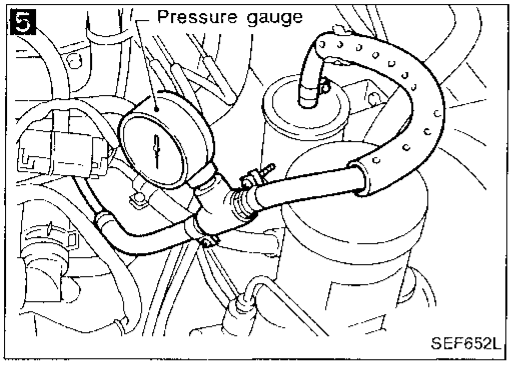
NG → Check ignition coil, power transistor unit and circuits. (See page EF & EC-264.)

OK ↓



(Go to Ⓐ on next page.)

Diagnostic Procedure 10 — Engine Stalls when Turning (Cont'd)



Ⓐ

5

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. (Refer to page EF & EC-333.)
2. Install fuel pressure gauge and check fuel pressure.

At idle:
Approx. 245 kPa
(2.5 kg/cm², 36 psi)
A few seconds after ignition switch is turned OFF to ON:
Approx. 294 kPa
(3.0 kg/cm², 43 psi)

NG → Check fuel pressure regulator diaphragm.

OK ↓

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

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-250.

NG → Repair or replace.

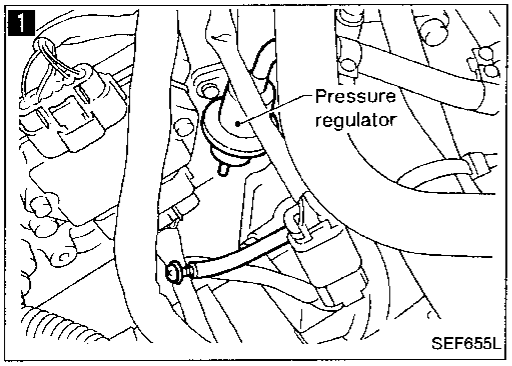
OK ↓

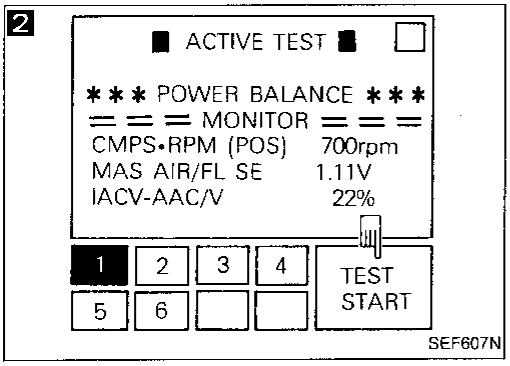
TRY A KNOWN GOOD ECM*

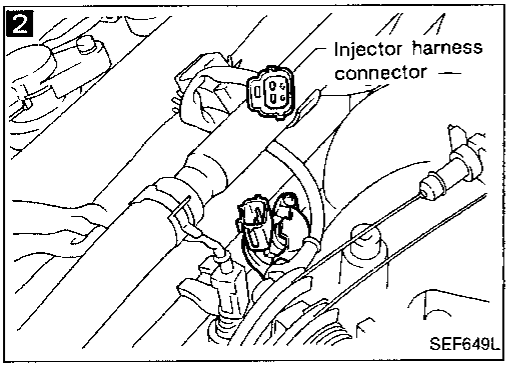
OK ↓

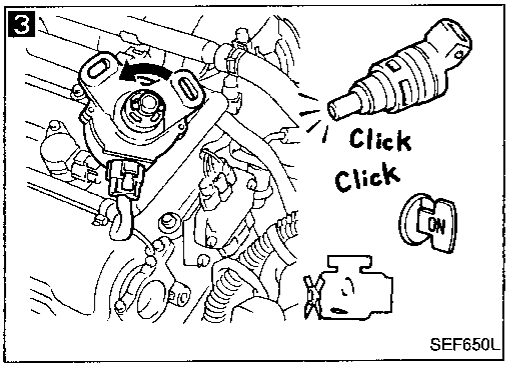
INSPECTION END

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









Diagnostic Procedure 11 — 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

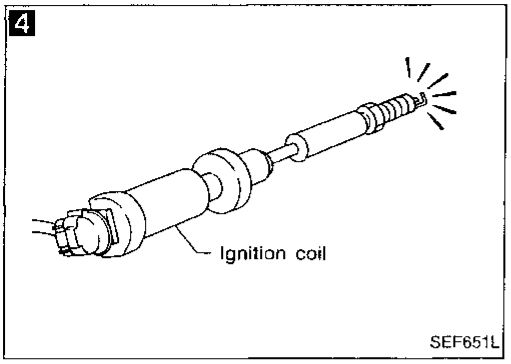
CHECK INJECTOR.
1. Remove camshaft position sensor from engine. (Harness connector should remain connected.)
2. Disconnect power transistor harness connector.
3. Turn ignition switch ON. (Do not start engine.)
4. When rotating camshaft position sensor shaft, does each injector make an operating sound?

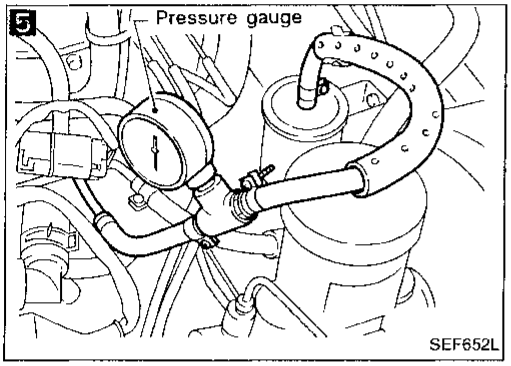
No → Check injector(s) and circuit(s).

Yes ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 11 — Engine Stalls when the Engine is Hot (Cont'd)





Ⓐ

4

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

NG → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-264.)

OK ↓

5

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. (Refer to page EF & EC-333.)
2. Install fuel pressure gauge and check fuel pressure.

At idle:
Approx. 245 kPa
(2.5 kg/cm², 36 psi)
A few seconds after ignition switch is turned OFF to ON:
Approx. 294 kPa
(3.0 kg/cm², 43 psi)

NG → Check fuel pressure regulator diaphragm.

OK ↓

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

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-250.

NG → Repair or replace.

OK ↓

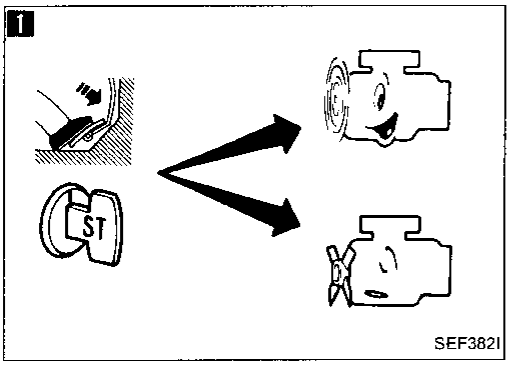
TRY A KNOWN GOOD ECM*

OK ↓

INSPECTION END

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

Diagnostic Procedure 12 — Engine Stalls when the Engine is Cold

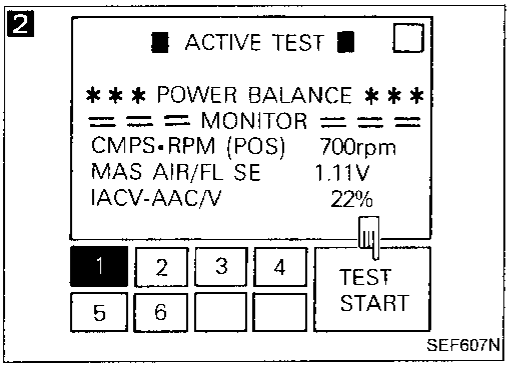


1

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

NG → Check IACV-AAC valve, IACV-air regulator and circuit. (See page EF & EC-305.)

OK ↓



2

PERFORM POWER BALANCE TEST.

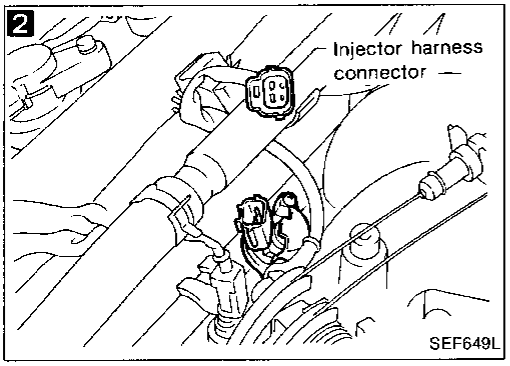
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

NG → 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?

OK ↓



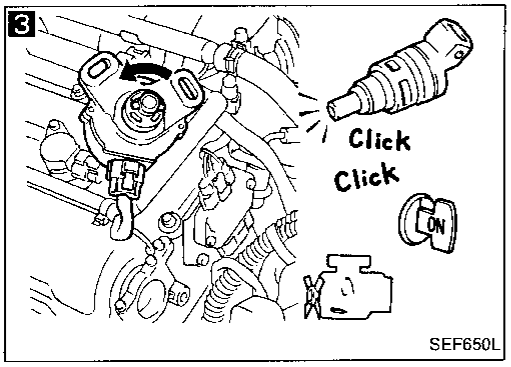
3

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?

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

OK ↓



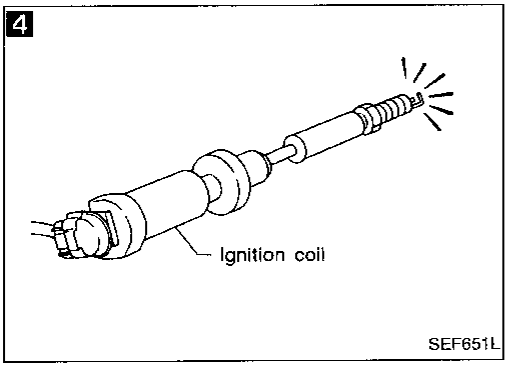
4

CHECK IGNITION SPARK.

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

NG → Check ignition coil, power transistor unit and circuits. (See page EF & EC-264.)

OK ↓



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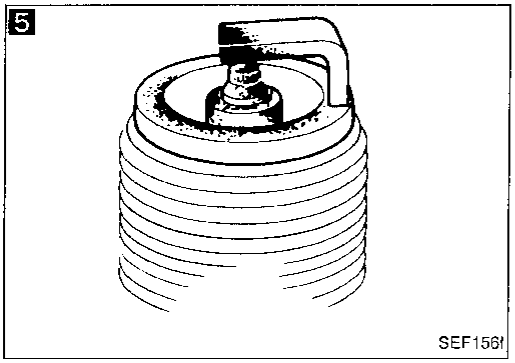
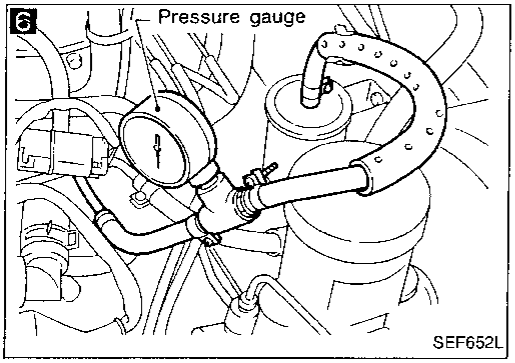
Diagnostic Procedure 12 — Engine Stalls when the Engine is Cold (Cont'd)

5



SEF156I

6



SEF652L

Ⓐ

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. Release fuel pressure to zero. (Refer to page EF & EC-333.)
2. Install fuel pressure gauge and check fuel pressure.

At idle:
Approx. 245 kPa (2.5 kg/cm², 36 psi)
A few seconds after ignition switch is turned OFF to ON:
Approx. 294 kPa (3.0 kg/cm², 43 psi)

NG → Check fuel pressure regulator diaphragm.

OK

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

NG → Repair or replace.

OK

Reconnect ECM harness connector and retest.

Trouble is not fixed.

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-250.

NG → Repair or replace.

OK

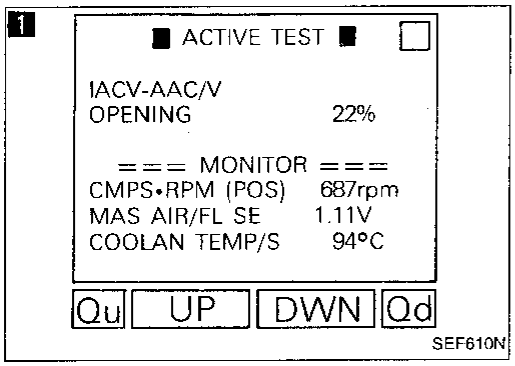
TRY A KNOWN GOOD ECM*

OK

INSPECTION END

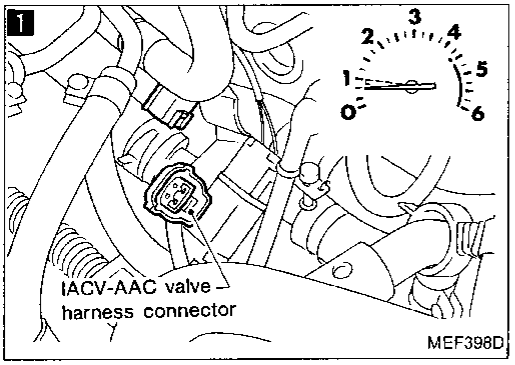
*: ECM may be the cause of a problem, but this is rarely the case.

1



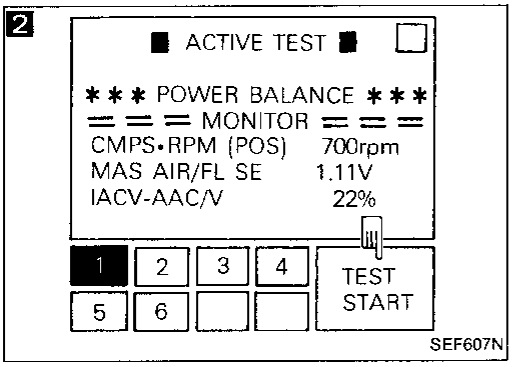
SEF610N

1



MEF398D

2



SEF607N

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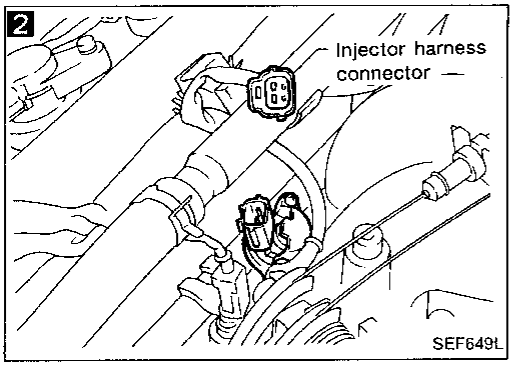
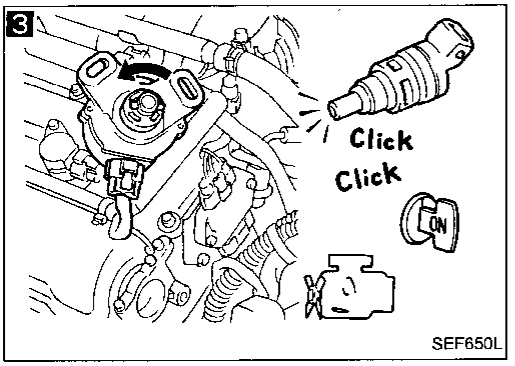


SEF649L

3



SEF650L

Diagnostic Procedure 13 — Engine Stalls when Stepping on the Accelerator Momentarily

1

CHECK IACV-AAC VALVE.

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?

No → Check IACV-AAC valve and circuit. (See page EF & EC-305.)

OR

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

Yes ↓

2

PERFORM POWER BALANCE TEST.

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

No → Go to **5** .

OR

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

Yes ↓

3

CHECK INJECTOR.

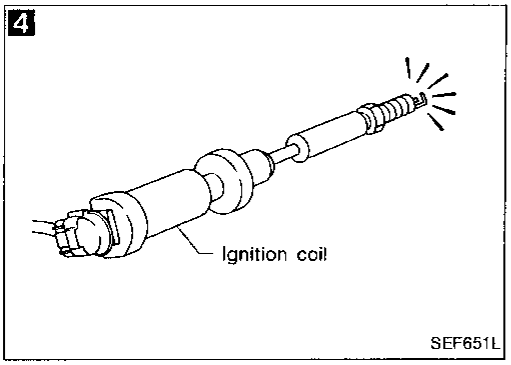
1. Remove camshaft position sensor from engine. (Harness connector should remain connected.)
2. Disconnect power transistor harness connector.
3. Turn ignition switch ON. (Do not start engine.)
4. When rotating camshaft position sensor shaft, does each injector make an operating sound?

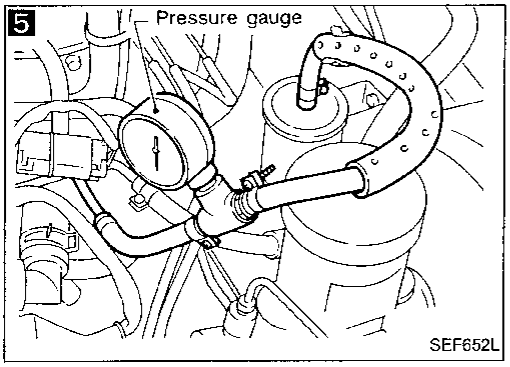
No → Check injector(s) and their circuit(s).

Yes ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 13 — Engine Stalls when Stepping on the Accelerator Momentarily (Cont'd)





Ⓐ

4

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

NG → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-264.)

OK ↓

5

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. (Refer to page EF & EC-333.)
2. Install fuel pressure gauge and check fuel pressure.

At idle:
Approx. 245 kPa
(2.5 kg/cm^2, 36 psi)

A few seconds after ignition switch is turned OFF to ON:
Approx. 294 kPa
(3.0 kg/cm^2, 43 psi)

NG → Check fuel pressure regulator diaphragm.

OK ↓

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

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-250.

NG → Repair or replace.

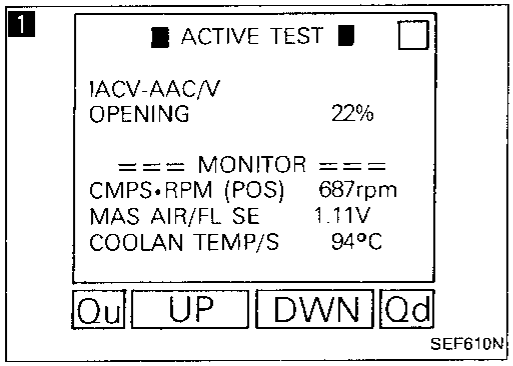
OK ↓

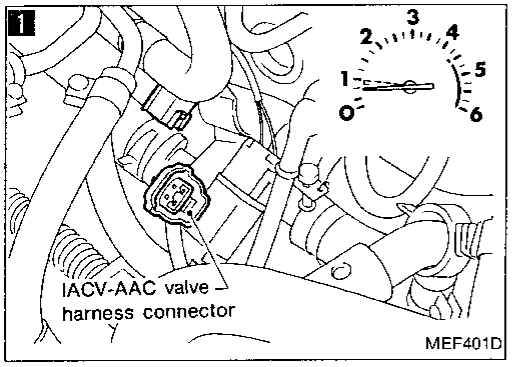
TRY A KNOWN GOOD ECM*

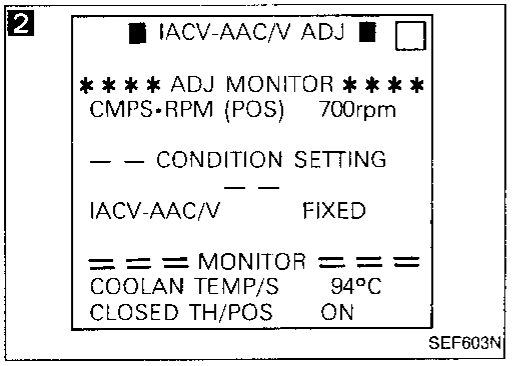
OK ↓

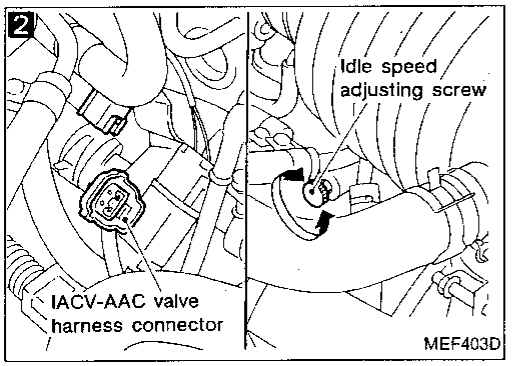
INSPECTION END

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









Diagnostic Procedure 14 — Engine Stalls after Decelerating

1

CHECK IACV-AAC VALVE.

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?

No → Check IACV-AAC valve and circuit. (See page EF & EC-305.)

OR

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

Yes ↓

2

CHECK IDLE ADJ. SCREW CLOGGING.

1. Perform "IACV-AAC/V ADJ" in "WORK SUPPORT" mode.
2. Can you set engine speed at 700±50 rpm (in "N" position) by turning idle adjusting screw?

No → Check for IAS clogging or throttle body clogging.

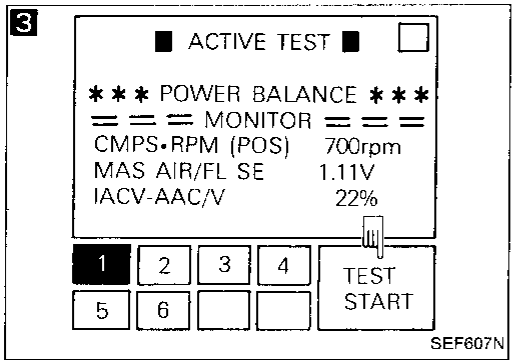
OR

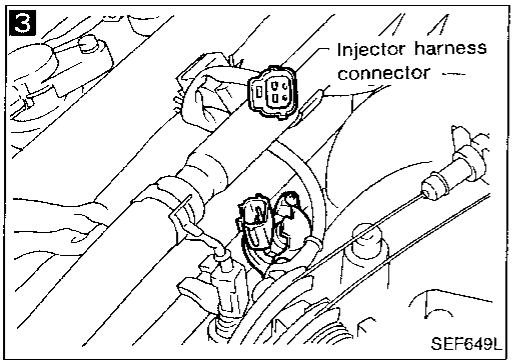
1. Disconnect IACV-AAC valve harness connector.
2. Can you set engine speed at 700±50 rpm (in "N" position) by turning idle adjusting screw?

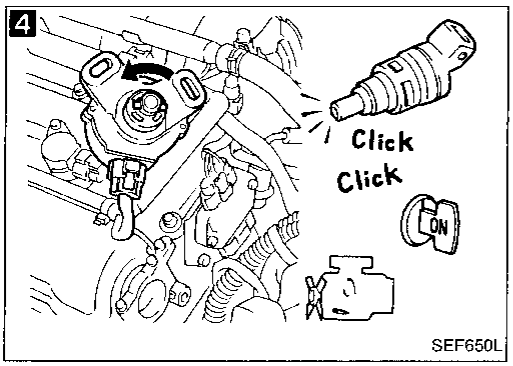
Yes ↓

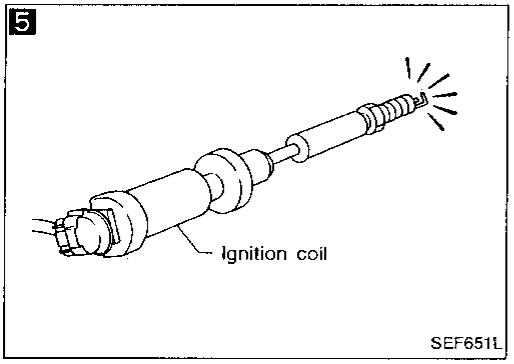
(Go to Ⓐ on next page.)

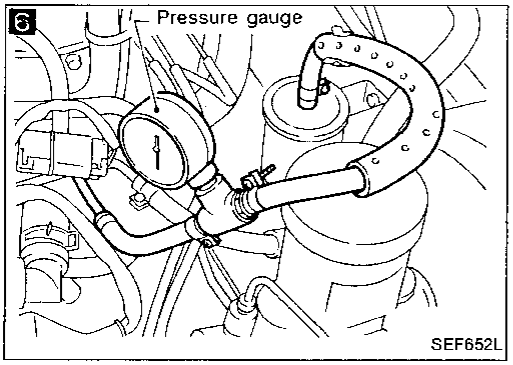
Diagnostic Procedure 14 — Engine Stalls after Decelerating (Cont'd)











Ⓐ

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. 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 ↓

5

CHECK IGNITION SPARK.

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

NG → Check ignition coil, power transistor unit and circuits. (See page EF & EC-264.)

OK ↓

6

CHECK FUEL PRESSURE.

1. Release fuel pressure to zero. (Refer to page EF & EC-333.)
2. Install fuel pressure gauge and check fuel pressure.

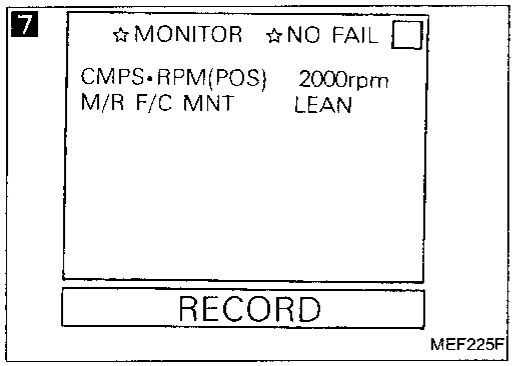
At idle:
Approx. 245 kPa
(2.5 kg/cm², 36 psi)
A few seconds after ignition switch is turned OFF to ON:
Approx. 294 kPa
(3.0 kg/cm², 43 psi)

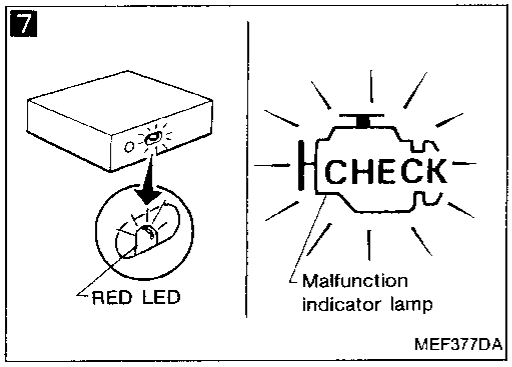
NG → Check fuel pressure regulator diaphragm.

OK ↓

Ⓑ

Diagnostic Procedure 14 — Engine Stalls after Decelerating (Cont'd)





Ⓑ

7

CHECK HEATED OXYGEN SENSOR.

1. See "M/R F/C MNT" in "DATA MONITOR" mode.
2. 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.
   RICH→LEAN→RICH→ LEAN→RICH.....
   (1 time, 2 times)

NG → Replace heated oxygen sensor.

OR

1. Set "Heated oxygen sensor monitor" in the Self-diagnostic Test Mode II. (See page EF & EC-201.)
2. Maintaining engine at 2,000 rpm under no load, check that the RED LED on the ECM or the malfunction indicator lamp on the instrument panel goes ON and OFF more than 5 times during 10 seconds.

OK ↓

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

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-250.

NG → Repair or replace.

OK ↓

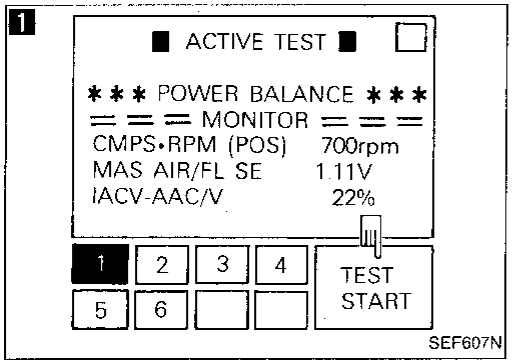
TRY A KNOWN GOOD ECM*

OK ↓

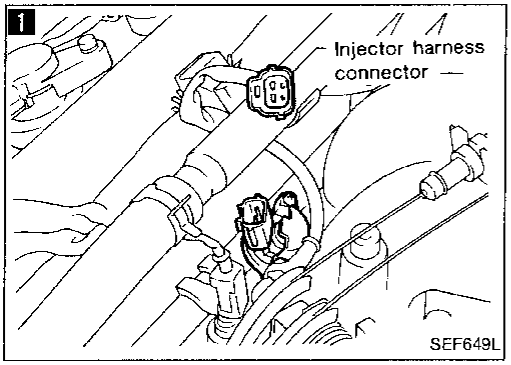
INSPECTION END

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

1



1



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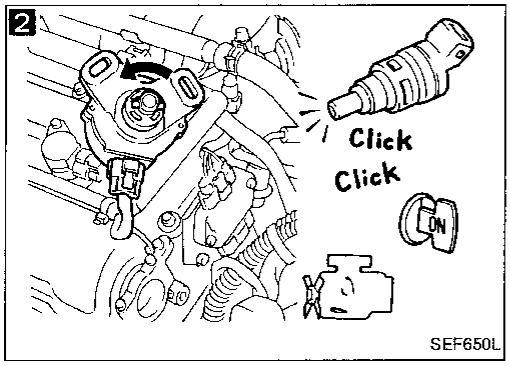

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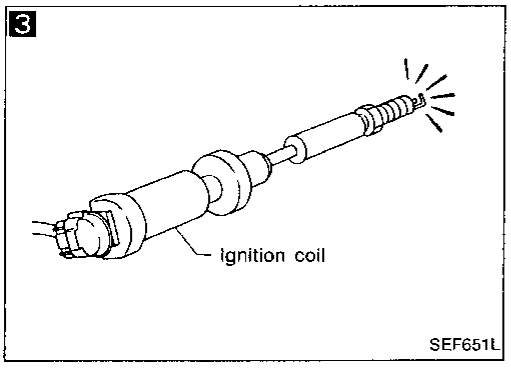


Diagnostic Procedure 15 — Engine Stalls when Accelerating or Cruising

1

PERFORM POWER BALANCE TEST.

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

No → Go to **4**.

OR

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

Yes ↓

2

CHECK INJECTOR.

1. Remove camshaft position sensor from engine. (Harness connector should remain connected.)
2. 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 ↓

3

CHECK IGNITION SPARK.

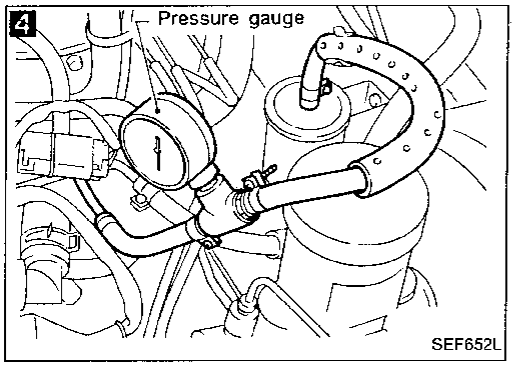
1. Disconnect ignition coil assembly from collector.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

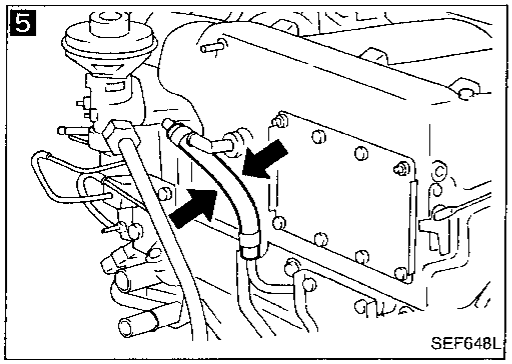
NG → Check ignition coil, power transistor unit and circuits. (See page EF & EC-264.)

OK ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 15 — Engine Stalls when Accelerating or Cruising (Cont'd)





Ⓐ

4

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. (Refer to page EF & EC-333.)
2. Install fuel pressure gauge and check fuel pressure.

At idle:
Approx. 245 kPa (2.5 kg/cm², 36 psi)

A few seconds after ignition switch is turned OFF to ON:
Approx. 294 kPa (3.0 kg/cm², 43 psi)

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

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 ↓

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

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-250.

Yes → Repair or replace.

No ↓

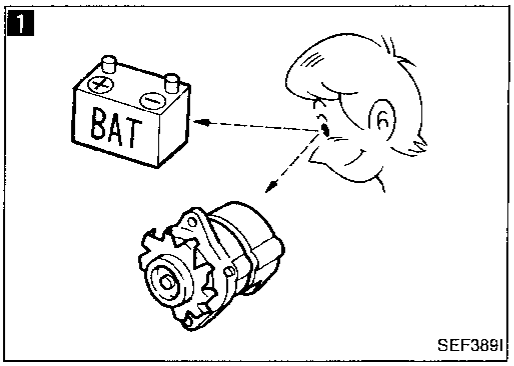
TRY A KNOWN GOOD ECM*

OK ↓

INSPECTION END

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

Diagnostic Procedure 16 — Engine Stalls when the Electrical Load is Heavy



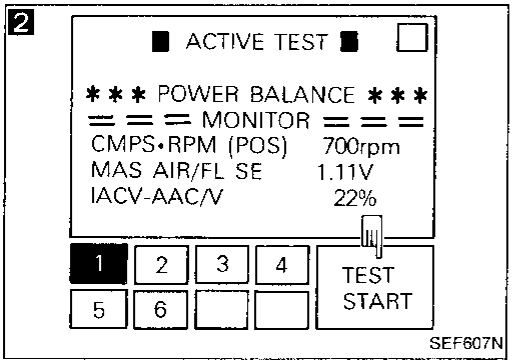
1

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

NG → Repair or replace.

OK ↓

2



PERFORM POWER BALANCE TEST.

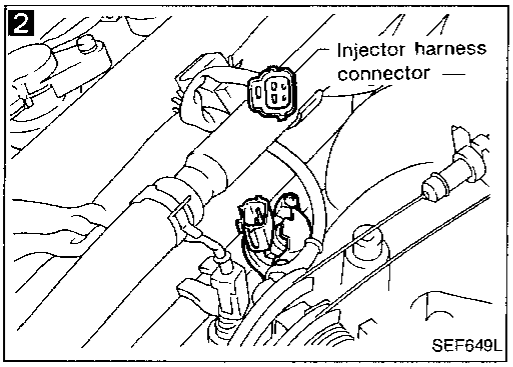
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

No → Go to **5** .

— OR —

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

Yes ↓



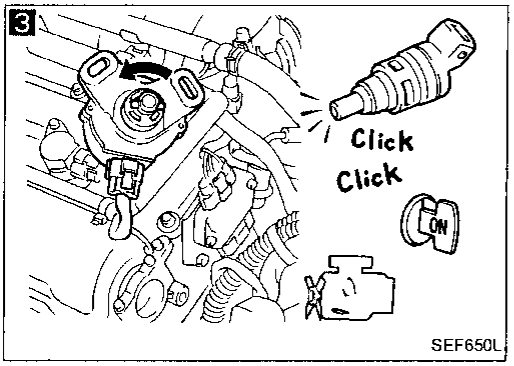
3

CHECK INJECTOR.

1. Remove camshaft position sensor from engine. (Harness connector should remain connected.)
2. 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 ↓



4

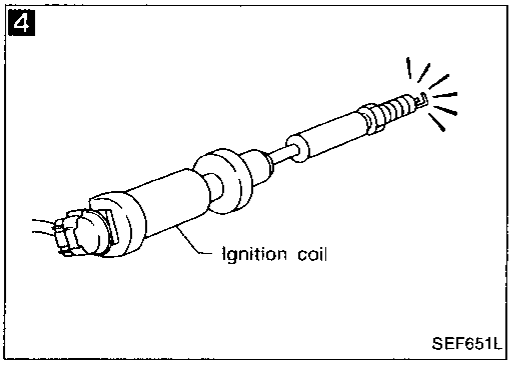
CHECK IGNITION SPARK.

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

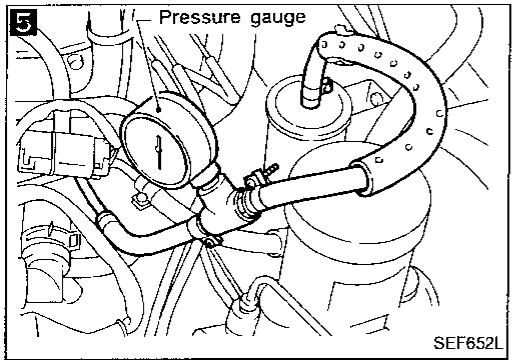
NG → Check ignition coil, power transistor unit and circuits. (See page EF & EC-264.)

OK ↓

(Go to Ⓐ on next page.)



Diagnostic Procedure 16 — Engine Stalls when the Electrical Load is Heavy (Cont'd)



Ⓐ

5

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. (Refer to page EF & EC-333.)
2. Install fuel pressure gauge and check fuel pressure.

At idle:
Approx. 245 kPa (2.5 kg/cm², 36 psi)
A few seconds after ignition switch is turned OFF to ON:
Approx. 294 kPa (3.0 kg/cm², 43 psi)

NG → Check fuel pressure regulator diaphragm.

OK ↓

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

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-250.

NG → Repair or replace.

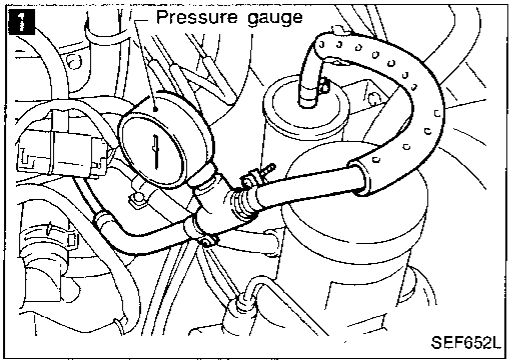
OK ↓

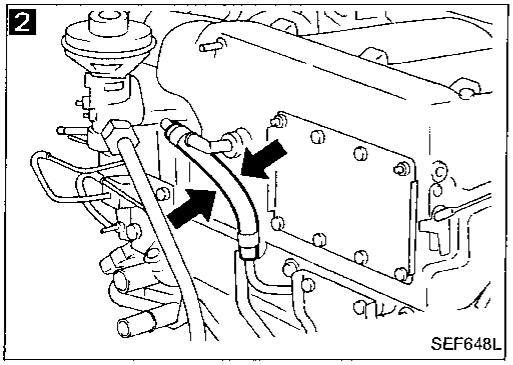
TRY A KNOWN GOOD ECM*.

OK ↓

INSPECTION END

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





Diagnostic Procedure 17 — Lack of Power and Stumble

1

CHECK FUEL PRESSURE.

1. Release fuel pressure to zero. (Refer to page EF & EC-333.)
2. Install fuel pressure gauge and check fuel pressure.

At idle:

Approx. 245 kPa
(2.5 kg/cm², 36 psi)

A few seconds after ignition switch is turned OFF to ON:

Approx. 294 kPa
(3.0 kg/cm², 43 psi)

NG → Check fuel pressure regulator diaphragm.

OK ↓

2

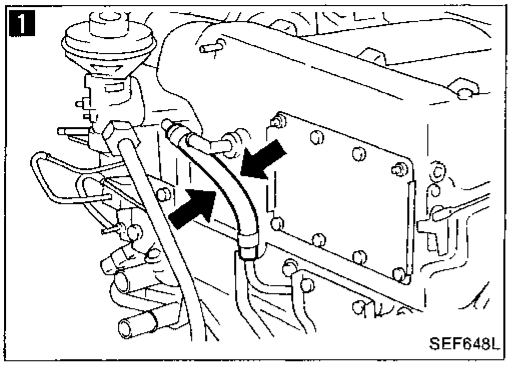
CHECK FOR INTAKE AIR LEAK.

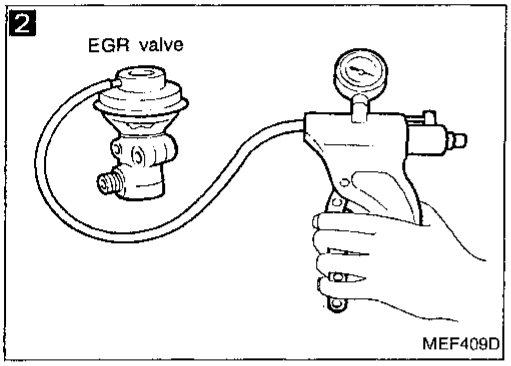
When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

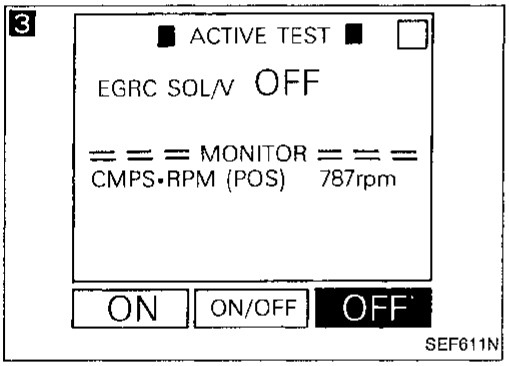
Yes → Discover air leak location and repair.

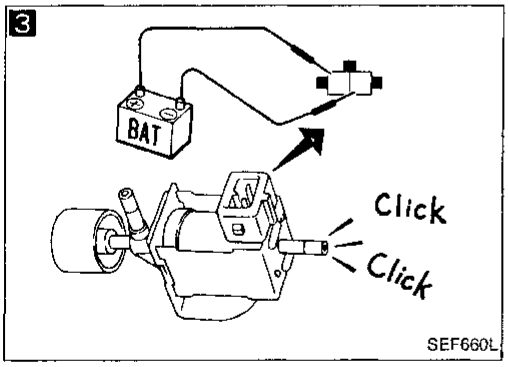
No ↓

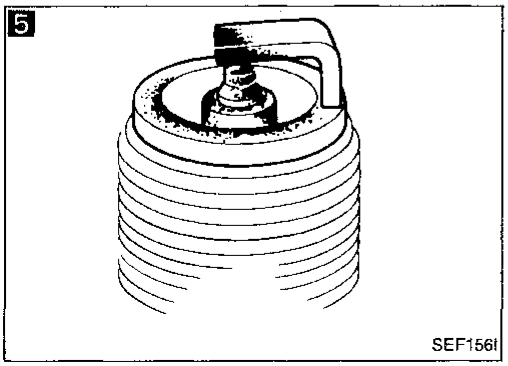
INSPECTION END











Diagnostic Procedure 18 — Knock

1

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

Yes → Discover air leak location and repair.

No ↓

2

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

No → Check EGR valve for sticking.

Yes ↓

3

CHECK EGRC-SOLENOID VALVE.
1. Select "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode.
2. Turn EGRC-solenoid valve ON and OFF.
3. Check operating sound.

NG → Check solenoid valve and circuit.

OR

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

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 ↓

5

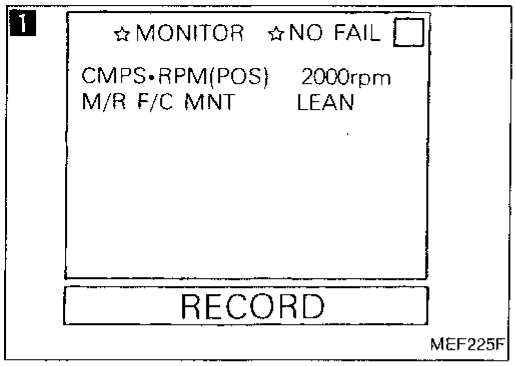
CHECK FOR OIL LEAK TO COMBUSTION CHAMBER.
Remove spark plugs and check for fouling with oil.

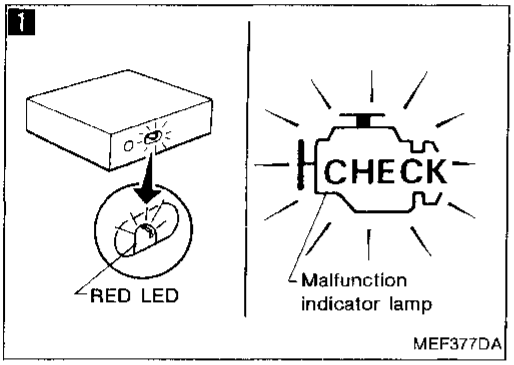
Yes → Check pistons, piston rings, valves, valve seats, valve oil seal, engine oil level, etc.

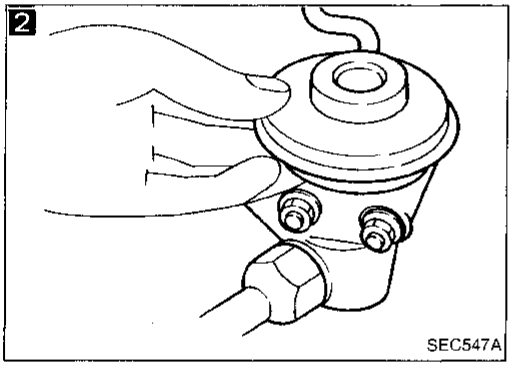
No ↓

INSPECTION END

Diagnostic Procedure 19 — Surge







1

CHECK HEATED OXYGEN SENSOR.

1. See "M/R F/C MNT" in "DATA MONITOR" mode.
2. 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.

RICH→LEAN→RICH→ LEAN→RICH.....
(1 time, 2 times)

NG → Replace heated oxygen sensor(s).

OR

1. Set "Heated oxygen sensor monitor" in the Self-diagnostic Test Mode II. (See page EF & EC-201.)
2. Maintaining engine at 2,000 rpm under no load, check that the RED LED on the ECM or the malfunction indicator lamp on the instrument panel goes ON and OFF more than 5 times during 10 seconds.

OK ↓

2

CHECK EGR VALVE.
Check EGR valve for sticking.

NG → Repair or replace.

OK ↓

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

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

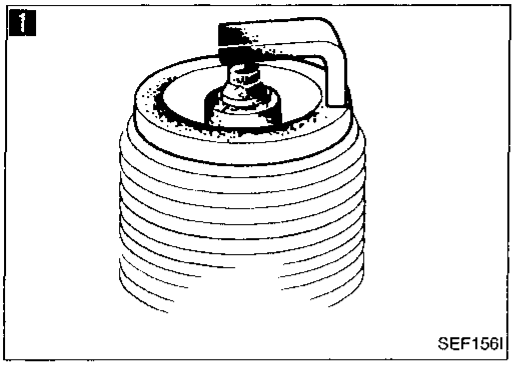
Trouble is not fixed. ↓

TRY A KNOWN GOOD ECM*

OK ↓

INSPECTION END

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



Diagnostic Procedure 20 — Backfire through the Intake

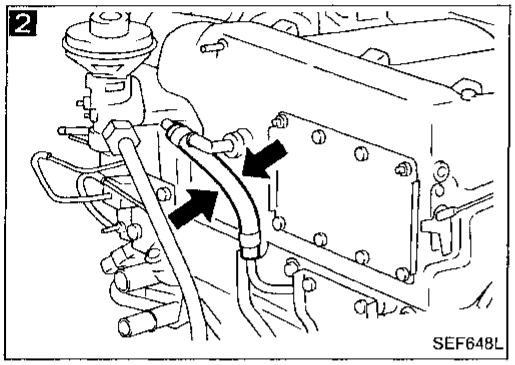
1

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

NG → Repair or replace spark plug(s).

OK ↓

2



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

Yes → Discover air leak location and repair.

No ↓

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

↓

INSPECTION END

Diagnostic Procedure 21 — Backfire through the Exhaust

CHECK ENGINE COOLANT TEMPERATURE SENSOR.
Check engine coolant temperature sensor and its circuit. (See page EF & EC-259.)

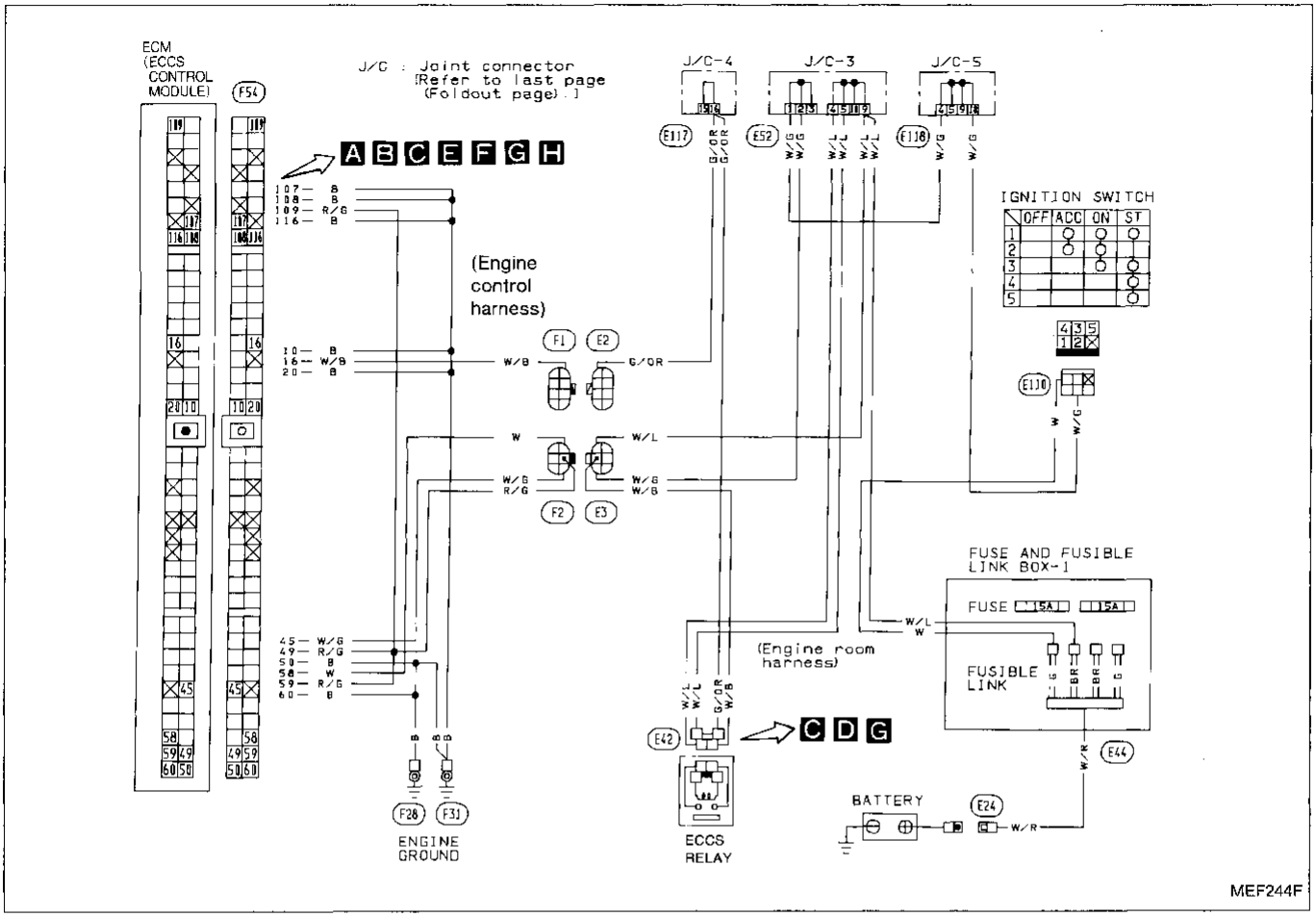
NG → Replace or repair.

OK ↓

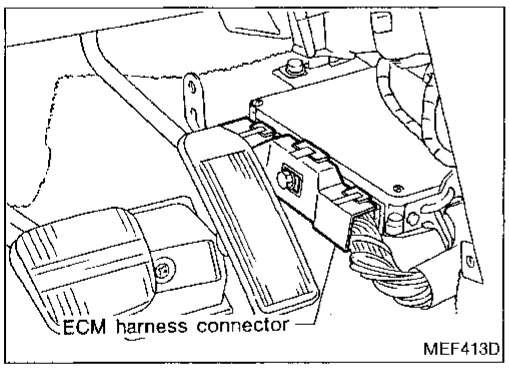
INSPECTION END

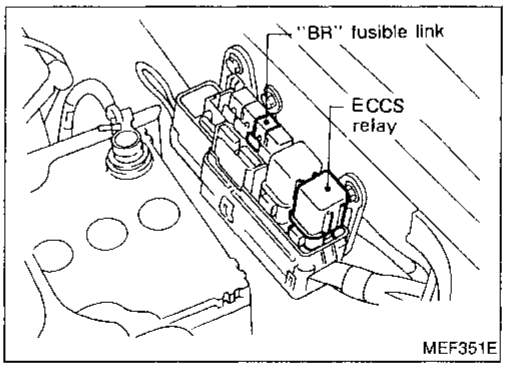
Diagnostic Procedure 22

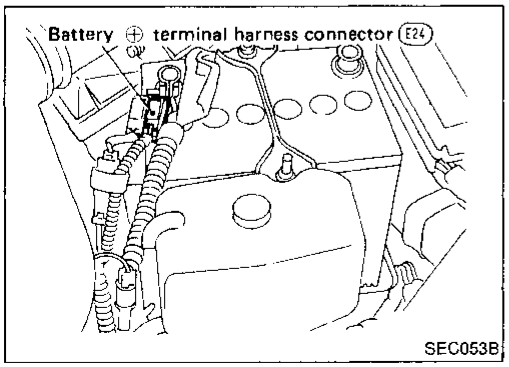
MAIN POWER SUPPLY AND GROUND CIRCUIT (Not self-diagnostic item)



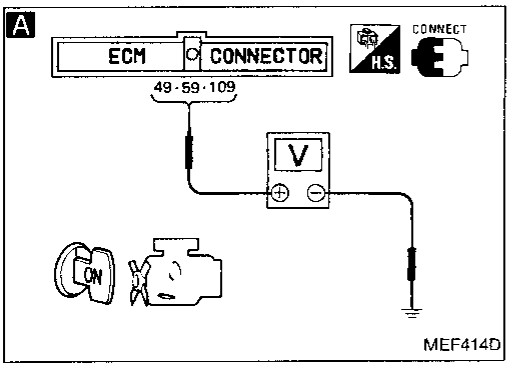
Harness layout

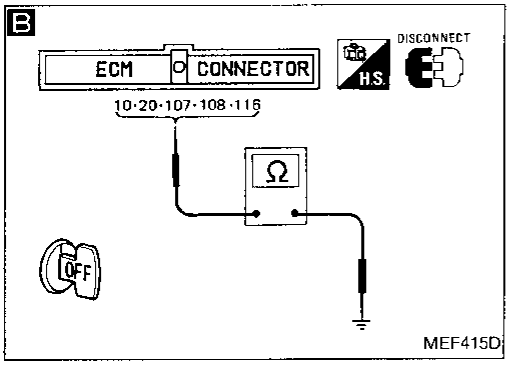


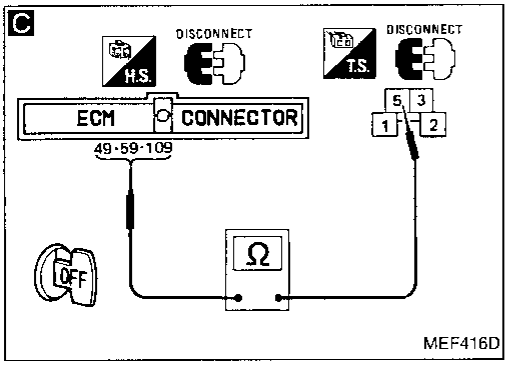


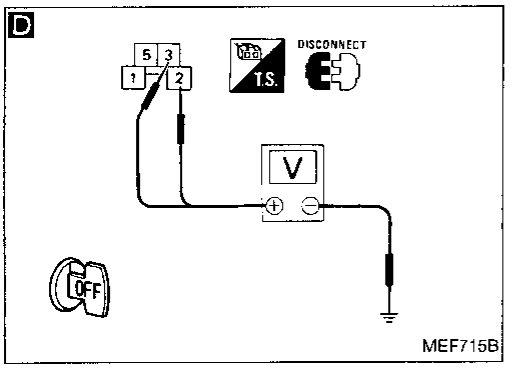


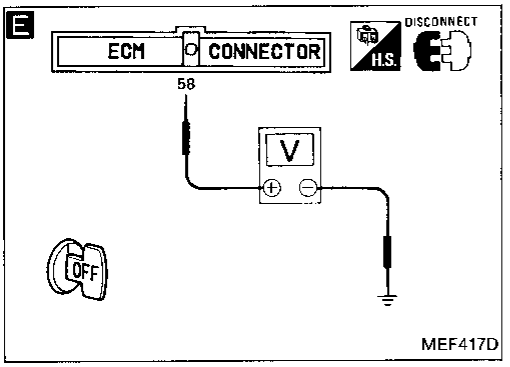
Diagnostic Procedure 22 (Cont'd)











INSPECTION START

A

CHECK POWER SUPPLY.
1) Turn ignition switch "ON".
2) Check voltage between ECM terminals ㊾ , ㊾, ㉒ and ground.
Voltage: Battery voltage

OK → **B**

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminals ⑩, ⑳, ⑩⑦, ⑩⑧, ⑪⑥ and engine ground.
Continuity should exist.
If NG, repair harness or connectors.

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

NG

C

CHECK HARNESS CONTINUITY BETWEEN ECCS RELAY AND ECM.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Disconnect ECCS relay.
4) Check harness continuity between ECM terminals ㊾ , ㊾, ㉒ and terminal ⑤.
Continuity should exist.

NG → Check the following.
- Harness connectors (F2) , (E3)
- Harness continuity between ECM and ECCS relay

If NG, repair harness or connectors.

OK

D

CHECK VOLTAGE BETWEEN ECCS RELAY AND GROUND.
1) Check voltage between terminals ②, ③ and ground.
Voltage: Battery voltage

NG → Check the following.
- "BR" fusible link
- Joint connector-3
- Harness continuity between ECCS relay and battery

If NG, repair harness or connectors.

OK

E

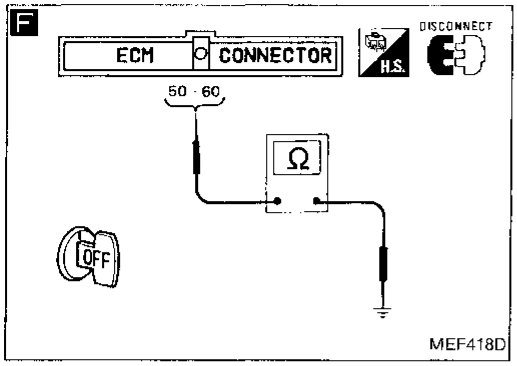
CHECK VOLTAGE BETWEEN ECM AND GROUND.
1) Check voltage between ECM terminal ㊽ and ground.
Voltage: Battery voltage

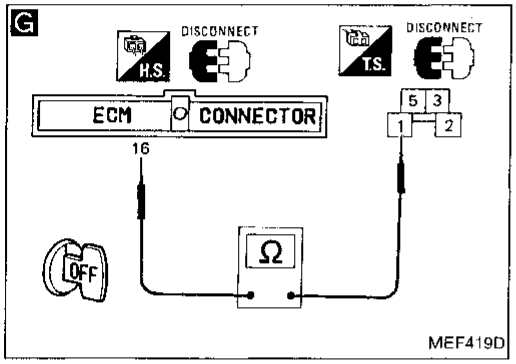
NG → Check the following.
- Harness connectors (F2) , (E3)
- Joint connector-3
- Harness continuity between ECM and joint connector-3

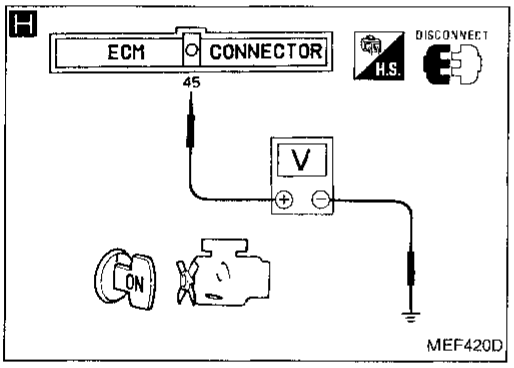
If NG, repair harness or connectors.

OK → Ⓐ

Diagnostic Procedure 22 (Cont'd)







Ⓐ

F

CHECK GROUND CIRCUIT.
1) Check harness continuity between ECM terminals ⑤⓪ , ⑥⓪ and engine ground.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

G

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

NG → Check the following.
- Harness connectors (F1) , (E2)
- Joint connector-4
- Harness continuity between ECM and ECCS relay

If NG, repair harness or connectors.

OK ↓

H

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "ON".
2) Check voltage between ECM terminal ④⑤ and ground.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F2) , (E3)
- Joint connector-3
- Joint connector-5
- Harness connector (E110)
- Harness continuity between ECM and ignition switch

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT (ECCS relay).
Refer to "Electrical Components Inspection".
(See page EF & EC-331.)

NG → Replace ECCS relay.

OK ↓

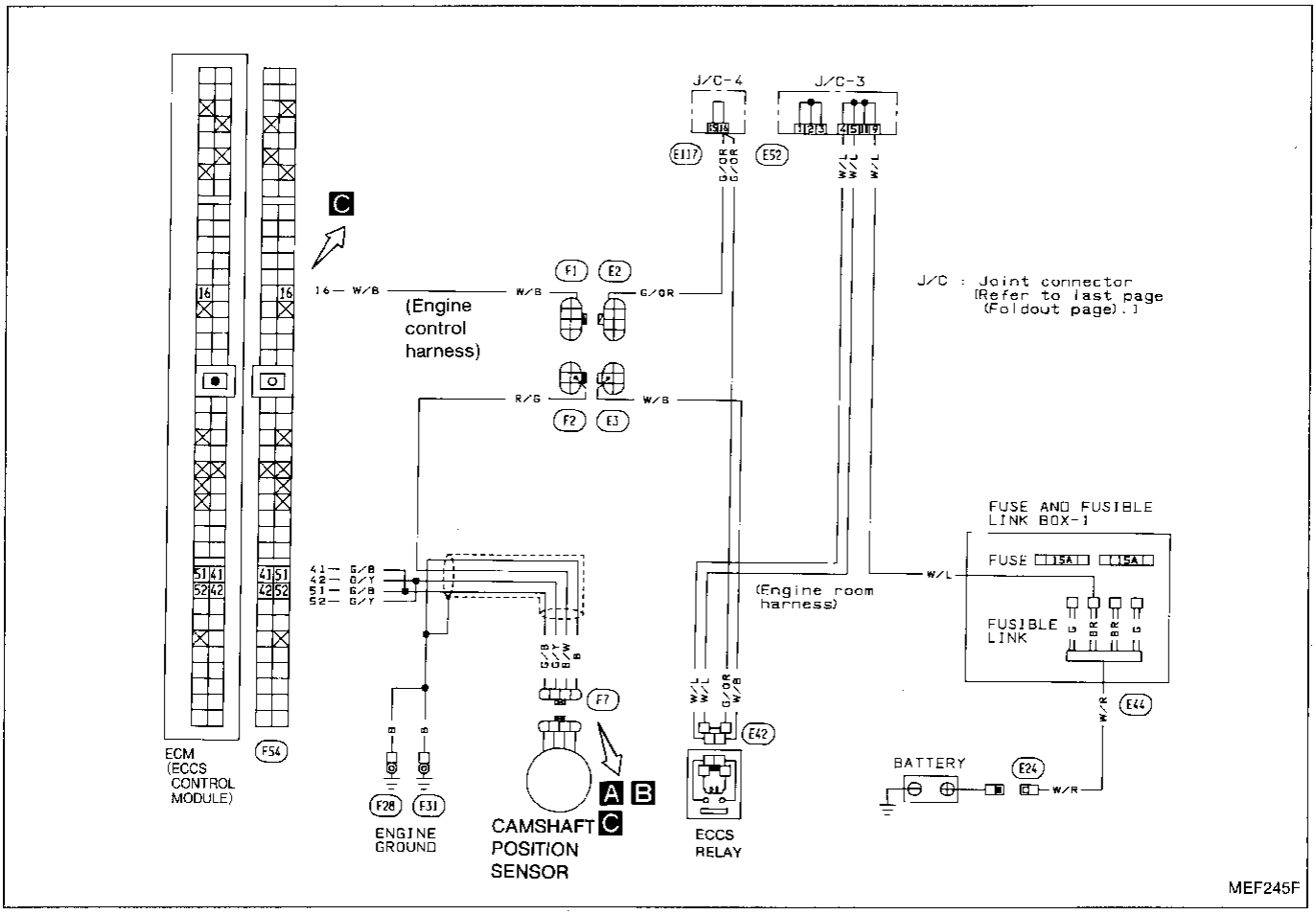
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed. ↓

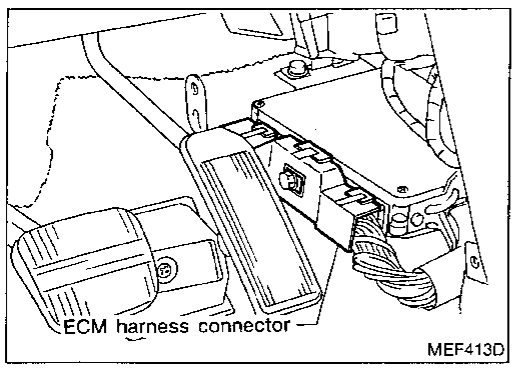
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

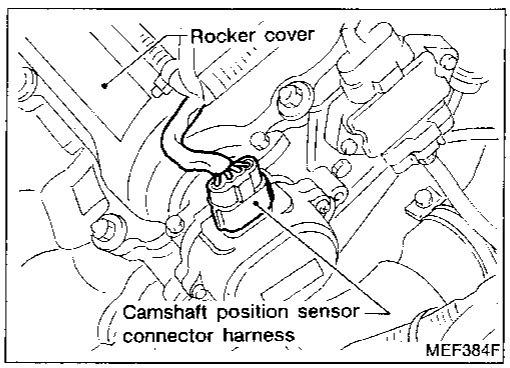
Diagnostic Procedure 23

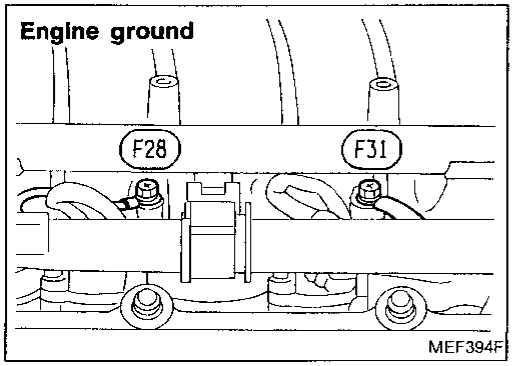
CAMSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)



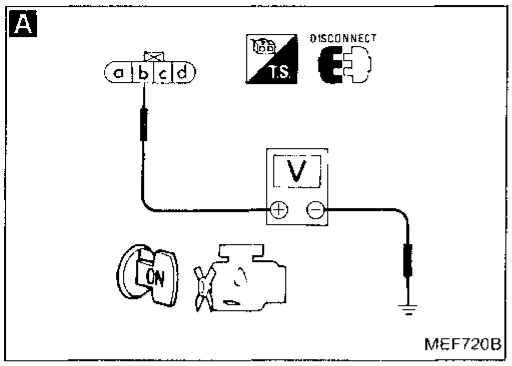
Harness layout

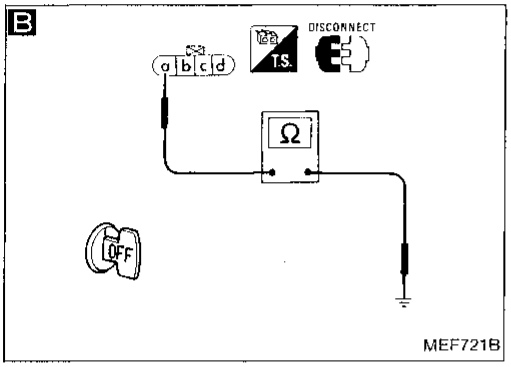


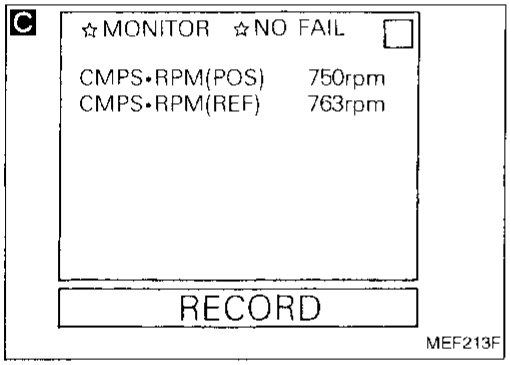


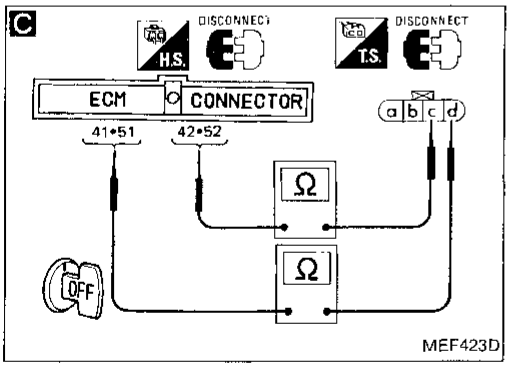


Diagnostic Procedure 23 (Cont'd)









INSPECTION START

A

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

NG → Check the following.
- Harness connectors (F2), (E3)
- Harness continuity between camshaft position sensor and ECCS relay

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 engine ground.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

C

CHECK INPUT SIGNAL CIRCUIT.
1) Reconnect camshaft position sensor harness connector.
2) Start engine.
3) Read "CMPS·RPM" signals in "DATA MONITOR" mode with CONSULT.
rpm: M/T 750 ± 50
A/T 790 ± 50

NG → Repair harness or connectors.

— OR —

1) Disconnect ECM harness connector.
2) Check harness continuity between terminal ⓒ and ECM terminals (42), (52) (1° signal), terminal ⓓ and ECM terminals (41), (51) (120° signal).
Continuity should exist.

OK ↓

CHECK COMPONENT (Camshaft position sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-324.)

NG → Replace camshaft position sensor.

OK ↓

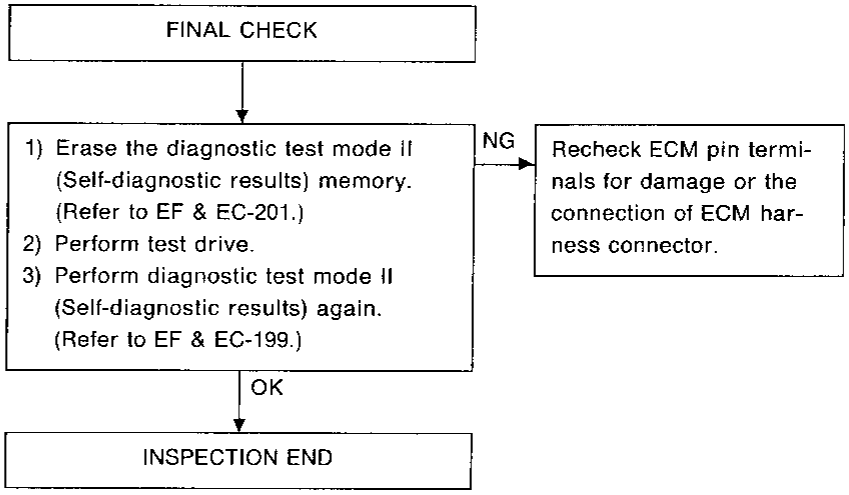
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed. ↓

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

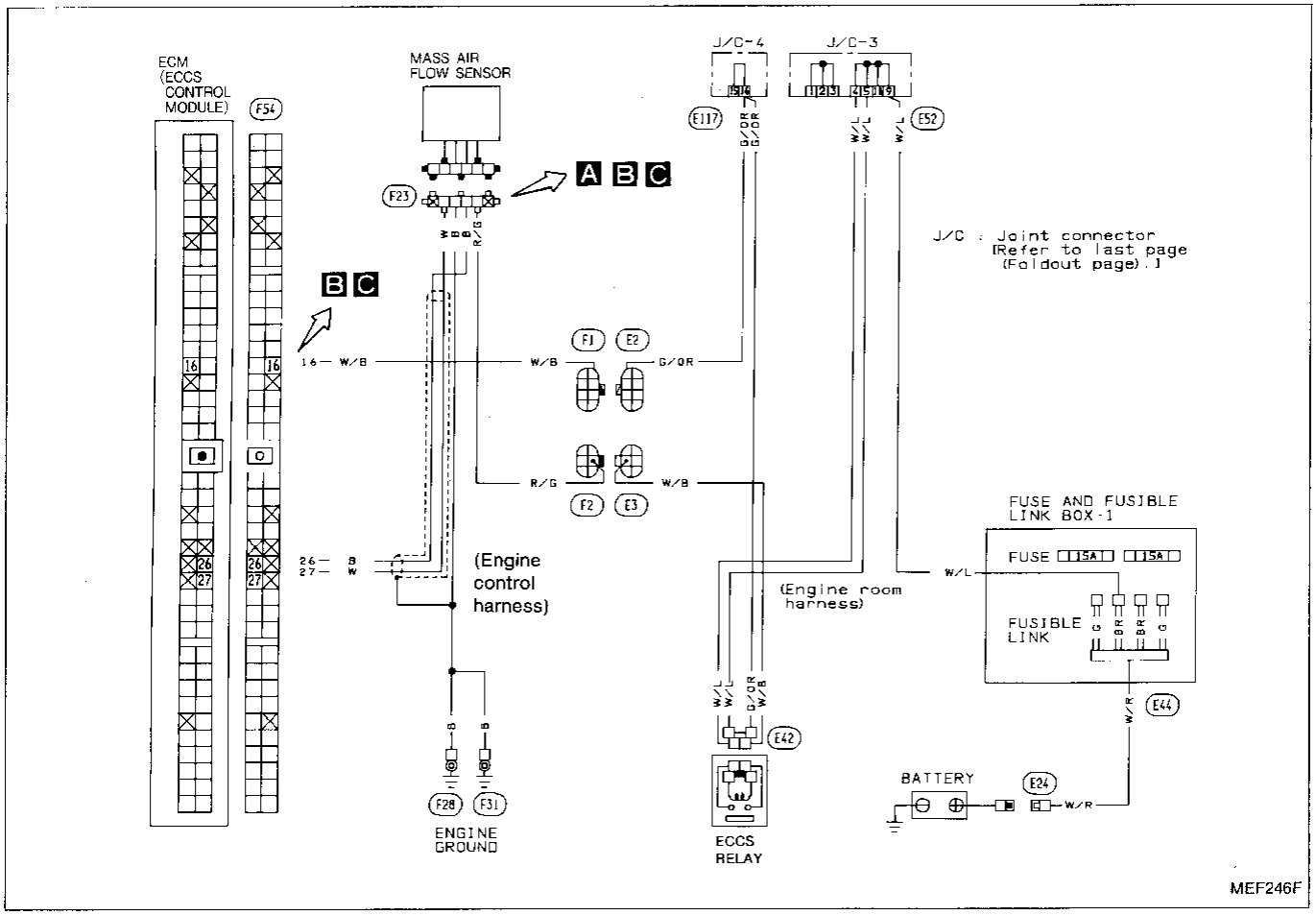
Diagnostic Procedure 23 (Cont'd)

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

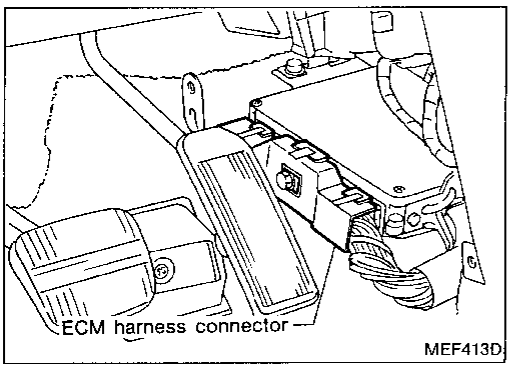


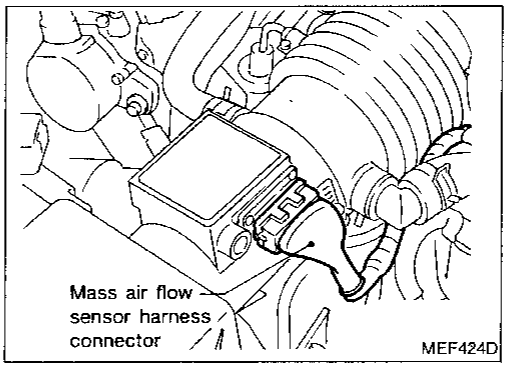
Diagnostic Procedure 24

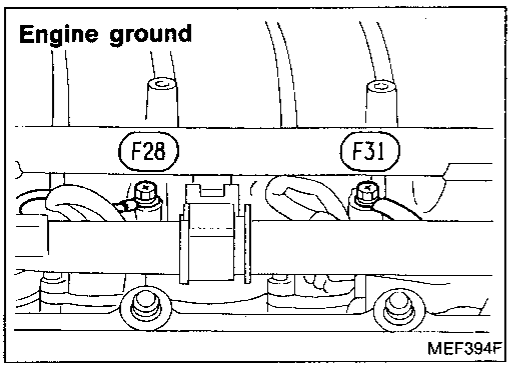
MASS AIR FLOW SENSOR (Diagnostic trouble code No. 12) CHECK (MALFUNCTION INDICATOR LAMP ITEM)



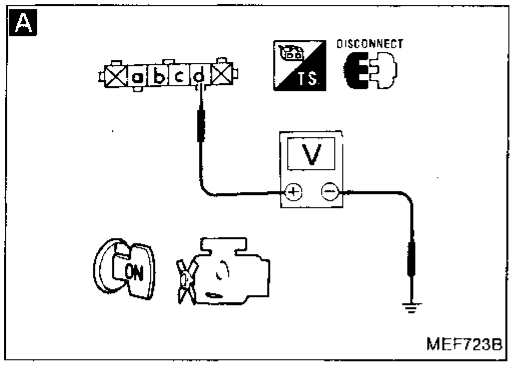
Harness layout

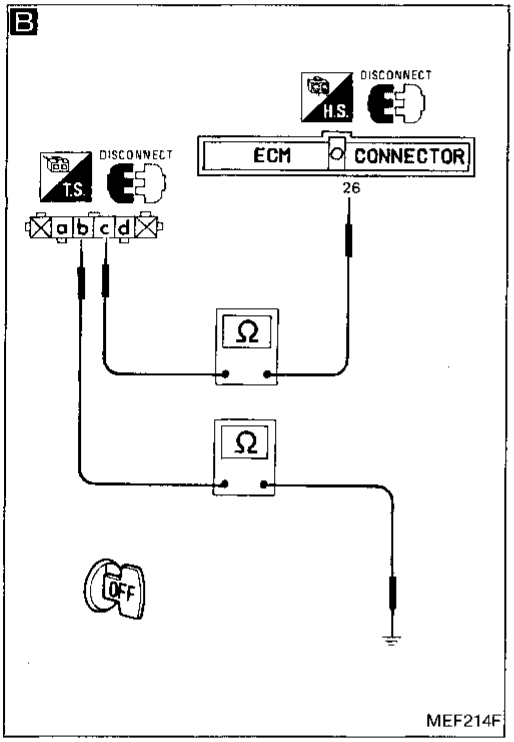


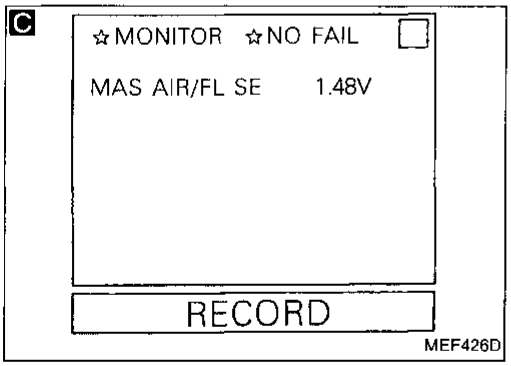


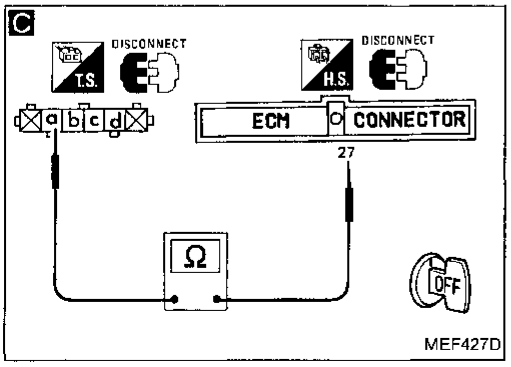


Diagnostic Procedure 24 (Cont'd)









INSPECTION START

A

CHECK POWER SUPPLY.
1) Disconnect mass air flow sensor harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal ⓓ and ground.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F2), (E3)
- Harness continuity between mass air flow sensor and ECCS relay

If NG, repair harness or connectors.

OK ↓

B

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

NG → Repair harness or connectors.

OK ↓

C

CHECK INPUT SIGNAL CIRCUIT.
1) Reconnect mass air flow sensor harness connector and ECM harness connector.
2) Start engine and warm it up sufficiently.
3) Read "MAS AIR/FL SE" signal in "DATA MONITOR" mode with CONSULT.
Voltage: 0.8 - 1.5V
(At idle)

NG → Repair harness or connectors.

OR

1) Check harness continuity between terminal ⓐ and ECM terminal (27).
Continuity should exist.

OK ↓

CHECK COMPONENT
(Mass air flow sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-324.)

NG → Replace mass air flow sensor.

OK ↓

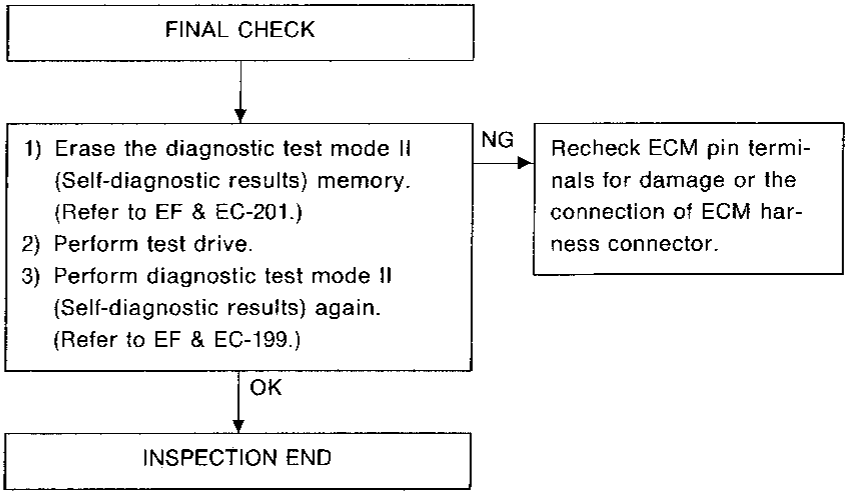
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed. ↓

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

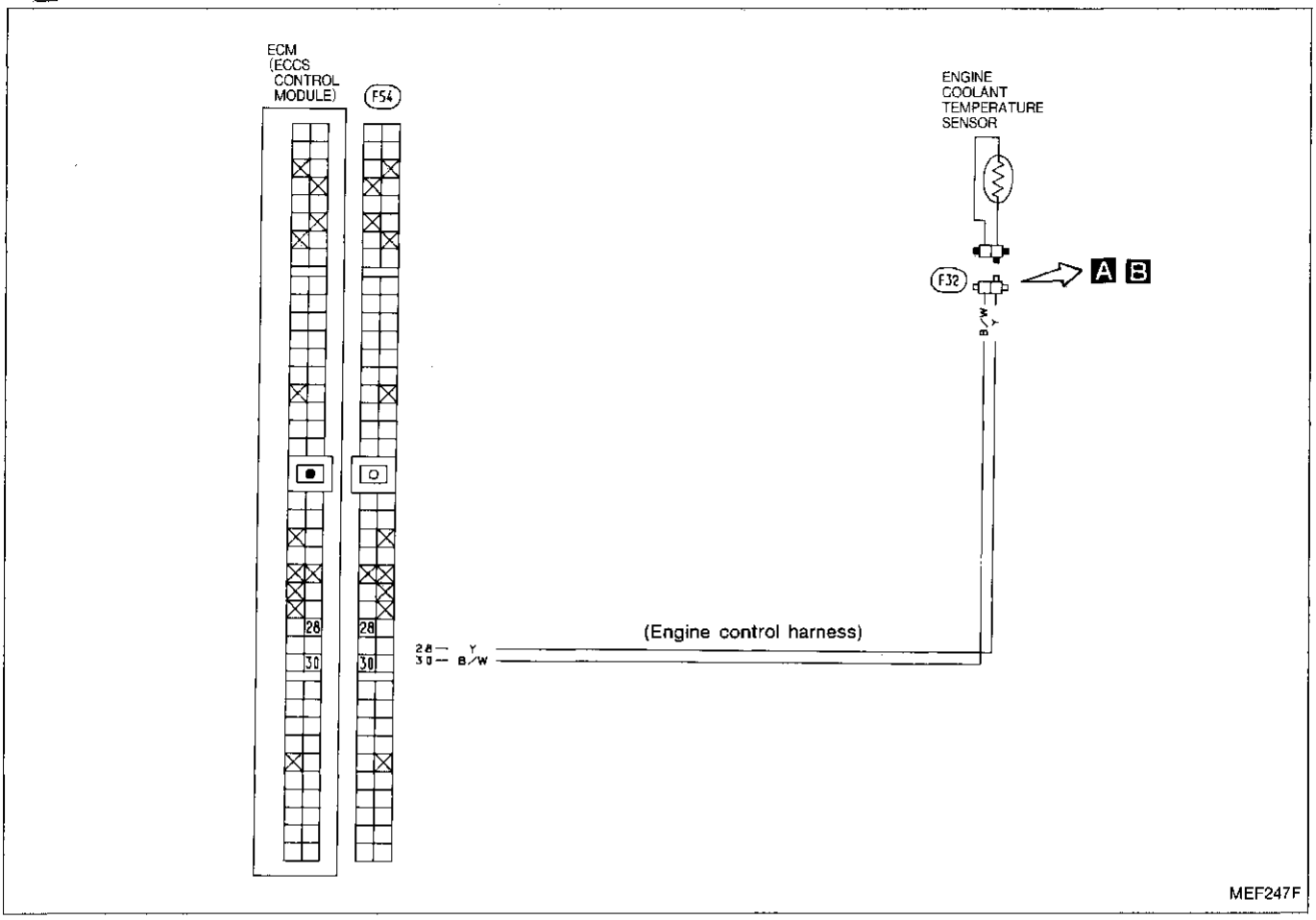
Diagnostic Procedure 24 (Cont'd)

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

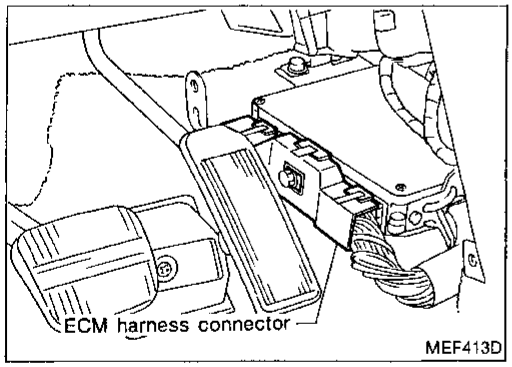


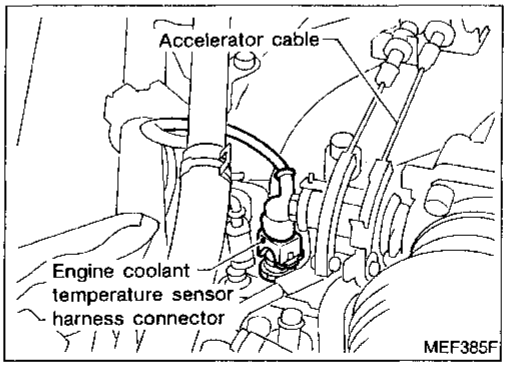
Diagnostic Procedure 25

ENGINE COOLANT TEMPERATURE SENSOR (Diagnostic trouble code No. 13)
(MALFUNCTION INDICATOR LAMP ITEM)

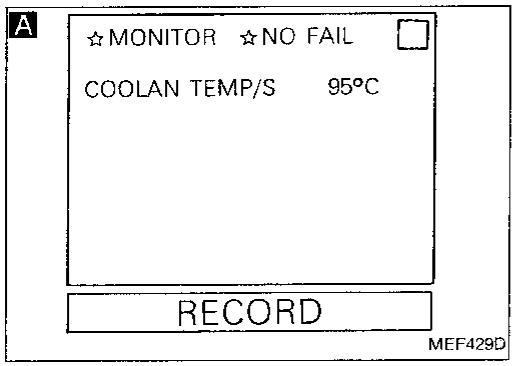


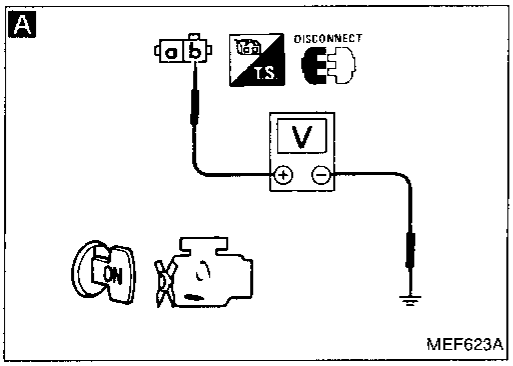
Harness layout

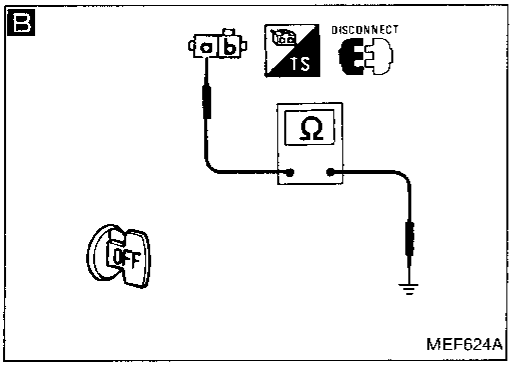




Diagnostic Procedure 25 (Cont'd)







INSPECTION START

A

CHECK POWER SUPPLY.

1) Start engine and warm it up sufficiently.
2) Select "COOLAN TEMP/S" signal in "DATA MONITOR" mode with CONSULT.
3) Stop engine.
4) When restarting engine make sure that CONSULT indicates "COOLAN TEMP/S" is 50°C (122°F) or more.

OR

1) Disconnect engine coolant temperature sensor harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal ⓑ and ground.
Voltage: Approximately 5V

NG → Check the following.
- Harness continuity between ECM and engine coolant temperature sensor.

If NG, repair harness or connectors.

OK

B

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

NG → Check the following.
- Harness continuity between ECM and engine coolant temperature sensor.

If NG, repair harness or connectors.

OK

CHECK COMPONENT
(Engine coolant temperature sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-325.)

NG → Replace engine coolant temperature sensor.

OK

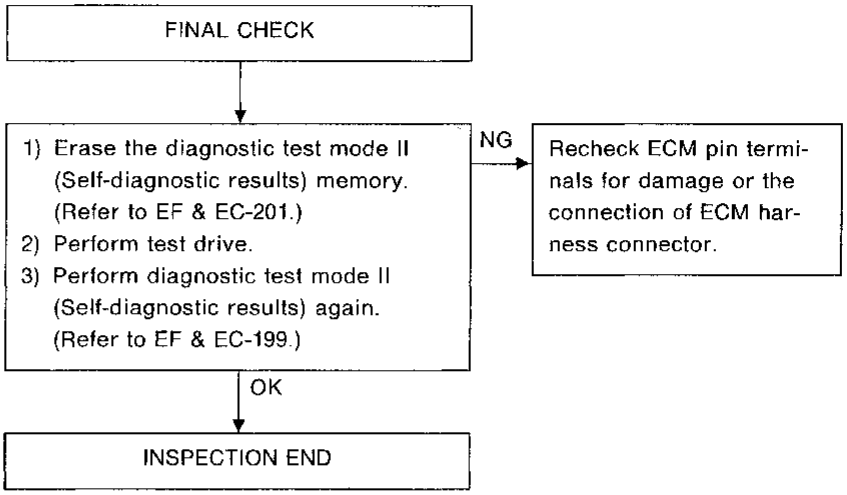
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed.

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

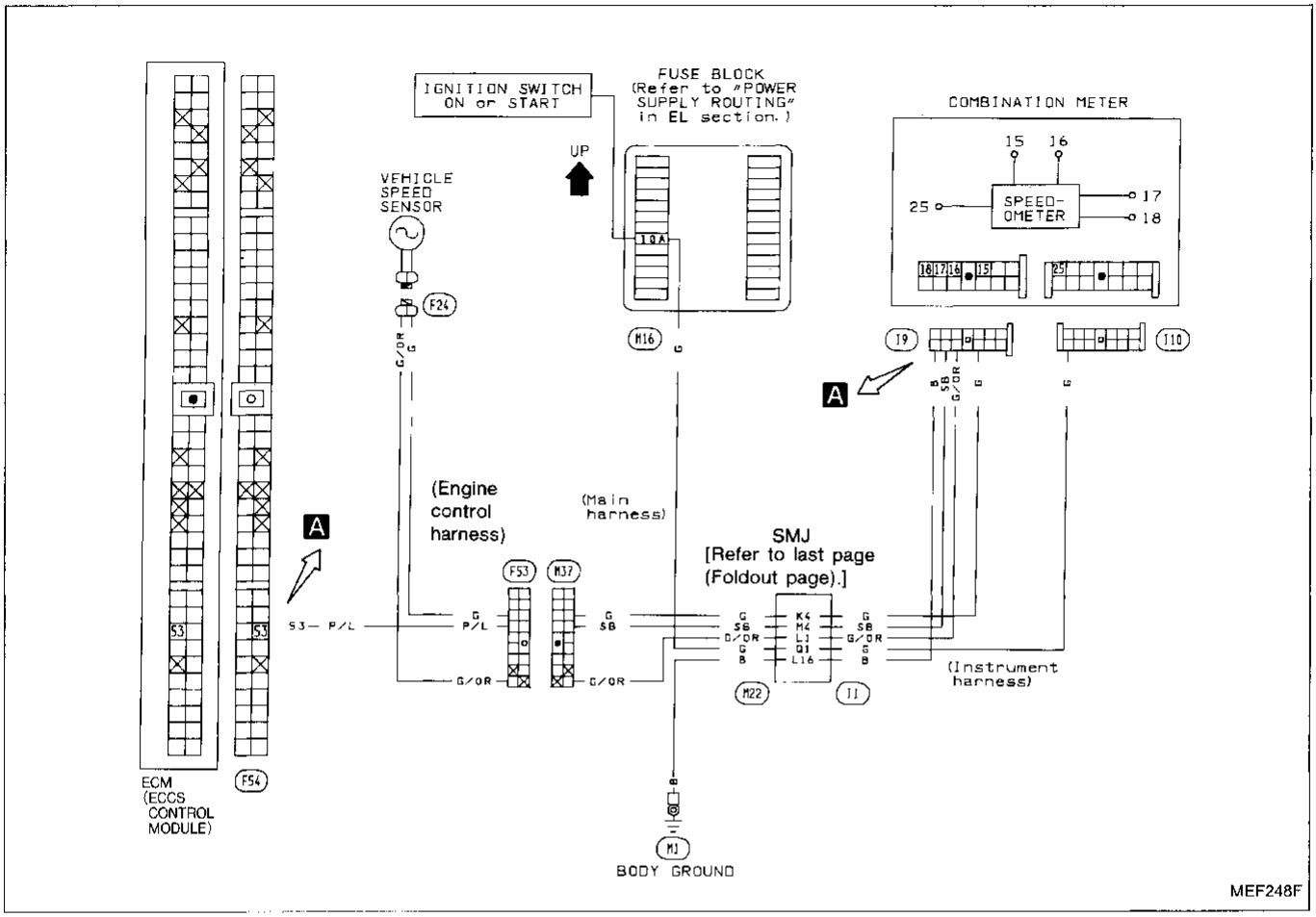
Diagnostic Procedure 25 (Cont'd)

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

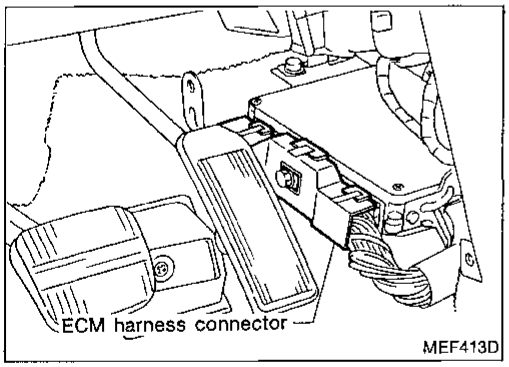


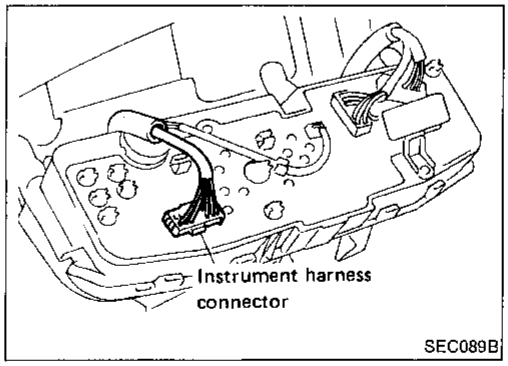
Diagnostic Procedure 26

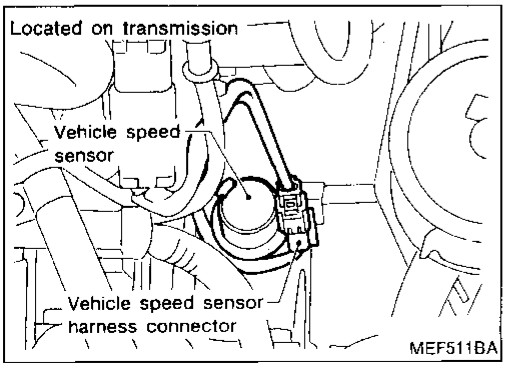
VEHICLE SPEED SENSOR (Diagnostic trouble code No. 14) (MALFUNCTION INDICATOR LAMP ITEM)



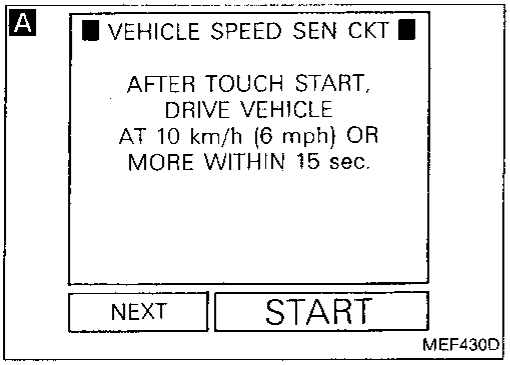
Harness layout

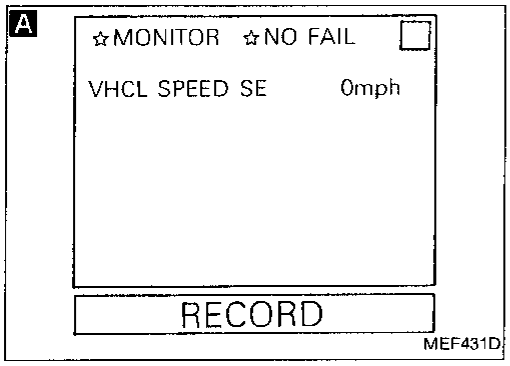


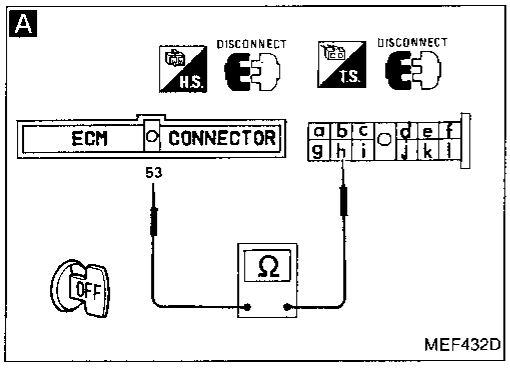




Diagnostic Procedure 26 (Cont'd)







INSPECTION START

CHECK SPEEDOMETER FUNCTION.
Make sure that speedometer functions properly.

NG → Check vehicle speed sensor and its circuit. (Refer to EL section.)

OK

A

CHECK INPUT SIGNAL CIRCUIT.

1) Perform "VEHICLE SPEED SEN CKT" in "FUNCTION TEST" mode with CONSULT.

OR

1) Read "VHCL SPEED SE" signal in "DATA MONITOR" mode with CONSULT.
CONSULT value should be the same as the speedometer indication.

OR

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 (h).
Continuity should exist.

NG → Check the following.
- Harness connectors (F53) , (M37)
- Harness connectors (M22) , (I1)
- Harness continuity between ECM and combination meter

If NG, repair harness or connectors.

OK

Disconnect and reconnect harness connectors in the circuit, and 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

Start engine.

Perform diagnostic test mode II (Self-diagnostic results).
(Refer to EF & EC-199.)

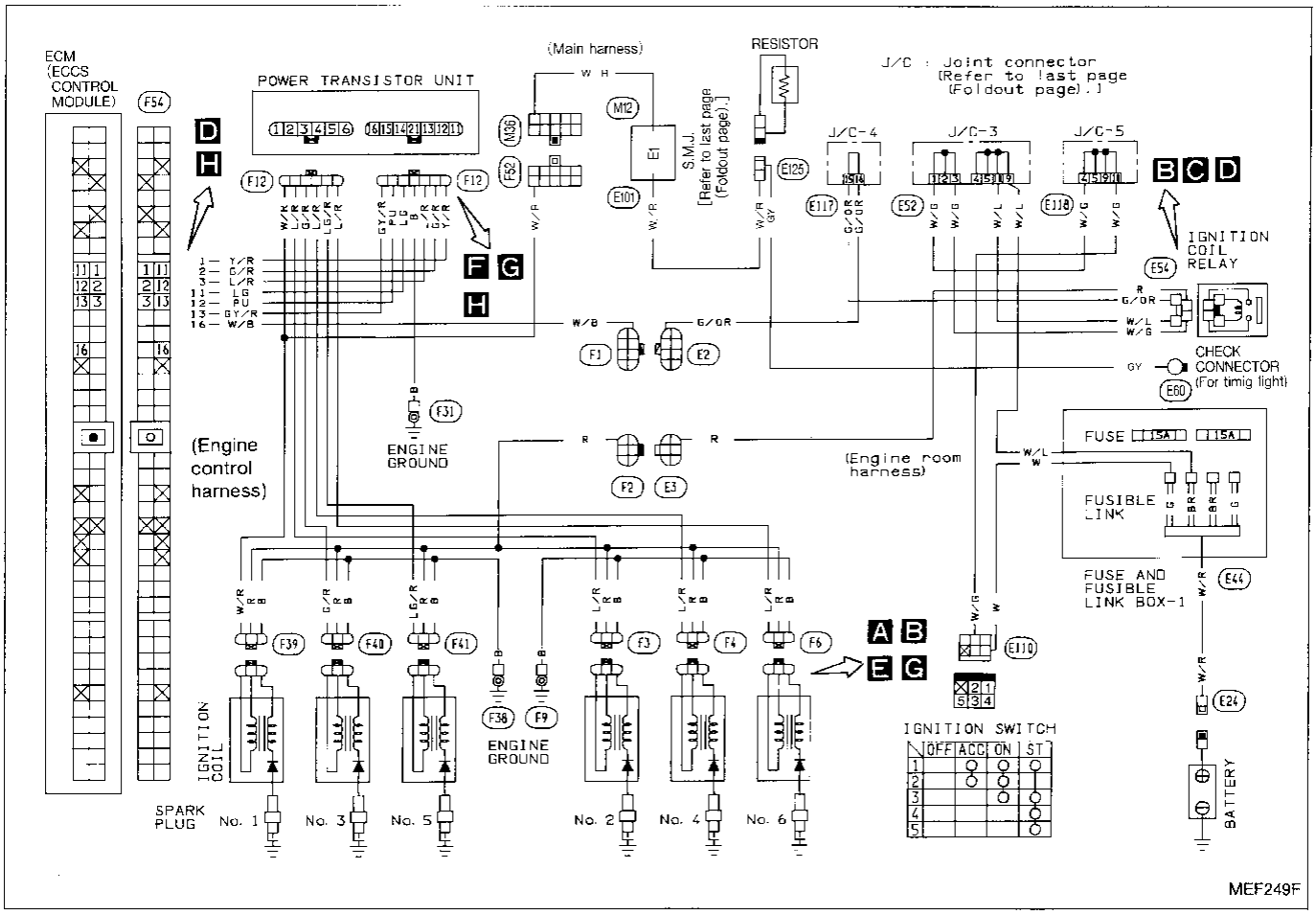
NG → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

OK

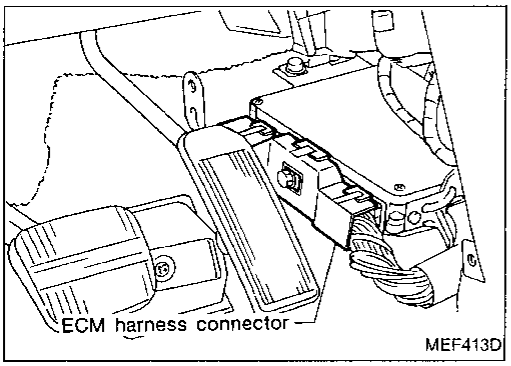
INSPECTION END

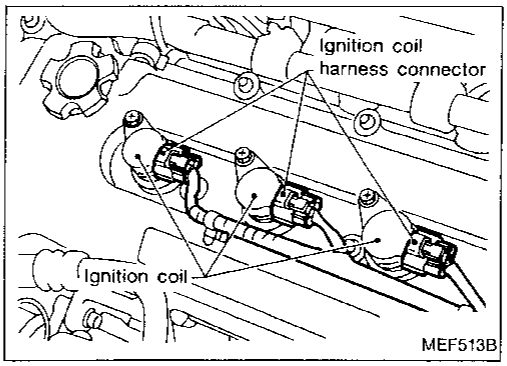
Diagnostic Procedure 27

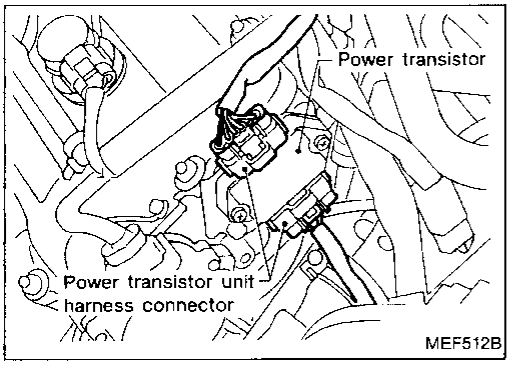
IGNITION SIGNAL (Diagnostic trouble code No. 21)

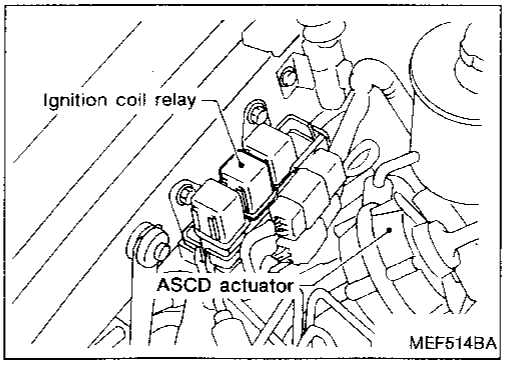


Harness layout

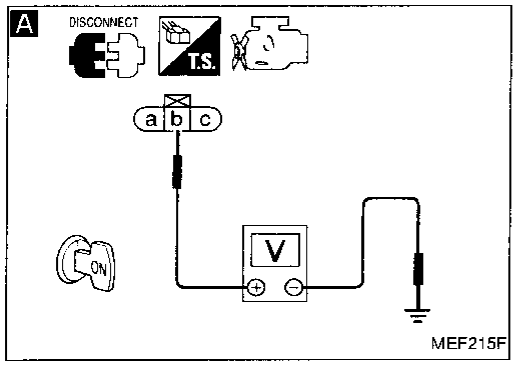


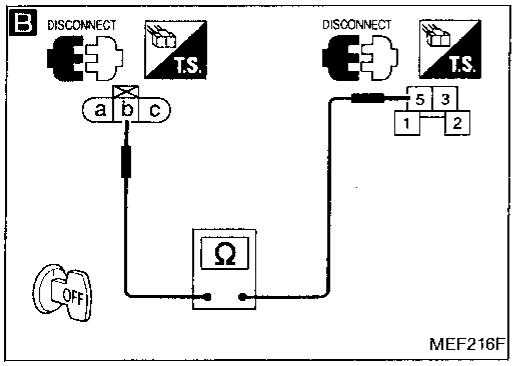


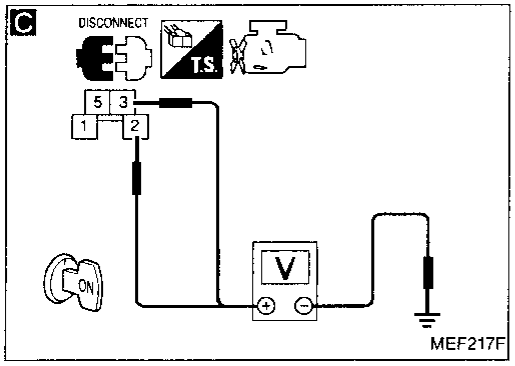


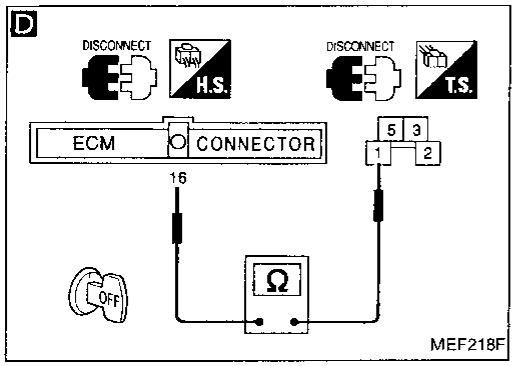


Diagnostic Procedure 27 (Cont'd)









INSPECTION START

A

CHECK POWER SUPPLY-I.
1) Disconnect ignition coil harness connectors.
2) Turn ignition switch "ON".
3) Check voltage between terminal ⓑ and ground.
Voltage: Battery voltage

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

NG

B

CHECK POWER SUPPLY-II.
1) Turn ignition switch "OFF".
2) Disconnect ignition coil relay.
3) Check harness continuity between terminal ⓑ and terminal ⑤.
Continuity should exist.

NG → Check the following.
- Harness connectors (F2) , (E3)
- Harness continuity between ignition coil and ignition coil relay

If NG, repair harness or connectors.

OK

C

CHECK POWER SUPPLY-III.
1) Turn ignition switch "ON".
2) Check voltage between terminals ②, ③ and ground.
Voltage: Battery voltage

NG → Check the following.
- Joint connector-3
- Joint connector-5
- "BR" fusible link
- Harness continuity between ignition coil relay and ignition switch
- Harness continuity between ignition coil relay and battery

If NG, repair harness or connectors.

OK

D

CHECK OUTPUT SIGNAL CIRCUIT-I.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal ⑯ and terminal ①.
Continuity should exist.

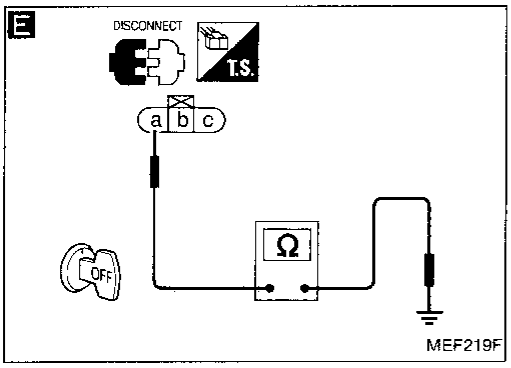
NG → Check the following.
- Harness connectors (F1) , (E2)
- Joint connector-4
- Harness continuity between ECM and ignition coil relay

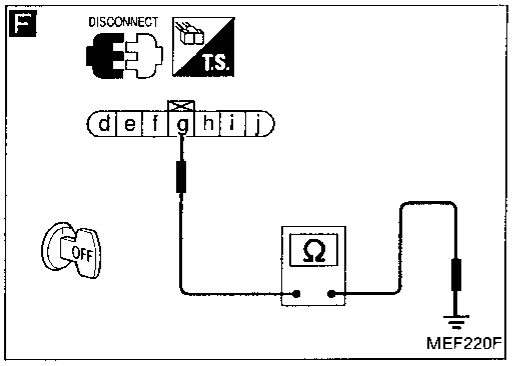
If NG, repair harness or connectors.

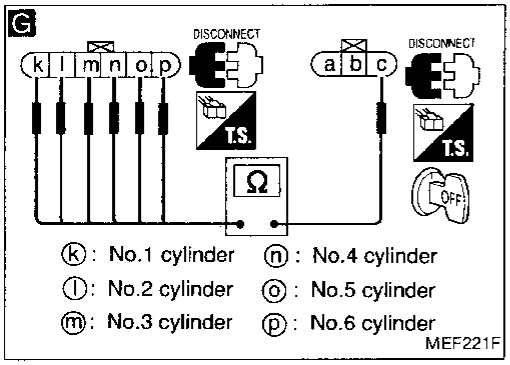
OK

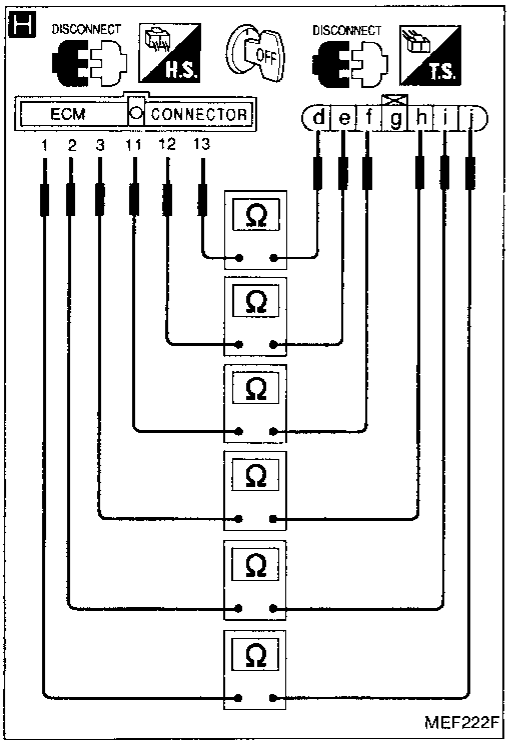
Ⓐ

Diagnostic Procedure 27 (Cont'd)









Ⓐ

CHECK COMPONENT
(Ignition coil relay).
Refer to "Electrical Components Inspection".
(See page EF & EC-331.)

NG → Replace ignition coil relay.

OK ↓

Disconnect and reconnect harness connectors in the circuit, and 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 GROUND CIRCUIT.
1) Turn ignition switch "OFF".
E 2) Check harness continuity between terminal ⓐ and engine ground.
Continuity should exist.
3) Disconnect power transistor unit harness connector.
F 4) Check harness continuity between terminal ⓖ and engine ground.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

CHECK OUTPUT SIGNAL CIRCUIT-II.
G 1) Check harness continuity between terminals ⓚ, ⓛ, ⓜ, ⓝ, ⓞ, ⓟ and terminal ⓒ.
Continuity should exist.
2) Disconnect ECM harness connector.
H 3) Check harness continuity between following terminals.
① - ⓙ ⑪ - ⓕ
② - ⓘ ⑫ - ⓔ
③ - ⓗ ⑬ - ⓓ
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENTS
(Ignition coil and power transistor).
Refer to "Electrical Components Inspection".
(See pages EF & EC-325 and 326.)

NG → Replace malfunctioning component(s).

OK ↓

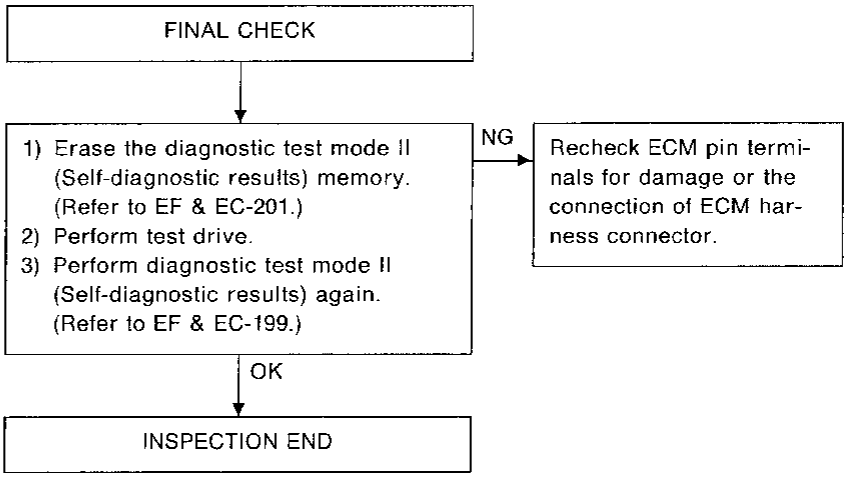
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed. ↓

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

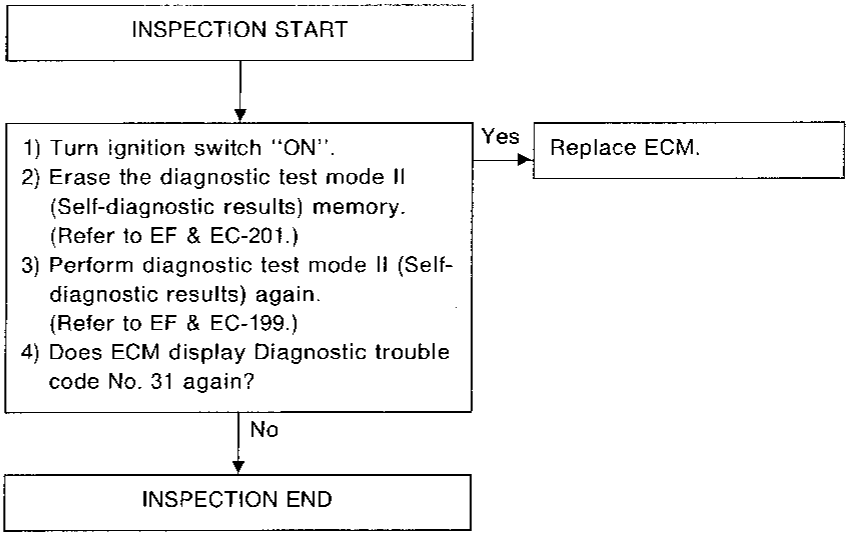
Diagnostic Procedure 27 (Cont'd)

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



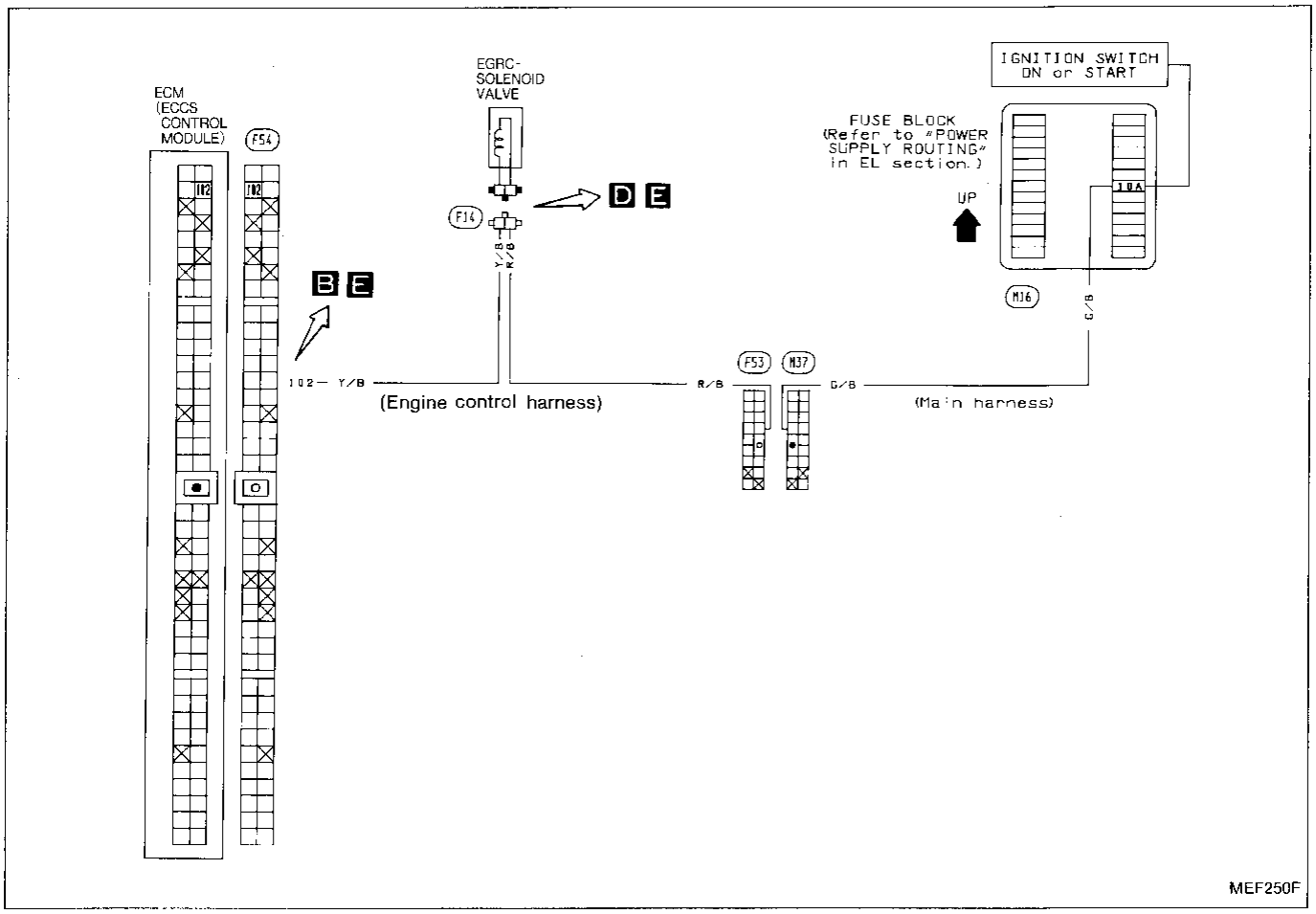
Diagnostic Procedure 28

ECM (ECCS CONTROL MODULE) (Diagnostic trouble code No. 31) (MALFUNCTION INDICATOR LAMP ITEM)

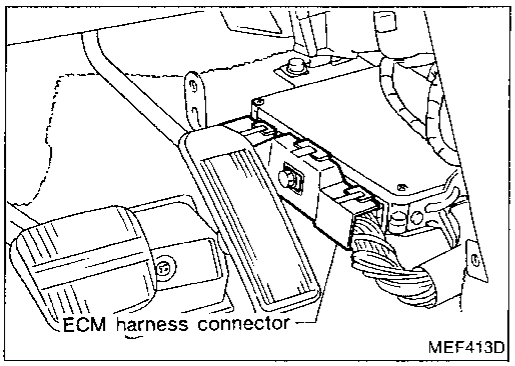


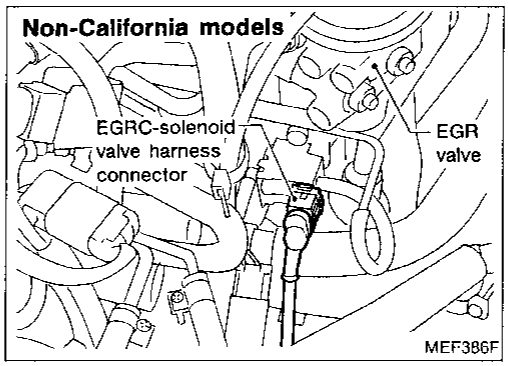
Diagnostic Procedure 29

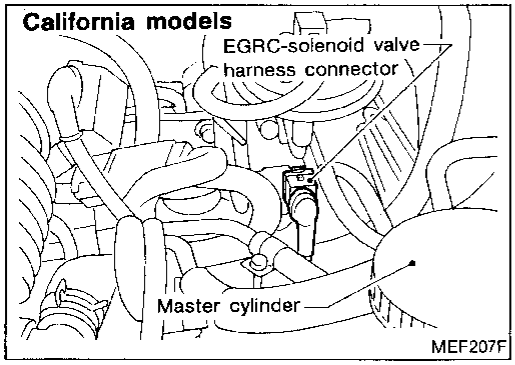
EGR FUNCTION (Diagnostic trouble code No. 32) (MALFUNCTION INDICATOR LAMP ITEM)



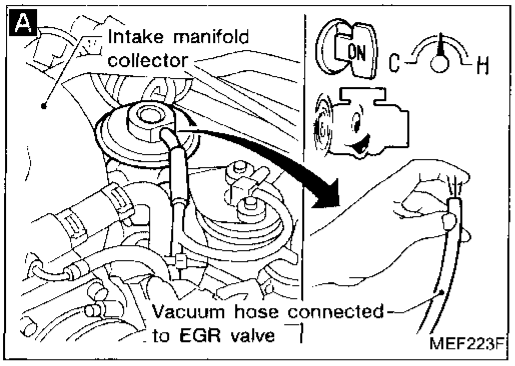
Harness layout

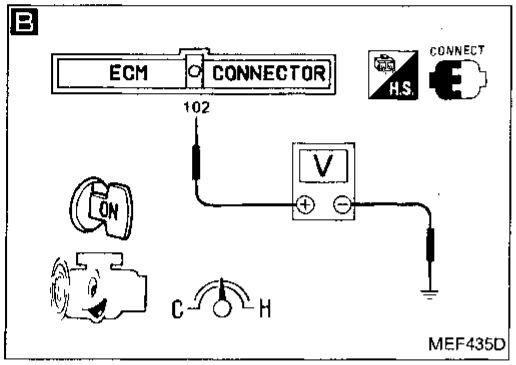


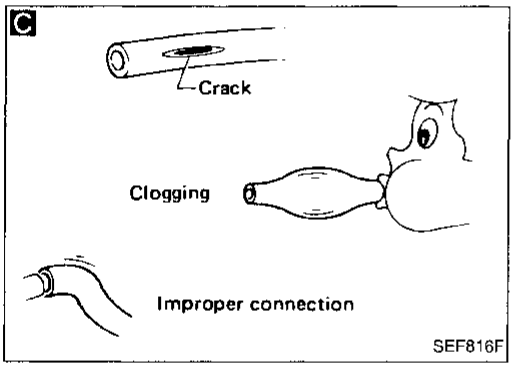


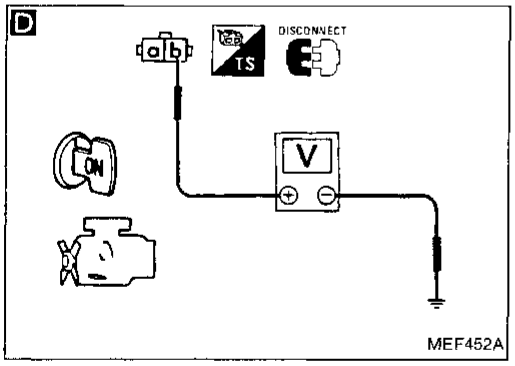


Diagnostic Procedure 29 (Cont'd)









INSPECTION START

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. 12 is not displayed.
3) Disconnect vacuum hose to EGR valve.
4) Make sure that vacuum exists under the following conditions.
At idle:
Vacuum should not exist.
Engine is racing:
Vacuum should exist.

OK → CHECK COMPONENTS (EGR valve, EGRC-BPT valve and EGR temperature sensor).
Refer to "Electrical Components Inspection". (See page EF & EC-326.)
NG → Replace malfunctioning component(s).

NG

B

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

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

NG

D

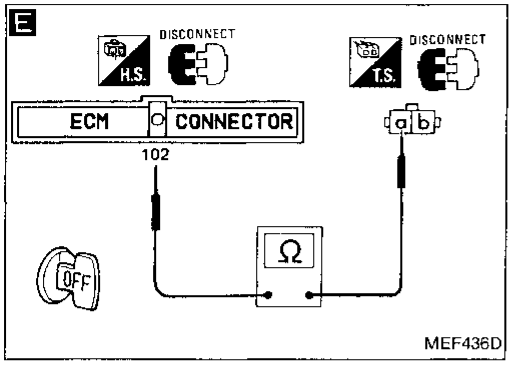
CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect EGRC-solenoid valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal (b) and ground.
Voltage: Battery voltage

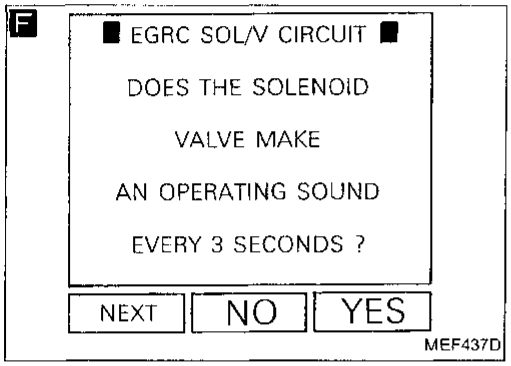
NG → Check the following.
- Harness connectors (F53), (M37)
- 10A fuse
- Harness continuity between EGRC-solenoid valve and fuse

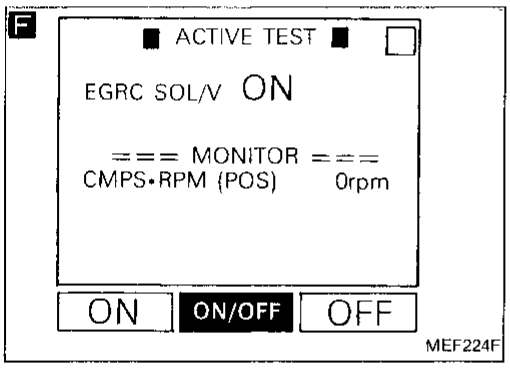
If NG, repair harness or connectors.

OK
Ⓐ

Diagnostic Procedure 29 (Cont'd)







Ⓐ

E

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 ↓

F

CHECK COMPONENT
(EGRC-solenoid valve).

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

OR

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

OR

Refer to "Electrical Components Inspection".
(See page EF & EC-326.)

NG → Replace EGRC-solenoid valve.

OK ↓

Check resistance of EGR temperature sensor.
(See page EF & EC-327.)

OK ↓

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

Trouble is not fixed. ↓

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

Diagnostic Procedure 29 (Cont'd)

G ROAD TEST

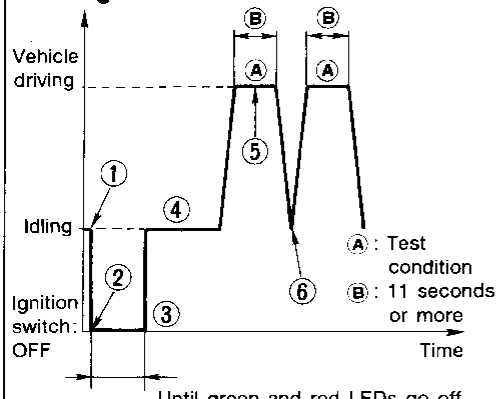
Test condition

Drive vehicle under the following conditions with a suitable shift position.

(1) Engine speed:
2,100±300 rpm

(2) Intake manifold vacuum:
M/T: –23.3±4.7 kPa
(–175±35 mmHg, –6.89±1.38 inHg)
A/T: –26.0±7.3 kPa
(–195±55 mmHg, –7.68±2.17 inHg)

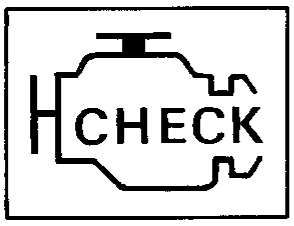
Driving mode



① Start engine and warm it up sufficiently.
② Turn off ignition switch and keep it off until green and red LEDs go off.
③ Start engine and make sure that air conditioner switch and rear defogger are turned "OFF" during driving test.
④ Keep engine running for at least 3 minutes.
⑤ Shift to suitable gear position and drive in "Test condition" for at least 11 seconds.
⑥ Decrease engine speed to less than 1,800 rpm.
⑦ Repeat steps ⑤ through ⑥ at least 1 time.

MEF440DA

H



MALFUNCTION INDICATOR LAMP

MEF439D

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

FINAL CHECK

↓

Erase the diagnostic test mode II (Self-diagnostic results) memory.
(Refer to EF & EC-201.)

↓

G

Perform test drive under the following conditions.
1) Warm up engine sufficiently.
2) Use test driving modes indicated in figure G .

↓

H

Make sure that malfunction indicator lamp does not come on during test drive.

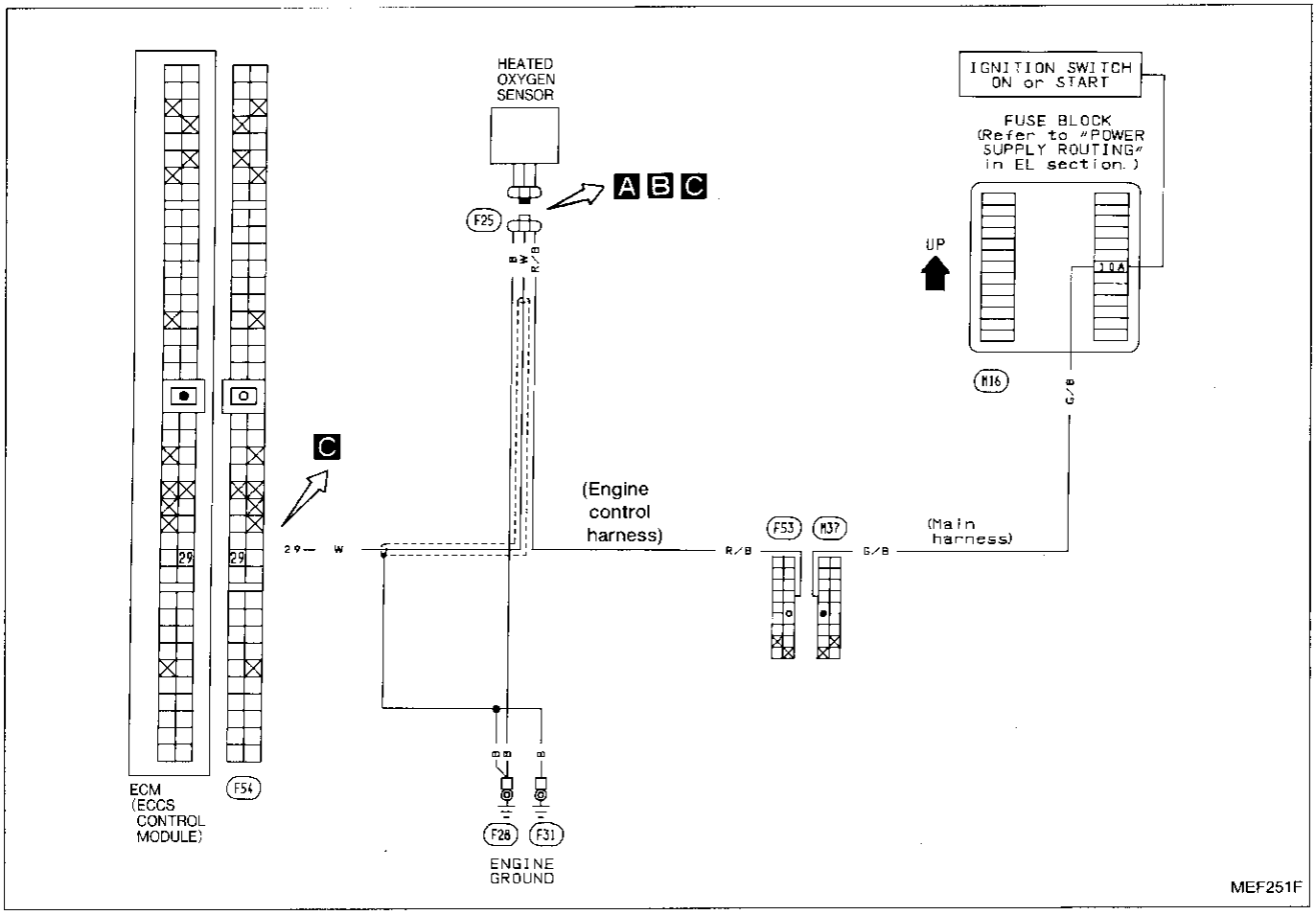
Comes on. → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

Does not come on. ↓

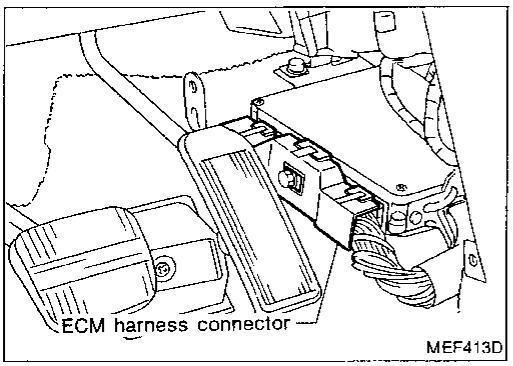
INSPECTION END

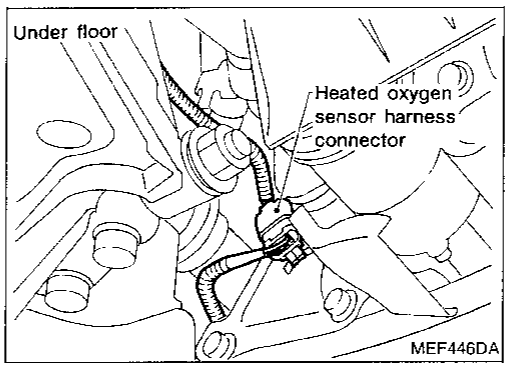
Diagnostic Procedure 30

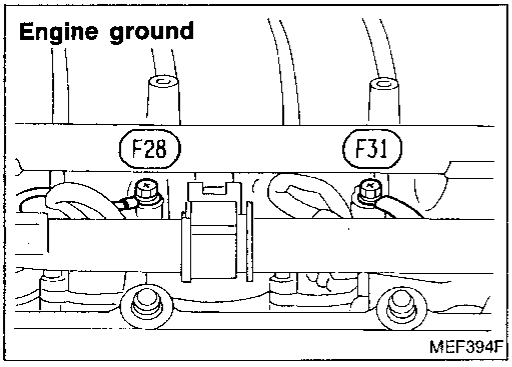
HEATED OXYGEN SENSOR (Diagnostic trouble code No. 33) (MALFUNCTION INDICATOR LAMP ITEM)



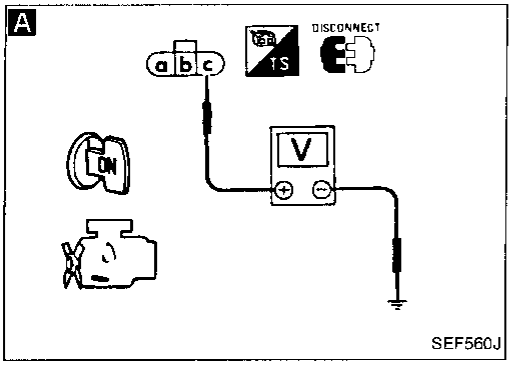
Harness layout

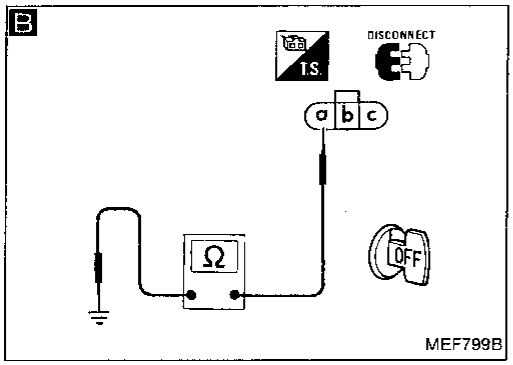


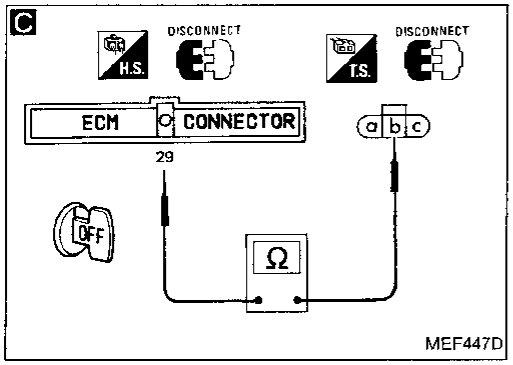




Diagnostic Procedure 30 (Cont'd)







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 (F53), (M37)
- 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) Check harness continuity between terminal ⓐ and engine ground.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

C

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ㉙ and terminal ⓑ.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

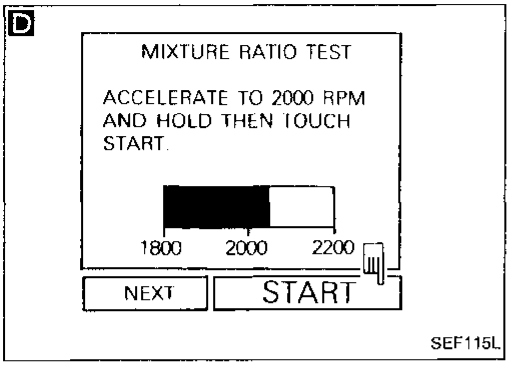
CHECK COMPONENT
(Heated oxygen sensor heater).
Refer to "Electrical Components Inspection".
(See page EF & EC-327.)

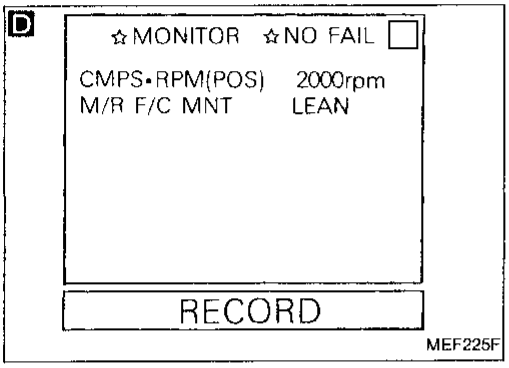
NG → Replace heated oxygen sensor.

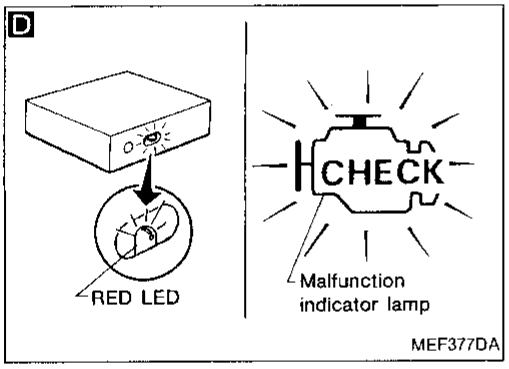
OK ↓

Ⓐ

Diagnostic Procedure 30 (Cont'd)







Ⓐ

D

CHECK COMPONENT (Heated oxygen sensor).
1) Reconnect heated oxygen sensor harness connector and ECM harness connector.
2) Start engine and warm it up sufficiently.
3) Perform "MIXTURE RATIO TEST" in "FUNCTION TEST" mode with CONSULT.

NG → Replace heated oxygen sensor.

OR

3) Make sure that "M/R F/C MNT" in "DATA MONITOR" mode indicates "RICH" and "LEAN" periodically more than 5 times during 10 seconds at 2,000 rpm.

OR

3) Make sure that the red LED on the ECM or the malfunction indicator lamp on the instrument panel 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).

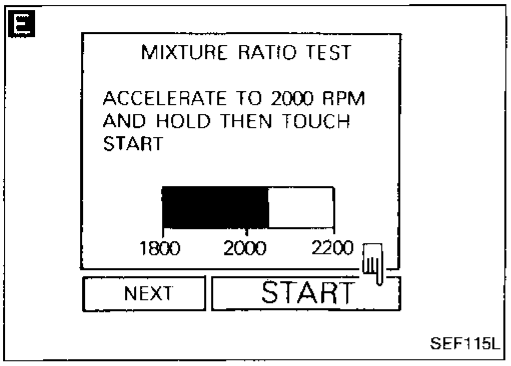
OK

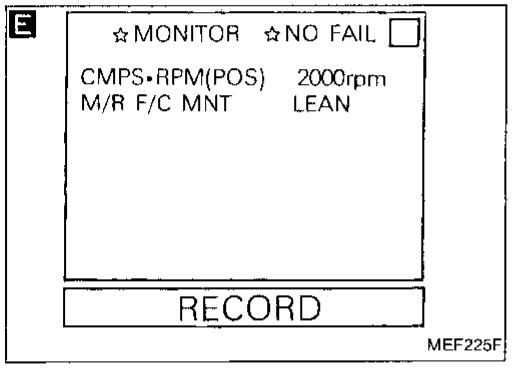
Disconnect and reconnect harness connectors in the circuit, and retest.

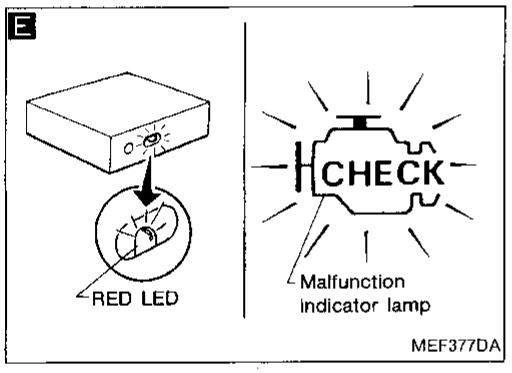
Trouble is not fixed.

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

Diagnostic Procedure 30 (Cont'd)







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

FINAL CHECK

↓

Erase the diagnostic test mode II (Self-diagnostic results) memory.
(Refer to EF & EC-201.)

↓

E

Perform test drive under the following conditions.
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" 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 the red LED on the ECM or the malfunction indicator lamp on the instrument panel 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).

↓

Perform diagnostic test mode II (Self-diagnostic results) again.
(Refer to EF & EC-199.)

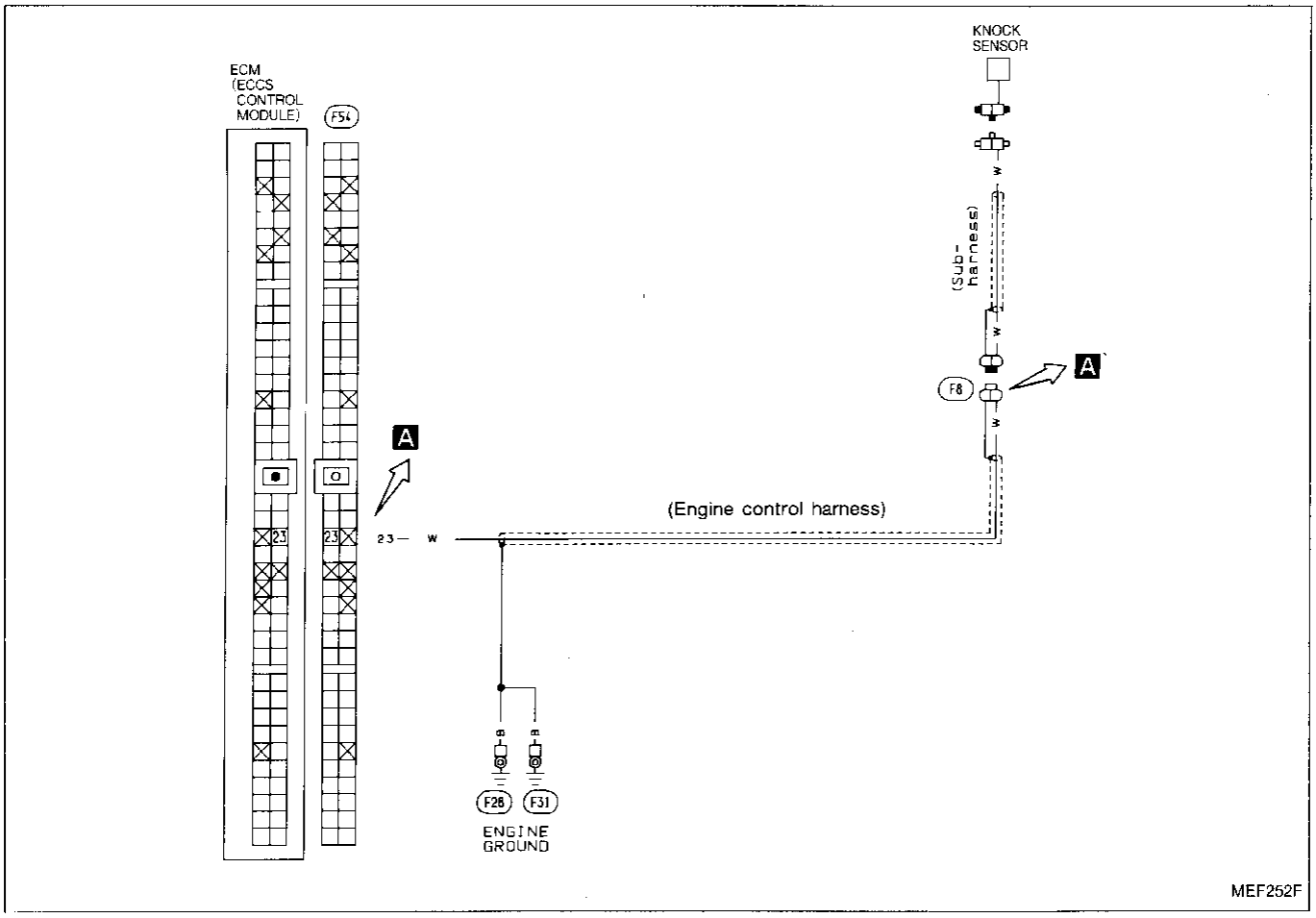
NG → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

OK ↓

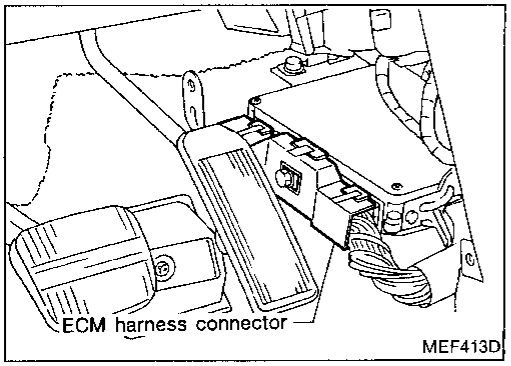
INSPECTION END

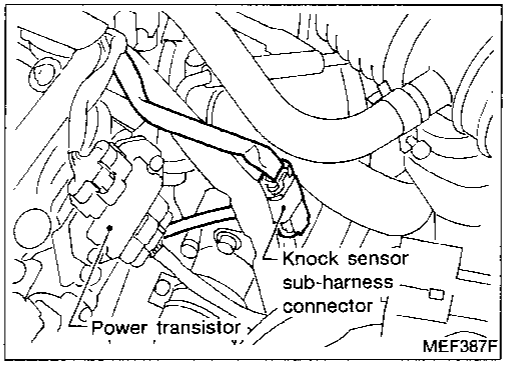
Diagnostic Procedure 31

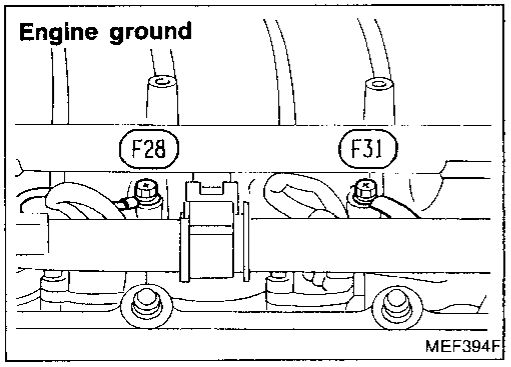
KNOCK SENSOR (Diagnostic trouble code No. 34)



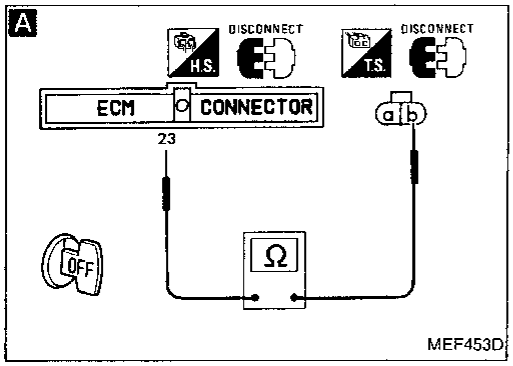
Harness layout







Diagnostic Procedure 31 (Cont'd)



INSPECTION START

A

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector and knock sensor sub-harness connector.
2) Check harness continuity between terminal ⓑ and ECM terminal ㉓ .
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

Loosen and retighten ground screws.

CHECK COMPONENT
(Knock sensor).
Refer to "Electrical Components Inspection"
(See page EF & EC-330.)

NG → Replace knock sensor.

OK ↓

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

Trouble is fixed. ↓

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

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

FINAL CHECK

1) Erase the diagnostic test mode II (Self-diagnostic results) memory. (Refer to EF & EC-201.)
2) Perform test drive.
3) Perform diagnostic test mode II (Self-diagnostic results) again. (Refer to EF & EC-199.)

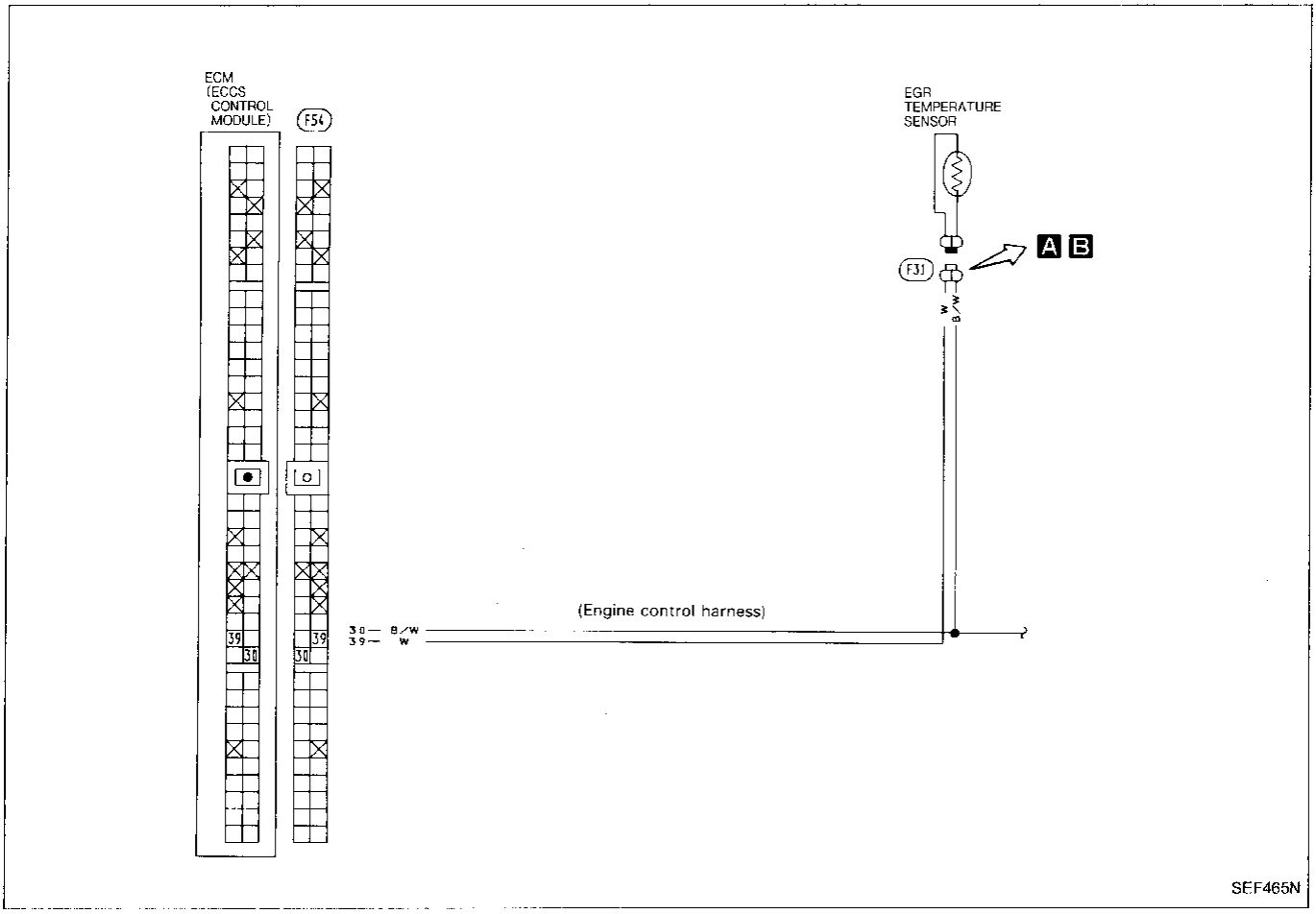
NG → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

OK ↓

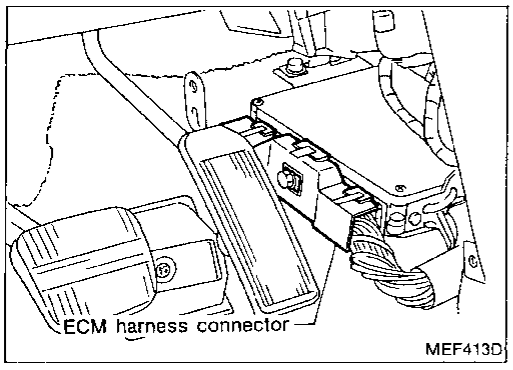
INSPECTION END

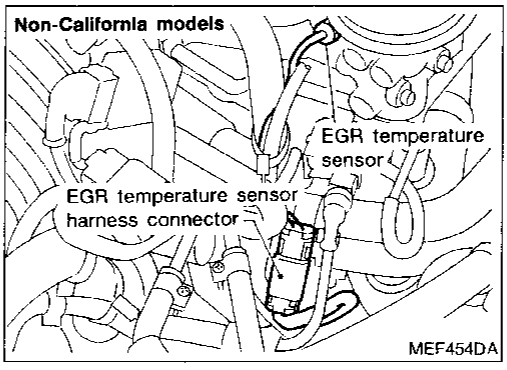
Diagnostic Procedure 32

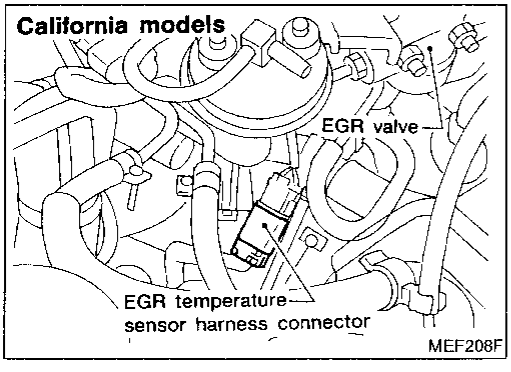
EGR TEMPERATURE SENSOR (Diagnostic trouble code No. 35) CHECK (MALFUNCTION INDICATOR LAMP ITEM)



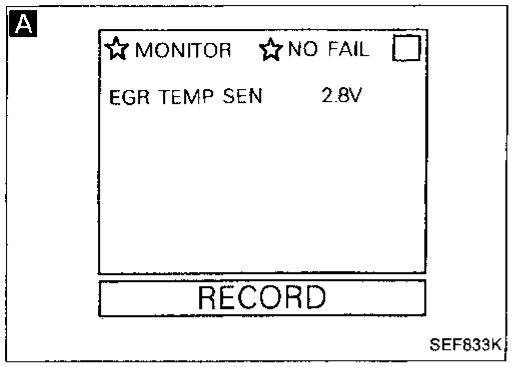
Harness layout

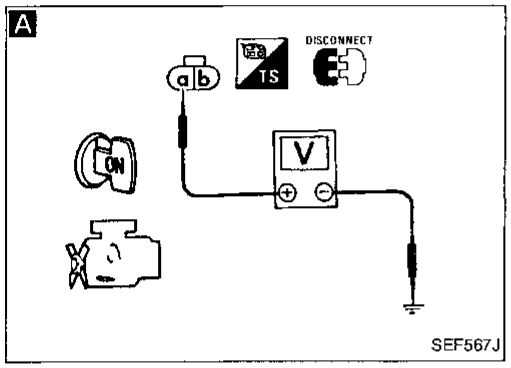


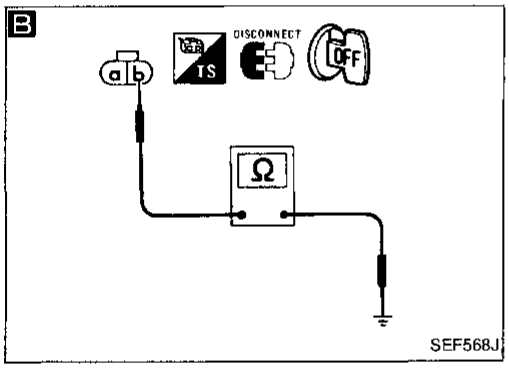




Diagnostic Procedure 32 (Cont'd)







INSPECTION START

A

CHECK POWER SUPPLY.
1) Start engine and warm it up sufficiently.
2) Read "EGR TEMP SEN" signal in "DATA MONITOR" mode with CONSULT.
Voltage: Less than 4.5V

OR

2) Stop engine.
3) Disconnect EGR temperature sensor harness connector.
4) Turn ignition switch "ON".
5) Check voltage between terminal ⓐ and ground.
Voltage: Less than 4.5V

NG → Repair harness or connectors.

OK ↓

B

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

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(EGR temperature sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-327.)

NG → Replace EGR temperature sensor.

OK ↓

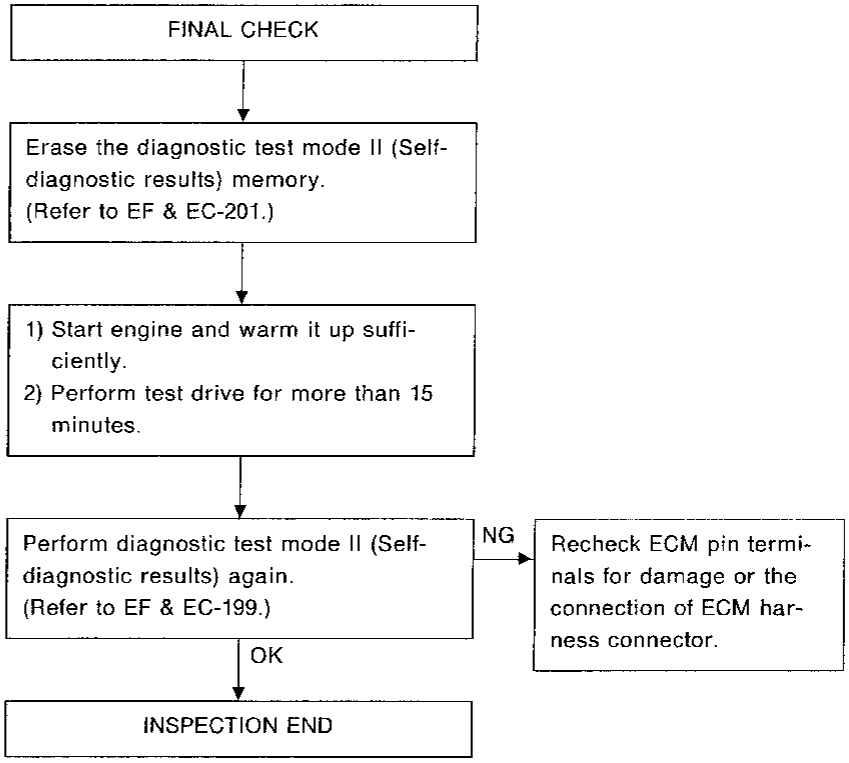
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed. ↓

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

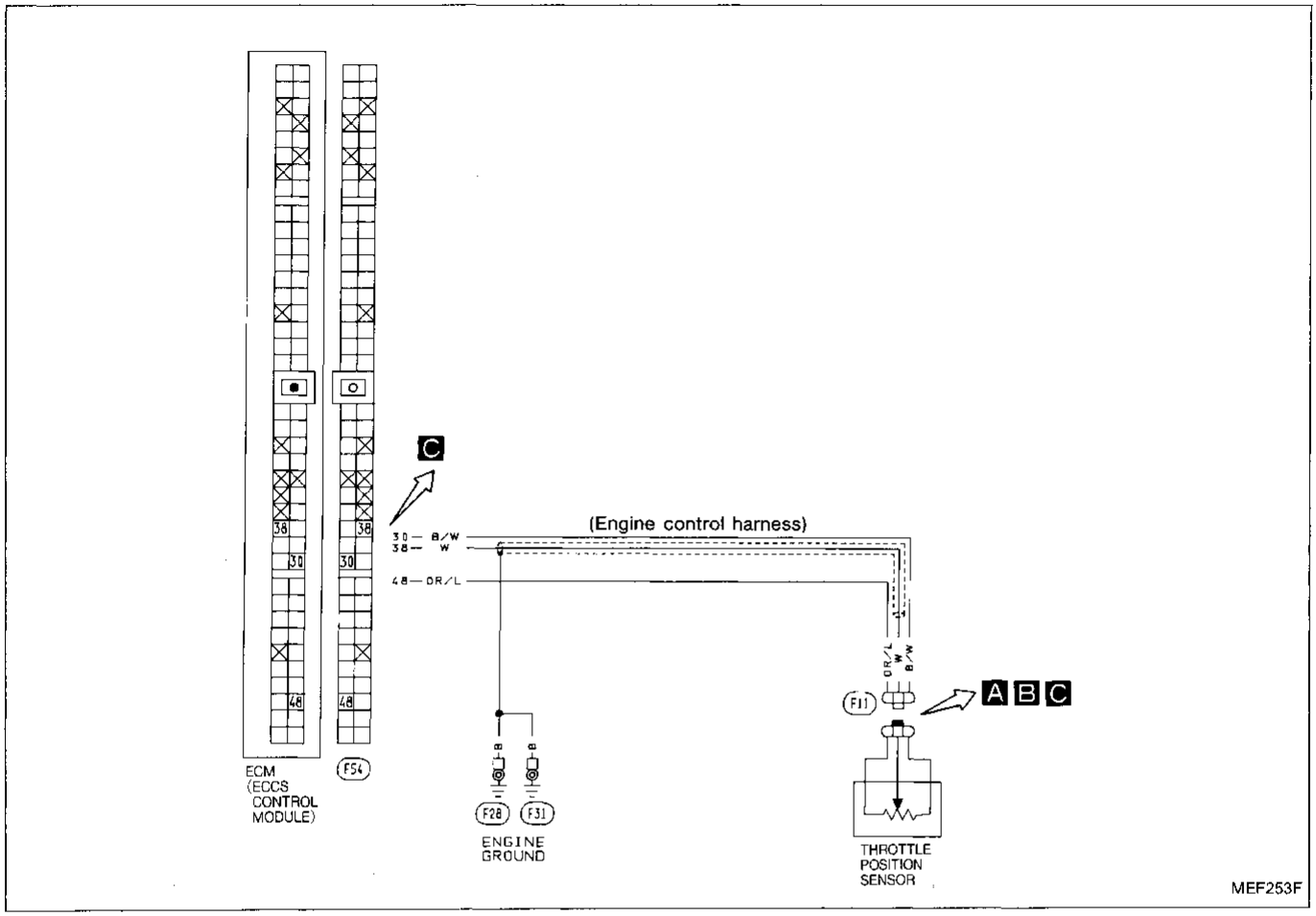
Diagnostic Procedure 32 (Cont'd)

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

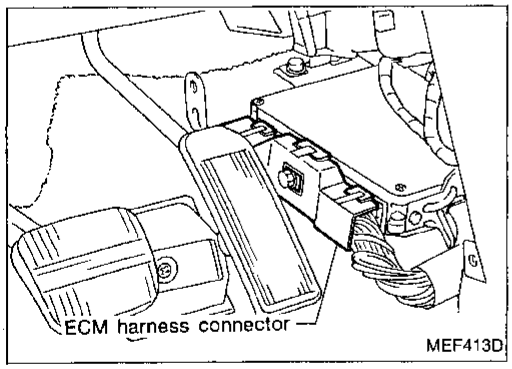


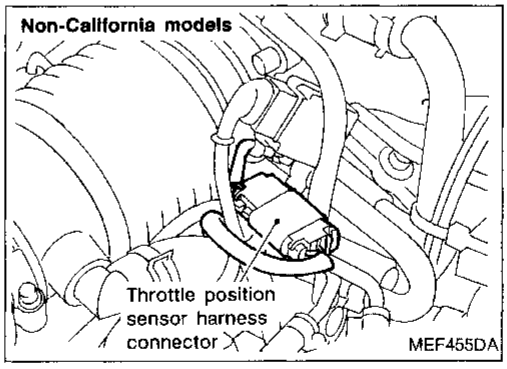
Diagnostic Procedure 33

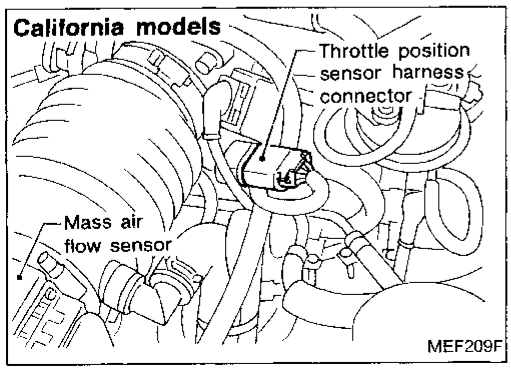
THROTTLE POSITION SENSOR (Diagnostic trouble code No. 43) (CHECK) (MALFUNCTION INDICATOR LAMP ITEM)

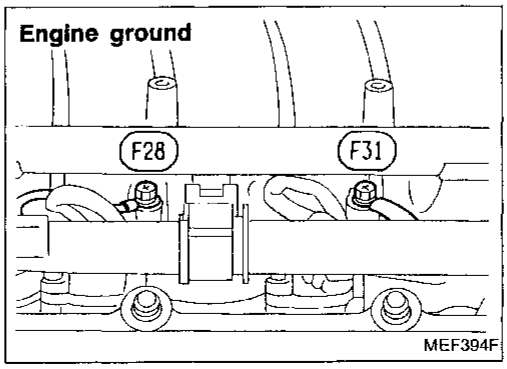


Harness layout

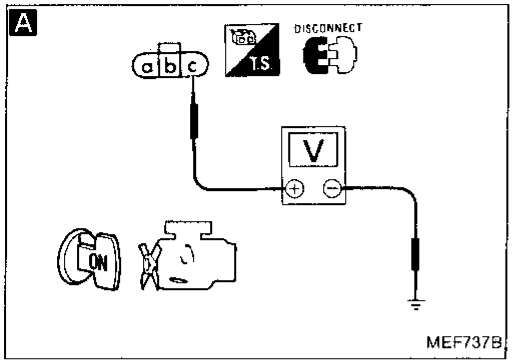


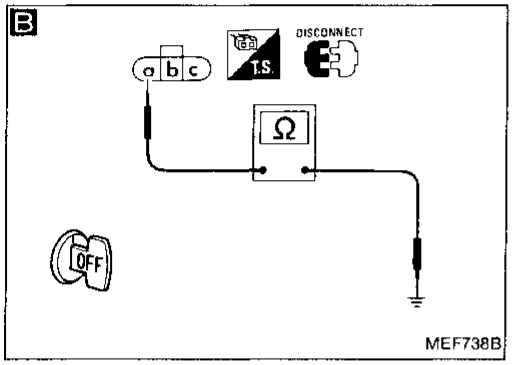


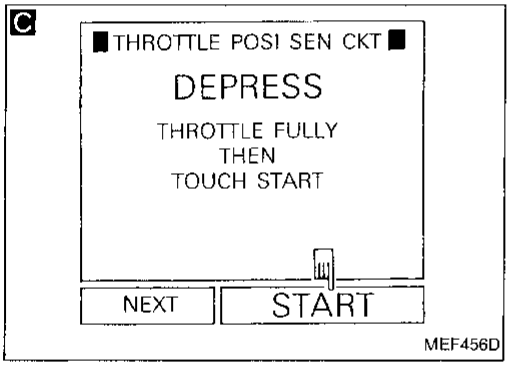


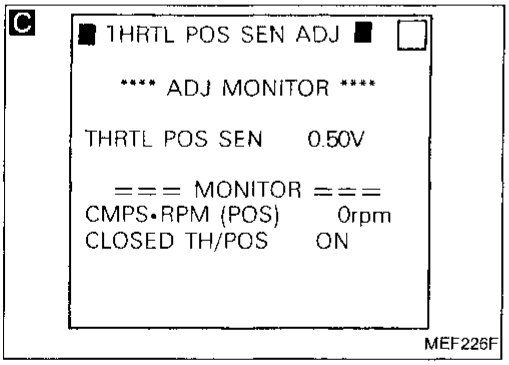


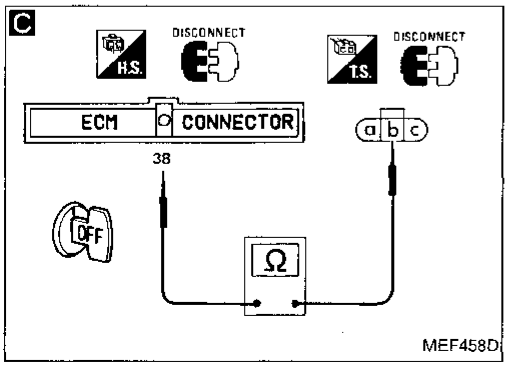
Diagnostic Procedure 33 (Cont'd)











INSPECTION START

A

CHECK POWER SUPPLY.
1) Disconnect throttle position sensor harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal ⓒ and ground.
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 → Repair harness or connectors.

OK

C

CHECK INPUT SIGNAL CIRCUIT.
1) Reconnect throttle position sensor harness connector.
2) Turn ignition switch "ON".
3) Perform "THROTTLE POSI SEN CKT" in "FUNCTION TEST" mode with CONSULT.

NG → Repair harness or connectors.

OR

3) Read "THRTL POS SEN" signal in "WORK SUPPORT" mode with CONSULT.
Throttle valve fully closed:
0.4 - 0.5V
Throttle valve fully open:
Approx. 4.0V

OR

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

OK

CHECK COMPONENT
(Throttle position sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-327.)

NG → Replace throttle position sensor.

OK

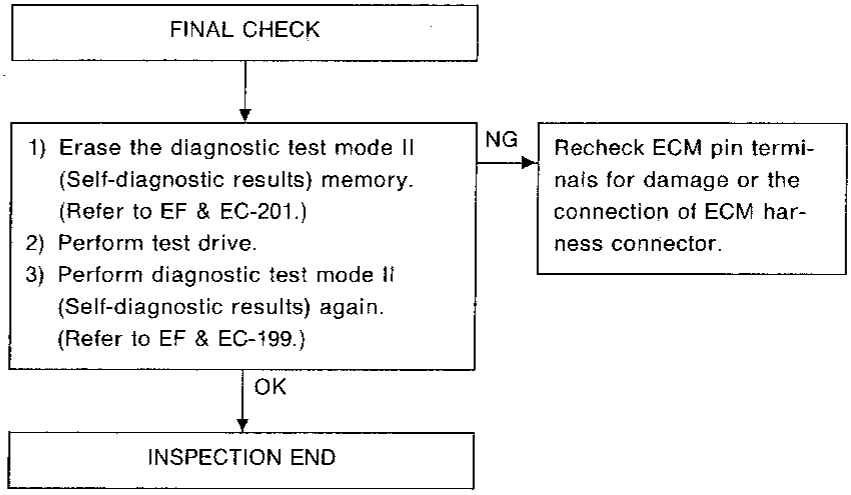
Disconnect and reconnect harness connectors in the circuit, and retest.

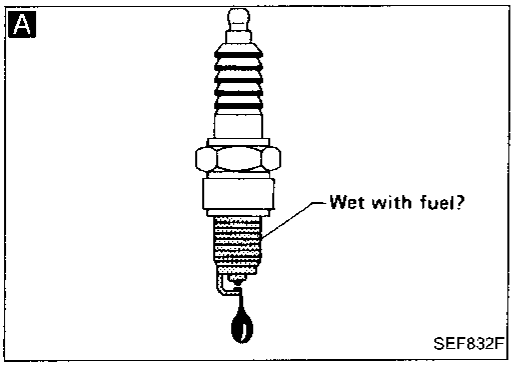
Trouble is not fixed.

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

Diagnostic Procedure 33 (Cont'd)

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





Diagnostic Procedure 34

INJECTOR LEAK (Diagnostic trouble code No. 45)
(MALFUNCTION INDICATOR LAMP ITEM)

INSPECTION START

Start engine and warm it up sufficiently.

Make sure engine runs smoothly at idle after warming.

Runs smoothly.

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

Does not run smoothly.

Set the diagnostic test mode selector of ECM to Diagnostic Test Mode II.

Check if the red LED on ECM stays off for 10 seconds with engine at idle speed.

Set diagnosis to Diagnostic Test Mode II and check that red LED on ECM blinks with engine at 2,000 rpm under no-load.

Stays off.

Does not stay off.

Check mixture ratio feedback system. (See page EF & EC-182.)

Does not blink.

Blinks.

Check idle CO%. (See page EF & EC-182.)

INSPECTION END

A

Remove all spark plugs from cylinder head. Is any plug wet with fuel?

Yes

Replace injector which supply cylinders having wet spark plugs.

No

Remove injector assembly. (See page EF & EC-334.) Keep fuel hose and all injectors connected to injector gallery.

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

Drips

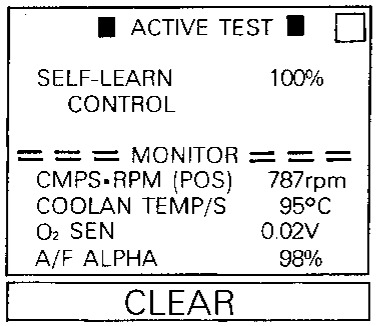
Replace the injectors from which fuel is dripping.

Does not drip.

Go to FINAL CHECK.

Diagnostic Procedure 34 (Cont'd)

B



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C

ROAD TEST

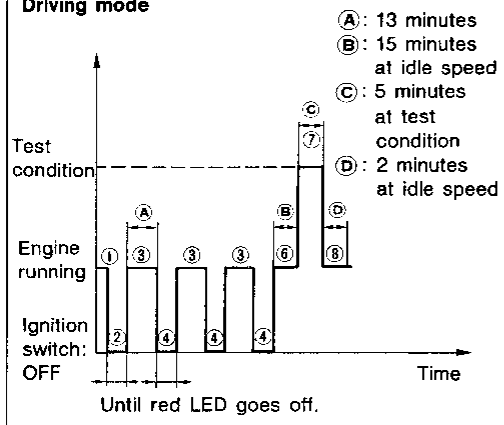
Test conditions

Drive vehicle under the following conditions with suitable gear position.

(1) Engine speed:
M/T : 2,600 ± 600 rpm
A/T : 2,500 ± 700 rpm

(2) Intake manifold vacuum:
M/T : −30.0±23.3 kPa (−225±175 mmHg, −8.86±6.89 inHg)
A/T : −45.3±8.0 kPa (−340±60 mmHg, −13.39±2.36 inHg)

Driving mode



① Start engine and warm it up sufficiently.
② Turn off ignition switch and keep it off until red LED goes off.
③ Start engine and keep it running for 13 minutes.
④ Turn off ignition switch and keep it off until red LED goes off.
⑤ Repeat steps ③ through ④: total 3 times.
⑥ Start engine and keep it at idle for at least 15 minutes.
If engine stalls or ignition is turned off under 13 minutes after starting engine, return to step ②. If over 13 minutes, restart step ⑥.
⑦ Shift to suitable gear position and drive in "Test condition" for at least 5 minutes.
If following conditions occur during step ⑦, return to step ⑥.
- Engine is raced over 4,000 rpm or hardly accelerated for more than 10 seconds.
- Engine stalls or ignition is turned off.

⑧ Keep engine at idle speed for more than 2 minutes.

SEF598N

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

FINAL CHECK

↓

Erase the diagnostic test mode II (Self-diagnostic results) memory. Make sure Diagnostic trouble code No. 55 is displayed in Diagnostic Test Mode II. Refer to EF & EC-201.

↓

B

Clear the self-learning data using the following procedure:

1) Start engine and warm it up sufficiently.

2) Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode.

3) Clear the self-leaning control coefficient by touching "CLEAR".

— OR —

2) Disconnect mass air flow sensor connector, and restart and run engine for at least 30 seconds at 2,000 rpm.

3) Stop engine and reconnect mass air flow sensor connector.

4) Make sure Diagnostic trouble code No. 12 is displayed in Diagnostic Test Mode II.

5) Erase the diagnostic test mode II (Self-diagnostic results) memory. Make sure Diagnostic trouble code No. 55 is displayed in Diagnostic Test Mode II.

↓

C

Perform test drive under the following conditions:

1) Warm up engine sufficiently.

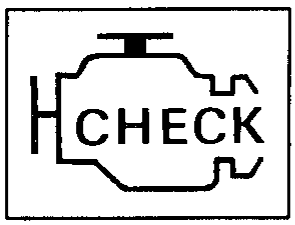
2) Use test driving modes indicated in figure **C** .

↓

Ⓐ

Diagnostic Procedure 34 (Cont'd)

D



MALFUNCTION INDICATOR LAMP

MEF460D

Ⓐ

D

Make sure that malfunction indicator lamp does not come on during engine test.

Comes on.

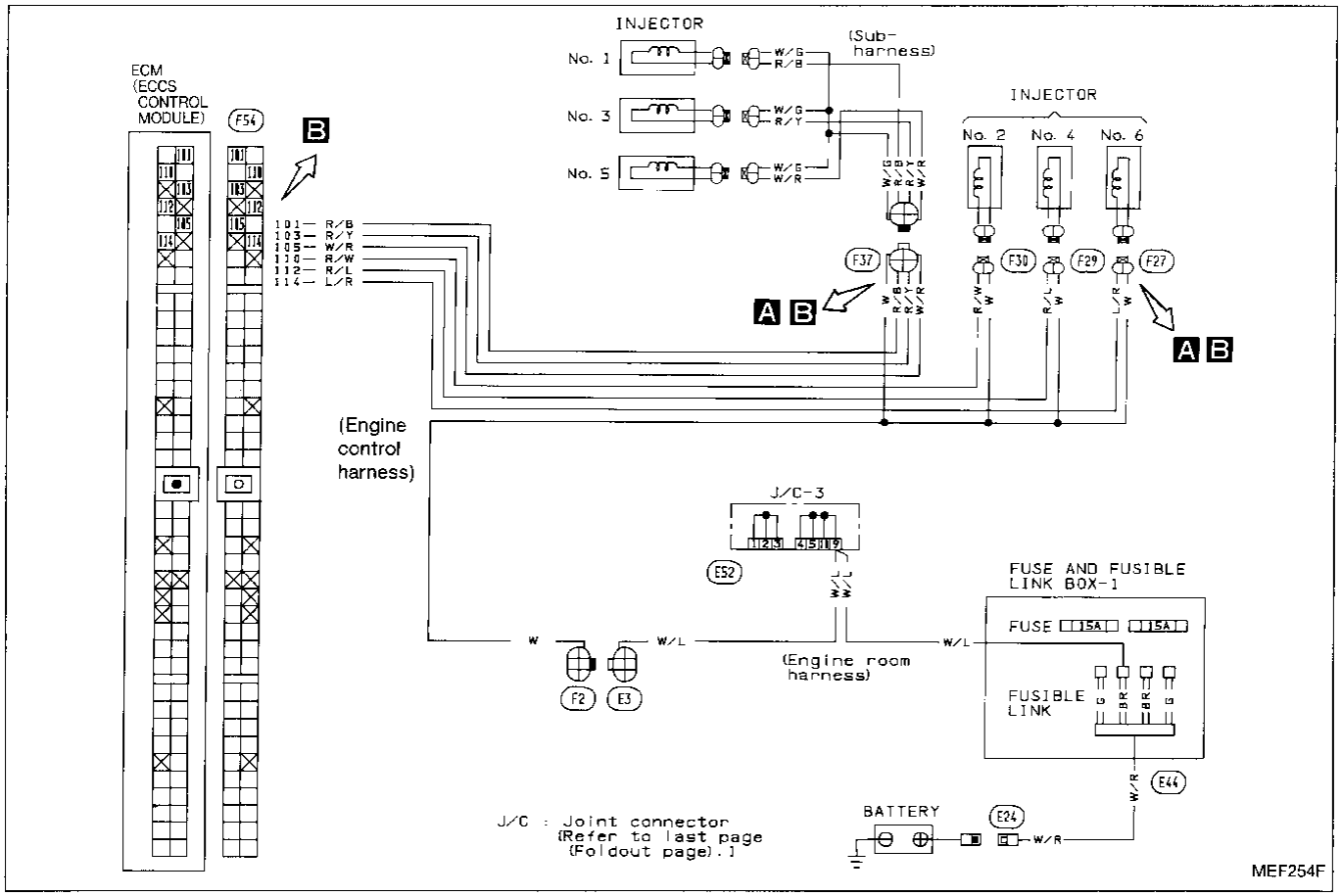
Recheck ECM pin terminals for damage or the connection of ECM harness connector.

Does not come on.

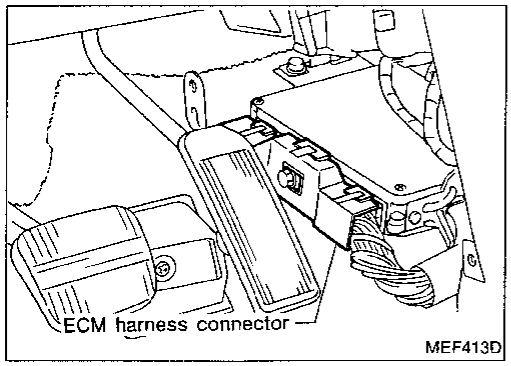
INSPECTION END

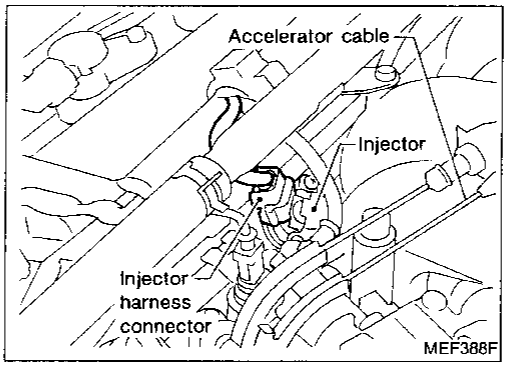
Diagnostic Procedure 35

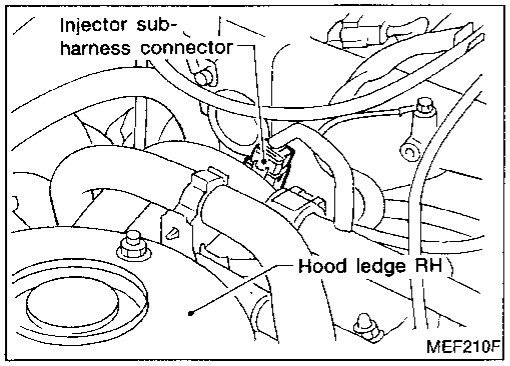
INJECTOR CIRCUIT (Diagnostic trouble code No. 51) (CHECK) (MALFUNCTION INDICATOR LAMP ITEM)



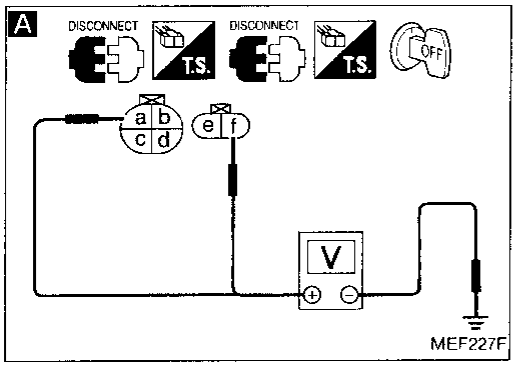
Harness layout

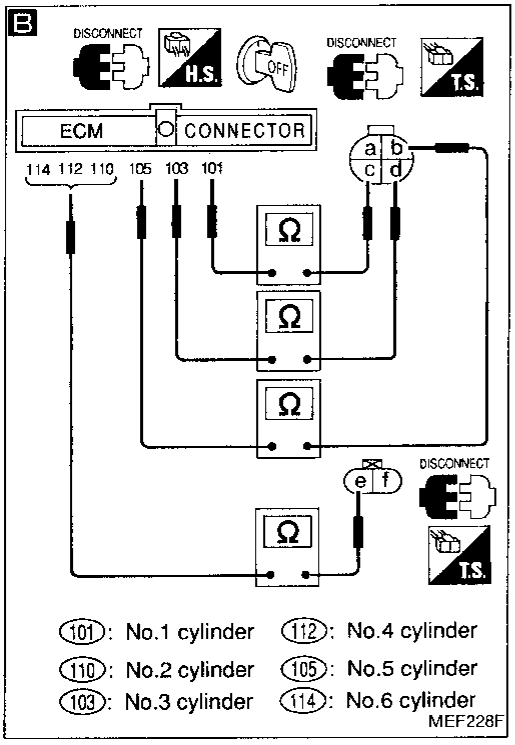






Diagnostic Procedure 35 (Cont'd)





INSPECTION START

A

CHECK POWER SUPPLY.
1) Disconnect injector sub-harness connector and injector harness connectors.
2) Check voltage between terminals ⓐ, ⓕ and ground.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F2), (E3)
- Joint connector-3
- "BR" fusible link
- Harness continuity between battery and injector
- Harness continuity between battery and injector sub-harness connector

If NG, repair harness or connectors.

OK ↓

B

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal (101) and terminal ⓒ, ECM terminal (103) and terminal ⓓ, ECM terminal (105) and terminal ⓑ, ECM terminals (110), (112), (114) and terminal ⓔ.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT (Injector).
Refer to "Electrical Components Inspection". (See page EF & EC-329.)

NG → Replace injector.

OK ↓

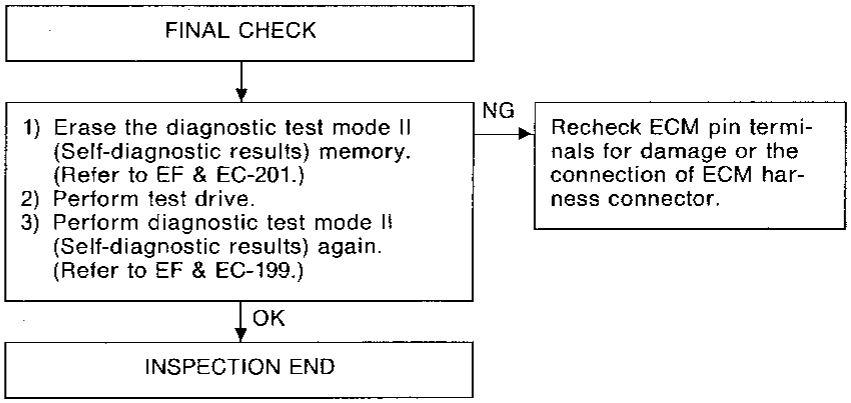
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed. ↓

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

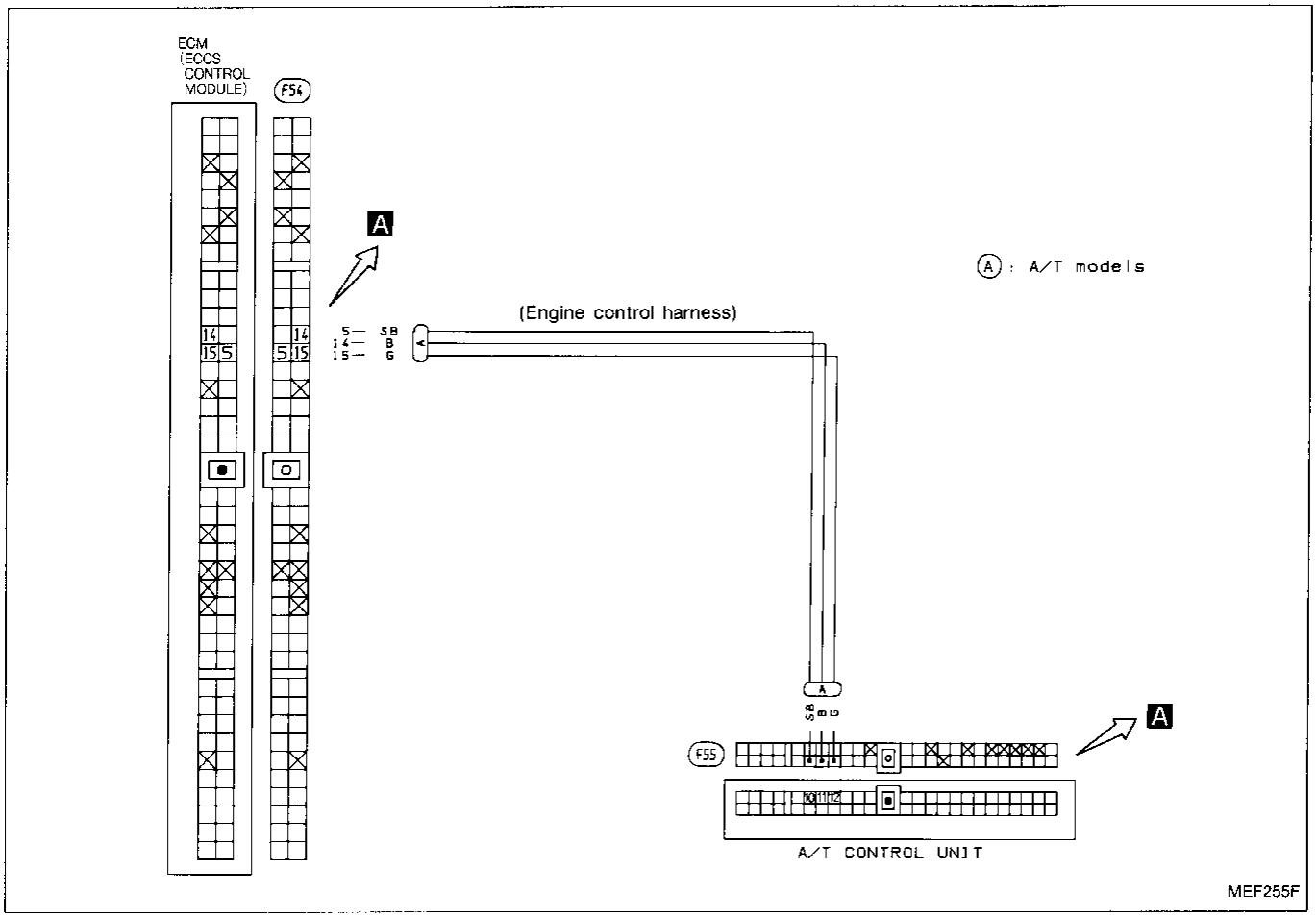
Diagnostic Procedure 35 (Cont'd)

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

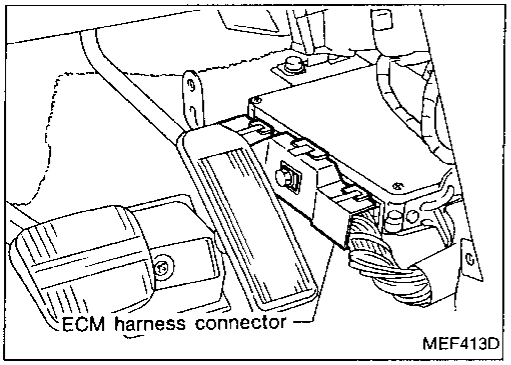


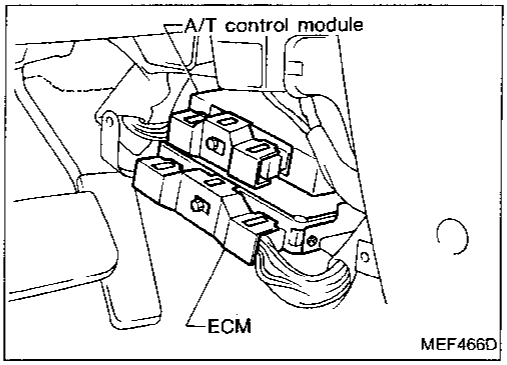
Diagnostic Procedure 36

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

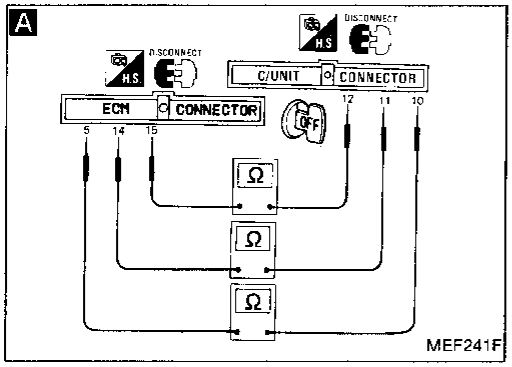


Harness layout





Diagnostic Procedure 36 (Cont'd)



INSPECTION START

A

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector and A/T control unit harness connector.
2) Check harness continuity between ECM terminal ⑤ and terminal ⑩, ECM terminal ⑭ and terminal ⑪, ECM terminal ⑮ and terminal ⑫.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

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

Trouble is not fixed. ↓

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

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

FINAL CHECK

1) Erase the diagnostic test mode II (Self-diagnostic results) memory. (Refer to EF & EC-201.)
2) Perform test drive.
3) Perform diagnostic test mode II (Self-diagnostic results) again. (Refer to EF & EC-199.)

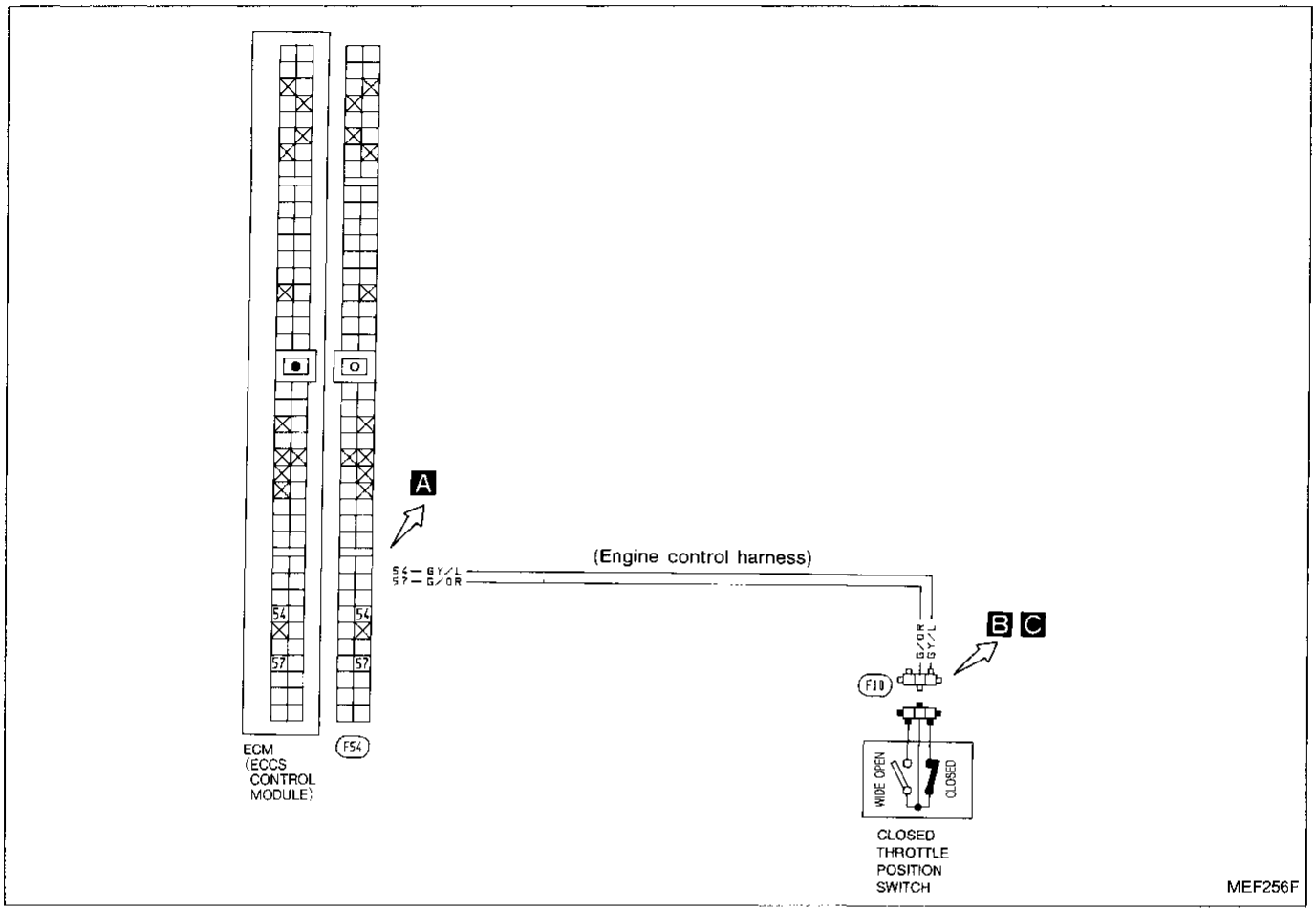
NG → Recheck ECM pin terminals for damage or the connection of ECM harness connector.

OK ↓

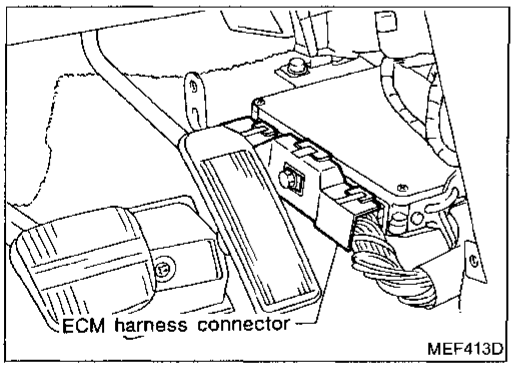
INSPECTION END

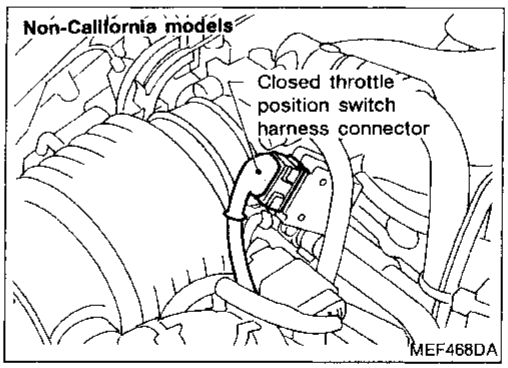
Diagnostic Procedure 37

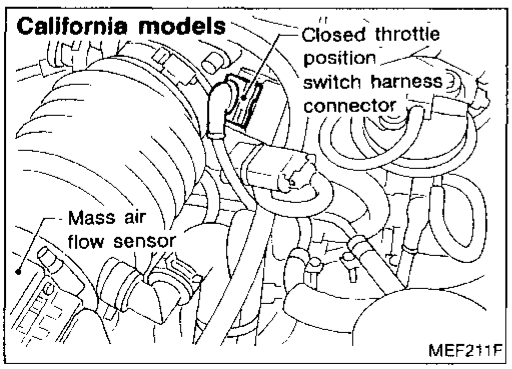
CLOSED THROTTLE POSITION SWITCH (Not self-diagnostic item)



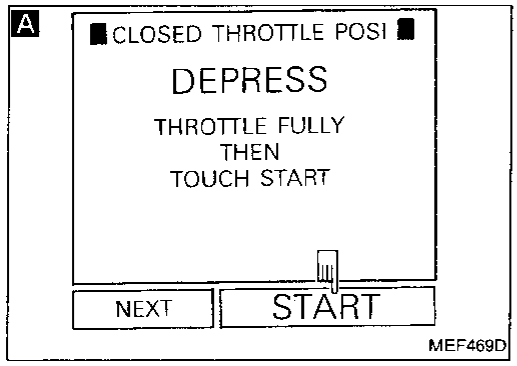
Harness layout

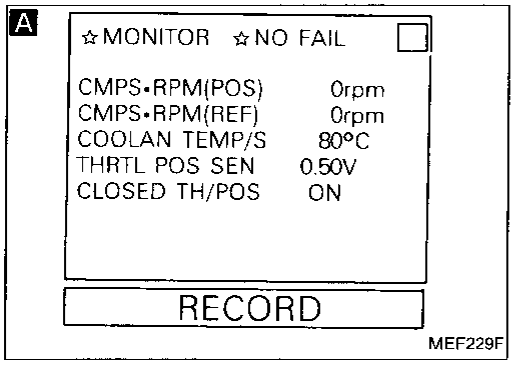


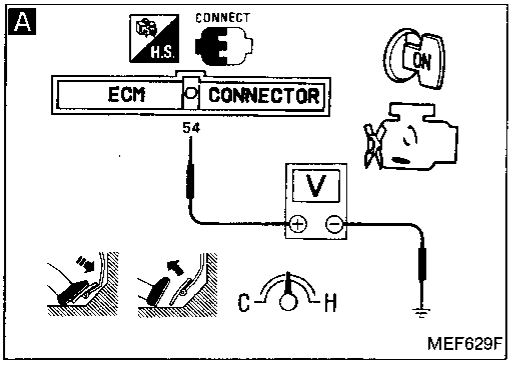


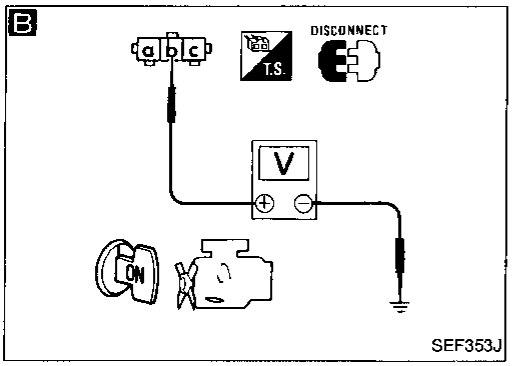


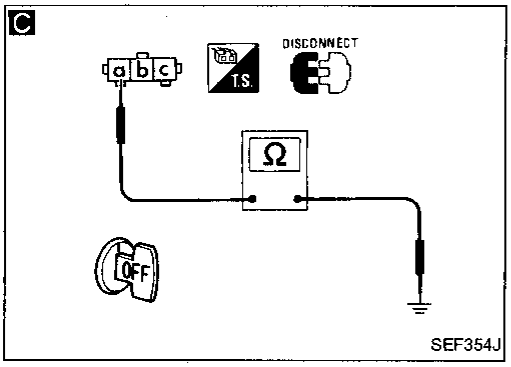
Diagnostic Procedure 37 (Cont'd)











INSPECTION START

A

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

OR

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 ⑭ and ground under the following conditions.
Voltage:
Accelerator pedal is released
Approximately 8 - 10V
Accelerator pedal is depressed
Approximately 0V

OK → INSPECTION END

NG ↓

B

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect closed throttle position switch harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓑ and ground.
Voltage: Approximately 8 - 10V

NG → Repair harness or connectors.

OK ↓

C

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

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(Closed throttle position switch).
Refer to "Electrical Components Inspection".
(See page EF & EC-327.)

NG → Replace closed throttle position switch.

OK ↓

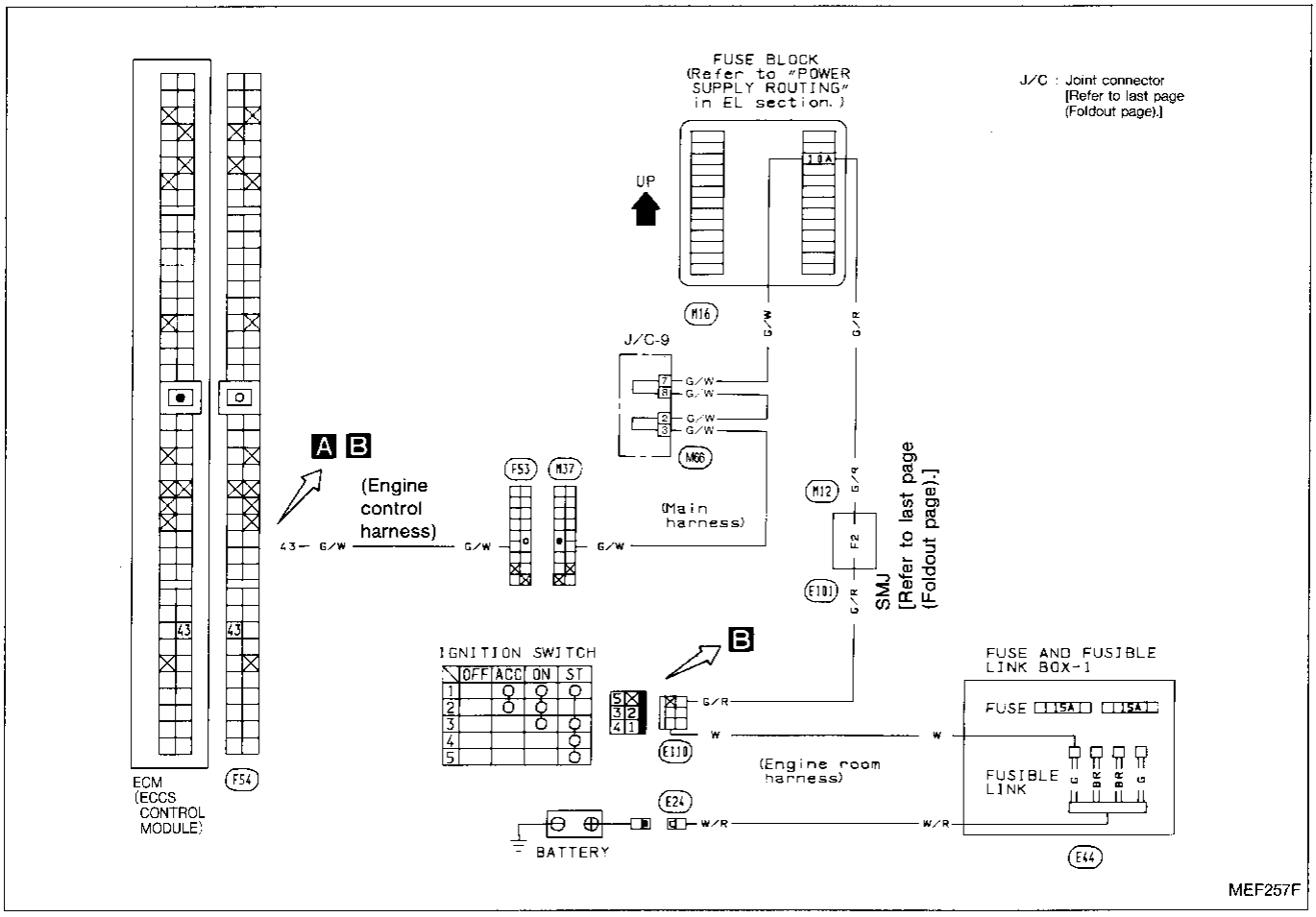
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed. ↓

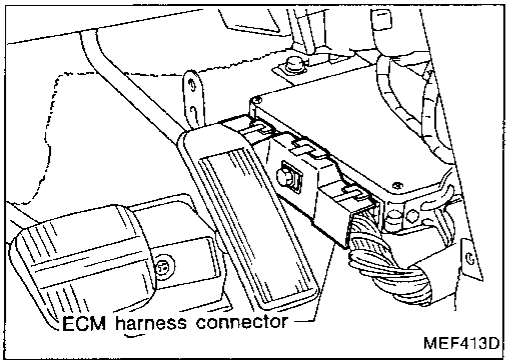
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Diagnostic Procedure 38

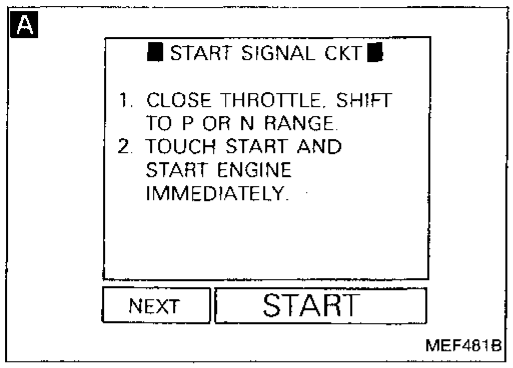
START SIGNAL (Not self-diagnostic item)

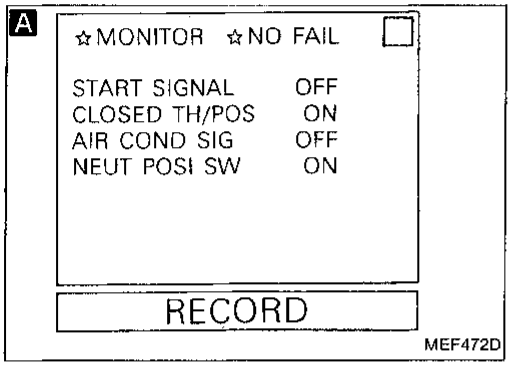


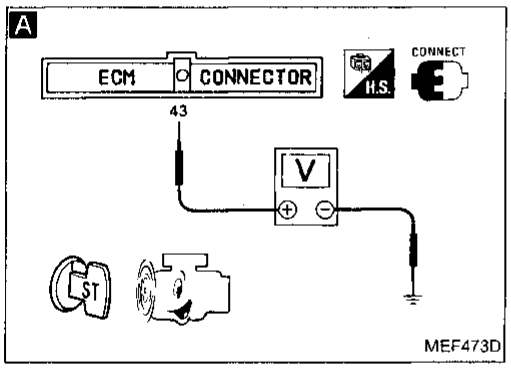
Harness layout

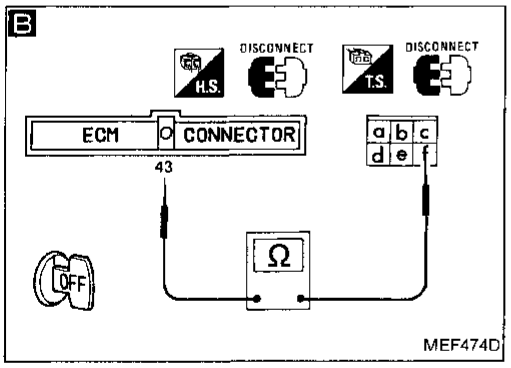


Diagnostic Procedure 38 (Cont'd)









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

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 (F53), (M37)
- Harness connectors (M12), (E101)
- Joint connector-9
- 10A fuse
- Harness continuity between ECM and ignition switch

If NG, repair harness or connectors.

OK

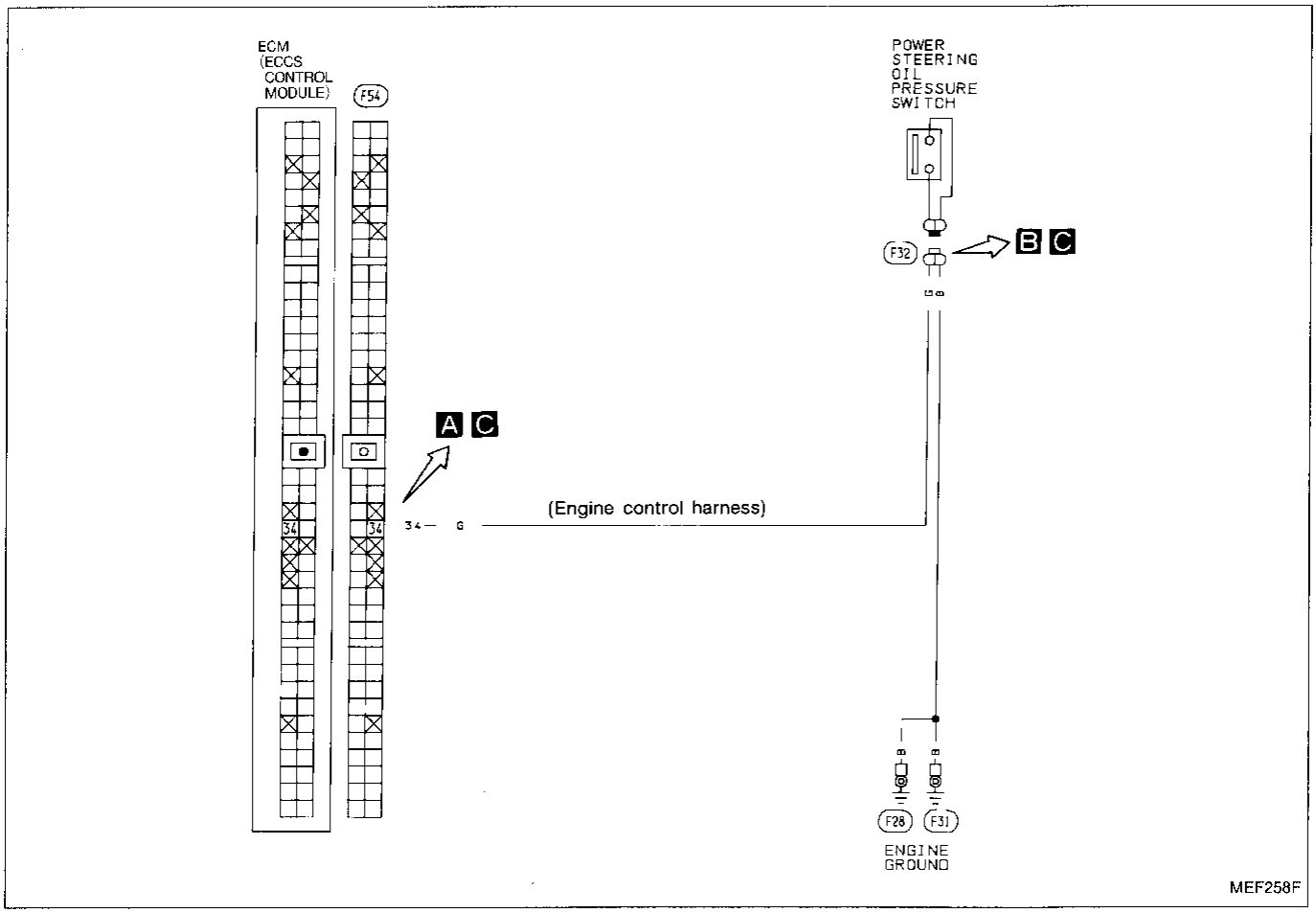
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed.

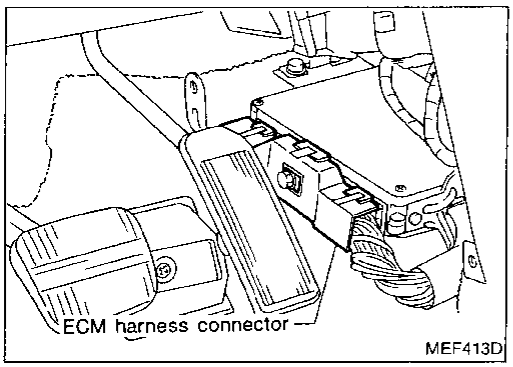
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

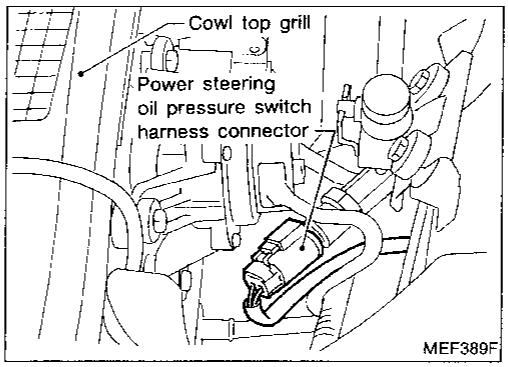
Diagnostic Procedure 39

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

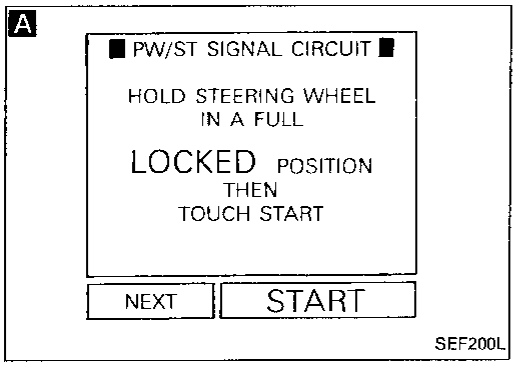


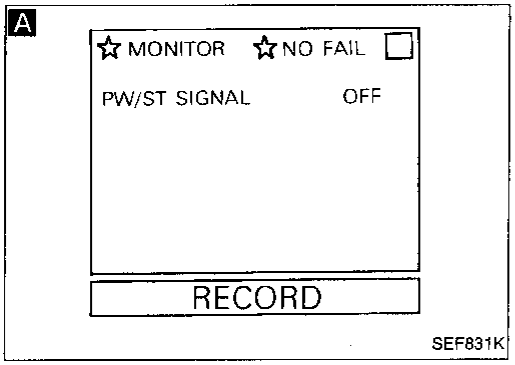
Harness layout

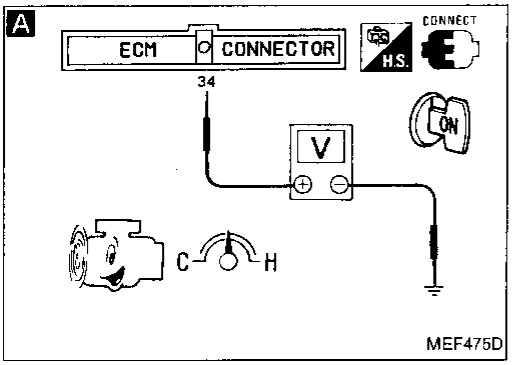


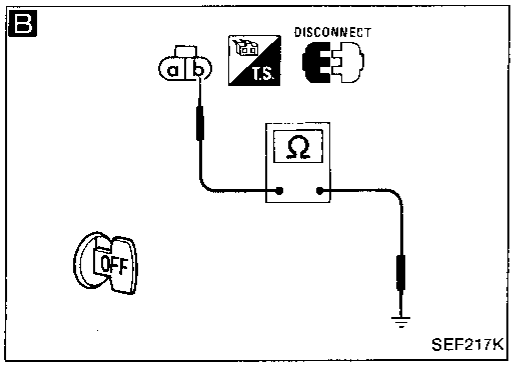


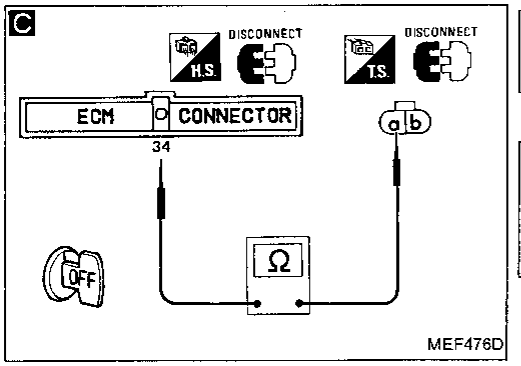
Diagnostic Procedure 39 (Cont'd)











INSPECTION START

A

CHECK CONTROL FUNCTION.
1) Start engine and warm it up sufficiently.
2) Perform "PW/ST SIGNAL CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

2) Check "PW/ST SIGNAL" in "DATA MONITOR" mode with CONSULT.
Steering is neutral position: OFF
Steering is turned: ON

OR

2) Check voltage between ECM terminal ㉞ and ground.
Voltage:
When steering wheel is turned quickly
Approximately 0V
Except above
4 - 5V

OK → INSPECTION END

NG

B

CHECK GROUND CIRCUIT.
1) Stop engine.
2) Disconnect power steering oil pressure switch harness connector.
3) Check harness continuity between terminal ⓑ and body ground.
Continuity should exist.

NG → Repair harness or connectors.

OK

C

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ㉞ and terminal ⓐ.
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-331.)

NG → Replace power steering oil pressure switch.

OK

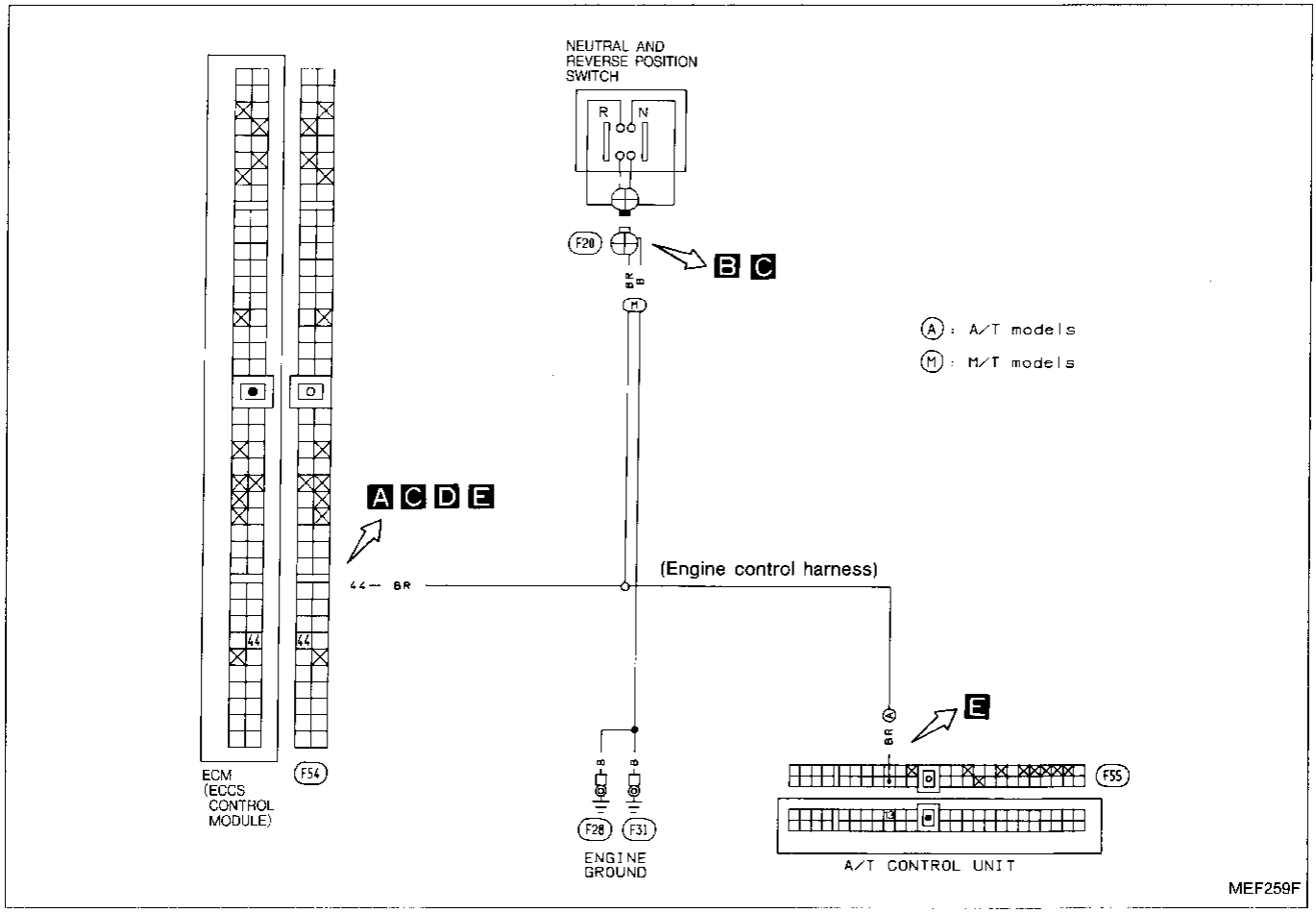
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed.

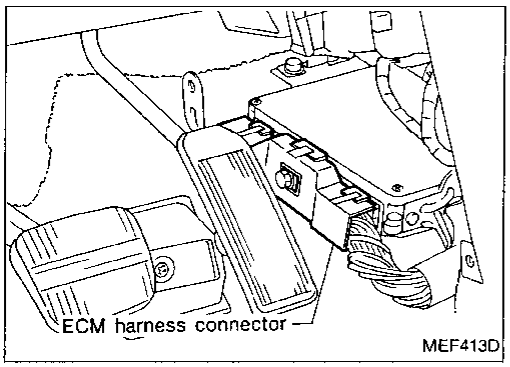
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

Diagnostic Procedure 40

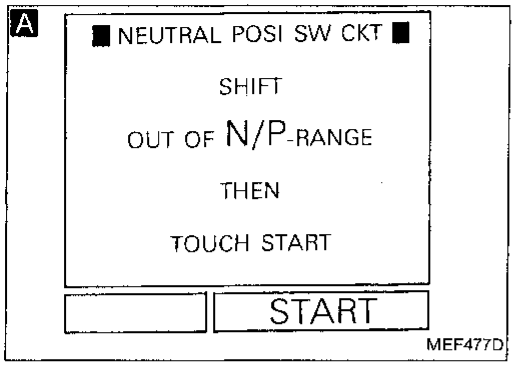
NEUTRAL POSITION SWITCH & A/T CONTROL UNIT (NEUTRAL POSITION SIGNAL) CIRCUIT (Not self-diagnostic item)

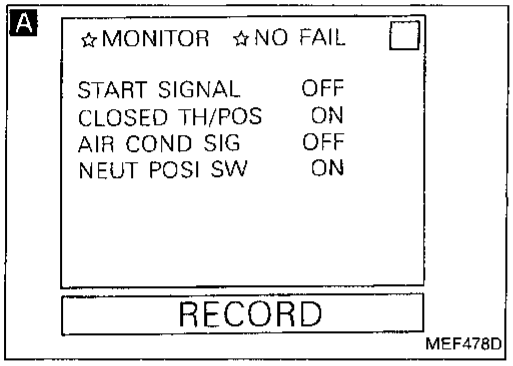


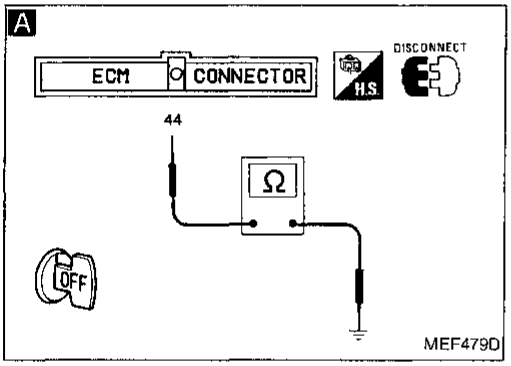
Harness layout

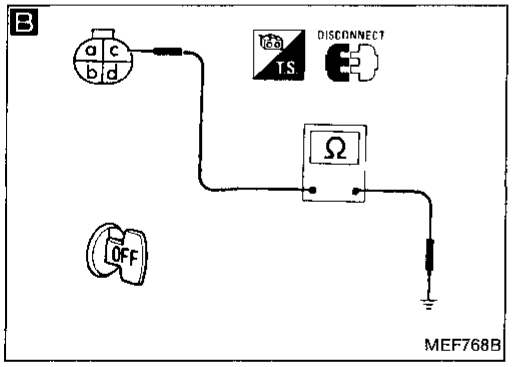


Diagnostic Procedure 40 (Cont'd)









Neutral position switch

INSPECTION START

A

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

OK → INSPECTION END

OR

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

OR

1) Set shift lever to the neutral position.
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal ㊹ and body ground.
Continuity should exist.

NG

Turn ignition switch "OFF".

B

CHECK GROUND CIRCUIT.
1) Disconnect neutral position switch harness connector.
2) Check harness continuity between terminal ⓒ and body ground.
Continuity should exist.

NG → Repair harness or connectors.

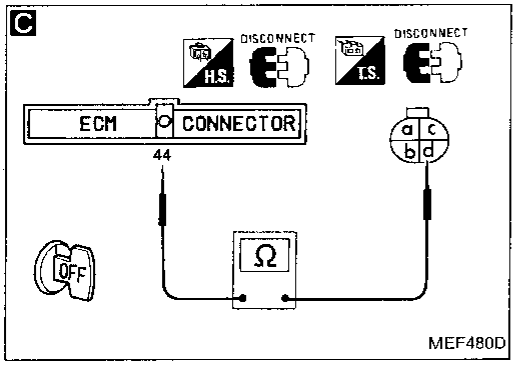
OK

Disconnect ECM harness connector.

Ⓐ

GI MA EM LC EF & EC FE CL MT AT FA RA BR ST BF HA EL IDX

Diagnostic Procedure 40 (Cont'd)



Ⓐ

C

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

NG → Repair harness or connectors.

OK

CHECK COMPONENT
(Neutral position switch).
Refer to "Electrical Components Inspection".
(See page EF & EC-330.)

NG → Replace neutral position switch.

OK

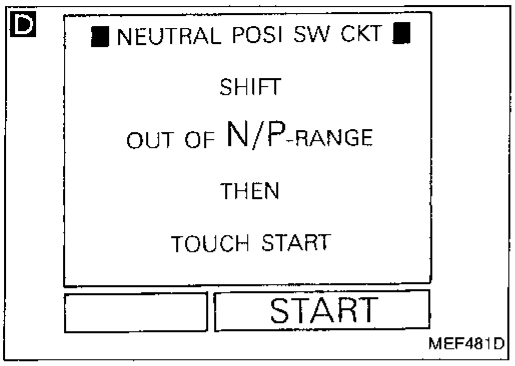
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed.

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

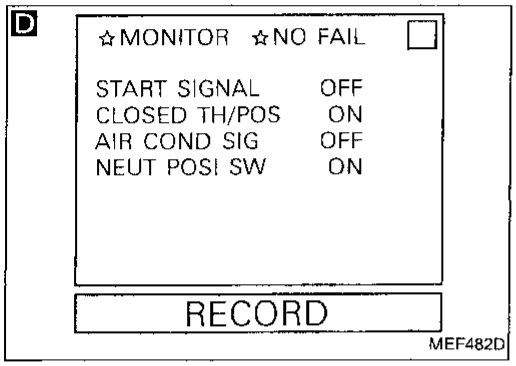
Diagnostic Procedure 40 (Cont'd)

D



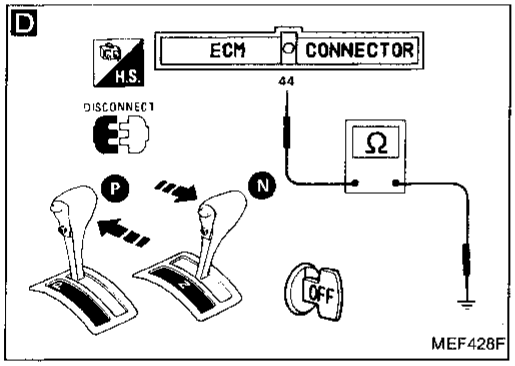
MEF481D

D



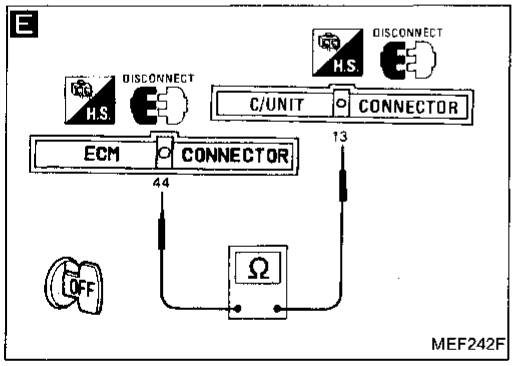
MEF482D

D



MEF428F

E



MEF242F

A/T CONTROL UNIT (NEUTRAL POSITION SIGNAL) CIRCUIT

INSPECTION START

D

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

OK → INSPECTION END

OR

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

OR

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

NG

1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.

E

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect A/T control unit harness connector.
2) Check harness continuity between ECM terminal ㊹ and terminal ⑬.
Continuity should exist.

NG → Repair harness or connectors.

OK

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

NG → Check inhibitor switch and circuit (Refer to AT section.)

OK

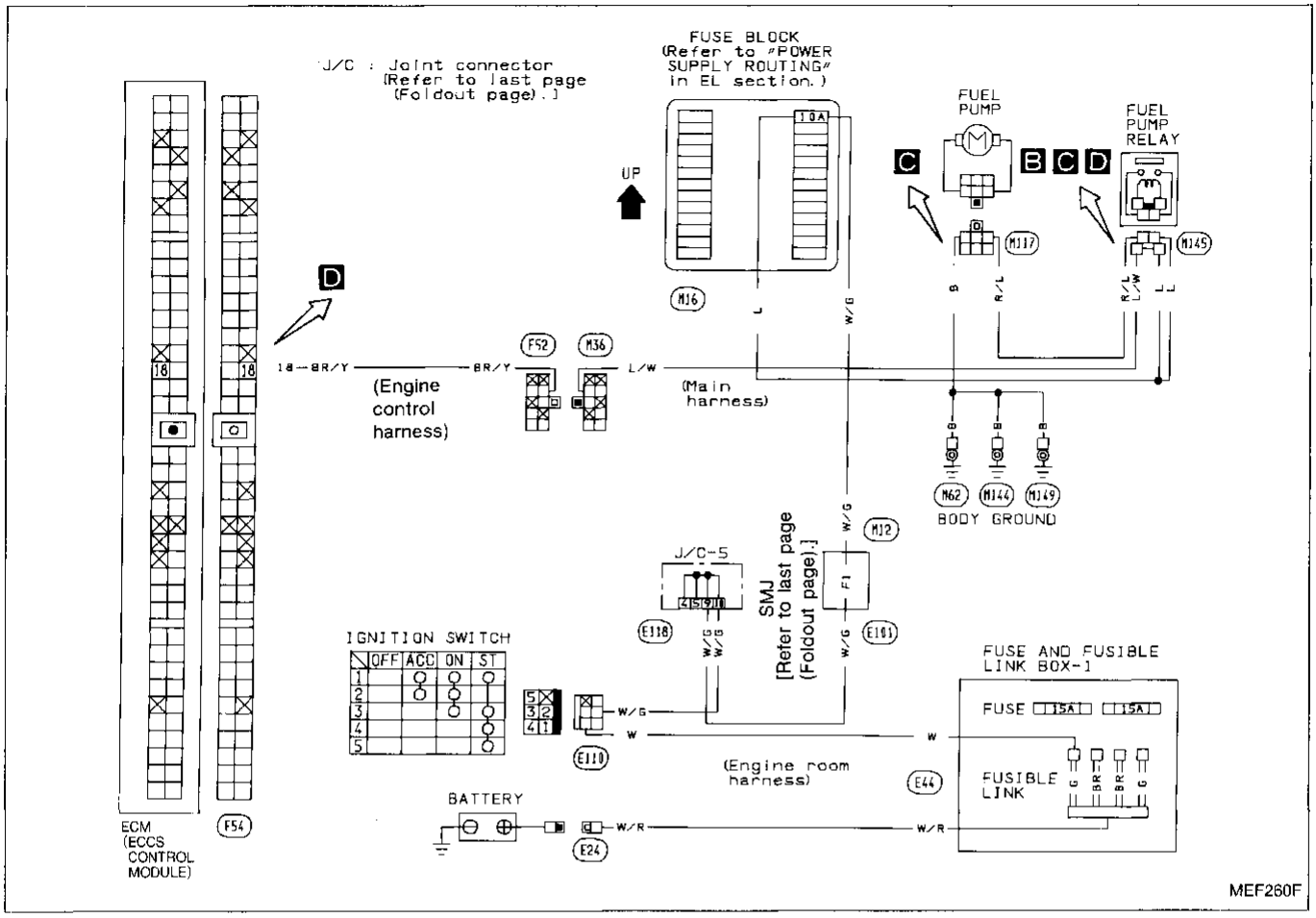
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed.

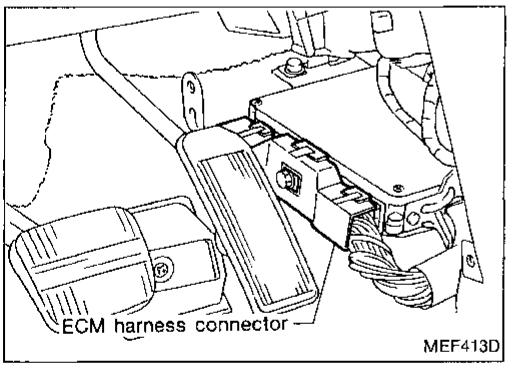
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

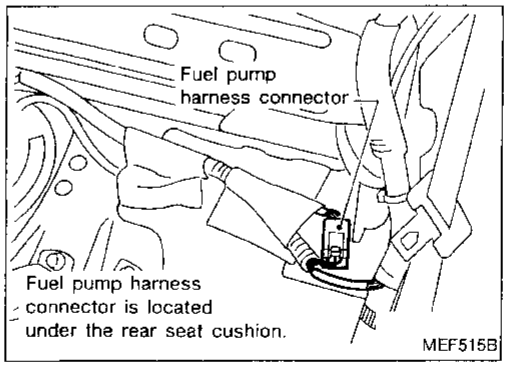
Diagnostic Procedure 41

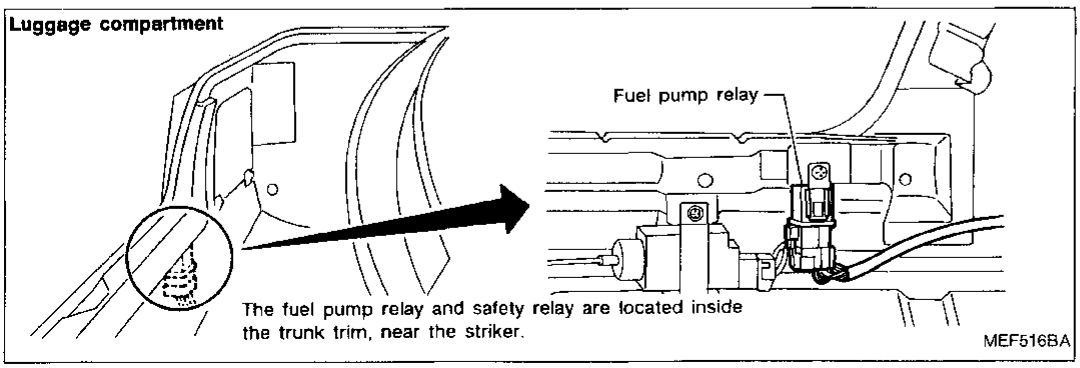
FUEL PUMP (Not self-diagnostic item)



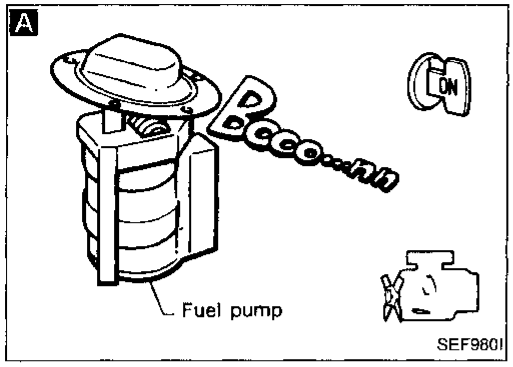
Harness layout

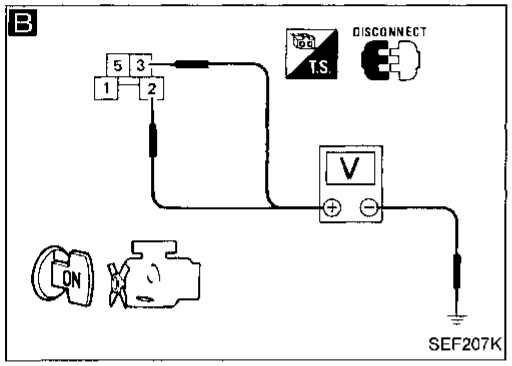


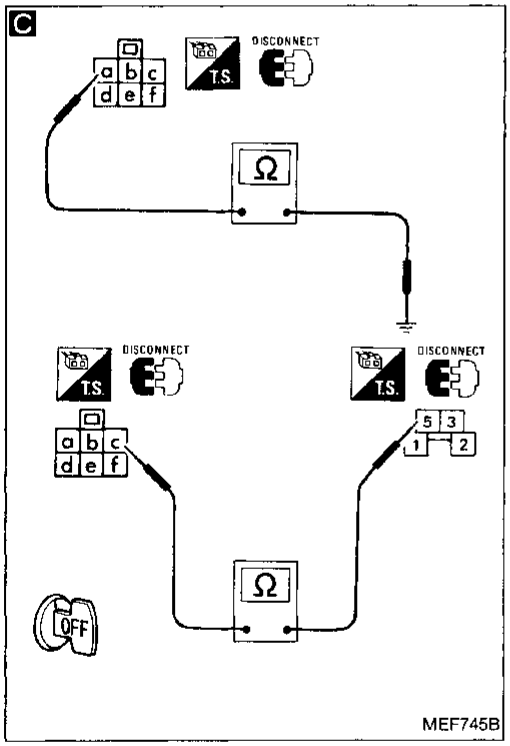


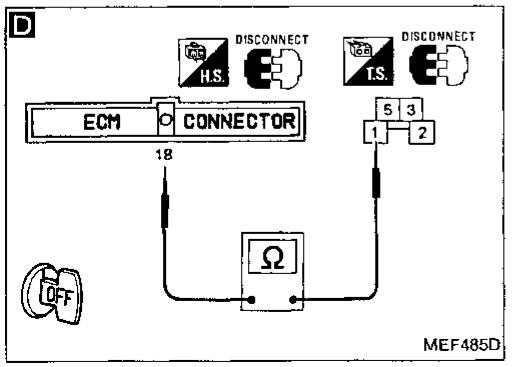


Diagnostic Procedure 41 (Cont'd)









INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Turn ignition switch "ON".
2) Listen to fuel pump operating sound.
Fuel pump should operate for 5 seconds after ignition switch is turned "ON".

OK → INSPECTION END

NG

B

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

NG → Check the following.
- Harness connectors (M12), (E101)
- Joint connector-5
- 10A 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.
3) Check harness continuity between terminal ② and body ground, terminal ⓒ and terminal ⑤.
Continuity should exist.

NG → Repair harness or connectors.

OK

D

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

NG → Check the following:
- Harness connectors (F52), (M36)
- Harness continuity between ECM and fuel pump relay

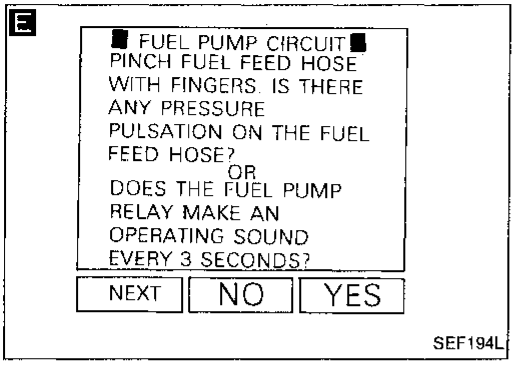
If NG, repair harness or connectors.

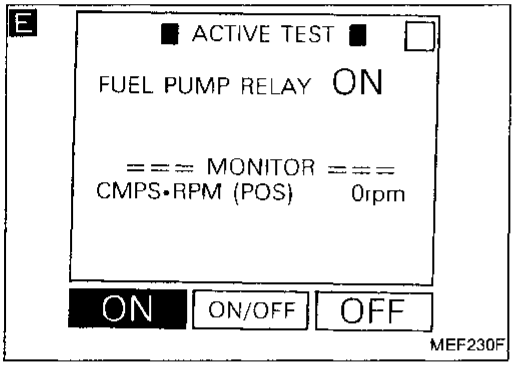
OK

Ⓐ

GI MA EM LC EF & EC FE CL MT AT FA RA BR ST BF HA EL IDX

Diagnostic Procedure 41 (Cont'd)





Ⓐ

E

CHECK COMPONENT
(Fuel pump relay).

1) Reconnect fuel pump relay, fuel pump harness connector and ECM harness connector.
2) Turn ignition switch "ON".
3) Perform "FUEL PUMP CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

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

OR

Refer to "Electrical Components Inspection".
(See page EF & EC-331.)

NG → Replace fuel pump relay.

OK

CHECK COMPONENT
(Fuel pump).
Refer to "Electrical Components Inspection".
(See page EF & EC-325.)

NG → Replace fuel pump.

OK

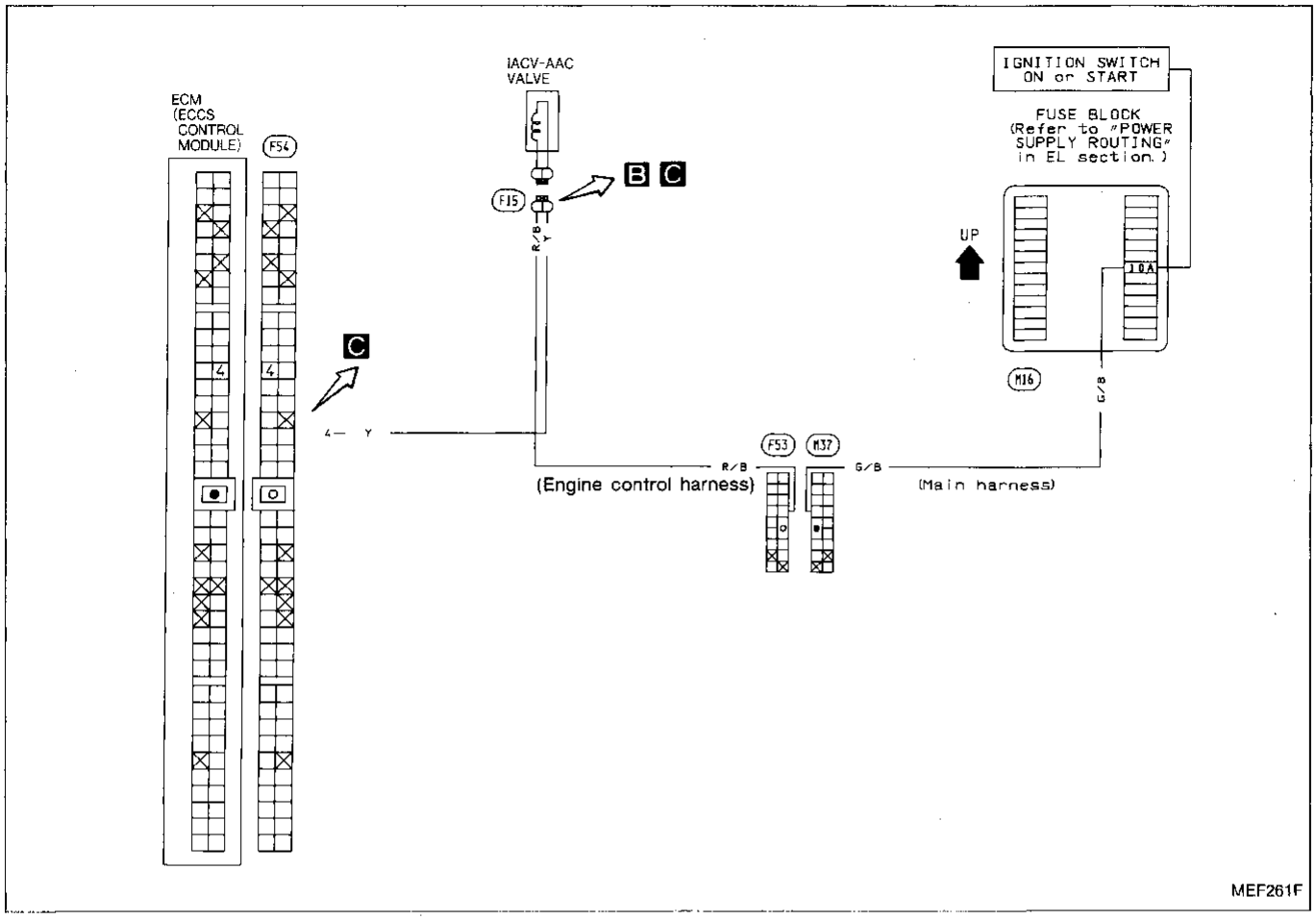
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed.

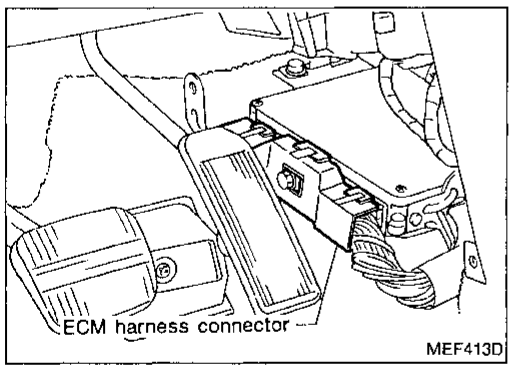
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

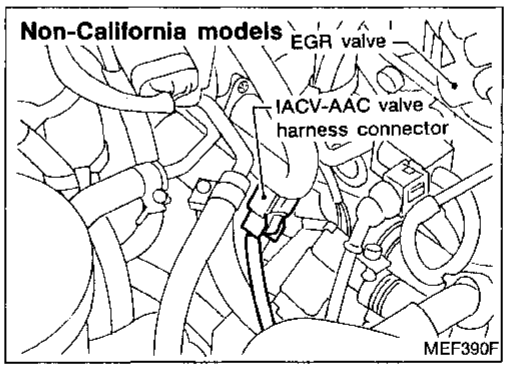
Diagnostic Procedure 42

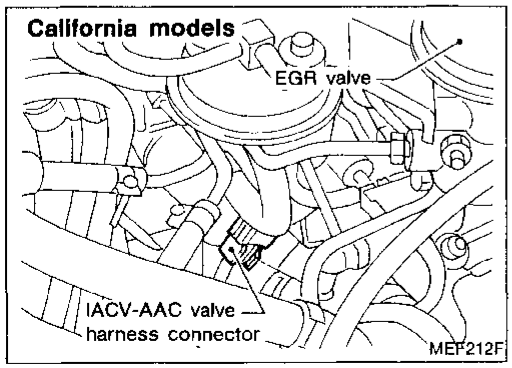
IACV-AAC VALVE (Not self-diagnostic item)



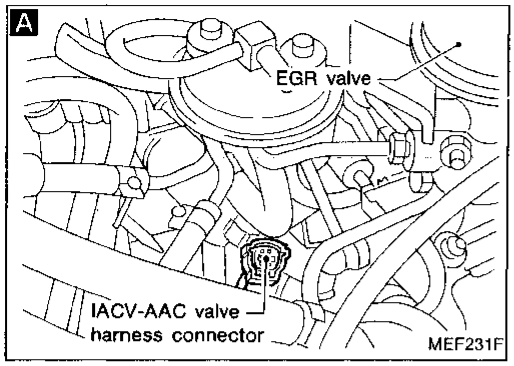
Harness layout

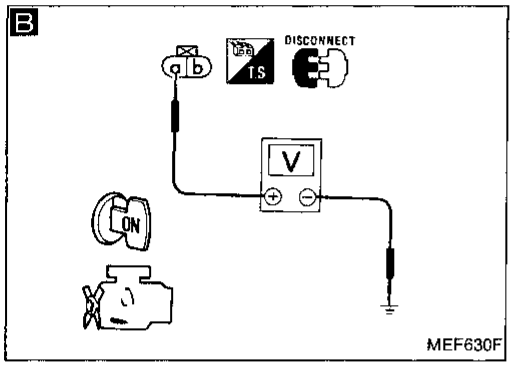


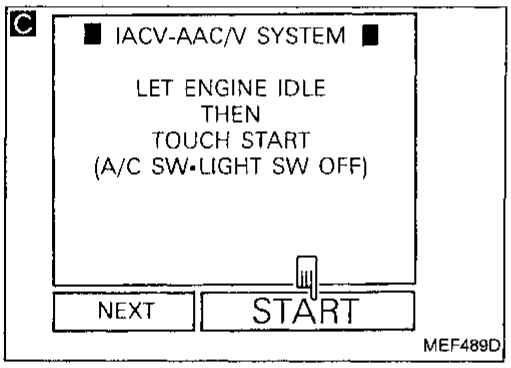


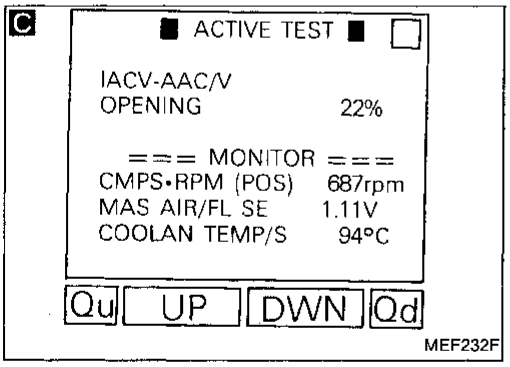


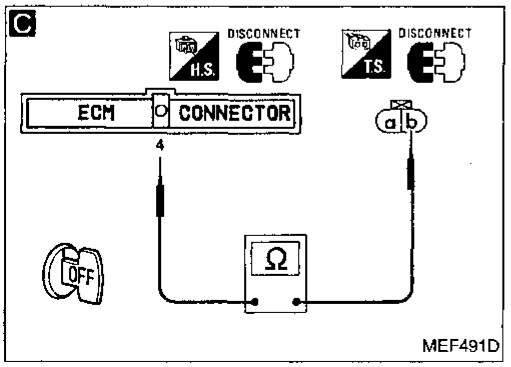
Diagnostic Procedure 42 (Cont'd)











INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Start engine and warm it up sufficiently.
2) Check idle speed.
M/T 750 ± 50 rpm
A/T 790 ± 50 rpm
If NG, adjust idle speed.
3) Disconnect IACV-AAC valve harness connector.
4) Make sure that idle speed drops.

Drops → INSPECTION END

Does not drop ↓

B

CHECK POWER SUPPLY.
1) Stop engine.
2) Turn ignition switch "ON".
3) Check voltage between terminal ⓐ and ground.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F53), (M37)
- 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) Reconnect IACV-AAC valve harness connector.
3) Perform "IACV-AAC/V SYSTEM" in "FUNCTION TEST" mode with CONSULT.

OR

2) Perform "IACV-AAC/V OPENING" in "ACTIVE TEST" mode with CONSULT.

OR

2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal ④ and terminal ⓑ.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT (IACV-AAC valve).
Refer to "Electrical Components Inspection".
(See page EF & EC-328.)

NG → Replace IACV-AAC valve.

OK ↓

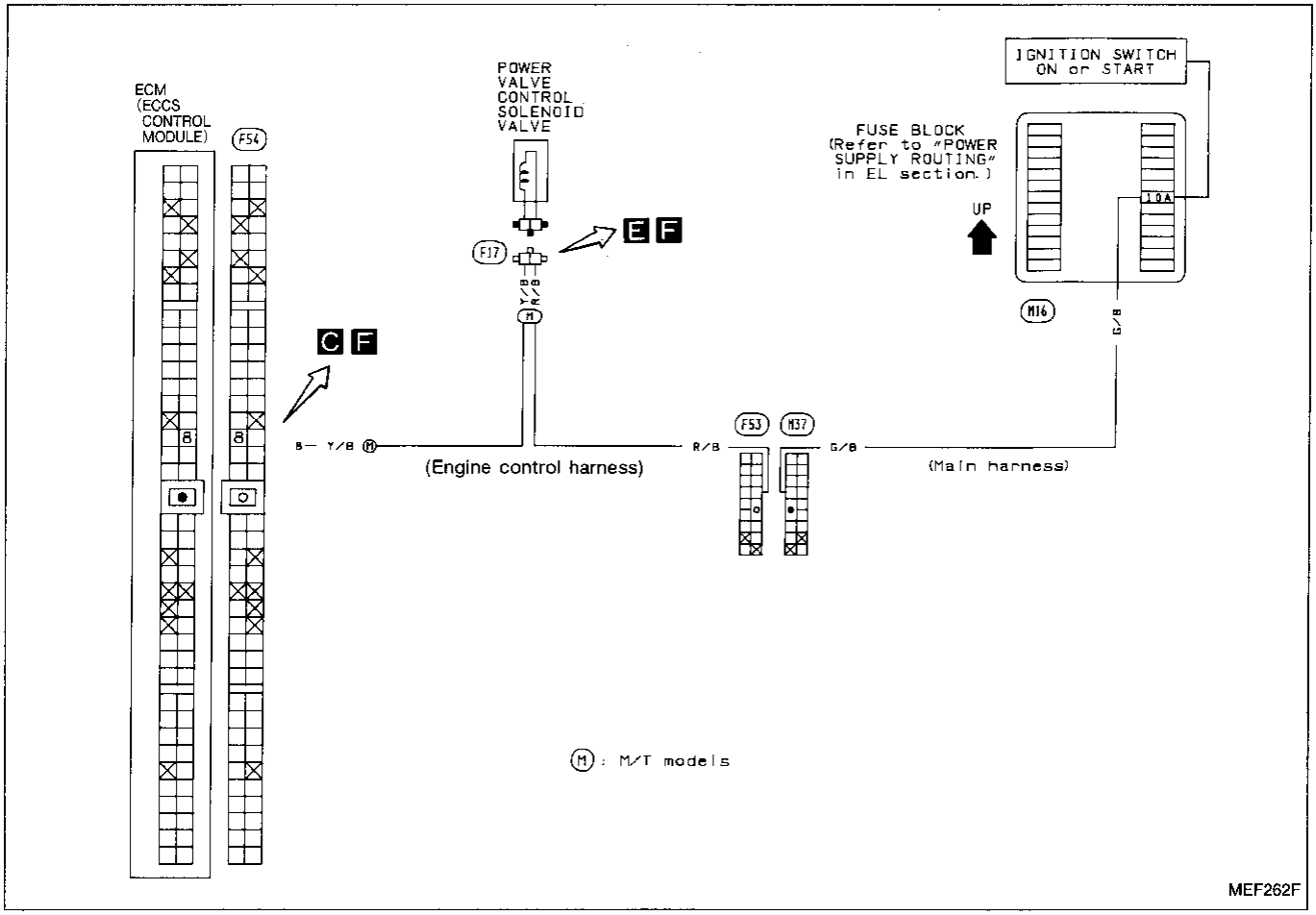
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed. ↓

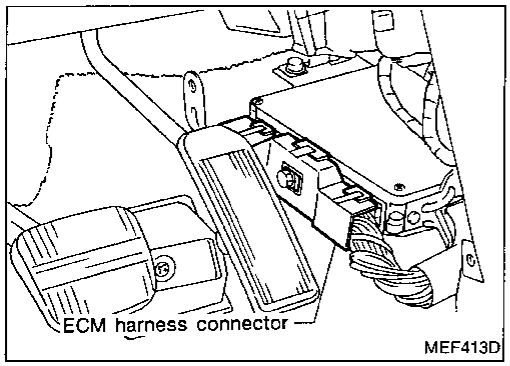
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

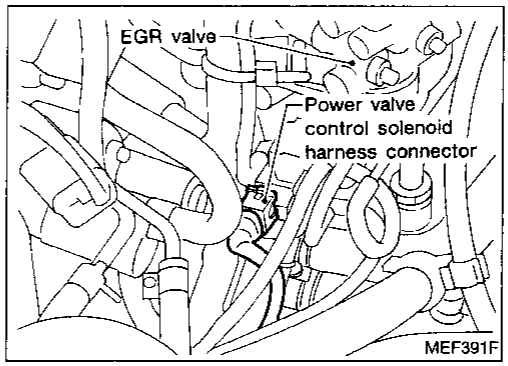
Diagnostic Procedure 43

POWER VALVE CONTROL (Not self-diagnostic item)

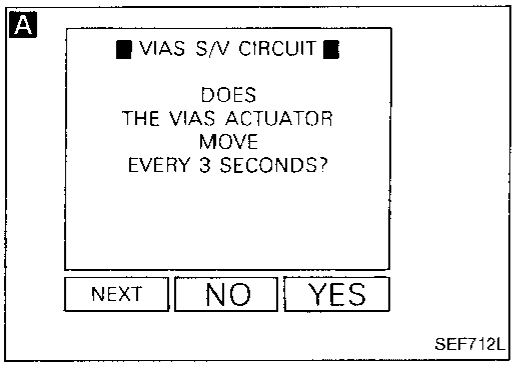


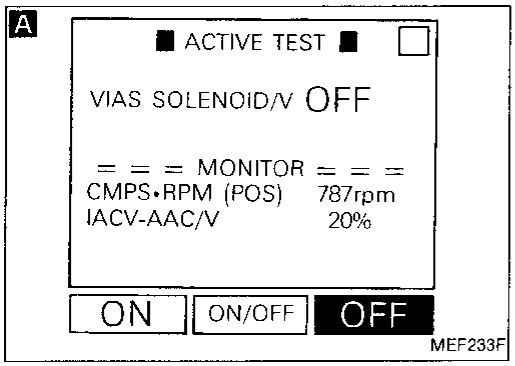
Harness layout

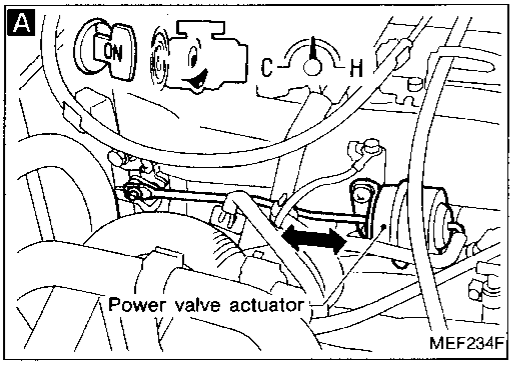


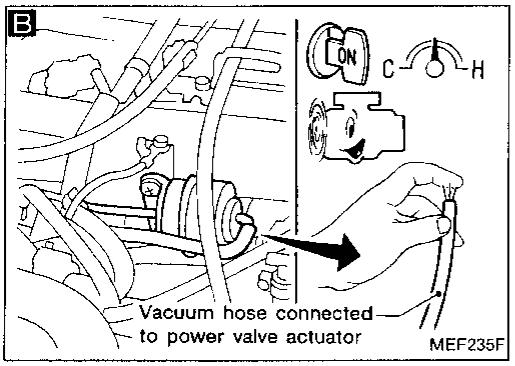


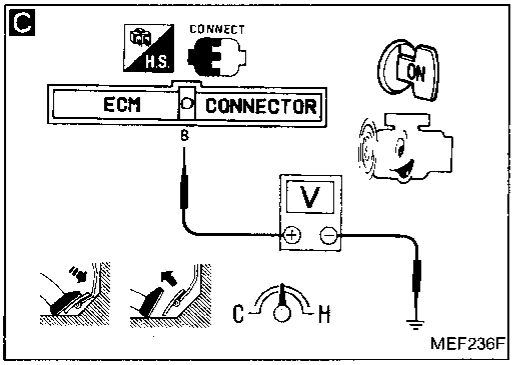
Diagnostic Procedure 43 (Cont'd)











INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Start engine and warm it up sufficiently.
2) Perform "VIAS S/V CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

— OR —

2) Perform "VIAS SOLENOID/V" in "ACTIVE TEST" mode with CONSULT.
3) Turn power valve control solenoid valve "ON" and "OFF", and make sure that power valve actuator moves.

— OR —

2) Race engine quickly (Up to about 4,000 rpm) and make sure that power valve actuator moves.

OK → INSPECTION END

NG

B

CHECK VACUUM SOURCE TO POWER VALVE ACTUATOR.
1) Disconnect vacuum hose to power valve actuator.
2) Make sure that vacuum exists under the following conditions.
At idle:
Vacuum should not exist.
Engine is racing quickly (Up to about 4,000 rpm).
Vacuum should exist.

OK → CHECK COMPONENT (Power valve actuator). Refer to "Electrical Components Inspection". (See page EF & EC-329.)

NG → Replace power valve actuator.

NG

C

CHECK CONTROL FUNCTION.
1) Check voltage between ECM terminal ⑧ and ground under the following conditions.
Voltage:
At idle
Battery voltage
Engine is racing quickly (Up to about 4,000 rpm).
Approximately 0V

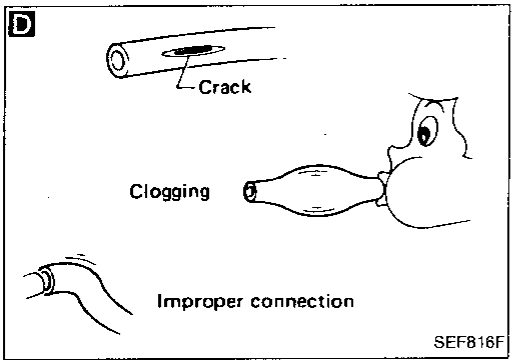
OK → **D** CHECK VACUUM HOSE.
1) Check vacuum hose for clogging, cracks and proper connection.

NG

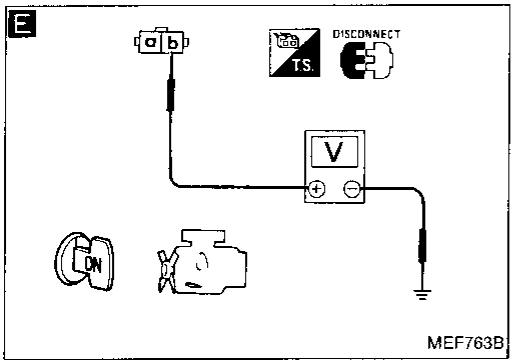
Ⓐ

Diagnostic Procedure 43 (Cont'd)

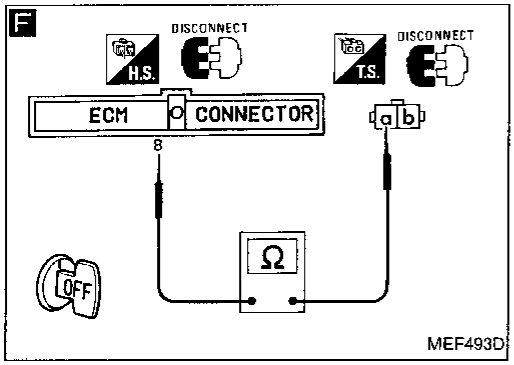
D



E



F



Ⓐ

E

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect power valve control solenoid valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal Ⓑ and ground.
Voltage: Battery voltage

NG → Check the following.
- Harness connectors (F53) , (M37)
- 10A fuse
- Harness continuity between fuse and power valve control solenoid valve

If NG, repair harness or connectors.

OK ↓

F

CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal ⑧ and terminal ⓐ.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(Power valve control solenoid valve).
Refer to "Electrical Components Inspection".
(See page EF & EC-329.)

NG → Replace power valve control solenoid valve.

OK ↓

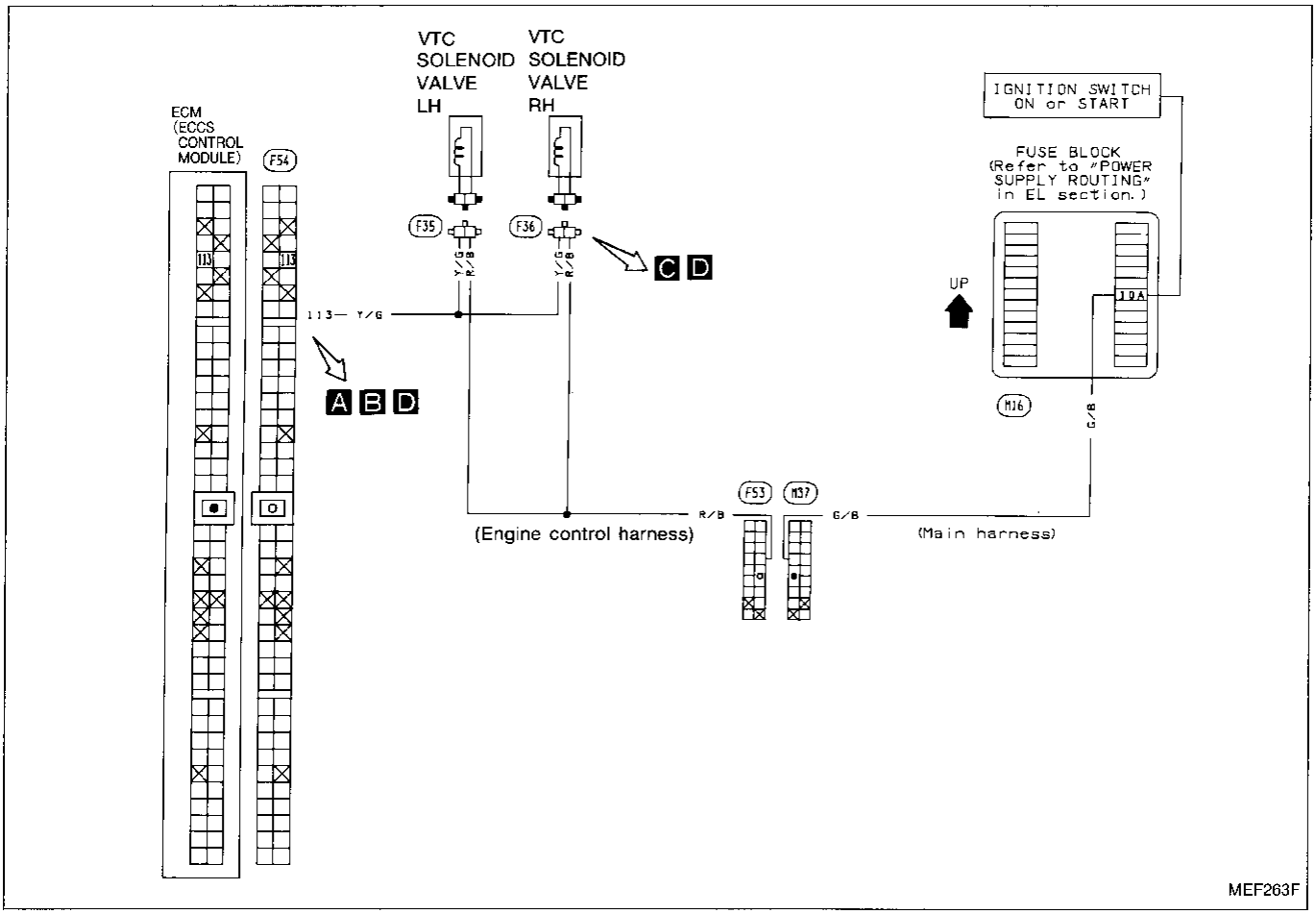
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed. ↓

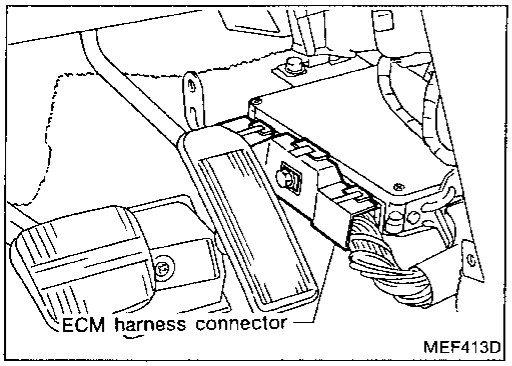
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

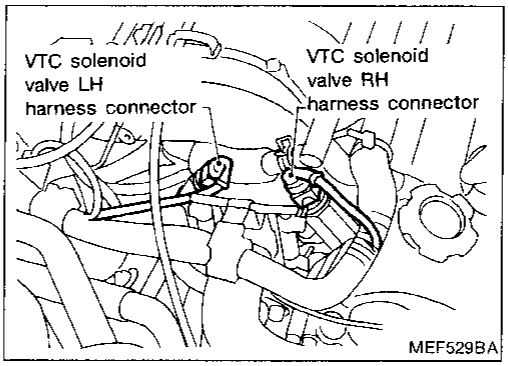
Diagnostic Procedure 44

VTC SOLENOID VALVE (Not self-diagnostic item)

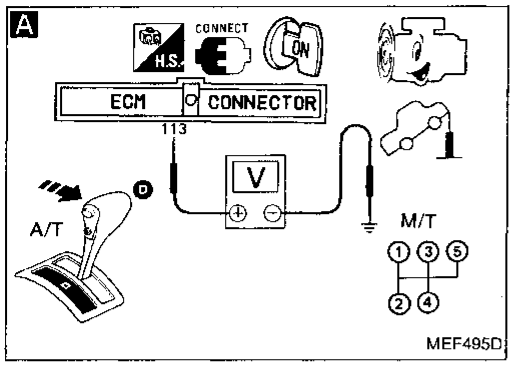


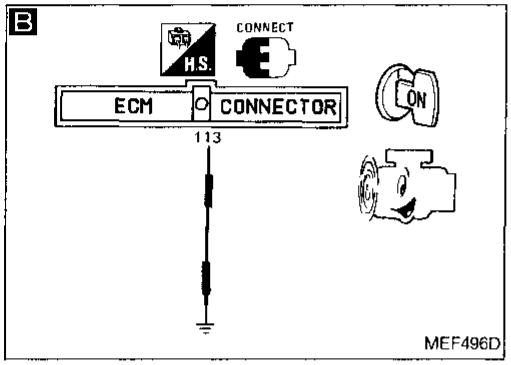
Harness layout

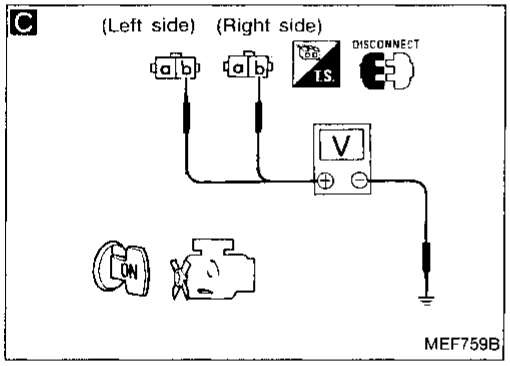


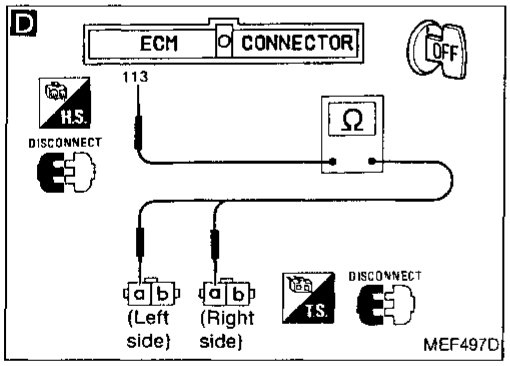


Diagnostic Procedure 44 (Cont'd)









INSPECTION START

A

CHECK CONTROL FUNCTION.
1) Jack up front wheel.
2) Start engine.
3) Shift gear to any position except the neutral position (M/T model).
Shift selector lever to any position except "N" or "P" position (A/T model).
4) Check voltage between ECM terminal (113) and ground under the following conditions.

Voltage:
Quickly depress accelerator pedal, then quickly release it.
0.2 - 0.5V
At *idle*
Battery voltage

OK → **B**

CHECK VTC SOLENOID VALVE OPERATION.
1) Stop engine.
2) Connect a suitable jumper wire between ECM terminal (113) and body ground.
3) Start engine and make sure that improper idle condition occurs.

If it does not occur, go to CHECK COMPONENT (VTC solenoid valve).

Occurs.

INSPECTION END

NG

C

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect VTC solenoid valve harness connectors.
3) Turn ignition switch "ON".
4) Check voltage between terminal (b) and ground.
Voltage: Battery voltage.

NG → Check the following.
- Harness connectors (F53), (M37)
- 10A fuse
- Harness continuity between VTC solenoid valve and fuse

If NG, repair harness or connectors.

OK

D

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

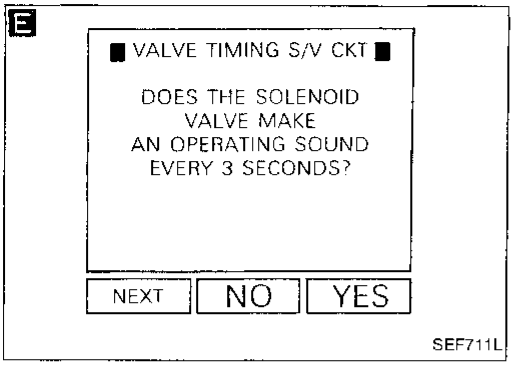
NG → Repair or replace harness or connectors.

OK

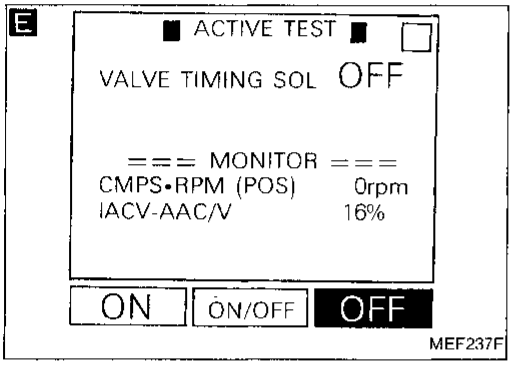
Ⓐ

Diagnostic Procedure 44 (Cont'd)

E



E



Ⓐ

E

CHECK COMPONENT (VTC solenoid valve).

1) Reconnect ECM harness connector and VTC solenoid valve harness connectors.
2) Turn ignition switch "ON".
3) Perform "VALVE TIMING S/V CKT" in "FUNCTION TEST" mode with CONSULT.

NG → Replace VTC solenoid valve.

OR

3) Perform "VALVE TIMING SOL" in "ACTIVE TEST" mode with CONSULT.
4) Turn VTC solenoid valve "ON" and "OFF", and check operating sound.

OR

Refer to "Electrical Components Inspection". (See page EF & EC-327.)

OK

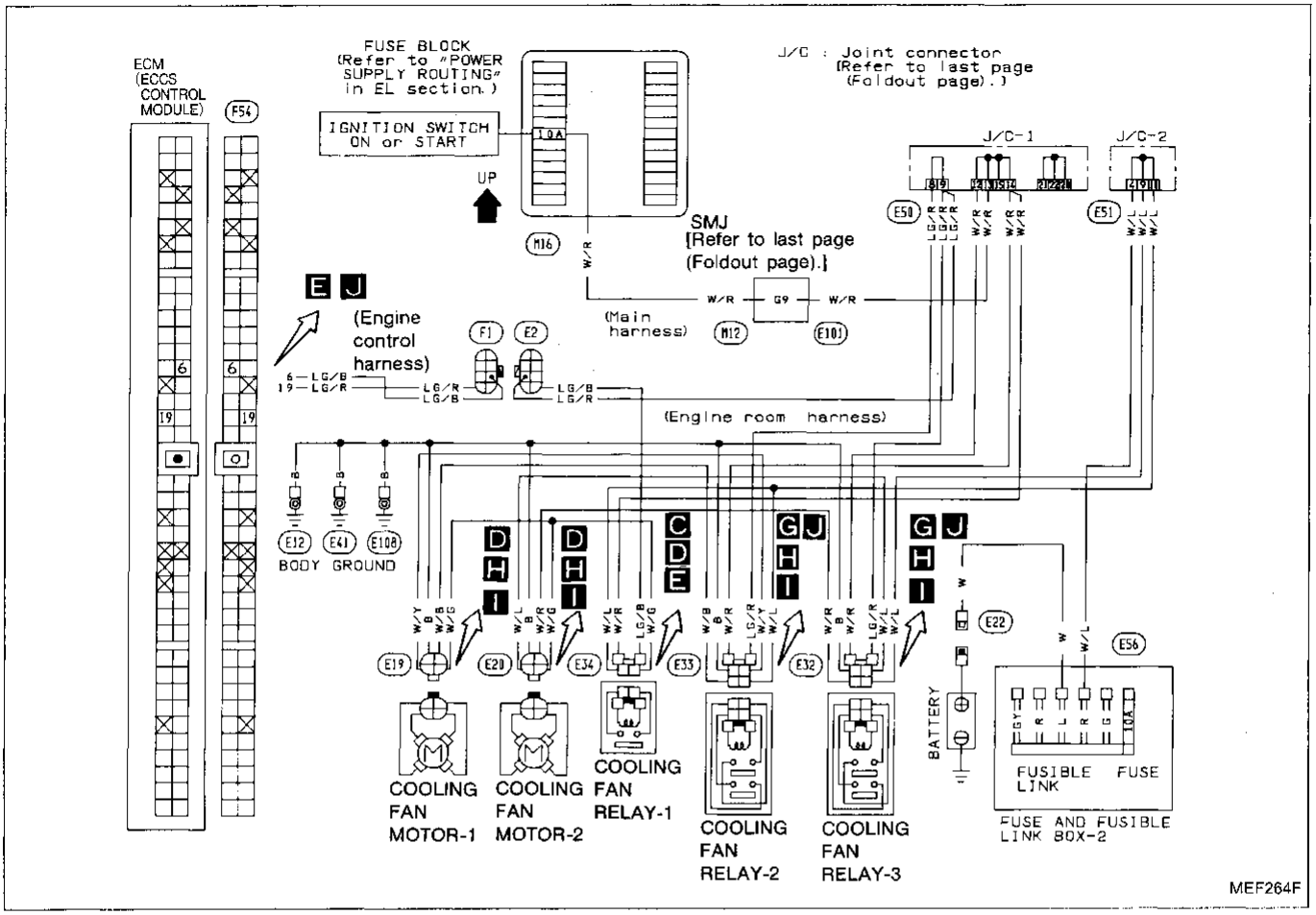
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed.

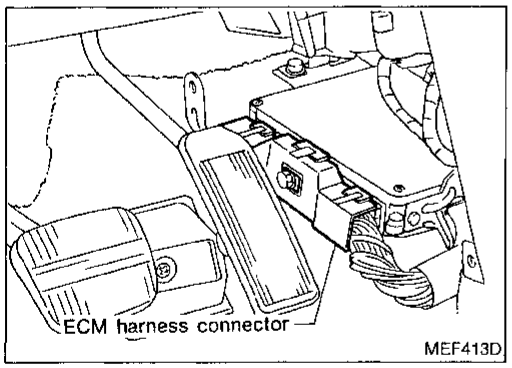
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.

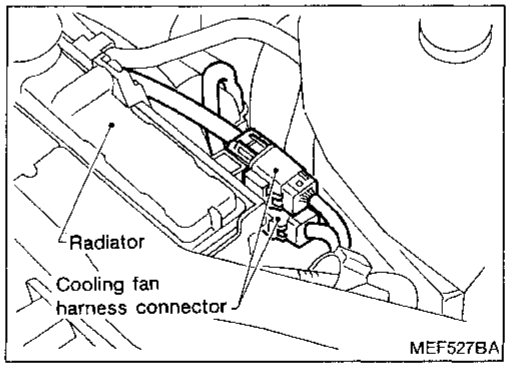
Diagnostic Procedure 45

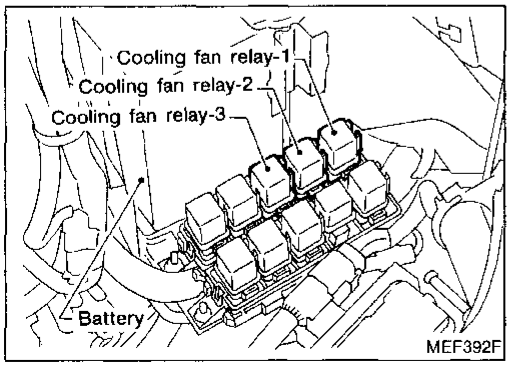
COOLING FAN CONTROL (Not self-diagnostic item)



Harness layout



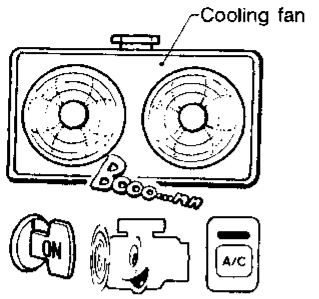




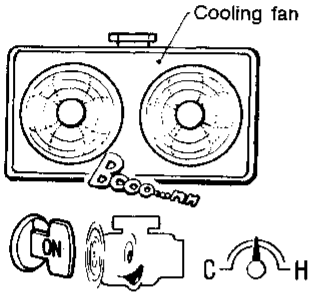
Diagnostic Procedure 45 (Cont'd)

A

With air conditioner



Without air conditioner



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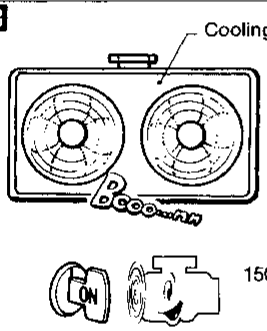
B



MEF238F

INSPECTION START

A

CHECK COOLING FAN LOW SPEED OPERATION.

With air conditioner

1) Start engine.
2) Set temperature lever at full cold position.
3) Turn air conditioner switch "ON".
4) Turn blower fan switch "ON".
5) Run engine at idle for a few minutes with air conditioner operating.
6) Make sure that cooling fan operates at low speed.

Without air conditioner

1) Start engine.
2) Keep engine speed at about 2,000 rpm until engine is warmed up sufficiently.
3) Make sure that cooling fan begins to operate at low speed during warm-up.

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

OK

B

CHECK COOLING FAN HIGH SPEED OPERATION.

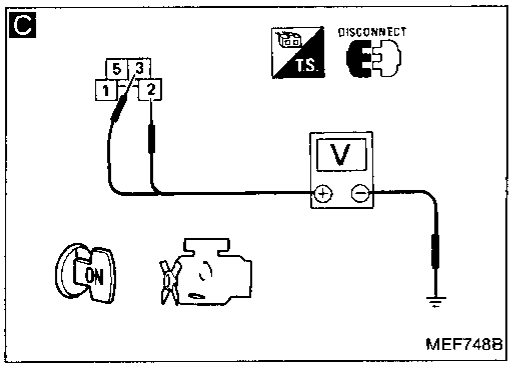
1) Turn air conditioner switch "OFF".
2) Turn blower fan switch "OFF". (Steps 1) and 2) are only performed for models with air conditioner.)
3) Stop engine.
4) Disconnect engine coolant temperature sensor harness connector.
5) Connect 150Ω resistor to engine coolant temperature sensor harness connector.
6) Restart engine and make sure that cooling fan operates at high speed.

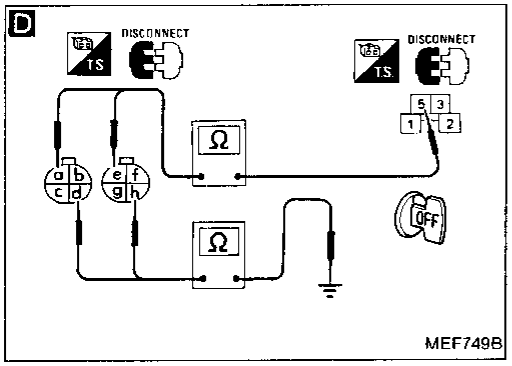
NG → Check cooling fan high speed control circuit. (Go to PROCEDURE B .)

OK

INSPECTION END

Diagnostic Procedure 45 (Cont'd)





PROCEDURE A

INSPECTION START

C

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect cooling fan relay-1.
3) Turn ignition switch "ON".
4) Check voltage between terminals ②, ③ and ground.
Voltage: Battery voltage

NG →
Check the following.
- Harness connectors (M12), (E101)
- 10A fuse
- "L" fusible link
- "R" fusible link
- Joint connector-1
- Joint connector-2
- 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 ↓

D

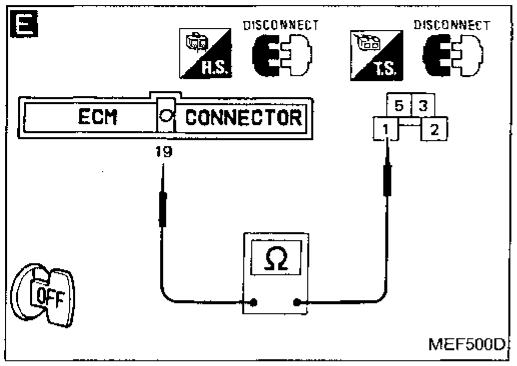
CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3) Check harness continuity between terminals ⓐ, ⓔ and terminal ⑤, terminals ⓓ, ⓗ and body ground.
Continuity should exist.

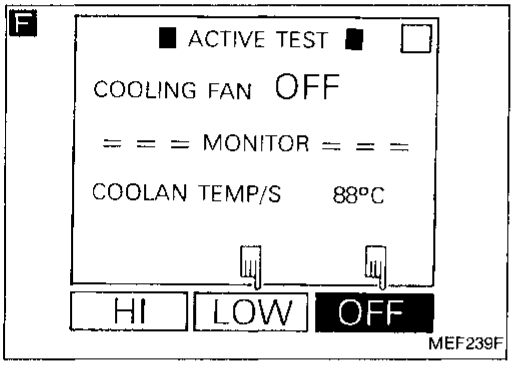
NG →
Repair harness or connectors.

OK ↓

Ⓐ

Diagnostic Procedure 45 (Cont'd)





Ⓐ

E

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

NG → Check the following.
- Harness connectors (F1), (E2)
- 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-331.)

NG → Replace cooling fan relay.

OK ↓

F

CHECK COMPONENTS
(Cooling fan motors-1 and -2).

1) Reconnect cooling fan relay-1, cooling fan motor harness connectors and ECM harness connector.
2) Start engine.
3) Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.

OR

Refer to "Electrical Components Inspection".
(See page EF & EC-332.)

NG → Replace cooling fan motors.

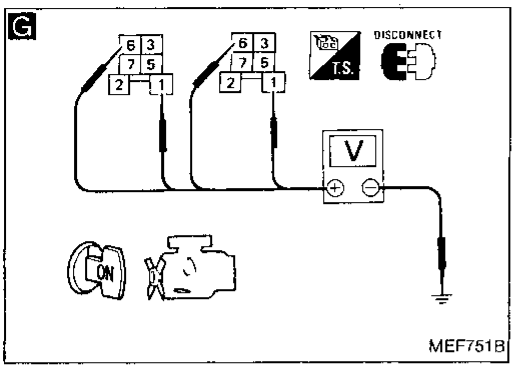
OK ↓

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

Trouble is not fixed. ↓

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

Diagnostic Procedure 45 (Cont'd)



PROCEDURE B

INSPECTION START

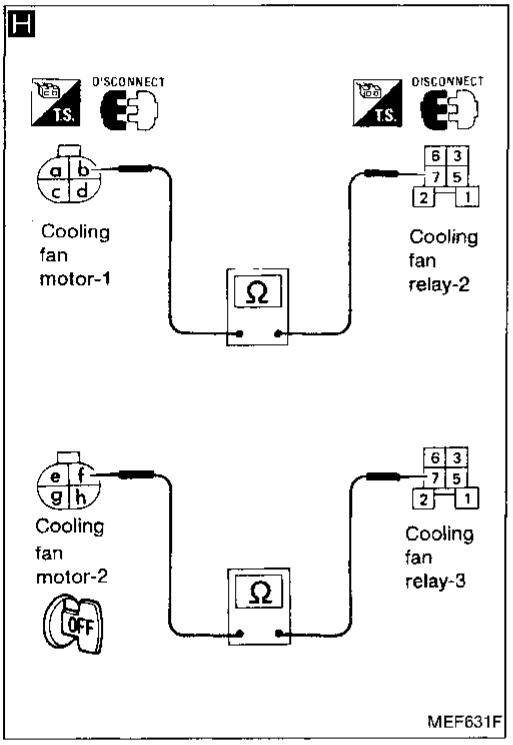
G

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect cooling fan relays-2, -3.
3) Turn ignition switch "ON".
4) Check voltage between terminals ①, ⑥ and ground.
Voltage: Battery voltage

NG → Check the following.
- Joint connector-1
- Joint connector-2
- Harness continuity between cooling fan relays-2, -3 and joint connector-1
- Harness continuity between cooling fan relays-2, -3 and joint connector-2

If NG, repair harness or connectors.

OK

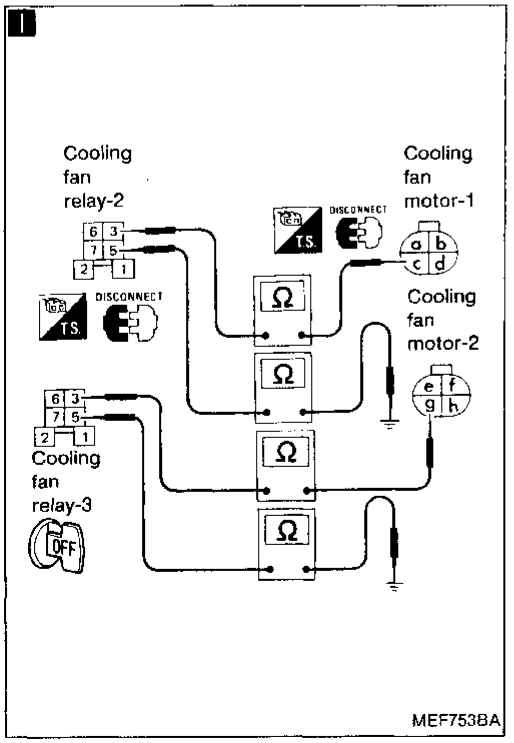


CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
H 3) Check harness continuity between terminal ⑦ and terminals ⓑ, ⓕ.
Continuity should exist.
I 4) Check harness continuity between terminal ③ and terminals ⓒ, ⓖ, terminal ⑤ and body ground.
Continuity should exist.

NG → Repair harness or connectors.

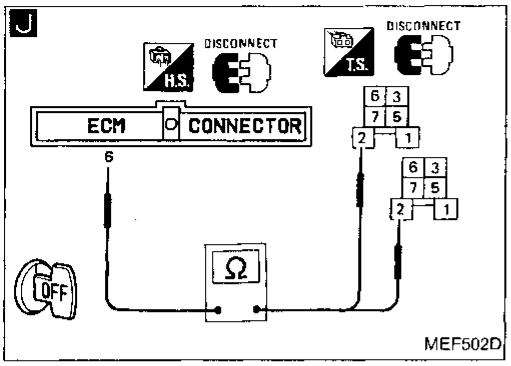
OK

Ⓐ

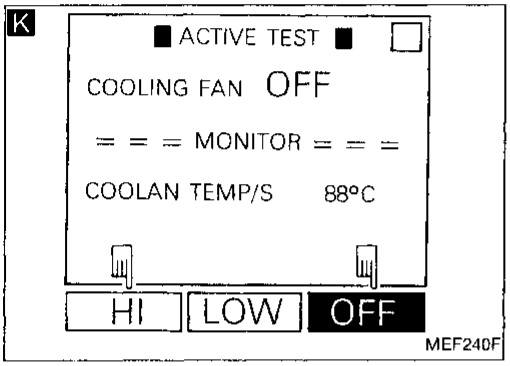


Diagnostic Procedure 45 (Cont'd)

J



K



Ⓐ

J

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

NG → Check the following.
- Harness connectors (F1), (E2)
- Harness continuity between ECM and cooling fan relays-2, -3

If NG, repair harness or connectors.

OK ↓

CHECK COMPONENT
(Cooling fan relays-2 and 3).
Refer to "Electrical Components Inspection".
(See page EF & EC-331.)

NG → Replace cooling fan relays.

OK ↓

K

CHECK COMPONENTS
(Cooling fan motors-1 and -2).

1) Reconnect cooling fan relays-2, -3, cooling fan motor harness connectors, engine coolant temperature sensor harness connector and ECM harness connector.
2) Start engine.
3) Perform "COOLING FAN" in "ACTIVE TEST" mode with CONSULT.

OR

Refer to "Electrical Components Inspection".
(See page EF & EC-332).

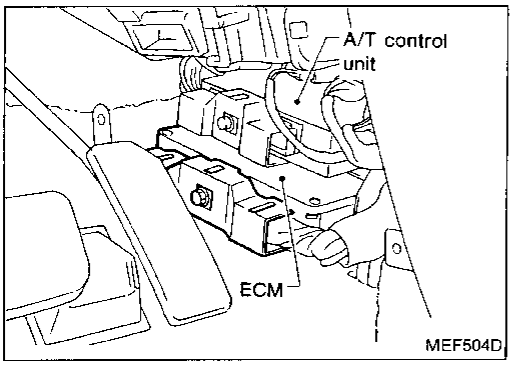
NG → Replace cooling fan motors.

OK ↓

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

Trouble is not fixed. ↓

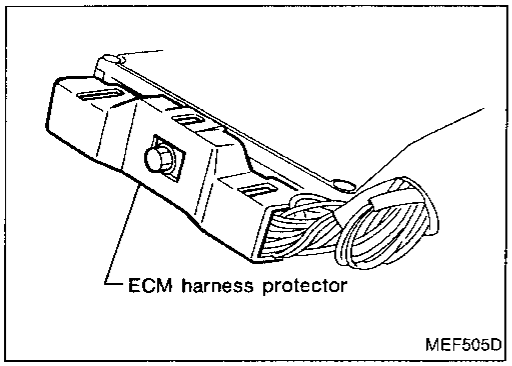
Check ECM pin terminals for damage or the connection of ECM harness connector. Reconnect ECM harness connector and retest.



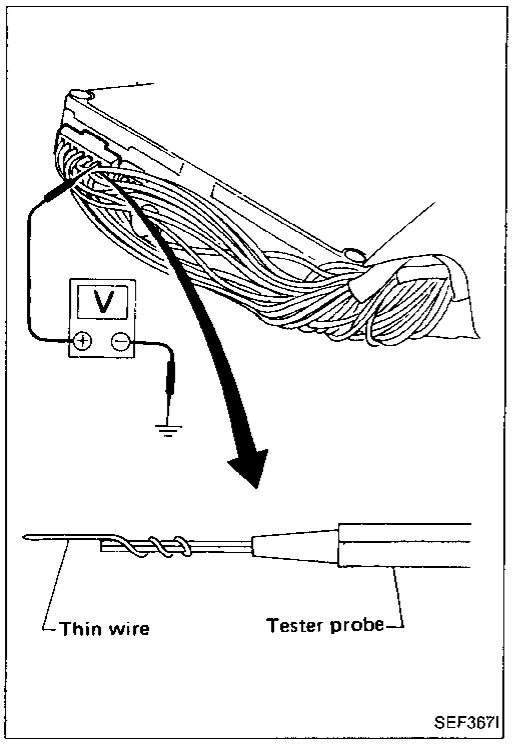
Electrical Components Inspection

ECM INPUT/OUTPUT SIGNAL INSPECTION

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

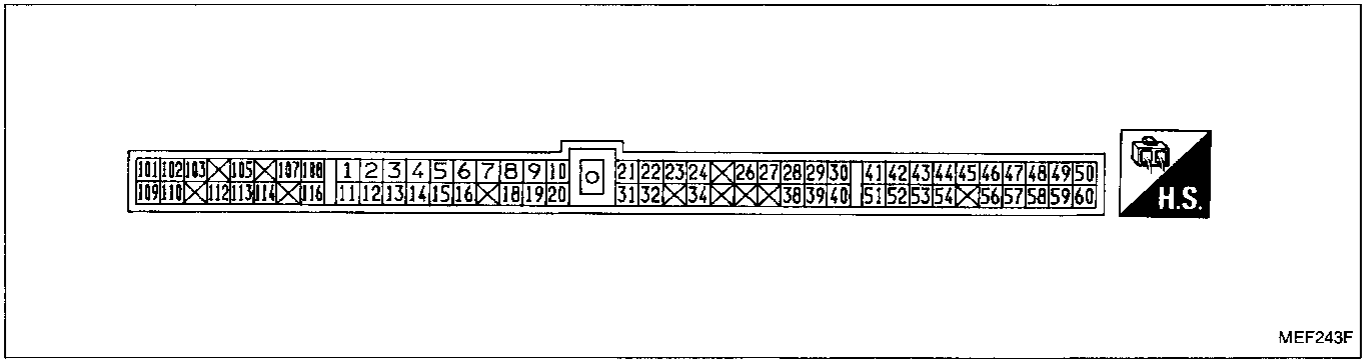


2. Remove ECM harness protector.



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

ECM HARNESS CONNECTOR TERMINAL LAYOUT



Electrical Components Inspection (Cont'd)

ECM inspection table

*Data are reference values.

TER-MINAL NO.	ITEM	CONDITION	*DATA
1, 2, 3, 11, 12, 13	Ignition signal	Engine is running. — Idle speed	Approximately 0.1V
		Engine is running. — Engine speed is 2,000 rpm.	Approximately 0.1V
4	IACV-AAC valve	Engine is running. — Racing condition	Voltage briefly decreases from battery voltage (11 - 14V).
6	Cooling fan (High speed)	Engine is running. — Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)
		Engine is running. — Cooling fan is operating.	Approximately 0V
7	Tachometer	Engine is running. — Idle speed	BATTERY VOLTAGE (11 - 14V)
		Engine is running. — Engine speed is 2,000 rpm.	Approximately 2.5V
8	Power valve control solenoid valve	Engine is running. — Idle speed	BATTERY VOLTAGE (11 - 14V)
		Engine is running. — Racing (up to 4,000 rpm) quickly	Approximately 0V
9	Air conditioner relay	Engine is running. — Air conditioner switch "OFF"	BATTERY VOLTAGE (11 - 14V)
		Engine is running. — Air conditioner switch "ON"	Approximately 0V
16	ECM power source (Self-shutoff)	Engine is running. — Idle speed	0.8 - 1.0V
		Engine is running. — For a few seconds after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)

Electrical Components Inspection (Cont'd)

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
18	Fuel pump relay	Ignition switch "ON" └ For 5 seconds after turning ignition switch "ON" Engine is running.	0.7 - 0.9V
		Ignition switch "ON" └ 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
19	Cooling fan (Low speed)	Engine is running. └ Cooling fan is not operating.	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Cooling fan is operating.	Approximately 0V
23	Knock sensor	Engine is running.	2.0 - 3.0V
27	Mass air flow sensor	Engine is running. (Warm-up condition) └ Idle speed	0.8 - 1.5V
		Engine is running. (Warm-up condition) └ Engine speed is 3,000 rpm.	1.4 - 2.0V
28	Engine coolant temperature sensor	Engine is running.	0 - 5.0V Output voltage varies with engine coolant temperature.
29	Heated oxygen sensor	Engine is running. └ After warming up sufficiently and engine speed is 2,000 rpm.	0 ↔ Approximately 0V
34	Power steering oil pressure switch	Engine is running. └ Steering wheel stays straight.	4.0 - 5.0V
		Engine is running. └ Steering wheel is turned.	Approximately 0V
38	Throttle position sensor	Ignition switch "ON"	0.4 - 4.0V Output voltage varies with throttle valve opening angle.

Electrical Components Inspection (Cont'd)

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
39	EGR temperature sensor	Engine is running. (Warm-up condition) └ Idle speed.	1.0V or more
		Engine is running. (Warm-up condition) └ EGR system is operating.	0 - 1.0V
41 51	Camshaft position sensor (Reference signal)	Engine is running. └ **Do not run engine at high speed under no-load.**	1.0 - 1.5V Output voltage slightly varies with engine speed.
42 52	Camshaft position sensor (Position signal)	Engine is running. └ **Do not run engine at high speed under no-load.**	2.3 - 2.6V Output voltage slightly varies with engine speed.
43	Start signal	Ignition switch "ON"	0V
		Ignition switch "START"	BATTERY VOLTAGE (11 - 14V)
44	Neutral position switch (M/T models) Inhibitor switch (A/T models)	Ignition switch "ON" ├ Gear position is "Neutral position" (M/T models) └ Gear position is "N" or "P" (A/T models)	0V
		Ignition switch "ON" └ Except the above conditions	4.0 - 5.0V
45	Ignition switch	Ignition switch "ON" └ Engine stopped	BATTERY VOLTAGE (11 - 14V)
46	Air conditioner switch	Engine is running. └ Air conditioner switch "OFF"	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Air conditioner switch "ON"	Approximately 0.2V
48	Power source for sensors	Ignition switch "ON" └ Engine stopped	Approximately 5.0V
49	Battery source	Ignition switch "ON" └ Engine stopped	BATTERY VOLTAGE (11 - 14V)

Electrical Components Inspection (Cont'd)

*Data are reference values.

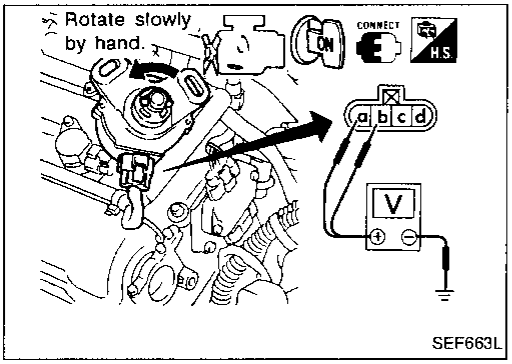
TERMINAL NO.	ITEM	CONDITION	*DATA
53	Vehicle speed sensor	Ignition switch "ON" — Engine stopped — While rotating front wheel by hand	0 or 7.0 - 9.0V
54	Closed throttle position switch (Idle position)	Ignition switch "ON" — Accelerator pedal is fully released (engine stopped).	8.0 - 10.0V
		Ignition switch "ON" — Accelerator pedal is depressed (engine stopped).	0V
57	Power source for closed throttle position switch	Ignition switch "ON" — Engine stopped	8.0 - 10.0V
58	Battery	Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
59	Power supply	Ignition switch "ON" — Idle speed	BATTERY VOLTAGE (11 - 14V)
101 103 105 110 112 114	Injectors	Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
102	EGRC-solenoid valve	Engine is running. (Warm-up condition) — Idle speed — Engine speed is approximately 2,700 rpm or more (M/T models) 3,200 rpm or more (A/T models)	Approximately 0V
		Engine is running. (Warm-up condition) — Engine speed is between idle and approximately 2,700 rpm or more (M/T models) 3,200 rpm or more (A/T models)	BATTERY VOLTAGE (11 - 14V)

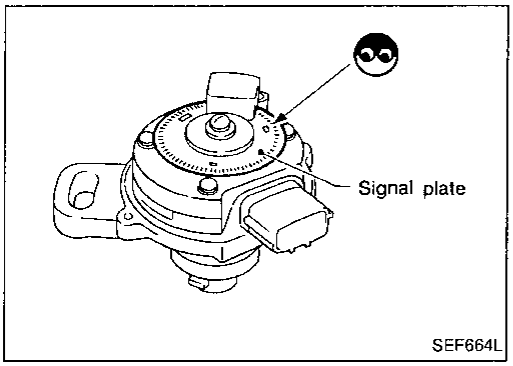
GI MA EM LC EF & EC FE CL MT AT FA RA BR ST BF HA EL IDX

Electrical Components Inspection (Cont'd)

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	*DATA
113	Valve timing control solenoid valve	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Quickly depress accelerator pedal, then quickly release it.	0.2 - 0.5V





CAMSHAFT POSITION SENSOR

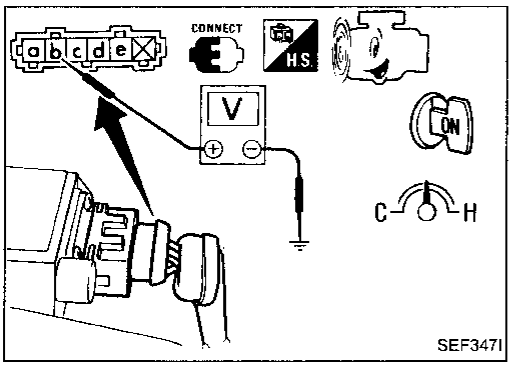
1. Remove camshaft position sensor from engine. (Camshaft position sensor harness connector should remain connected.)
2. Disconnect power transistor harness connector.
3. Turn ignition switch "ON".
4. Rotate camshaft position sensor shaft slowly by hand and check voltage between terminals ⓐ, ⓑ and ground.

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

If NG, replace camshaft position sensor.

After this inspection, diagnostic trouble code Nos. 11 and 21 might be displayed though the camshaft position sensor is functioning properly. In this case erase the stored memory.

5. Visually check signal plate for damage or dust.

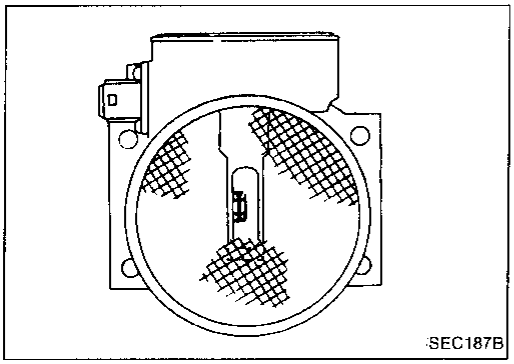


MASS AIR FLOW SENSOR

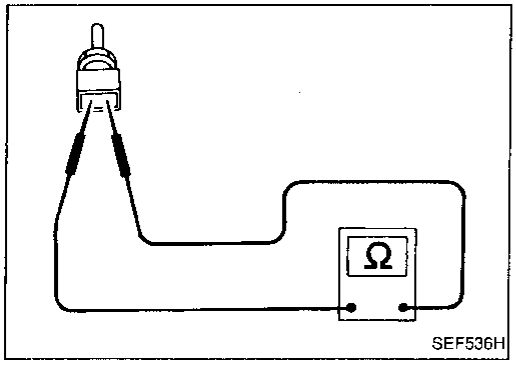
1. Fold back mass air flow sensor harness connector rubber as shown in the figure if the harness connector is connected.
2. Turn ignition switch "ON".
3. Start engine and warm it up sufficiently.
4. Check voltage between terminal ⓑ and ground.

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 1.0V
Idle (Engine is warm-up sufficiently.)	Approximately 0.8 - 1.5

Electrical Components Inspection (Cont'd)


SEC187B

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



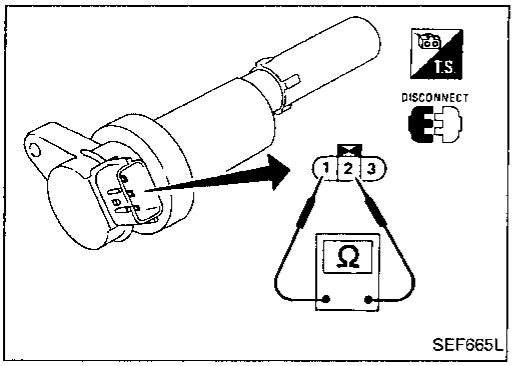
SEF536H

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.



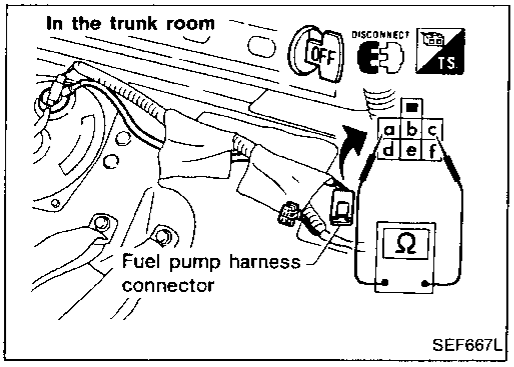
SEF665L

IGNITION COIL

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

Terminal	Resistance
① - ②	Approximately 0.8Ω

If NG, replace ignition coil.



SEF667L

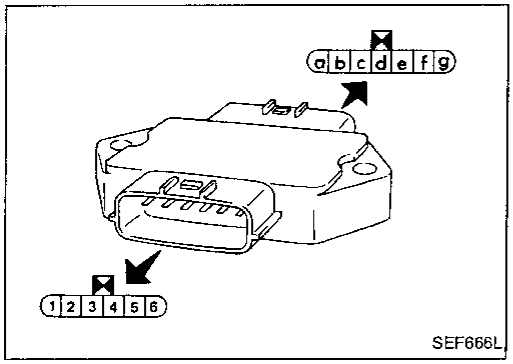
FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals ⓐ and ⓒ.
   Resistance: Approximately 0.5Ω

If NG, replace fuel pump.

GI MA EM LC EF & EC FE CL MT AT FA RA BR ST BF HA EL IDX

Electrical Components Inspection (Cont'd)

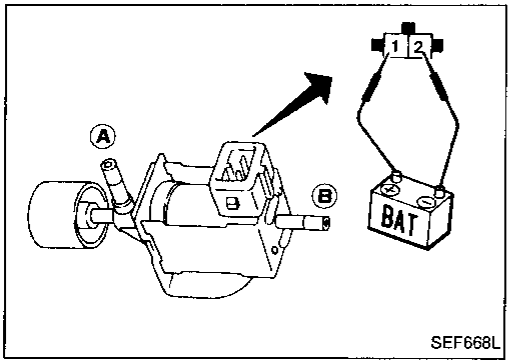


POWER TRANSISTOR

1. Disconnect power transistor harness connector.
2. Check power transistor resistance between terminals with a digital tester as shown in the figure.

Terminal combination						Tester polarity	Resistance	Tester polarity	Resistance
d	d	d	d	d	d	⊕	Not ∞ or 0	⊖	Not ∞ or 0
a	b	c	e	f	g	⊖		⊕	
d	d	d	d	d	d	⊕	Not ∞ or 0	⊖	∞
1	2	3	4	5	6	⊖		⊕	
a	b	c	e	f	g	⊕	Not ∞ or 0	⊖	∞
1	2	3	4	5	6	⊖		⊕	

If NG, replace power transistor.

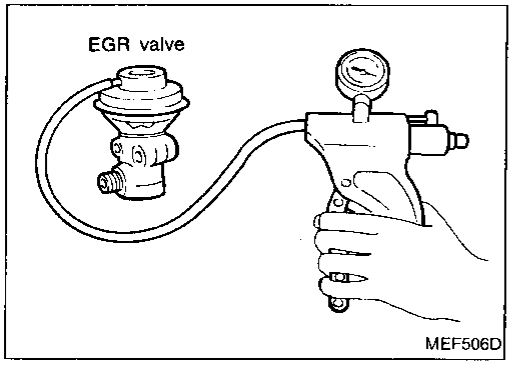


EGRC-SOLENOID VALVE

Check air passage continuity.

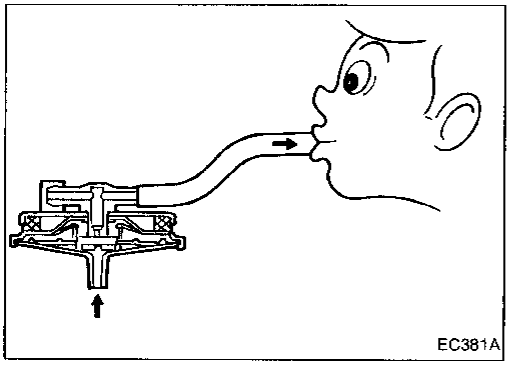
Condition	Air passage continuity between Ⓐ and Ⓑ
12V direct current supply between terminals ① and ②	Yes
No supply	No

If NG, replace solenoid valve.



EGR VALVE

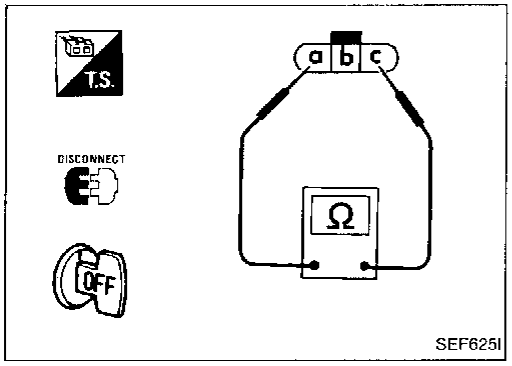
Apply vacuum to EGR vacuum port with a hand vacuum pump.
EGR valve spring should lift.
If NG, replace EGR valve.



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.

Electrical Components Inspection (Cont'd)



HEATED OXYGEN SENSOR

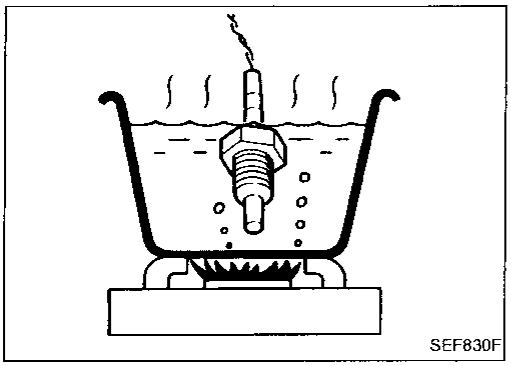
Refer to "Diagnostic Procedure 30".
(See page EF & EC-272.)

HEATED OXYGEN SENSOR HEATER

Check resistance between terminals ⓐ and ⓒ.

Resistance: 3 - 1,000Ω

If NG, replace heated oxygen sensor.



EGR TEMPERATURE SENSOR

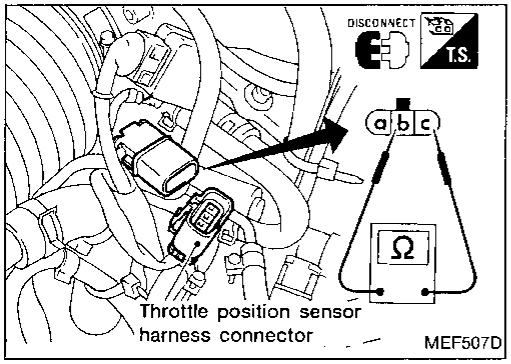
Check resistance change and resistance value at 100°C (212°F).

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

Resistance: 100°C (212°F)

85.3 ± 8.53 kΩ

If NG, replace EGR temperature sensor.

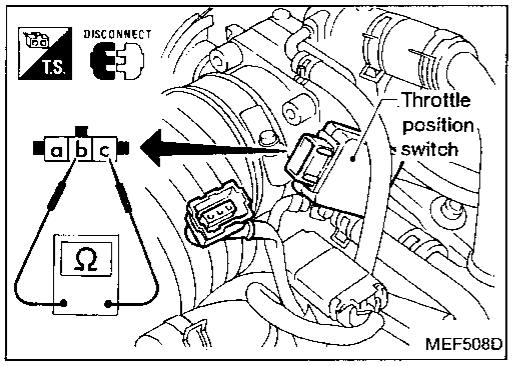


THROTTLE POSITION SENSOR

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

Accelerator pedal condition	Resistance kΩ
Completely released	Approximately 1
Partially released	1 - 9
Completely depressed	Approximately 9

If NG, replace throttle position sensor.



CLOSED THROTTLE POSITION SWITCH (Idle position)

1. Warm up engine sufficiently.
2. Disconnect closed 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.

Adjustment for throttle position sensor and throttle position switch

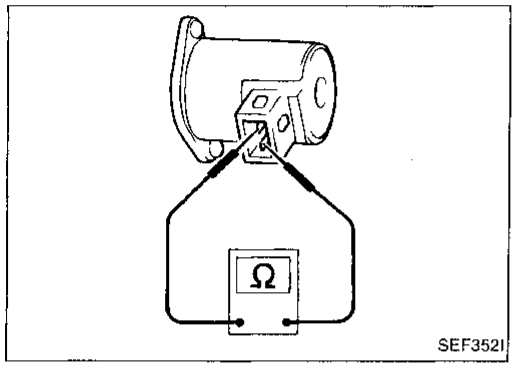
If throttle position sensor, closed throttle position switch or wide open throttle position switch is replaced or removed, it is necessary to install it in the proper position, by following the procedure as shown below:

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.

Electrical Components Inspection (Cont'd)

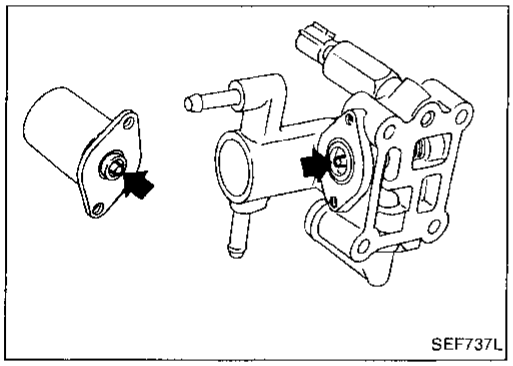
3. Start engine and warm it up sufficiently.
4. Disconnect closed throttle position switch harness connector.
5. Check closed throttle position switch OFF → ON speed with circuit tester, closing throttle valve manually.

Closed throttle position switch OFF → ON speed:
A/T: Engine speed in "N" position
950 ± 150 rpm

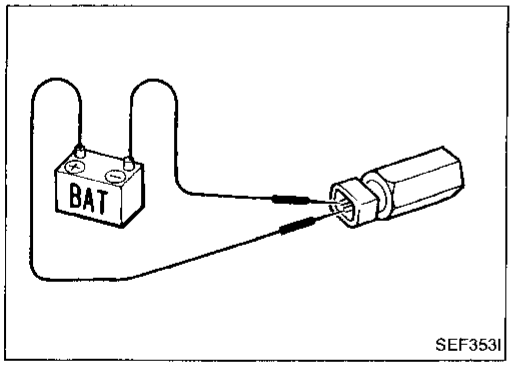


IACV-AAC VALVE

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

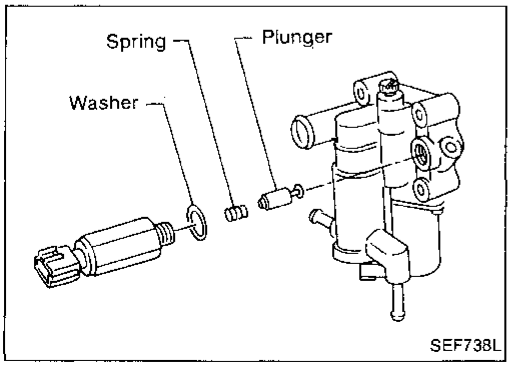


- Check plunger for seizing or sticking.
- Check for broken spring.



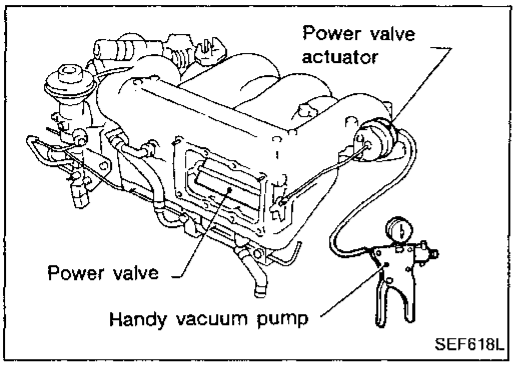
IACV-FICD SOLENOID VALVE

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



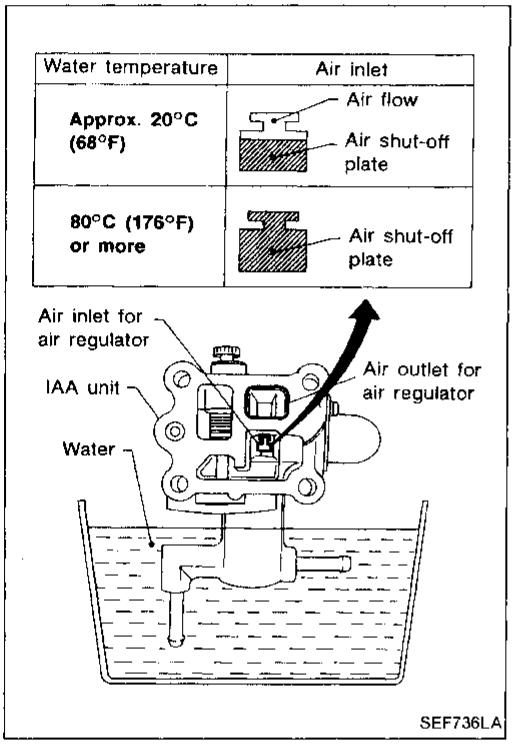
- Check plunger for seizing or sticking.
- Check for broken spring.

Electrical Components Inspection (Cont'd)



POWER VALVE ACTUATOR

1. Disconnect power valve actuator vacuum hose.
2. Connect handy vacuum pump with power valve actuator.
3. Apply vacuum. Make sure that power valve begins to open between –13.3 and –26.7 kPa (–100 and –200 mmHg, –3.94 and –7.87 inHg) vacuum and there is no vacuum leak in the actuator.
4. If there is vacuum leakage, replace power valve actuator.

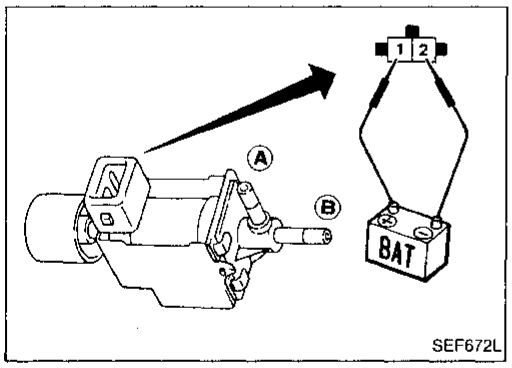


IACV-AIR REGULATOR

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

Water temperature	When blowing from air inlet hole
20°C (68°F)	Air flows
80°C (176°F) or more	Almost no air flows

If NG, replace air cut valve.

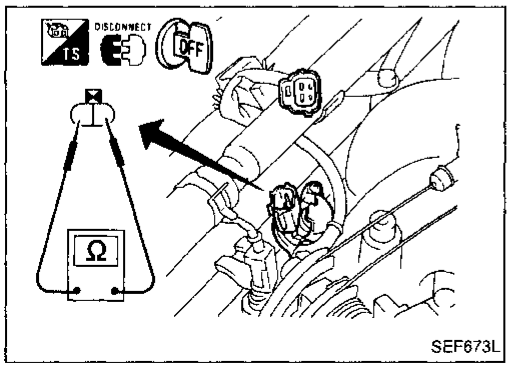


POWER VALVE CONTROL SOLENOID VALVE

1. Disconnect power valve control solenoid valve harness connector.
2. Check solenoid valve, following the table as shown below:

Conditions	Continuity between port Ⓐ and Ⓑ
Supply 12V direct current between terminals ① and ②	Yes
No current supply	No

If NG, replace power valve control solenoid valve.



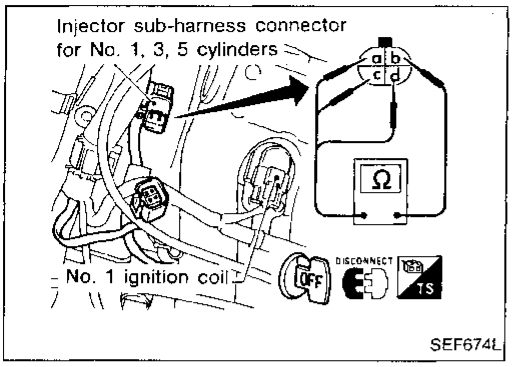
INJECTOR

No. 2, No. 4 and No. 6 cylinders

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

If NG, replace injector.

Electrical Components Inspection (Cont'd)

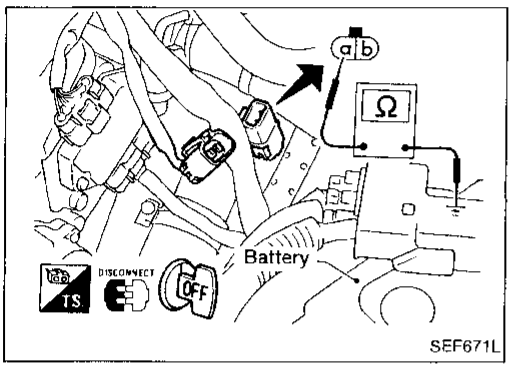


No. 1, No. 3 and No. 5 cylinders

1. Disconnect sub-harness connector for injectors.
2. Check resistance between terminals, following the table as shown below:

Cylinder	Terminal No.	Resistance
No. 1	ⓑ - ⓓ	10 - 14Ω
No. 3	ⓑ - ⓒ	
No. 5	ⓑ - ⓐ	

If NG, replace injector.



KNOCK SENSOR

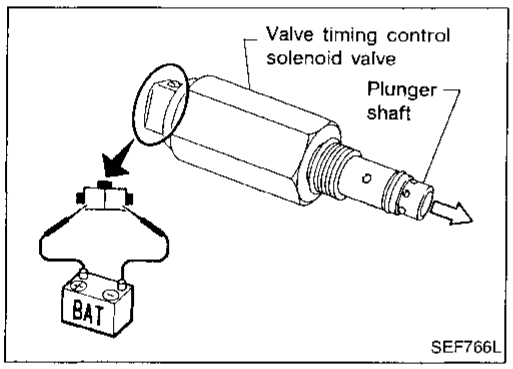
1. Disconnect knock sensor sub-harness connector.
2. Check continuity between terminal ⓐ and ground.

Continuity should exist.

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

CAUTION:

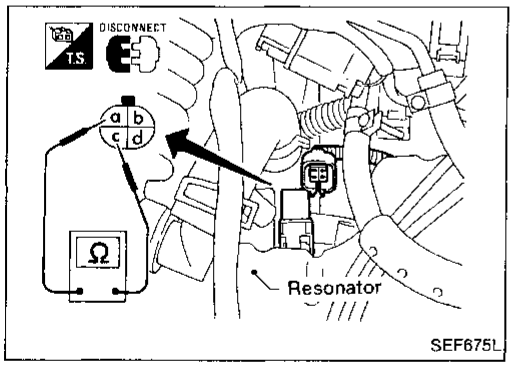
Discard any knock sensor which has been dropped or undergone shocks; use a new one.



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.

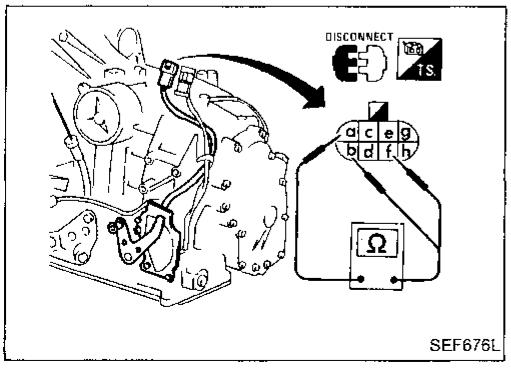


NEUTRAL POSITION SWITCH

Check continuity between terminals ⓐ and ⓒ.

Conditions	Continuity
Shift to Neutral position	Yes
Shift to other position	No

If NG, replace neutral position switch.

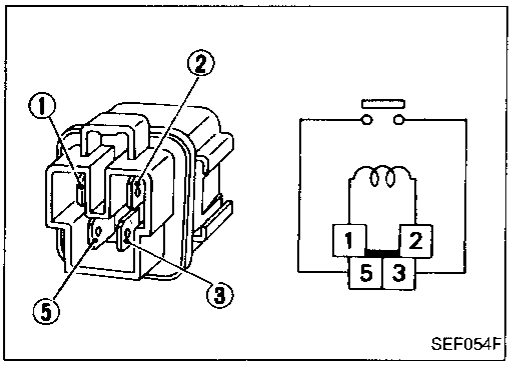


INHIBITOR SWITCH

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"	No	No

Electrical Components Inspection (Cont'd)



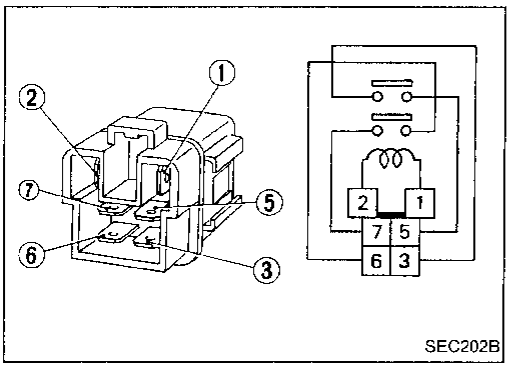
SEF054F

ECCS RELAY, FUEL PUMP RELAY, COOLING FAN RELAY-1 AND IGNITION COIL 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.



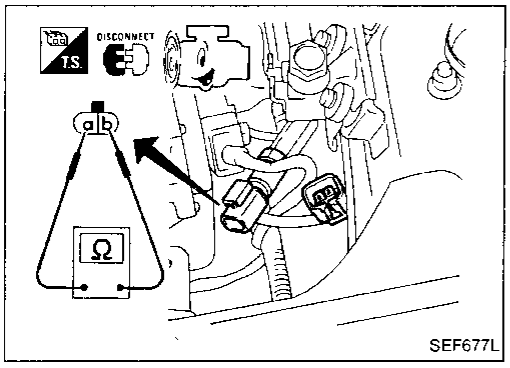
SEC202B

COOLING FAN RELAYS-2 AND -3

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.



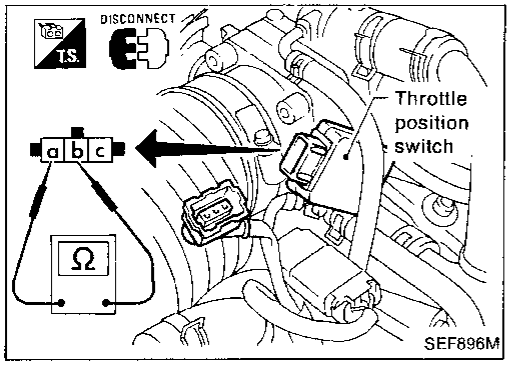
SEF677L

POWER STEERING OIL PRESSURE SWITCH

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

Conditions (Engine running)	Continuity
Steering wheel is being turned	Yes
Steering wheel is not being turned	No

If NG, replace power steering oil pressure switch.



SEF896M

WIDE OPEN THROTTLE POSITION SWITCH

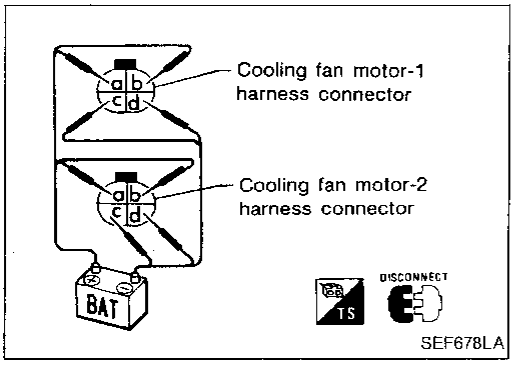
1. Warm up engine sufficiently.
2. Check continuity between terminals ⓑ and ⓐ.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes

If NG, replace throttle position switch.

Electrical Components Inspection (Cont'd)

COOLING FAN MOTORS-1 AND -2

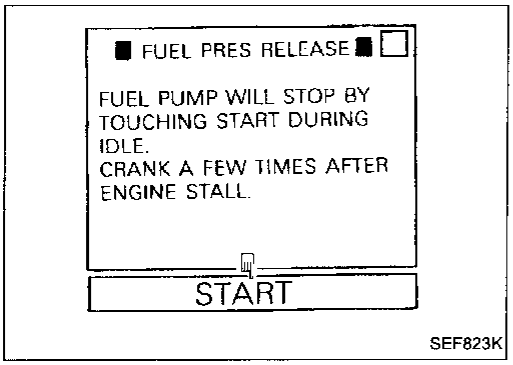


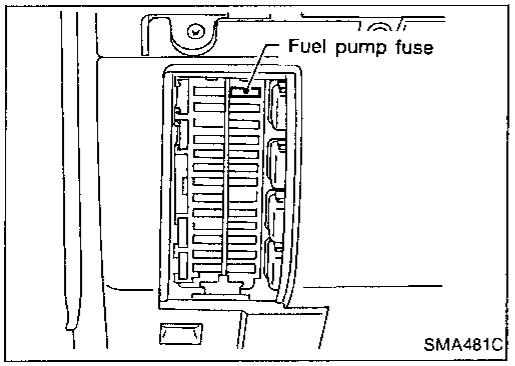
1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Speed	Terminals	
		(⊕)	(⊖)
Cooling fan motor-1	Low	ⓑ	ⓒ
	High	ⓐ, ⓑ	ⓒ, ⓓ
Cooling fan motor-2	Low	ⓑ	ⓒ
	High	ⓐ, ⓑ	ⓒ, ⓓ

Cooling fan motor should operate.

If NG, replace cooling fan motor.





Releasing Fuel Pressure

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

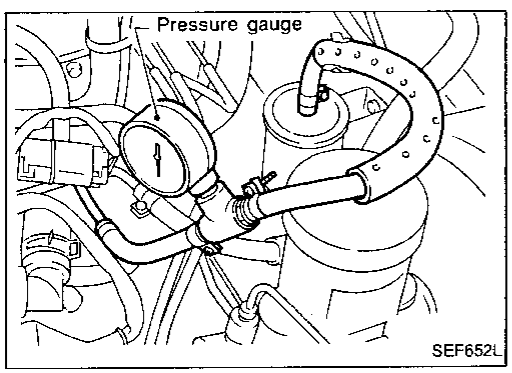
1. Turn ignition switch "ON".
2. Perform "FUEL PRES RELEASE" in "WORK SUPPORT" mode with CONSULT.
3. Start engine.
4. After engine stalls crank it two or three times to release all fuel pressure.
5. Turn ignition switch off.

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

Fuel Pressure Check

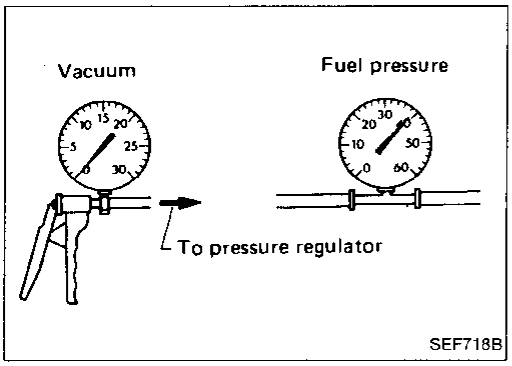
a. When reconnecting fuel line, always use new clamps.
b. Make sure that clamp screw does not contact adjacent parts.
c. Use a torque driver to tighten clamps.
d. Use Pressure Gauge to check fuel pressure.
e. Do not perform fuel pressure check while fuel pressure regulator control system is operating; 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.



5. Read the indication of fuel pressure gauge.
   At idling:
   Approximately 245 kPa (2.5 kg/cm^2, 36 psi)
   A few seconds after ignition switch is turned OFF to ON:
   Approximately 294 kPa (3.0 kg/cm^2, 43 psi)
6. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
7. Plug intake manifold with a rubber cap.
8. Connect variable vacuum source to fuel pressure regulator.

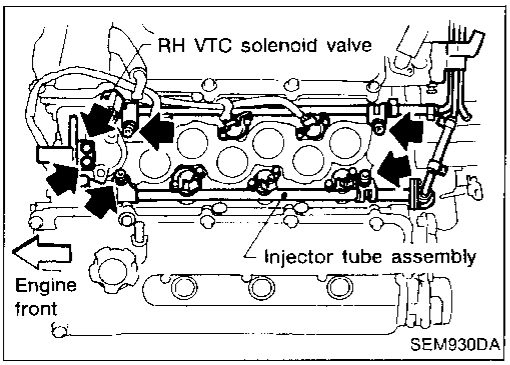
Fuel Pressure Check (Cont'd)



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

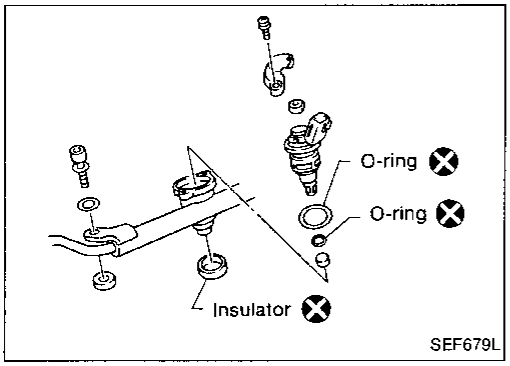
Fuel pressure should decrease as vacuum increases. If results are unsatisfactory, replace fuel pressure regulator.

Injector Removal and Installation



1. Release fuel pressure to zero.
2. Drain coolant from radiator drain cock.
3. Remove or disconnect the following:
- Related harnesses, wires and tubes
- Intake manifold collector
  For details, refer to EM section.
4. Remove injectors with fuel tube assembly.
5. Push out any malfunctioning injector from fuel tube assembly.

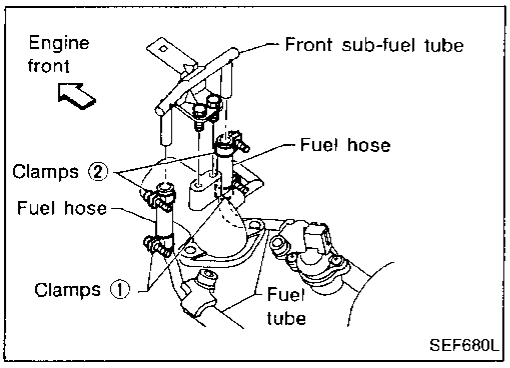
Do not extract injector by pinching connector.



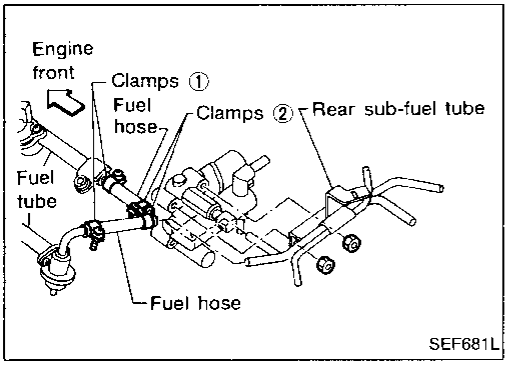
6. Replace or clean injector as necessary.
7. Install injector to fuel tube assembly.

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

8. Install fuel tube assembly onto intake manifold.



9. Install front sub-fuel tube as follows:
1) Connect fuel hoses to fuel tubes.
2) Tighten clamps ①.
3) Install front sub-fuel tube.
4) Tighten clamps ②.

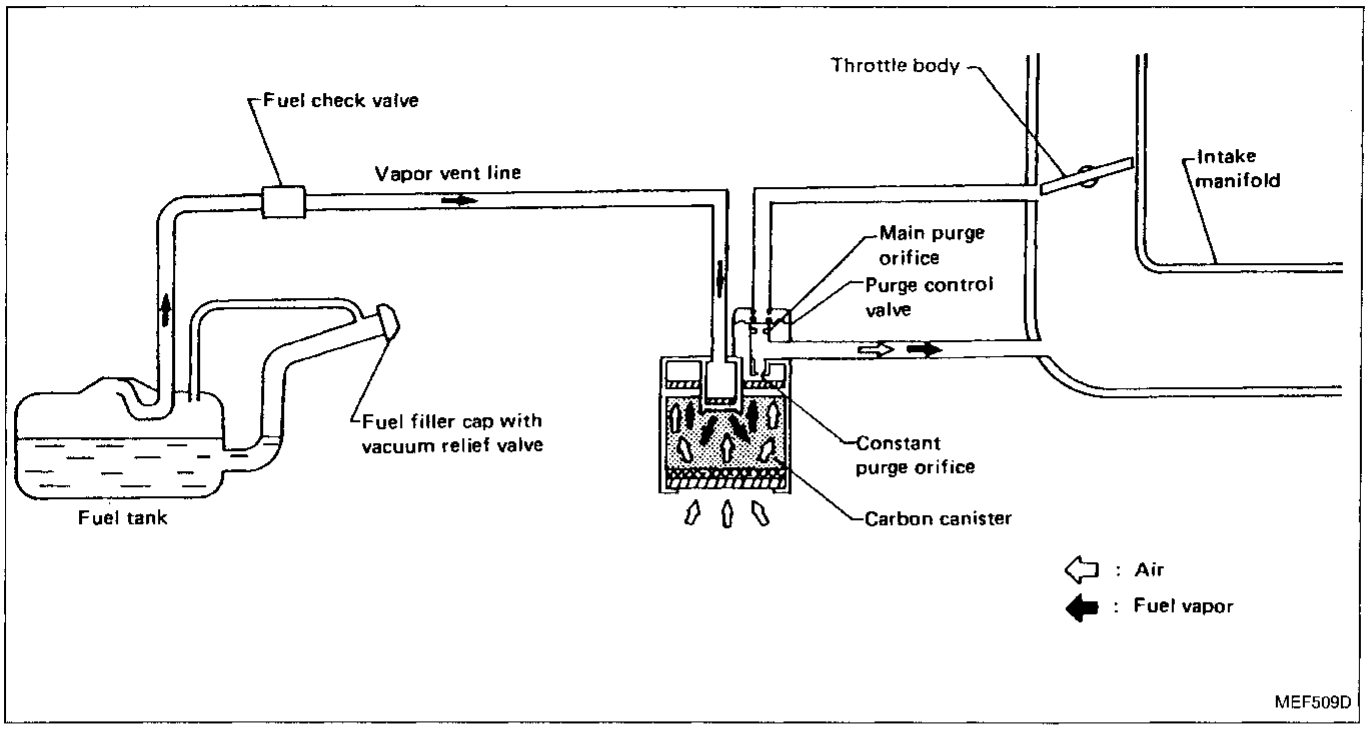


10. Install rear sub-fuel tube as follows:
1) Connect fuel hoses to fuel tubes.
2) Tighten clamps ①.
3) Install rear sub-fuel tube.
4) Tighten clamps ②.

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

11. Install any parts removed in reverse order of removal.

Description

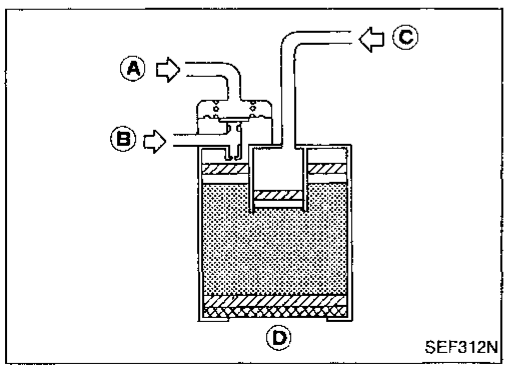


The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the carbon canister.

The fuel vapor from the sealed fuel tank is led into the canister which contains activated carbon and the vapor is stored there when the engine is not running.

The canister retains the fuel vapor until the canister is purged by the air drawn through the bottom of the canister to the intake manifold when the engine is running. When the engine runs at idle, the purge control valve is closed.

Only a small amount of stored vapor flows into the intake manifold through the constant purge orifice. As the engine speed increases, and the throttle vacuum rises higher, the purge control valve opens and the vapor is sucked into the intake manifold through both the main purge orifice and the constant purge orifice.



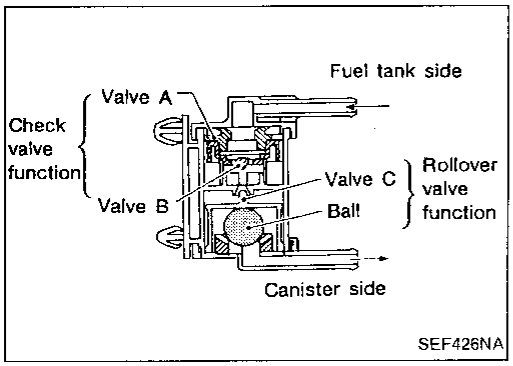
Inspection

ACTIVATED CARBON CANISTER

Check carbon canister as follows:

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

Inspection (Cont'd)



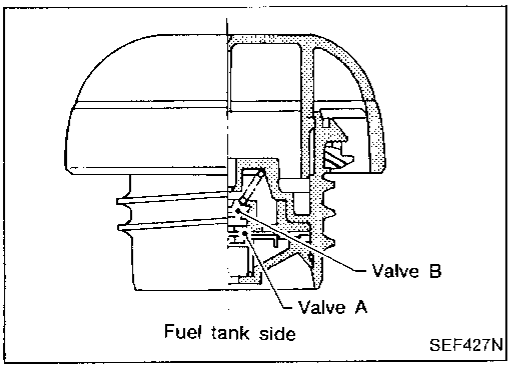
FUEL CHECK VALVE (With rollover valve)

Check valve operation

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

Rollover valve operation

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

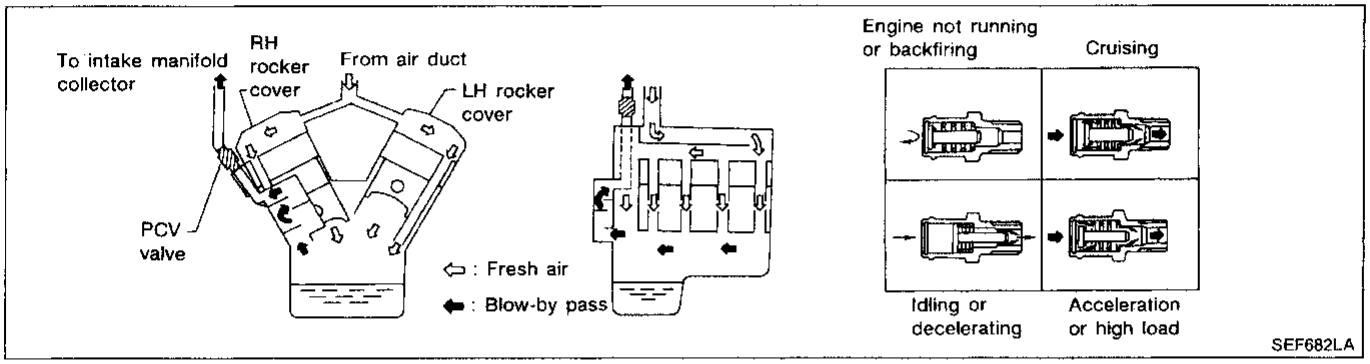


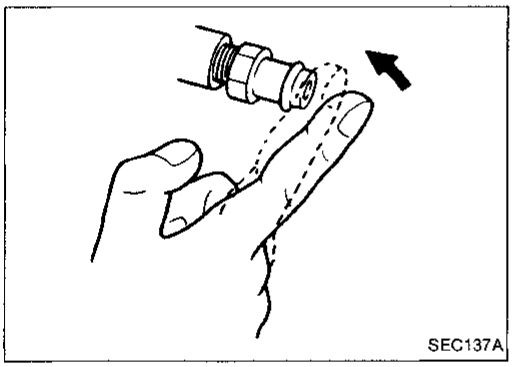
FUEL TANK VACUUM RELIEF VALVE

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

Description

This system returns blow-by gas to both the intake manifold and air inlet tubes.
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.
The ventilating air is then drawn from the air inlet tubes, 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.
On vehicles with an excessively high blow-by some of the flow will go through the hose connection to the air inlet tubes under all conditions.

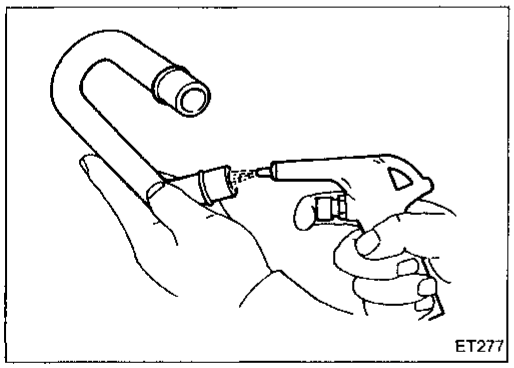




Inspection

PCV (Positive Crankcase Ventilation)

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



VENTILATION HOSE

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

General Specifications

PRESSURE REGULATOR	
Regulated pressure kPa (kg/cm^2, psi)	
Vacuum hose is connected	250.1 (2.55, 36.3)
Vacuum hose is disconnected	299.1 (3.05, 43.4)

Inspection and Adjustment

Idle speed*1 rpm	
No-load*2	
A/T (in "N" position)	750±50
Air conditioner: ON	
A/T (in "N" position)	800±50
Ignition timing degree	15°±2° BTDC
Closed closed throttle position switch touch speed rpm	
A/T (in "N" position)	Idle speed + 250±150*3

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

*3: Diagnostic test mode selector turned fully clockwise

IGNITION COIL

Primary voltage	V	12
Primary resistance [at 20°C (68°F)]	Ω	Approximately 1.0
Secondary resistance [at 20°C (68°F)]	Ω	8.2 - 12.4

MASS AIR FLOW SENSOR

Supply voltage	V	Battery voltage (11 - 14)
Output voltage	V	Approximately 1.0 - 1.3*

*: Engine is warmed up sufficiently and idling under no-load.

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

EGR TEMPERATURE SENSOR

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

IACV-AAC VALVE (Step motor type)

Resistance	Ω	Approximately 0.5

INJECTOR

Resistance	Ω	10 - 14

RESISTOR

Resistance	KΩ	Approximately 2.2

THROTTLE POSITION SENSOR

Accelerator pedal conditions	Resistance kΩ
Completely released	Approximately 1
Partially released	1 - 9
Completely depressed	Approximately 9

IGNITION WIRE

Resistance	kΩ/m (kΩ/ft)	Less than 30 (9.1)

General Specifications

PRESSURE REGULATOR	
Fuel pressure at idling kPa (kg/cm^2, psi)	
Vacuum hose is connected	Approximately 245 (2.5, 36)
Vacuum hose is disconnected	Approximately 294 (3.0, 43)

Inspection and Adjustment

Idle speed*1 rpm	
No-load*2 M/T	750 ± 50
A/T (in "N" position)	790 ± 50
Air conditioner: ON (in "N" position)	800 ± 50
Ignition timing degree	15 ± 2 BTDC
Throttle position sensor idle position V	0.4 - 0.5

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

IGNITION COIL

Primary voltage	V	12
Primary resistance [at 20°C (68°F)]	Ω	Approximately 0.8
Secondary resistance [at 20°C (68°F)]	Ω	∞

MASS AIR FLOW SENSOR

Supply voltage	V	Battery voltage (11 - 14)
Output voltage	V	0.8 - 1.5*

*: Engine is warmed up sufficiently and idling under no-load.

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 0.5

EGR TEMPERATURE SENSOR

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

HEATED OXYGEN SENSOR HEATER

Resistance	Ω	3 - 1,000

IACV-AAC VALVE

Resistance	Ω	Approximately 10

INJECTOR

Resistance	Ω	10 - 14

THROTTLE POSITION SENSOR

Accelerator pedal conditions	Resistance kΩ
Completely released	Approximately 1
Partially released	1 - 9
Completely depressed	Approximately 9