

ENGINE FUEL & EMISSION CONTROL SYSTEM

SECTION EF & EC

GI

MA

EM

LC

EF & EC

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

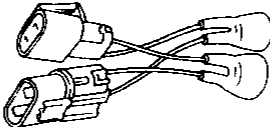
When you read wiring diagrams:

- 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".

PREPARATION AND PRECAUTIONS

Special Service Tool

Tool number (Kent-Moore No.) Tool name	Description	
EG11160000 (—) Ignition coil adapter harness		Measuring engine speed

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PREPARATION AND PRECAUTIONS

Precautions

ECM

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

BATTERY

- Always use a 12 volt battery as a power source.
- Do not disconnect battery cables while the engine is running.
- Do not reverse polarity of battery when connecting it. Otherwise, ECM and/or injectors may be burned.

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 detergent.
- Do not jolt or jar the crankshaft position sensor.

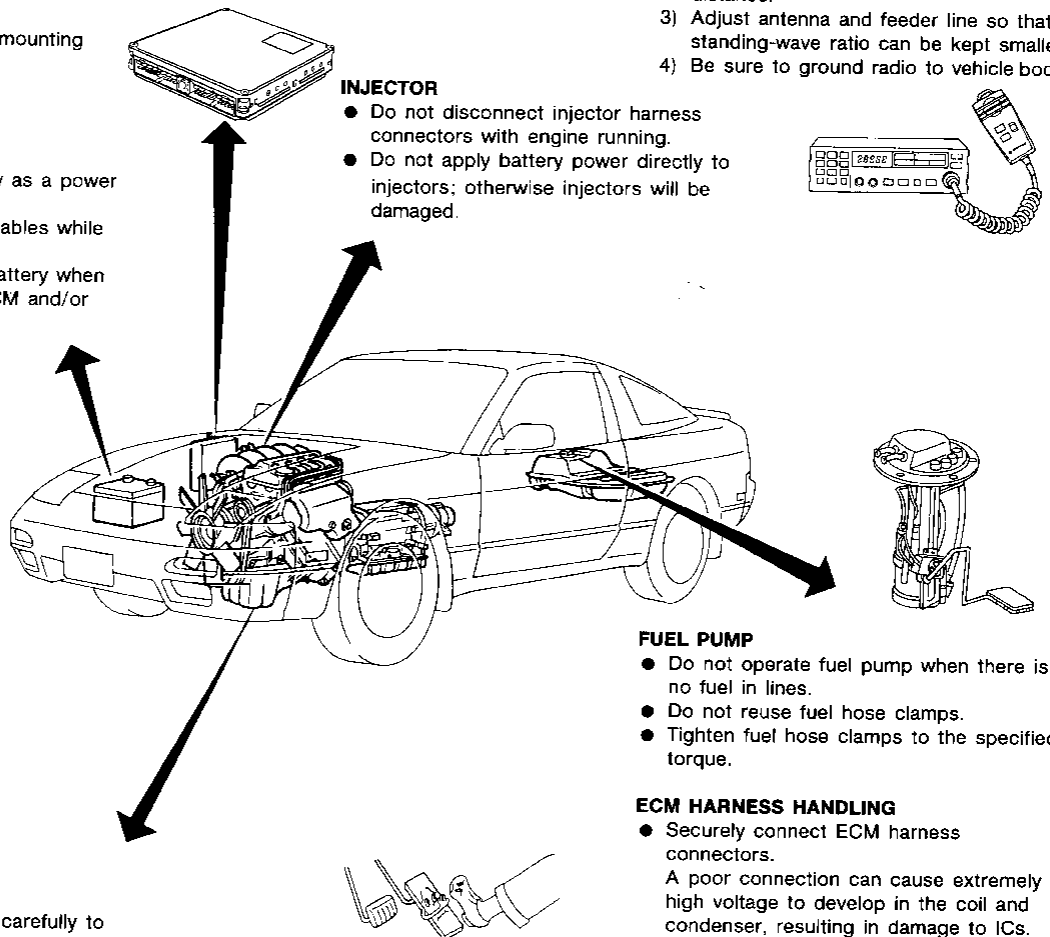
- Before connecting or disconnecting ECM connector, make sure red and green LEDs are off after turning ignition key off.
- Always install the properly specified ECM on car; otherwise, erroneous engine operation may result.
- Disconnect connector by pulling it (not the harness) straight out.
- Before connecting connector, make sure all pins are straight.

INJECTOR

- Do not disconnect injector harness connectors with engine running.
- Do not apply battery power directly to injectors; otherwise injectors will be damaged.

WIRELESS EQUIPMENT

- When installing a C.B. ham radio or a mobile phone, be sure to observe the following, as installation location may affect the electronic control systems.
 - 1) Keep antenna as far as possible away from electronic control units.
 - 2) Keep antenna feeder line more than 20 cm (7.9 in) away from harness of electronic controls. Do not let them run parallel for a long distance.
 - 3) Adjust antenna and feeder line so that standing-wave ratio can be kept smaller.
 - 4) Be sure to ground radio to vehicle body.



FUEL PUMP

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

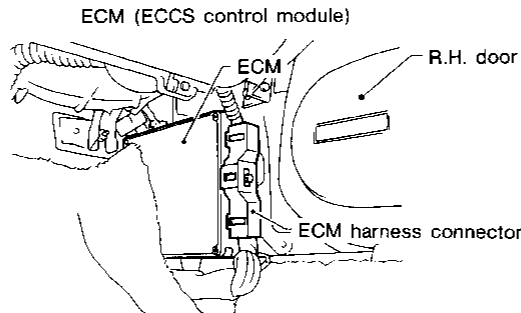
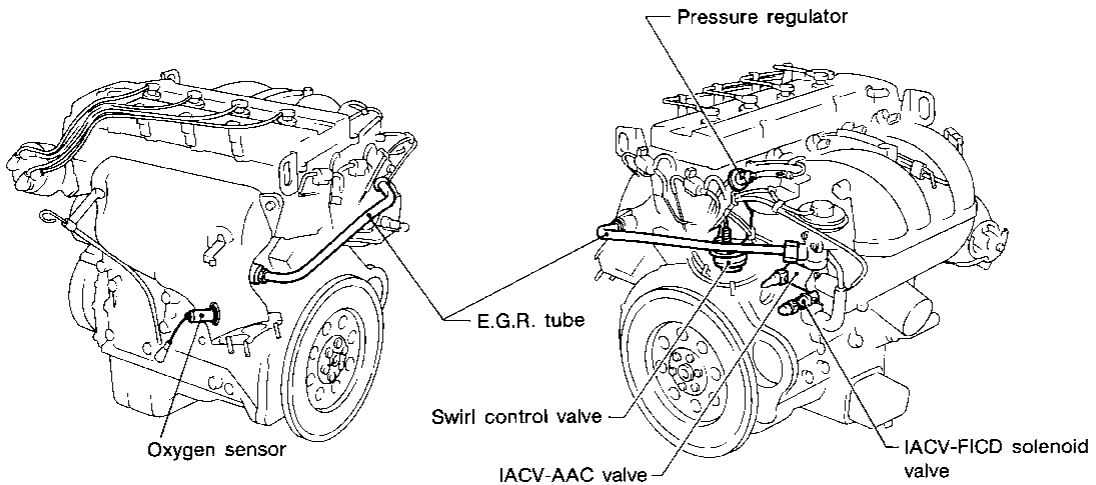
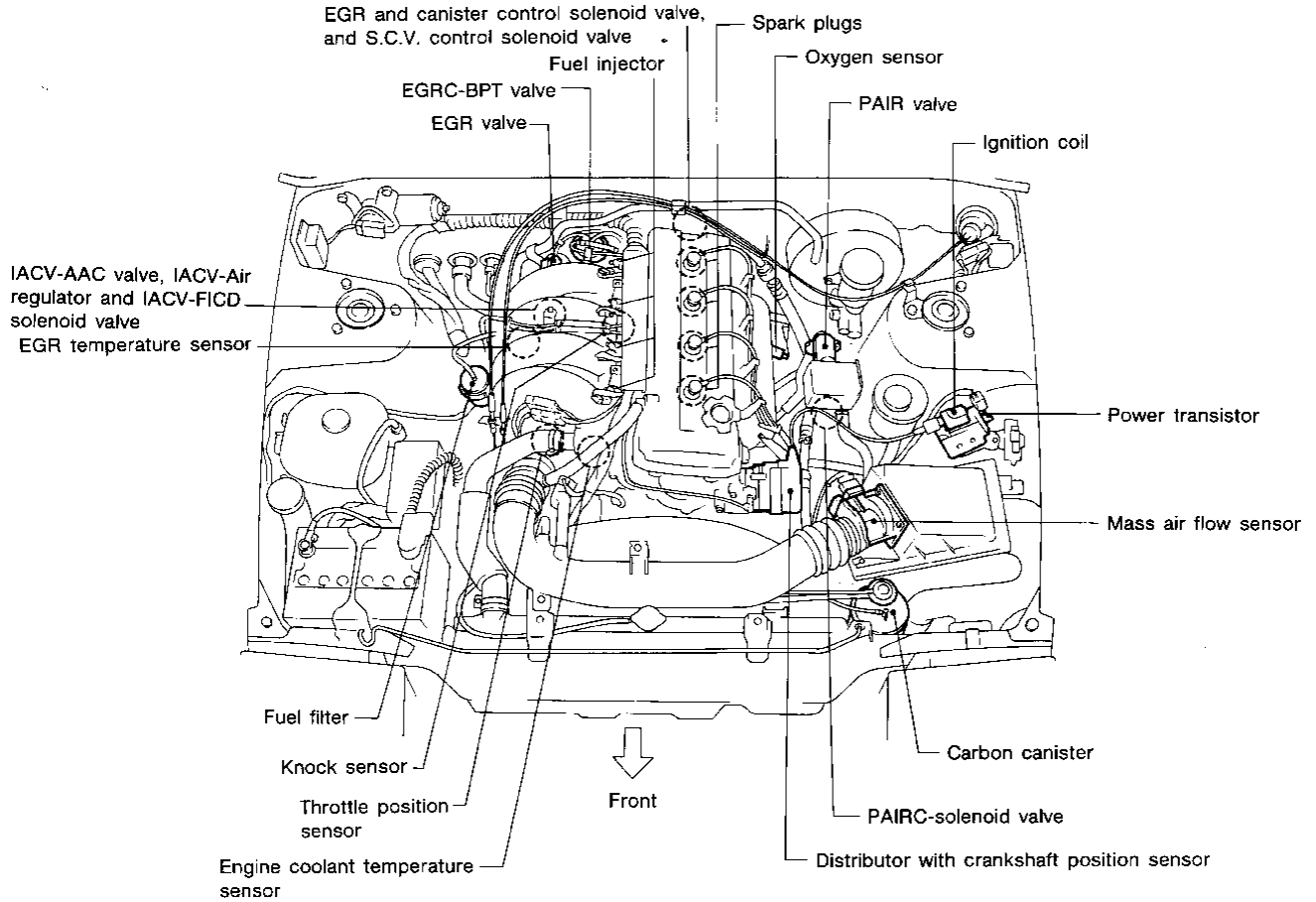
ECM HARNESS HANDLING

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

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.

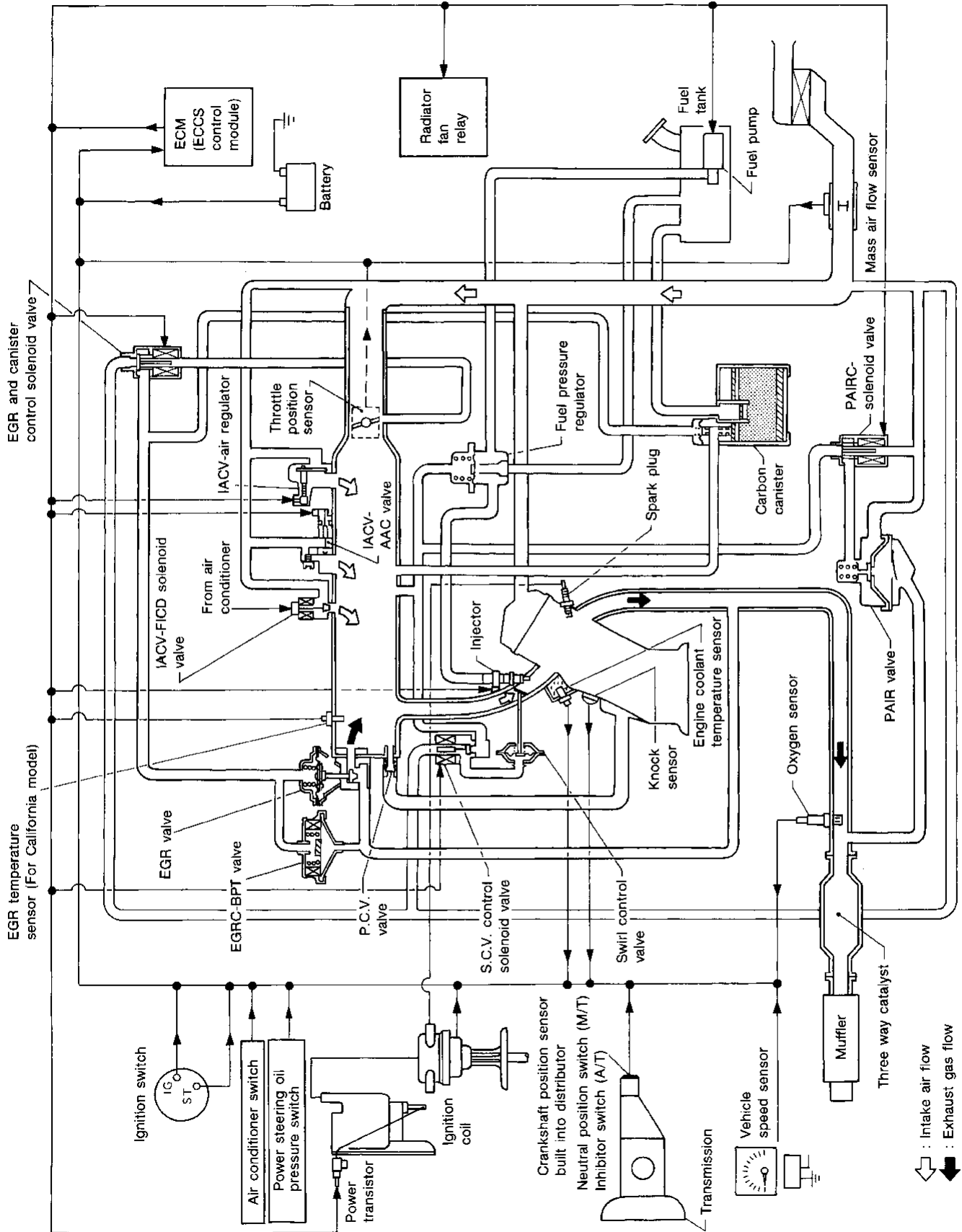
ECCS Component Parts Location



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ENGINE AND EMISSION CONTROL OVERALL SYSTEM

System Diagram

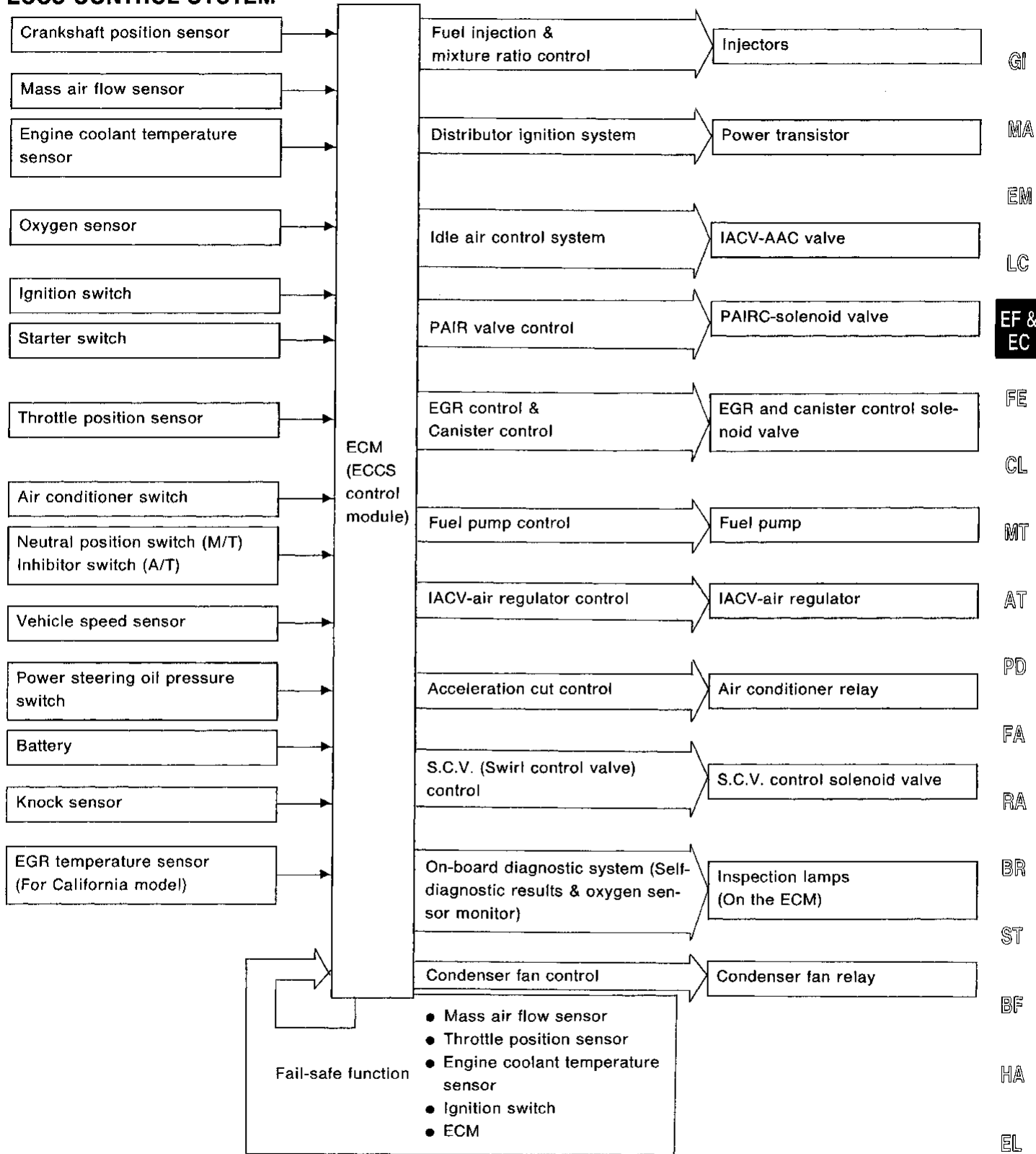


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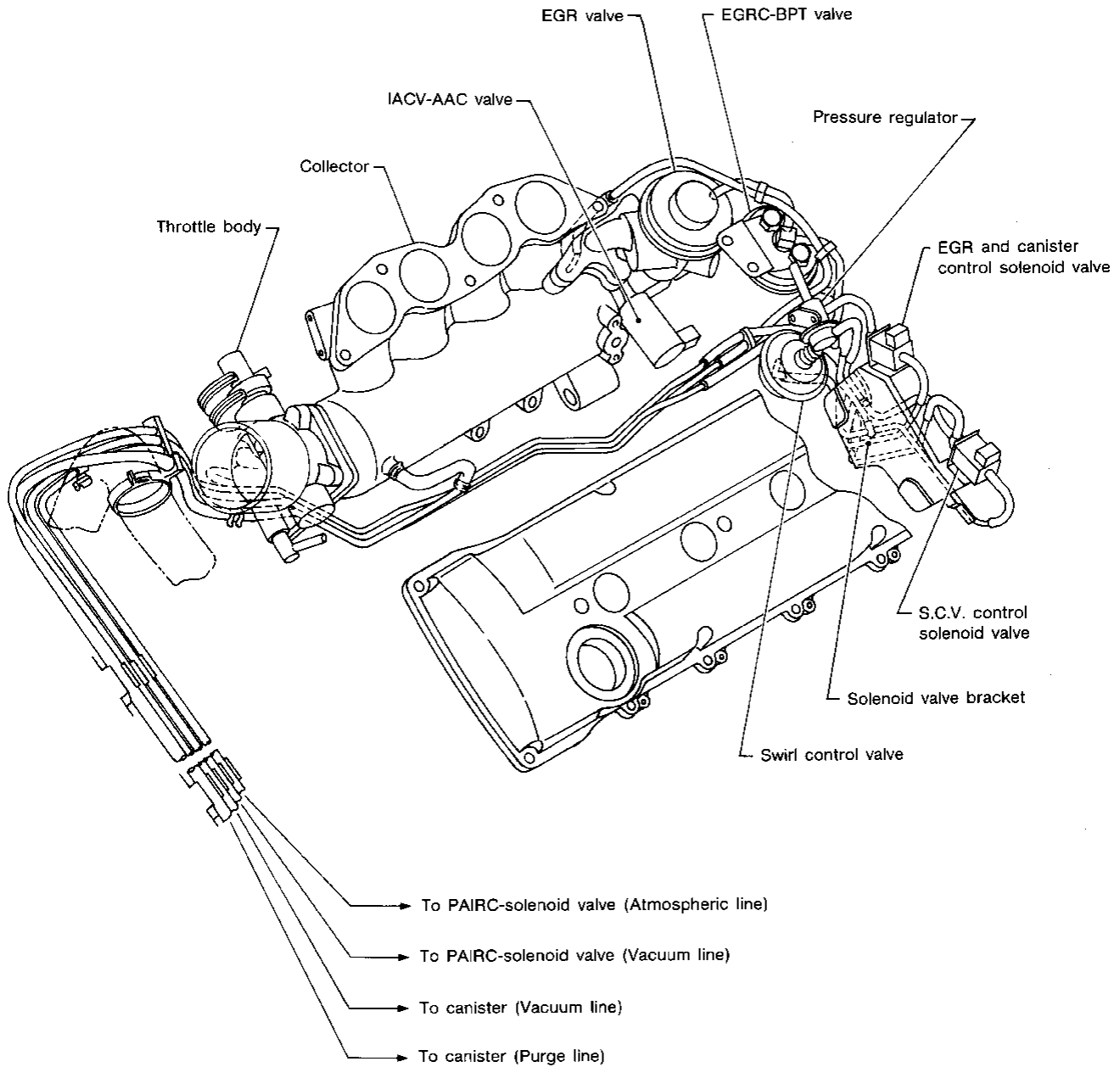
ENGINE AND EMISSION CONTROL OVERALL SYSTEM

System Chart

ECCS CONTROL SYSTEM

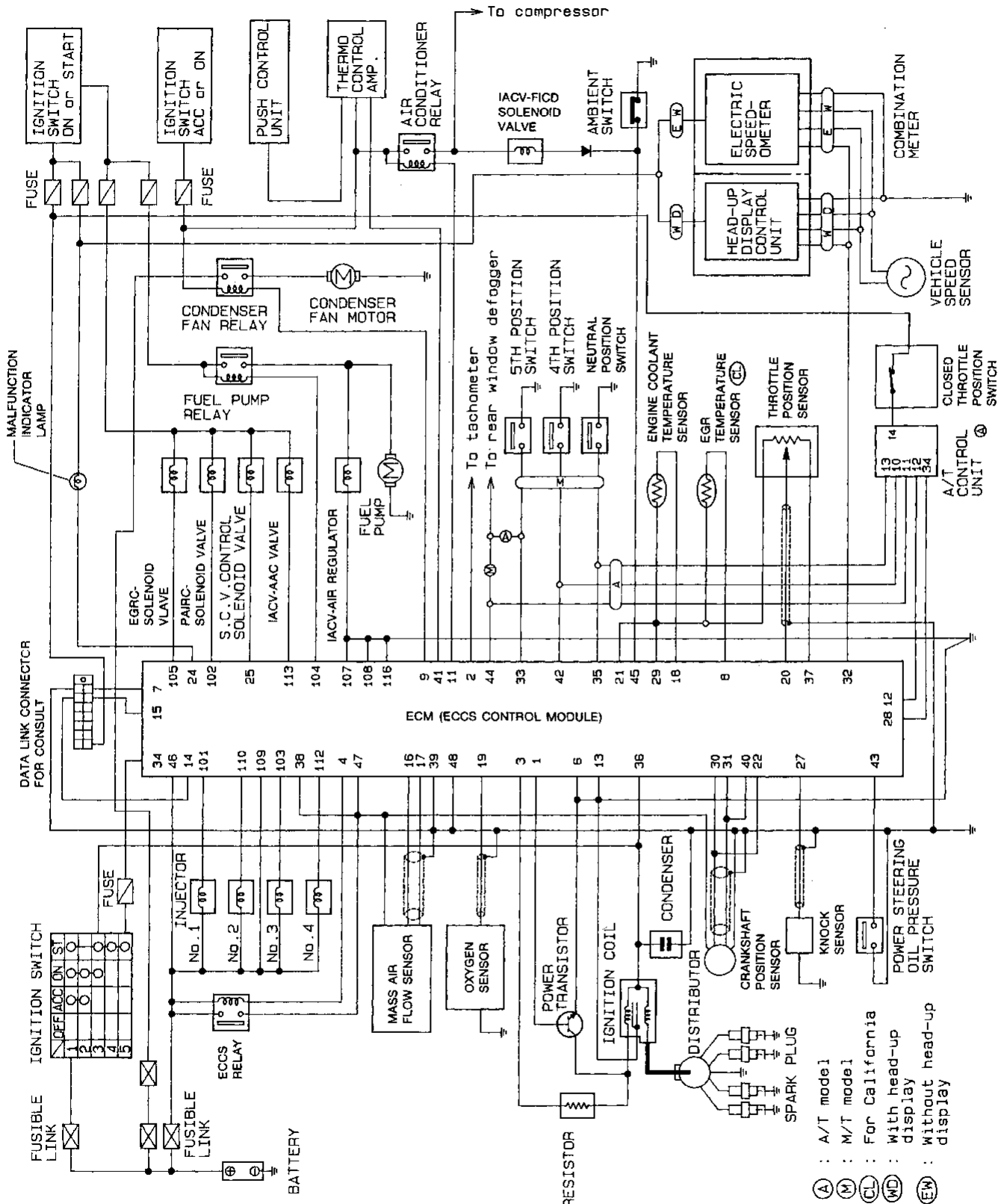


Vacuum Hose Drawing



ENGINE AND EMISSION CONTROL OVERALL SYSTEM

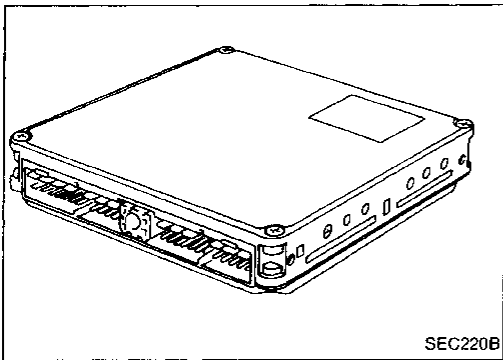
Circuit Diagram



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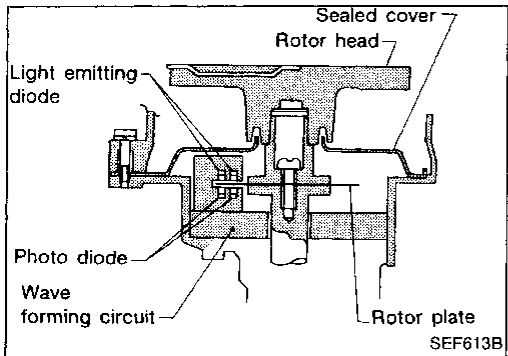
FOR '94 CONV. SEE EPA/EC 93-015/MB 93-171

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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 unit controls the engine.

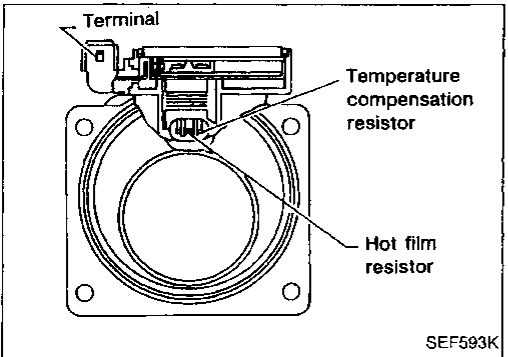
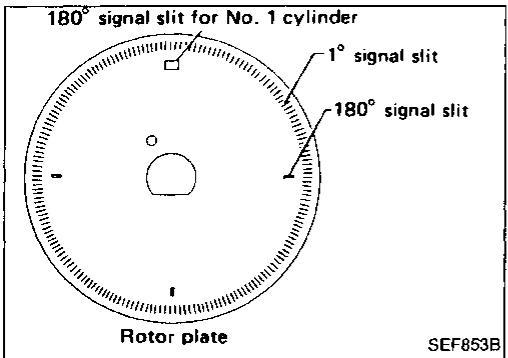


Crankshaft Position Sensor (CKPS)

The crankshaft 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 crankshaft position sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for 1° signal and 4 slits for 180° signal. Light Emitting Diodes (L.E.D.) and photo diodes are built in the wave-forming circuit.

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

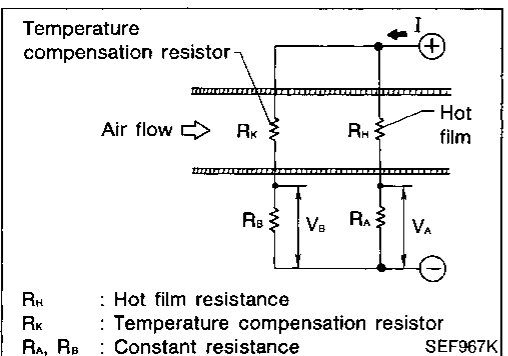


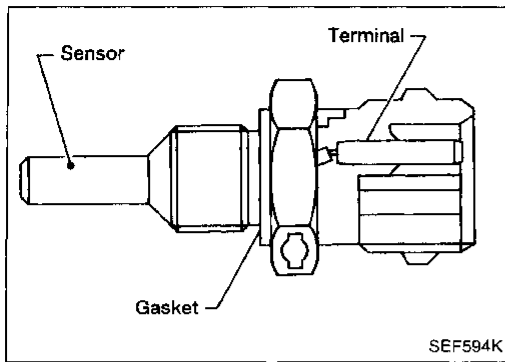
Mass Air Flow Sensor (MAFS)

The mass air flow sensor measures the intake air flow rate by measuring a part of the entire flow. Measurements are made in such a way that the ECM receives electrical output signals 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 reduction depends on the air flow. 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 detects the air flow by means of this current change.

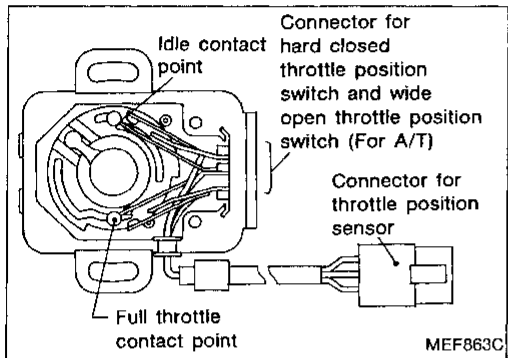




Engine Coolant Temperature Sensor (ECTS)

The engine coolant temperature sensor detects the engine coolant temperature, which is dependent on engine coolant temperature, and transmits a signal to the ECM.

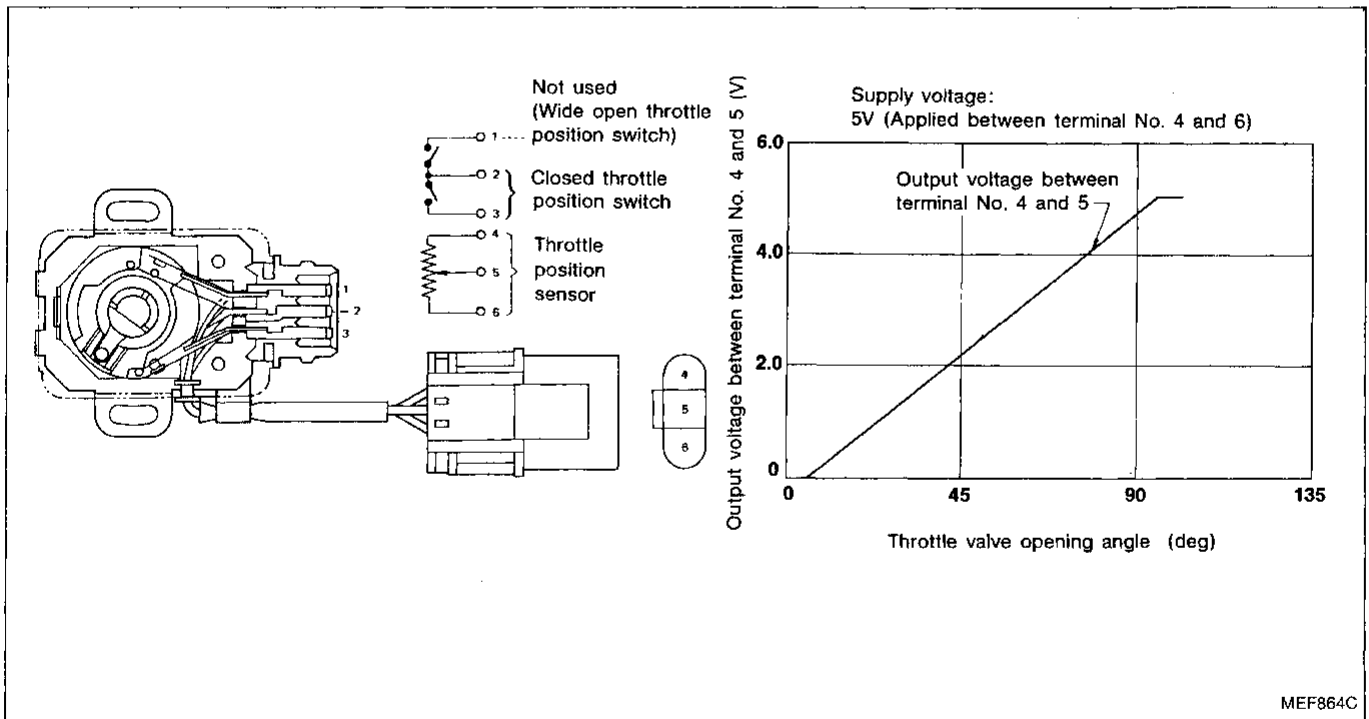
The temperature sensing unit employs a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

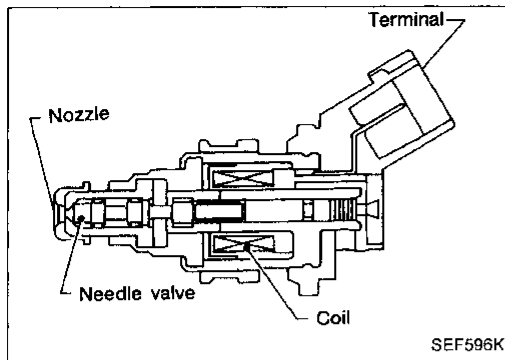


Throttle Position Sensor (TP) & Soft/Hard Closed Throttle Position (CTP) Switch

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.

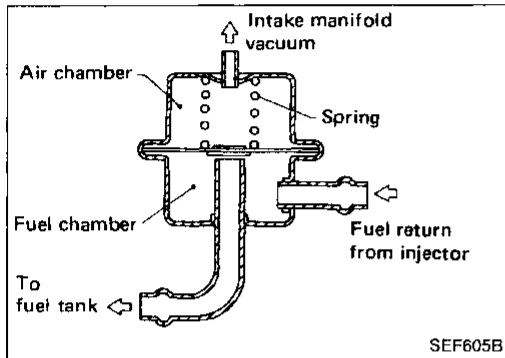
Closed throttle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This system is called "soft closed throttle position switch" and controls engine operation such as fuel cut. On the other hand, "hard closed throttle position switch", which is built into the throttle position sensor unit on A/T equipped models, is used not for engine control.





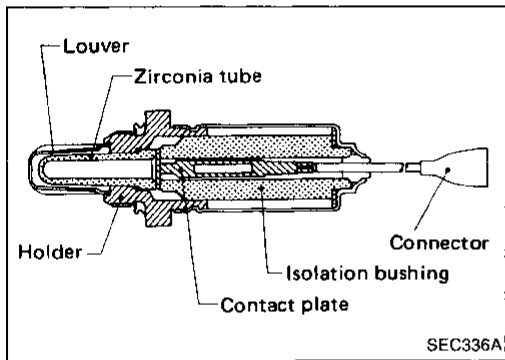
Fuel Injector

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.



Pressure Regulator

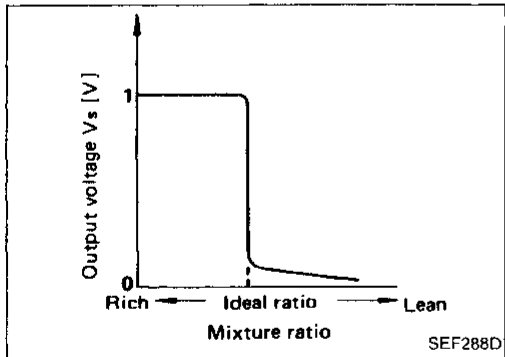
The pressure regulator maintains the fuel pressure at 299.1 kPa (3.05 kg/cm², 43.4 psi). Since the injected fuel amount depends on injection pulse duration, it is necessary to maintain the pressure at the above value.



Oxygen Sensor (O2S)

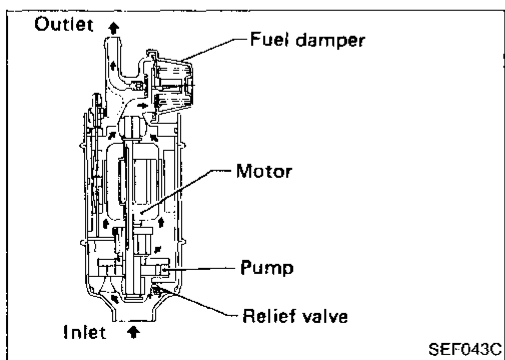
The oxygen sensor, which is placed into the exhaust manifold, monitors the amount of oxygen in the exhaust gas.

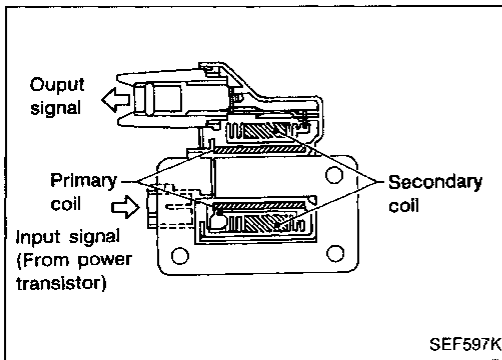
The sensor has a closed-end tube made of ceramic zirconia. The outer surface of the tube is exposed to exhaust gas, and the inner surface to atmosphere. The zirconia of the tube compares the oxygen density of exhaust gas with that of atmosphere, and generates electricity. In order to improve the generating power of the zirconia, its tube is coated with platinum. The voltage is approximately 1V in a richer condition of the mixture ratio than the ideal air-fuel ratio, while approximately 0V in leaner conditions. The radical change from 1V to 0V occurs at around the ideal mixture ratio. In this way, the oxygen sensor detects the amount of oxygen in the exhaust gas and sends the signal of approximately 1V or 0V to the ECM.



Fuel Pump

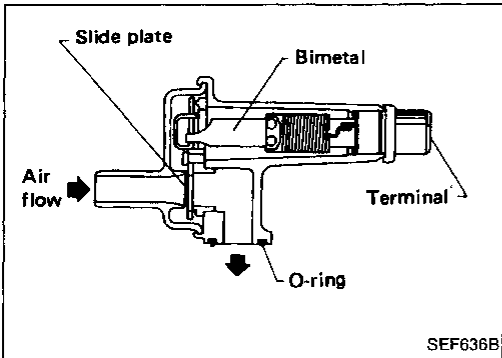
The fuel pump with a fuel damper is a submersible type, and are located in the fuel tank.





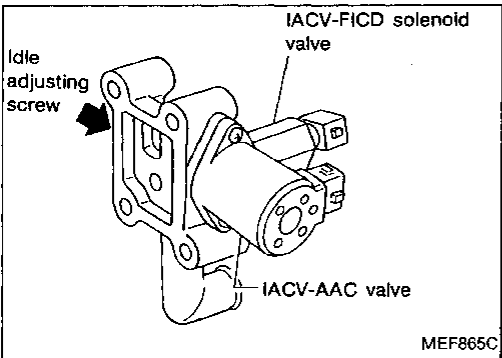
Ignition Coil with Power Transistor

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.



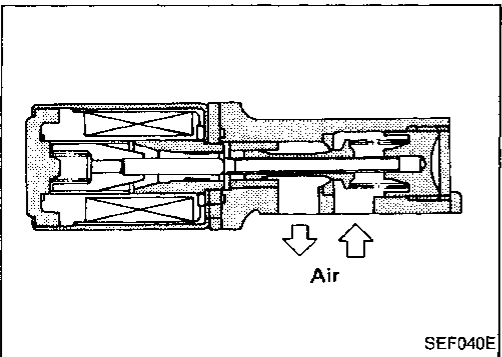
Idle Air Control Valve (IACV)-Air Regulator

The IACV-air regulator provides an air by-pass when the engine is cold for a fast idle during warm-up. A bimetal, heater and rotary shutter are built into the IACV-air regulator. When the bimetal temperature is low, the air by-pass port opens. As the engine starts and electric current flows through a heater, the bimetal begins to turn the shutter to close the by-pass port. The air passage remains closed until the engine stops and the bimetal temperature drops.



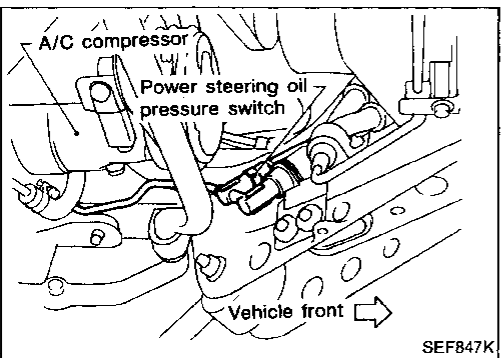
Idle Air Adjusting (I.A.A.) Unit

The I.A.A. unit is made up of the IACV-AAC valve, IACV-FICD solenoid valve and idle adjust screw. It receives the signal from the ECM and controls the idle speed at the preset value. The IACV-FICD solenoid valve compensates for changes in idle speed caused by the operation of the air compressor. A vacuum control valve is also installed in this unit to prevent an abnormal rise in intake manifold vacuum pressure during deceleration.



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

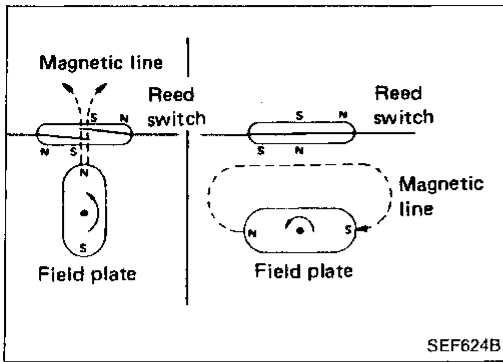
The ECM actuates the IACV-AAC valve by an ON/OFF pulse. The longer that ON pulse is received, the larger the amount of air that will flow through the IACV-AAC valve.



Power Steering Oil Pressure Switch

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

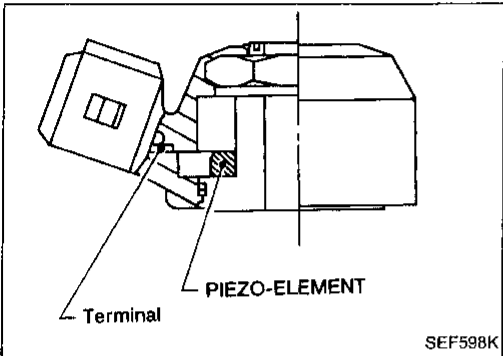
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Vehicle Speed Sensor (VSS)

The vehicle speed sensor provides a vehicle speed signal to the ECM.

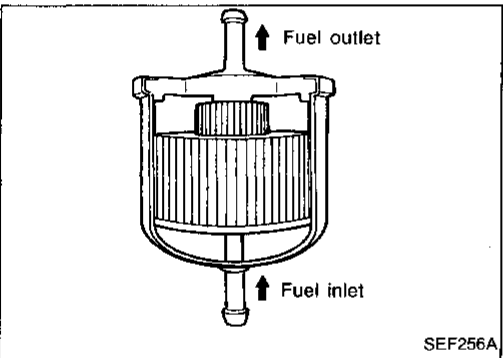
The speed sensor consists of a reed switch, which is installed on the transmission unit and transforms vehicle speed into a pulse signal.



Knock Sensor (KS)

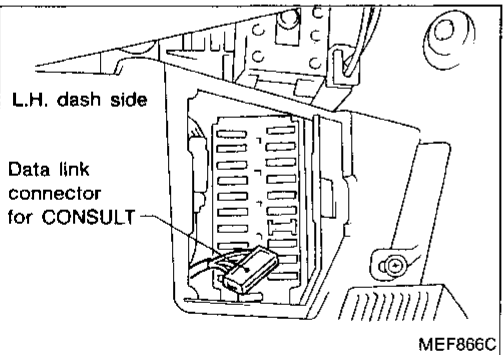
The knock sensor is attached to the cylinder block and senses engine knocking conditions.

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 sent to the ECM.



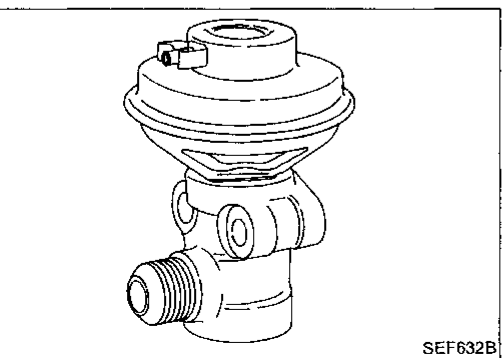
Fuel Filter

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 beside the fuse lid.

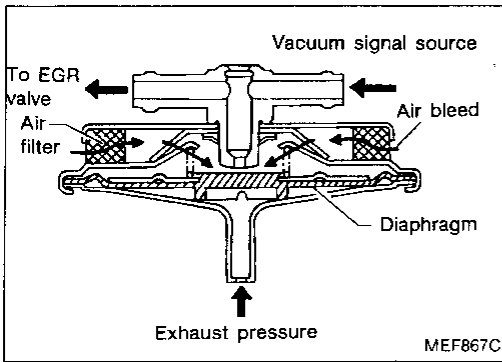


Exhaust Gas Recirculation (EGR) Valve

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.

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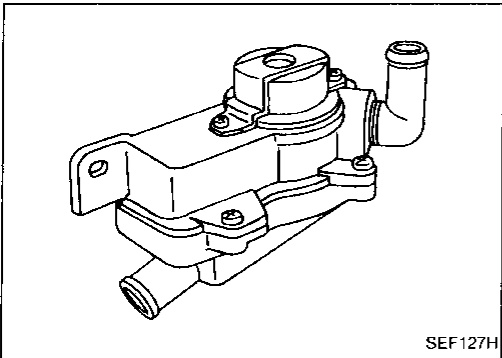
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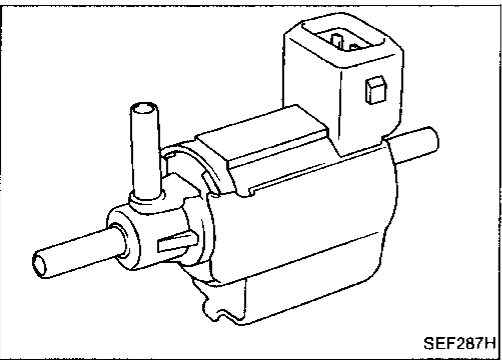
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Pulsed Secondary Air Injection (PAIR) Valve (PAIR valve)

The PAIR valve sends secondary air to the exhaust manifold, using a vacuum created by exhaust pulsation in the exhaust manifold. When the exhaust pressure is below atmospheric pressure (negative pressure), secondary air is sent to the exhaust manifold. When the exhaust pressure is above atmospheric pressure, the reed valves prevent secondary air from being sent back to the air cleaner.



Pulsed Secondary Air Injection (PAIRC) Solenoid Valve

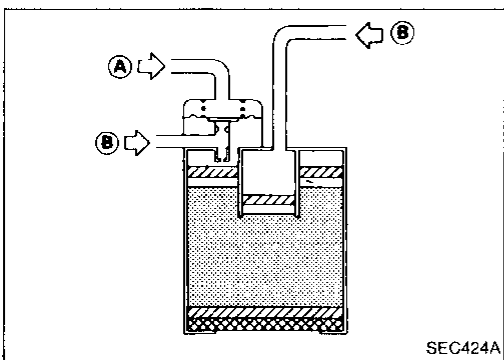
The PAIRC-solenoid valve cuts the intake manifold vacuum signal for PAIR valve control. It responds to the ON/OFF signal from the ECM. When the solenoid is off, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal, the coil pulls the plunger downward and feeds the vacuum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

EGR and Canister Control Solenoid Valve

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

S.C.V. Control Solenoid Valve

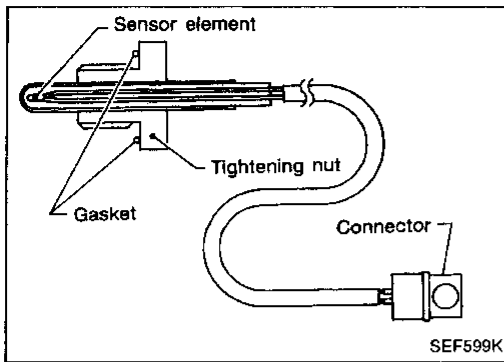
The S.C.V. control solenoid valve cuts the intake manifold vacuum signal for swirl control valve. It responds to the ON/OFF signal from the ECM. When the solenoid is off, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger and feeds the vacuum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



Carbon Canister

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

The vacuum in the intake passage upstream of the throttle valve increases in response to the amount of the intake air. When the vacuum of the intake passage is higher than a pre-set value, the 2nd purge control valve opens and the absorbed gases are sucked into the intake passage for combustion purposes.

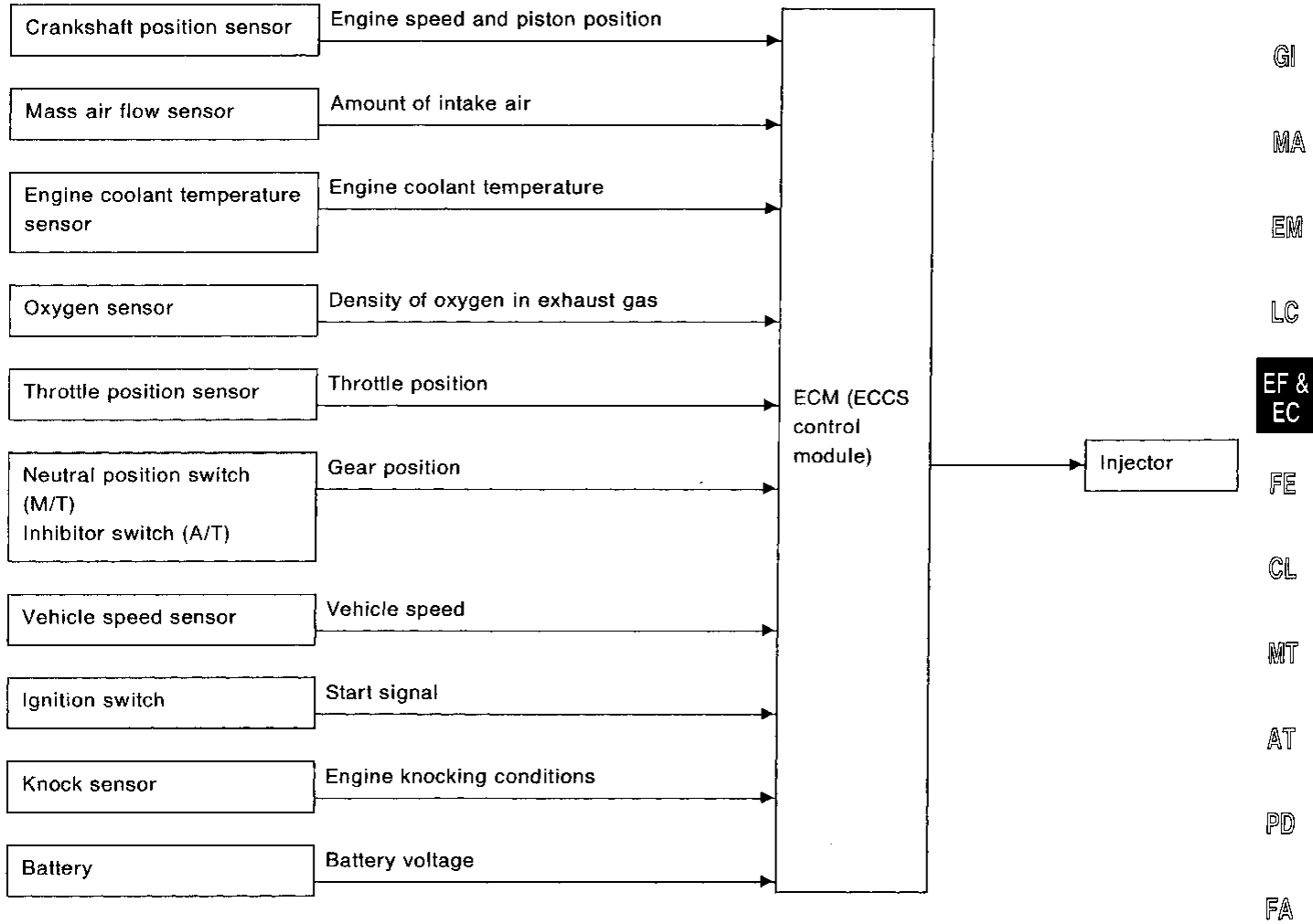


EGR Temperature Sensor (For California models)

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 MULTIPOINT 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 crankshaft 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

ENGINE AND EMISSION CONTROL SYSTEM DESCRIPTION

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

MIXTURE RATIO FEEDBACK CONTROL

The mixture ratio feedback system is used for precise control of the mixture ratio to the stoichiometric point, so that the three way catalyst can reduce CO, HC and NO_x emissions. This system uses an 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.

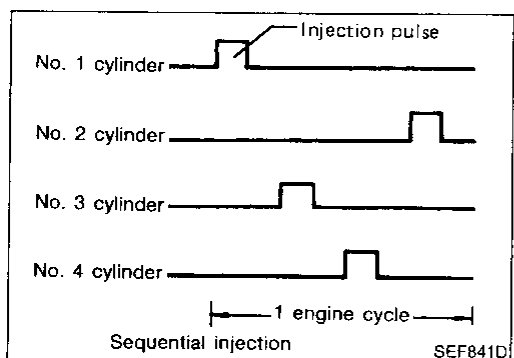
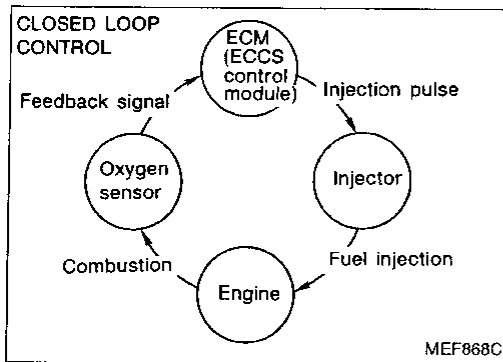
This stage refers to the closed loop control condition. The open loop control condition refers to that under which the ECM detects any of the following conditions and feedback control stops in order to maintain stabilized fuel combustion.

- 1) Deceleration and acceleration
- 2) High-load, high-speed operation
- 3) Engine idling
- 4) Malfunction of oxygen sensor or its circuit
- 5) Insufficient activation of oxygen sensor at low engine coolant temperature
- 6) Engine starting
- 7) High-engine coolant temperature
- 8) After shifting from "N" position to "D" position

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the 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 differences (e.g., mass air flow sensor hot film) and changes to the ECCS parts during operation (injector clogging, etc.) which directly affect the mixture ratio.

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

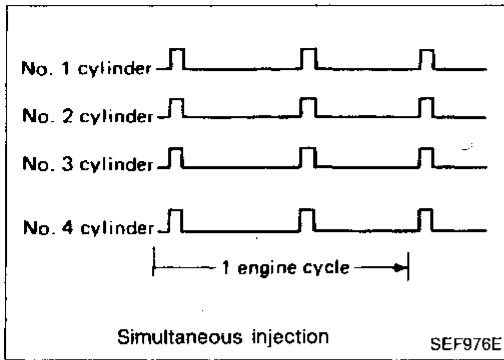


FUEL INJECTION TIMING

Two types of fuel injection systems are used — sequential multiport fuel injection system and simultaneous multiport fuel injection system. In the former, fuel is injected into each cylinder during each engine cycle according to the firing order.

ENGINE AND EMISSION CONTROL SYSTEM DESCRIPTION

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



In the simultaneous multiport fuel injection system, fuel is injected into all four cylinders simultaneously twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM to the four injectors two times for each engine cycle.

When the engine is being started and/or if the fail-safe system (C.P.U., crankshaft position sensor) 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, operation of the engine at excessively high speeds or at high exhaust temperatures.

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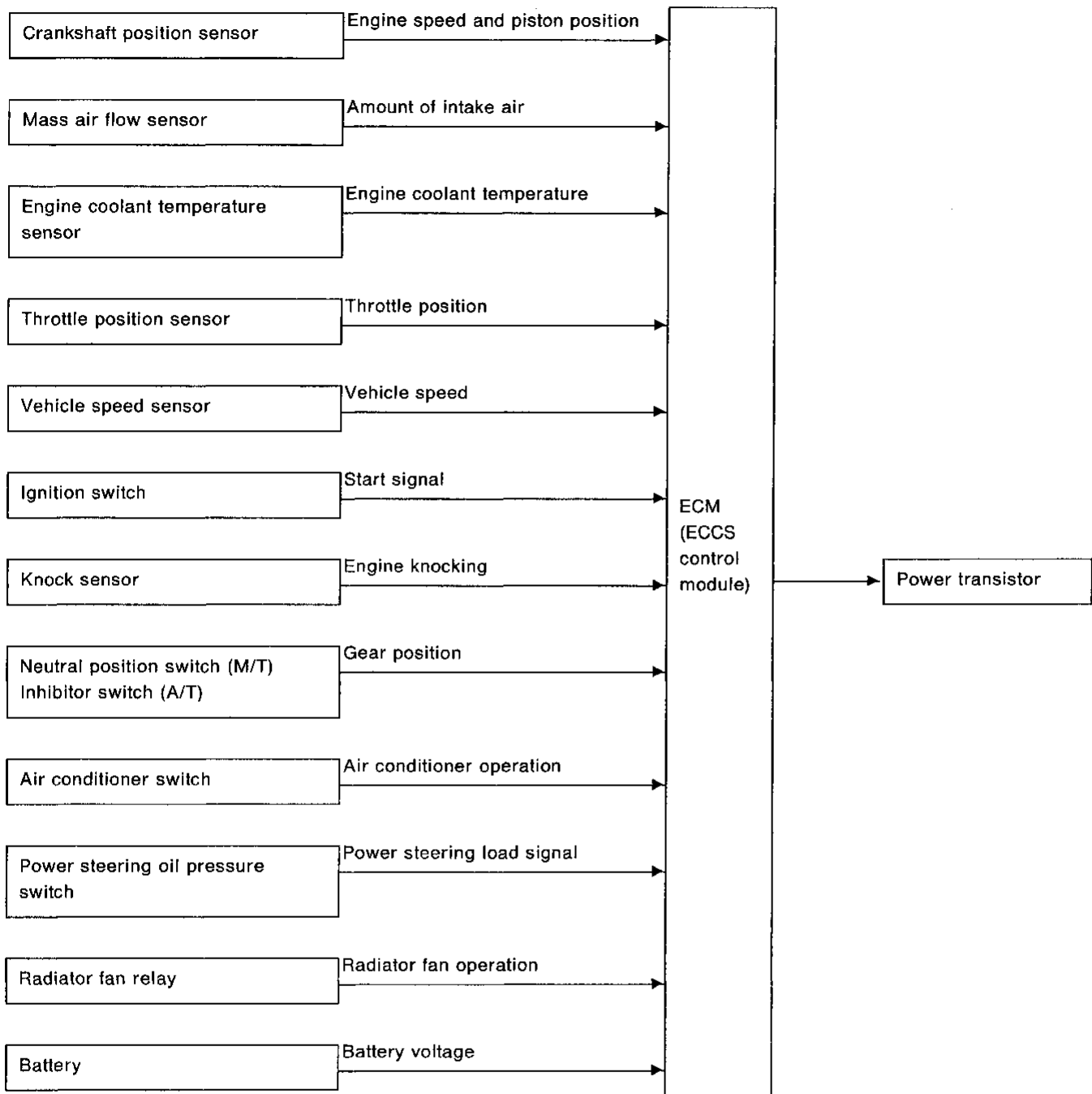
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Distributor Ignition (DI) System

INPUT/OUTPUT SIGNAL LINE



ENGINE AND EMISSION CONTROL SYSTEM DESCRIPTION

Distributor Ignition (DI) System (Cont'd)

SYSTEM DESCRIPTION

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

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

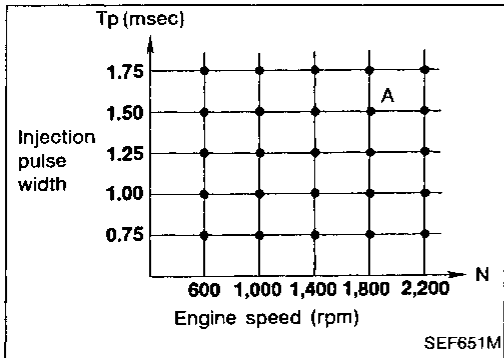
The ECM detects information such as the injection pulse width and crankshaft position sensor signal which varies every moment. Then responding to this information, ignition signals are transmitted to the power transistor.

e.g. N: 1,800 rpm, Tp: 1.50 msec
A °B.T.D.C.

In addition to this,

- 1 At starting
- 2 During warm-up
- 3 At idle
- 4 During swirl control valve operates
- 5 Hot engine operation
- 6 At acceleration

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



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

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

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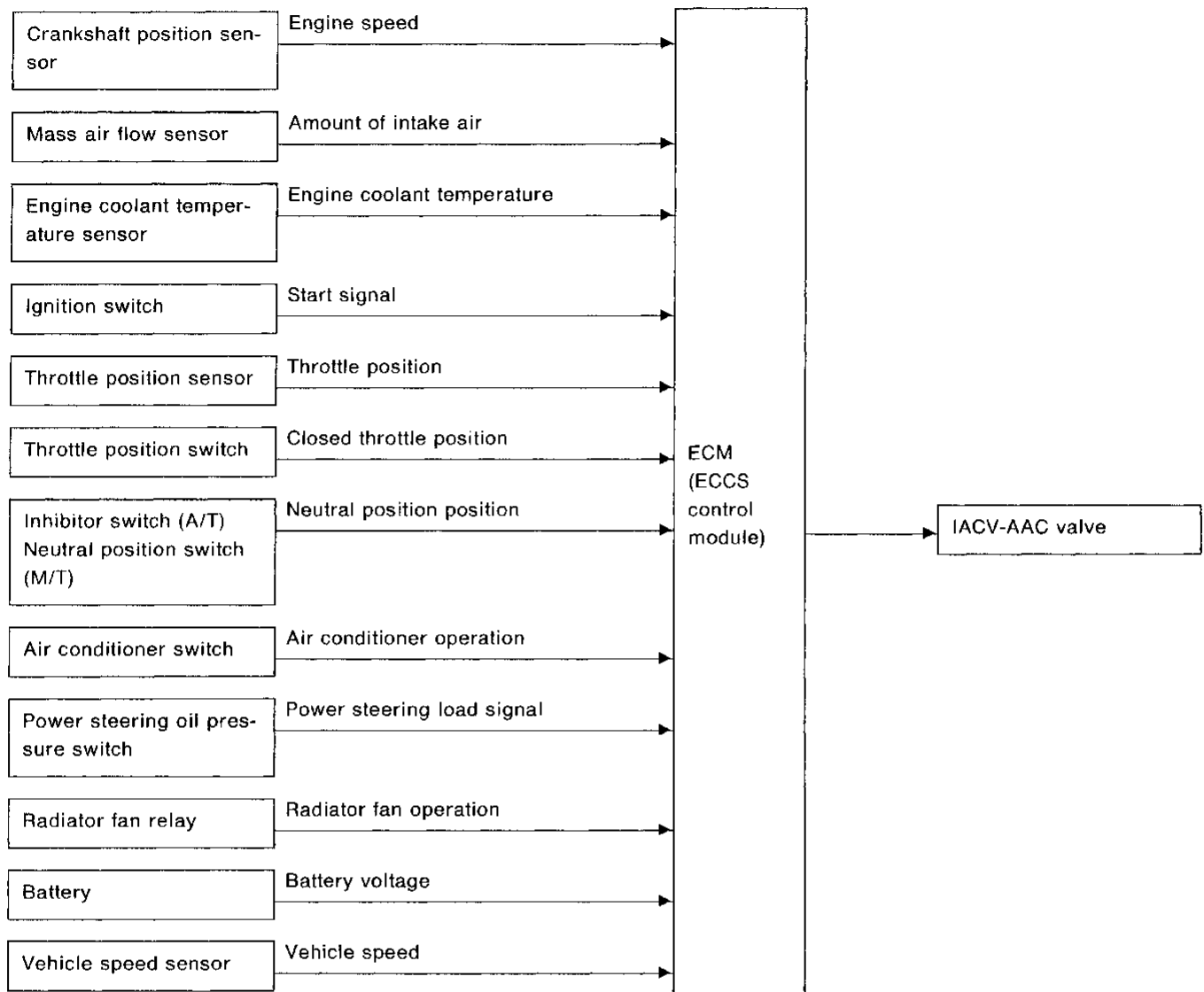
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Idle Air Control (IACV) System

INPUT/OUTPUT SIGNAL LINE



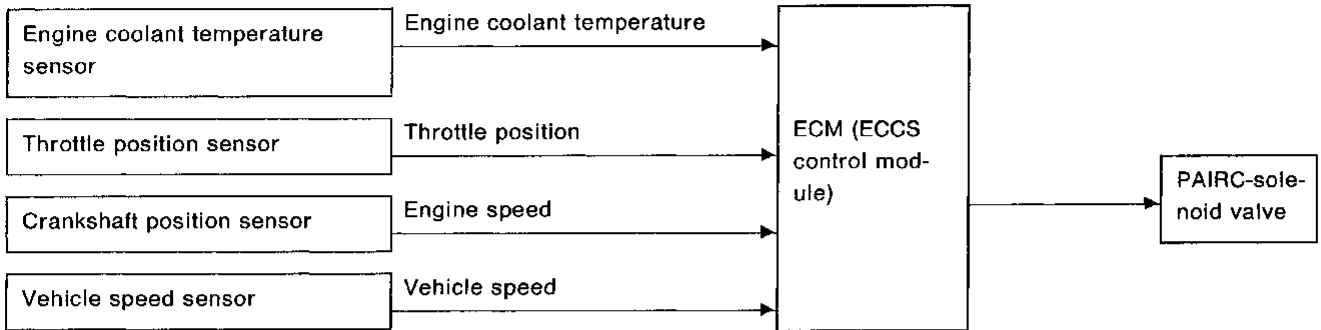
SYSTEM DESCRIPTION

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which by-passes the throttle valve via the IACV-AAC valve. The IACV-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The crankshaft 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 noise and vibration transmitted to the vehicle interior, fuel consumption, and engine load.

**Pulsed Secondary Air Injection (PAIR) Valve
(PAIR valve) Control**

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

The PAIR system is designed to send secondary air to the exhaust manifold, utilizing the vacuum caused by exhaust pulsation in the exhaust manifold.

The exhaust pressure in the exhaust manifold usually pulsates in response to the opening and closing of the exhaust valve and decreases below atmospheric pressure periodically.

If a secondary air intake pipe is opened to the atmosphere under vacuum conditions, secondary

air can be drawn into the exhaust manifold in proportion to the vacuum.

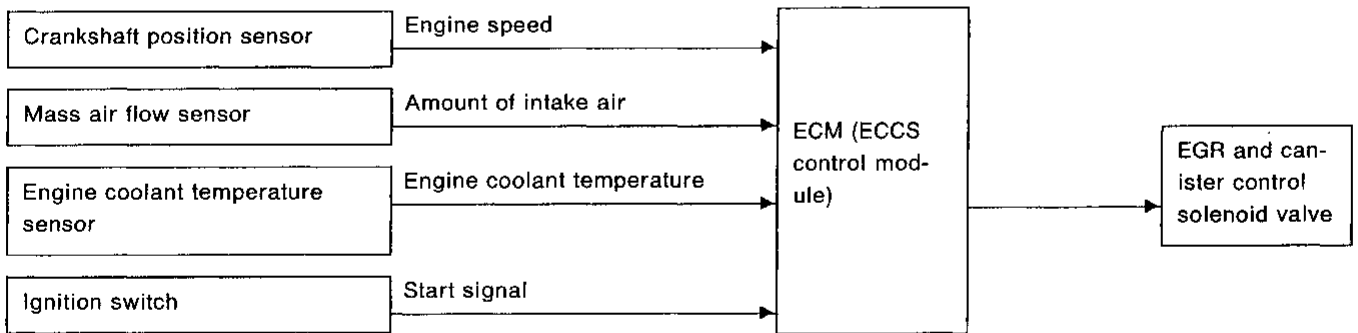
The PAIR valve is controlled by the ECM, corresponding to the engine coolant temperature. When the engine is cold, the PAIR valve control system operates to reduce HC and CO.

In extremely cold conditions, PAIR valve control system does not operate to reduce after-burning.

This system also operates during deceleration for the purpose of blowing off water around the PAIR valve.

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.

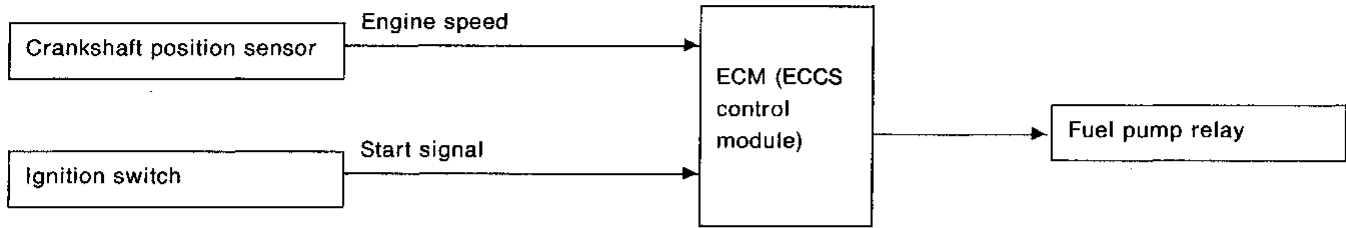
- 1) Low engine coolant temperature
- 2) Engine starting
- 3) High-speed engine operation
- 4) Engine idling
- 5) Excessively high engine coolant temperature

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ENGINE AND EMISSION CONTROL SYSTEM DESCRIPTION

Fuel Pump Control

INPUT/OUTPUT SIGNAL LINE



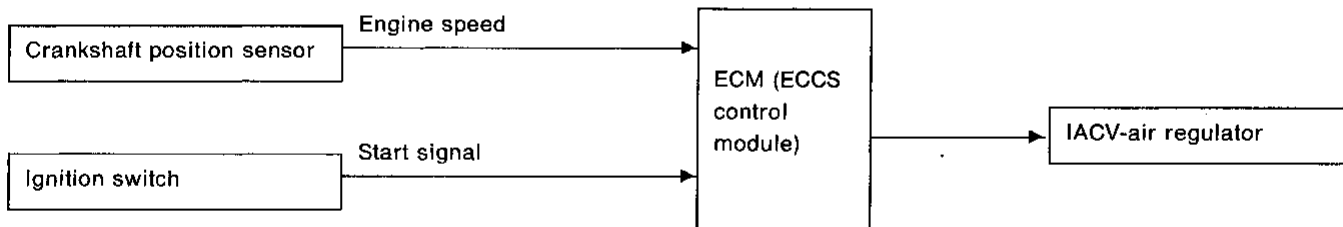
SYSTEM DESCRIPTION

The ECM activates the fuel pump for several seconds after the ignition switch is turned on to improve engine start-up. If the ECM receives a 1° signal from the crankshaft position sensor, it knows that the engine is rotating, and causes the pump to activate. If the 1° signal is not received when the ignition switch is on, the engine stalls. The ECM stops pump operation and prevents 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 second
Except as shown above	Stops

Idle Air Control Valve (IACV)-Air Regulator Control

INPUT/OUTPUT SIGNAL LINE



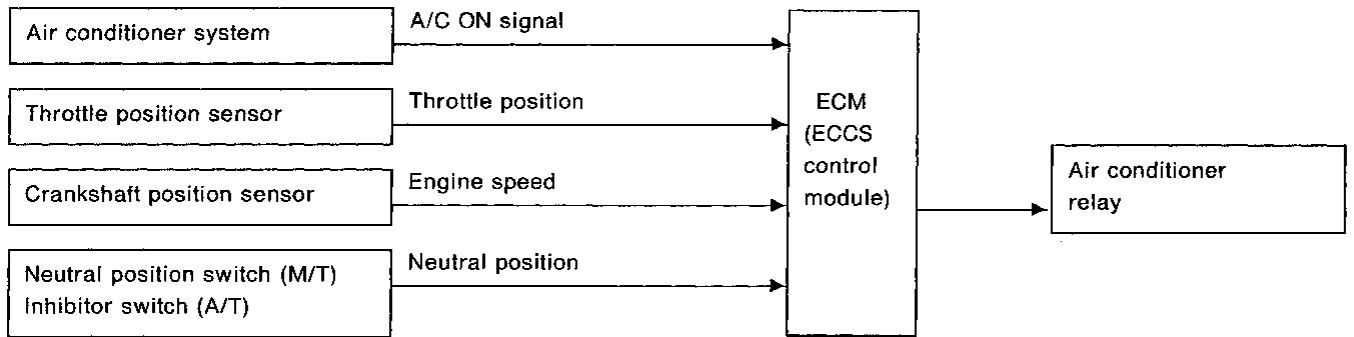
SYSTEM DESCRIPTION

The IACV-air regulator is controlled by the ECM at the same time as fuel pump ON-OFF control.

Condition	IACV-air regulator operation
Ignition switch is turned to ON	Operates for 5 seconds
While engine is running and cranking	Operates
When engine is stopped	OFF in 1 second
Except as shown above	OFF

Acceleration Cut Control

INPUT/OUTPUT SIGNAL LINE



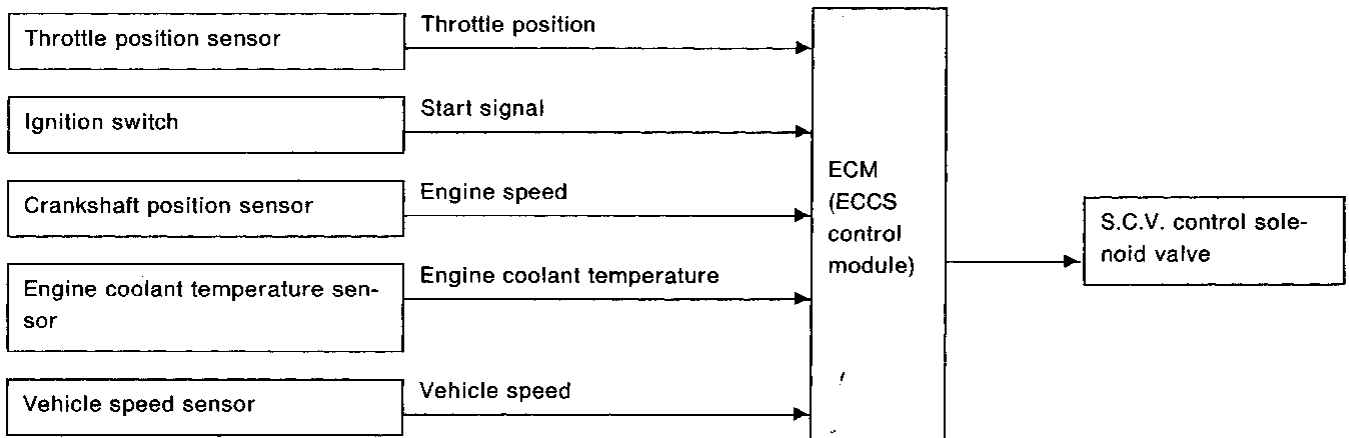
SYSTEM DESCRIPTION

When the accelerator pedal is fully depressed or the engine is running at high speed, the air conditioner is turned off for a few seconds.

This system improves acceleration when the air conditioner is used.

Swirl Control Valve (S.C.V.) Control

INPUT/OUTPUT SIGNAL LINE



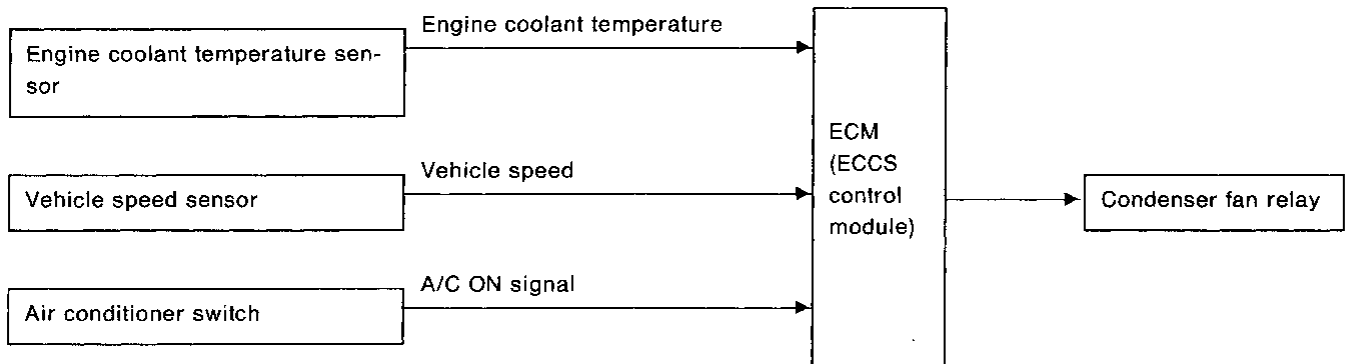
SYSTEM DESCRIPTION

This system has a swirl control valve (S.C.V.) in the intake passage of each cylinder. While idling the S.C.V. closes. Thus the velocity of the air in the intake passage increases, promoting the vaporization of the fuel and producing a swirl in the combustion chamber. Because of this operation, this system tends to increase the burning speed of the gas mixture,

improve fuel consumption, and increase the stability in running conditions. Also, except when idling, this system opens the S.C.V. In this condition, this system tends to increase power by improving intake efficiency via reduction of intake flow resistance, intake flow. The solenoid valve controls S.C.V.'s shut/open condition. This solenoid valve is operated by the ECM.

Condenser Fan Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

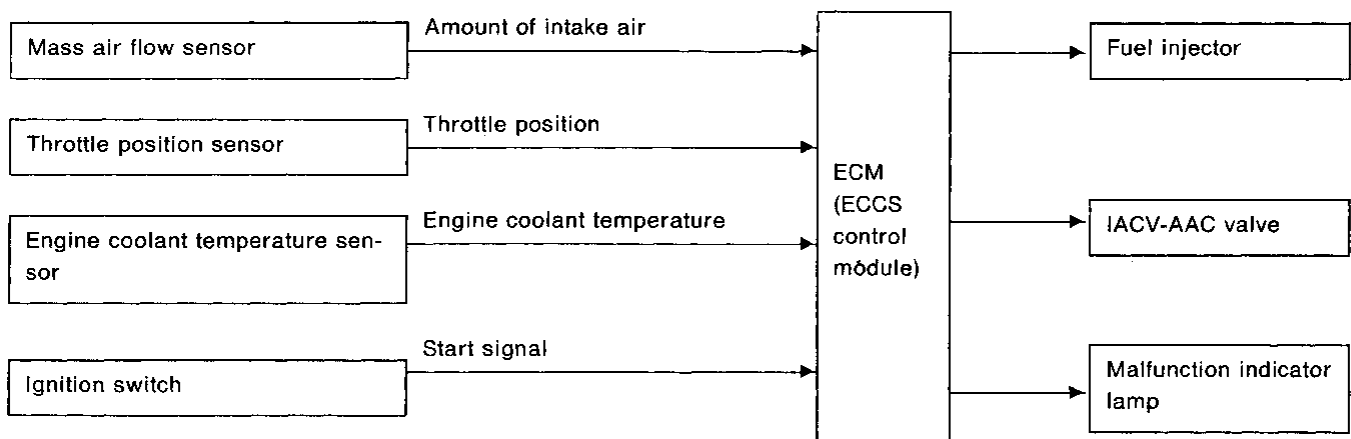
The ECM performs ON and OFF control of the radiator fan relay, corresponding to the engine coolant temperature sensor, vehicle speed sensor and air conditioner switch operations.

Vehicle speed km/h (MPH)	Engine coolant temperature °C (°F)	A/C OFF	A/C ON
Below 20 (12)	Below 100 (212)	FAN OFF	FAN ON
	100 (212) or more	FAN ON	
Between 20 (12) and 79 (49)	Below 100 (212)	FAN OFF	
	100 (212) or more	FAN ON	
80 (50) or more	Below 100 (212)	FAN OFF	
	100 (212) or more	FAN ON	

Fail-safe System

C.P.U. MALFUNCTION

Input/output signal line



ENGINE AND EMISSION CONTROL SYSTEM DESCRIPTION

Fail-safe System (Cont'd)

Outline

The fail-safe system makes engine starting possible if there is something malfunctioning in the ECM's C.P.U. 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 C.P.U. 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, and so on are controlled under certain limitations.

Operation (Mass air flow sensor malfunction)

Engine condition	Starter switch	Fail-safe system	Fail-safe functioning
Stopped	ANY	Does not operate	—
Cranking	ON		
Running	OFF	Operates	Engine speed will not rise above 2,400 rpm

ENGINE COOLANT TEMPERATURE SENSOR MALFUNCTION

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

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

Cancellation of fail-safe system when ECM is malfunctioning

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

MASS AIR FLOW SENSOR MALFUNCTION

If the mass air flow sensor output voltage is below the specified value when the starter switch is being turned OFF, the ECM senses an mass air flow sensor malfunction. In the case of a malfunction, the fuel injection operates without the mass air flow sensor signal.

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.

THROTTLE POSITION SENSOR MALFUNCTION

When the throttle position sensor output voltage is below or above the specified value, the throttle position is fixed at a specified value. In this condition the ECM does not use the throttle position sensor output. The closed throttle position is decided by the mass air flow sensor, crankshaft position sensor output signals.

Operation	Driving condition
While idling	Low engine speed
While accelerating	Poor acceleration

START SIGNAL FOR MISOPERATION

Once the engine speed exceeds 1,000 rpm, no ill effect will be caused in the engine control during engine operation even if the ignition switch is set by mistake to the START position.

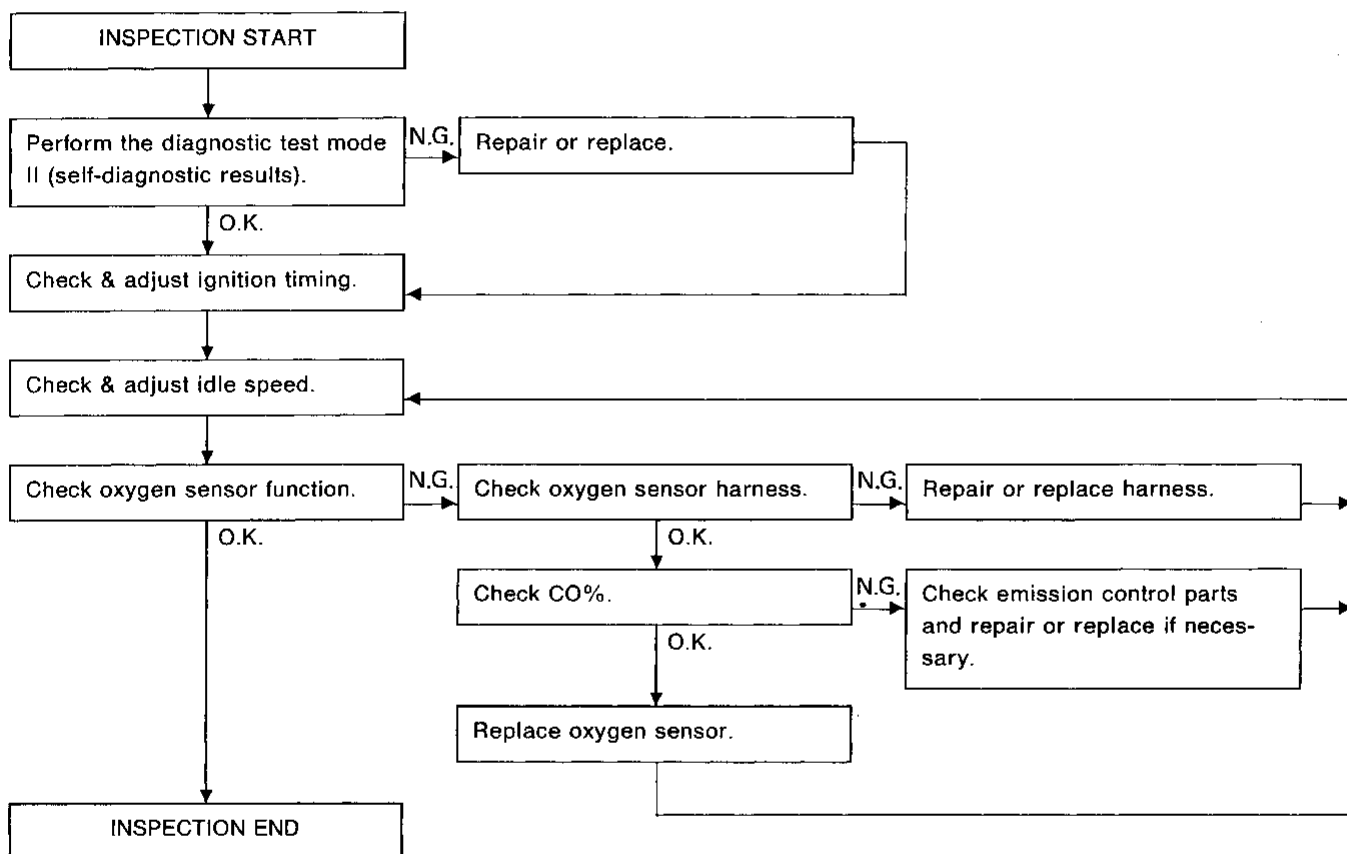
IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION

PREPARATION

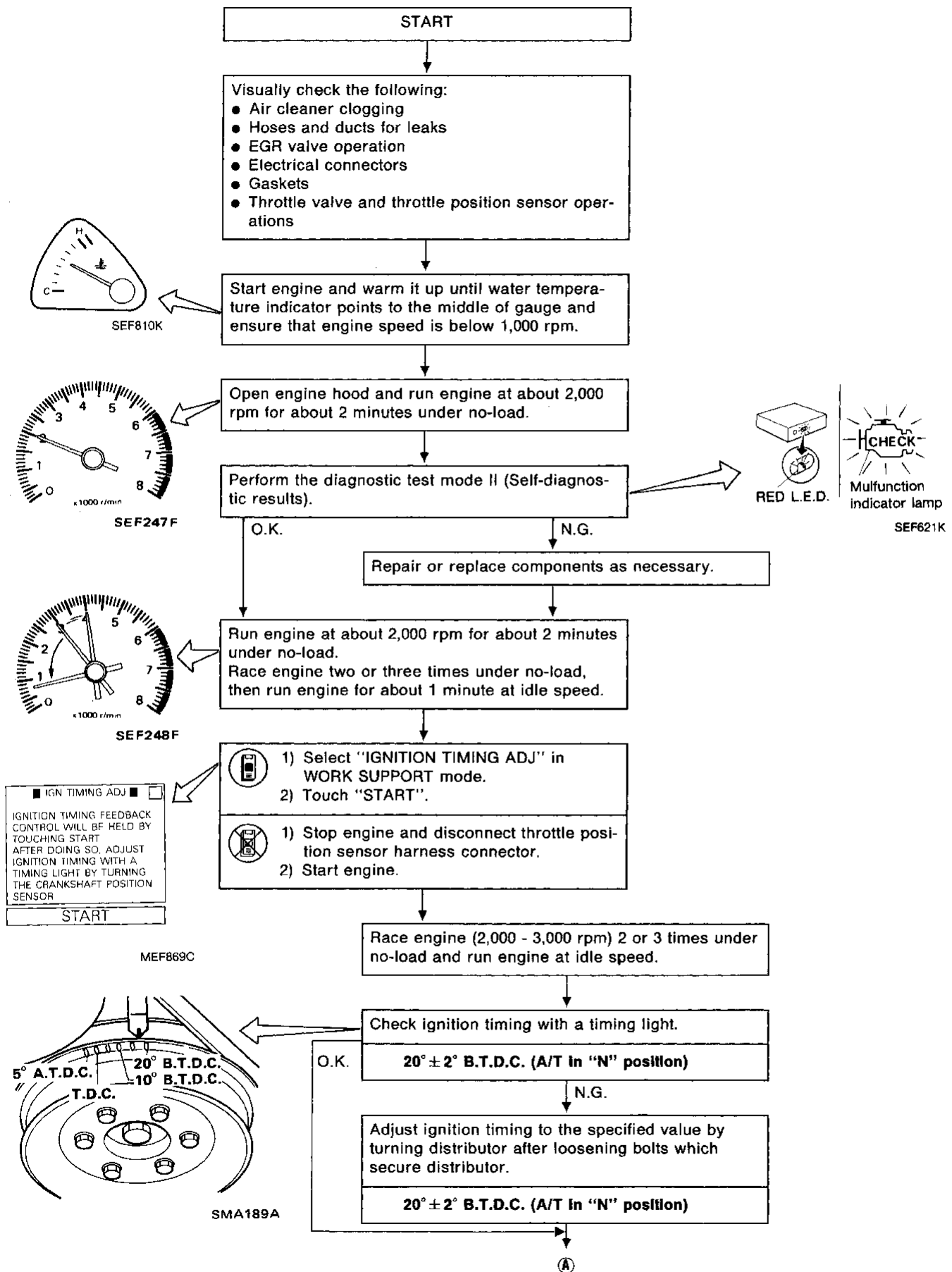
1. Make sure that the following parts are in good order.
 - Battery
 - Ignition system
 - Engine oil and coolant levels
 - Fuses
 - ECM harness connector
 - Vacuum hoses
 - Air intake system (Oil filler cap, oil level gauge, etc.)
 - Fuel pressure
 - Engine compression
 - EGR valve operation
 - Throttle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

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

Overall inspection sequence

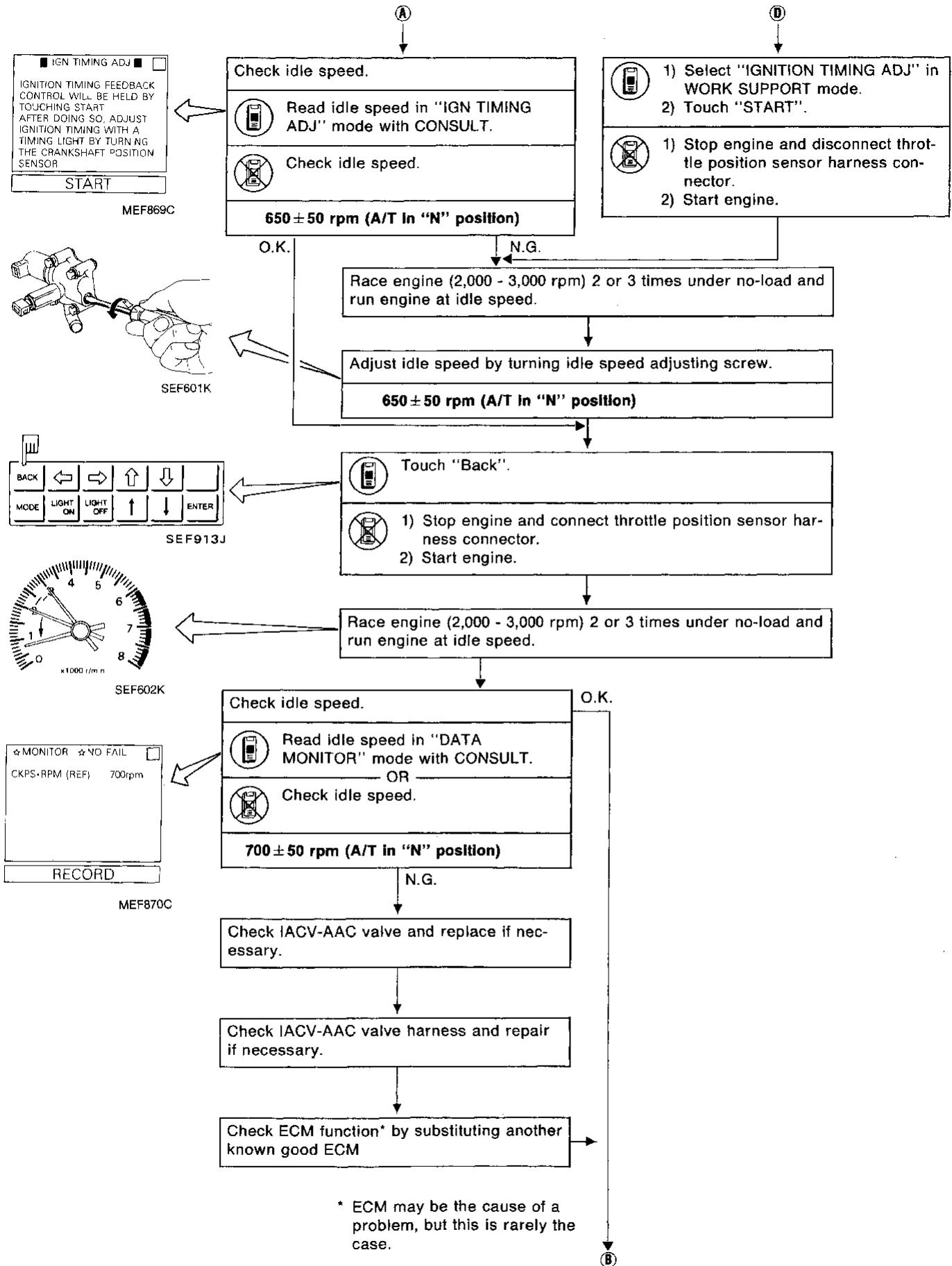


IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION

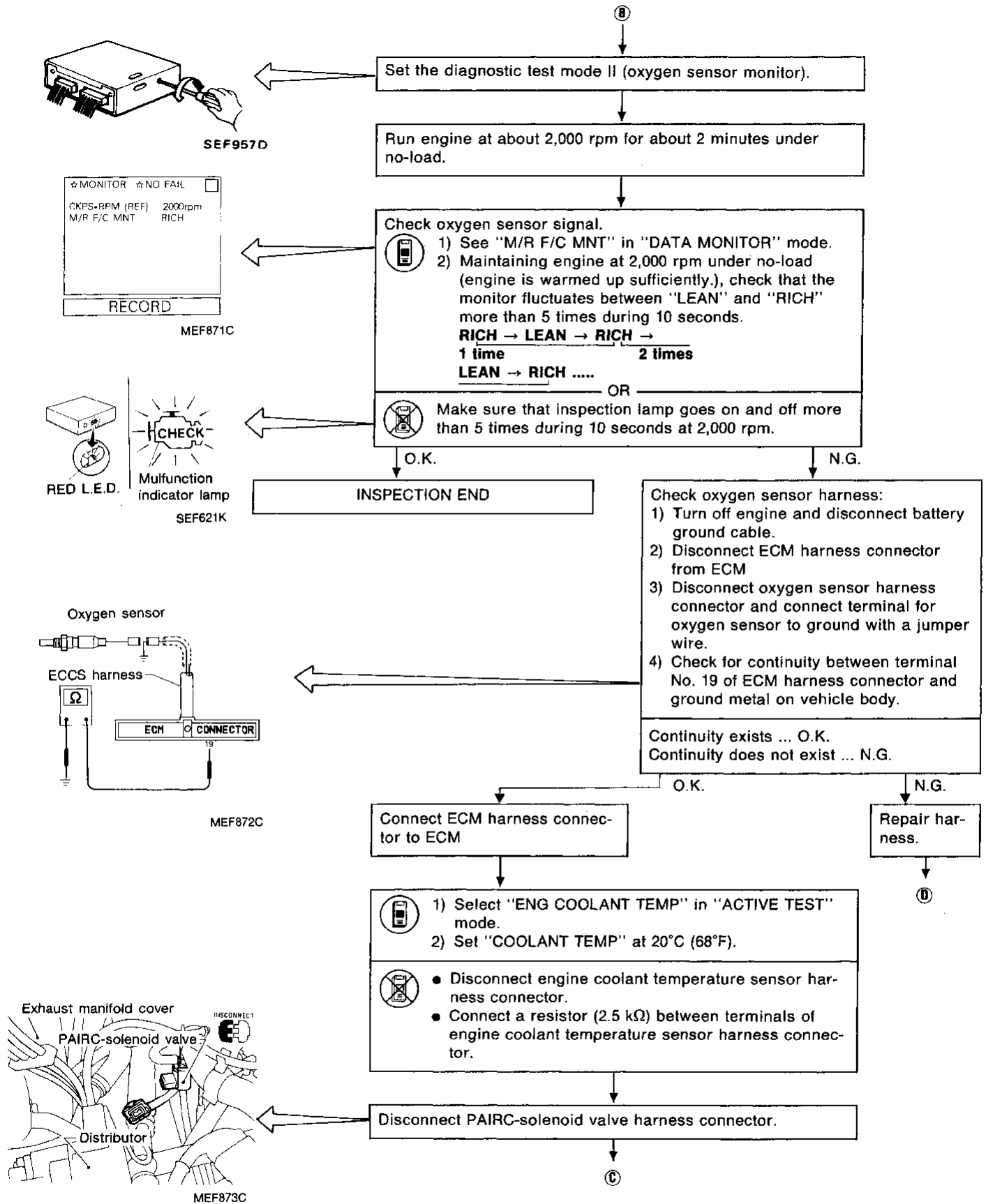


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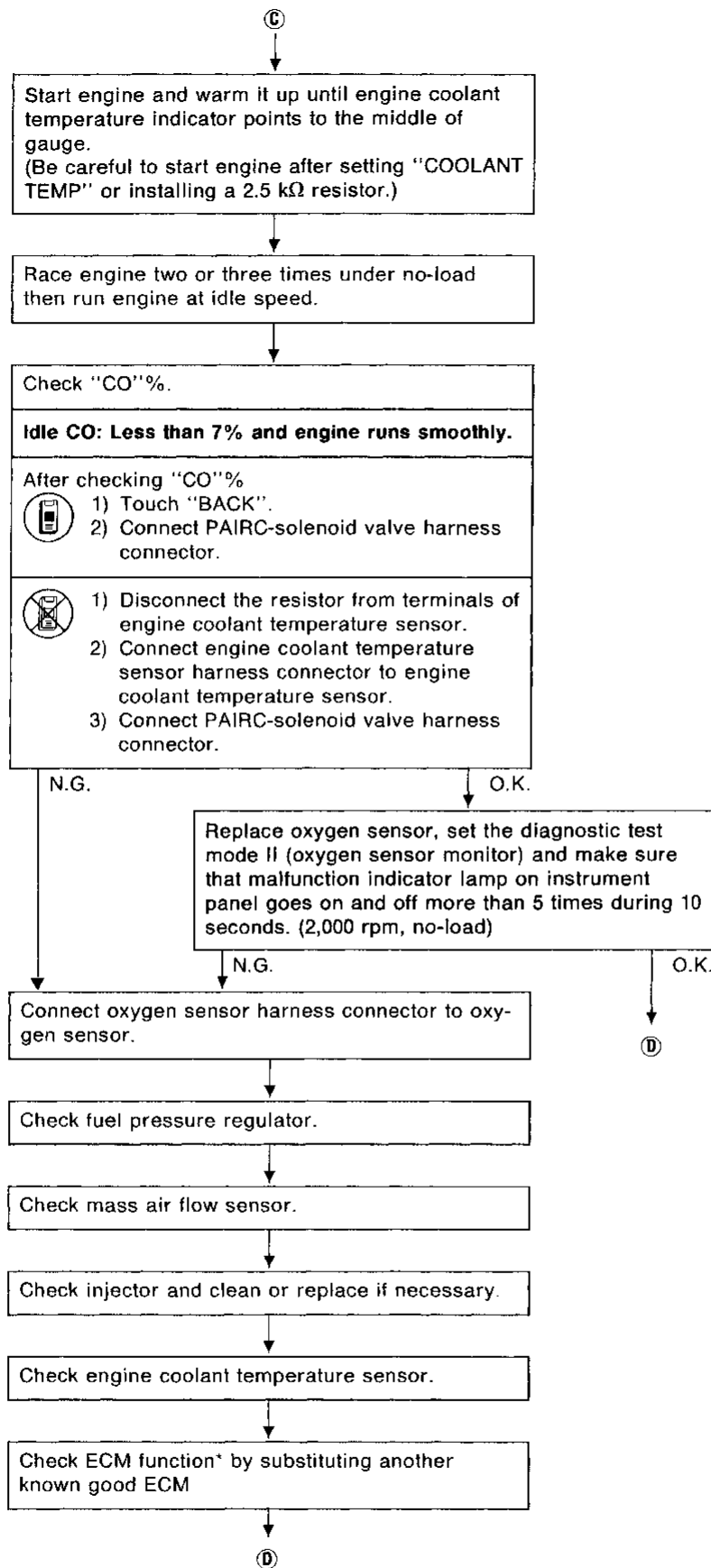
IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION



IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION



IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION



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

TROUBLE DIAGNOSES

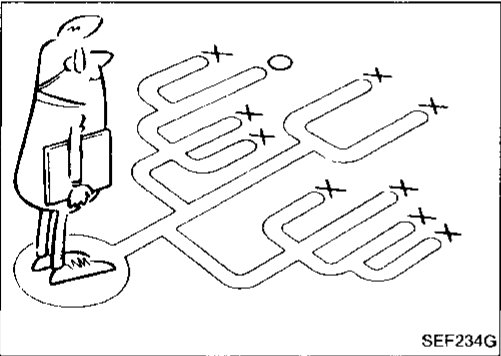
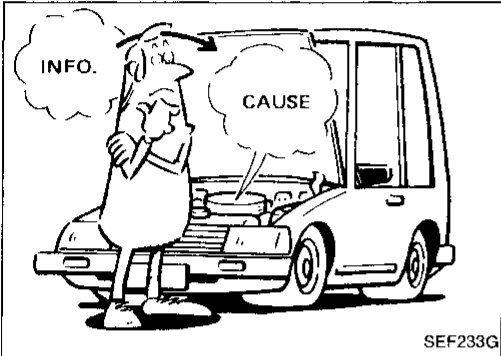
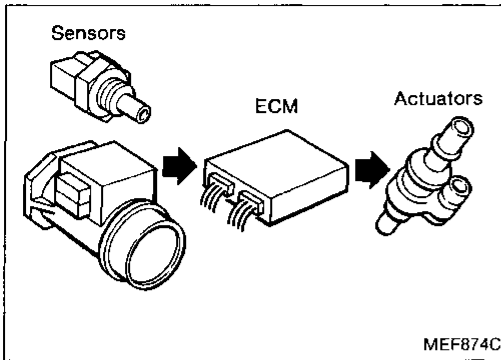
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How to Perform Trouble Diagnoses for Quick and Accurate Repair

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.

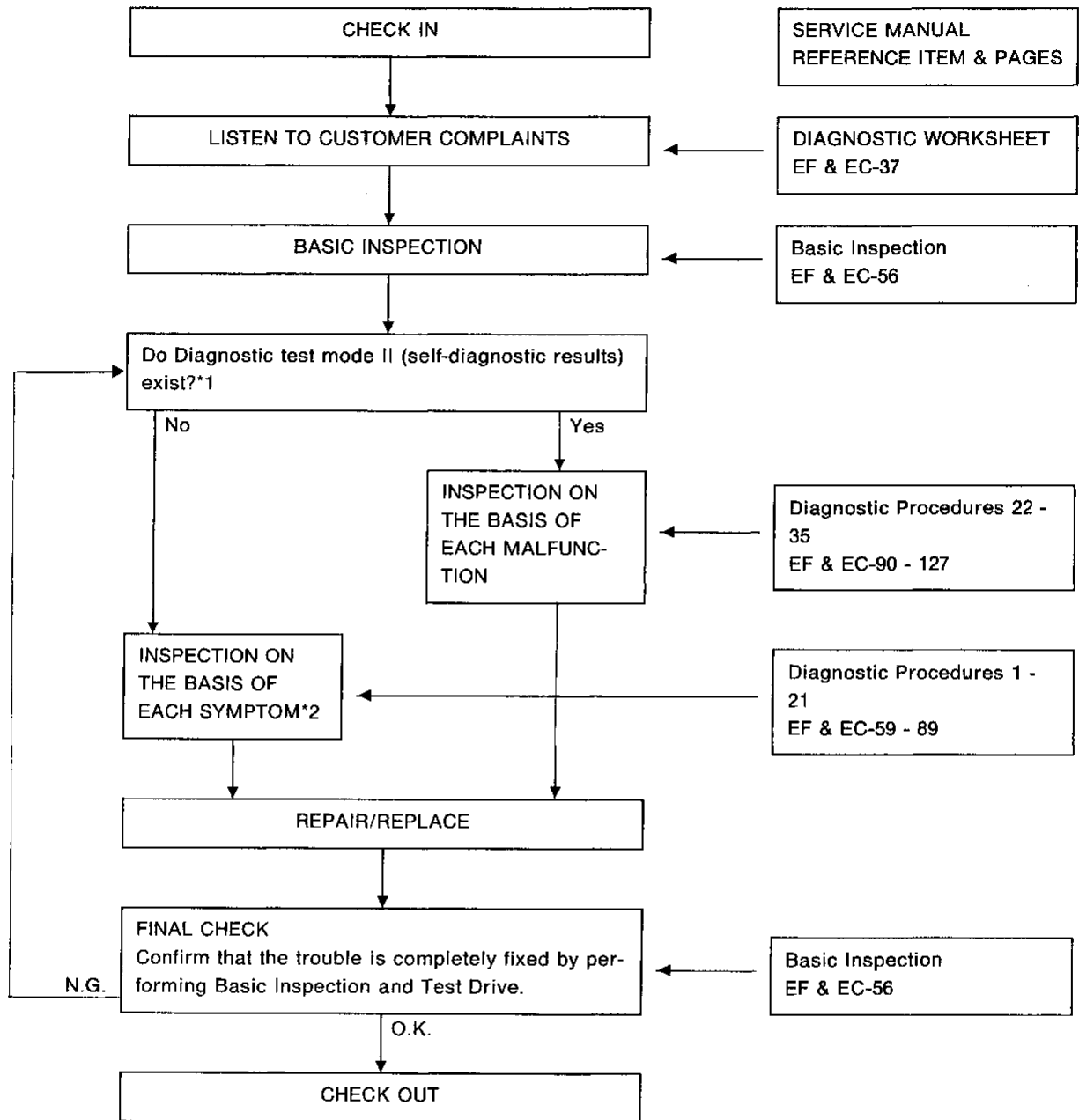
Start your diagnosis by looking for "conventional" problems first. This is one of the best ways to troubleshoot driveability problems on an electronically controlled engine vehicle.

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TROUBLE DIAGNOSES

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

WORK FLOW



*1: If the Diagnostic test mode II (self-diagnosis) 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-38).

TROUBLE DIAGNOSES

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

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.

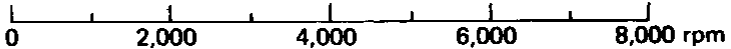
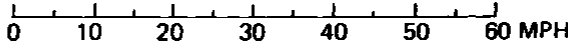
Make good use of a diagnostic worksheet such as the one shown below in order to utilize all the complaints for trouble-shooting.

KEY POINTS

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

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Worksheet sample

Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
Symptoms	<input type="checkbox"/> Startability	<input type="checkbox"/> Impossible to start <input type="checkbox"/> No combustion <input type="checkbox"/> Partial combustion <input type="checkbox"/> Partial combustion affected by throttle position <input type="checkbox"/> Partial combustion NOT affected by throttle position <input type="checkbox"/> Possible but hard to start <input type="checkbox"/> Others []	
	<input type="checkbox"/> Idling	<input type="checkbox"/> No fast idle <input type="checkbox"/> Unstable <input type="checkbox"/> High idle <input type="checkbox"/> Low idle <input type="checkbox"/> Others []	
	<input type="checkbox"/> Driveability	<input type="checkbox"/> Stumble <input type="checkbox"/> Surge <input type="checkbox"/> Knock <input type="checkbox"/> Lack of power <input type="checkbox"/> Intake backfire <input type="checkbox"/> Exhaust backfire <input type="checkbox"/> Others []	
	<input type="checkbox"/> Engine stall	<input type="checkbox"/> At the time of start <input type="checkbox"/> While idling <input type="checkbox"/> While accelerating <input type="checkbox"/> While decelerating <input type="checkbox"/> Just after stopping <input type="checkbox"/> While loading	
Incident occurrence		<input type="checkbox"/> Just after delivery <input type="checkbox"/> Recently <input type="checkbox"/> In the morning <input type="checkbox"/> At night <input type="checkbox"/> In the daytime	
Frequency		<input type="checkbox"/> All the time <input type="checkbox"/> Under certain conditions <input type="checkbox"/> Sometimes	
Weather conditions		<input type="checkbox"/> Not affected	
	Weather	<input type="checkbox"/> Fine <input type="checkbox"/> Raining <input type="checkbox"/> Snowing <input type="checkbox"/> Others []	
	Temperature	<input type="checkbox"/> Hot <input type="checkbox"/> Warm <input type="checkbox"/> Cool <input type="checkbox"/> Cold <input type="checkbox"/> Humid °F	
Engine conditions		<input type="checkbox"/> Cold <input type="checkbox"/> During warm-up <input type="checkbox"/> After warm-up	
		Engine speed 	
Road conditions		<input type="checkbox"/> In town <input type="checkbox"/> In suburbs <input type="checkbox"/> Highway <input type="checkbox"/> Off road (up/down)	
Driving conditions		<input type="checkbox"/> Not affected <input type="checkbox"/> At starting <input type="checkbox"/> While idling <input type="checkbox"/> At racing <input type="checkbox"/> While accelerating <input type="checkbox"/> While cruising <input type="checkbox"/> While decelerating <input type="checkbox"/> While turning (RH/LH)	
		Vehicle speed 	
Malfunction indicator lamp		<input type="checkbox"/> Turned on <input type="checkbox"/> Not turned on	

TROUBLE DIAGNOSES

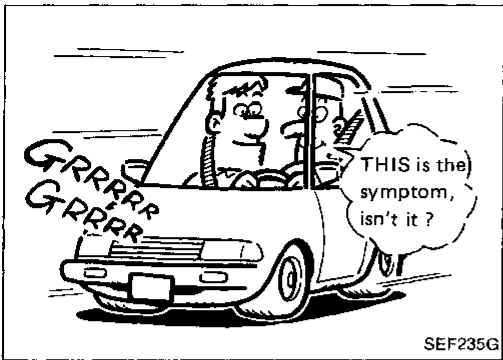
How to Perform Trouble Diagnoses for Quick and Accurate Repair (Cont'd)

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.

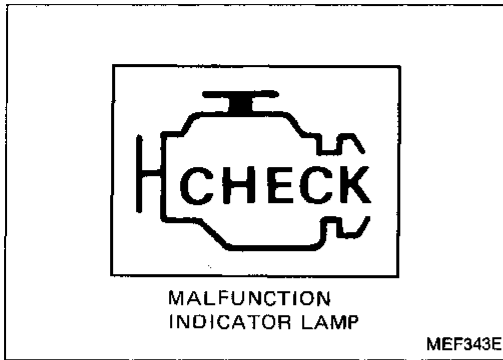
Perform the activity listed under

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	Crankshaft position sensor	Advanced	Rotate distributor clockwise.
			Retarded	Rotate distributor counterclockwise.
3	Mixture ratio feedback control	Oxygen sensor	Suspended	Disconnect oxygen sensor harness connector.
		ECM	Operation check	Perform Diagnostic test mode II (oxygen sensor monitor) at 2,000 rpm.
4	Idle speed	IACV-AAC valve	Raised	Turn idle adjusting screw counterclockwise.
			Lowered	Turn idle adjusting screw clockwise.
5	Electrical connection (Electric continuity)	Harness connectors and wires	Poor electrical connection or improper wiring	Tap or wiggle. Race engine rapidly. See if the torque reaction of the engine unit causes electric breaks.
			Cooled	Cool with an icing spray or similar device.
6	Temperature	ECM	Warmed	Heat with a hair drier. [WARNING: Do not overheat the unit.]
			Damp	Wet. [WARNING: Do not directly pour water on components. Use a mist sprayer.]
7	Moisture	Electric parts		
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 coil adapter (S.S.T.).

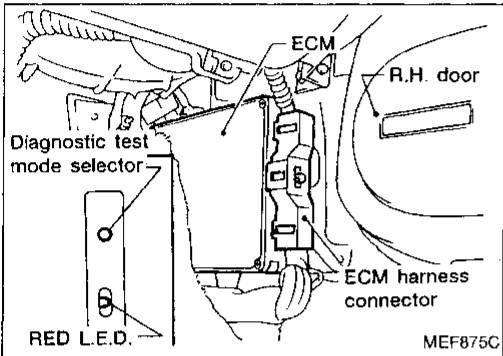
TROUBLE DIAGNOSES



On-board Diagnostic System

MALFUNCTION INDICATOR LAMP




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



ECM L.E.D.

The ECM has only one RED L.E.D.

SELF-DIAGNOSTIC FUNCTION

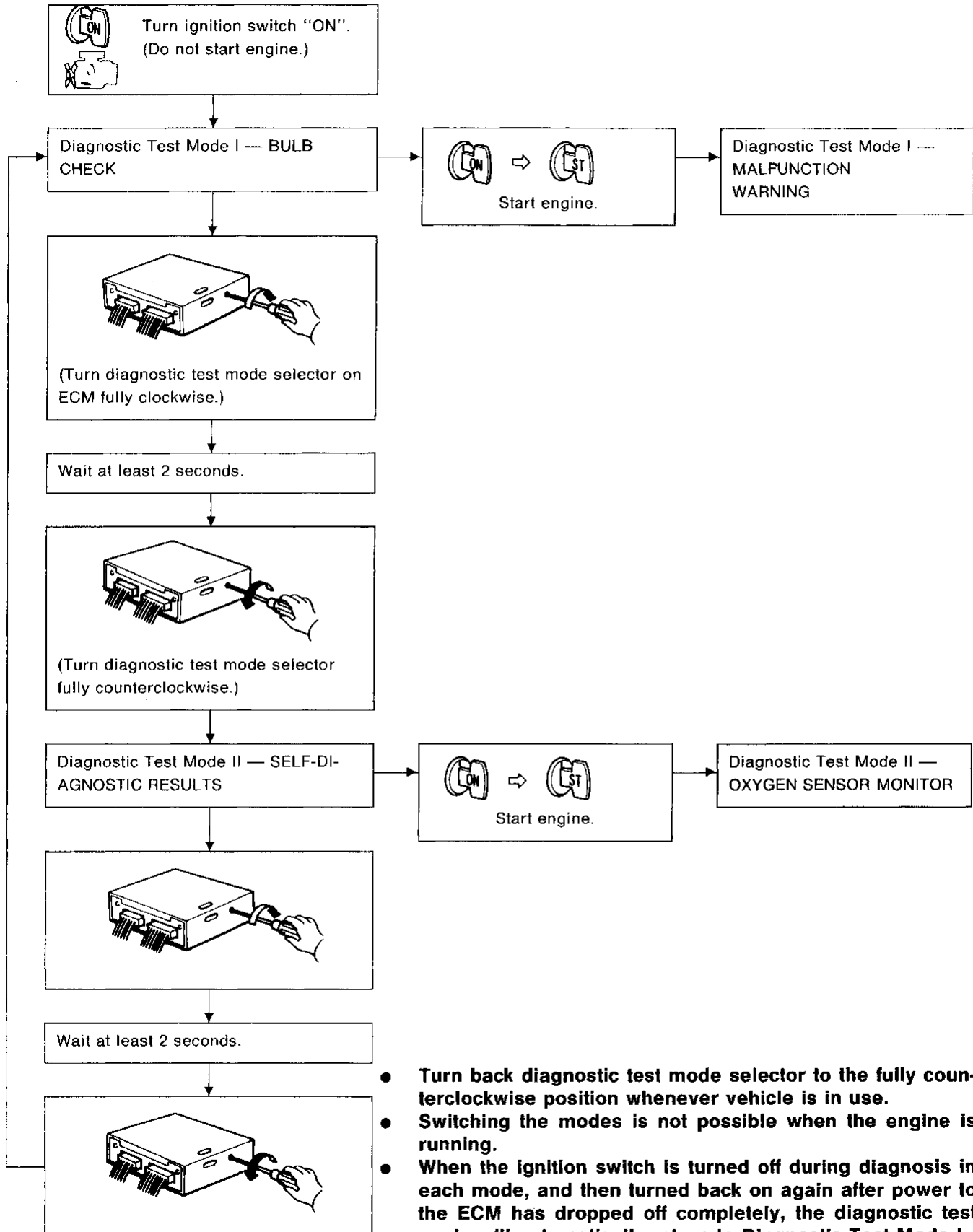
Condition		Diagnostic Test Mode	
		Diagnostic Test Mode I	Diagnostic Test Mode II
Ignition switch in "ON" position 	Engine stopped 	BULB CHECK	SELF-DIAGNOSTIC RESULTS
	Engine running 	MALFUNCTION WARNING	OXYGEN SENSOR MONITOR

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TROUBLE DIAGNOSES

On-board Diagnostic System (Cont'd)

HOW TO SWITCH MODES



- Turn back diagnostic test mode selector to the fully counterclockwise position whenever vehicle is in use.
- Switching the modes is not possible when the engine is running.
- When 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 diagnostic test mode will automatically return to Diagnostic Test Mode I.

TROUBLE DIAGNOSES

On-board Diagnostic System — Diagnostic Test Mode I

DIAGNOSTIC TEST MODE I — BULB CHECK

In this mode, the RED L.E.D. 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 L.E.D.

DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

FOR CALIFORNIA MODELS

MALFUNCTION INDICATOR LAMP and RED L.E.D.	Condition
ON	When the following malfunctions (malfunction indicator lamp item) are detected or the ECM's C.P.U. or crankshaft position sensor is malfunctioning.
OFF	O.K.

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

- These Diagnostic Trouble Code Numbers are clarified in Diagnostic Test Mode II — SELF-DIAGNOSTIC RESULTS.
- The RED L.E.D. 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.

FOR NON-CALIFORNIA MODELS

MALFUNCTION INDICATOR LAMP and RED L.E.D.	Condition
ON	When the ECM's C.P.U. or crankshaft position sensor is malfunctioning.
OFF	O.K.

TROUBLE DIAGNOSES

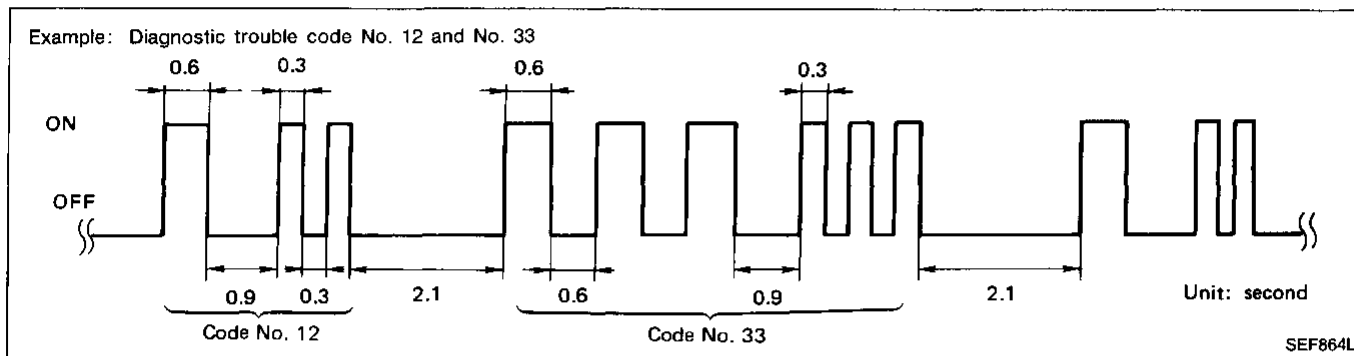
On-board Diagnostic System — Diagnostic Test Mode II (Self-diagnostic results)

CAUTION:

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

DESCRIPTION

In this mode, a diagnostic trouble code is indicated by the number of flashes from the RED L.E.D. 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 L.E.D. 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	California models	Non-California models
11*	Crankshaft position sensor circuit	X	X
12	Mass air flow sensor circuit	X	X
13	Engine coolant temperature sensor circuit	X	X
14	Vehicle speed sensor circuit	X	X
21*	Ignition signal circuit	X	X
31	ECM	X	X
32	EGR function	X	—
33	Oxygen sensor circuit	X	X
34	Knock sensor circuit	X	X
35	EGR temperature sensor circuit	X	—
43	Throttle position sensor circuit	X	X
45	Injector leak	X	—
54	Signal circuit from A/T control unit to ECM (A/T only)	X	X
55	No malfunction in the above circuits	X	X

X: Available

—: Not available

: Malfunction indicator lamp item

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

TROUBLE DIAGNOSES

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*	Crankshaft position sensor circuit	<ul style="list-style-type: none"> ● Either 1° or 90° signal is not entered for the first few seconds during engine cranking. ● Either 1° or 90° signal is not input often enough while the engine speed is higher than the specified rpm. 	<ul style="list-style-type: none"> ● Harness and connector (If harness and connector are normal, replace crankshaft position sensor.)
12	Mass air flow sensor circuit	<ul style="list-style-type: none"> ● The mass air flow sensor circuit is open or shorted. (An abnormally high or low voltage is entered.) 	<ul style="list-style-type: none"> ● Harness and connector (If harness and connector are normal, replace mass air flow sensor.)
13	Engine coolant temperature sensor circuit	<ul style="list-style-type: none"> ● The engine coolant temperature sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.) 	<ul style="list-style-type: none"> ● Harness and connector ● Engine coolant temperature sensor
14	Vehicle speed sensor circuit	<ul style="list-style-type: none"> ● The vehicle speed sensor circuit is open or shorted. 	<ul style="list-style-type: none"> ● Harness and connector ● Vehicle speed sensor (reed switch)
21*	Ignition signal circuit	<ul style="list-style-type: none"> ● The ignition signal in the primary circuit is not entered during engine cranking or running. 	<ul style="list-style-type: none"> ● Harness and connector ● Power transistor unit
31	ECM	<ul style="list-style-type: none"> ● ECM calculation function is malfunctioning. 	(Replace ECM (ECCS control module).)
32	EGR function	<ul style="list-style-type: none"> ● EGR valve does not operate. (EGR valve spring does not lift.) 	<ul style="list-style-type: none"> ● EGR valve ● EGR and canister control solenoid valve
33	Oxygen sensor circuit	<ul style="list-style-type: none"> ● The oxygen sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.) 	<ul style="list-style-type: none"> ● Harness and connector ● Oxygen sensor ● Fuel pressure ● Injectors ● Intake air leaks
34	Knock sensor circuit	<ul style="list-style-type: none"> ● The knock sensor circuit is open or shorted. (An abnormally high or low voltage is entered.) 	<ul style="list-style-type: none"> ● Harness and connector ● Knock sensor
35	EGR temperature sensor circuit	<ul style="list-style-type: none"> ● The EGR temperature sensor circuit is open or shorted. (An abnormally high or low voltage is entered.) 	<ul style="list-style-type: none"> ● Harness and connector ● EGR temperature sensor
43	Throttle position sensor circuit	<ul style="list-style-type: none"> ● The throttle position sensor circuit is open or shorted. (An abnormally high or low voltage is entered.) 	<ul style="list-style-type: none"> ● Harness and connector ● Throttle position sensor
45	Injector leak	<ul style="list-style-type: none"> ● Fuel leaks from injector. 	<ul style="list-style-type: none"> ● Injector
54	Signal circuit from A/T control unit to ECM (A/T only)	<ul style="list-style-type: none"> ● The A/T communication line is open or shorted. 	<ul style="list-style-type: none"> ● Harness and connector

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

HOW TO ERASE 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.**
- **Before starting diagnostic test mode II (Self-diagnostic results), do not erase the stored memory before beginning diagnostic test mode II (Self-diagnostic results).**

TROUBLE DIAGNOSES

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

DESCRIPTION

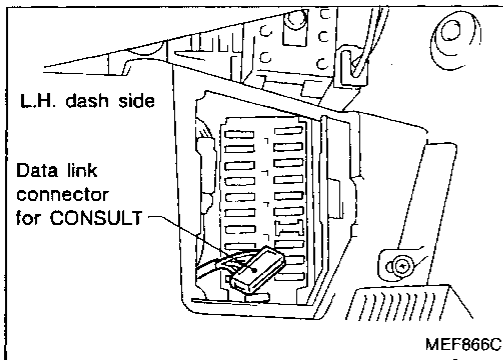
In this mode, the MALFUNCTION INDICATOR LAMP and RED L.E.D. display the condition of the fuel mixture (lean or rich) which is monitored by the oxygen sensor.

MALFUNCTION INDICATOR LAMP and RED L.E.D.	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 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 L.E.D. 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 lower side instrument panel.)

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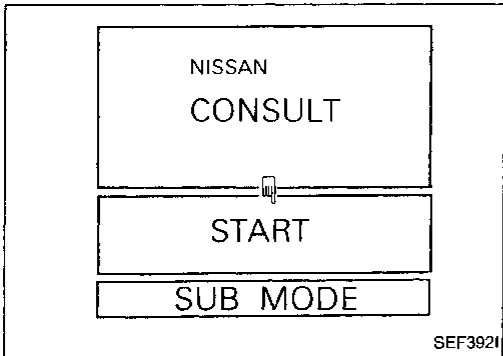
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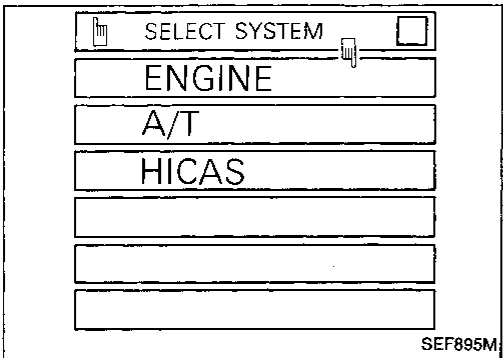
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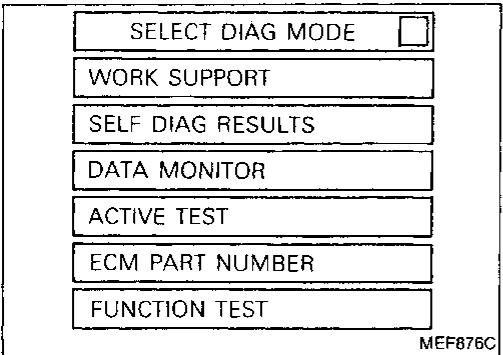
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3. Turn on ignition switch.
4. Touch "START".



5. Touch "ENGINE".



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

For further information, see the CONSULT Operation Manual.

TROUBLE DIAGNOSES

Consult (Cont'd)

ECCS COMPONENT PARTS APPLICATION

ECCS COMPONENT PARTS		DIAGNOSTIC TEST MODE				
		WORK SUPPORT	SELF-DIAGNOSTIC RESULTS	DATA MONITOR	ACTIVE TEST	FUNCTION TEST
INPUT	Crankshaft position sensor (REF)		X	X		
	Mass air flow sensor		X	X		
	Engine coolant temperature sensor		X	X	X	
	Oxygen sensor		X	X		X
	Vehicle speed sensor		X	X		X
	Throttle position sensor	X	X	X		X
	EGR temperature sensor*		X	X		
	Knock sensor		X			
	Ignition switch (start signal)			X		X
	Air conditioner switch			X		
	Neutral position switch			X		X
	Power steering oil pressure switch			X		X
	Closed throttle position switch			X		
	Battery			X		
OUT-PUT	Injectors		X	X	X	X
	Power transistor (ignition timing)	X	X (Ignition signal)	X	X	X
	IACV-AAC valve	X		X	X	X
	EGR and canister control solenoid valve		X	X	X	X
	Air conditioner relay			X		
	Fuel pump relay	X		X	X	X
	PAIRC-solenoid valve			X	X	
	Swirl control solenoid valve			X	X	X
	Radiator fan relay			X	X	X

: The ECCS component part marked "" is applicable to vehicles for California only.

X: Applicable

TROUBLE DIAGNOSES

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.
Data monitor	Input/Output data in the ECM can be read.
Active test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
ECM part number	ECM part number can be read.
Function test	Conducted by CONSULT instead of a technician to determine whether each system is "OK" or "NG".

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WORK SUPPORT DIAGNOSTIC TEST 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. <ul style="list-style-type: none"> ● IGN SW "ON" ● ENG NOT RUNNING ● ACC PEDAL NOT PRESSED 	When adjusting throttle position sensor initial position
IGNITION TIMING ADJ*	● IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING "START". AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CRANKSHAFT POSITION SENSOR.	When adjusting initial ignition timing
IACV-AAC/V ADJ	SET ENGINE SPEED AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS. <ul style="list-style-type: none"> ● ENGINE WARMED UP ● NO-LOAD 	When adjusting idle speed
FUEL PRESSURE RELEASE	● FUEL PUMP WILL STOP BY TOUCHING "START" WHEN IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line

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TROUBLE DIAGNOSES

Consult (Cont'd)

SELF-DIAGNOSTIC RESULTS DIAGNOSTIC TEST MODE

DIAGNOSTIC ITEM	DIAGNOSTIC ITEM IS DETECTED WHEN ...	CHECK ITEM (REMEDY)
CRANK POSITION SEN*	<ul style="list-style-type: none"> ● 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. 	<ul style="list-style-type: none"> ● Harness and connector (If harness and connector are normal, replace crankshaft position sensor.)
MASS AIR FLOW SEN	<ul style="list-style-type: none"> ● The mass air flow sensor circuit is open or shorted. (An abnormally high or low voltage is entered.) 	<ul style="list-style-type: none"> ● Harness and connector (If harness and connector are normal, replace mass air flow sensor.)
COOLANT TEMP SEN	<ul style="list-style-type: none"> ● The engine coolant temperature sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.) 	<ul style="list-style-type: none"> ● Harness and connector ● Engine coolant temperature sensor
VEHICLE SPEED SEN	<ul style="list-style-type: none"> ● The vehicle speed sensor circuit is open or shorted. 	<ul style="list-style-type: none"> ● Harness and connector ● Vehicle speed sensor (reed switch)
IGN SIGNAL-PRIMARY*	<ul style="list-style-type: none"> ● The ignition signal in primary circuit is not entered during engine cranking or running. 	<ul style="list-style-type: none"> ● Harness and connector ● Power transistor unit
ECM	<ul style="list-style-type: none"> ● ECM calculation function is malfunctioning. 	(Replace ECM (ECCS control module).)
EGRC SOLENOID/V**	<ul style="list-style-type: none"> ● EGR valve does not operate. (EGR valve spring does not lift.) 	<ul style="list-style-type: none"> ● EGR valve ● EGR and canister control solenoid valve
OXYGEN SEN	<ul style="list-style-type: none"> ● The oxygen sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.) 	<ul style="list-style-type: none"> ● Harness and connector ● Oxygen sensor ● Fuel pressure ● Injectors ● Intake air leaks
KNOCK SENSOR	<ul style="list-style-type: none"> ● The knock sensor circuit is open or shorted. (An abnormally high or low voltage is entered.) 	<ul style="list-style-type: none"> ● Harness and connector ● Knock sensor
EGR TEMP SENSOR**	<ul style="list-style-type: none"> ● The EGR temperature sensor circuit is open or shorted. (An abnormally high or low voltage is entered.) 	<ul style="list-style-type: none"> ● Harness and connector ● EGR temperature sensor
THROTTLE POSI SEN	<ul style="list-style-type: none"> ● The throttle position sensor circuit is open or shorted. (An abnormally high or low voltage is entered.) 	<ul style="list-style-type: none"> ● Harness and connector ● Throttle position sensor
INJECTOR LEAK**	<ul style="list-style-type: none"> ● Fuel leaks from injector. 	<ul style="list-style-type: none"> ● Injector

*: Check items causing a malfunction of crankshaft position sensor circuit first, if both "CRANK POSITION SEN" and "IGN SIGNAL-PRIMARY" come out at the same time.

**The diagnostic item marked "*" is applicable to vehicles for California only.

TROUBLE DIAGNOSES

Consult (Cont'd)

DATA MONITOR DIAGNOSTIC TEST MODE

MONITOR ITEM	CONDITION		SPECIFICATION	CHECK ITEM WHEN OUTSIDE SPEC.	
CKPS-RPM (REF)	<ul style="list-style-type: none"> Tachometer: Connect Run engine and compare tachometer indication with the CONSULT value. 		Almost the same speed as the CONSULT value.	<ul style="list-style-type: none"> Harness and connector Crankshaft position sensor 	GI
MAS AIR/FL SE	<ul style="list-style-type: none"> Engine: After warming up, idle the engine A/C switch "OFF" Shift lever "N" position 	Idle	1.0 - 1.5V	<ul style="list-style-type: none"> Harness and connector Mass air flow sensor 	MA
		2,000 rpm	1.4 - 1.9V		
COOLANT TEMP/S	<ul style="list-style-type: none"> Engine: After warming up 		More than 70°C (158°F)	<ul style="list-style-type: none"> Harness and connector Engine coolant temperature sensor 	EM
O2 SEN	<ul style="list-style-type: none"> Engine: After warming up 	Maintaining engine speed at 2,000 rpm	0 ↔ Approx. 1.5V	<ul style="list-style-type: none"> Harness and connector Oxygen sensor Intake air leaks Injectors 	LC
M/R F/C MNT			LEAN ↔ RICH Changes more than 5 times during 10 seconds.		
VHCL SPEED SE	<ul style="list-style-type: none"> Turn drive wheels and compare speedometer indication with the CONSULT value 		Almost the same speed as the CONSULT value	<ul style="list-style-type: none"> Harness and connector Vehicle speed sensor 	
BATTERY VOLT	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) 		11 - 14V	<ul style="list-style-type: none"> Battery ECM power supply circuit 	FE
THRTL POS SEN	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) 	Throttle valve fully closed	0.5 ± 0.2V	<ul style="list-style-type: none"> Harness and connector Throttle position sensor Throttle position sensor adjustment 	CL
		Throttle valve fully opened	Approx. 4.0V		
EGR TEMP SEN*	<ul style="list-style-type: none"> Engine: After warming up 		Less than 4.5V	<ul style="list-style-type: none"> Harness and connector EGR temperature sensor 	MT
START SIGNAL	<ul style="list-style-type: none"> Ignition switch: ON → START 		OFF → ON	<ul style="list-style-type: none"> Harness and connector Starter switch 	AT
CLOSED THL/SW	<ul style="list-style-type: none"> Ignition switch: ON (Engine stopped) 	Throttle valve: Closed throttle position	ON	<ul style="list-style-type: none"> Harness and connector Throttle position sensor Throttle position sensor adjustment 	PD
		Throttle valve: Slightly open	OFF		
AIR COND SIG	<ul style="list-style-type: none"> Engine: After warming up, idle the engine 	A/C switch "OFF"	OFF	<ul style="list-style-type: none"> Harness and connector Air conditioner switch 	FA
		A/C switch "ON"	ON		
NEUT POSI SW	<ul style="list-style-type: none"> Ignition switch: ON 	Shift lever "P" or "N"	ON	<ul style="list-style-type: none"> Harness and connector Neutral position switch 	RA
		Except above	OFF		

Remarks: The monitor item marked "*" is applicable to vehicles for California only.
Specifications are reference values.

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TROUBLE DIAGNOSES

Consult (Cont'd)

MONITOR ITEM	CONDITION		SPECIFICATION	CHECK ITEM WHEN OUTSIDE SPEC.
INJ PULSE	<ul style="list-style-type: none"> ● Engine: After warming up ● A/C switch "OFF" ● Shift lever "N" ● No-load 	Idle	2.3 - 3.0 msec.	<ul style="list-style-type: none"> ● Harness and connector ● Injector ● Mass air flow sensor ● Intake air system
		2,000 rpm	2.1 - 2.8 msec.	
IGN TIMING	ditto	Idle	20° B.T.D.C.	<ul style="list-style-type: none"> ● Harness and connector ● Crankshaft position sensor
		2,000 rpm	More than 25° B.T.D.C.	
IACV-AAC/V	ditto	Idle	15 - 40%	<ul style="list-style-type: none"> ● Harness and connector ● IACV-AAC valve
		2,000 rpm	—	
AIR COND RLY	● Air conditioner switch OFF → ON		OFF → ON	<ul style="list-style-type: none"> ● Harness and connector ● Air conditioner switch ● Air conditioner relay
SWRL CONT S/V	● Fuel temperature is above 35°C (95°F)	Idle	ON	<ul style="list-style-type: none"> ● Harness and connector ● Pressure regulator control solenoid valve ● Fuel temperature sensor
		2,000 rpm	OFF	
EGRC SOL/V	<ul style="list-style-type: none"> ● Engine: After warming up ● A/C switch "OFF" ● Shift lever "N" position ● No-load 	Idle	ON	<ul style="list-style-type: none"> ● Harness and connector ● EGR and canister control solenoid valve
		Race engine (2,000 - 3,000 rpm)	OFF	
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF	<ul style="list-style-type: none"> ● Harness and connector ● Power steering oil pressure switch
		The steering wheel is turned.	ON	
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger is operating.	ON	<ul style="list-style-type: none"> ● Harness and connector ● Rear window defogger system (Refer to section EL.)
		Rear window defogger is not operating.	OFF	
AMB TEMP SW	<ul style="list-style-type: none"> ● Ignition switch: ON ● Compare ambient temperature with the following: 	Below 19°C (66°F)	OFF	<ul style="list-style-type: none"> ● Harness and connector ● Ambient switch
		19 - 25°C (66 - 77°F)	—	
		Above 25°C (77°F)	ON	

Remarks: Specifications are reference values.

TROUBLE DIAGNOSES

Consult (Cont'd)

ACTIVE TEST DIAGNOSTIC TEST MODE

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	<ul style="list-style-type: none"> ● Engine: Return to the original trouble condition ● Change the amount of fuel injection with the CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> ● Harness and connector ● Fuel injectors ● Oxygen sensors
IACV-AAC/V OPENING	<ul style="list-style-type: none"> ● 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.	<ul style="list-style-type: none"> ● Harness and connector ● IACV-AAC valve
ENG COOLANT TEMP	<ul style="list-style-type: none"> ● Engine: Return to the original trouble condition ● Change the engine coolant temperature with the CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> ● Harness and connector ● Engine coolant temperature sensor ● Fuel injectors
IGN TIMING TEST	<ul style="list-style-type: none"> ● Engine: Return to the original trouble condition ● Timing light: Set ● Retard the ignition timing with the CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	<ul style="list-style-type: none"> ● Adjust initial ignition timing
POWER BALANCE	<ul style="list-style-type: none"> ● Engine: After warming up, idle the engine. ● A/C switch "OFF" ● Shift lever "N" position ● Cut off each injector signal one at a time with the CONSULT. 	Engine runs rough or dies.	<ul style="list-style-type: none"> ● Harness and connector ● Compression ● Injectors ● Power transistor ● Spark plugs ● Ignition coils
RADIATOR FAN	<ul style="list-style-type: none"> ● Ignition switch: ON ● Turn the radiator fan "ON" and "OFF" with the CONSULT. 	Radiator fan moves and stops.	<ul style="list-style-type: none"> ● Harness and connector ● Radiator fan motor
FUEL PUMP RELAY	<ul style="list-style-type: none"> ● 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.	<ul style="list-style-type: none"> ● Harness and connector ● Fuel pump relay
EGRC SOLENOID VALVE	<ul style="list-style-type: none"> ● Ignition switch: ON ● Turn solenoid valve "ON" and "OFF" with the CONSULT and listen to operating sound. 	Each solenoid valve makes an operating sound.	<ul style="list-style-type: none"> ● Harness and connector ● Solenoid valve
PAIRC-SOLENOID/V			
SWIRL CONT SOL VALVE			
SELF-LEARN CONT	<ul style="list-style-type: none"> ● In this test, the coefficient of self-learning control mixture ratio returns to the original coefficient by touching "CLEAR" on the screen. 		

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TROUBLE DIAGNOSES

Consult (Cont'd)

FUNCTION TEST DIAGNOSTIC TEST MODE

FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
SELF-DIAG RESULTS	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Displays the results of on-board diagnostic system. 	—		Objective system
CLOSED THROTTLE POSI (CLOSED THROTTLE POSITION SWITCH CIRCUIT)	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Closed throttle position switch circuit is tested when throttle is opened and closed fully. ("CLOSED THROTTLE POSI" is the test item name for the vehicles in which idle is selected by throttle position sensor.) 	Throttle valve: opened	OFF	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● Harness and connector ● Throttle position sensor ● Throttle position sensor adjustment ● Throttle linkage ● Verify operation in DATA MONITOR mode.
NEUTRAL POSI SW CKT	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Neutral position switch circuit is tested when shift lever is manipulated. 	OUT OF N/P POSITION	OFF	<ul style="list-style-type: none"> ● Harness and connector ● Neutral position switch/Inhibitor switch ● Linkage + Inhibitor switch adjustment
		IN N-RANGE	ON	
FUEL PUMP CIRCUIT	<ul style="list-style-type: none"> ● 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.		<ul style="list-style-type: none"> ● Harness and connector ● Fuel pump ● Fuel pump relay ● Fuel filter clogging ● Fuel level
EGRC SOL/V CIRCUIT	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● EGRC S/V circuit is tested by checking solenoid valve operating noise. 	The solenoid valve makes an operating sound every 3 seconds.		<ul style="list-style-type: none"> ● Harness and connector ● EGRC-solenoid valve
RADIATOR FAN CIRCUIT	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine stopped) ● Radiator fan circuit is tested by checking radiator fan operation. 	<ul style="list-style-type: none"> ● The radiator fan rotates and stops every 3 seconds 		<ul style="list-style-type: none"> ● Harness and connector ● Radiator fan motor ● Radiator fan relay

TROUBLE DIAGNOSES

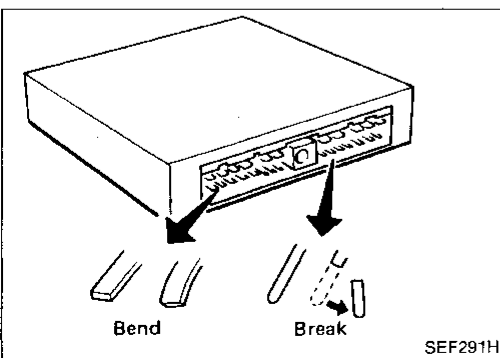
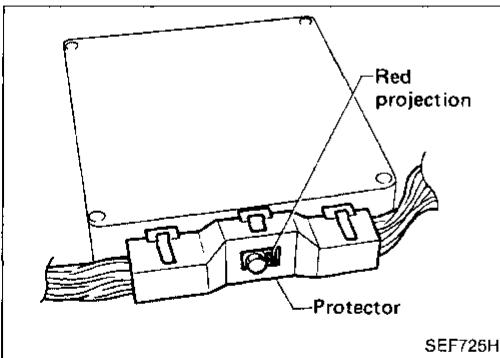
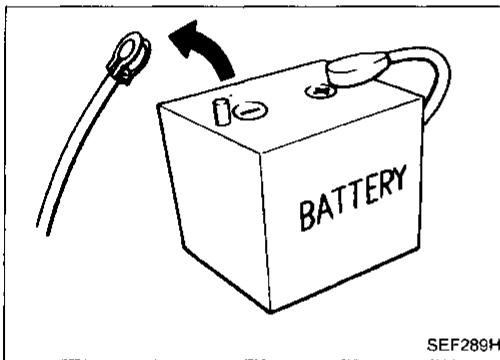
Consult (Cont'd)

FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)	
START SIGNAL CIRCUIT	<ul style="list-style-type: none"> ● Ignition switch: ON → START ● Start signal circuit is tested when engine is started by operating the starter. Battery voltage and water temperature before cranking, and average battery voltage, mass air flow sensor output voltage and cranking speed during cranking are displayed. 	Start signal: OFF → ON		<ul style="list-style-type: none"> ● Harness and connector ● Ignition switch 	GI MA
PW/ST SIGNAL CIRCUIT	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● Harness and connector ● Power steering oil pressure switch ● Power steering oil pump 	EM LC
		Neutral position	OFF		EF & EC
SWIRL CONTROL S/V CIRCUIT	<ul style="list-style-type: none"> ● Ignition switch: ON (Engine running) ● Swirl control S/V circuit is tested by checking swirl control actuator operation. 	<ul style="list-style-type: none"> ● The swirl control actuator moves every 3 seconds 		<ul style="list-style-type: none"> ● Harness and connector ● Swirl control solenoid valve ● Swirl control actuator ● Vacuum hose 	FE CL
VEHICLE SPEED SEN CIRCUIT	<ul style="list-style-type: none"> ● 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)		<ul style="list-style-type: none"> ● Harness and connector ● Vehicle speed sensor ● Electric speedometer 	MT AT
IGN TIMING ADJ	<ul style="list-style-type: none"> ● 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.		<ul style="list-style-type: none"> ● Adjust ignition timing (by moving crankshaft position sensor or distributor) ● Crankshaft position sensor drive mechanism 	PD FA RA
MIXTURE RATIO TEST	<ul style="list-style-type: none"> ● Air-fuel ratio feedback circuit (injection system, ignition system, vacuum system, etc.) is tested by examining the O₂ sensor output at 2,000 rpm under non-loaded state. 	<ul style="list-style-type: none"> ● O₂ SEN COUNT: More than 5 times during 10 seconds (O₂ SEN-R COUNT: More than 5 times during 10 seconds) 		<ul style="list-style-type: none"> ● 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) ● Oxygen sensor circuit ● Oxygen sensor operation ● Fuel pressure high or low ● Mass air flow sensor 	BR ST BF HA EL

TROUBLE DIAGNOSES

Consult (Cont'd)

FUNCTION TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
POWER BALANCE	<ul style="list-style-type: none"> ● 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.	<ul style="list-style-type: none"> ● Injector circuit (Injector, harness or connector) ● Ignition circuit (Spark plug, power transistor, ignition coil, harness or connector) ● Compression ● Valve timing
IACV-AAC/V SYSTEM	<ul style="list-style-type: none"> ● 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).	<ul style="list-style-type: none"> ● Harness and connector ● IACV-AAC valve ● Air passage restriction between air inlet and IACV-AAC valve ● IAS (Idle adjusting screw) adjustment



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.

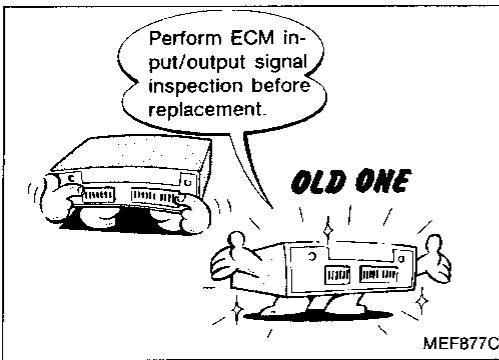
2. When connecting ECM harness connector, tighten securing bolt until red projection is in line with connector face.

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.

TROUBLE DIAGNOSES

Diagnostic Procedure (Cont'd)



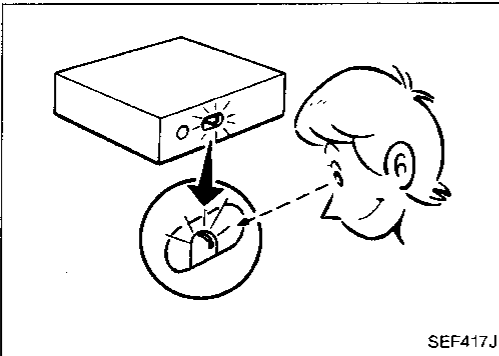
5. Before replacing ECM, perform ECM input/output signal inspection and make sure whether ECM functions properly or not. (See page EF & EC-155.)

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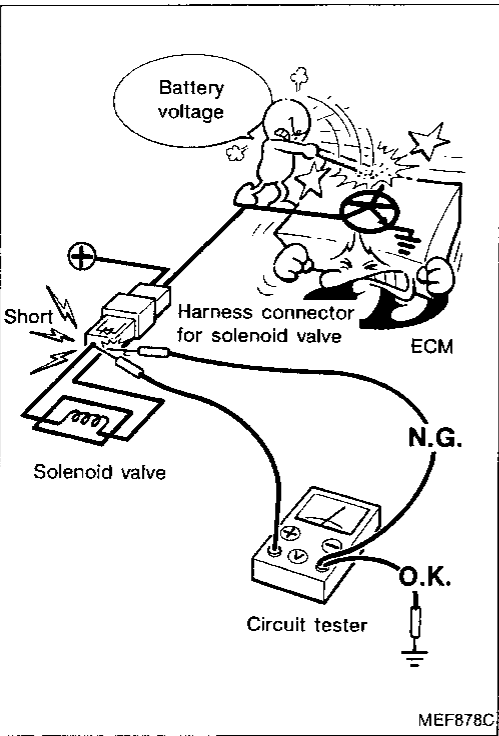


6. After performing this "Diagnostic Procedure", perform diagnostic test mode II (Self-diagnostic results) and driving test.

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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.

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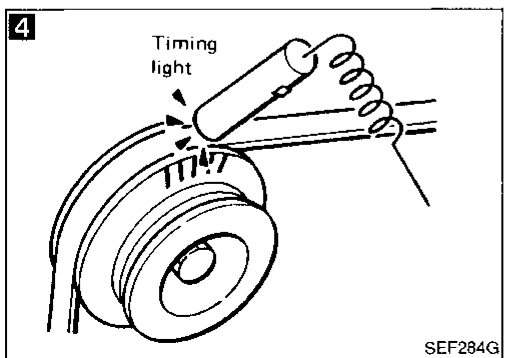
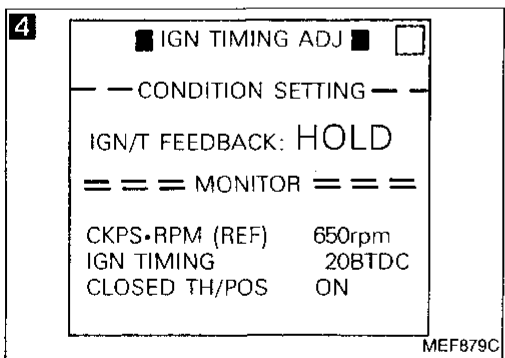
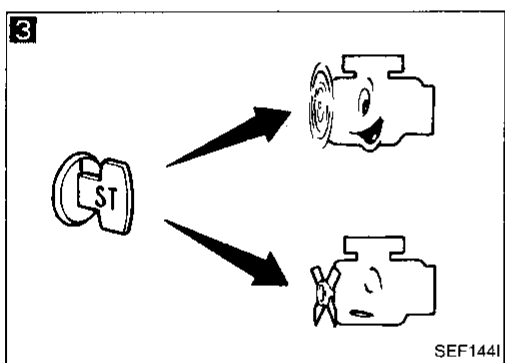
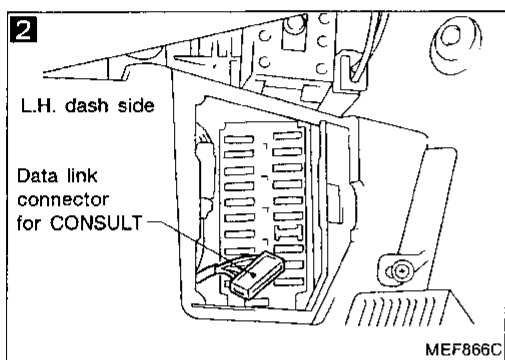
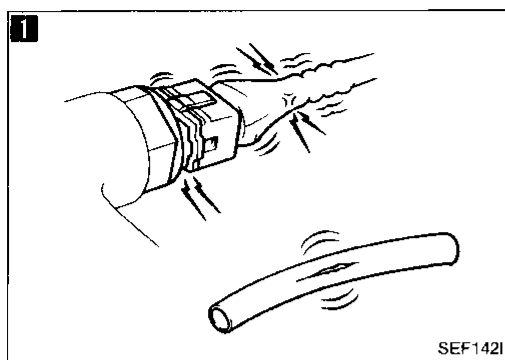
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Basic Inspection

- 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-45.)

- 3**
- DOES ENGINE START?**
- No → Go to **6**

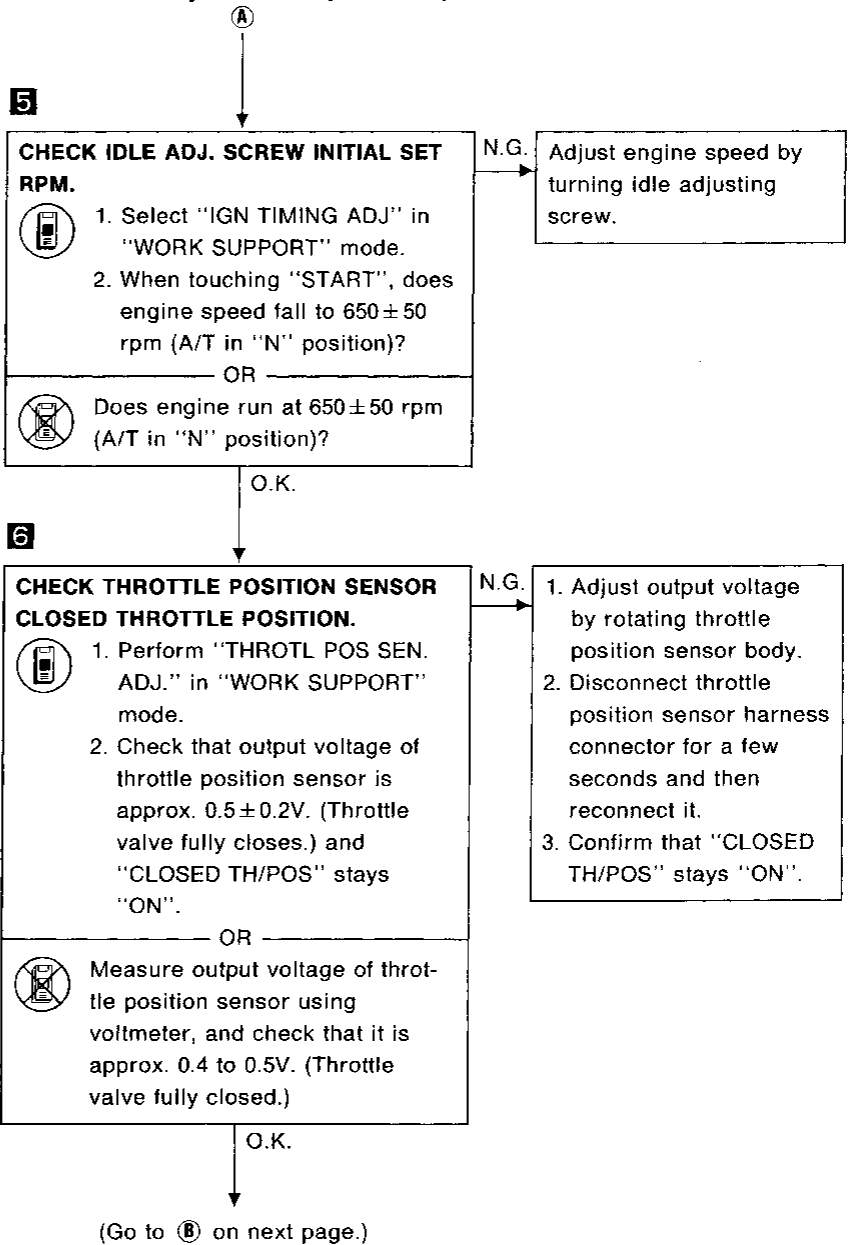
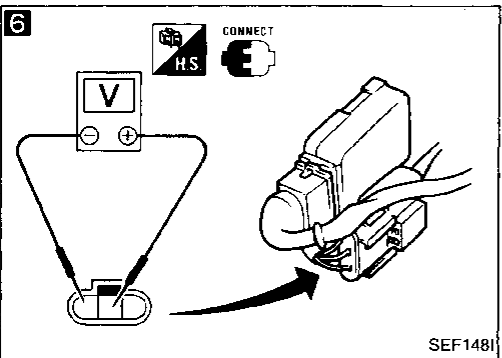
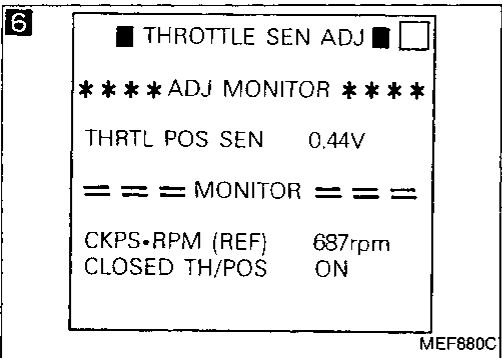
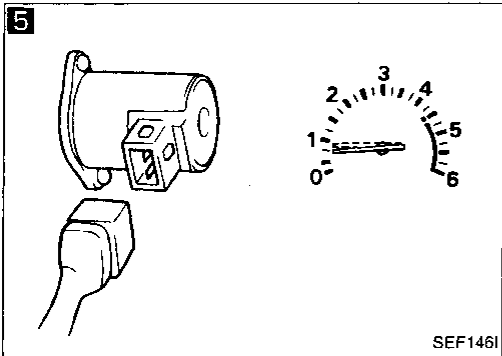
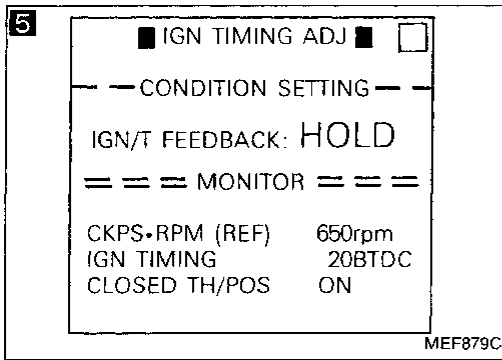
- 4**
- CHECK IGNITION TIMING.**
1. Warm up engine sufficiently.
 2. Select "IGN TIMING ADJ" in "WORK SUPPORT" mode.
 3. Touch "START".
 4. Check ignition timing at idle using timing light.
- Ignition timing:**
20° ± 2° B.T.D.C.
- N.G. → Adjust ignition timing by turning crankshaft position sensor. Refer to page EF & EC-28.

1. Warm up engine sufficiently.
 2. Stop engine and disconnect throttle position sensor harness connector.
 3. Start engine.
 4. Check ignition timing at idle using timing light.
- Ignition timing:**
20° ± 2° B.T.D.C.

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↓
(Go to **A**) on next page.)

TROUBLE DIAGNOSES

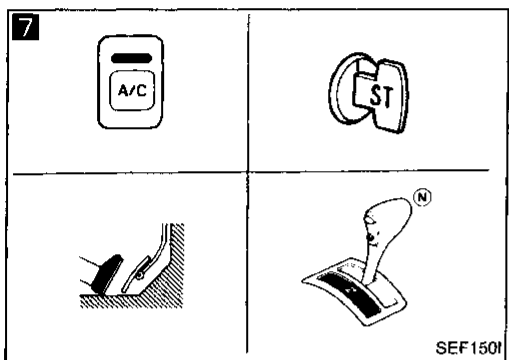
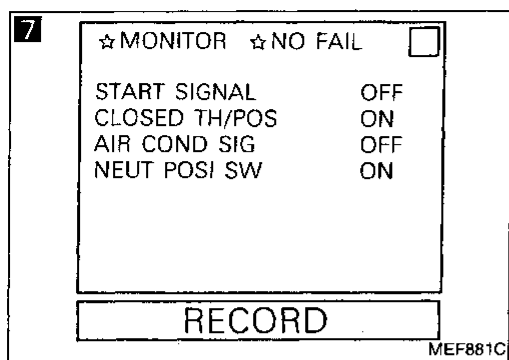
Basic Inspection (Cont'd)



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TROUBLE DIAGNOSES

Basic Inspection (Cont'd)



7

CHECK SWITCH INPUT SIGNAL.

Select the following switches in "DATA MONITOR" mode,

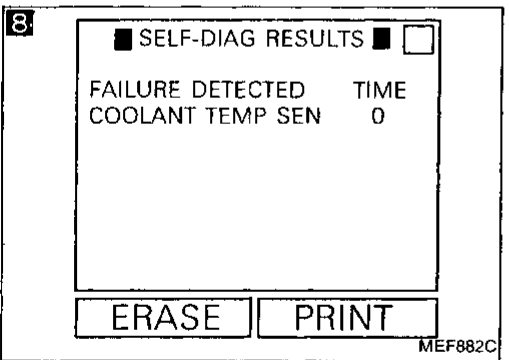
- Start signal,
- Idle position,
- Air conditioner signal,
- Neutral position (Parking) switch, and check the switches' ON-OFF operation.

OR

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

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

N.G. Repair or replace the malfunctioning switch or its circuit.



8

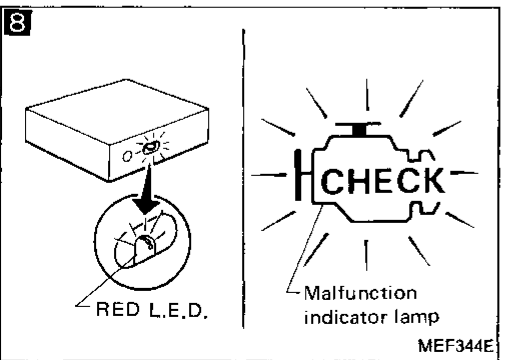
READ SELF-DIAGNOSTIC RESULTS.

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

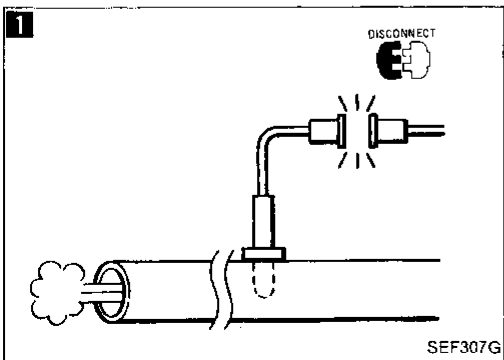
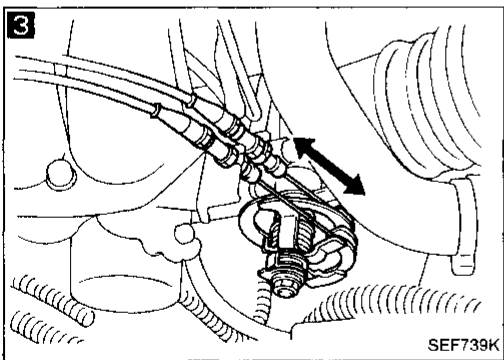
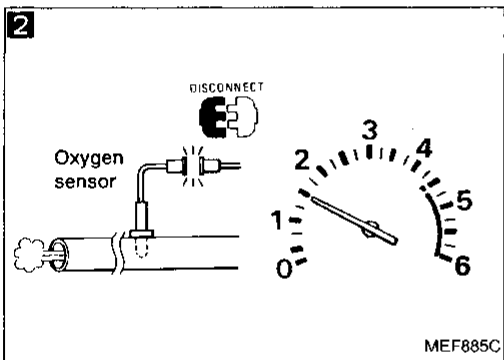
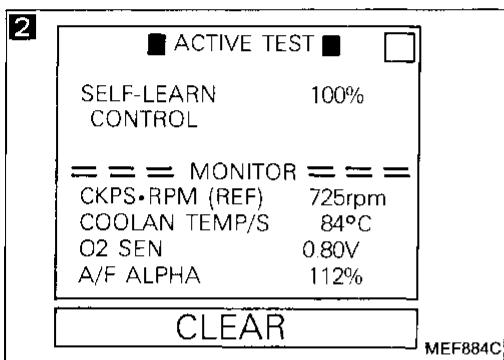
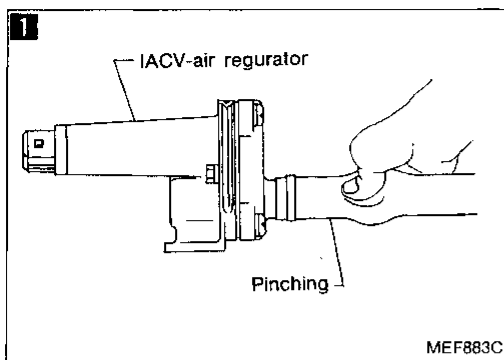
OR

- Set diagnostic test mode II (self-diagnostic results) (Refer to page EF & EC-41.)
- Count the number of RED L.E.D. or malfunction indicator lamp flashes and read out the diagnostic trouble codes.
- Are the diagnostic trouble codes being output?

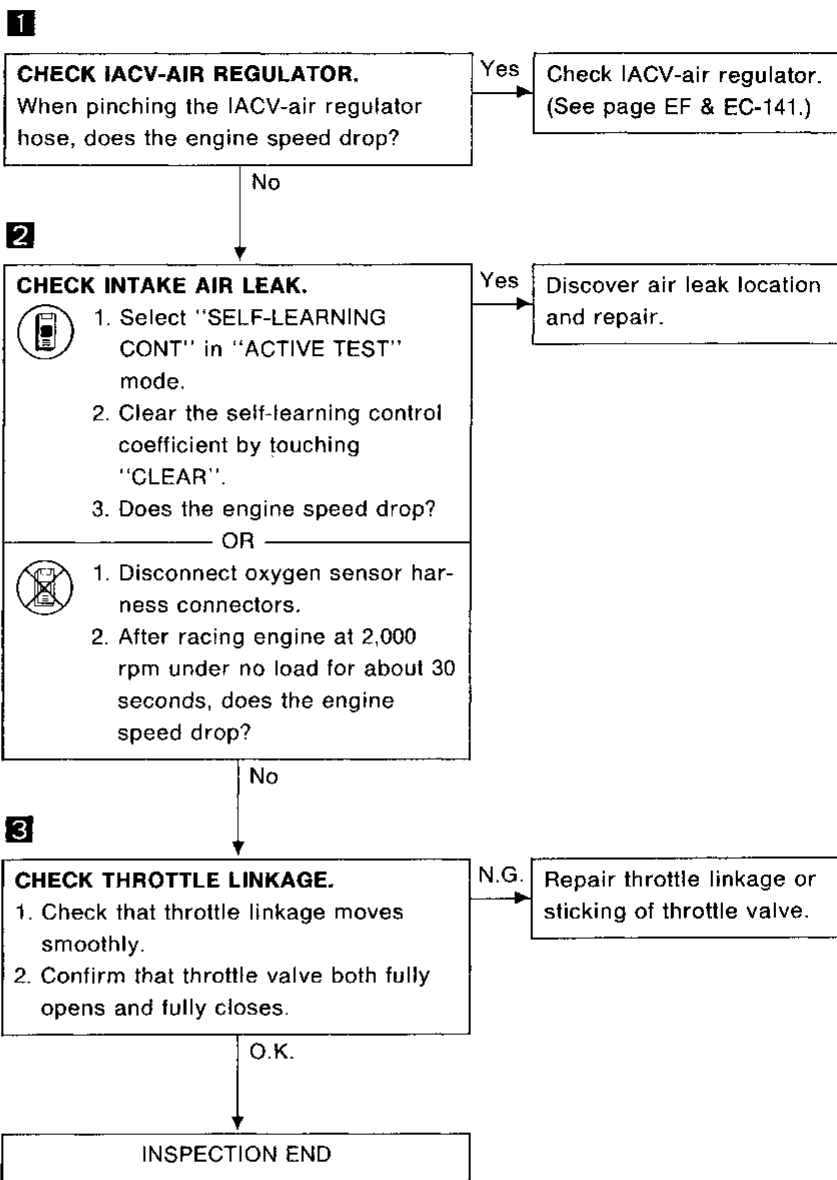
Yes Go to the relevant inspection procedure.



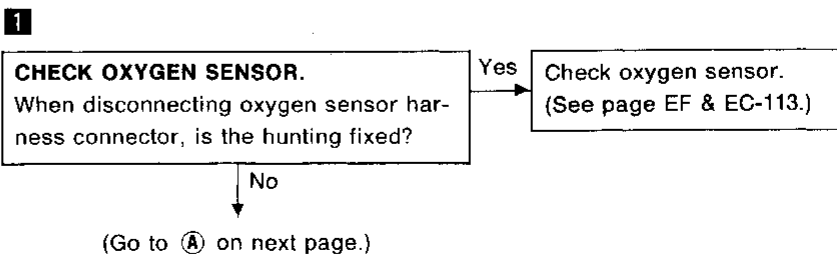
No INSPECTION END



Diagnostic Procedure 1 — High Idling after Warm-up



Diagnostic Procedure 2 — Hunting



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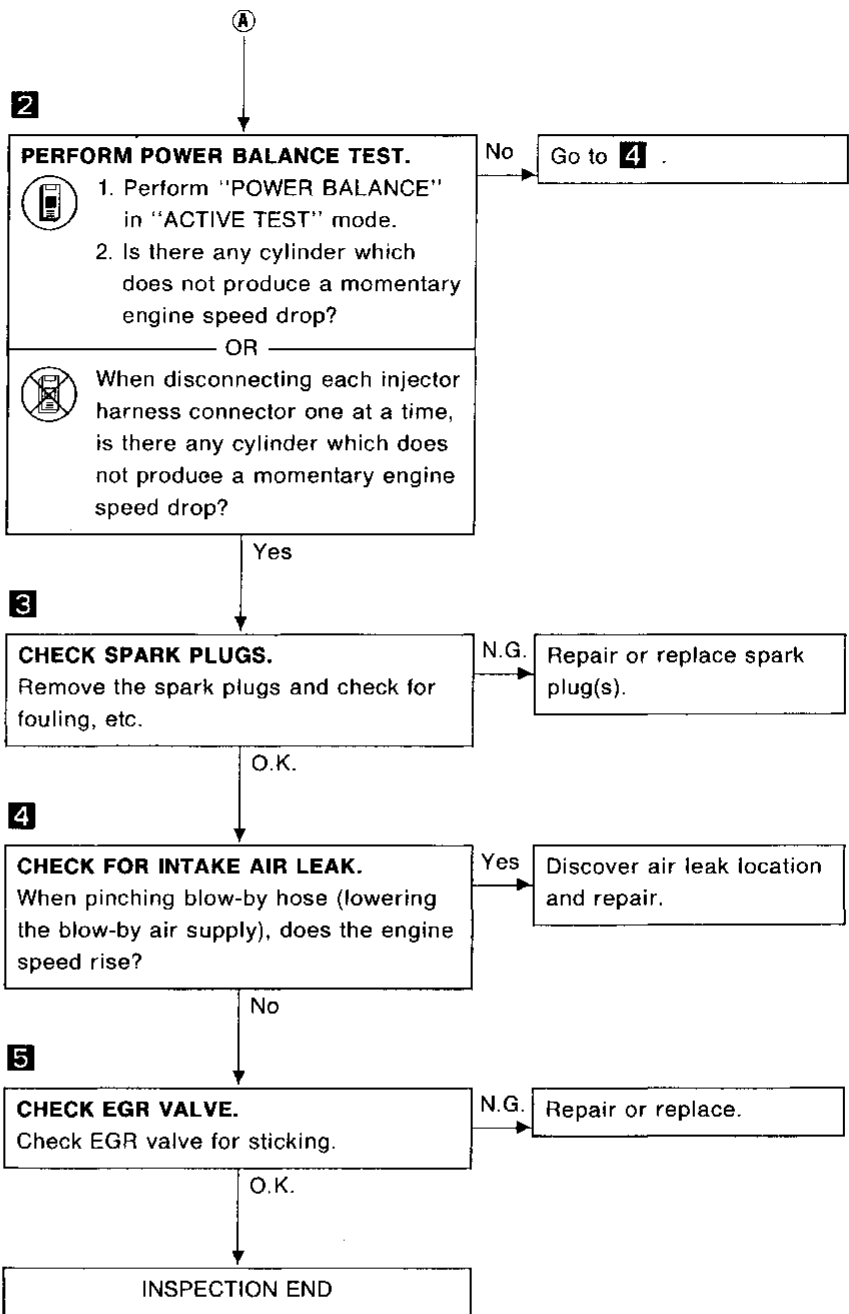
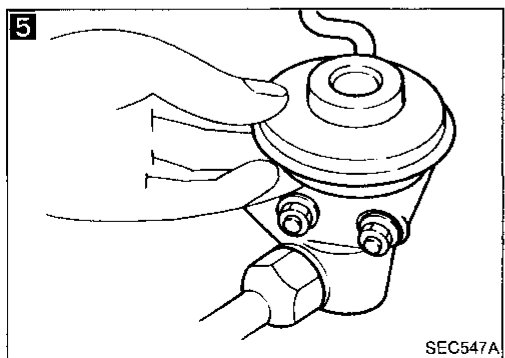
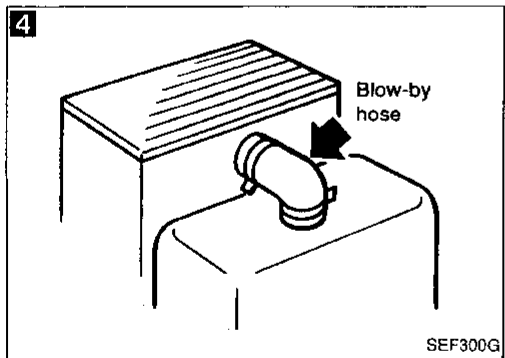
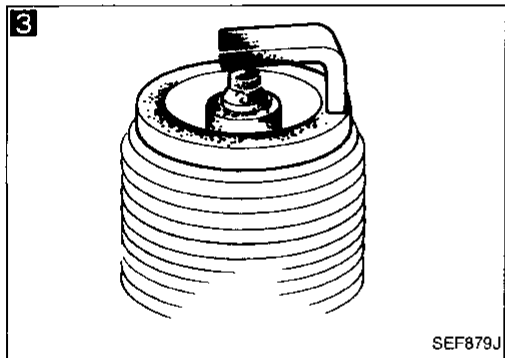
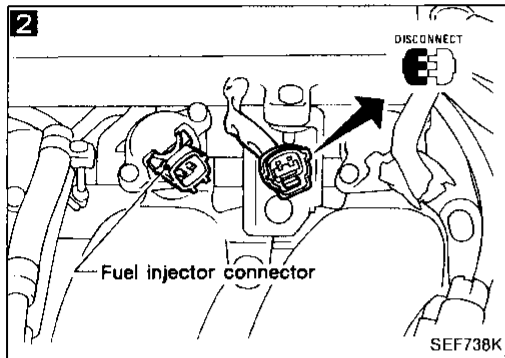
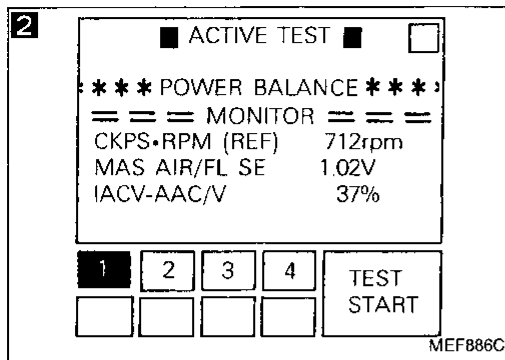
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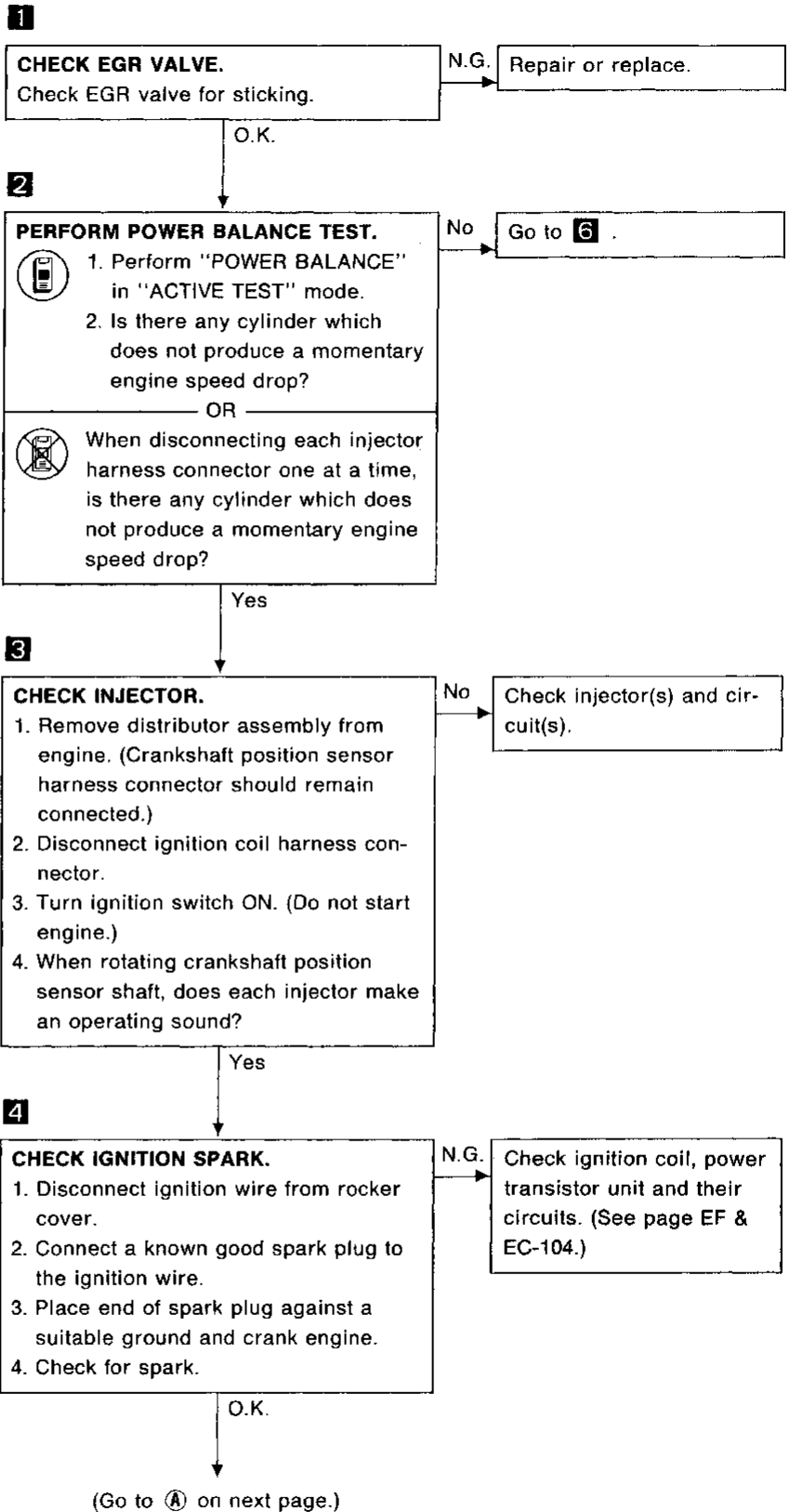
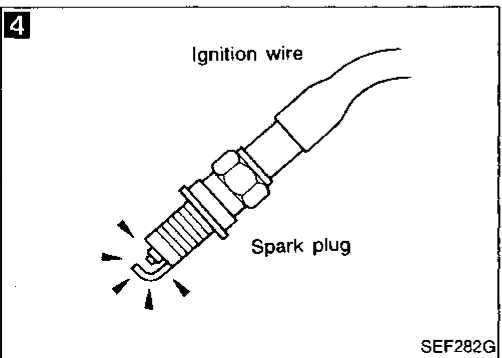
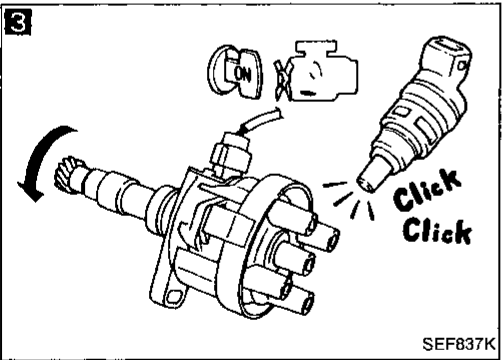
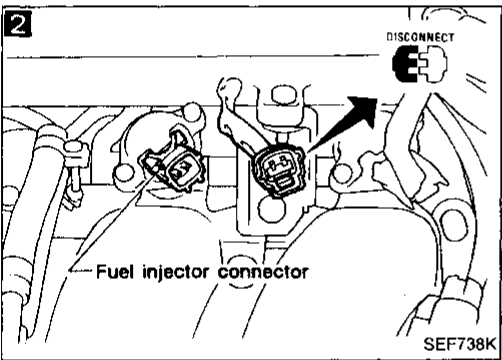
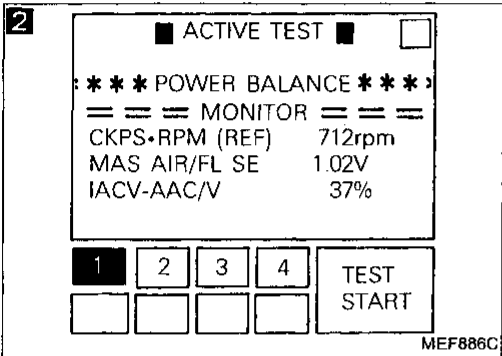
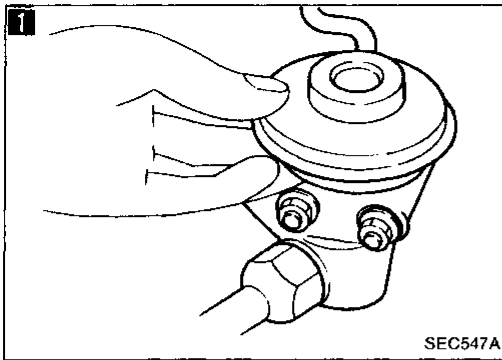
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TROUBLE DIAGNOSES

Diagnostic Procedure 2 — Hunting (Cont'd)



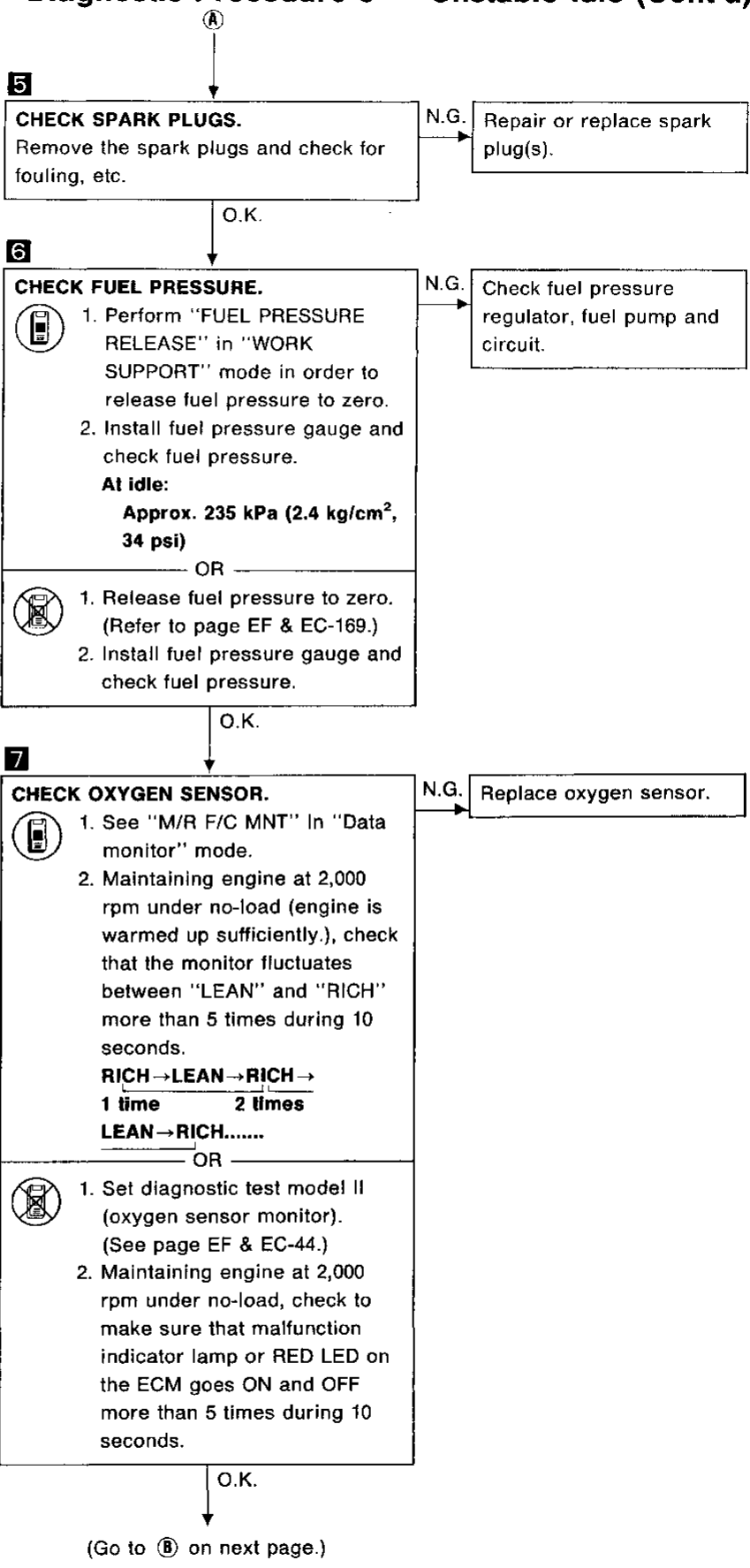
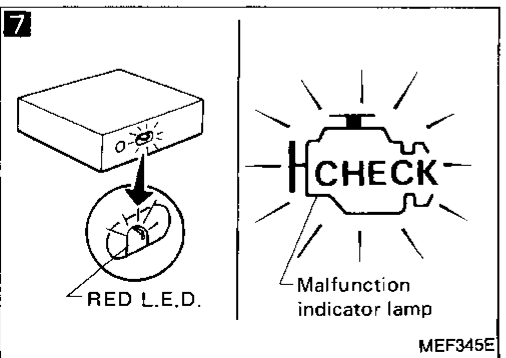
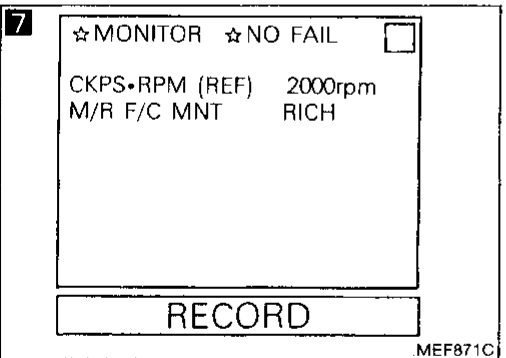
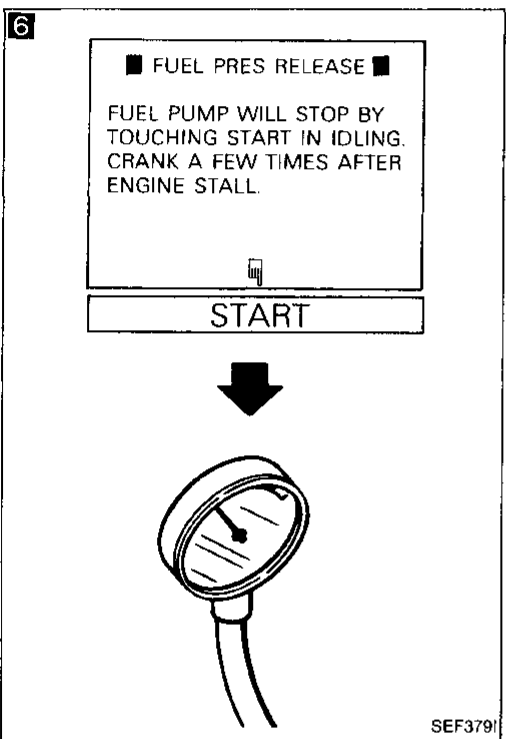
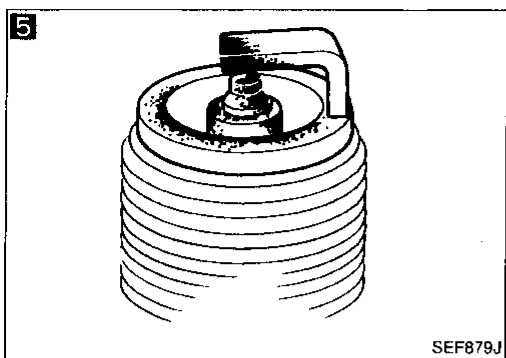
Diagnostic Procedure 3 — Unstable Idle



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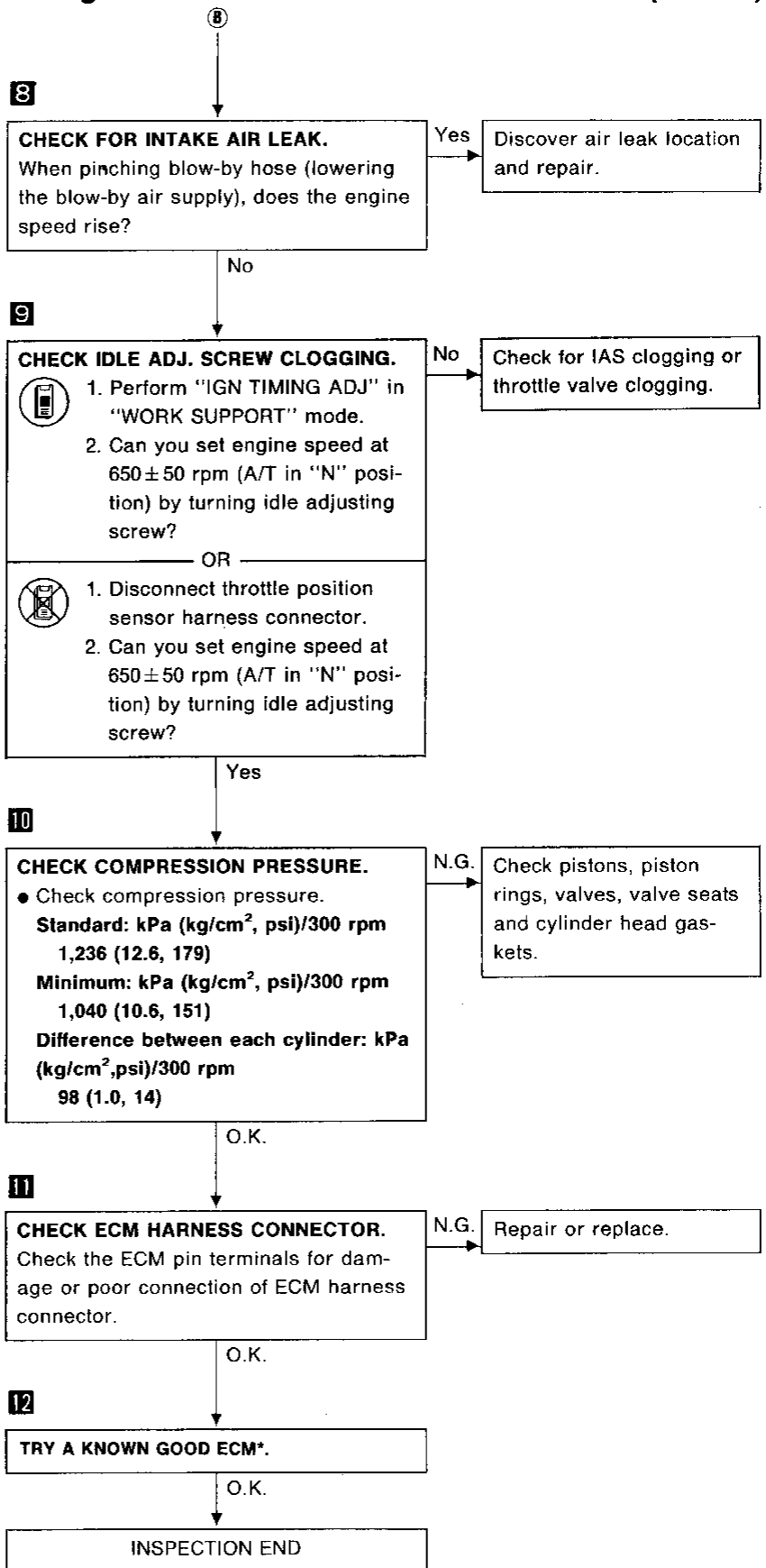
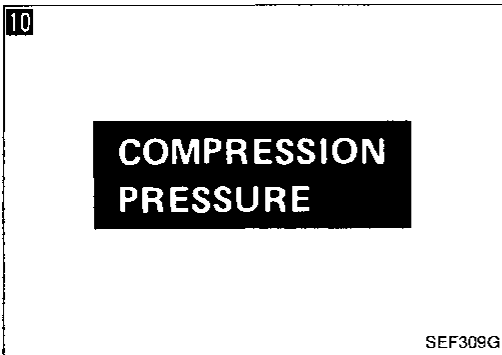
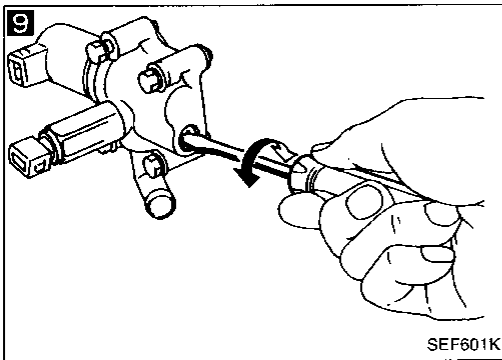
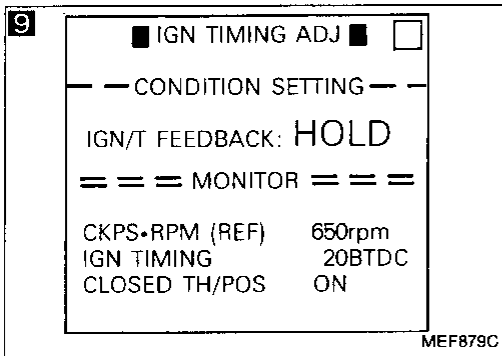
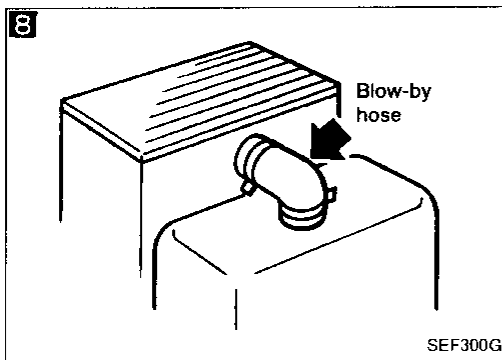
TROUBLE DIAGNOSES

Diagnostic Procedure 3 — Unstable Idle (Cont'd)



TROUBLE DIAGNOSES

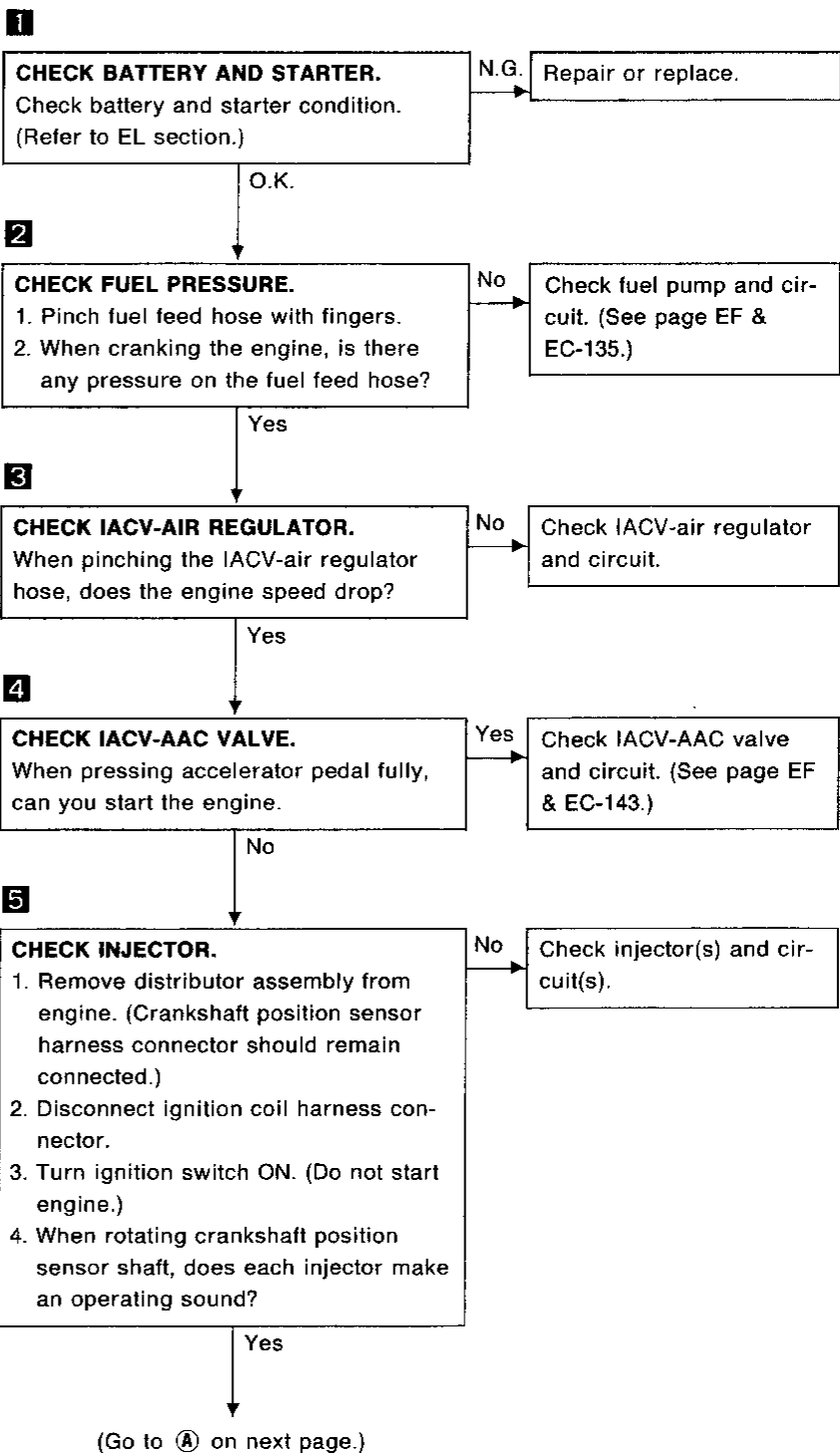
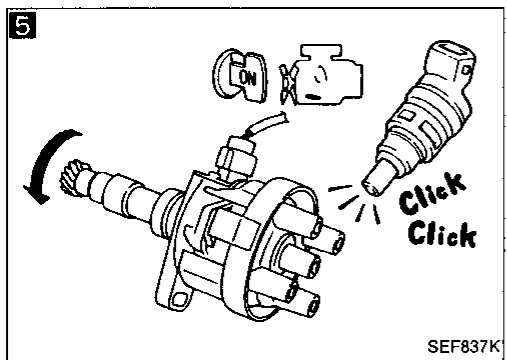
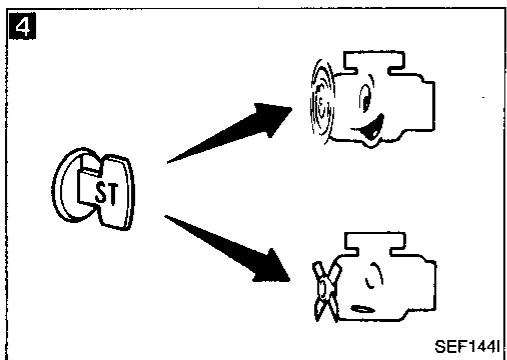
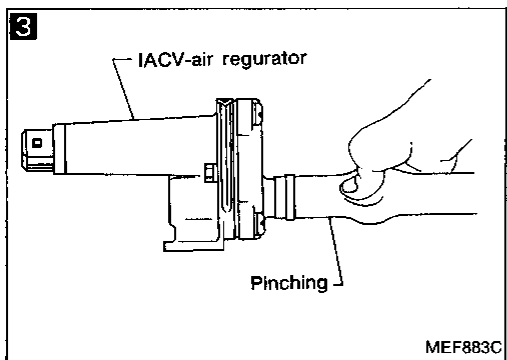
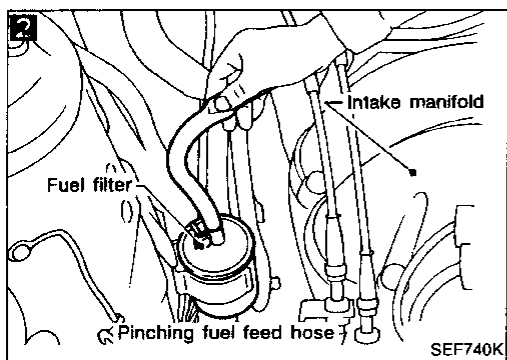
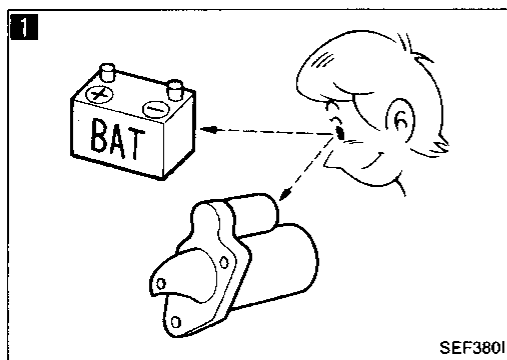
Diagnostic Procedure 3 — Unstable Idle (Cont'd)



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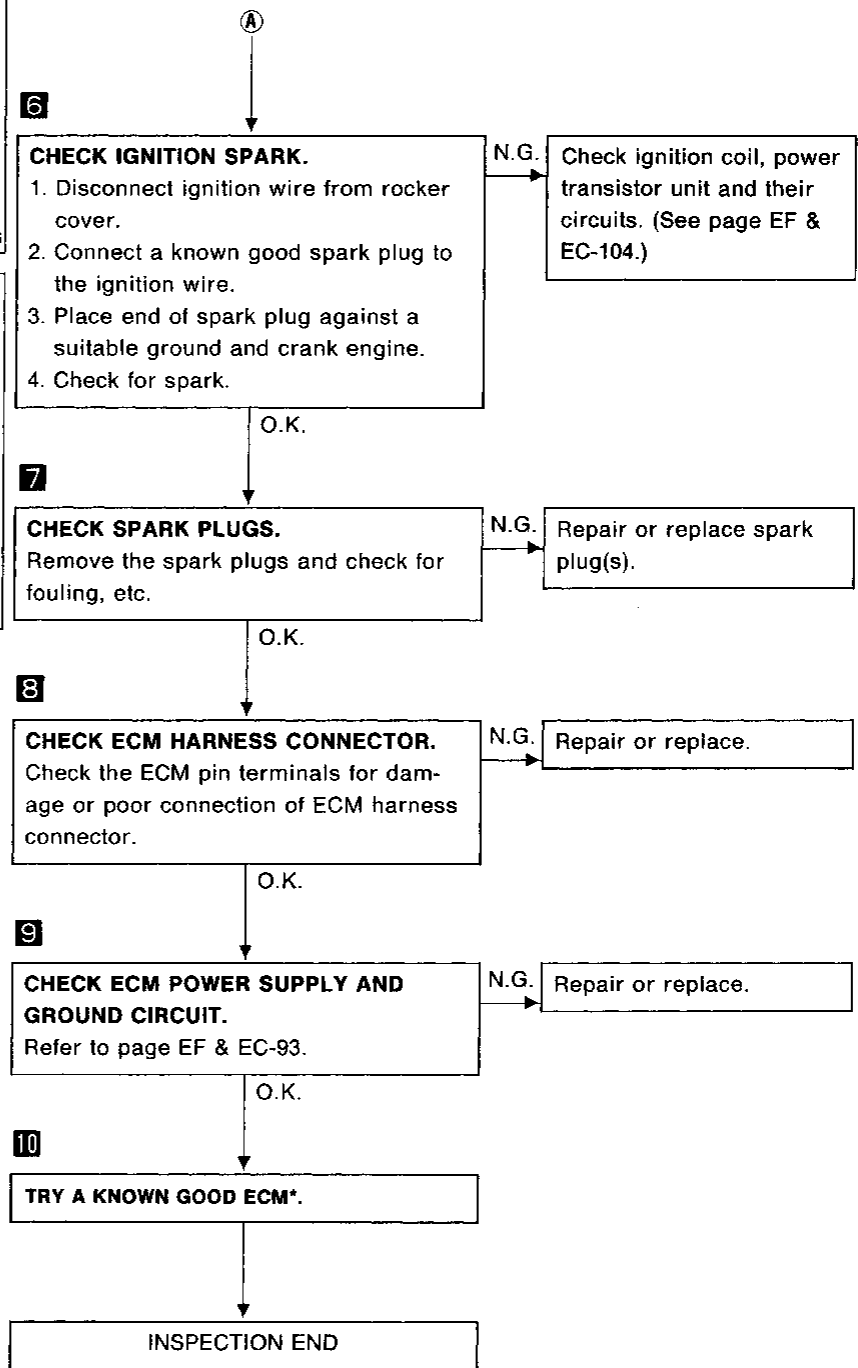
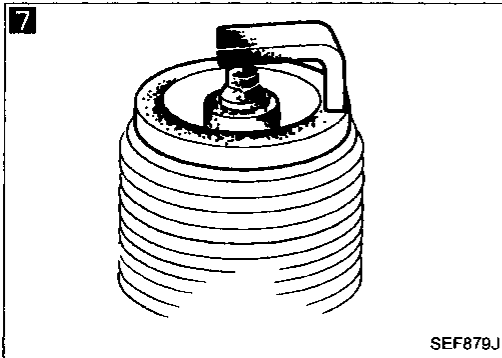
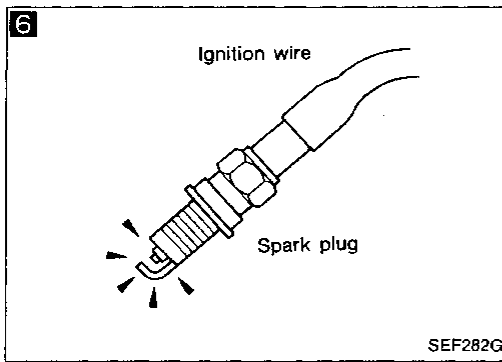
*: ECM may be the cause of a problem, but this is rarely the case.

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



TROUBLE DIAGNOSES

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

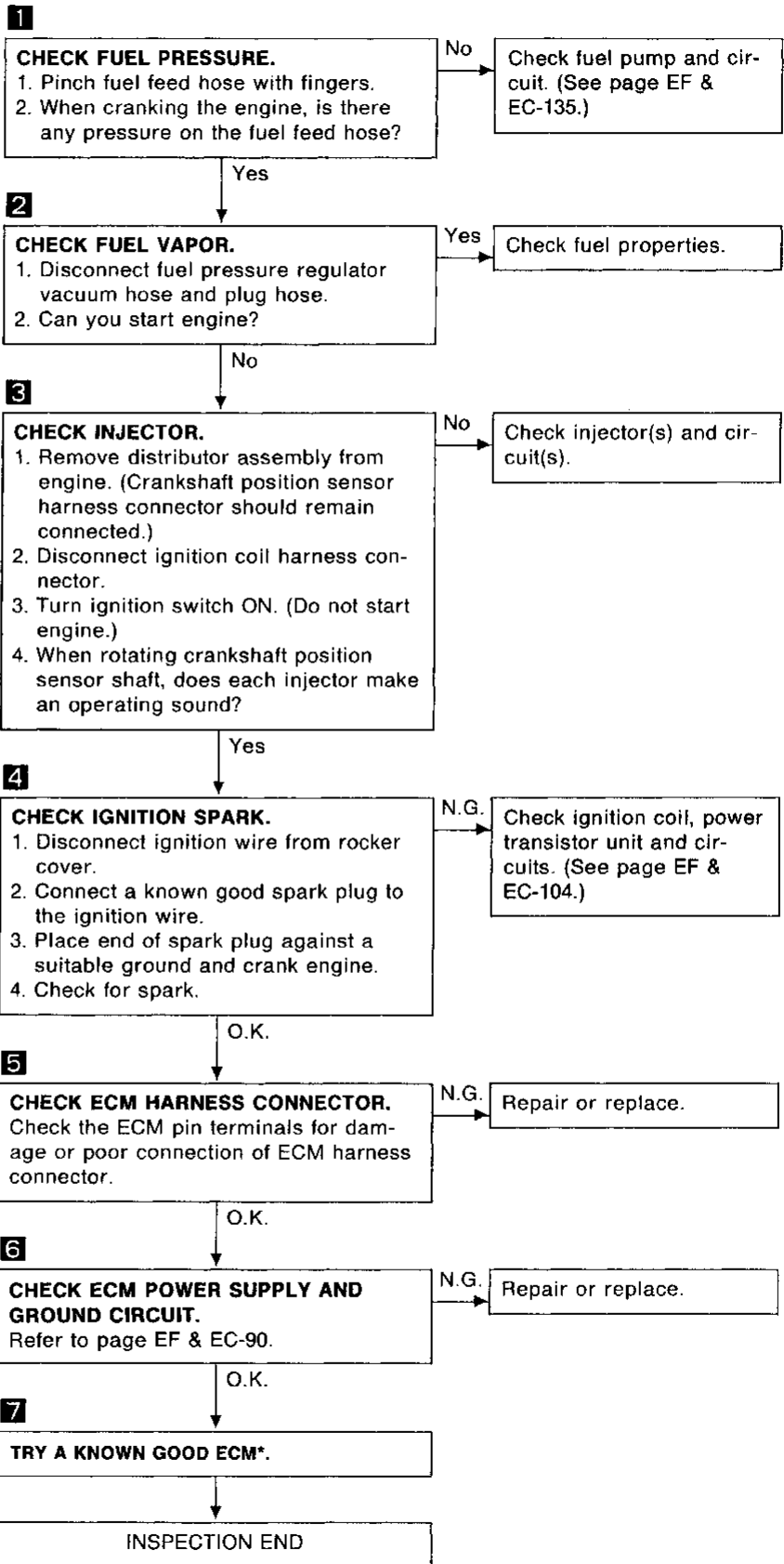
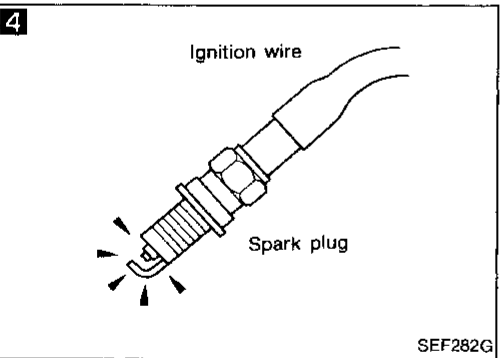
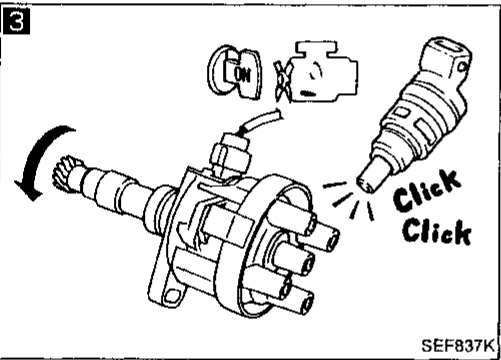
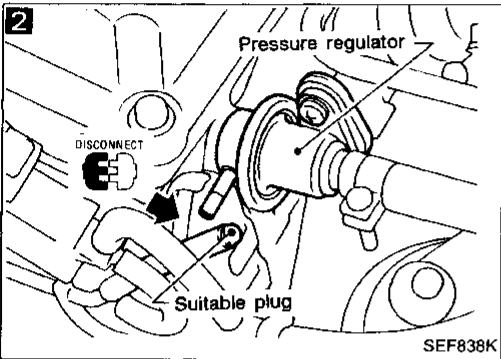
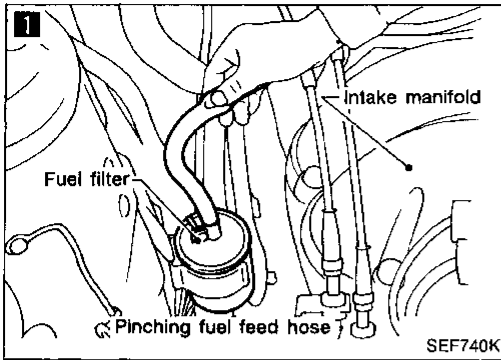


*: ECM may be the cause of a problem, but this is rarely the case.

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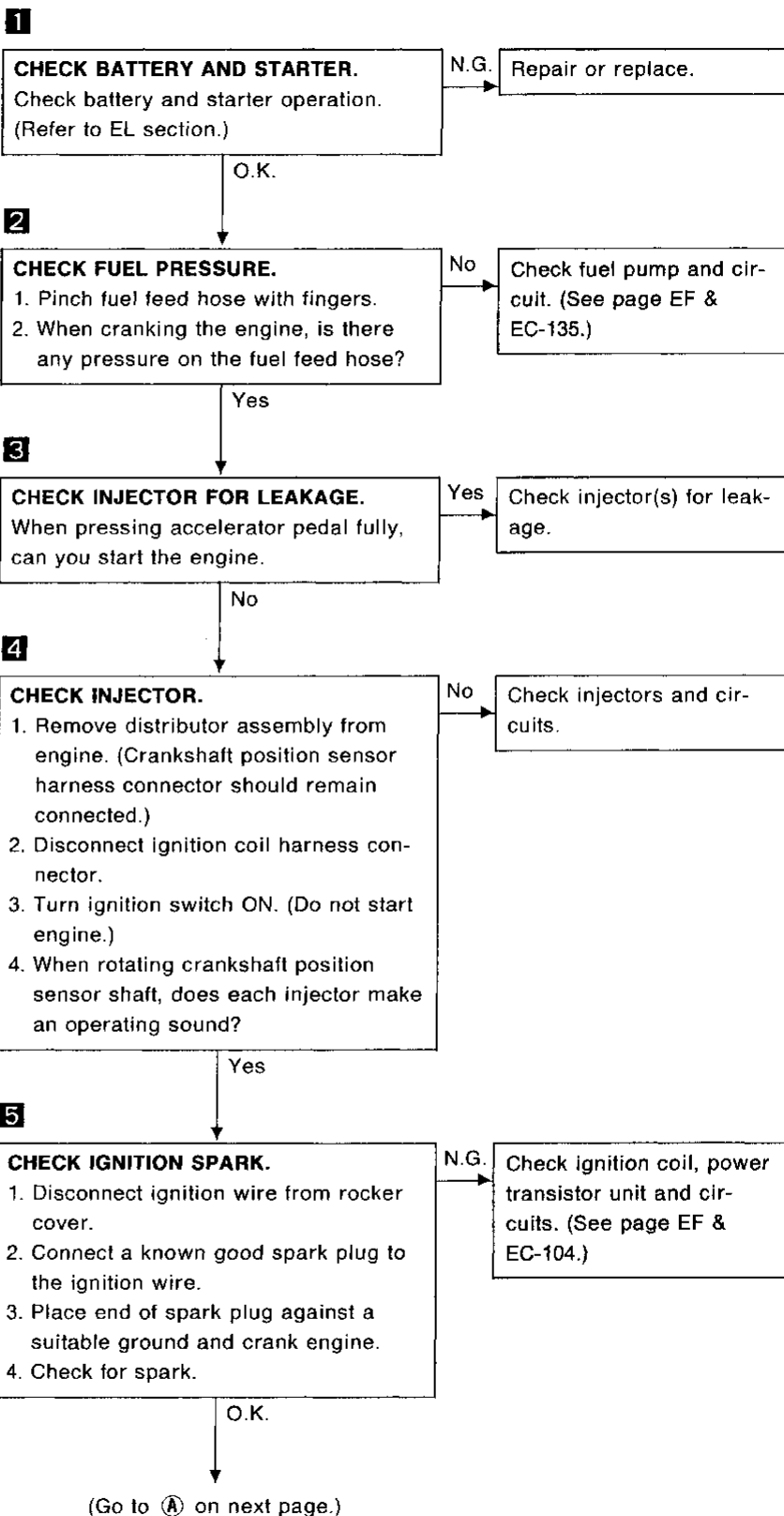
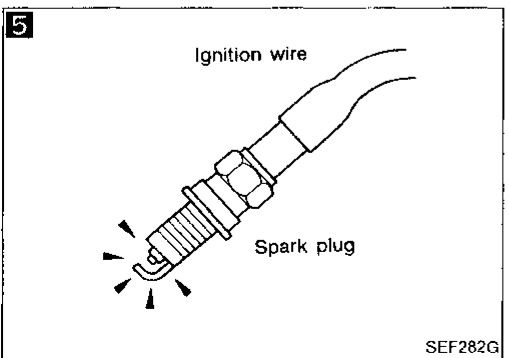
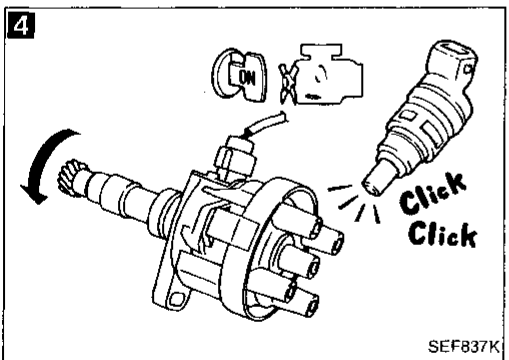
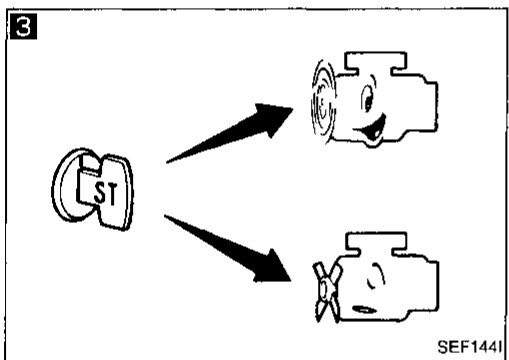
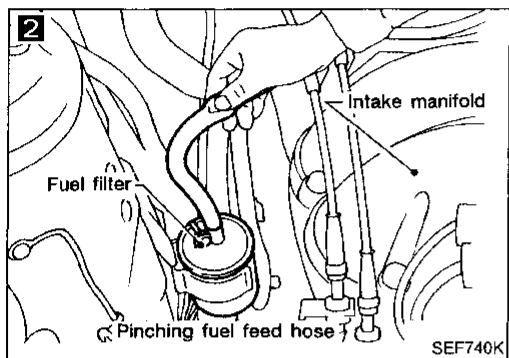
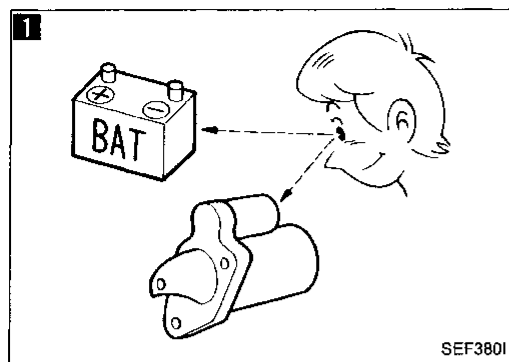
TROUBLE DIAGNOSES

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



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

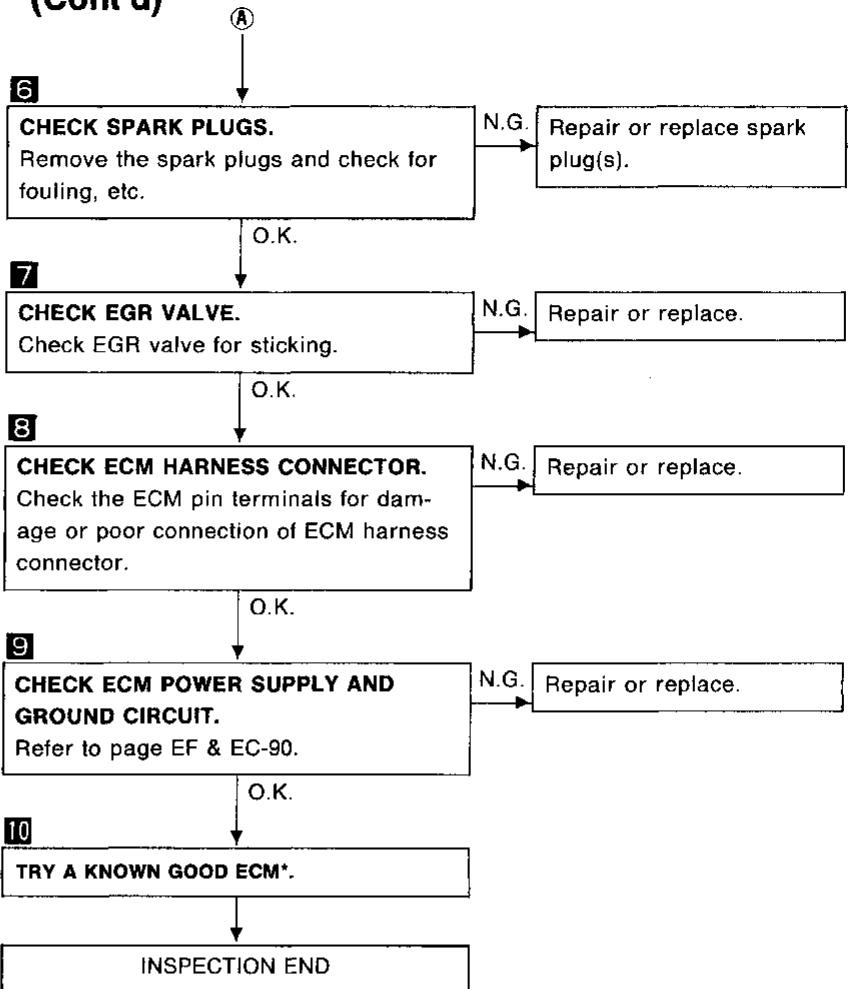
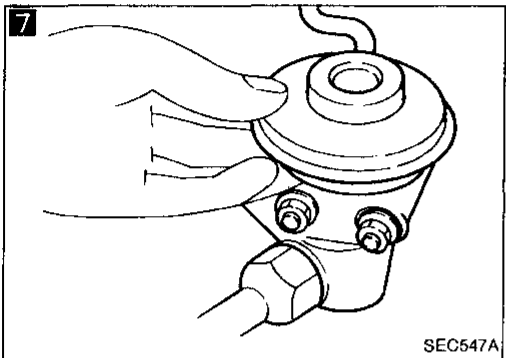
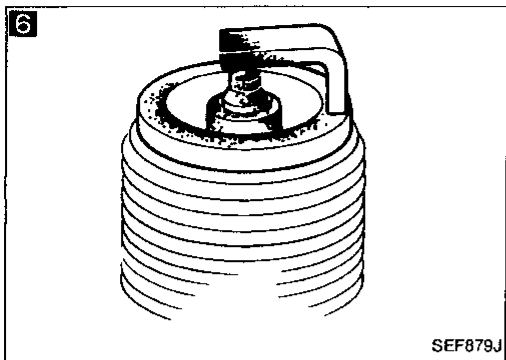
Diagnostic Procedure 6 — Hard to Start or Impossible to Start under Normal Conditions



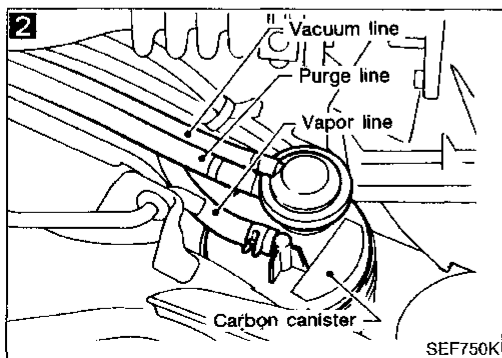
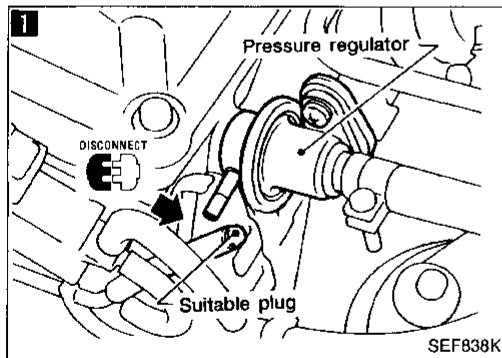
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TROUBLE DIAGNOSES

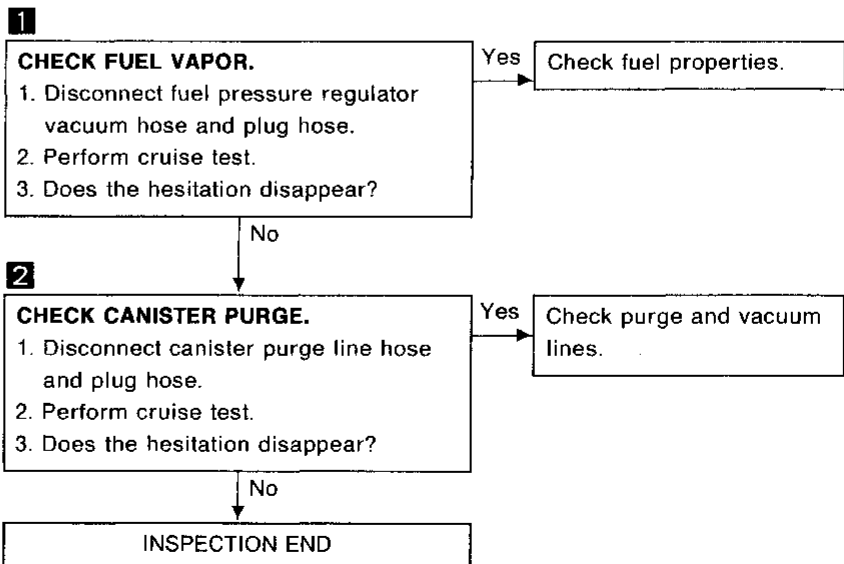
Diagnostic Procedure 6 — Hard to Start or Impossible to Start under Normal Conditions (Cont'd)



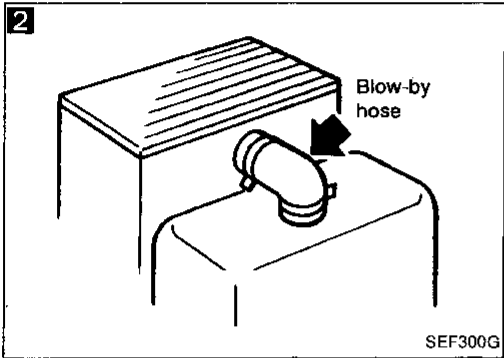
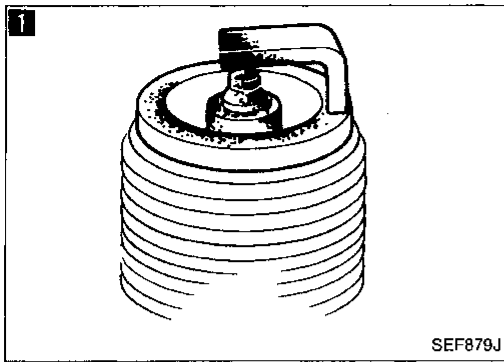
*: ECM may be the cause of a problem, but this is rarely the case.



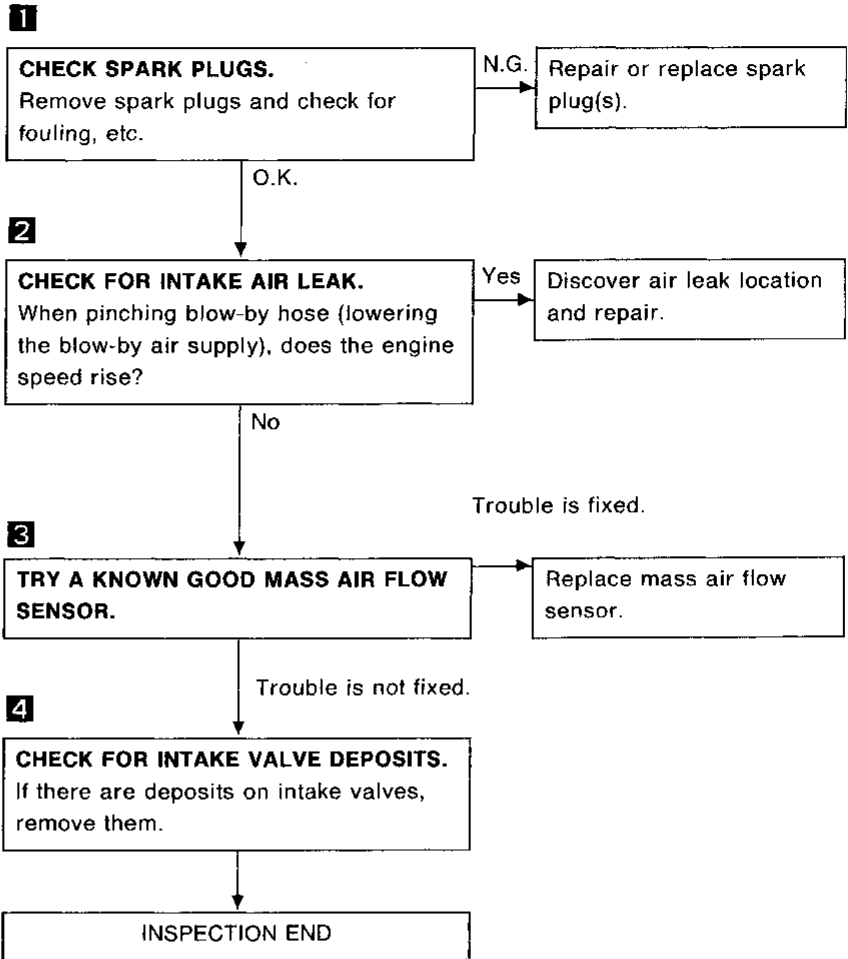
Diagnostic Procedure 7 — Hesitation when the Engine is Hot



TROUBLE DIAGNOSES



Diagnostic Procedure 8 — Hesitation when the Engine is Cold



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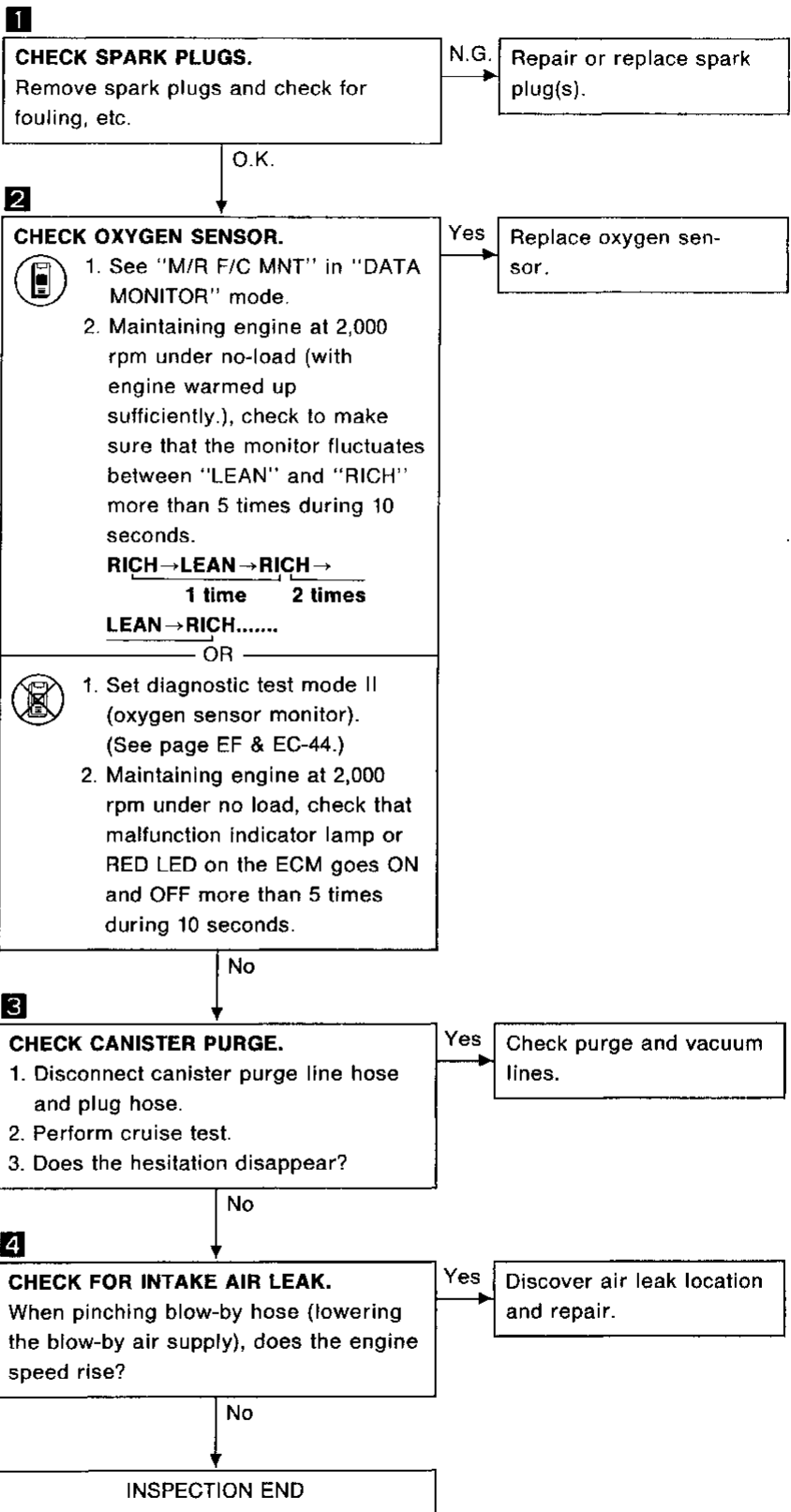
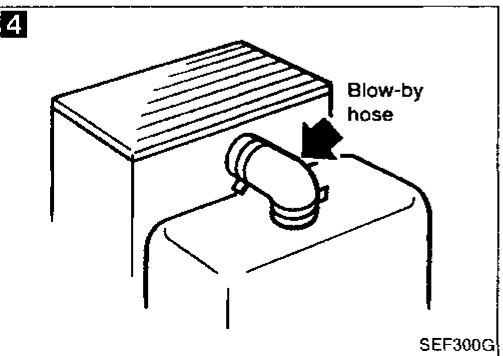
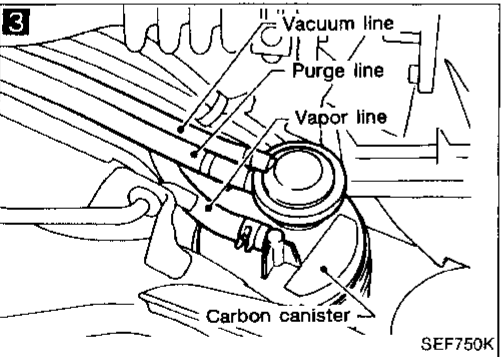
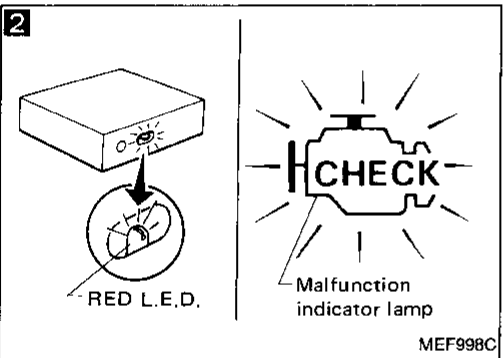
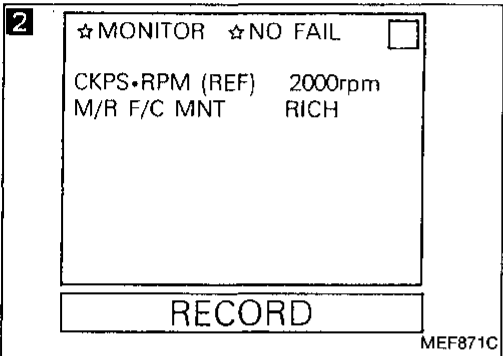
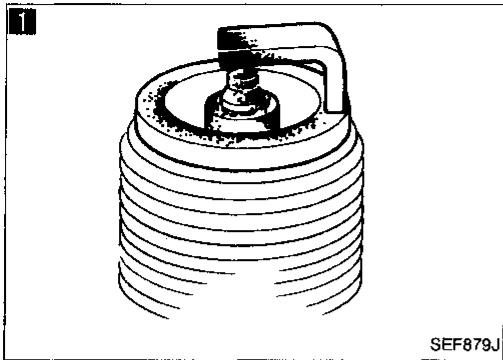
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HA

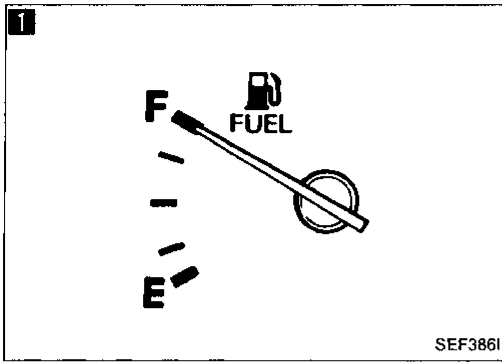
EL

TROUBLE DIAGNOSES

Diagnostic Procedure 9 — Hesitation under Normal Conditions



Diagnostic Procedure 10 — Engine Stalls when Turning



1

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

N.G. → Fill fuel tank with fuel.

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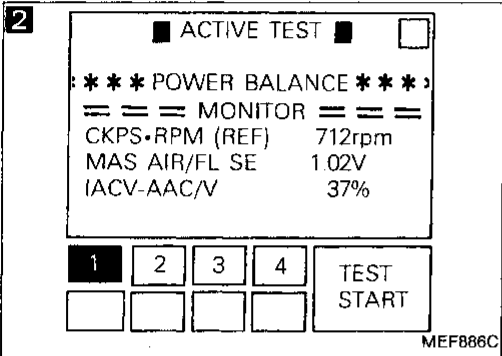
BR

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2

PERFORM POWER BALANCE TEST.

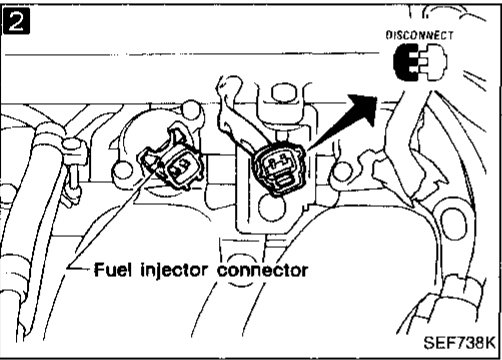
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.

2. Is there any cylinder which does not produce a momentary engine speed drop?

OR

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

No → Go to 5



3

CHECK INJECTOR.

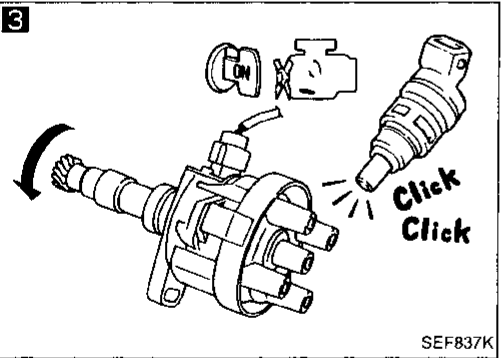
1. Remove distributor assembly from engine. (Crankshaft position sensor harness connector should remain connected.)

2. Disconnect ignition coil harness connector.

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

4. When rotating crankshaft position sensor shaft, does each injector make an operating sound?

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



4

CHECK IGNITION SPARK.

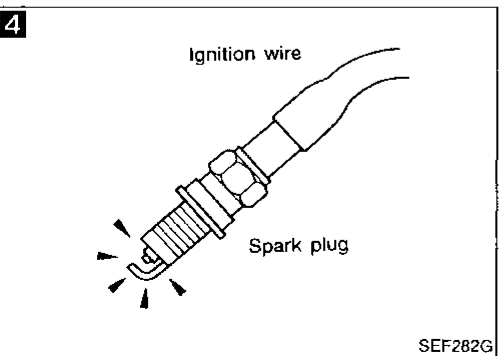
1. Disconnect ignition wire from rocker cover.

2. Connect a known good spark plug to the ignition wire.

3. Place end of spark plug against a suitable ground and crank engine.

4. Check for spark.

N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-104.)



O.K.

(Go to A on next page.)

TROUBLE DIAGNOSES

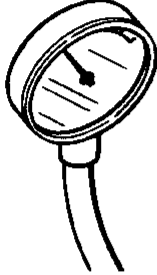
Diagnostic Procedure 10 — Engine Stalls when Turning (Cont'd)

5

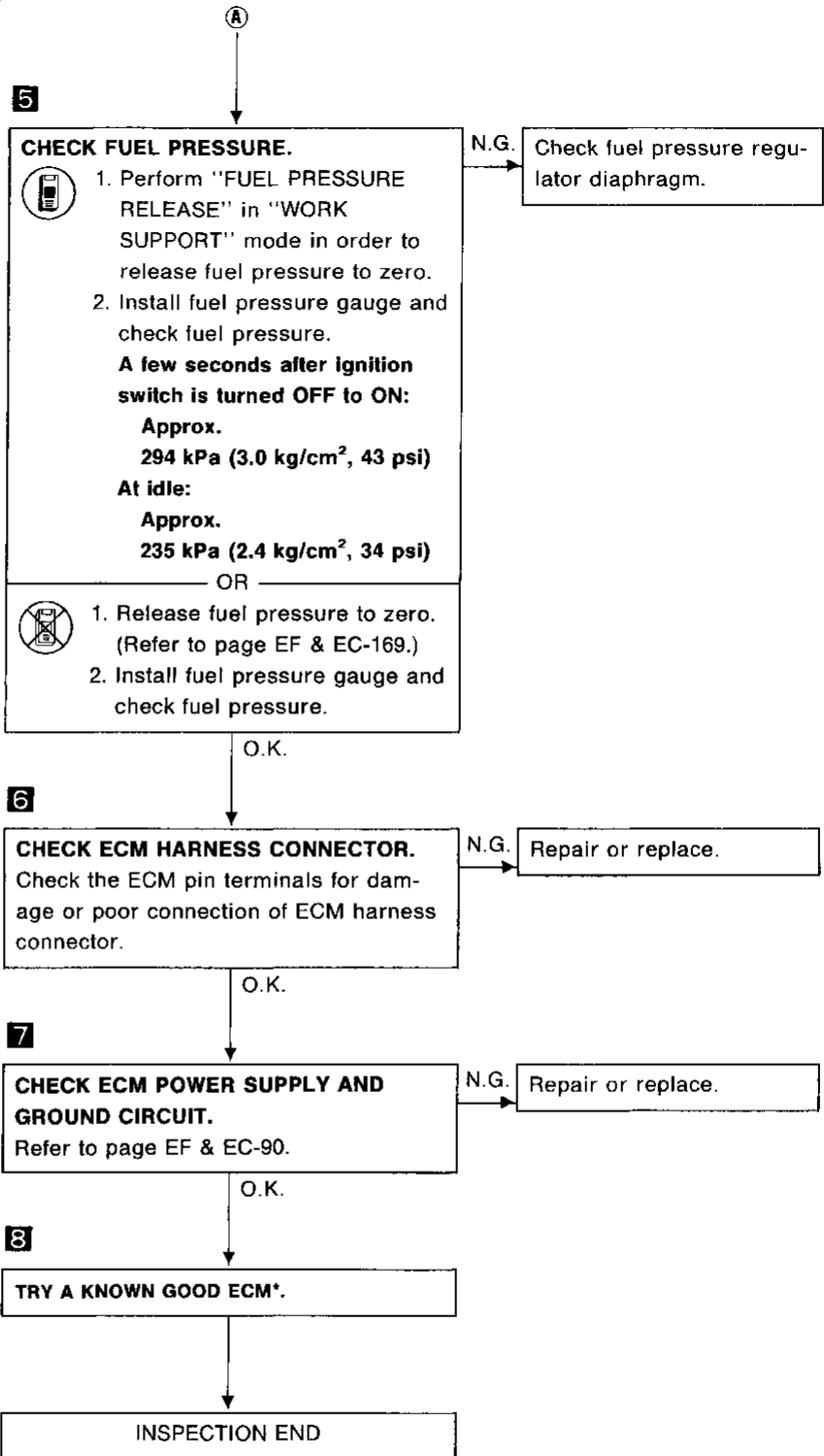
■ FUEL PRES RELEASE ■

FUEL PUMP WILL STOP BY TOUCHING START IN IDLING. CRANK A FEW TIMES AFTER ENGINE STALL.

START

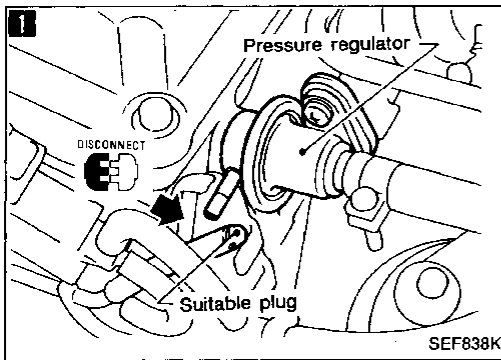


SEF379I



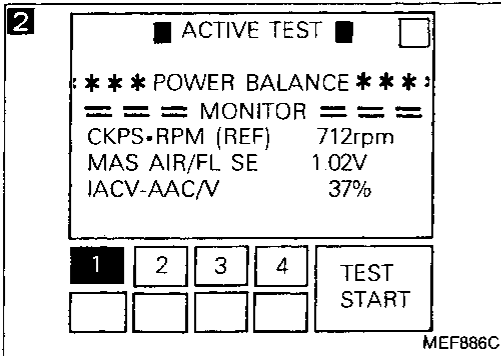
*: ECM may be the cause of a problem, but this is rarely the case.

Diagnostic Procedure 11 — Engine Stalls when the Engine is Hot



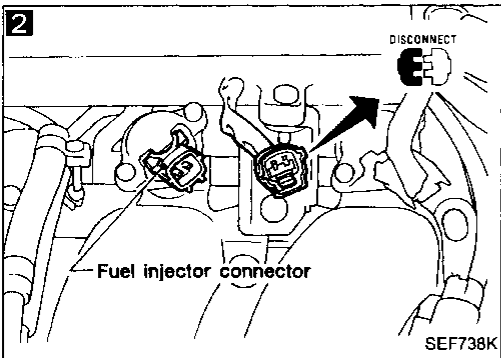
1
CHECK FUEL VAPOR.
1. Disconnect fuel pressure regulator vacuum hose and plug hose.
2. Perform cruise test.
3. Does the engine stall disappear?

Yes → Check fuel properties.



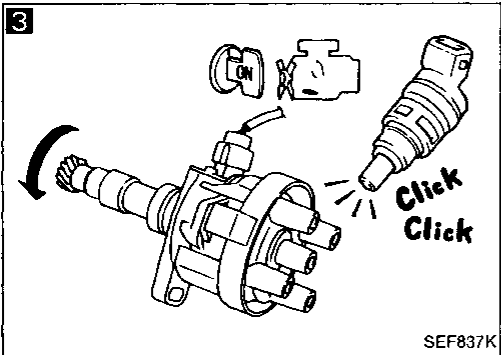
2
PERFORM POWER BALANCE TEST.
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?
OR
When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?

No → Go to 5.



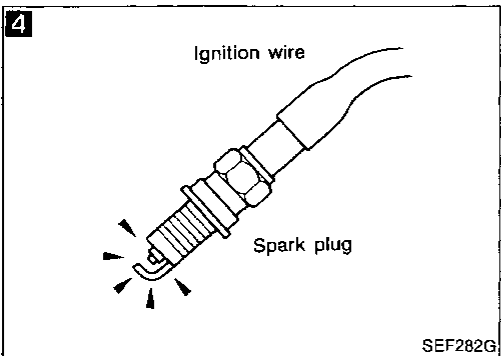
3
CHECK INJECTOR.
1. Remove distributor assembly from engine. (Crankshaft position sensor harness connector should remain connected.)
2. Disconnect ignition coil harness connector.
3. Turn ignition switch ON. (Do not start engine.)
4. When rotating crankshaft position sensor shaft, does each injector make an operating sound?

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



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

N.G. → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-104.)



O.K.
→ (Go to A on next page.)

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TROUBLE DIAGNOSES

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


5

■ FUEL PRES RELEASE ■

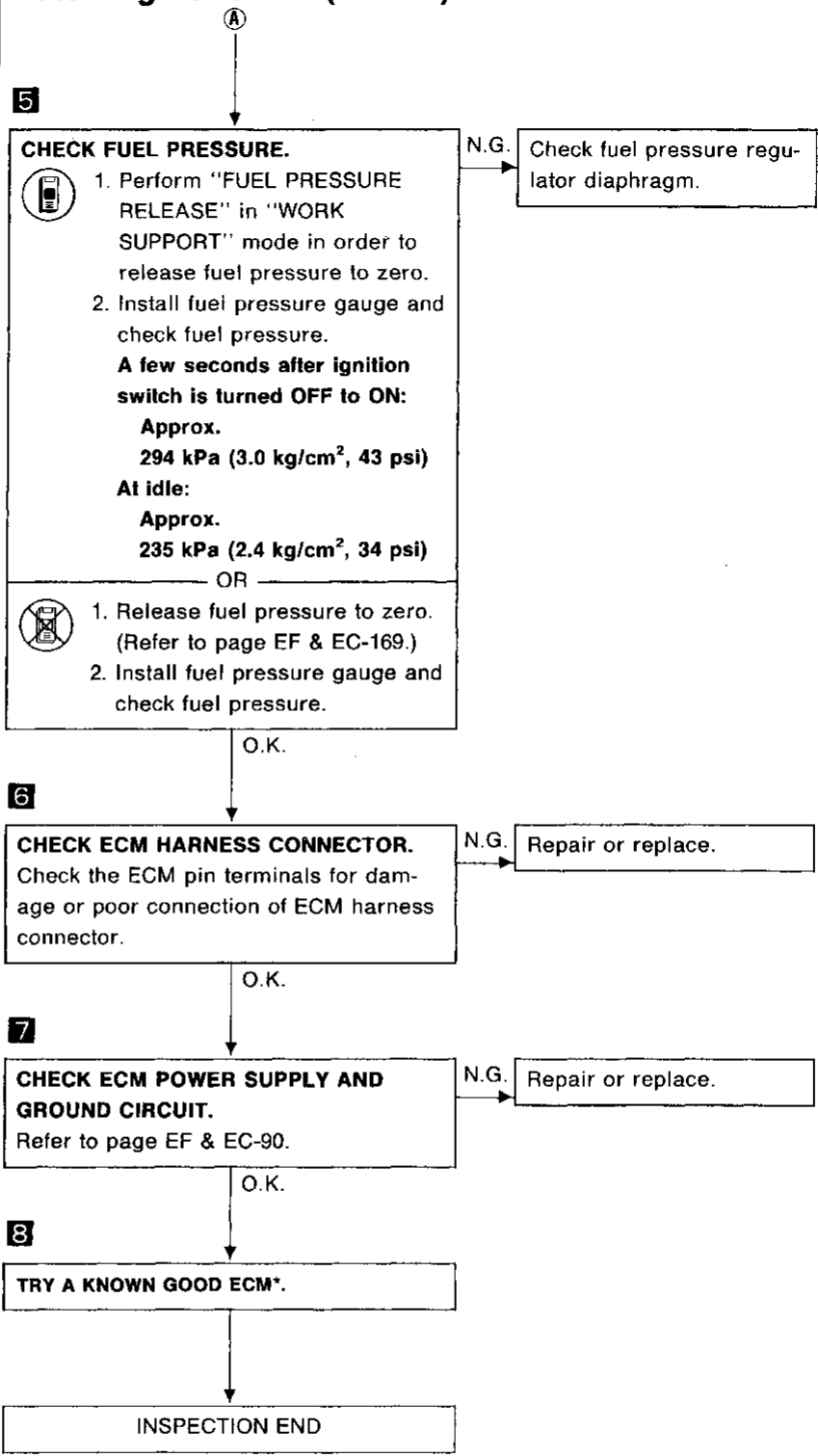
FUEL PUMP WILL STOP BY TOUCHING START IN IDLING. CRANK A FEW TIMES AFTER ENGINE STALL.

START

↓

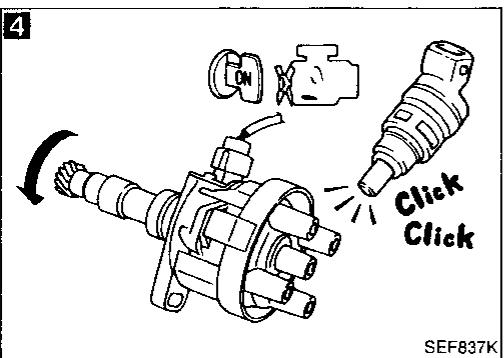
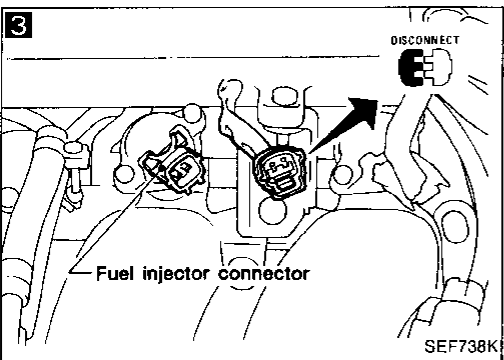
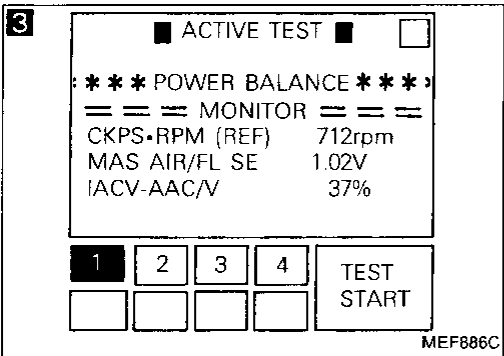
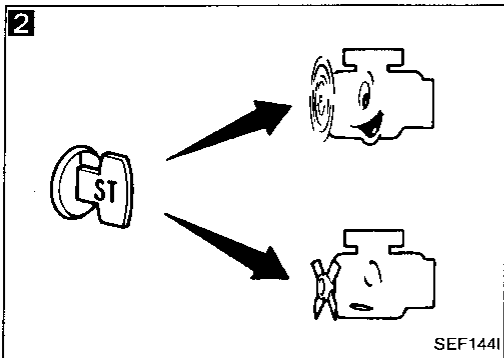
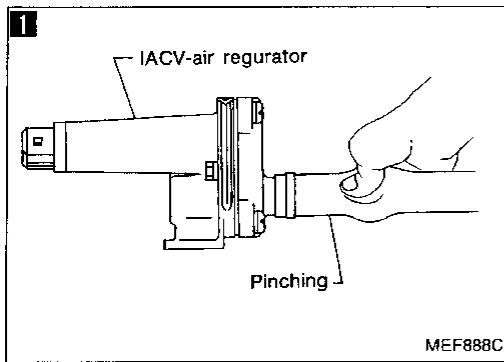


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*: ECM may be the cause of a problem, but this is rarely the case.

Diagnostic Procedure 12 — Engine Stalls when the Engine is Cold



1
CHECK IACV-AIR REGULATOR.
 When pinching the IACV-air regulator hose, does the engine speed drop?

No → Check IACV-air regulator and circuit.

Yes
2
CHECK IACV-AAC VALVE.
 When the engine is cold, can you start the engine when pressing accelerator pedal fully?

Yes → Check IACV-AAC valve and circuits. (See page EF & EC-143.)

No
3
PERFORM POWER BALANCE TEST.
 1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
 2. Is there any cylinder which does not produce a momentary engine speed drop?

N.G. → Go to **7**

OR

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

O.K. →

4
CHECK INJECTOR.
 1. Remove distributor assembly from engine. (Crankshaft position sensor harness connector should remain connected.)
 2. Disconnect ignition coil harness connector.
 3. Turn ignition switch ON. (Do not start engine.)
 4. When rotating crankshaft position sensor shaft, does each injector make an operating sound?

N.G. → Check injector(s) and circuit(s).

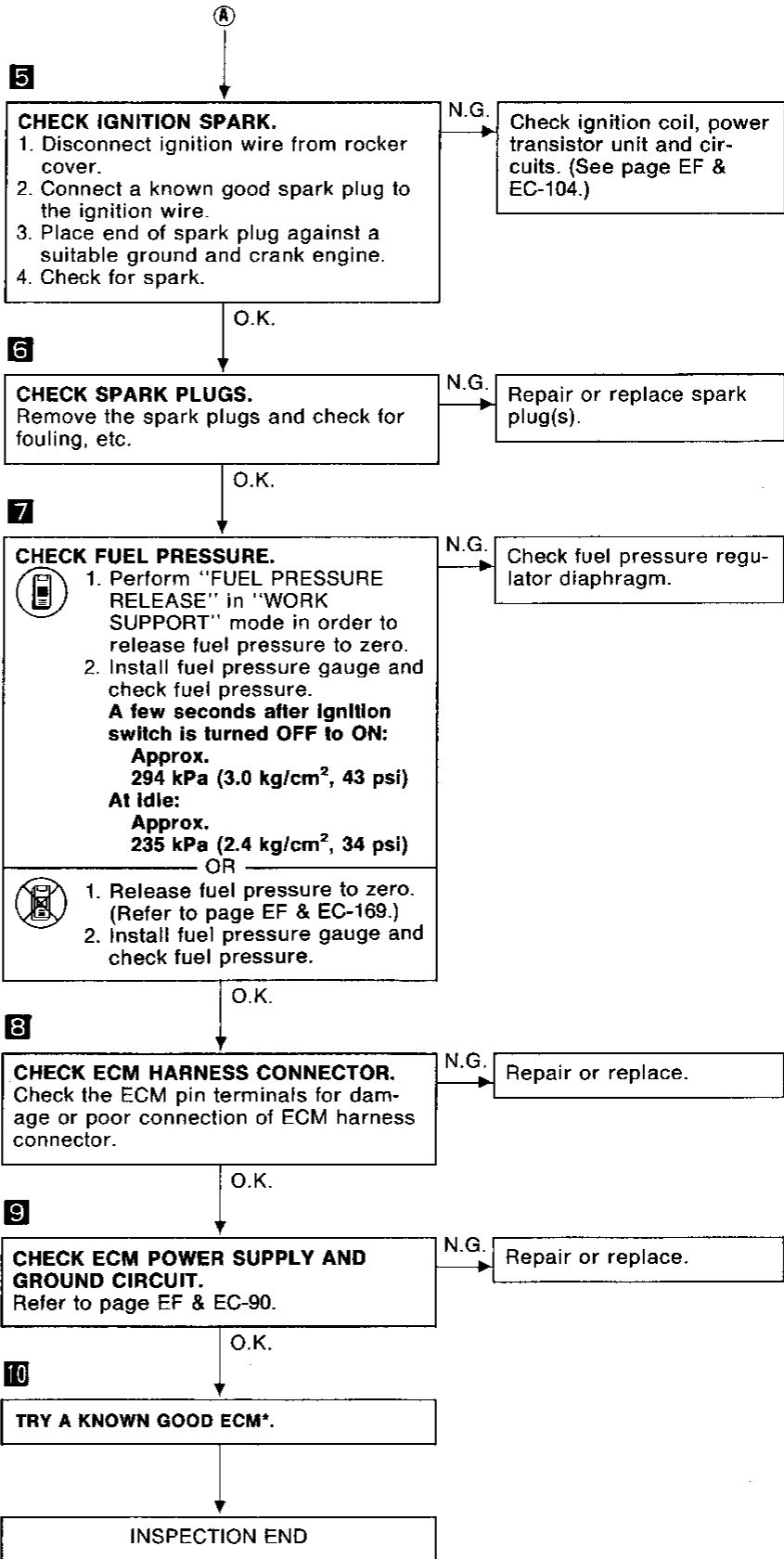
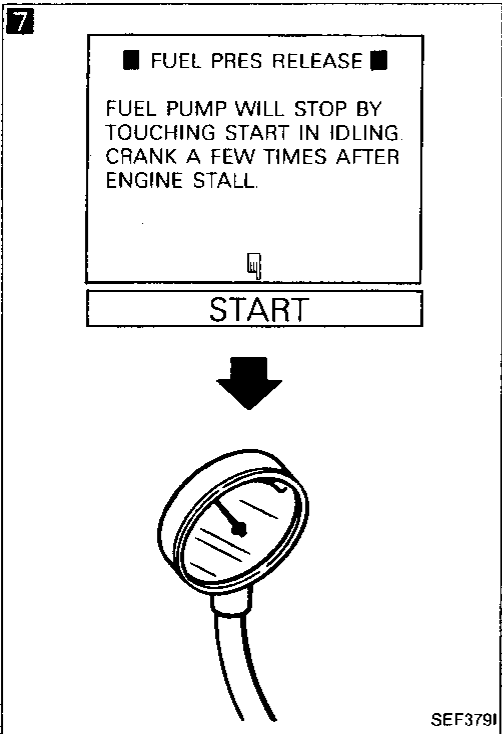
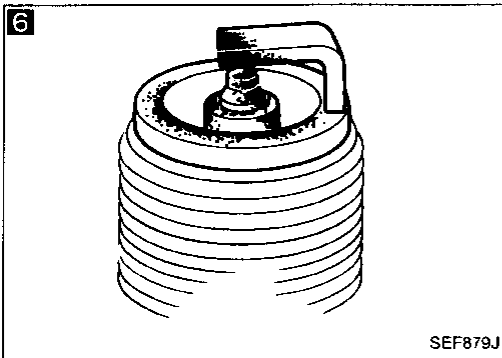
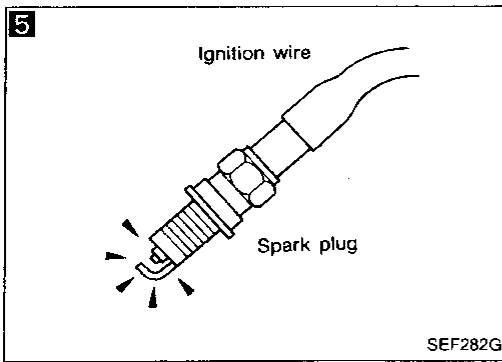
O.K. →

(Go to **A** on next page.)

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TROUBLE DIAGNOSES

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



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

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

1 ■ IACV-AAC/V SYSTEM ■

LET ENGINE IDLE
THEN
TOUCH START
(A/C SW•LIGHT SW OFF)

NEXT START

MEF889C

1 ■ ACTIVE TEST ■

IACV-AAC/V OPENING 50%

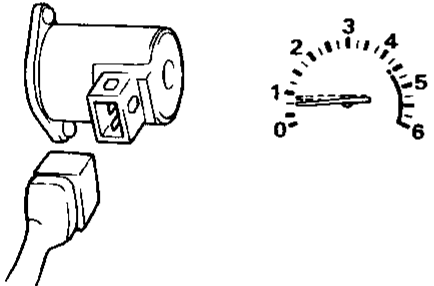
== == MONITOR == ==

CKPS•RPM (REF)	825rpm
MAS AIR/FL SE	1.12V
COOLAN TEMP/S	84°C

Qu UP DWN Qd

MEF890C

1



SEF146I

2 ■ ACTIVE TEST ■

*** POWER BALANCE ***

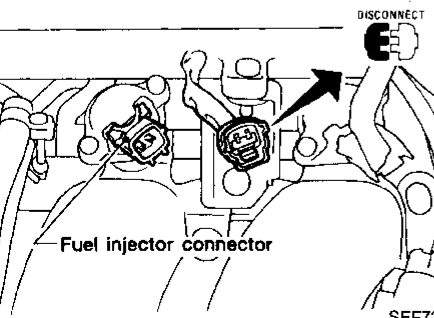
== == MONITOR == ==

CKPS•RPM (REF)	712rpm
MAS AIR/FL SE	1.02V
IACV-AAC/V	37%

1 2 3 4 TEST START

MEF886C

2



Fuel injector connector

SEF738K

1

CHECK OVERALL FUNCTION.

- 1) Start engine and warm it up sufficiently.
- 2) Check idle speed.
700 ± 50 rpm
(A/T in "N" position)
- 3) Perform "IACV-AAC VALVE SYSTEM" in "FUNCTION TEST" mode with CONSULT.

OR

CHECK IACV-AAC VALVE.

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

OR

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

Yes

2

PERFORM POWER BALANCE TEST.

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

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 distributor assembly from engine. (Crankshaft position sensor harness connector should remain connected.)
2. Disconnect ignition coil harness connector.
3. Turn ignition switch ON. (Do not start engine.)
4. When rotating crankshaft position sensor shaft, does each injector make an operating sound?

Yes

(Go to **A** on next page.)

No
Check IACV-AAC valve and circuit. (See page EF & EC-143.)

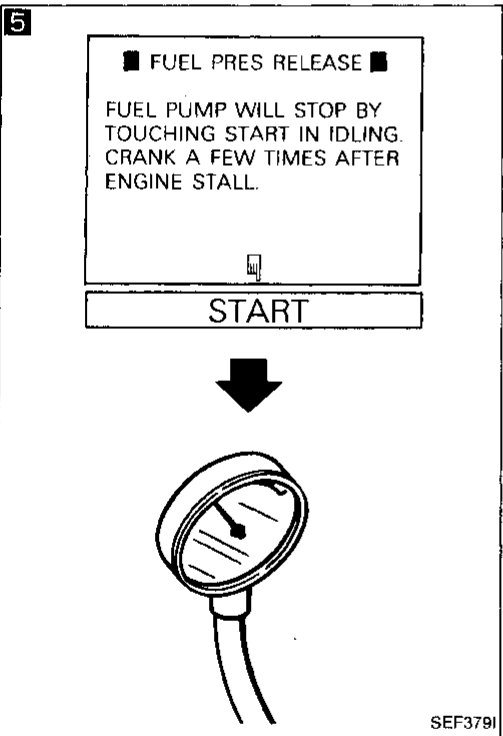
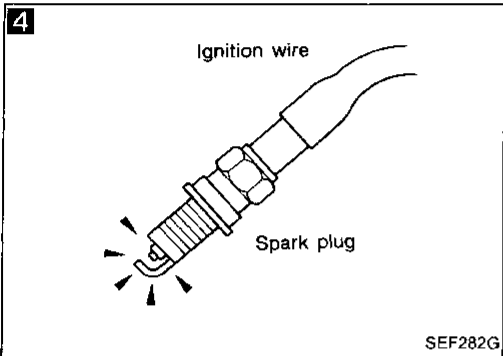
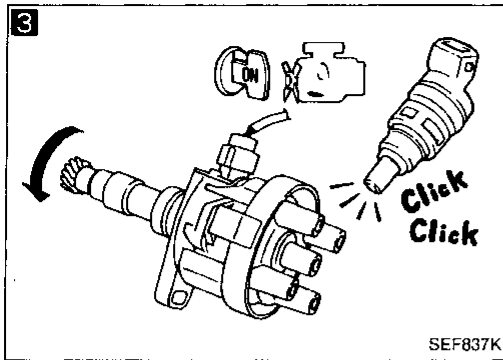
No
Go to **5**

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

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TROUBLE DIAGNOSES

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



4
CHECK IGNITION SPARK.
 1. Disconnect ignition wire from rocker cover.
 2. Connect a known good spark plug to the ignition wire.
 3. Place end of spark plug against an earth point with engine cranking.
 4. Check for spark.

N.G. → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-104.)

5
CHECK FUEL PRESSURE.
 1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
 2. Install fuel pressure gauge and check fuel pressure.
A few seconds after ignition switch is turned OFF to ON:
Approx.
294 kPa (3.0 kg/cm², 43 psi)
At idle:
Approx.
235 kPa (2.4 kg/cm², 34 psi)
 OR
 1. Release fuel pressure to zero. (Refer to page EF & EC-169.)
 2. Install fuel pressure gauge and check fuel pressure.

N.G. → Check fuel pressure regulator diaphragm.

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

N.G. → Repair or replace.

7
CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
 Refer to page EF & EC-90.

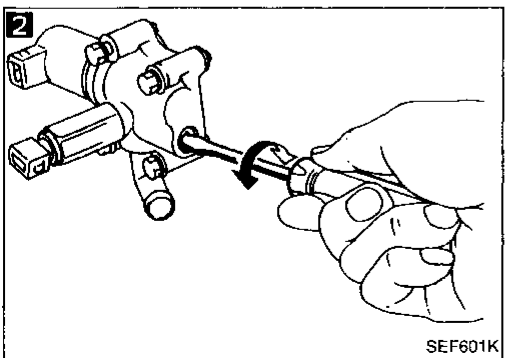
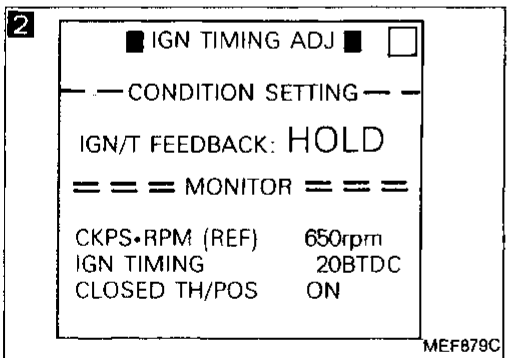
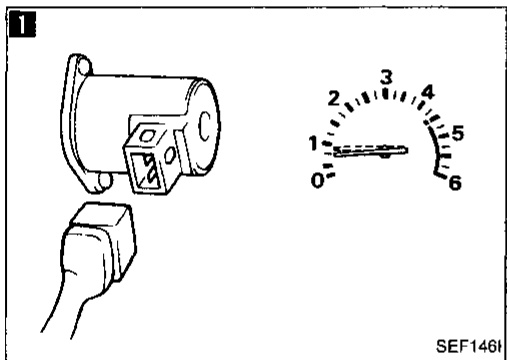
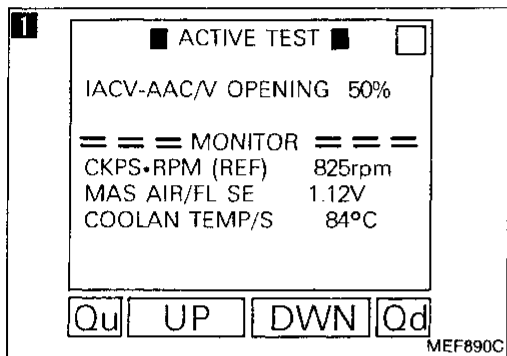
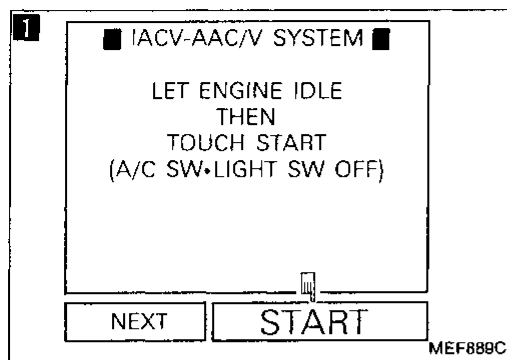
N.G. → Repair or replace.

8
TRY A KNOWN GOOD ECM*.

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 OVERALL FUNCTION.

- 1) Start engine and warm it up sufficiently.
- 2) Check idle speed.
700 ± 50 rpm
(A/T in "N" position)
- 3) Perform "IACV-AAC/V SYSTEM" in "FUNCTION TEST" mode with CONSULT.

OR

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

OR

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

No → Check IACV-AAC valve and circuit. (See page EF & EC-143.)

2

CHECK IDLE ADJ. SCREW CLOGGING.

1. Perform "IGN TIMING ADJ" in "WORK SUPPORT" mode.
2. Can you set engine speed at 650 ± 50 rpm (A/T in "N" position) by turning idle adjusting screw?

OR

1. Disconnect throttle position sensor harness connector.
2. Can you set engine speed at 650 ± 50 rpm (A/T in "N" position) by turning idle adjusting screw?

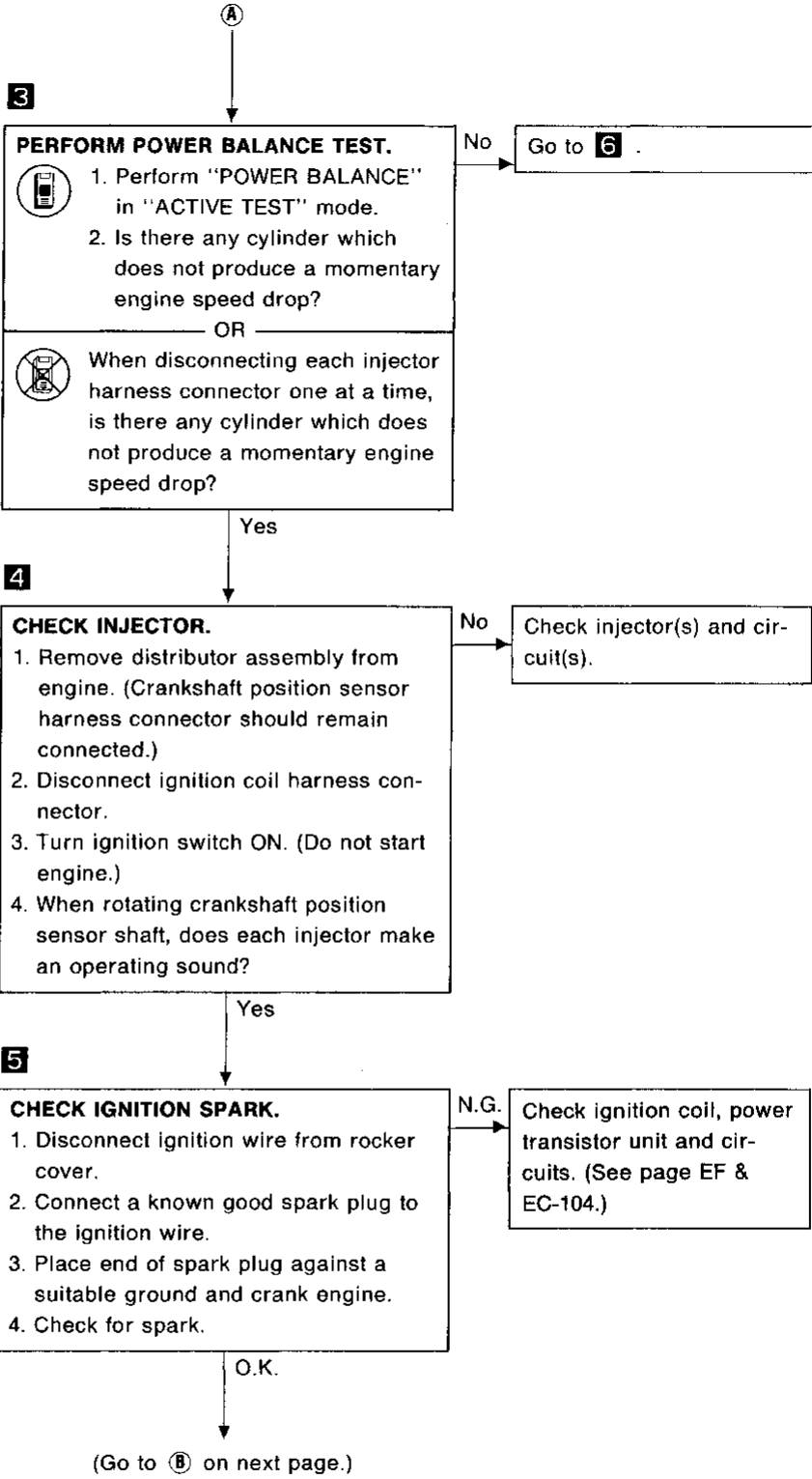
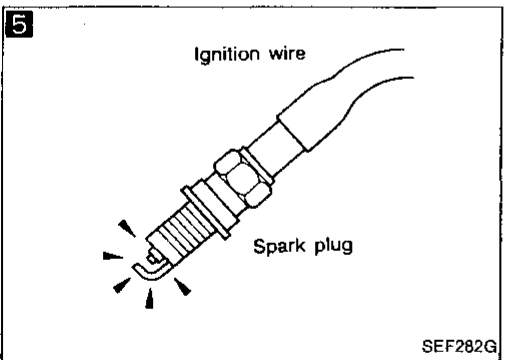
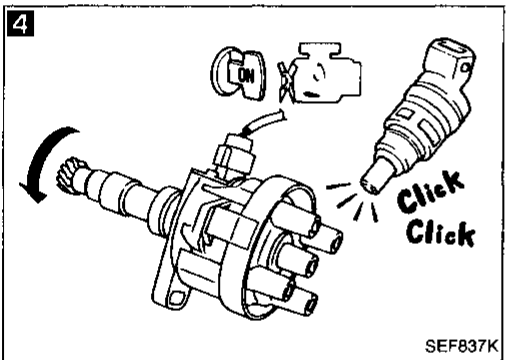
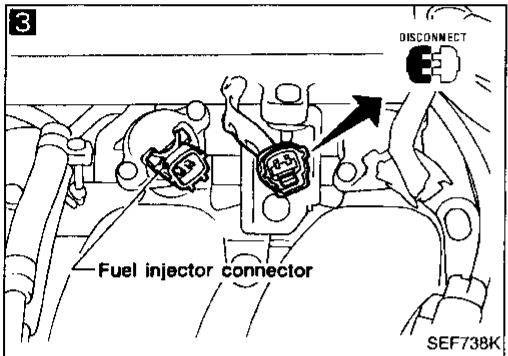
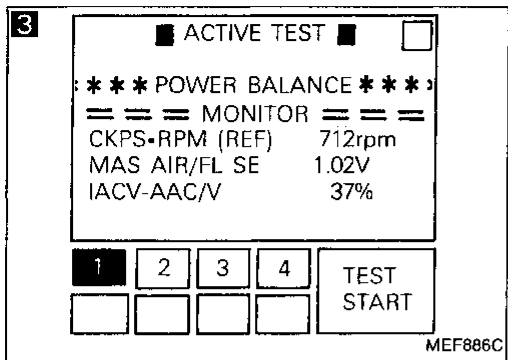
No → Check for IAS clogging or throttle body clogging.

Yes → (Go to Ⓐ on next page.)

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TROUBLE DIAGNOSES

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



TROUBLE DIAGNOSES

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

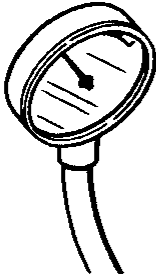
6

■ FUEL PRES RELEASE ■

FUEL PUMP WILL STOP BY TOUCHING START IN IDLING. CRANK A FEW TIMES AFTER ENGINE STALL.

START

↓



SEF3/91

7

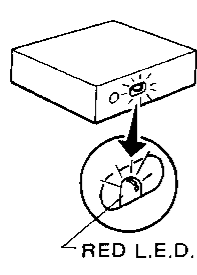
☆ MONITOR ☆ NO FAIL

CKPS•RPM (REF)	2000rpm
M/R F/C MNT	RICH

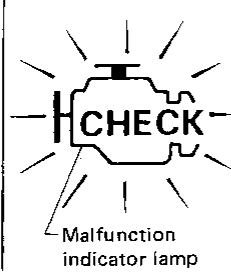
RECORD

MEF871C

7



RED L.E.D.



Malfunction indicator lamp


MEF339E

ⓑ

↓

6

CHECK FUEL PRESSURE.


 1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.

2. Install fuel pressure gauge and check fuel pressure.

A few seconds after ignition switch is turned OFF to ON:
Approx.
294 kPa (3.0 kg/cm², 43 psi)

At idle:
Approx.
235 kPa (2.4 kg/cm², 34 psi)

OR

 1. Release fuel pressure to zero. (Refer to page EF & EC-169.)

2. Install fuel pressure gauge and check fuel pressure.


N.G. → Check fuel pressure regulator diaphragm.

O.K.

↓

7

CHECK 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 2 times

LEAN → RICH.....

OR

 1. Set diagnostic test mode II (oxygen sensor monitor). (See page EF & EC-44.)

2. Maintaining engine at 2,000 rpm under no load, check that malfunction indicator lamp or RED LED on the ECM goes ON and OFF more than 5 times during 10 seconds.

N.G. → Replace oxygen sensor.

O.K.

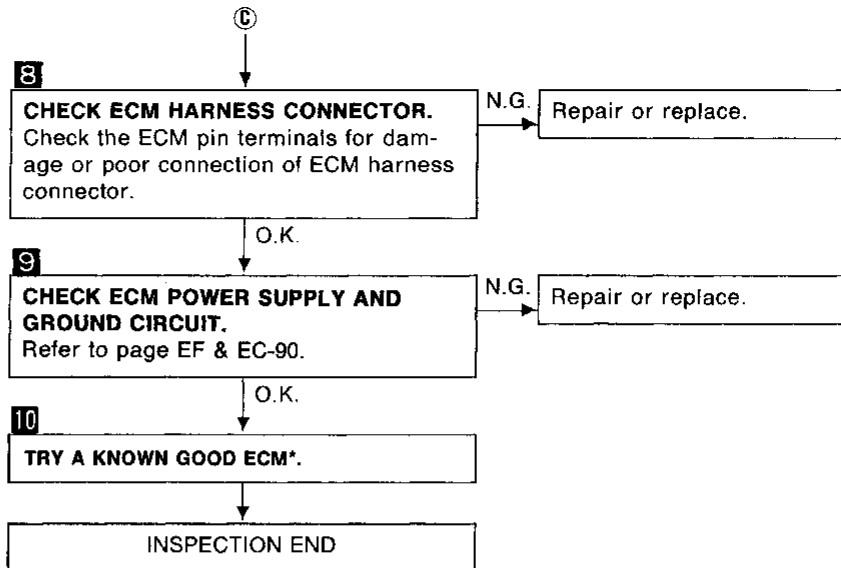
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(Go to Ⓒ on next page.)

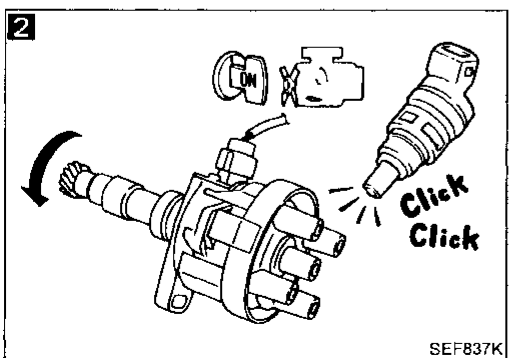
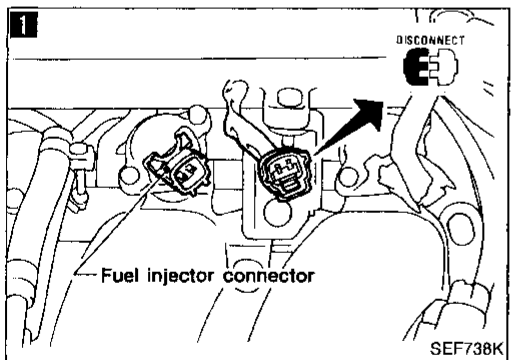
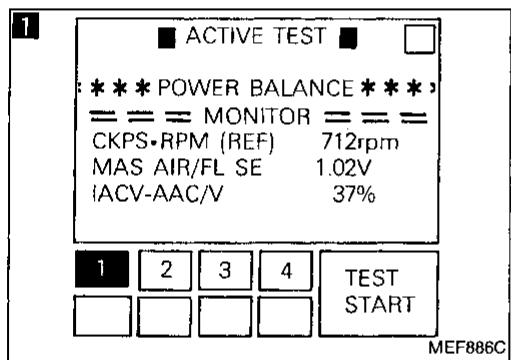
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TROUBLE DIAGNOSES

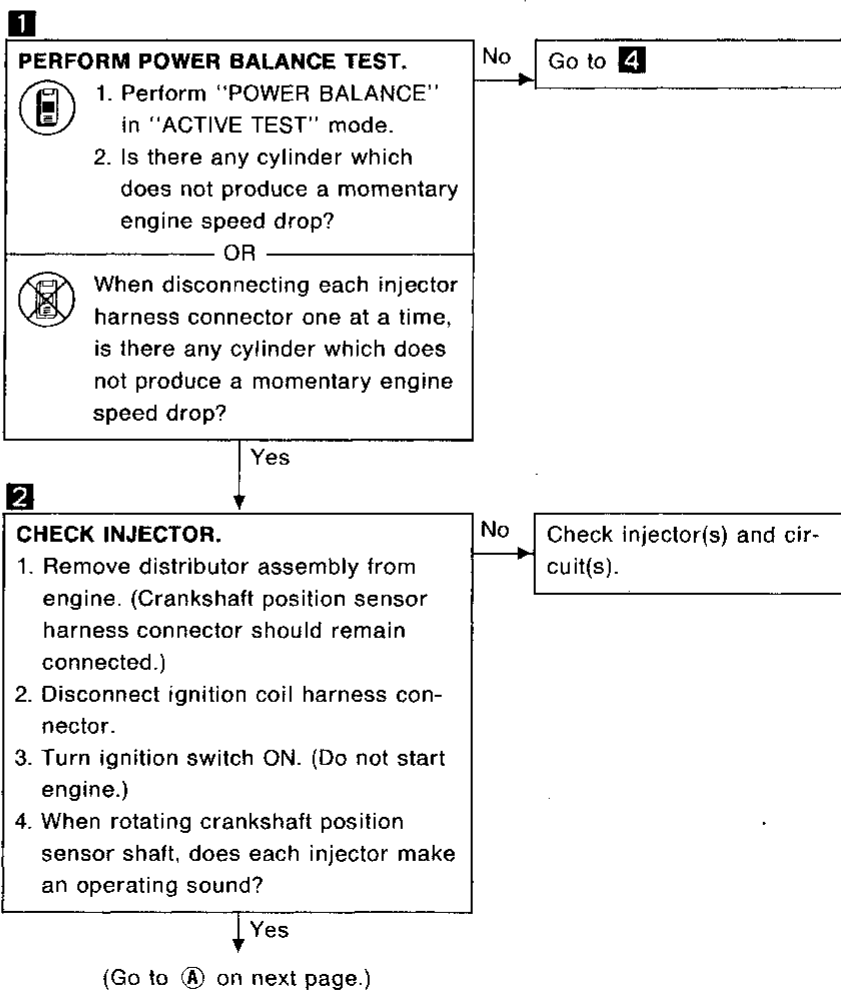
Diagnostic Procedure 14 — Engine Stalls after Decelerating (Cont'd)



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

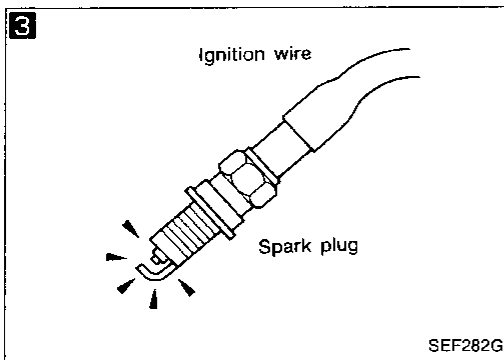


Diagnostic Procedure 15 — Engine Stalls when Accelerating or when Driving at Constant Speed



TROUBLE DIAGNOSES

Diagnostic Procedure 15 — Engine Stalls when Accelerating or when Driving at Constant Speed (Cont'd)



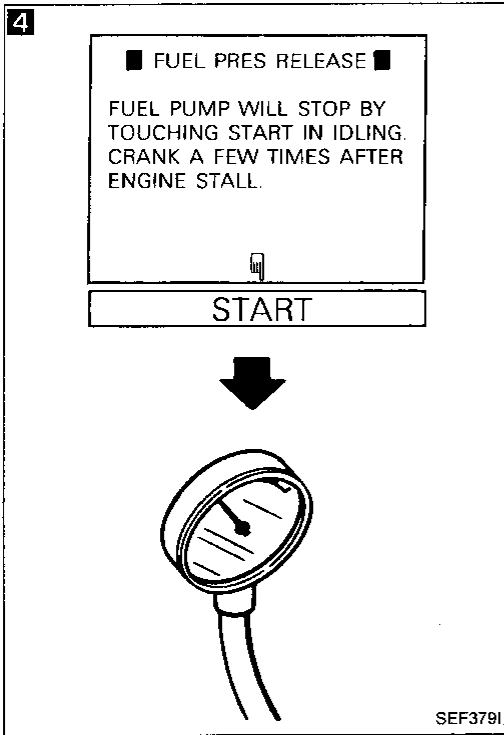
3

CHECK IGNITION SPARK.

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

N.G. Check ignition coil, power transistor unit and circuits. (See page EF & EC-104.)

GI
MA
EM



4

CHECK FUEL PRESSURE.

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

A few seconds after ignition switch is turned OFF to ON:

Approx.
294 kPa (3.0 kg/cm², 43 psi)
At idle:
Approx.
235 kPa (2.4 kg/cm², 34 psi)

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-169.)
2. Install fuel pressure gauge and check fuel pressure.

N.G. Check fuel pump, circuit and fuel pressure regulator.

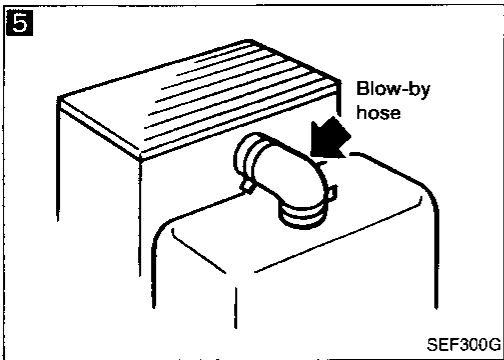
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5

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.

PD
FA



6

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

N.G. Repair or replace.

RA
BR

7

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-90.

Yes Repair or replace.

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8

TRY A KNOWN GOOD ECM*.

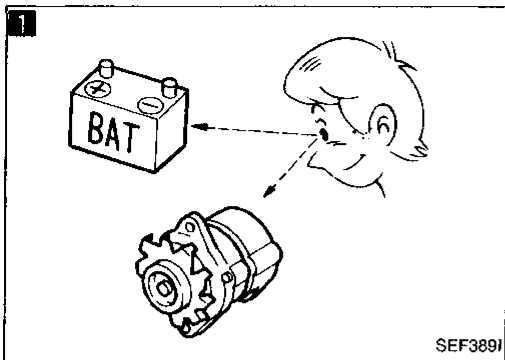
INSPECTION END

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

TROUBLE DIAGNOSES

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



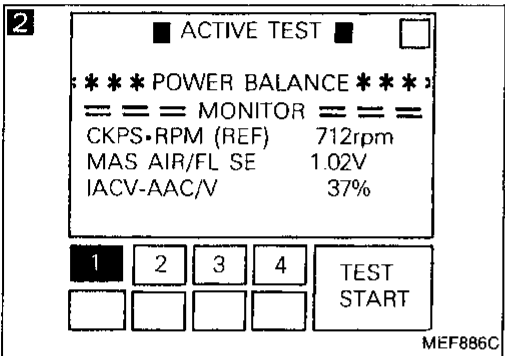
1

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

N.G. Repair or replace.

O.K.

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**

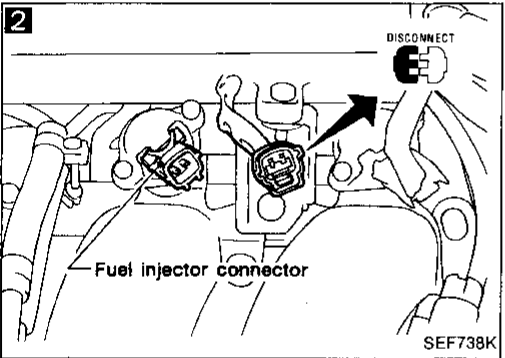
OR



- 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



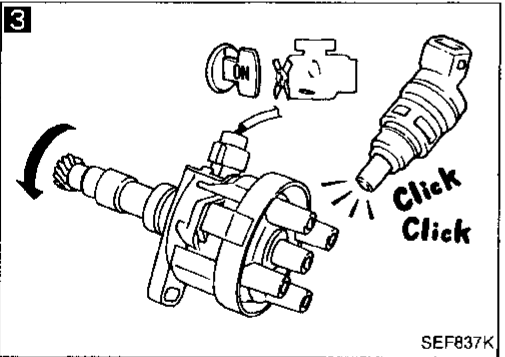
CHECK INJECTOR.

1. Remove distributor assembly from engine. (Crankshaft position sensor harness connector should remain connected.)
2. Disconnect ignition coil harness connector.
3. Turn ignition switch ON. (Do not start engine.)
4. When rotating crankshaft position sensor shaft, does each injector make an operating sound?

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

Yes

4



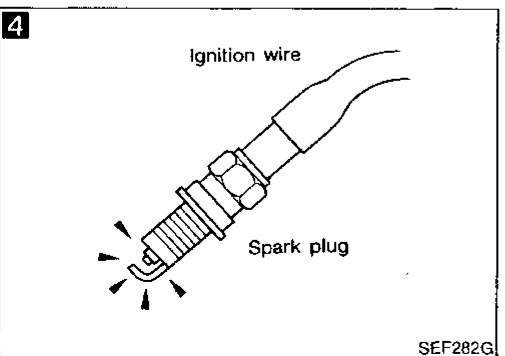
CHECK IGNITION SPARK.

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

N.G. Check ignition coil, power transistor unit and circuits. (See page EF & EC-104.)

O.K.

(Go to **A** on next page.)



TROUBLE DIAGNOSES

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

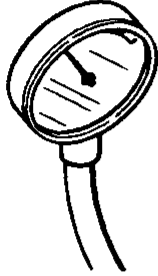
5

■ FUEL PRES RELEASE ■

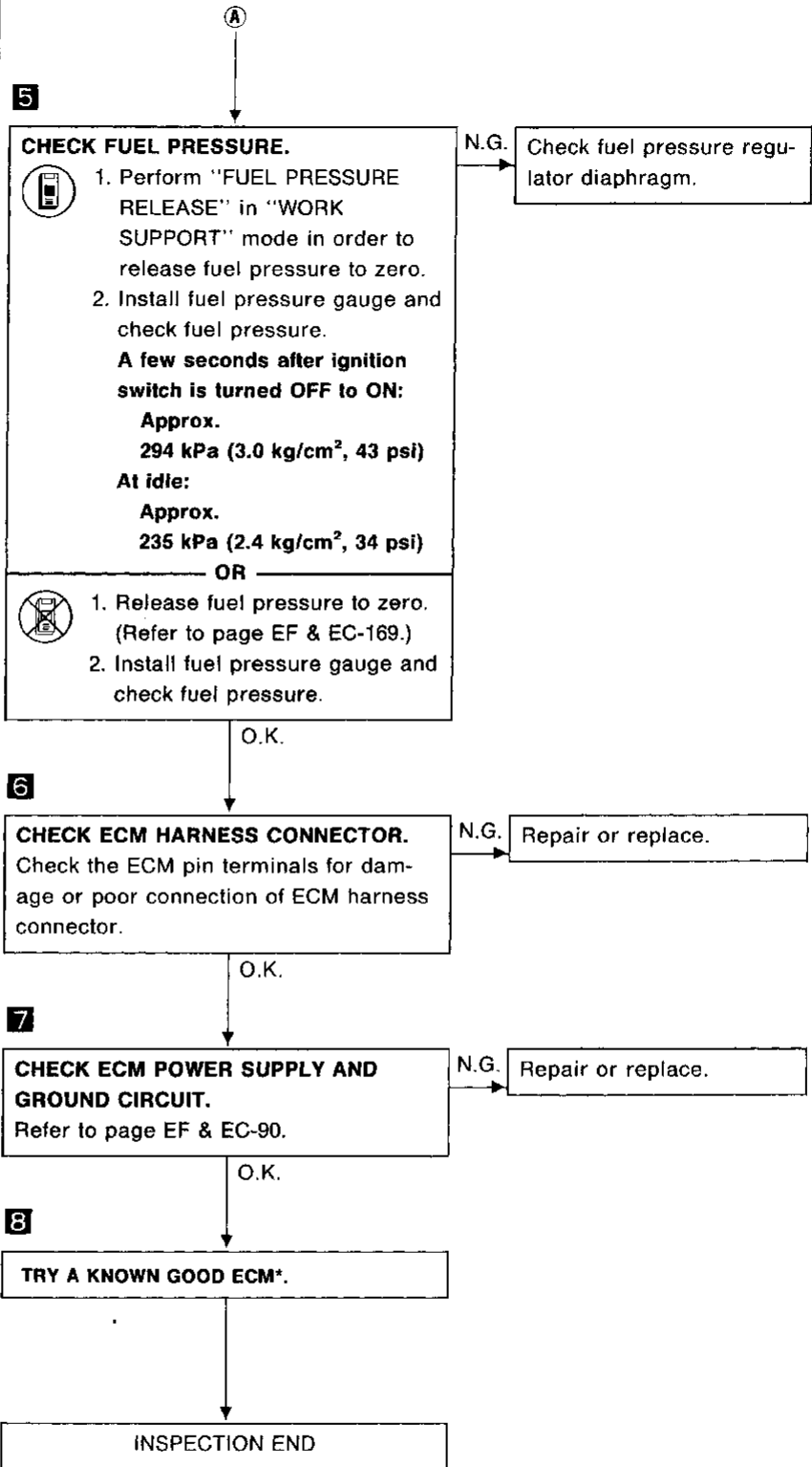
FUEL PUMP WILL STOP BY TOUCHING START IN IDLING. CRANK A FEW TIMES AFTER ENGINE STALL.

START

↓



SEF379I



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

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1

■ FUEL PRES RELEASE ■

FUEL PUMP WILL STOP BY TOUCHING START IN IDLING. CRANK A FEW TIMES AFTER ENGINE STALL.

START

SEF379I

Diagnostic Procedure 17 — Lack of Power and Stumble

1

CHECK FUEL PRESSURE.

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.

2. Install fuel pressure gauge and check fuel pressure.

A few seconds after ignition switch is turned OFF to ON:

Approx.
294 kPa (3.0 kg/cm², 43 psi)

At idle:
Approx.
235 kPa (2.4 kg/cm², 34 psi)

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-169.)

2. Install fuel pressure gauge and check fuel pressure.

N.G. → Check fuel pressure regulator diaphragm.

2

Blow-by hose

SEF300G

O.K. ↓

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

1

Blow-by hose

SEF300G

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

EGR valve

MEF892C

2

CHECK E.G.R. OPERATION.

1. Apply vacuum directly to the EGR and canister valve using a handy vacuum pump.

2. Check to see that the engine runs rough or dies.

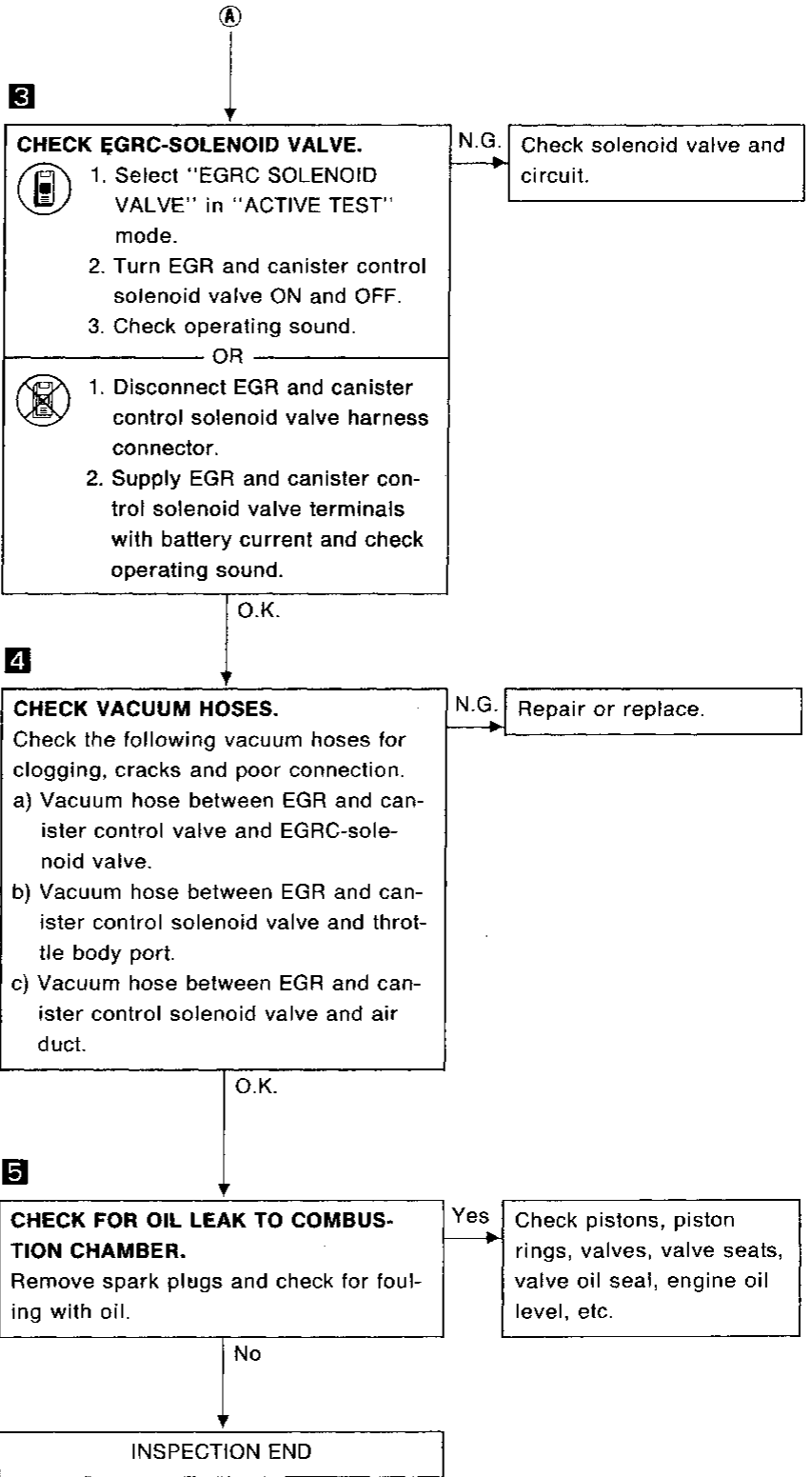
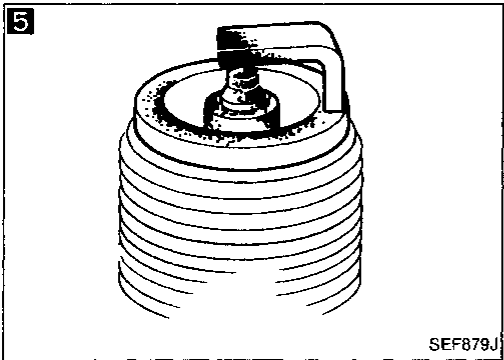
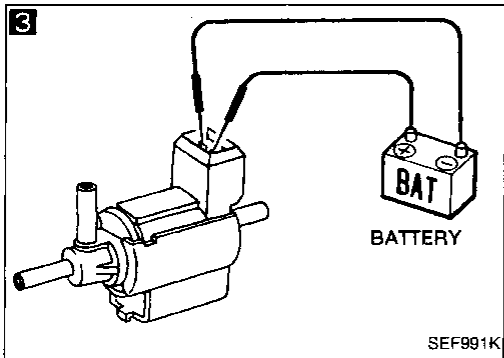
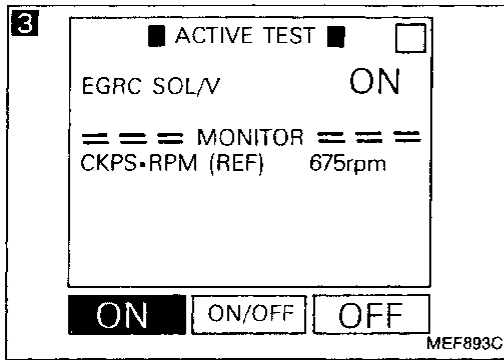
No → Check EGR and canister valve for sticking.

Yes ↓

(Go to (A) on next page.)

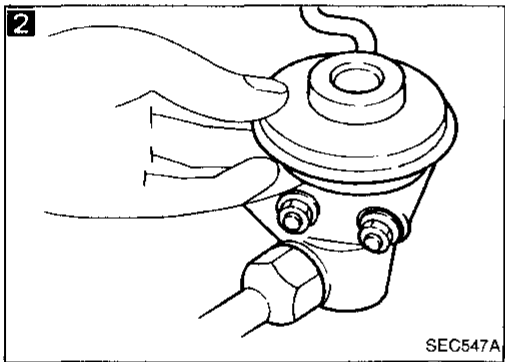
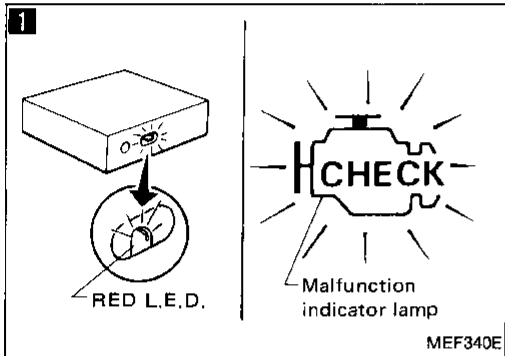
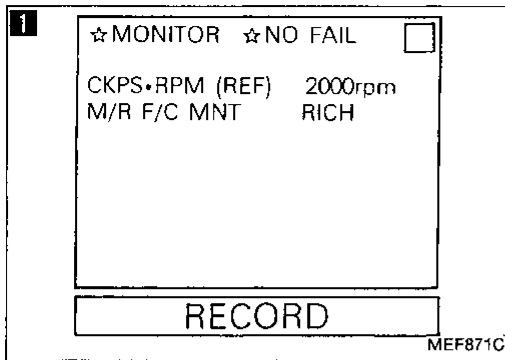
TROUBLE DIAGNOSES

Diagnostic Procedure 18 — Knock (Cont'd)



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Diagnostic Procedure 19 — Surge



1

CHECK 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 2 times
LEAN → RICH.....
OR

1. Set diagnostic test mode II (oxygen sensor monitor). (See page EF & EC-44.)
2. Maintaining engine at 2,000 rpm under no load, check that malfunction indicator lamp or RED LED on the ECM goes ON and OFF more than 5 times during 10 seconds.

N.G. Replace oxygen sensor.

2

CHECK EGR VALVE.
Check EGR valve for sticking.

N.G. Repair or replace.

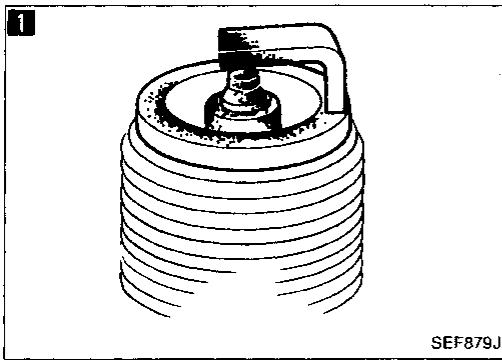
3

TRY A KNOWN GOOD ECM*.

INSPECTION END

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

TROUBLE DIAGNOSES



Diagnostic Procedure 20 — Backfire through the Intake

1

CHECK SPARK PLUGS.

Remove the spark plugs and check for fouling, etc.

N.G.

Repair or replace spark plug.

O.K.

2

CHECK INTAKE AIR LEAK.

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

Yes

Discover air leak location and repair.

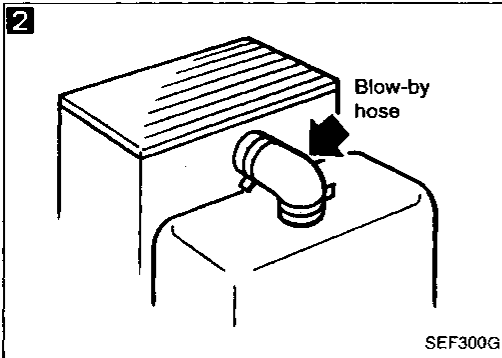
No

3

CHECK FOR INTAKE VALVE DEPOSITS.

If there are deposits on intake valves, remove them.

INSPECTION END



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Diagnostic Procedure 21 — Backfire through the Exhaust

CHECK ENGINE COOLANT TEMPERATURE SENSOR.

Check engine coolant temperature sensor and its circuit. (See page EF & EC-99.)

N.G.

Replace or repair.

O.K.

INSPECTION END

BR

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BF

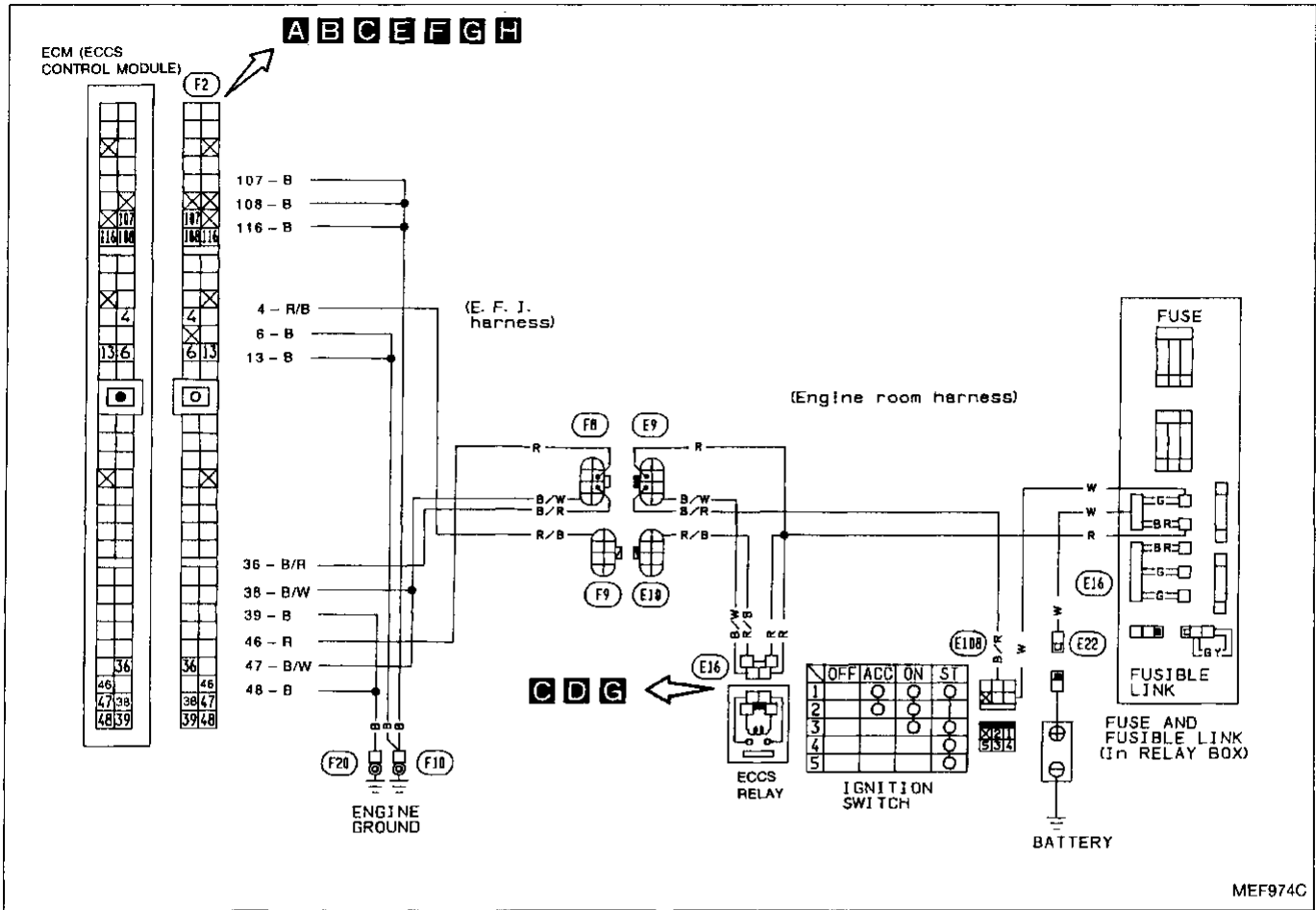
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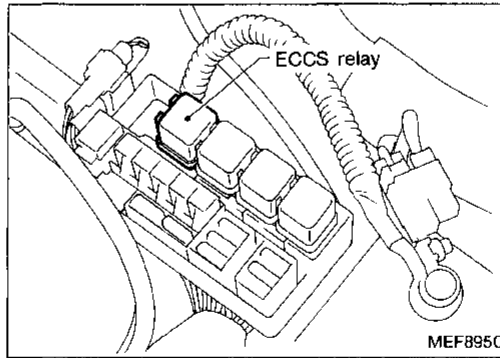
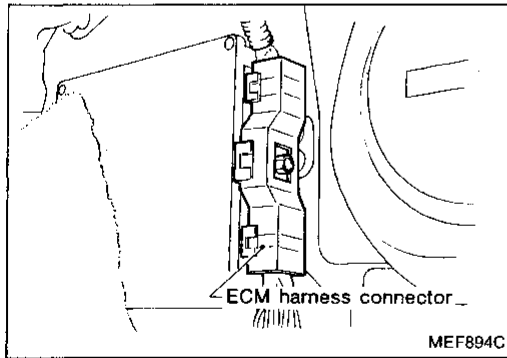
TROUBLE DIAGNOSES

Diagnostic Procedure 22

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

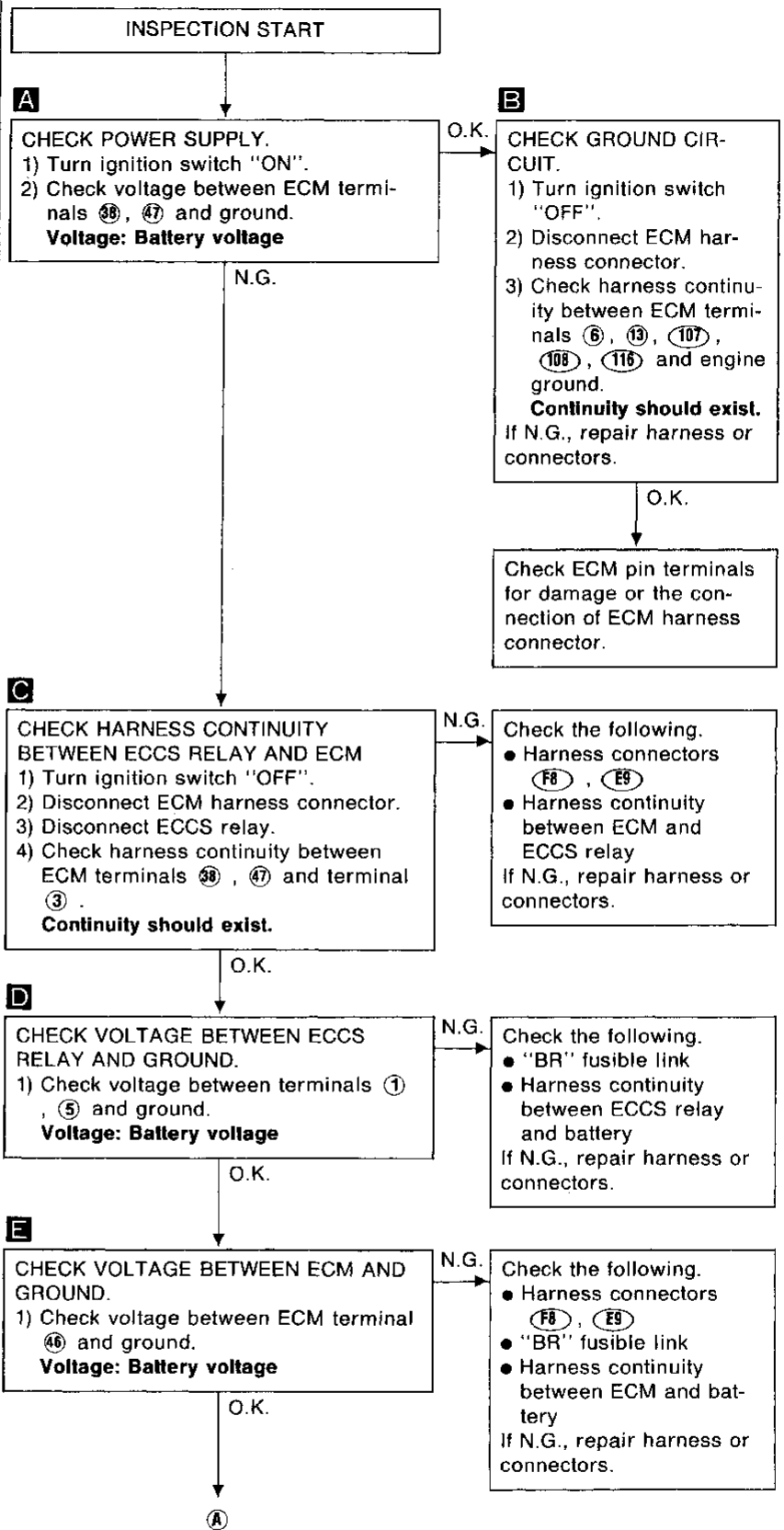
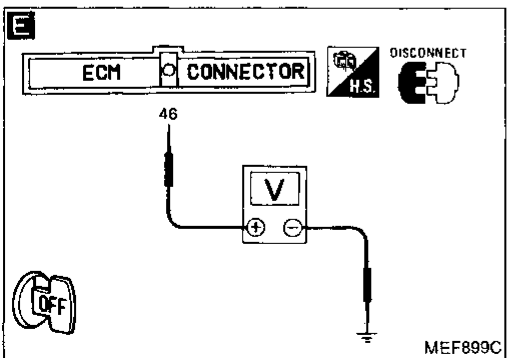
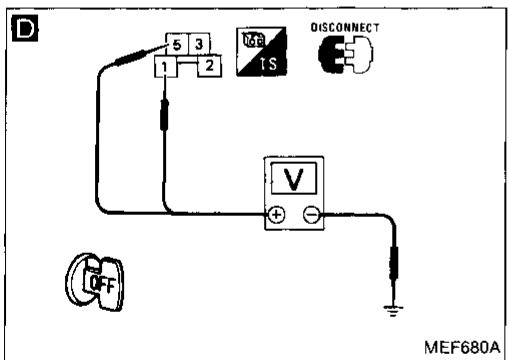
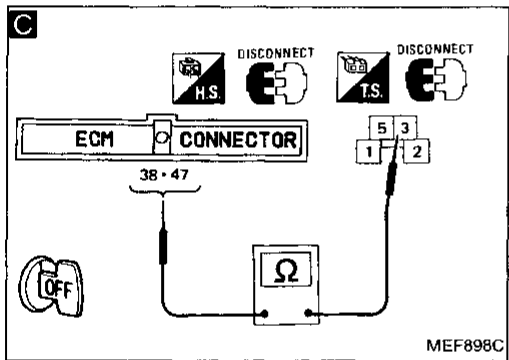
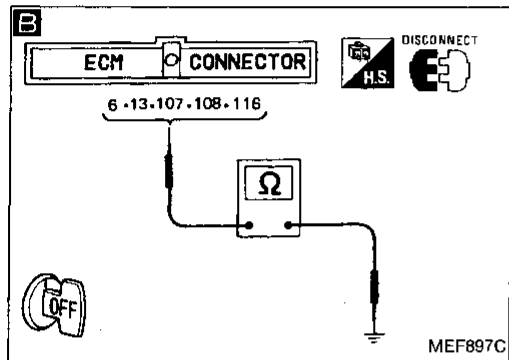
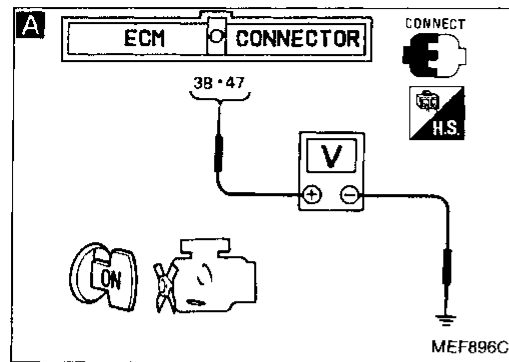


Harness layout



TROUBLE DIAGNOSES

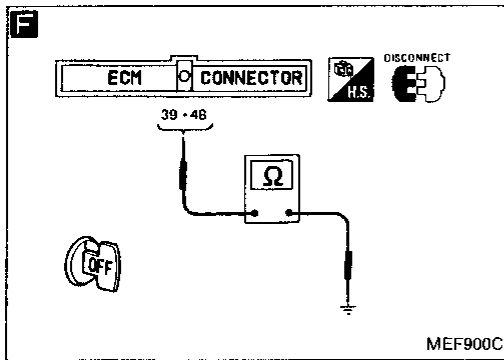
Diagnostic Procedure 22 (Cont'd)



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TROUBLE DIAGNOSES

Diagnostic Procedure 22 (Cont'd)

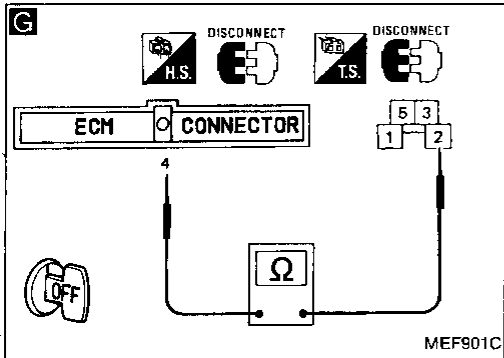


F

CHECK GROUND CIRCUIT.
 1) Check harness continuity between ECM terminals ③⑨, ④⑩ and engine ground.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

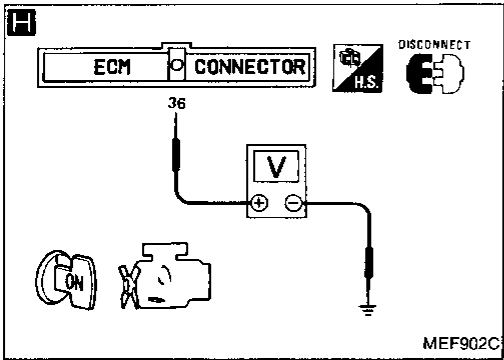


G

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

N.G. → Check the following.
 ● Harness connectors ①⑨, ①⑩
 ● Harness continuity between ECM and ECCS relay
 If N.G., repair harness or connectors.

O.K. ↓



H

CHECK INPUT SIGNAL CIRCUIT.
 1) Turn ignition switch "ON".
 2) Check voltage between ECM terminal ③⑥ and ground.
Voltage: Battery voltage

N.G. → Check the following.
 ● Harness connectors ①⑧, ①⑨
 ● Harness continuity between ECM and ignition switch
 If N.G., repair harness or connectors.

O.K. ↓

CHECK COMPONENT (ECCS relay).
 Refer to "Electrical Components Inspection".
 (See page EF & EC-166.)

N.G. → Replace ECCS relay.

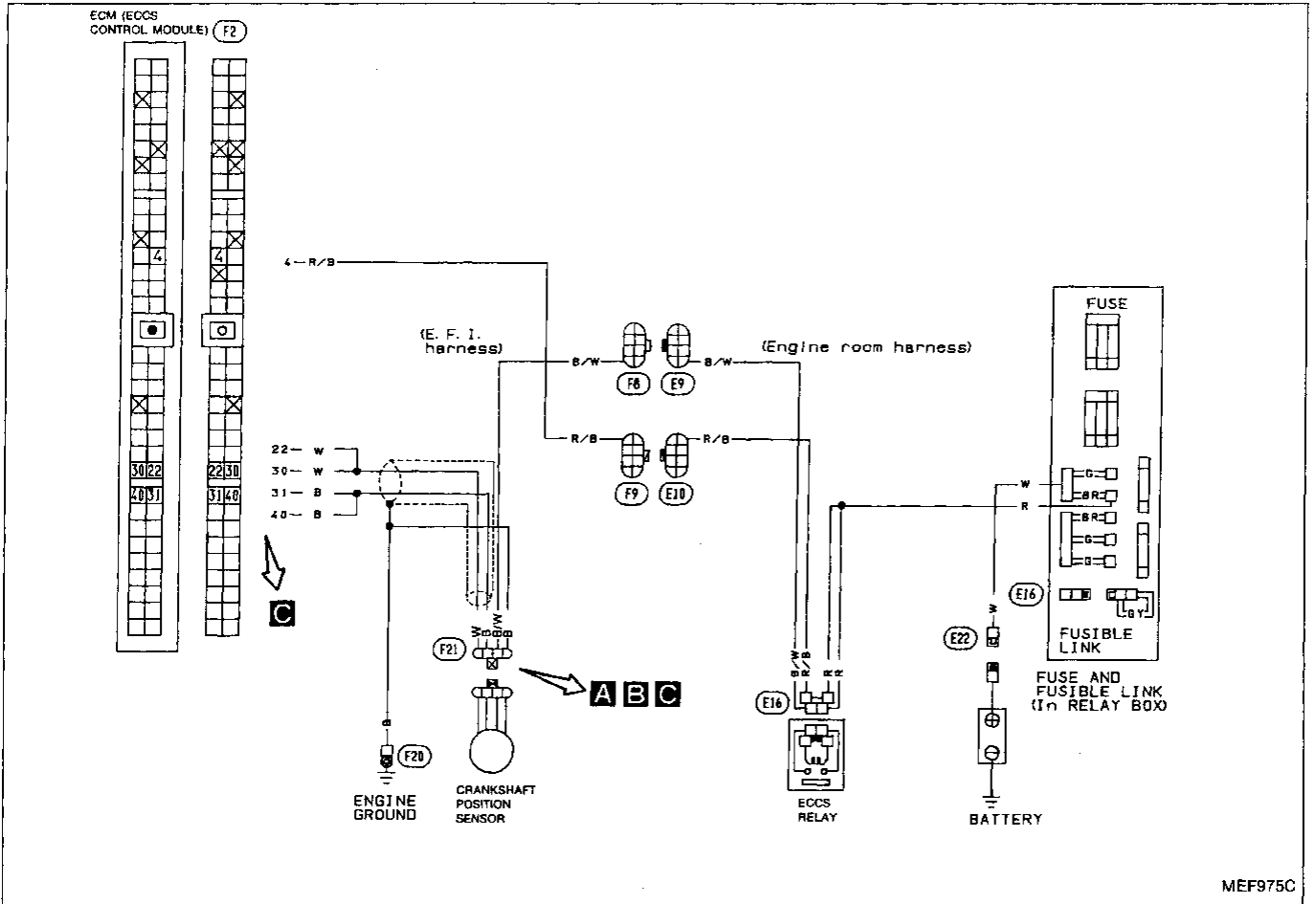
O.K. ↓

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

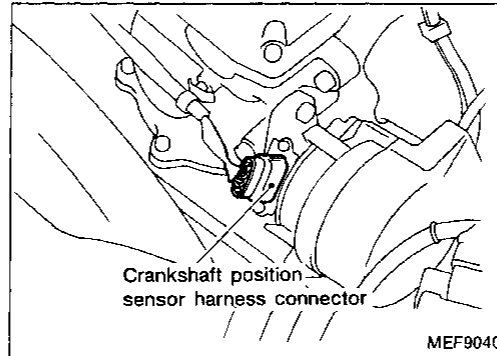
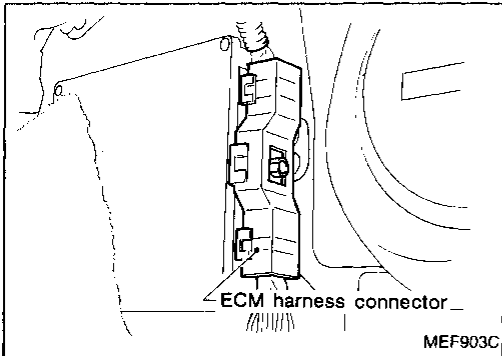
TROUBLE DIAGNOSES

Diagnostic Procedure 23

CRANKSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)



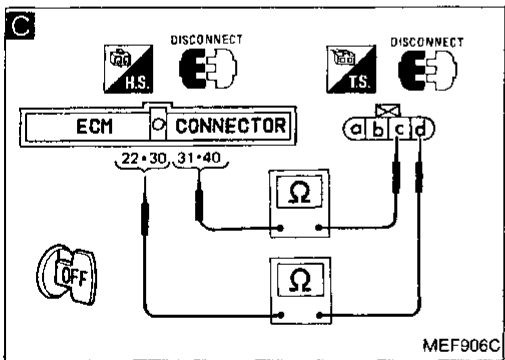
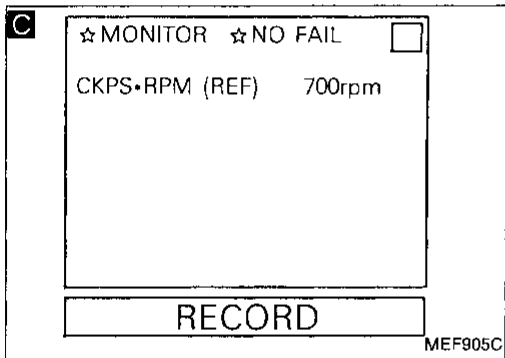
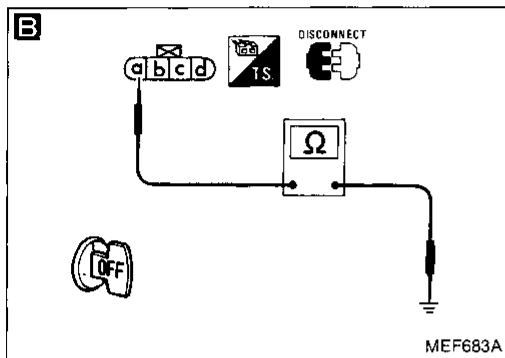
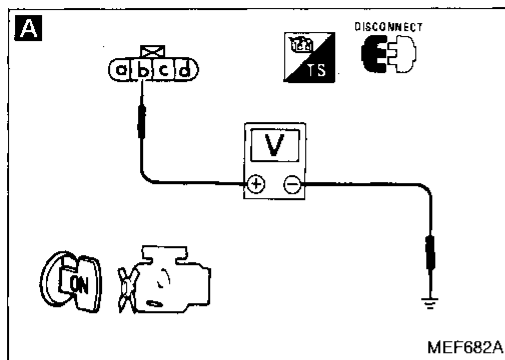
Harness layout



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TROUBLE DIAGNOSES

Diagnostic Procedure 23 (Cont'd)



INSPECTION START

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

N.G. → Check the following.
 ● Harness connectors (FB), (EB)
 ● Harness continuity between crankshaft position sensor and ECCS relay
 If N.G., repair harness or connectors.

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

N.G. → Repair harness or connectors.

C
CHECK INPUT SIGNAL CIRCUIT.
 1) Reconnect crankshaft position sensor harness connector.
 2) Start engine.
 3) Read crankshaft position sensor signals in "DATA MONITOR" mode with CONSULT.
rpm: 700 ± 50

N.G. → Repair harness or connectors.

OR
 1) Disconnect ECM harness connector.
 2) Check harness continuity between terminal (c) and ECM terminals (31), (40) (1° signal), terminal (d) and ECM terminals (22), (30) (180° signal).
Continuity should exist.

CHECK COMPONENT
 (Crankshaft position sensor). Refer to "Electrical Components Inspection". (See page EF & EC-159.)

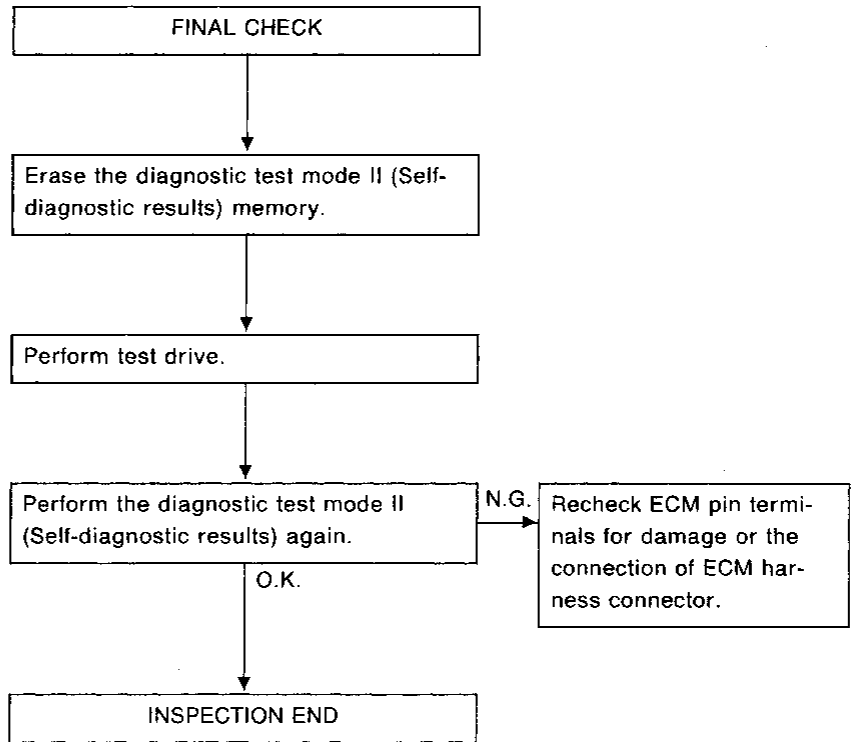
N.G. → Replace crankshaft position sensor.

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

TROUBLE DIAGNOSES

Diagnostic Procedure 23 (Cont'd)

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



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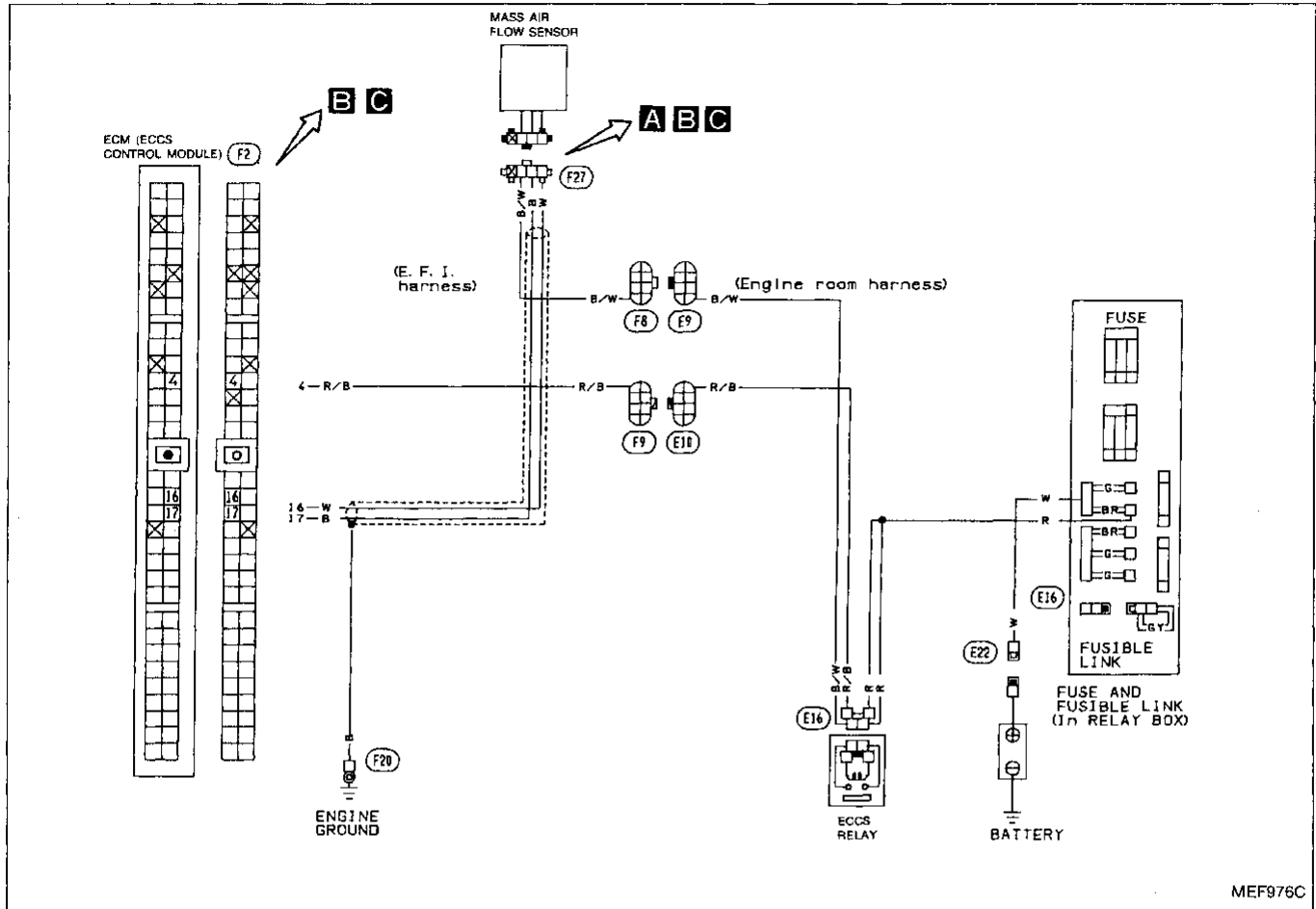
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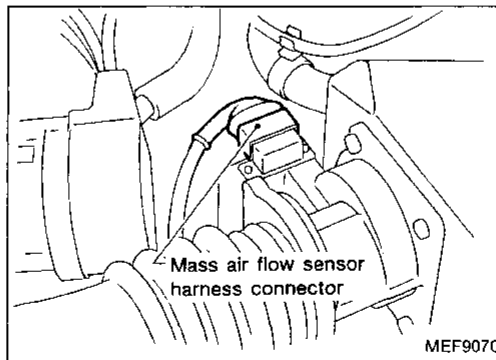
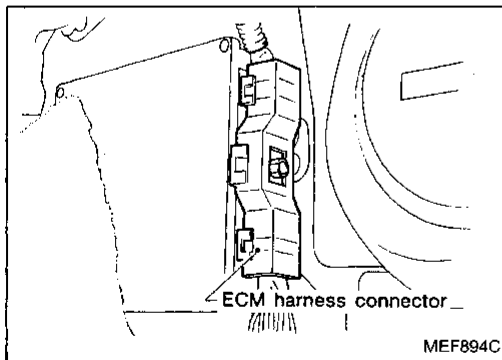
TROUBLE DIAGNOSES

Diagnostic Procedure 24

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

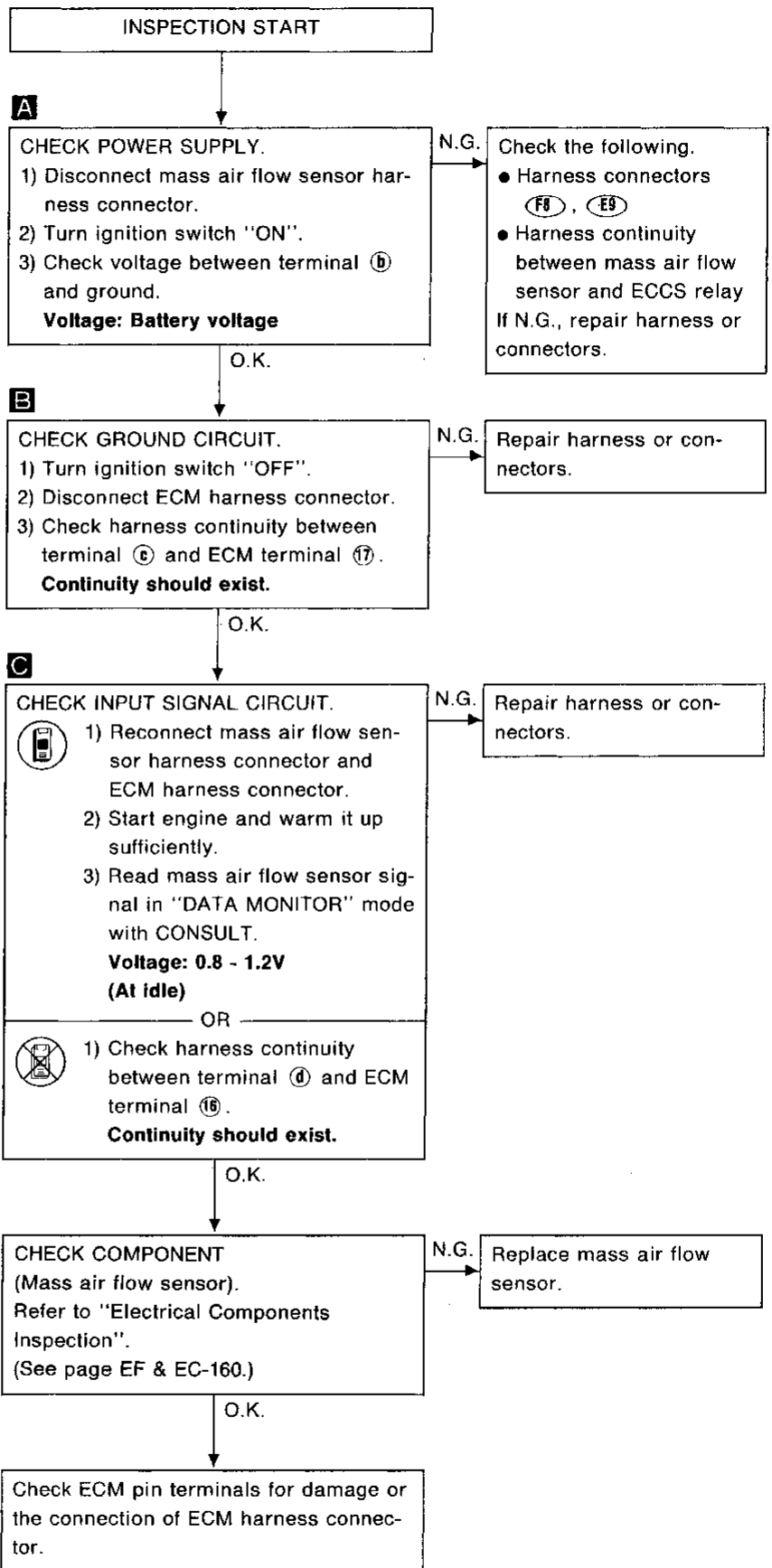
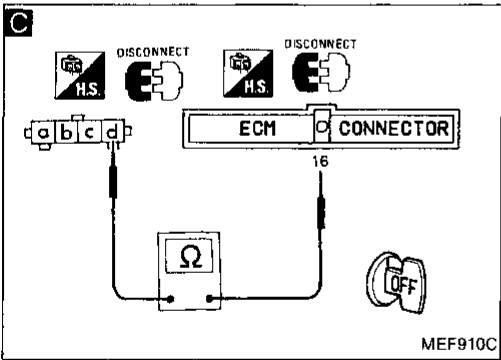
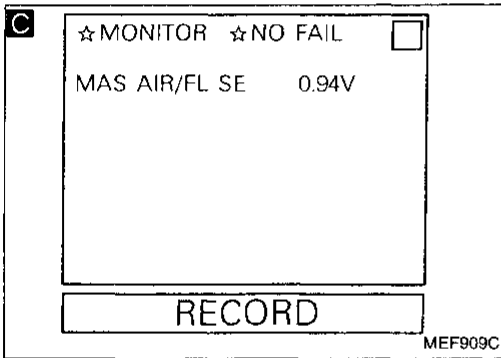
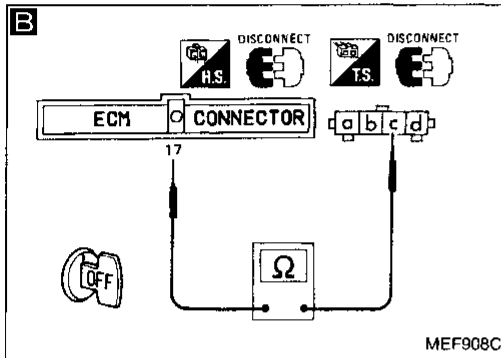
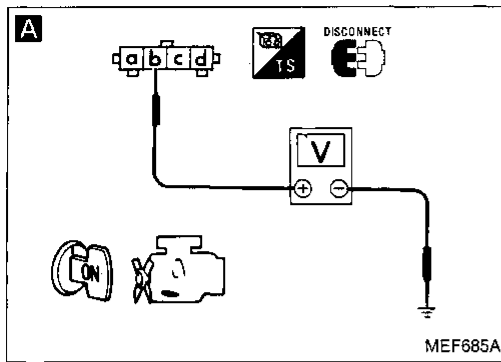


Harness layout



TROUBLE DIAGNOSES

Diagnostic Procedure 24 (Cont'd)

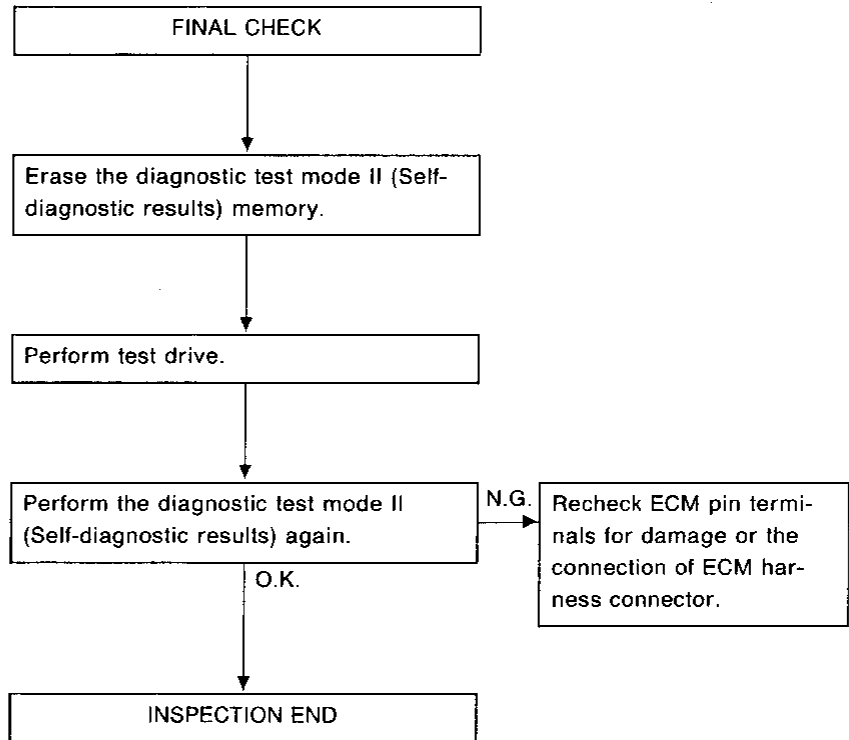


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TROUBLE DIAGNOSES

Diagnostic Procedure 24 (Cont'd)

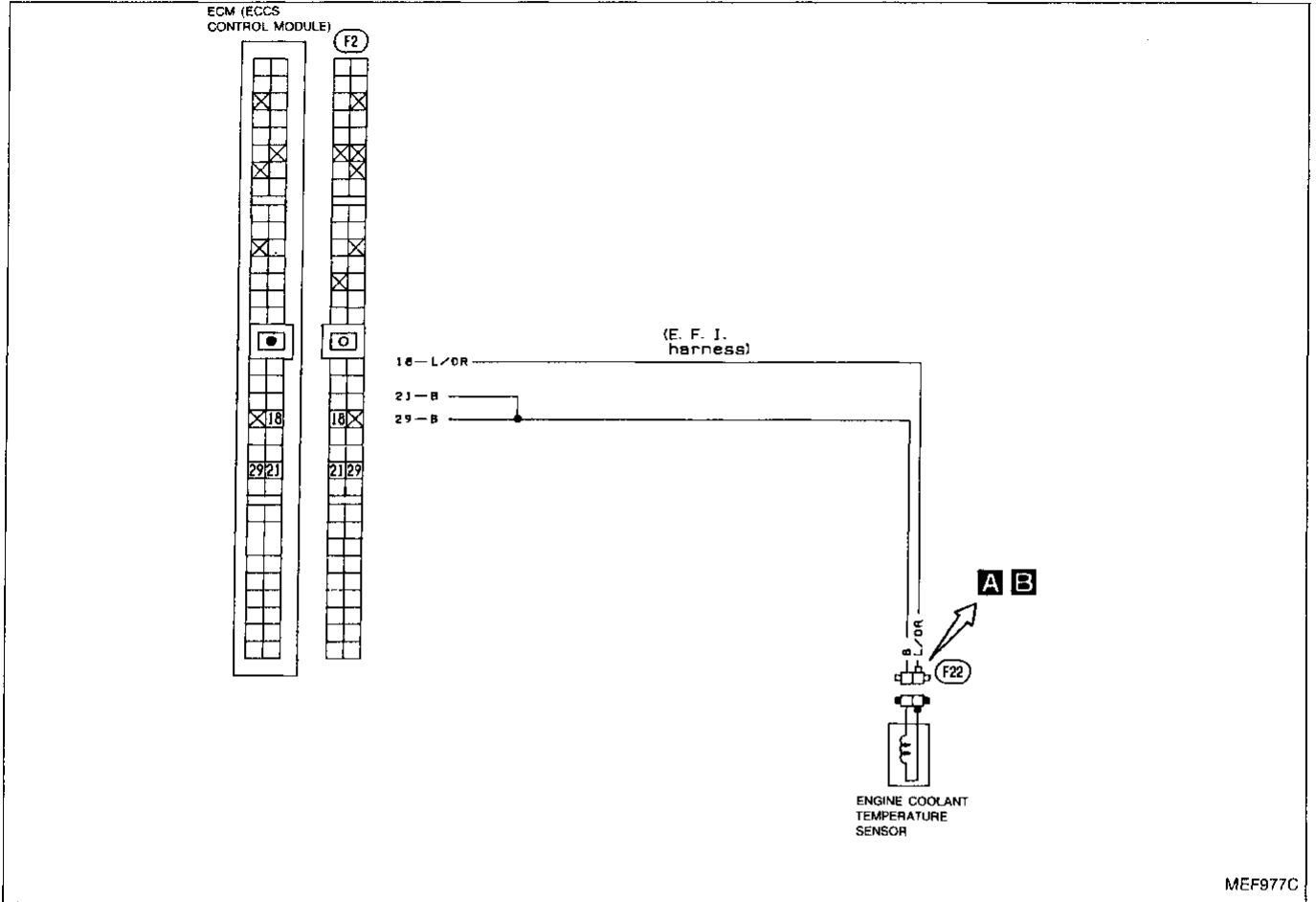
Perform FINAL CHECK by the following procedure after repair is completed.



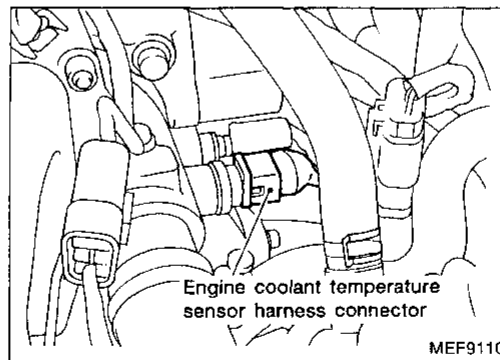
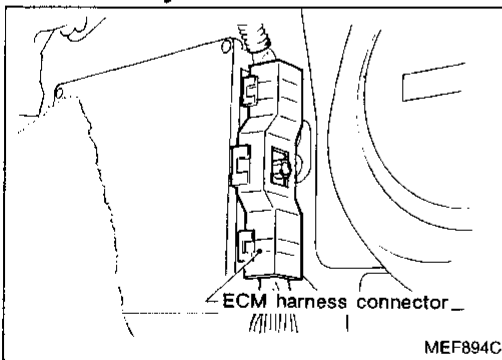
TROUBLE DIAGNOSES

Diagnostic Procedure 25

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



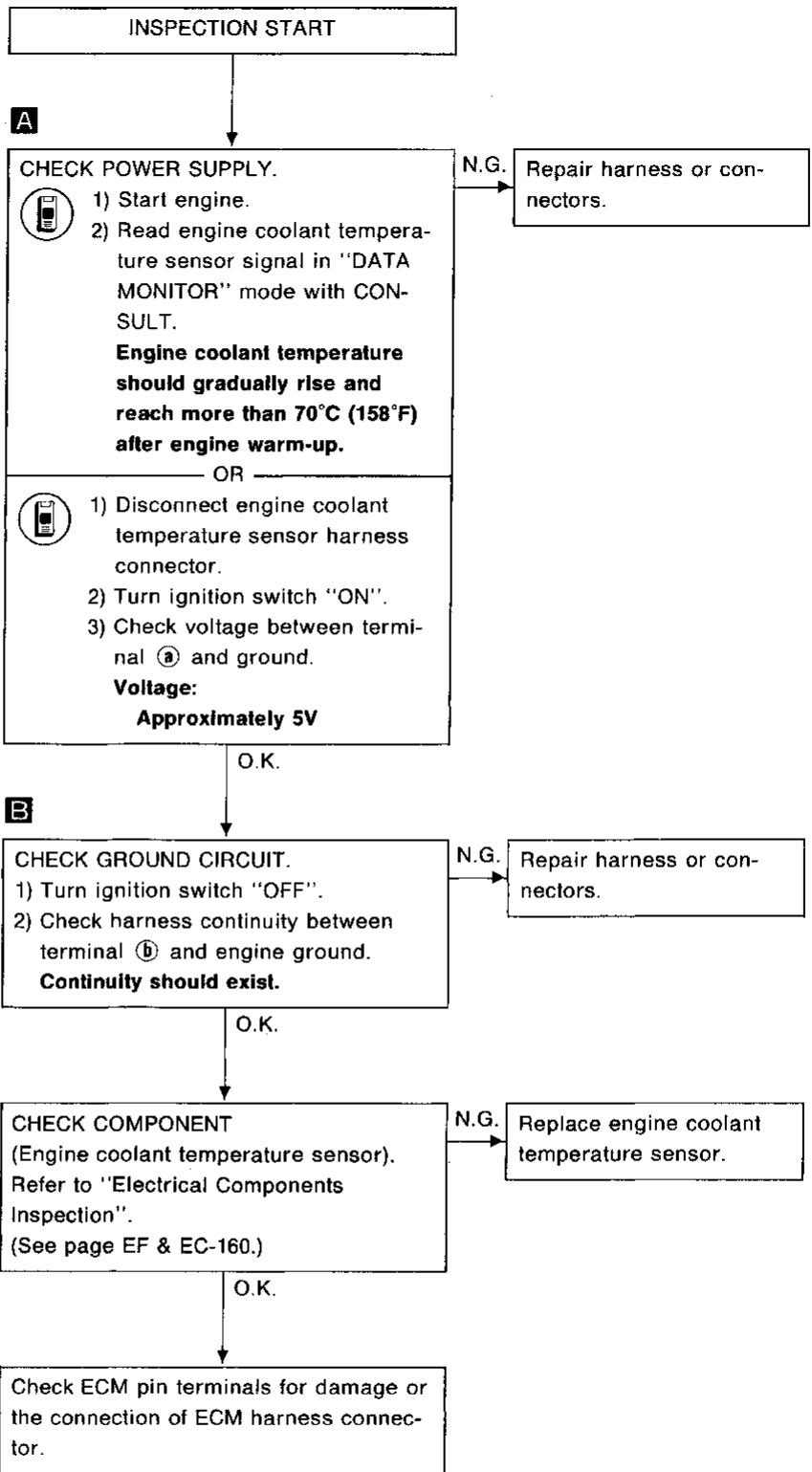
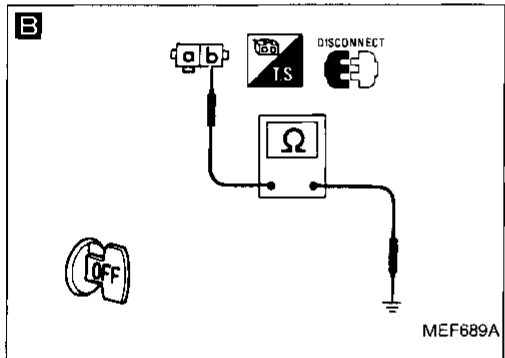
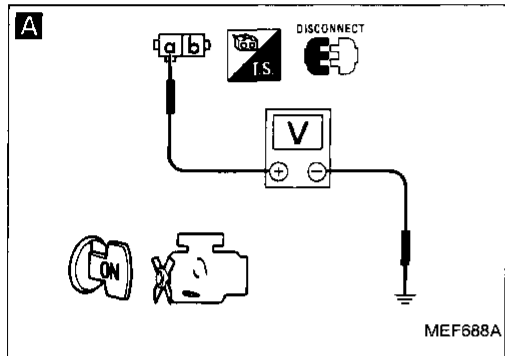
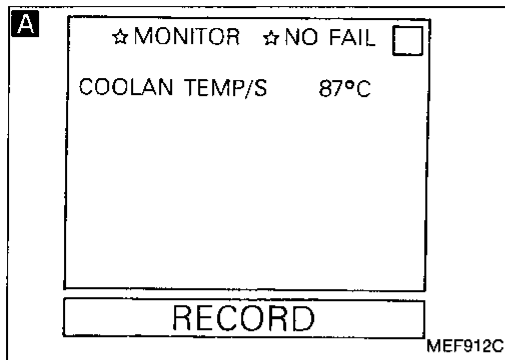
Harness layout



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TROUBLE DIAGNOSES

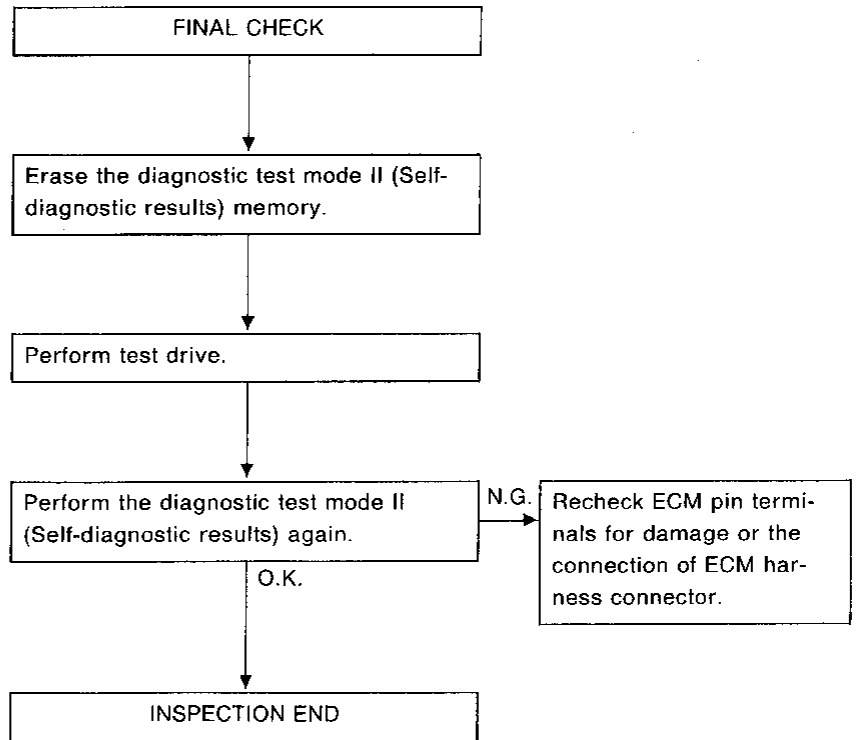
Diagnostic Procedure 25 (Cont'd)



TROUBLE DIAGNOSES

Diagnostic Procedure 25 (Cont'd)

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

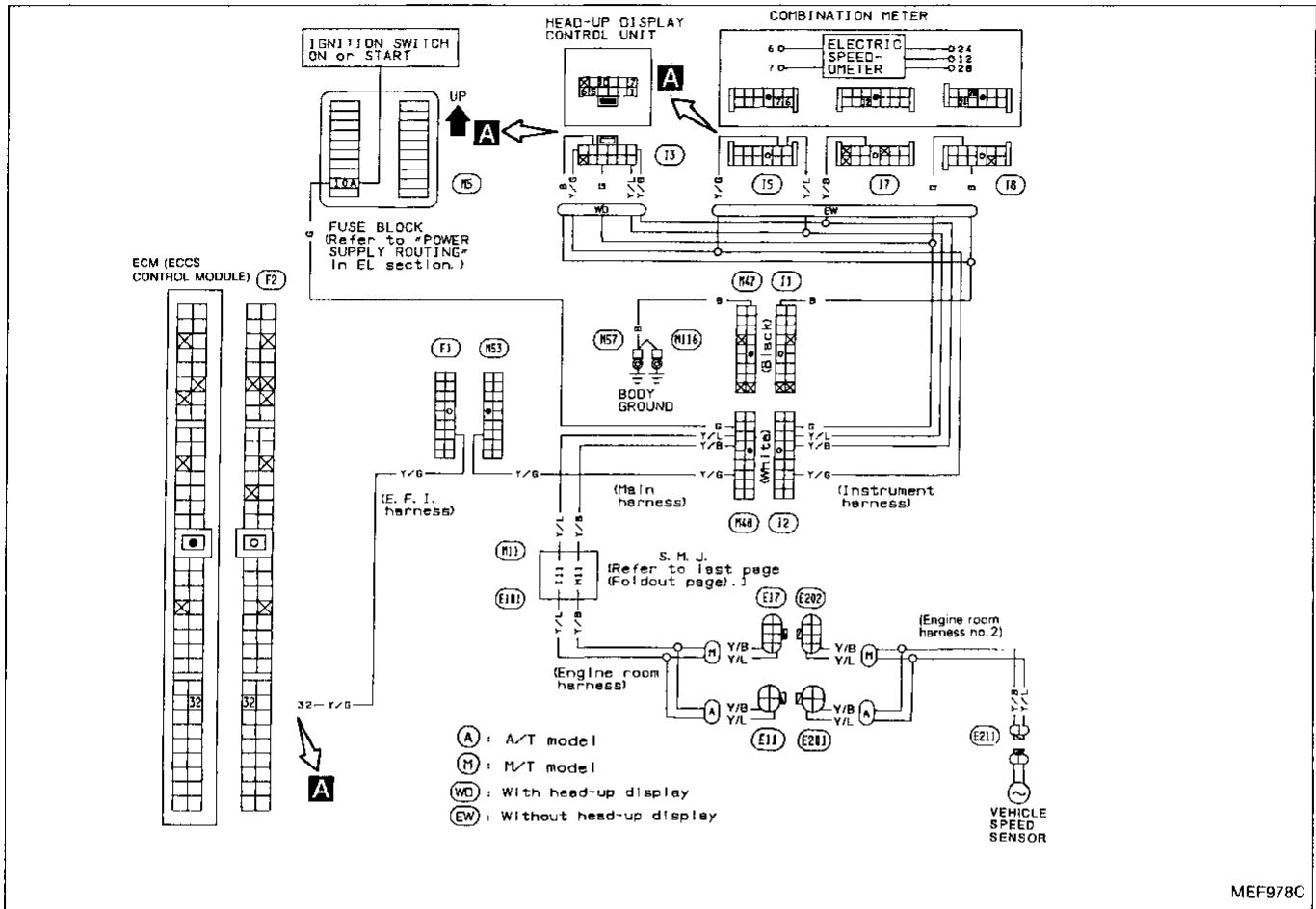


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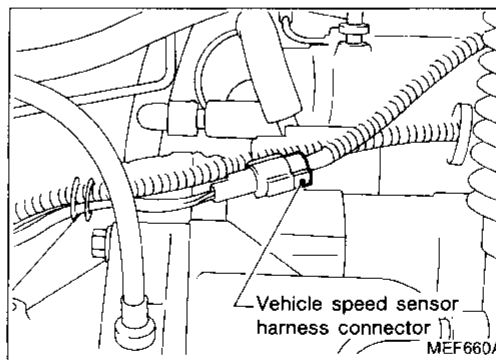
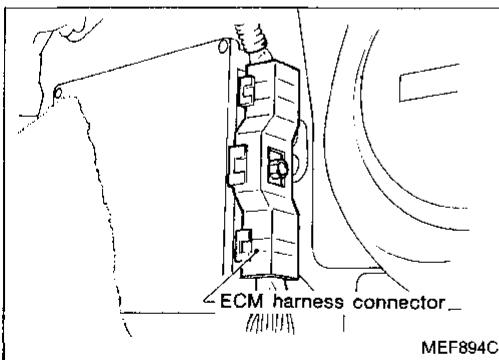
TROUBLE DIAGNOSES

Diagnostic Procedure 26

VEHICLE SPEED SENSOR (Diagnostic trouble code No. 14) (MALFUNCTION INDICATOR LAMP ITEM)



Harness layout



TROUBLE DIAGNOSES

Diagnostic Procedure 26 (Cont'd)

A ■ VEHICLE SPEED SEN CKT ■

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

NEXT START

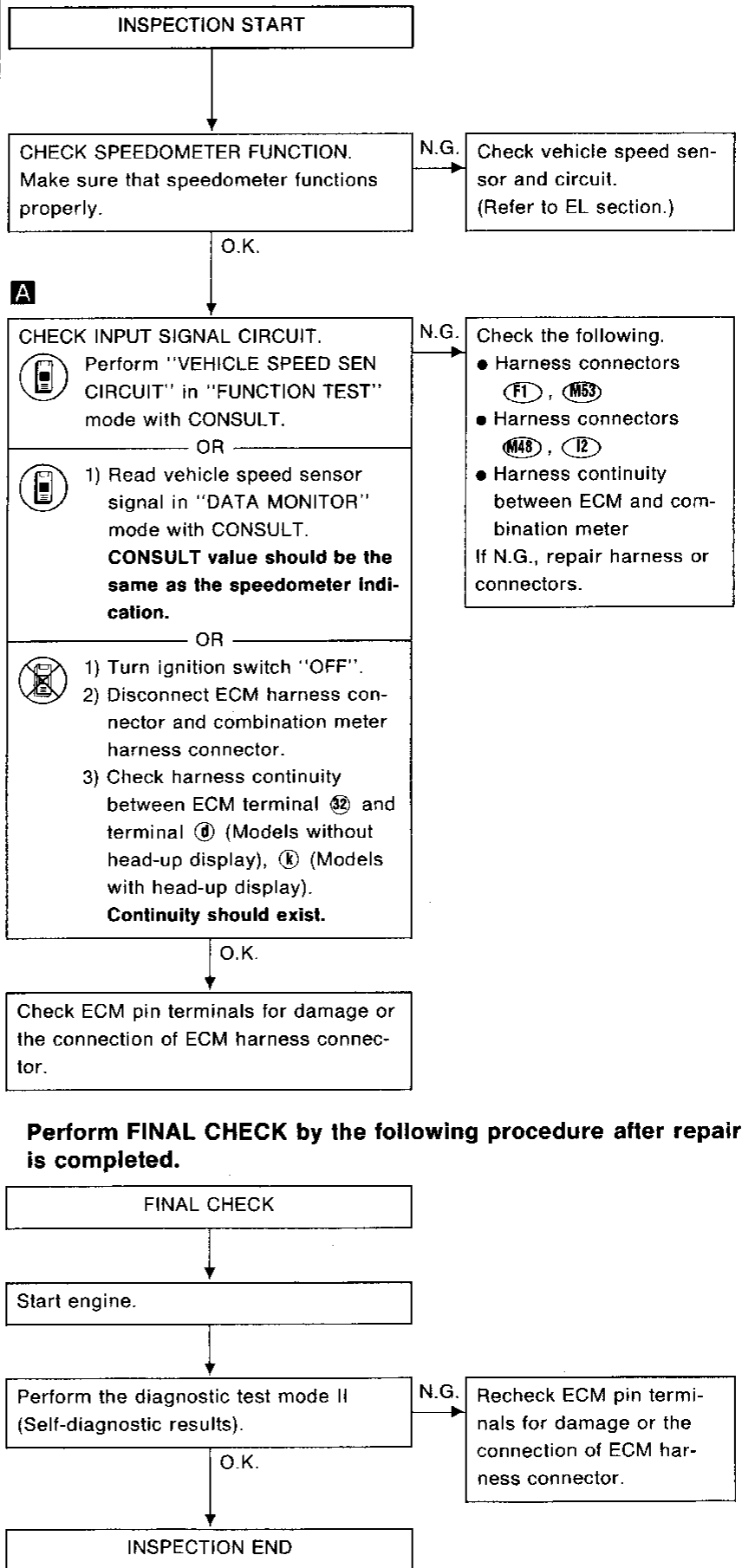
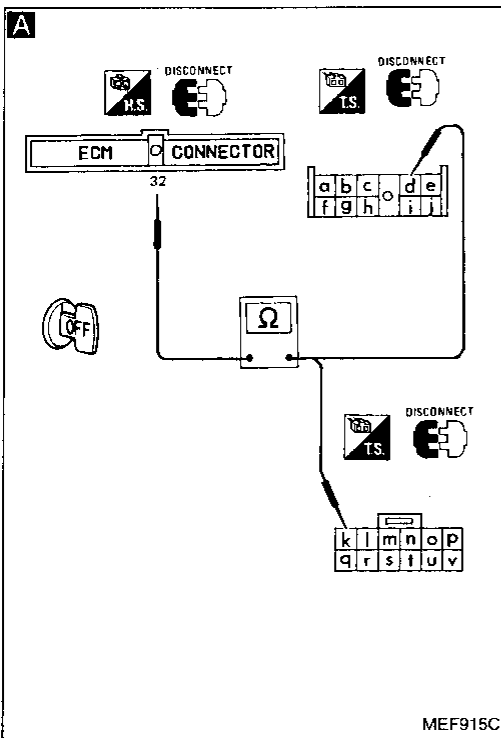
MEF913C

A ☆MONITOR ☆NO FAIL

VHCL SPEED SE 10mph

RECORD

MEF914C

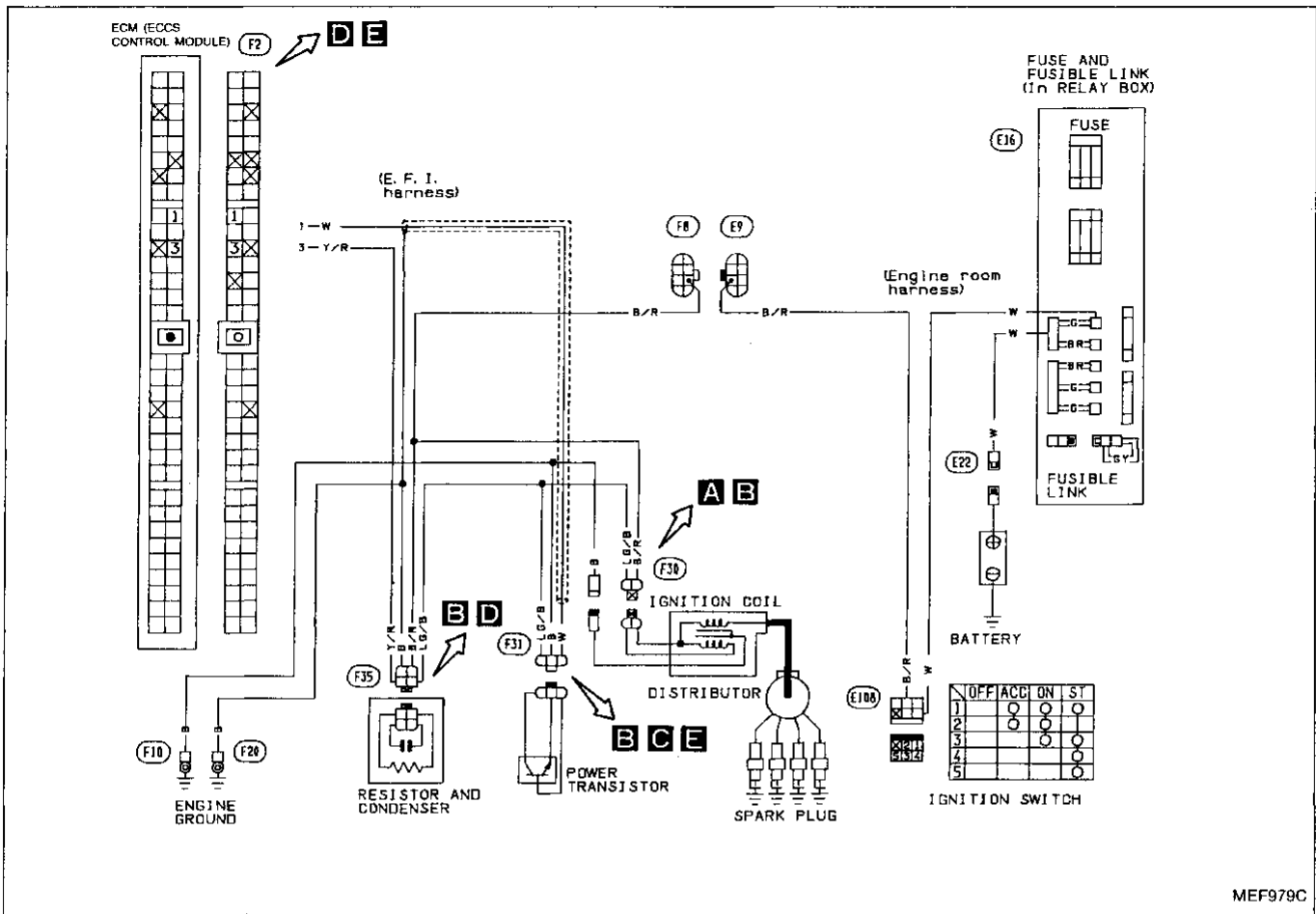


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TROUBLE DIAGNOSES

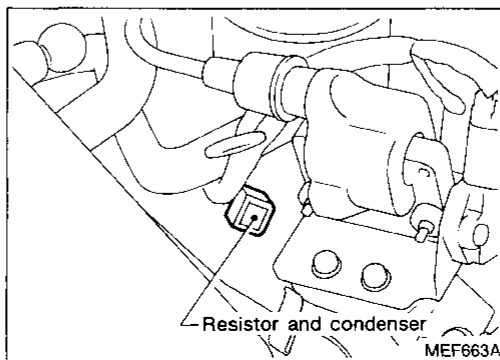
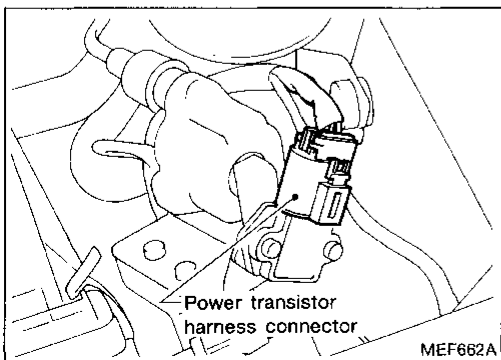
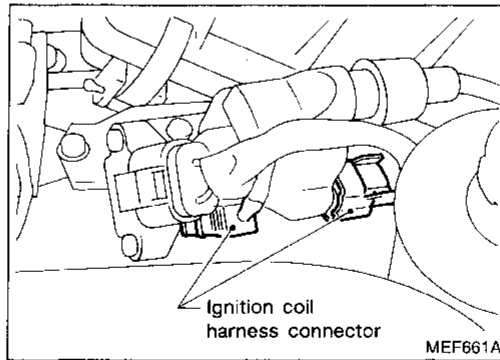
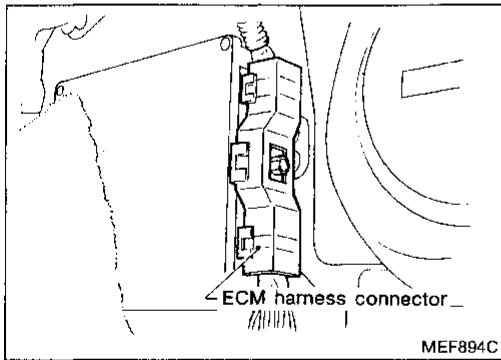
Diagnostic Procedure 27

IGNITION SIGNAL (Diagnostic trouble code No. 21)



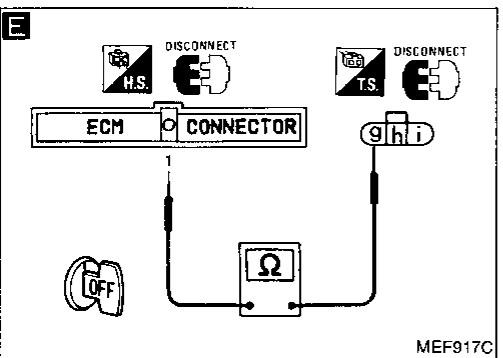
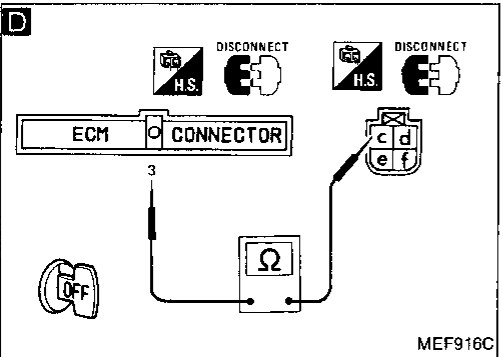
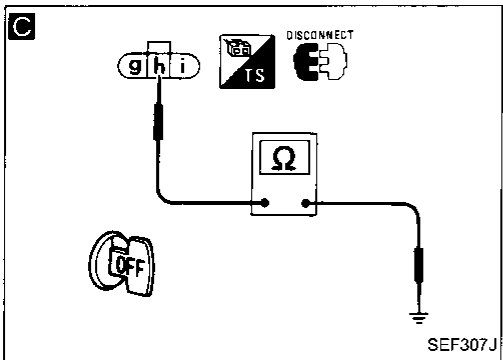
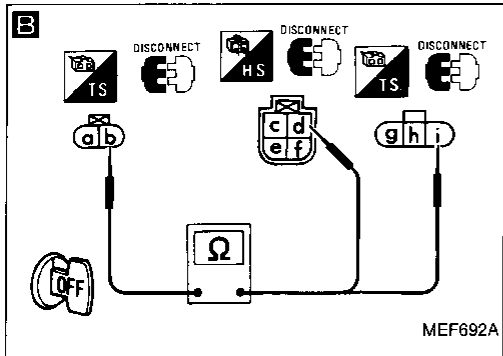
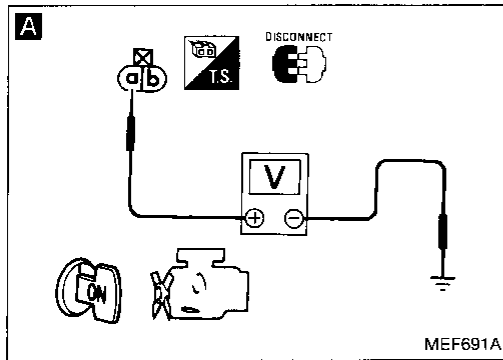
MEF979C

Harness layout



TROUBLE DIAGNOSES

Diagnostic Procedure 27 (Cont'd)



INSPECTION START

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

N.G. → Check the following.
 • Harness connectors **F8**, **E9**
 • Harness continuity between ignition coil and ignition switch
 If N.G., repair harness or connectors.

O.K. →

B CHECK GROUND CIRCUIT.
 1) Turn ignition switch "OFF".
 2) Disconnect resistor and condenser harness connector.
 3) Disconnect power transistor harness connector.
B 4) Check harness continuity between terminal **b** and terminals **d**, **i**.
C 5) Check harness continuity between terminal **h** and engine ground.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. →

D CHECK INPUT SIGNAL CIRCUIT.
 1) Disconnect ECM harness connector.
 2) Check harness continuity between terminal **d** and ECM terminal **3**.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. →

E CHECK OUTPUT SIGNAL CIRCUIT.
 1) Check harness continuity between terminal **d** and ECM terminal **1**.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. →

CHECK COMPONENTS (Ignition coil, resistor and power transistor).
 Refer to "Electrical Components Inspection".
 (See pages EF & EC-161, 168.)

N.G. → Replace malfunctioning component(s).

O.K. →

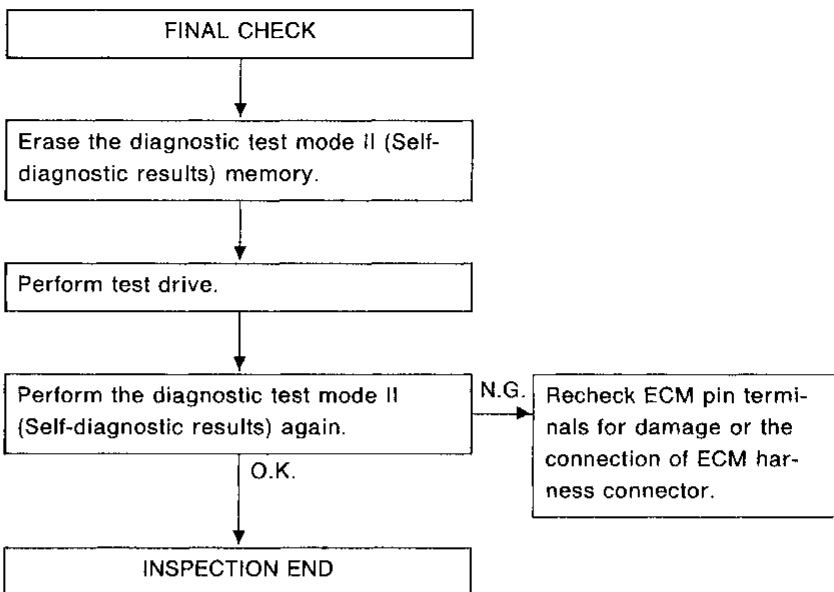
Check ECM pin terminals for damage or the connection of ECM harness connector.

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TROUBLE DIAGNOSES

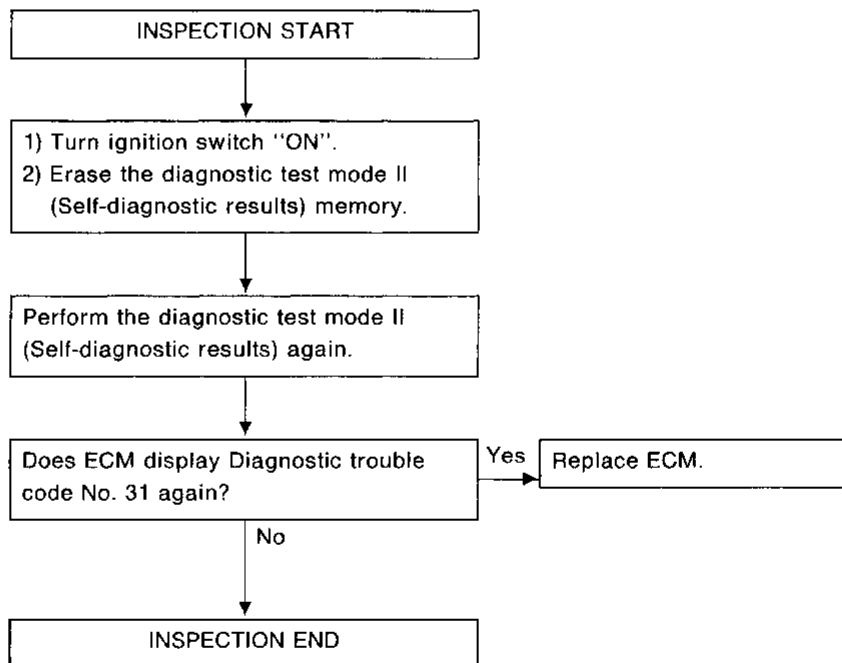
Diagnostic Procedure 27 (Cont'd)

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




Diagnostic Procedure 28

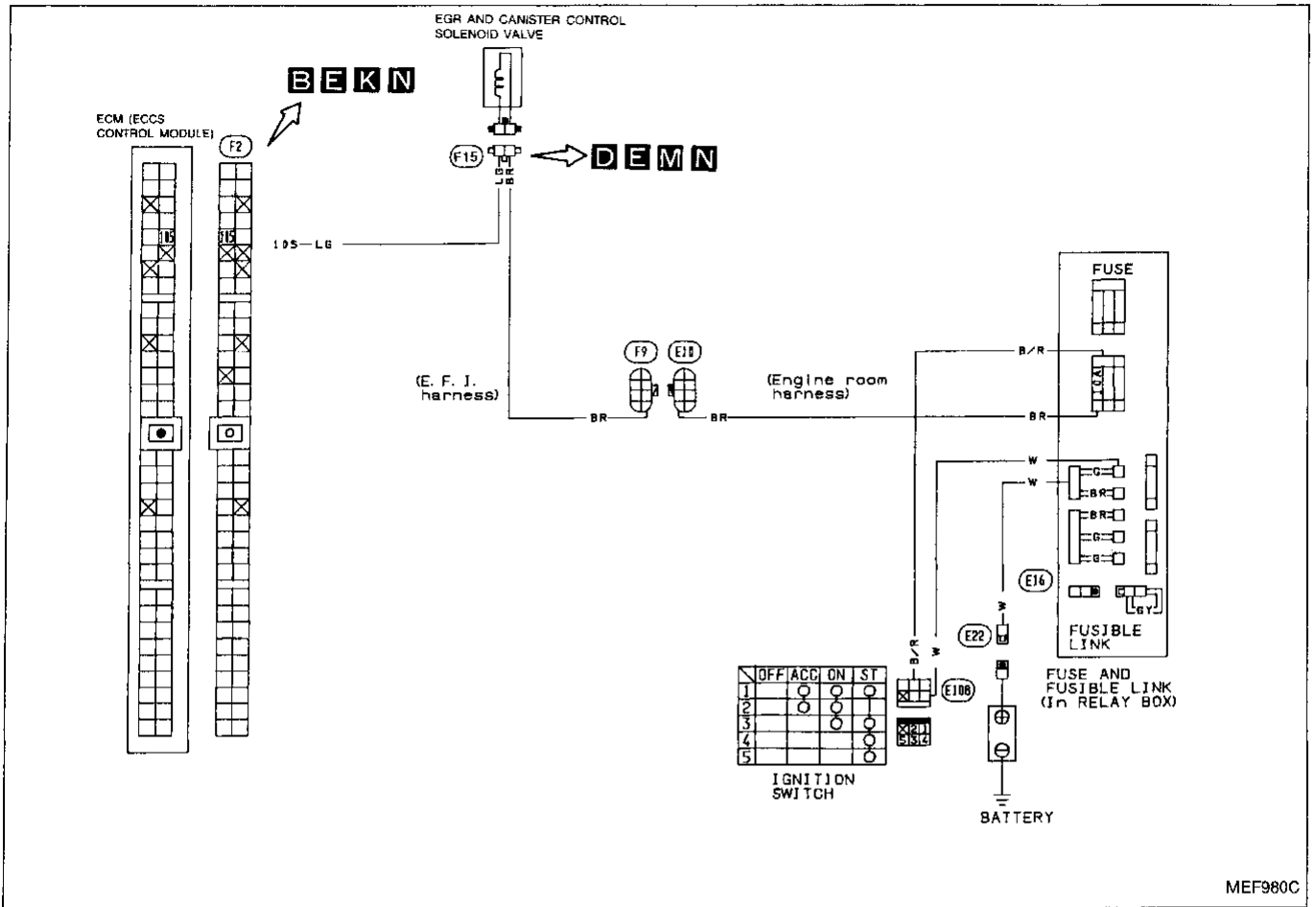
ECM (ECCS CONTROL MODULE) (Diagnostic trouble code No. 31)  (MALFUNCTION INDICATOR LAMP ITEM)



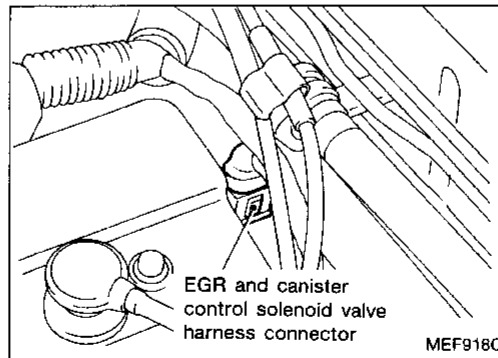
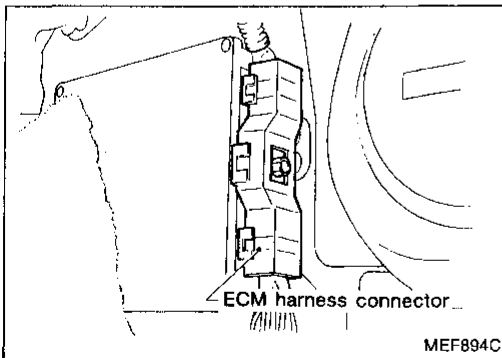
TROUBLE DIAGNOSES

Diagnostic Procedure 29

EGR FUNCTION (Diagnostic trouble code No. 32)  (MALFUNCTION INDICATOR LAMP ITEM): CALIFORNIA MODEL
EGR CONTROL (Not self-diagnostic item): NON-CALIFORNIA MODEL



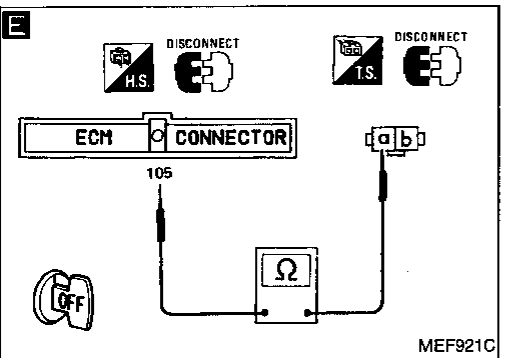
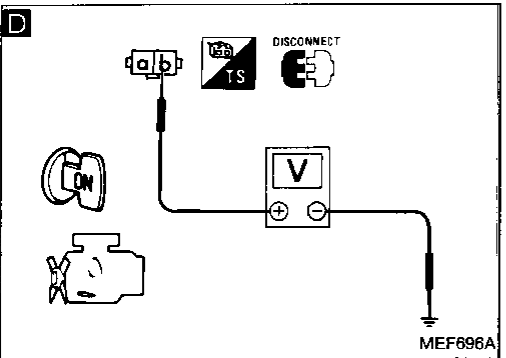
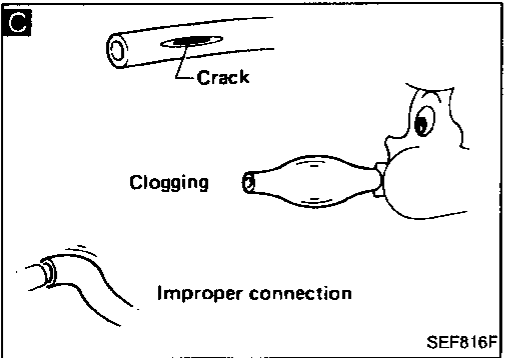
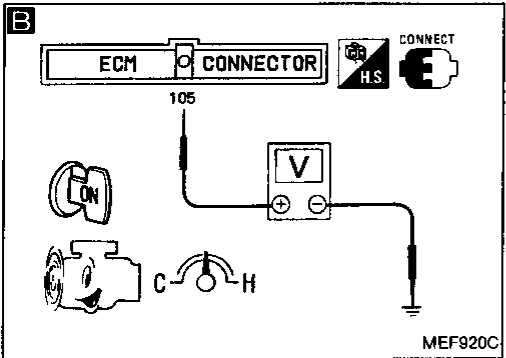
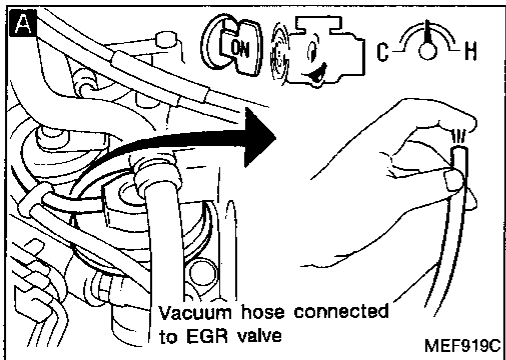
Harness layout



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TROUBLE DIAGNOSES

Diagnostic Procedure 29 (Cont'd)



California model

INSPECTION START

A

CHECK VACUUM SOURCE TO EGR VALVE.

- 1) Start engine and warm it up sufficiently.
- 2) Perform the diagnostic test mode II (Self-diagnostic results). Make sure that none of the diagnostic trouble codes No. 12, No. 13, No. 35 or No. 43 are displayed.
- 3) Keep engine speed at about 2,000 rpm.
- 4) Disconnect vacuum hose to EGR valve.
- 5) Make sure that vacuum exists under the following conditions.

At idle:
Vacuum should not exist.

Engine speed is about 2,000 rpm.:
Vacuum should exist.

O.K.

CHECK COMPONENTS
(EGR valve, EGRC-BPT valve and EGR temperature sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-162.)

N.G.

Replace malfunctioning component(s).

B

CHECK CONTROL FUNCTION.

- 1) Check voltage between ECM terminal (105) and ground under the following conditions.

Voltage:

At idle
Approximately 0V

Engine speed is about 2,000 rpm.
Battery voltage

O.K.

C

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

D

CHECK POWER SUPPLY.

- 1) Stop engine.
- 2) Disconnect EGR & canister control solenoid valve harness connector.
- 3) Turn ignition switch "ON".
- 4) Check voltage between terminal (b) and ground.

Voltage: Battery voltage

N.G.

Check the following.

- Harness connectors (F9), (E10)
- 10A fuse
- Harness continuity between EGR & canister control solenoid valve and fuse

If N.G., repair harness or connectors.

O.K.

➔ **A**

TROUBLE DIAGNOSES

Diagnostic Procedure 29 (Cont'd)

F ■ EGRC SOL/V CIRCUIT ■

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

NEXT NO YES

MEF922C

F ■ ACTIVE TEST ■

EGRC SOL/V OFF

=== MONITOR ===
CKPS•RPM (REF) 687rpm

ON ON/OFF OFF

MEF923C

E

Ⓐ

CHECK OUTPUT SIGNAL CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Disconnect ECM harness connector.
- 3) Check harness continuity between ECM terminal (105) and terminal (a).
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

F

CHECK COMPONENT (EGR & canister control solenoid valve).

- 1) Reconnect EGR & canister control 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

- 2) Start engine.
- 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-162.)

N.G. → Replace EGR & canister control solenoid valve.

O.K.

Check resistance of EGR temperature sensor.
(See page EF & EC-163.)

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

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TROUBLE DIAGNOSES

Diagnostic Procedure 29 (Cont'd)

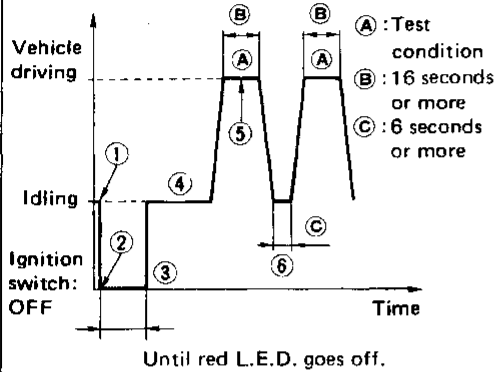
G ROAD TEST

Test condition

Drive vehicle under the following conditions with suitable shift position.

- (1) Engine speed:
2,400±800 rpm
- (2) Intake manifold vacuum:
-40.0±13.3 kPa
(-300±100 mmHg, -11.81±3.94 inHg)

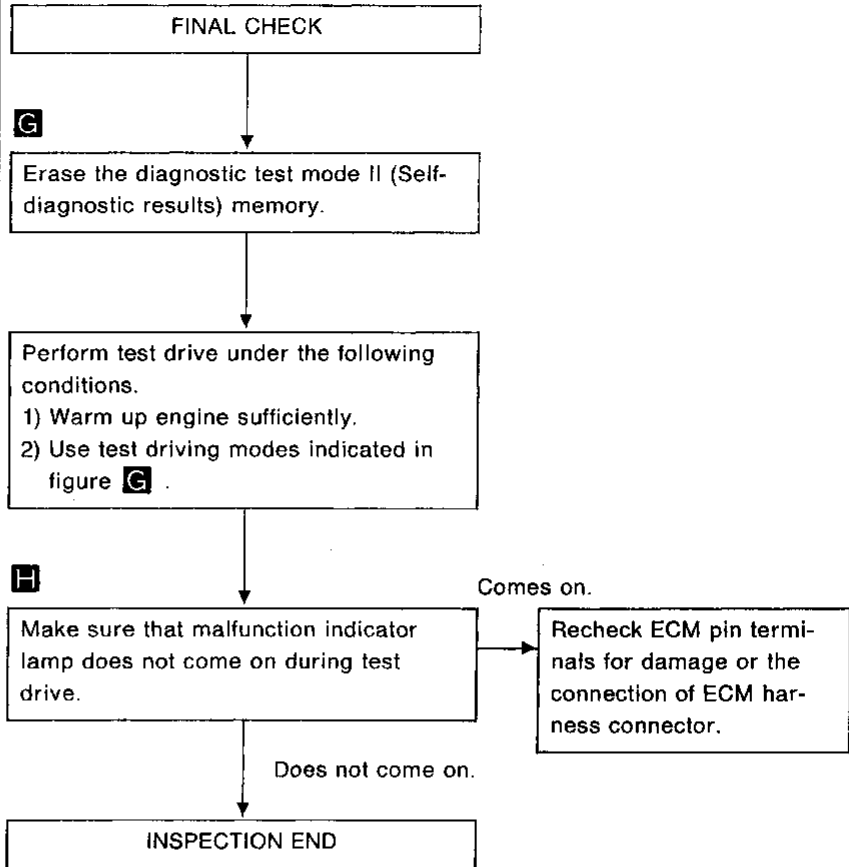
Driving mode



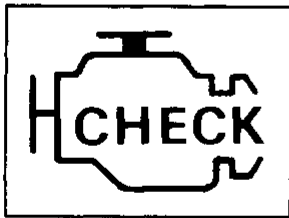
- ① Start engine and warm it up sufficiently.
- ② Turn off ignition switch and keep it off until red L.E.D. goes off.
- ③ Start engine and make sure that air conditioner switch and rear defogger are turned "OFF" during test drive.
- ④ Keep engine running for at least 4 minutes.
- ⑤ Shift to suitable gear position and drive in "Test condition" for at least 16 seconds.
- ⑥ Decrease engine revolutions to less than 1,500 rpm for at least 6 seconds.
- ⑦ Repeat steps ⑤ through ⑥ at least 1 more time.

SEF007L

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



H

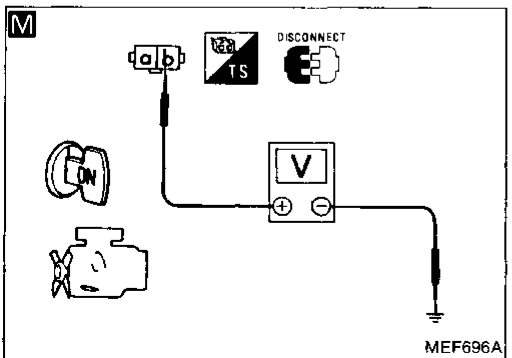
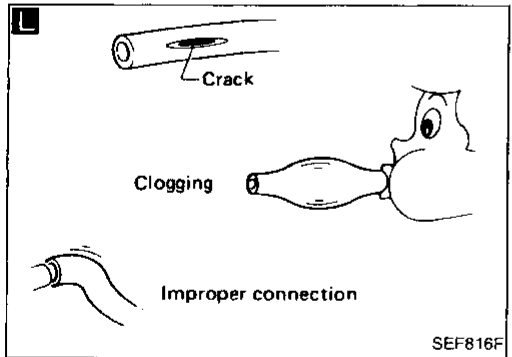
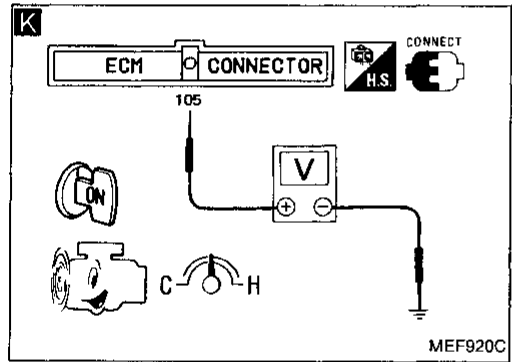
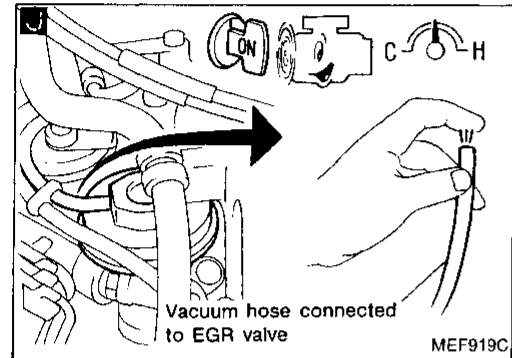
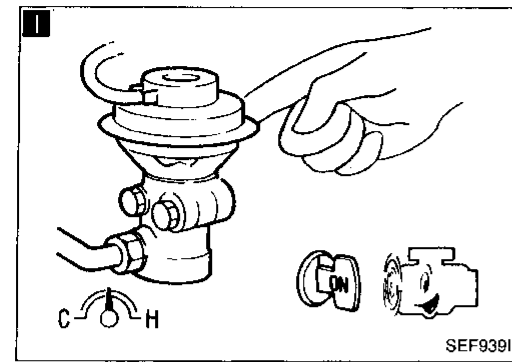


MALFUNCTION
INDICATOR LAMP

MEF997C

TROUBLE DIAGNOSES

Diagnostic Procedure 29 (Cont'd)



Non-California model

INSPECTION START

I
CHECK OVERALL FUNCTION.
 1) Start engine and warm it up sufficiently.
 2) Make sure that EGR valve spring is lifted up and down when racing engine (2,000 rpm). (Use your finger.)

Is lifted up and down.

INSPECTION END

Is not lifted up and down.

J
CHECK VACUUM SOURCE TO EGR VALVE.
 1) Disconnect vacuum hose to EGR valve.
 2) Make sure that vacuum exists under the following conditions.
At idle:
 Vacuum should not exist.
Engine speed is about 2,000 rpm:
 Vacuum should exist.

O.K.

CHECK COMPONENTS (EGR valve and EGRC-BPT valve). Refer to "Electrical Components Inspection". (See page EF & EC-162.)

N.G.

Replace malfunctioning component(s).

K
CHECK CONTROL FUNCTION.
 1) Check voltage between ECM terminal **(105)** and ground under the following conditions.
Voltage:
At idle
 Approximately 0V
Engine speed is about 2,000 rpm.
 Battery voltage

O.K.

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

N.G.

M
CHECK POWER SUPPLY.
 1) Stop engine.
 2) Disconnect EGR and canister control solenoid valve harness connector.
 3) Turn ignition switch "ON".
 4) Check voltage between terminal **(B)** and ground.
Voltage: Battery voltage

N.G.

Check the following.
 • Harness connectors **(F9)**, **(E10)**
 • 10A fuse
 • Harness continuity between EGR and canister control solenoid valve and fuse
 If N.G., repair harness or connectors.

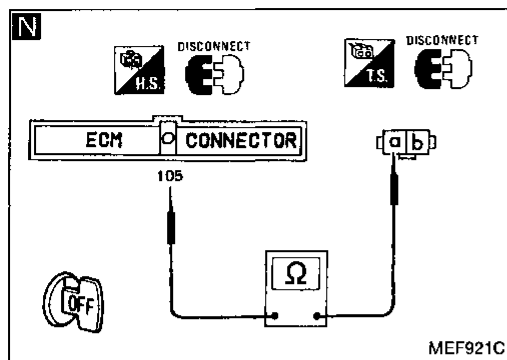
O.K.

(A)

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TROUBLE DIAGNOSES

Diagnostic Procedure 29 (Cont'd)



N

Ⓐ

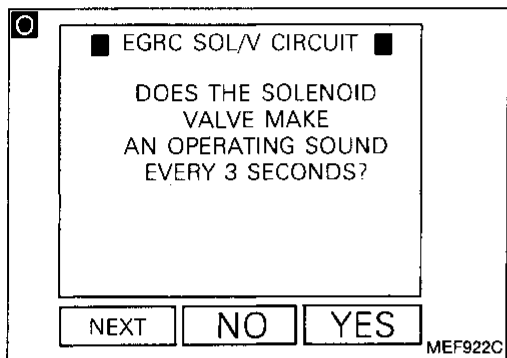
CHECK OUTPUT SIGNAL CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Disconnect ECM harness connector.
- 3) Check harness continuity between ECM terminal (105) and terminal (A).

Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓



O

CHECK COMPONENT
(E.G.R. & canister control solenoid valve).

- 1) Reconnect EGR and canister control 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

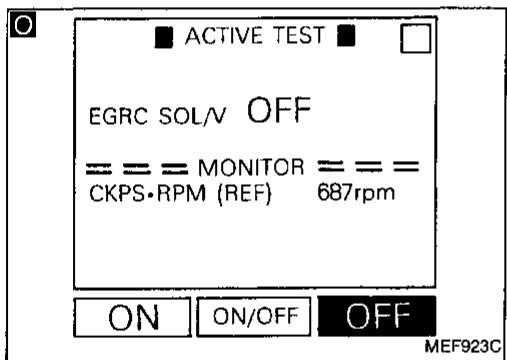
- 2) Start engine.
- 3) Turn EGRC-solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.

OR

Refer to "Electrical Components Inspection".
(See page EF & EC-162.)

N.G. → Replace EGR and canister control solenoid valve.

O.K. ↓




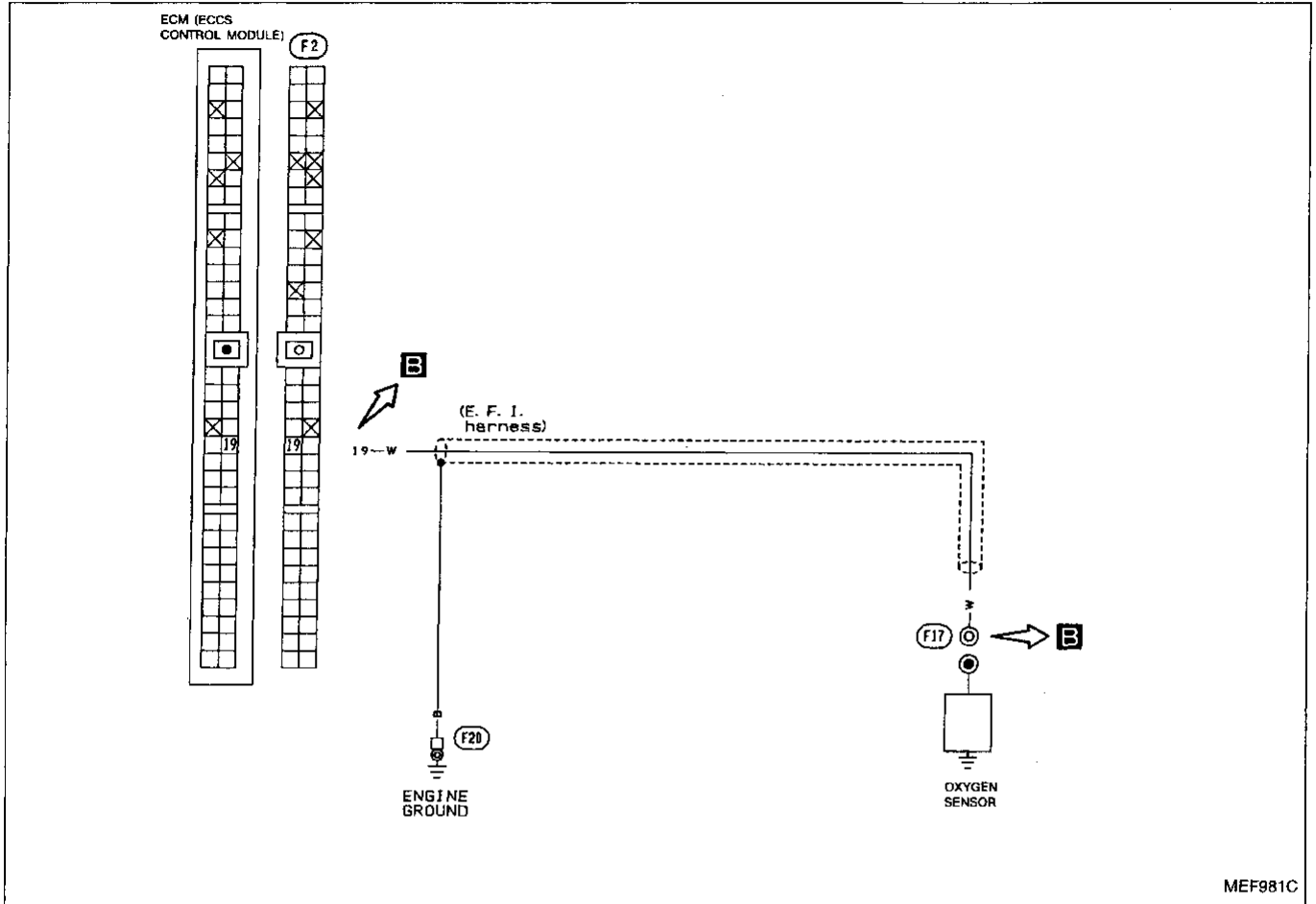
O.K. ↓

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

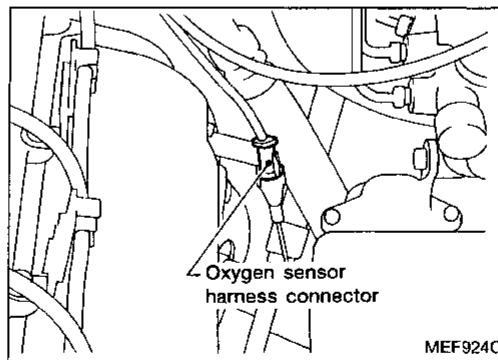
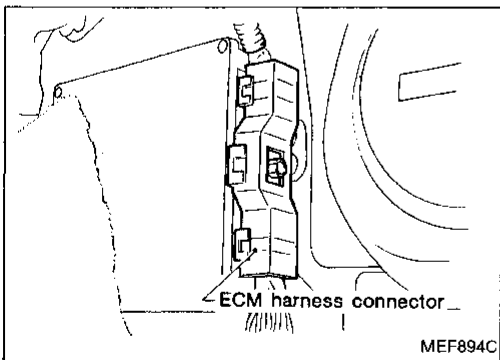
TROUBLE DIAGNOSES

Diagnostic Procedure 30

OXYGEN SENSOR (Diagnostic trouble code No. 33)  (MALFUNCTION INDICATOR LAMP ITEM): CALIFORNIA MODEL ONLY



Harness layout



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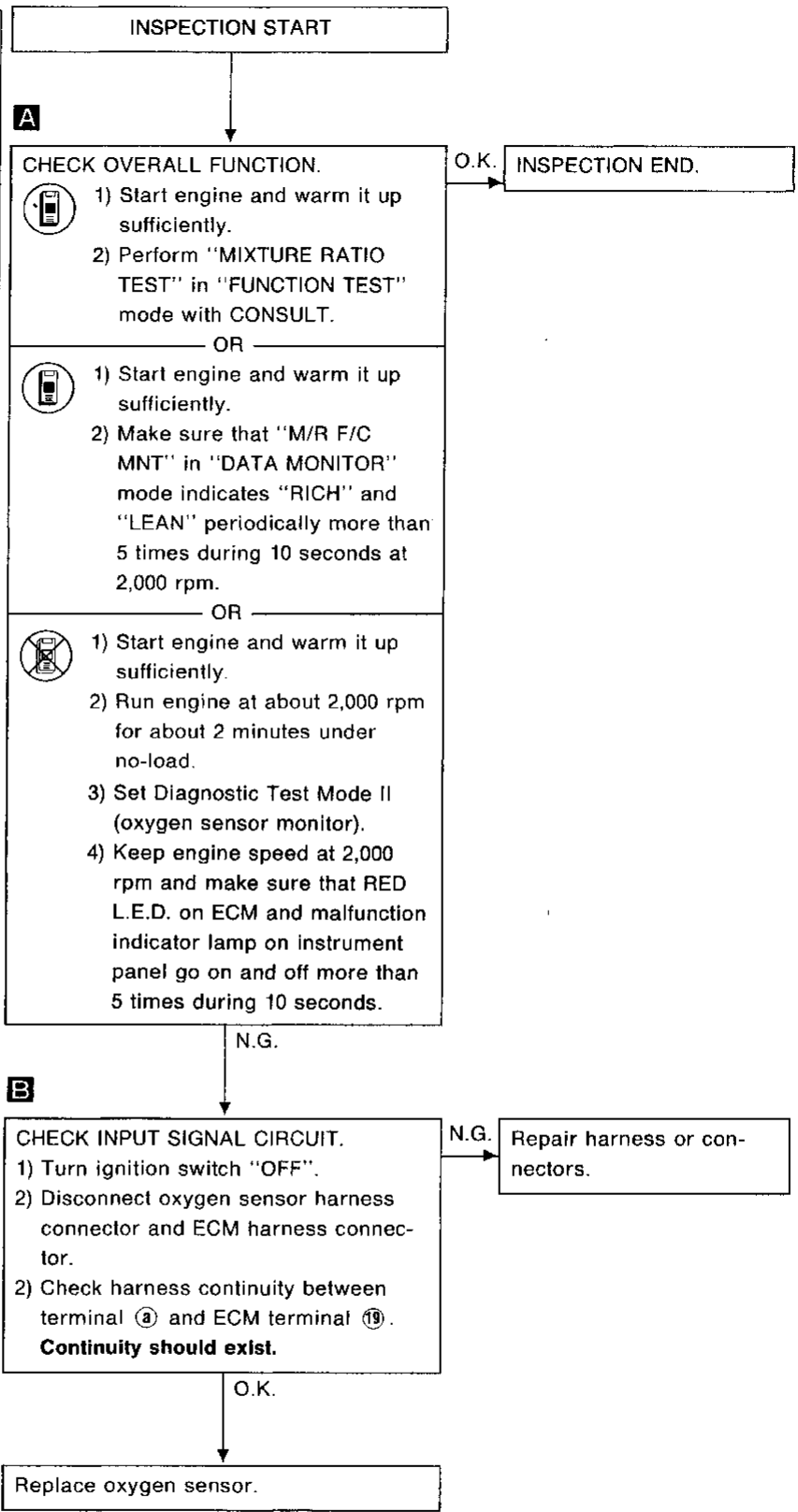
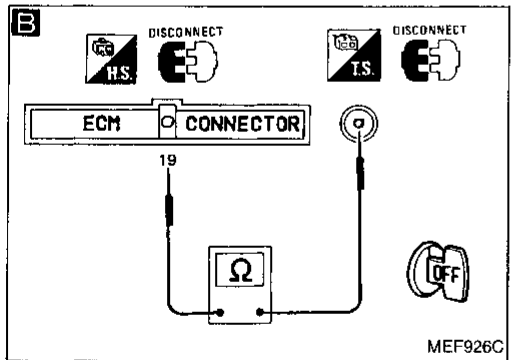
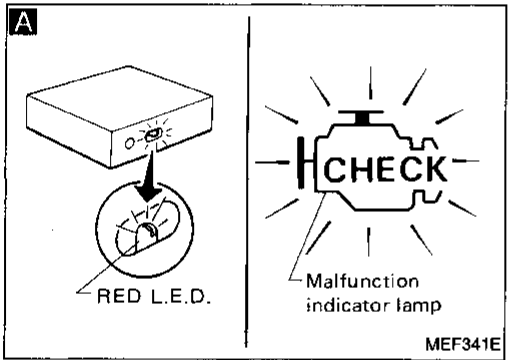
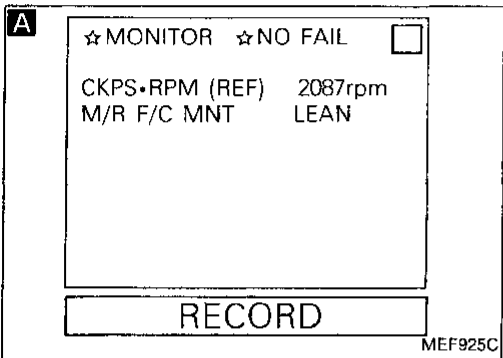
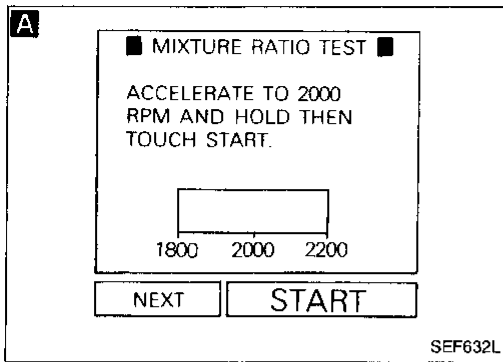
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TROUBLE DIAGNOSES

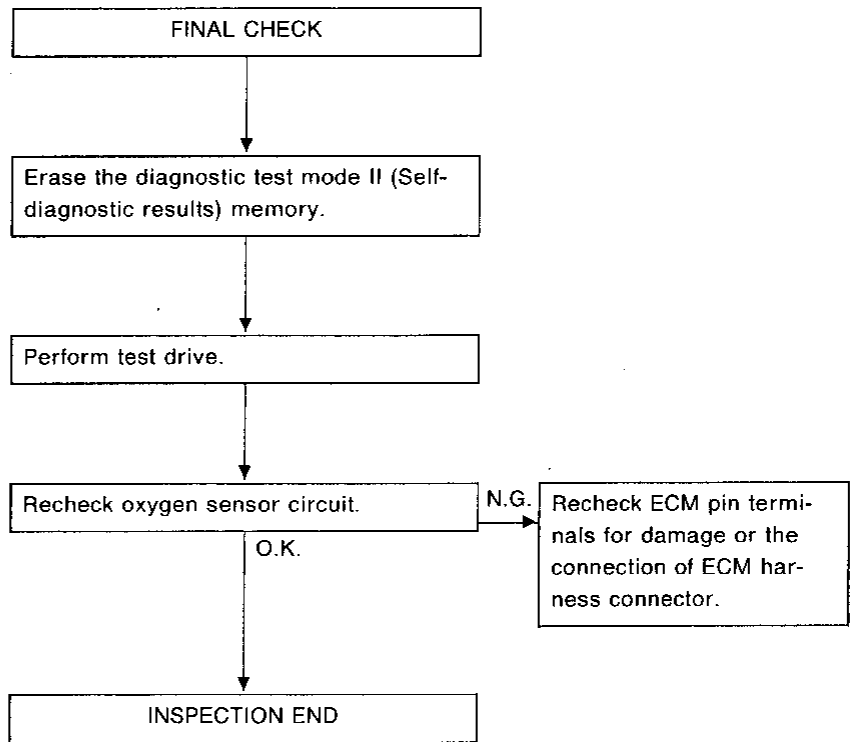
Diagnostic Procedure 30 (Cont'd)



TROUBLE DIAGNOSES

Diagnostic Procedure 30 (Cont'd)

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



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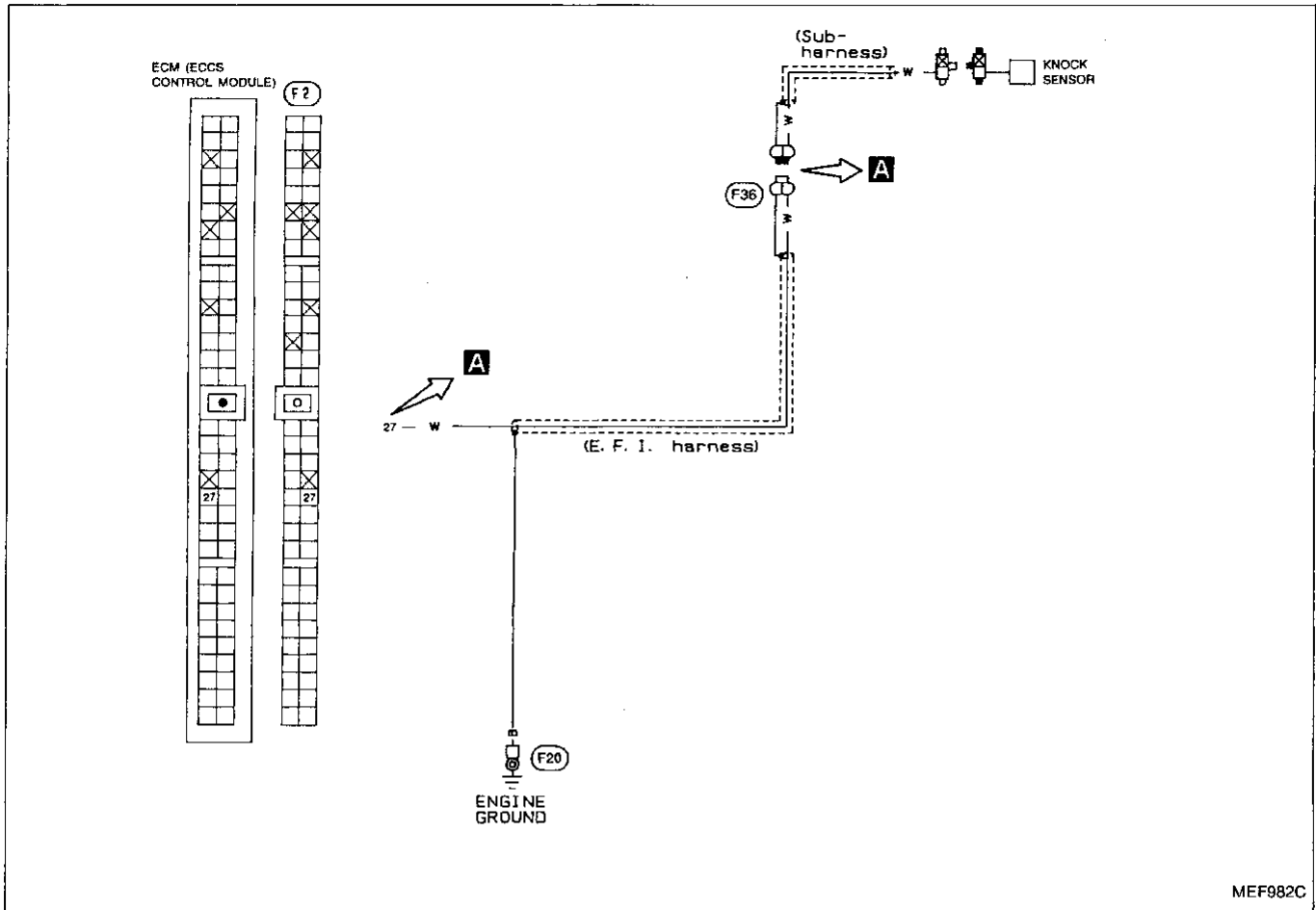
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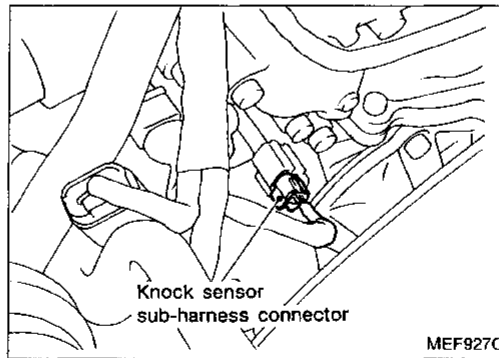
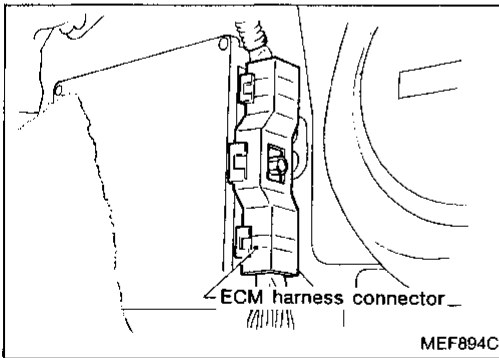
TROUBLE DIAGNOSES

Diagnostic Procedure 31

KNOCK SENSOR (Diagnostic trouble code No. 34)

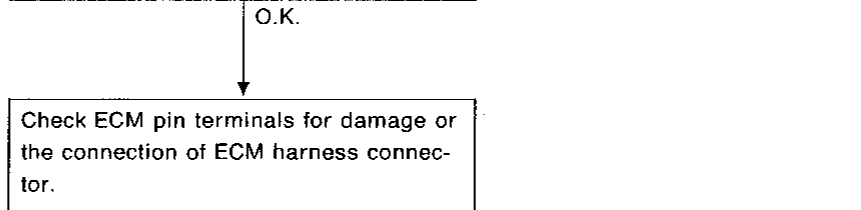
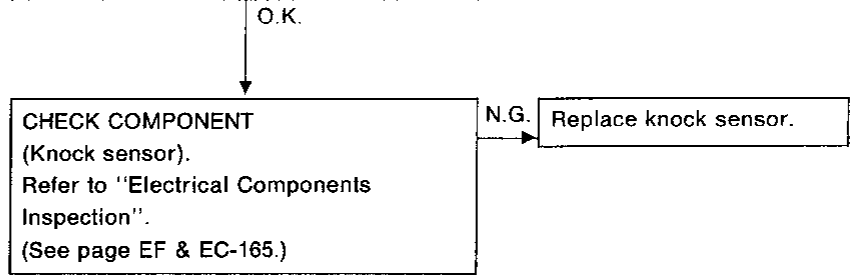
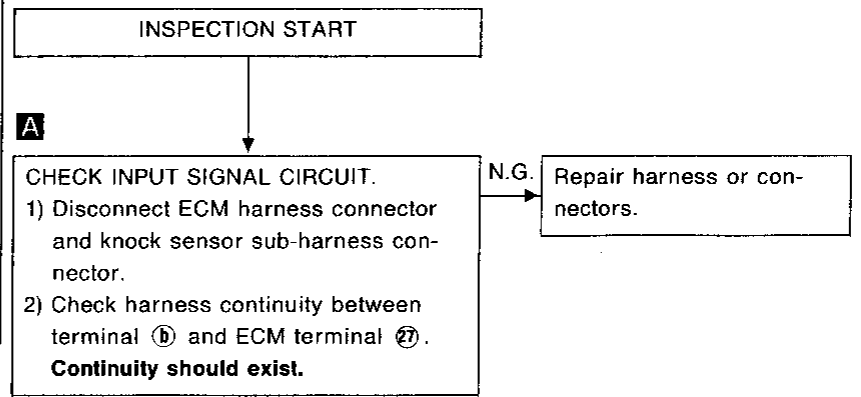
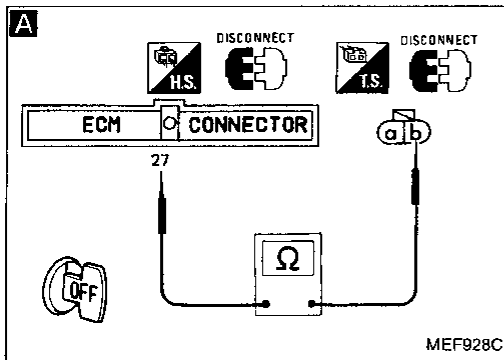


Harness layout

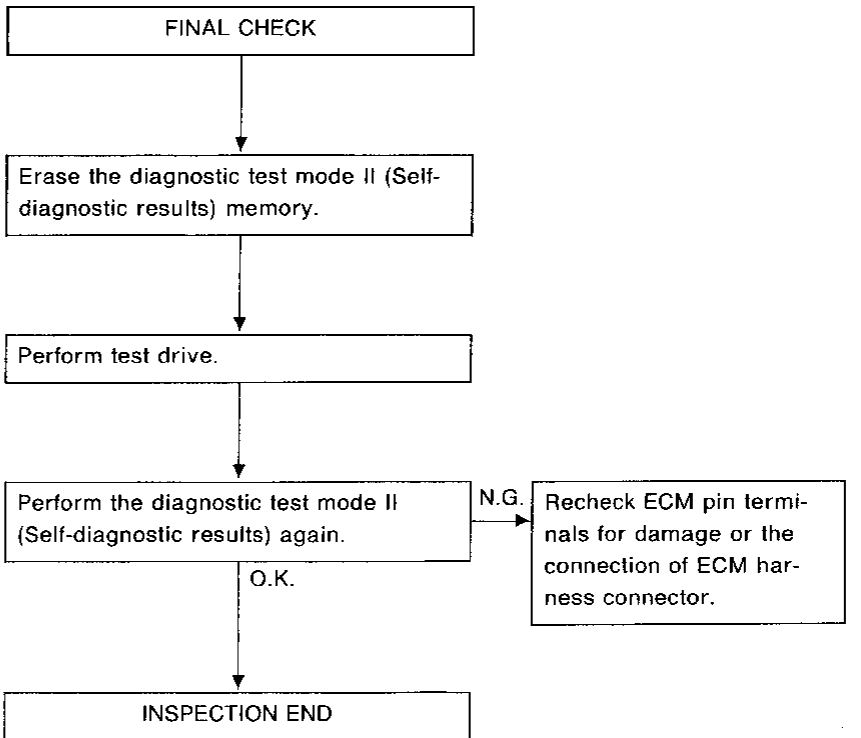


TROUBLE DIAGNOSES

Diagnostic Procedure 31 (Cont'd)



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



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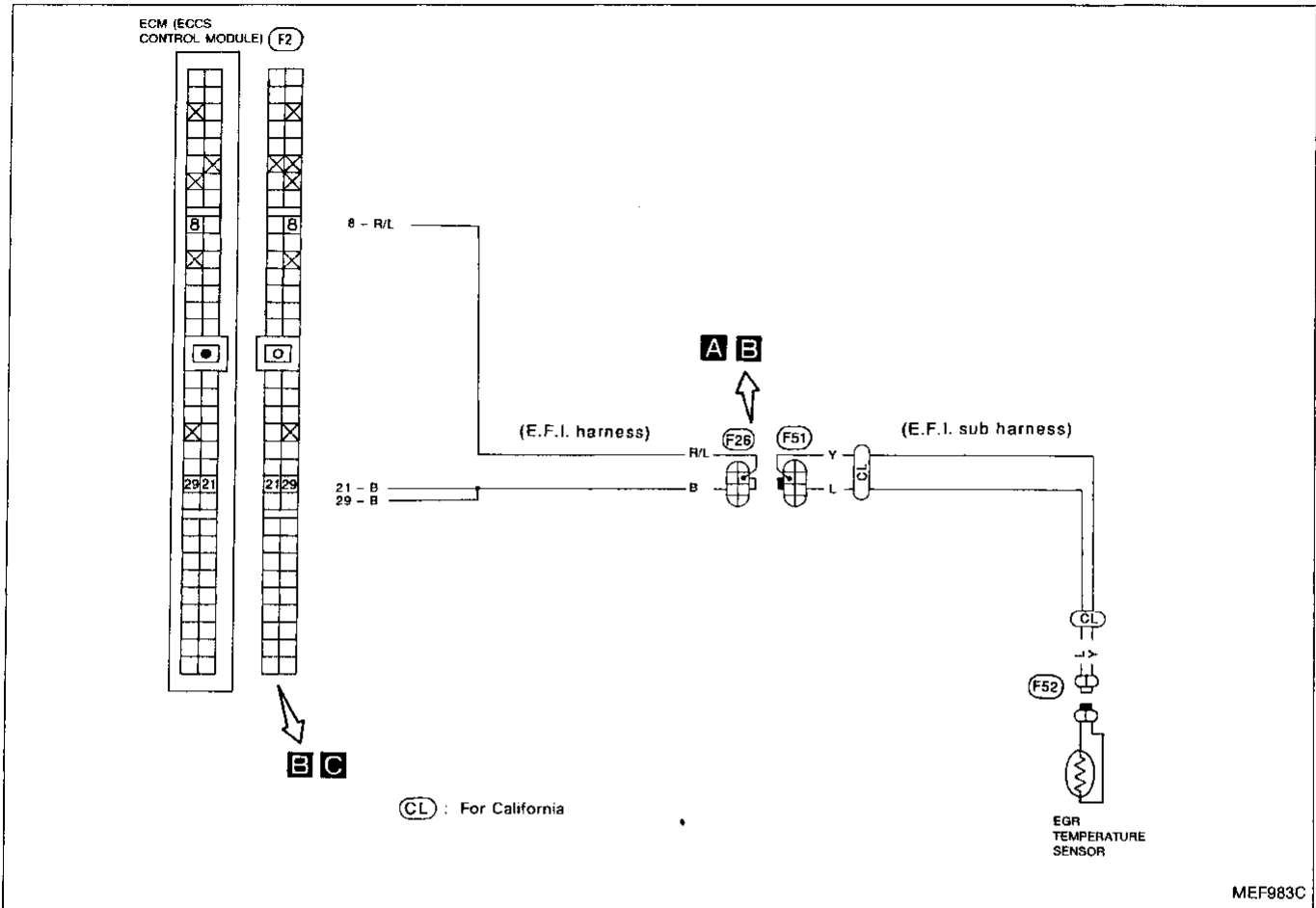
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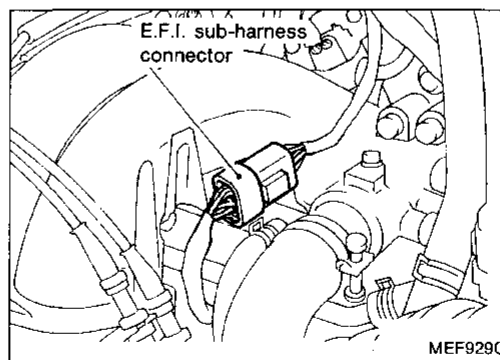
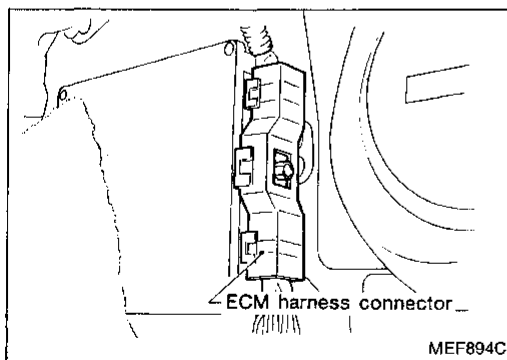
TROUBLE DIAGNOSES

Diagnostic Procedure 32

EGR TEMPERATURE SENSOR (Diagnostic trouble code No. 35) (MALFUNCTION INDICATOR LAMP ITEM): CALIFORNIA MODEL ONLY

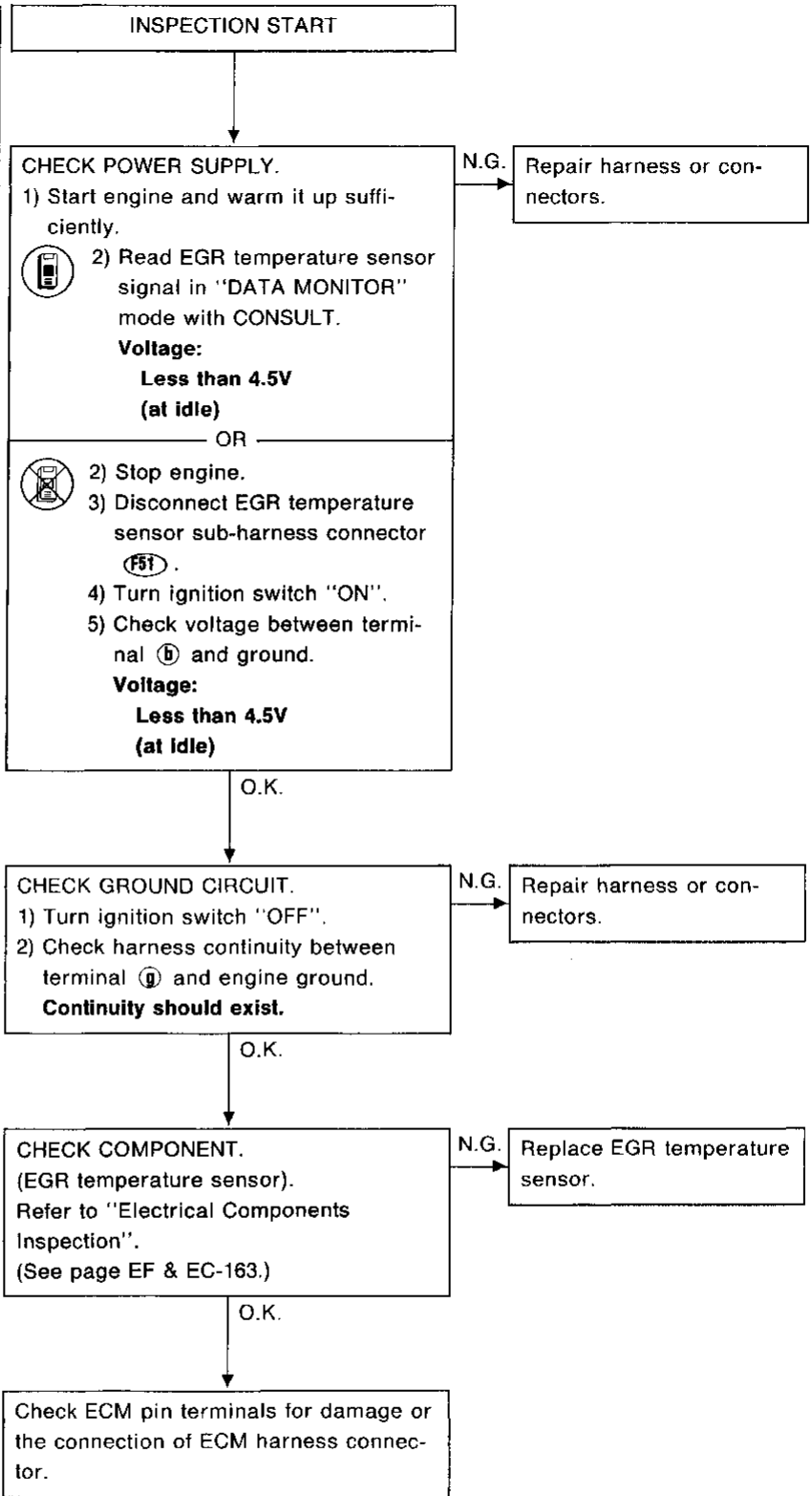
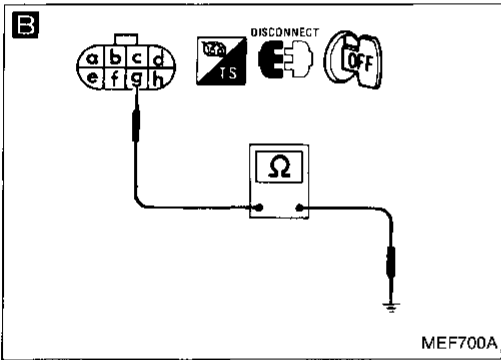
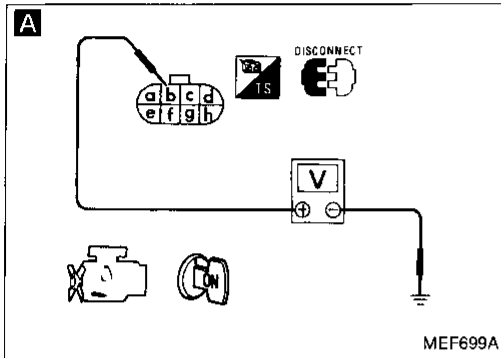
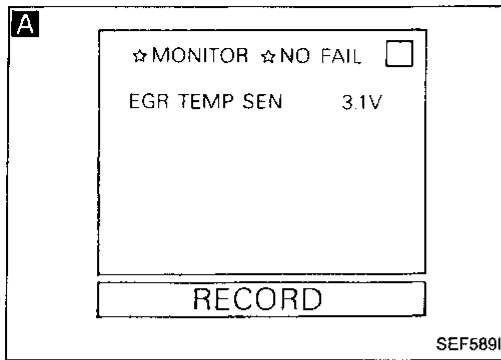


Harness layout



TROUBLE DIAGNOSES

Diagnostic Procedure 32 (Cont'd)

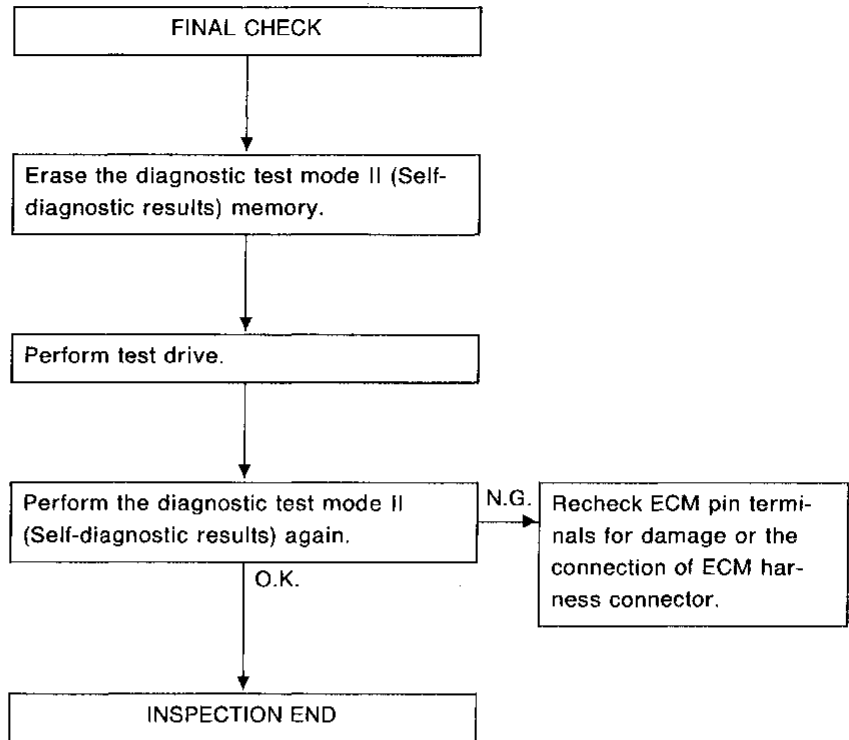


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TROUBLE DIAGNOSES

Diagnostic Procedure 32 (Cont'd)

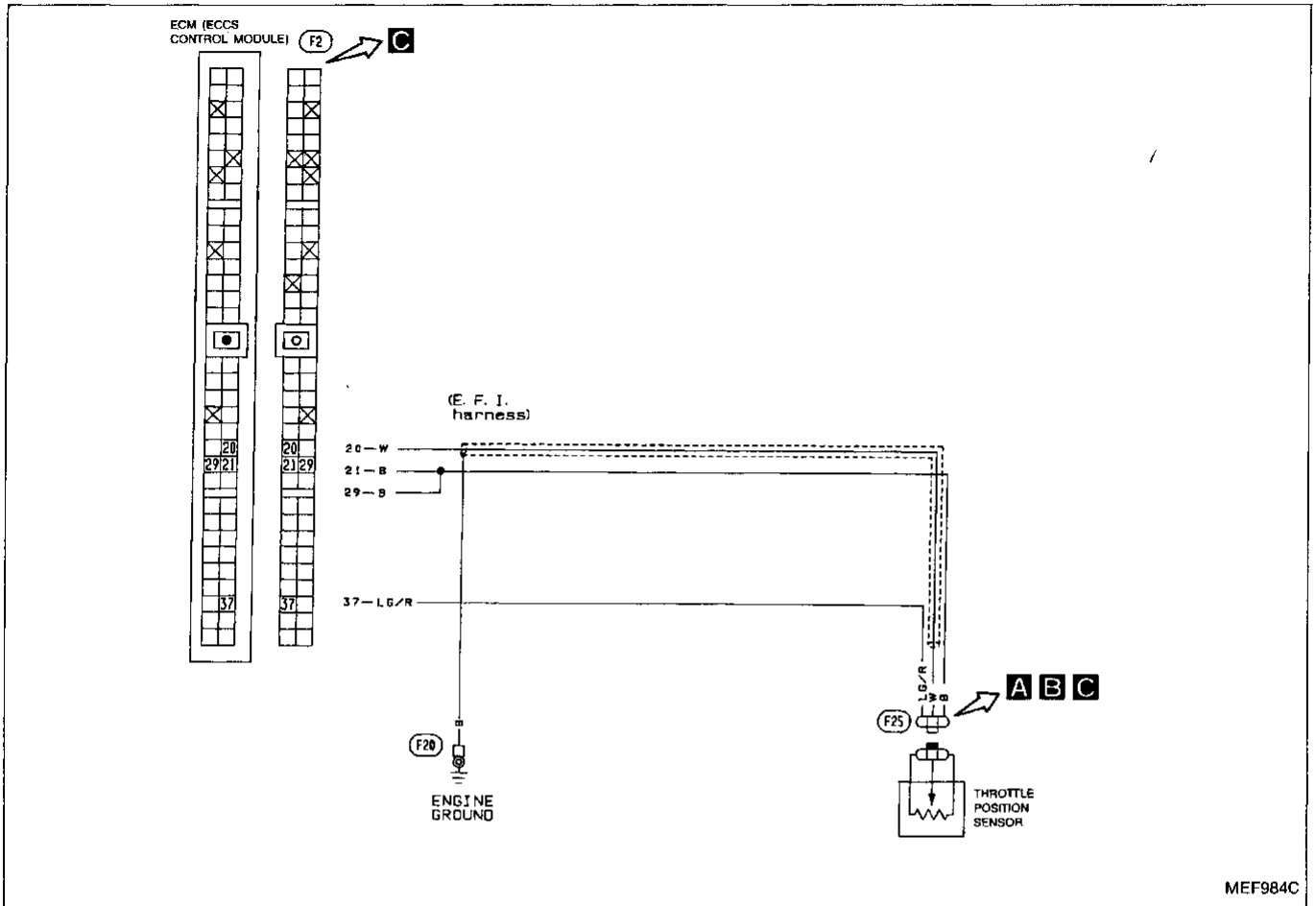
Perform FINAL CHECK by the following procedure after repair is completed.



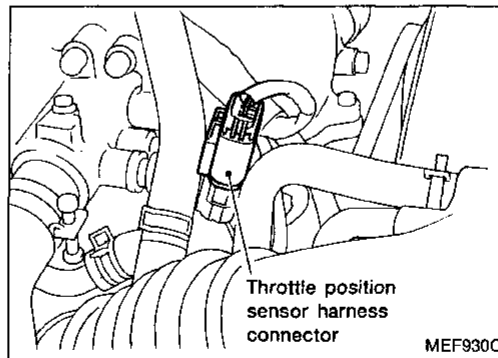
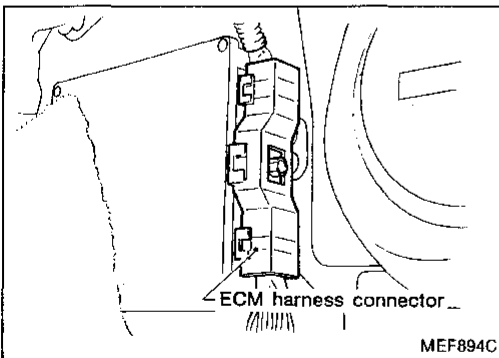
TROUBLE DIAGNOSES

Diagnostic Procedure 33

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



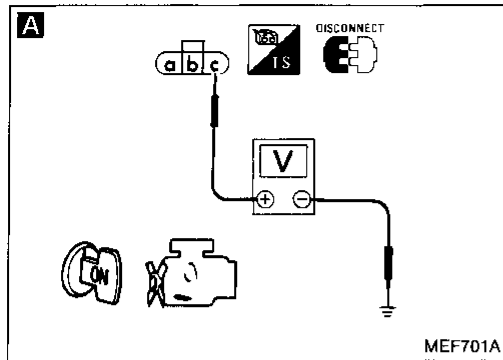
Harness layout



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TROUBLE DIAGNOSES

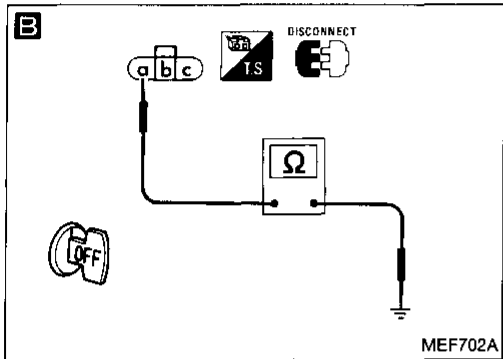
Diagnostic Procedure 33 (Cont'd)



INSPECTION START

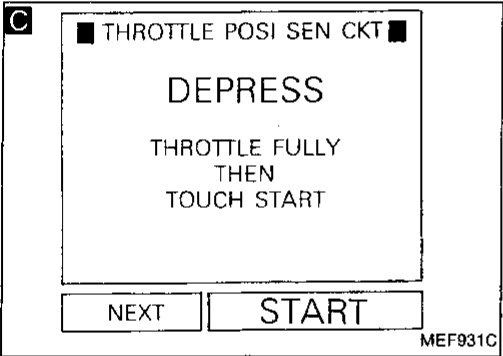
A
CHECK POWER SUPPLY.
 1) Disconnect throttle position sensor harness connector.
 2) Turn ignition switch "ON".
 3) Check voltage between terminal ③ and ground.
Voltage: Approximately 5V

N.G. Repair harness or connectors.



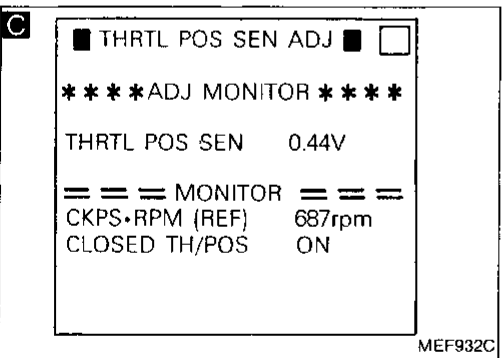
B
CHECK GROUND CIRCUIT.
 1) Turn ignition switch "OFF".
 2) Check harness continuity between terminal ② and engine ground.
Continuity should exist.

N.G. Repair harness or connectors.



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.

N.G. Repair harness or connectors.

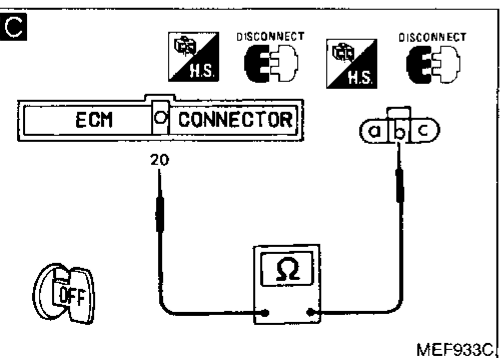


OR

3) Read "THRTL POS SEN ADJ" in "WORK SUPPORT" mode with CONSULT.
Throttle valve fully closed: Approx. 0.5V
Throttle valve fully open: Approx. 4.0V

OR

1) Disconnect ECM harness connector.
 2) Check harness continuity between ECM terminal ⑩ and terminal ①.
Continuity should exist.



CHECK COMPONENT
 (Throttle position sensor).
 Refer to "Electrical Components Inspection".
 (See page EF & EC-163.)

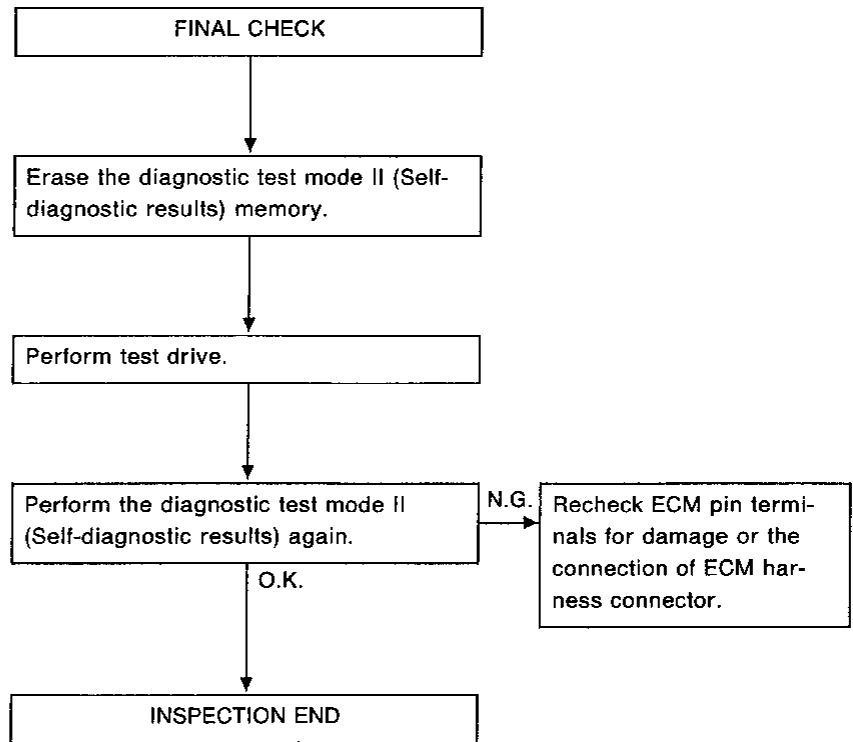
N.G. Replace throttle position sensor.

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

TROUBLE DIAGNOSES

Diagnostic Procedure 33 (Cont'd)

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



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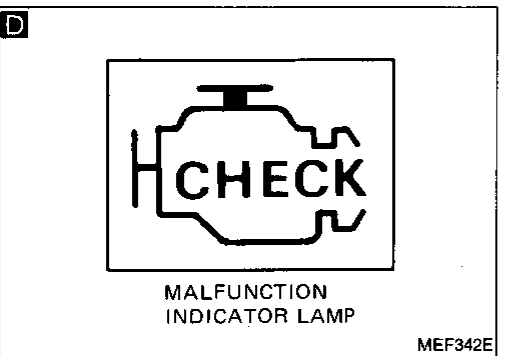
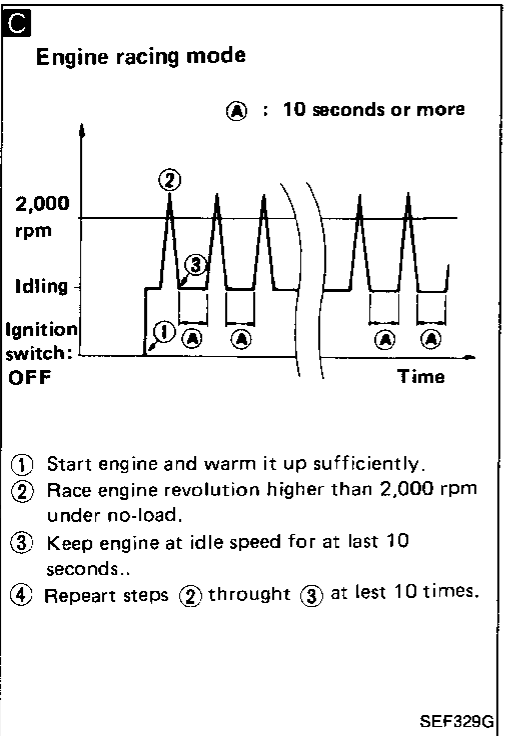
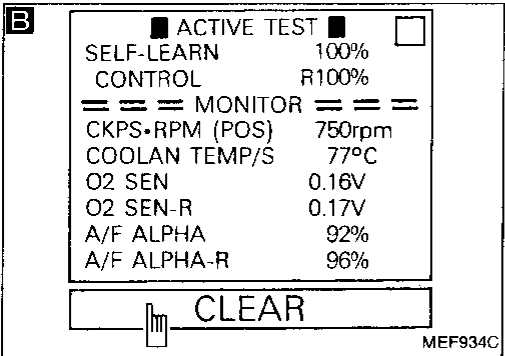
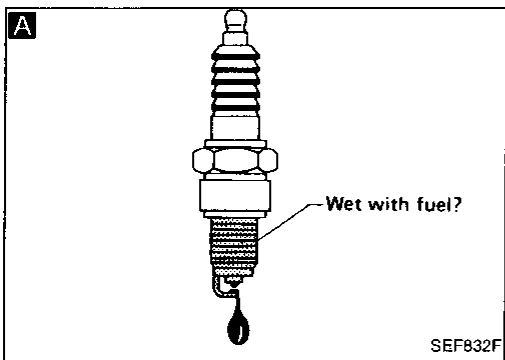
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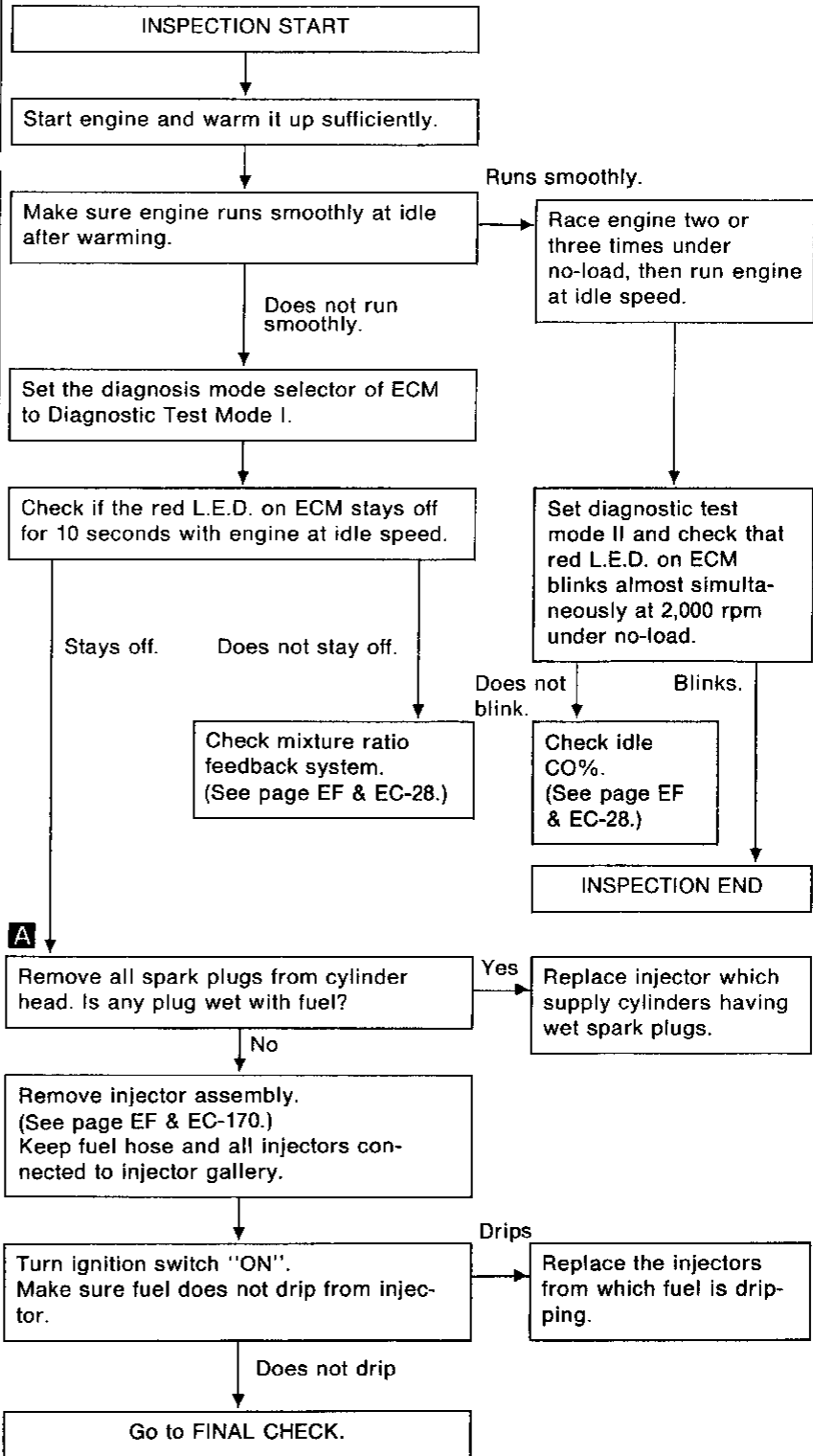
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Diagnostic Procedure 34

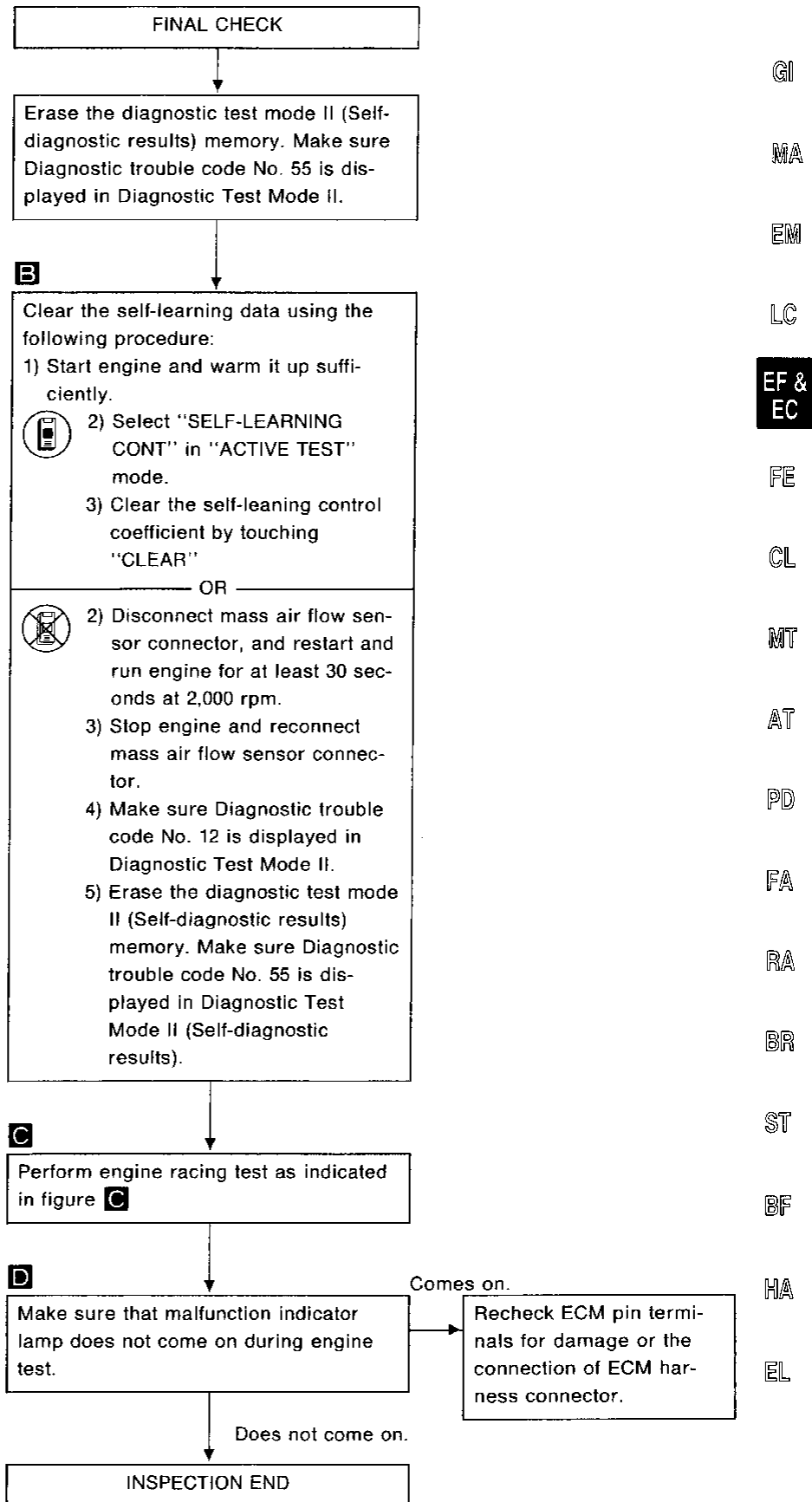
INJECTOR LEAK (Diagnostic trouble code No. 45)
 (MALFUNCTION INDICATOR LAMP ITEM);
CALIFORNIA MODEL ONLY



TROUBLE DIAGNOSES

Diagnostic Procedure 34 (Cont'd)

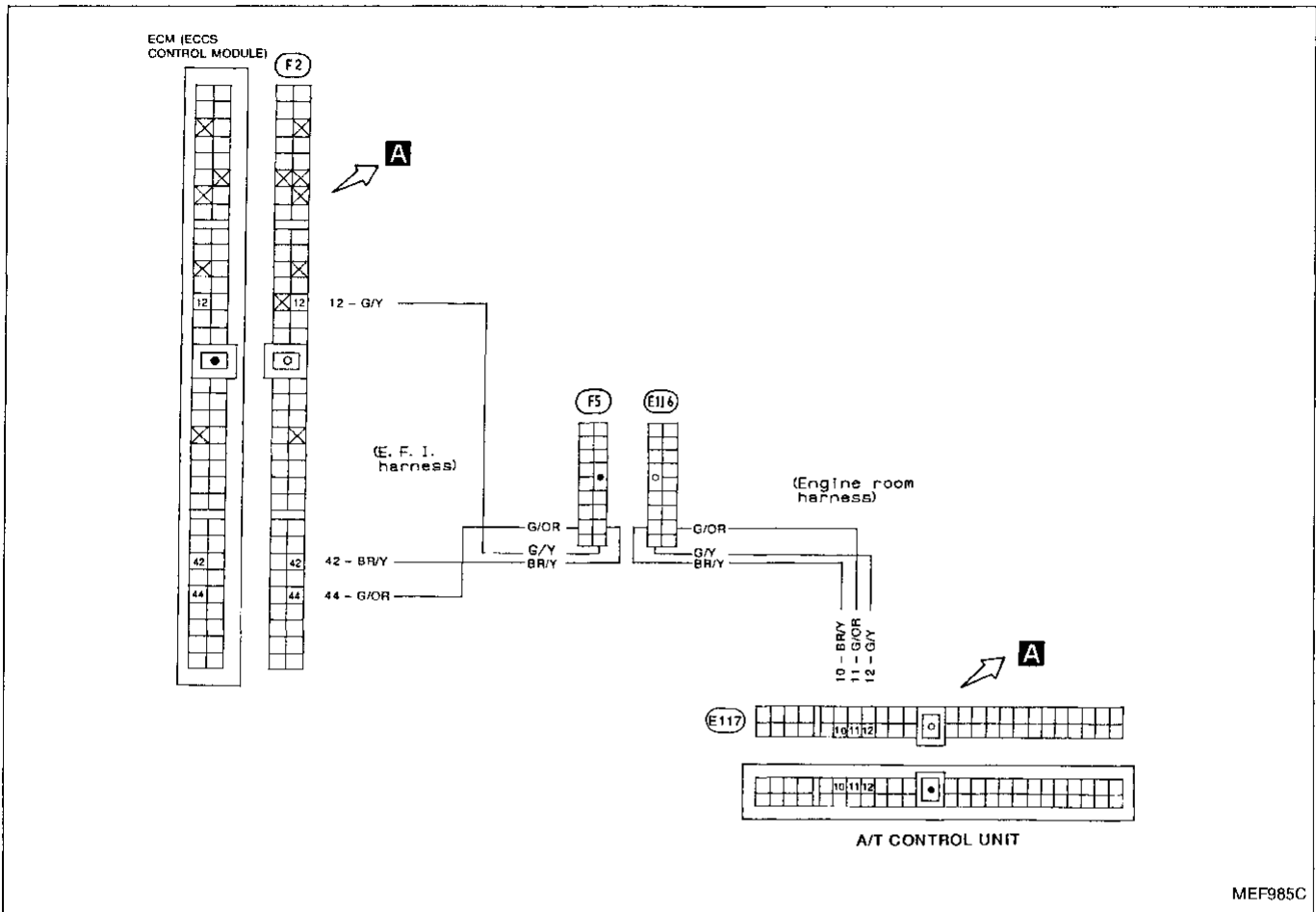
Perform FINAL CHECK by the following procedure after repair is completed.



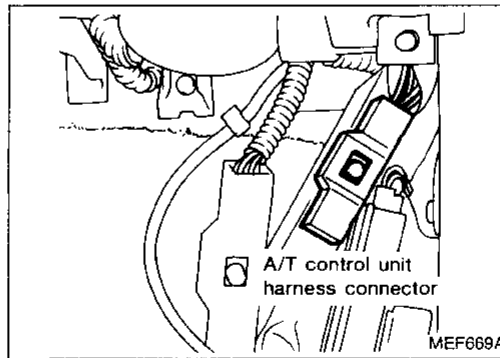
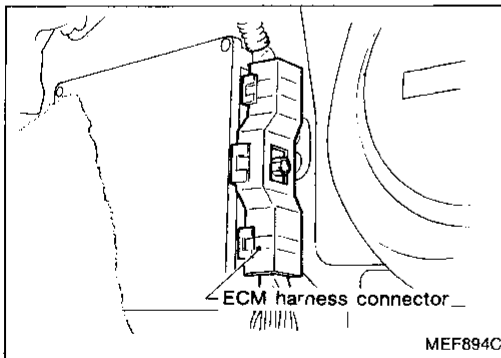
TROUBLE DIAGNOSES

Diagnostic Procedure 35

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

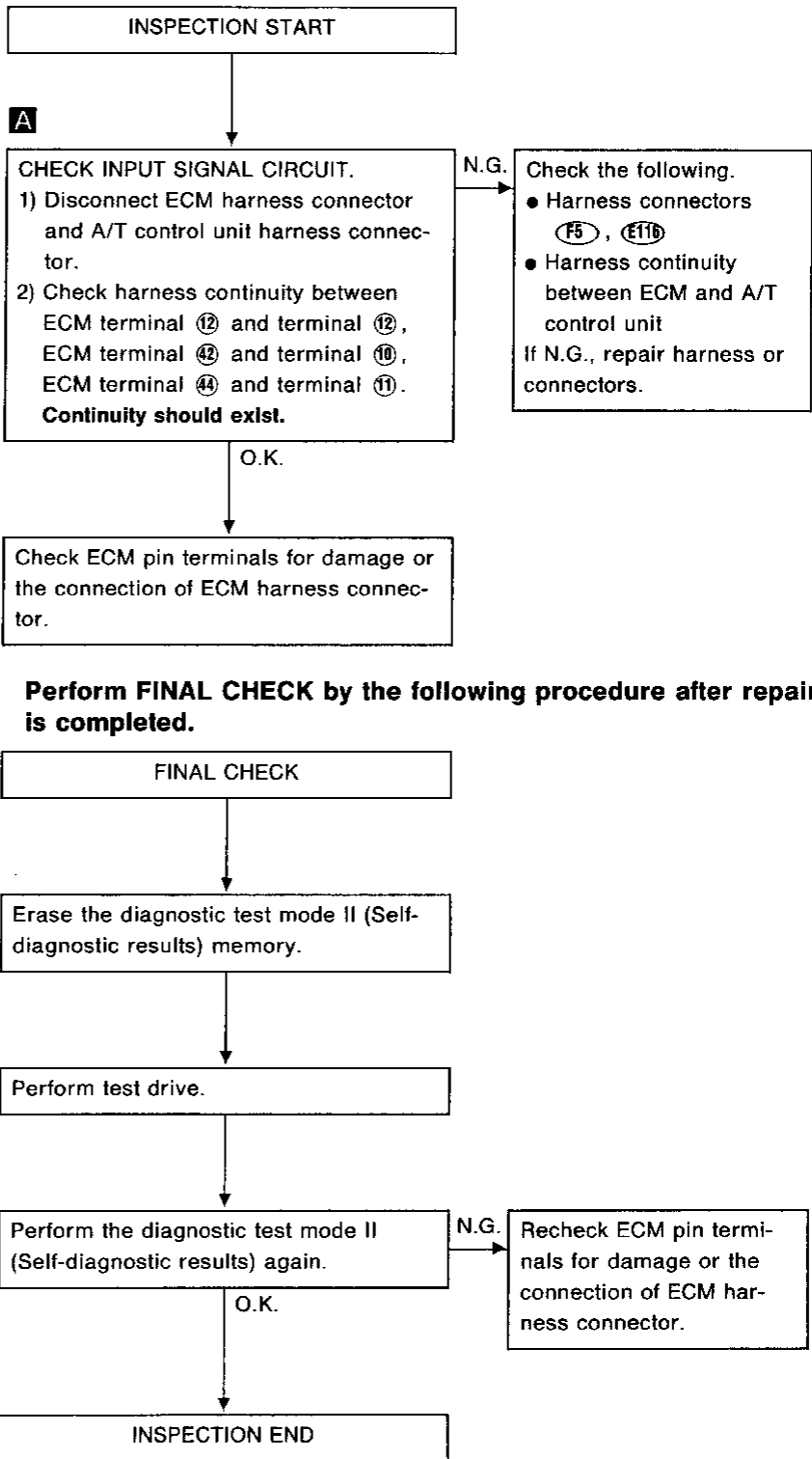
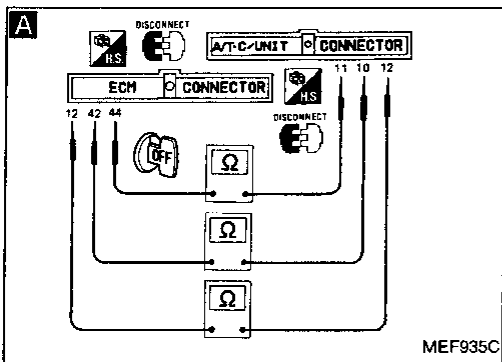


Harness layout



TROUBLE DIAGNOSES

Diagnostic Procedure 35 (Cont'd)



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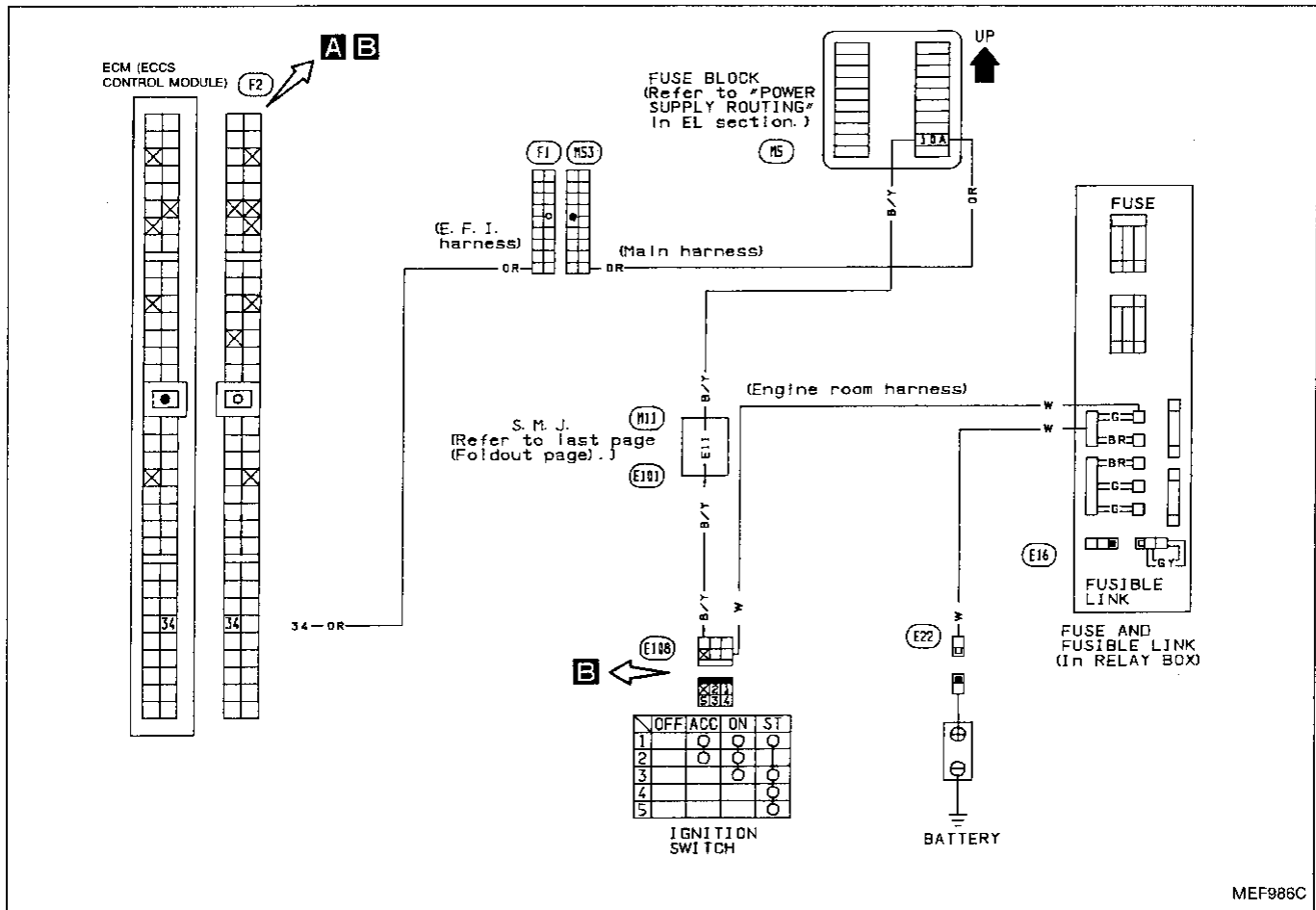
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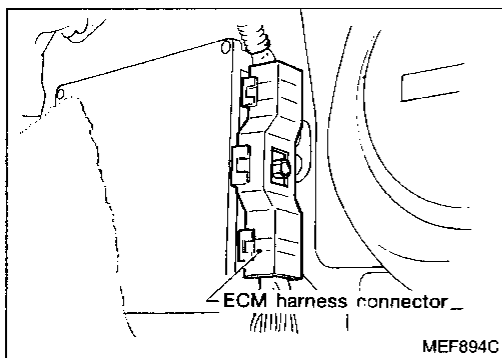
TROUBLE DIAGNOSES

Diagnostic Procedure 36

START SIGNAL (Not self-diagnostic item)



Harness layout



TROUBLE DIAGNOSES

Diagnostic Procedure 36 (Cont'd)

A

■ START SIGNAL CKT ■

1. CLOSE THROTTLE. SHIFT TO P OR N RANGE.
2. TOUCH START AND START ENGINE IMMEDIATELY.

NEXT START

SEF191L

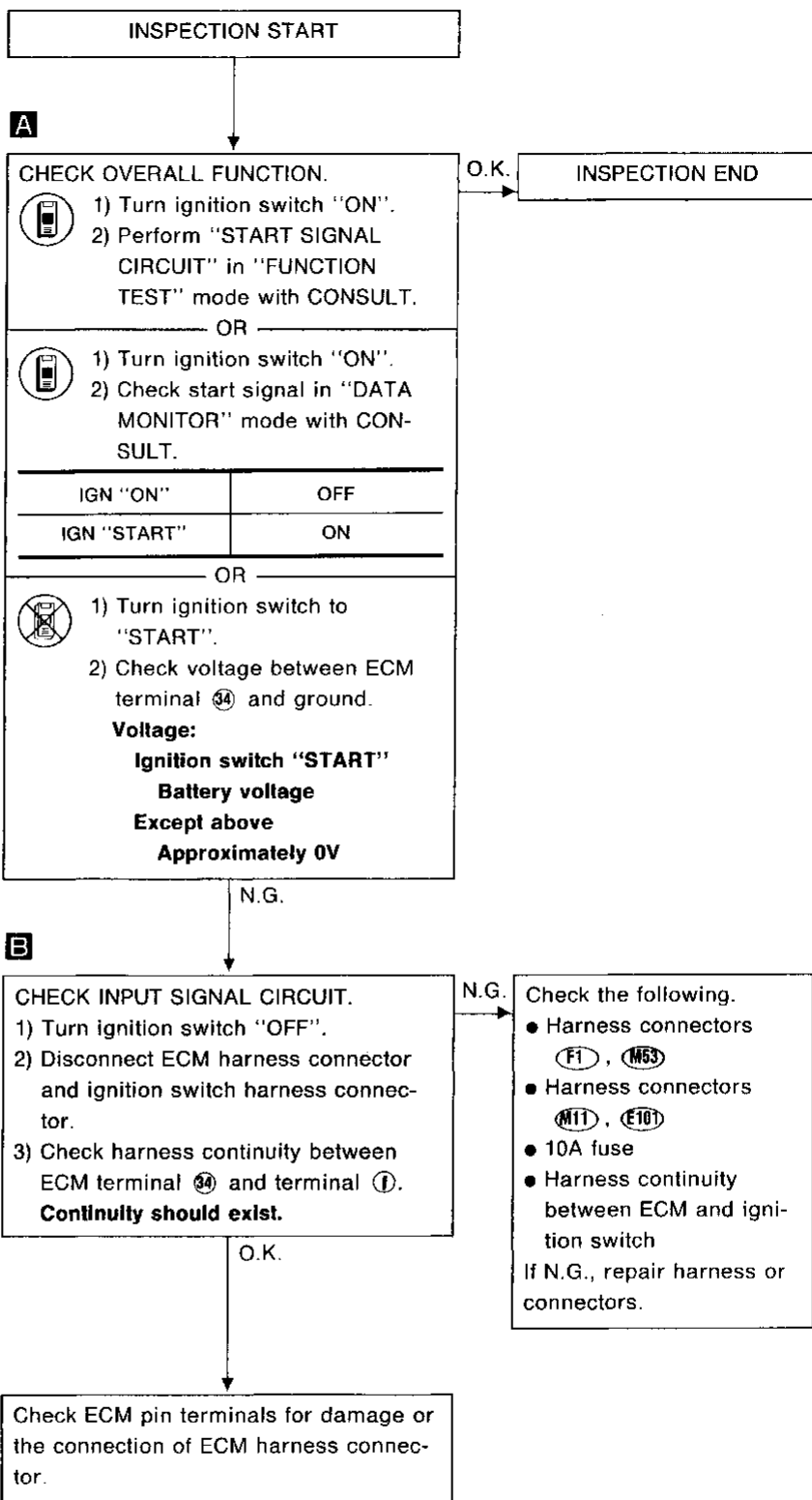
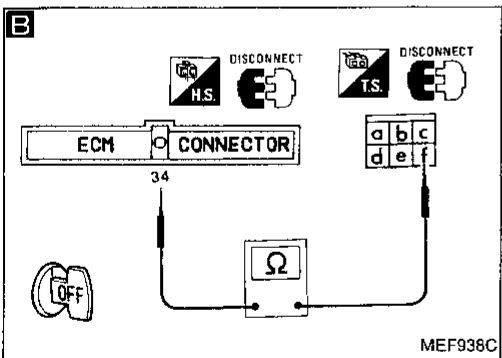
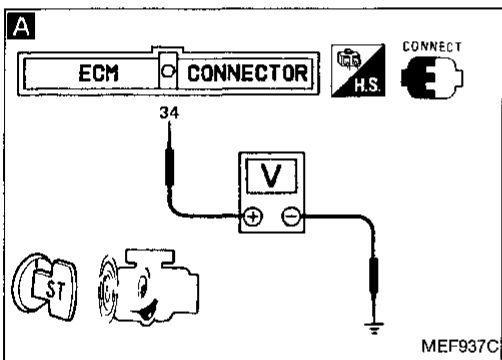
A

☆MONITOR ☆NO FAIL

START SIGNAL	OFF
CLOSED TH/POS	ON
AIR COND SIG	OFF
NEUT POSI SW	ON

RECORD

MEF936C



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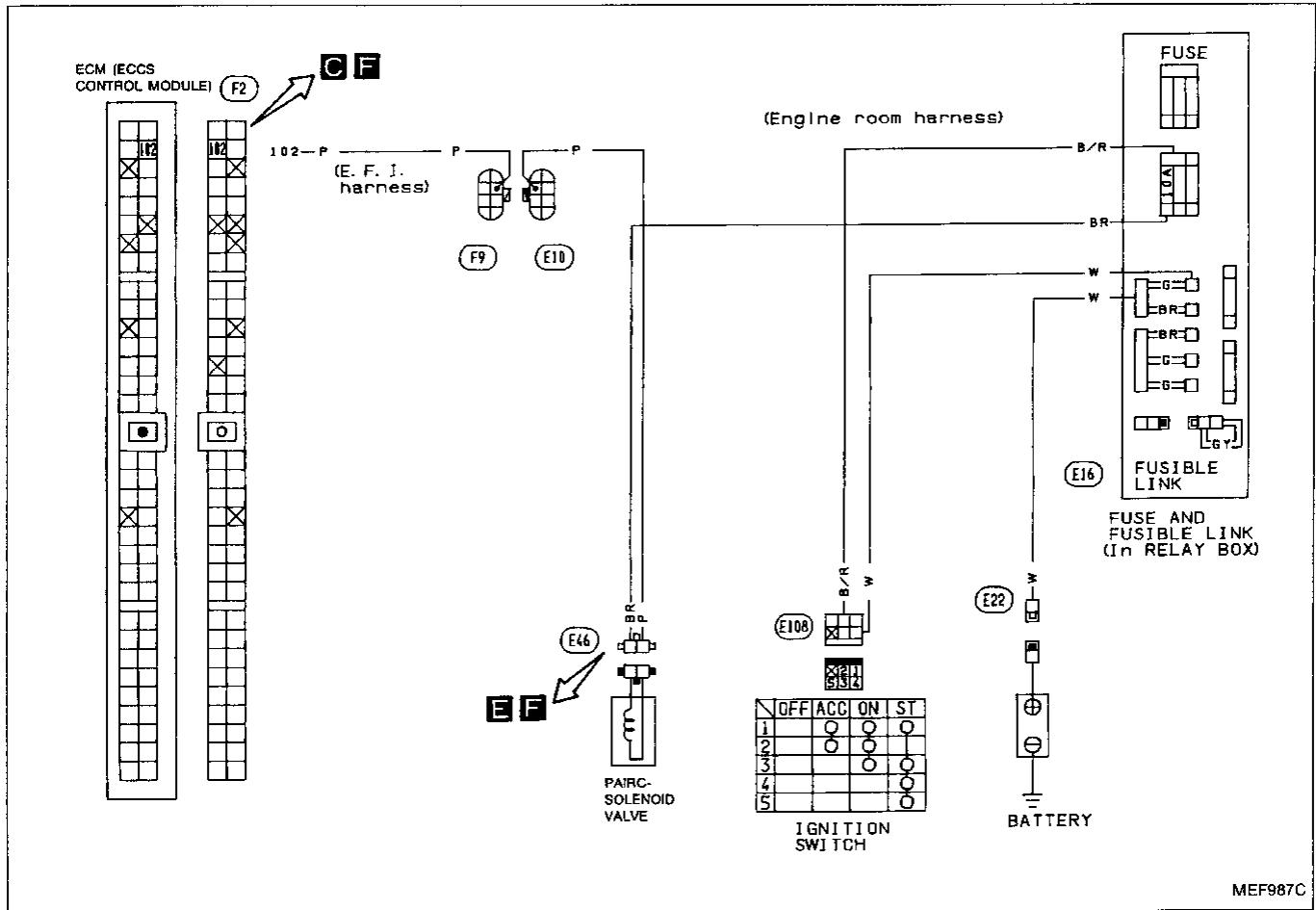
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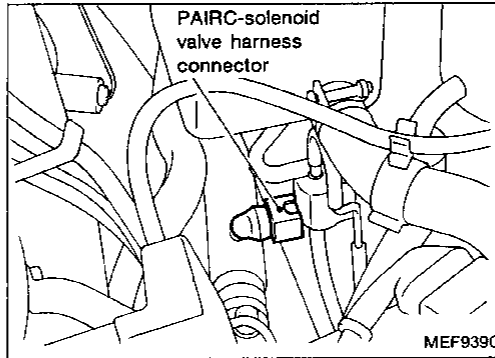
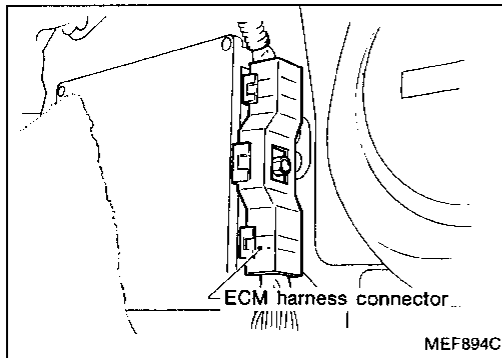
EL

Diagnostic Procedure 37

PAIR valve CONTROL (Not self-diagnostic item)

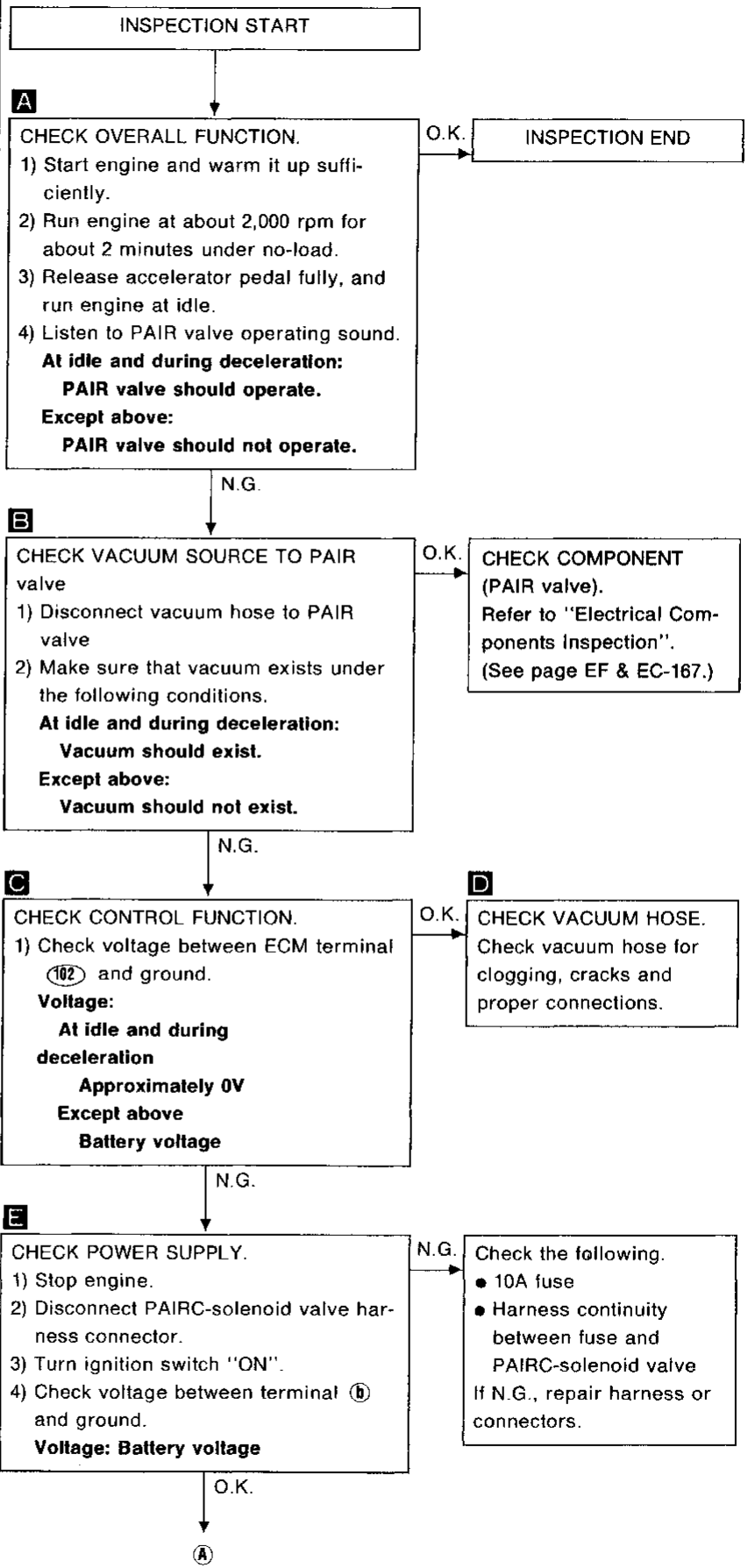
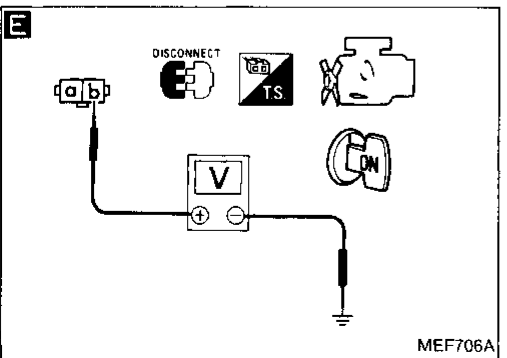
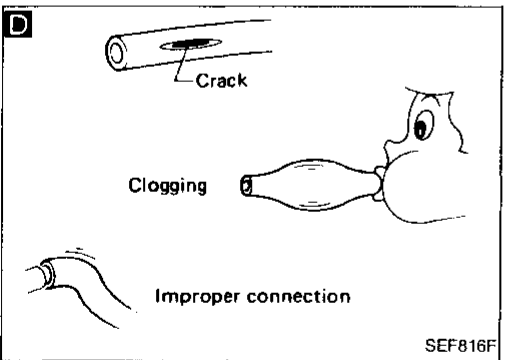
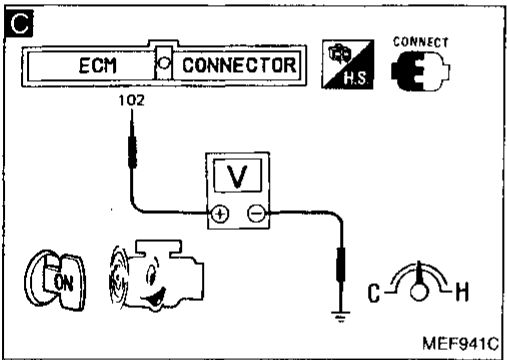
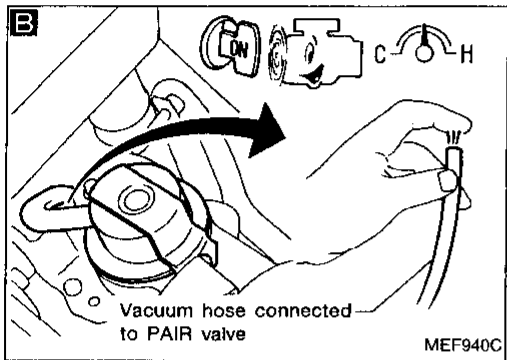
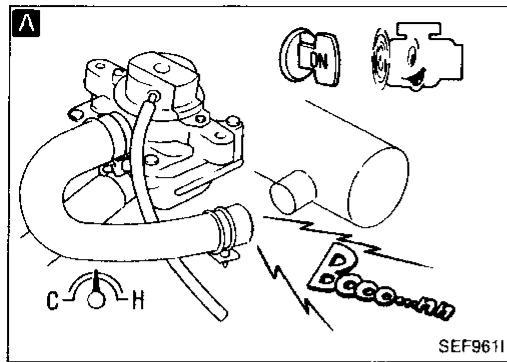


Harness layout



TROUBLE DIAGNOSES

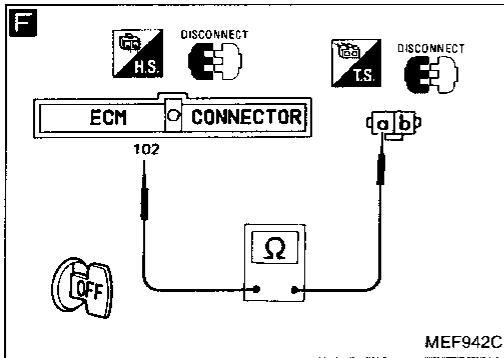
Diagnostic Procedure 37 (Cont'd)



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TROUBLE DIAGNOSES

Diagnostic Procedure 37 (Cont'd)



F

①

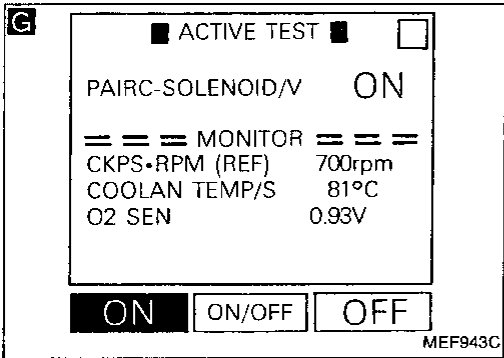
F

CHECK OUTPUT SIGNAL CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Disconnect ECM harness connector.
- 3) Check harness continuity between ECM terminal ⑩② and terminal ①.

Continuity should exist.

N.G. Repair harness or connectors.



G

CHECK COMPONENT (PAIRC-solenoid valve).

- 1) Reconnect ECM harness connector and PAIRC-solenoid valve harness connector.
- 2) Start engine.
- 3) Perform "PAIRC-SOLENOID/V TEST" in "ACTIVE TEST" mode with CONSULT.

OR

Refer to "Electrical Components Inspection".
(See page EF & EC-162.)

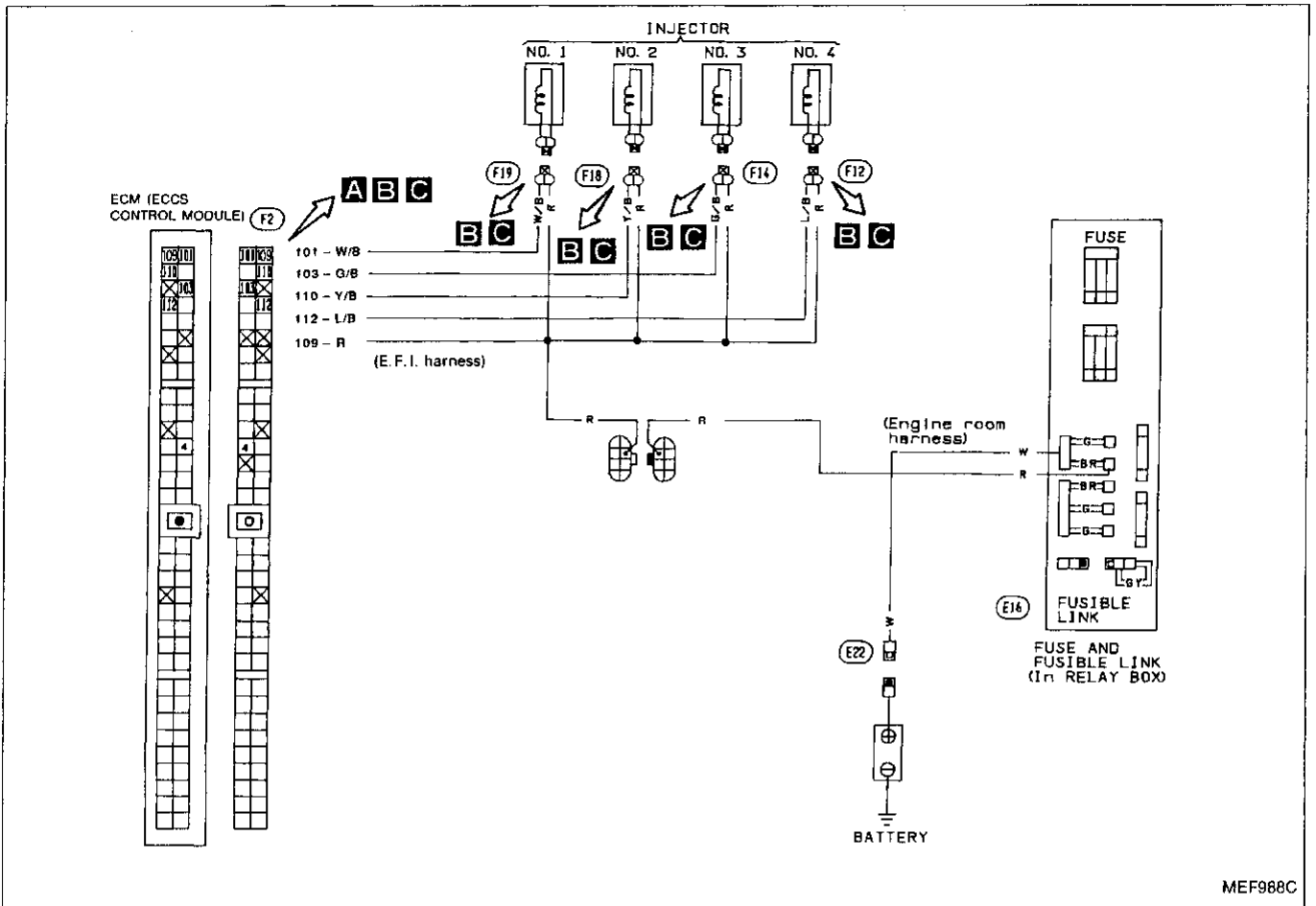
N.G. Replace PAIRC-solenoid valve.

O.K.

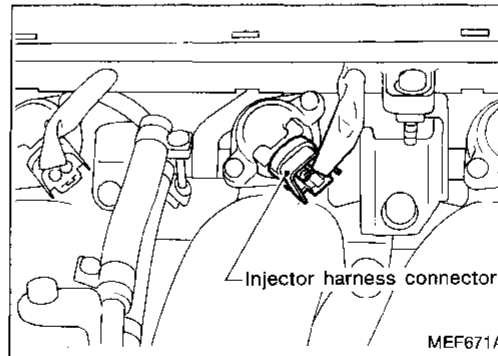
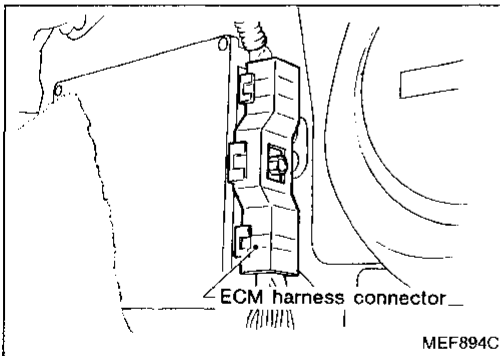
Check ECM pin terminals for damage or the connection of ECM harness connector.

Diagnostic Procedure 38

INJECTOR (Not self-diagnostic item)



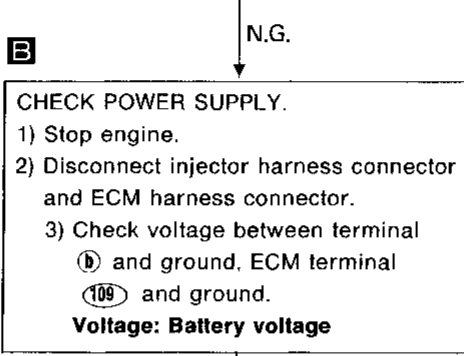
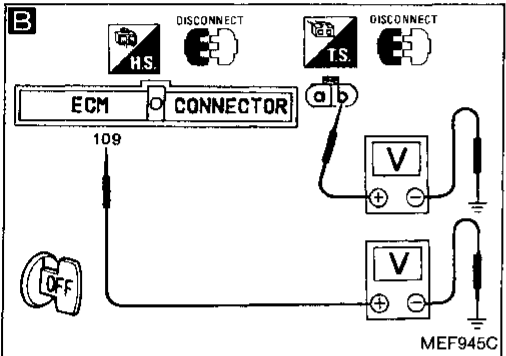
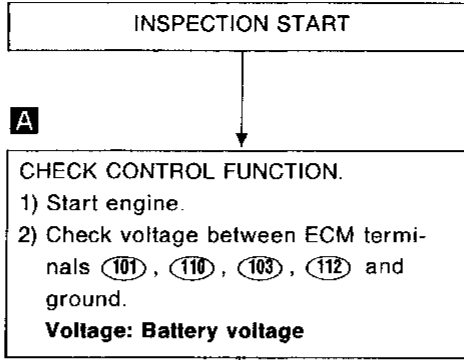
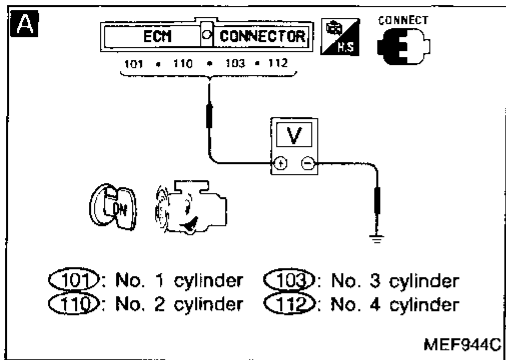
Harness layout



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TROUBLE DIAGNOSES

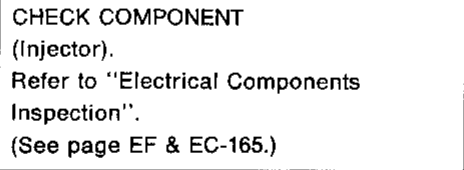
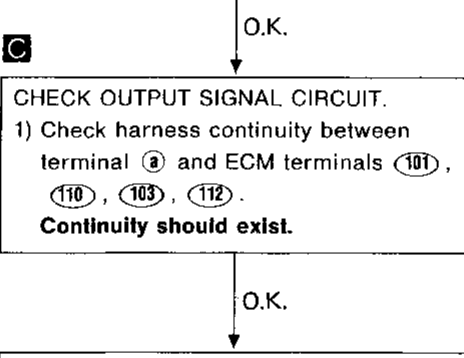
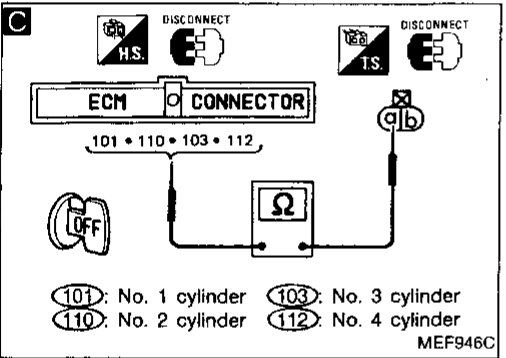
Diagnostic Procedure 38 (Cont'd)



Check the following.

- Harness connectors (F8), (E9)
- "BR" fusible link
- Harness continuity between ECM, injector and battery

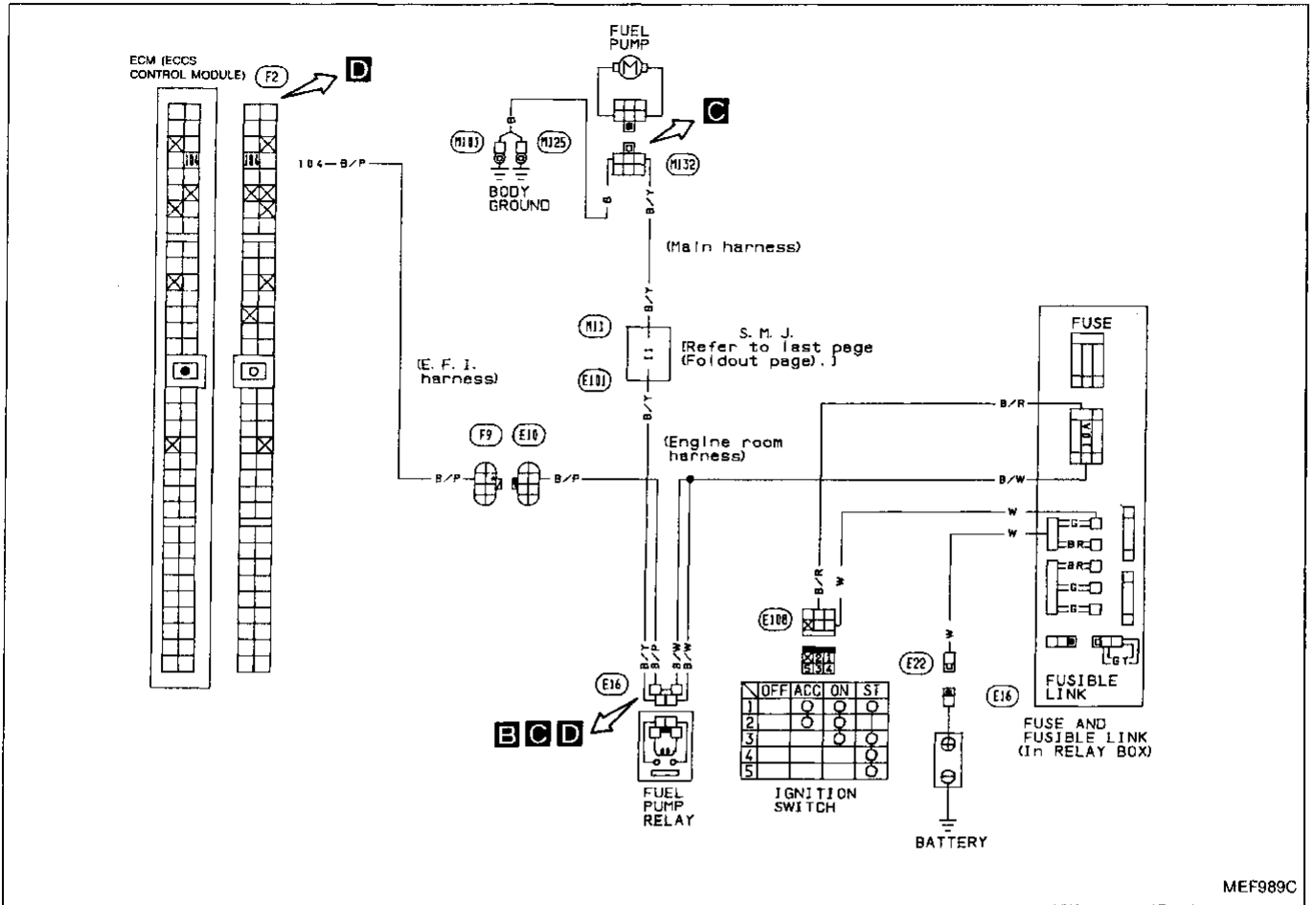
If N.G., repair harness or connectors.



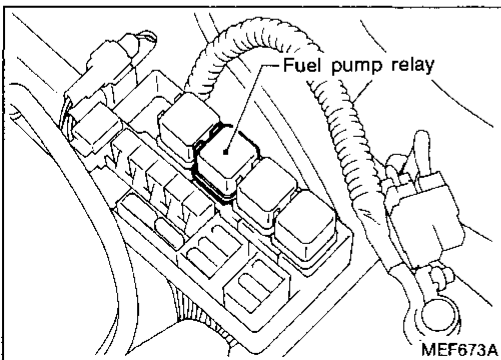
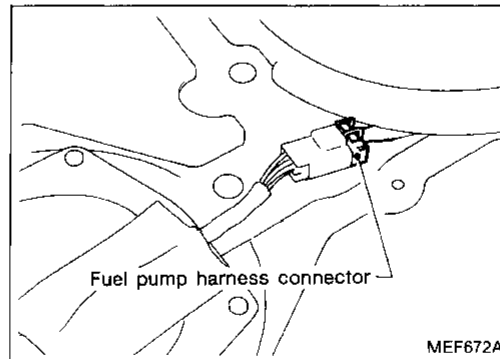
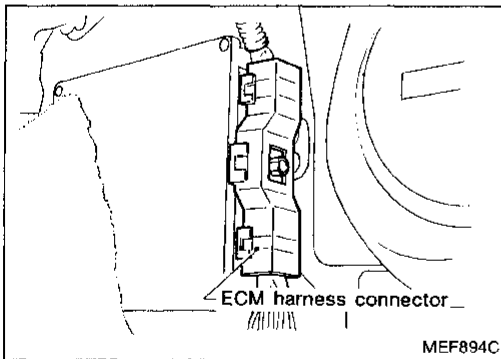
Check ECM pin terminals for damage or the connection of ECM harness connector.

Diagnostic Procedure 39

FUEL PUMP (Not self-diagnostic item)



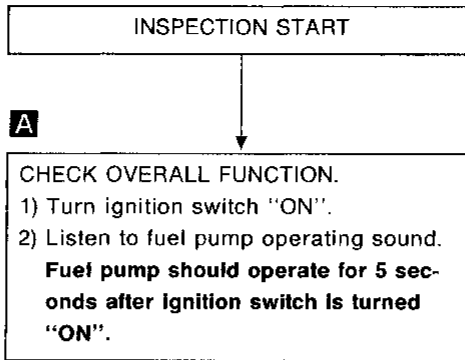
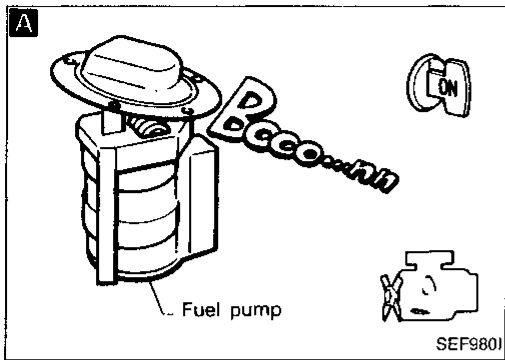
Harness layout



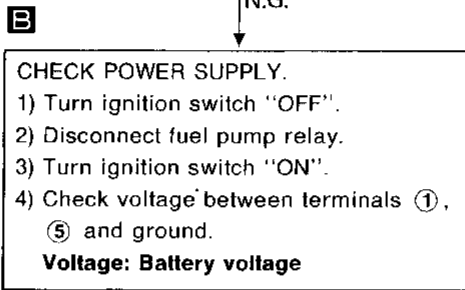
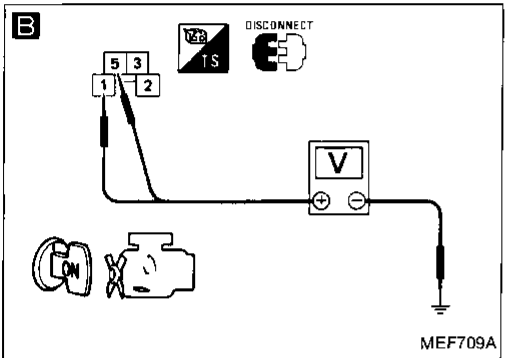
GI
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TROUBLE DIAGNOSES

Diagnostic Procedure 39 (Cont'd)



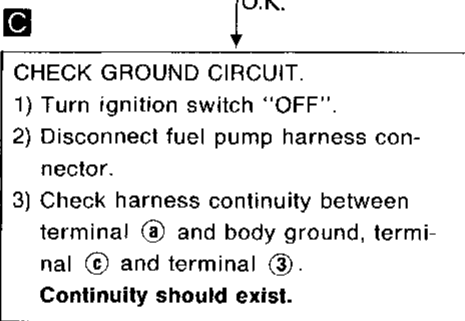
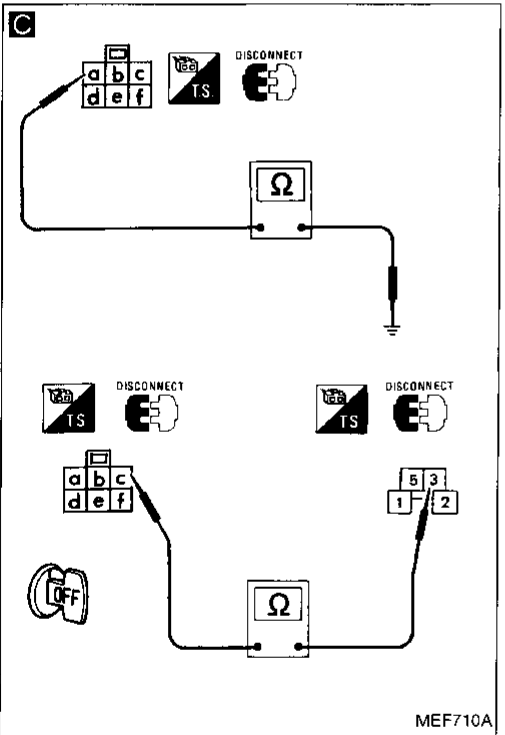
O.K. → INSPECTION END



N.G. → Check the following.

- 10A fuse
- Harness continuity between fuse and fuel pump relay

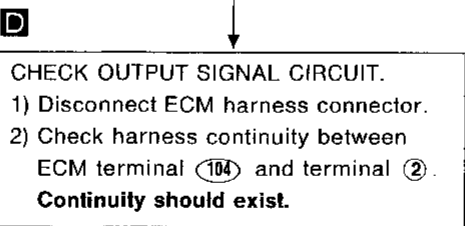
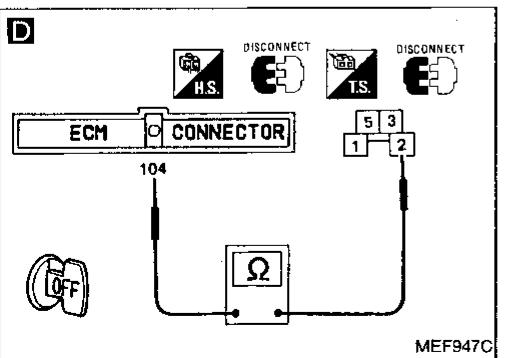
If N.G., repair harness or connectors.



N.G. → Check the following.

- Harness connectors (M11), (E10)
- Harness continuity between fuel pump and body ground
- Harness continuity between fuel pump and fuel pump relay

If N.G., repair harness or connectors.



N.G. → Check the following.

- Harness connectors (F9), (E10)
- Harness continuity between ECM and fuel pump relay

If N.G., repair harness or connectors.

O.K. → O.K. → **A**

TROUBLE DIAGNOSES

Diagnostic Procedure 39 (Cont'd)

E

■ FUEL PUMP CIRCUIT ■

PINCH FUEL FEED HOSE WITH FINGERS IS THERE ANY PRESSURE PULSATION ON THE FUEL FEED HOSE?

OR

DOES THE FUEL PUMP RELAY MAKE AN OPERATING SOUND EVERY 3 SECONDS?

NEXT NO YES

SEF633L

E

■ ACTIVE TEST ■

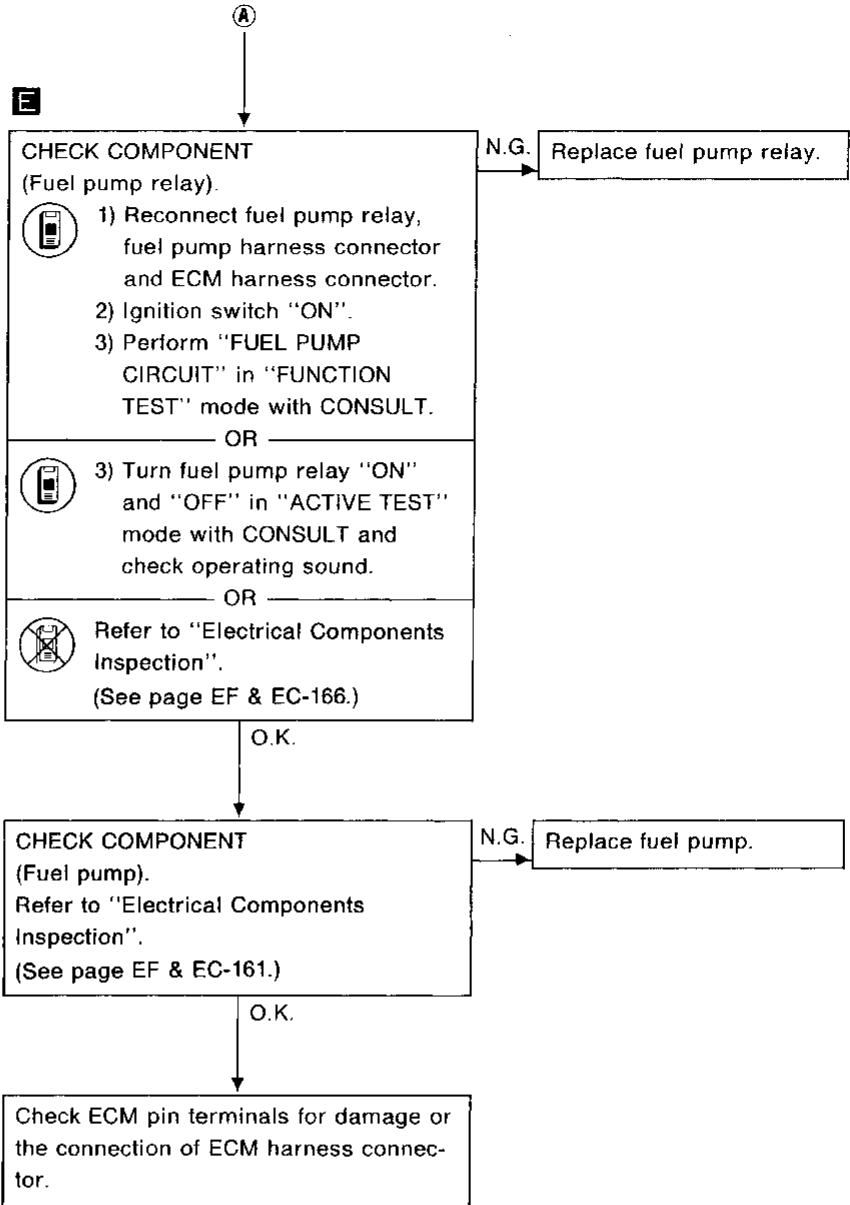
FUEL PUMP RELAY ON

=== MONITOR ===

CKPS•RPM (REF) 700rpm

ON ON/OFF OFF

MEF948C

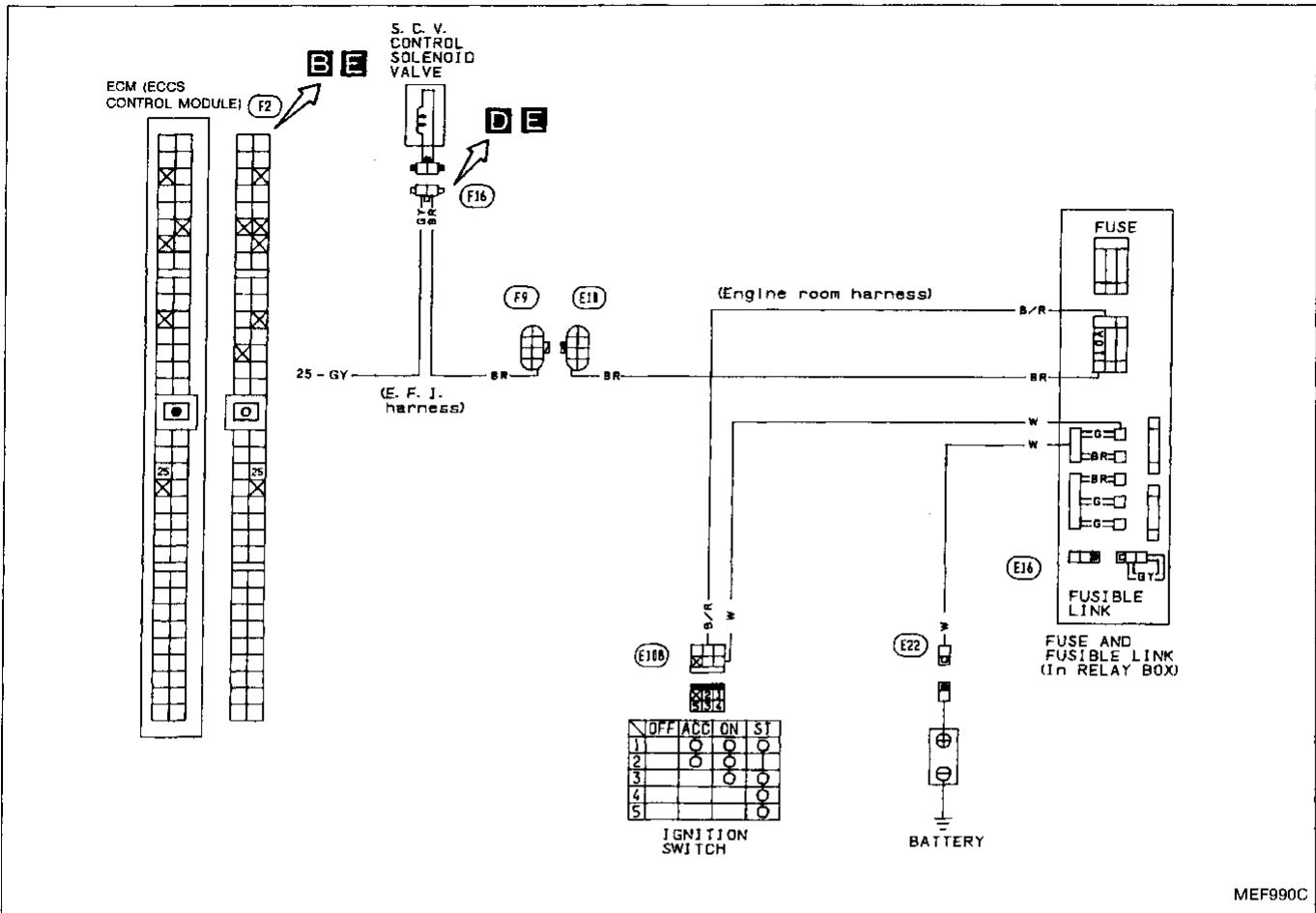


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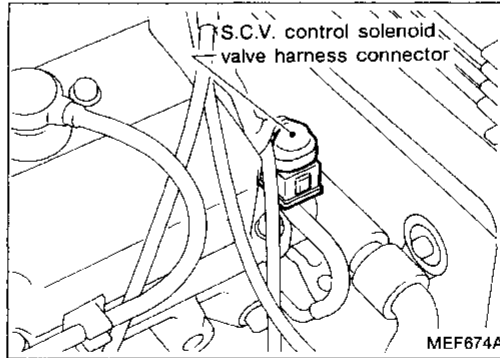
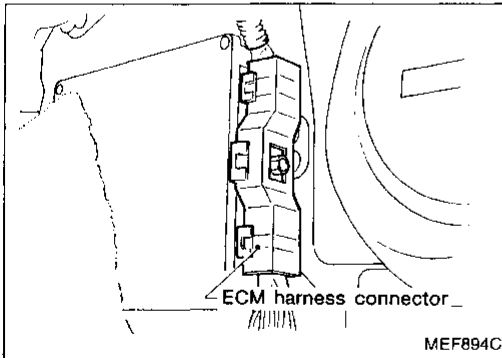
TROUBLE DIAGNOSES

Diagnostic Procedure 40

S.C.V. CONTROL (Not self-diagnostic item)

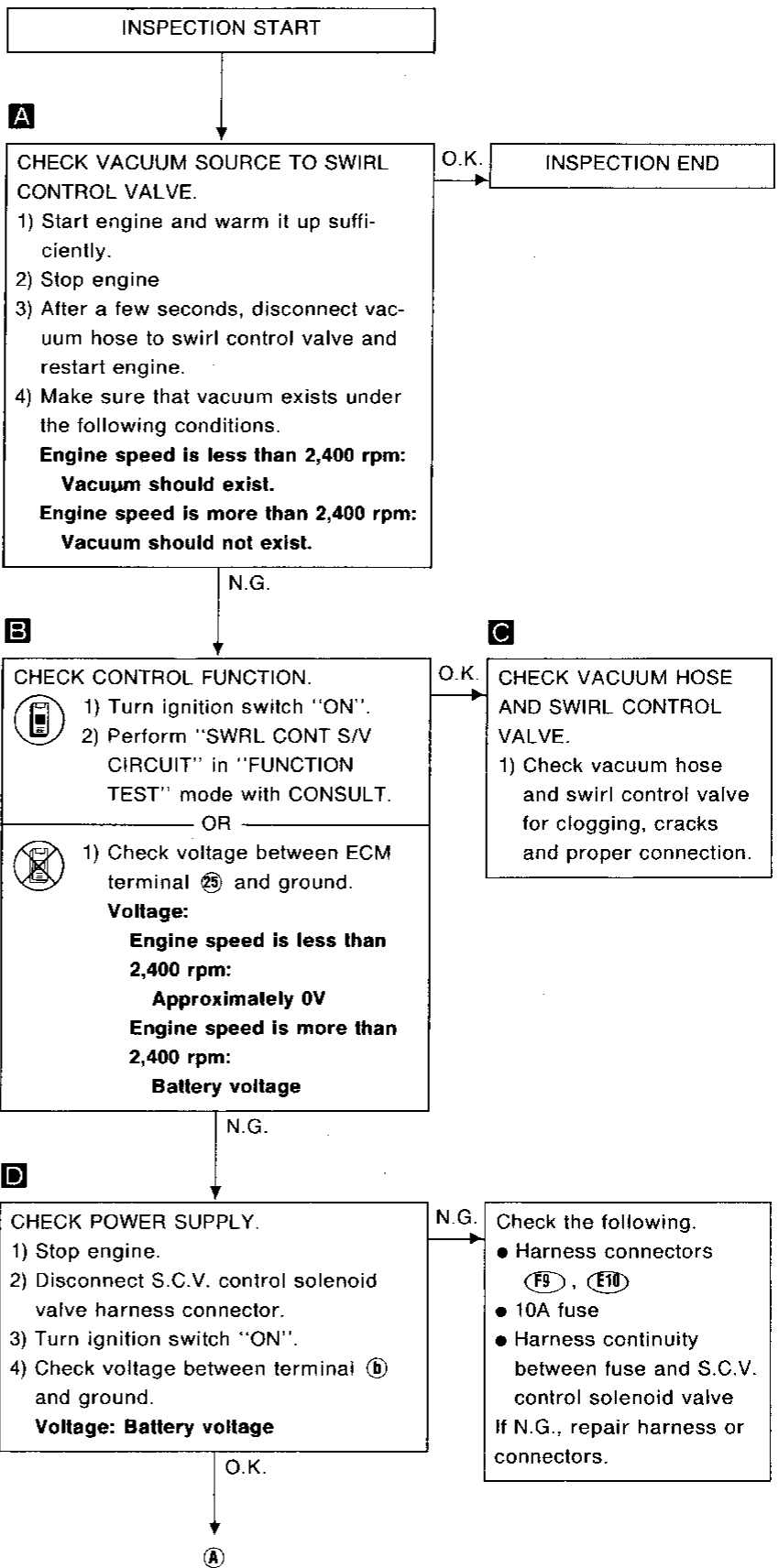
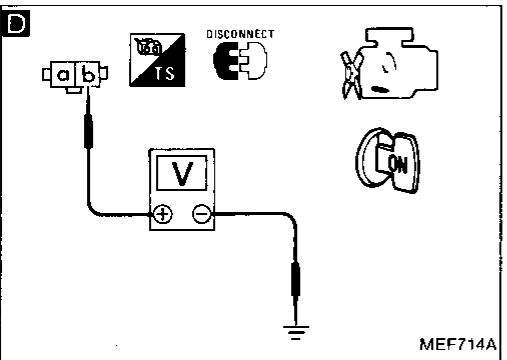
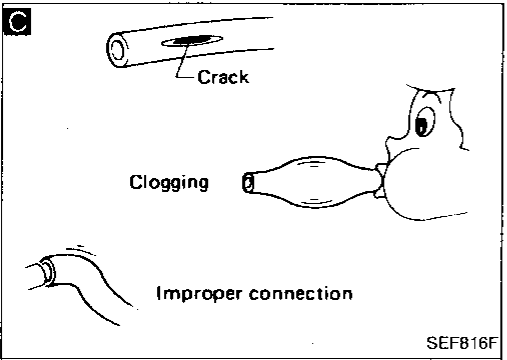
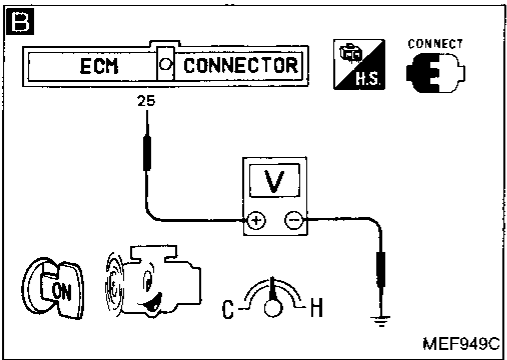
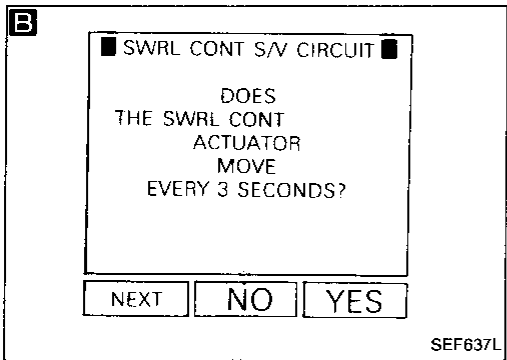
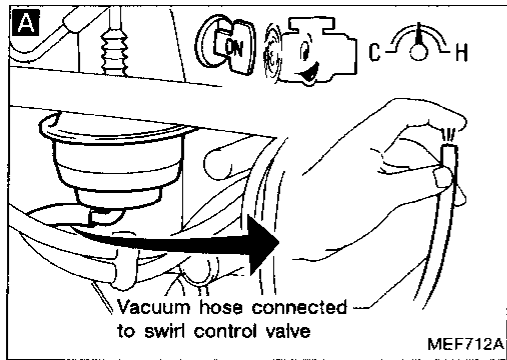


Harness layout



TROUBLE DIAGNOSES

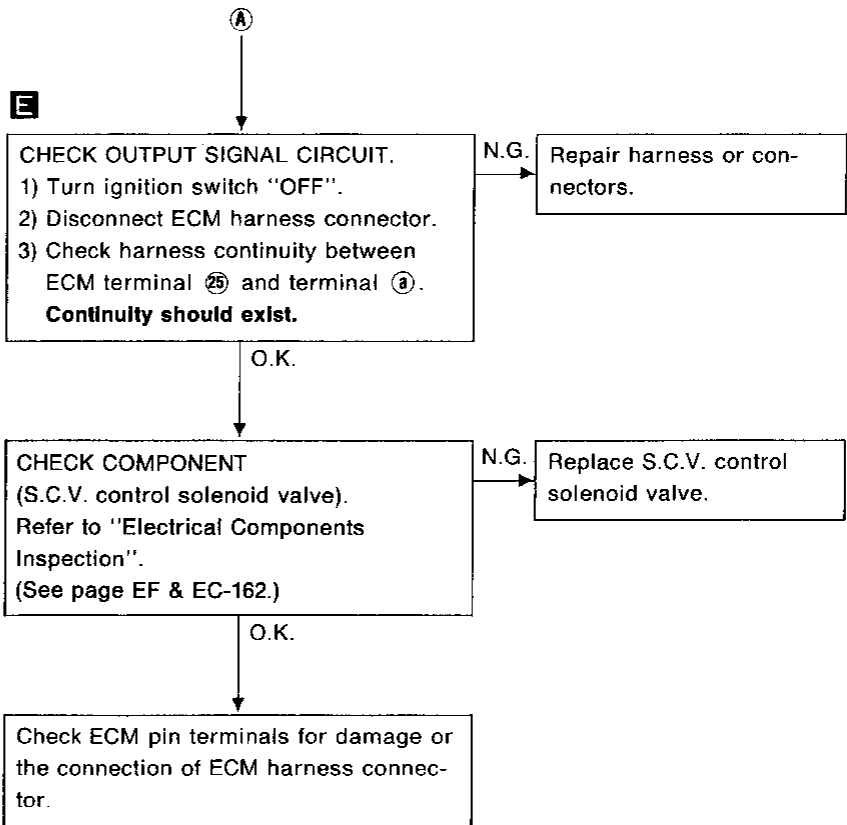
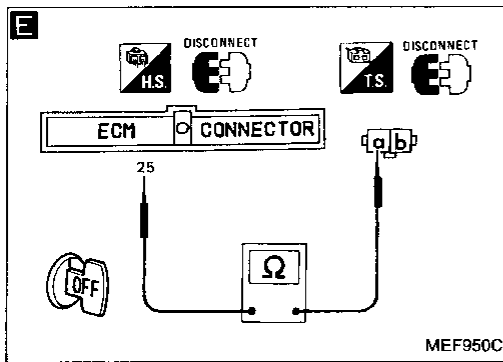
Diagnostic Procedure 40 (Cont'd)



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TROUBLE DIAGNOSES

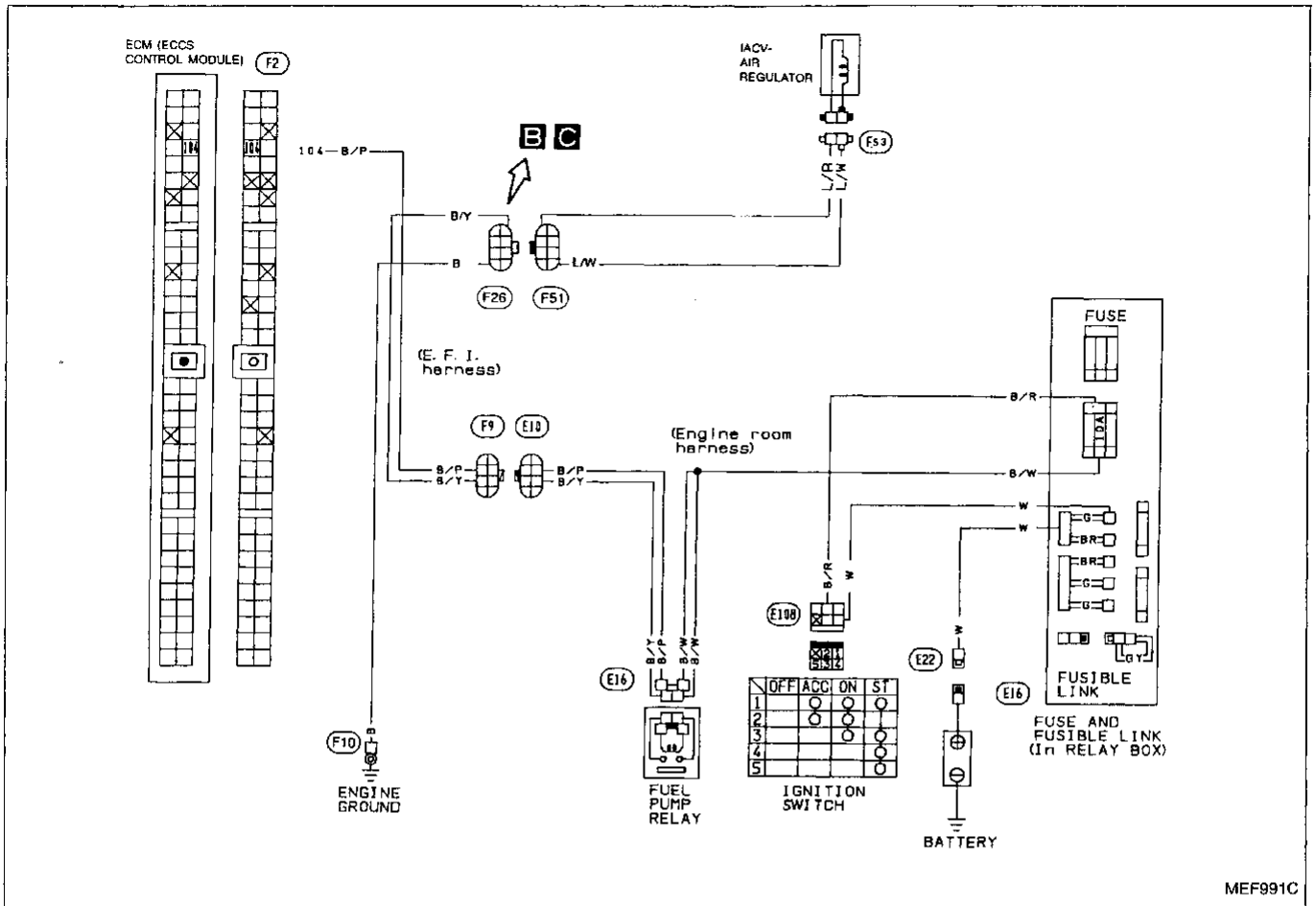
Diagnostic Procedure 40 (Cont'd)



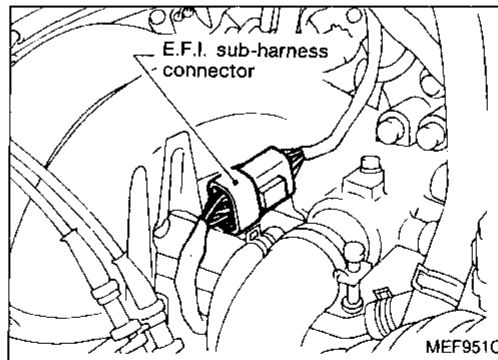
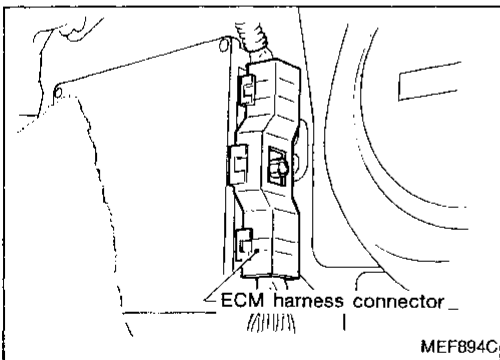
TROUBLE DIAGNOSES

Diagnostic Procedure 41

IACV-AIR REGULATOR (Not self-diagnostic item)



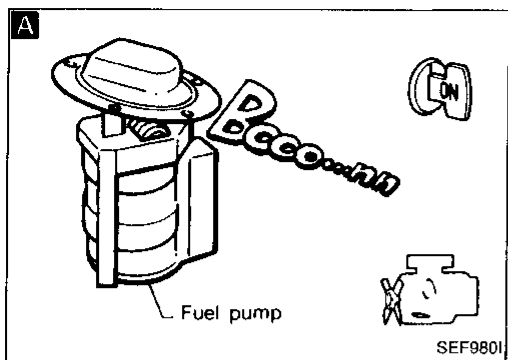
Harness layout



GI
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TROUBLE DIAGNOSES

Diagnostic Procedure 41 (Cont'd)



INSPECTION START

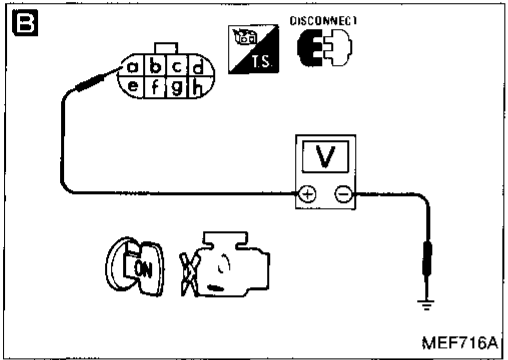
A

CHECK CONTROL 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".

N.G. Check fuel pump control circuit.
(See page EF & EC-135.)



O.K.

B

CHECK POWER SUPPLY.

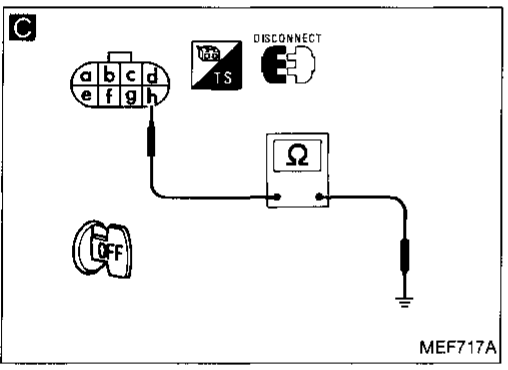
- 1) Turn ignition switch "OFF".
- 2) Disconnect IACV-air regulator sub-harness connector (F51).
- 3) Turn ignition switch "ON".
- 4) Check voltage between terminal (a) and ground.

Battery voltage should exist for 5 seconds after ignition switch is turned "ON".

N.G. Check the following.

- Harness connectors (F9), (E10)
- Harness continuity between IACV-air regulator sub-harness connector and fuel pump relay

If N.G., repair harness or connectors.



O.K.

C

CHECK GROUND CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Check harness continuity between terminal (b) and body ground.

Continuity should exist.

N.G. Repair harness or connectors.

O.K.

CHECK COMPONENT (IACV-air regulator). Refer to "Electrical Components Inspection". (See page EF & EC-167.)

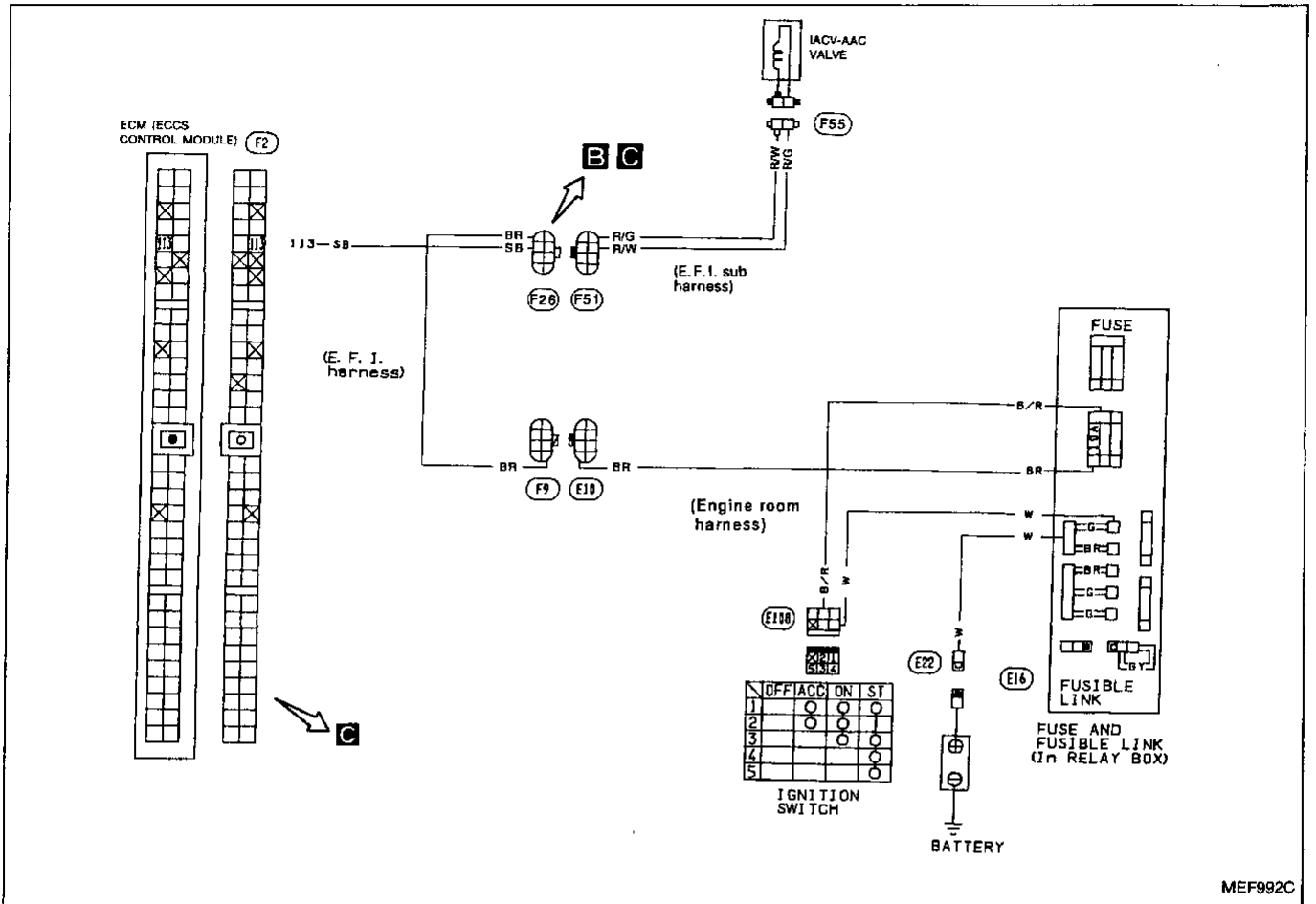
N.G. Replace IACV-air regulator.

INSPECTION END

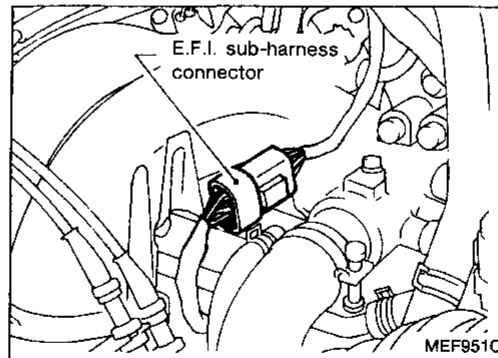
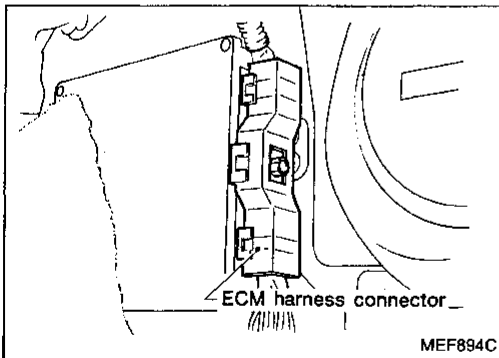
TROUBLE DIAGNOSES

Diagnostic Procedure 42

IACV-AAC VALVE (Not self-diagnostic item)

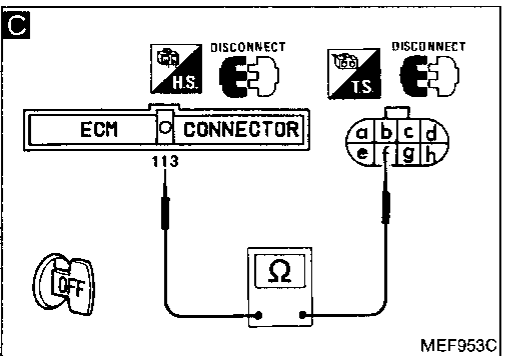
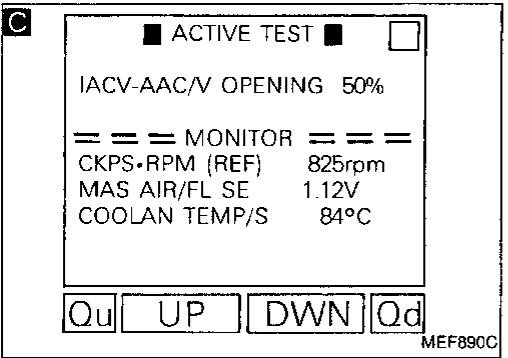
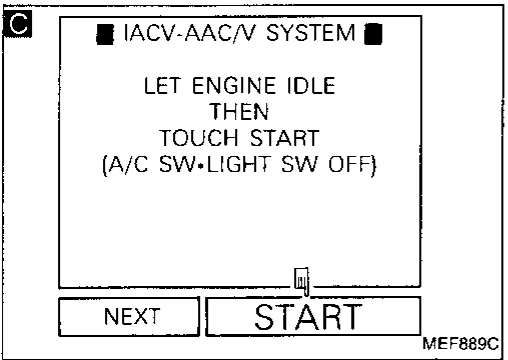
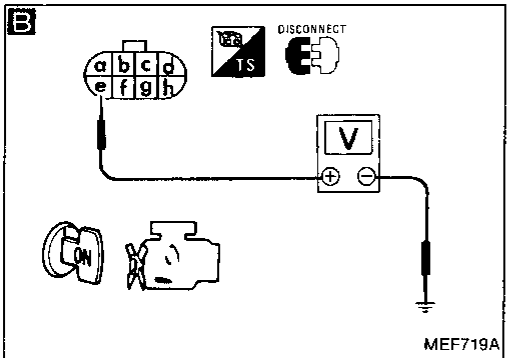
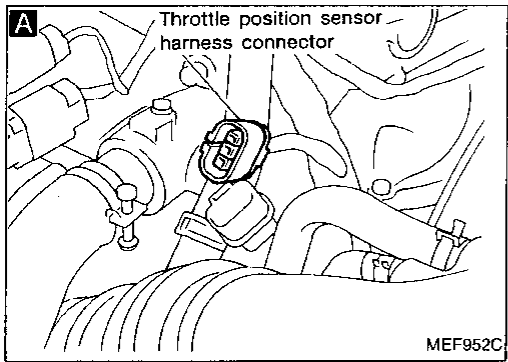


Harness layout



TROUBLE DIAGNOSES

Diagnostic Procedure 42 (Cont'd)



INSPECTION START

A

CHECK OVERALL FUNCTION.

- 1) Start engine and warm it up sufficiently.
- 2) Check idle speed.
700 ± 50 rpm
If N.G., adjust idle speed.
- 3) Perform the diagnostic test mode II (Self-diagnostic results).
Make sure that diagnostic trouble code No. 43 is not displayed.
Make sure that throttle position sensor is not in "fail-safe" state.
- 4) Disconnect throttle position sensor harness connector.
- 5) Make sure that idle speed drops.

Drops

INSPECTION END

B

CHECK POWER SUPPLY.

- 1) Stop engine.
- 2) Disconnect IACV-AAC valve sub-harness connector (F51).
- 3) Turn ignition switch "ON".
- 4) Check voltage between terminal ⑥ and ground.
Voltage: Battery voltage

Does not drop

N.G.

Check the following.

- Harness connectors (F9), (E10)
- 10A fuse
- Harness continuity between IACV-AAC valve sub-harness connector and fuse

If N.G., repair harness or connectors.

C

CHECK OUTPUT SIGNAL CIRCUIT.

- 1) Perform "IACV-AAC/V SYSTEM" in "FUNCTION TEST" mode with CONSULT.
— OR —
- 1) Reconnect throttle position sensor harness connector and IACV-AAC valve sub-harness connector.
- 2) Perform "IACV-AAC/V OPENING" in "ACTIVE TEST" mode with CONSULT.
— OR —
- 1) Turn ignition switch "OFF".
- 2) Disconnect ECM harness connector.
- 3) Check harness continuity between ECM terminal (113) and terminal ①.
Continuity should exist.

N.G.

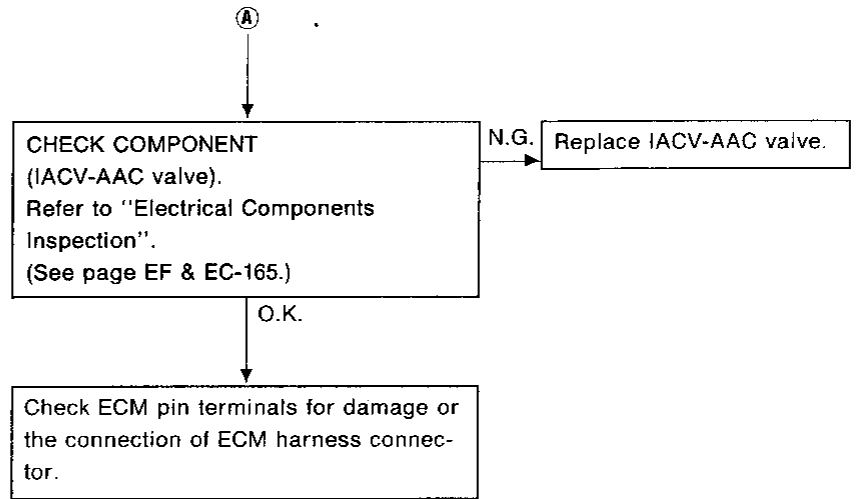
Repair harness or connectors.

O.K.

A

TROUBLE DIAGNOSES

Diagnostic Procedure 42 (Cont'd)



GI

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EM

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**EF &
EC**

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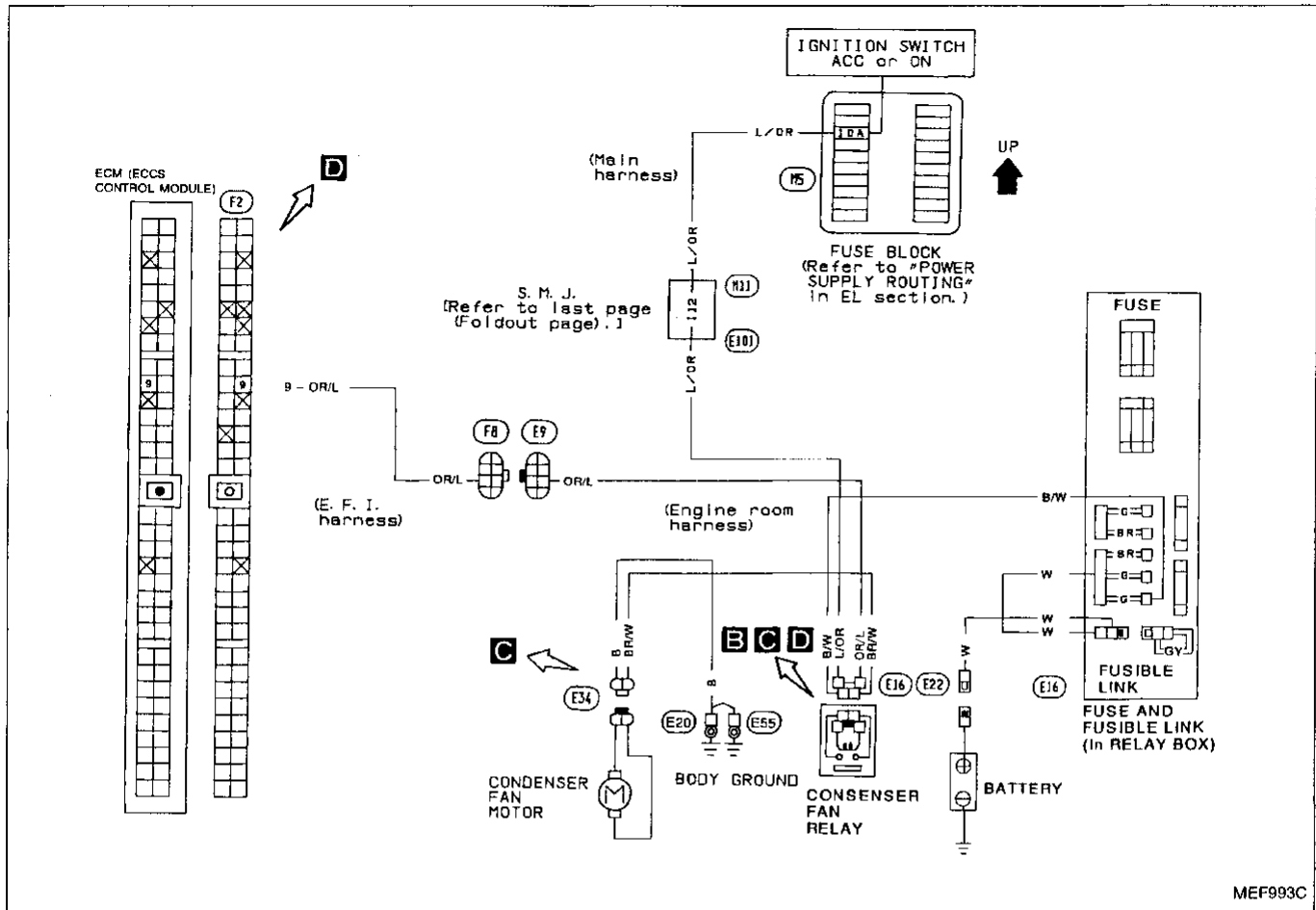
HA

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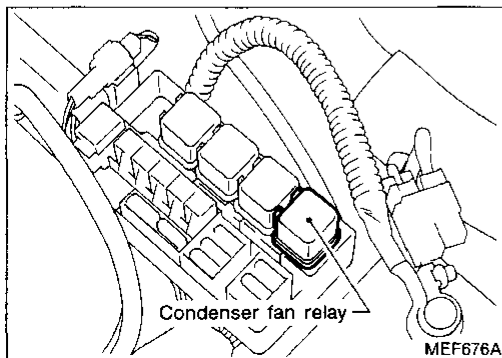
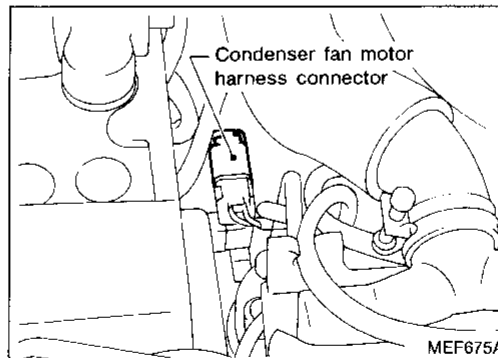
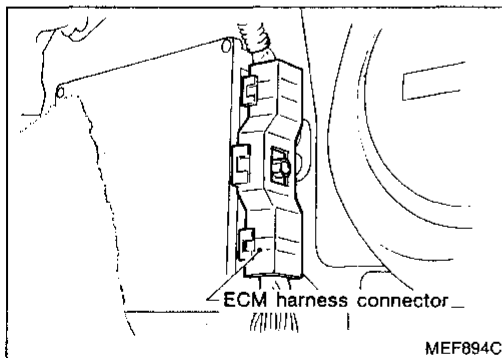
TROUBLE DIAGNOSES

Diagnostic Procedure 43

CONDENSER FAN CONTROL (Not self-diagnostic item)

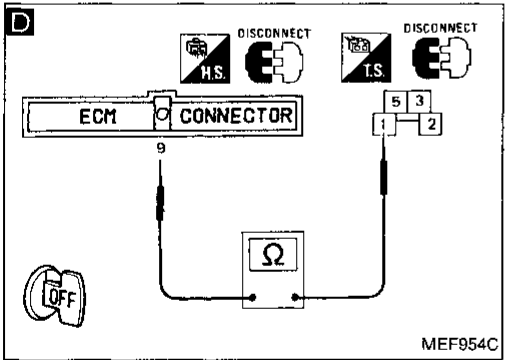
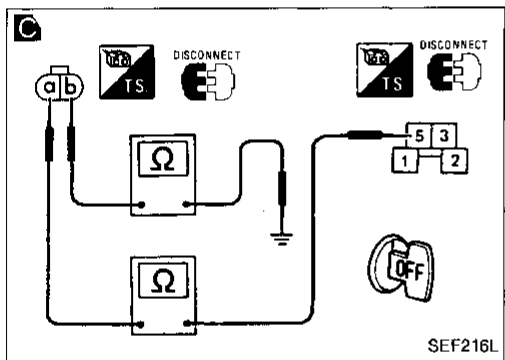
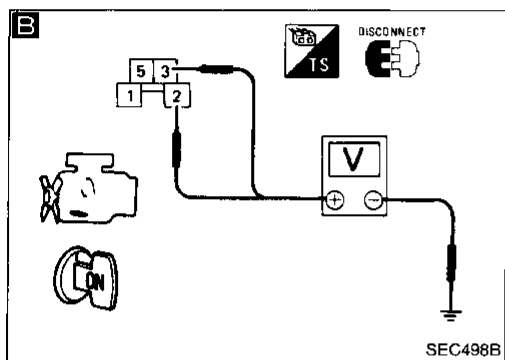
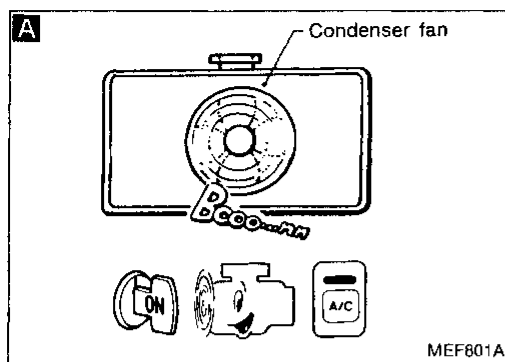


Harness layout



TROUBLE DIAGNOSES

Diagnostic Procedure 43 (Cont'd)



■ RADIATOR FAN CIRCUIT ■

DOES
RADIATOR FAN
ROTATE AND STOP
EVERY 3 SECONDS ?

SEF624L

INSPECTION START

A

CHECK CONDENSER FAN OPERATION.

- 1) Start engine.
- 2) Set A/C 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 condenser fan operates.

O.K. → INSPECTION END

N.G.

B

CHECK POWER SUPPLY.

- 1) Turn air conditioner switch "OFF".
- 2) Turn blower fan switch "OFF".
- 3) Stop engine.
- 4) Disconnect condenser fan relay.
- 5) Turn ignition switch "ON".
- 6) Check voltage between terminals ②, ③ and ground.

Voltage: Battery voltage

N.G. →

Check the following.

- Harness connectors
- "GY" fusible link
- "G" fusible link
- 10A fuse
- Harness continuity between battery and condenser fan relay
- Harness continuity between fuse and condenser fan relay

If N.G., repair harness or connectors.

O.K.

C

CHECK GROUND CIRCUIT.

- 1) Turn ignition switch "OFF".
- 2) Disconnect condenser fan motor harness connector.
- 3) Check harness continuity between terminal ① and terminal ⑤, terminal ⑥ and body ground.

Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

D

CHECK OUTPUT SIGNAL CIRCUIT.

- 1) Disconnect ECM harness connector.
- 2) Check harness continuity between ECM terminal ⑨ and terminal ①.

Continuity should exist.

N.G. →

Check the following.

- Harness connectors
- Harness continuity between ECM and condenser fan relay

If N.G., repair harness or connectors.

A

GI

MA

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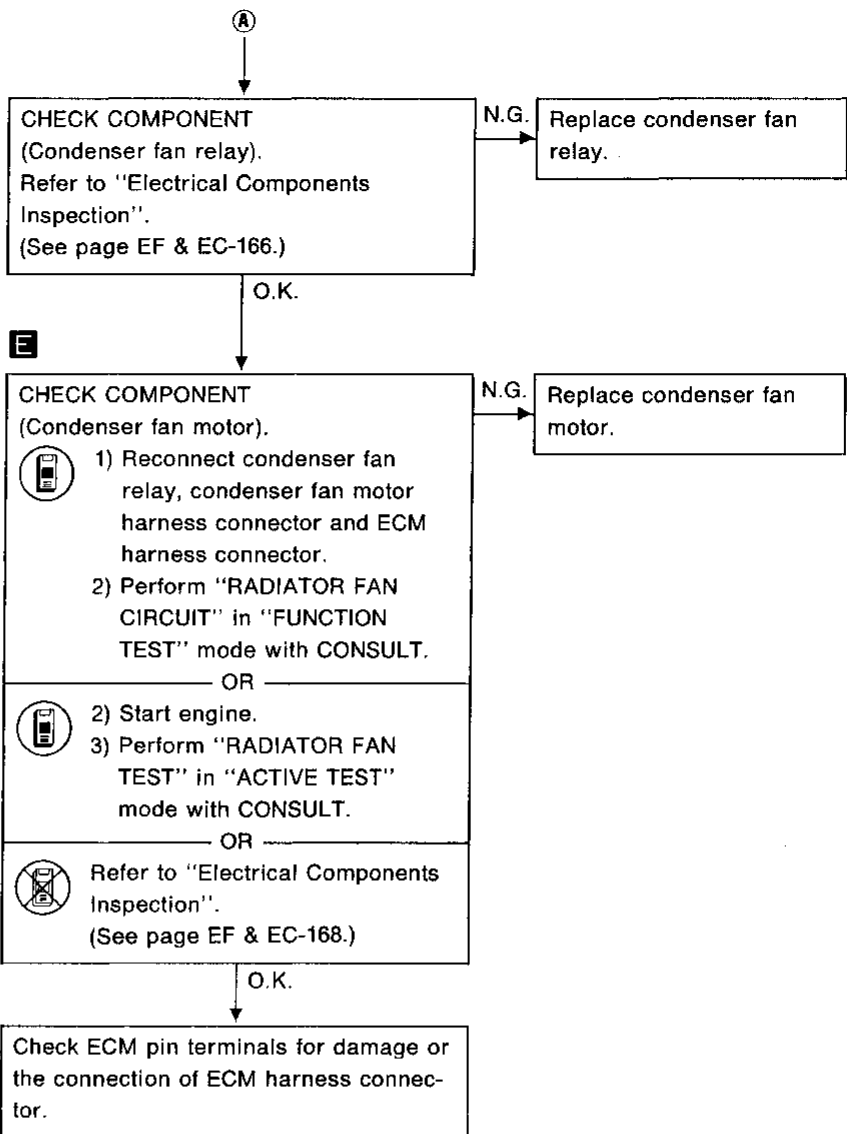
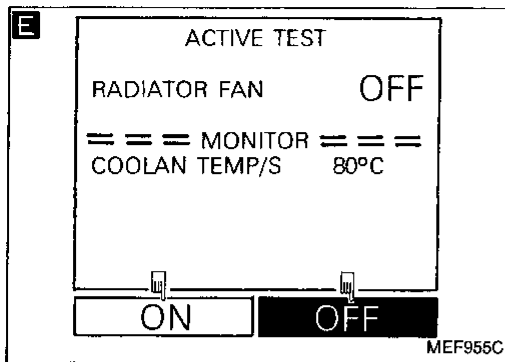
BF

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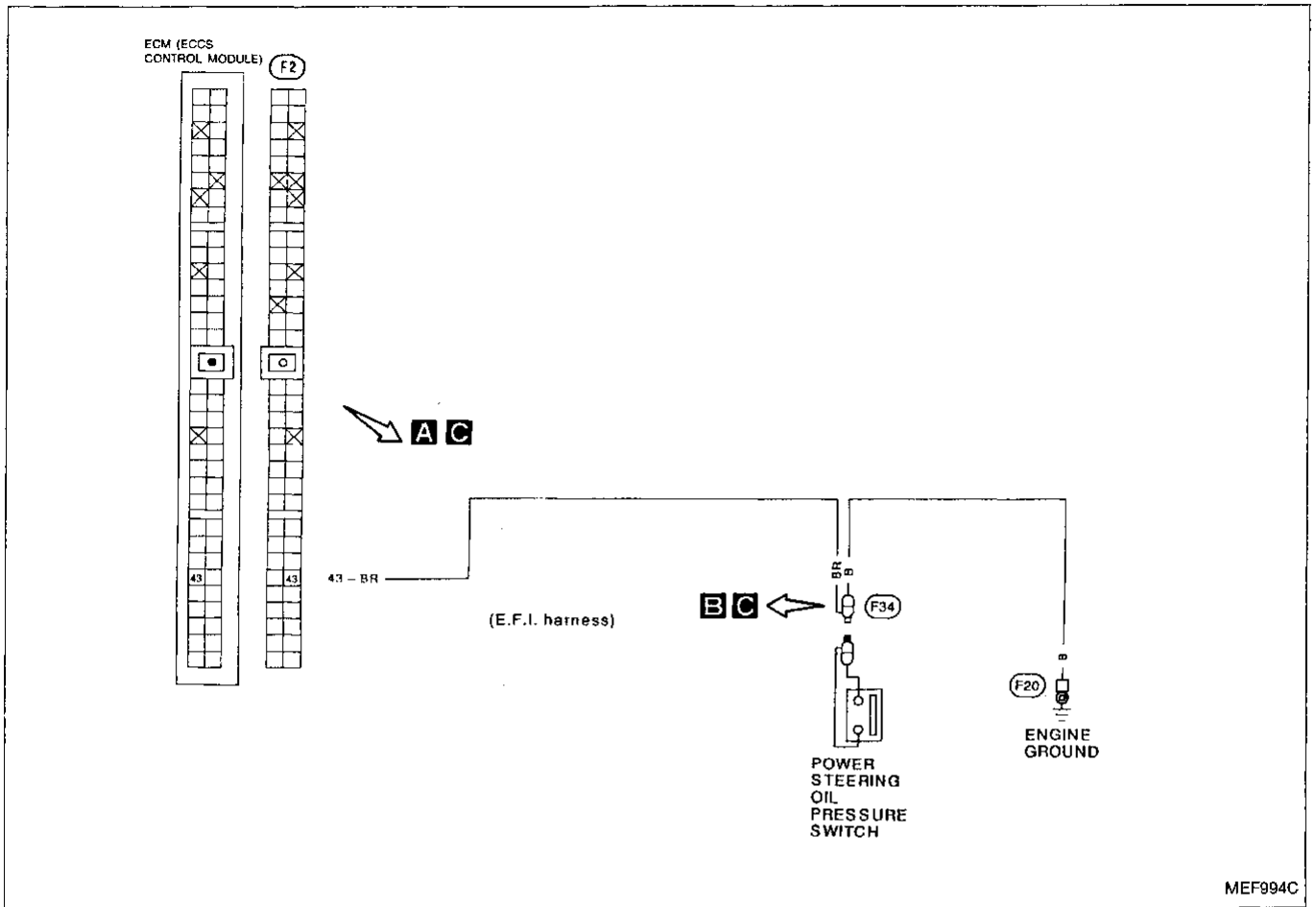
TROUBLE DIAGNOSES

Diagnostic Procedure 43 (Cont'd)

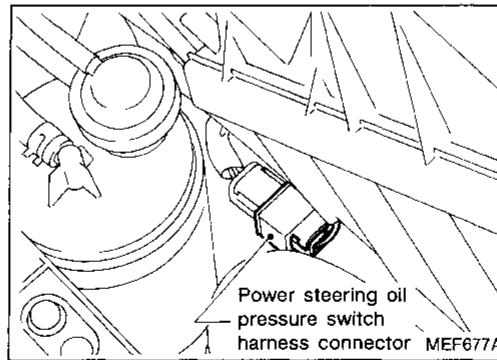
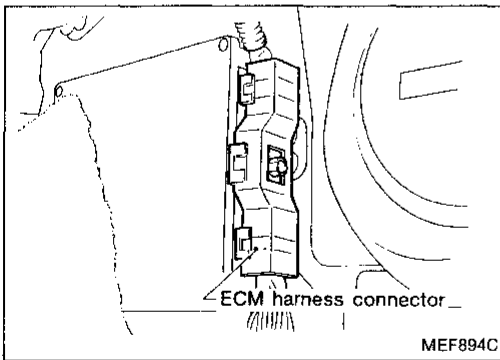


Diagnostic Procedure 44

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



Harness layout



GI

MA

EM

LC

EF & EC

FE

CL

MT

AT

PD

FA

RA

BR

ST

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HA

EL

TROUBLE DIAGNOSES

Diagnostic Procedure 44 (Cont'd)

A

■ PW/ST SIGNAL CIRCUIT ■

HOLD STEERING WHEEL
IN A FULL
LOCKED POSITION
THEN
TOUCH START

NEXT START

SEF200L

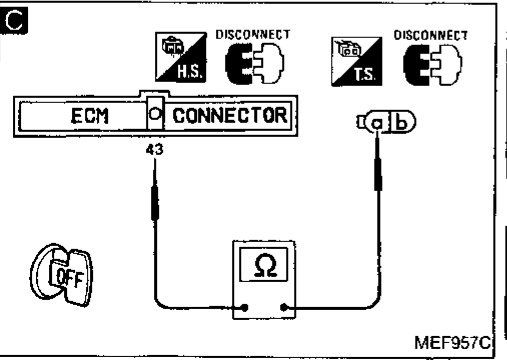
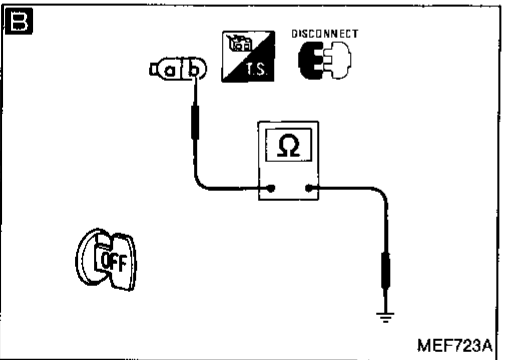
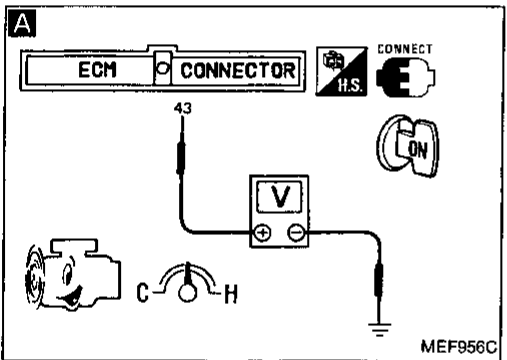
A

☆ MONITOR ☆ NO FAIL

PW/ST SIGNAL OFF

RECORD

SEF5911



INSPECTION START

A

CHECK OVERALL FUNCTION.

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

OR

1) Start engine.
2) Check power steering oil pressure switch signal in "DATA MONITOR" mode with CONSULT.

Steering is neutral position: OFF
Steering is turned: ON

OR

1) Start engine.
2) Check voltage between ECM terminal ④③ and ground with CONSULT or tester.

Voltage:
When steering wheel is turned quickly.
Approximately 0V
Except above
Approximately 7 - 9V

O.K. → INSPECTION END

B

CHECK GROUND CIRCUIT.

1) Stop engine.
2) Disconnect power steering oil pressure switch harness connector.
3) Check harness continuity between terminal ④ and engine ground.
Continuity should exist.

N.G. → Repair harness or connectors.

C

CHECK INPUT SIGNAL CIRCUIT.

1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ④③ and terminal ⑧.
Continuity should exist.

N.G. → Repair harness or connectors.

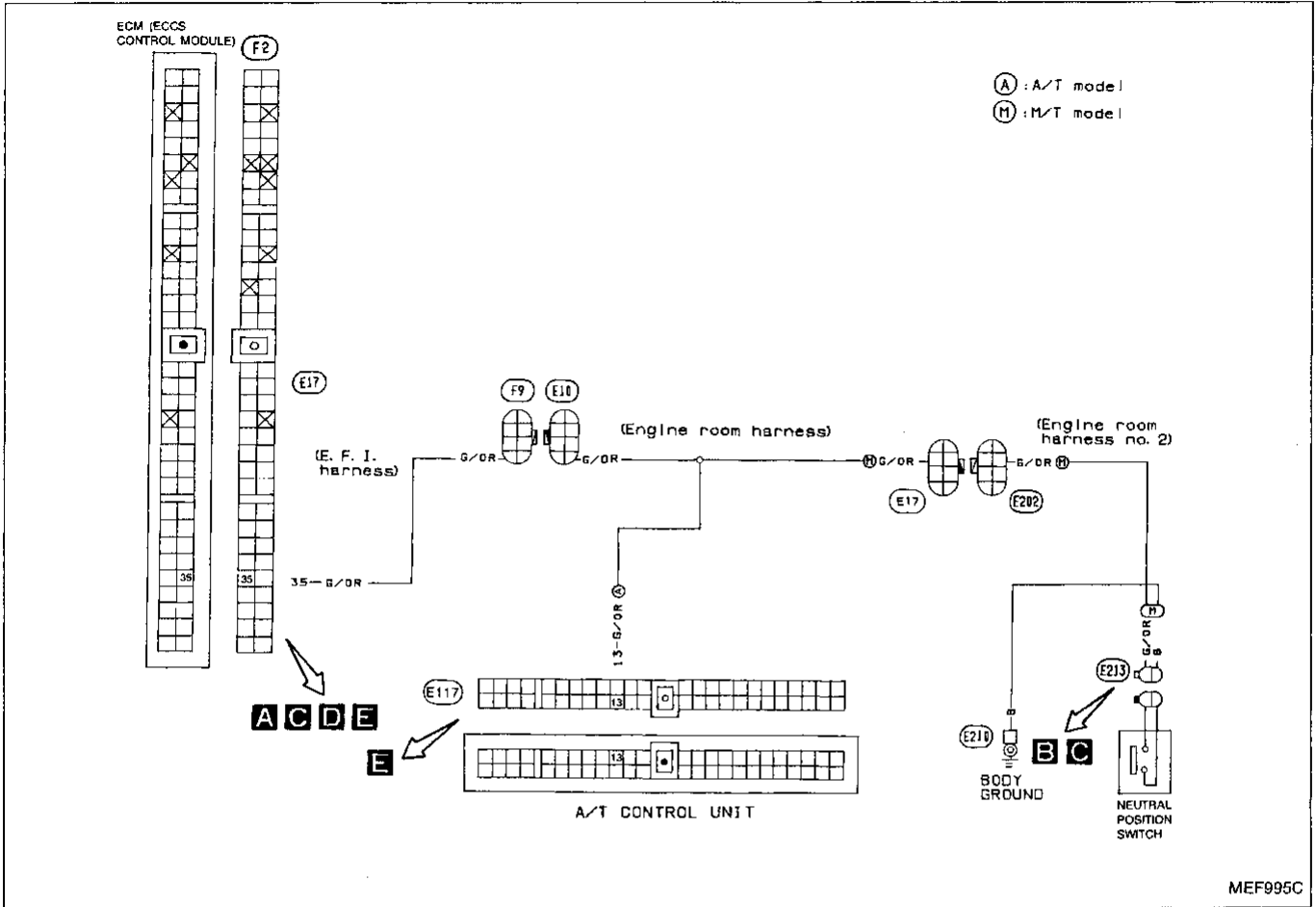
CHECK COMPONENT
(Power steering oil pressure switch).
Refer to "Electrical Components Inspection".
(See page EF & EC-167.)

N.G. → Replace power steering oil pressure switch.

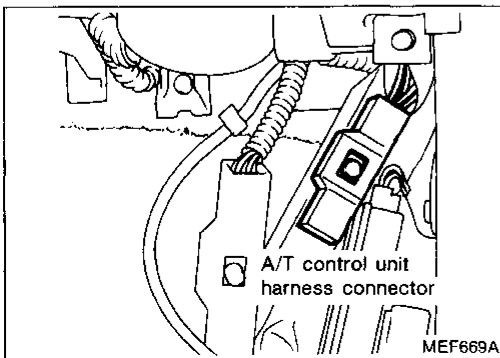
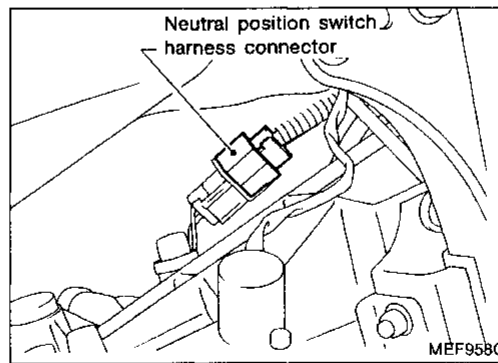
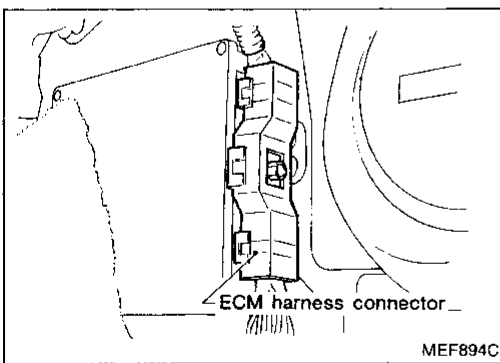
Check ECM pin terminals for damage or the connection of ECM harness connector.

Diagnostic Procedure 45

NEUTRAL POSITION SWITCH/A/T CONTROL UNIT (NEUTRAL POSITION SIGNAL) (Not self-diagnostic item)



Harness layout



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

TROUBLE DIAGNOSES

Diagnostic Procedure 45 (Cont'd)

A

■ NEUTRAL POSI SW CKT ■

SHIFT
OUT OF N/P-RANGE
THEN
TOUCH START

START

SEF206L

A

☆ MONITOR ☆ NO FAIL

START SIGNAL	OFF
CLOSED TH/POS	ON
AIR COND SIG	OFF
NEUT POSI SW	ON

RECORD

MEF936C

A

ECM CONNECTOR

35

Ω

DISCONNECT H.S.

OFF

MEF959C

B

a b

Ω

DISCONNECT H.S.

OFF

SEF219K

C

ECM CONNECTOR

35

Ω

DISCONNECT H.S.

DISCONNECT H.S.

a b

OFF

MEF960C

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.

O.K. → INSPECTION END

OR

1) Turn ignition switch "ON".
2) Check neutral position switch 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 ③⑤ and body ground.
Continuity should exist.

N.G.

B

Turn ignition switch "OFF".

C

CHECK GROUND CIRCUIT.

1) Disconnect neutral position switch harness connector.
2) Check harness continuity between terminal ① and body ground.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

Disconnect ECM harness connector.

CHECK INPUT SIGNAL CIRCUIT.

1) Check harness continuity between ECM terminal ③⑤ and terminal ②.
Continuity should exist.

N.G. → Check the following.

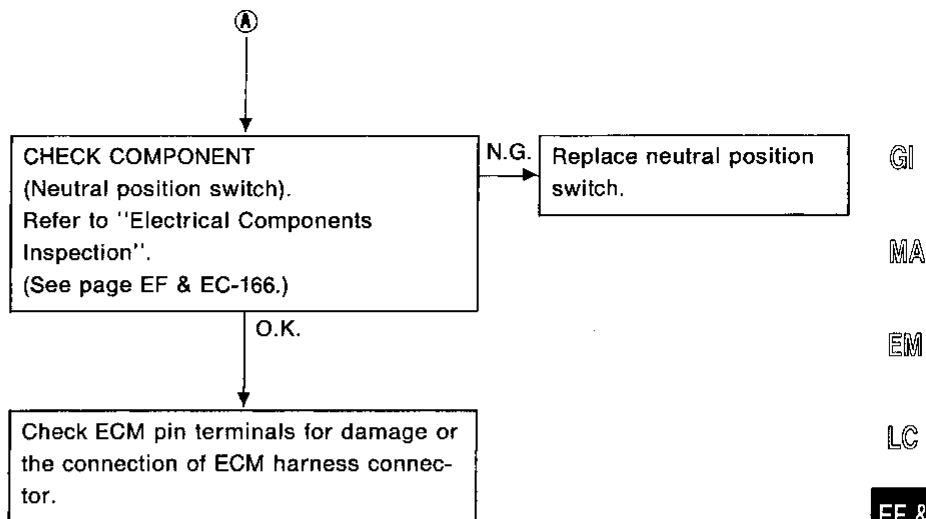
- Harness connectors ①⑨, ①⑩
 - Harness connectors ①⑦, ②⑩
 - Harness continuity between ECM and neutral position switch
- If N.G., repair harness or connectors.

O.K.

→ A

TROUBLE DIAGNOSES

Diagnostic Procedure 45 (Cont'd)



GI

MA

EM

LC

EF &
EC

FE

CL

MT

AT

PD

FA

RA

BR

ST

BF

HA

EL

TROUBLE DIAGNOSES

Diagnostic Procedure 45 (Cont'd)

D

☆ MONITOR ☆ NO FAIL

START SIGNAL	OFF
CLOSED TH/POS	ON
AIR COND SIG	OFF
NEUT POST SW	ON

RECORD

MEF961C

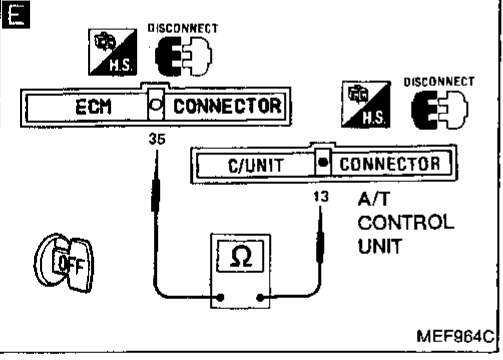
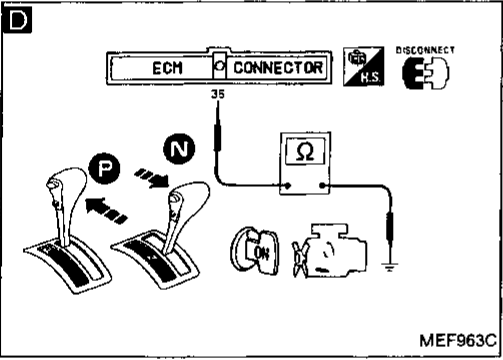
D

■ NEUTRAL POSI SW CKT ■

SHIFT
OUT OF N/P-RANGE
THEN
TOUCH START

START

MEF962C



A/T control unit

INSPECTION START

D

CHECK OVERALL FUNCTION.

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

OR

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

OR

1) Make sure that inhibitor switch circuit functions properly. (Refer to AT section.)
2) Disconnect ECM harness connector.
3) Shift selector lever to "P" position.
4) Turn ignition switch "ON".
5) Check harness continuity between ECM terminal 35 and body ground.
Continuity should exist.
6) Shift selector lever to "N" position.
7) Check harness continuity between ECM terminal 35 and body ground.
Continuity should exist.

O.K. INSPECTION END

E

CHECK INPUT SIGNAL CIRCUIT.

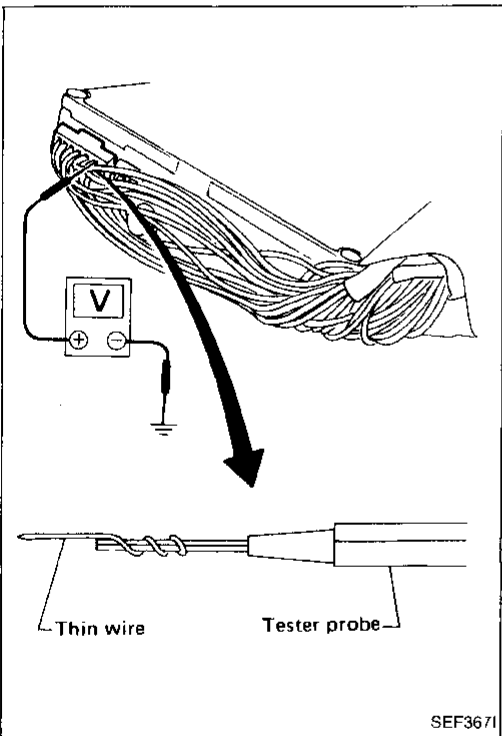
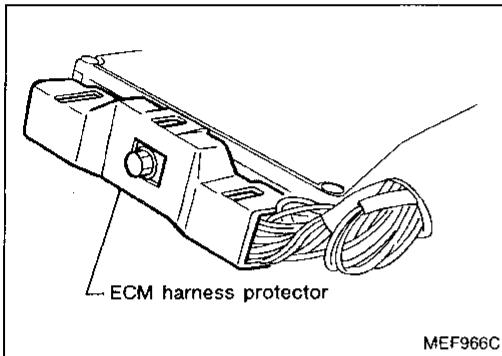
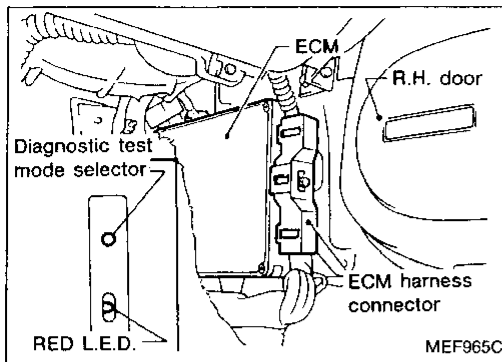
1) Turn ignition switch "OFF".
2) Disconnect A/T control unit harness connector.
3) Check harness continuity between ECM terminal 35 and terminal 13.
Continuity should exist.

N.G. Check the following.

- Harness connectors (F9), (E10)
- Harness continuity between ECM and A/T control unit

If N.G., repair harness or connectors.

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



Electrical Components Inspection

ECM INPUT/OUTPUT SIGNAL INSPECTION

1. ECM is located behind front passenger side dash. For this inspection, remove the front passenger side dash.
2. Remove ECM harness protector.
3. Perform all voltage measurements with the connectors connected. Extend tester probe as shown to perform tests easily.

GI

MA

EM

LC

EF &
EC

FE

CL

MT

AT

PD

FA

RA

BR

ST

BF

HA

EL

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

ECM inspection table

*Data are reference values.

TER-MINAL NO.	ITEM	CONDITION	*DATA
1	Ignition signal	Engine is running. └ Idle speed	0.2 - 0.3V
		Engine is running. └ Engine speed is 2,000 rpm.	Approximately 0.8V
3	Ignition check	Engine is running. └ Idle speed	BATTERY VOLTAGE (11 - 14V)
4	ECCS relay (Self-shutoff)	Engine is running. Ignition switch "OFF" └ For approximately 1 second after turning ignition switch "OFF"	0 - 1V
		Ignition switch "OFF" └ Approximately 1 second after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
8	EGR temperature sensor	Engine is running. └ EGR system is not operating.	Less than 4.5V
		Engine is running. └ EGR system is operating.	0 - 1.0V
9	Condenser fan relay	Engine is running. └ Condenser fan is not operating.	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └ Condenser fan is operating.	Approximately 0.7V
11	Air conditioner relay	Engine is running. └ Both A/C switch and blower switch are "ON".	Approximately 0.7V
		Engine is running. └ A/C switch is "OFF".	BATTERY VOLTAGE (11 - 14V)
16	Mass air flow sensor	Engine is running. └ Idle speed	0.8 - 3.0V Output voltage varies with engine speed.
18	Engine coolant temperature sensor	Engine is running.	0 - 5.0V Output voltage varies with engine water temperature.
19	Oxygen sensor	Engine is running. └ After warming up sufficiently	0 - Approximately 1.0V
20	Throttle position sensor	Ignition switch "ON"	0.3 - Approximately 5V Output voltage varies with the throttle position.

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

*Data are reference values.

TER-MINAL NO.	ITEM	CONDITION	*DATA
20	Throttle position sensor	Ignition switch "ON"	0.3 - Approximately 5V Output voltage varies with the throttle position.
22 30	Crankshaft position sensor (Reference signal)	Engine is running. Do not run engine at high speed under no-load.	0.1 - 1.3V
25	S.C.V. control solenoid valve	Engine is running. (Warm-up condition) Idle speed	Approximately 0.7V
		Engine is running. Engine speed is about 2,000 rpm.	BATTERY VOLTAGE (11 - 14V)
27	Knock sensor	Engine is running. Idle speed	Approximately 2.5V
31 40	Crankshaft position sensor (Position signal)	Engine is running. Do not run engine at high speed under no-load.	2.0 - 3.0V
34	Start signal	Ignition switch "ON"	Approximately 0V
		Ignition switch "START"	BATTERY VOLTAGE (11 - 14V)
35	Neutral position switch	Ignition switch "ON" Neutral position	0V
		Ignition switch "ON" Except the above gear position	Approximately 6V
36	Ignition switch	Ignition switch "OFF"	0V
		Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
37	Throttle position sensor power supply	Ignition switch "ON"	Approximately 5V
38 47	Power supply for ECM	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
41	Air conditioner switch	Engine is running. Both air conditioner switch and blower switch are "ON".	Approximately 0V
		Engine is running. Air conditioner switch is "OFF".	BATTERY VOLTAGE (11 - 14V)

GI
 MA
 EM
 LC
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 FE
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 BF
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 EL

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

*Data are reference values.

TER-MINAL NO.	ITEM	CONDITION	*DATA
43	Power steering oil pressure switch	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> Steering wheel is being turned. 	0V
		<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> Steering wheel is not being turned. 	Approximately 8V
45	Fan switch	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> Fan switch is "ON". 	Approximately 0V
		<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> Fan switch is "OFF". 	Approximately 7V
46	Power supply (Back-up)	<div style="border: 1px solid black; padding: 2px;">Ignition switch "OFF"</div>	BATTERY VOLTAGE (11 - 14V)
101	Injector No. 1	Engine is running.	BATTERY VOLTAGE (11 - 14V)
103	Injector No. 3		
110	Injector No. 2		
112	Injector No. 4		
102	PAIRC-solenoid valve	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> (Warm-up condition) <ul style="list-style-type: none"> Idle speed During deceleration 	Approximately 0.7V
		<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> Accelerator pedal is depressed. 	BATTERY VOLTAGE (11 - 14V)
104	Fuel pump relay	<div style="border: 1px solid black; padding: 2px;">Ignition switch "ON"</div> <ul style="list-style-type: none"> For 5 seconds after turning ignition switch "ON" 	Approximately 0.8V
		<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <div style="border: 1px solid black; padding: 2px;">Ignition switch "ON"</div> <ul style="list-style-type: none"> 5 seconds after turning ignition switch "ON" 	BATTERY VOLTAGE (11 - 14V)
105	EGR & canister control solenoid valve	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> (Warm-up condition) <ul style="list-style-type: none"> Idle speed 	Approximately 0.7V
		<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> (Warm-up condition) <ul style="list-style-type: none"> Engine speed is about 2,000 rpm. 	BATTERY VOLTAGE (11 - 14V)

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

*Data are reference values.

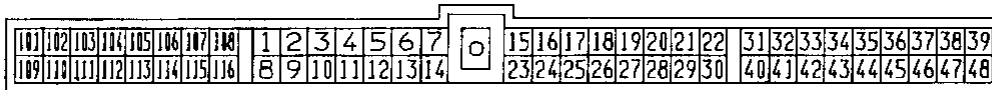
TER-MINAL NO.	ITEM	CONDITION	*DATA
113	IACV-AAC valve	<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> — Idle speed 	9 - 14V
		<div style="border: 1px solid black; padding: 2px;">Engine is running.</div> <ul style="list-style-type: none"> — Steering wheel is being turned. — Air conditioner is operating. — Rear defogger is "ON". — Headlamp are in high position. 	5 - 9V

GI
 MA
 EM
 LC
 EF & EC

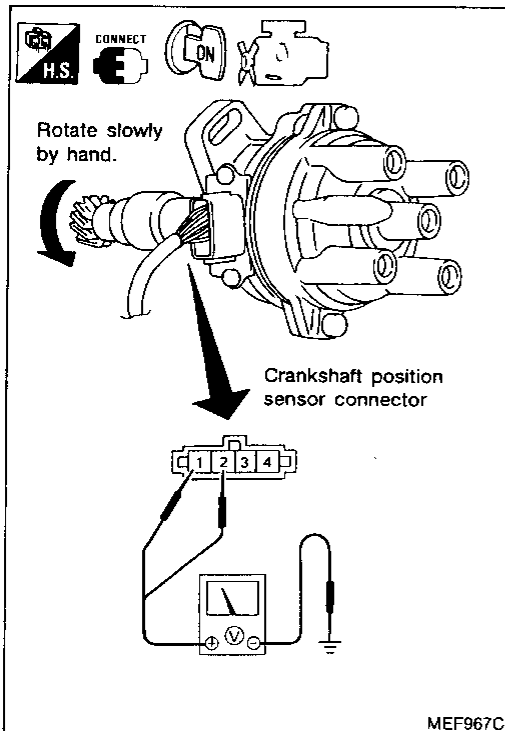
FE
 CL
 MT
 AT
 PD
 FA

RA
 BR
 ST
 BF
 HA
 EL

ECM HARNESS CONNECTOR TERMINAL LAYOUT



SEF419H.



CRANKSHAFT POSITION SENSOR

1. Remove distributor assembly from engine. Disconnect ignition wires and center cable from distributor. (Crankshaft position sensor harness connector should remain connected.)
2. Turn ignition switch "ON".
3. Rotate crankshaft position sensor shaft slowly by hand and check voltage between terminals ①, ② and ground.

Terminal	Voltage
① (180° signal)	Voltage fluctuates between 5V and 0V.
② (1° signal)	

4. Rotate crankshaft position sensor shaft slowly by hand and check voltage between terminals ① and ② ground. Measure with circuit tester set in 100 mV range, AC.

Tester pointer deflects: O.K.

Tester pointer does not deflect: N.G.

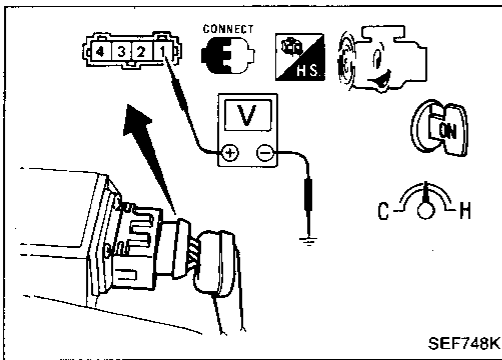
If N.G., replace crankshaft position sensor.

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

TROUBLE DIAGNOSES

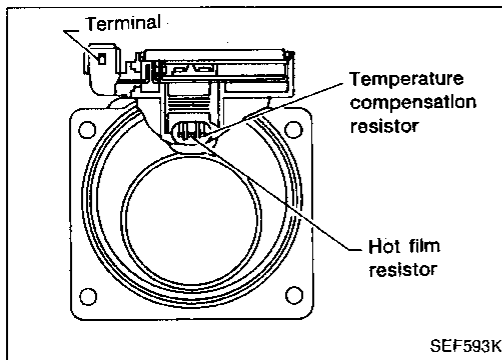
Electrical Components Inspection (Cont'd)

MASS AIR FLOW SENSOR

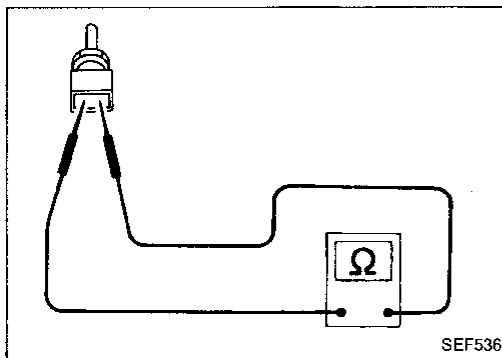


1. Fold back mass air flow sensor harness connector rubber as shown in the figure if the harness connector is connected.
2. Turn ignition switch "ON".
3. Start engine and warm it up sufficiently.
4. Check voltage between terminal ① and ground.

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



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



ENGINE COOLANT TEMPERATURE SENSOR

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

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

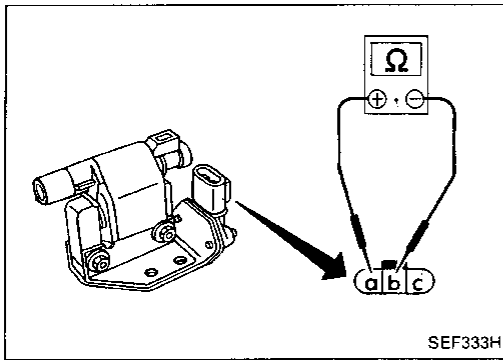
If N.G., replace engine coolant temperature sensor.

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

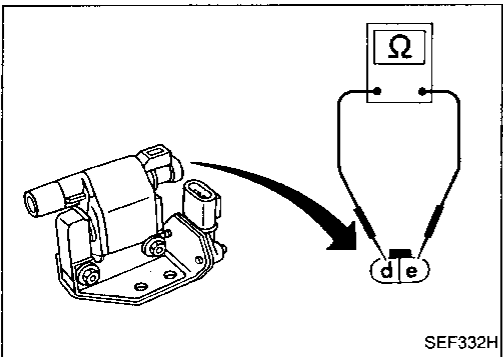
POWER TRANSISTOR

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



⊕ terminal side	⊖ terminal side					
	Terminal ①		Terminal ②		Terminal ③	
	Resistance Ω	Result	Resistance Ω	Result	Resistance Ω	Result
Terminal ①	—	—	∞	O.K.	∞	O.K.
	—	—	Not ∞ or 0	N.G.	Not ∞ or 0	N.G.
	—	—	0	N.G.	0	N.G.
Terminal ②	∞	N.G.	—	—	∞	N.G.
	Not ∞ or 0	O.K.	—	—	Not ∞ or 0	O.K.
	0	N.G.	—	—	0	N.G.
Terminal ③	∞	N.G.	∞	N.G.	—	—
	Not ∞ or 0	O.K.	Not ∞ or 0	O.K.	—	—
	0	N.G.	0	N.G.	—	—

If N.G., replace power transistor.

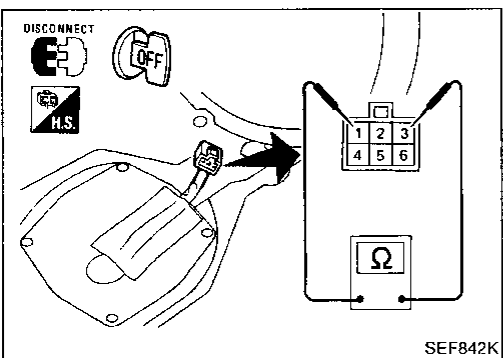


IGNITION COIL

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

Terminal	Resistance
① - ②	Approximately 0.7Ω

If N.G., replace power transistor.



FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals ① and ③.

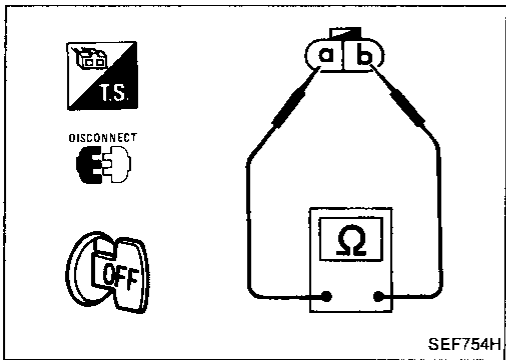
Resistance: Approximately 0.5Ω

If N.G., replace fuel pump.

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

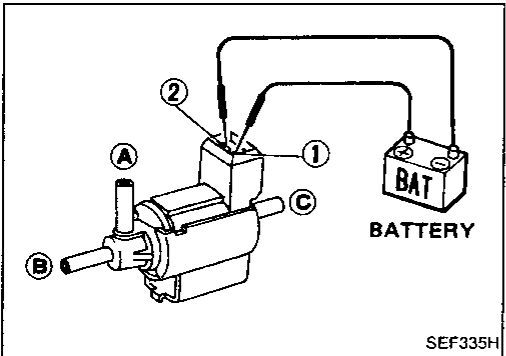
VEHICLE SPEED SENSOR



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

Continuity should come and go.

If N.G. replace vehicle speed sensor.

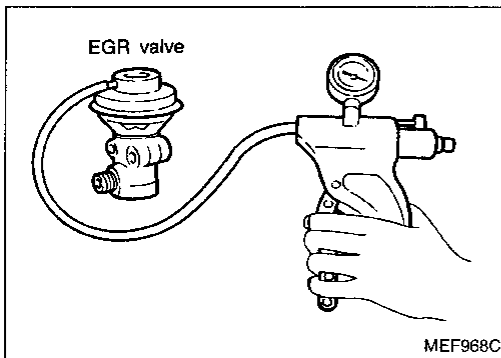


EGR AND CANISTER CONTROL SOLENOID VALVE, S.C.V. CONTROL SOLENOID VALVE AND PAIRC-SOLENOID VALVE

Check air passage continuity.

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

If N.G., replace solenoid valve.

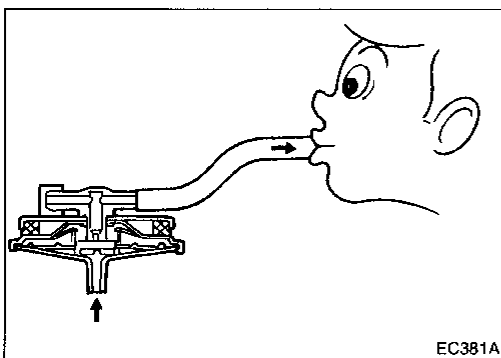


EGR VALVE

Apply vacuum to E.G.R. vacuum port with a hand vacuum pump.

EGR valve spring should lift.

If N.G., replace EGR valve.



EGRC-BPT VALVE

Plug one of two ports of EGRC-BPT valve.

Apply a pressure above 0.490 kPa (50 mmH₂O, 1.97 inH₂O) to check for leakage. If a leak is noted, replace valve.

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

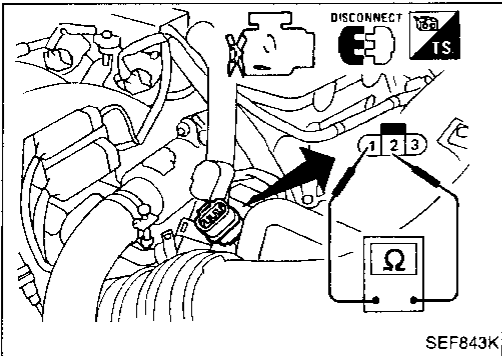
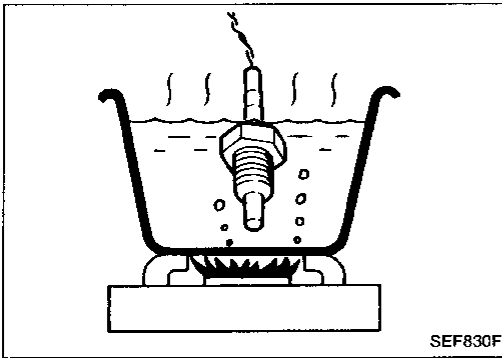
EGR TEMPERATURE SENSOR

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

- Resistance should decrease in response to temperature increase.

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

If N.G., replace EGR temperature sensor.



THROTTLE POSITION SENSOR

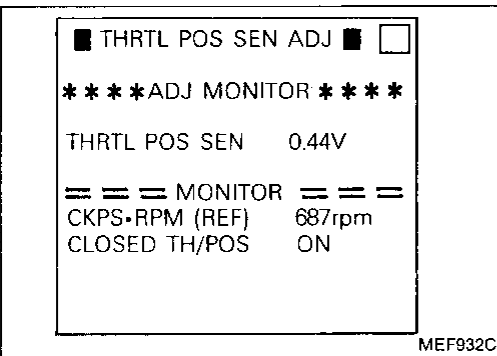
1. Disconnect throttle position sensor harness connector.
2. Make sure that resistance between terminals ① and ② changes when opening throttle valve manually.

Accelerator pedal conditions	Resistance kΩ
Completely released	Approximately 2
Partially released	2 - 10
Completely depressed	Approximately 10

If N.G., replace throttle position sensor.

Adjustment for throttle position sensor (M/T model only)

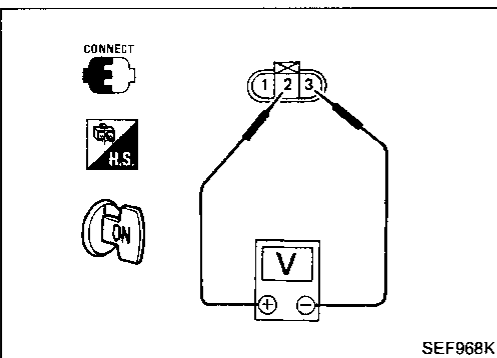
If throttle position sensor is replaced or removed, it is necessary to install in proper position, by following the procedure as shown below:



1. Install throttle position sensor in throttle body. Do not tighten bolts. Leave bolts loose.
2. Connect throttle position sensor harness connector.
3. Start engine and warm it up sufficiently.
4. Perform "THRTL POS SEN ADJ" in "WORK SUPPORT" mode.



5. Measure output voltage of throttle position sensor using voltmeter.



5. Adjust by rotating throttle position sensor body so that output voltage is 0.5 ± 0.2V.
6. Tighten mounting bolts.
7. Disconnect throttle position sensor harness connector for a few seconds and then reconnect it.

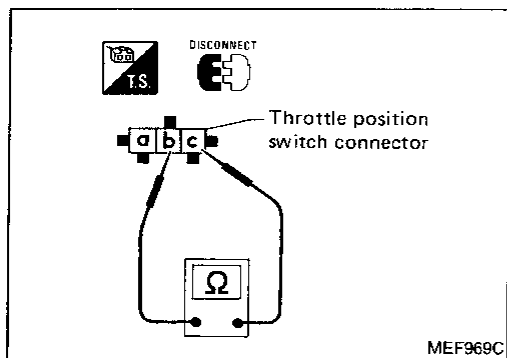
TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

CLOSED THROTTLE POSITION SWITCH

(A/T model only)

1. Warm up engine sufficiently.
2. Disconnect throttle position switch harness connector.
3. Check continuity between terminals **(b)** and **(c)**.



Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

If N.G., replace throttle position switch.

Adjustment for closed throttle position switch (A/T model only)

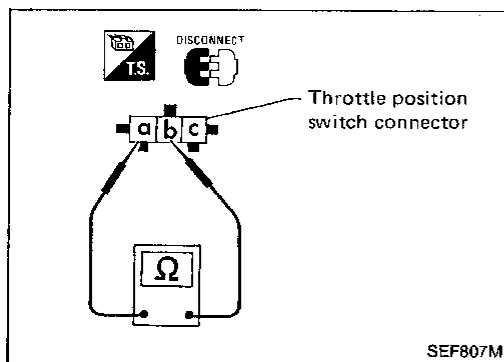
If throttle position sensor or closed throttle position switch is replaced or removed, it is necessary to install it in the proper position, by following the procedure as shown below:

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

Closed throttle position switch OFF → ON speed:

A/T: Engine speed in "N" position

900 ± 150 rpm



WIDE OPEN THROTTLE POSITION SWITCH (AT model only)

1. Warm up engine sufficiently.
2. Disconnect throttle position switch harness connector.
3. Check continuity between terminals **(a)** and **(b)**.

Accelerator pedal condition	Continuity
Released fully	No
Depressed fully	Yes

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

If N.G., replace throttle position switch.

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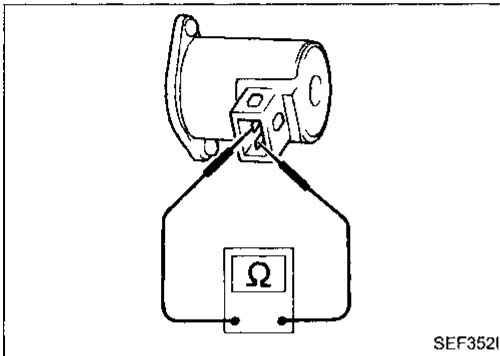
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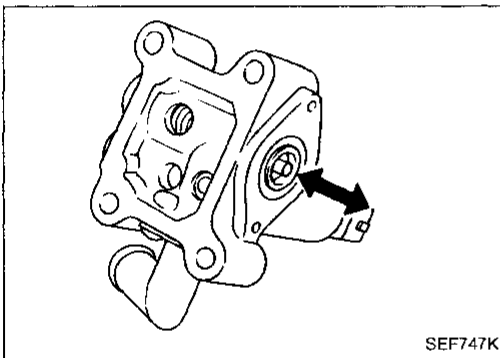


IACV-AAC VALVE

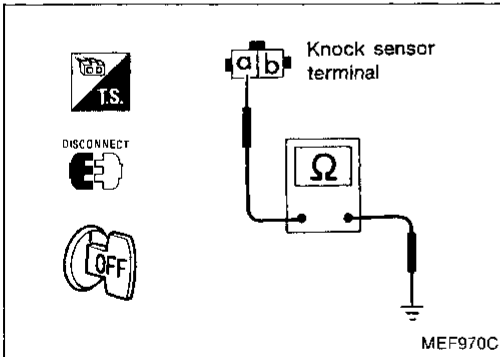
- Check IACV-AAC valve resistance.

Resistance:

Approximately 10Ω



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

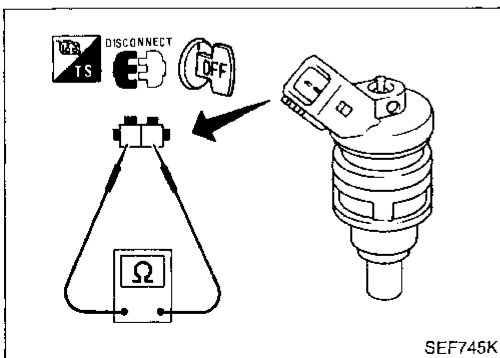


KNOCK SENSOR

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

Continuity should exist.

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



INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: Approximately 11Ω [at 20°C (68°F)]

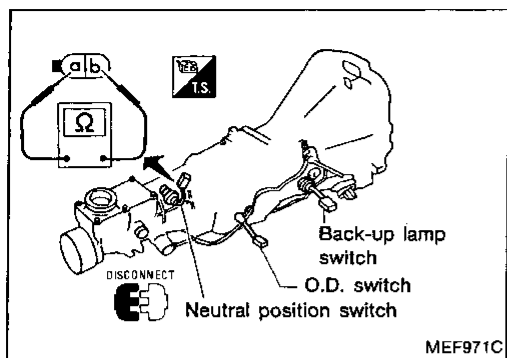
If N.G., replace injector.

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

NEUTRAL POSITION SWITCH (M/T models)

Check continuity between terminals as shown in the figure.

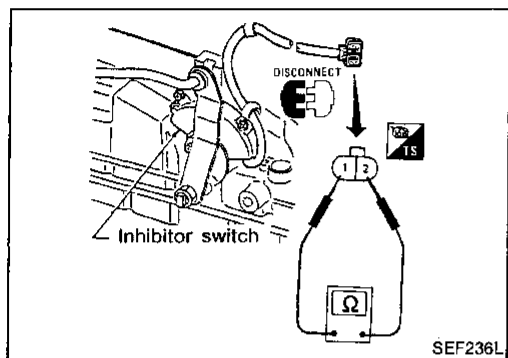


Conditions	Continuity
Shift to neutral position	Yes
Shift to other position	No

If N.G., replace neutral position switch.

INHIBITOR SWITCH (A/T models)

Check continuity between terminals ① and ②.



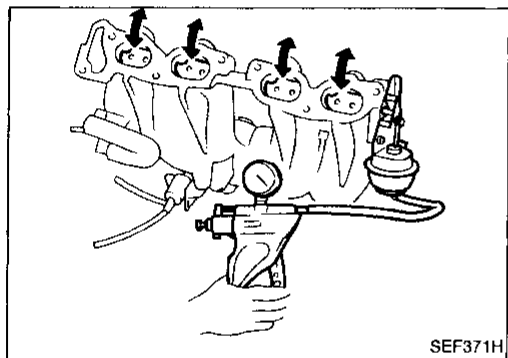
Conditions	Continuity
Shift to "P" or "N" position	Yes
Shift to other position	No

If N.G., replace inhibitor switch.

Refer to section AT.

SWIRL CONTROL VALVE

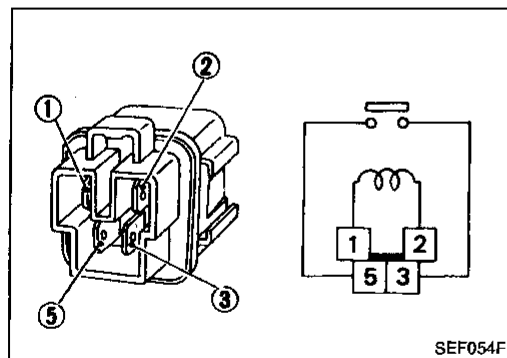
Supply vacuum to actuator and check swirl control valve operation.



Conditions	Swirl control valve
Supply vacuum to actuator	Close
No supply	Open

ECCS RELAY, FUEL PUMP RELAY, CONDENSER FAN RELAY AND IGNITION COIL RELAY

Check continuity between terminals ③ and ⑤.

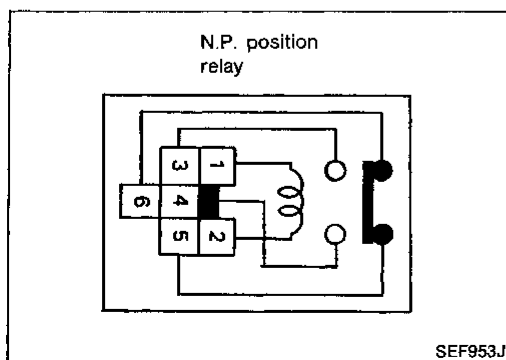


Conditions	Continuity
12V direct current supply between terminals ① and ②	Yes
No current supply	No

If N.G., replace relay.

N.P. POSITION RELAY

Check continuity between terminals ③ and ④.



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

If N.G., replace relay.

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

POWER STEERING OIL PRESSURE SWITCH

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

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

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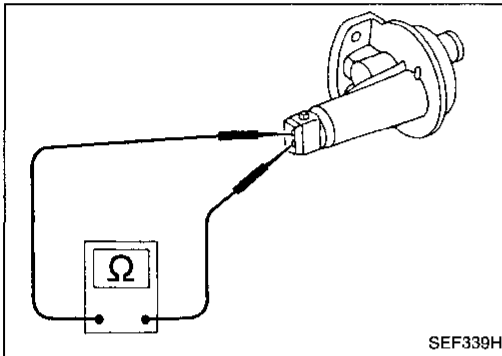
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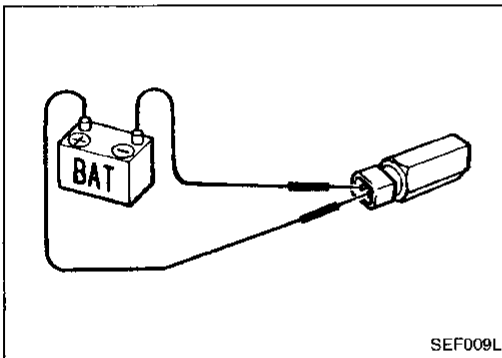
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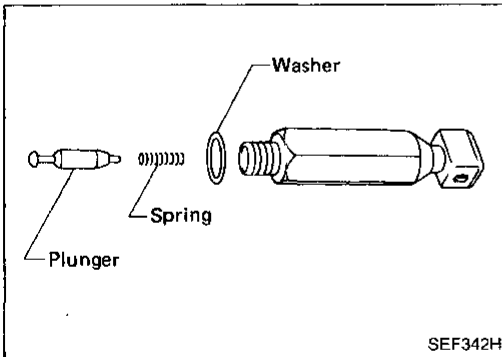
IACV-AIR REGULATOR

- Check IACV-air regulator resistance.
Resistance:
Approximately 75Ω
- Check IACV-air regulator for clogging.

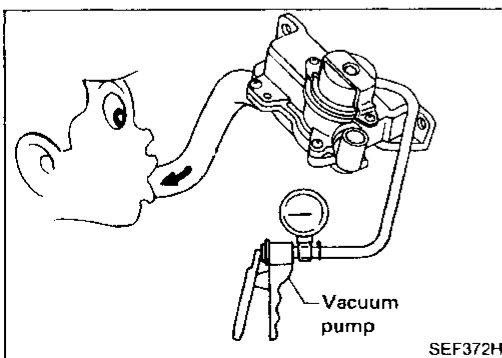


IACV-FICD SOLENOID VALVE

- Check that clicking sound is heard when applying 12V direct current to terminals.



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



PAIR VALVE

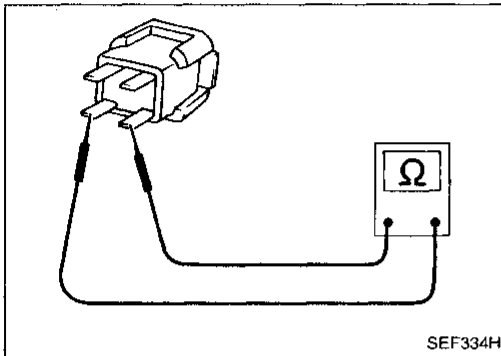
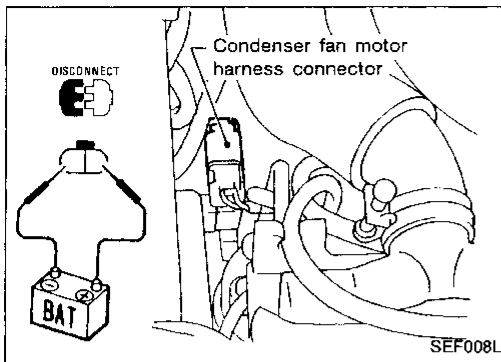
Apply vacuum to vacuum motor, suck or blow hose to make sure that air flows only towards the air induction side.

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

CONDENSER FAN MOTOR

Check that condenser fan operates when applying 12V direct current to terminals as shown in figure.



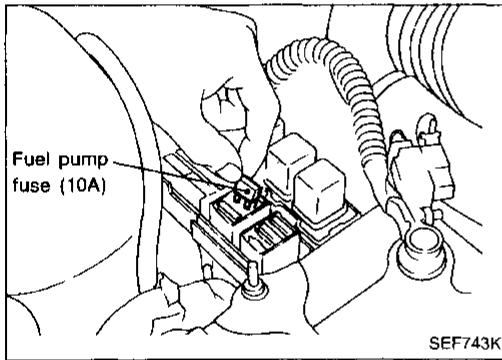
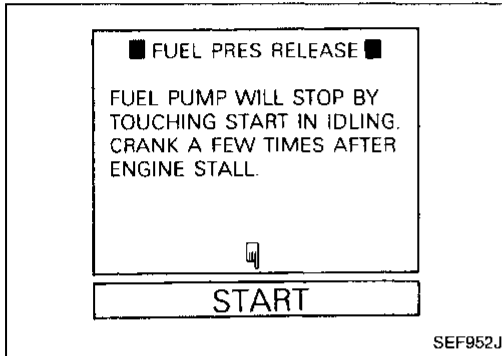
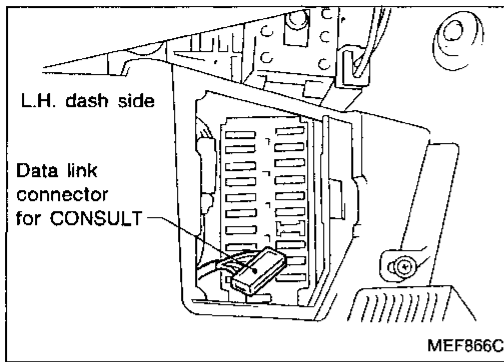
RESISTOR

1. Disconnect resistor harness connector.
2. Check resistance between terminals **(a)** and **(b)**.

Resistance: Approximately 2.2k Ω

If N.G., replace resistor.

MULTIPOINT FUEL INJECTION SYSTEM INSPECTION



Releasing Fuel Pressure

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



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



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

Fuel Pressure Check

- a. Make sure that clamp screw does not contact adjacent parts.
 - b. Use a torque driver to tighten clamps.
 - c. Use Pressure Gauge to check fuel pressure.
 - d. Do not perform fuel pressure check while fuel pressure regulator control system is operating; otherwise, fuel pressure gauge might indicate incorrect readings.
1. Release fuel pressure to zero.
 2. Disconnect fuel hose between fuel filter and fuel tube (engine side).
 3. Install pressure gauge between fuel filter and fuel tube.
 4. Start engine and check for fuel leakage.

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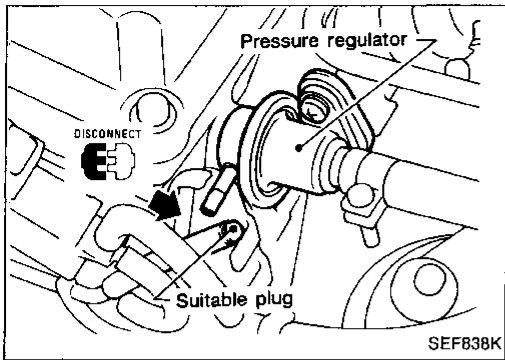
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MULTIPOINT FUEL INJECTION SYSTEM INSPECTION

Fuel Pressure Check (Cont'd)



5. Read the indication of fuel pressure gauge.

At idling:

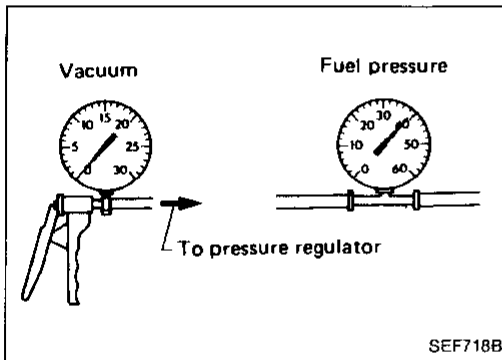
When fuel pressure regulator valve vacuum hose is connected.

Approximately 235 kPa (2.4 kg/cm², 34 psi)

When fuel pressure regulator valve vacuum hose is disconnected.

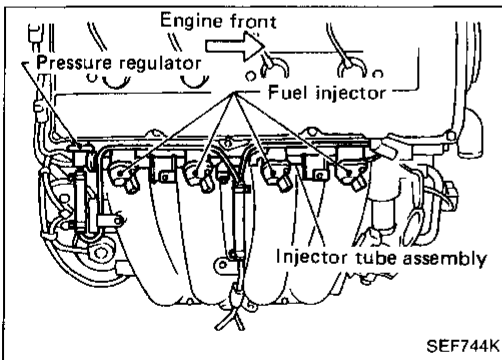
Approximately 294 kPa (3.0 kg/cm², 43 psi)

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.



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

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



Injector Removal and Installation

1. Release fuel pressure to zero.
2. Remove related covers, harnesses, wires and tubes.
3. Remove injector tube assembly with injectors from intake manifold.
4. Remove injectors from injector tube assembly.
 - Push injector tail piece.
 - Do not pull on the connector.
5. Install injectors as follows:
 - 1) Clean exterior of injector tail piece.
 - 2) Use new O-rings

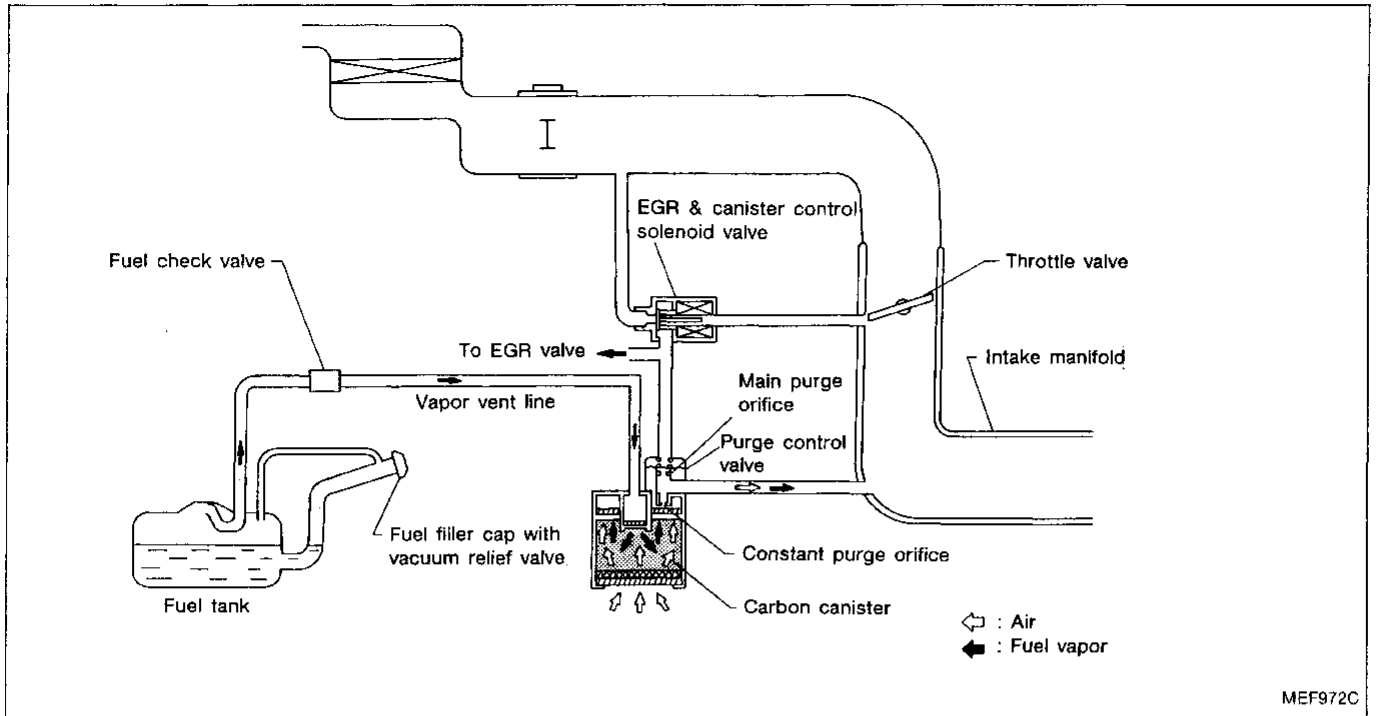
CAUTION:

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

6. Assemble injectors to injector tube assembly.
7. Install injector tube assembly to intake manifold.

EVAPORATIVE EMISSION SYSTEM

Description

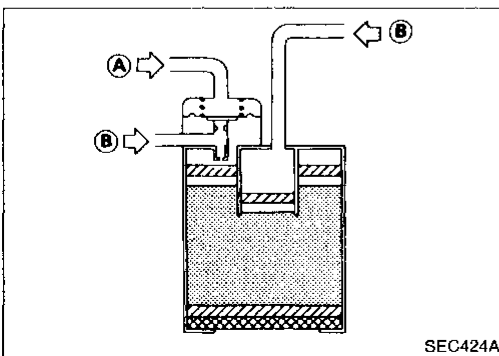


The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the carbon canister.

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

CARBON CANISTER

Check carbon canister as follows:

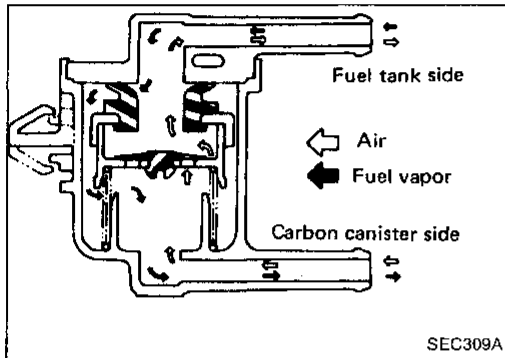
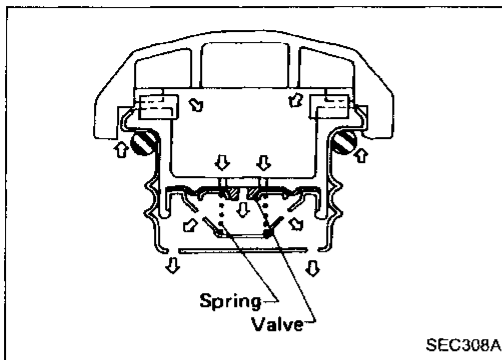
- Ⓐ : Blow air and ensure that there is no leakage.
- Ⓑ : Blow air and ensure that there is leakage.

EVAPORATIVE EMISSION SYSTEM

Inspection (Cont'd)

FUEL TANK VACUUM RELIEF VALVE

1. Wipe clean valve housing.
2. Suck air through the cap. A slight resistance accompanied by valve clicks indicates that valve is in good mechanical condition. Note also that, by further sucking air, the resistance should disappear with valve clicks.
3. If valve is clogged or if no resistance is felt, replace cap as an assembly.



FUEL CHECK VALVE

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

CRANKCASE EMISSION CONTROL SYSTEM

Description

This system returns blow-by gas to the intake collector.

The positive crankcase ventilation (P.C.V.) valve is provided to conduct crankcase blow-by gas to the intake manifold.

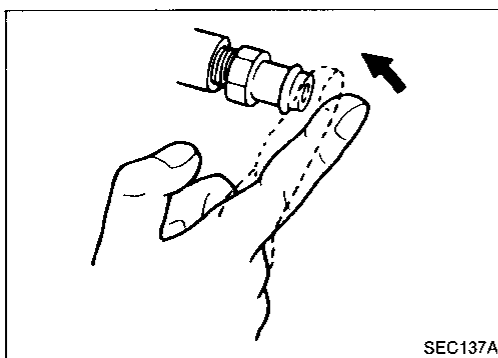
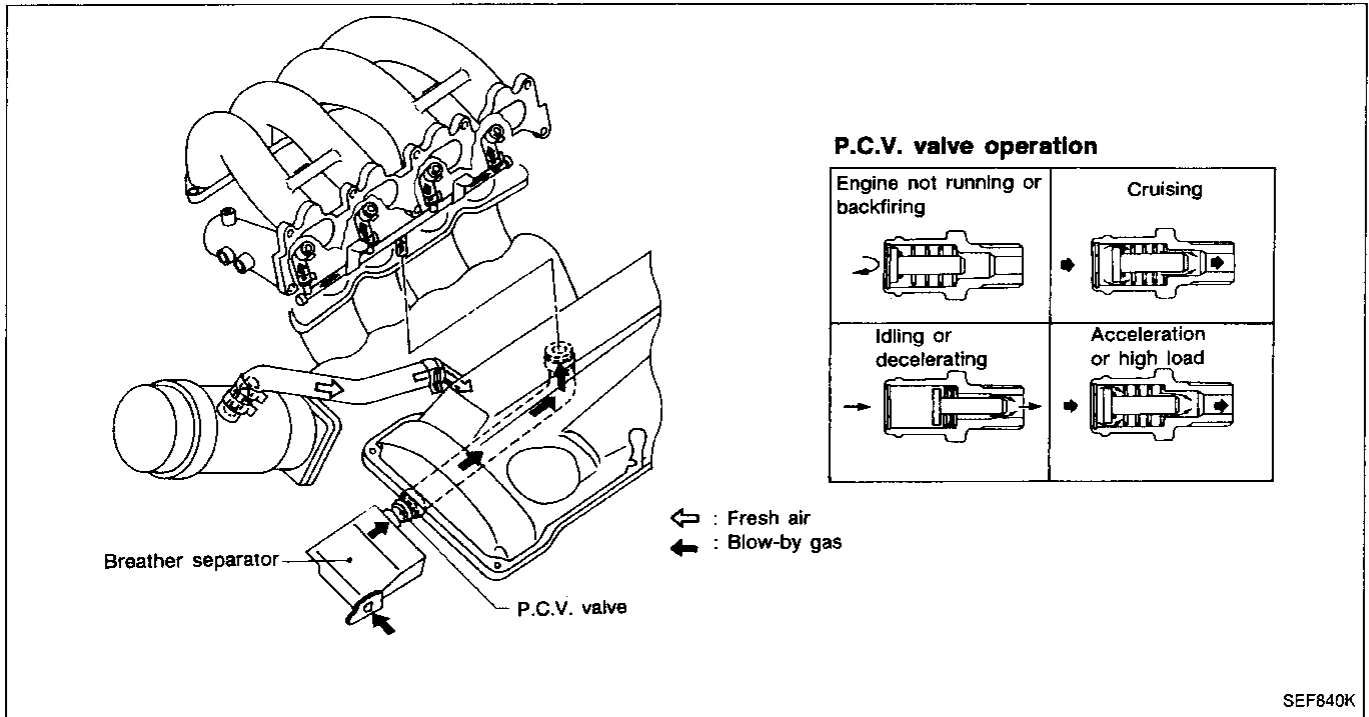
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the P.C.V. valve.

Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.

The ventilating air is then drawn from the air duct, through the hose connecting air inlet tubes to rocker cover, into the crankcase.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve, and its flow goes through the hose connection in the reverse direction.

On vehicles with an excessively high blow-by some of the flow will go through the hose connection to the intake collector under all conditions.



Inspection

P.C.V. (Positive Crankcase Ventilation)

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

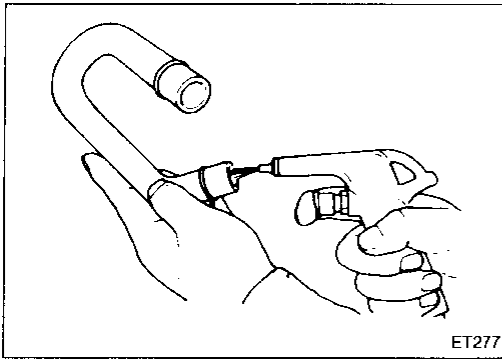
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CRANKCASE EMISSION CONTROL SYSTEM

Inspection (Cont'd)

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.



SERVICE DATA AND SPECIFICATIONS (S.D.S.)

General Specifications

PRESSURE REGULATOR	
Fuel pressure at idling kPa (kg/cm ² , psi)	
Vacuum hose is connected	Approximately 235 (2.4, 34)
Vacuum hose is disconnected	Approximately 294 (3.0, 43)

Inspection and Adjustment

Idle speed*1	rpm	
No-load*2 (in "N" position)		700 ± 50
Air conditioner: ON (in "N" position)		1,000 ± 50
Ignition timing		20° ± 2° B.T.D.C.
Throttle position sensor (Closed throttle position)	V	0.4 - 0.5

*1: Feedback controlled and needs no adjustments

*2: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater, fan & rear defogger)

IGNITION COIL

Primary voltage	V	Battery voltage (11 - 14)
Primary resistance [at 20°C (68°F)]	Ω	Approximately 1.0
Secondary resistance [at 20°C (68°F)]	kΩ	Approximately 10.0

MASS AIR FLOW SENSOR

Supply voltage	V	Battery voltage (11 - 14)
Output voltage	V	0.8 - 1.2

*: 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

EGR TEMPERATURE SENSOR

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

Resistance	Ω	Approximately 0.5
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IACV-AAC VALVE

Resistance	Ω	Approximately 10.0
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INJECTOR

Resistance	Ω	Approximately 11
------------	---	------------------

RESISTOR

Resistance	kΩ	Approximately 2.2
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THROTTLE POSITION SENSOR

Accelerator pedal conditions	Resistance kΩ
Completely released	Approximately 2
Partially released	2 - 10
Completely depressed	Approximately 10

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