ENGINE FUEL AND EMISSION CONTROL SYSTEM

SECTION EF & EC

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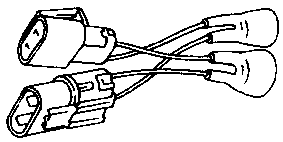
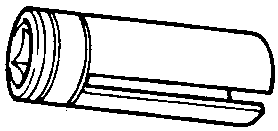
Note: Refer to Foldout page for "ECCS WIRING DIAGRAM".

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".

Special Service Tools

Tool number (Kent-Moore No.) Tool name	Description	
EG11160000 (—) Ignition coil adapter harness		Measuring engine speed
(J36471) Oxygen sensor wrench		Loosening or tightening oxygen sensor

Precautions for Supplemental Restraint System "AIR BAG"

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

WARNING:

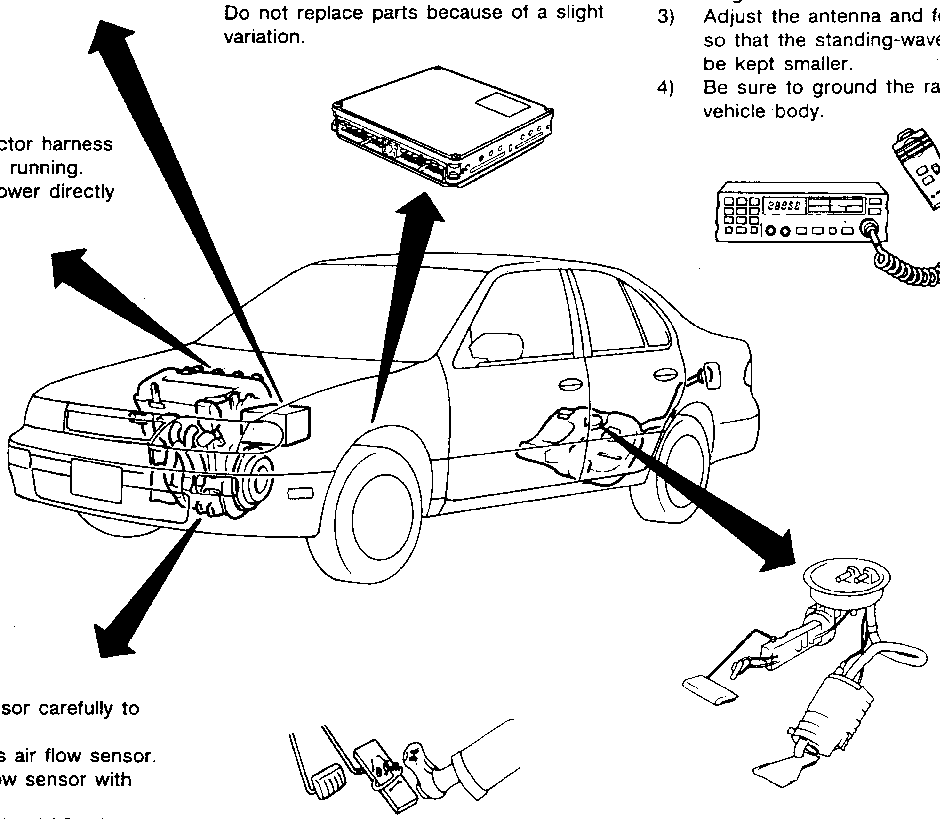
- **To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal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

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

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

ECCS PARTS HANDLING
- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble IAC valve-AAC valve.
- Even a slight leak in the air intake system can cause serious problems.
- **Do not shock or jar the camshaft position sensor.**

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



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.

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

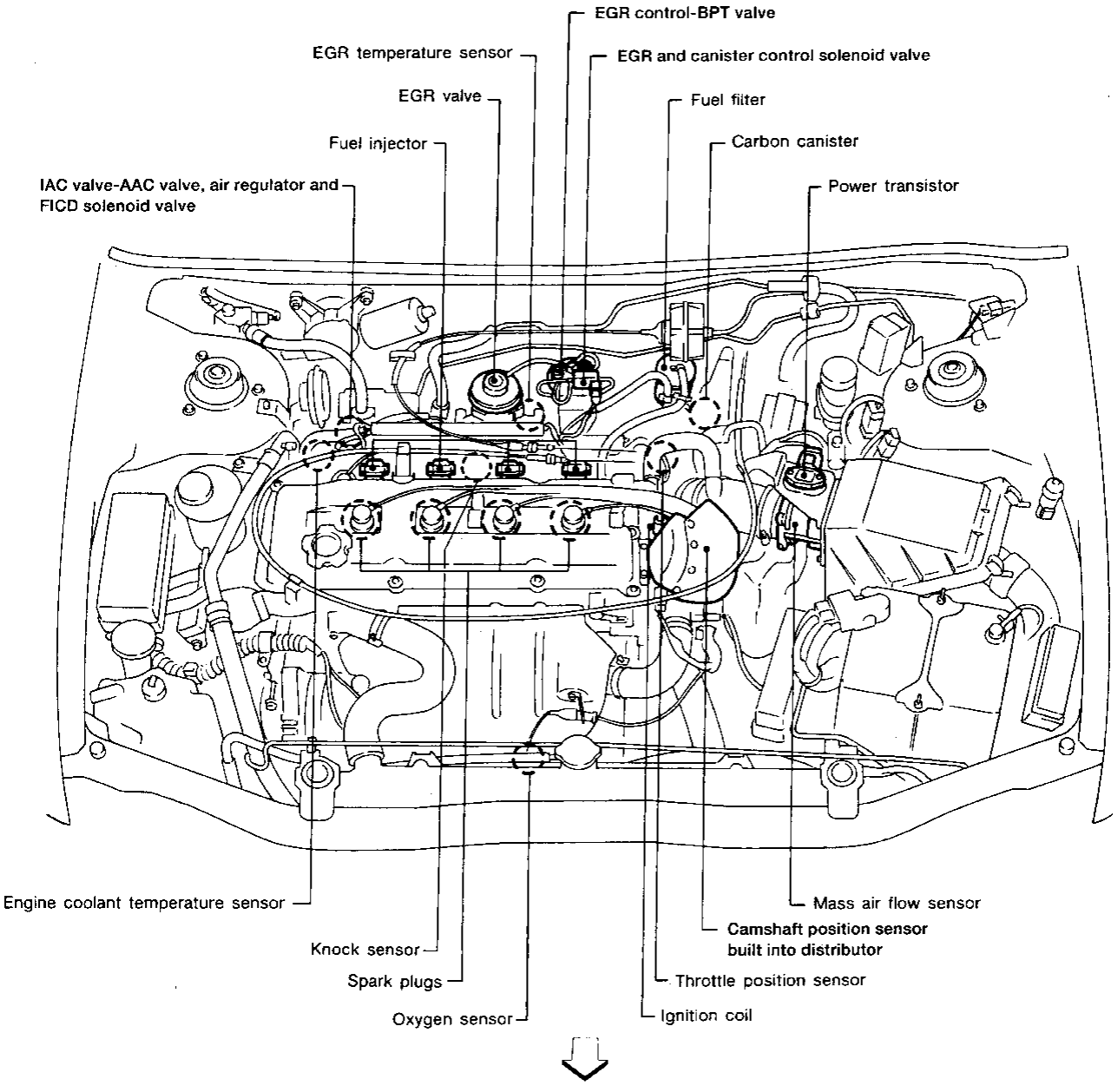
1) Keep the antenna as far as possible away from the electronic control units.
2) Keep the antenna feeder line more the 20 cm (7.9 in) away from the harness of electronic controls.
   Do not let them run parallel for a long distance.
3) Adjust the antenna and feeder line so that the standing-wave ratio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

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

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

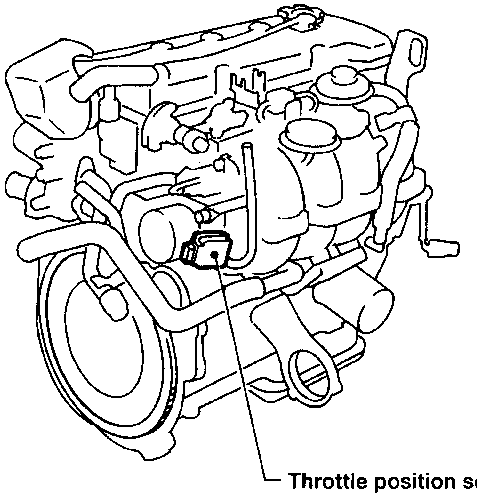
AEC270

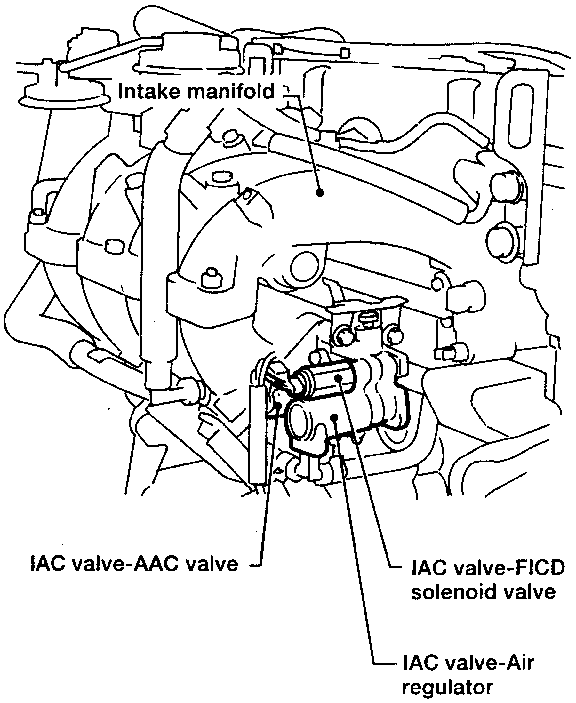
ECCS Component Parts Location

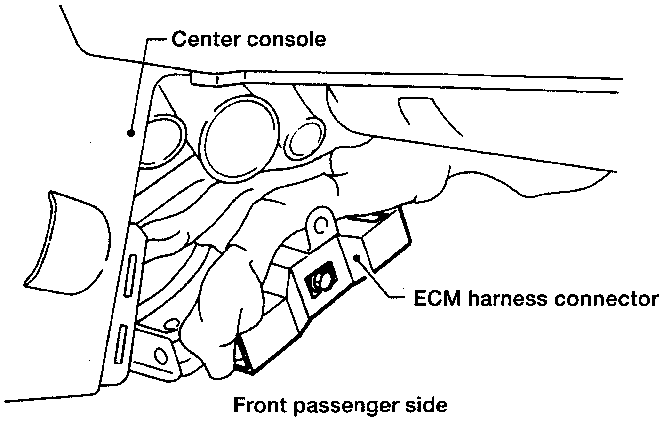


AEC271

ECCS Component Parts Location (Cont'd)



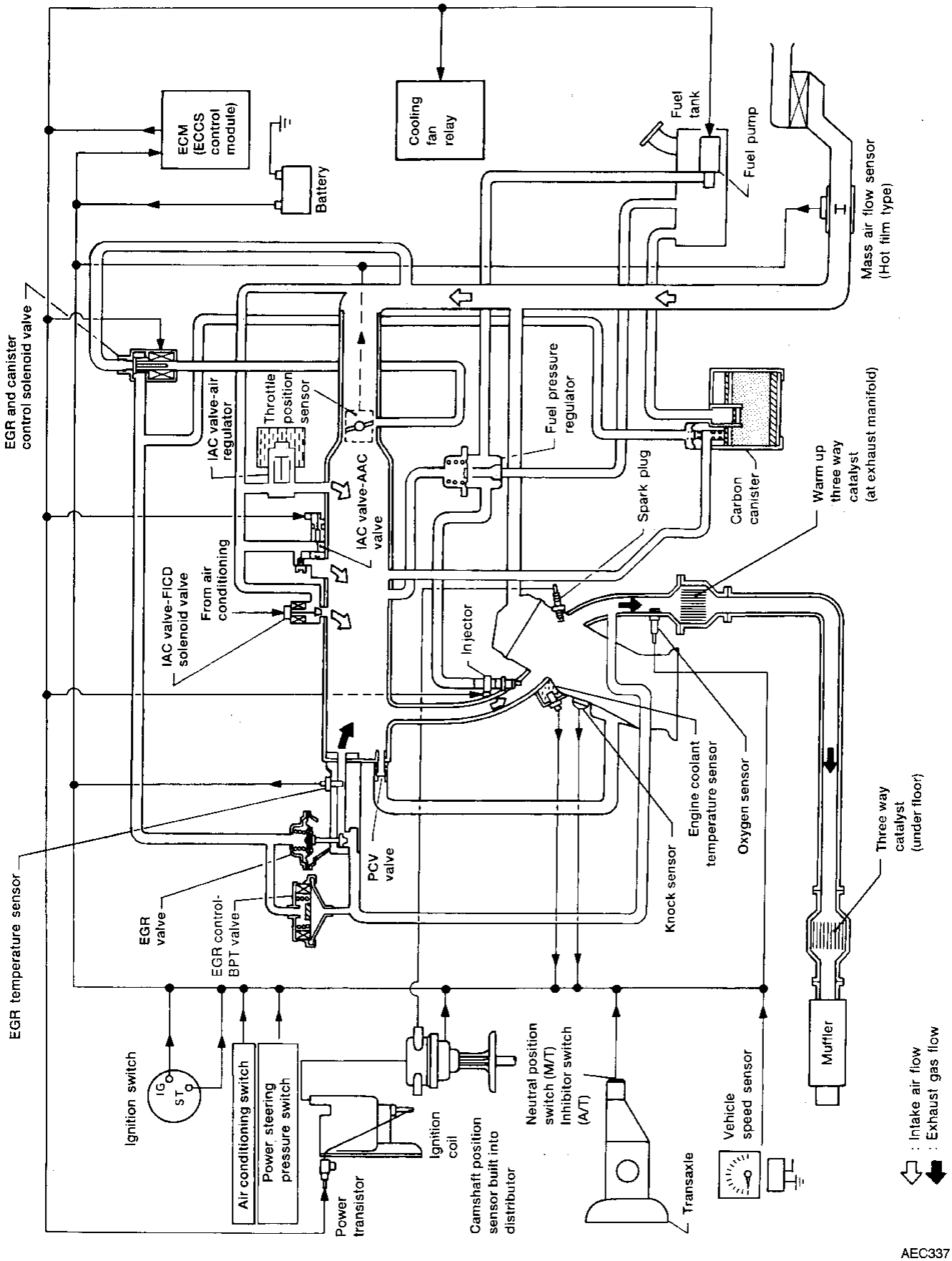




AEC331

System Diagram

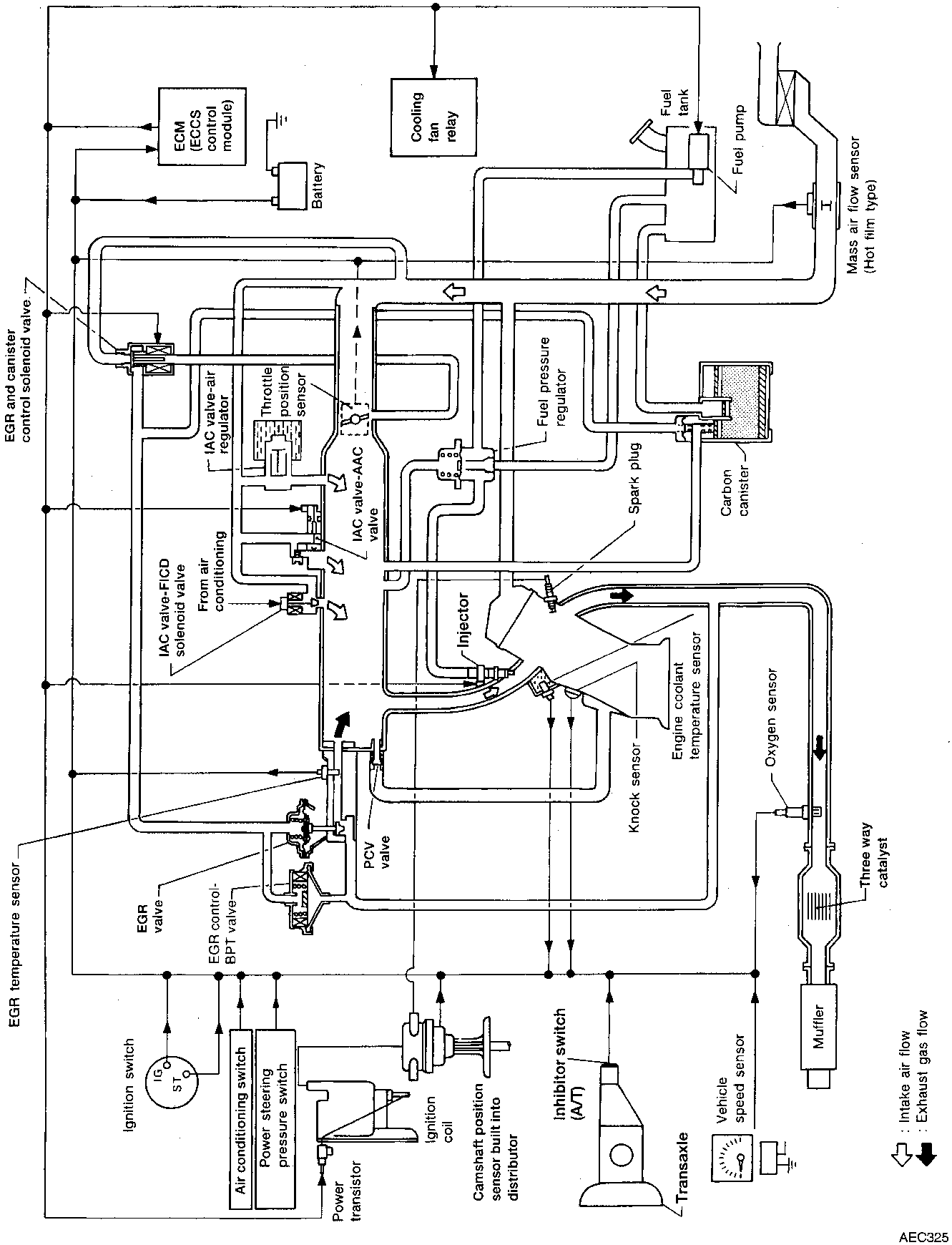
A/T MODELS FOR CALIFORNIA AND M/T MODELS



AEC337

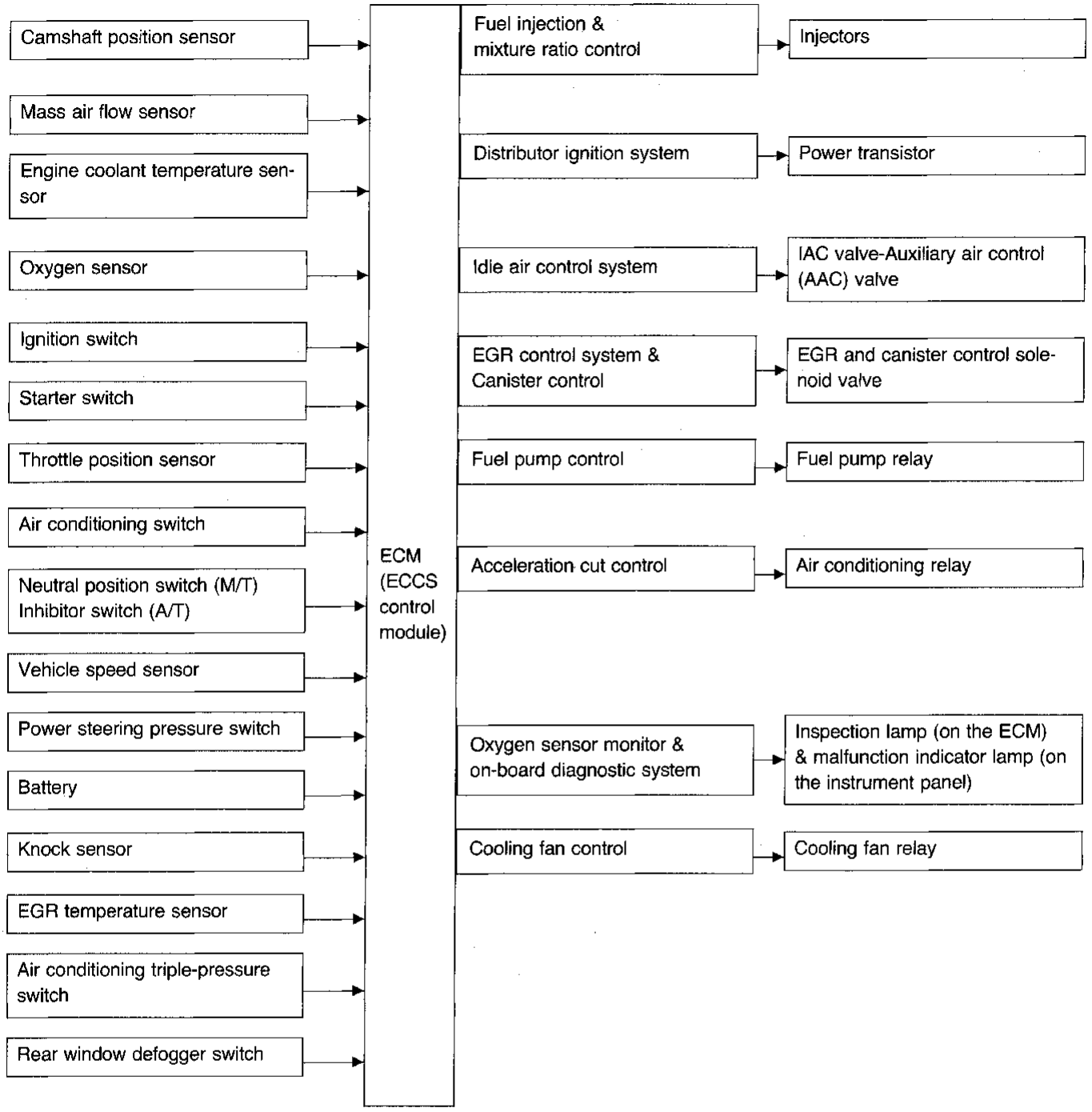
System Diagram (Cont'd)

A/T MODELS EXCEPT FOR CALIFORNIA

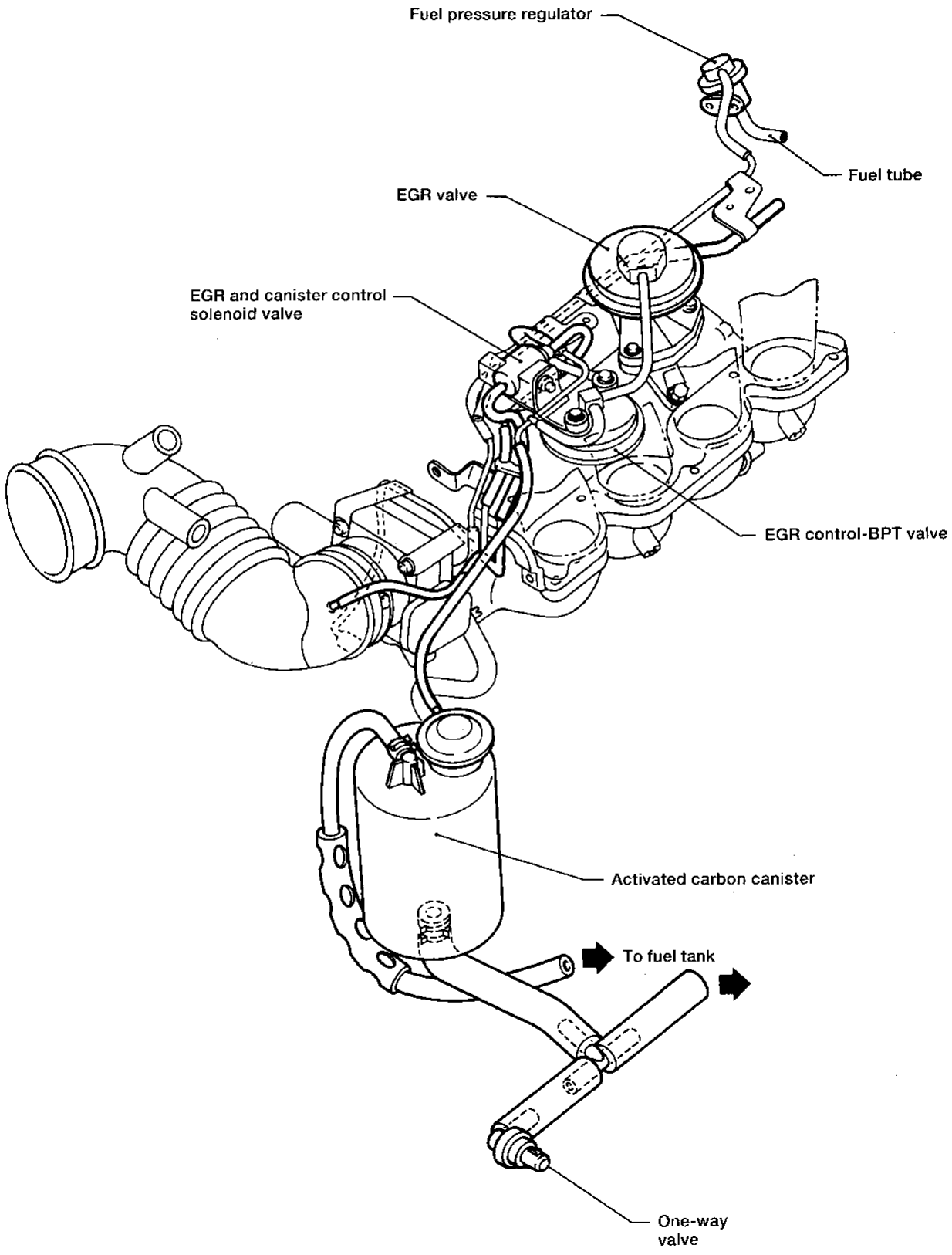


AEC325

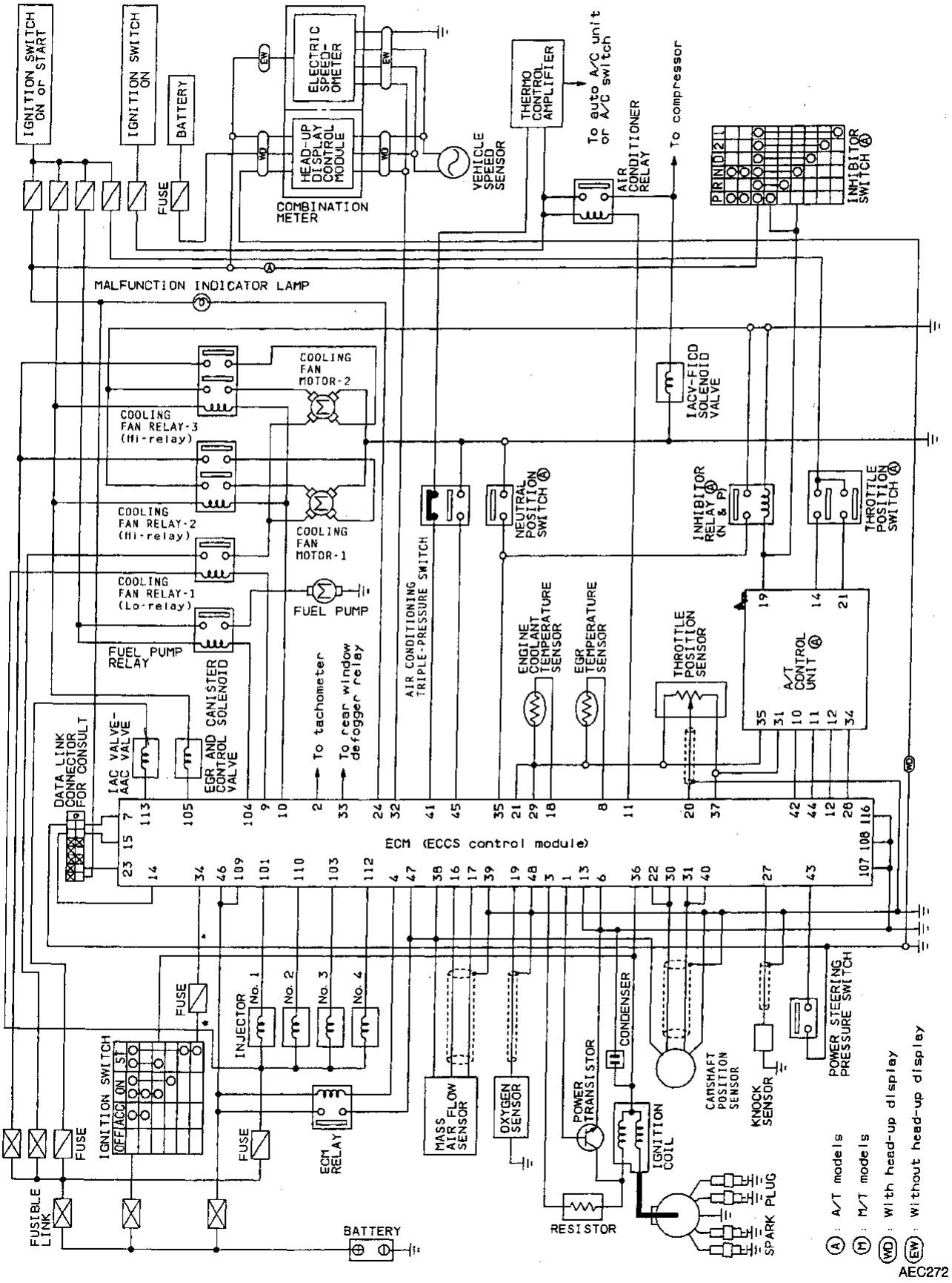
System Chart

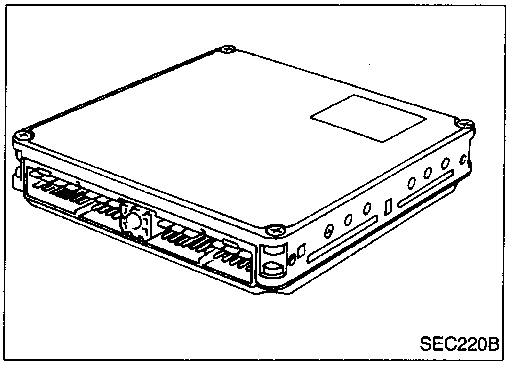


Vacuum Hose Drawing



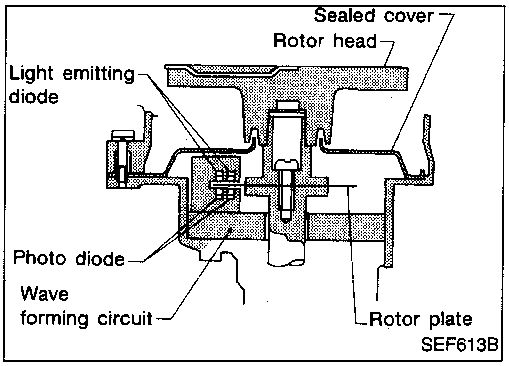
Circuit Diagram




SEC220B

Engine Control Module (ECM)-ECCS Control Module

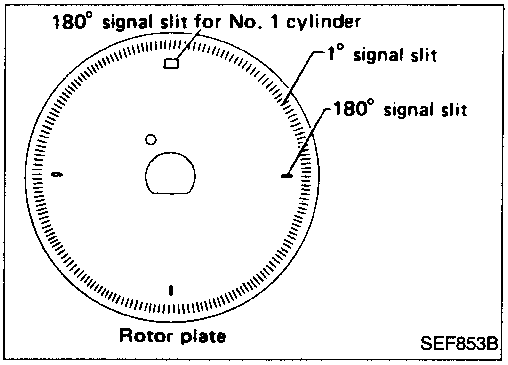
The ECM controls the engine using a microcomputer. It uses input signals from various sensors and components to control ouput devices. The ECM also has an on-board diagnostic test mode selector, an inspection lamp, and connectors for signal input and output, and for power supply. For diagnosis, refer to EF & EC-109.



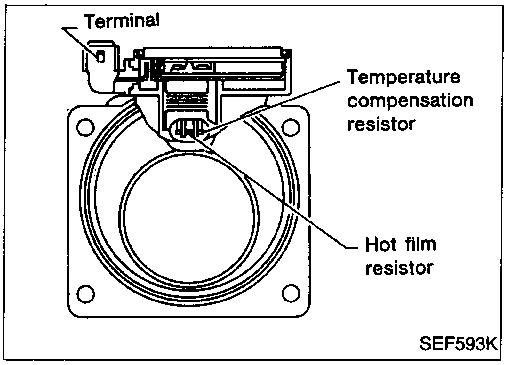
SEF613B

Camshaft Position (CMP) Sensor

The camshaft position sensor is a basic component of the ECCS. It monitors engine speed and piston position. These input signals to the ECM are used to control fuel injection, ignition timing and other functions.
The camshaft position sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for a 1° signal and 4 slits for a 180° signal. The wave-forming circuit consists of Light Emitting Diodes (LED) and photo diodes.
The rotor plate is positioned between the LED and the photo diode. The LED transmits light to the photo diode. As the rotor plate turns, the slits cut the light to generate rough-shaped pulses. These pulses are converted into on-off signals by the wave-forming circuit and sent to the ECM. For diagnosis, refer to EF & EC-95.



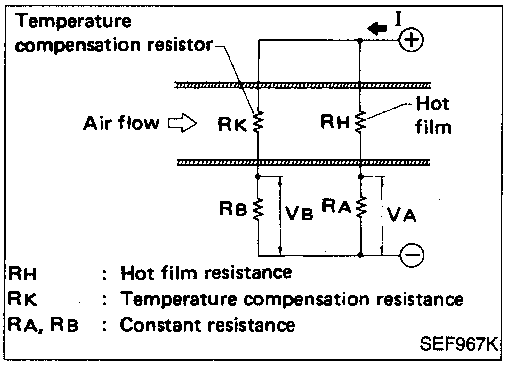
SEF853B



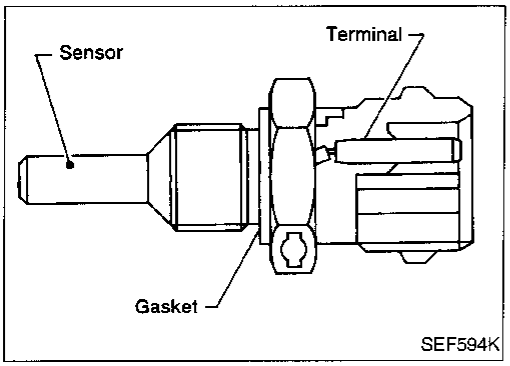
SEF593K

Mass Air Flow (MAF) Sensor

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. It consists of a hot film resistor that is supplied with electric current from the ECM. The temperature of the hot film resistor is controlled by the ECM a certain amount. The heat generated by the hot film resistor is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the ECM must supply more electric current to maintain the temperature of the hot film resistor as air flow increases. The ECM detects the air flow by means of this current change. For diagnosis, refer to EF & EC-98.

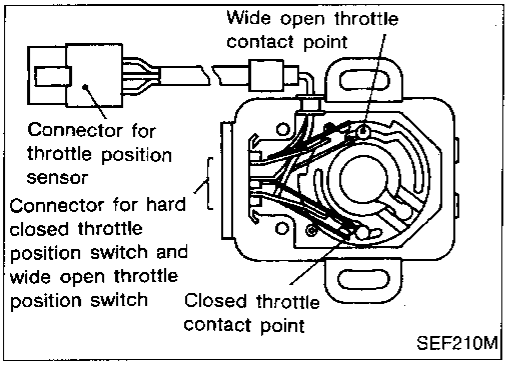


SEF967K



Engine Coolant Temperature (ECT) Sensor

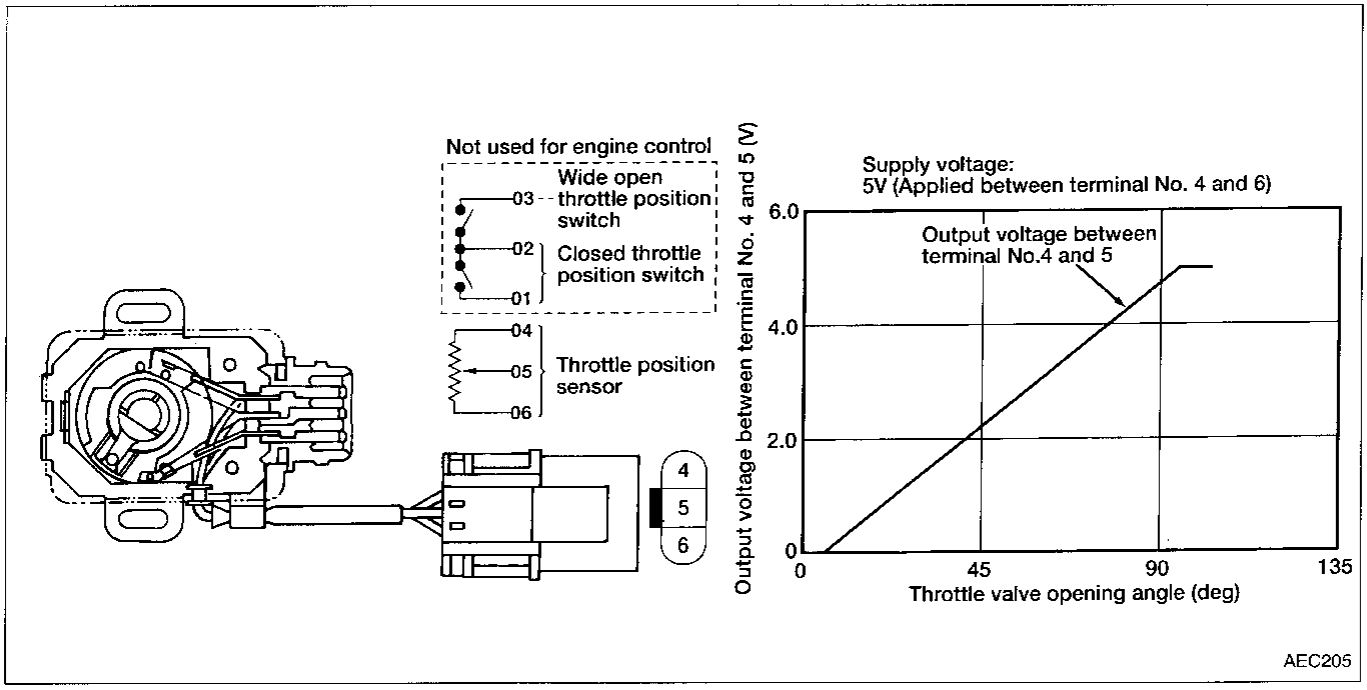
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the ECT input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases. For diagnosis, refer to EF & EC-101.

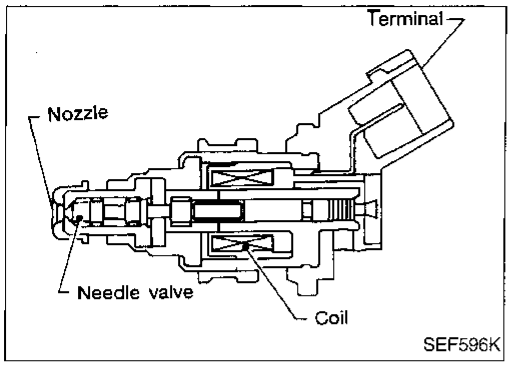


Throttle Position (TP) Sensor & Soft/Hard Closed Throttle Position (CTP) Switch

The throttle position sensor is located on the throttle body. It monitors accelerator pedal movement using a potentiometer. The potentiometer changes the throttle valve position into an output voltage. The throttle position sensor also detects the opening and closing speed of the throttle valve. These signals are sent to the ECM.

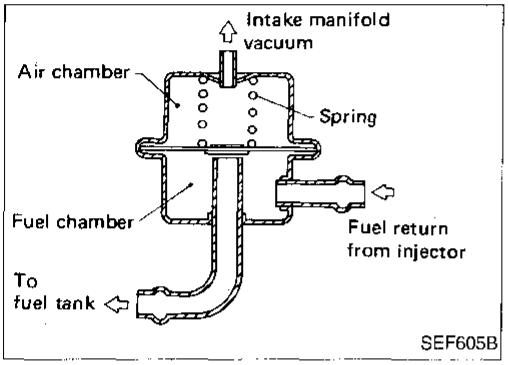
The ECM detects closed throttle valve position using the voltage from the throttle position sensor. This system is called "soft closed throttle position". This signal is used to control engine operations such as fuel cut. On A/T models, "hard closed throttle position switch" is built into the throttle position sensor but is not used for engine control. For diagnosis, refer to EF & EC-122.





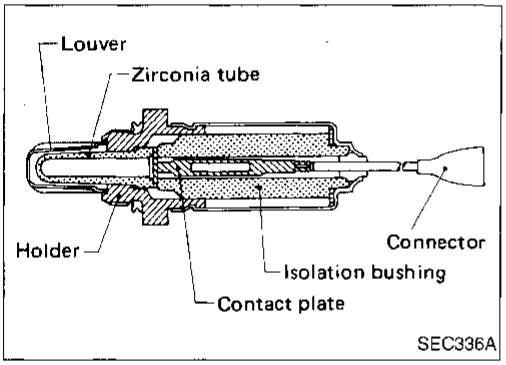
Fuel Injector

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs. For diagnosis, refer to EF & EC-125 or EF & EC-131.



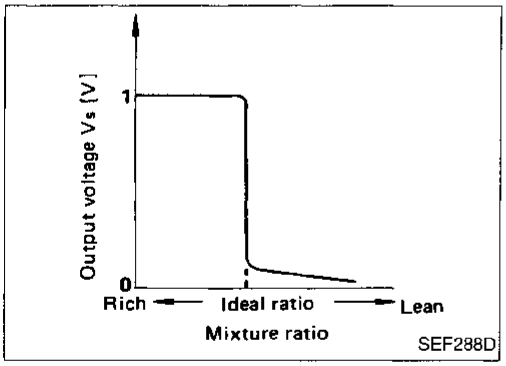
Fuel Pressure Regulator

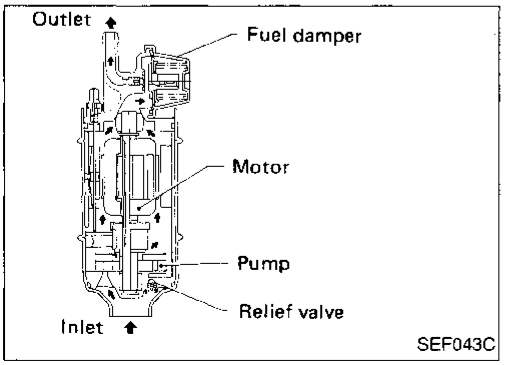
The fuel pressure regulator adjusts the fuel pressure to the fuel injector depending upon engine load. When intake manifold vacuum is high, fuel pressure to the injector will be lowered. When intake manifold vacuum is low, fuel pressure to the injector will be raised. For diagnosis, refer to EF & EC-166.



Oxygen Sensor (O2S)

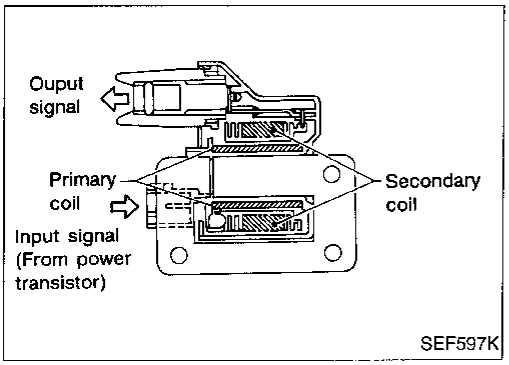
The oxygen sensor is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The oxygen sensor has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The oxygen sensor signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V. For diagnosis, refer to EF & EC-114.





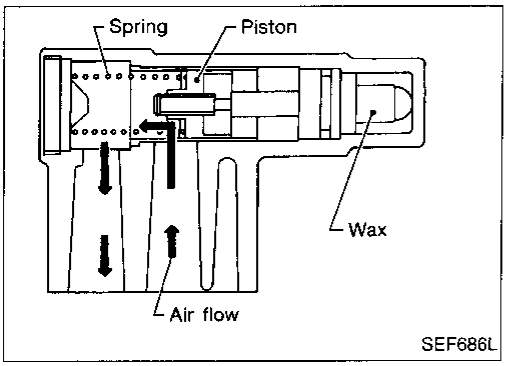
Fuel Pump

The fuel pump is located in the fuel tank. It consists of a motor, pump, fuel damper and relief valve. For diagnosis, refer to EF & EC-133.



Ignition Coil with Power Transistor

The ignition coil is a small molded type. The ignition signal from the ECM is sent to the power transistor. The power transistor switches on and off the ignition coil primary circuit. As the primary circuit is turned on and off, the proper high voltage is induced in the coil secondary circuit. For diagnosis, refer to EF & EC-107.

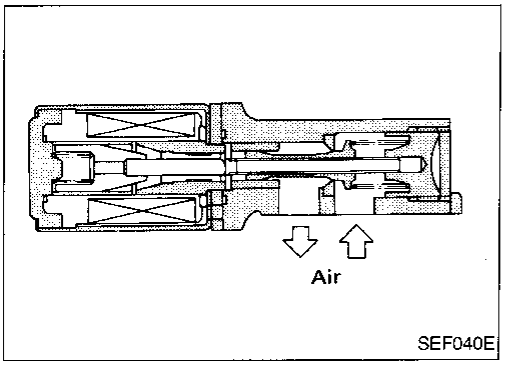


Idle Air Control (IAC) Valve-Air Regulator

The IAC valve-air regulator contains wax, a piston and a spring. When the engine coolant is cold, the wax is compressed allowing an air by-pass port to open. This provides for a fast idle setting while the engine heats. As the engine coolant warms, the wax expands, closing the air by-pass port and decreasing the idle speed.

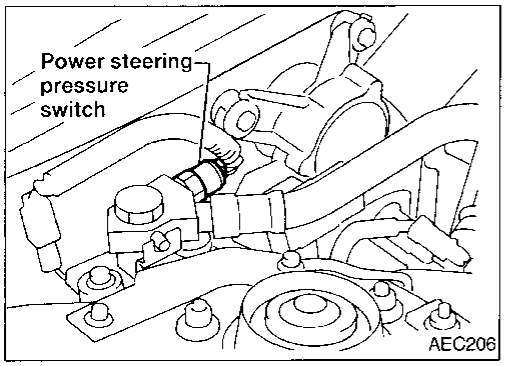
Idle Air Control (IAC) Valve-Fast Idle Control Device (FICD) Solenoid Valve

When the air conditioning is on, the IAC valve-FICD valve supplies additional air to adjust to the increased load.



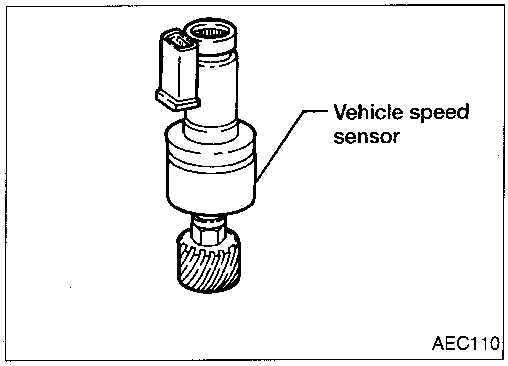
Idle Air Control (IAC) Valve-Auxiliary Air Control (AAC) Valve

The IAC valve-AAC valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of air that will flow through the valve. The more air that flows through the valve, the higher the idle speed. For diagnosis, refer to EF & EC-136.



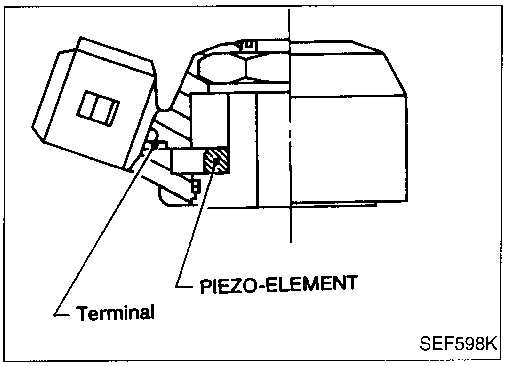
Power Steering Pressure Switch

The power steering pressure switch is attached to the power steering high-pressure tube and detects a power steering load. When a power steering load is detected, it signals the ECM. The ECM adjusts the IAC valve-AAC valve to increase the idle speed and adjust for the increased load. For diagnosis, refer to EF & EC-145.



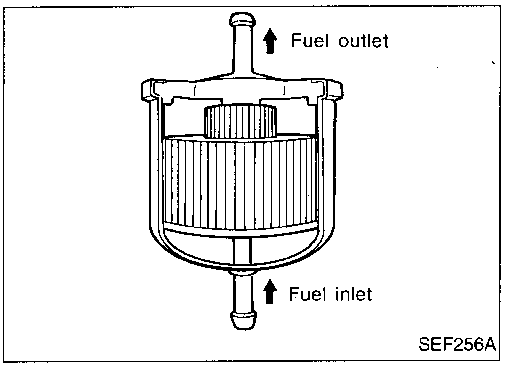
Vehicle Speed Sensor (VSS)

The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM. For diagnosis, refer to EF & EC-104.



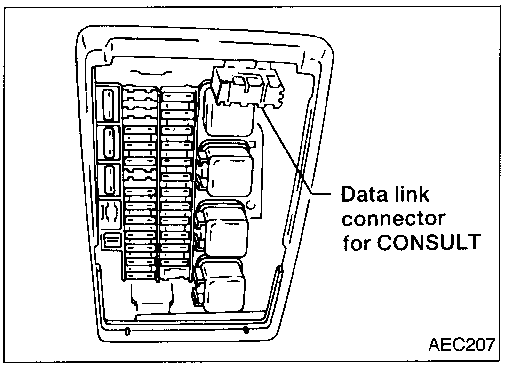
Knock Sensor (KS)

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM. For diagnosis, refer to EF & EC-117.



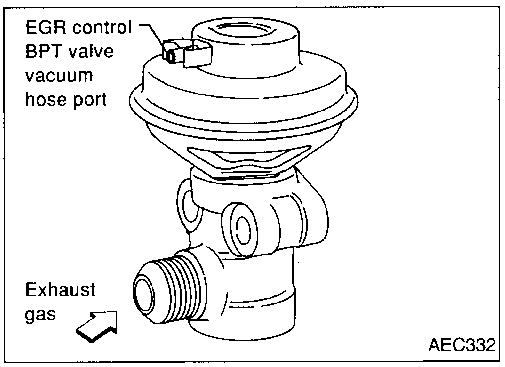
Fuel Filter

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



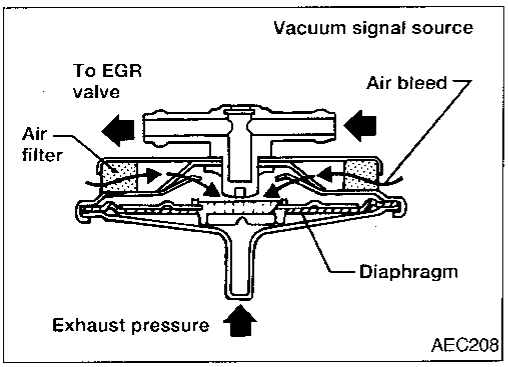
Data Link Connector (DLC) for CONSULT

The data link connector is located beside the fuse lid. The CONSULT tester plugs into the data link connector for diagnosis.



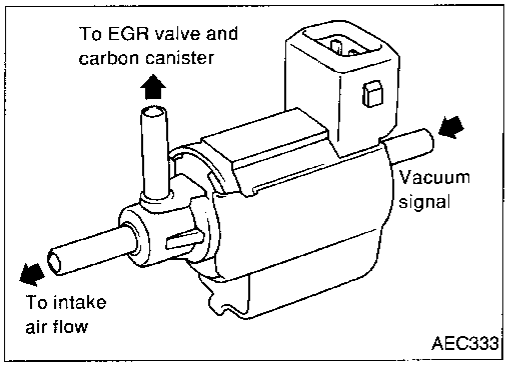
Exhaust Gas Recirculation (EGR) Valve

The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve. For diagnosis, refer to EF & EC-110.



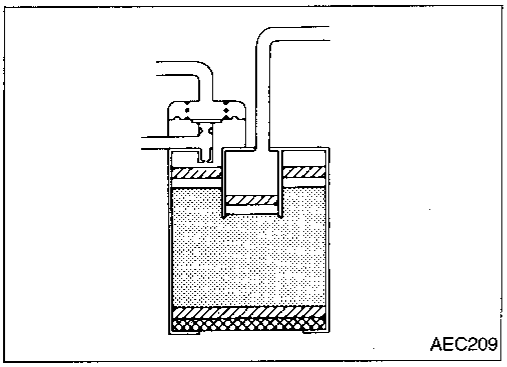
EGR Control-BPT Valve

The EGR control-BPT valve controls the amount of vacuum applied to the EGR valve. A diaphragm adjusts the vacuum in response to exhaust system pressure. This helps control the amount of recirculated exhaust gas based on EGR valve position. For diagnosis, refer to EF & EC-110.



EGR and Canister Control Solenoid Valve

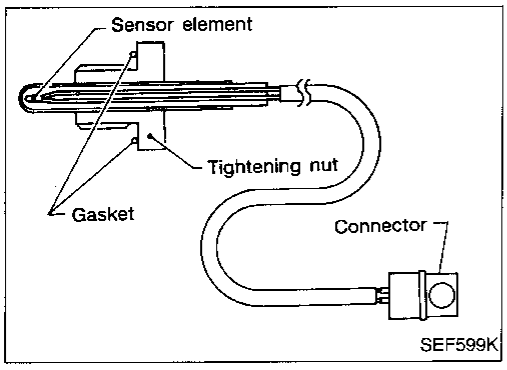
The EGR and canister control solenoid valve responds to signals from the ECM. When the ECM sends a ground signal, the coil in the solenoid valve is energized and a plunger moves to cut the vacuum signal from the throttle body to the EGR valve and carbon canister purge valve. When the ECM sends an OFF signal, the vacuum signal from the throttle body passes through the solenoid valve to the EGR valve and carbon canister. For diagnosis, refer to EF & EC-110.



Carbon Canister

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

The vacuum in the air duct upstream from the throttle body increases with the amount of intake air flow. When this vacuum is greater than a preset value, a second purge control valve on the carbon canister opens. The absorbed gases are delivered to the intake air flow by the vacuum. For diagnosis, refer to EF & EC-168.

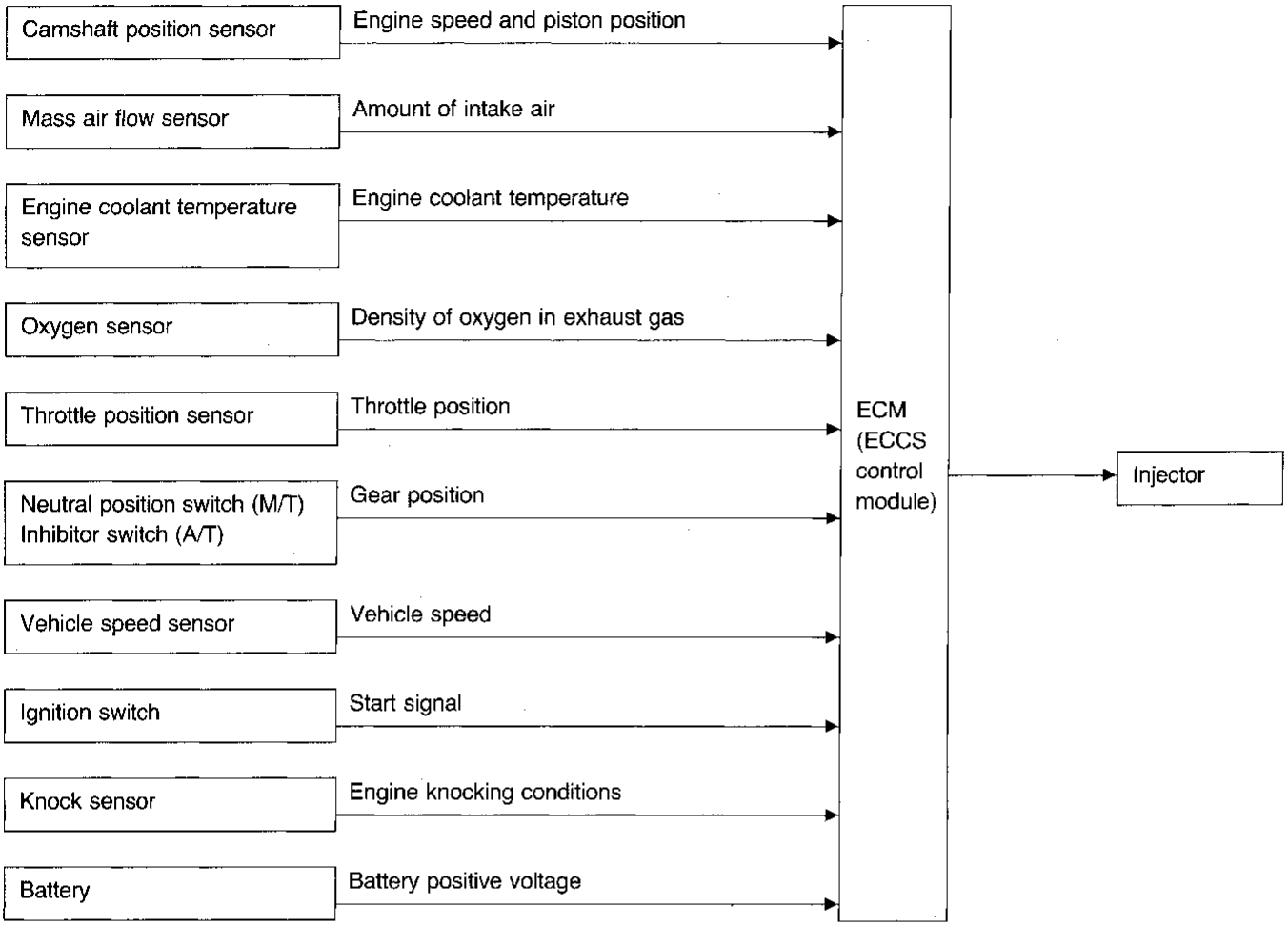


EGR Temperature Sensor

The EGR temperature sensor detects temperature changes in the EGR passage way. When the EGR valve opens, hot exhaust gases flow, and the temperature in the passage way changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases. For diagnosis, refer to EF & EC-119.

Multiport Fuel Injection (MFI) System

INPUT/OUTPUT SIGNAL LINE



BASIC MULTIPORT FUEL INJECTION SYSTEM

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

VARIOUS FUEL INJECTION INCREASE/ DECREASE COMPENSATION

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

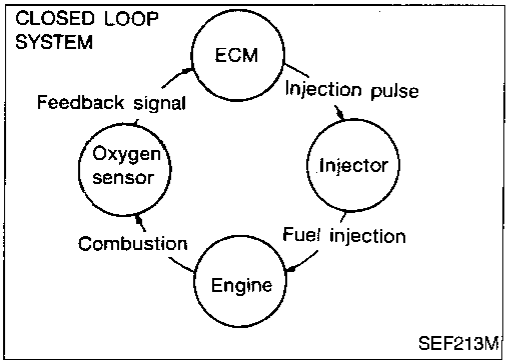
〈Fuel increase〉

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

〈Fuel decrease〉

1) During deceleration
2) During high engine speed operation

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



MIXTURE RATIO FEEDBACK CONTROL

The mixture ratio feedback system is used for precise control of the air-fuel ratio to the stoichiometric point. The three way catalyst can then better reduce CO, HC and NOx emissions. This system uses an oxygen sensor in the exhaust manifold to monitor the mixture ratio. The ECM adjusts the injection pulse width according to the sensor voltage signal. This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.

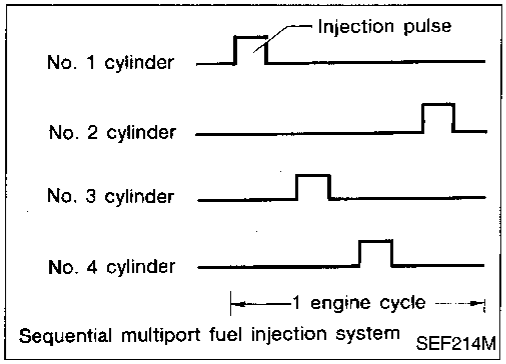
OPEN LOOP CONTROL

The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

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" to "D"

MIXTURE RATIO SELF-LEARNING CONTROL

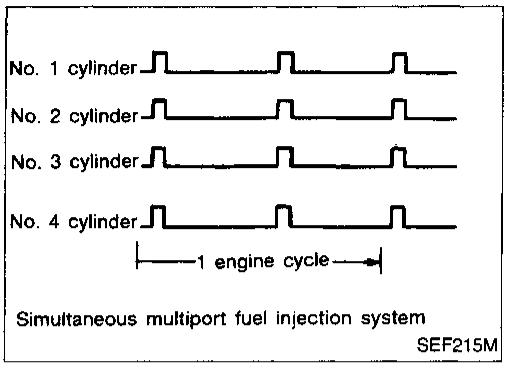
The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the oxygen sensor. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. 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 "injection pulse 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 sequential multiport fuel injection system, fuel is injected into each cylinder during each engine cycle according to the firing order.

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



Simultaneous multiport fuel injection system
SEF215M

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.

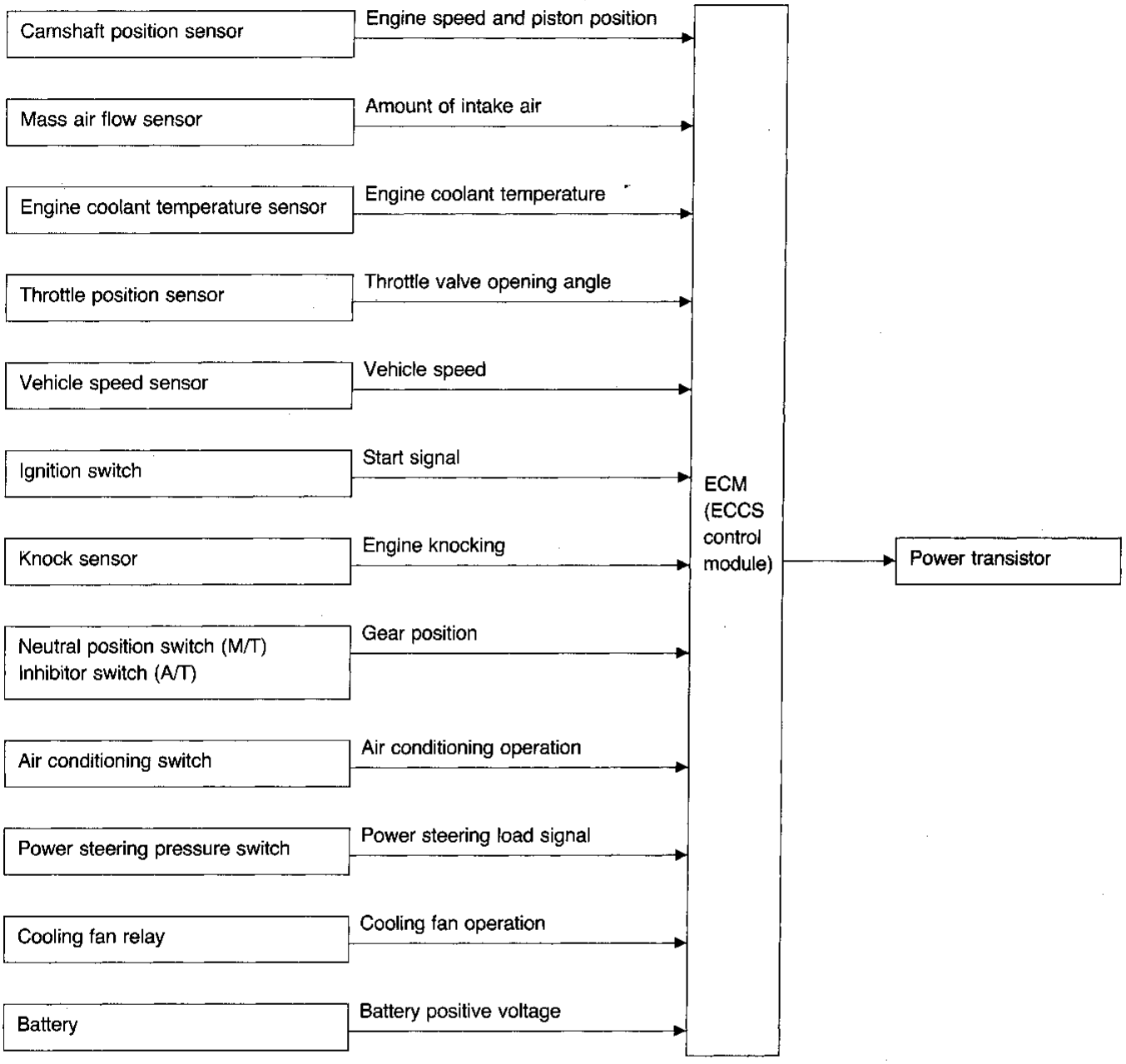
When the engine is being started and/or if the fail-safe system (CPU) is operating, simultaneous multiport fuel injection system is used. When the engine is running sequential multiport fuel injection system is used.

FUEL SHUT-OFF

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

Distributor Ignition (DI) System

INPUT/OUTPUT SIGNAL LINE



Distributor Ignition (DI) System (Cont'd)

SYSTEM DESCRIPTION

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

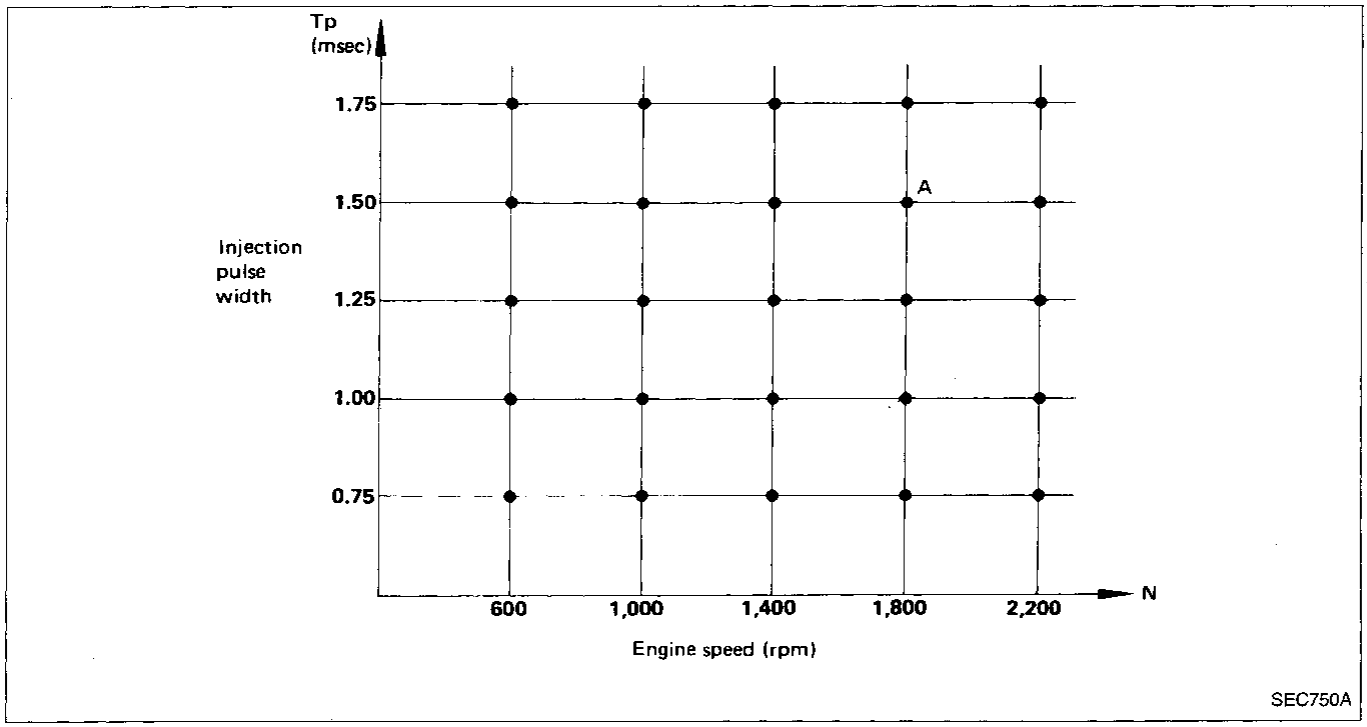
The ignition timing data is stored in the ECM. This data forms the map shown below.

The ECM detects information such as the injection pulse width and camshaft position sensor signal. Responding to this information, ignition signals are transmitted to the power transistor.

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

During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

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

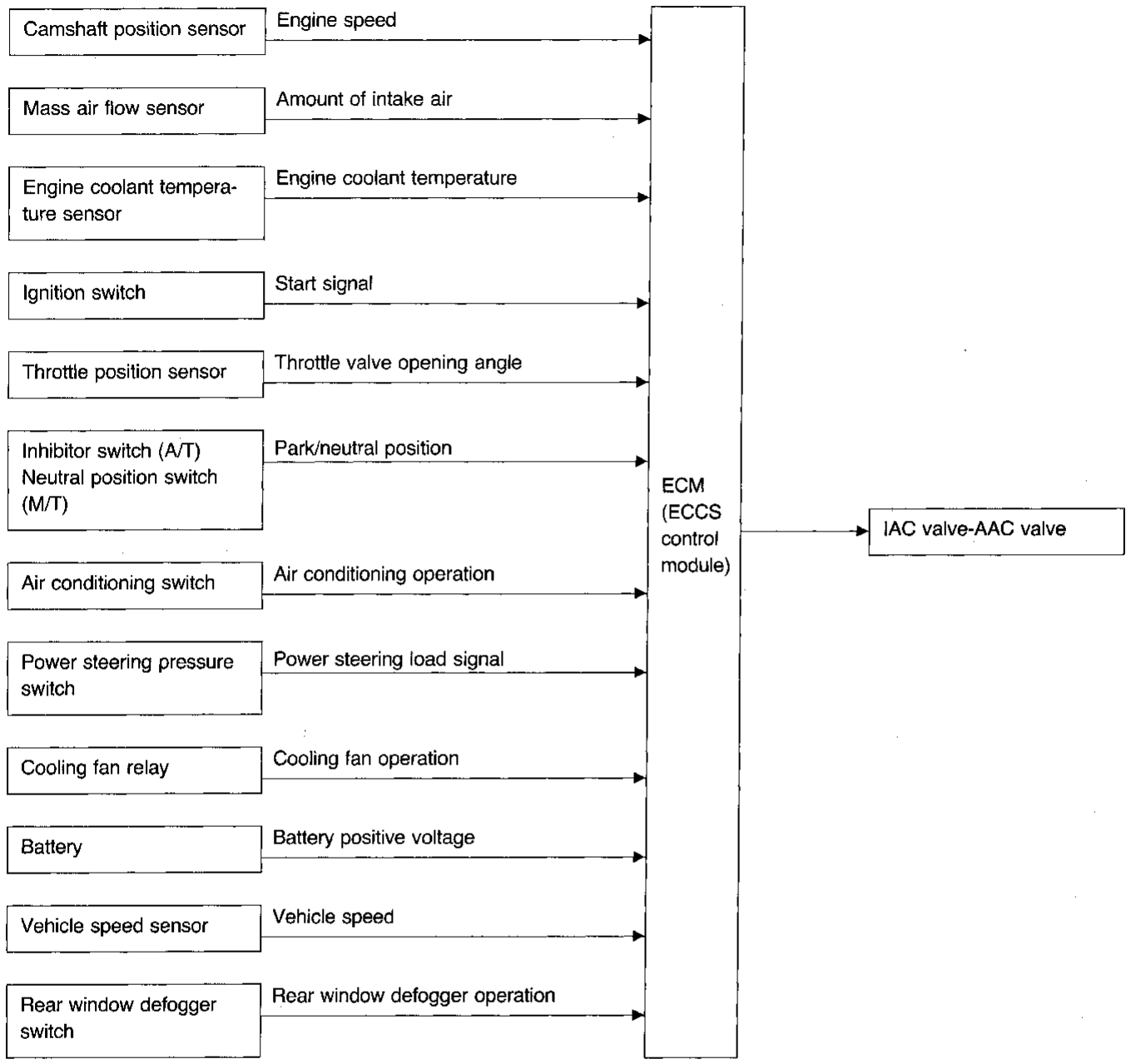


The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions.

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

Idle Air Control (IAC) System

INPUT/OUTPUT SIGNAL LINE



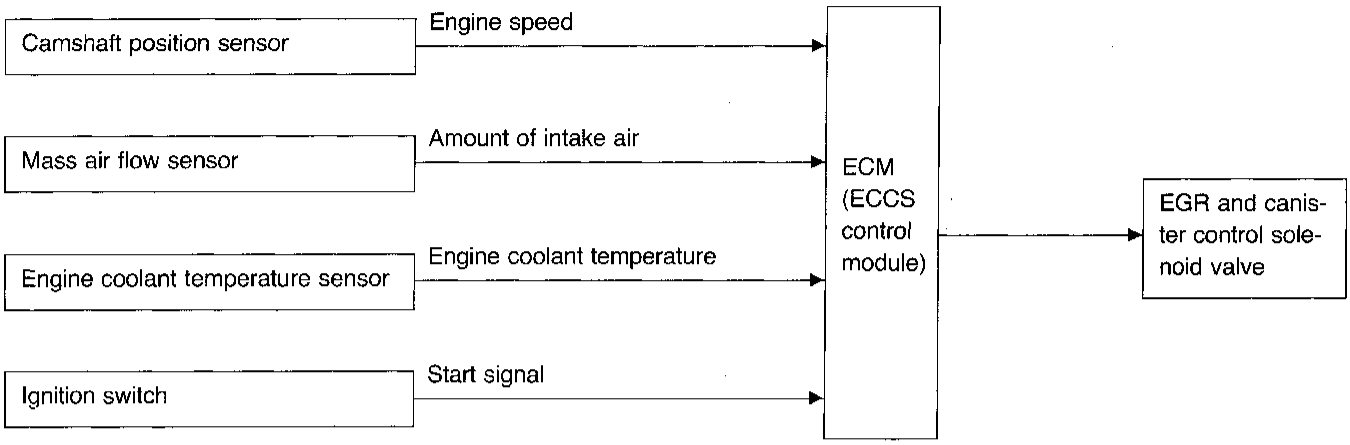
SYSTEM DESCRIPTION

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which by-passes the throttle valve via the IAC valve-AAC valve. The IAC valve-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM.

The ECM then controls the ON/OFF time of the IAC valve-AAC valve so that the 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 various engine conditions into consideration. This includes noise and vibration transmitted to the vehicle interior, fuel consumption, and engine load.

Exhaust Gas Recirculation (EGR) System

INPUT/OUTPUT SIGNAL LINE



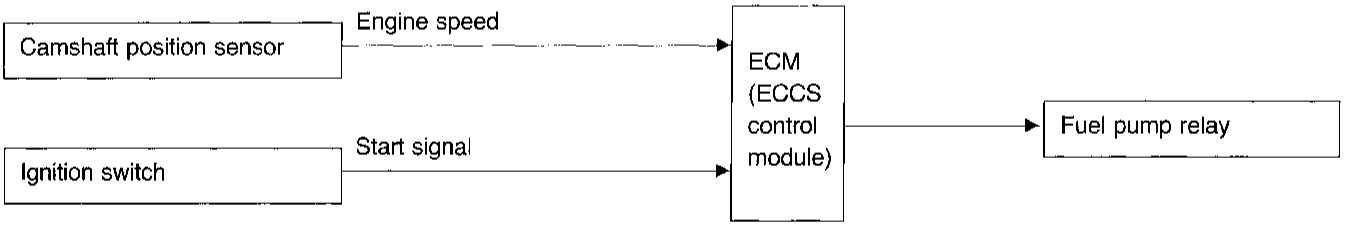
SYSTEM DESCRIPTION

A system is provided which precisely cuts and controls vacuum applied to the EGR valve to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM and the EGR and canister control solenoid valve. When the ECM detects any of the following conditions, current flows through the solenoid valve, causing the port vacuum to be discharged into the atmosphere. 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

Fuel Pump Control

INPUT/OUTPUT SIGNAL LINE



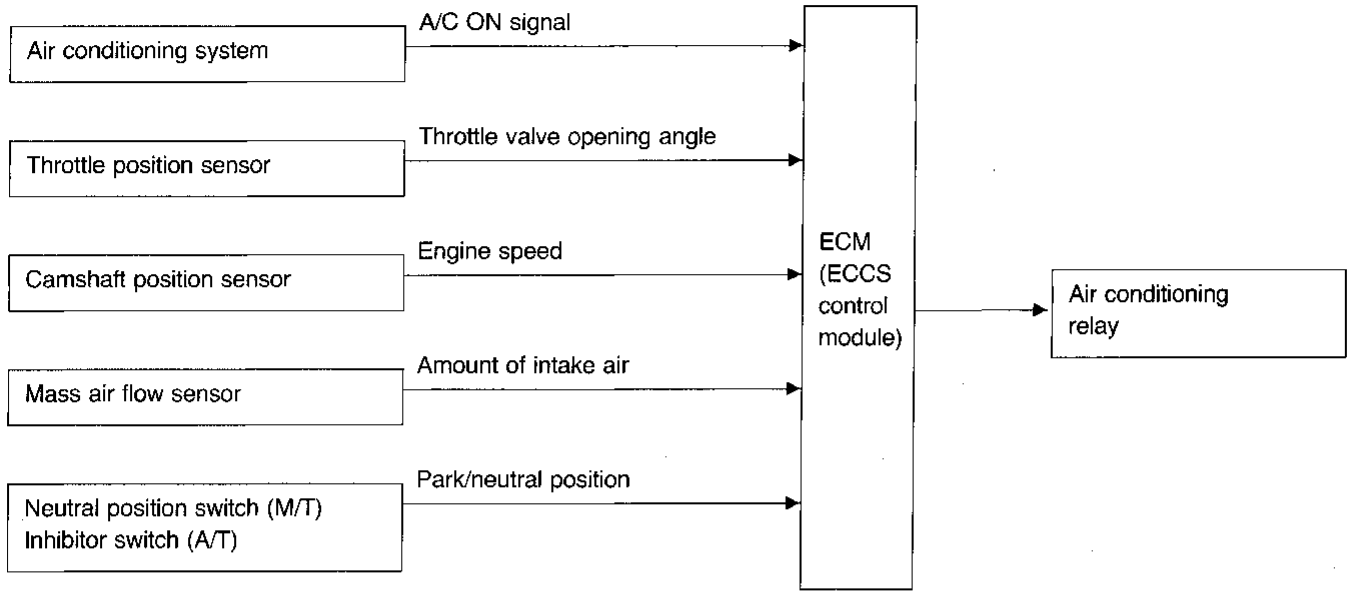
SYSTEM DESCRIPTION

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

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 5 seconds
Engine running and cranking	Operates
When engine is stopped	Stops in 1 second
Except as shown above	Stops

Acceleration Cut Control

INPUT/OUTPUT SIGNAL LINE



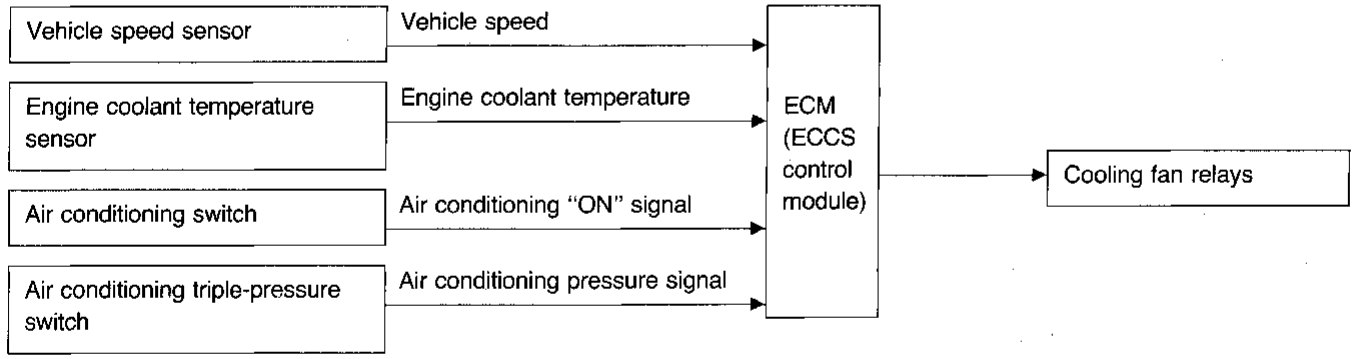
SYSTEM DESCRIPTION

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

This system improves acceleration when the air conditioning is used.

Cooling Fan Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

The ECM controls the cooling fan corresponding to the following conditions.

1) Vehicle speed
2) Engine coolant temperature
3) Air conditioning discharge side pressure
4) Air conditioning ON signal

The control system has a 3-step control [HIGH/LOW/OFF].

Cooling Fan Control (Cont'd)

OPERATION

Vehicle speed km/h (MPH)	Air conditioning switch	Air conditioning triple-pressure switch	Engine coolant temperature °C(°F)		
			95 (203)	100 (212)	105 (221)
0 - 20 (0 - 12)	OFF	OFF	OFF	LOW	HIGH
	ON	OFF	LOW		HIGH
		ON	HIGH		
20 - 80 (12 - 50)	OFF	OFF	OFF	LOW	HIGH
	ON	OFF	LOW		HIGH
		ON	LOW		HIGH
80 (50) or more	OFF	OFF	OFF	LOW	HIGH
	ON	OFF	OFF	LOW	HIGH
		ON	OFF	LOW	HIGH

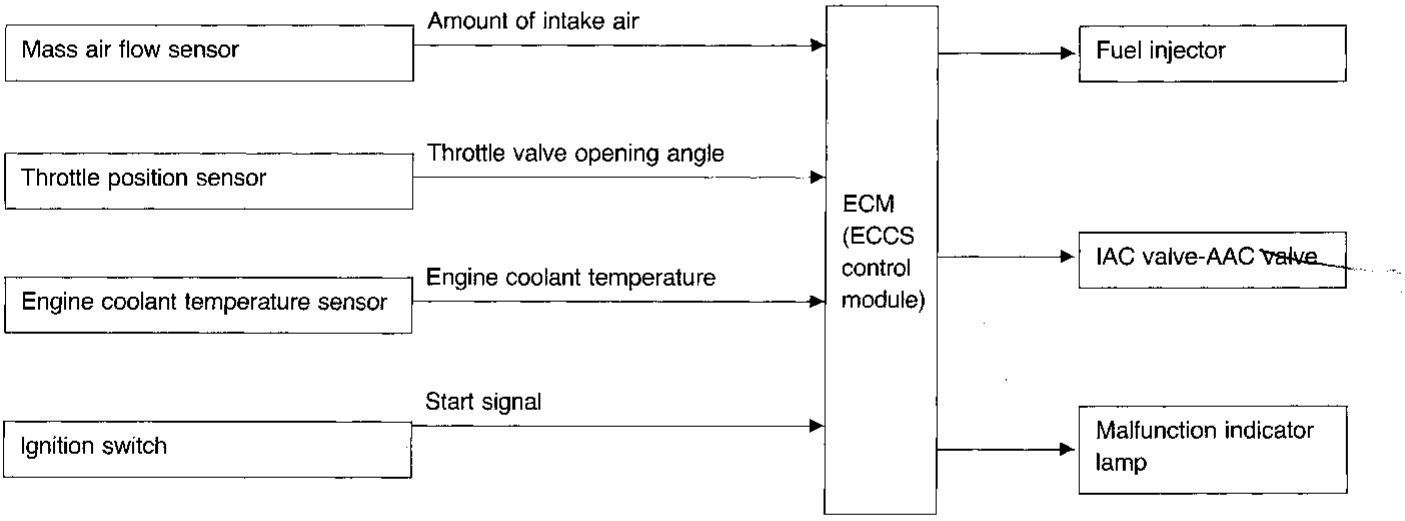
AT models for California and MT models

When the ignition switch is turned off at high engine coolant temperature, the cooling fan operates at low speed for a specific time. Cooling fan operating time is set by the engine coolant temperature when the ignition switch is turned off.

Fail-safe System

CPU MALFUNCTION

Input/output signal line



Outline

The fail-safe system makes engine starting possible if there is something malfunctioning in the ECM's CPU circuit. In former models, engine starting was difficult under this condition. However, provisions in this fail-safe system make it possible to start the engine.

Fail-safe system activating condition when ECM is malfunctioning

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

Fail-safe System (Cont'd)

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.

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 conditions are satisfied after turning the ignition switch from OFF to ON.

MASS AIR FLOW SENSOR MALFUNCTION

The ECM senses a 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. 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. Engine speed will not rise more than 2,400 rpm. This informs the driver of fail-safe system operation while driving.

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)

AT models for California and MT models

When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates for 120 seconds after turning off the ignition switch.

KNOCK SENSOR MALFUNCTION

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

THROTTLE POSITION SENSOR MALFUNCTION

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

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

START SIGNAL FOR MALFUNCTION

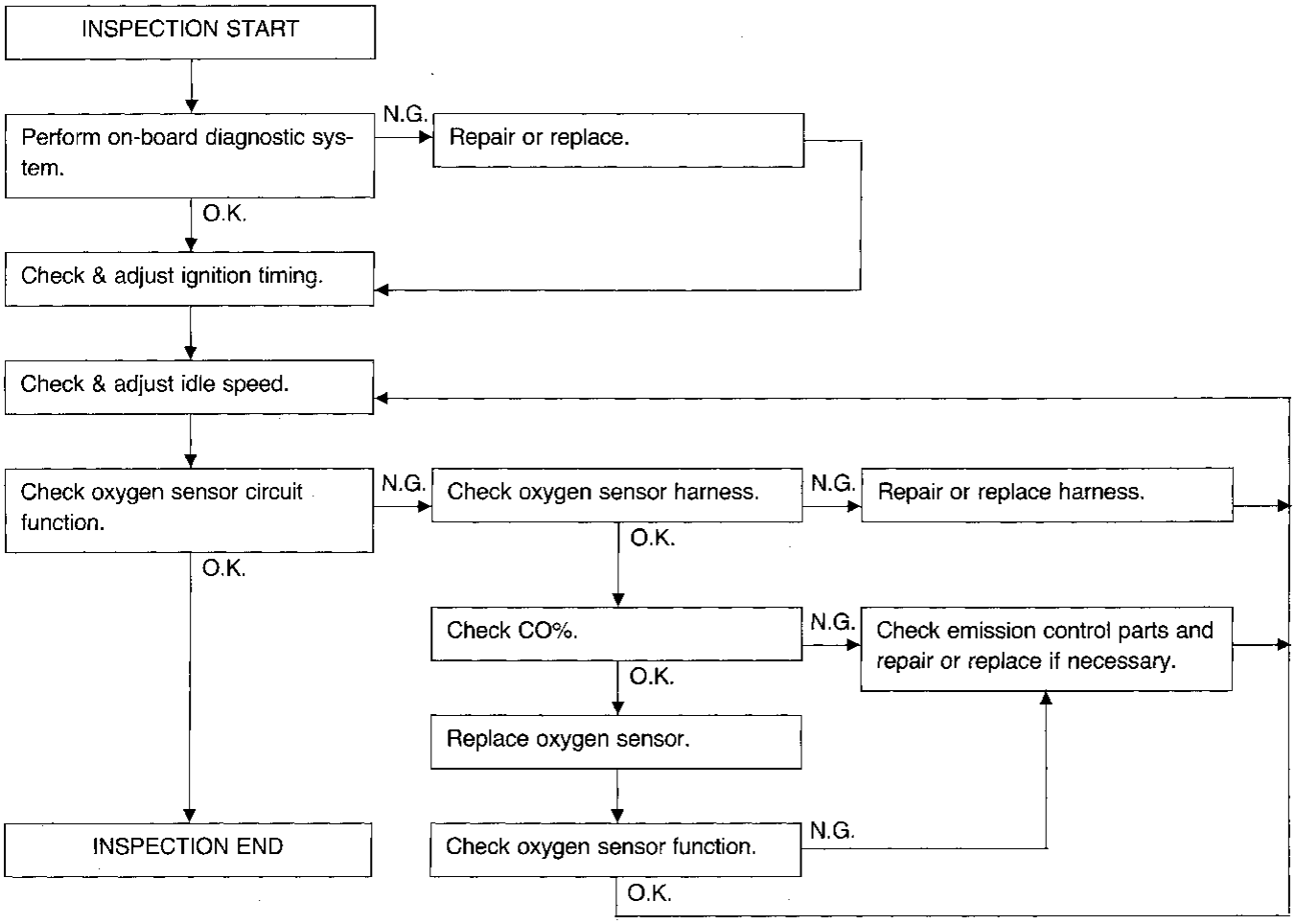
If the ECM always receives a start signal, the ECM will judge the start signal "OFF" when engine speed is above 1,000 rpm. This prevents extra enrichment.
After the engine speed is below 200 rpm, start-up enrichment will be allowed until the engine speed reaches 1,000 rpm.

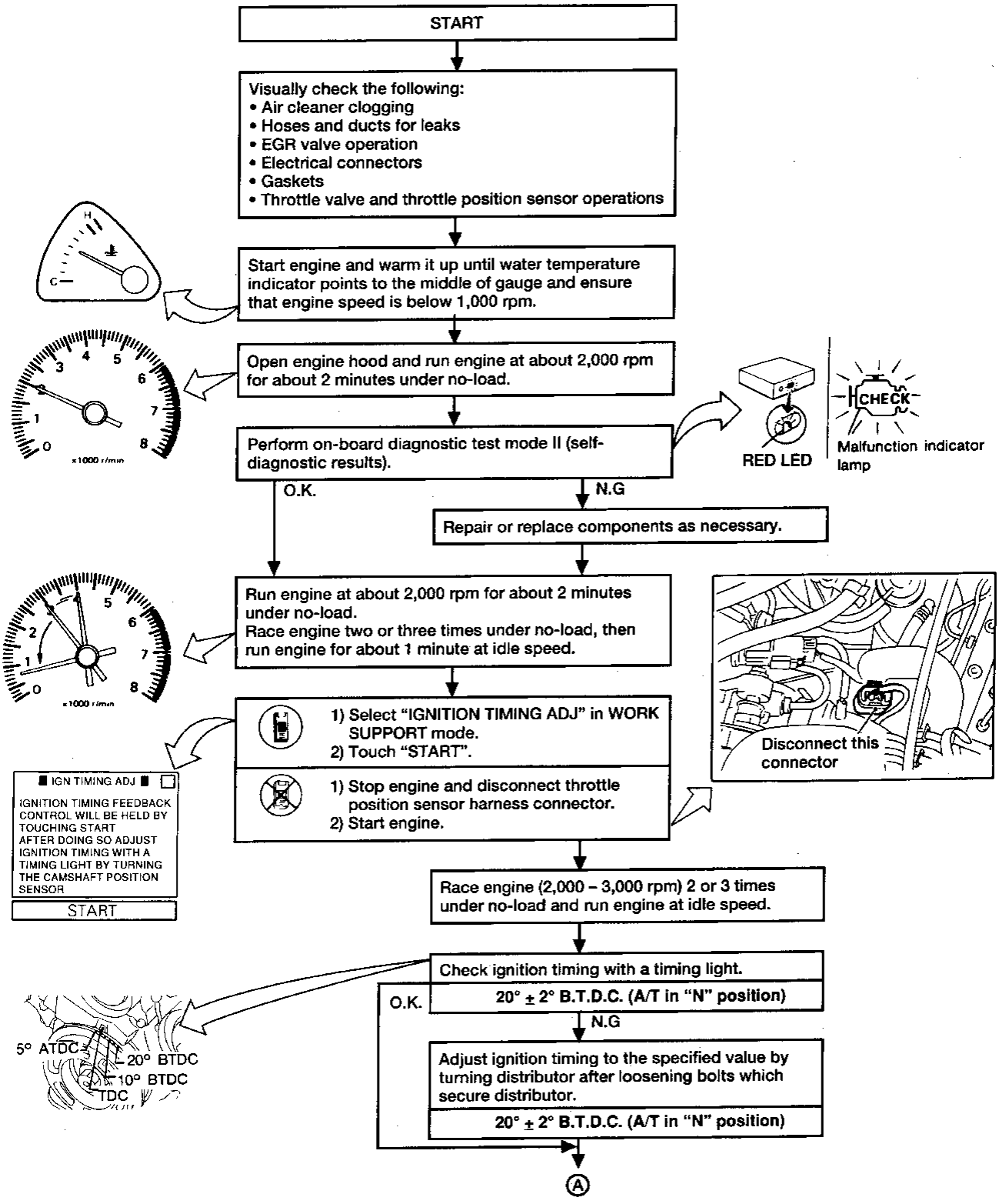
PREPARATION

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

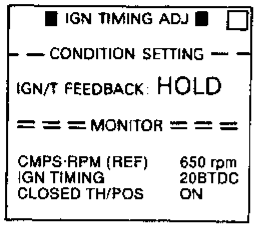
2. On air conditioning equipped models, checks should be carried out while the air conditioning is "OFF".
3. On automatic transaxle equipped models, when checking idle rpm, ignition timing and mixture ratio, checks should be carried out while shift lever is in "N" position.
4. When measuring "CO" percentage,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

Overall inspection sequence




START
Visually check the following:
• Air cleaner clogging
• Hoses and ducts for leaks
• EGR valve operation
• Electrical connectors
• Gaskets
• Throttle valve and throttle position sensor operations
Start engine and warm it up until water temperature indicator points to the middle of gauge and ensure that engine speed is below 1,000 rpm.
Open engine hood and run engine at about 2,000 rpm for about 2 minutes under no-load.
Perform on-board diagnostic test mode II (self-diagnostic results).
RED LED
CHECK
Malfunction indicator lamp
O.K.
N.G
Repair or replace components as necessary.
Run engine at about 2,000 rpm for about 2 minutes under no-load.
Race engine two or three times under no-load, then run engine for about 1 minute at idle speed.
1) Select "IGNITION TIMING ADJ" in WORK SUPPORT mode.
2) Touch "START".
1) Stop engine and disconnect throttle position sensor harness connector.
2) Start engine.
Disconnect this connector
IGN 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 CAMSHAFT POSITION SENSOR
START
Race engine (2,000 – 3,000 rpm) 2 or 3 times under no-load and run engine at idle speed.
Check ignition timing with a timing light.
O.K.
20° ± 2° B.T.D.C. (A/T in "N" position)
N.G
Adjust ignition timing to the specified value by turning distributor after loosening bolts which secure distributor.
20° ± 2° B.T.D.C. (A/T in "N" position)
5° ATDC
20° BTDC
10° BTDC
TDC
Ⓐ

AEC273



Ⓐ

Check idle speed.

Read idle speed in "IGN TIMING ADJ" mode with CONSULT.

Check idle speed.

650° ± 50 rpm (A/T in "N" position)

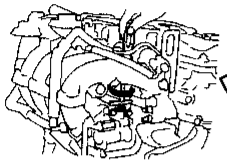
O.K.

Ⓓ

1) Select "IGNITION TIMING ADJ" in WORK SUPPORT mode.
2) Touch "START".

1) Stop engine and disconnect throttle position sensor harness connector.
2) Start engine.

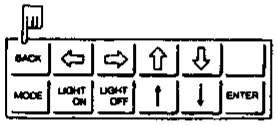
N.G.



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

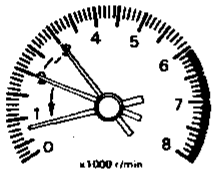
Adjust idle speed by turning idle speed adjusting screw.

650 ± 50 rpm (A/T in "N" position)

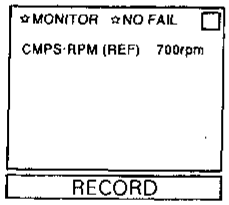


Touch "Back".

1) Stop engine and connect throttle position sensor harness connector.
2) Start engine.



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



Check idle speed.

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

OR

Check idle speed.

700° ± 50 rpm (A/T in "N" position)

O.K.

N.G

Check IAC valve–AAC valve and replace if necessary.

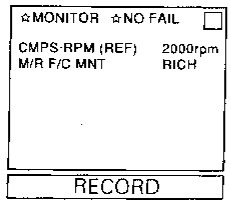
Check IAC valve-AAC valve harness and repair if necessary.

Check ECM function* by substituting another known good ECM.

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

Ⓑ

AEC274



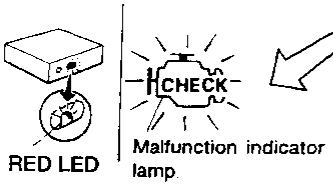
Ⓑ

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

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

OR

1) Set "Oxygen sensor monitor" in the On-board Diagnostic Test Mode II.
(See page EF & EC 38).
2) Maintaining engine at 2,000 rpm under no-load (engine is warmed up sufficiently), check to make sure that malfunction indicator lamp on the instrument panel goes ON and OFF more than 5 times during 10 seconds.

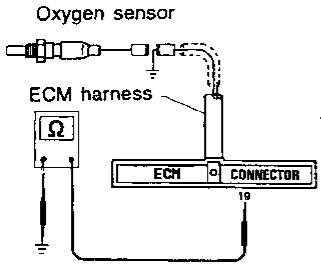


O.K. N.G.

INSPECTION END

Check oxygen sensor harness:
1) Turn off engine and disconnect battery ground cable.
2) Disconnect ECM harness connector from ECM.
3) Disconnect oxygen sensor harness connector and connect terminal for oxygen sensor to ground with a jumper wire.
4) Check for continuity between terminal No. 19 of ECM harness connector and ground metal on vehicle body.

Continuity exists ... O.K.
Continuity does not exist ... N.G.



O.K. N.G.

Connect ECM harness connector to ECM.

Repair harness

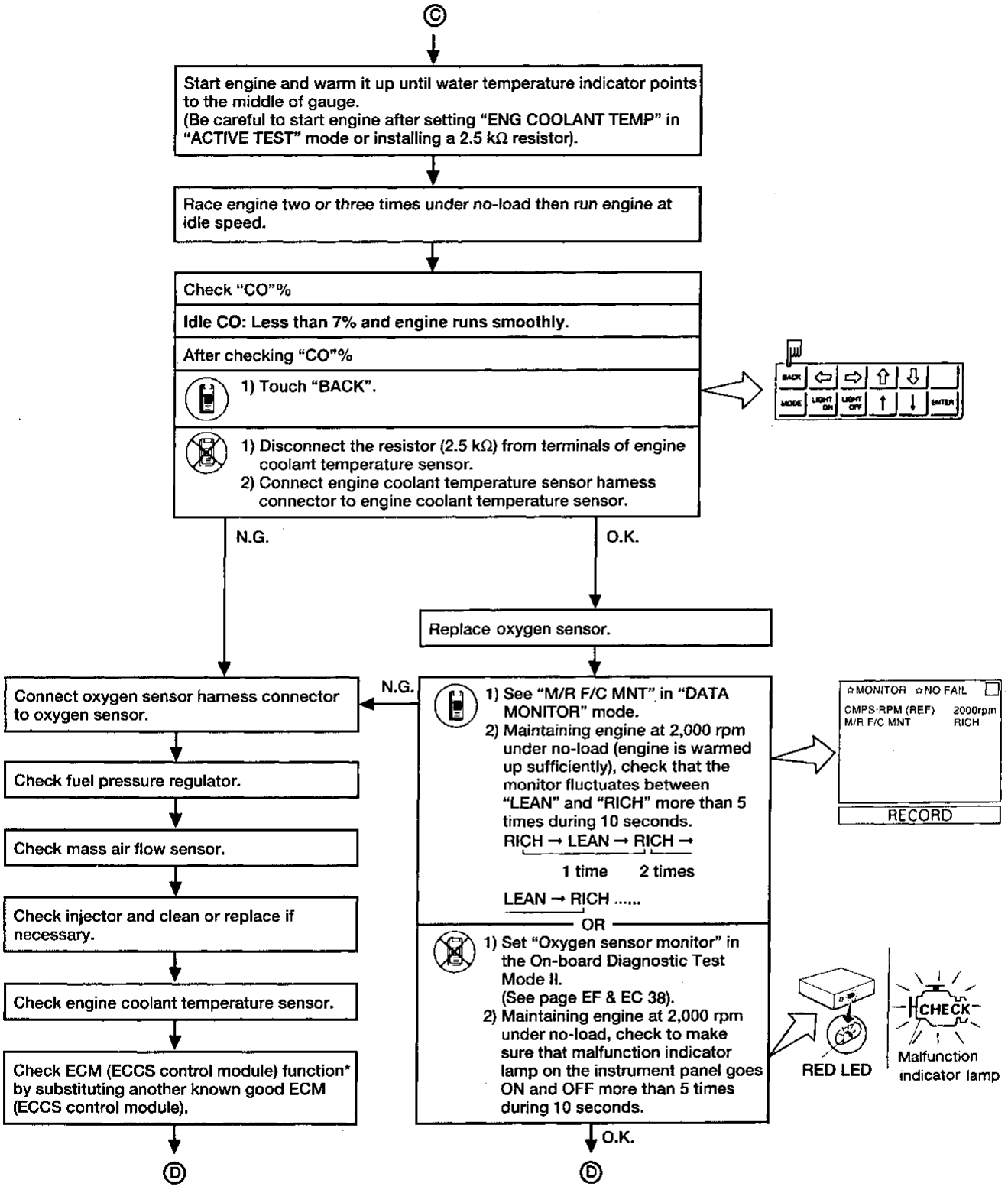
Ⓓ

1) Select "ENG COOLANT TEMP" in "ACTIVE TEST" mode.
2) Set "ENGINE TEMP" at 20°C (68°F).

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

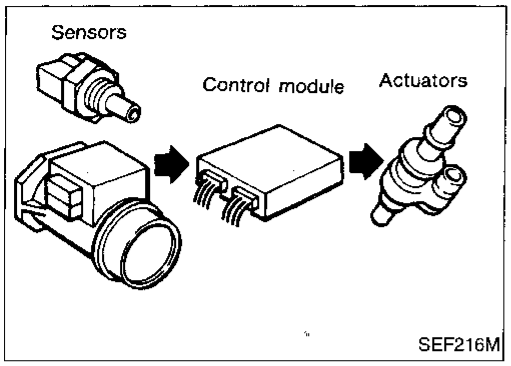
Ⓒ

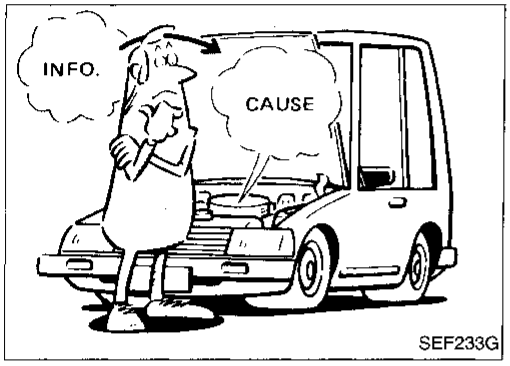
AEC275

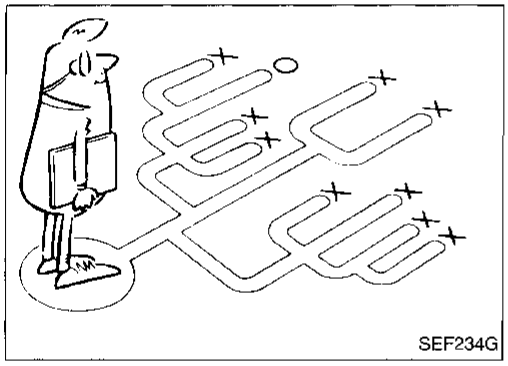


*ECM (ECCS control module) may be the cause of a problem, but this is rarely the case.

AEC276







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.

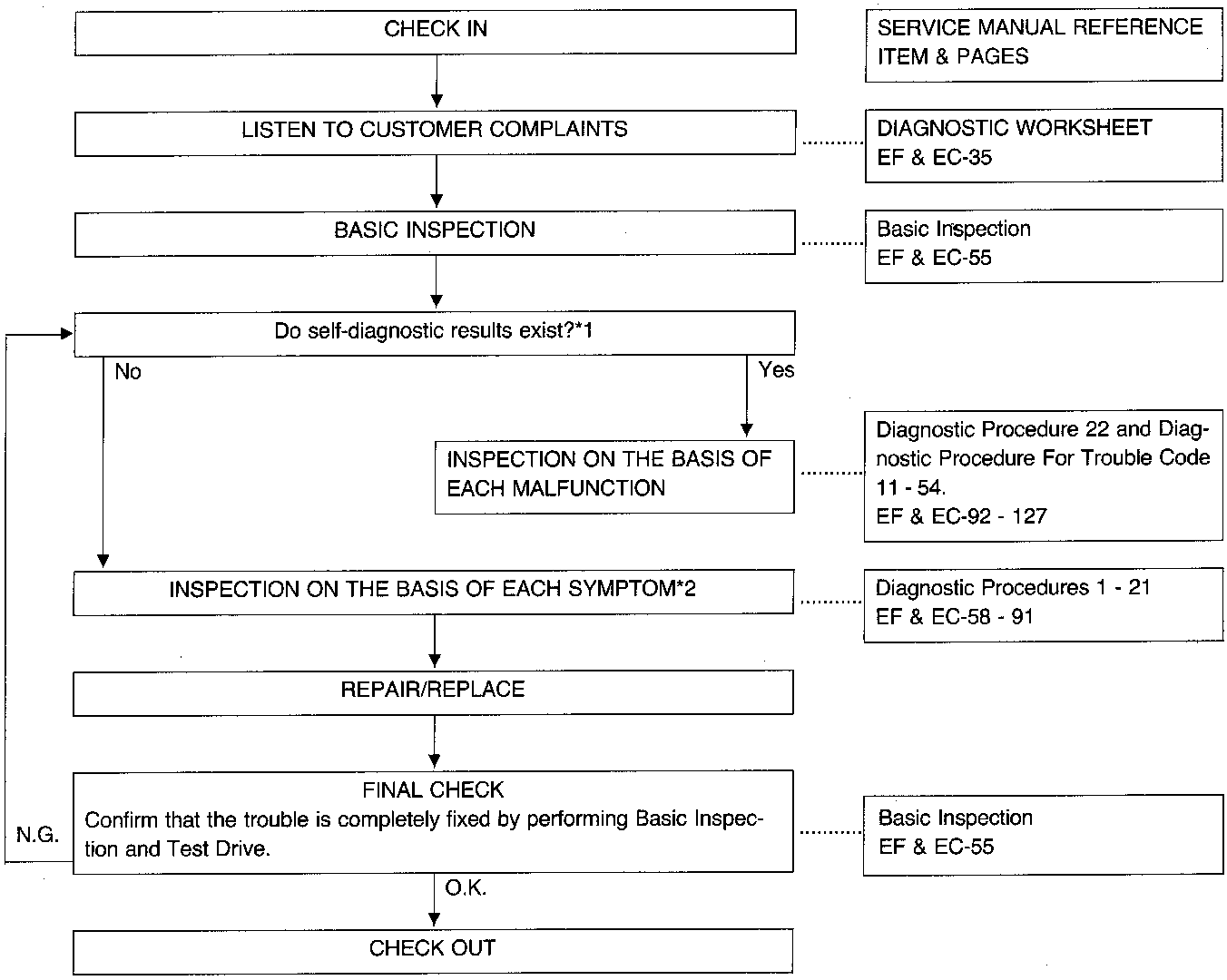
Before undertaking actual checks, take just a few minutes to talk with a customer who approaches with a driveability complaint. The customer is a very good supplier of information on such problems, especially intermittent ones. Through interaction with the customer, find out what symptoms are present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

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

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

WORK FLOW



***1: If the on-board diagnostic system cannot be performed, check main power supply and ground circuit. (Refer to EF & EC-92.)**

***2: If the trouble is not duplicated, refer to EF & EC-36.**

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

KEY POINTS

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

SEF907L

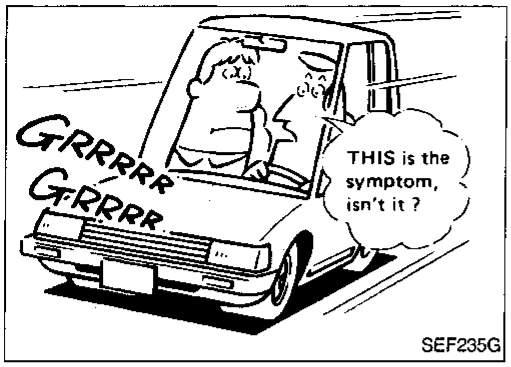
DIAGNOSTIC WORKSHEET

There are many kinds of operating conditions that lead to malfunctions on engine components.
A good grasp of such conditions can make trouble-shooting faster and more accurate. Ask your service advisor to collect this information.
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 conditions for trouble-shooting.

Worksheet sample

Customer name MR/MS	Model & Year	VIN
Engine #	Trans.	Mileage
Incident Date	Manuf. Date	In Service Date
Symptoms — ☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
Symptoms — ☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
Symptoms — ☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [ ]	
Symptoms — ☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence	☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency	☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather	☐ Not affected ☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions	☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions	☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions	☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator lamp	☐ Turned on ☐ Not turned on	

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

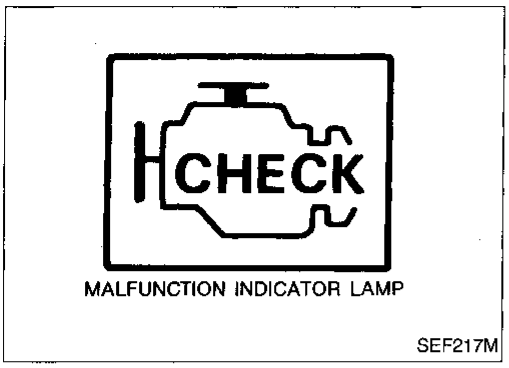


INTERMITTENT PROBLEM SIMULATION

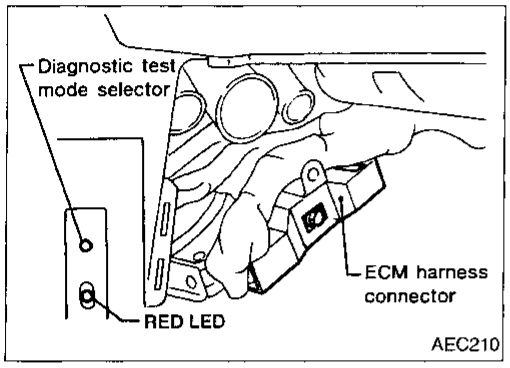
In order to duplicate an intermittent problem, it is effective to create similar conditions for component parts, under which the problem might occur.
Perform the activity listed under
Service procedure and note the result.

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

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



MALFUNCTION INDICATOR LAMP
SEF217M



AEC210

On-board Diagnostic System

MALFUNCTION INDICATOR LAMP (MIL)

A malfunction indicator lamp has been adopted on all models. This lamp blinks simultaneously with the RED LED on the ECM. Malfunction indicator lamp is located on the instrument panel.

ECM LED

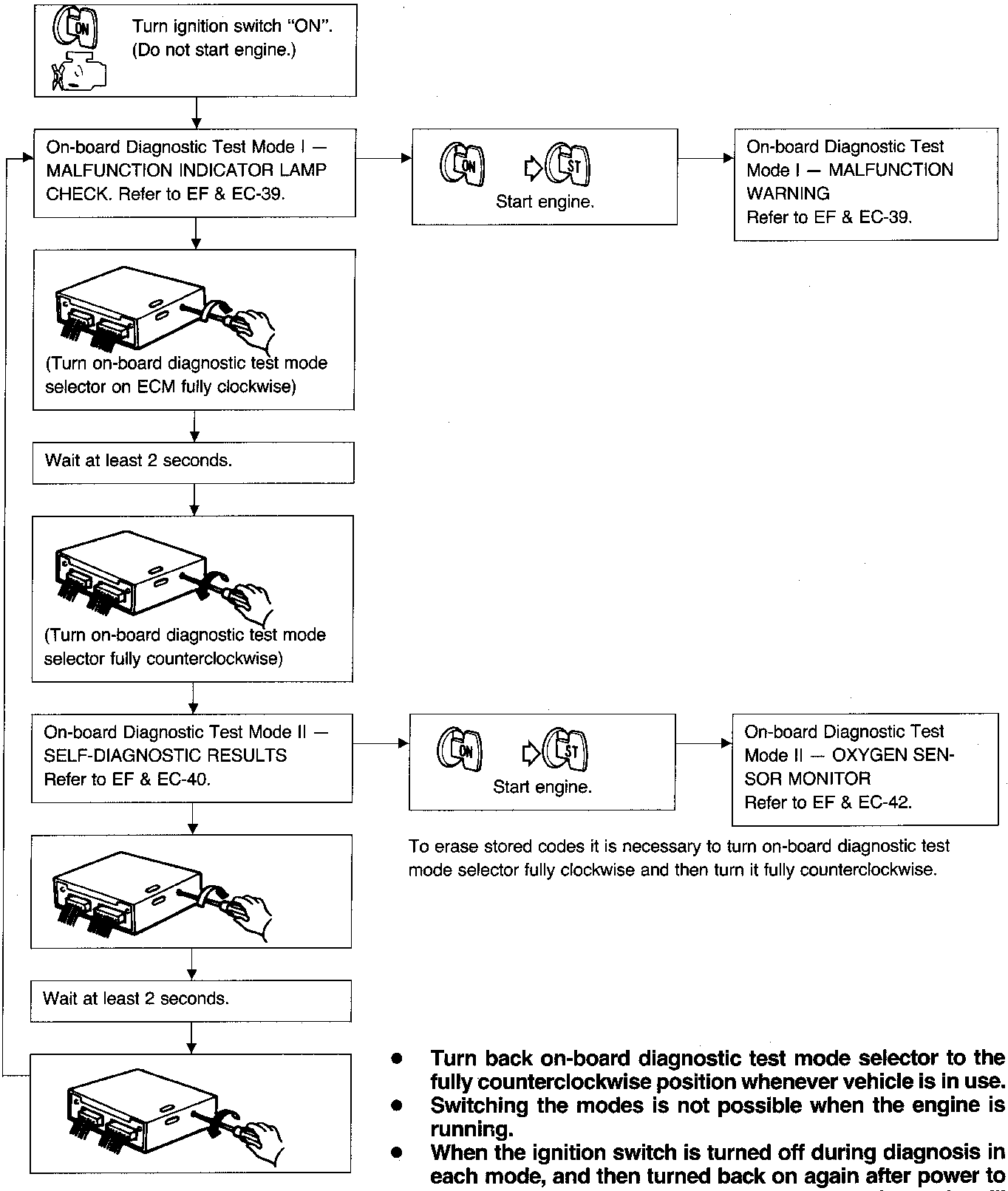
The ECM has only one RED LED.

ON-BOARD DIAGNOSTIC SYSTEM MODES

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

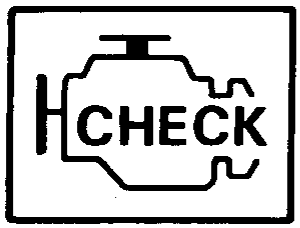
On-board Diagnostic System (Cont'd)

HOW TO SWITCH ON-BOARD DIAGNOSTIC TEST MODES (Without CONSULT)



To erase stored codes it is necessary to turn on-board diagnostic test mode selector fully clockwise and then turn it fully counterclockwise.

- **Turn back on-board 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 diagnosis will automatically return to On-board Diagnostic Test Mode I but stored codes will remain in memory unless the erasing procedure has been performed.**



MALFUNCTION INDICATOR LAMP

SEF217M

On-board Diagnostic System — On-board Diagnostic Test Mode I

ON-BOARD DIAGNOSTIC TEST MODE I — MALFUNCTION INDICATOR LAMP CHECK

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

ON-BOARD DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

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

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

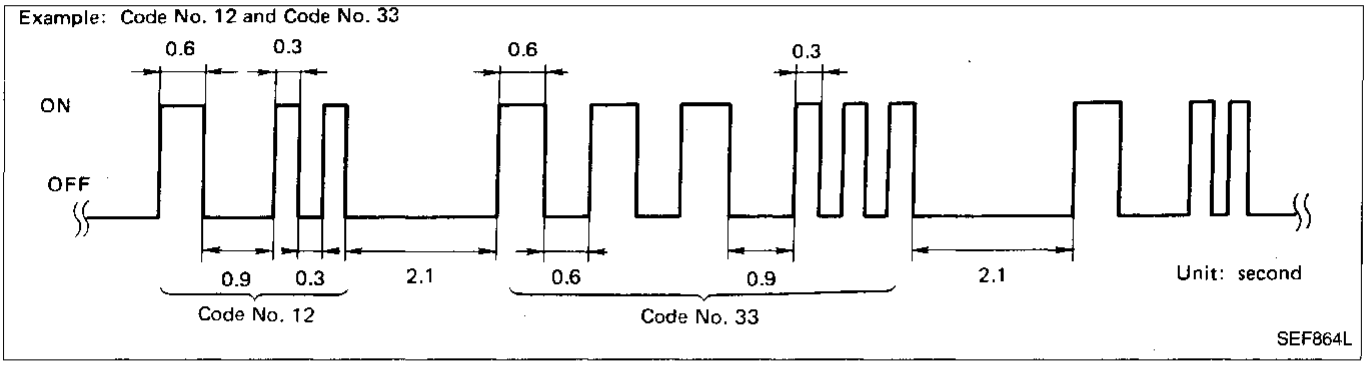
- **These Diagnostic trouble code Numbers are clarified in On-board Diagnostic Test Mode II — SELF-DIAGNOSTIC RESULTS. Refer to EF & EC-40.**
- **The RED LED and the MALFUNCTION INDICATOR LAMP will turn off when operation returns to normal. But, the On-board Diagnostic Test Mode II — SELF-DIAGNOSTIC RESULTS memory will hold the diagnostic trouble code until the memory is cleared. To clear SELF-DIAGNOSTIC RESULTS memory, refer to EF & EC-38 (Without CONSULT). To clear SELF-DIAGNOSTIC RESULTS memory (With CONSULT), refer to CONSULT Operation Manual — Engine.**

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

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

DESCRIPTION

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



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

Display diagnostic trouble code table

Diagnostic trouble code No.	Detected items	Diagnostic Procedure page
11*	Camshaft position sensor circuit	EF & EC-95
12 CHECK	Mass air flow sensor circuit	EF & EC-98
13 CHECK	Engine coolant temperature sensor circuit	EF & EC-101
14 CHECK	Vehicle speed sensor circuit	EF & EC-104
21*	Ignition signal circuit	EF & EC-107
31 CHECK	ECM	EF & EC-109
32 CHECK	EGR function	EF & EC-110
33 CHECK	Oxygen sensor circuit	EF & EC-114
34	Knock sensor circuit	EF & EC-117
35 CHECK	EGR temperature sensor circuit	EF & EC-119
43 CHECK	Throttle position sensor circuit	EF & EC-122
45 CHECK	Injector leak	EF & EC-125
54	Signal circuit from A/T control unit to ECM (A/T only)	EF & EC-127
55	No malfunction in the above circuits	EF & EC-34

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

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

Diagnostic trouble code No.	Detected items	Malfunction is detected when ...	Check item (remedy)
11*	Camshaft position sensor circuit	• Either 1° or 180° signal is not entered for the first few seconds during engine cranking. • Either 1° or 180° signal is not input often enough while the engine speed is higher than the specified rpm.	• Harness and connector (If harness and connector are normal, replace camshaft position sensor.)
12	Mass air flow sensor circuit	• The mass air flow sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector (If harness and connector are normal, replace mass air flow sensor.)
13	Engine coolant temperature sensor circuit	• The engine coolant temperature sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Engine coolant temperature sensor
14	Vehicle speed sensor circuit	• The vehicle speed sensor circuit is open or shorted.	• Harness and connector • Vehicle speed sensor (pulse generator)
21*	Ignition signal circuit	• The ignition signal in the primary circuit is not entered during engine cranking or running.	• Harness and connector • Power transistor unit
31	ECM	• ECM calculation function is malfunctioning.	[Replace ECM (ECCS control module).]
32	EGR function	• EGR valve does not operate. (EGR valve spring does not lift.)	• EGR valve • EGR and canister control solenoid valve
33	Oxygen sensor circuit	• The oxygen sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Oxygen sensor • Fuel pressure • Injectors • Intake air leaks
34	Knock sensor circuit	• The knock sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Knock sensor
35	EGR temperature sensor circuit	• The EGR temperature sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • EGR temperature sensor
43	Throttle position sensor circuit	• The throttle position sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Throttle position sensor
45	Injector leak	• Fuel leaks from injector.	• Injector
54	Signal circuit from A/T control unit to ECM (A/T only)	• The A/T communication line is open or shorted.	• Harness and connector
55	None	• None of the above items detected.	Refer to EF & EC-34.

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

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

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

The diagnostic trouble code is erased from the backup memory on the ECM when the on-board diagnostic test mode is changed from On-board Diagnostic Test Mode II to On-board Diagnostic Test Mode I. Refer to EF & EC-38.

- **When the battery terminal is disconnected, the diagnostic trouble code will be lost from the backup memory within 24 hours.**
- **Before starting On-board Diagnostic Test Mode II (Self-diagnostic results), do not erase the stored memory.**
  - **Refer to CONSULT Operation Manual — Engine.**

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

DESCRIPTION

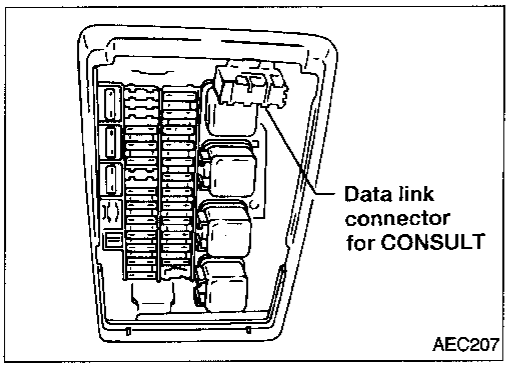
In this mode, the MALFUNCTION INDICATOR LAMP and RED LED display the condition of the fuel mixture (lean or rich) which is monitored by the oxygen sensor.

MALFUNCTION INDICATOR LAMP and RED LED	Fuel mixture condition in the exhaust gas	②Air fuel ratio feedback control condition
ON	Lean	Closed loop system
OFF	Rich	
①Remains ON or OFF	Any condition	Open loop system

①: Maintains the mixture condition present just before switching to open loop.
②: Refer to EF & EC-19 for description of mixture ratio feedback system and open loop system.

HOW TO CHECK OXYGEN SENSOR

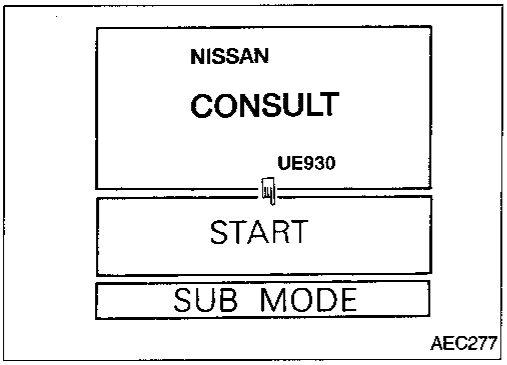
1. Set On-board Diagnostic Test Mode II. Refer to EF & EC-38.
2. Start engine and warm it up until engine coolant temperature indicator points to the middle of the gauge.
3. Run engine at about 2,000 rpm for about 2 minutes under no-load conditions.
4. Make sure RED LED or MALFUNCTION INDICATOR LAMP goes ON and OFF more than 5 times every 10 seconds; measured at 2,000 rpm under no-load.



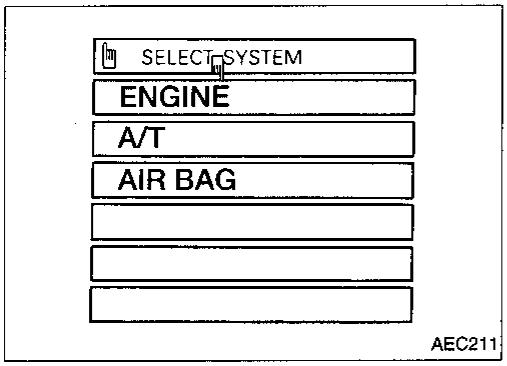
Consult

CONSULT INSPECTION PROCEDURE

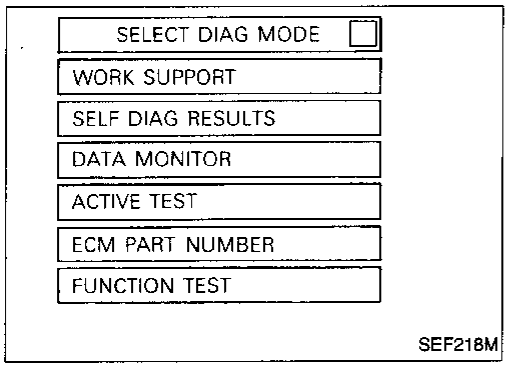
1. Turn off ignition switch.
2. Connect "CONSULT" to data link connector for CONSULT. (Data link connector for CONSULT is located beside the fuse lid.)



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 — Engine.

FUNCTION

Diagnostic test mode	Function	Page
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT unit.	EF & EC-45
Self-diagnostic results	Self-diagnostic results can be read and erased quickly.	EF & EC-46
Data monitor	Input/Output data in the ECM can be read.	EF & EC-47
Active test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the control modules and also shifts some parameters in a specified range.	EF & EC-49
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".	EF & EC-50

ECCS COMPONENT PARTS APPLICATION

ECCS COMPONENT PARTS		DIAGNOSTIC TEST MODE				
		WORK SUPPORT	SELF-DIAGNOSTIC RESULTS	DATA MONITOR	ACTIVE TEST	FUNCTION TEST
INPUT	Camshaft position sensor (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 conditioning switch			X		
	Neutral position switch (M/T)			X		X
	Inhibitor switch (A/T)			X		X
	Power steering pressure switch			X		X
	Soft closed throttle position switch			X		
	Battery			X		
OUTPUT	Injectors		X	X	X	X
	Power transistor (ignition timing)	X	X (Ignition signal)	X	X	X
	IAC valve-AAC valve	X		X	X	X
	EGR and canister control solenoid valve		X	X	X	X
	Air conditioning relay			X		
	Fuel pump relay	X		X	X	X
	Cooling fan relay			X	X	X

X: Applicable

Consult (Cont'd)

WORK SUPPORT DIAGNOSTIC TEST MODE

WORK ITEM	CONDITION	USAGE
CLOSED TH/SW ADJ	CHECK THE THROTTLE POSITION SENSOR SIGNAL. ADJUST IT TO THE SPECIFIED VALUE BY ROTATING THE SENSOR BODY UNDER THE FOLLOWING CONDITIONS. ● IGN SW "ON" ● ENG NOT RUNNING ● ACC PEDAL NOT PRESSED	When adjusting throttle position sensor initial position Refer to EF & EC-55.
IGN 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 CAMSHAFT POSITION SENSOR.	When adjusting initial ignition timing Refer to EF & EC-28.
IACV-AAC/V ADJ	SET ENGINE SPEED AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS. ● ENGINE WARMED UP ● NO-LOAD	When adjusting idle speed
FUEL PRES RELEASE	● FUEL PUMP WILL STOP BY TOUCHING "START" WHEN IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line Refer to EF & EC-166.

Consult (Cont'd)

SELF-DIAGNOSTIC RESULTS DIAGNOSTIC TEST MODE

DIAGNOSTIC ITEM	DIAGNOSTIC ITEM IS DETECTED WHEN ...	CHECK ITEM (REMEDY)
CAMSHAFT POSITION SEN*	• Either 1° or 180° signal is not entered for the first few seconds during engine cranking. • Either 1° or 180° signal is not input often enough while the engine speed is higher than the specified rpm.	• Harness and connector (If harness and connector are normal, replace camshaft position sensor.)
MASS AIR FLOW SEN	• The mass air flow sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector (If harness and connector are normal, replace mass air flow sensor.)
COOLANT TEMP SEN	• The engine coolant temperature sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Engine coolant temperature sensor
VEHICLE SPEED SEN	• The vehicle speed sensor circuit is open or shorted.	• Harness and connector • Vehicle speed sensor (pulse generator)
IGN SIGNAL-PRIMARY*	• The ignition signal in primary circuit is not entered during engine cranking or running.	• Harness and connector • Power transistor unit
ECM	• ECM calculation function is malfunctioning.	[Replace ECM (ECCS control module).]
EGR SYSTEM	• EGR valve does not operate. (EGR valve spring does not lift.)	• EGR valve • EGR and canister control solenoid valve
OXYGEN SEN	• The oxygen sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Oxygen sensor • Fuel pressure • Injectors • Intake air leaks
KNOCK SENSOR	• The knock sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Knock sensor
EGR TEMP SENSOR	• The EGR temperature sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • EGR temperature sensor
THROTTLE POSI SEN	• The throttle position sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Throttle position sensor
INJECTOR•LEAK	• Fuel leaks from injector.	• Injector

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

Consult (Cont'd)

DATA MONITOR DIAGNOSTIC TEST MODE

Remarks : • Specification data are reference values.
- Specification data are output/input values which are detected or supplied by ECM at the connector.
  *Specification data may not be directly related to their components signals/values/operations.
  ie. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing being not adjusted to the specification data. This IGN TIMING monitors the calculated data by ECM according to the input signals from camshaft position sensor and other ignition timing related sensors.
- If the real-time diagnosis results are NG and the on-board diagnostic system results are OK when diagnosing the mass air flow sensor, first check to see if the fuel pump control circuit is normal.
- If the A/F ALPHA is below 100, the ECM is compensating for a rich signal from the oxygen sensor. If it is above 100, the ECM is compensating for a lean signal from the oxygen sensor.

MONITOR ITEM	CONDITION		SPECIFICATION	CHECK ITEM WHEN OUTSIDE SPEC.
CMPS, RPM (REF)	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT value.		Almost the same speed as the CONSULT value.	• Harness and connector • Camshaft position sensor
MAS AIR/FL SE	• Engine: After warming up, idle the engine • A/C switch "OFF" • Shift lever "N"	Idle	0.85 - 1.35V	• Harness and connector • Mass air flow sensor
		2,000 rpm	1.3 - 1.8V	
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)	• Harness and connector • Engine coolant temperature sensor
O2 SEN	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ 0.6 - 1.0V	• Harness and connector • Oxygen sensor • Intake air leaks • Injectors
M/R F/C MNT			LEAN ↔ RICH Changes more than 5 times during 10 seconds.	
VHCL SPEED SE	• Turn drive wheels and compare speedometer indication with the CONSULT value		Almost the same speed as the CONSULT value	• Harness and connector • Vehicle speed sensor
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V	• Battery • ECM power supply circuit
THRTL POS SEN	• Ignition switch: ON (Engine stopped)	Throttle valve fully closed	0.3 - 0.7V	• Harness and connector • Throttle position sensor • Throttle position sensor adjustment
		Throttle valve fully opened	Approx. 4.0V	
EGR TEMP SEN	• Engine: After warming up		Less than 5.0V	• Harness and connector • EGR temperature sensor
START SIGNAL	• Ignition switch: ON → START		OFF → ON	• Harness and connector • Starter switch
CLOSED TH/POS	• Ignition switch: ON (Engine stopped)	Throttle valve: Idle position	ON	• Harness and connector • Throttle position sensor • Throttle position sensor adjustment
		Throttle valve: Slightly open	OFF	
AIR COND SIG	• Engine: After warming up, idle the engine	A/C switch "OFF"	OFF	• Harness and connector • Air conditioning switch
		A/C switch "ON"	ON	
NEUT POSI SW	• Ignition switch: ON	Shift lever "P" or "N"	ON	• Harness and connector • Neutral position/Inhibitor switch
		Except above	OFF	

Consult (Cont'd)

MONITOR ITEM	CONDITION		SPECIFICATION	CHECK ITEM WHEN OUTSIDE SPEC.
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF	• Harness and connector • Power steering pressure switch
		The steering wheel is turned.	ON	
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger is operating.	ON	• Harness and connector • Rear window defogger system Refer to EL section ("REAR WINDOW DEFOGGER").
		Rear window defogger is not operating.	OFF	
INJ PULSE	• Engine: After warming up • A/C switch "OFF" • Shift lever "N" • No-load	Idle	2.3 - 3.3 msec.	• Harness and connector • Injector • Mass air flow sensor • Intake air system
		2,000 rpm	2.4 - 3.3 msec.	
IGN TIMING	ditto	Idle	20° B.T.D.C.	• Harness and connector • Camshaft position sensor
		2,000 rpm	More than 30° B.T.D.C.	
IACV-AAC/V	ditto	Idle	10 - 40%	• Harness and connector • IAC valve-AAC valve
		2,000 rpm	—	
A/F ALPHA	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	75 - 125%	• Harness and connector • Injectors • Mass air flow sensor • Oxygen sensor • Canister purge line • Intake air system
AIR COND RLY	• Air conditioning switch OFF → ON		OFF → ON	• Harness and connector • Air conditioning switch • Air conditioning relay
FUEL PUMP RLY	• Ignition switch is turned to ON (Operates for 5 seconds) • Engine running and cranking • When engine is stopped (stops in 1.5 seconds)		ON	• Harness and connector • Fuel pump relay
	Except as shown above		OFF	
COOLING FAN	• After warming up engine, idle the engine. • A/C switch "OFF"	Engine coolant temperature is 94°C (201°F) or less	OFF	• Harness and connector • Cooling fan relays • Cooling fan
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F).	LOW	
		Engine coolant temperature is 105°C (221°F) or more	HIGH	
EGRC SOL/V	• Engine: After warming up • A/C switch "OFF" • Shift lever "N" • No-load	Idle	ON	• Harness and connector • EGR and canister control solenoid valve
		2,000 rpm	OFF	

Consult (Cont'd)

ACTIVE TEST DIAGNOSTIC TEST MODE

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

Consult (Cont'd)

FUNCTION TEST DIAGNOSTIC TEST MODE

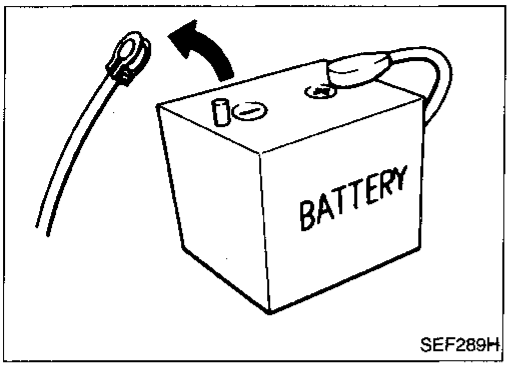
FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
SELF-DIAG RESULTS	• Ignition switch: ON (Engine stopped) • Displays the results of on-board diagnostic system.	—		Objective system
CLOSED THROTTLE POSI (SOFT CLOSED THROTTLE POS SWITCH CIRCUIT)	• Ignition switch: ON (Engine stopped) • Soft closed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

Consult (Cont'd)

FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
START SIGNAL CKT	• Ignition switch: ON → START • Start signal circuit is tested when engine is started by operating the starter. Battery positive voltage and water temperature before cranking, and average battery positive voltage, mass air flow sensor output voltage and cranking speed during cranking are displayed.	Start signal: OFF → ON		• Harness and connector • Ignition switch
PW/ST SIGNAL CIRCUIT	• Ignition switch: ON (Engine running) • Power steering circuit is tested when steering wheel is rotated fully and then set to a straight line running position.	Locked position	ON	• Harness and connector • Power steering pressure switch • Power steering oil pump
		Neutral position	OFF	
VEHICLE SPEED SEN CKT	• Vehicle speed sensor circuit is tested when vehicle is running at a speed of 10 km/h (6 MPH) or higher.	Vehicle speed sensor input signal is greater than 4 km/h (2 MPH)		• Harness and connector • Vehicle speed sensor • Electric speedometer
IGN TIMING ADJ	• After warming up, idle the engine. • Ignition timing adjustment is checked by reading ignition timing with a timing light and checking whether it agrees with specifications.	The timing light indicates the same value on the screen.		• Adjust ignition timing (by moving camshaft position sensor or distributor) • Camshaft position sensor drive mechanism
MIXTURE RATIO TEST	• Air-fuel ratio feedback circuit (injection system, ignition system, vacuum system, etc.) is tested by examining the oxygen sensor output at 2,000 rpm under non-loaded state.	• OXYGEN SENSOR COUNT: More than 5 times during 10 seconds		• INJECTION SYS (Injector, fuel pressure regulator, harness or connector) • IGNITION SYS (Spark plug, power transistor, ignition coil, harness or connector) • VACUUM SYS (Intake air leaks) • Oxygen sensor circuit • Oxygen sensor operation • Fuel pressure high or low • Mass air flow sensor

Consult (Cont'd)

FUNCTION TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
POWER BALANCE	• After warming up, idle the engine. • Injector operation of each cylinder is stopped one after another, and resultant change in engine rotation is examined to evaluate combustion of each cylinder. (This is only displayed for models where a sequential multiport fuel injection system is used.)	Difference in engine speed is greater than 25 rpm before and after cutting off the injector of each cylinder.	• Injector circuit (Injector, harness or connector) • Ignition circuit (Spark plug, power transistor, ignition coil, harness or connector) • Compression • Valve timing
IACV-AAC/V SYSTEM	• After warming up, idle the engine. • IAC valve-AAC valve system is tested by detecting change in engine speed when IAC valve-AAC valve opening is changed to 0%, 20% and 80%.	Difference in engine speed is greater than 150 rpm between when valve opening is at 80% (102 steps) and at 20% (25 steps).	• Harness and connector • IAC valve-AAC valve • Air passage restriction between air inlet and IAC valve-AAC valve • IAS (Idle adjusting screw) adjustment



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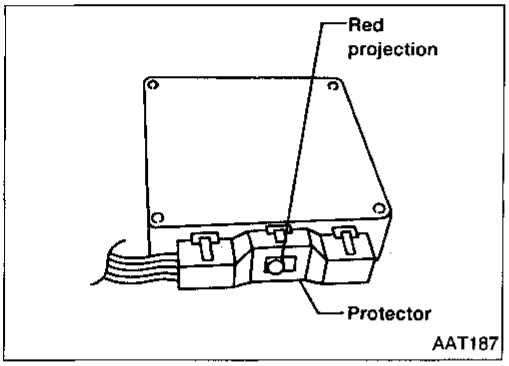
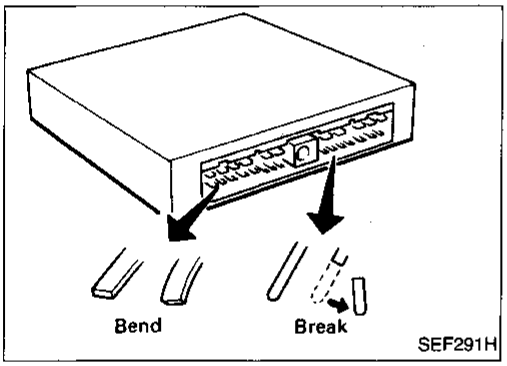


AAT187



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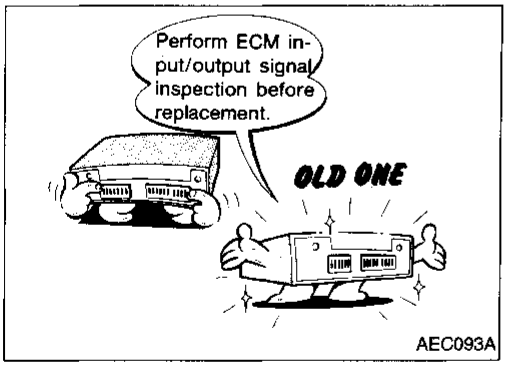

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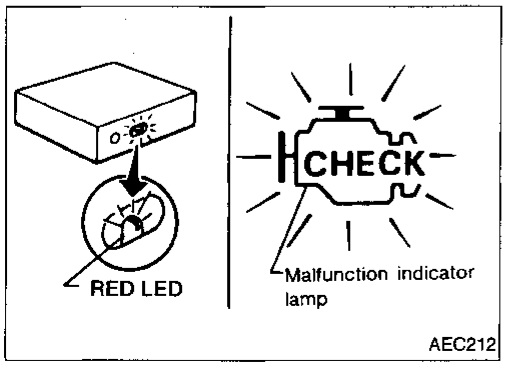


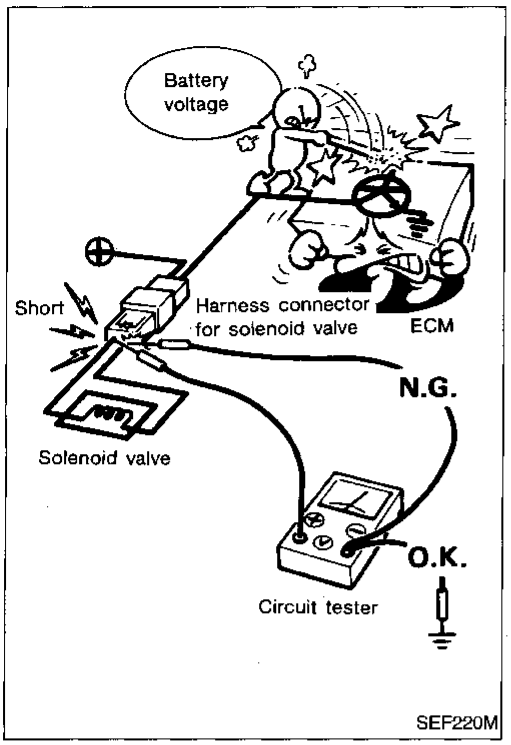
AEC212

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 positive 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.**
5. **Before replacing ECM, perform ECM input/output signal inspection and make sure whether ECM functions properly or not. Refer to EF & EC-153.**
6. **After reviewing the above items, perform On-board Diagnostic Test Mode II (Self-diagnostic results) and driving test.**

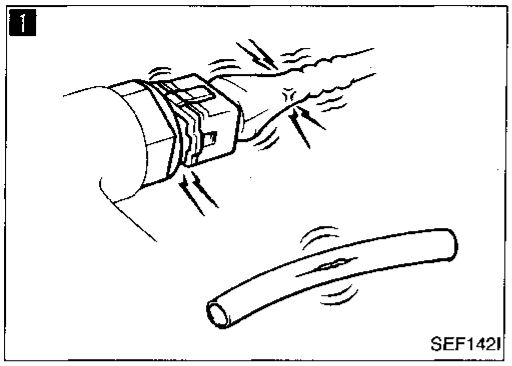
Diagnostic Procedure (Cont'd)



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

Basic Inspection

1



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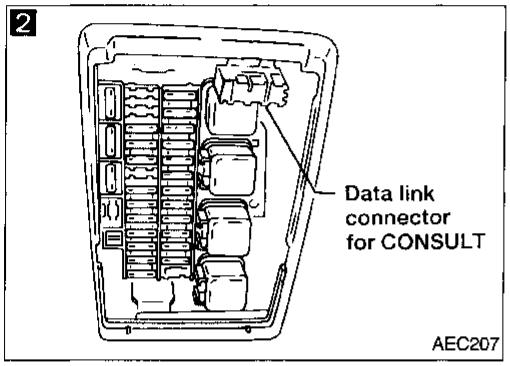

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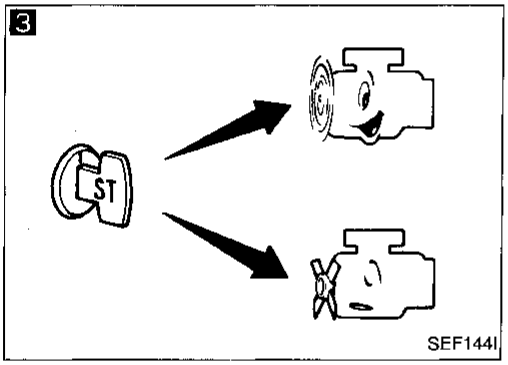

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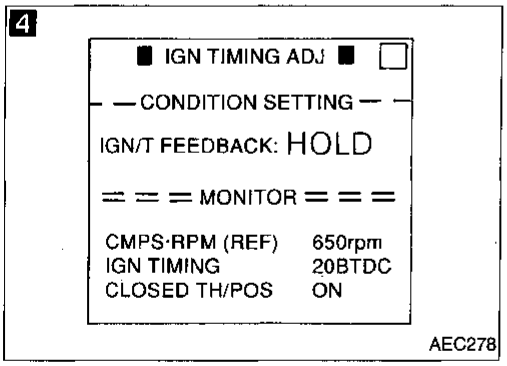

AEC278

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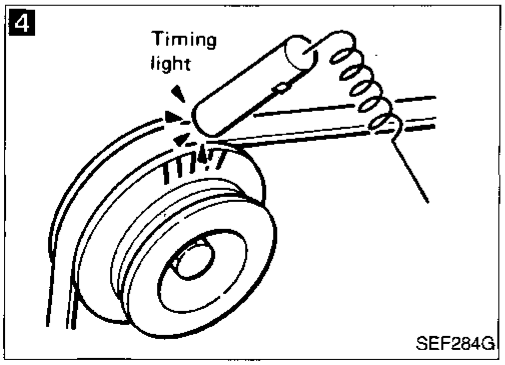


SEF284G

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 EF & EC-43.

3

DOES ENGINE START?

No → Go to **6** .

Yes

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 camshaft position sensor. Refer to 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.

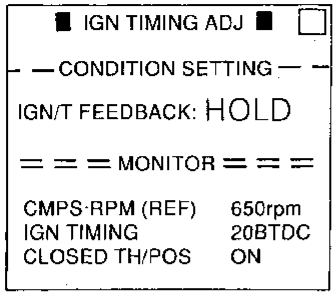
Ignition timing:
20° ± 2° B.T.D.C.

O.K.

(Go to Ⓐ on next page.)

Basic Inspection (Cont'd)

5



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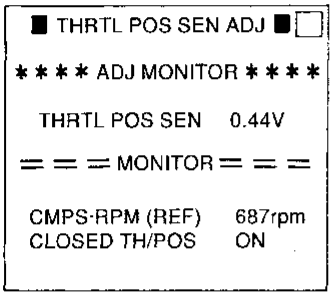

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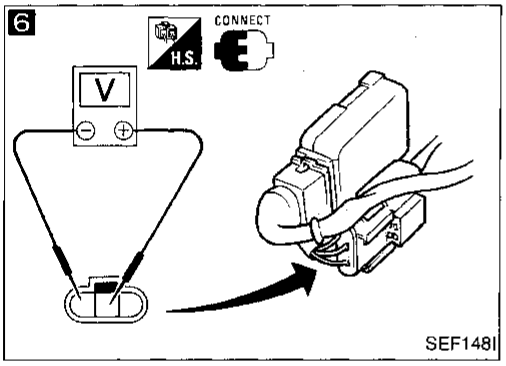

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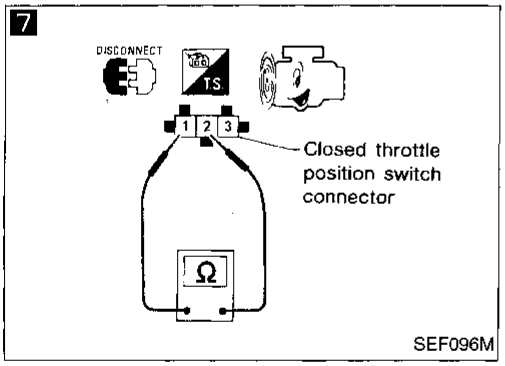
7



SEF096M

Ⓐ

5

CHECK IDLE ADJ. SCREW INITIAL SET RPM.

1. Select "IGN TIMING ADJ" in "WORK SUPPORT" mode.
2. When touching "START", does engine speed fall to 650±50 rpm (A/T in "N" position)?

N.G. → Adjust engine speed by turning idle adjusting screw.

OR

When disconnecting throttle position sensor harness connector, does engine speed fall to 650±50 rpm (A/T in "N" position)?

O.K. ↓

6

CHECK THROTTLE POSITION SENSOR IDLE POSITION. (MT model only).

1. Perform "THRTL POS SEN. ADJ." in "WORK SUPPORT" mode.
2. Check that output voltage of throttle position sensor is approx. 0.3 to 0.7V. (Throttle valve fully closes.) and "CLOSED TH/POS" stays "ON".

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

OR

Measure output voltage of throttle position sensor using voltmeter, and check that it is approx. 0.3 to 0.7V. (Throttle valve fully closed.)

O.K. ↓

7

CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION (AT model only).

Check closed throttle position switch OFF → ON engine speed with circuit tester, closing throttle valve manually.

Closed throttle position switch OFF → ON engine speed

900±150 rpm ("N" position)

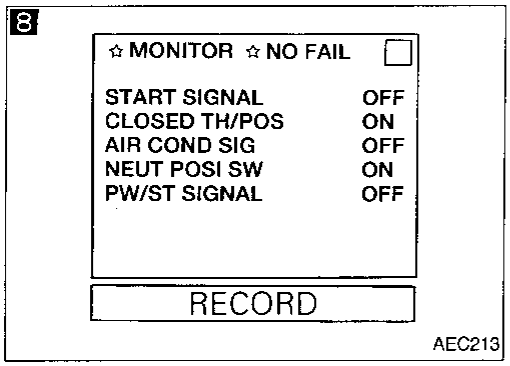
N.G. →
1. Adjust continuity signal by rotating throttle position sensor body.
2. Disconnect throttle position sensor harness connector for a few seconds and then reconnect it.
3. Confirm that "CLOSED TH/POS" stays "ON" using CONSULT.

O.K. ↓

(Go to Ⓑ on next page.)

Basic Inspection (Cont'd)

8



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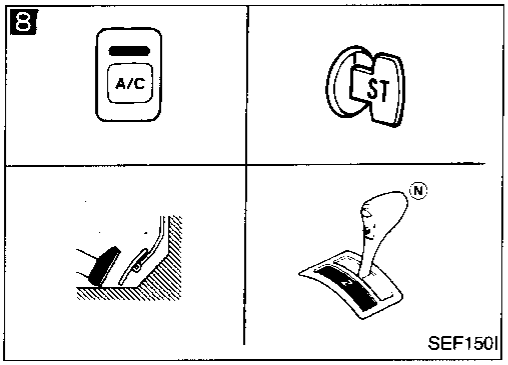

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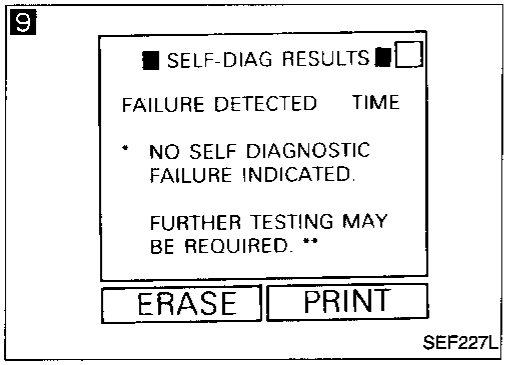
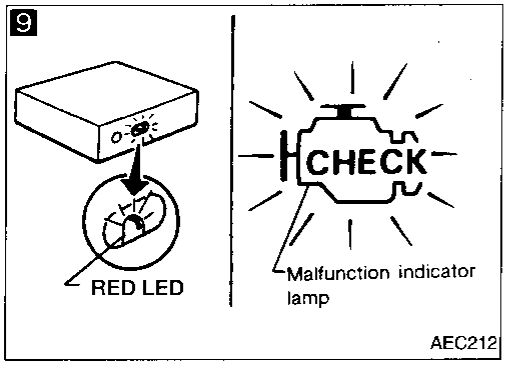


9



Ⓑ

8 CHECK SWITCH INPUT SIGNAL.

Select the following switches in "DATA MONITOR" mode,
a) Start signal,
b) Closed throttle position,
c) Air conditioning signal,
d) Neutral position/Inhibitor
e) Power steering pressure switch,
and check the switches' ON-OFF operation.

OR

Perform ECM INPUT/OUTPUT SIGNAL INSPECTION. Refer to EF & EC-153 and test terminals 20, 34, 41, and 43.

N.G. → Repair or replace the malfunctioning switch or its circuit. For start signal, refer to EF & EC-129. For closed throttle position, refer to EF & EC-122. For Neutral position/ Inhibitor switch, refer to EF & EC-147. For power steering pressure switch, refer to EF & EC-145. For air conditioning signal, refer to HA section.

O.K. ↓

9 READ SELF-DIAGNOSTIC RESULTS.

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

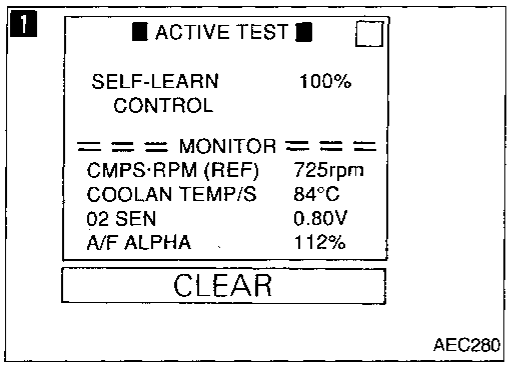
OR

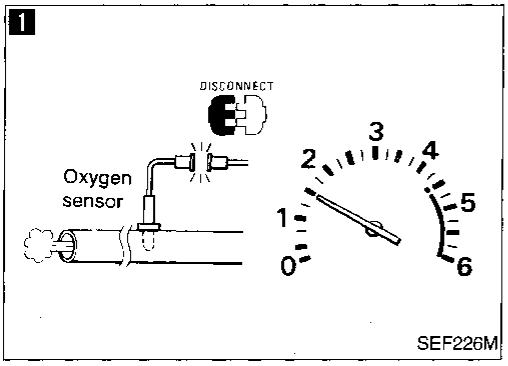
1. Set "SELF-DIAG RESULTS" mode in On-board Diagnostic Test Mode II. (Refer to EF & EC-38.)
2. Count the number of RED LED or malfunction indicator lamp flashes and read out the diagnostic trouble code.
3. Are the diagnostic trouble code being output?

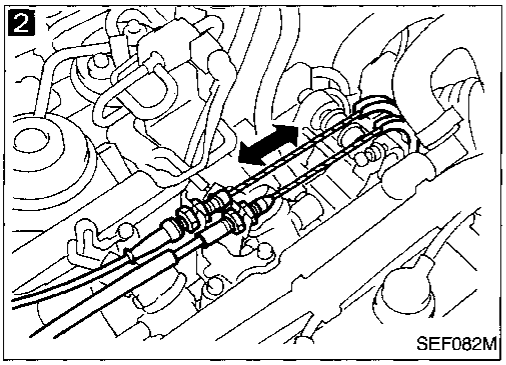
Yes → Go to the relevant inspection procedure. Refer to EF & EC-40.

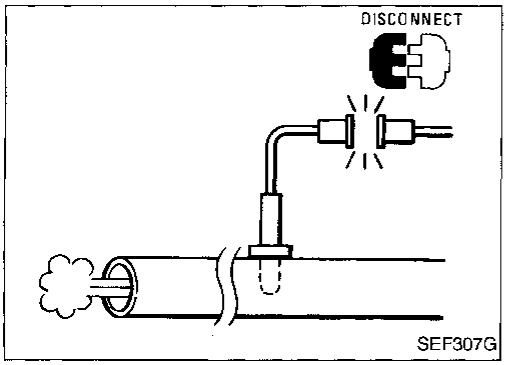
No ↓

INSPECTION END









Diagnostic Procedure 1 — High Idling after Warm-up

1

CHECK INTAKE AIR LEAK.

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

Yes → Discover air leak location and repair.

OR

1. Disconnect oxygen sensor harness connectors.
2. After racing engine at 2,000 rpm under no load for about 30 seconds, does the engine speed drop?

No ↓

2

CHECK THROTTLE LINKAGE.

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

N.G. → Repair throttle linkage or sticking of throttle valve.

O.K. ↓

INSPECTION END

Diagnostic Procedure 2 — Hunting

CHECK OXYGEN SENSOR.

When disconnecting oxygen sensor harness connector, is the hunting fixed?

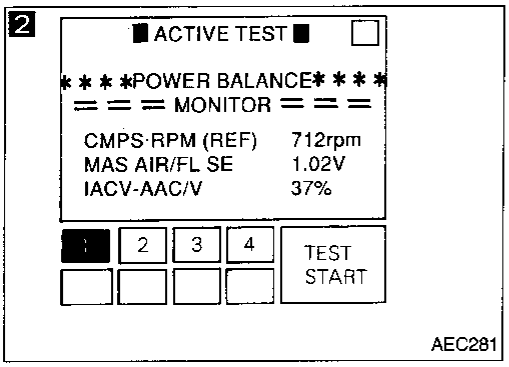
Yes → Check oxygen sensor. Refer to EF & EC-114.

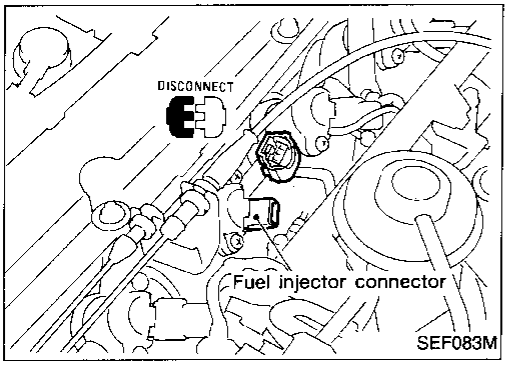
No ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 2 — Hunting (Cont'd)

2





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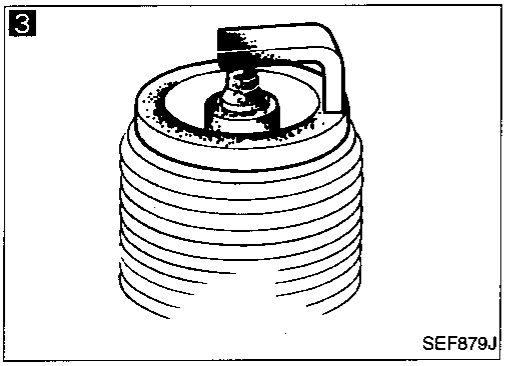

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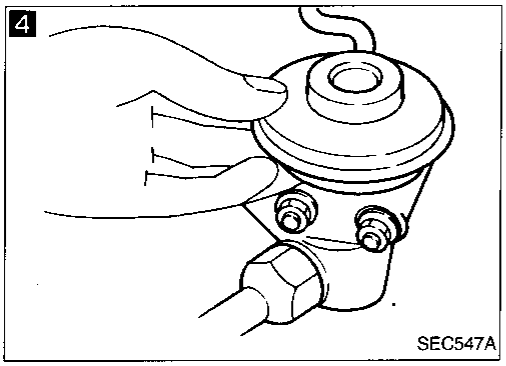


Ⓐ

PERFORM POWER BALANCE TEST.

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

No → Go to 4 .

OR

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

Yes

3

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

N.G. → Repair or replace spark plug(s).

O.K.

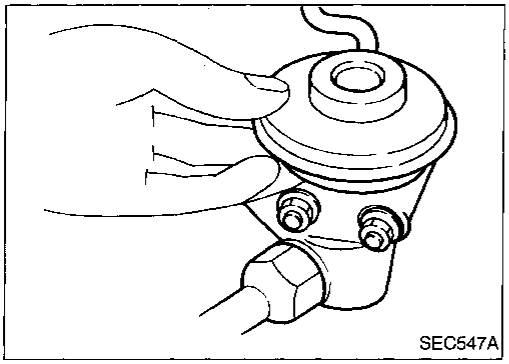
CHECK EGR VALVE.
Check EGR valve for sticking.

N.G. → Repair or replace.

O.K.

INSPECTION END

Diagnostic Procedure 3 — Unstable Idle


SEC547A

CHECK EGR VALVE.
Check EGR valve for sticking.

N.G. → Repair or replace.

O.K. ↓

PERFORM POWER BALANCE TEST.

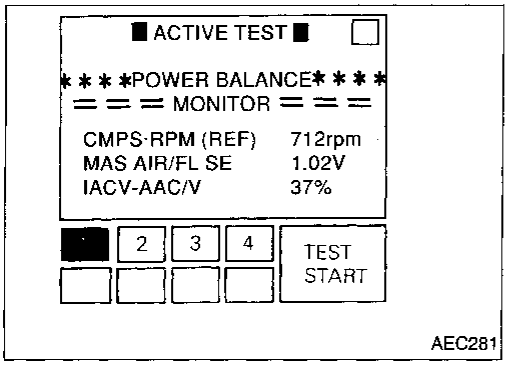
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

OR

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

No → Go to 6

Yes ↓



AEC281

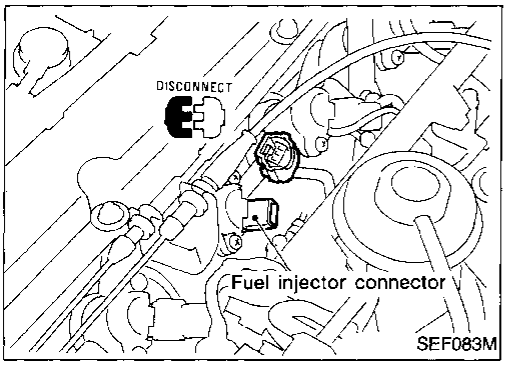
3

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 wire, distributor cap and connections.

O.K. ↓



SEF083M

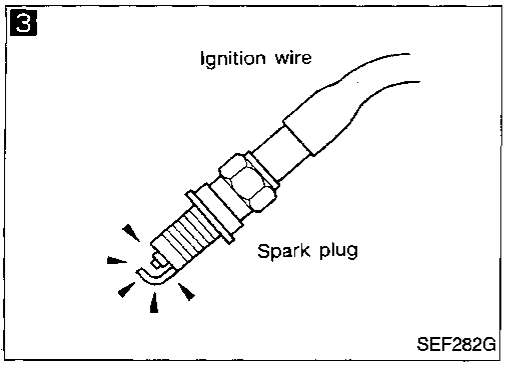
CHECK SPARK PLUGS.
Remove the spark plugs and check for fouling, etc.

N.G. → Repair or replace spark plug(s).

O.K. ↓

(Go to Ⓐ on next page.)

3



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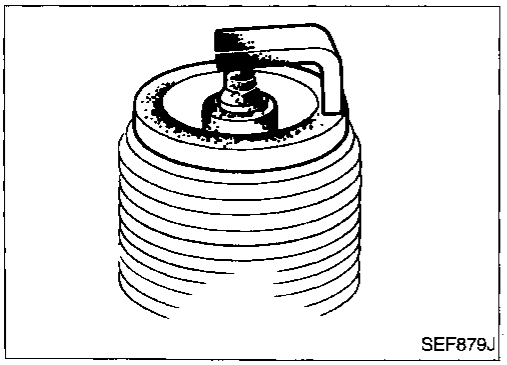
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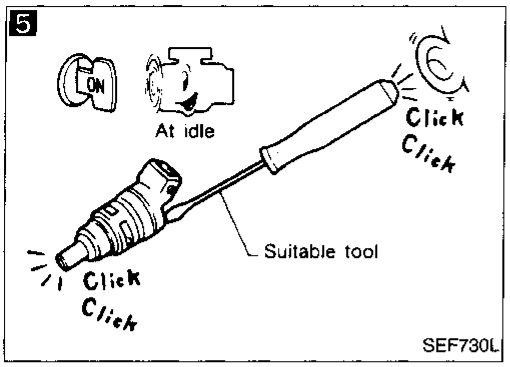
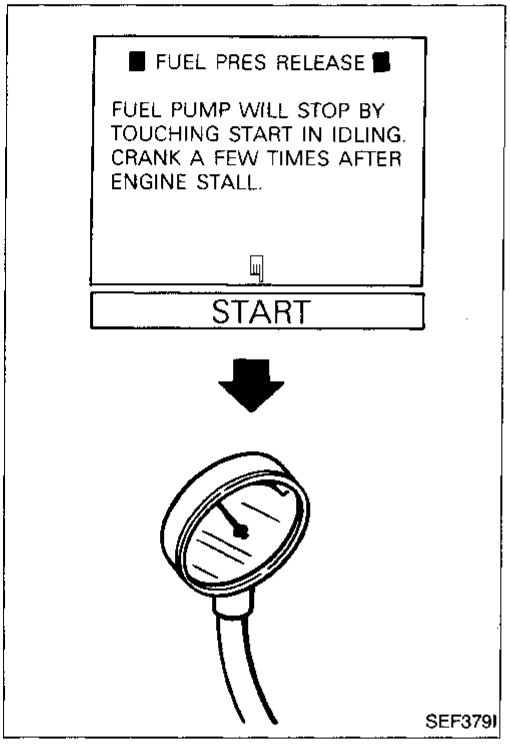
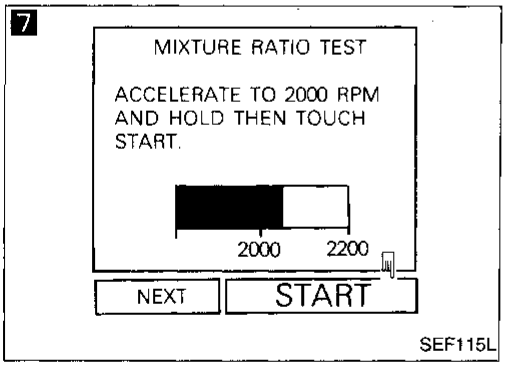
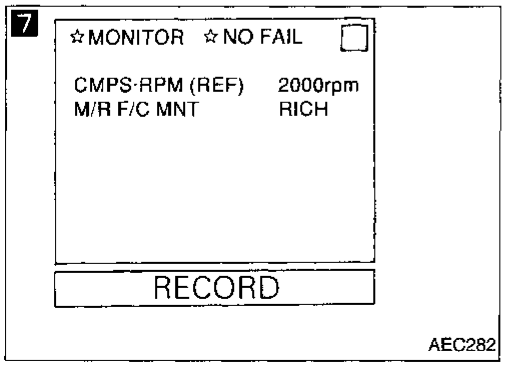
Diagnostic Procedure 3 — Unstable Idle (Cont'd)









Ⓐ

5

CHECK INJECTOR.
Does each injector sound like it is operating at idle?

No → Check injector(s) and circuit(s). Refer to EF & EC-131.

Yes ↓

CHECK FUEL PRESSURE.

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.
   At idle:
   Approx. 235 kPa (2.4 kg/cm², 34 psi)

N.G. → Check fuel pressure regulator, fuel pump and circuit. Refer to EF & EC-133 and 166.

OR

1. Release fuel pressure to zero. Refer to EF & EC-166.
2. Install fuel pressure gauge and check fuel pressure.

O.K. ↓

7

CHECK OXYGEN SENSOR.

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

N.G. → Replace oxygen sensor.

OR

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

OR

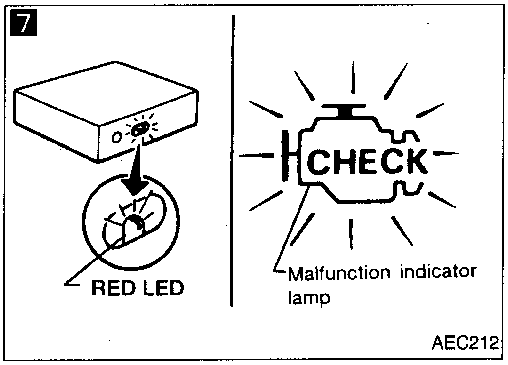
1. Set "Oxygen sensor monitor" in On-board Diagnostic Test Mode II. Refer to EF & EC-38.
2. Maintaining engine at 2,000 rpm under no-load, check to make sure that malfunction indicator lamp or RED LED on the ECM goes ON and OFF more than 5 times during 10 seconds.

O.K. ↓

(Go to Ⓑ on next page.)

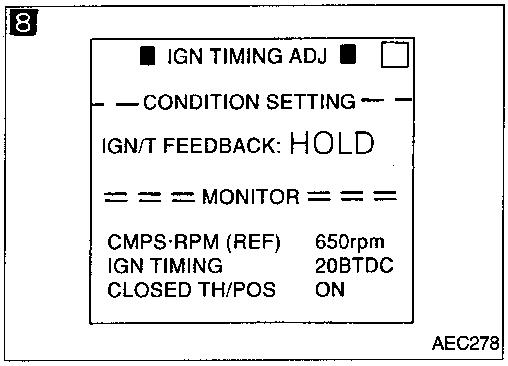
Diagnostic Procedure 3 — Unstable Idle (Cont'd)

7



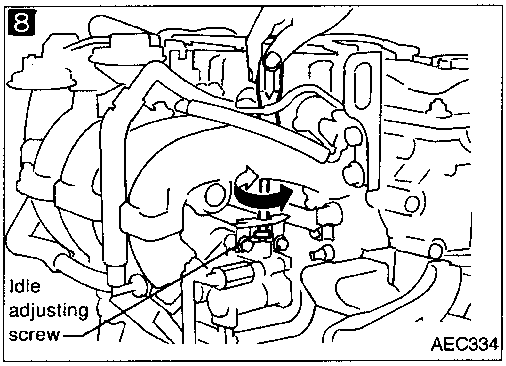
AEC212

8



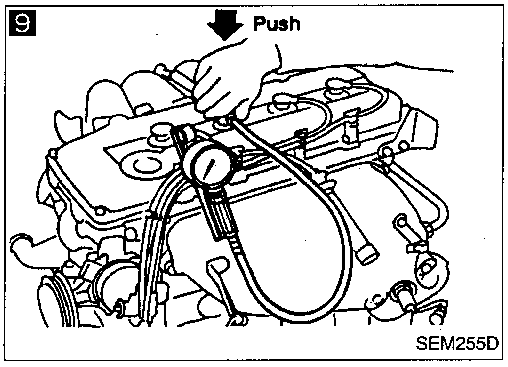
AEC278

8



AEC334

9



SEM255D

Ⓑ

8

CHECK IDLE ADJ. SCREW CLOGGING.

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

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

OR

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

Yes

9

CHECK COMPRESSION PRESSURE.

- Check compression pressure.

Standard: kPa (kg/cm², psi)/300 rpm
1,226 (12.5, 178)
Minimum: kPa (kg/cm², psi)/300 rpm
1,030 (10.5, 149)
Difference between each cylinder: kPa (kg/cm², psi)/300 rpm
98 (1.0, 14)

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

O.K.

10

CHECK ECM HARNESS CONNECTOR.

Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-153.

N.G. → Repair or replace.

O.K.

11

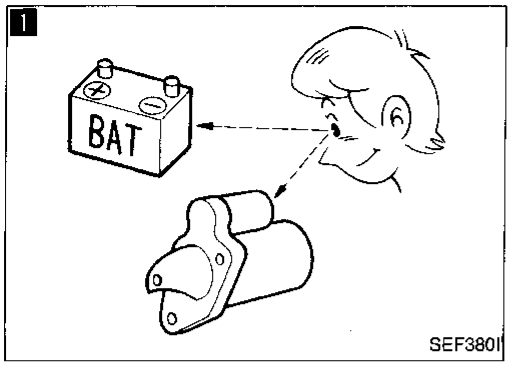
TRY A KNOWN GOOD ECM*

O.K.

INSPECTION END

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

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

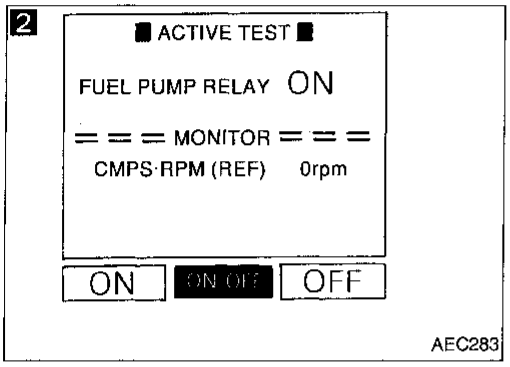


1

CHECK BATTERY AND STARTER.
Check battery and starter condition. Refer to EL section ("SPECIFIC GRAVITY CHECK", "BATTERY") and ("SDS", "STARTING SYSTEM — Starter — ").

N.G. → Repair or replace.

O.K. ↓



2

CHECK FUEL PRESSURE.

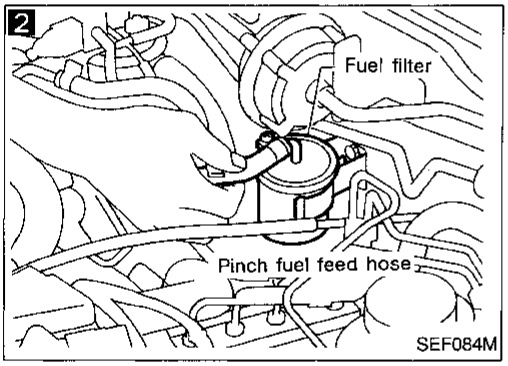
1. Turn ignition switch "ON".
2. Perform "FUEL PUMP RELAY" in "ACTIVE TEST" mode.
3. Pinch fuel feed hose with fingers.

Is fuel pressure pulsation felt on the fuel feed hose?

No → Check fuel pump and circuit. Refer to EF & EC-133.

OR

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



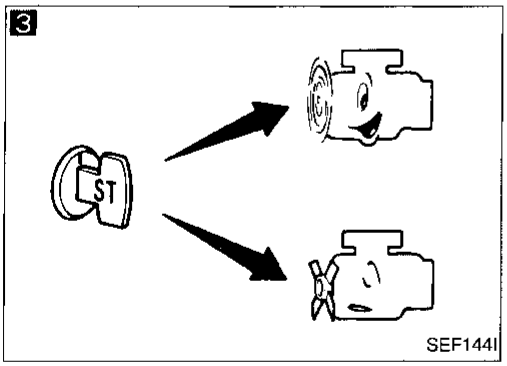
Yes ↓

3

CHECK IAC VALVE-AAC VALVE.
When pressing accelerator pedal 1/4 open, can you start the engine.

Yes → Check IAC valve-AAC valve and circuit. Refer to EF & EC-136.

No ↓



4

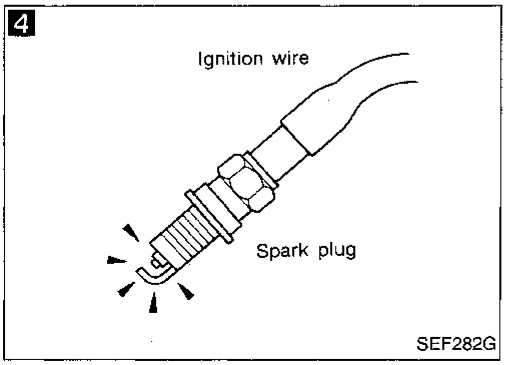
CHECK IGNITION SPARK.

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.

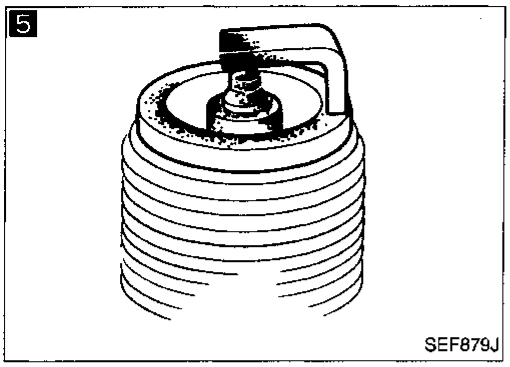
N.G. → Check ignition coil, power transistor unit and their circuits. Refer to EF & EC-107.

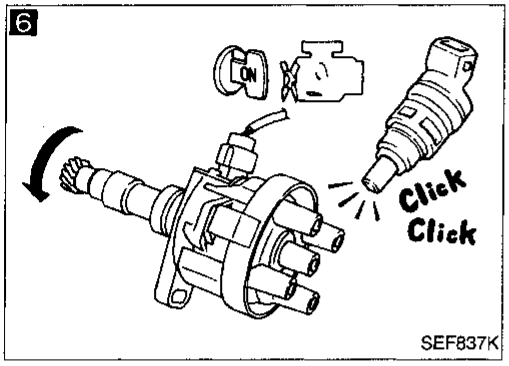
O.K. ↓

(Go to Ⓐ on next page.)



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





Ⓐ

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

N.G. → Repair or replace spark plug(s).

O.K. ↓

6 **CHECK INJECTOR.**
1. Remove camshaft position sensor from engine. (Camshaft 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 camshaft position sensor shaft, does each injector make an operating sound?

No → Check injector(s) and circuit(s). Refer to EF & EC-131.

Yes ↓

7 **CHECK ECM HARNESS CONNECTOR.**
Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-153.

N.G. → Repair or replace.

O.K. ↓

8 **CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.**
Refer to EF & EC-92.

N.G. → Repair or replace.

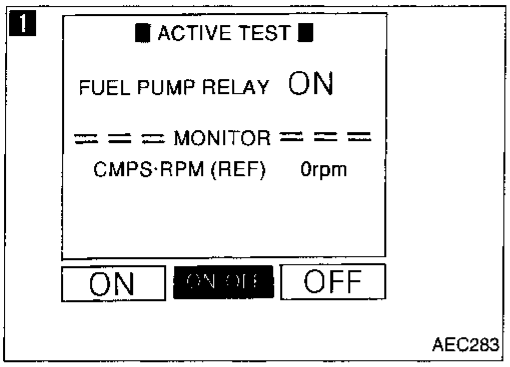
O.K. ↓

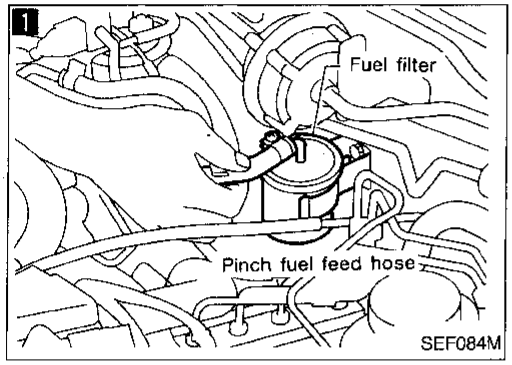
9 **TRY A KNOWN GOOD ECM***

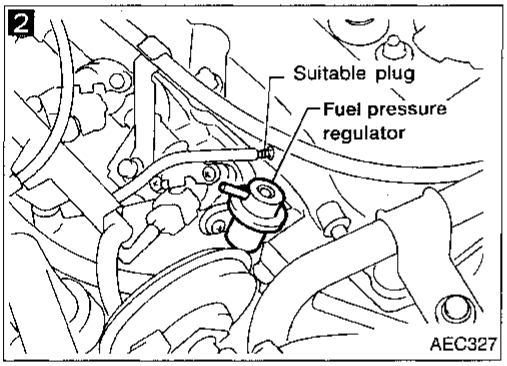
↓

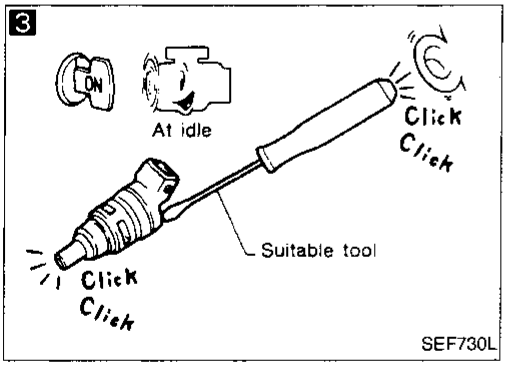
INSPECTION END

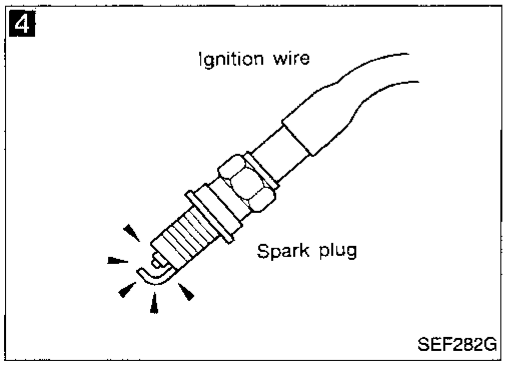
*: ECM may be the cause of a problem, but this is rarely the case.











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

1

CHECK FUEL PRESSURE.

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

Is fuel pressure pulsation felt on the fuel feed hose?

No → Check fuel pump and circuit. Refer to EF & EC-133.

OR

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

Yes

2

CHECK FUEL VAPOR.

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

Yes → Check fuel properties.

No

3

CHECK INJECTOR.

Does each injector sound like it is operating at idling?

No → Check injector(s) and circuit(s). Refer to EF & EC-131.

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. Refer to EF & EC-107.

O.K.

5

CHECK ECM HARNESS CONNECTOR.

Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-153.

N.G. → Repair or replace.

O.K.

6

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.

Refer to EF & EC-92.

N.G. → Repair or replace.

O.K.

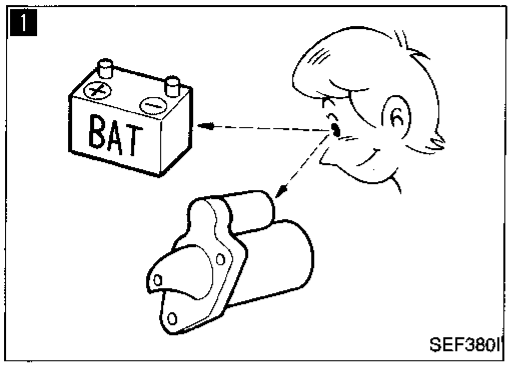
7

TRY A KNOWN GOOD ECM*

INSPECTION END

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

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

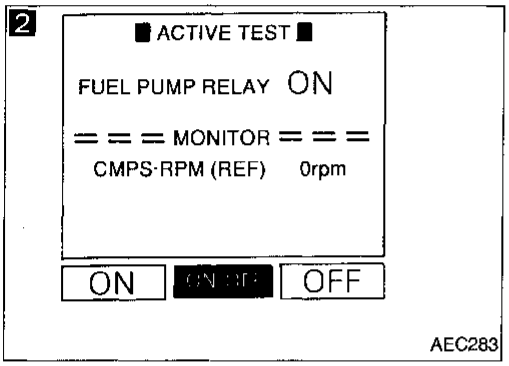


1

CHECK BATTERY AND STARTER.
Check battery and starter operation.
Refer to EL section ("SPECIFIC GRAVITY CHECK", "BATTERY") and ("SDS", "STARTING SYSTEM — Starter — ").

N.G. → Repair or replace.

O.K. ↓



2

CHECK FUEL PRESSURE.

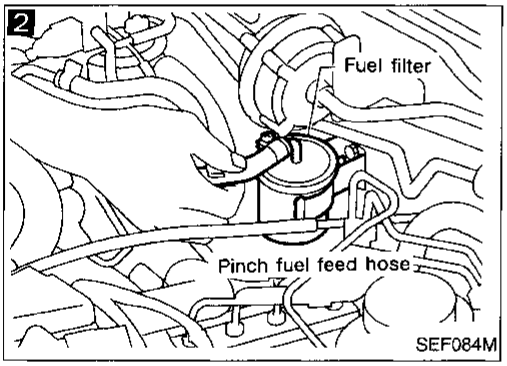
1. Turn ignition switch "ON".
2. Perform "FUEL PUMP RELAY" in "ACTIVE TEST" mode.
3. Pinch fuel feed hose with fingers.
   Is fuel pressure pulsation felt on the fuel feed hose?

No → Check fuel pump and circuit. Refer to EF & EC-133.

OR

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

Yes ↓



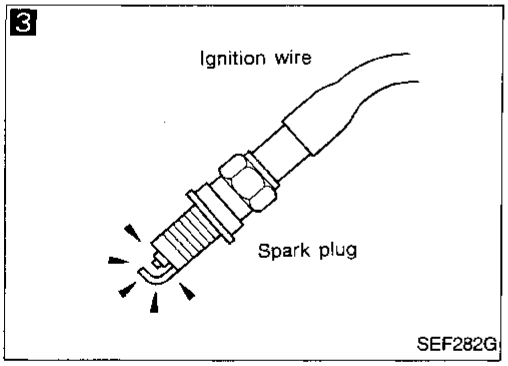
3

CHECK 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. Refer to EF & EC-107.

O.K. ↓

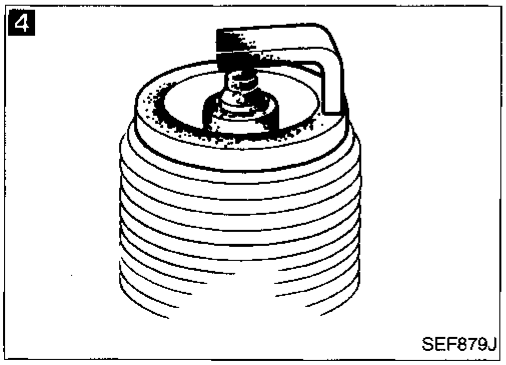


4

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

N.G. → Repair or replace spark plug(s).

O.K. ↓



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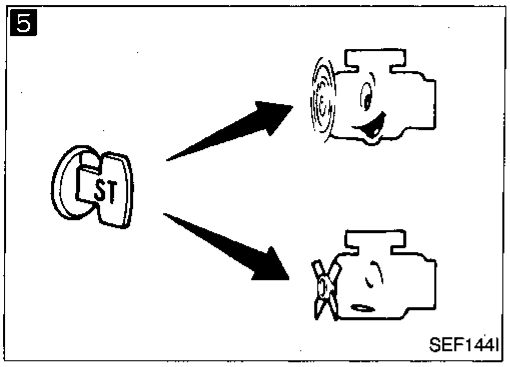
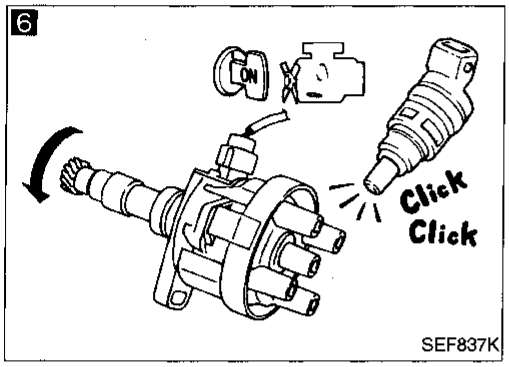
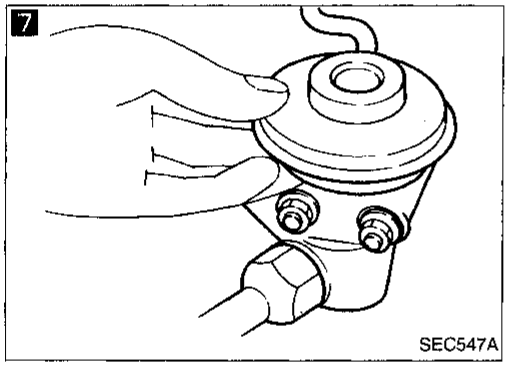
Diagnostic Procedure 6 — Hard to Start or Impossible to Start under Normal Conditions (Cont'd)







Ⓐ

5

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

Yes → Check injector(s) for leakage. Refer to EF & EC-125.

No ↓

6

CHECK INJECTOR.
1. Remove camshaft position sensor from engine. (Camshaft 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 camshaft position sensor shaft, does each injector make an operating sound?

No → Check injectors and circuits. Refer to EF & EC-131.

Yes ↓

7

CHECK EGR VALVE.
Check EGR valve for sticking.

N.G. → Repair or replace.

O.K. ↓

8

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-153.

N.G. → Repair or replace.

O.K. ↓

9

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to EF & EC-92.

N.G. → Repair or replace.

O.K. ↓

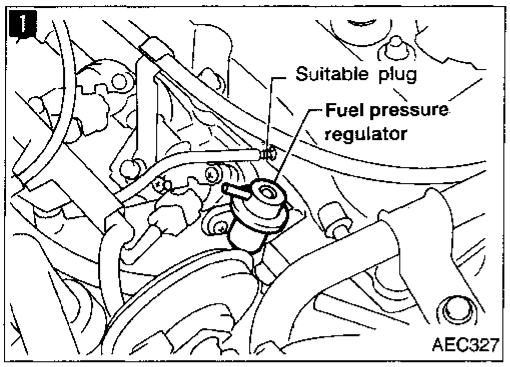
10

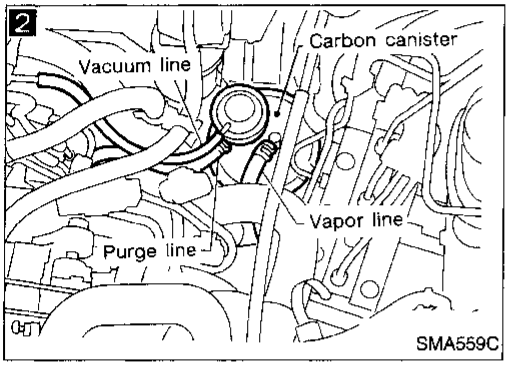
TRY A KNOWN GOOD ECM*

↓

INSPECTION END

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





Diagnostic Procedure 7 — Hesitation when the Engine is Hot

1

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

Yes → Check fuel properties.

No ↓

2

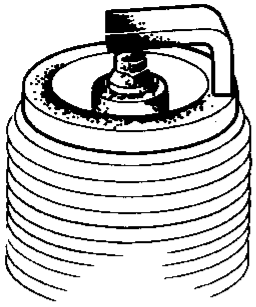
CHECK CANISTER PURGE.
1. Disconnect canister purge line hose and plug hose.
2. Perform cruise test.
3. Does the hesitation disappear?

Yes → Check purge and vacuum lines. Refer to EF & EC-107.

No ↓

INSPECTION END

1



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Diagnostic Procedure 8 — Hesitation when the Engine is Cold

1

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

N.G. → Repair or replace spark plug(s).

O.K. ↓

2

TRY A KNOWN GOOD MASS AIR FLOW SENSOR.

Trouble is fixed. → Replace mass air flow sensor.

Trouble is not fixed. ↓

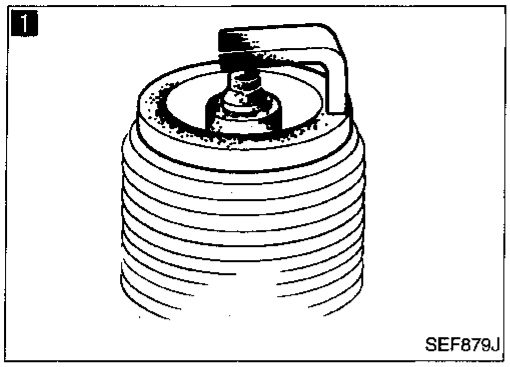
3

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

↓

INSPECTION END

Diagnostic Procedure 9 — Hesitation under Normal Conditions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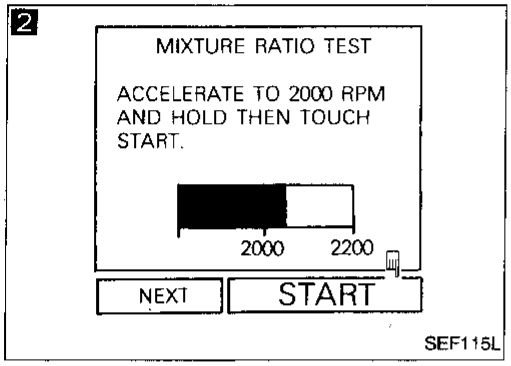

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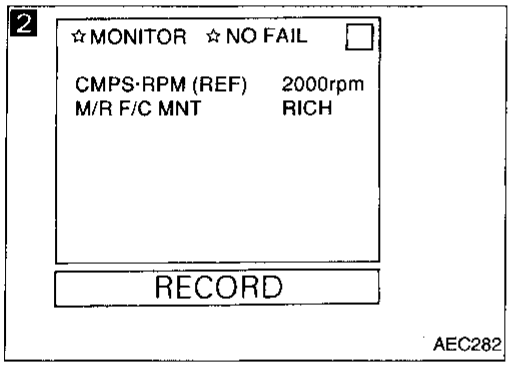

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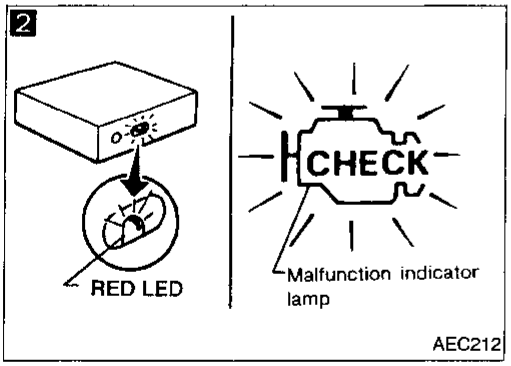
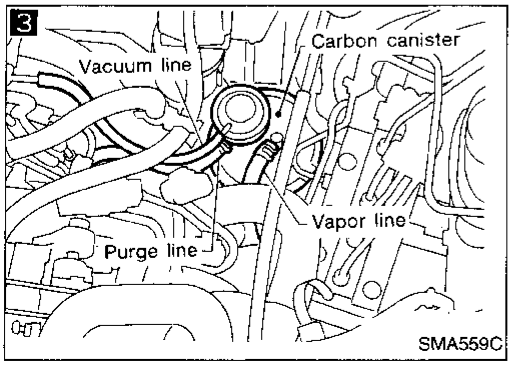


AEC212



SMA559C

1

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

N.G. → Repair or replace spark plug(s).

O.K. ↓

2

CHECK OXYGEN SENSOR.

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

OR

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 "Oxygen sensor monitor" in the On-board Diagnostic Test Mode II. Refer to EF & EC-38.
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.

Yes → Replace oxygen sensor(s).

No ↓

3

CHECK CANISTER PURGE.

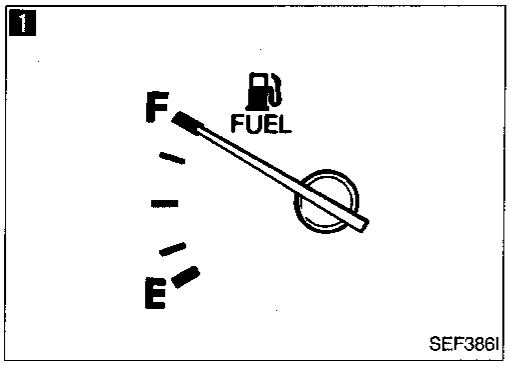
1. Disconnect canister purge line hose and plug hose.
2. Perform cruise test.
3. Does the hesitation disappear?

Yes → Check purge and vacuum lines. Refer to EF & EC-168.

No ↓

INSPECTION END

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.

O.K. ↓

2

PERFORM POWER BALANCE TEST.

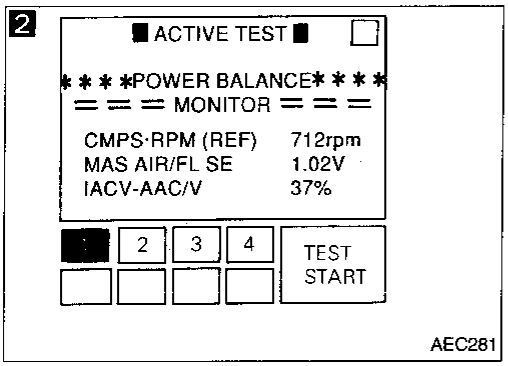
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

— OR —

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

No → Go to **5** .

Yes ↓

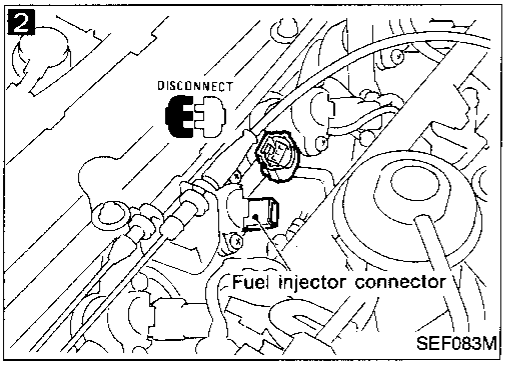


3

CHECK INJECTOR.
Does each injector sound like it is operating at idle?

No → Check injector(s) and circuit(s). Refer to EF & EC-131.

Yes ↓



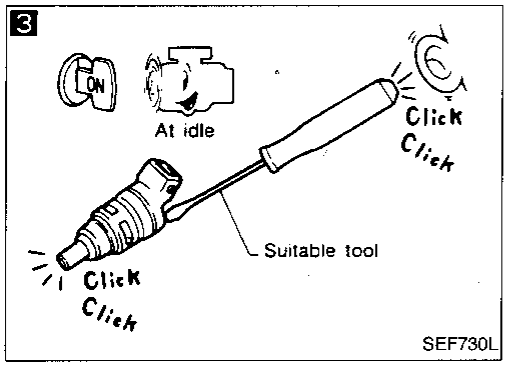
4

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. Refer to EF & EC-107.

O.K. ↓



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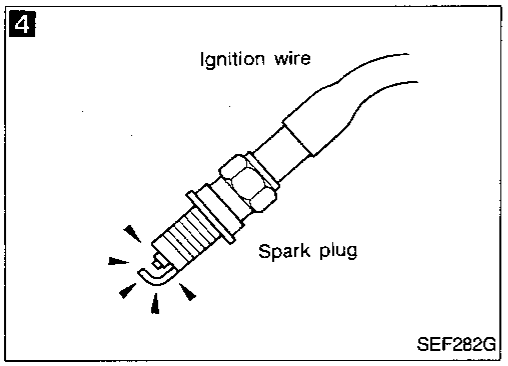


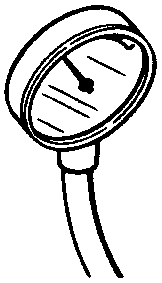
Diagnostic Procedure 10 — Engine Stalls when Turning (Cont'd)

5

FUEL PRES RELEASE

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

START



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Ⓐ

5

CHECK FUEL PRESSURE.

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

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)

N.G. → Check fuel pressure regulator diaphragm. Refer to EF & EC-167.

OR

1. Release fuel pressure to zero. Refer to EF & EC-166.
2. Install fuel pressure gauge and check fuel pressure.

O.K.

6

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-153.

N.G. → Repair or replace.

O.K.

7

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to EF & EC-92.

N.G. → Repair or replace.

O.K.

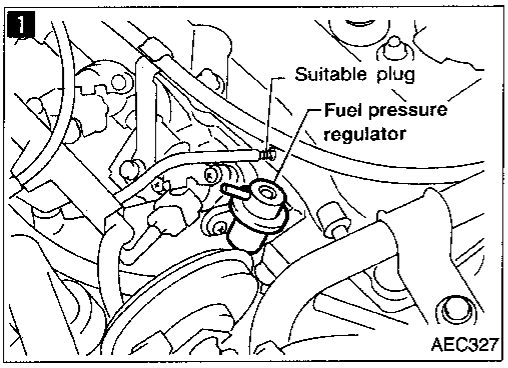
8

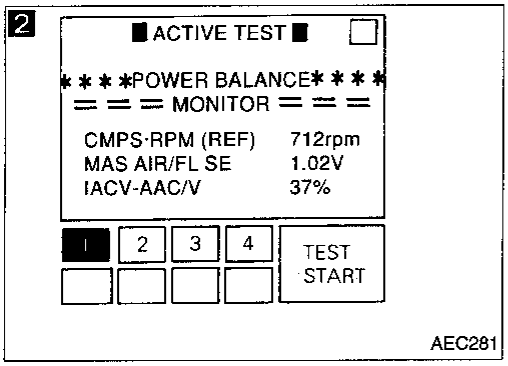
TRY A KNOWN GOOD ECM*

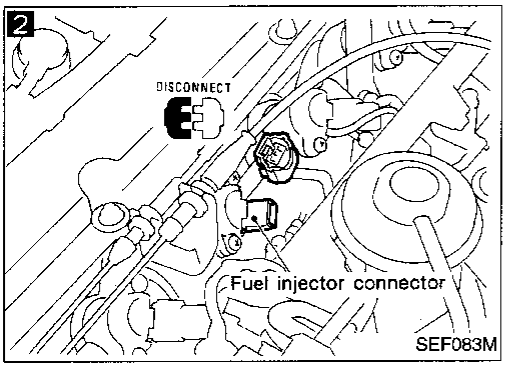
INSPECTION END

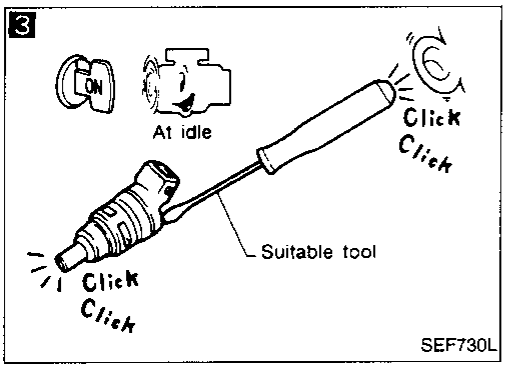
*: ECM may be the cause of a problem, but this is rarely the case.

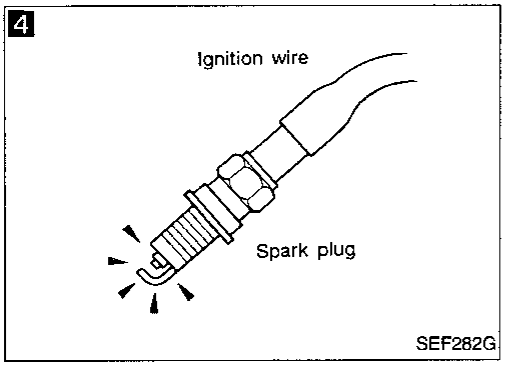
Diagnostic Procedure 11 — Engine Stalls when the Engine is Hot











1

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

Yes → Check fuel properties.

No ↓

2

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

No → Go to 5 .

OR

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

Yes ↓

3

CHECK INJECTOR.
Does each injector sound like it is operating at idle?

No → Check injector(s) and circuit(s). Refer to EF & EC-131.

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 their circuits. Refer to EF & EC-107.

O.K. ↓

(Go to Ⓐ on next page.)

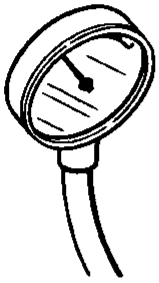
Diagnostic Procedure 11 — Engine Stalls when the Engine is Hot (Cont'd)

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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Ⓐ

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)

N.G. → Check fuel pressure regulator diaphragm. Refer to EF & EC-167.

OR

1. Release fuel pressure to zero. Refer to EF & EC-166.
2. Install fuel pressure gauge and check fuel pressure.

O.K.

6

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-153.

N.G. → Repair or replace.

O.K.

7

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to EF & EC-92.

N.G. → Repair or replace.

O.K.

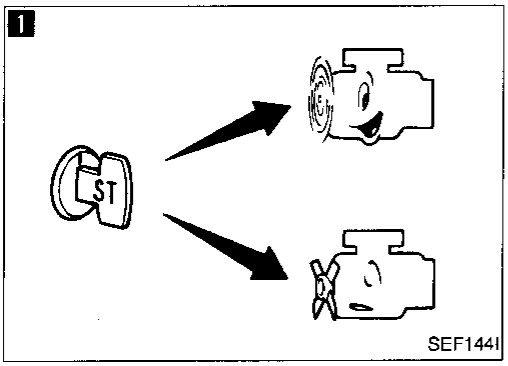
8

TRY A KNOWN GOOD ECM*

INSPECTION END

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

1



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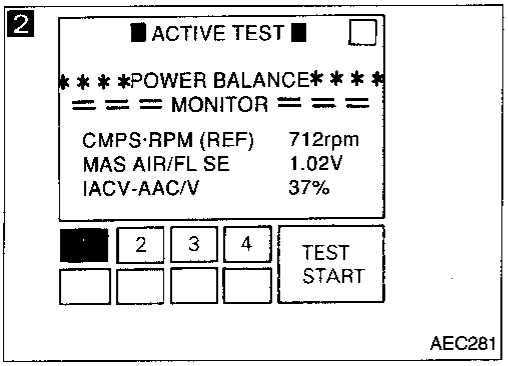
2



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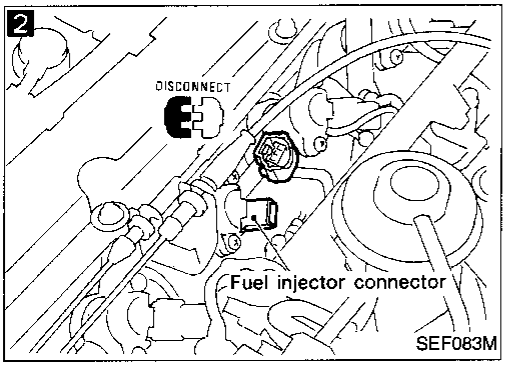
2



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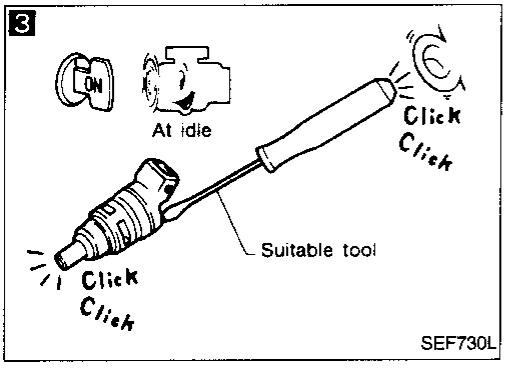
3



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Diagnostic Procedure 12 — Engine Stalls when the Engine is Cold

1

CHECK IAC VALVE-AAC VALVE.
When the engine is cold, can you start the engine when pressing accelerator pedal 1/4 open?

Yes → Check IAC valve-AAC valve and circuits. Refer to EF & EC-136.

No ↓

2

PERFORM POWER BALANCE TEST.

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

N.G. → Go to 6 .

OR

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

O.K. ↓

3

CHECK INJECTOR.
Does each injector sound like it is operating at idle?

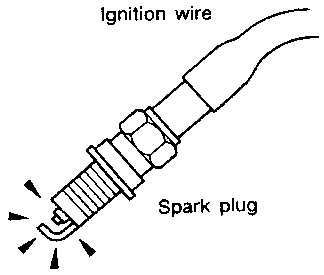
N.G. → Check injector(s) and circuit(s). Refer to EF & EC-131.

O.K. ↓

(Go to Ⓐ on next page.)

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

4



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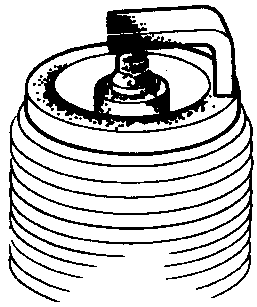
5



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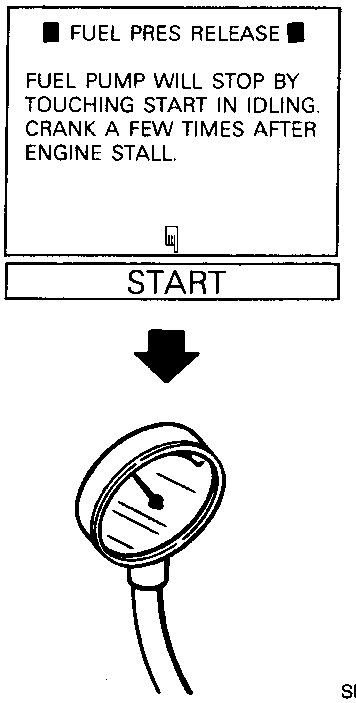
6



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Ⓐ

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. Refer to EF & EC-107.

O.K.

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

N.G. → Repair or replace spark plug(s).

O.K.

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/cm^2, 43 psi)
   At idle:
   Approx.
   235 kPa (2.4 kg/cm^2, 34 psi)

N.G. → Check fuel pressure regulator diaphragm. Refer to EF & EC-167.

OR

1. Release fuel pressure to zero. Refer to EF & EC-166.
2. Install fuel pressure gauge and check fuel pressure.

O.K.

7 **CHECK ECM HARNESS CONNECTOR.**
Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-153.

N.G. → Repair or replace.

O.K.

8 **CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.**
Refer to EF & EC-92.

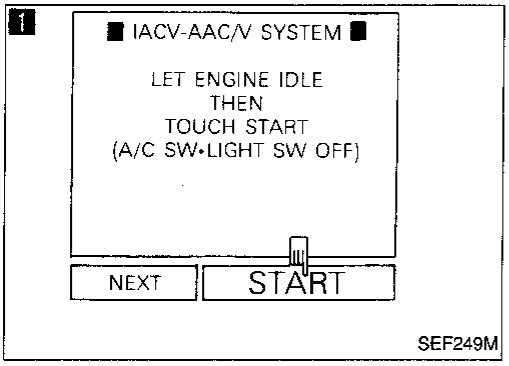
N.G. → Repair or replace.

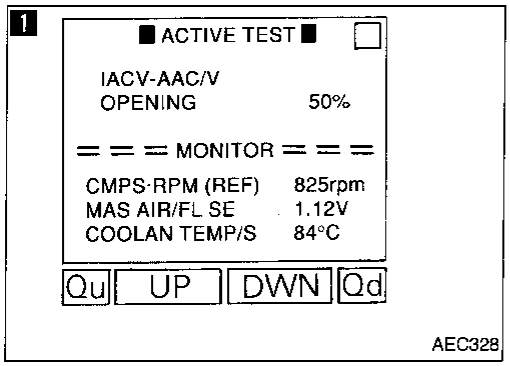
O.K.

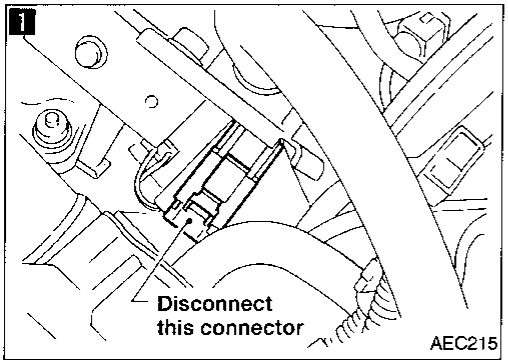
9 **TRY A KNOWN GOOD ECM***

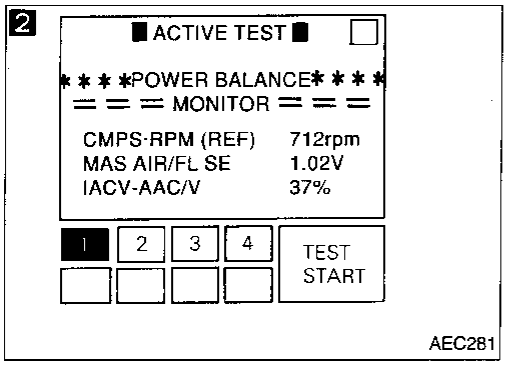
INSPECTION END

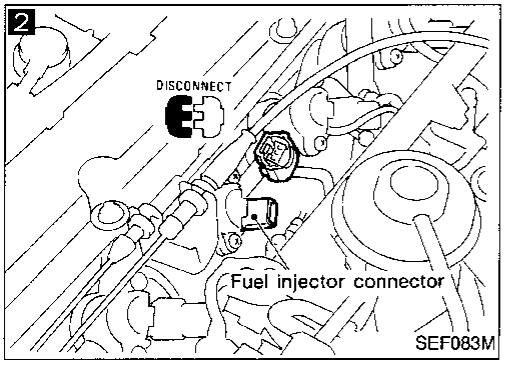
*: ECM may be the cause of a problem, but this is rarely the case.











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

1

CHECK IAC VALVE-AAC VALVE.

1) Start engine and warm it up sufficiently.
2) Check idle speed.
   700 ± 50 rpm
   (A/T in "N" position)

No → Check IAC valve-AAC valve and circuit. Refer to EF & EC-136.

3) Perform "IACV AAC/V SYSTEM" in "FUNCTION TEST" mode with CONSULT.

— OR —

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

— OR —

3) When disconnecting IAC valve-AAC valve harness connector, does the engine speed drop?

Yes ↓

2

PERFORM POWER BALANCE TEST.

No → Go to **5** .

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

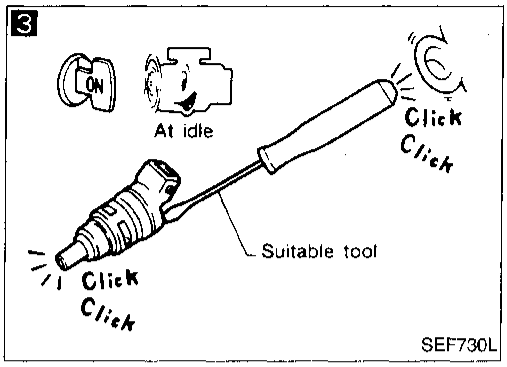
— OR —

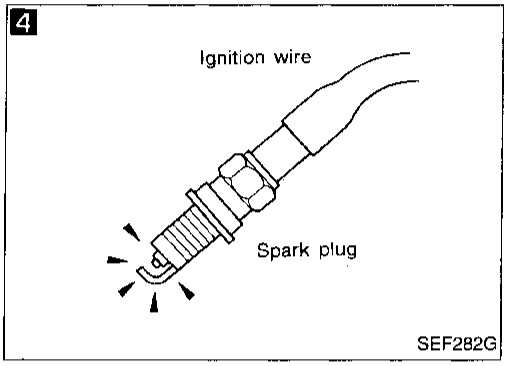
When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?

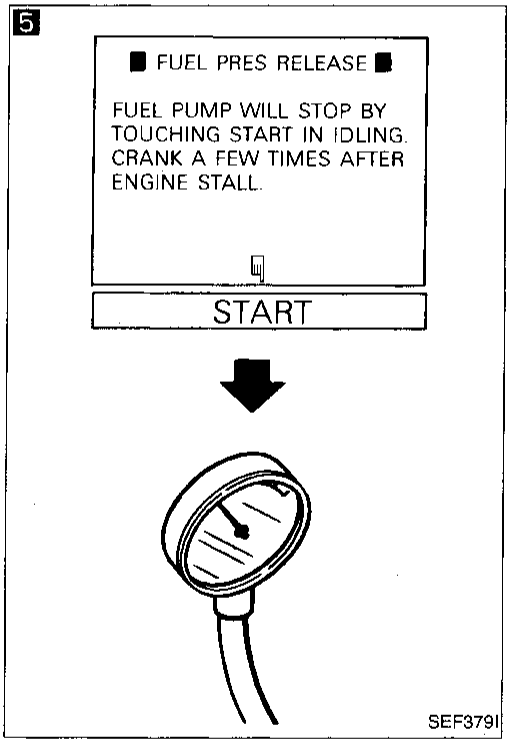
Yes ↓

(Go to Ⓐ on next page.)

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







Ⓐ

3

CHECK INJECTOR.
Does each injector sound like it is operating at idle?

No → Check injector(s) and their circuit(s). Refer to EF & EC-131.

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 an ground point with engine cranking.
4. Check for spark.

N.G. → Check ignition coil, power transistor unit and their circuits. Refer to EF & EC-107.

O.K. ↓

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 EF & EC-166.
2. Install fuel pressure gauge and check fuel pressure.

N.G. → Check fuel pressure regulator diaphragm. Refer to EF & EC-167.

O.K. ↓

6

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-153.

N.G. → Repair or replace.

O.K. ↓

7

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to EF & EC-92.

N.G. → Repair or replace.

O.K. ↓

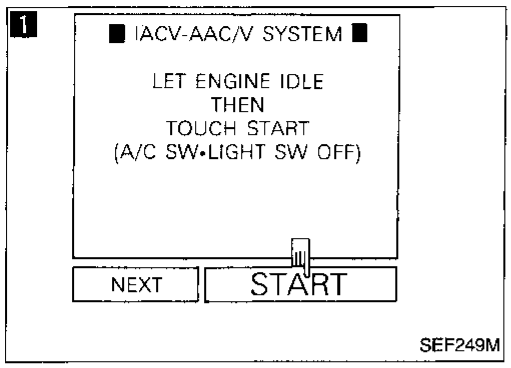
8

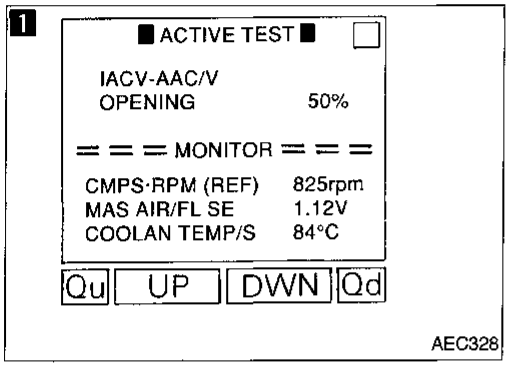
TRY A KNOWN GOOD ECM*

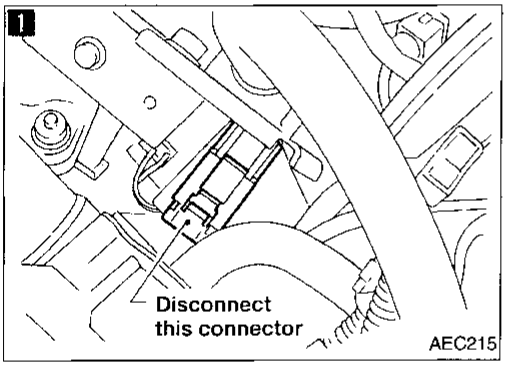
↓

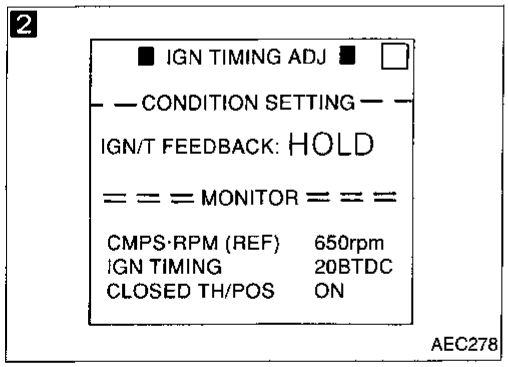
INSPECTION END

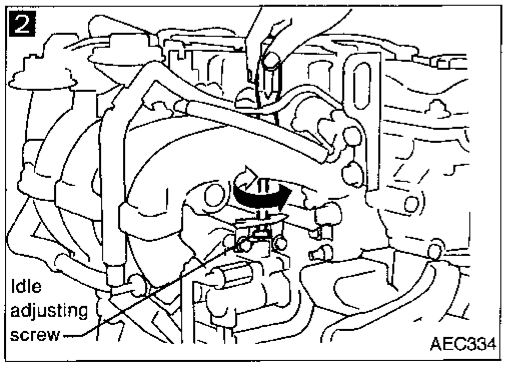
*: ECM may be the cause of a problem, but this is rarely the case.











Diagnostic Procedure 14 — Engine Stalls after Decelerating

1

CHECK IAC VALVE-AAC VALVE.

1) Start engine and warm it up sufficiently.
2) Check idle speed.
   700 ± 50 rpm
   (A/T in "N" position)

No → Check IAC valve-AAC valve and circuit. Refer to EF & EC-136.

3) Perform "IACV-AAC/V SYSTEM" in "FUNCTION TEST" mode with CONSULT.

OR

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

OR

3) When disconnecting IAC valve-AAC valve harness connector, does the engine speed drop?

Yes ↓

2

CHECK IDLE ADJ. SCREW CLOGGING.

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

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

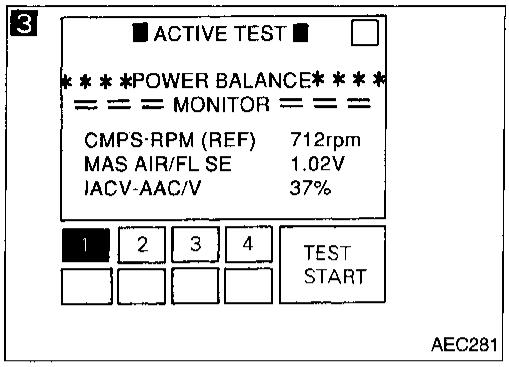
OR

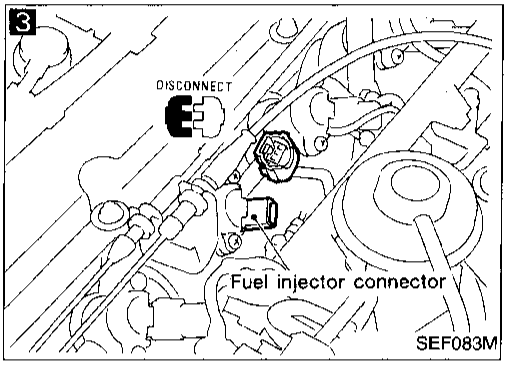
1. Disconnect throttle position sensor harness connector.
2. Can you set engine speed at 650 ± 50 rpm (in "N" position) by turning idle adjusting screw?

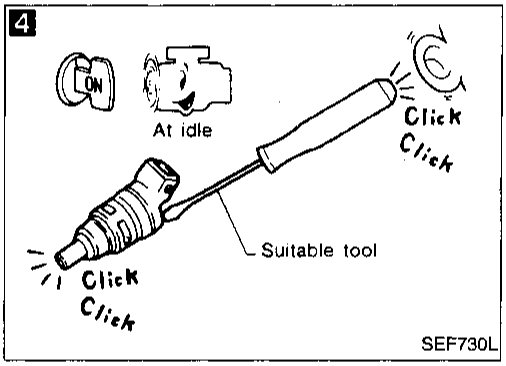
Yes ↓

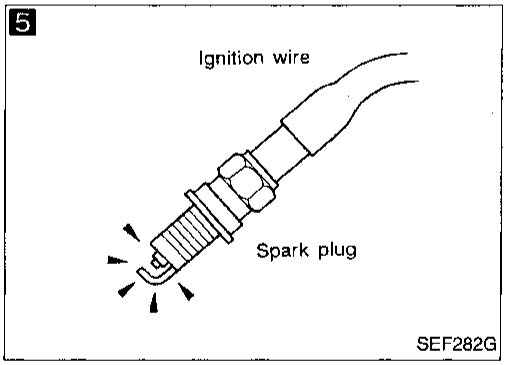
(Go to Ⓐ on next page.)

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









Ⓐ

3

PERFORM POWER BALANCE TEST.

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

OR

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

No → Go to **6** .

Yes ↓

4

CHECK INJECTOR.

Does each injector sound like it is operating at idle?

No → Check injector(s) and circuit(s). Refer to EF & EC-131.

Yes ↓

5

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. Refer to EF & EC-107.

O.K. ↓

(Go to Ⓑ on next page.)

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

Ⓑ

6

CHECK FUEL PRESSURE.

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

N.G. → Check fuel pressure regulator diaphragm. Refer to EF & EC-167.

OR

1. Release fuel pressure to zero. Refer to EF & EC-166.
2. Install fuel pressure gauge and check fuel pressure.

O.K.

7

CHECK OXYGEN SENSOR.

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

N.G. → Replace oxygen sensor.

OR

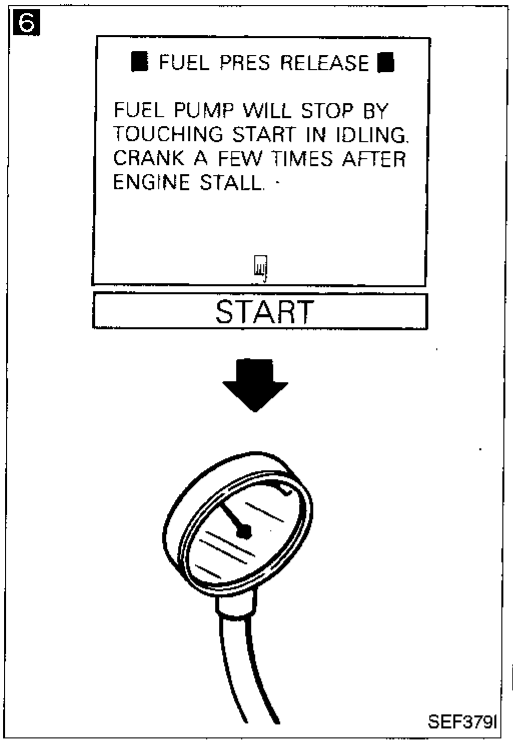
1. See "M/R F/C MNT" in "DATA MONITOR" mode.
2. Maintaining engine at 2,000 rpm under no-load (with engine warmed up sufficiently.), check to make sure that the monitor fluctuates between "LEAN" and "RICH" more than 5 times during 10 seconds.
   RICH→LEAN→RICH→
   1 time 2 times
   LEAN→RICH.....

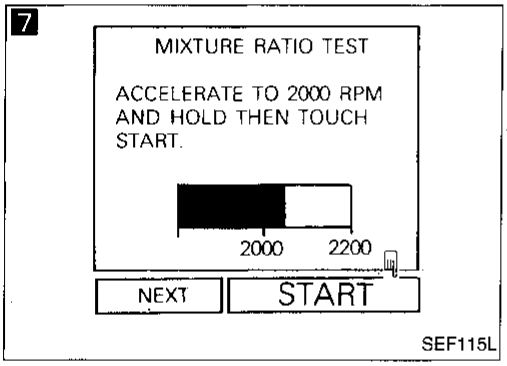
OR

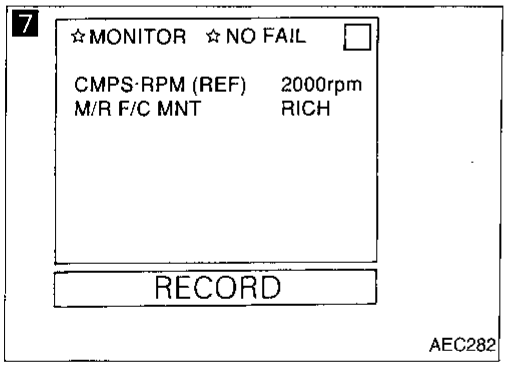
1. Set "Oxygen sensor monitor" in the On-board Diagnostic Test Mode II. Refer to EF & EC-38.
2. Maintaining engine at 2,000 rpm under no load, check that malfunction indicator lamp or RED LED on the ECM goes ON and OFF more than 5 times during 10 seconds.

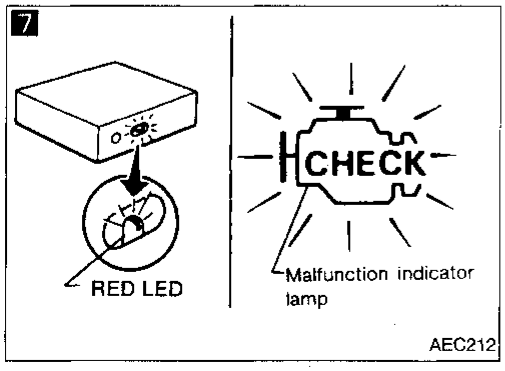
O.K.

(Go to Ⓒ on next page.)

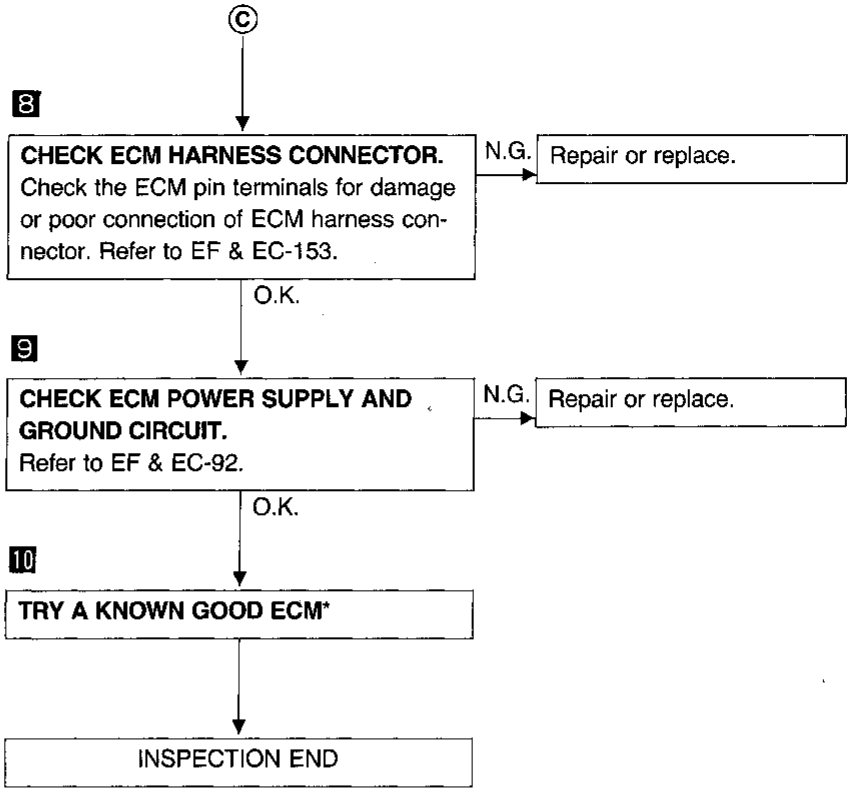






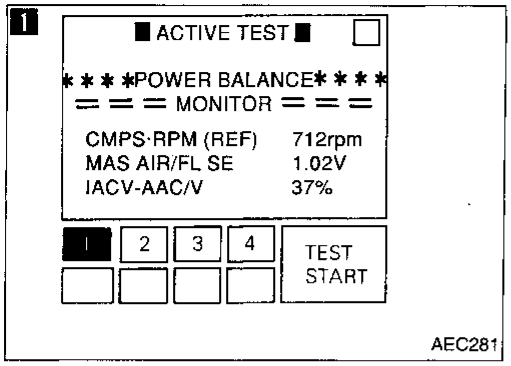


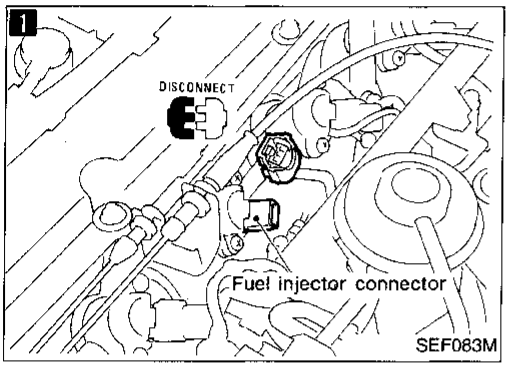
Diagnostic Procedure 14 — Engine Stalls after Decelerating (Cont'd)

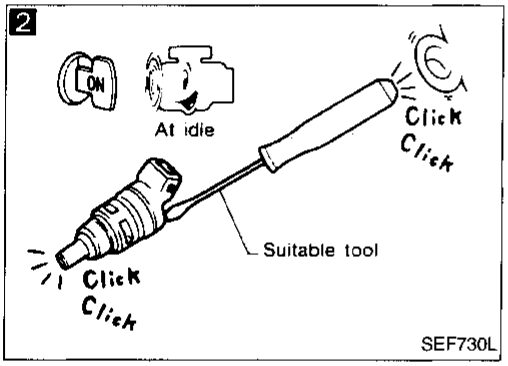


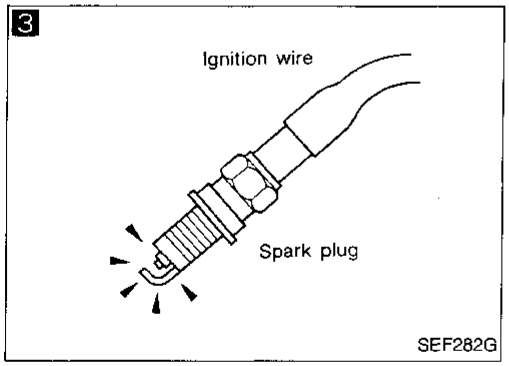
*: ECM may be the cause of a problem, but this is rarely the case.

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









1

PERFORM POWER BALANCE TEST.

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

No → Go to **4**.

OR

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

Yes ↓

2

CHECK INJECTOR.

Does each injector sound like it is operating at idle?

No → Check injector(s) and circuit(s). Refer to EF & EC-131.

Yes ↓

3

CHECK IGNITION SPARK.

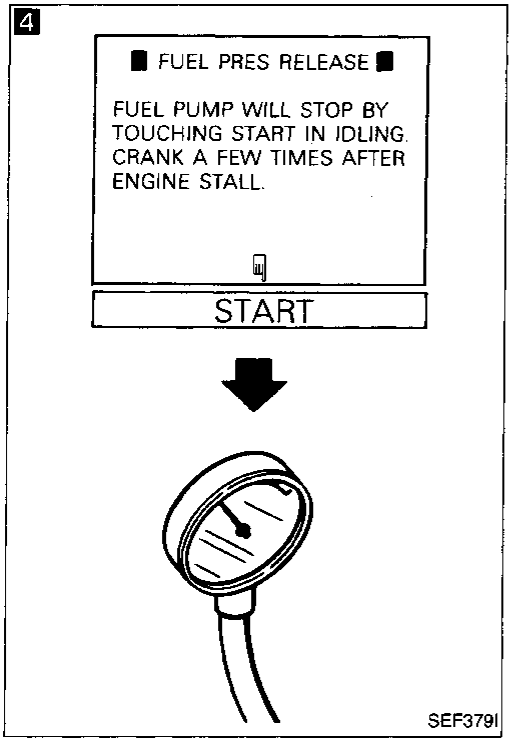
1. Disconnect ignition wire from rocker cover.
2. Connect a known good spark plug to the ignition wire.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

N.G. → Check ignition coil, power transistor unit and circuits. Refer to EF & EC-107.

O.K. ↓

(Go to Ⓐ on next page.)

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



Ⓐ

4

CHECK FUEL PRESSURE.

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

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)

N.G. → Check fuel pump fluid circuit and fuel pressure regulator. Refer to EF & EC-167.

— OR —

1. Release fuel pressure to zero. Refer to EF & EC-166.
2. Install fuel pressure gauge and check fuel pressure.

O.K.

5

CHECK ECM HARNESS CONNECTOR. Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-153.

N.G. → Repair or replace.

O.K.

6

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT. Refer to EF & EC-92.

Yes → Repair or replace.

No

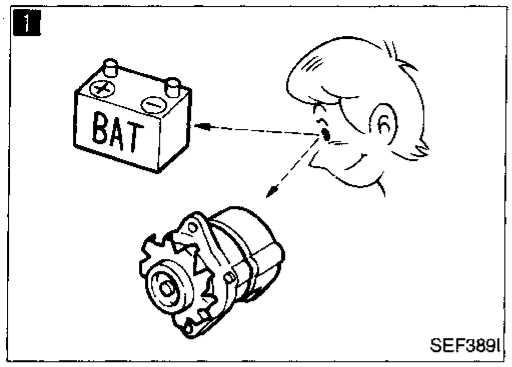
7

TRY A KNOWN GOOD ECM*

INSPECTION END

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

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

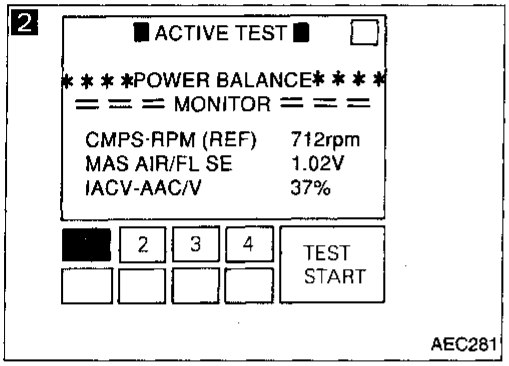


1

CHECK BATTERY AND GENERATOR.
Check battery and generator condition.
Refer to EL section ("SPECIFIC GRAVITY CHECK", "BATTERY") and ("Trouble-shooting", "CHARGING SYSTEM").

N.G. → Repair or replace.

O.K. ↓



2

PERFORM POWER BALANCE TEST.

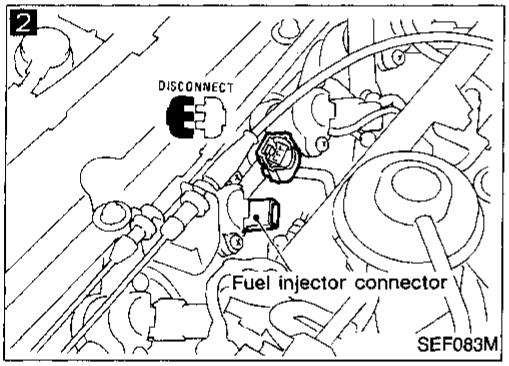
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

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 ↓

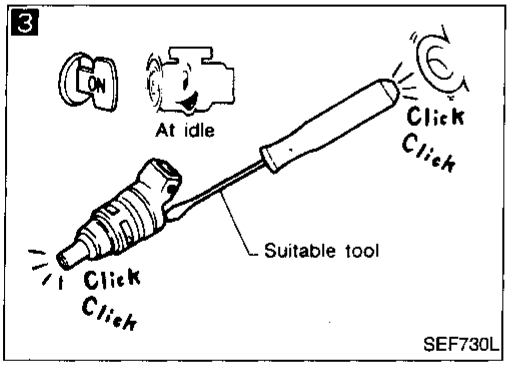


3

CHECK INJECTOR.
Does each injector sound like it is operating at idle?

No → Check injector(s) and circuit(s). Refer to EF & EC-131.

Yes ↓



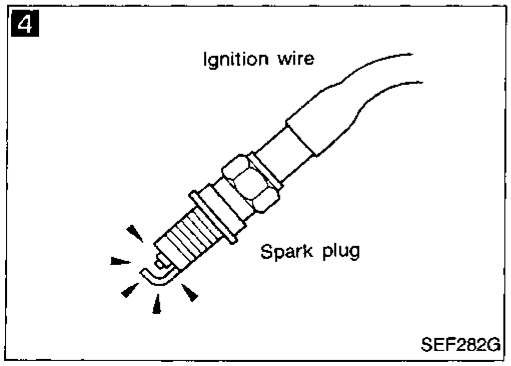
4

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. Refer to EF & EC-107.

O.K. ↓



(Go to Ⓐ on next page.)

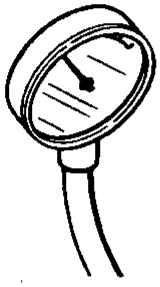
Diagnostic Procedure 16 — Engine Stalls when the Electrical Load is Heavy (Cont'd)

5

■ FUEL PRES RELEASE ■

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

START



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Ⓐ

5

CHECK FUEL PRESSURE.

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

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)

N.G. → Check fuel pressure regulator diaphragm. Refer to EF & EC-167.

OR

1. Release fuel pressure to zero. Refer to EF & EC-166.
2. Install fuel pressure gauge and check fuel pressure.

O.K.

6

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-153.

N.G. → Repair or replace.

O.K.

7

CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to EF & EC-92.

N.G. → Repair or replace.

O.K.

8

TRY A KNOWN GOOD ECM*

INSPECTION END

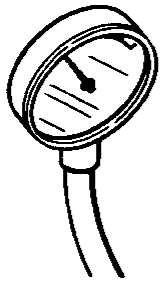
*: ECM may be the cause of a problem, but this is rarely the case.

1

■ FUEL PRES RELEASE ■

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

START



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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)

N.G. → Check fuel pressure regulator diaphragm. Refer to EF & EC-167.

OR

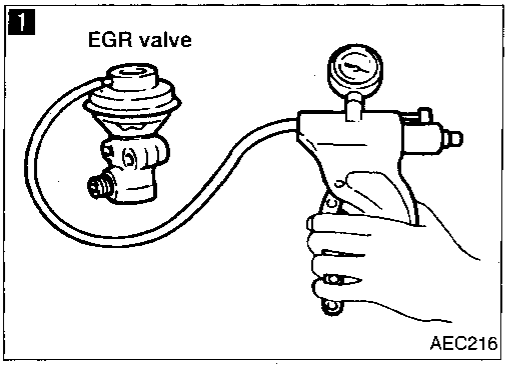
1. Release fuel pressure to zero. Refer to EF & EC-166.
2. Install fuel pressure gauge and check fuel pressure.

O.K.

INSPECTION END

Diagnostic Procedure 18 — Knock

1



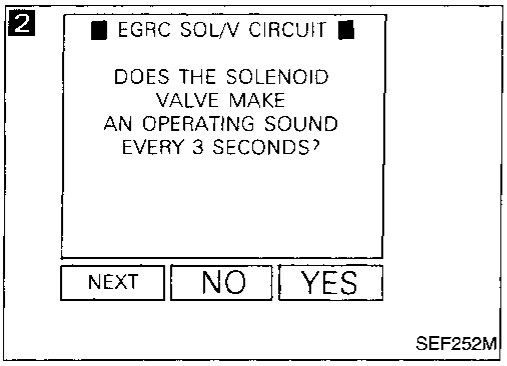
1

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

No → Check EGR valve for sticking.

Yes ↓

2



CHECK EGR & CANISTER CONTROL SOLENOID VALVE.

1. Start engine and warm it up sufficiently.
2. Perform "EGRC SOL/V CIRCUIT" in "FUNCTION TEST" mode.

— OR —

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

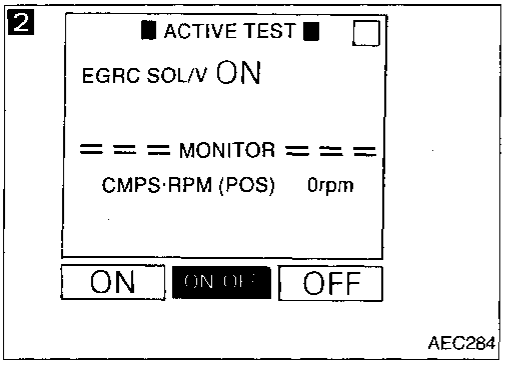
— OR —

1. Disconnect EGR and canister control solenoid valve harness connector.
2. Supply EGR and canister control solenoid valve terminals with battery current and check operating sound.

N.G. → Check solenoid valve and circuit. Refer to EF & EC-110.

O.K. ↓

2



3

CHECK VACUUM HOSES.

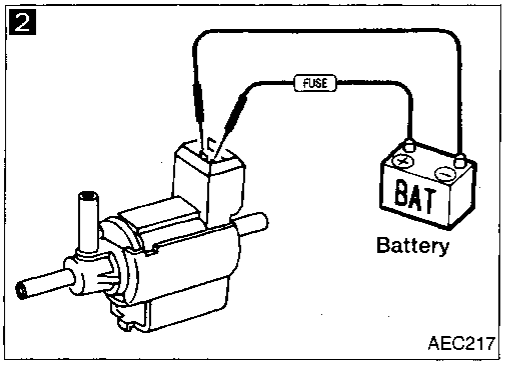
Check the following vacuum hoses for clogging, cracks and poor connection.

a) Vacuum hose between EGR valve and EGR and canister control solenoid valve.
b) Vacuum hose between EGR and canister control solenoid valve and throttle body port.
c) Vacuum hose between EGR and canister control solenoid valve and air duct. Refer to EF & EC-10.

N.G. → Repair or replace.

O.K. ↓

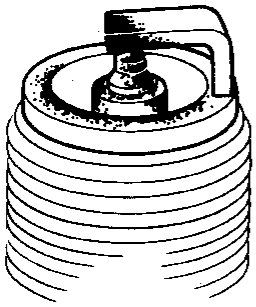
2



(Go to Ⓐ on next page.)

Diagnostic Procedure 18 — Knock (Cont'd)

4



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Ⓐ

4

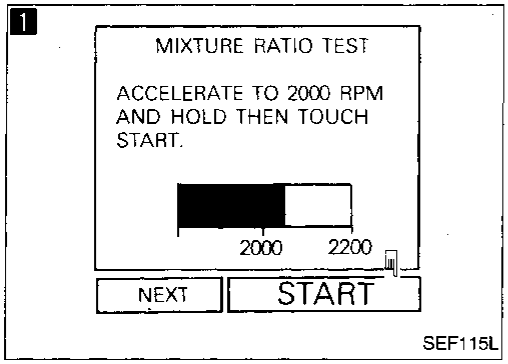
CHECK FOR OIL LEAK TO COMBUSTION CHAMBER.
Remove spark plugs and check for fouling with oil.

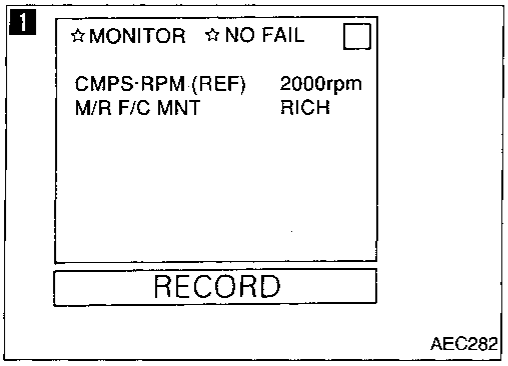
Yes → Check pistons, piston rings, valves, valve seats, valve oil seal, engine oil level, etc.

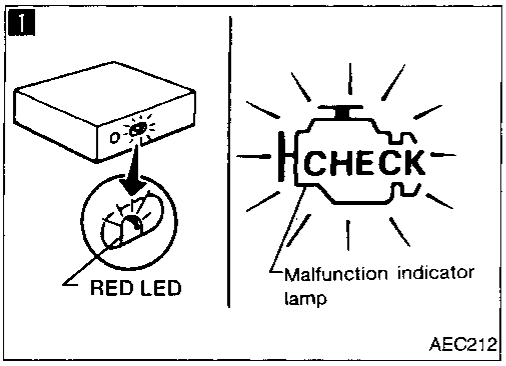
No ↓

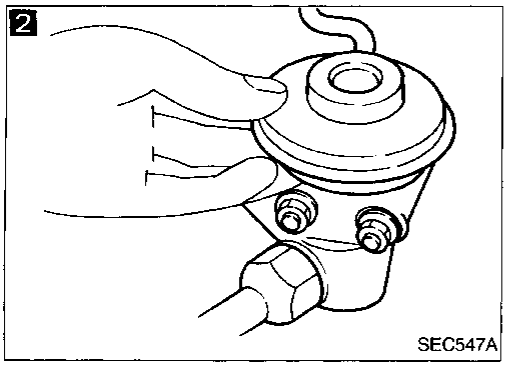
INSPECTION END

Diagnostic Procedure 19 — Surge









1

CHECK OXYGEN SENSOR.

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

N.G. → Replace oxygen sensor.

OR

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 "Oxygen sensor monitor" in the On-board Diagnostic Test Mode II. Refer to EF & EC-38.
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.

O.K.

2

CHECK EGR VALVE.
Check EGR valve for sticking.

N.G. → Repair or replace.

O.K.

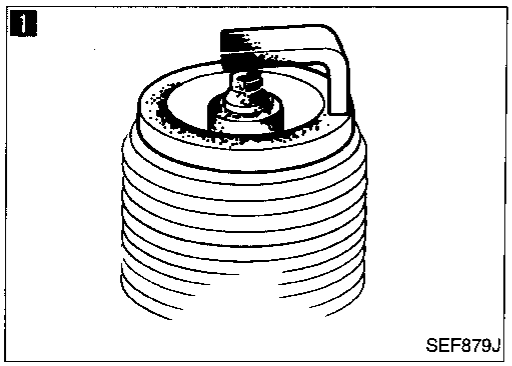
3

TRY A KNOWN GOOD ECM*

O.K.

INSPECTION END

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



Diagnostic Procedure 20 — Backfire through the Intake

1

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

N.G. → Repair or replace spark plug.

O.K. ↓

2

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

↓

INSPECTION END

Diagnostic Procedure 21 — Backfire through the Exhaust on Deceleration

CHECK ENGINE COOLANT TEMPERATURE SENSOR.
Check engine coolant temperature sensor and its circuit. Refer to EF & EC-101.

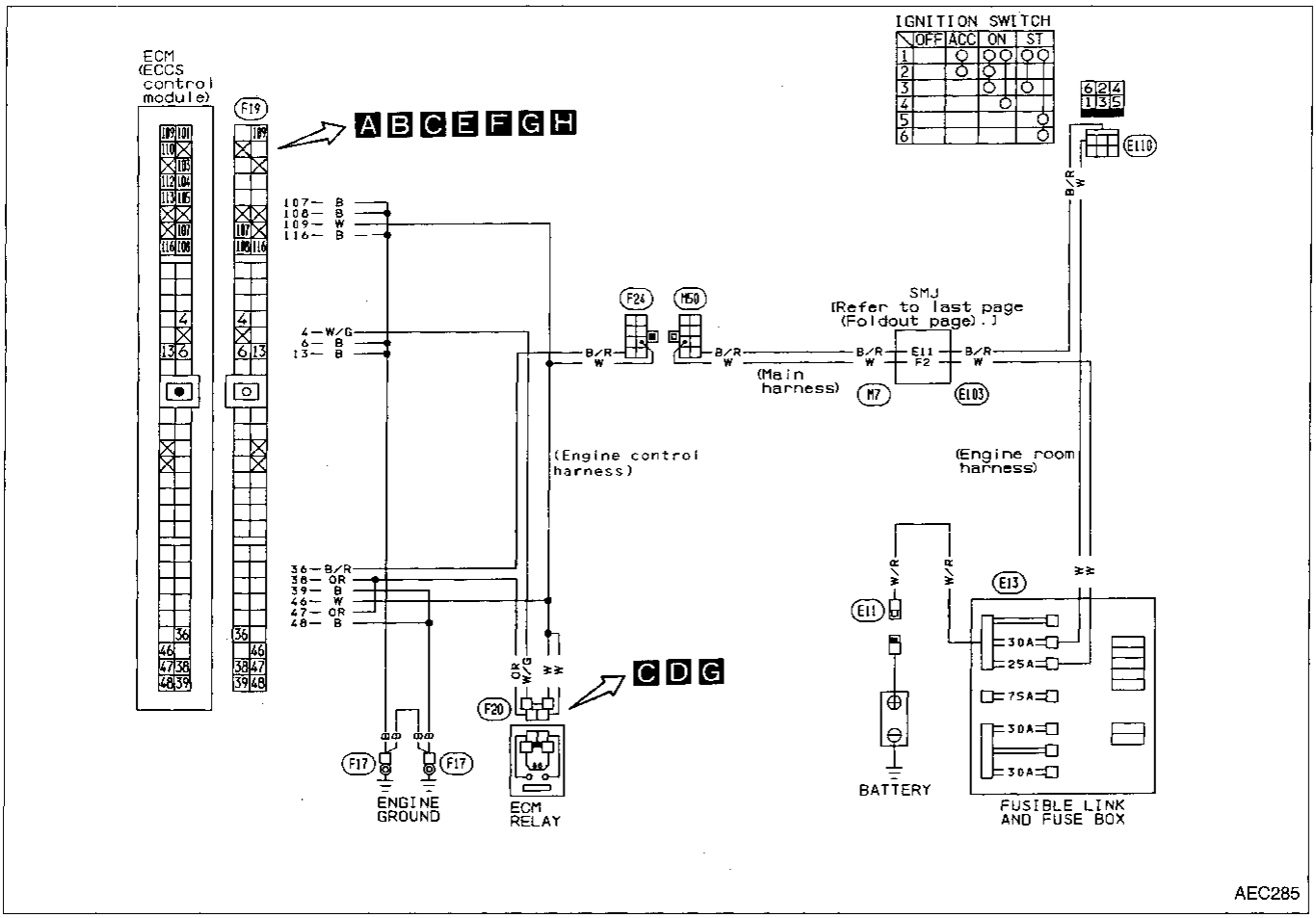
N.G. → Replace or repair.

O.K. ↓

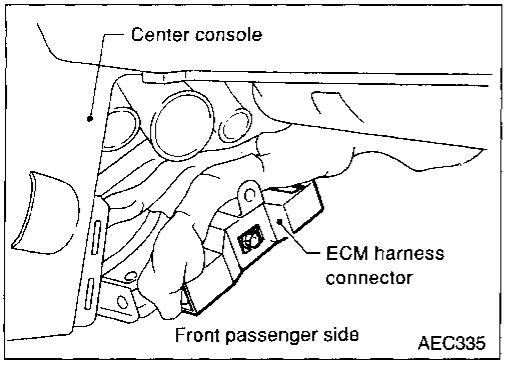
INSPECTION END

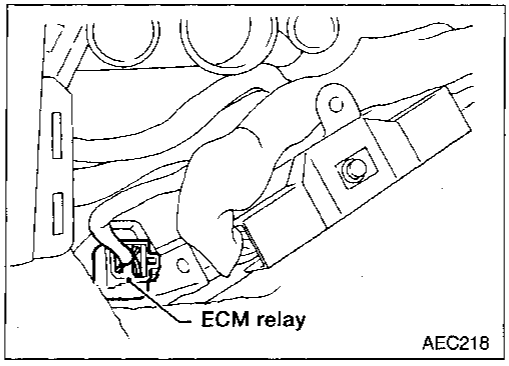
Diagnostic Procedure 22

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

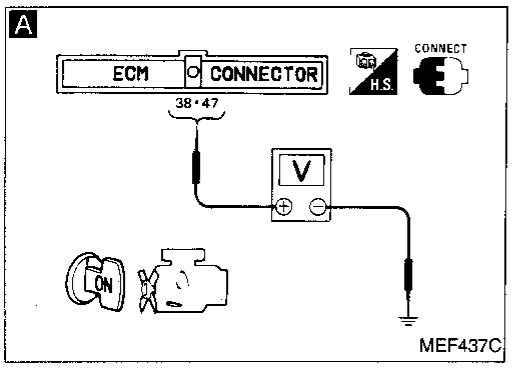


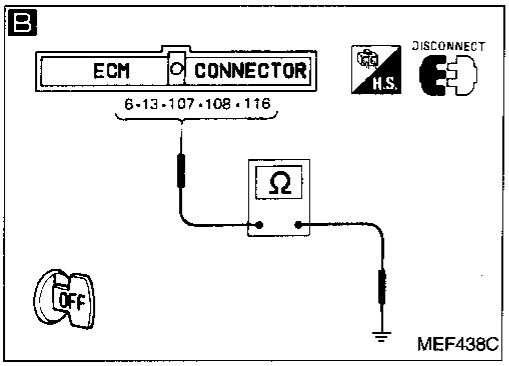
Harness layout

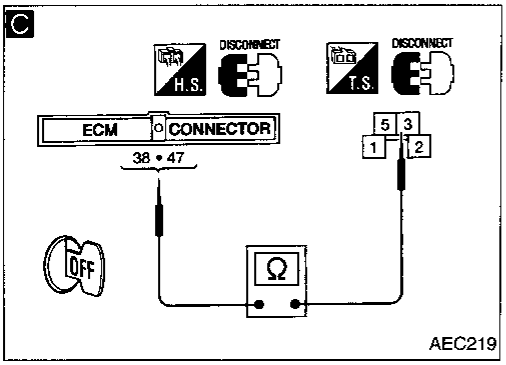


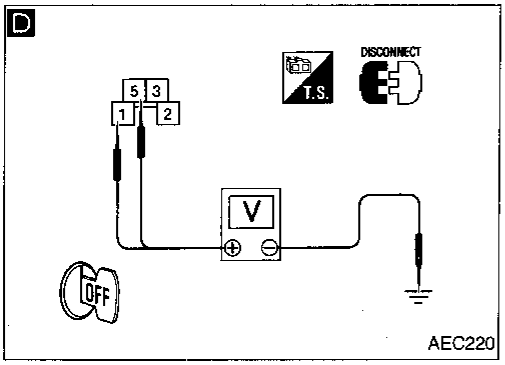


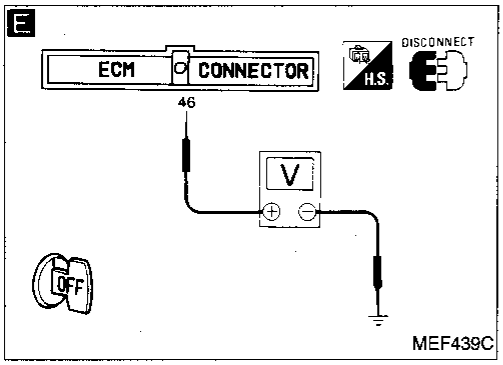
Diagnostic Procedure 22 (Cont'd)











INSPECTION START

A

CHECK POWER SUPPLY.
1) Turn ignition switch "ON".
2) Check voltage between ECM terminals (38), (47) and ground.
Voltage: Battery positive voltage

O.K. → **B**

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminals (6), (13), (107), (108), (116) and engine ground.
Continuity should exist.
If N.G., repair harness or connectors.

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

N.G. →

C

CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Disconnect ECM relay.
4) Check harness continuity between ECM terminals (38), (47) and terminal (3).
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. →

D

CHECK VOLTAGE BETWEEN ECM RELAY AND GROUND.
1) Check voltage between terminals (1), (5) and ground.
Voltage: Battery positive voltage

N.G. → Check the following.
- Harness connectors (F24), (M50)
- Harness connectors (M7), (E103)
- 25A fusible link
- Harness continuity between ECM relay and battery

If N.G., repair harness or connectors.

O.K. →

E

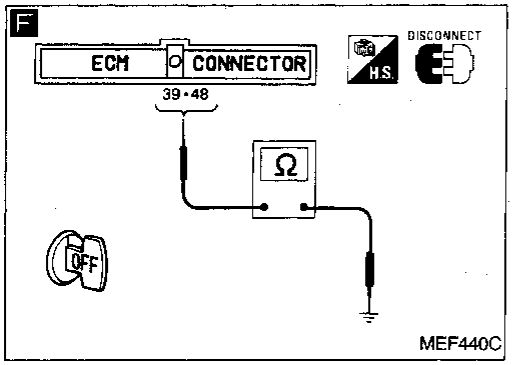
CHECK VOLTAGE BETWEEN ECM AND GROUND.
1) Check voltage between ECM terminal (46) and ground.
Voltage: Battery positive voltage

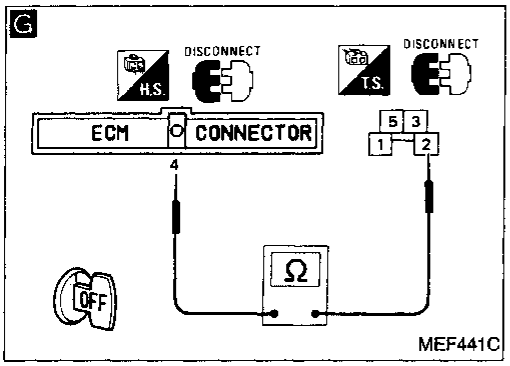
N.G. → Check the following.
- Harness connectors (F24), (M50)
- Harness connectors (M7), (E103)
- 25A fusible link
- Harness continuity between ECM and battery

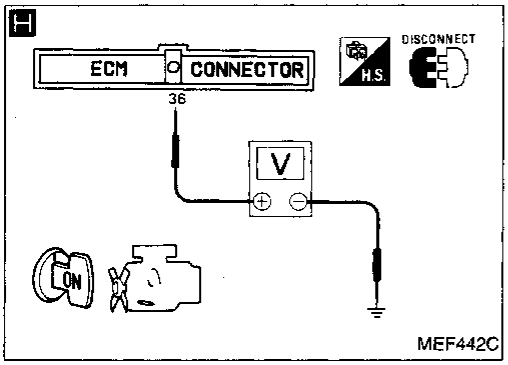
If N.G., repair harness or connectors.

O.K. → (A)

Diagnostic Procedure 22 (Cont'd)







Ⓐ

F

CHECK GROUND CIRCUIT.
1) Check harness continuity between ECM terminals ㊴, ㊽ 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. → 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 positive voltage

N.G. → Check the following.
- Harness connectors (F24), (M50)
- Harness connectors (M7), (E103)
- Harness continuity between ECM and ignition switch

If N.G., repair harness or connectors.

O.K. ↓

CHECK COMPONENT (ECM relay).
Refer to EF & EC-164.

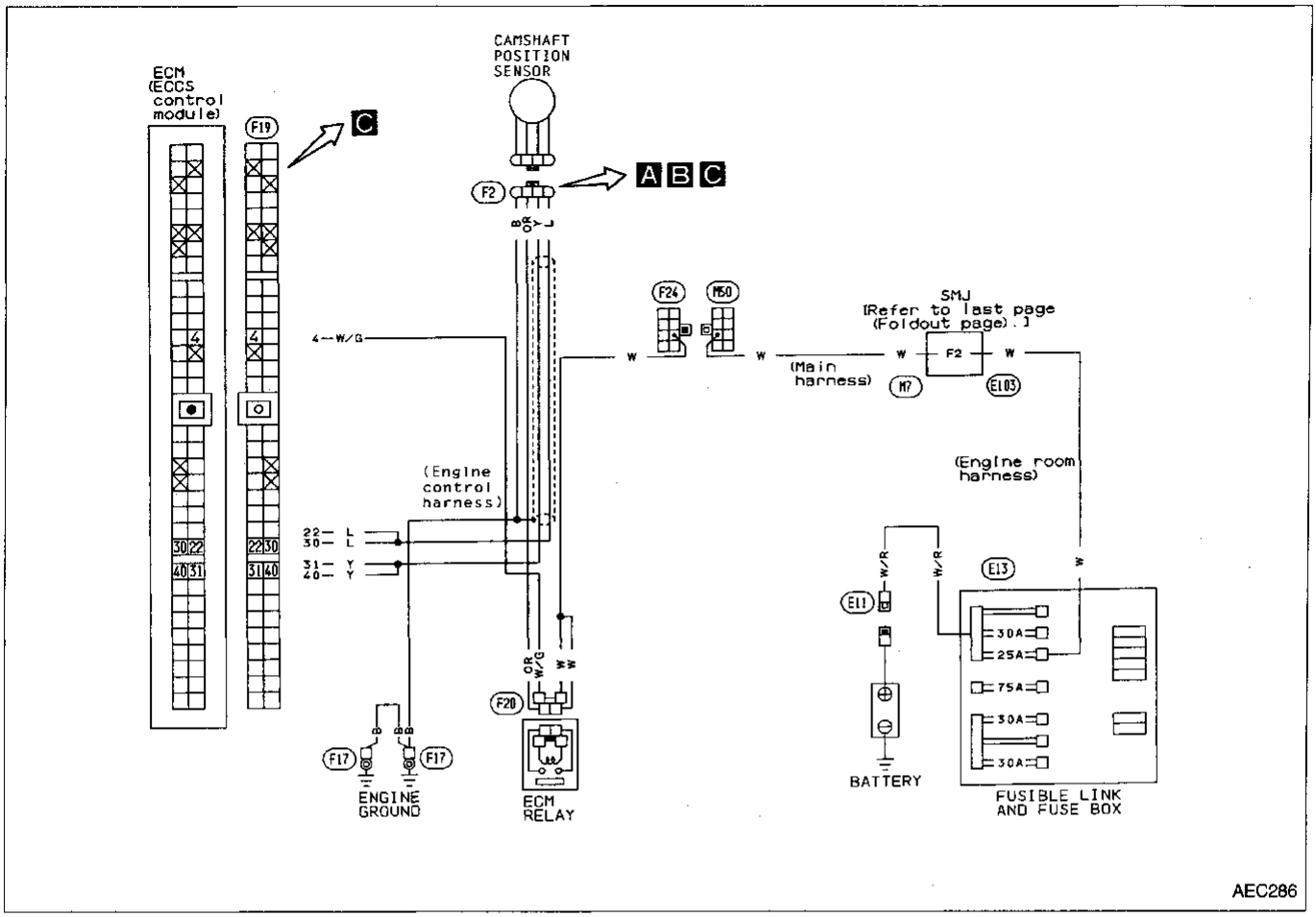
N.G. → Replace ECM relay.

O.K. ↓

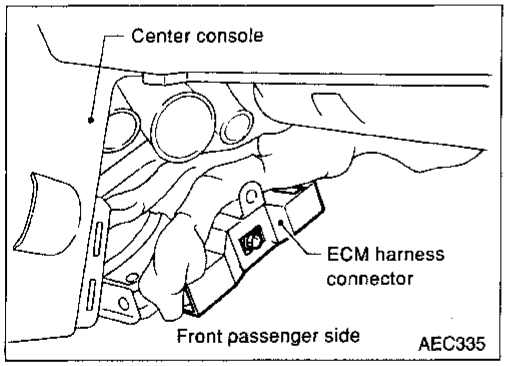
Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-153.

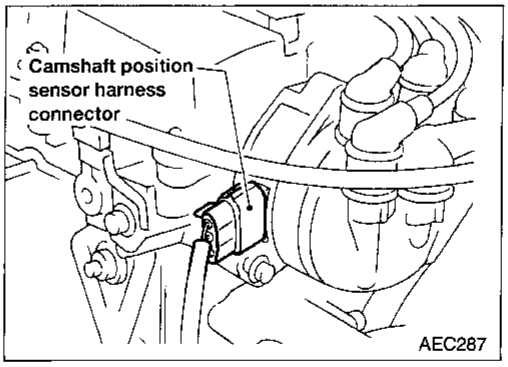
Diagnostic Procedure For Trouble Code 11

CAMSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)

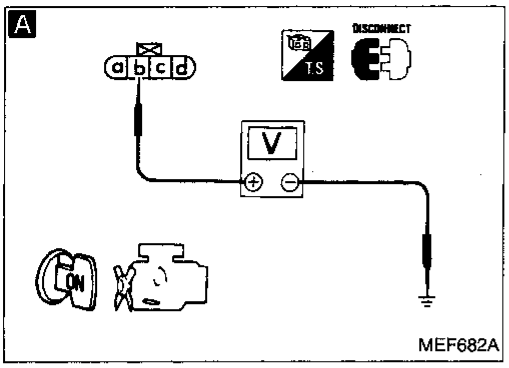


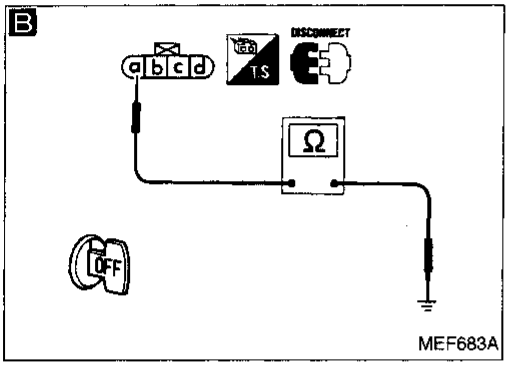
Harness layout

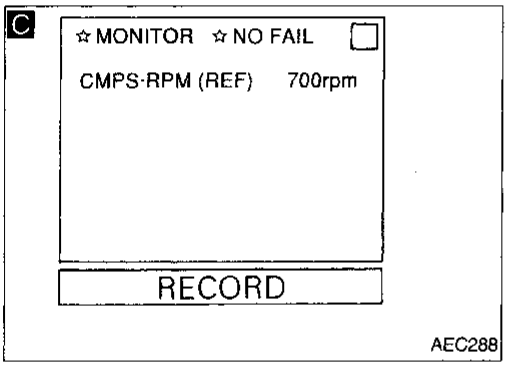


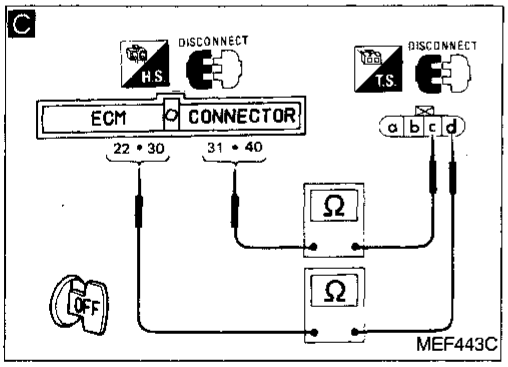


Diagnostic Procedure For Trouble Code 11 (Cont'd)









INSPECTION START

A

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

N.G. → Repair harness or connectors.

O.K.

B

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

N.G. → Repair harness or connectors.

O.K.

C

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

OR

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

N.G. → Repair harness or connectors.

O.K.

CHECK COMPONENT
(Camshaft position sensor).
Refer to EF & EC-158.

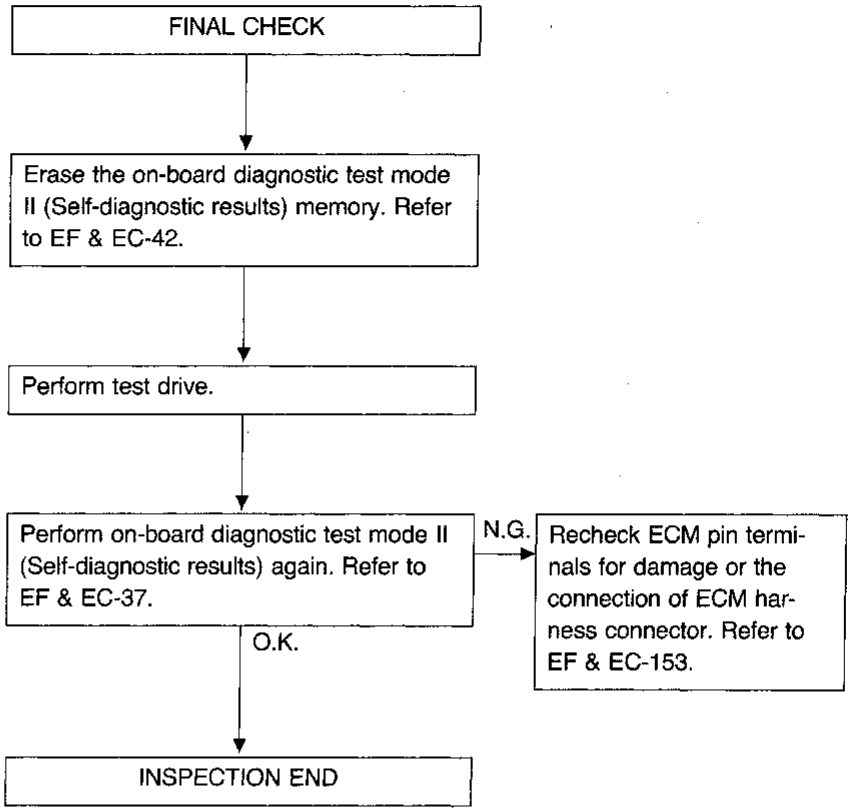
N.G. → Replace camshaft position sensor.

O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-153.

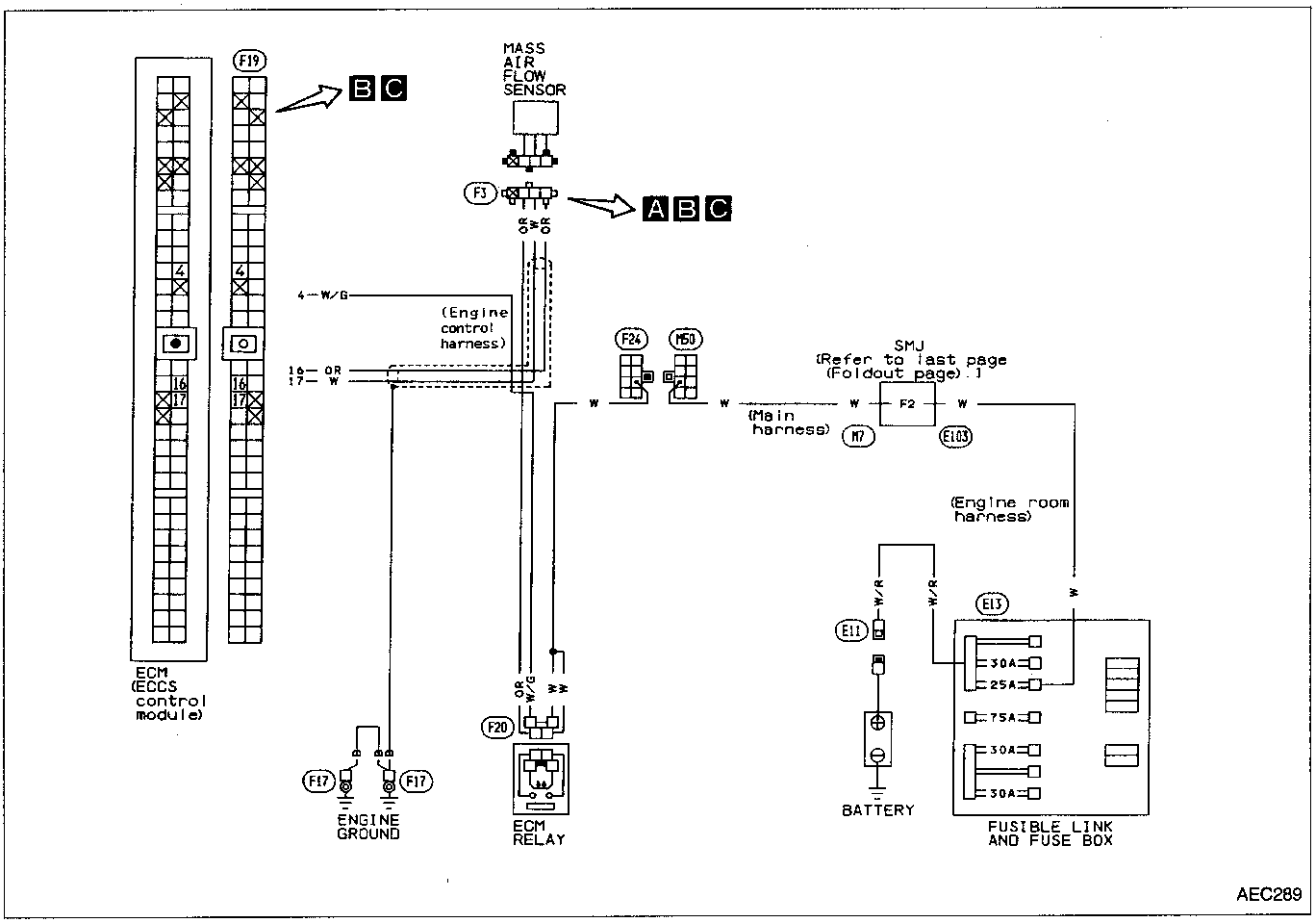
Diagnostic Procedure For Trouble Code 11 (Cont'd)

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

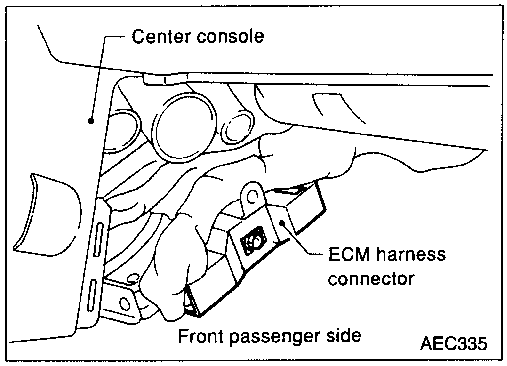


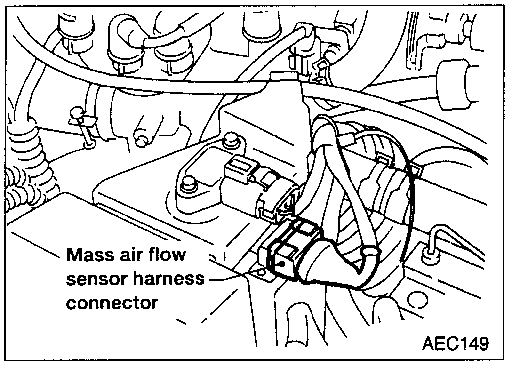
Diagnostic Procedure For Trouble Code 12

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

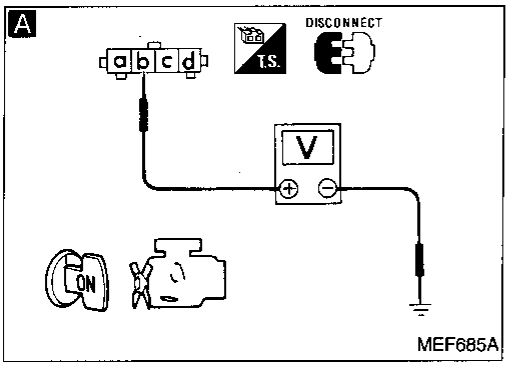


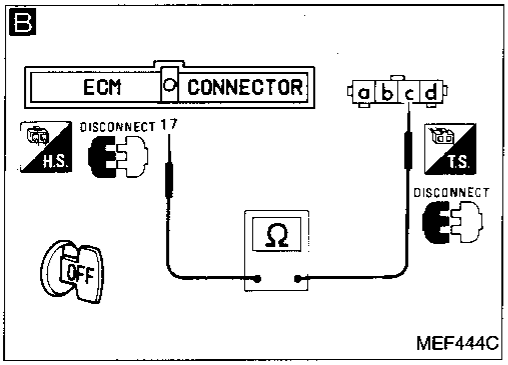
Harness layout

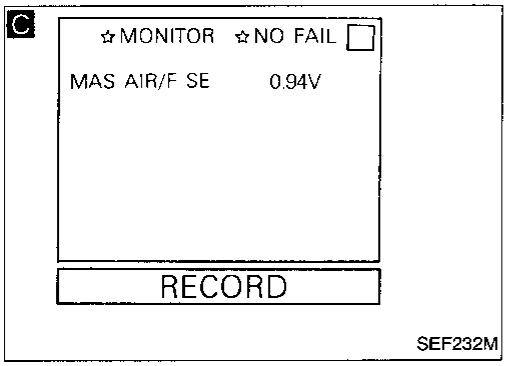


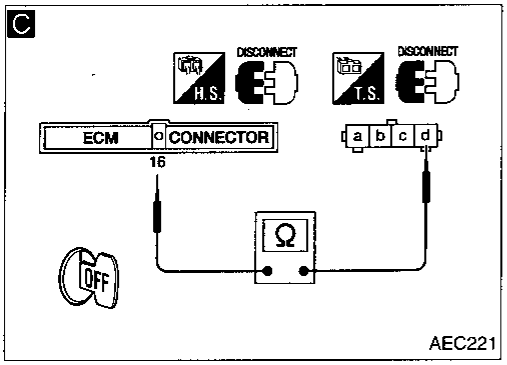


Diagnostic Procedure For Trouble Code 12 (Cont'd)









INSPECTION START

A

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

N.G. → Repair harness or connectors.

O.K.

B

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between terminal ⓒ and ECM terminal ⑰.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

C

CHECK INPUT SIGNAL CIRCUIT.
1) Reconnect mass air flow sensor harness connector and ECM harness connector.
2) Start engine and warm it up sufficiently.
3) Read mass air flow sensor signal in "DATA MONITOR" mode with CONSULT.
Voltage:
0.85 - 1.35V (At idle)

OR

1) Check harness continuity between terminal ⓓ and ECM terminal ⑯.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

CHECK COMPONENT
(Mass air flow sensor).
Refer to EF & EC-158.

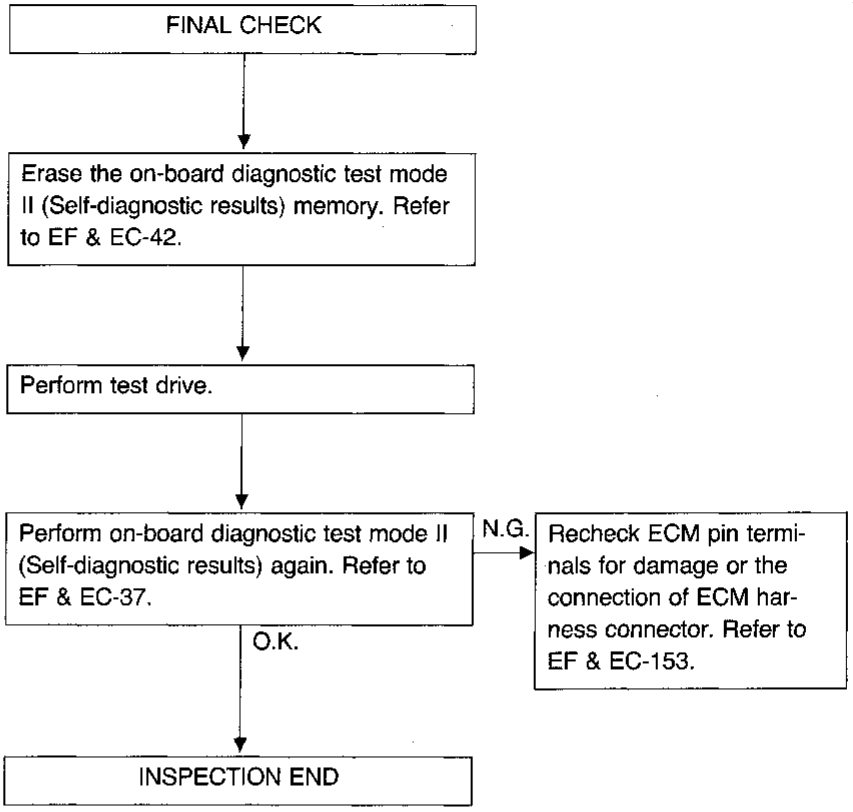
N.G. → Replace mass air flow sensor.

O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-153.

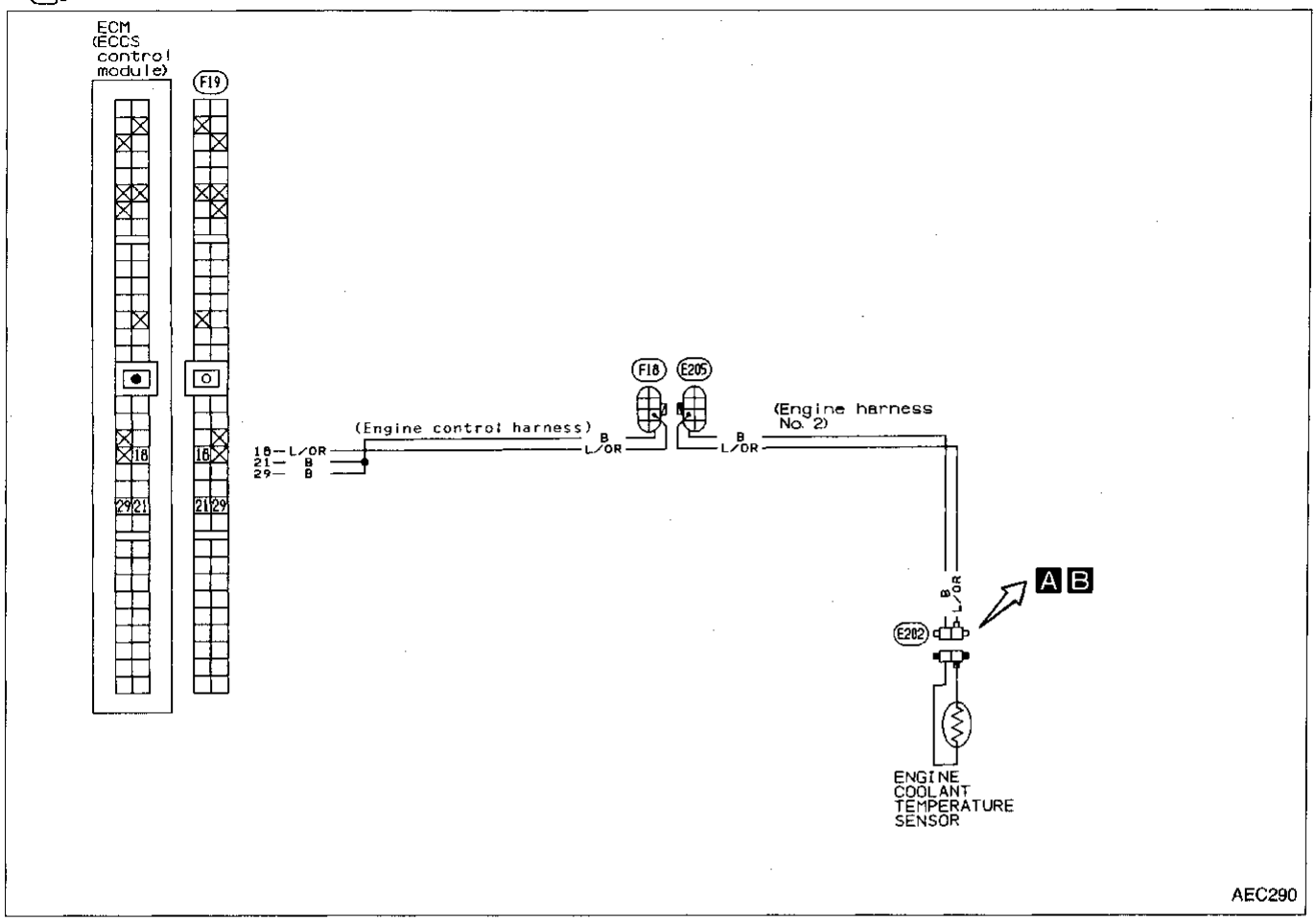
Diagnostic Procedure For Trouble Code 12 (Cont'd)

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

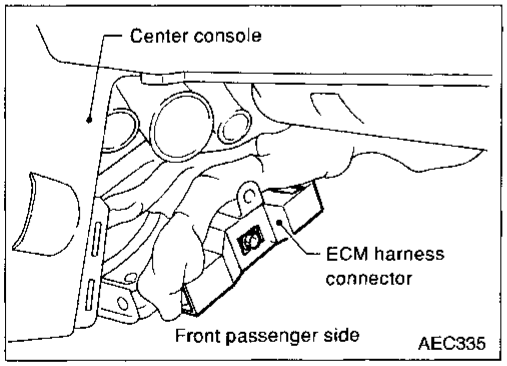


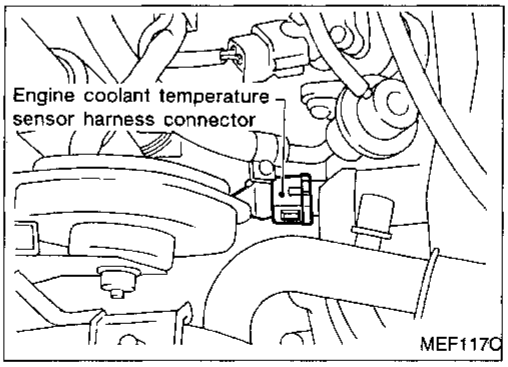
Diagnostic Procedure For Trouble Code 13

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

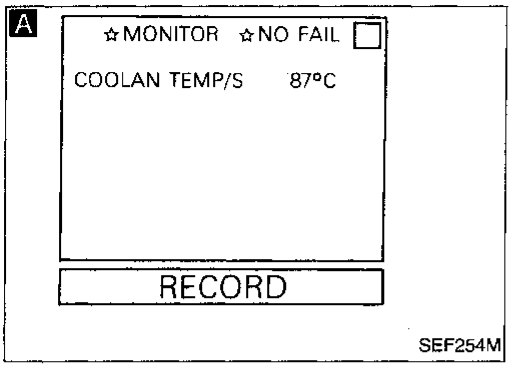


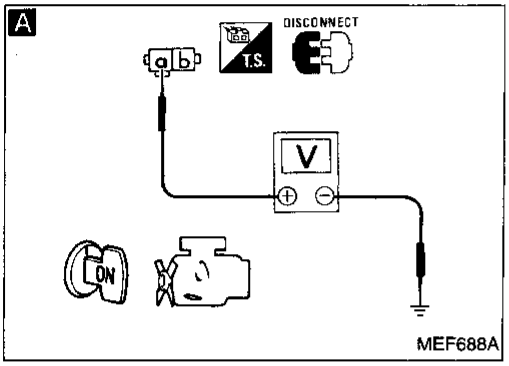
Harness layout

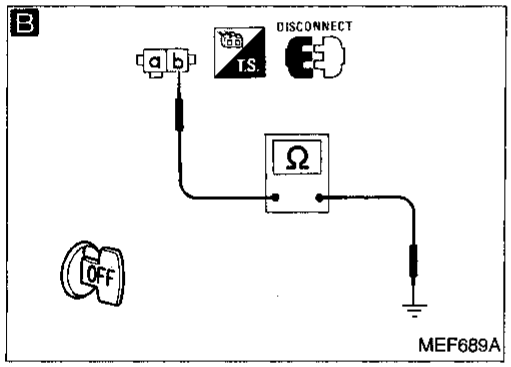




Diagnostic Procedure For Trouble Code 13 (Cont'd)







INSPECTION START

A

CHECK POWER SUPPLY.

1) Start engine.
2) Read engine coolant temperature sensor signal in "DATA MONITOR" mode with CONSULT.
Engine coolant temperature should gradually rise and reach more than 70°C (158°F) after engine warm-up.

OR

1) Disconnect engine coolant temperature sensor harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal (a) and ground.
Voltage:
Approximately 5V

N.G. → Check the following.
- Harness connectors (F18), (E205)
- Harness continuity between ECM and engine coolant temperature sensor

If N.G., repair harness or connectors.

O.K. ↓

B

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

N.G. → Check the following.
- Harness connectors (F18), (E205)
- Harness continuity between ECM and engine coolant temperature sensor

If N.G., repair harness or connectors.

O.K. ↓

CHECK COMPONENT
(Engine coolant temperature sensor).
Refer to EF & EC-159.

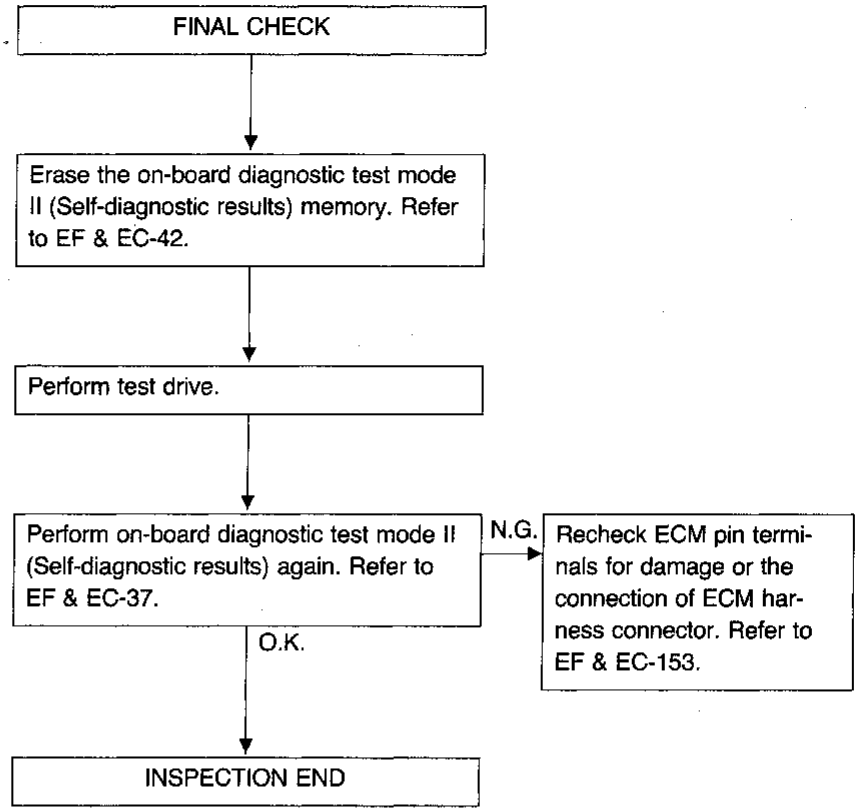
N.G. → Replace engine coolant temperature sensor.

O.K. ↓

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-153.

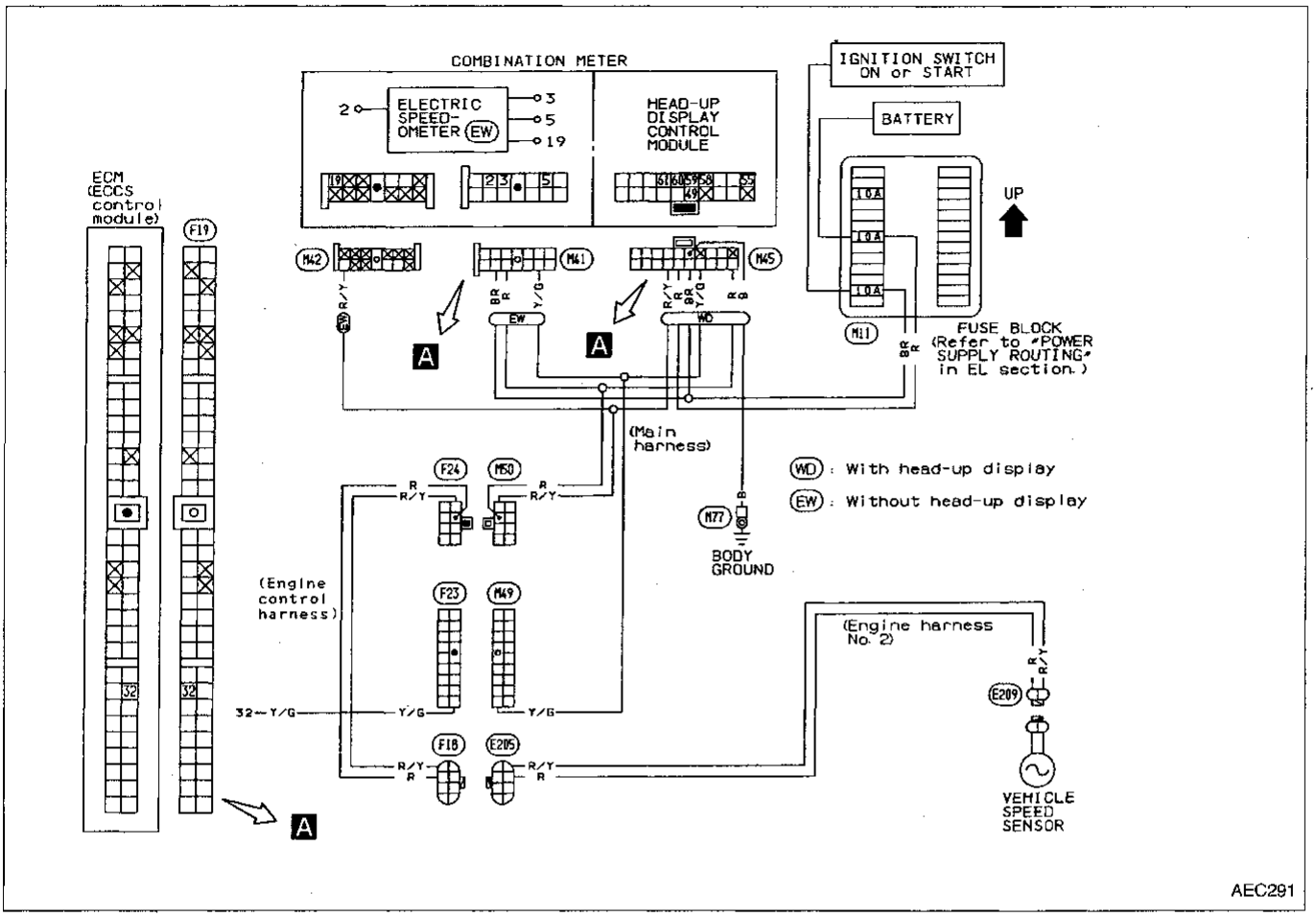
Diagnostic Procedure For Trouble Code 13 (Cont'd)

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

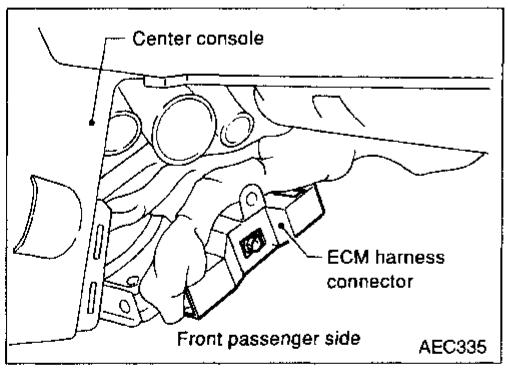


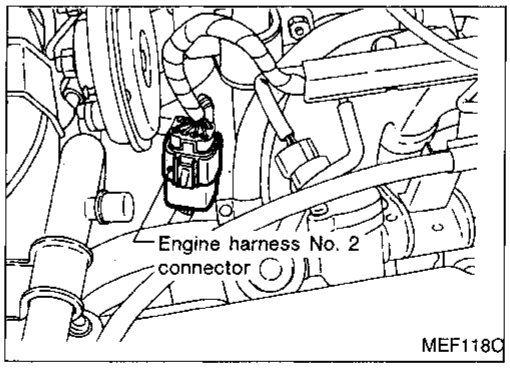
Diagnostic Procedure For Trouble Code 14

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

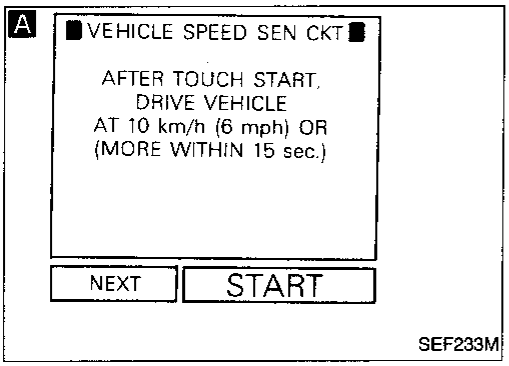


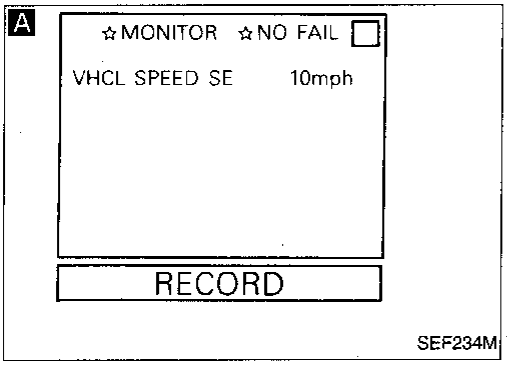
Harness layout

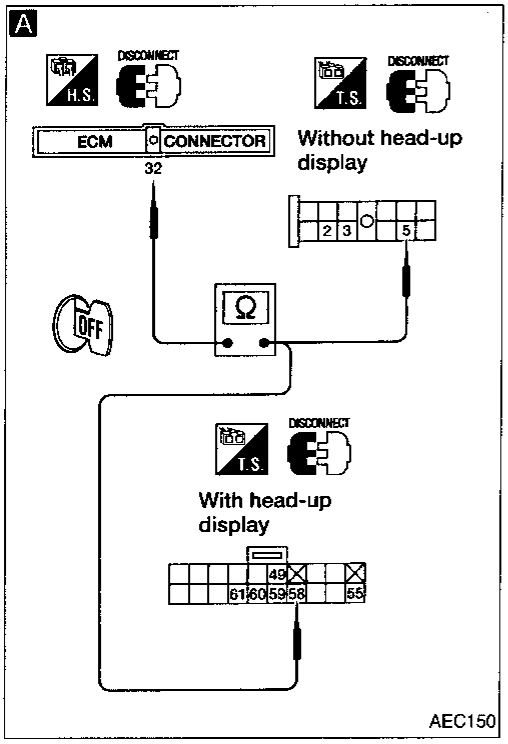




Diagnostic Procedure For Trouble Code 14 (Cont'd)







INSPECTION START

CHECK SPEEDOMETER FUNCTION.
Make sure that speedometer functions properly.

N.G. → Check vehicle speed sensor and circuit.
Refer to EL section ("Vehicle Speed Sensor Signal Check", "METER AND GAUGES").

O.K.

A

CHECK INPUT SIGNAL CIRCUIT.

Perform "VEHICLE SPEED SEN CKT" in "FUNCTION TEST" mode with CONSULT.

N.G. → Check the following.
- Harness connectors (F23), (M49)
- Harness continuity between ECM and combination meter

If N.G., repair harness or connectors.

OR

1) Read vehicle speed sensor signal in "DATA MONITOR" mode with CONSULT.
CONSULT value should be the same as the speedometer indication.

OR

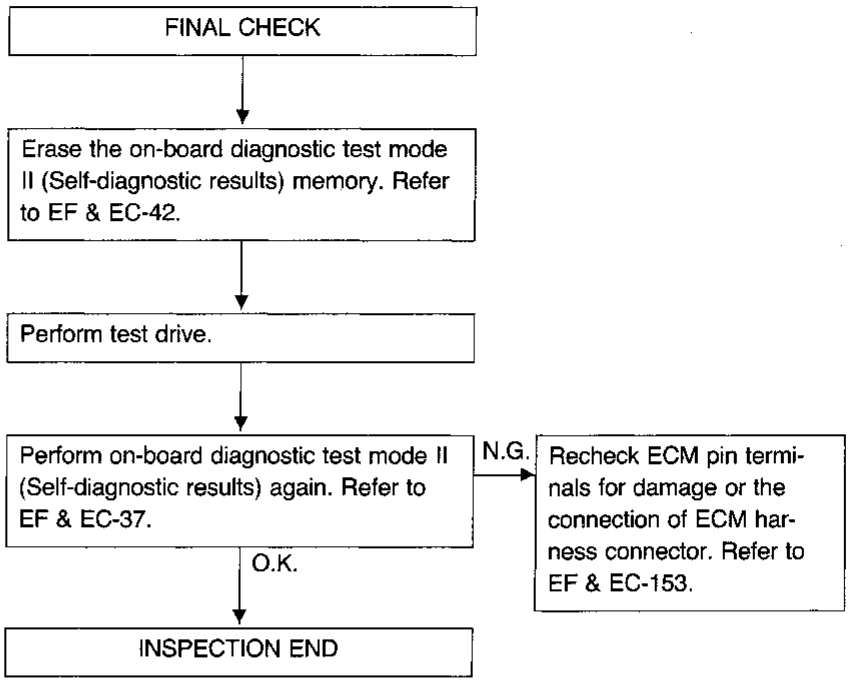
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector and combination meter harness connector.
3) Check harness continuity between ECM terminal (32) and terminal (5) (Models without head-up display), (58) (Models with head-up display).
Continuity should exist.

O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-153.

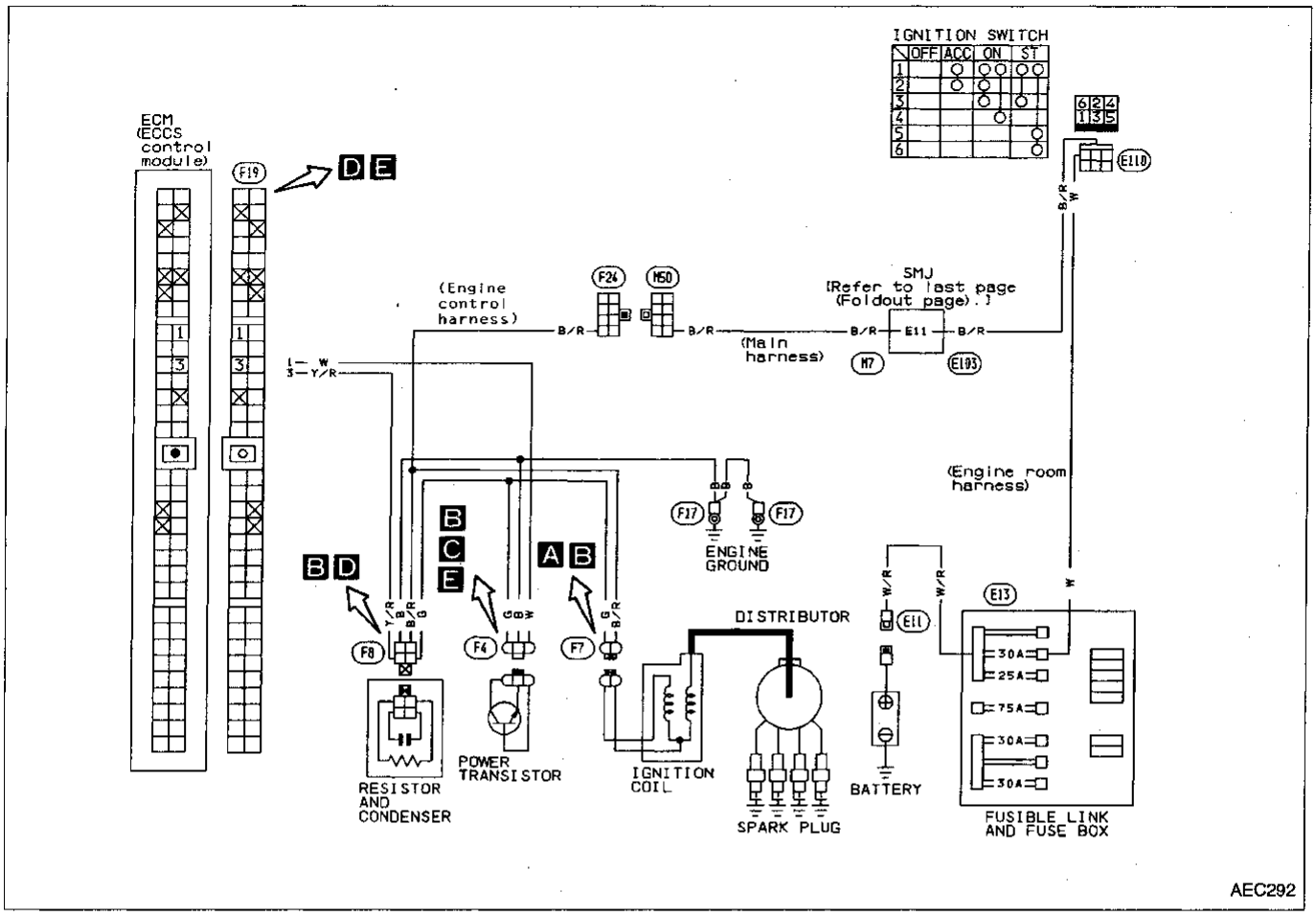
Diagnostic Procedure For Trouble Code 14 (Cont'd)

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

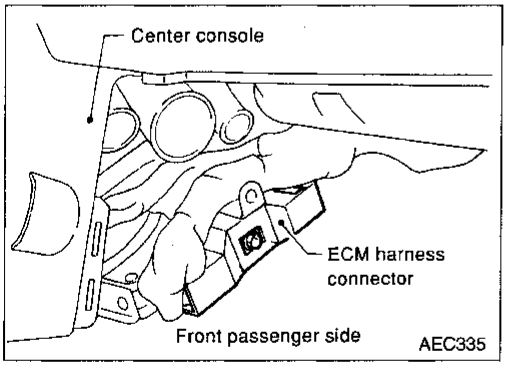


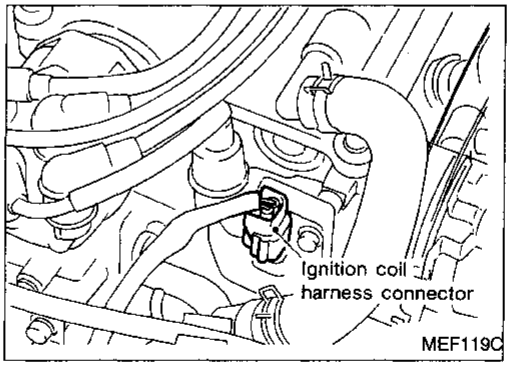
Diagnostic Procedure For Trouble Code 21

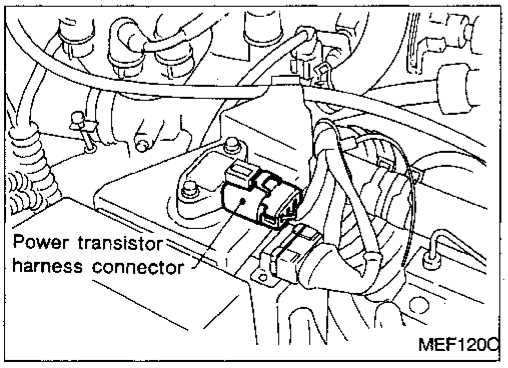
IGNITION SIGNAL (Diagnostic trouble code No. 21)

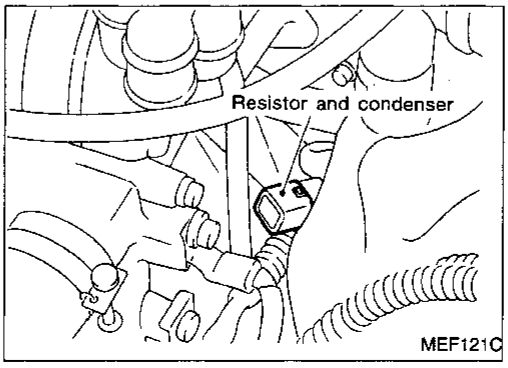


Harness layout

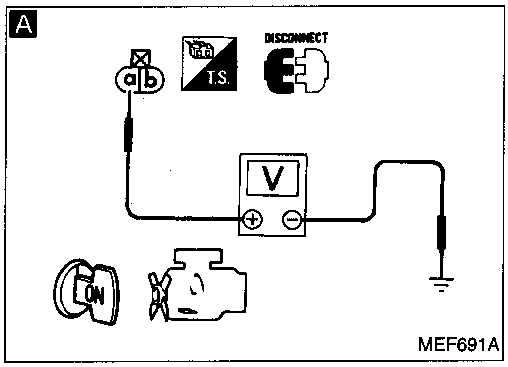


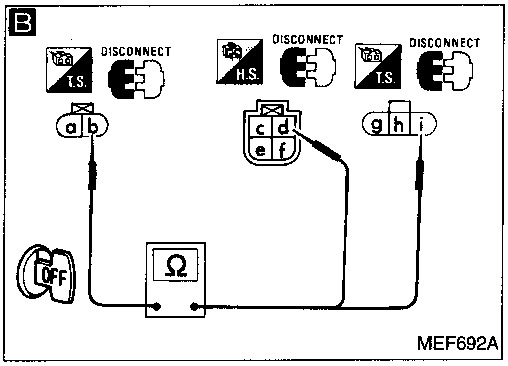


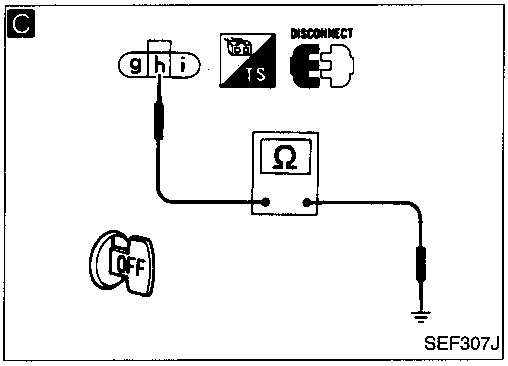


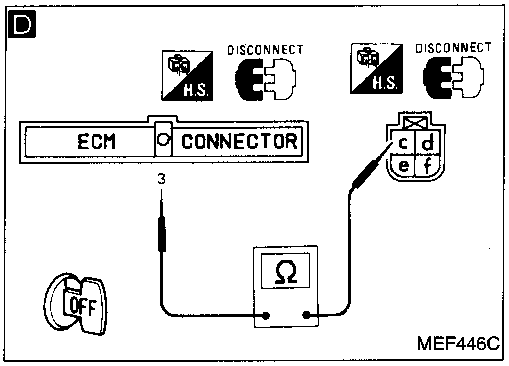


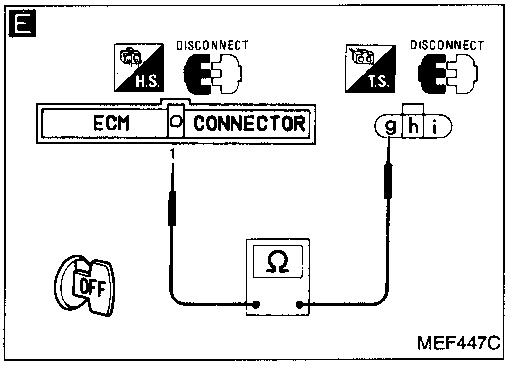
Diagnostic Procedure For Trouble Code 21 (Cont'd)











INSPECTION START

A

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

N.G. → Check the following.
- Harness connectors (F24), (M50)
- Harness connectors (M7), (E103)
- Harness continuity between ignition coil and ignition switch

If N.G., repair harness or connectors.

O.K. ↓

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 ⓑ and terminals ⓓ, ⓘ.
Continuity should exist.
C 5) Check harness continuity between terminal ⓗ 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 ⓒ 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 ⓖ and ECM terminal ①.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

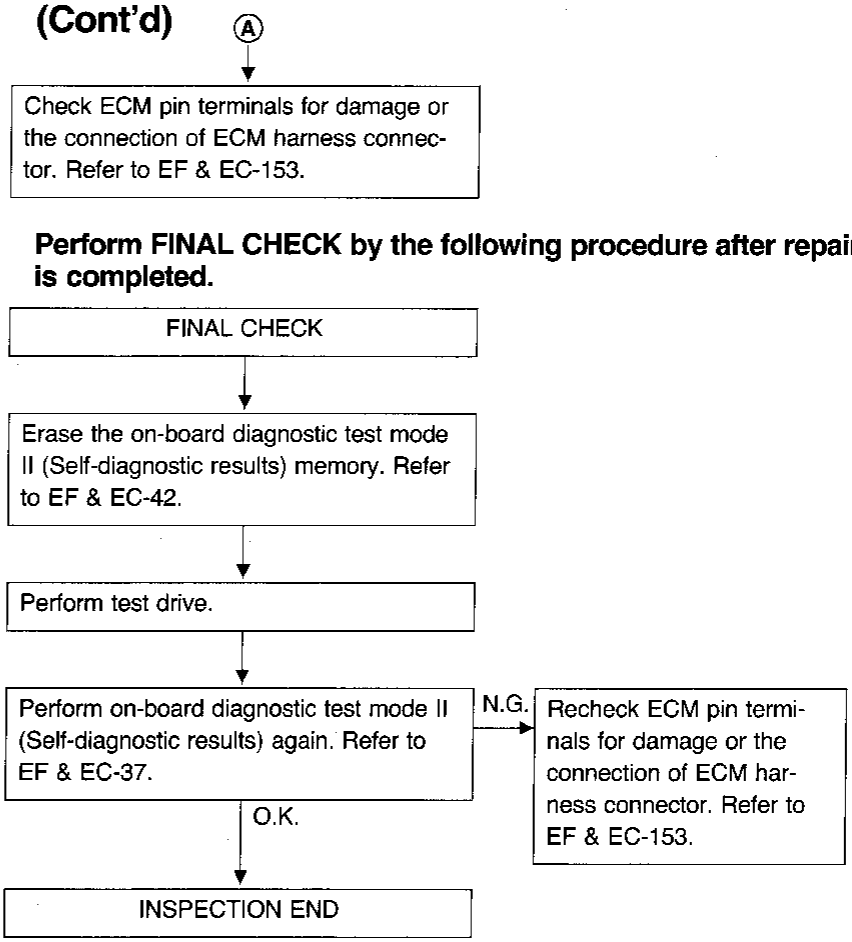
CHECK COMPONENTS
(Ignition coil, resistor and power transistor).
Refer to EF & EC-159, 160, 165.

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

O.K. ↓

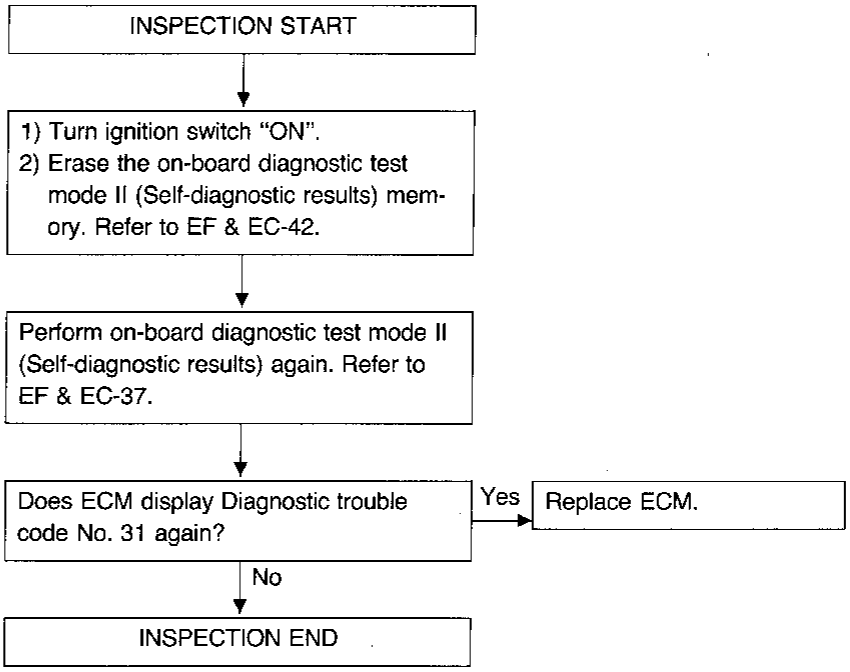
Ⓐ

Diagnostic Procedure For Trouble Code 21 (Cont'd)



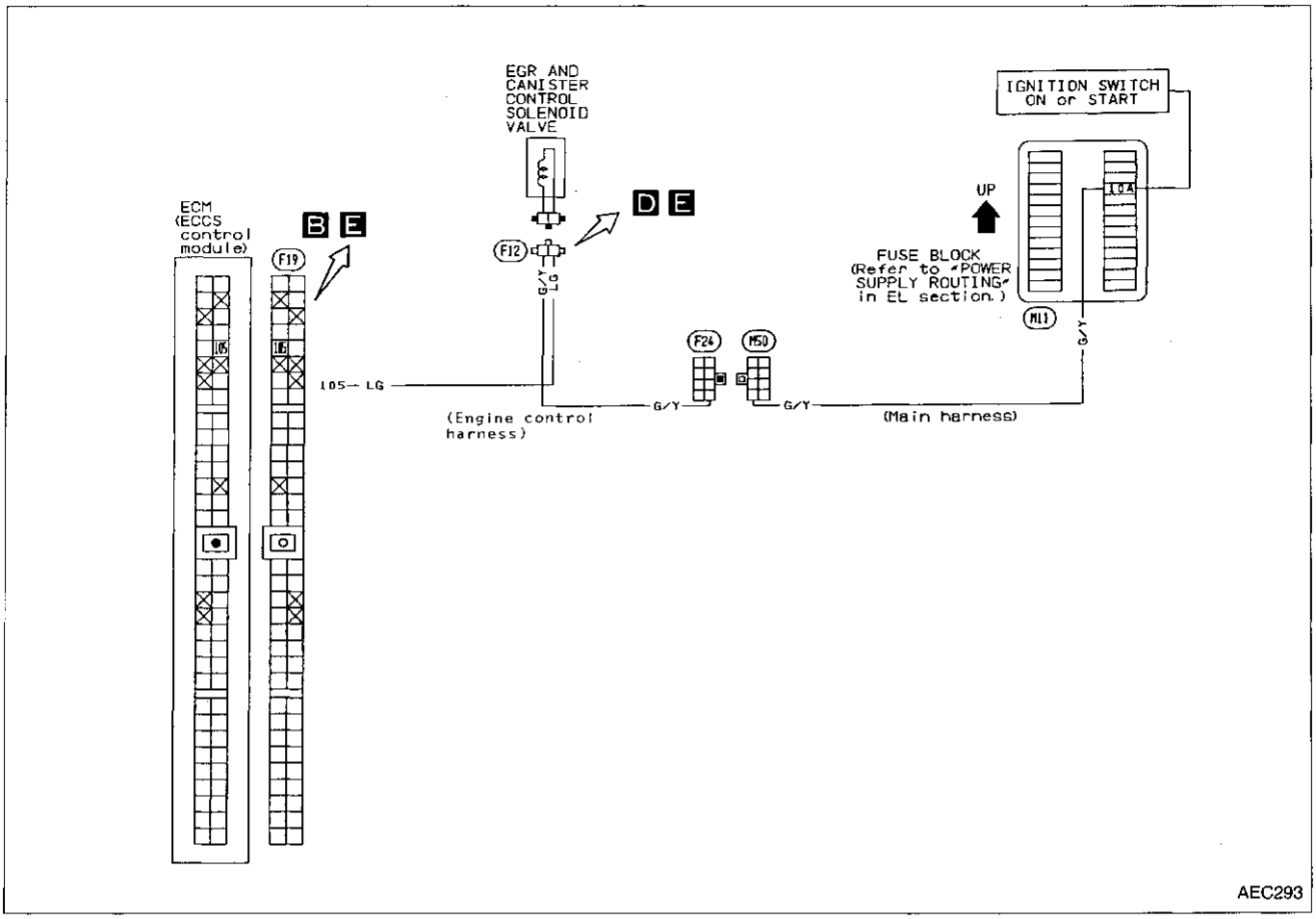
Diagnostic Procedure For Trouble Code 31

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

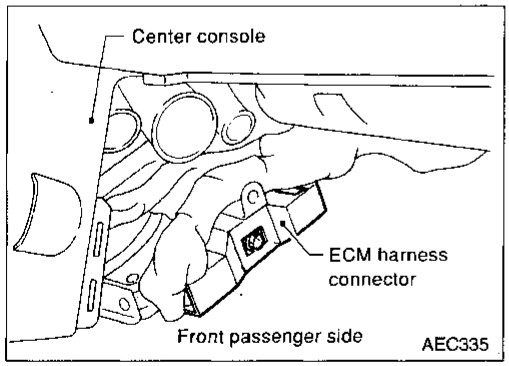


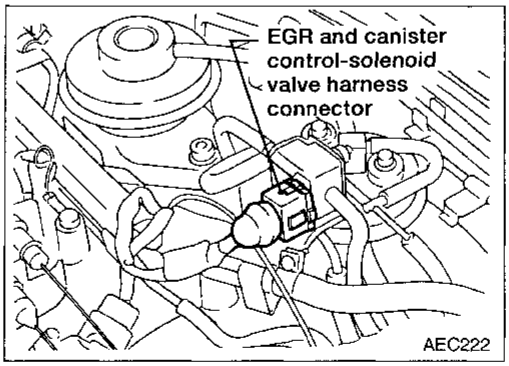
Diagnostic Procedure For Trouble Code 32

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

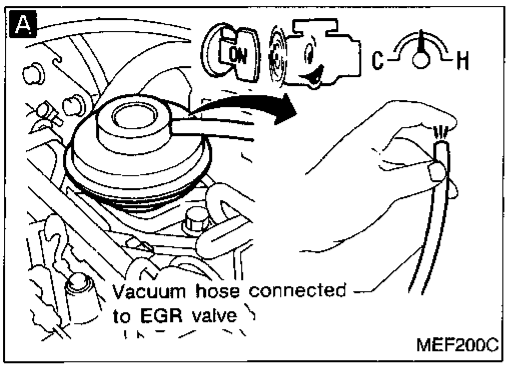


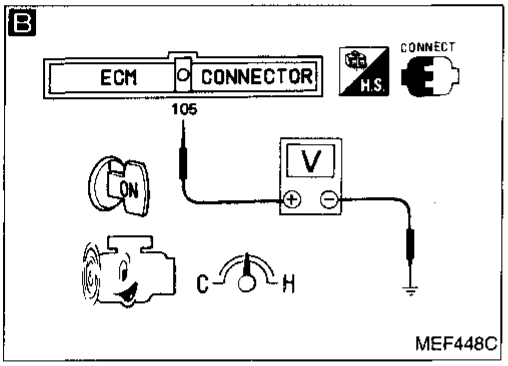
Harness layout

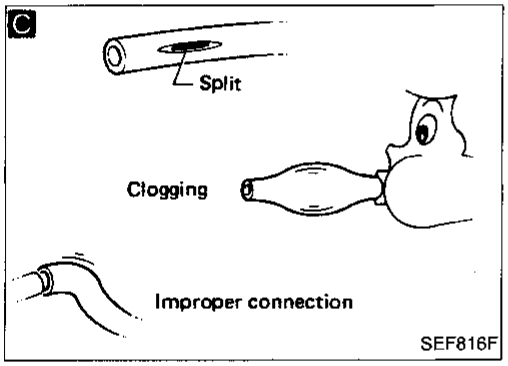


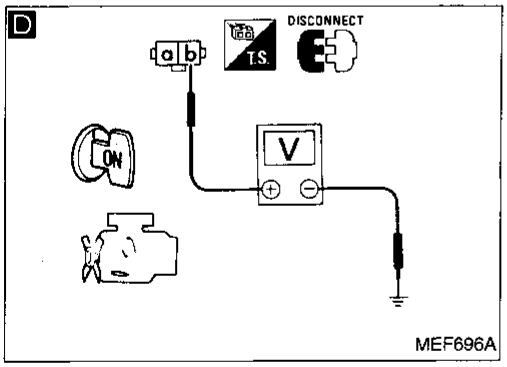


Diagnostic Procedure For Trouble Code 32 (Cont'd)









INSPECTION START

A

CHECK VACUUM SOURCE TO EGR VALVE.
1) Start engine and warm it up sufficiently.
2) Perform on-board diagnostic test mode II (Self-diagnostic results). Make sure that none of the diagnostic trouble code 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 is racing (2,000 rpm):
Vacuum should exist.

O.K. → CHECK COMPONENTS (EGR valve, EGR control-BPT valve and EGR temperature sensor). Refer to EF & EC-161.

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

N.G. ↓

B

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

O.K. → **C**

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

N.G. ↓

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 positive voltage

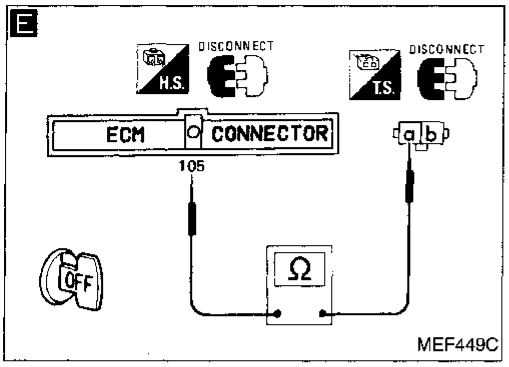
N.G. → Check the following.
- Harness connectors (F24), (M50)
- 10A fuse
- Harness continuity between EGR & canister control solenoid valve and fuse

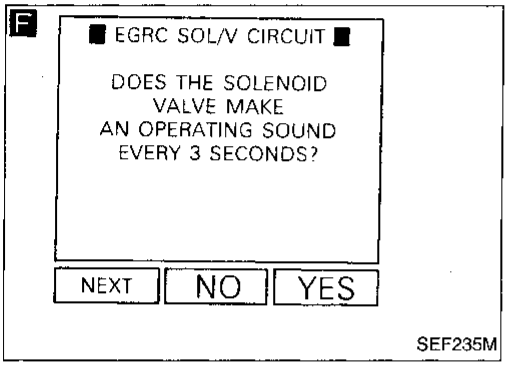
If N.G., repair harness or connectors.

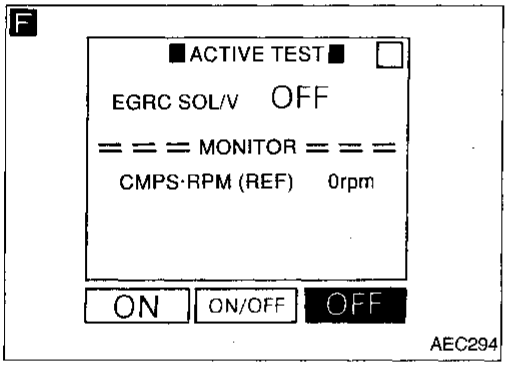
O.K. ↓

(A)

Diagnostic Procedure For Trouble Code 32 (Cont'd)







Ⓐ

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 ⓐ.
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

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

OR

Refer to EF & EC-161.

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

O.K. ↓

Check resistance of EGR temperature sensor.
Refer to EF & EC-161.

↓

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-153.

Diagnostic Procedure For Trouble Code 32 (Cont'd)

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

FINAL CHECK

↓

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

↓

G

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

↓

H

Make sure that malfunction indicator lamp does not come on during test drive.

Comes on. → Recheck ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-153.

Does not come on.

↓

INSPECTION END

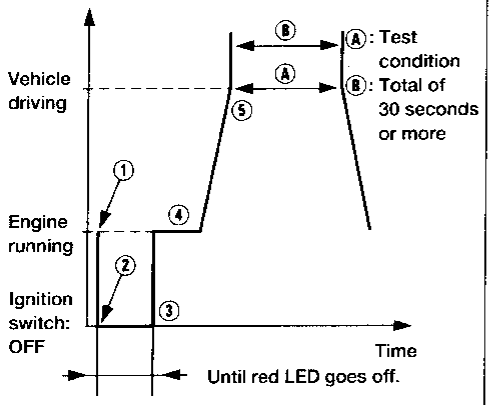
G

ROAD TEST

Test condition

Drive vehicle under the following conditions with suitable gear position.
(1) Engine speed:
2450 ± 550 rpm
(2) Intake manifold vacuum:
-40.0 ± 6.7 kPa
(-300 ± 50 mmHg, -11.81 ± 1.97 inHg)

Driving mode

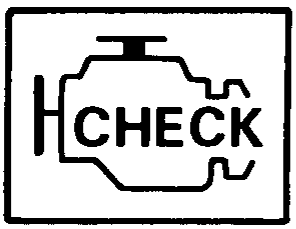


① Start engine and warm it up sufficiently.
② Turn off ignition switch and keep it off until red LED goes off.
③ Start engine and make sure that air conditioning switch and rear defogger are turned "OFF" during test drive.
④ Keep engine running for at least 30 seconds.
⑤ Shift to suitable gear position and drive in "Test condition" for a total of 50 seconds or more.

Note: If engine stalls or ignition switch is turned "OFF" during step ⑤, return to step ②.

AEC338

H

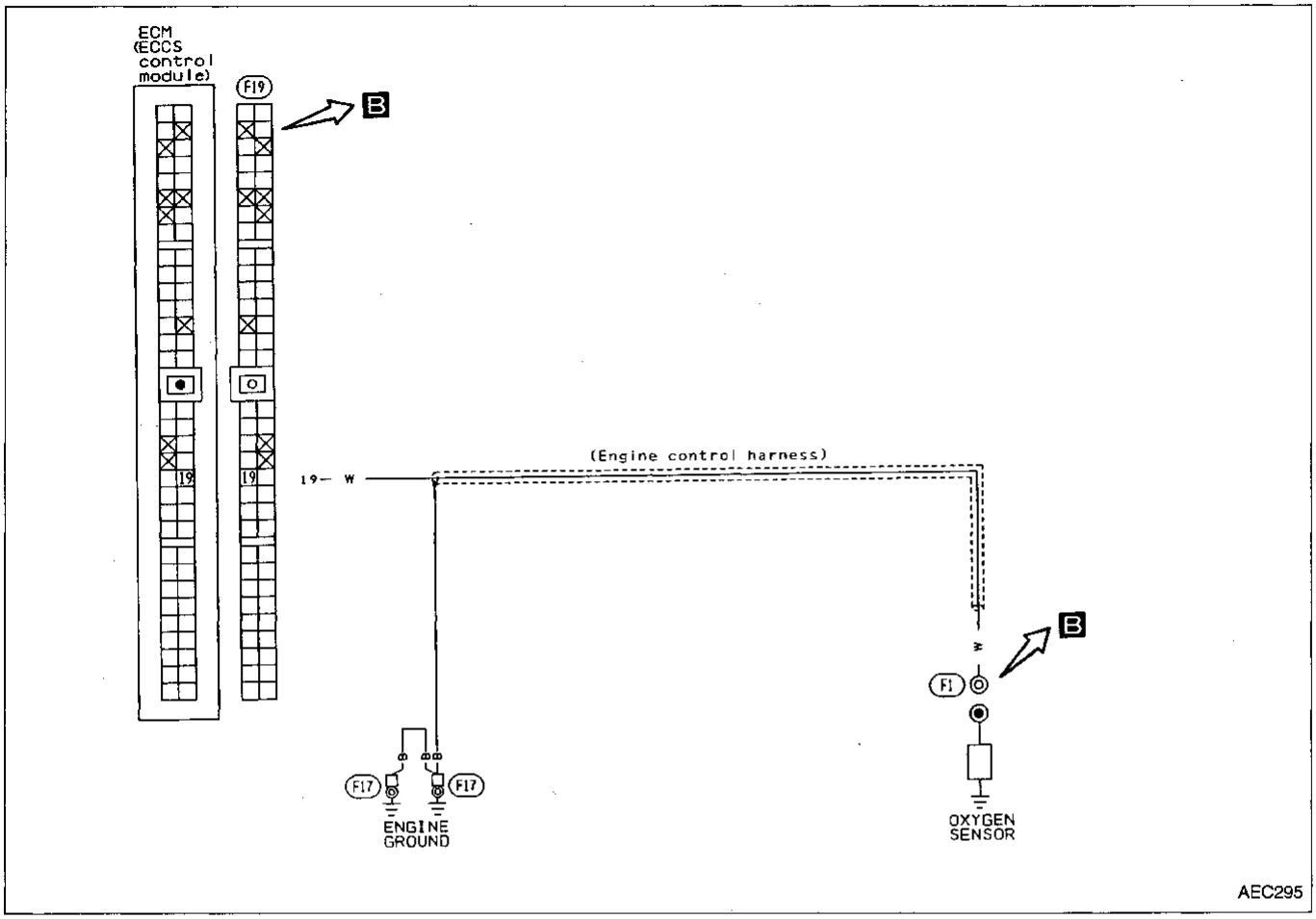


MALFUNCTION INDICATOR LAMP

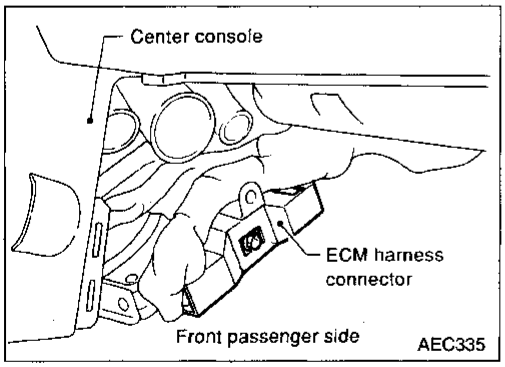
SEF217M

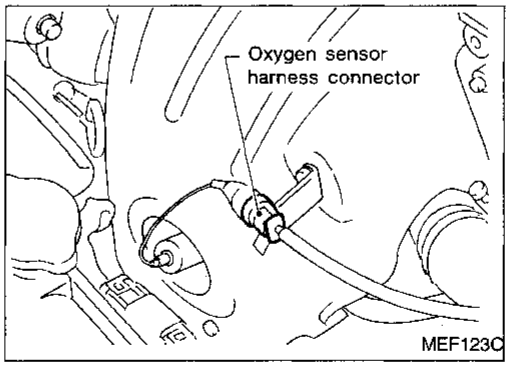
Diagnostic Procedure For Trouble Code 33

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

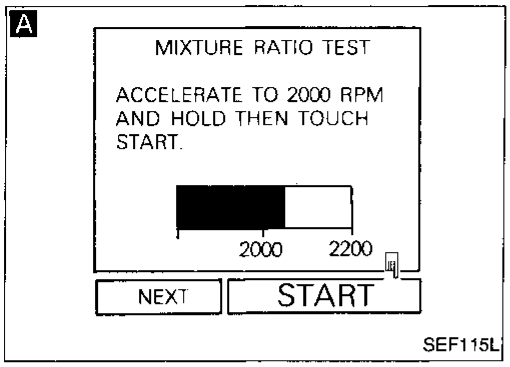


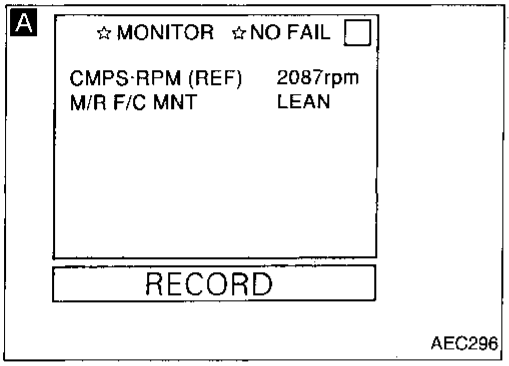
Harness layout

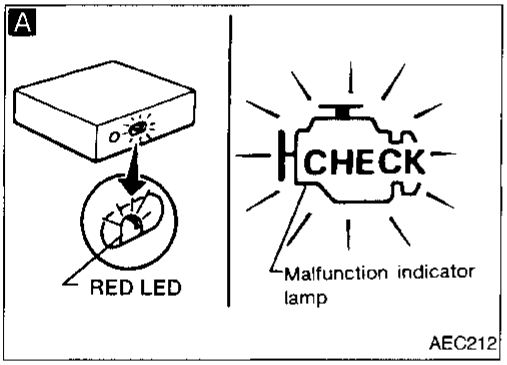


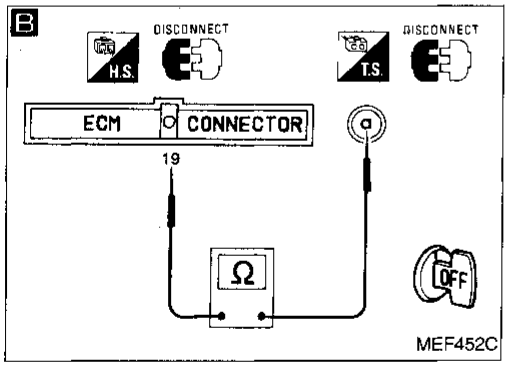


Diagnostic Procedure For Trouble Code 33 (Cont'd)









INSPECTION START

A

CHECK OVERALL FUNCTION.

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

OR

1) Start engine and warm it up sufficiently.
2) Make sure that "M/R F/C MNT" in "DATA MONITOR" mode indicates "RICH" and "LEAN" periodically more than 5 times during 10 seconds at 2,000 rpm.

OR

1) Start engine and warm it up sufficiently.
2) Run engine at about 2,000 rpm for about 2 minutes under no-load.
3) Set ECM diagnosis mode to On-board Diagnostic Test Mode II. Refer to EF & EC-38.
4) Keep engine speed at 2,000 rpm and make sure that RED LED on ECM and malfunction indicator lamp on instrument panel go on and off more than 5 times during 10 seconds.

O.K. → INSPECTION END.

N.G.

B

CHECK INPUT SIGNAL CIRCUIT.

1) Turn ignition switch "OFF".
2) Disconnect oxygen sensor harness connector and ECM harness connector.
3) Check harness continuity between terminal ⓐ and ECM terminal ⑲.
Continuity should exist.

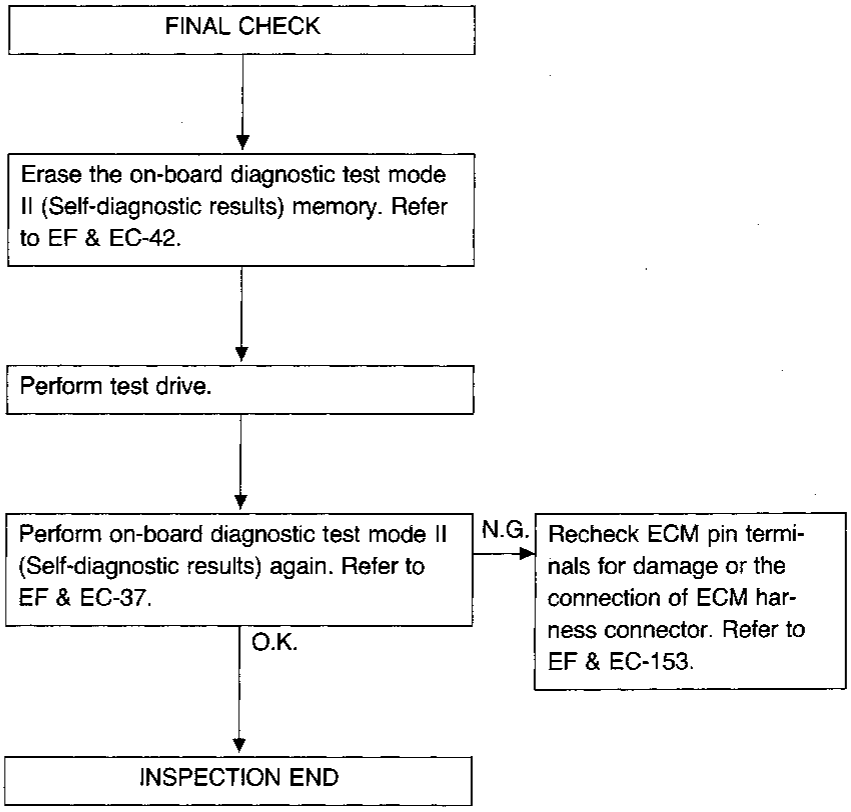
N.G. → Repair harness or connectors.

O.K.

Replace oxygen sensor.

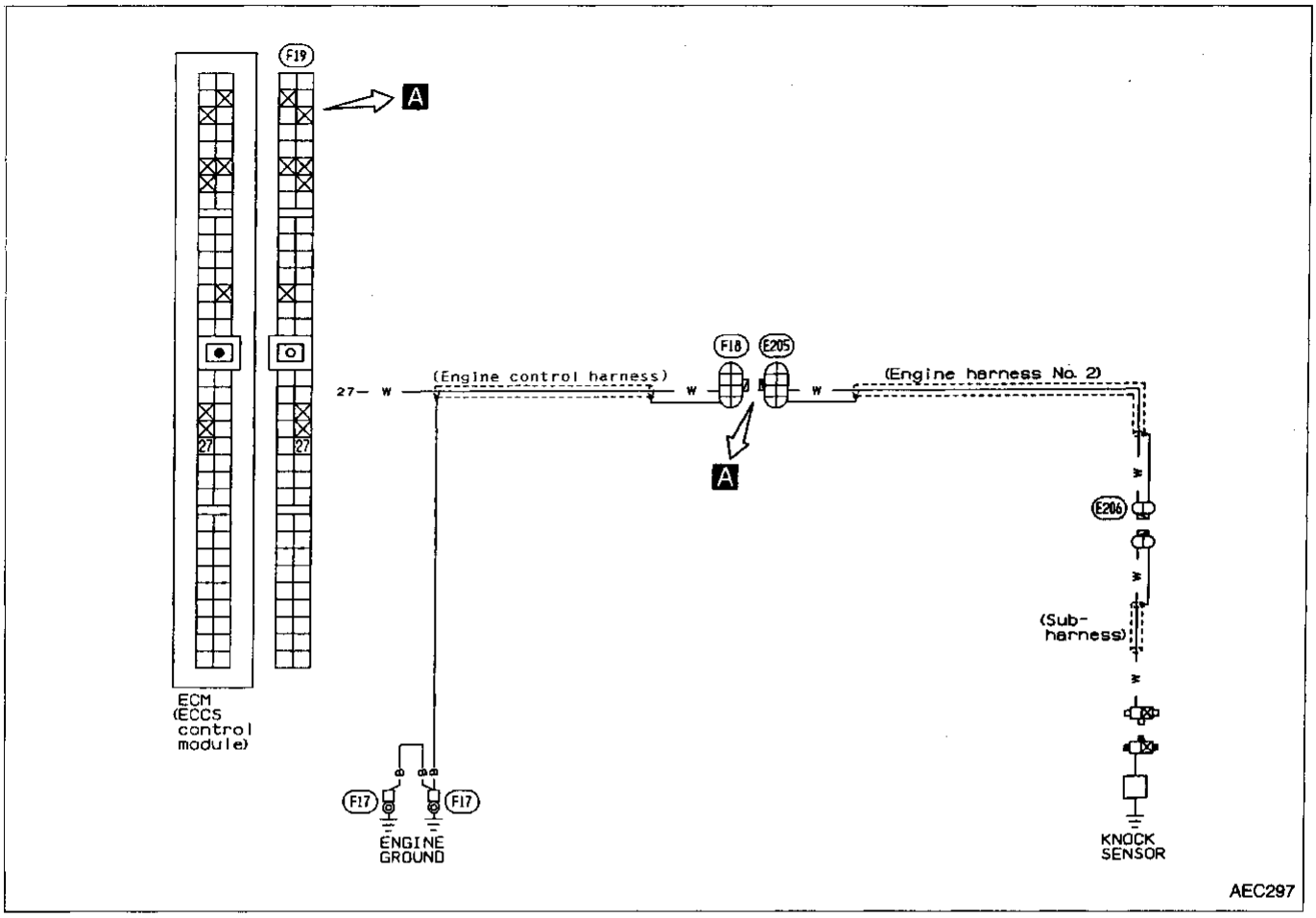
Diagnostic Procedure For Trouble Code 33 (Cont'd)

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

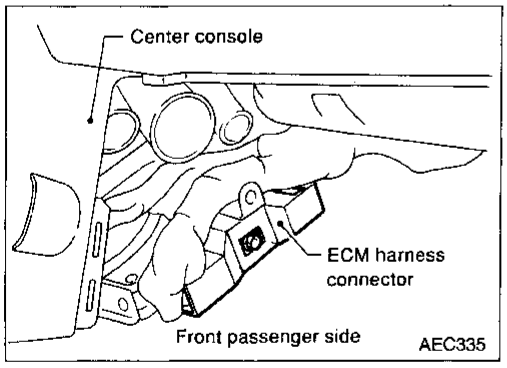


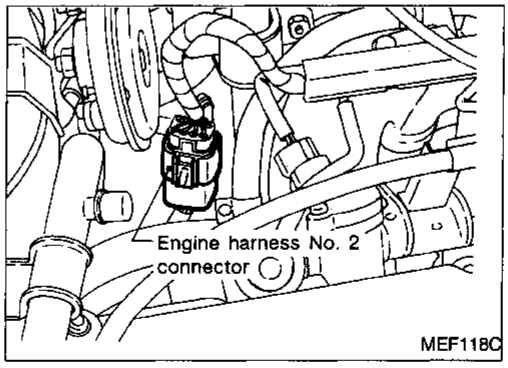
Diagnostic Procedure For Trouble Code 34

KNOCK SENSOR (Diagnostic trouble code No. 34)

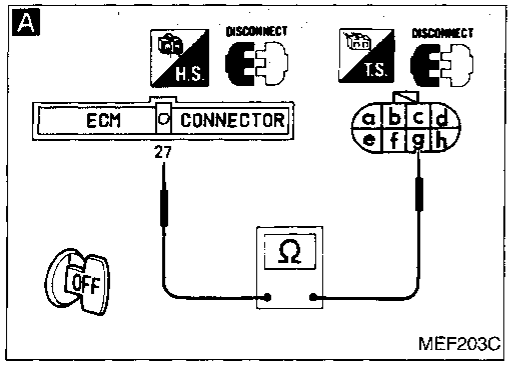


Harness layout





Diagnostic Procedure For Trouble Code 34 (Cont'd)



INSPECTION START

A

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector and engine harness No. 2 connector (F18).
2) Check harness continuity between terminal (g) and ECM terminal (27).
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

CHECK COMPONENT
(Knock sensor).
Refer to EF & EC-163.

N.G. → Replace knock sensor.

O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-153.

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

FINAL CHECK

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

Perform test drive.

Perform on-board diagnostic test mode II (Self-diagnostic results) again. Refer to EF & EC-37.

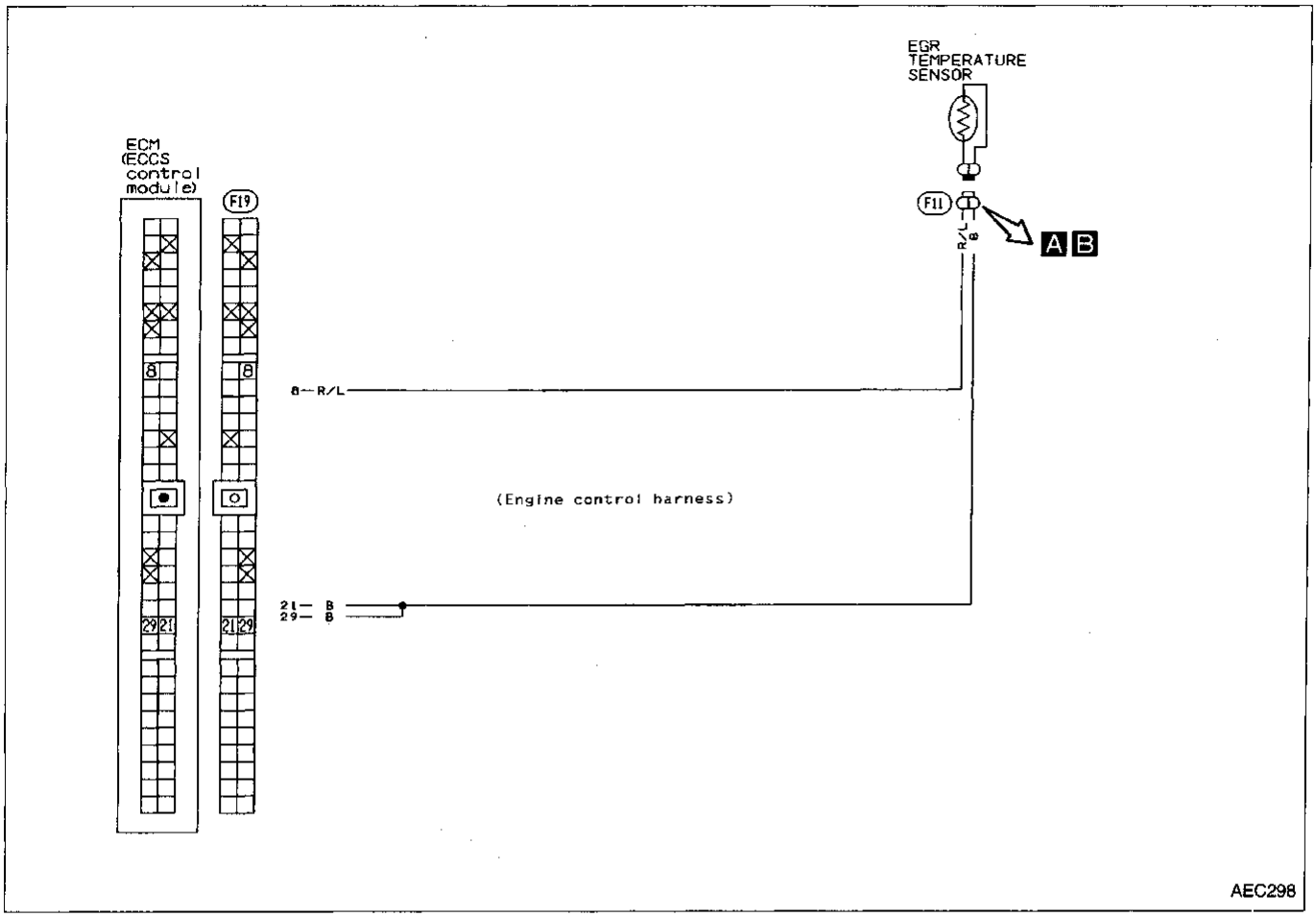
N.G. → Recheck ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-153.

O.K.

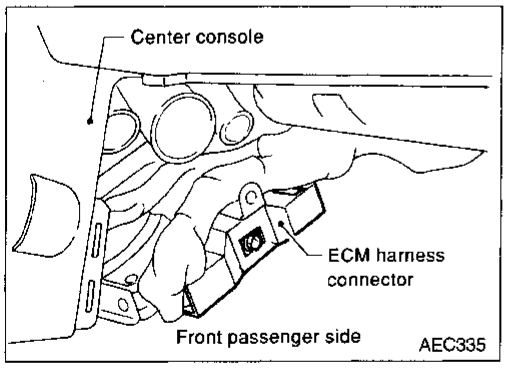
INSPECTION END

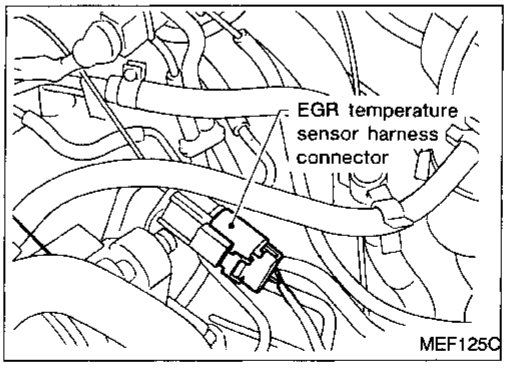
Diagnostic Procedure For Trouble Code 35

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

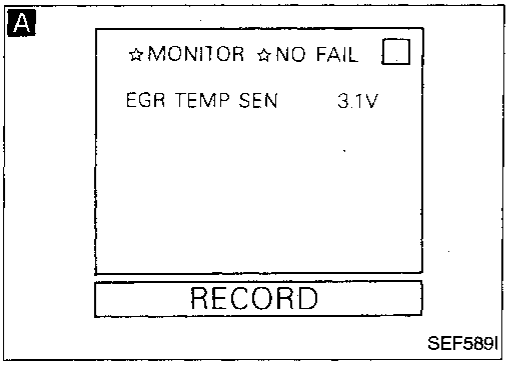


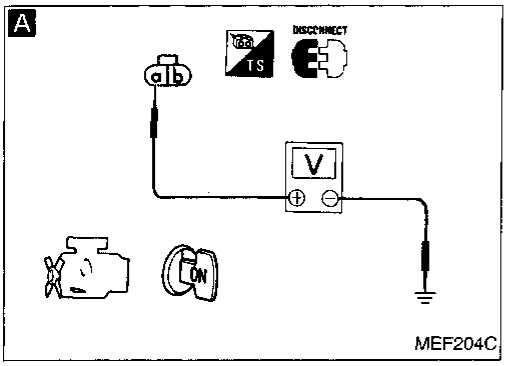
Harness layout

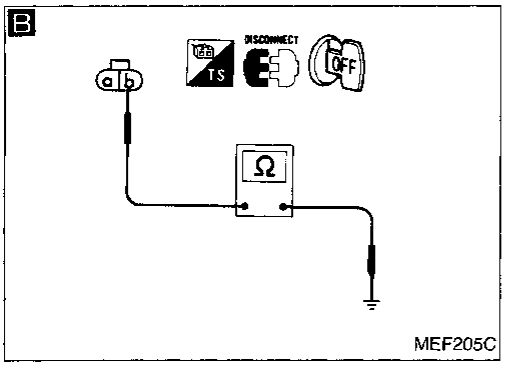




Diagnostic Procedure For Trouble Code 35 (Cont'd)







INSPECTION START

A

CHECK POWER SUPPLY.
1) Start engine and warm it up sufficiently.
2) Read EGR temperature sensor signal in "DATA MONITOR" mode with CONSULT.
Voltage:
Less than 5V (at idle)

N.G. → Repair harness or connectors.

OR

2) Stop engine.
3) Disconnect EGR temperature sensor connector.
4) Turn ignition switch "ON".
5) Check voltage between terminal ⓐ and ground.
Voltage:
Less than 5V (at idle)

O.K.

B

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

N.G. → Repair harness or connectors.

O.K.

CHECK COMPONENT.
(EGR temperature sensor).
Refer to EF & EC-161.

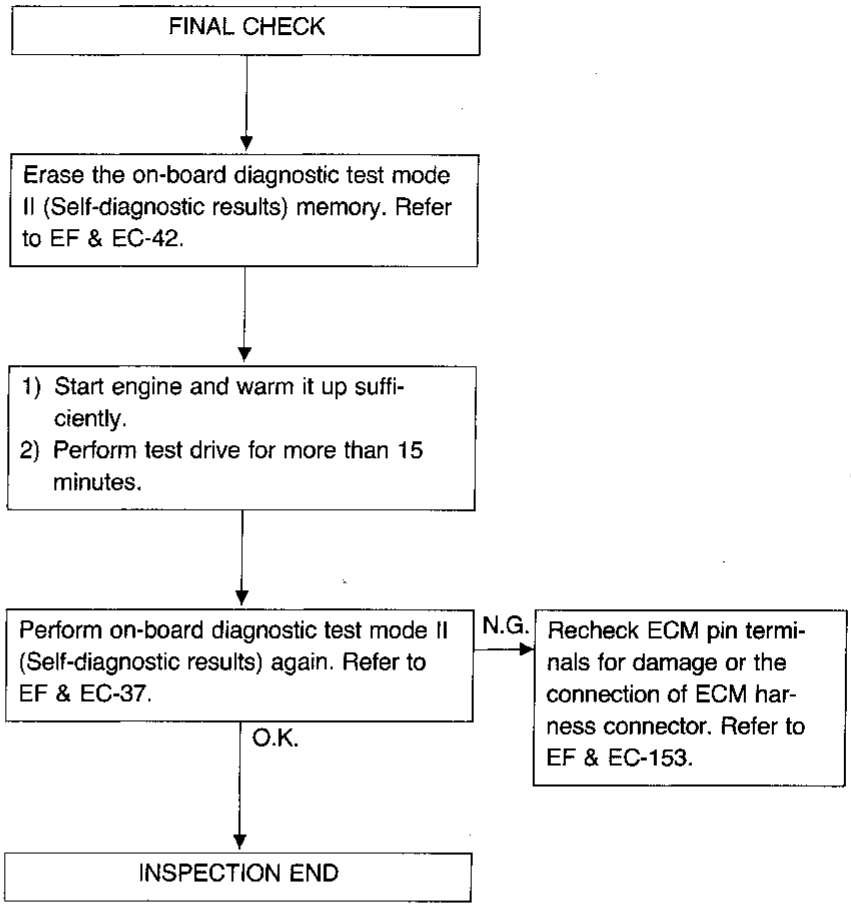
N.G. → Replace EGR temperature sensor.

O.K.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-153.

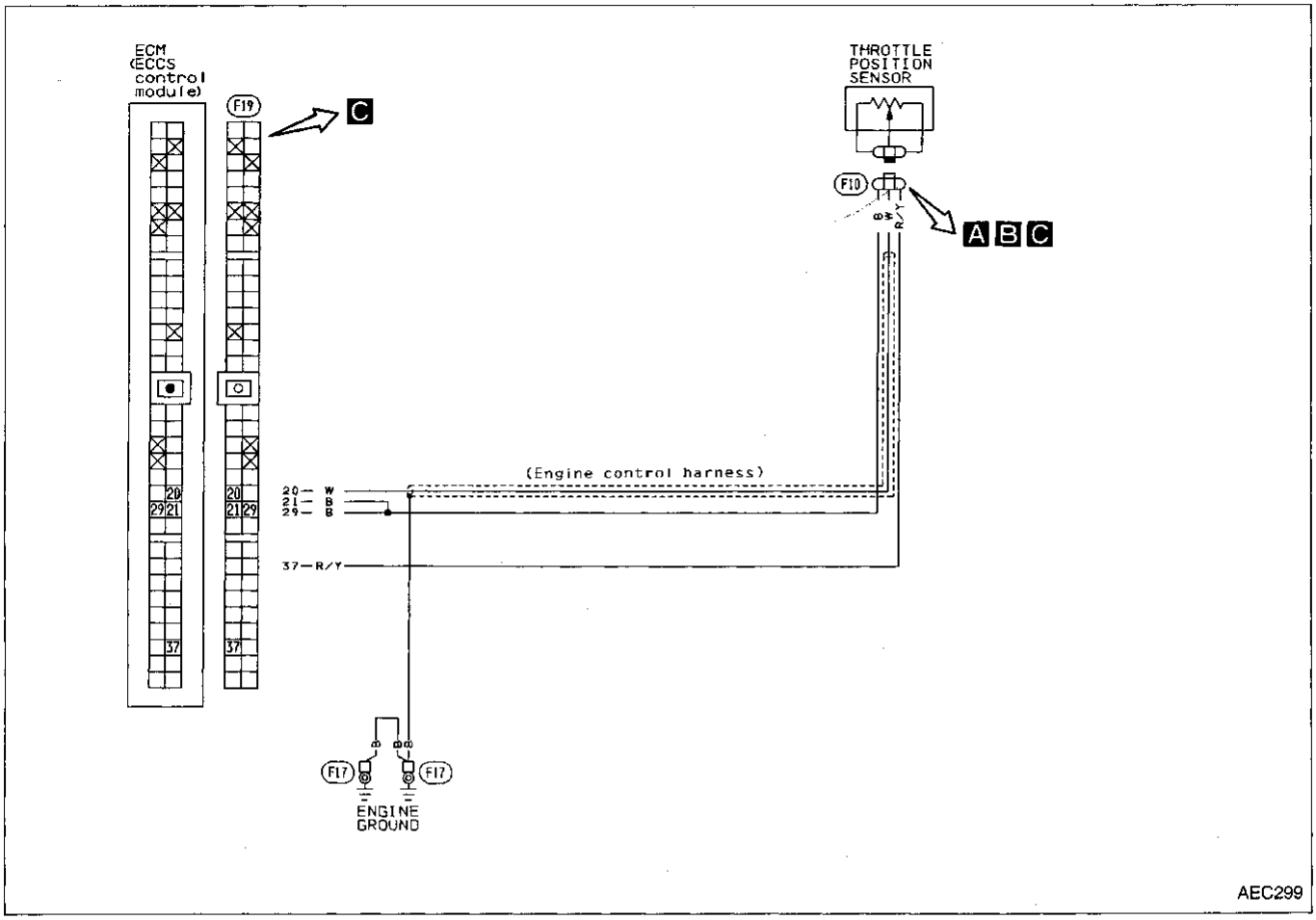
Diagnostic Procedure For Trouble Code 35 (Cont'd)

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

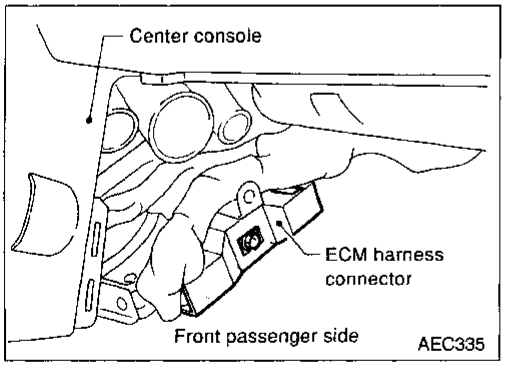


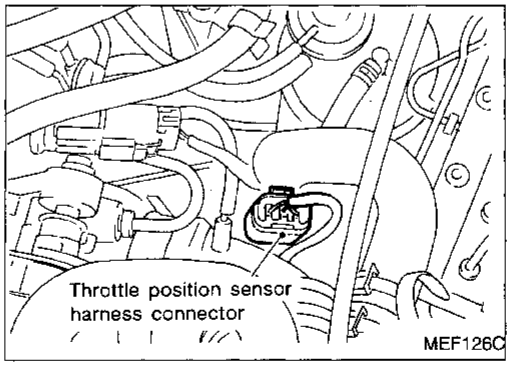
Diagnostic Procedure For Trouble Code 43

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

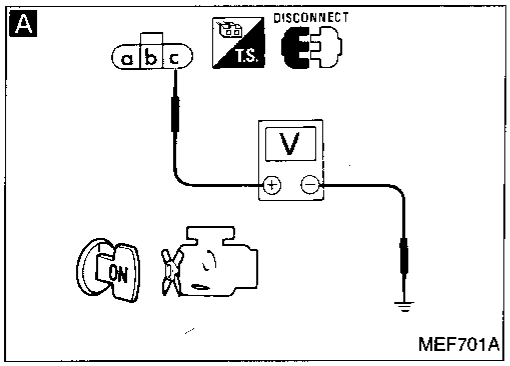


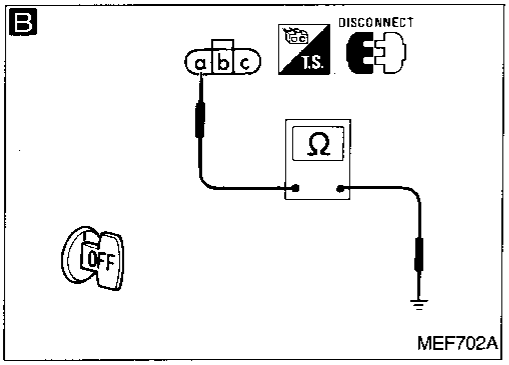
Harness layout

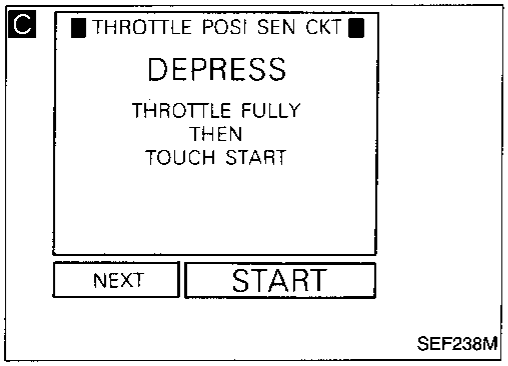


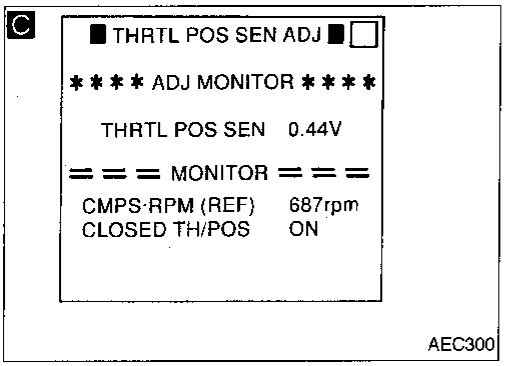


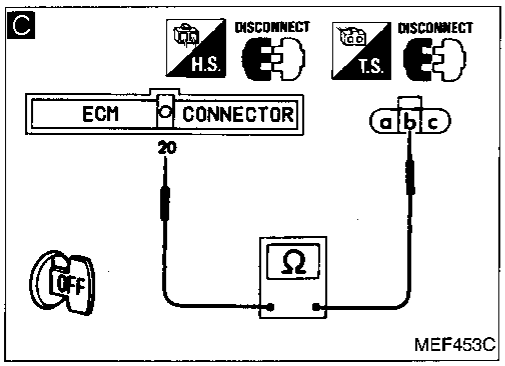
Diagnostic Procedure For Trouble Code 43 (Cont'd)











INSPECTION START

A

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

N.G. → Repair harness or connectors.

O.K.

B

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

N.G. → Repair harness or connectors.

O.K.

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.

OR

3) Read throttle position sensor output voltage in "WORK SUPPORT" mode with CONSULT.
Throttle valve fully closed:
Approx. 0.3 - 0.7V
Throttle valve fully open:
Approx. 4.0V

OR

1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ⑳ and terminal ⓑ.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

CHECK COMPONENT
(Throttle position sensor).
Refer to EF & EC-162.

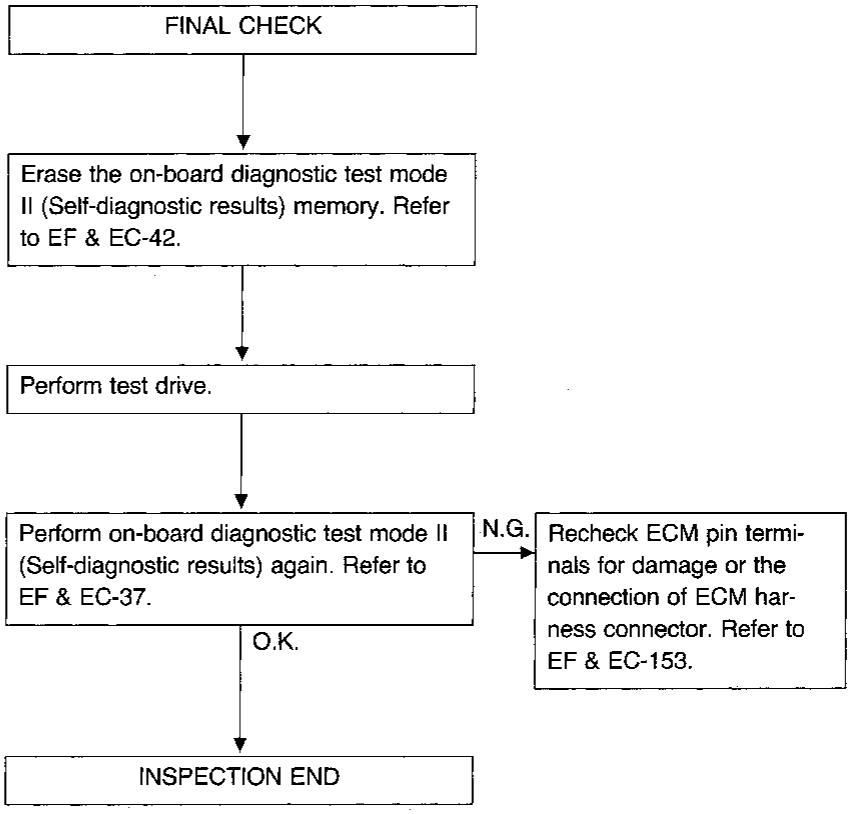
N.G. → Replace throttle position sensor.

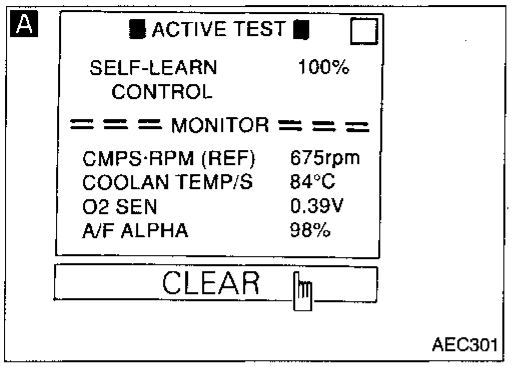
O.K.

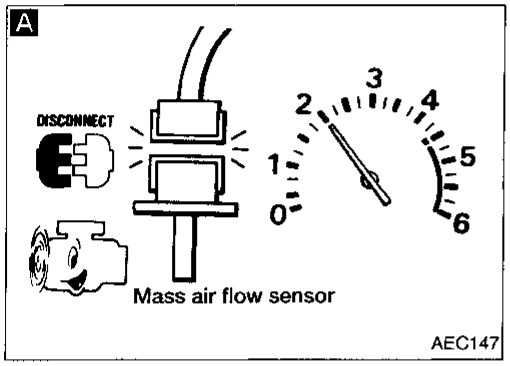
Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-153.

Diagnostic Procedure For Trouble Code 43 (Cont'd)

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







Diagnostic Procedure For Trouble Code 45

INJECTOR LEAK (Diagnostic trouble code No. 45)

(MALFUNCTION INDICATOR LAMP ITEM)

INSPECTION START

A

Clear the self-learning data

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

OR

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

Ⓐ

Diagnostic Procedure For Trouble Code 45 (Cont'd)

Ⓐ

B

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

O.K. → INSPECTION END

N.G.

Remove injector assembly.
Refer to EF & EC-167.
Keep fuel hose and all injectors connected to injector gallery.

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

Drips → Replace the injectors from which fuel is dripping.

Do not drip

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-153.

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

FINAL CHECK

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

Clear the self-learning data again.

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

N.G. → Recheck ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-153.

O.K.

INSPECTION END

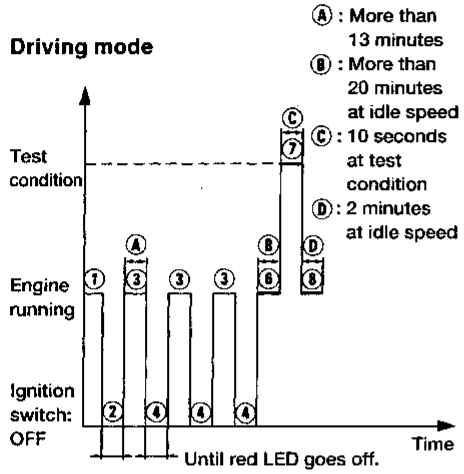
B

ROAD TEST

Test condition

Drive vehicle under the following conditions with suitable gear position.
(1) Engine speed:
2550 ± 650 rpm
(2) Intake manifold vacuum:
-46.7 ± 6.7 kPa
(-350 ± 50 mmHg, -13.78 ± 1.97 inHg)

Driving mode



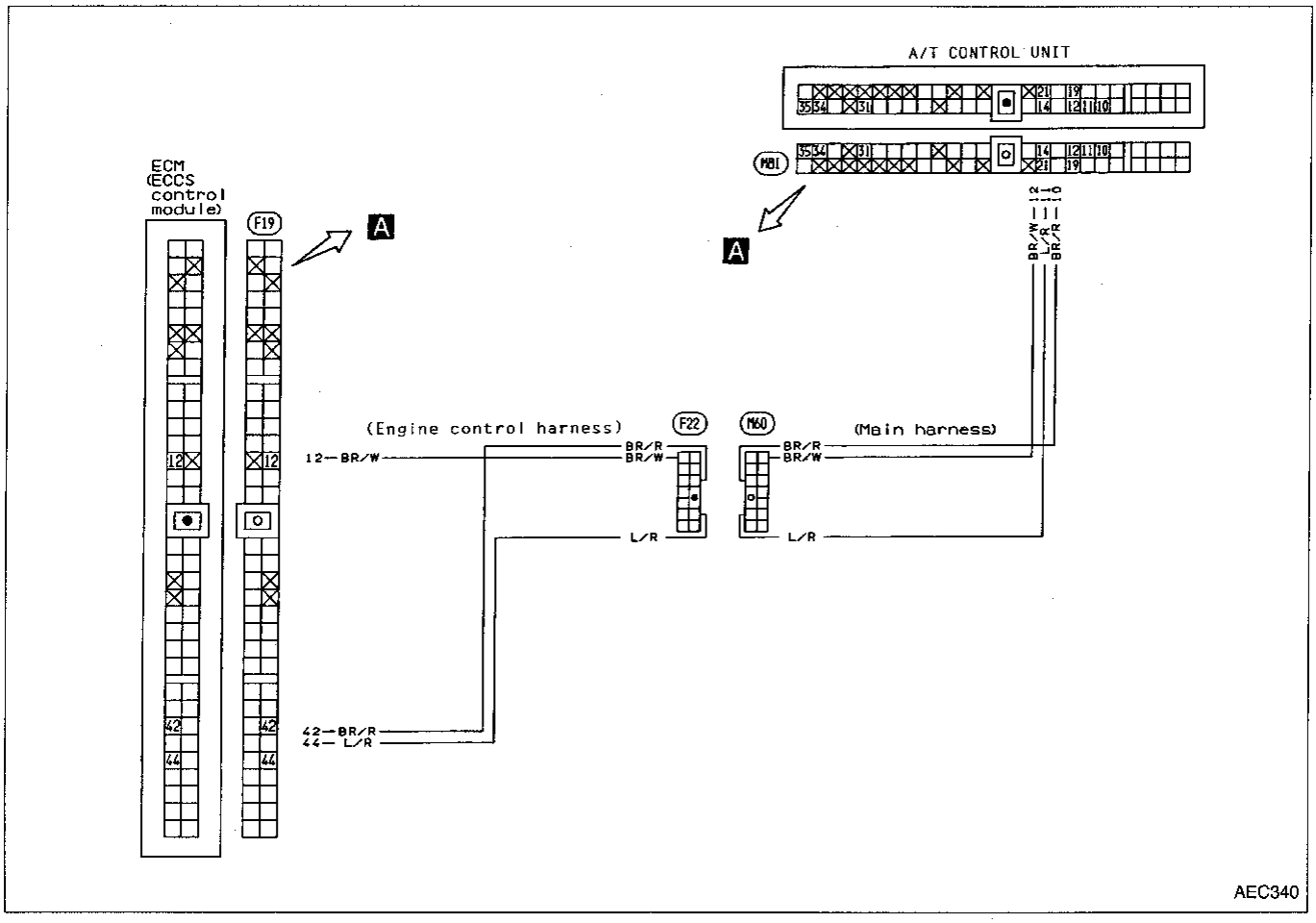
① Start engine and warm it up sufficiently.
② Turn off ignition switch and keep it off until red LED goes off.
③ Start engine and keep it running for more than 13 minutes.
④ Turn off ignition switch and keep it off until red LED goes off.
⑤ Repeat steps ③ through ④ a total of 3 times.
⑥ Start engine and keep it at idle speed for more than 20 minutes.
If engine stalls or ignition is turned off within 13 minutes of engine starting, return to step ②. If after 13 minutes, restart step ⑥.
⑦ Shift to suitable gear position and drive in "Test condition" for at least 10 seconds.
If the following conditions occur during step ⑦, return to step ⑥.
- Engine races over 4,000 rpm or hardly accelerates for more than 10 seconds.
- Engine stalls or ignition is turned off.

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

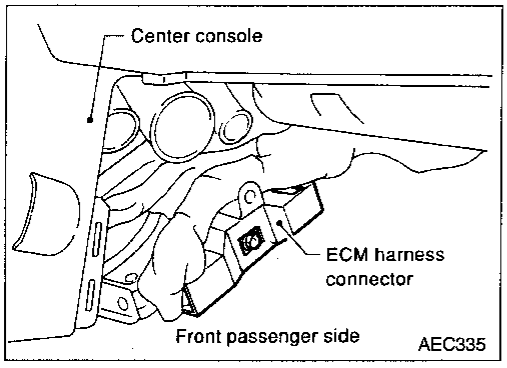
AEC339

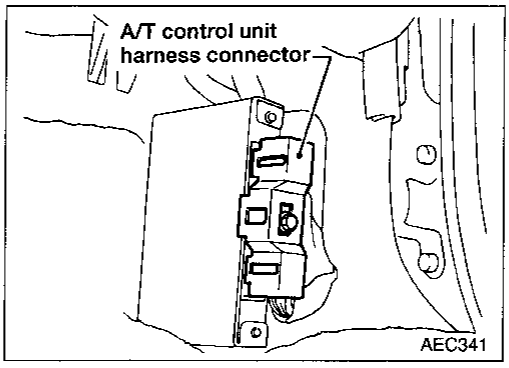
Diagnostic Procedure For Trouble Code 54

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

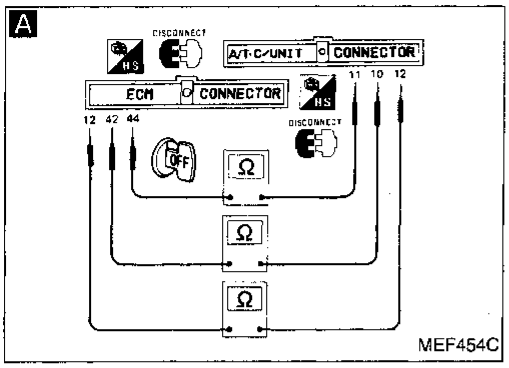


Harness layout





Diagnostic Procedure For Trouble Code 54 (Cont'd)



INSPECTION START

A

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector and A/T control unit harness connector.
2) Check harness continuity between ECM terminal (12) and terminal (12), ECM terminal (42) and terminal (10), ECM terminal (44) and terminal (11).
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F22), (M60)
- 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. Refer to EF & EC-153.

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

FINAL CHECK

↓

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

↓

Perform test drive.

↓

Perform on-board diagnostic test mode II (Self-diagnostic results) again. Refer to EF & EC-37.

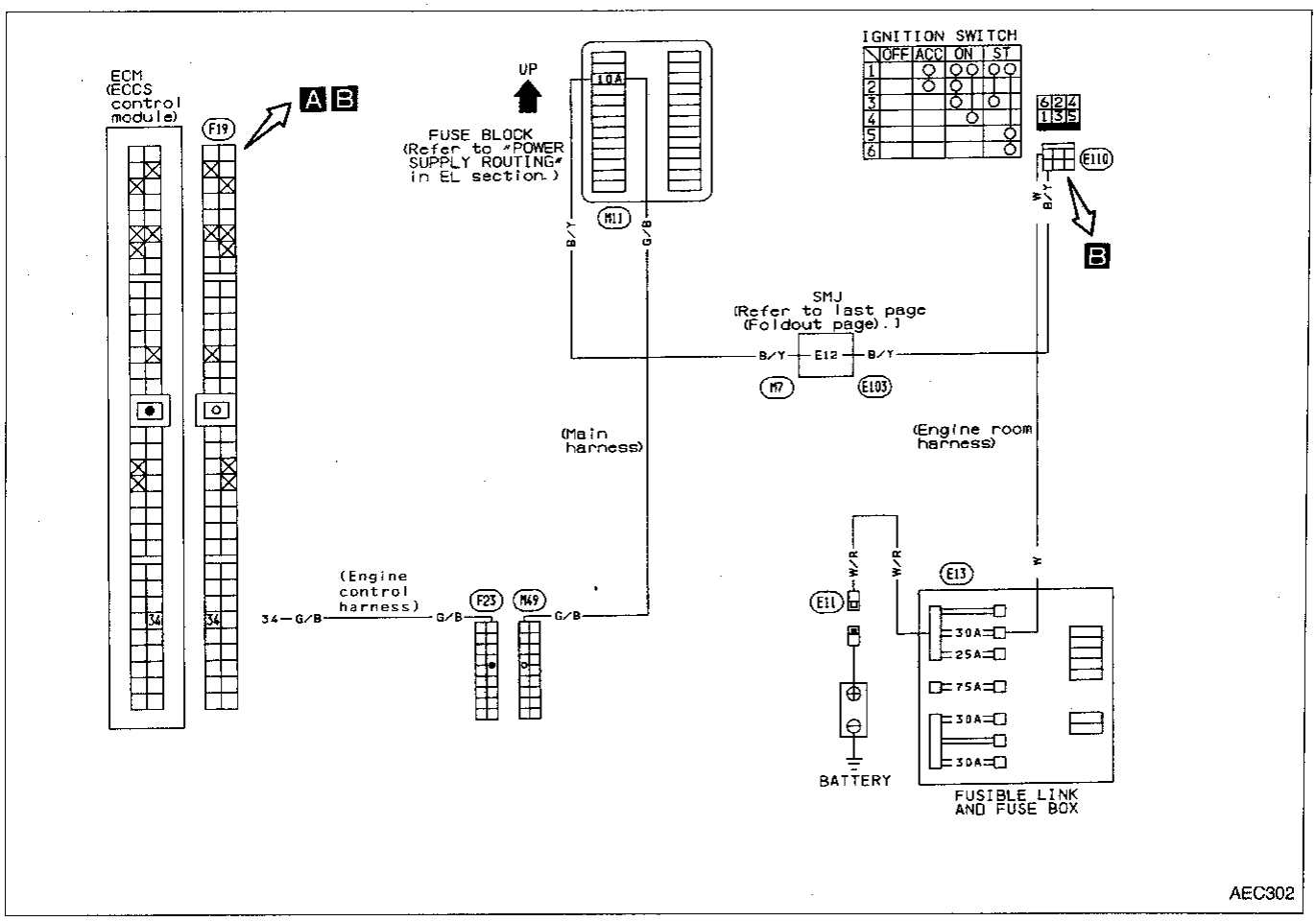
N.G. → Recheck ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-153.

O.K. ↓

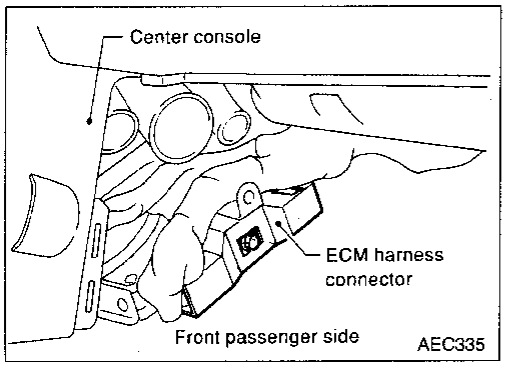
INSPECTION END

Diagnostic Procedure 23

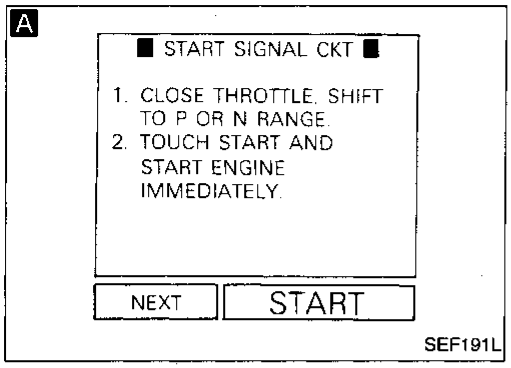
START SIGNAL (Not self-diagnostic item)

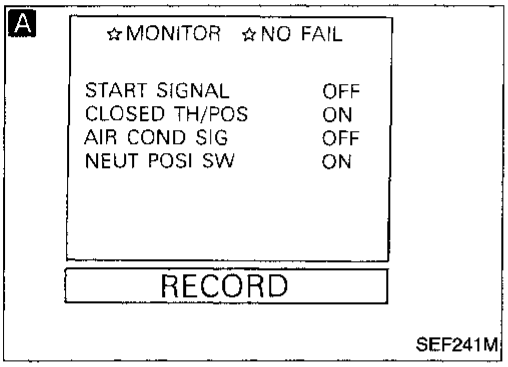


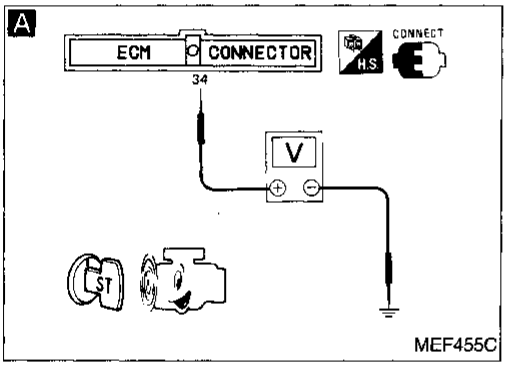
Harness layout

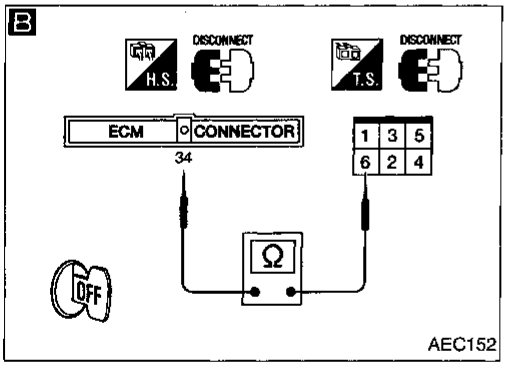


Diagnostic Procedure 23 (Cont'd)









INSPECTION START

A

CHECK OVERALL FUNCTION.

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

OR

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

IGN "ON"	OFF
IGN "START"	ON

OR

1) Turn ignition switch to "START".
2) Check voltage between ECM terminal (34) and ground.

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

O.K. → INSPECTION END

N.G. ↓

B

CHECK INPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector and ignition switch harness connector.
3) Check harness continuity between ECM terminal (34) and terminal (6).
Continuity should exist.

N.G. → Check the following.
- Harness connectors (F23), (M49)
- Harness connectors (M7), (E103)
- 10A fuse
- Harness continuity between ECM and ignition switch

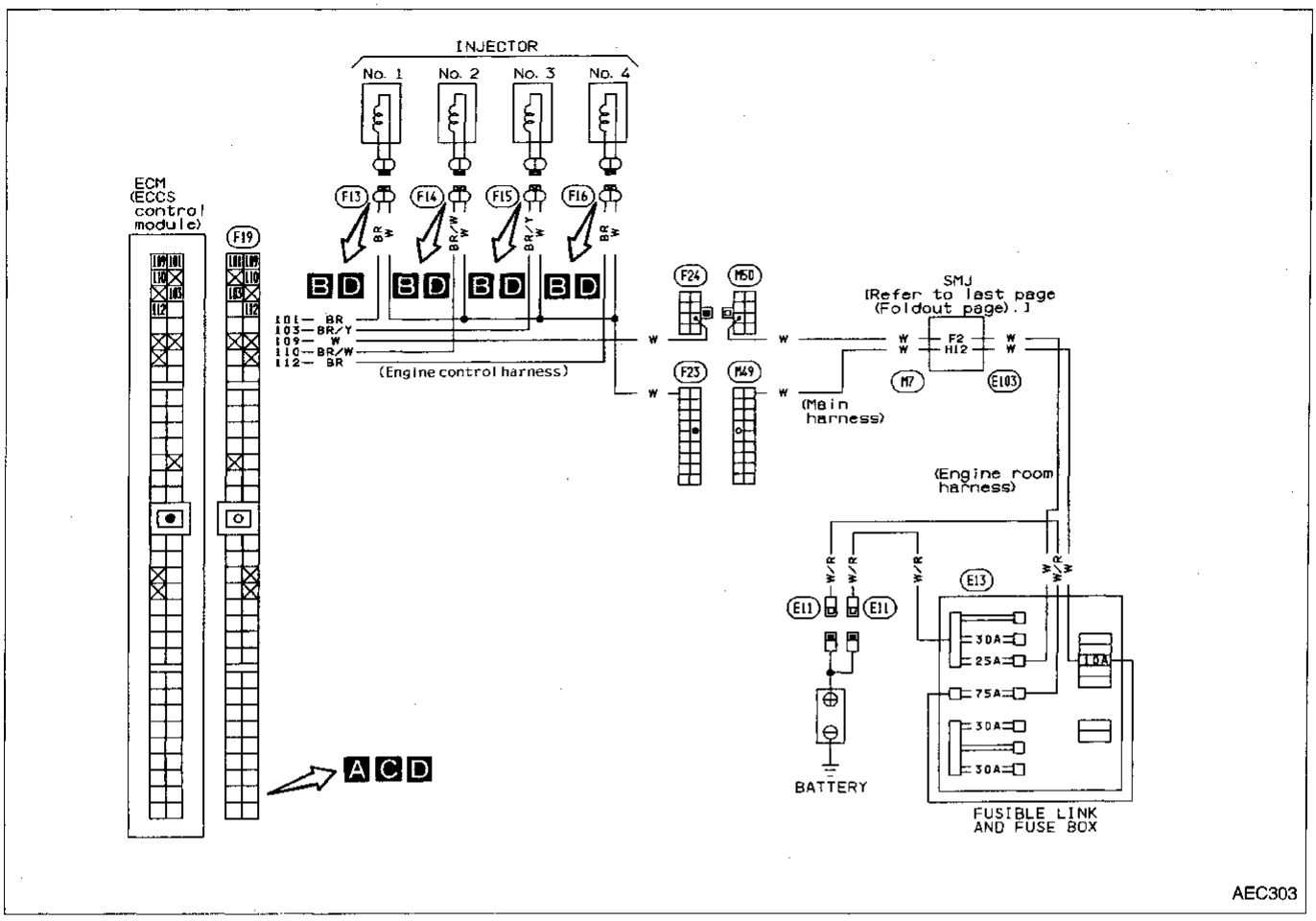
If N.G., repair harness or connectors.

O.K. ↓

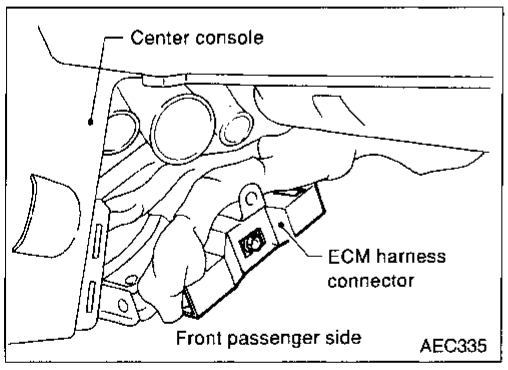
Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-153.

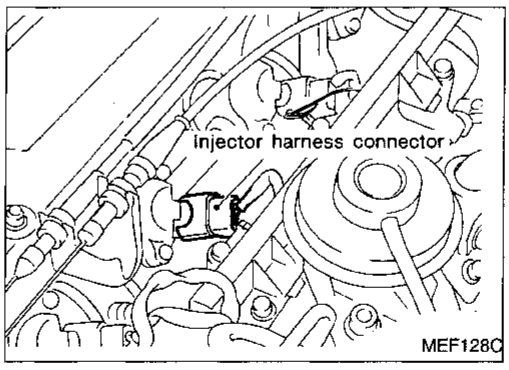
Diagnostic Procedure 24

INJECTOR (Not self-diagnostic item)

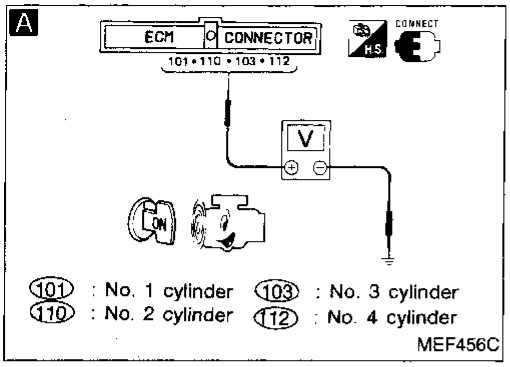


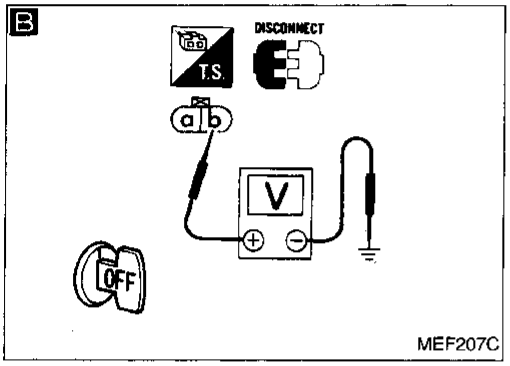
Harness layout

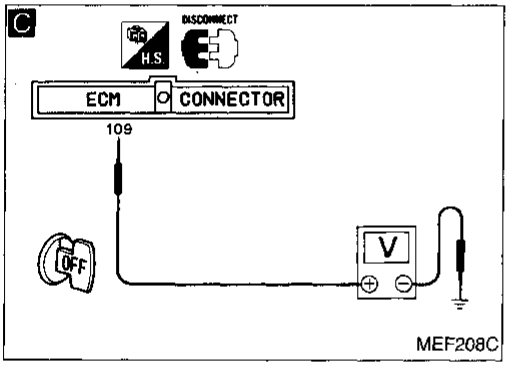


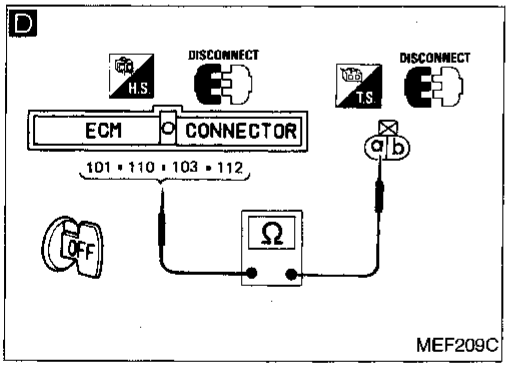


Diagnostic Procedure 24 (Cont'd)









INSPECTION START

A

CHECK CONTROL FUNCTION.
1) Start engine.
2) Check voltage between ECM terminals (101), (110), (103), (112) and ground.
Voltage: Battery positive voltage

O.K. → INSPECTION END

N.G.

B

CHECK POWER SUPPLY 1.
1) Stop engine.
2) Disconnect each injector harness connector.
3) Check voltage between terminal (b) and ground.
Voltage: Battery positive voltage

N.G. → Check the following.
- Harness connectors (F23), (M49)
- Harness connectors (M7), (E103)
- 10A fuse
- 75A fusible link
- Harness continuity between injector and battery

If N.G., repair harness or connectors.

O.K.

C

CHECK POWER SUPPLY 2.
1) Disconnect ECM harness connector.
2) Check voltage between ECM terminal (109) and ground.
Voltage: Battery positive voltage

N.G. → Check the following.
- Harness connectors (F24), (M50)
- Harness connectors (M7), (E103)
- 25A fusible link
- Harness continuity between ECM and battery

If N.G., repair harness or connectors.

O.K.

D

CHECK OUTPUT SIGNAL CIRCUIT.
1) Check harness continuity between terminal (a) and ECM terminals (101), (110), (103), (112).
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

CHECK COMPONENT (Injector).
Refer to EF & EC-163.

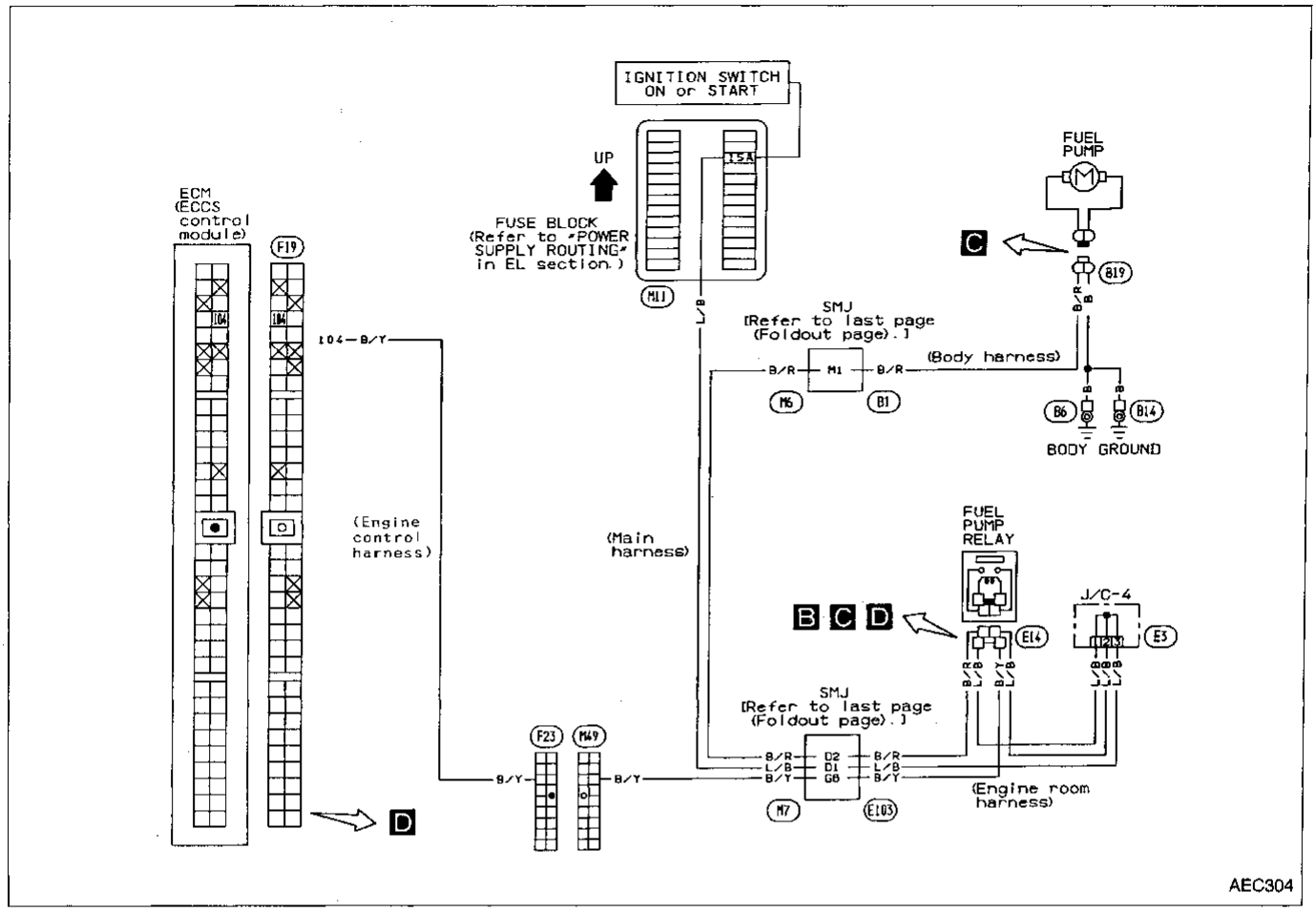
N.G. → Replace injector.

O.K.

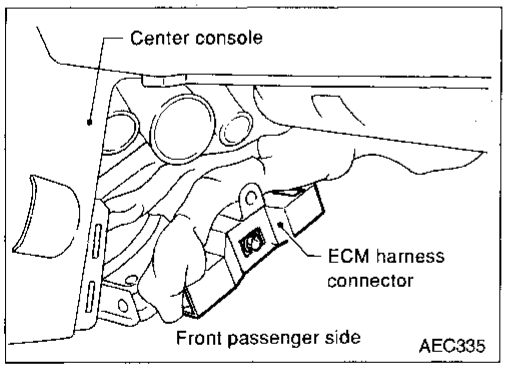
Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-153.

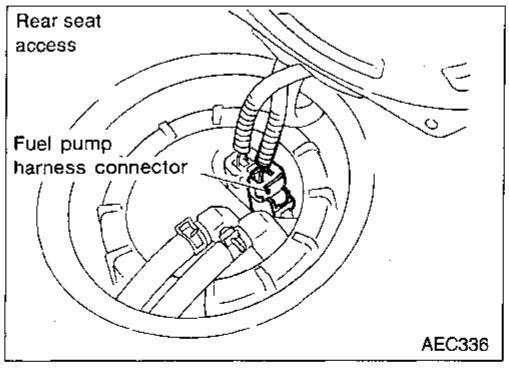
Diagnostic Procedure 25

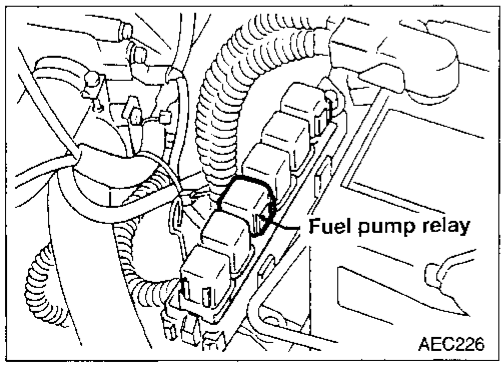
FUEL PUMP (Not self-diagnostic item)



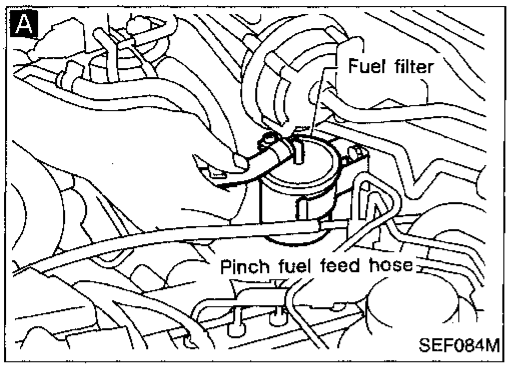
Harness layout







Diagnostic Procedure 25 (Cont'd)



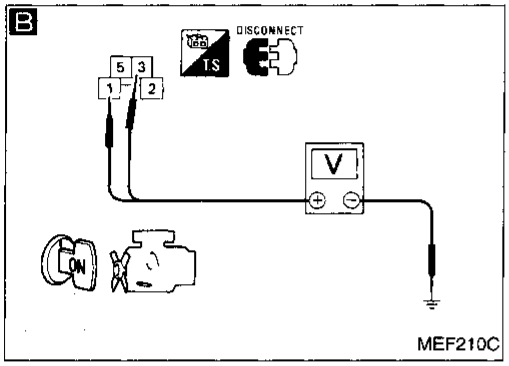
INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Turn ignition switch "ON".
2) Pinch fuel feed hose with fingers.
Fuel pressure pulsation should be felt for 5 seconds after ignition switch is turned "ON".

O.K. → INSPECTION END

N.G.



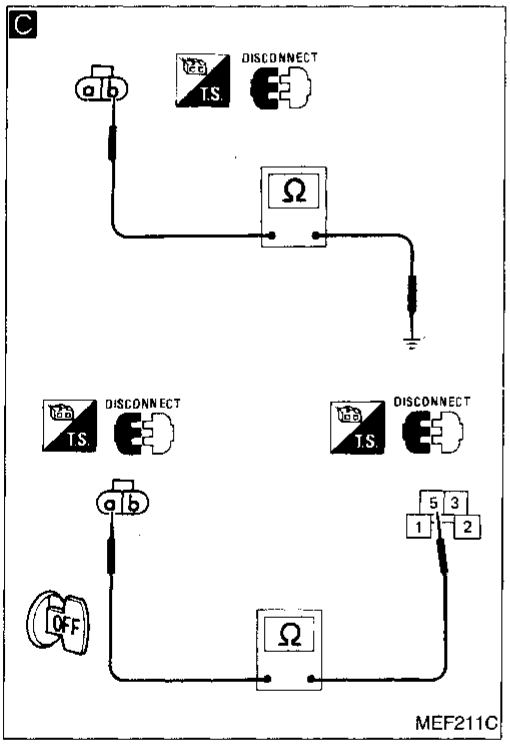
B

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

N.G. → Check the following.
- Harness connectors (E103) , (M7)
- Joint connector (E3)
- 15A fuse
- Harness continuity between fuse and fuel pump relay

If N.G., repair harness or connectors.

O.K.



C

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

N.G. → Check the following.
- Harness connectors (B1) , (M6)
- Harness connectors (M7) , (E103)
- Harness continuity between fuel pump and body ground
- Harness continuity between fuel pump and fuel pump relay

If N.G., repair harness or connectors.

O.K.

D

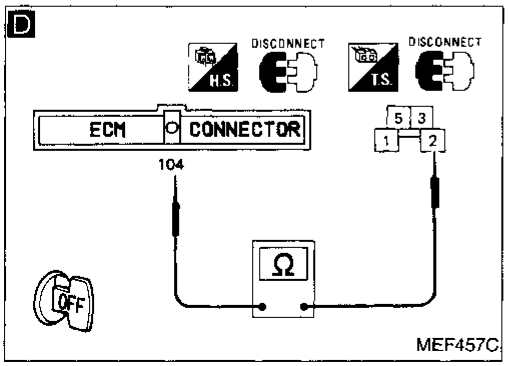
CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal (104) and terminal ②.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (M7) , (E103)
- Harness connectors (M49) , (F23)
- Harness continuity between ECM and fuel pump relay

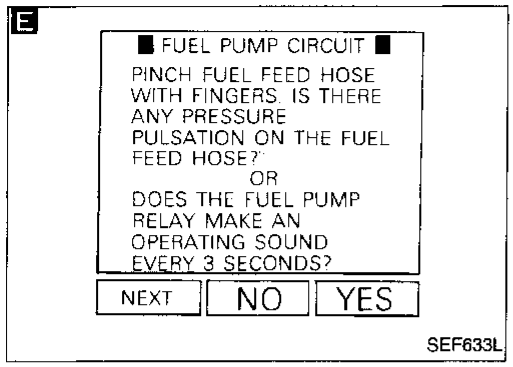
If N.G., repair harness or connectors.

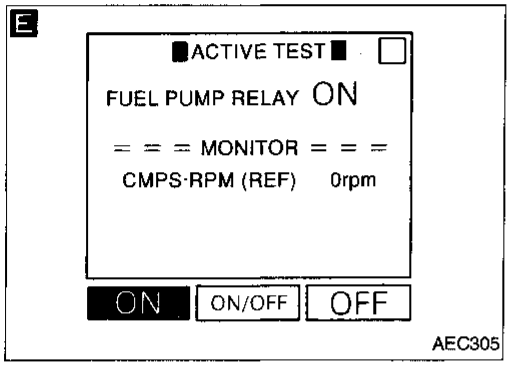
O.K.

Ⓐ



Diagnostic Procedure 25 (Cont'd)





Ⓐ

E

CHECK COMPONENT (Fuel pump relay).

1) Reconnect fuel pump relay, fuel pump harness connector and ECM harness connector.
2) Ignition switch "ON".
3) Perform "FUEL PUMP CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

OR

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

OR

Refer to EF & EC-164.

N.G. → Replace fuel pump relay.

O.K. ↓

CHECK COMPONENT (Fuel pump). Refer to EF & EC-160.

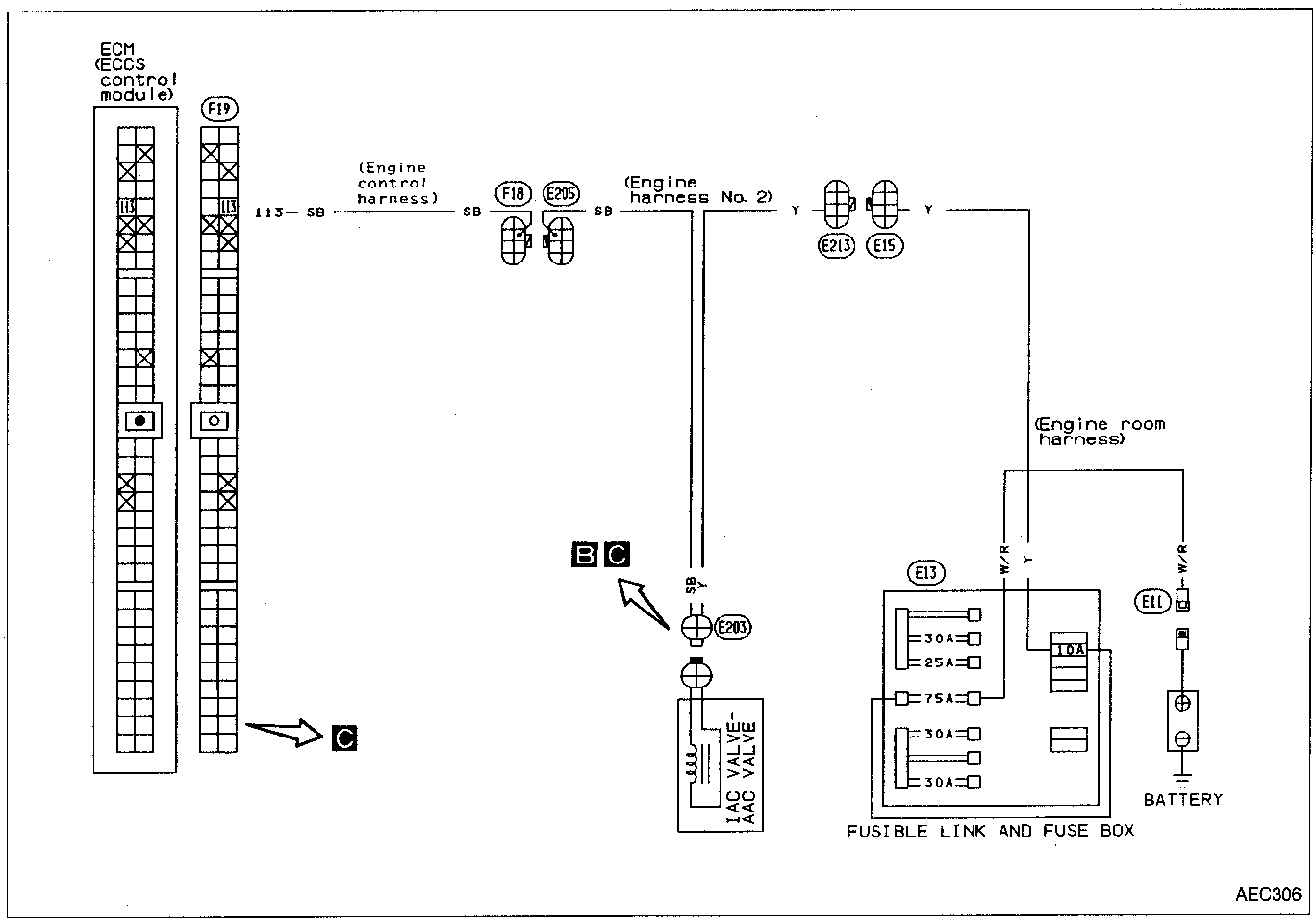
N.G. → Replace fuel pump.

O.K. ↓

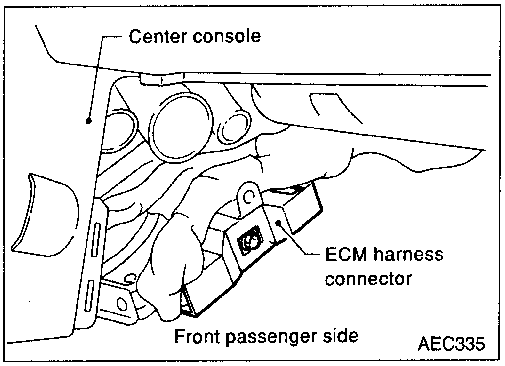
Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-153.

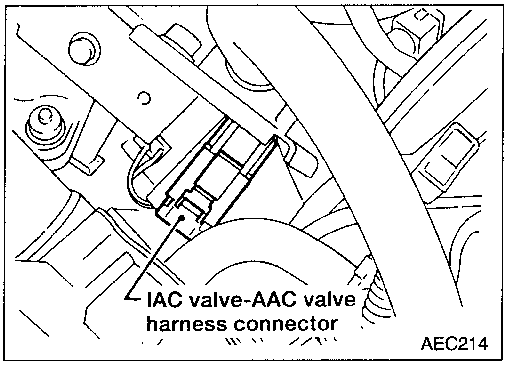
Diagnostic Procedure 26

IAC VALVE-AAC VALVE (Not self-diagnostic item)

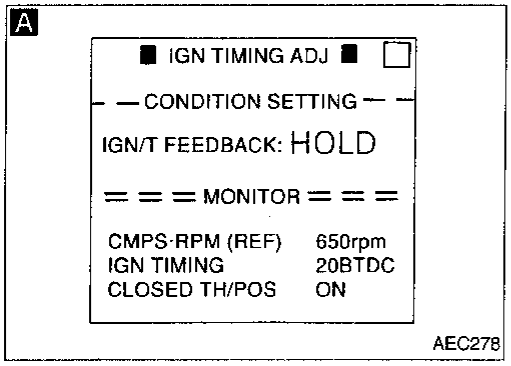


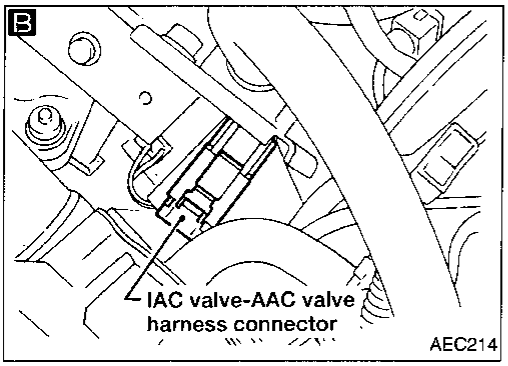
Harness layout

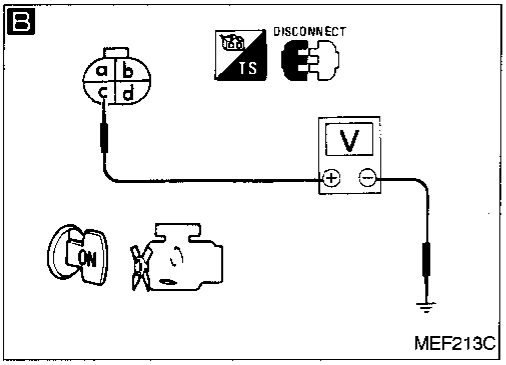


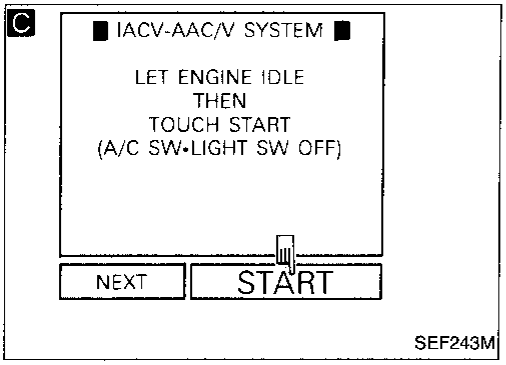


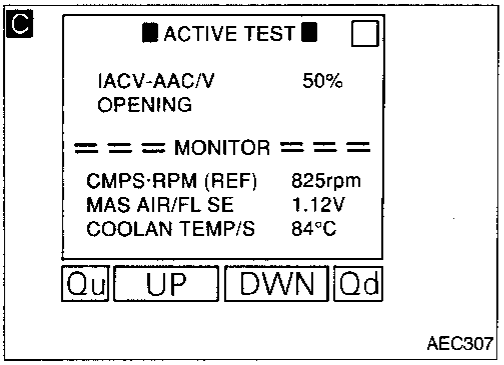
Diagnostic Procedure 26 (Cont'd)











INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Start engine and warm it up sufficiently.
2) Check idle speed.
700 ± 50 rpm
3) Perform "IGN TIMING ADJ" in "WORK SUPPORT" mode with CONSULT.

OR

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

Drops → INSPECTION END

Does not drop ↓

B

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect IAC valve-AAC valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓒ and ground.
Voltage: Battery positive voltage

N.G. → Check the following.
- Harness connectors E213, E15
- 10A fuse
- 75A fusible link
- Harness continuity between IAC valve-AAC valve harness connector and fuse

If N.G., repair harness or connectors.

O.K. ↓

C

CHECK OUTPUT SIGNAL CIRCUIT.
1) Reconnect throttle position sensor harness connector and IAC valve-AAC valve harness connector.
2) Perform "IACV-AAC/V SYSTEM" in "FUNCTION TEST" mode with CONSULT.

OR

2) Perform "IACV-AAC/V OPENING TEST" 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 ⓓ.
Continuity should exist.

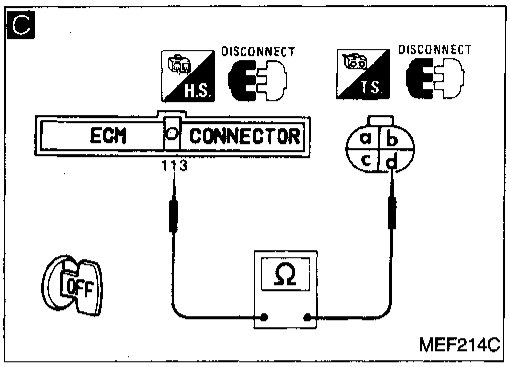
N.G. → Check the following.
- Harness connectors F18, E205
- Harness continuity between ECM and IAC valve-AAC valve harness connector

If N.G., repair harness or connectors.

O.K. ↓

Ⓐ

Diagnostic Procedure 26 (Cont'd)



Ⓐ

CHECK COMPONENT
(IAC valve-AAC valve).
Refer to EF & EC-163.

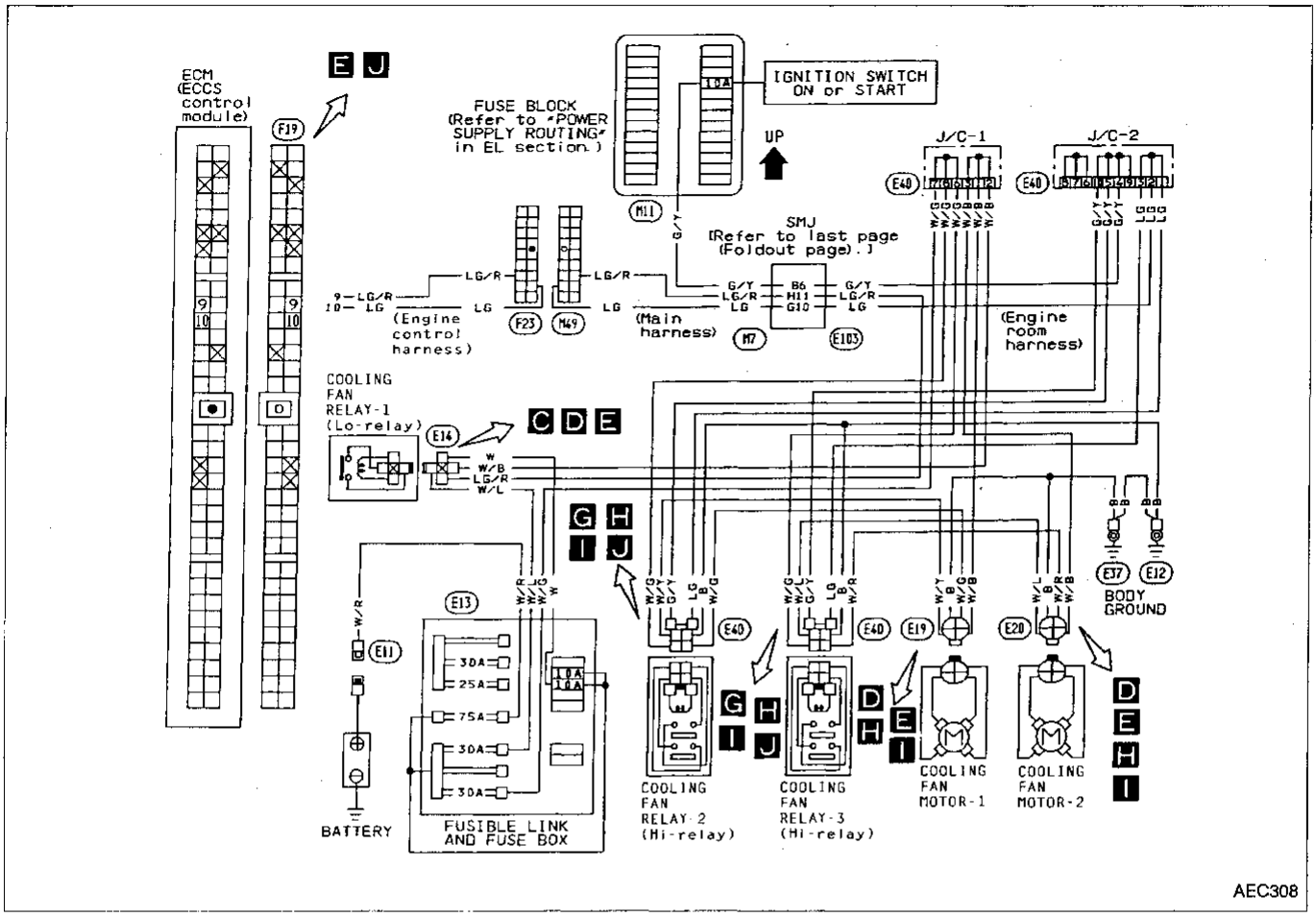
N.G. → Replace IAC valve-AAC valve.

O.K.

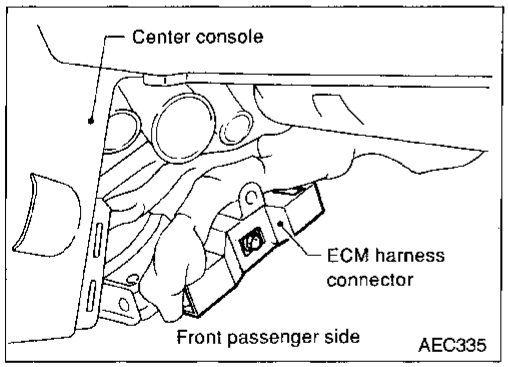
Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-153.

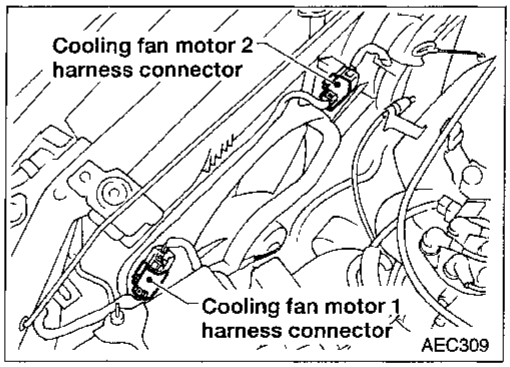
Diagnostic Procedure 27

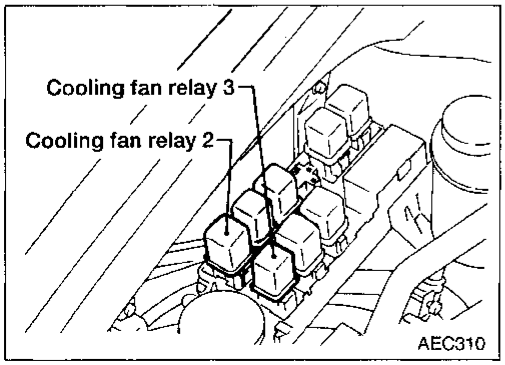
COOLING FAN CONTROL (Not self-diagnostic item)

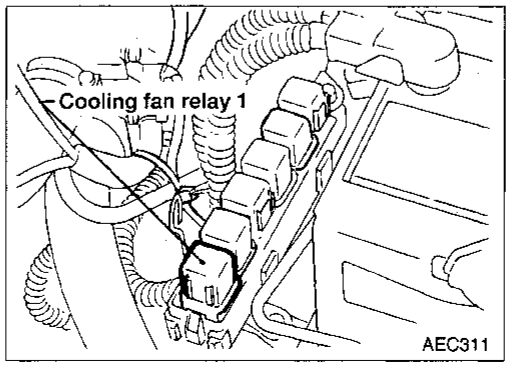


Harness layout

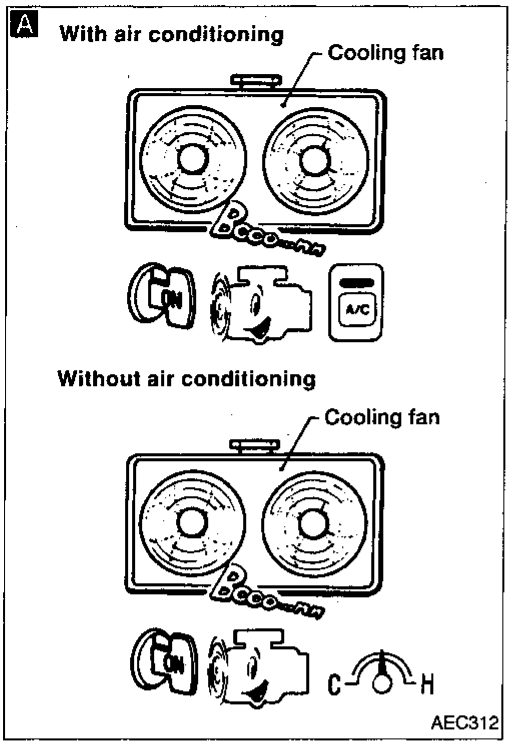


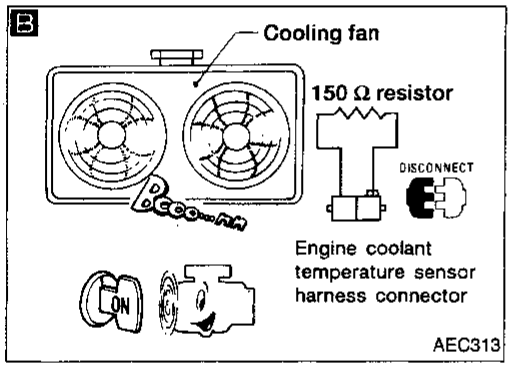






Diagnostic Procedure 27 (Cont'd)





INSPECTION START

A

CHECK COOLING FAN LOW SPEED OPERATION.

With air conditioning

1) Start engine.
2) Set temperature lever at full cold position.
3) Turn air conditioning switch "ON".
4) Turn blower fan switch "ON".
5) Run engine at idle for a few minutes with air conditioning operating.
6) Make sure that cooling fan operates at low speed.

Without air conditioning

1) Start engine.
2) Keep engine speed at about 2,000 rpm until engine is warmed up sufficiently.
3) Make sure that cooling fan begins to operate at low speed during warm-up.

N.G. → Check cooling fan low speed control circuit. (Perform PROCEDURE A .)

O.K.

B

CHECK COOLING FAN HIGH SPEED OPERATION.

1) Turn air conditioning switch "OFF".
2) Turn blower fan switch "OFF".
   (Steps 1) and 2) are only performed for models with air conditioning.)
3) Stop engine.
4) Disconnect engine coolant temperature sensor harness connector.
5) Connect 150Ω resistor to engine coolant temperature sensor harness connector.
6) Restart engine and make sure that cooling fan operates at high speed.

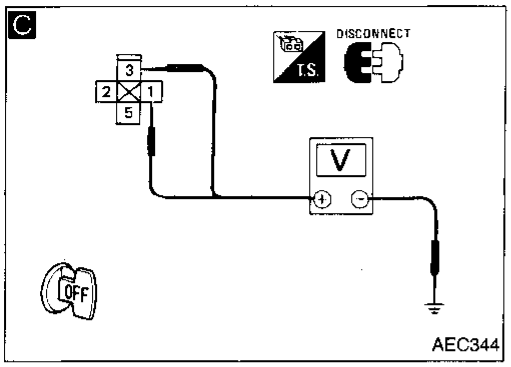
N.G. → Check cooling fan high speed control circuit. (Perform PROCEDURE B .)

O.K.

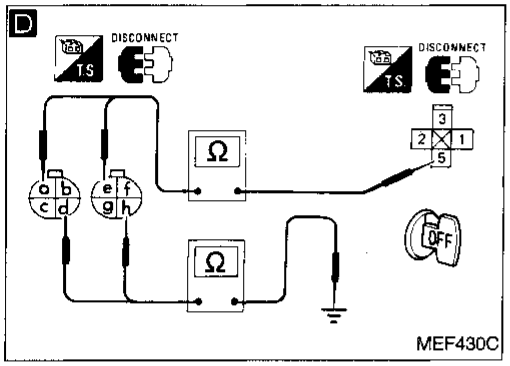
INSPECTION END

Diagnostic Procedure 27 (Cont'd)

C



D



PROCEDURE A

INSPECTION START

C

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect cooling fan relay-1.
3) Check voltage between terminals ①, ③ and ground.
Voltage: Battery positive voltage

N.G. → Check the following.
- 10A fuse
- 30A fusible link
- 75A fusible link
- Harness continuity between cooling fan relay-1 and battery

If N.G., repair harness or connectors.

O.K. ↓

D

CHECK GROUND CIRCUIT.
1) Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
2) Check harness continuity between terminals ⓐ, ⓔ and terminal ⑤, terminals ⓓ, ⓗ and body ground.
Continuity should exist.

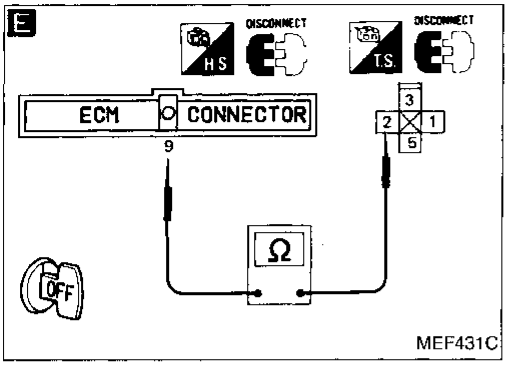
N.G. → Repair harness or connectors.
Check the following.
- Joint connector-1
- Harness continuity between cooling fan relay-1 and cooling fan motor-1, 2.

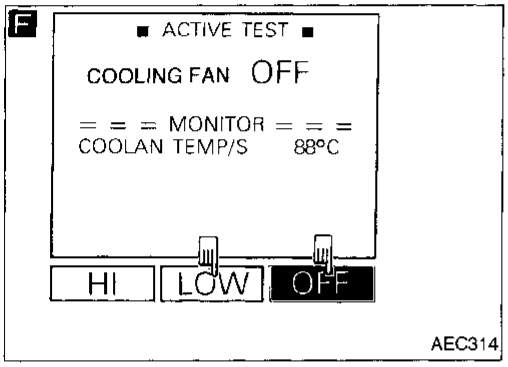
If N.G., repair harness or connectors.

O.K. ↓

Ⓐ

Diagnostic Procedure 27 (Cont'd)





Ⓐ

E

CHECK OUTPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ⑨ and terminal ②.
Continuity should exist.

N.G. → Check the following.
- Harness connectors (M7) , (E103)
- Harness connectors (F23) , (M49)
- Harness continuity between cooling fan relay-1 and ECM

If N.G., repair harness or connectors.

O.K. ↓

CHECK COMPONENT
(Cooling fan relay-1).
Refer to EF & EC-164.

N.G. → Replace cooling fan relay.

O.K. ↓

F

CHECK COMPONENTS
(Cooling fan motors-1 and -2).

1) Reconnect cooling fan relay-1, cooling fan motor harness connector and ECM harness connector.
2) Start engine.
3) Perform "COOLING FAN TEST" in "ACTIVE TEST" mode with CONSULT.

OR

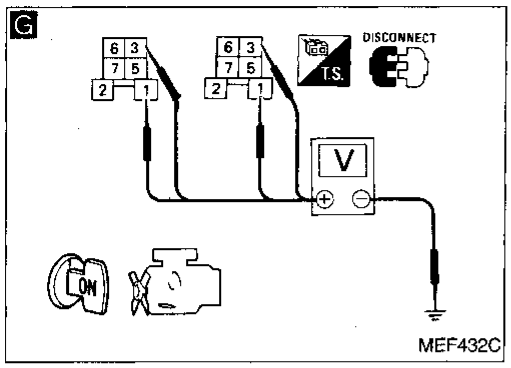
Refer to EF & EC-165.

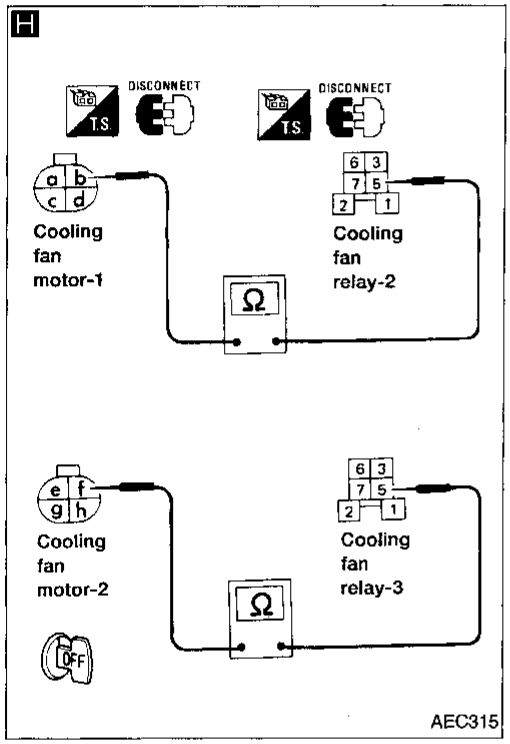
N.G. → Replace cooling fan motors.

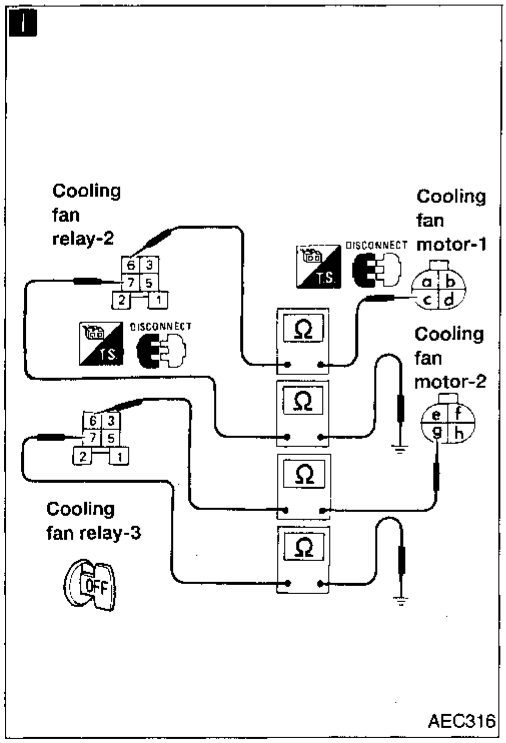
O.K. ↓

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-153.

Diagnostic Procedure 27 (Cont'd)







PROCEDURE B

INSPECTION START

G

CHECK POWER SUPPLY.
1) Stop engine.
2) Disconnect cooling fan relays-2 and 3.
3) Turn ignition switch "ON".
4) Check voltage between terminals ①, ③ and ground.
Voltage: Battery positive voltage

N.G. → Check the following.
- Harness connectors (M7), (E103)
- 10A fuse
- 30A fusible link
- 75A fusible link
- Joint connector-1
- Joint connector-2
- Harness continuity between cooling fan relays-2 and 3 and fuse
- Harness continuity between cooling fan relays-2 and 3 and battery

If N.G., repair harness or connectors.

O.K. ↓

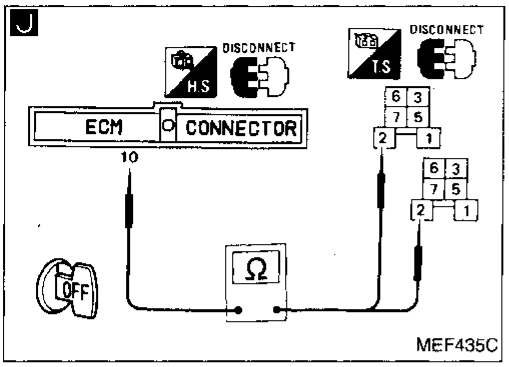
CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect cooling fan motor harness connector.
H 3) Check harness continuity between terminal ⑤ and terminals ⓑ, ⓕ.
Continuity should exist.
I 4) Check harness continuity between terminal ⑥ and terminals ⓒ, ⓖ, terminal ⑦ and body ground.
Continuity should exist.

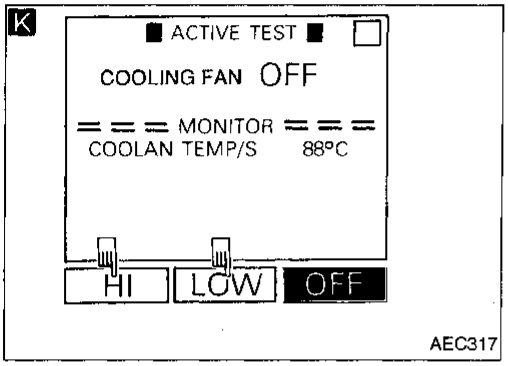
N.G. → Repair harness or connectors.

O.K. ↓

Ⓐ

Diagnostic Procedure 27 (Cont'd)





Ⓐ

J

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

N.G. → Check the following.
- Harness connectors (M7) , (E103)
- Harness connectors (F23) , (M49)
- Joint connector-2
- Harness continuity between ECM and cooling fan relays-2 and 3

If N.G., repair harness or connectors.

O.K. ↓

CHECK COMPONENT
(Cooling fan relays-2 and 3).
Refer to EF & EC-164.

N.G. → Replace cooling fan relay.

O.K. ↓

K

CHECK COMPONENTS
(Cooling fan motors-1 and -2).
1) Reconnect cooling fan relay-2, -3, cooling fan motor harness connector, engine coolant temperature sensor harness connector and ECM harness connector.
2) Start engine.
3) Perform "COOLANT FAN TEST" in "ACTIVE TEST" mode with CONSULT.

OR

Refer to EF & EC-165.

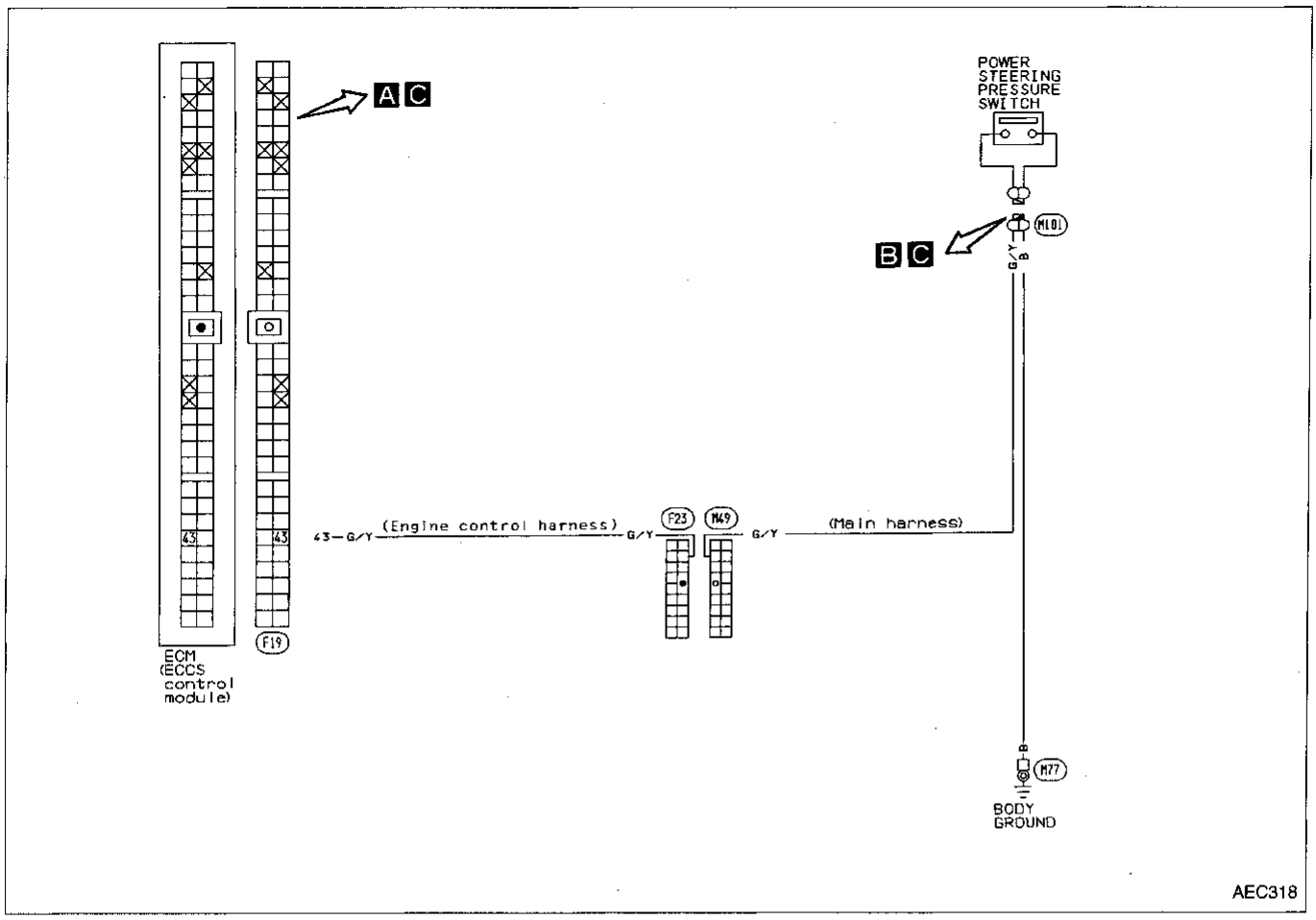
N.G. → Replace cooling fan motors.

O.K. ↓

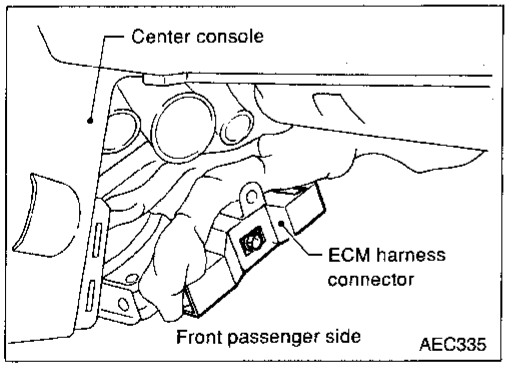
Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-153.

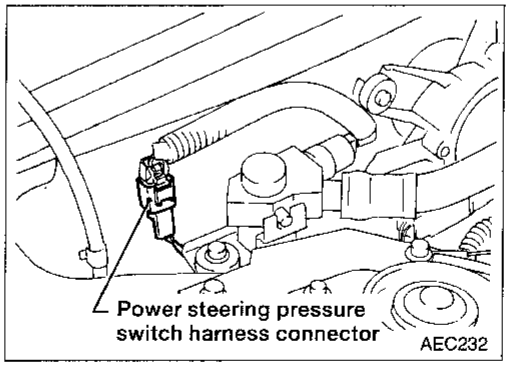
Diagnostic Procedure 28

POWER STEERING PRESSURE SWITCH (Not self-diagnostic item)

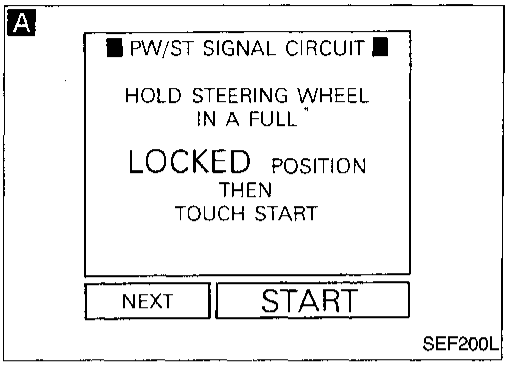


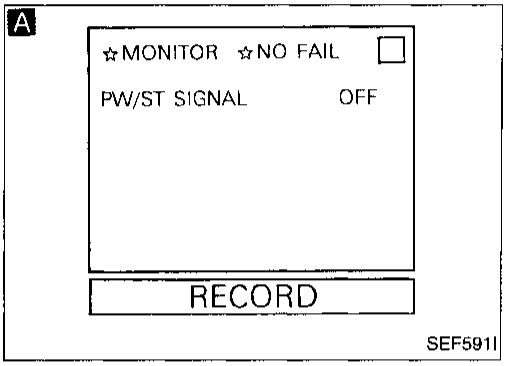
Harness layout

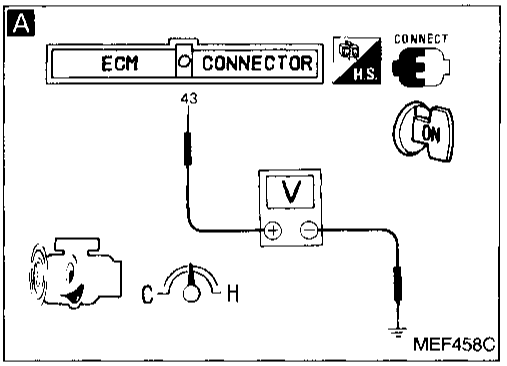


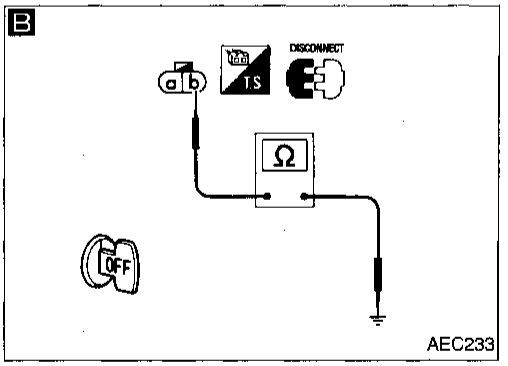


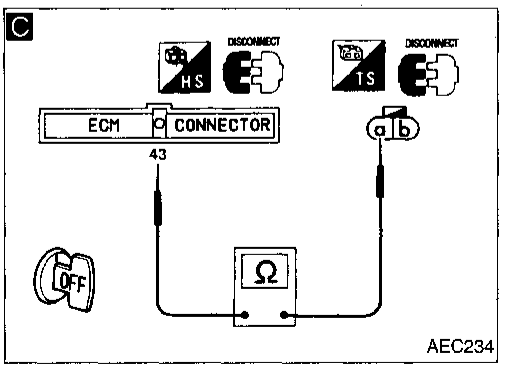
Diagnostic Procedure 28 (Cont'd)











INSPECTION START

A

CHECK OVERALL FUNCTION.

1) Start engine.
2) Perform "PW/ST SIGNAL CIRCUIT" in "FUNCTION TEST" mode with CONSULT.

O.K. → INSPECTION END

OR

1) Start engine.
2) Check power steering 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.

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

N.G.

B

CHECK GROUND CIRCUIT.

1) Stop engine.
2) Disconnect power steering pressure switch harness connector.
3) Check harness continuity between terminal (b) and engine ground.

Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

C

CHECK INPUT SIGNAL CIRCUIT.

1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal (43) and terminal (a).

Continuity should exist.

N.G. → Check the following.
- Harness connectors (F23), (M49)
- Harness continuity between ECM and power steering pressure switch

If N.G., repair harness or connectors.

O.K.

CHECK COMPONENT
(Power steering pressure switch).
Refer to EF & EC-164.

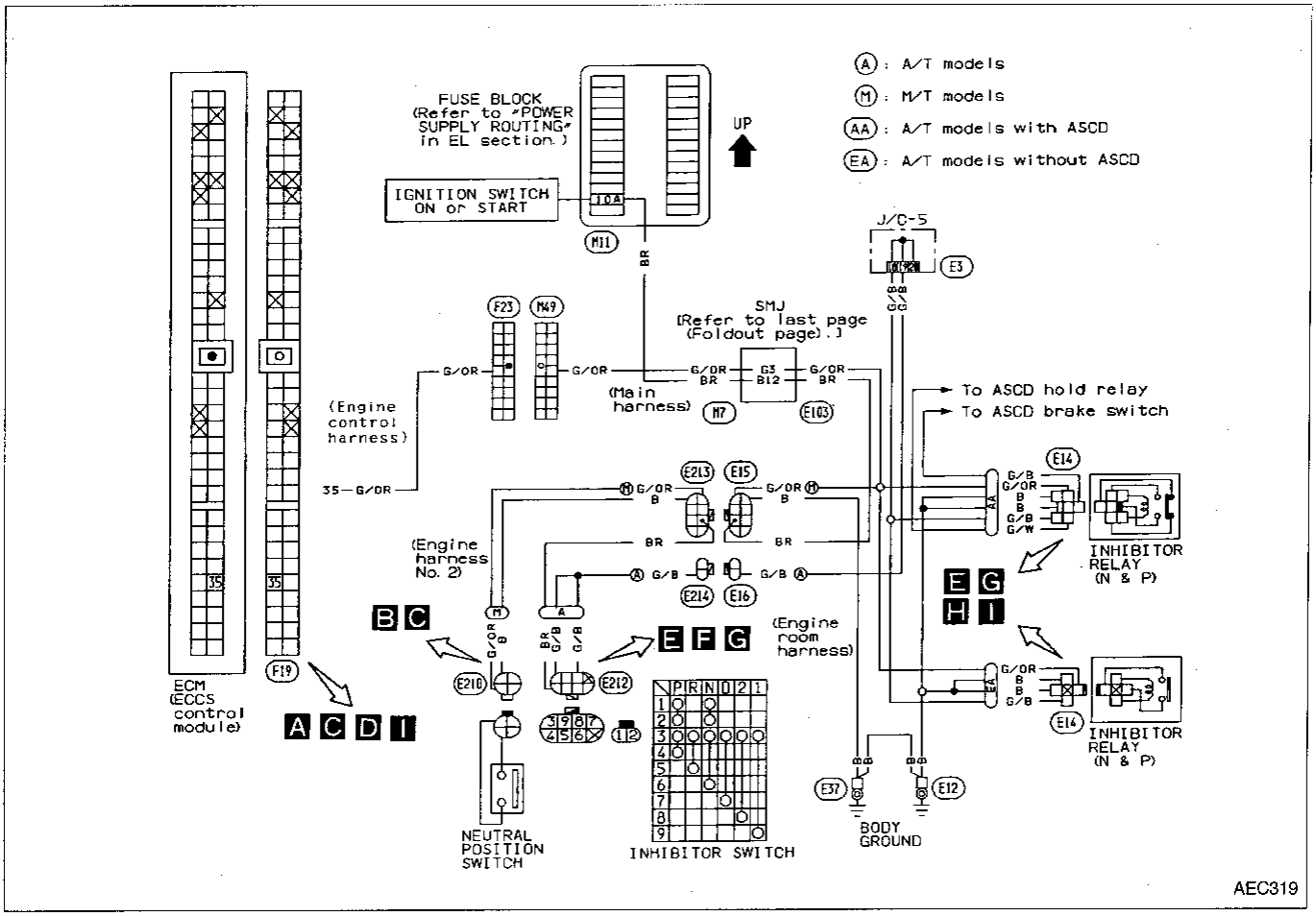
N.G. → Replace power steering pressure switch.

O.K.

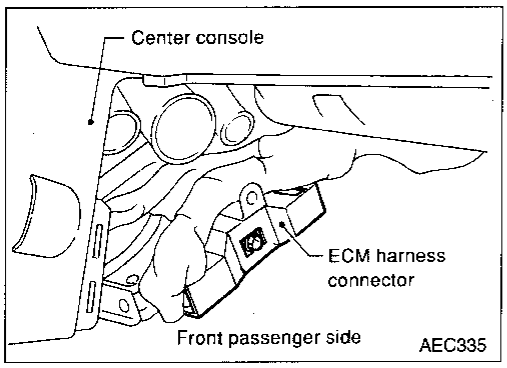
Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-153.

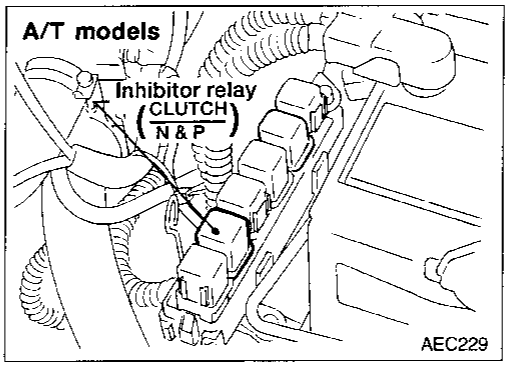
Diagnostic Procedure 29

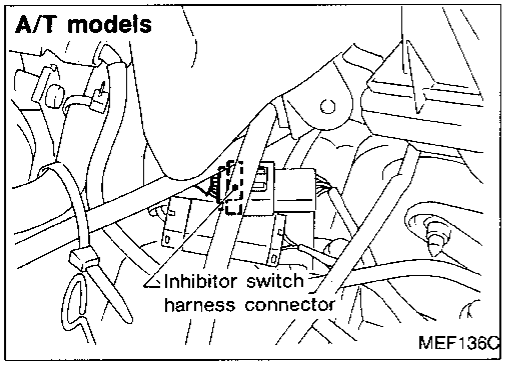
NEUTRAL POSITION SWITCH/INHIBITOR SWITCH (Not self-diagnostic item)

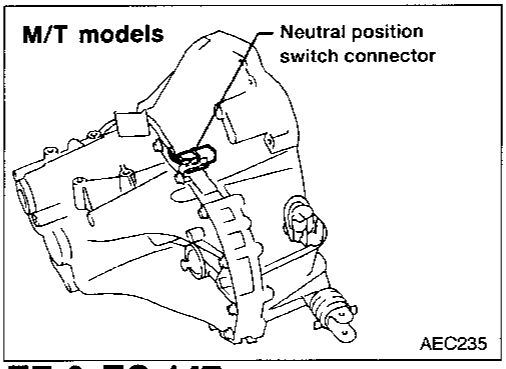


Harness layout

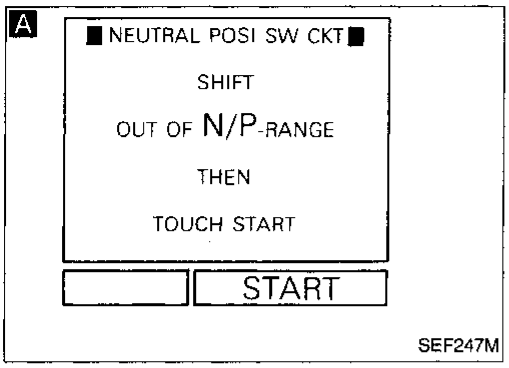


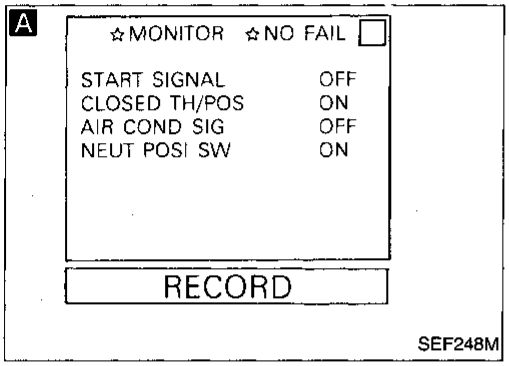


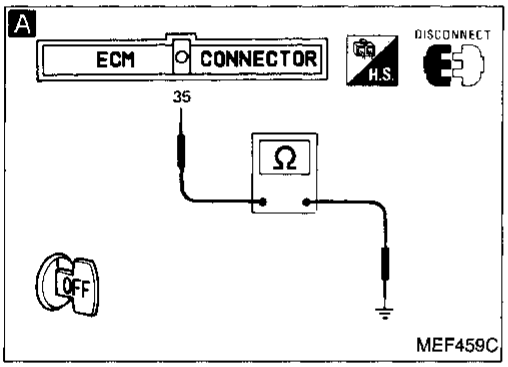


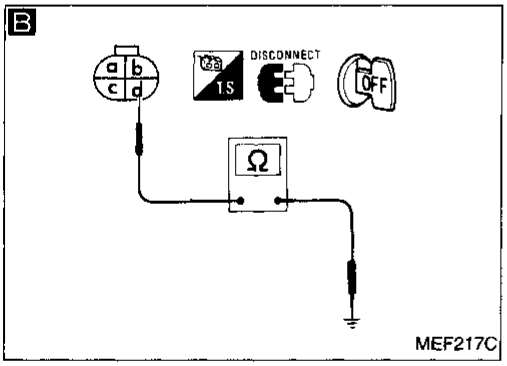


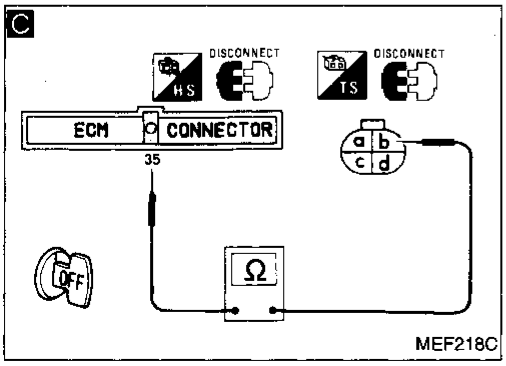
Diagnostic Procedure 29 (Cont'd)











Neutral position switch (M/T)

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.

Turn ignition switch "OFF".

B

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

N.G. → Check the following.
- Harness connectors (E213), (E15)
- Harness continuity between neutral position switch and body ground.

If N.G., repair harness or connectors.

O.K.

Disconnect ECM harness connector.

C

CHECK INPUT SIGNAL CIRCUIT.
1) Check harness continuity between ECM terminal (35) and terminal (b).
Continuity should exist.

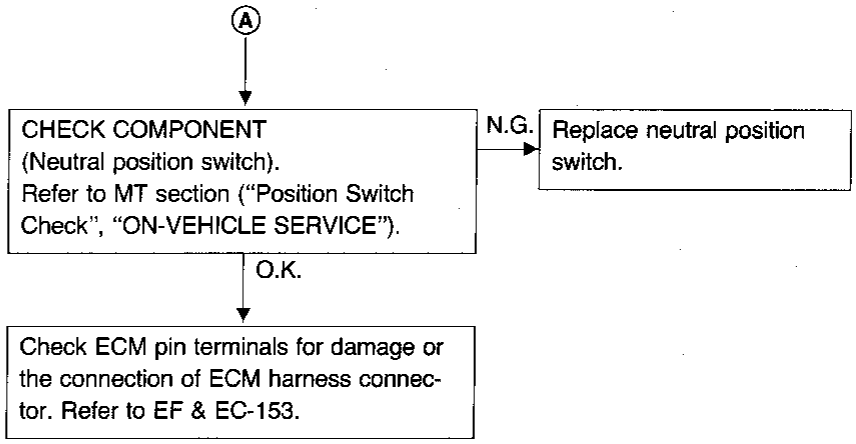
N.G. → Check the following.
- Harness connectors (E213), (E15)
- Harness connectors (E103), (M7)
- Harness connectors (M49), (F23)
- Harness continuity between ECM and neutral position switch

If N.G., repair harness or connectors.

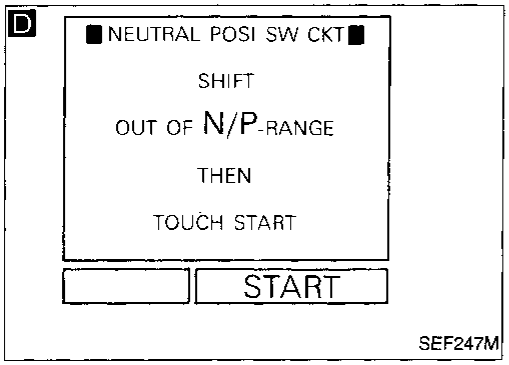
O.K.

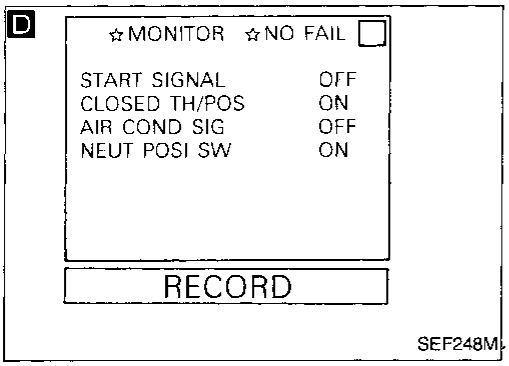
Ⓐ

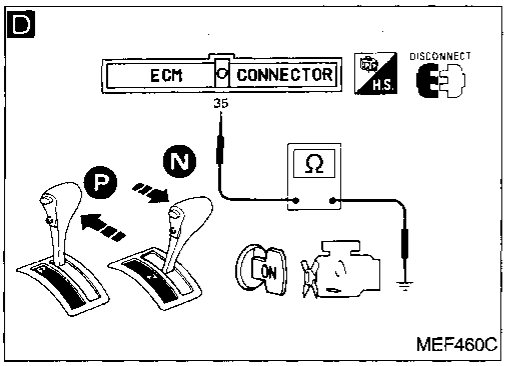
Diagnostic Procedure 29 (Cont'd)



Diagnostic Procedure 29 (Cont'd)







Inhibitor switch (A/T)

INSPECTION START

D

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 park/neutral position switch signal in "DATA MONITOR" mode with CONSULT.
   "N" or "P": ON
   Except above: OFF

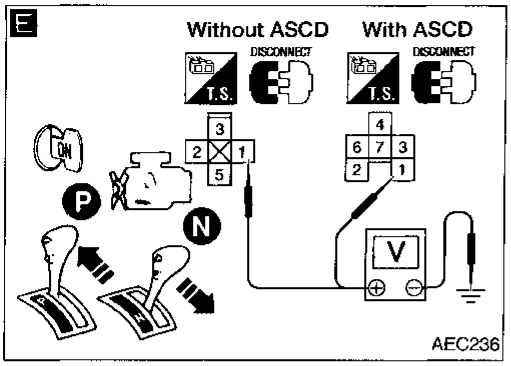
OR

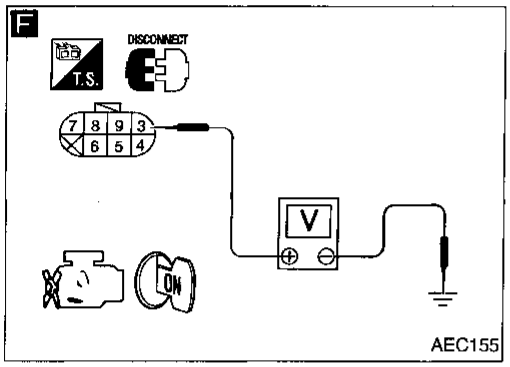
1) Make sure that inhibitor switch circuit functions properly. Refer to AT section ("INHIBITOR SWITCH, OVERDRIVE SWITCH AND CLOSED THROTTLE POSITION SWITCH CIRCUIT CHECKS", "Self-diagnosis", "TROUBLE DIAGNOSES").
2) Disconnect ECM harness connector.
3) Shift selector lever to "P" range.
4) Turn ignition switch "ON".
5) Check harness continuity between ECM terminal (35) and body ground.
   Continuity should exist.
6) Shift selector lever to "N" range.
7) Check harness continuity between ECM terminal (35) and body ground.
   Continuity should exist.

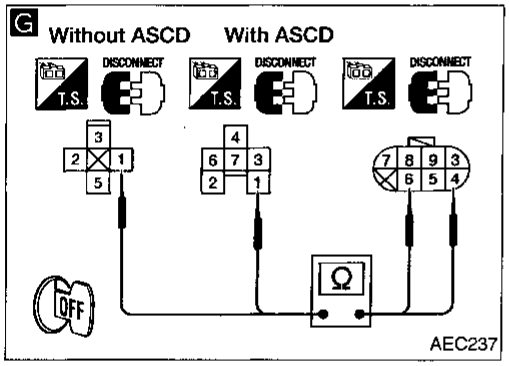
N.G.

Ⓐ

Diagnostic Procedure 29 (Cont'd)







Ⓐ

E

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect inhibitor relay.
3) Make sure that selector lever is in "P" or "N" range.
4) Turn ignition switch "ON".
5) Check voltage between terminal ① and ground.
Voltage: Battery positive voltage

O.K. → Ⓑ

N.G. ↓

F

CHECK HARNESS CONTINUITY BETWEEN INHIBITOR SWITCH AND BATTERY.
1) Turn ignition switch "OFF".
2) Disconnect inhibitor switch harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ③ and ground.
Voltage: Battery positive voltage

N.G. → Check the following.
- Harness connectors (E213), (E15)
- Harness connectors (M7), (E103)
- 10A fuse
- Harness continuity between fuse and inhibitor switch

If N.G. repair harness or connectors.

O.K. ↓

G

CHECK HARNESS CONTINUITY BETWEEN INHIBITOR SWITCH AND INHIBITOR RELAY.
1) Turn ignition switch "OFF".
2) Check harness continuity between terminals ① and ⑥.
Continuity should exist.
3) Check harness continuity between terminals ① and ④.
Continuity should exist.

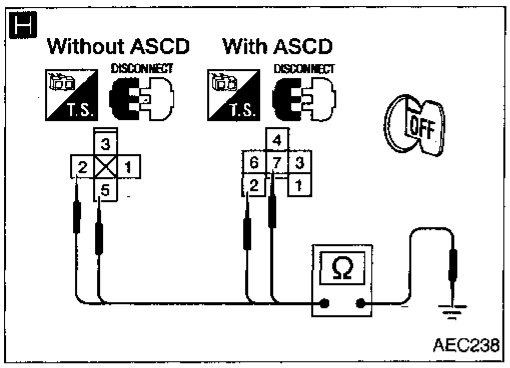
N.G. → Check the following.
- Joint connector-5
- Harness connectors (E214), (E16)
- Harness continuity between inhibitor switch and inhibitor relay

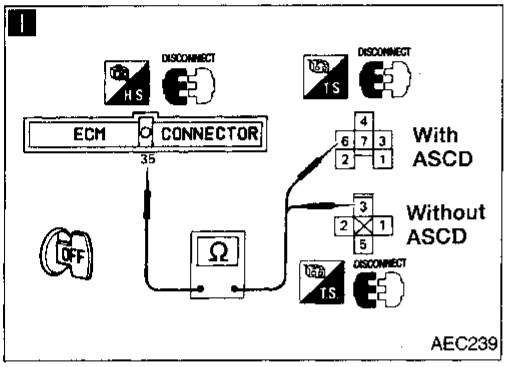
If N.G., repair harness or connectors.

O.K. ↓

CHECK COMPONENT (Inhibitor switch).
Refer to AT section ("INHIBITOR SWITCH", "Electrical Components Inspection", "TROUBLE DIAGNOSES").

Diagnostic Procedure 29 (Cont'd)





Ⓑ

H

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) With ASCD:
Check harness continuity between terminals ②, ⑦ and body ground.
Without ASCD:
Check harness continuity between terminals ②, ⑤ and body ground.

N.G. → Repair harness or connectors.

O.K. ↓

I

CHECK INPUT SIGNAL CIRCUIT.
1) With ASCD:
Check harness continuity between ECM terminal ㉟ and terminal ⑥.
Without ASCD:
Check harness continuity between ECM terminal ㉟ and terminal ③.

N.G. → Check the following.
- Harness connectors (M7), (E103)
- Harness connectors (M49), (F23)
- Harness continuity between ECM and inhibitor relay

If N.G., repair harness or connectors.

O.K. ↓

CHECK COMPONENT
(Inhibitor relay).
Refer to EF & EC-164.

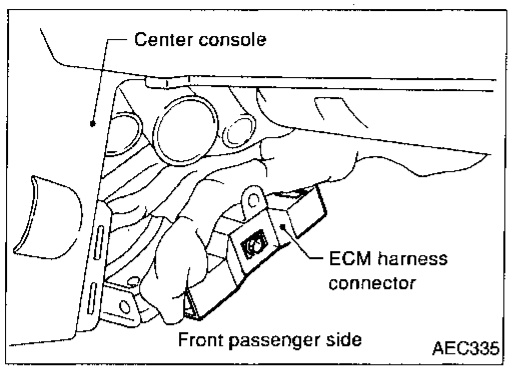
N.G. → Replace inhibitor relay.

O.K. ↓

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-153.

↓

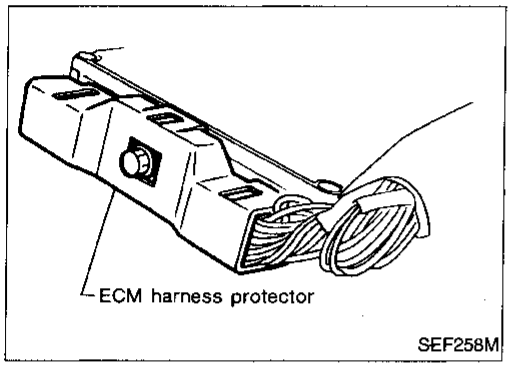
INSPECTION END



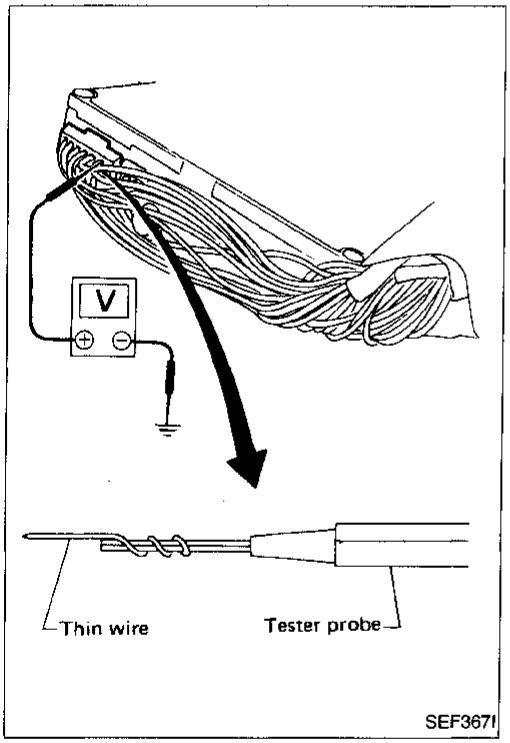
Electrical Components Inspection

ECM INPUT/OUTPUT SIGNAL INSPECTION

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

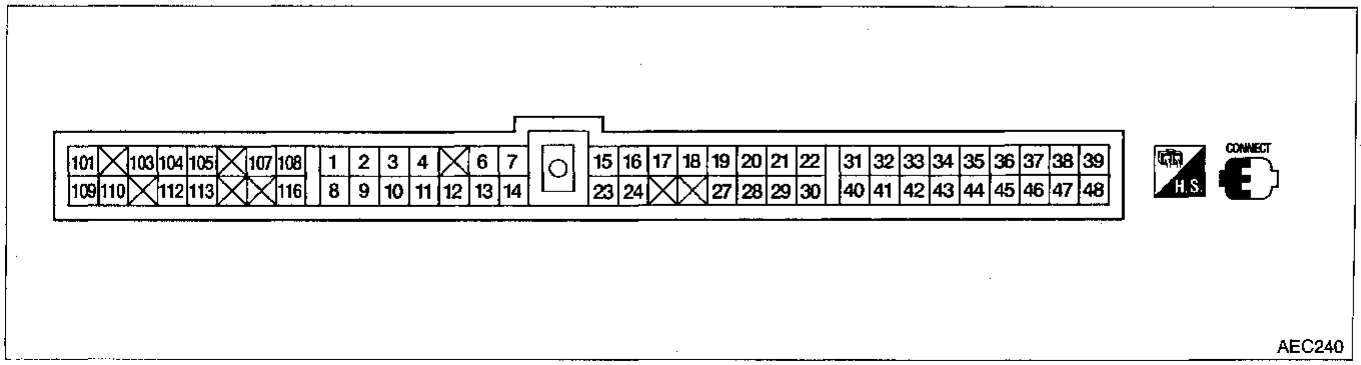


2. Remove ECM harness protector.



3. Perform all voltage measurements with the connectors connected. Extend tester probe as shown to perform tests easily.
   - Open harness securing clip to make testing easier.
   - Use extreme care not to touch 2 pins at one time.
   - Data is for comparison and may not be exact.

ECM HARNESS CONNECTOR TERMINAL LAYOUT



Electrical Components Inspection (Cont'd)

ECM inspection table

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 POSITIVE VOLTAGE (11 - 14V)
4	ECM 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 POSITIVE VOLTAGE (11 - 14V)
8	EGR temperature sensor	Engine is running. └ EGR system is not operating.	Less than 5V
		Engine is running. └ EGR system is operating.	0 - 1.0V
9	Cooling fan relay (Low speed)	Engine is running. └ Cooling fans are not operating.	BATTERY POSITIVE VOLTAGE (11 - 14V)
		Engine is running. └ Cooling fans are operating at low speed.	Approximately 0.7V
10	Cooling fan relay (High speed)	Engine is running. └ Cooling fans are not operating.	BATTERY POSITIVE VOLTAGE (11 - 14V)
		Engine is running. └ Cooling fans are operating at high speed.	Approximately 0.7V
11	Air conditioning 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 POSITIVE 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.

TERMINAL NO.	ITEM	CONDITION	DATA
19	Oxygen sensor	Engine is running. └ After warming up sufficiently	0 - Approximately 1.0V
20	Throttle position sensor	Ignition switch "ON"	0.3 - Approximately 4V Output voltage varies with the throttle valve opening angle.
22 30	Camshaft position sensor (Reference signal)	Engine is running. └ **Do not run engine at high speed under no-load.**	0.1 - 1.3V
24	Malfunction indicator lamp	Ignition switch "ON"	Approximately 1.5V
		Engine is running.	BATTERY POSITIVE VOLTAGE (11 - 14V)
27	Knock sensor	Engine is running. └ Idle speed	Approximately 2.5V
31 40	Camshaft position sensor (Position signal)	Engine is running. └ **Do not run engine at high speed under no-load.**	2.0 - 3.0V
32	Vehicle speed sensor	Ignition switch "ON" └ Engine stopped and gear position is "Neutral". └ While rotating front wheel by hand	Varies from 0 to 10V
33	Rear window defogger switch	Engine is running. └ Rear window defogger switch is "ON".	BATTERY POSITIVE VOLTAGE (11 - 14V)
		Engine is running. └ Rear window defogger switch is "OFF".	0V
34	Start signal	Ignition switch "ON"	Approximately 0V
		Ignition switch "START"	BATTERY POSITIVE VOLTAGE (11 - 14V)
35	Park/neutral position switch	Ignition switch "ON" └ Park/neutral position	0V
		Ignition switch "ON" └ Except the above gear position	Approximately 6V
36	Ignition switch	Ignition switch "OFF"	0V
		Ignition switch "ON"	BATTERY POSITIVE VOLTAGE (11 - 14V)
37	Throttle position sensor power supply	Ignition switch "ON"	Approximately 5V

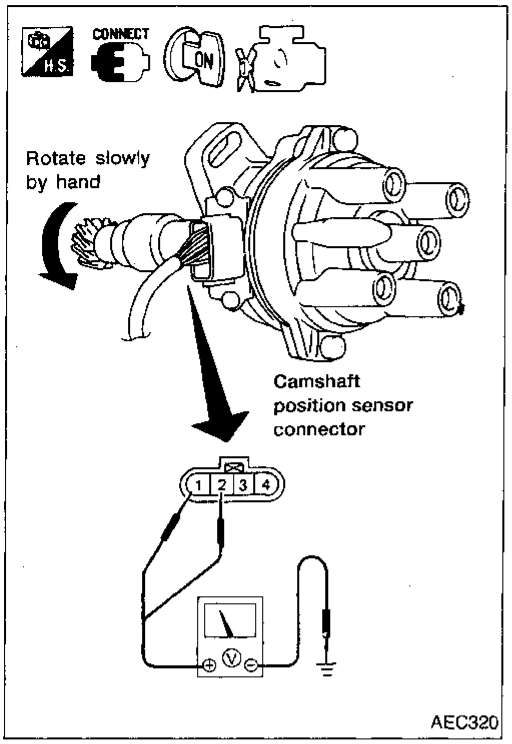
Electrical Components Inspection (Cont'd)

TER-MINAL NO.	ITEM	CONDITION	DATA
38 47	Power supply for ECM	Ignition switch "ON"	BATTERY POSITIVE VOLTAGE (11 - 14V)
41	Air conditioning switch	Engine is running. └ Both air conditioning switch and blower switch are "ON".	Approximately 0V
		Engine is running. └ Air conditioning switch is "OFF".	BATTERY POSITIVE VOLTAGE (11 - 14V)
43	Power steering pressure switch	Engine is running. └ Steering wheel is being turned.	0V
		Engine is running. └ Steering wheel is not being turned.	Approximately 8V
45	Air conditioning triple-pressure switch	Engine is running. └ Air conditioning switch is "ON". └ Air conditioning triple-pressure switch is "ON".	Approximately 0V
		Engine is running. └ Air conditioning switch is "ON". └ Air conditioning triple-pressure switch is "OFF".	Approximately 7V
46 109	Power supply (Back-up)	Ignition switch "OFF"	BATTERY POSITIVE VOLTAGE (11 - 14V)
101	Injector No. 1	Engine is running.	BATTERY POSITIVE VOLTAGE (11 - 14V)
103	Injector No. 3		
110	Injector No. 2		
112	Injector No. 4		
104	Fuel pump relay	Ignition switch "ON" └ For 5 seconds after turning ignition switch "ON" Engine is running.	Approximately 0.8V
		Ignition switch "ON" └ 5 seconds after turning ignition switch "ON"	BATTERY POSITIVE VOLTAGE (11 - 14V)

Electrical Components Inspection (Cont'd)

TER-MINAL NO.	ITEM	CONDITION	DATA
105	EGR & canister control solenoid valve	Engine is running. └ Engine is cold [Water temperature is below 60° (140°F)]	Approximately 0.7V
		Engine is racing (2,000 rpm) └ After warming up [Water temperature is between 60°F (140°C) and 105°C (221°F)]	BATTERY POSITIVE VOLTAGE (11 - 14V)
113	IAC valve-AAC valve	Engine is running. └ Idle speed	9 - 14V
		Engine is running. — Steering wheel is being turned. — Air conditioning is operating. — Rear defogger is "ON". └ Headlamp are in high position.	5 - 9V

Electrical Components Inspection (Cont'd)



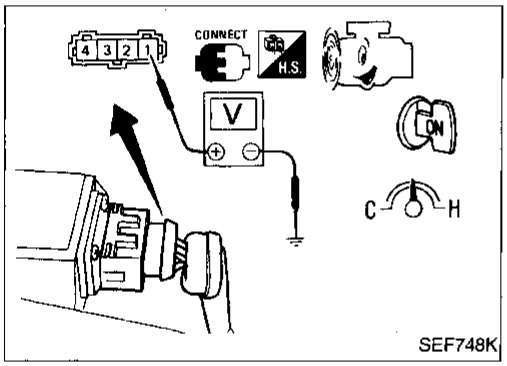
CAMSHAFT POSITION SENSOR

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

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

4. Rotate camshaft position sensor shaft slowly by hand and check voltage between terminals ①, ② and 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 camshaft position sensor.

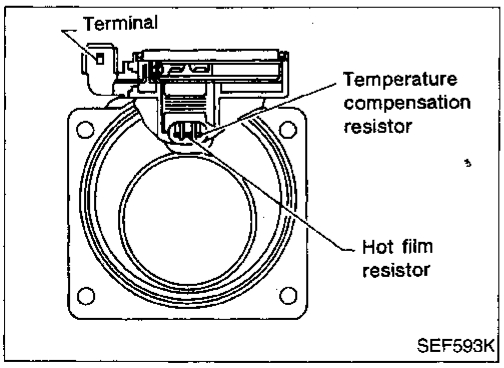
After this inspection, diagnostic trouble code No. 11 might be displayed though the camshaft position sensor is functioning properly. In this case erase the stored memory.



MASS AIR FLOW SENSOR

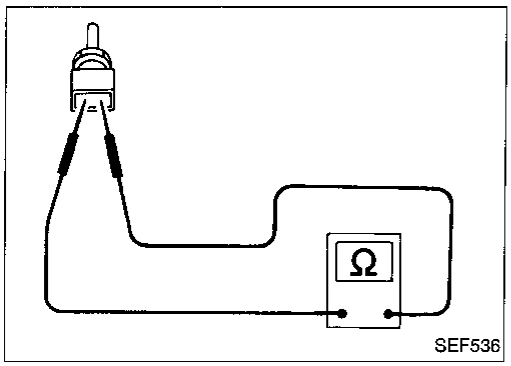
1. Fold back mass air flow sensor harness connector rubber as shown in the figure if the harness connector is connected.
2. Turn ignition switch "ON".
3. Start engine and warm it up sufficiently.
4. Check voltage between terminal ① and ground.

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Approximately 0.2
Idle (Engine is warmed-up sufficiently.)	Approximately 0.85 - 1.35



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

Electrical Components Inspection (Cont'd)

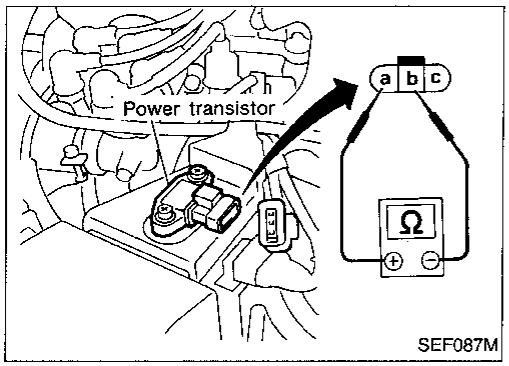


ENGINE COOLANT TEMPERATURE SENSOR

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.



POWER TRANSISTOR

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

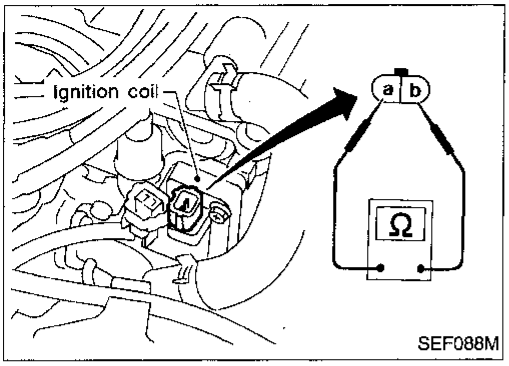
- The digital tester must have a diode check position to perform this test.

⊕ terminal side	⊖ terminal side					
	Terminal ⓐ		Terminal ⓑ		Terminal ⓒ	
	Resistance Ω	Result	Resistance Ω	Result	Resistance Ω	Result
Terminal ⓐ	—	—	∞	O.K.	∞	O.K.
	—	—	Not ∞ or 0	N.G.	Not ∞ or 0	N.G.
	—	—	0	N.G.	0	N.G.
Terminal ⓑ	∞	N.G.	—	—	∞	N.G.
	Not ∞ or 0	O.K.	—	—	Not ∞ or 0	O.K.
	0	N.G.	—	—	0	N.G.
Terminal ⓒ	∞	N.G.	∞	N.G.	—	—
	Not ∞ or 0	O.K.	Not ∞ or 0	O.K.	—	—
	0	N.G.	0	N.G.	—	—

∞ : Infinity resistance

If N.G., replace power transistor.

Electrical Components Inspection (Cont'd)

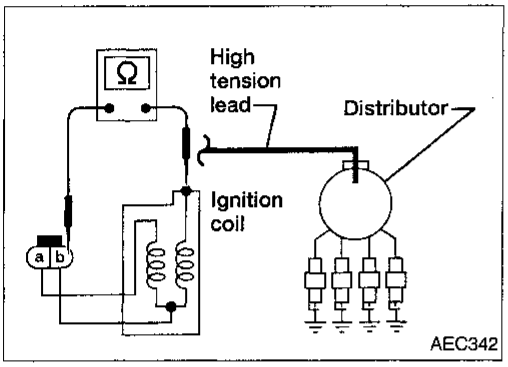


IGNITION COIL

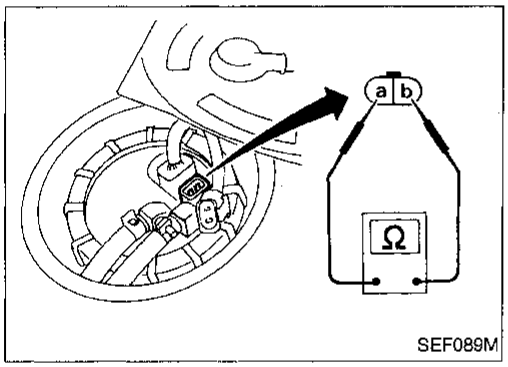
1. Disconnect ignition coil harness connector.
2. Check resistance as shown in the figure.

Terminal	Resistance
ⓐ - ⓑ	Approximately 1.0Ω

If N.G., replace ignition coil.

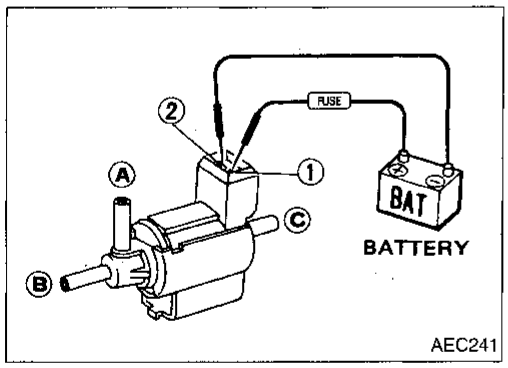


3. Disconnect the high tension lead.
4. Check resistance between ignition coil harness connector terminal ⓑ and the connector on the ignition coil for the high tension lead.
   Resistance: Approximately 10.0kΩ
   If N.G., replace ignition coil.



FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals ⓐ and ⓑ.
   Resistance: Approximately 0.5Ω
   If N.G., replace fuel pump.



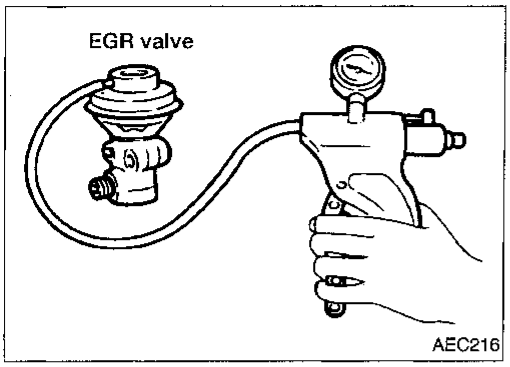
EGR AND CANISTER CONTROL SOLENOID VALVE

Check air passage continuity.

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

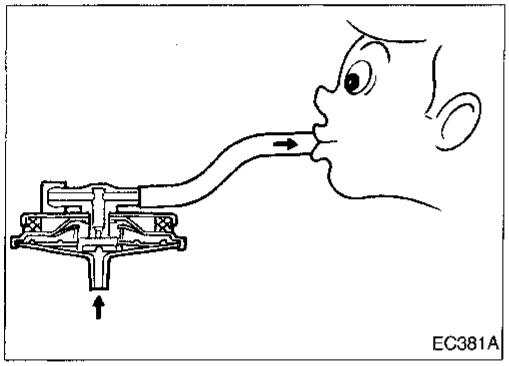
If N.G., replace solenoid valve.

Electrical Components Inspection (Cont'd)



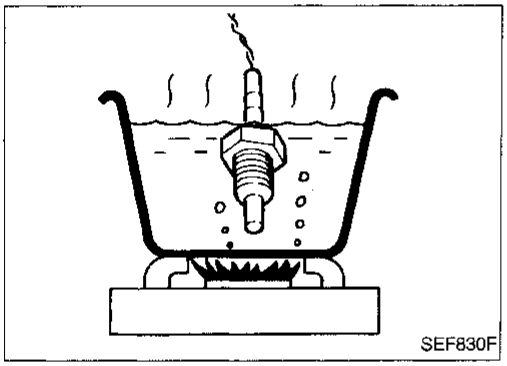
EGR VALVE

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



EGR CONTROL-BPT VALVE

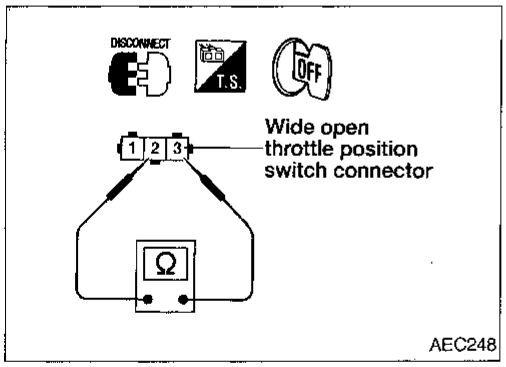
Plug one of two ports of EGR control-BPT valve.
Apply a pressure above 0.490 kPa (50 mmH_2O, 1.97 inH_2O) to check for leakage. If a leak is noted, replace valve.



EGR TEMPERATURE SENSOR

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

- **Resistance should decrease in response to temperature increase.**
  Resistance: 100°C (212°F)
  85.3 ± 8.53 kΩ
  If N.G., replace EGR temperature sensor.



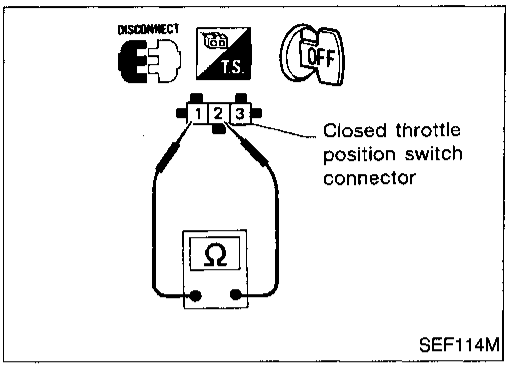
WIDE OPEN THROTTLE POSITION SWITCH — A/T model only

1. Disconnect wide open throttle position switch harness connector.
2. Check continuity between terminals ② and ③.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes

If N.G., replace wide open throttle position switch.

Electrical Components Inspection (Cont'd)

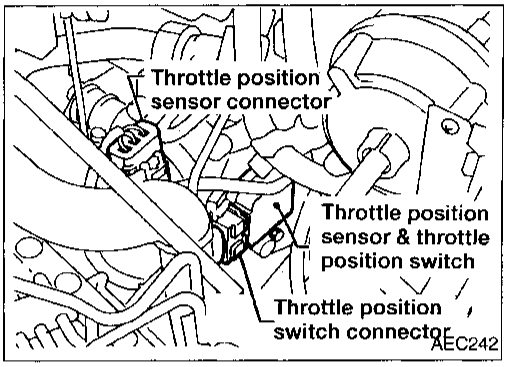


CLOSED THROTTLE POSITION SWITCH (Idle position) — A/T model only

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

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

If N.G., replace closed throttle position switch.

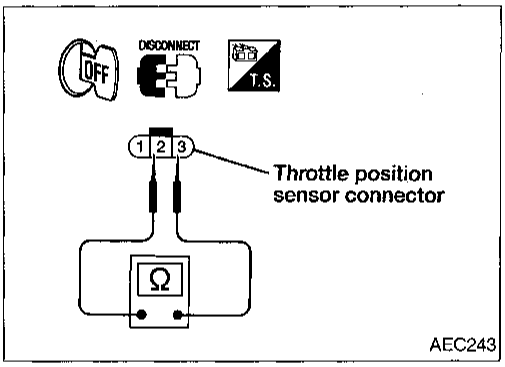


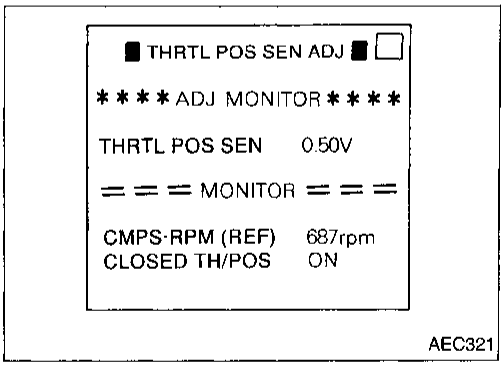
THROTTLE POSITION SENSOR

1. Disconnect throttle position sensor harness connector.
2. Make sure that resistance between terminals ② and ③ 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.



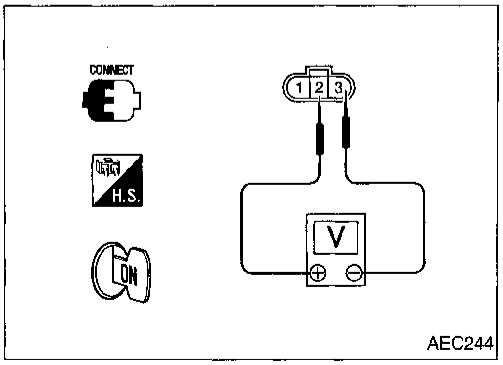


Adjustment

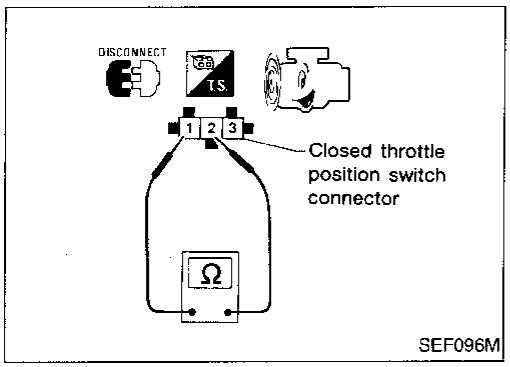
If throttle position sensor, closed throttle position switch or wide open throttle position switch is replaced or removed, it is necessary to install in proper position, by following the procedure as shown below:

MT model;

1. Install throttle position sensor body 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.
   Measure output voltage of throttle position sensor using voltmeter.
5. Adjust by rotating throttle position sensor body so that output voltage is 0.3 to 0.7V.
6. Tighten mounting bolts.
7. Disconnect throttle position sensor harness connector for a few seconds and then reconnect it.



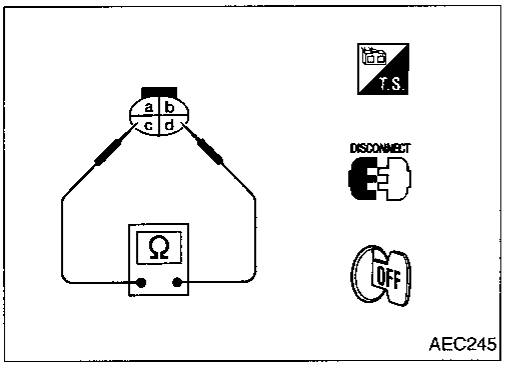
Electrical Components Inspection (Cont'd)



AT model;

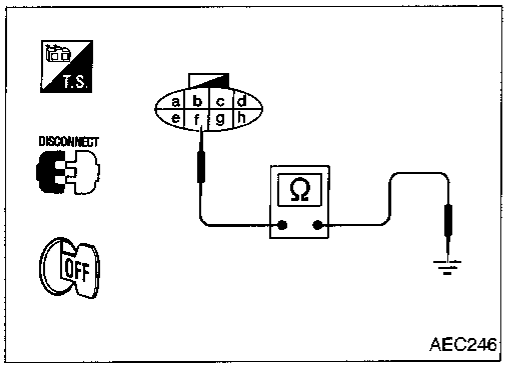
1. Install throttle position sensor in throttle body. Do not tighten bolts. Leave bolts loose.
2. Connect throttle position sensor and closed throttle position switch harness connector.
3. Start engine and warm it up sufficiently.
4. Disconnect closed throttle position switch harness connector.
5. Check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

   Closed throttle position switch continuity OFF → ON engine speed (in "N" position):
   900 ± 150 rpm



IAC VALVE-AAC VALVE

- Check IAC valve-AAC valve resistance.
  Resistance:
  Approximately 10Ω
- Check plunger for seizing or sticking.
- Check for broken spring.



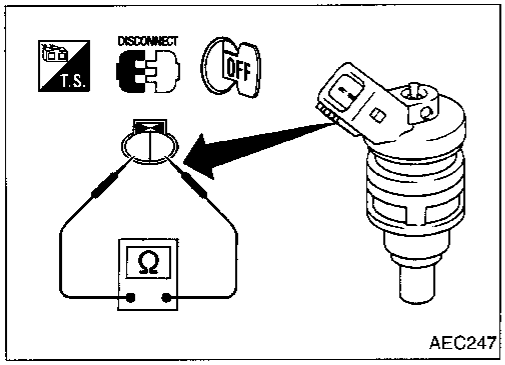
KNOCK SENSOR

1. Disconnect engine harness No. 2 connector (E205).
2. Check continuity between terminal (f) and ground.

Continuity should exist.

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

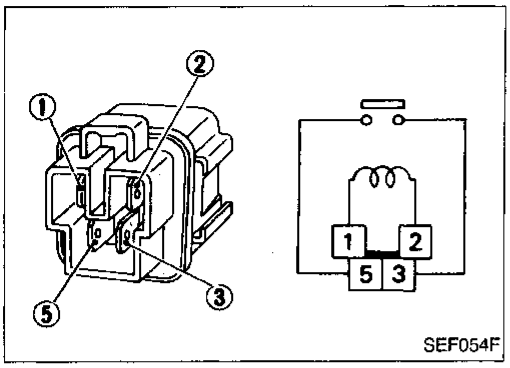
CAUTION:
Discard any knock sensor which has been dropped or undergone shocks; use a new one.



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.

Electrical Components Inspection (Cont'd)

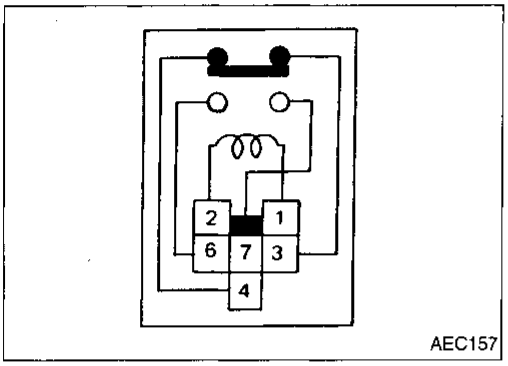


ECM RELAY AND FUEL PUMP RELAY

Check continuity between terminals ③ and ⑤.

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

If N.G., replace relay.

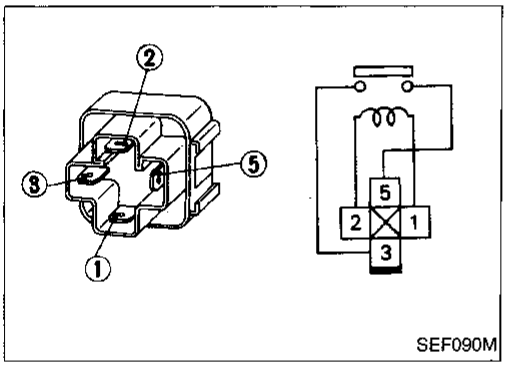


INHIBITOR RELAY (A/T models with ASCD)

Check continuity between terminals ⑥ and ⑦.

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

If N.G., replace relay.

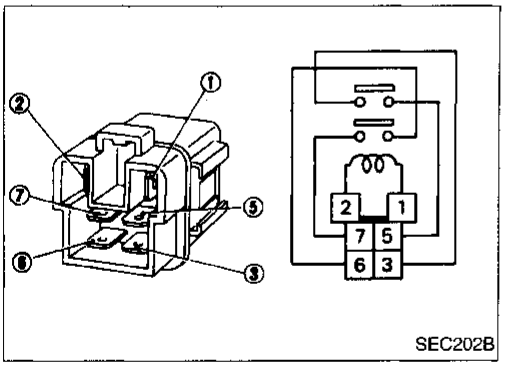


INHIBITOR RELAY (A/T models without ASCD) AND COOLING FAN RELAY-1

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.

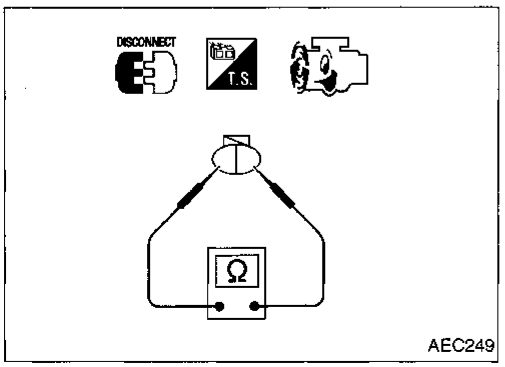


COOLING FAN RELAYS-2 AND -3

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

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

If N.G., replace relay.

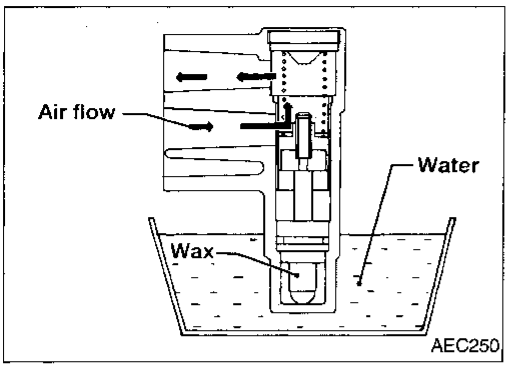


POWER STEERING PRESSURE SWITCH

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

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

Electrical Components Inspection (Cont'd)

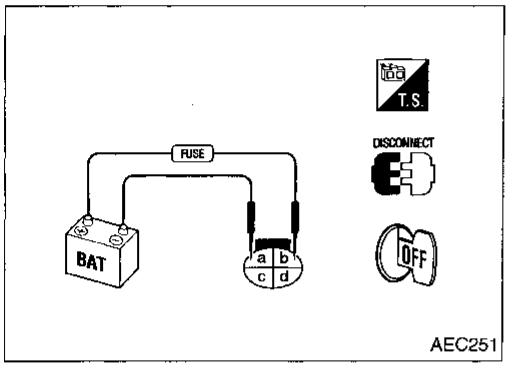


IAC VALVE-AIR REGULATOR

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

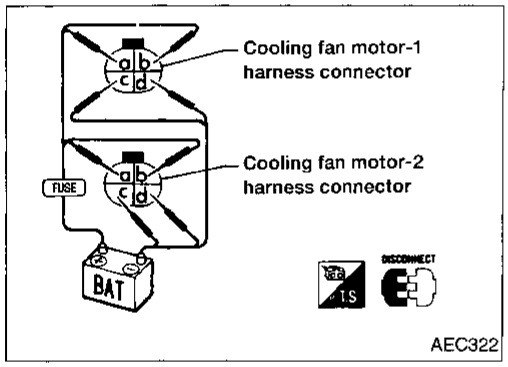
Water temperature	When blowing from air inlet hole
20°C (68°F)	Air flows
80°C (176°F) or more	Almost no air flows

If N.G., replace IAC valve unit.



IAC VALVE-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.



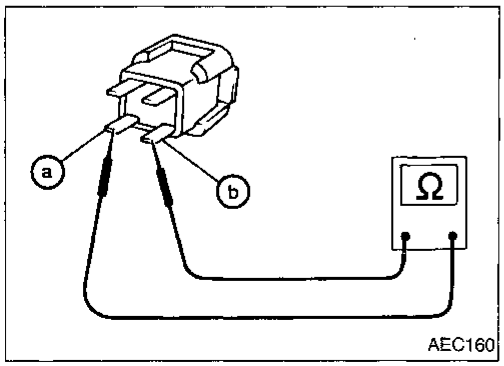
COOLING FAN MOTORS-1 AND -2

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

	Speed	Terminals	
		(⊕)	(⊖)
Cooling fan motor-1	Low	ⓑ	ⓒ
	High	ⓐ, ⓑ	ⓒ, ⓓ
Cooling fan motor-2	Low	ⓑ	ⓒ
	High	ⓐ, ⓑ	ⓒ, ⓓ

Cooling fan motor should operate.

If N.G., replace cooling fan motor.

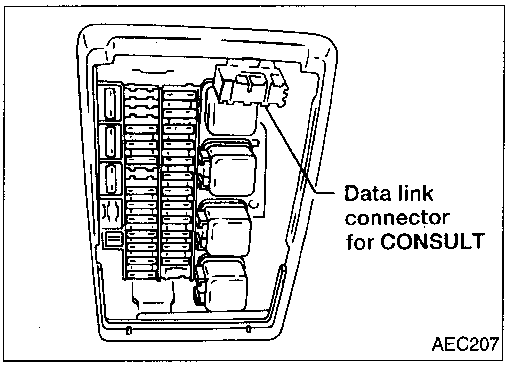


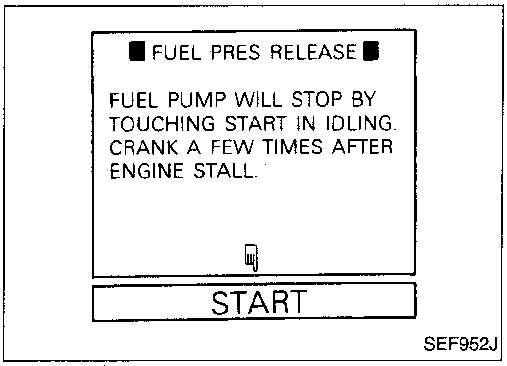
RESISTOR

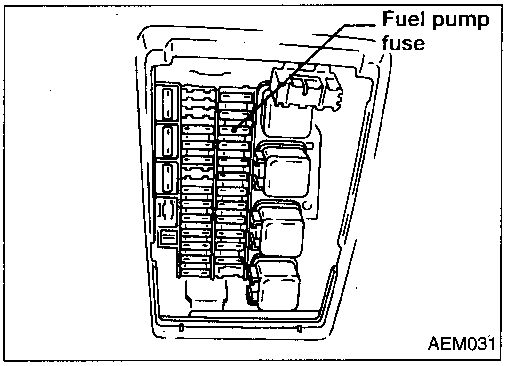
1. Disconnect resistor harness connector (F8).
2. Check resistance between terminals ⓐ and ⓑ.

Resistance: Approximately 2.2kΩ

If N.G., replace resistor.







Releasing Fuel Pressure

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

1. Turn ignition switch "ON".
2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch "OFF".

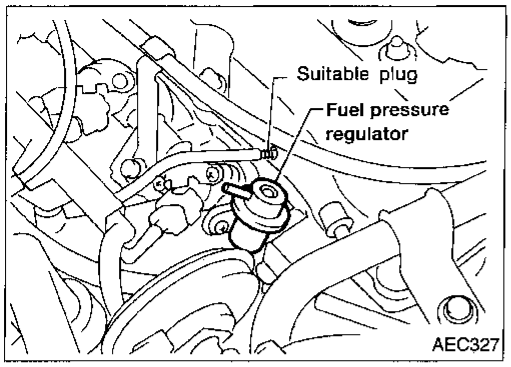
1. Remove fuel pump fuse.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch "OFF" and reconnect fuel pump fuse.

Fuel Pressure Check

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

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

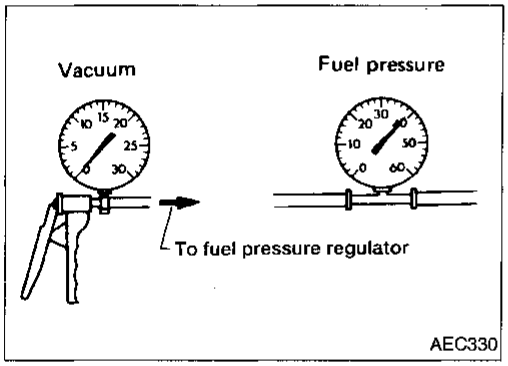
Fuel Pressure Check (Cont'd)



5. Read the indication of fuel pressure gauge.
   At idling:
   When fuel pressure regulator valve vacuum hose is connected.
   Approximately 235 kPa (2.4 kg/cm^2, 34 psi)
   When fuel pressure regulator valve vacuum hose is disconnected.
   Approximately 294 kPa (3.0 kg/cm^2, 43 psi)
   If results are unsatisfactory, perform Fuel Pressure Regulator Check.

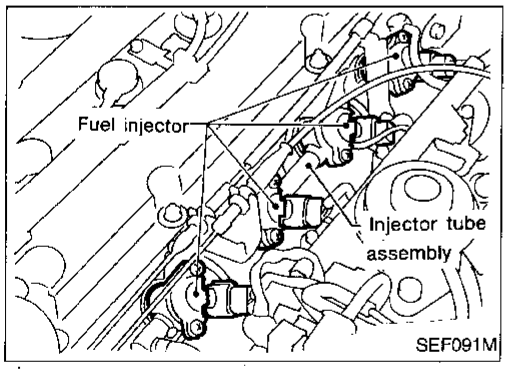
Fuel Pressure Regulator Check

1. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
2. Plug intake manifold with a rubber cap.
3. Connect variable vacuum source to fuel pressure regulator.



4. 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

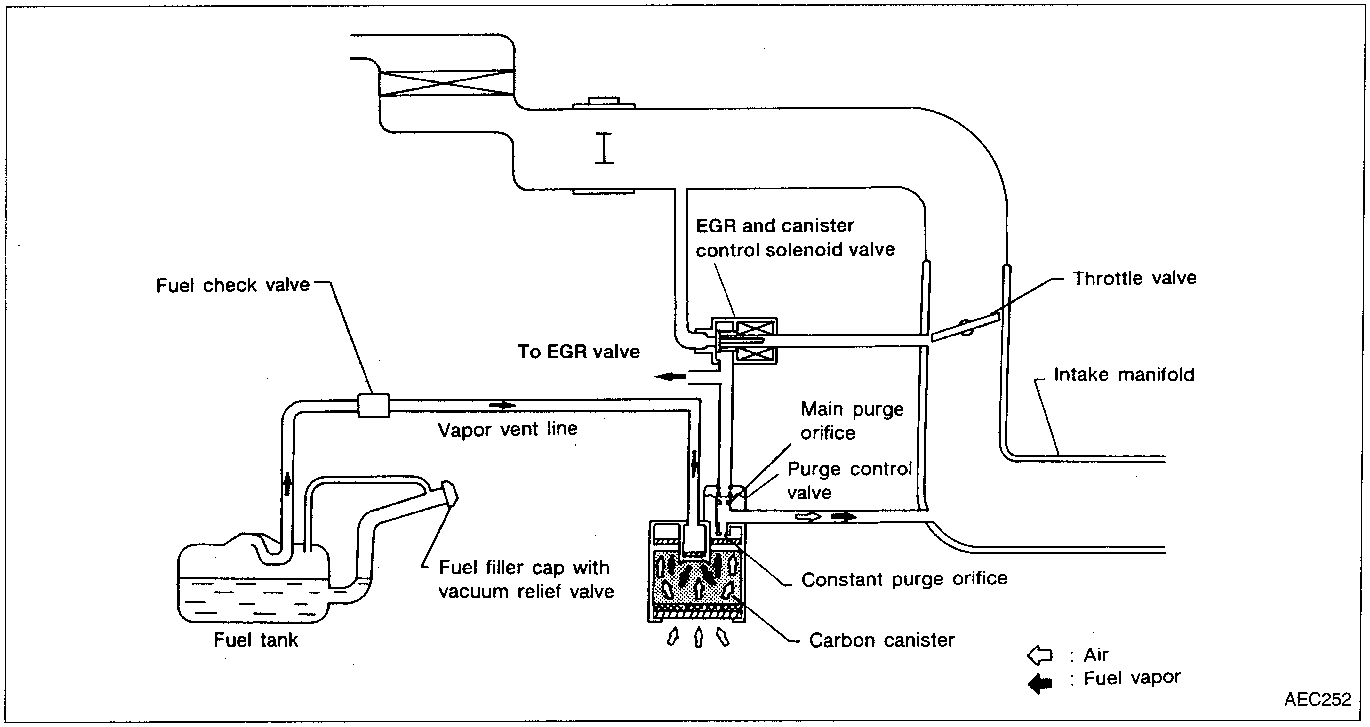
1. Release fuel pressure to zero.
2. Remove injector tube assembly with injectors from intake manifold.
3. Remove injectors from injector tube assembly.
- Push injector tail piece.
- Do not pull on the connector.

4. Install injectors as follows:
- Clean exterior of injector tail piece.
- Use new O-rings

5. Assemble injectors to injector tube assembly.

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

Description

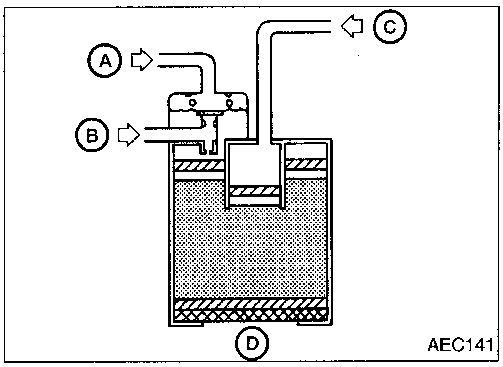


The evaporative emission (EVAP) system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the carbon canister.

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.



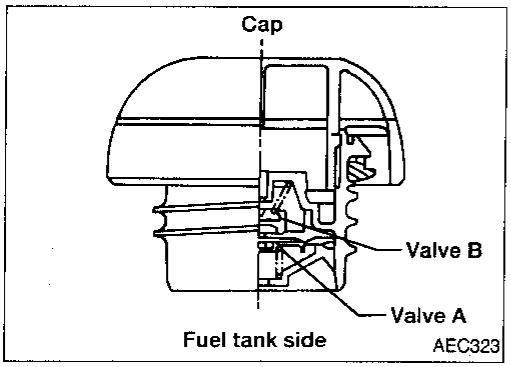
Inspection

CARBON CANISTER

Check carbon canister as follows:

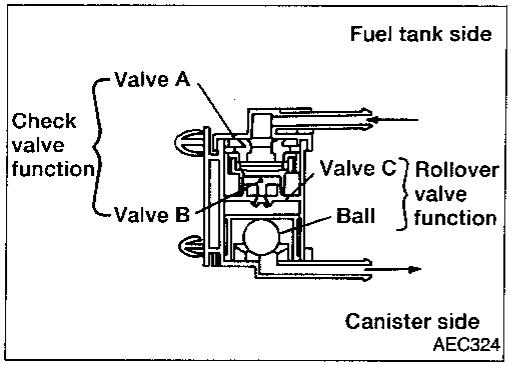
1. Blow air in port Ⓐ and ensure that there is no leakage.
2. ● Apply vacuum to port Ⓐ
   ● Cover port Ⓓ with your hand.
   ● Blow air in port Ⓒ and ensure free flow out of port Ⓑ.

Inspection (Cont'd)



FUEL TANK VACUUM RELIEF VALVE

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



FUEL CHECK VALVE (With rollover valve)

Check valve operation

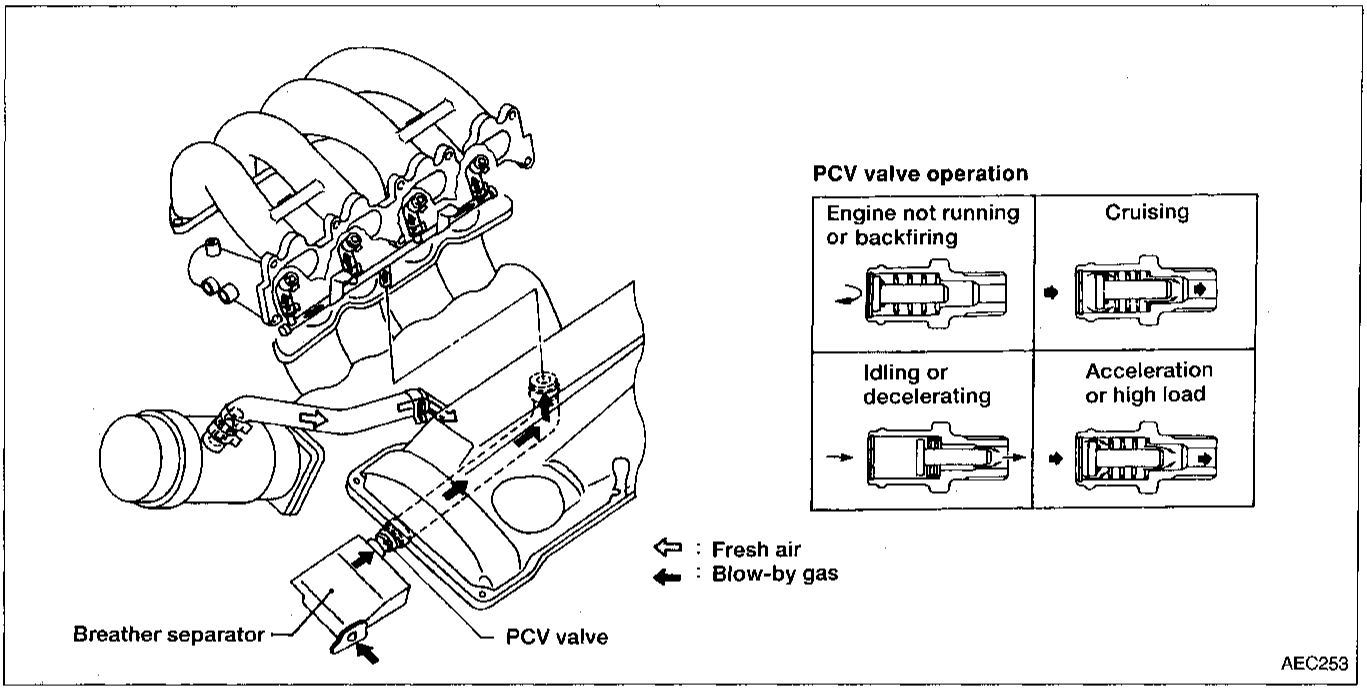
1. Blow air through connector on fuel tank side.
   A considerable resistance should be felt and a portion of air flow should be directed toward the canister side.
2. Blow air through connector on canister side.
   Air flow should be smoothly directed toward fuel tank side.
3. If fuel check valve is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

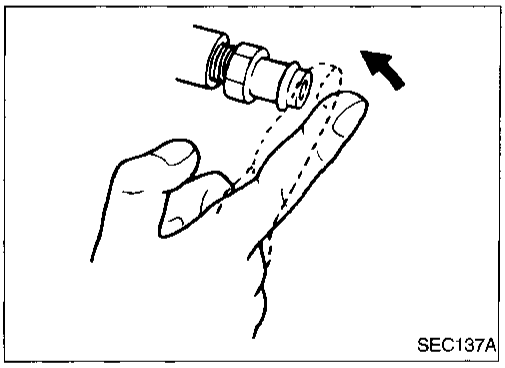
Rollover valve operation

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

Description

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

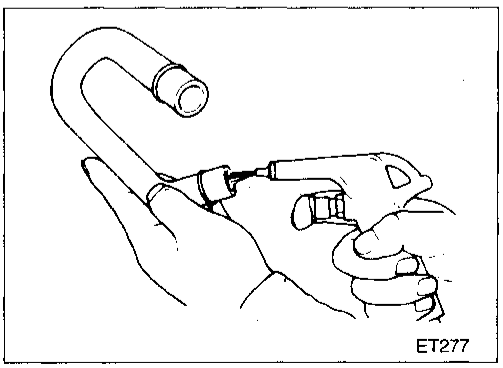




Inspection

PCV (Positive Crankcase Ventilation) VALVE

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



VENTILATION HOSE

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

General Specifications

FUEL PRESSURE REGULATOR	
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 conditioning: ON (in "N" position)	800 ± 50
Ignition timing	20° ± 2° B.T.D.C.
Throttle position sensor idle position V	0.3 - 0.7

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

IGNITION COIL

Primary voltage	V	Battery positive 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

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

FUEL PUMP

Resistance	Ω	Approximately 0.5

IAC VALVE-AAC VALVE

Resistance	Ω	Approximately 10.0

INJECTOR

Resistance	Ω	Approximately 11

RESISTOR

Resistance	kΩ	Approximately 2.2