ENGINE FUEL AND EMISSION CONTROL SYSTEM

SECTION EF & EC

CONTENTS

CONTENTS (Cont'd.)

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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".

Precautions for Supplemental Restraint System Supplemental "AIR BAG"

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

WARNING:

- **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 Supplemental "Air Bag".**

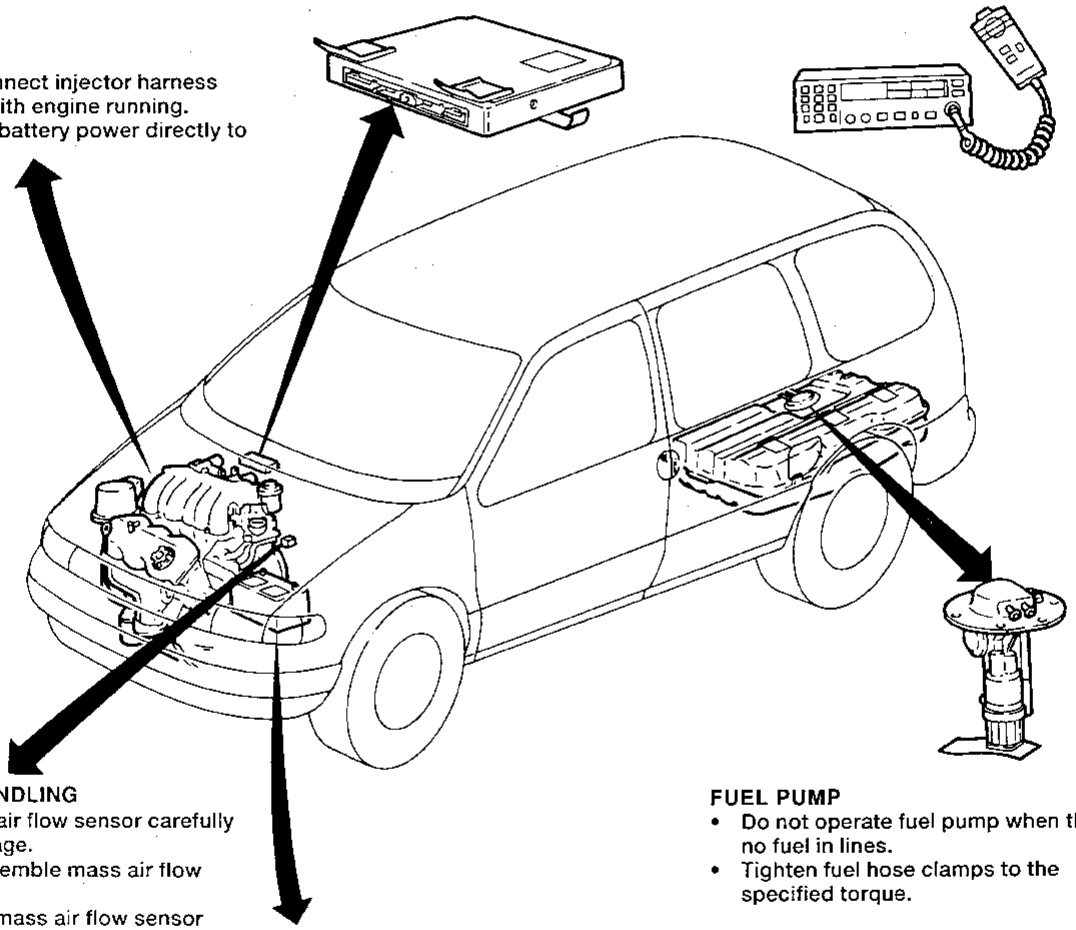
Engine Fuel & Emission Control System

WIRELESS EQUIPMENT
- When installing CB 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 than 20 cm (7.9 in) away from the harness of electronic controls.
   Do not let them run parallel for a long distance.
3) Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
4) Be sure to ground the radio to vehicle body.

ECM (ECCS Control Module)
- Do not disassemble ECM.
- 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.

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



ECM 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.

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

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

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

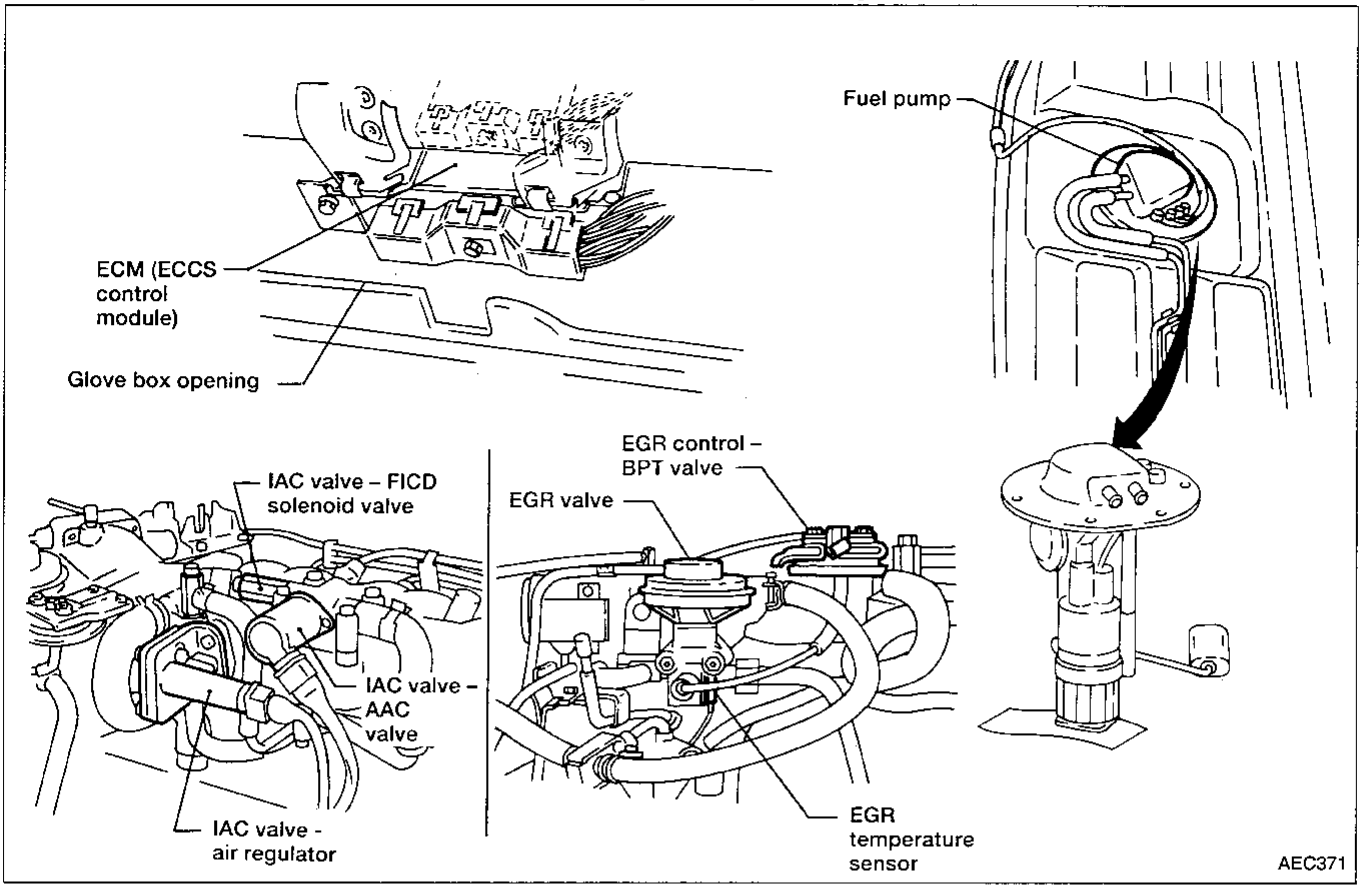
ECM HARNESS HANDLING
- Securely connect ECM harness connectors.
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep ECM harness at least 10 cm (3.9 in.) away from adjacent harnesses to prevent an ECM system malfunction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

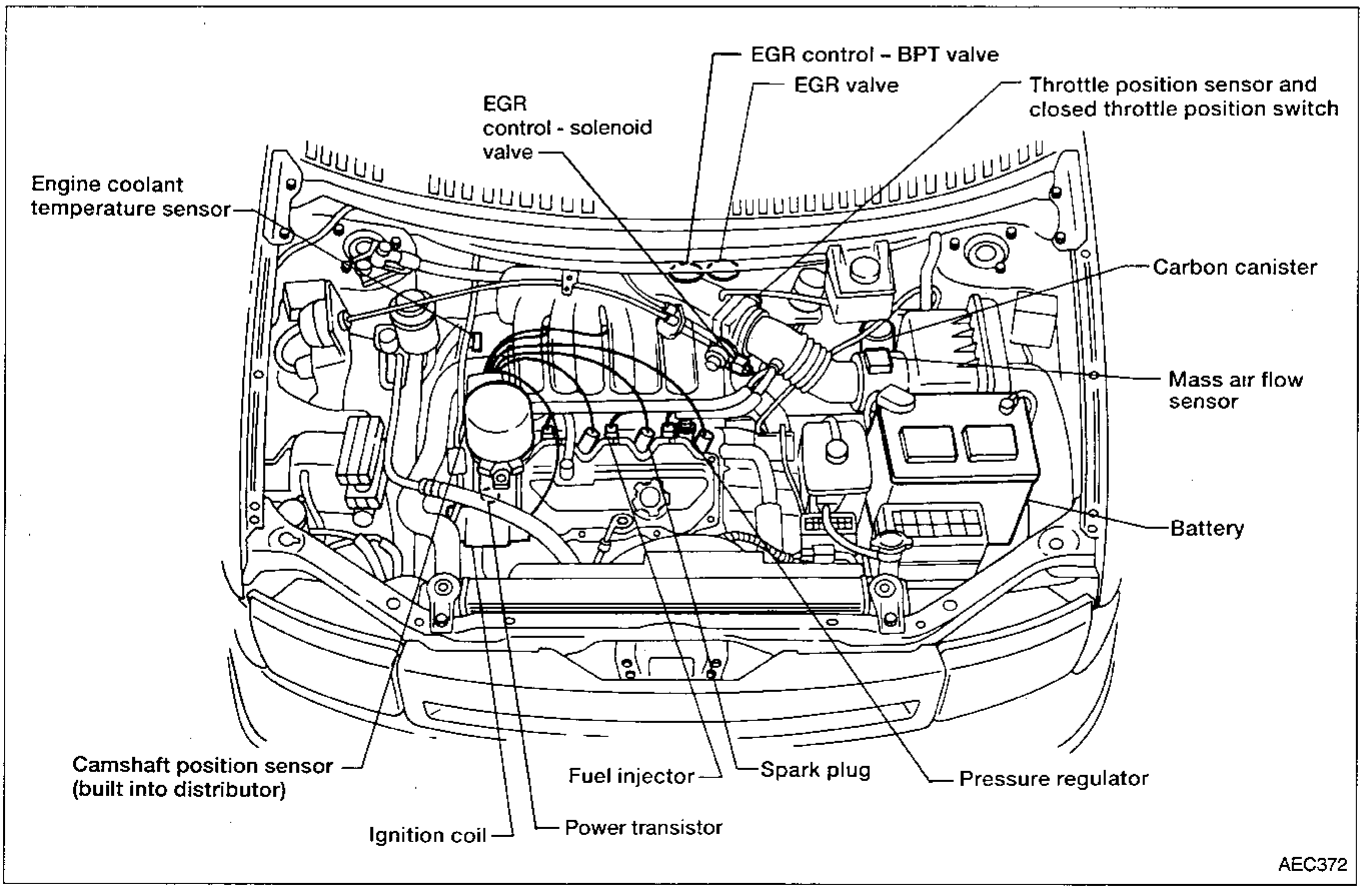
AEC370

Special Service Tool

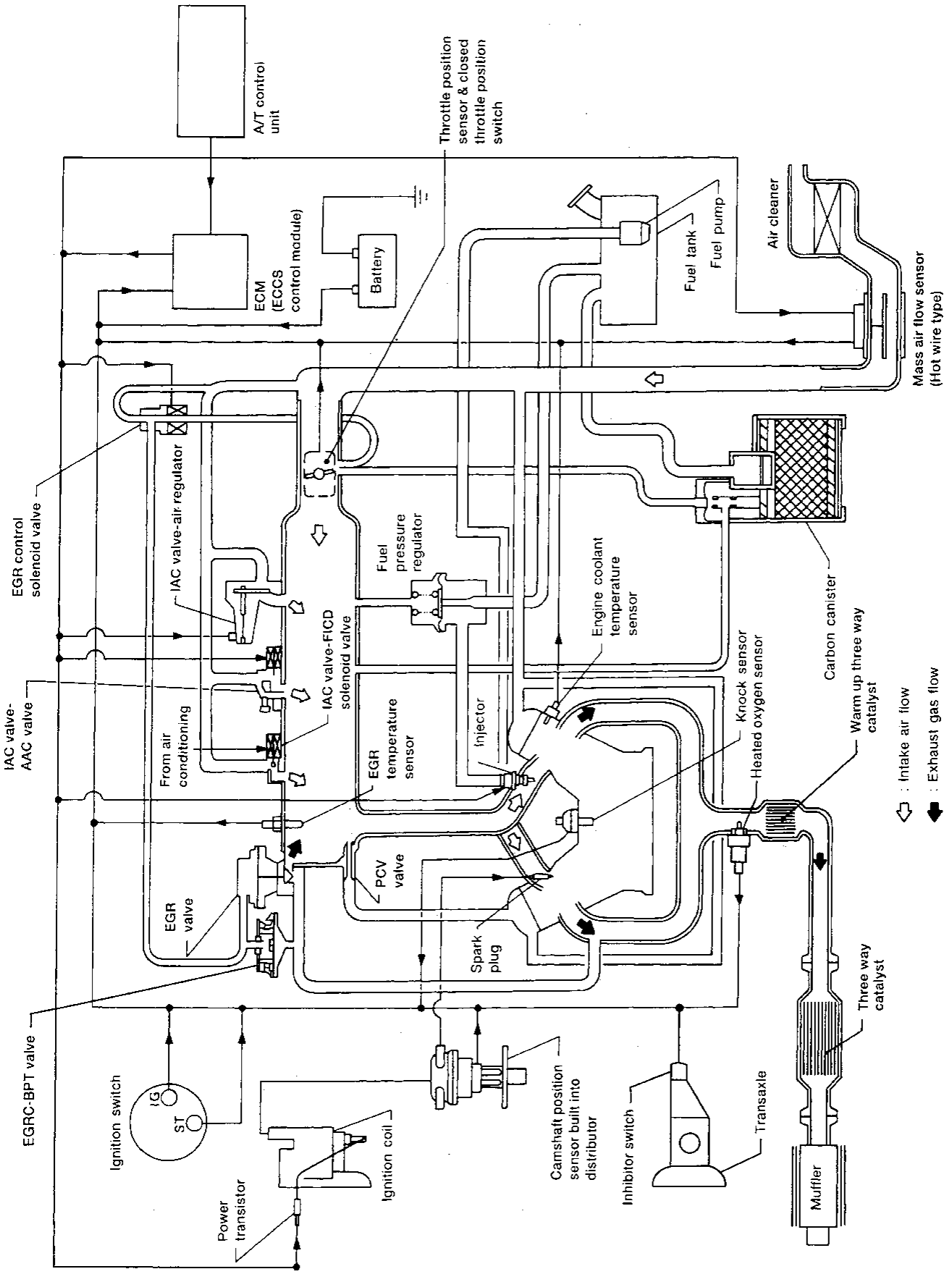
Tool number (Kent-Moore No.) Tool name	Description	
(J34267)	2.5 kΩ resistor	CO checking procedure

ECM (ECCS) Component Parts Location



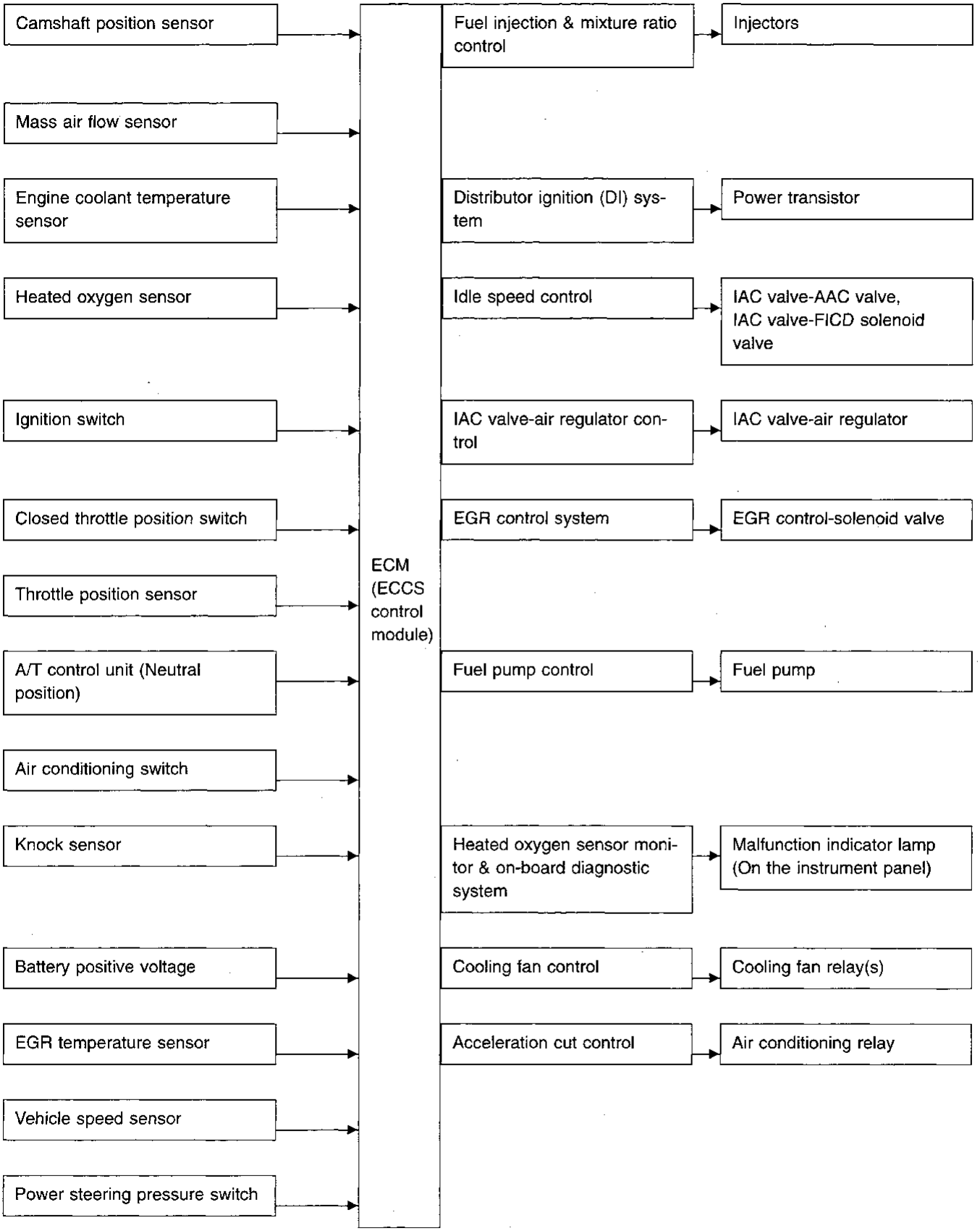


System Diagram

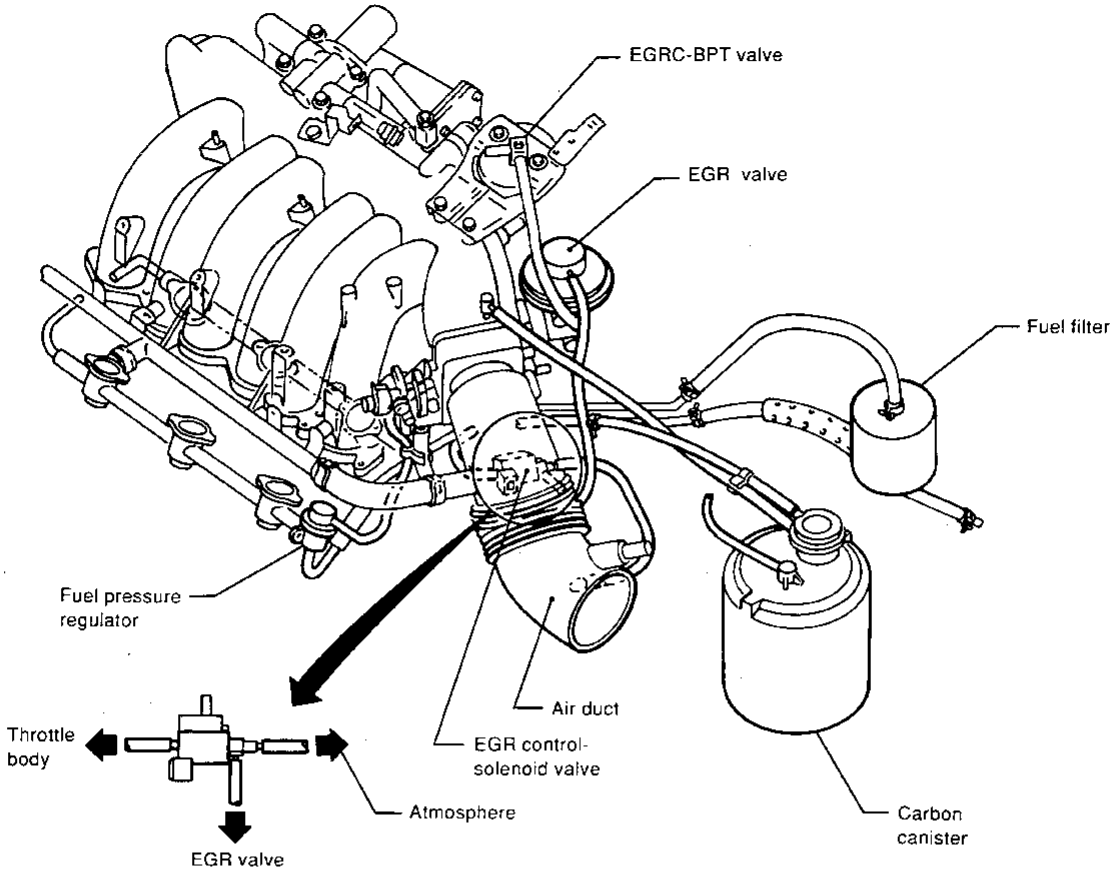


AEC366

System Chart



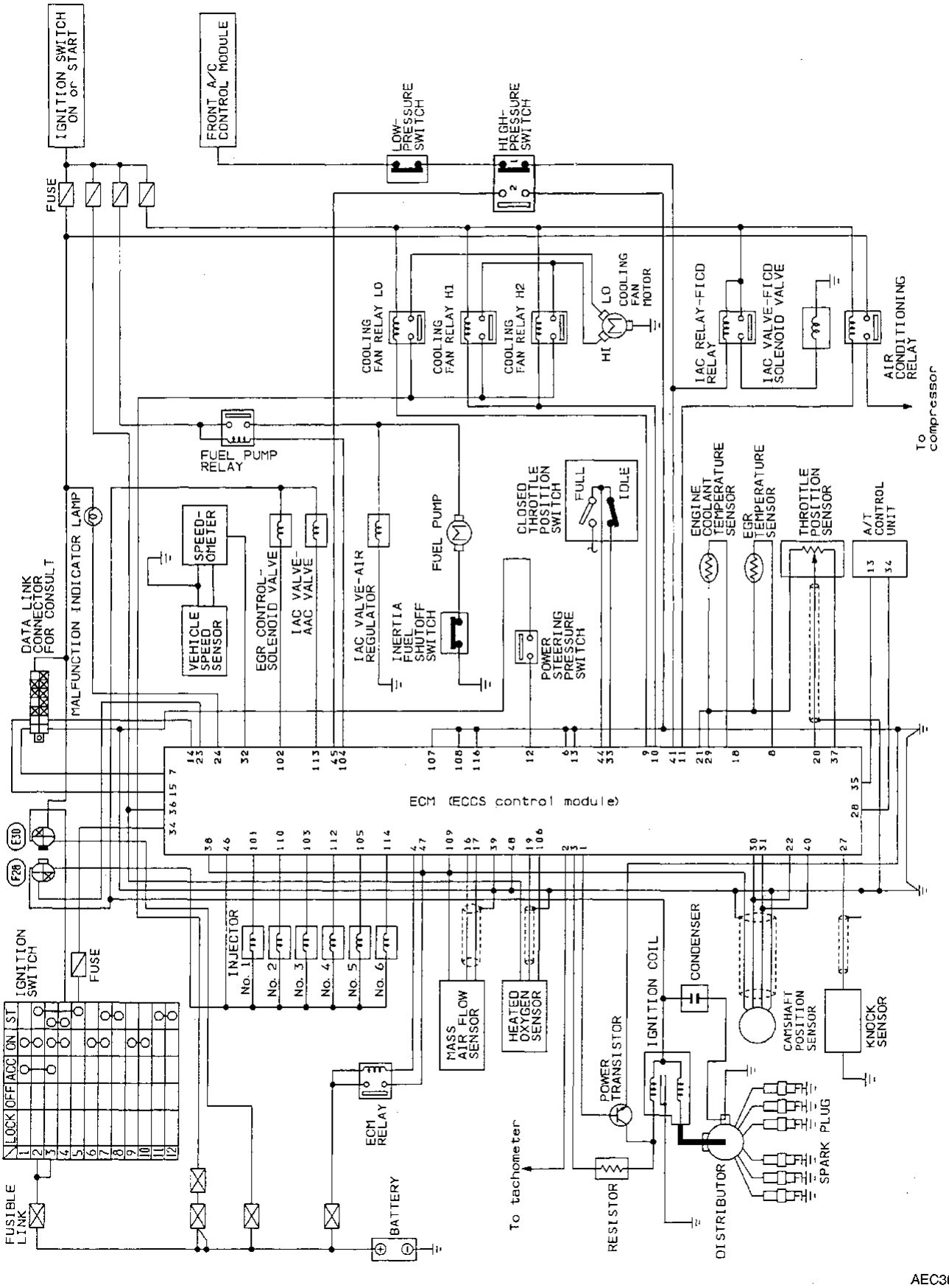
Vacuum Hose Drawing

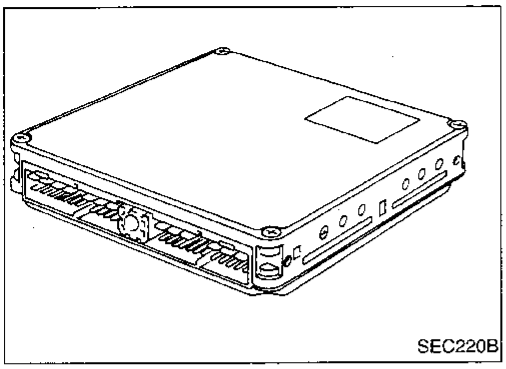


AEC367

① Fuel pressure regulator to intake manifold collector
② EGR valve to EGR control-solenoid valve
③ EGR control-solenoid valve to throttle body
④ Carbon canister (purge port) to intake manifold collector
⑤ Carbon canister (vacuum port) to throttle body
⑥ EGR control-solenoid valve to air duct

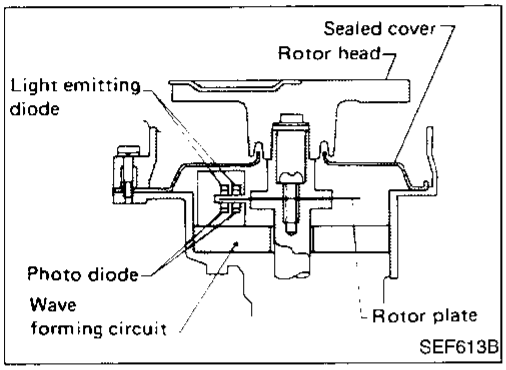
Circuit Diagram




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-158.

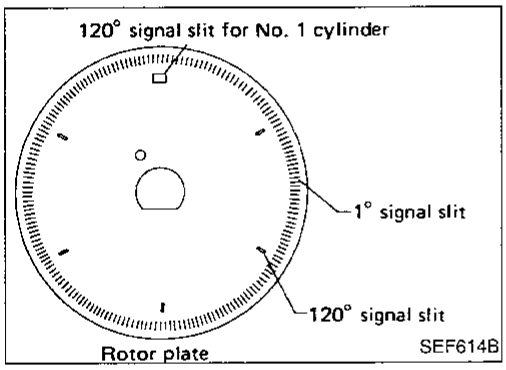


SEF613B

Camshaft Position (CMP) Sensor

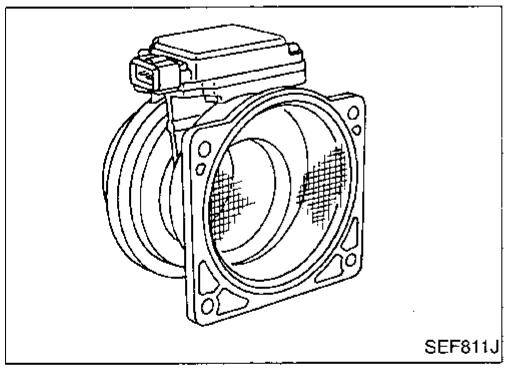
The Camshaft Position (CMP) sensor is a basic component of the entire ECCS. It monitors engine speed and piston position, and sends signals to the ECM to control fuel injection, ignition timing and other functions.

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



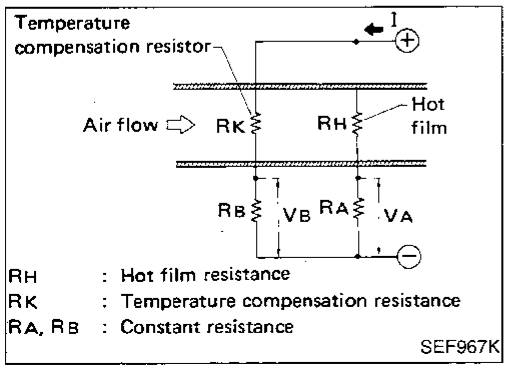
SEF614B

When the rotor plate passes between the LED and the photo diode, the slits in the rotor plate continually cut the light being transmitted to the photo diode from the LED This generates rough-shaped pulses which are converted into on-off pulses by the wave-forming circuit, which are sent to the ECM. For diagnosis, refer to EF & EC-163.

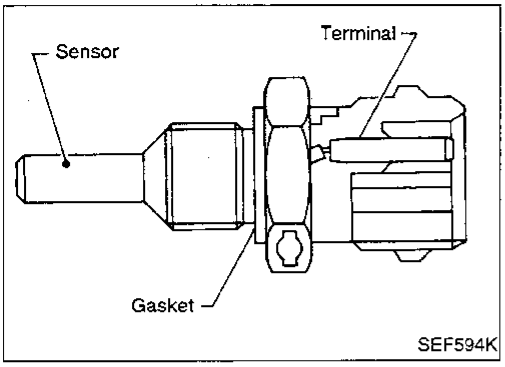

SEF811J

Mass Air Flow (MAF) Sensor

The Mass Air Flow (MAF) 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-163.

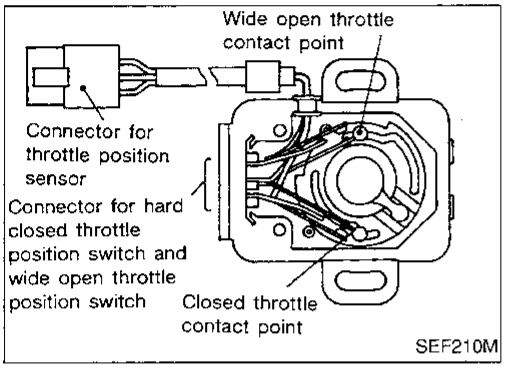


SEF967K



Engine Coolant Temperature (ECT) Sensor

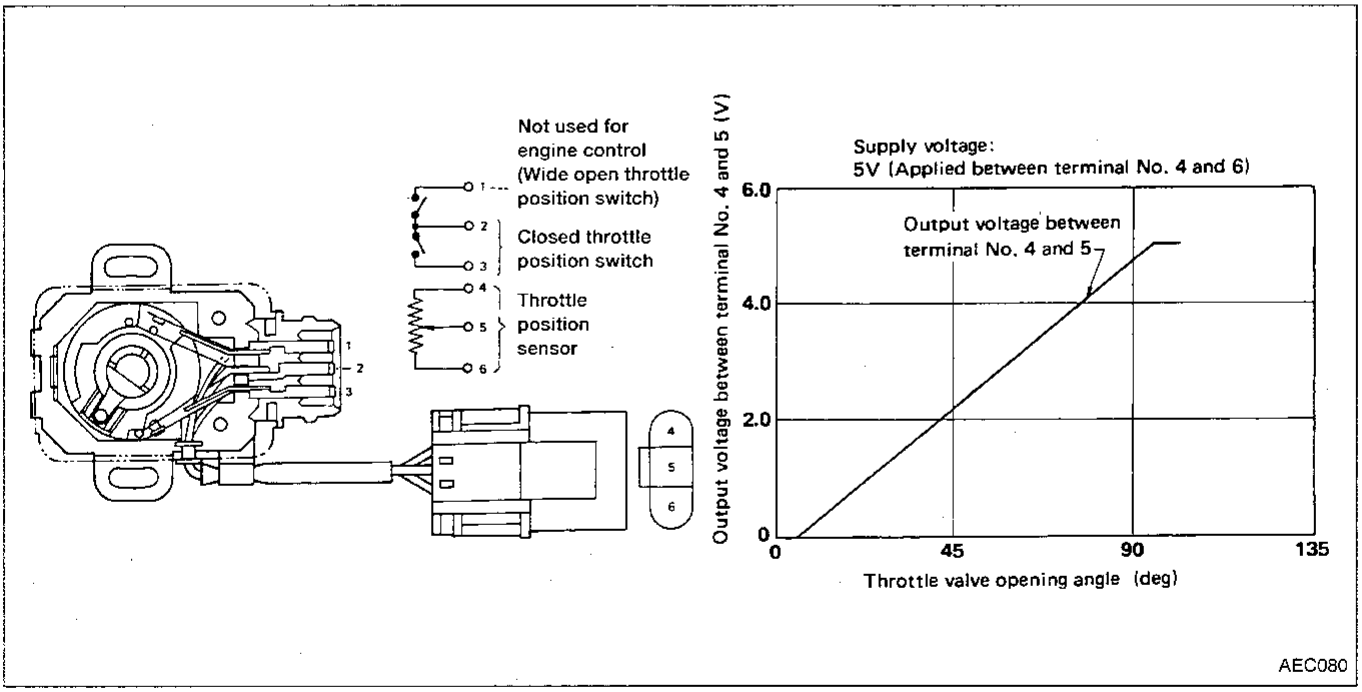
The Engine Coolant Temperature (ECT) sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the ECT input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases. For diagnosis, refer to EF & EC-164.

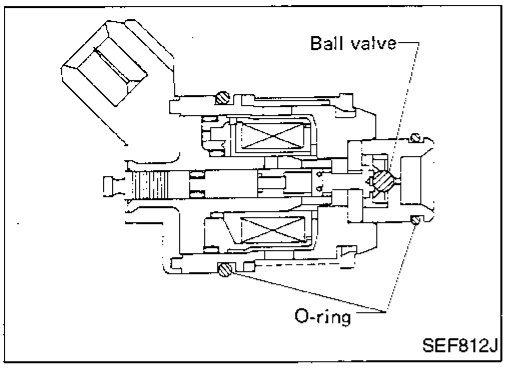


Throttle Position (TP) Sensor & Soft/Hard Closed Throttle Position Switch

The Throttle Position (TP) 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.

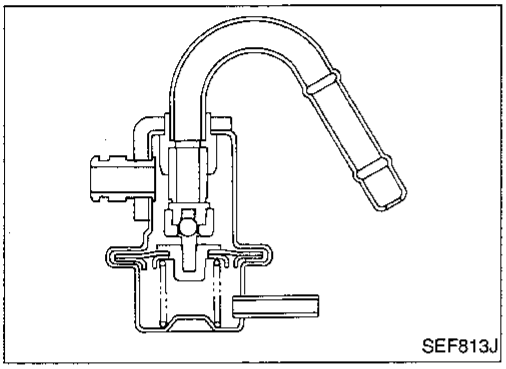
The ECM detects closed throttle valve position using the voltage from the throttle position sensor. This system is called "soft closed throttle position". This signal is used to control engine operations such as fuel cut. Also built into the throttle position sensor is "hard closed throttle position switch". This signal is used for engine control only when the soft closed throttle position switch is malfunctioning. For diagnosis, refer to EF & EC-166.





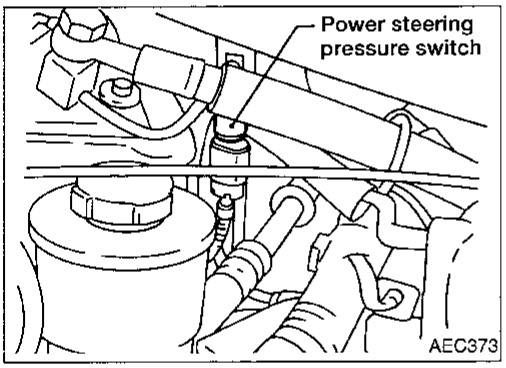
Fuel Injector

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-169.



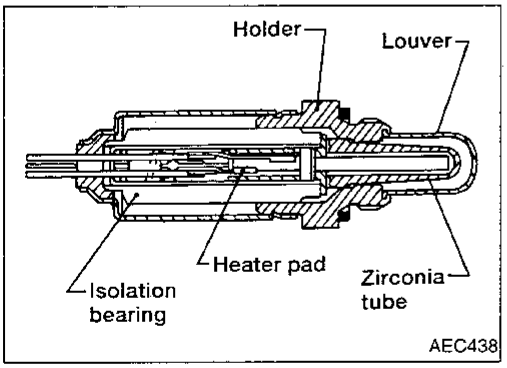
Fuel Pressure Regulator

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-171.



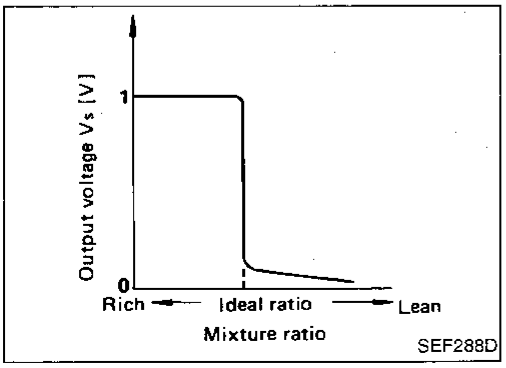
Power Steering Pressure (PSP) Switch

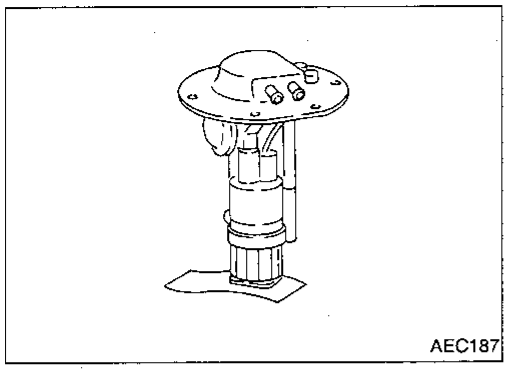
The Power Steering Pressure (PSP) switch is attached to the power steering high-pressure tube and detects the power steering load, sending the load signal to the ECM. The ECM then sends the idle-up signal to the IAC valve-AAC valve to increase the idle speed and adjust for the increased load. For diagnosis, refer to EF & EC-170.



Heated Oxygen Sensor (HO2S)

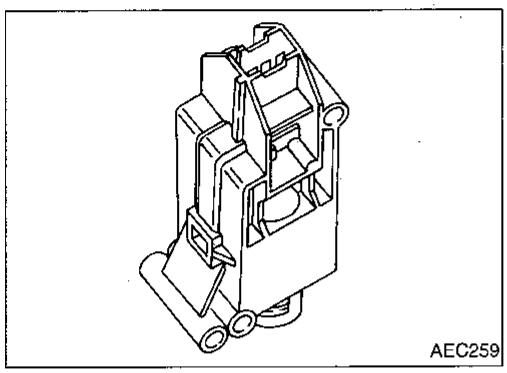
The Heated Oxygen Sensor (HO2S) is located in the exhaust tube. It detects the amount of oxygen in the exhaust gas compaired to the outside air. The heated oxygen sensor has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V. A heater is used to activate the sensor. For diagnosis, refer to EF & EC-114.




AEC187

Fuel Pump

The fuel pump is located in the fuel tank. It consists of a motor, pump, fuel damper and a relief valve. For diagnosis, refer to EF & EC-165.

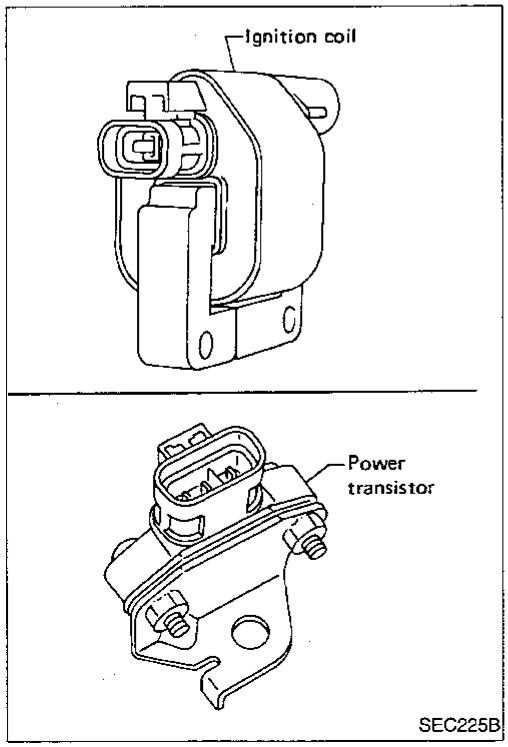

AEC259

Inertia Fuel Shutoff Switch

The inertia fuel shutoff switch automatically stops the flow of fuel to the engine when the vehicle is involved in a collision. The impact does not have to be great to trigger the switch. Minor parking lot bumping and severe road impacts (such as potholes) may trigger the switch.

Once the switch is triggered, it must be reset manually before starting the vehicle. Reset the switch by pressing the red button located on the top of the switch.

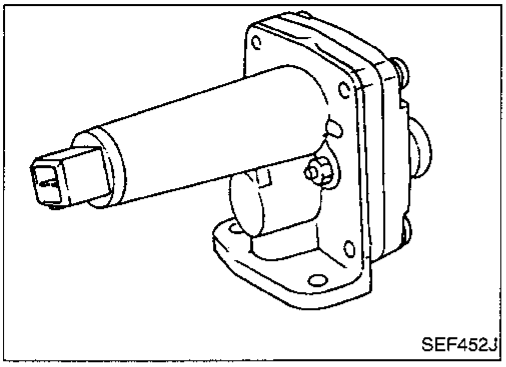
The inertia fuel shutoff switch is located near the driver's door frame below the hood release handle. For diagnosis, refer to EF & EC-165.



SEC225B

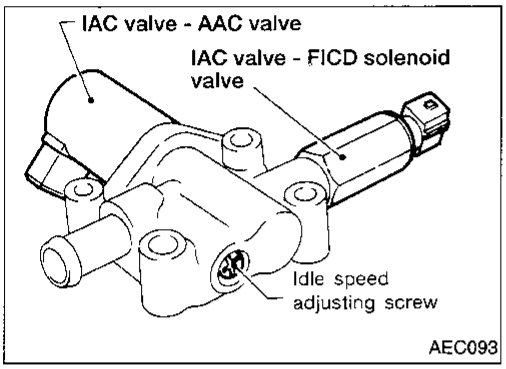
Power Transistor & Ignition Coil

The ignition signal from the ECM is amplified by the power transistor, which turns the ignition coil primary circuit on and off, inducing the proper high voltage in the secondary circuit. The ignition coil is a small, molded type. For diagnosis, refer to EF & EC-164.


SEF452J

Idle Air Control (IAC) Valve-Air Regulator

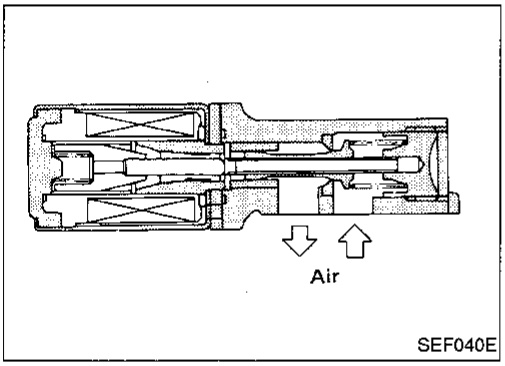
The IAC valve-air regulator provides an air by-pass when the engine is cold for a fast idle during warm-up.
A bimetal, heater and rotary shutter are built into the IAC valve-air regulator. When the bimetal temperature is low, the air by-pass port opens. As the engine starts and electric current flows through a heater, the bimetal begins to turn the shutter to close the by-pass port. The air passage remains closed until the engine stops and the bimetal temperature drops. For diagnosis, refer to EF & EC-168.



AEC093

Idle Air Adjusting (IAA) Unit

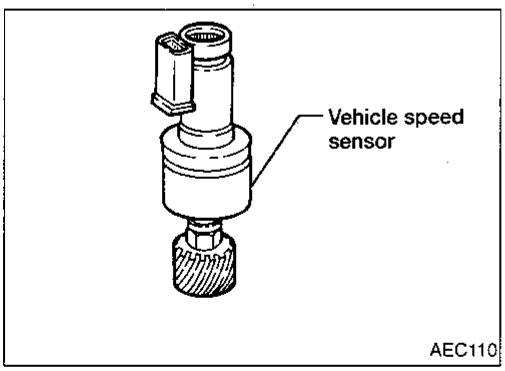
The IAA unit is made up of the IAC valve-AAC valve, IAC valve-FICD solenoid valve and idle adjusting screw. It receives the signal from the ECM and controls the idle speed at the preset value. The IAC valve-FICD solenoid valve compensates for changes in idle speed caused by the operation of the air conditioning compressor. For diagnosis, refer to EF & EC-168.



SEF040E

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

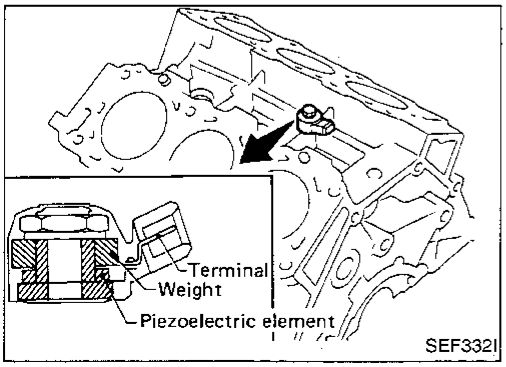
The IAC valve-AAC valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of air that will flow through the valve. The more air that flows through the valve, the higher the idle speed. For diagnosis, refer to EF & EC-167.



AEC110

Vehicle Speed Sensor (VSS)

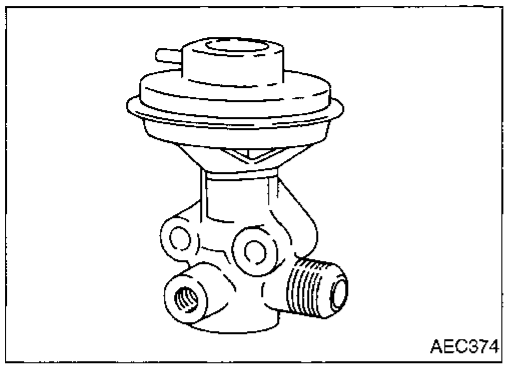
The Vehicle Speed Sensor (VSS) provides a vehicle speed signal to the speedometer and the speedometer sends a signal to the ECM.
The speed sensor consists of a pulse generator, which is installed in the speedometer unit in the transaxle. For diagnosis, refer to EF & EC-103.



SEF332I

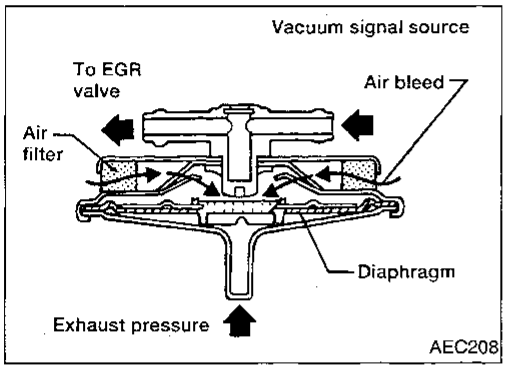
Knock Sensor (KS)

The Knock Sensor (KS) is attached to the cylinder block and senses engine knocking conditions.
A knocking vibration from the cylinder block is applied as pressure to the piezoelectric element. This vibrational pressure is then converted into a voltage signal which is delivered as output. For diagnosis, refer to EF & EC-168.


AEC374

Exhaust Gas Recirculation (EGR) Valve

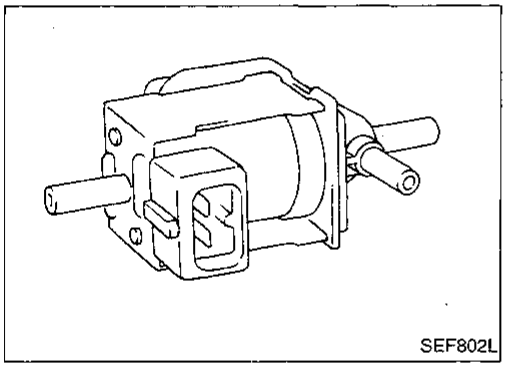
The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve. For diagnosis, refer to EF & EC-165.



AEC208

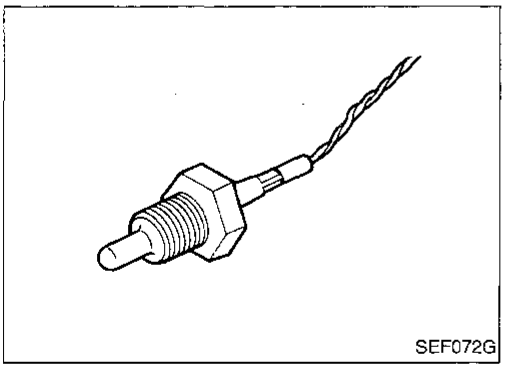
EGR Control-BPT Valve

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-166.


SEF802L

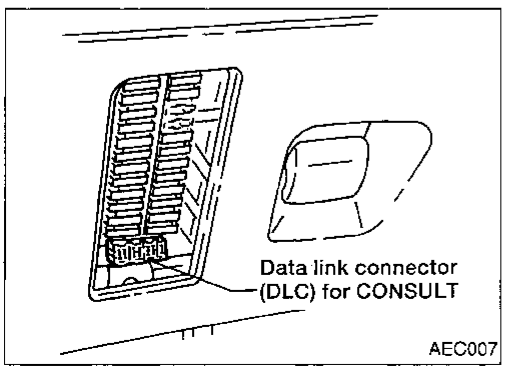
EGR Control-Solenoid Valve

The EGR system is controlled only by the ECM. At both low- and high-speed revolutions of engine, the solenoid valve turns on and the EGR valve cuts the exhaust gas leading to the intake manifold accordingly. For diagnosis, refer to EF & EC-165.


SEF072G

EGR Temperature Sensor

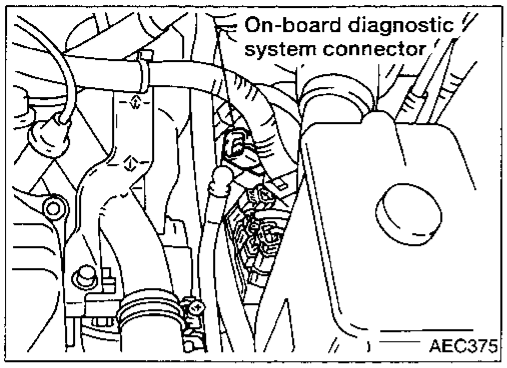
The EGR temperature sensor detects temperature changes in the EGR passage way. When the EGR valve opens, hot exhaust gases flow, and the temperature in the passage way changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases. For diagnosis, refer to EF & EC-166.



AEC007

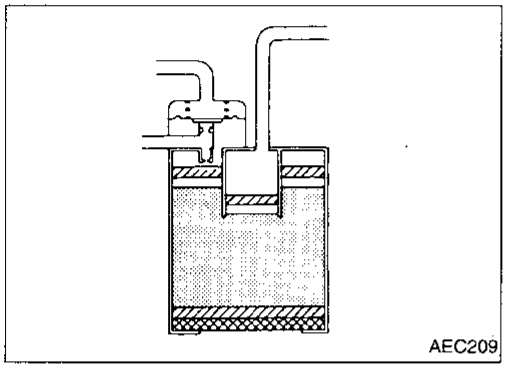
Data Link Connector (DLC) for CONSULT

The data link connector for CONSULT is located in the instrument lower panel, at the bottom of the fuse panel.



ECM On-Board Diagnostic System Connector

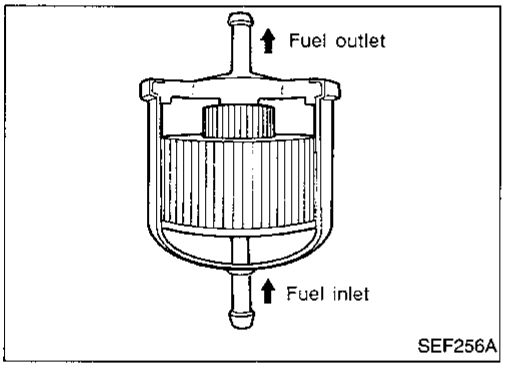
This connector is used to retreive self-diagnosis codes and monitor Heated Oxygen Sensor (HO2S) operation. For diagnosis, refer to EF & EC-37.



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-174.

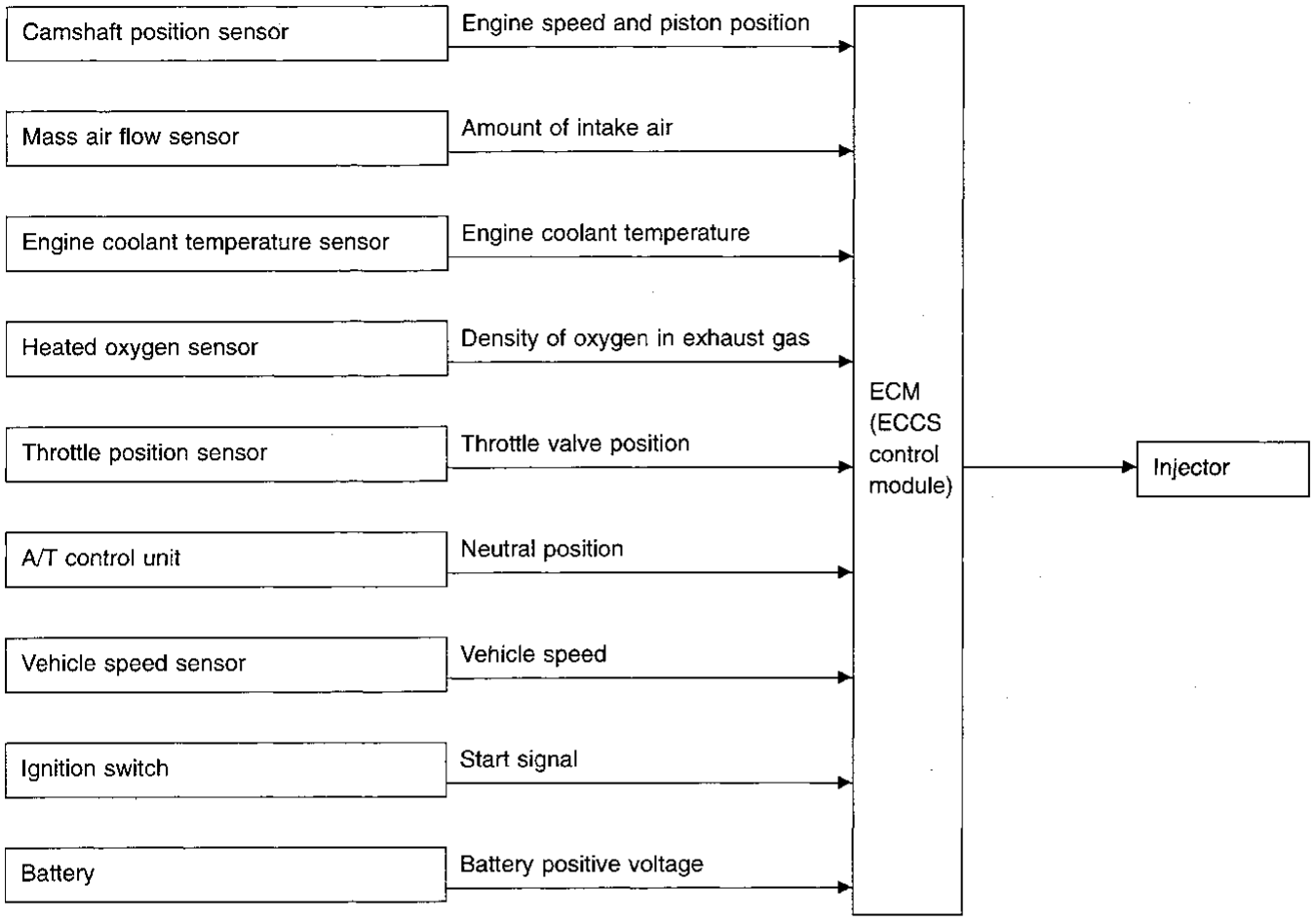


Fuel Filter

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

Multiport Fuel Injection (MFI) System

INPUT/OUTPUT SIGNAL LINE



BASIC MULTIPORT FUEL INJECTION (MFI) 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

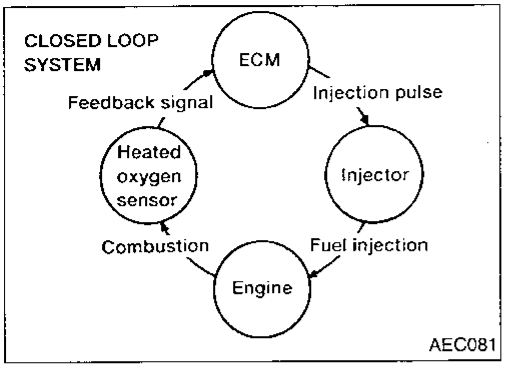
In addition, the amount of fuel injection is compensated for to improve engine performance under various operating conditions as listed below.

〈Fuel increase〉

1) During warm-up
2) When starting the engine
3) During acceleration
4) Hot-engine operation
5) When selector lever is moved from "N" to "D"

〈Fuel decrease〉

1) During deceleration
2) During high engine speed operation



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

MIXTURE RATIO FEEDBACK CONTROL

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 a heated oxygen sensor in the exhaust tube to monitor the air-fuel ratio. The ECM adjusts the injection pulse width according to the sensor voltage signal. This maintains the mixture ratio within the range of the stoichiometric (ideal air-fuel mixture). This stage is referred to as the closed loop control condition.

OPEN LOOP CONTROL

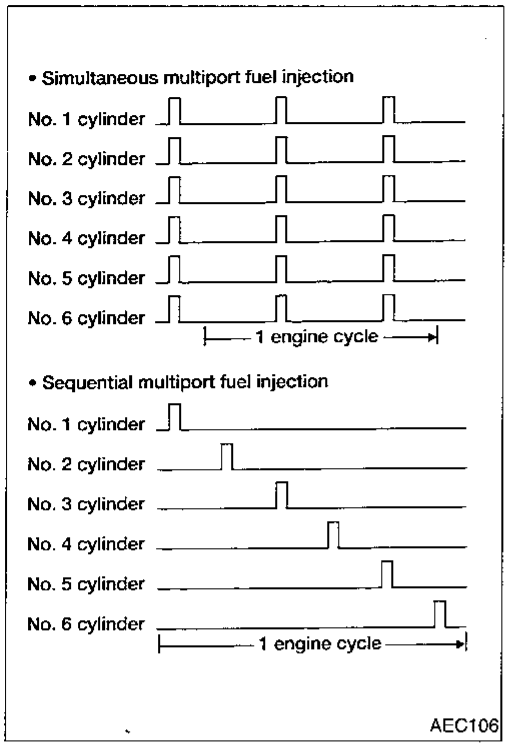
The open loop control condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

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

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the heated oxygen sensor. This feedback signal is then sent to the ECM. 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 during operation (injector clogging, etc.) of ECCS parts which directly affect the mixture ratio.

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



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

FUEL INJECTION TIMING

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

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

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

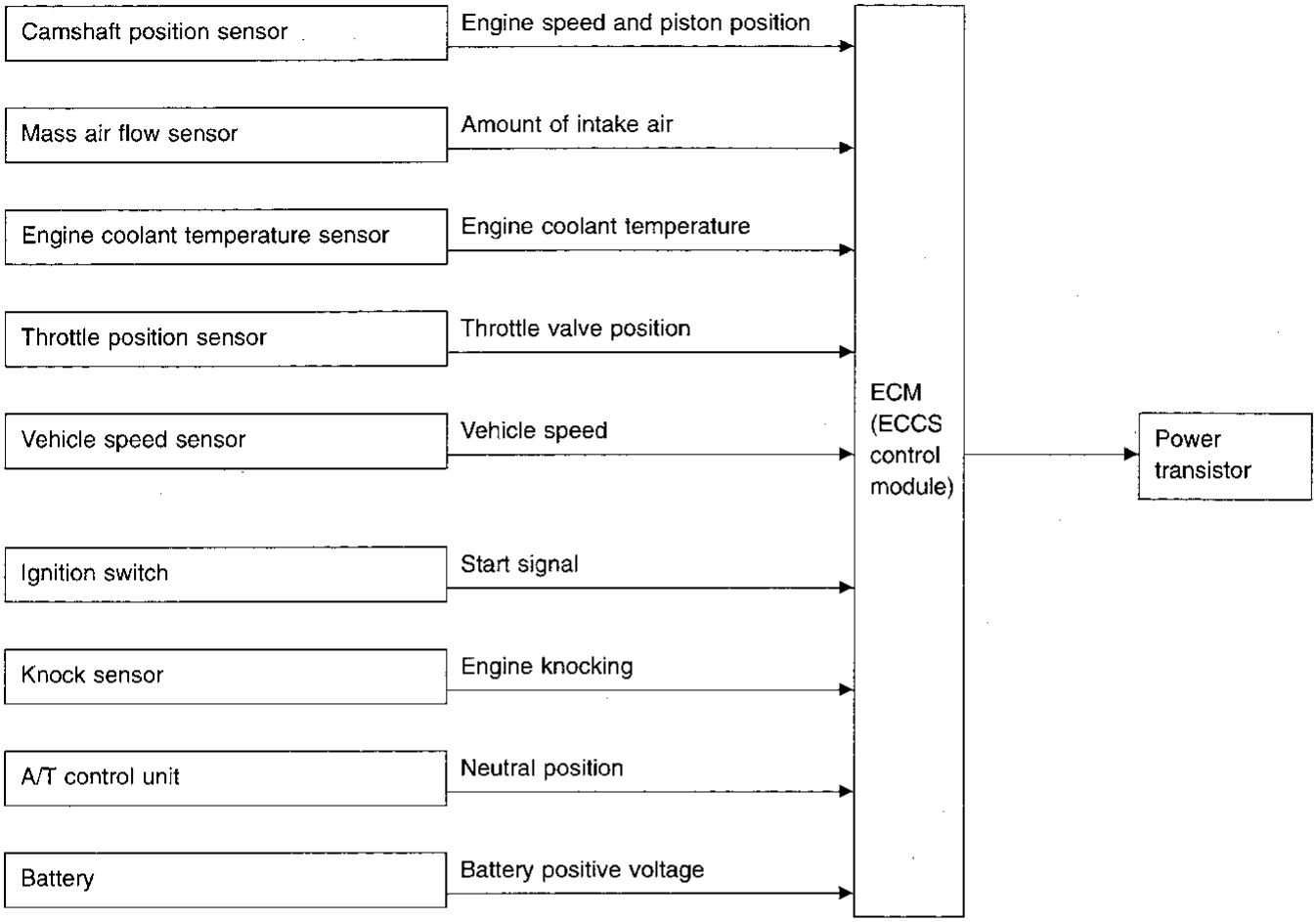
When the engine is being started and/or if the fail-safe system (CPU) is operating, simultaneous multiport fuel injection system is used. When the engine is running, sequential multiport fuel injection system is used.

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)

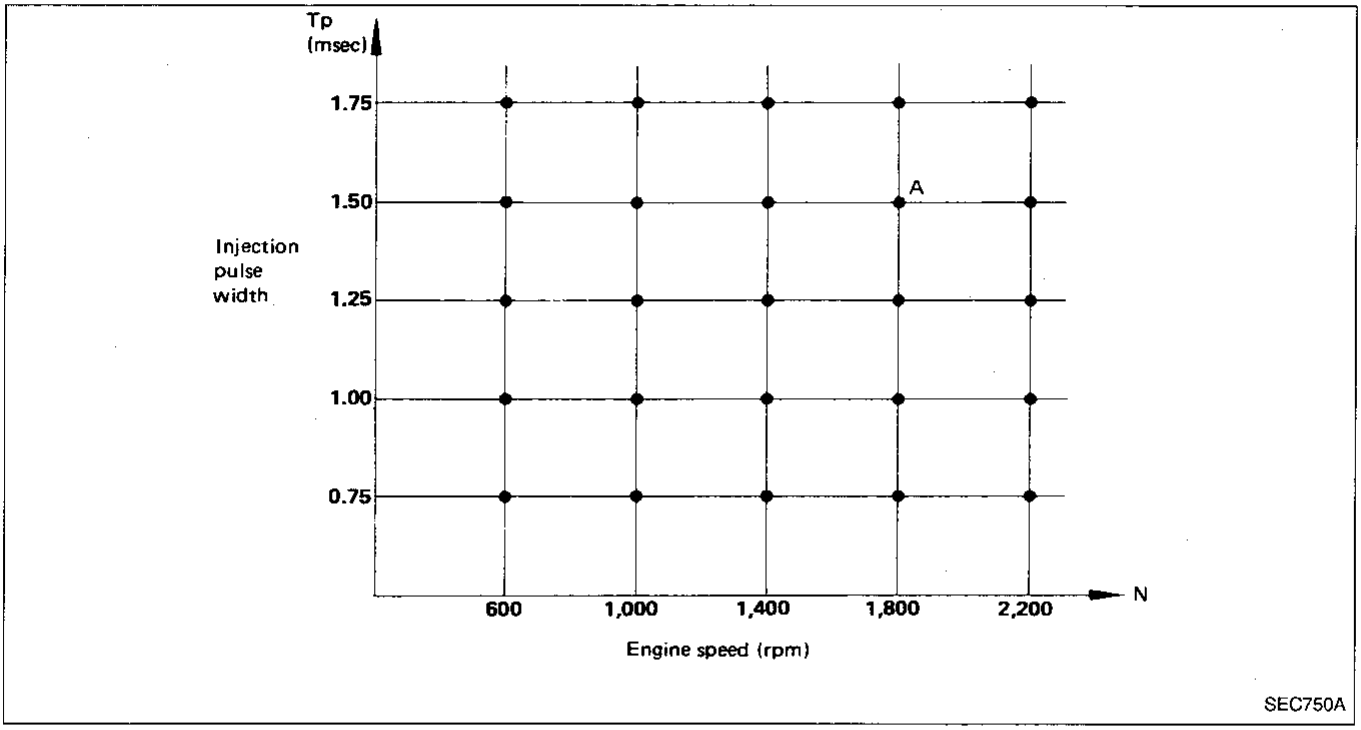
SYSTEM DESCRIPTION

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 °BTDC

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) At low battery positive voltage

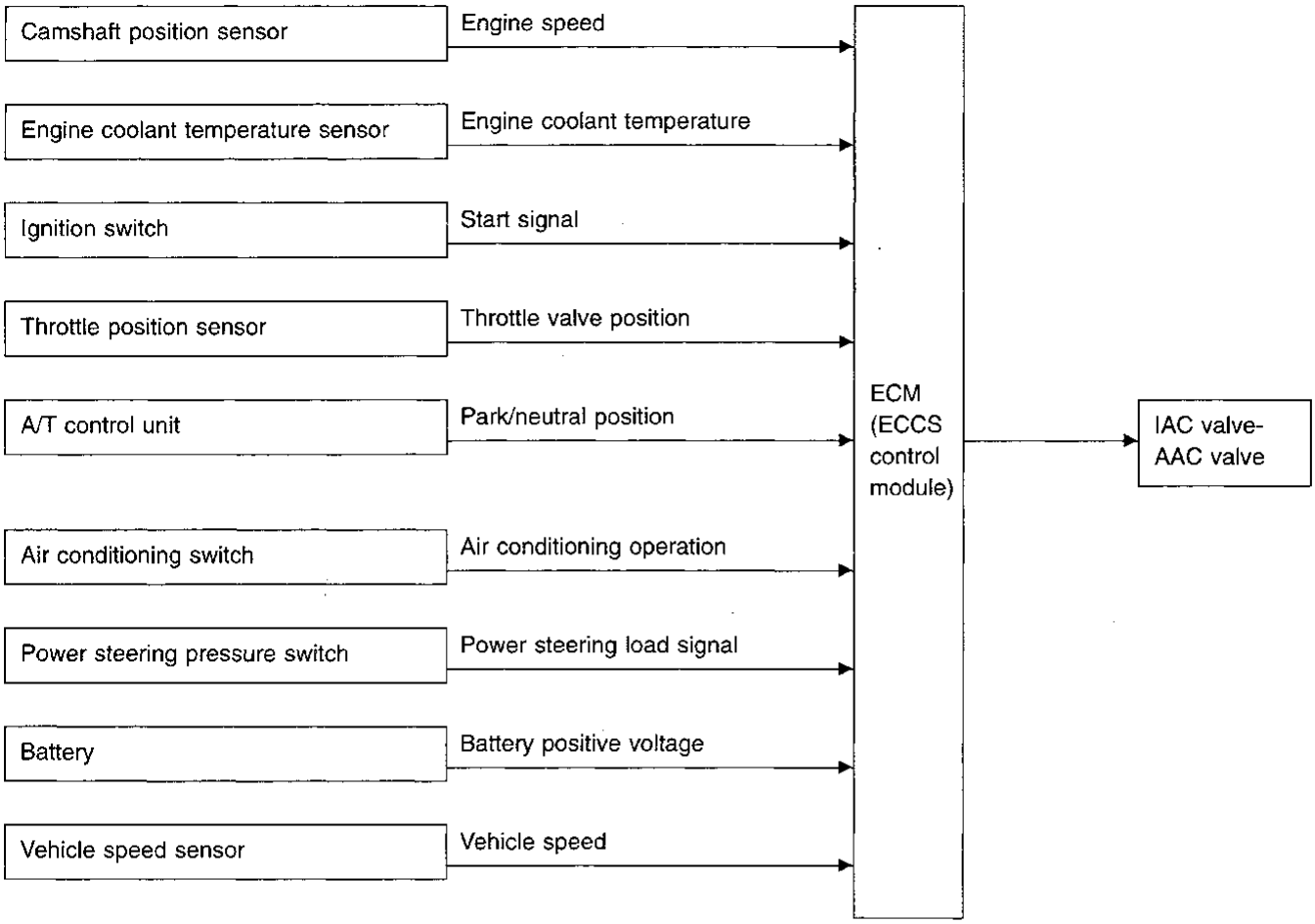


The knock sensor retard system is designed only for emergencies. The basic ignition timing is preprogrammed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions.

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

Idle Speed Control

INPUT/OUTPUT SIGNAL LINE

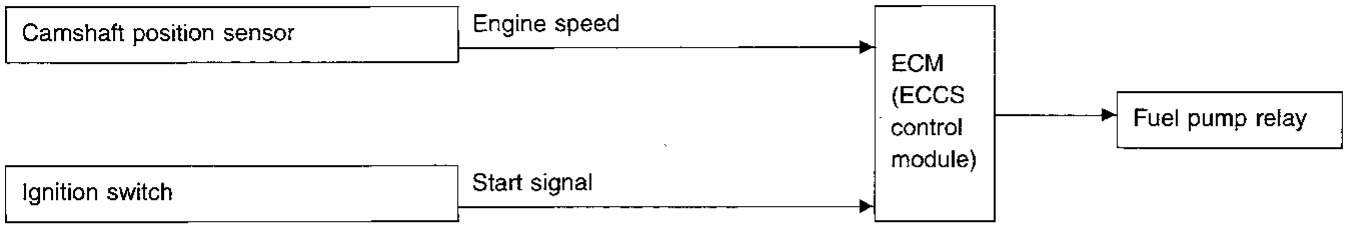


SYSTEM DESCRIPTION

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 IAC valve-AAC valve. The IAC valve-AAC valve repeats ON/OFF operation according to the signal sent by 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 engine speed matches the target value memorized in ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking various engine conditions into consideration such as warming up and during deceleration, fuel consumption, and engine load (air conditioning, electrical load).

Fuel Pump Control

INPUT/OUTPUT SIGNAL LINE



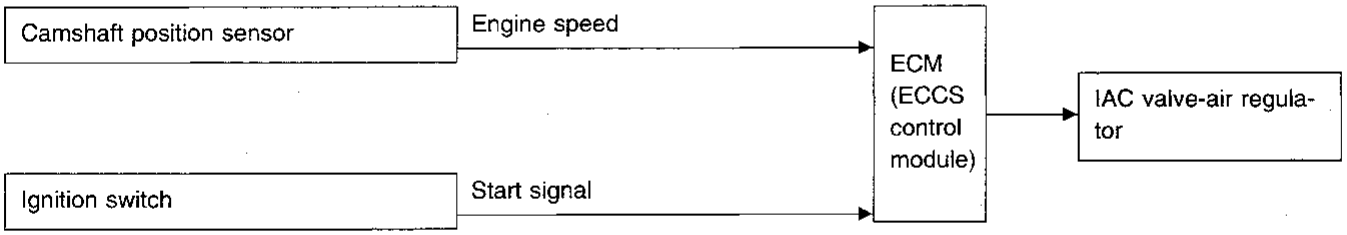
SYSTEM DESCRIPTION

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

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

Idle Air Control (IAC) Valve-Air Regulator Control

INPUT/OUTPUT SIGNAL LINE



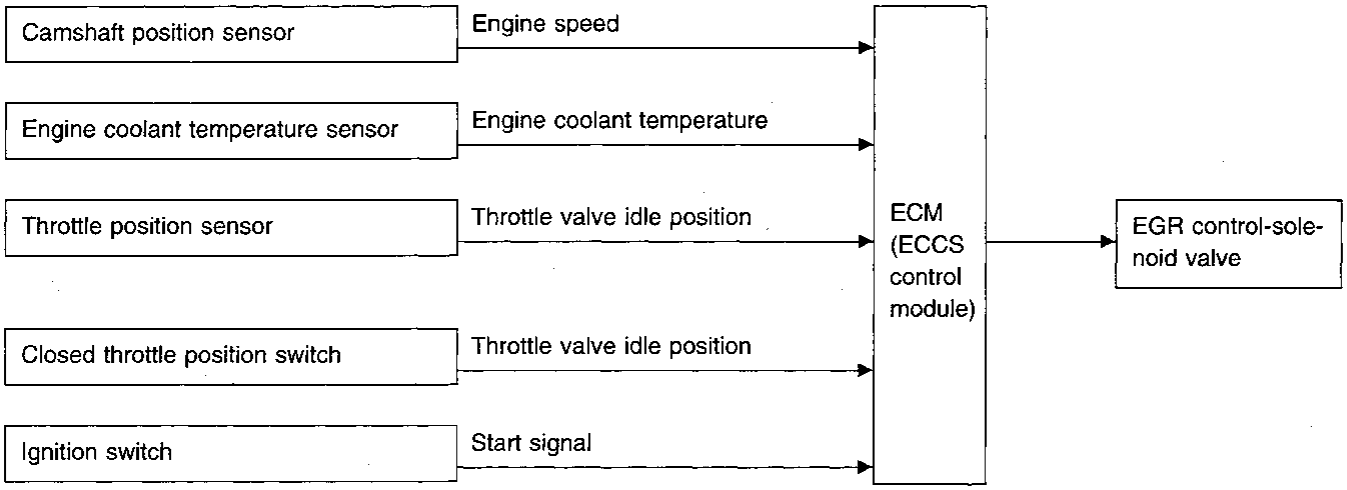
SYSTEM DESCRIPTION

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

Condition	IAC valve-air regulator operation
Ignition switch is turned to ON	Operates for 5 seconds
While engine is running and cranking	Operates
When engine is stopped	OFF in 1.5 seconds
Except as shown above	OFF

Exhaust Gas Recirculation (EGR) System

INPUT/OUTPUT SIGNAL LINE



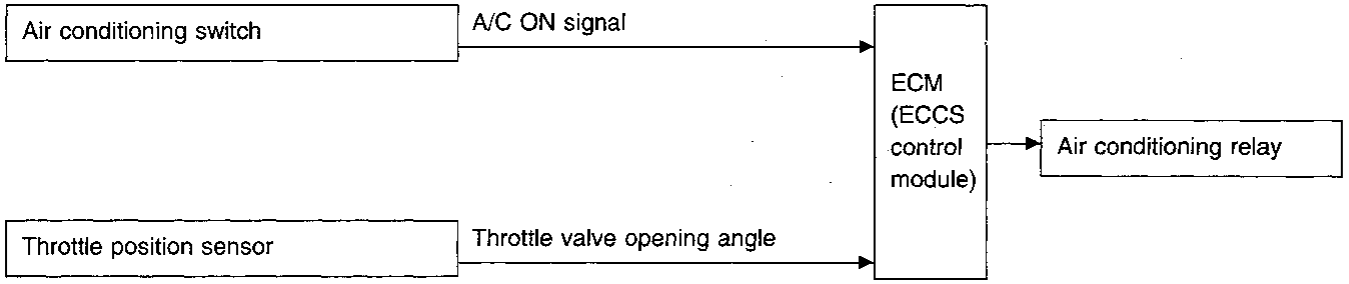
SYSTEM DESCRIPTION

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 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) Camshaft position sensor malfunction
6) ECM (ECCS control module) malfunction

Acceleration Cut Control

INPUT/OUTPUT SIGNAL LINE

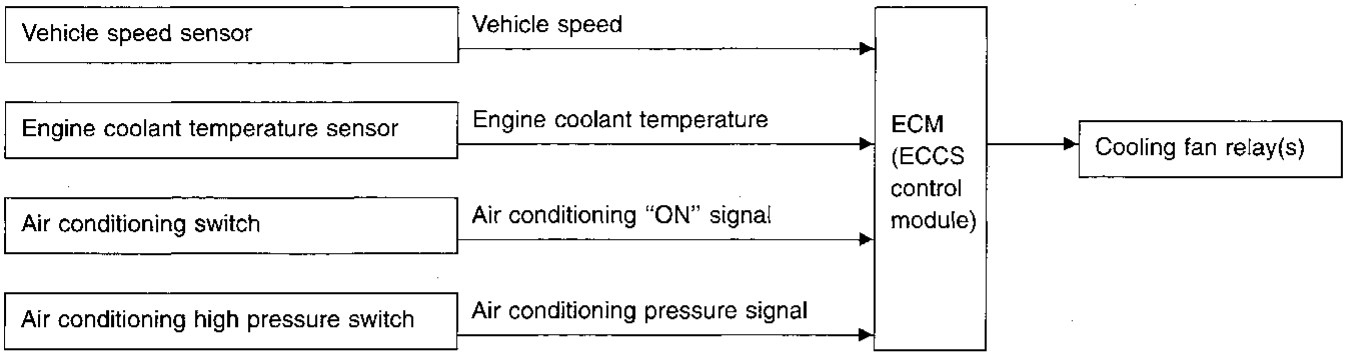


SYSTEM DESCRIPTION

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



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

Operation

Air conditioning switch is "OFF"

Engine coolant temperature °C (°F)	Cooling fans	Remarks
94 (201) or less	OFF	
Between 95 (203) and 99 (210)	LOW	
Between 100 (212) and 104 (219)	LOW	Vehicle speed is 19 km/h (12 MPH) or less
	HIGH	Vehicle speed is 20 km/h (12 MPH) or more
105 (221) or more	HIGH	

Air conditioning switch is "ON" (Any mode except "OFF"), high pressure switch is "OFF".

Engine coolant temperature °C (°F)	Cooling fans	Remarks
94 (201) or less	OFF	Vehicle speed is 110 km/h (68 MPH) or more
	LOW	Vehicle speed is 109 km/h (68 MPH) or less
Between 95 (203) and 104 (219)	LOW	Vehicle speed is 19 km/h (12 MPH) or less
	HIGH	Vehicle speed is 20 km/h (12 MPH) or more
105 (221) or more	HIGH	

Air conditioning switch is "ON" (Any mode except "OFF"), high pressure switch is "ON".

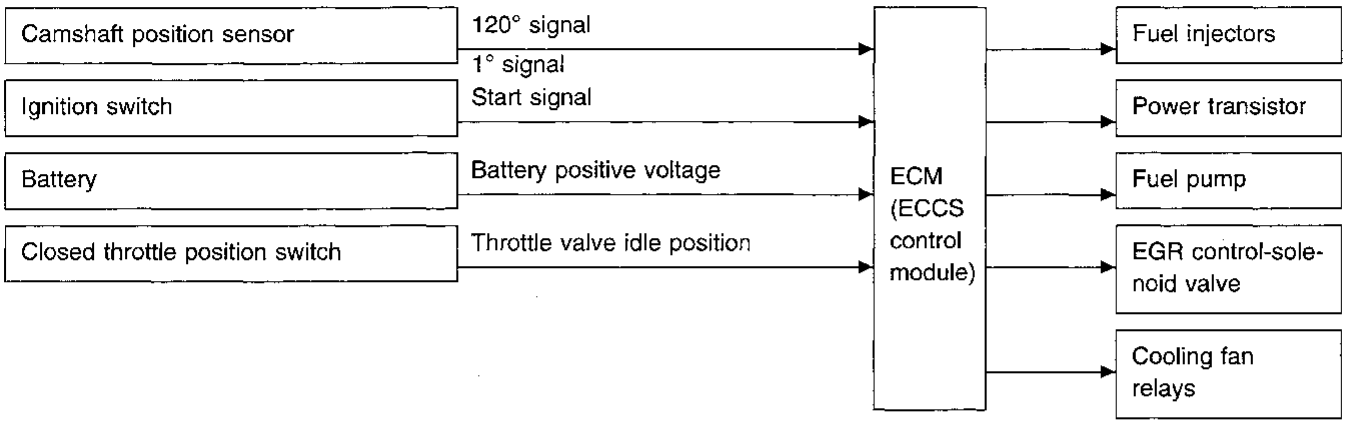
Engine coolant temperature °C (°F)	Cooling fans	Remarks
All	HIGH	

- **The cooling fan operates at HIGH if the self-diagnosing engine coolant temperature sensor system or ECM results in "NG".**
- **A/C compressor clutch will not engage if A/C system low side pressure is below 331 kPa (3.38 kg/cm^2, 48 psi). Therefore, the A/C compressor clutch will not engage in cold temperatures [below 10°C (50°F)].**

Fail-safe System

CPU MALFUNCTION OF ECM

Powertrain input/control signal line



Outline

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

Fail-safe system activating condition when ECM is malfunctioning

The fail-safe mode operates when the 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.

Engine control with fail-safe system operating

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

Cancellation of fail-safe system when ECM is malfunctioning

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

Operation

	Operation
Fuel injection	Simultaneous multiport fuel injection
Ignition timing	Ignition timing is fixed at the preset valve.
Fuel pump	Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls.
EGR control-solenoid valve	ON (EGR cut)
Cooling fan	Cooling fan operates at high speed

CAMSHAFT POSITION SENSOR MALFUNCTION

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

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

Fail-safe System (Cont'd)

MASS AIR FLOW (MAF) SENSOR MALFUNCTION

If the mass air flow sensor output voltage is below the specified value, the ECM senses an mass air flow sensor malfunction. In case of a malfunction, the throttle position sensor substitutes for the mass air flow sensor.

Though the mass air flow sensor is malfunctioning, it is possible to start the engine and drive the vehicle. However, engine speed will not rise more than 2,000 rpm in order to inform the driver of fail-safe system operation while driving.

Operation

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

ENGINE COOLANT TEMPERATURE (ECT) SENSOR MALFUNCTION

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

Operation

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

KNOCK SENSOR MALFUNCTION

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

THROTTLE POSITION (TP) SENSOR MALFUNCTION

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

PREPARATION

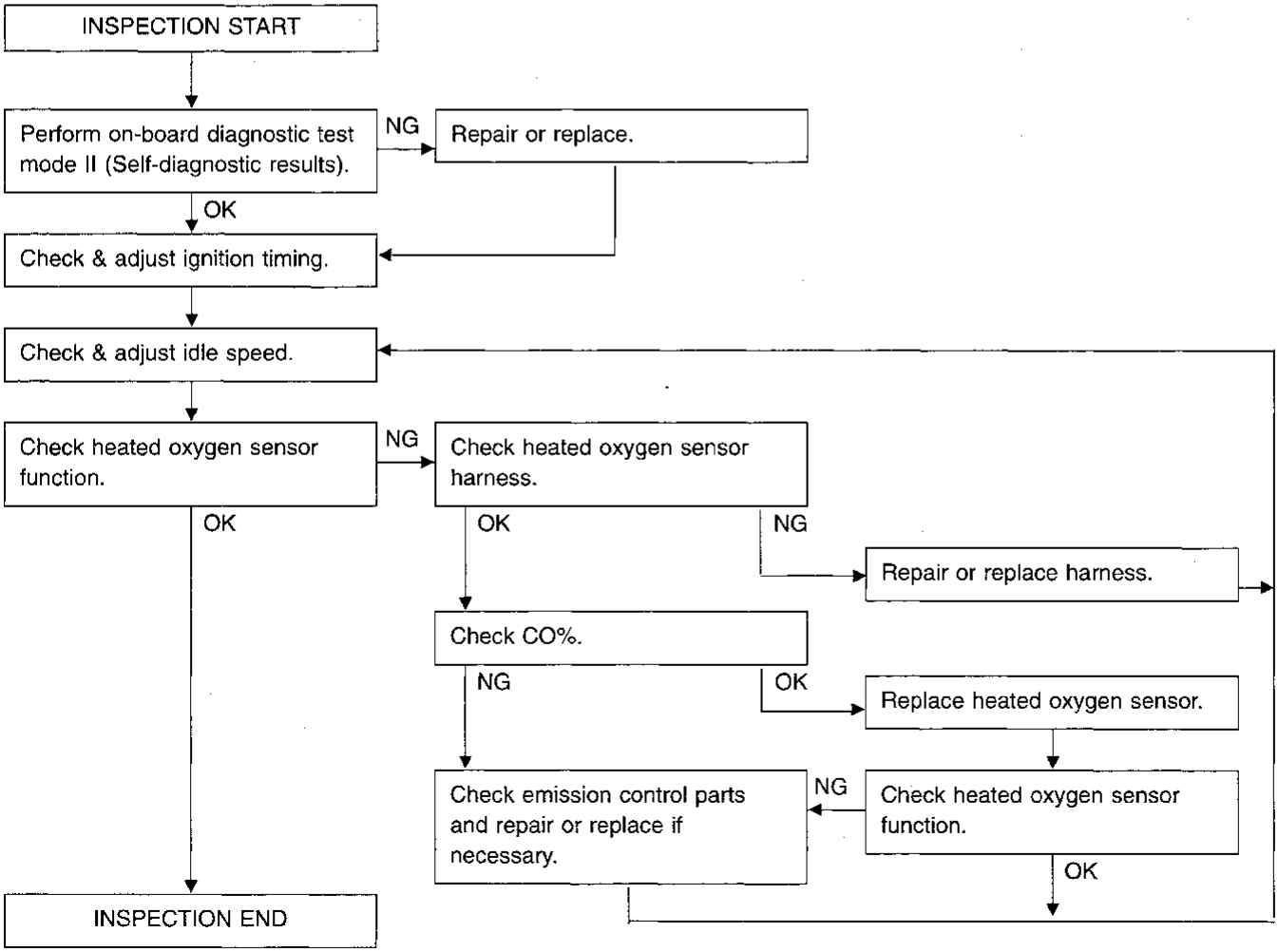
1. Make sure that the following parts are in good order.
- Battery
- Ignition system
- Engine oil and coolant levels
- Fuses
- ECM harness connector
- Vacuum hoses
- Air intake system (Oil filler cap, oil level gauge, etc.)
- Fuel pressure
- Engine compression
- EGR valve operation
- Throttle valve

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

WARNING:

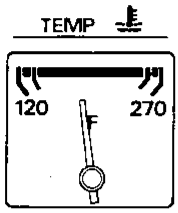
a. Before selector lever is shifted to "D" position, apply parking brake and block both front and rear wheels with chocks.
b. Depress brake pedal while racing the engine to prevent forward surge of vehicle.
c. After the adjustment has been made, shift the lever to the "N" or "P" position and remove wheel chocks.

Overall inspection sequence



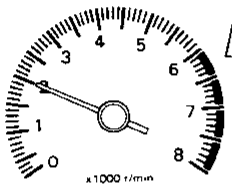
START

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

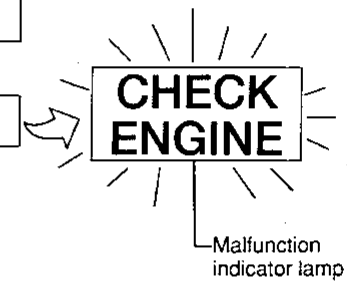


Warm up engine until water temperature indicator points to the middle of gauge and ensure that engine speed is below 1,000 rpm.

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



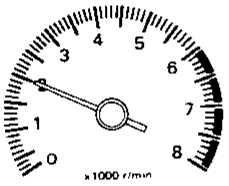
Perform On-board Diagnostic Test Mode II (Self-diagnostic results). Refer to EF & EC-41.



NG

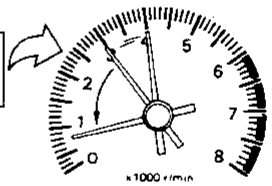
Repair or replace components if necessary.

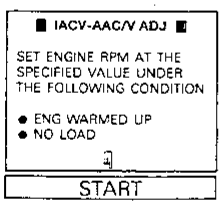
OK



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

Race engine 2 or 3 times under no-load, then run engine for about 1 minute at idle speed.

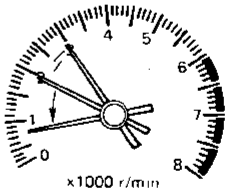


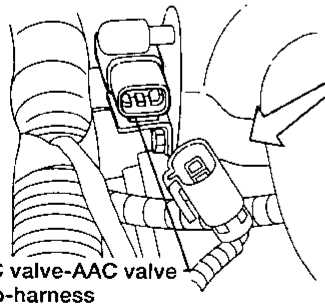


1) Select "IACV-AAC/V ADJ" in "WORK SUPPORT" mode.
2) Touch "START".

OR

1) Turn off engine.
2) Disconnect IAC valve-AAC valve sub-harness connector.
3) Restart engine.





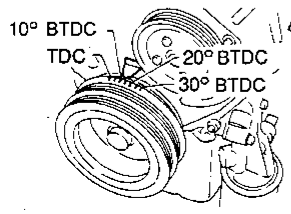
Race engine (2,000 - 3,000 rpm) 2 or 3 times under no-load and run engine at idle speed.

Check ignition timing with a timing light.

15° ± 2° BTDC (A/T in "N" position)

OK → Ⓐ

NG



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

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

AEC434

Ⓐ

Check idle speed.

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

OR

- Check idle speed. 700 ± 50 rpm (A/T in "N" position)

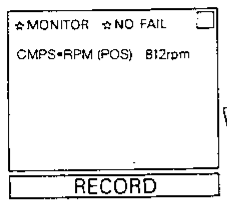
OK / NG

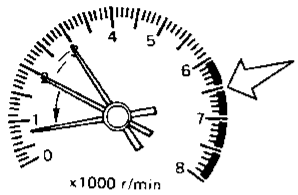
Ⓕ

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

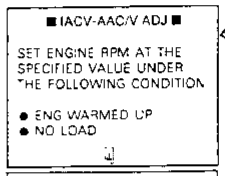
OR

1) Turn off engine.
2) Disconnect IAC valve-AAC valve harness connector.



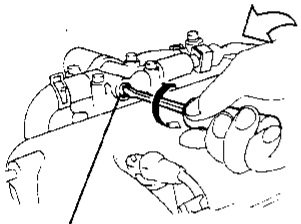


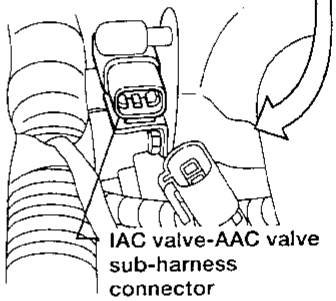
Race engine (2,000 - 3,000 rpm) 2 or 3 times under no-load and run engine at idle speed.

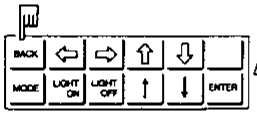


Adjust idle speed by turning idle adjusting screw.

700 ± 50 rpm (A/T in "N" position)



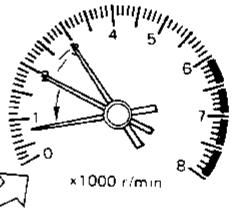




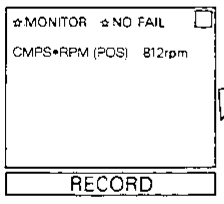
1) Touch "BACK".

OR

1) Turn off engine.
2) Connect IAC valve-AAC valve sub-harness connector.
3) 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. 750 ± 50 rpm (A/T in "N" position)

OR

- Check idle speed. 750 ± 50 rpm (A/T in "N" position)

OK / NG

Ⓒ

Check IAC valve-AAC valve and replace if necessary.

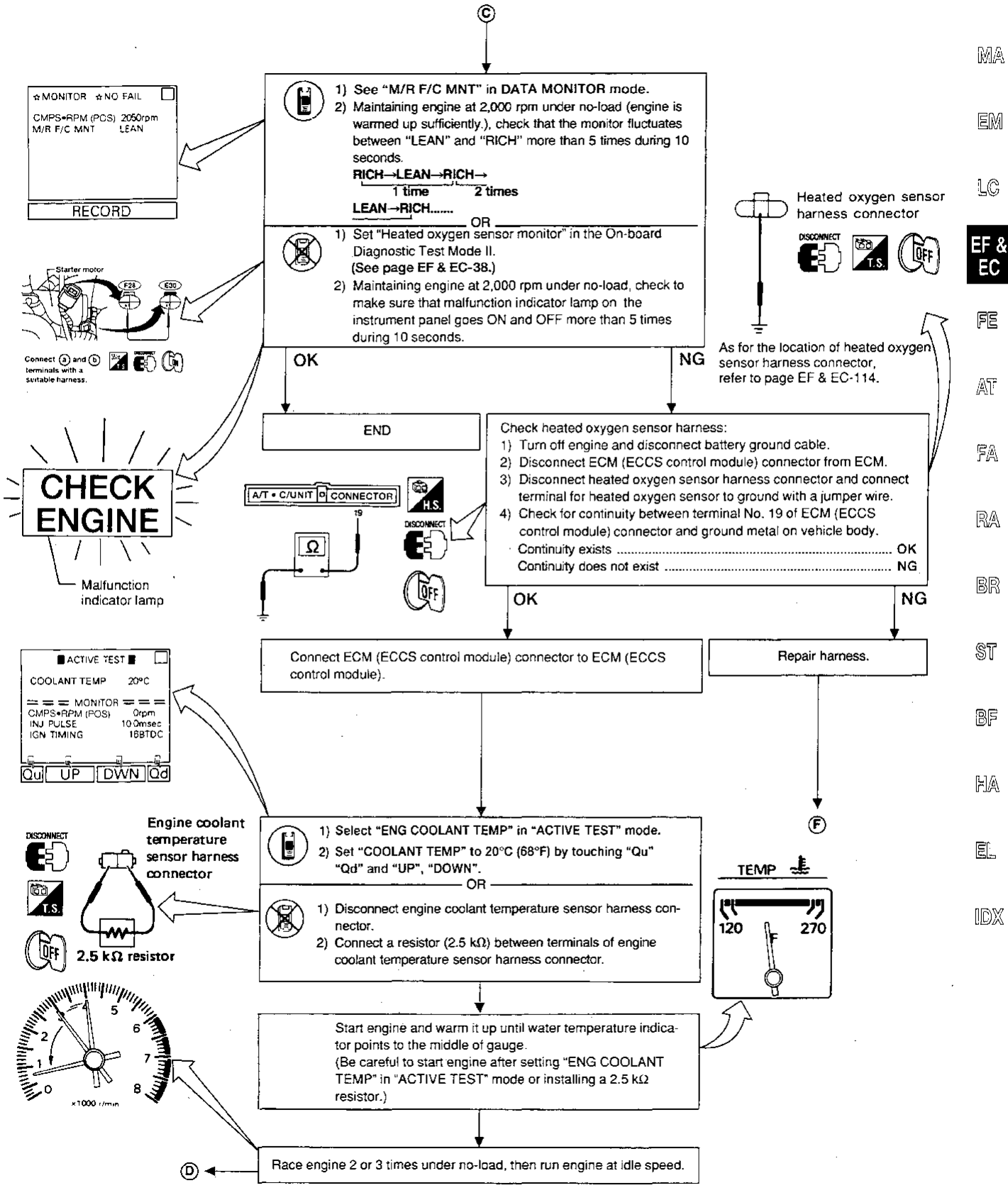
Check IAC valve-AAC valve harness and repair if necessary.

Check ECM (ECCS control module) function* by substituting another known good ECM (ECCS control module).

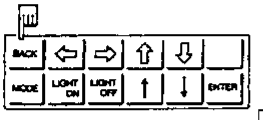
Ⓒ

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

AEC435


Ⓒ
☆MONITOR ☆NO FAIL
CMPS•RPM (POS) 2050rpm
M/R F/C MNT LEAN
RECORD
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 "Heated 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, check to make sure that malfunction indicator lamp on the instrument panel goes ON and OFF more than 5 times during 10 seconds.
Heated oxygen sensor harness connector
DISCONNECT
T.S.
OFF
Starter motor
F28
E30
Connect Ⓐ and Ⓑ terminals with a suitable harness.
OK
NG
As for the location of heated oxygen sensor harness connector, refer to page EF & EC-114.
END
CHECK ENGINE
Malfunction indicator lamp
A/T • C/UNIT CONNECTOR
19
H.S.
DISCONNECT
Ω
OFF
Check heated oxygen sensor harness:
1) Turn off engine and disconnect battery ground cable.
2) Disconnect ECM (ECCS control module) connector from ECM.
3) Disconnect heated oxygen sensor harness connector and connect terminal for heated oxygen sensor to ground with a jumper wire.
4) Check for continuity between terminal No. 19 of ECM (ECCS control module) connector and ground metal on vehicle body.
Continuity exists ..... OK
Continuity does not exist ..... NG
OK
NG
Connect ECM (ECCS control module) connector to ECM (ECCS control module).
Repair harness.
ACTIVE TEST
COOLANT TEMP 20°C
MONITOR
CMPS•RPM (POS) 0rpm
INJ PULSE 10.0msec
IGN TIMING 18BTDC
Qu UP DWN Qd
Engine coolant temperature sensor harness connector
DISCONNECT
T.S.
OFF
2.5 kΩ resistor
1) Select "ENG COOLANT TEMP" in "ACTIVE TEST" mode.
2) Set "COOLANT TEMP" to 20°C (68°F) by touching "Qu" "Qd" and "UP", "DOWN".
OR
1) Disconnect engine coolant temperature sensor harness connector.
2) Connect a resistor (2.5 kΩ) between terminals of engine coolant temperature sensor harness connector.
Ⓕ
TEMP
120
270
F
Start engine and warm it up until water temperature indicator points to the middle of gauge.
(Be careful to start engine after setting "ENG COOLANT TEMP" in "ACTIVE TEST" mode or installing a 2.5 kΩ resistor.)
Race engine 2 or 3 times under no-load, then run engine at idle speed.
Ⓓ
×1000 r/min

AEC436



Ⓓ

Check "CO" %.

Idle CO: 0.2 - 8.0%

After checking CO%.

1) Touch "BACK".

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

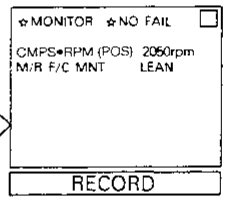
NG

OK

Replace heated oxygen sensor.

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→ LEAN→RICH.....
1 time 2 times



NG

Connect heated oxygen sensor harness connector to heated oxygen sensor.

Check fuel pressure regulator.

Check mass air flow sensor.

Check injector and clean or replace if necessary.

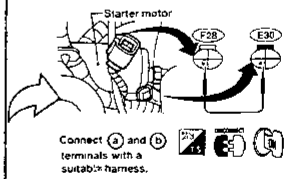
Check engine coolant temperature sensor.

Check ECM (ECCS control module) function* by substituting another known good ECM (ECCS control module).

Ⓕ Refer to EF & EC 30.

OR

1) Set "Heated 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, check to make sure that malfunction indicator lamp on the instrument panel goes ON and OFF more than 5 times during 10 seconds.

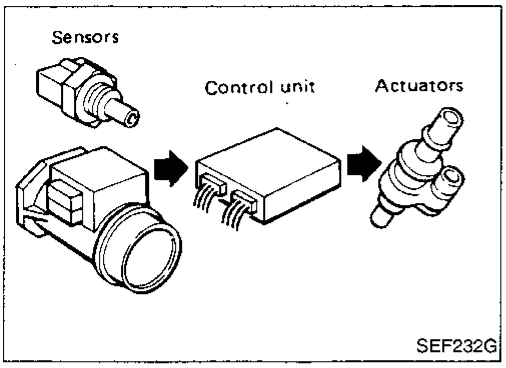


OK

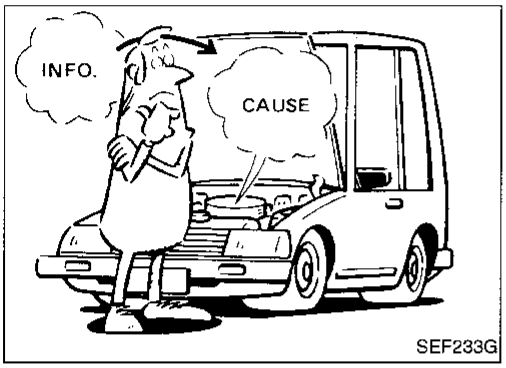
Ⓕ

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

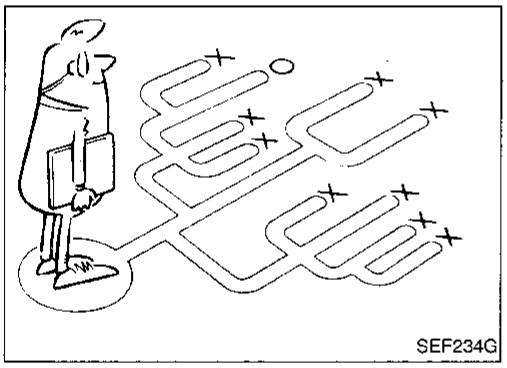
AEC437



SEF232G



SEF233G


SEF234G

Fail-safe System

How to Perform Trouble Diagnoses for Quick and Accurate Repair

INTRODUCTION

The engine has an ECM (ECCS control module) to control major systems such as fuel control, ignition control, idle speed control, etc. The ECM accepts powertrain 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 either poor electrical 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.

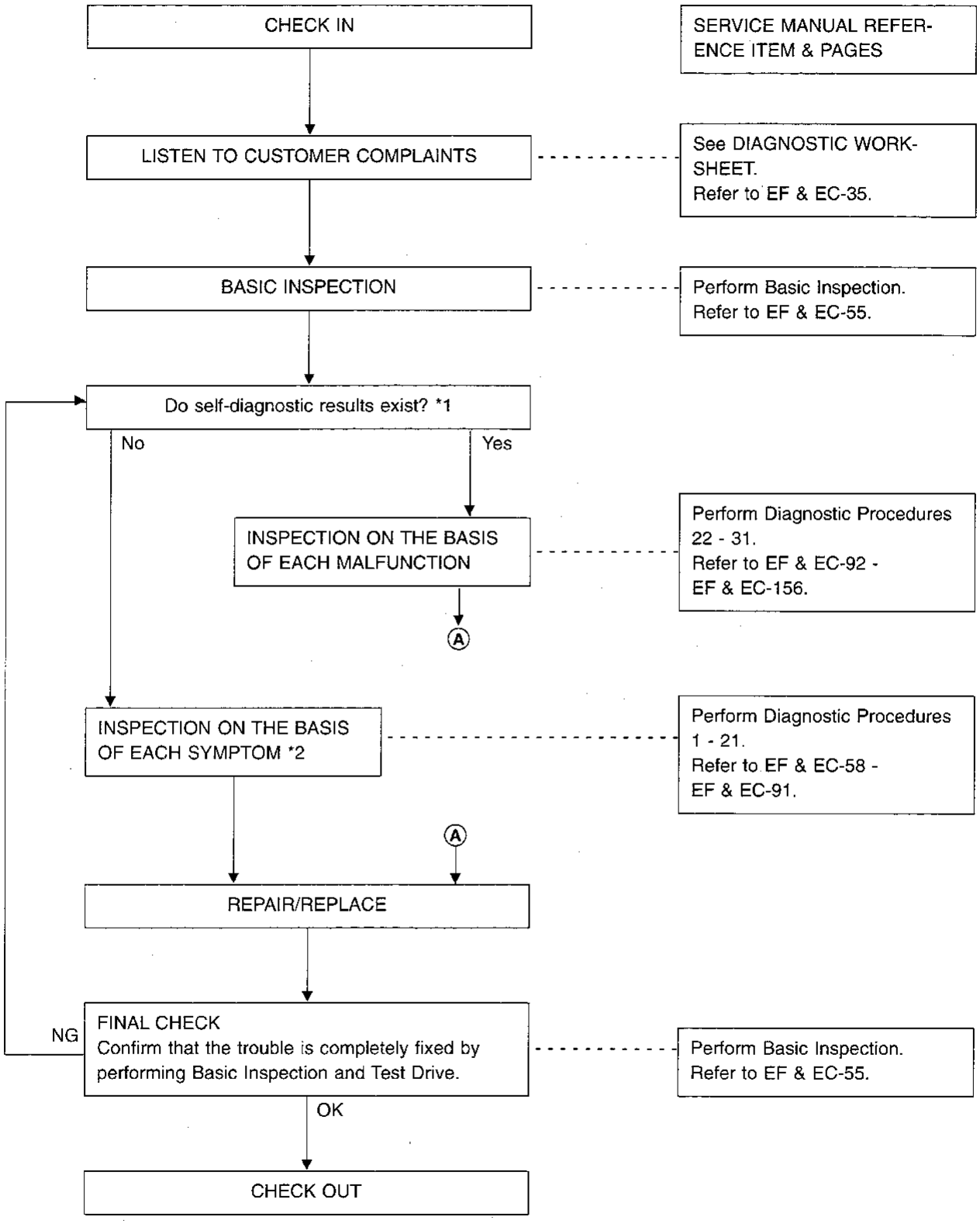
Before undertaking actual checks, take just a few minutes to talk with a customer who approaches with a driveability complaint. The customer is a very good supplier of information on such problems, especially intermittent ones. Through interaction with the customer, find out what symptoms are present 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 self-diagnosis cannot be performed, check main power supply and ground circuit. (See Diagnostic Procedure 22. Refer to EF & EC-92)

*2: If the trouble is not duplicated, see INTERMITTENT PROBLEM SIMULATION. 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

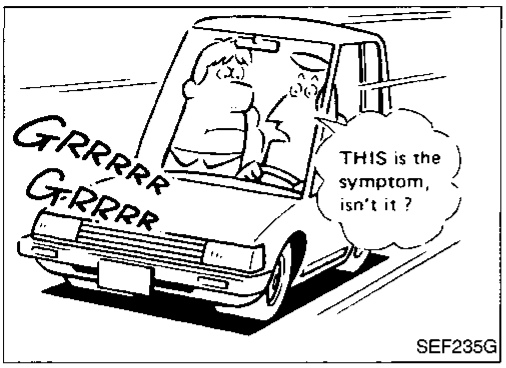
SEF907L

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	Diagnostic Test 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 ☐ Detonation ☐ 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	☐ No affect ☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions	☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions	☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions	☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator lamp	☐ Turned on ☐ Not turned on	



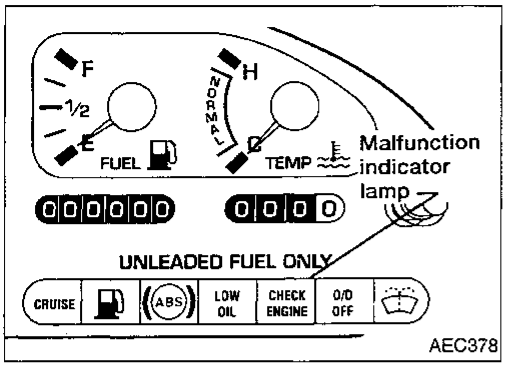
How to Perform Trouble Diagnoses for Quick and Accurate Repair (Cont'd)

INTERMITTENT PROBLEM SIMULATION

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

	Variable factor	Influential part	Target condition	Service procedure
1	Mixture ratio	Pressure regulator	Made lean	Remove vacuum hose and apply vacuum.
			Made rich	Remove vacuum hose and apply pressure.
2	Ignition timing	Camshaft position sensor	Advanced	Rotate distributor clockwise.
			Retarded	Rotate distributor counterclockwise.
3	Mixture ratio feedback control	Heated oxygen sensor	Suspended	Disconnect heated oxygen sensor harness connector.
		ECM	Operation check	Perform on-board diagnostic test mode II (Self-diagnostic results) 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	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.**



On-board Diagnostic System

MALFUNCTION INDICATOR LAMP (MIL)

A malfunction indicator lamp has been adopted on all models. For a list of conditions that turn the lamp on, refer to EF & EC-40.

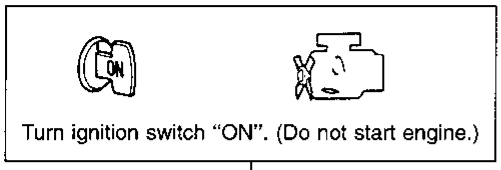
ON-BOARD DIAGNOSTIC SYSTEM MODES

Condition		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	HEATED OXYGEN SENSOR MONITOR

- Refer to the next page for on-board diagnostic procedures (without CONSULT) or EF & EC-44 (with CONSULT).

On-board Diagnostic System (Cont'd)

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



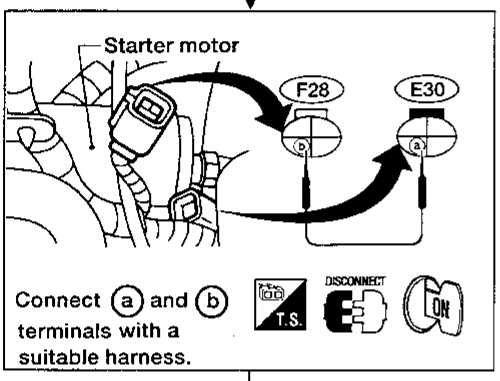
Turn ignition switch "ON". (Do not start engine.)

A

Mode I — MALFUNCTION INDICATOR LAMP CHECK. Refer to EF & EC-40.

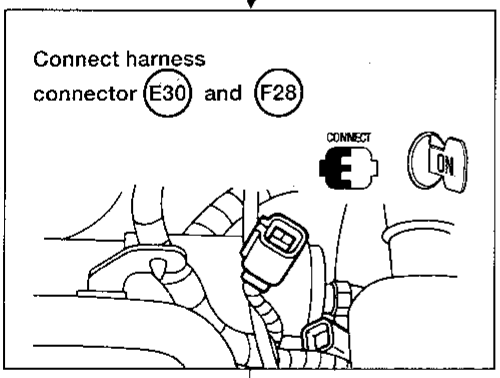
Start engine.

Mode I — MALFUNCTION WARNING. Refer to EF & EC-40.



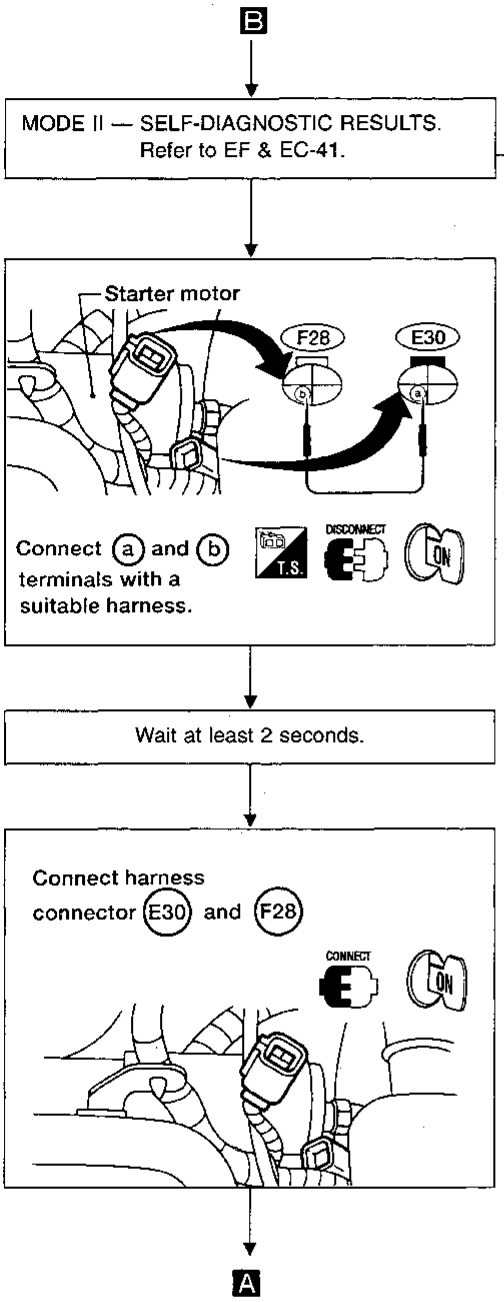
Disconnect harness connectors (E30) and (F28) and connect Ⓐ and Ⓑ terminals with a suitable jumper wire.

Wait at least 2 seconds.



Remove jumper wire and reconnect harness connectors (E30) and (F28).

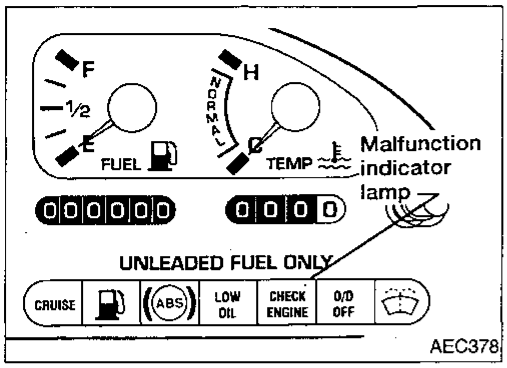
B



To erase stored codes it is necessary to disconnect harness connectors (E30) and (F28) and connect Ⓐ and Ⓑ terminals with a suitable jumper wire.

Remove jumper wire and reconnect harness connectors (E30) and (F28).

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



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

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

In this mode, the MALFUNCTION INDICATOR LAMP in the instrument panel stays "ON".
If MALFUNCTION INDICATOR LAMP remains "OFF", check the bulb in the MALFUNCTION INDICATOR LAMP.

ON-BOARD DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

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

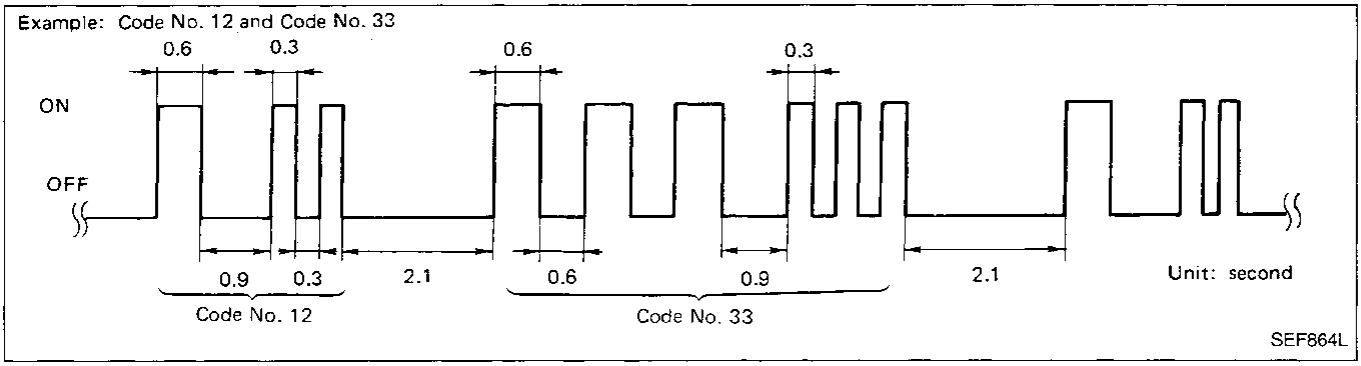
Diagnostic trouble code No.	Malfunction
12	Mass air flow sensor circuit
13	Engine coolant temperature sensor circuit
14	Vehicle speed sensor circuit
31	ECM (ECCS control module) CPU
32	EGR function
33	Heated oxygen sensor circuit
35	EGR temperature sensor circuit
43	Throttle position sensor circuit
45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

- **These Diagnostic trouble code Numbers are clarified in On-board Diagnostic Test Mode II — SELF-DIAGNOSTIC RESULTS. Refer to EF & EC-41.**
- **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)

DESCRIPTION

In this mode, a diagnostic trouble code is indicated by the number of flashes from 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, MALFUNCTION INDICATOR LAMP 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 ENGINE	Mass air flow sensor circuit	EF & EC-98
13	CHECK ENGINE	Engine coolant temperature sensor circuit	EF & EC-101
14	CHECK ENGINE	Vehicle speed sensor circuit	EF & EC-103
21*		Ignition signal circuit	EF & EC-106
31	CHECK ENGINE	ECM CPU	EF & EC-109
32	CHECK ENGINE	EGR function	EF & EC-110
33	CHECK ENGINE	Heated oxygen sensor circuit	EF & EC-114
34		Knock sensor circuit	EF & EC-117
35	CHECK ENGINE	EGR temperature sensor circuit	EF & EC-119
43	CHECK ENGINE	Throttle position sensor circuit	EF & EC-122
45	CHECK ENGINE	Injector leak	EF & EC-125
51	CHECK ENGINE	Injector circuit	EF & EC-127
55		No malfunction in the above circuits	EF & EC-34

CHECK ENGINE : 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 120° signal is not entered for the first few seconds during engine cranking. • Either 1° or 120° signal is not input often enough while the engine speed is higher than the specified rpm.	• Harness and connector (If harness and connector are normal, replace camshaft position sensor.)
12	Mass air flow sensor circuit	• The mass air flow sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector (If harness and connector are normal, replace mass air flow sensor.)
13	Engine coolant temperature sensor circuit	• The engine coolant temperature sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Engine coolant temperature sensor
14	Vehicle speed sensor circuit	• The vehicle speed sensor circuit is open or shorted.	• Harness and connector • Vehicle speed sensor (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 CPU	• 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 control-solenoid valve
33	Heated oxygen sensor circuit	• The heated oxygen sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Heated oxygen sensor • Fuel pressure • Injectors • Intake air leaks
34	Knock sensor circuit	• The knock sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Knock sensor
35	EGR temperature sensor circuit	• The EGR temperature sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • EGR temperature sensor
43	Throttle position sensor circuit	• The throttle position sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Throttle position sensor
45	Injector leak	• Fuel leaks from injector.	• Injector
51	Injector circuit	• The injector circuit is open.	• Injector
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 diagnostic trouble code No. 11 and 21 come out at the same time.

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 "HOW TO SWITCH ON-BOARD DIAGNOSTIC TEST MODES".) 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 result), do not erase the stored memory.**
- **Refer to CONSULT Operation Manual — Engine.**

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

DESCRIPTION

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

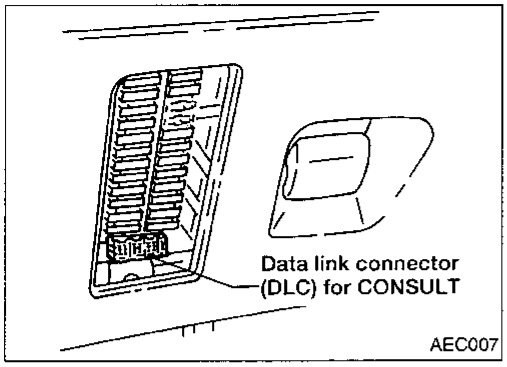
MALFUNCTION INDICATOR LAMP	Fuel mixture condition in the exhaust gas	②Air fuel ratio feedback control condition
ON	Lean	Closed loop system
OFF	Rich	
①Remains ON or OFF	Any condition	Open loop system

①: Maintains the mixture condition present just before switching to open loop.

② Refer to EF & EC-18 for description of mixture ratio feedback system and open loop system.

HOW TO CHECK HEATED OXYGEN SENSOR

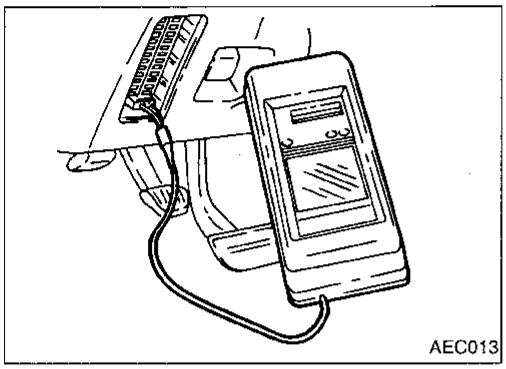
1. Set On-board Diagnostic Test Mode II. (Refer to "HOW TO SWITCH ON-BOARD DIAGNOSTIC TEST MODES".) Refer to EF & EC-38.
2. Start engine and warm it up until engine coolant temperature indicator points to the middle of the gauge.
3. Run engine at about 2,000 rpm for about 2 minutes under no-load conditions.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

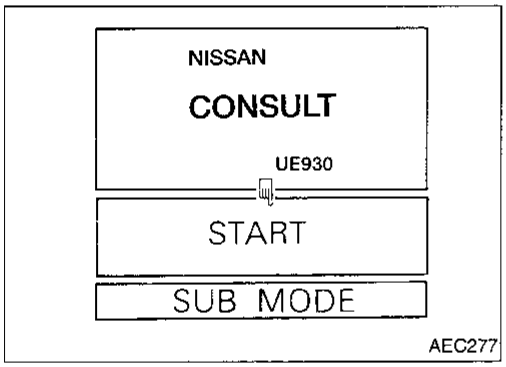


CONSULT

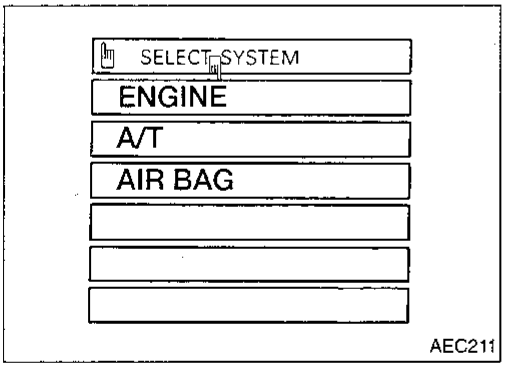
CONSULT INSPECTION PROCEDURE

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

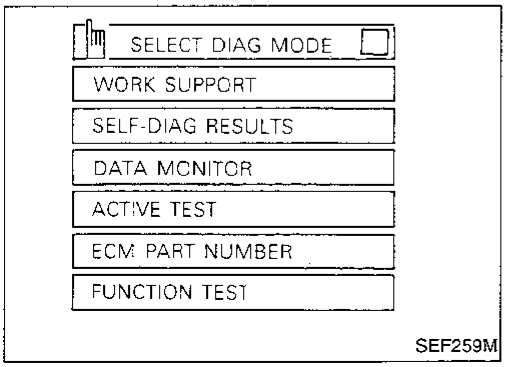




3. Turn on ignition switch.
4. Touch "START".



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.

CONSULT (Cont'd)

DEFINITION OF CONSULT FUNCTIONS

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-46
Self-diagnostic results	Self-diagnostic results can be read and erased quickly.	EF & EC-47
Data monitor	Input/Output data in the ECM can be read.	EF & EC-48
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-50
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-51

ECCS COMPONENT PARTS APPLICATION

ECCS COMPONENT PARTS		DIAGNOSTIC TEST MODE				
		WORK SUPPORT	SELF-DIAGNOSTIC RESULTS	DATA MONITOR	ACTIVE TEST	FUNCTION TEST
INPUT	Camshaft position sensor		X	X		
	Mass air flow sensor		X	X		
	Engine coolant temperature sensor		X	X	X	
	Heated oxygen 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 signal			X		
	Park/neutral position switch			X		X
	Battery			X		
	Power steering pressure switch			X		X
	Closed throttle position switch			X		X
OUTPUT	Injectors		X	X	X	X
	Power transistor (ignition timing)		X (Ignition signal)	X	X	X
	IAC valve-AAC valve	X		X	X	X
	Fuel pump relay	X		X	X	X
	EGR control-solenoid valve			X	X	X
	Air conditioning relay			X		
	Cooling fan relay(s)			X	X	X

X: Applicable

CONSULT (Cont'd)

WORK SUPPORT DIAGNOSTIC TEST MODE

WORK ITEM	CONDITION	USAGE
THRTL POS SEN ADJ	CHECK THE THROTTLE POSITION SENSOR SIGNAL. ADJUST IT TO THE SPECIFIED VALUE BY ROTATING THE SENSOR BODY UNDER THE FOLLOWING CONDITION. • IGN SW "ON" • ENG NOT RUNNING • ACC PEDAL KEPT OFF	When adjusting throttle position sensor initial position. Refer to EF & EC-56.
IACV-AAC/V ADJ	SET ENGINE RPM AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITION. • ENG WARMED UP ENOUGH • NO LOAD	When adjusting idle speed. Refer to EF & EC-56.
FUEL PRES RELEASE	• FUEL PUMP WILL STOP BY TOUCHING START DURING IDLE CRANK A FEW TIMES AFTER ENGINE STALL.	When releasing fuel pressure. Refer to MA section.

CONSULT (Cont'd)

SELF-DIAGNOSTIC RESULTS DIAGNOSTIC TEST MODE

DIAGNOSTIC ITEM	DIAGNOSTIC ITEM IS DETECTED WHEN ...	CHECK ITEM (REMEDY)
CAMSHAFT POSITION SENSOR*	• Either 1° or 120° signal is not entered for the first few seconds during engine cranking. • Either 1° or 120° signal is not input often enough while the engine speed is higher than the specified rpm.	• Harness and connector (If harness and connector are normal, replace camshaft position sensor.)
MASS AIR FLOW SENSOR	• The mass air flow sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector (If harness and connector are normal, replace mass air flow sensor.)
ENGINE COOLANT TEMPERATURE SENSOR	• The engine coolant temperature sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Engine coolant temperature sensor
VEHICLE SPEED SENSOR	• The vehicle speed sensor circuit is open or shorted.	• Harness and connector • Vehicle speed sensor (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 control-solenoid valve
HEATED OXYGEN SENSOR	• The heated oxygen sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Heated oxygen sensor • Fuel pressure • Injectors • Intake air leaks
KNOCK SENSOR	• The knock sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Knock sensor
EGR TEMP SENSOR	• The EGR temperature sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • EGR temperature sensor
THROTTLE POSITION SENSOR	• The throttle position sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Throttle position sensor
INJECTOR LEAK	• Fuel leaks from injector.	• Injector
INJECTOR OPEN	• The injector circuit is open.	• Injector

*: Inspect 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.

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

CONSULT (Cont'd)

DATA MONITOR 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 heated oxygen sensor. If it is above 100, the ECM is compensating for a lean signal from the heated oxygen sensor.

MONITOR ITEM	CONDITION		SPECIFICATION	CHECK ITEM WHEN OUTSIDE SPEC.
CMPS · RPM (POS)	• 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	1.0 - 1.7V	• Harness and connector • Mass air flow sensor
		2,000 rpm	1.4 - 2.2V	
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 ↔ Approx. 1.5V	• Harness and connector • Heated oxygen sensor • Intake air leaks • Injectors
M/R F/C MNT			LEAN ↔ RICH Changes more than 5 times during 10 seconds.	
VHCL SPEED SE	• Turn drive wheels and compare speedometer indication with the CONSULT value		Almost the same speed as the CONSULT value	• Harness and connector • Vehicle speed sensor
BATTERY VOLT	• Ignition switch: "ON" (Engine stopped)		11 - 14V	• Battery • ECM power supply circuit
THRTL POS SEN	• Ignition switch: "ON" (Engine stopped)	Throttle valve fully closed	0.3 - 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 4.5V	• Harness and connector • EGR temperature sensor
START SIGNAL	• Ignition switch: "ON" → "START"		OFF → ON	• Harness and connector • Starter switch
CLOSED TH/POS	• Ignition switch: "ON" (Engine stopped)	Throttle valve: Idle position	ON	• Harness and connector • Throttle position sensor • Throttle position sensor adjustment
		Throttle valve: Slightly open	OFF	
AIR COND SIG	• Engine: After warming up, idle the engine	A/C switch "OFF"	OFF	• Harness and connector • Air conditioning switch
		A/C switch "ON" (1)	ON	
NEUT POSI SW	• Ignition switch: "ON"	Shift lever "P" or "N"	ON	• Harness and connector • Park/neutral position switch
		Except above	OFF	

(1): Any mode except "OFF", ambient temperature above 10°C (50°F).

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	
INJ PULSE	• Engine: After warming up • A/C switch "OFF" • Shift lever "N" • No-load	Idle	2.4 - 3.5 msec.	• Harness and connector • Injector • Mass air flow sensor • Intake air system
		2,000 rpm	2.3 - 3.2 msec.	
IGN TIMING	ditto	Idle	15° BTDC	• Harness and connector • Camshaft position sensor
		2,000 rpm	More than 25° BTDC	
IACV-AAC V	ditto	Idle	15 - 40%	• Harness and connector • IAC valve-AAC valve
		2,000 rpm	—	
AIR COND RLY	• Air conditioning switch OFF → ON (1)		OFF → ON	• Harness and connector • Air conditioning switch • Air conditioning relay
EGRC SOL/V	• Engine: After warming up • A/C switch "OFF" • Shift lever "N" • No-load	Idle	ON	• Harness and connector • EGR control-solenoid valve
		2,000 rpm	OFF	
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	
A/F ALPHA	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	75 - 125%	• Harness and connector • Injectors • Mass air flow sensor • Heated oxygen sensor • Canister purge line • Intake air system

(1): Any mode except "OFF", ambient temperature above 10°C (50°F).

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 • Heated oxygen sensor
IAC VALVE-AAC VALVE 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 TEST	• Engine: Return to the original trouble condition • Change the engine coolant temperature with the CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Engine coolant temperature sensor • Fuel injectors
IGNITION 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	• Engine: After warming up, idle the engine. • Turn cooling fan "ON" and "OFF" with the CONSULT.	Cooling fan moves and stops.	• Harness and connector • Cooling fan motor
FUEL PUMP RELAY TEST	• Ignition switch: "ON" (Engine stopped) • Turn the fuel pump relay "ON" and "OFF" with the CONSULT and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connector • Fuel pump relay
EGRC SOLENOID VALVE TEST	• Ignition switch: "ON" • Turn solenoid valve "ON" and "OFF" with the CONSULT and listen to operating sound.	EGR control-solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve
SELF-LEARNING CONT TEST	• In this test, the coefficient of self-learning control mixture ratio returns to the original coefficient by touching "CLEAR" on the screen.		

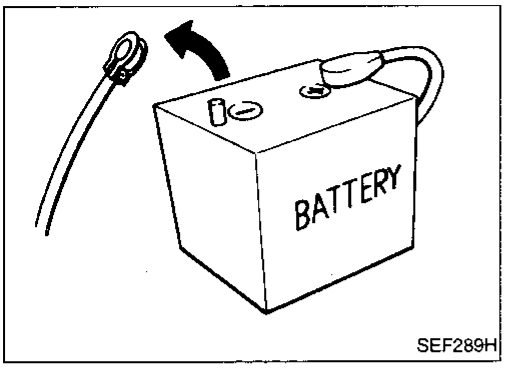
CONSULT (Cont'd)

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 (CLOSED THROTTLE POSI-TION SWITCH CIRCUIT)	• Ignition switch: "ON" (Engine stopped) • Closed throttle position switch circuit is tested when throttle is opened and closed fully. ("CLOSED THROTTLE POSI" is the test item name for the vehicles in which idle is selected by throttle position sensor.)	Throttle valve: opened	OFF	• Harness and connector • Throttle position sensor (Closed throttle position switch) • Throttle position sensor (Closed throttle position switch) adjustment • Throttle linkage • Verify operation in DATA MONITOR mode.
		Throttle valve: closed	ON	
THROTTLE POSI SEN CKT	• Ignition switch: "ON" (Engine stopped) • Throttle position sensor circuit is tested when throttle is opened and closed fully.	Range (Throttle valve fully opened — Throttle valve fully closed)	More than 3.0V	• Harness and connector • Throttle position sensor • Throttle position sensor adjustment • Throttle linkage • Verify operation in DATA MONITOR mode.
NEUTRAL POSI SW CKT	• Ignition switch: "ON" (Engine stopped) • Park/neutral position switch circuit is tested when shift lever is manipulated.	OUT OF N/P-RANGE	OFF	• Harness and connector • Park/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. The relay makes an operating sound every 3 seconds.		• 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
START SIGNAL CIRCUIT	• 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

CONSULT (Cont'd)

FUNCTION TEST ITEM	CONDITION	JUDGEMENT		CHECK ITEM (REMEDY)
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 powertrain input signal is greater than 4 km/h (2 MPH)		• Harness and connector • Vehicle speed sensor • Electric speedometer
IGN TIMING ADJ	• After warming up, idle the engine. • Ignition timing adjustment is checked by reading ignition timing with a timing light and checking whether it agrees with specifications.	The timing light indicates the same value on the screen.		• Adjust ignition timing (by moving camshaft position sensor or distributor) • Camshaft position sensor drive mechanism
MIXTURE RATIO TEST	• Air-fuel ratio feedback circuit (injection system, ignition system, vacuum system, etc.) is tested by examining the heated oxygen sensor output at 2,000 rpm under non-loaded state.	• HEATED OXYGEN 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) • Heated oxygen sensor circuit • Heated oxygen sensor operation • Fuel pressure high or low • Mass air flow sensor
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 rpm 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 rpm when IAC valve-AAC valve opening is changed to 0%, 20%and 80%.	Difference in engine rpm 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

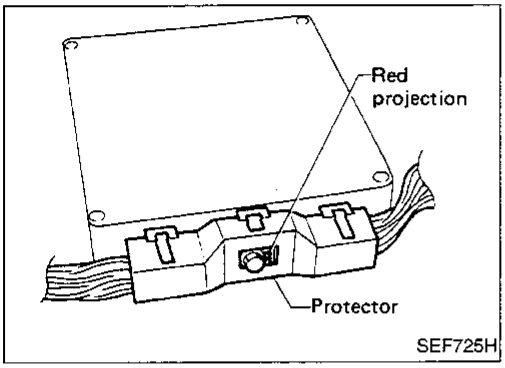


SEF289H

Diagnostic Precautions

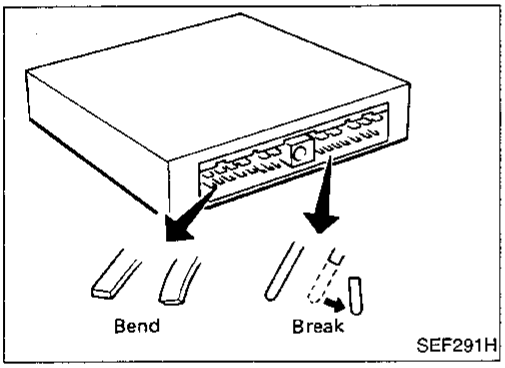
CAUTION:

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.**



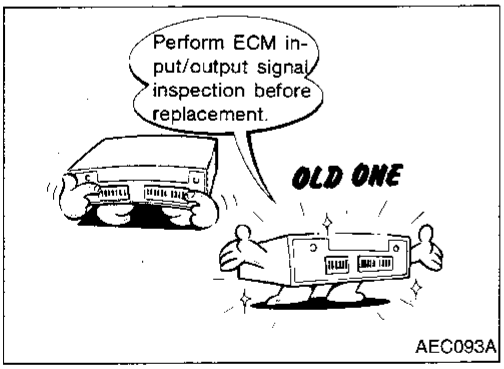
SEF725H

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



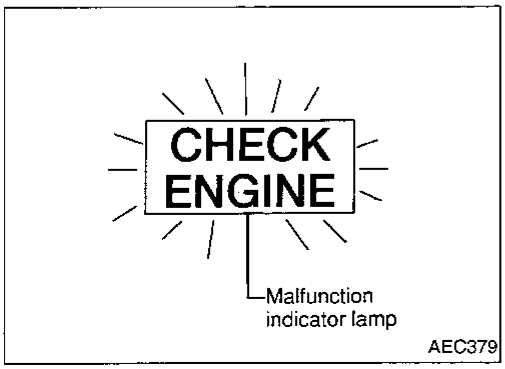
SEF291H

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



AEC093A

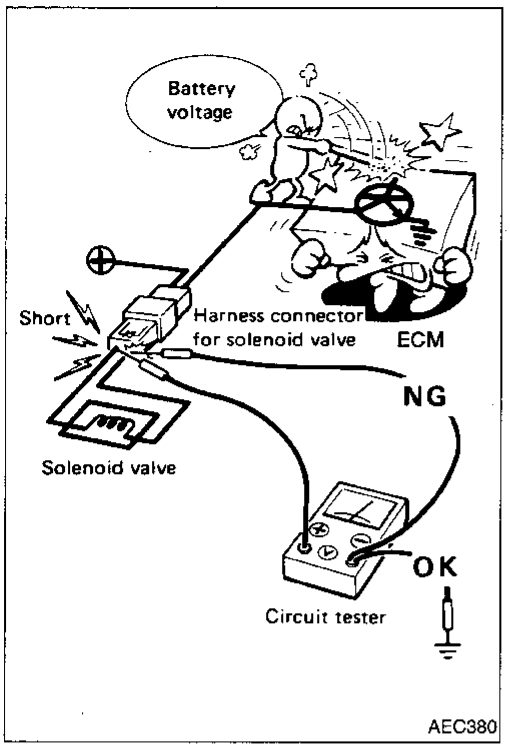
5. **Before replacing ECM, perform ECM input/output signal inspection and make sure whether ECM functions properly or not. Refer to EF & EC-158.**



AEC379

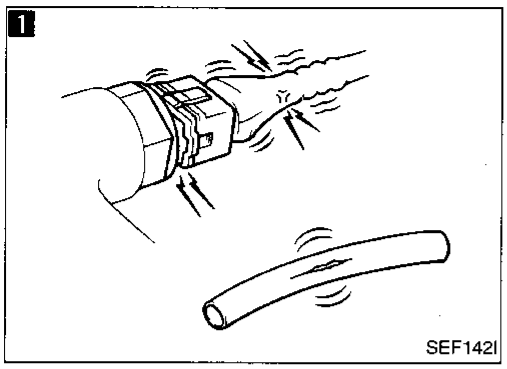
6. **After reviewing the above items, perform On-board Diagnostic Test Mode II (Self-diagnostic results) and driving test.**

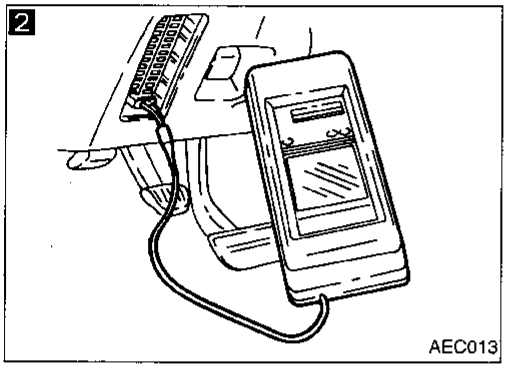
Diagnostic Precautions (Cont'd)

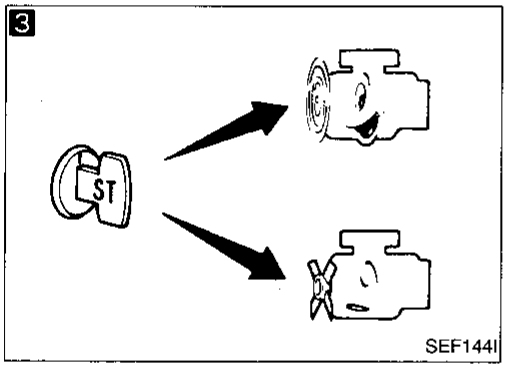


7. **When measuring ECM controlled components supply voltage with a circuit tester, separate one tester probe from the other.**
   If the two tester probes accidentally make contact with each other during measurement, the circuit will be shorted, resulting in damage to the ECM power transistor.

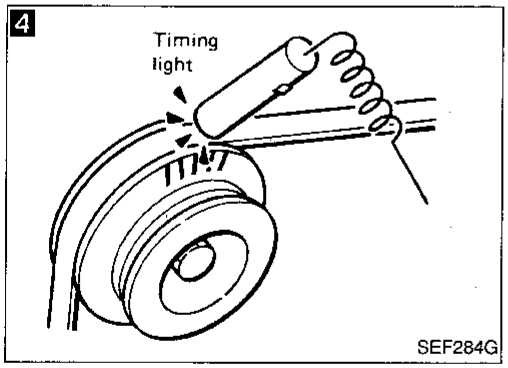
Basic Inspection


SEF142I


AEC013



SEF144I



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-44.

3

DOES ENGINE START? — No → Go to **6** .

Yes

4

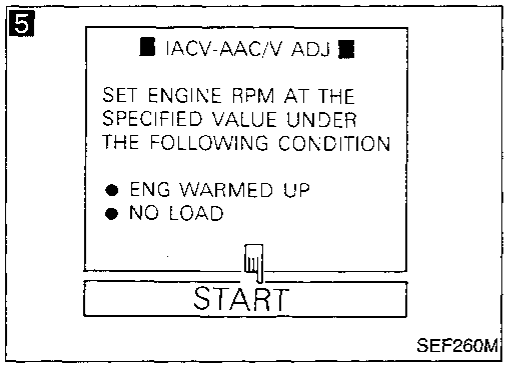
CHECK IGNITION TIMING.
Warm up engine sufficiently and check ignition timing at idle using timing light. Refer to EF & EC-28.
Ignition timing:
15°±2° BTDC

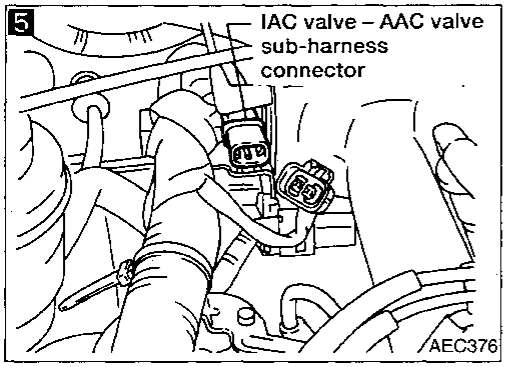
NG → Adjust ignition timing by turning camshaft position sensor.

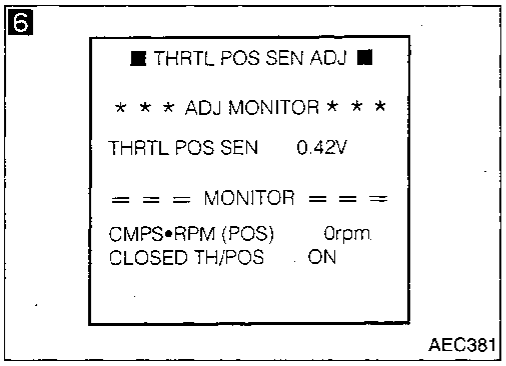
OK

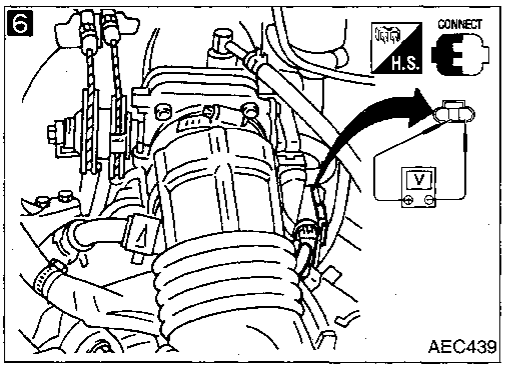
(Go to Ⓐ on next page.)

Basic Inspection (Cont'd)









Ⓐ

5

CHECK IDLE ADJ. SCREW INITIAL SET RPM.

1. Select "IACV-AAC/V ADJ" in "WORK SUPPORT" mode.
2. When touching "START", does engine rpm fall to 700±50 rpm (in "N" position)?

No → Adjust engine rpm by turning idle adjusting screw.

OR

When disconnecting IAC valve-AAC valve sub-harness connector (F106), does engine rpm fall to 700±50 rpm (in "N" position)?

Yes

6

CHECK THROTTLE POSITION SENSOR IDLE POSITION.

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

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

OR

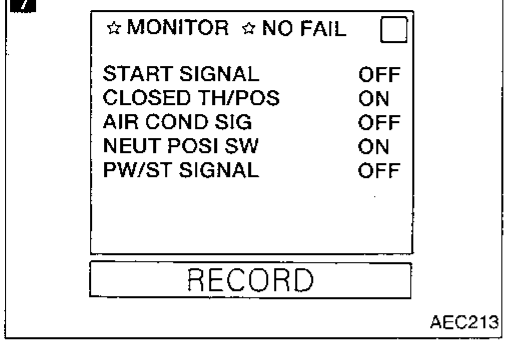
Measure output voltage of throttle position sensor using voltmeter, and check that it is 0.3 to 0.7V. (Throttle valve fully closed.)

OK

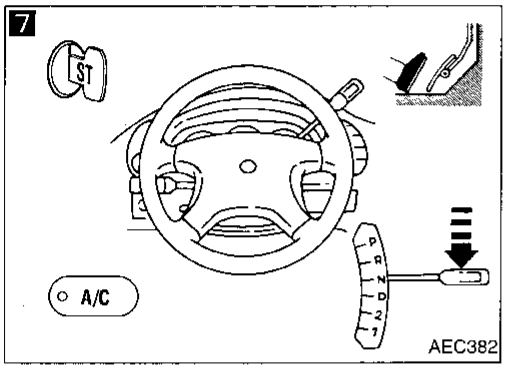
(Go to Ⓑ on next page.)

Basic Inspection (Cont'd)

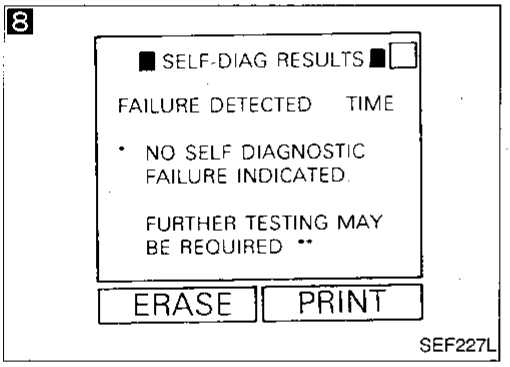
7



7



8



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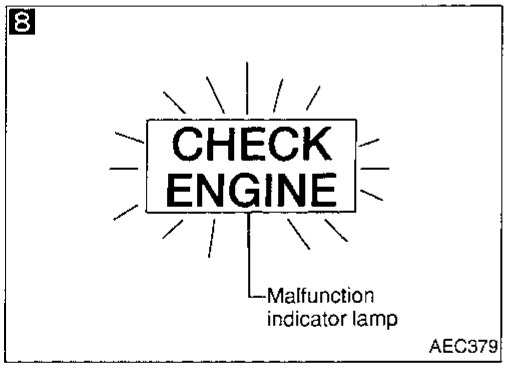


Ⓑ

7

CHECK SWITCH INPUT SIGNAL.

Select the following switches in "DATA MONITOR" mode,

a) Start signal,
b) Closed throttle position,
c) Air conditioning signal,
d) Park/neutral position switch,
e) Power steering pressure switch,

and check the switches' ON-OFF operation.

OR

Perform ECM INPUT/OUTPUT SIGNAL INSPECTION. Refer to EF & EC-158 and test terminals 12, 33, 34, 35, and 41.

NG → Repair or replace the malfunctioning switch or its circuit. For start signal, refer to EF & EC-136. For closed throttle position, refer to EF & EC-133. For park/neutral position switch, refer to EF & EC-156. For power steering pressure switch, refer to EF & EC-154. For air conditioning signal, refer to HA section.

OK ↓

8

READ SELF-DIAGNOSTIC RESULTS.

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

OR

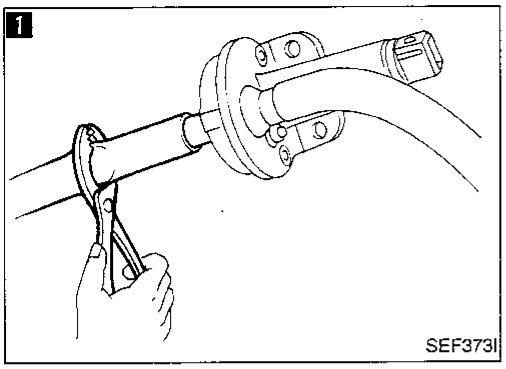
1. Set "Self-diagnostic results mode" in On-board Diagnostic Test Mode II. Refer to EF & EC-38.
2. Count the number of malfunction indicator lamp flashes and read out the diagnostic trouble codes.
3. Are the diagnostic trouble codes being output?

Yes → Go to the relevant inspection procedure. Refer to EF & EC-41.

No ↓

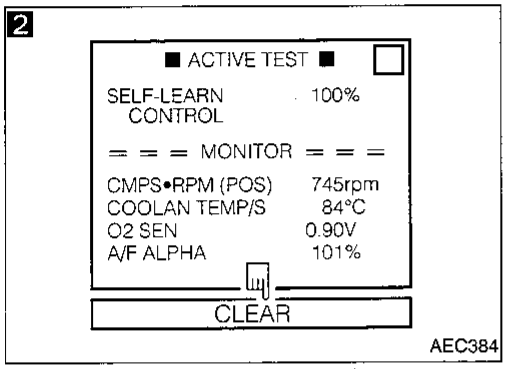
INSPECTION END

1



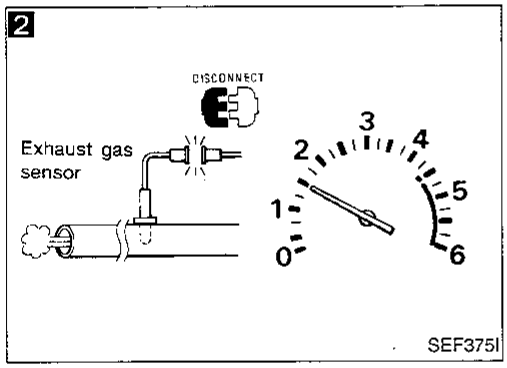
SEF373I

2



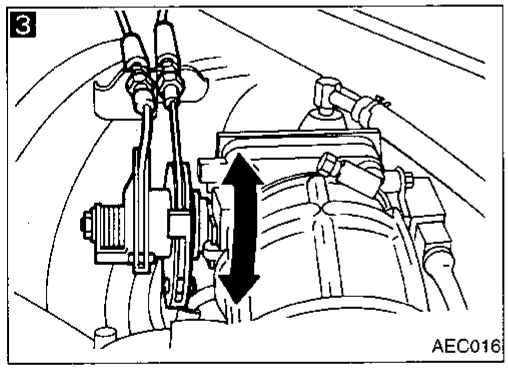
AEC384

2



SEF375I

3



AEC016

Diagnostic Procedure 1 — High Idling after Warm-up

1

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

Yes → Check IAC valve-air regulator and circuit. Refer to EF & EC-138.

No ↓

2

CHECK INTAKE AIR LEAK.

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

Yes → Discover air leak location and repair.

OR

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

No ↓

3

CHECK THROTTLE LINKAGE.

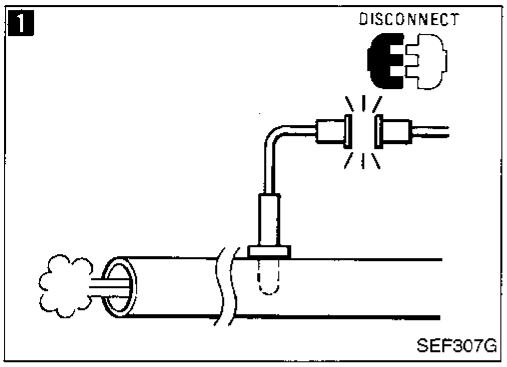
1. Check that throttle linkage moves smoothly.
2. Confirm that throttle valve fully opens and fully closes.

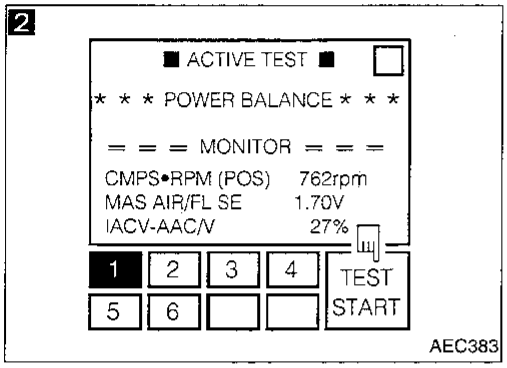
NG → Repair throttle linkage or sticking of throttle valve.

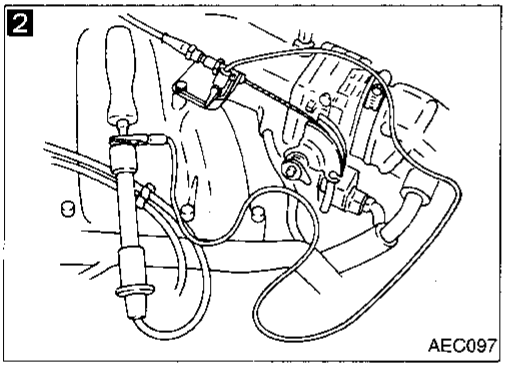
OK ↓

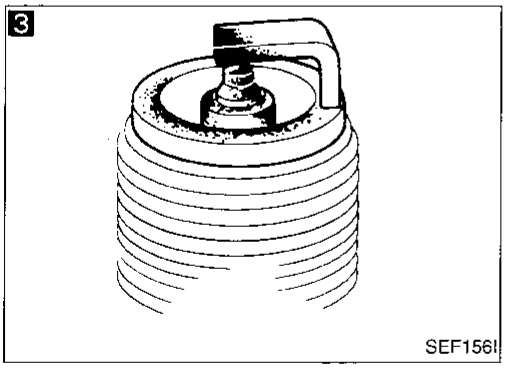
INSPECTION END

Diagnostic Procedure 2 — Hunting









1

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

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

No ↓

2

PERFORM POWER BALANCE TEST.

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

No → Go to **4** .

OR

Disconnect each ignition wire from spark plug and ground it, one at a time, is there any cylinder which does not produce a momentary engine speed drop?

Yes ↓

3

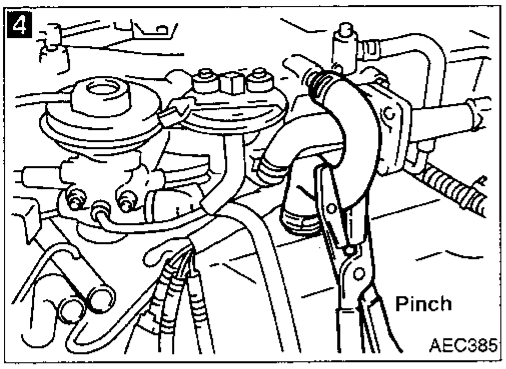
CHECK SPARK PLUGS.
Remove the spark plugs and check for fouling, etc.

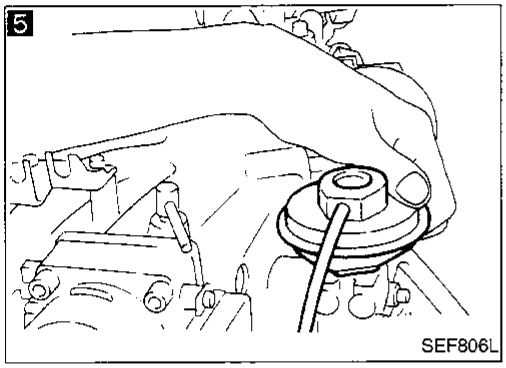
NG → Repair or replace spark plug(s).

OK ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 2 — Hunting (Cont'd)





Ⓐ

4

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

Yes → Discover air leak location and repair.

No

5

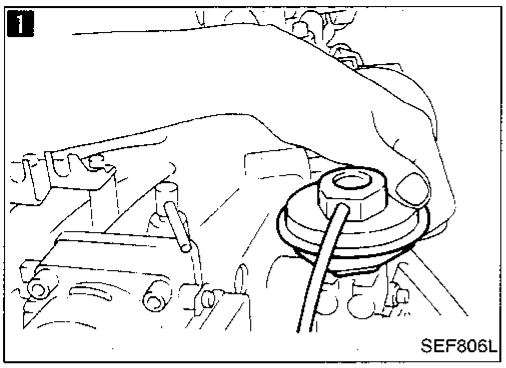
CHECK EGR VALVE.
Check EGR valve for sticking.

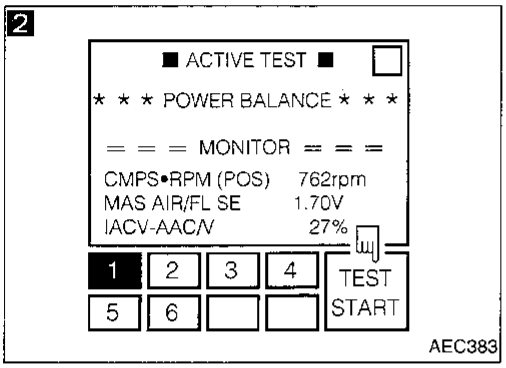
NG → Repair or replace.

OK

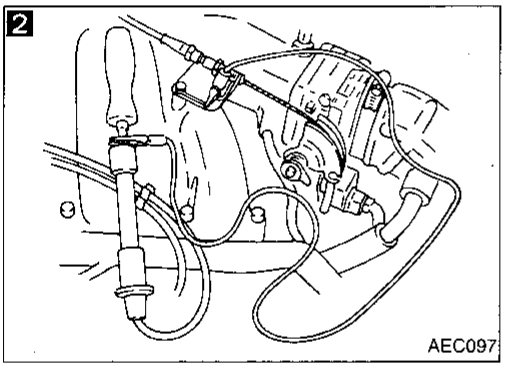
INSPECTION END

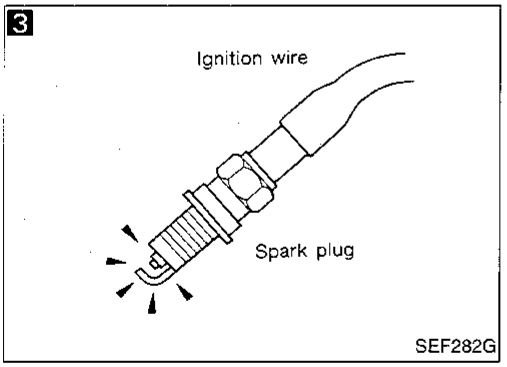
Diagnostic Procedure 3 — Unstable Idle


SEF806L

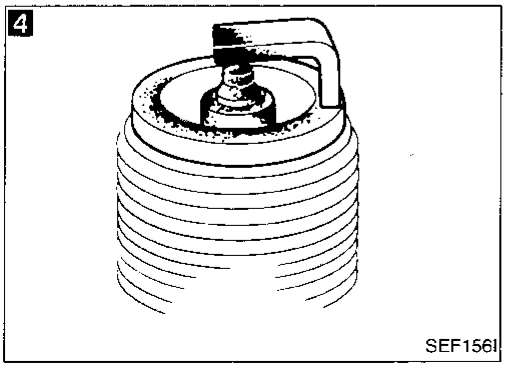


AEC383


AEC097



SEF282G


SEF156I

1

CHECK EGR VALVE.
Check EGR valve for sticking.

NG → Repair or replace.

OK ↓

2

PERFORM POWER BALANCE TEST.

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

OR

Disconnect each ignition wire from spark plug and ground it, one at a time, is there any cylinder which does not produce a momentary engine speed drop?

No → Go to **6** .

Yes ↓

3

CHECK IGNITION SPARK.

1. Disconnect ignition wire from spark plug of cylinder which did not produce a momentary engine speed drop.
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.

NG → Check ignition wire, distributor cap and connections. Refer to EF & EC-177.

OK ↓

4

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

NG → Repair or replace spark plug(s).

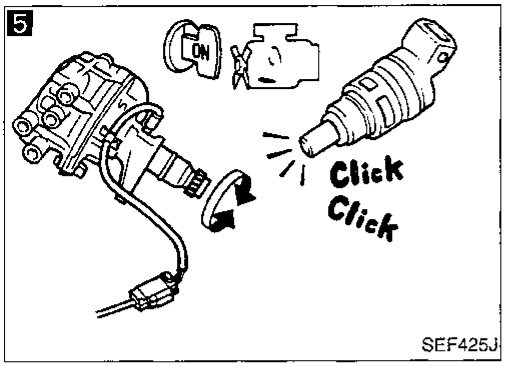
OK ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 3 — Unstable Idle (Cont'd)

Ⓐ

5



SEF425J

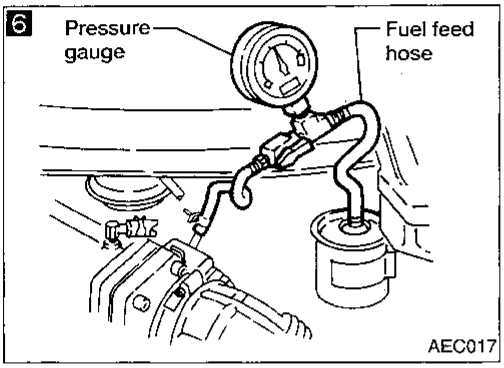
CHECK INJECTOR.

1. Remove distributor from engine. (Camshaft position sensor harness connector should remain connected.)
2. Turn ignition switch "ON". (Do not start engine.)
3. When rotating distributor shaft slowly by hand, does each injector make an operating sound?

No → Check injector(s) and circuit(s). Refer to EF & EC- 127.

Yes ↓

6



AEC017

CHECK FUEL PRESSURE.

1. Release fuel pressure to zero. Refer to EF & EC-171.
2. Install fuel pressure gauge and check fuel pressure.

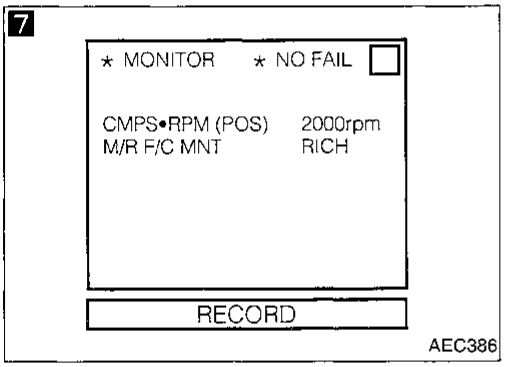
At idle:

Approx. 235 kPa
(2.4 kg/cm², 34 psi)

NG → Check fuel pump and circuit. Refer to EF & EC-130.

OK ↓

7



AEC386

CHECK HEATED OXYGEN SENSOR.

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

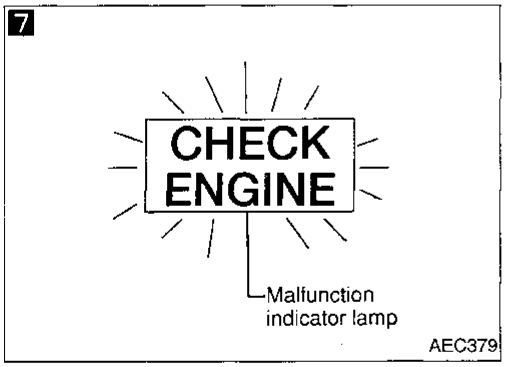
RICH→LEAN→RICH→
1 time 2 times
LEAN→RICH.....

NG → Replace heated oxygen sensor.

OR

1. Set "Heated oxygen sensor monitor" in the 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 goes ON and OFF more than 5 times during 10 seconds.

7

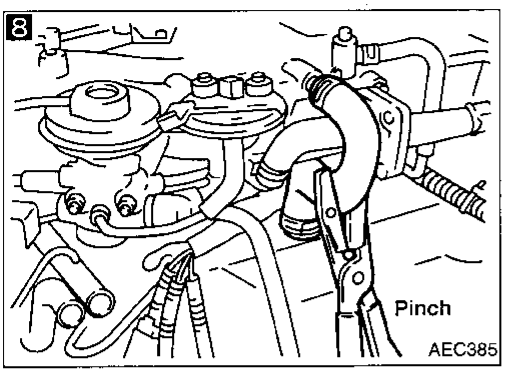


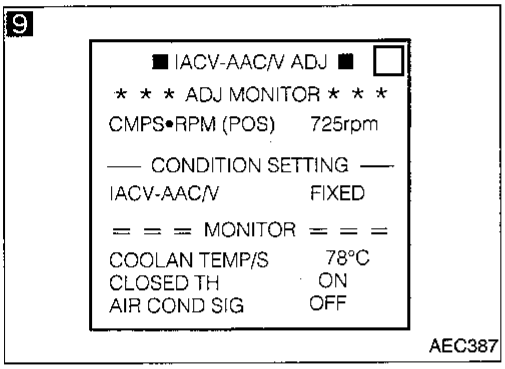
AEC379

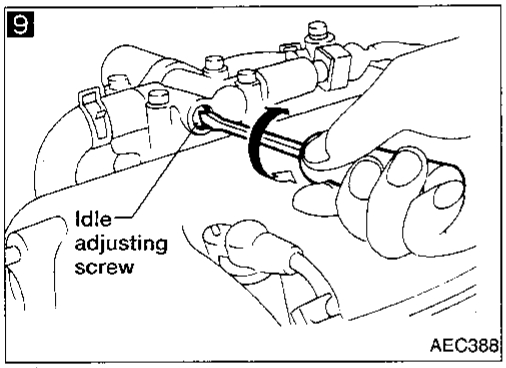
OK ↓

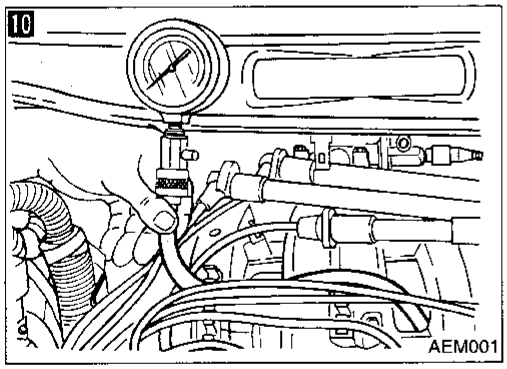
(Go to Ⓑ on next page.)

Diagnostic Procedure 3 — Unstable Idle (Cont'd)









Ⓑ

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

Yes → Discover air leak location and repair.

No ↓

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

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

No → Check for IAS clogging or throttle valve clogging.

OR

1. Disconnect IAC valve-AAC valve sub-harness connector (F106).
2. Can you set engine rpm at 700±50 rpm (in "N" position) by turning idle adjusting screw?

Yes ↓

10 **CHECK COMPRESSION PRESSURE.**
Refer to EM section ("Measurement of Compression Pressure", "COMPRESSION PRESSURE").

- Check compression pressure.

Standard: kPa (kg/cm², psi)/300 rpm
1,196 (12.2, 173)
Minimum: kPa (kg/cm², psi)/300 rpm
883 (9.0, 128)
Difference between each cylinder: kPa (kg/cm²,psi)/300 rpm
98 (1.0, 14)

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

OK ↓

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-158.

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

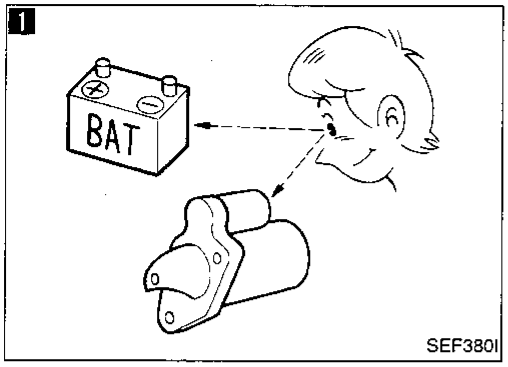
Trouble is not fixed. ↓

TRY A KNOWN GOOD ECM.

↓

INSPECTION END

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

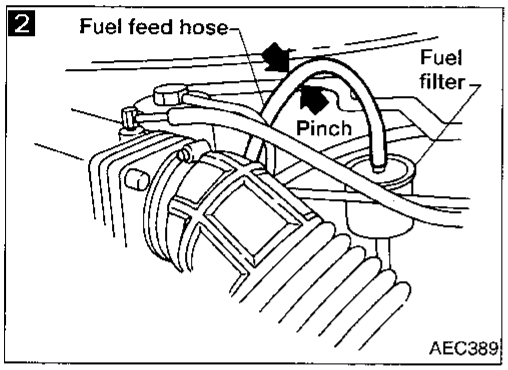


1

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

NG → Repair or replace.

OK ↓

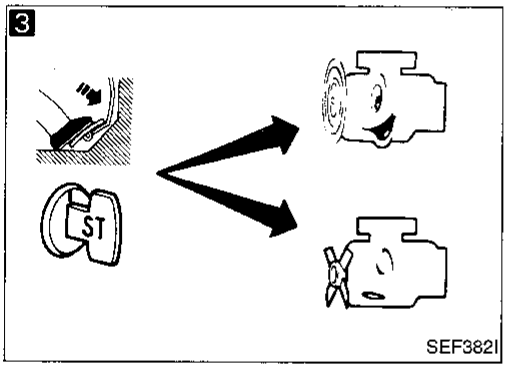


2

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

No → Check fuel pump and circuit. Refer to EF & EC-130.

Yes ↓

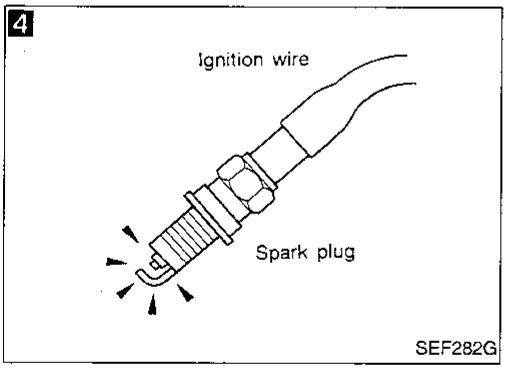


3

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

Yes → Check IAC valve-AAC valve, IAC valve-air regulator and circuits. Refer to EF & EC-138 and EF & EC-140.

No ↓

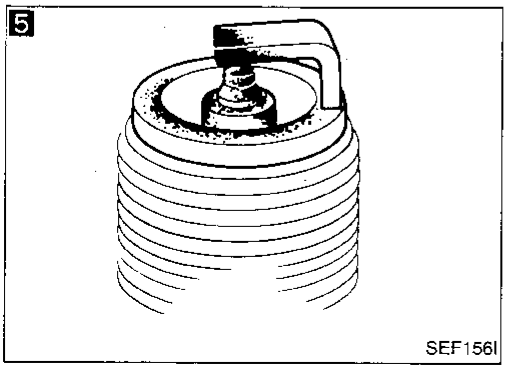


4

CHECK IGNITION SPARK.
1. Disconnect ignition wire from spark plug.
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.

NG → Check ignition coil, power transistor unit and their circuits. Refer to EF & EC- 106.

OK ↓



5

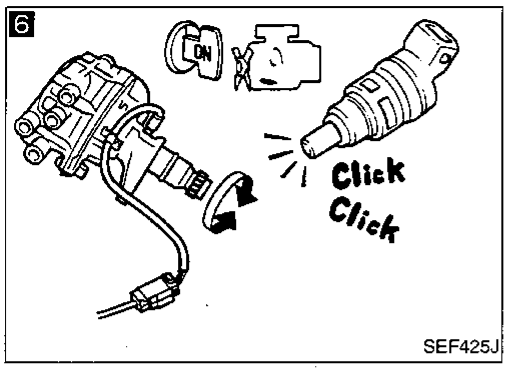
CHECK SPARK PLUGS.
Remove the spark plugs and check for fouling, etc.

NG → Repair or replace spark plug(s).

OK ↓

(Go to Ⓐ on next page.)

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



(A)

6

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

No → Check injector(s) and circuit(s). Refer to EF & EC-127.

Yes ↓

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-158.

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

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

NG → Repair or replace.

OK ↓

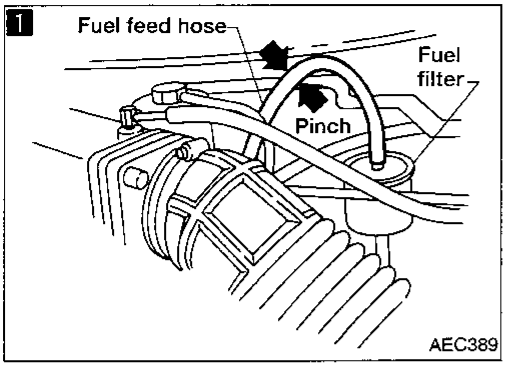
TRY A KNOWN GOOD ECM.

↓

INSPECTION END

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

1

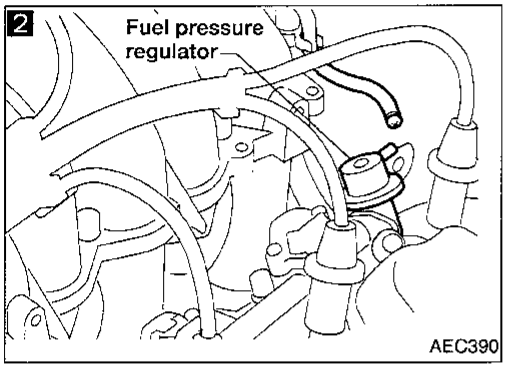


CHECK FUEL PRESSURE.
1. Pinch fuel feed hose with fingers.
2. When cranking the engine, is there any pressure on the fuel feed hose?

No → Check fuel pump and circuit. Refer to EF & EC-130.

Yes ↓

2

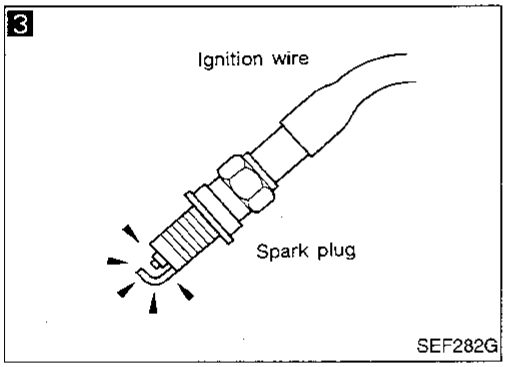


CHECK FUEL VAPOR.
1. Disconnect fuel pressure regulator vacuum hose and plug hose.
2. Can you start engine?

Yes → Check fuel properties.

No ↓

3

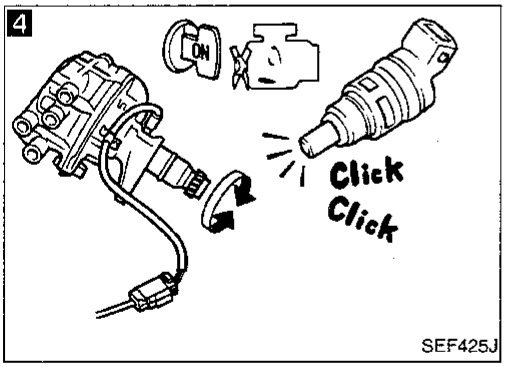


CHECK IGNITION SPARK.
1. Disconnect ignition wire from spark plug.
2. Connect a known good spark plug to the ignition wire
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

NG → Check ignition coil, power transistor unit and circuits. Refer to EF & EC-106.

OK ↓

4



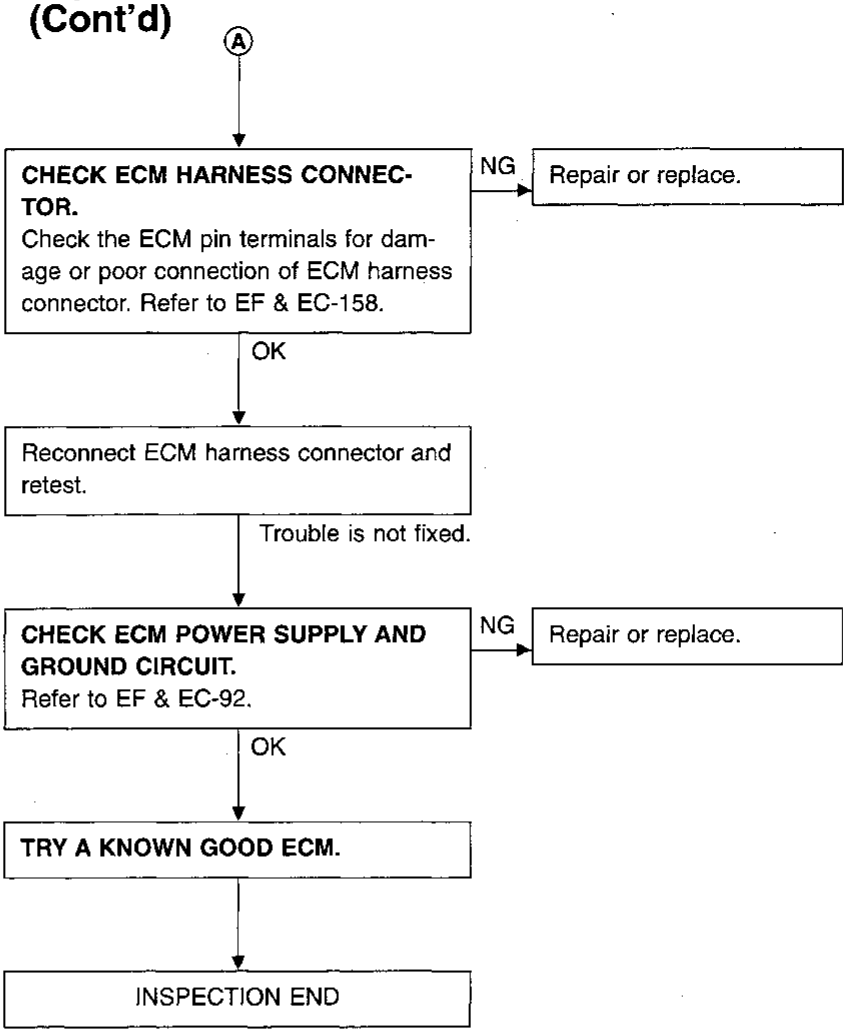
CHECK INJECTOR.
1. Remove distributor from engine. (Camshaft position sensor harness connector should remain connected.)
2. Turn ignition switch "ON". (Do not start engine.)
3. When rotating distributor shaft slowly by hand, does each injector make an operating sound?

No → Check injector(s) and circuit(s). Refer to EF & EC-127.

Yes ↓

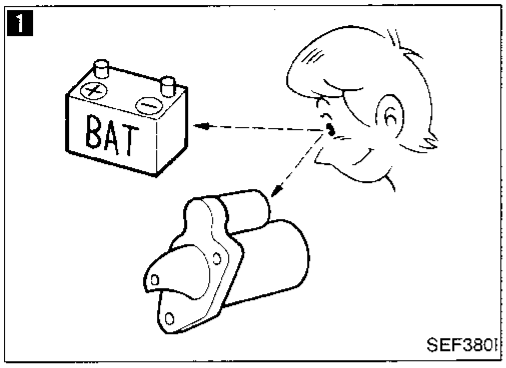
(Go to Ⓐ on next page.)

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



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

1



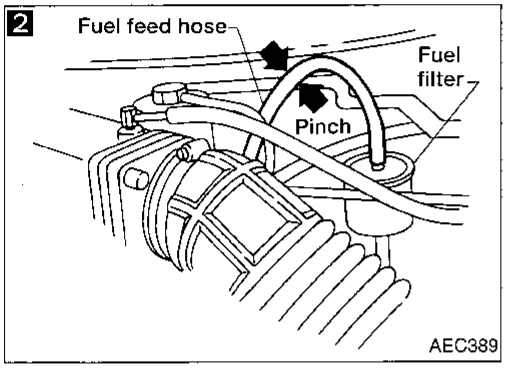
SEF380I

CHECK BATTERY AND STARTER.
Check battery and starter operation.
Refer to EL section ("SPECIFIC GRAVITY CHECK", "BATTERY") and ("Trouble Diagnoses", "CHARGING SYSTEM").

NG → Repair or replace.

OK ↓

2



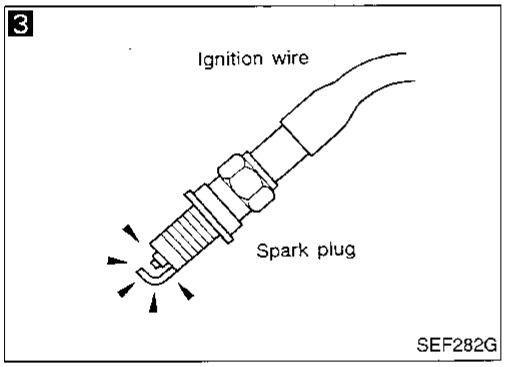
AEC389

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

No → Check fuel pump and circuit. Refer to EF & EC-130.

Yes ↓

3



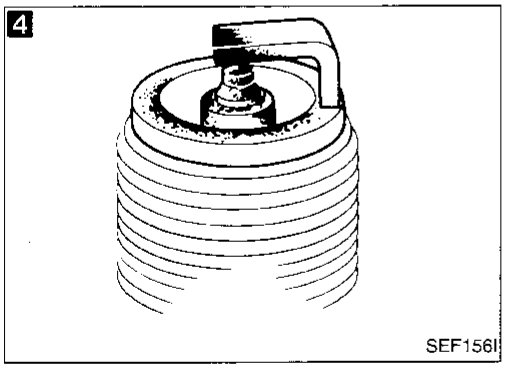
SEF282G

CHECK IGNITION SPARK.
1. Disconnect ignition wire from spark plug.
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.

NG → Check ignition coil, power transistor unit and circuits. Refer to EF & EC-106.

OK ↓

4

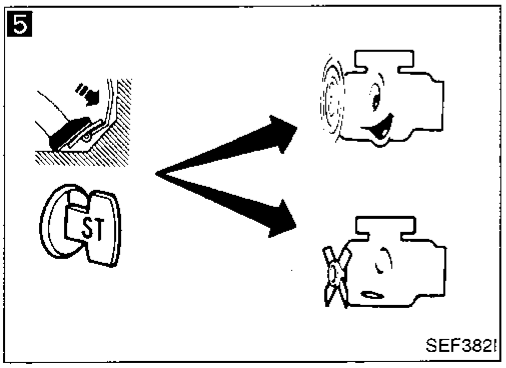

SEF156I

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

NG → Repair or replace spark plug(s).

OK ↓

5



SEF382I

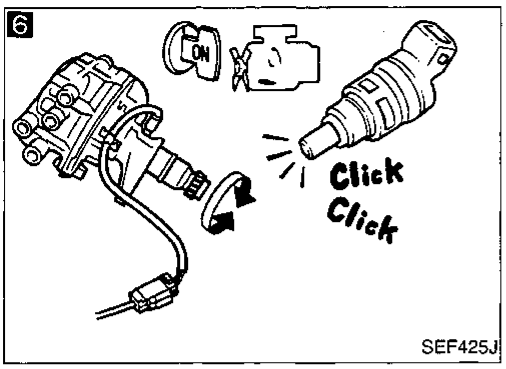
CHECK INJECTOR FOR LEAKAGE.
When pressing accelerator pedal fully, can you start the engine.

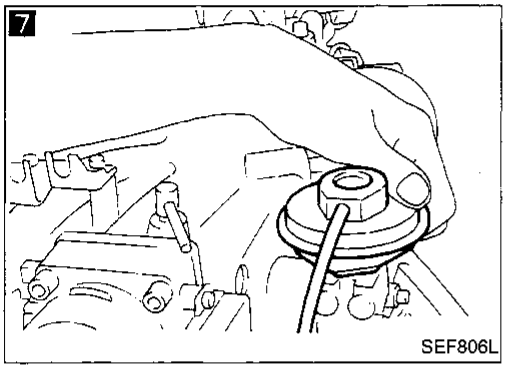
Yes → Check injector(s) for leakage. Refer to EF & EC-125.

No ↓

(Go to Ⓐ on next page.)

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





Ⓐ

6

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

No → Check injector(s) and circuits. Refer to EF & EC-127.

Yes

7

CHECK EGR VALVE.
Check EGR valve for sticking.

NG → Repair or replace.

OK

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-158.

NG → Repair or replace.

OK

Reconnect ECM harness connector and retest.

Trouble is not fixed.

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

NG → Repair or replace.

OK

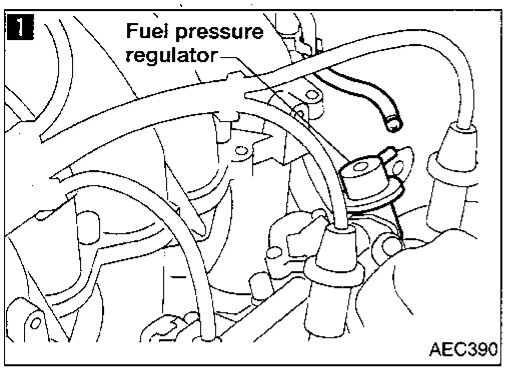
TRY A KNOWN GOOD ECM.

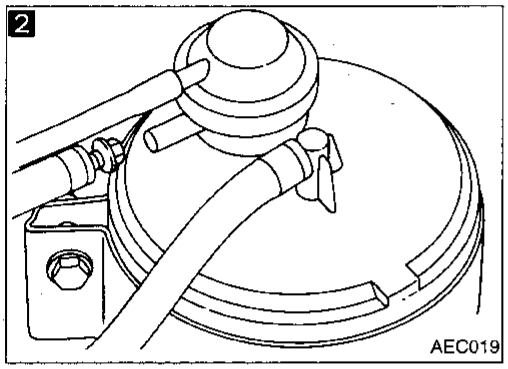
CHECK TIMING BELT FOR PROPER INSTALLATION.

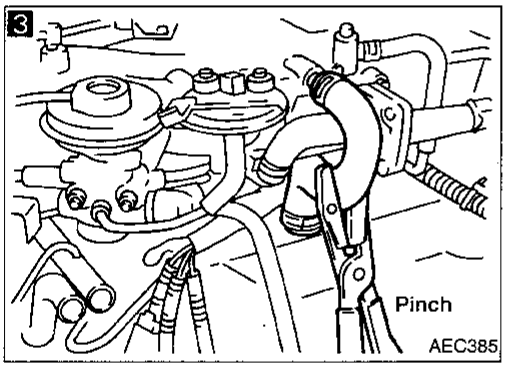
NG → Properly install new timing belt. Refer to EM section ("Installation", "TIMING BELT").

OK

INSPECTION END







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 line. Refer to EF & EC-174.

No ↓

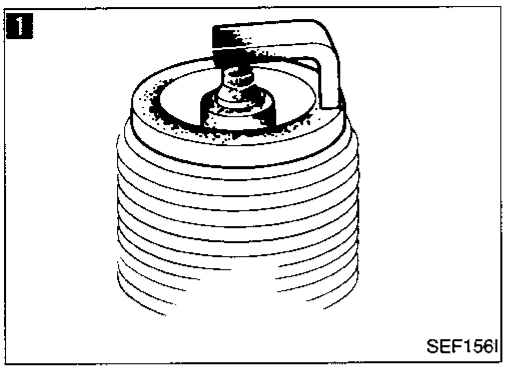
3

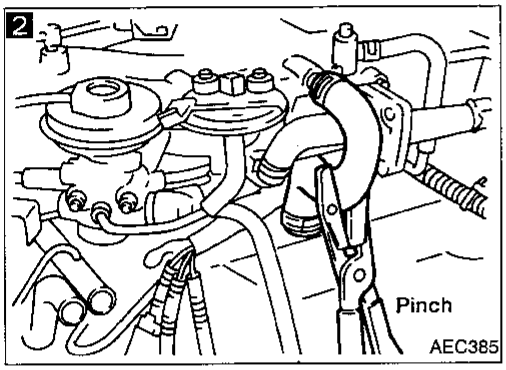
CHECK FOR INTAKE AIR LEAK.
When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

Yes → Discover air leak location and repair.

No ↓

INSPECTION END





Diagnostic Procedure 8 — Hesitation when the Engine is Cold

1

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

NG → Repair or replace spark plug(s).

OK ↓

2

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

Yes → Discover air leak location and repair.

No ↓

TRY A KNOWN GOOD MASS AIR FLOW SENSOR.

Trouble is fixed. → Replace mass air flow sensor.

Trouble is not fixed. ↓

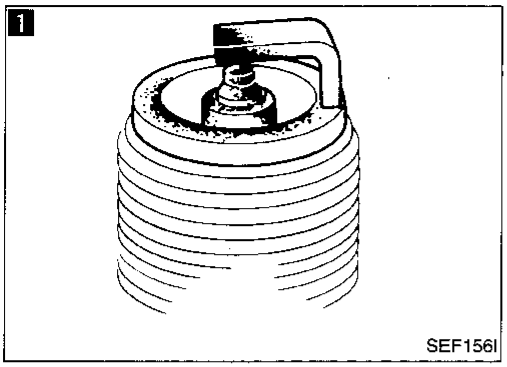
CHECK FOR INTAKE VALVE DEPOSITS.
If there are deposits on intake valves, remove them.

↓

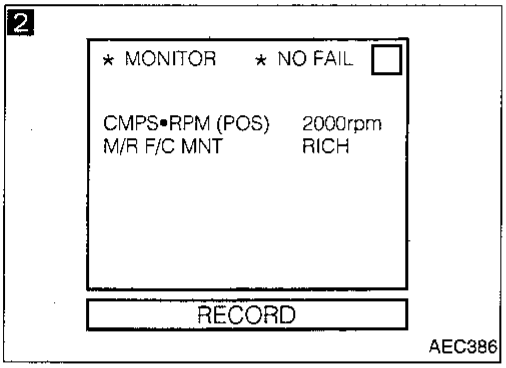
INSPECTION END

Diagnostic Procedure 9 — Hesitation under Normal Conditions

1

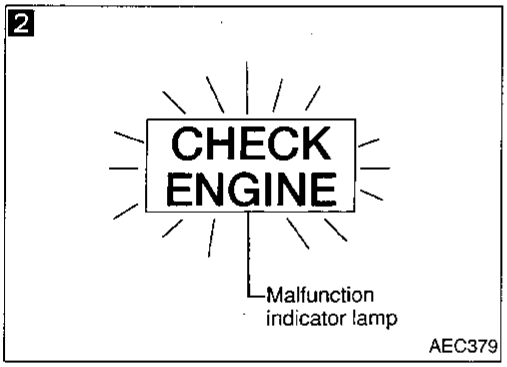

SEF156I

2



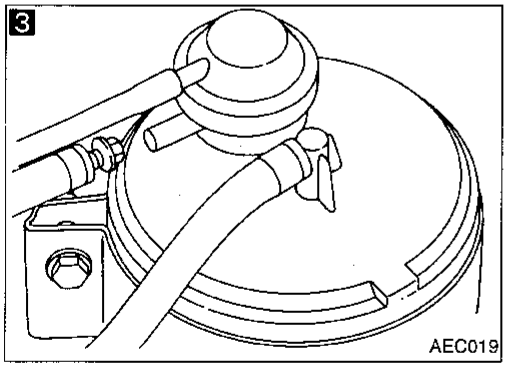
AEC386

2

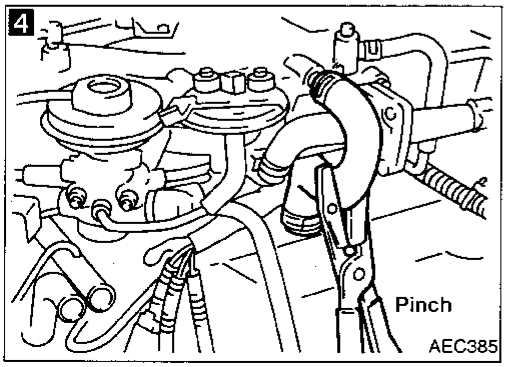


AEC379

3


AEC019

4



AEC385

1

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

NG → Repair or replace spark plug(s).

OK ↓

2

CHECK HEATED OXYGEN SENSOR.

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

NG → Replace heated oxygen sensor.

OR

1. Set "Heated 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 goes ON and OFF more than 5 times during 10 seconds.

OK ↓

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 line. Refer to EF & EC-174.

No ↓

4

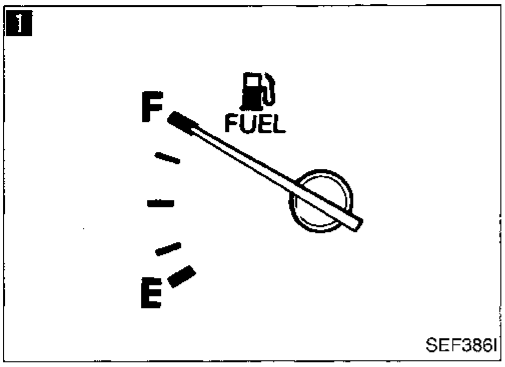
CHECK FOR INTAKE AIR LEAK.
When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise?

Yes → Discover air leak location and repair.

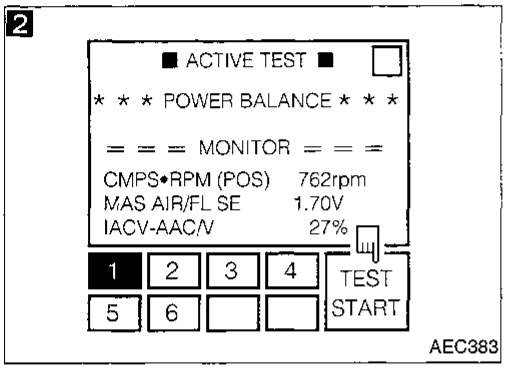
No ↓

INSPECTION END

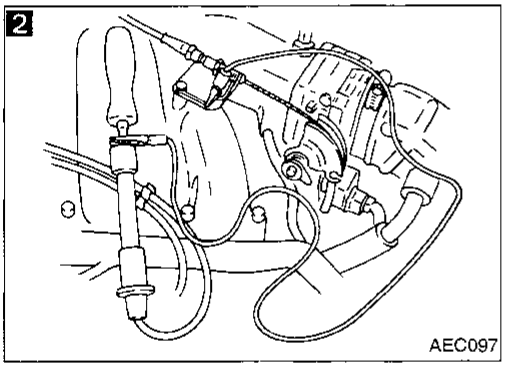
Diagnostic Procedure 10 — Engine Stalls when Turning

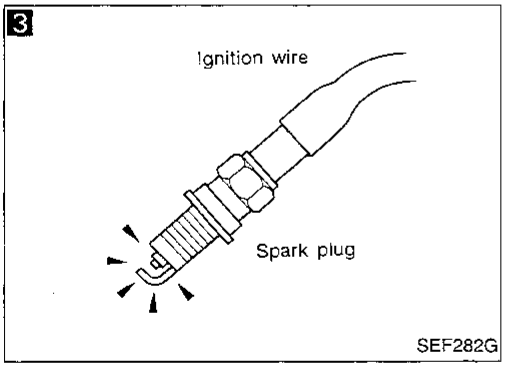


SEF386I

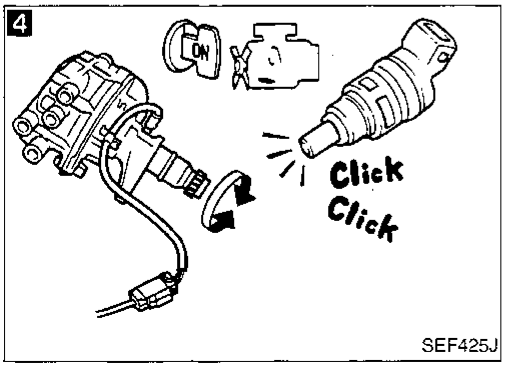


AEC383


AEC097



SEF282G



SEF425J

1

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

NG → Fill fuel tank with fuel.

OK ↓

2

PERFORM POWER BALANCE TEST.

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

No → Go to **5**.

OR

Disconnect each ignition wire from spark plug and ground it, one at a time, is there any cylinder which does not produce a momentary engine speed drop?

Yes ↓

3

CHECK IGNITION SPARK.

1. Disconnect ignition wire from spark plug.
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.

NG → Check ignition coil, power transistor unit and circuits. Refer to EF & EC-106.

OK ↓

4

CHECK INJECTOR.

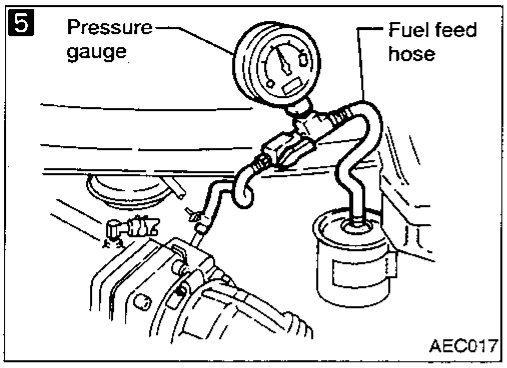
1. Remove distributor from engine. (Camshaft position sensor harness connector should remain connected.)
2. Turn ignition switch "ON". (Do not start engine.)
3. When rotating distributor shaft slowly by hand, does each injector make an operating sound?

No → Check injector(s) and circuit(s). Refer to EF & EC-127.

Yes ↓

(Go to Ⓐ on next page.)

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



Ⓐ

5

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. Refer to EF & EC-171.
2. Install fuel pressure gauge and check fuel pressure.

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

NG → Check fuel pressure regulator diaphragm. Refer to EF & EC-171.

OK ↓

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-158.

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

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

NG → Repair or replace.

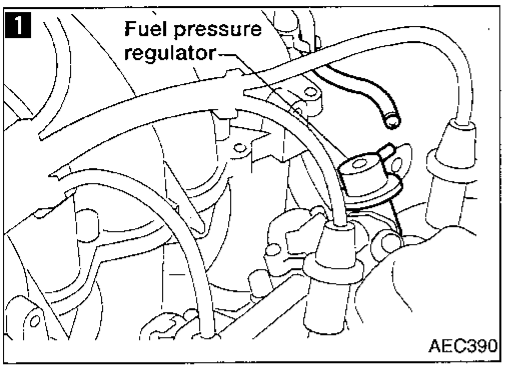
OK ↓

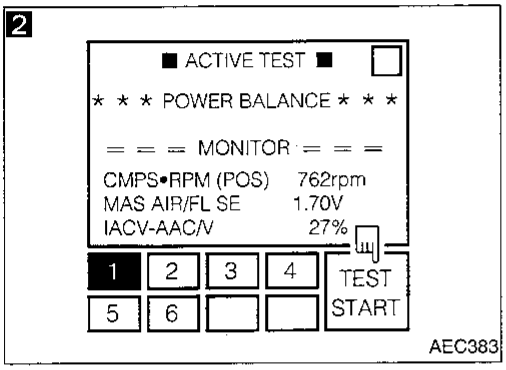
TRY A KNOWN GOOD ECM.

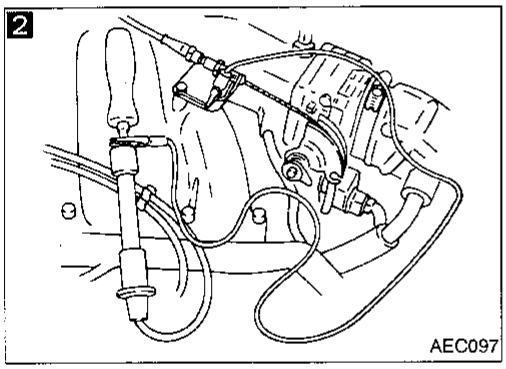
↓

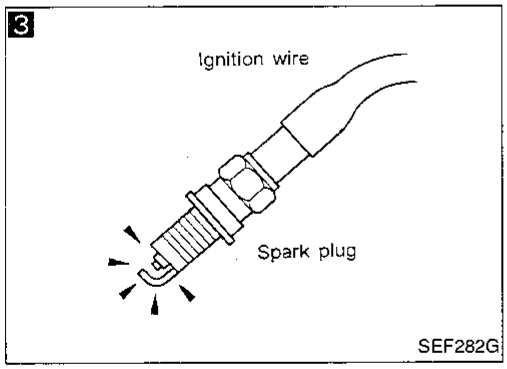
INSPECTION END

Diagnostic Procedure 11 — Engine Stalls when the Engine is Hot









1

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

Yes → Check fuel properties.

No ↓

2

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

OR

Disconnect each ignition wire from spark plug and ground it, one at a time, is there any cylinder which does not produce a momentary engine speed drop?

No → Go to **5** .

Yes ↓

3

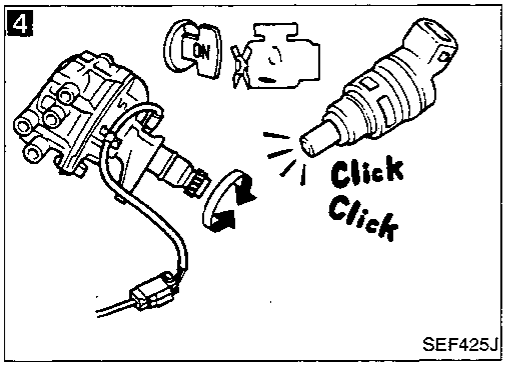
CHECK IGNITION SPARK.
1. Disconnect ignition wire from spark plug.
2. Connect a known good spark plug to the ignition wire.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

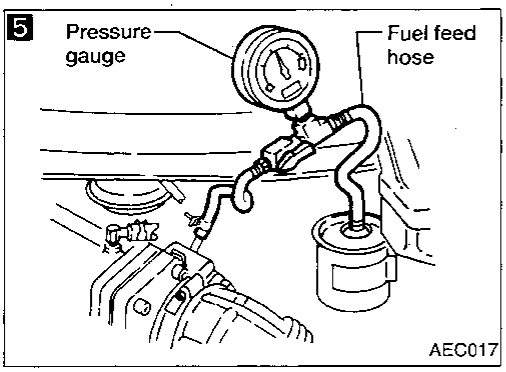
NG → Check ignition coil, power transistor unit and their circuits. Refer to EF & EC-106.

OK ↓

(Go to Ⓐ on next page.)

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





Ⓐ

4

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

No → Check injector(s) and circuit(s). Refer to EF & EC-127.

Yes

5

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. Refer to EF & EC-171.
2. Install fuel pressure gauge and check fuel pressure.

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

NG → Check fuel pressure regulator diaphragm. Refer to EF & EC-171.

OK

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-158.

NG → Repair or replace.

OK

Reconnect ECM harness connector and retest.

Trouble is not fixed.

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

NG → Repair or replace.

OK

TRY A KNOWN GOOD ECM.

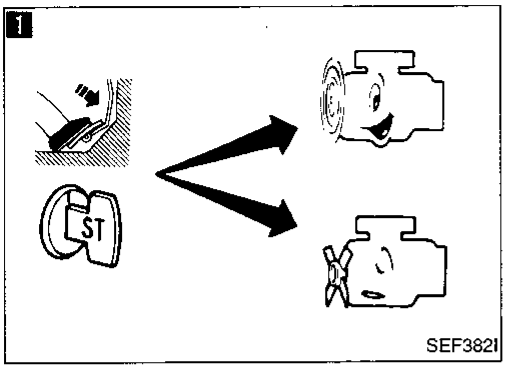
CHECK TIMING BELT FOR PROPER INSTALLATION.

NG → Properly install new timing belt. Refer to EM section ("Installation", "TIMING BELT").

OK

INSPECTION END

Diagnostic Procedure 12 — Engine Stalls when the Engine is Cold

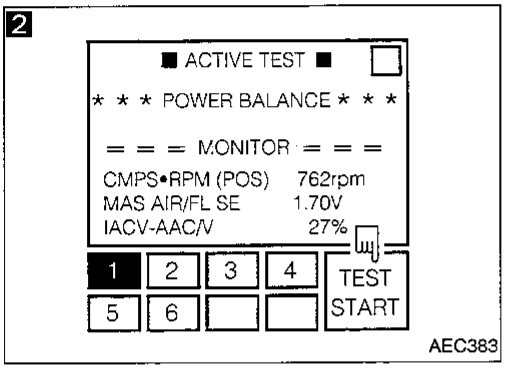


1

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

NG → Check IAC valve-AAC valve, IAC valve-air regulator and circuits. Refer to EF & EC-138 and EF & EC-140.

OK ↓



2

PERFORM POWER BALANCE TEST.

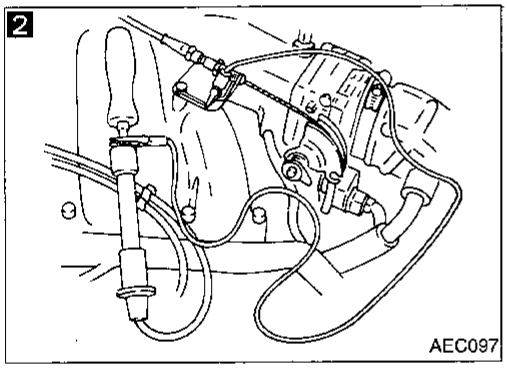
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

NG → Go to 6 .

OR

Disconnect each ignition wire from spark plug and ground it, one at a time, is there any cylinder which does not produce a momentary engine speed drop?

OK ↓



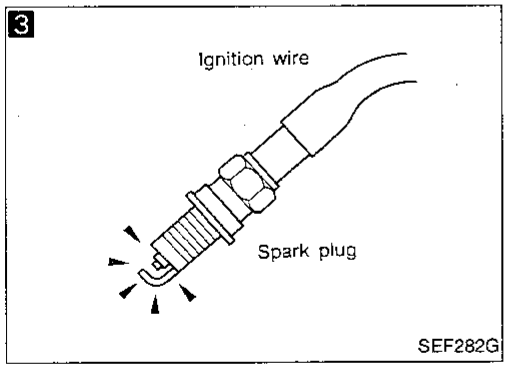
3

CHECK IGNITION SPARK.

1. Disconnect ignition wire from spark plug.
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.

NG → Check ignition coil, power transistor unit and circuits. Refer to EF & EC-106.

OK ↓

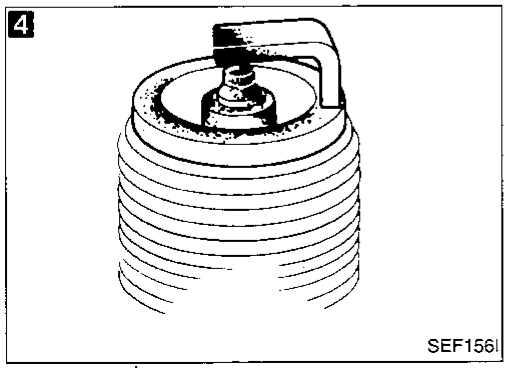


4

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

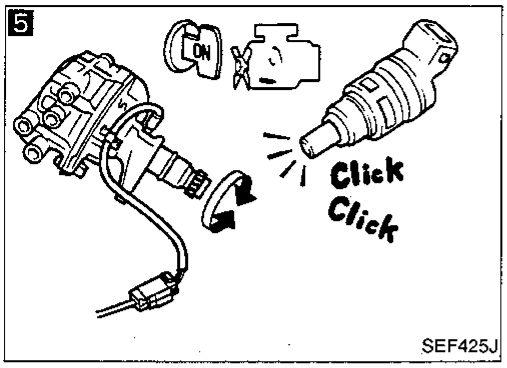
NG → Repair or replace spark plug(s).

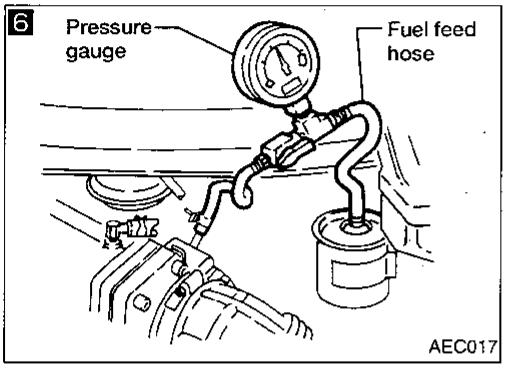
OK ↓



(Go to Ⓐ on next page.)

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





Ⓐ

5

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

NG → Check injector(s) and circuit(s). Refer to EF & EC-127.

OK ↓

6

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. Refer to EF & EC-171.
2. Install fuel pressure gauge and check fuel pressure.

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

NG → Check fuel pressure regulator diaphragm. Refer to EF & EC-171.

OK ↓

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-158.

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

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

NG → Repair or replace.

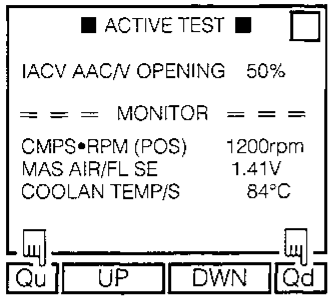
OK ↓

TRY A KNOWN GOOD ECM.

↓

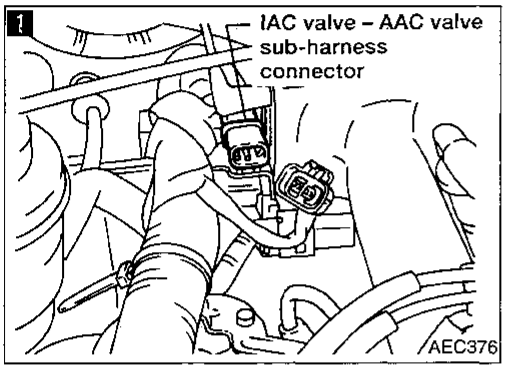
INSPECTION END

1



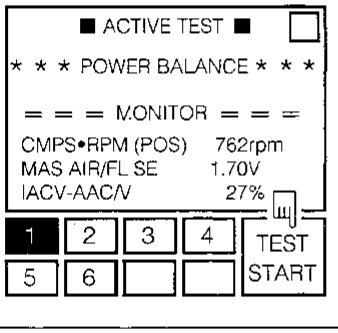
AEC391

1



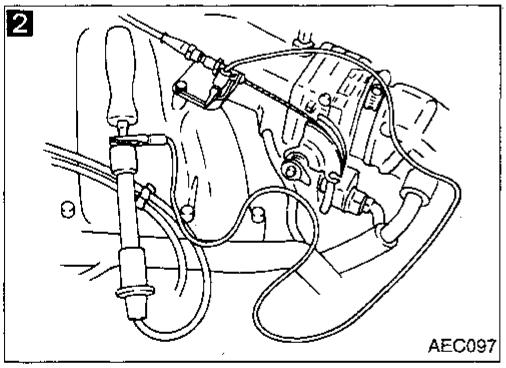
AEC376

2



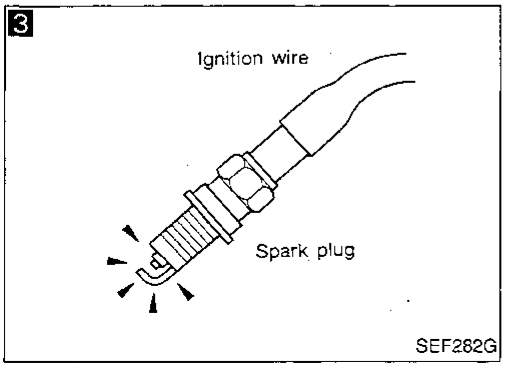
AEC383

2



AEC097

3



SEF282G

Diagnostic Procedure 13 — Engine Stalls when Accelerator is Momentarily Pressed and Released

1

CHECK IAC VALVE-AAC/V VALVE.

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

OR

When disconnecting IAC valve-AAC valve sub-harness connector (F106), does the engine speed drop?

No → Check IAC valve-AAC valve and circuit. Refer to EF & EC-140.

Yes ↓

2

PERFORM POWER BALANCE TEST.

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

OR

Disconnect each ignition wire from spark plug and grount it, one at a time, is there any cylinder which does not produce a momentary engine speed drop?

No → Go to 5 .

Yes ↓

3

CHECK IGNITION SPARK.

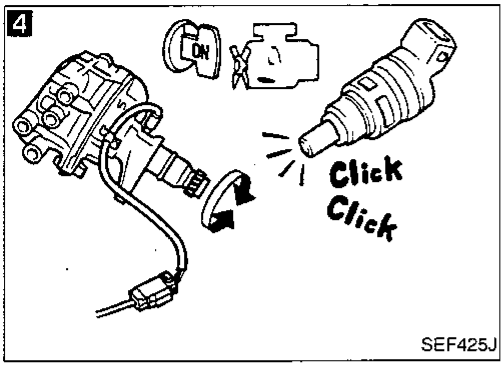
1. Disconnect ignition wire from spark plug.
2. Connect a known good spark plug to the ignition wire.
3. Place end of spark plug against an ground point with engine cranking.
4. Check for spark.

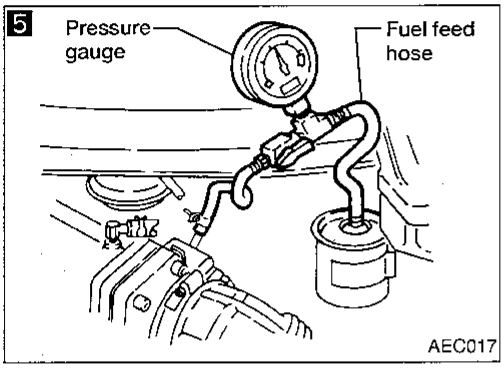
NG → Check ignition coil, power transistor unit and their circuits. Refer to EF & EC-106.

OK ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 13 — Engine Stalls when Accelerator is Momentarily Pressed and Released (Cont'd)





Ⓐ

4

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

No → Check injector(s) and their circuit(s). Refer to EF & EC-127.

Yes

5

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. Refer to EF & EC-171.
2. Install fuel pressure gauge and check fuel pressure.

At idle:
Approx. 235 kPa (2.4 kg/cm^2, 34 psi)
The moment throttle valve is fully open:
Approx. 294 kPa (3.0 kg/cm^2, 43 psi)

NG → Check fuel pressure regulator diaphragm. Refer to EF & EC-171.

OK

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-158.

NG → Repair or replace.

OK

Reconnect ECM harness connector and retest.

Trouble is not fixed.

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

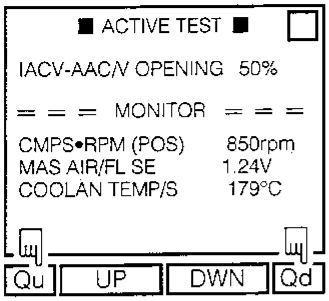
NG → Repair or replace.

OK

TRY A KNOWN GOOD ECM.

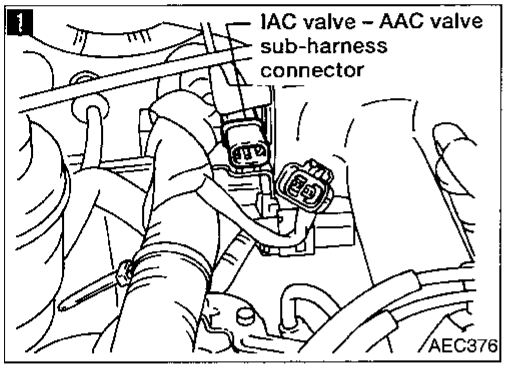
INSPECTION END

1



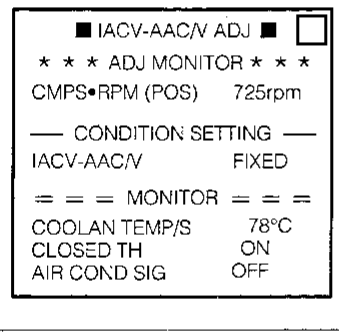
AEC392

1



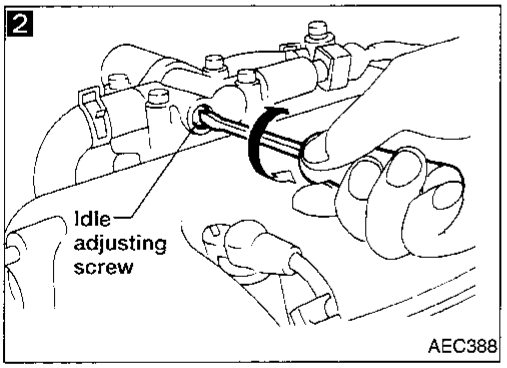
AEC376

2



AEC387

2



AEC388

Diagnostic Procedure 14 — Engine Stalls after Decelerating

1

CHECK IAC VALVE-AAC VALVE.

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

OR

When disconnecting IAC valve-AAC valve sub-harness connector (F106), does the engine speed drop?

No → Check IAC valve-AAC valve and circuit. Refer to EF & EC-140.

Yes ↓

2

CHECK IDLE ADJ. SCREW CLOGGING.

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

OR

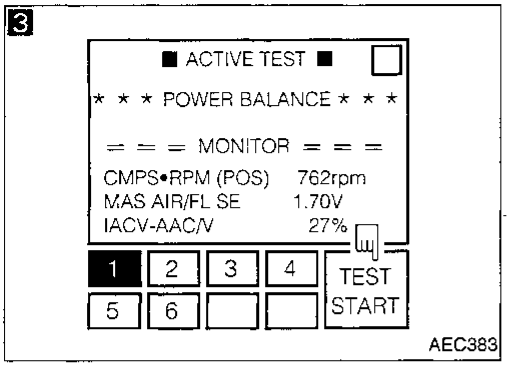
1. Disconnect IAC valve-AAC valve sub-harness connector (F106).
2. Can you set engine rpm at 700±50 rpm (in "N" position) by turning idle adjusting screw?

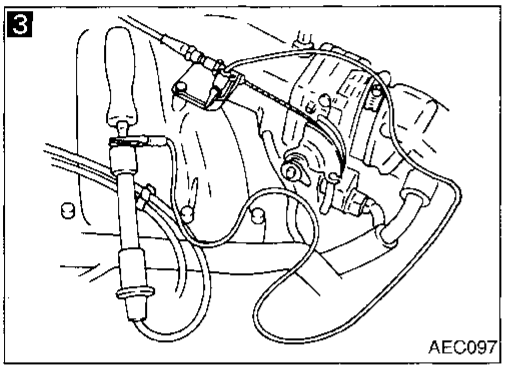
No → Check idle adjusting screw on throttle body passages for clogging.

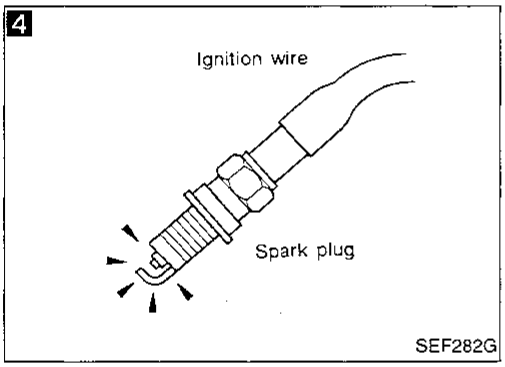
Yes ↓

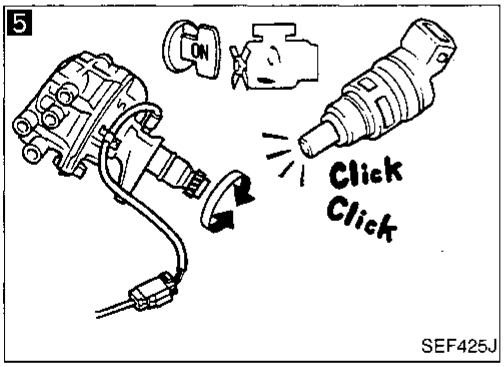
(Go to Ⓐ on next page.)

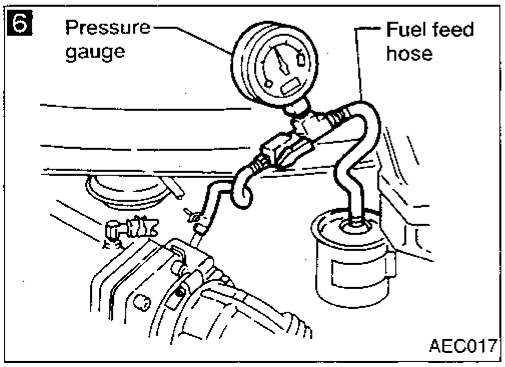
Diagnostic Procedure 14 — Engine Stalls after Decelerating (Cont'd)











Ⓐ

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 —

Disconnect each ignition wire from spark plug and ground it, one at a time, is there any cylinder which does not produce a momentary engine speed drop?

No → Go to **6** .

Yes ↓

4 **CHECK IGNITION SPARK.**

1. Disconnect ignition wire from spark plug.
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.

No → Check ignition coil, power transistor unit and circuits. Refer to EF & EC-106.

Yes ↓

5 **CHECK INJECTOR.**

1. Remove distributor from engine. (Camshaft position sensor harness connector should remain connected.)
2. Turn ignition switch "ON". (Do not start engine.)
3. When rotating distributor shaft slowly by hand, does each injector make an operating sound?

No → Check injector(s) and circuit(s). Refer to EF & EC-127.

Yes ↓

6 **CHECK FUEL PRESSURE.**

1. Release fuel pressure to zero. Refer to EF & EC-171.
2. Install fuel pressure gauge and check fuel pressure.

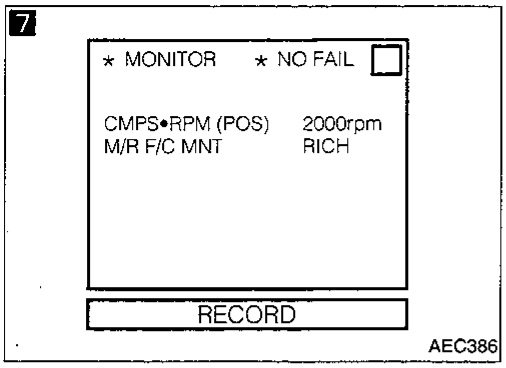
At idle:
Approx. 235 kPa
(2.4 kg/cm^2, 34 psi)
The moment throttle valve is fully open:
Approx. 294 kPa
(3.0 kg/cm^2, 43 psi)

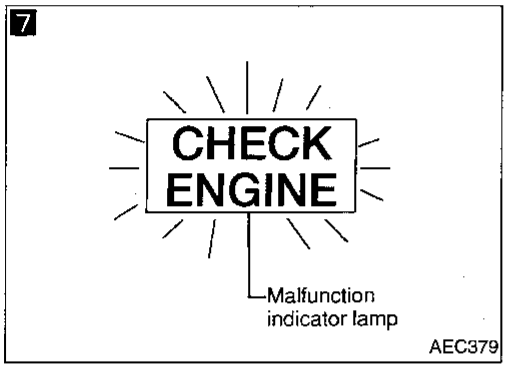
NG → Check fuel pressure regulator diaphragm. Refer to EF & EC-171.

OK ↓

(Go to Ⓑ on next page.)

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





Ⓑ

7

CHECK HEATED OXYGEN SENSOR.

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

NG → Replace heated oxygen sensor.

OR

1. Set "Heated 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 goes ON and OFF more than 5 times during 10 seconds.

OK ↓

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-158.

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

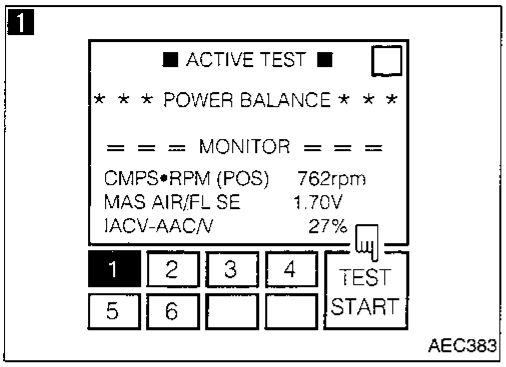
CHECK ECM POWER SUPPLY AND GROUND CIRCUIT.
Refer to EF & EC-92.

NG → Repair or replace.

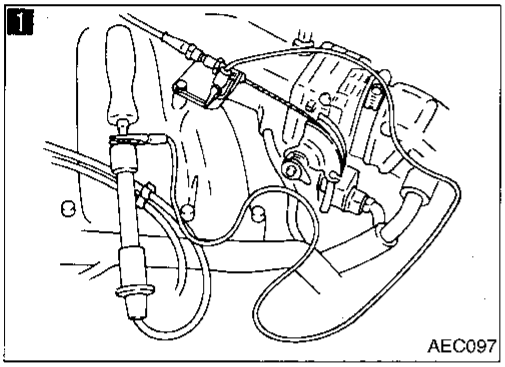
OK ↓

TRY A KNOWN GOOD ECM.

INSPECTION END



AEC383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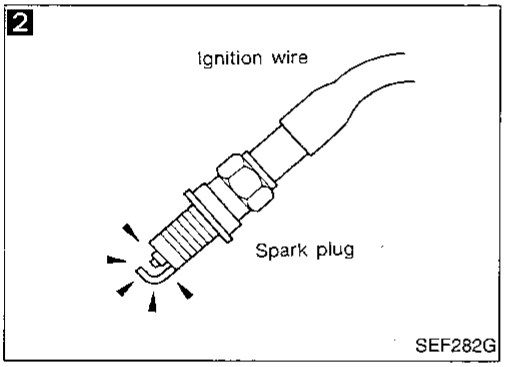
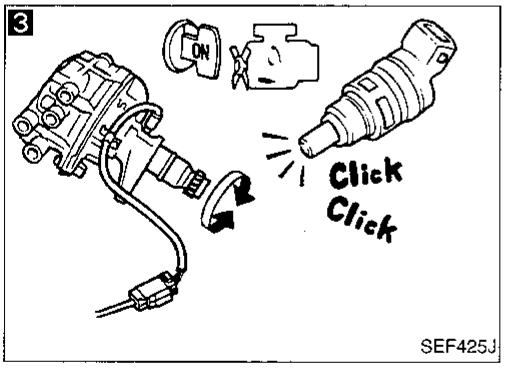


SEF282G



SEF425J

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

Disconnect each ignition wire from spark plug and ground it, one at a time, is there any cylinder which does not produce a momentary engine speed drop?

Yes ↓

2

CHECK IGNITION SPARK.

1. Disconnect ignition wire from spark plug.
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.

No → Check ignition coil, power transistor unit and circuits. Refer to EF & EC-106.

Yes ↓

3

CHECK INJECTOR.

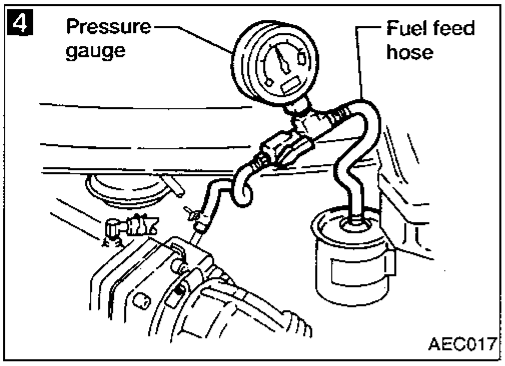
1. Remove distributor from engine. (Camshaft position sensor harness connector should remain connected.)
2. Turn ignition switch "ON". (Do not start engine.)
3. When rotating distributor shaft slowly by hand, does each injector make an operating sound?

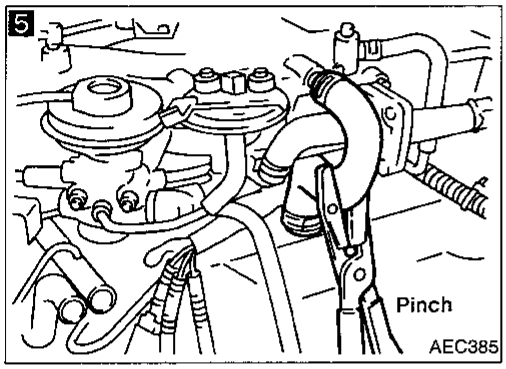
No → Check injector(s) and circuit(s). Refer to EF & EC-127.

Yes ↓

(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. Release fuel pressure to zero. Refer to EF & EC-171.
2. Install fuel pressure gauge and check fuel pressure.

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

NG → Check fuel pump fluid circuit and fuel pressure regulator. Refer to EF & EC-171.

OK ↓

5

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

Yes → Discover air leak location and repair.

No ↓

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-158.

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

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

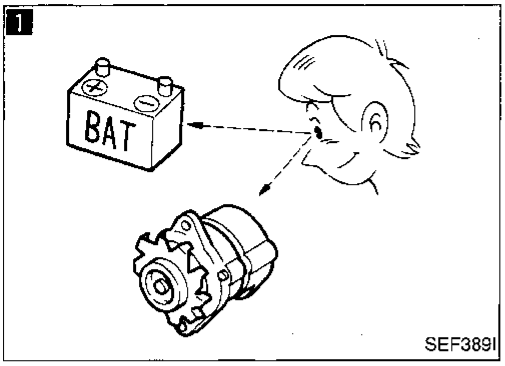
Yes → Repair or replace.

No ↓

TRY A KNOWN GOOD ECM.

INSPECTION END

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

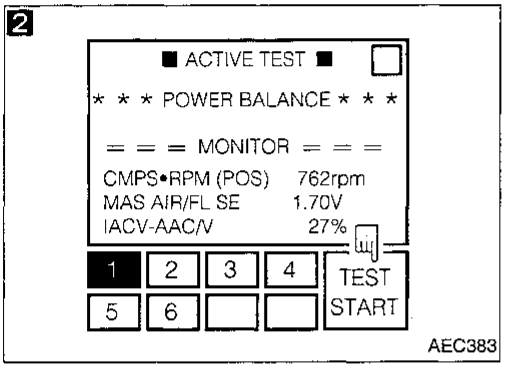


1

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

NG → Repair or replace.

OK ↓



2

PERFORM POWER BALANCE TEST.

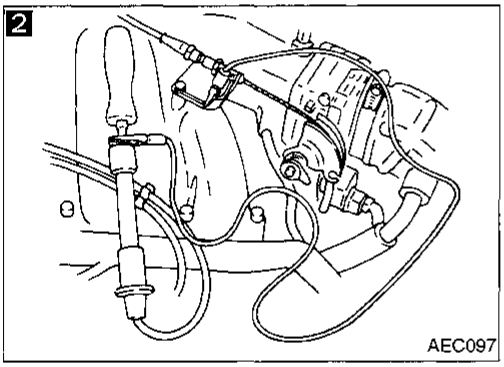
1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

No → Go to **5** .

OR

Disconnect each ignition wire from spark plug and ground it, one at a time, is there any cylinder which does not produce a momentary engine speed drop?

Yes ↓



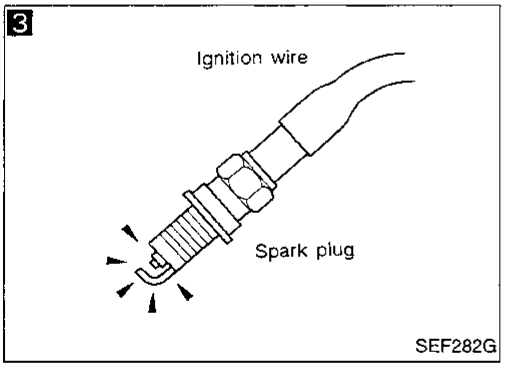
3

CHECK IGNITION SPARK.

1. Disconnect ignition wire from spark plug.
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.

NG → Check ignition coil, power transistor unit and circuits. Refer to EF & EC-106.

OK ↓



4

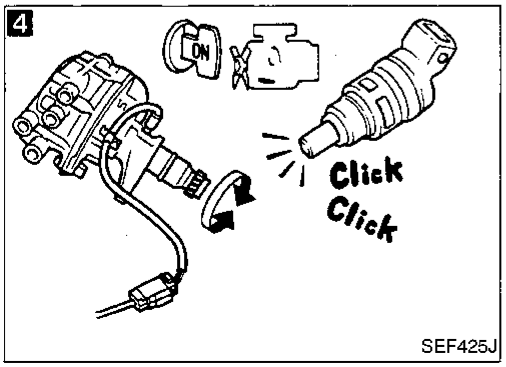
CHECK INJECTOR.

1. Remove distributor from engine. (Camshaft position sensor harness connector should remain connected.)
2. Turn ignition switch "ON". (Do not start engine.)
3. When rotating distributor shaft slowly by hand, does each injector make an operating sound?

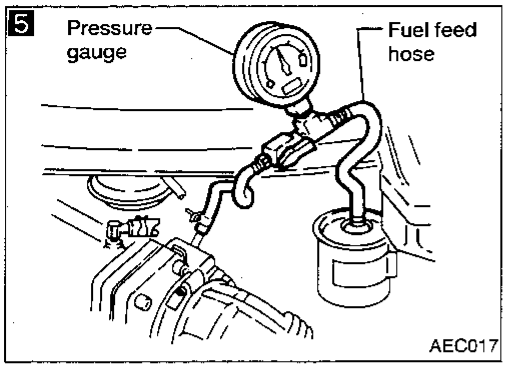
No → Check injector(s) and circuit(s). Refer to EF & EC-127.

Yes ↓

(Go to Ⓐ on next page.)



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



Ⓐ

5

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. Refer to EF & EC-171.
2. Install fuel pressure gauge and check fuel pressure.

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

NG → Check fuel pressure regulator diaphragm. Refer to EF & EC-171.

OK ↓

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC-158.

NG → Repair or replace.

OK ↓

Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

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

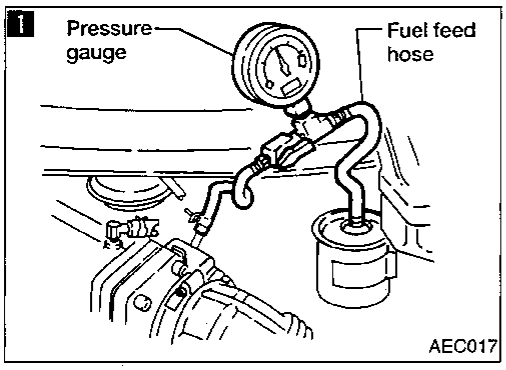
NG → Repair or replace.

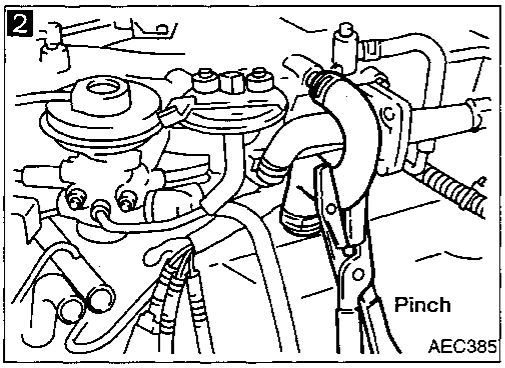
OK ↓

TRY A KNOWN GOOD ECM.

↓

INSPECTION END





Diagnostic Procedure 17 — Lack of Power and Stumble

1

CHECK FUEL PRESSURE.
1. Release fuel pressure to zero. Refer to EF & EC-171.
2. Install fuel pressure gauge and check fuel pressure.

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

NG → Check fuel pressure regulator diaphragm. Refer to EF & EC-171.

OK ↓

2

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

Yes → Discover air leak location and repair.

No ↓

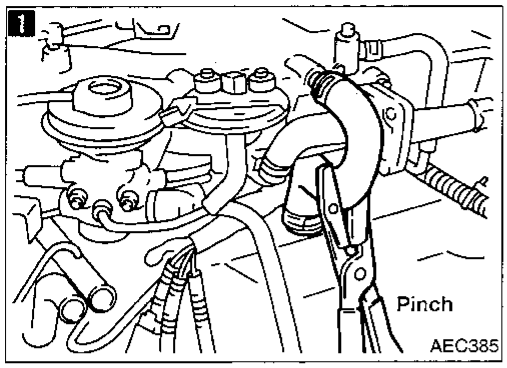
CHECK TIMING BELT FOR PROPER INSTALLATION.

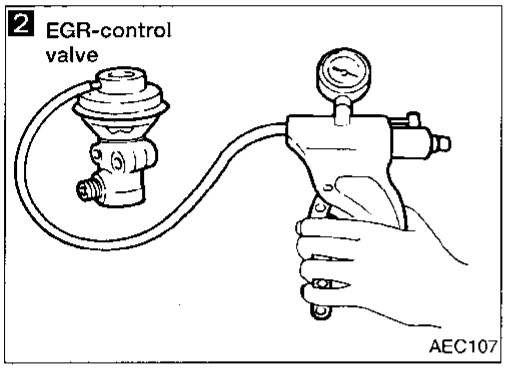
NG → Properly install new timing belt. Refer to EM section ("Installation", "TIMING BELT").

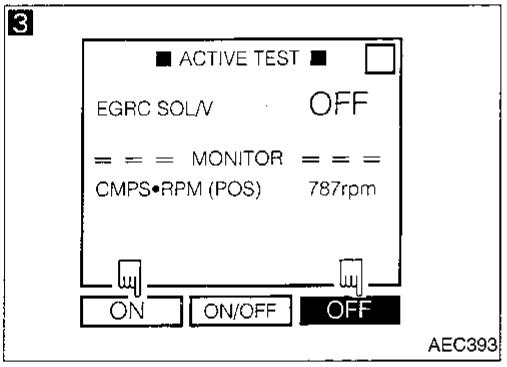
OK ↓

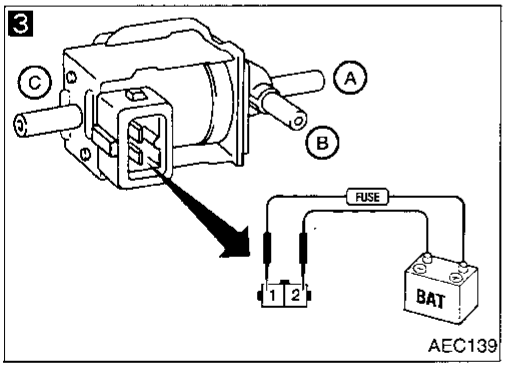
INSPECTION END

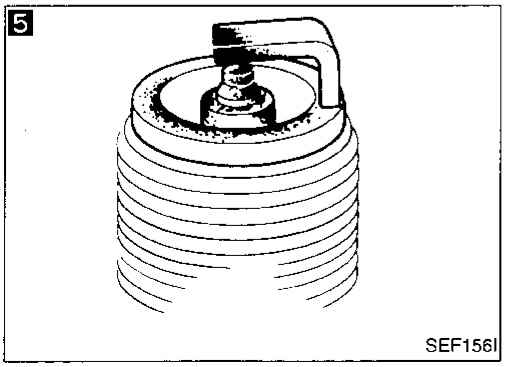
Diagnostic Procedure 18 — Knock











1

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

Yes → Discover air leak location and repair.

No ↓

2

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

No → Check EGR valve for sticking.

Yes ↓

3

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

OR

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

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

OK ↓

4

CHECK VACUUM HOSES.
Check the following vacuum hoses for clogging, cracks and poor connection.
a) Vacuum hose between EGR valve and EGR control-solenoid valve.
b) Vacuum hose between EGR control-solenoid valve and throttle body port. Refer to EF & EC-8.

NG → Repair or replace.

OK ↓

5

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

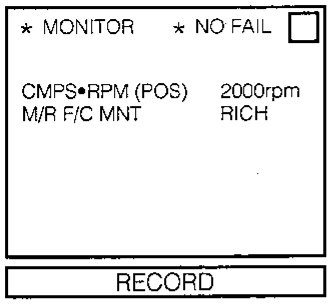
Yes → Check pistons, piston rings, valves, valve seats, valve oil seal, engine oil level, etc.

No ↓

INSPECTION END

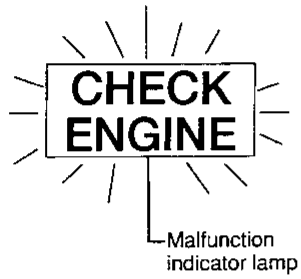
Diagnostic Procedure 19 — Surge

1



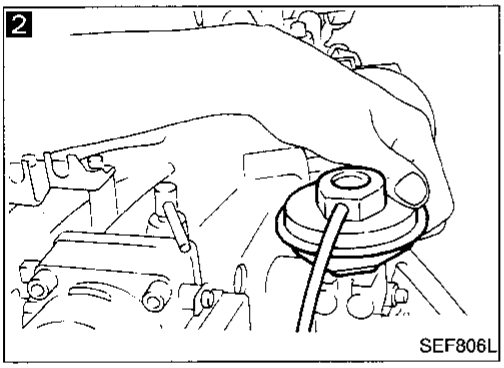
AEC386

1



AEC379

2



SEF806L

1

CHECK HEATED OXYGEN SENSOR.

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

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

NG → Replace heated oxygen sensor.

OR

1. Set "Heated 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 goes ON and OFF more than 5 times during 10 seconds.

OK

2

CHECK EGR VALVE.
Check EGR valve for sticking.

NG → Repair or replace.

OK

CHECK ECM HARNESS CONNECTOR.
Check the ECM pin terminals for damage or poor connection of ECM harness connector. Refer to EF & EC- 158.

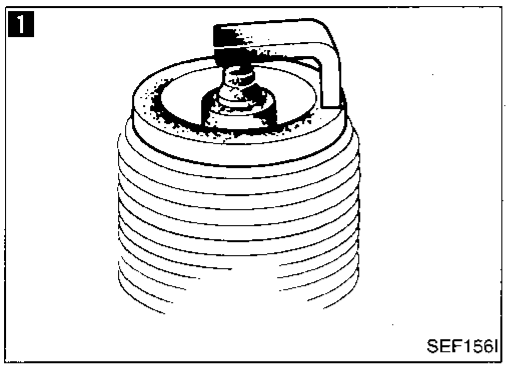
OK

Reconnect ECM harness connector and retest.

Trouble is not fixed.

TRY A KNOWN GOOD ECM.

INSPECTION END



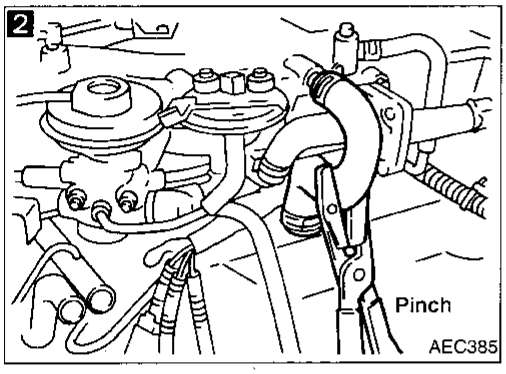
Diagnostic Procedure 20 — Backfire through the Intake

1

CHECK SPARK PLUGS AND DISTRIBUTOR CAP.
Remove the spark plugs and check for fouling, etc. Remove and check distributor cap for carbon tracking.

NG → Repair or replace spark plug(s) or distributor cap.

OK ↓



2

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

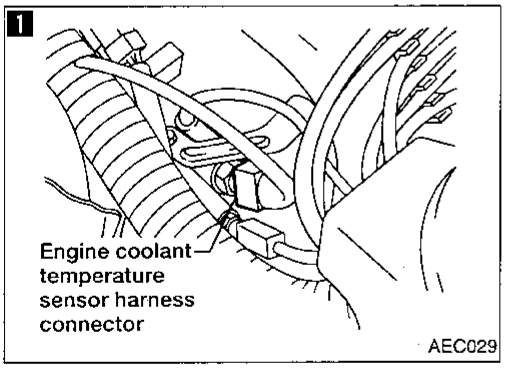
Yes → Discover air leak location and repair.

No ↓

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

↓

INSPECTION END



Diagnostic Procedure 21 — Backfire through the Exhaust on Deceleration

1

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

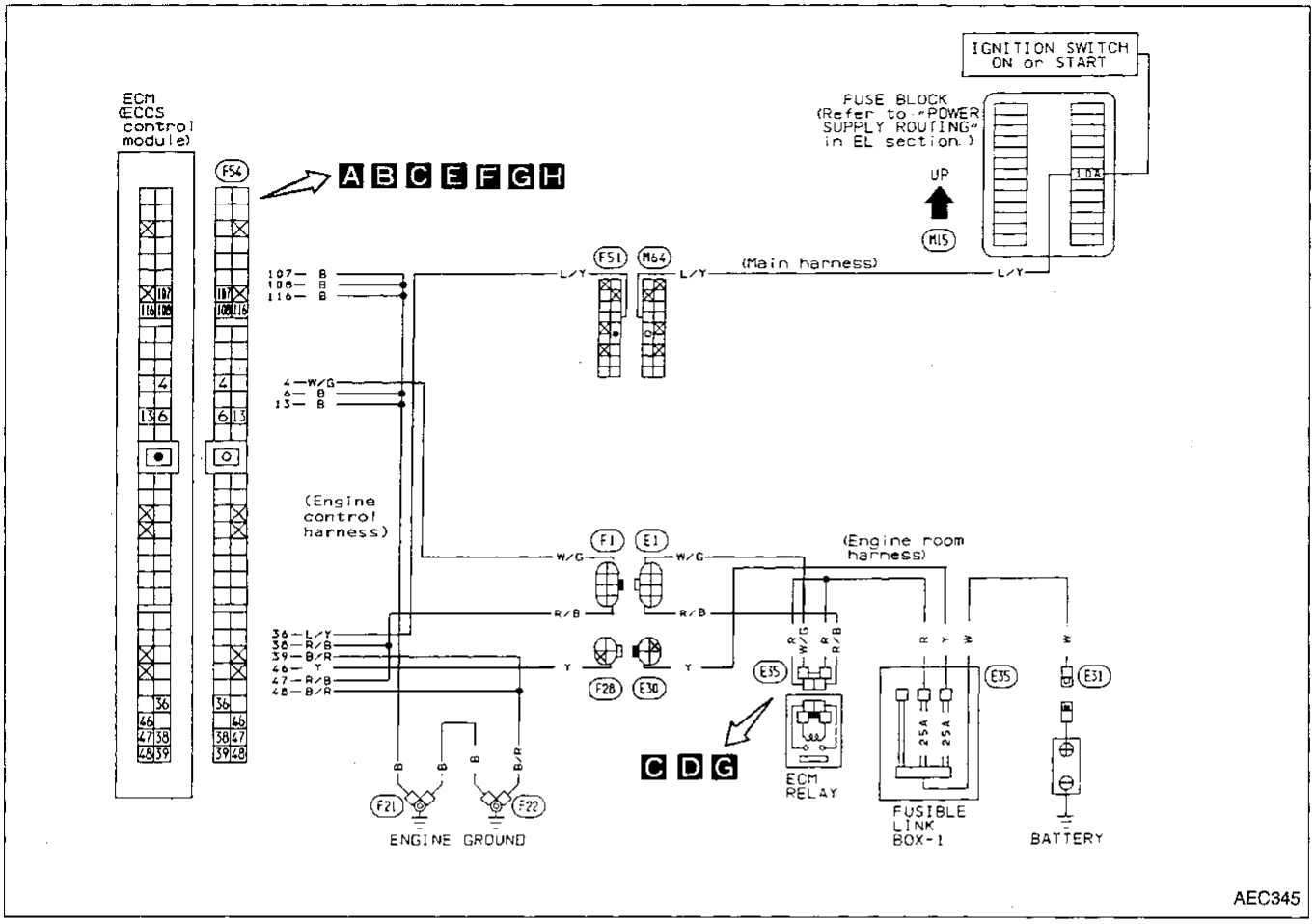
NG → Replace or repair.

OK ↓

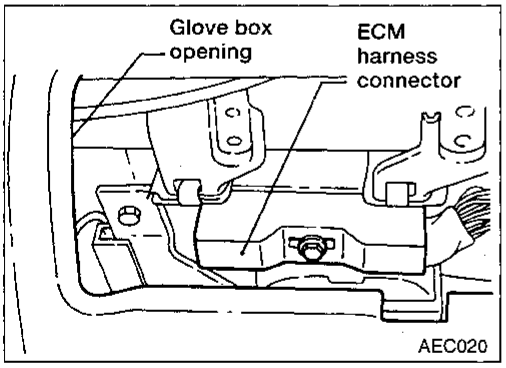
INSPECTION END

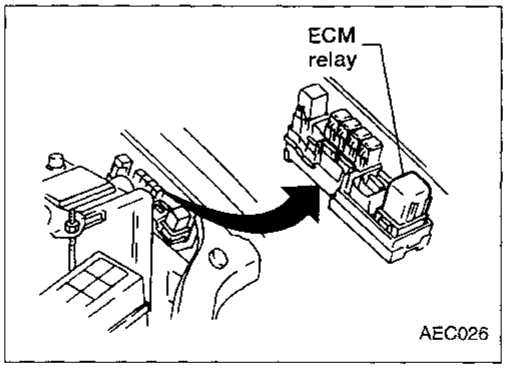
Diagnostic Procedure 22

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

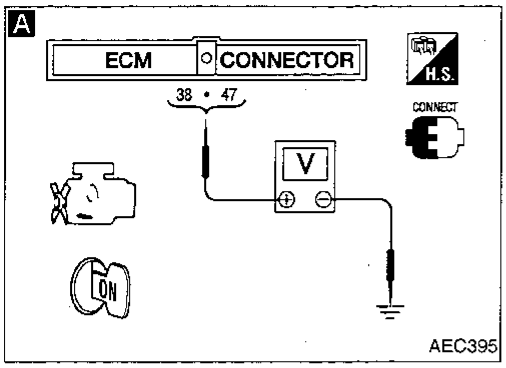


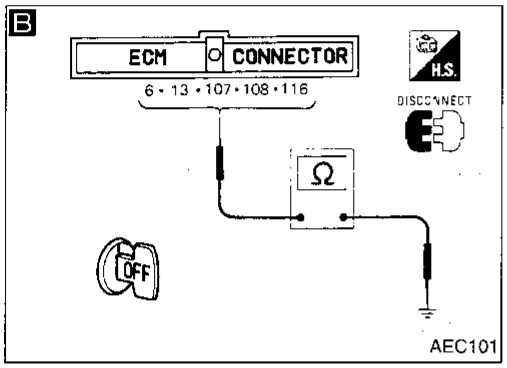
Harness layout

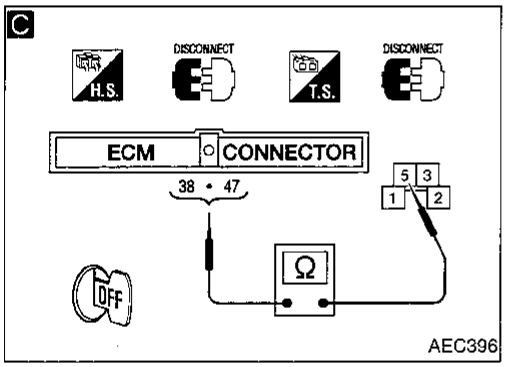


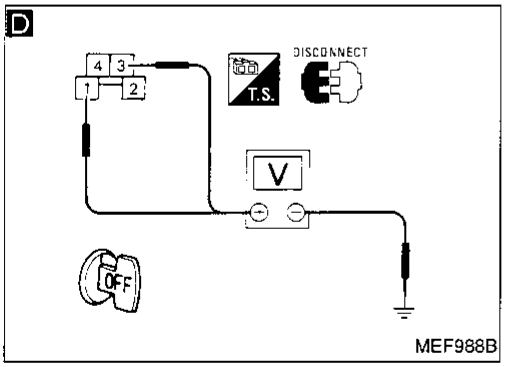


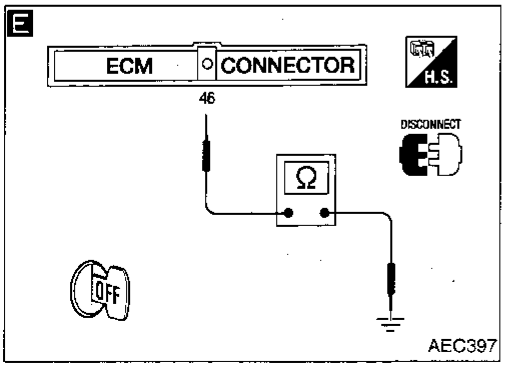
Diagnostic Procedure 22 (Cont'd)











INSPECTION START

A

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

OK → **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 NG, repair harness or connectors.

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

NG ↓

C

CHECK HARNESS CONTINUITY BETWEEN 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 (5).
Continuity should exist.

NG → Check the following.
- Harness connectors (F1), (E1)
- Harness continuity between ECM and ECM relay.

If NG, repair harness or connectors.

OK ↓

D

CHECK VOLTAGE BETWEEN ECM RELAY AND GROUND.
1) Check voltage between terminals (1), (3) and ground.
Voltage: Battery positive voltage

NG → Check the following.
- 25A fusible link
- Harness continuity between ECM relay and battery

If NG, repair harness or connectors.

OK ↓

E

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

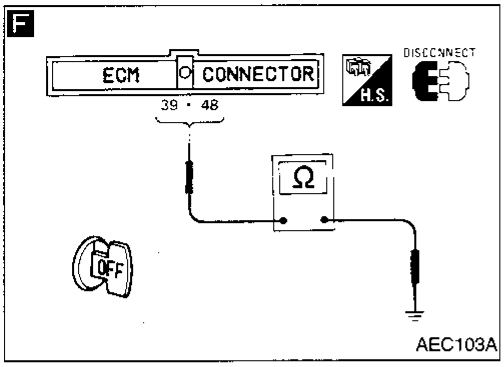
NG → Check the following.
- Harness connectors (F28), (E30)
- 25A fusible link
- Harness continuity between ECM and battery

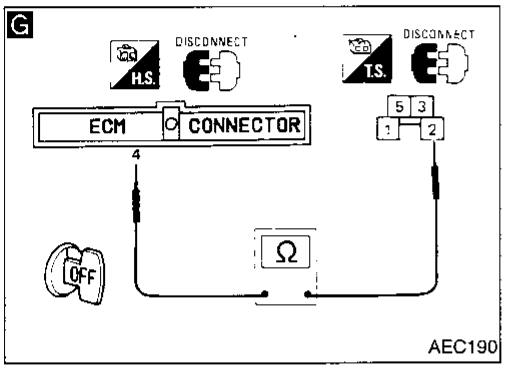
If NG, repair harness or connectors.

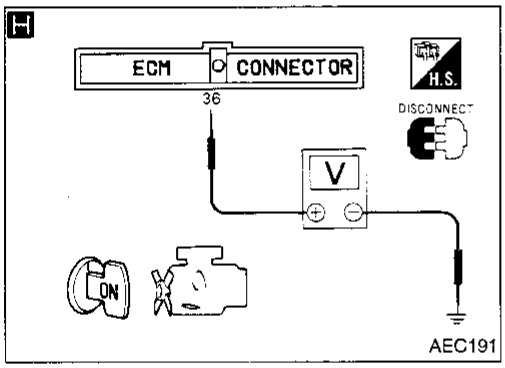
OK ↓

(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.

NG → Repair harness or connectors.

OK

G

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

NG → Check the following.
- Harness connectors (F1), (E1)
- Harness continuity between ECM and ECM relay

If NG, repair harness or connectors.

OK

H

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

NG → Check the following.
- Harness connectors (F51), (M64)
- "10A" fuse
- Harness continuity between ECM and ignition switch

If NG, repair harness or connectors.

OK

CHECK COMPONENT (ECM relay).
Refer to EF & EC-169.

NG → Replace ECM relay.

OK

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

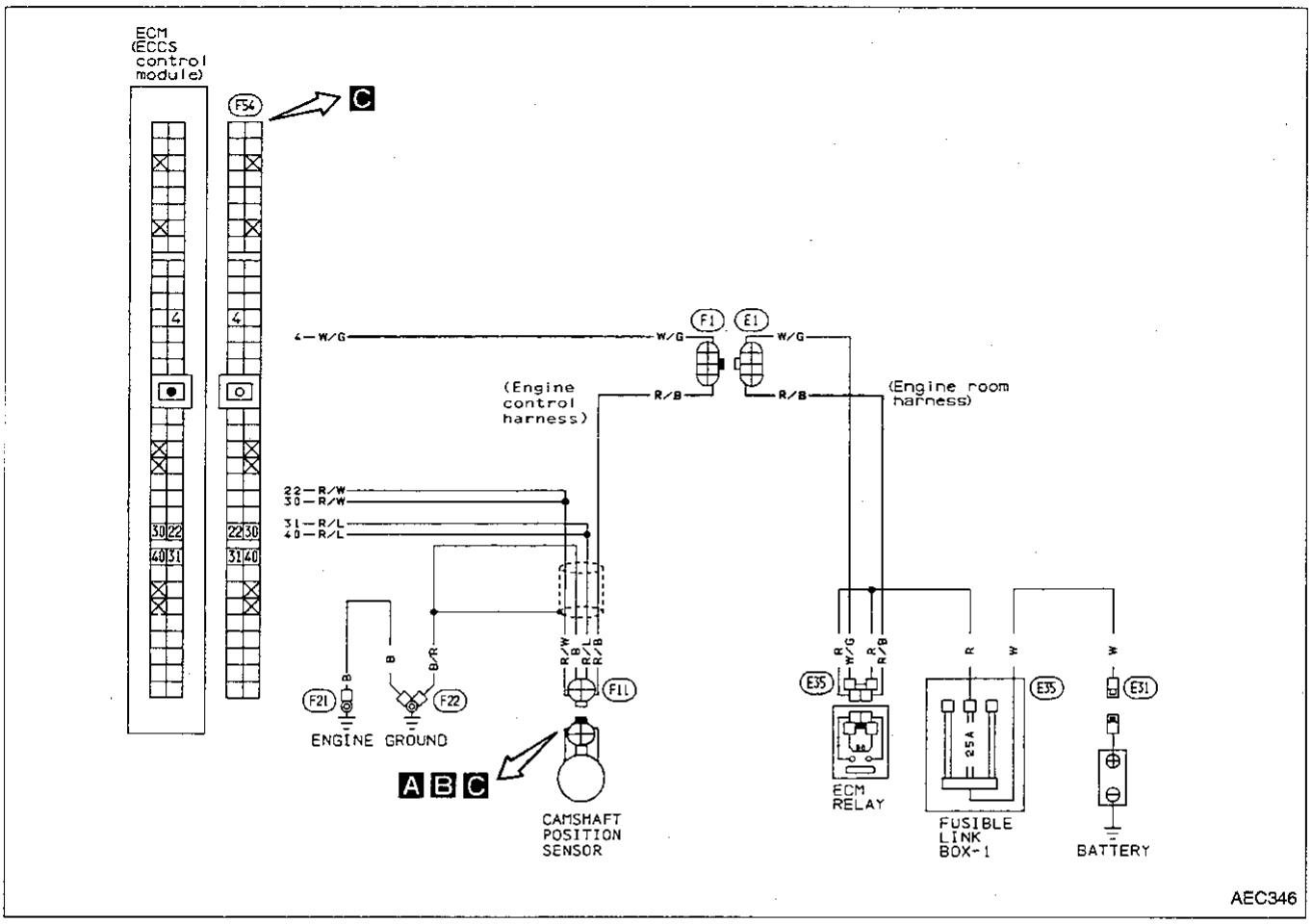
Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.
Reconnect ECM harness connector and retest.

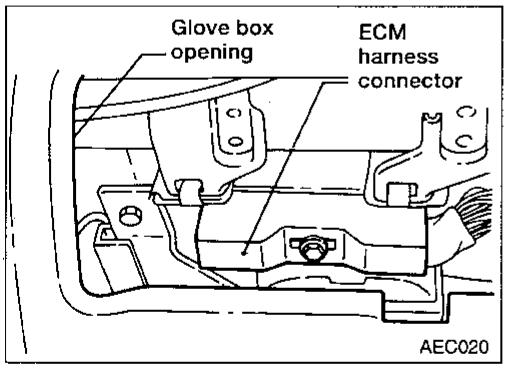
INSPECTION END

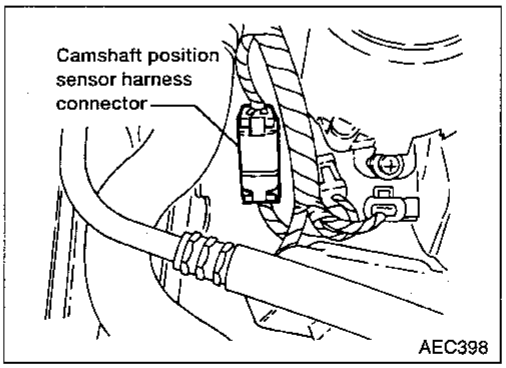
Diagnostic Procedure For Trouble Code 11

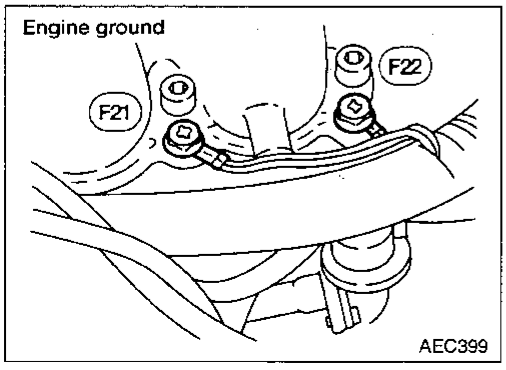
CAMSHAFT POSITION SENSOR (Diagnostic trouble code No. 11)



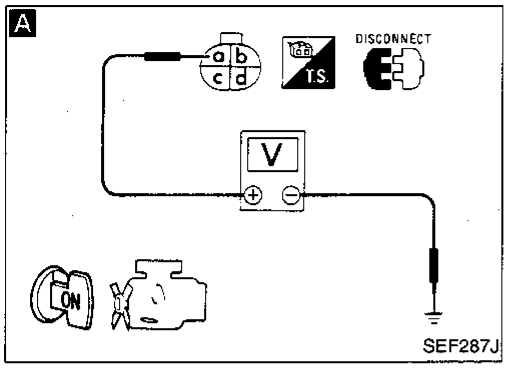
Harness layout

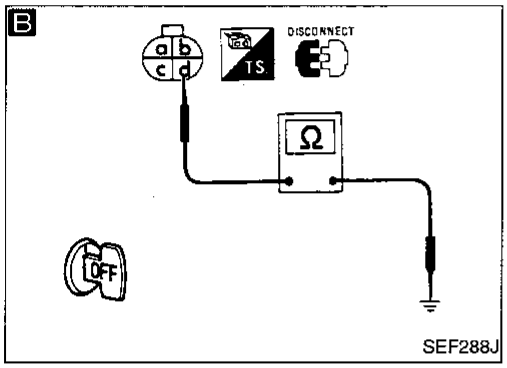


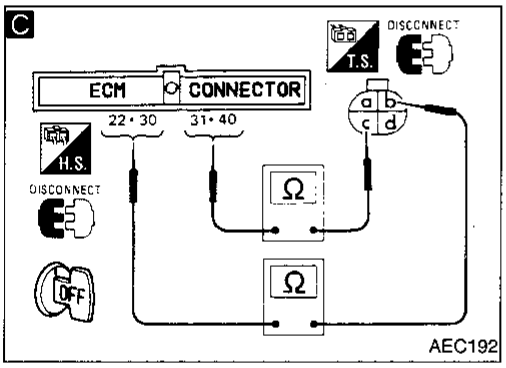




Diagnostic Procedure For Trouble Code 11 (Cont'd)







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

NG → Check the following.
- Harness connectors (F1), (E1)
- Harness continuity between camshaft position sensor and ECM relay

If NG, repair harness or connectors.

OK ↓

B

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Loosen and retighten ground screws.
3) Check harness continuity between terminal ⓓ and engine ground.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

C

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between terminal ⓒ and ECM terminals ㉛, ㊵ (1° signal), terminal ⓑ and ECM terminals ㉒, ㉚ (120° signal).
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

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

NG → Replace camshaft position sensor.

OK ↓

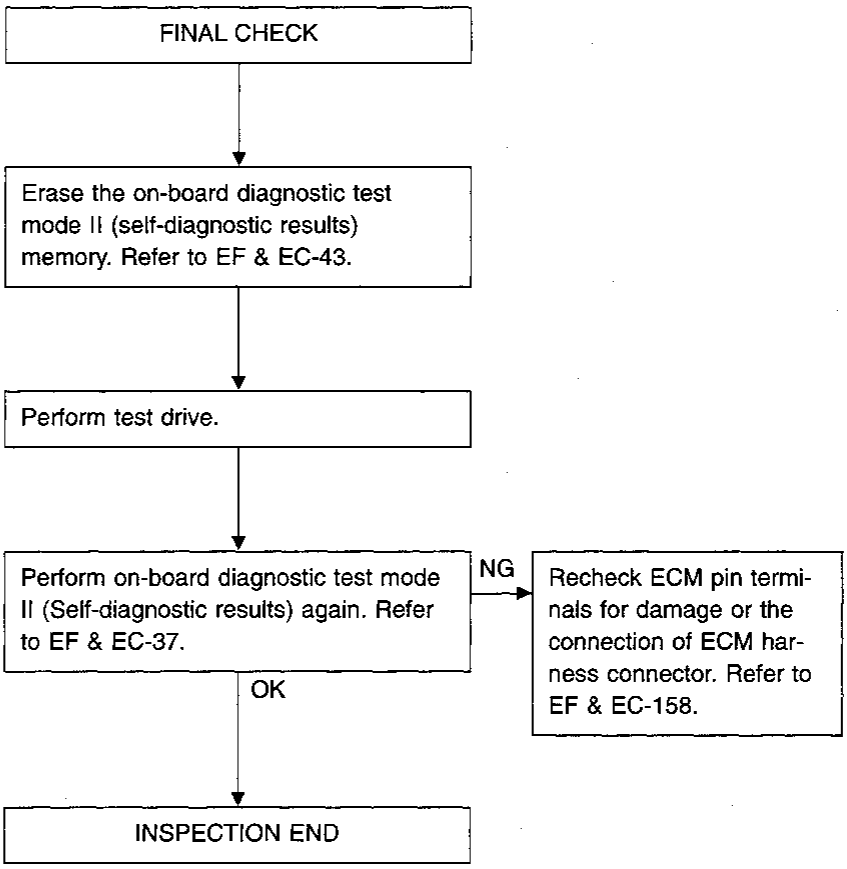
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed. ↓

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.
Reconnect ECM harness connector and retest.

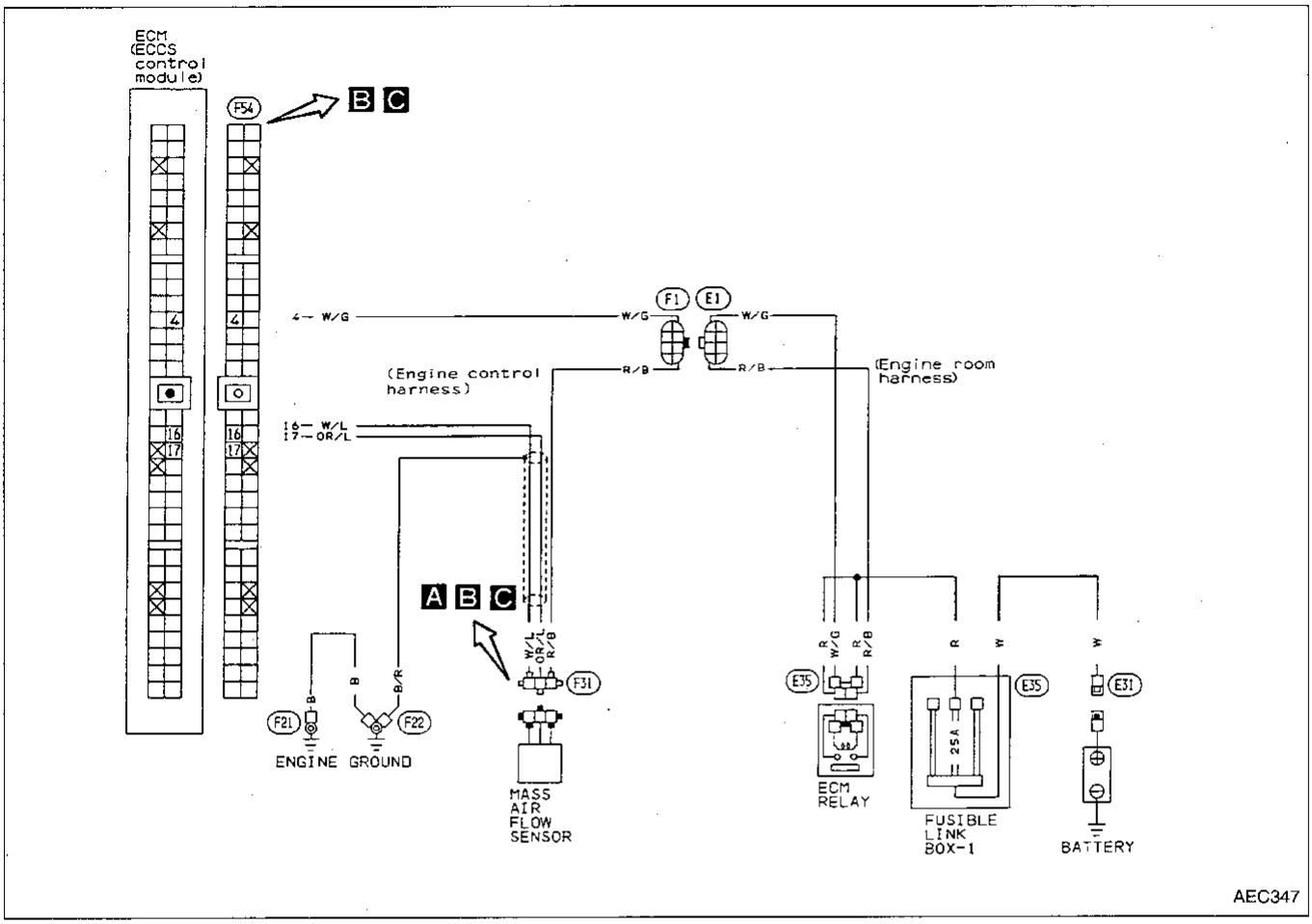
Diagnostic Procedure For Trouble Code 11 (Cont'd)

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

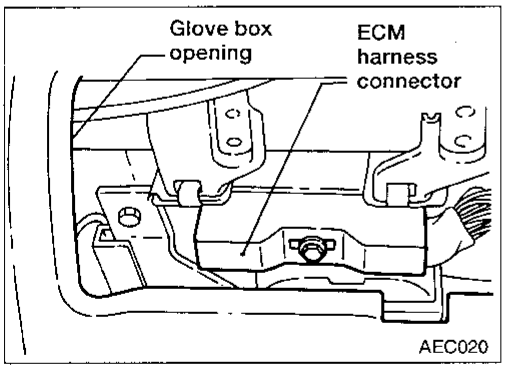


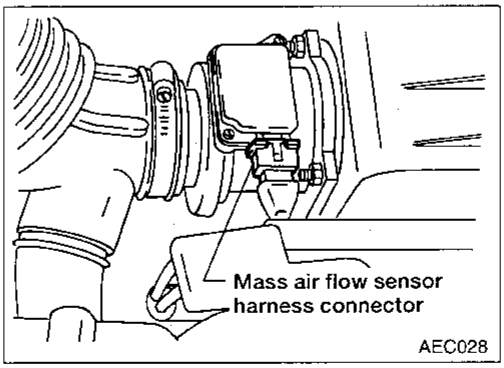
Diagnostic Procedure For Trouble Code 12

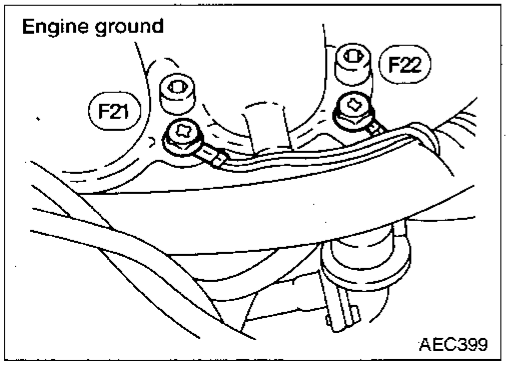
MASS AIR FLOW SENSOR (Diagnostic trouble code No. 12) CHECK ENGINE (MALFUNCTION INDICATOR LAMP ITEM)



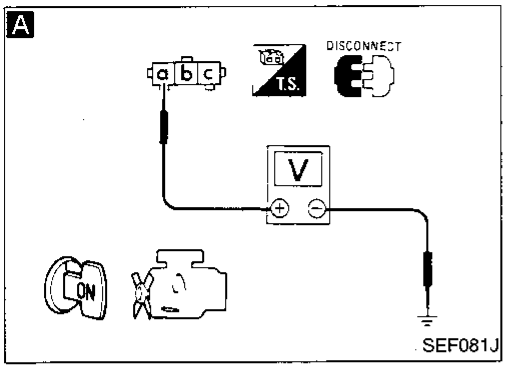
Harness layout

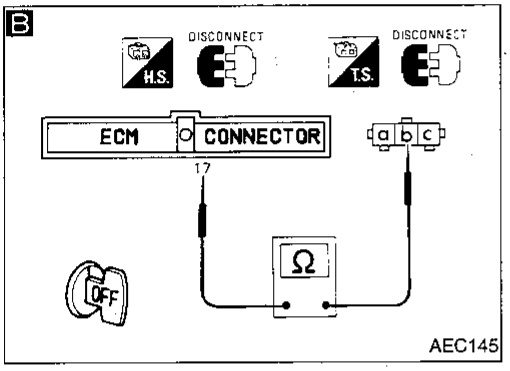


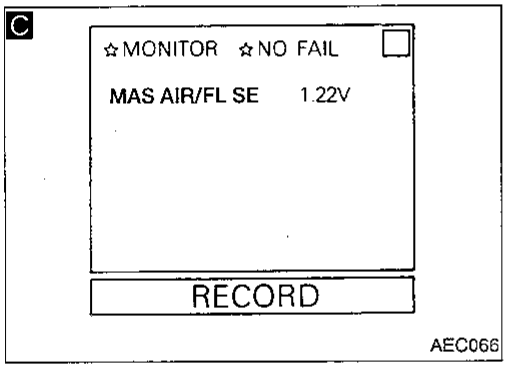


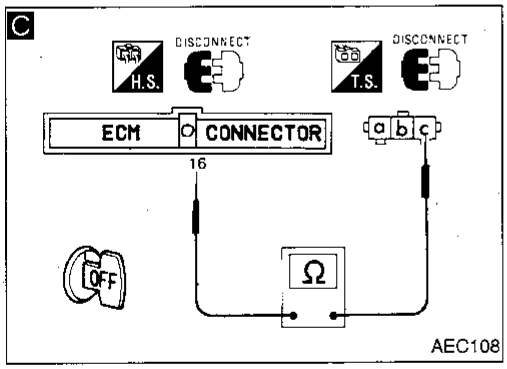


Diagnostic Procedure For Trouble Code 12 (Cont'd)









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

NG → Check the following.
- Harness connectors (F1), (E1)
- Harness continuity between mass air flow sensor and ECM relay

If NG, repair harness or connectors.

OK

B

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

NG → Repair harness or connectors.

OK

C

CHECK INPUT SIGNAL CIRCUIT.
1) Reconnect mass air flow sensor harness connector and ECM harness connector.
2) Start engine and warm it up sufficiently.
3) Read mass air flow sensor signal in "DATA MONITOR" mode with CONSULT.
Voltage: 1.0 - 1.7V

OR

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

NG → Repair harness or connectors.

OK

CHECK COMPONENT
(Mass air flow sensor).
Refer to EF & EC-163.

NG → Replace mass air flow sensor.

OK

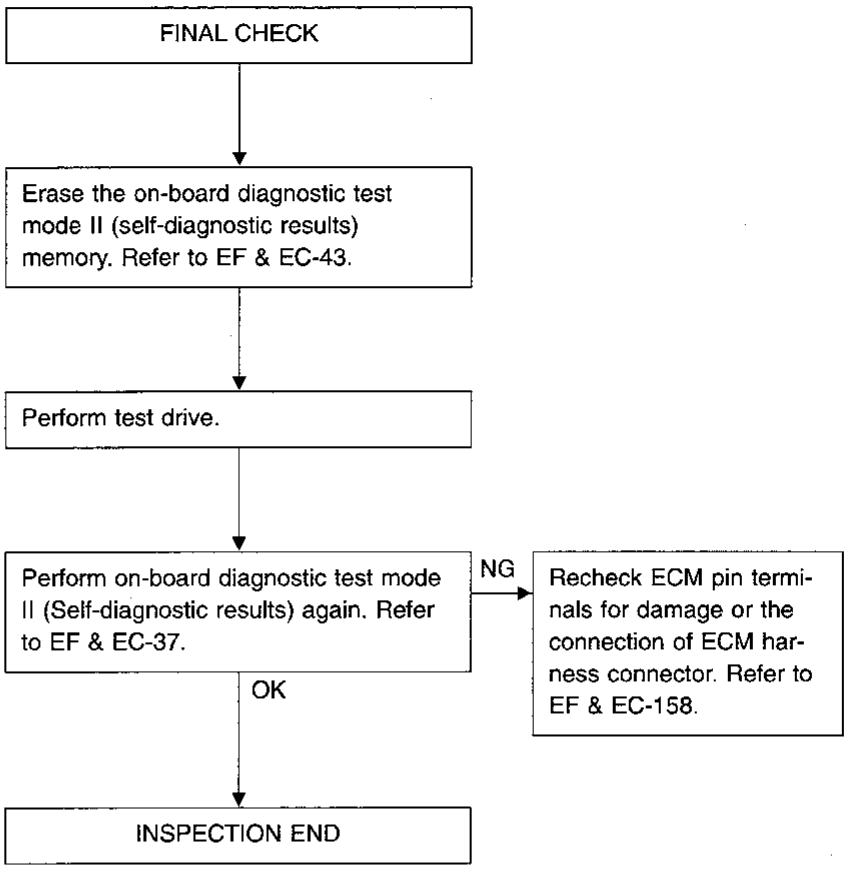
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.
Reconnect ECM harness connector and retest.

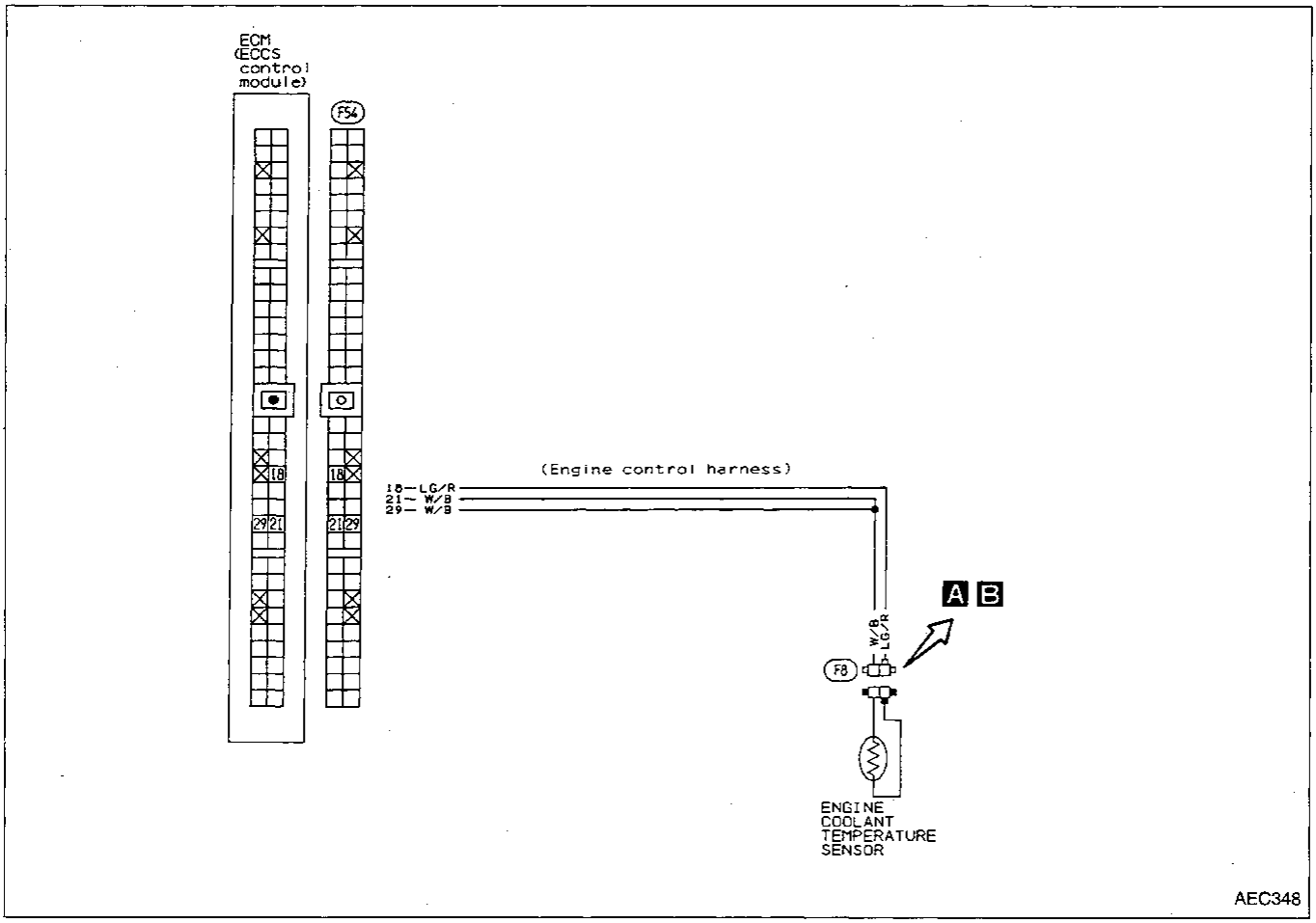
Diagnostic Procedure For Trouble Code 12 (Cont'd)

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

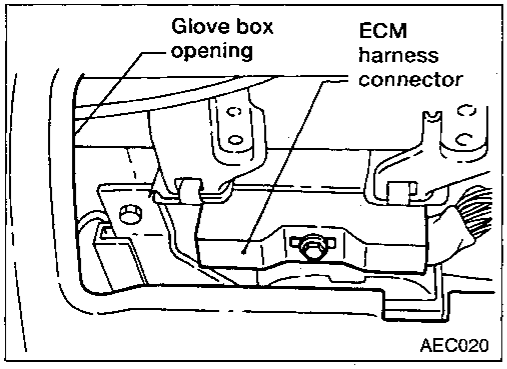


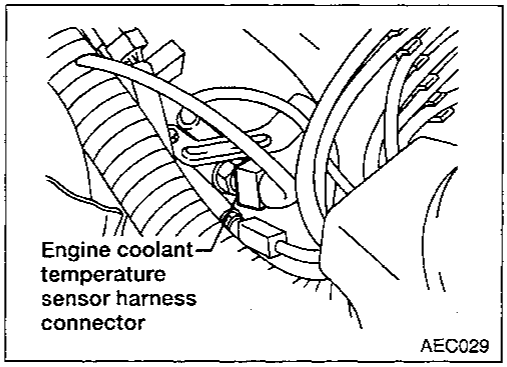
Diagnostic Procedure For Trouble Code 13

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

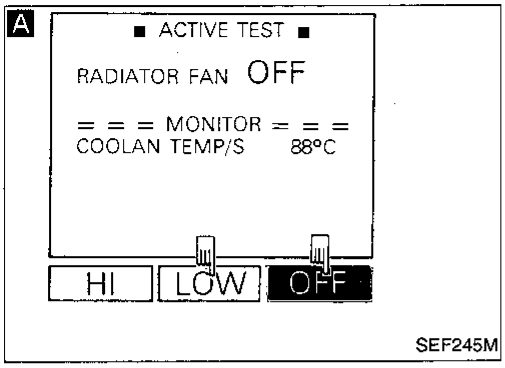


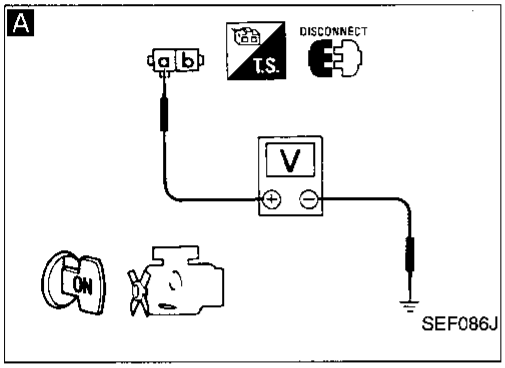
Harness layout

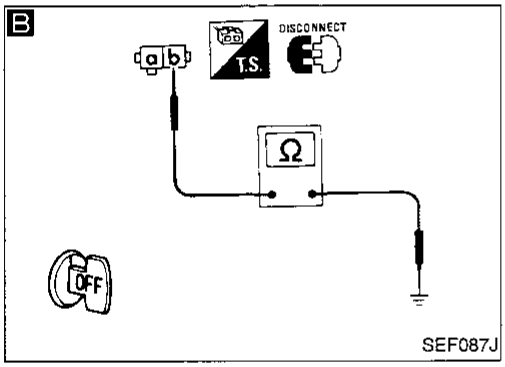




Diagnostic Procedure For Trouble Code 13 (Cont'd)







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.

NG → Repair harness or connectors.

OR

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

OK

B

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

NG → Repair harness or connectors.

OK

CHECK COMPONENT
(Engine coolant temperature sensor).
Refer to EF & EC-164.

NG → Replace engine coolant temperature sensor.

OK

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

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.
Reconnect ECM harness connector and retest.

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-43.

Perform test drive.

Perform On-board Diagnostic Test Mode II (Self-diagnostic results) again.
Refer to EF & EC-37.

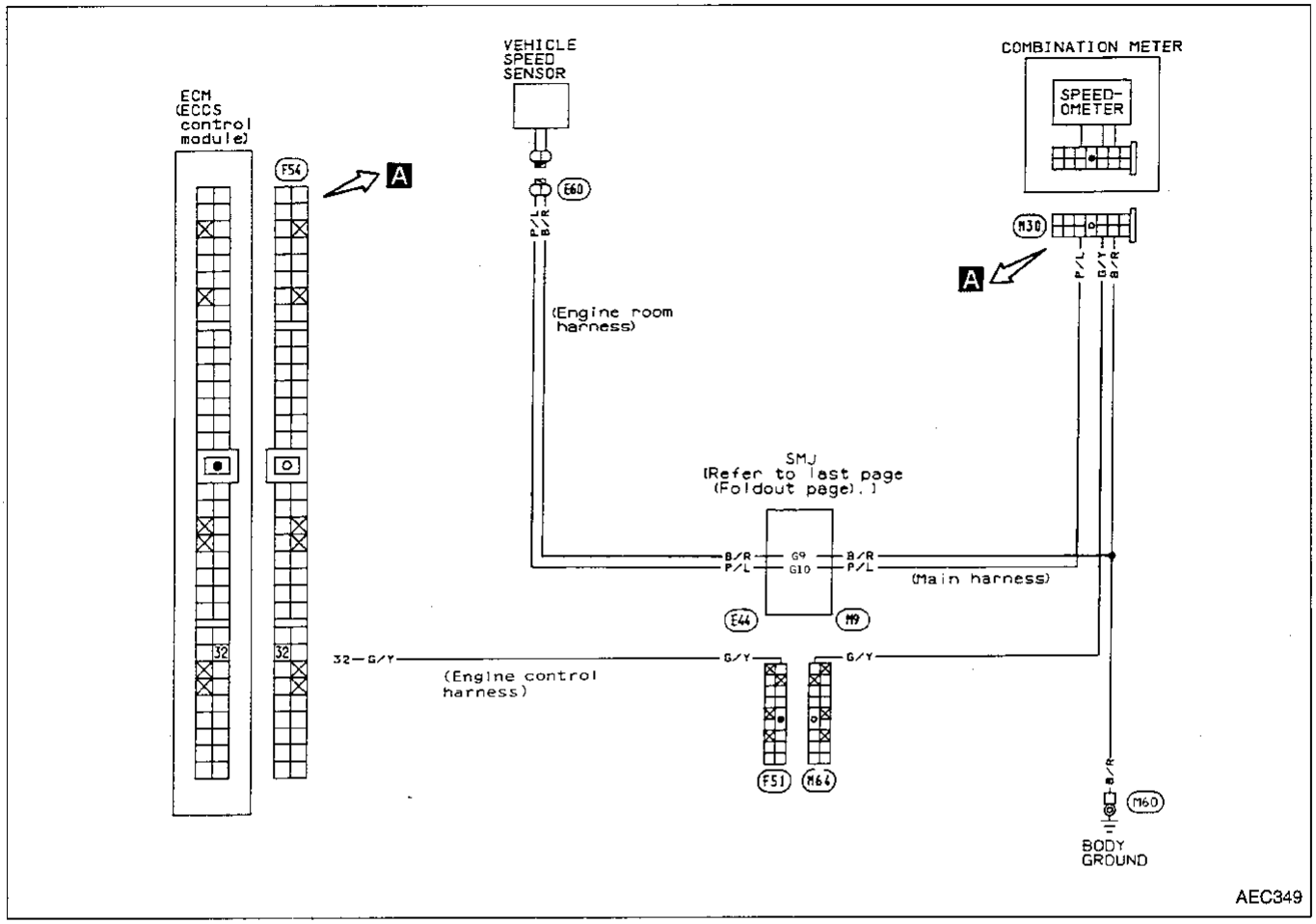
NG → Recheck ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.

OK

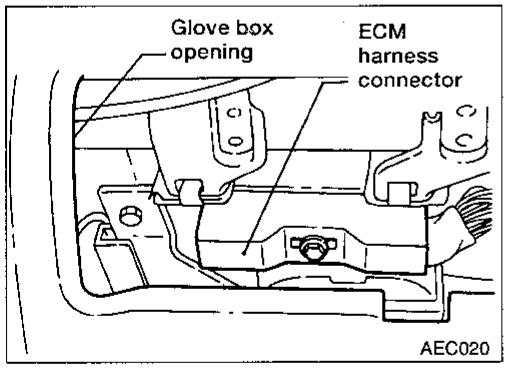
INSPECTION END

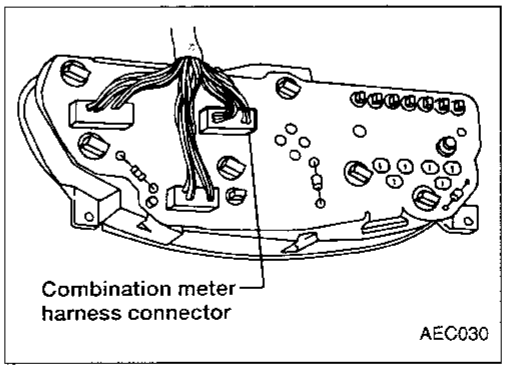
Diagnostic Procedure For Trouble Code 14

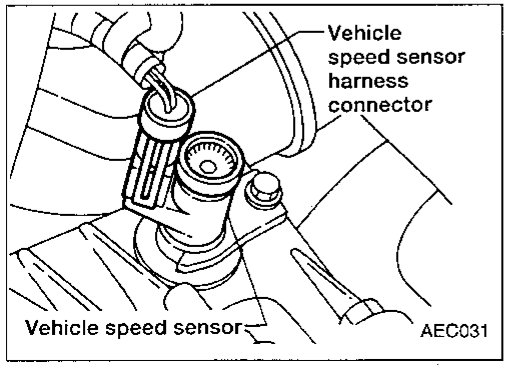
VEHICLE SPEED SENSOR (Diagnostic trouble code No. 14) CHECK ENGINE (MALFUNCTION INDICATOR LAMP ITEM)



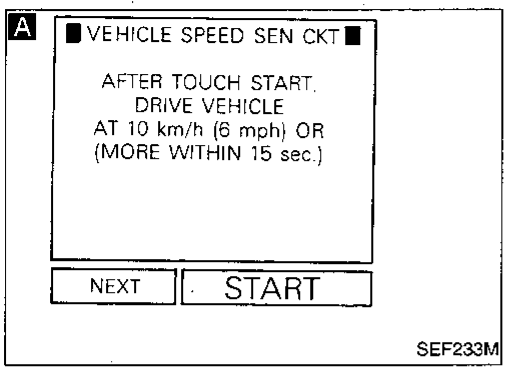
Harness layout

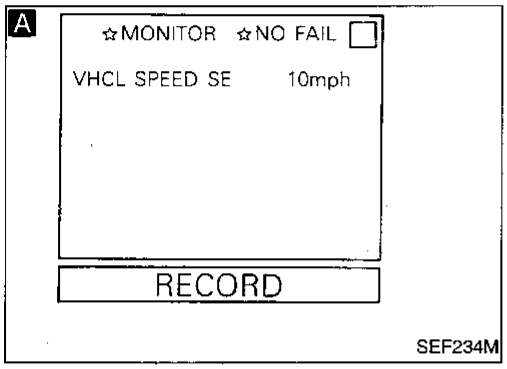


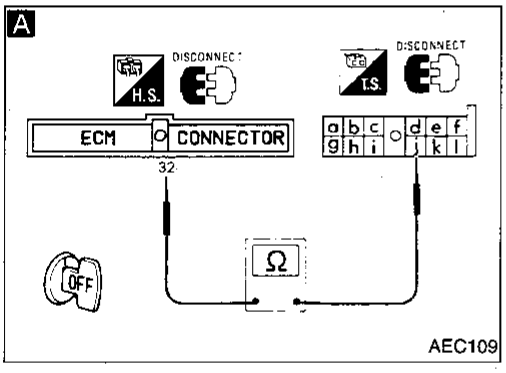




Diagnostic Procedure For Trouble Code 14 (Cont'd)







INSPECTION START

CHECK SPEEDOMETER FUNCTION.
Make sure that speedometer functions properly.

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

OK

A

CHECK INPUT SIGNAL CIRCUIT.

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

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 (J).
Continuity should exist.

NG → Check the following.
- Harness connectors (F51), (M64)
- Harness continuity between ECM and combination meter

If NG, repair harness or connectors.

OK

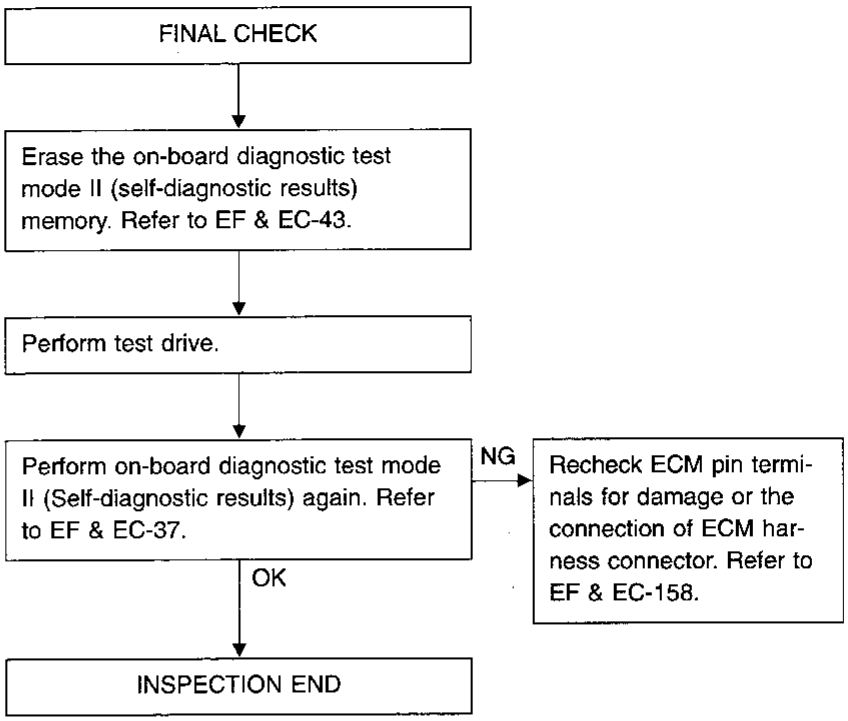
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.
Reconnect ECM harness connector and retest.

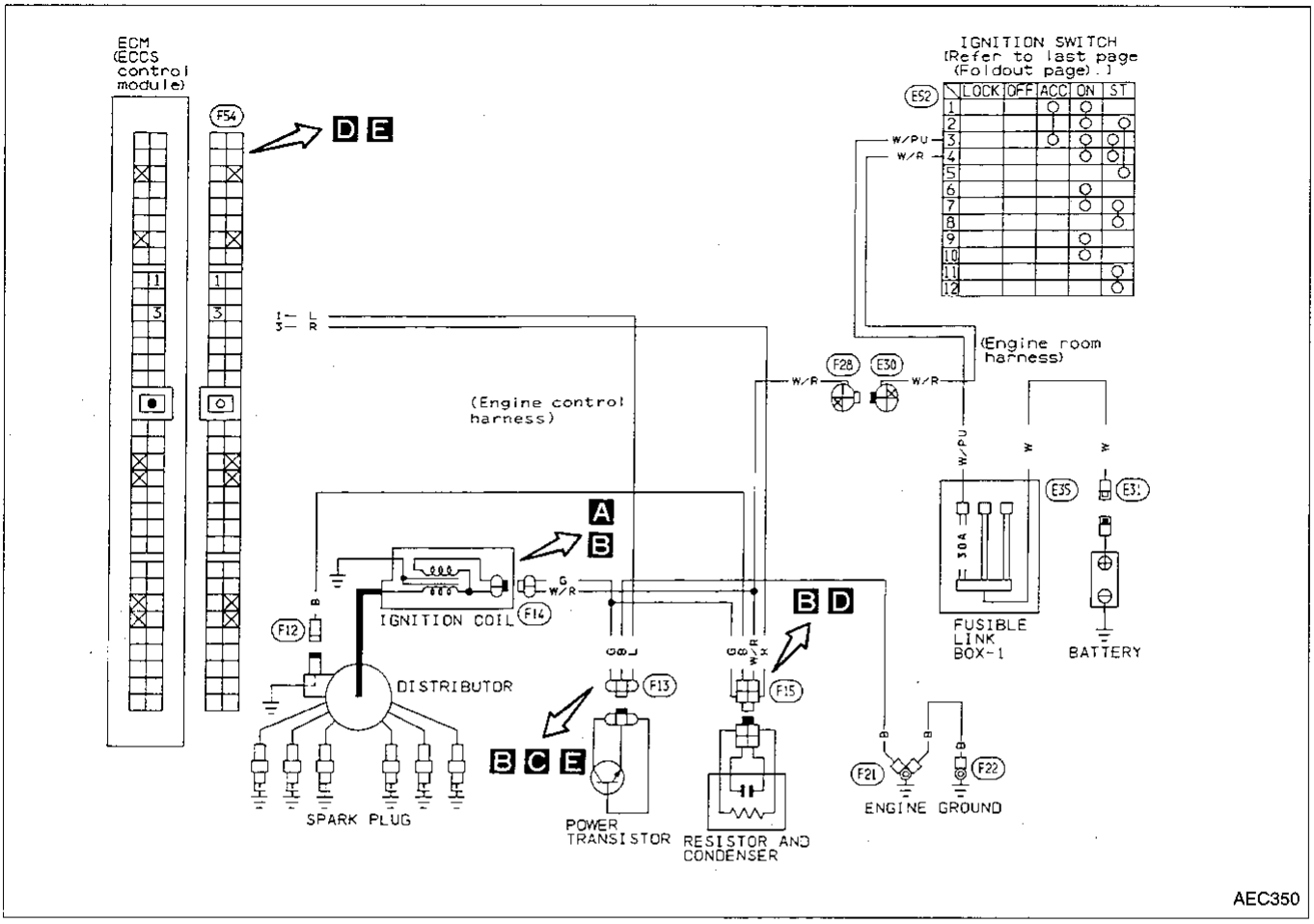
Diagnostic Procedure For Trouble Code 14 (Cont'd)

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

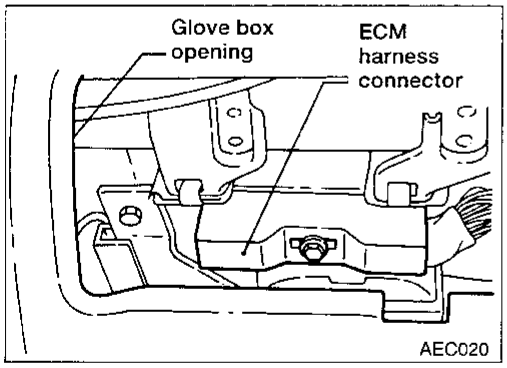


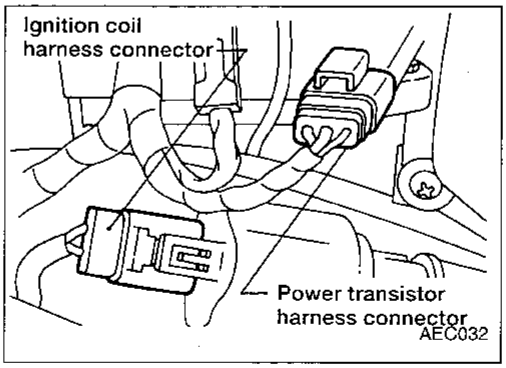
Diagnostic Procedure For Trouble Code 21

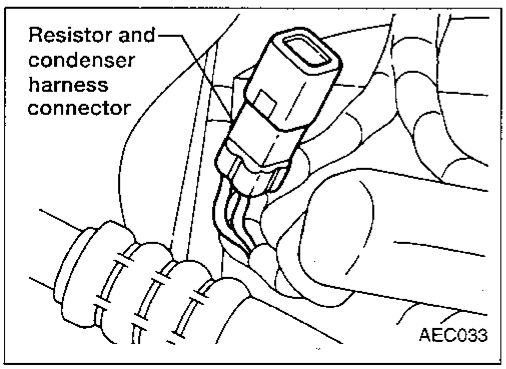
IGNITION SIGNAL (Diagnostic trouble code No. 21)



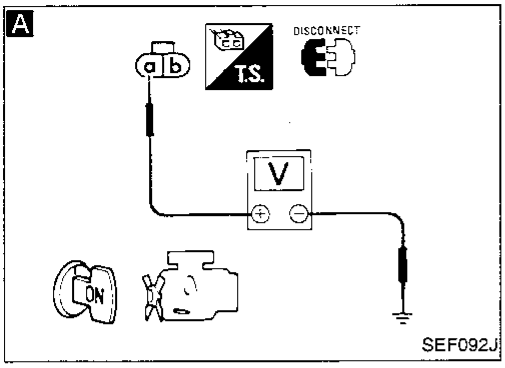
Harness layout

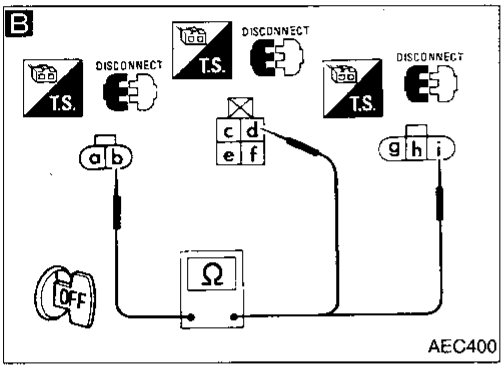


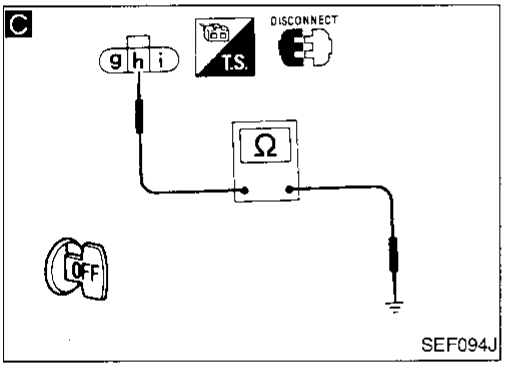


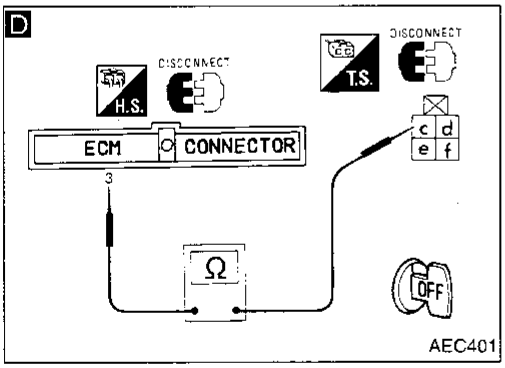


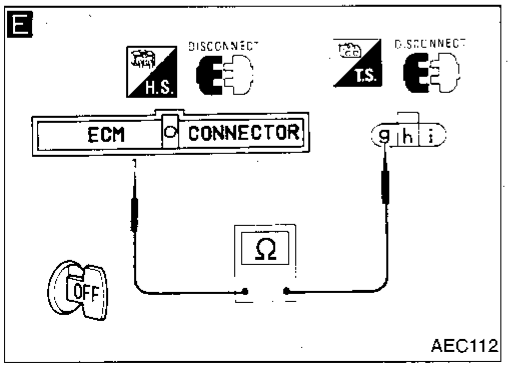
Diagnostic Procedure For Trouble Code 21 (Cont'd)











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

NG → Check the following.
- Harness connectors F28, E30
- Harness continuity between ignition coil and ignition switch

If NG, repair harness or connectors.

OK ↓

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 ⓓ, ⓘ.
Continuity should exist.

C 5) Check harness continuity between terminal ⓗ and engine ground.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

D

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

NG → Repair harness or connectors.

OK ↓

E

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

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENTS
(Ignition coil, resistor and condenser, power transistor).
Refer to EF & EC-164, EF & EC-164, EF & EC-170.

NG → Replace malfunctioning component(s).

OK ↓

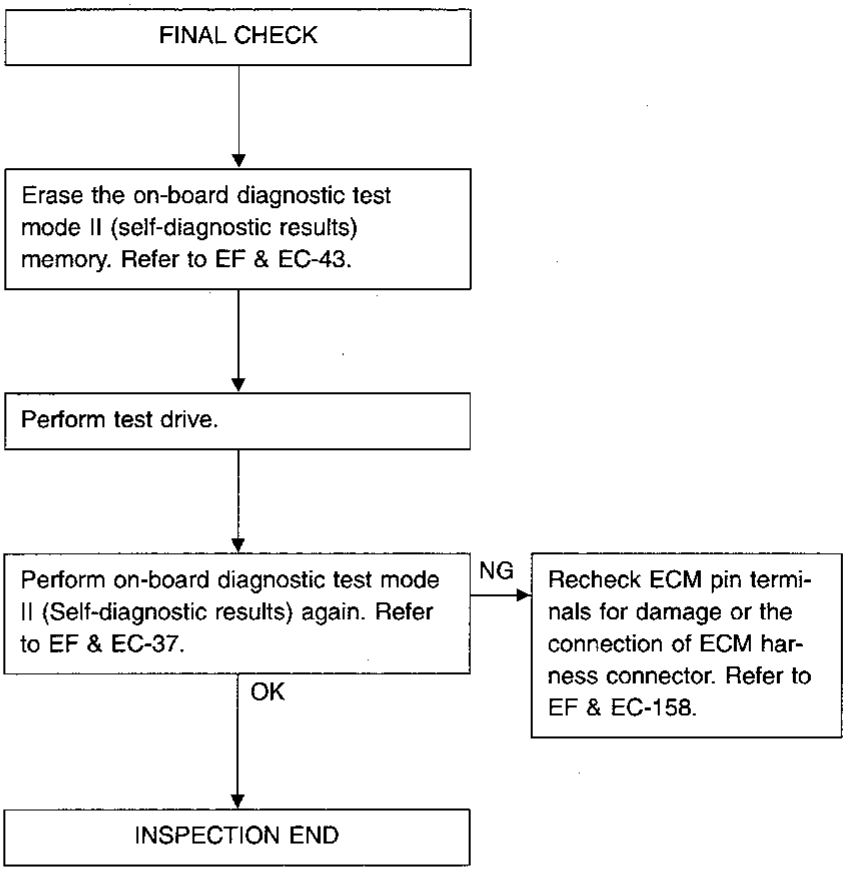
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed. ↓

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.
Reconnect ECM harness connector and retest.

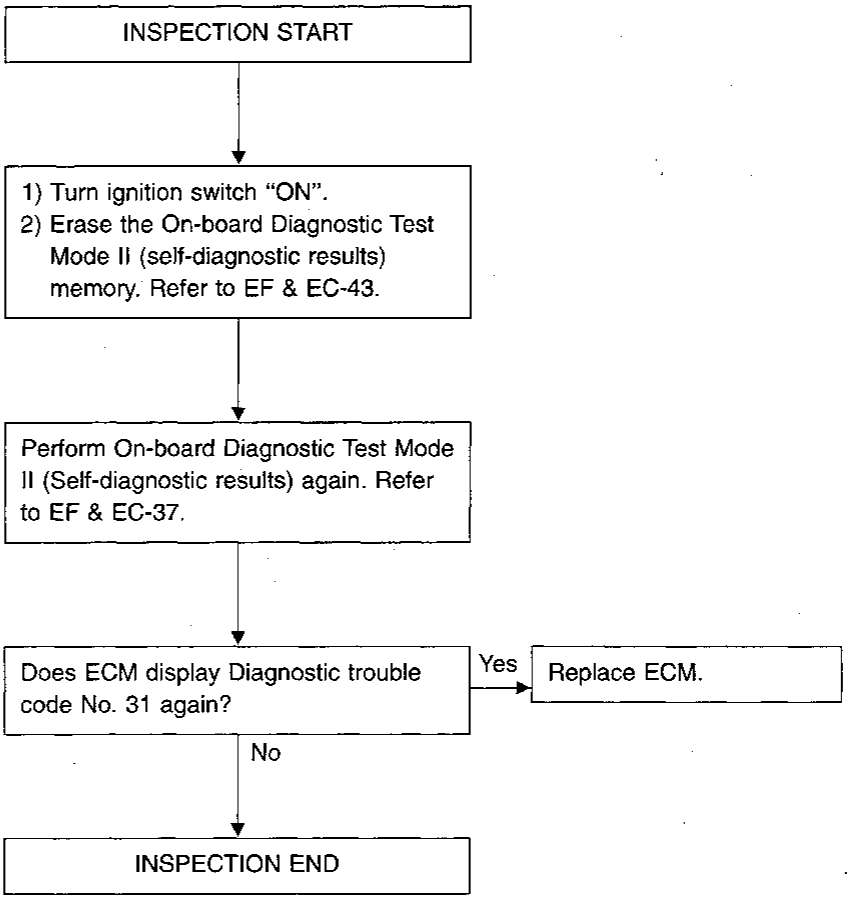
Diagnostic Procedure For Trouble Code 21 (Cont'd)

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



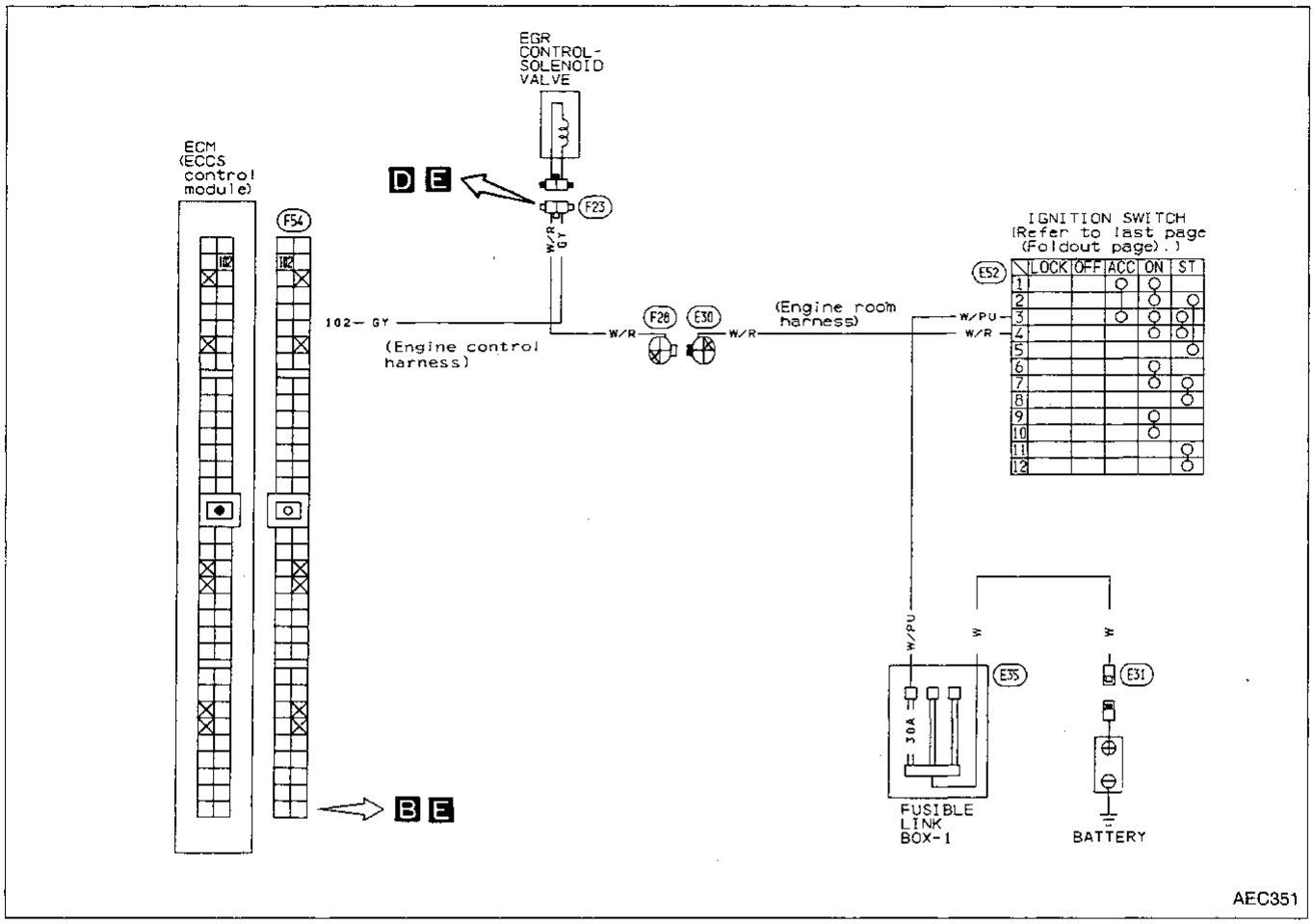
Diagnostic Procedure For Trouble Code 31

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

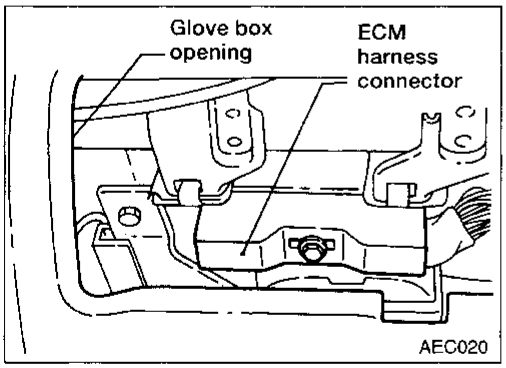


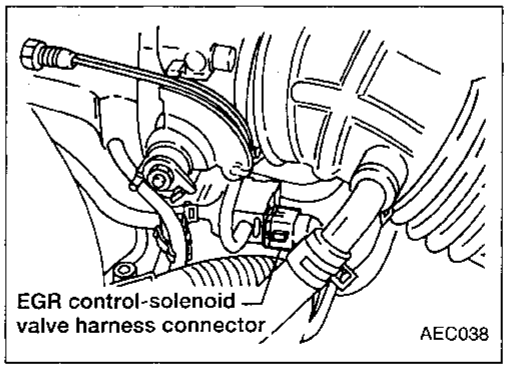
Diagnostic Procedure For Trouble Code 32

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

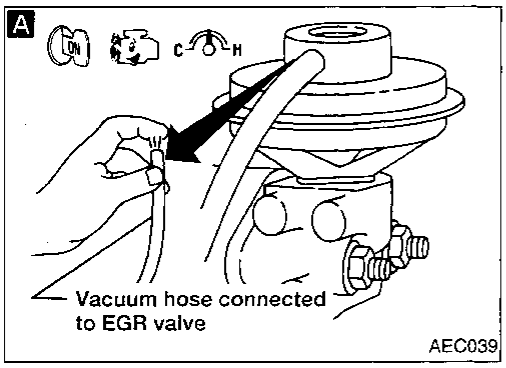


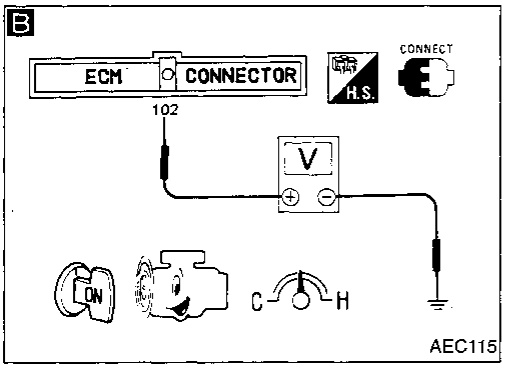
Harness layout

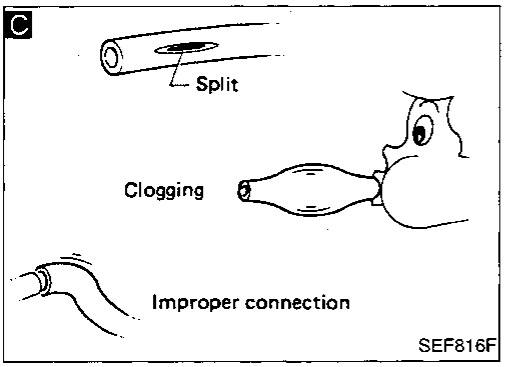


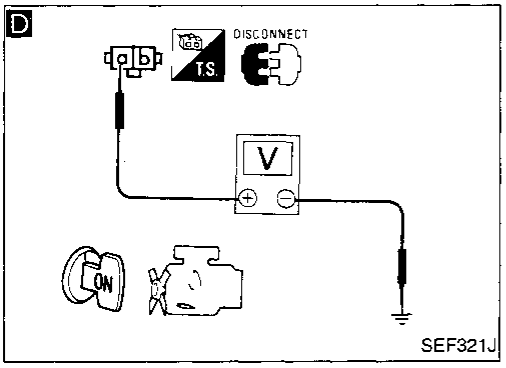


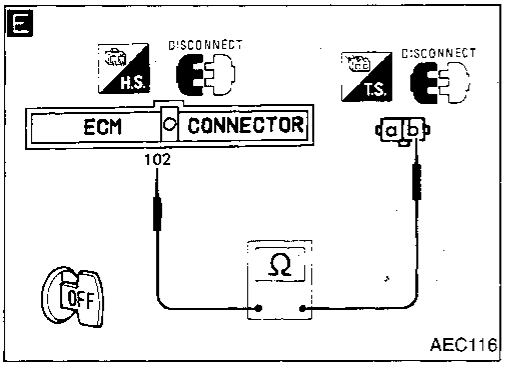
Diagnostic Procedure For Trouble Code 32 (Cont'd)











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 diagnostic trouble code No. 12 is not displayed. Make sure that both camshaft position sensor and ECM's CPU are not in "fail-safe" state.
3) Keep engine speed at 2,000 rpm.
4) Disconnect vacuum hose to EGR valve.
5) Make sure that vacuum exists. **Vacuum should exist.**

OK → CHECK COMPONENTS (EGR valve, EGRC-BPT valve and EGR temperature sensor). Refer to EF & EC-165, 166.

NG → Replace malfunctioning component(s).

NG

B

CHECK CONTROL FUNCTION.
1) Check voltage between ECM terminal (102) and ground under the following conditions.
Voltage:
Engine speed is about 2,000 rpm
Battery positive voltage
Engine speed is about 4,000 rpm
0.8 - 0.9V

OK → **C**

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

NG

D

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

NG → Check the following.
- Harness connectors (F28), (E30)
- Harness continuity between EGR control-solenoid valve and ignition switch

If NG, repair harness or connectors.

OK

E

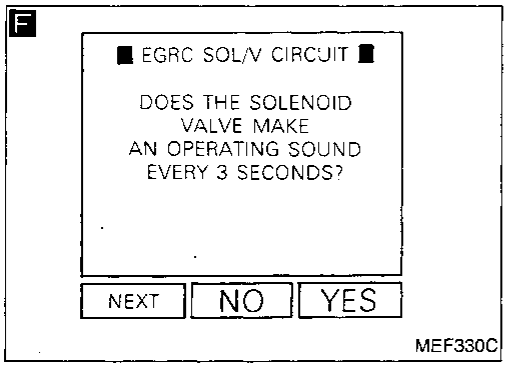
CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal (102) and terminal (b).
Continuity should exist.

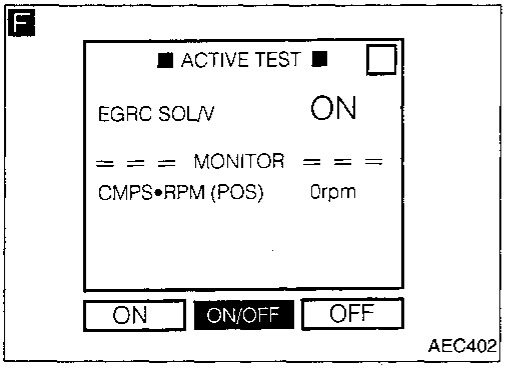
NG → Repair harness or connectors.

OK

(A)

Diagnostic Procedure For Trouble Code 32 (Cont'd)





Ⓐ

F

CHECK COMPONENT
(EGR control-solenoid valve).

1) Reconnect ECM 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.

NG → Replace EGR control-solenoid valve.

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-165.

OK

Check resistance of EGR temperature sensor.
Refer to EF & EC-166.

OK

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

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.
Reconnect ECM harness connector and retest.

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-43.

↓

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-158.

Does not come on

↓

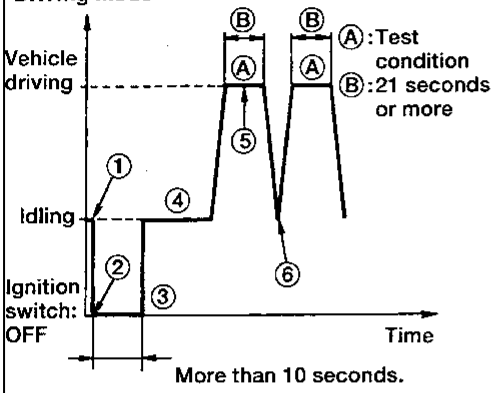
INSPECTION END

G

ROAD TEST
Test condition

Drive vehicle under the following conditions with a suitable shift position.
(1) Engine speed:
2,150±450 rpm
(2) Intake manifold vacuum:
–32.0±6.7 kPa
(–240±50 mmHg, –9.45±1.97 inHg)

Driving mode



①Start engine and warm it up sufficiently.
②Turn off ignition switch and keep it off more than 10 seconds.
③Start engine and make sure that air conditioning switch and rear defogger are turned "OFF" during driving test.
④Keep engine running for at least 4 minutes.
⑤Shift to suitable gear position and drive in "Test condition" for at least 21 seconds.
⑥Decrease engine revolution to idle speed.
⑦Repeat steps ⑤ through ⑥ at least 1 time.

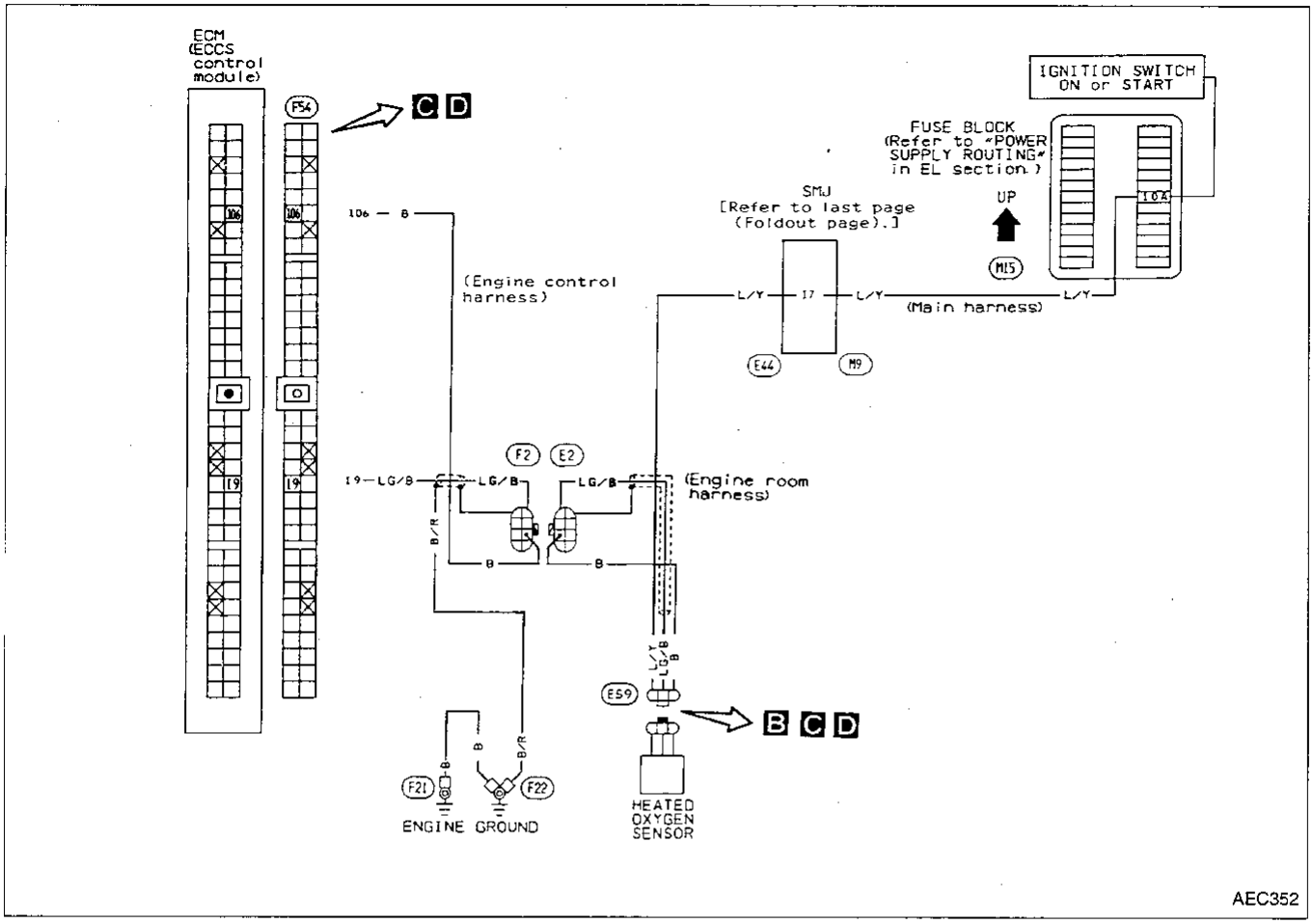
AEC175

H

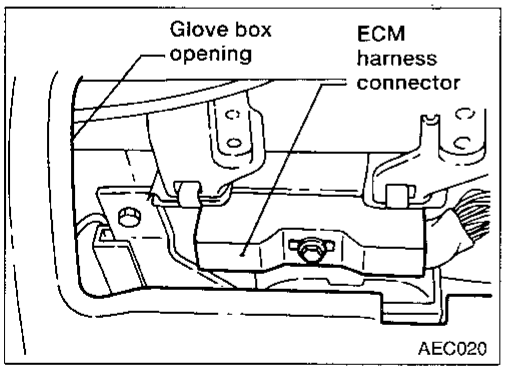
AEC015

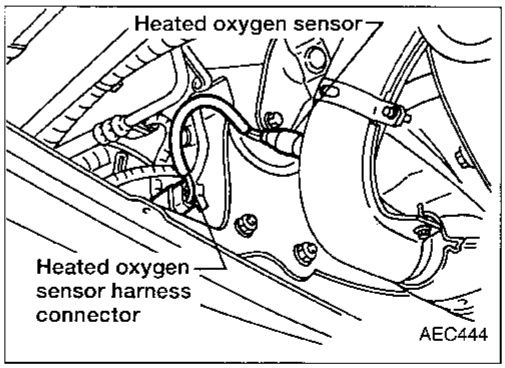
Diagnostic Procedure For Trouble Code 33

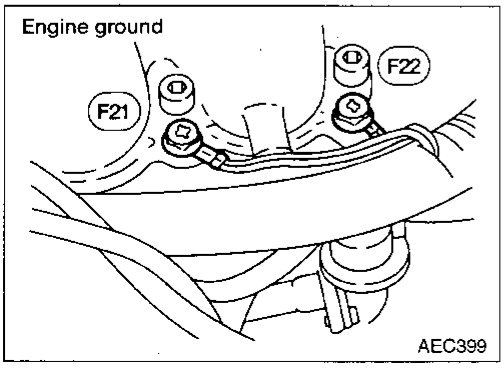
HEATED OXYGEN SENSOR (Diagnostic trouble code No. 33)



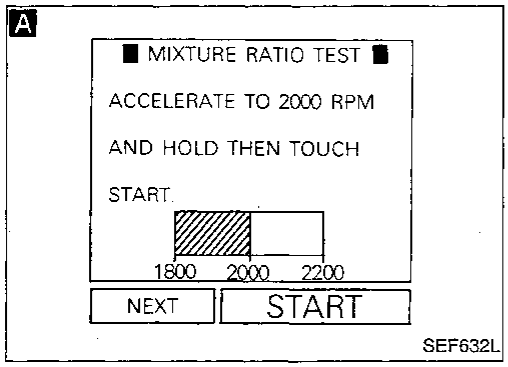
Harness layout

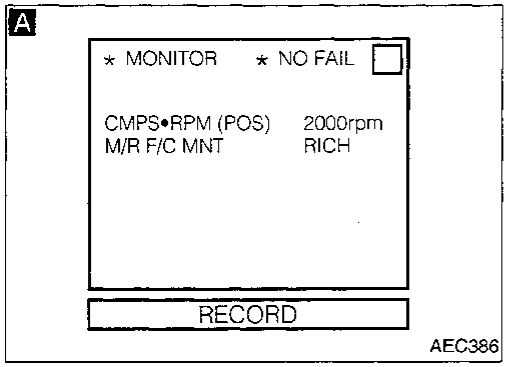


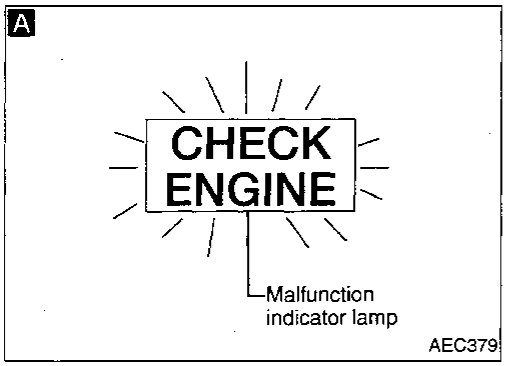


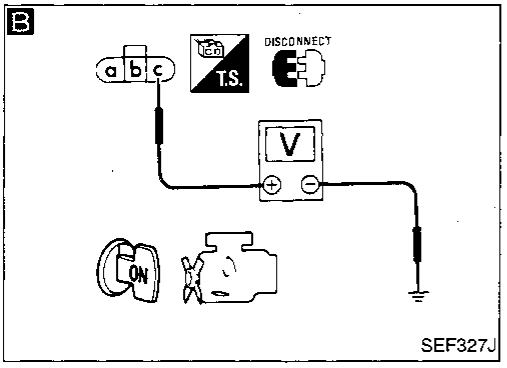


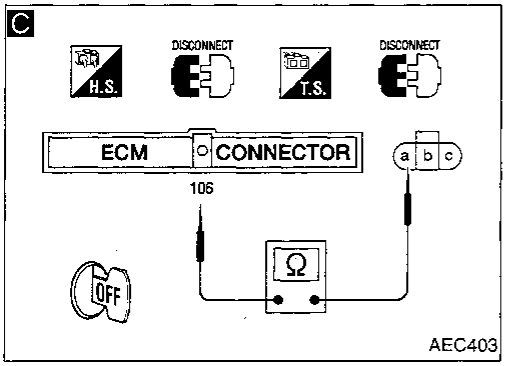
Diagnostic Procedure For Trouble Code 33 (Cont'd)











INSPECTION START

Loosen and retighten ground screws.

A

CHECK HEATED OXYGEN SENSOR CIRCUIT.

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

OR

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

OR

2) 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 malfunction indicator lamp goes on and off more than 5 times during 10 seconds.

OK → INSPECTION END

NG

B

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

NG → Check the following.
- Harness connectors (E44), (M9)
- 10A fuse
- Harness continuity between heated oxygen sensor and fuse

If NG, repair harness or connectors.

OK

C

CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal (106) and terminal ⓐ.
Continuity should exist.

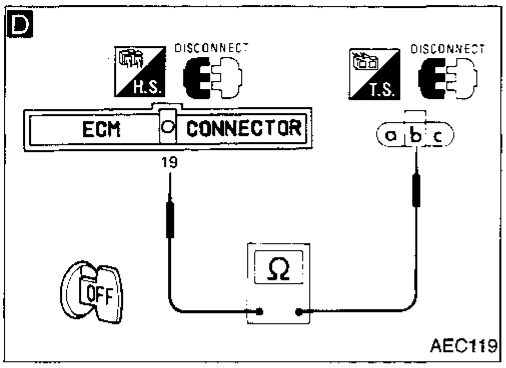
NG → Check the following.
- Harness connectors (F2), (E2)

If NG, repair harness or connectors.

OK

Ⓐ

Diagnostic Procedure For Trouble Code 33 (Cont'd)



Ⓐ

D

CHECK INPUT SIGNAL CIRCUIT.
1) Check harness continuity between ECM terminal ⑲ and terminal ⓑ.
Continuity should exist.

NG → Check the following.
- Harness connectors (F2), (E2)

If NG, repair harness or connectors.

OK ↓

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

Trouble is not fixed. ↓

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.
Reconnect ECM harness connector and retest.

Trouble is not fixed. ↓

Replace heated oxygen sensor.

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-43. ↓

Perform test drive. ↓

Perform On-board Diagnostic Test Mode II (Self-diagnostic results) again. Refer to EF & EC-37.

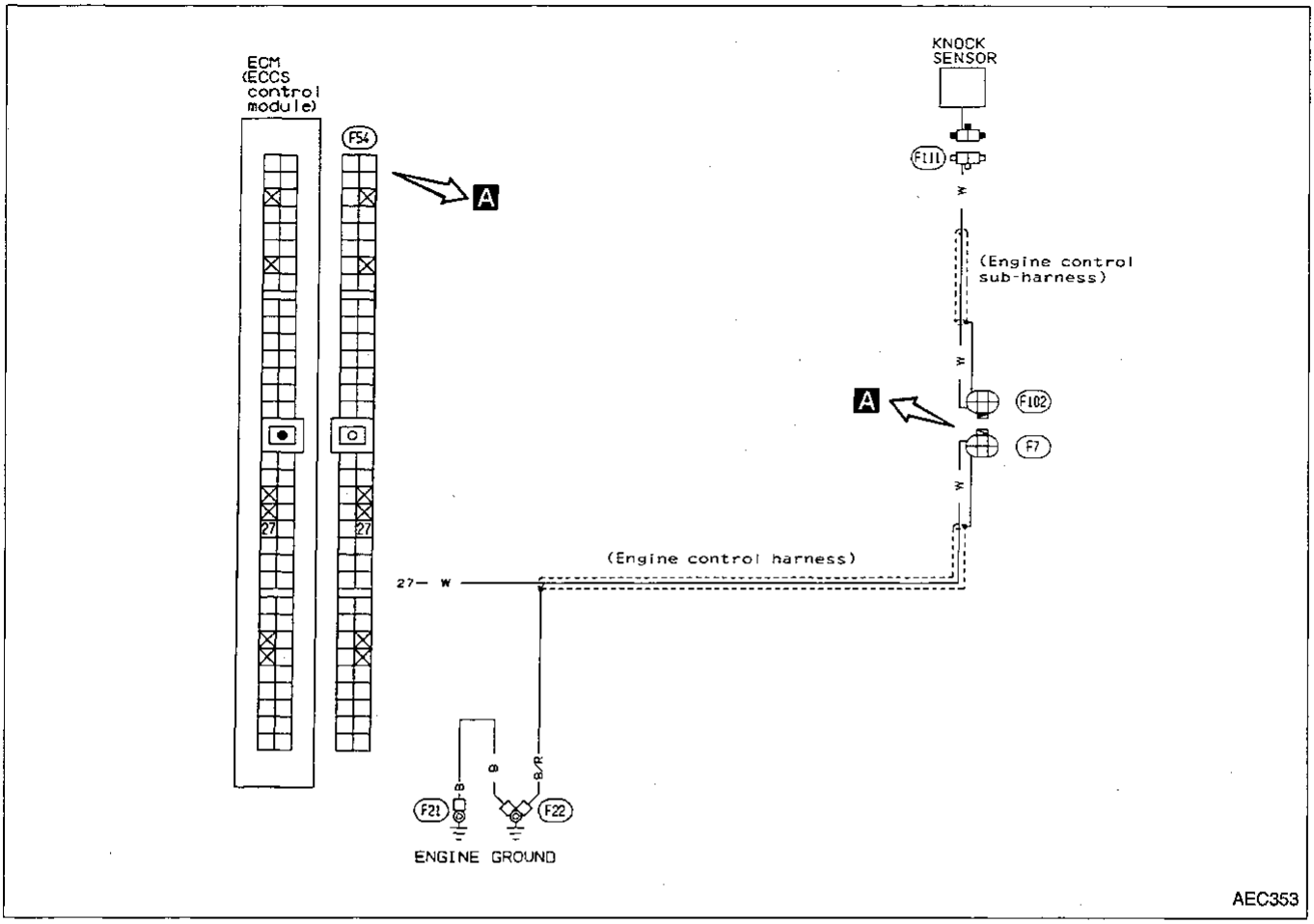
NG → Recheck ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.

OK ↓

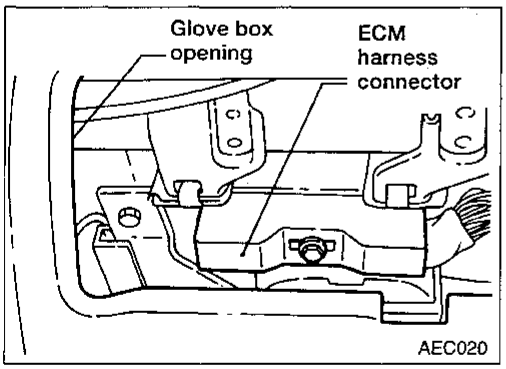
INSPECTION END

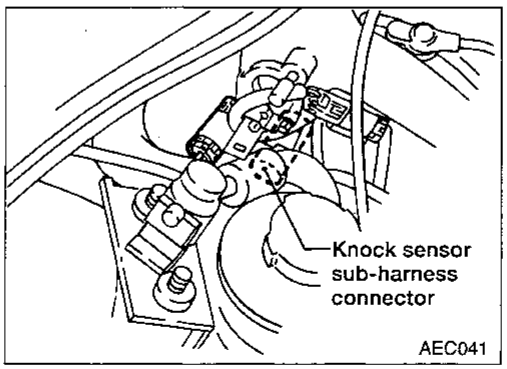
Diagnostic Procedure For Trouble Code 34

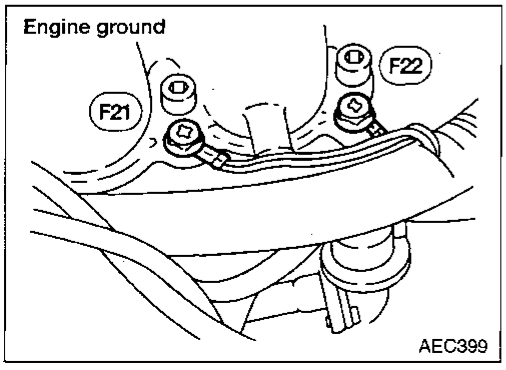
KNOCK SENSOR (Diagnostic trouble code No. 34)



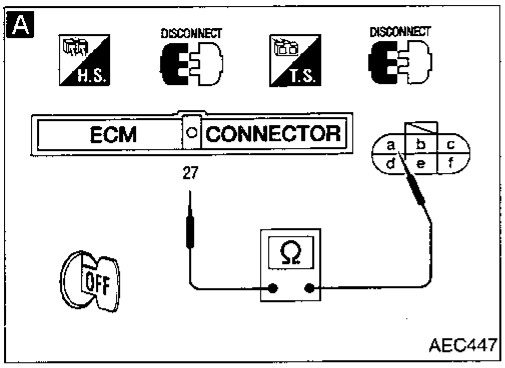
Harness layout







Diagnostic Procedure For Trouble Code 34 (Cont'd)



INSPECTION START

Loosen and retighten ground screws.

A

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector and knock sensor sub-harness connector.
2) Check harness continuity between terminal (a) and ECM terminal (27).
Continuity should exist.

NG → Repair harness or connectors.

OK

CHECK COMPONENT
(Knock sensor).
Refer to EF & EC-168.

NG → Replace knock sensor.

OK

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

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.
Reconnect ECM harness connector and retest.

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-43.

Perform test drive.

Perform On-board Diagnostic Test Mode II (Self-diagnostic results) again. Refer to EF & EC-37.

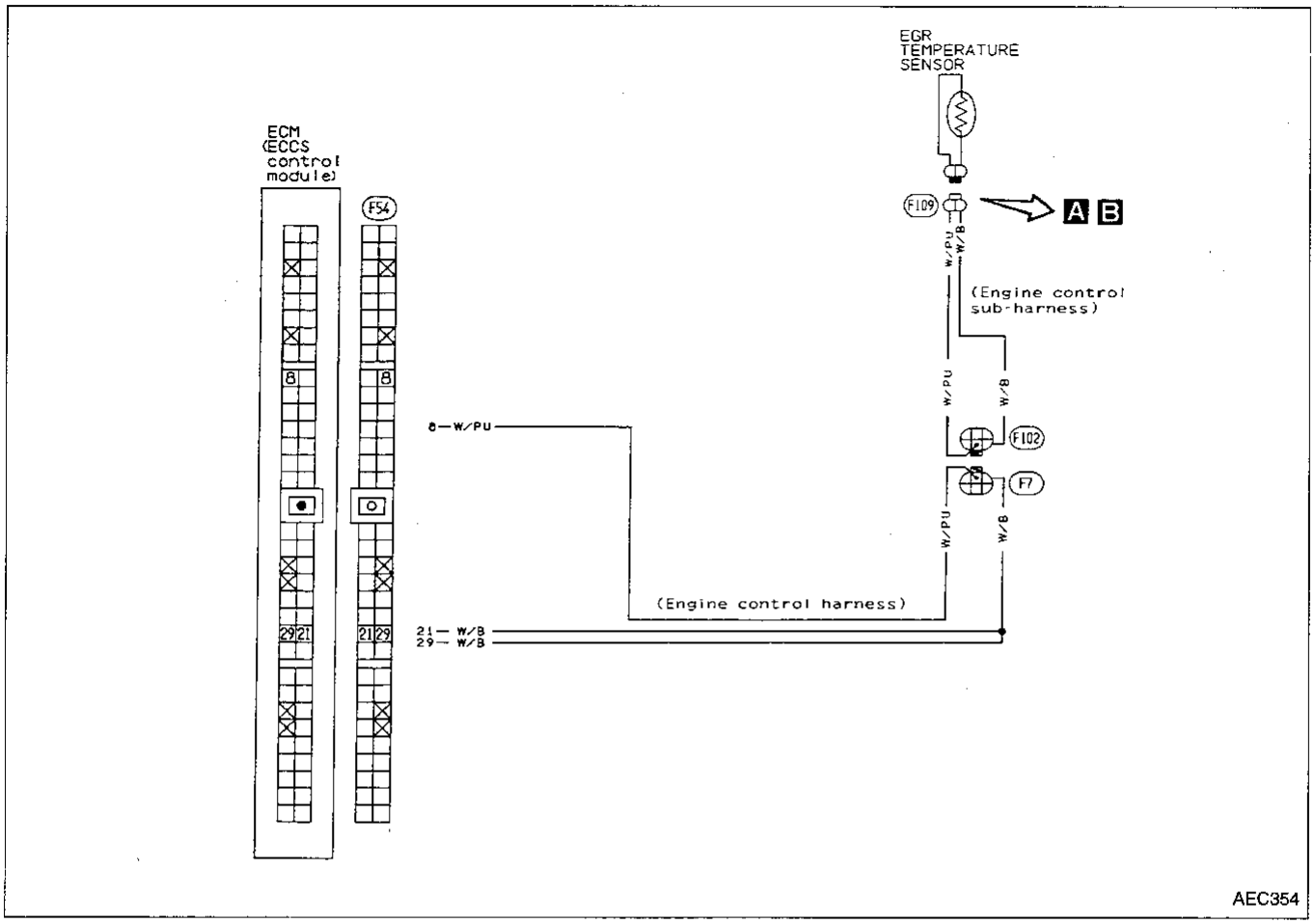
NG → Recheck ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.

OK

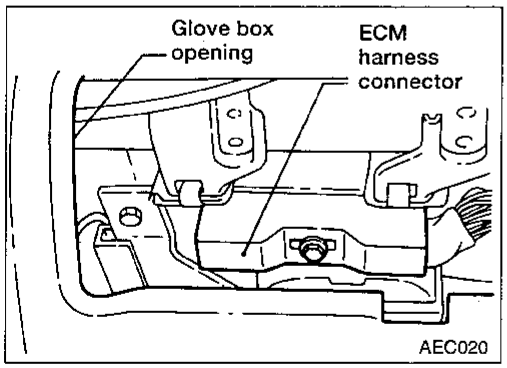
INSPECTION END

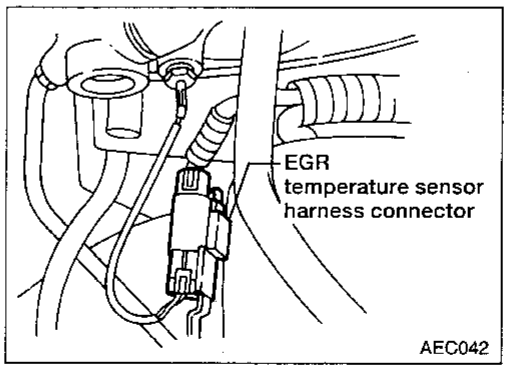
Diagnostic Procedure For Trouble Code 35

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

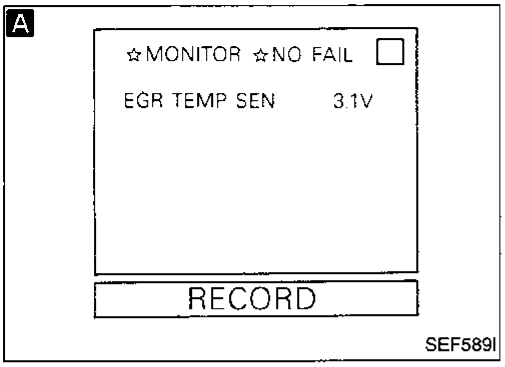


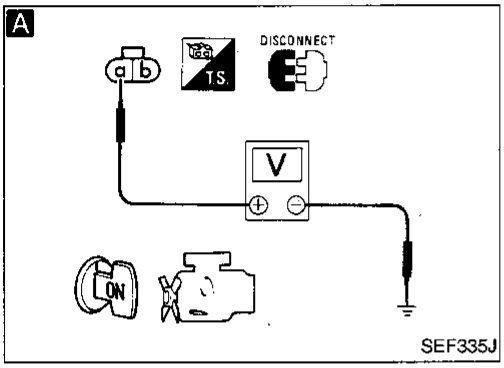
Harness layout

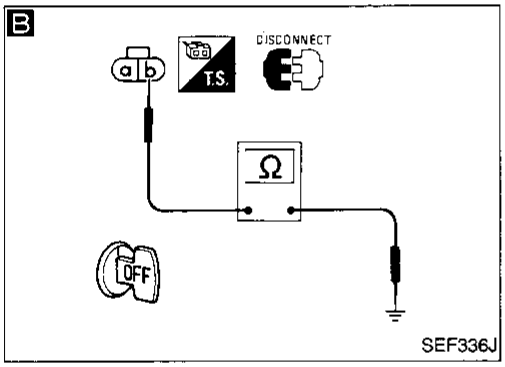




Diagnostic Procedure For Trouble Code 35 (Cont'd)







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 4.5V (at idle)

NG → Repair harness, connectors or check EGR temperature sensor.

OR

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

NG → Check the following.
- Harness connectors (F7), (F102)
- Harness continuity between ECM and EGR temperature sensor

If NG, repair harness or connectors.

OK

B

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

NG → Check the following.
- Harness connectors (F7), (F102)
- Harness continuity between ECM and EGR temperature sensor

If NG, repair harness or connectors.

OK

CHECK COMPONENT (EGR temperature sensor).
Refer to EF & EC-166.

NG → Replace EGR temperature sensor.

OK

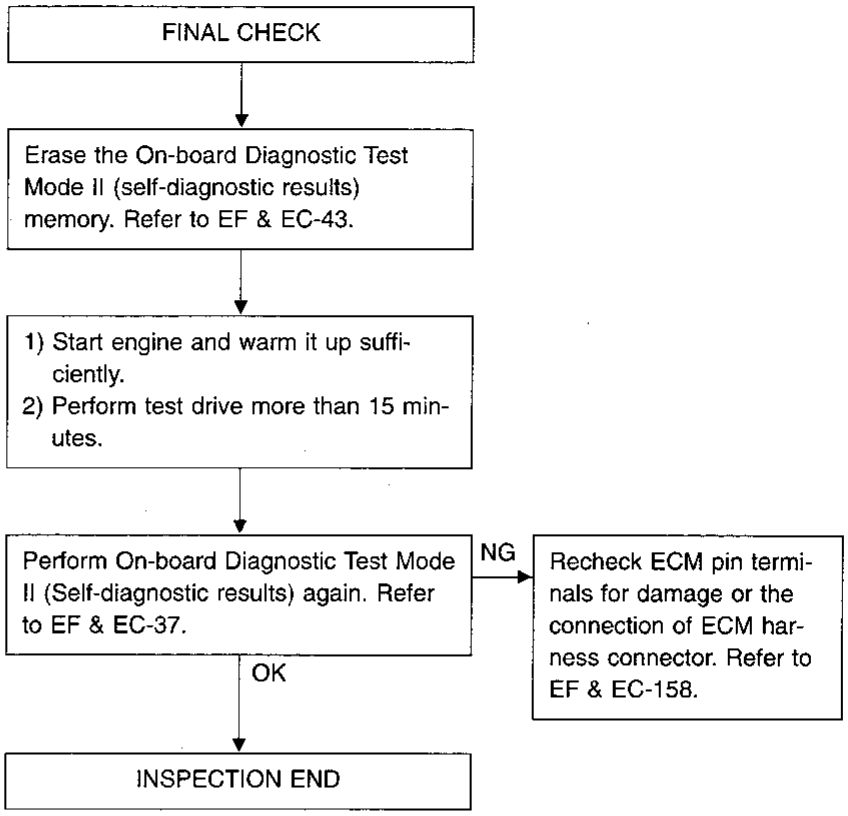
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.
Reconnect ECM harness connector and retest.

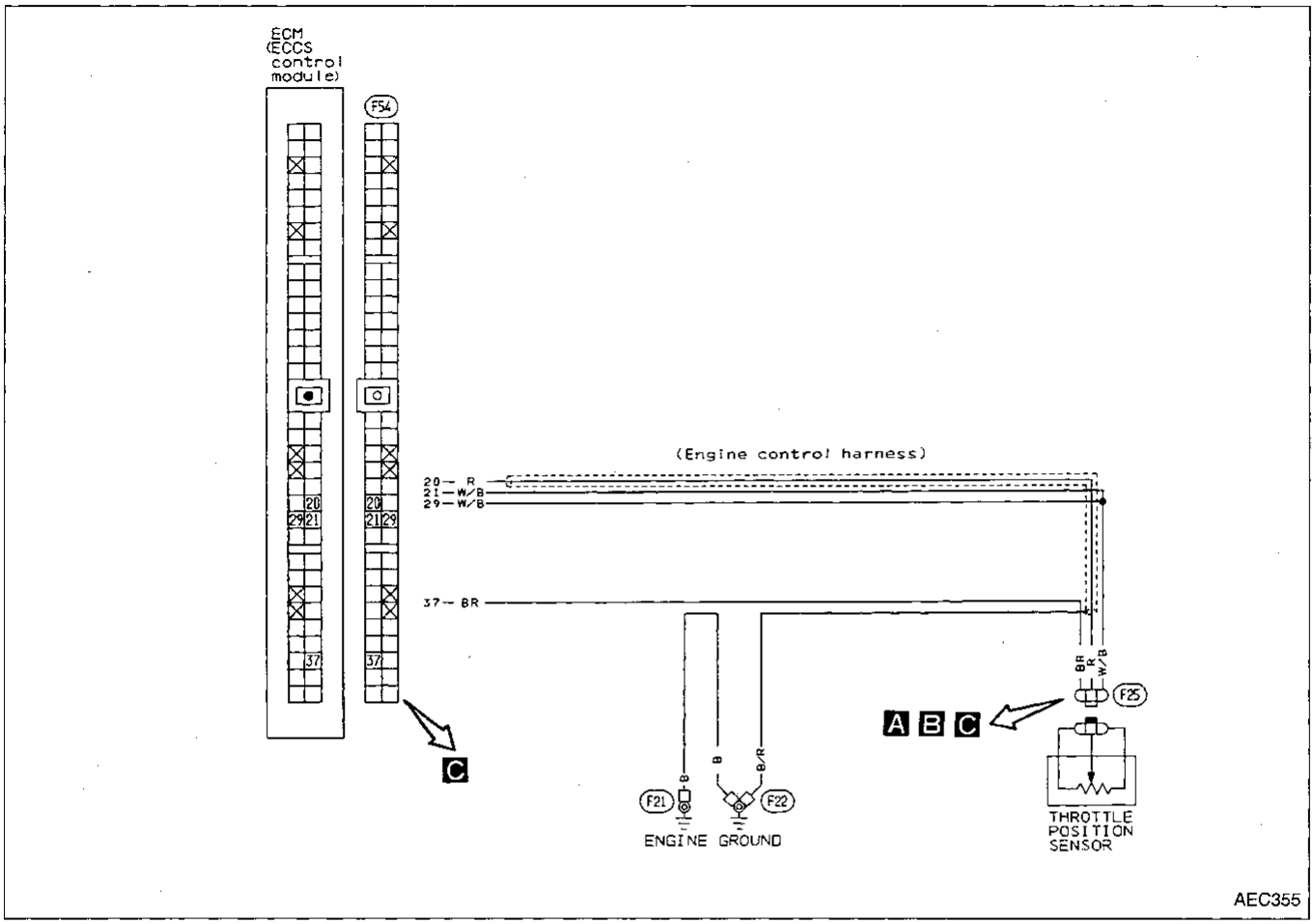
Diagnostic Procedure For Trouble Code 35 (Cont'd)

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

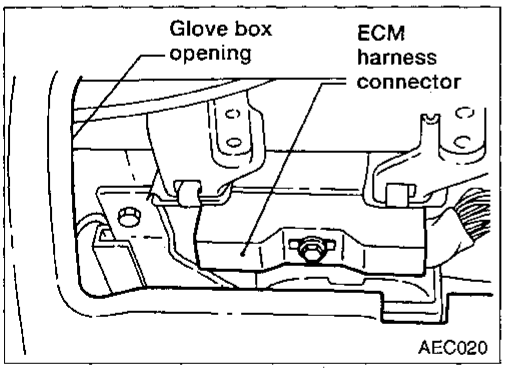


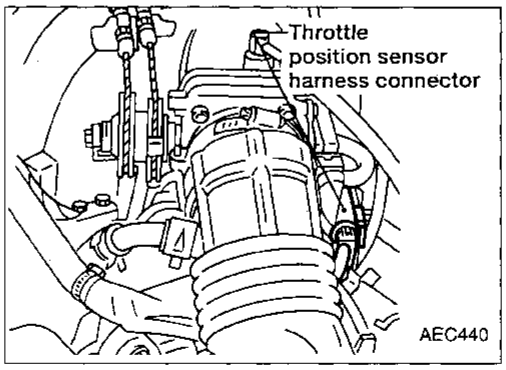
Diagnostic Procedure For Trouble Code 43

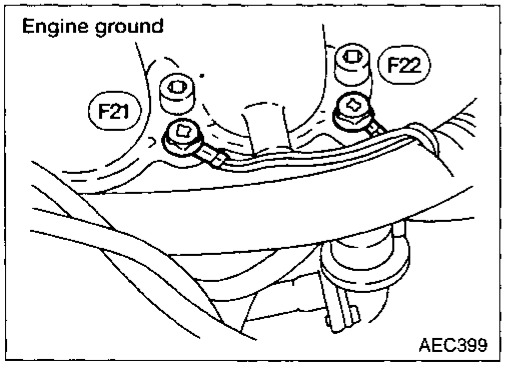
THROTTLE POSITION SENSOR (Diagnostic trouble code No. 43) CHECK ENGINE (MALFUNCTION INDICATOR LAMP ITEM)



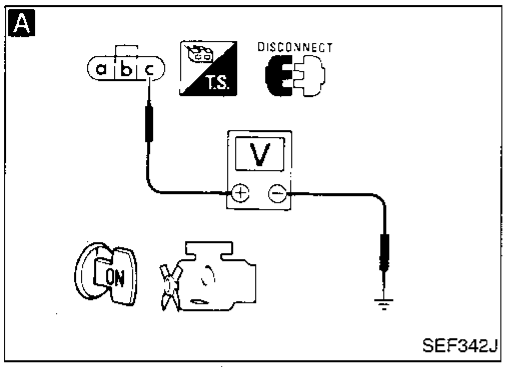
Harness layout

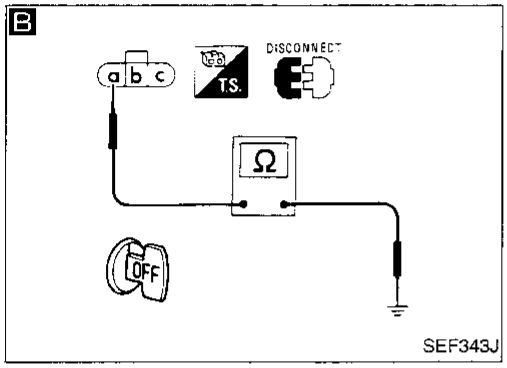


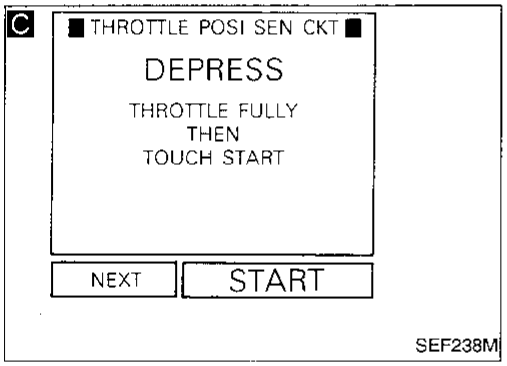


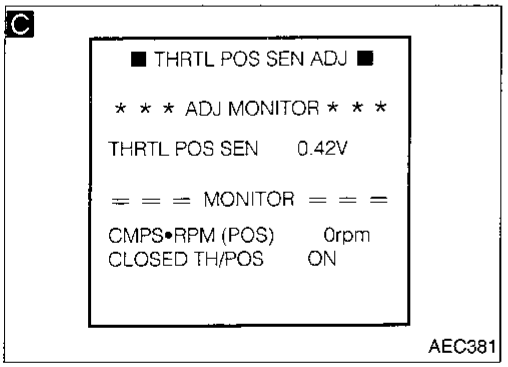


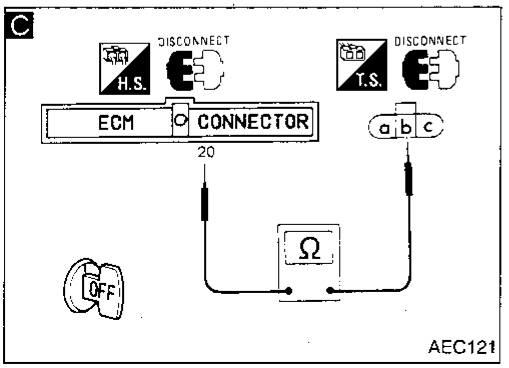
Diagnostic Procedure For Trouble Code 43 (Cont'd)











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

NG → Repair harness or connectors.

OK

B

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

NG → Repair harness or connectors.

OK

C

CHECK INPUT SIGNAL CIRCUIT.
1) Reconnect throttle position sensor harness connector.
2) Turn ignition switch "ON".
3) Perform "THROTTLE POSI SEN CKT" in "FUNCTION TEST" mode with CONSULT.

NG → Repair harness or connectors.

OR

3) Read throttle position sensor output voltage in "WORK SUPPORT" mode with CONSULT.
Throttle valve fully closed:
0.4 - 0.5V
Smoothly and gradually increasing until 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.

OK

CHECK COMPONENT (Throttle position sensor). Refer to EF & EC-166.

NG → Replace throttle position sensor.

OK

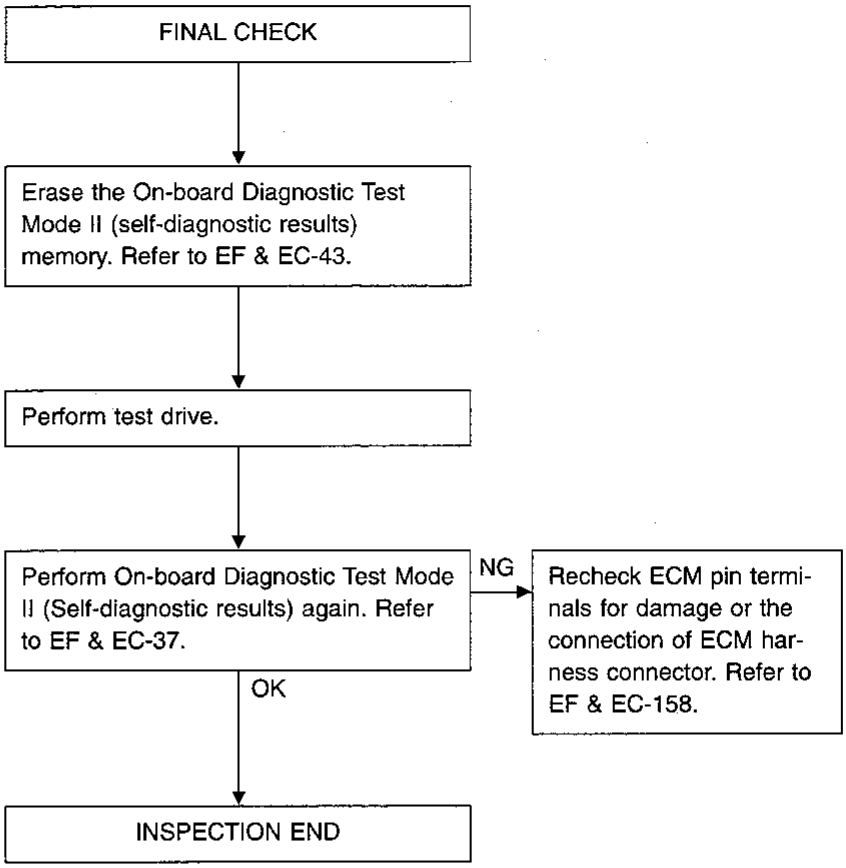
Disconnect and reconnect harness connectors in the circuit, and retest.

Trouble is not fixed.

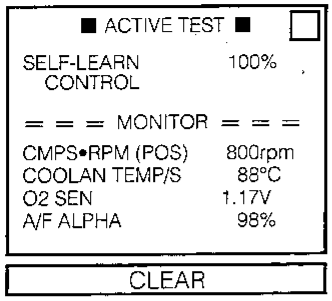
Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.
Reconnect ECM harness connector and retest.

Diagnostic Procedure For Trouble Code 43 (Cont'd)

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



A



AEC405

B

ROAD TEST

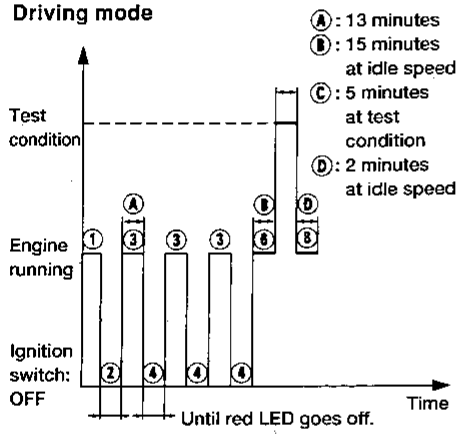
Test condition

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 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 at least 15 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 5 minutes.
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.

AEC406

Diagnostic Procedure For Trouble Code 45

INJECTOR LEAK (Code No. 45)

CHECK ENGINE (MALFUNCTION INDICATOR LAMP ITEM)

INSPECTION START

A

Clear the self-learning data using the following procedure:
1) Start engine and warm it up sufficiently.
2) Select "SELF-LEARNING CONT" in "ACTIVE TEST" mode.
3) Clear the self-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.

B

Perform engine racing test as indicated in figure B.

Ⓐ

Diagnostic Procedure For Trouble Code 45 (Cont'd)

C

CHECK ENGINE

AEC015

Ⓐ

C

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

Comes on → Recheck ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.

Does not come on ↓

Remove injector assembly.
Refer to EF & EC-172.
Keep fuel hose and all injectors connected to injector gallery.

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

Drip → Replace dripping injector.

No drip ↓

Check ECM pin terminals for damage and connection of ECM harness connector. Refer to EF & EC-158.
Reconnect ECM harness connector and retest.

Go to FINAL CHECK.

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-43.

Clear the self-learning data again.

Perform On-board Diagnostic Test Mode II (Self-diagnostic results) again. Refer to EF & EC-37.

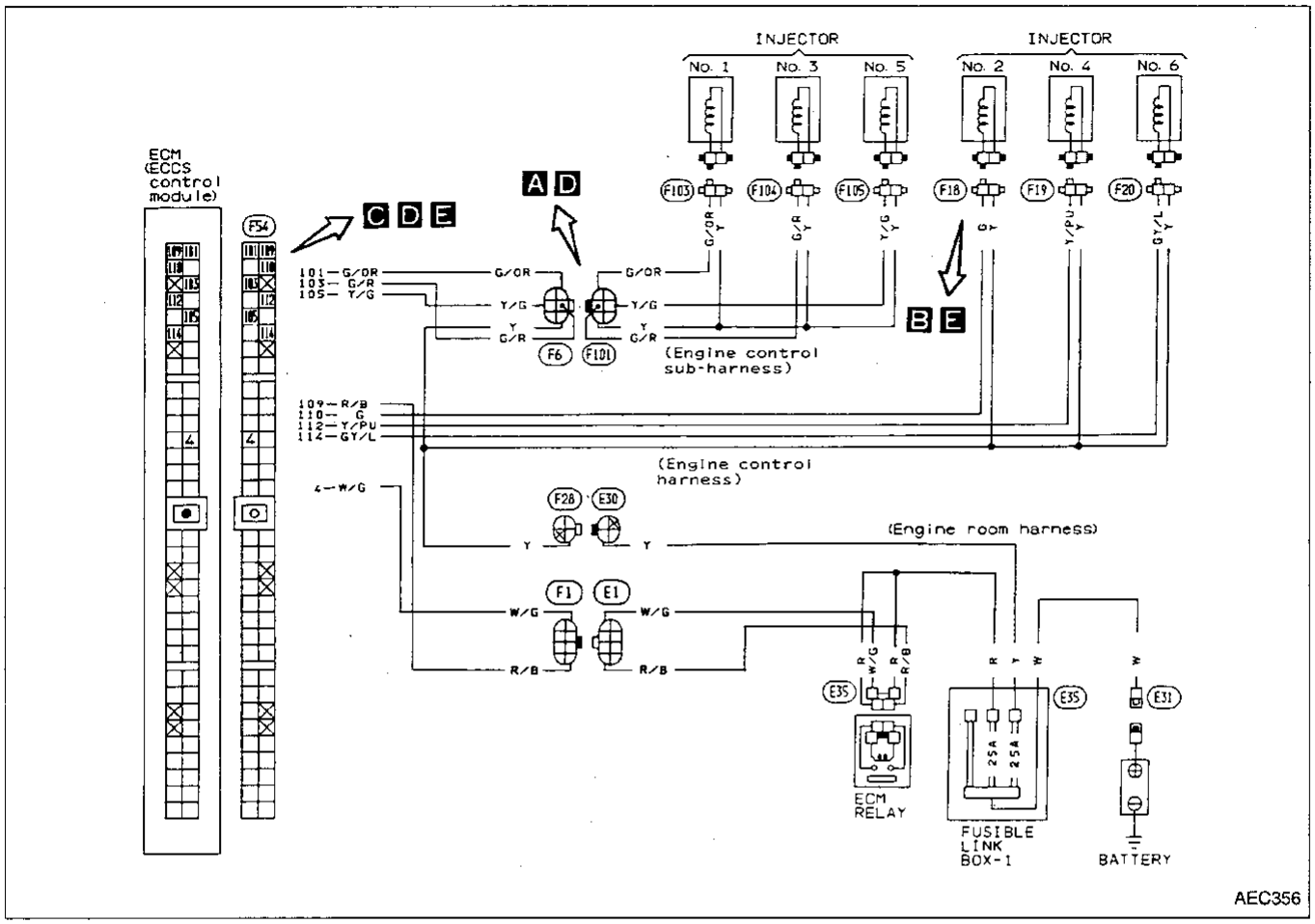
NG → Recheck ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.

OK ↓

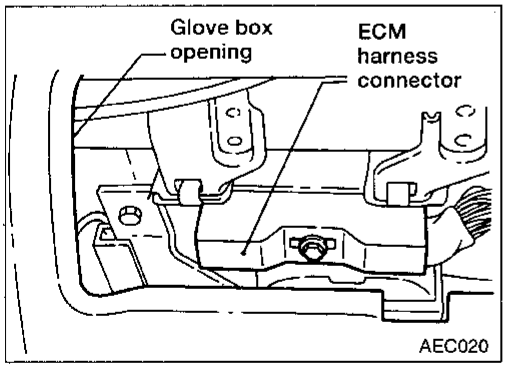
INSPECTION END

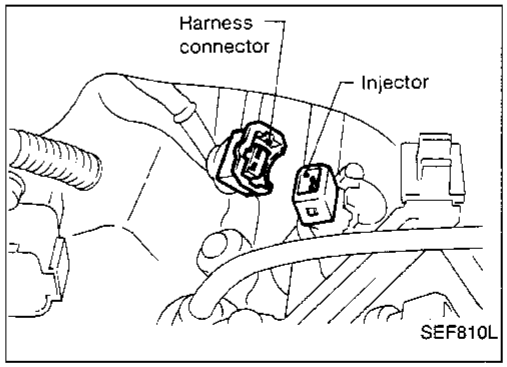
Diagnostic Procedure For Trouble Code 51

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

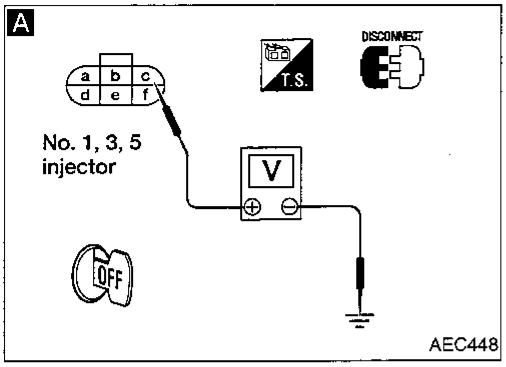


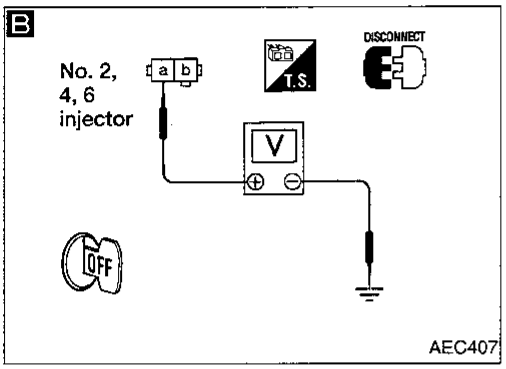
Harness layout

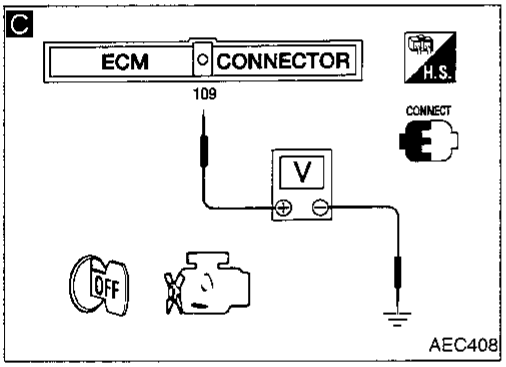


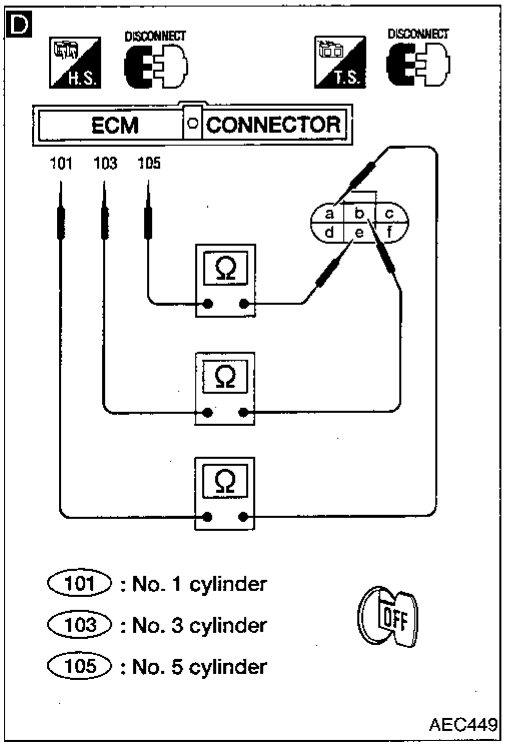


Diagnostic Procedure For Trouble Code 51 (Cont'd)









INSPECTION START

CHECK POWER SUPPLY.
1) Disconnect sub-harness connectors (F6), (F101) for No. 1, No. 3, No. 5 cylinders.
A 2) Check voltage between terminal (c) and ground.
Voltage: Battery positive voltage
3) Disconnect injector harness connectors for No. 2, No. 4, No. 6 cylinders.
B 4) Check voltage between terminal (a) and ground.
Voltage: Battery positive voltage
5) Turn ignition switch "ON".
C 6) Check voltage between ECM terminal (109) and ground.
Voltage: Battery positive voltage

NG → Check the following.
- Harness connectors (F28), (E30)
- Harness connectors (F1), (E1)
- 25A fusible link
- Harness continuity between battery and ECM
- Harness continuity between ECM relay and ECM

If NG, repair harness or connectors.

OK ↓

CHECK OUTPUT SIGNAL CIRCUIT.
1) Turn ignition switch "OFF".
D 2) Check harness continuity between terminal (a) and ECM terminal (101), terminal (b) and ECM terminal (103), (e) and ECM terminal (105).
Continuity should exist.
E 3) Check harness continuity between terminal (b) and ECM terminals (110), (112), (114).
Continuity should exist.

NG → Repair harness and connectors.

OK ↓

CHECK COMPONENT (Injector).
Refer to EF & EC-169.

NG → Replace injector. Refer to EF & EC-172.

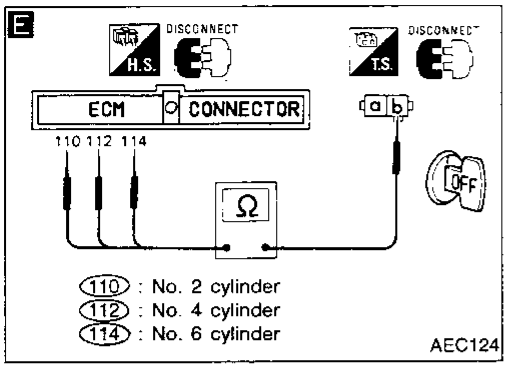
OK ↓

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

Trouble is not fixed. ↓

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.
Reconnect ECM harness connector and retest.

Diagnostic Procedure For Trouble Code 51 (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-43.

↓

Perform test drive.

↓

Perform On-board Diagnostic Test Mode II (Self-diagnostic results) again. Refer to EF & EC-37.

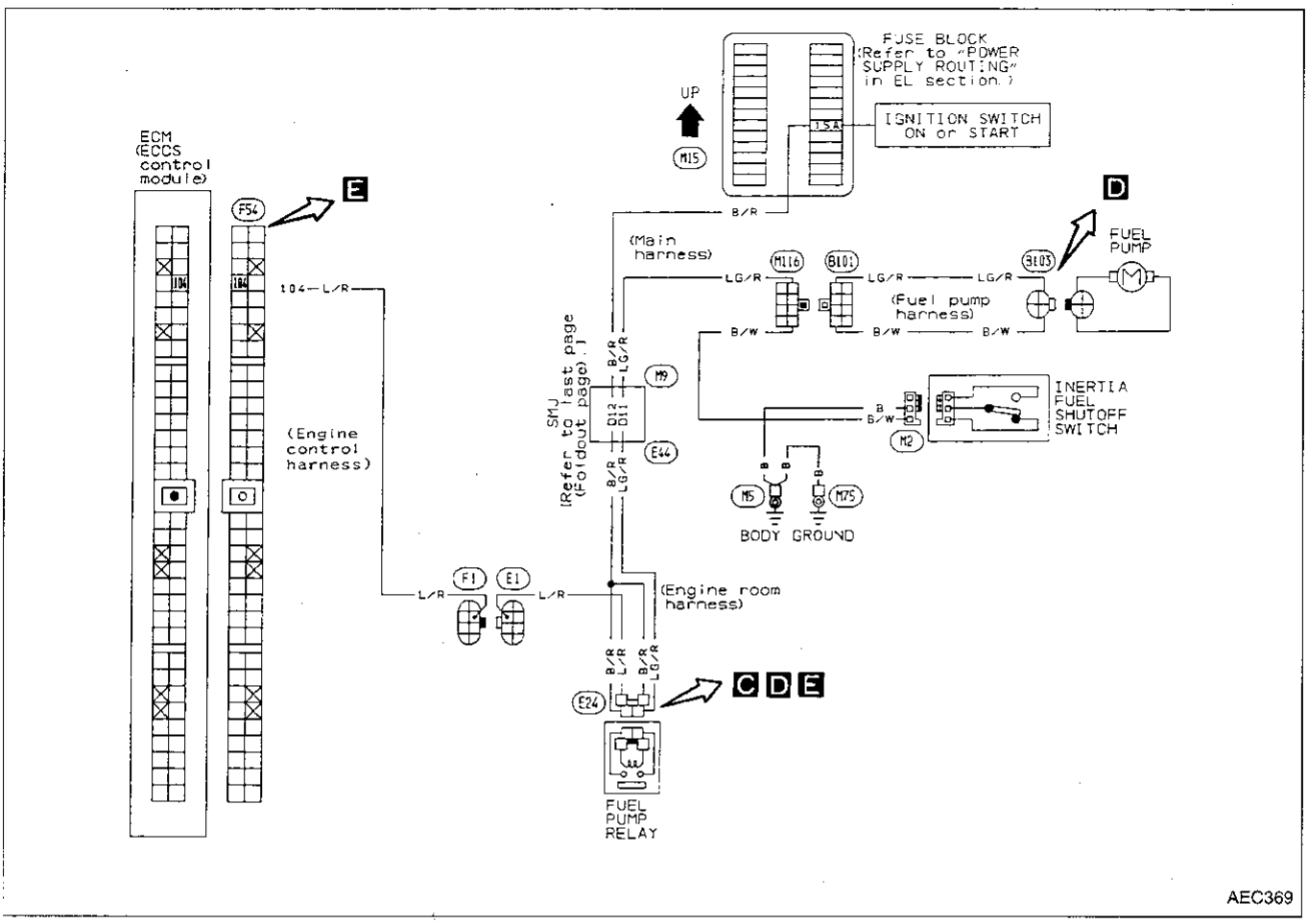
NG → Recheck ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.

OK ↓

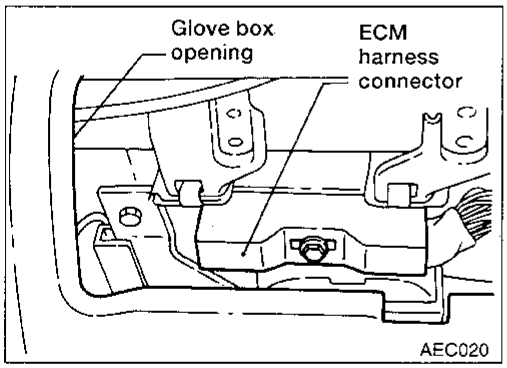
INSPECTION END

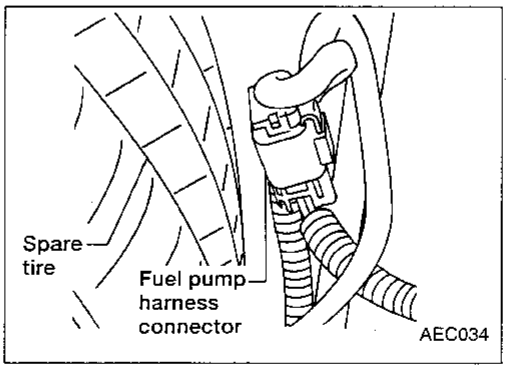
Diagnostic Procedure 23

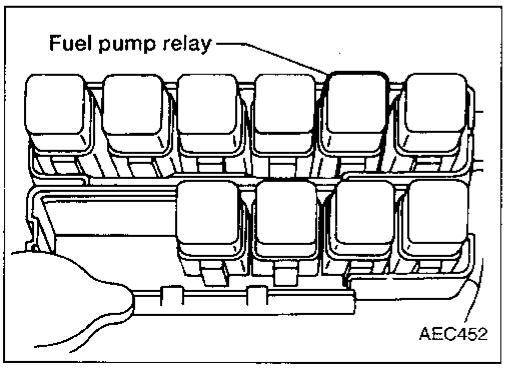
FUEL PUMP CONTROL (Not self-diagnostic item)

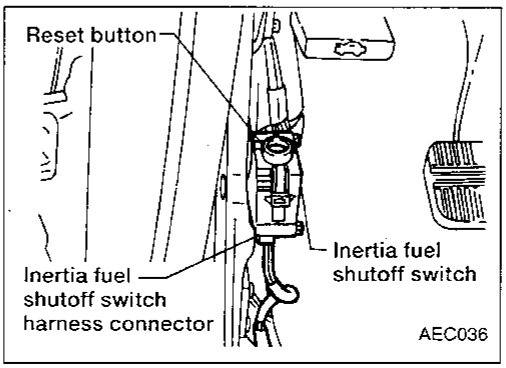


Harness layout

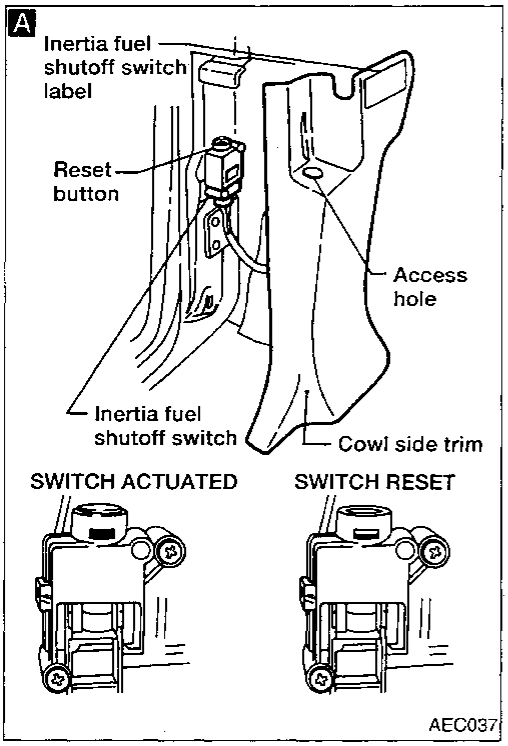


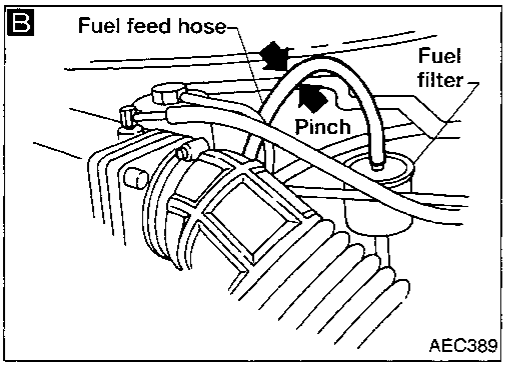


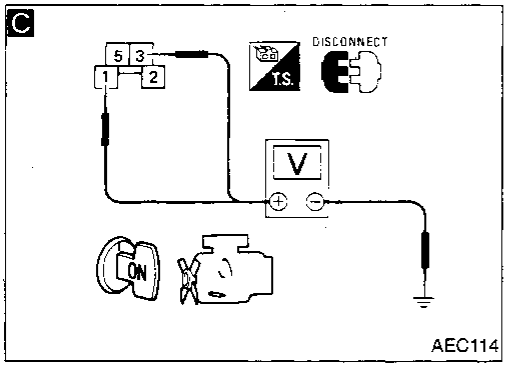




Diagnostic Procedure 23 (Cont'd)







INSPECTION START

A

CHECK INERTIA FUEL SHUTOFF SWITCH.
If the engine cranks but does not start after a collision, this switch may have been triggered.
Is the switch triggered?
Red reset button/indicator shows the switch ON/OFF condition.
And the indicator is visible through side slots of shroud.

Yes → Reset inertia fuel shufoff switch.
WARNING:
If you see or smell gasoline at any time other than during fueling, do not reset the switch.

No

B

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".

OK → INSPECTION END

NG

C

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

NG → Check the following.
- Harness connectors (E44), (M9)
- 15A fuse
- Harness continuity between fuse and fuel pump relay

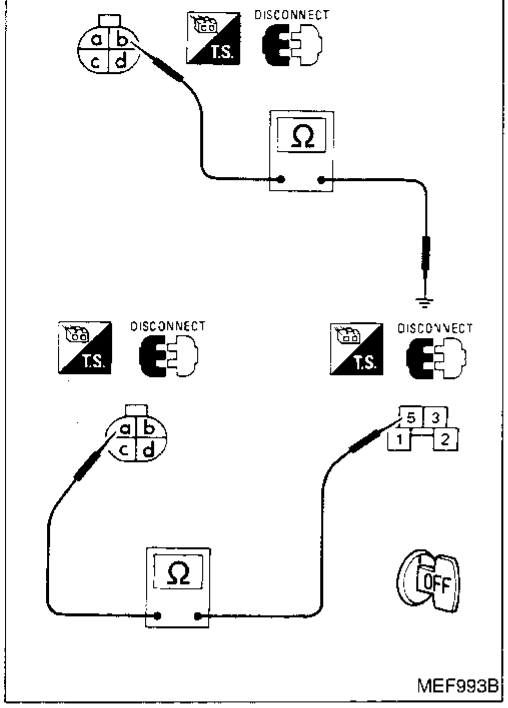
If NG, repair harness or connectors.

OK

Ⓐ

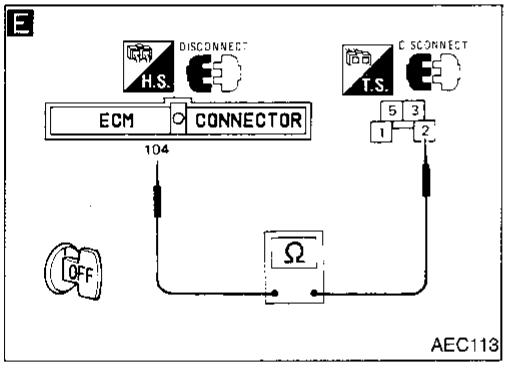
Diagnostic Procedure 23 (Cont'd)

D



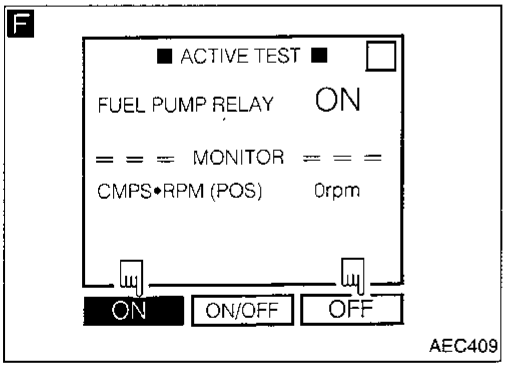
MEF993B

E



AEC113

F



AEC409

Ⓐ

D

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.

NG → Check the following.
- Harness connectors (B101), (M116)
- Harness connectors (M9), (E44)
- Inertia fuel shutoff switch. Refer to EF & EC-165.
- Harness continuity between fuel pump and body ground
- Harness continuity between fuel pump and fuel pump relay

If NG, repair harness or connectors.

OK ↓

E

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

NG → Check the following.
- Harness connectors (F1), (E1)
- Harness continuity between ECM and fuel pump relay

If NG, repair harness or connectors.

OK ↓

F

CHECK COMPONENT
(Fuel pump relay).
1) Reconnect fuel pump relay, fuel pump harness connector and ECM harness connector.
2) Turn ignition switch "ON".
3) Turn fuel pump relay "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.

NG → Replace fuel pump relay.

OR

Refer to EF & EC-169.

OK ↓

CHECK COMPONENT
(Fuel pump).
Refer to EF & EC-165.

NG → Replace fuel pump.

OK ↓

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

Trouble is not fixed. ↓

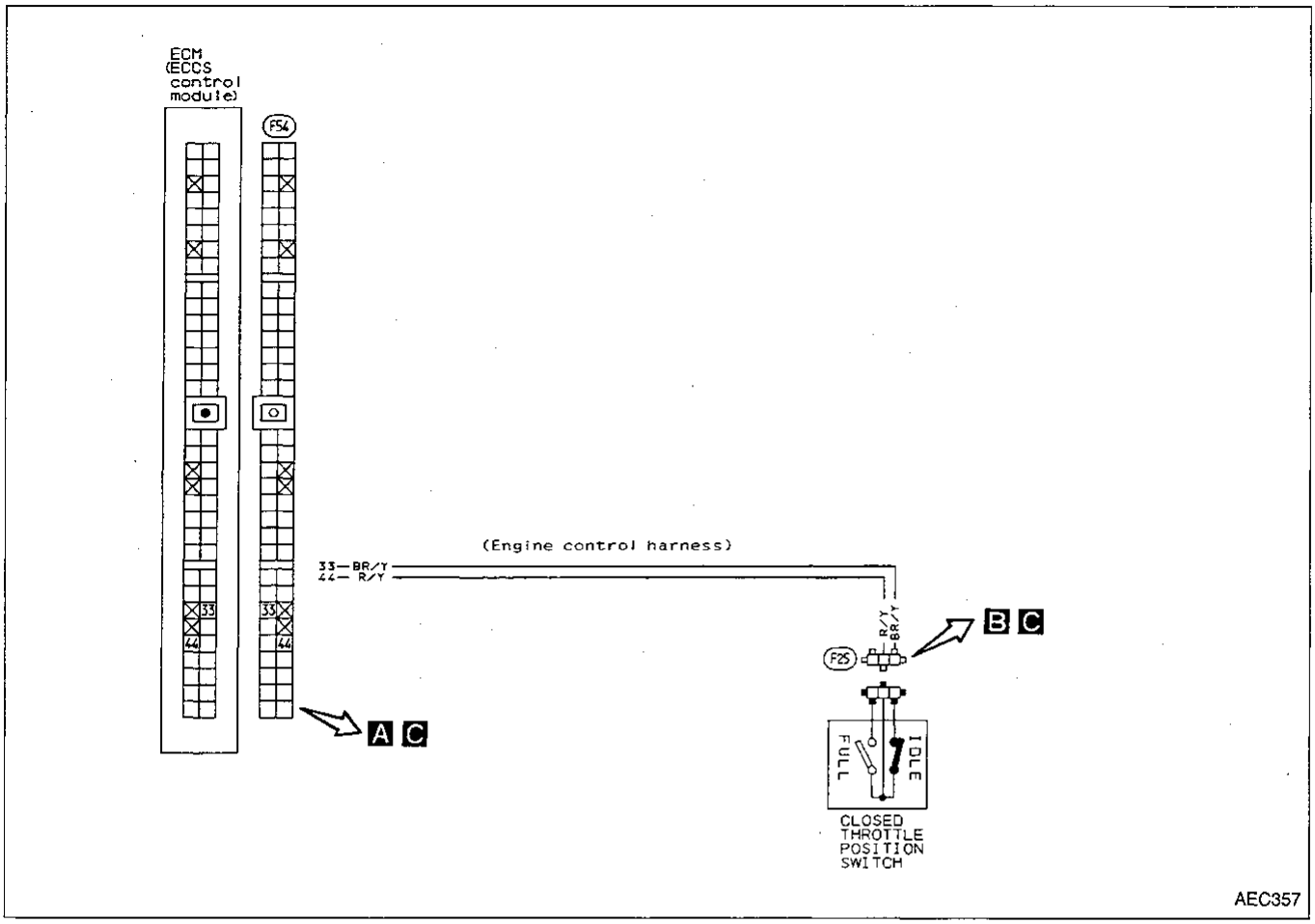
Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.
Reconnect ECM harness connector and retest.

↓

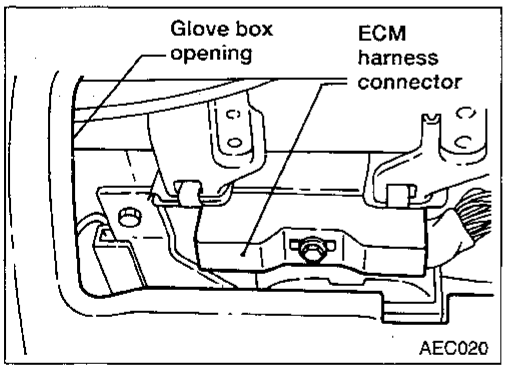
INSPECTION END

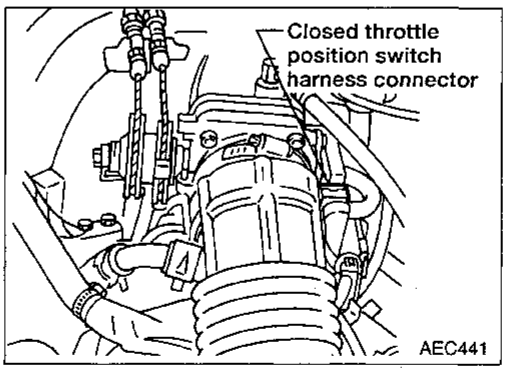
Diagnostic Procedure 24

CLOSED THROTTLE POSITION SWITCH (Not self-diagnostic item)

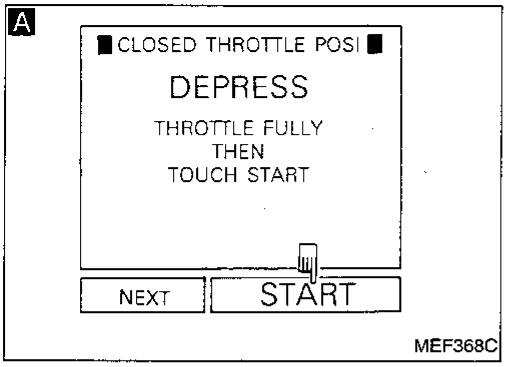


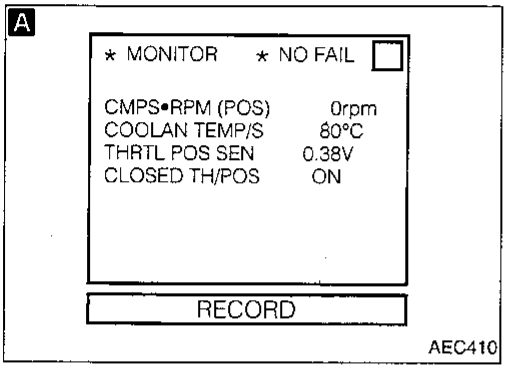
Harness layout

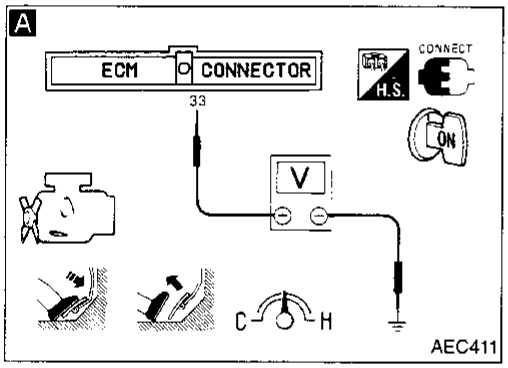


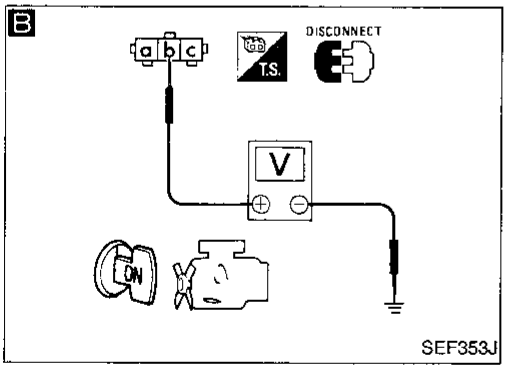


Diagnostic Procedure 24 (Cont'd)









INSPECTION START

A

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

OR

5) Check closed throttle position switch signal in "DATA MONITOR" mode with CONSULT.
CLOSED TH/POS:
Accelerator pedal is released ... ON
Accelerator pedal is depressed .. OFF

OR

3) Turn ignition switch "ON".
4) Check voltage between ECM terminal (33) and ground under the following conditions.
Voltage:
Accelerator pedal is released
Approximately 8 - 10V
Accelerator pedal is depressed
Approximately 0V

OK → INSPECTION END

NG

B

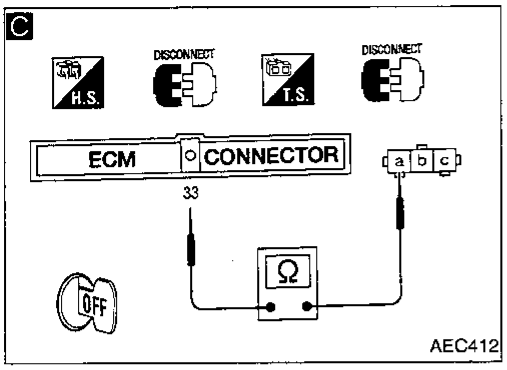
CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect closed throttle position switch harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal (b) and ground.
Voltage:
Approximately 8 - 10V

NG → Repair harness or connectors.

OK

(A)

Diagnostic Procedure 24 (Cont'd)



Ⓐ

C

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

NG → Repair harness or connectors.

OK ↓

CHECK COMPONENT
(Closed throttle position switch).
Refer to EF & EC-166.

NG → Replace closed throttle position switch.

OK ↓

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

Trouble is not fixed. ↓

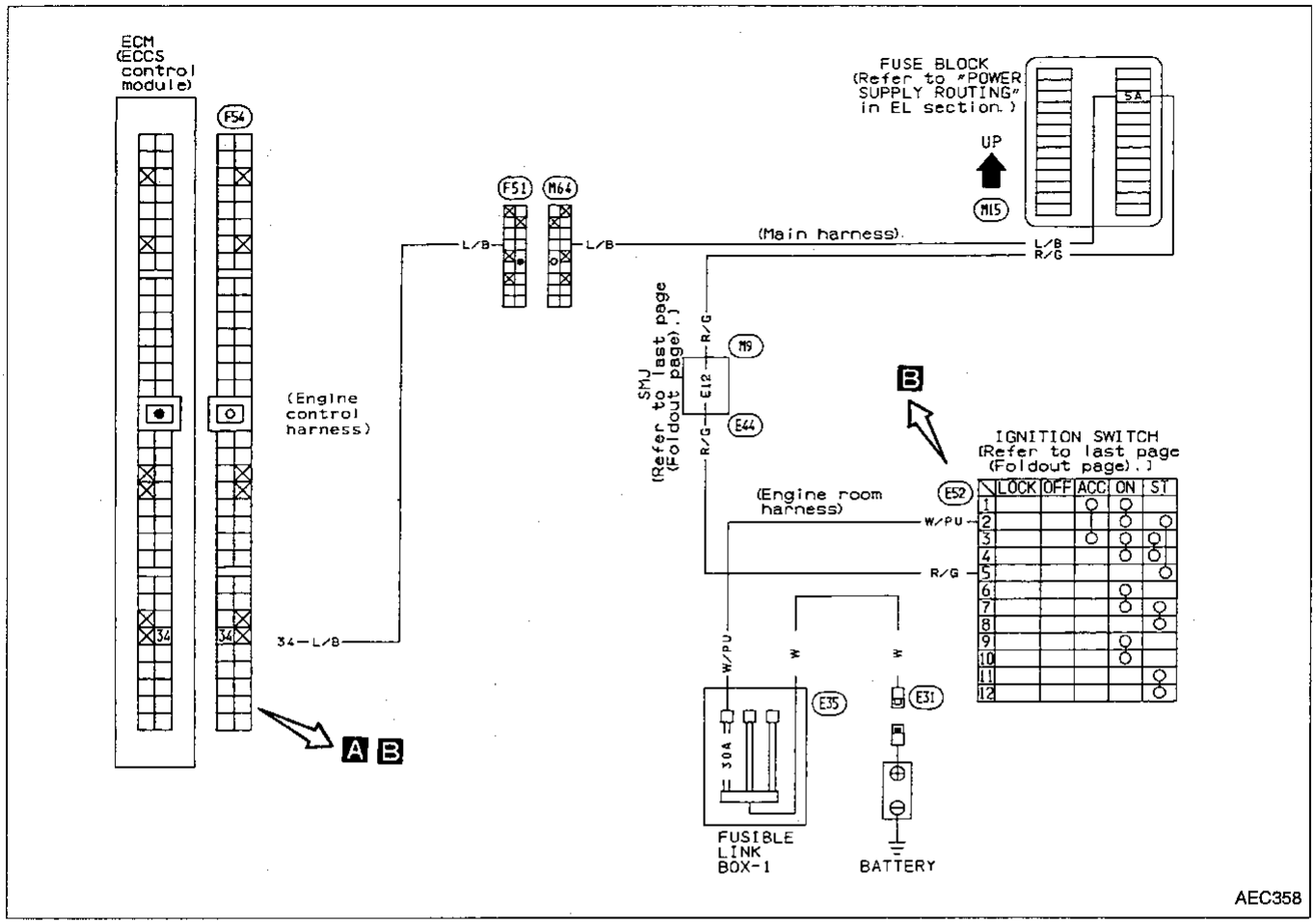
Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.
Reconnect ECM harness connector and retest.

↓

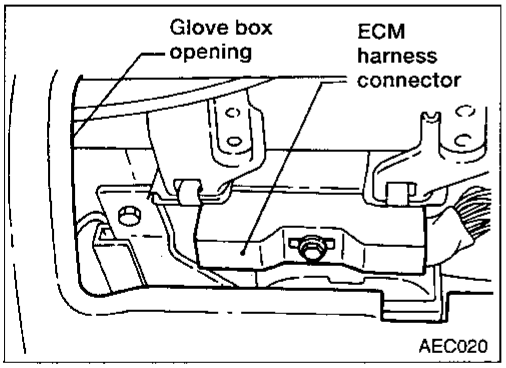
INSPECTION END

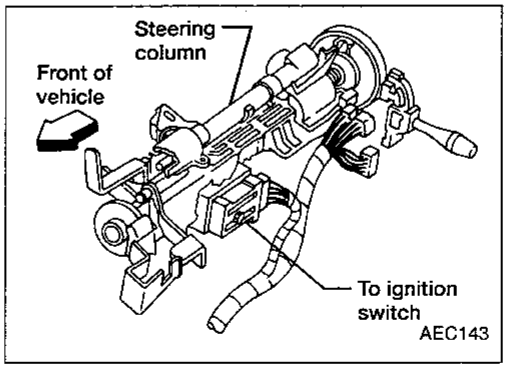
Diagnostic Procedure 25

START SIGNAL (Not self-diagnostic item)

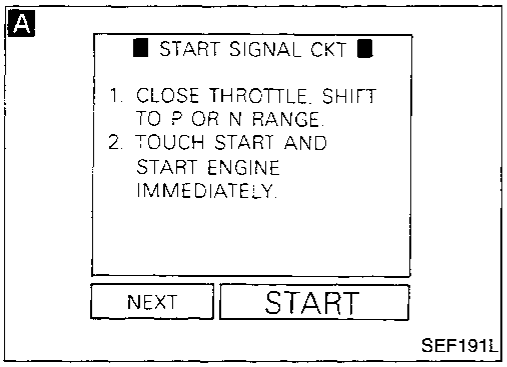


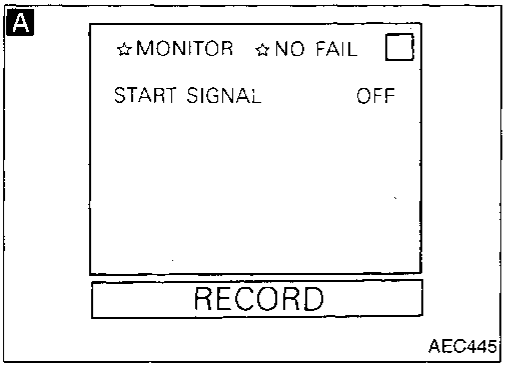
Harness layout

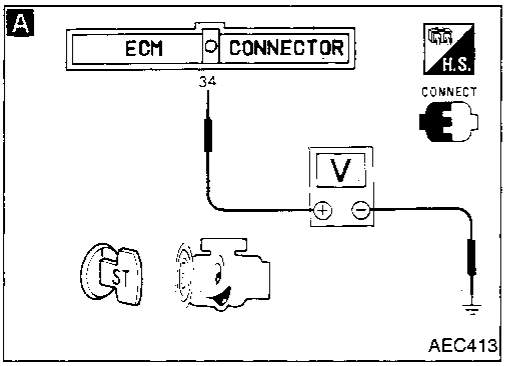


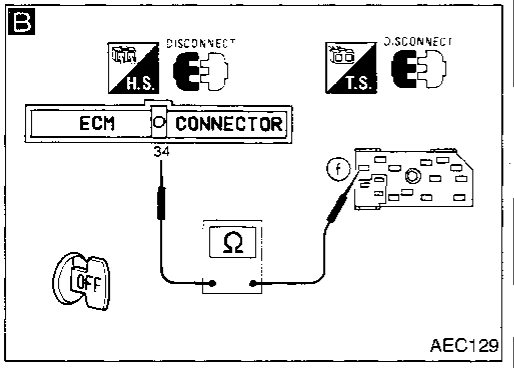


Diagnostic Procedure 25 (Cont'd)









INSPECTION START

A

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

OK → INSPECTION END

OR

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

NG

B

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

NG → Check the following.
- Harness connectors (F51) , (M64)
- Harness connectors (M9) , (E44)
- 5A fuse
- Harness continuity between ECM and ignition switch

If NG, repair harness or connectors.

OK

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

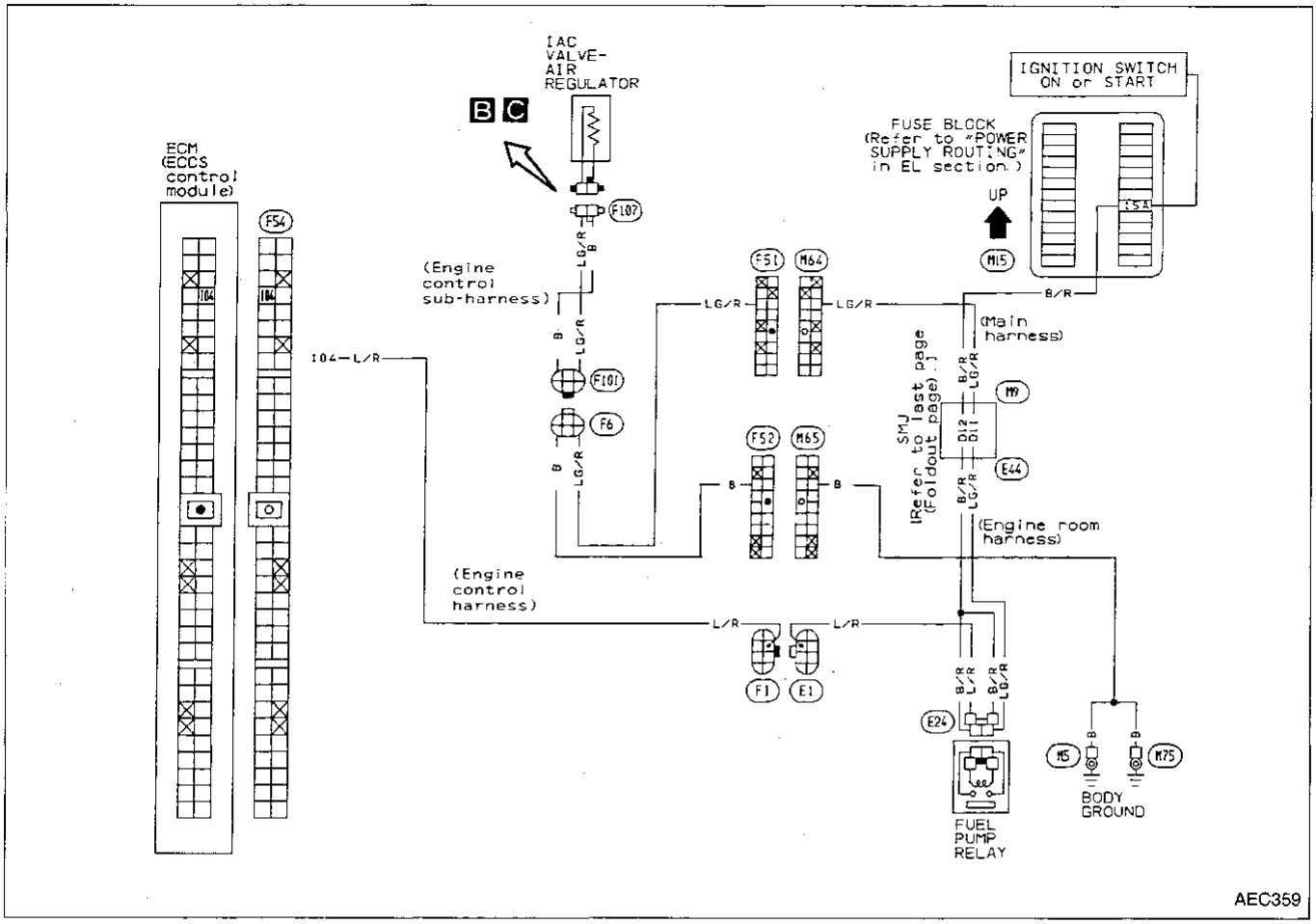
Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.
Reconnect ECM harness connector and retest.

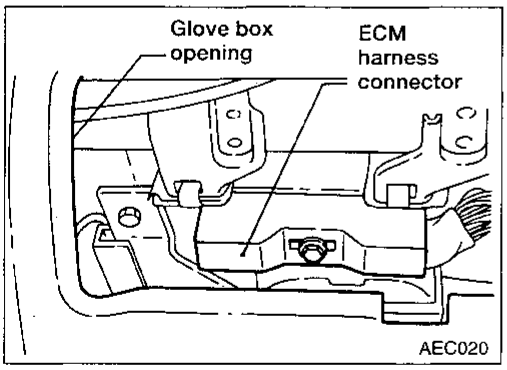
INSPECTION END

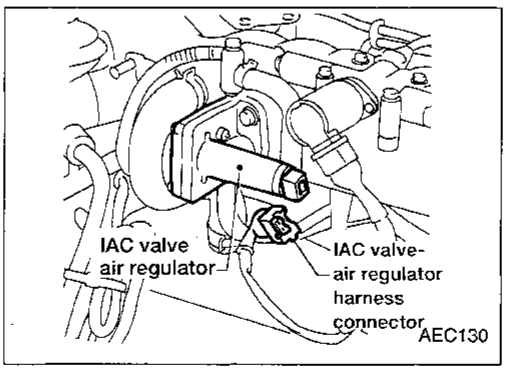
Diagnostic Procedure 26

IAC VALVE-AIR REGULATOR (Not self-diagnostic item)

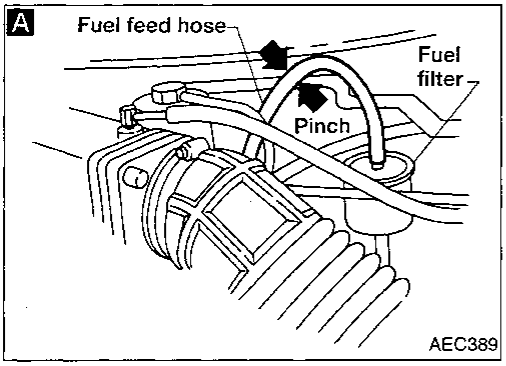


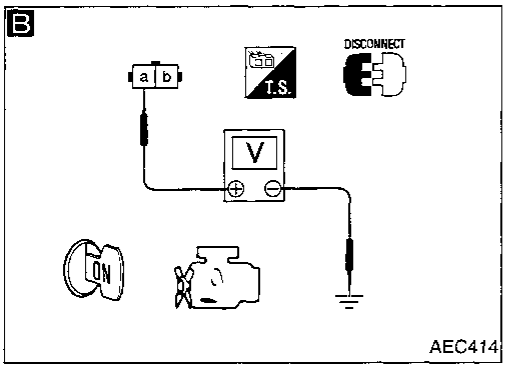
Harness layout

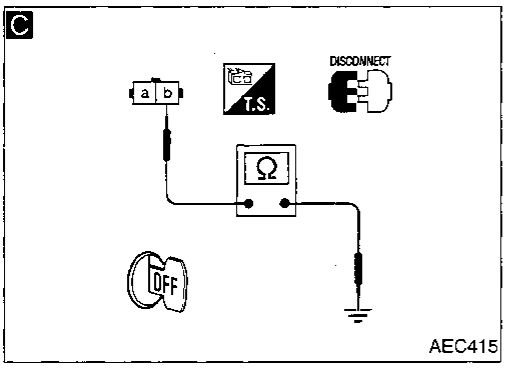




Diagnostic Procedure 26 (Cont'd)







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".

NG → Check fuel pump control circuit.
Refer to EF & EC-130.

OK

B

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect IAC valve-air regulator harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal (a) and ground.
Battery positive voltage should exist for 5 seconds after ignition switch is turned "ON".

NG → Check the following.
- Harness connectors (F51), (M64)
- Harness connectors (M9), (E44)
- Harness connectors (F101), (F6)
- Harness continuity between IAC valve-air regulator and fuel pump relay

If NG, repair harness or connectors.

OK

C

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

NG → Check the following.
- Harness connectors (F52), (M65)
- Harness connectors (F101), (F6)
- Harness continuity between IAC valve-air regulator and body ground

If NG, repair harness or connectors.

OK

CHECK COMPONENT
(IAC valve-air regulator).
Refer to EF & EC-168.

NG → Replace IAC valve-air regulator.

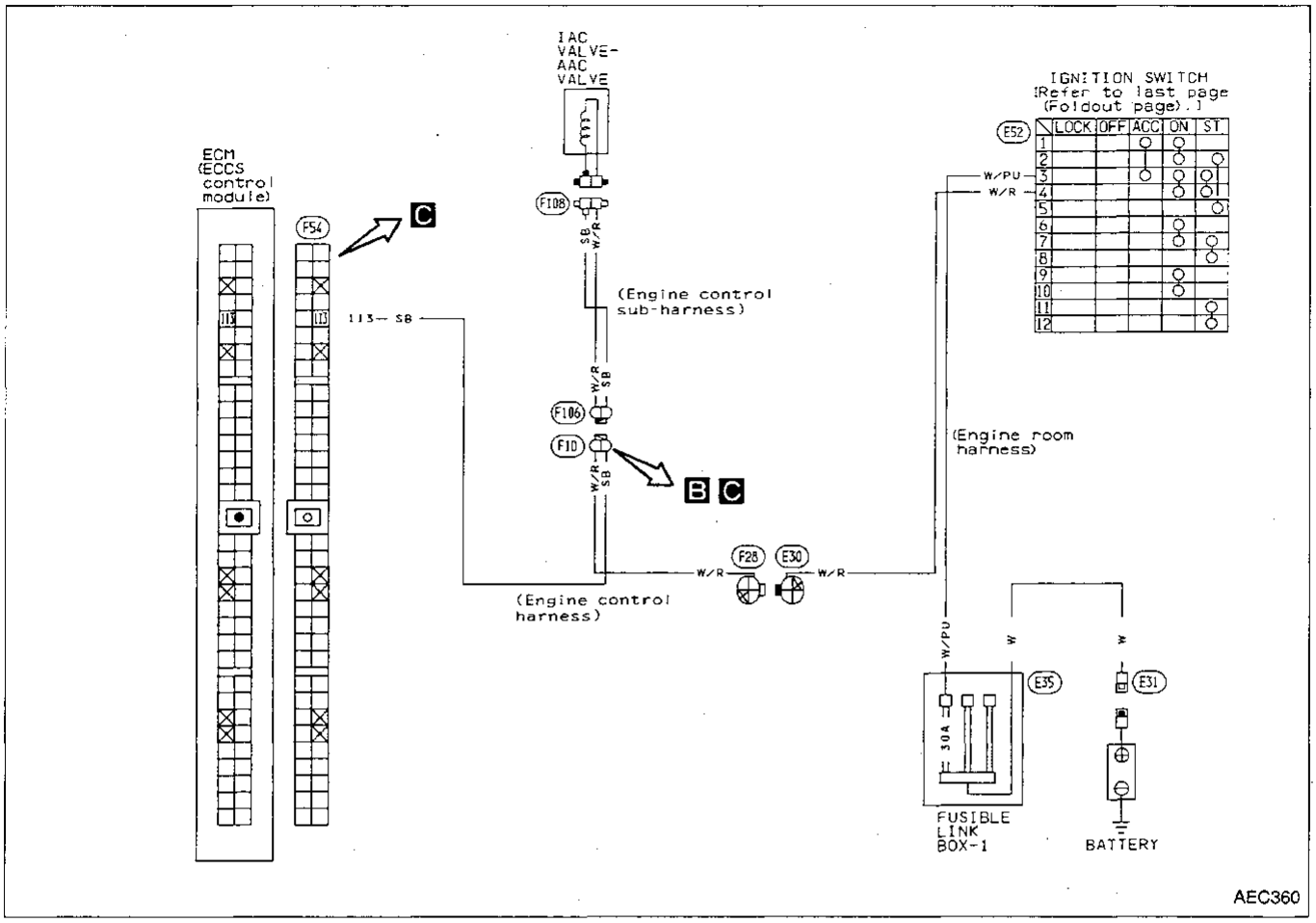
OK

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

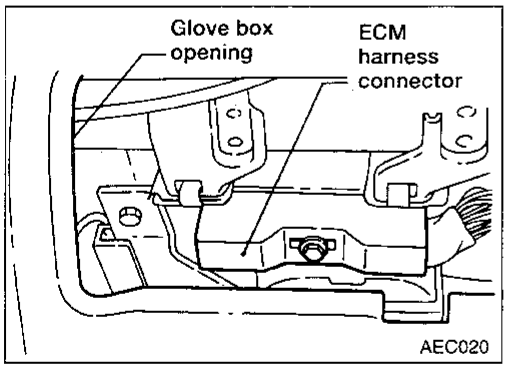
INSPECTION END

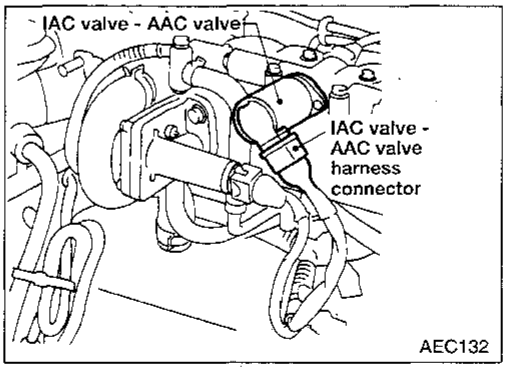
Diagnostic Procedure 27

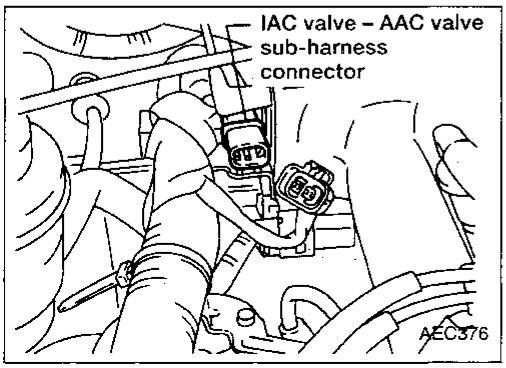
IAC VALVE-AAC VALVE (Not self-diagnostic item)



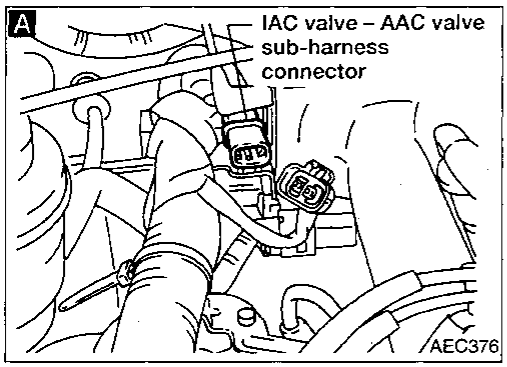
Harness layout

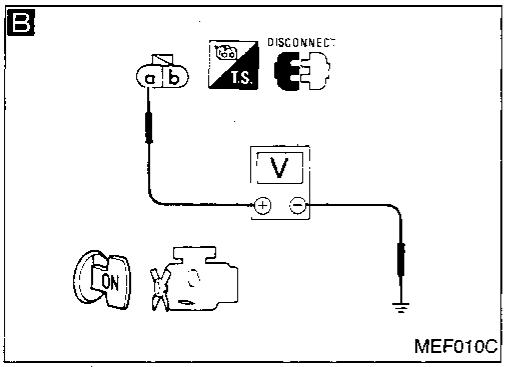


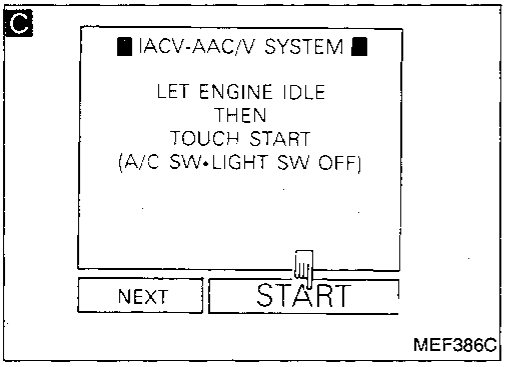


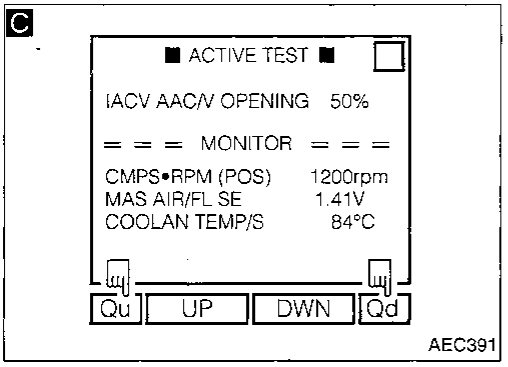


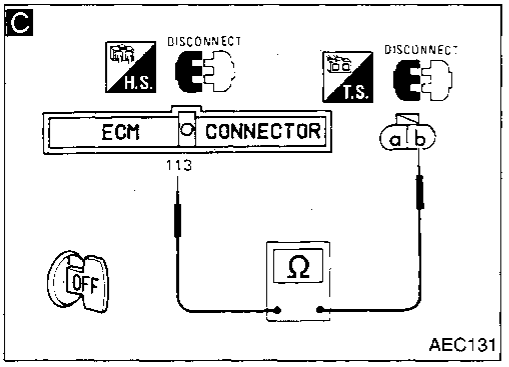
Diagnostic Procedure 27 (Cont'd)











INSPECTION START

A

CHECK OVERALL FUNCTION.
1) Start engine and warm it up sufficiently.
2) Check idle speed.
   750 ± 50 rpm
   If NG, adjust idle speed. Refer to EF & EC- 28.
3) Disconnect IAC valve-AAC valve sub-harness connectors (F106) , (F10) .
4) Make sure that idle speed drops.

Drops → INSPECTION END

Does not drop

B

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

NG → Check the following.
- Harness connectors (F28) , (E30)
- Harness continuity between sub-harness connector (F10) and ignition switch

If NG, repair harness or connectors.

OK

C

CHECK OUTPUT SIGNAL CIRCUIT.
1) Reconnect IAC valve-AAC valve sub-harness connector.
2) Start engine and let it idle.
3) Perform "IACV-AAC/V SYSTEM" in "FUNCTION TEST" mode with CONSULT.

OR

3) 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 (b).
   Continuity should exist.

NG → Repair harness or connectors.

OK

CHECK COMPONENT
(IAC valve-AAC valve).
Refer to EF & EC-167.

NG → Replace IAC valve-AAC valve.

OK

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

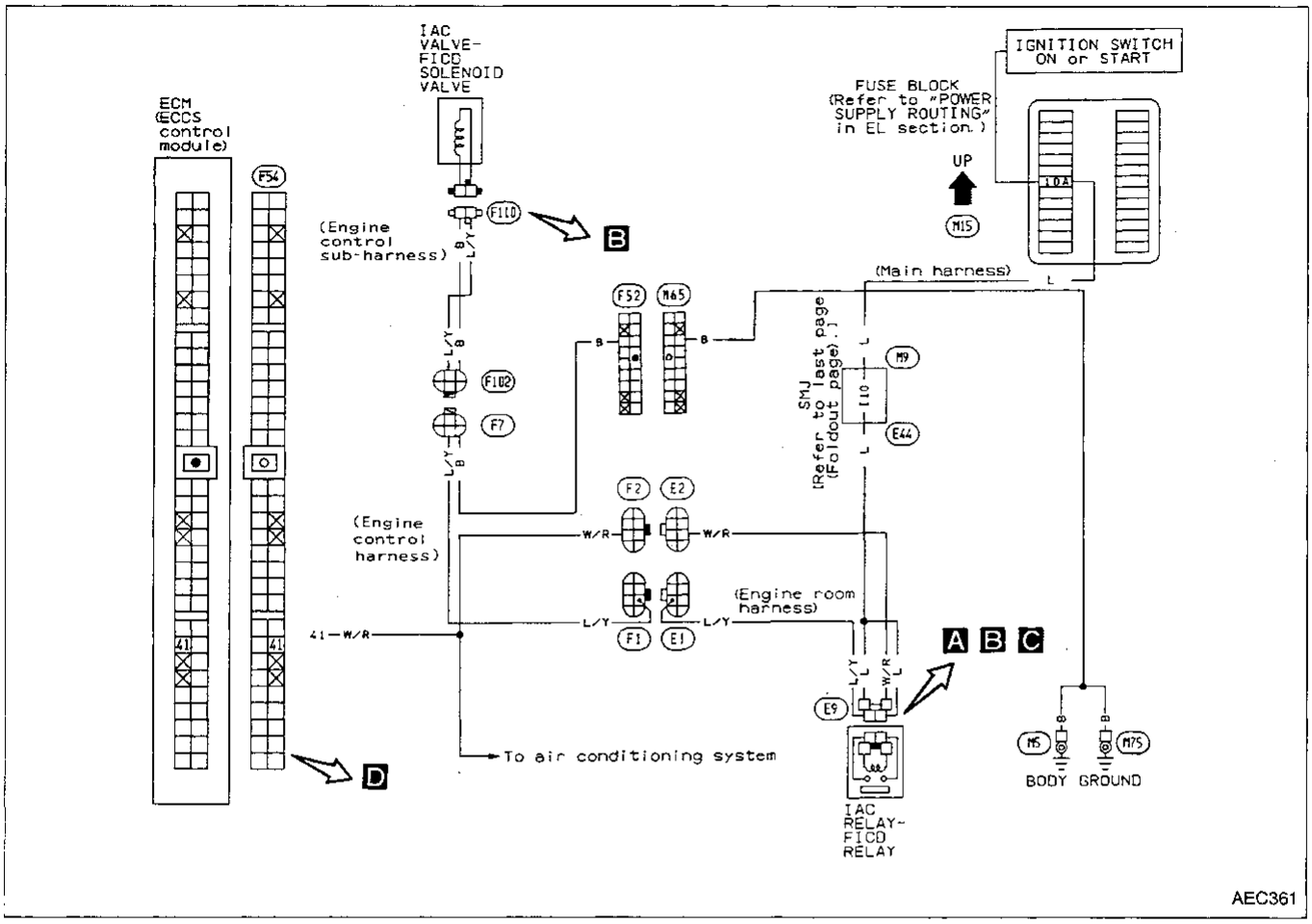
Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.
Reconnect ECM harness connector and retest.

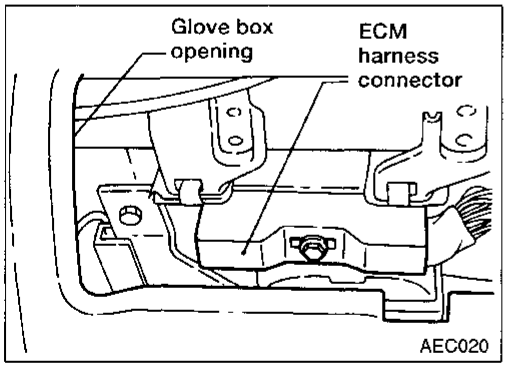
INSPECTION END

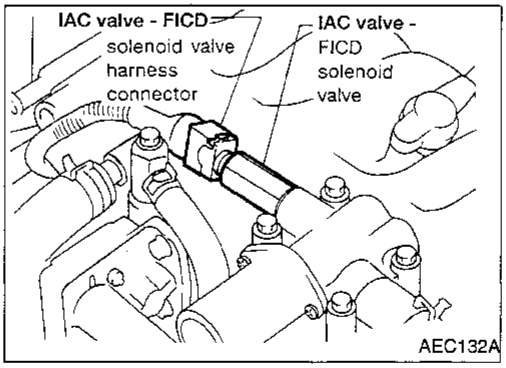
Diagnostic Procedure 28

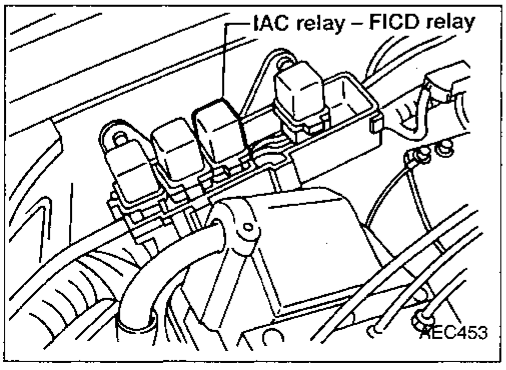
IAC VALVE-FICD SOLENOID VALVE (Not self-diagnostic item) AND AIR CONDITIONING SYSTEM INPUT (Not self-diagnostic item)



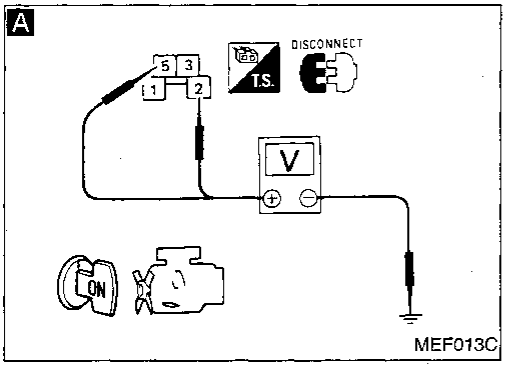
Harness layout

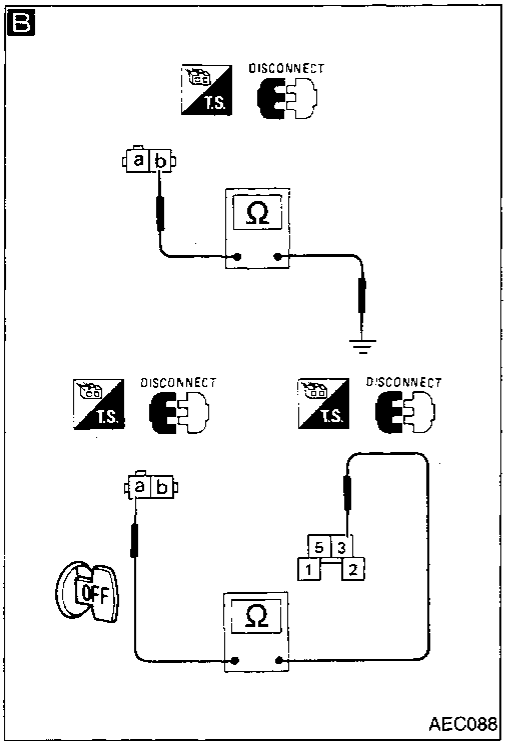






Diagnostic Procedure 28 (Cont'd)





IAC valve-FICD solenoid valve

INSPECTION START

CHECK OVERALL FUNCTION.
1) Start engine and warm it up sufficiently.
2) Check idle speed.
   750 ± 50 rpm
   If NG, adjust idle speed.
3) Turn both air conditioning switch and blower fan switch "ON", any mode except "OFF", ambient temperature above 10°C (50°F), then recheck idle speed.
   800 ± 50 rpm

OK → INSPECTION END

NG

Check if air conditioning compressor functions normally.

NG → Refer to HA section.

OK

A

CHECK POWER SUPPLY.
1) Turn ignition switch "OFF".
2) Disconnect IAC relay-FICD relay.
3) Turn ignition switch "ON".
4) Check voltage between terminals ②, ⑤ and ground.
   Voltage: Battery positive voltage

NG →
Check the following.
- Harness connectors (E44) , (M9)
- 10A fuse
- Harness continuity between fuse and IAC relay-FICD relay

If NG, repair harness or connectors.

OK

B

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect IAC valve-FICD solenoid valve harness connector.
3) Check harness continuity between terminal ⓑ and body ground, terminal ⓐ and terminal ③.
   Continuity should exist.

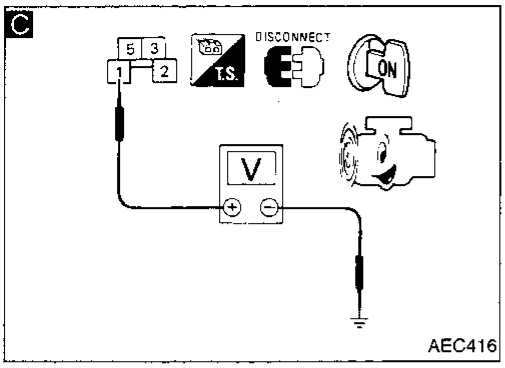
NG →
Check the following.
- Harness connectors (F52) , (M65)
- Harness connectors (F7) , (F102)
- Harness connectors (F1) , (E1)
- Harness continuity between IAC valve-FICD solenoid valve and body ground
- Harness continuity between IAC valve-FICD solenoid valve and IAC relay-FICD relay

If NG, repair harness or connectors.

OK

Ⓐ

Diagnostic Procedure 28 (Cont'd)



(A)

C

CHECK INPUT SIGNAL CIRCUIT.
1) Start engine.
2) Check voltage between terminal (1) and ground.
Voltage:
With air conditioning switch "ON" and fan switch in any position and any mode except "OFF", ambient temperature above 10°C (50°F)
Less than 2.3V
With air conditioning switch "OFF"
7.0 - 9.0V

NG → Check the following.
- Harness connectors (F2), (E2)
- Harness continuity between air conditioning system and IAC relay-FICD relay.

If NG, repair harness or connectors. Refer to HA section.

OK ↓

CHECK COMPONENT (IAC relay-FICD relay). Refer to EF & EC-169.

NG → Replace IAC relay-FICD relay.

OK ↓

CHECK COMPONENT (IAC valve-FICD solenoid valve). Refer to EF & EC-168.

NG → Replace IAC valve-FICD solenoid valve.

OK ↓

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

Trouble is not fixed. ↓

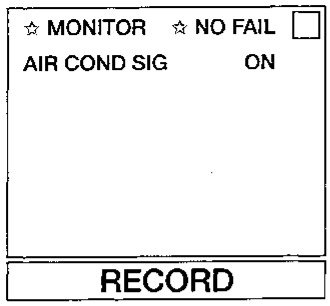
Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.
Reconnect ECM harness connector and retest.

↓

INSPECTION END

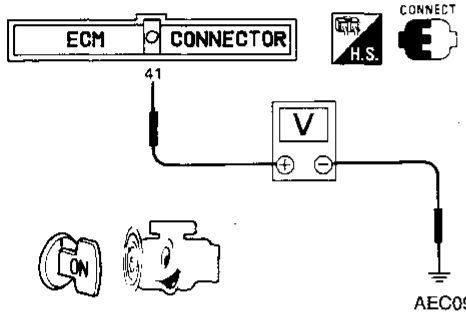
Diagnostic Procedure 28 (Cont'd)

D



AEC091

D



AEC090

Air conditioning (A/C) switch

INSPECTION START

D

CHECK OVERALL FUNCTION.

1) Start engine.
2) Check A/C switch signal in "DATA MONITOR" mode with CONSULT.

With air conditioning switch "ON" and fan switch in any position and any mode except "OFF", ambient temperature above 10°C (50°F):
ON
With air conditioning switch "OFF":
OFF

NG → Check harness continuity between A/C system and ECM terminal (41). Refer to HA section. If NG, repair harness or connectors.

OR

1) Start engine.
2) Check voltage between ECM terminal (41) and ground.

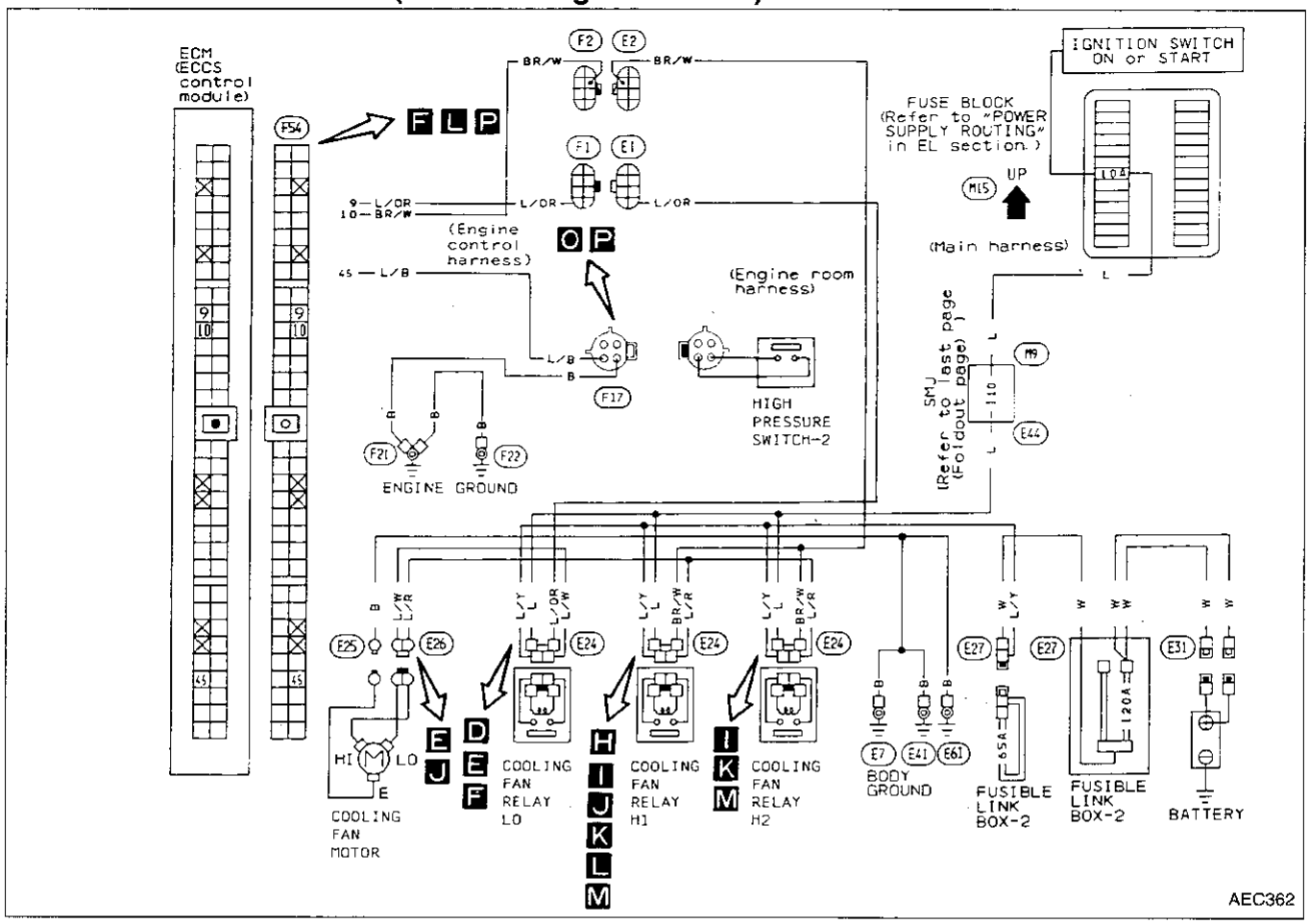
Voltage:
With air conditioning switch "ON" and fan switch in any position and any mode except "OFF", ambient temperature above 10°C (50°F)
Less than 2.3V
With air conditioning switch "OFF"
Battery positive voltage

OK

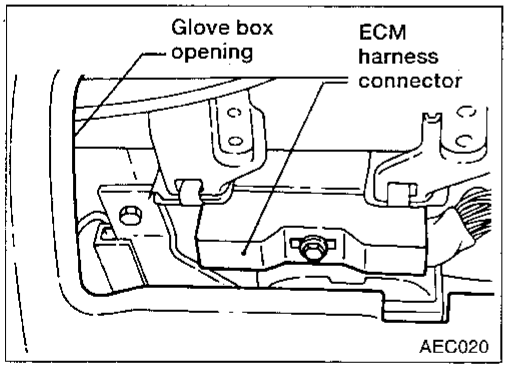
INSPECTION END

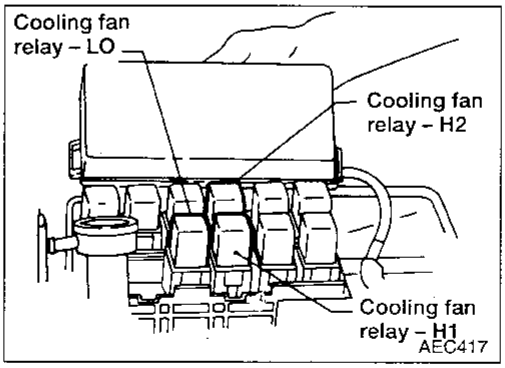
Diagnostic Procedure 29

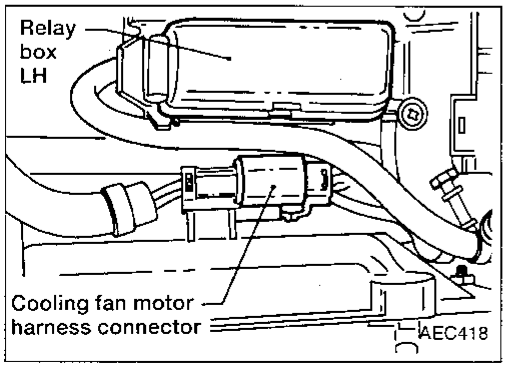
COOLING FAN CONTROL (Not self-diagnostic item)

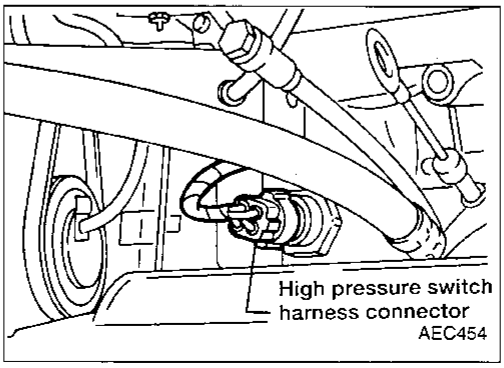


Harness layout



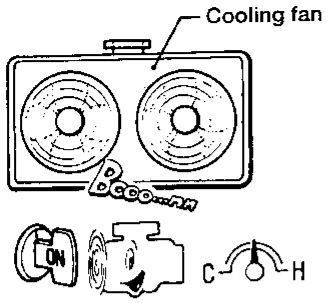






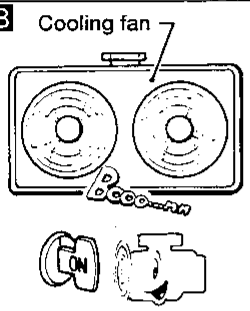
Diagnostic Procedure 29 (Cont'd)

A

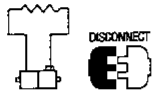


AEC419

B



150 Ω resistor

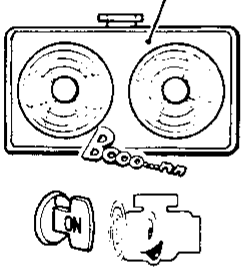


Engine coolant temperature sensor harness connector

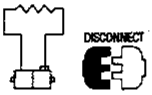
Cooling fan relay – H1 harness connector

AEC420

C



150 Ω resistor



Engine coolant temperature sensor harness connector

Cooling fan relay – H2 harness connector

AEC421

Cooling fan

INSPECTION START

A

CHECK COOLING FAN LOW SPEED OPERATION.

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

NG → Check cooling fan low speed control circuit. (Go to PROCEDURE A .) Refer to EF & EC-153.

OK

CHECK COOLING FAN HIGH SPEED OPERATION.

1) Stop engine.
B 2) Disconnect radiator fan relay-LO and cooling fan relay-H1.
3) Disconnect engine coolant temperature sensor harness connector.
4) Connect 150Ω resistor to engine coolant temperature sensor harness connector.
5) Restart engine.
Make sure that cooling fan operates at high speed.
6) Stop engine.
C 7) Reconnect cooling fan relay-H1 and disconnect cooling fan relay-H2.
8) Restart engine.
Make sure that cooling fan operates at high speed.

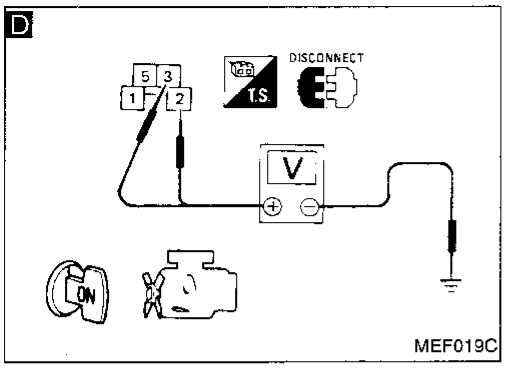
NG → Check cooling fan high speed control circuit. (Go to PROCEDURE B .) Refer to EF & EC-150.

OK

INSPECTION END

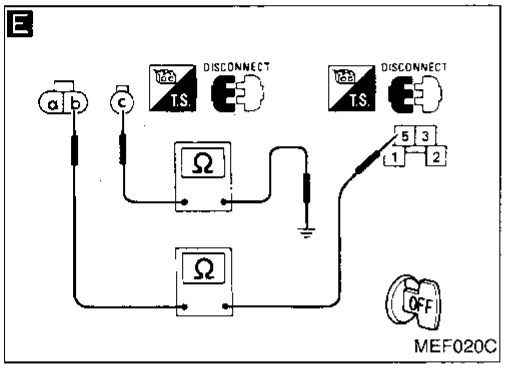
Diagnostic Procedure 29 (Cont'd)

D



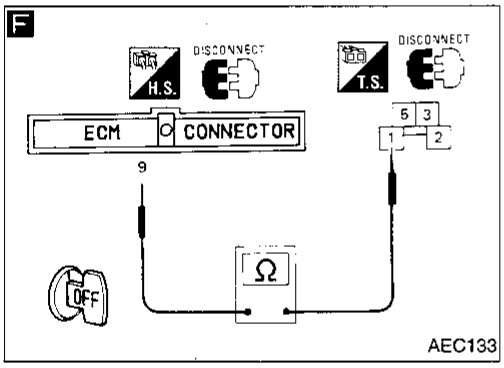
MEF019C

E



MEF020C

F



AEC133

PROCEDURE A

INSPECTION START

D

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

NG → Check the following.
- Harness connectors (E44), (M9)
- 10A fuse
- 65A fusible link
- 120A fusible link
- Harness continuity between cooling fan relay-LO and fuse
- Harness continuity between cooling fan relay-LO and battery

If NG, repair harness or connectors.

OK

E

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect cooling fan motor harness connectors.
3) Check harness continuity between terminal ⑤ and terminal ⓑ, terminal ⓒ and body ground.
Continuity should exist.

NG → Repair harness or connectors.

OK

F

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

NG → Check the following.
- Harness connectors (F1), (E1)
- Harness continuity between cooling fan relay-LO and ECM

If NG, repair harness or connectors.

OK

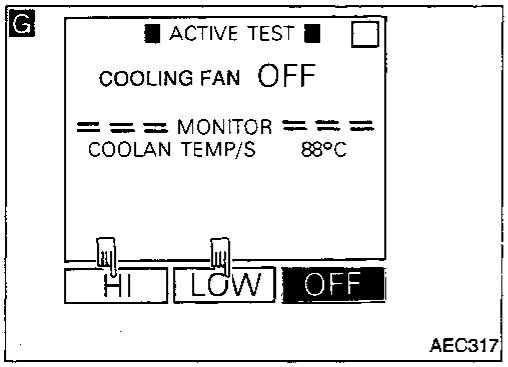
CHECK COMPONENT
(Cooling fan relay-LO).
Refer to EF & EC-169.

NG → Replace cooling fan relay-LO.

OK

Ⓐ

Diagnostic Procedure 29 (Cont'd)



Ⓐ

G

CHECK COMPONENT
(Cooling fan motor).

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

OR

Refer to EF & EC-170.

NG → Replace cooling fan motor.

OK ↓

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

Trouble is not fixed. ↓

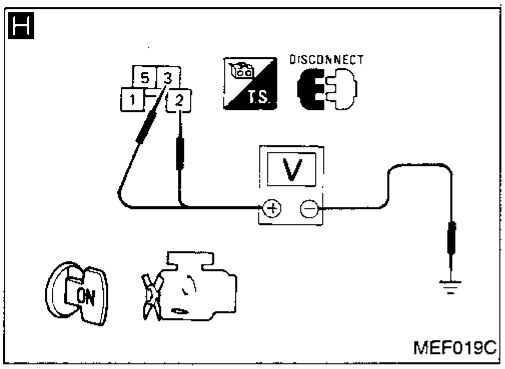
Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.
Reconnect ECM harness connector and retest.

↓

INSPECTION END

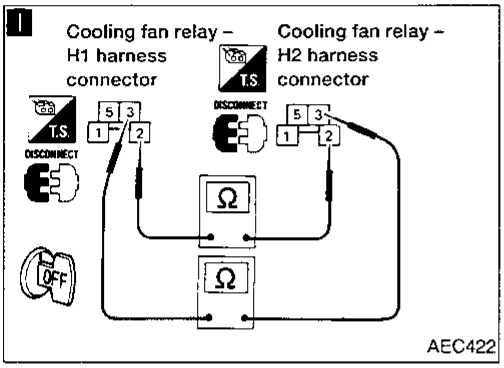
Diagnostic Procedure 29 (Cont'd)

H



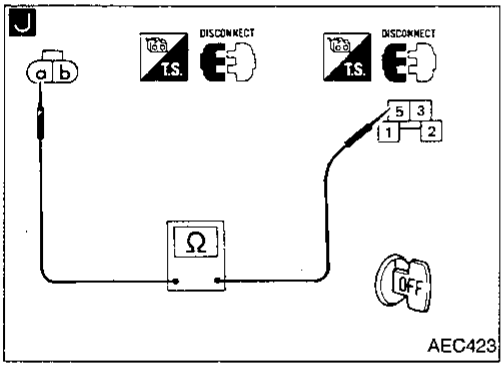
MEF019C

I



AEC422

J



AEC423

PROCEDURE B

INSPECTION START

H

CHECK POWER SUPPLY 1.
1) Stop engine.
2) Disconnect radiator fan relay-H1.
3) Turn ignition switch "ON".
4) Check voltage between terminals ②, ③ and ground.
Voltage: Battery positive voltage

NG → Check the following.
- Harness continuity between cooling fan relay-H1 and harness connector (E44)
- Harness continuity between cooling fan relay-H1 and fusible link (E27)

If NG, repair harness or connectors.

OK ↓

I

CHECK POWER SUPPLY 2.
1) Turn ignition switch "OFF".
2) Disconnect cooling fan relay-H2.
3) Check harness continuity between terminals ② and terminal ②, terminal ③ and terminal ③.
Continuity should exist.

NG → Repair harness or connectors.

OK ↓

J

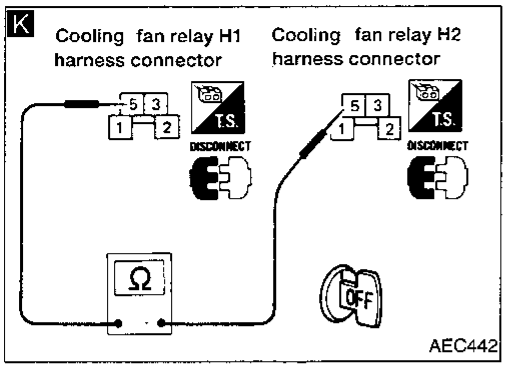
CHECK GROUND CIRCUIT 1.
1) Disconnect cooling fan motor harness connectors.
2) Check harness continuity between terminal ⓐ and cooling fan relay-H1 terminal ⑤.
Continuity should exist.

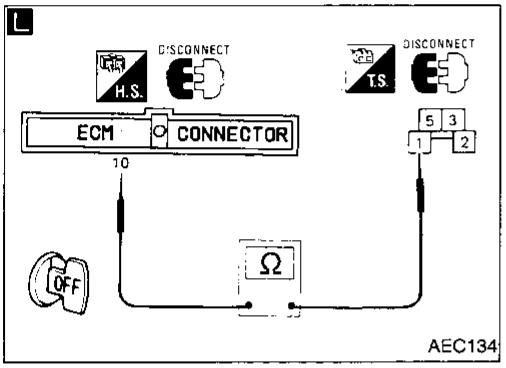
NG → Repair harness or connectors.

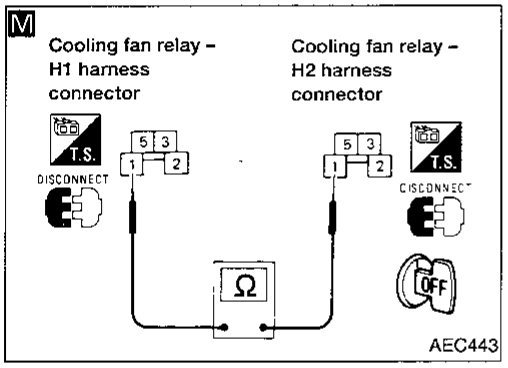
OK ↓

Ⓐ

Diagnostic Procedure 29 (Cont'd)







Ⓐ

K

CHECK GROUND CIRCUIT 2.
1) Check harness continuity between terminal ⑤ and terminal ⑤.
Continuity should exist.

NG → Repair harness or connectors.

OK

L

CHECK OUTPUT SIGNAL CIRCUIT 1.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ⑩ and cooling fan relay-H1 terminal ①.
Continuity should exist.

NG → Check the following.
- Harness connectors (E2) , (F2)
- Harness continuity between ECM and cooling fan relay-H1

If NG, repair harness or connectors.

OK

M

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

NG → Repair harness or connectors.

OK

CHECK COMPONENT
(Cooling fan relay-H1).
Refer to EF & EC-169.

NG → Replace cooling fan relay-H1.

OK

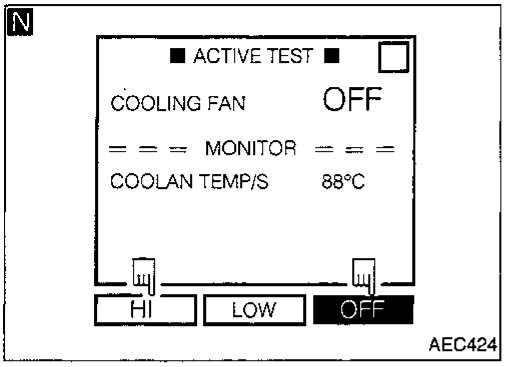
CHECK COMPONENT
(Cooling fan relay-H2).
Refer to EF & EC-169.

NG → Replace cooling fan relay-H2.

OK

Ⓑ

Diagnostic Procedure 29 (Cont'd)



(B)

CHECK COMPONENT
(Cooling fan motor).

1) Reconnect cooling fan relay-H1, -H2, cooling fan motor harness connectors and ECM harness connector.
2) Start engine.
3) Perform "COOLING FAN TEST" in "ACTIVE TEST" mode with CONSULT.

OR

Refer to EF & EC-170.

NG → Replace cooling fan motor.

OK

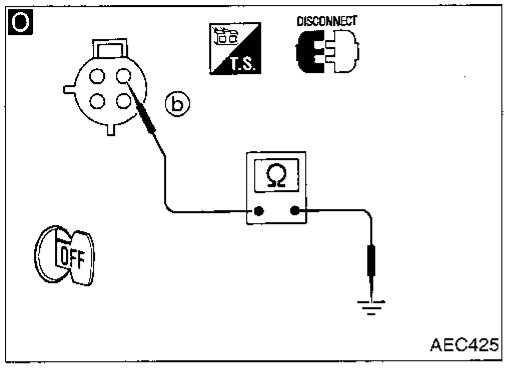
Disconnect and reconnect harness connectors in the circuit, and retest.

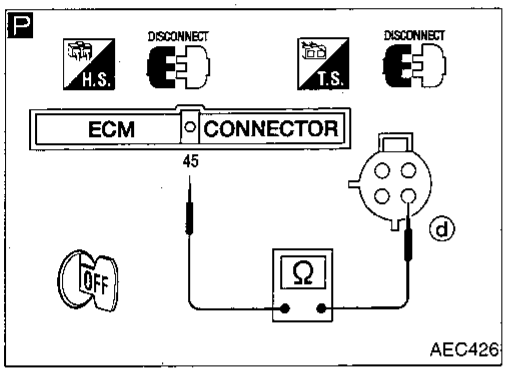
Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158. Reconnect ECM harness connector and retest.

INSPECTION END

Diagnostic Procedure 29 (Cont'd)





High pressure switch-2 box

INSPECTION START

O

CHECK GROUND CIRCUIT.
1) Disconnect high pressure switch-2 harness connector.
2) Check harness continuity between terminal (b) and engine ground.
Continuity should exist.

NG → Repair harness or connectors.

OK

P

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal (45) and terminal (d).
Continuity should exist.

NG → Repair harness or connectors.

OK

CHECK COMPONENT
(High pressure switch-2).
Refer to EF & EC-170.

NG → Replace high pressure switch.

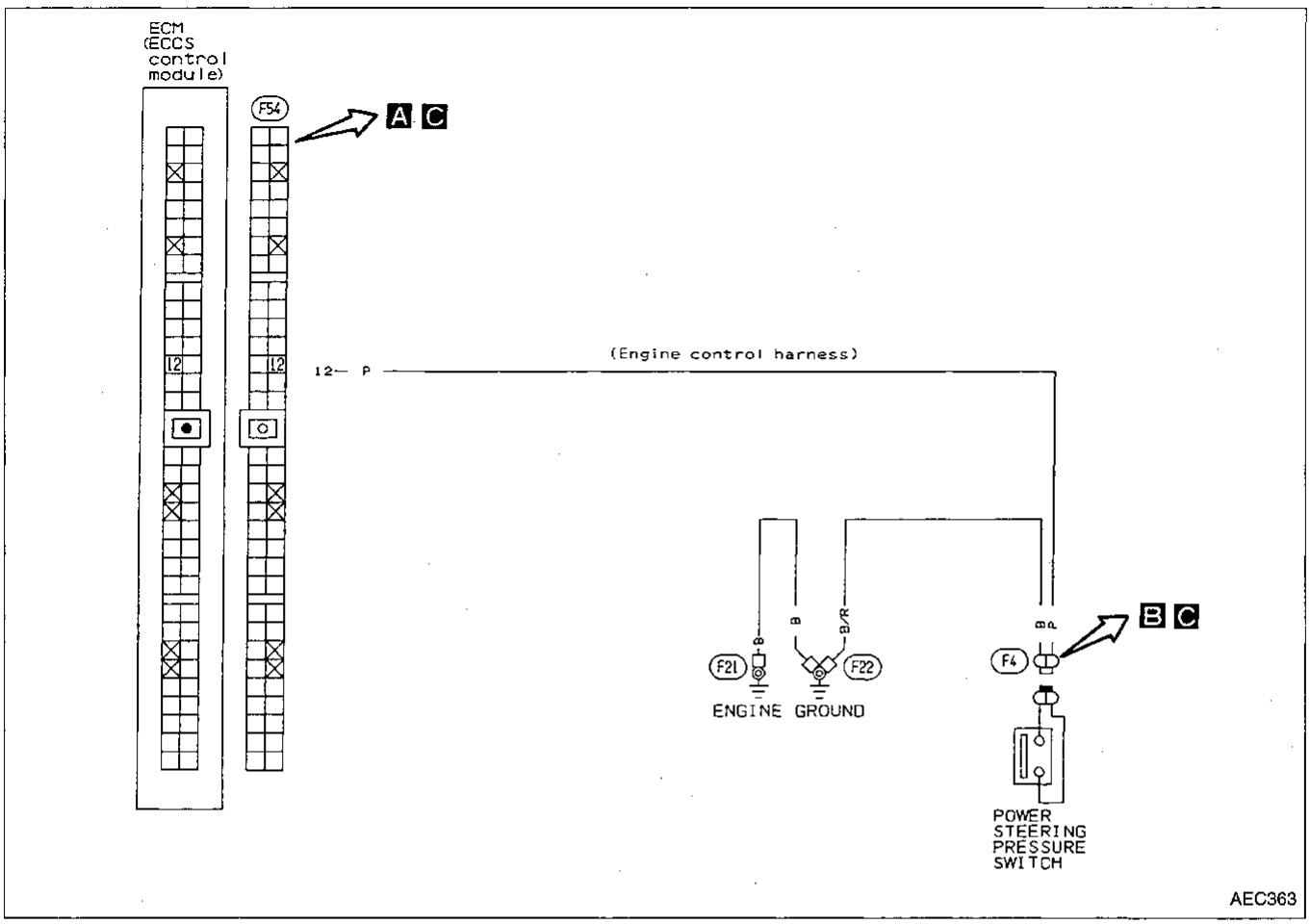
OK

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.

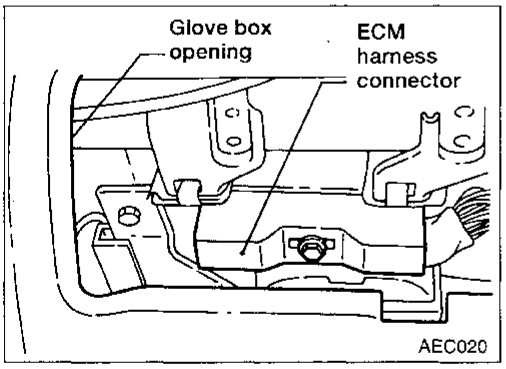
INSPECTION END

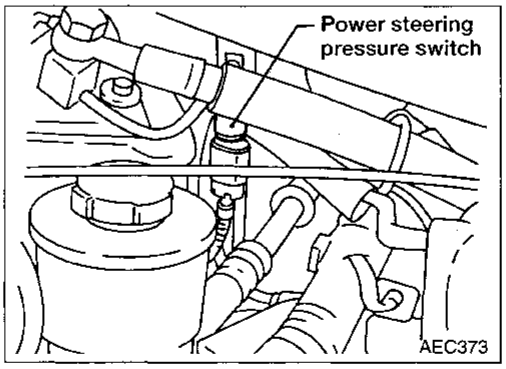
Diagnostic Procedure 30

POWER STEERING PRESSURE SWITCH (Not self-diagnostic item)

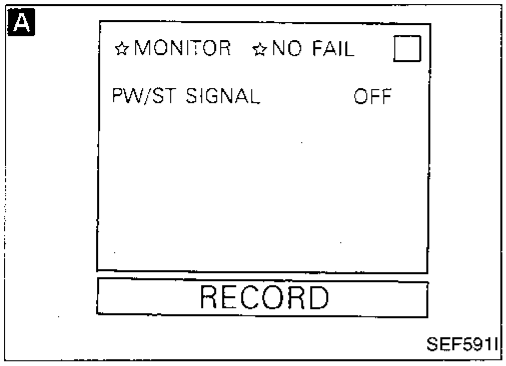


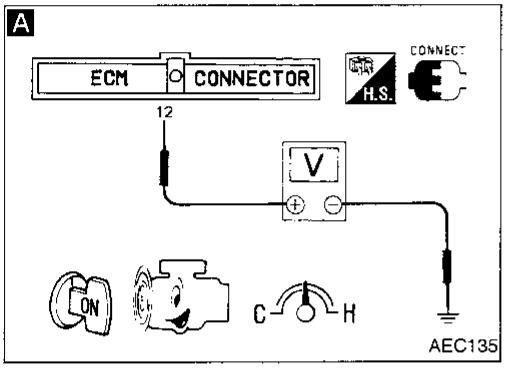
Harness layout

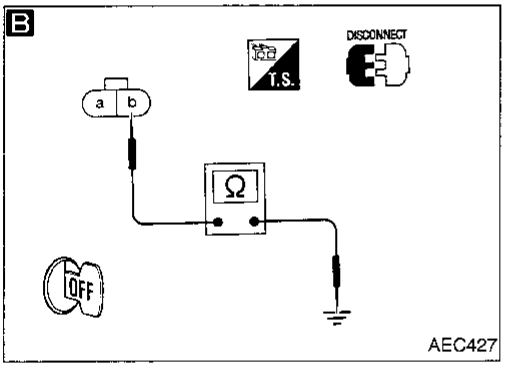


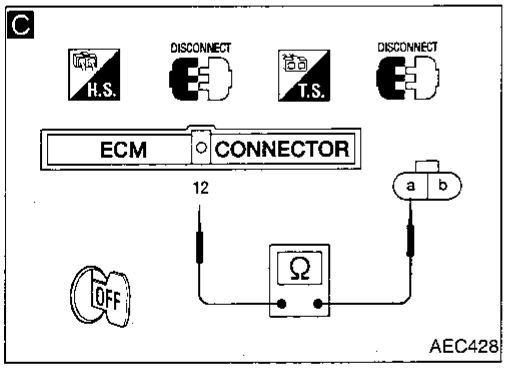


Diagnostic Procedure 30 (Cont'd)









INSPECTION START

A

CHECK CONTROL FUNCTION.
1) Start engine and warm it up sufficiently.
2) Check power steering pressure switch signal in "DATA MONITOR" mode with CONSULT.
Steering is neutral: OFF
Steering is turned: ON

OR

2) Check voltage between ECM terminal ⑫ and ground.
Voltage:
When steering wheel is turned quickly.
Approximately 0V
Except above
Approximately 5V

OK → INSPECTION END

NG

B

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

NG → Repair harness or connectors.

OK

C

CHECK INPUT SIGNAL CIRCUIT.
1) Disconnect ECM harness connector.
2) Check harness continuity between ECM terminal ⑫ and terminal ⓐ.
Continuity should exist.

NG → Repair harness or connectors.

OK

CHECK COMPONENT
(Power steering pressure switch).
Refer to EF & EC-170.

NG → Replace power steering pressure switch.

OK

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

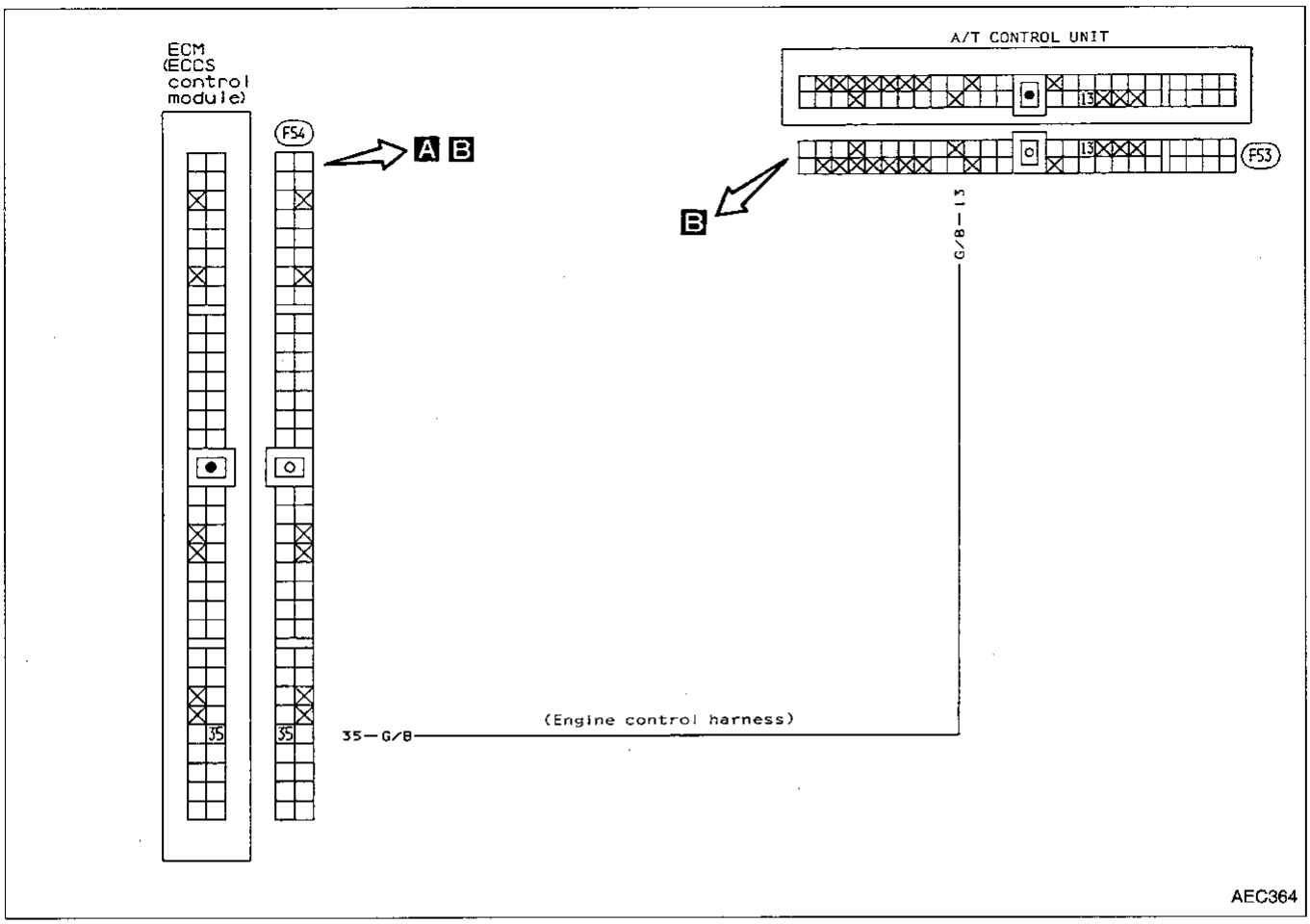
Trouble is not fixed.

Check ECM pin terminals for damage or the connection of the ECM harness connector. Refer to EF & EC-158.
Reconnect ECM harness connector and retest.

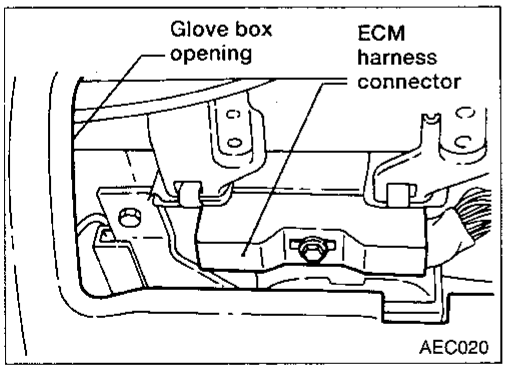
INSPECTION END

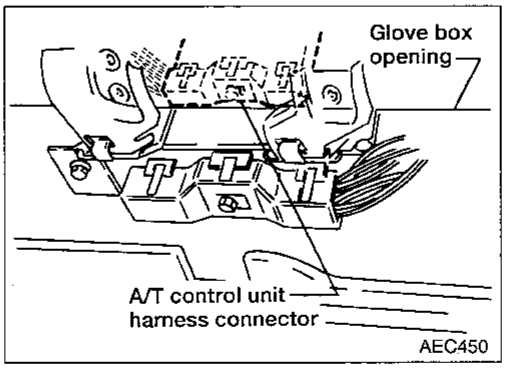
Diagnostic Procedure 31

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

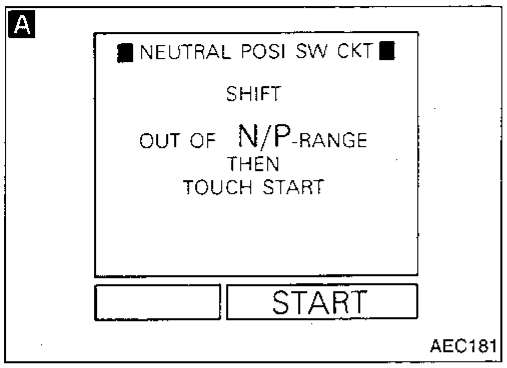


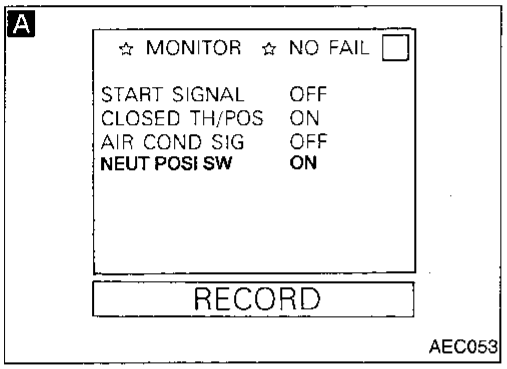
Harness layout

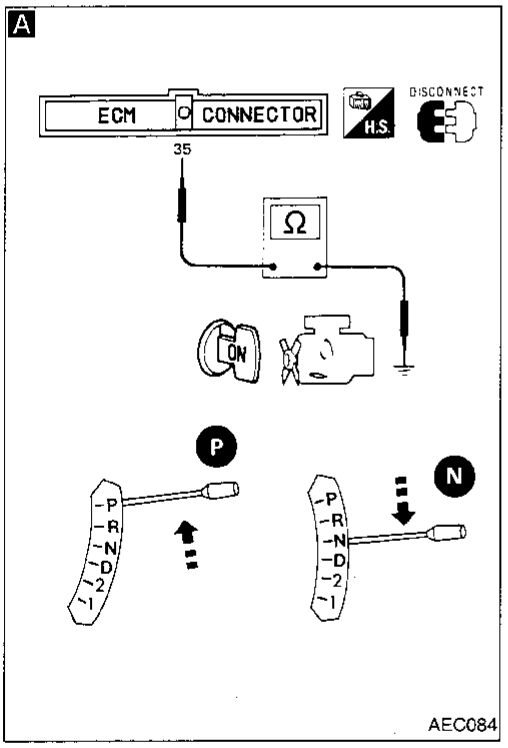


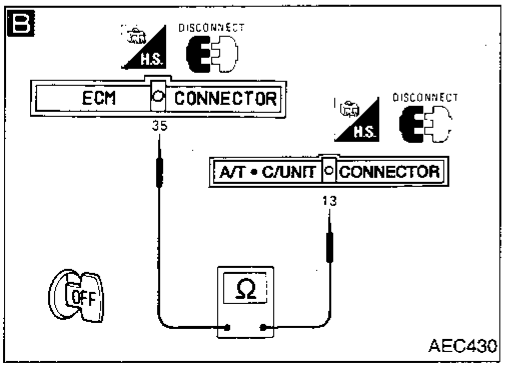


Diagnostic Procedure 31 (Cont'd)









INSPECTION START

A

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

OK → INSPECTION END

OR

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) Set shift lever to the park/neutral position.
2) Disconnect ECM harness connector.
3) Check harness continuity between ECM terminal (35) and body ground.
Continuity should exist.

NG

B

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

NG → Repair harness or connectors.

OK

CHECK INHIBITOR SWITCH CIRCUIT.
Refer to AT section ("INHIBITOR SWITCH, TRANSAXLE GEAR SELECTION SWITCH-OD AND CLOSED THROTTLE POSITION SWITCH CIRCUIT CHECKS", "Self-diagnosis", "TROUBLE DIAGNOSES").

NG → Replace inhibitor switch.

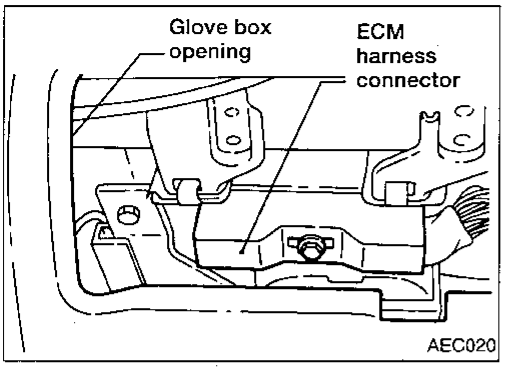
OK

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

Trouble is not fixed.

Check ECM pin terminals for damage or the connection of ECM harness connector. Refer to EF & EC-158.
Reconnect ECM harness connector and retest.

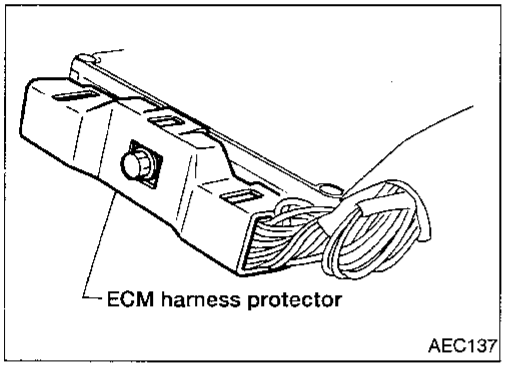
INSPECTION END



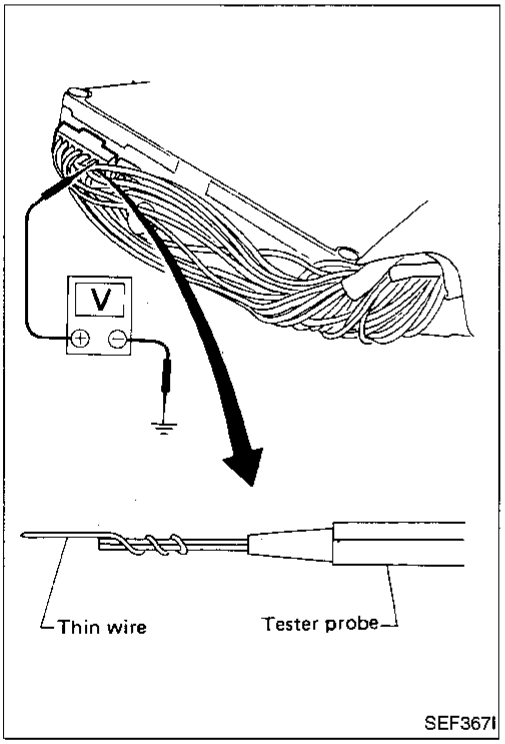
Electrical Components Inspection

ECM INPUT/OUTPUT SIGNAL INSPECTION

1. ECM is located behind the glove box. For this inspection:
   - Remove glove box bucket.
   - Remove lower finisher panel by reaching through the glove box and releasing the spring clips.

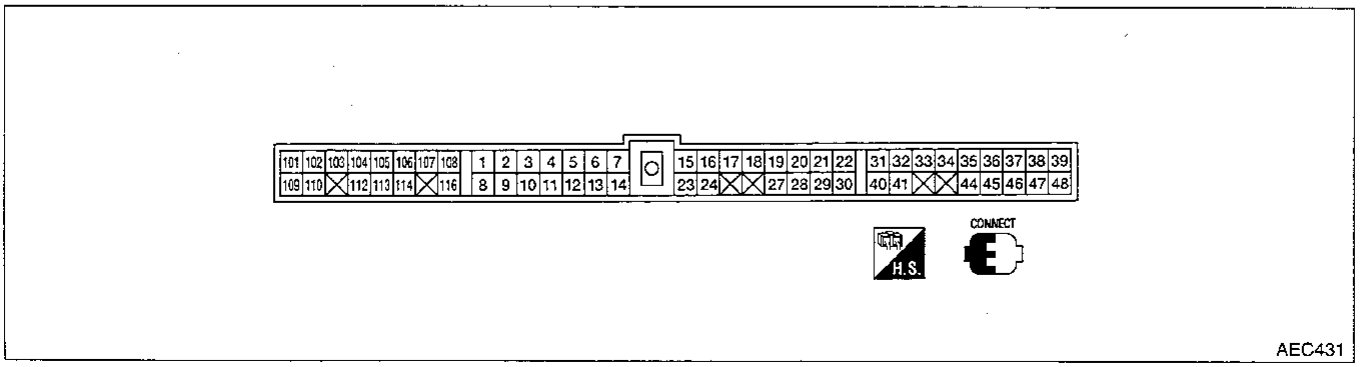


2. Remove ECM harness protector.



3. Perform all voltage measurements with the connector 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



ECM Inspection table

TERMINAL NO.	ITEM	CONDITION	DATA
1	Ignition signal	Engine is running. └ Idle speed	0.4 - 0.6V
		Engine is running. └ Engine speed is 2,000 rpm.	1.1 - 1.3V
2	Tachometer	Engine is running. └ Idle speed	Approximately 1.0V
		Engine is running. └ Engine speed is 2,000 rpm.	3.2 - 3.6V
3	Ignition check	Engine is running. └ Idle speed	9 - 12V
4	ECM power source (Self-shutoff)	Engine is running. └ Idle speed	0 - 1V
		Engine is running. └ For a few seconds after turning ignition switch "OFF"	BATTERY POSITIVE VOLTAGE (11 - 14V)
8	EGR temperature sensor	Engine is running. (Warm-up condition) └ Idle speed	1.0V or more
		Engine is running. (Warm-up condition) └ EGR system is operating.	0 - 1.0V
9	Cooling fan (Low speed)	Engine is running. └ Cooling fan is not operating.	BATTERY POSITIVE VOLTAGE (11 - 14V)
		Engine is running. └ Cooling fan is operating at low speed.	0.7 - 0.8V
10	Cooling fan (High speed)	Engine is running. └ Cooling fan is not operating.	BATTERY POSITIVE VOLTAGE (11 - 14V)
		Engine is running. └ Cooling fan is operating at high speed.	0.7 - 0.8V
11	Air conditioning relay	Engine is running. └ Both A/C switch and blower switch are "ON". (1)	Approximately 0V
		Engine is running. └ A/C switch is "OFF".	BATTERY POSITIVE VOLTAGE (11 - 14V)

(1) Any mode except "OFF", ambient temperature above 10°C (50°F).

TERMINAL NO.	ITEM	CONDITION	DATA
12	Power steering pressure switch	Engine is running. └ Steering wheel is being turned.	Approximately 0V
		Engine is running. └ Steering wheel is not being turned.	Approximately 5V
16	Mass air flow sensor	Engine is running.	1.0 - 3.0V Voltage varies with engine speed.
18	Engine coolant temperature sensor	Engine is running.	0 - 5.0V Voltage varies with engine coolant temperature
19	Heated oxygen sensor	Engine is running. └ After warming up sufficiently	0 - Approximately 1.0V
20	Throttle position sensor	Ignition switch "ON"	0.4 - Approximately 4V Voltage varies with the throttle valve opening angle.
22 30	Crankshaft position sensor (Reference signal)	Engine is running. **Do not run engine at high speed under no-load.**	0.2 - 0.5V
27	Knock sensor	Engine is running. └ Idle speed	Approximately 2.5V
28	Throttle opening signal	Ignition switch "ON"	0.3 - Approximately 3V Voltage varies with the throttle valve opening angle
31 40	Crankshaft 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 5V
33	Closed throttle position switch (Idle position)	Ignition switch "ON" └ Throttle valve: Idle position	Approximately 8 - 10V
		Ignition switch "ON" └ Throttle valve: Any position except idle position	0V
34	Start signal	Ignition switch "START"	8 - 12V
		Ignition switch "ON"	Approximately 0V

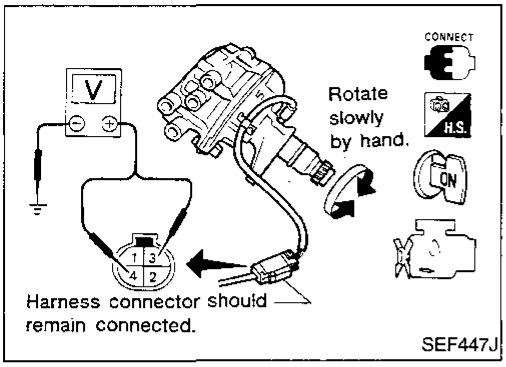
TERMINAL NO.	ITEM	CONDITION	DATA
35	A/T control unit (Park/neutral position)	Ignition switch "ON" └ Neutral/Parking	0V
		Ignition switch "ON" └ Except the above gear position	4 - 6V
36	Ignition switch	Ignition switch "OFF"	0V
		Ignition switch "ON"	BATTERY POSITIVE VOLTAGE (11 - 14V)
37	Power source for sensors	Ignition switch "ON"	Approximately 5V
38 47	Power supply for ECM	Ignition switch "ON"	BATTERY POSITIVE VOLTAGE
41	Air conditioning signal	Engine is running. └ Both air conditioning switch and blower switch are "ON".	2.0 - 2.5V
		Engine is running. └ Air conditioning switch is "OFF".	BATTERY POSITIVE VOLTAGE (11 - 14V)
44	Power source for closed throttle position switch	Ignition switch "ON" └ Throttle valve: Idle position	Approximately 8 - 9V
		Ignition switch "ON" └ Throttle valve: Except idle position	BATTERY POSITIVE VOLTAGE (11 - 14V)
46	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		
105	Injector No. 5		
110	Injector No. 2		
112	Injector No. 4		
114	Injector No. 6		
102	EGR control-solenoid valve	Engine is running. (Warm-up condition) └ Engine speed is below 3,200 rpm.	BATTERY POSITIVE VOLTAGE (11 - 14V)
		Engine is running. (Warm-up condition) └ Engine speed is above 3,200 rpm.	0.8 - 0.9V

Electrical Components Inspection (Cont'd)

TERMINAL NO.	ITEM	CONDITION	DATA
104	Fuel pump relay	Ignition switch "ON" └ For 5 seconds after turning ignition switch "ON" Engine is running.	0.7 - 0.9V
		Ignition switch "ON" └ Within 5 seconds after turning ignition switch "ON"	BATTERY POSITIVE VOLTAGE (11 - 14V)
113	IAC valve-AAC valve	Engine is running. └ Idle speed	8 - 11V
		Engine is running. — Steering wheel is being turned. — Air conditioning is operating. — Rear defogger is "ON". └ Headlamps are in high position.	4 - 7V

Electrical Components Inspection (Cont'd)

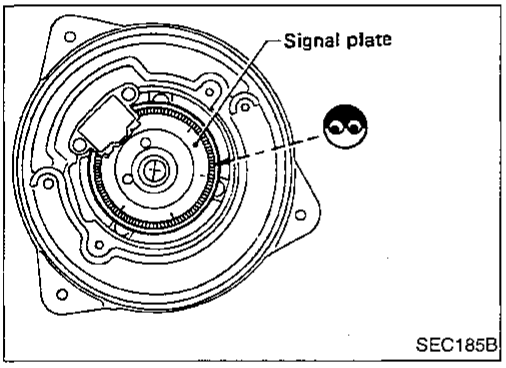
CAMSHAFT POSITION SENSOR



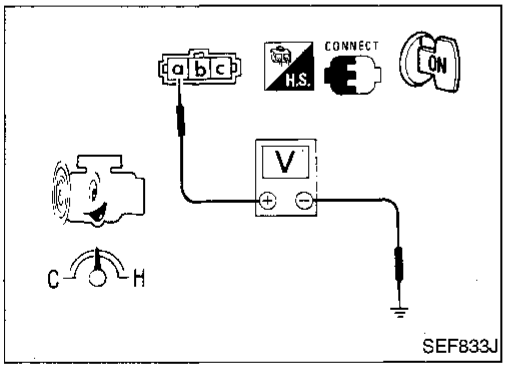
1. Remove distributor from engine. (Camshaft position sensor harness connector should remain connected.)
2. Turn ignition switch "ON".
3. Rotate distributor shaft slowly by hand and check voltage between terminals ③, ④ and ground.

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

If NG, replace distributor assembly with camshaft position sensor.



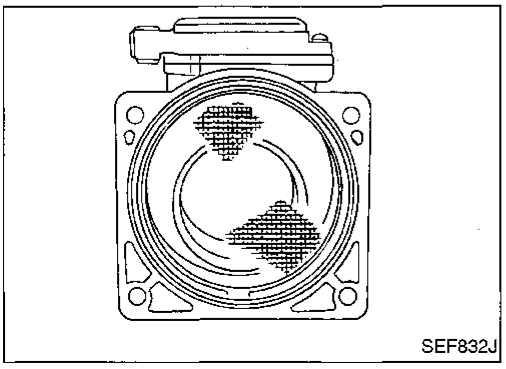
4. Visually check signal plate for damage or dust.



MASS AIR FLOW SENSOR

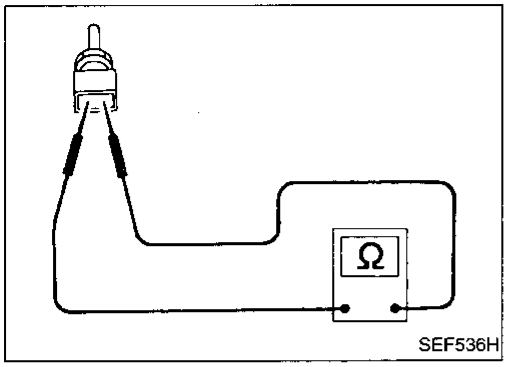
1. Peel mass air flow sensor harness connector rubber if the harness connector is connected.
2. Turn ignition switch "ON".
3. Start engine and warm it up sufficiently.
4. Check voltage between terminal ⓐ and ground.

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Less than 0.5
Idle (Engine is warm-up sufficiently.)	Approximately 1.0 - 1.7



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

Electrical Components Inspection (Cont'd)

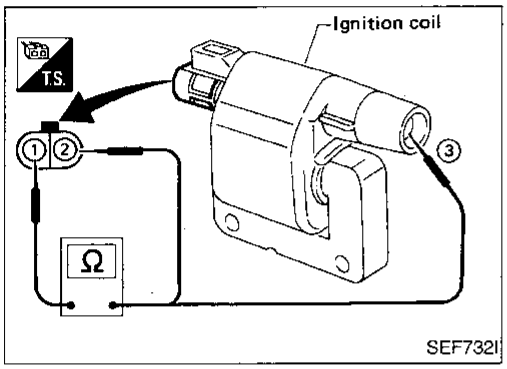


ENGINE COOLANT TEMPERATURE (ECT) SENSOR

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 - 1.0
80 (176)	0.30 - 0.33

If NG, replace engine coolant temperature sensor.

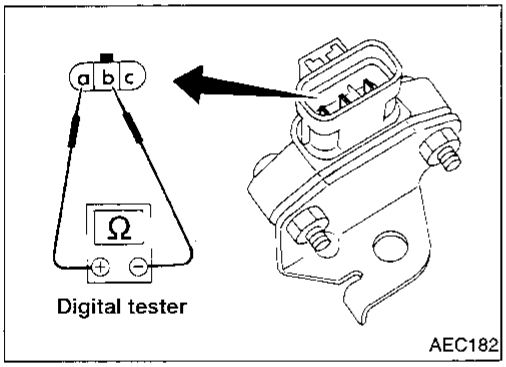


IGNITION COIL

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

Terminal	Resistance
① - ②	Approximately 1.0Ω
① - ③	Approximately 10 kΩ

If NG, replace ignition coil.



POWER TRANSISTOR

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

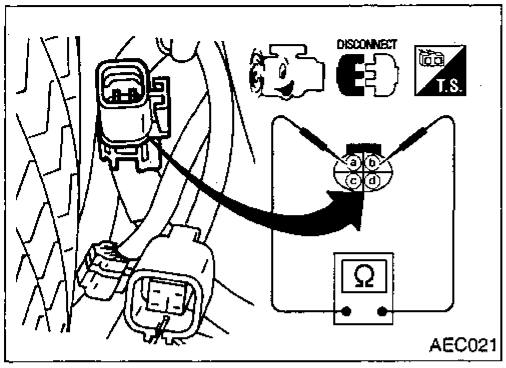
- The digital tester must have a diode check position to perform this test.

⊕Terminal side	⊖ Terminal side					
	Terminal ⓐ		Terminal ⓑ		Terminal ⓒ	
	Resistance Ω	Result	Resistance Ω	Result	Resistance Ω	Result
Terminal ⓐ	—	—	∞	OK	∞	OK
	—	—	Not ∞ or 0	NG	Not ∞ or 0	NG
	—	—	0	NG	0	NG
Terminal ⓑ	∞	NG	—	—	∞	NG
	Not ∞ or 0	OK	—	—	Not ∞ or 0	OK
	0	NG	—	—	0	NG
Terminal ⓒ	∞	NG	∞	NG	—	—
	Not ∞ or 0	OK	Not ∞ or 0	OK	—	—
	0	NG	0	NG	—	—

∞: Infinity resistance

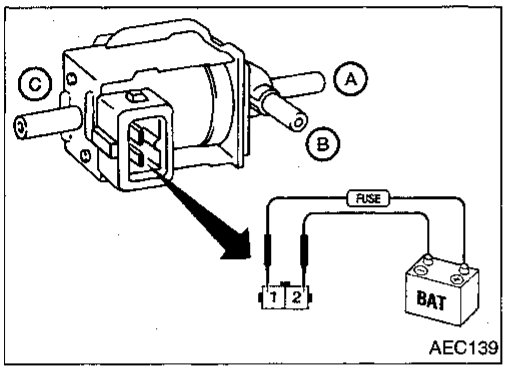
If NG, replace power transistor.

Electrical Components Inspection (Cont'd)



FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals ⓐ and ⓑ.
   Resistance: Approximately 0.7Ω
   If NG, replace fuel pump.

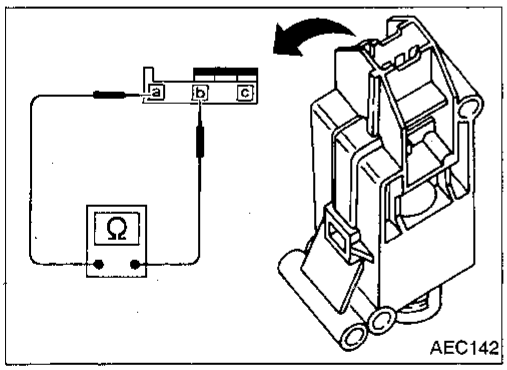


EGR CONTROL-SOLENOID VALVE AND PRESSURE REGULATOR CONTROL SOLENOID VALVE

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

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

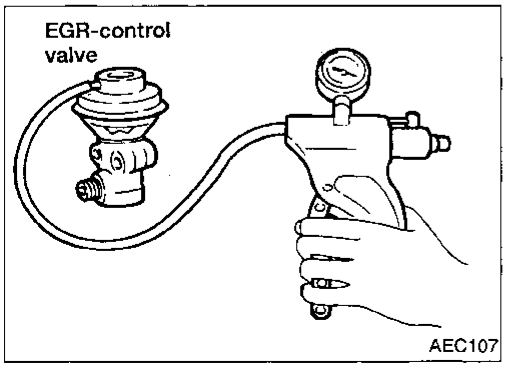
If NG, replace EGR control-solenoid valve.



INERTIA FUEL SHUTOFF SWITCH

1. Disconnect inertia fuel shutoff switch harness connector.
2. Check inertia fuel shutoff switch, following the table as shown below:

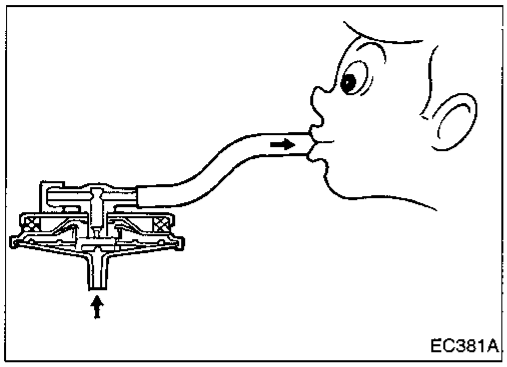
Conditions	Continuity between terminals ⓐ and ⓑ
Switch open (tripped)	No
Switch closed (set)	Yes



EGR VALVE

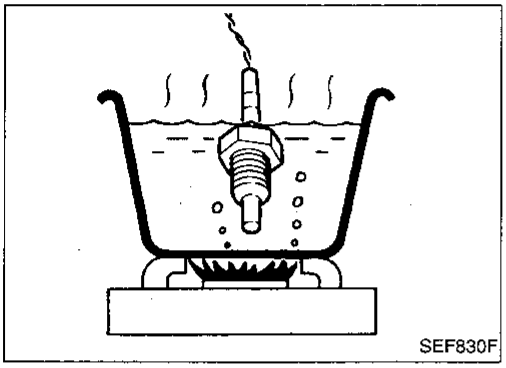
Apply vacuum to EGR vacuum port with a hand vacuum pump.
EGR valve spring should lift.
If NG, replace EGR valve.

Electrical Components Inspection (Cont'd)



EGRC-BPT VALVE

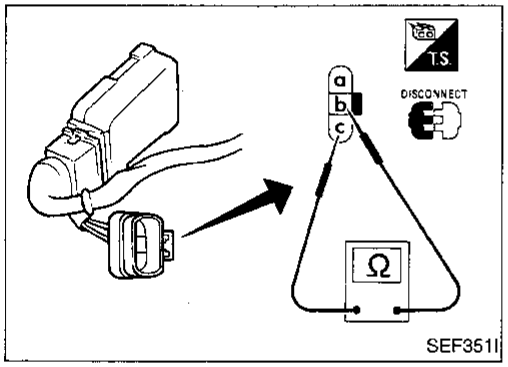
Plug one of two ports of EGRC-BPT valve.
Apply a pressure above 0.490 kPa (50 mmH_2O, 1.97 inH_2O) to check for leakage. If a leak is noted, replace valve.



EGR TEMPERATURE SENSOR

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

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

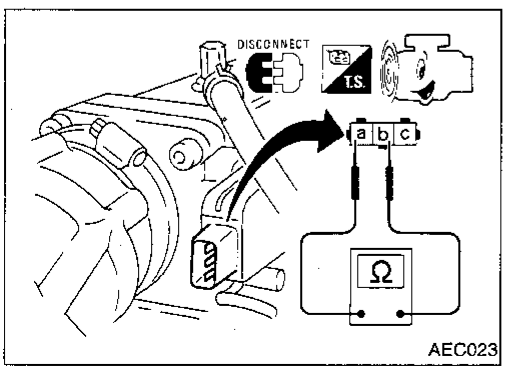


THROTTLE POSITION (TP) SENSOR

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

Accelerator pedal conditions	Resistance kΩ
Completely released	Approximately 1
While moving	(smoothly) 1 - 9
Completely depressed	Approximately 9

If NG, replace throttle position sensor, adjust as instructed below.



CLOSED THROTTLE POSITION SWITCH

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

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

If NG, replace closed throttle position switch, adjust as instructed below.

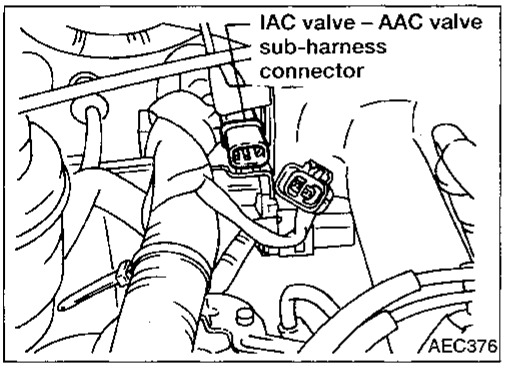
Electrical Components Inspection (Cont'd)

ADJUSTMENT FOR THROTTLE POSITION (TP) SENSOR AND CLOSED THROTTLE POSITION SWITCH

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

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

   Closed throttle position switch OFF → ON speed:
   Idle speed $^{+400}_{+100}$ rpm in "N" position.

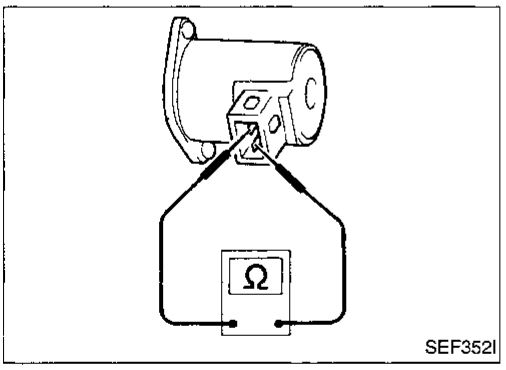


IAC VALVE-AAC VALVE

1. Disconnect IAC valve-AAC valve sub-harness connector (F106).
2. Check IAC valve-AAC valve resistance at sub-harness connector.

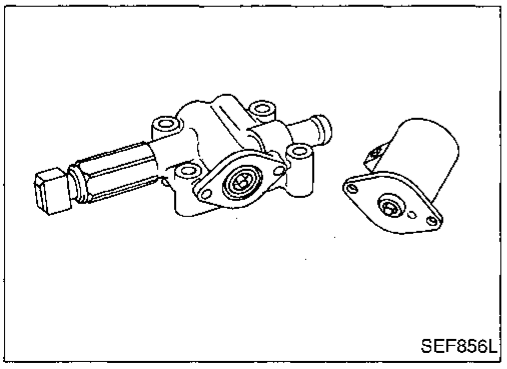
   Resistance:
   Approximately 10Ω

- If NG check resistance of IAC valve-AAC valve and sub-harness separately.



- Check IAC valve-AAC valve resistance.

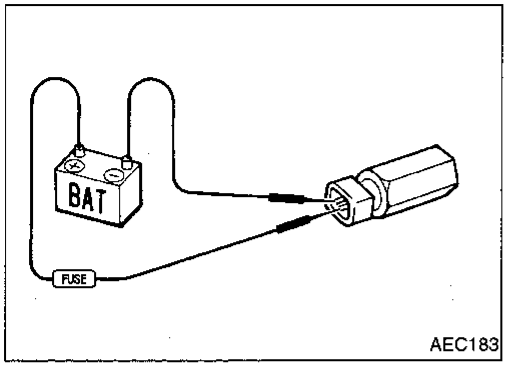
  Resistance:
  Approximately 10Ω



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

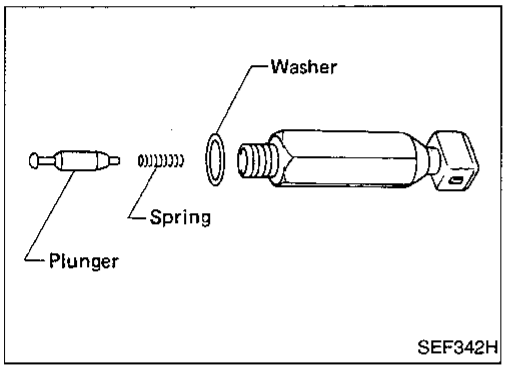
Electrical Components Inspection (Cont'd)

IAC VALVE-FICD SOLENOID VALVE



AEC183

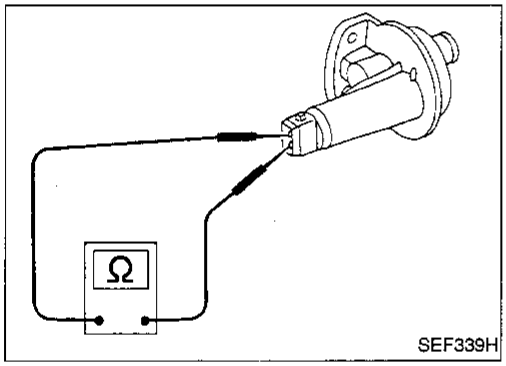
- Check for clicking sound when applying 12V direct current to terminals.



SEF342H

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

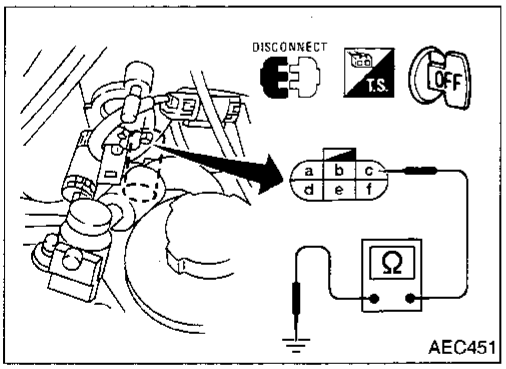
IAC VALVE-AIR REGULATOR



SEF339H

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

KNOCK SENSOR



AEC451

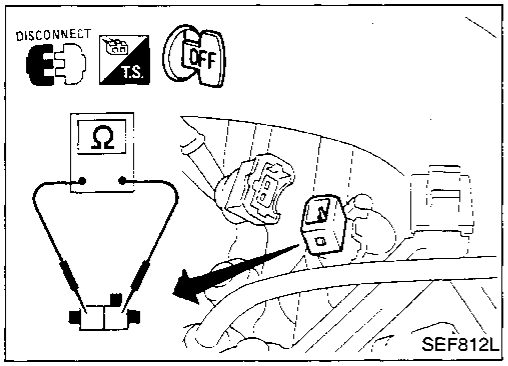
1. Disconnect knock sensor sub-harness connector (F102) .
2. Check continuity between terminal ⓒ and ground.

Continuity should exist.

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

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

Electrical Components Inspection (Cont'd)



FUEL INJECTOR

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

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

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

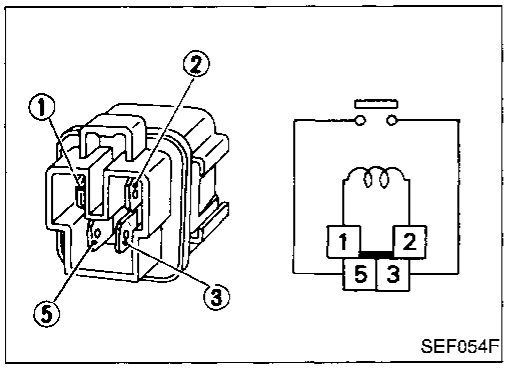
1. Disconnect sub-harness connector (F101) for injectors.
2. Check resistance between terminals, following the table as shown below:

Cylinder	Terminal No.	Resistance
No. 1	ⓐ - ⓒ	10 - 14Ω
No. 3	ⓐ - ⓑ	
No. 5	ⓐ - ⓔ	

If NG, replace injector.

HEATED OXYGEN SENSOR (HO2S)

Perform "Diagnostic Procedure For Trouble Code 33".
Refer to EF & EC-114.



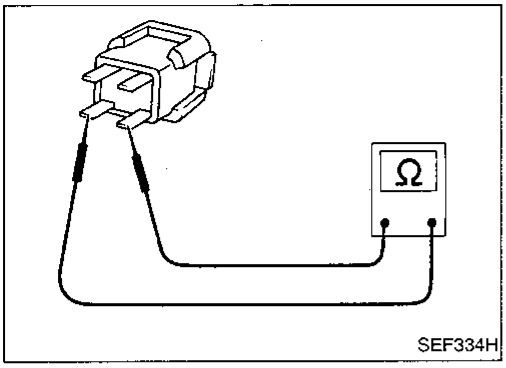
ECM RELAY, FUEL PUMP RELAY, AIR CONDITIONING RELAY, IAC RELAY-FICD RELAY AND COOLING FAN RELAYS

Check continuity between terminals ③ and ⑤.

Conditions	Continuity between terminals ③ and ⑤
12V (fused) direct current supply between terminals ① and ②	Yes
No current supply	No

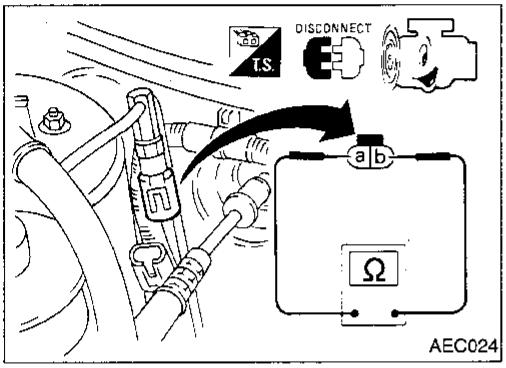
If NG, replace relay.

Electrical Components Inspection (Cont'd)



RESISTOR

1. Disconnect resistor harness connector.
2. Check resistance between terminal ⓐ and ⓑ.
   Resistance: Approximately 2.2kΩ
   If NG, replace resistor.

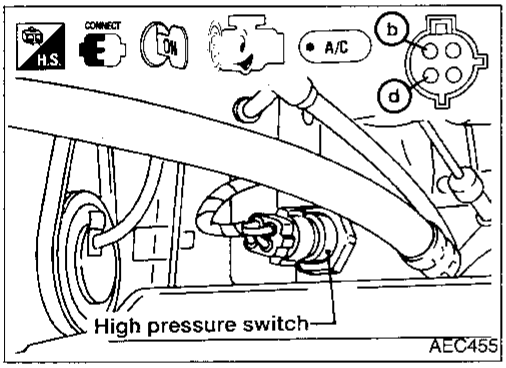


POWER STEERING PRESSURE (PSP) SWITCH

1. Disconnect power steering pressure switch harness connector.
2. Start engine.
3. Check continuity between terminals ⓐ and ⓑ.

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

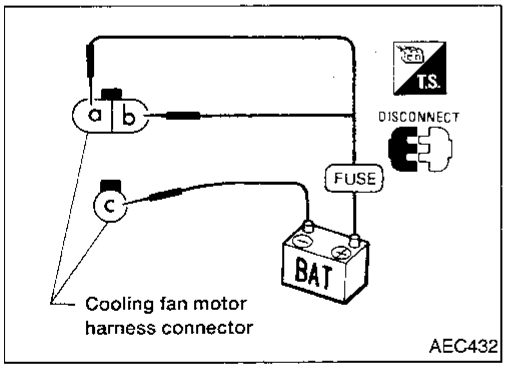
If NG, replace power steering pressure switch.



HIGH PRESSURE SWITCH-2

Check continuity between terminals ⓑ and ⓓ.

High-pressure side line pressure	kPa (kg/cm², psi)	Operation	Continuity
Increasing to	2,246 (22.9, 326)	Fan OFF	Does not exist
Decreasing to	1,824 (18.6, 264)	Fan ON	Exists

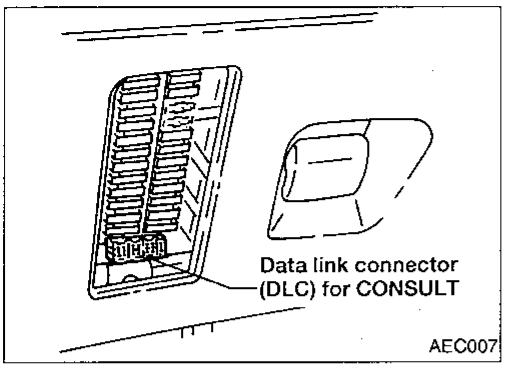


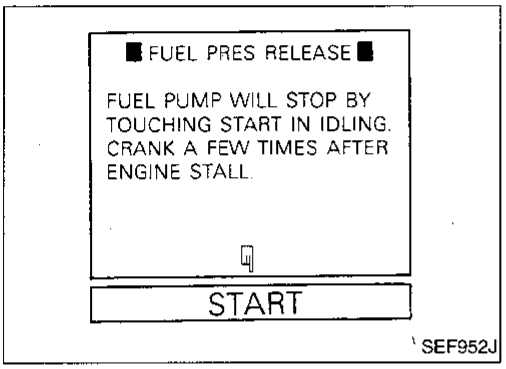
COOLING FAN MOTOR

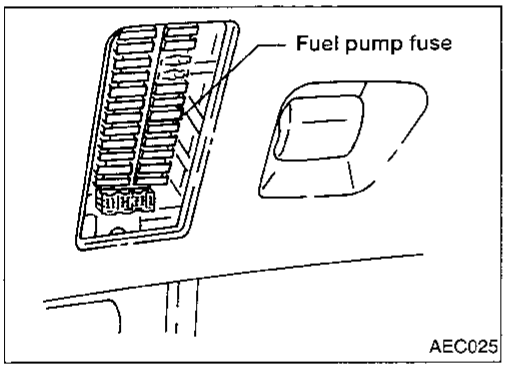
1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery positive voltage and check operation.

	Speed	Terminals	
		(⊕)	(⊖)
Cooling fan motor	Low	ⓐ	ⓒ
	High	ⓑ	ⓒ

Cooling fan motor should operate.
If NG, replace cooling fan motor.







Releasing Fuel Pressure

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

1. Turn ignition switch "ON".
2. Perform "FUEL 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".

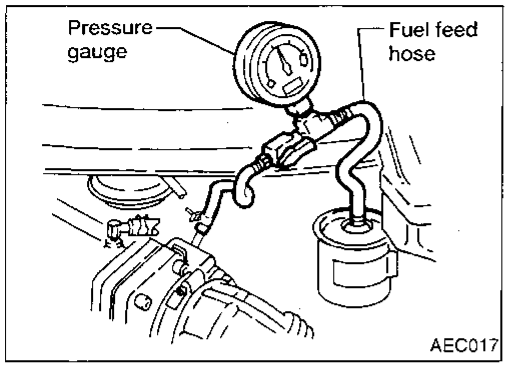
1. Remove fuel pump fuse.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch "OFF".
5. Reinstall fuel pump fuse after servicing fuel system.

Fuel Pressure Check

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

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

Fuel Pressure Check (Cont'd)

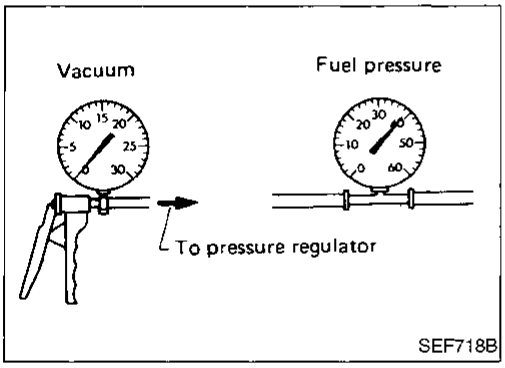


5. Read the indication of fuel pressure gauge.
   At idling:
   When fuel pressure regulator valve vacuum hose is connected.
   Approximately 235 kPa (2.4 kg/cm^2, 34 psi)
   When fuel pressure regulator valve vacuum hose is disconnected.
   Approximately 294 kPa (3.0 kg/cm^2, 43 psi)

   If results are unsatisfactory, perform Fuel Pressure Regulator Check.

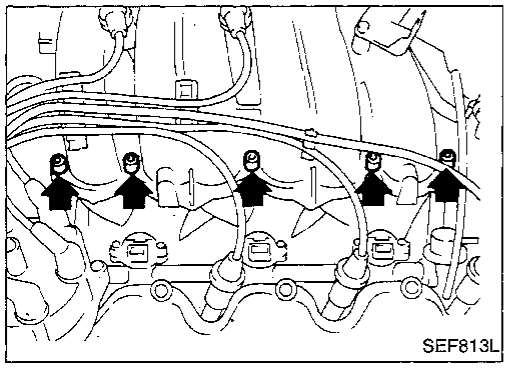
Fuel Pressure Regulator Check

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.


SEF813L

Injector Removal

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

The following parts should be disconnected or removed.

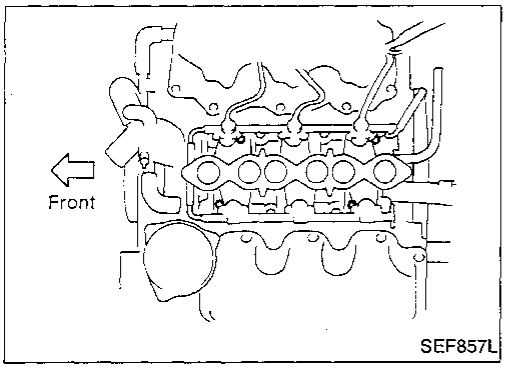
(1) Harness connectors for
- IAC valve-AAC valve
- IAC valve-FICD solenoid valve
- Closed throttle position switch
- Throttle position sensor
- IAC valve-air regulator
- EGR control-solenoid valve
- EGR temperature sensor
- Ground harness

(2) PCV hoses
(3) Vacuum hoses for
- Master brake cylinder
- EGR control-solenoid valve
- Fuel pressure regulator
- Carbon canister
- EGRC-BPT valve

(4) Air hoses from
- Air duct
- IAC valve-AAC valve
- IAC valve-air regulator

(5) Water hoses for
- Throttle body
- Air relief plug

(6) Carbon canister purge hose
(7) EGR flare tube



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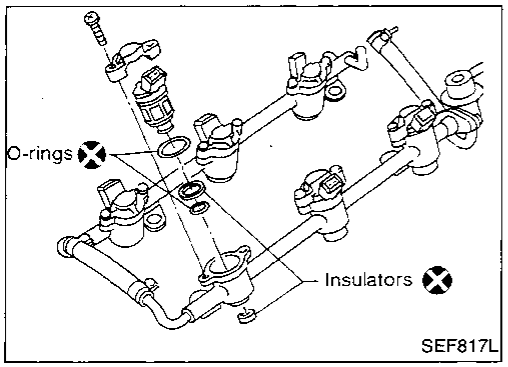
4. Remove injector fuel tube assembly.

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



SEF817L

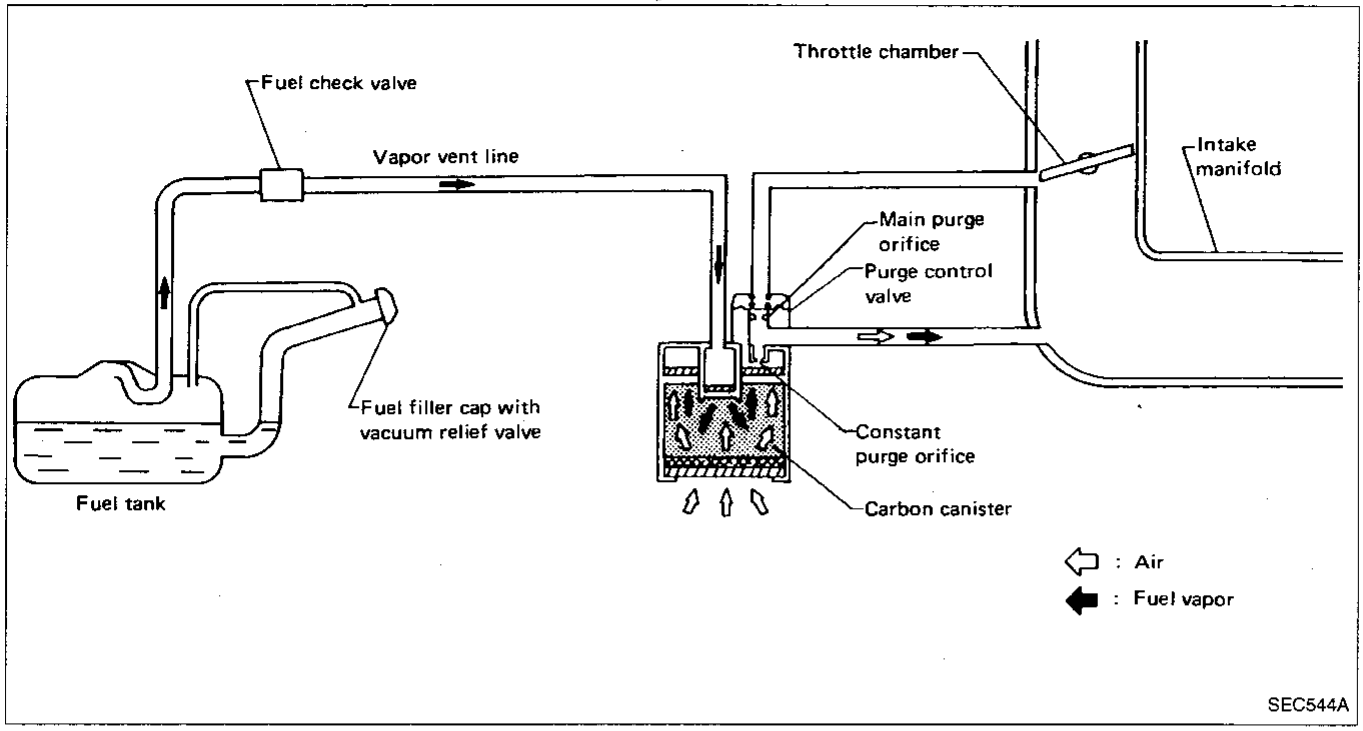
5. Remove any malfunctioning injector from injector fuel tube.
6. Replace or clean injector as necessary.

Always replace O-rings and insulators with new ones.

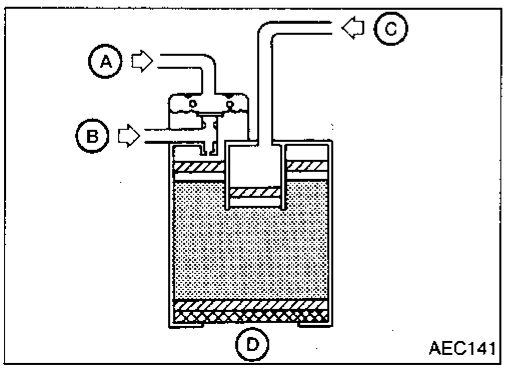
7. Connect injector to injector fuel tube.
8. Reinstall any part removed in reverse order of removal.

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

Description



The evaporative emission (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.

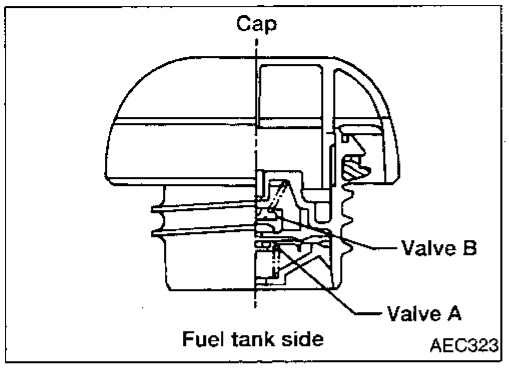


Inspection

CARBON CANISTER

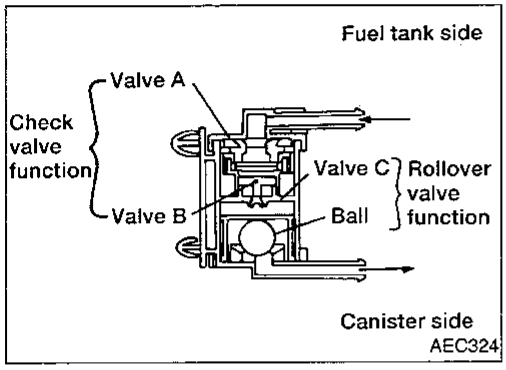
Check carbon canister as follows:
1. Blow air in port Ⓐ and ensure that there is no leakage.
2. • Apply vacuum to port Ⓐ.
   • Cover port Ⓓ with hand.
   • Blow air in port Ⓒ and ensure free flow out of port Ⓑ.

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.

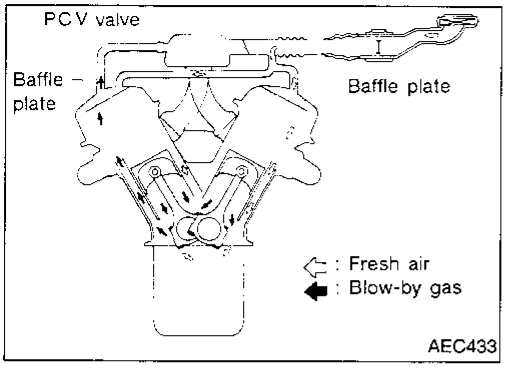


FUEL CHECK VALVE (With rollover valve)

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.

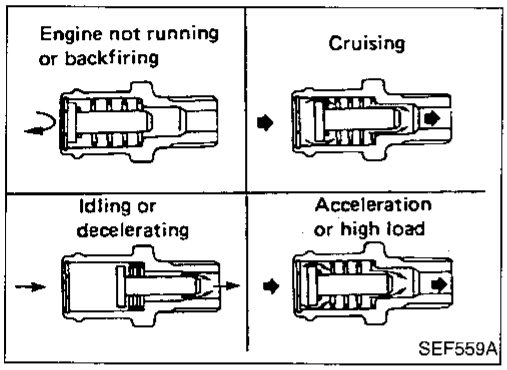
Rollover valve operation

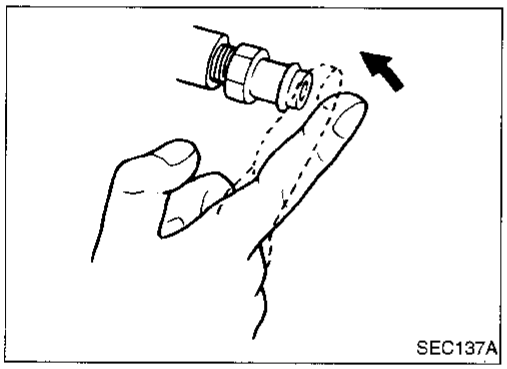
Ensure that continuity of air passage does not exist when the installed rollover valve is tilted to 90° or 180°.



Description

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

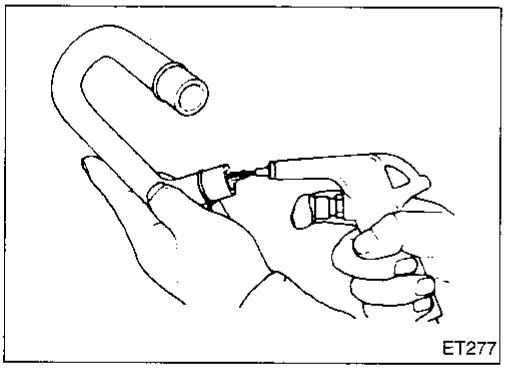




Inspection

PCV (Positive Crankcase Ventilation)

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



VENTILATION HOSE

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

General Specifications

PRESSURE REGULATOR Regulated pressure kPa (kg/cm^2, psi)	
Vacuum hose is connected	235 (2.4, 34)
Vacuum hose is disconnected	294 (3.0, 43)

Inspection and Adjustment

Idle speed*1 rpm No-load*2 (in "N" position)	750±50 (700)*3
Air conditioning: ON (in "N" position)	800±50
Ignition timing degree	15°±2° BTDC
Closed throttle position switch touch speed ("OFF" to "ON") rpm (in "N" position)	Idle speed + 400 *3 + 100

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

*3: ( ): Disconnect IAC valve-AAC valve sub-harness connector.

IGNITION COIL

Primary voltage	V	12
Primary resistance [at 20°C (68°F)]	Ω	Approximately 1.0
Secondary resistance [at 20°C (68°F)]	kΩ	Approximately 10

MASS AIR FLOW SENSOR

Supply voltage	V	Battery positive voltage (11 - 14)
Output voltage	V	Approximately 1.0 - 1.7*

*: Engine is warmed up sufficiently and idling under no-load.

ENGINE COOLANT TEMPERATURE SENSOR

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

FUEL PUMP

Resistance	Ω	Approximately 0.7

EGR TEMPERATURE SENSOR

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

IAC VALVE-AAC VALVE

Resistance	Ω	Approximately 10.0

INJECTOR

Resistance	Ω	10 - 14

RESISTOR

Resistance	kΩ	Approximately 2.2

THROTTLE POSITION SENSOR

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

IGNITION WIRE

Resistance	kΩ/m (kΩ/ft)	Less than 30 (9.1)