ENGINE FUEL & EMISSION CONTROL SYSTEM

SECTION EF & EC

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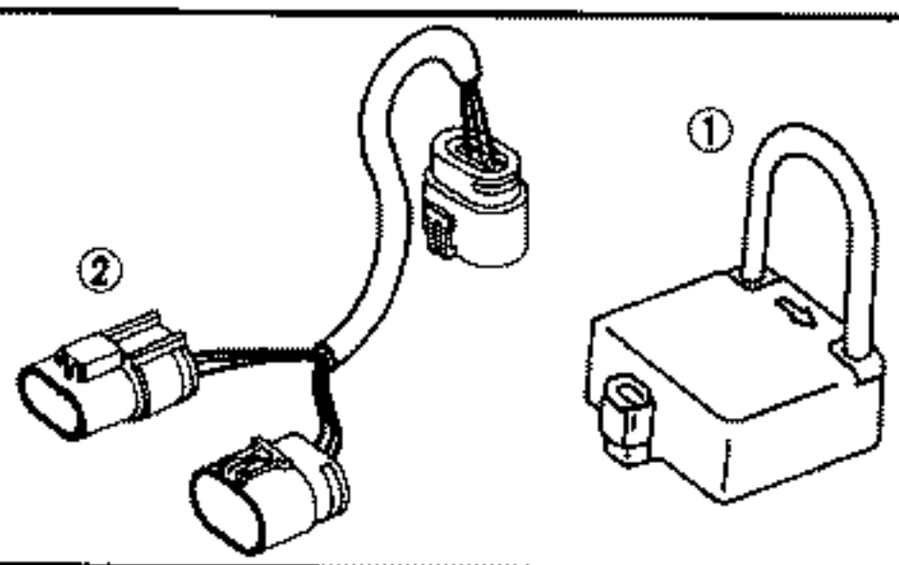
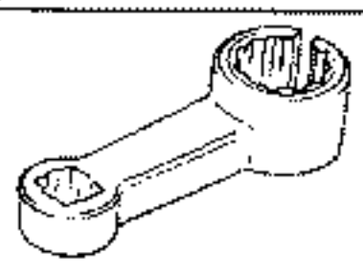
For assistance with wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

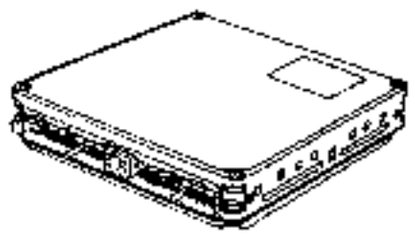
When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES".

SPECIAL SERVICE TOOLS

Tool number Tool name	Description	
① KV109D0010 Ignition timing adapter coil ② KV10114200 Adapter harness		Measuring ignition timing
KV10114400 Exhaust gas sensor wrench		Loosening or tightening exhaust gas sensor

E.C.U.

- Do not disassemble E.C.C.S. control unit (E.C.U.).
- Do not turn diagnosis mode selector forcibly.
- If a battery terminal is disconnected, the memory will return to the ROM value. The E.C.C.S. 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.



BATTERY

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

INJECTOR

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

E.C.C.S. PARTS HANDLING

- Handle air flow meter carefully to avoid damage.
- Do not disassemble air flow meter.
- Do not clean air flow meter with any type of detergent.
- Do not disassemble auxiliary air control valve.
- Even a slight leak in the air intake system can cause serious problems.
- Do not shock or jar the crank angle sensor.

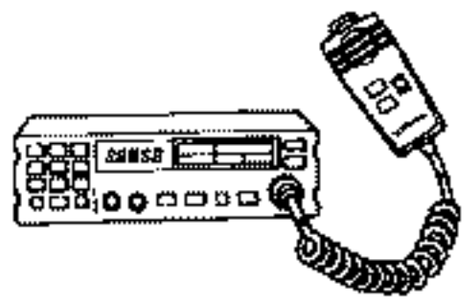
WHEN STARTING

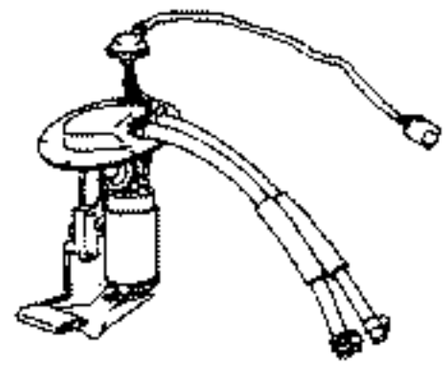
- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.

WIRELESS EQUIPMENT

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

1) Keep the antenna as far as possible 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.





FUEL PUMP

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

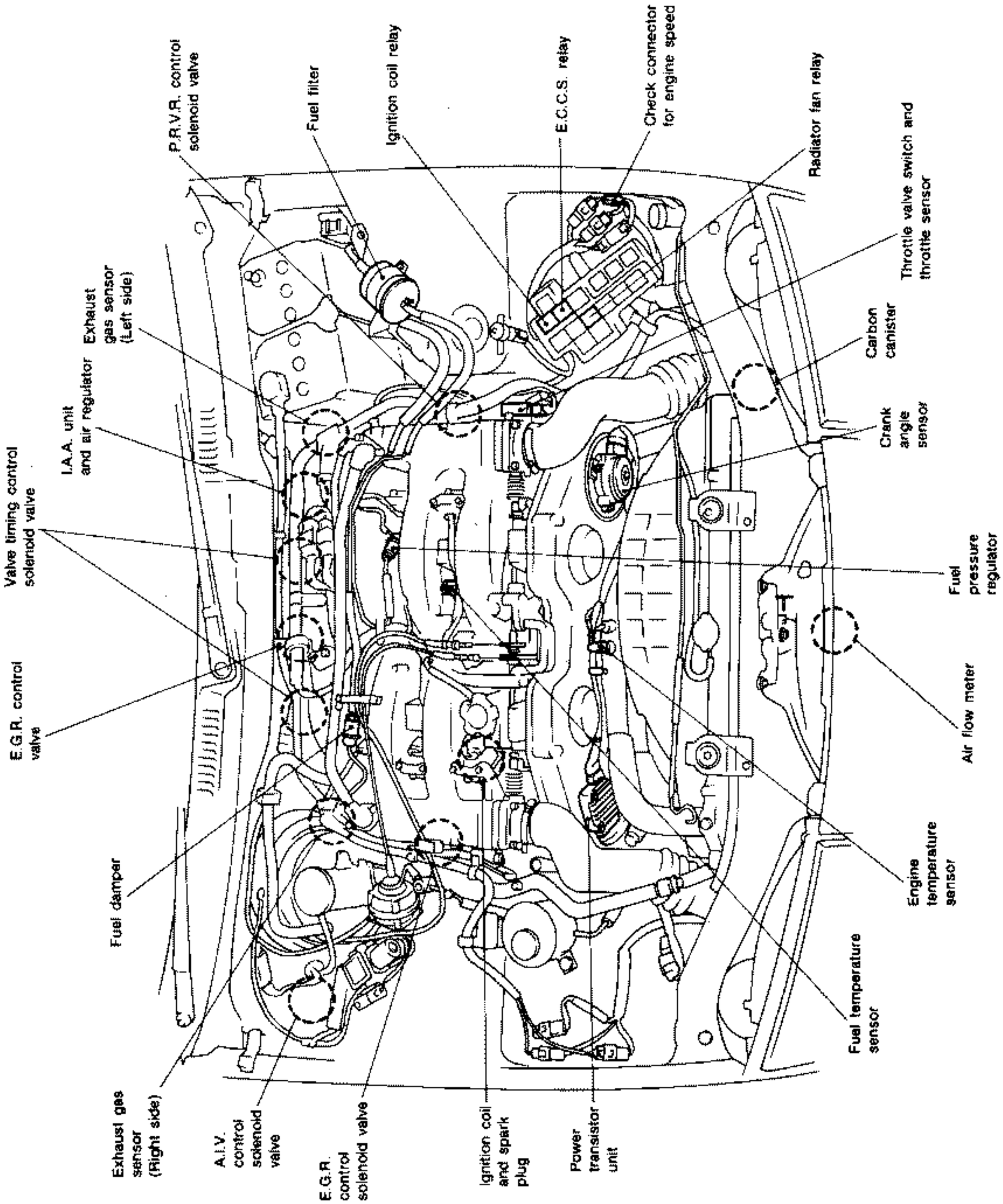
E.C.C.S. HARNESS HANDLING

- Securely connect E.C.C.S. 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 E.C.C.S. harness at least 10 cm (3.9 in) away from adjacent harnesses, to prevent an E.C.C.S. system malfunction due to receiving external noise, degraded operation of ICs, etc.
- Keep E.C.C.S. parts and harnesses dry.
- Before removing parts, turn off ignition switch and then disconnect battery ground cable.

SEF323I

E.C.C.S. Component Parts Location

NON-TURBO MODEL



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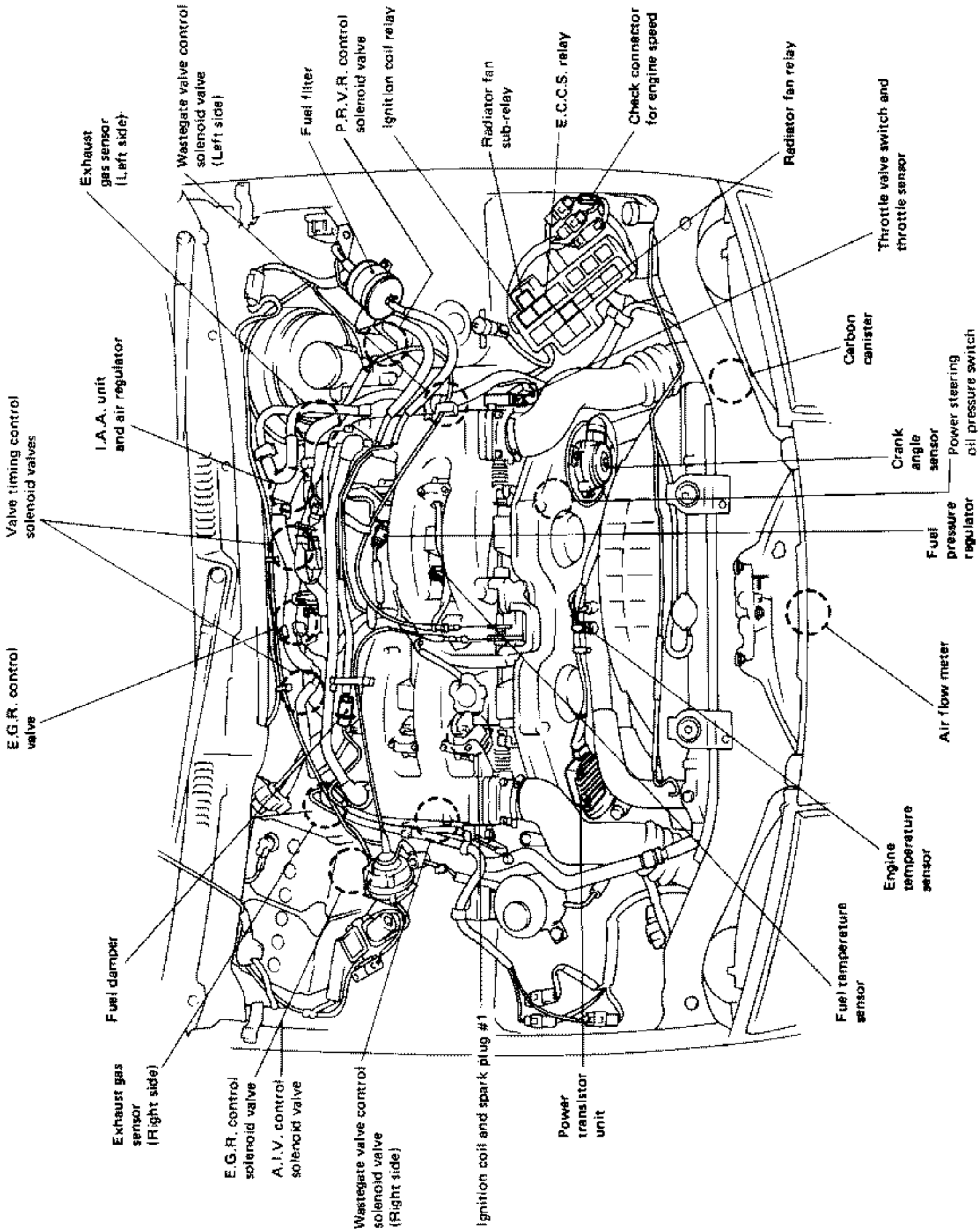
E.C.C.S. Component Parts Location (Cont'd)

TURBO MODEL



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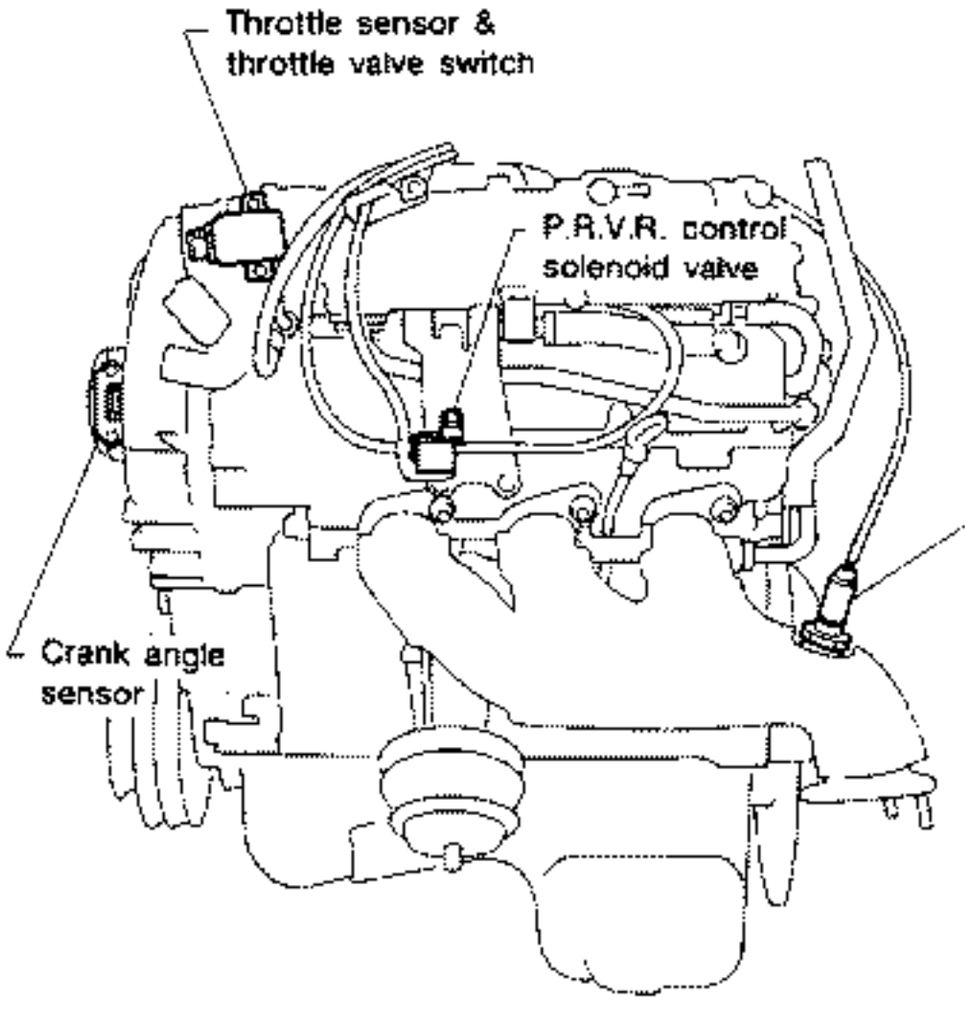
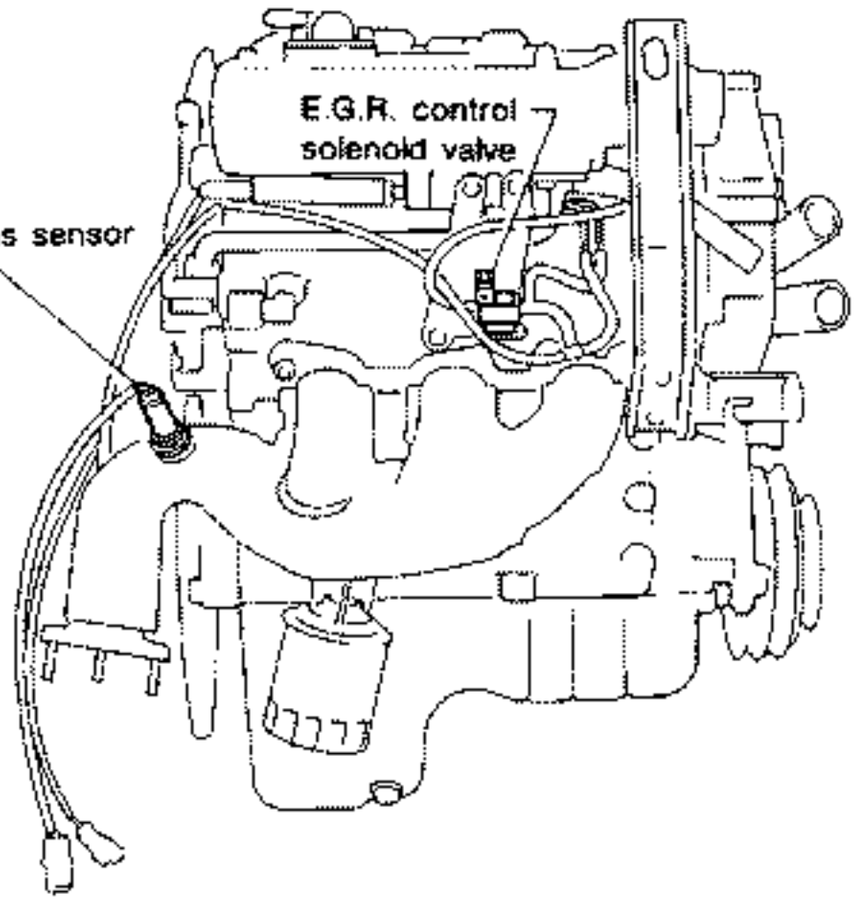
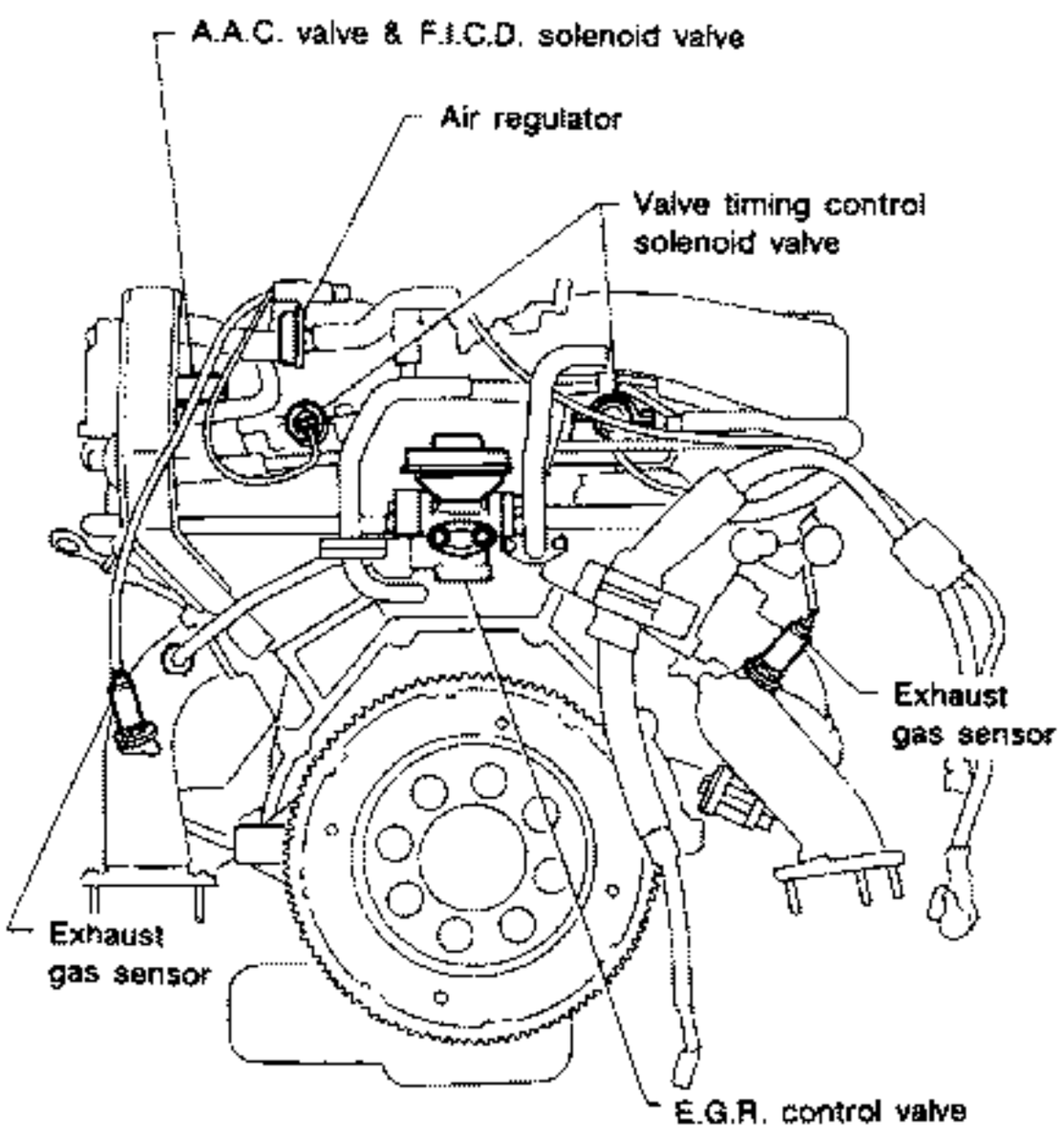
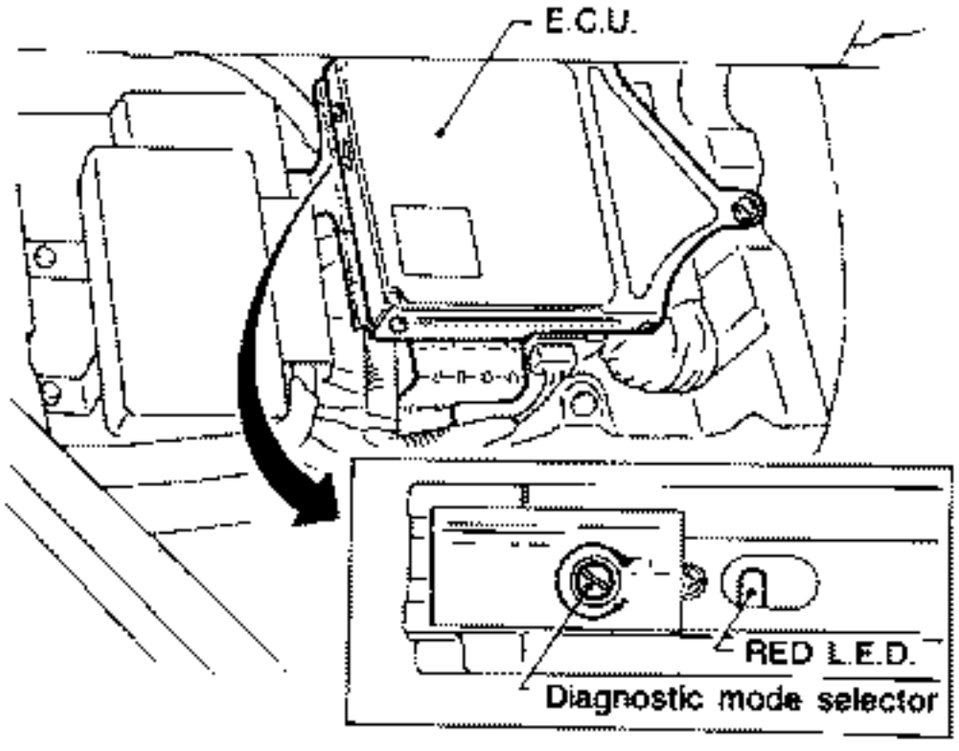
E.C.C.S. Component Parts Location (Cont'd)

NON-TURBO MODEL









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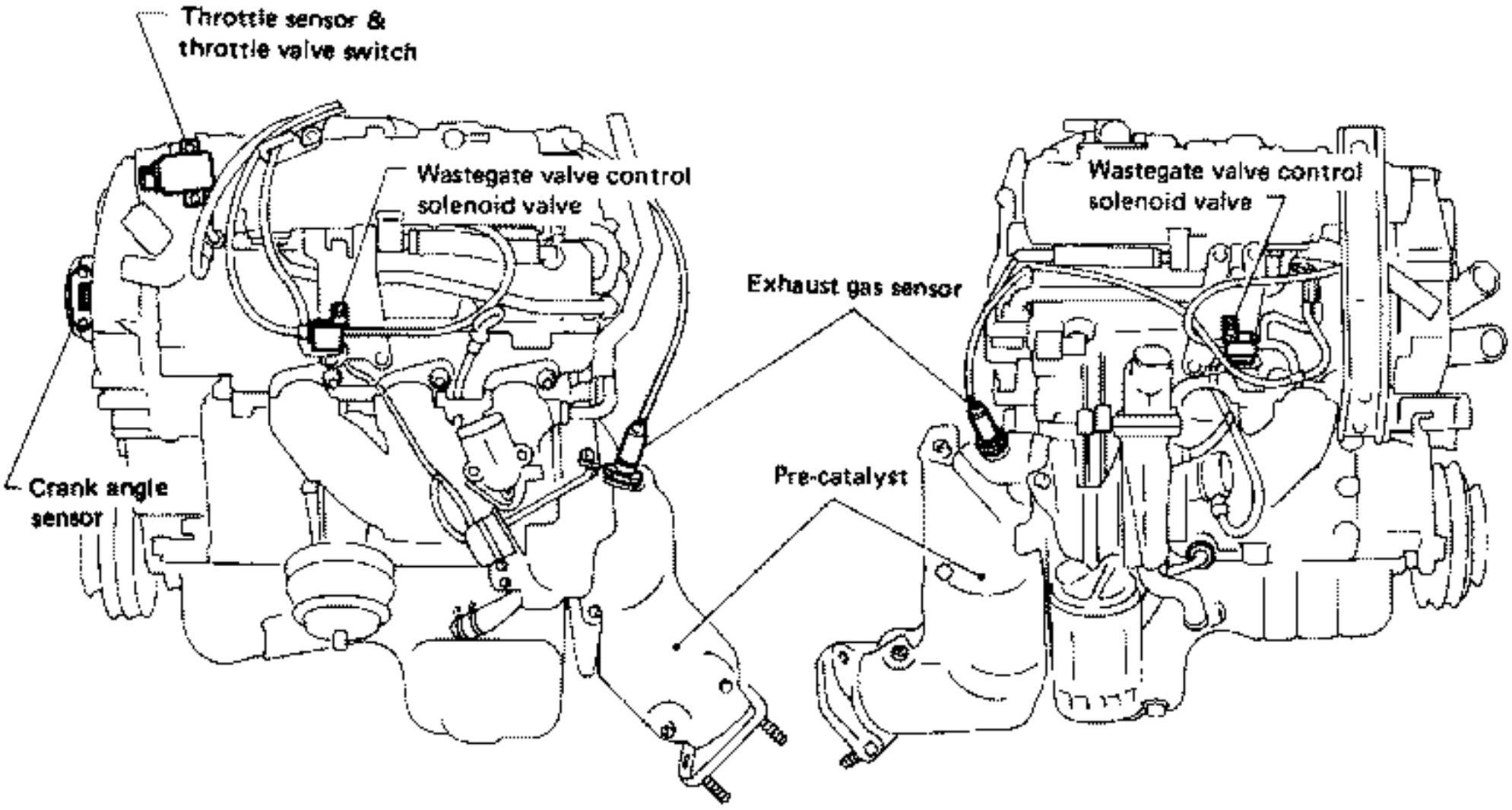
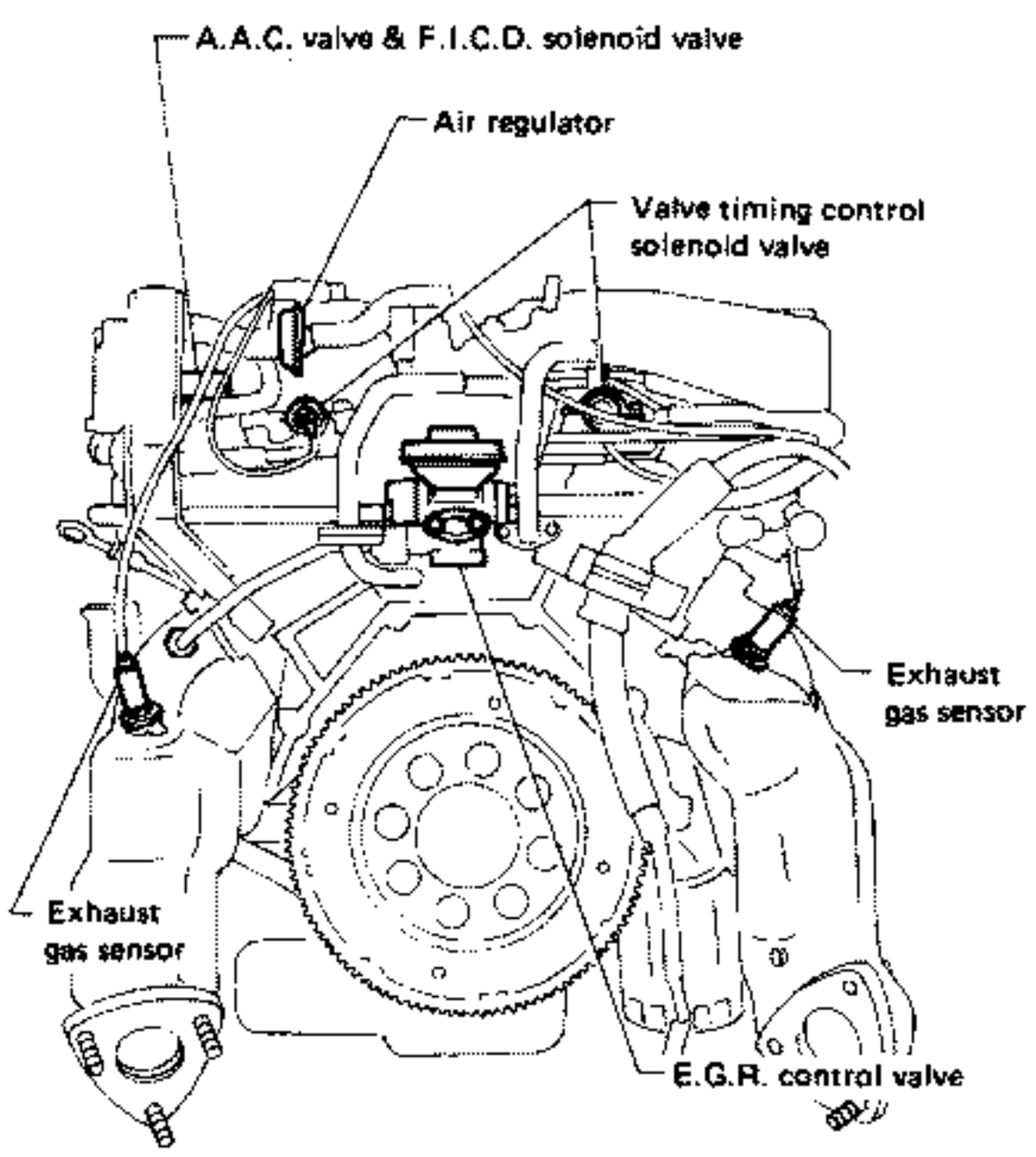
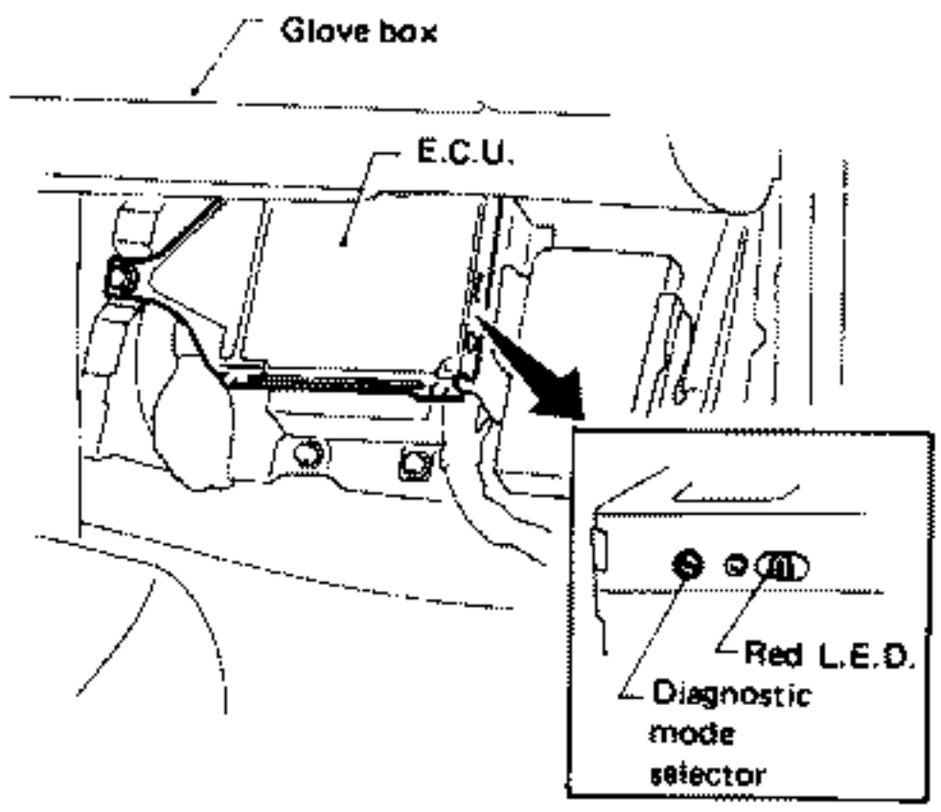
E.C.C.S. Component Parts Location (Cont'd)

TURBO MODEL







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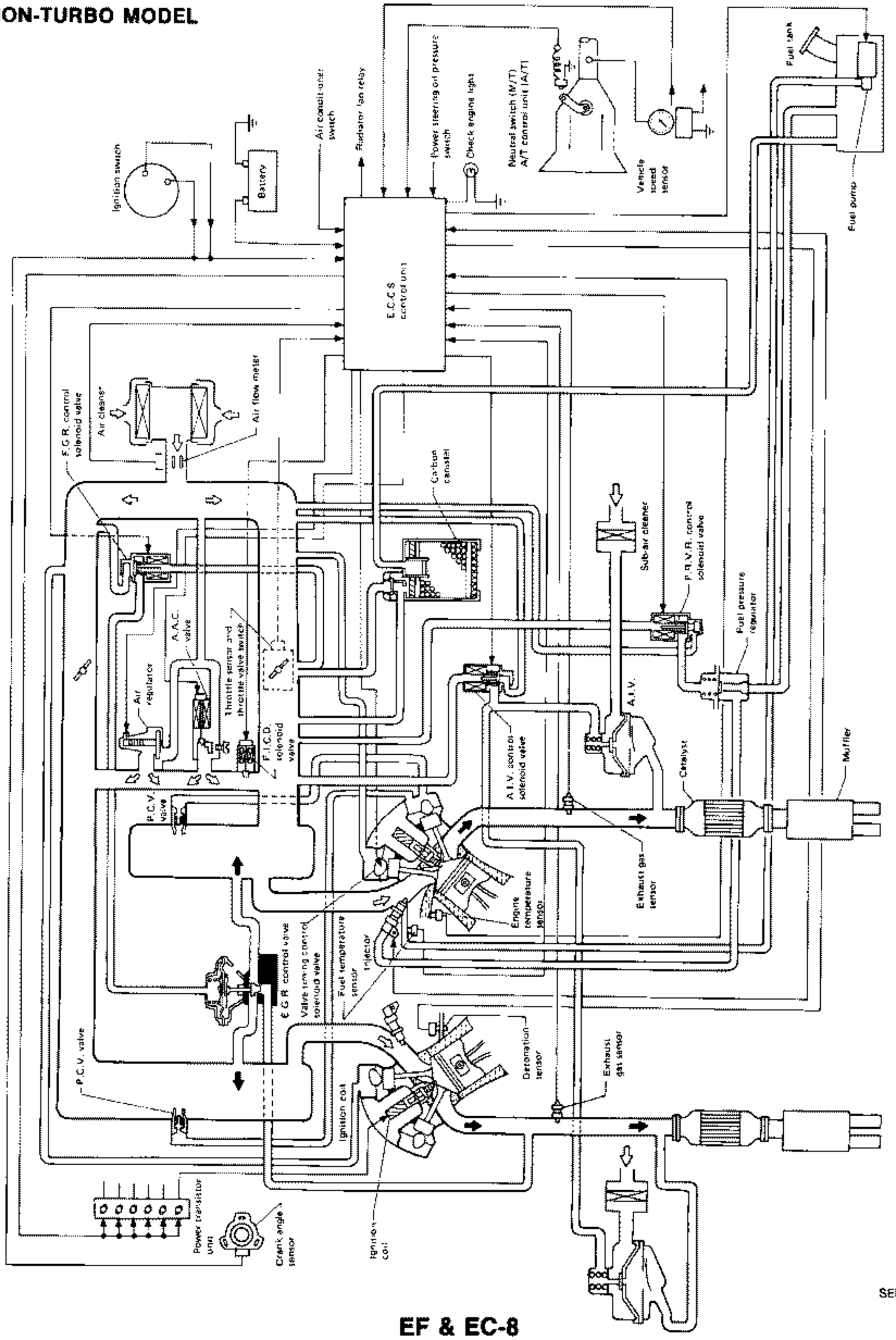
System Diagram

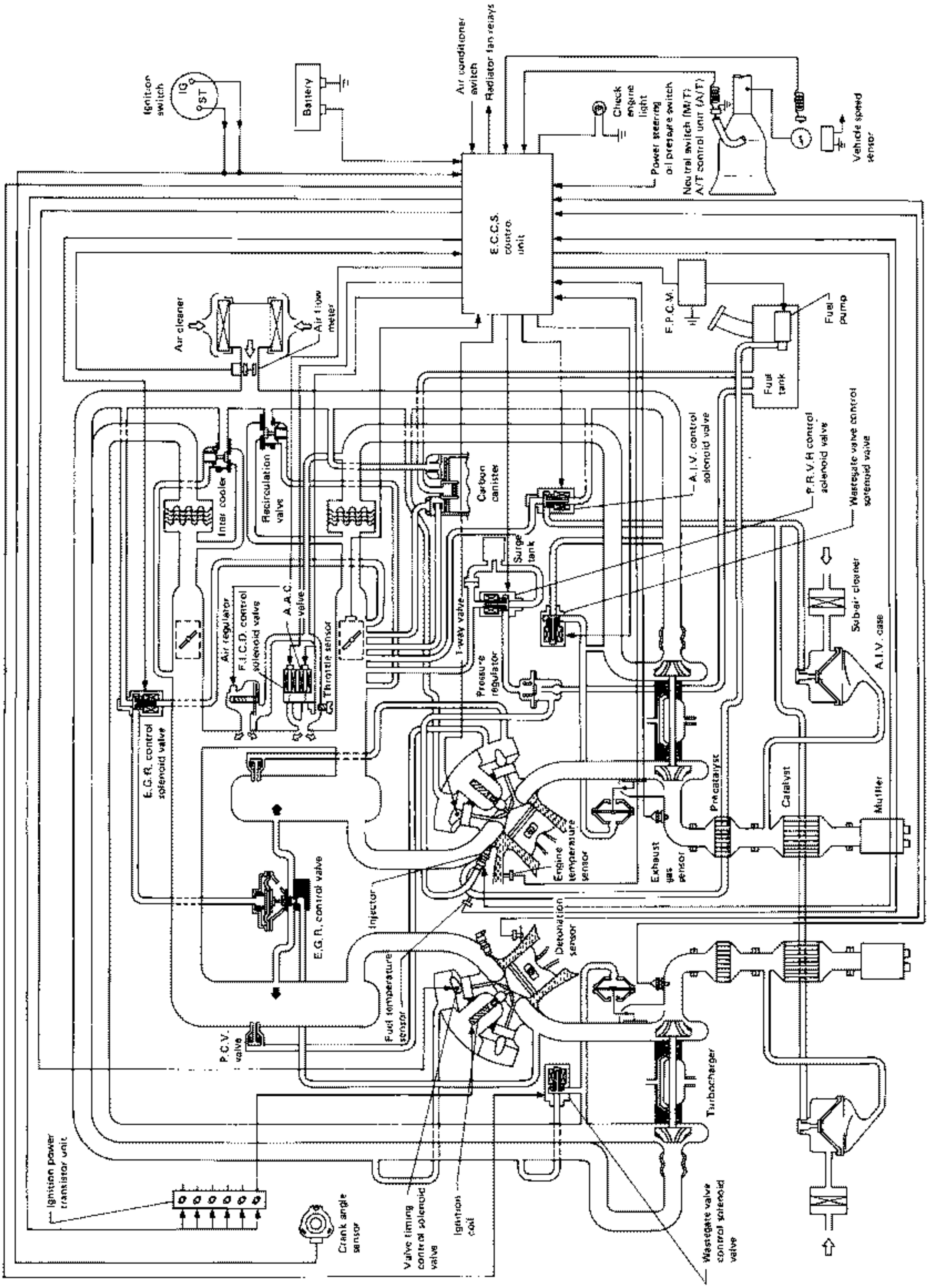
NON-TURBO MODEL



SEF987J

System Diagram (Cont'd)

TURBO MODEL



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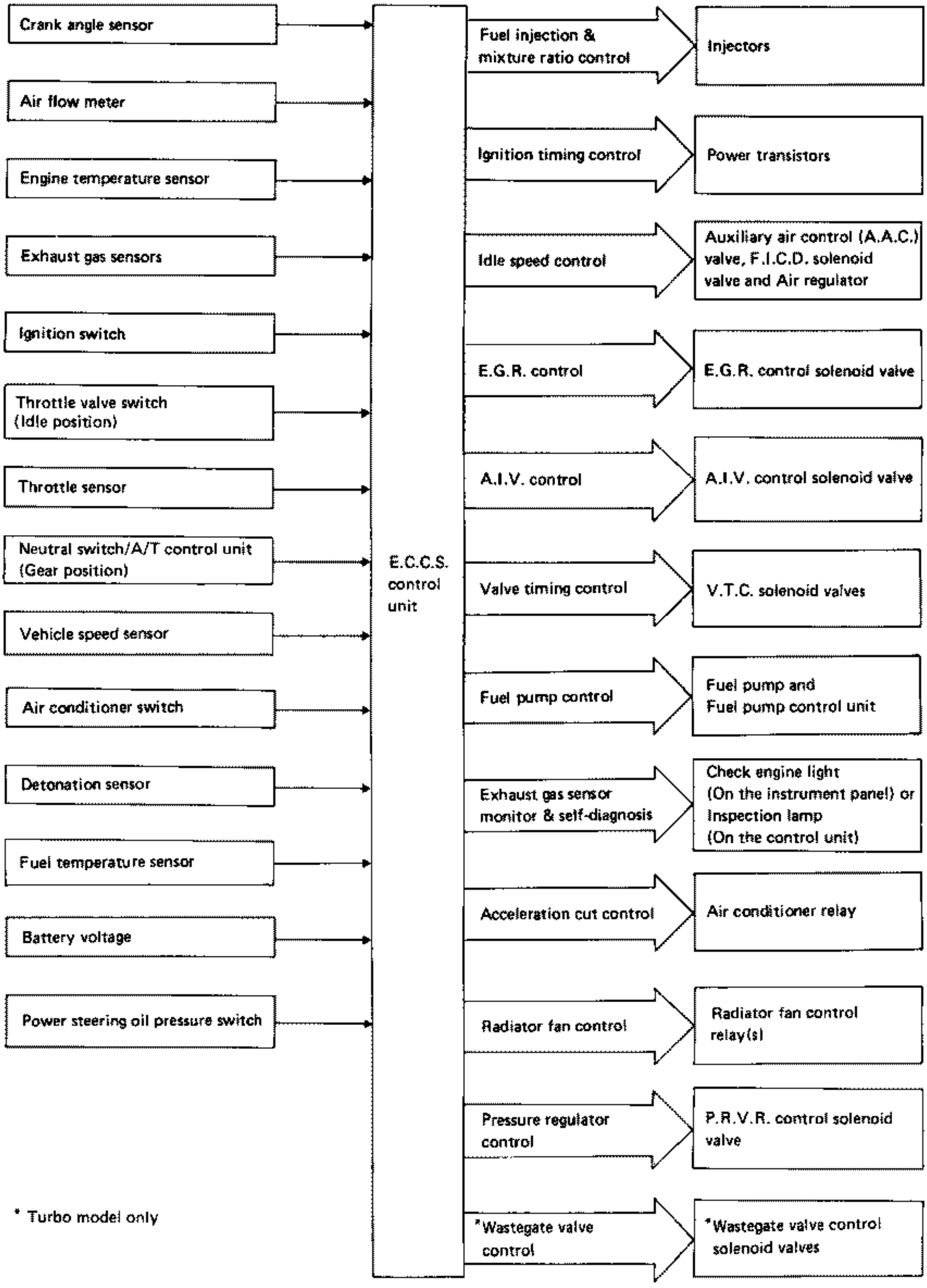
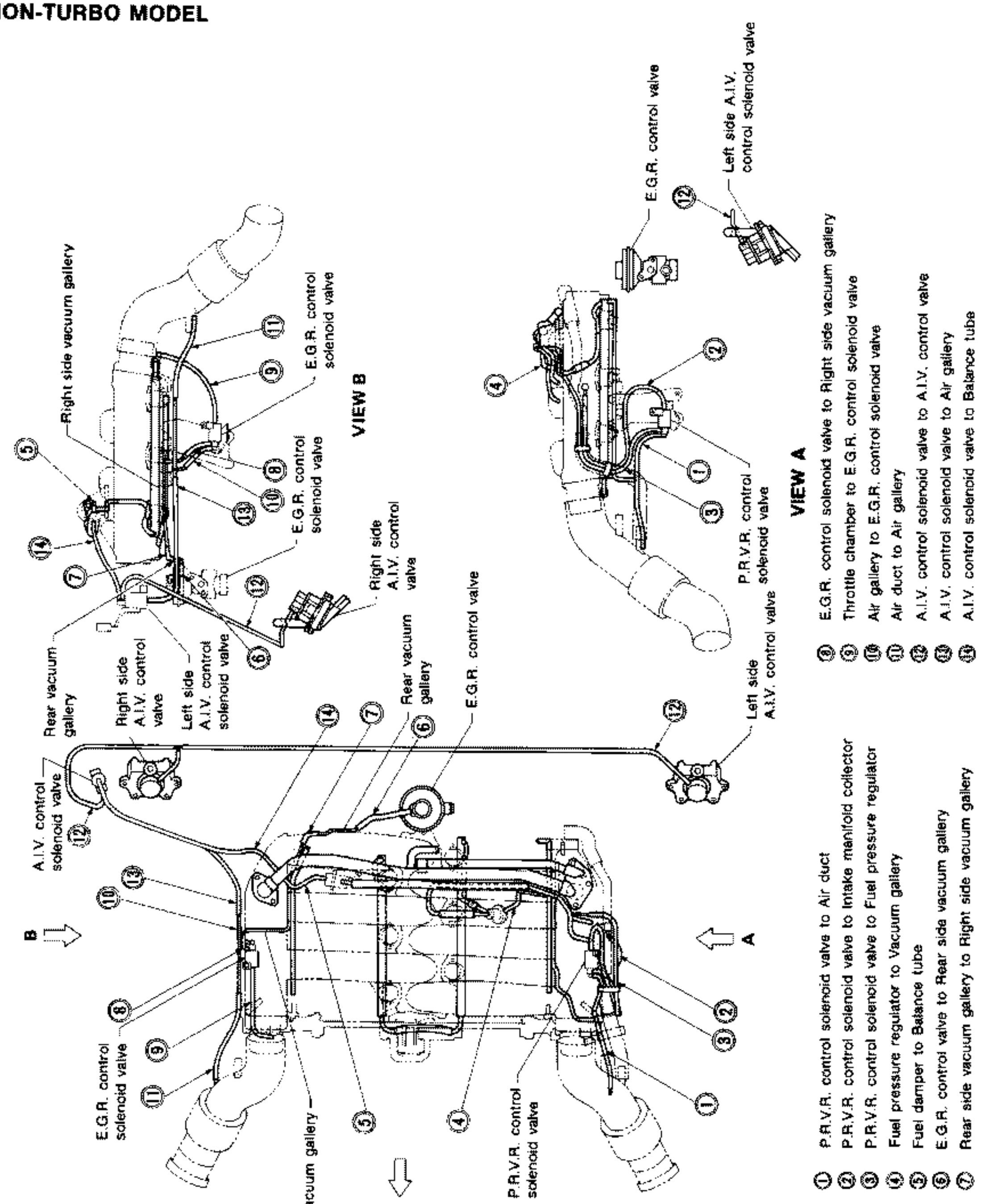
System Chart



* Turbo model only

Vacuum Hose Drawing

NON-TURBO MODEL



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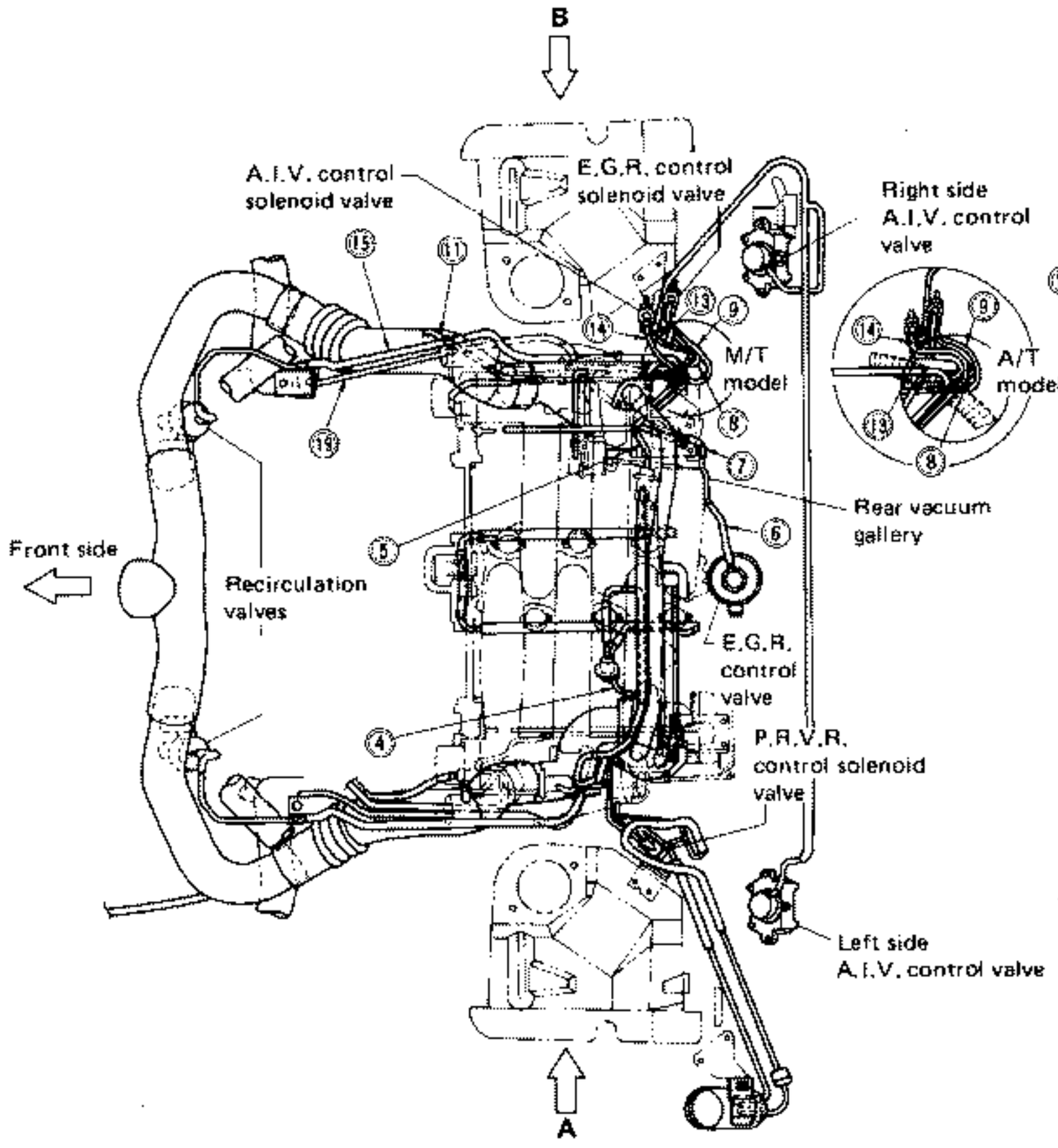
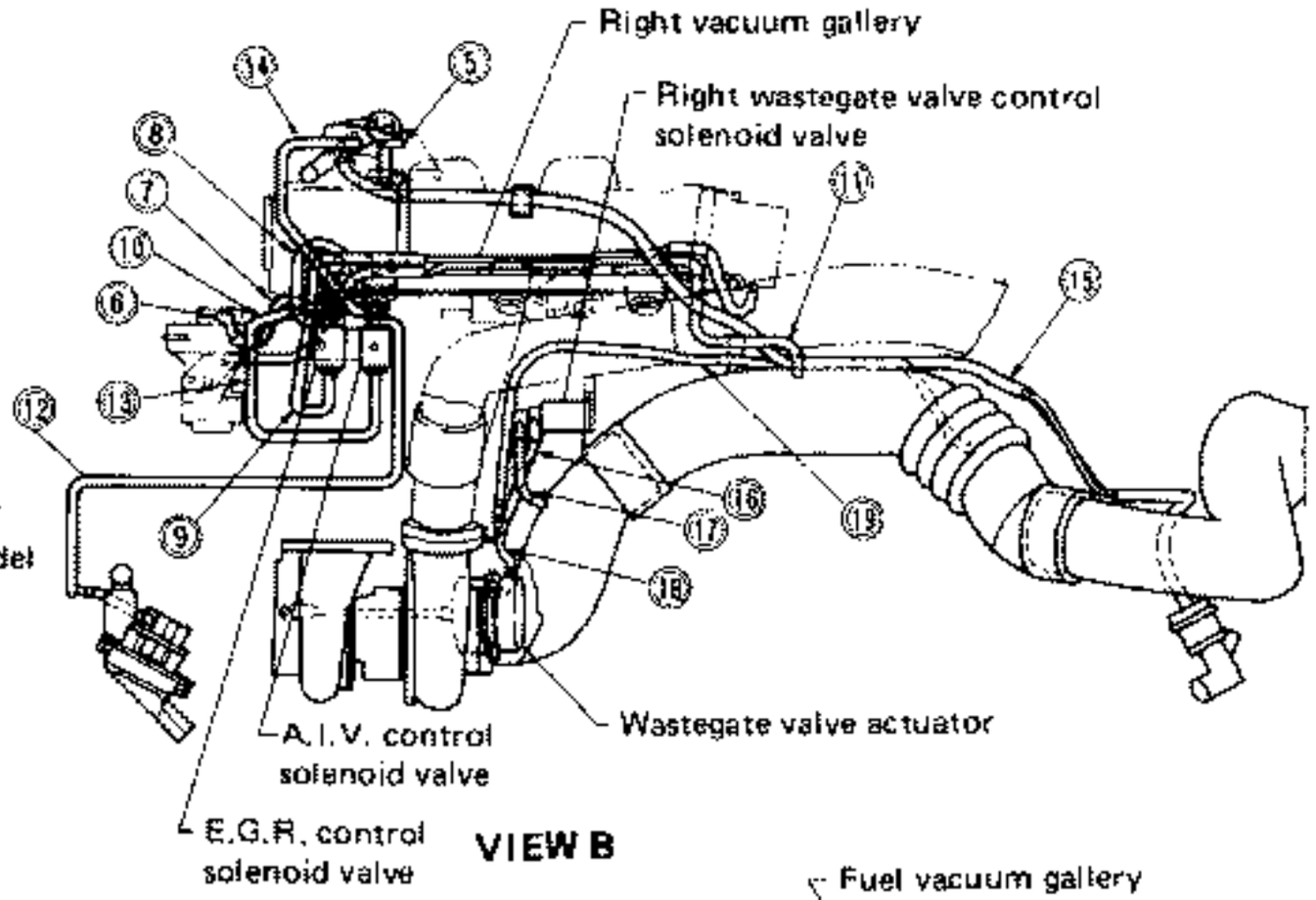
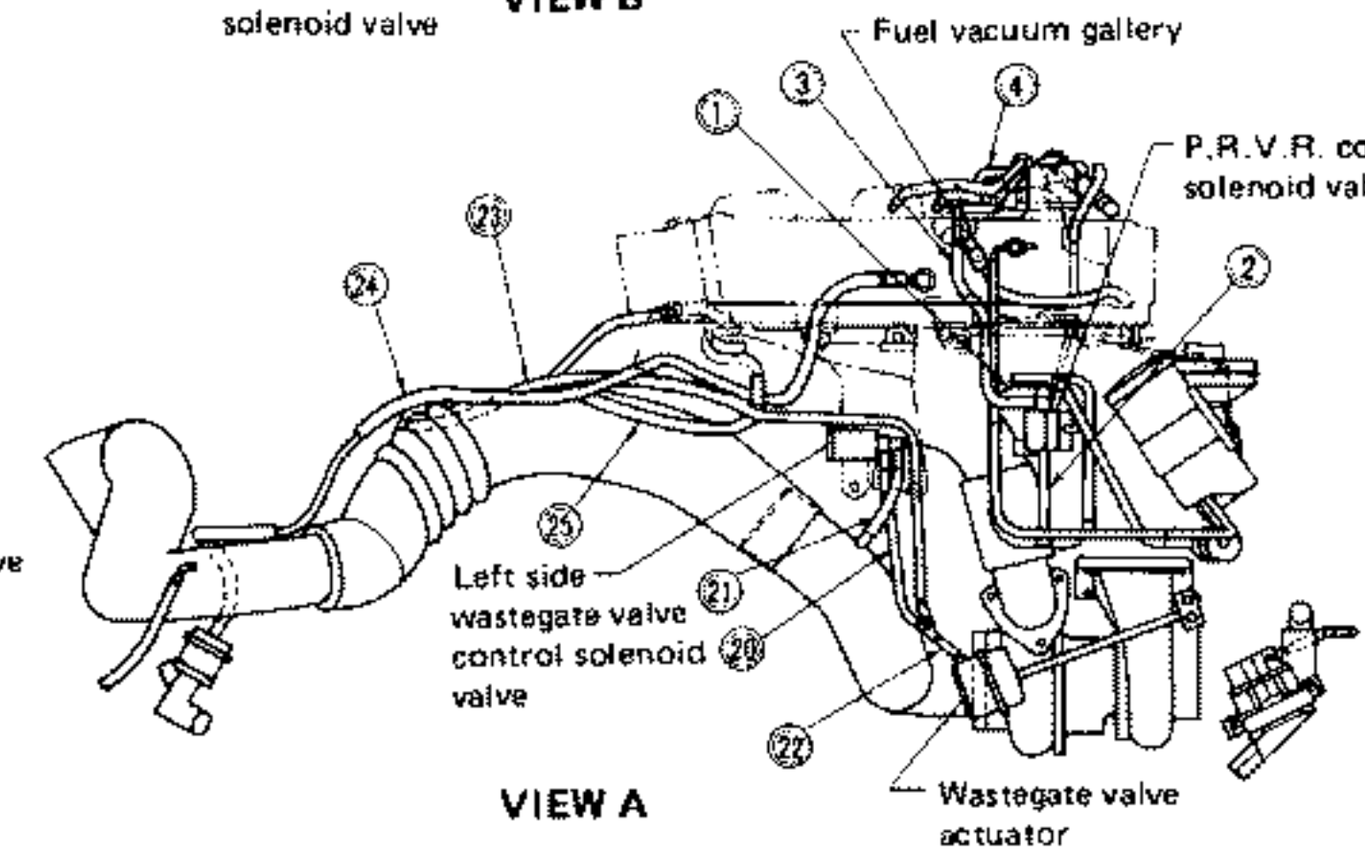
TURBO MODEL

Vacuum Hose Drawing (Cont'd)

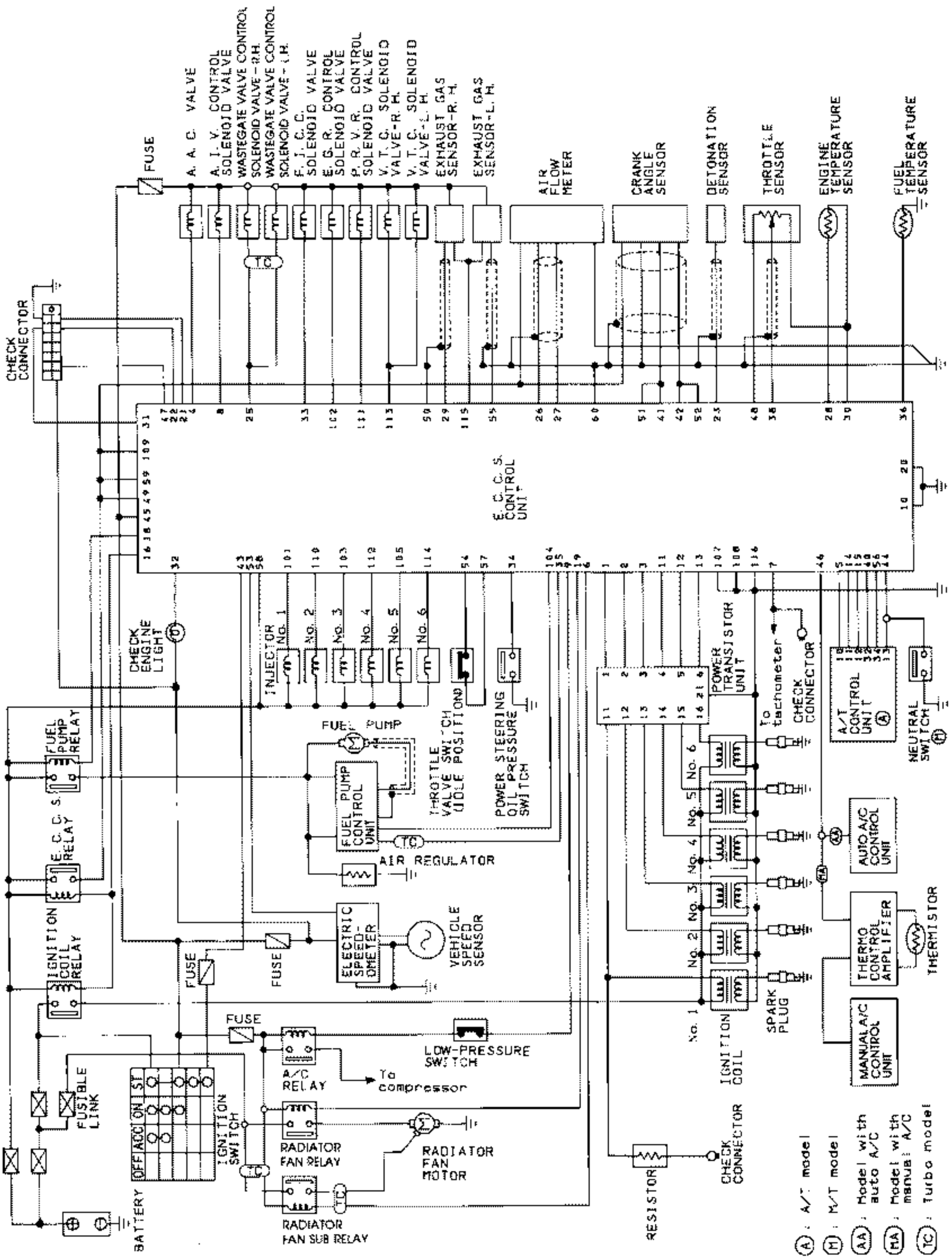






① P.R.V.R. control solenoid valve to Vacuum tank
② P.R.V.R. control solenoid valve to Intake manifold collector
③ P.R.V.R. control solenoid valve to Fuel vacuum gallery
④ Fuel pressure regulator to Fuel vacuum gallery
⑤ Fuel damper to Balance tube
⑥ E.G.R. control solenoid valve to Rear side vacuum gallery
⑦ Rear side vacuum gallery to Right side vacuum gallery
⑧ E.G.R. control solenoid valve to Right side vacuum gallery
⑨ Throttle chamber to E.G.R. control solenoid valve
⑩ E.G.R. control solenoid valve to Right side air gallery through 3-way connector
⑪ Air duct to Right side air gallery
⑫ A.I.V. control solenoid valve to A.I.V. control valve
⑬ A.I.V. control solenoid valve to Right side air gallery through 3-way connector
⑭ A.I.V. control solenoid valve to Balance tube
⑮ Right side recirculation valve to Intake manifold collector
⑯ Right side wastegate valve control solenoid valve to Air pipe through 3-way connector
⑰ Right side wastegate valve control solenoid valve to Suction pipe
⑱ Right side wastegate valve actuator to Air pipe through 3-way connector
⑲ Air pipe to 3-way connector (For right side wastegate valve control)
⑳ Left side wastegate valve control solenoid valve to Air pipe through 3-way connector
㉑ Left side wastegate valve control solenoid valve to Suction pipe
㉒ Left side wastegate valve actuator to Air pipe through 3-way connector
㉓ Air pipe to 3-way connector (For left side wastegate valve control)
㉔ Left side recirculation valve to Intake manifold collector
㉕ Canister purge line

Circuit Diagram



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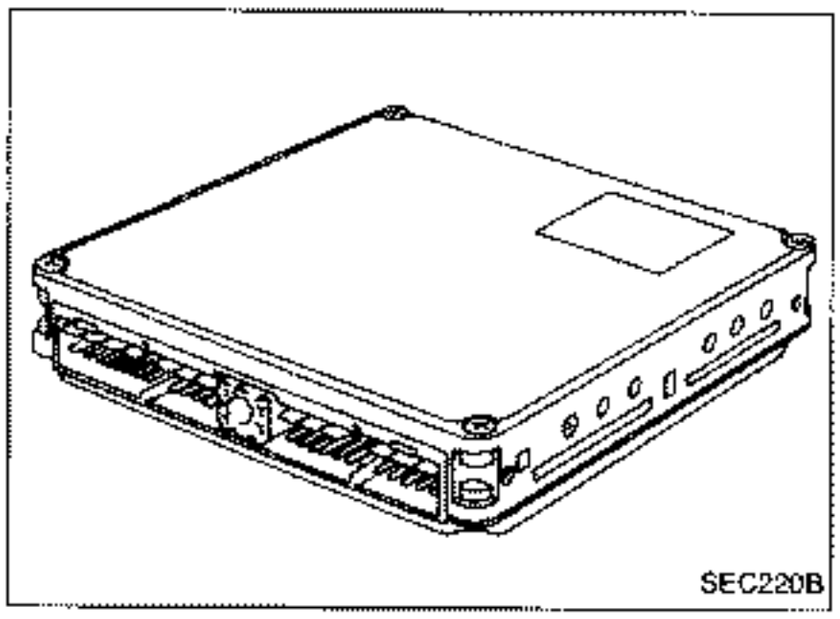
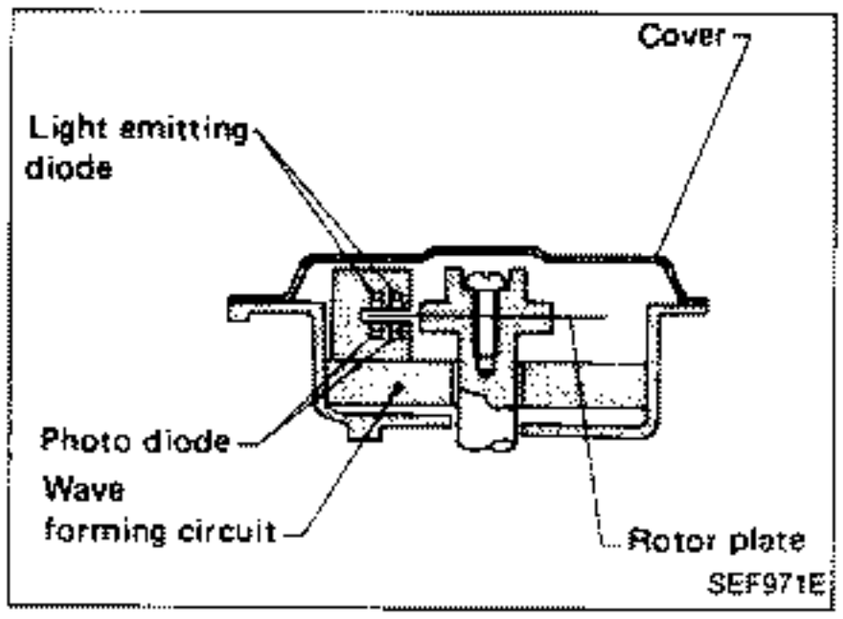

SEC220B

E.C.C.S. Control Unit (E.C.U.)

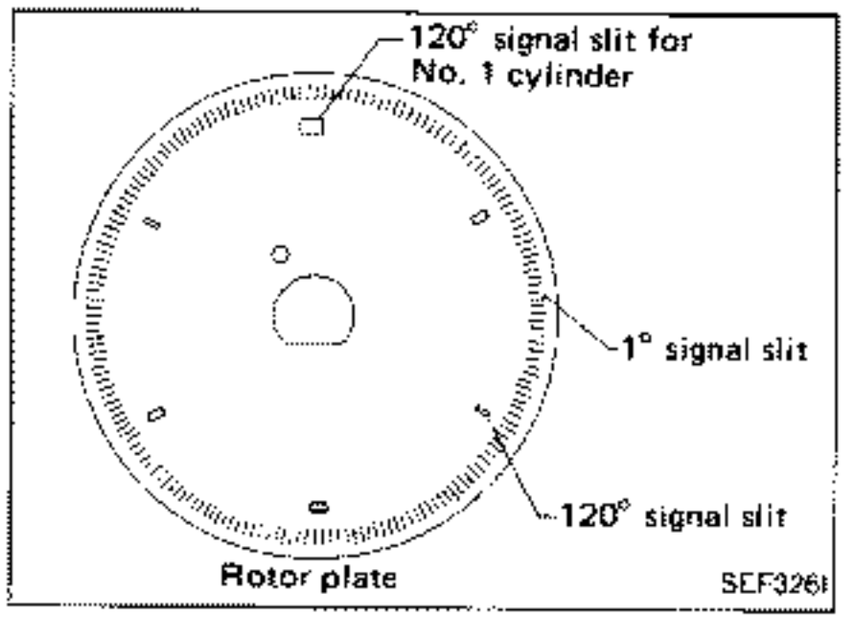
The E.C.U. consists of a microcomputer, an inspection lamp, a diagnostic mode selector, and connectors for signal input and output and for power supply. The unit controls the engine.



SEF971E

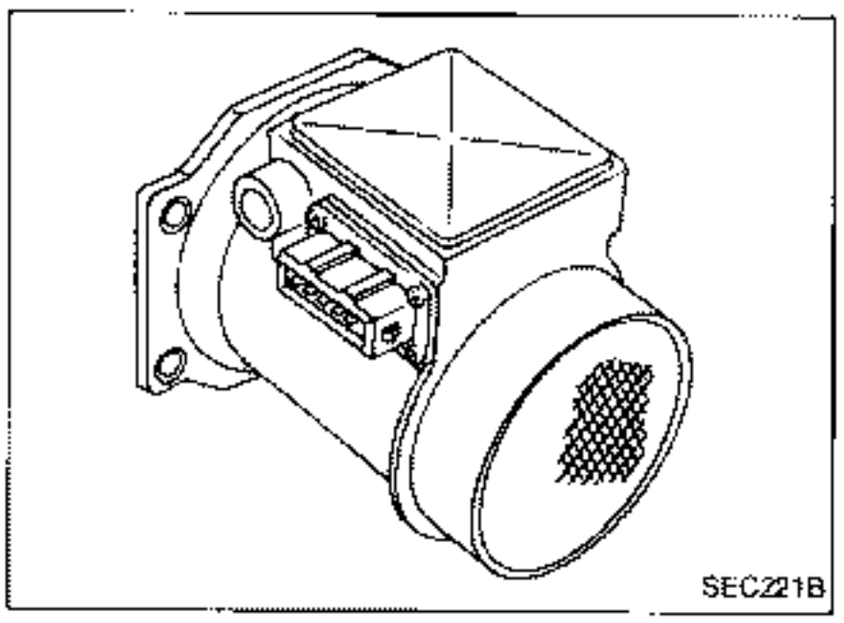
Crank Angle Sensor

The crank angle sensor is a basic component of the E.C.C.S. It monitors engine speed and piston position, and sends signals to the E.C.U. to control fuel injection, ignition timing and other functions.
The crank angle 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 (L.E.D.) and photo diodes are built in the wave-forming circuit.



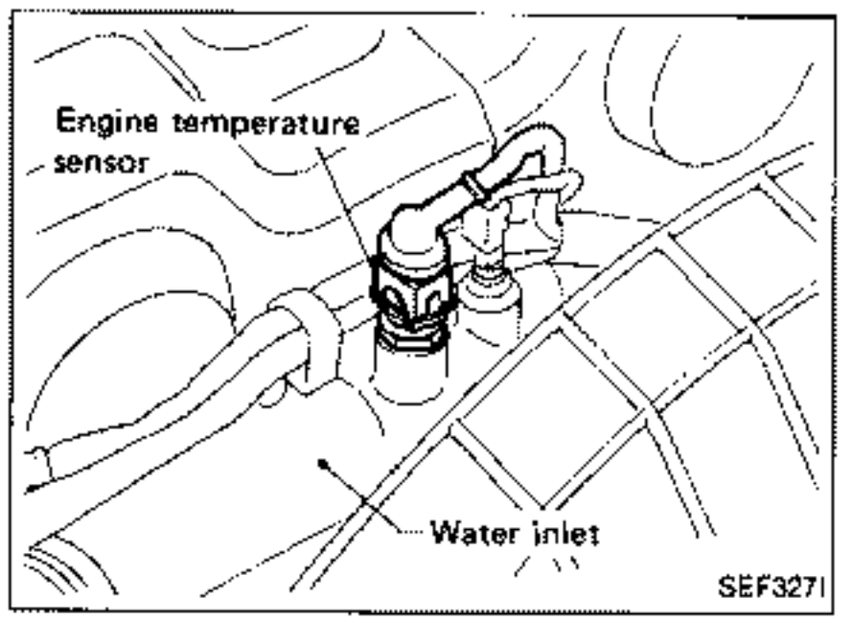
SEF326I

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


SEC221B

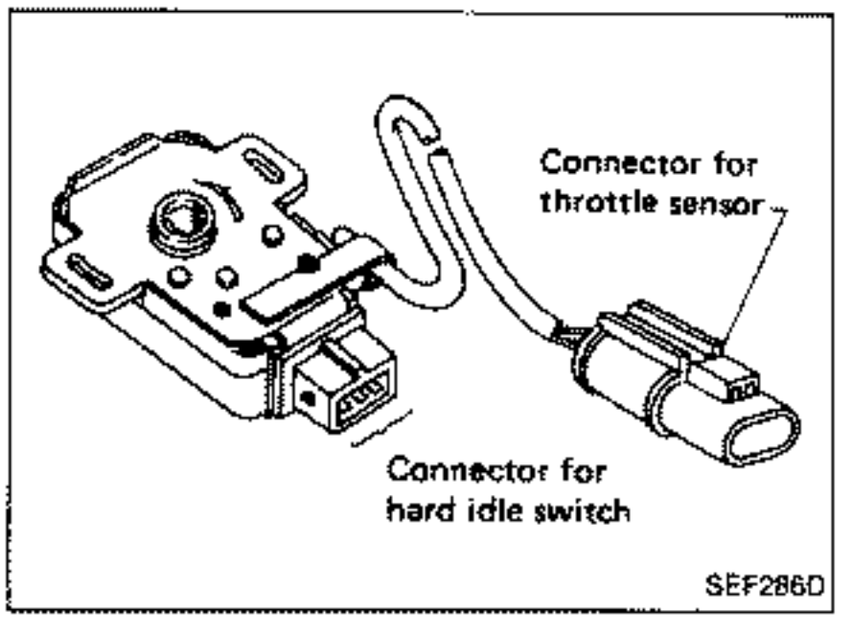
Air Flow Meter

The air flow meter measures the intake air flow rate by measuring a part of the entire flow. Measurements are made in such a way that the E.C.U. receives electrical output signals varied by the amount of heat emitting from the hot film placed in the stream of the intake air.
When intake air flows into the intake manifold through a route around the hot film, the heat generated from the hot film is taken away by the air. The amount of heat reduction depends on the air flow. The temperature of the hot film is automatically controlled to a certain number of degrees.
Therefore, it is necessary to supply the hot film with more electric current in order to maintain the temperature of the hot film. The E.C.U. detects the air flow by means of this current change.



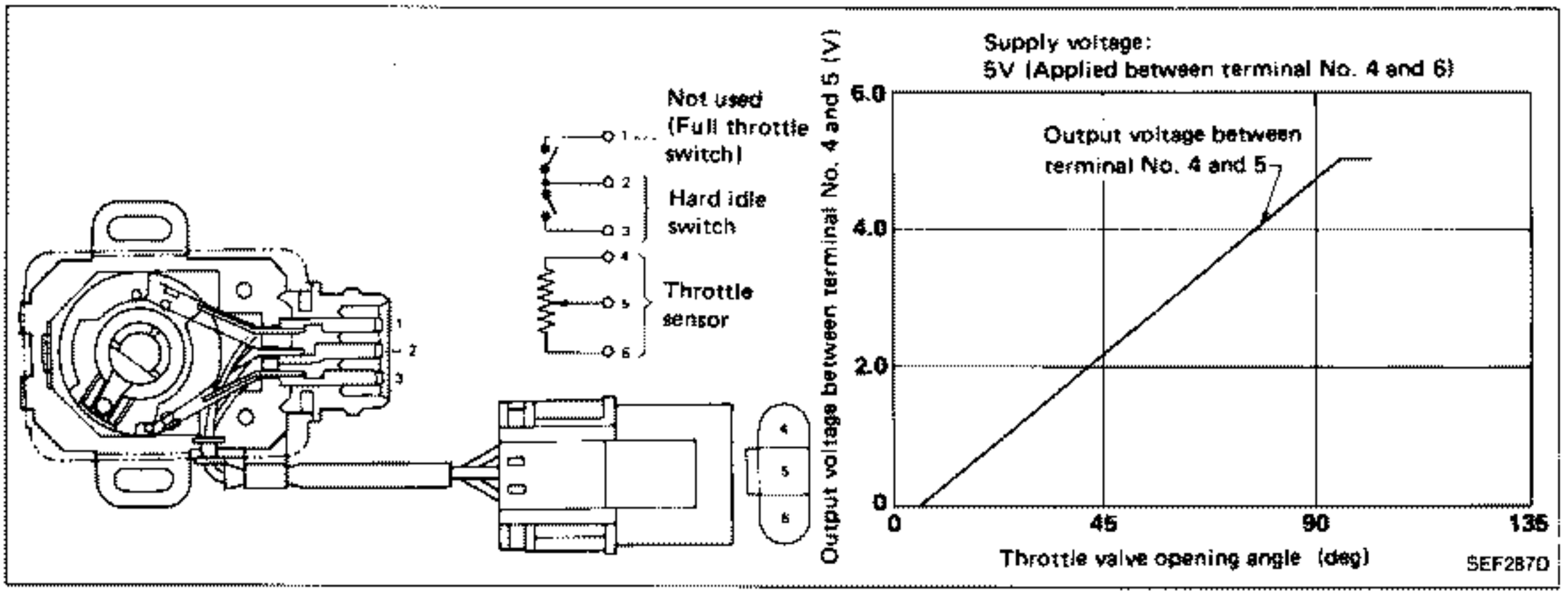
Engine Temperature Sensor

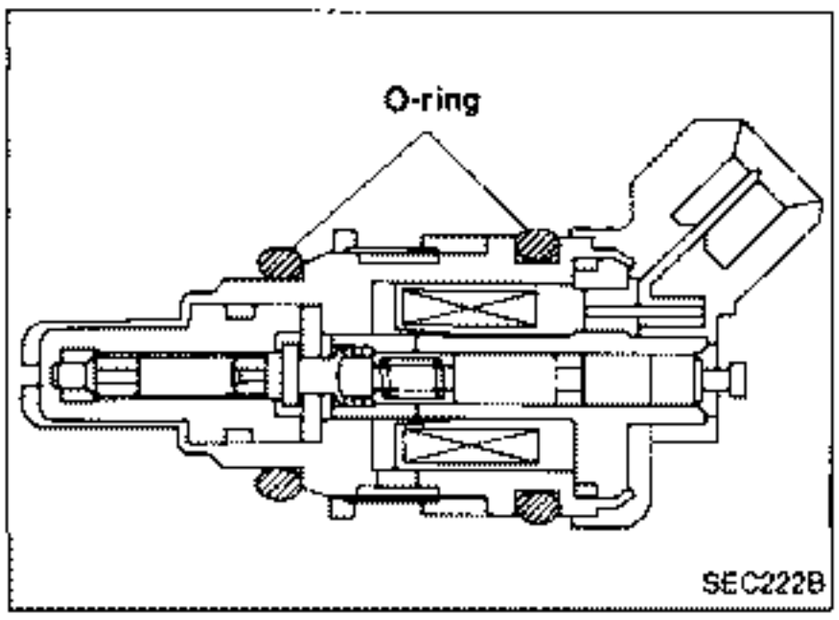
The engine temperature sensor, located on the top of water inlet housing, detects engine coolant temperature and transmits a signal to the E.C.U.
The temperature sensing unit employs a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



Throttle Sensor & Soft/Hard Idle Switch

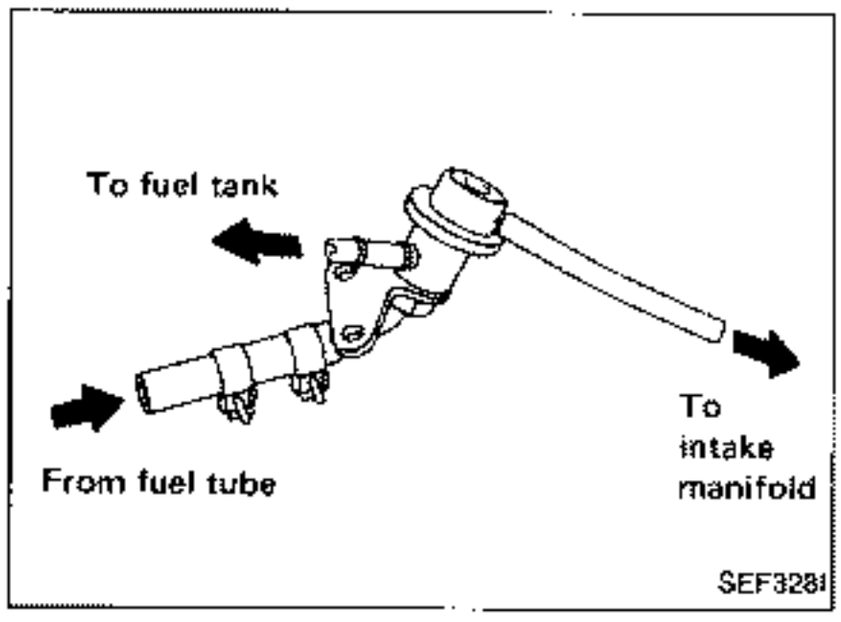
The throttle sensor responds to accelerator pedal movement. This sensor is a kind of potentiometer which transforms the throttle valve position into output voltage, and emits the voltage signal to the E.C.U. In addition, the sensor detects the opening and closing speed of the throttle valve and feeds the voltage signal to the E.C.U.
Idle position of the throttle valve is determined by the E.C.U. receiving the signal from the throttle sensor. This system is called "soft idle switch". It controls engine operation such as fuel cut. On the other hand, "hard idle switch", which is built in the throttle sensor unit, is used for engine control when soft idle switch is malfunctioning.





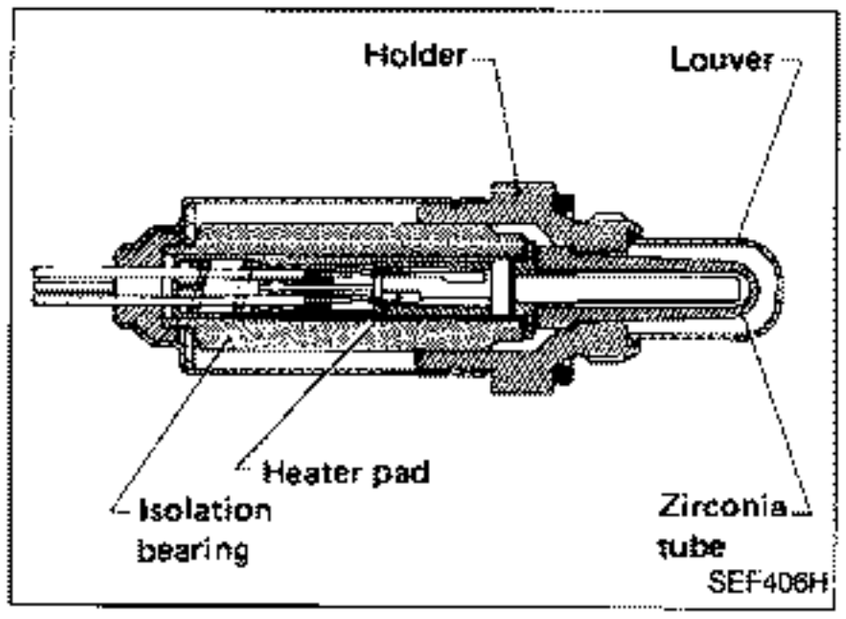
Fuel Injector

The fuel injector is a small, elaborate solenoid valve. As the E.C.U. sends injection signals to the injector, the coil in the injector pulls the needle valve back and fuel is released into the intake manifold through the nozzle. The injected fuel is controlled by the E.C.U. in terms of injection pulse duration.



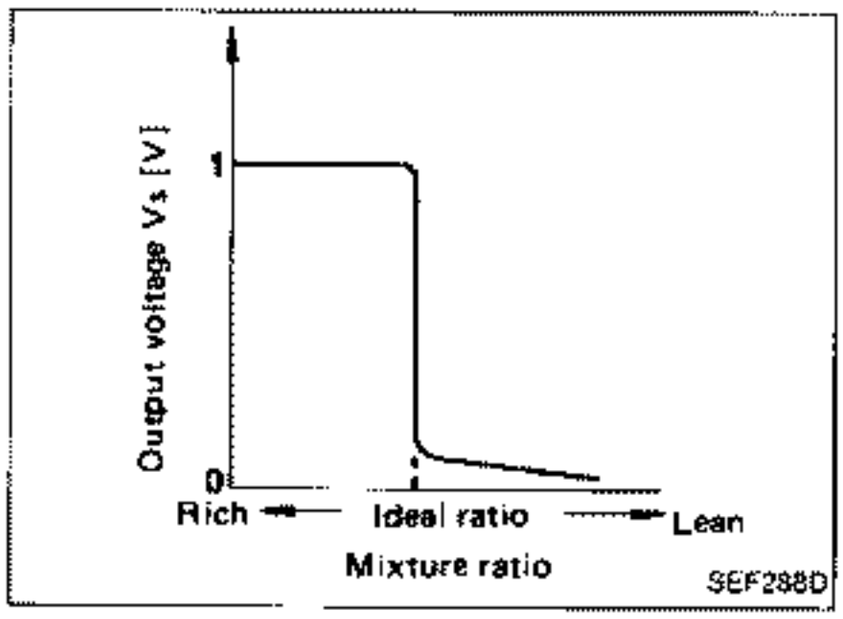
Pressure Regulator

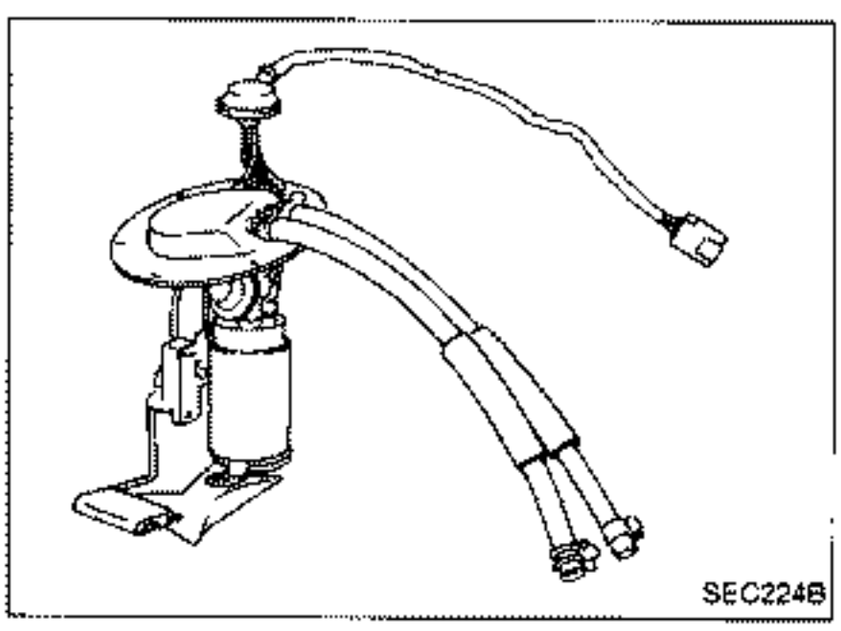
The pressure regulator maintains the fuel pressure at 299.1 kPa (2.991 bar, 3.05 kg/cm^2, 43.4 psi). Since the injected fuel amount depends on injection pulse duration, it is necessary to maintain the pressure at the above value.



Exhaust Gas Sensor

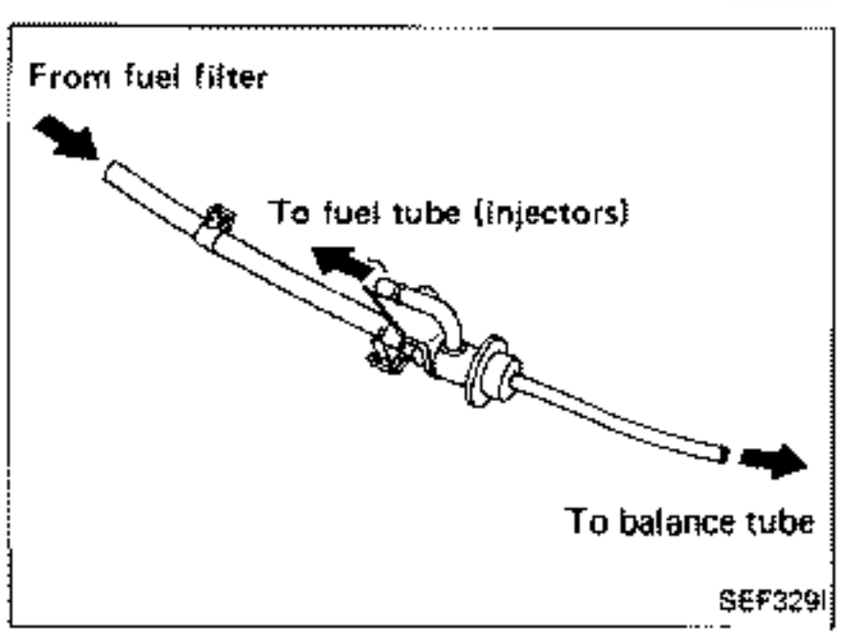
The exhaust gas sensor, which is placed into the exhaust outlet, monitors the amount of oxygen in the exhaust gas.
The sensor has a closed-end tube made of ceramic zirconia. The outer surface of the tube is exposed to exhaust gas, and the inner surface to atmosphere. The zirconia of the tube compares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





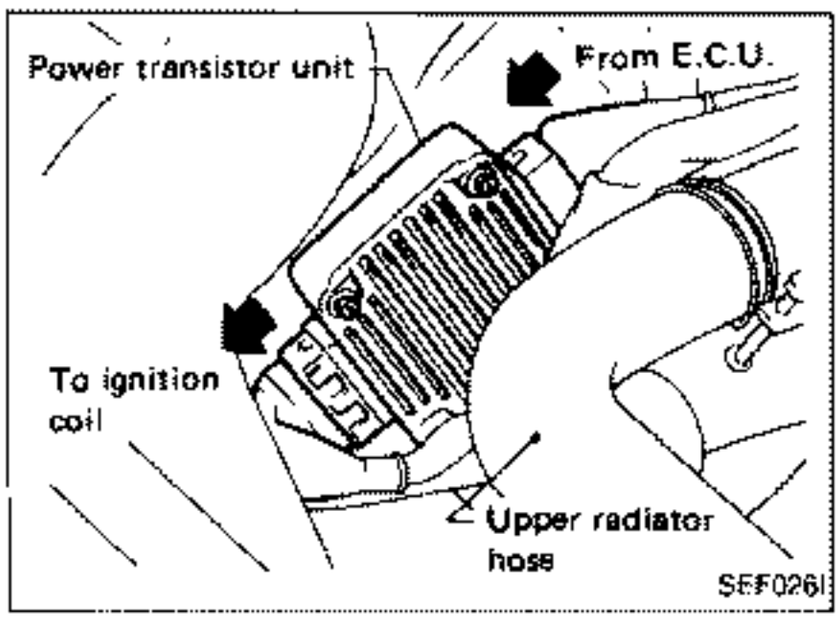
Fuel Pump

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



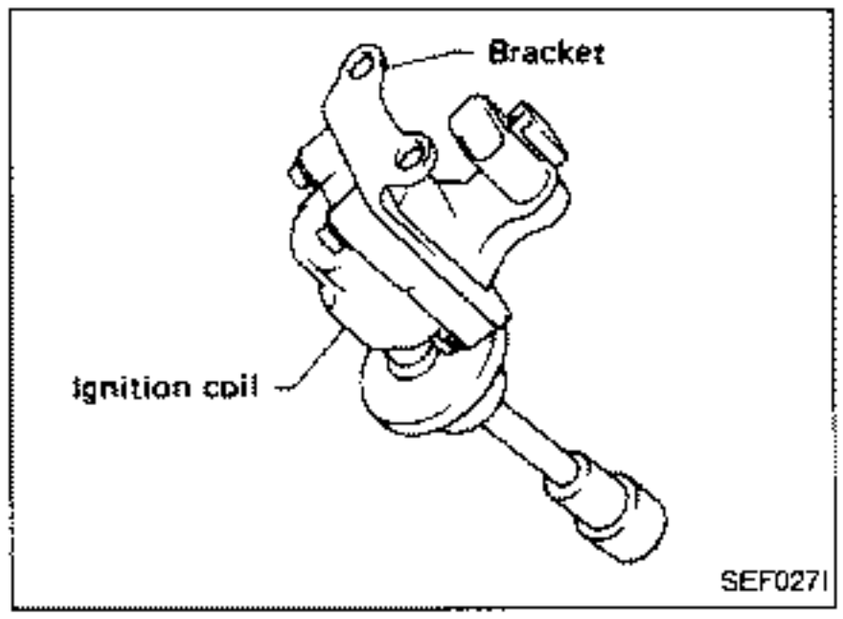
Fuel Damper

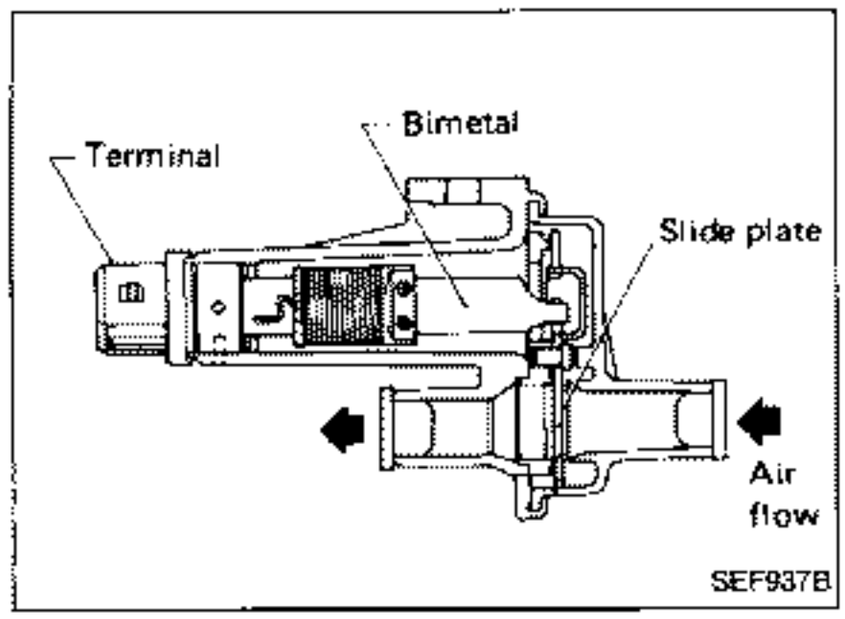
The fuel damper, which consists of a diagram, reduces fuel pressure pulsation in the fuel feed line between the fuel filter and injectors.



Power Transistor Unit & Ignition Coil

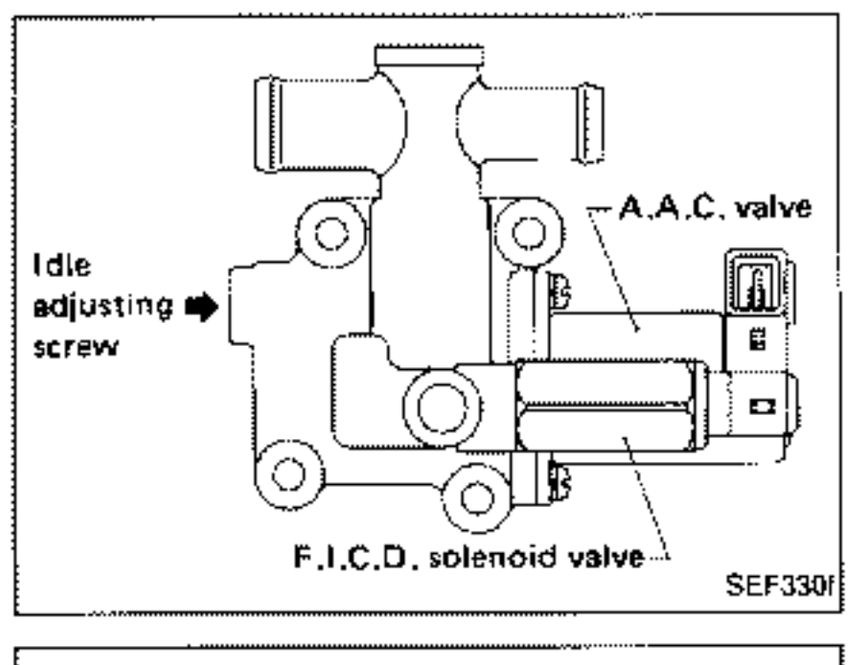
The ignition signal from the E.C.U. is amplified by the power transistor, which turns the ignition coil primary circuit on and off, inducing the proper high voltage in the secondary circuit. The ignition coil is a small, molded type.





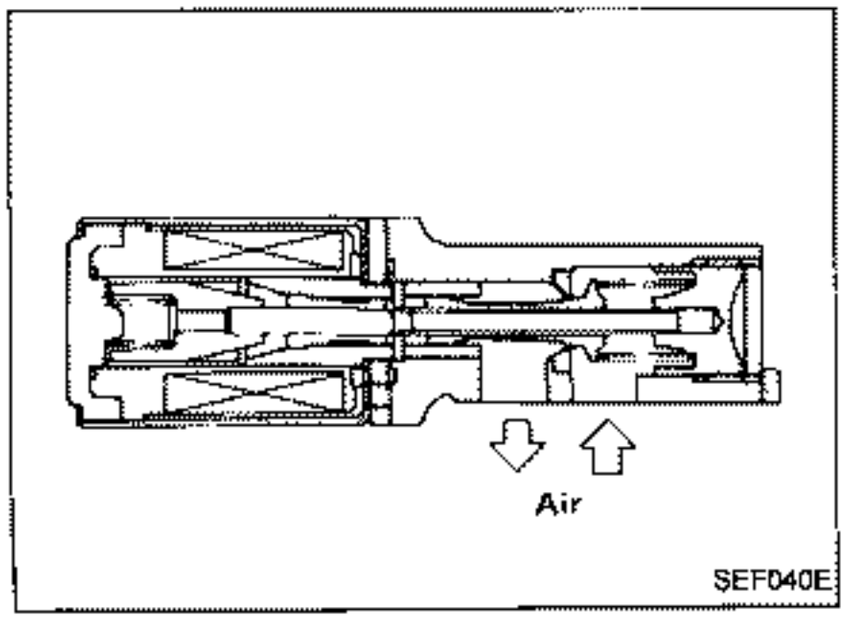
Air Regulator

The 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 air regulator. When the bimetal temperature is low, the air by-pass port opens. As the engine starts and electric current flows through a heater, the bimetal begins to turn the shutter to close the by-pass port. The air passage remains closed until the engine stops and the bimetal temperature drops.



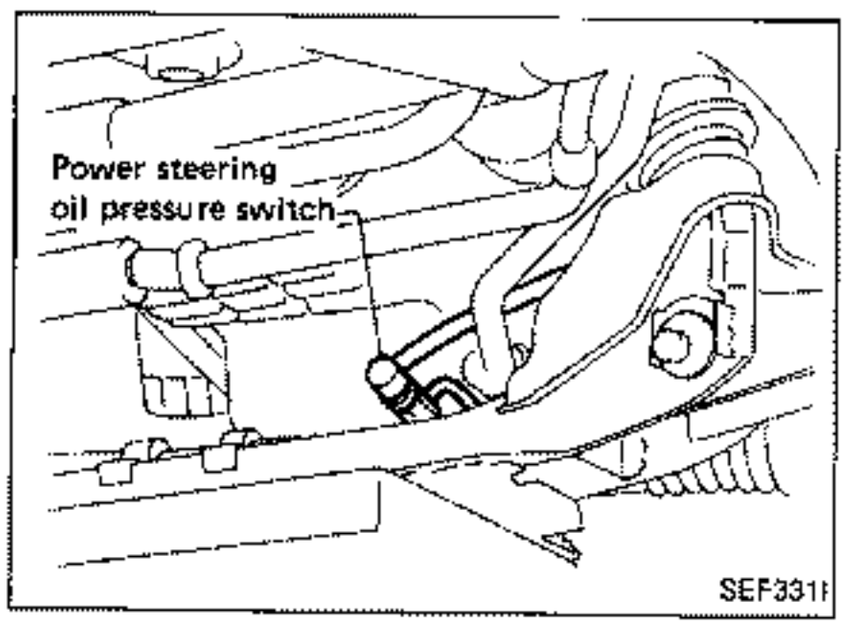
Idle Air Adjusting (I.A.A.) Unit

The I.A.A. unit is made up of the A.A.C. valve, F.I.C.D. solenoid valve and idle adjust screw. It receives the signal from the E.C.U. and controls the idle speed at the preset value.
The F.I.C.D. solenoid valve compensates for changes in idle speed caused by the operation of the air compressor.



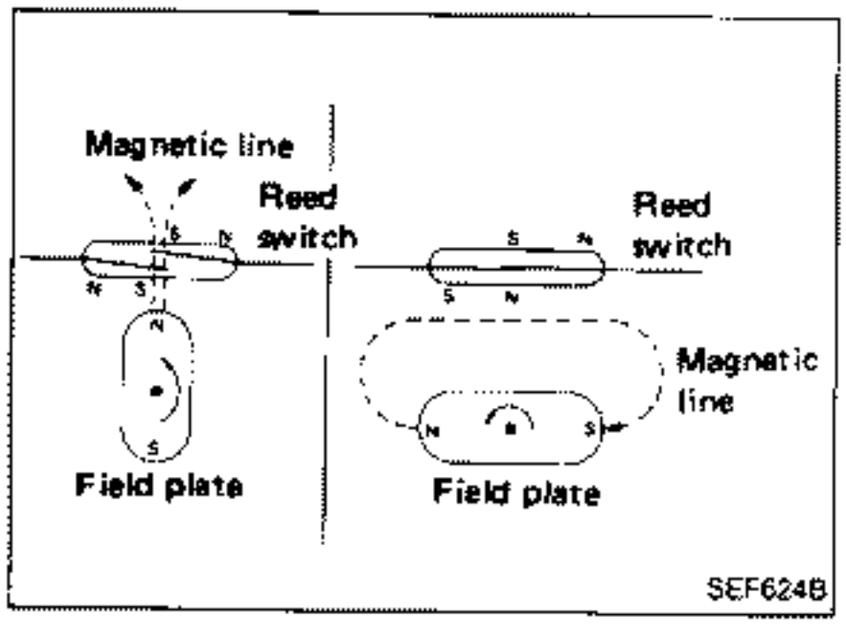
Auxiliary Air Control (A.A.C.) Valve

The E.C.U. actuates the A.A.C. valve by an ON/OFF pulse. The longer that ON duty is left on, the larger the amount of air that will flow through the A.A.C. valve.



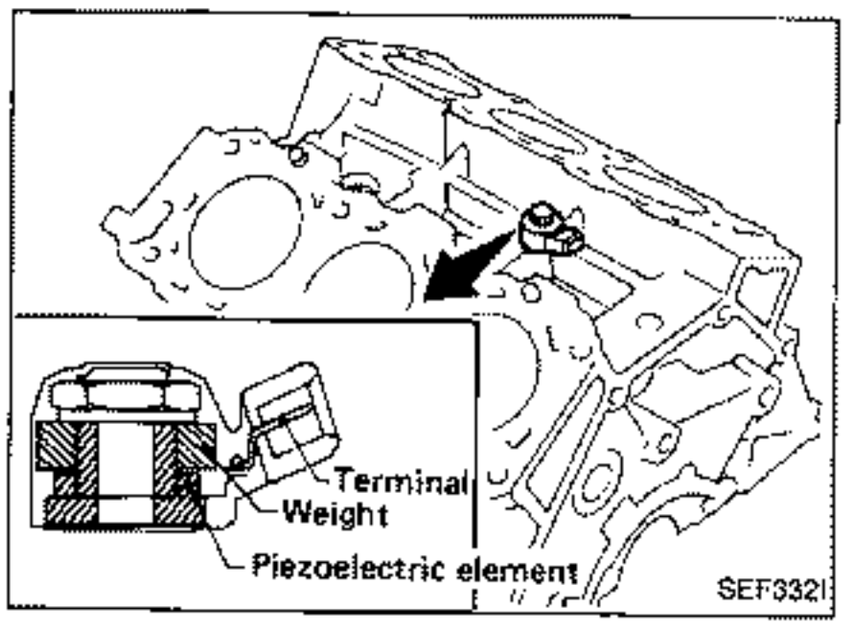
Power Steering Oil Pressure Switch

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



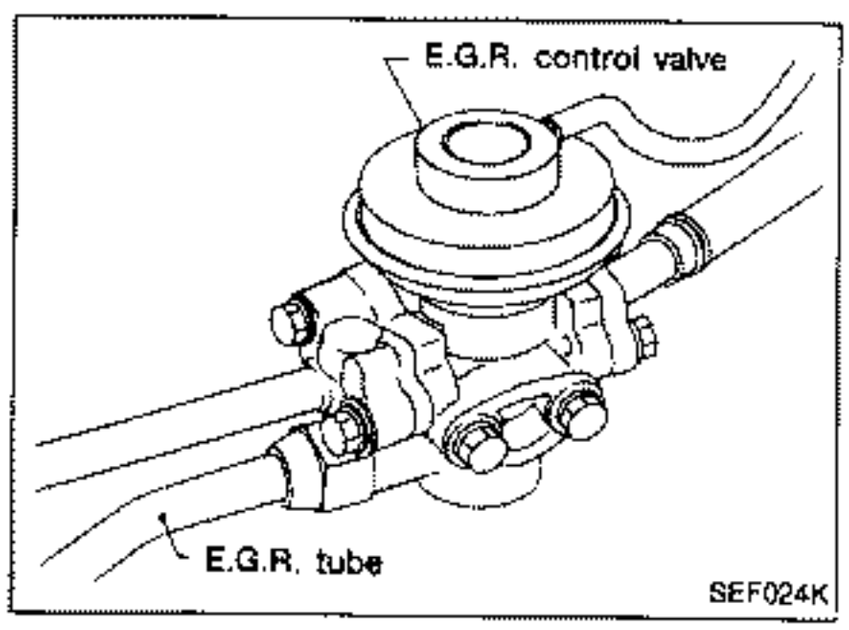
Vehicle Speed Sensor

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



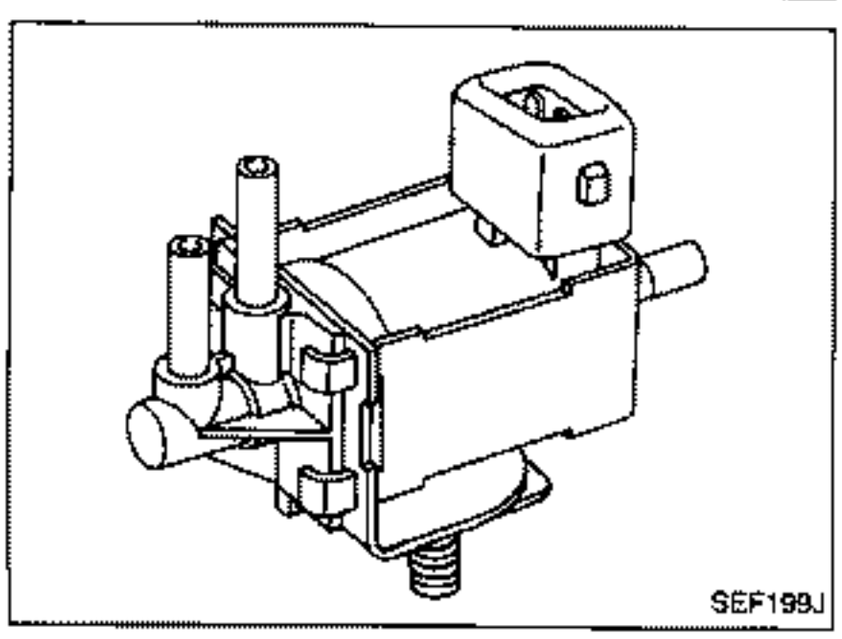
Detonation Sensor

The detonation sensor is attached to the cylinder block and senses engine knocking conditions.
A knocking vibration from the cylinder block is applied as pressure to the piezoelectric element. This vibrational pressure is then converted into a voltage signal which is sent to the E.C.U.



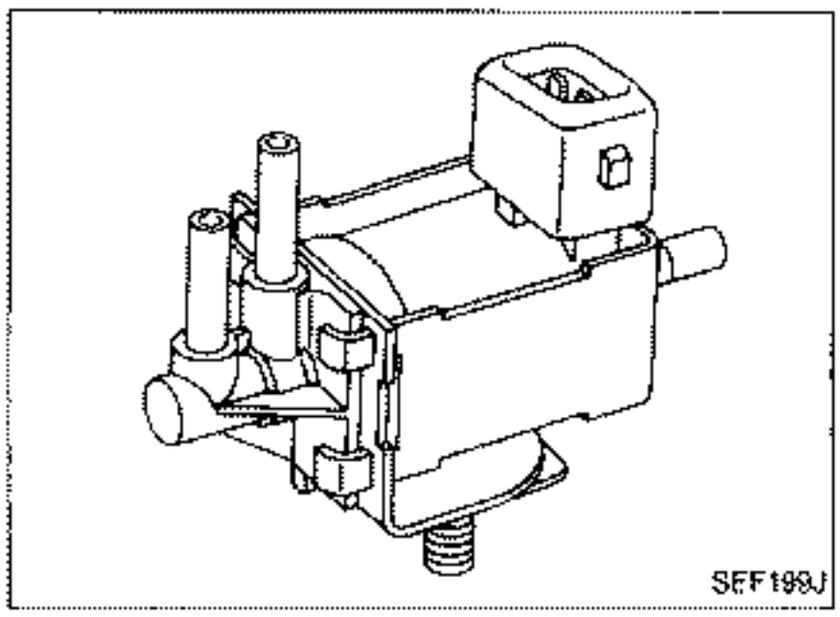
E.G.R. Control Valve

The E.G.R. control valve controls the quantity of exhaust gas to be diverted to the intake manifold through vertical movement of a taper valve connected to the diaphragm. Vacuum is applied to the diaphragm in response to the opening of the throttle valve.



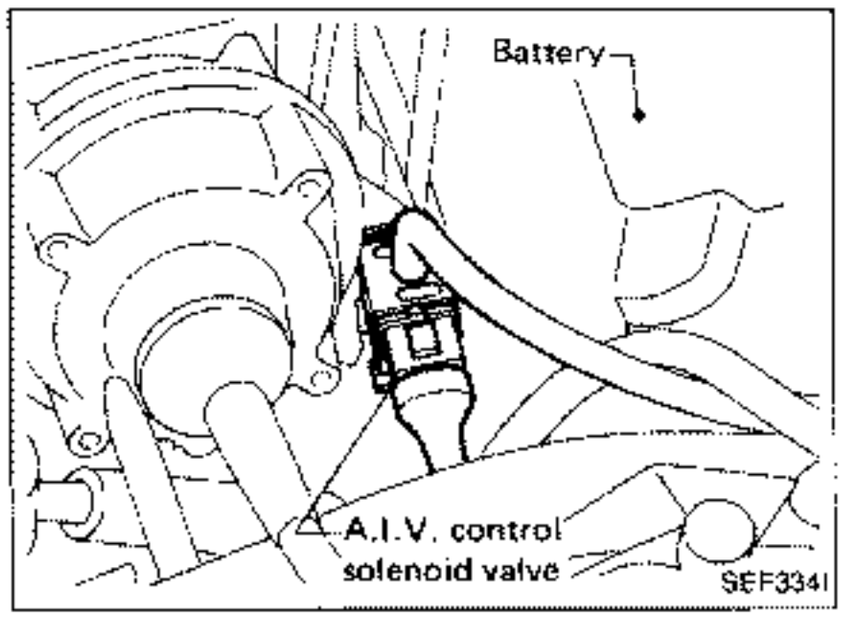
E.G.R. Control Solenoid Valve

The solenoid valve responds to the ON/OFF signal from the E.C.U. When it is off, a vacuum signal from the throttle chamber is fed into the E.G.R. control valve. When the control unit sends an ON signal, the coil pulls the plunger downward and cuts the vacuum signal.



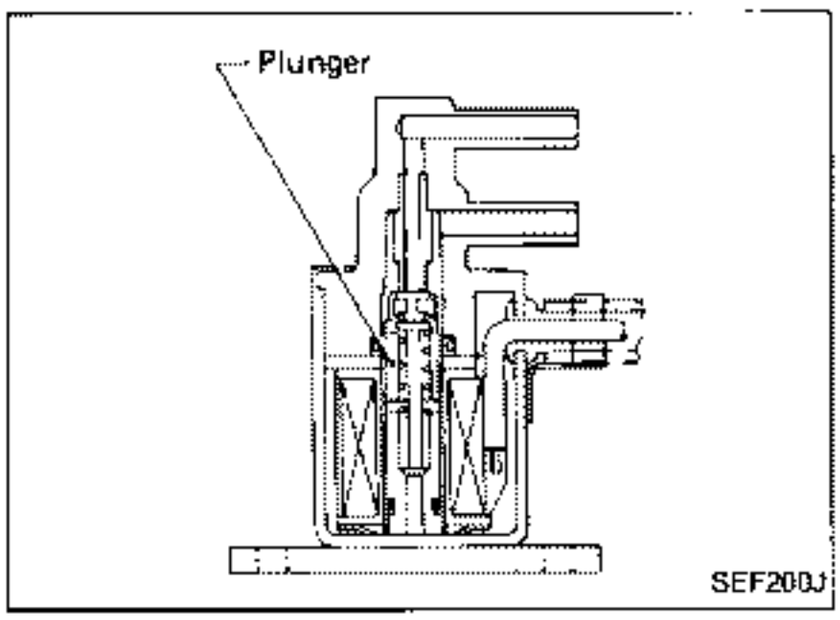
Pressure Regulator Vacuum Relief (P.R.V.R.) Control Solenoid Valve

The solenoid valve responds to the ON/OFF signal from the E.C.U. When it is off, a vacuum signal from the intake manifold is fed into the pressure regulator. When the control unit sends an ON signal, the coil pulls the plunger downward and cuts the vacuum signal.



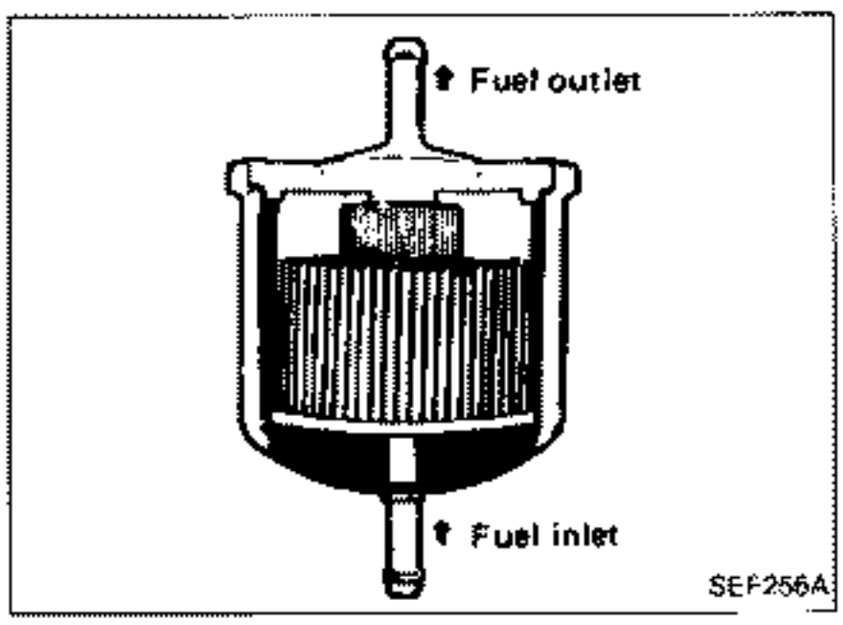
A.I.V. Control Solenoid Valve

The solenoid valve responds to the ON/OFF signal from the E.C.U. When it is ON, a vacuum signal from the intake manifold is fed into the A.I.V. control valve. When the control unit sends an OFF signal, the coil pulls the plunger downward and cuts the vacuum signal.



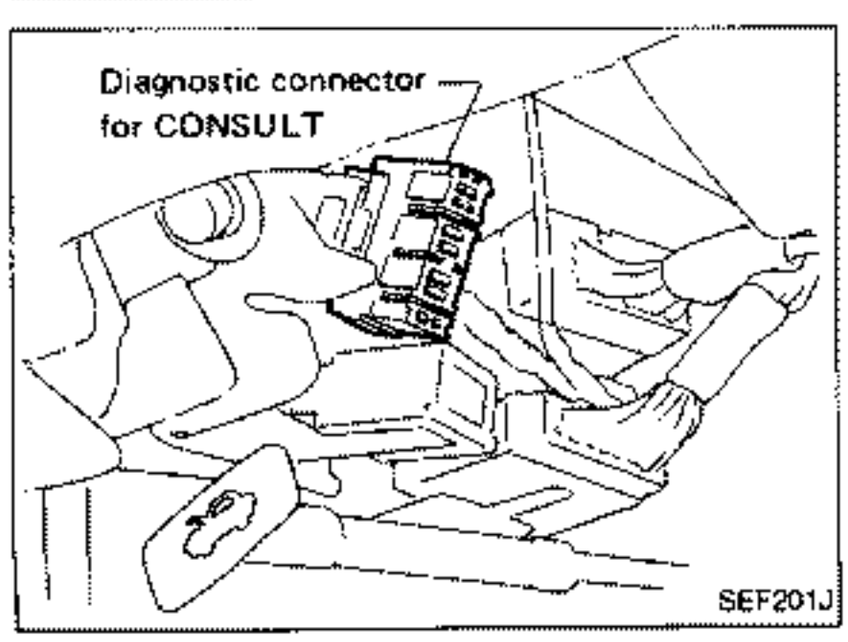
Wastegate Valve Control Solenoid Valve

The solenoid valve responds to the ON/OFF signal from the E.C.U. When it is ON, a vacuum signal from the suction pipe or compressor outlet is fed into the wastegate valve actuator. The actuator is hard to open at this time. When the control unit sends an OFF signal, the coil pulls the plunger upward and cuts the route to the suction pipe.



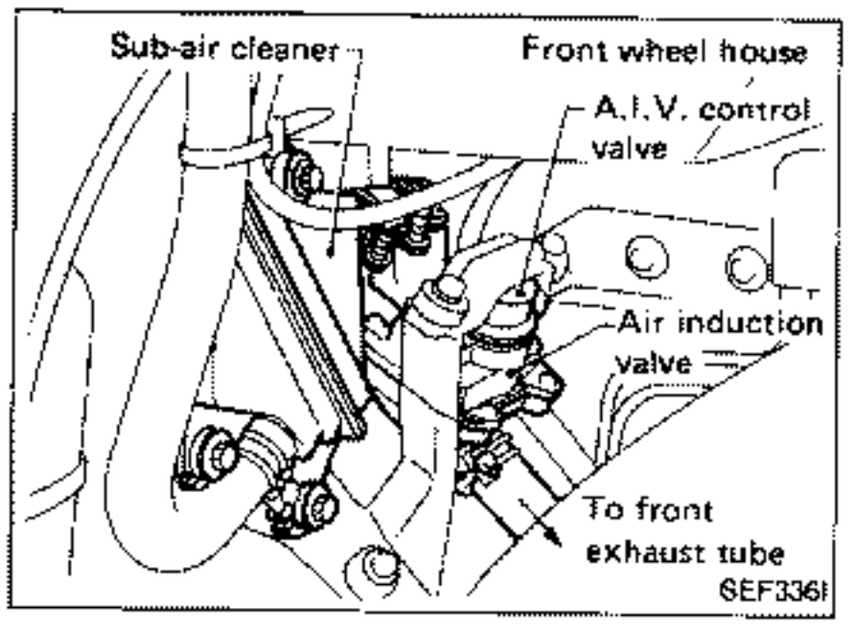
Fuel Filter

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



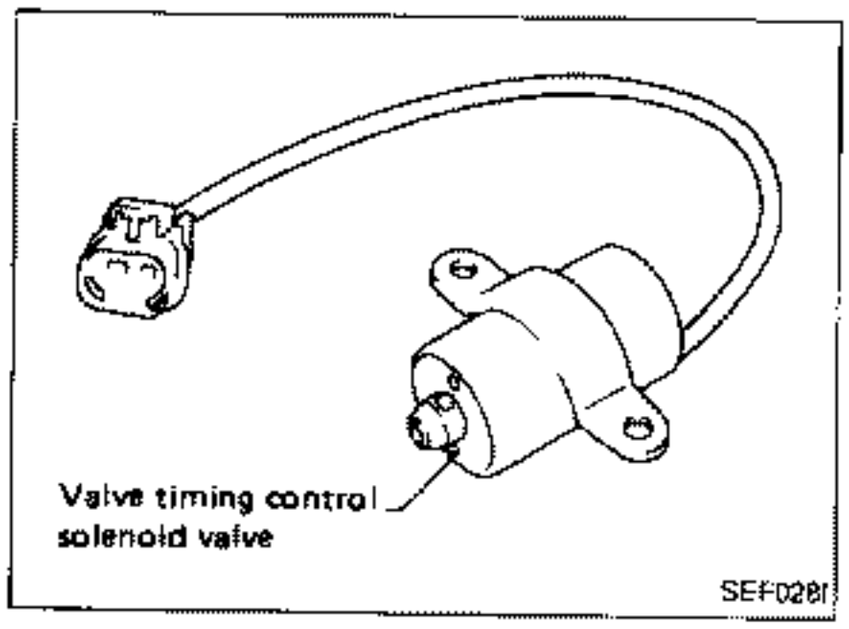
Diagnostic Connector for CONSULT

The diagnostic connector for CONSULT is located above the hood release handle.



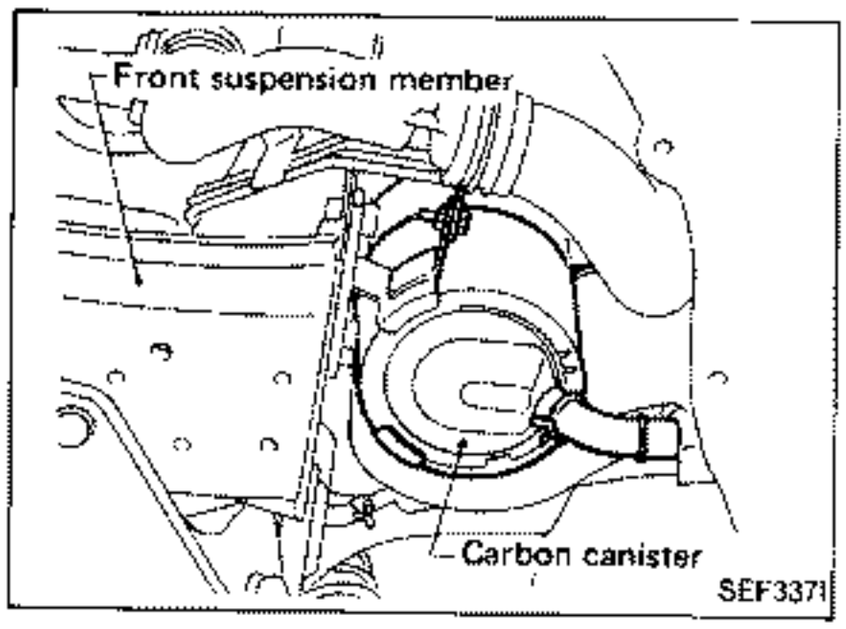
Air Induction Valve (A.I.V.)

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



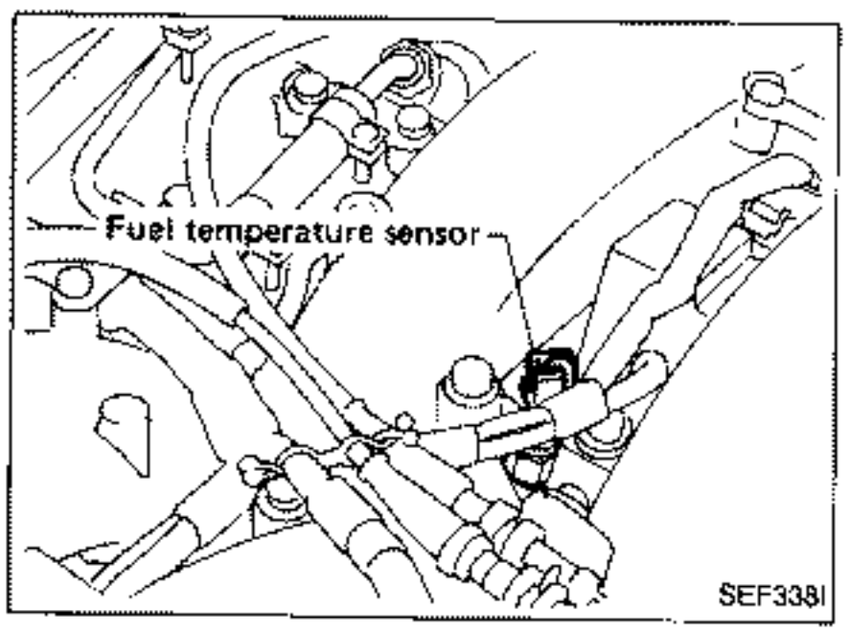
Valve Timing Control (V.T.C.) Solenoid Valve

The valve timing control solenoids are installed at the rear end of the intake camshafts, and control oil pressure which regulates the position of the intake camshafts.



Carbon Canister

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

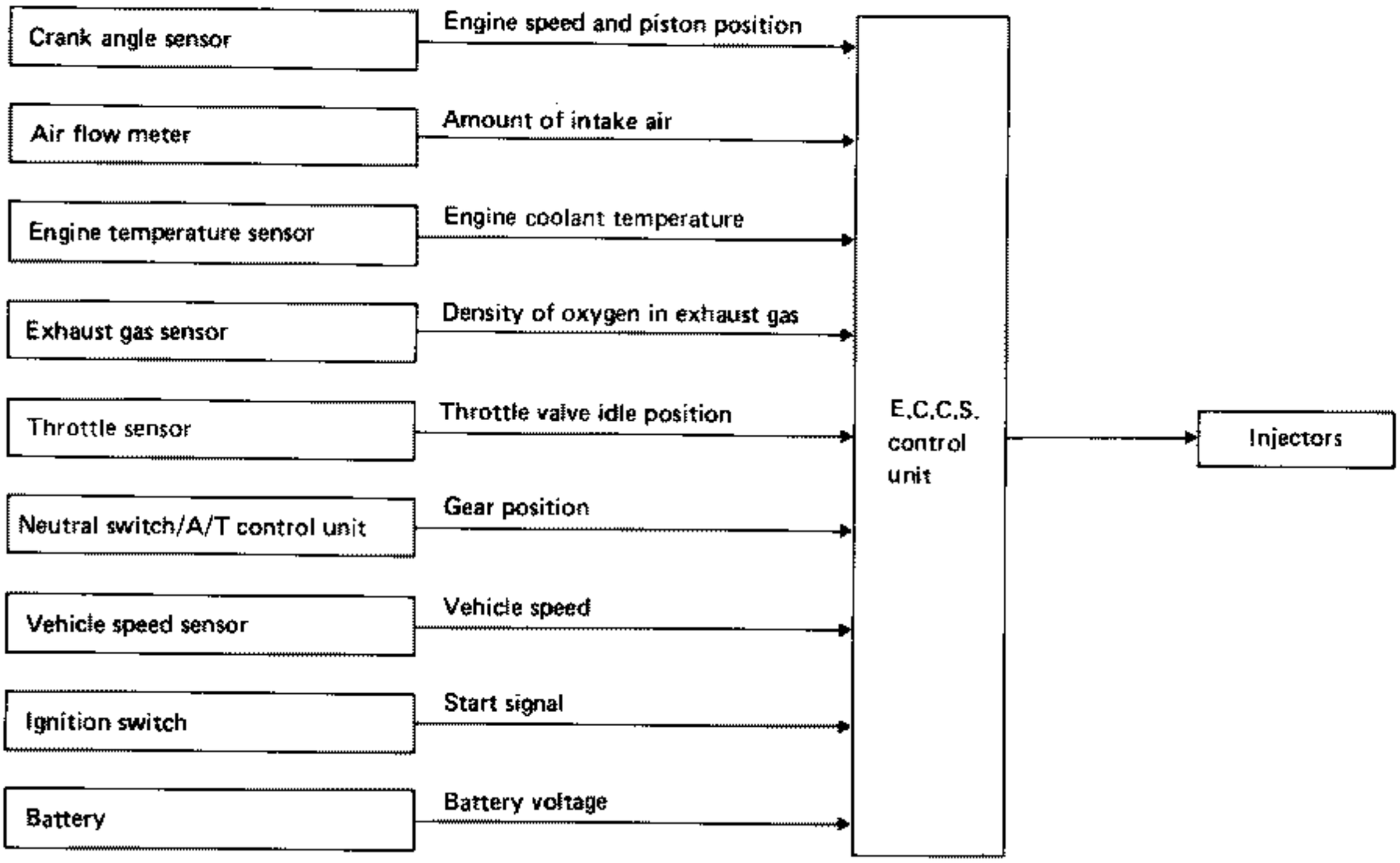


Fuel Temperature Sensor

The fuel temperature sensor, built into the fuel tube, senses fuel temperature. When the fuel temperature is higher than specified, the E.C.C.S. control unit turns the P.R.V.R. control solenoid valve ON and raises fuel pressure.

Fuel Injection Control

INPUT/OUTPUT SIGNAL LINE



BASIC FUEL INJECTION CONTROL

The amount of fuel injected from the fuel injector, or the length of time the valve remains open, is determined by the E.C.U. The basic amount of fuel injected is a program value mapped in the E.C.U. ROM memory. In other words, the program value is preset by engine operating conditions determined by input signals (for engine rpm and air intake) from both the crank angle sensor and the air flow meter.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

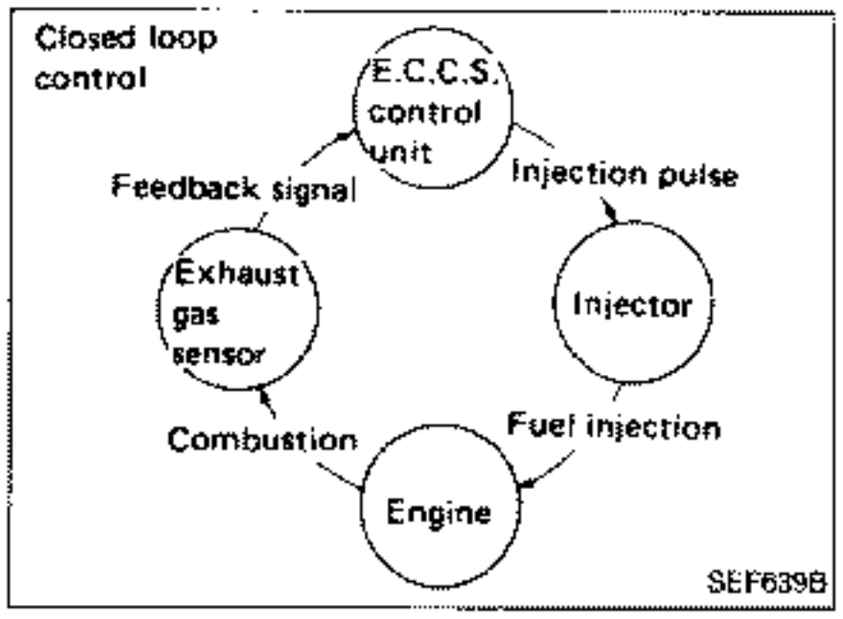
In addition, the amount of fuel injection is compensated for to improve engine performance under various operating conditions as listed below.

<Fuel increase>

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

<Fuel decrease>

1) During deceleration



Fuel Injection Control (Cont'd)

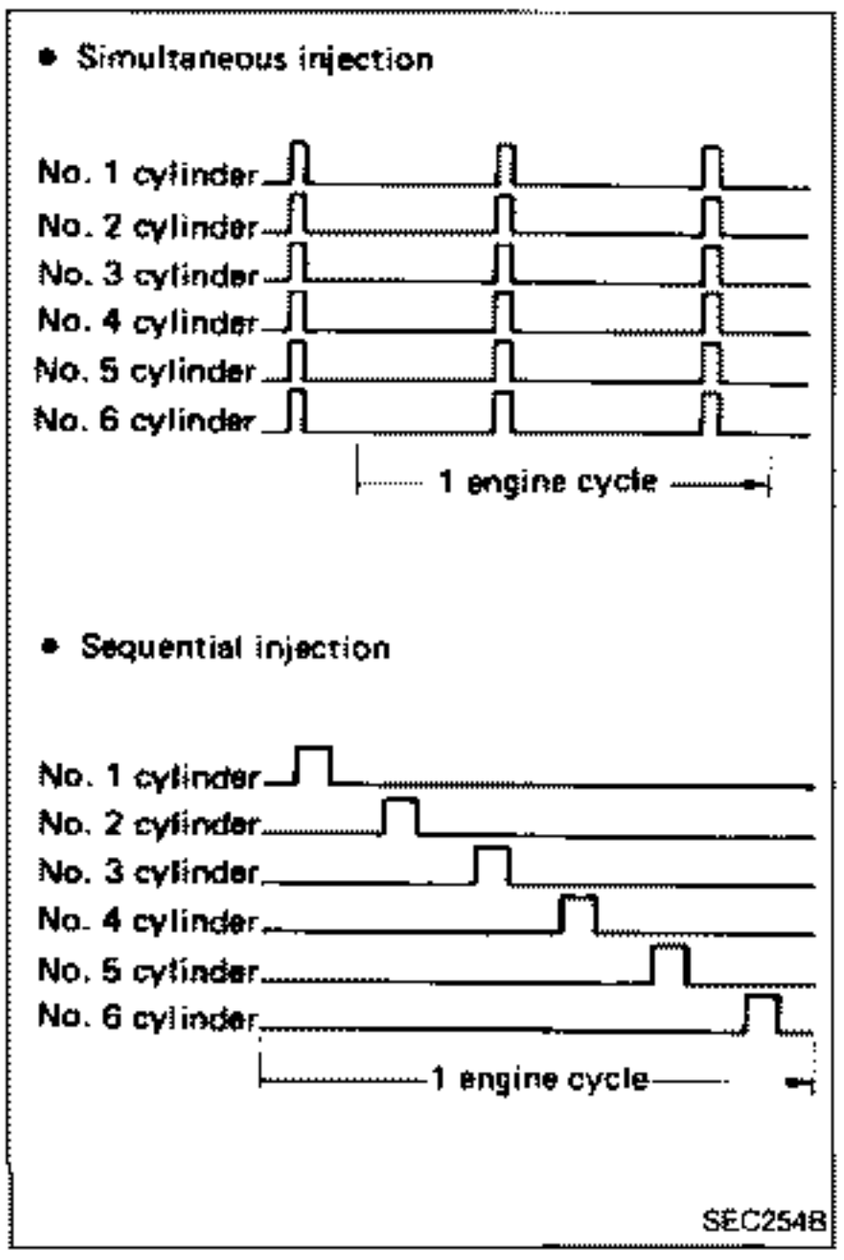
MIXTURE RATIO FEEDBACK CONTROL

The mixture ratio feedback system is used for precise control of the mixture ratio to the stoichiometric point, so that the three-way catalyst can reduce CO, HC and NOx emissions. This system uses an exhaust gas sensor in the exhaust manifold to check the air-fuel ratio. The control unit adjusts the injection pulse width according to the sensor voltage so the mixture ratio will be within the range of the stoichiometric air-fuel ratio.
This stage refers to the closed-loop control condition. The open-loop control condition refers to that under which the E.C.U. detects any of the following conditions and feedback control stops in order to maintain stabilized fuel combustion.

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

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the exhaust gas sensor. This feedback signal is then sent to the E.C.U. to control the amount of fuel injection to provide a basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. This is due to manufacturing errors (e.g., air flow meter hot wire) and changes during operation (injector clogging, etc.) of E.C.C.S. parts which directly affect the mixture ratio.
Accordingly, a difference between the basic and theoretical mixture ratios is monitored in this system. It is then computed in terms of "fuel injection duration" to automatically compensate for the difference between the two ratios.



FUEL INJECTION TIMING

Two types of fuel injection systems are used — simultaneous injection and sequential injection. In the former, fuel is injected into all six cylinders simultaneously twice each engine cycle.
In other words, pulse signals of the same width are simultaneously transmitted from the E.C.U. to the six injectors two times for each engine cycle.
In the sequential injection system, fuel is injected into each cylinder during each engine cycle according to the firing order. When engine is starting, fuel is injected into all six cylinders simultaneously twice per cycle.

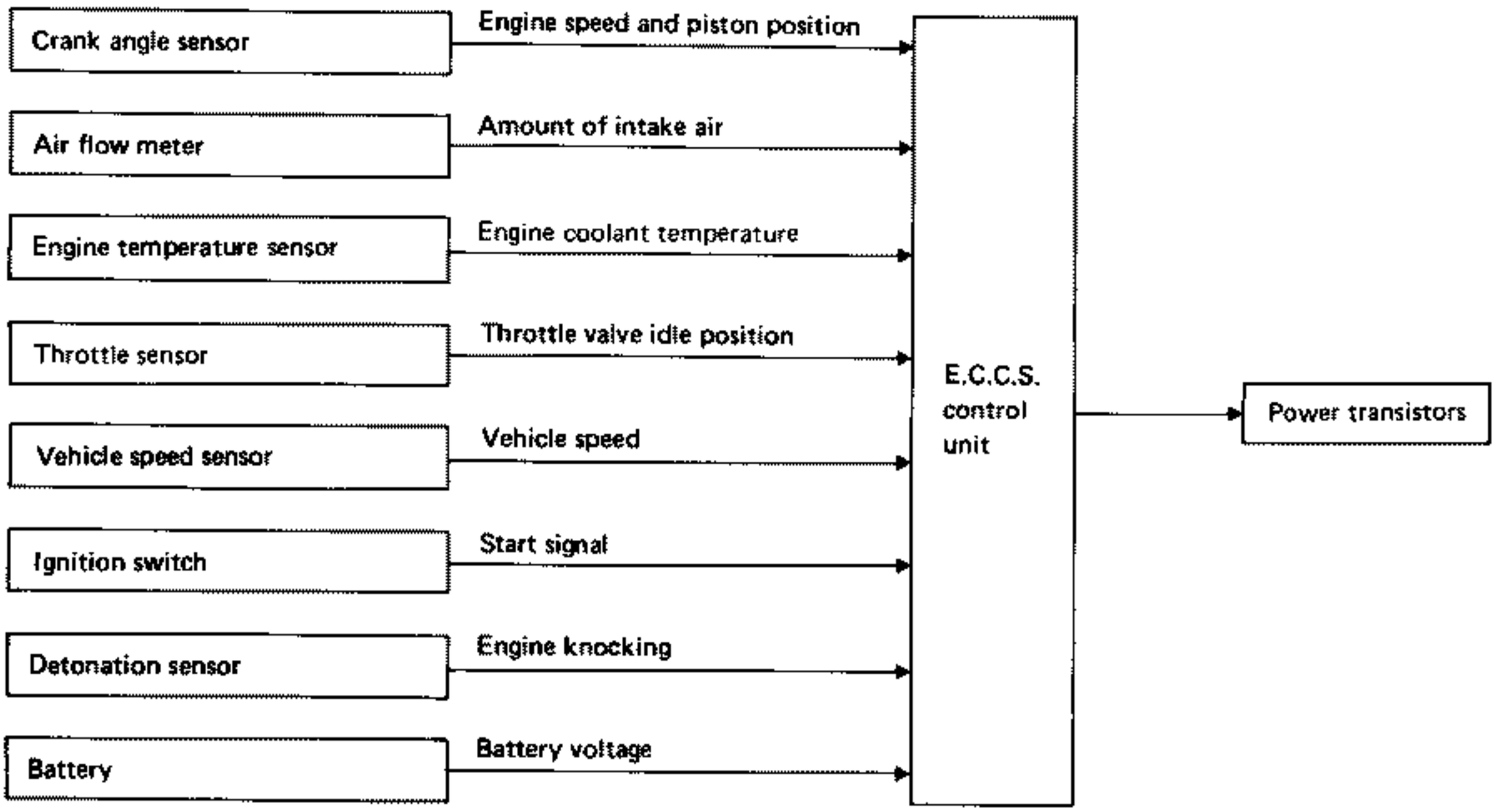
Fuel Injection Control (Cont'd)

FUEL SHUT-OFF

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

Ignition Timing Control

INPUT/OUTPUT SIGNAL LINE



Ignition Timing Control (Cont'd)

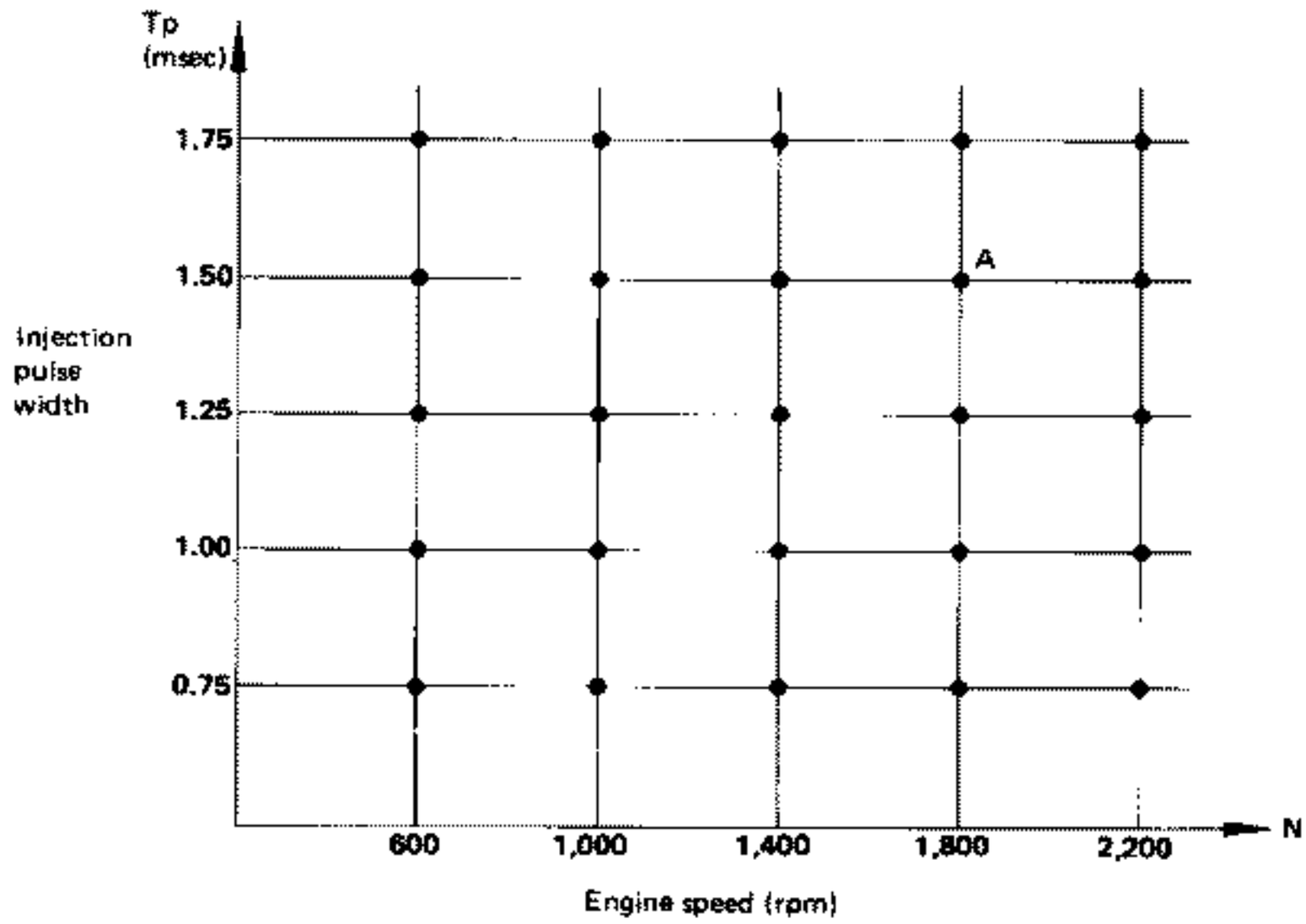
SYSTEM DESCRIPTION

The ignition timing is controlled by the E.C.U. in order to maintain the best air-fuel ratio in response to every running condition of the engine.
The ignition timing data is stored in the ROM located in the E.C.U. This data forms the map shown below.
The E.C.U. detects information such as the injection pulse width and crank angle sensor signal which varies every moment. Then responding to this information, ignition signals are transmitted to the power transistor.

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

In addition to this,
1) At starting
2) During warm-up
3) At idle
4) At low battery voltage

the ignition timing is revised by the E.C.U. according to the other data stored in the ROM.



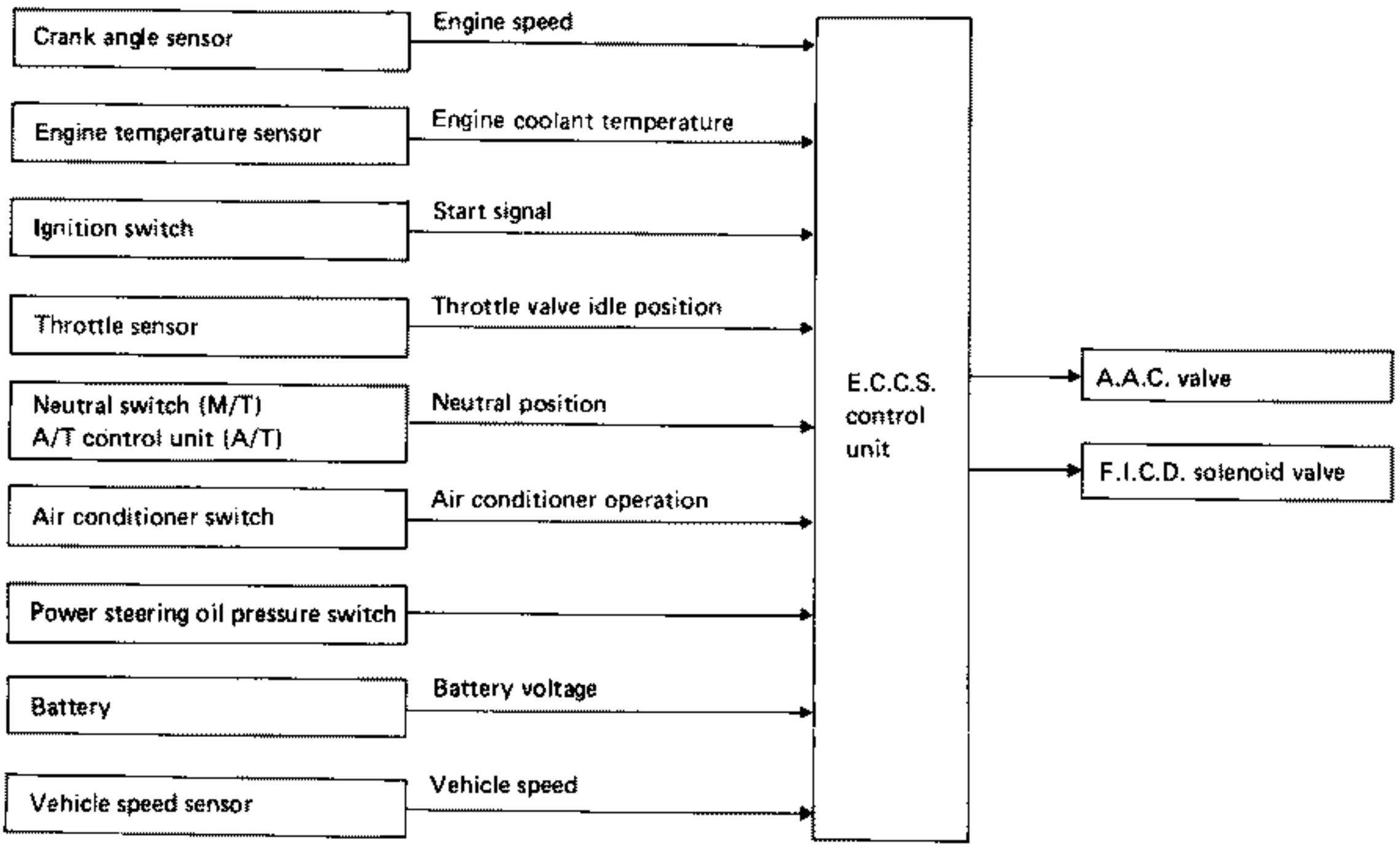
SEC750A

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

However, if engine knocking occurs, the detonation sensor monitors the condition and the signal is transmitted to the E.C.C.S. control unit. After receiving it, the control unit retards the ignition timing to eliminate the knocking condition.

Idle Speed Control

INPUT/OUTPUT SIGNAL LINE

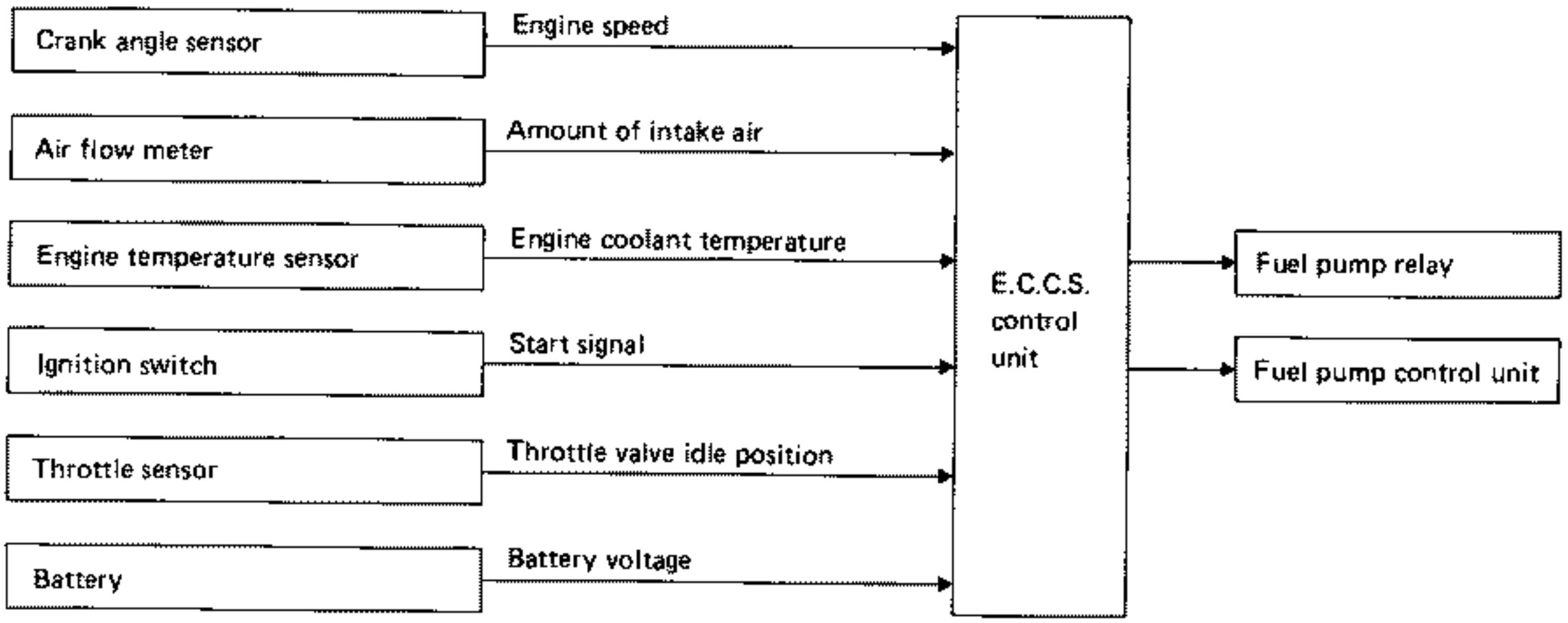


SYSTEM DESCRIPTION

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 A.A.C. valve. The A.A.C. valve repeats ON/OFF operation according to the signal sent from the E.C.U. The crank angle sensor detects the actual engine speed and sends a signal to the E.C.U. The E.C.U. then controls the ON/OFF time of the A.A.C. valve so that engine speed coincides with the target value memorized in ROM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ROM is determined by taking into consideration various engine conditions, such as noise and vibration transmitted to the vehicle interior, fuel consumption, and engine load.

Fuel Pump Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

Fuel pump and air regulator ON-OFF control

The E.C.U. activates the fuel pump for several seconds after the ignition switch is turned on to improve engine start-up. If the E.C.U. receives a 1° signal from the crank angle sensor, it knows that the engine is rotating, and causes the pump to activate. If the 1° signal is not received when the ignition switch is on, the engine stalls. The E.C.U. stops pump operation and prevents battery discharging, thereby improving safety. The E.C.U. 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 1 second
Engine running and cranking	Operates
When engine is stopped	Stops in 1.5 seconds
Except as shown above	Stops

Fuel pump voltage control

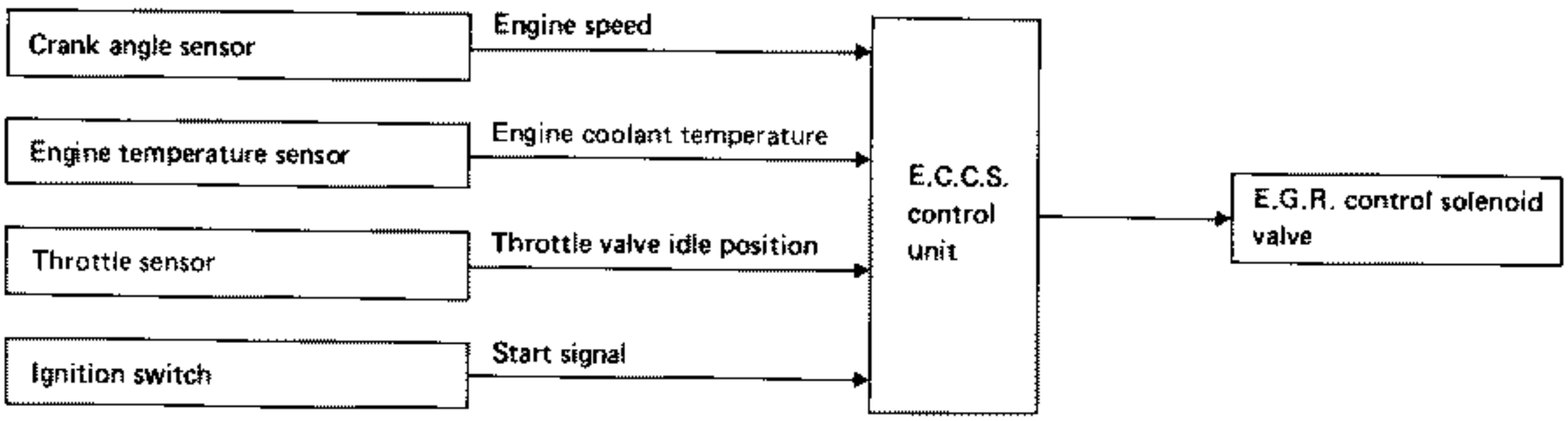
The fuel pump is controlled by the fuel pump control unit adjusting the voltage supplied to the fuel pump.

Condition	Supplied voltage	
	Turbo model	Non-turbo model
• 1 second after ignition switch is turned ON • Engine cranking • 30 (*NA)/5 (**TC) seconds after engine start [above 50°C (122°F)] • Engine temperature below 10°C (50°F) • Engine is running under heavy load	Battery voltage	Battery voltage
• Engine is running under middle load	Approx. 7V	Battery voltage
• Except the above	Approx. 6V	Approx. 8V

*NA: Non-turbo model **TC: Turbo model

E.G.R. (Exhaust Gas Recirculation) Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

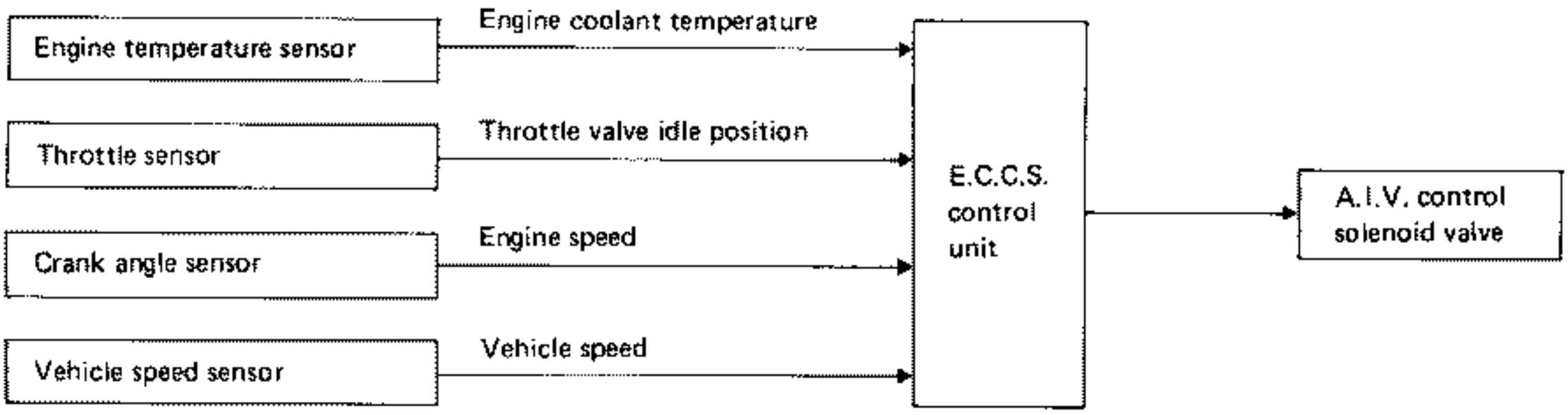
In addition, a system is provided which precisely cuts and controls port vacuum applied to the E.G.R. valve to suit engine operating conditions. This cut-and-control operation is accomplished through the E.C.U. When the E.C.U. detects any of the following conditions, current flows through the solenoid valve in the E.G.R. control vacuum line.

This causes the port vacuum to be discharged into the atmosphere so that the E.G.R. control valve remains closed.

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

Air Induction Valve (A.I.V.) Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

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

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

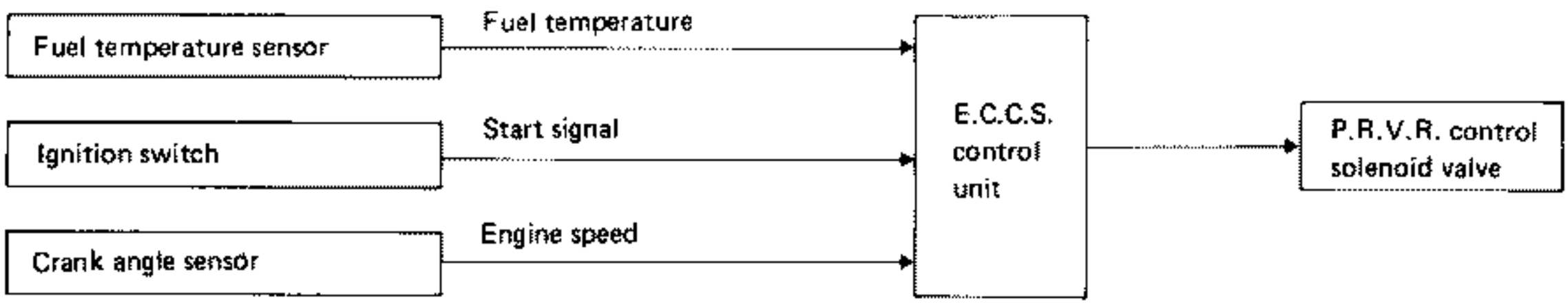
If a secondary air intake pipe is opened to the atmosphere under vacuum conditions, secondary air can be drawn into the exhaust manifold in proportion to the vacuum.

The air induction valve is controlled by the E.C.C.S. control unit, corresponding to the engine temperature. When the engine is cold, the A.I.V. control system operates to reduce HC and CO. This system also operates during deceleration for the purpose of blowing off water around the air induction valve.

Engine condition	Engine coolant temperature °C (°F)	Vehicle speed km/h (MPH)	A.I.V. control solenoid valve	A.I.V. control system
Throttle valve is at idle position	Below 64 (147)	Any condition	ON	Operates
	Above 65 (149)	Below 24 (15)		

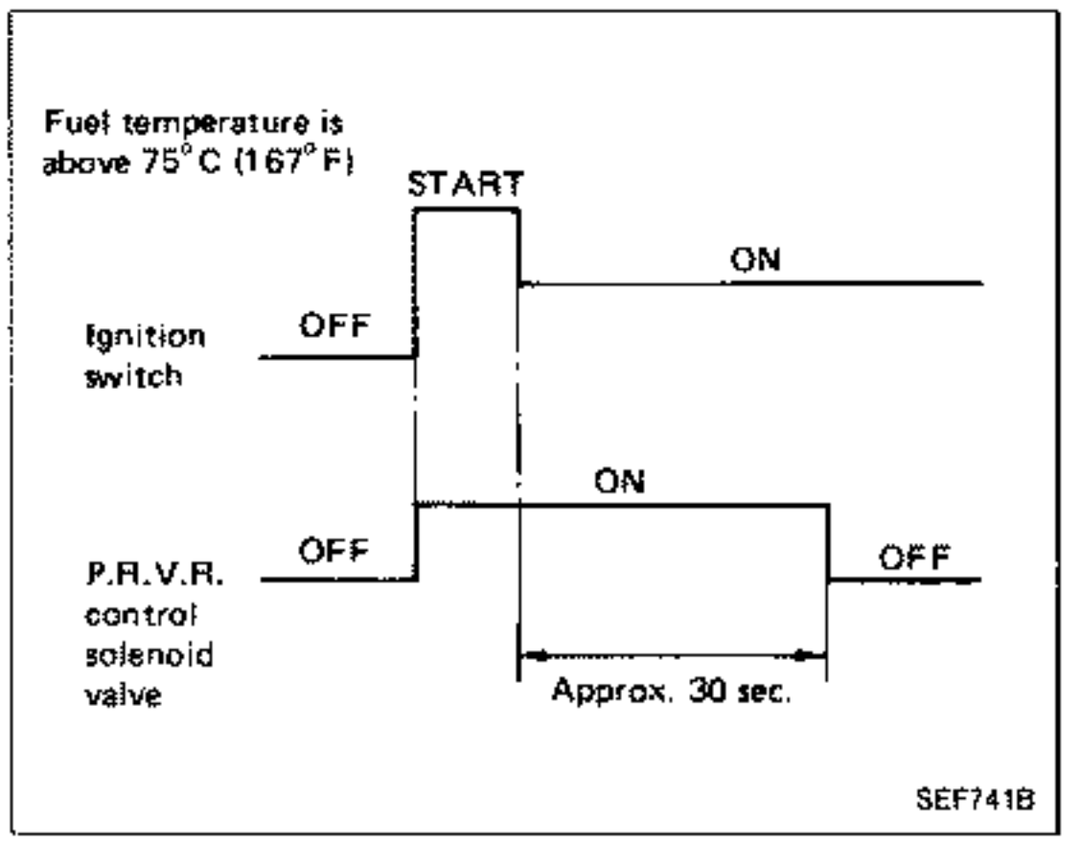
Fuel Pressure Regulator Control

INPUT/OUTPUT SIGNAL LINE



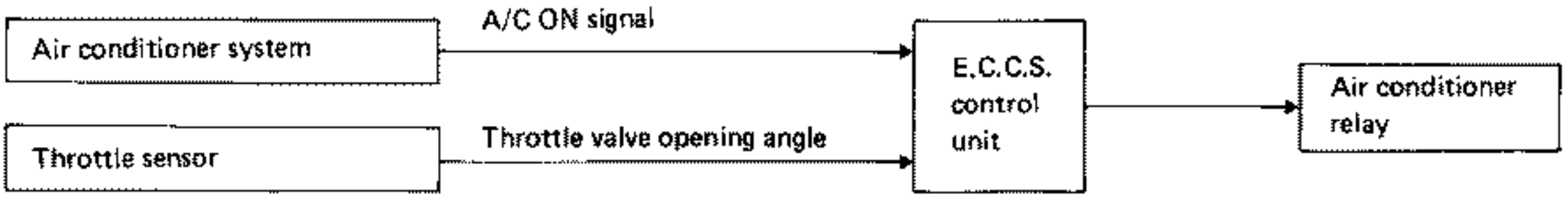
SYSTEM DESCRIPTION

The fuel "pressure-up" control system briefly increases fuel pressure for improved starting performance of a hot engine. Under normal operating conditions, manifold vacuum is applied to the fuel pressure regulator. When starting the engine, however, the E.C.U. allows current to flow through the ON/OFF solenoid valve in the control vacuum line, opening this line to the atmosphere. As a result, atmospheric pressure is applied, restricting the fuel return line so as to increase fuel pressure.



Acceleration Cut Control

INPUT/OUTPUT SIGNAL LINE

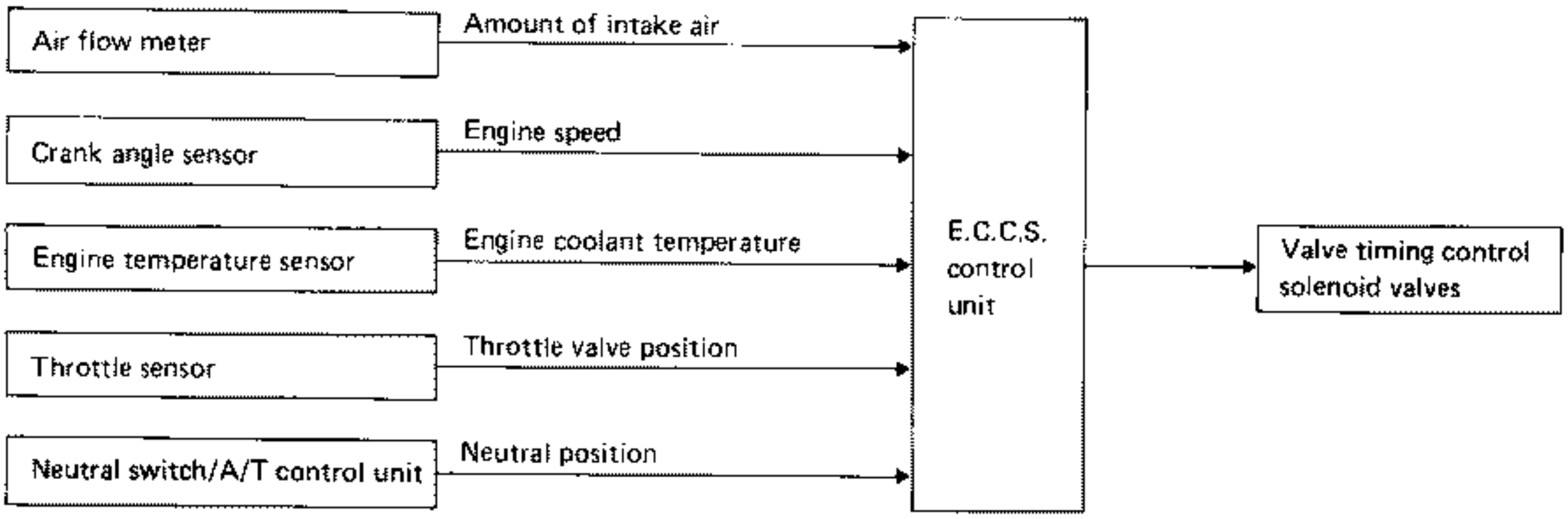


SYSTEM DESCRIPTION

When the accelerator pedal is fully depressed, the air conditioner is turned off for a few seconds. This system improves acceleration when the air conditioner is used.

Valve Timing Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

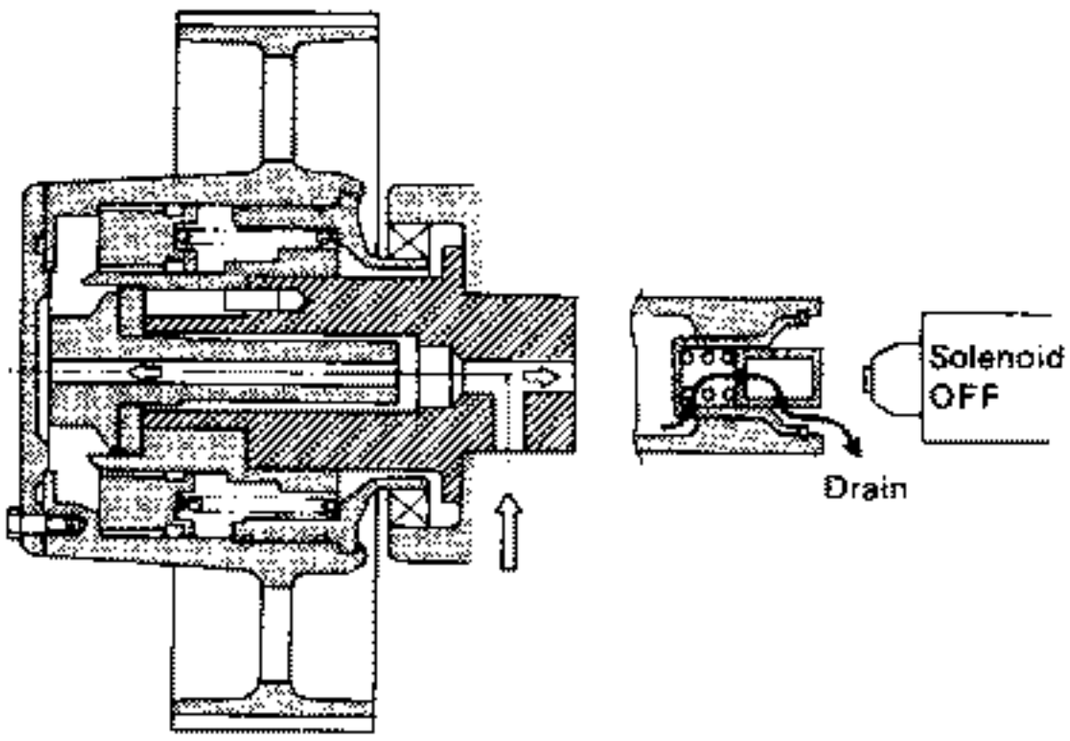
The valve timing control system is utilized to increase engine performance. Intake valve opening and closing time is controlled, according to the engine operating conditions, by the E.C.U.
Engine coolant temperature signals, engine speed, amount of intake air, throttle valve position and gear position are used to determine intake valve timing.
The intake camshaft pulley position is regulated by oil pressure, which is controlled by the valve timing control solenoid valve.

Valve Timing Control (Cont'd)

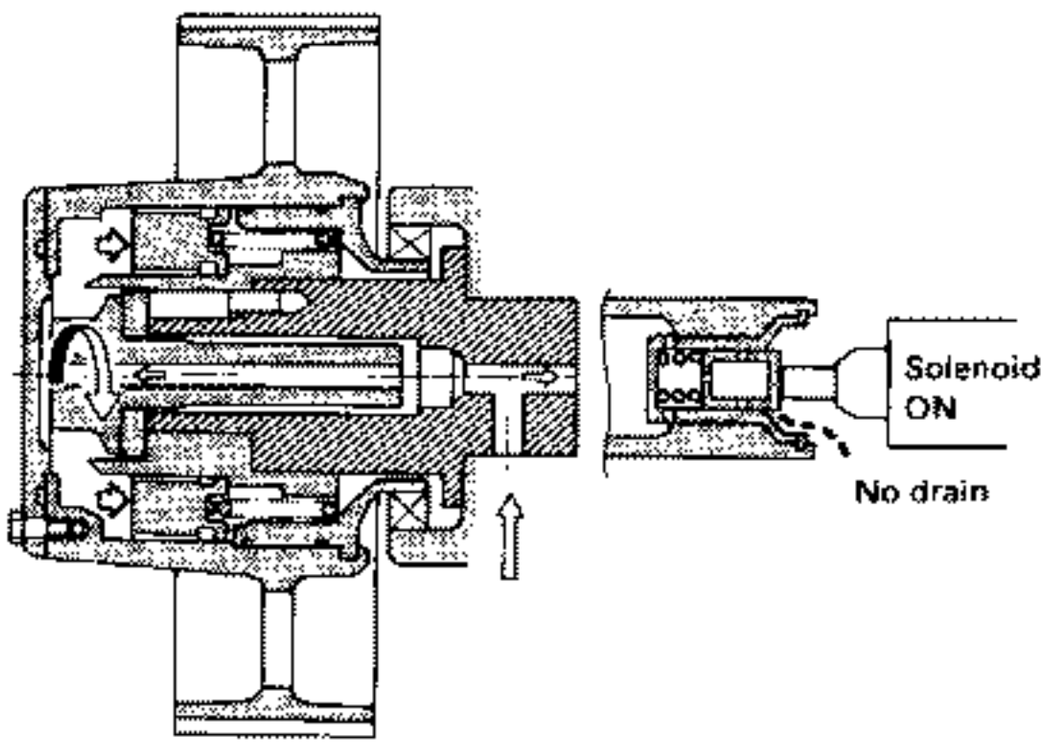
OPERATION

Engine operating condition	Valve timing control solenoid valve	Intake valve opening and closing time	Valve overlap	Engine torque curve
Idling, high speed	OFF	Retard	Decreased	Ⅰ
Low to medium speed	ON	Advance	Increased	Ⅱ

(I) Valve timing control solenoid valve is OFF.



(II) Valve timing control solenoid valve is ON.



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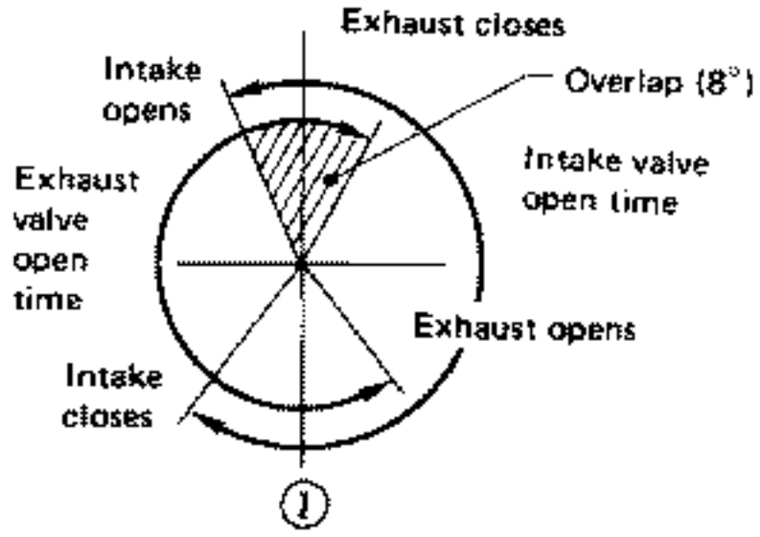
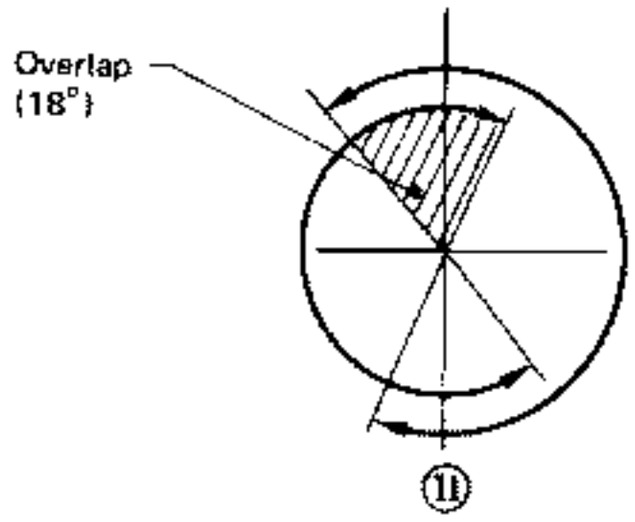
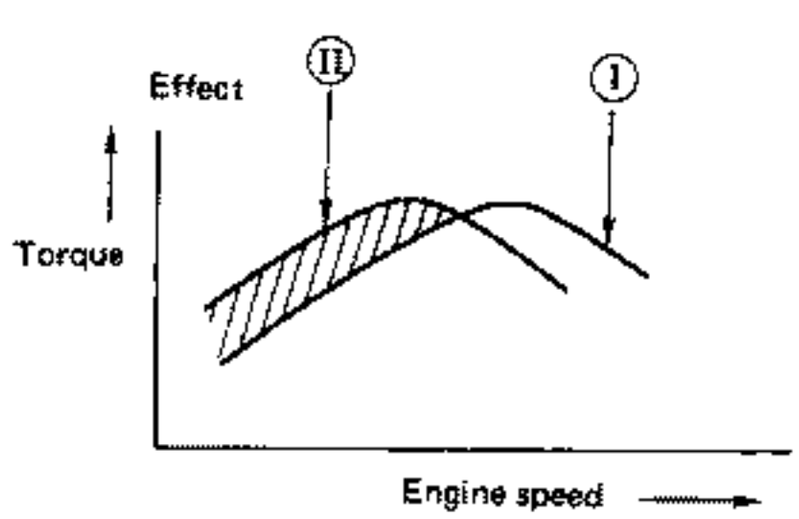


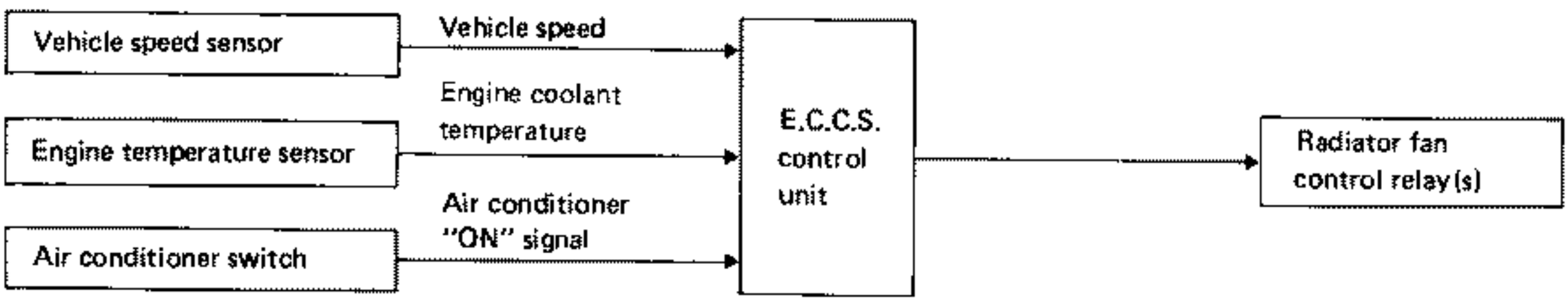




SEF010I

Radiator Fan Control

INPUT/OUTPUT SIGNAL LINE



The E.C.U. controls the radiator fan corresponding to the vehicle speed, engine temperature, and air conditioner ON signal. The non-turbo model has 2-step control [ON (HIGH)/OFF], and the turbo model 3-step control [HIGH/LOW/OFF].

OPERATION

[Non-turbo model]

Air conditioner switch is "OFF"

Engine coolant temperature °C (°F)	Radiator fan
Below 104 (219)	OFF
Above 105 (221)	ON

Air conditioner switch is "ON"

Vehicle speed km/h (MPH)	Engine coolant temperature °C (°F)	Radiator fan
Below 39 (24)	Below 94 (201)	OFF
	Above 95 (203)	ON (HIGH)
Above 40 (25)	Below 104 (219)	OFF
	Above 105 (221)	ON (HIGH)

[Turbo model]

Air conditioner switch is "OFF"

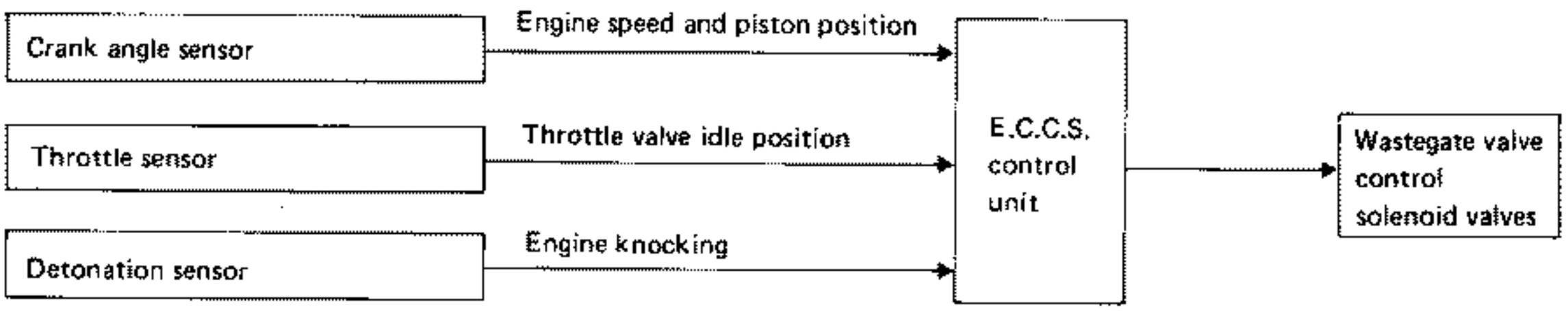
Engine coolant temperature °C (°F)	Radiator fan
Below 104 (219)	OFF
Above 105 (221)	ON

Air conditioner switch is "ON"

Vehicle speed km/h (MPH)	Engine coolant temperature °C (°F)	Radiator fan
Below 39 (24)	Below 89 (192)	OFF
	Between 90 (194) and 99 (210)	LOW
	Above 100 (212)	HIGH
Above 40 (25)	Below 104 (219)	OFF
	Above 105 (221)	HIGH

Wastegate Valve Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

The wastegate valve control solenoid valve changes the source vacuum which activates the actuator. This results in a suitable turbo-pressure.

When detonation signs are detected, which means a low octane fuel is being used, the solenoid valve turns OFF, and turbocharger pressure becomes low.

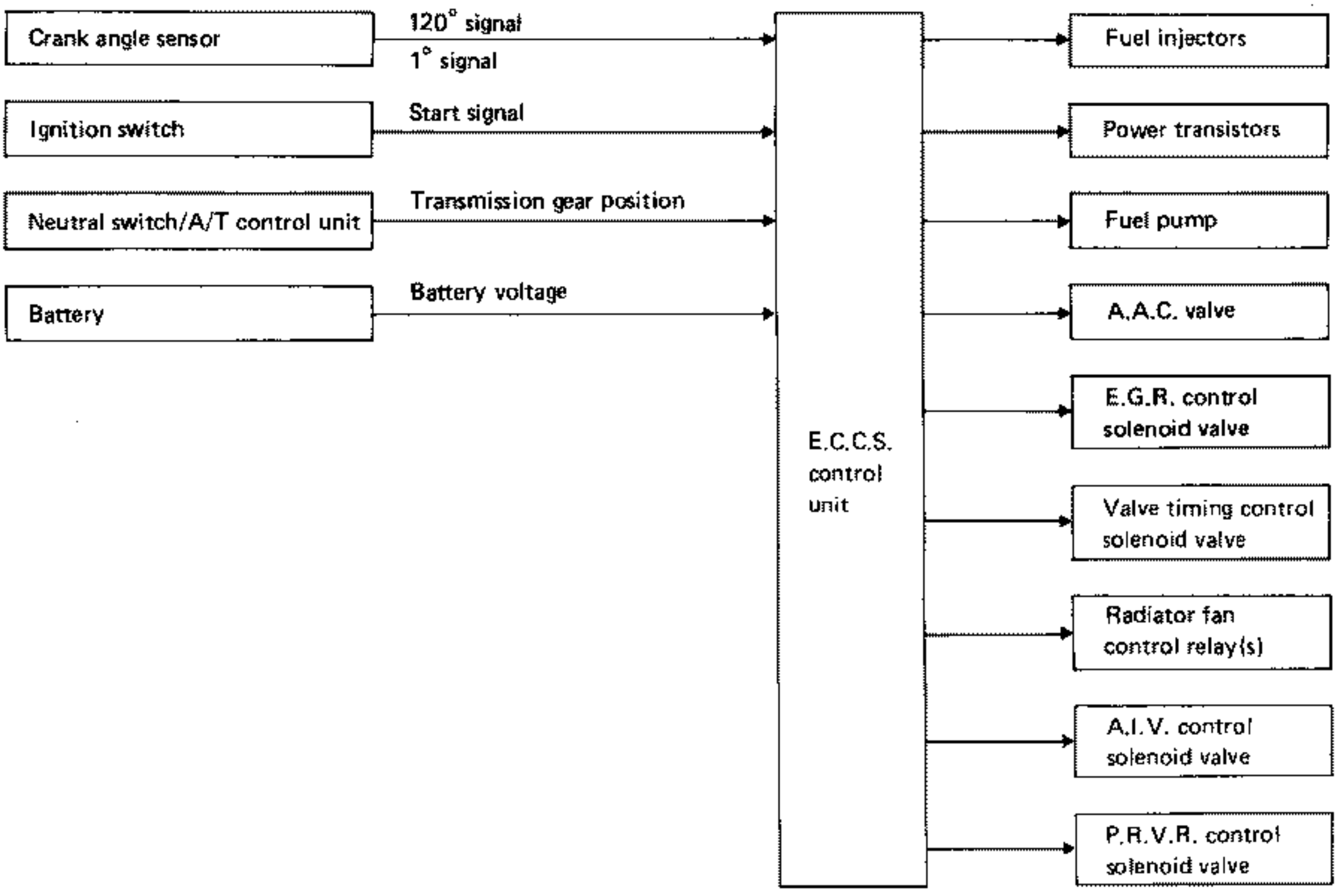
OPERATION

Engine condition	Wastegate valve control solenoid valves	Wastegate valve actuators	Turbocharger pressure
• Engine running or cranking • Throttle sensor output voltage: more than 0.1V • Judged fuel quality: high octane (Detecting no sign of detonation)	ON	Lead to suction pipe or turbocharger compressor outlet	HIGH
• Except the above	OFF	Lead to turbocharger compressor outlet	LOW

Fail-safe System

C.P.U. MALFUNCTION OF E.C.U.

Input/output signal line



Outline

The fail-safe system makes engine starting possible if there is something malfunctioning in the E.C.U.'s C.P.U. circuit.

In former models, engine starting was difficult under the previously mentioned conditions. But with the provisions in this fail-safe system, it is possible to start the engine.

Fail-safe System (Cont'd)

Fail-safe system activating condition when E.C.U. is malfunctioning

The fail-safe mode operation starts when the computing function of the E.C.U. is judged to be malfunctioning.
When the fail-safe system activates, i.e. if a malfunction condition is detected in the C.P.U. of the E.C.U., the CHECK ENGINE LIGHT on the instrument panel lights to warn the driver.

Engine control, with fail-safe system, operates when E.C.U. is malfunctioning

When the fail-safe system is operating, fuel injection, ignition timing, fuel pump operation, engine idle speed, E.G.R. operation, and so on are controlled under certain limitations.

Cancellation of fail-safe system when E.C.U. 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.

AIR FLOW METER MALFUNCTION

If the air flow meter output voltage is above or below the specified value, the E.C.U. senses an air flow meter malfunction. In case of a malfunction, the throttle sensor substitutes for the air flow meter.
Although the air flow meter is malfunctioning, it is possible to start the engine and drive the vehicle. But engine speed will not rise more than 2,400 rpm in order to inform the driver of fail-safe system operation while driving.

Operation

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

ENGINE TEMPERATURE SENSOR MALFUNCTION

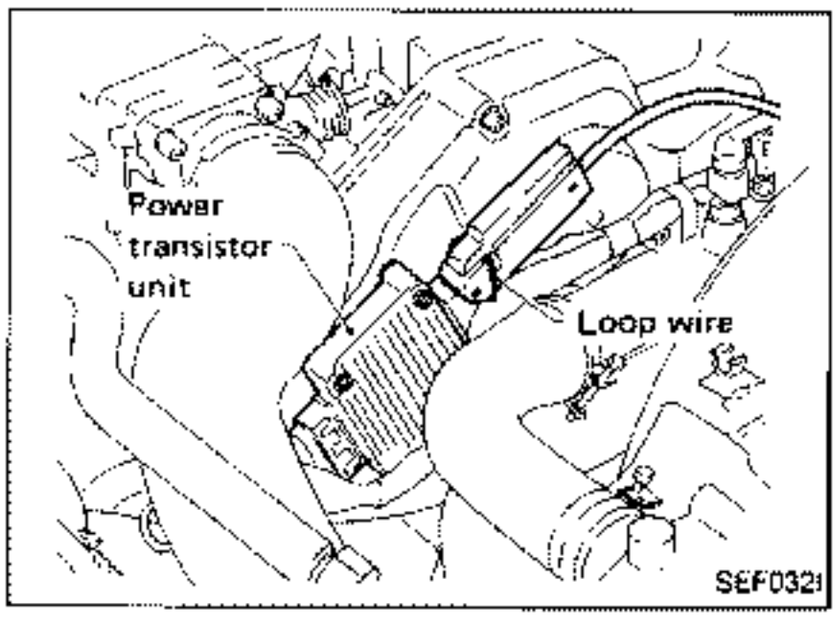
When engine temperature sensor output voltage is below or above the specified value, engine coolant temperature is fixed at the preset value as follows:

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

FUEL TEMPERATURE SENSOR MALFUNCTION

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

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



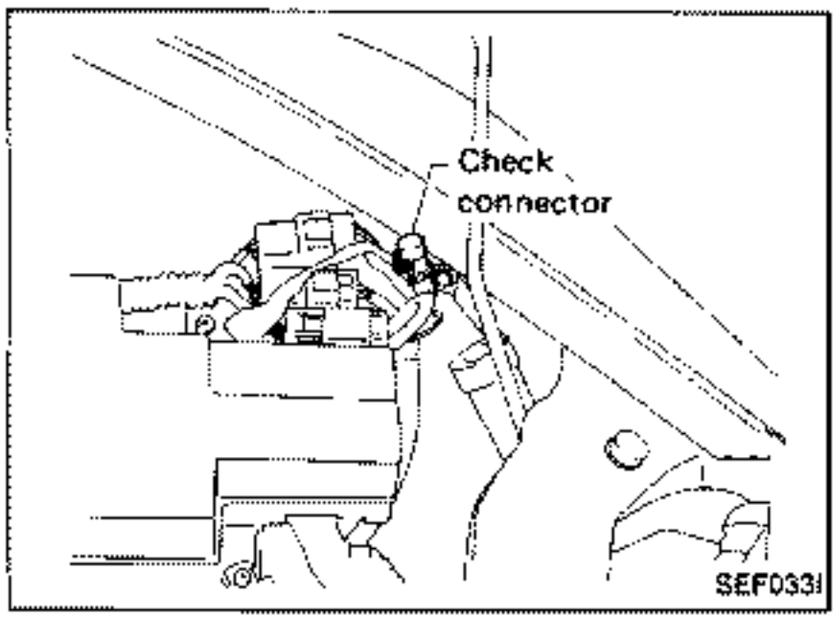
Direct Ignition System

CHECKING IDLE SPEED AND IGNITION TIMING

Idle speed

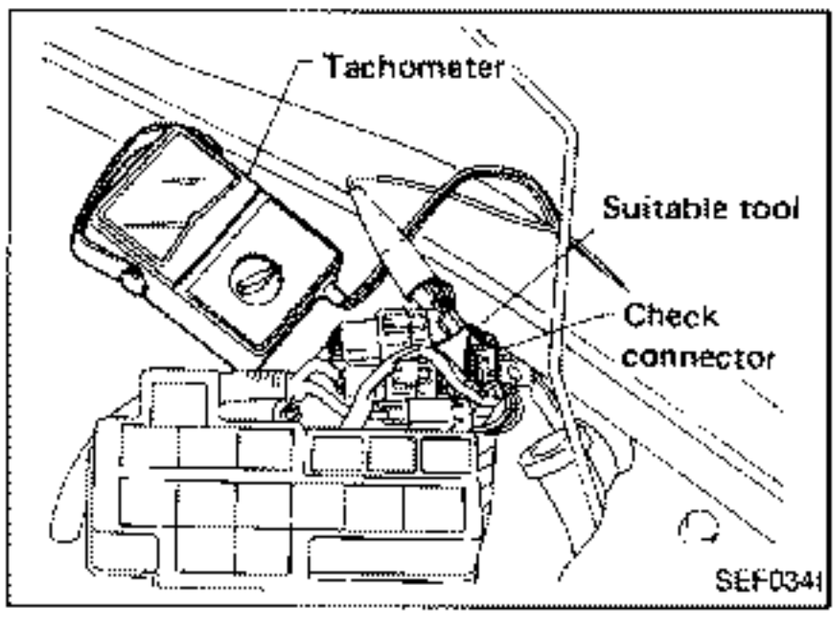
- **Method A (With pulse type tachometer)**

Clamp loop wire as shown.



- **Method B (With voltage type tachometer)**

1. Disconnect check connector (Harness color: Y/R) for tachometer.

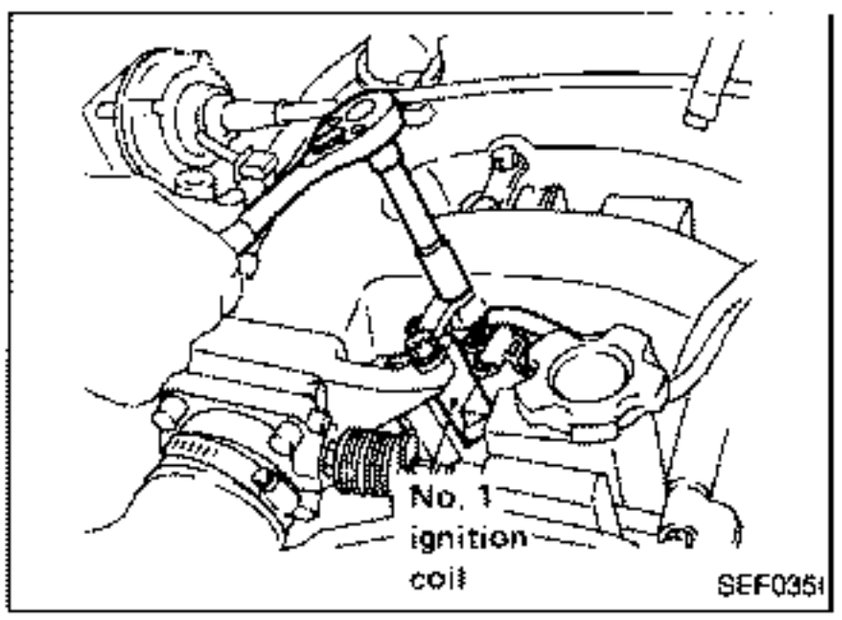


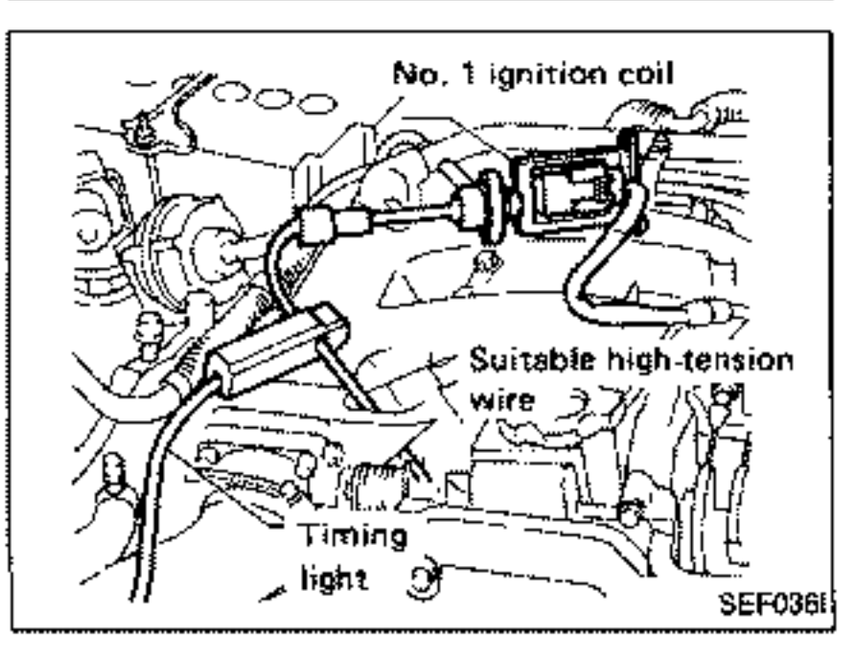
2. Connect tachometer using a suitable tool.

Ignition timing

- **Method A (Without S.S.T.)**

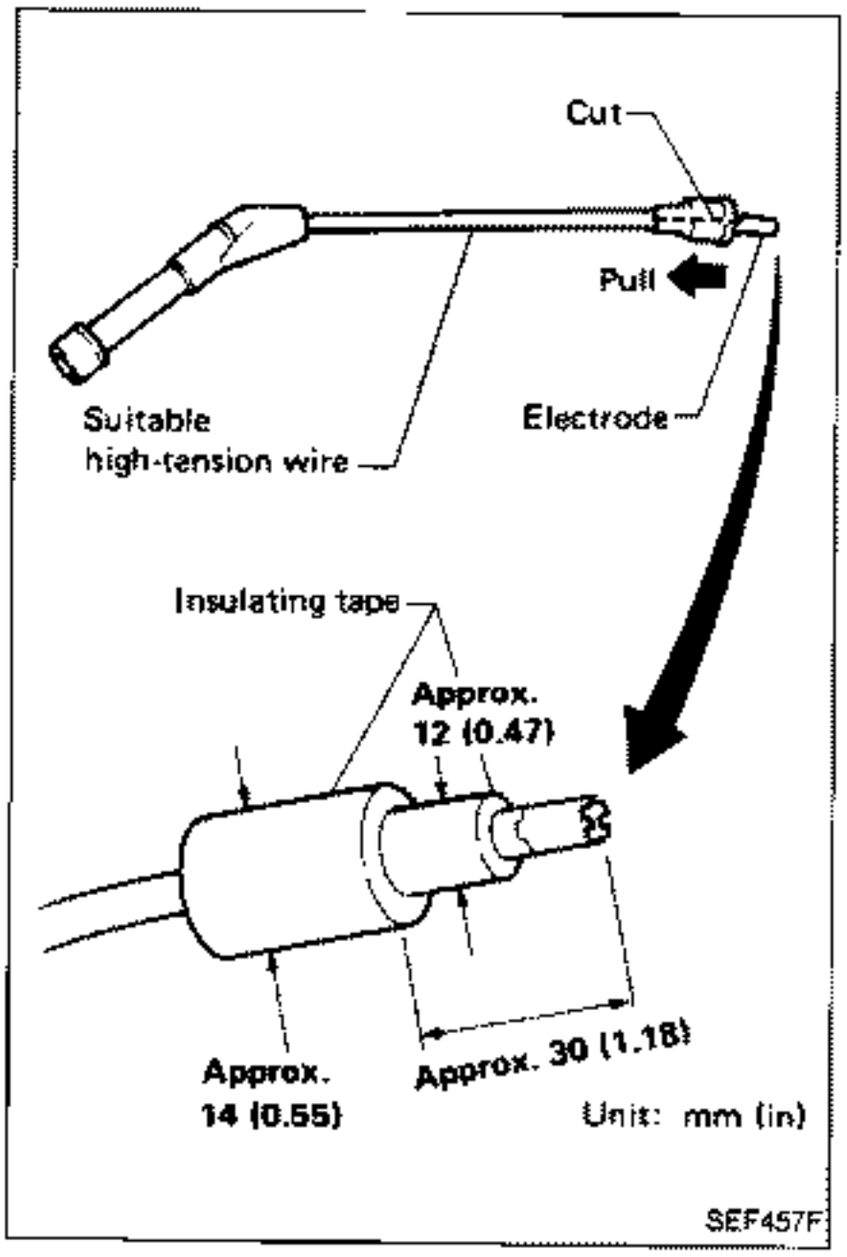
1. Remove No. 1 ignition coil.



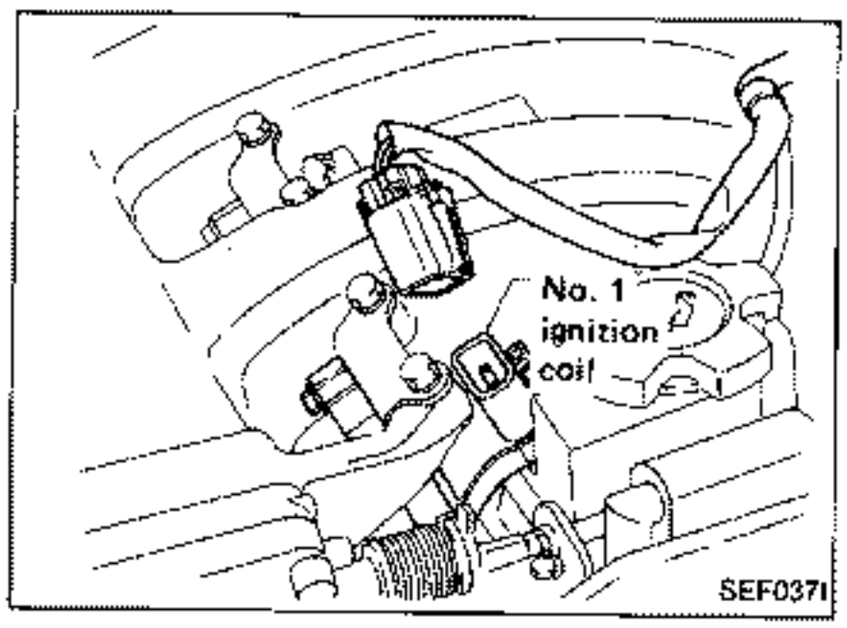


2. Connect No. 1 ignition coil and No. 1 spark plug with a suitable high-tension wire as shown, and attach timing light clamp to this wire.
3. Check ignition timing.

Direct Ignition System (Cont'd)

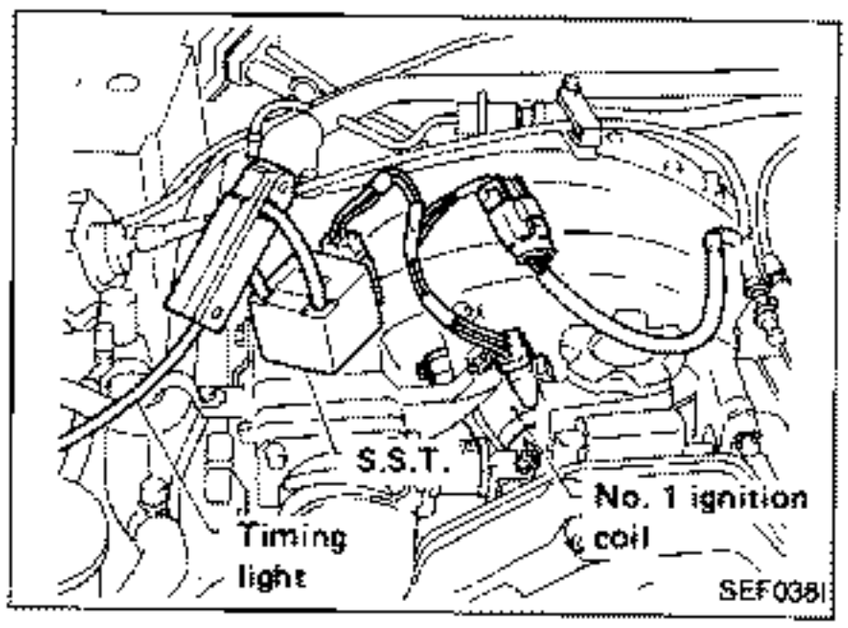


4. For above procedures, enlarge the end of a suitable high-tension wire with insulating tape as shown.

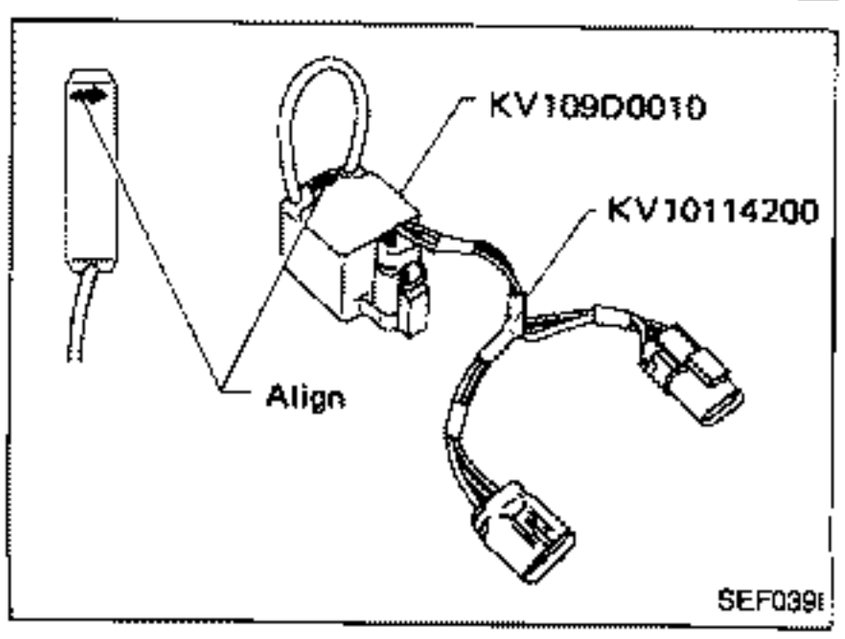


- **Method B (With S.S.T.)**

1. Disconnect connector of No. 1 ignition coil.



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



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

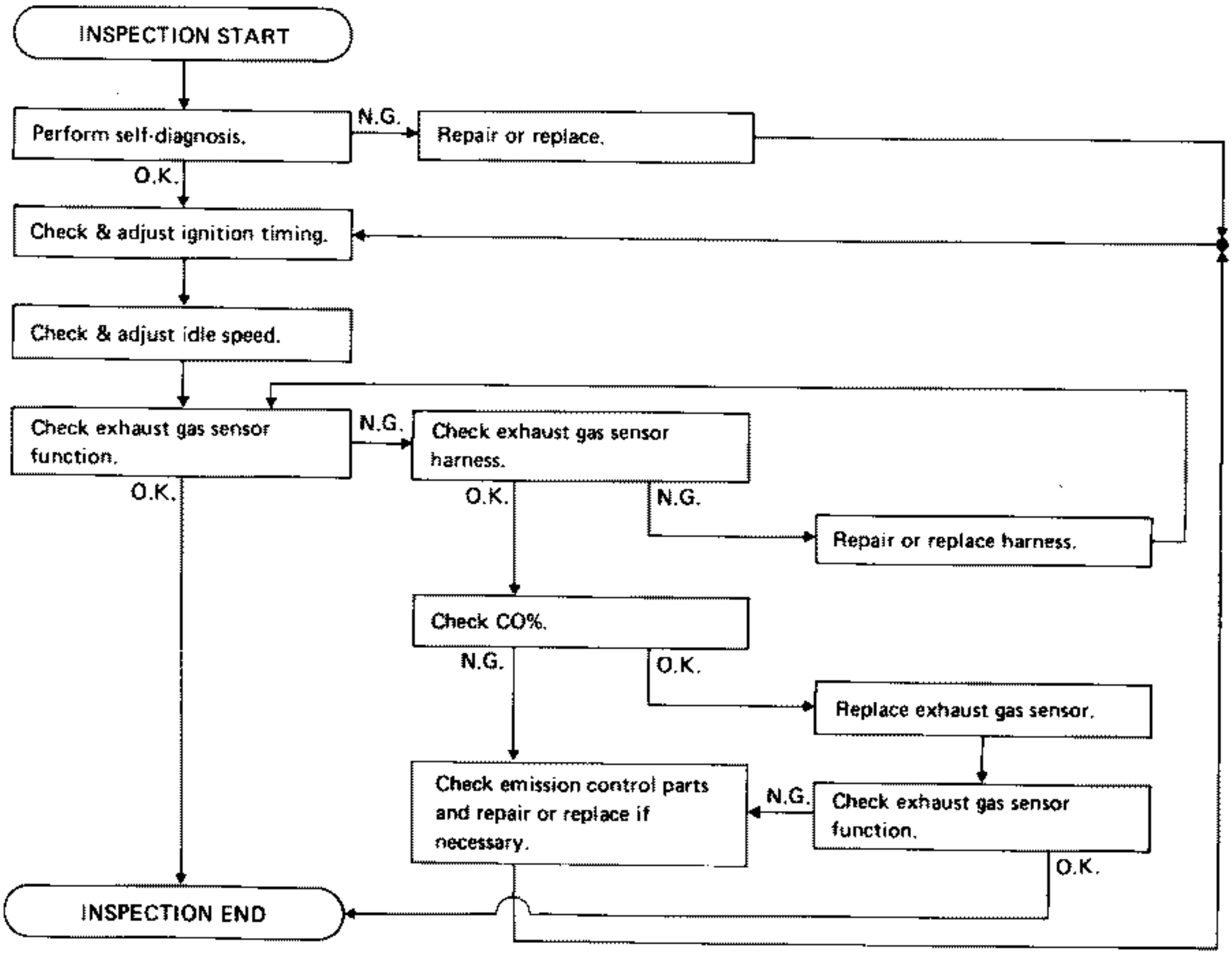
PREPARATION

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

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

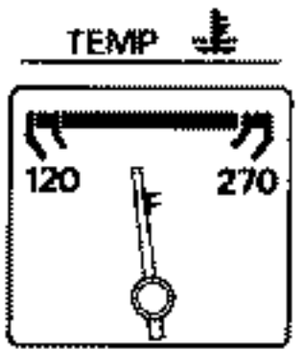
WARNING:
Apply parking brake and block both front and rear wheels with chocks.

Overall inspection sequence



START

Visually check the following:
- Air cleaner clogging
- Hoses and ducts for leaks
- E.G.R. control valve operation
- Electrical connectors
- Gasket



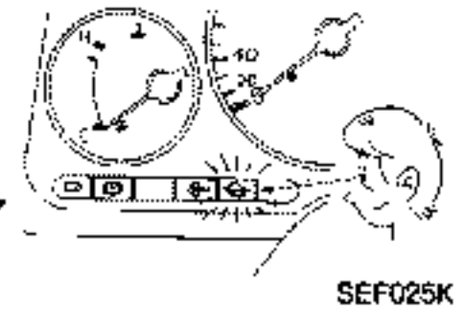
SEF246F

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

SEF247F

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

Perform E.C.C.S. self-diagnosis.


SEF025K

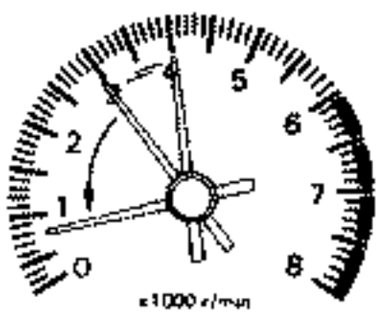
O.K. | N.G.

Repair or replace components as necessary.

Does engine run smoothly?

O.K. | N.G.

Clean injectors.



SEF248F

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

Check ignition timing with a timing light.

$15^\circ \pm 2^\circ$ B.T.D.C.

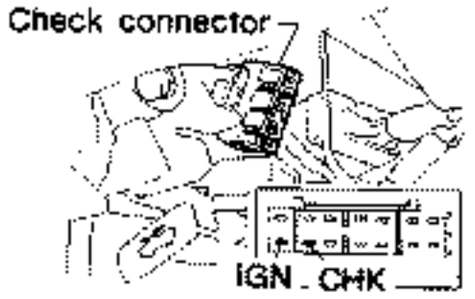
O.K. | N.G.

Adjust ignition timing by turning crank angle sensor after loosening securing bolts.

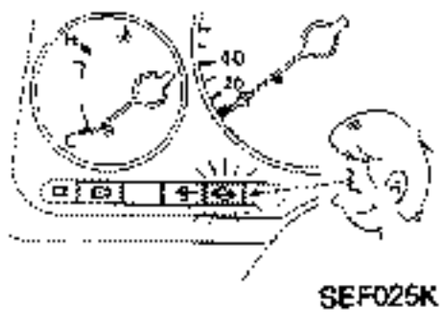
(A) (B) (H)

SEF364I

SEF247F



SMA325C



SEF025K

Ⓐ

Check idle speed.

	A/T*	M/T
Non-turbo	770±50 rpm	700±50 rpm
Turbo	750±50 rpm	

*: in "N" position

O.K.

N.G.

Disconnect A.A.C. valve harness connector.

Adjust idle speed by turning idle speed adjusting screw.

	A/T*	M/T
Non-turbo	720 rpm	650 rpm
Turbo	700 rpm	

*: in "N" position

Connect A.A.C. valve harness connector.

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

Set the diagnosis mode of E.C.U. to Mode II.

Ⓘ

Check left side exhaust gas sensor signal.
Make sure that inspection lamp goes on and off more than 5 times during 10 seconds (at 2,000 rpm).

Inspection lamp does not blink.

O.K.

Less than 5 times

Replace left side exhaust gas sensor.

Ⓙ

Check left side exhaust gas sensor signal.
Make sure that inspection lamp goes on and off more than 5 times during 10 seconds at 2,000 rpm.

O.K.

N.G.

Ⓚ

Check right side exhaust gas sensor signal.
Make sure that inspection lamp goes on and off more than 5 times during 10 seconds (at 2,000 rpm).

Inspection lamp does not blink.

O.K.

Less than 5 times

END

Replace right side exhaust gas sensor.

Ⓒ Ⓓ Ⓔ Ⓕ

Ⓒ

Ⓓ

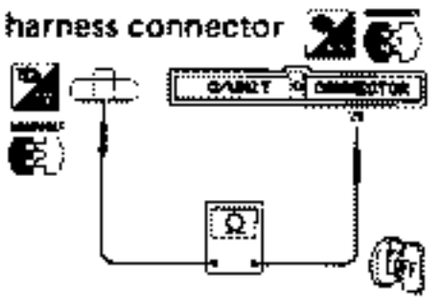
Check right side exhaust gas sensor signal.
Make sure that inspection lamp goes on and off more than 5 times during 10 seconds at 2,000 rpm.

N.G. → Ⓔ

O.K.

END

Exhaust gas sensor harness connector



SEF571I

Check right side exhaust gas sensor harness:
1) Turn off engine and disconnect battery ground cable.
2) Disconnect 76-pin connector from E.C.U.
3) Disconnect right side exhaust gas sensor harness connector.
4) Check for continuity between terminal No. 29 of 76-pin connector and harness connector for exhaust gas sensor.

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

O.K.

N.G.

Repair or replace harness. → Ⓘ

Connect 76-pin connector to E.C.U.

Check left side exhaust gas sensor harness:
1) Turn off engine and disconnect battery ground cable.
2) Disconnect 76-pin connector from E.C.U.
3) Disconnect left side exhaust gas sensor harness connector.
4) Check for continuity between terminal No. 55 of 76-pin connector and harness connector for exhaust gas sensor.

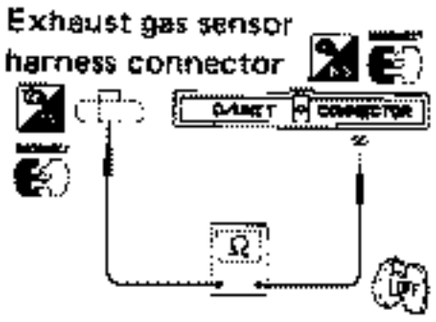
Continuity exists . . . . . O.K.
Continuity does not exist . . . . N.G.

O.K.

N.G.

Repair or replace harness. → Ⓘ

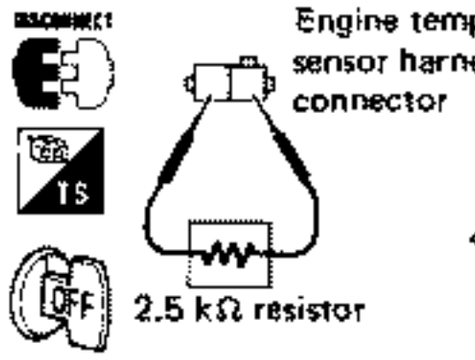
Exhaust gas sensor harness connector



SEF363I

Connect 76-pin connector to control unit.

Ⓖ

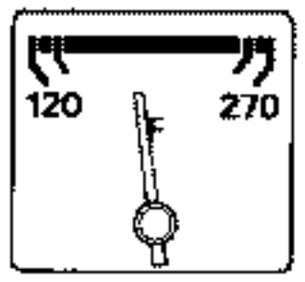


SEC242B

Ⓖ

1) Disconnect engine temperature sensor harness connector.
2) Connect a resistor (2.5 kΩ) between terminals of engine temperature sensor harness connector.
3) Disconnect A.I.V. control solenoid valve harness connector.

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



SEF246F

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

SEF248F

Check "CO" %.

Idle CO: 0.2 ~ 8%

After checking CO%,
1) Disconnect the resistor from terminals of engine temperature sensor.
2) Connect engine temperature sensor harness connector to engine temperature sensor.
3) Connect A.I.V. control solenoid valve harness connector.

O.K. → Ⓙ

N.G.

Connect exhaust gas sensor harness connector to exhaust gas sensor.

Check fuel pressure regulator. ← Ⓚ

Check air flow meter.

Check injector.
Clean or replace if necessary.

Check engine temperature sensor.

Check E.C.U. function* by substituting another known good E.C.U. → Ⓗ

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

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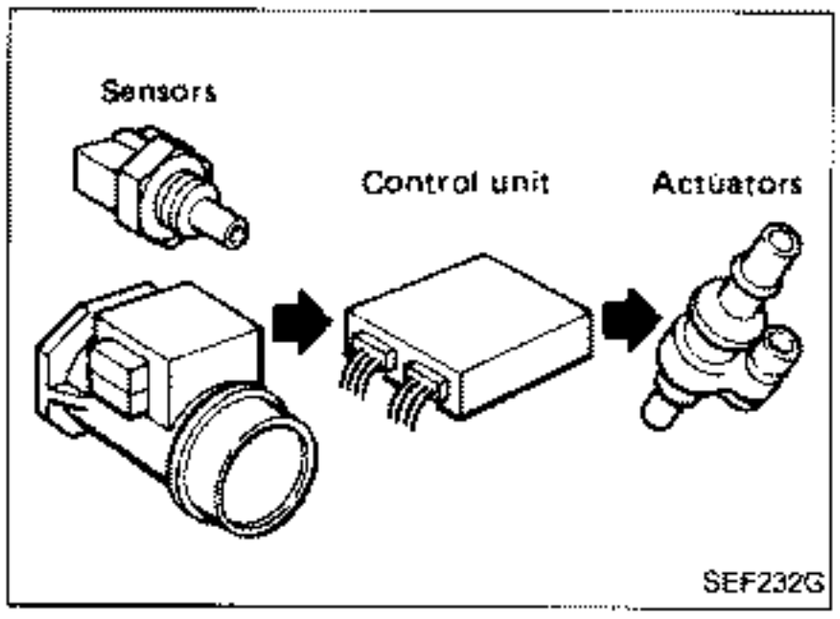
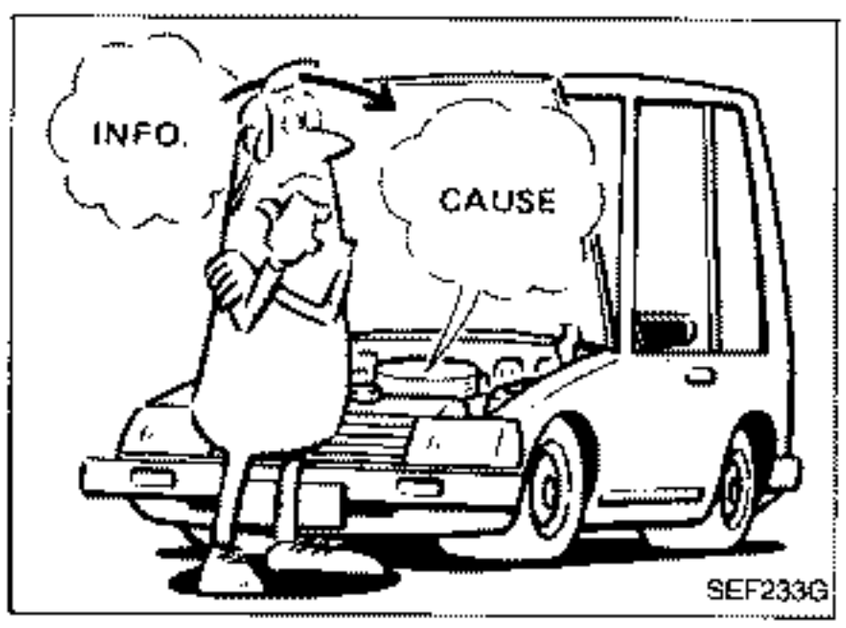
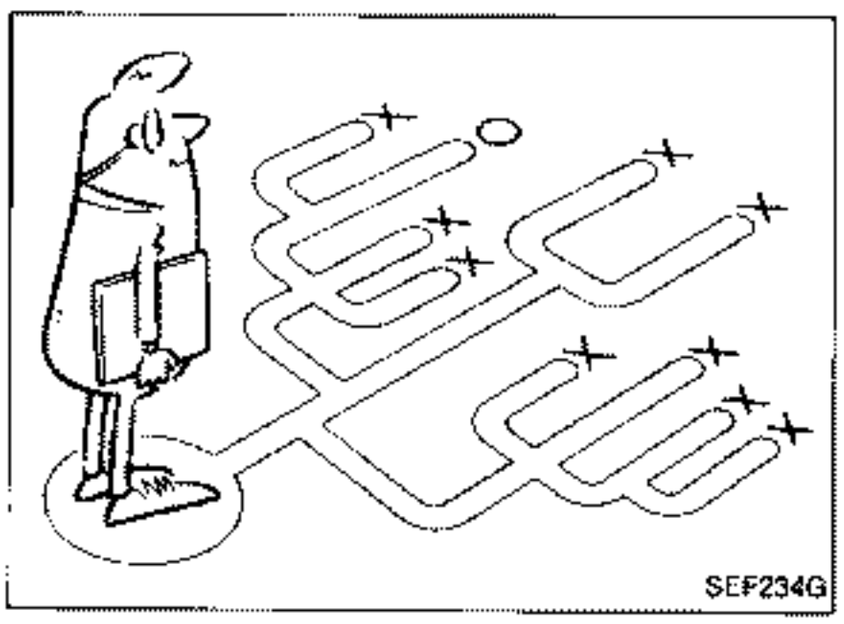






How to Perform Trouble Diagnoses for Quick and Accurate Repair

INTRODUCTION

The engine has an electronic control unit to control major systems such as fuel control, ignition control, idle speed control, etc. The control unit accepts input signals from sensors and instantly drives actuators. It is essential that both kinds of signals are proper and stable. At the same time, it is important that there are no conventional problems such as vacuum leaks, fouled spark plugs, or other problems with the engine.

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

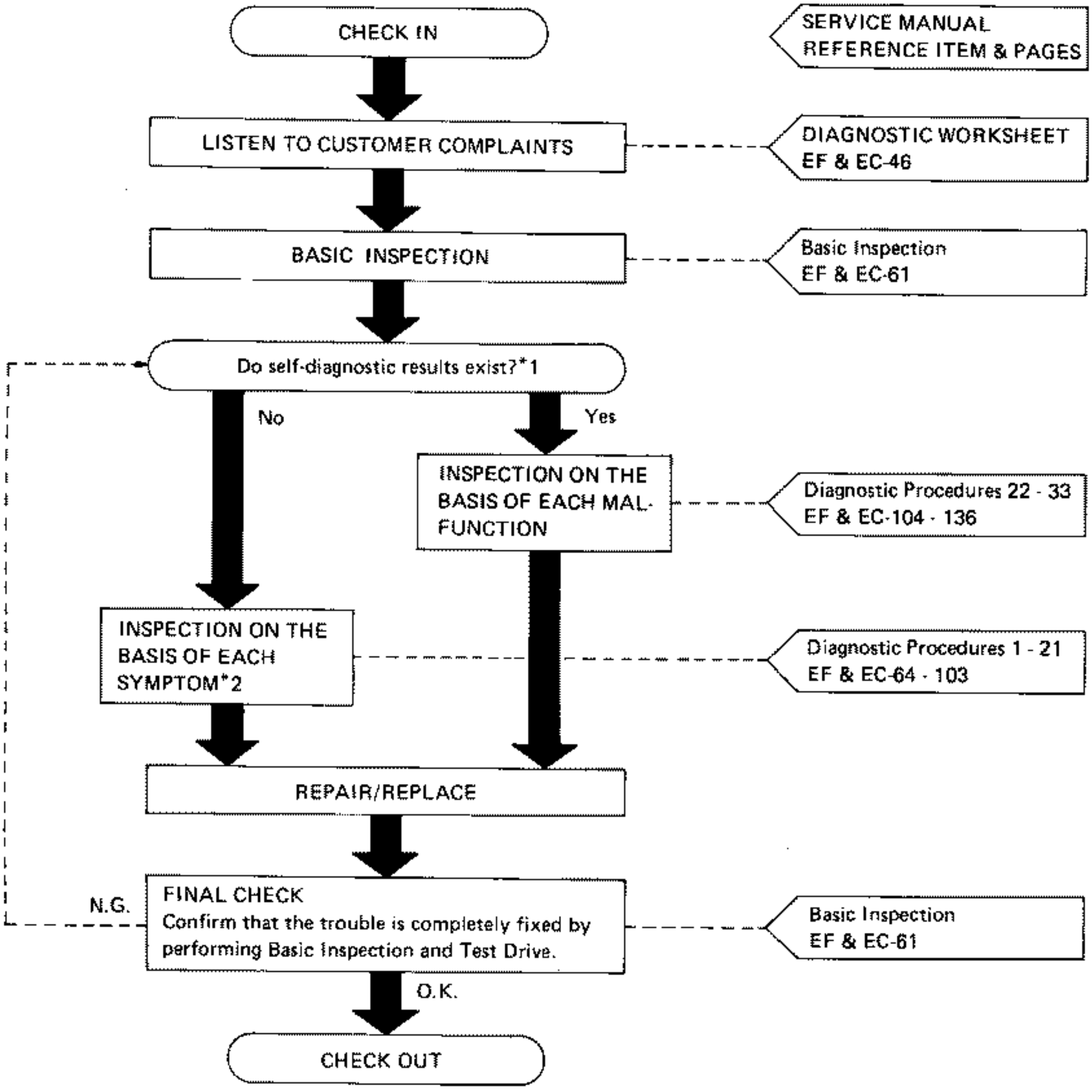
A visual check only may not find the cause of the problems, so a road test with a circuit tester connected to a suspected circuit should be performed.

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

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

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

WORK FLOW



*1: If the self-diagnosis cannot be performed, check main power supply and ground circuit. (See Diagnostic Procedure 22.)
*2: If the trouble is not duplicated, see INTERMITTENT PROBLEM SIMULATION (EF & EC-47).

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

DIAGNOSTIC WORKSHEET

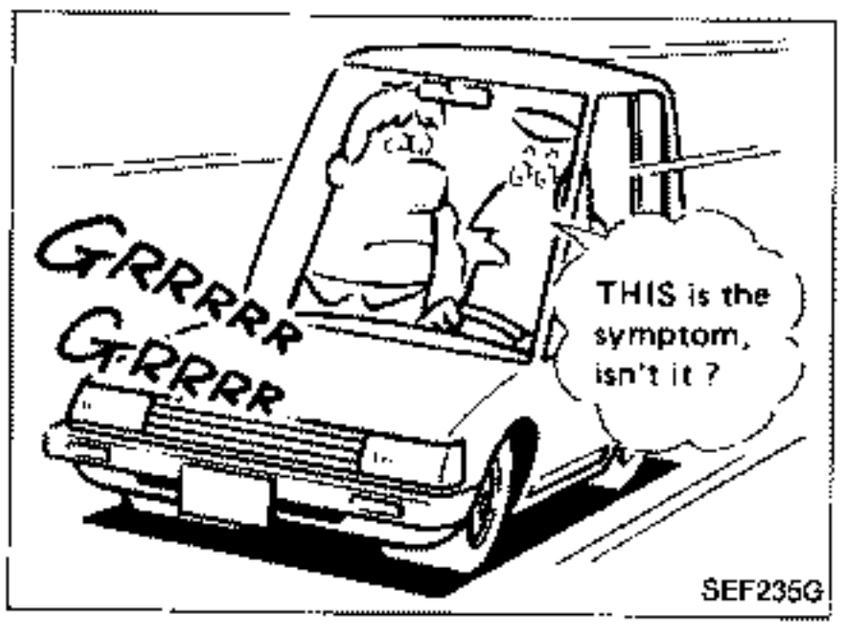
There are many kinds of operating conditions that lead to malfunctions on engine components.
A good grasp of such conditions can make trouble-shooting faster and more accurate.
In general, feelings for a problem depend on each customer. It is important to fully understand the symptoms or under what conditions a customer complains.
Make good use of a diagnostic worksheet such as the one shown below in order to utilize all the complaints for trouble-shooting.

Worksheet sample

Customer name MR/MS	Model & Year	VIN
Engine #	Trans.	Mileage
Incident Date	Manuf. Date	In Service Date

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

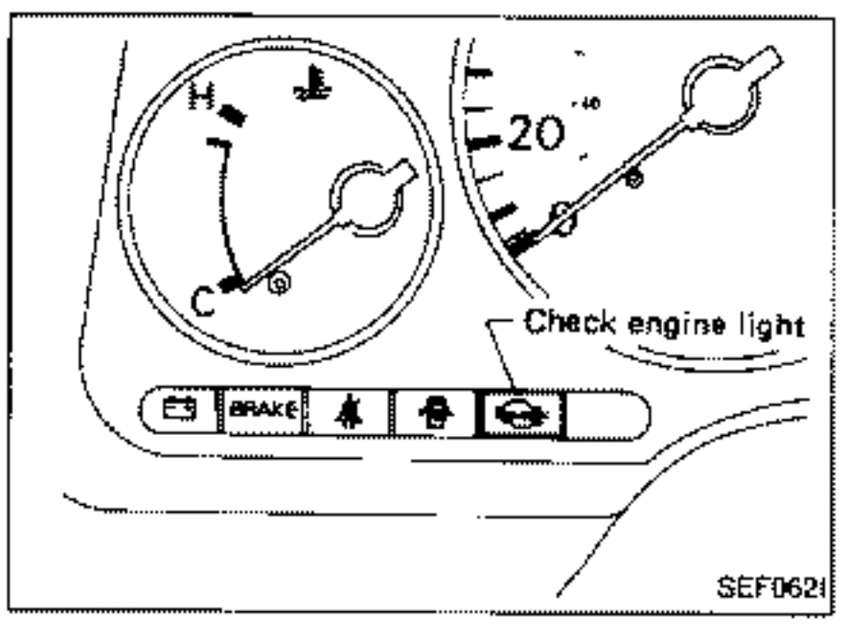
How to Perform Trouble Diagnoses for Quick and Accurate Repair (Cont'd)



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.

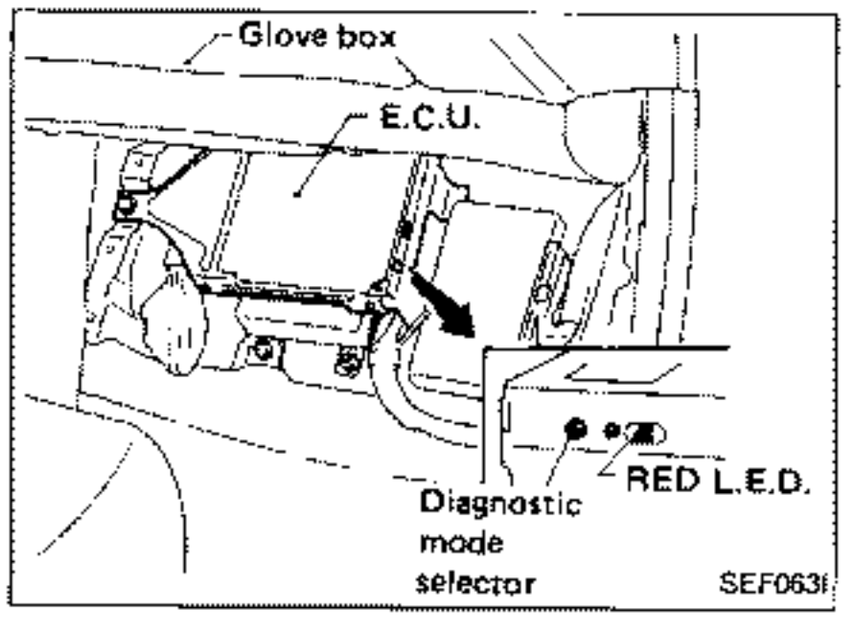
	Variable factor	Influential part	Target condition	Service procedure
1	Mixture ratio	Pressure regulator	Made lean	Remove vacuum hose and apply vacuum.
			Made rich	Remove vacuum hose and apply pressure.
2	Ignition timing	Crank angle sensor	Advanced	Rotate distributor counterclockwise.
			Retarded	Rotate distributor clockwise.
3	Mixture ratio feedback control	Exhaust gas sensor	Suspended	Disconnect exhaust gas sensor harness connector.
		Control unit	Operation check	Perform self-diagnosis (Mode II) at 2,000 rpm.
4	Idle speed	A.A.C. 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	Control unit	Cooled	Cool with an icing spray or similar device.
			Warmed	Heat with a hair drier. **[WARNING: Do not overheat the unit.]**
7	Moisture	Electric parts	Damp	Wet. **[WARNING: Do not directly pour water on components. Use a mist sprayer.]**
8	Electric loads	Load switches	Loaded	Turn on headlamps, air conditioner, rear defogger, etc.
9	Idle switch condition	Control unit	ON-OFF switching	Rotate throttle sensor body.
10	Ignition spark	Timing light	Spark power check	Try to flash timing light for each cylinder using ignition coil adapter (S.S.T.).



Self-diagnosis

CHECK ENGINE LIGHT

A check engine light has been adopted. This light blinks simultaneously with the RED L.E.D. on the E.C.U.

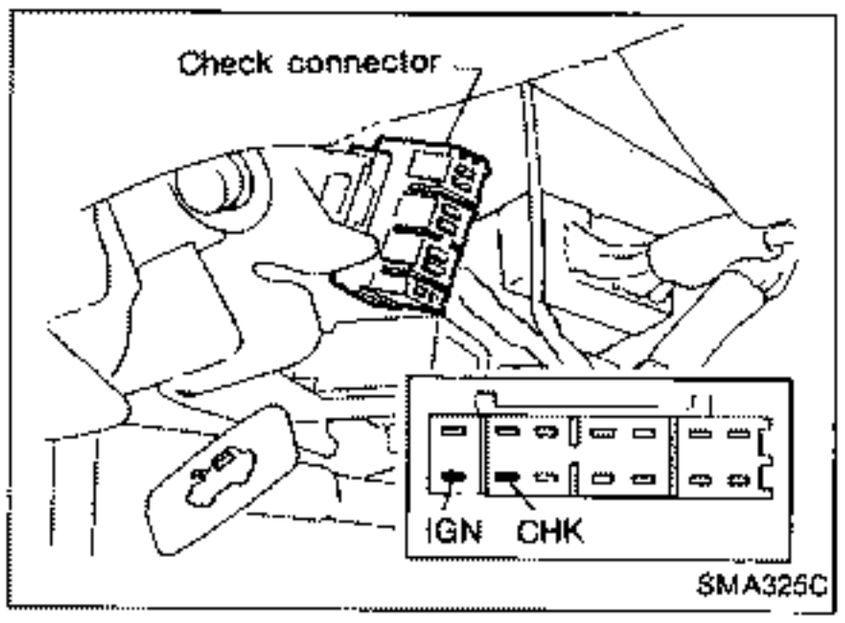


E.C.U. L.E.D.

In the E.C.U., the Green and Red L.E.D.'s have now been permanently changed to one RED L.E.D.

DIAGNOSTIC MODE SELECTOR

The diagnostic mode selector is on the side of the E.C.U.



CHECK CONNECTOR

The check connector is under the driver's side dash.

SELF-DIAGNOSTIC FUNCTION

Condition \ Mode		Mode I	Mode II
Ignition switch in "ON" position	Engine stopped	BULB CHECK	SELF-DIAGNOSTIC RESULTS
	Engine running	MALFUNCTION WARNING	EXHAUST GAS SENSOR MONITOR

Self-diagnosis (Cont'd)

HOW TO SWITCH MODES

- Switching the modes is not possible when the engine is running.
- When the ignition switch is turned off during diagnosis in each mode, and then turned back on again after power to the E.C.U. has dropped off completely, the diagnosis will automatically return to Mode I.
- Switching the modes can be done by using either the diagnostic mode selector on the E.C.U. or the check connector.

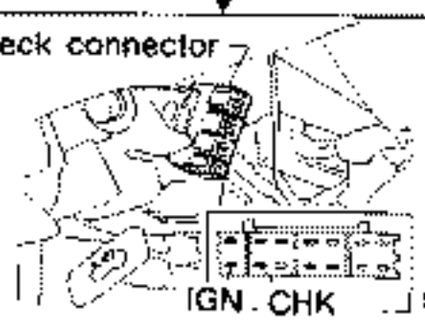
Turn ignition switch "ON".
(Do not start engine.)

Mode I – BULB CHECK

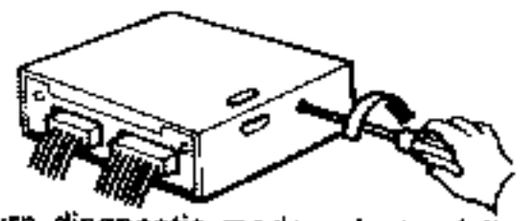
Start engine.

Mode I – MALFUNCTION WARNING

Check connector



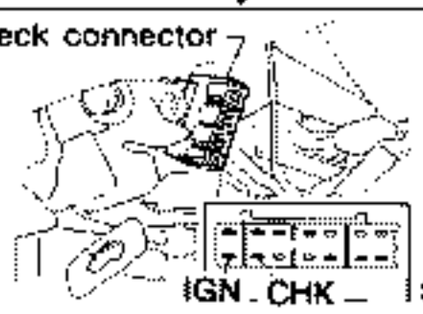
(Short CHC and IGN terminals with a suitable harness.)



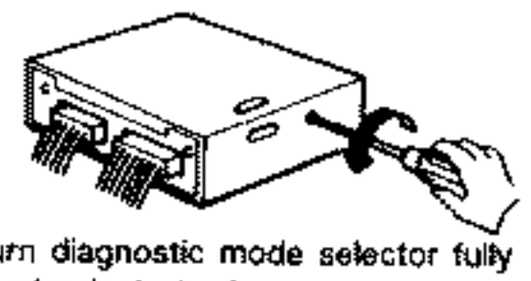
(Turn diagnostic mode selector fully clockwise.)

Wait at least 2 seconds.

Check connector

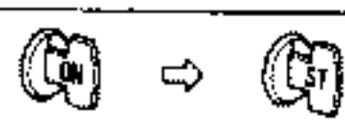


(Disconnect the harness.)



(Turn diagnostic mode selector fully counterclockwise.)

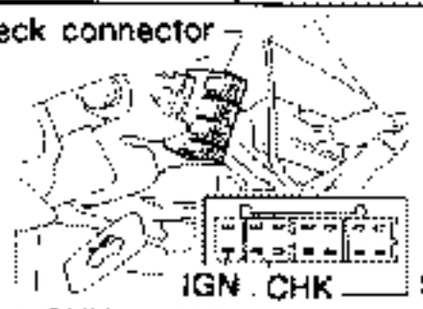
Mode II – SELF-DIAGNOSTIC RESULTS



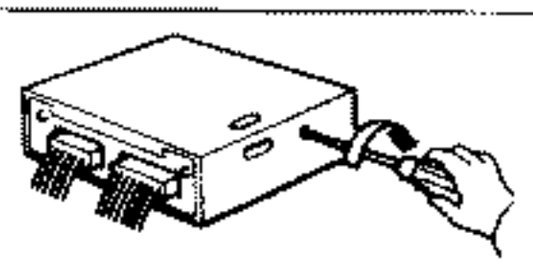
Start engine.

Mode II – EXHAUST GAS SENSOR MONITOR

Check connector

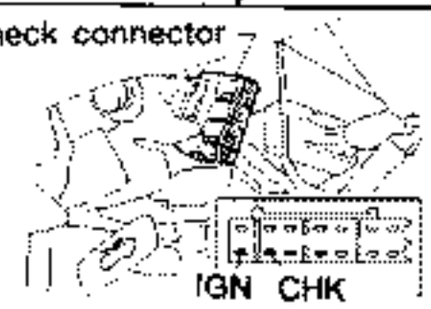


(Short CHK and IGN terminals with a suitable harness.)

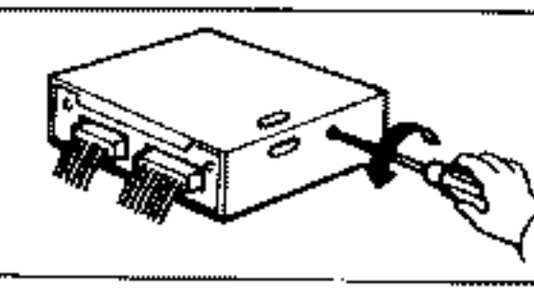


Wait at least 2 seconds.

Check connector



(Disconnect the harness.)



- Turn back diagnostic mode selector to the fully counterclockwise position whenever vehicle is in use.

Self-diagnosis — Mode I

MODE I — BULB CHECK

In this mode, the RED L.E.D. in the E.C.U. and the CHECK ENGINE LIGHT in the instrument panel stay "ON".
If either remain "OFF", check the bulb in the CHECK ENGINE LIGHT or the RED L.E.D.

MODE I — MALFUNCTION WARNING

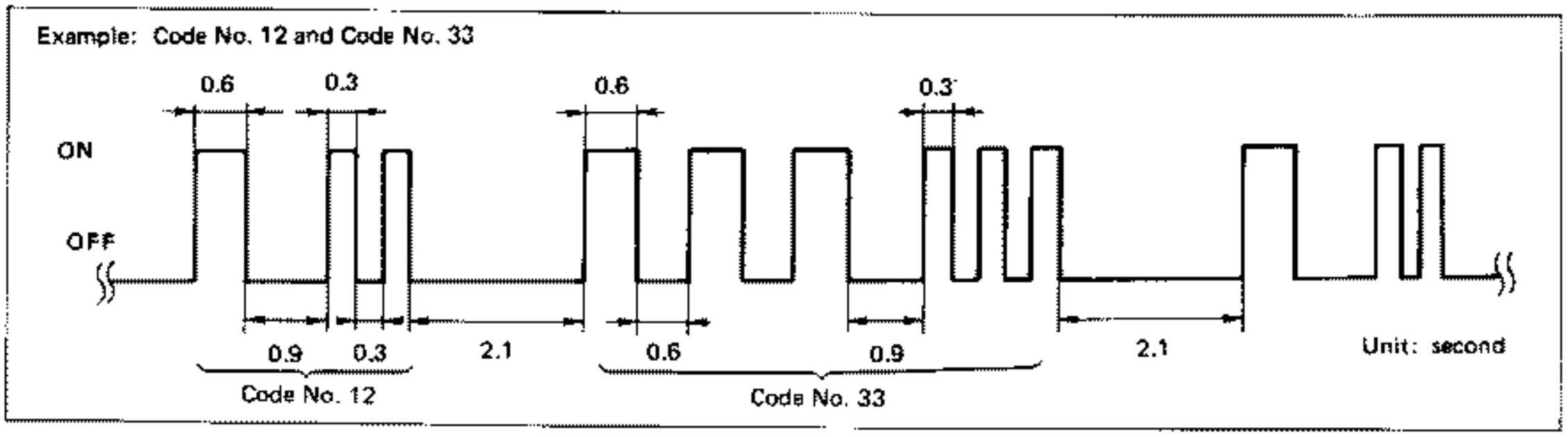
CHECK ENGINE LIGHT and RED L.E.D.	Condition
ON	When the E.C.U.'s C.P.U. is malfunctioning.
OFF	O.K.

Self-diagnosis — Mode II (Self-diagnostic results)

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

DESCRIPTION

In this mode, a malfunction code is indicated by the number of flashes from the RED L.E.D. or the CHECK ENGINE LIGHT as shown below:



Long (0.6 second) blinking indicates the number of ten digits and short (0.3 second) blinking indicates the number of single digits. For example, the red L.E.D. flashes once for 0.6 seconds and then it flashes twice for 0.3 seconds. This indicates the number "12" and refers to a malfunction in the air flow meter. In this way, all the problems are classified by their code numbers.

Self-diagnosis — Mode II (Self-diagnostic results) (Cont'd)

Display code table

Code No.	Detected items
11	Crank angle sensor circuit
12	Air flow meter circuit
13	Engine temperature sensor circuit
21	Ignition signal circuit
34	Detonation sensor circuit
42	Fuel temperature sensor circuit
43	Throttle sensor circuit
54	Signal circuit from A/T control unit to E.C.U. (A/T only)
55	No malfunction in the above circuits

Code No.	Detected items	Malfunction is detected when ...	Check item (remedy)
*11	Crank angle 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 crank angle sensor.)
12	Air flow meter circuit	• The air flow meter circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector (If harness and connector are normal, replace air flow meter.)
13	Engine temperature sensor circuit	• The engine temperature sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Engine temperature sensor
*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
34	Detonation sensor circuit	• The detonation circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Detonation sensor
42	Fuel temperature sensor circuit	• The fuel temperature sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Fuel temperature sensor
43	Throttle sensor circuit	• The throttle sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Throttle sensor
54	Signal circuit from A/T control unit to E.C.U. (A/T only)	• The A/T communication line is open or shorted.	• Harness and connector

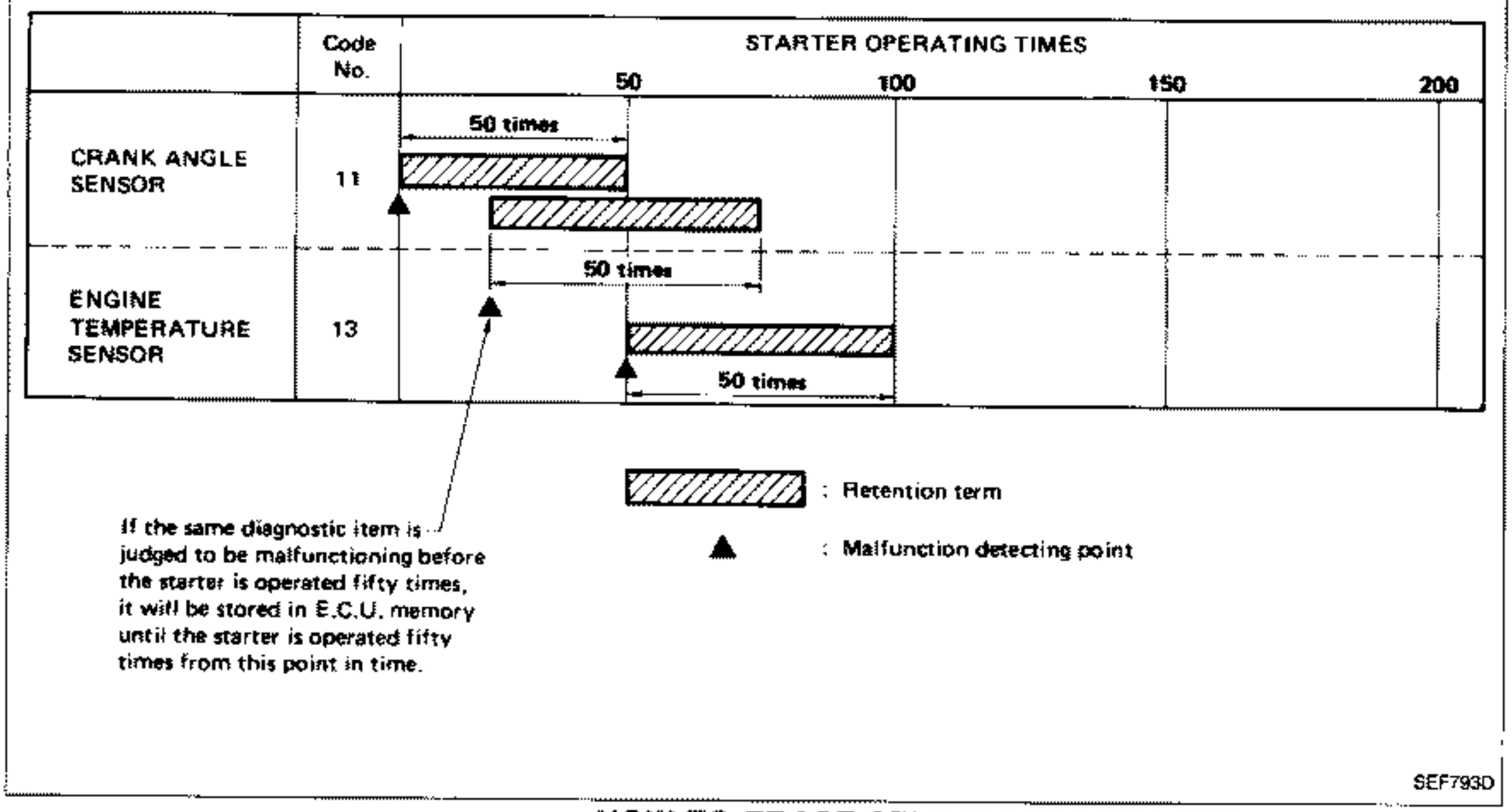
*: Check items causing a malfunction of crank angle sensor circuit first, if both code No. 11 and 21 are displayed at the same time.

Self-diagnosis — Mode II (Self-diagnostic results) (Cont'd)

RETENTION OF DIAGNOSTIC RESULTS

The diagnostic results will remain in E.C.U. memory until the starter is operated fifty times after a diagnostic item has been judged to be malfunctioning. The diagnostic result will then be cancelled automatically. If a diagnostic item which has been judged to be malfunctioning and stored in memory is again judged to be malfunctioning before the starter is operated fifty times, the second result will replace the previous one. It will be stored in E.C.U. memory until the starter is operated fifty times more.

RETENTION TERM CHART (Example)



SEF793D

HOW TO ERASE SELF-DIAGNOSTIC RESULTS

The malfunction code is erased from the backup memory on the E.C.U. when the diagnostic mode is changed from Mode II to Mode I. (Refer to "HOW TO SWITCH MODES".)

- **When the battery terminal is disconnected, the malfunction code will be lost from the backup memory within 24 hours.**
- **Before starting self-diagnosis, do not erase the stored memory before beginning self-diagnosis.**

Self-diagnosis — Mode II (Exhaust gas sensor monitor)

DESCRIPTION

In this mode, the CHECK ENGINE LIGHT and RED L.E.D. display the condition of the fuel mixture (lean or rich) which is monitored by the exhaust gas sensor.

CHECK ENGINE LIGHT and RED L.E.D.	Fuel mixture condition in the exhaust gas	Air fuel ratio feedback control condition
ON	Lean	Closed loop control
OFF	Rich	
*Remains ON or OFF	Any condition	Open loop control

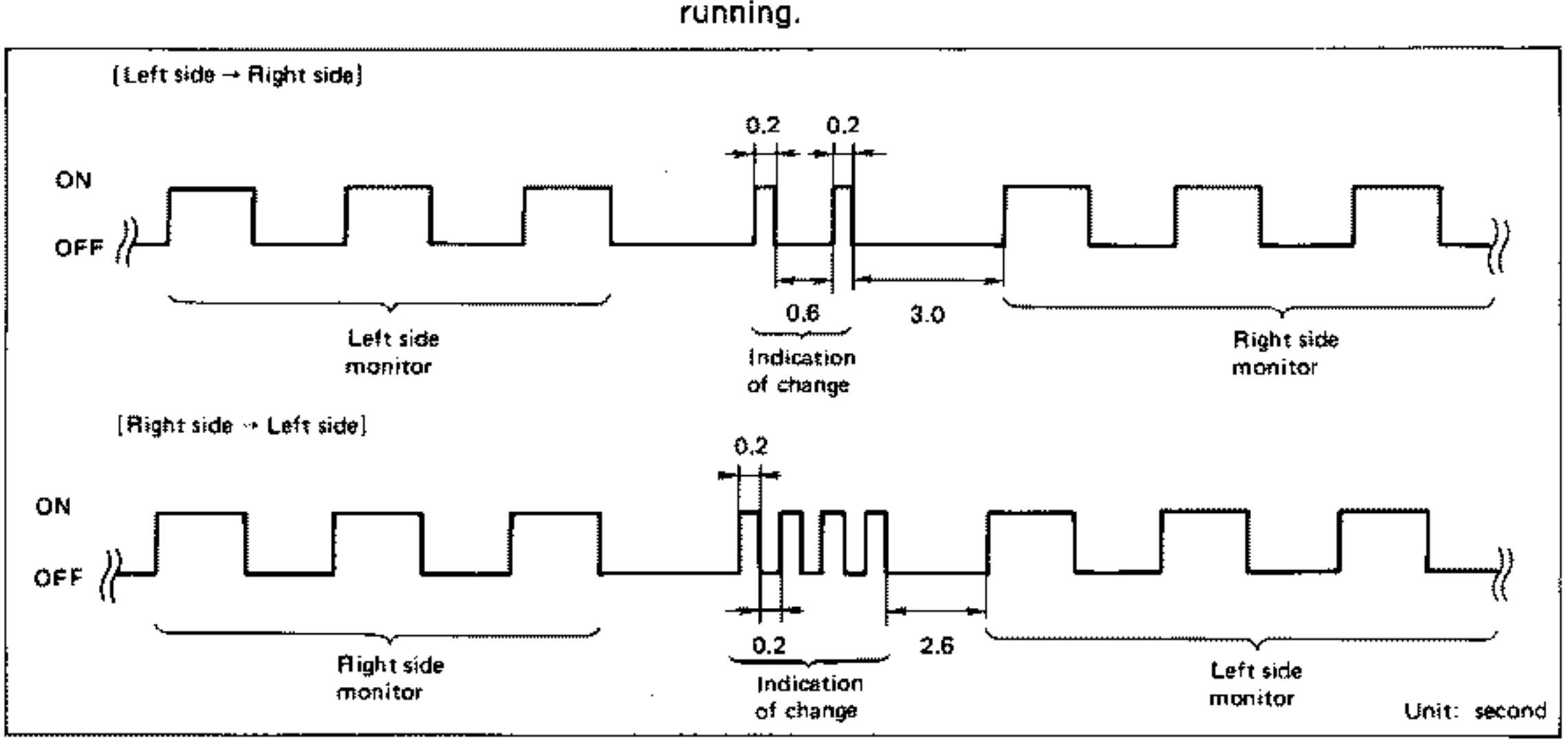
*: Maintains conditions just before switching to open loop.

If two exhaust gas sensors (right side and left side) are fitted on the engine, the left side exhaust gas sensor monitor operates first, when selecting this mode.

HOW TO CHANGE MONITOR FROM LEFT SIDE (Right side) TO RIGHT SIDE (Left side)

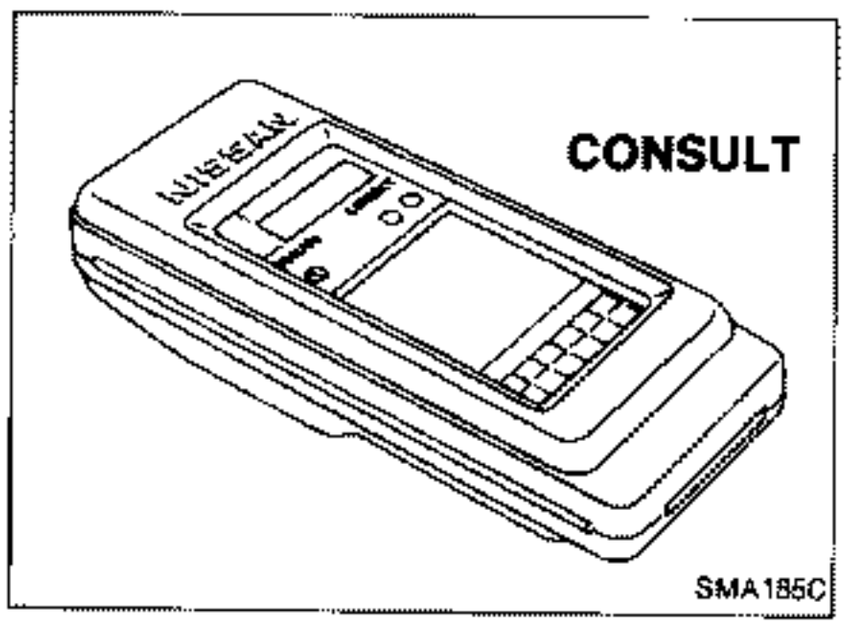
1. Turn diagnostic mode selector on E.C.U. fully clockwise.
2. Wait at least 2 seconds.
3. Turn diagnostic mode selector on E.C.U. fully counterclockwise.

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



HOW TO CHECK EXHAUST GAS SENSOR

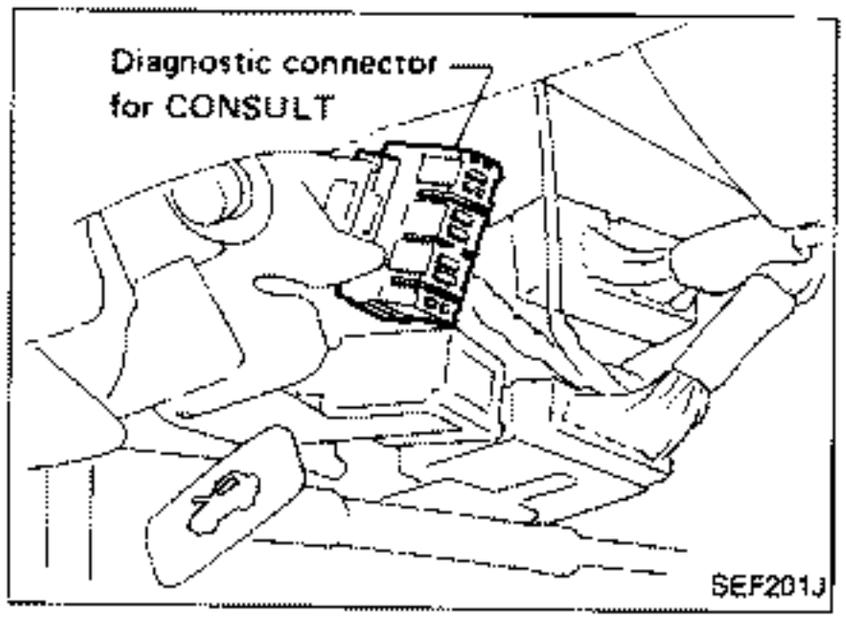
1. Set Mode II. (Refer to "HOW TO SWITCH MODES".)
2. Start engine and warm it up until engine coolant temperature indicator points to the middle of the gauge.
3. Run engine at about 2,000 rpm for about 2 minutes under no-load conditions.
4. Make sure RED L.E.D. or CHECK ENGINE LIGHT goes ON and OFF more than 5 times every 10 seconds; measured at 2,000 rpm under no-load.

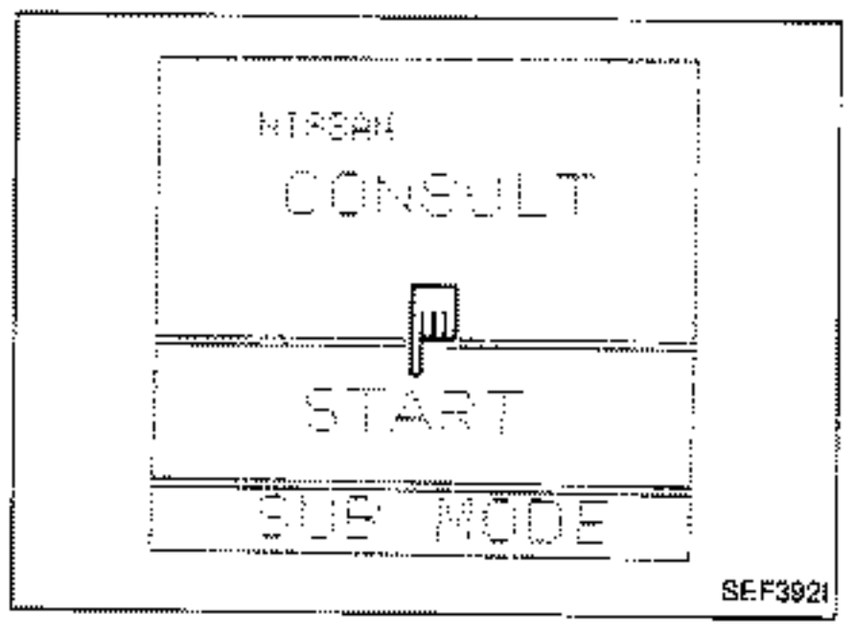


Consult

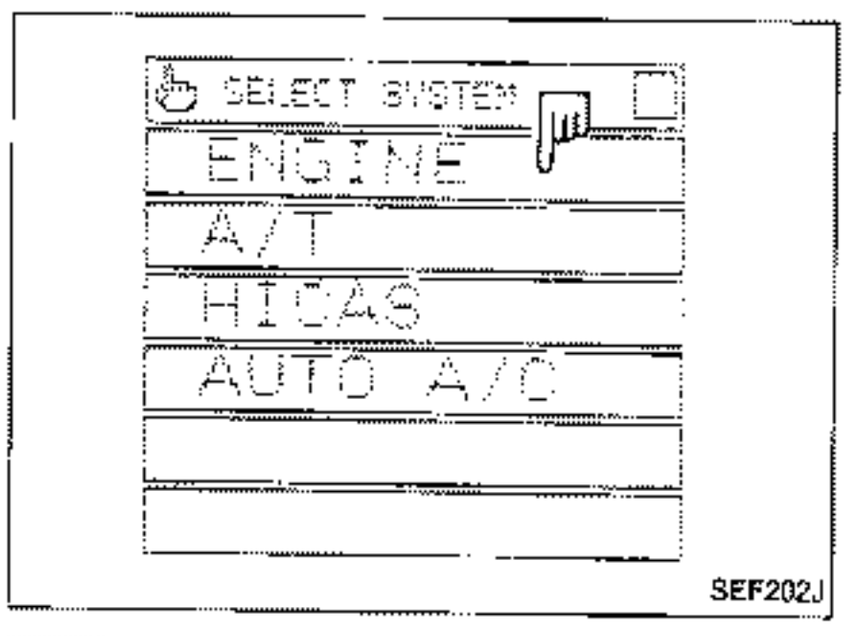
CONSULT INSPECTION PROCEDURE

1. Turn off ignition switch.
2. Connect "CONSULT" to diagnostic connector.
   (Diagnostic connector is located in left dash side panel.)

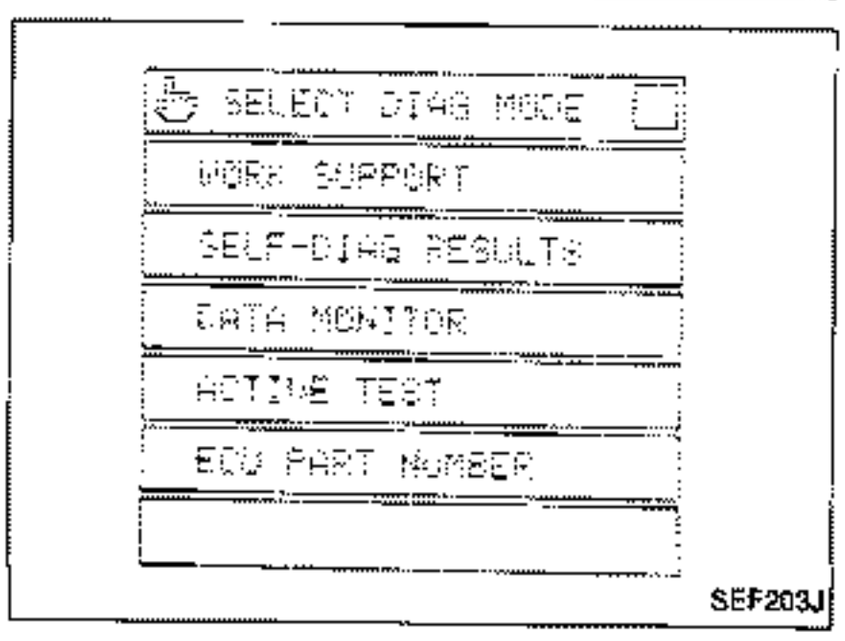




3. Turn on ignition switch.
4. Touch "START".



5. Touch "ENGINE".



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

For further information, see the CONSULT Operation Manual.

Consult (Cont'd)

E.C.C.S. COMPONENT PARTS APPLICATION

E.C.C.S. COMPONENT PARTS \ MODE		WORK SUPPORT	SELF- DIAGNOS-TIC RESULTS	DATA MONITOR	ACTIVE TEST
INPUT	Control unit (E.C.U.)		X		
	Crank angle sensor		X	X	
	Air flow meter		X	X	
	Engine temperature sensor		X	X	X
	Exhaust gas sensors		X*	X	
	Vehicle speed sensor		X*	X	
	Throttle sensor	X	X	X	
	Fuel temperature sensor		X	X	
	Defonation sensor		X		
	Ignition switch (start signal)			X	
	Air conditioner switch			X	
	Neutral switch			X	
	Power steering oil pressure switch			X	
	Battery			X	
	A/T signal		X	X	
*	Exhaust gas temperature sensor		X*	X*	
OUTPUT	Injectors		X*	X	X
	Power transistors (ignition signal)	X (Ignition timing)	X	X (Ignition timing)	X
	A.A.C. valve	X		X	X
	F.I.C.D. solenoid valve			X	X
	Valve timing control solenoid valve			X	X
	A.I.V. control solenoid valve			X	X
	P.R.V.R. control solenoid valve		X*		X
	E.G.R. control solenoid valve			X	X
	Wastegate valve control solenoid valves			X	
	Air conditioner relay			X	
	Fuel pump relay	X		X	X
	Radiator fan			X	X

X: Applicable *: U.S.A. model

Consult (Cont'd)

FUNCTION

Diagnostic mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT unit.
Self-diagnostic results	Self-diagnostic results can be read and erased quickly.
Data monitor	Input/Output data in the control unit can be read.
Active test	Mode in which CONSULT drives some actuators apart from the control units and also shifts some parameters in a specified range.
E.C.U. part numbers	E.C.U. part number can be read.

WORK SUPPORT MODE

WORK ITEM	CONDITION	USAGE
THROTTLE SENSOR ADJUSTMENT	CHECK THE THROTTLE SENSOR SIGNAL. ADJUST IT TO THE SPECIFIED VALUE BY ROTATING THE SENSOR BODY UNDER THE FOLLOWING CONDITIONS. • IGN SW "ON" • ENG NOT RUNNING • ACC PEDAL NOT PRESSED	When adjusting throttle sensor initial position.
IGNITION TIMING ADJUSTMENT*	• IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING "START". AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CRANK ANGLE SENSOR.	When adjusting initial ignition timing.
AAC VALVE ADJUSTMENT	SET ENGINE RPM AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS. • ENGINE WARMED UP • NO-LOAD	When adjusting idle speed.
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line.

*: The ignition timing feedback control is not adopted on model 300ZX, so it is not necessary to perform IGNITION TIMING ADJUSTMENT.

Consult (Cont'd)

SELF-DIAGNOSTIC RESULTS MODE

DIAGNOSTIC ITEM	DIAGNOSTIC ITEM IS DETECTED WHEN ...	CHECK ITEM (REMEDY)
CRANK ANGLE 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 crank angle sensor.)
AIR FLOW METER	• The air flow meter circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector (If harness and connector are normal, replace air flow meter.)
ENGINE TEMP SENSOR	• The engine temperature sensor circuit is open or shorted. (An abnormally high or low output voltage is entered.)	• Harness and connector • Engine temperature sensor
IGN SIGNAL-PRIMARY*	• The ignition signal in primary circuit is not entered during engine cranking or running.	• Harness and connector • Power transistor unit
CONTROL UNIT	• E.C.U. calculation function is malfunctioning.	(Replace E.C.C.S. control unit.)
DETONATION SENSOR	• The detonation circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Detonation sensor
FUEL TEMP SENSOR	• The fuel temperature sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Fuel temperature sensor
THROTTLE SENSOR	• The throttle sensor circuit is open or shorted. (An abnormally high or low voltage is entered.)	• Harness and connector • Throttle sensor
A/T COMM LINE	• The A/T communication line is open or shorted.	• Harness and connector

*: Check items causing a malfunction of crank angle sensor circuit first, if both "CRANK ANGLE SENSOR" and "IGN SIGNAL—PRIMARY" are displayed at the same time.

Consult (Cont'd)

DATA MONITOR MODE

Remarks; • The monitor item marked "**" is applicable to vehicles for the U.S.A. only.
- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by E.C.U. 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 E.C.U. according to the input signals from crank angle sensor and other ignition timing related sensors.

MONITOR ITEM	CONDITION		SPECIFICATION		CHECK ITEM WHEN OUTSIDE SPEC.
			Non-turbo	Turbo	
CAS-RPM (POS) CAS-RPM (REF)	• Tachometer: Connect • Run engine and compare tachometer indication with the CONSULT value.		Almost the same speed as the CONSULT value.		• Harness and connector • Crank angle sensor
AIR FLOW MTR	• Engine: After warming up, idle the engine • A/C switch "OFF" • Shift lever "N" • No-load	Idle	0.8 - 1.5V	0.9 - 1.4V	• Harness and connector • Air flow meter
		2,000 rpm	1.4 - 1.8V	1.4 - 1.8V	
ENG TEMP SEN	• Engine: After warming up		More than 70°C (158°F)		• Harness and connector • Engine temperature sensor
EXH GAS SEN EXH GAS SEN-R M/R F/C MNT M/R F/C MNT-R	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ↔ 0.6 - 1.0V		• Harness and connector • Exhaust gas sensor • Intake air leaks • Injectors
			LEAN ↔ RICH Changes more than 5 times during 10 seconds.		
CAR SPEED SEN	• 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 • E.C.U. power supply circuit
THROTTLE SEN	• Ignition switch: ON (Engine stopped)	Throttle valve fully closed	0.4 - 0.5V		• Harness and connector • Throttle sensor • Throttle sensor adjustment
		Throttle valve fully opened	Approx. 4.0V		
FUEL TEMP SEN	• Engine: After warming up		20 - 60°C (68 - 140°F)		• Harness and connector • Fuel temp. sensor
START SIGNAL	• Ignition switch: ON → START		OFF → ON		• Harness and connector • Starter switch
IDLE POSITION	• Ignition switch: ON (Engine stopped)	Throttle valve: Idle position	ON		• Harness and connector • Throttle sensor • Throttle sensor adjustment
		Throttle valve: Slightly open	OFF		

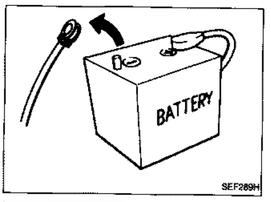
Consult (Cont'd)

MONITOR ITEM	CONDITION		SPECIFICATION		CHECK ITEM WHEN OUTSIDE SPEC.
			Non-turbo	Turbo	
AIR COND SIG	• Engine: After warming up, idle the engine	A/C switch "OFF"	OFF		• Harness and connector • Air conditioner switch
		A/C switch "ON"	ON		
NEUTRAL SW	• Ignition switch: ON	Shift lever "P" or "N"	ON		• Harness and connector • Neutral switch
		Except above	OFF		
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel in neutral (forward direction)	OFF		• Harness and connector • Power steering oil pressure switch
		The steering wheel is turned	ON		
INJ PULSE	• Engine: After warming up • A/C switch "OFF" • Shift lever "N" • No-load	Idle	2.0 - 3.0 msec.	1.8 - 2.5 msec.	• Harness and connector • Injector • Air flow meter • Intake air system
INJ PULSE-R		2,000 rpm	2.0 - 3.0 msec.	1.8 - 2.2 msec.	
IGN TIMING	ditto	Idle	15° B.T.D.C.	15° B.T.D.C.	• Harness and connector • Crank angle sensor
		2,000 rpm	More than 25° B.T.D.C.	More than 25° B.T.D.C.	
AAC VALVE	ditto	Idle	15 - 40%	15 - 35%	• Harness and connector • A.A.C. valve
		2,000 rpm	—	—	
EGR TEMP SEN**	• Engine: After warming up		Less than 4.5V		• Harness and connector • Exhaust gas temperature sensor

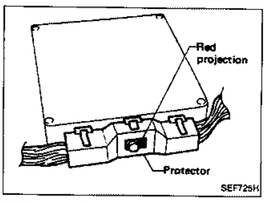
Consult (Cont'd)

ACTIVE TEST MODE

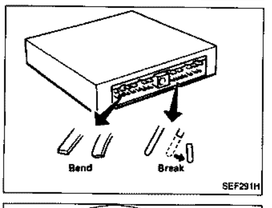
TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
FUEL INJECTION TEST	• Engine: Return to the original trouble condition • Change the amount of fuel injection with the CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connector • Fuel injectors • Exhaust gas sensor
AAC/V OPENING TEST	• Engine: After warming up, idle the engine. • Change the AAC valve opening percent with the CONSULT.	Engine speed changes according to the opening percent.	• Harness and connector • AAC valve
ENGINE 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 temperature sensor • Fuel injectors
IGN TIMING TEST	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing with the CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Adjust initial ignition timing
POWER BALANCE TEST	• Engine: After warming up, idle the engine. • A/C switch "OFF" • Shift lever "N" • Cut off each injector signal one at a time with the CONSULT.	Engine runs rough or dies.	• Harness and connector • Compression • Injectors • Power transistor • Spark plugs • Ignition coils
RADIATOR FAN TEST	• Ignition switch: ON • Turn the radiator fan "ON" and "OFF" with the CONSULT.	Radiator fan moves and stops.	• Harness and connector • Radiator fan motor
FICD SOL/V TEST	• Engine: After warming up, idle the engine. • A/C switch "OFF" • Shift lever "N" • Turn the FICD solenoid valve "ON" with the CONSULT.	Engine speed will increase momentarily by approx. 200 rpm.	• Harness and connector • FICD solenoid valve
FUEL PUMP RLY TEST	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay "ON" and "OFF" with the CONSULT and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connector • Fuel pump relay
EGR CONT SOL/V TEST	• Ignition switch: ON • Turn solenoid valve "ON" and "OFF" with the CONSULT and listen to operating sound.	Each solenoid valve makes an operating sound.	• Harness and connector • Solenoid valve
PRVR CONT SOL/V TEST			
AIV CONT SOL/V TEST			
VALVE TIM SOL TEST			
SELF-LEARN CONT TEST	• In this test, the coefficient of self-learning control mixture ratio returns to the original coefficient by touching "CLEAR" on the screen.		



SEF289H



SEF725H



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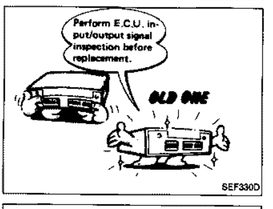
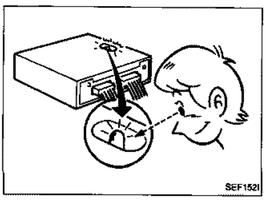


SEF330D

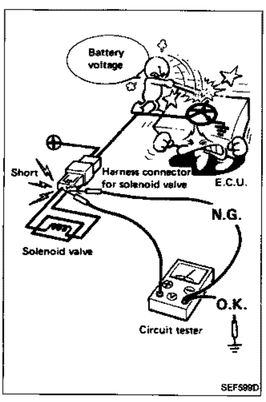

SEF152I

Diagnostic Procedure

CAUTION:

1. **Before connecting or disconnecting the E.C.U. harness connector to or from any E.C.U., be sure to turn the ignition switch to the "OFF" position and disconnect the negative battery terminal in order not to damage E.C.U. as battery voltage is applied to E.C.U. even if ignition switch is turned off. Failure to do so may damage the E.C.U.**
2. **When connecting E.C.U. harness connector, tighten securing bolt until red projection is in line with connector face.**
3. **When connecting or disconnecting pin connectors into or from E.C.U., take care not to damage pin terminals (bend or break).**
4. **Make sure that there are not any bends or breaks on E.C.U. pin terminal, when connecting pin connectors.**
5. **Before replacing E.C.U., perform E.C.U. input/output signal inspection and make sure whether E.C.U. functions properly or not. (See page EF & EC-174.)**
6. **After performing this "Diagnostic Procedure", perform E.C.C.S. self-diagnosis and driving test.**

Diagnostic Procedure (Cont'd)

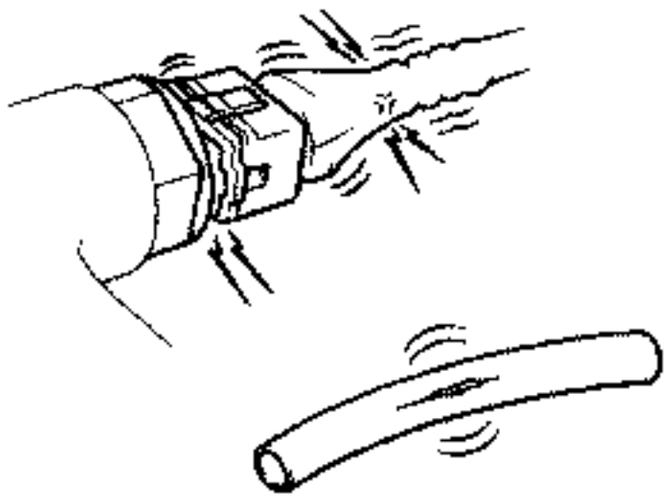


SEF599D

7.When measuring E.C.U. 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 control unit power transistor.

Basic Inspection

1



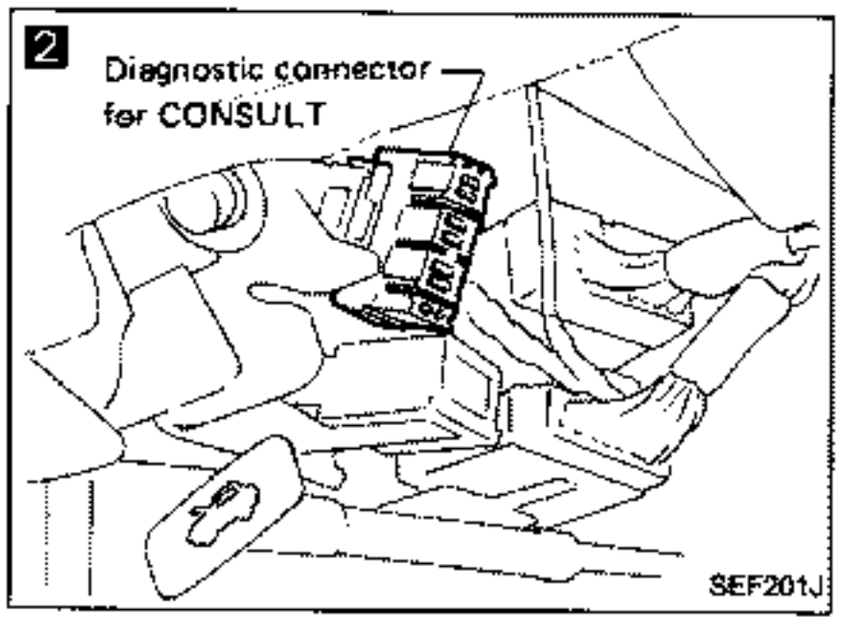
SEF142I

BEFORE STARTING

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

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

2

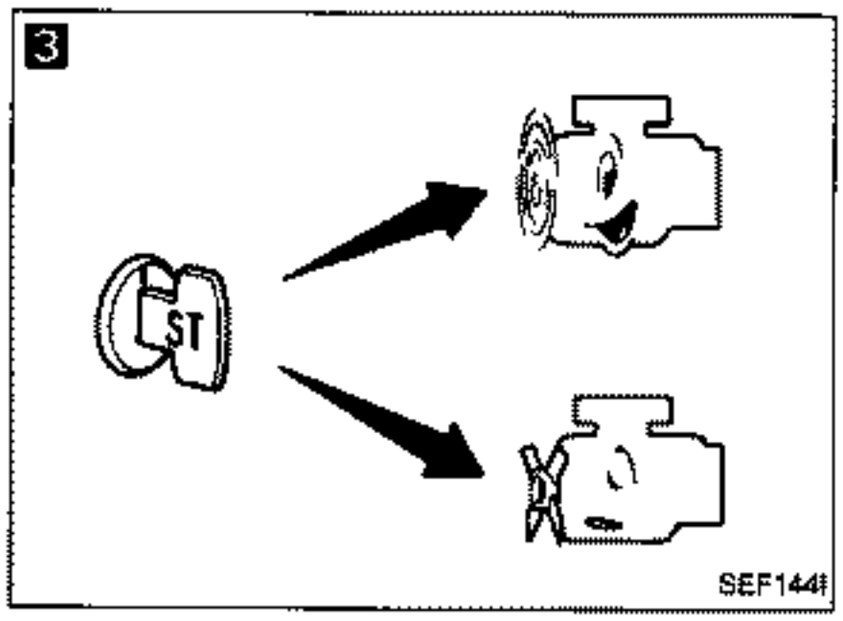


SEF201J

CONNECT CONSULT TO THE VEHICLE

Connect "CONSULT" to the diagnostic connector and select "ENGINE" from the menu. (Refer to page EF & EC-54.)

3



SEF144I

DOES ENGINE START?

No → Go to 6.

Yes

4

CHECK IGNITION TIMING.

Warm up engine sufficiently and check ignition timing at idle using timing light. (Refer to page EF & EC-35.)

Ignition timing:

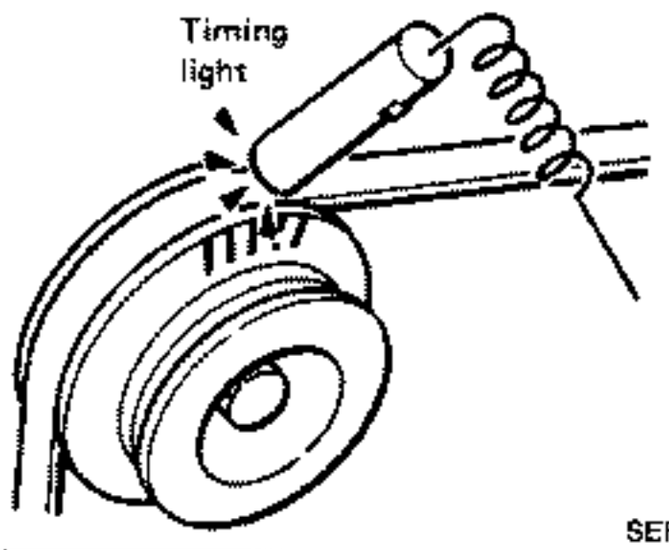
15° ± 2° B.T.D.C.

N.G. → Adjust ignition timing by turning crank angle sensor.

O.K.

(Go to Ⓐ on next page.)

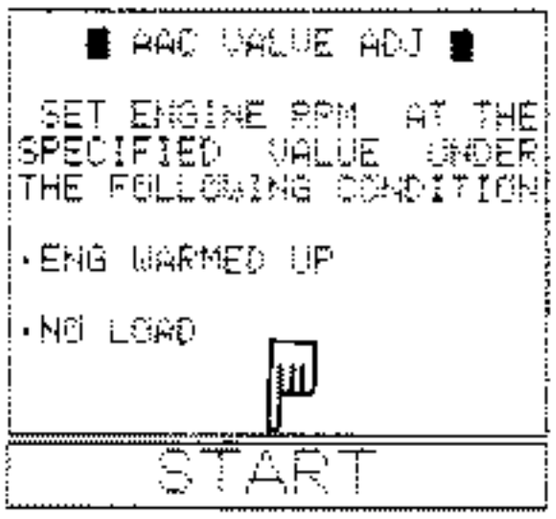
4



SEF284G

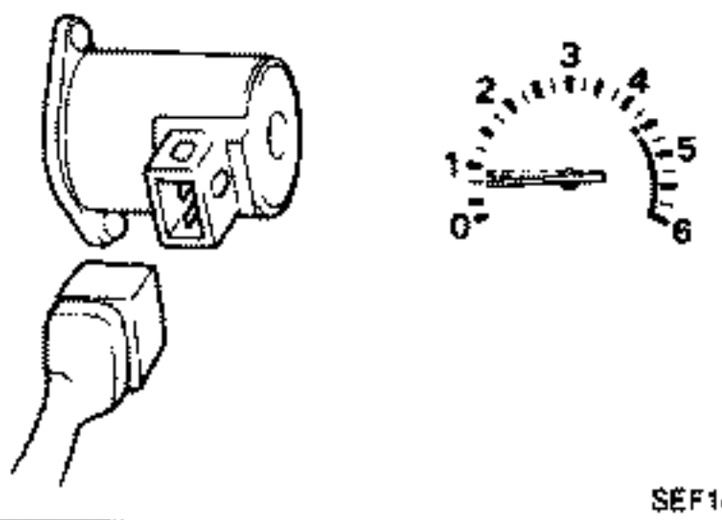
Basic Inspection (Cont'd)

5



SEF372I

5



SEF146I

Ⓐ

5

CHECK IDLE ADJ. SCREW INITIAL SET RPM.

1. Select "A.A.C. VALVE ADJ" in "WORK SUPPORT" mode.
2. When touching "START", does engine rpm fall to;

	A/T*	M/T
Non-turbo	720±50 rpm	650±50 rpm
Turbo	700±50 rpm	

*: in "N" position

OR

When disconnecting A.A.C. valve harness connector, does engine rpm fall to;

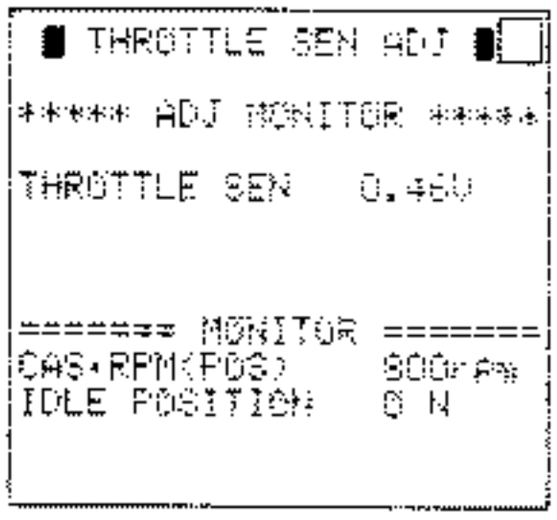
	A/T*	M/T
Non-turbo	720±50 rpm	650±50 rpm
Turbo	700±50 rpm	

*: in "N" position

No → Adjust engine rpm by turning idle adjusting screw.

Yes

6



SEF147I

6

CHECK THROTTLE SENSOR IDLE POSITION.

1. Perform "THROTTLE SEN. ADJ." in "WORK SUPPORT" mode.
2. Check that output voltage of throttle sensor is 0.4 to 0.5V. (Throttle valve fully closes.) and "IDLE POSITION" stays "ON".

OR

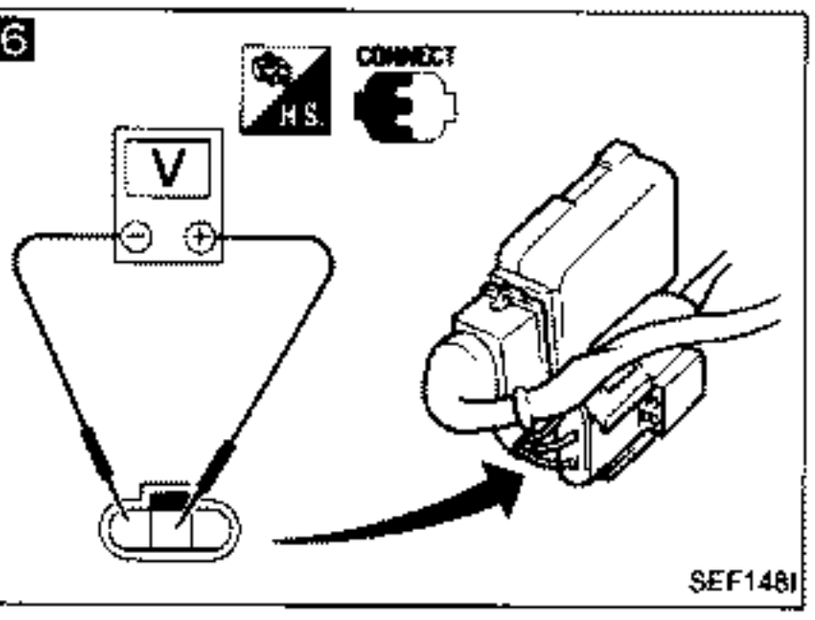
Measure output voltage of throttle sensor using voltmeter, and check that it is 0.4 to 0.5V. (Throttle valve fully closed.)

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

O.K.

(Go to Ⓑ on next page.)

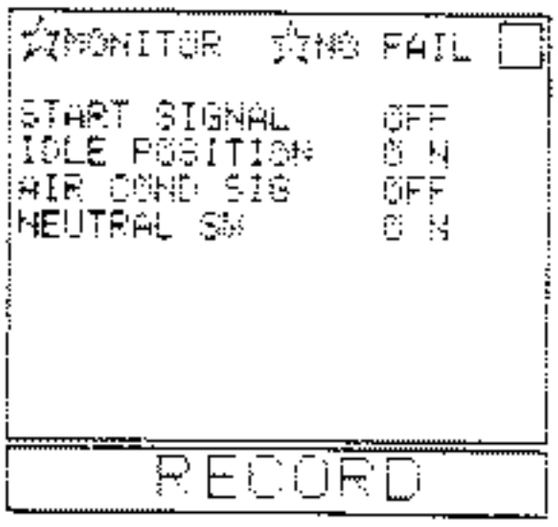
6



SEF148I

Basic Inspection (Cont'd)

7



SEF149I

Ⓑ

7

CHECK SWITCH INPUT SIGNAL.

Select the following switches in "DATA MONITOR" mode,
a) Start signal,
b) Idle position,
c) Air conditioner signal,
d) Neutral (Parking) switch,
and check the switches' ON-OFF operation.

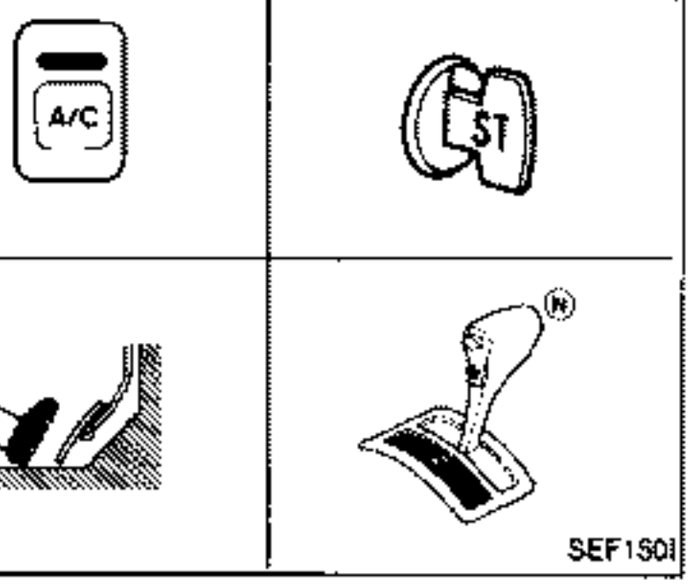
N.G. → Repair or replace the malfunctioning switch or its circuit.

OR

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

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

7



SEF150I

O.K.

8

READ SELF-DIAGNOSTIC RESULTS.

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

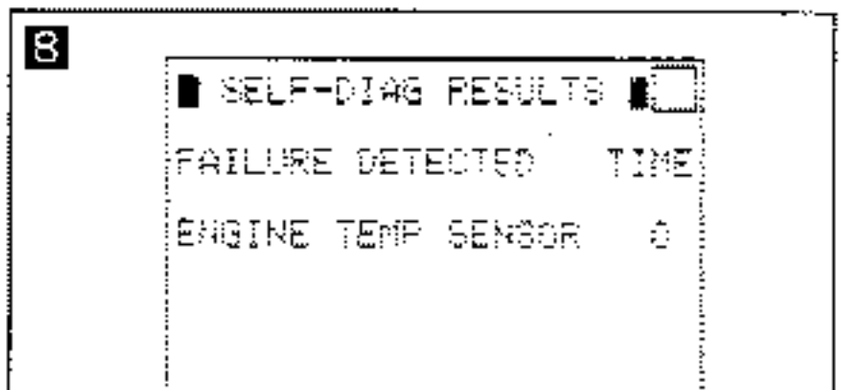
Yes → Go to the relevant inspection procedure.

OR

1. Set "Self-diagnostic results mode" in Mode II. (Refer to page EF & EC-49.)
2. Count the number of check engine light flashes and read out the codes.
3. Are the codes being output?

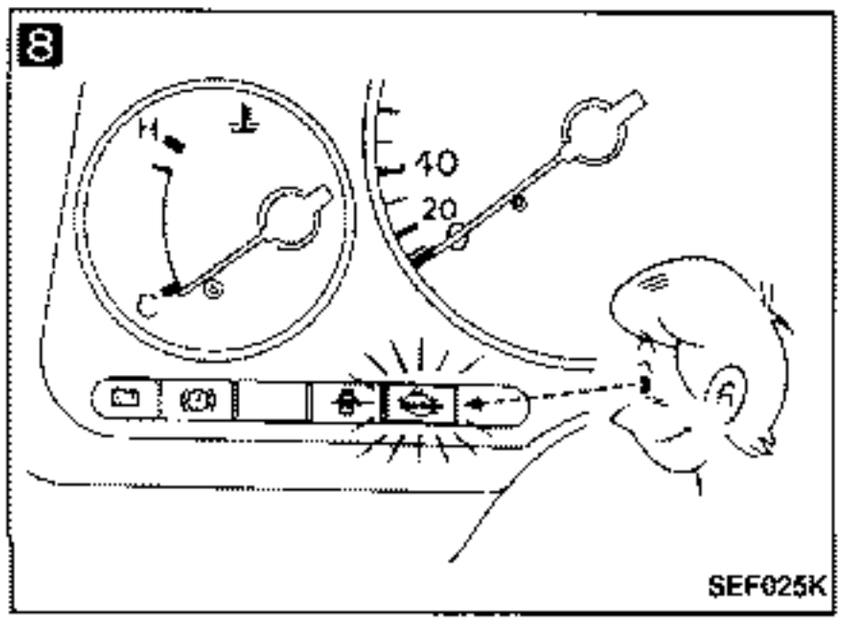
No → INSPECTION END

8



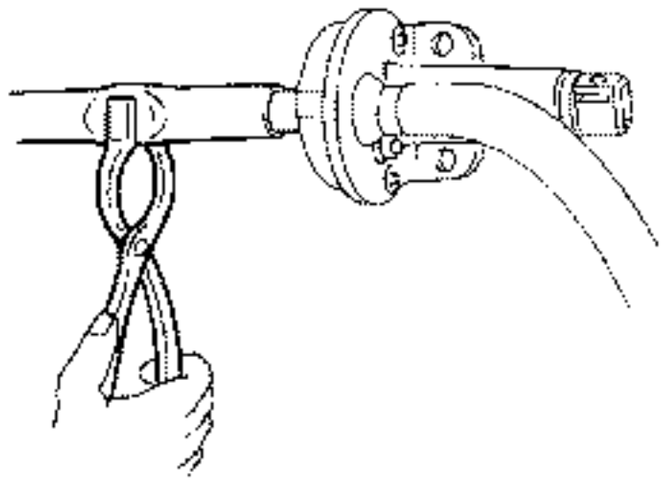
SEF151I

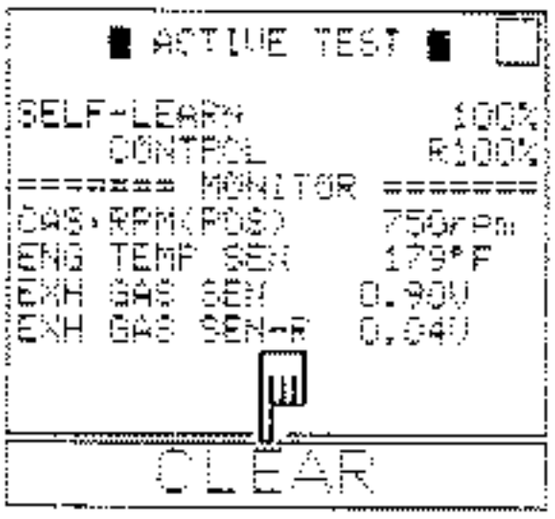
8



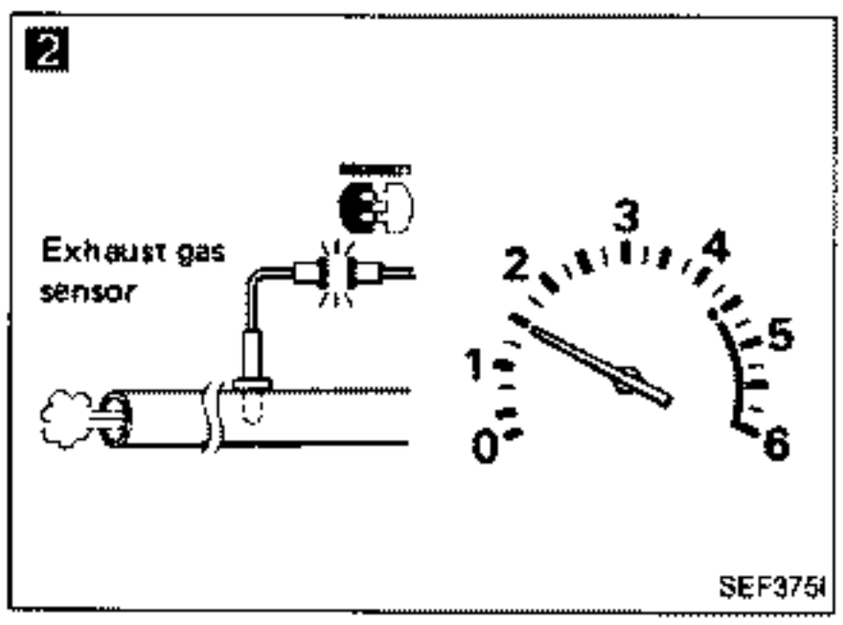
SEF025K

Diagnostic Procedure 1 — High Idling after Warm-up

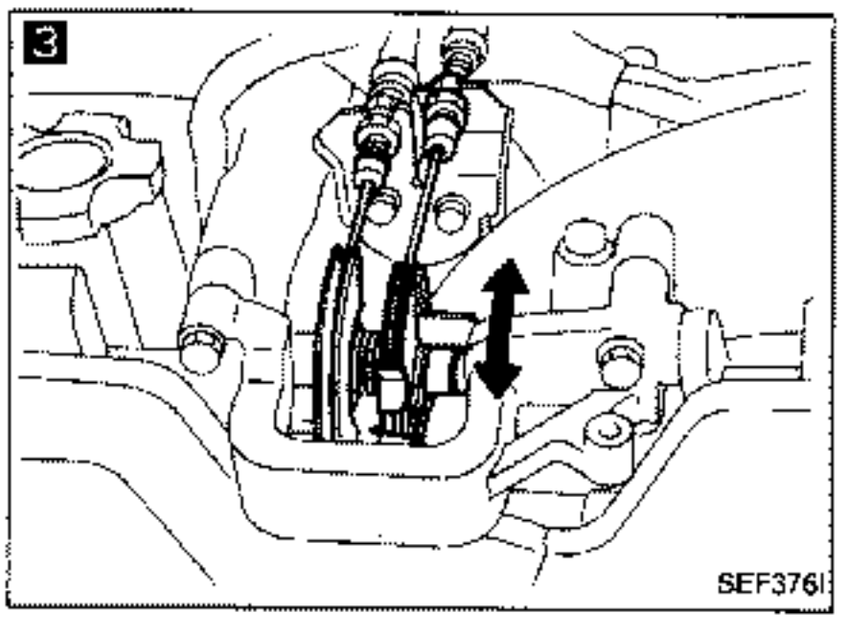

SEF021K



SEF374I



SEF375I


SEF376I

1

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

Yes → Check air regulator and circuit.

No ↓

2

CHECK INTAKE AIR LEAK.

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

— OR —

1. Disconnect exhaust gas sensor harness connectors.
2. After racing engine at 1,500 rpm under no-load for about 30 seconds, does the engine speed drop?

Yes → Discover air leak location and repair.

No ↓

3

CHECK THROTTLE LINKAGE.

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

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

O.K. ↓

INSPECTION END

Diagnostic Procedure 2 — Hunting

1

CHECK EXHAUST GAS SENSOR.
When disconnecting exhaust gas sensor harness connector, is the hunting fixed?

Yes → Check exhaust gas sensor(s). (See page EF & EC-128.)

No ↓

2

PERFORM POWER BALANCE TEST.

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

—OR—

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

No → Go to **4**.

Yes ↓

3

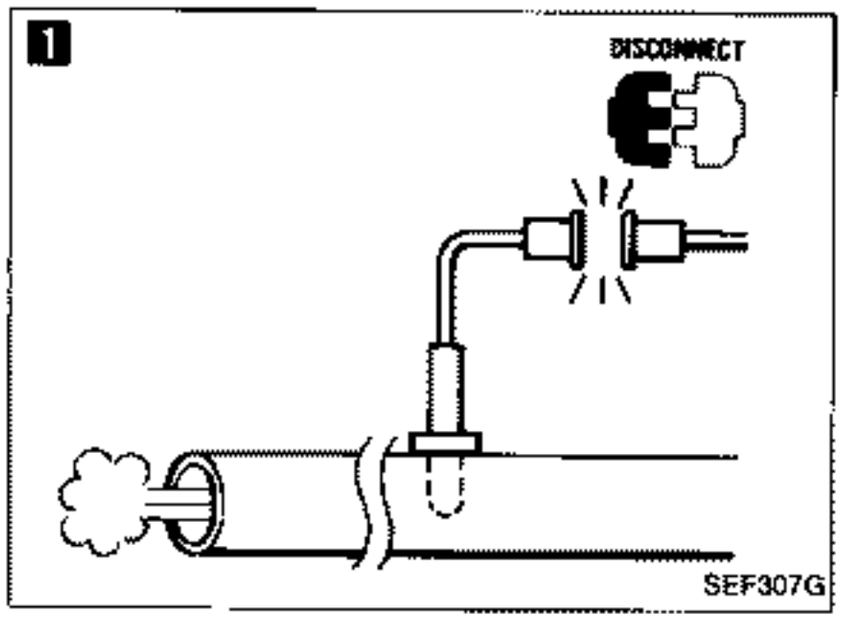
CHECK SPARK PLUGS.
Remove the spark plugs and check for fouling, etc.

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

O.K. ↓

(Go to Ⓐ on next page.)

1



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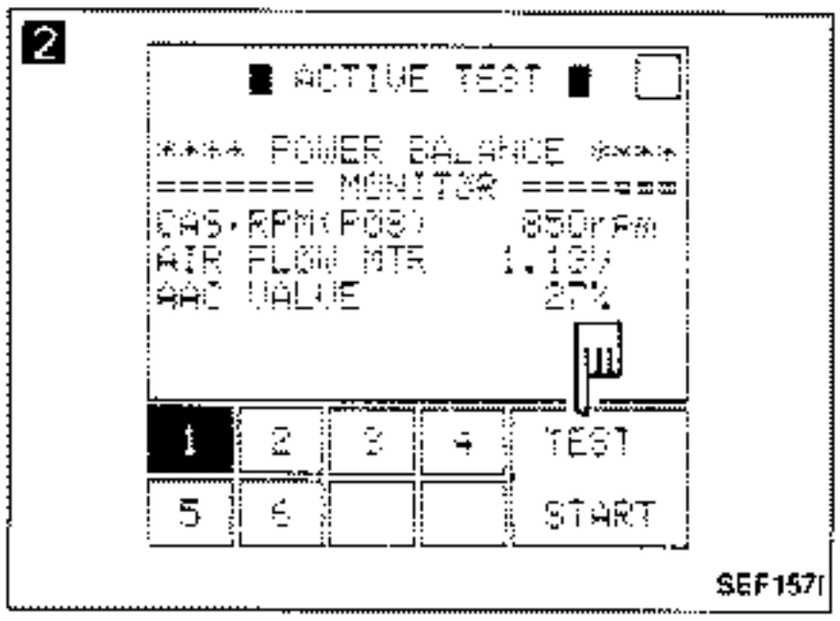

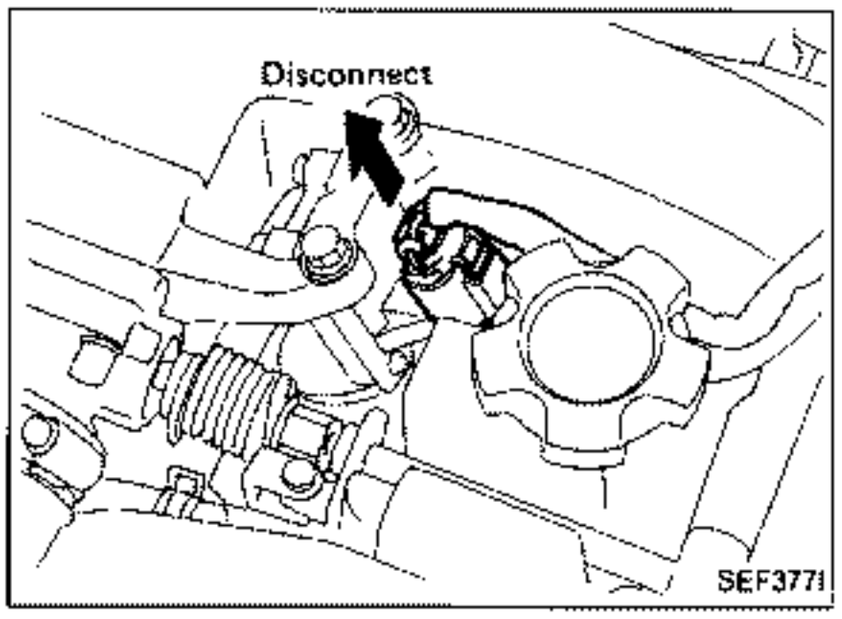

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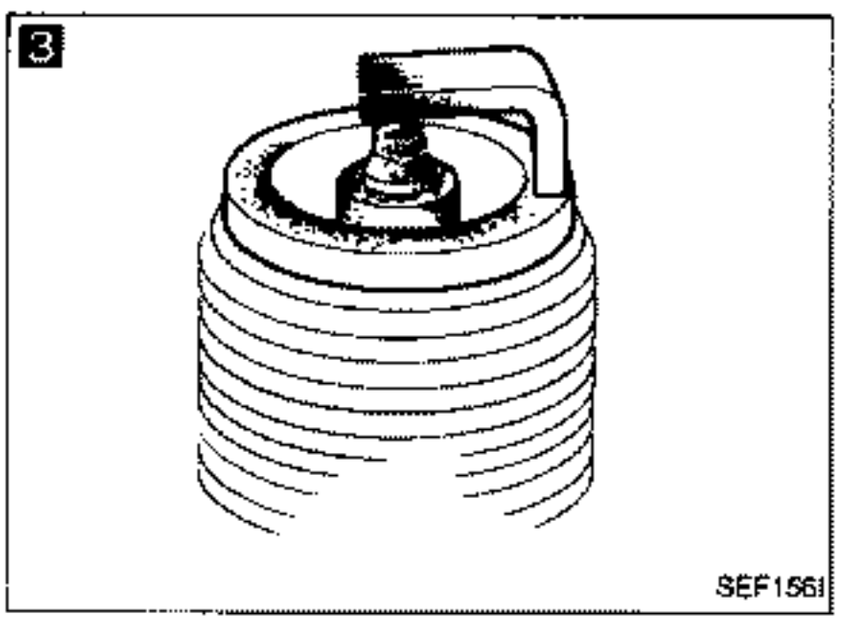
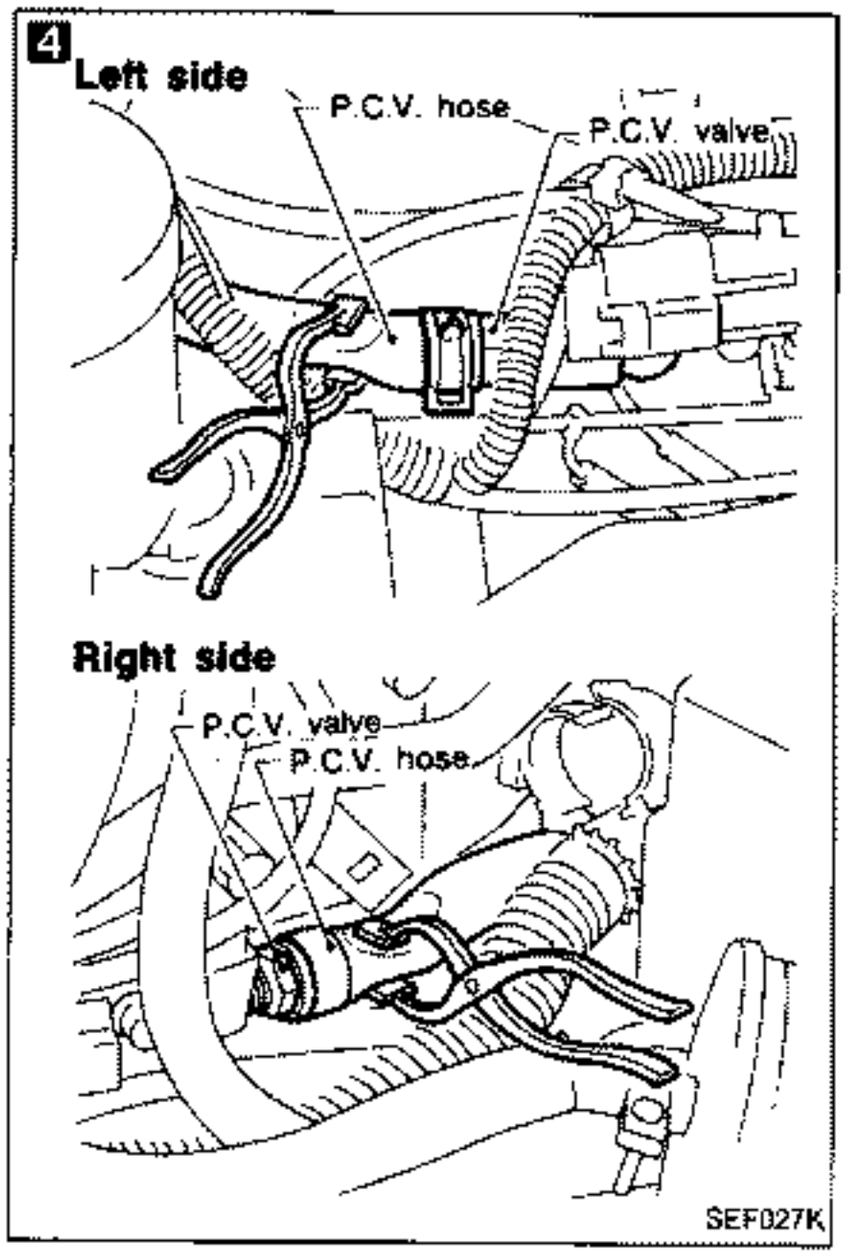
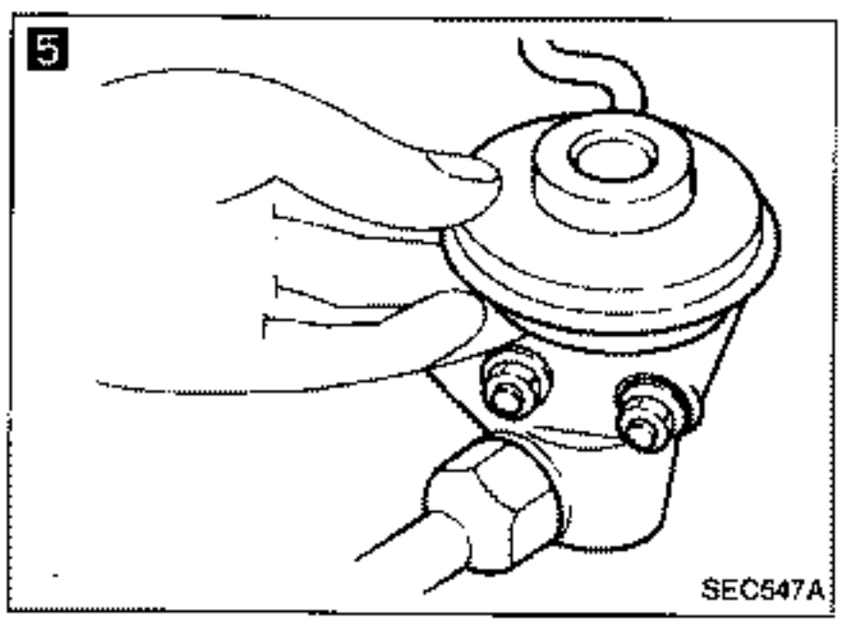


Diagnostic Procedure 2 — Hunting (Cont'd)





Ⓐ

4

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

Yes → Discover air leak location and repair.

No ↓

5

CHECK E.G.R. CONTROL VALVE.
Check E.G.R. control valve for sticking.

N.G. → Repair or replace.

O.K. ↓

INSPECTION END

Diagnostic Procedure 3 — Unstable Idle

1

CHECK E.G.R. CONTROL VALVE.
Check E.G.R. control valve for sticking.

N.G. → Repair or replace.

O.K. ↓

2

PERFORM POWER BALANCE TEST.

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

— OR —

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

No → Go to **6**.

Yes ↓

3

CHECK INJECTOR.

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

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

Yes ↓

4

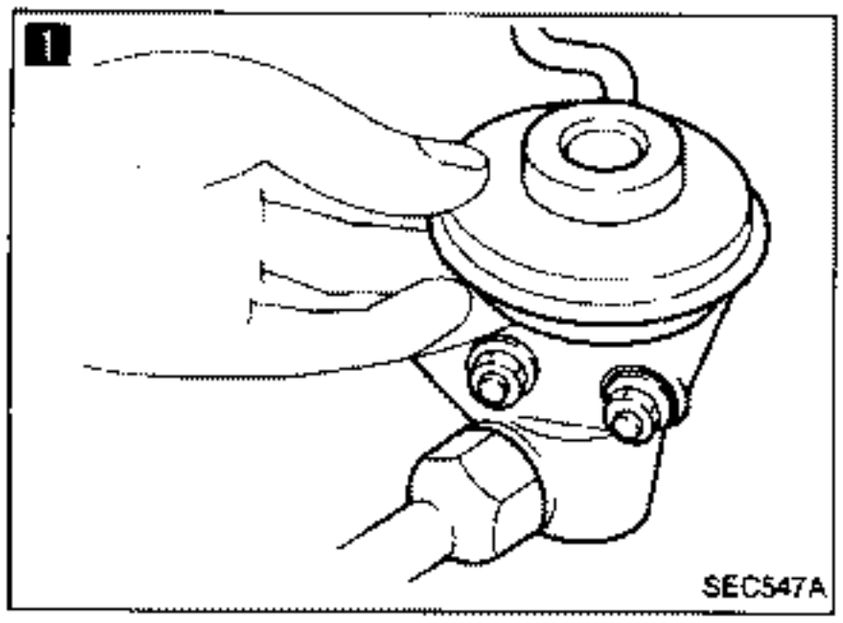
CHECK IGNITION SPARK.

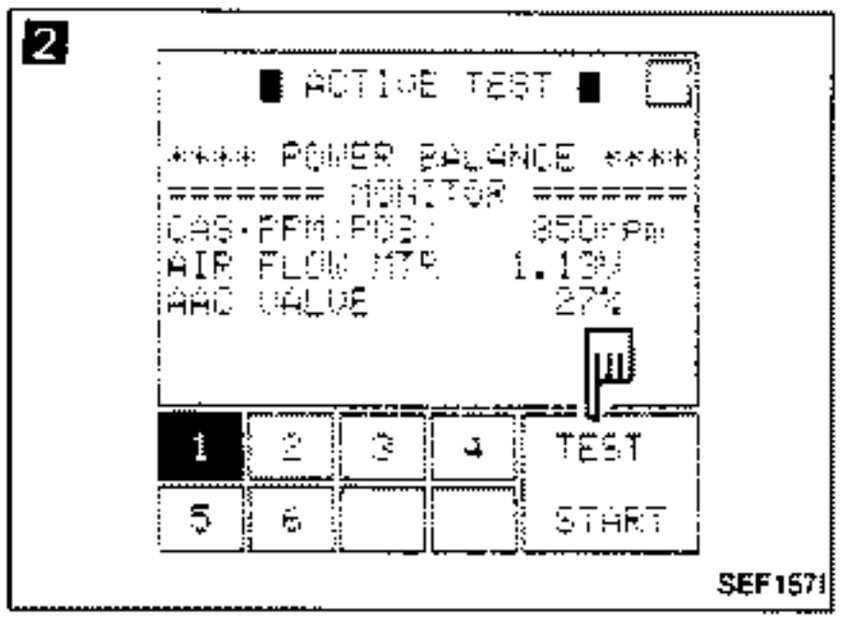
1. Disconnect ignition coil assembly from collector.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

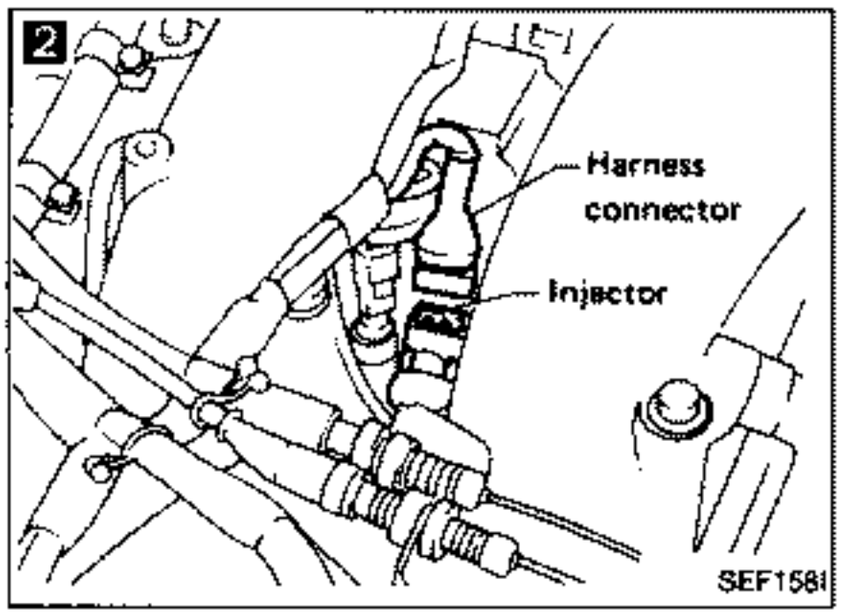
N.G. → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-118.)

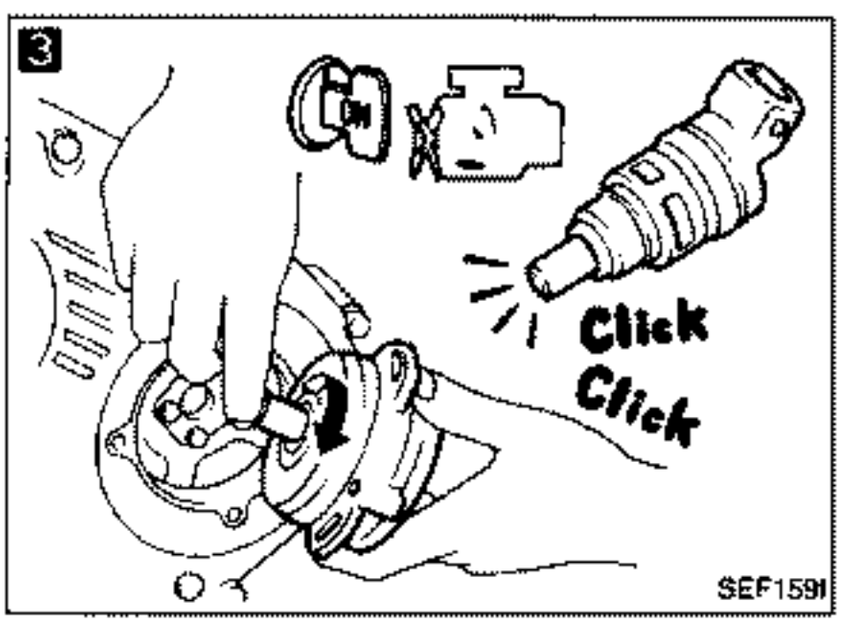
O.K. ↓

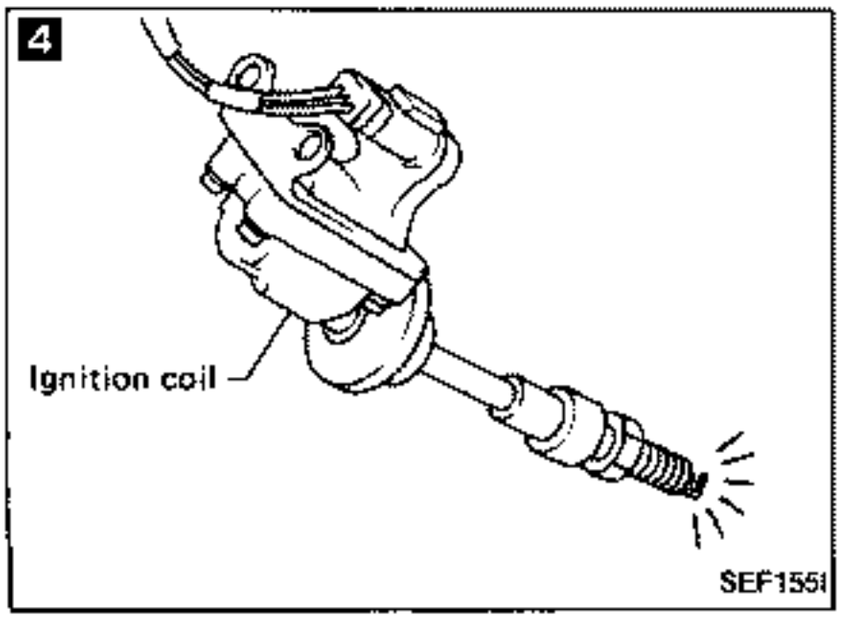
(Go to Ⓐ on next page.)





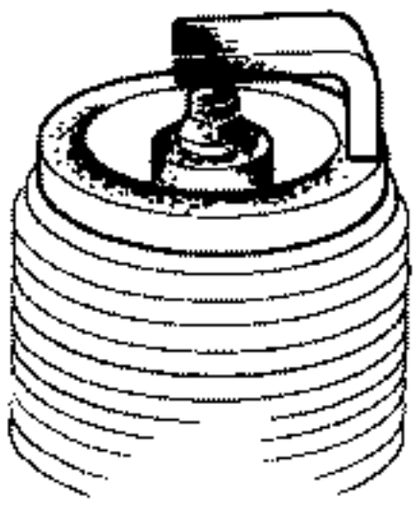






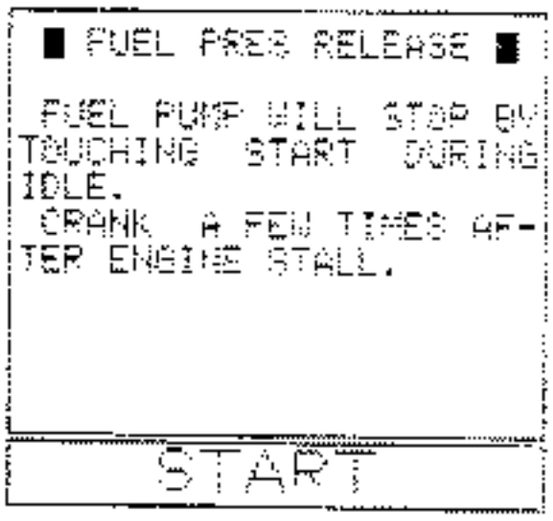
Diagnostic Procedure 3 — Unstable Idle (Cont'd)

5



SEF156I

6



SEF204I

Ⓐ

5

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

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

O.K.

6

CHECK FUEL PRESSURE.

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.
   At idle approx. 255 kPa (2.55 bar, 2.6 kg/cm^2, 37 psi)

N.G. → Check fuel pump and circuit.

OR

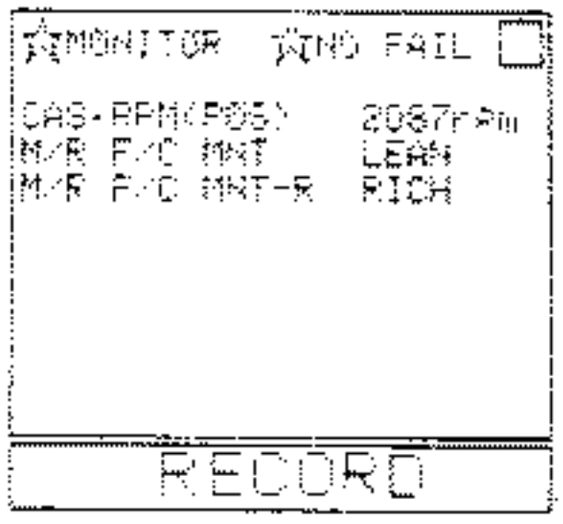
1. Release fuel pressure to zero. (Refer to page EF & EC-185.)
2. Install fuel pressure gauge and check fuel pressure.

O.K.

(Go to Ⓑ on next page.)

Diagnostic Procedure 3 — Unstable Idle (Cont'd)

7



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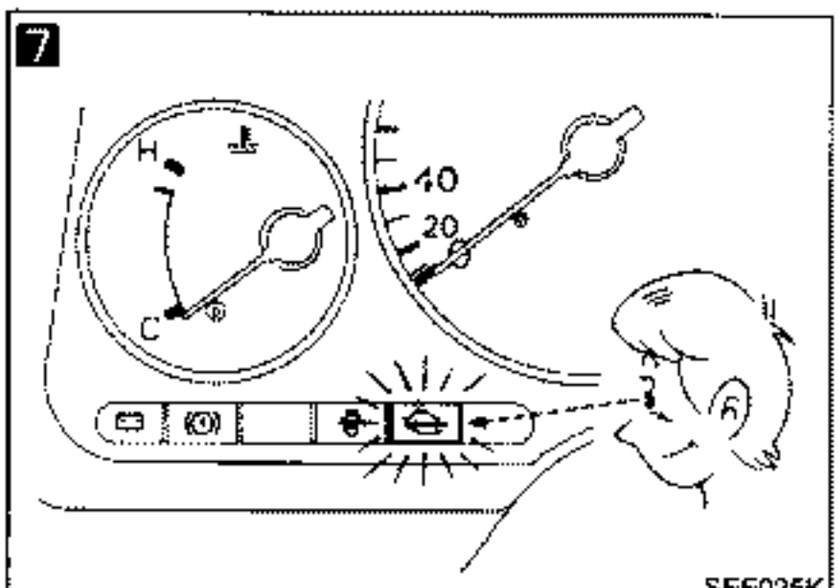
7



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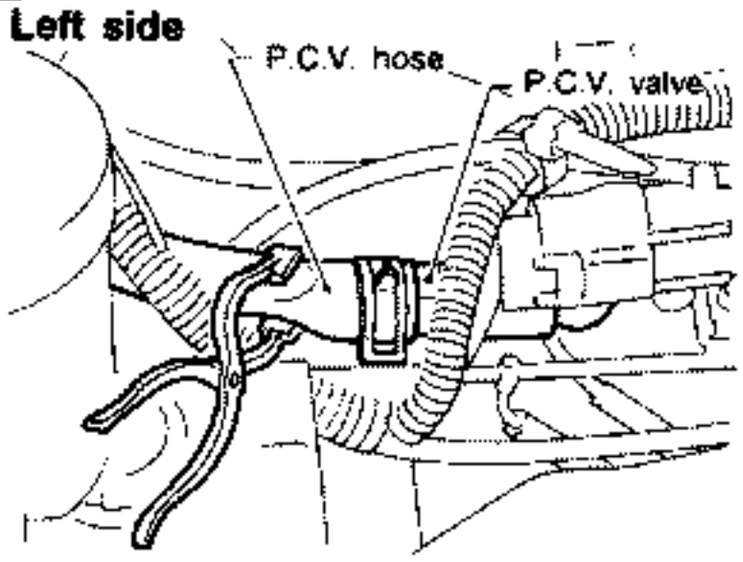
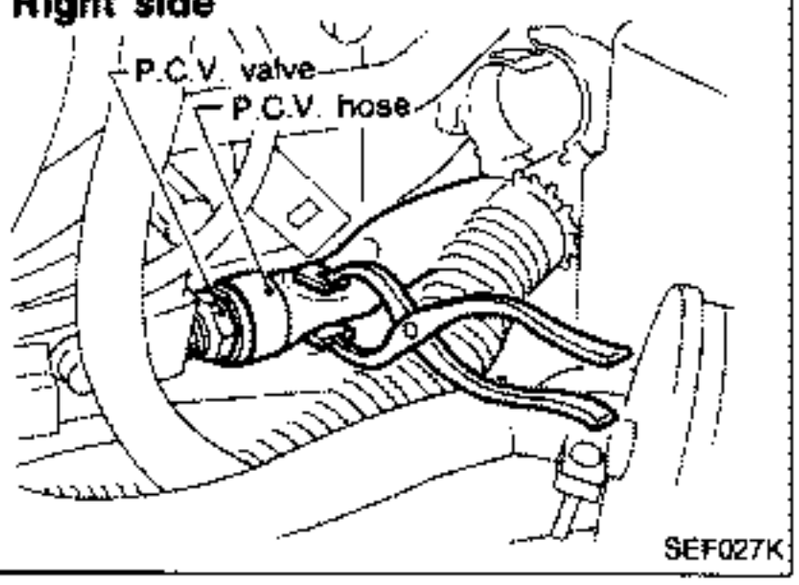
8

Left side



Right side



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Ⓑ

7

CHECK EXHAUST GAS SENSOR.

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

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

N.G. → Replace exhaust gas sensor(s).

OR

1. Set "Exhaust gas sensor monitor" in the self-diagnostic Mode II. (See page EF & EC-49.)
2. Maintaining engine at 2,000 rpm under no-load, check to make sure that check engine light goes ON and OFF more than 5 times during 10 seconds.

O.K.

8

CHECK FOR INTAKE AIR LEAK.

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

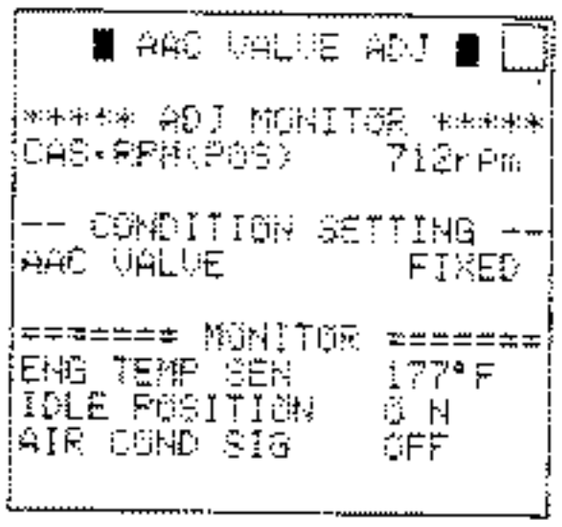
Yes → Discover air leak location and repair.

No

(Go to Ⓒ on next page.)

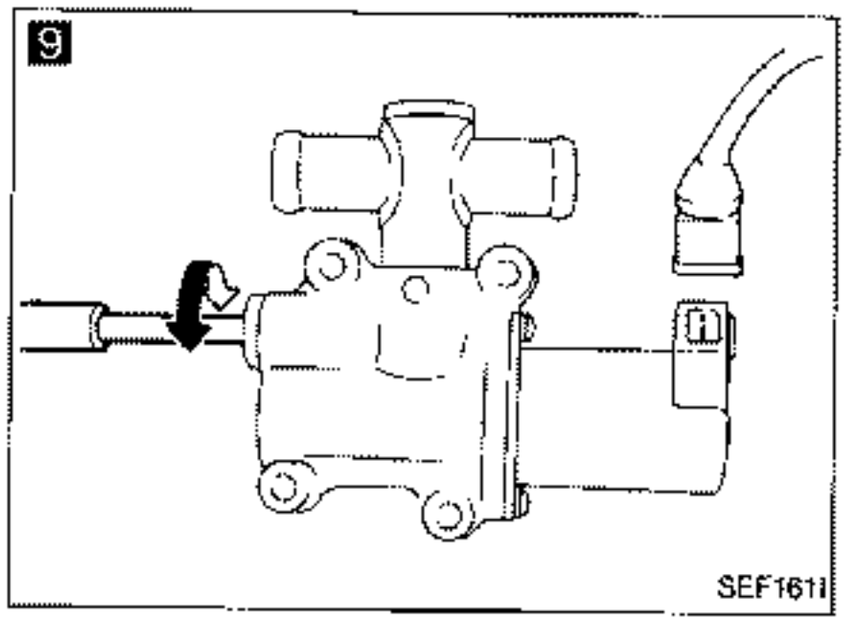
Diagnostic Procedure 3 — Unstable Idle (Cont'd)

9



SEF145I

9



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10

SEF309G

9

CHECK IDLE ADJ. SCREW CLOGGING.

1. Perform "AAC VALVE ADJ" in "WORK SUPPORT" mode.
2. Can you set engine rpm as follows by turning idle adjusting screw?

	A/T*	M/T
Non-turbo	720±50 rpm	650±50 rpm
Turbo	700±50 rpm	

*: in "N" position

No → Check for IAS clogging or throttle valve clogging.

OR

1. Disconnect A.A.C. valve harness connector.
2. Can you set engine rpm as follows by turning idle adjusting screw?

	A/T*	M/T
Non-turbo	720±50 rpm	650±50 rpm
Turbo	700±50 rpm	

*: in "N" position

Yes ↓

10

CHECK COMPRESSION PRESSURE.

- Check compression pressure.

Standard: kPa (bar, kg/cm², psi)/300 rpm

1,285 (12.85, 13.1, 186)

Minimum: kPa (bar, kg/cm², psi)/300 rpm

981 (9.81, 10.0, 142)

Difference between each cylinder: kPa (bar, kg/cm², psi)/300 rpm

98 (0.98, 1.0, 14)

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

O.K. ↓

11

CHECK E.C.U. HARNESS CONNECTOR.

Check the E.C.U. pin terminals for damage or poor connection of E.C.U. harness connector.

N.G. → Repair or replace.

O.K. ↓

12

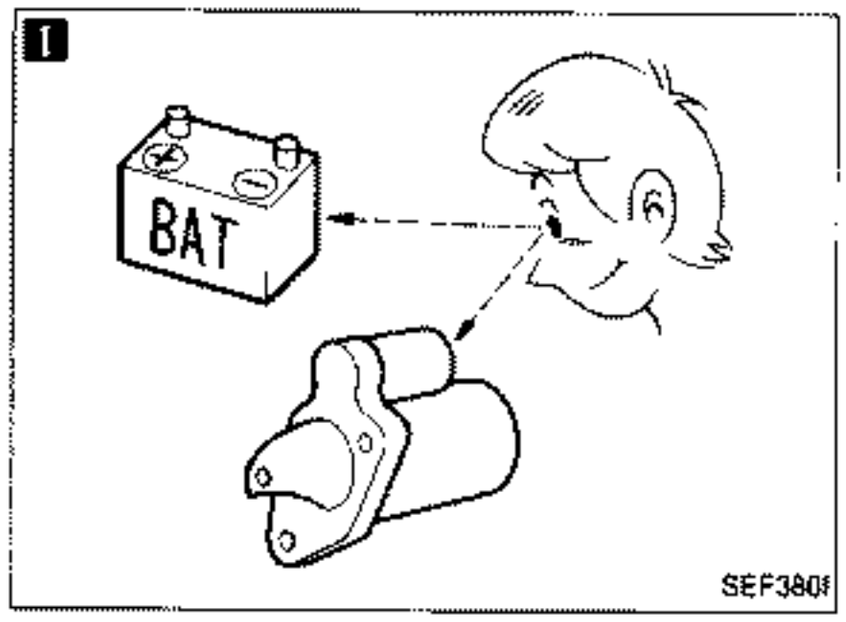
TRY A KNOWN GOOD E.C.U.

O.K. ↓

INSPECTION END

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

1

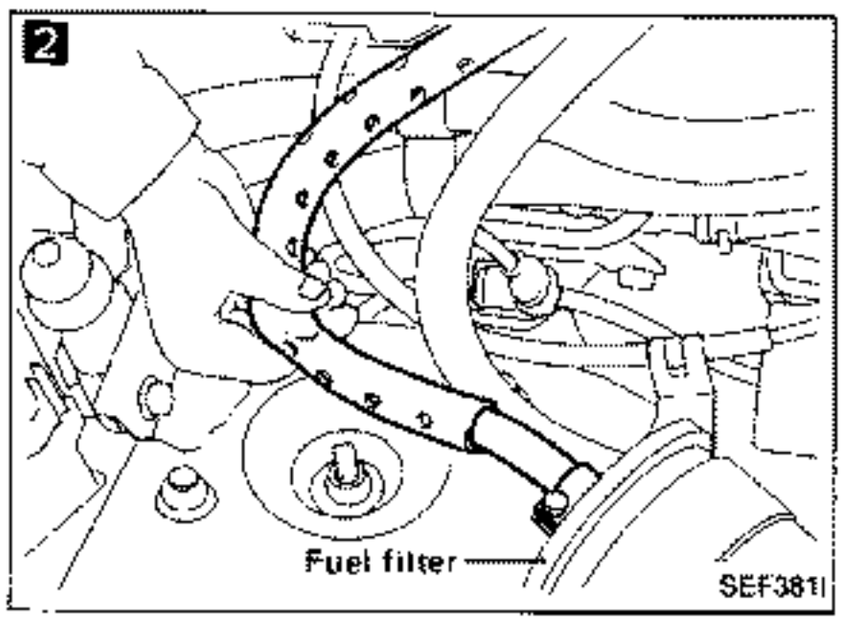


CHECK BATTERY AND STARTER.
Check battery and starter condition.
(Refer to EL section.)

N.G. → Repair or replace.

O.K. ↓

2

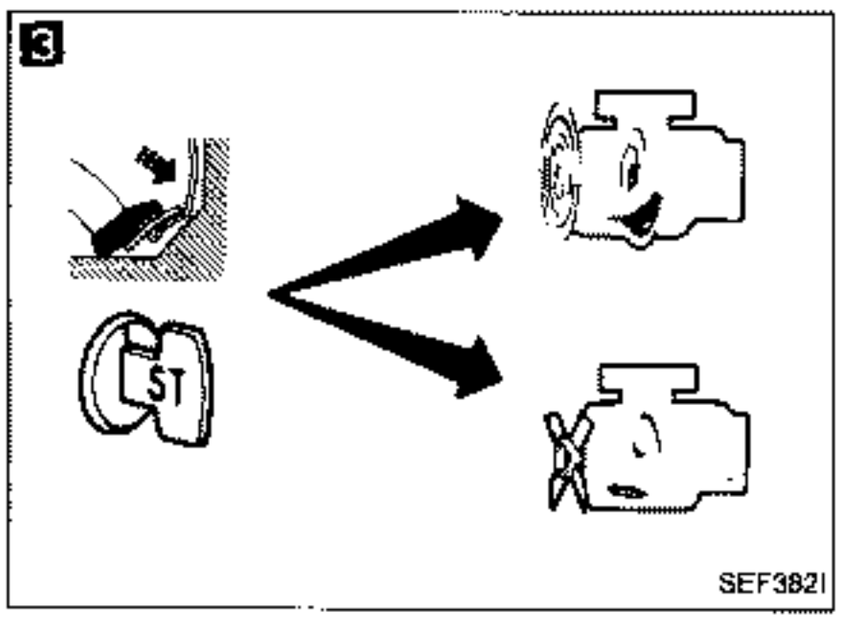


CHECK FUEL PRESSURE.
1. Pinch fuel feed hose with fingers.
2. When cranking the engine, is there any pressure on the fuel feed hose?

No → Check fuel pump and circuit. (See page EF & EC-150.)

Yes ↓

3

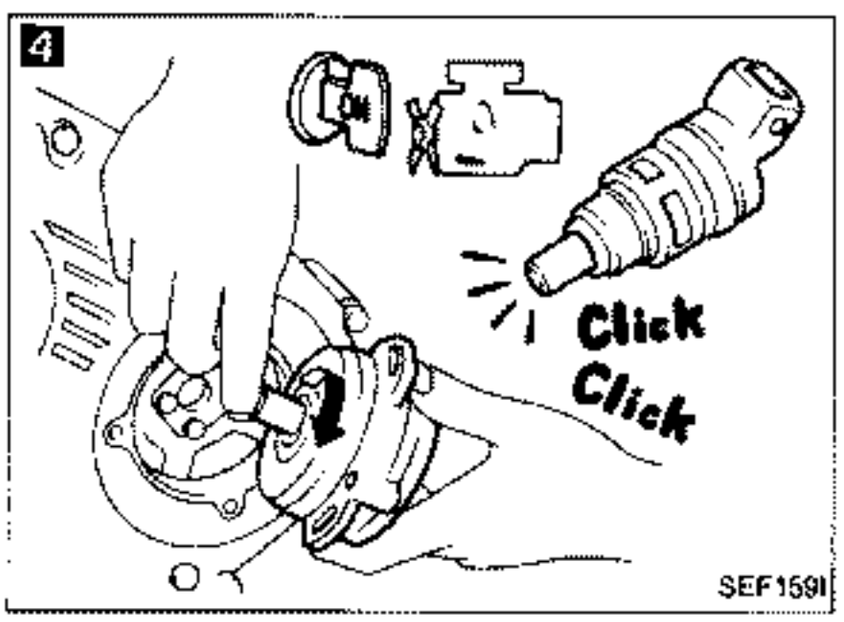


CHECK AIR REGULATOR AND A.A.C. VALVE.
When pressing accelerator pedal fully, can you start the engine.

Yes → Check A.A.C. valve, air regulator and circuits. (See pages EF & EC-156, 154.)

No ↓

4

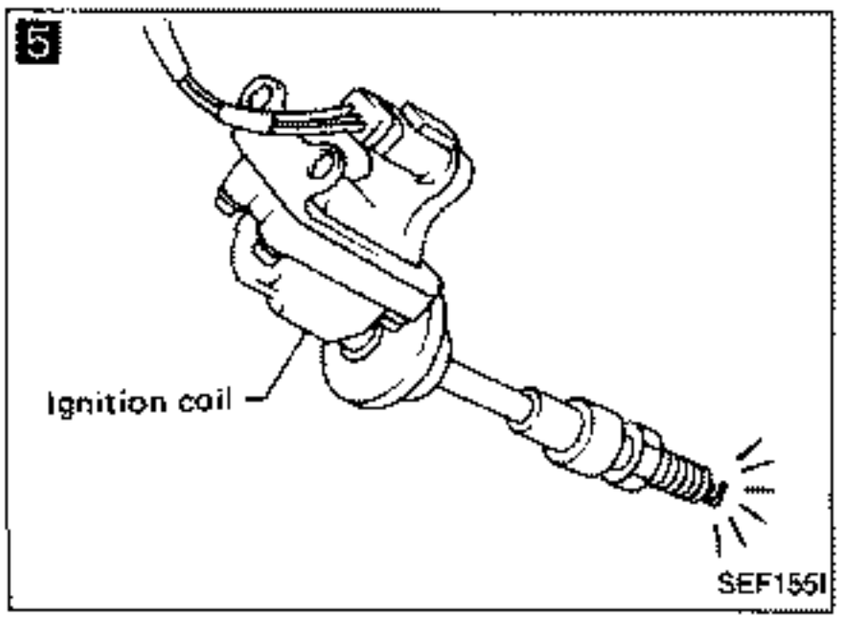


CHECK INJECTOR.
1. Remove crank angle sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating crank angle sensor shaft, does each injector make an operating sound?

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

Yes ↓

5



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

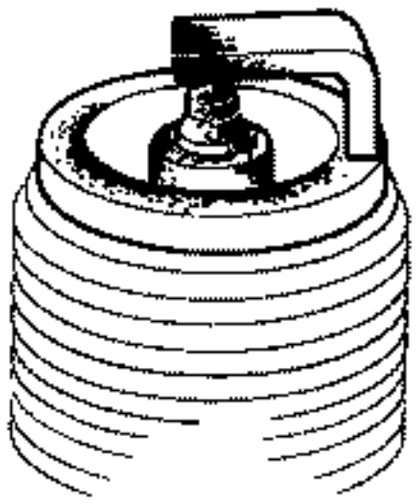
N.G. → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-118.)

O.K. ↓

(Go to Ⓐ on next page.)

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

6



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(A)

6

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

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

O.K.

7

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

N.G. → Repair or replace.

O.K.

8

CHECK E.C.U. POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-104.

N.G. → Repair or replace.

O.K.

9

TRY A KNOWN GOOD E.C.U.

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. (See page EF & EC-150.)

Yes ↓

2

CHECK FUEL VAPOR.

1. Select "PRVR CONT SOL VALVE" in "ACTIVE TEST" mode.
2. After touching "ON", can you start the engine?

— OR —

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

Yes → Check fuel properties.

No ↓

3

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

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

Yes ↓

4

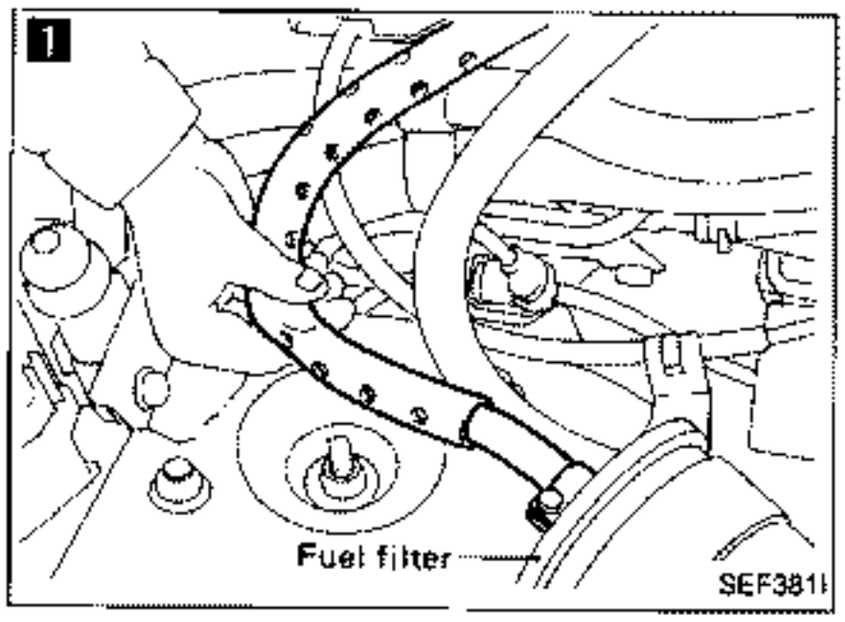
CHECK IGNITION SPARK.
1. Disconnect ignition coil assembly from collector.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-118.)

O.K. ↓

(Go to Ⓐ on next page.)

1



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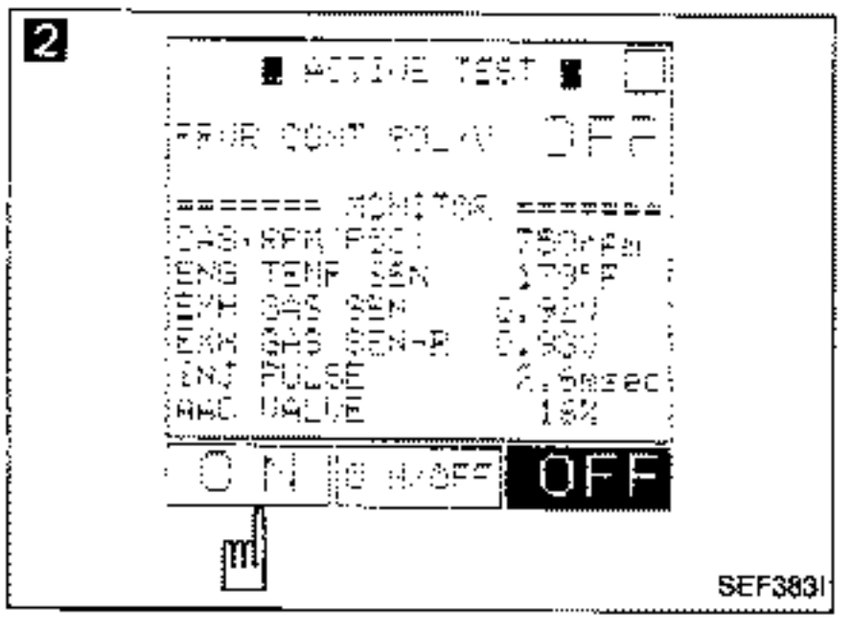

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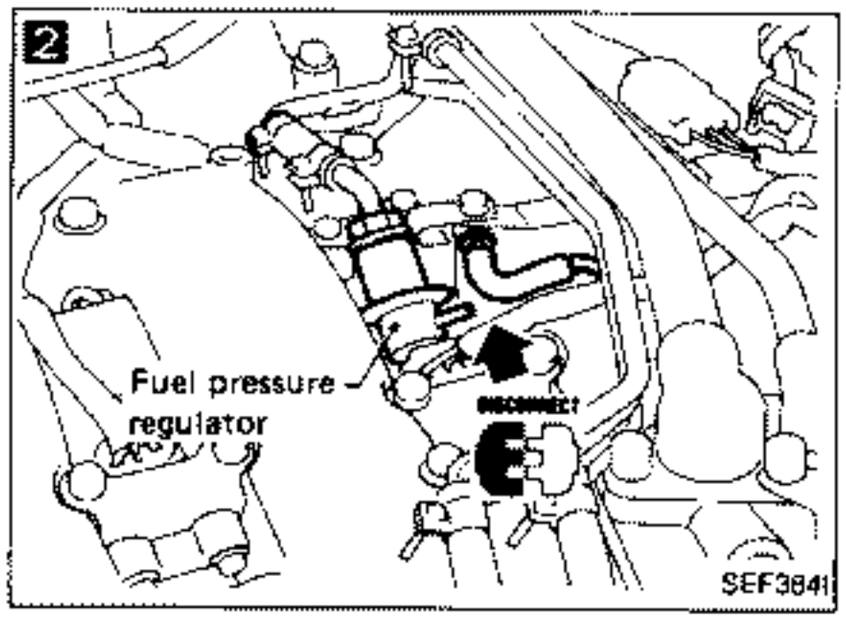
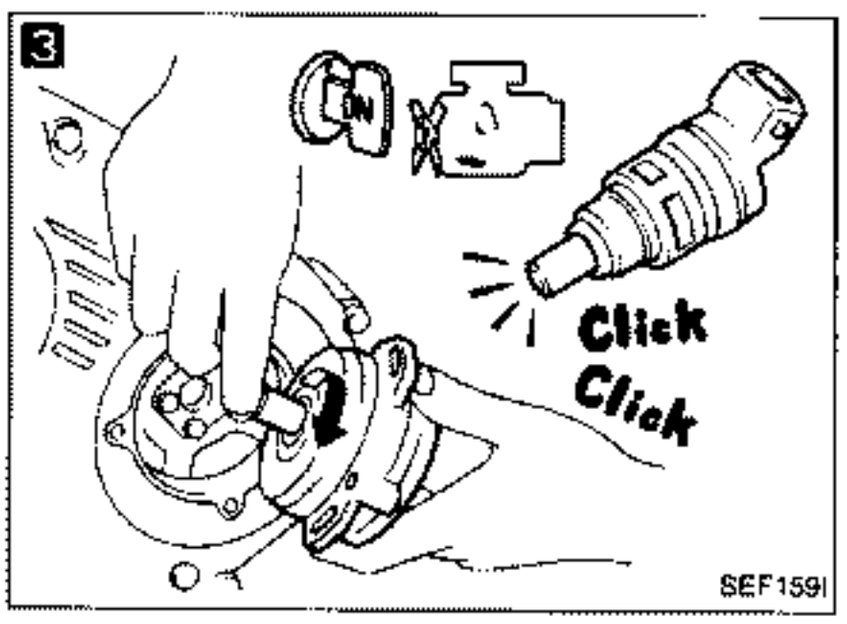


3



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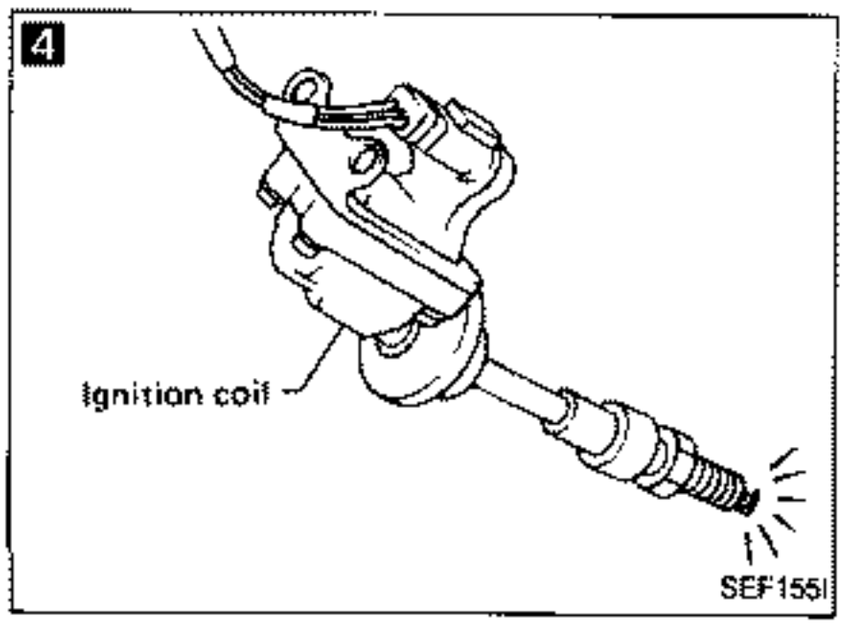
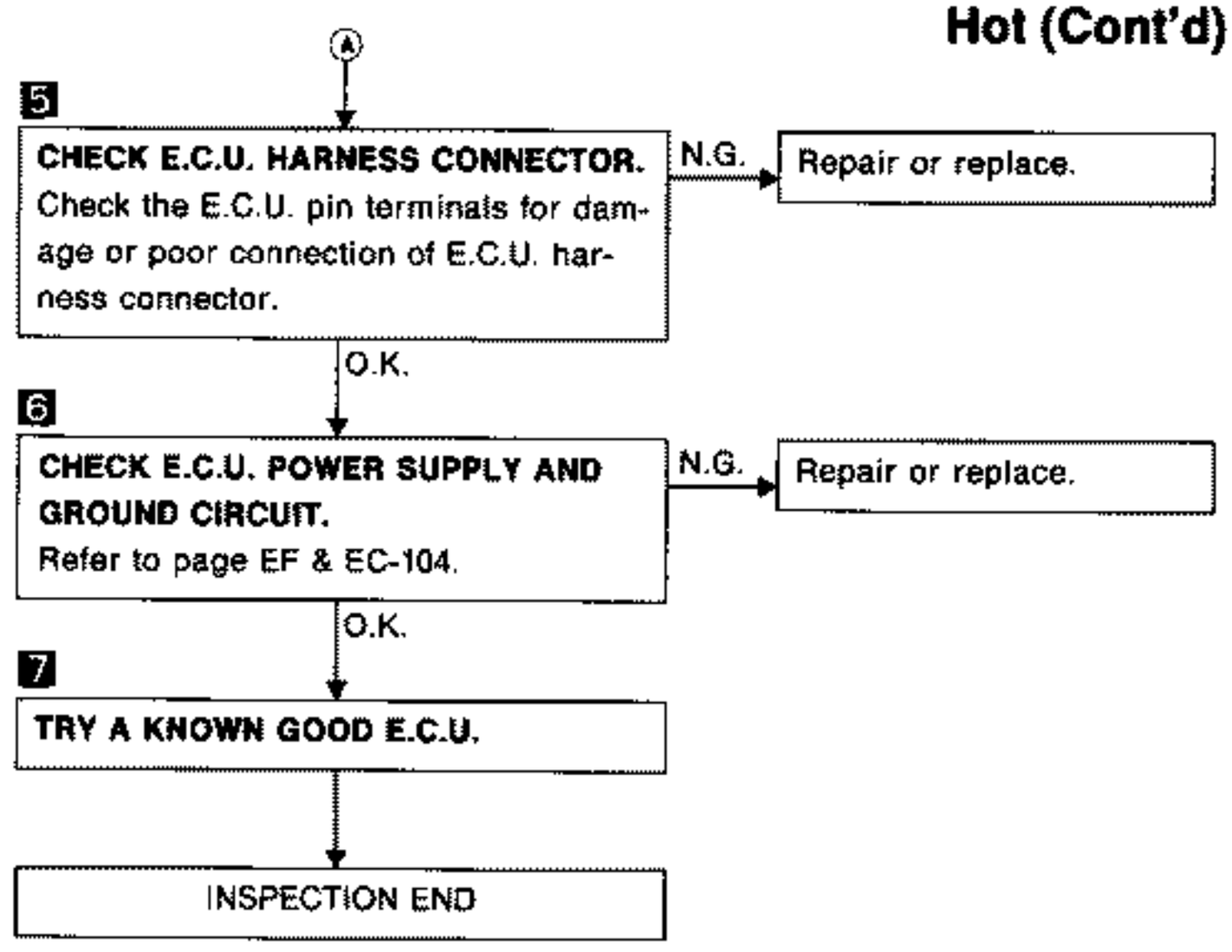


Diagnostic Procedure 5 — Hard to Start or Impossible to Start when the Engine is Hot (Cont'd)



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

1

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

N.G. → Repair or replace.

O.K. ↓

2

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

No → Check fuel pump and circuit. (See page EF & EC-150.)

Yes ↓

3

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

Yes → Check injector(s) for leakage.

No ↓

4

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

No → Check injectors and circuits.

Yes ↓

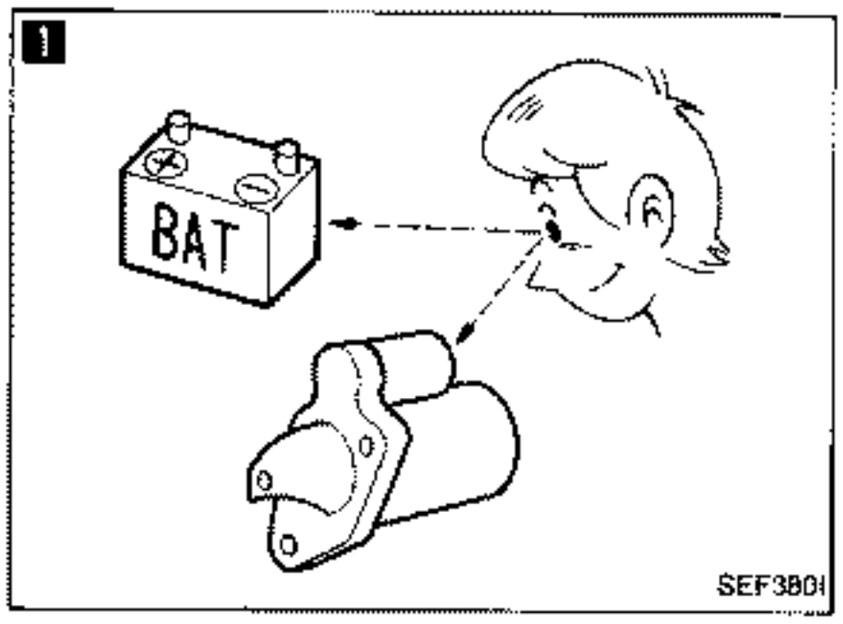
5

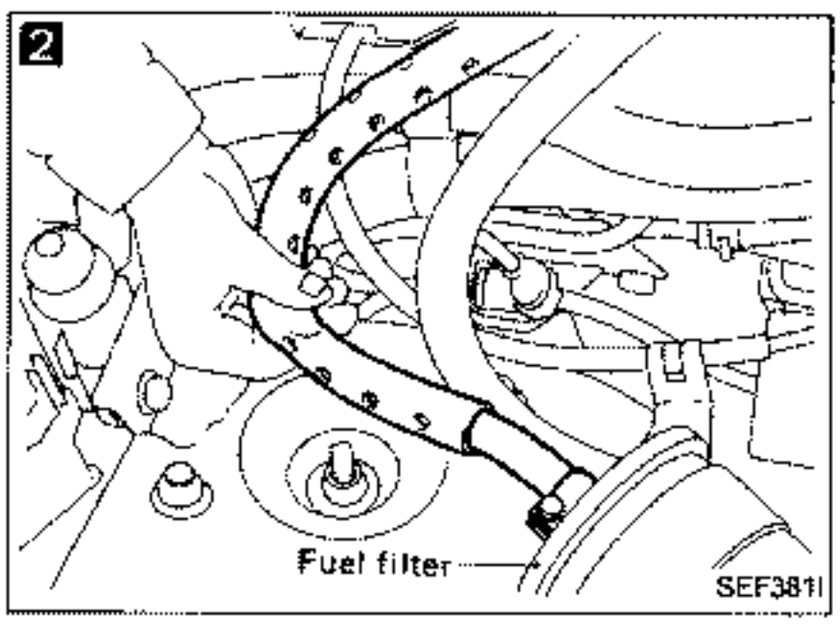
CHECK IGNITION SPARK.
1. Disconnect ignition coil assembly from collector.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

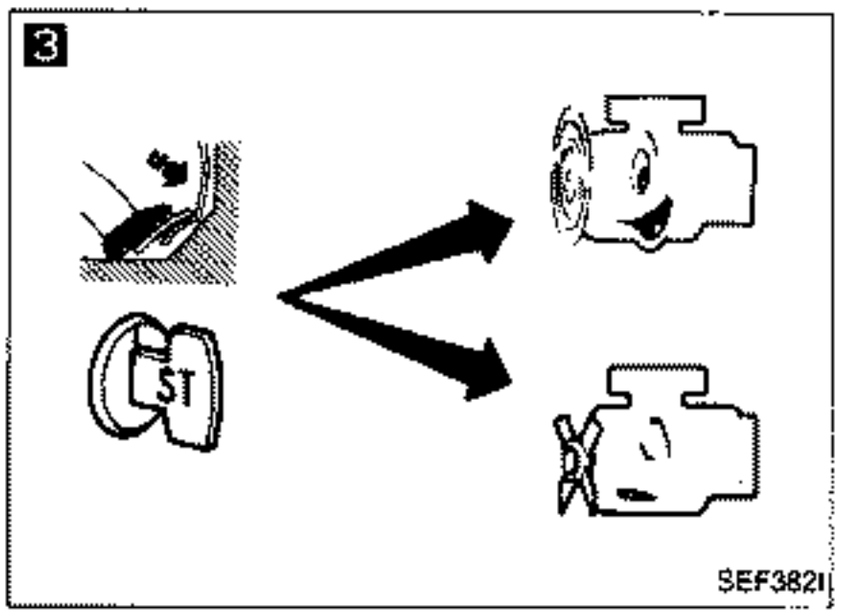
N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-118.)

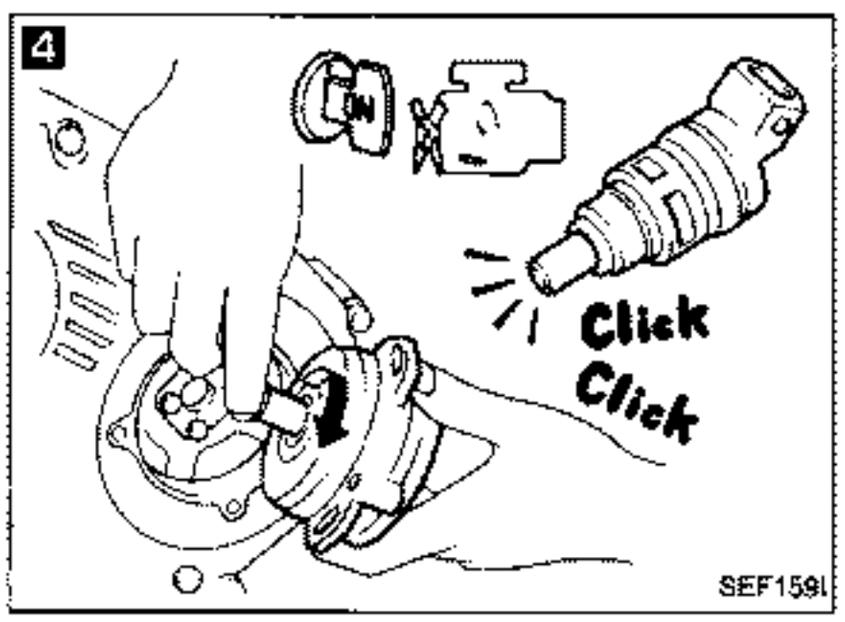
O.K. ↓

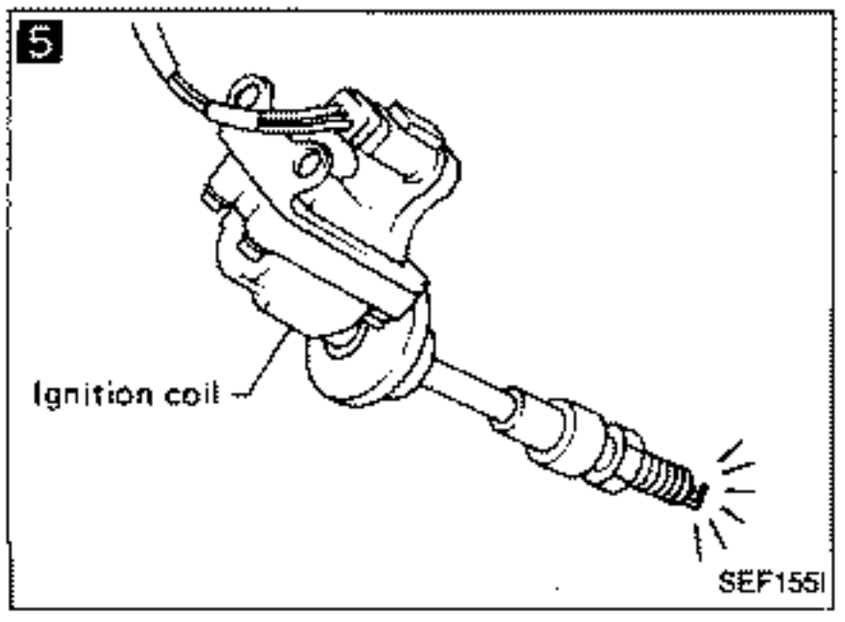
(Go to Ⓐ on next page.)





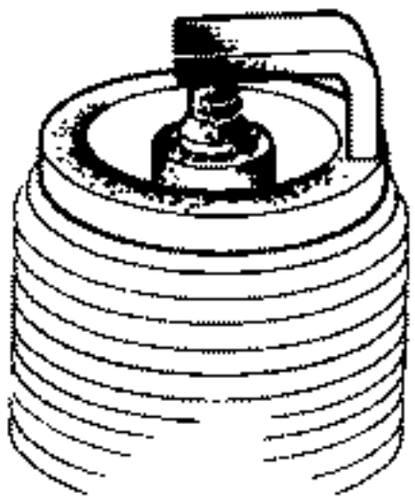






Diagnostic Procedure 6 — Hard to Start or Impossible to Start under Normal Conditions (Cont'd)

6



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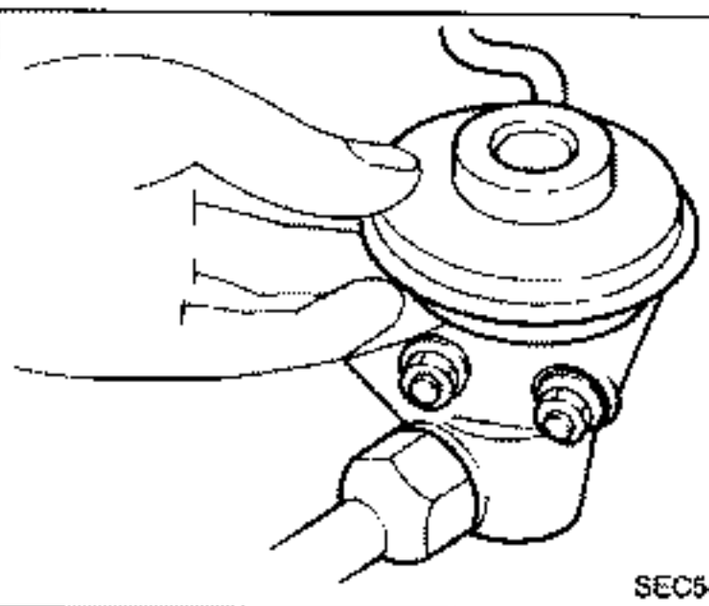
7



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Ⓐ

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

7 **CHECK E.G.R. CONTROL VALVE.**
Check E.G.R. control valve for sticking.
N.G. → Repair or replace.
O.K. ↓

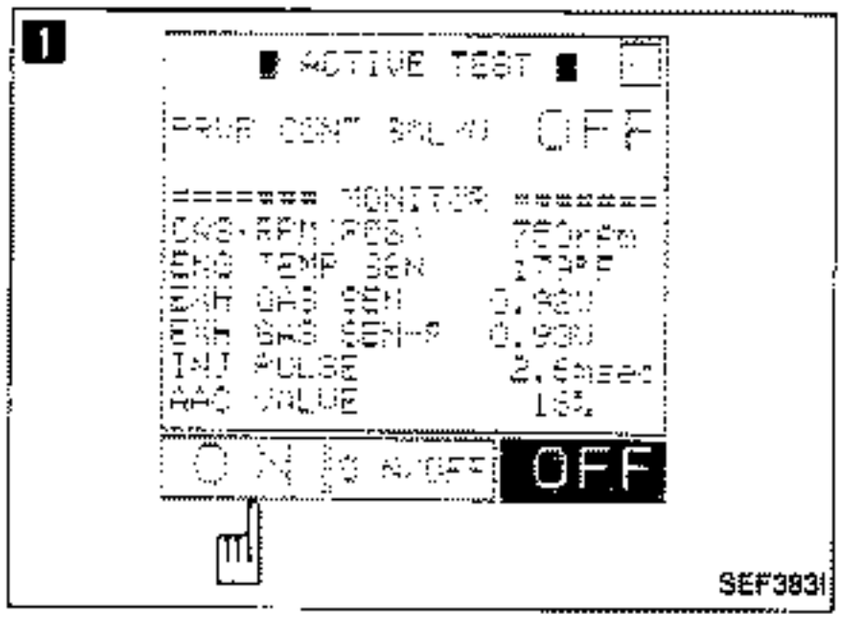
8 **CHECK E.C.U. HARNESS CONNECTOR.**
Check the E.C.U. pin terminals for damage or poor connection of E.C.U. harness connector.
N.G. → Repair or replace.
O.K. ↓

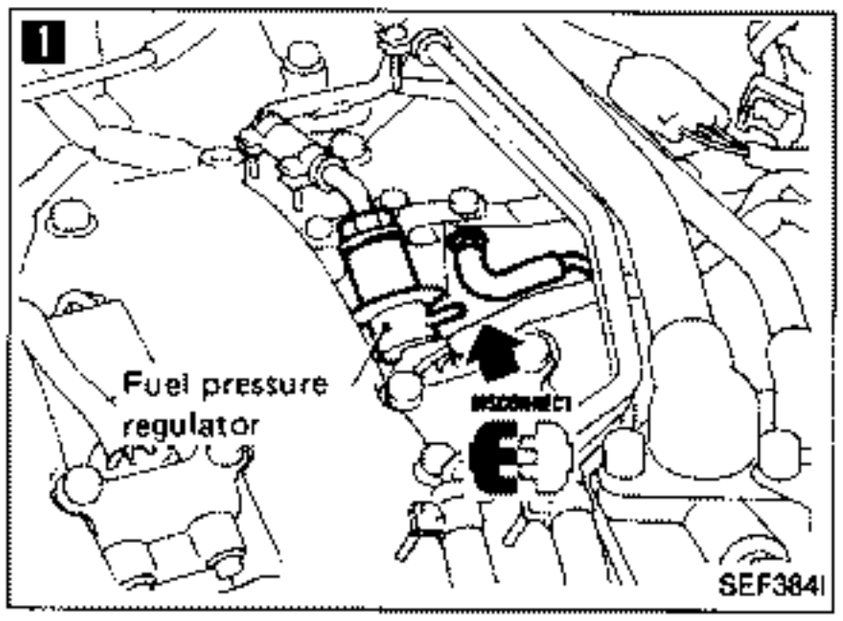
9 **CHECK E.C.U. POWER SUPPLY AND GROUND CIRCUIT.**
Refer to page EF & EC-104.
N.G. → Repair or replace.
O.K. ↓

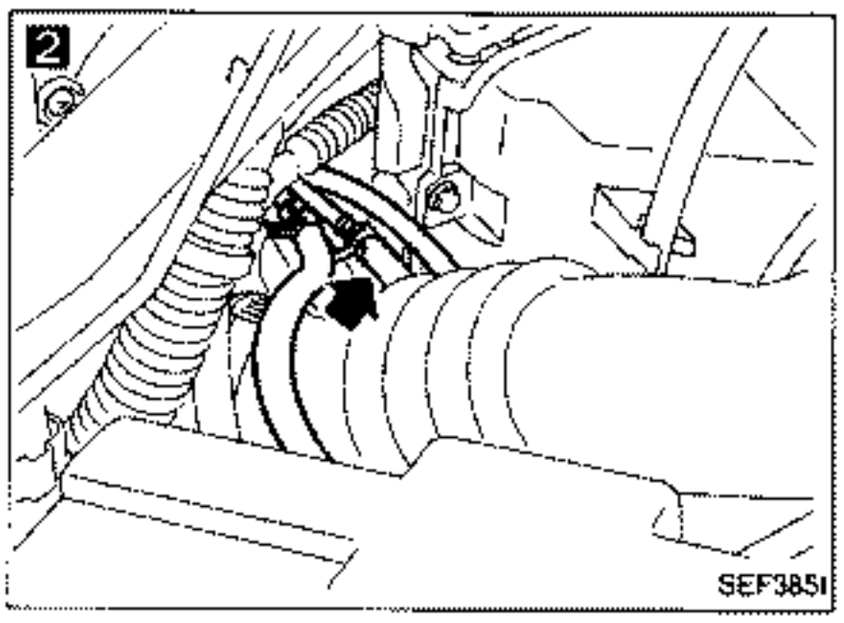
10 **TRY A KNOWN GOOD E.C.U.**
Trouble is fixed. → Replace E.C.U.
Trouble is not fixed. ↓

11 **CHECK TIMING BELT FOR PROPER INSTALLATION.**
N.G. → Replace timing belt.
O.K. ↓

INSPECTION END







Diagnostic Procedure 7 — Hesitation when the Engine is Hot

1

CHECK FUEL VAPOR.

1. Select "PRVR CONT SOL VALVE" in "ACTIVE TEST" mode.
2. After touching "ON", perform cruise test.
3. Does the hesitation disappear?

Yes → Check fuel properties.

OR

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

No ↓

2

CHECK CANISTER PURGE.

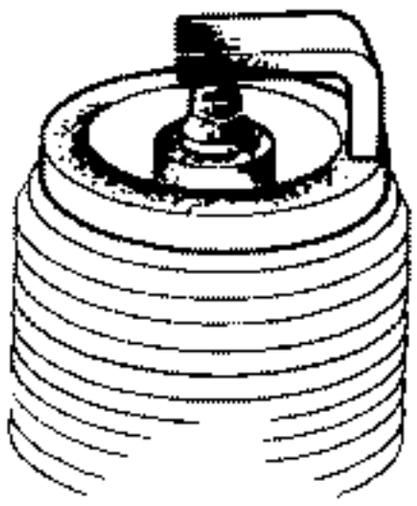
1. Disconnect canister purge line hose and plug hose.
2. Perform cruise test.
3. Does the hesitation disappear?

Yes → Check purge and vacuum lines.

No ↓

INSPECTION END

1



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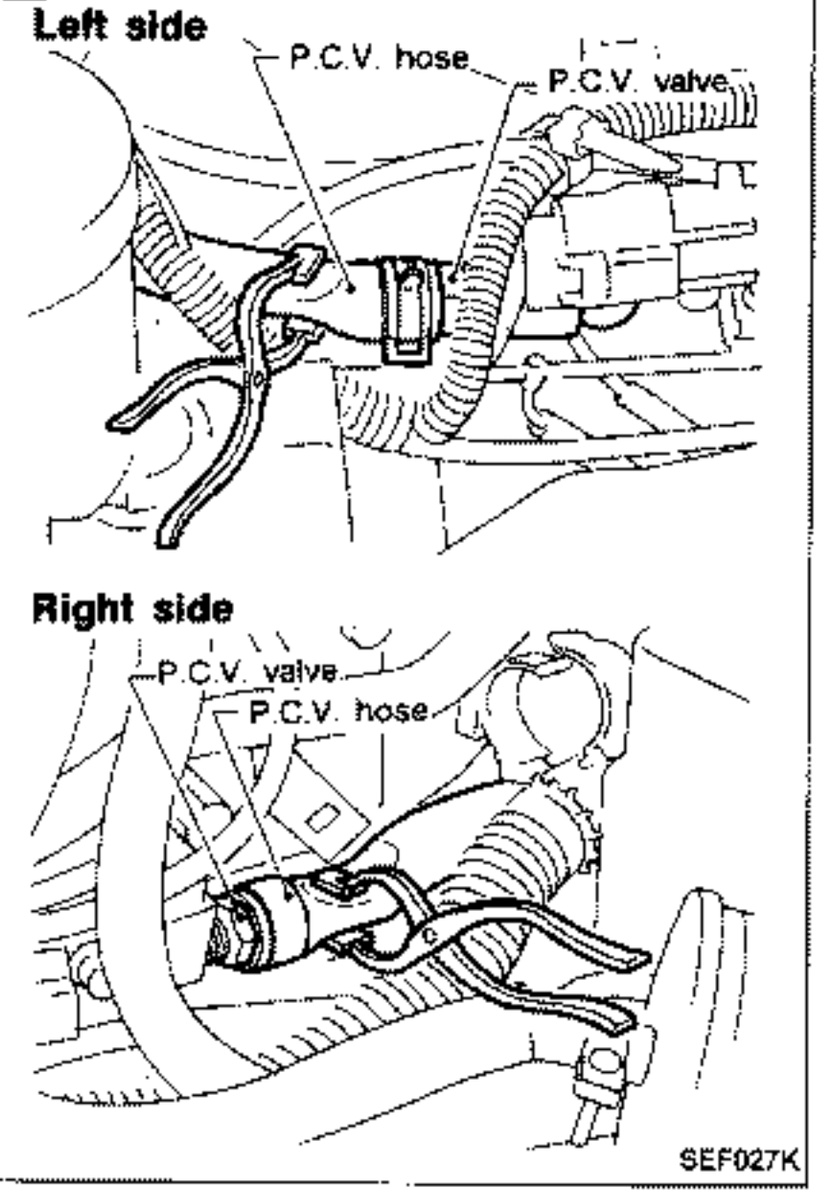
2



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Diagnostic Procedure 8 — Hesitation when the Engine is Cold

1

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

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

O.K. ↓

2

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

Yes → Discover air leak location and repair.

No ↓

3

TRY A KNOWN GOOD AIR FLOW METER.

Trouble is fixed. → Replace air flow meter.

Trouble is not fixed. ↓

4

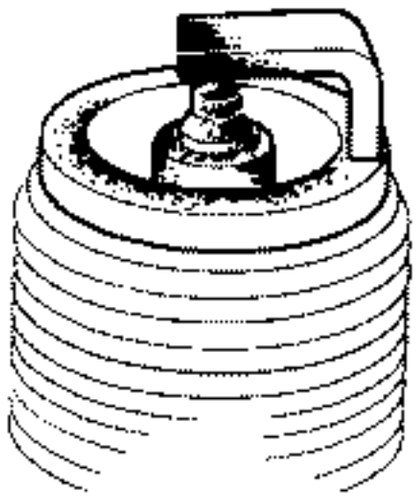
CHECK FOR INTAKE VALVE DEPOSITS.
If there are deposits on intake valves, remove them.

↓

INSPECTION END

Diagnostic Procedure 9 — Hesitation under Normal Conditions

1



SEF156I

1

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

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

O.K. ↓

2

CHECK EXHAUST GAS SENSOR.

1. See "M/R F/C MNT (right and left sides)" in "DATA MONITOR" mode.
2. Maintaining engine at 2,000 rpm under no-load (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.....

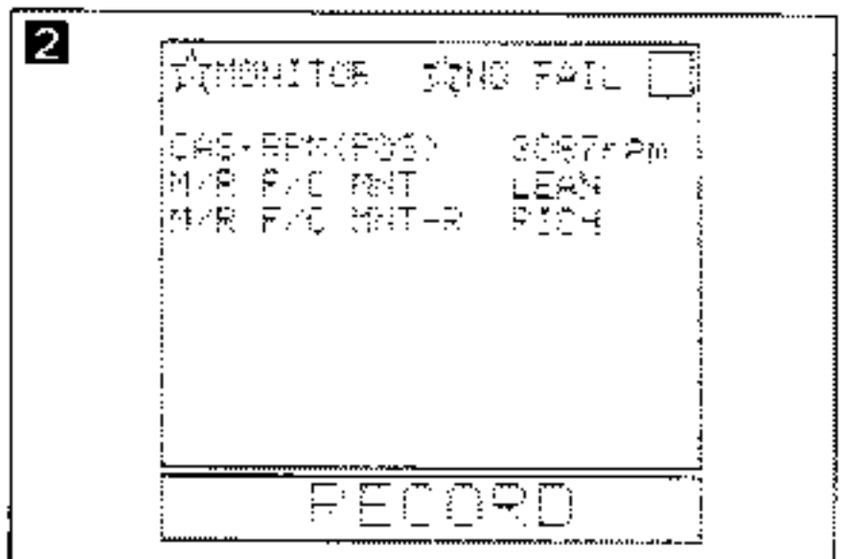
Yes → Replace exhaust gas sensor(s).

— OR —

1. Set "Exhaust gas sensor monitor" in the self-diagnostic Mode II. (See page EF & EC-49.)
2. Maintaining engine at 2,000 rpm under no-load, check that check engine light goes ON and OFF more than 5 times during 10 seconds.

No ↓

2



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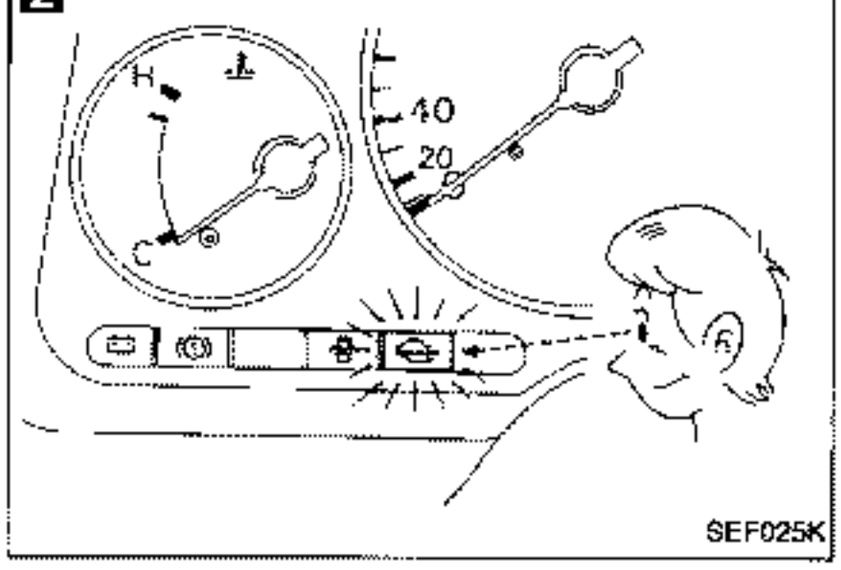
2



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3

CHECK CANISTER PURGE.

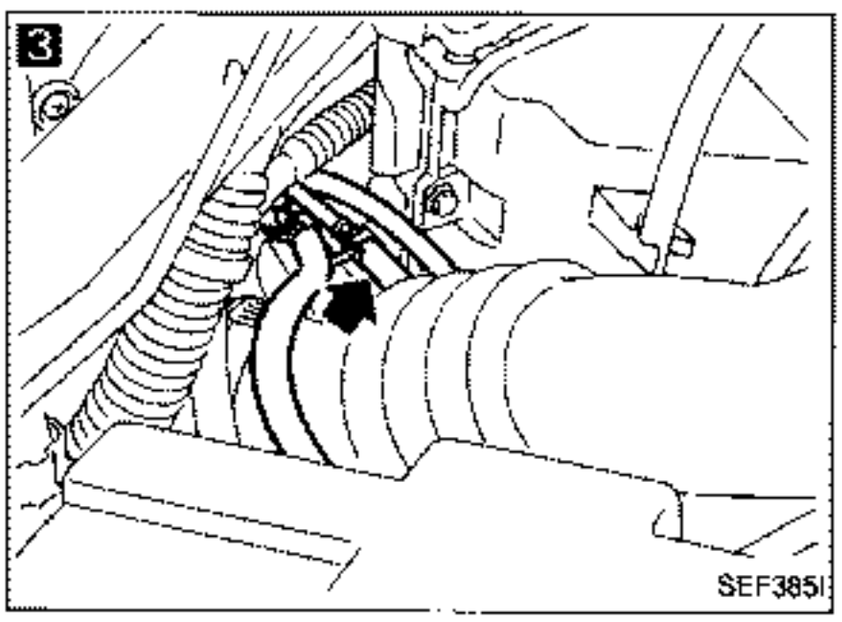
1. Disconnect canister purge line hose and plug hose.
2. Perform cruise test.
3. Does the hesitation disappear?

Yes → Check purge and vacuum lines.

No ↓

(Go to Ⓐ on next page.)

3



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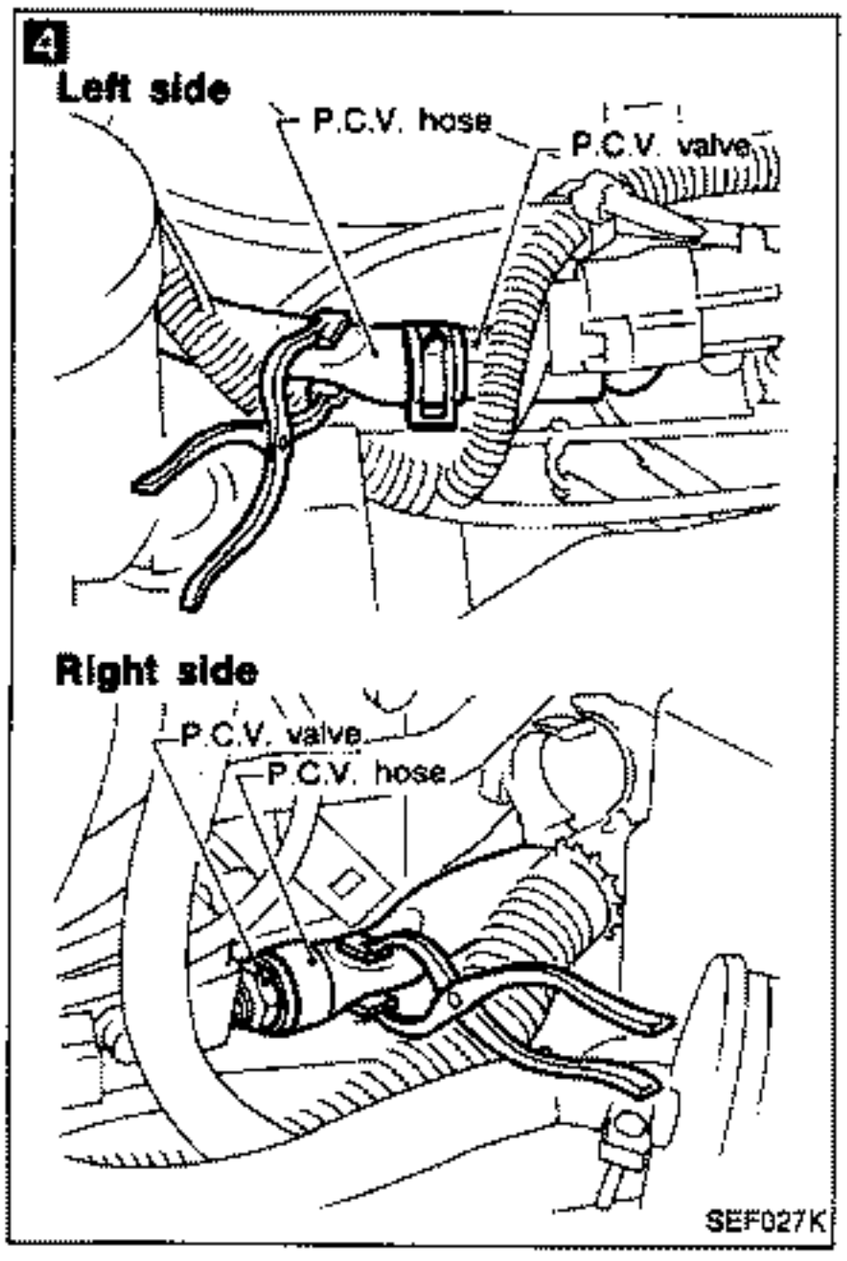
Diagnostic Procedure 9 — Hesitation under Normal Conditions (Cont'd)



4

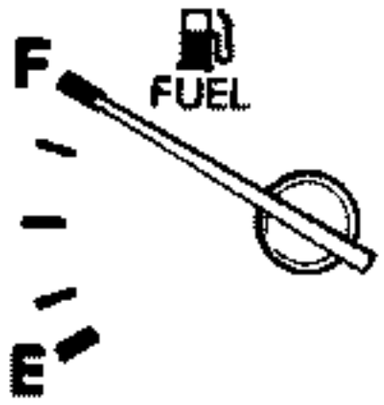
CHECK FOR INTAKE AIR LEAK.
When pinching blow-by hose (lowering the blow-by air supply), does the engine speed rise or the engine become more stable?

Yes → Discover air leak location and repair.

No → INSPECTION END

Diagnostic Procedure 10 — Engine Stalls when Turning

1



SEF386I

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

N.G. → Fill fuel tank with fuel.

O.K. ↓

2

PERFORM POWER BALANCE TEST.

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

— OR —

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

No → Go to **5**

Yes ↓

3

CHECK INJECTOR.

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

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

Yes ↓

4

CHECK IGNITION SPARK.

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

N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-118.)

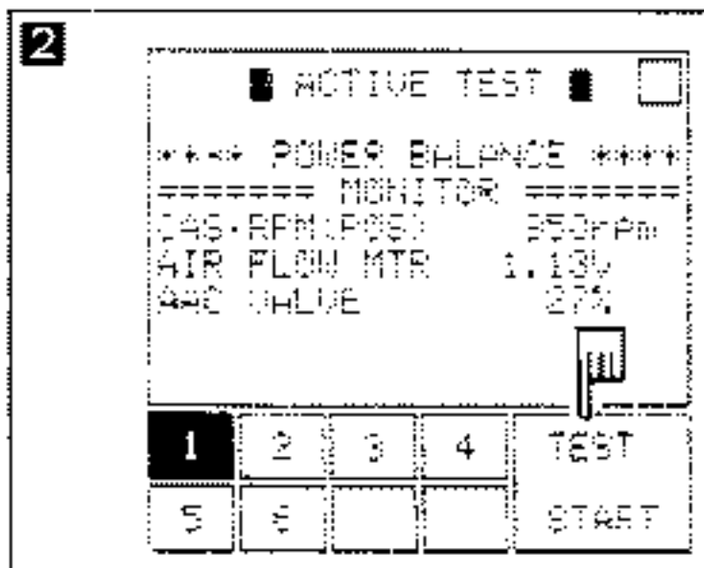
O.K. ↓

(Go to Ⓐ on next page.)

1

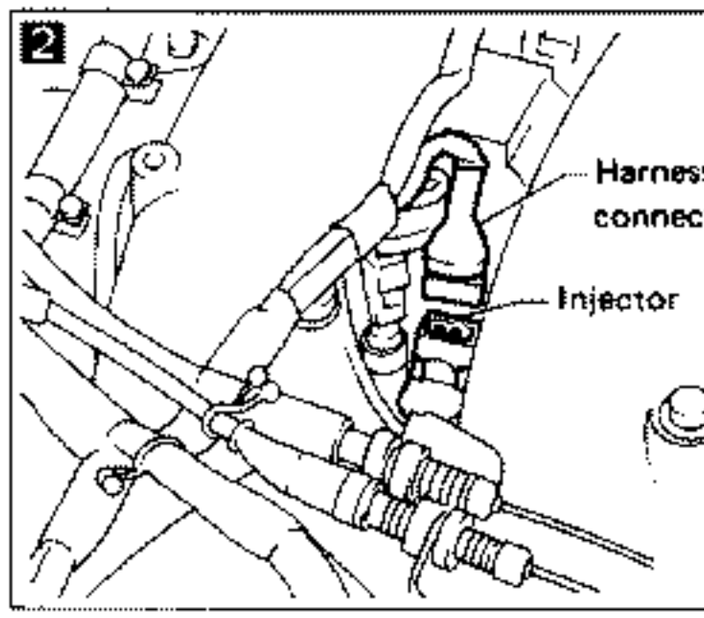
SEF386I

2



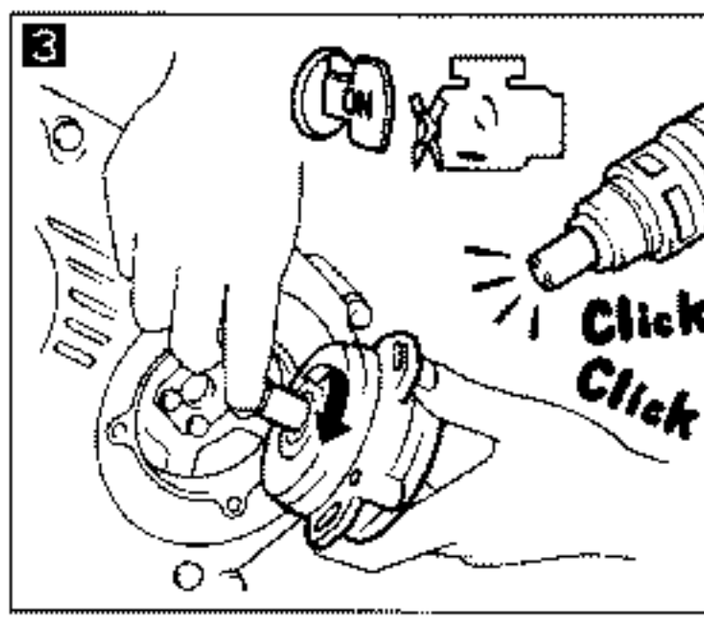
SEF157I

2



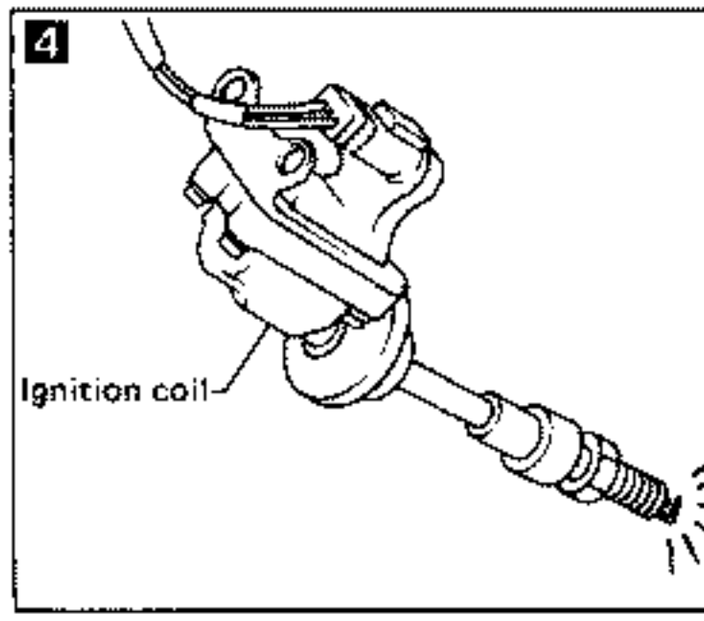
SEF158I

3



SEF159I

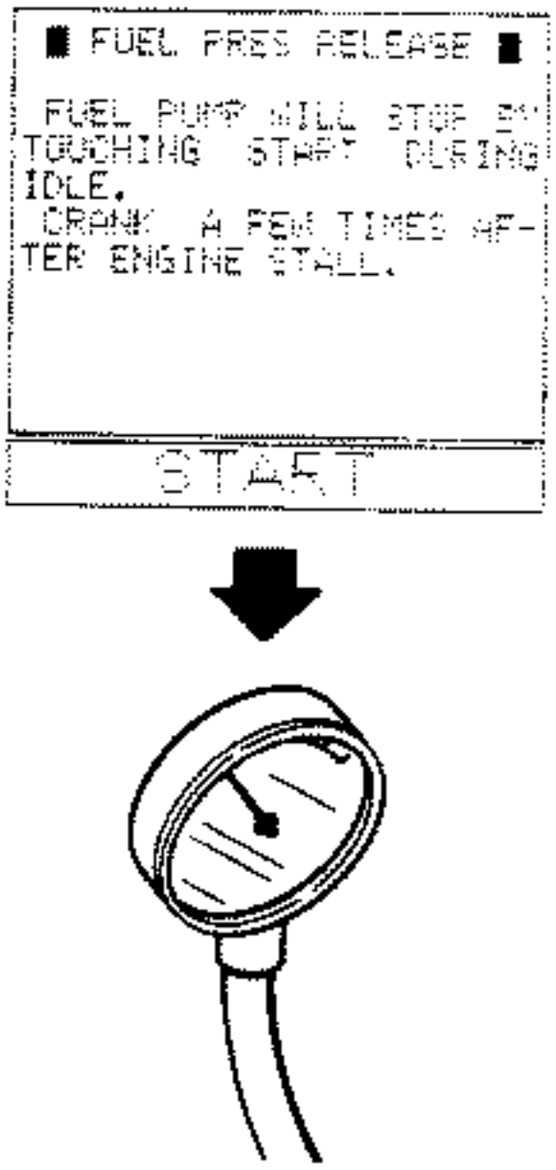
4



SEF155I

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

5



SEF204J

5

CHECK FUEL PRESSURE.

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.
   At idle approx. 255 kPa (2.55 bar, 2.6 kg/cm^2, 37 psi)
   The moment throttle valve is fully open:
   approx. 304 kPa (3.04 bar, 3.1 kg/cm^2, 44 psi)

N.G. → Check fuel pressure regulator diaphragm.

— OR —

1. Release fuel pressure to zero. (Refer to page EF & EC-185.)
2. Install fuel pressure gauge and check fuel pressure.

O.K.

6

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

N.G. → Repair or replace.

O.K.

7

CHECK E.C.U. POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-104.

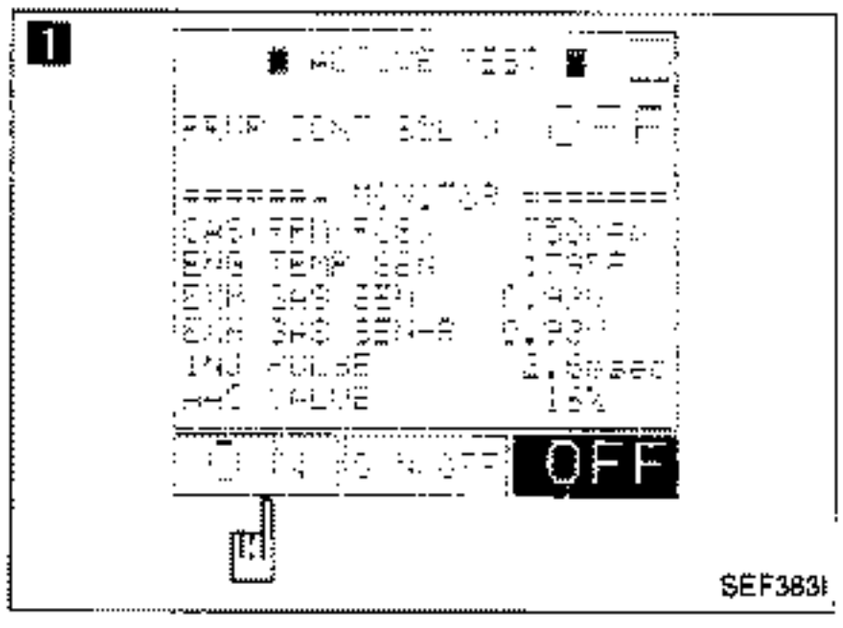
N.G. → Repair or replace.

O.K.

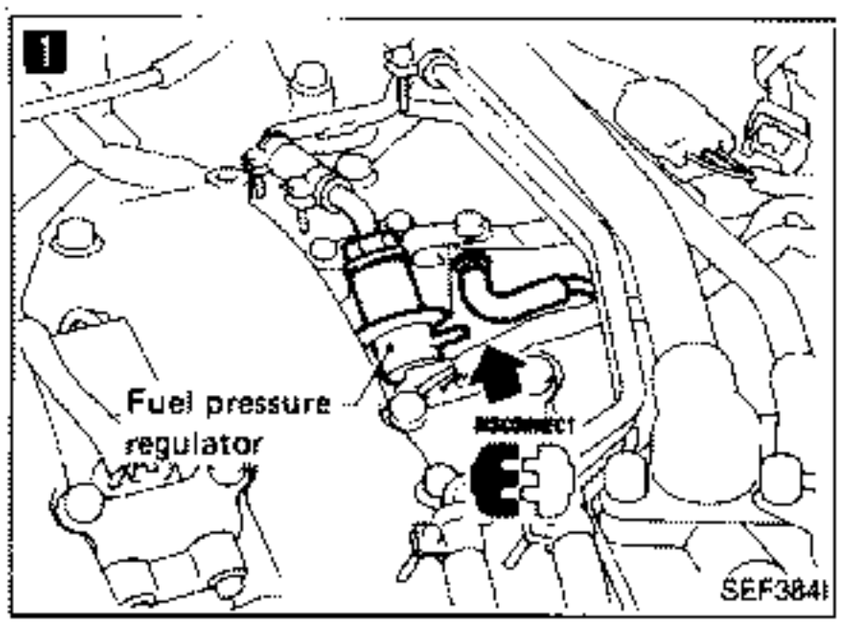
8

TRY A KNOWN GOOD E.C.U.

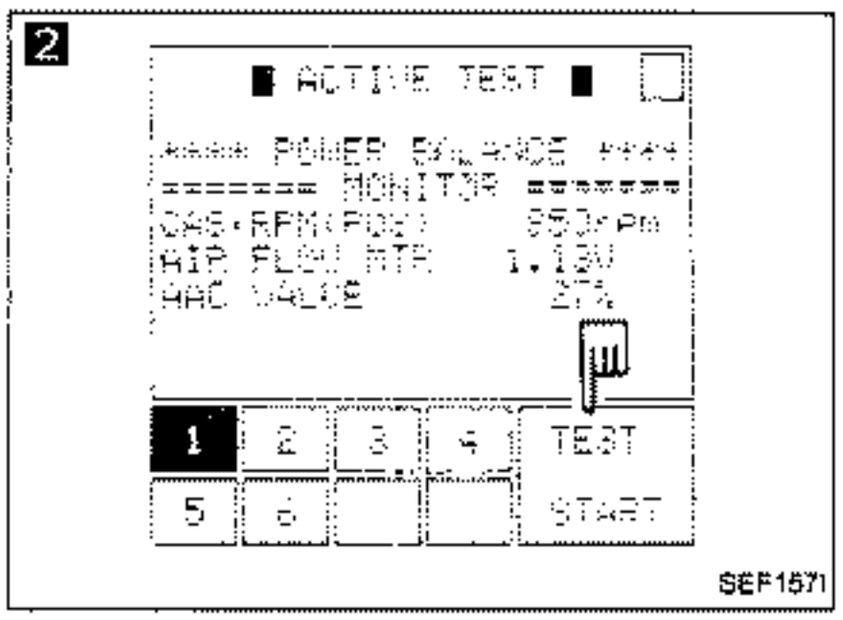
INSPECTION END



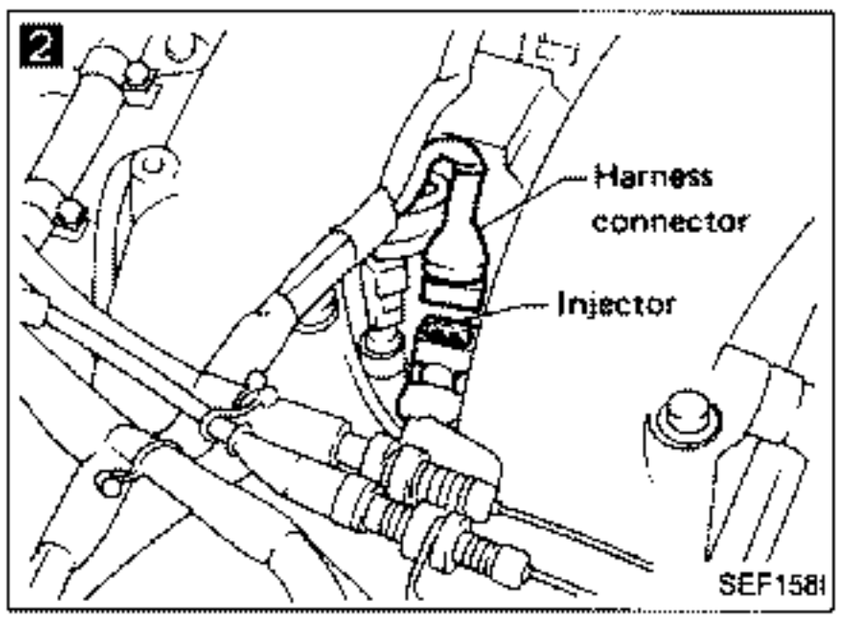
SEF383I



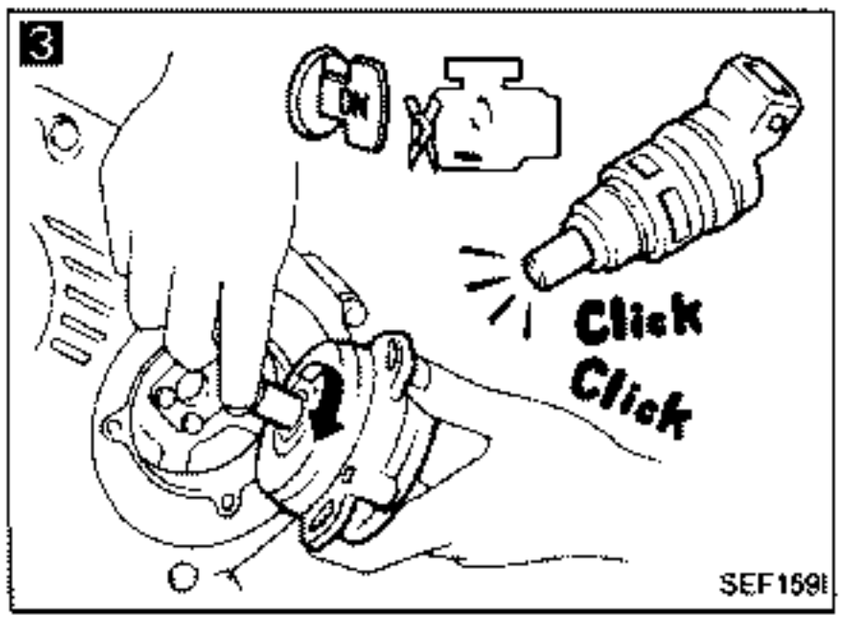
SEF384I



SEF157I



SEF158I



SEF159I

Diagnostic Procedure 11 — Engine Stalls when the Engine is Hot

1

CHECK FUEL VAPOR.

1. Select "PRVR CONT SOL VALVE" in "ACTIVE TEST" mode.
2. After touching "ON", perform cruise test.
3. Does the engine stall disappear?

Yes → Check fuel properties.

OR

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

No

2

PERFORM POWER BALANCE TEST.

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

No → Go to **5**.

OR

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

Yes

3

CHECK INJECTOR.

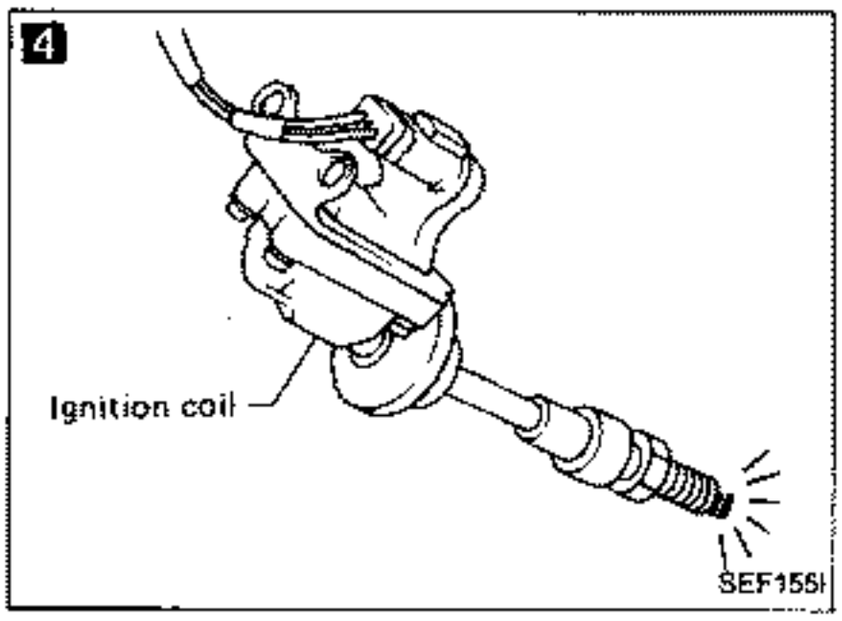
1. Remove crank angle sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating crank angle sensor shaft, does each injector make an operating sound?

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

Yes

(Go to Ⓐ on next page.)

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



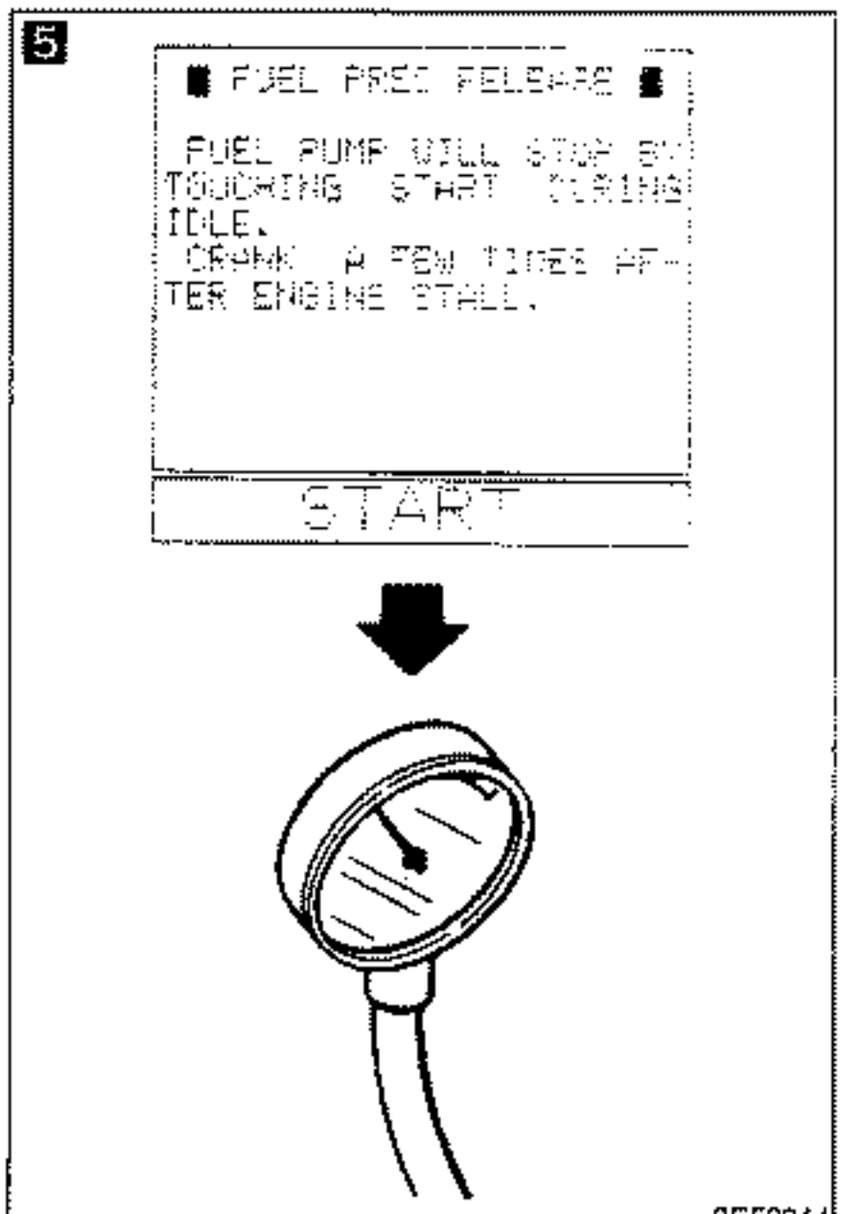
Ⓐ

4

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

N.G. → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-118.)

O.K.



5

CHECK FUEL PRESSURE.
1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.
   At idle approx. 255 kPa (2.55 bar, 2.6 kg/cm², 37 psi)
   The moment throttle valve is fully open:
   approx. 304 kPa (3.04 bar, 3.1 kg/cm², 44 psi)

— OR —

1. Release fuel pressure to zero. (Refer to page EF & EC-185.)
2. Install fuel pressure gauge and check fuel pressure.

N.G. → Check fuel pressure regulator diaphragm.

O.K.

6

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

N.G. → Repair or replace.

O.K.

7

CHECK E.C.U. POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-104.

N.G. → Repair or replace.

O.K.

8

TRY A KNOWN GOOD E.C.U.

Trouble is fixed. → Replace E.C.U.

Trouble is not fixed.

9

CHECK TIMING BELT FOR PROPER INSTALLATION.

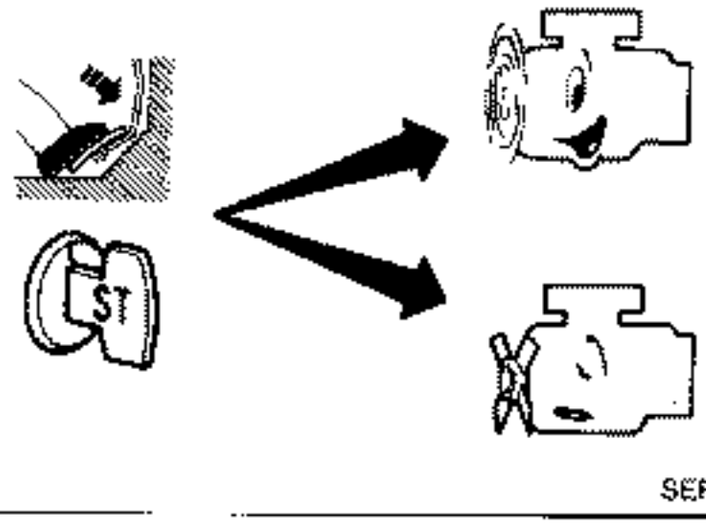
N.G. → Replace timing belt.

O.K.

INSPECTION END

Diagnostic Procedure 12 — Engine Stalls when the Engine is Cold

1



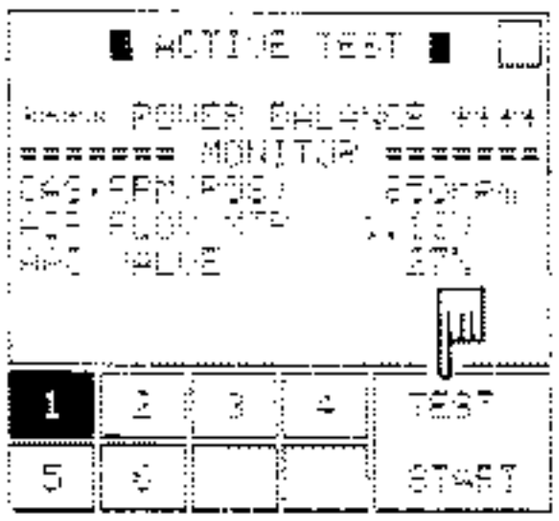
SEF382I

CHECK AIR REGULATOR AND A.A.C. VALVE.
When the engine is cold, can you start the engine when pressing accelerator pedal fully?

N.G. → Check A.A.C. valve, air regulator and circuits. (See pages EF & EC-156, 154.)

O.K.

2



SEF157I

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

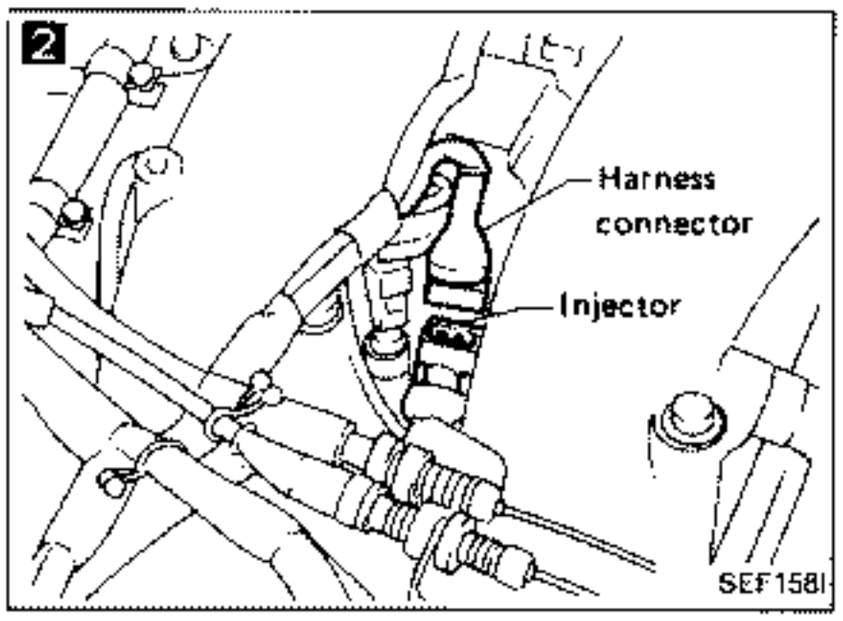
— OR —

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

N.G. → Go to **6**.

O.K.

2



SEF158I

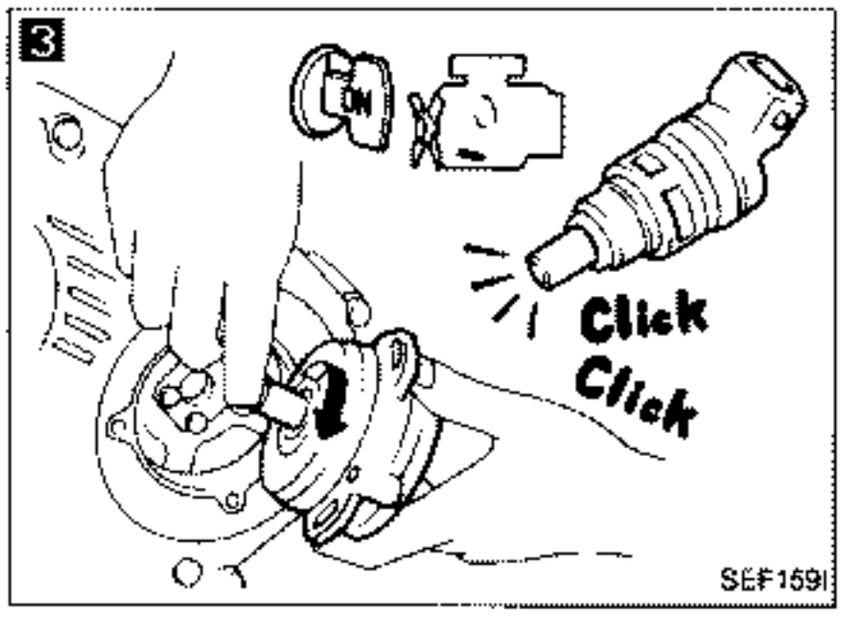
3

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

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

O.K.

3



SEF159I

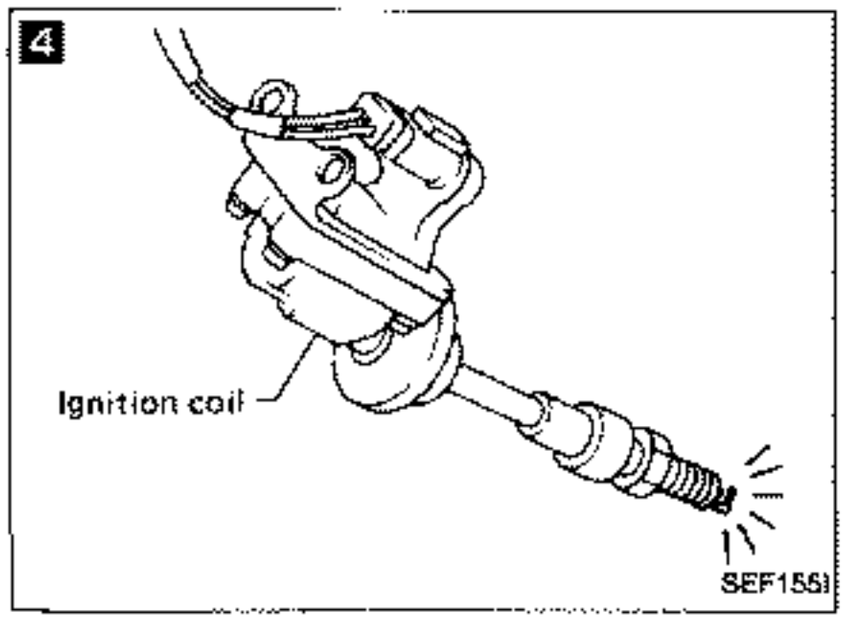
4

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

N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-118.)

O.K.

4

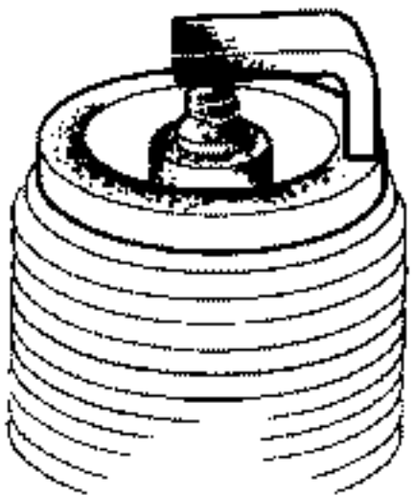


SEF155I

(Go to Ⓐ on next page.)

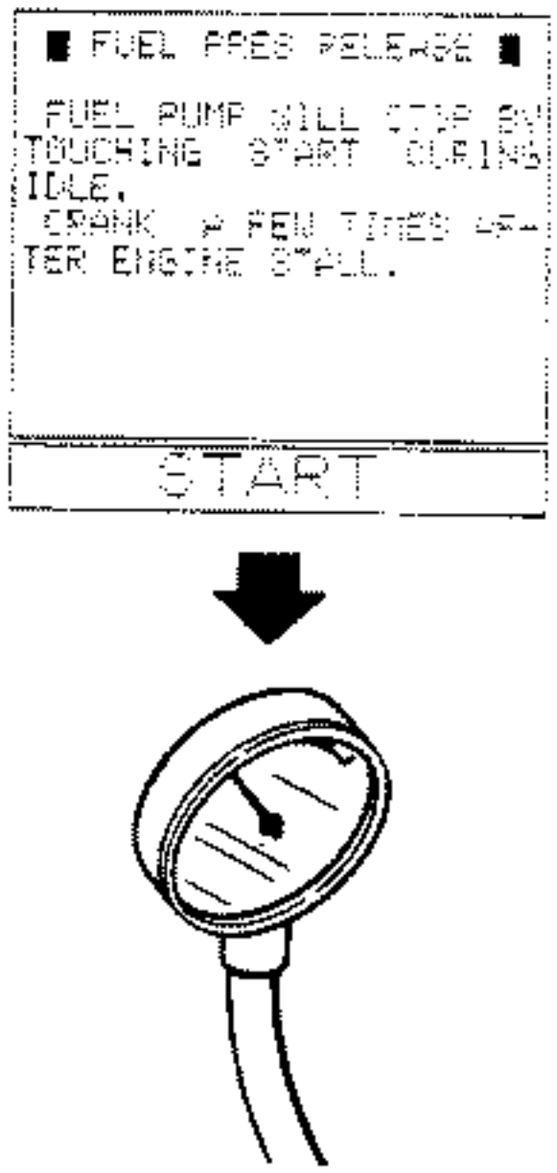
Diagnostic Procedure 12 — Engine Stalls when the Engine is Cold (Cont'd)

5



SEF156I

6



SEF204J

Ⓐ

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

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

O.K. ↓

6 **CHECK FUEL PRESSURE.**

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.
   At idle approx. 255 kPa (2.55 bar, 2.6 kg/cm², 37 psi)
   The moment throttle valve is fully open:
   approx. 304 kPa (3.04 bar, 3.1 kg/cm², 44 psi)

N.G. → Check fuel pressure regulator diaphragm.

— OR —

1. Release fuel pressure to zero. (Refer to page EF & EC-185.)
2. Install fuel pressure gauge and check fuel pressure.

O.K. ↓

7 **CHECK E.C.U. HARNESS CONNECTOR.**
Check the E.C.U. pin terminals for damage or poor connection of E.C.U. harness connector.

N.G. → Repair or replace.

O.K. ↓

8 **CHECK E.C.U. POWER SUPPLY AND GROUND CIRCUIT.**
Refer to page EF & EC-104.

N.G. → Repair or replace.

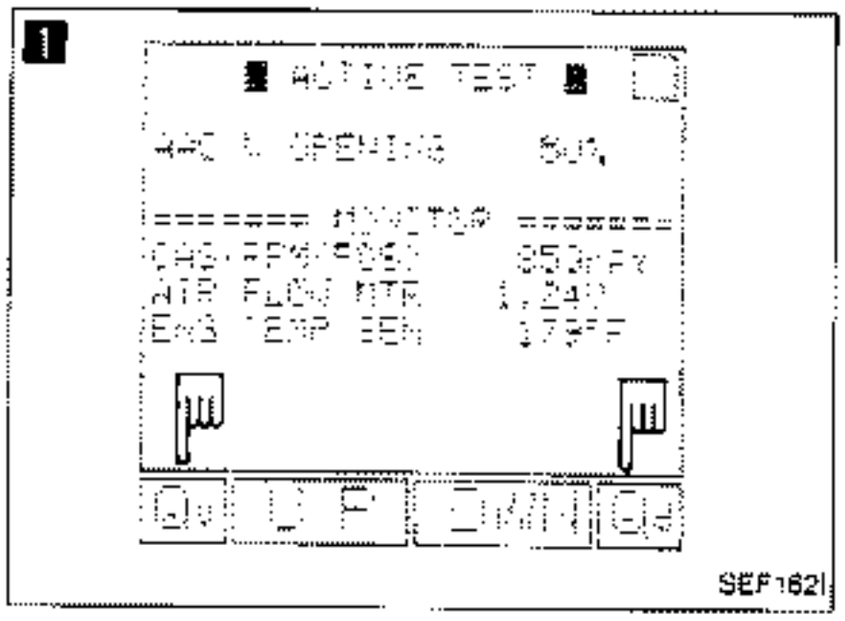
O.K. ↓

9 **TRY A KNOWN GOOD E.C.U.**

↓

INSPECTION END

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



1

CHECK A.A.C. VALVE.

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

No → Check A.A.C. valve and circuit. (See page EF & EC-156.)

— OR —

When disconnecting A.A.C. valve harness connector, does the engine speed drop?

Yes ↓

2

PERFORM POWER BALANCE TEST.

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

No → Go to **5**.

— OR —

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

Yes ↓

3

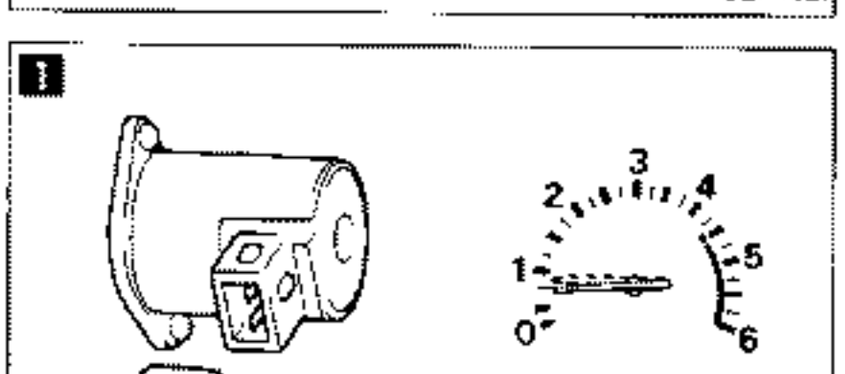
CHECK INJECTOR.

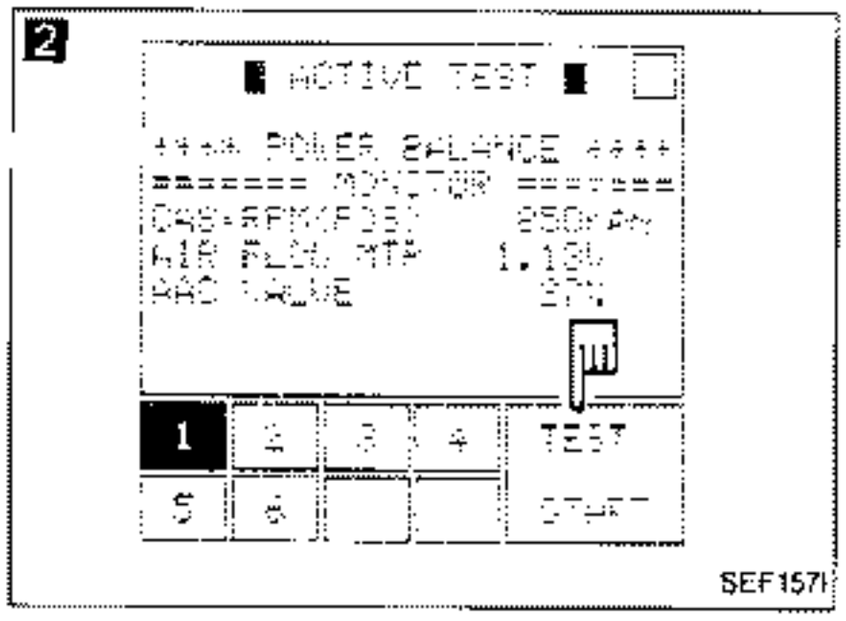
1. Remove crank angle sensor from engine. (Harness connector should remain connected.)
2. Turn ignition switch ON. (Do not start engine.)
3. When rotating crank angle sensor shaft, does each injector make an operating sound?

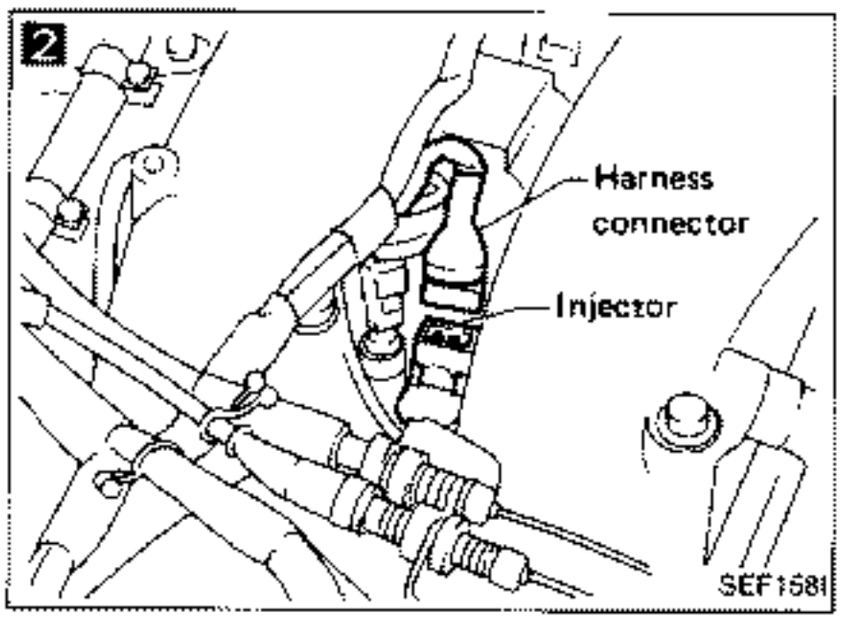
No → Check injector(s) and their circuit(s).

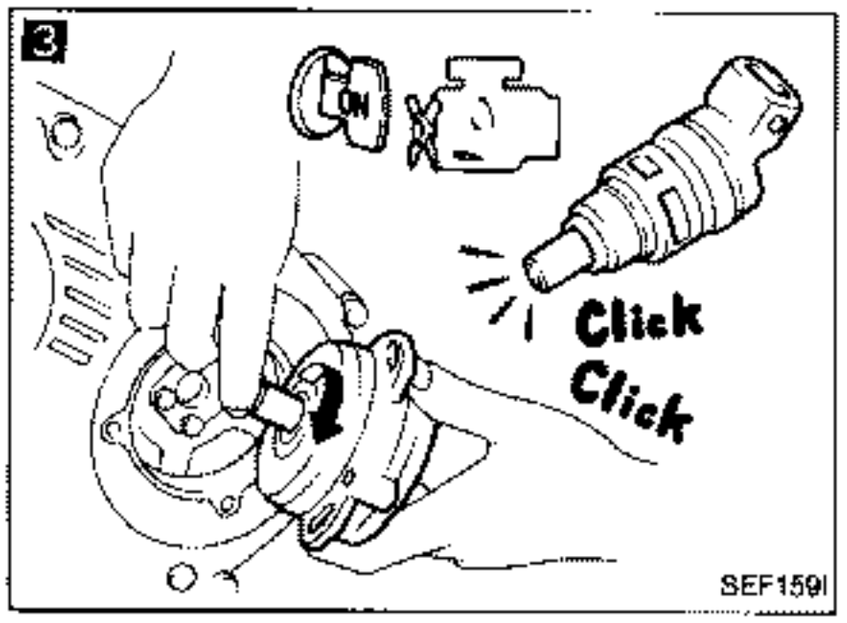
Yes ↓

(Go to Ⓐ on next page.)



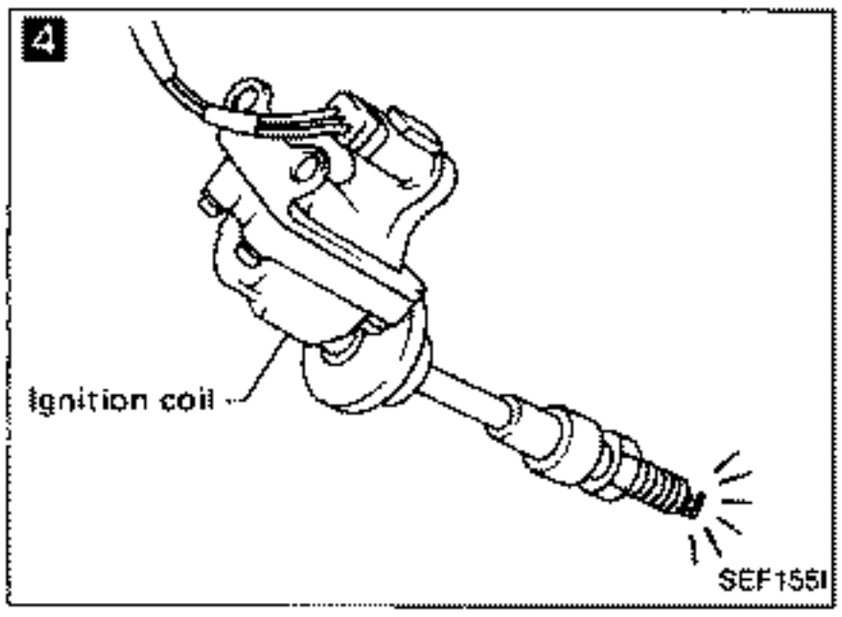






Diagnostic Procedure 13 — Engine Stalls when Stepping on the Accelerator Momentarily (Cont'd)

4



Ⓐ

4

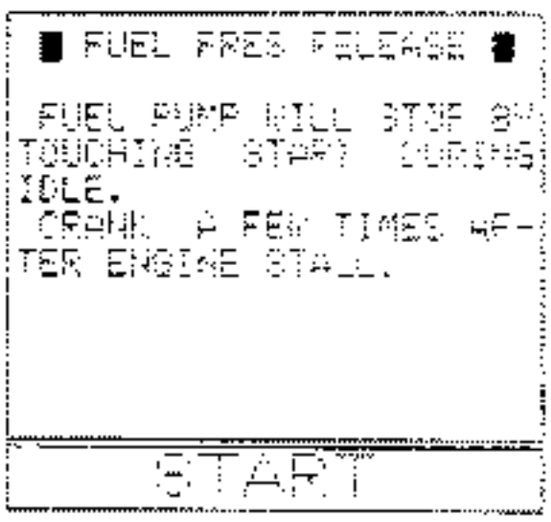
CHECK IGNITION SPARK.

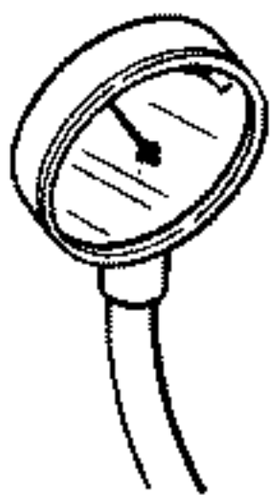
1. Disconnect ignition coil assembly from collector.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

N.G. → Check ignition coil, power transistor unit and their circuits. (See page EF & EC-118.)

O.K.

5





SEF204J

5

CHECK FUEL PRESSURE.

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.
   At idle approx. 255 kPa (2.55 bar, 2.6 kg/cm², 37 psi)
   The moment throttle valve is fully open:
   approx. 304 kPa (3.04 bar, 3.1 kg/cm², 44 psi)

N.G. → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-185.)
2. Install fuel pressure gauge and check fuel pressure.

O.K.

6

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

N.G. → Repair or replace.

O.K.

7

CHECK E.C.U. POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-104.

N.G. → Repair or replace.

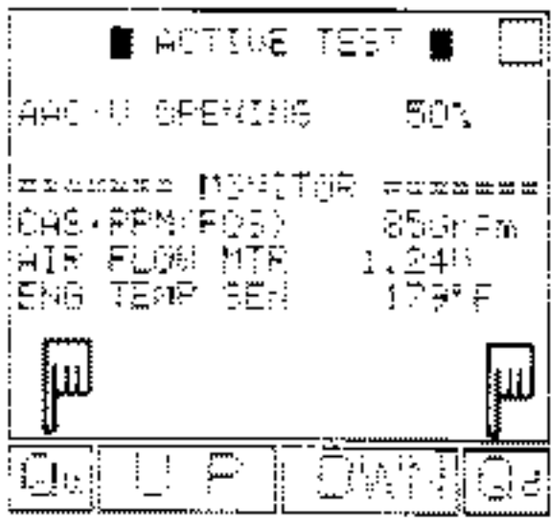
O.K.

8

TRY A KNOWN GOOD E.C.U.

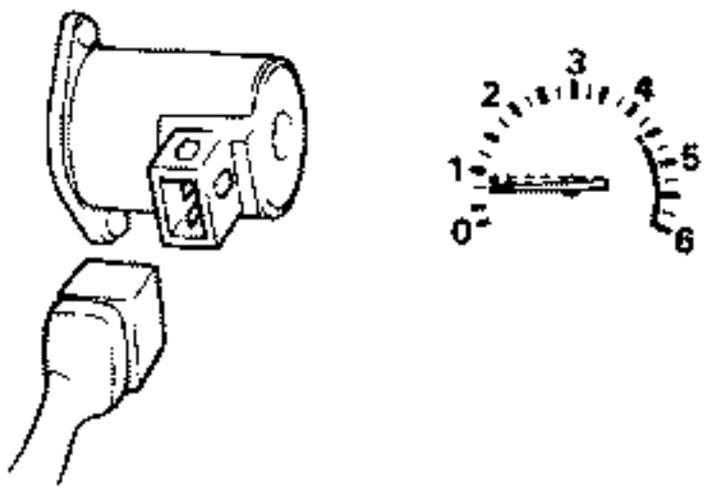
INSPECTION END

1



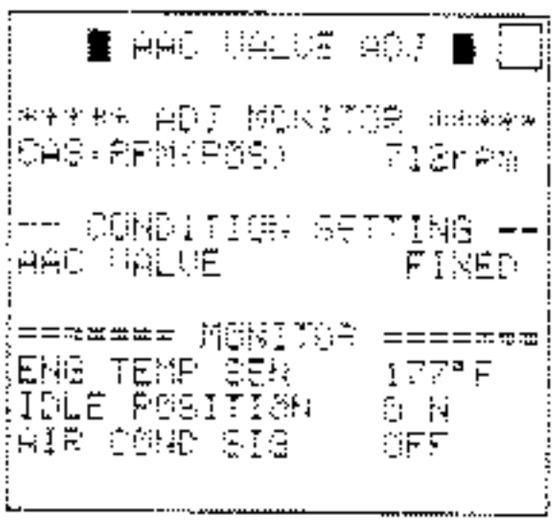
SEF162I

1



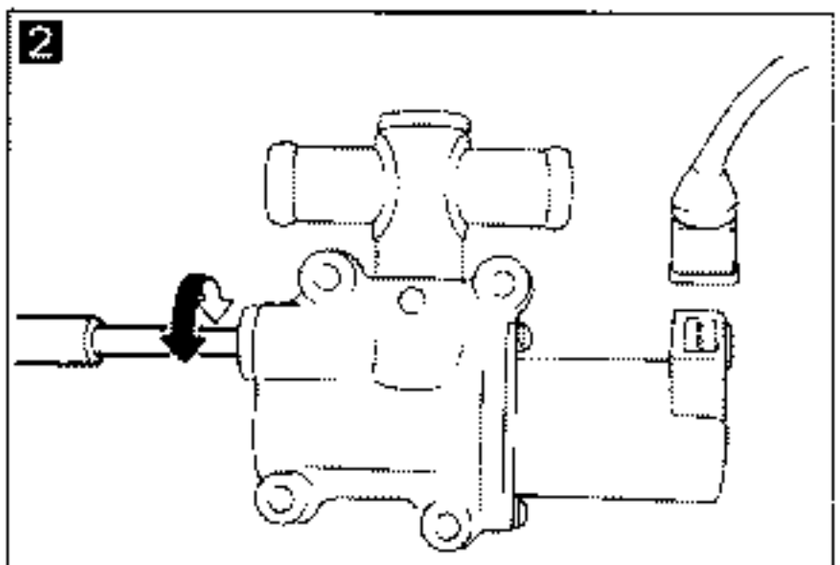
SEF146I

2



SEF145I

2



SEF161I

Diagnostic Procedure 14 — Engine Stalls after Decelerating

1

CHECK A.A.C. VALVE.

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

No → Check A.A.C. valve and circuit. (See page EF & EC-156.)

— OR —

When disconnecting A.A.C. valve harness connector, does the engine speed drop?

Yes ↓

2

CHECK IDLE ADJ. SCREW CLOGGING.

1. Perform "A.A.C. VALVE ADJ" in "WORK SUPPORT" mode.
2. Can you set engine rpm as follows by turning idle adjusting screw?

	A/T*	M/T
Non-turbo	720±50 rpm	650±50 rpm
Turbo	700±50 rpm	

*: in "N" position

No → Check for IAS clogging or throttle chamber clogging.

— OR —

1. Disconnect A.A.C. valve harness connector
2. Can you set engine rpm as follows by turning idle adjusting screw?

	A/T*	M/T
Non-turbo	720±50 rpm	650±50 rpm
Turbo	700±50 rpm	

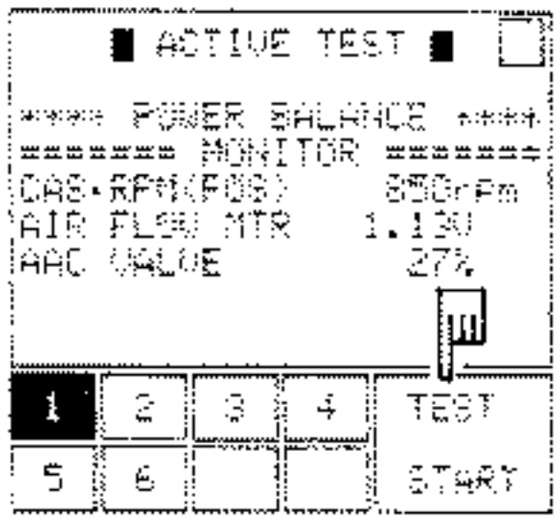
*: in "N" position

Yes ↓

(Go to Ⓐ on next page.)

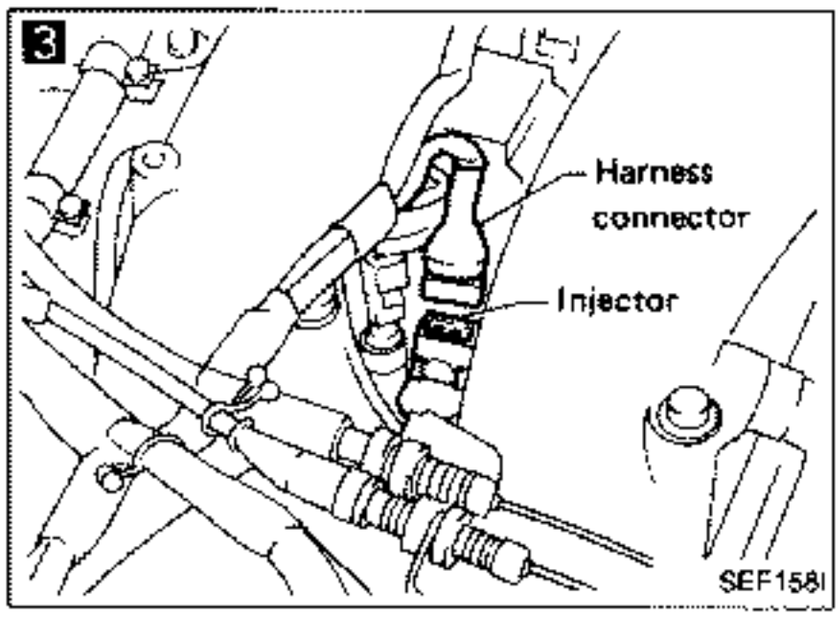
Diagnostic Procedure 14 — Engine Stalls after Decelerating (Cont'd)

3



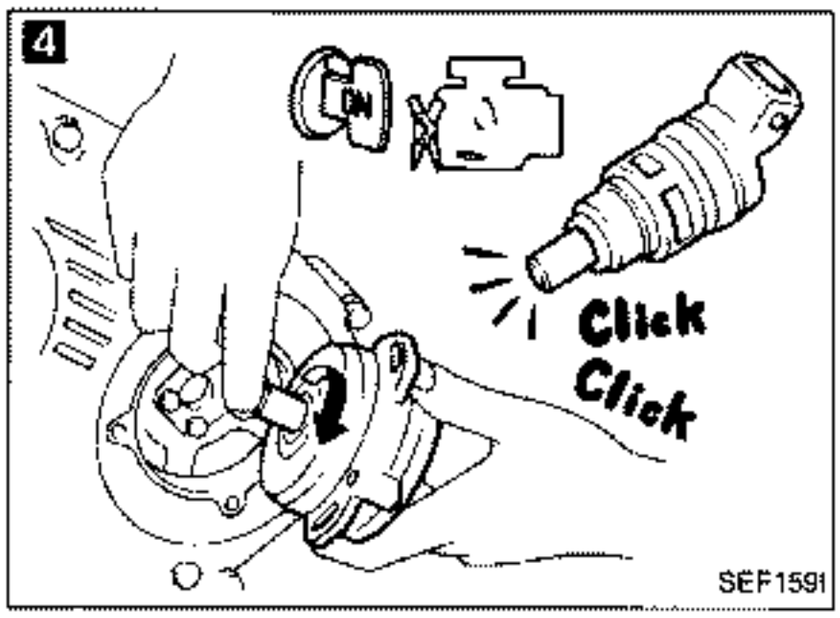
SEF157I

3



SEF158I

4



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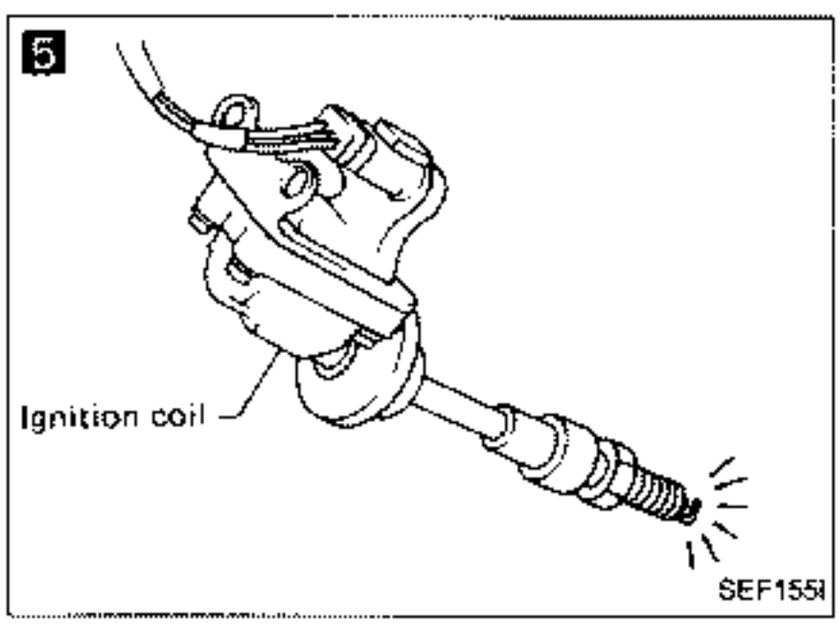
5



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(A)

3

PERFORM POWER BALANCE TEST.

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

No → Go to 6.

— OR —

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

Yes ↓

4

CHECK INJECTOR.

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

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

Yes ↓

5

CHECK IGNITION SPARK.

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

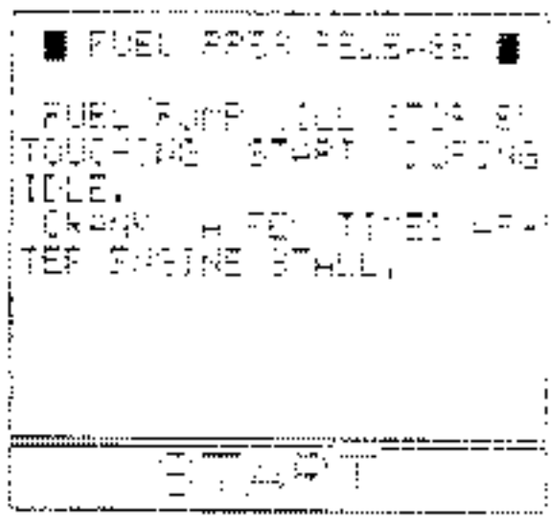
N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-118.)

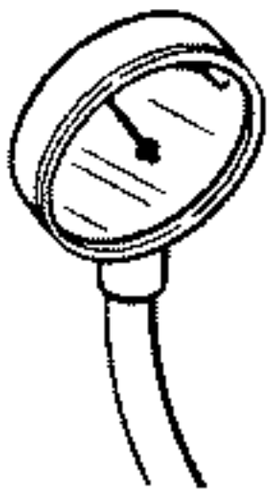
O.K. ↓

(Go to (B) on next page.)

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

6





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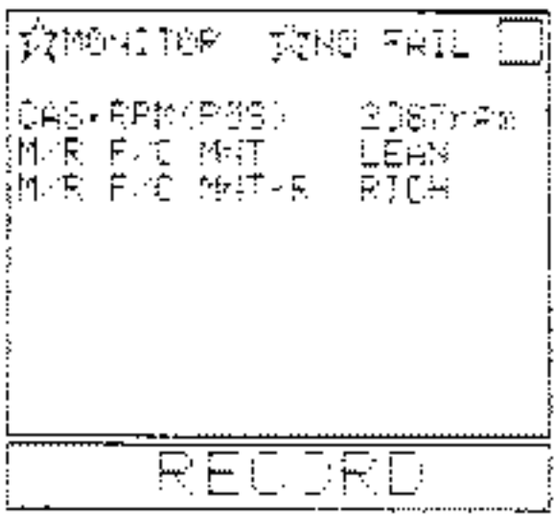
7



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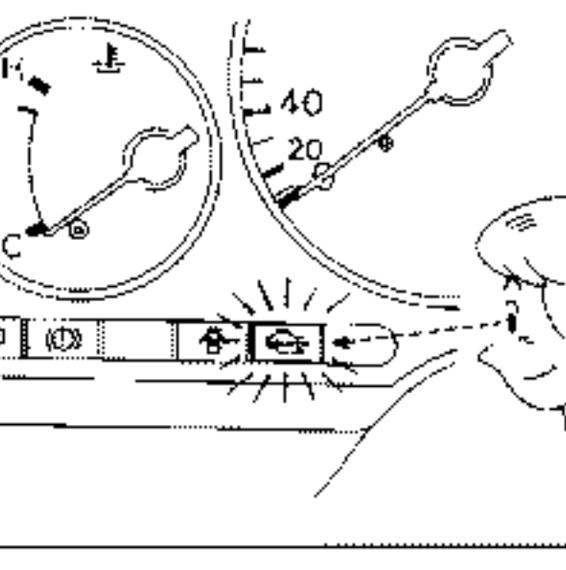
7



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Ⓑ

6

CHECK FUEL PRESSURE.

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.
   At idle approx. 255 kPa (2.55 bar, 2.6 kg/cm², 37 psi)
   The moment throttle valve is fully open:
   approx. 304 kPa (3.04 bar, 3.1 kg/cm², 44 psi)

N.G. → Check fuel pressure regulator diaphragm.

— OR —

1. Release fuel pressure to zero. (Refer to page EF & EC-185.)
2. Install fuel pressure gauge and check fuel pressure.

O.K.

7

CHECK EXHAUST GAS SENSOR.

1. See "M/R F/C MNT (right and left sides)" in "DATA MONITOR" mode.
2. Maintaining engine at 2,000 rpm under no-load (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.....

N.G. → Replace exhaust gas sensor(s).

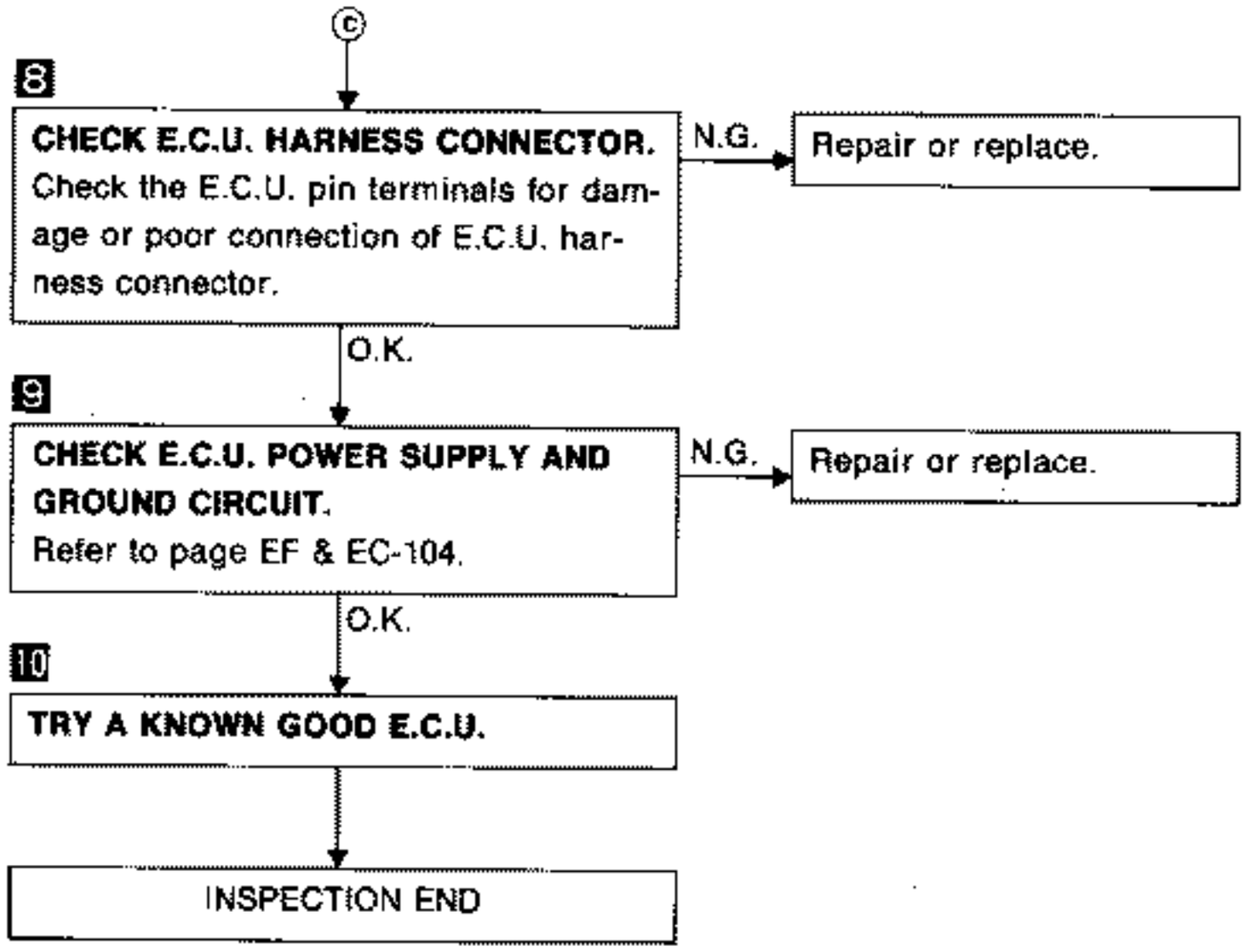
— OR —

1. Set "Exhaust gas sensor monitor" in the self-diagnostic Mode II. (See page EF & EC-49.)
2. Maintaining engine at 2,000 rpm under no-load, check that check engine light goes ON and OFF more than 5 times during 10 seconds.

O.K.

(Go to Ⓒ on next page.)

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



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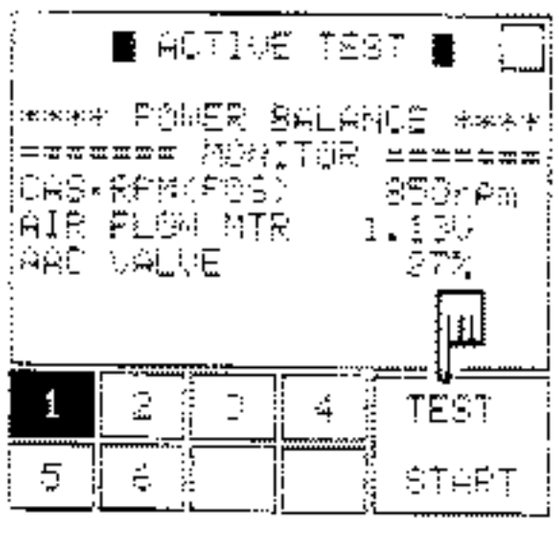

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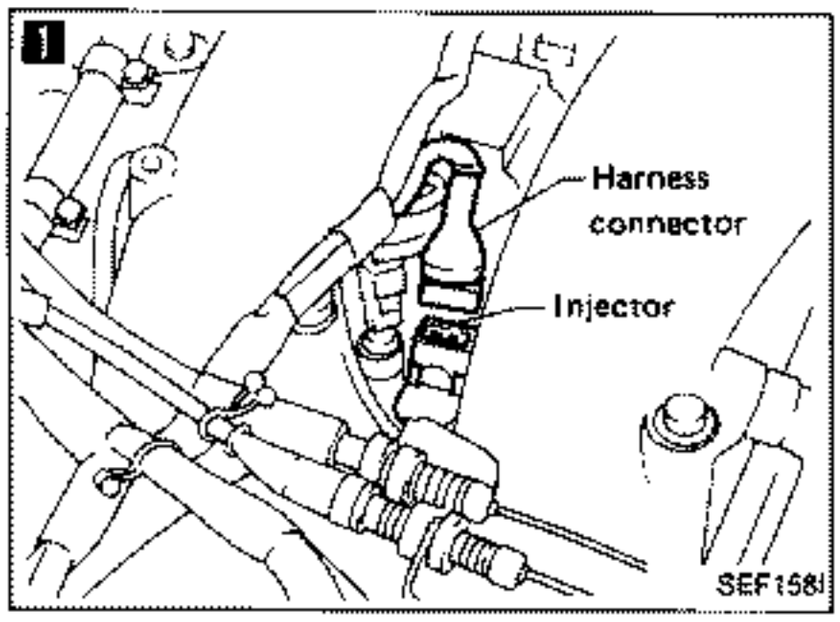
1



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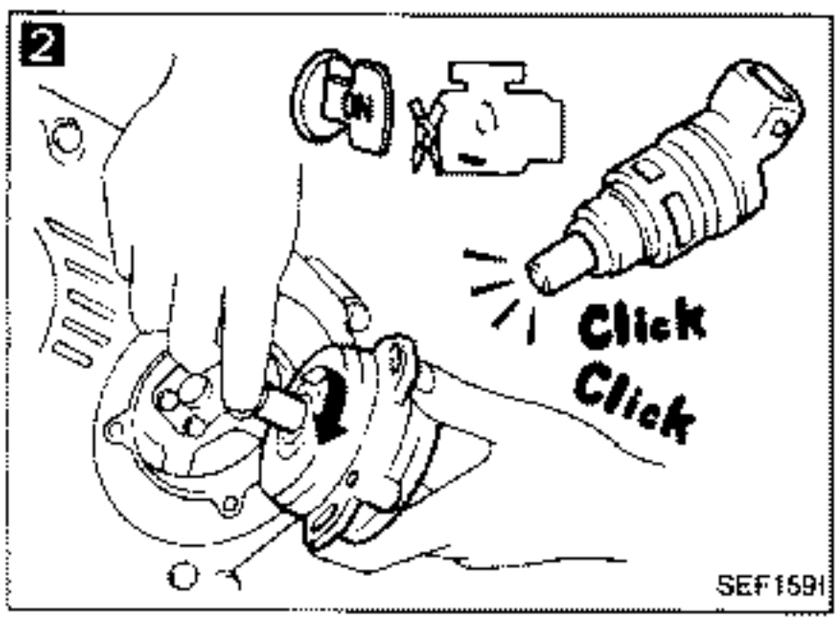

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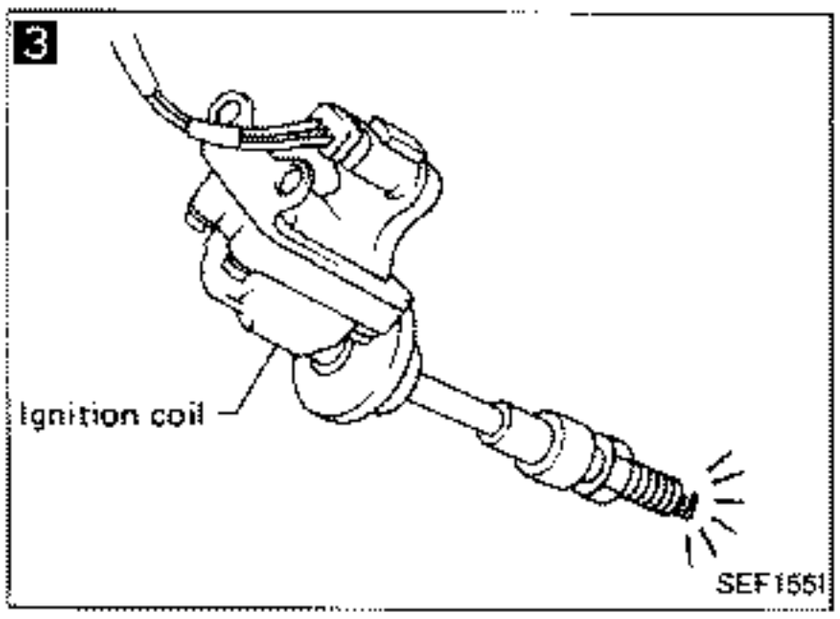


SEF155I

Diagnostic Procedure 15 — Engine Stalls when Accelerating or Cruising

1

PERFORM POWER BALANCE TEST.

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

No → Go to 4.

OR

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

Yes ↓

2

CHECK INJECTOR.

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

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

Yes ↓

3

CHECK IGNITION SPARK.

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

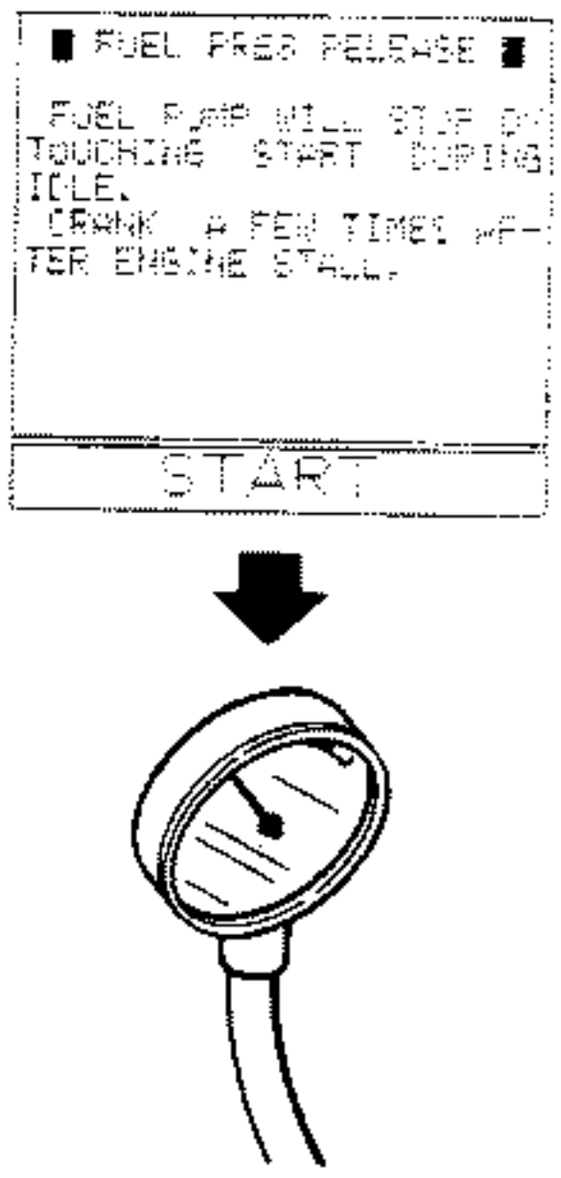
N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-118.)

O.K. ↓

(Go to Ⓐ on next page.)

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

4



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Ⓐ

4

CHECK FUEL PRESSURE.

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.
   At idle approx. 255 kPa (2.55 bar, 2.6 kg/cm², 37 psi)
   The moment throttle valve is fully open:
   approx. 304 kPa (3.04 bar, 3.1 kg/cm², 44 psi)

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

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-185.)
2. Install fuel pressure gauge and check fuel pressure.

O.K.

5

CHECK FOR INTAKE AIR LEAK.

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

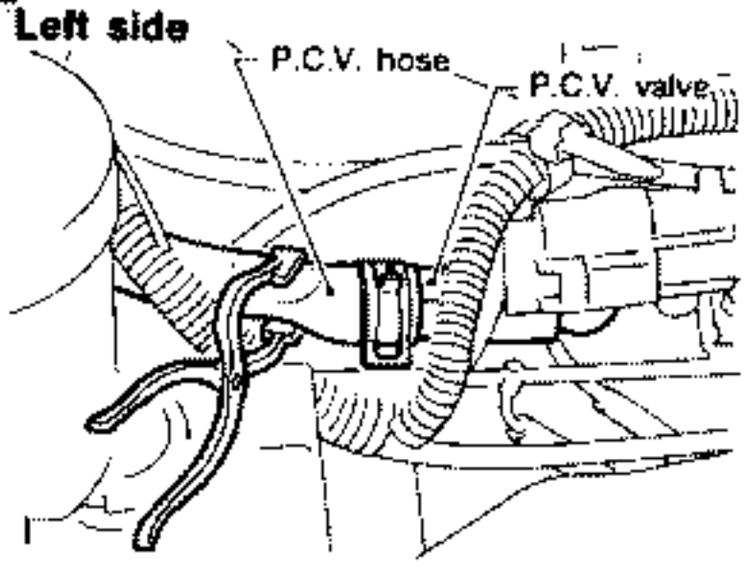
Yes → Discover air leak location and repair.

No

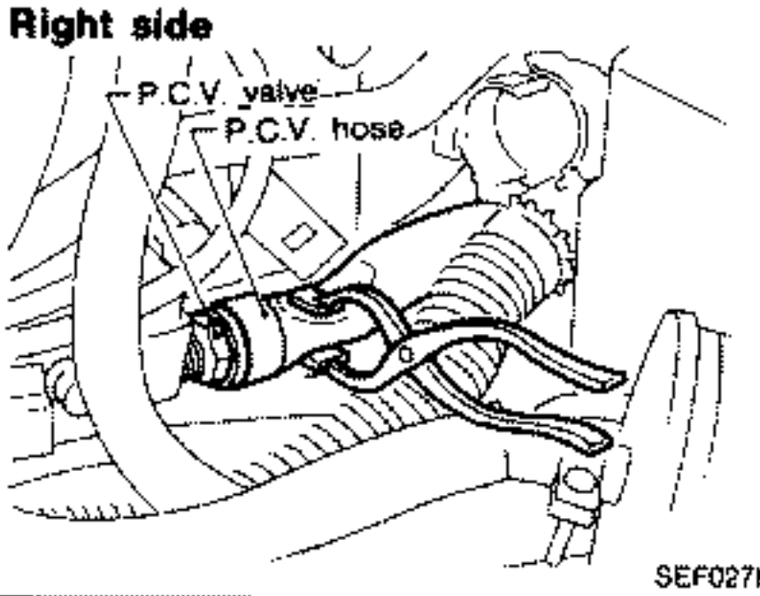
(Go to Ⓑ on next page.)

5

Left side



Right side



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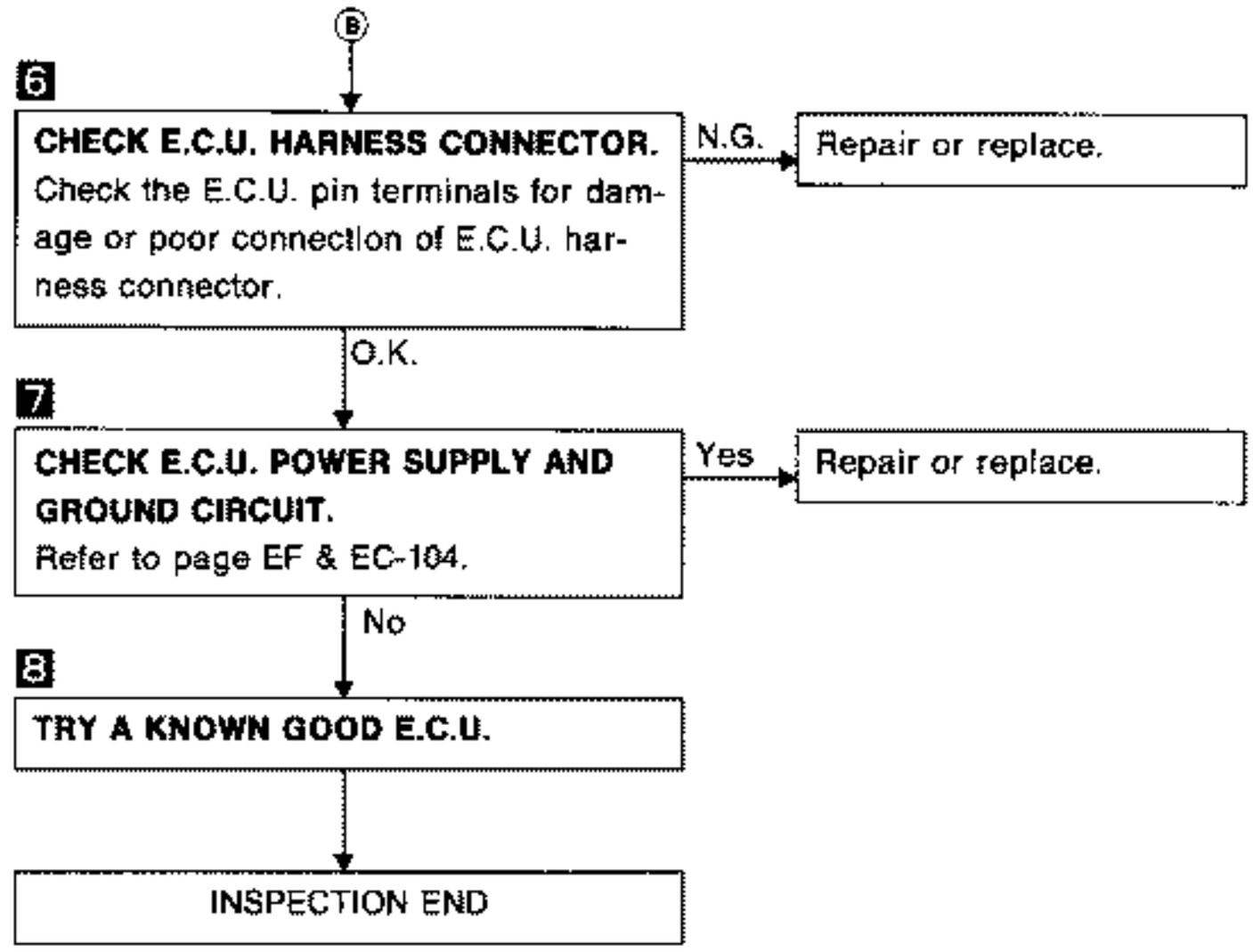
Diagnostic Procedure 15 — Engine Stalls when Accelerating or Cruising (Cont'd)



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

1

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

N.G. → Repair or replace.

O.K. ↓

2

PERFORM POWER BALANCE TEST.

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

— OR —

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

No → Go to **5**.

Yes ↓

3

CHECK INJECTOR.

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

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

Yes ↓

4

CHECK IGNITION SPARK.

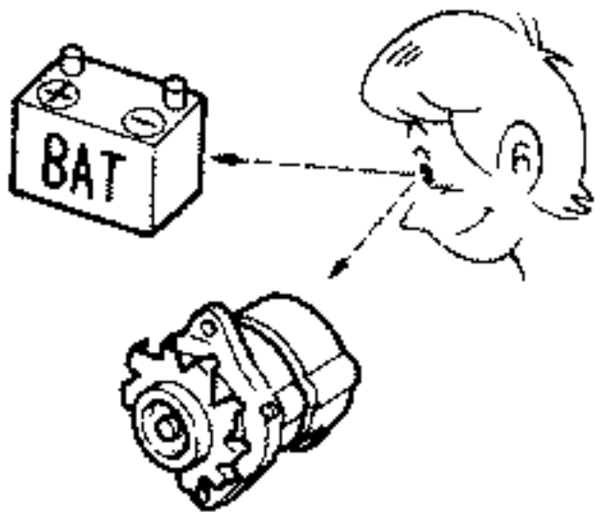
1. Disconnect ignition coil assembly from collector.
2. Connect a known good spark plug to the ignition coil assembly.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

N.G. → Check ignition coil, power transistor unit and circuits. (See page EF & EC-118.)

O.K. ↓

(Go to Ⓐ on next page.)

1



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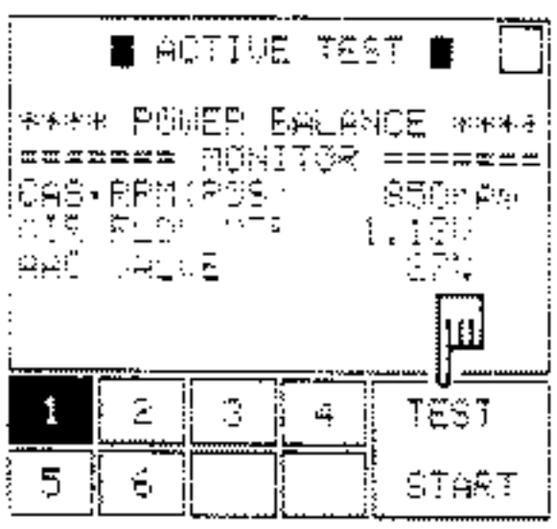
2



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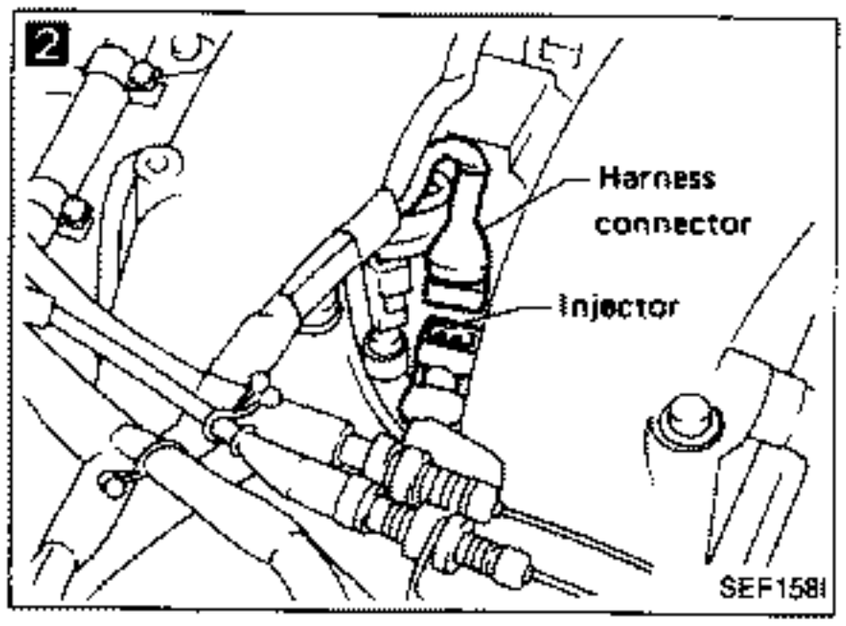

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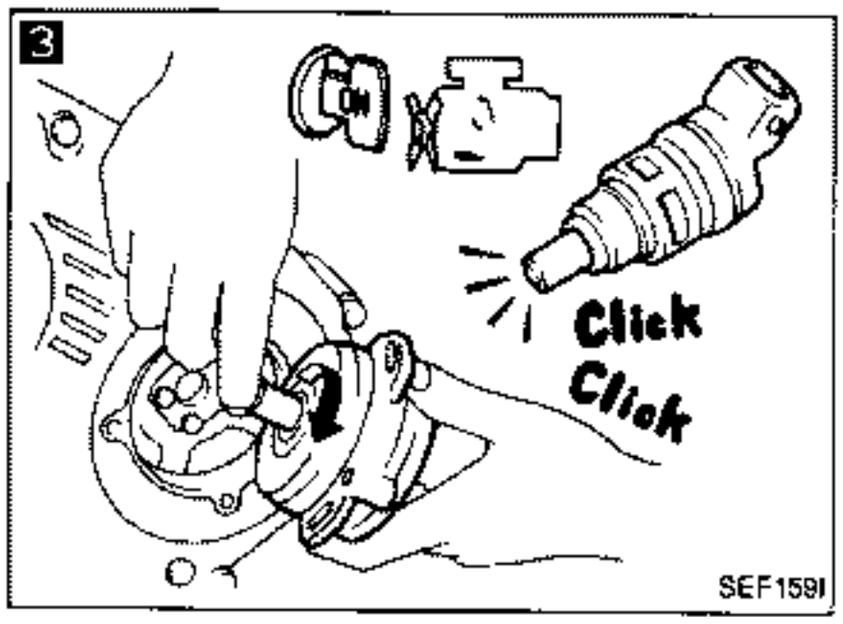
3



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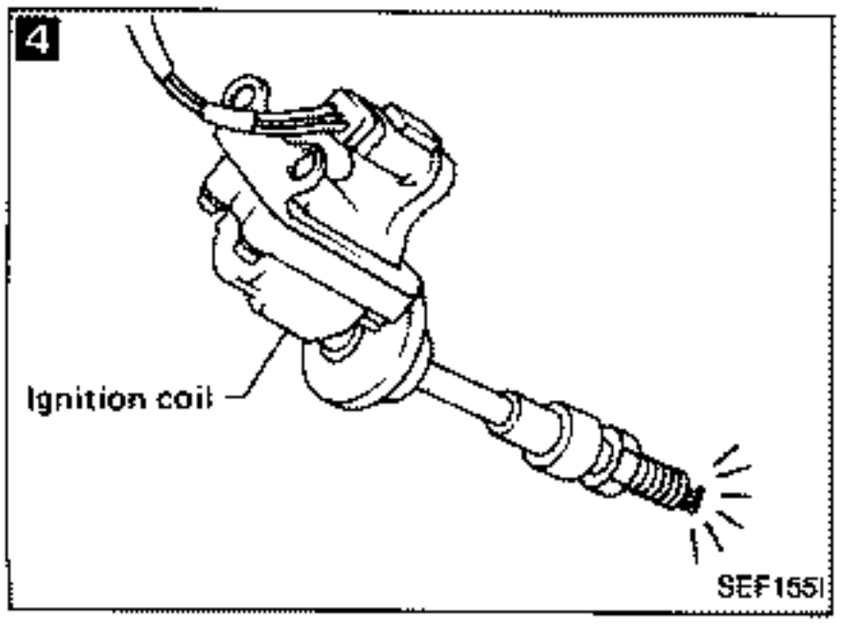

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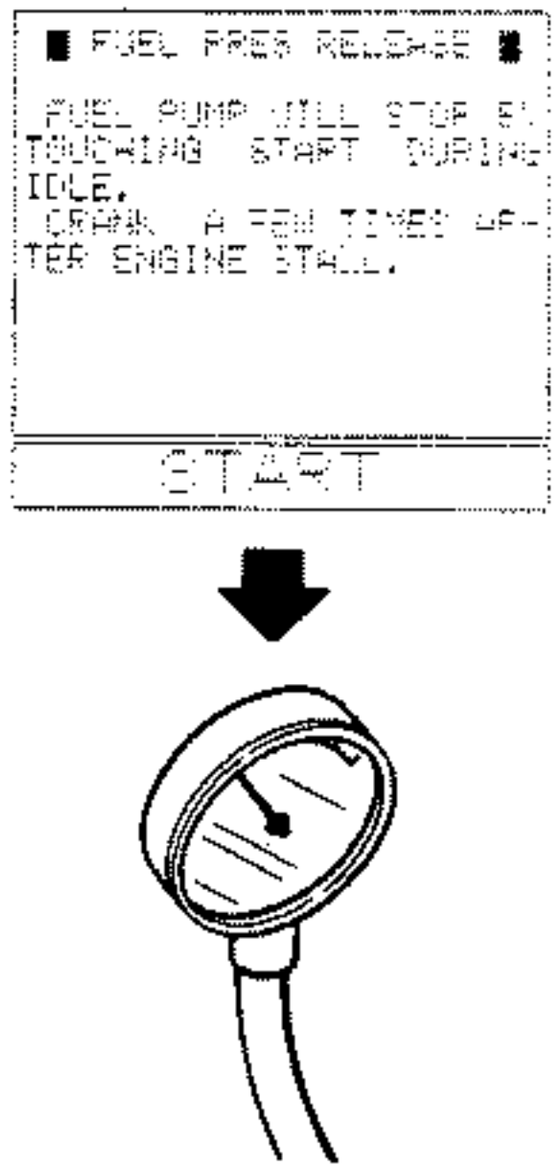
Diagnostic Procedure 16 — Engine Stalls when the Electrical Load is Heavy (Cont'd)

5



SEF204J

5 (A)

CHECK FUEL PRESSURE.

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.
   At idle approx. 255 kPa (2.55 bar, 2.6 kg/cm^2, 37 psi)
   The moment throttle valve is fully open:
   approx. 304 kPa (3.04 bar, 3.1 kg/cm^2, 44 psi)

N.G. → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-185.)
2. Install fuel pressure gauge and check fuel pressure.

O.K. ↓

6

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

N.G. → Repair or replace.

O.K. ↓

7

CHECK E.C.U. POWER SUPPLY AND GROUND CIRCUIT.
Refer to page EF & EC-104.

N.G. → Repair or replace.

O.K. ↓

8

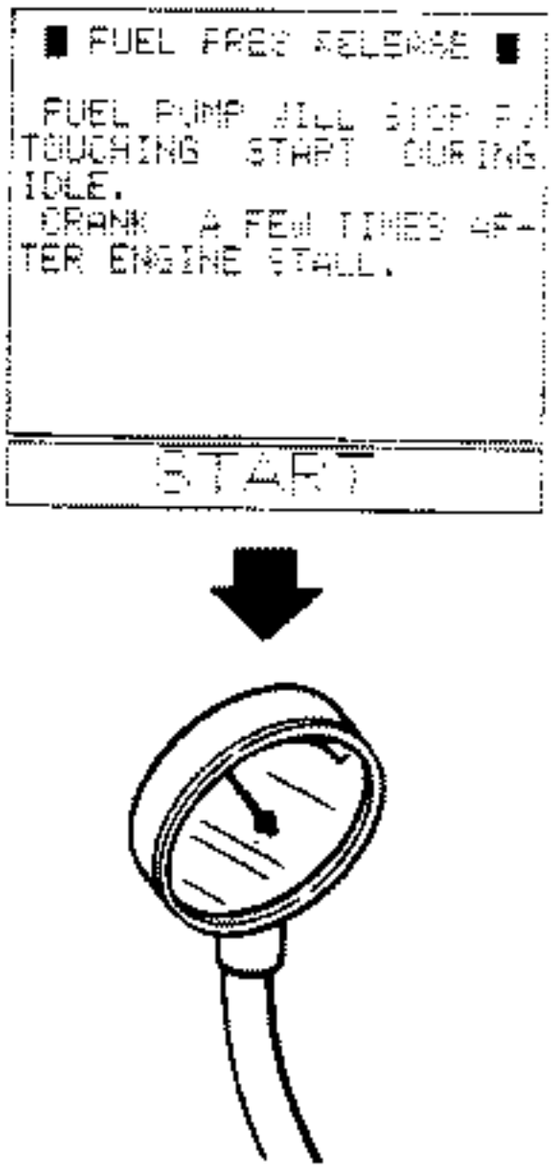
TRY A KNOWN GOOD E.C.U.

↓

INSPECTION END

Diagnostic Procedure 17 — Lack of Power and Stumble

1



SEF204J

CHECK FUEL PRESSURE.

1. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode in order to release fuel pressure to zero.
2. Install fuel pressure gauge and check fuel pressure.
   At idle approx. 255 kPa (2.55 bar, 2.6 kg/cm², 37 psi)
   The moment throttle valve is fully open:
   approx. 304 kPa (3.04 bar, 3.1 kg/cm², 44 psi)

N.G. → Check fuel pressure regulator diaphragm.

OR

1. Release fuel pressure to zero. (Refer to page EF & EC-185.)
2. Install fuel pressure gauge and check fuel pressure.

O.K. ↓

2

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

Yes → Discover air leak location and repair.

No ↓

CHECK TIMING BELT FOR PROPER INSTALLATION.

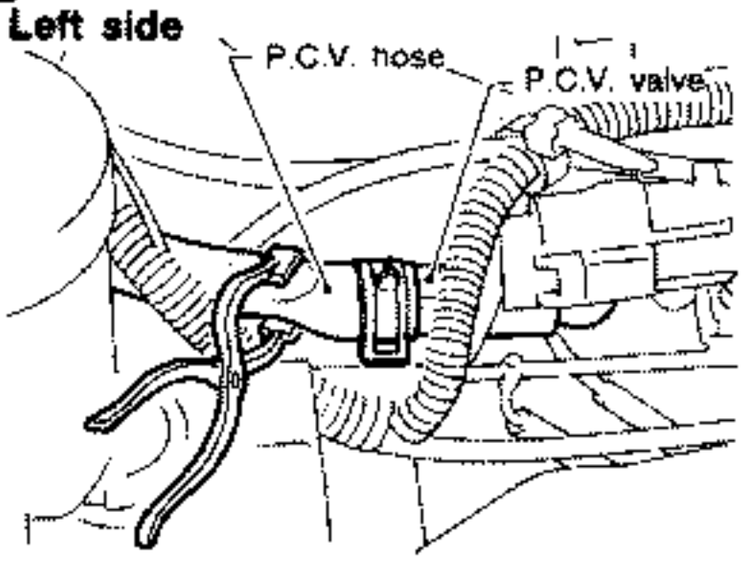
N.G. → Replace timing belt.

O.K. ↓

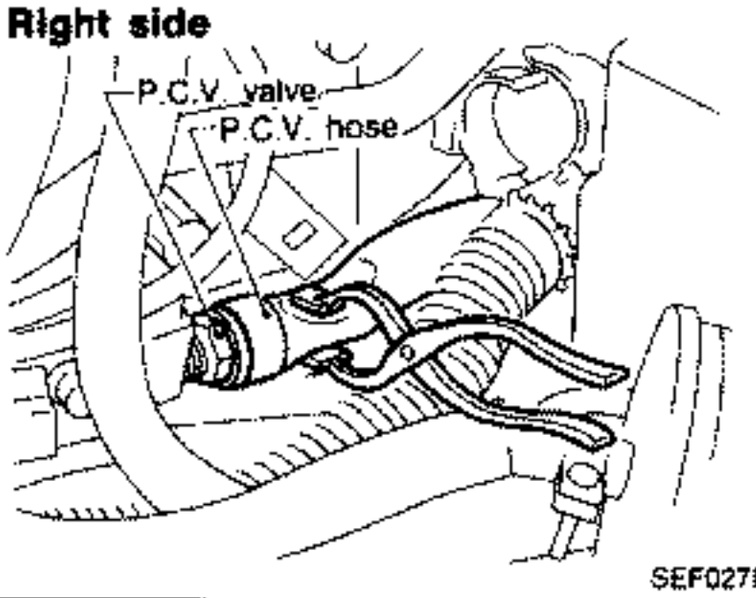
INSPECTION END

2

Left side



Right side



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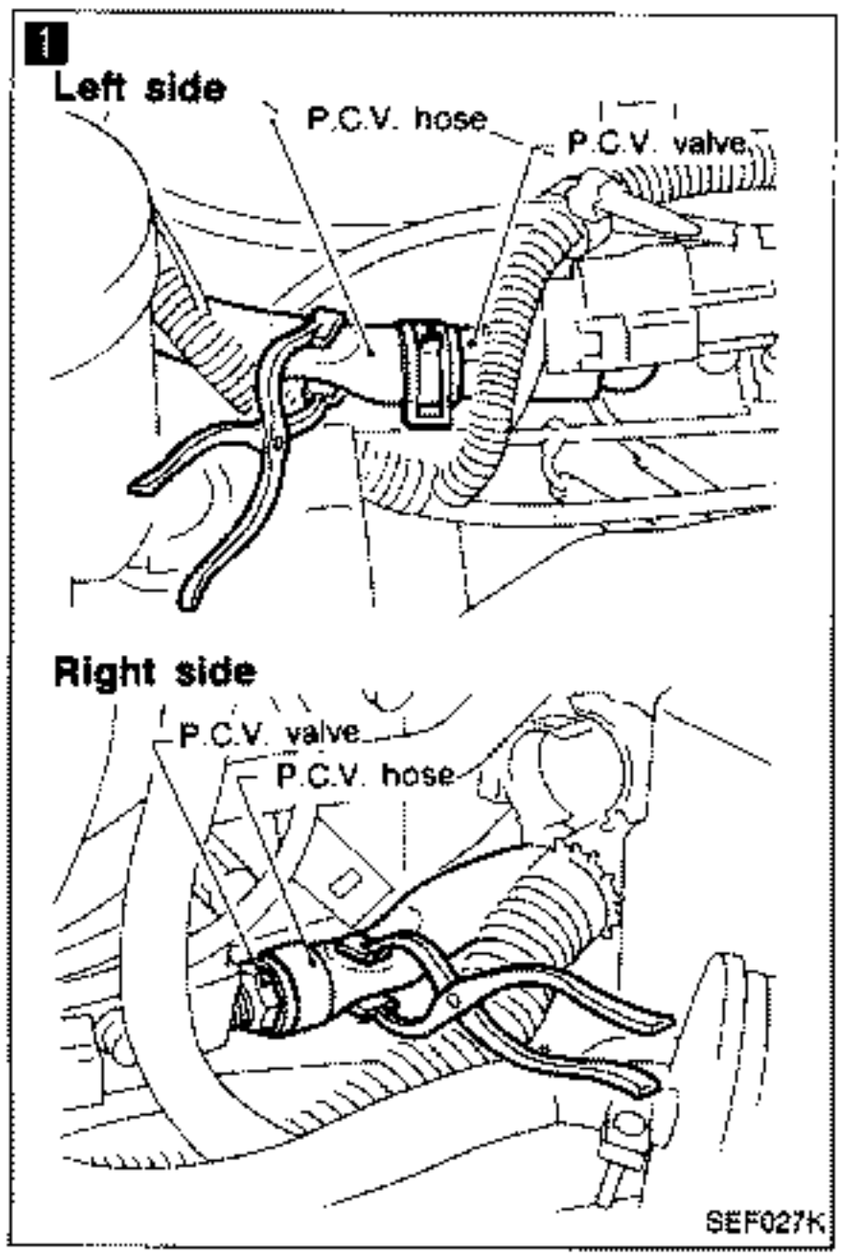
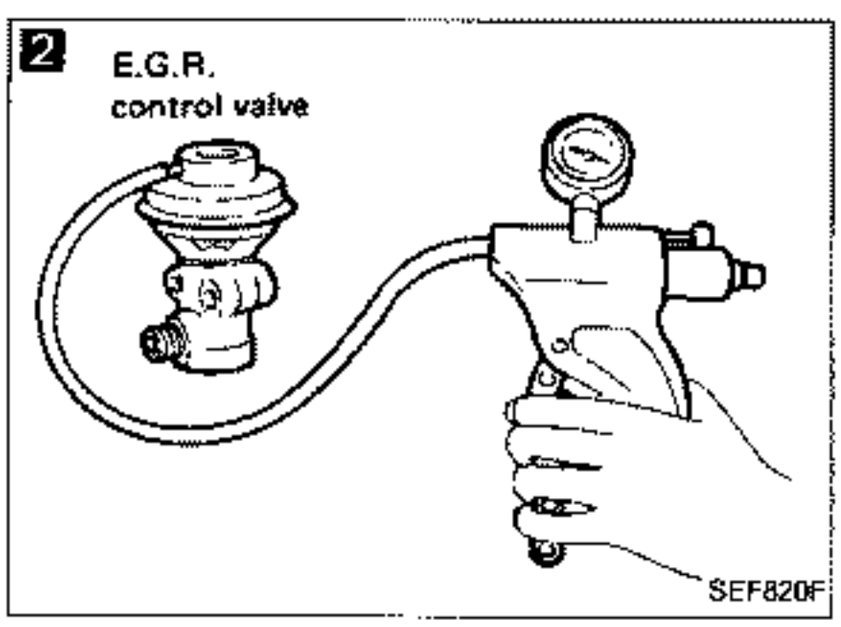
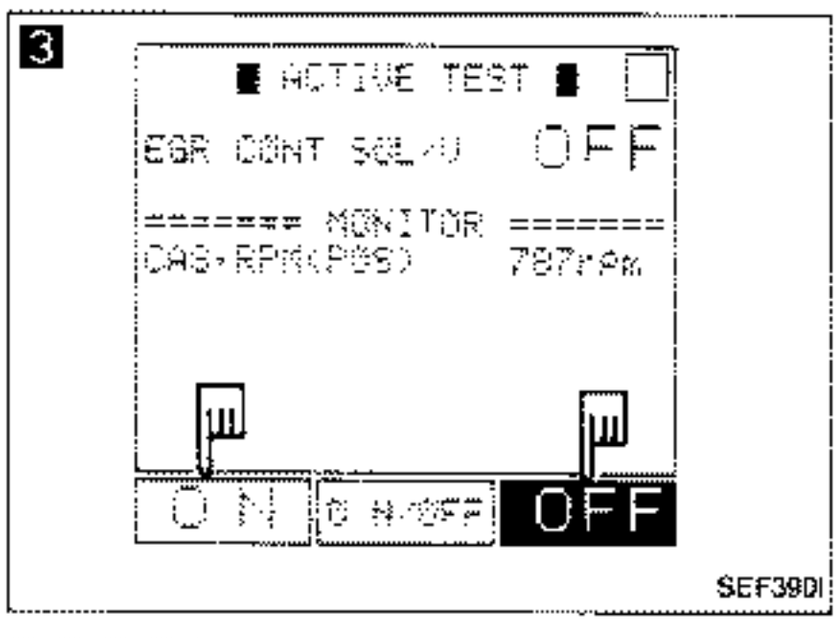
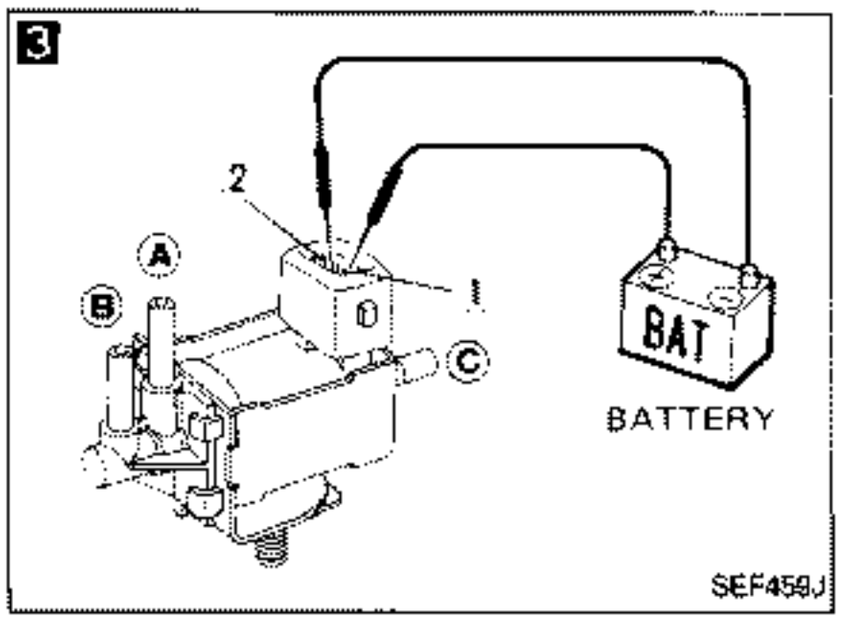
Diagnostic Procedure 18 — Detonation









1

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

Yes → Discover air leak location and repair.

No ↓

2

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

No → Check E.G.R. valve for sticking.

Yes ↓

3

CHECK E.G.R. CONTROL SOLENOID VALVE.

1. Select "E.G.R. CONT SOL VALVE" in "ACTIVE TEST" mode.
2. Turn E.G.R. control solenoid valve ON and OFF.
3. Check operating sound.

— OR —

1. Disconnect E.G.R. control solenoid valve harness connector.
2. Supply E.G.R. control solenoid valve terminals with battery current and check operating sound.

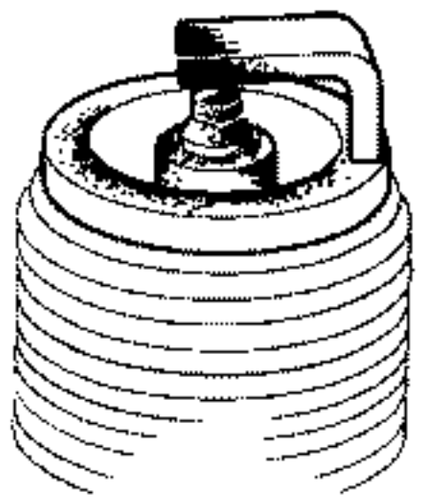
N.G. → Check solenoid valve and circuit.

O.K. ↓

(Go to Ⓐ on next page.)

Diagnostic Procedure 18 — Detonation (Cont'd)

5



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4

CHECK VACUUM HOSES.
Check the following vacuum hoses for clogging, cracks and poor connection.
a) Vacuum hose between E.G.R. control valve and E.G.R. control solenoid valve.
b) Vacuum hose between E.G.R. control solenoid valve and throttle chamber port.
c) Vacuum hose between E.G.R. control solenoid valve and air duct.

N.G. → Repair or replace.

O.K. ↓

5

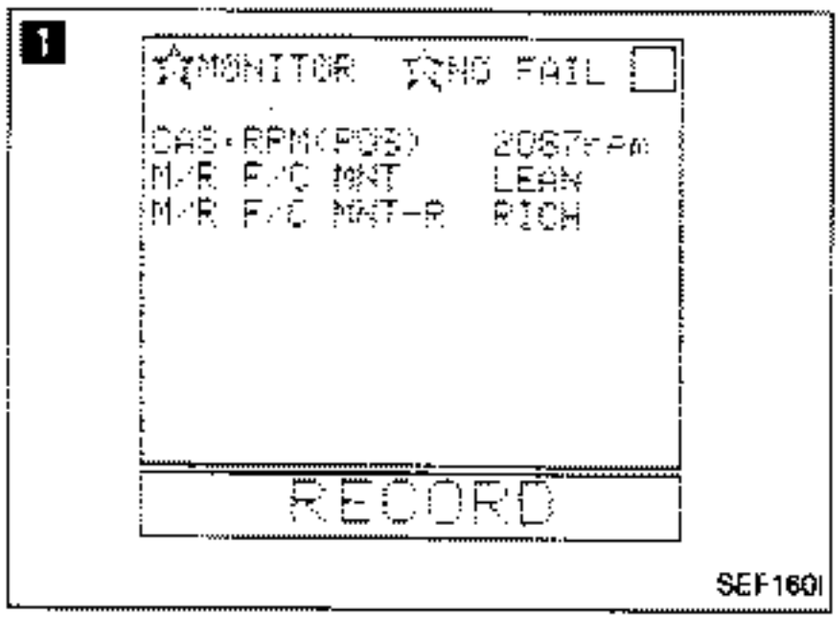
CHECK FOR OIL LEAK TO COMBUSTION CHAMBER.
Remove spark plugs and check for fouling with oil.

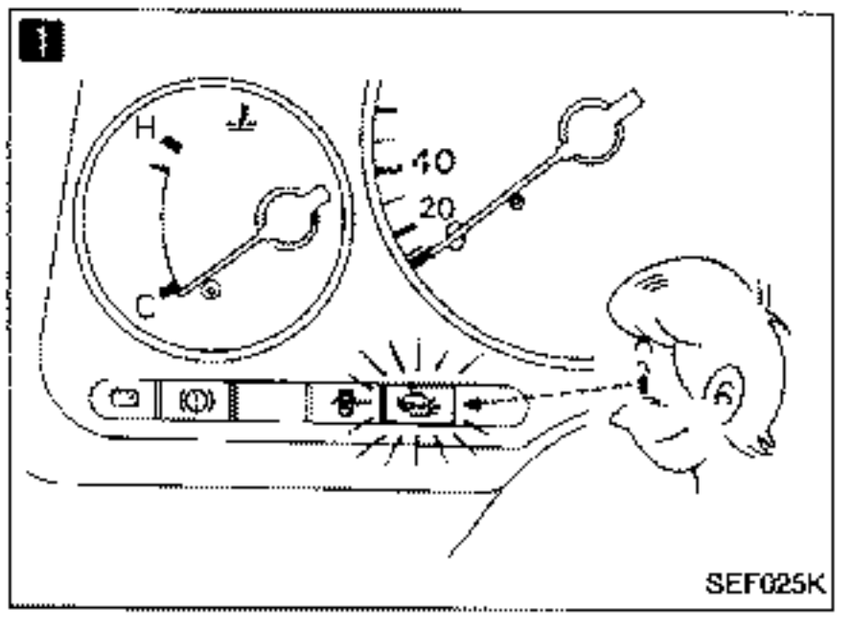
Yes → Check pistons, piston rings, valves, valve seats, valve oil seal, engine oil level, etc.

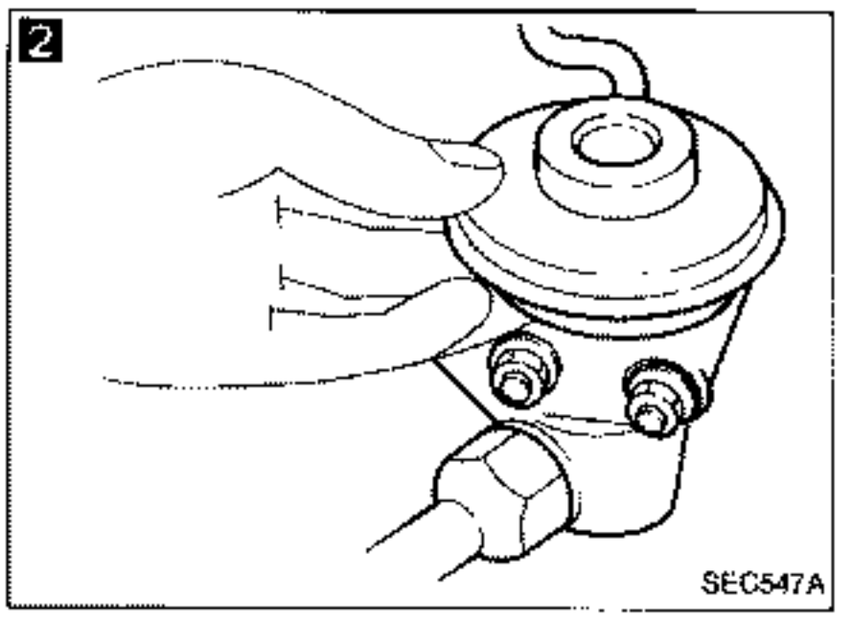
No ↓

INSPECTION END

Diagnostic Procedure 19 — Surge







1

CHECK EXHAUST GAS SENSOR.

1. See "M/R F/C MNT (right and left sides)" in "DATA MONITOR" mode.
2. Maintaining engine at 2,000 rpm under no-load (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.....

N.G. → Replace exhaust gas sensor(s).

OR

1. Set "Exhaust gas sensor monitor" in the self-diagnostic Mode II. (See page EF & EC-49.)
2. Maintaining engine at 2,000 rpm under no-load, check that check engine light goes ON and OFF more than 5 times during 10 seconds.

O.K.

2

CHECK E.G.R. CONTROL VALVE.
Check E.G.R. control valve for sticking.

N.G. → Repair or replace.

O.K.

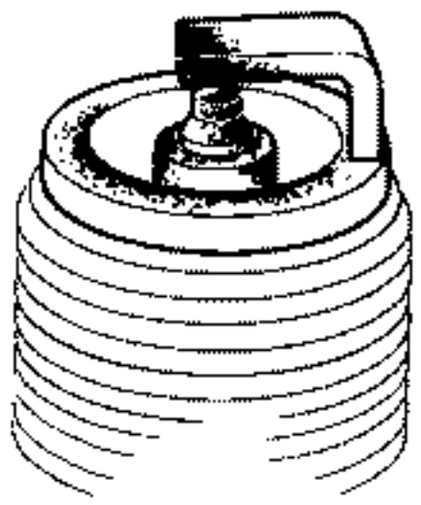
3

TRY A KNOWN GOOD E.C.U.

O.K.

INSPECTION END

1



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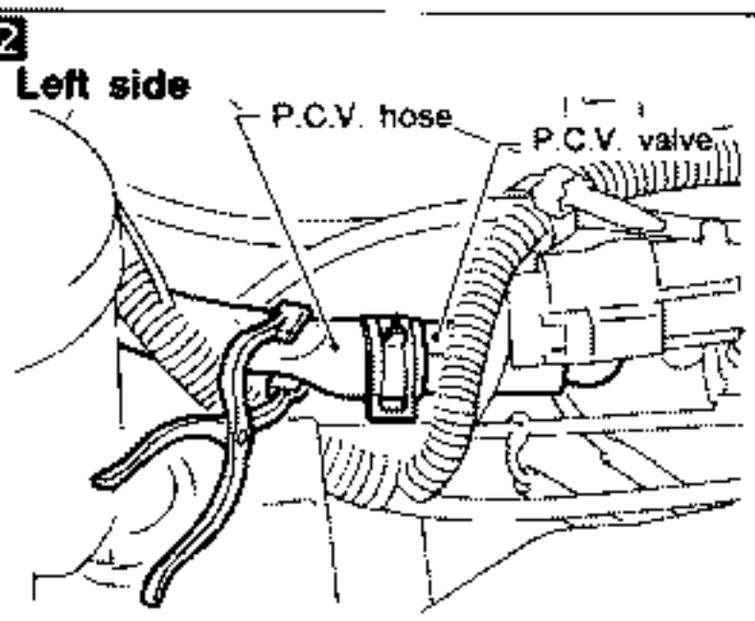
2



SEF027K

Diagnostic Procedure 20 — Backfire through the Intake

1

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

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

O.K. ↓

2

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

Yes → Discover air leak location and repair.

No ↓

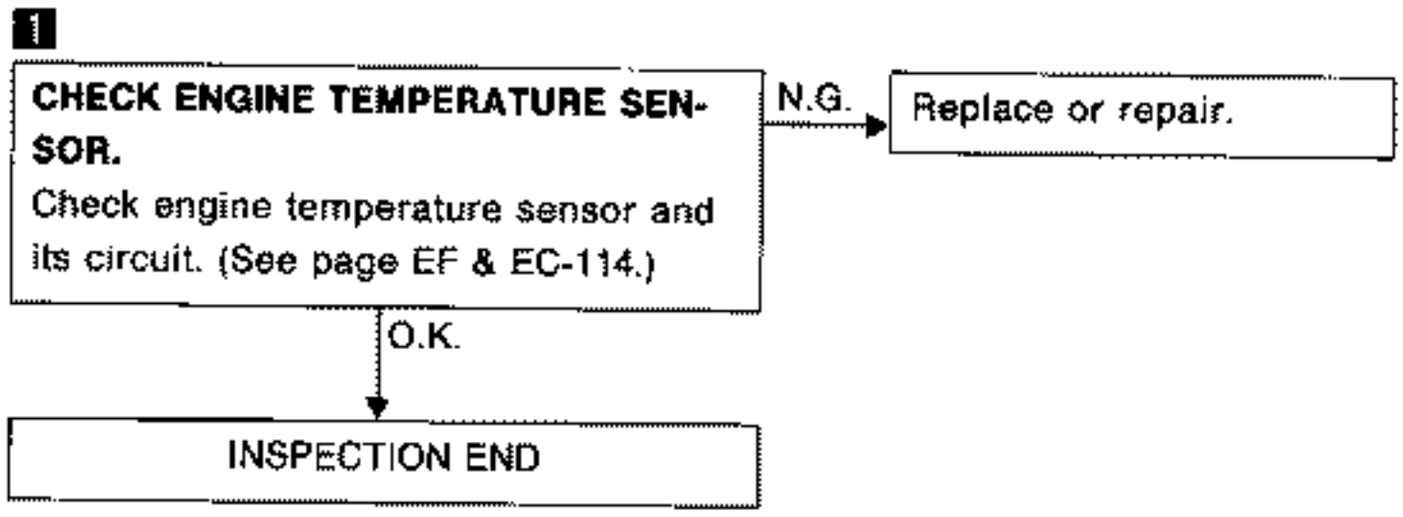
3

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

↓

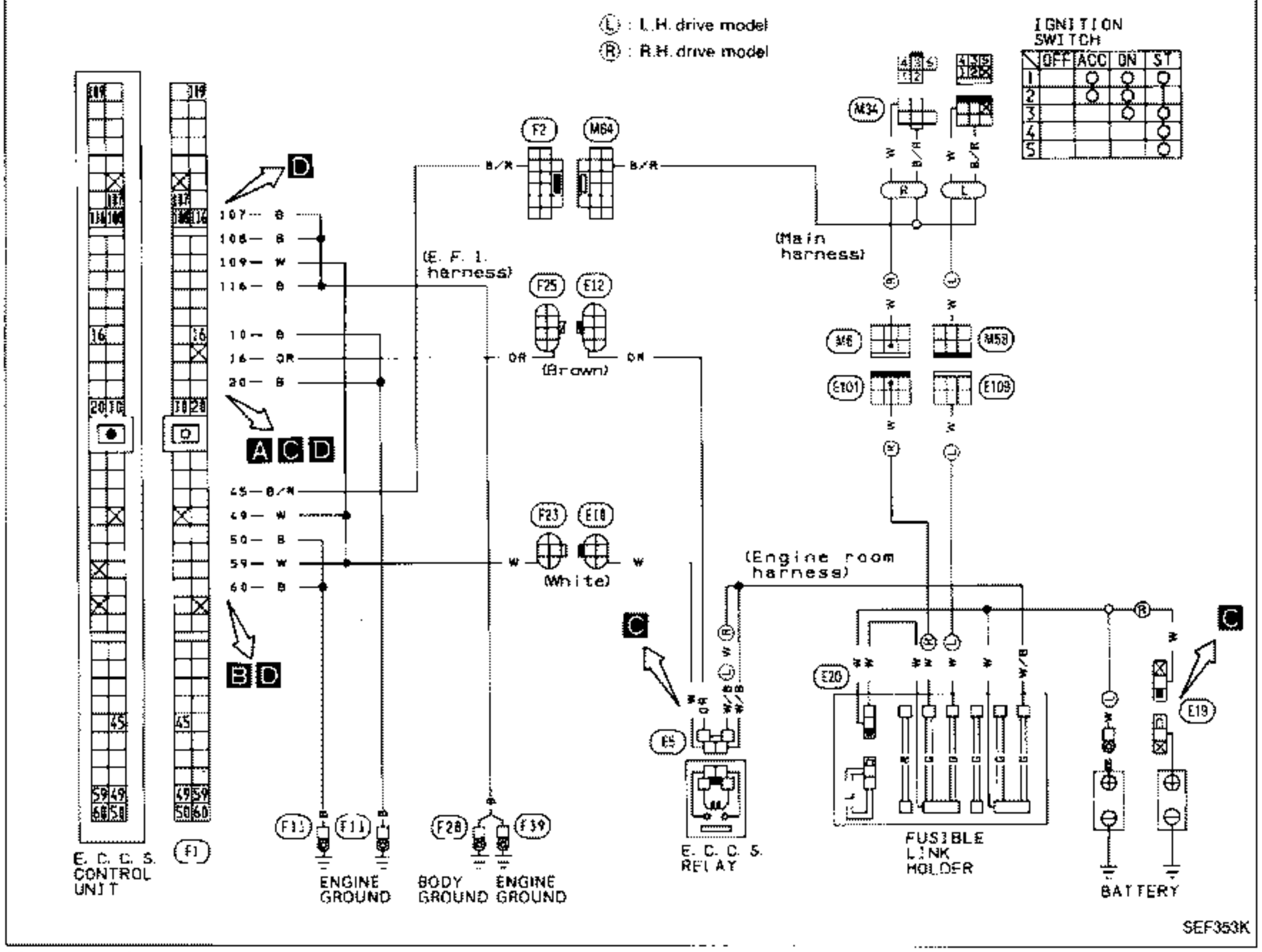
INSPECTION END

Diagnostic Procedure 21 — Backfire through the Exhaust

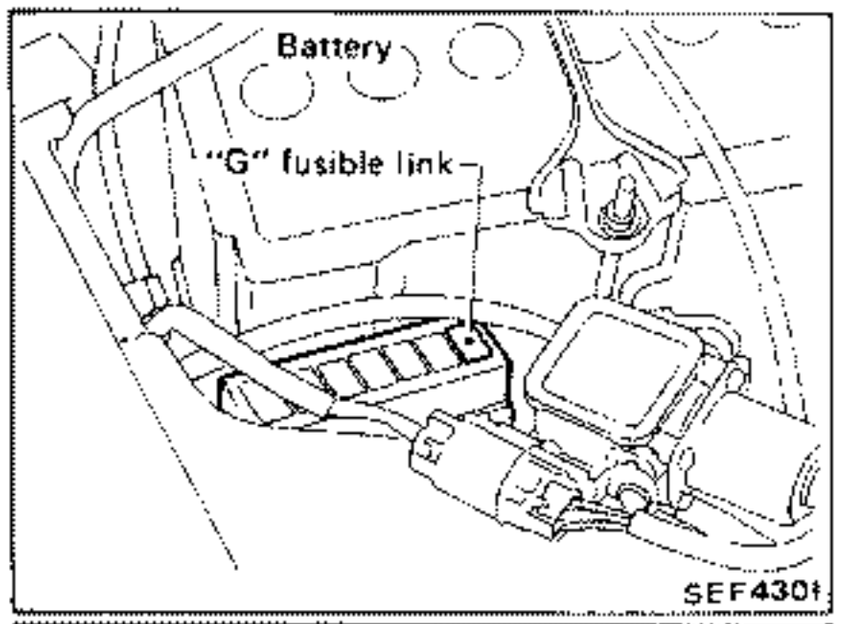


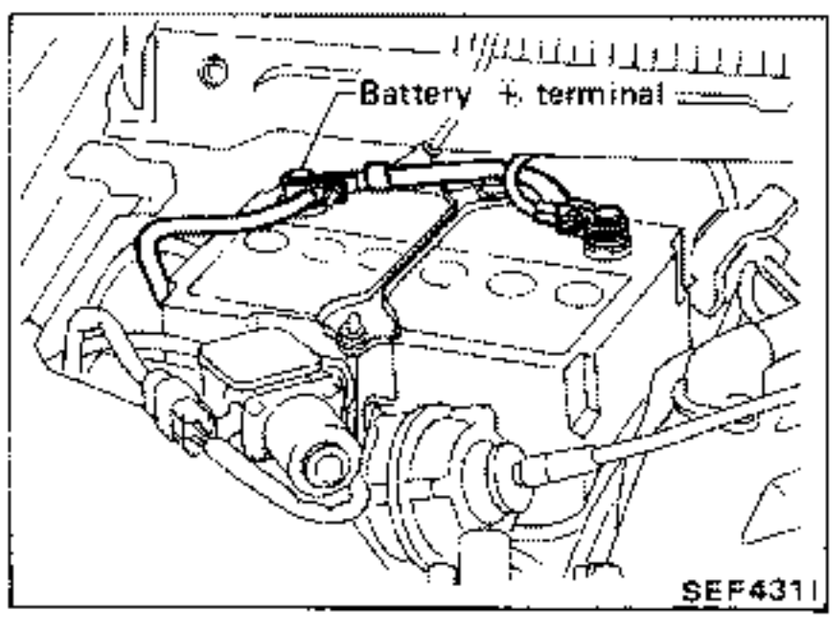
Diagnostic Procedure 22

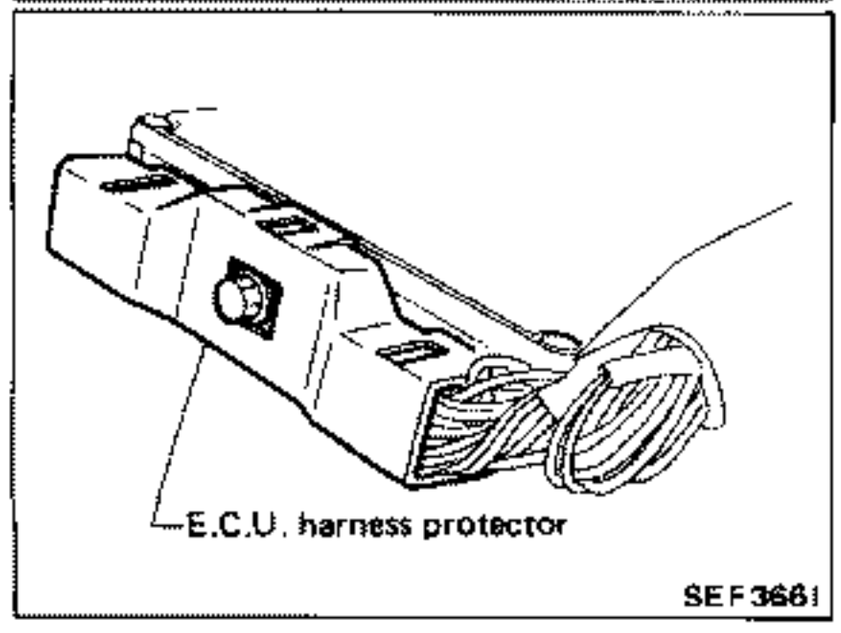
MAIN POWER SUPPLY AND GROUND CIRCUIT



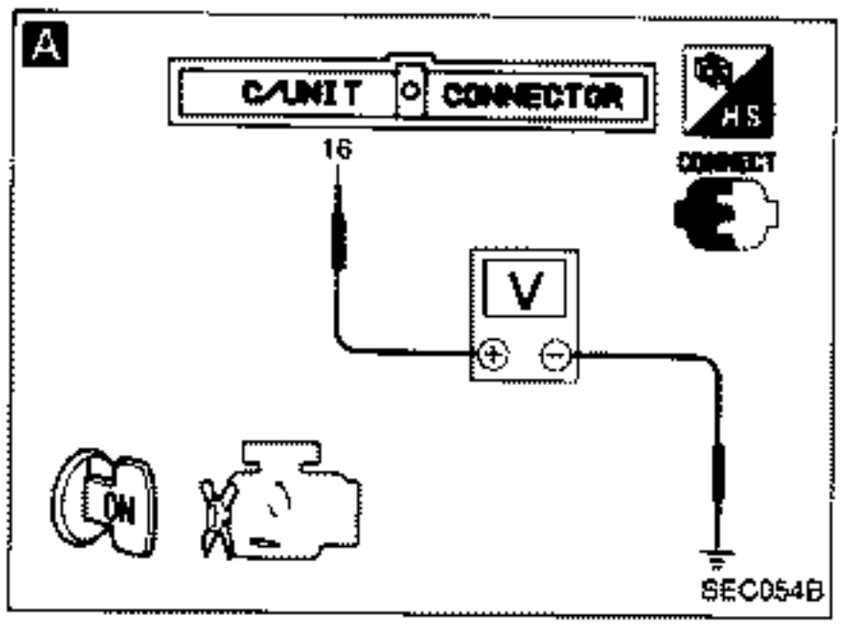
Harness layout

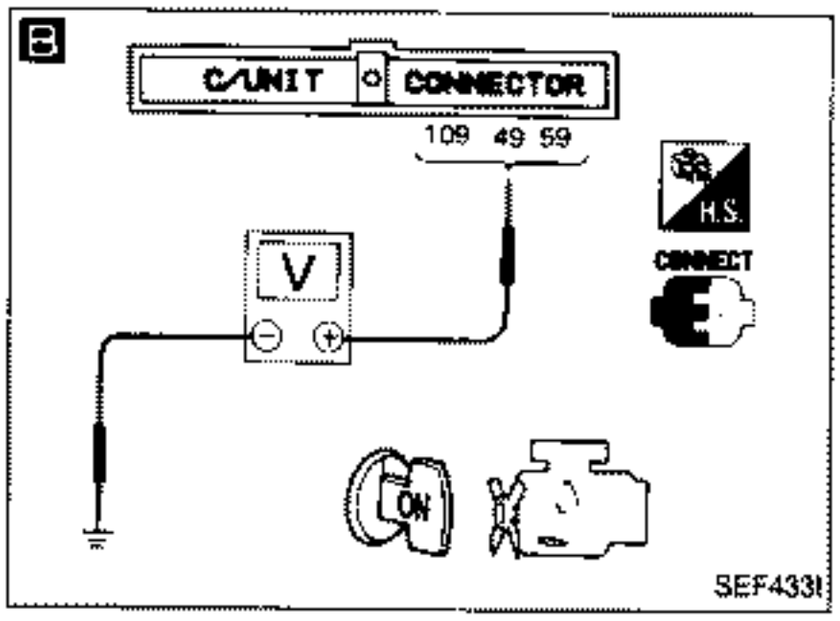


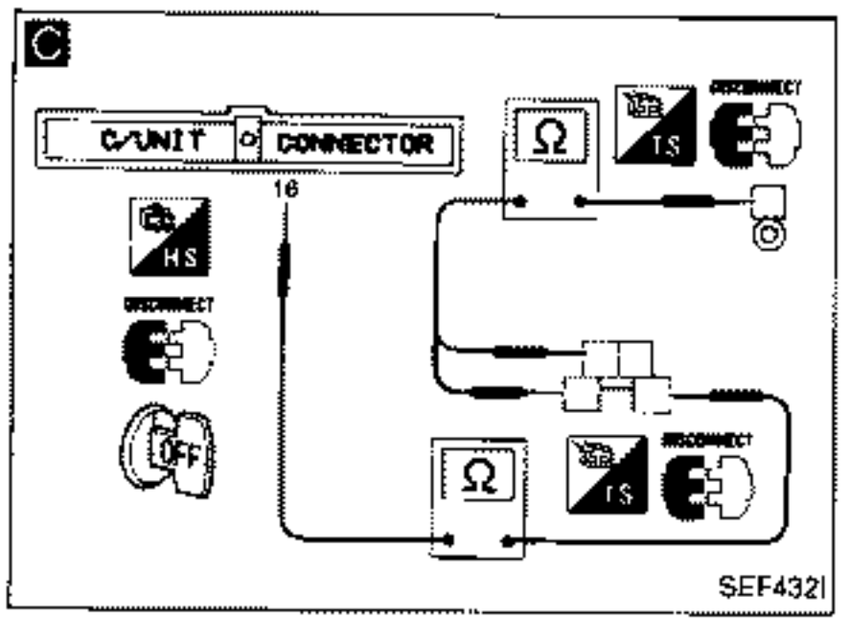


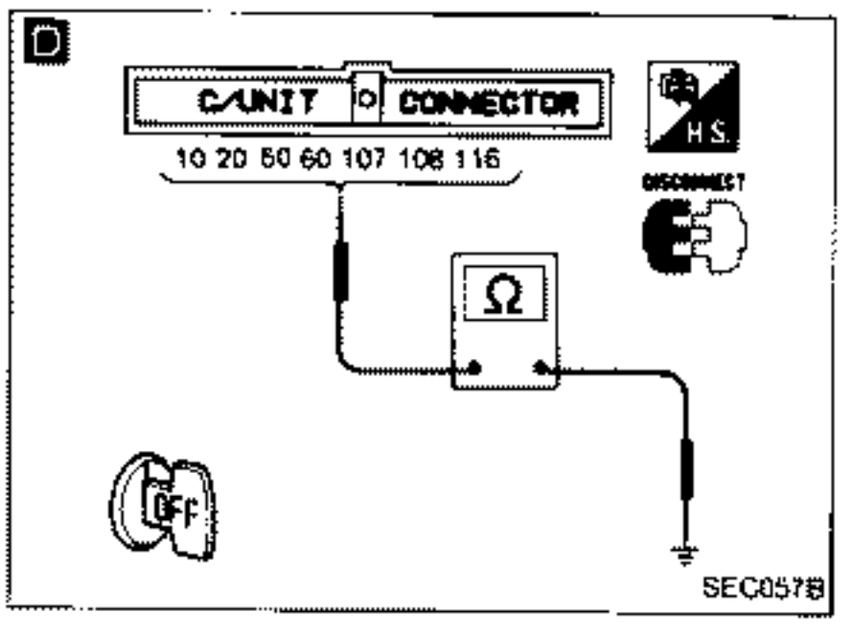


Diagnostic Procedure 22 (Cont'd)









INSPECTION START

CHECK POWER SUPPLY.
1) Turn ignition switch "ON".
A 2) Check voltage between E.C.U. pin terminal (16) and ground.
Voltage:
Approximately 0.8 - 1.0V
B 3) Check voltage between E.C.U. pin terminals (49), (59), (109) and ground.
Voltage: Battery voltage

N.G. → C

C
Check the following items.
1) E.C.C.S. relay
Refer to "Electrical Components Inspection".
(See page EF & EC-184.)
2) "G" fusible link
3) Harness continuity between E.C.C.S. relay and battery ⊕ terminal
Continuity should exist.
4) Harness continuity between E.C.C.S. relay and E.C.U. pin terminal (16)
Continuity should exist.

O.K. ↓

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

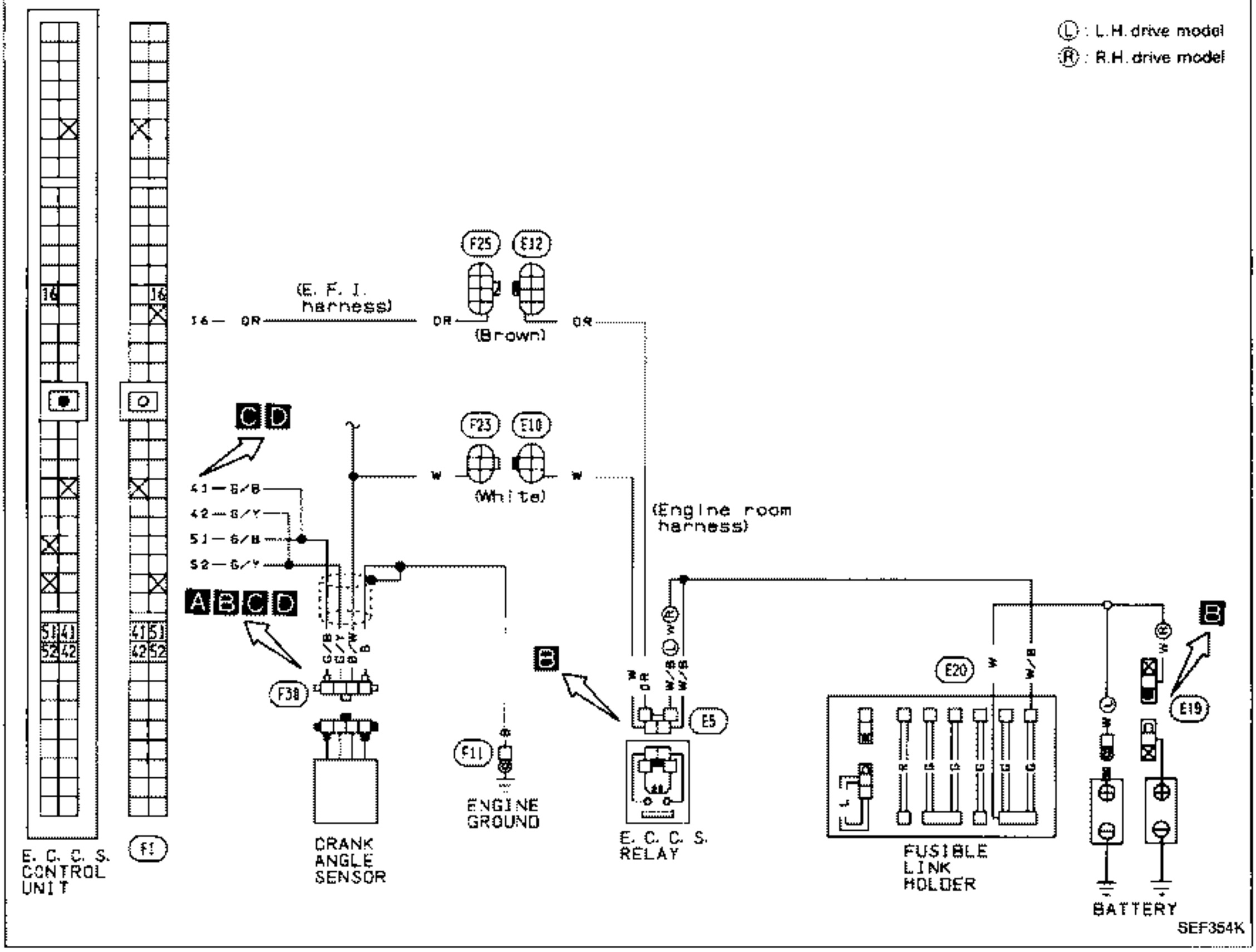
N.G. → 1) Check if engine ground terminal connectors (F28), (F11) and (F39) make contact with engine body properly.
2) Repair harness or connectors.

O.K. ↓

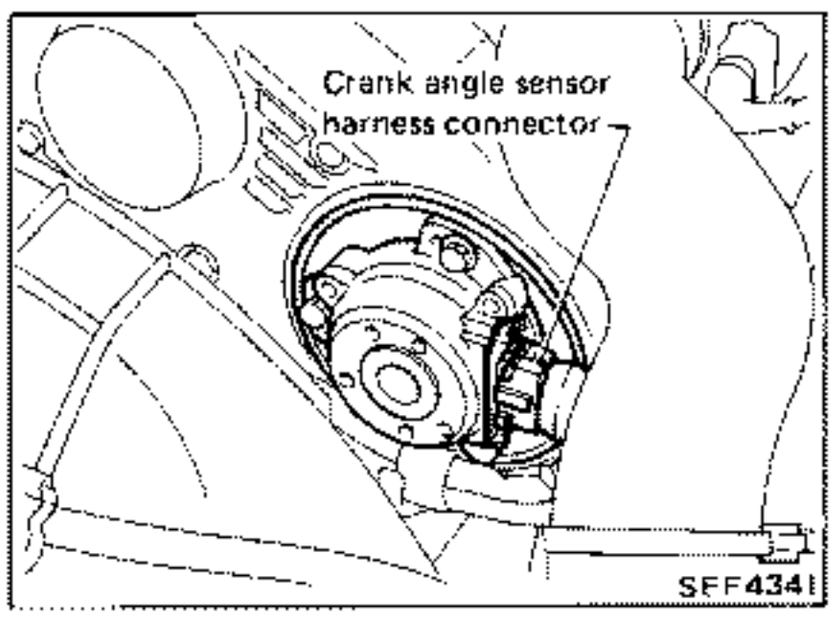
INSPECTION END

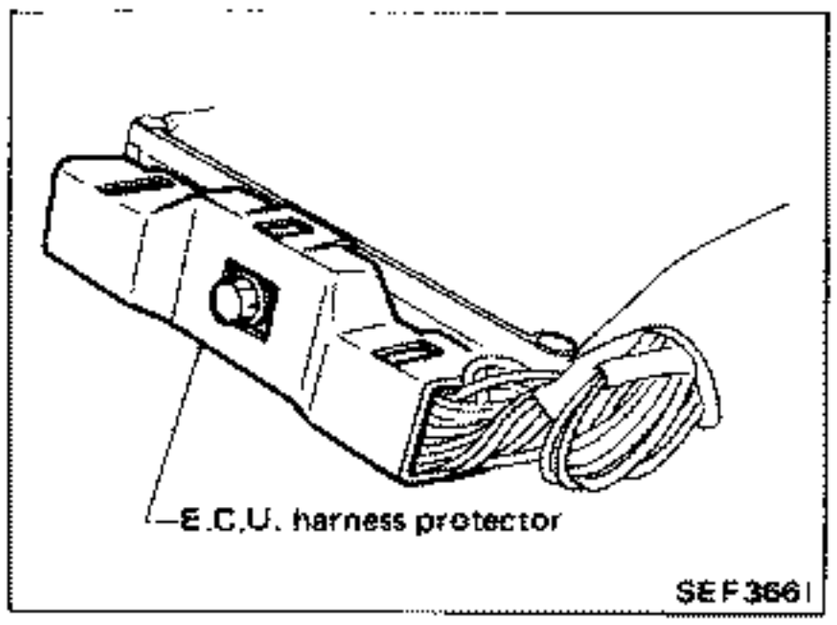
Diagnostic Procedure 23

CRANK ANGLE SENSOR (Code No. 11)

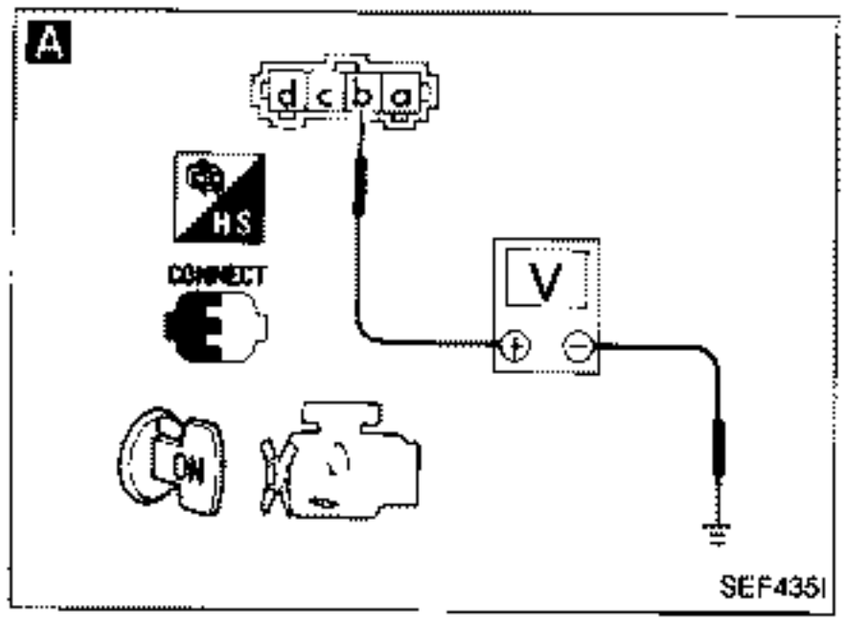


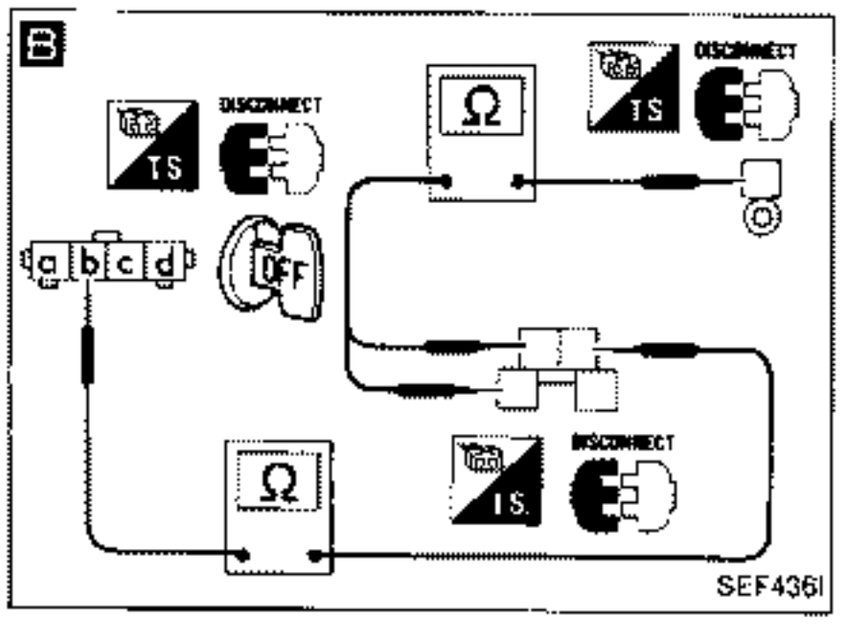
Harness layout

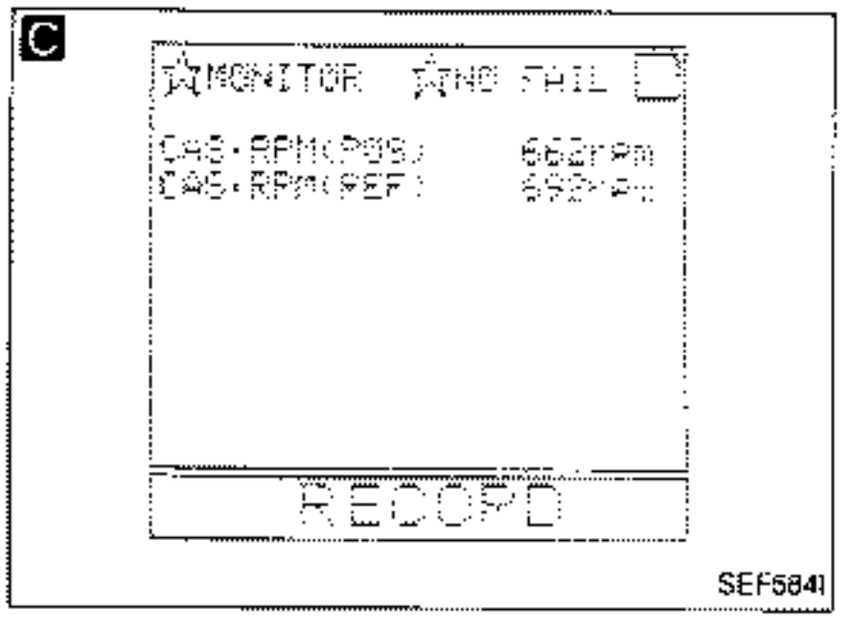


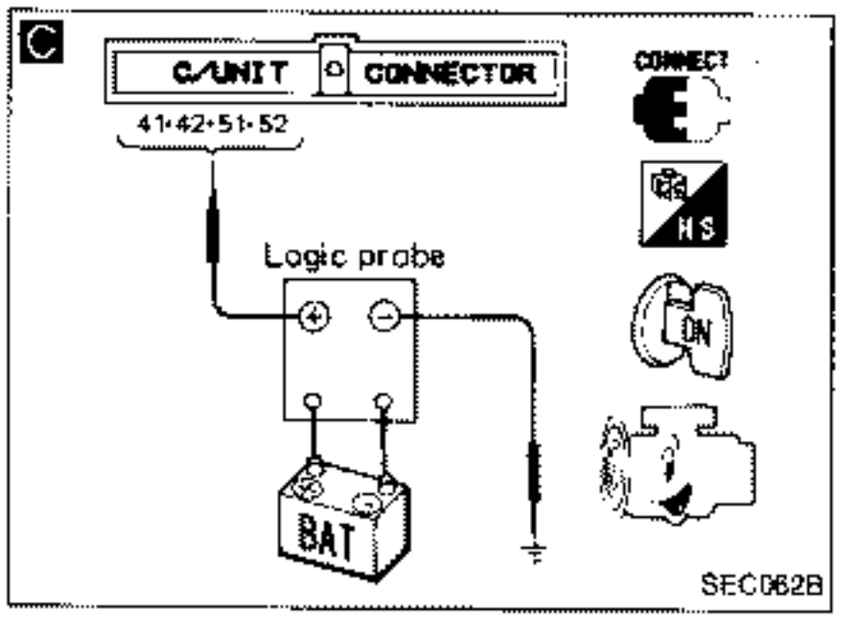


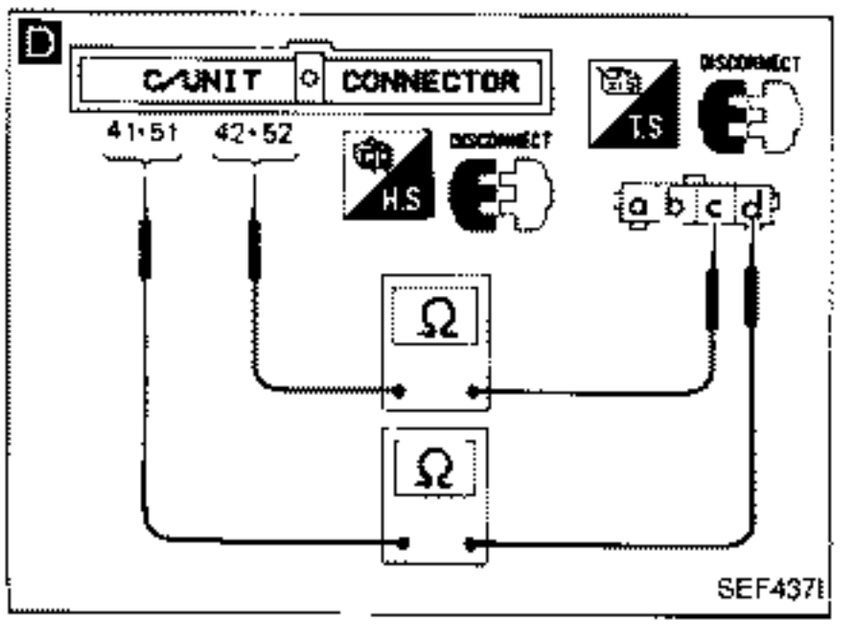
Diagnostic Procedure 23 (Cont'd)











INSPECTION START

A

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

N.G. →

B

Check the following items.
1) E.C.C.S. relay
Refer to "Electrical Components Inspection".
(See page EF & EC-184.)
2) "G" fusible link
3) Harness continuity between E.C.C.S. relay and battery ⊕ terminal
Continuity should exist.
4) Harness continuity between E.C.C.S. relay and crank angle sensor terminal ⓑ
Continuity should exist.

O.K.

C

CHECK INPUT SIGNAL.
1) Start engine.
2) Read crank angle sensor signals in "DATA MONITOR" mode with CONSULT.

	A/T*	M/T
Non-turbo	770±50 rpm	700±50 rpm
Turbo	750±50 rpm	

*: in "N" position

OR

2) Check that pulse signals exist in E.C.U. terminals ㊶, ㊶ and ㊷, ㊷ with logic probe.
Pulse signal should exist.
㊶, ㊶: 120° signal
㊷, ㊷: 1° signal

N.G. →

D

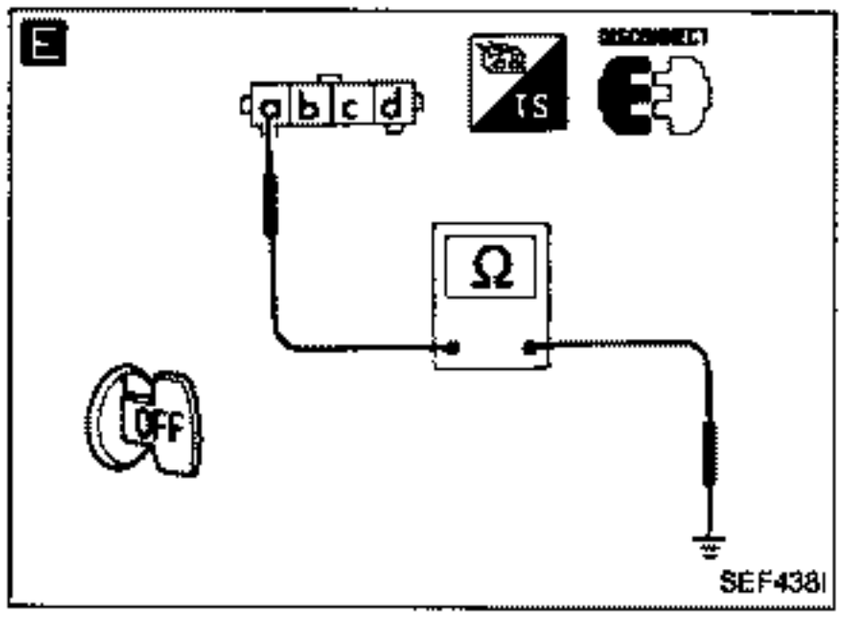
CHECK HARNESS CONTINUITY BETWEEN E.C.U. AND CRANK ANGLE SENSOR.
1) Stop engine.
2) Disconnect crank angle sensor harness connector.
3) Disconnect E.C.U. harness connector.
4) Check harness continuity between E.C.U. terminals ㊶, ㊶ and terminal ⓓ, E.C.U. terminals ㊷, ㊷ and terminal ⓒ.
Continuity should exist.
If N.G., repair harness or connectors.

O.K.

CHECK COMPONENT
(Crank angle sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-178.)

O.K.

Diagnostic Procedure 23 (Cont'd)



E

CHECK GROUND CIRCUIT.
1) Stop engine.
2) Disconnect crank angle sensor harness connector.
3) Check harness continuity between terminal (a) and ground.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

Reinstall any part removed.

↓

Erase the SELF-DIAGNOSTIC RESULTS memory.

↓

Perform driving test and then perform SELF-DIAGNOSTIC RESULTS (Mode II) again.

N.G. → 1) Perform E.C.U. input/output signal inspection test.
2) If N.G., recheck the E.C.U. pin terminals for damage. Check the connection at the E.C.U. harness connector.

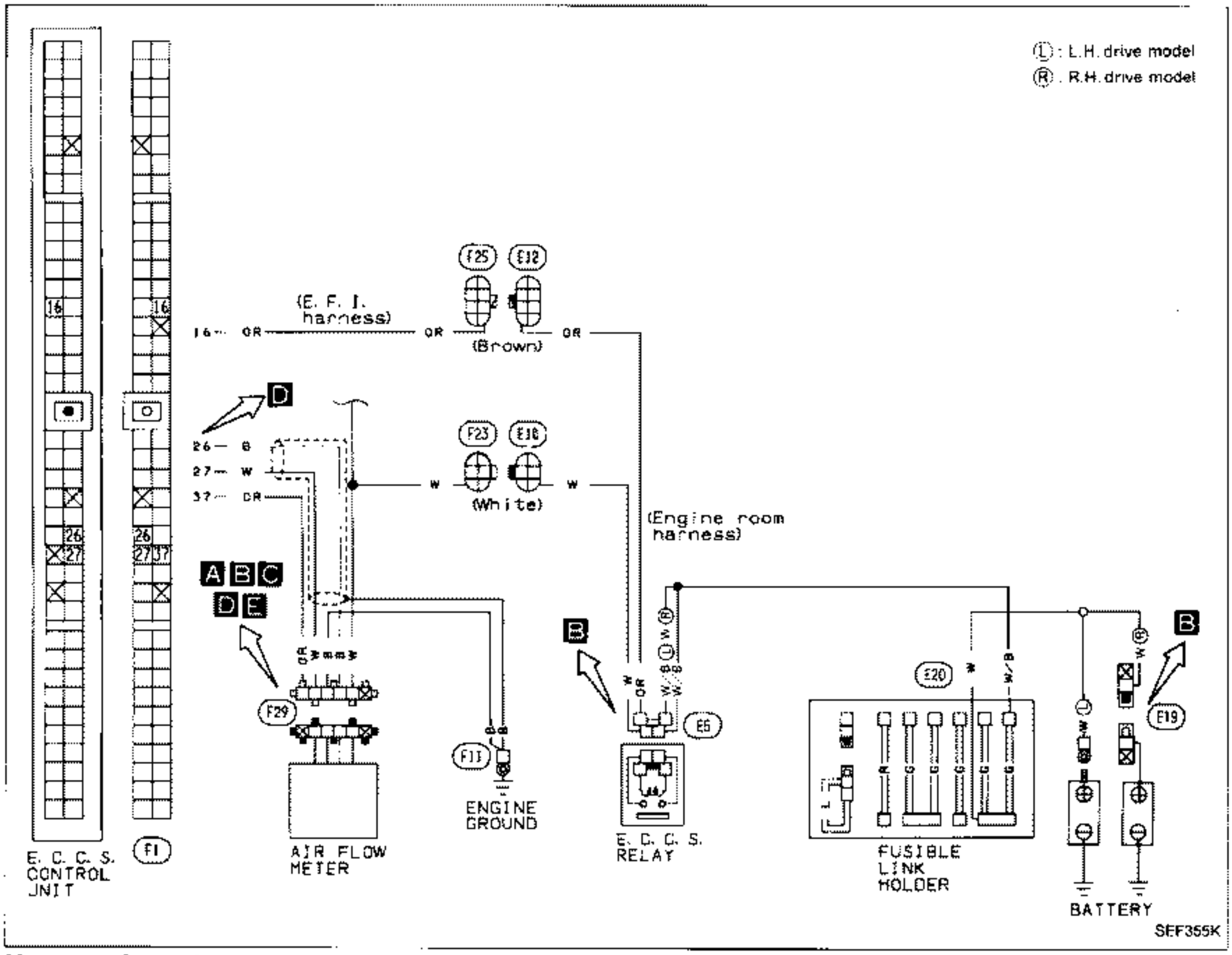
O.K. ↓

INSPECTION END

NOTE

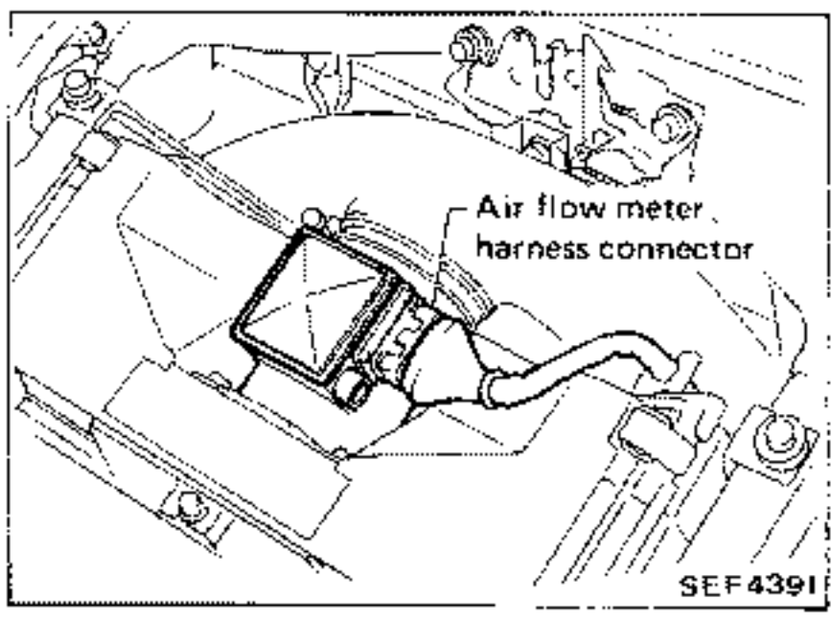
Diagnostic Procedure 24

AIR FLOW METER (Code No. 12)

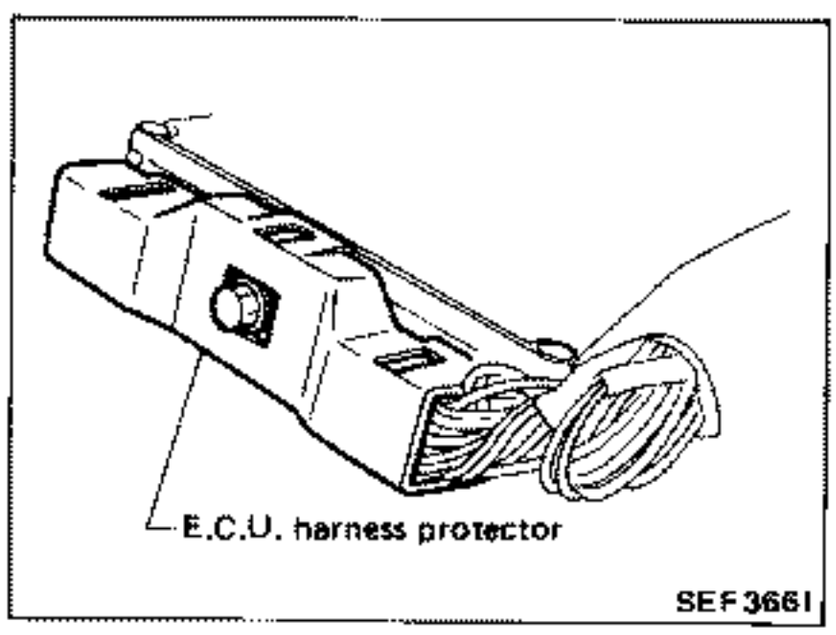


SEF355K

Harness layout



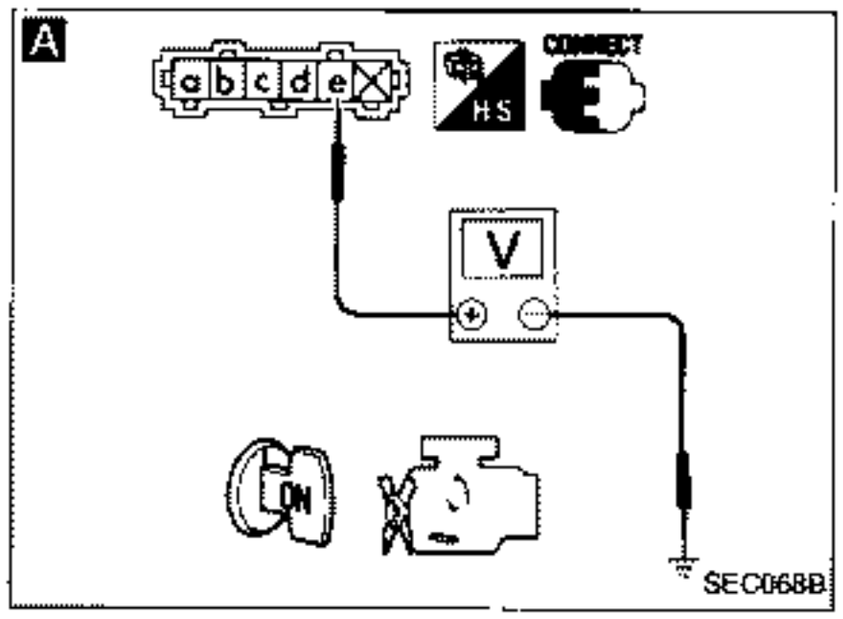
SEF439I



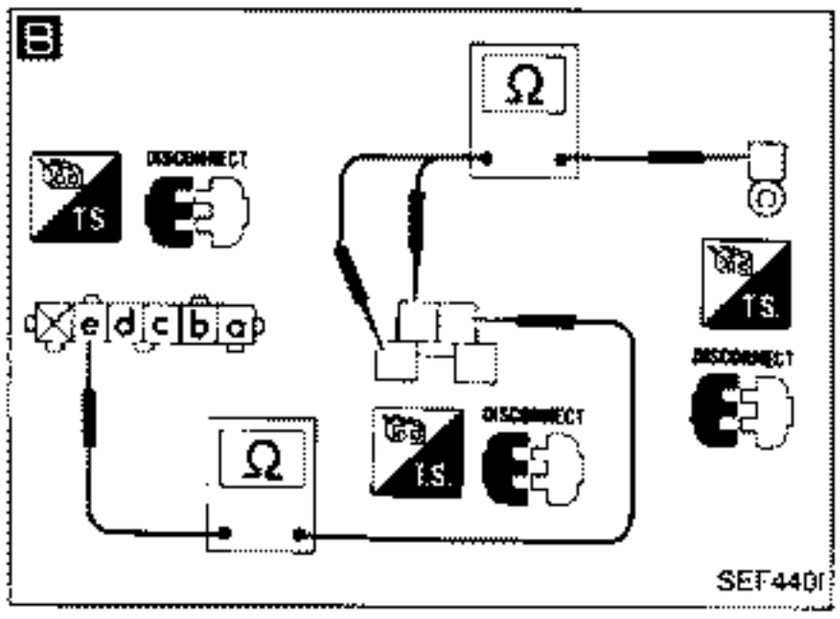
SEF366I

Diagnostic Procedure 24 (Cont'd)

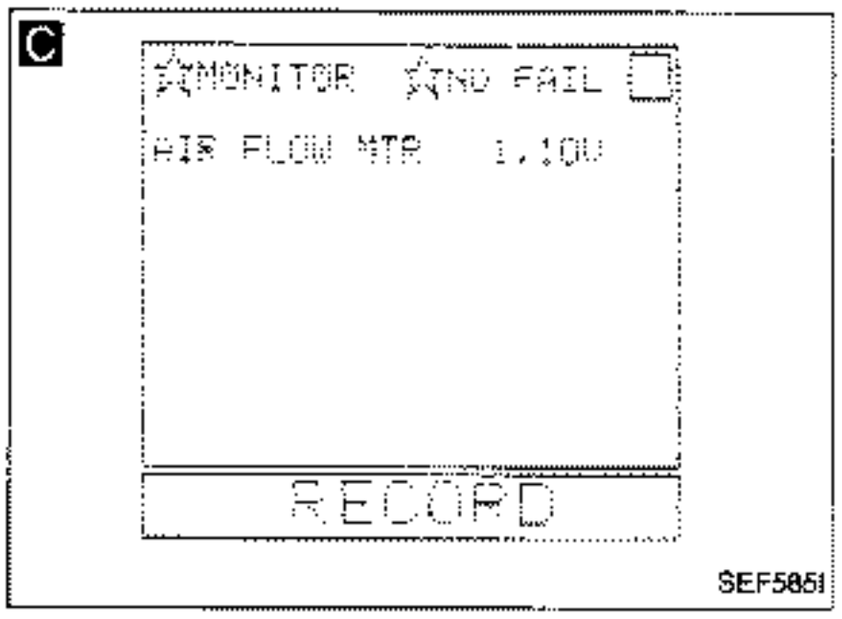
A



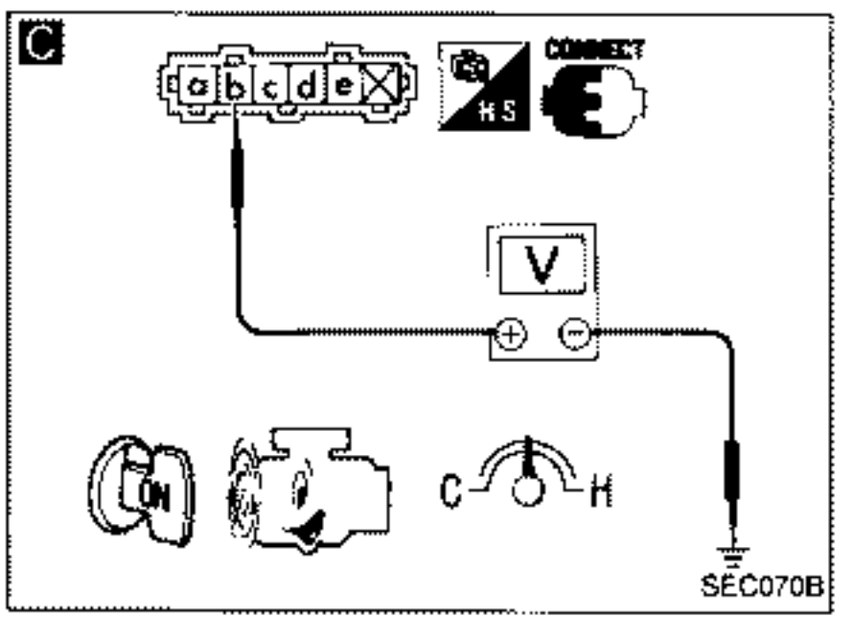
B



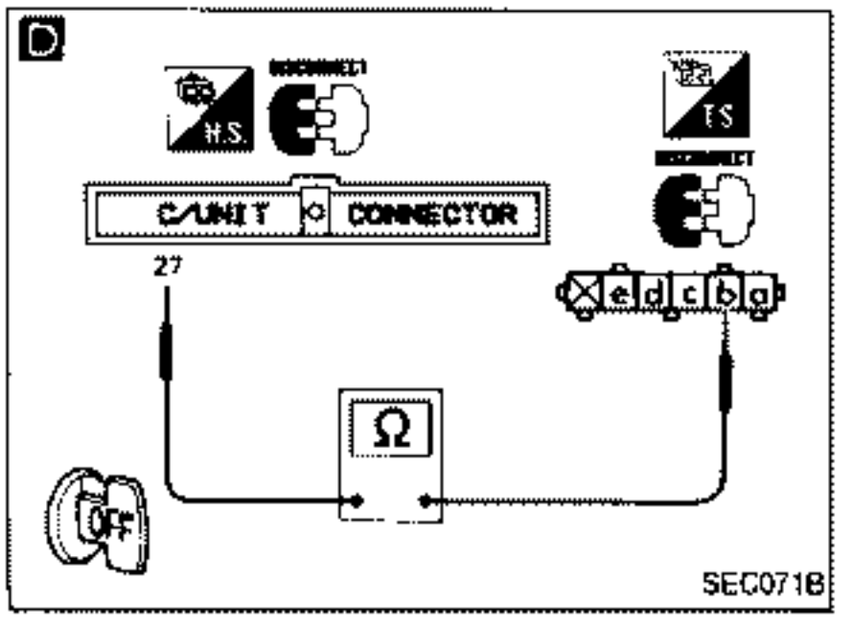
C



C



D



INSPECTION START

A

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

N.G. → B

O.K.

B

Check the following items.
1) E.C.C.S. relay
Refer to "Electrical Components Inspection".
(See page EF & EC-184.)
2) "G" fusible link
3) Harness continuity between E.C.C.S. relay and battery ⊕ terminal
Continuity should exist.
4) Harness continuity between E.C.C.S. relay and air flow meter terminal ⓔ
Continuity should exist.

C

CHECK INPUT SIGNAL.
1) Start engine and warm it up sufficiently.
2) Read air flow meter signal in "DATA MONITOR" mode with CONSULT.
Voltage: 0.8 - 1.5V

OR

2) Check voltage between terminals ⓑ and ground at idle under no-load.
Voltage: 0.8 - 1.5V

N.G. → D

D

CHECK HARNESS CONTINUITY BETWEEN AIR FLOW METER AND E.C.U.
1) Stop engine.
2) Disconnect air flow meter harness connector.
3) Disconnect E.C.U. harness connector.
4) Check harness continuity between E.C.U. terminal ㉗ and terminal ⓑ.
Continuity should exist.
If N.G., repair harness or connectors.

O.K.

CHECK COMPONENT
(Air flow meter).
Refer to "Electrical Components Inspection".
(See page EF & EC-178.)

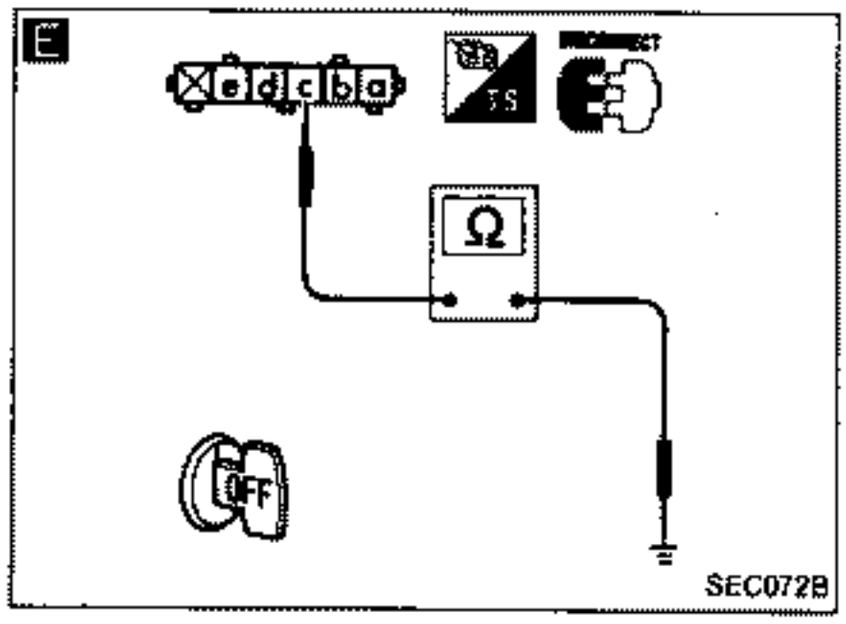
E

CHECK GROUND CIRCUIT.
1) Stop engine.
2) Disconnect air flow meter harness connector.
3) Check harness continuity between terminal ⓒ and ground.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

Diagnostic Procedure 24 (Cont'd)



Reinstall any part removed.

Erase the SELF-DIAGNOSTIC RESULTS memory.

Perform driving test and then perform SELF-DIAGNOSTIC RESULTS (Mode II) again.

N.G.

1) Perform E.C.U. input/output signal inspection test.
2) If N.G., recheck the E.C.U. pin terminals for damage. Check the connection at the E.C.U. harness connector.

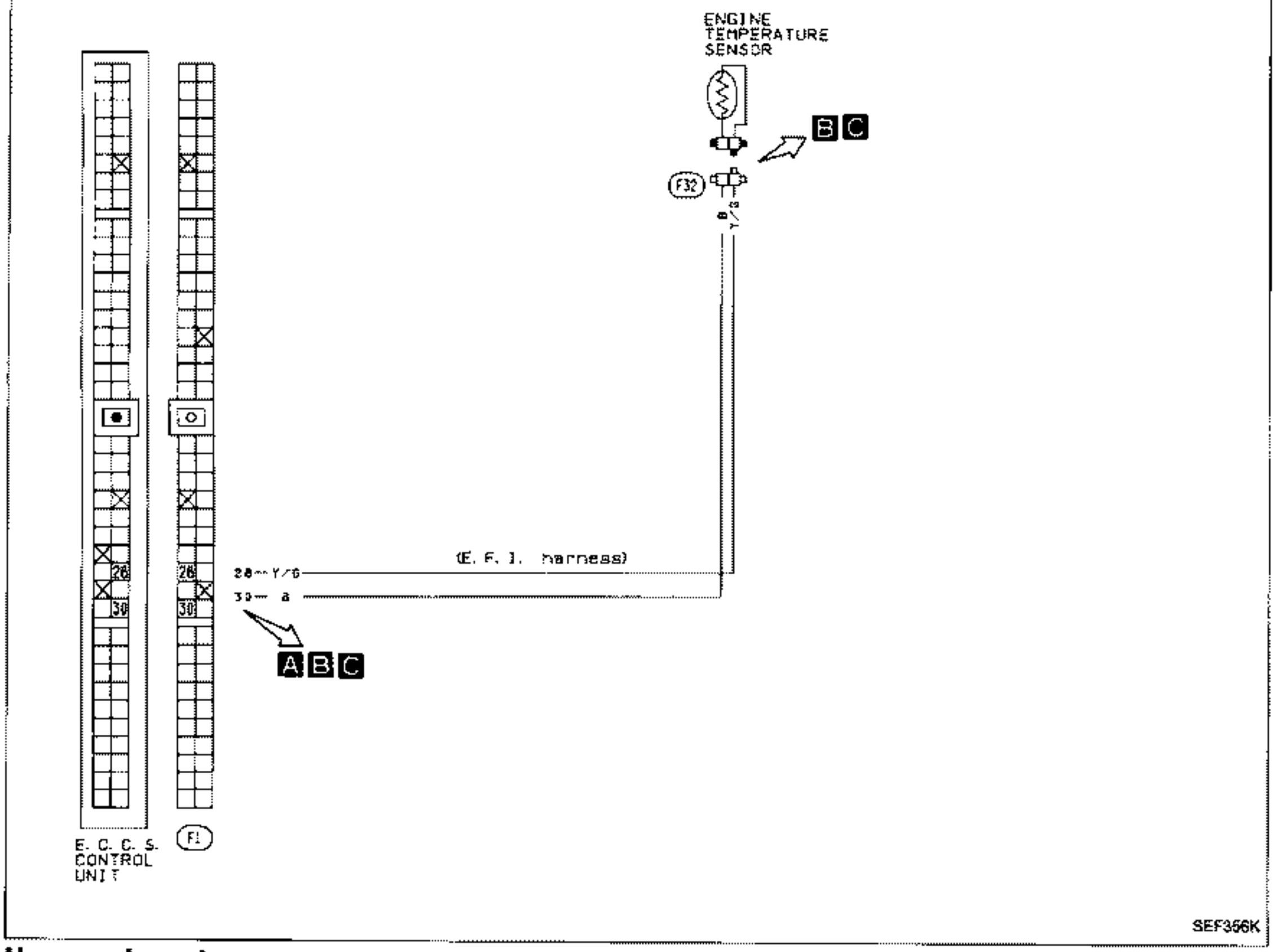
O.K.

INSPECTION END

NOTE

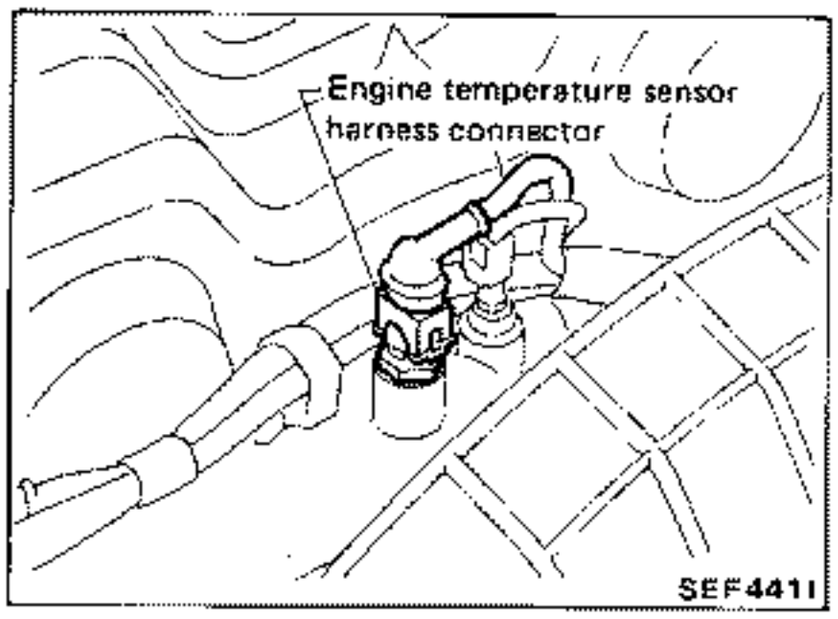
Diagnostic Procedure 25

ENGINE TEMPERATURE SENSOR (Code No. 13)

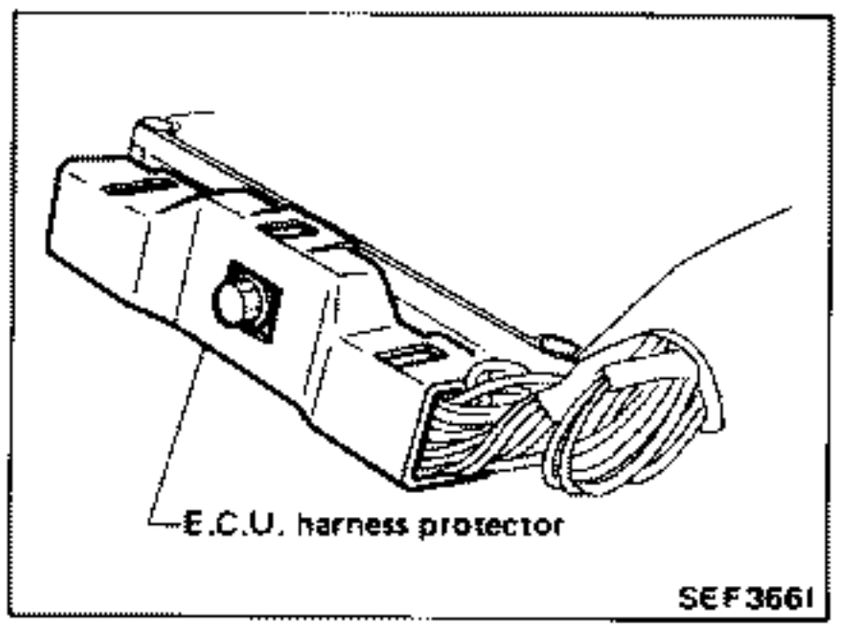


SEF356K

Harness layout

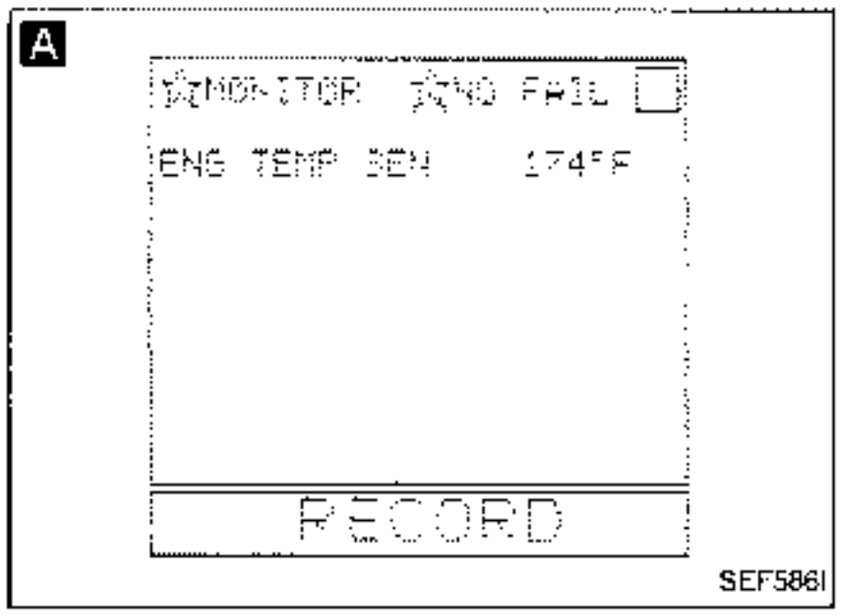


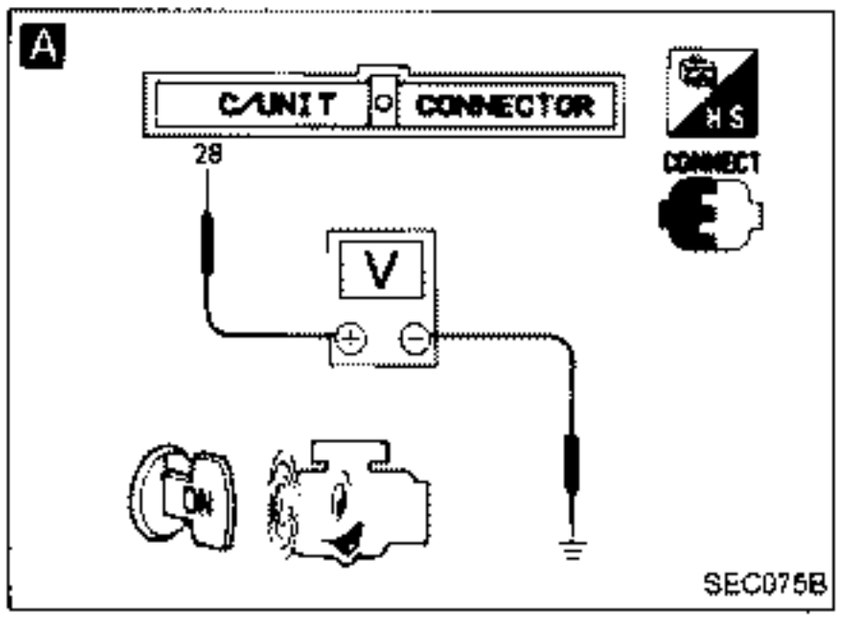
SEF441I

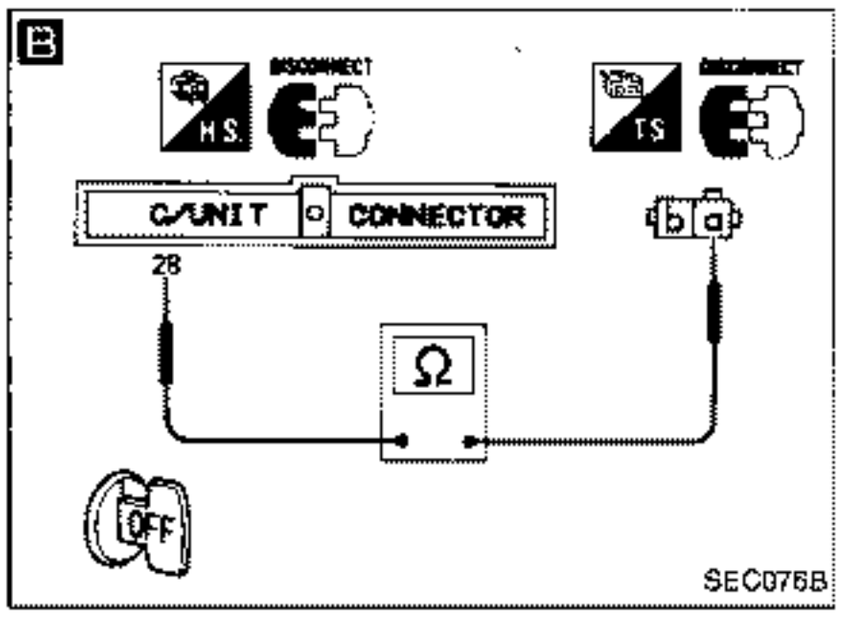


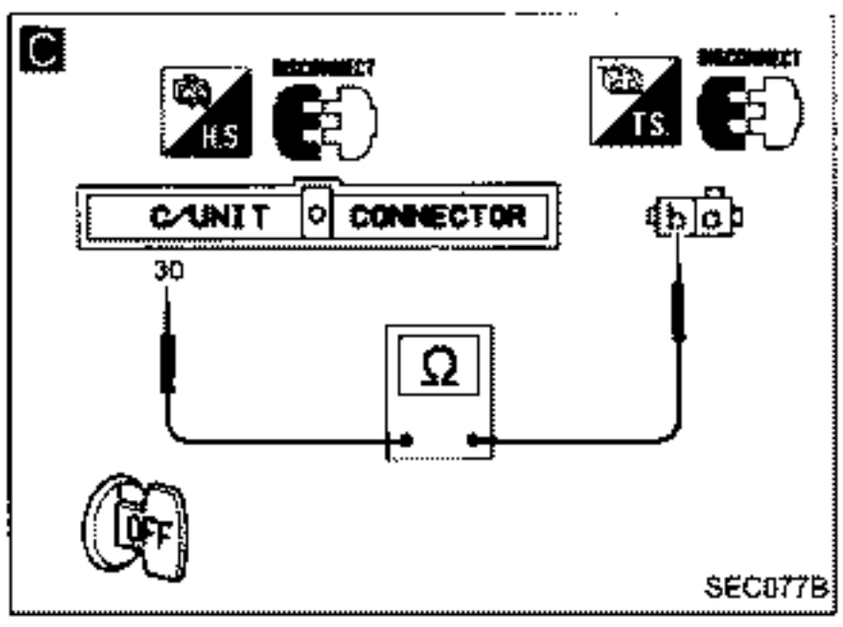
SEF366I

Diagnostic Procedure 25 (Cont'd)









INSPECTION START

A

CHECK INPUT SIGNAL.

1) Start engine.
2) Read engine temperature sensor signal in "DATA MONITOR" mode with CONSULT.

Engine temperature should gradually rise and reach more than 70°C (158°F) after engine warm-up.

OR

2) Make sure that voltage between E.C.U. terminal ㉘ and ground changes during engine warm-up.

Cold → Hot:
Approximately 5 - 0V

N.G. →

B

CHECK HARNESS CONTINUITY BETWEEN ENGINE TEMPERATURE SENSOR AND E.C.U.

1) Stop engine.
2) Disconnect engine temperature sensor harness connector.
3) Disconnect E.C.U. harness connector.
4) Check harness continuity between E.C.U. terminal ㉘ and terminal ⓐ.

Continuity should exist.

If N.G., repair harness or connectors.

O.K. ↓

CHECK COMPONENT (Engine temperature sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-178.)

O.K. ↓

C

CHECK GROUND CIRCUIT.

1) Stop engine.
2) Disconnect engine temperature sensor harness connector.
3) Disconnect E.C.U. harness connector.
4) Check harness continuity between E.C.U. terminal ㉚ and terminal ⓑ.

N.G. → Repair harness or connectors.

O.K. ↓

Reinstall any part removed.

↓

Erase the SELF-DIAGNOSTIC RESULTS memory.

↓

Perform driving test and then perform SELF-DIAGNOSTIC RESULTS (Mode II) again.

N.G. →

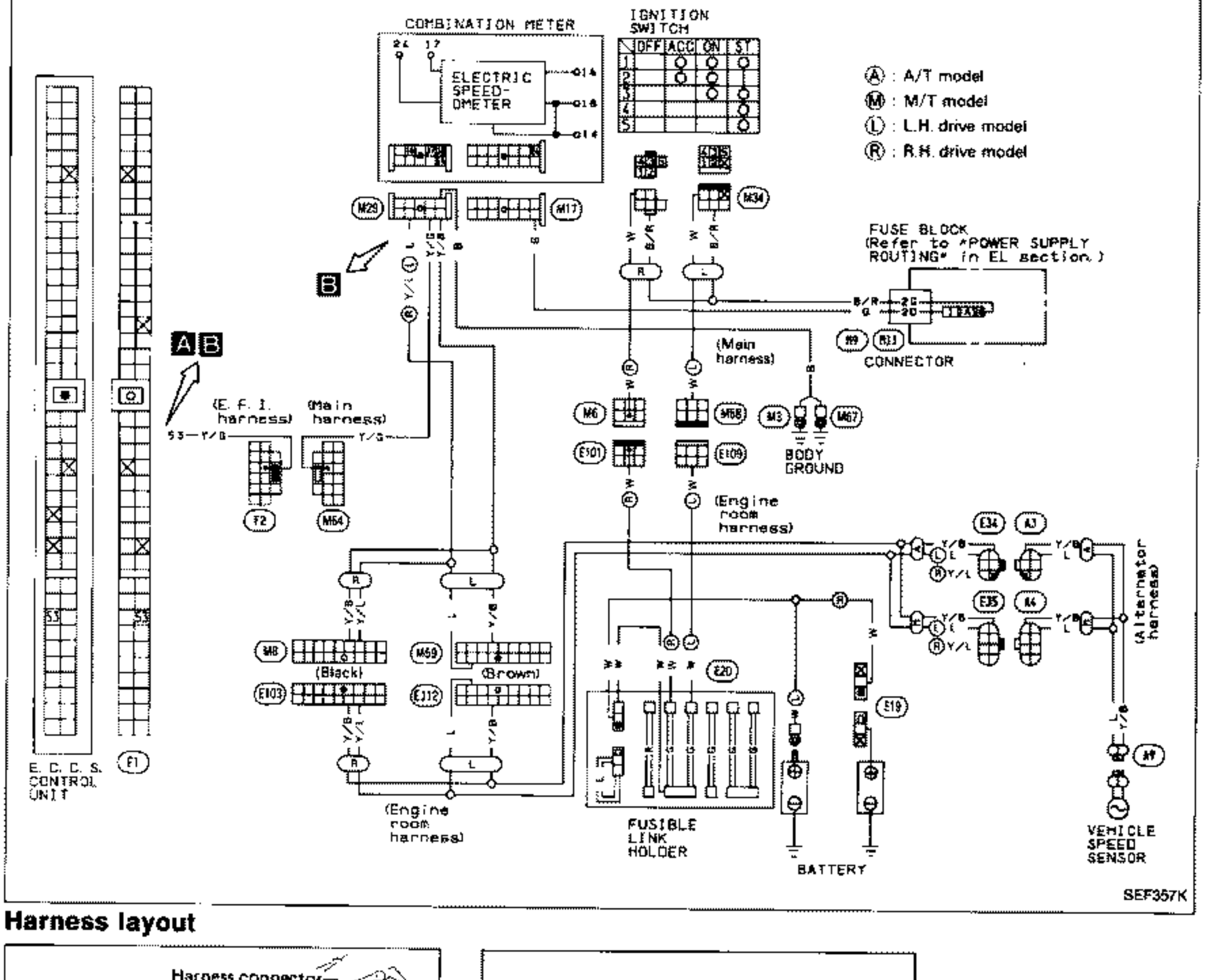
1) Perform E.C.U. input/output signal inspection test.
2) If N.G., recheck the E.C.U. pin terminals for damage. Check the connection at the E.C.U. harness connector.

O.K. ↓

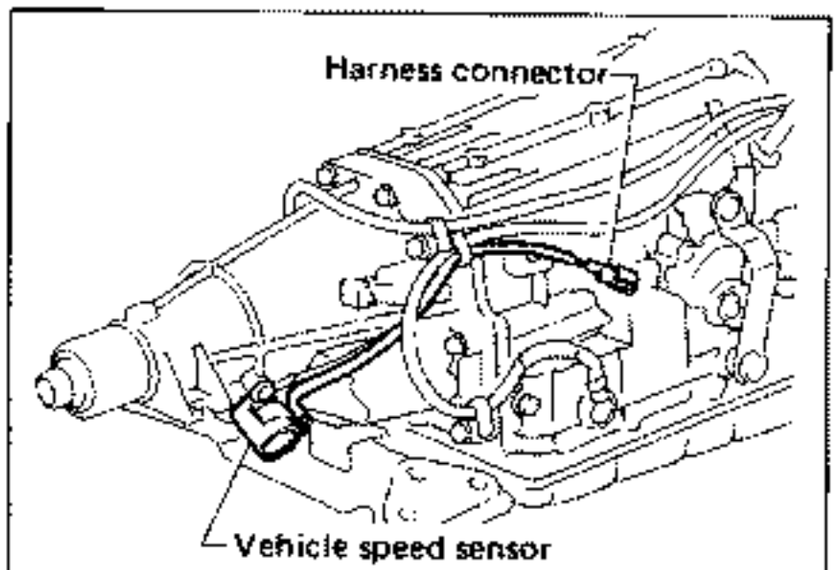
INSPECTION END

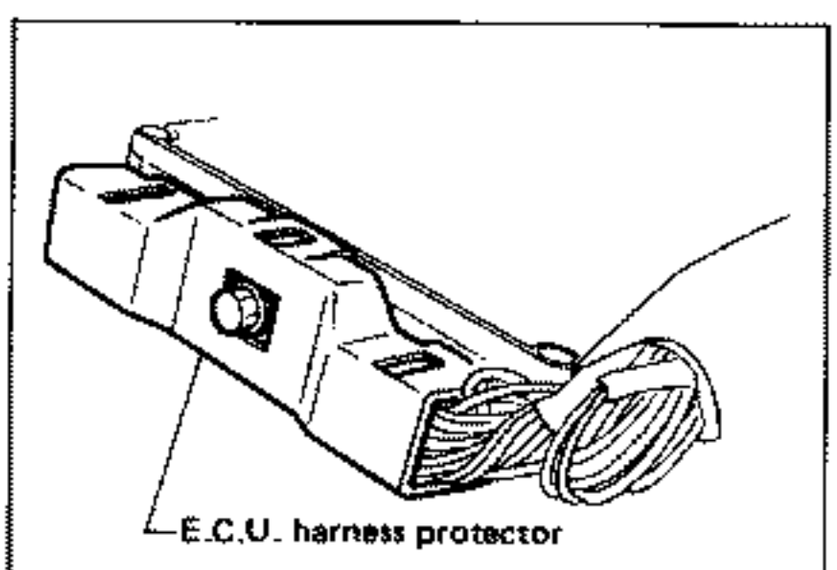
Diagnostic Procedure 26

VEHICLE SPEED SENSOR



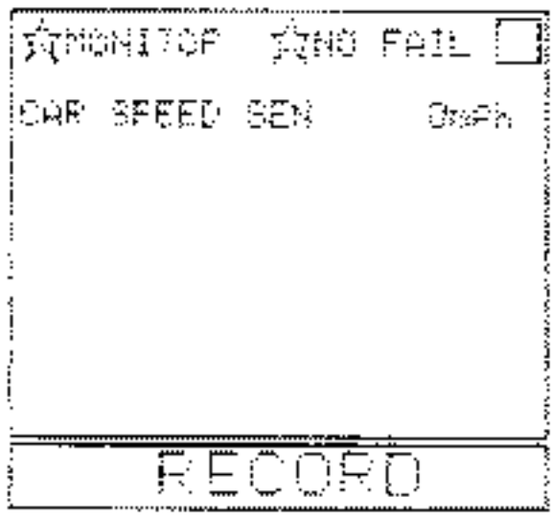
Harness layout





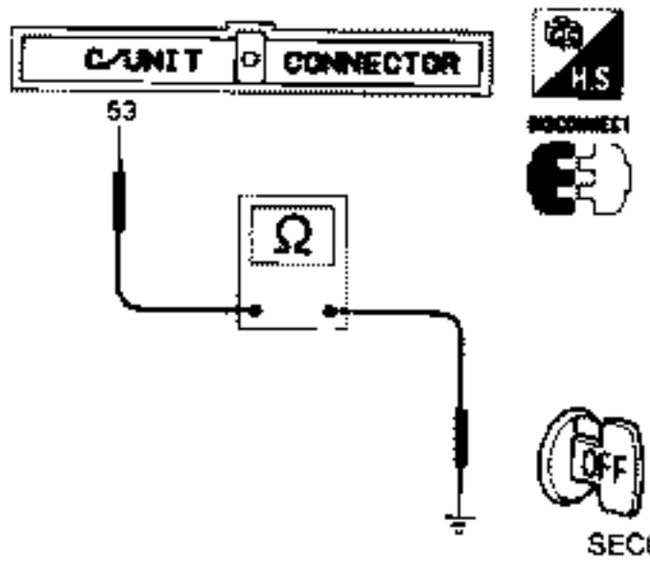
Diagnostic Procedure 26 (Cont'd)

A



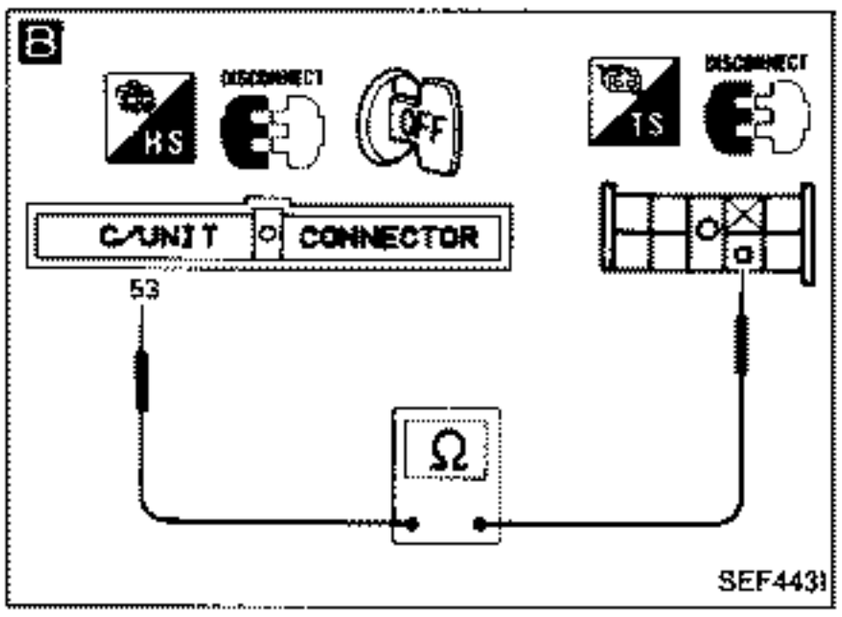
SEF587I

A



SEC091B

B



SEF443I

INSPECTION START

Make sure that speedometer in combination meter operates properly.

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

O.K.

CHECK COMPONENT (Vehicle speed sensor). Refer to "Electrical Components Inspection". (See page EF & EC-179.)

A

CHECK INPUT SIGNAL

1) Read vehicle speed sensor signal in "DATA MONITOR" mode with CONSULT.

CONSULT value should be the same as the speedometer indication

—OR—

1) Jack up rear wheels.
2) Disconnect E.C.U. harness connector.
3) Check resistance between E.C.U. terminal ㊸ and ground. With transmission in neutral, turn both rear wheels.

Continuity should be intermittent.

N.G. → B

B

CHECK HARNESS CONTINUITY BETWEEN COMBINATION METER AND E.C.U.

1) Remove combination meter from instrument panel.
2) Disconnect combination meter harness connector ⑯ .
3) Check harness continuity between E.C.U. terminal ㊸, and terminal ⓐ.

Continuity should exist.

O.K.

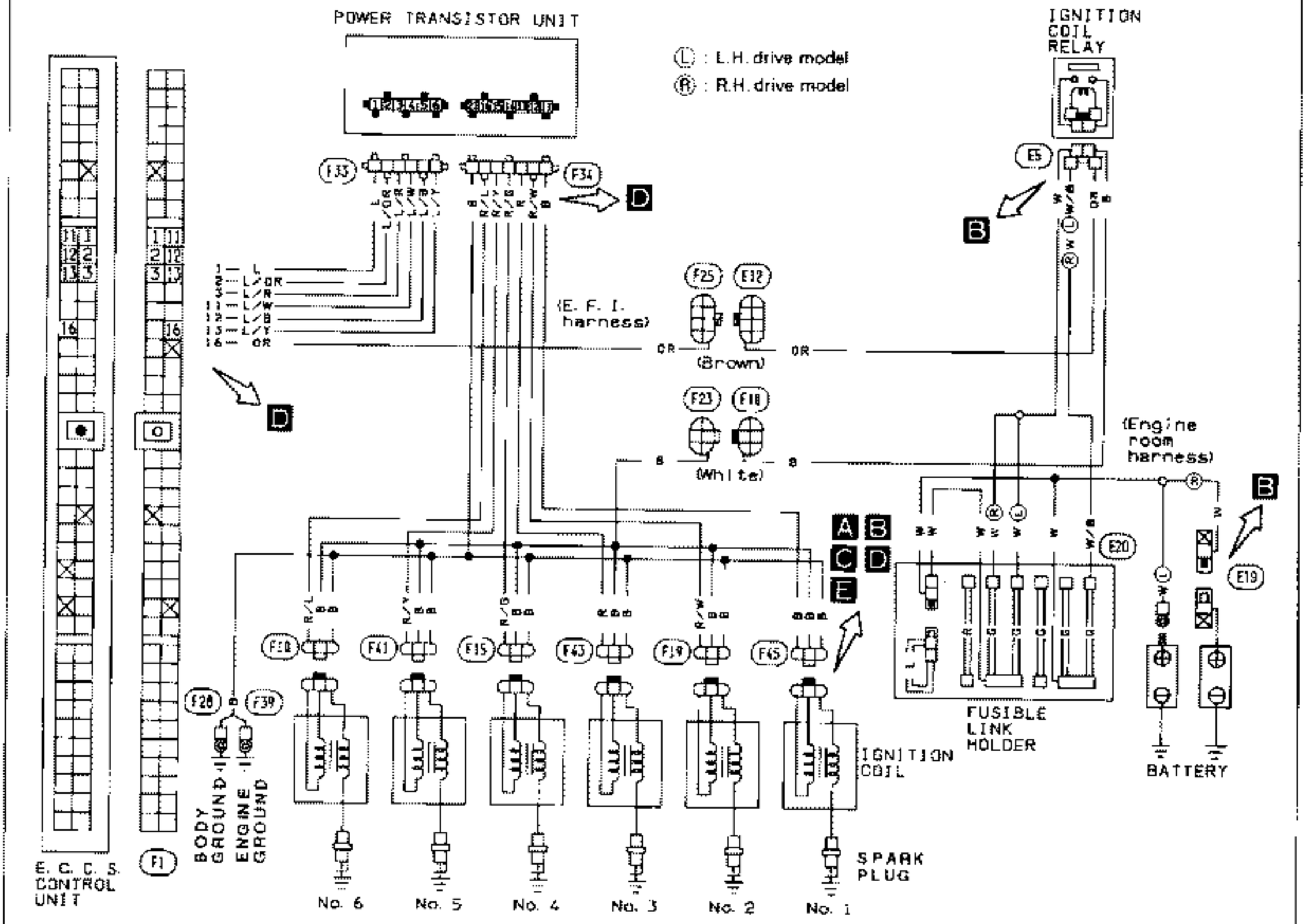
Reinstall any part removed.

1) Perform E.C.U. input/output signal Inspection test.
2) If N.G., recheck the E.C.U. pin terminals for damage. Check the connection at the E.C.U. harness connector.

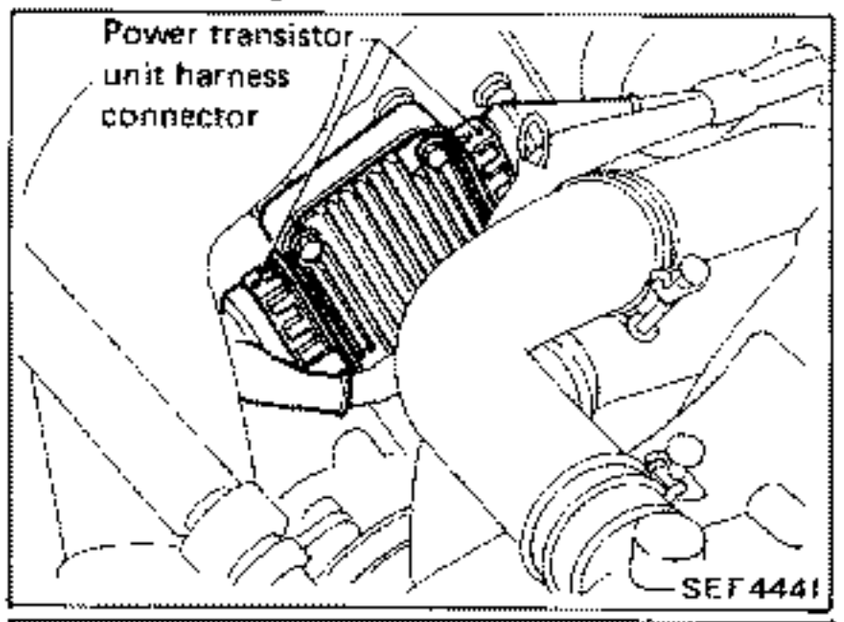
INSPECTION END

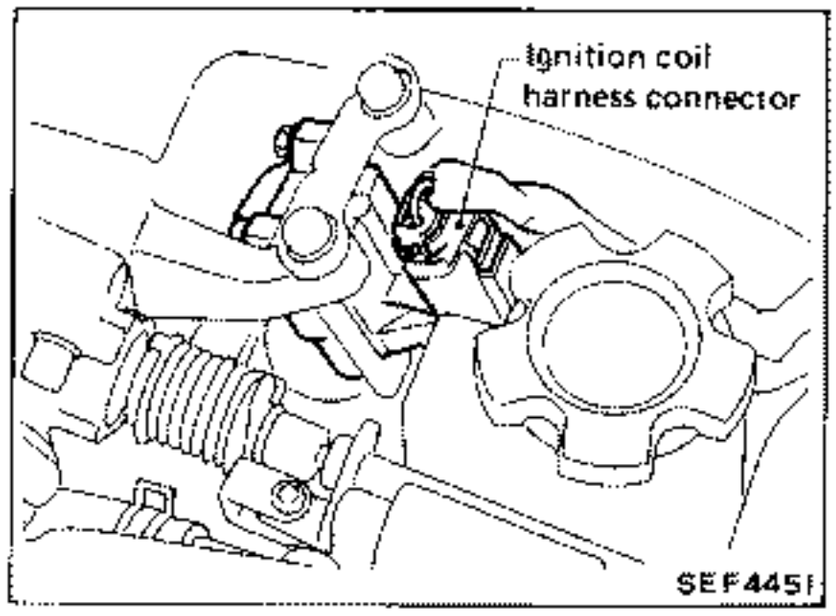
Diagnostic Procedure 27

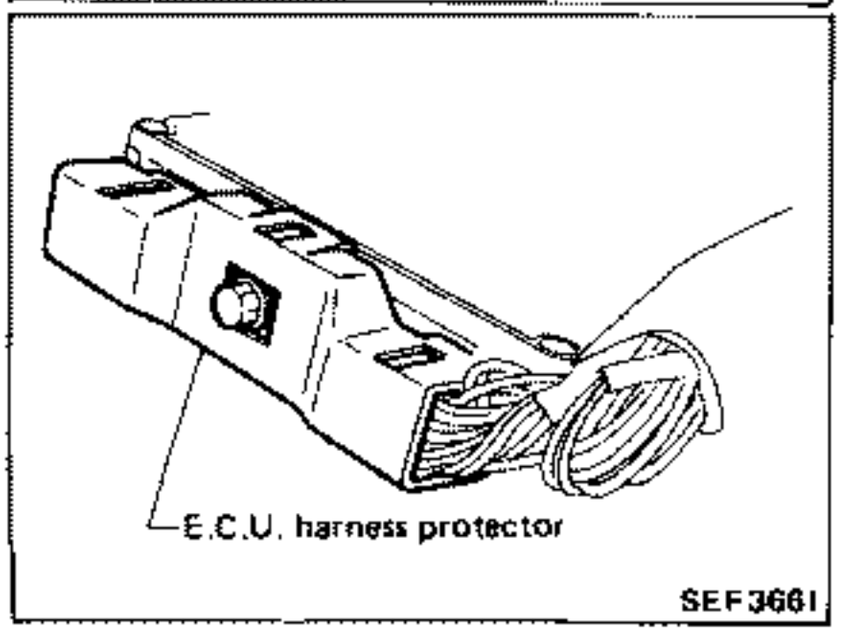
IGNITION SIGNAL (Code No. 21)



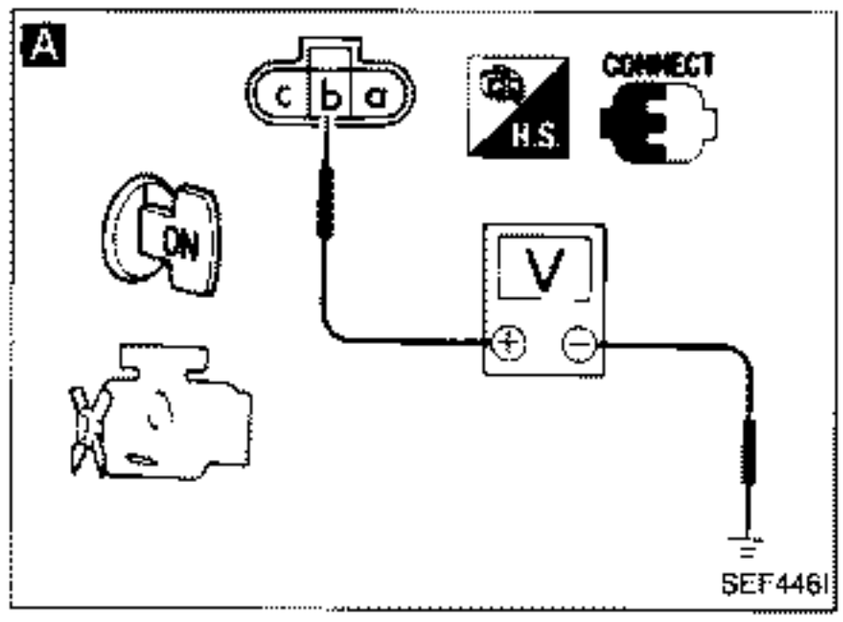
Harness layout

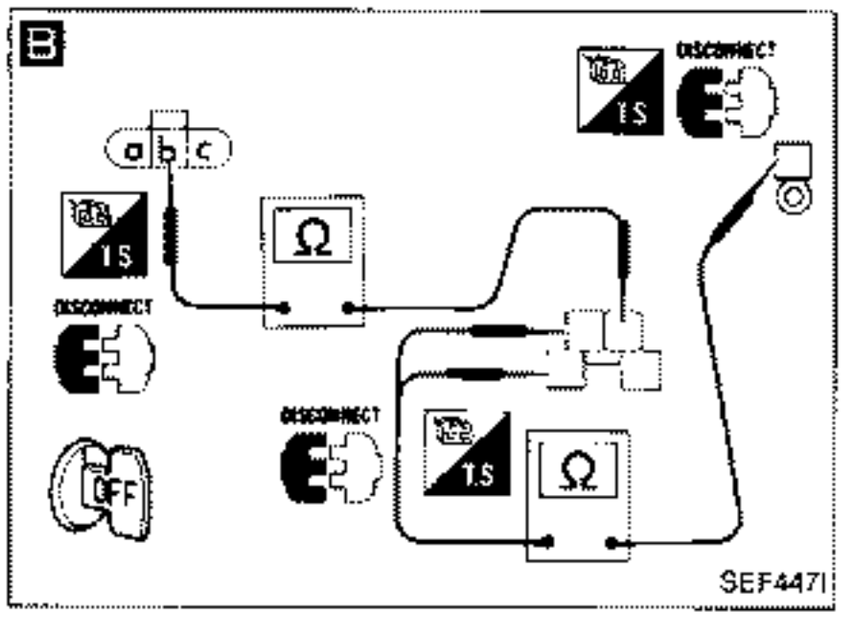


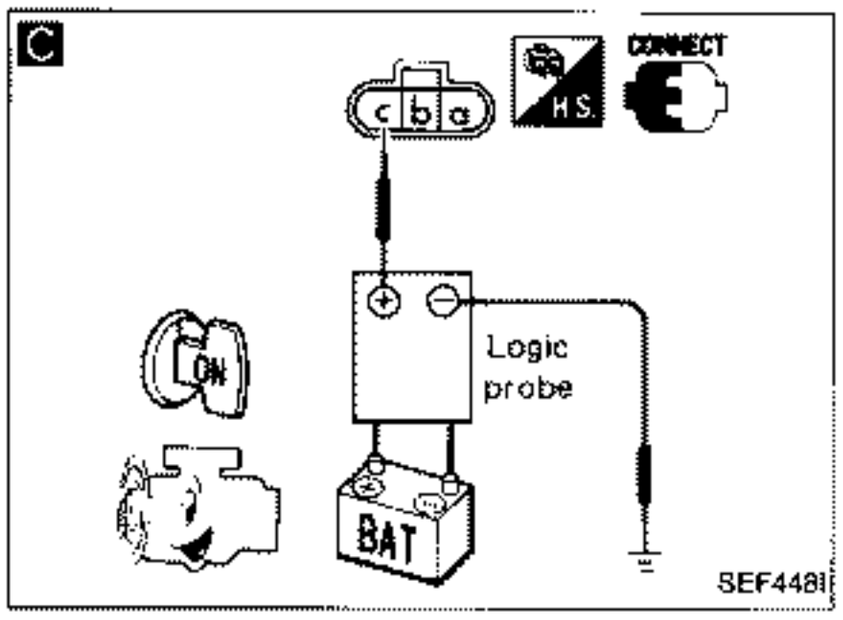


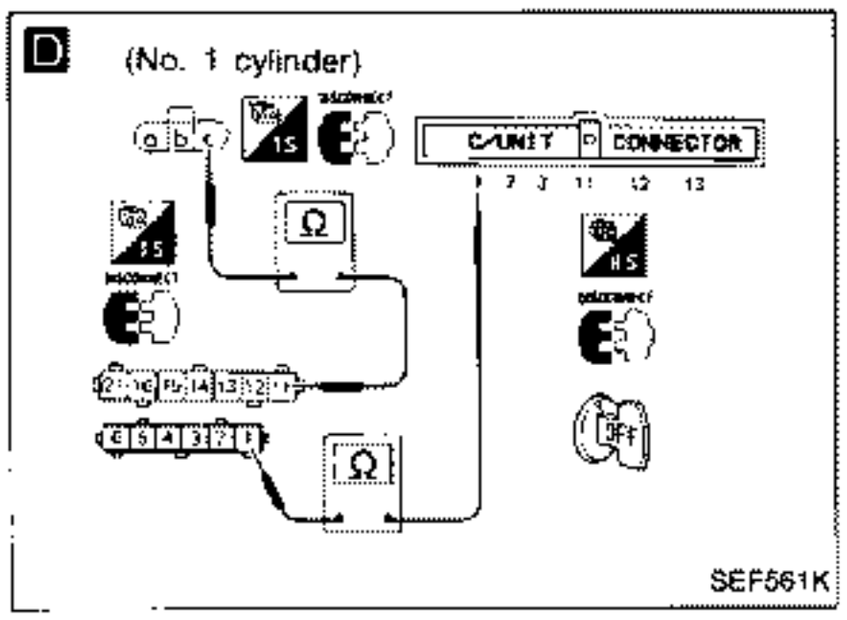


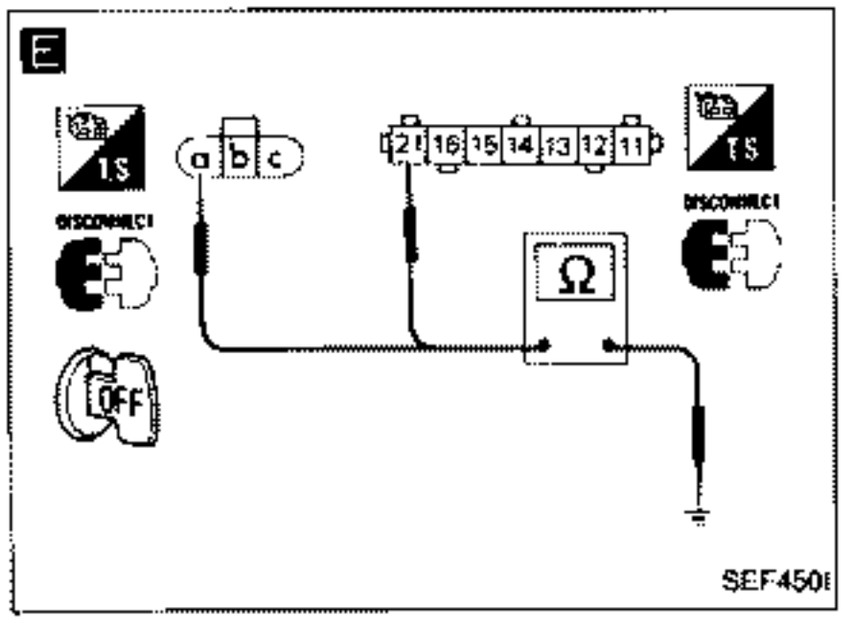
Diagnostic Procedure 27 (Cont'd)











INSPECTION START

A

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

N.G. →

B

Check the following items.
1) Ignition coil relay
Refer to "Electrical Components Inspection".
(See page EF & EC-184.)
2) "G" fusible link
3) Harness continuity between ignition coil relay and ignition coils.
Continuity should exist.
4) Harness continuity between ignition coil relay and battery ⊕ terminal.
Continuity should exist.

O.K. ↓

C

CHECK OUTPUT SIGNAL.
1) Start engine.
2) With logic probe make sure that pulse signal exists between terminal ⓒ and ground.
Pulse signal should exist.

N.G. →

D

Check the following items.
1) Power transistor unit
Refer to "Electrical Components Inspection".
(See page EF & EC-179.)
2) Harness continuity between terminal ⓒ and power transistor terminals ⑪ (No. 1 cylinder), ⑫ (No. 2 cylinder), ... ⑯ (No. 6 cylinder).
Continuity should exist.
3) Harness continuity between power transistor terminals and E.C.U. terminals.
⑪ - ①　⑪ - ④
⑫ - ②　⑫ - ⑤
⑬ - ③　⑬ - ⑥
Continuity should exist.

O.K. ↓

E

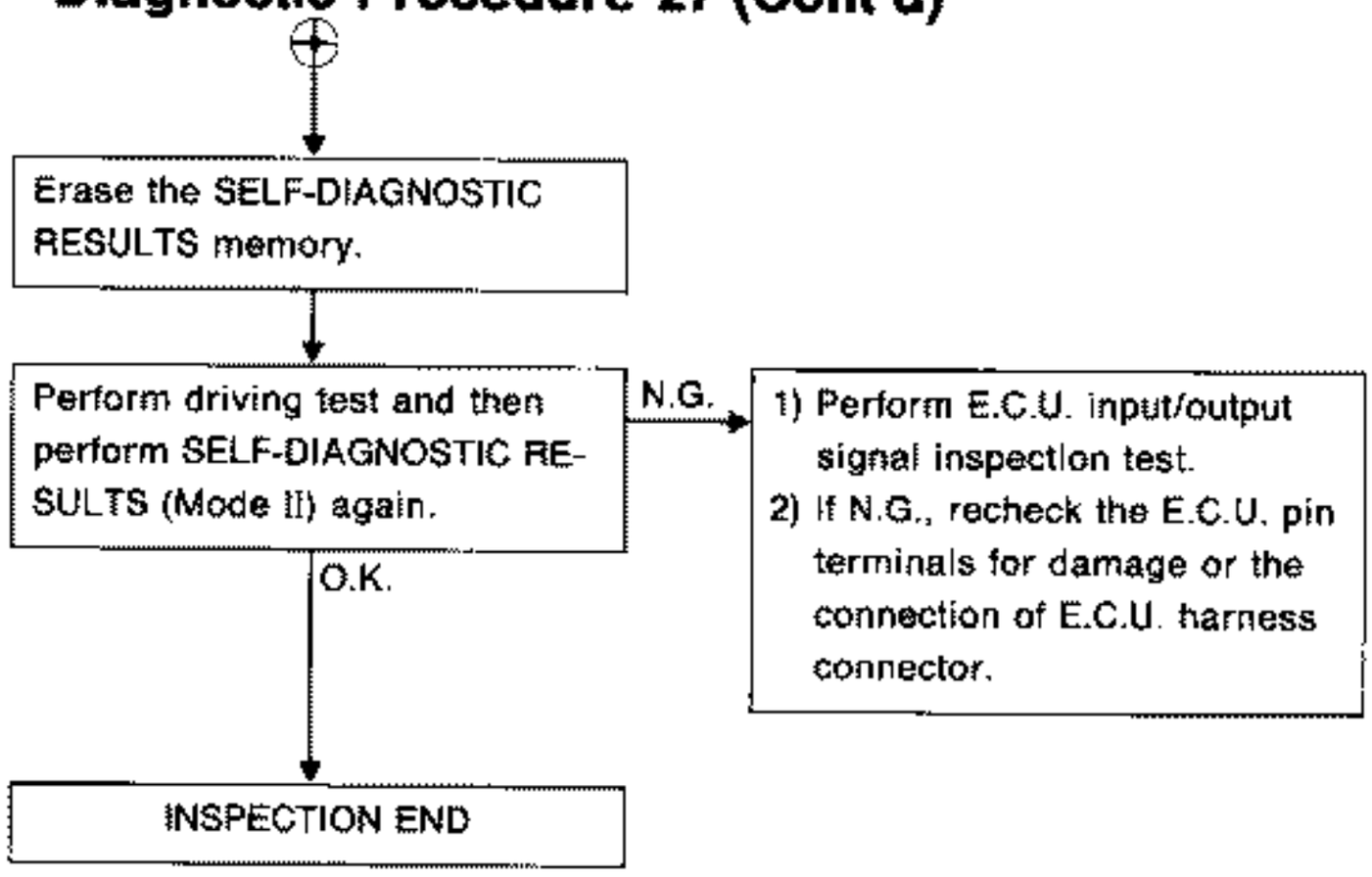
CHECK GROUND CIRCUIT.
1) Stop engine.
2) Disconnect ignition coil and power transistor harness connectors.
3) Check harness continuity between terminal ⓐ (㉑) and ground.
Continuity should exist.

N.G. → Repair or replace harness.

O.K. ↓

Reinstall any part removed.

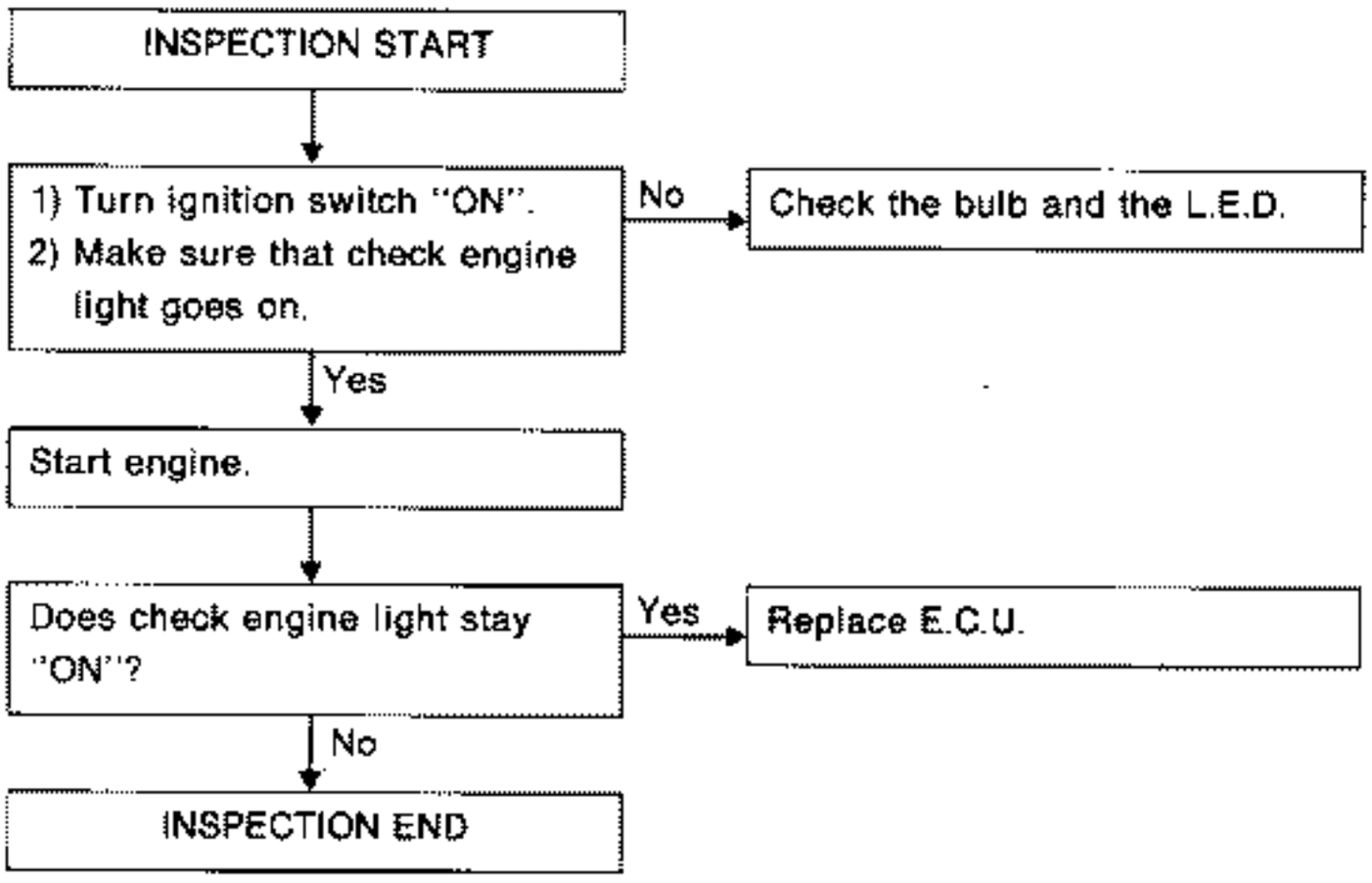
Diagnostic Procedure 27 (Cont'd)



NOTE

Diagnostic Procedure 28

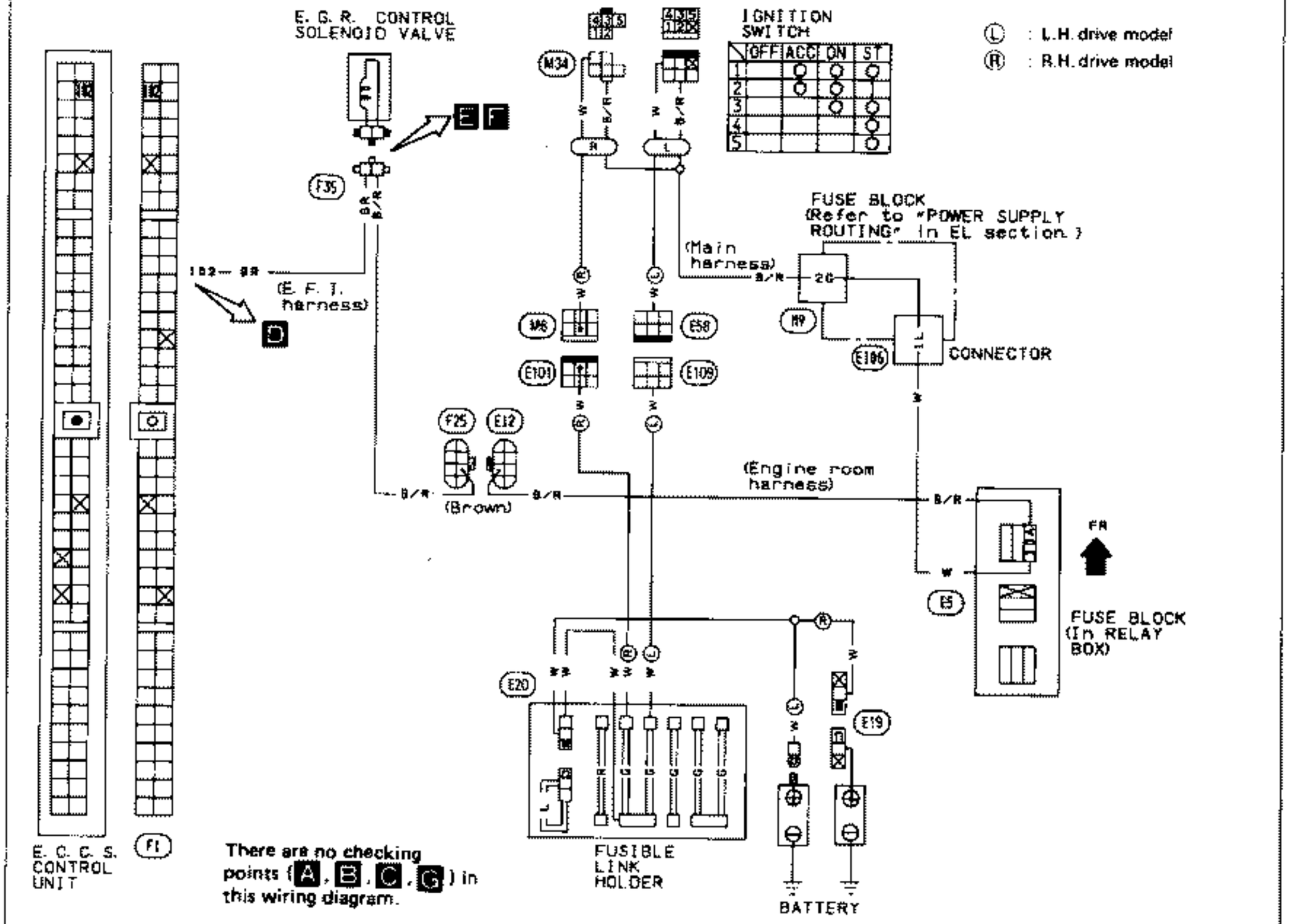
ENGINE CONTROL UNIT



NOTE

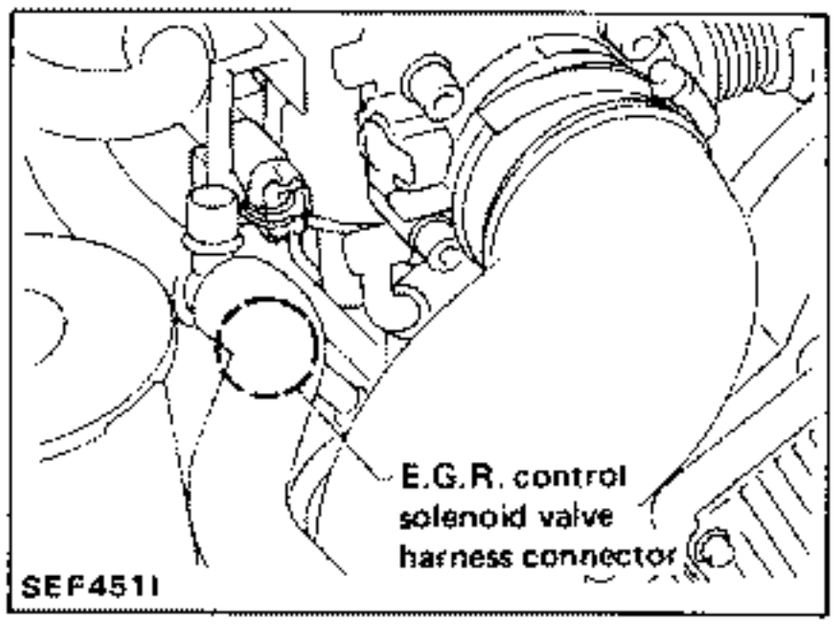
Diagnostic Procedure 29

E.G.R. FUNCTION

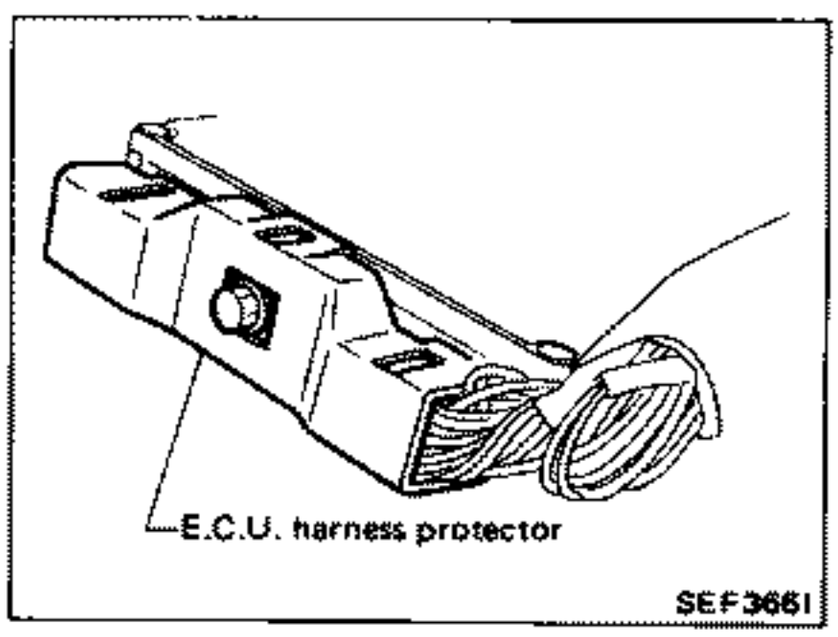


SEF359K

Harness layout

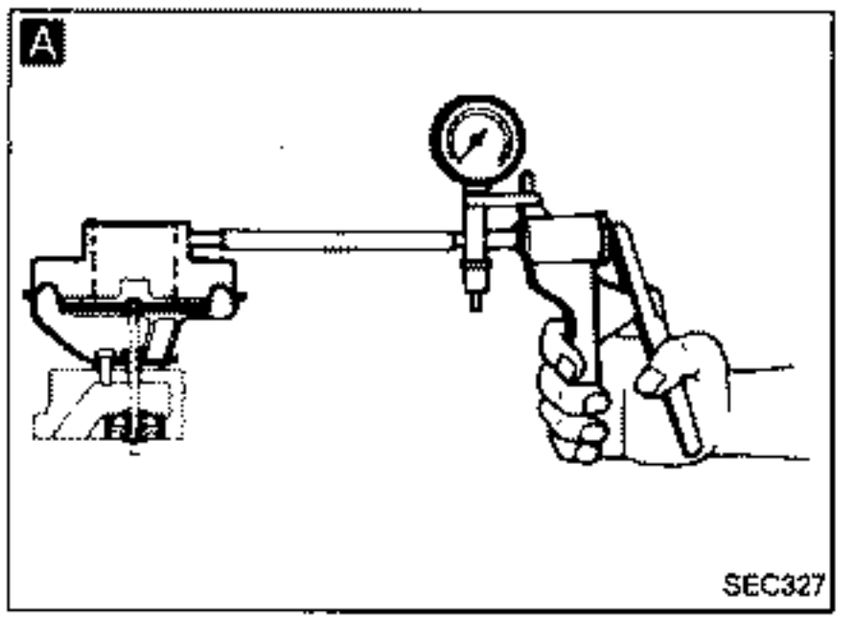


SEF451I



SEF366I

Diagnostic Procedure 29 (Cont'd)



INSPECTION START

A

CHECK E.G.R. CONTROL VALVE OPERATION.
Make sure that E.G.R. control valve lifts up when applying vacuum.

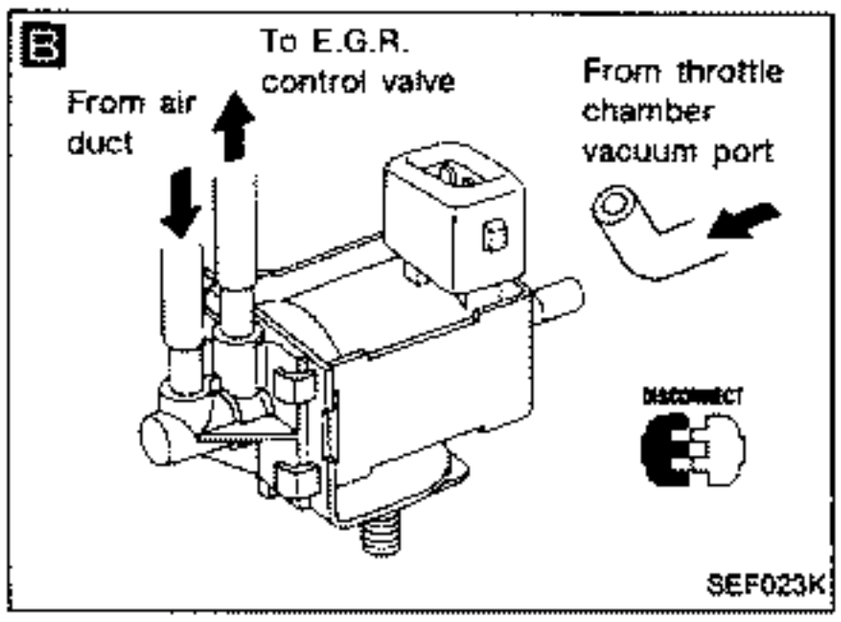
N.G. → Replace or repair E.G.R. control valve.

O.K.

B

CHECK VACUUM SOURCE TO E.G.R. CONTROL VALVE.
1) Disconnect vacuum hose connected to E.G.R. control solenoid valve.
2) Make sure vacuum exists when racing engine.

N.G. → CHECK THROTTLE CHAMBER VACUUM PORT FOR CLOGGING.

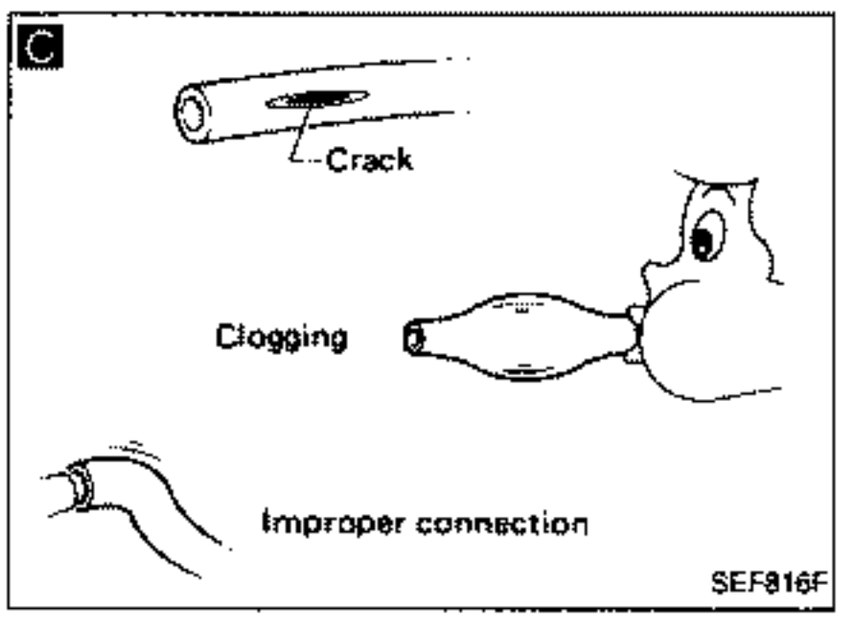


O.K.

C

CHECK VACUUM HOSE.
Check vacuum hose for clogging, cracks or improper connections.

N.G. → If necessary, replace vacuum hose or reconnect vacuum hose firmly.



O.K.

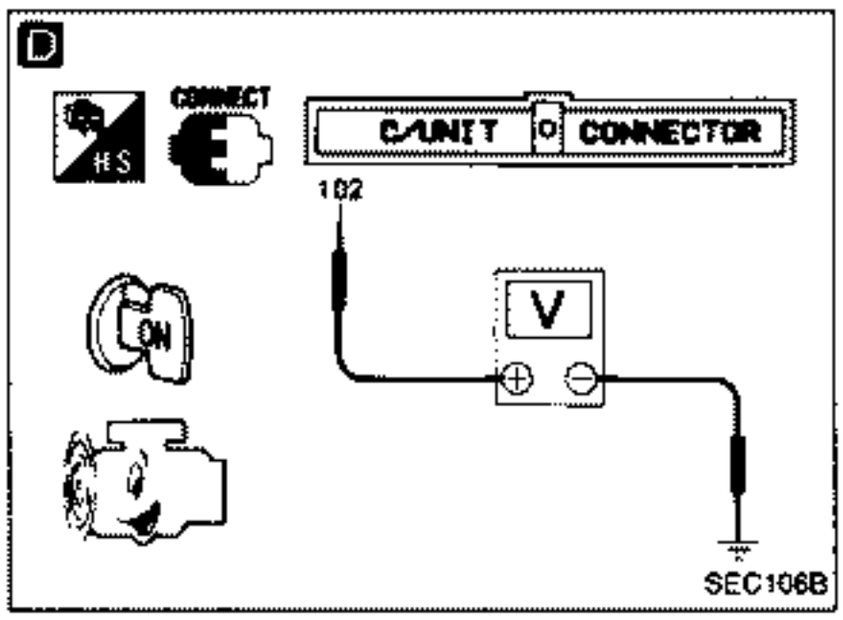
D

CHECK E.C.U. OUTPUT SIGNAL.
1) Check voltage between E.C.U. terminal (102) and ground under the following conditions.

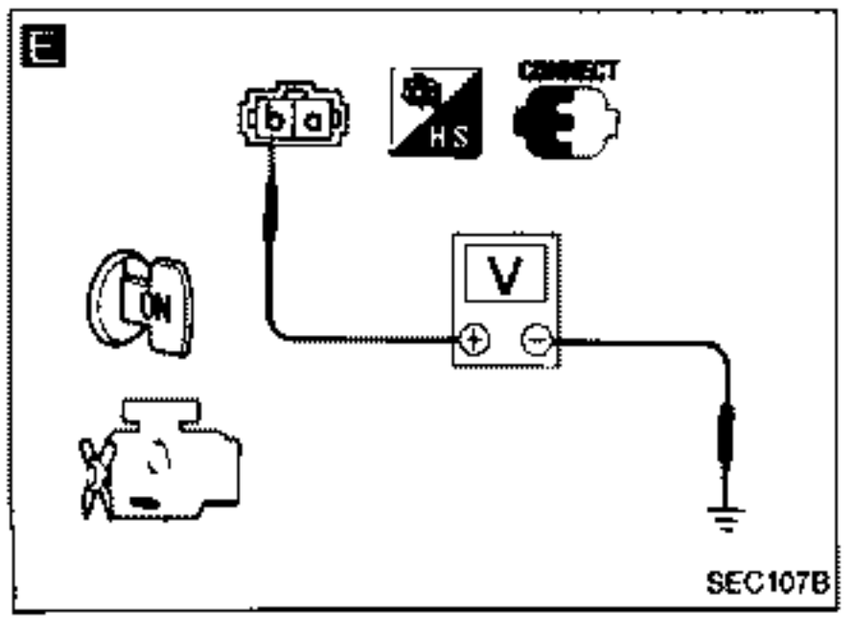
Engine condition	Voltage
Idle	0.7 - 0.8V
Racing (Less than approx. 3,000 rpm)	Battery voltage

N.G. → E CHECK POWER SOURCE TO E.G.R. CONTROL SOLENOID VALVE.
1) Stop engine.
2) Turn ignition switch "ON".
3) Check voltage between terminal (b) and ground.
Voltage: Battery voltage

F CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect E.C.U. harness connector.
3) Disconnect E.G.R. control solenoid valve harness connector.
4) Check resistance between E.C.U. terminal (102) and terminal (b).
Resistance:
Approximately 0Ω
If N.G. repair or replace harness.

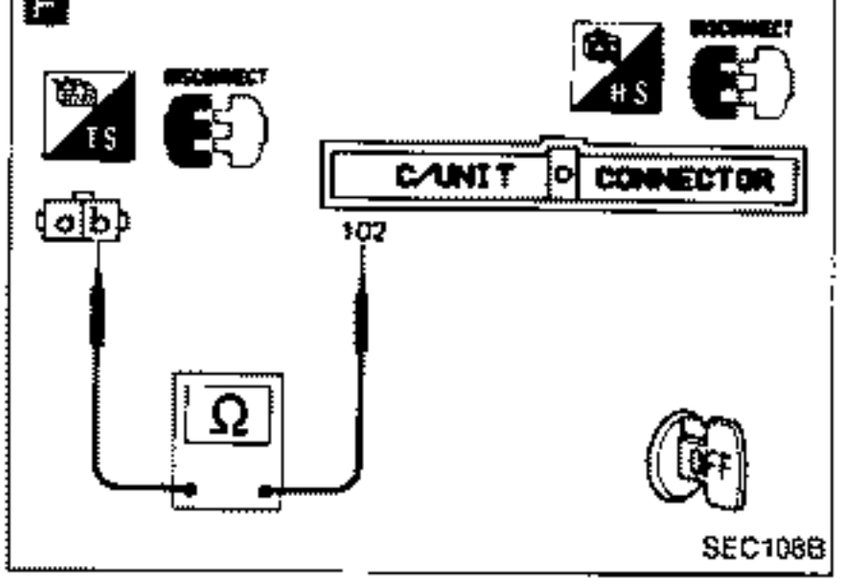


O.K.

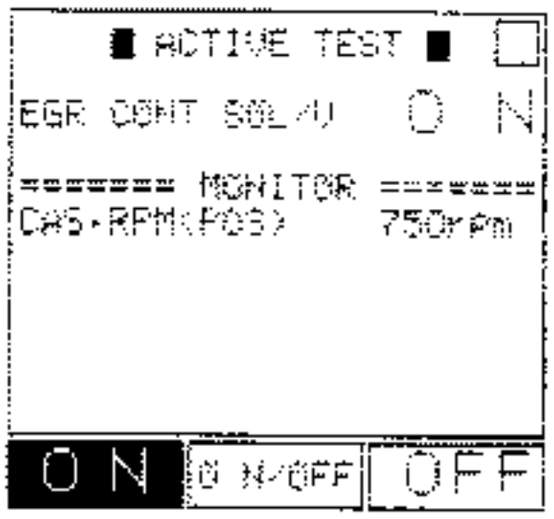


Diagnostic Procedure 29 (Cont'd)

F



G



H ROAD TEST

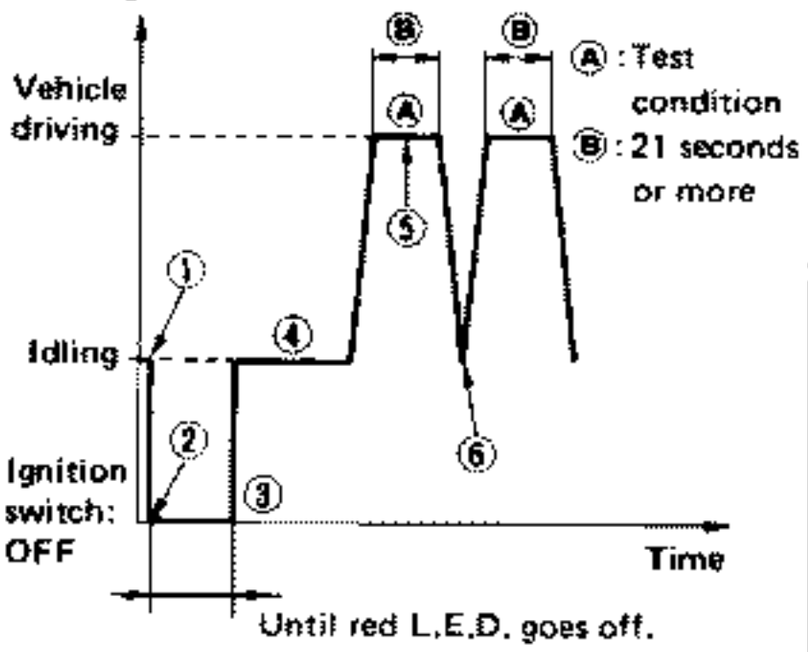
Test condition

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

(1) Engine speed:
2,200±200 rpm

(2) Intake manifold vacuum:
−30.0±10.0 kPa (−300±100 mbar, −225±75 mmHg, −8.86±2.95 inHg)

Driving mode



① Start engine and warm it up sufficiently.
② Turn off ignition switch and keep it off until red L.E.D. goes off.
③ Start engine and make sure that air conditioner switch and rear defogger are turned "OFF" during driving test.
④ Keep engine running for at least 3 minutes.
⑤ Shift to suitable gear position and drive in "Test condition" for at least 21 seconds.
⑥ Decrease engine revolutions to less than 2,000 rpm.
⑦ Repeat steps ⑤ through ⑥ at last 1 more time.

SEF302H

G

CHECK COMPONENT.

Turn E.G.R. control solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT and check operating sound.

— OR —

Check E.G.R. control solenoid valve.
Refer to "Electrical Components Inspection".
(See page EF & EC-180.)

N.G. → Replace E.G.R. control solenoid valve.

O.K. ↓

Reinstall any part removed.

H

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

N.G. → Perform electric control system inspection.

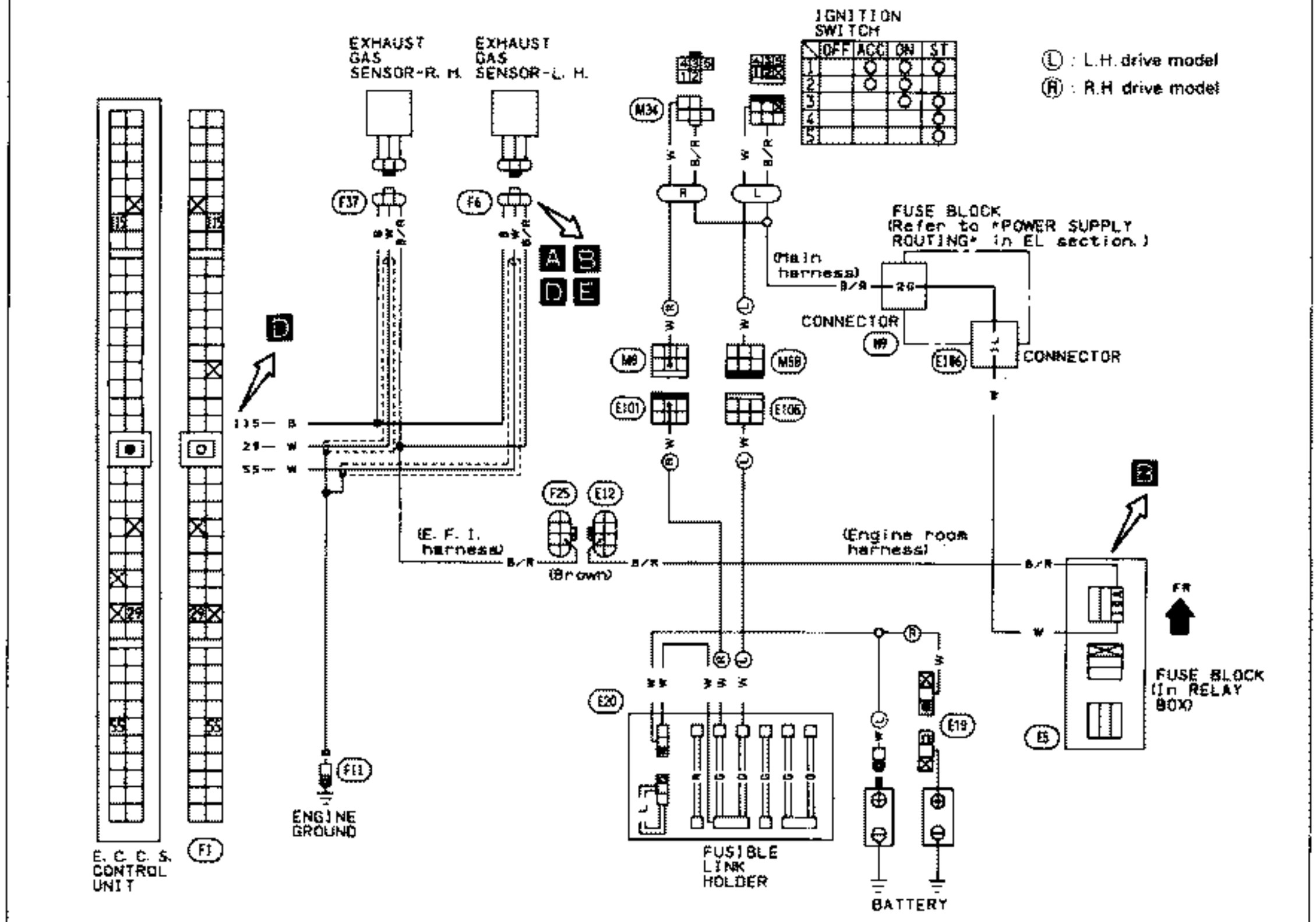
O.K. ↓

INSPECTION END

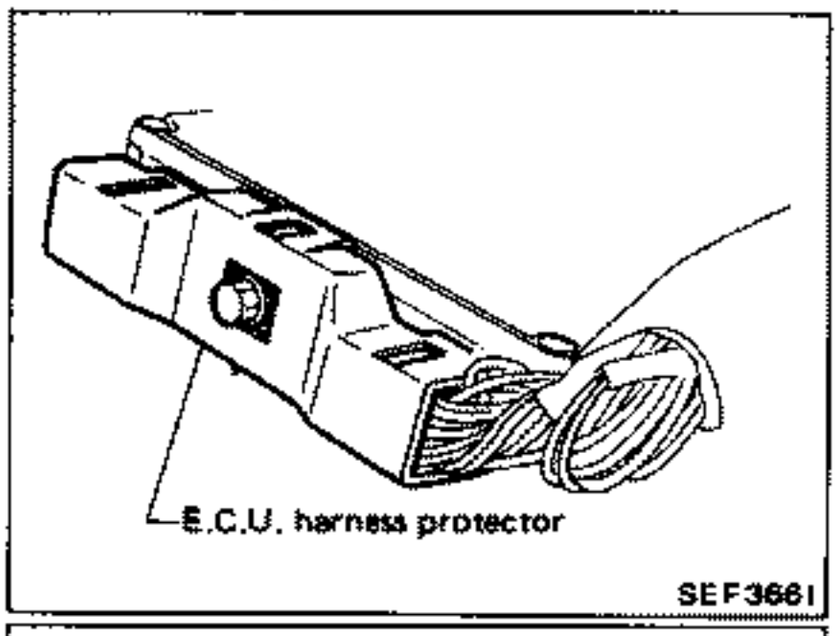
NOTE

Diagnostic Procedure 30

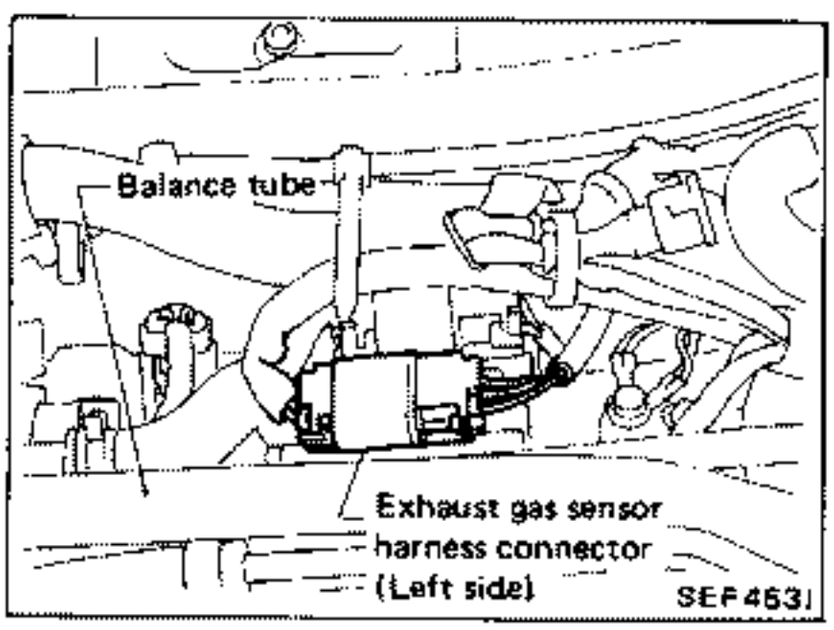
EXHAUST GAS SENSOR



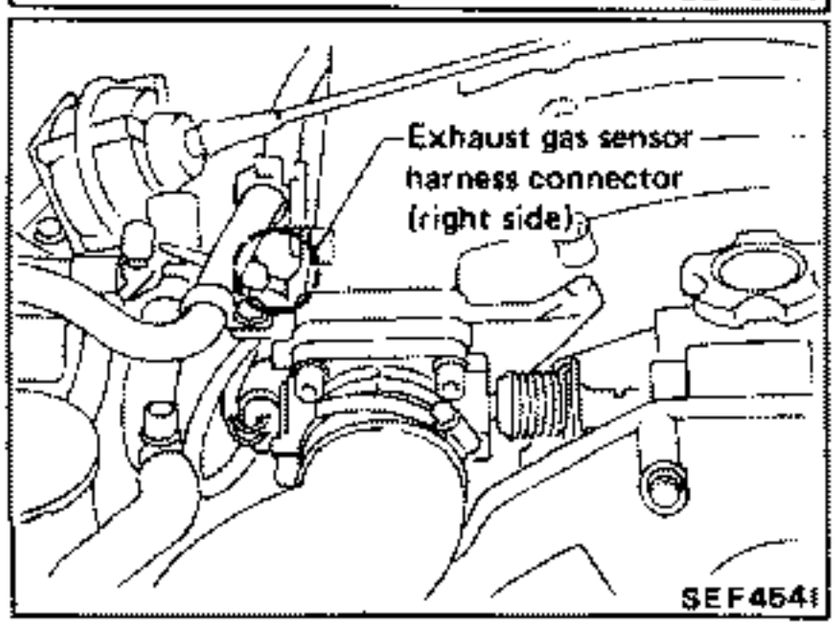
Harness layout



SEF366I



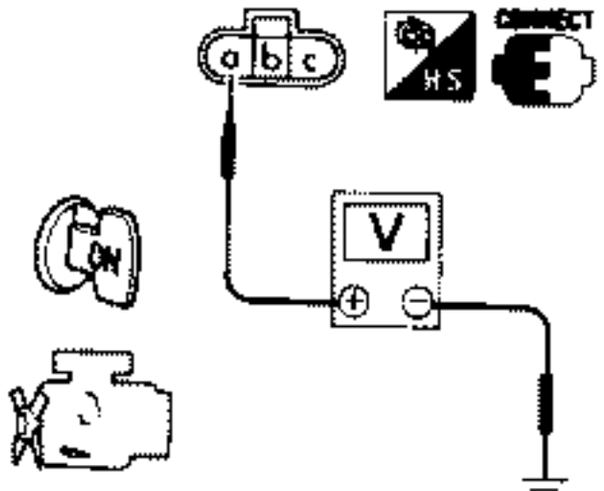
SEF453I



SEF454I

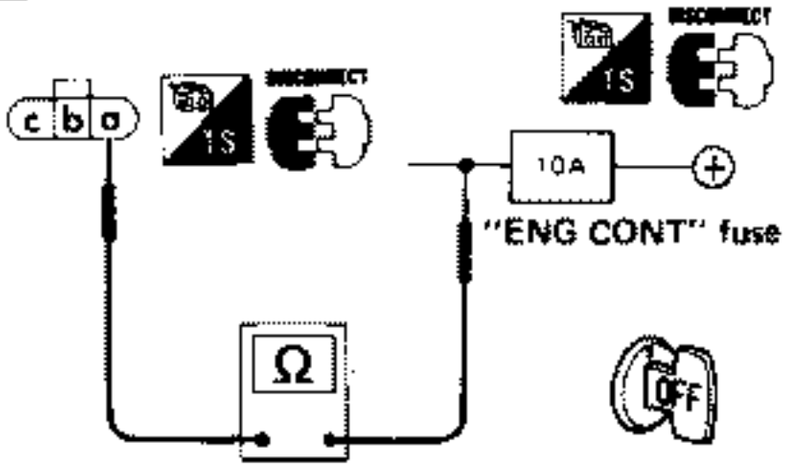
Diagnostic Procedure 30 (Cont'd)

A



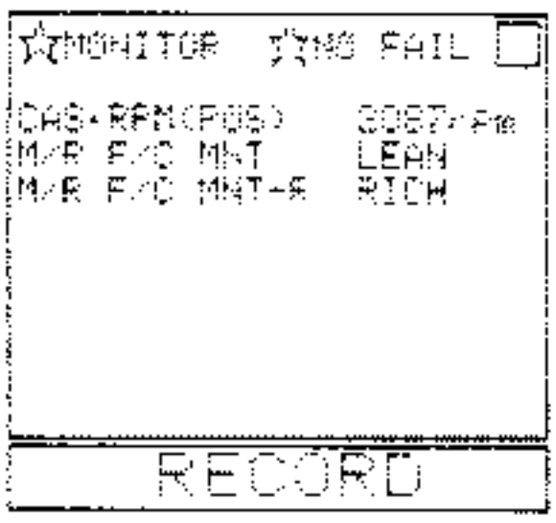
SEC111B

B



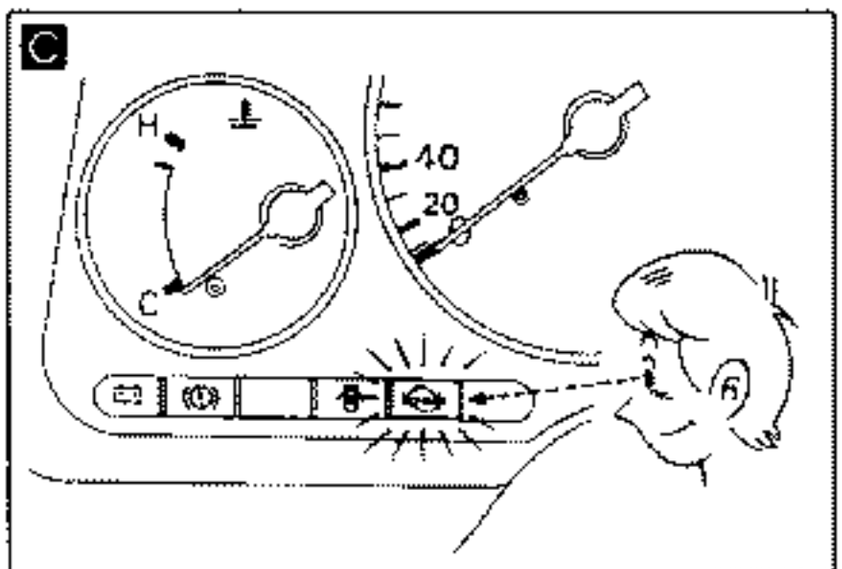
SEC112B

C



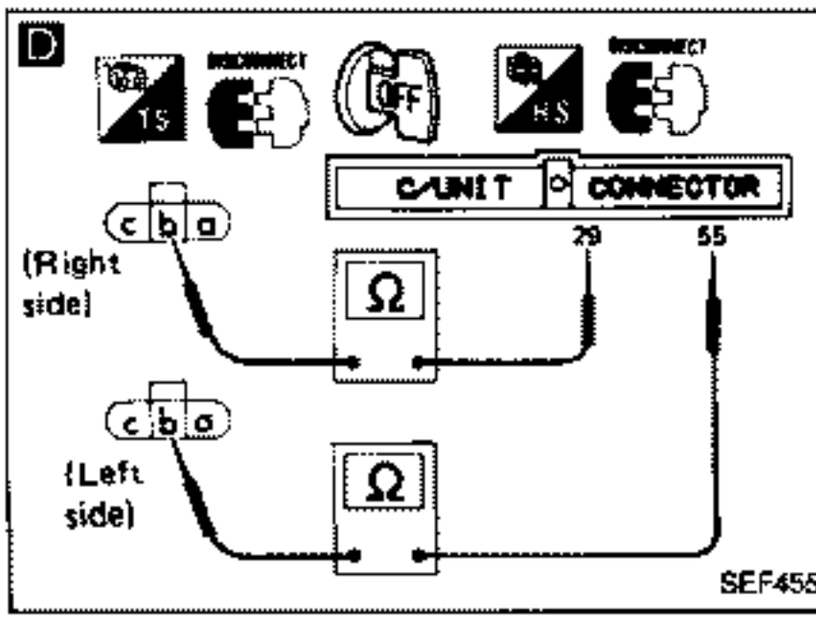
SEF160I

C



SEF025K

D



SEF455I

INSPECTION START

A

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

N.G. → B

O.K.

C

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

OR

2) Make sure that check engine light goes on and off periodically more than 5 times during 10 seconds at 2,000 rpm in self-diagnostic results Mode II.

N.G. → D

O.K.

E

CHECK GROUND CIRCUIT.
1) Stop engine.
2) Disconnect exhaust gas sensor harness connector.
3) Check harness continuity between terminal ⓒ and ground.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

⊕

B

CHECK HARNESS CONTINUITY BETWEEN EXHAUST GAS SENSOR AND FUSE.
1) Turn ignition switch "OFF".
2) Disconnect exhaust gas sensor harness connector.
3) Disconnect "ENG CONT" fuse.
4) Check harness continuity between terminal ⓐ and the fuse.
Continuity should exist.
If N.G., repair harness or connectors.

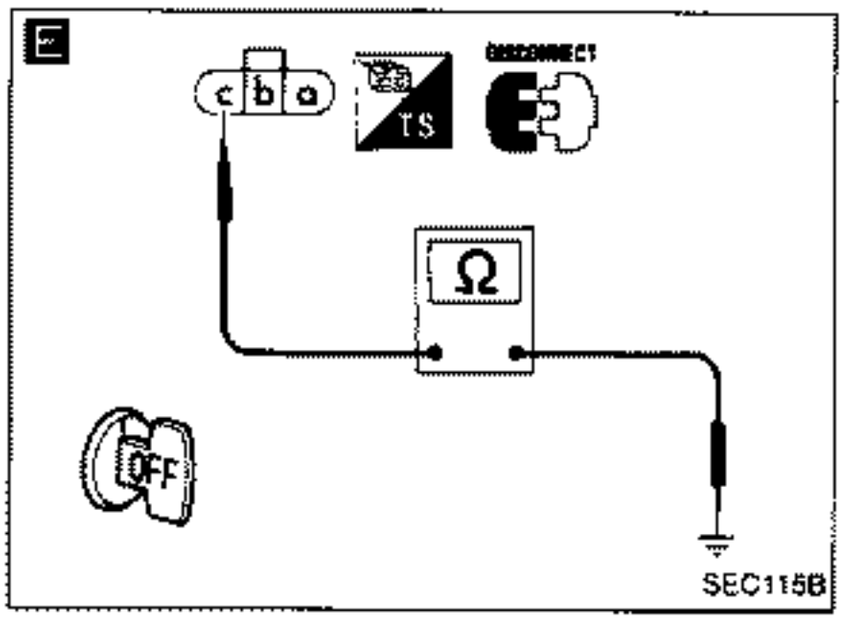
D

CHECK HARNESS CONTINUITY BETWEEN EXHAUST GAS SENSOR AND E.C.U.
1) Stop engine.
2) Disconnect exhaust gas sensor harness connector.
3) Disconnect E.C.U. harness connector.
4) Check harness continuity between E.C.U. terminals and exhaust gas sensor terminals.
Right side: ㉙ - ⓑ
Left side: ㊺ - ⓑ
Continuity should exist.
If N.G., repair harness or connectors.

O.K.

Replace exhaust gas sensor.

Diagnostic Procedure 30 (Cont'd)



Reinstall any part removed.

Perform driving test again.

N.G.

1) Perform E.C.U. input/output signal inspection test.
2) If N.G., recheck the E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

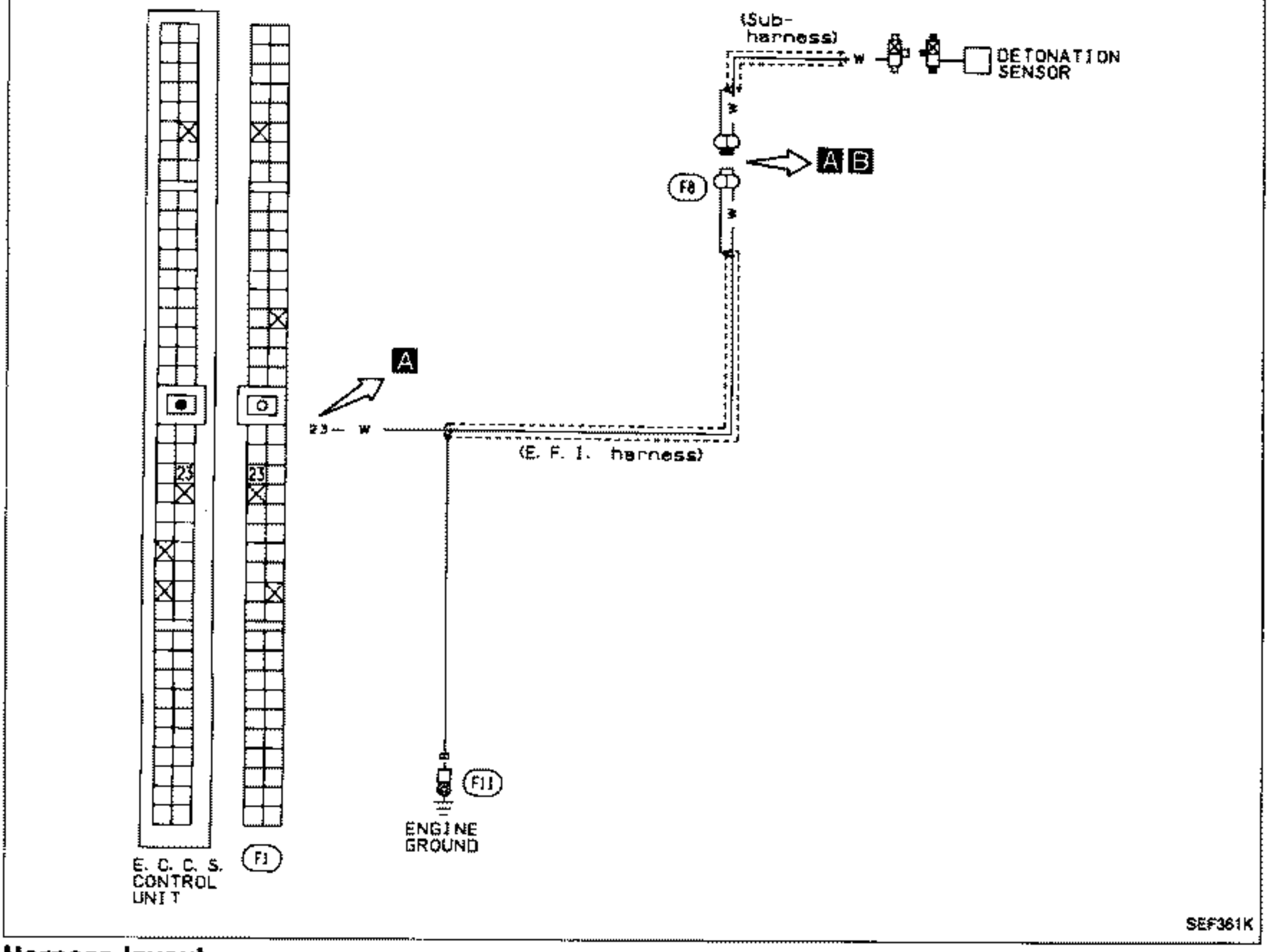
O.K.

INSPECTION END

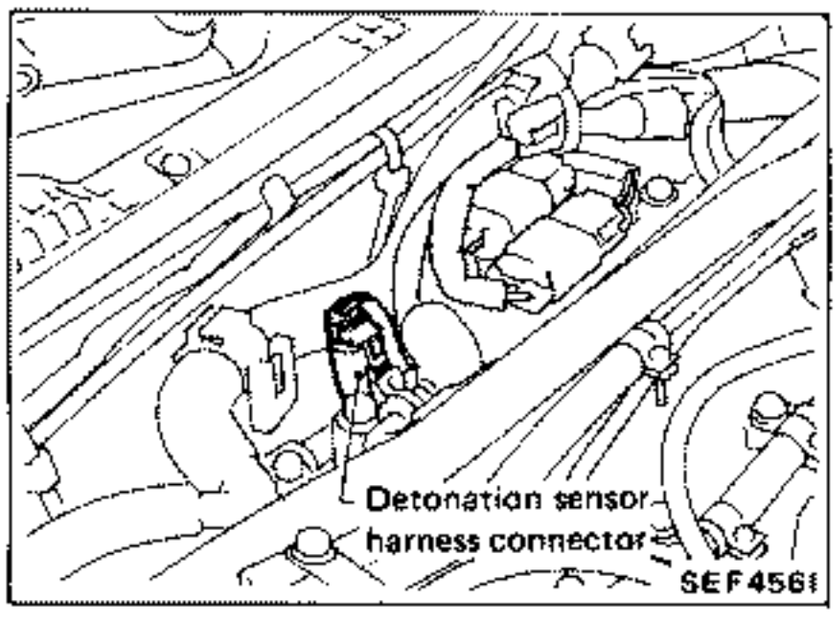
NOTE

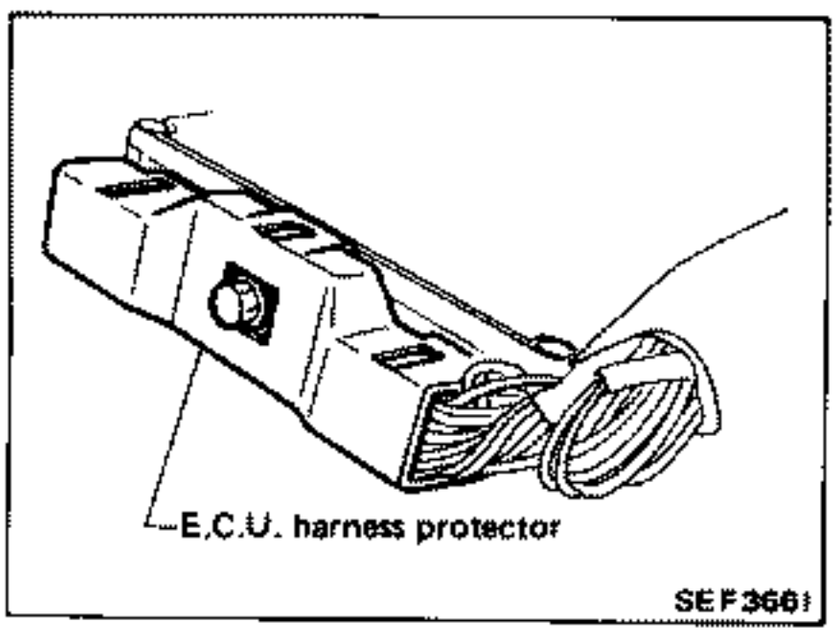
Diagnostic Procedure 31

DETONATION SENSOR (Code No. 34)

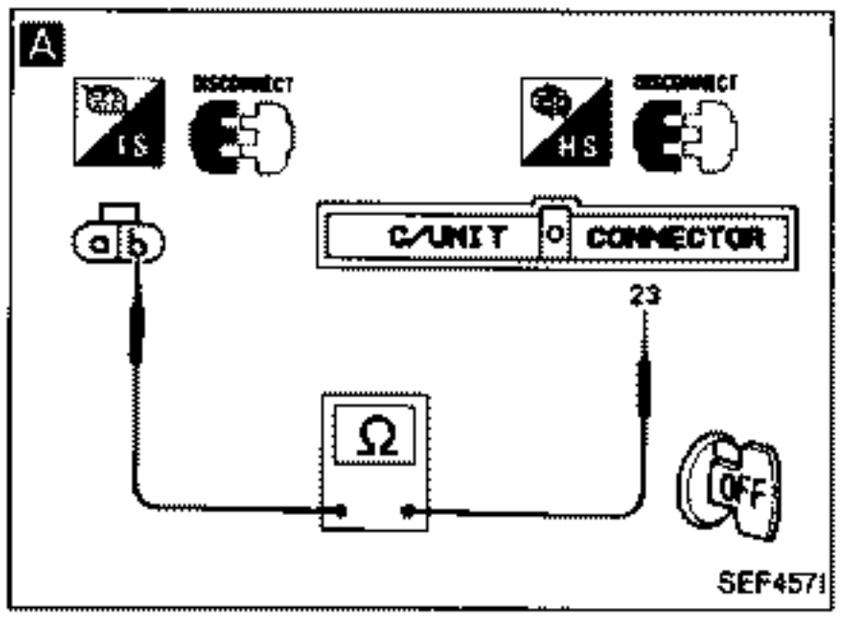


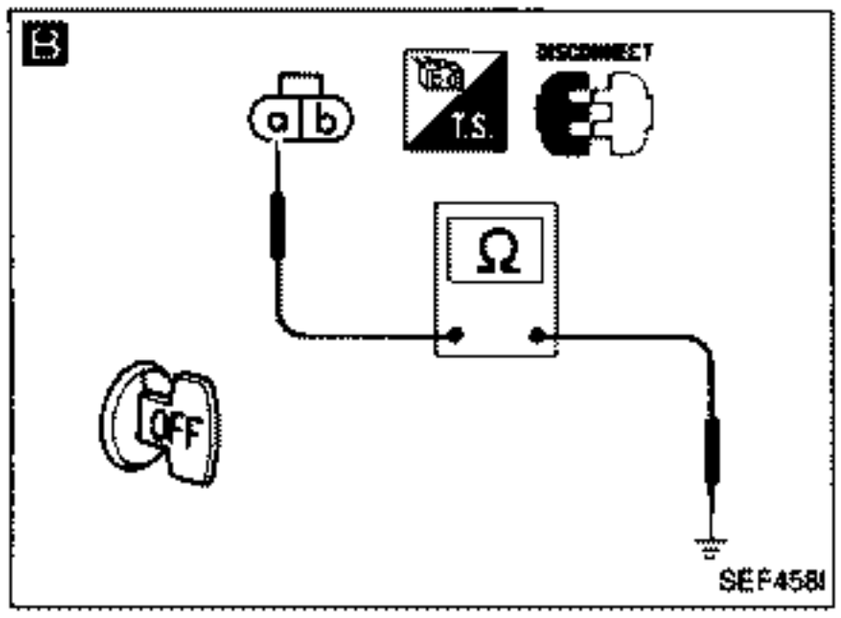
Harness layout





Diagnostic Procedure 31 (Cont'd)





INSPECTION START

A

CHECK INPUT SIGNAL CIRCUIT.
1) Make sure that ignition switch is in "OFF" position.
2) Disconnect detonation sensor sub-harness connector.
3) Disconnect E.C.U. harness connector.
4) Check harness continuity between E.C.U. terminal ㉓ and terminal ⓑ.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K. ↓

B

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

N.G. → Repair harness or connectors.

O.K. ↓

CHECK COMPONENT
(Detonation sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-182.)

O.K. ↓

Reinstall any part removed.

↓

Erase the SELF-DIAGNOSTIC RESULTS memory.

↓

Perform driving test and then perform SELF-DIAGNOSTIC RESULTS (Mode II) again.

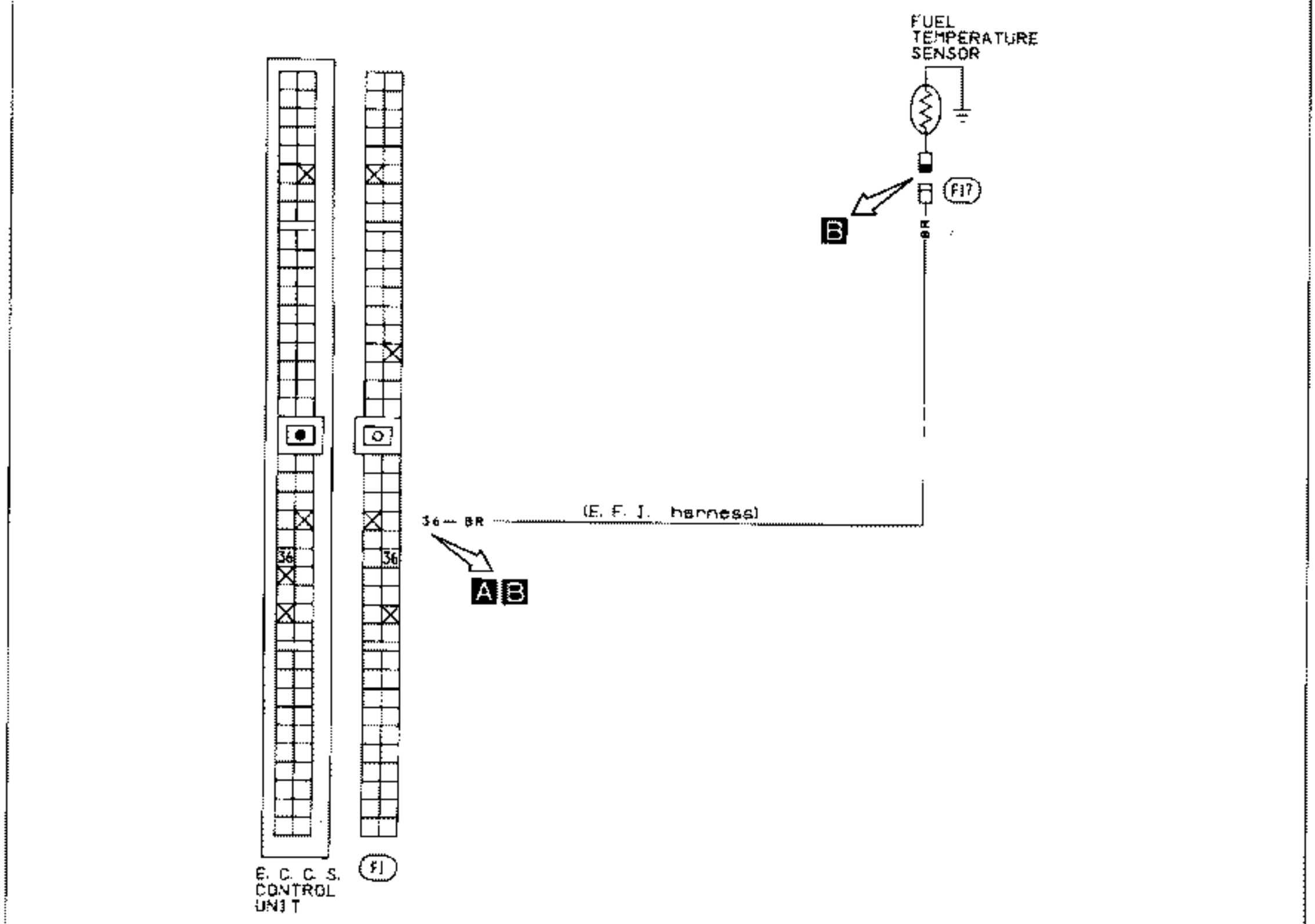
N.G. → 1) Perform E.C.U. input/output signal inspection test.
2) If N.G., recheck the E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

O.K. ↓

INSPECTION END

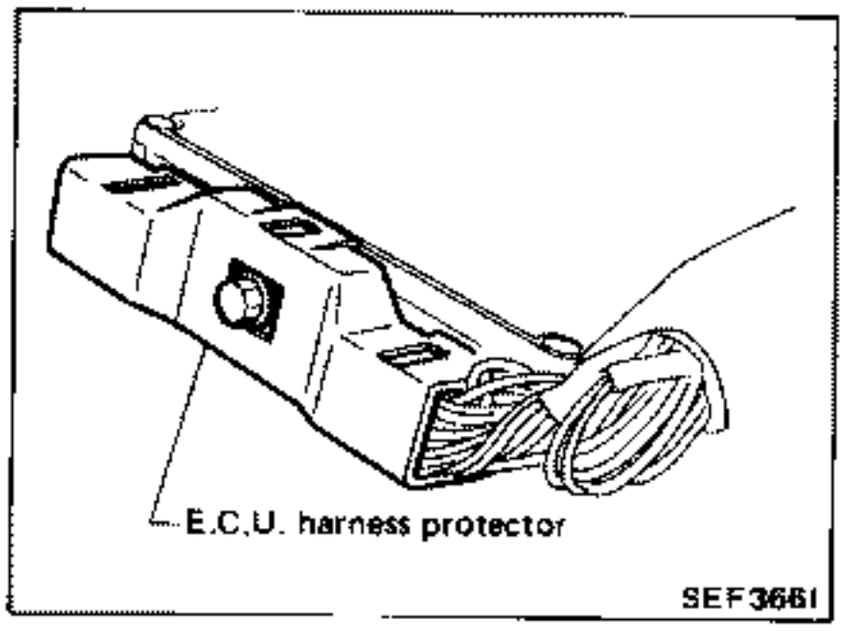
Diagnostic Procedure 32

FUEL TEMPERATURE SENSOR (Code No. 42)

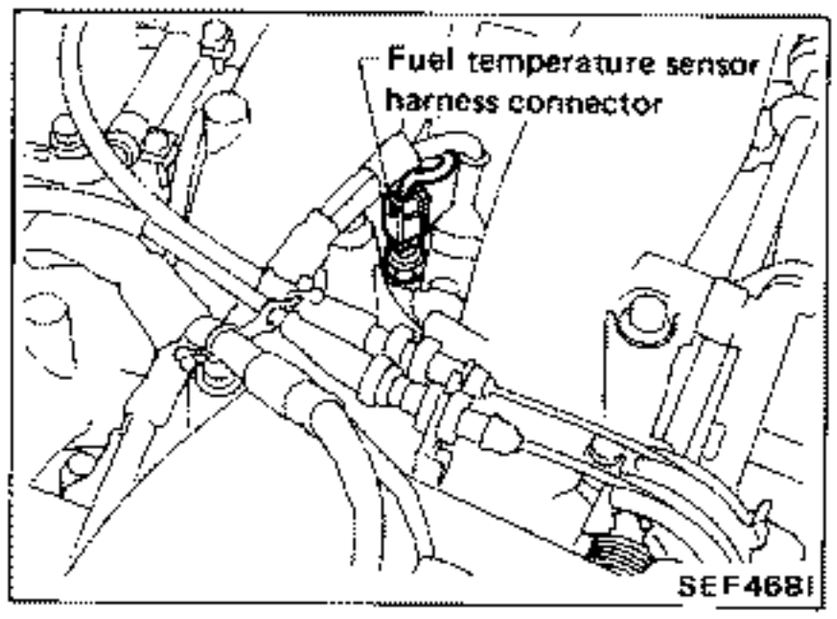


SEF362K

Harness layout

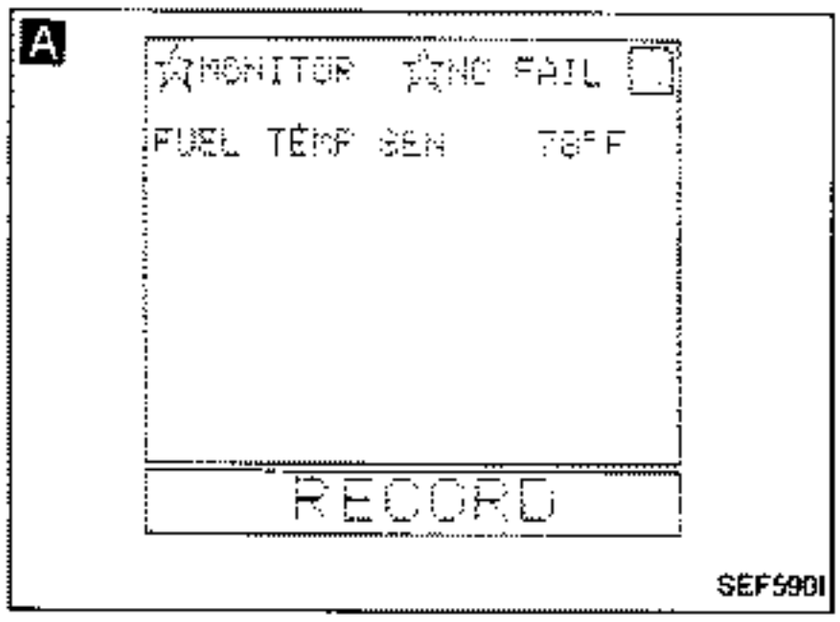


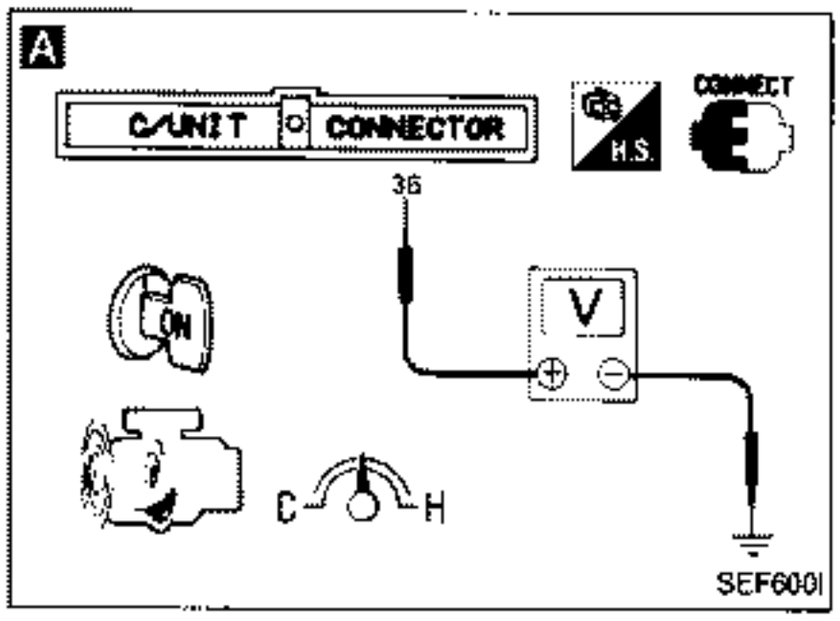
SEF366I

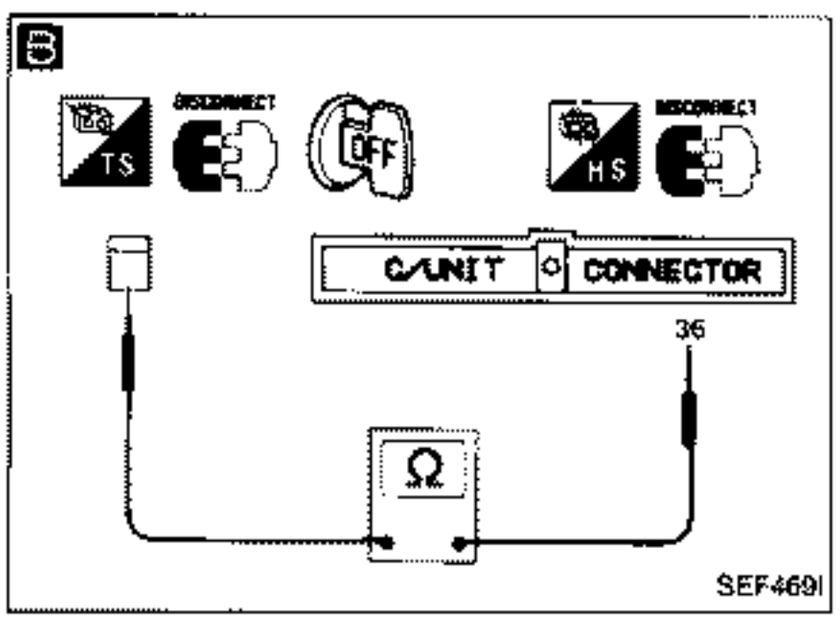


SEF468I

Diagnostic Procedure 32 (Cont'd)







INSPECTION START

A

CHECK INPUT SIGNAL.

Read fuel temperature sensor signal in "DATA MONITOR" mode with CONSULT after engine warm-up.

Fuel temperature:
20 - 60°C (68 - 140°F)

OR

Check voltage between E.C.U. terminal ㊱ and ground after engine warm-up.

Voltage: 0 - 5.0V

N.G. →

B

CHECK HARNESS CONTINUITY BETWEEN E.C.U. AND FUEL TEMPERATURE SENSOR.

1) Stop engine.
2) Disconnect E.C.U. harness connector.
3) Disconnect exhaust gas temperature sensor harness connector.
4) Check continuity between E.C.U. terminal ㊱ and fuel temperature terminal.
Continuity should exist.

O.K. ↓

CHECK COMPONENT
(Fuel temperature sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-184.)

O.K. ↓

Reinstall any part removed.

↓

Erase the SELF-DIAGNOSTIC RESULTS memory.

↓

Perform driving test and then perform SELF-DIAGNOSTIC RESULTS (Mode II) again.

N.G. →

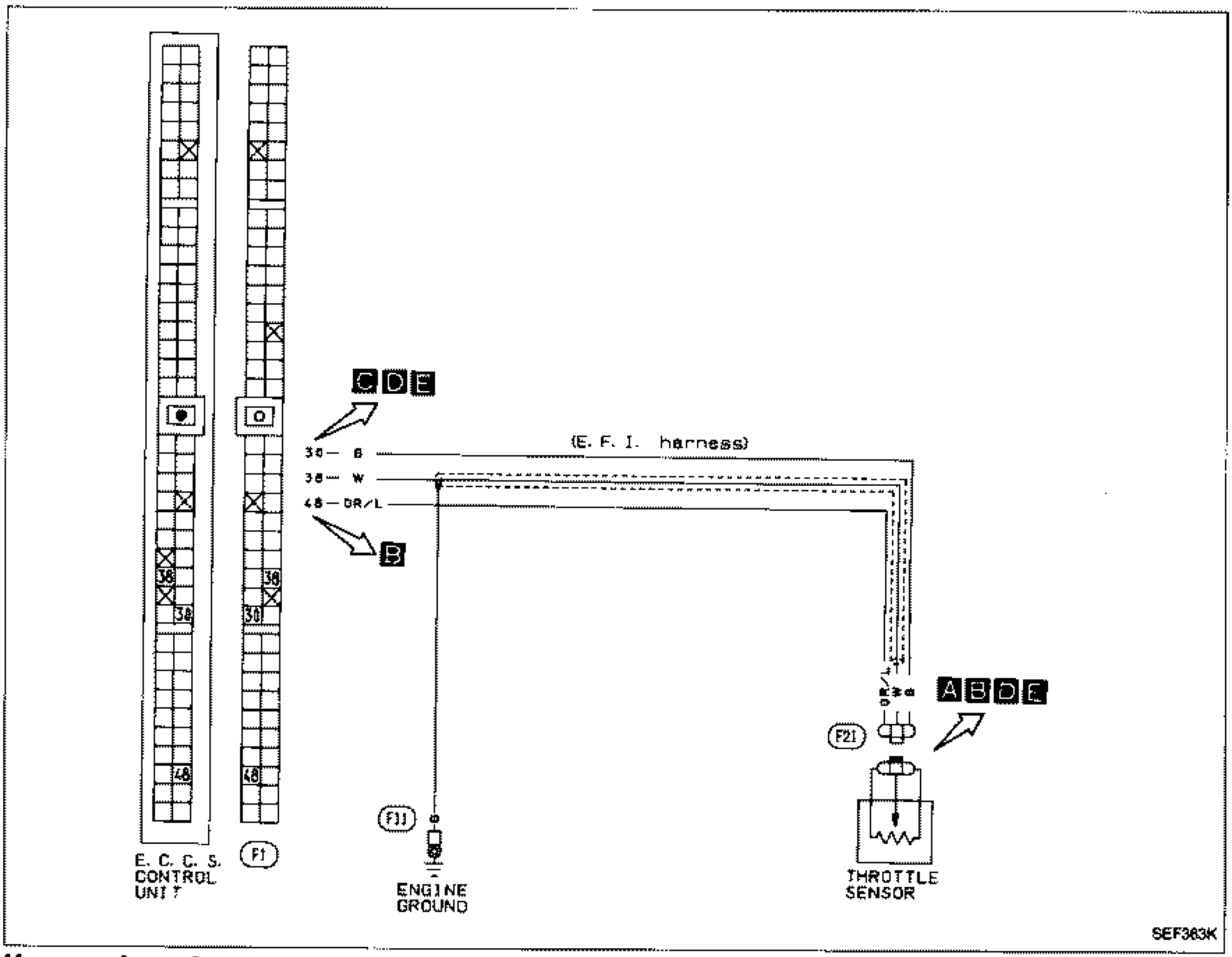
1) Perform E.C.U. input/output signal inspection test.
2) If N.G., recheck the E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

O.K. ↓

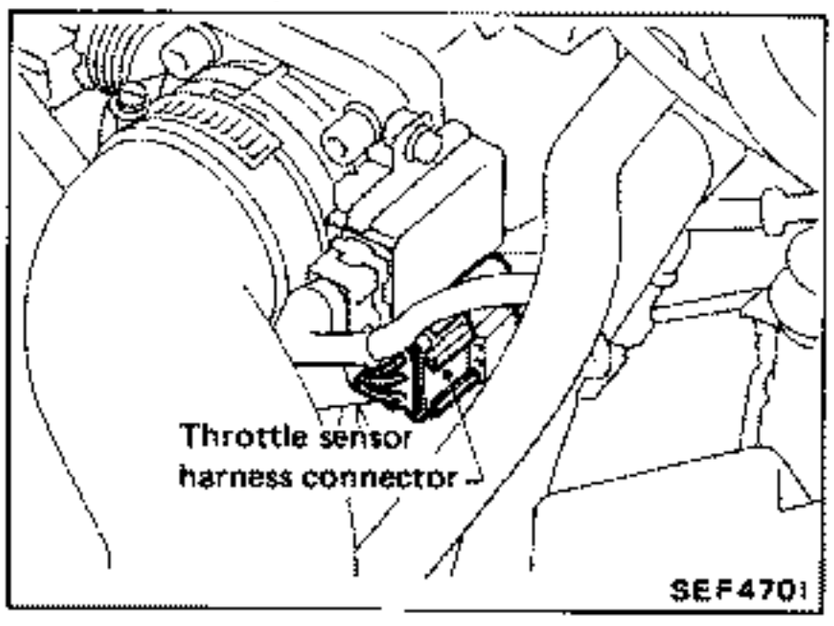
INSPECTION END

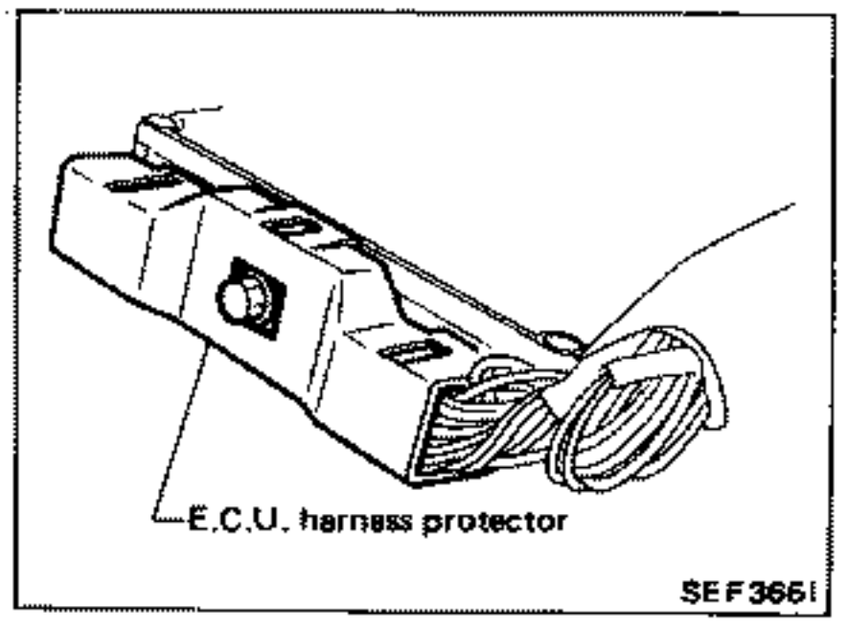
Diagnostic Procedure 33

THROTTLE SENSOR (Code No. 43)

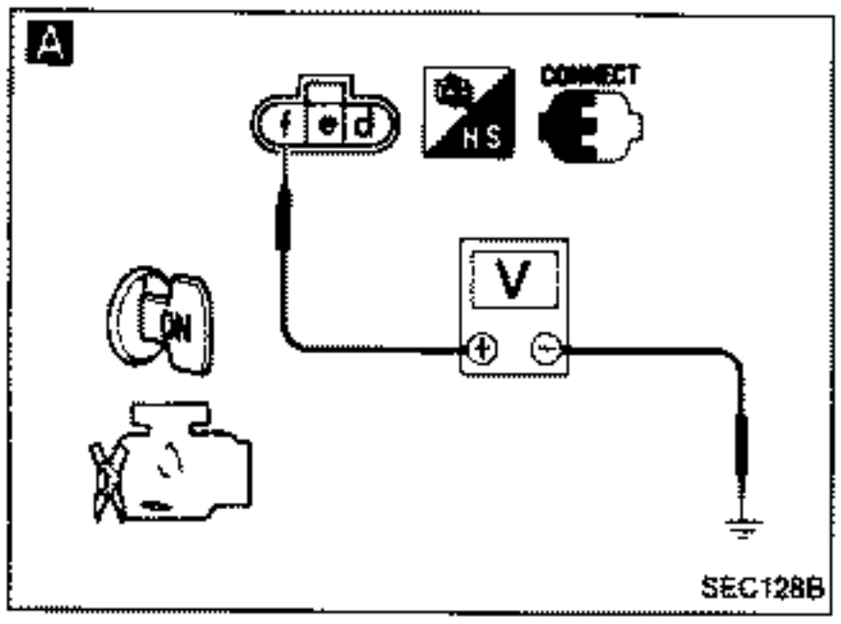


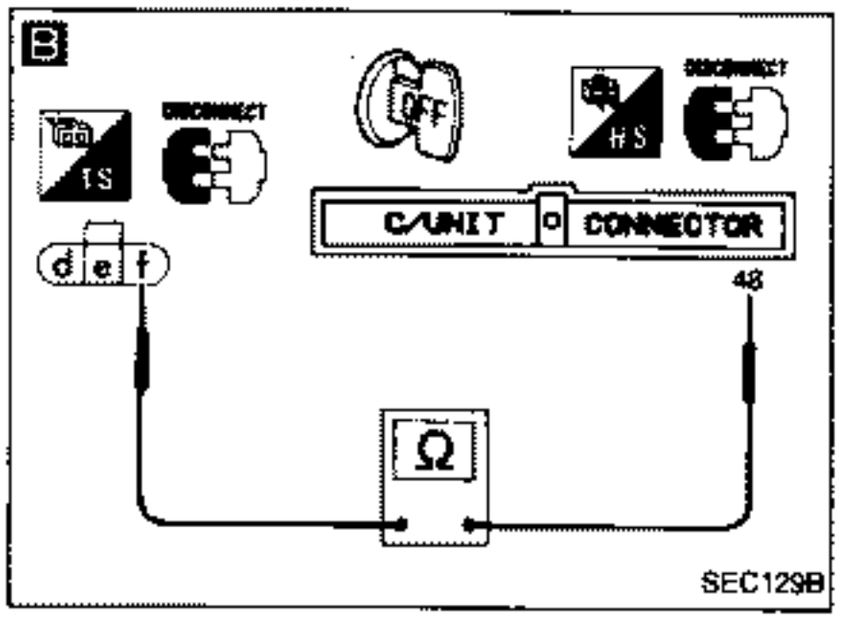
Harness layout

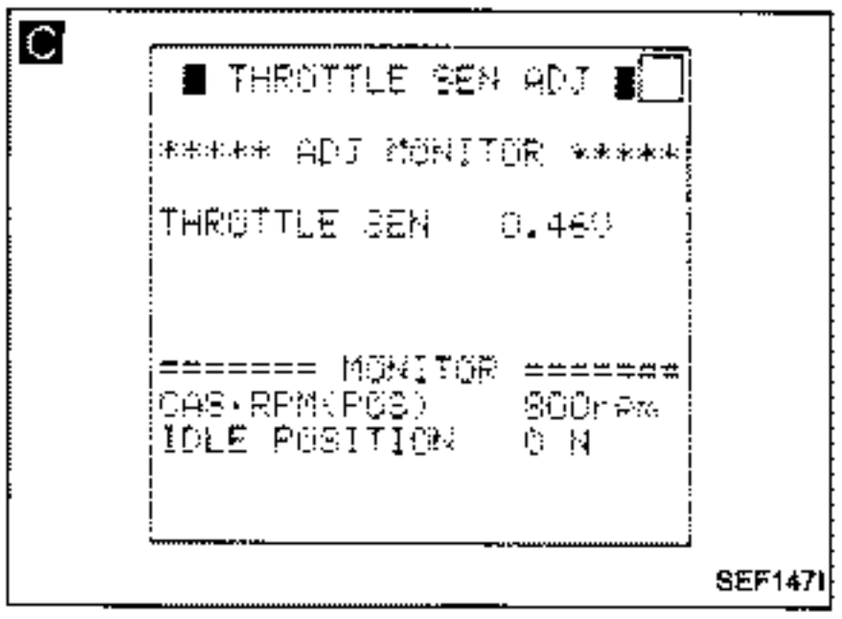


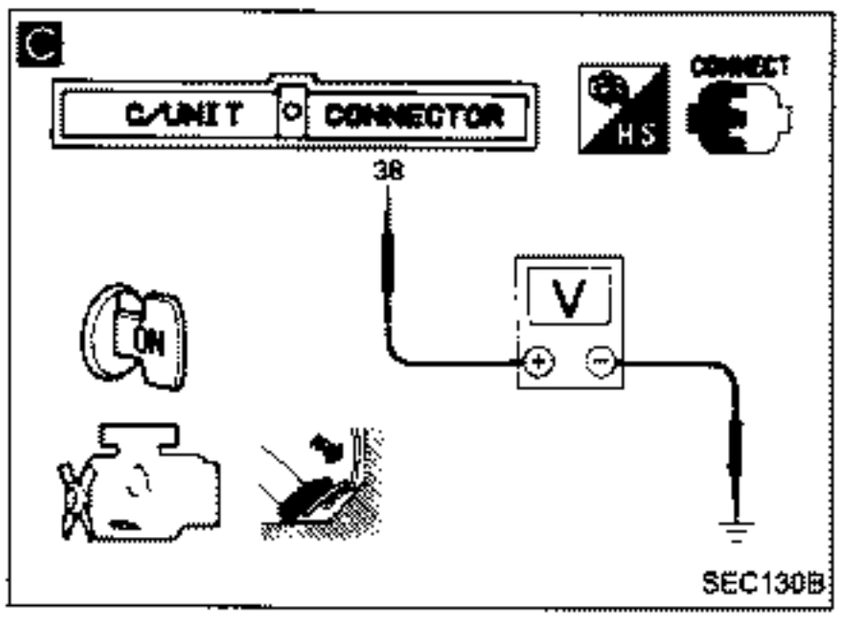


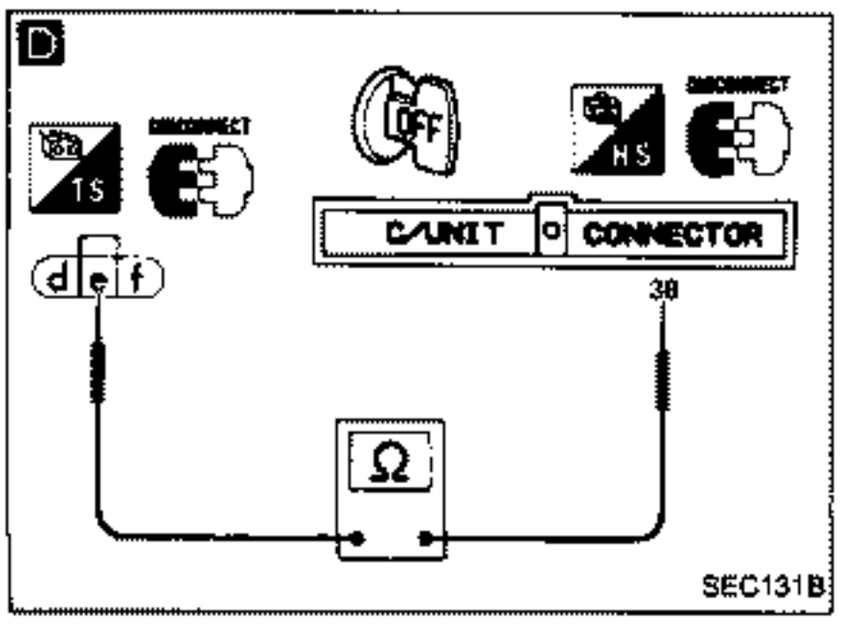
Diagnostic Procedure 33 (Cont'd)











INSPECTION START

A

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

N.G. →

B

CHECK HARNESS CONTINUITY BETWEEN THROTTLE SENSOR AND E.C.U.
1) Turn ignition switch "OFF".
2) Disconnect throttle sensor harness connector.
3) Disconnect E.C.U. harness connector.
4) Check harness continuity between E.C.U. terminal (48) and terminal (f).
Continuity should exist.
If N.G., repair harness or connectors.

O.K. ↓

C

CHECK INPUT SIGNAL.
Read throttle sensor output voltage in "WORK SUPPORT" mode with CONSULT.
Throttle valve fully closed:
0.4 - 0.5V
Throttle valve fully open:
Approx. 4.0V

OR

Make sure that voltage between E.C.U. terminal (38) and ground changes when accelerator pedal is depressed.
Voltage:
Throttle valve fully closed:
0.4 - 0.5V
Throttle valve fully open:
Approx. 4.0V

N.G. →

ADJUST THROTTLE SENSOR INITIAL POSITION.
(See page EF & EC-181.)

D

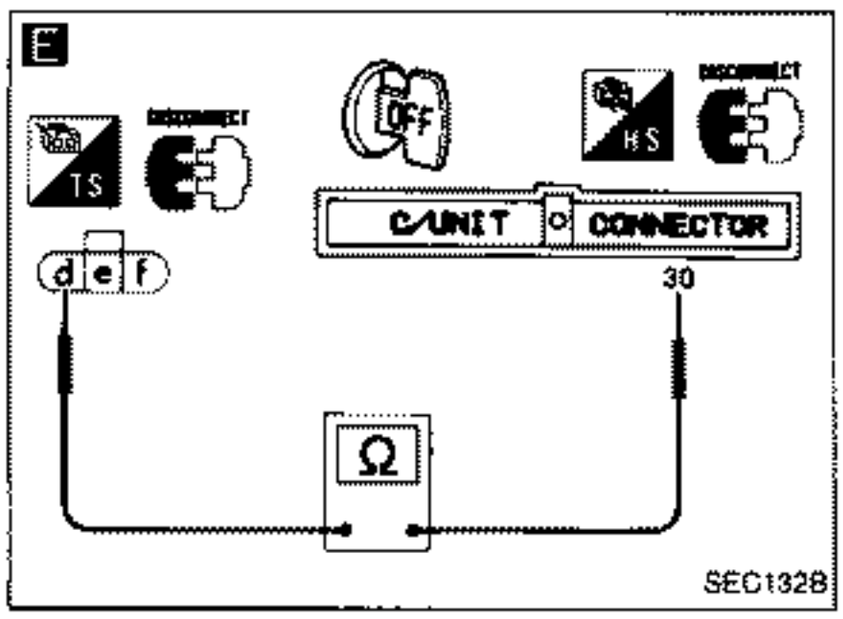
CHECK HARNESS CONTINUITY BETWEEN THROTTLE SENSOR AND E.C.U.
1) Turn ignition switch "OFF".
2) Disconnect throttle sensor harness connector.
3) Disconnect E.C.U. harness connector.
4) Check harness continuity between E.C.U. terminal (38) and terminal (e).
Continuity should exist.
If N.G., repair harness or connectors.

O.K. ↓

CHECK COMPONENT
(Throttle sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-181.)

O.K. ↓

Diagnostic Procedure 33 (Cont'd)



E

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect E.C.U. harness connector.
3) Disconnect throttle sensor harness connector.
4) Check resistance between E.C.U. terminal ㉚ and terminal ⓓ.
Continuity should exist.

N.G. → 1)Check harness continuity between throttle sensor and ground.
2) E.C.U. ground circuit.

O.K. ↓

Reinstall any part removed. ↓

Erase the SELF-DIAGNOSTIC RESULTS memory. ↓

Perform driving test and then perform SELF-DIAGNOSTIC RESULTS (Mode II) again.

N.G. → 1) Perform E.C.U. input/output signal inspection test.
2) If N.G., recheck the E.C.U. pin terminals damage or the connection of E.C.U. harness connector.

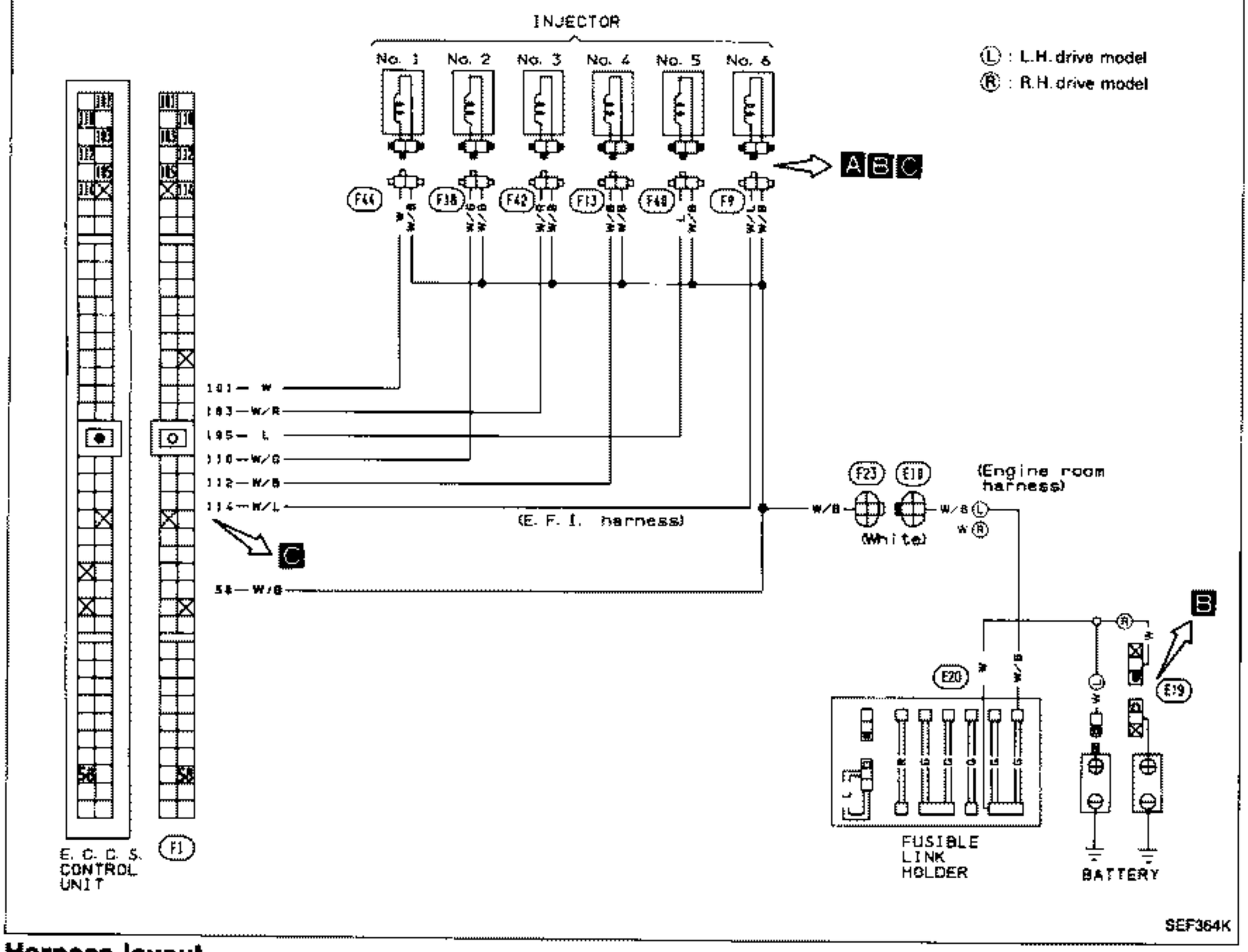
O.K. ↓

INSPECTION END

NOTE

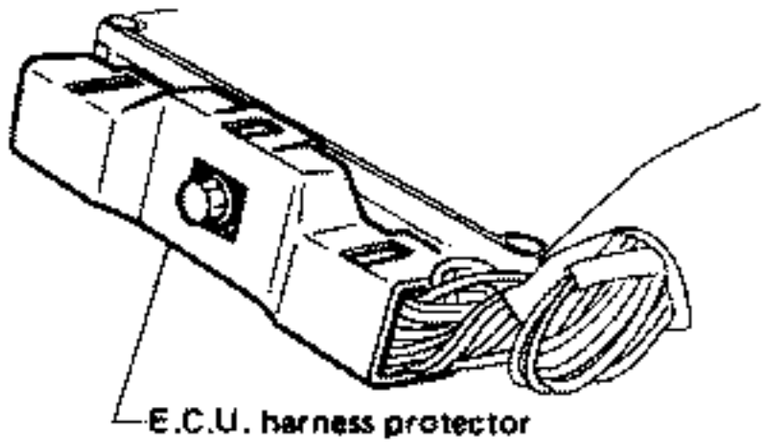
Diagnostic Procedure 34

INJECTOR CIRCUIT

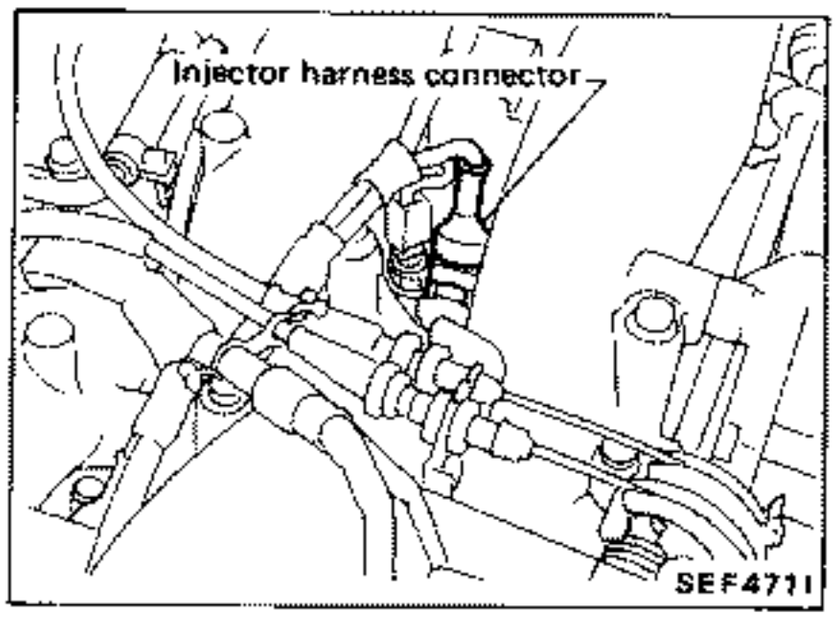


SEF364K

Harness layout

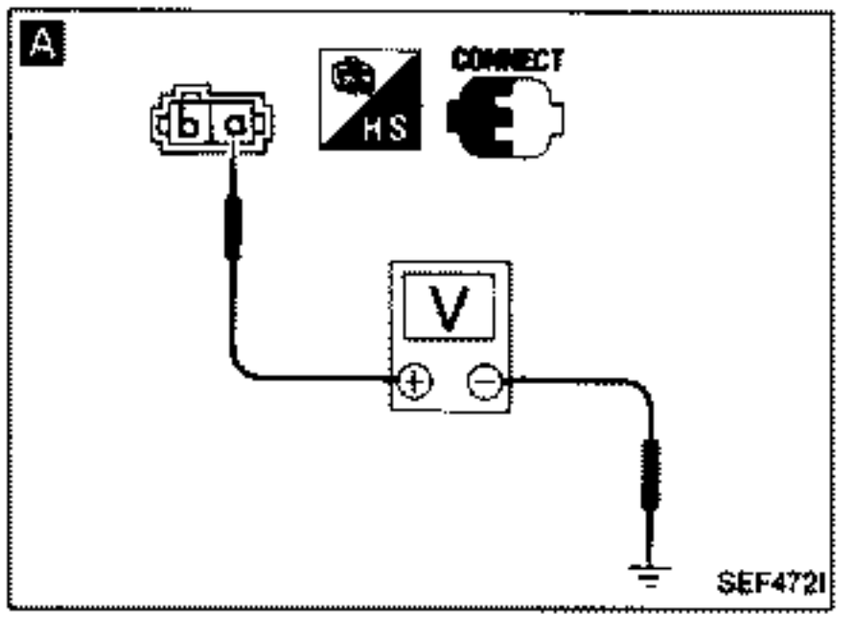


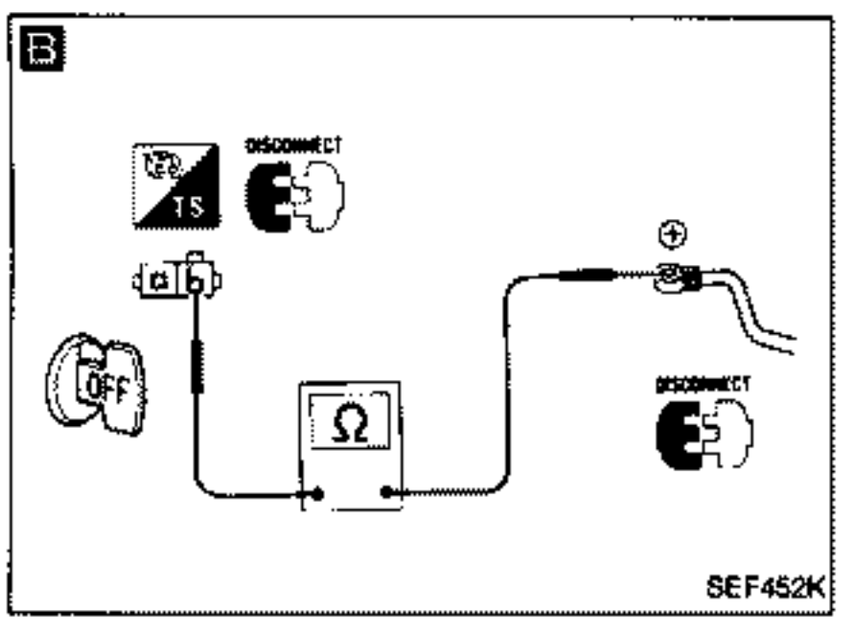
SEF366I

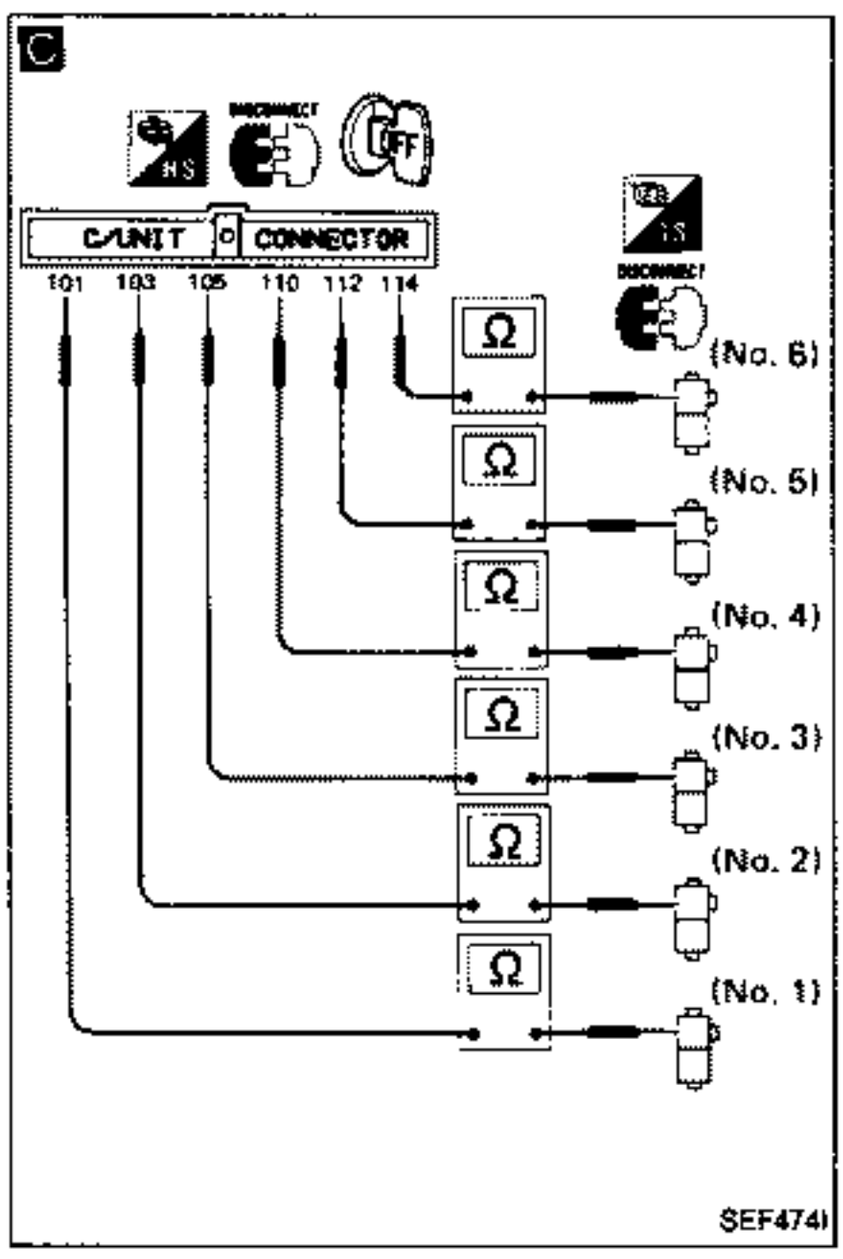


SEF471I

Diagnostic Procedure 34 (Cont'd)







INSPECTION START

A

CHECK POWER SUPPLY.
Check voltage between terminal ⓐ and ground.
Voltage: Battery voltage

N.G. → **B**

CHECK HARNESS CONTINUITY BETWEEN INJECTORS AND BATTERY.
1) Turn ignition switch "OFF".
2) Disconnect injector harness connector.
3) Disconnect battery ⊕ terminal.
4) Check harness continuity between terminal ⓐ and battery ⊕ terminal.
Continuity should exist.
5) Check "G" fusible link.
If N.G., replace harness, connector or fusible link.

O.K.

C

CHECK HARNESS CONTINUITY BETWEEN INJECTORS AND E.C.U.
1) Disconnect battery ⊕ terminal.
2) Disconnect injector harness connectors and E.C.U. harness connector.
3) Check harness continuity, following figure **C**.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

CHECK COMPONENT (Injector).
Refer to "Electrical Components Inspection".
(See page EF & EC-183.)

N.G. → Repair or replace injector.

O.K.

Reinstall any part removed.

Perform driving test again.

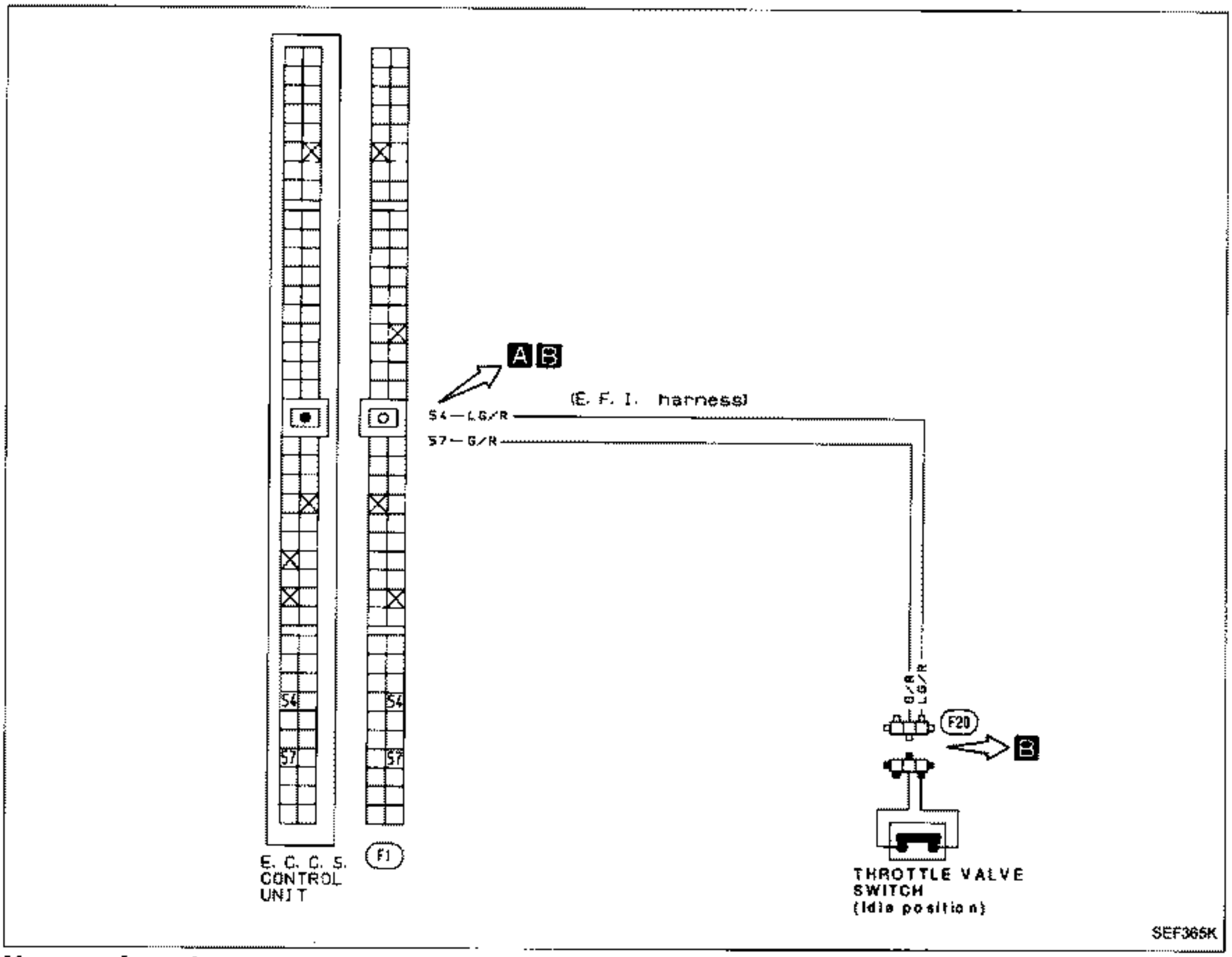
N.G. →
1) Perform E.C.U. input/output signal inspection test.
2) If N.G., recheck the E.C.U. pin terminals for damage or the connection of E.C.U. harness connector.

O.K.

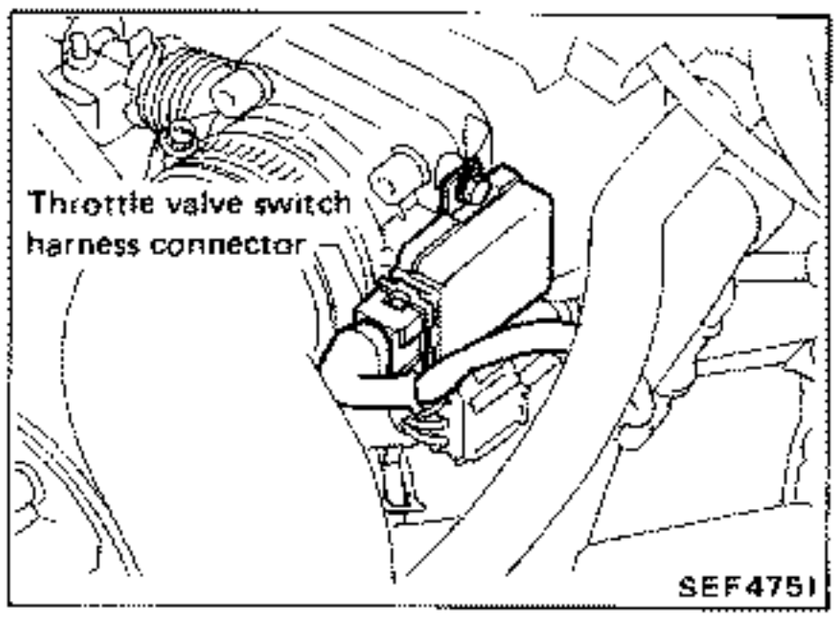
INSPECTION END

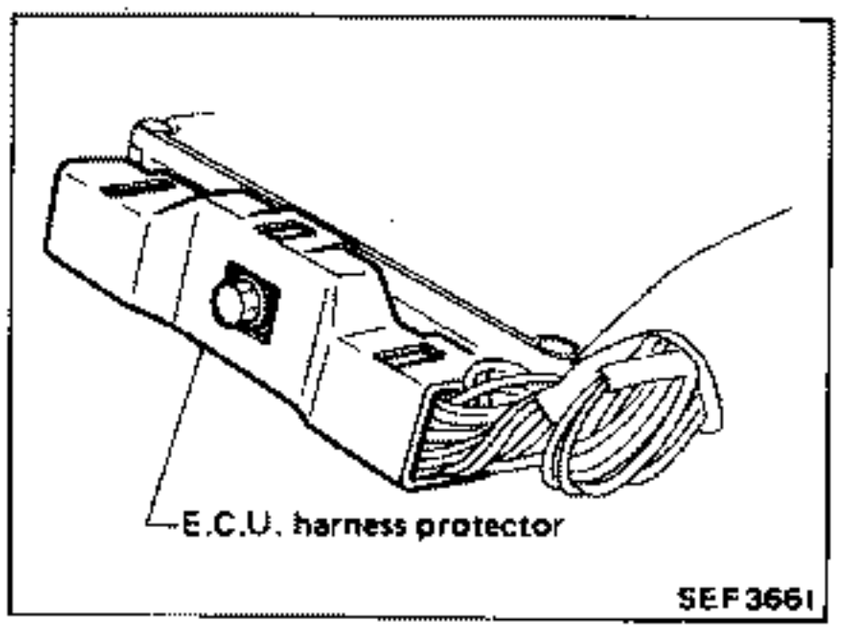
Diagnostic Procedure 35

THROTTLE VALVE SWITCH (Idle position)

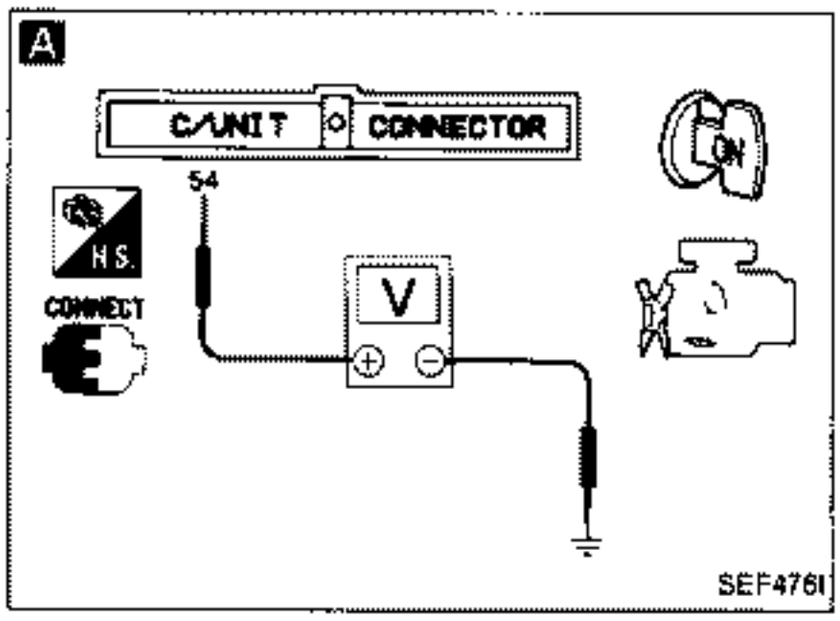


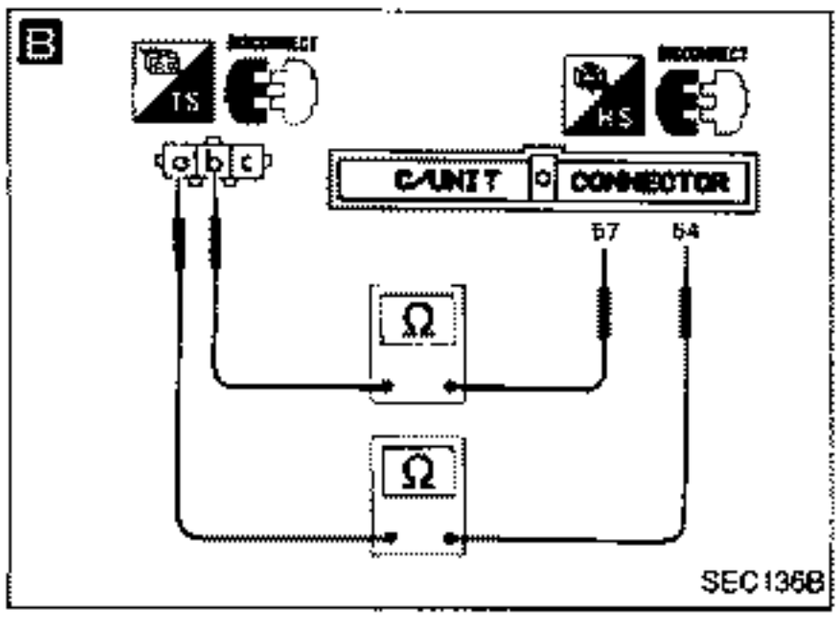
Harness layout





Diagnostic Procedure 35 (Cont'd)





INSPECTION START

A

CHECK INPUT SIGNAL.
1) Turn ignition switch "ON".
2) Check voltage between E.C.U. terminal ⑭ and ground.
Voltage:
Throttle valve fully closed:
9.0 - 10.0V
Throttle valve fully open:
0V

N.G. → B

O.K.

INSPECTION END

B

CHECK HARNESS CONTINUITY BETWEEN E.C.U. AND THROTTLE VALVE SWITCH.
1) Turn ignition switch "OFF".
2) Disconnect throttle valve switch harness connector.
3) Disconnect E.C.U. harness connector.
4) Check harness continuity between E.C.U. terminals ⑭, ⑰ and terminals ⓐ, ⓑ.
Continuity should exist.
If N.G., repair harness or connectors.

O.K.

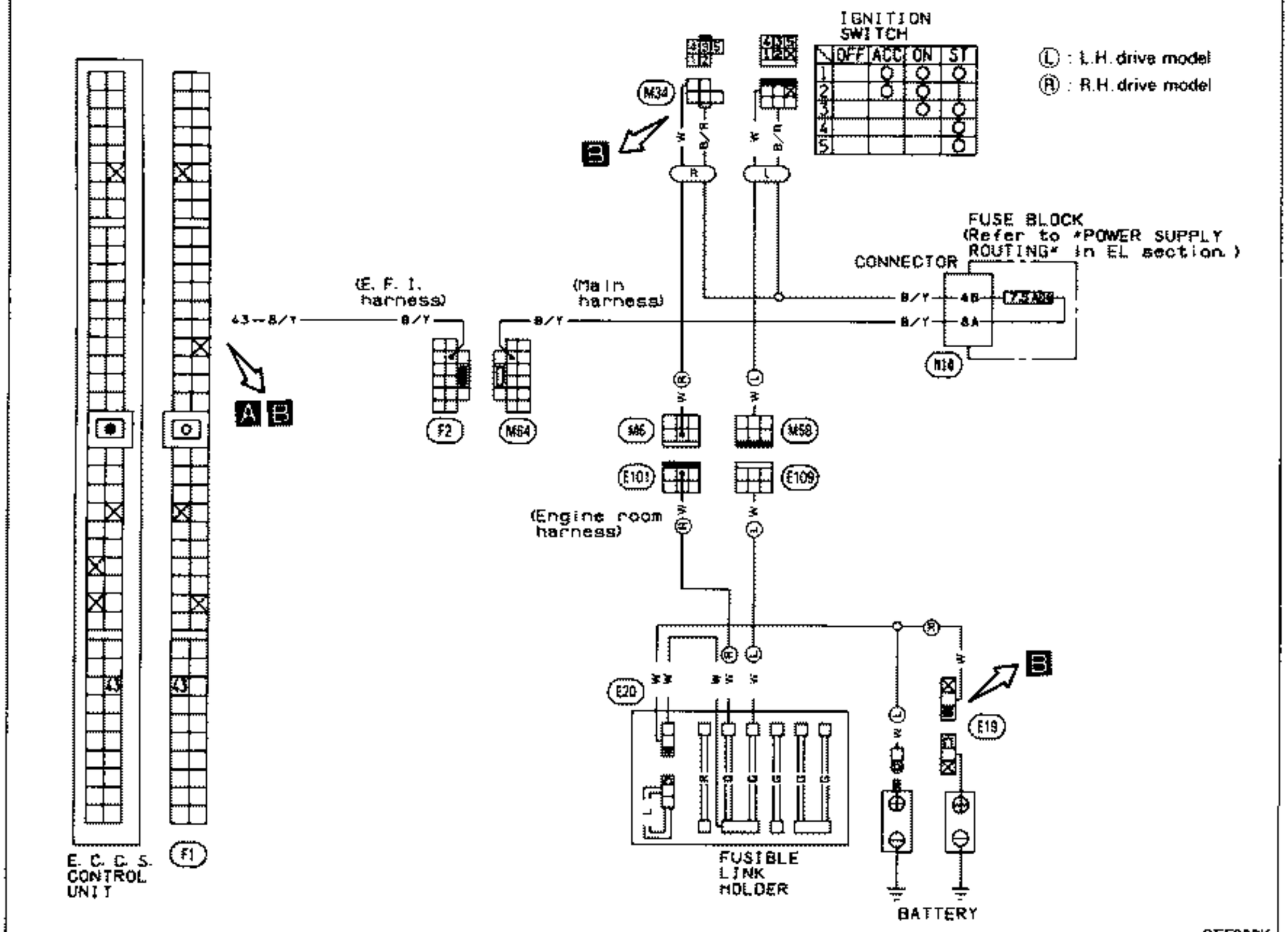
Check if throttle valve switch (throttle sensor body) is installed in proper position.
(See page EF & EC-181.)

O.K.

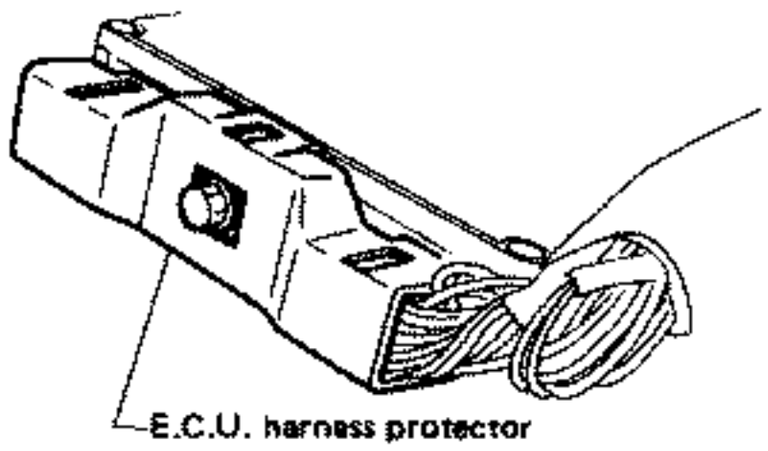
CHECK COMPONENT (throttle valve switch).
Refer to "Electrical Components Inspection".
(See page EF & EC-183.)

Diagnostic Procedure 36

START SIGNAL

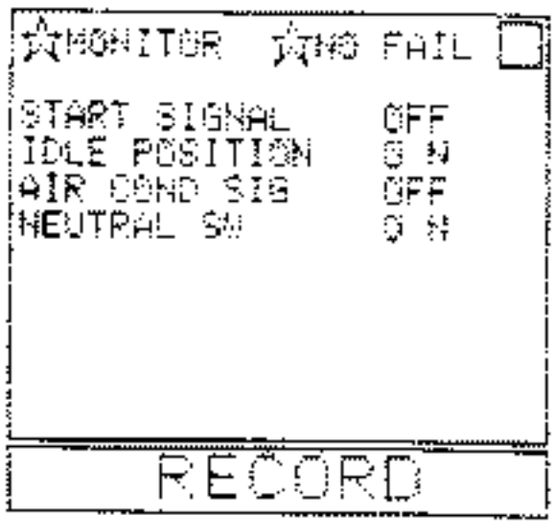


Harness layout



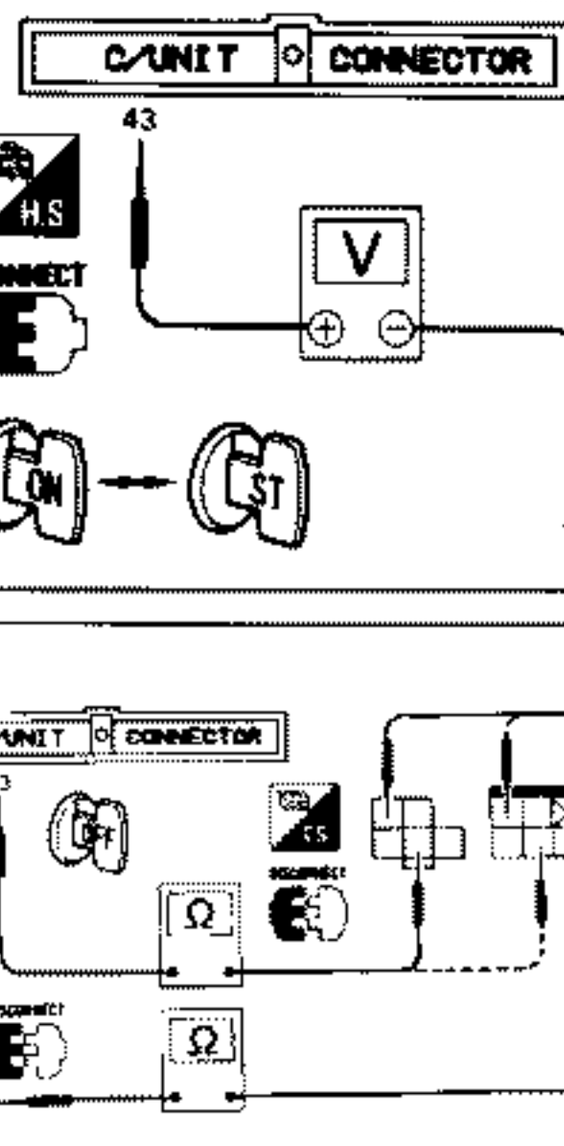
Diagnostic Procedure 36 (Cont'd)

A



SEF149I

A



SEF477I

B

SEF453K

INSPECTION START

A

CHECK INPUT SIGNAL.

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

IGN "ON"	OFF
IGN "START"	ON

OR

2) Check voltage between E.C.U. terminal (43) and ground.

When cranking:
Battery voltage
Except above:
0V

N.G. →

B

Check the following items.

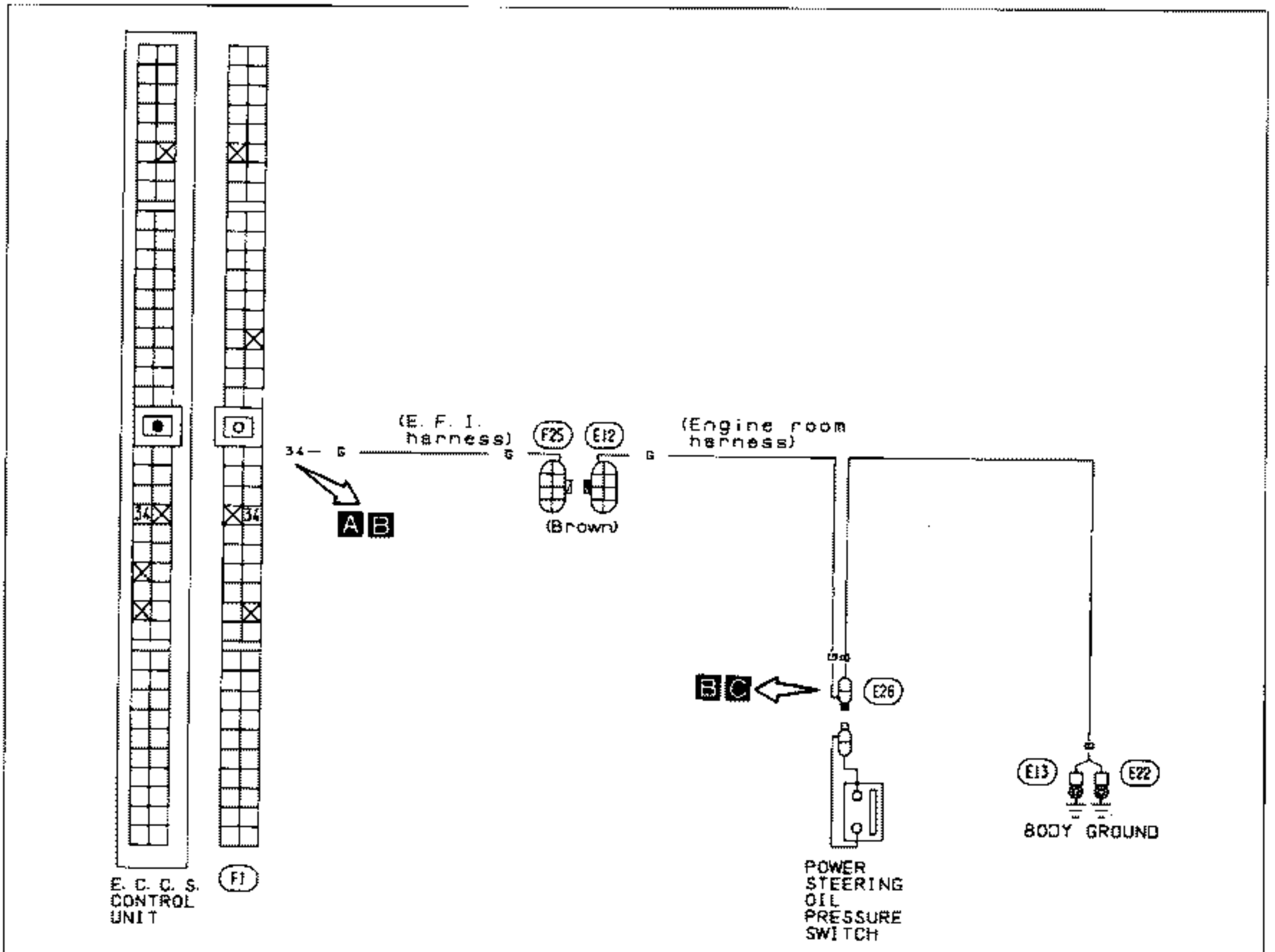
1) "G" fusible link
2) "7.5A" fuse
3) Ignition switch
4) Harness continuity between E.C.U. and ignition switch
Continuity should exist.
5) Harness continuity between battery ⊕ terminal and ignition switch
Continuity should exist.

O.K. ↓

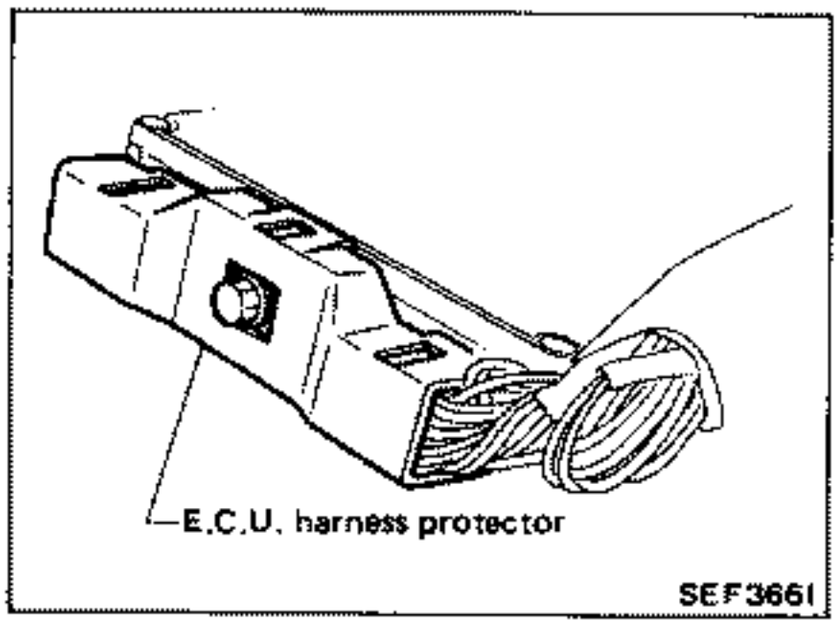
INSPECTION END

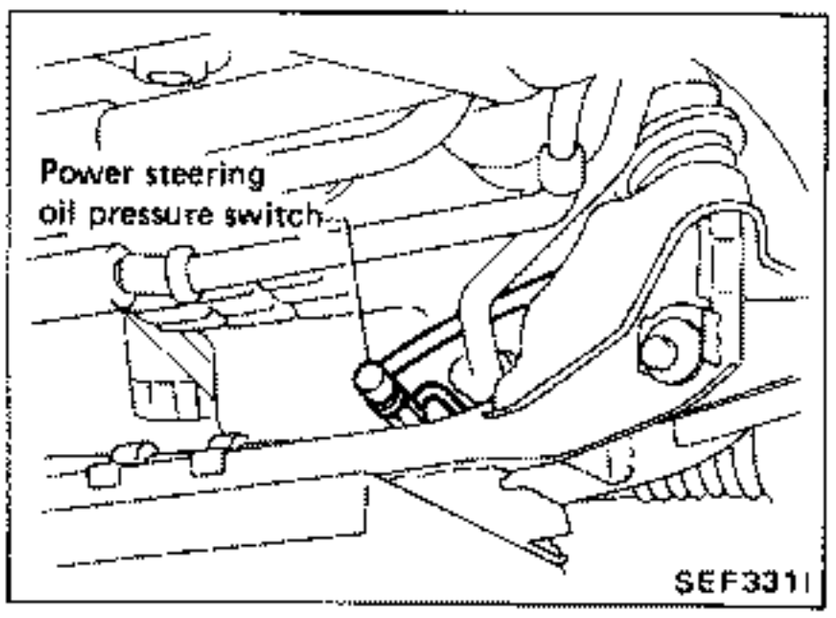
Diagnostic Procedure 37

POWER STEERING OIL PRESSURE SWITCH

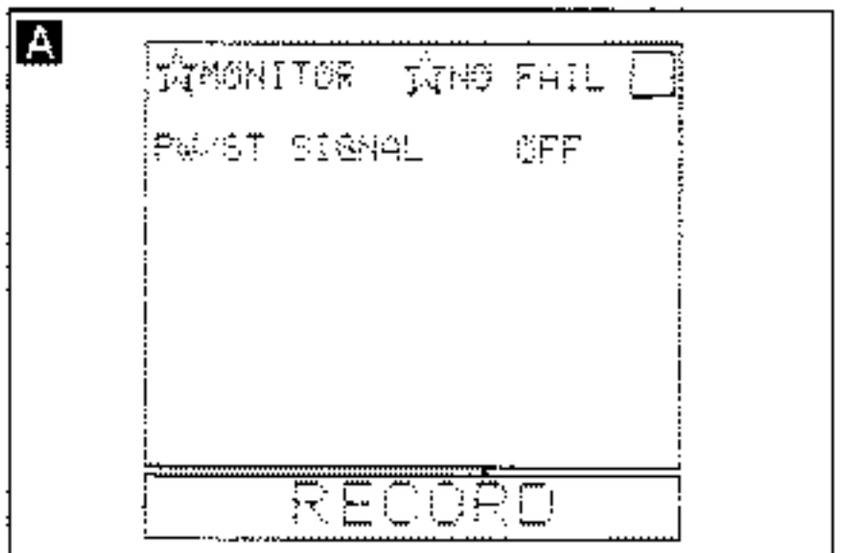


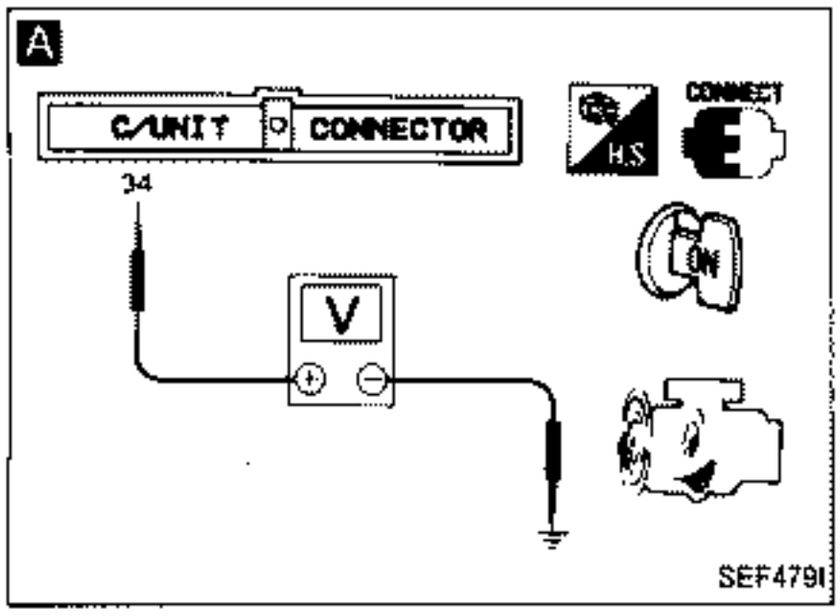
Harness layout

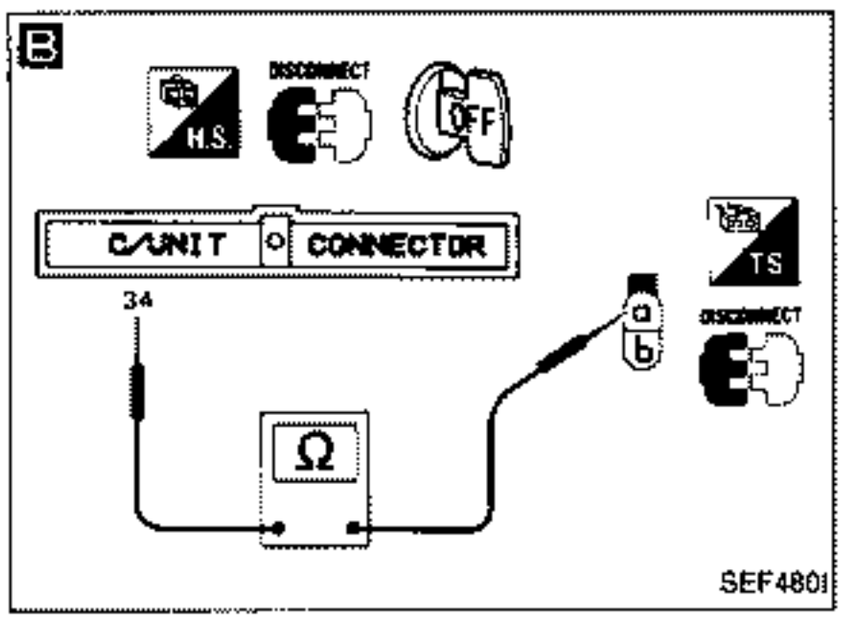


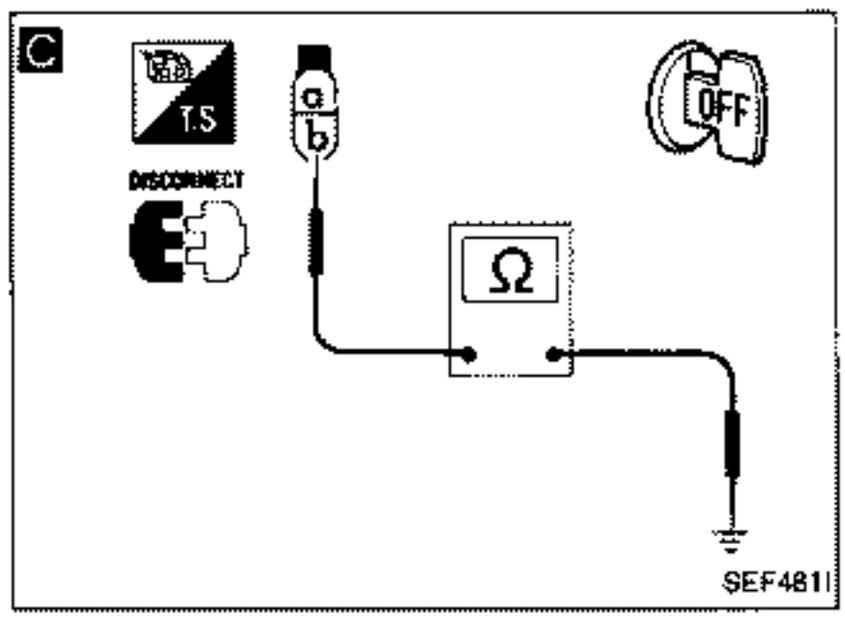


Diagnostic Procedure 37 (Cont'd)









INSPECTION START

A

CHECK INPUT SIGNAL.
1) Start engine.
2) Check power steering oil pressure switch signal in "DATA MONITOR" mode with CONSULT.
Steering is neutral: OFF
Steering is turned: ON

O.K. → INSPECTION END

OR

2) Check voltage between E.C.U. terminal (34) and ground.
Steering is neutral: Approx. 8 - 9V
Steering is turned: Approx. 0V

N.G.

B

CHECK HARNESS CONTINUITY BETWEEN POWER STEERING OIL PRESSURE SWITCH AND E.C.U.
1) Turn ignition switch "OFF".
2) Disconnect E.C.U. harness connector and power steering oil pressure switch harness connector.
3) Check harness continuity between E.C.U. terminal (34) and (a).
Continuity should exist.

N.G. → Repair or replace harness or connectors.

O.K.

C

CHECK GROUND CIRCUIT.
Check harness continuity between terminal (b) and ground.
Continuity should exist.

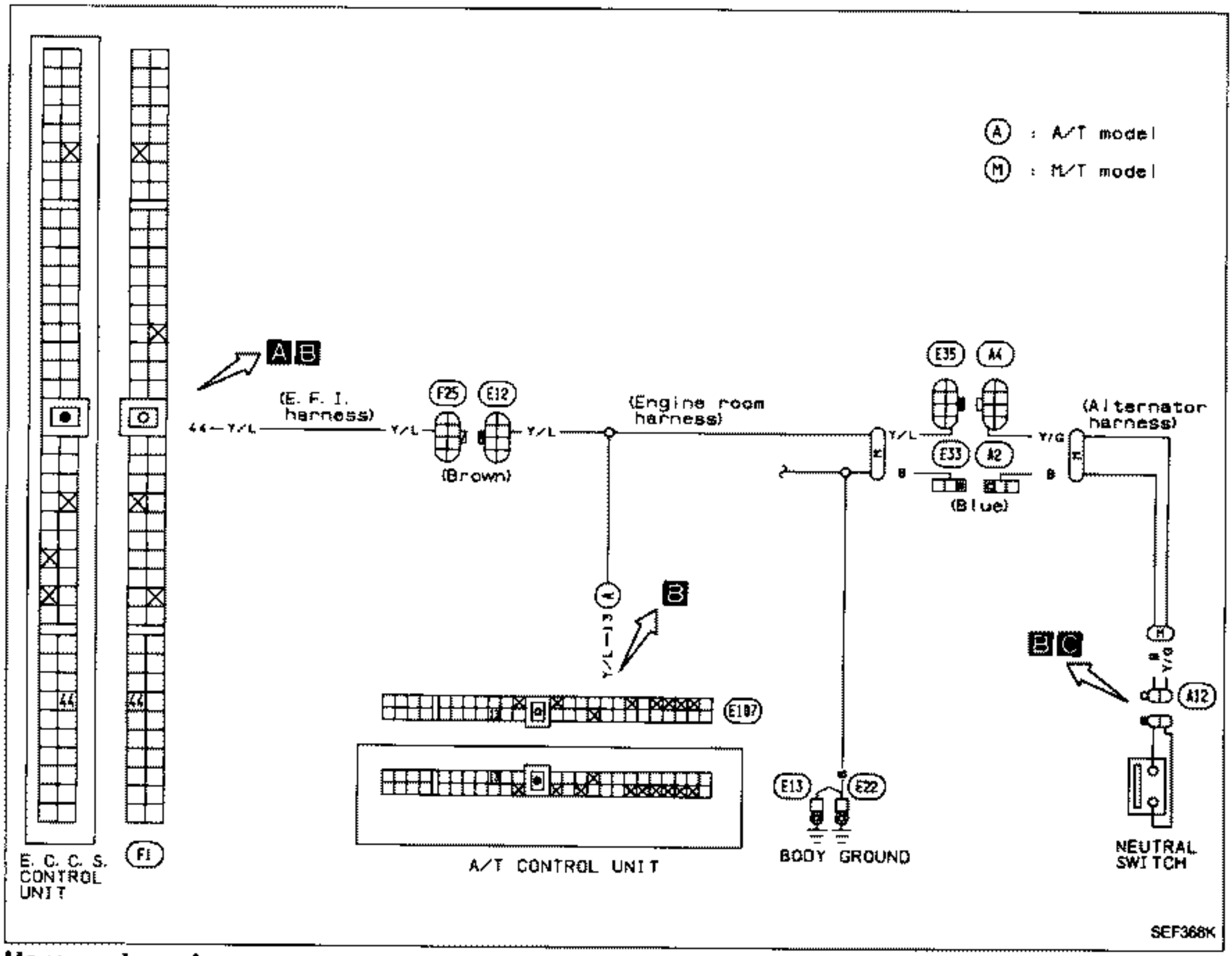
N.G. → Repair or replace harness or connectors.

O.K.

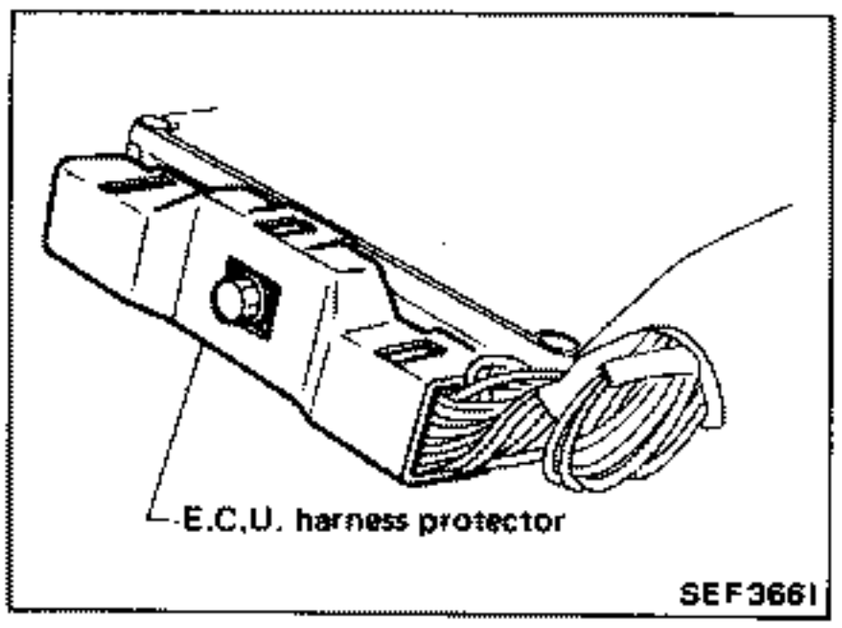
CHECK COMPONENT.
(Power steering oil pressure switch)
Refer to "Electrical Components Inspection". (See page EF & EC-184.)

Diagnostic Procedure 38

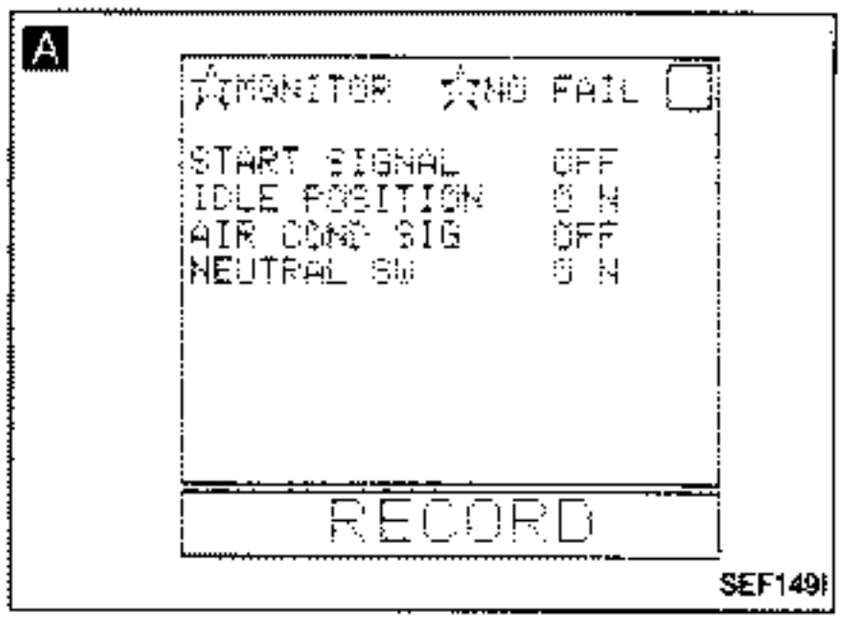
NEUTRAL SWITCH & A/T CONTROL UNIT (NEUTRAL SIGNAL) CIRCUIT

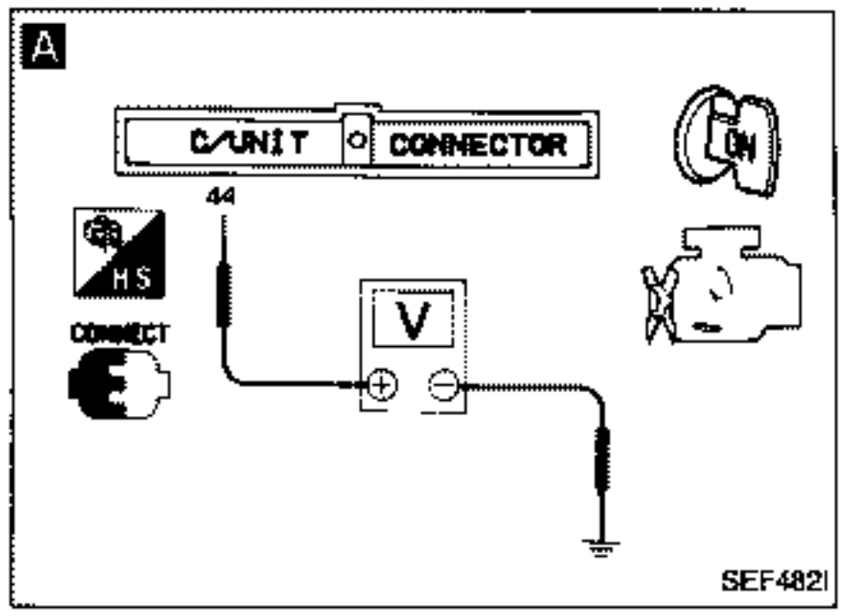


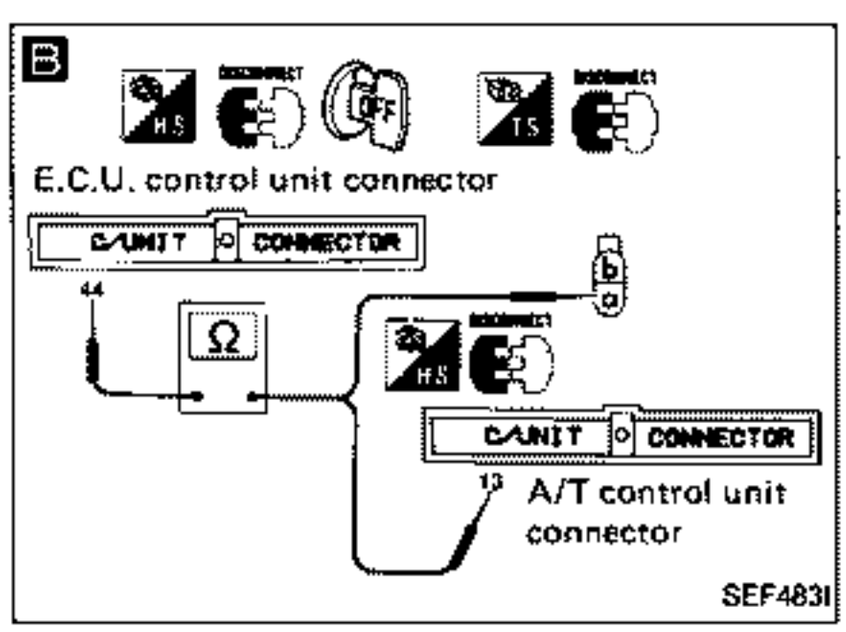
Harness layout

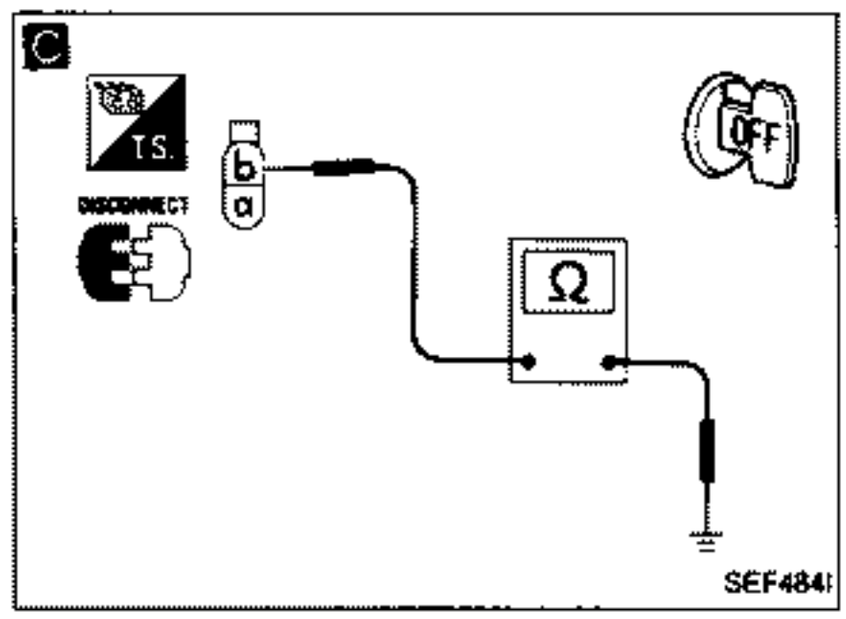


Diagnostic Procedure 38 (Cont'd)









INSPECTION START

A

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

OR

2) Check voltage between E.C.U. terminal (44) and ground.
"N" or "P": Approx. 0V
Except above: 8 - 9V

O.K. → INSPECTION END

N.G. ↓

B

CHECK HARNESS CONTINUITY BETWEEN E.C.U. AND NEUTRAL SWITCH (A/T CONTROL UNIT).
1) Turn the ignition switch "OFF".
2) Disconnect E.C.U. harness connector and neutral switch harness connector (A/T control unit harness connector.)
3) Check harness continuity between E.C.U. terminal (44) and (a) ((13)).
Continuity should exist.

N.G. → Repair or replace harness or connectors.

O.K. ↓

C

CHECK GROUND CIRCUIT (M/T only).
Check harness continuity between terminal (b) and ground.
Continuity should exist.

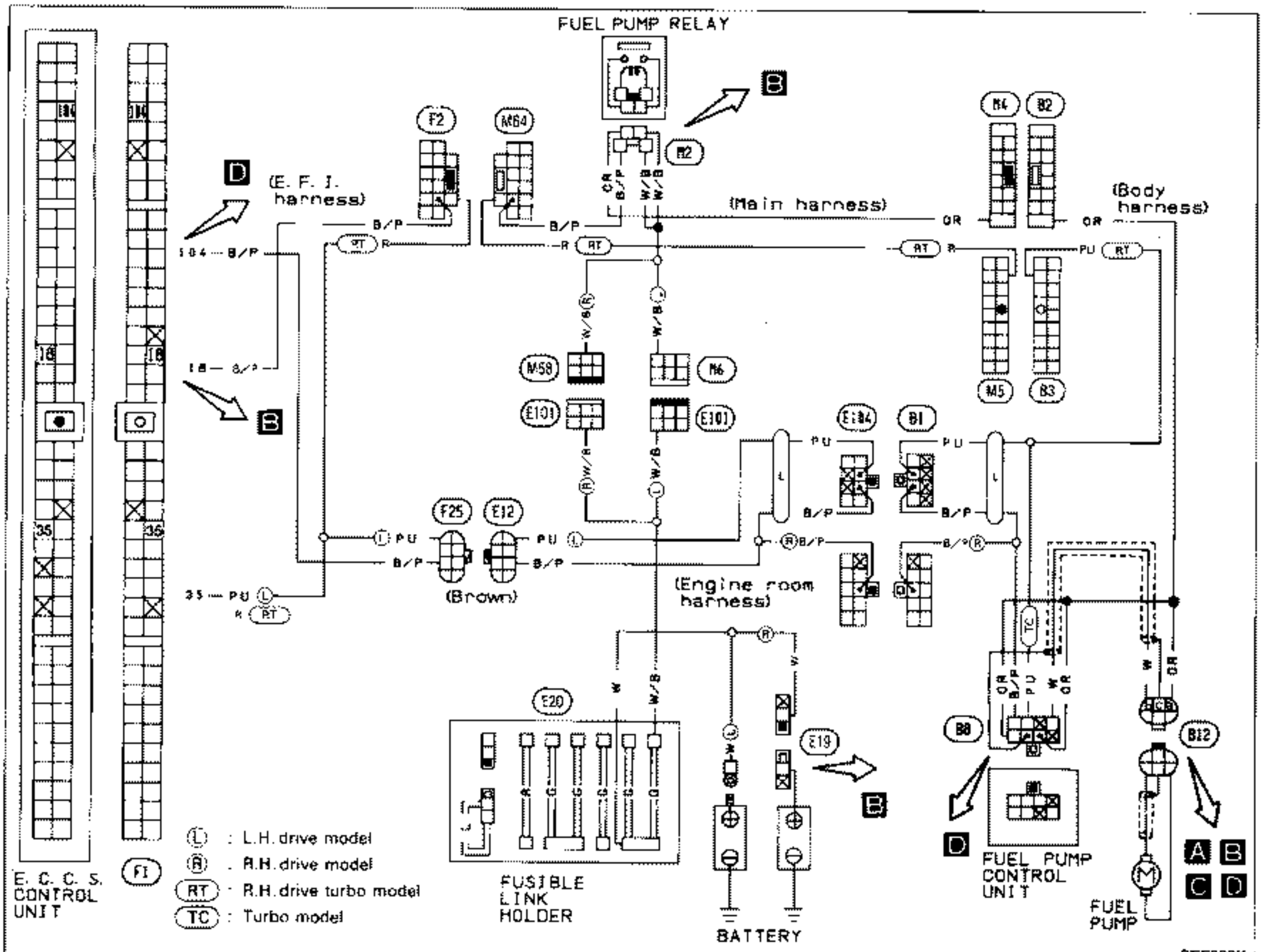
N.G. → (Repair or replace harness or connectors.)

O.K. ↓

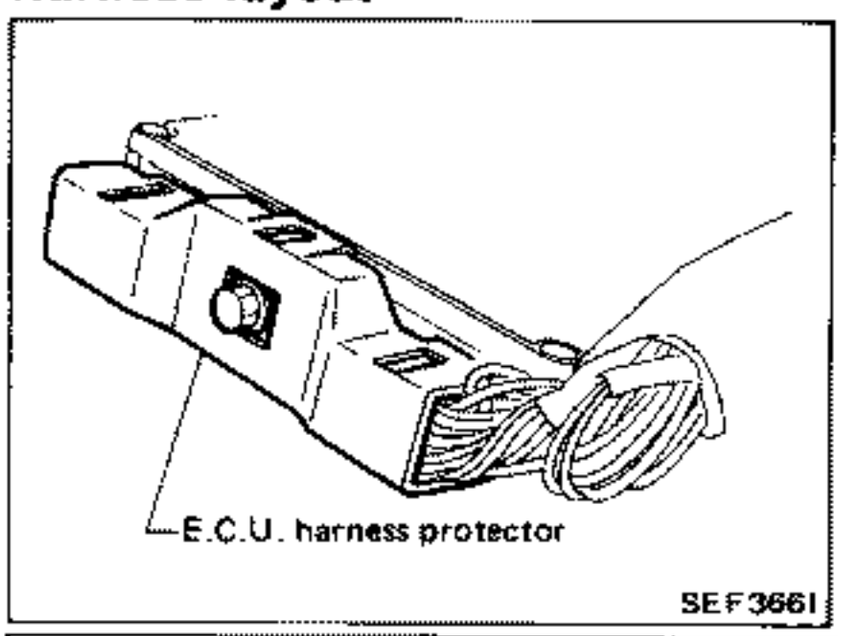
CHECK COMPONENT.
- (Neutral switch)
  Refer to "Electrical Components Inspection".
  (See page EF & EC-183.)
- (A/T control unit)
  See A/T section.
- (Inhibitor switch)
  Refer to "Electrical Components Inspection".
  (See page EF & EC-183.)

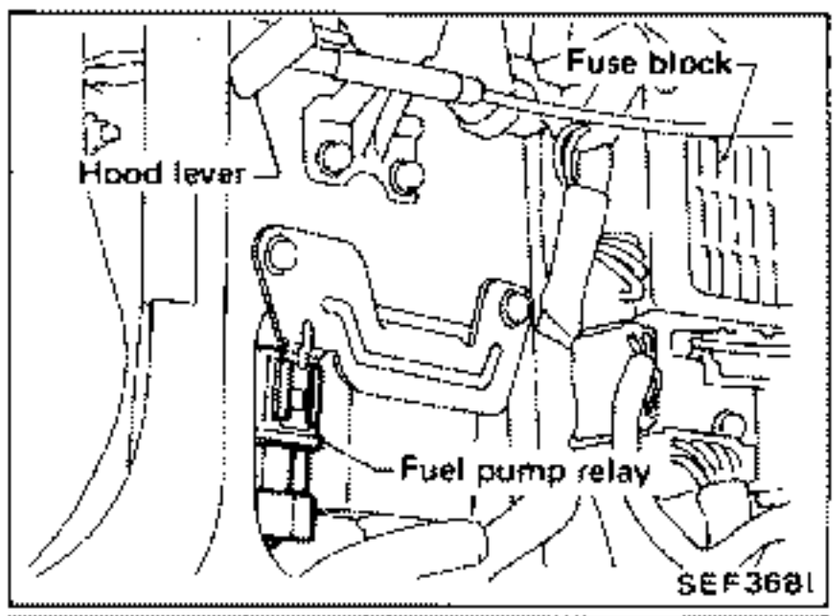
Diagnostic Procedure 39

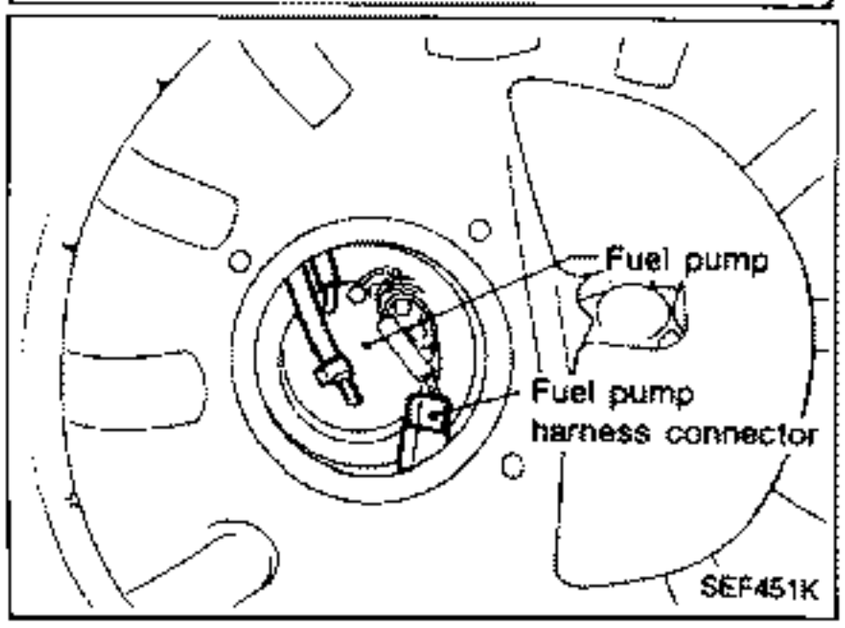
FUEL PUMP

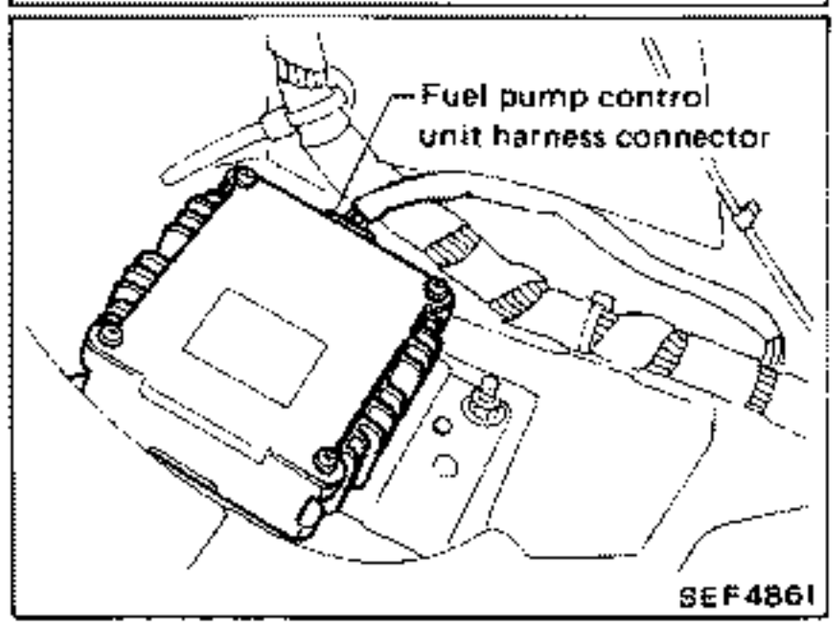


Harness layout

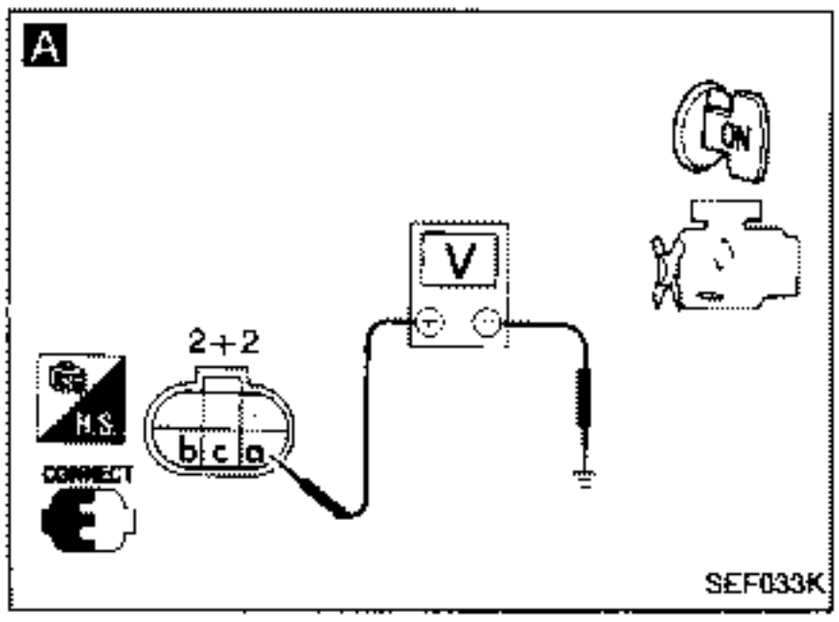


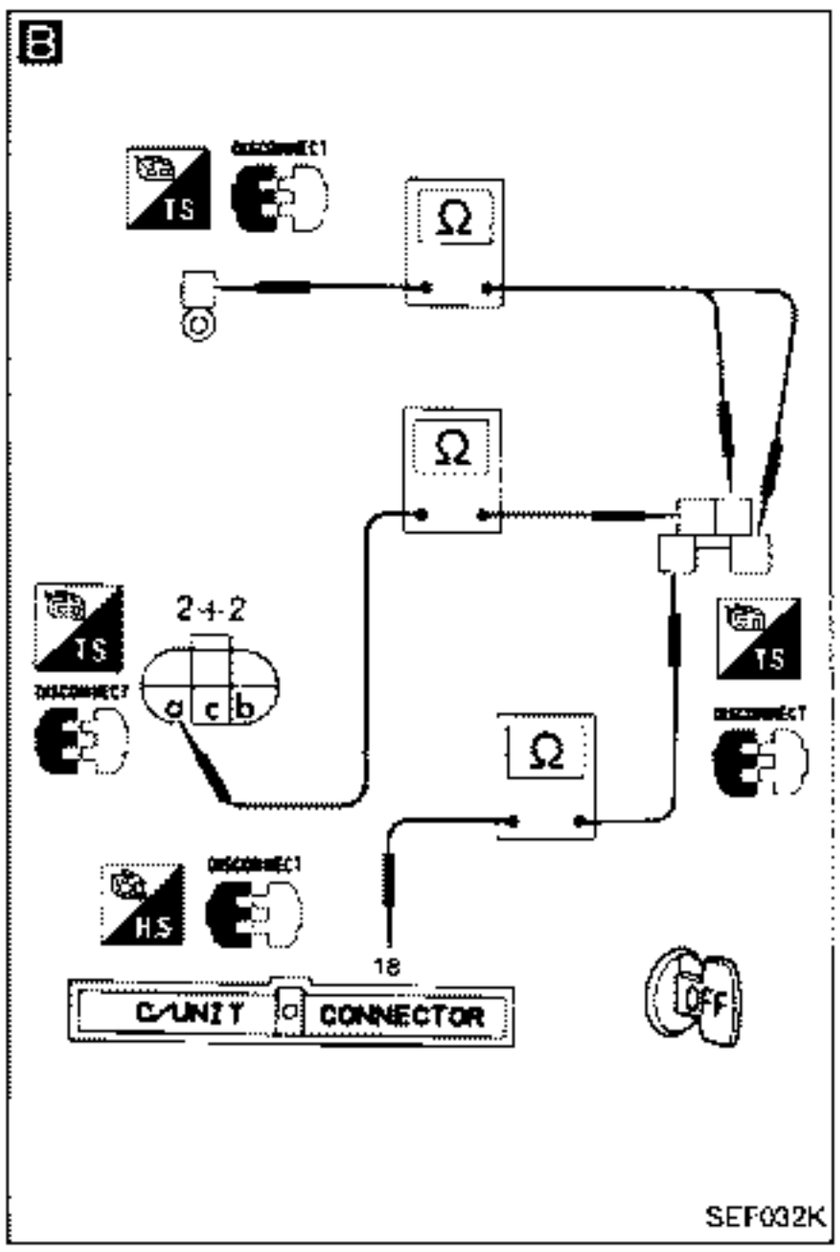


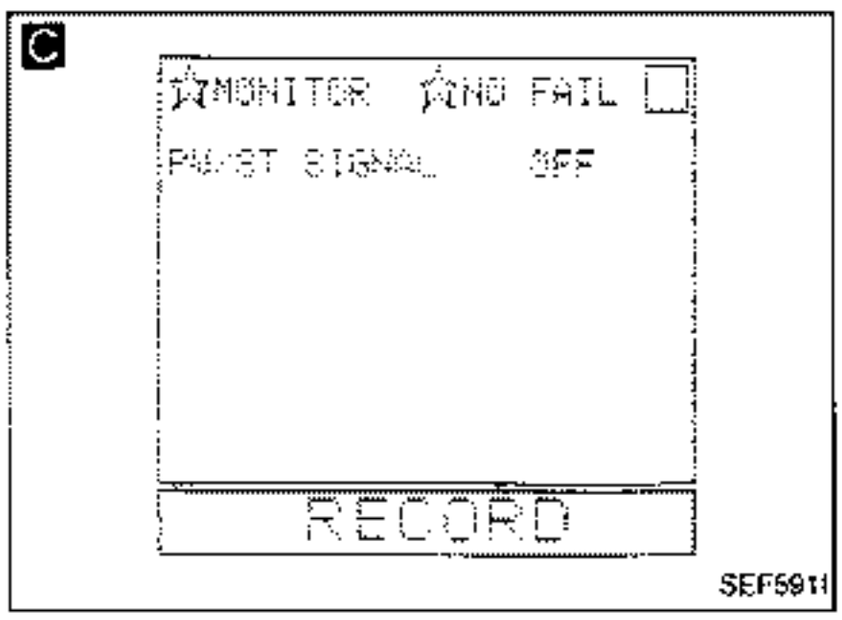


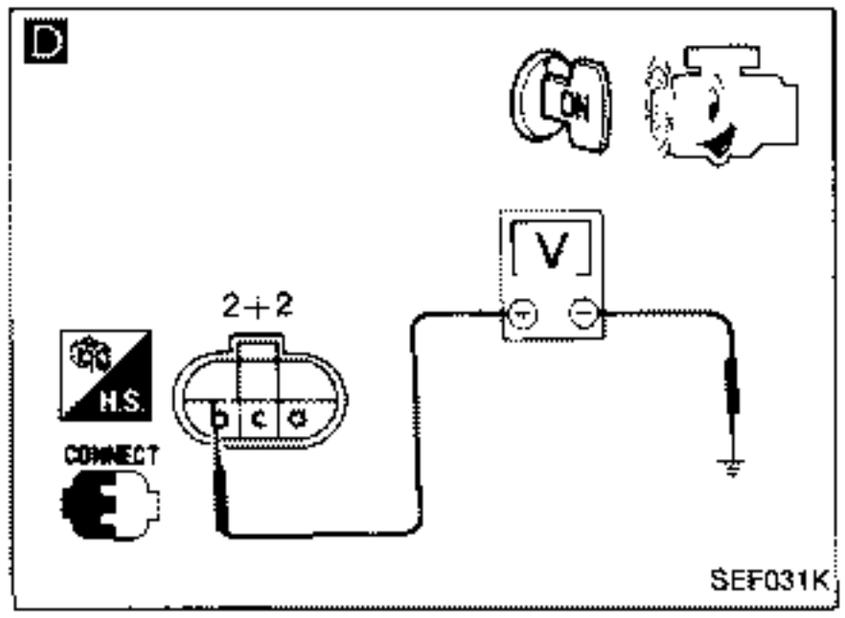


Diagnostic Procedure 39 (Cont'd)









INSPECTION START

A

CHECK POWER SUPPLY.
1) Turn ignition switch "ON".
2) Check voltage between fuel pump connector terminal ⓐ and ground.
Battery voltage indication should appear for 1 second after turning ignition switch "ON".

N.G. → **B**

Check the following items.
1) "G" fusible link
2) Harness continuity between
- battery ⊕ terminal and fuel pump relay
- fuel pump relay and fuel pump
- fuel pump relay and E.C.U. terminal ⑱

Continuity should exist.

O.K. ↓

C

CHECK COMPONENT
(Fuel pump relay).
Perform "FUEL PUMP RELAY TEST" in "ACTIVE TEST" mode with CONSULT.

OR

Refer to "Electrical Components Inspection".
(See page EF & EC-184.)

D

CHECK GROUND CIRCUIT.
Check voltage between fuel pump terminal ⓑ and ground under the following conditions.

Idling	Approx. 3 - 6V
For 30 seconds after starting engine	Battery voltage

N.G. → **E**

Check the following items.
Harness continuity between
- fuel pump and fuel pump control unit
- fuel pump control unit and E.C.U. terminal ⑩④

Continuity should exist.

O.K. ↓

CHECK COMPONENT
(Fuel pump).
Refer to "Electrical Components Inspection".
(See page EF & EC-179.)

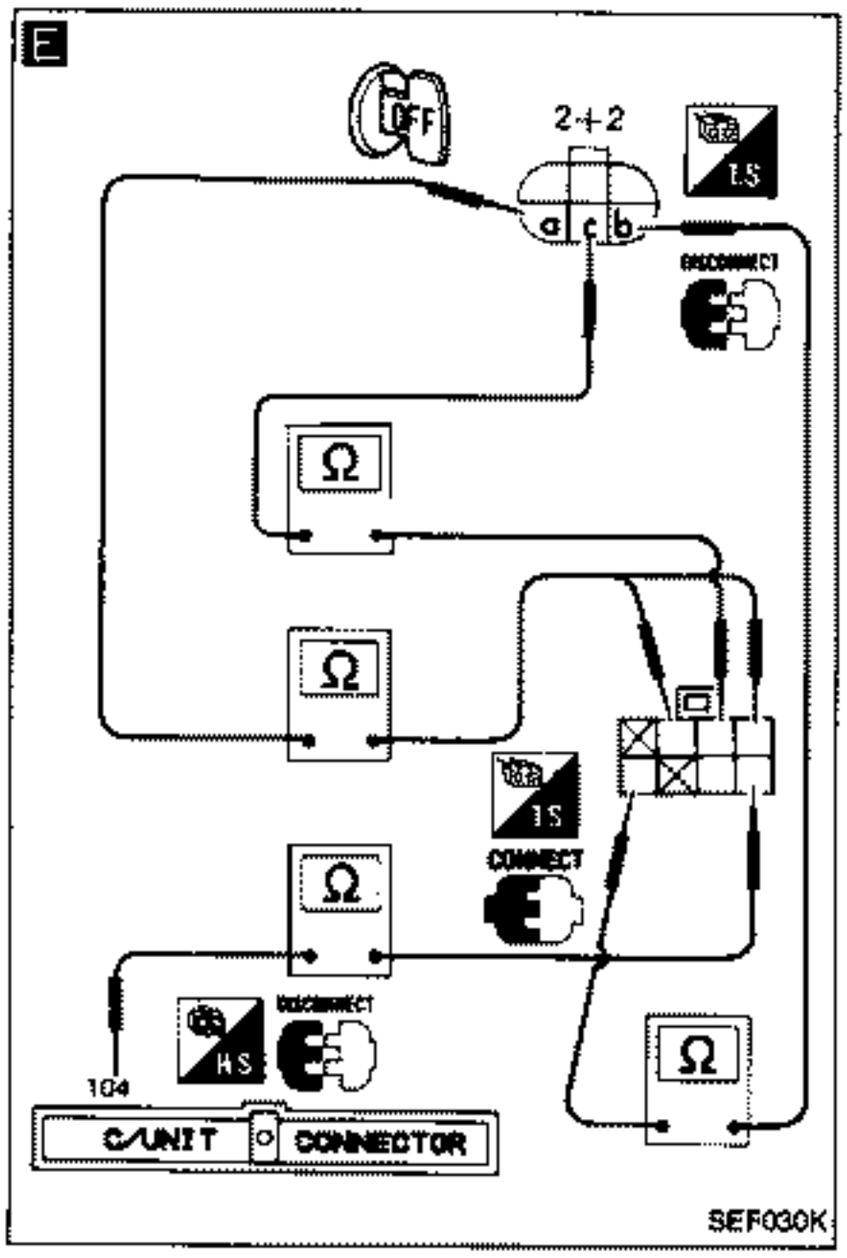
N.G. ↓

Replace fuel pump control unit.

O.K. ↓

INSPECTION END

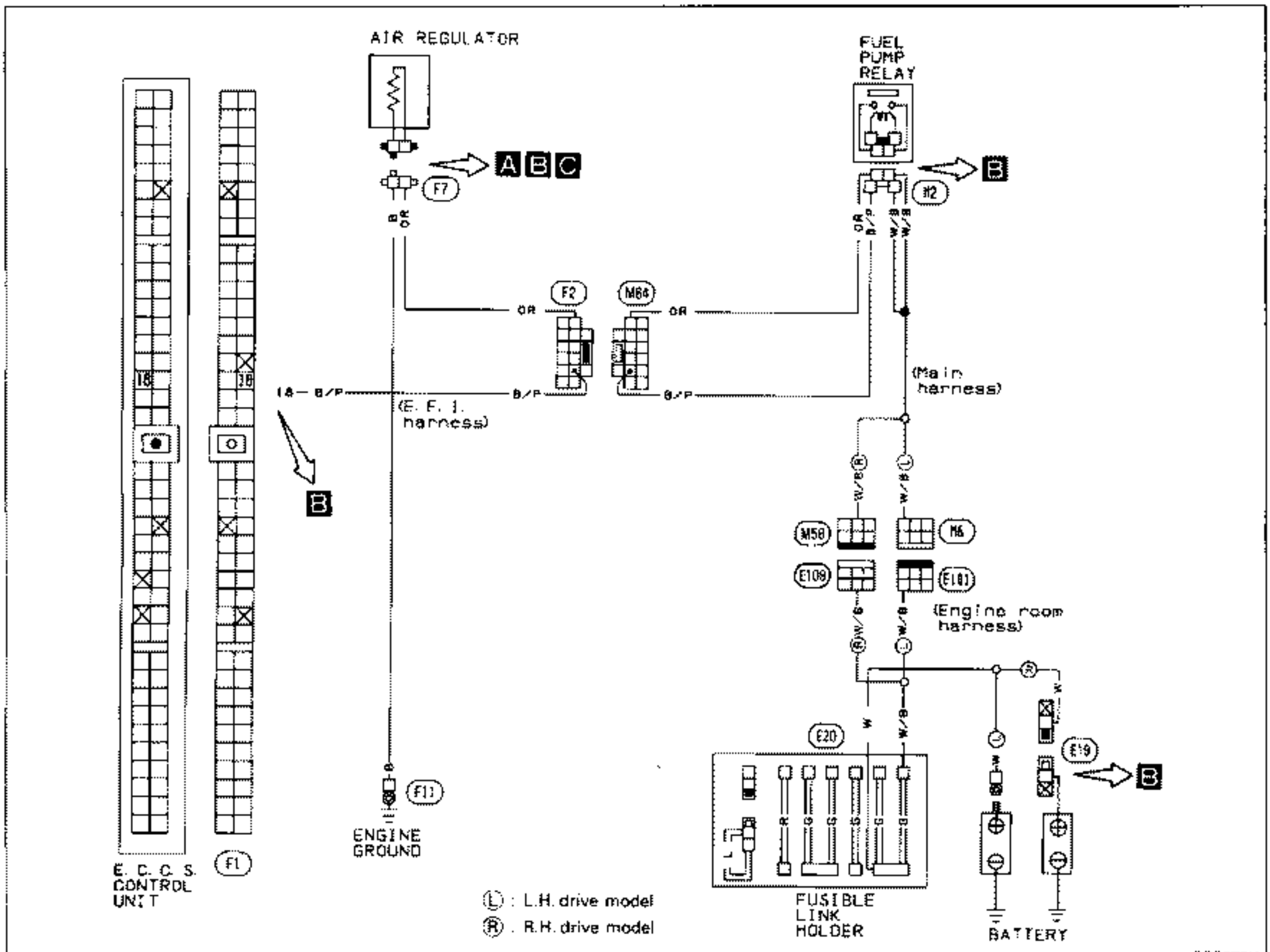
Diagnostic Procedure 39 (Cont'd)



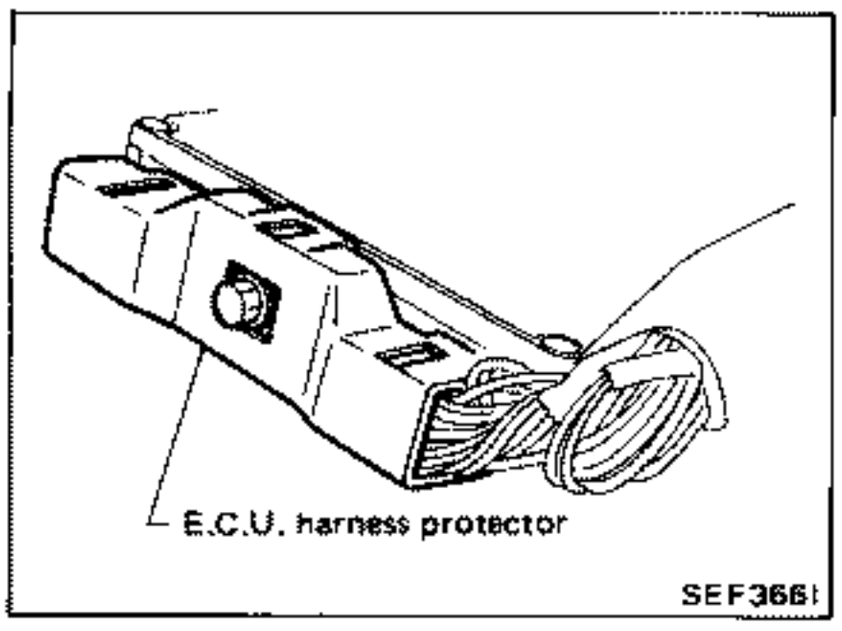
NOTE

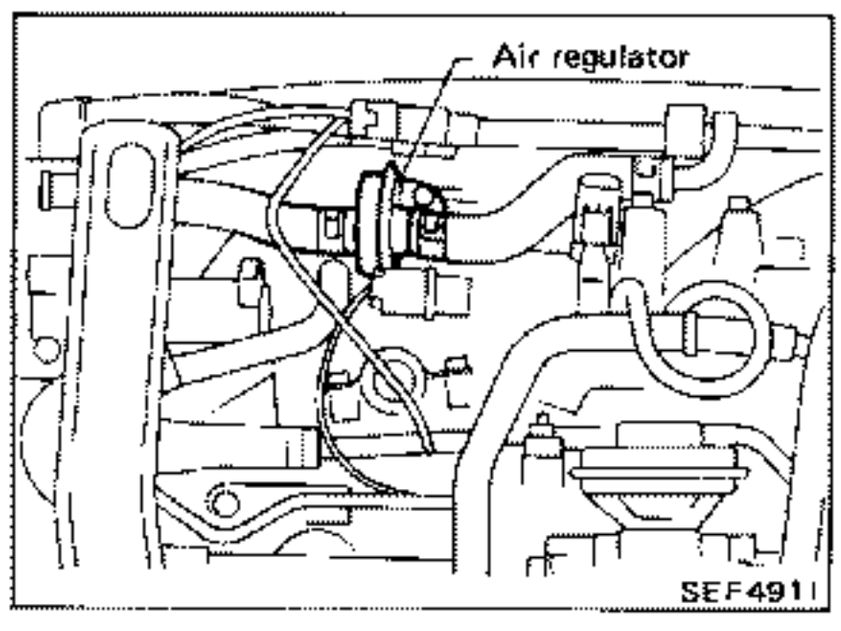
Diagnostic Procedure 40

AIR REGULATOR

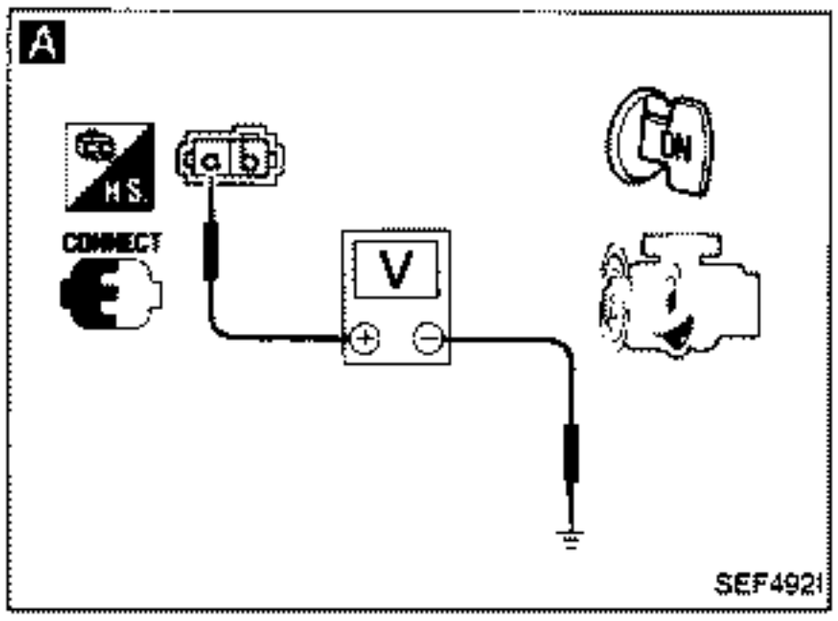


Harness layout





Diagnostic Procedure 40 (Cont'd)



INSPECTION START

A

CHECK POWER SUPPLY.
1) Start engine.
2) Check voltage between air regulator terminal ⓐ and ground.
Voltage: Battery voltage

N.G. →

B

Check the following items.
1) Harness continuity between
- air regulator and fuel pump relay
- fuel pump relay and battery ⊕ terminal
- fuel pump relay and E.C.U. terminal ⑱

Continuity should exist.

2) "G" fusible link

O.K.

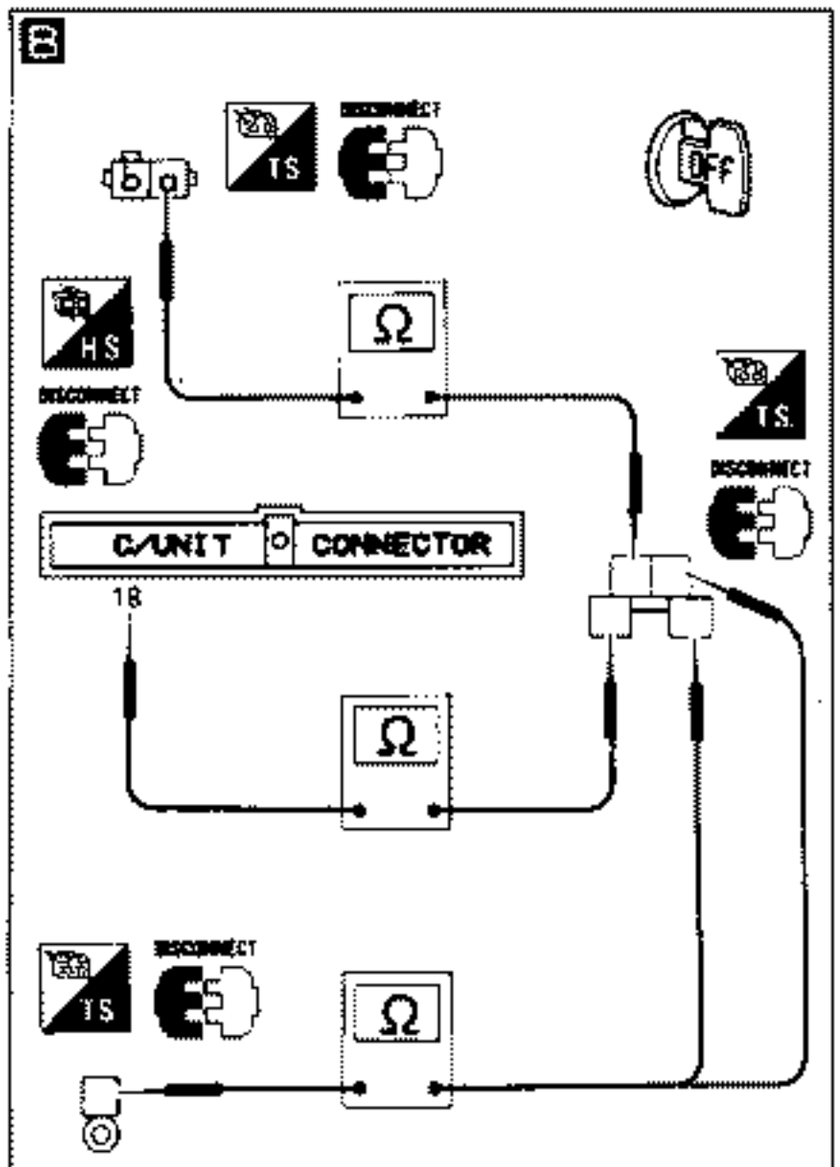
C

CHECK COMPONENT
(Fuel pump relay).

Perform "FUEL PUMP RELAY TEST" in "ACTIVE TEST" mode with CONSULT.

OR

Refer to "Electrical Components Inspection". (See page EF & EC-184.)



D

CHECK GROUND CIRCUIT.
Check harness continuity between air regulator terminal ⓑ and ground.
Continuity should exist.

N.G. → Repair or replace harness or connectors.

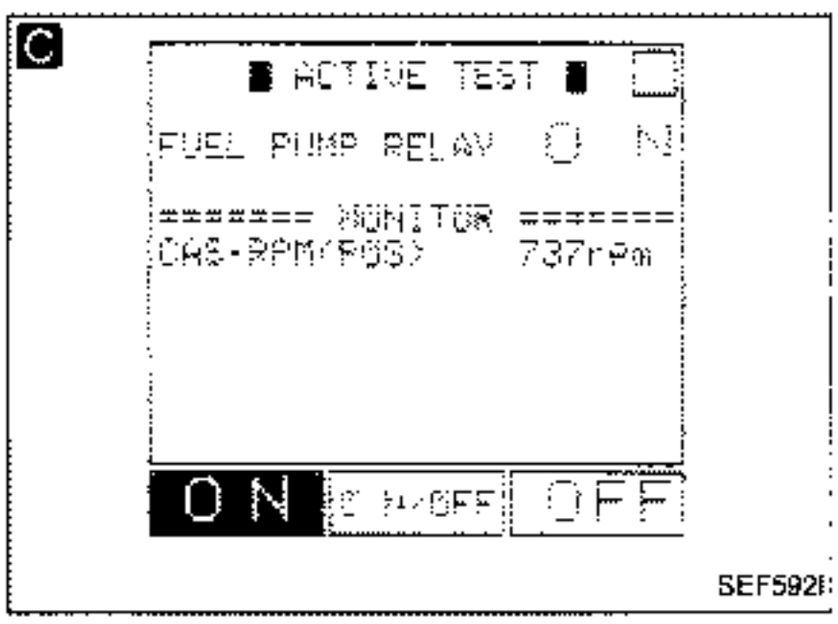
O.K.

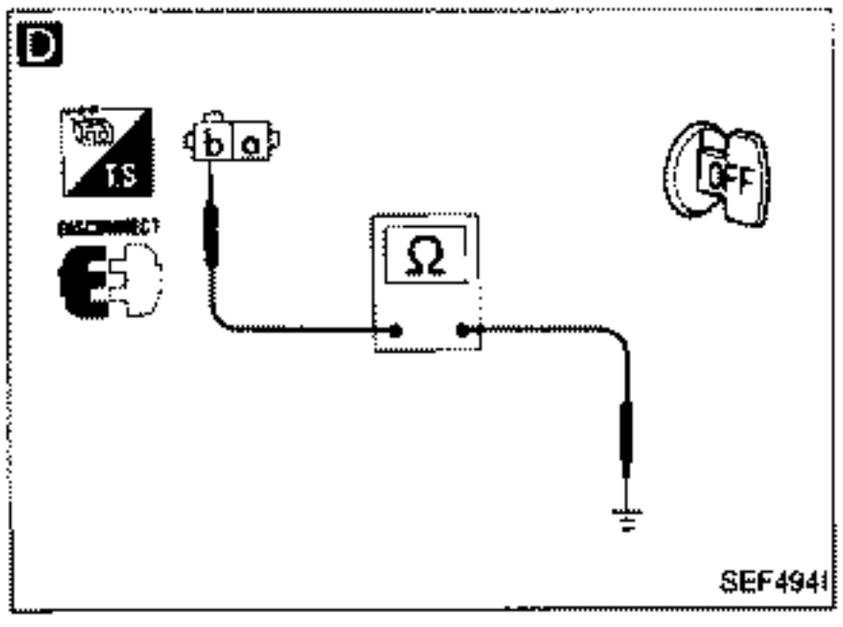
CHECK COMPONENT
(Air regulator).
Refer to "Electrical Components Inspection". (See page EF & EC-182.)

N.G. → Repair or replace air regulator.

O.K.

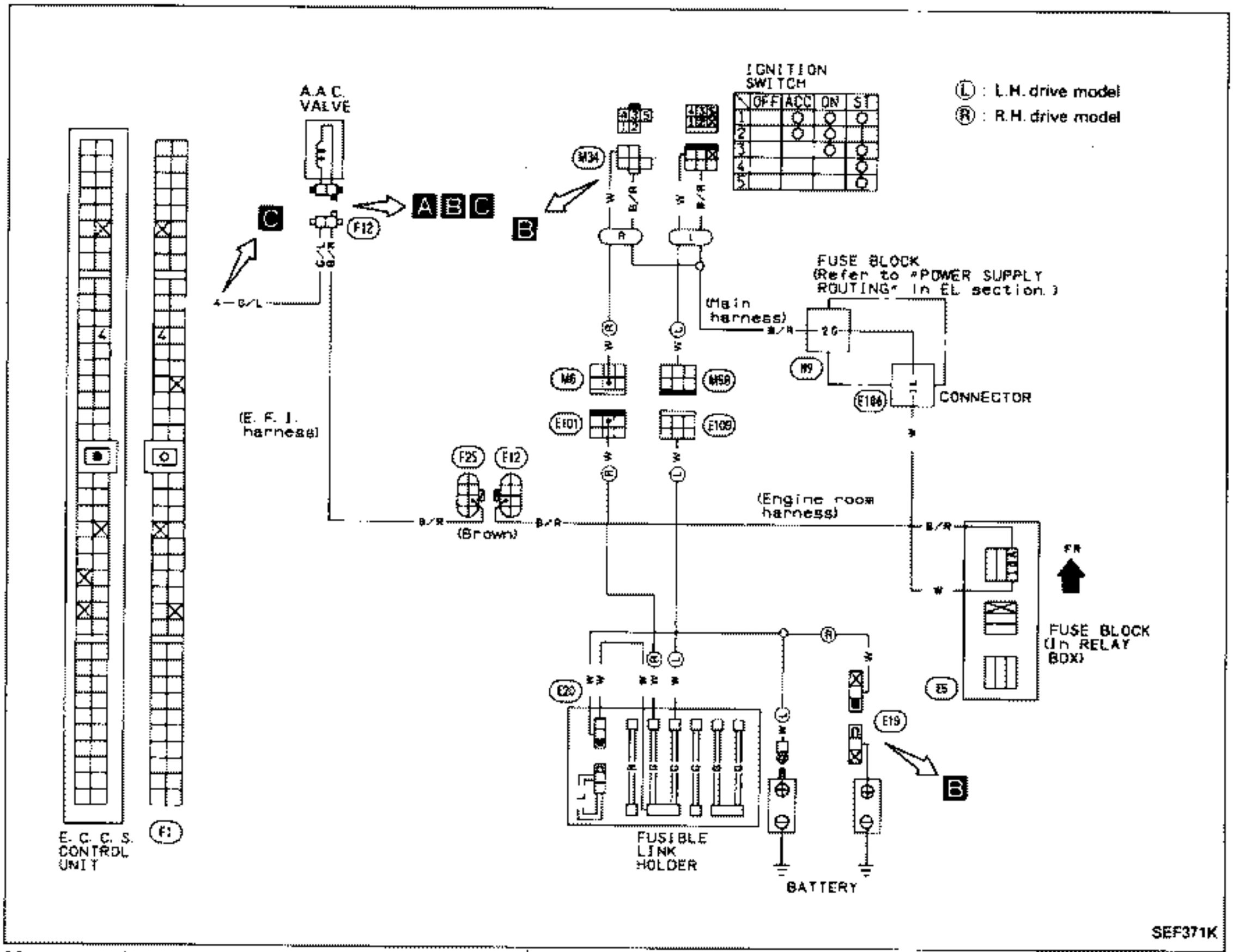
INSPECTION END



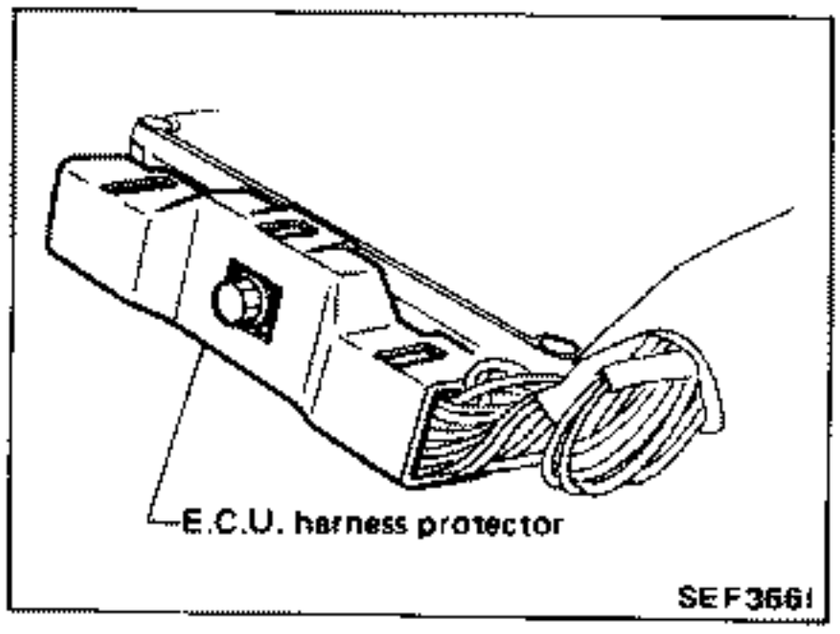


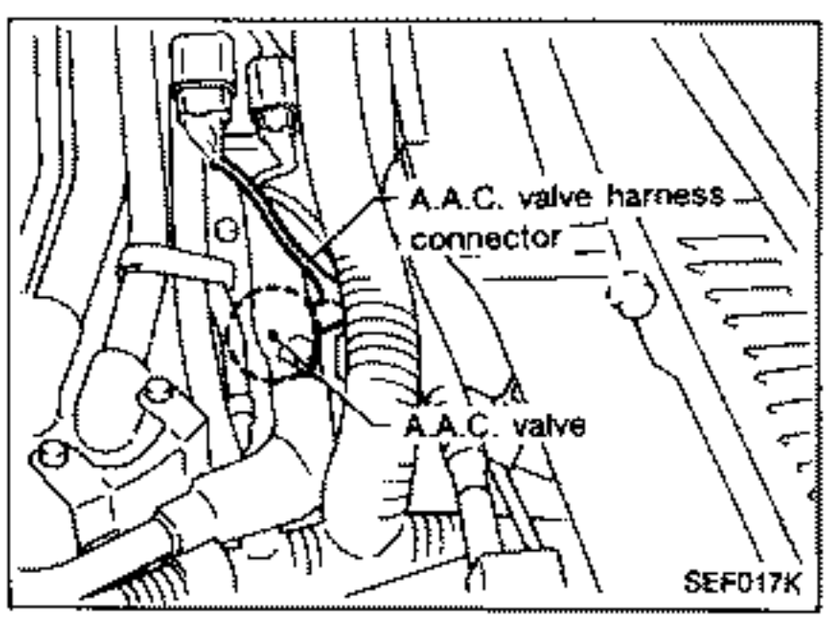
Diagnostic Procedure 41

A.A.C. VALVE

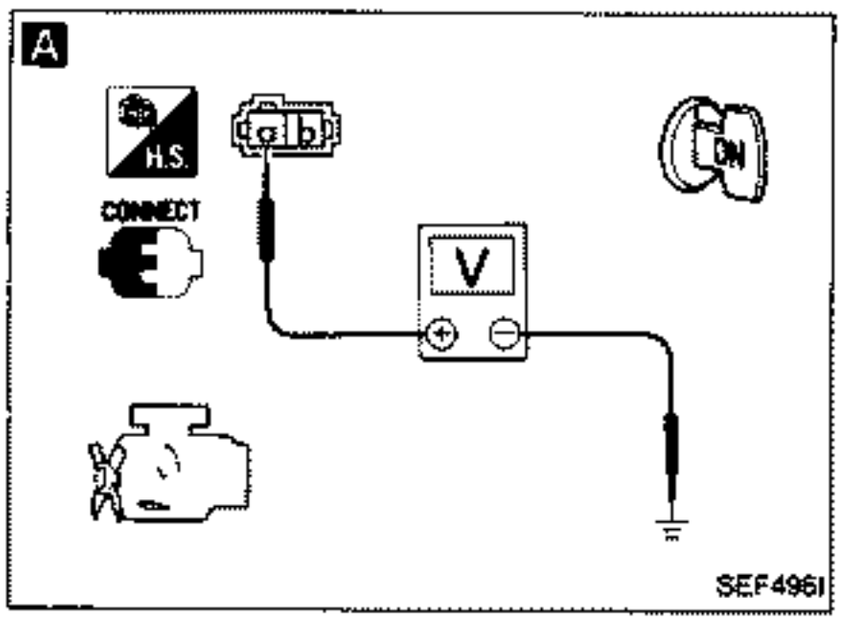


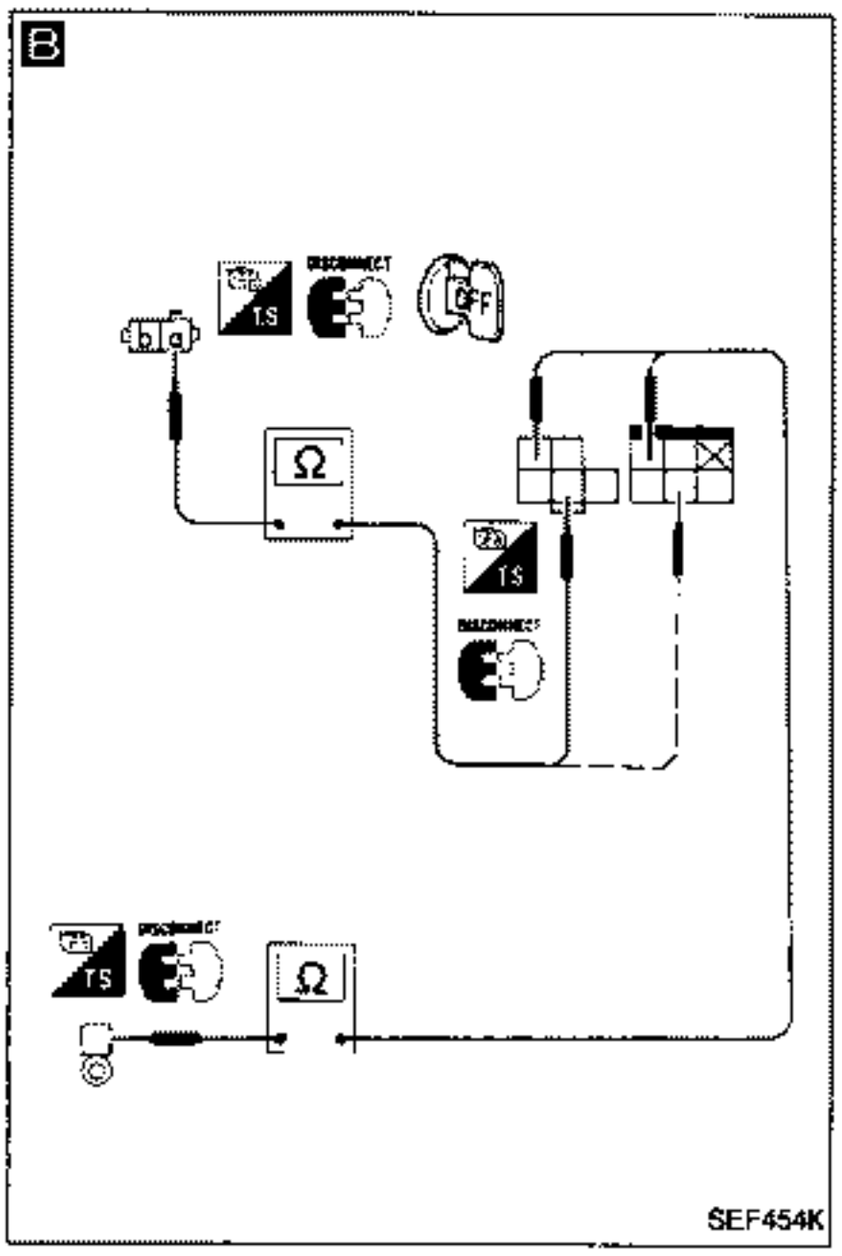
Harness layout

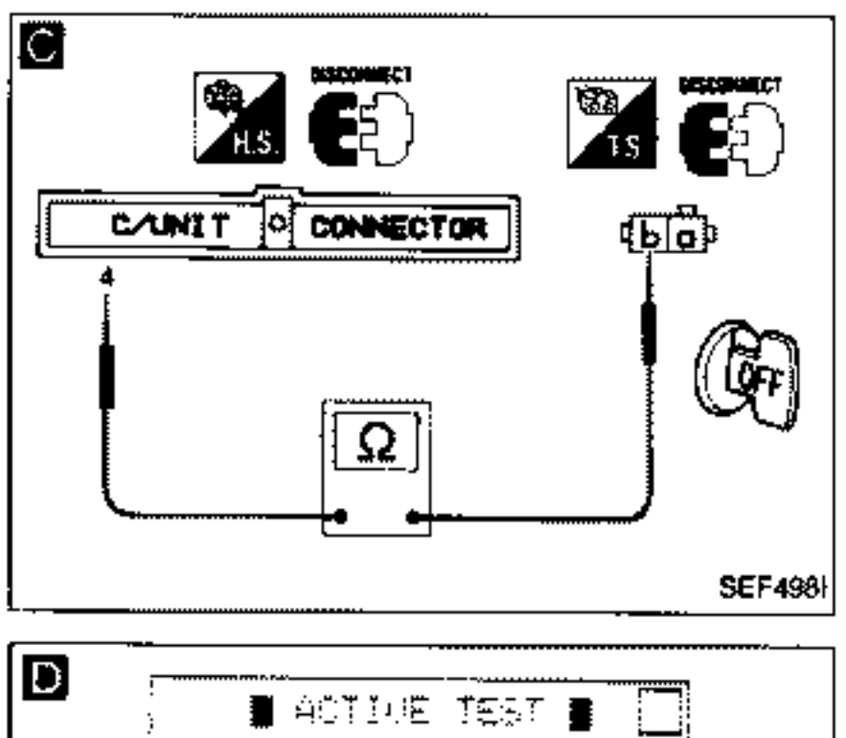


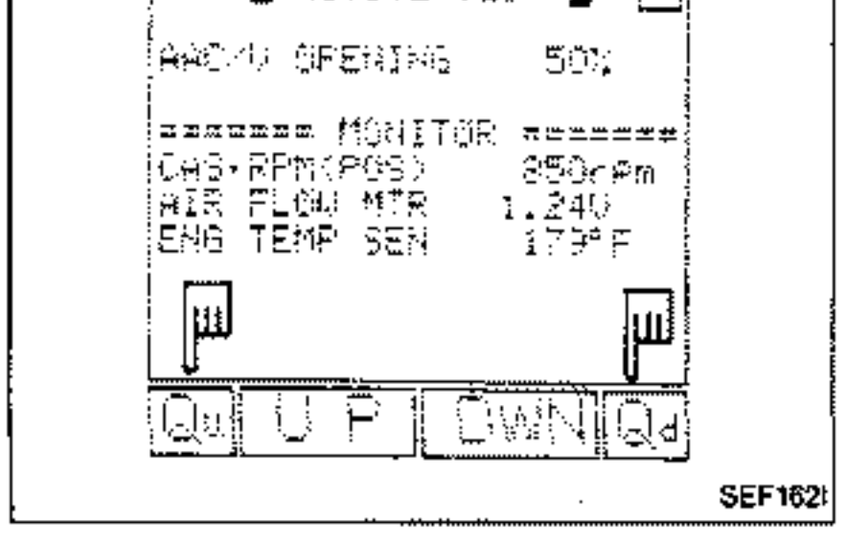


Diagnostic Procedure 41 (Cont'd)









INSPECTION START

A

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

N.G. → **B**

Check the following items.
1) "G" fusible link
2) Ignition switch
3) "10A" fuses
4) Harness continuity between terminals:
- A.A.C. valve and ignition switch
- Ignition switch and battery ⊕ terminal.

O.K. ↓

C

CHECK HARNESS CONTINUITY BETWEEN A.A.C. VALVE AND E.C.U.
Check harness continuity between A.A.C. valve terminal ⓑ and E.C.U. terminal ④.
Continuity should exist.

N.G. → Repair or replace harness or connectors.

O.K. ↓

D

CHECK COMPONENT (A.A.C. valve).

Perform "AAC VALVE OPENING TEST" in "ACTIVE TEST" mode with CONSULT.

— OR —

Refer to "Electrical Components Inspection". (See page EF & EC-181.)

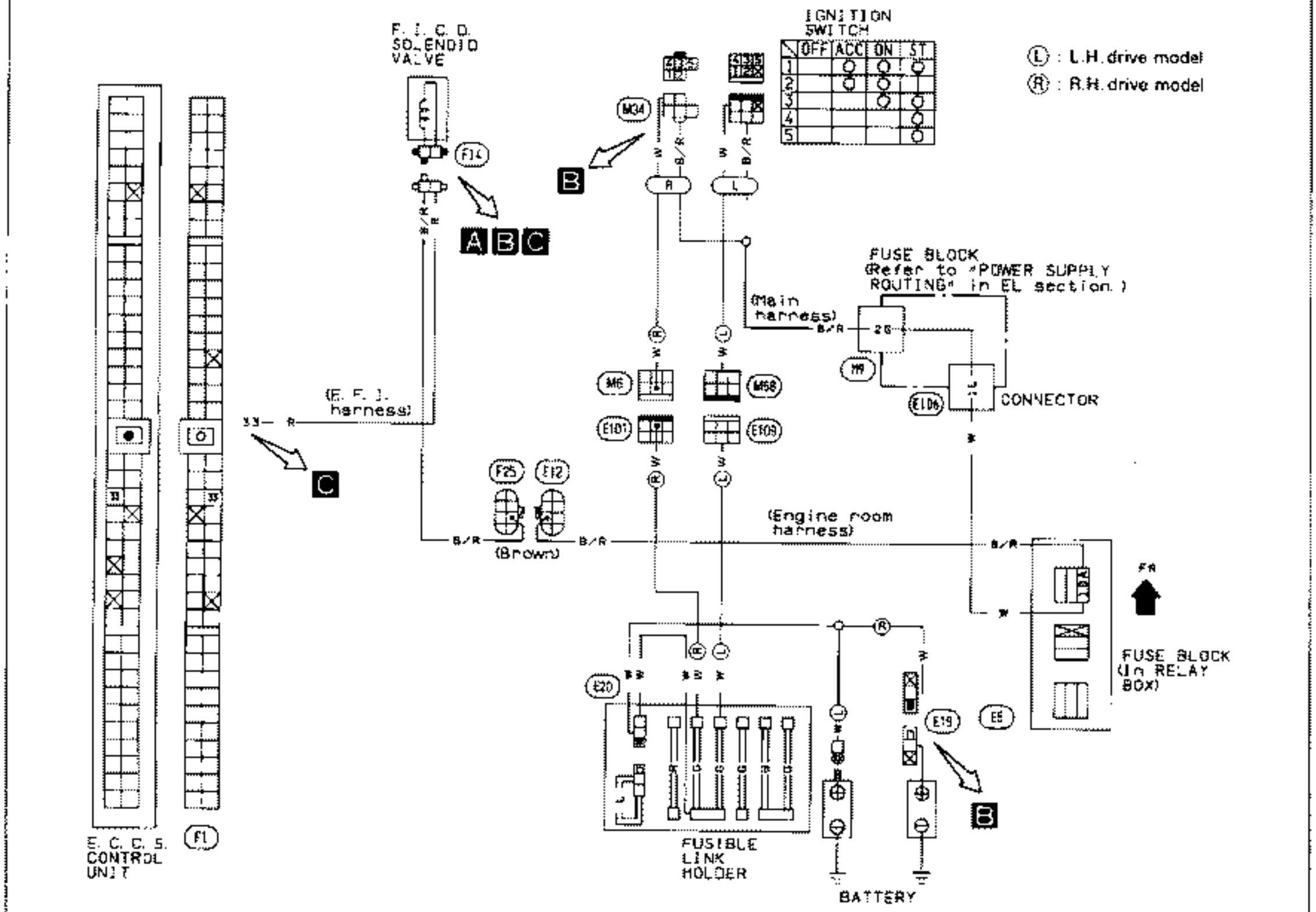
N.G. → Repair or replace A.A.C. valve.

O.K. ↓

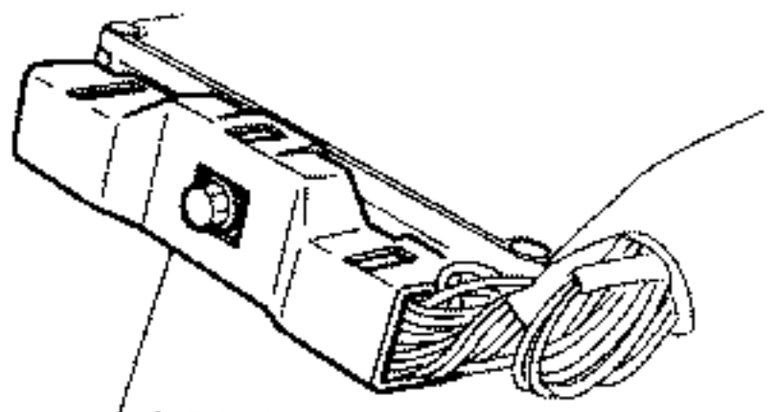
INSPECTION END

Diagnostic Procedure 42

F.I.C.D. SOLENOID VALVE

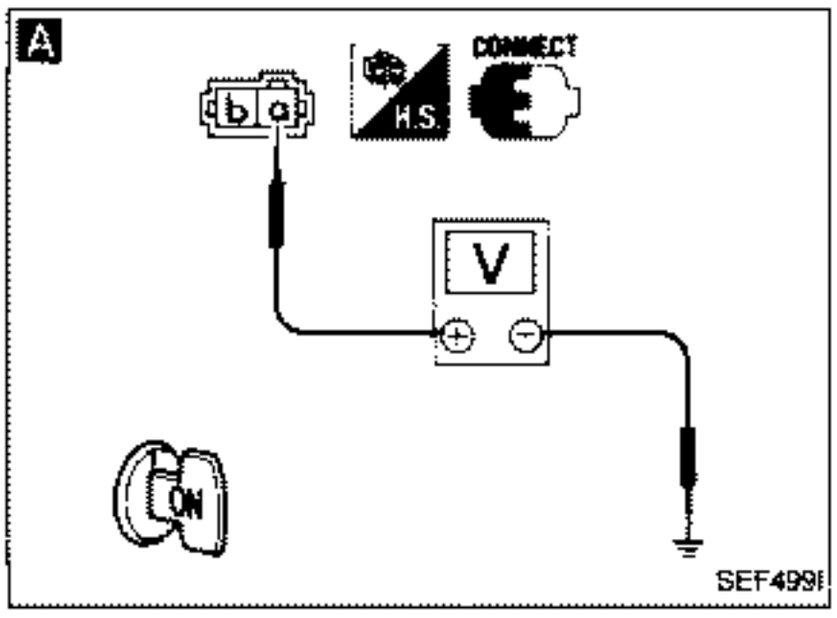


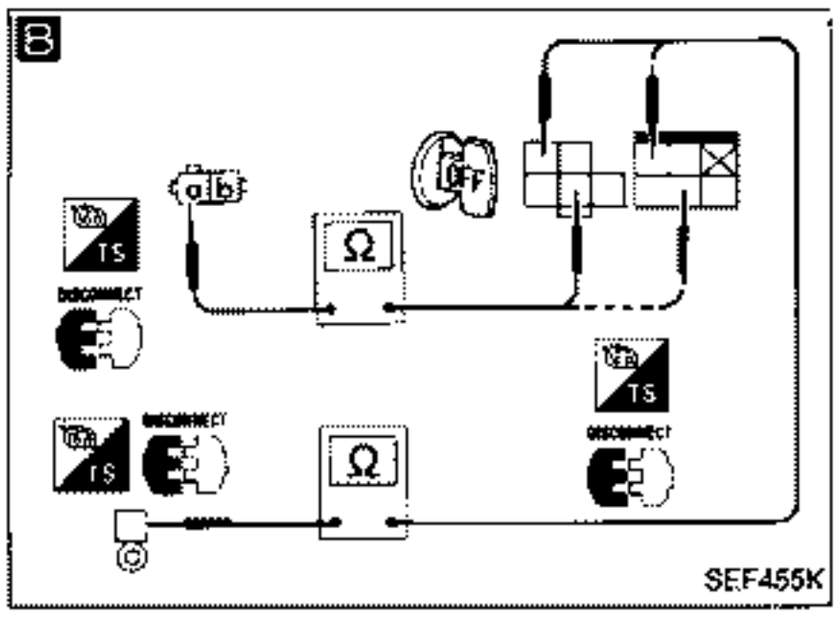
Harness layout

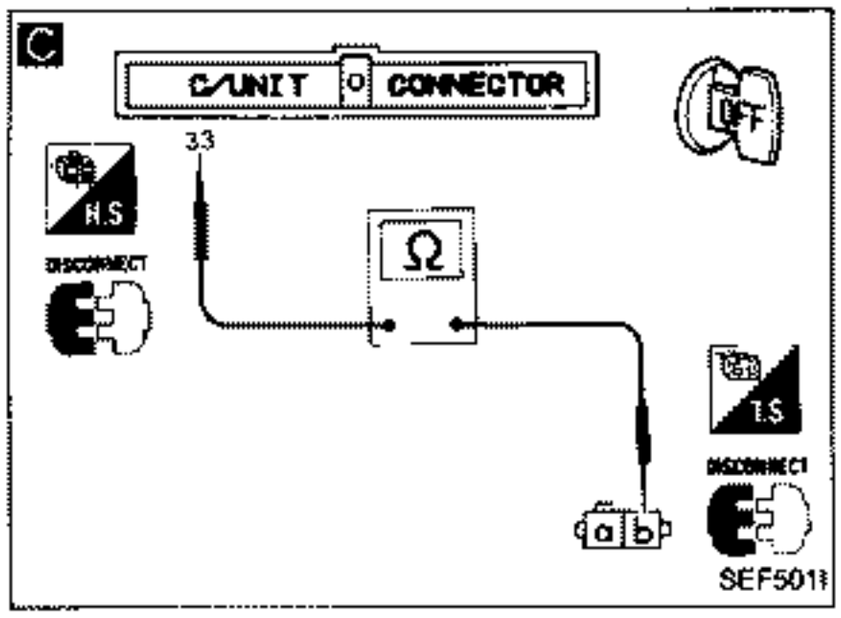


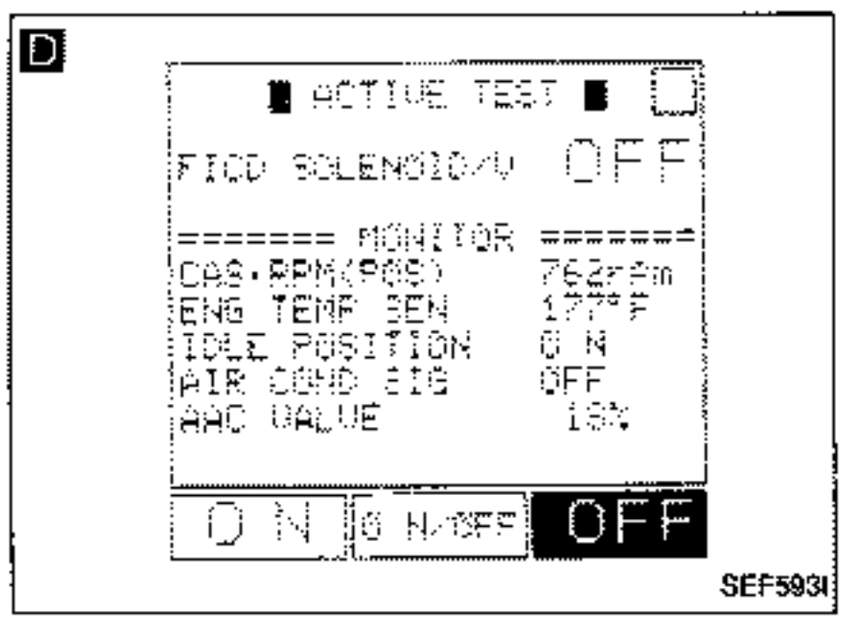
F.I.C.D. solenoid valve harness connector is located near A.A.C. valve harness connector.

Diagnostic Procedure 42 (Cont'd)









INSPECTION START

A

CHECK POWER SUPPLY.
1) Turn ignition switch "ON".
2) Check voltage between F.I.C.D. solenoid valve terminal ⓐ and ground.
Voltage: Battery voltage

N.G. →

B

Check the following items.
1) "G" fusible link
2) "10A" fuses
3) Ignition switch
4) Harness continuity between terminals:
- F.I.C.D. solenoid valve and ignition switch
- Ignition switch and battery ⊕ terminal.

Continuity should exist.

O.K. ↓

C

CHECK HARNESS CONTINUITY BETWEEN F.I.C.D. SOLENOID VALVE AND E.C.U.
Check harness continuity between F.I.C.D. solenoid valve terminal ⓑ and E.C.U. terminal ㉝.
Continuity should exist.

N.G. →

Repair or replace harness or connectors.

O.K. ↓

D

CHECK COMPONENT (F.I.C.D. solenoid valve).

Perform "F.I.C.D. SOLENOID VALVE TEST" in "ACTIVE TEST" mode with CONSULT.

OR

Refer to "Electrical Components Inspection". (See page EF & EC-182.)

N.G. →

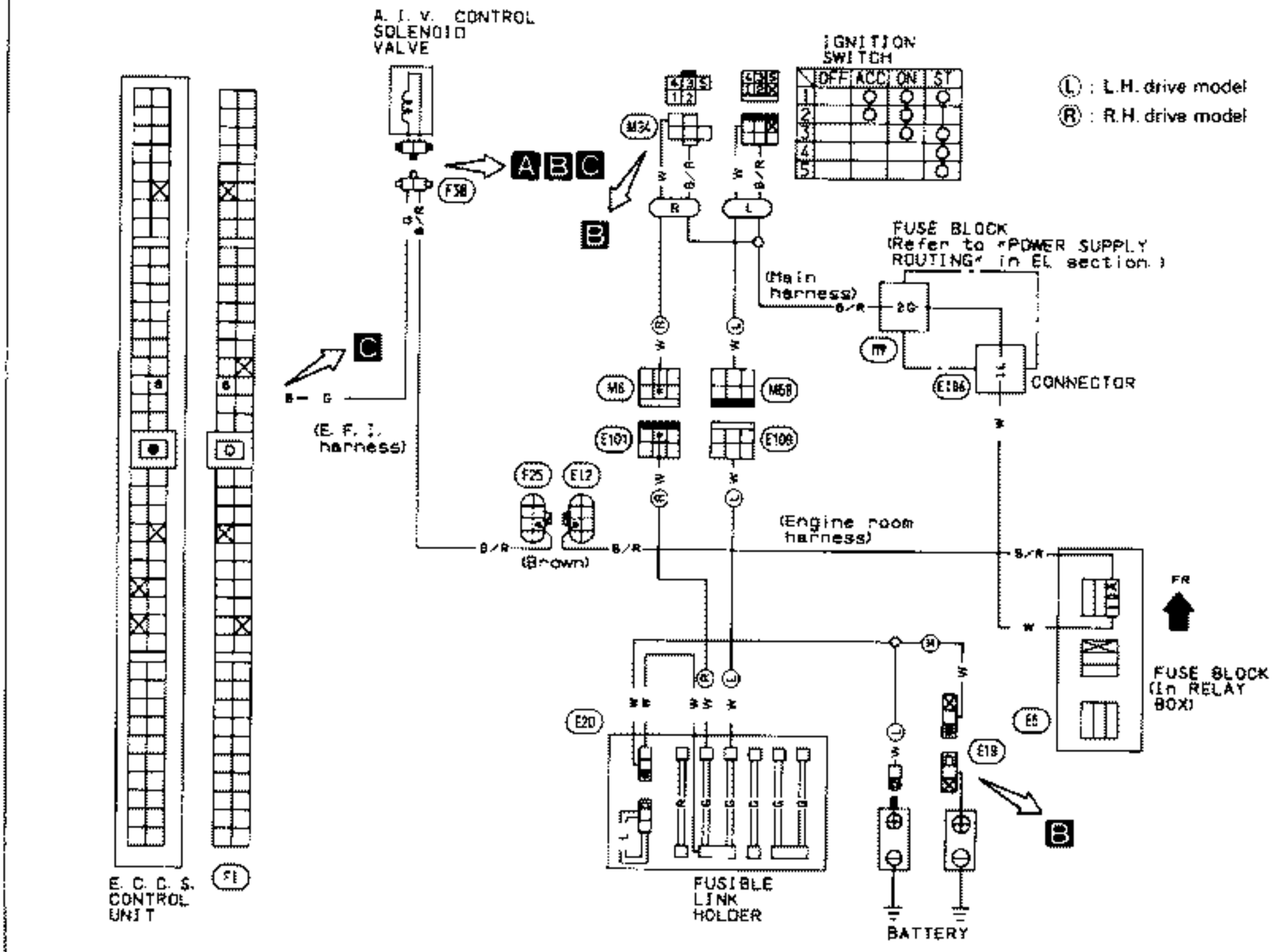
Repair or replace F.I.C.D. solenoid valve.

O.K. ↓

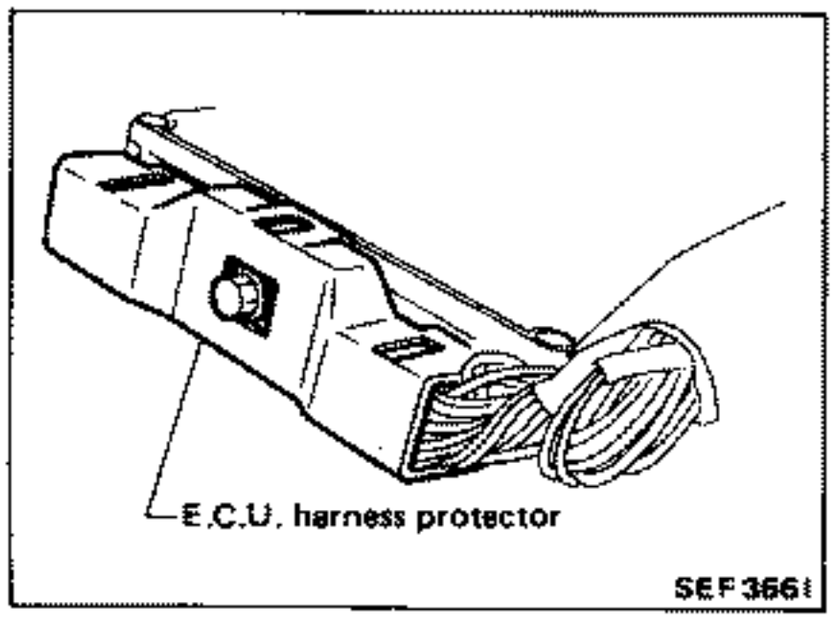
INSPECTION END

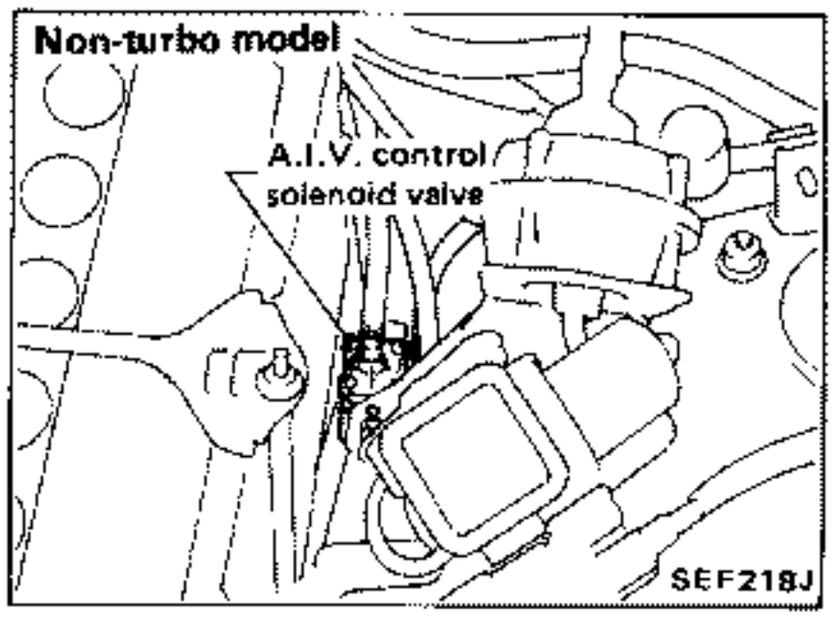
Diagnostic Procedure 43

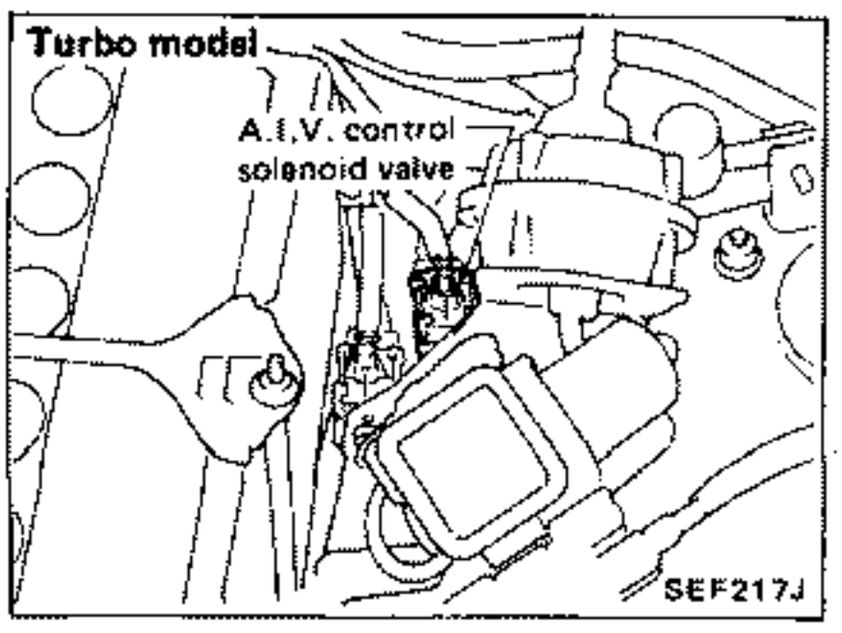
A.I.V. CONTROL SOLENOID VALVE



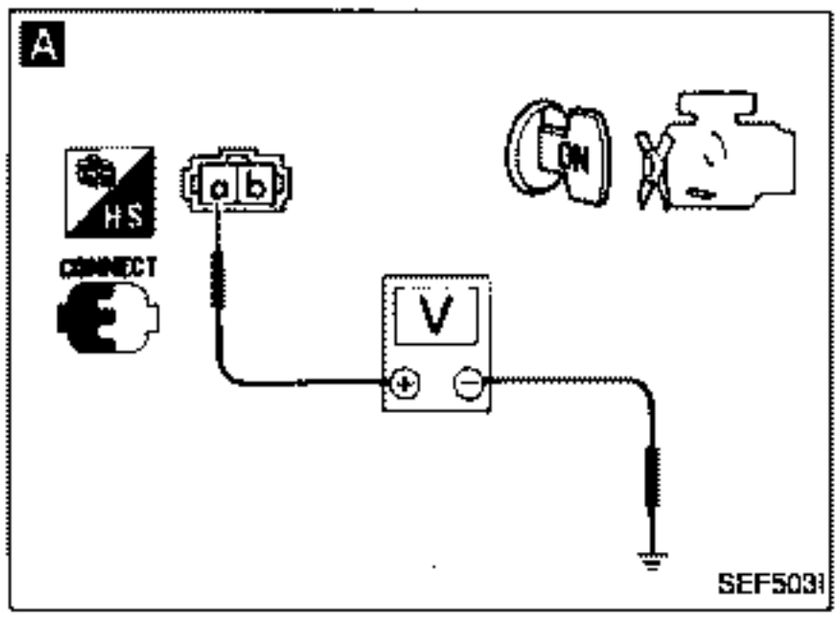
Harness layout

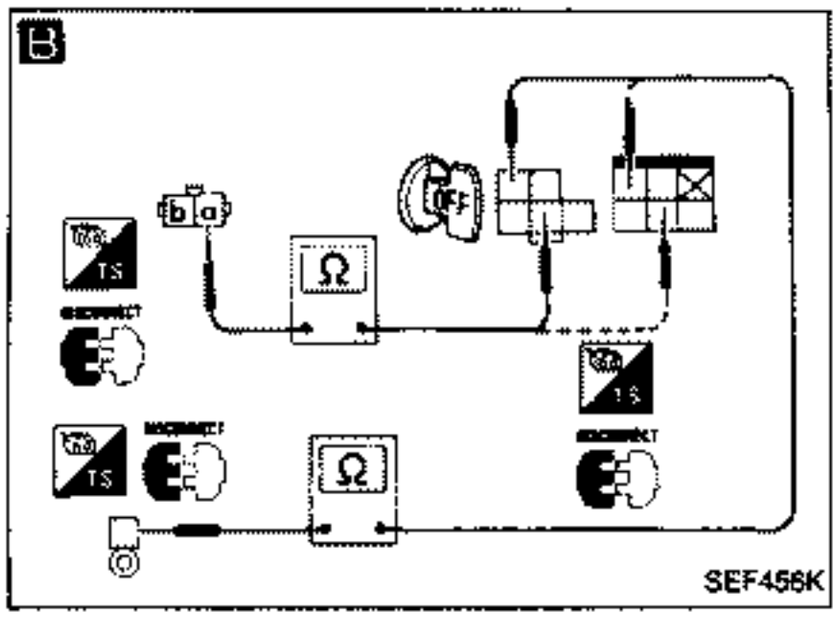


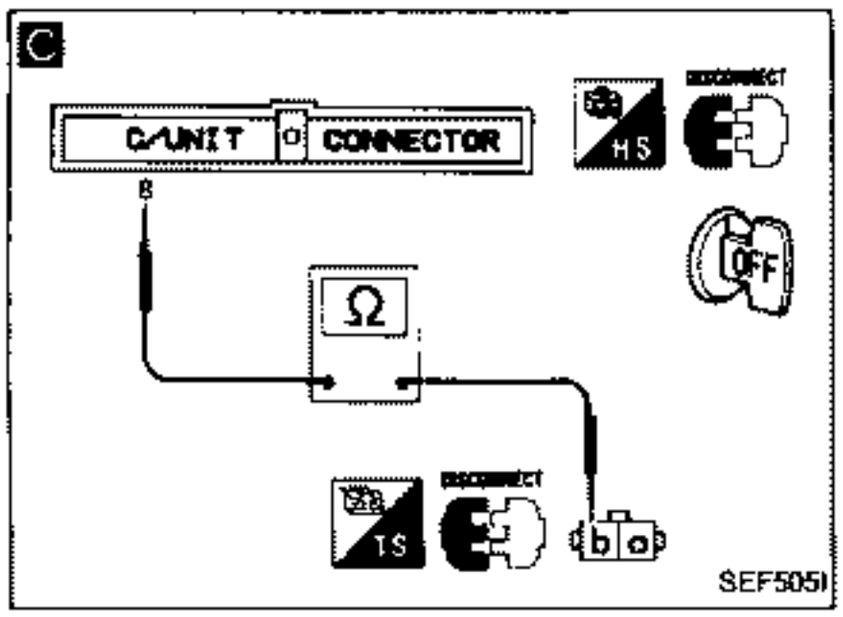


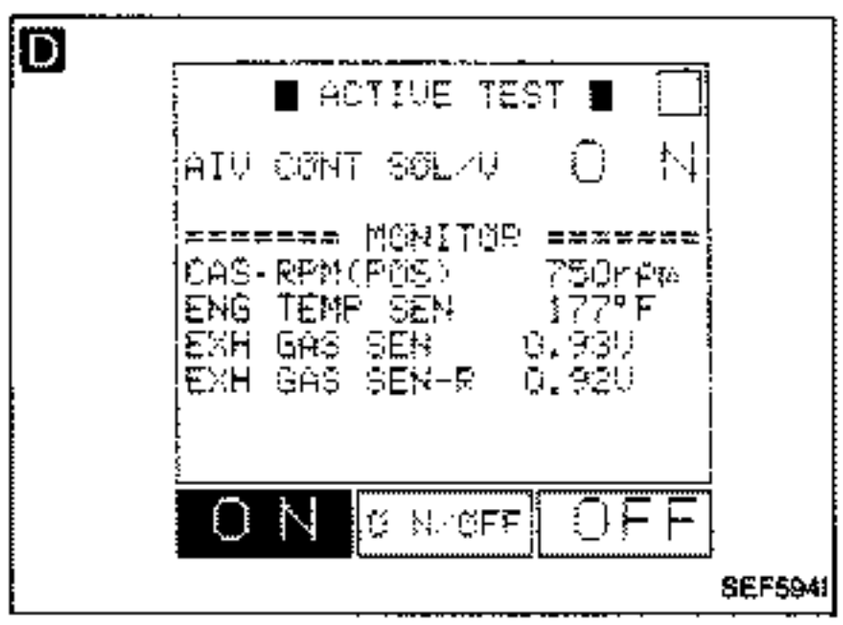


Diagnostic Procedure 43 (Cont'd)









INSPECTION START

A

CHECK POWER SUPPLY.
1) Turn ignition switch "ON".
2) Check voltage between A.I.V. control solenoid valve terminal ⓐ and ground.
Voltage: Battery voltage

N.G. → **B**

Check the following items.
1) "G" fusible link
2) "10A" fuses
3) Ignition switch
4) Harness continuity between terminals:
- A.I.V. control solenoid valve and ignition switch
- Ignition switch and battery ⊕ terminal.

Continuity should exist.

O.K. ↓

C

CHECK HARNESS CONTINUITY BETWEEN A.I.V. CONTROL SOLENOID VALVE AND E.C.U.
Check harness continuity between A.I.V. control solenoid valve terminal ⓑ and E.C.U. terminal ⑧.
Continuity should exist.

N.G. → Repair or replace harness or connectors.

O.K. ↓

D

CHECK COMPONENT
(A.I.V. control solenoid valve).

Perform "A.I.V. CONTROL SOLENOID VALVE TEST" in "ACTIVE TEST" mode with CONSULT.

— OR —

Refer to "Electrical Components Inspection". (See page EF & EC-180.)

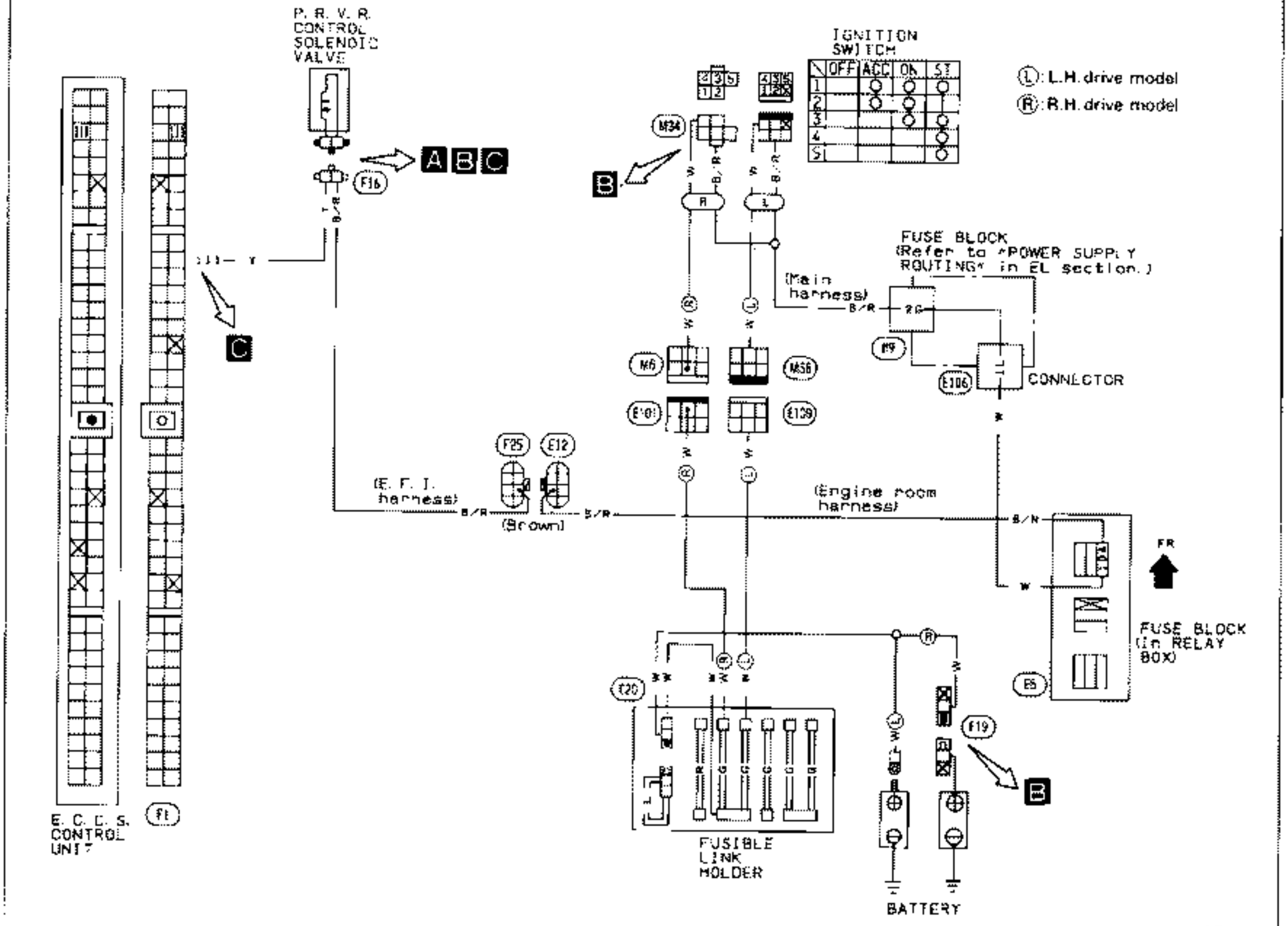
N.G. → Repair or replace A.I.V. control solenoid valve.

O.K. ↓

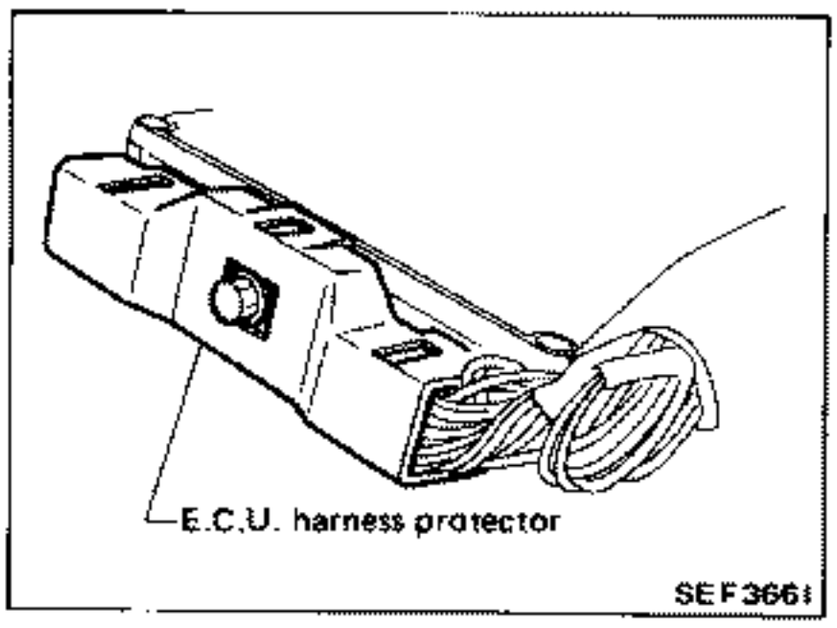
INSPECTION END

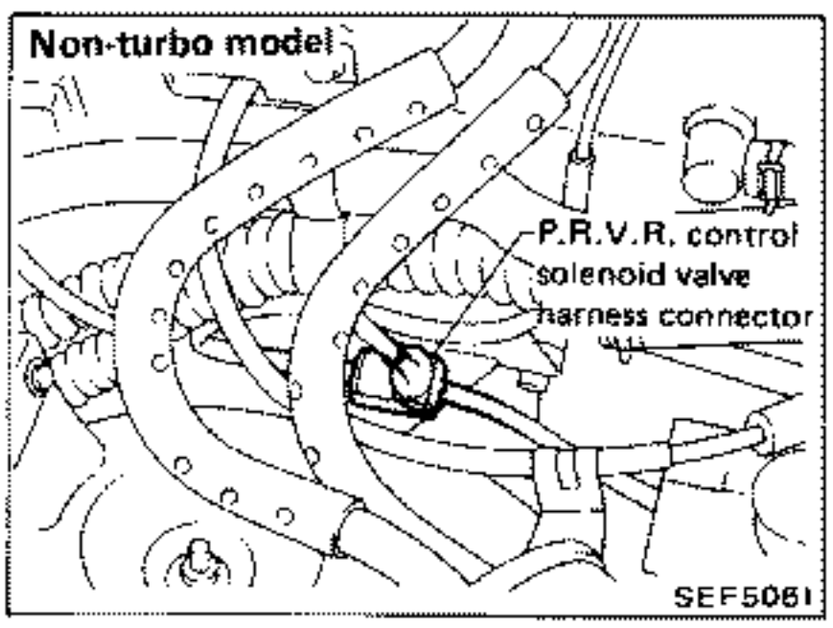
Diagnostic Procedure 44

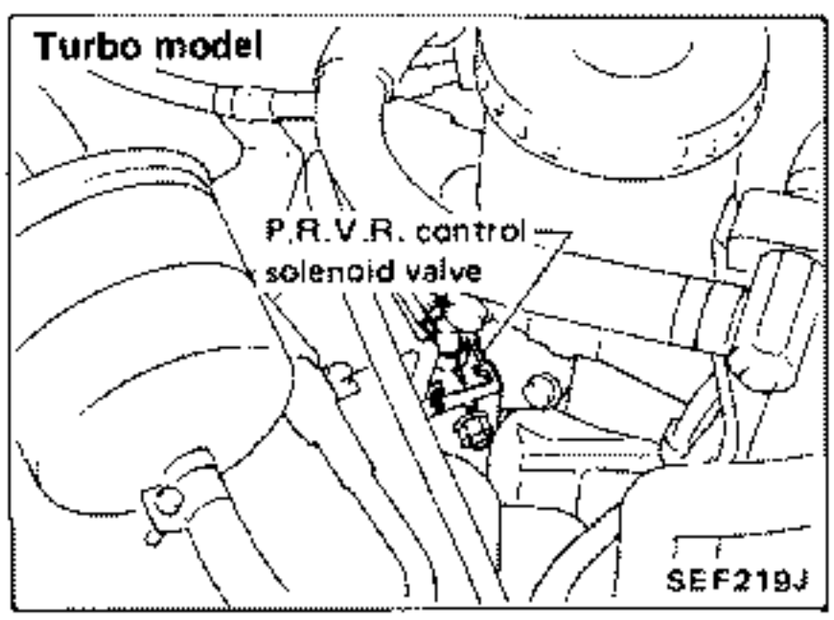
P.R.V.R. CONTROL SOLENOID VALVE



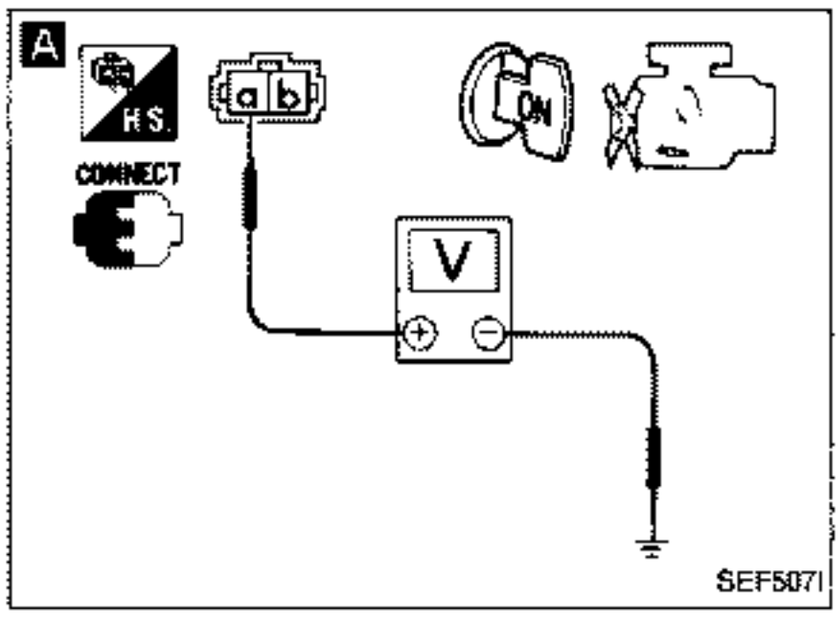
Harness layout

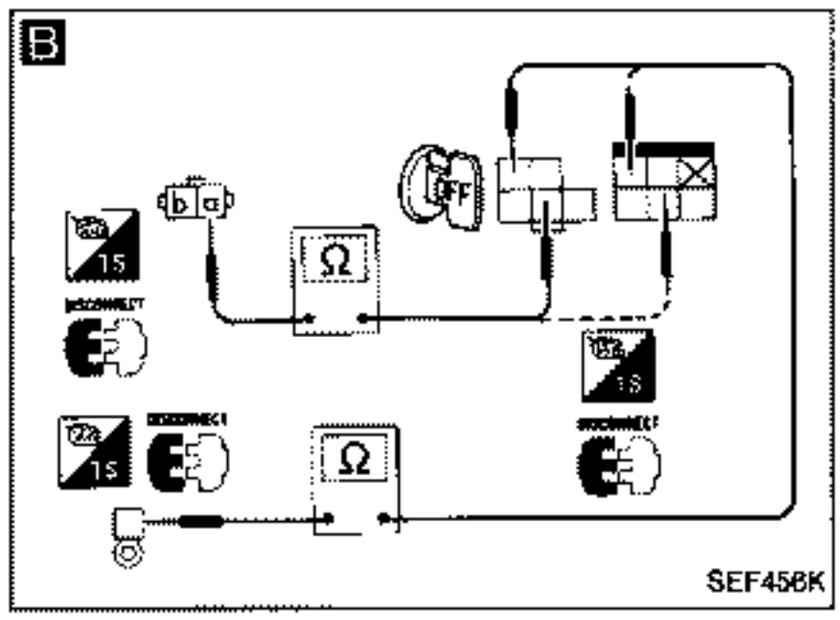


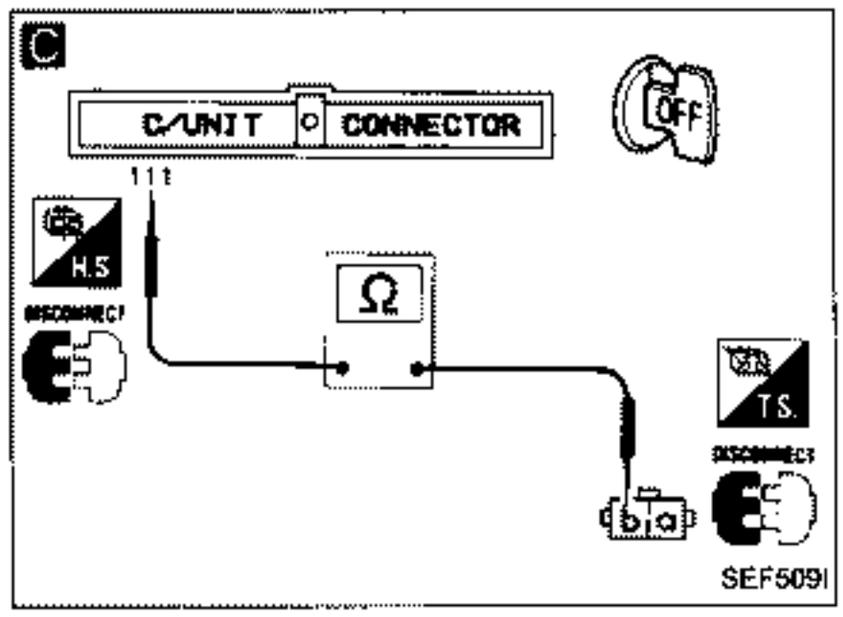


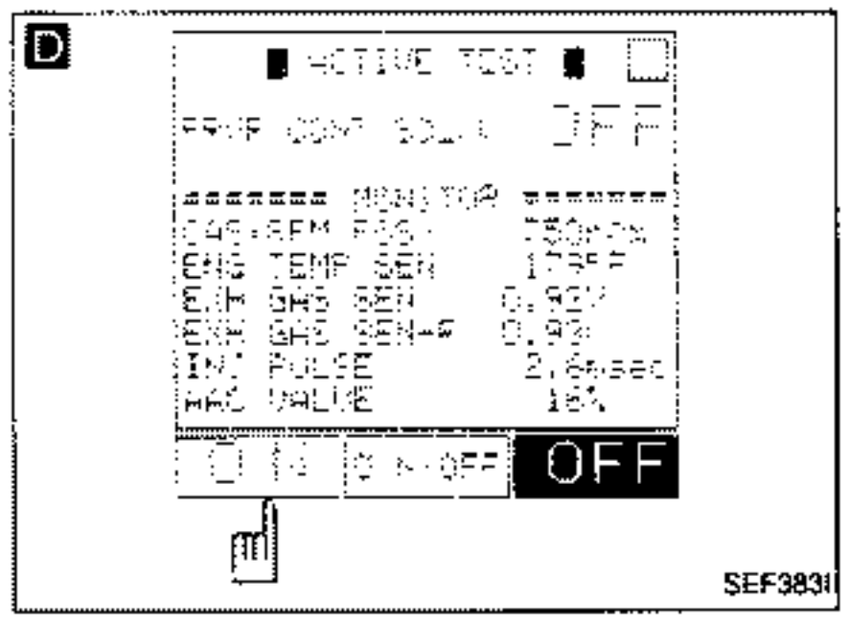


Diagnostic Procedure 44 (Cont'd)









INSPECTION START

A

CHECK POWER SUPPLY.
1) Turn ignition switch "ON".
2) Check voltage between P.R.V.R. control solenoid valve terminal ⓐ and ground.
Voltage: Battery voltage

N.G. →

B

Check the following items.
1) "G" fusible link
2) "10A" fuses
3) Ignition switch
4) Harness continuity between terminals:
- P.R.V.R. control solenoid valve and ignition switch
- Ignition switch and battery ⊕ terminal.

Continuity should exist.

O.K. ↓

C

CHECK HARNESS CONTINUITY BETWEEN P.R.V.R. CONTROL SOLENOID VALVE AND E.C.U.
Check harness continuity between P.R.V.R. control solenoid valve terminal ⓑ and E.C.U. terminal (111)
Continuity should exist.

N.G. → Repair or replace harness or connectors.

O.K. ↓

D

CHECK COMPONENT (P.R.V.R. control solenoid valve).

Perform "P.R.V.R. CONTROL SOLENOID VALVE TEST" in "ACTIVE TEST" mode with CONSULT.

OR

Refer to "Electrical Components Inspection". (See page EF & EC-180.)

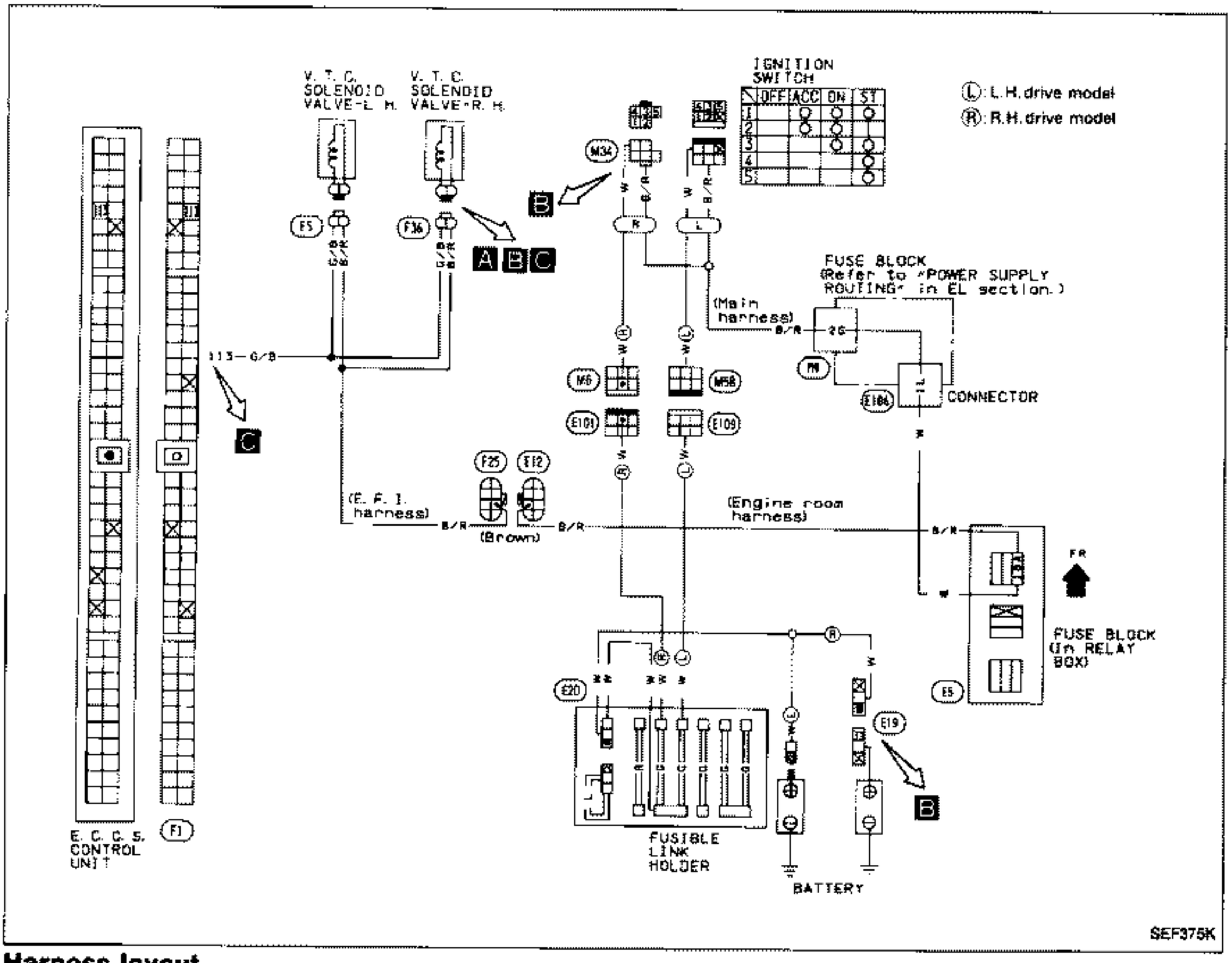
N.G. → Repair or replace P.R.V.R. control solenoid valve.

O.K. ↓

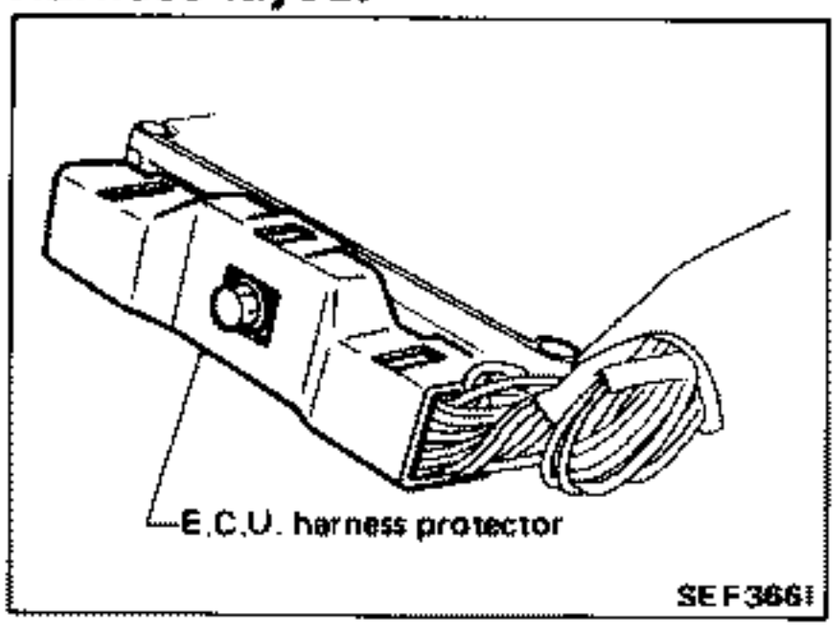
INSPECTION END

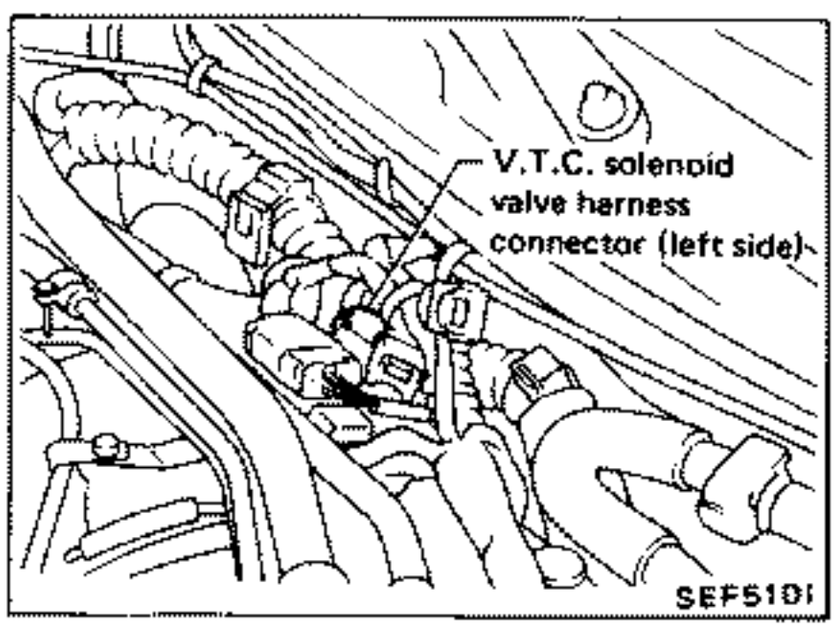
Diagnostic Procedure 45

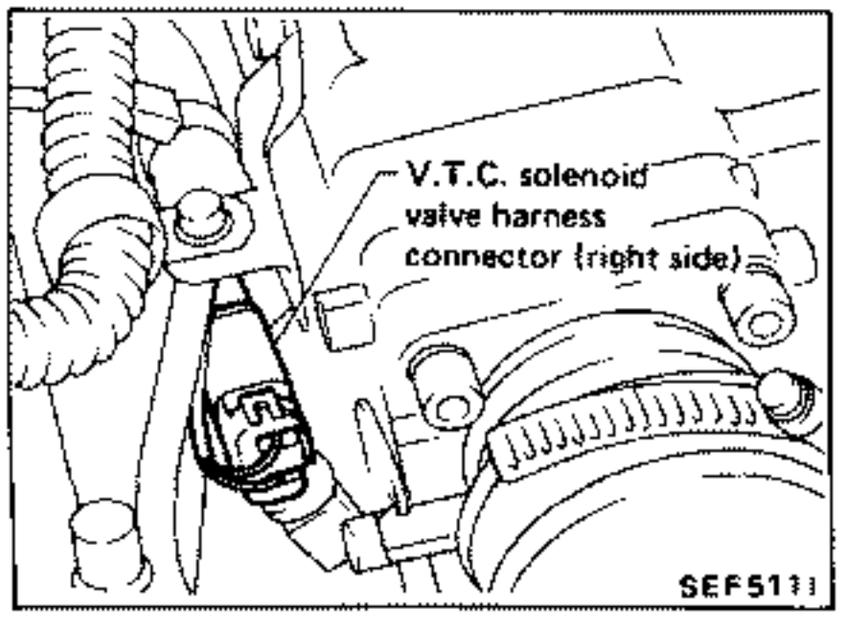
V.T.C. SOLENOID VALVE



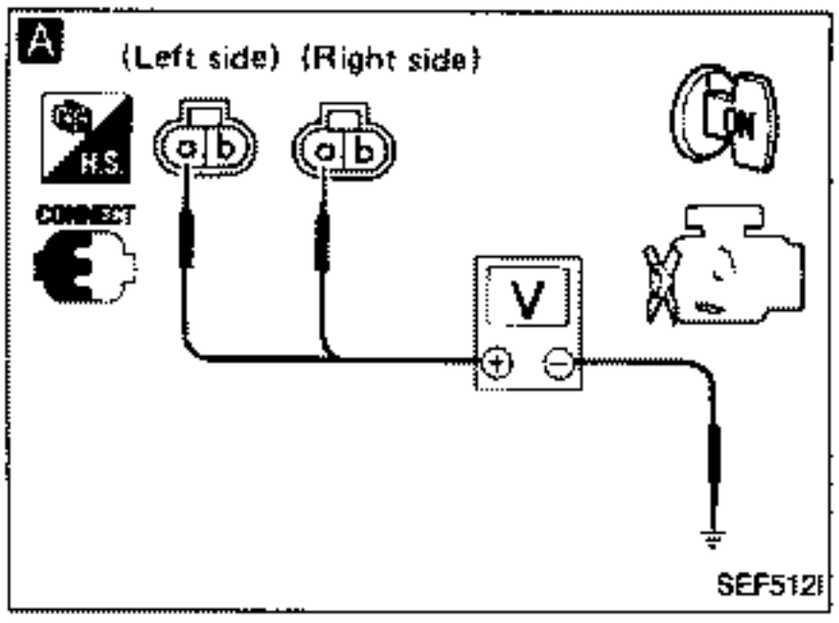
Harness layout

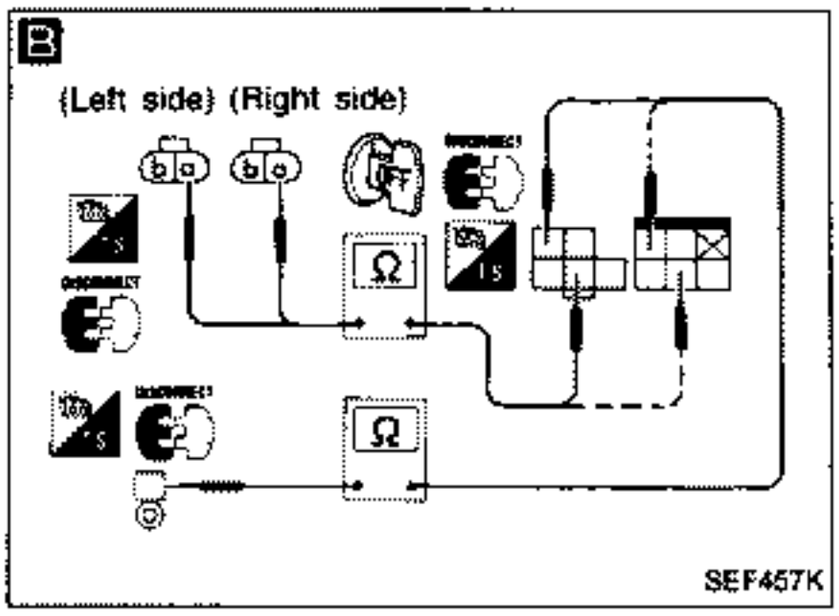


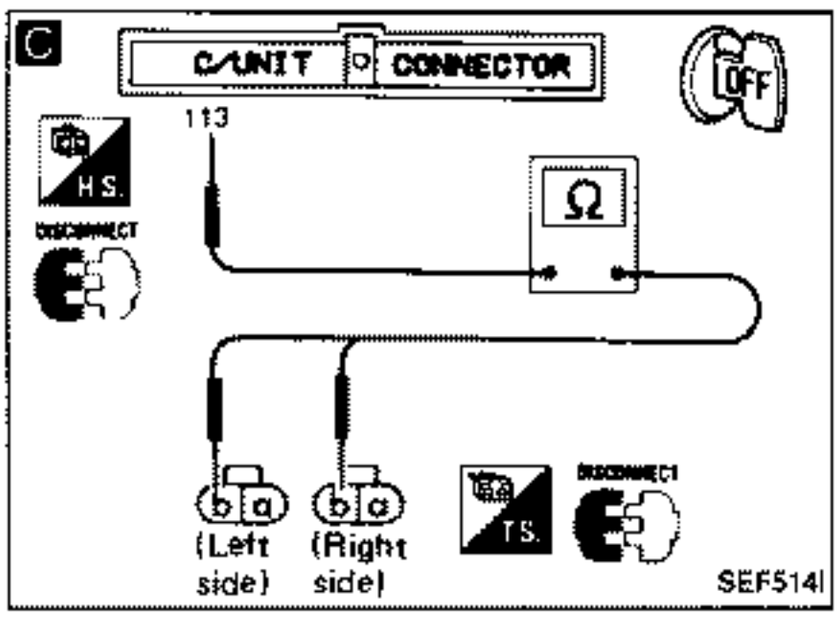


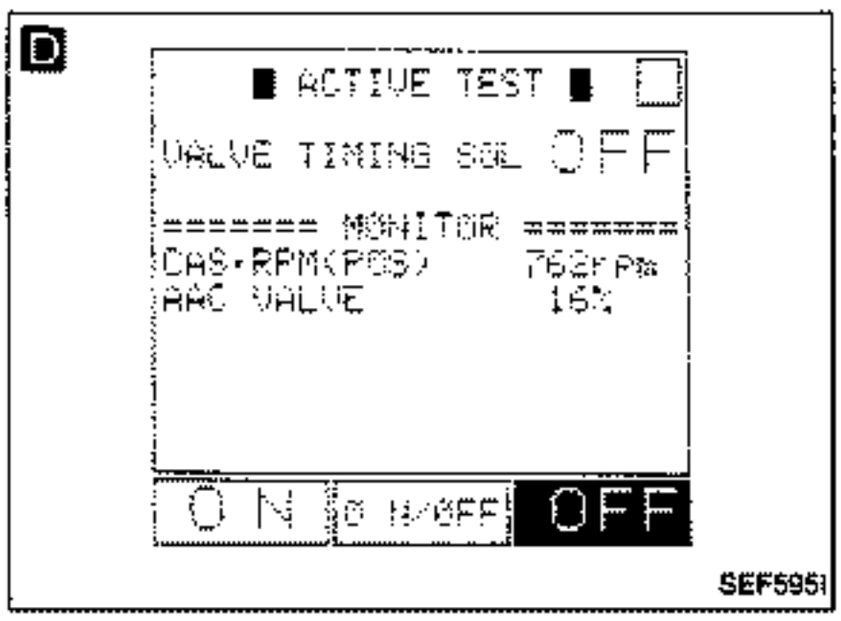


Diagnostic Procedure 45 (Cont'd)









INSPECTION START

A

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

N.G. →

B

Check the following items.
1) "G" fusible link
2) "10A" fuses
3) Ignition switch
4) Harness continuity between terminals:
- V.T.C. solenoid valve and ignition switch
- Ignition switch and battery ⊕ terminal.

Continuity should exist.

O.K. ↓

C

CHECK HARNESS CONTINUITY BETWEEN V.T.C. SOLENOID VALVE AND E.C.U.
Check harness continuity between V.T.C. solenoid valve terminal ⓑ and E.C.U. terminal (113)
Continuity should exist.

N.G. → Repair or replace harness or connectors.

O.K. ↓

D

CHECK COMPONENT (V.T.C. solenoid valve).

Perform "V.T.C. SOLENOID VALVE TEST" in "ACTIVE TEST" mode with CONSULT.

OR

Refer to "Electrical Components Inspection". (See page EF & EC-183.)

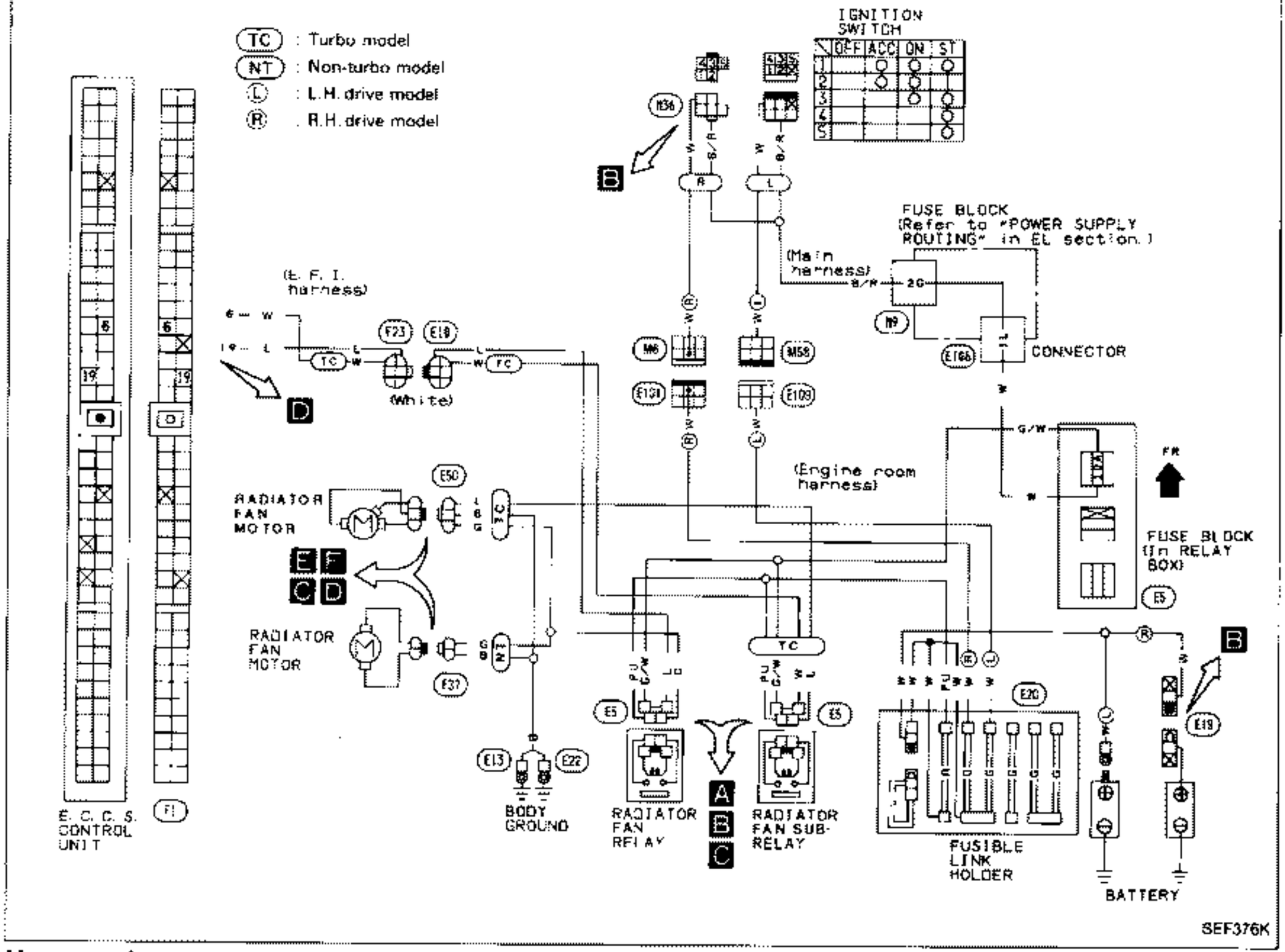
N.G. → Repair or replace V.T.C. solenoid valve.

O.K. ↓

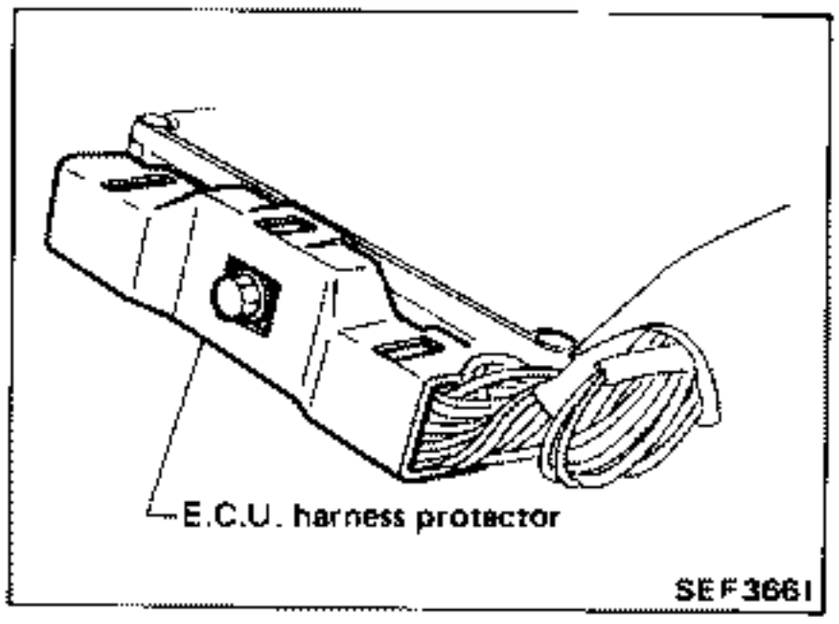
INSPECTION END

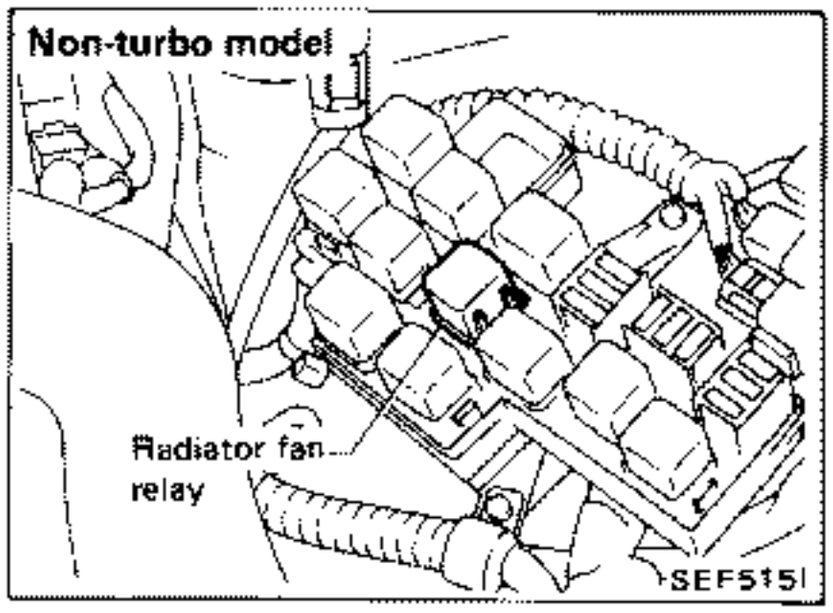
Diagnostic Procedure 46

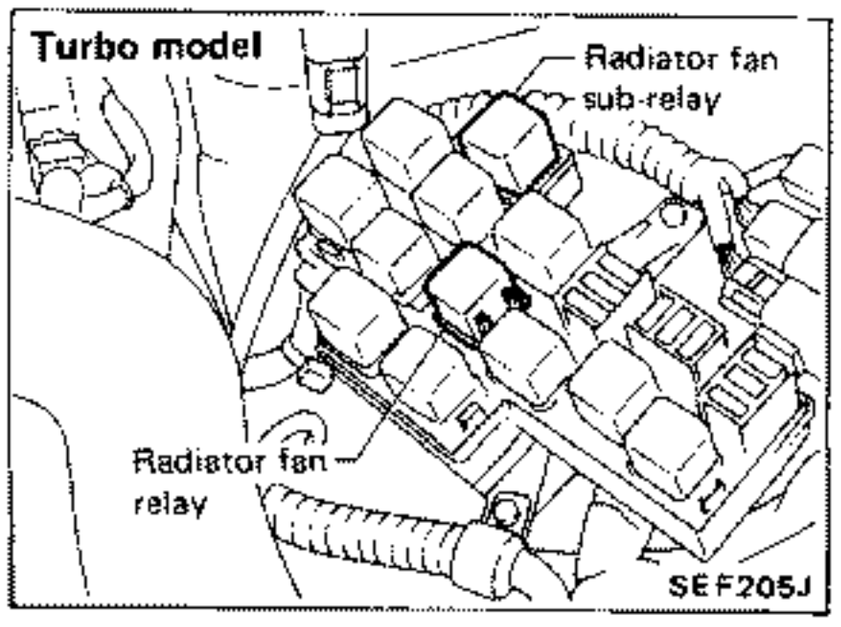
RADIATOR FAN CONTROL



Harness layout

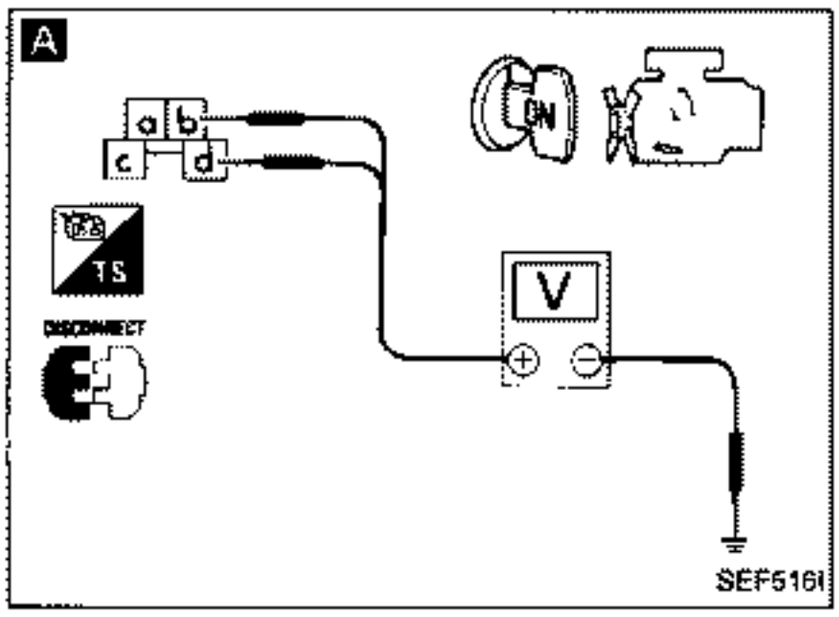


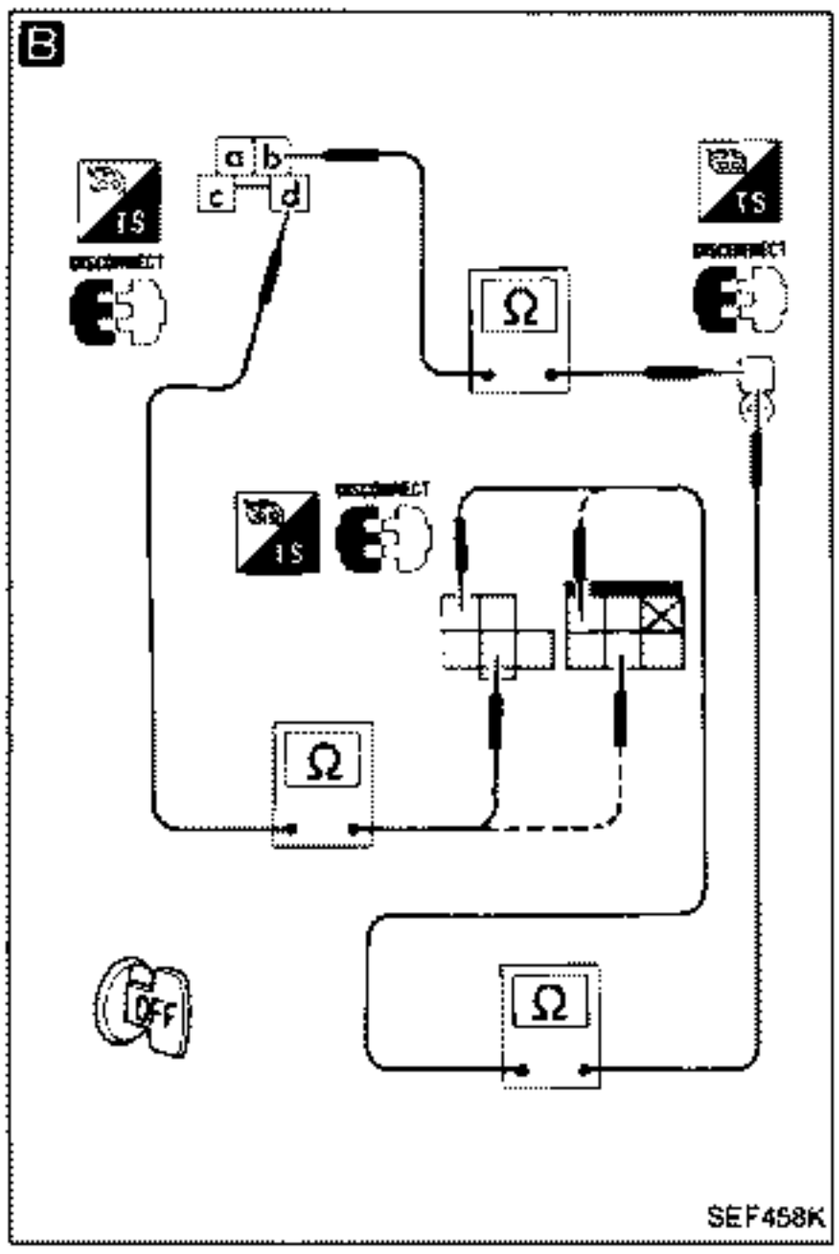


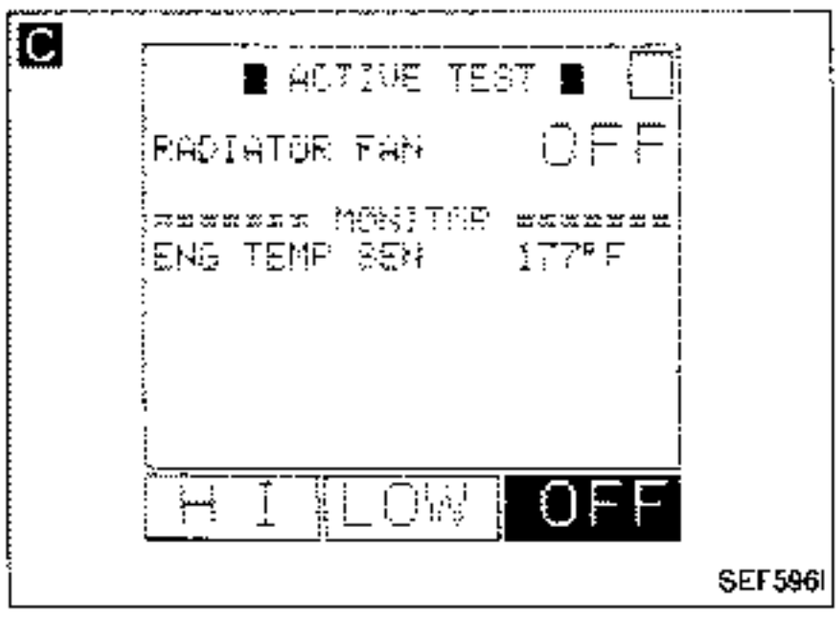


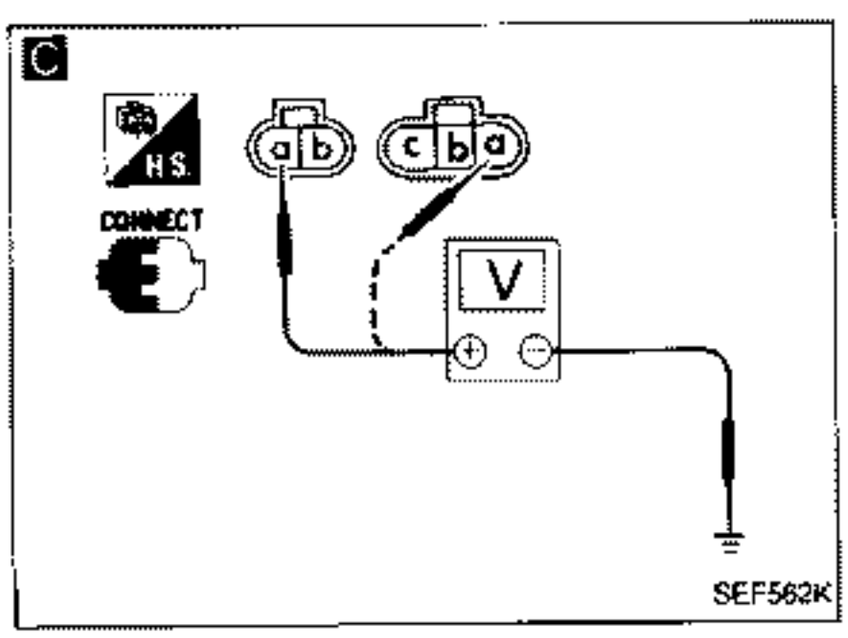
For radiator fan motor harness connector, see "HARNESS LAYOUT" in EL section.

Diagnostic Procedure 46 (Cont'd)









INSPECTION START

A

CHECK POWER SUPPLY (1).
1) Turn ignition switch "ON".
2) Check voltage between radiator fan relay terminals ⓑ, ⓓ and ground.
Voltage: Battery voltage

N.G. → **B**

Check the following items.
1) "G", "R" and "L" fusible links.
2) "10A" fuses
3) Ignition switch
4) Harness continuity between
- radiator fan relay terminal ⓑ and battery ⊕ terminal
- radiator fan relay terminal ⓓ and ignition switch
- ignition switch and battery ⊕ terminal

Continuity should exist.

O.K. ↓

C

CHECK POWER SUPPLY (2).
1) Turn radiator fan relay "ON" in "ACTIVE TEST" mode with CONSULT.
2) Check voltage between radiator fan motor terminal ⓐ and ground.
Voltage: Battery voltage

N.G. → **D**

Check the following items.
Harness continuity between
- radiator fan motor and radiator fan relay
- radiator fan relay and E.C.U. terminal ⑲

O.K. ↓

CHECK COMPONENT (Radiator fan relay).
Perform "RADIATOR FAN TEST" in "ACTIVE TEST" mode with CONSULT.

— OR —

Refer to "Electrical Components Inspection". (See page EF & EC-184.)

O.K. ↓

E

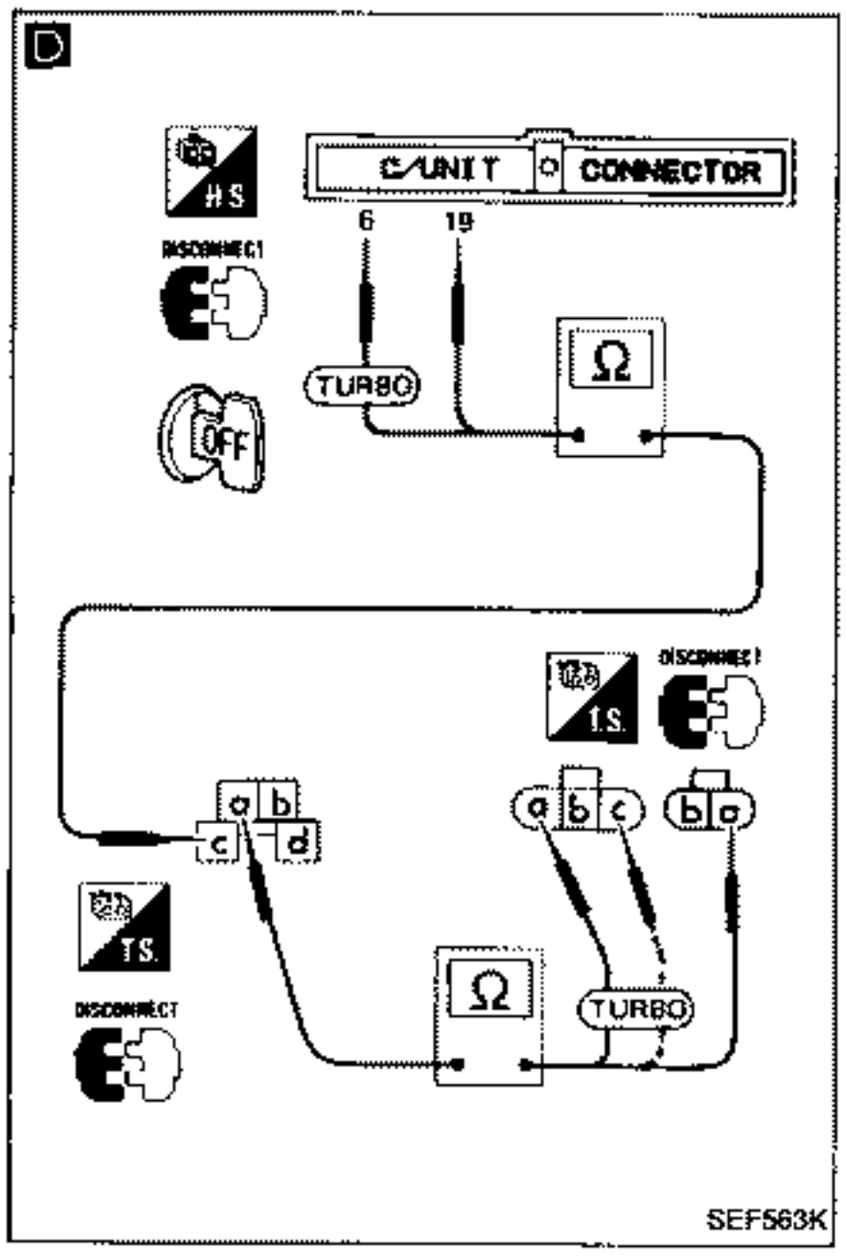
CHECK GROUND CIRCUIT.
Check harness continuity between radiator fan motor terminal ⓑ and ground.
Continuity should exist.

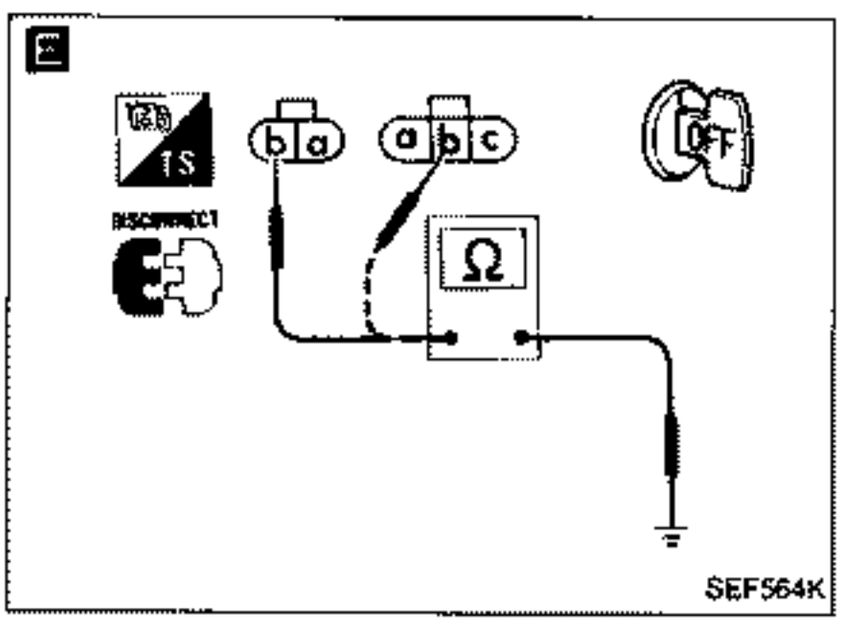
N.G. → Repair or replace harness or connectors.

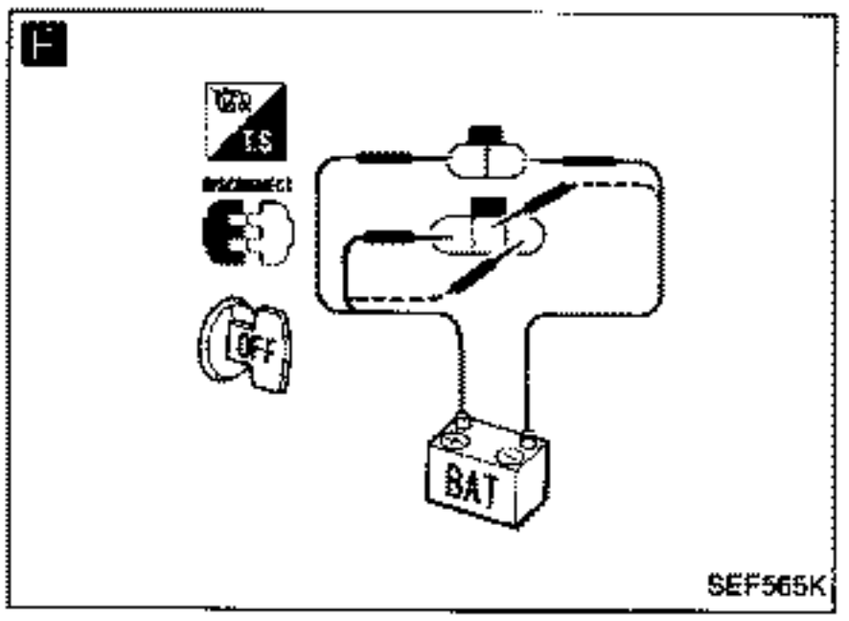
O.K. ↓

⊕

Diagnostic Procedure 46 (Cont'd)







F

CHECK RADIATOR FAN MOTOR.
Supply radiator fan motor terminals with battery voltage and check operation.
Radiator fan motor should operate.

N.G. → Repair or replace radiator fan motor.

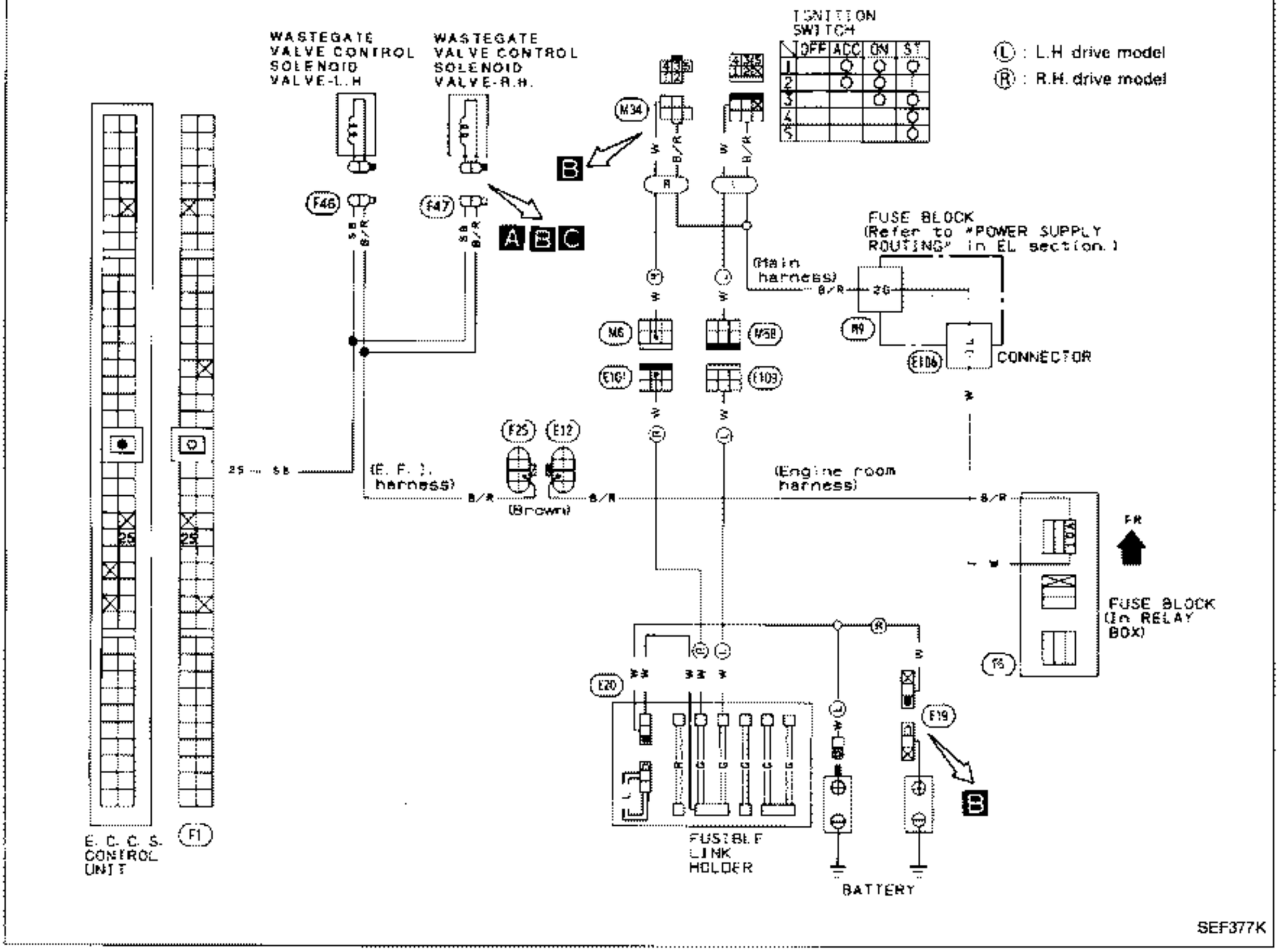
O.K. ↓

INSPECTION END

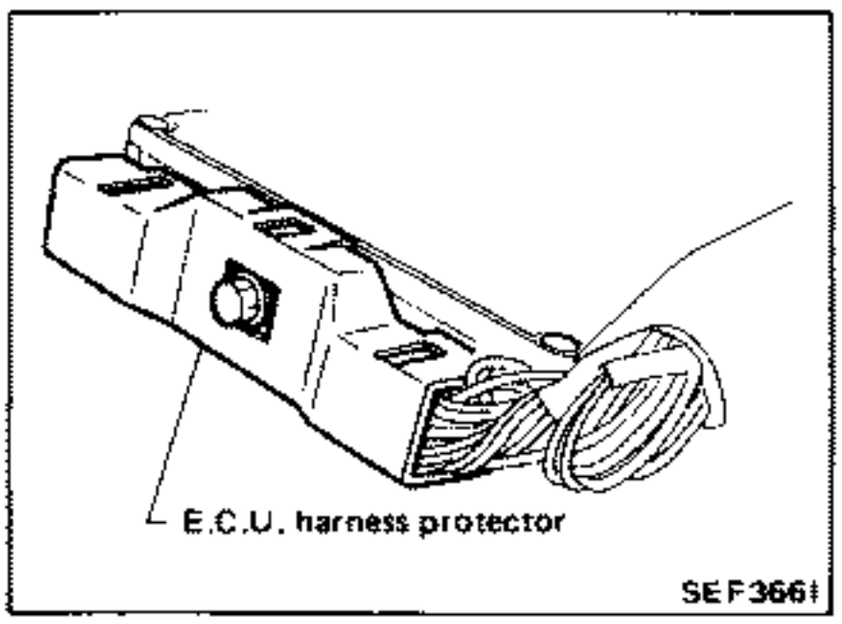
NOTE

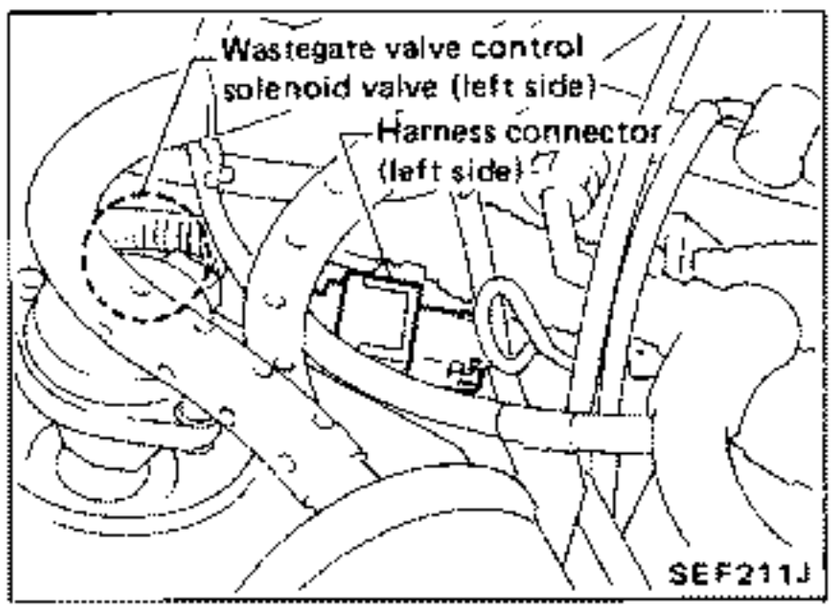
Diagnostic Procedure 47

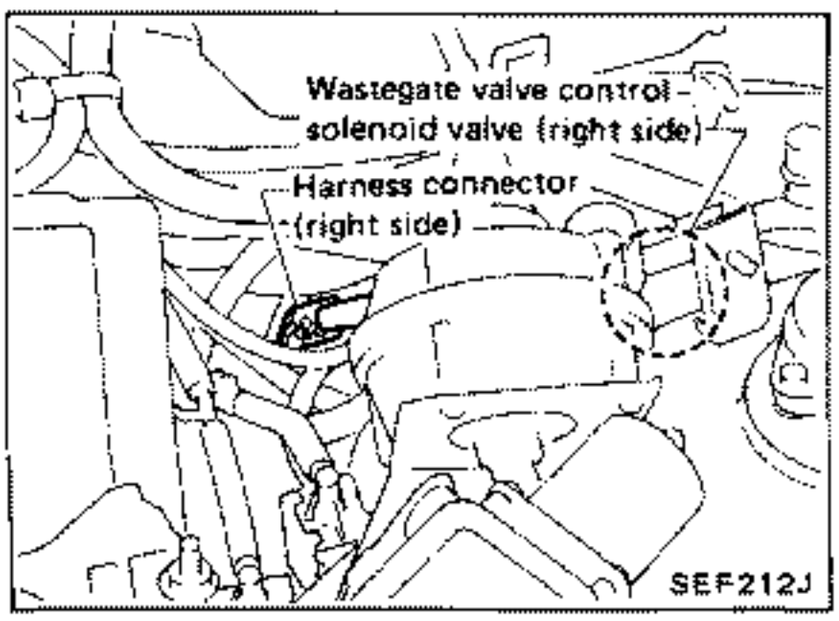
WASTEGATE VALVE CONTROL SOLENOID VALVE



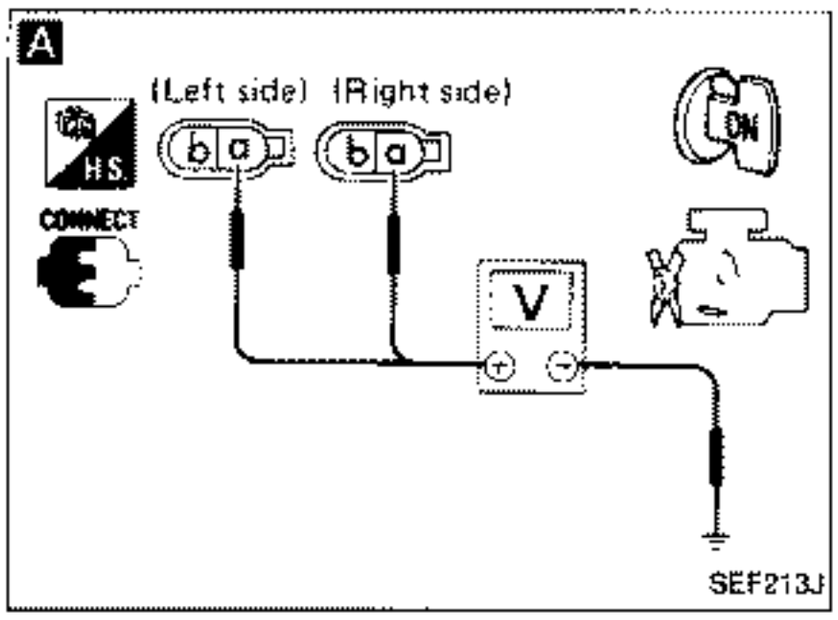
Harness layout







Diagnostic Procedure 47 (Cont'd)



INSPECTION START

A

CHECK POWER SUPPLY.
1) Turn ignition switch "ON".
2) Check voltage between wastegate valve control solenoid valve terminal ⓓ and ground.
Voltage: Battery voltage

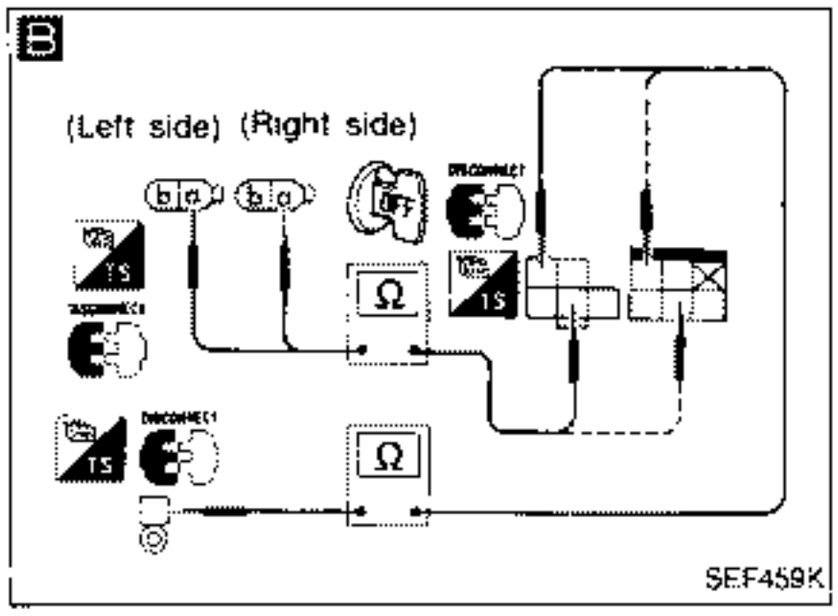
N.G. →

B

Check the following items.
1) "G" fusible link
2) "10A" fuses
3) Ignition switch
4) Harness continuity between terminals:
- Wastegate valve control solenoid valve and ignition switch
- Ignition switch and battery ⊕ terminal.

Continuity should exist.

O.K. ↓



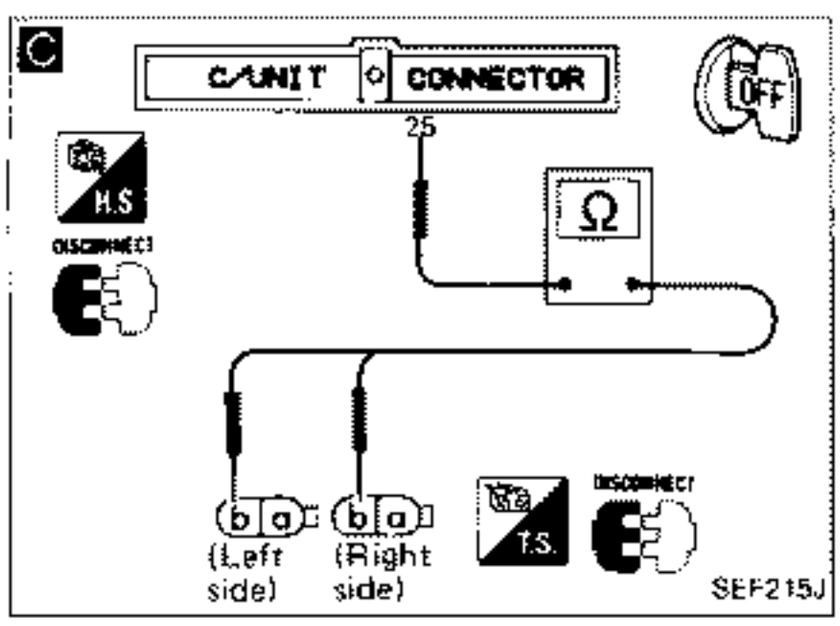
C

CHECK HARNESS CONTINUITY BETWEEN WASTEGATE VALVE CONTROL SOLENOID VALVE AND E.C.U.
Check harness continuity between wastegate valve control solenoid valve terminal ⓑ and E.C.U. terminal ㉕.
Continuity should exist.

N.G. →

Repair or replace harness or connectors.

O.K. ↓



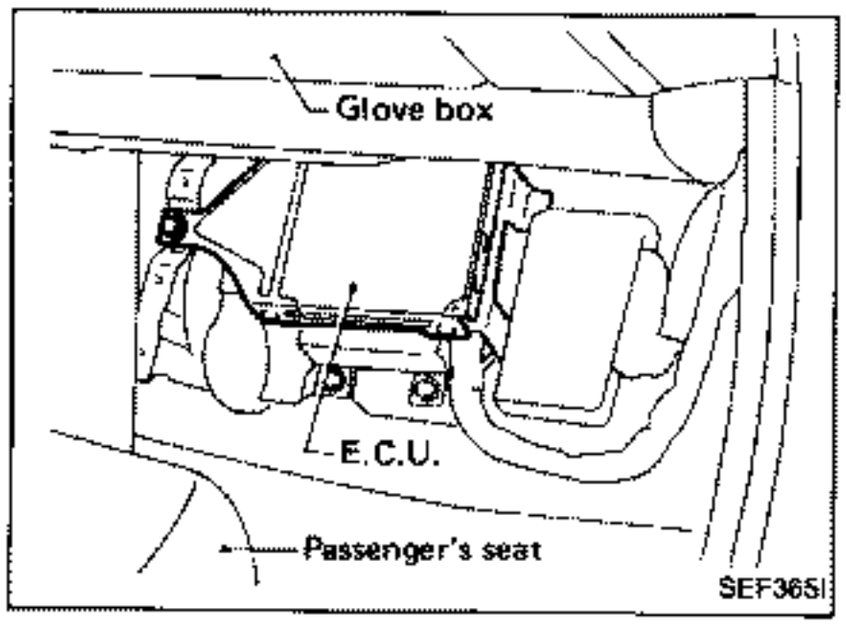
CHECK COMPONENT
(Wastegate valve control solenoid valve).
Refer to "Electrical Components Inspection".
(See page EF & EC-180.)

N.G. →

Repair or replace wastegate valve control solenoid valve.

O.K. ↓

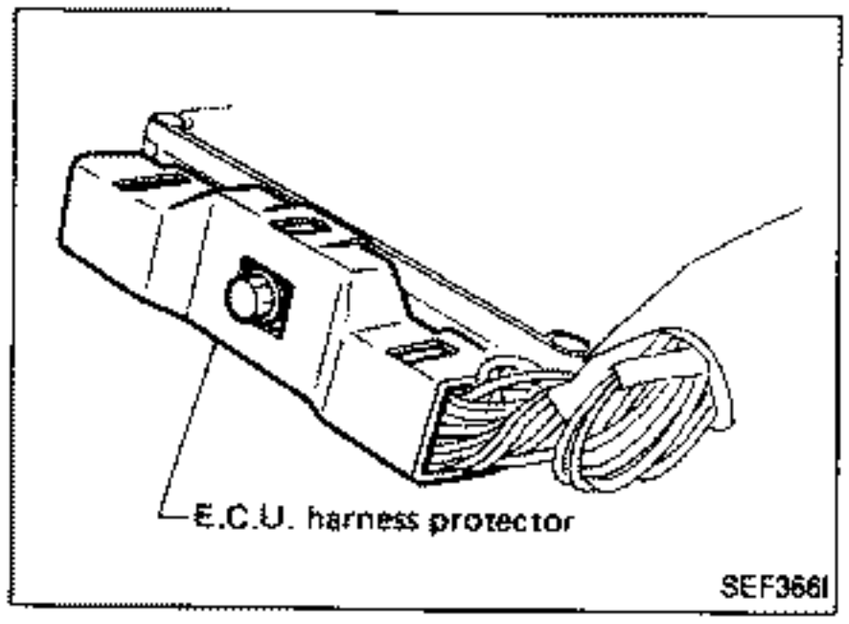
INSPECTION END



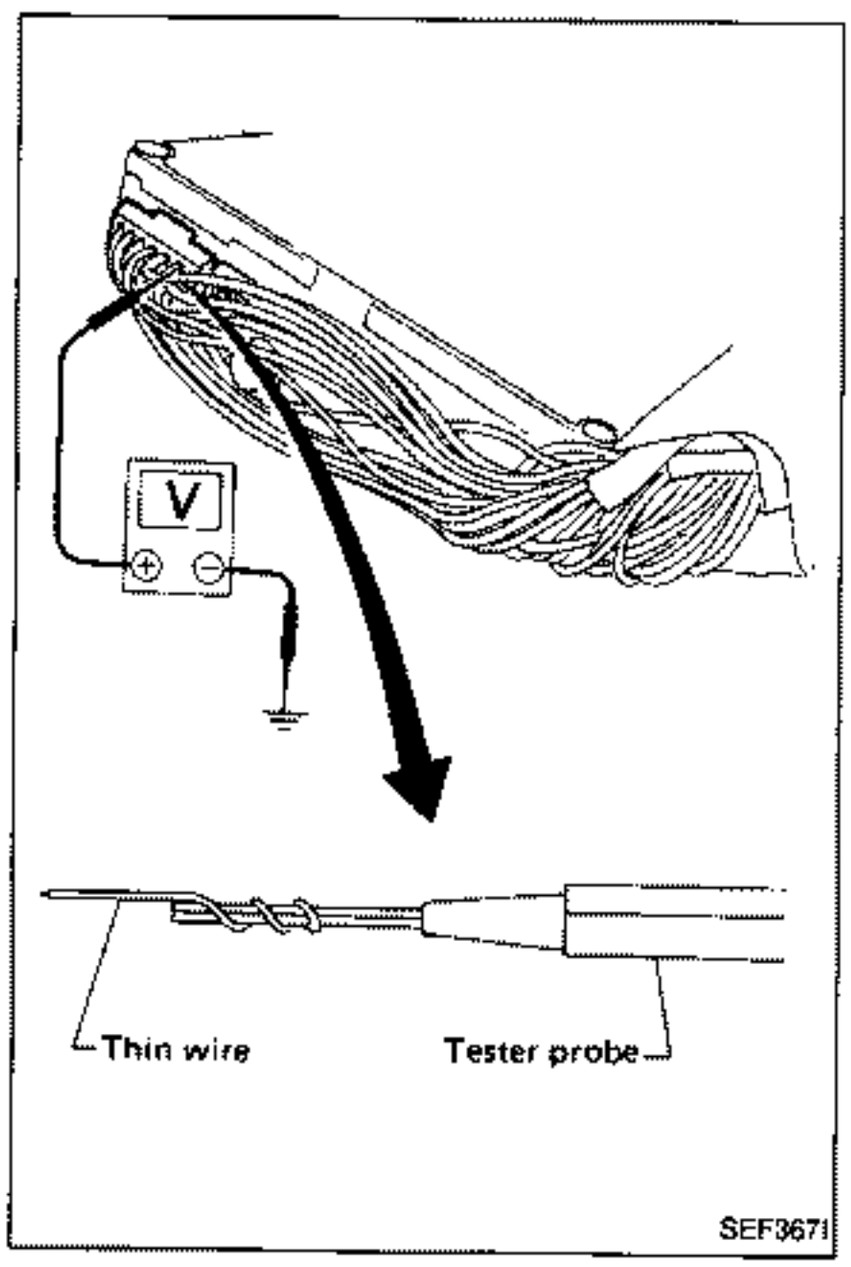
Electrical Components Inspection

E.C.U. INPUT/OUTPUT SIGNAL INSPECTION

1. E.C.U. is located behind front passenger side floor board. For this inspection, remove the front passenger side floor board.



2. Remove E.C.U. harness protector.



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

Electrical Components Inspection (Cont'd)

E.C.U. inspection table

*Data are reference values.

TER-MINAL NO.	ITEM	CONDITION	*DATA
1 2 3	Ignition signal	Engine is running. └Idle speed	Approx. 0.1V
11 12 13		Engine is running. └Engine speed is 2,000 rpm.	Approx. 0.14V
4	A.A.C. valve	Engine is running. └Racing condition	Voltage briefly decreases from battery voltage (11 - 14V).
6	Radiator fan sub-relay (Turbo model)	Engine is running. └Radiator fan is not operating.	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └Radiator fan is operating.	0.1 - 0.3V
7	Tachometer	Engine is running. └Idle speed	Approx. 0.7V
		Engine is running. └Engine speed is 2,000 rpm.	Approx. 1.2V
8	A.I.V. control solenoid valve	Engine is running. └Idle speed	Approx. 0V
		Engine is running. └Engine speed is 2,000 rpm.	BATTERY VOLTAGE (11 - 14V)
9	Air conditioner relay	Engine is running. └Air conditioner switch "OFF"	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └Air conditioner switch "ON"	Approx. 0V
16	E.C.U. power source (Self-shutoff)	Engine is running. └Idle speed	0.8 - 1.0V
		Engine is not running. └For a few seconds after turning ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)

Electrical Components Inspection (Cont'd)

*Data are reference values.

TER-MINAL NO.	ITEM	CONDITION	*DATA
18	Fuel pump relay	Ignition switch "ON" └For 5 seconds after turning ignition switch "ON"	0.7 - 0.9V
		Engine is running. Ignition switch "ON" └In 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
19	Radiator fan relay	Engine is running. └Radiator fan is not operating.	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └Radiator fan is operating.	0.1 - 0.3V
23	Detonation sensor	Engine is running. └Idle speed	Approx. 2.5V
25	Wastegate valve control solenoid valves (Turbo model)	Ignition switch "ON" Engine is running.	BATTERY VOLTAGE (11 - 14V)
		Engine is racing. └Engine speed is up to 2,000 rpm	Approx. 0.2V
27	Air flow meter	Engine is running. (Warm-up condition) └Idle speed	0.8 - 1.5V
		Engine is running. (Warm-up condition) └Engine speed is 2,000 rpm.	1.0 - 1.6V
28	Engine temperature sensor	Engine is running.	0 - 5.0V Output voltage varies with engine temperature.
29 55	Right side exhaust gas sensor Left side exhaust gas sensor	Engine is running. └After warming up sufficiently and engine speed is 2,000 rpm.	0 ↔ Approx. 1.0V
33	F.I.C.D. solenoid valve	Engine is running. └A/C compressor is not operating.	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └A/C compressor is operating.	0.7 - 0.8V

Electrical Components Inspection (Cont'd)

*Data are reference values.

TER-MINAL NO.	ITEM	CONDITION	*DATA
34	Power steering oil pressure switch	Engine is running. └Steering wheel is in the "straight ahead" position.	8.0 - 9.0V
		Engine is running. └Steering wheel is turned.	Approx. 0V
36	Fuel temperature sensor	Engine is running.	0 - 5.0V Output voltage varies with fuel temperature.
38	Throttle sensor	Ignition switch "ON"	0.4 - 4.0V Output voltage varies with throttle valve opening angle.
41 51	Crank angle sensor (Reference signal)	Engine is running. **Do not run engine at high speed under no-load.**	1.2 - 1.4V Output voltage varies slightly with engine speed.
42 52	Crank angle sensor (Position signal)	Engine is running. **Do not run engine at high speed under no-load.**	2.5 - 2.7V Output voltage varies slightly with engine speed.
43	Start signal	Ignition switch "ON"	Approx. 0V
		Ignition switch "START"	BATTERY VOLTAGE (11 - 14V)
44	Neutral switch (M/T model) A/T control unit (A/T model)	Ignition switch "ON" ┌Gear position is "Neutral" (M/T model). └Gear position is "N" or "P" (A/T model).	Approx. 0V
		Ignition switch "ON" └Except the above conditions	8.0 - 9.0V
45	Ignition switch	Ignition switch "ON" └Engine stopped	BATTERY VOLTAGE (11 - 14V)
46	Air conditioner switch	Engine is running. └Air conditioner switch "OFF"	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └Air conditioner switch "ON"	0.5 - 0.7V

Electrical Components Inspection (Cont'd)

*Data are reference values.

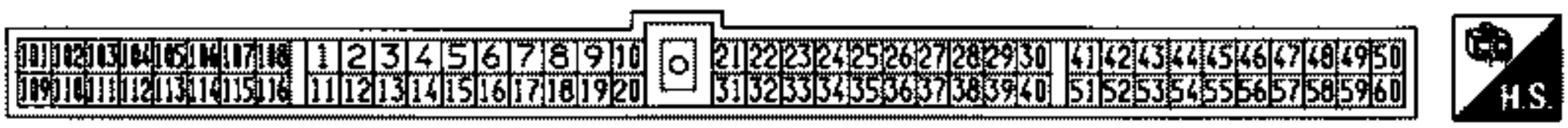
TER-MINAL NO.	ITEM	CONDITION	*DATA
48	Power source for sensors	Ignition switch "ON" └Engine stopped	Approximately 5.0V
49	Battery source	Ignition switch "ON" └Engine stopped	BATTERY VOLTAGE (11 - 14V)
54	Throttle valve switch (Idle position)	Ignition switch "ON" └Accelerator pedal is fully released (engine running).	9.0 - 10.0V
		Ignition switch "ON" └Accelerator pedal is depressed (engine running).	0V
57	Power source for throttle valve switch	Ignition switch "ON" └Engine running	BATTERY VOLTAGE (11 - 14V)
59	Power supply	Ignition switch "ON" └Engine running	BATTERY VOLTAGE (11 - 14V)
101 103 105 110 112 114	Injectors	Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
102	E.G.R. control solenoid valve	Engine is running. (Warm-up condition) └Idle speed	0.7 - 0.8V
		Engine is running. (Warm-up condition) └Engine speed is 2,000 rpm.	BATTERY VOLTAGE (11 - 14V)
35 104	Fuel pump voltage control (35: Turbo model)	Ignition switch "ON" └Engine stopped	BATTERY VOLTAGE (11 - 14V)
		Engine is running. (Warm-up condition) └Idle speed	Approx. 0V
111	P.R.V.R. control solenoid valve	Stop and restart engine after warming it up. └Fuel temperature is above 75°C (167°F)	0 - 1.0V (for 30 seconds after ignition switch is turned off.)
			BATTERY VOLTAGE (After 30 seconds)
		Stop and restart engine after warming it up. └Fuel temperature is below 75°C (167°F)	BATTERY VOLTAGE (11 - 14V)

Electrical Components Inspection (Cont'd)

*Data are reference values.

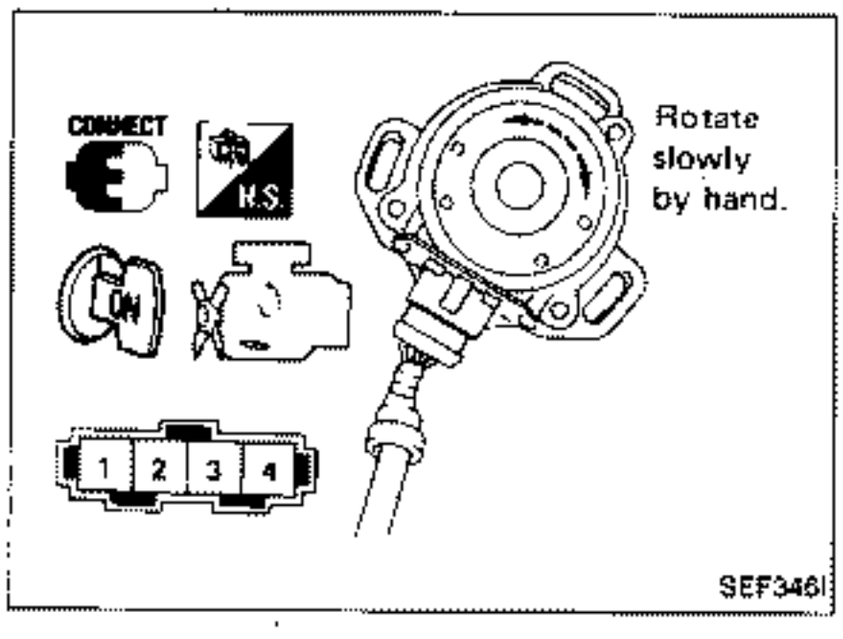
TER-MINAL NO.	ITEM	CONDITION	*DATA
113	Valve timing control solenoid valves	Engine is running. └Idle speed	BATTERY VOLTAGE (11 - 14V)
		Engine is running. └Engine speed is 3,000 rpm.	0.2 - 0.5V

E.C.U. HARNESS CONNECTOR TERMINAL LAYOUT



SEC250B

Electrical Components Inspection (Cont'd)



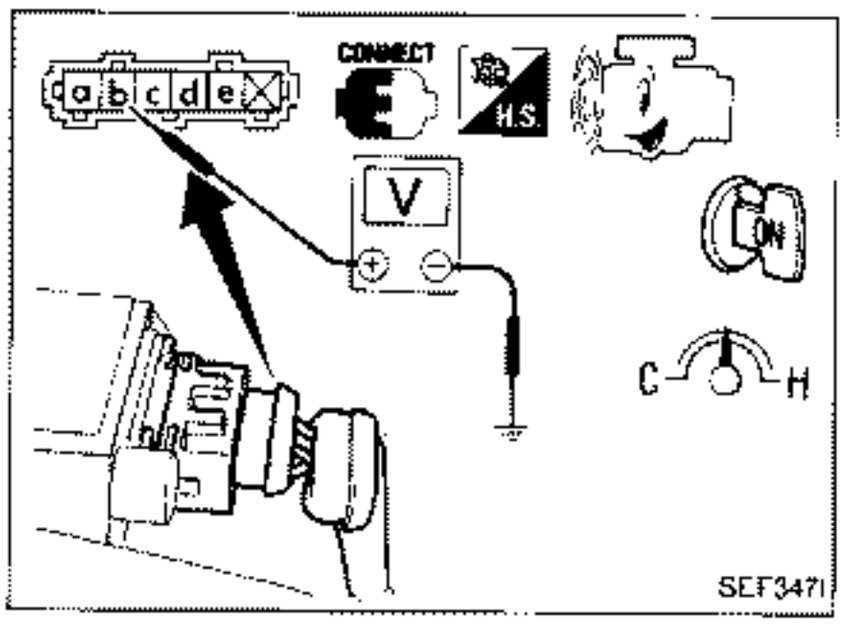
CRANK ANGLE SENSOR

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

Terminal	Voltage
② (120° signal)	Voltage fluctuates between 5V and 0V.
① (1° signal)	

If N.G., replace crank angle sensor.

After this inspection, malfunction code No. 11 might be displayed though the crank angle sensor is functioning properly. In this case erase the stored memory.

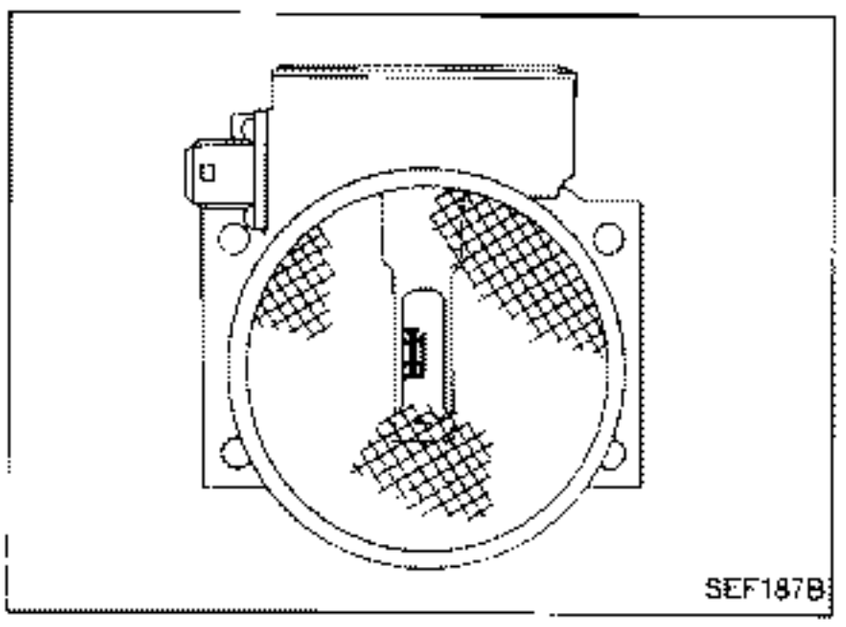


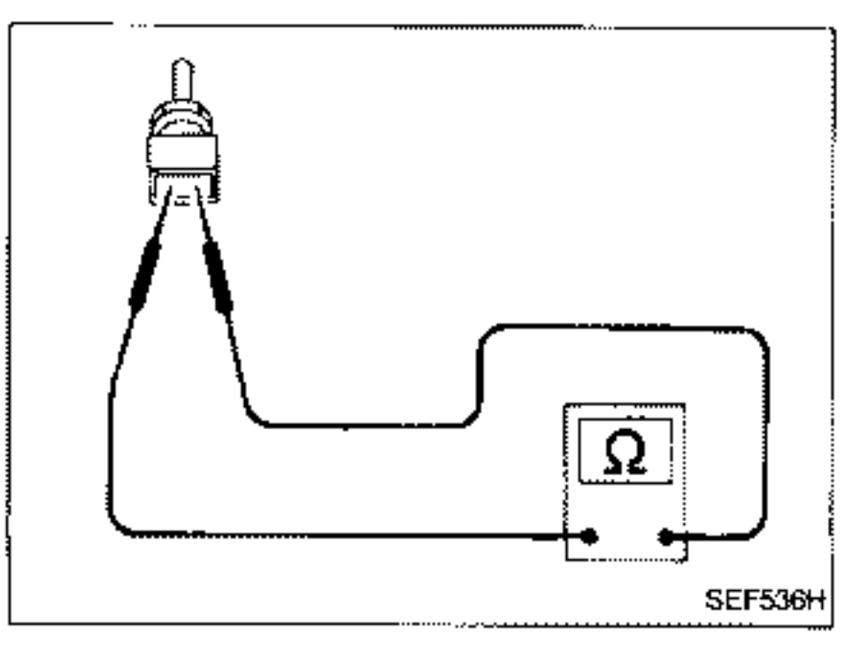
AIR FLOW METER

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

Conditions	Voltage V
Ignition switch "ON" (Engine stopped.)	Approximately 0.8
Idle (Engine is warm-up sufficiently.)	Approximately 0.8 - 1.5

5. If N.G., remove air flow meter from air duct. Check hot wire for damage or dust.





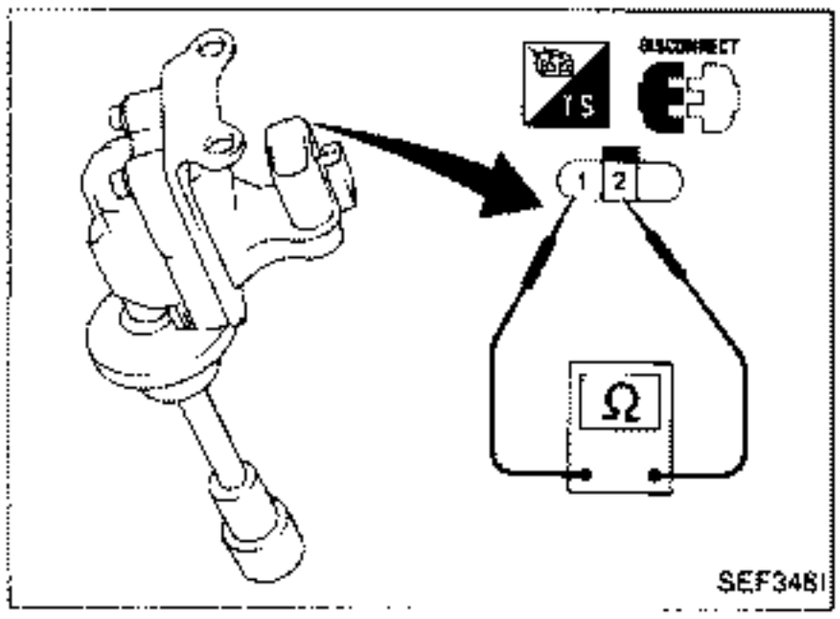
ENGINE TEMPERATURE SENSOR

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

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

If N.G., replace engine temperature sensor.

Electrical Components Inspection (Cont'd)

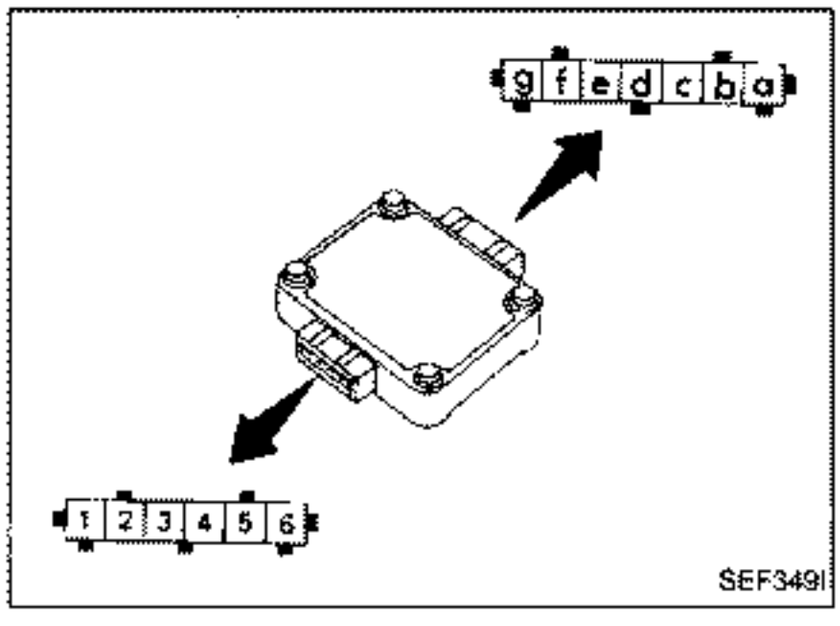


IGNITION COIL

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

Terminal	Resistance
① - ②	Approximately 0.7Ω

If N.G., replace ignition coil.

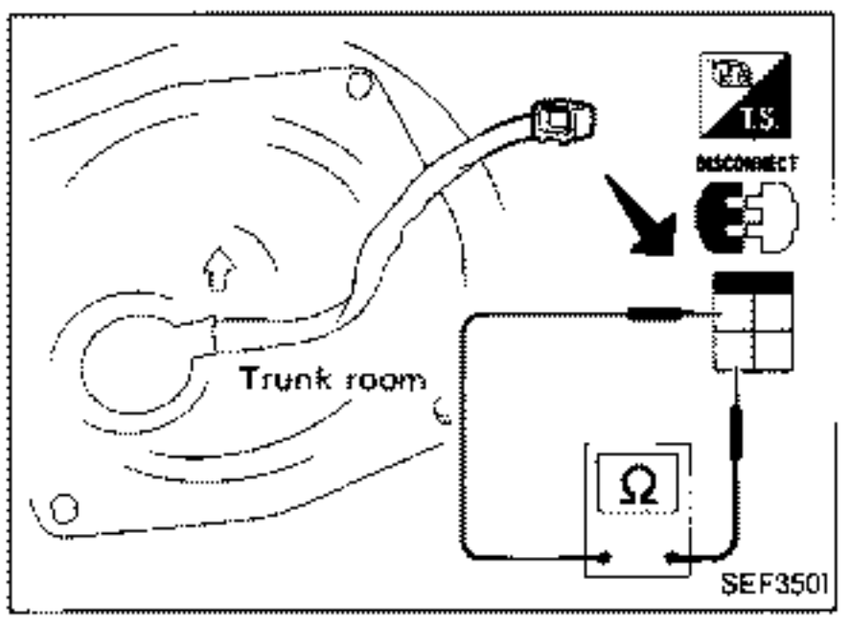


POWER TRANSISTOR

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

Terminal combination						Tester polarity	Continuity	Tester polarity	Continuity
g	g	g	g	g	g	⊕	No	⊖	Yes
a	b	c	d	e	f	⊖		⊕	
g	g	g	g	g	g	⊕	Yes	⊖	Yes
1	2	3	4	5	6	⊖		⊕	
a	b	c	d	e	f	⊕	Yes	⊖	No
1	2	3	4	5	6	⊖		⊕	

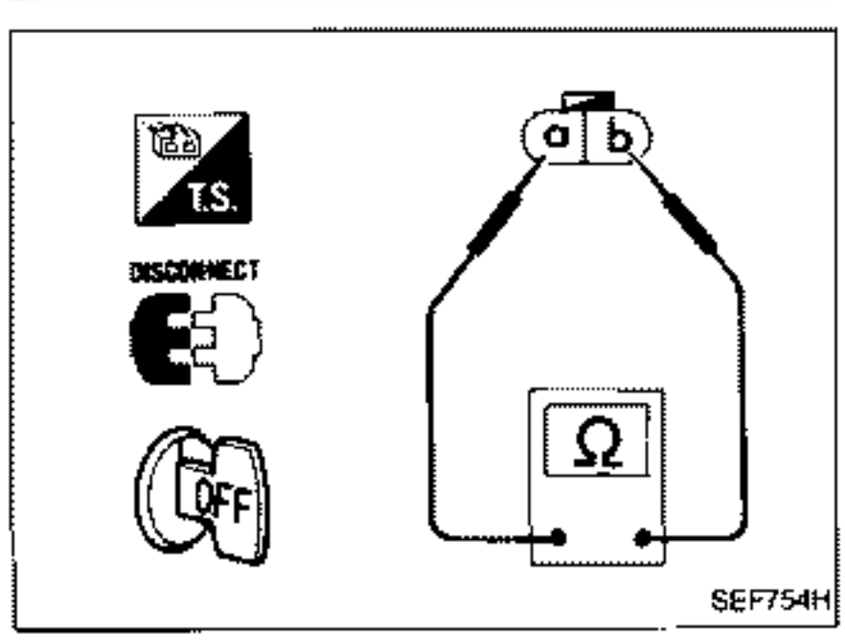
If N.G., replace power transistor.



FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between terminals ⓐ and ⓒ.
   Resistance: Approximately 0.5Ω

If N.G., replace fuel pump.



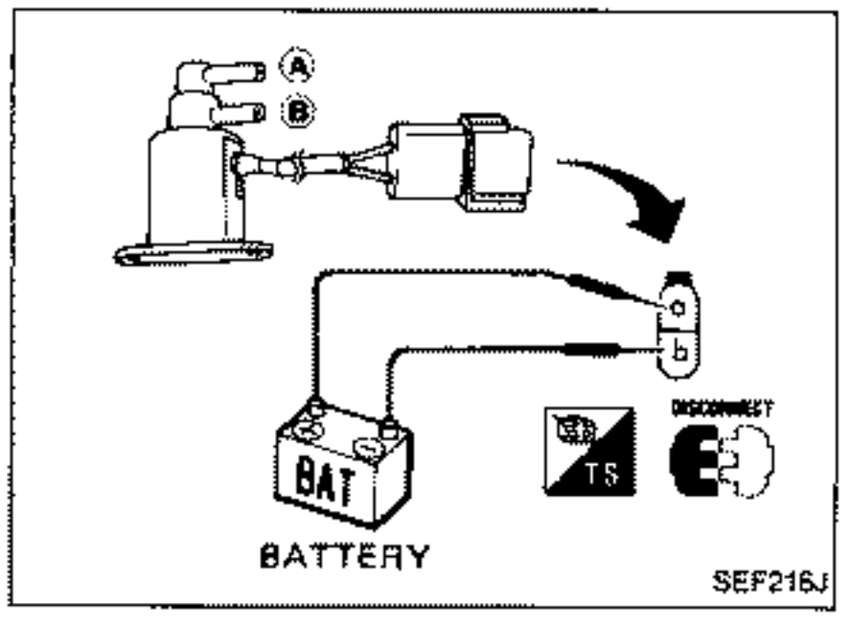
VEHICLE SPEED SENSOR

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

Continuity should come and go.

If N.G., replace vehicle speed sensor.

Electrical Components Inspection (Cont'd)

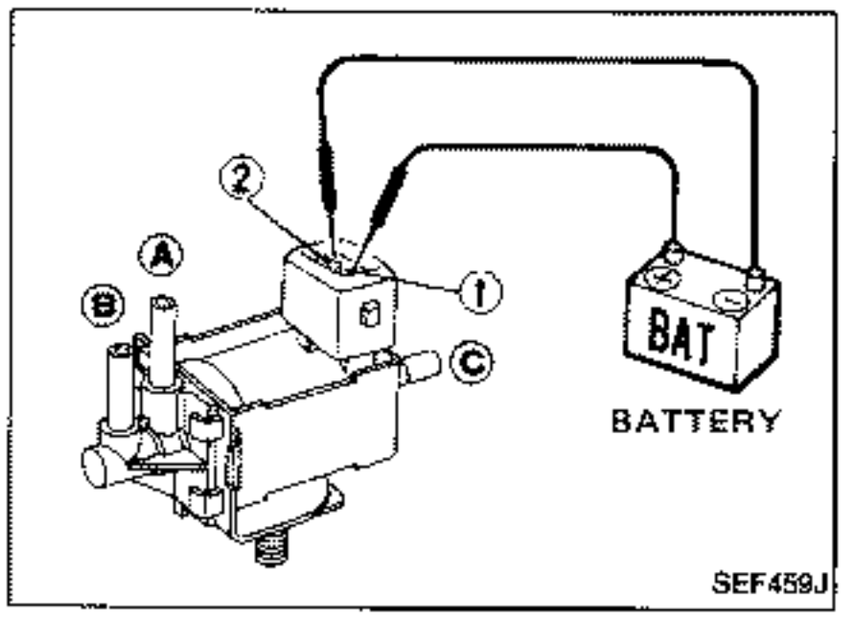


WASTEGATE VALVE CONTROL SOLENOID VALVE

Check air passage continuity.

Condition	Air passage continuity between Ⓐ and Ⓑ
12V direct current supply between terminals ⓐ and ⓑ	Yes
No supply	No

If N.G., replace solenoid valve.

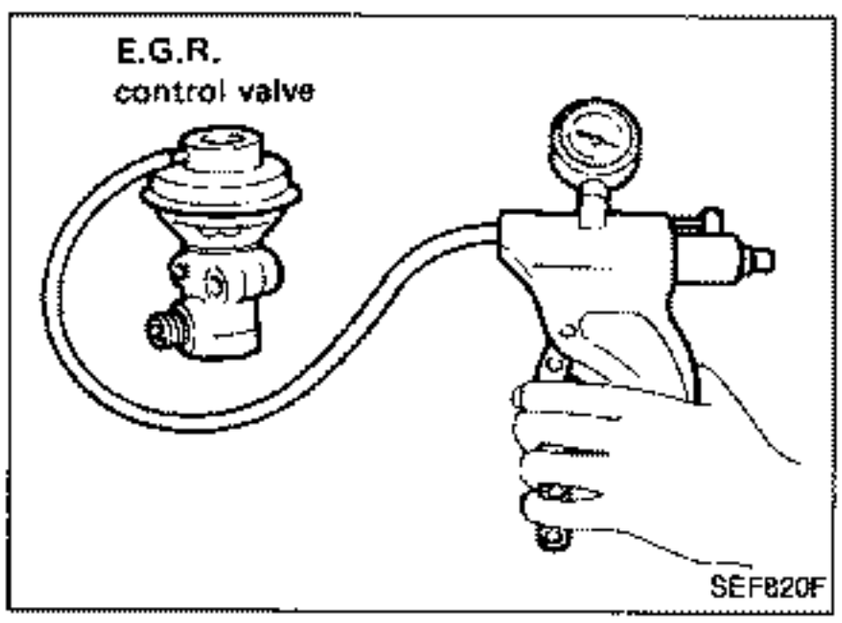


E.G.R. CONTROL SOLENOID VALVE
A.I.V. CONTROL SOLENOID VALVE
P.R.V.R. CONTROL SOLENOID VALVE

Check air passage continuity.

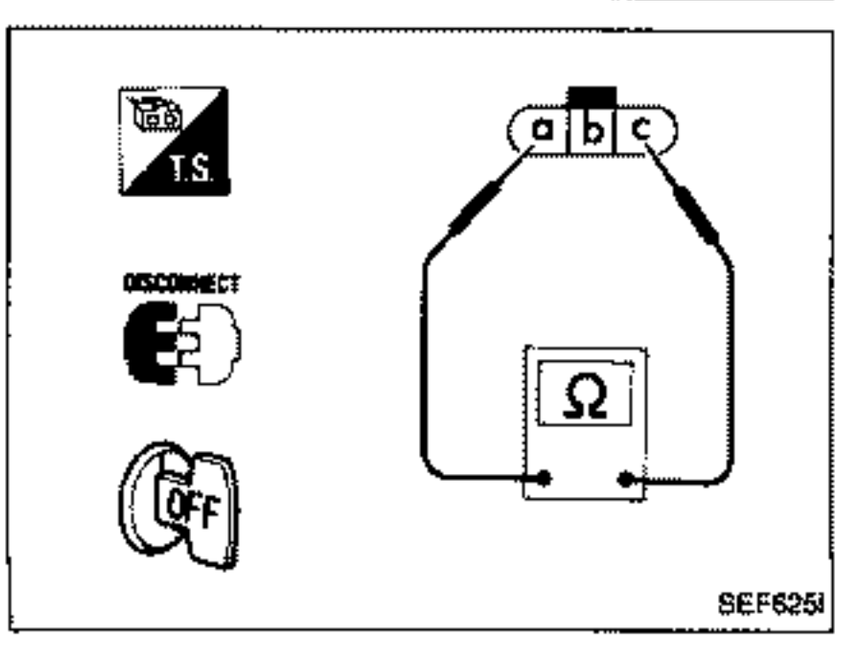
Condition	Air passage continuity between Ⓐ and Ⓑ	Air passage continuity between Ⓐ and Ⓒ
12V direct current supply between terminals ① and ②	Yes	No
No supply	No	Yes

If N.G., replace solenoid valve.



E.G.R. CONTROL VALVE

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



EXHAUST GAS SENSOR

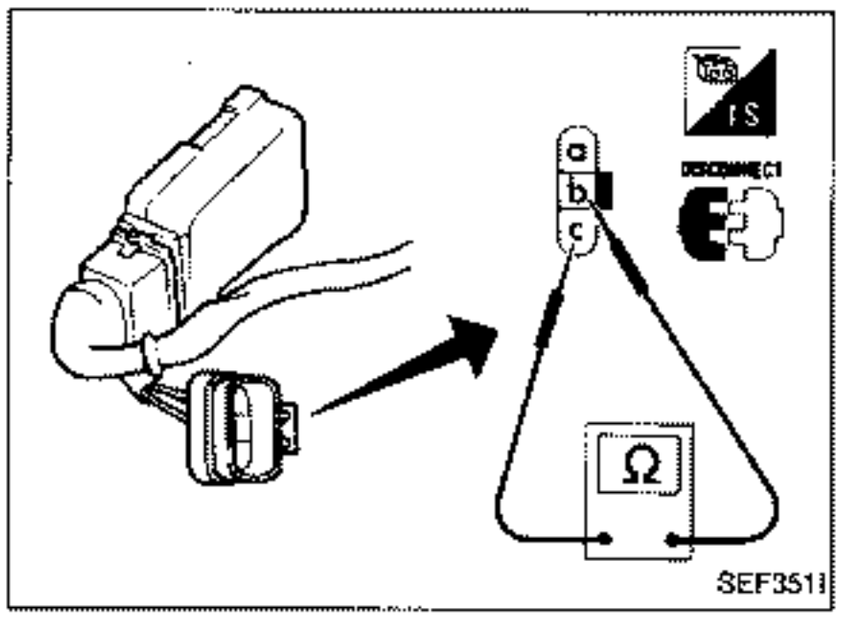
Refer to "Diagnostic Procedure 30".
(See page EF & EC-128.)

EXHAUST GAS SENSOR HEATER

Check resistance between terminals ⓐ and ⓒ.
Resistance: 3 - 1,000Ω
If N.G., replace exhaust gas sensor.

Electrical Components Inspection (Cont'd)

THROTTLE SENSOR



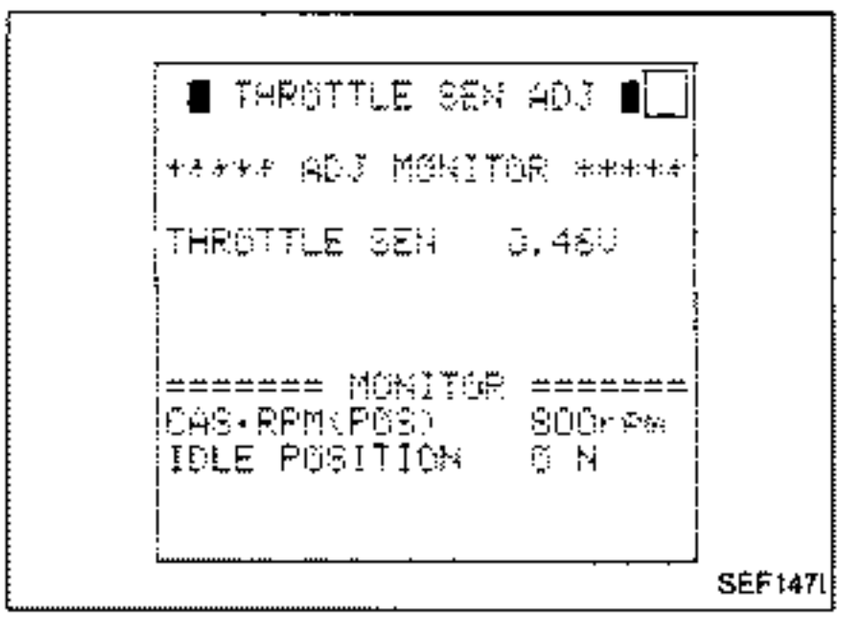
1. Disconnect throttle sensor harness connector.
2. Make sure that resistance between terminals ⓑ and ⓒ changes when opening throttle valve manually.

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

If N.G., replace throttle sensor.

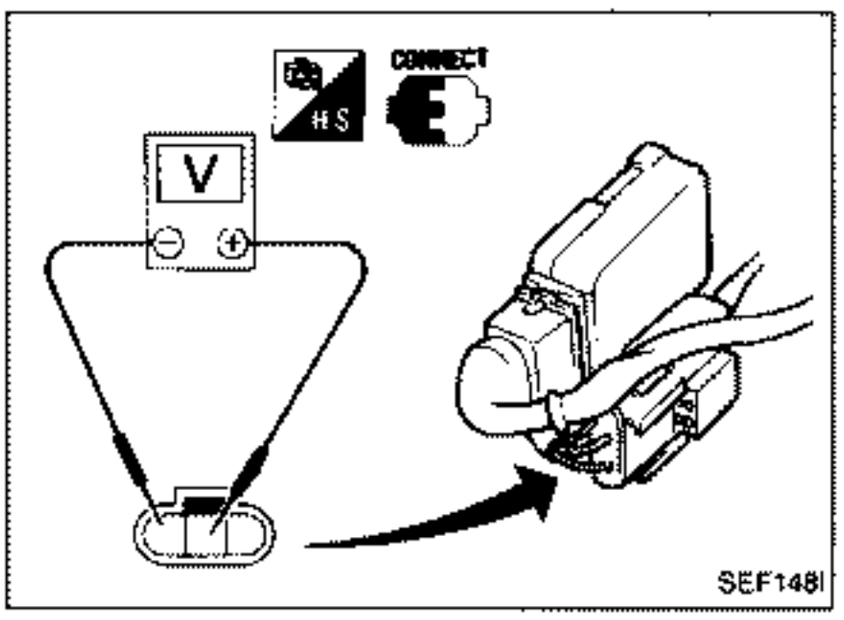
Adjustment

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

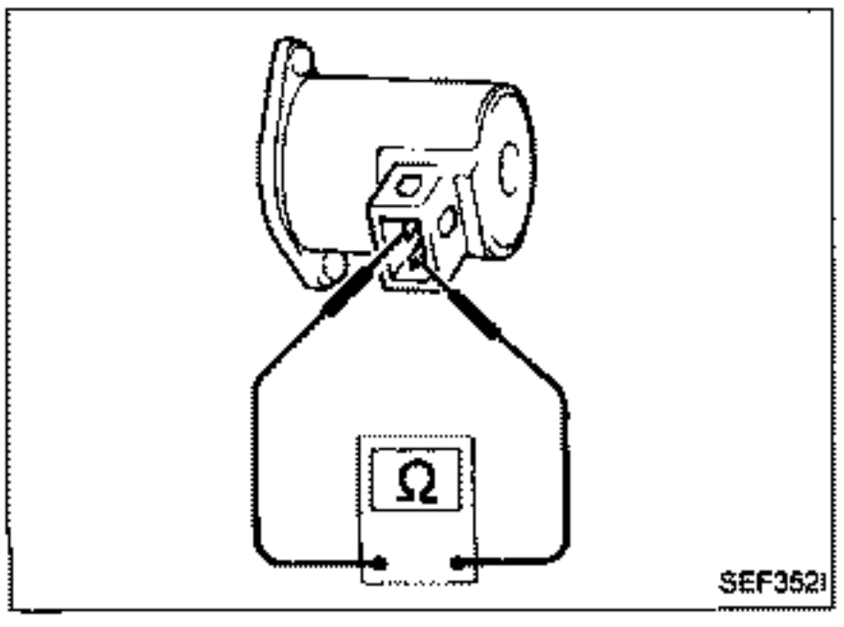


1. Install throttle sensor body in throttle chamber. Do not tighten bolts.
2. Connect throttle sensor and idle switch harness connector.
3. Start engine and warm it up sufficiently.
4. Perform "THROTTLE SEN ADJ" in "WORK SUPPORT" mode.

Measure output voltage of throttle sensor using voltmeter.



5. Adjust by rotating throttle sensor body so that output voltage is 0.4 to 0.5V.
6. Tighten mounting bolts.
7. Disconnect throttle sensor harness connector for a few seconds and then reconnect it.



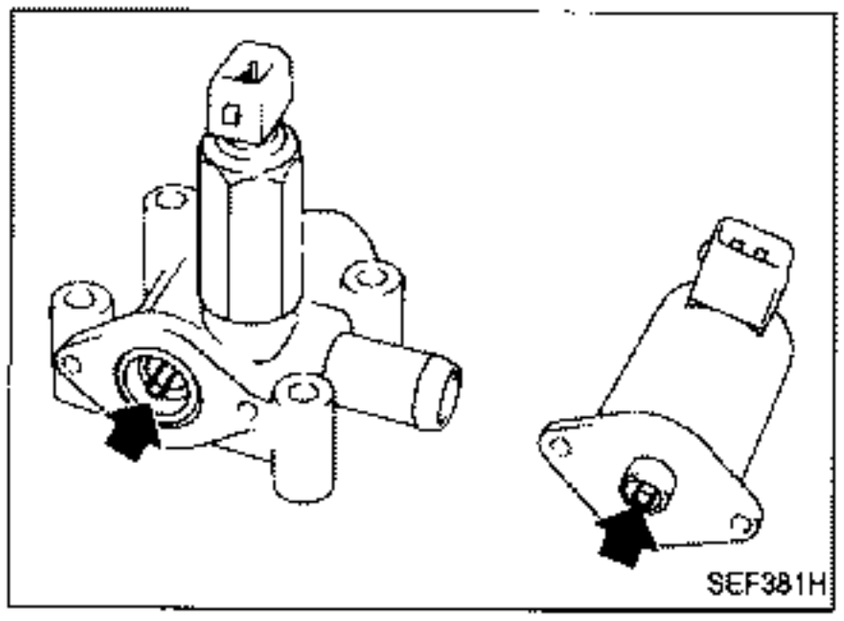
A.A.C. VALVE

- Check A.A.C. valve resistance.

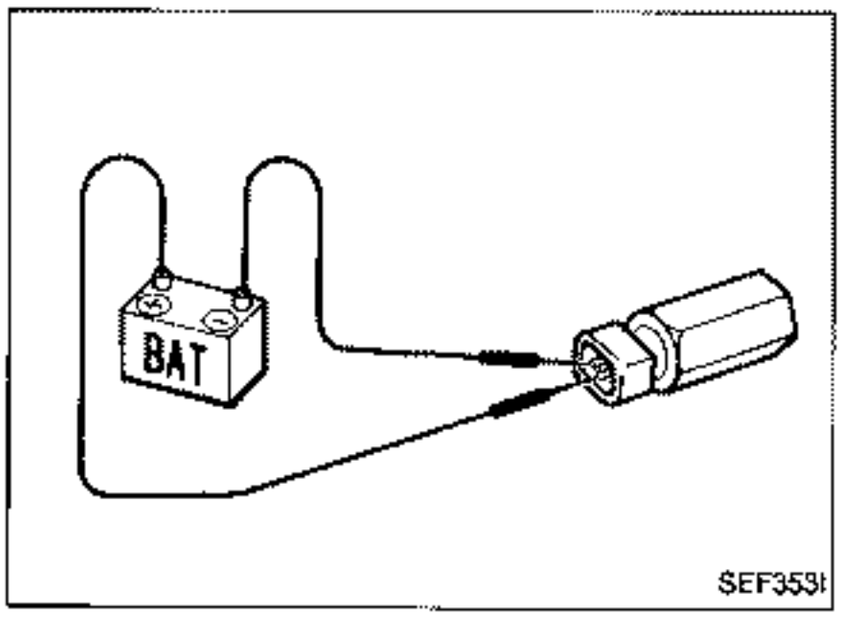
  Resistance:

  Approximately 10Ω

Electrical Components Inspection (Cont'd)

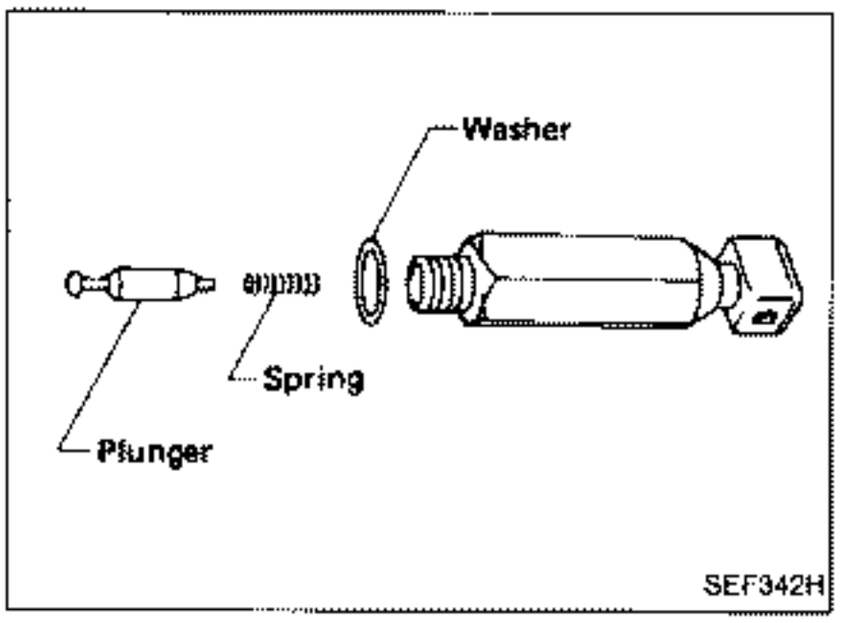


- Check plunger for seizing or sticking.
- Check for broken spring.

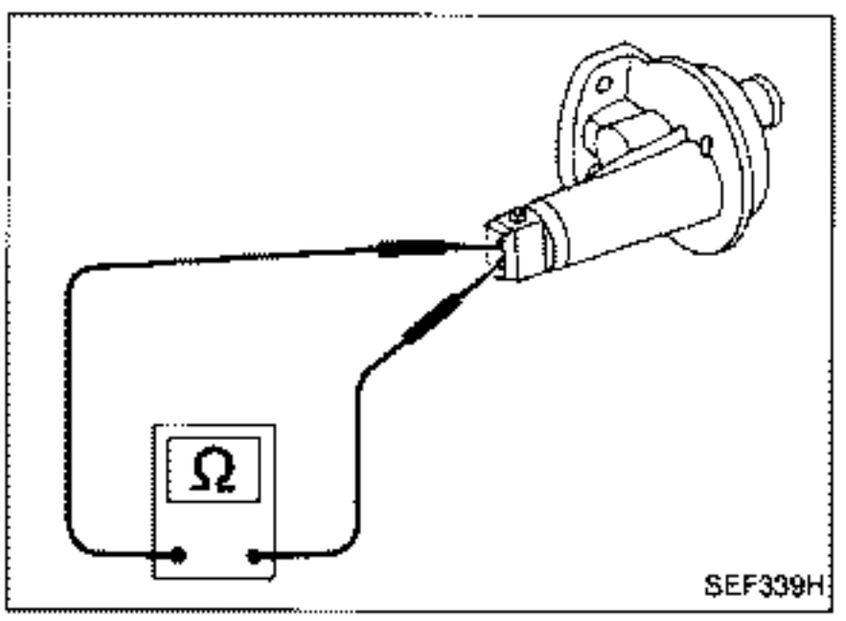


F.I.C.D. SOLENOID VALVE

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

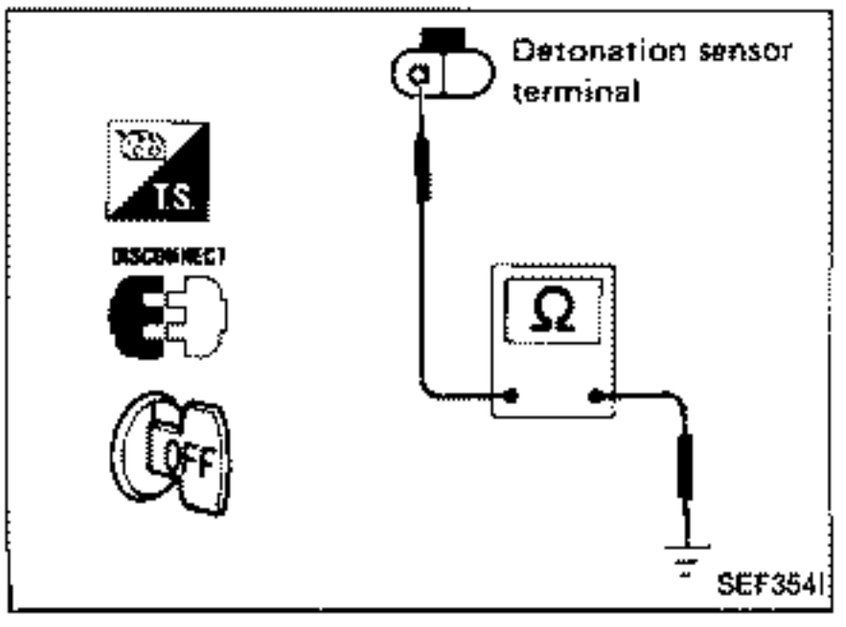


- Check plunger for seizing or sticking.
- Check for broken spring.



AIR REGULATOR

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

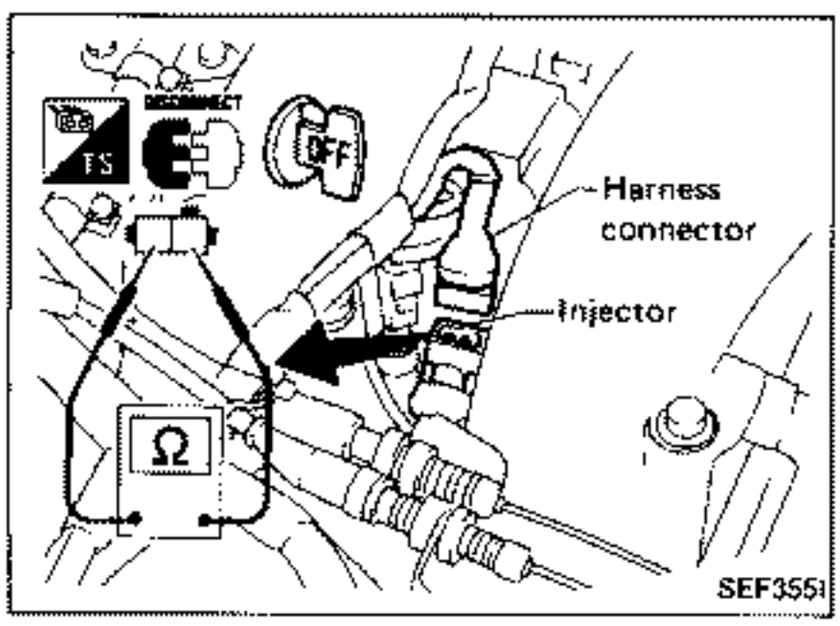


DETONATION SENSOR

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

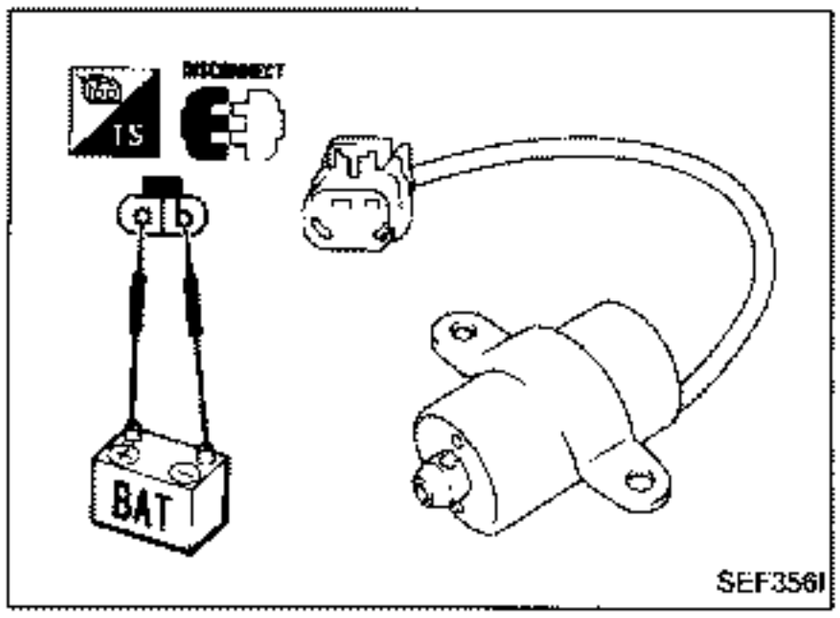
Continuity should exist.

Electrical Components Inspection (Cont'd)



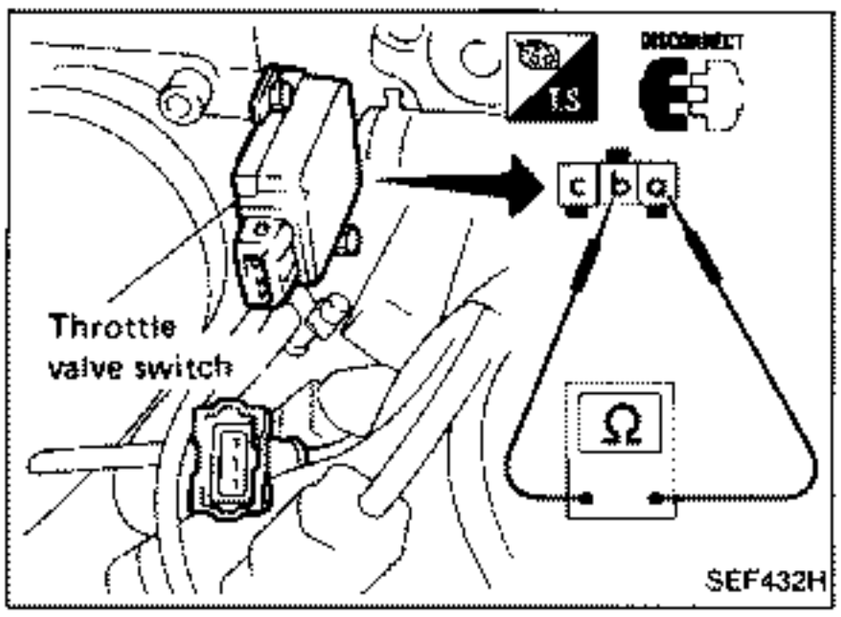
INJECTOR

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



VALVE TIMING CONTROL SOLENOID VALVE

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

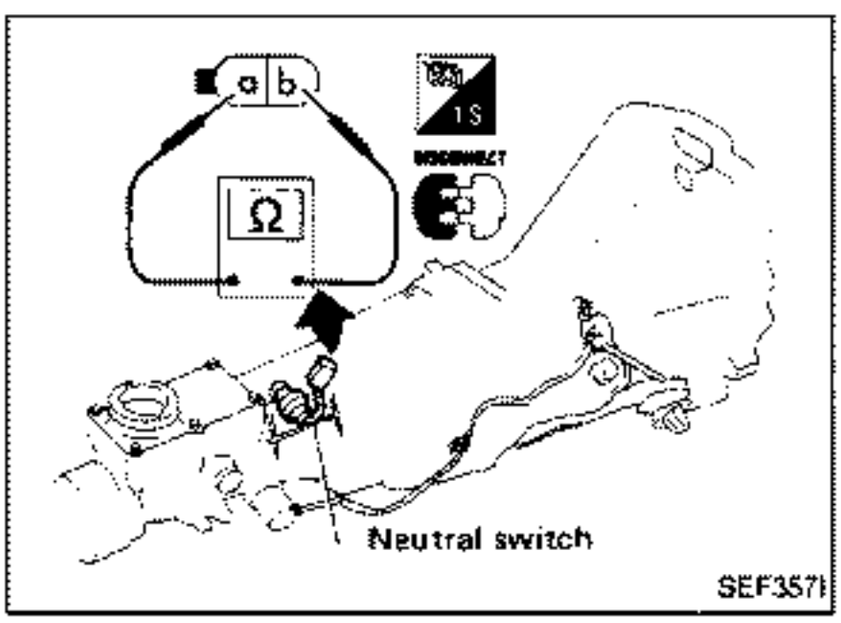


THROTTLE VALVE SWITCH (Idle position)

1. Disconnect idle switch harness connector.
2. Check continuity between terminals ⓐ and ⓑ.

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

If N.G., replace throttle valve switch.

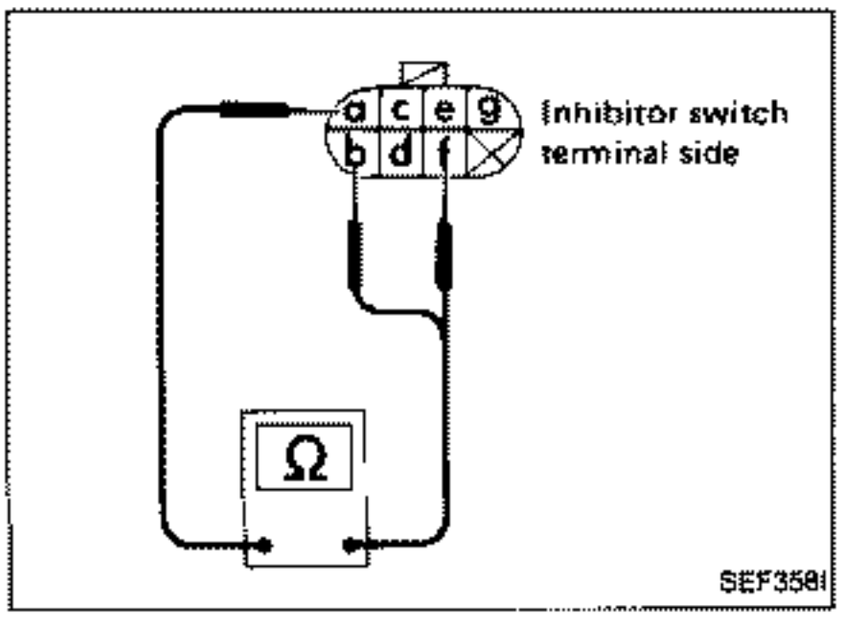


NEUTRAL SWITCH

Check continuity between terminals ⓐ and ⓑ.

Conditions	Continuity
Shift to Neutral	Yes
Shift to other position	No

If N.G., replace neutral switch.

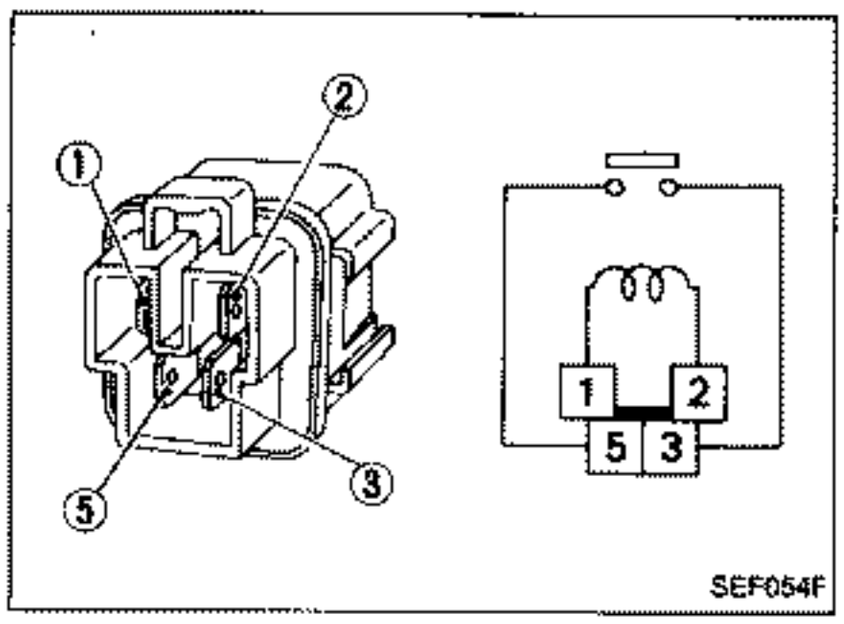


INHIBITOR SWITCH

Check continuity between terminals ⓐ and ⓑ, ⓕ.

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

Electrical Components Inspection (Cont'd)



E.C.C.S. RELAY, FUEL PUMP RELAY, RADIATOR FAN RELAY AND IGNITION COIL RELAY

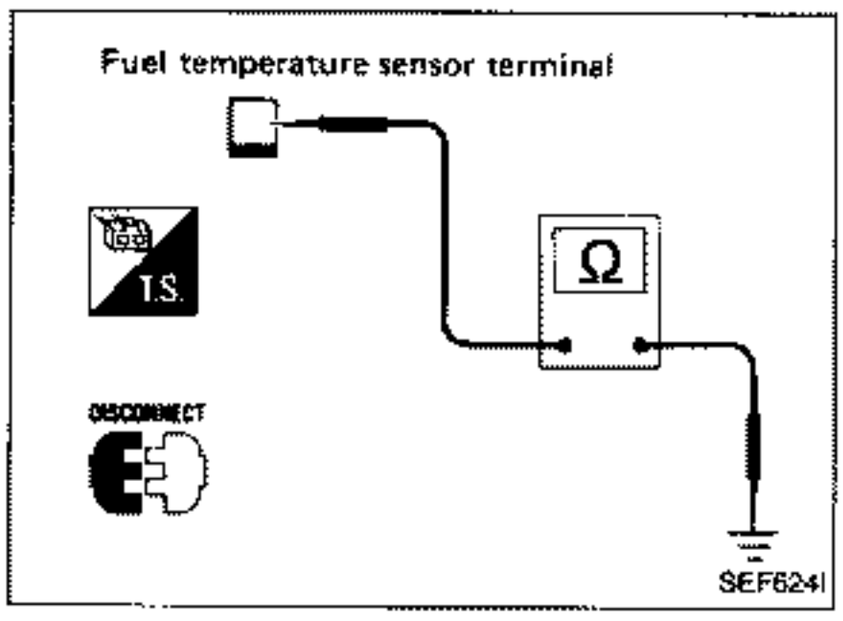
Check continuity between terminals ③ and ⑤.

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

If N.G., replace relay.

POWER STEERING OIL PRESSURE SWITCH

1. Disconnect power steering oil pressure switch harness connector.
2. Check resistance between terminals.
   Resistance: Approximately 2 - 3Ω

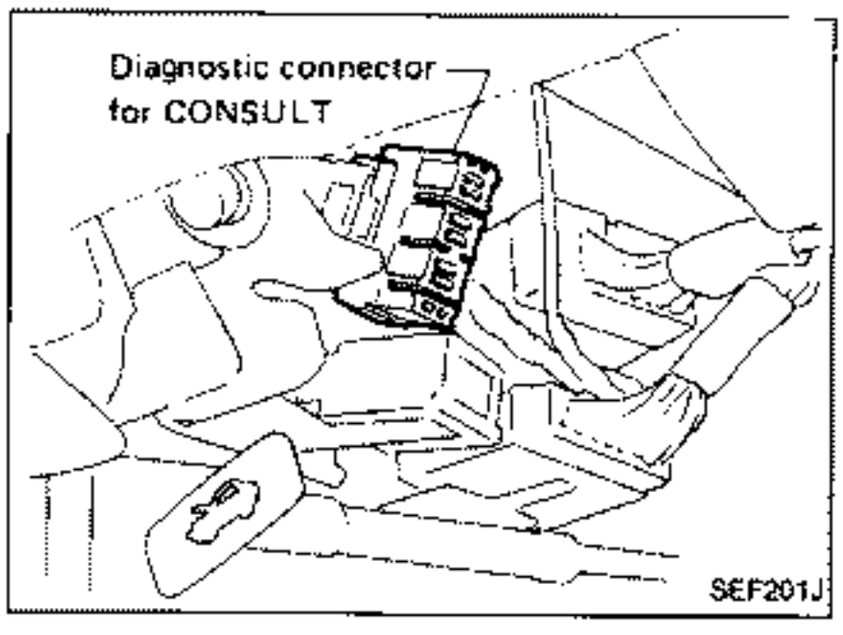


FUEL TEMPERATURE SENSOR

1. Disconnect fuel temperature sensor harness connector.
2. Check resistance between terminal and ground as shown in the figure.

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

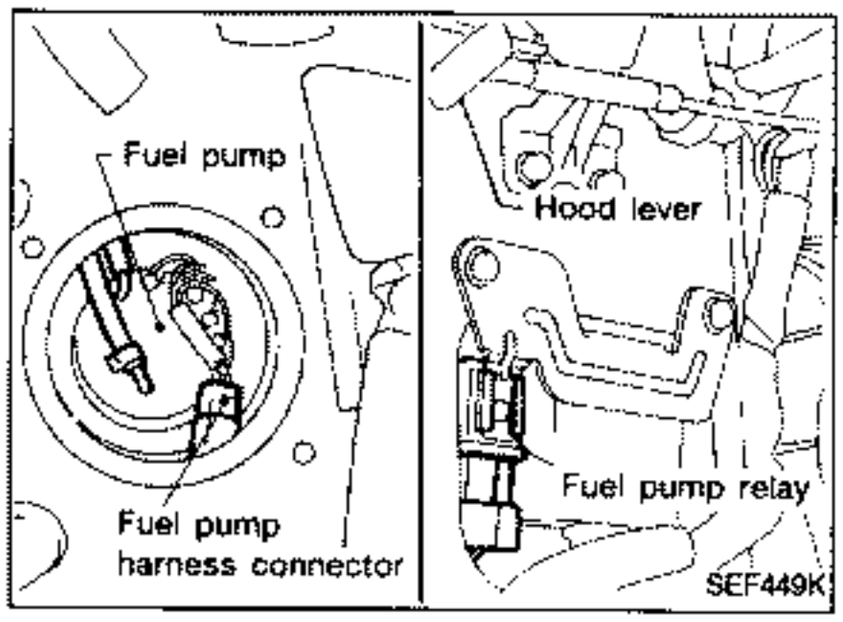
If N.G., replace fuel inhibitor switch.



Releasing Fuel Pressure

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

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

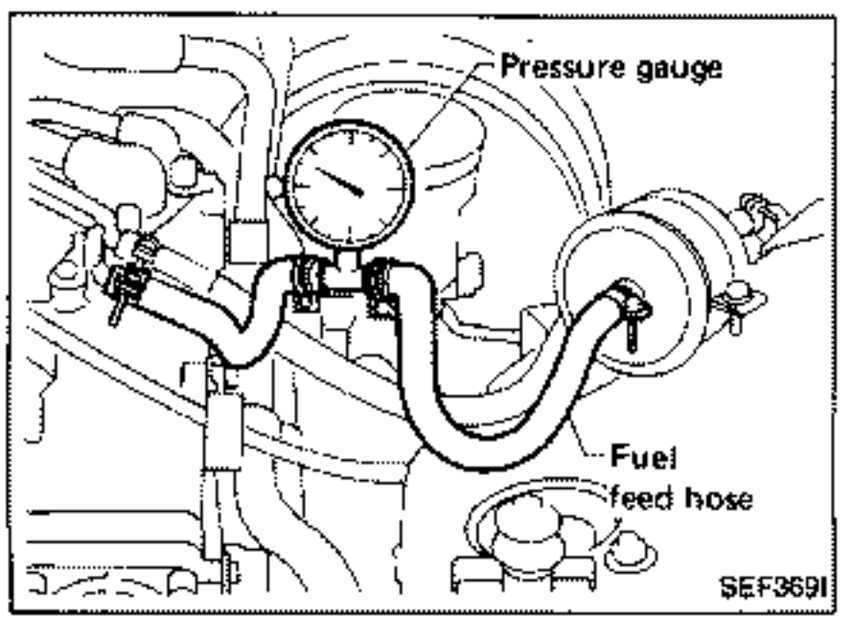


1. Remove fuel pump relay or disconnect fuel pump connector.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch off and reconnect fuel pump relay or fuel pump connector.

Fuel Pressure Check

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

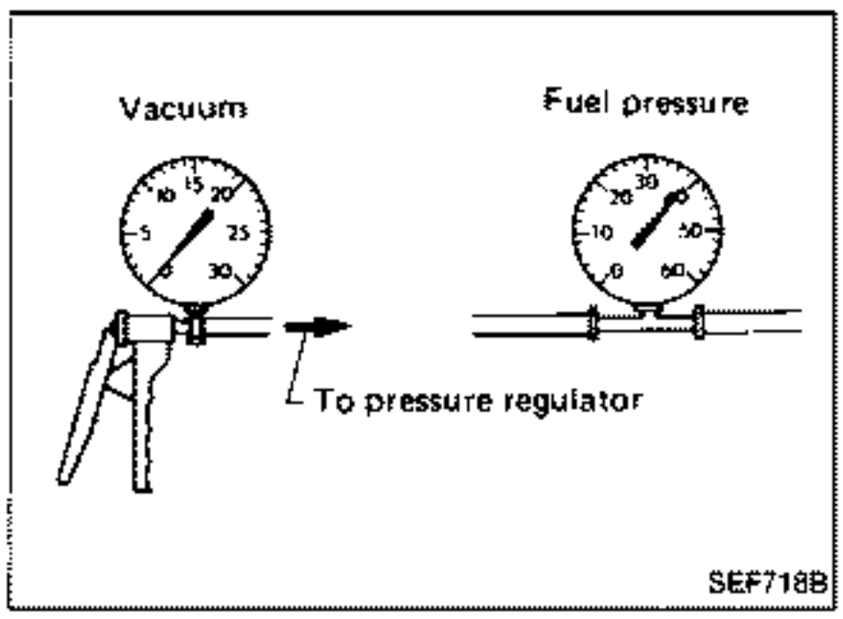
1. Release fuel pressure to zero.
2. Disconnect fuel hose between fuel filter and fuel tube (engine side).
3. Install pressure gauge between fuel filter and fuel tube.
4. Start engine and check for fuel leakage.



5. Read the indication of fuel pressure gauge.
   At idling:
   When fuel pressure regulator valve vacuum hose is connected.
   Approximately 250.1 kPa (2.501 bar, 2.55 kg/cm^2, 36.3 psi)
   When fuel pressure regulator valve vacuum hose is disconnected.
   Approximately 299.1 kPa (2.991 bar, 3.05 kg/cm^2, 43.4 psi)

Fuel Pressure Check (Cont'd)

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



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

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

Injector Removal and Installation

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

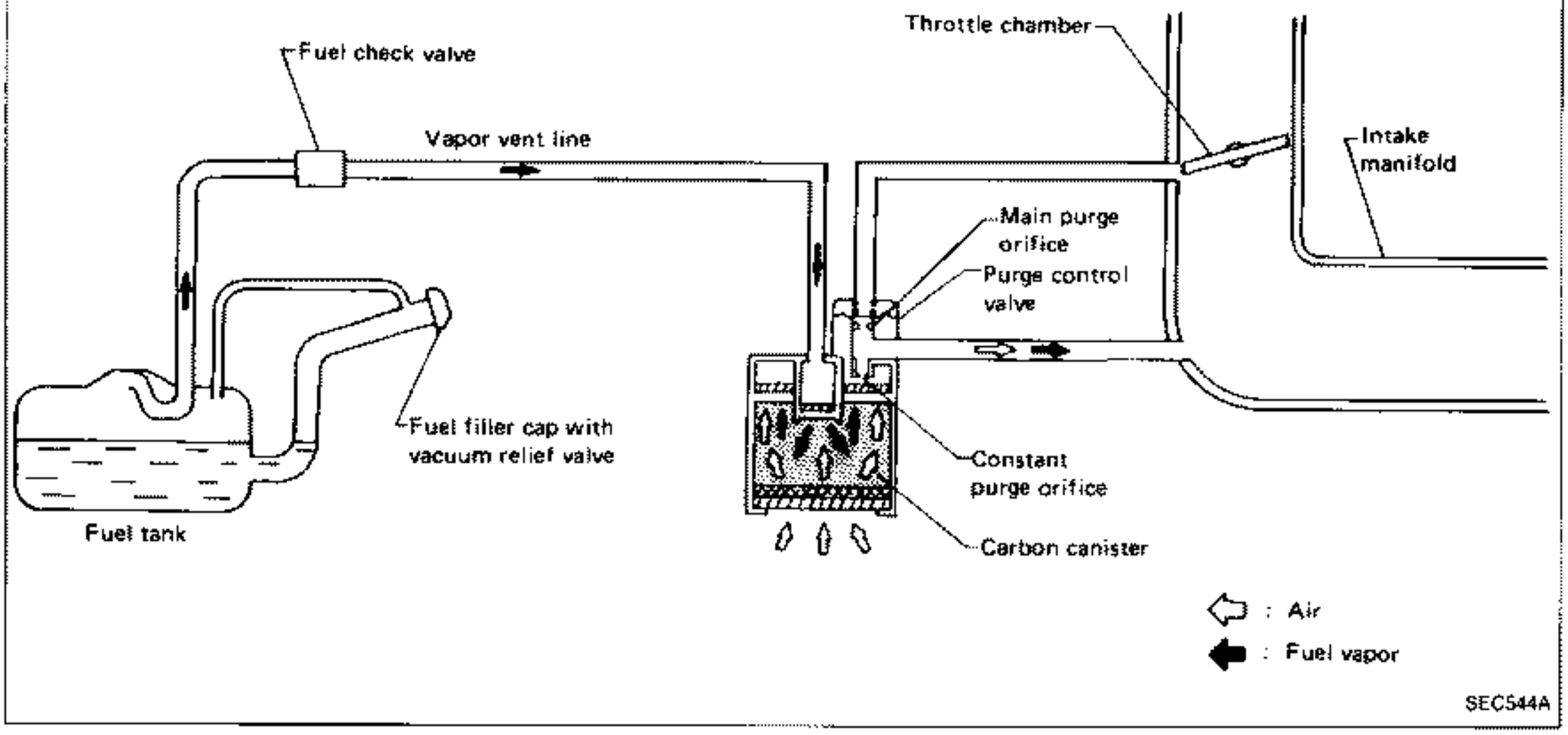
   For details, refer to EM section.
4. Remove injectors with fuel tube assembly.
5. Remove injectors from fuel tube assembly.
6. Install injectors as follows:

1) Clean exterior of injector tail piece.
2) Use new O-rings.

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

7. Assemble injectors with fuel tube assembly to intake manifold.

Description

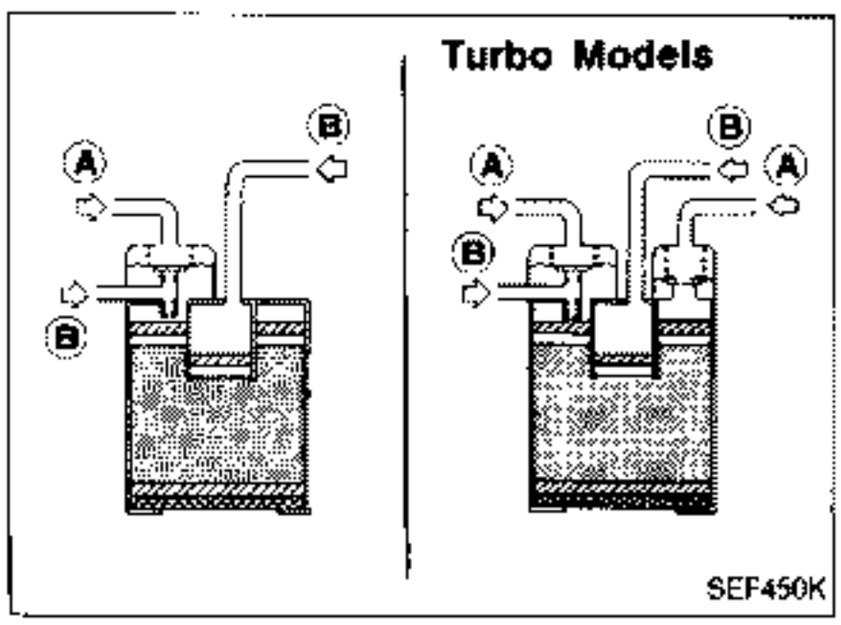


The evaporative emission control system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the carbon canister.

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

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

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



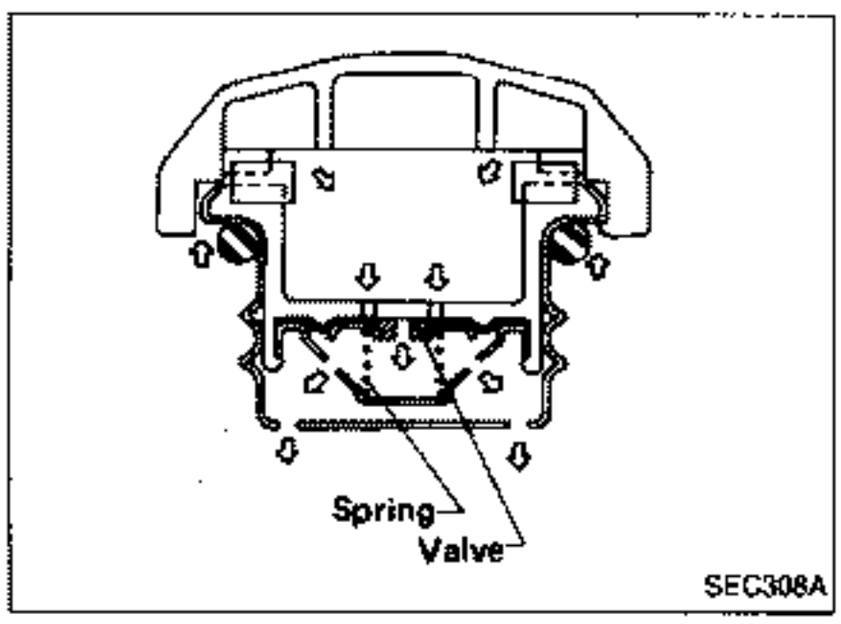
Inspection

CARBON CANISTER

Check carbon canister as follows:

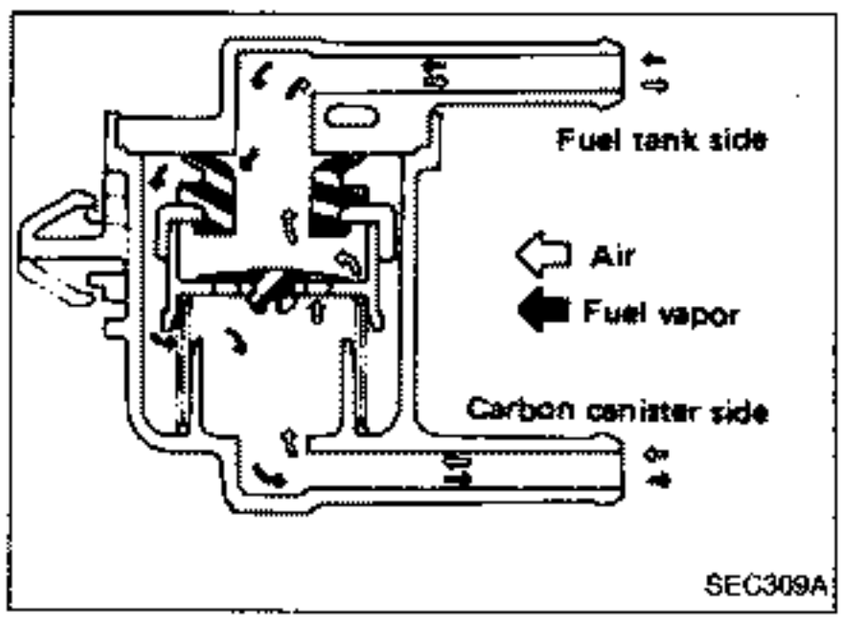
Ⓐ : Blow air and ensure that there is no leakage.
Ⓑ : Blow air and ensure that there is leakage.

Inspection (Cont'd)



FUEL TANK VACUUM RELIEF VALVE

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

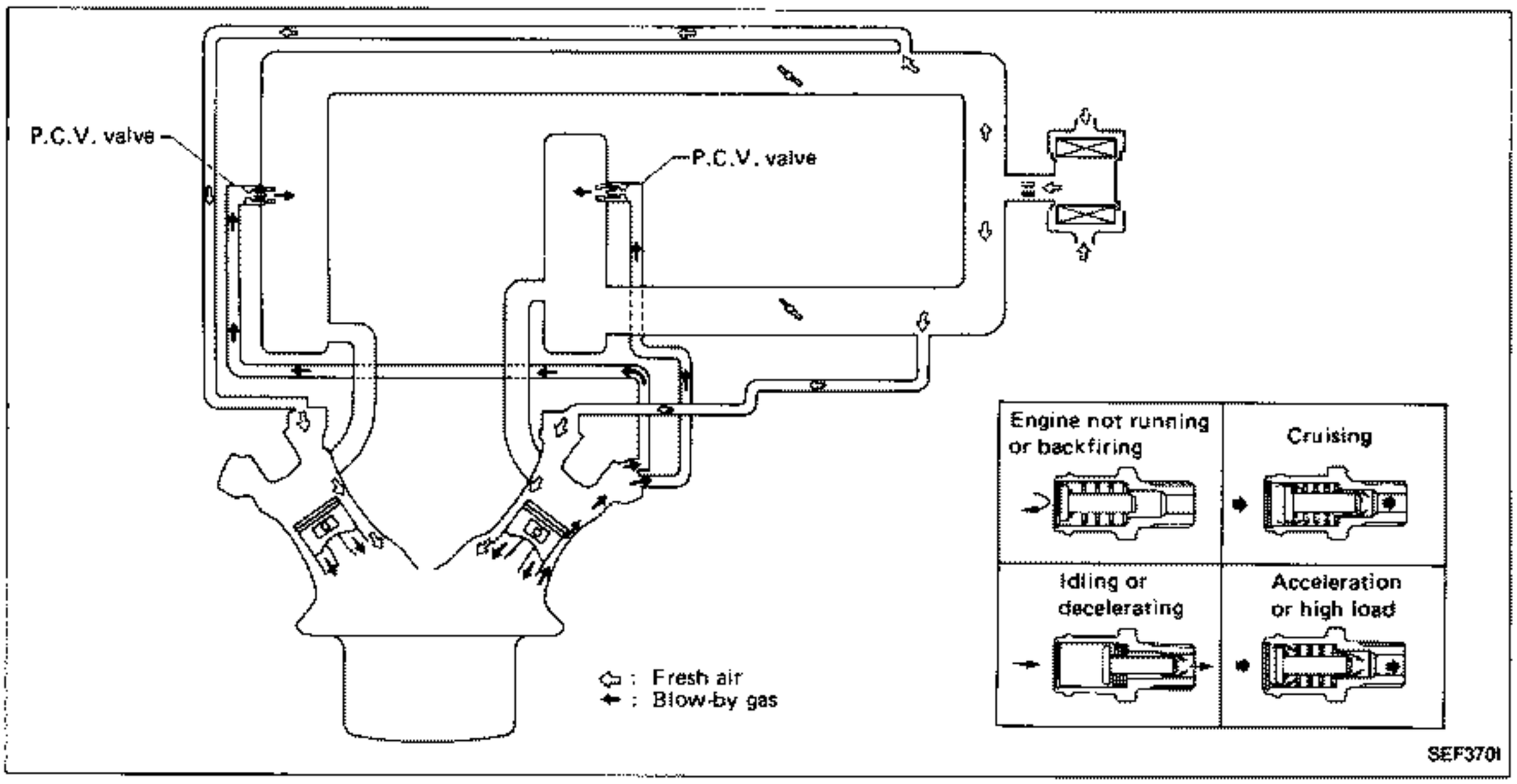


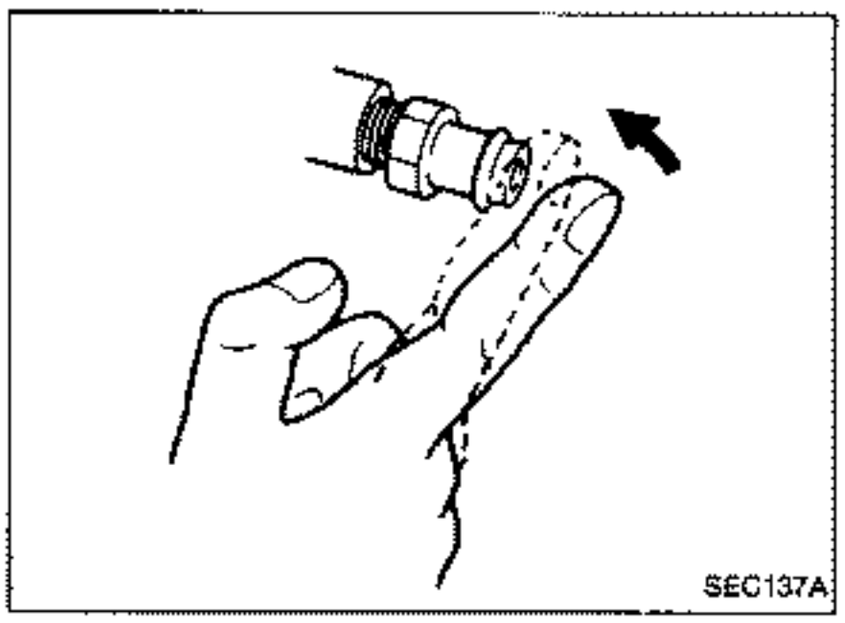
FUEL CHECK VALVE

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

Description

This system returns blow-by gas to both the intake manifold and air inlet tubes.
The positive crankcase ventilation (P.C.V.) valve is provided to conduct crankcase blow-by gas to the intake manifold.
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the P.C.V. valve.
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.
The ventilating air is then drawn from the air 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.

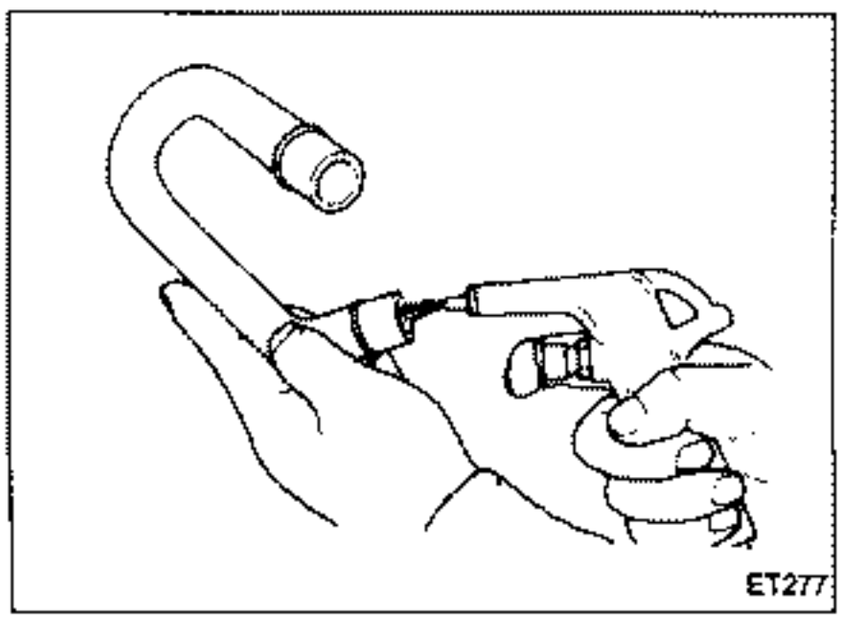



SEC137A

Inspection

P.C.V. (Positive Crankcase Ventilation)

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


ET277

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 (bar, kg/cm^2, psi)	299.1 (2.991, 3.05, 43.4)

Inspection and Adjustment

Idle speed*1	rpm	
No-load*2		
M/T		700 ± 50
A/T (in "N" position)		
Non-turbo		770 ± 50
Turbo		750 ± 50
Air conditioner: ON		
Non-turbo		800 ± 50
Turbo		850 ± 50
Ignition timing	degree	15 ± 2 B.T.D.C.
Throttle sensor idle position	V	0.4 - 0.5

*1: Feedback controlled and needs no adjustments

*2: Under the following conditions:
- Air conditioner switch: OFF
- Steering wheel: Kept straight
- Electric load: OFF (Lights, heater, fan & rear defogger)
- Radiator fan: OFF

IGNITION COIL

Primary voltage	V	12
Primary resistance [at 20°C (68°F)]	Ω	Approximately 0.7
Secondary resistance [at 20°C (68°F)]	kΩ	Approximately 8

ENGINE TEMPERATURE SENSOR AND FUEL TEMPERATURE SENSOR

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

FUEL PUMP

Resistance	Ω	Approximately 0.5

EXHAUST GAS TEMPERATURE SENSOR

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

EXHAUST GAS SENSOR HEATER

Resistance	Ω	3 - 1,000

A.A.C. VALVE

Resistance	Ω	Approximately 10

INJECTOR

Resistance	Ω	10 - 14

THROTTLE SENSOR

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

AIR REGULATOR

Resistance	Ω	70 - 80

POWER STEERING OIL PRESSURE SWITCH

Resistance	Ω	Approximately 2 - 3