ENGINE FUEL & EMISSION CONTROL SYSTEM

SECTION EF & EC

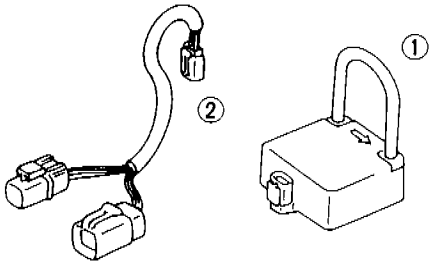
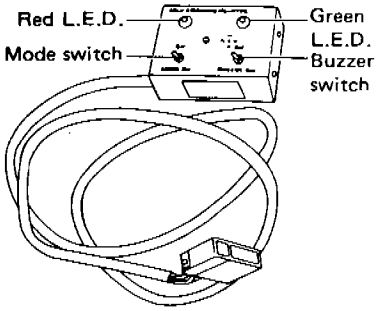
CONTENTS

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

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

E.C.C.S Wiring Diagram — See pull-out following EL section.

SPECIAL SERVICE TOOLS

Tool number Tool name	Description	
KV109D10S0 Ignition timing adapter coil set ① KV109D0010 Ignition timing adapter coil ② KV109D0015 Adapter harness		Measuring ignition timing
KV109D0020 Checker Box		Reading self-diagnosis indication

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. (Model with catalyzer)
- Do not apply undue force to mounting bracket.
- Before connecting or disconnecting E.C.U. connector, make sure red and green L.E.D.s are off after turning ignition key off.
- Always install specified E.C.U. on car; otherwise, erroneous engine operation may result.
- Disconnect connector by pulling it (not the harness) straight out.

E.C.C.S. HARNESS HANDLING

- Securely connect E.C.C.S. harness connectors.
  A poor connection can cause extremely high voltage to develop in the coil and condenser, 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.
- Before connecting connector, make sure all pins are straight.

E.C.C.S. PARTS HANDLING

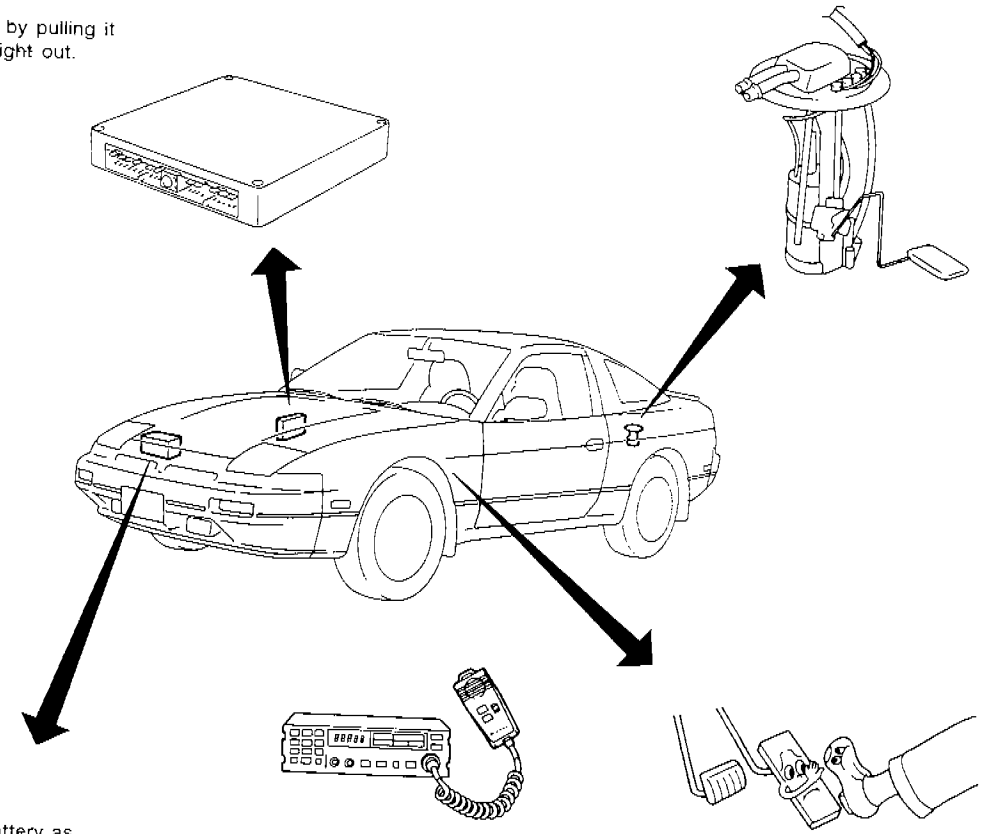
- Handle air flow meter carefully to avoid damage.
- Do not disassemble air flow meter.
- Do not clean air flow meter with detergent.
- Do not shock or jar the crank angle sensor.

INJECTOR

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

FUEL PUMP

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



BATTERY

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

WIRELESS EQUIPMENT

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

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

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.

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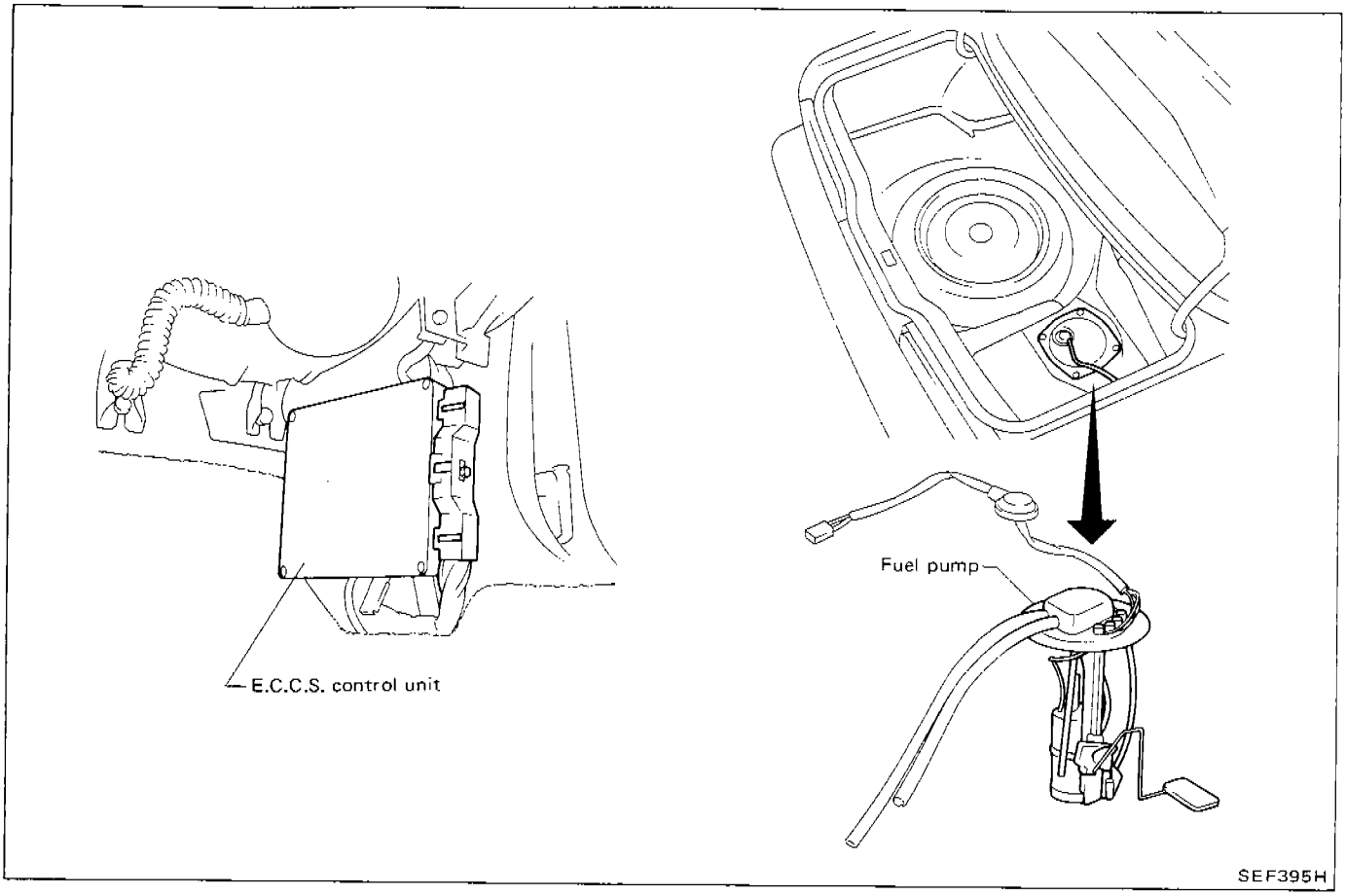
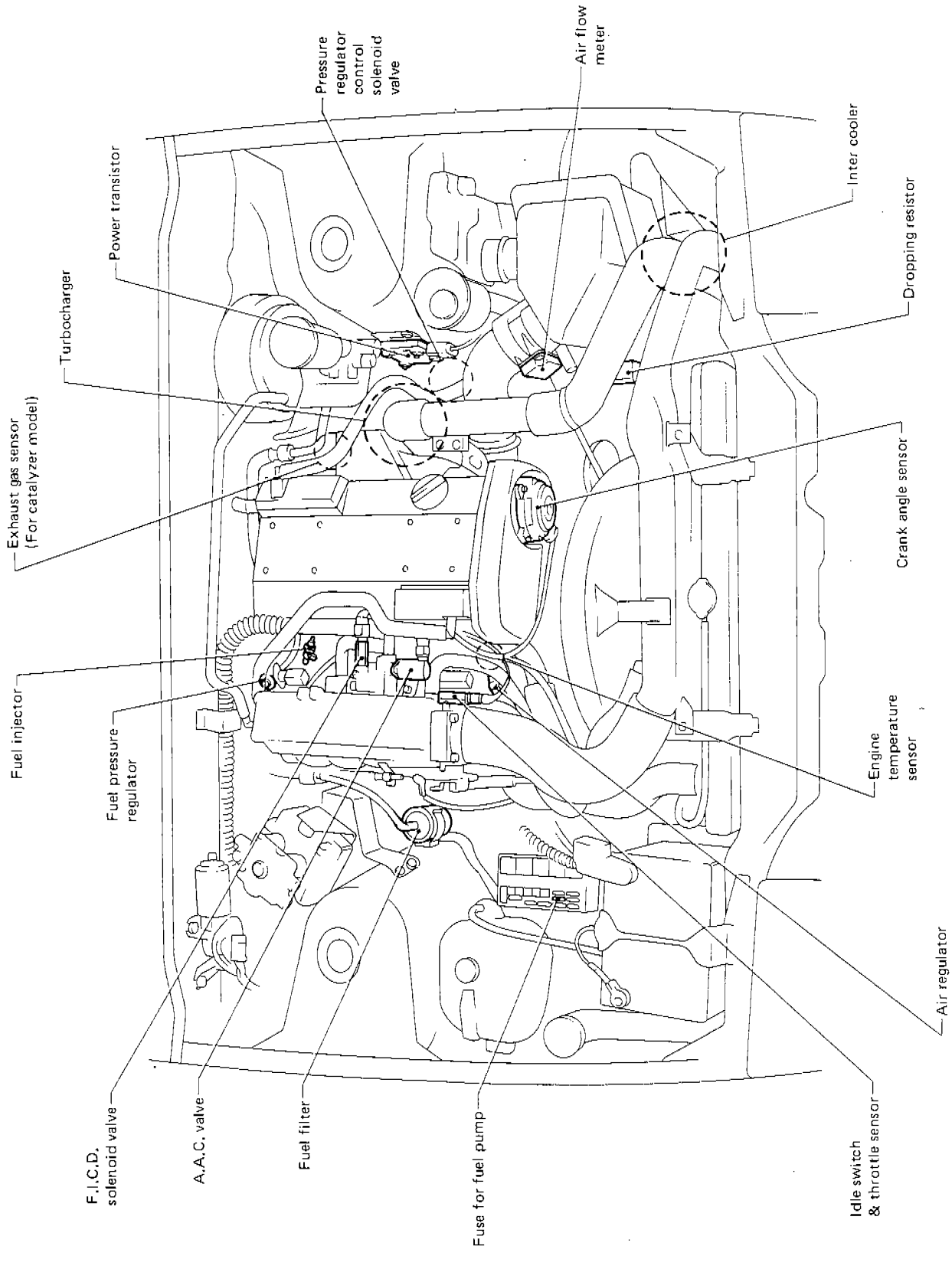
E.C.C.S. Component Parts Location



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



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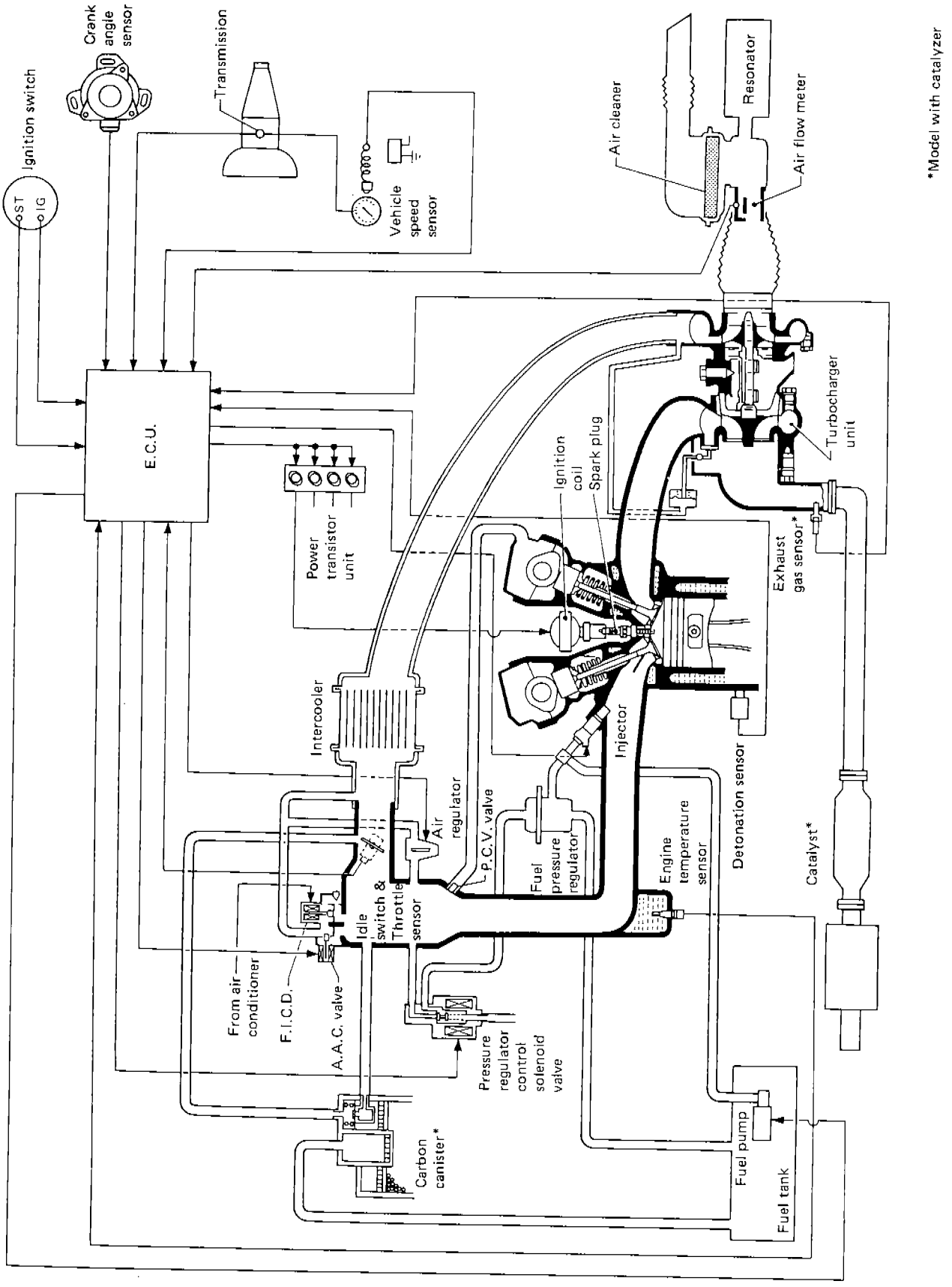
System Diagram



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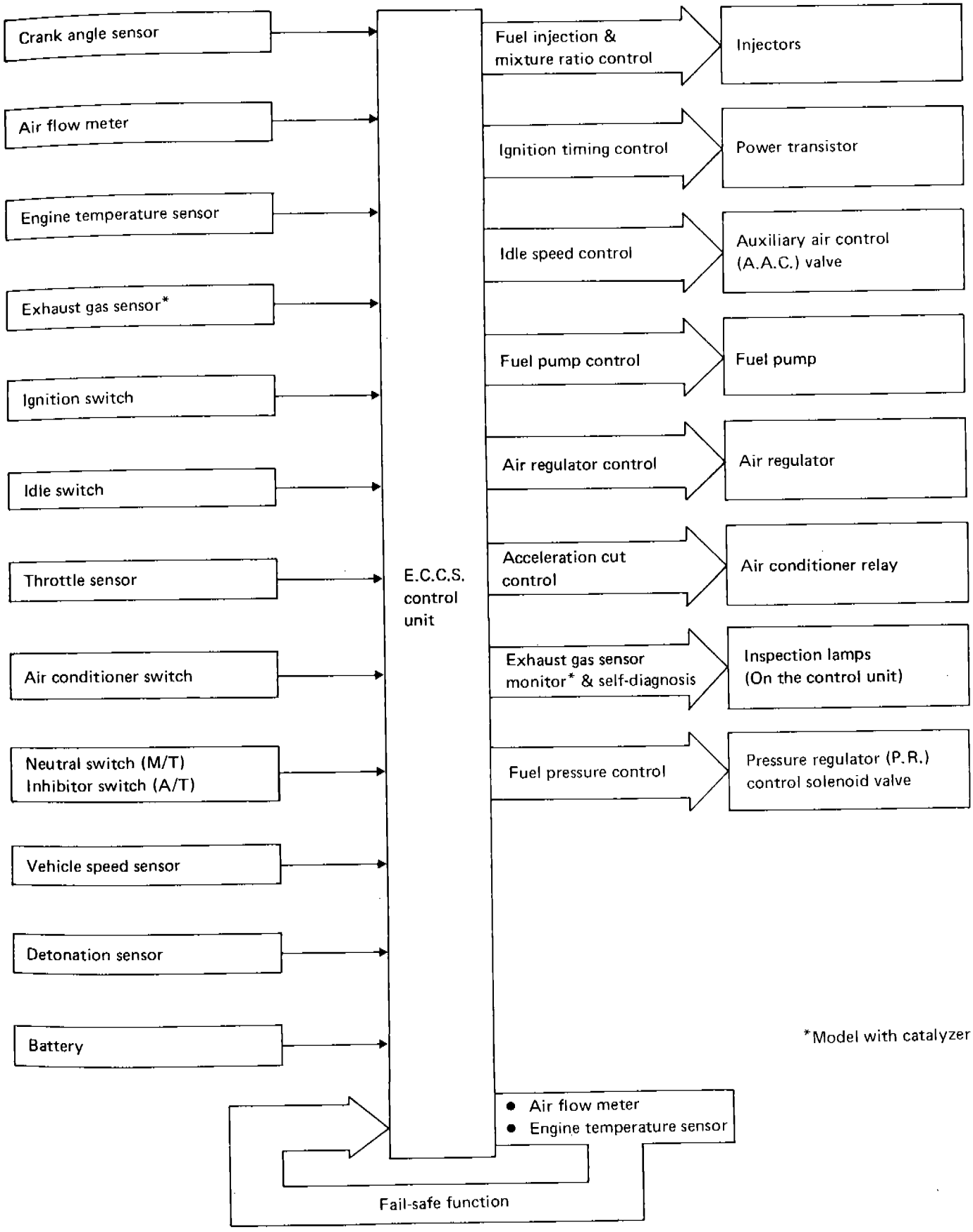
System Chart

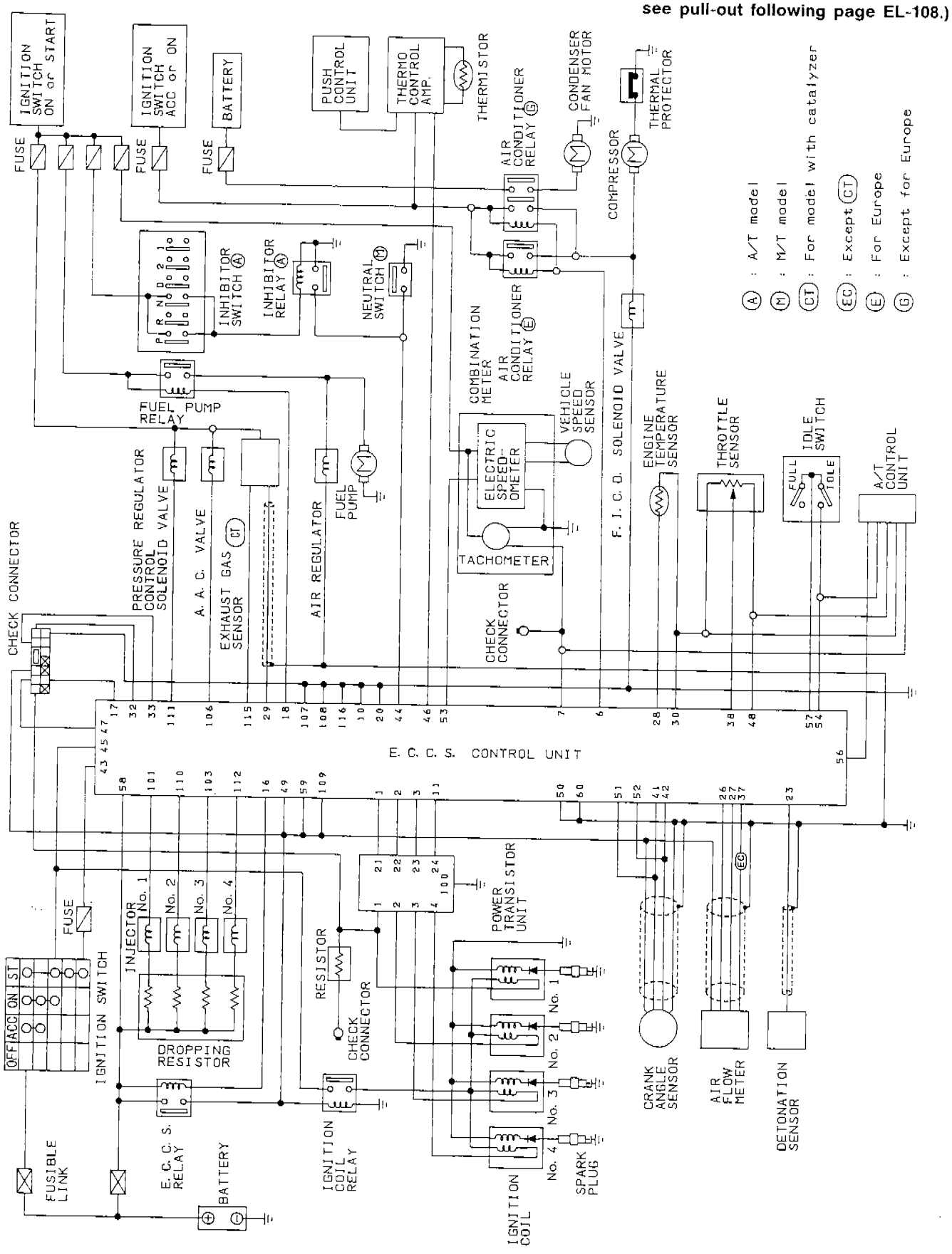
E.C.C.S. CONTROL

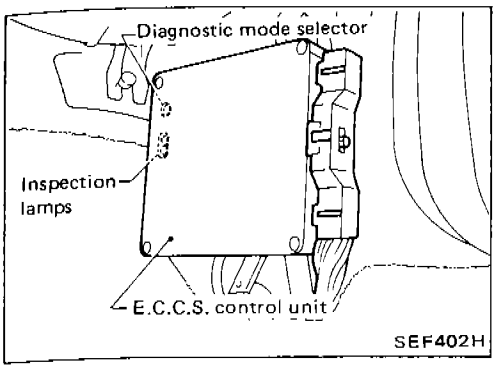


*Model with catalyzer

Circuit Diagram

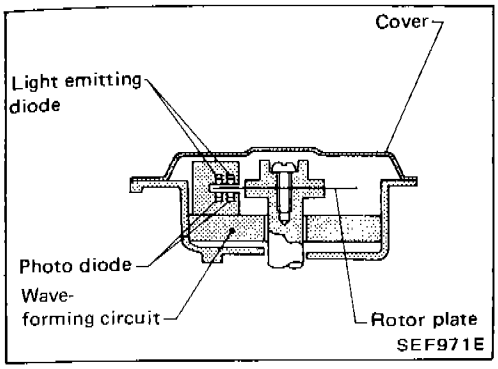
(For Wiring Diagram — see pull-out following page EL-108.)





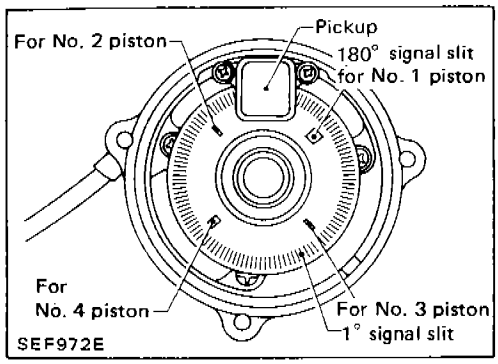
E.C.C.S. Control Unit (E.C.U.)

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

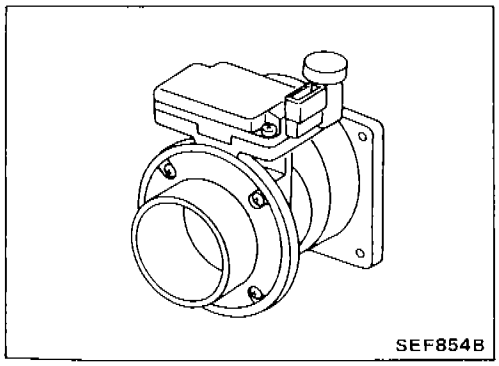


Crank Angle Sensor

The crank angle sensor is a basic component of the entire 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.

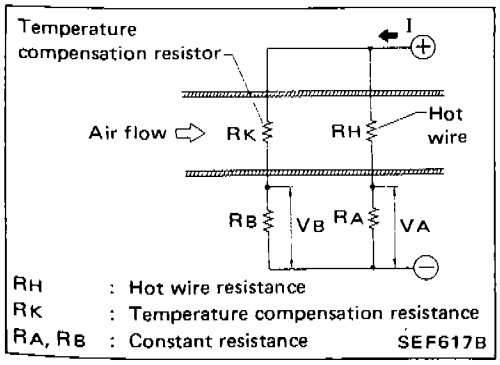


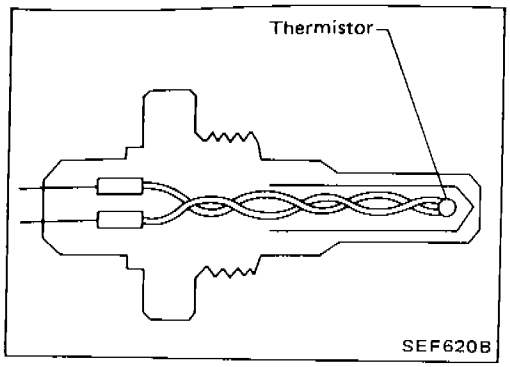
The crank angle sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for 1° signal and 4 slits for 180° signal. Light Emitting Diodes (L.E.D.) and photo diodes are built in the wave-forming circuit.
When the rotor plate passes between the L.E.D. and the photo diode, the slits in the rotor plate continually cut the light being transmitted to the photo diode from the L.E.D. This generates rough-shaped pulses which are converted into on-off pulses by the wave-forming circuit, which are sent to the E.C.U.



Air Flow Meter

The air flow meter measures the mass flow rate of intake air. Measurements are made so that the control circuit will emit an electrical output signal corresponding to the amount of heat dissipated from a hot wire placed in the stream of intake air.
The airflow past the hot wire removes the heat from the hot wire. The temperature of the hot wire is very sensitive to the mass flow rate. The higher the temperature of the hot wire, the greater its resistance value. This temperature change (resistance) is determined by the mass air flow rate. The control circuit accurately regulates current (I) in relation to the varying resistance value (R_H) so that V_A always equals V_B. The air flow meter transmits an output for voltage V_A to the control unit where the output is converted into an intake air signal.

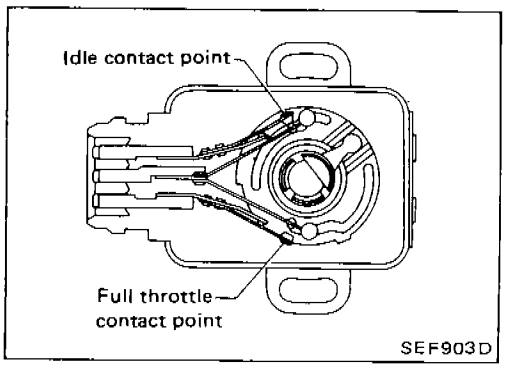




Engine Temperature Sensor

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

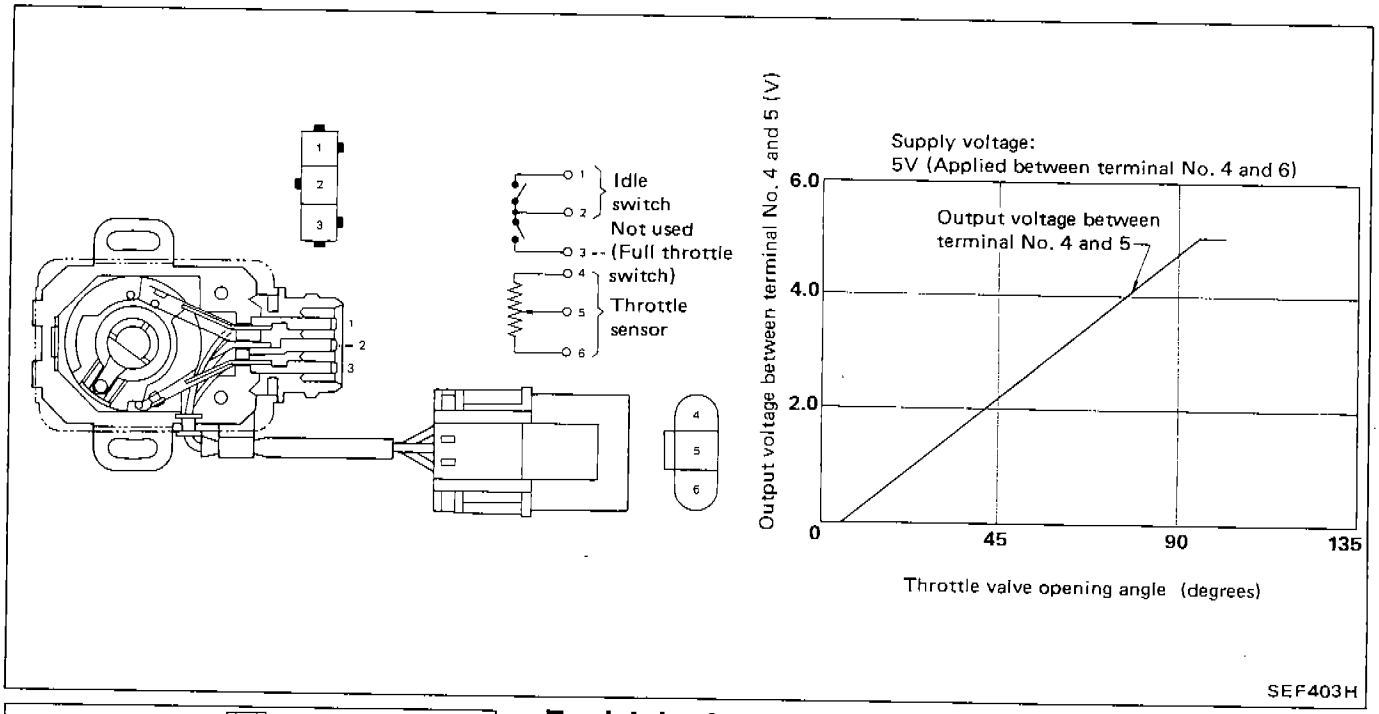
The temperature sensing unit employs a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

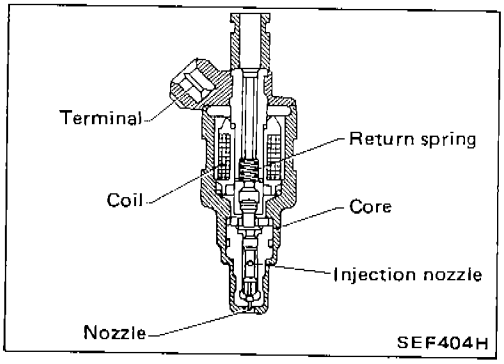


Throttle Sensor and Idle Switch

The throttle sensor responds to the 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 A/T control unit. The idle switch actuates in response to accelerator pedal movement.

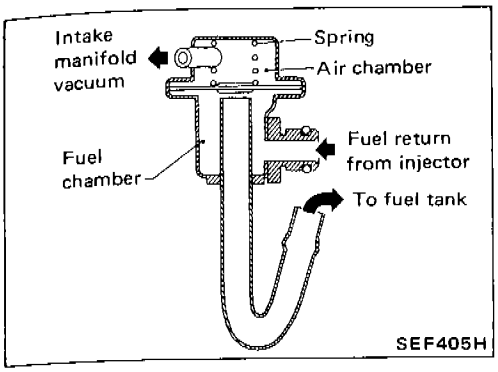
This switch has idle contact and full throttle contact. The idle contact is used for engine control. It closes when the throttle valve is positioned at idle and opens when it is at any other position.





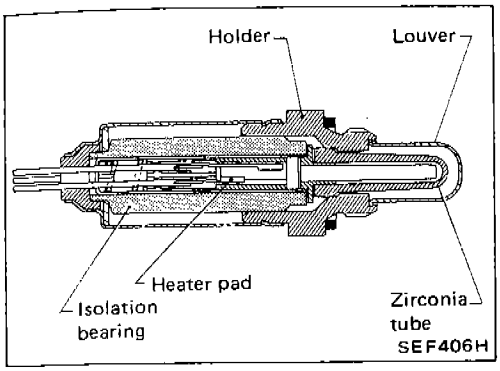
Fuel Injector

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.



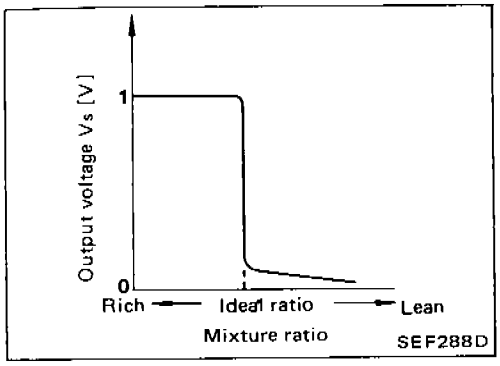
Pressure Regulator

The pressure regulator maintains the fuel pressure at 250.1 kPa (2.501 bar, 2.55 kg/cm^2, 36.3 psi). Since the injected fuel amount depends on injection pulse duration, it is necessary to maintain the pressure at the above value.



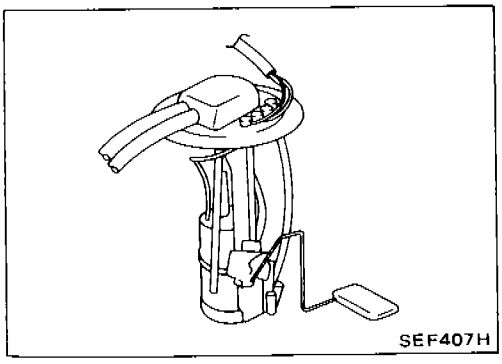
Exhaust Gas Sensor (For catalyzer model)

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.



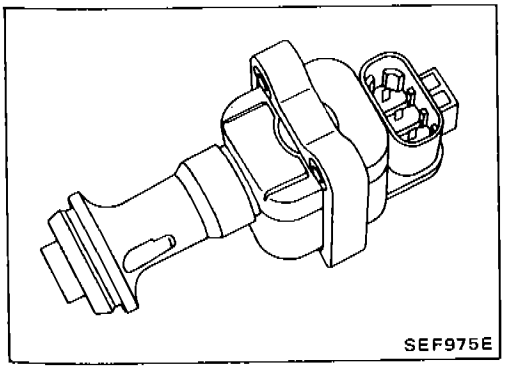
Fuel Pump

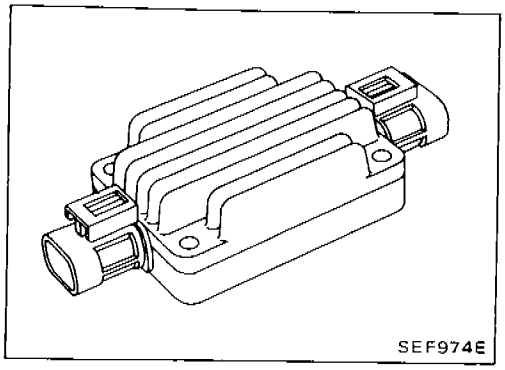
The fuel pump is an electric turbine type with the turbines directly connected to the motor. This assembly is located in the fuel tank.



Ignition Coil

The ignition coil is a small, molded type.

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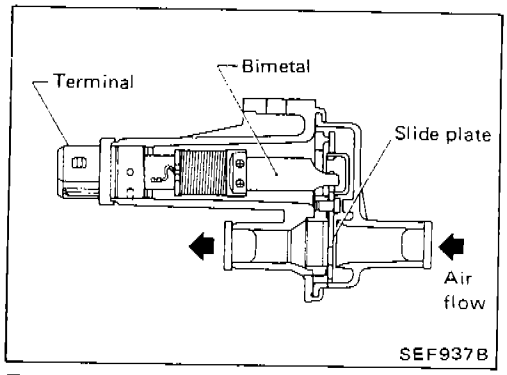
Power Transistor

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.



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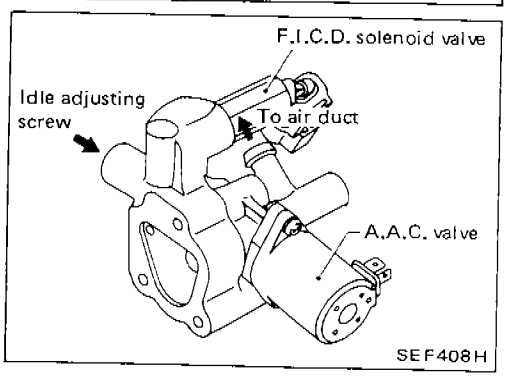
Air Regulator

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.



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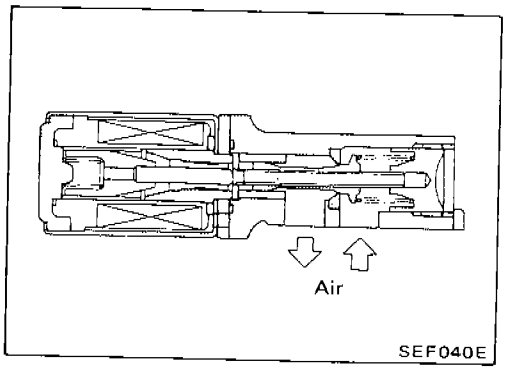
Idle Air Adjusting (I.A.A.) Unit

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.



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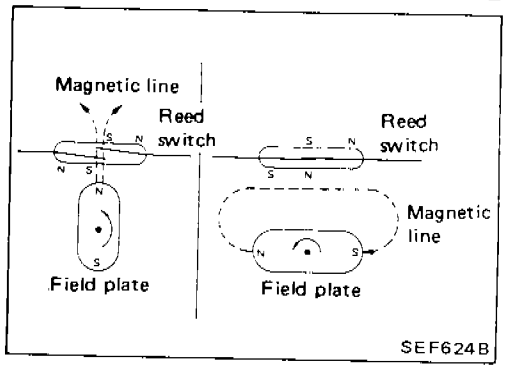
Auxiliary Air Control (A.A.C.) Valve

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.



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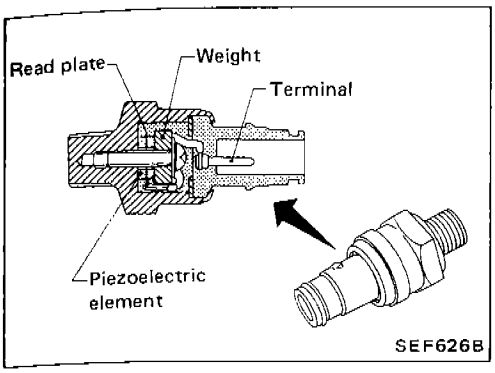
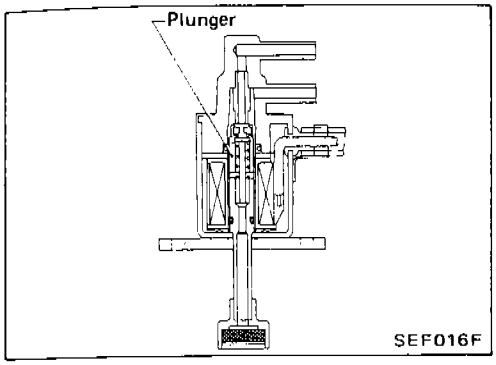
Vehicle Speed Sensor

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



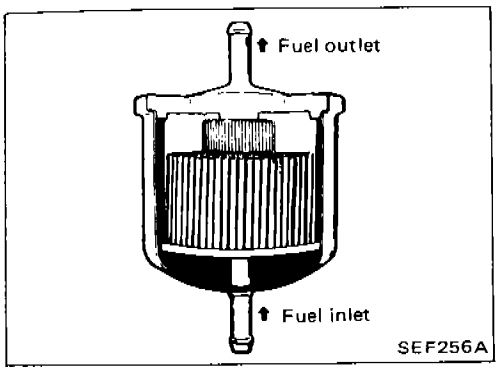
Detonation Sensor

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 delivered as output.



Pressure Regulator (P.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.

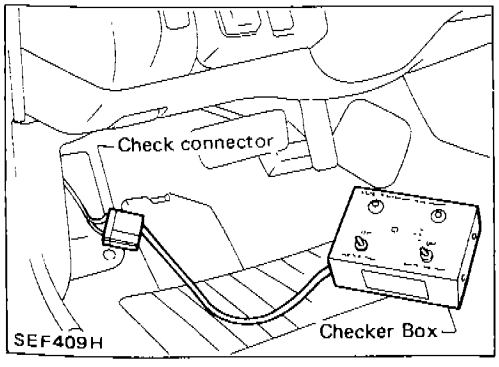


Fuel Filter

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

Carbon Canister (For catalyzer model)

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.

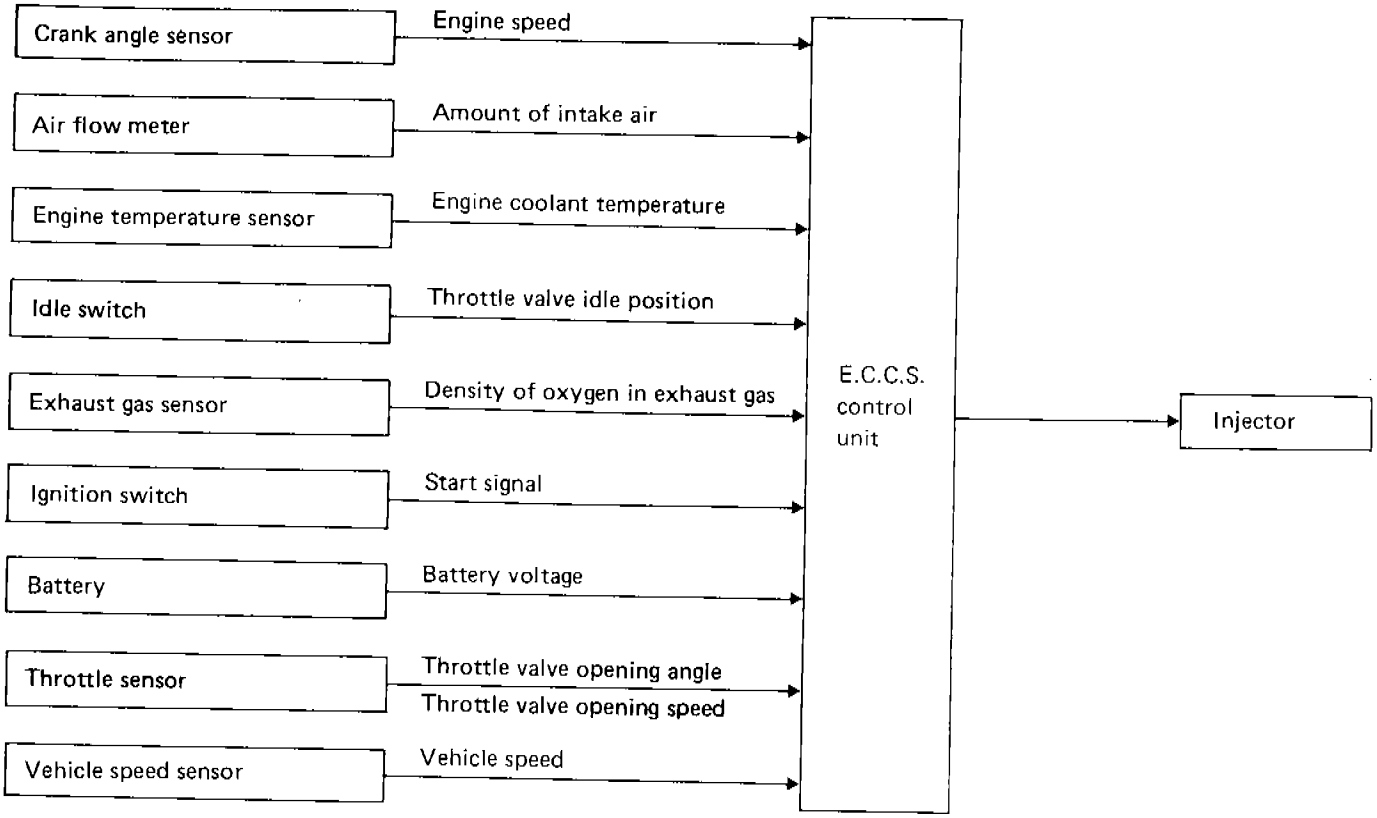


Check Connector for E.C.C.S. Checker Box

The check connector for E.C.C.S. Checker Box is in the vicinity of the fuse box.

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

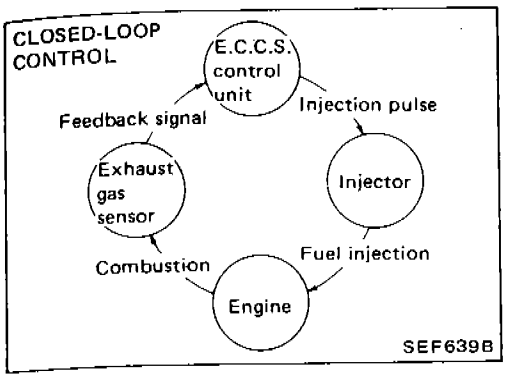
In addition, the amount of fuel injection is compensated for to improve engine performance under various operating conditions as listed below:

<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 (For catalyzer model)

Mixture ratio feedback system is designed to precisely control the mixture ratio to the stoichiometric point so that the three-way catalyst can reduce CO, HC and NOx emissions. This system uses an 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.

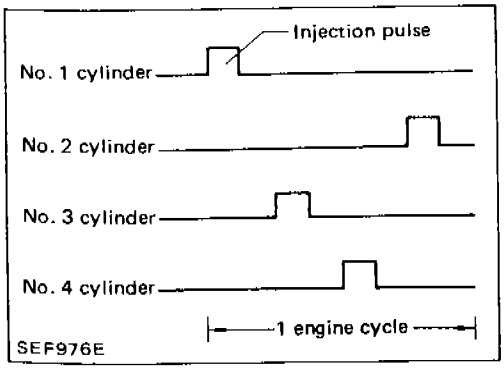
This stage refers to the closed-loop control condition. The open-loop control condition refers to that under which the E.C.U. detects any of the following conditions and feedback control stops in order to maintain stabilized fuel combustion.

1) Deceleration
2) High-load, high-speed operation
3) Engine idling
4) Malfunctioning 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 (For catalyzer model)

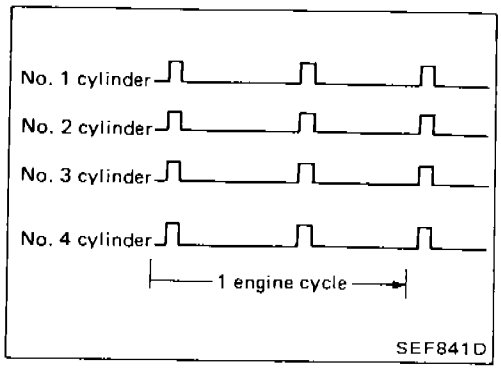
The air-fuel ratio feedback control system monitors the air-fuel signal transmitted from the exhaust gas sensor. This feedback signal is then sent to the E.C.U. to control the amount of fuel injection to provide a basic air-fuel ratio as close to the theoretical air-fuel ratio as possible. However, the basic air-fuel 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 air-fuel ratio.

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



FUEL INJECTION TIMING

Fuel is injected once a cycle for each cylinder in the firing order.



Fuel Injection Control (Cont'd)

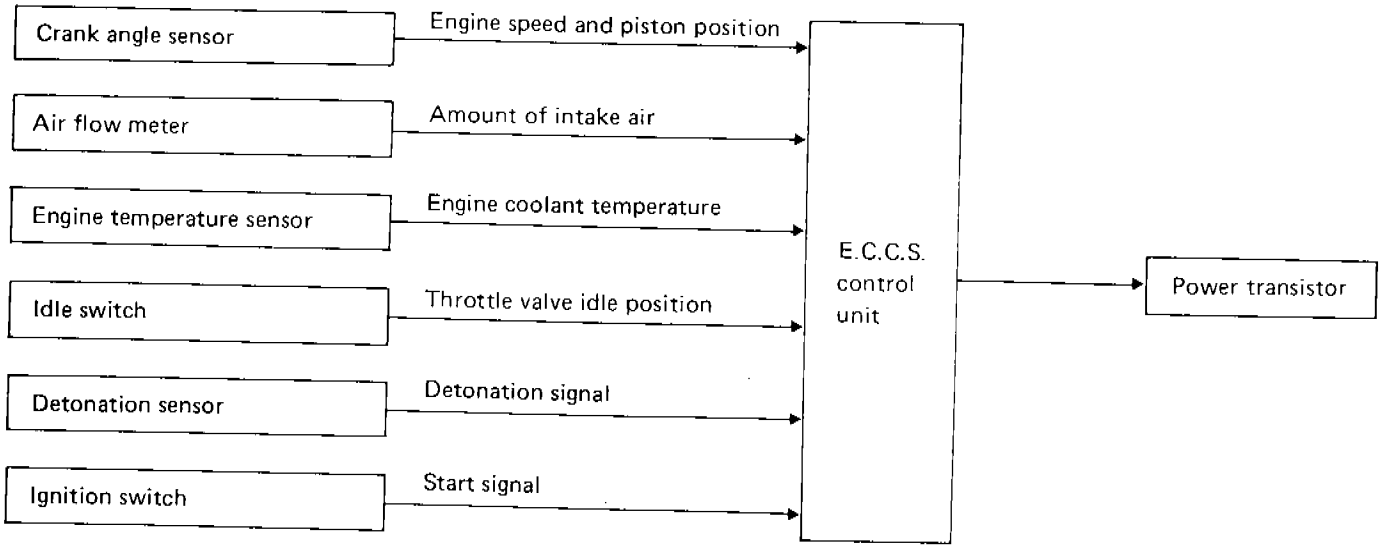
When engine temperature is low, engine starts, or engine load is heavy, fuel is injected into all four cylinders simultaneously twice a cycle.

FUEL SHUT-OFF

Fuel to all cylinders is cut off during deceleration or high-speed operation.

Ignition Timing Control

INPUT/OUTPUT SIGNAL LINE



Ignition Timing Control (Cont'd)

SYSTEM DESCRIPTION

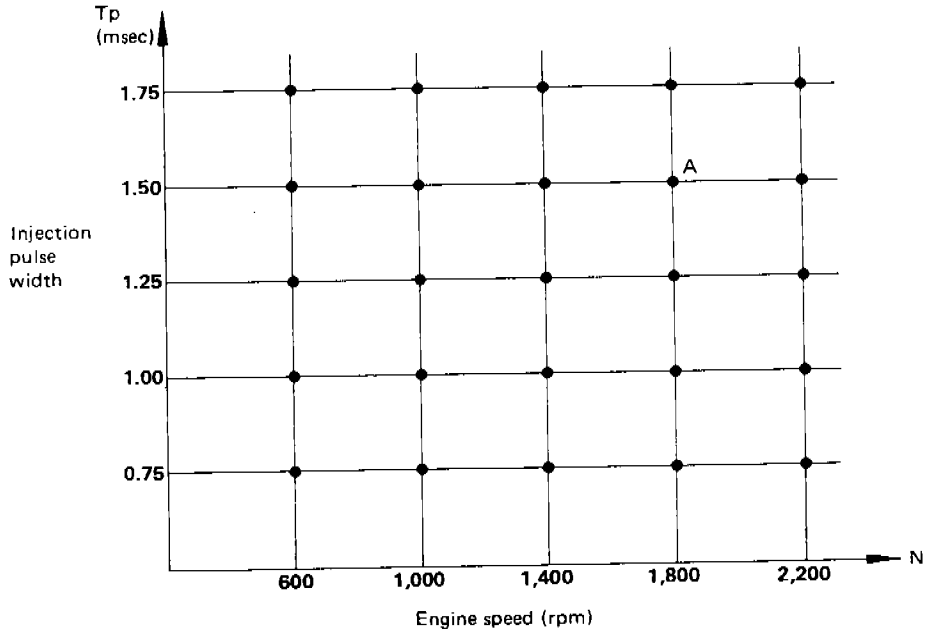
The ignition timing is controlled by the E.C.U. in order to maintain the best air-fuel ratio in response to every running condition of the engine.
The ignition timing data is stored in the ROM located in the E.C.U., in the form of the map shown below.
The E.C.U. detects information such as the injection 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.

The retard system by 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.

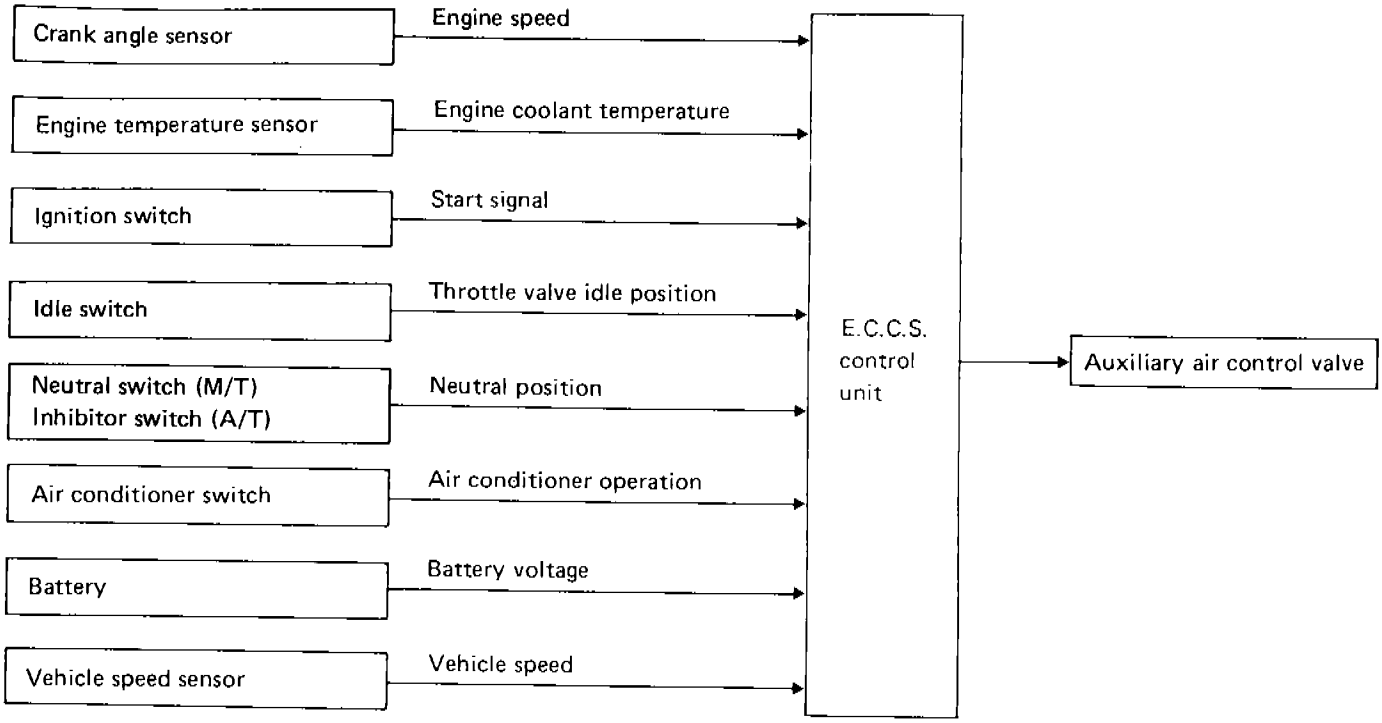
However, if engine knocking occurs, the detonation sensor monitors the condition and the signal is transmitted to the E.C.C.S. control unit. After receiving it, the control unit retards the ignition timing to avoid the knocking condition.



SEC750A

Idle Speed Control

INPUT/OUTPUT SIGNAL LINE

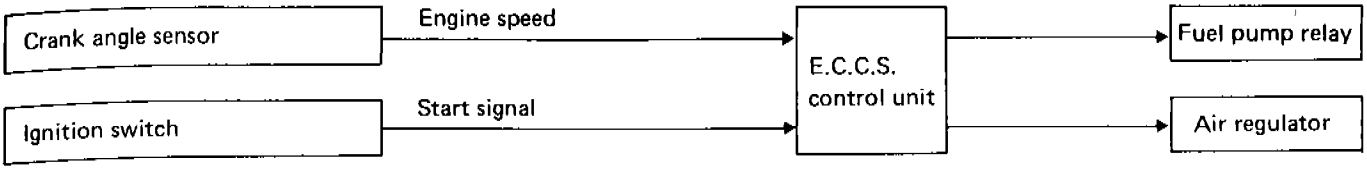


SYSTEM DESCRIPTION

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 compartment, fuel consumption, and engine load.

Fuel Pump Control

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

The E.C.U. activates the fuel pump for several seconds after the ignition switch is turned on to improve engine startability. 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 rotate. 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 ON/OFF of the fuel pump relay, which in turn controls the fuel pump.

Fuel pump and air regulator ON-OFF control

Ignition switch position	Engine condition	Fuel pump/ Air regulator operation
ON	Stopped	Operates for 5 seconds
	Running	Operates
	After stopped	Stops after 1 second
START	Starting	Operates

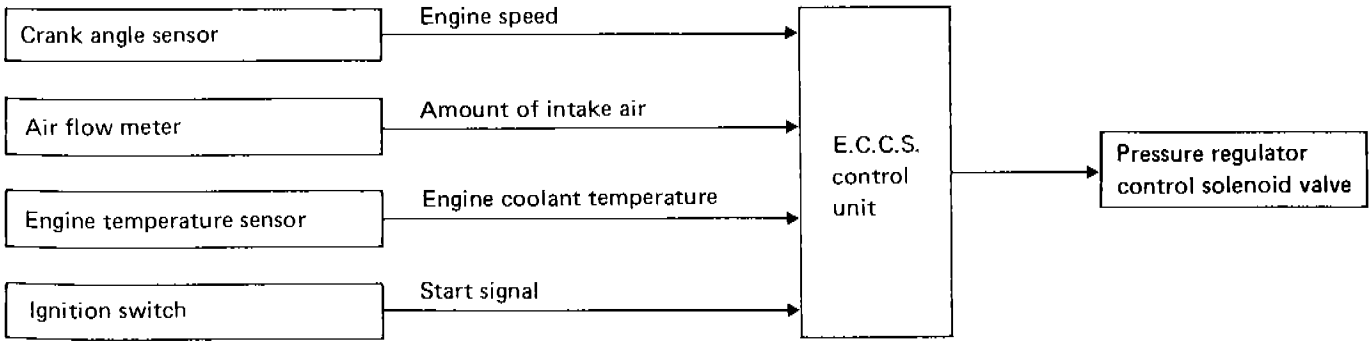
Air Regulator Control

SYSTEM DESCRIPTION

The air regulator is controlled by the E.C.U. at the same time as fuel pump ON-OFF control.

Fuel Pressure Regulator Control

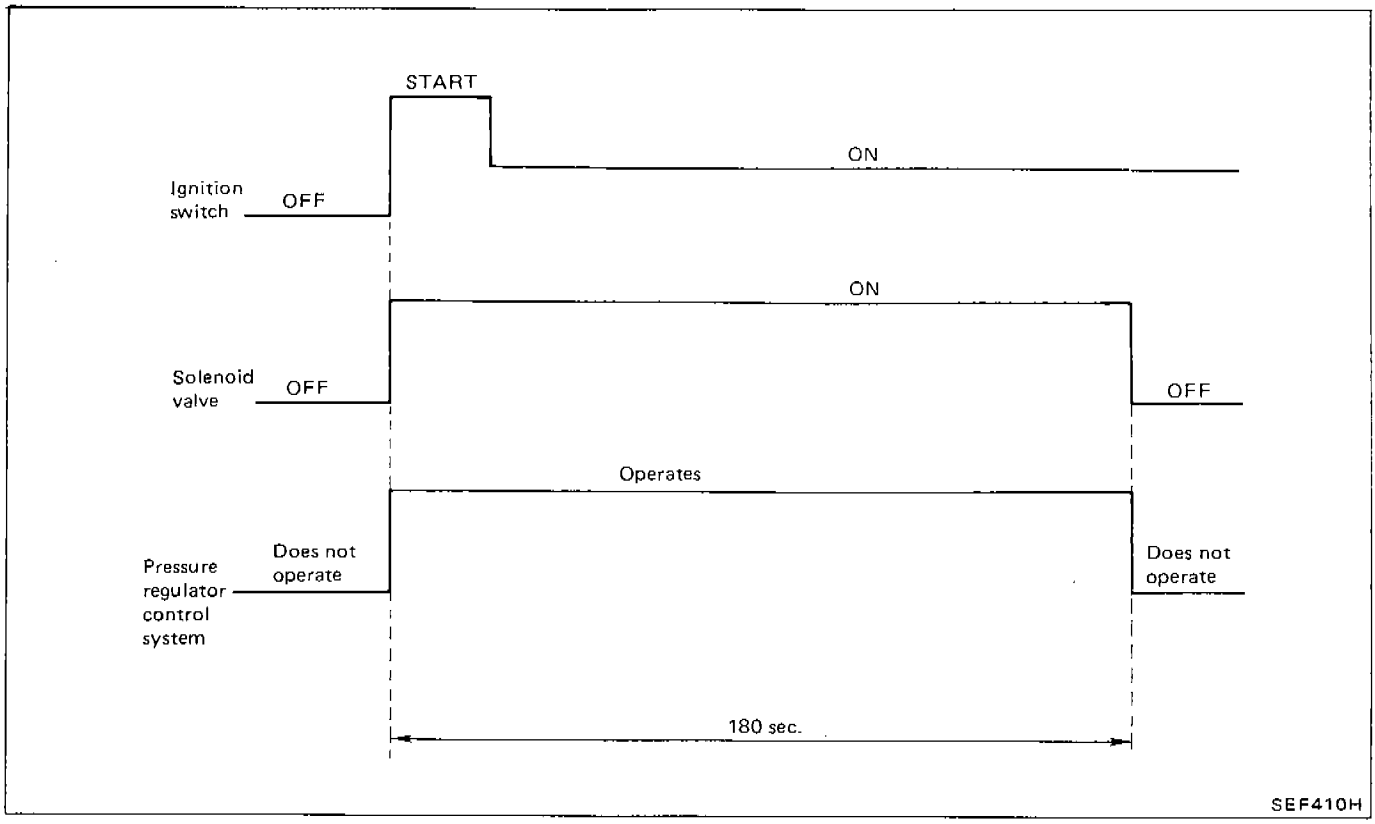
INPUT/OUTPUT SIGNAL LINE



Fuel Pressure Regulator Control (Cont'd)

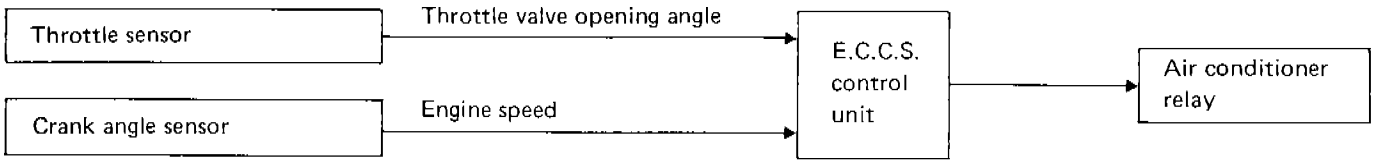
SYSTEM DESCRIPTION

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, throttling the fuel passage to increase fuel pressure.



Acceleration Cut Control

INPUT/OUTPUT SIGNAL LINE

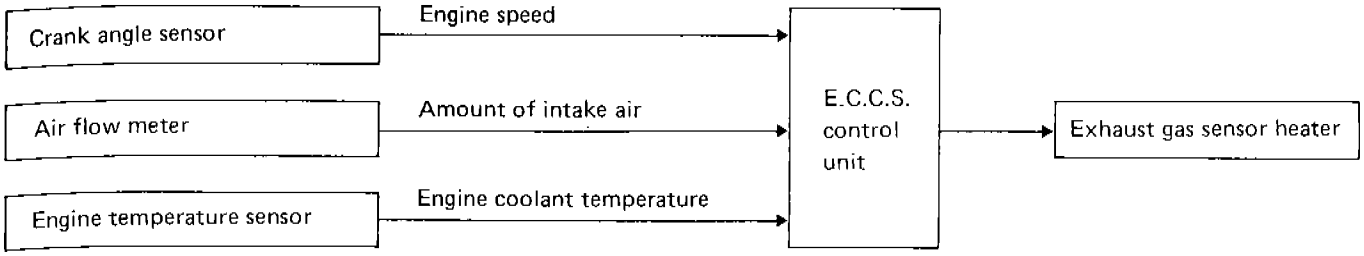


SYSTEM DESCRIPTION

When E.C.U. detects heavy load conditions, air conditioner is turned off for a few seconds.
This system improves acceleration when air conditioner is used.

Exhaust Gas Sensor Heater Control (For catalyzer model)

INPUT/OUTPUT SIGNAL LINE



SYSTEM DESCRIPTION

The exhaust gas sensor heater helps activate the sensor quickly to stabilize closed-loop control under all operating conditions.

Fail-safe System

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.

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

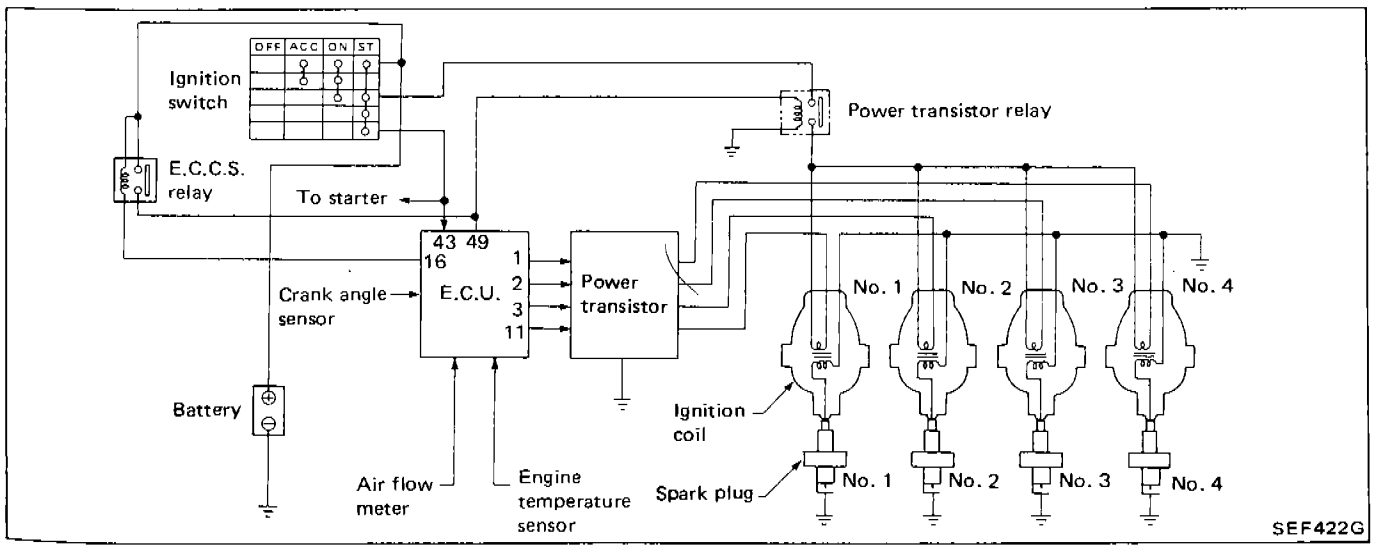
ENGINE TEMPERATURE SENSOR MALFUNCTION

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

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

Direct Ignition System

This system has no conventional distributor and high-tension wires. Small, very efficient ignition coils are fitted directly to each spark plug.



Direct Ignition System (Cont'd)

CHECKING IGNITION TIMING AND IDLE SPEED

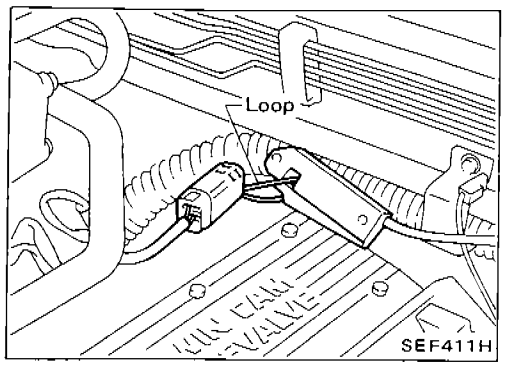
Checking idle speed

Idle speed:

M/T: 850 ± 50 rpm

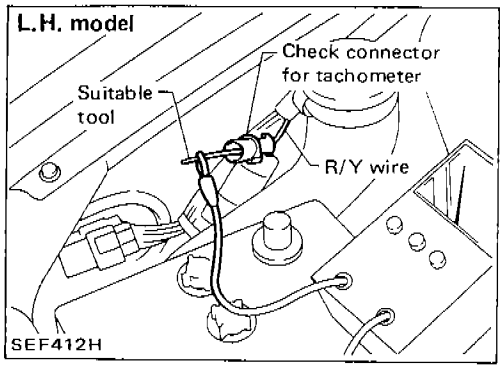
A/T: 850 ± 50 rpm (in "N" position)

If idle speed is not within specific value, refer to IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION.



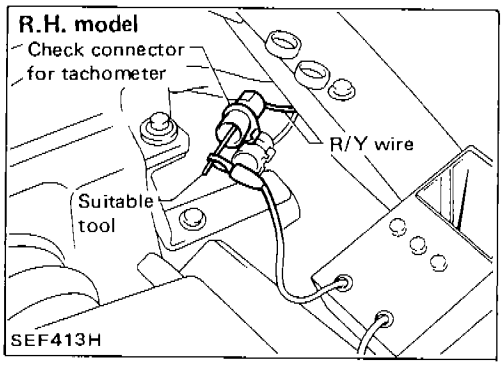
- METHOD A (With pulse type tachometer)

Clamp loop wire as shown.



- METHOD B (With voltage type tachometer)

1. Disconnect check connector for tachometer.

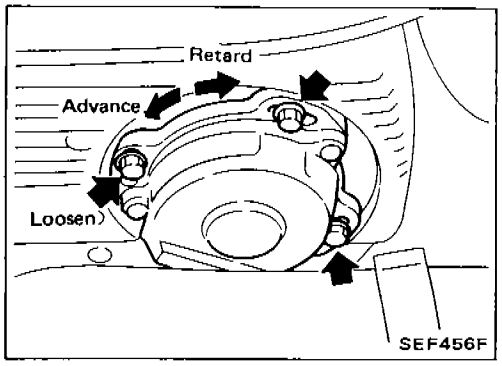


2. Connect tachometer using suitable tool.

Checking ignition timing

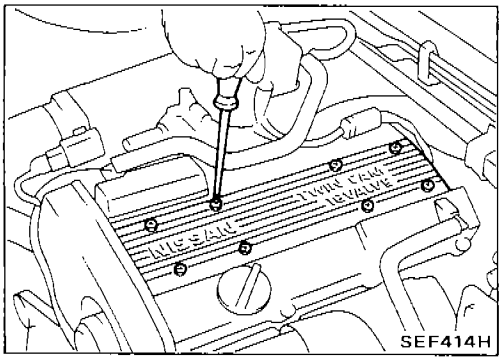
Ignition timing: 15° ± 2° B.T.D.C.

If ignition timing is not within specific value, adjust ignition timing as shown.

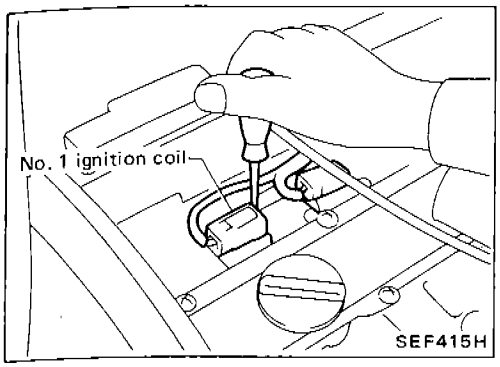


- METHOD A (Without Tool)

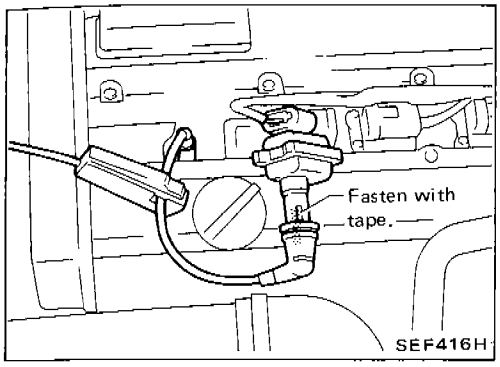
1. Remove ornament cover.



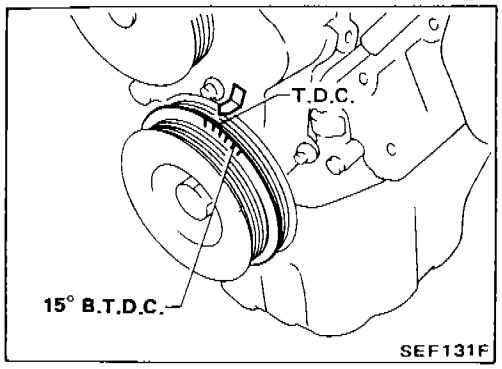
Direct Ignition System (Cont'd)



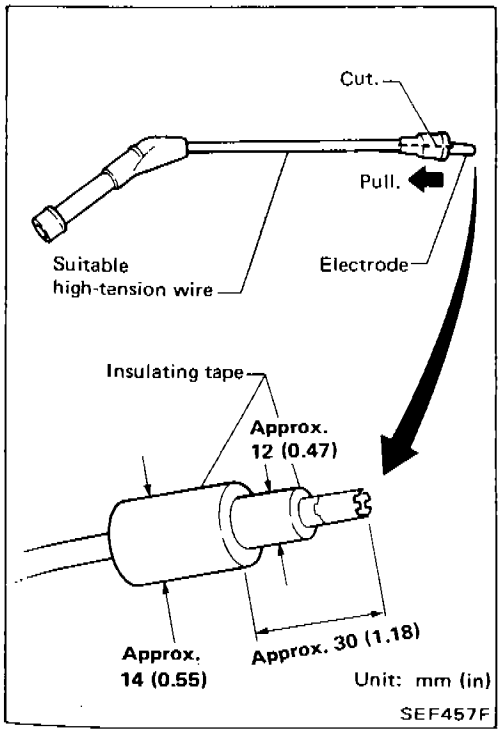
2. Remove No. 1 ignition coil.



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

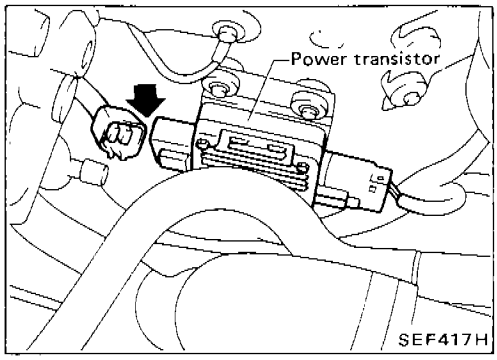


4. Check ignition timing.
5. Install No. 1 ignition coil and ornament cover.



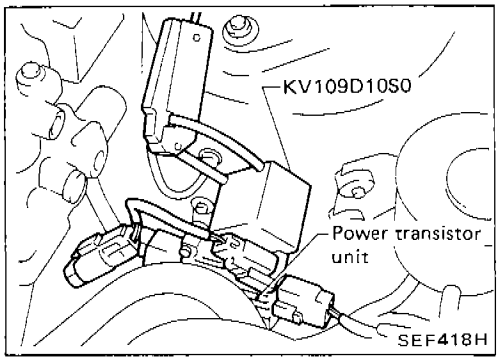
For above procedures, enlarge suitable high-tension wire end with insulating tape as shown.

Direct Ignition System (Cont'd)

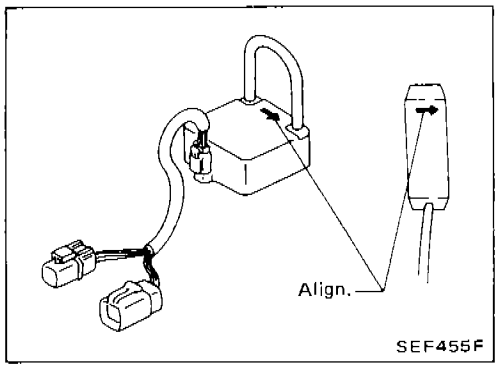


- METHOD B (With Tool KV109D10S0)

1. Disconnect connector of power transistor unit.



2. Connect Tool and clamp wire as shown.



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

Preparation

Make sure that the following parts are in good condition.

- **Battery**
- **Ignition system**
- **Engine oil and coolant levels**
- **Fuses**
- **E.C.C.S. harness connectors**
- **Vacuum hoses**
- **Air intake system (oil filler cap, oil level gauge, etc.)**
- **Fuel pressure**
- **Engine compression**
- **Throttle valve**
- **Fuel pressure regulator control system**

Notice

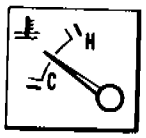
1. Turn off air conditioner and headlamps.
2. During checking and adjusting, make sure engine is at normal operating temperature.
3. Set shift lever in "Neutral" position ("N" or "P" position for automatic transmission).
4. Engage parking brake and lock both front and rear wheels with wheel chocks.
5. Measure "CO"% with air cleaner installed.
6. When measuring "CO" percentage, insert probe more than 40 cm (15.7 in) into tailpipe.
7. Make sure fuel pressure regulator control system does not operate.

INSPECTION PROCEDURE

For catalyzer model

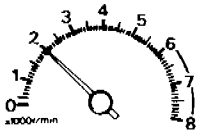
INSPECTION START

Visually check the following:
- Air cleaner clogging
- Hoses and ducts for leaks
- Electrical connectors
- Gaskets
- Throttle valve and throttle valve switch operation



SEF457C

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



SEF477B

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. (Select mode III)

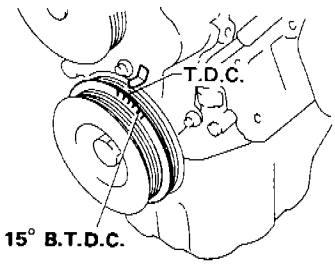
O.K. / N.G.

Check, correct or replace malfunctioning parts.

Does engine run smoothly?

O.K. / N.G.

Check and clean injectors, and replace injectors if necessary.



SEF131F

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

Check idle speed.

M/T: 850±50 rpm
A/T: 850±50 rpm (in "N" position)

O.K. / N.G.

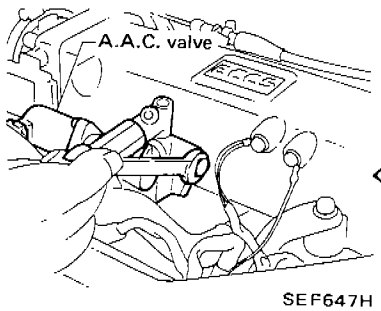
Check ignition timing with a timing light. **Refer to page EF & EC-22.**

15°±2° B.T.D.C.

N.G.

Adjust ignition timing by turning crank angle sensor after loosing bolts which secure it.

O.K.



SEF647H

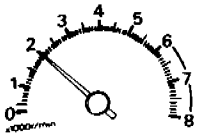
Disconnect A.A.C. valve harness connector.

Adjust idle speed to 800 rpm by turning idle speed adjusting screw.

Connect A.A.C. valve harness connector.

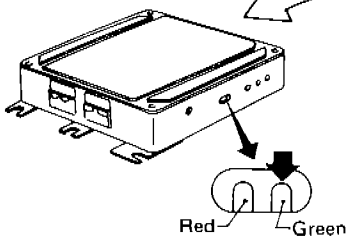
Ⓐ

Ⓑ


SEF477B

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

Make sure that inspection lamp (Green) on control unit goes on and off periodically more than 9 times during 10 seconds at 2,000 rpm under no-load. (Select mode I or II)



SEF433D

O.K. / N.G.

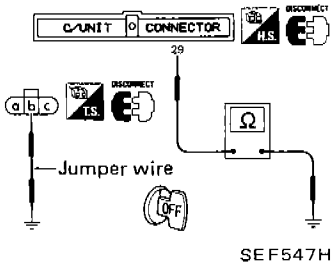
Race engine two or three times under no-load, then run engine at idle speed.

Set the diagnosis mode of E.C.U. to No. 2 mode and check that inspection lamps (Red and Green) on control unit blink at 2,000 rpm under no-load. They should blink simultaneously.

No → Ⓒ

Yes → INSPECTION END

Check exhaust gas sensor harness:
1) Turn off engine and disconnect battery ground cable.
2) Disconnect connector from Control Unit.
3) Disconnect exhaust gas sensor harness connector and connect terminal for exhaust gas sensor harness connector to ground with a jumping wire.
4) Check for continuity between terminal No. 29 and ground metal on vehicle body.
5) Connect Control Unit connector and battery ground cable.

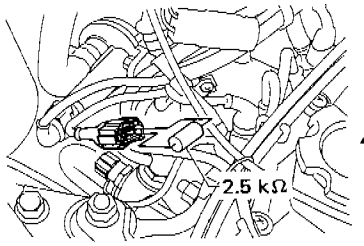


SEF547H

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

O.K. / N.G.

Repair or replace E.C.C.S. harness.

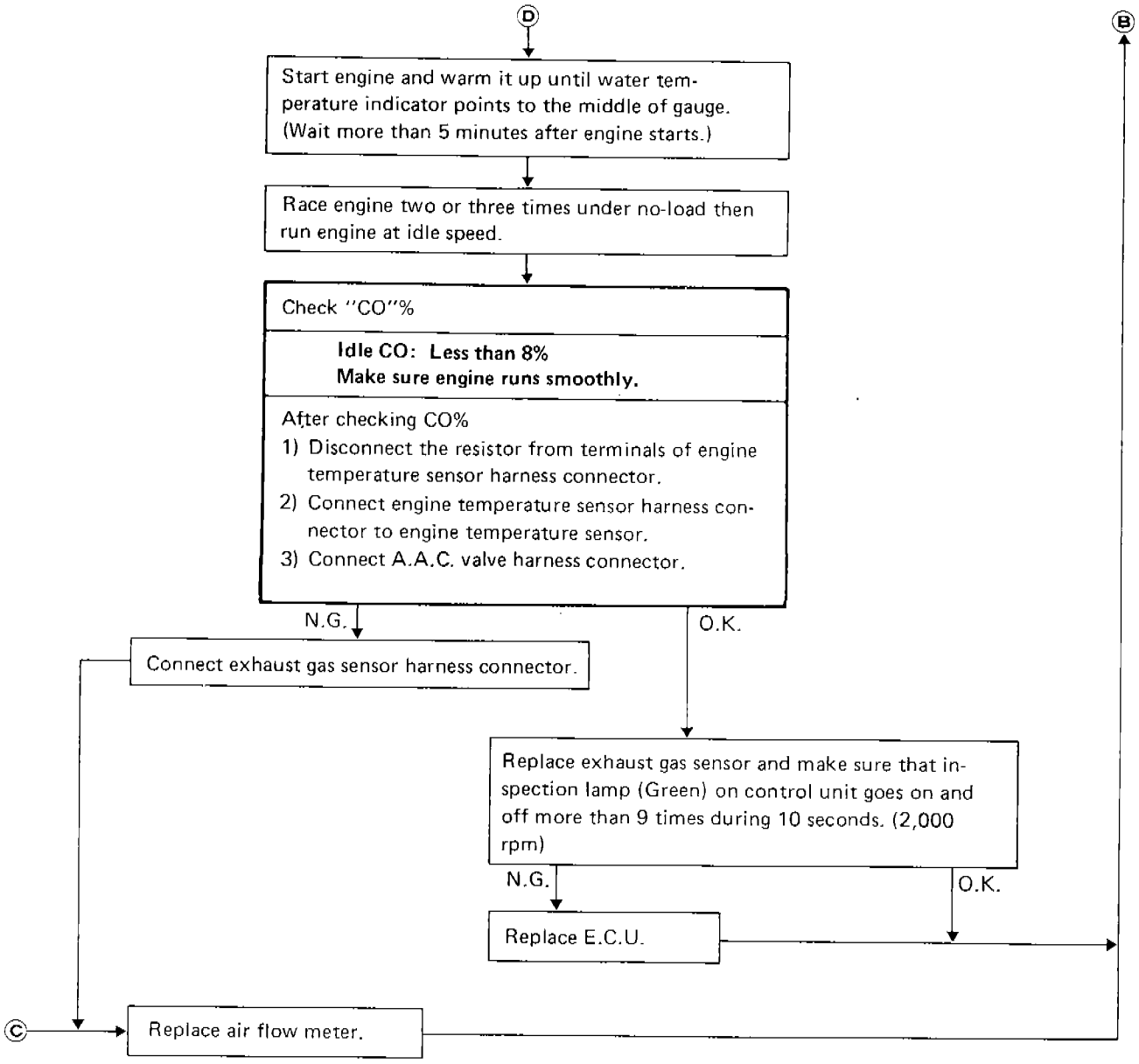


SEF333C

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

Ⓓ

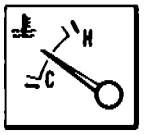
Ⓑ


D
Start engine and warm it up until water temperature indicator points to the middle of gauge. (Wait more than 5 minutes after engine starts.)
Race engine two or three times under no-load then run engine at idle speed.
Check "CO"%
Idle CO: Less than 8%
Make sure engine runs smoothly.
After checking CO%
1) Disconnect the resistor from terminals of engine temperature sensor harness connector.
2) Connect engine temperature sensor harness connector to engine temperature sensor.
3) Connect A.A.C. valve harness connector.
N.G.
O.K.
Connect exhaust gas sensor harness connector.
Replace exhaust gas sensor and make sure that inspection lamp (Green) on control unit goes on and off more than 9 times during 10 seconds. (2,000 rpm)
N.G.
O.K.
Replace E.C.U.
C
Replace air flow meter.
B

For non-catalyzer model
[With "CO"-meter]

INSPECTION START

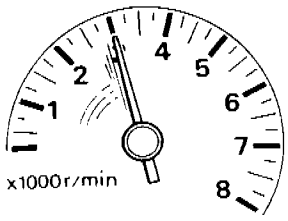
Confirm that engine is at normal operating temperature.



SEF457C

Check and adjust idle speed and ignition timing.

Idle speed: rpm M/T 850±50
A/T 850±50 (in "N" position)
Ignition timing: 15° ±2° B.T.D.C.
Refer to page EF & EC-22.



SMA957A

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

Check "CO" with "CO"-meter.

Idle "CO"%:
2.0 or lower

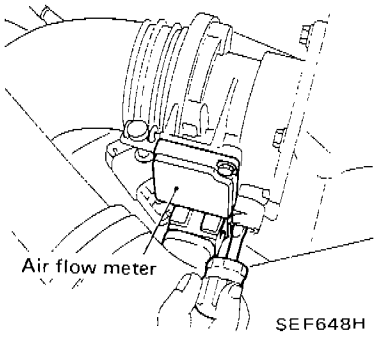
O.K.

N.G.

Turn off engine and remove air flow meter from vehicle.

Drill a hole in seal plug which seals air flow meter variable resister and remove seal plug.

Install air flow meter on vehicle.
Start engine and warm it up untill water temperature indicator points to the middle of gauge.



SEF648H

Adjust "CO"% by turning variable resistor on air flow meter.

Idle "CO"%:
2.0 or lower

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

Check idle speed.

Idle speed: rpm M/T 850±50
A/T 850±50 (in "N" position)

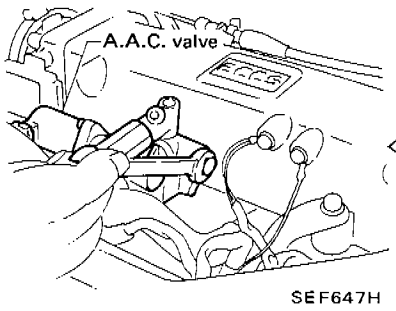
N.G.

O.K.

Stop engine.

INSPECTION END

Ⓐ Ⓑ



SEF647H

Ⓐ

Disconnect A.A.C. valve harness connector.

Adjust idle speed to 800 rpm by turning idle speed adjusting screw.

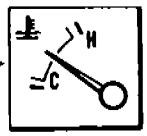
Connect A.A.C. valve harness connector.

Ⓑ

For non-catalyzer model
[Without "CO"-meter]

INSPECTION START

Confirm that engine is at normal operating temperature.



SEF457C

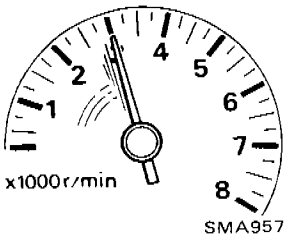
Check and adjust idle speed and ignition timing.

Idle speed: rpm M/T 850±50
A/T 850±50 (in "N" position)
Ignition timing: 15°±2° B.T.D.C.
Refer to page EF & EC-22.

Turn off engine and remove air flow meter from vehicle.

Drill a hole in seal plug which seals air flow meter variable resister and remove seal plug.

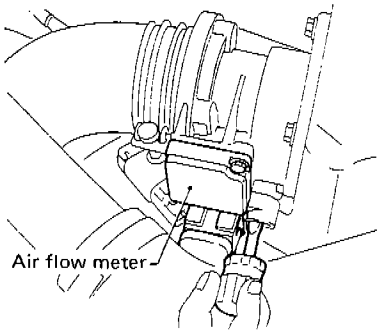
Install air flow meter on vehicle.
Start engine and warm it up untill water temperature indicator points to the middle of gauge.



SMA957A

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

Adjust mixture ratio with engine speed set at maximum by turning variable resistor.



SEF648H

Turn variable resistor of air flow meter 2 full turns counterclockwise.

Check idle speed.

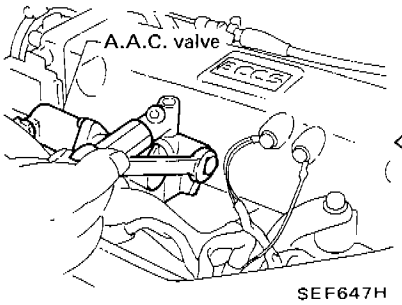
Idle speed: rpm M/T 850±50
A/T 850±50 (in "N" position)

N.G.

O.K.

Stop engine.

INSPECTION END



SEF647H

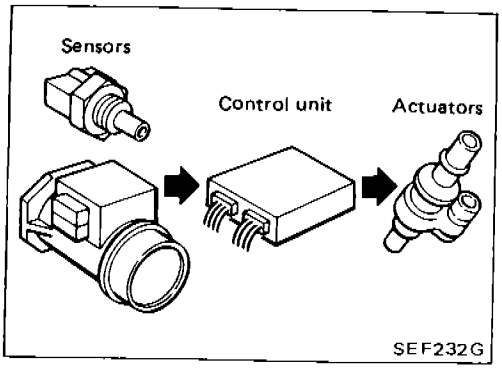
Disconnect A.A.C. valve harness connector.

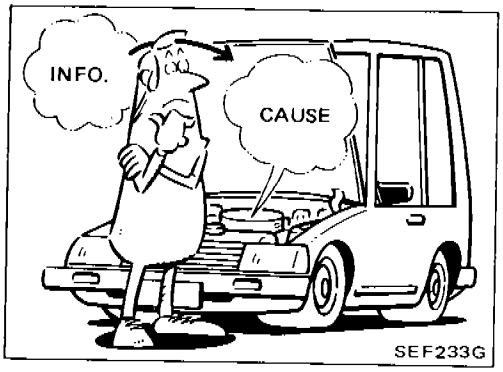
Adjust idle speed to 800 rpm by turning idle speed adjusting screw.

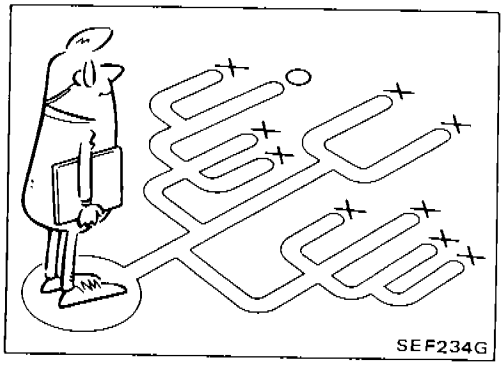
Connect A.A.C. valve harness connector.

Contents

Contents (Cont'd)







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 faulty wiring. In this case, careful checking of suspicious circuits may help prevent the replacement of good parts.

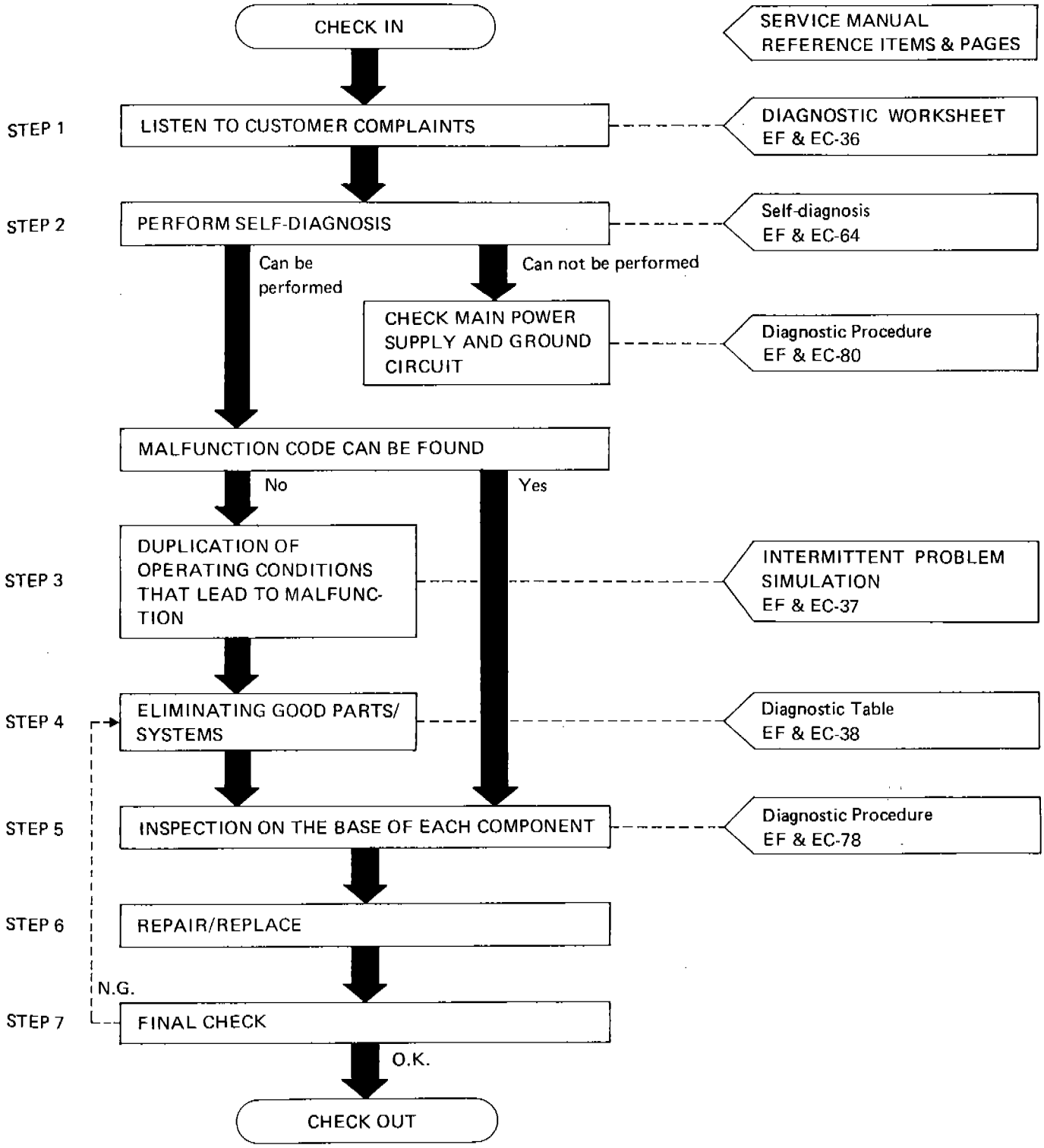
A visual check only may not find the cause of the problems. A road test with a circuit tester connected to a suspected circuit should be performed.

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 the talks 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



KEY POINTS

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

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

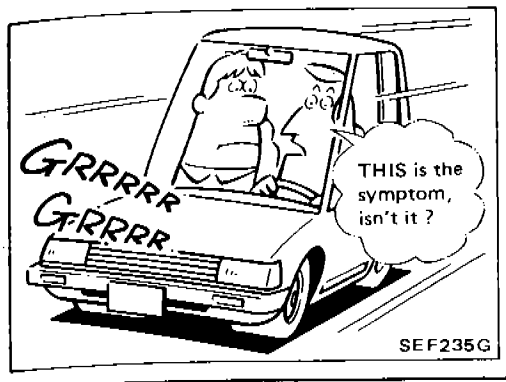
DIAGNOSTIC WORKSHEET

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

Worksheet sample

Customer name MR/MS	Model & Year	VIN
Engine #	Trans.	Mileage (kilometer)
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 effected
	Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F
Engine conditions		☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm
Road conditions		☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)
Driving conditions		☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH
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 crank angle sensor counterclockwise.
			Retarded	Rotate crank angle sensor clockwise.
3*	Mixture ratio feedback control	Exhaust gas sensor	Suspended	Disconnect exhaust gas sensor harness connector.
		Control unit	Operation check	Perform self-diagnosis (Mode I/II) at 2,000 rpm.
4	Idle speed	I.A.A. unit	Raised	Turn idle adjust screw counterclockwise.
			Lowered	Turn idle adjust screw clockwise.
5	Electric connection (Electric continuity)	Harness connectors and wires	Poor electric connection or faulty wiring	Tap or wiggle.
				Race engine rapidly. See if the torque reaction of the engine unit causes electric breaks.
6	Temperature	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 head lights, air conditioner, rear defogger, etc.
9	Idle switch condition	Control unit	ON-OFF switching	Perform self-diagnosis (Mode IV).
10	Ignition spark	Timing light	Spark power check	Try to flash timing light for each cylinder.

***For catalyzer model**

Diagnostic Table

To assist with your trouble diagnoses, some typical diagnostic procedures for the following symptoms are described.

REMARKS

In the following pages, the numbers such as ❶, ❷ in the above chart correspond to those in the service procedure described below.
Possible causes can be checked through the service procedure shown by the mark "○".

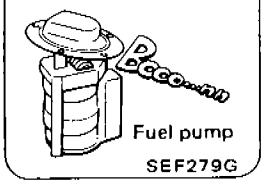
Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 1 **Impossible to start – no combustion**

POSSIBLE CAUSES		❶	❷	❸	❹	❺	❻	❼
SPECIFICATIONS	Mixture ratio (too lean)	○	○					
	Ignition sparks (weak, missing)				○	○		
	Ignition timing						○	
FUEL SYSTEM	Fuel pump (no operation)	○						
	Fuel pump relay (open circuited)	○						
	Injectors (no operation, clogged)		○					
IGNITION SYSTEM	Ignition switch	○	○	○	○		○	
	E.C.C.S. relay	○	○	○	○		○	
	Power transistor			○	○		○	
	Ignition coil				○		○	
	Spark plugs					○		
CONTROL SYSTEM	Crank angle sensor	○	○		○		○	○

SERVICE PROCEDURE

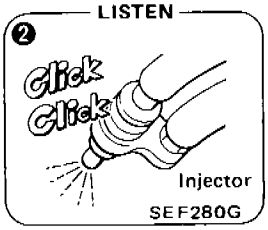
❶ **LISTEN**



Listen for fuel pump operating sound.

N.G. → Check fuel pump and/or related circuits. [See page EF & EC-102.]

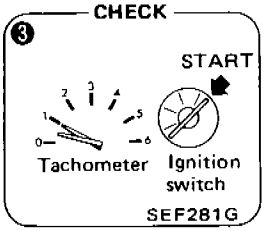
❷ **LISTEN**



Listen for injector operating sound.

N.G. → Check injector circuit. [See page EF & EC-112.]

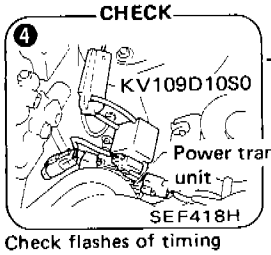
❸ **CHECK**



Make sure tachometer needle moves when cranking.

N.G. →

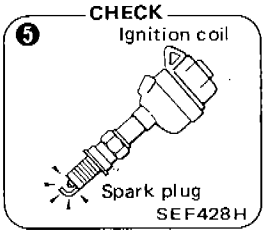
❹ **CHECK**



Check flashes of timing light for weakness.

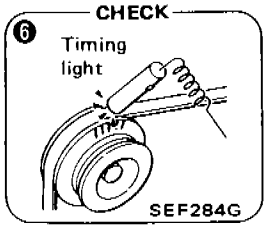
N.G. → Check ignition signal circuit. [See page EF & EC-90.]

❺ **CHECK** Ignition coil



Remove spark plugs and check their ignition sparks.

❻ **CHECK**

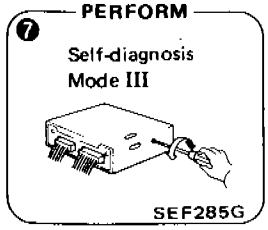


Check ignition timing.

N.G. → Adjust ignition timing. [See page EF & EC-22.]

❼ **PERFORM**

Self-diagnosis Mode III



Perform self-diagnosis Mode III (for crank angle sensor).

N.G. → Check crank angle sensor and/or related circuits. [See page EF & EC-82.]

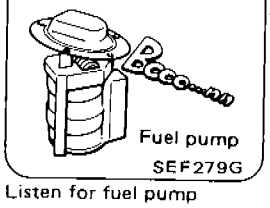
Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 2 **Impossible to start — partial combustion**

POSSIBLE CAUSES		❶	❷	❸	❹	❺
SPECIFICATIONS	Mixture ratio	○	○	○		
	Fuel pressure (too low)				○	
	Ignition timing					○
FUEL SYSTEM	Fuel pump	○				
	Fuel pump relay (open circuited)	○				
	Injectors (clogged)		○			

SERVICE PROCEDURE

❶ **LISTEN**

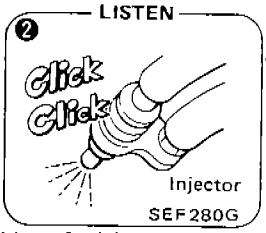


Listen for fuel pump operating sound.

N.G. → Check fuel pump and/or related circuits. [See page EF & EC-102.]

O.K. →

❷ **LISTEN**

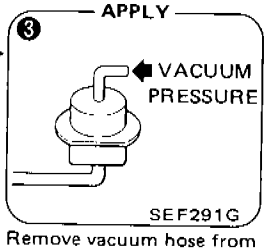


Listen for injector operating sound.

N.G. → Check injector circuit. [See page EF & EC-112.]

O.K. →

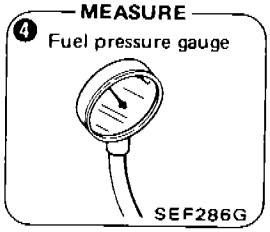
❸ **APPLY**



Remove vacuum hose from pressure regulator, and apply vacuum and/or pressure, and try to start.

Improved →

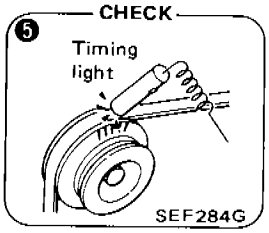
❹ **MEASURE** Fuel pressure gauge



Connect vacuum hose to pressure regulator and measure fuel pressure.

Check idle mixture ratio. [See page EF & EC-25.]

❺ **CHECK**



Check ignition timing.

Adjust ignition timing. [See page EF & EC-22.]

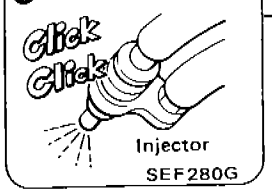
Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 3 | **Impossible to start – partial combustion (not affected by throttle position)**

	POSSIBLE CAUSES	❶	❷	❸	❹	❺	❻	❼	❽	❾	❿	⓫
SPECIFICATIONS	Mixture ratio	○		○	○							
	Fuel pressure (too low)			○	○	○						
	Ignition timing						○					
FUEL SYSTEM	Fuel filter (clogged)					○						
	Fuel line (clogged)					○						
	Injectors (clogged)	○										
	Pressure regulator				○							
	Pressure regulator vacuum hose (clogged)			○								
IGNITION SYSTEM	Spark plugs (wet with fuel)								○			
	Ignition switch	○						○		○		
INTAKE SYSTEM	Throttle chamber (with ports clogged)		○									
	Throttle valve (clogged)		○									
CONTROL SYSTEM	Engine temperature sensor										○	○
	Crank angle sensor	○						○			○	

SERVICE PROCEDURE

❶ **LISTEN**

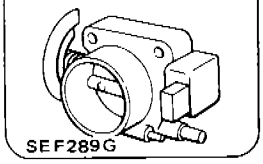


Listen for injector operating sound.

N.G. → Check injector circuit. [See page EF & EC-112.]

O.K. ↓

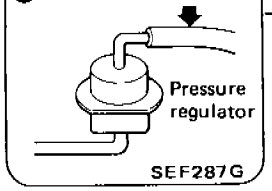
❷ **CHECK** Throttle chamber



Check throttle chamber ports and valve for clogging.

N.G. → Clean the ports and/or throttle valve.

❸ **CHECK**

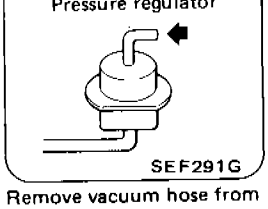


Check vacuum hose of pressure regulator for clogging.

N.G. ↓

Repair or replace the hose.

O.K. → ❹ **REMOVE** Pressure regulator



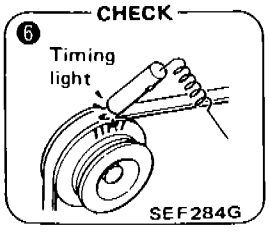
Remove vacuum hose from pressure regulator, and try to start.

Improved → ❺ **MEASURE** Fuel pressure

Connect vacuum hose to pressure regulator and measure fuel pressure.

→ Check idle mixture ratio. [See page EF & EC-25.]

❻ **CHECK**

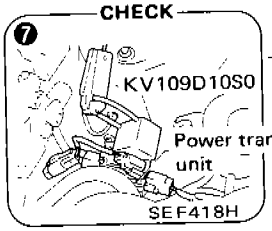


Check ignition timing.

N.G. ↓

Adjust ignition timing. [See page EF & EC-22.]

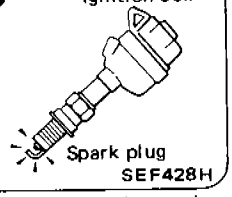
❼ **CHECK**



Check flashes of timing light for weakness.

N.G. → Check ignition signal circuit. [See page EF & EC-90.]

❽ **CHECK** Ignition coil



Remove spark plugs and check their ignition sparks by cranking.

❾ **PERFORM** Self-diagnosis Mode IV

Perform self-diagnosis Mode IV (for start signal).

N.G. → Check starter circuit. [See page EF & EC-104.]

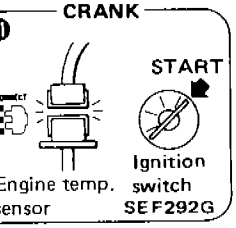
❿ **PERFORM** Self-diagnosis Mode III

Perform self-diagnosis Mode III (for engine temp. sensor and crank angle sensor).

For crank angle sensor → Check the sensor circuits. [See page EF & EC-86 (engine temp. sensor), page EF & EC-82 (crank angle sensor).]

For engine temp. sensor →

⓫ **CRANK**



Start with engine temp. sensor connector disconnected.

N.G. →

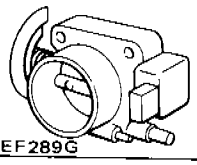
Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 4 **Impossible to start — partial combustion (throttle position changes combustion quality)**

POSSIBLE CAUSES		❶	❷	❸	❹	❺
INTAKE SYSTEM	Throttle chamber (with ports clogged)	○				
	Throttle valve (clogged)		○			
	Air regulator (stuck closed)			○		
CONTROL SYSTEM	Engine temperature sensor				○	
	Idle switch				○	
	Neutral switch					○

SERVICE PROCEDURE

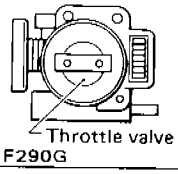
❶ **CHECK** Throttle chamber



N.G. → Clean the ports.

Check throttle chamber ports for clogging.

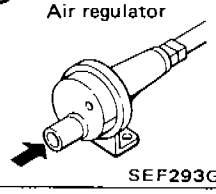
❷ **CHECK** Throttle chamber



N.G. → Clean the valve.

Check throttle valve for clogging.

❸ **CHECK** Air regulator



N.G. → Check air regulator and/or its circuit. [See page EF & EC-110.]

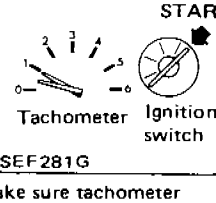
Make sure air regulator stays open before warm-up

❹ **PERFORM**

Self-dragnosis Mode III/IV

Perform self-diagnosis Mode III (for engine temp. sensor), Mode IV (for idle switch).

❺ **CHECK**



N.G. → Check neutral switch and/or its circuit. [See page EF & EC-116.]

Make sure tachometer indicates about 300 rpm while cranking.

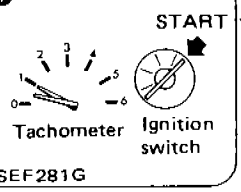
Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 5 **Hard to start — before warm-up**

	POSSIBLE CAUSES	❶	❷	❸	❹	❺	❻
SPECIFICATIONS	Mixture ratio			○			○
IGNITION SYSTEM	Ignition switch (no start signal)	○			○		
INTAKE SYSTEM	Air regulator			○			
CONTROL SYSTEM	Engine temperature sensor					○	○
	Idle switch				○		
	Neutral switch	○					
OTHERS	Starter (operation too slow)	○					
	Battery (voltage too low)	○	○				

SERVICE PROCEDURE

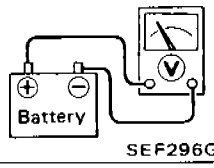
❶ **CHECK**



Make sure tachometer indicates about 300 rpm while cranking.

N.G. →

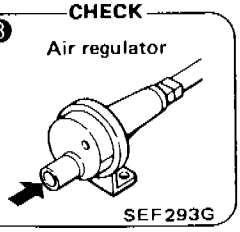
❷ **MEASURE**



Measure battery voltage.

N.G. (less than 12V) → Charge the battery.

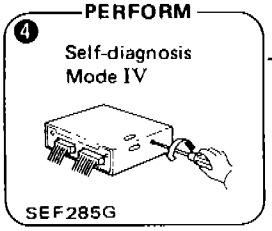
❸ **CHECK**



Make sure air regulator stays open before warm-up.

N.G. → Check air regulator and/or its circuit. [See page EF & EC-110.]

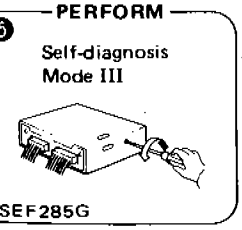
❹ **PERFORM**



Perform self-diagnosis Mode IV (for start signal and idle switch).

N.G. → Check the malfunctioning switches and/or circuits. [See page EF & EC-104 (start signal), page EF & EC-94 (idle switch).]

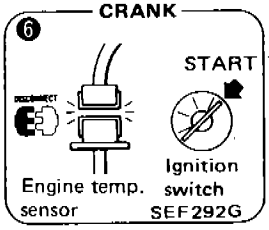
❺ **PERFORM**



Perform sel-diagnosis Mode III (for engine temp. sensor).

N.G. →

❻ **CRANK**



Start with engine temp. sensor connector disconnected.

N.G. → Check sensor circuit. [See page EF & EC-86 (engine temp. sensor).]

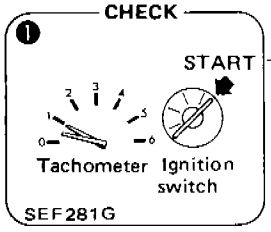
Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 6 Hard to start — after warm-up

POSSIBLE CAUSES		❶	❷	❸	❹	❺	❻	❼	❽
SPECIFICATIONS	Mixture ratio			○			○		
	Fuel pressure			○			○	○	
FUEL SYSTEM	Fuel line (hot fuel)			○					
	Pressure regulator (low fuel pressure)						○		
	Pressure regulator vacuum hose (clogged)						○		
	Pressure regulator control solenoid							○	○
	Pressure regulator control solenoid vacuum hose						○		
IGNITION SYSTEM	Ignition switch (no start signal)	○				○			
CONTROL SYSTEM	Engine temperature sensor				○				
	Air flow meter				○				
OTHERS	Starter (operation too slow)	○							
	Battery (voltage too low)	○	○						

SERVICE PROCEDURE

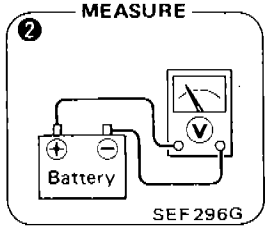
❶ CHECK



Make sure tachometer indicates about 300 rpm while cranking.

N.G. →

❷ MEASURE

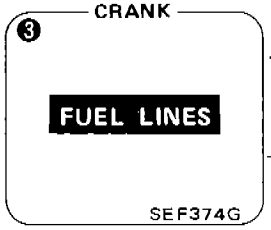


Measure battery voltage.

N.G. (less than 12V) ↓

Charge the battery.

❸ CRANK

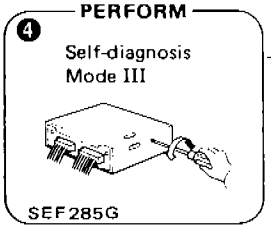


Cool fuel lines with wet rags, etc. and try to start.

No change → Proceed to other steps.

Improved → Proceed to other steps. If everything is O.K., check fuel vapor pressure.

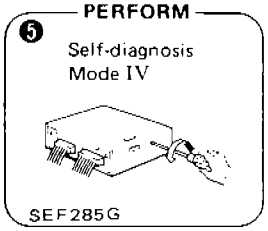
❹ PERFORM



Perform self-diagnosis Mode III (for engine temp. sensor and air flow meter).

N.G. → Check sensor circuits. [See page EF & EC-86 (engine temp. sensor), page EF & EC-84 (air flow meter).]

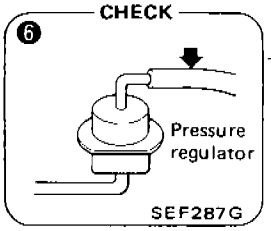
❺ PERFORM



Perform self-diagnosis Mode IV (for start signal).

N.G. → Check starter circuit. [See page EF & EC-104.]

❻ CHECK



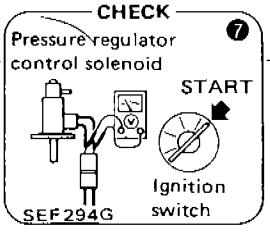
Check vacuum hose of pressure regulator for clogging.

N.G. ↓

Repair or replace the hose.

O.K. →

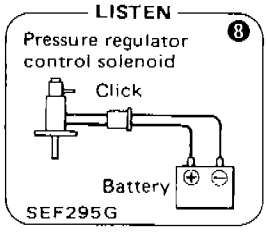
❼ CHECK



Check terminal voltage of pressure regulator control solenoid while cranking.

N.G. →

❽ LISTEN



Listen for clicking sound from pressure regulator control solenoid when applying battery voltage.

N.G. ↓ Replace the solenoid.

O.K. ↓ Check the solenoid circuit. [See page EF & EC-114.]

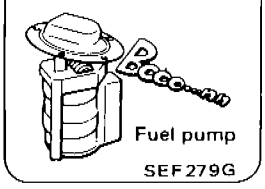
Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 7 **Hard to start – every time**

	POSSIBLE CAUSES	❶	❷	❸	❹	❺	❻	❼	❽	❾	❿	⓫
SPECIFICATIONS	Mixture ratio	○				○	○					
	Fuel pressure						○	○				
	Ignition sparks (missing)								○		○	
	Ignition timing				○							
FUEL SYSTEM	Fuel pump (improper operation)	○										
	Fuel line (clogged)							○				
	Canister (air leaks)					○						
	Pressure regulator (low fuel pressure)						○					
IGNITION SYSTEM	Spark plugs (improper gap)									○		
CONTROL SYSTEM	Crank angle sensor	○							○			○
	Engine temperature sensor											○
	Idle switch											○
	Neutral switch		○									
OTHERS	Starter (operation too slow)		○									
	Battery (voltage too low)		○	○								

SERVICE PROCEDURE

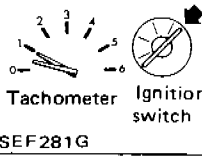
❶ **LISTEN**



Listen for fuel pump operating sound.

N.G. → Check fuel pump and/or related circuits. [See page EF & EC-102.]

❷ **CHECK**



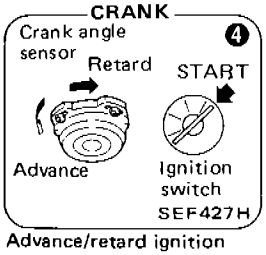
Make sure tachometer indicates about 300 rpm while cranking.

N.G. → ❸ **MEASURE** Battery

Measure battery voltage.

N.G. → Charge the battery.

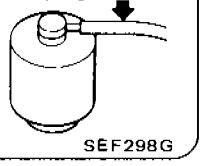
❹ **CRANK**



Advance/retard ignition timing and try to start.

No change → [Proceed to other steps.]

❺ **CHECK**

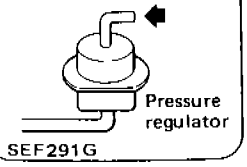


Check vacuum hose of canister for air leaks.

N.G. → Repair or replace the hose.

Improved → Check idle mixture ratio. [See page EF & EC-25.]

❻ **REMOVE**



Remove vacuum hose from pressure regulator, and try to start.

❼ **MEASURE** Fuel pressure

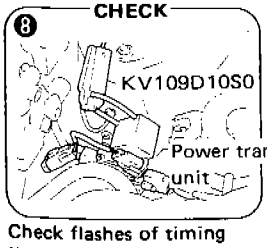
Connect vacuum hose to pressure regulator and measure fuel pressure.

⓫ **PERFORM** Self-diagnosis Mode III/IV

Perform self-diagnosis Mode III (for engine temp. sensor and crank angle sensor), Mode IV (for idle switch).

N.G. → Check the malfunctioning circuits. [See page EF & EC-86 (engine temp. sensor), page EF & EC-82 (crank angle sensor), page EF & EC-94 (idle switch).]

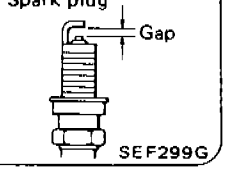
❽ **CHECK**



Check flashes of timing light for weakness.

N.G. → Check ignition signal circuit. [See page EF & EC-90.]

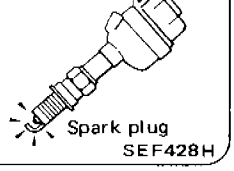
❾ **MEASURE**



Remove spark plugs and measure their gaps.

N.G. → Replace the wires.

O.K. → ❿ **CHECK** Ignition coil



Check ignition sparks.

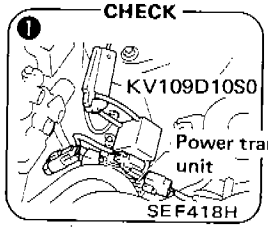
Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 8 Hard to start — morning after a rainy day

POSSIBLE CAUSES		❶	❷	❸	❹
SPECIFICATIONS	Ignition sparks (weak)	○			○
IGNITION SYSTEM	Power transistor	○			○
	Ignition coil	○	○		○
	Spark plugs (improper gap)			○	○

SERVICE PROCEDURE

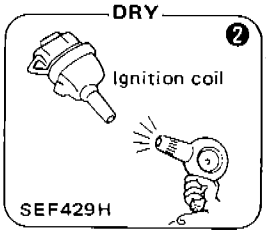
❶ CHECK



Check flashes of timing light for weakness.

N.G. → Check ignition signal circuit. [See page EF & EC-90.]

❷ DRY

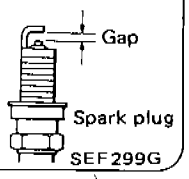


Dry ignition coil and try to start.

Can start → Replace the parts.

No change →

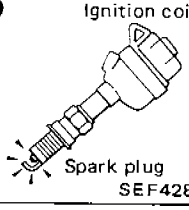
❸ MEASURE



Remove spark plugs and measure their gaps. (For conventional type plug)

O.K. →

❹ CHECK



Check ignition sparks.

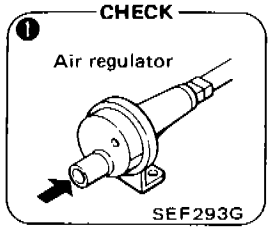
Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 9 **Abnormal idling – no fast idle**

	POSSIBLE CAUSES	❶	❷	❸	❹	❺	❻
SPECIFICATIONS	Mixture ratio	○	○		○		
	Ignition timing			○			
INTAKE SYSTEM	Blow-by hose (clogged)		○				
	Air regulator (stuck closed)	○					
CONTROL SYSTEM	Engine temperature sensor					○	○

SERVICE PROCEDURE

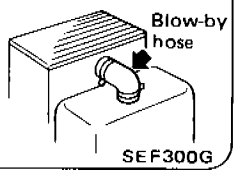
❶ **CHECK**



N.G. → Check air regulator and/or its circuit. [See page EF & EC-110.]

Make sure air regulator stays open before warm-up.

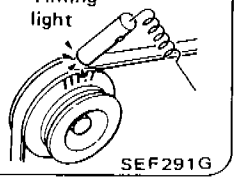
❷ **CHECK**



N.G. → Clean or replace the hose.

Check blow-by hose for clogging.

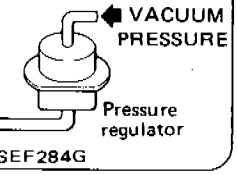
❸ **APPLY**



Improved → Adjust ignition timing. [See page EF & EC-22.]

Check ignition timing.

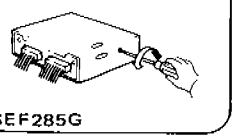
❹ **CHECK**



N.G. → Check idle mixture ratio. [See page EF & EC-25.]

Apply vacuum/pressure to pressure regulator after disconnecting vacuum hose, and check idling.

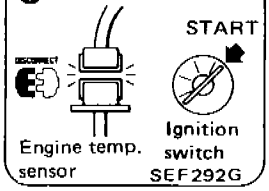
❺ **PERFORM**



N.G. →

Perform self-diagnosis Mode III (for engine temp. sensor).

❻ **CRANK**



N.G. → Check sensor circuit. [See page EF & EC-86 (engine temp. sensor).]

Start with engine temp. sensor connector disconnected.

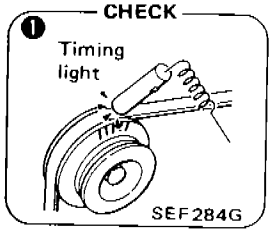
Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 10 Abnormal idling – low idle (after warm-up)

POSSIBLE CAUSES		❶	❷	❸	❹	❺	❻	❼
SPECIFICATIONS	Mixture ratio		○			○		
	Ignition timing (too retarded)	○						
INTAKE SYSTEM	Throttle chamber (with ports clogged)			○				
	Throttle valve (clogged)				○			
CONTROL SYSTEM	Crank angle sensor						○	
	Air flow meter						○	
	Engine temperature sensor						○	○

SERVICE PROCEDURE

❶ CHECK

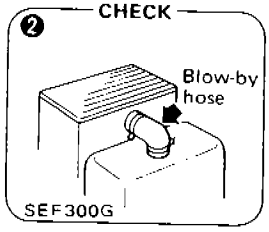


Check ignition timing.

N.G.

Adjust ignition timing. [See page EF & EC-22.]

❷ CHECK

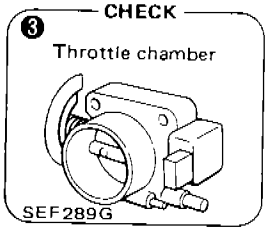


Check blow-by hose for clogging.

N.G.

Clean or replace the hose.

❸ CHECK

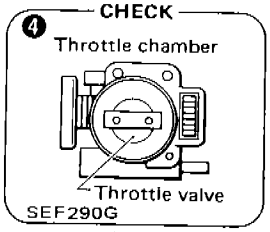


Check throttle chamber ports for clogging.

N.G.

Clean the ports.

❹ CHECK

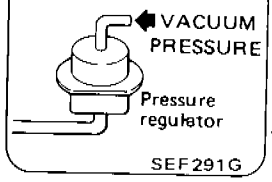


Check throttle valve for clogging.

N.G.

Clean the valve.

❺ APPLY

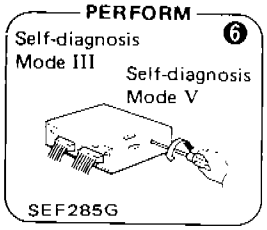


Apply vacuum/pressure to pressure regulator after disconnecting vacuum hose, and check idling.

Improved → Check idle mixture ratio. [See page EF & EC-25.]

No change → Check load signal circuit. [See EL section.]

❻ PERFORM

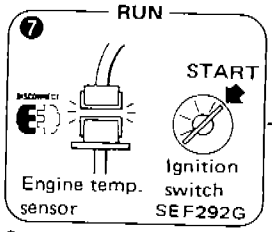


Perform self-diagnosis Modes III and V (for air flow meter, and engine temp. sensor.)

N.G.

Check the malfunctioning parts and/or circuits. [See page EF & EC-84 (air flow meter), page EF & EC-86 (engine temp. sensor).]

❼ RUN



N.G.

Start and run engine with engine temp. sensor connector disconnected.

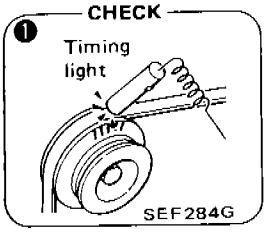
Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 11 — Abnormal idling – high idle (after warm-up)

	POSSIBLE CAUSES	❶	❷	❸	❹	❺	❻	❼	❽	❾	❿	⓫
SPECIFICATIONS	Mixture ratio		○	○		○	○			○		
	Ignition timing (too advanced)	○										
INTAKE SYSTEM	Air duct (leaks)		○									
	Throttle chamber (air leaks)				○							
	Throttle valve (stuck control wire)				○							
	Intake manifold (gasket) (air leaks)		○									
	Air regulator (stuck open)			○								
	A.A.C. valve							○				
	F.I.C.D. solenoid (remaining ON)								○			
CONTROL SYSTEM	Crank angle sensor										○	
	Air flow meter										○	
	Engine temperature sensor										○	○
	Idle switch (remaining OFF)							○		○		
OTHERS	Battery (voltage too low)											

SERVICE PROCEDURE

❶ CHECK

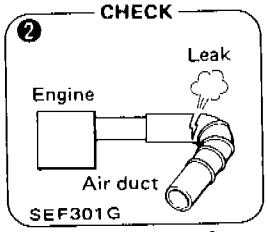


Check ignition timing.

N.G. ↓

Adjust ignition timing.
[See page EF & EC-22.]

❷ CHECK



Check intake system for air leaks.

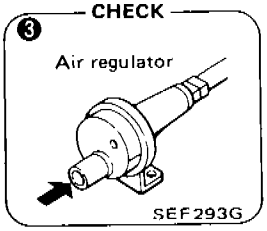
O.K. ↓

N.G. ↓

Check throttle wire for rough sliding.

Repair/replace the part.

❸ CHECK

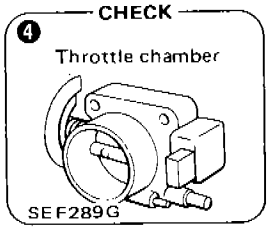


Make sure air regulator stays closed after warm-up.

N.G. ↓

Check air regulator and/or its circuit.
[See page EF & EC-110.]

❹ CHECK

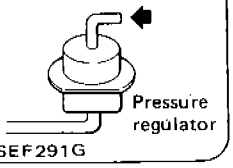


Check throttle chamber ports and valve for clogging.

N.G. ↓

Clean the ports and/or throttle valve.

❺ REMOVE



Remove vacuum hose from pressure regulator, and try to start.

Improved →

❻ MEASURE

Fuel pressure

Connect vacuum hose to pressure regulator and measure fuel pressure.

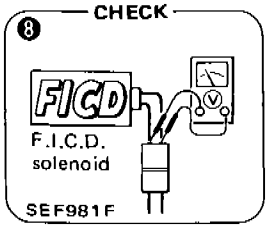
↓

Check idle mixture ratio.
[See page EF & EC-25.]

❼ CHECK

Check A.A.C. valve and/or its circuit
[See page EF & EC-106.]

❽ CHECK



Check terminal voltage of F.I.C.D. solenoid while idling.

↓

Check the part and/or circuit.
[See HA section.]

❾ PERFORM

Self-diagnosis Mode IV

Perform self-diagnosis Mode IV (for idle switch).

N.G. ↓

Check the idle switch circuit.
[See page EF & EC-94.]

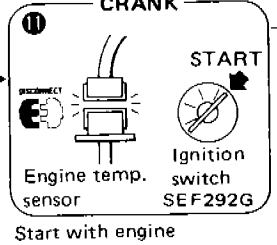
❿ PERFORM

Self-diagnosis Mode III

N.G. → Check sensor circuit.
[See page EF & EC-86 (engine temp. sensor), page EF & EC-82 (crank angle sensor), page EF & EC-84 (air flow meter).]

Perform self-diagnosis Mode III (for engine temp. sensor, crank angle sensor and air flow meter).

⓫ CRANK



N.G. → Check sensor circuit.
[See page EF & EC-86 (engine temp. sensor), page EF & EC-82 (crank angle sensor), page EF & EC-84 (air flow meter).]

Start with engine temp. sensor connector disconnected.

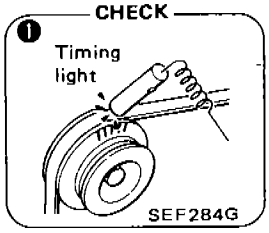
Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 12 **Unstable idling – before warm-up**

POSSIBLE CAUSES		❶	❷	❸	❹	❺	❻
SPECIFICATIONS	Mixture ratio		○	○			
	Ignition timing	○					
INTAKE SYSTEM	Air regulator (not open enough)		○				
	A.A.C. valve				○		
CONTROL SYSTEM	Engine temperature sensor					○	○

SERVICE PROCEDURE

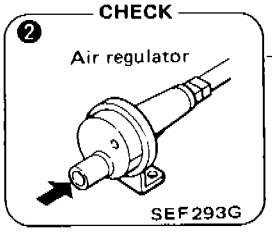
❶ CHECK



Check ignition timing.

N.G. → Adjust ignition timing. [See page EF & EC-22.]

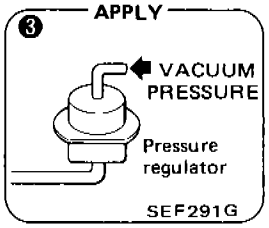
❷ CHECK



Make sure air regulator stays open before warm-up.

N.G. → Check air regulator and/or its circuit. [See page EF & EC-110.]

❸ APPLY



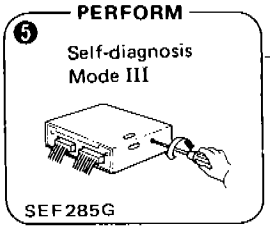
Apply vacuum/pressure to pressure regulator after disconnecting vacuum hose, and check idling.

Improved → Check idle mixture ratio. [See page EF & EC-25.]

❹ CHECK

Check A.A.C. valve and/or its circuit. [See page EF & EC-106.]

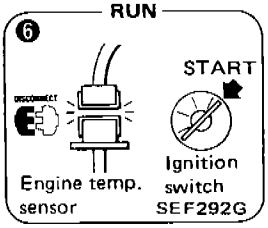
❺ PERFORM



Perform self-diagnosis Mode III (for engine temp. sensor).

N.G. → Check sensor circuit. [See page EF & EC-86.]

❻ RUN



Start and run engine with engine temp. sensor connector disconnected.

N.G. → Check sensor circuit. [See page EF & EC-86.]

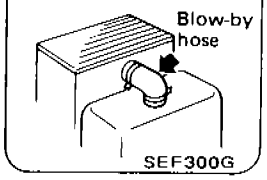
Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 13 Unstable idling – after warm-up

POSSIBLE CAUSES		❶	❷	❸	❹	❺	❻	❼	❽	❾
SPECIFICATIONS	Mixture ratio	○	○	○	○					
	Ignition sparks					○	○			
	Ignition timing							○		
	Compression pressure								○	
FUEL SYSTEM	Fuel line (clogged)									
	Canister (air leaks)			○						
	Pressure regulator control solenoid				○					
IGNITION SYSTEM	Power transistor					○	○			
	Ignition coil					○	○			
INTAKE SYSTEM	Blow-by hose (leaks)	○								
	Air duct (leaks)		○							
CONTROL SYSTEM	Idle switch									○

SERVICE PROCEDURE

❶ CHECK

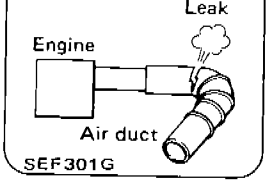


Check blow-by hose for leaks.

↓ N.G.

Repair/replace the hose.

❷ CHECK

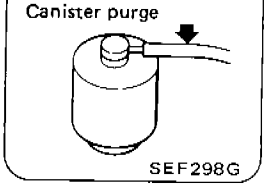


Check intake system for air leaks.

↓ N.G.

Repair/replace the part.

❸ CHECK

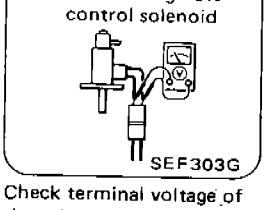


Check purge line for leaks.

↓ N.G.

Repair/replace the hose.

❹ CHECK

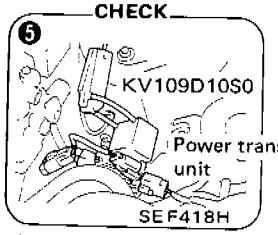


Check terminal voltage of the solenoid while idling.

↓ N.G.

Check the solenoid circuit.
[See page EF & EC-114.]

❺ CHECK

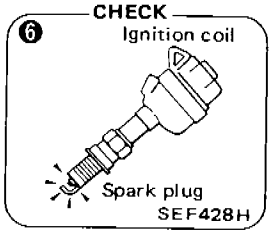


Check flashes of timing light for weakness.

↓ N.G.

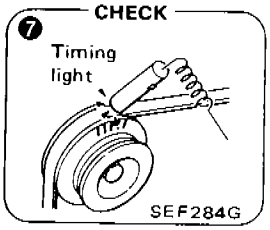
Check ignition signal circuit.
[See page EF & EC-90.]

❻ CHECK



Remove spark plugs and check their ignition sparks.

❼ CHECK

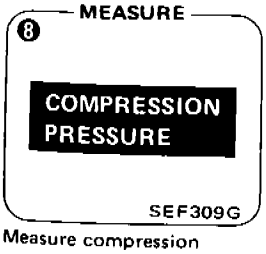


Check ignition timing.

↓ N.G.

Adjust ignition timing.
[See page EF & EC-22.]

❽ MEASURE

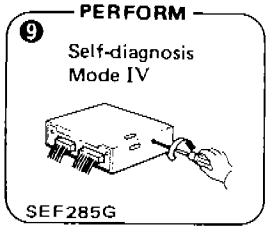


Measure compression pressure.

↓ N.G.

Check cylinder head and gasket.
[See EM section.]

❾ PERFORM



Perform self-diagnosis Mode IV (for idle switch).

↓ N.G.

Check the idle switch circuit.
[See page EF & EC-94.]

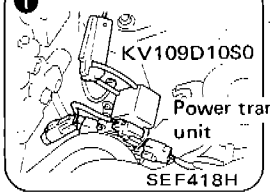
Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 14 Poor driveability – stumble (while accelerating)

POSSIBLE CAUSES		❶	❷	❸	❹	❺	❻	❼	❽
SPECIFICATIONS	Mixture ratio			○		○	○		○
	Fuel pressure					○	○		
FUEL SYSTEM	Fuel filter (clogged)						○		
	Fuel line (clogged)						○		
	Injectors (clogged)						○		
IGNITION SYSTEM	Power transistor	○	○						
	Ignition coil	○	○						
	Spark plugs (ignition leaks, improper gap)		○						
INTAKE SYSTEM	Air duct (leaks)			○					
CONTROL SYSTEM	Crank angle sensor	○						○	
	Air flow meter							○	
	Engine temperature sensor	○						○	
	Exhaust gas sensor								○
	Idle switch (remaining OFF)				○				
OTHERS	Fuel (poor quality)								

SERVICE PROCEDURE

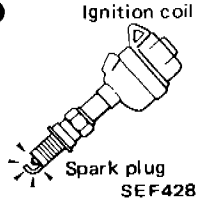
❶ CHECK



N.G. → Check ignition signal circuit. [See pgae EF & EC-90.]

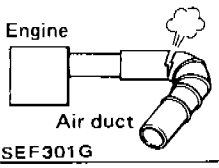
Check flashes of timing light for weakness.

❷ CHECK Ignition coil



Remove spark plugs and check their ignition sparks.

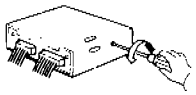
❸ CHECK



N.G. → Repair/replace the part.

Check intake system for air leaks.

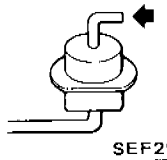
❹ PERFORM Self-diagnosis Mode IV



N.G. → Check the idle switch circuit. [See page EF & EC-94.]

Perform self-diagnosis Mode IV (for idle switch).

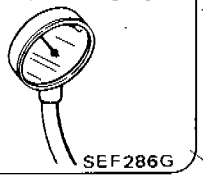
❺ REMOVE Pressure regulator



Improved →

Remove vacuum hose from pressure regulator, and try to drive.

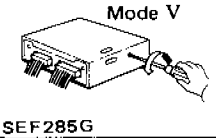
❻ MEASURE Fuel pressure gauge



Connect vacuum hose to pressure regulator and measure fuel pressure while driving.

→ Check idle mixture ratio. [See page EF & EC-25.]

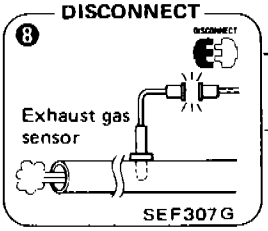
❼ PERFORM Self-diagnosis Mode III, Self-diagnosis Mode V



N.G. → Check the malfunctioning parts and/or circuits. [See page EF & EC-84 (air flow meter), page EF & EC-82 (crank angle sensor), page EF & EC-86 (engine temp. sensor).]

Perform self-diagnosis Mode III and V (for air flow meter, crank angle sensor and engine temp. sensor).

❽ DISCONNECT



Improved → Replace the sensor.

No change → Check idle mixture ratio. [See page EF & EC-25.]

Disconnect exhaust gas sensor connector, and try to drive.

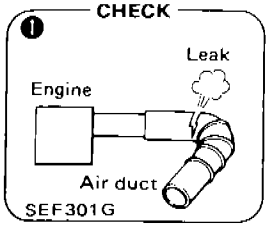
Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 15 Poor driveability — surge (while cruising)

POSSIBLE CAUSES		❶	❷	❸	❹	❺	❻	❼
SPECIFICATIONS	Mixture ratio (too lean)	○		○	○			○
	Fuel pressure (low)			○	○			
	Ignition timing		○					
IGNITION SYSTEM	(missing)						○	
INTAKE SYSTEM	Air duct (leaks)	○						
	Throttle chamber (air leaks)	○						
	Intake manifold (gasket) (air leaks)	○						
CONTROL SYSTEM	Crank angle sensor						○	
	Air flow meter						○	
	Exhaust gas sensor							○
	Idle switch					○		

SERVICE PROCEDURE

❶ **CHECK**

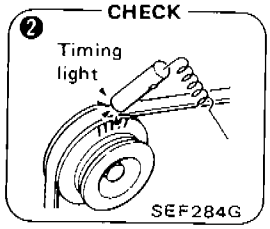


Check intake system for air leaks.

↓ N.G.

Repair/replace the part.

❷ **CHECK**



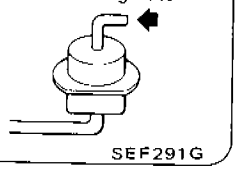
Check ignition timing.

↓ N.G.

Adjust ignition timing. [See page EF & EC-22.]

❸ **REMOVE**

Pressure regulator

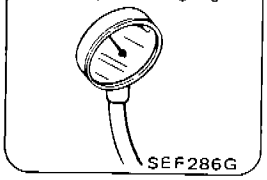


Remove vacuum hose from pressure regulator, and try to drive.

Improved →

❹ **MEASURE**

Fuel pressure gauge

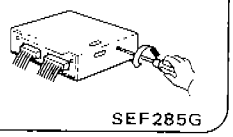


Connect vacuum hose to pressure regulator and measure fuel pressure while driving.

→ Check idle mixture ratio. [See page EF & EC-25.]

❺ **PERFORM**

Self-diagnosis Mode IV



Perform self-diagnosis Mode IV (for idle switch).

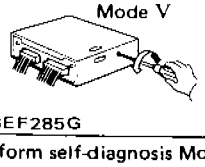
↓ N.G.

Check the idle switch circuit. [See page EF & EC-94.]

❻ **PERFORM**

Self-diagnosis Mode III

Self-diagnosis Mode V

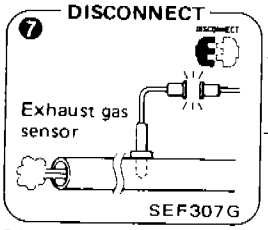


Perform self-diagnosis Mode III and V (for crank angle sensor, air flow meter and ignition signal).

N.G. →

Check the malfunctioning parts and/or circuits. [See page EF & EC-82 (crank angle sensor), page EF & EC-84 (air flow meter), page EF & EC-90 (ignition signal).]

❼ **DISCONNECT**



Disconnect exhaust gas sensor connector, and try to drive.

Improved → Replace the sensor.

No change → Check idle mixture ratio. [See page EF & EC-25.]

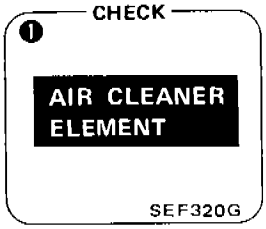
Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 16 Poor driveability — lack of power

POSSIBLE CAUSES		❶	❷	❸	❹	❺	❻	❼	❽	❾
SPECIFICATIONS	Fuel pressure						○	○		
	Ignition timing		○							
	Compression pressure (too low)					○				
FUEL SYSTEM	Fuel pump (low fuel output)							○		
	Fuel filter (clogged)							○		
	Fuel line (clogged)							○		
	Injectors (clogged)							○		
IGNITION SYSTEM	Spark plugs (improper gap)				○					
INTAKE SYSTEM	Air cleaner element (clogged)	○								
	Throttle chamber (clogged)			○						
	Throttle valve (not open enough)			○						
CONTROL SYSTEM	Air flow meter								○	
	Exhaust gas sensor									○

SERVICE PROCEDURE

❶ CHECK — AIR CLEANER ELEMENT

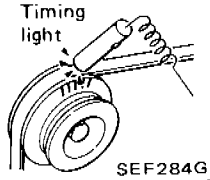


Check air cleaner element for clogging.

N.G. ↓

Replace the part.

❷ CHECK — Timing light

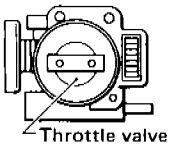


Check ignition timing with a timing light.

N.G. ↓

Adjust ignition timing.
[See page EF & EC-22.]

❸ CHECK — Throttle chamber

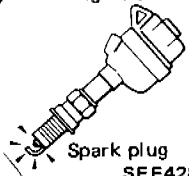


Check throttle valve for rough movement.

N.G. ↓

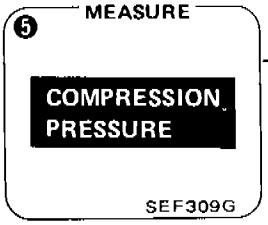
Repair/replace the part.

❹ CHECK — Ignition coil



Remove spark plugs and check their ignition sparks.

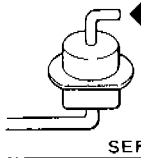
❺ MEASURE — COMPRESSION PRESSURE



Measure compression pressure.

→ Check cylinder head and gasket.
[See EM section.]

❻ REMOVE — Pressure regulator



Remove vacuum hose from pressure regulator, and try to drive.

Improved →

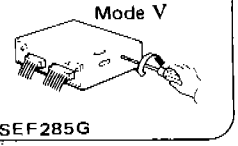
❼ MEASURE — Fuel pressure gauge

Connect vacuum hose to pressure regulator and measure fuel pressure while driving.

↓

Check idle mixture ratio.
[See page EF & EC-25.]

❽ PERFORM — Self-diagnosis Mode III, Self-diagnosis Mode V

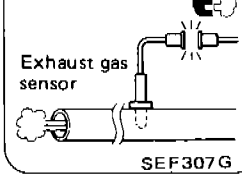


Perform self-diagnosis Mode III and V (for air flow meter).

N.G. ↓

Check the malfunctioning parts and/or circuit.
[See page EF & EC-84.]

❾ DISCONNECT — Exhaust gas sensor



Disconnect exhaust gas sensor connector, and try to drive.

No change ↓ / Improved ↓

Replace the sensor.

Check idle mixture ratio.
[See page EF & EC-25.]

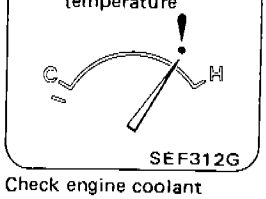
Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 17 Poor driveability — detonation

POSSIBLE CAUSES		❶	❷	❸	❹	❺
SPECIFICATIONS	Mixture ratio (too lean)			○	○	
	Fuel pressure (low)			○		
	Ignition timing (too advanced)		○			
FUEL SYSTEM	Fuel filter (clogged)				○	
	Fuel line (clogged)				○	
	Injectors (clogged)				○	
CONTROL SYSTEM	Crank angle sensor (improper 1°-signals)					○
	Air flow meter					○
	Engine temperature sensor					○
OTHERS	Engine coolant temperature (too high)	○				
	Fuel (low octane rating, poor quality)					

SERVICE PROCEDURE

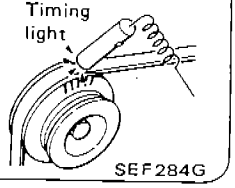
❶ **CHECK** Engine coolant temperature



Check engine coolant temperature.

Too high → Check cooling system. [See LC section.]

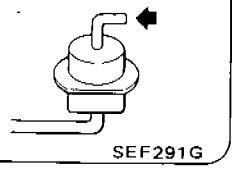
❷ **CHECK** Timing light



Check ignition timing.

N.G. → Adjust ignition timing. [See page EF & EC-22.]

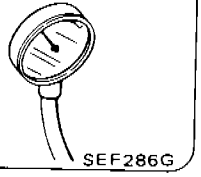
❸ **REMOVE** Pressure regulator



Remove vacuum hose from pressure regulator, and try to drive.

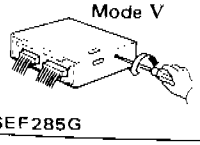
Improved →

❹ **MEASURE** Fuel pressure gauge



Connect vacuum hose to pressure regulator, and measure fuel pressure while driving.

PERFORM ❺ Self-diagnosis Mode III, Self-diagnosis Mode V



Perform self-diagnosis Mode III and V (for crank angle sensor, air flow meter and engine temp. sensor).

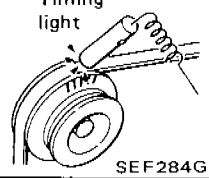
N.G. → Check the malfunctioning parts. [See page EF & EC-82 (crank angle sensor), page EF & EC-84 (air flow meter), page EF & EC-86 (engine temp. sensor).]

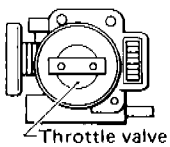
Diagnostic Table (Cont'd)

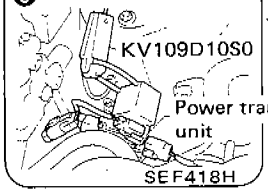
SYMPTOM & CONDITION 18 **Engine stall — during start-up**

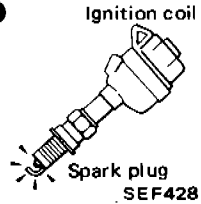
POSSIBLE CAUSES		❶	❷	❸	❹	❺	❻	❼	❽
SPECIFICATIONS	Mixture ratio (too rich/too lean)						○	○	○
	Ignition sparks (weak)			○					
	Ignition timing	○							
	Compression pressure (too low)					○			
FUEL SYSTEM	Canister (too much evaporation to intake)						○		
IGNITION SYSTEM	Spark plugs (wet with fuel, improper gap)				○				
INTAKE SYSTEM	Throttle valve (not open enough)		○						
CONTROL SYSTEM	Exhaust gas sensor								○

SERVICE PROCEDURE

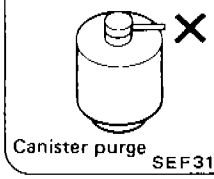
❶ CHECK
Timing light

SEF284G
N.G. → Adjust ignition timing. [See page EF & EC-22.]
Check ignition timing.

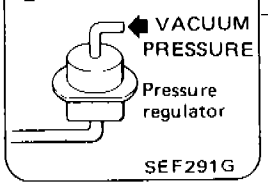
❷ CHECK
Throttle chamber

Throttle valve
SEF290G
N.G. → Repair/replace the part.
Check throttle valve for rough movement.

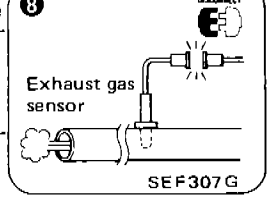
❸ CHECK

KV109D10S0
Power transistor unit
SEF418H
N.G. → Check ignition signal circuit. [See page EF & EC-90.]
Check flashes of timing light for weakness.

❹ CHECK
Ignition coil

Spark plug
SEF428H
Remove spark plugs and check their ignition sparks.

❺ MEASURE
COMPRESSION PRESSURE
SEF309G
Measure compression pressure.
↓
Check cylinder head and gasket. [See EM section.]

❻ TRY

Canister purge
SEF314G
Improved → Replace the canister and/or the hoses.
No change
Shut evaporated fuel to intake valve and try to drive.

❼ APPLY

VACUUM PRESSURE
Pressure regulator
SEF291G
Improved → Check idle mixture ratio. [See page EF & EC-25.]
Apply vacuum/pressure to pressure regulator after disconnecting vacuum hose, and try to drive.

❽ DISCONNECT

Exhaust gas sensor
SEF307G
No change → Replace the sensor.
Improved
Disconnect exhaust gas sensor connector and try to drive.

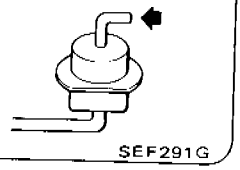
Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 19 Engine stall – while idling

POSSIBLE CAUSES		❶	❷	❸	❹	❺	❻	❼	❽	❾
SPECIFICATIONS	Mixture ratio (too rich/too lean)	○	○							
	Fuel pressure (low)	○	○							
	Ignition sparks (weak, missing)				○					
	Idle speed (low)			○						
FUEL SYSTEM	Fuel line (clogged)		○							
IGNITION SYSTEM	Spark plugs (wet with fuel, improper gap)					○	○			
INTAKE SYSTEM	A.A.C. valve			○				○		
	F.I.C.D. solenoid (improper operation)			○					○	
CONTROL SYSTEM	Idle switch (remaining OFF)									○
	Neutral switch (remaining OFF)			○						

SERVICE PROCEDURE

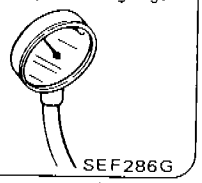
❶ REMOVE
Pressure regulator



Remove vacuum hose from pressure regulator, and check idling.

Improved →

❷ MEASURE
Fuel pressure gauge



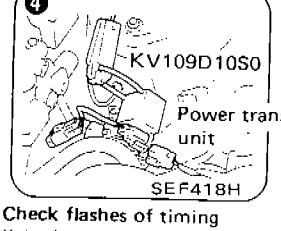
Connect vacuum hose to pressure regulator and measure fuel pressure.

→ Check idle mixture ratio.
[See page EF & EC-25.]

❸ MEASURE
Tachometer

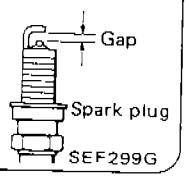
Measure idle speed.
↓ N.G.
Adjust idle speed.
[See page EF & EC-25.]

❹ CHECK



Check flashes of timing light for weakness.
↓ N.G.
Check ignition signal circuit.
[See page EF & EC-90.]

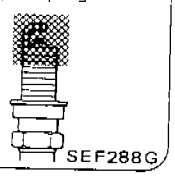
❺ CHECK



Remove spark plugs and check their gaps and tips.
(For conventional type plug)

and/or

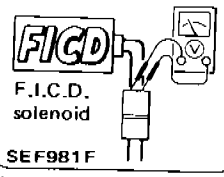
❻ CHECK
Spark plug



Check spark plugs for being foul or wet with fuel.

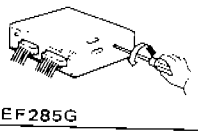
❼ CHECK
Check A.A.C. valve and/or its circuit.
[See page EF & EC-106.]

❽ CHECK



Check terminal voltage of F.I.C.D. solenoid.
↓ N.G.
Check the part and/or circuit.
[See HA section.]

❾ PERFORM
Self-diagnosis Mode IV



Perform self-diagnosis Mode IV (for idle switch).

N.G. → Check the idle switch circuit.
[See page EF & EC-94.]

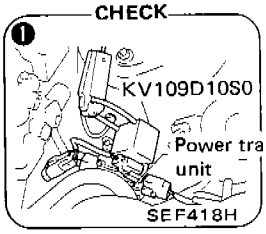
Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 20 **Engine stall — while accelerating**

POSSIBLE CAUSES		❶	❷	❸	❹	❺	❻
SPECIFICATIONS	Mixture ratio				○	○	
	Ignition sparks (weak, missing)	○	○				
	Compression pressure (low)			○			
CONTROL SYSTEM	Crank angle sensor	○					○
	Air flow meter						○
	Exhaust gas sensor				○	○	

SERVICE PROCEDURE

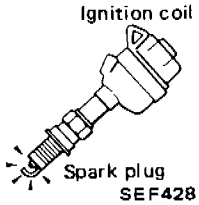
❶ **CHECK**



Check flashes of timing light for weakness during acceleration.

N.G. → Check ignition signal circuit. [See page EF & EC-90.]

❷ **CHECK** Ignition coil



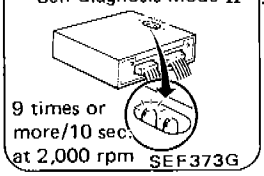
Remove spark plugs and check their ignition sparks.

❸ **MEASURE**

Measure compression pressure.

N.G. → Check cylinder head and gasket. [See EM section.]

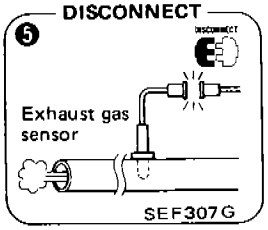
❹ **CHECK** Self-diagnosis Mode II



Check mixture ratio by flashes of inspection lamps.

N.G. →

❺ **DISCONNECT**



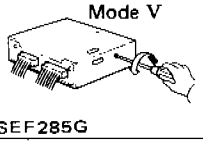
Disconnect exhaust gas sensor connector, and try to drive.

Improved → Replace the sensor.

No change → Check idle mixture ratio. [See page EF & EC-25.]

❻ **PERFORM**

Self-diagnosis Mode III, Self-diagnosis Mode V



Perform self-diagnosis Mode III and V (for crank angle sensor and air flow meter).

N.G. → Check the malfunctioning parts and/or circuits. [See page EF & EC-82 (crank angle sensor), page EF & EC-84 (air flow meter).]

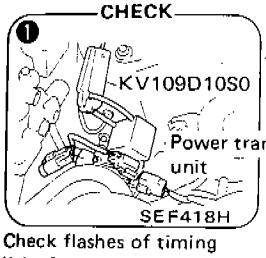
Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 21 Engine stall — while cruising

POSSIBLE CAUSES		❶	❷	❸	❹	❺
SPECIFICATIONS	Mixture ratio			○	○	
	Ignition sparks (weak, missing)	○	○			
CONTROL SYSTEM	Crank angle sensor					○
	Air flow meter					○
	Exhaust gas sensor			○	○	

SERVICE PROCEDURE

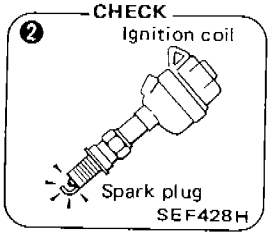
❶ CHECK



Check flashes of timing light for weakness at constant engine rev. (1,000 to 2,000 rpm).

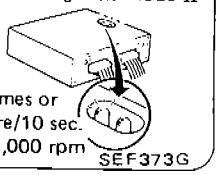
N.G. → Check ignition signal circuit. [See page EF & EC-90.]

❷ CHECK Ignition coil



Remove spark plugs and check their ignition sparks.

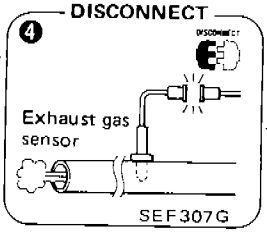
❸ CHECK Self-diagnosis Mode II



Check mixture ratio by flashes of inspection lamps.

N.G. →

❹ DISCONNECT

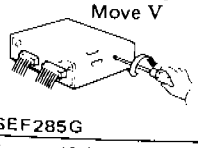


Disconnect exhaust gas sensor connector, and try to drive.

Improved → Replace the sensor.

No change → Check idle mixture ratio. [See page EF & EC-25.]

❺ PERFORM Self-diagnosis Mode III, Self-diagnosis Move V



Perform self-diagnosis Mode III and V (for air flow meter and crank angle sensor).

N.G. → Check the circuits. [See page EF & EC-82 (crank angle sensor), page EF & EC-84 (air flow meter).]

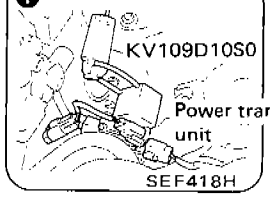
Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 22 | Engine stall – while decelerating/just after stopping

POSSIBLE CAUSES		❶	❷	❸	❹	❺	❻
SPECIFICATIONS	Mixture ratio					○	○
	Ignition sparks (missing)	○					
	Idle speed (too low)			○			
IGNITION SYSTEM	(missing)	○	○				
INTAKE SYSTEM	A.A.C. valve			○	○		
CONTROL SYSTEM	Exhaust gas sensor					○	○
	Crank angle sensor		○				
	Idle switch (remaining OFF)			○			

SERVICE PROCEDURE

❶ CHECK

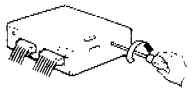


Check flashes of timing light while decreasing engine speed.

N.G. →

❷ PERFORM

Self-diagnosis Mode V



Perform self-diagnosis Mode V (for ignition signal and crank angle sensor).

N.G. → Check the malfunctioning parts and/or circuits. [See page EF & EC-90 (ignition siglal), page EF & EC-82 (crank angle sensor).]

❸ MEASURE

Tachometer

Measure idle speed.

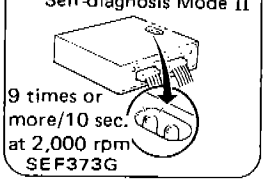
N.G. → Adjust idle speed. [See page EF & EC-25.]

❹ CHECK

Check A.A.C. valve and/or its circuit. [See page EF & EC-106.]

❺ CHECK

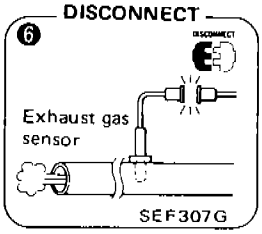
Self-diagnosis Mode II



Check mixture ratio by flashes of inspection lamps.

N.G. →

❻ DISCONNECT



Disconnect exhaust gas sensor connector, and try to drive.

Improved → Replace the sensor.

No change → Check idle mixture ratio. [See page EF & EC-25.]

Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 23 Engine stall – while loading

POSSIBLE CAUSES		❶	❷	❸	❹	❺
SPECIFICATIONS	Ignition timing		○			
	Idle speed (too low)	○				
INTAKE SYSTEM	A.A.C. valve	○		○		
	F.I.C.D. solenoid (remaining OFF)	○			○	
CONTROL SYSTEM	Idle switch (remaining OFF)	○				○

SERVICE PROCEDURE

❶ MEASURE

Tachometer

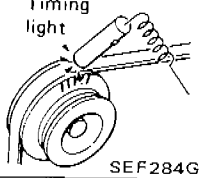
SEF316G

Measure idle speed.

N.G. → Adjust idle speed. [See page EF & EC-25.]

❷ CHECK

Timing light



SEF284G

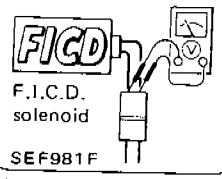
Check ignition timing.

N.G. → Adjust ignition timing. [See page EF & EC-22.]

❸ CHECK

Check A.A.C. valve and/or its circuit. [See page EF & EC-106.]

❹ CHECK



F.I.C.D. solenoid

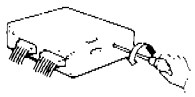
SEF981F

Check terminal voltage of F.I.C.D. solenoid.

→ Check the part and/or circuit. [See HA section.]

❺ PERFORM

Self-diagnosis Mode IV



SEF285G

Perform self-diagnosis Mode IV (for idle switch).

N.G. → Check the idle switch circuit. [See page EF & EC-94.]

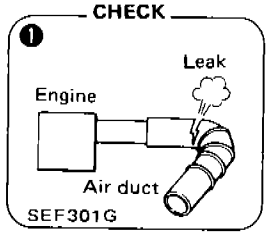
Diagnostic Table (Cont'd)

SYMPTOM & CONDITION 24 Backfire — through the intake

POSSIBLE CAUSES		❶	❷	❸	❹	❺	❻	❼
SPECIFICATIONS	Mixture ratio (too lean)	○		○		○	○	
	Ignition timing (too retarded)		○					
FUEL SYSTEM	Injectors (clogged)				○			
INTAKE SYSTEM	Air duct (air leaks)	○						
	Intake manifold (gaskets) (air leaks)	○						
CONTROL SYSTEM	Air flow meter							○
	Exhaust gas sensor					○	○	

SERVICE PROCEDURE

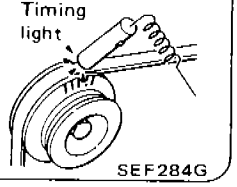
❶ CHECK



N.G. → Repair/replace the part.

Check intake system for air leaks.

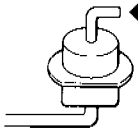
❷ CHECK



N.G. → Adjust ignition timing. [See page EF & EC-22.]

Check ignition timing.

❸ REMOVE

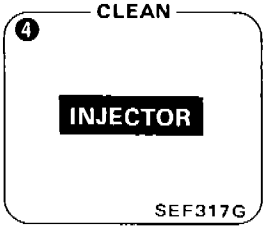


Improved → Check idle mixture ratio. [See page EF & EC-25.]

Remove vacuum hose from pressure regulator, and try to drive.

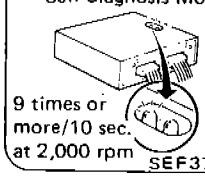
No change ↓

❹ CLEAN



Clean the injector.

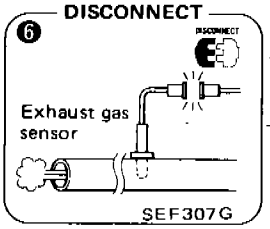
❺ PERFORM



N.G. →

Check mixture ratio by flashes of inspection lamps.

❻ DISCONNECT

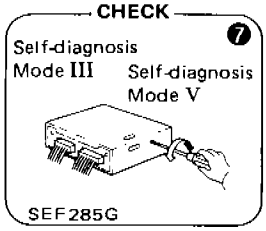


Improved → Replace the sensor.

No change → Check idle mixture ratio. [See page EF & EC-25.]

Disconnect exhaust gas sensor connector, and try to drive.

❼ CHECK



Perform self-diagnosis Mode III and V (for air flow meter).

N.G. ↓

Check the circuits. [See page EF & EC-84 (air flow meter).]

Diagnostic Table (Cont'd)

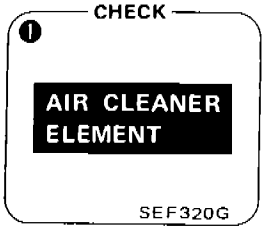
SYMPTOM & CONDITION 25 **Backfire — through the exhaust**

POSSIBLE CAUSES		❶	❷	❸	❹
SPECIFICATIONS	Mixture ratio (too rich)	○	○		
FUEL SYSTEM	Injectors (fuel leaks)		○		
IGNITION SYSTEM	(missing)				○
INTAKE SYSTEM	Air cleaner element (clogged)	○			
CONTROL SYSTEM	Idle switch (remaining OFF)			○	

SERVICE PROCEDURE

❶ CHECK

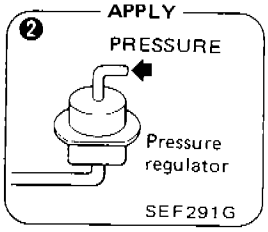
AIR CLEANER ELEMENT



N.G. → Replace the element.

Check air cleaner element for clogging.

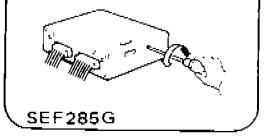
❷ APPLY PRESSURE



Improved → Check idle mixture ratio. [See page EF & EC-25.]

Apply pressure to pressure regulator after disconnecting vacuum hose, and try to drive.

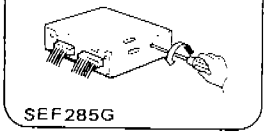
❸ PERFORM Self-diagnosis Mode IV



N.G. → Check idle switch and/or its circuit. [See page EF & EC-94.]

Perform self-diagnosis Mode IV (for idle switch).

❹ PERFORM Self-diagnosis Mode V



N.G. → Check the malfunctioning part and/or circuit. [See page EF & EC-90 (ignition signal).]

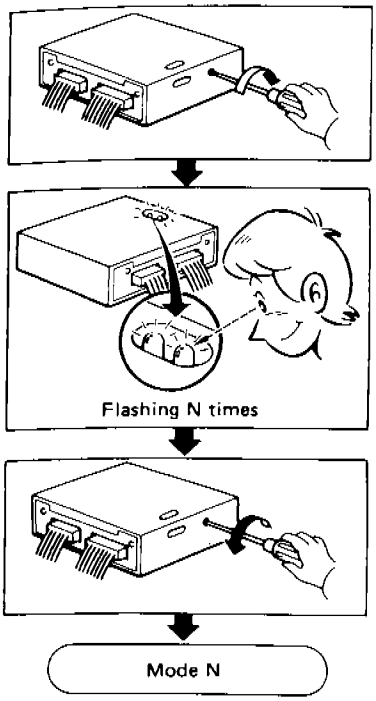
Perform self-diagnosis Mode V (for ignition signal).

Self-diagnosis — Description

The self-diagnosis is useful to diagnose malfunctions in major sensors and actuators of the E.C.C.S. system. There are 5 modes in the self-diagnosis system.

Mode I and Mode II apply only for model with catalyzer.

1. **Mode I — Mixture ratio feedback control monitor A**
   - During closed loop condition:
     The green inspection lamp turns ON when lean condition is detected and goes OFF by rich condition.
   - During open loop condition:
     The green inspection lamp remains ON or OFF.
2. **Mode II — Mixture ratio feedback control monitor B**
   The green inspection lamp function is the same as Mode I.
   - During closed loop condition:
     The red inspection lamp turns ON and OFF simultaneously with the green inspection lamp when the mixture ratio is controlled within the specified value.
   - During open loop condition:
     The red inspection lamp remains ON or OFF.
3. **Mode III — Self-diagnosis**
   This mode is the same as the former self-diagnosis in self-diagnosis mode.
4. **Mode IV — Switches ON/OFF diagnosis**
   During this mode, the inspection lamps monitor the switch ON-OFF condition.
   - Idle switch
   - Ignition switch "START"
   - Vehicle speed sensor
5. **Mode V — Real-time diagnosis**
   The moment the malfunction is detected, the display will be presented immediately. That is, the condition at which the malfunction occurs can be found by observing the inspection lamps during driving test.

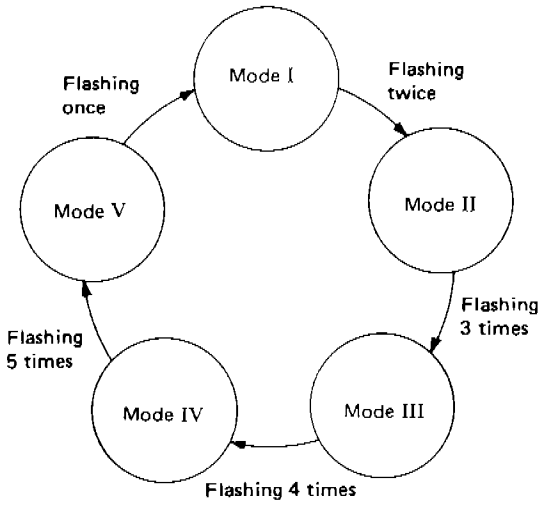


SEF872D

Self-diagnosis — Description (Cont'd)

SWITCHING THE MODES

1. Turn ignition switch "ON".
2. Turn diagnostic mode selector on E.C.U. fully clockwise and wait the inspection lamps flash.
3. Count the number of the flashing time, and after the inspection lamps have flashed the number of the required mode, turn diagnostic mode selector fully counterclockwise immediately.



SEF989D

When the ignition switch is turned off during diagnosis, in each mode, and then turned back on again after the power to the E.C.U. has dropped off completely, the diagnosis will automatically return to Mode I.

The stored memory would be lost if:

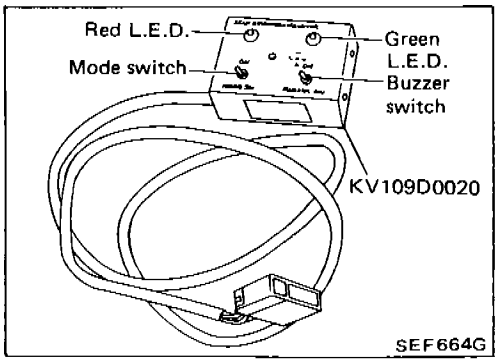
1. Battery terminal is disconnected.
2. After selecting Mode III, Mode IV is selected.
   However, if the diagnostic mode selector is kept turned fully clockwise, it will continue to change in the order of Mode I → II → III → IV → V → I ... etc., and in this state the stored memory will not be erased.

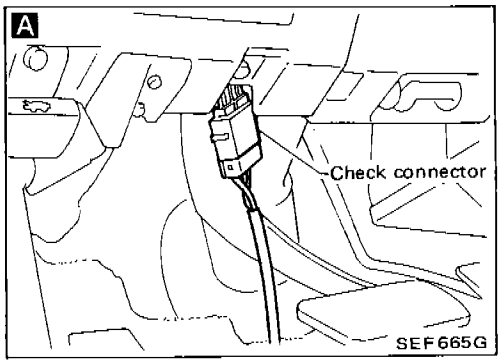
Self-diagnosis — Description (Cont'd)

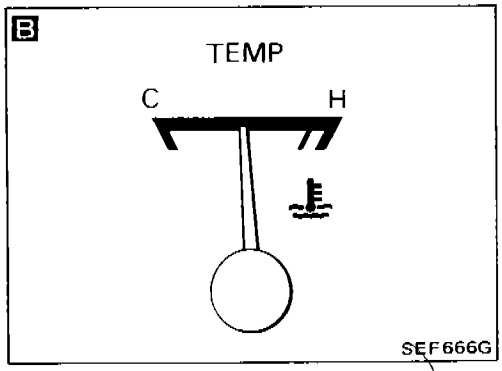
CHECKER BOX

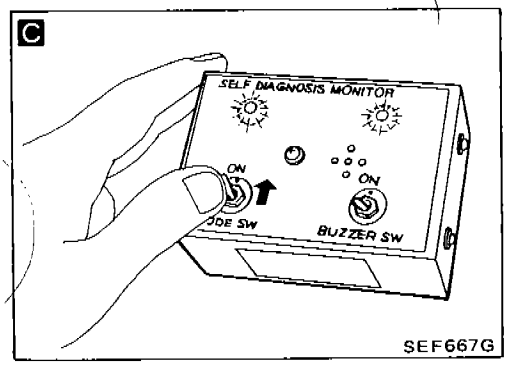
The Checker Box is used to control and read the self-diagnosis systems on models equipped with the "check connector" harness. It is a tool which can be used to operate the self-diagnosis system easily.

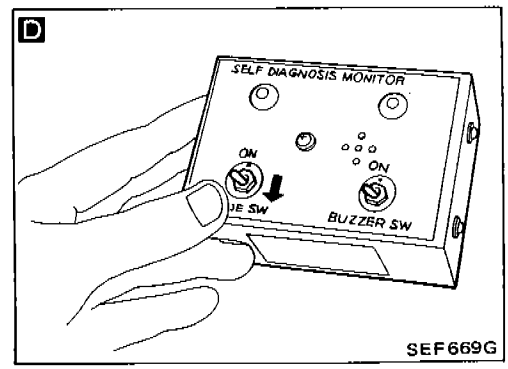
The Checker Box switch is used to trigger each of the self-diagnosis modes. You can read the red and green light emitting diode (L.E.D.) codes in the Checker Box, so it is not necessary to remove the E.C.U. The Checker Box also has an audible tone for each L.E.D. signal, so you can "hear" the codes instead of looking at the L.E.D. if necessary.











Self-diagnostic procedure

DIAGNOSIS START

A Connect Checker Box harness to the check connector on the vehicle.

- **Connect the Checker Box to the check connector only when the ignition key is in the "OFF" position.**

B Start engine and warm it up to normal operating temperature.

C Push and hold the mode switch in the "ON" position and wait for the inspection lamps to flash.

D Count the number of flashes, and after the lamps have flashed the number for the required mode, immediately release the mode switch.

Perform the required self-diagnostic procedure.

- **You can erase the stored memory by changing from diagnostic mode to Mode IV using the mode switch on the Checker Box.**

Stop engine and disconnect Checker Box harness from the check connector on the vehicle.

- **Disconnect the Checker Box from the check connector only when the ignition key is in the "OFF" position and the inspection lamps turn off.**

DIAGNOSIS END

Service procedures and instructions except for the above are the same as those where Checker Box is not used.

Self-diagnosis — Modes I & II (Model with catalyzer)

In these modes, the control unit provides the mixture ratio monitor presentation and the mixture ratio feedback coefficient monitor presentation.

<table>
<tr><td rowspan="2">Mode</td><td rowspan="2">L.E.D.</td><td rowspan="2">Engine stopped (Ignition switch "ON")</td><td colspan="4">Engine running</td></tr>
<tr><td>Open loop condition</td><td colspan="3">Closed loop condition</td></tr>
<tr><td rowspan="2">Mode I (Monitor A)</td><td>Green</td><td>ON</td><td>*Remains ON or OFF</td><td colspan="3">Blinks</td></tr>
<tr><td>Red</td><td>ON</td><td colspan="4">OFF</td></tr>
<tr><td rowspan="4">Mode II (Monitor B)</td><td>Green</td><td>ON</td><td>*Remains ON or OFF</td><td colspan="3">Blinks</td></tr>
<tr><td rowspan="3">Red</td><td rowspan="3">OFF</td><td rowspan="3">*Remains ON or OFF (synchronous with green L.E.D.)</td><td colspan="3">Compensating mixture ratio</td></tr>
<tr><td>More than 5% rich</td><td>Between 5% lean and 5% rich</td><td>More</td></tr>
<tr><td>OFF</td><td>Synchronized with green L.E.D.</td><td>Remains ON</td></tr>
</table>

*Maintains conditions just before switching to open loop

Modes I & II are not available for non-catalyzer model.

Self-diagnosis — Mode III

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

A malfunctioning part's group is indicated by the number of both the red and the green L.E.D.s flashing. First, the red L.E.D. flashes and the green flashes follow. The red L.E.D. refers to the number of tens while the green one refers to the number of units. For example, when the red L.E.D. flashes once and then the green one flashes twice, this means the number "12" showing the air flow meter signal is malfunctioning. In this way, all the problems are classified by the code numbers.

- **When engine fails to start, crank engine more than two seconds before starting self-diagnosis.**
- **Before starting self-diagnosis, do not erase stored memory. If doing so, self-diagnosis function for intermittent malfunctions would be lost.**

The stored memory would be lost if:

1. **Battery terminal is disconnected.**
2. **After selecting Mode III, Mode IV is selected.**

DISPLAY CODE TABLE

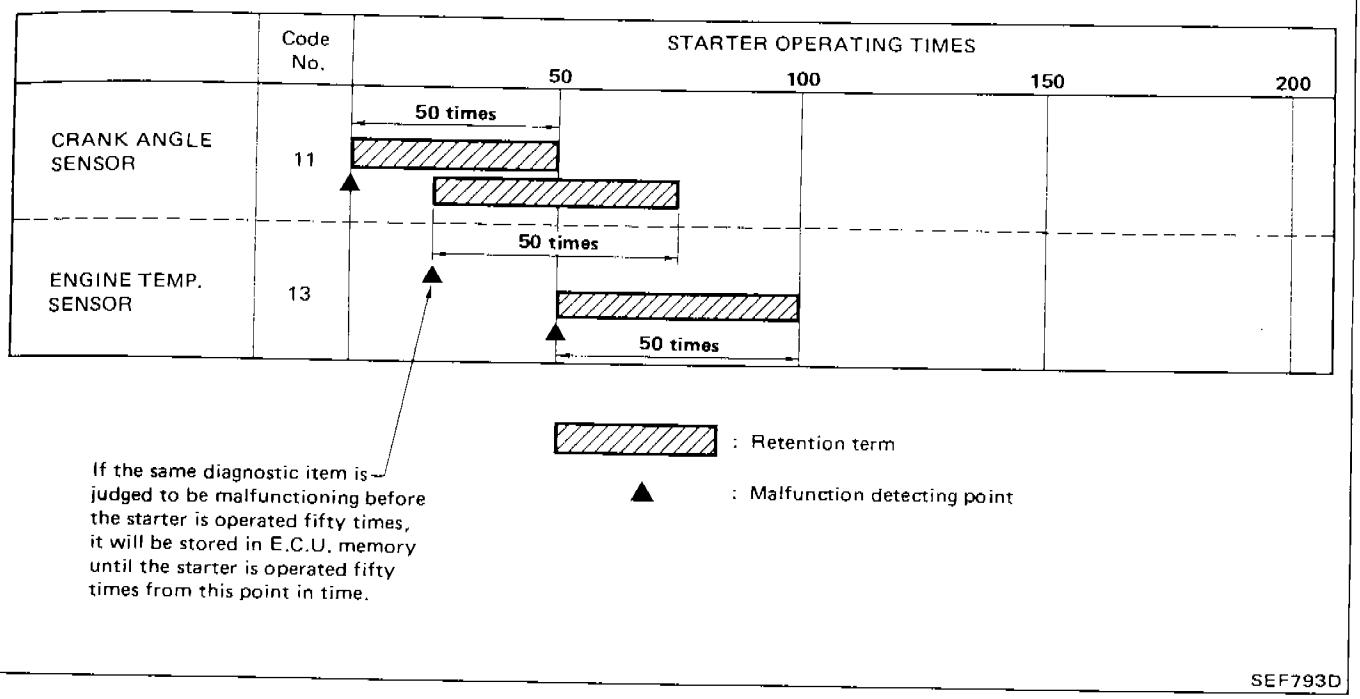
Code No.	Detected items
11	Crank angle sensor circuit
12	Air flow meter circuit
13	Engine temperature sensor circuit
21	Ignition signal circuit
34	Detonation sensor circuit
43	Throttle sensor circuit
55	No malfunctioning in the above circuit

Self-diagnosis — Mode III (Cont'd)

RETENTION OF DIAGNOSTIC RESULTS

The diagnostic result is retained in E.C.U. memory until the starter is operated fifty times after a diagnostic item is 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.

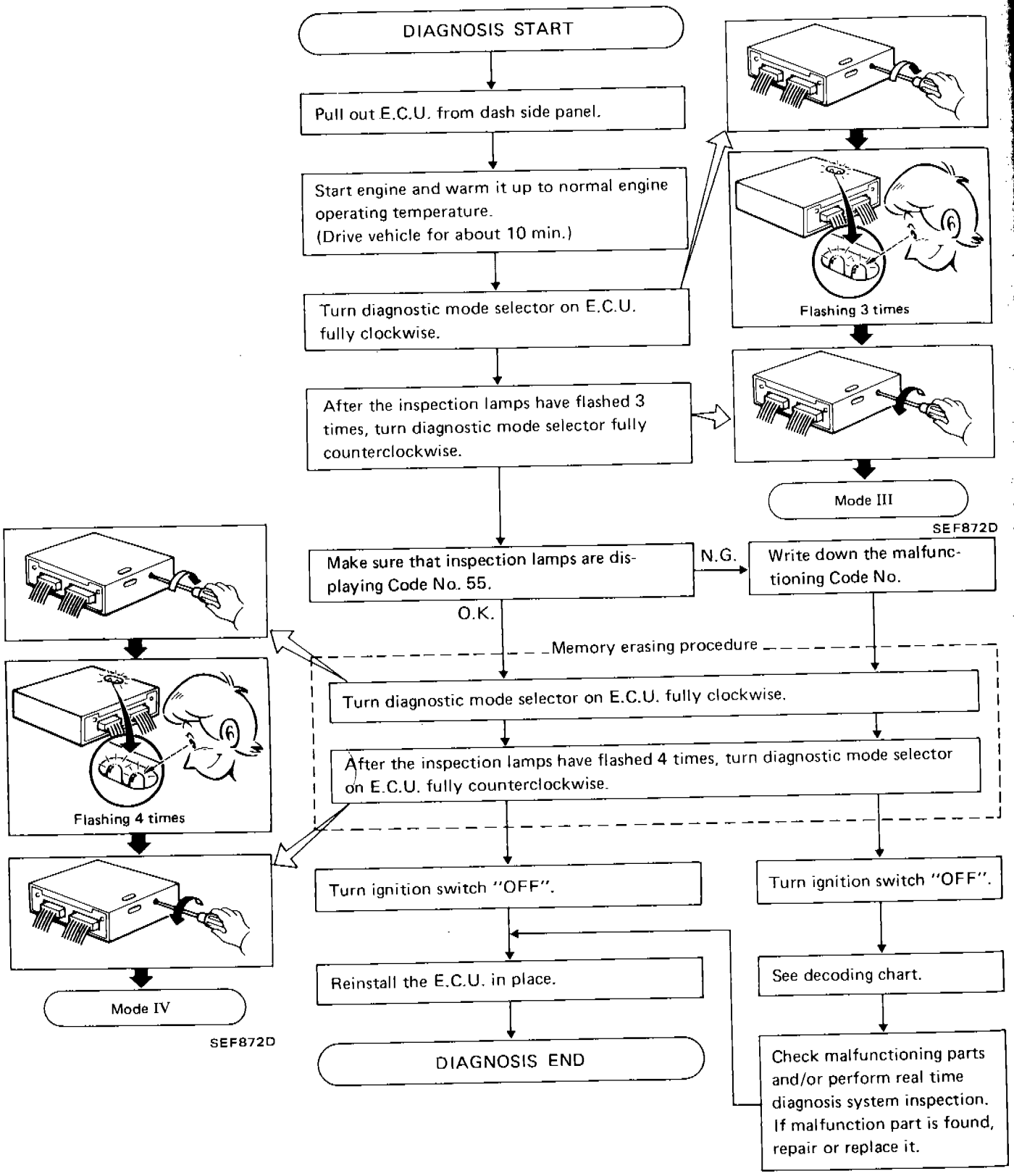
RETENTION TERM CHART (Example)



SEF793D

Self-diagnosis — Mode III (Cont'd)

SELF-DIAGNOSTIC PROCEDURE



CAUTION:
During displaying Code No. in self-diagnosis mode (Mode III), if the other diagnostic mode should be done, make sure to write down the malfunctioning Code No. before turning diagnostic mode selector on E.C.U. fully clockwise, or select the diagnostic mode after turning switch "OFF". Otherwise self-diagnosis information stored in E.C.U. memory until now would be lost.

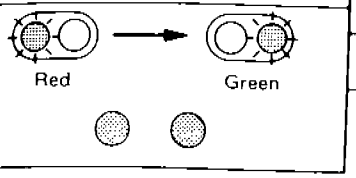
Self-diagnosis — Mode III (Cont'd)

DECODING CHART

Display code	Malfunctioning circuit or parts	Control unit shows a malfunction signal when the following conditions are detected.

CRANK ANGLE SENSOR

Code No. 11



Crank angle sensor circuit

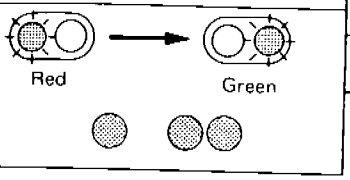
- Either 1° or 180° signal is not entered for the first few seconds during engine cranking.
- Either 1° or 180° signal is not input often enough while the engine speed is higher than the specified rpm.

SYSTEM INSPECTION
See page EF & EC-82.

SEF042F

AIR FLOW METER

Code No. 12



Air flow meter circuit

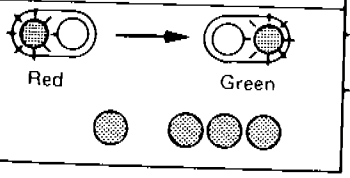
- The air flow meter circuit is open or shorted.
  (An abnormally high or low voltage is entered.)

SYSTEM INSPECTION
See page EF & EC-84.

SEF043F

ENGINE TEMPERATURE SENSOR

Code No. 13



Engine temperature sensor circuit

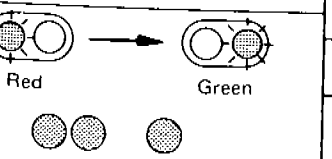
- The engine temperature sensor circuit is open or shorted.
  (An abnormally high or low output voltage is entered.)

SYSTEM INSPECTION
See page EF & EC-86.

SEF044F

IGNITION SIGNAL

Code No. 21



Ignition signal circuit

- The circuit between power transistor unit and E.C.U. is opened.

SYSTEM INSPECTION
See page EF & EC-90.

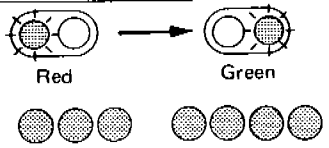
SEF045F

Self-diagnosis — Mode III (Cont'd)

Display code	Malfunctioning circuit or parts	Control unit shows a malfunction signal when the following conditions are detected.

DETONATION SENSOR

Code No. 34



Detonation sensor circuit

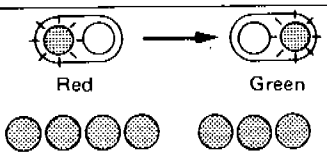
- The detonation sensor circuit is open or shorted.

SYSTEM INSPECTION
See page EF & EC-90.

SEF132F

THROTTLE SENSOR

Code No. 43



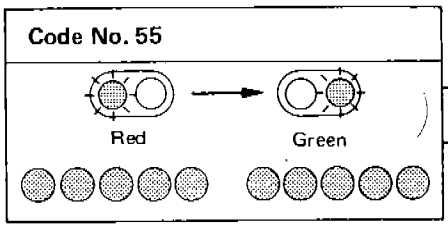
Throttle sensor circuit

- Throttle sensor circuit is open or short.
  (Output voltage is too high or too low.)

SYSTEM INSPECTION
See page EF & EC-98.

SEF079G

Code No. 55



E.C.C.S. normal operation.

SEF984F

Self-diagnosis — Mode IV

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

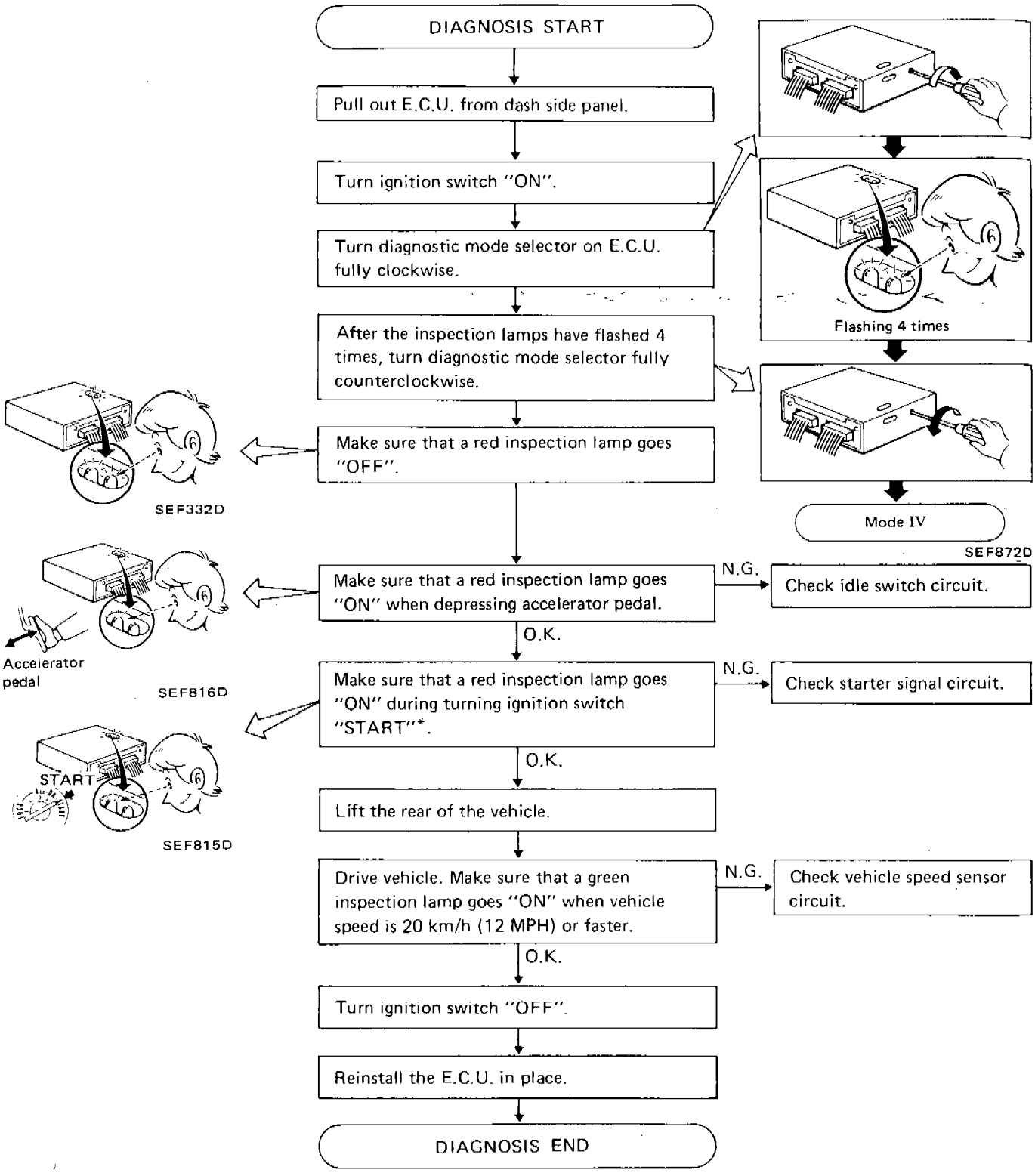
- Idle switch
- Ignition switch "START"
- Vehicle speed sensor

(1) Idle switch & Ignition switch "START"
The switches ON/OFF status at the point when mode IV is selected is stored in E.C.U. memory. When either switch is turned from "ON" to "OFF" or "OFF" to "ON", the red L.E.D. on E.C.U. alternately comes on and goes off each time switching is detected.

(2) Vehicle speed sensor
The switches ON/OFF status at the point when mode IV is selected is stored in E.C.U. memory. When vehicle speed is 20 km/h (12 MPH) or slower, the green L.E.D. on E.C.U. is off. When vehicle speed exceeds 20 km/h (12 MPH), the green L.E.D. on E.C.U. comes "ON".

Self-diagnosis — Mode IV (Cont'd)

SELF-DIAGNOSTIC PROCEDURE



CAUTION:

- ***If ignition switch is turned to "START" an even number of times, a red inspection lamp goes "OFF" when depressing accelerator pedal.**
- **For safety, do not turn front wheel at higher speed than required.**

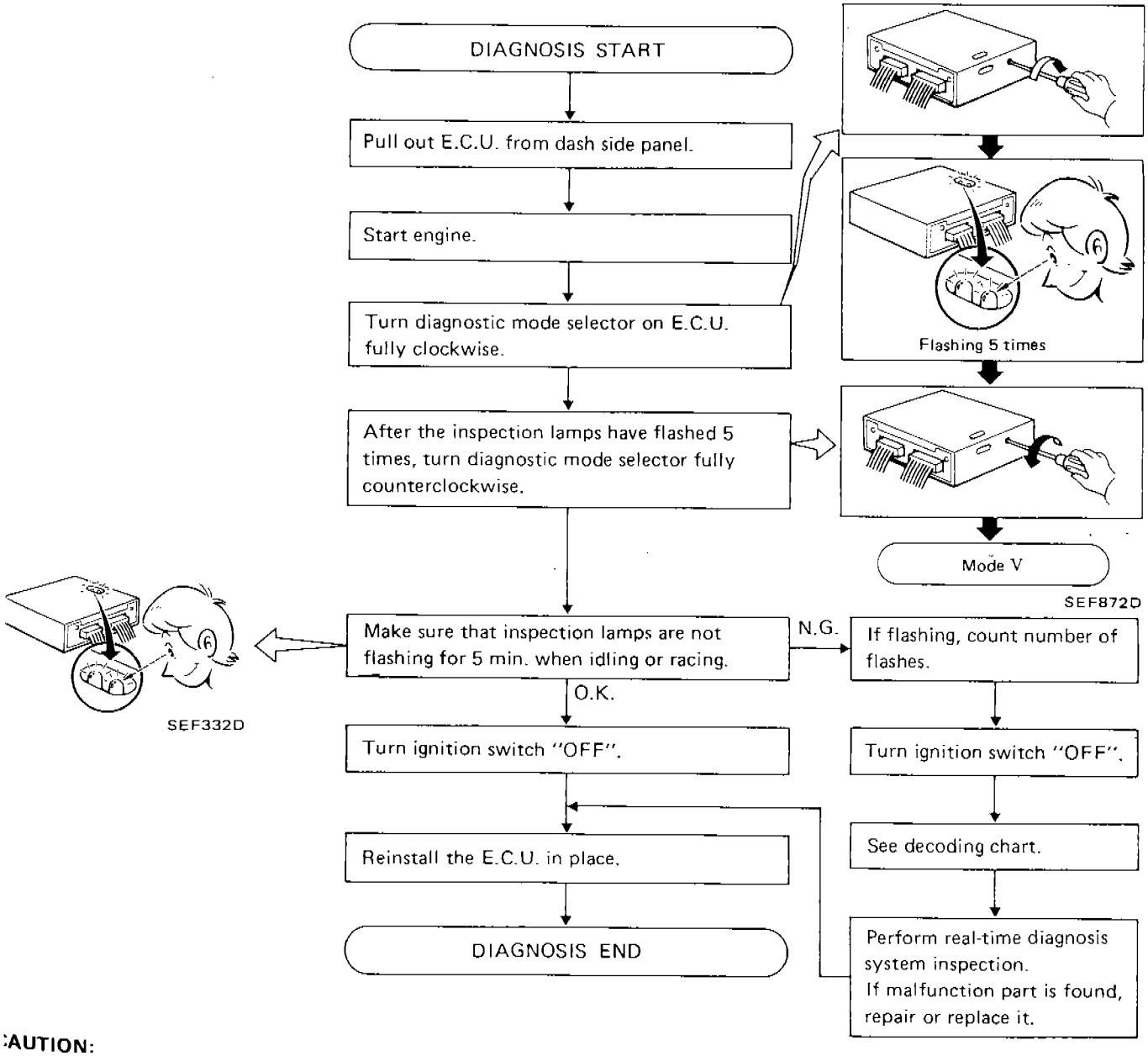
Self-diagnosis — Mode V

In real-time diagnosis, if any of the following items are judged to be faulty, a malfunction is indicated immediately.

- Crank angle sensor (180° signal & 1° signal)
- Ignition signal
- Air flow meter output signal

Consequently, this diagnosis is a very effective measure to diagnose whether the above systems cause the malfunction or not, during driving test. Compared with self-diagnosis, real-time diagnosis is very sensitive, and can detect malfunctioning conditions in a moment. Further, items regarded to be malfunctions in this diagnosis are not stored in E.C.U. memory.

SELF-DIAGNOSITC PROCEDURE



CAUTION:

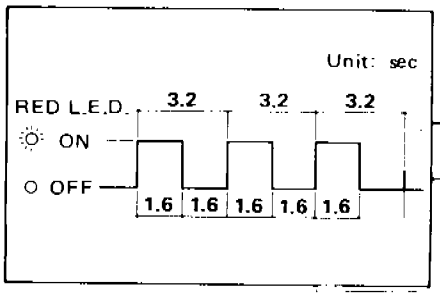
In real-time diagnosis, pay attention to inspection lamp flashing. E.C.U. displays the malfunction code only once, and does not memorize the inspection.

Self-diagnosis — Mode V (Cont'd)

DECODING CHART

Display code	Malfunctioning circuit or parts	Control unit shows a malfunction signal when the following conditions are detected. (Compare with Self-diagnosis —Mode III.)
CRANK ANGLE SENSOR	Malfunction of crank angle sensor circuit	• The 1° or 180° signal is momentarily missing, or, multiple, momentary noise signals enter.
AIR FLOW METER	Malfunction of air flow meter circuit	• Abnormal, momentary increase in air flow meter output signal
IGNITION SIGNAL	Malfunction of ignition signal	• Signal from the primary ignition coil momentarily drops off.

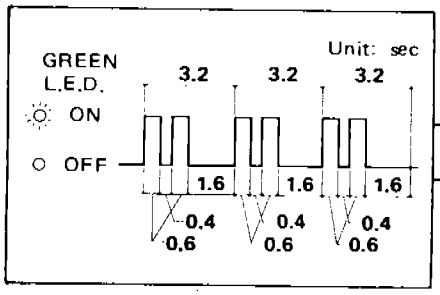
CRANK ANGLE SENSOR



REAL-TIME DIAGNOSTIC INSPECTION
See page EF & EC-77.

SEF047F

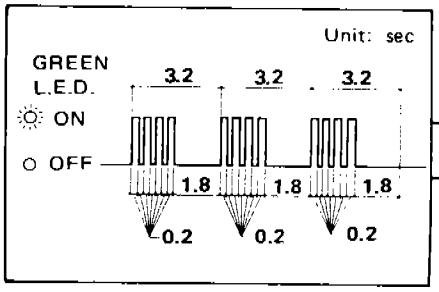
AIR FLOW METER



REAL-TIME DIAGNOSTIC INSPECTION
See page EF & EC-77.

SEF048F

IGNITION SIGNAL



REAL-TIME DIAGNOSTIC INSPECTION
See page EF & EC-77.

SEF049F

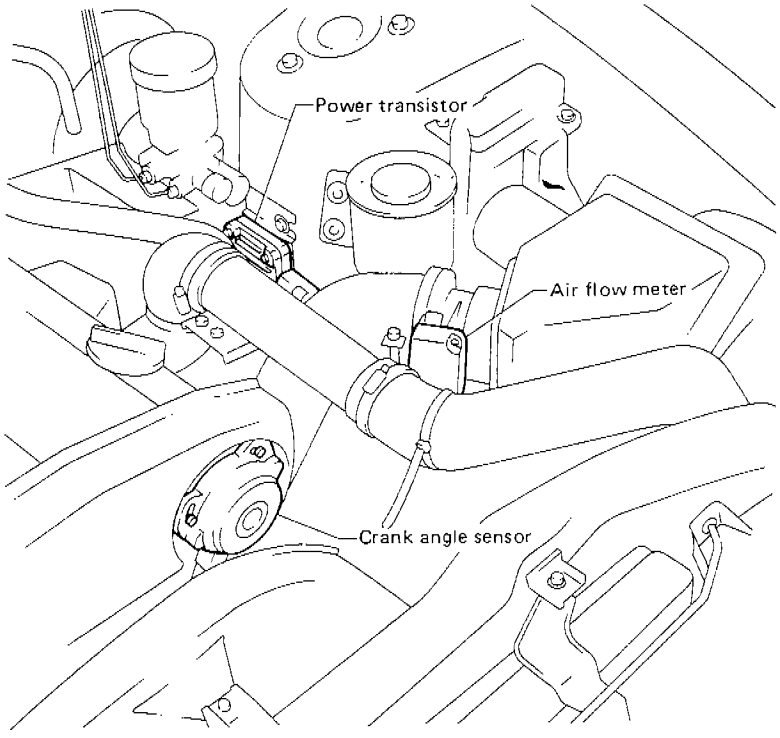
Self-diagnosis — Mode V (Cont'd)

REAL-TIME DIAGNOSTIC INSPECTION

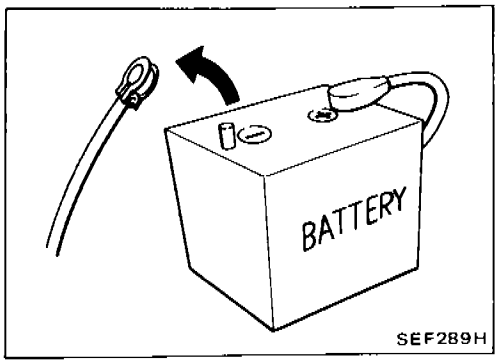
X: Available
—: Not available

Crank Angle Sensor, Air Flow Meter and Ignition Signal

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



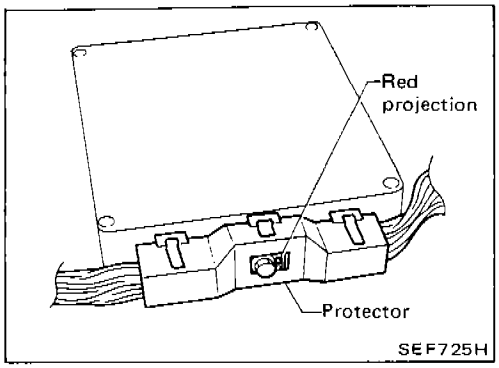
SEF426H



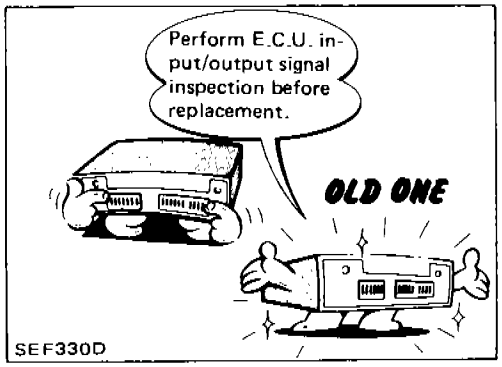
Diagnostic Procedure

CAUTION:

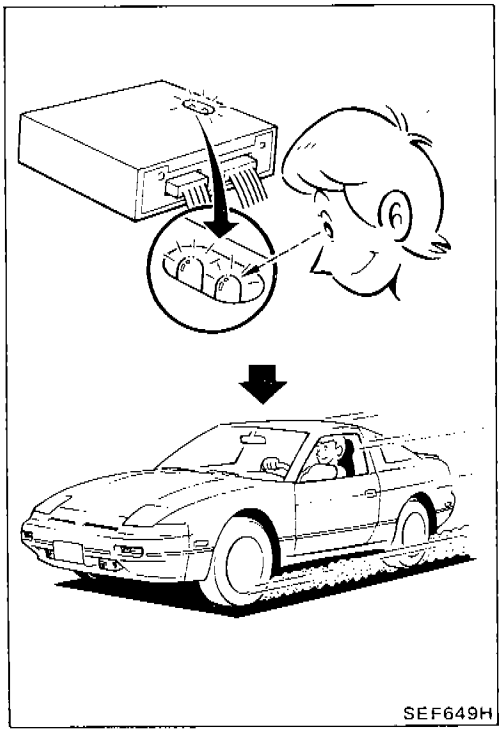
1. Before connecting or disconnecting E.C.U. harness connector to or from any E.C.U., be sure to turn the ignition switch to the "OFF" position and disconnect the negative battery terminal in order not to damage E.C.U. as battery voltage is applied to E.C.U. even if ignition switch is turned off. Otherwise, there may be damage to the E.C.U.



2. When connecting E.C.U. harness connector into E.C.U. or disconnecting it from E.C.U., take care not to damage pin terminal of E.C.U. (Bend or break).
3. Make sure that there are not any bends or breaks on E.C.U. pin terminal, when connecting pin connectors into E.C.U.
4. When connecting E.C.U. harness connector, tighten securing bolt until red projection is in line with connector face.

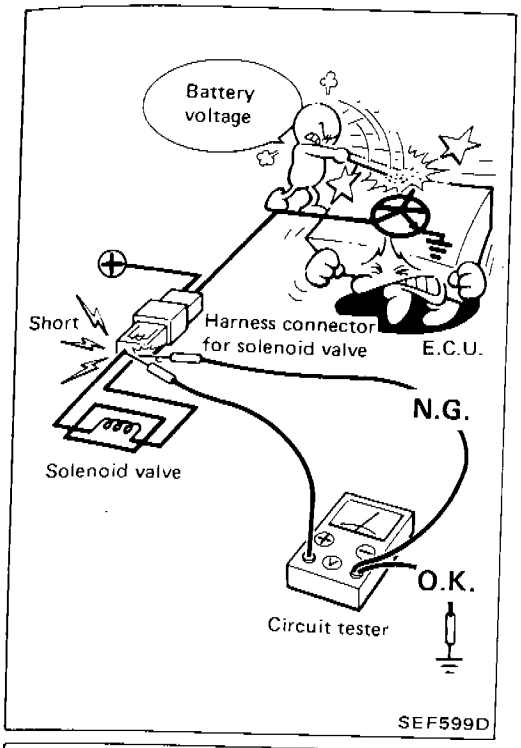


5. Before replacing E.C.U. perform E.C.U. input/output signal inspection and make sure whether E.C.U. functions properly or not. (See page EF & EC-120.)

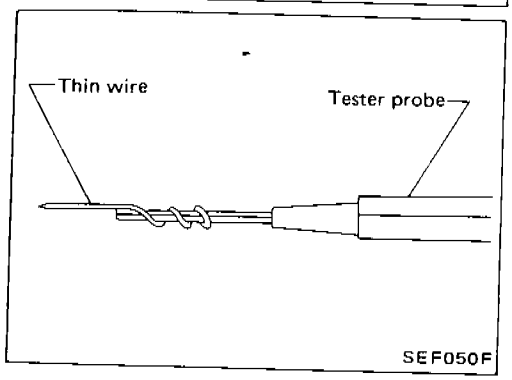


6. After performing this "Diagnostic Procedure", perform E.C.C.S. self-diagnosis and driving test.

Diagnostic Procedure (Cont'd)



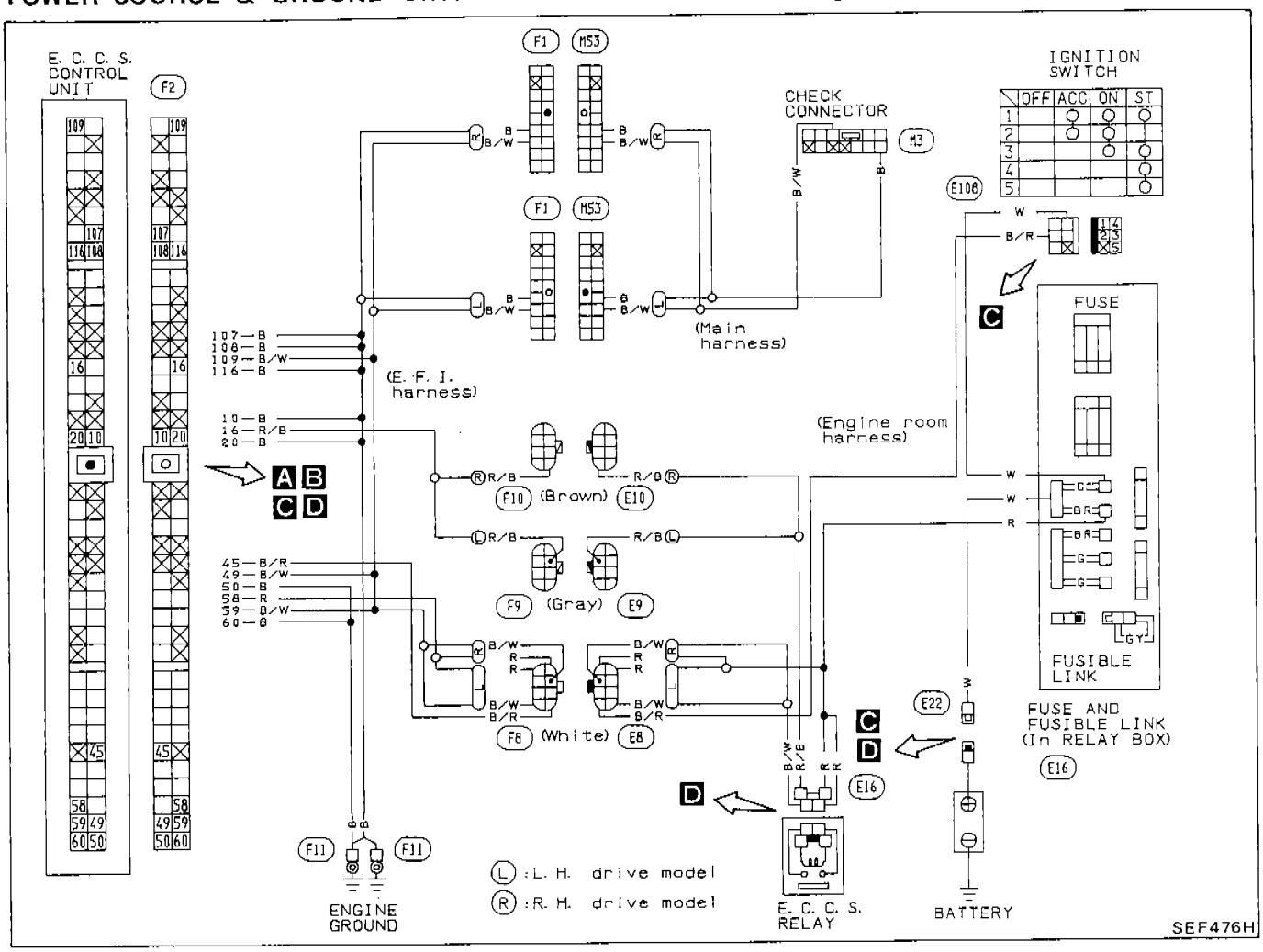
7. When measuring supply voltage of E.C.U. controlled components with a circuit tester, separate one tester probe from the other.
   If the two tester probes accidentally make contact with each other during measurement, the circuit will be shorted, resulting in damage to the power transistor of the control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



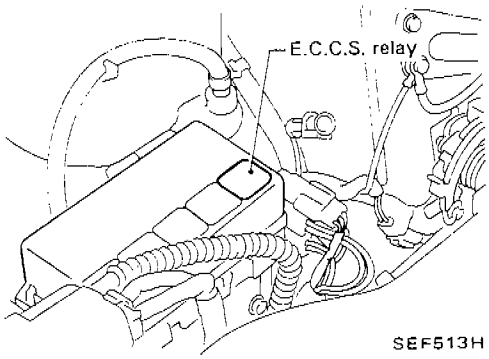
8. Improve tester probe as shown to perform test easily.
9. For the first trouble-shooting procedure, perform POWER SOURCE & GROUND CIRCUIT FOR E.C.U. check.

Diagnostic Procedure 1

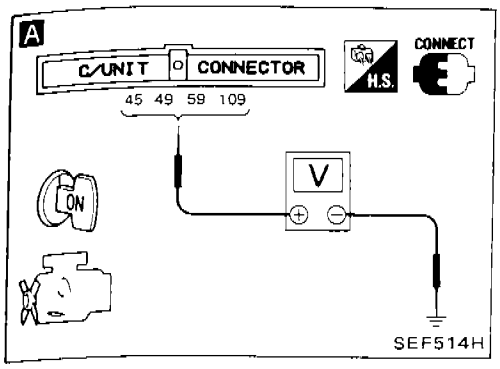
POWER SOURCE & GROUND CIRCUIT FOR E.C.U. (Not self-diagnostic item)

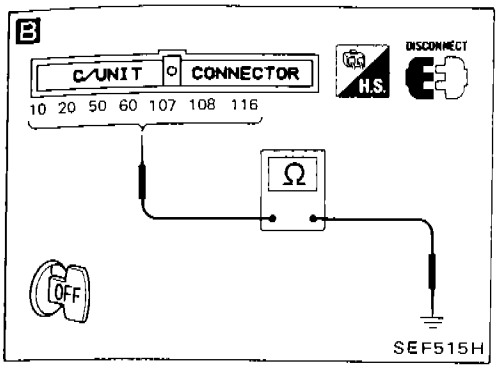


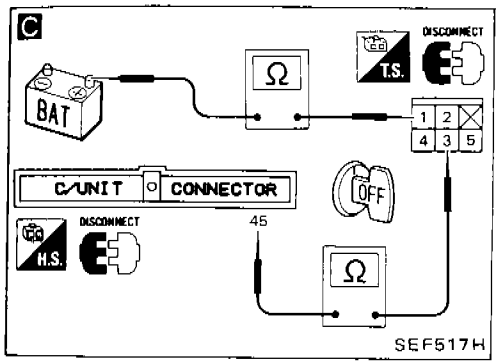
Component location

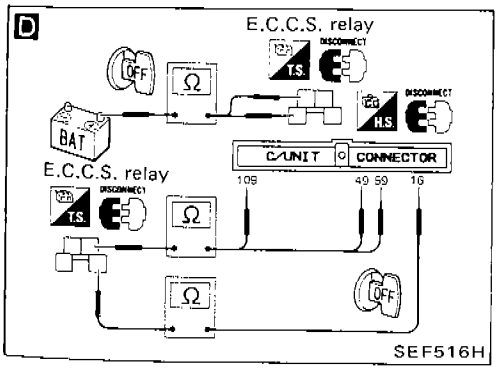


Diagnostic Procedure 1 (Cont'd)









INSPECTION START

A

CHECK POWER SOURCE FOR E.C.U.
1) Turn ignition switch "ON".
2) Check voltage between terminals (45), (49), (59), (109) and ground.
Voltage: Battery voltage

N.G. (45) → Check ignition switch and "G" fusible link.

O.K. → **C**

1) Check harness continuity between ignition switch and battery ⊕ terminal.
Continuity should exist.
2) Check harness continuity between ignition switch and E.C.U.
Continuity should exist.
If N.G., replace harness or connector.

O.K. ↑

CHECK COMPONENT (E.C.C.S. relay).
Refer to "Electrical Components Inspection".
(See page EF & EC-128.)
If N.G., replace E.C.C.S. relay.

O.K. → **D**

1) Check harness continuity between E.C.C.S. relay and E.C.U.
Continuity should exist.
2) Check harness continuity between E.C.C.S. relay and battery ⊕ terminal.
Continuity should exist.
If N.G., replace harness or connectors.

O.K. → **B**

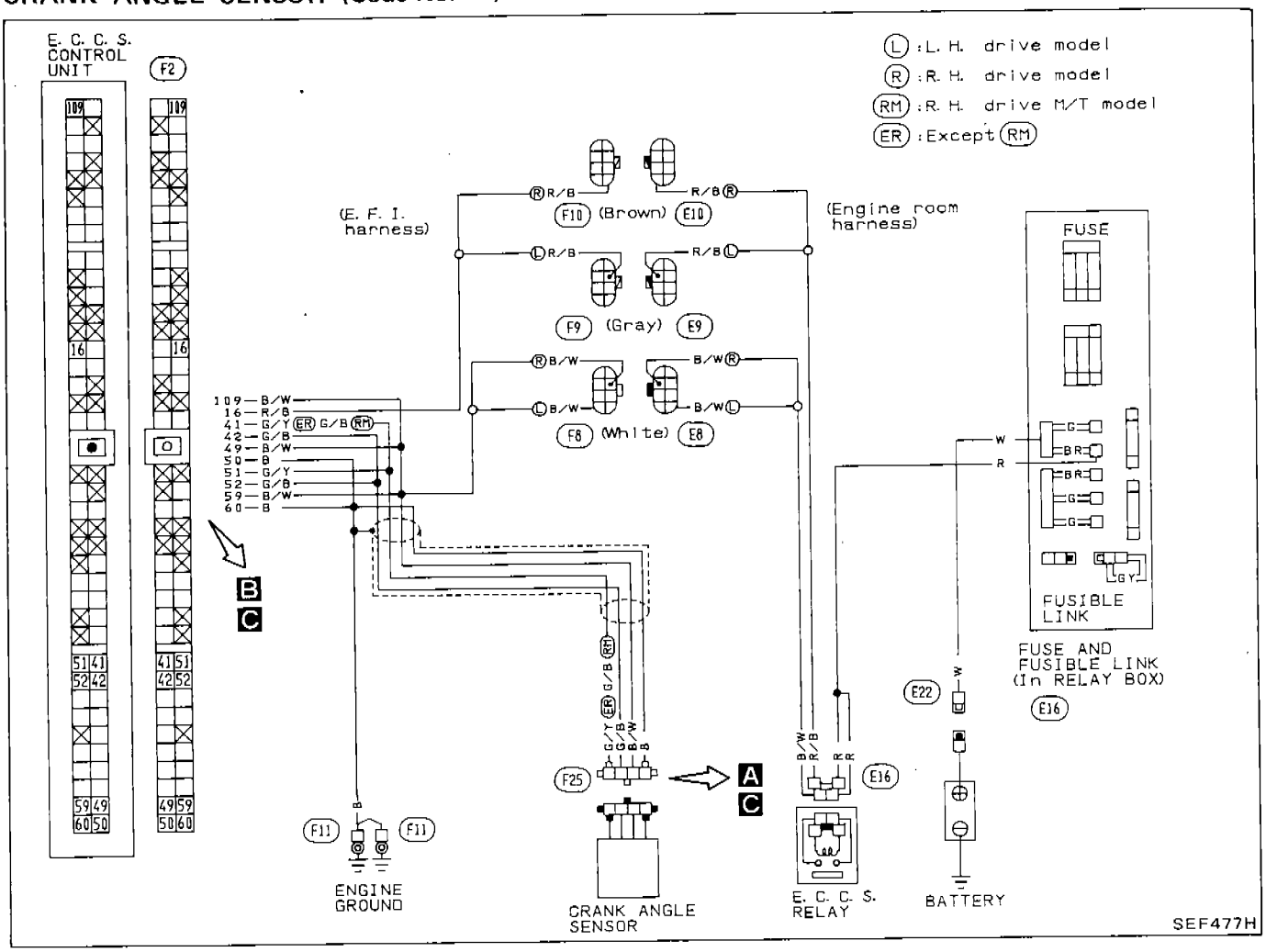
1) Turn ignition switch "OFF".
2) Disconnect connectors from E.C.U.
3) Check resistance between terminals (10), (20), (50), (60), (107), (108), (116) and ground.
Resistance:
Approximately 0Ω
If N.G., repair harness or connectors.

O.K. → INSPECTION END

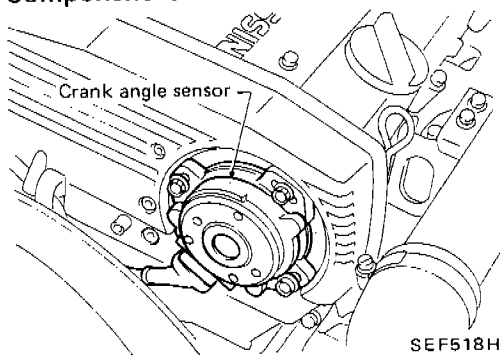
N.G. (49), (59), (109) → CHECK COMPONENT (E.C.C.S. relay).

Diagnostic Procedure 2

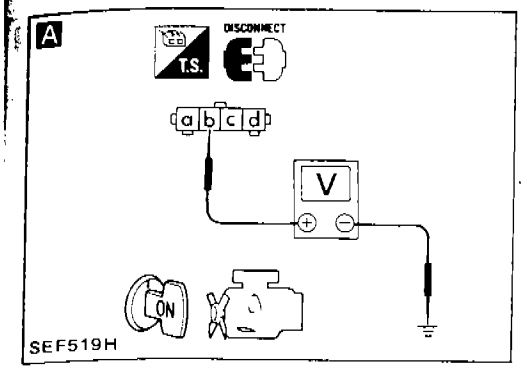
CRANK ANGLE SENSOR (Code No. 11)

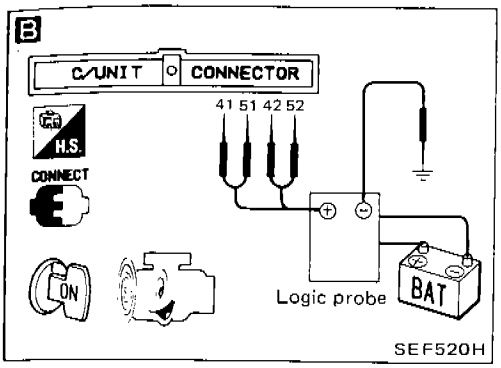


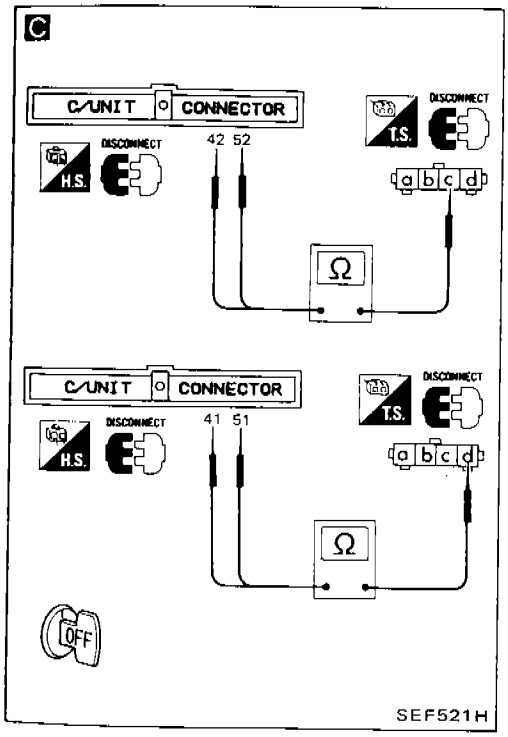
Component location



Diagnostic Procedure 2 (Cont'd)







INSPECTION START

Perform self-diagnosis (Mode III).
Is Code No. 11 indicated?

No → INSPECTION END

Yes

A

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

N.G. → Repair harness or connectors.

O.K.

B

CHECK INPUT SIGNAL.
1) Reconnect crank angle sensor harness connector.
2) Start engine.
3) Check that pulse signals exist in E.C.U. terminals ㊷, ㊷ and ㊶, ㊶ with logic probe.
Pulse signals should exist.
㊷, ㊷: 1° signal
㊶, ㊶: 180° signal

N.G. → **C**

CHECK CONTINUITY BETWEEN E.C.U. AND CRANK ANGLE SENSOR.
1) Turn ignition switch "OFF".
2) Disconnect E.C.U. harness connector.
3) Disconnect crank angle sensor harness connector.
4) Check continuity between terminal ⓐ and ground, terminals ⓒ and ㊷, ㊷ and terminals ⓓ and ㊶, ㊶.
Resistance:
Approximately 0Ω

O.K.

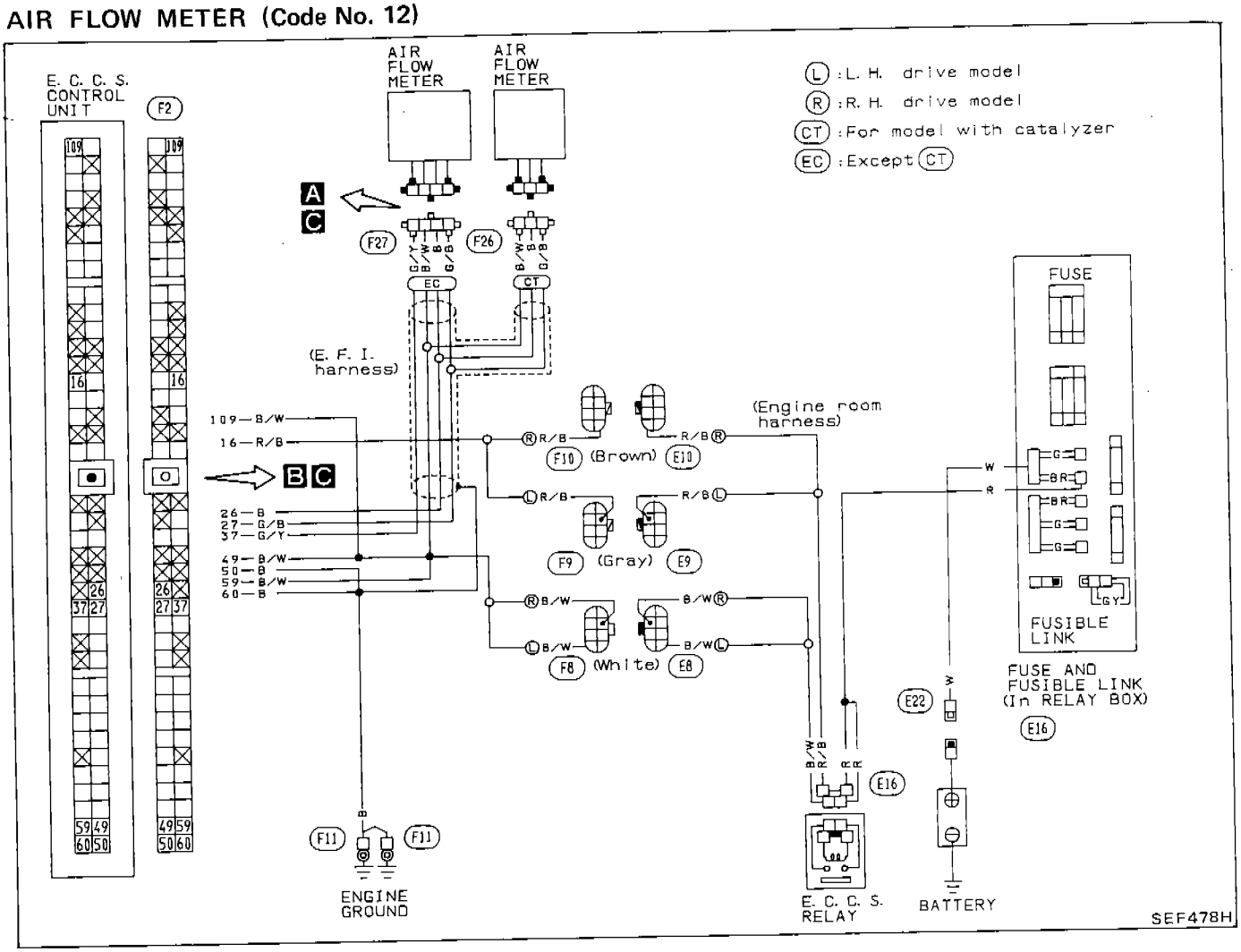
CHECK COMPONENT
(Crank angle sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-124.)

O.K.

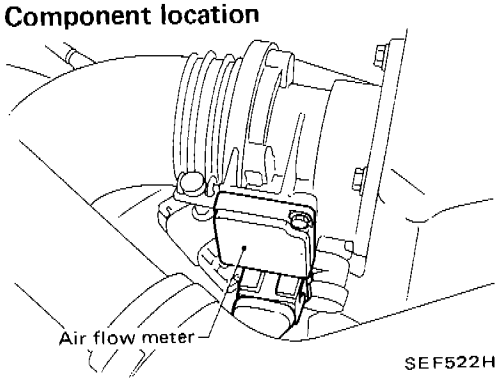
INSPECTION END

Diagnostic Procedure 3

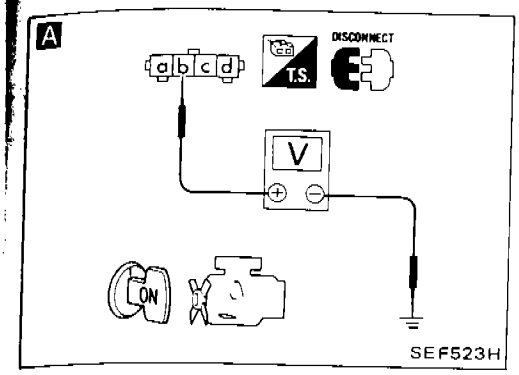
AIR FLOW METER (Code No. 12)

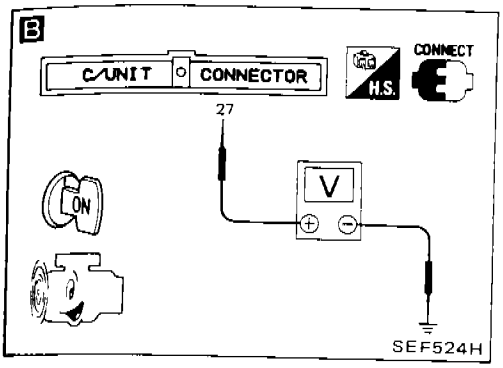


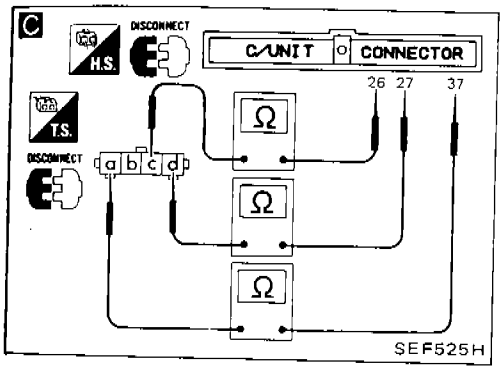
Component location



Diagnostic Procedure 3 (Cont'd)







INSPECTION START

Perform self-diagnosis (Mode III).
Is Code No. 12 indicated?

No → INSPECTION END

Yes

A

CHECK POWER SOURCE.
1) Disconnect air flow meter harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal ⓑ and ground.
Battery voltage should exist.

N.G. → Repair harness or connectors.

O.K.

B

CHECK INPUT SIGNAL.
1) Reconnect air flow meter harness connector.
2) Start engine and warm it up sufficiently.
3) Make sure that voltage exists between E.C.U. terminal ㉗ and ground.
Voltage:
Approximately 1.5V (at idle)

N.G. → **C**

CHECK CONTINUITY BETWEEN E.C.U. AND AIR FLOW METER.
1) Turn ignition switch "OFF".
2) Disconnect E.C.U. harness connector.
3) Disconnect air flow meter harness connector.
4) Check continuity between terminals ⓐ and ㊲, ⓒ and ㉖, and ⓓ and ㉗.
Resistance:
Approximately 0Ω

O.K.

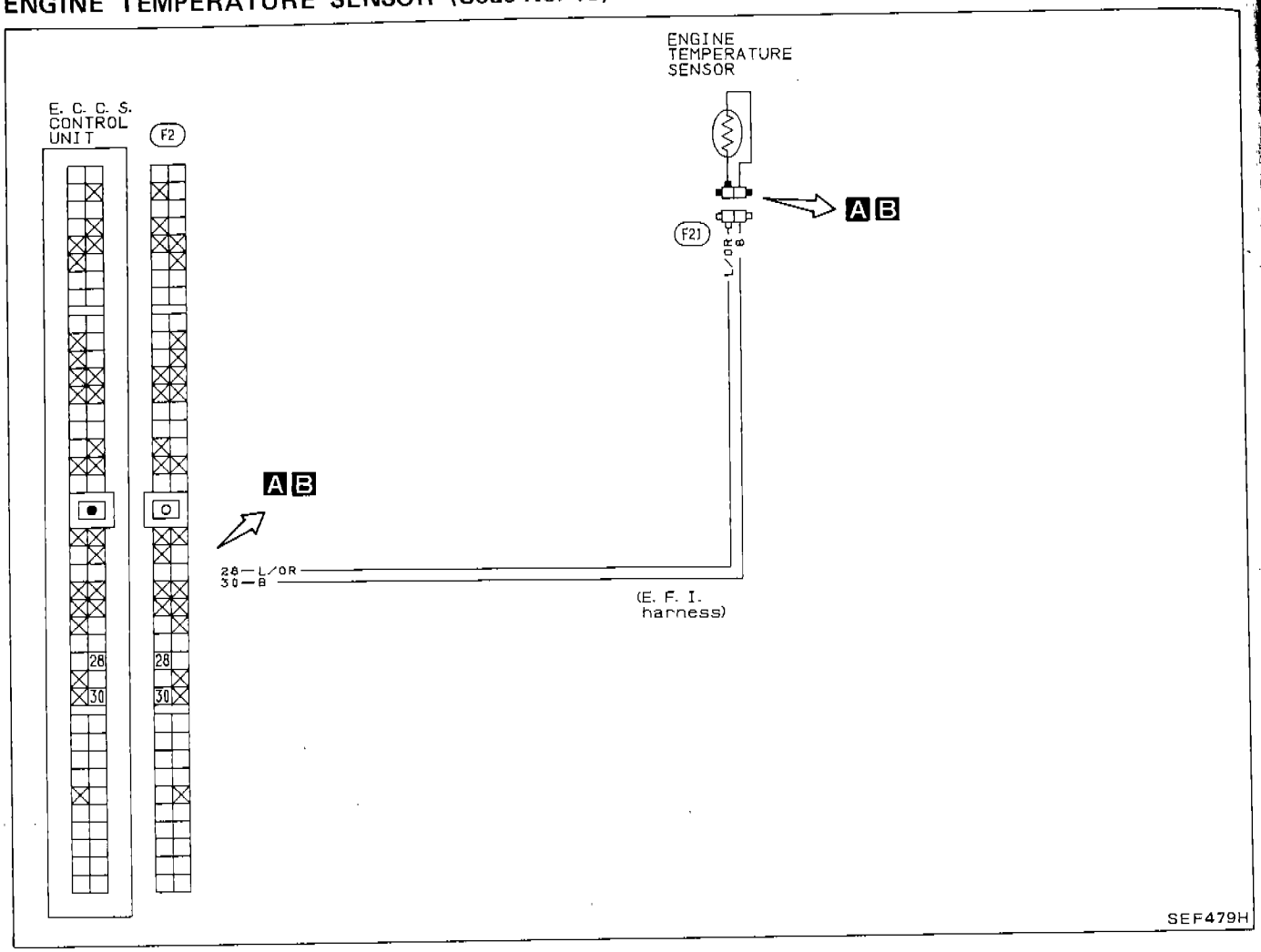
CHECK COMPONENT (Air flow meter).
Refer to "Electrical Components Inspection".
(See page EF & EC-124.)

O.K.

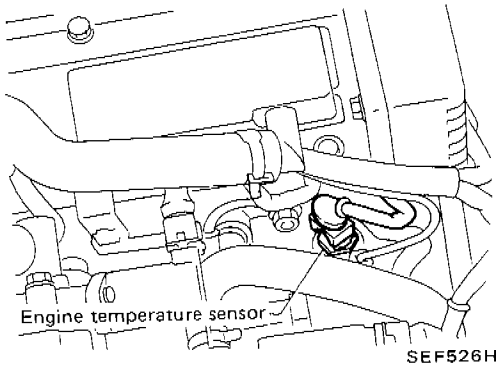
INSPECTION END

Diagnostic Procedure 4

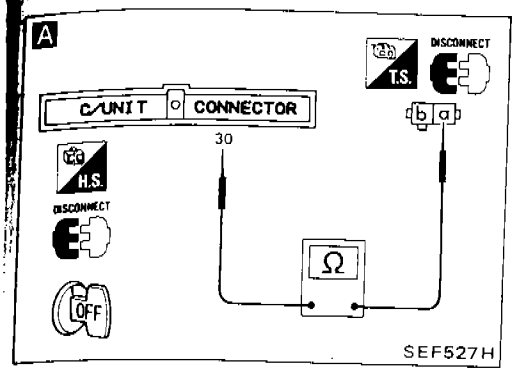
ENGINE TEMPERATURE SENSOR (Code No. 13)

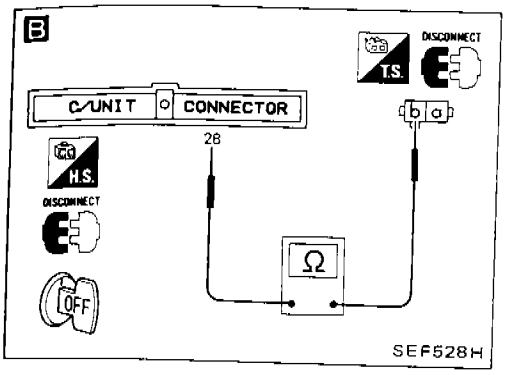


Component location



Diagnostic Procedure 4 (Cont'd)





INSPECTION START

Perform self-diagnosis (Mode III).
Is code No. 13 indicated?

No → INSPECTION END

Yes

CHECK COMPONENT
(Engine temperature sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-124.)

N.G. → Replace engine temperature sensor.

O.K.

A

CHECK GROUND CIRCUIT.
1) Disconnect E.C.U. harness connector.
2) Check continuity between terminals ⓐ and ㉚.
Continuity should exist.

N.G. → Repair harness or connectors.

O.K.

B

CHECK INPUT SIGNAL CIRCUIT.
Check continuity between terminals ⓑ and ㉘.
Continuity should exist.

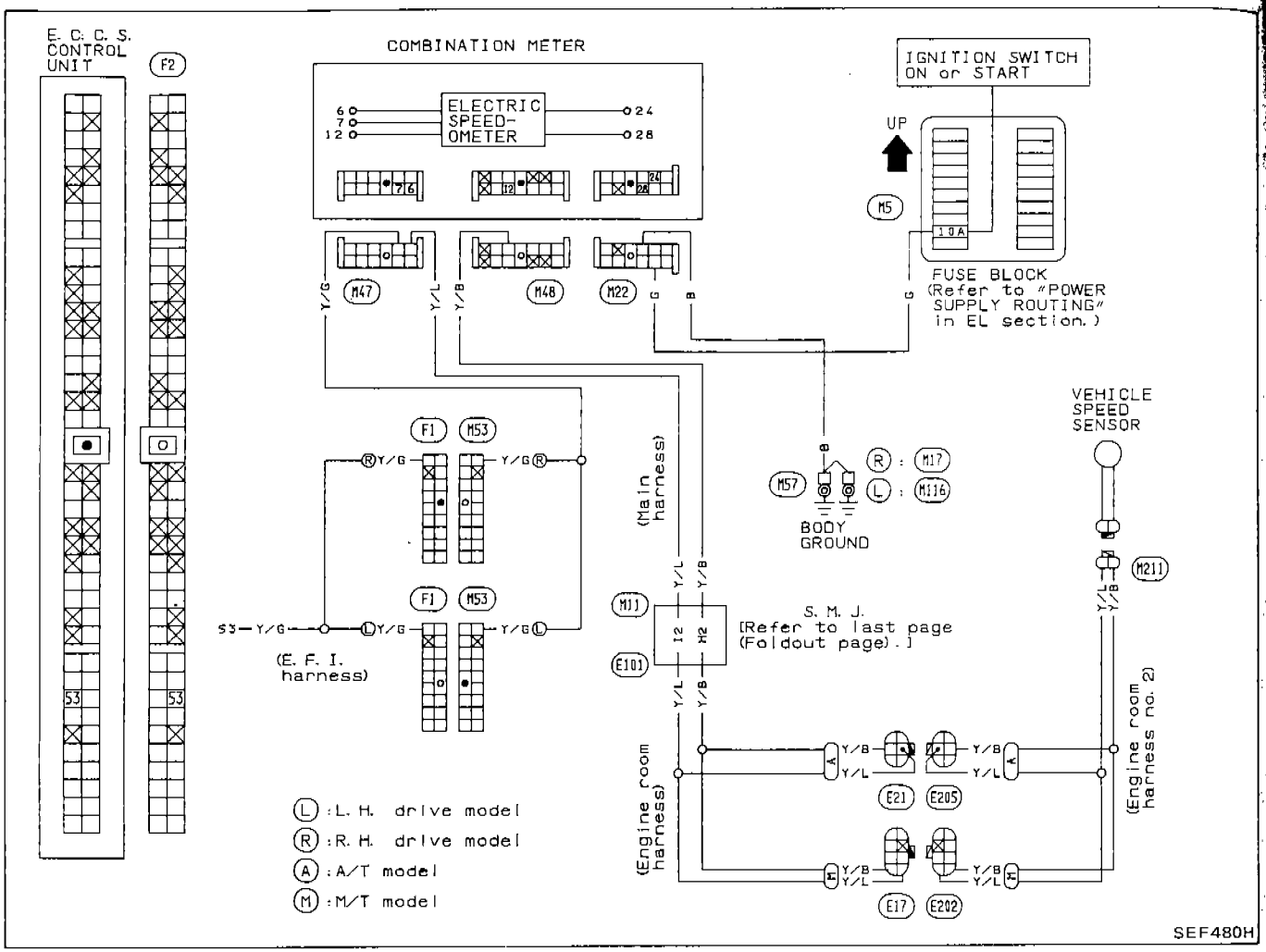
N.G. → Repair harness or connectors.

O.K.

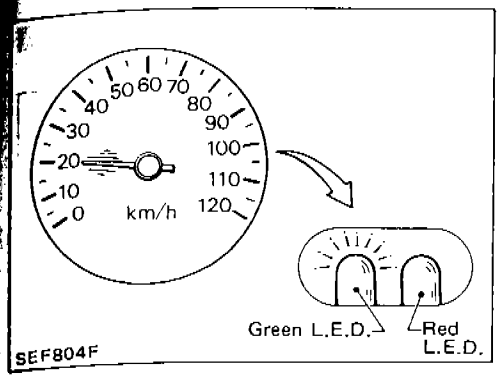
INSPECTION END

Diagnostic Procedure 5

VEHICLE SPEED SENSOR



Diagnostic Procedure 5 (Cont'd)



INSPECTION START

CHECK INPUT SIGNAL.
1) Perform switch ON/OFF diagnosis (in Mode IV).
2) Make sure green L.E.D. on E.C.U. comes "ON" when vehicle speed reaches 20 km/h (12 MPH).

O.K. → INSPECTION END

N.G. ↓

CHECK COMPONENT
(Vehicle speed sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-128.)

O.K. →
1) Repair or replace harness.
2) Check middle harness connector for proper connection.
3) Check S.M.J.

N.G. ↓

Repair or replace vehicle speed sensor.

↓

Reinstall any part removed.

↓

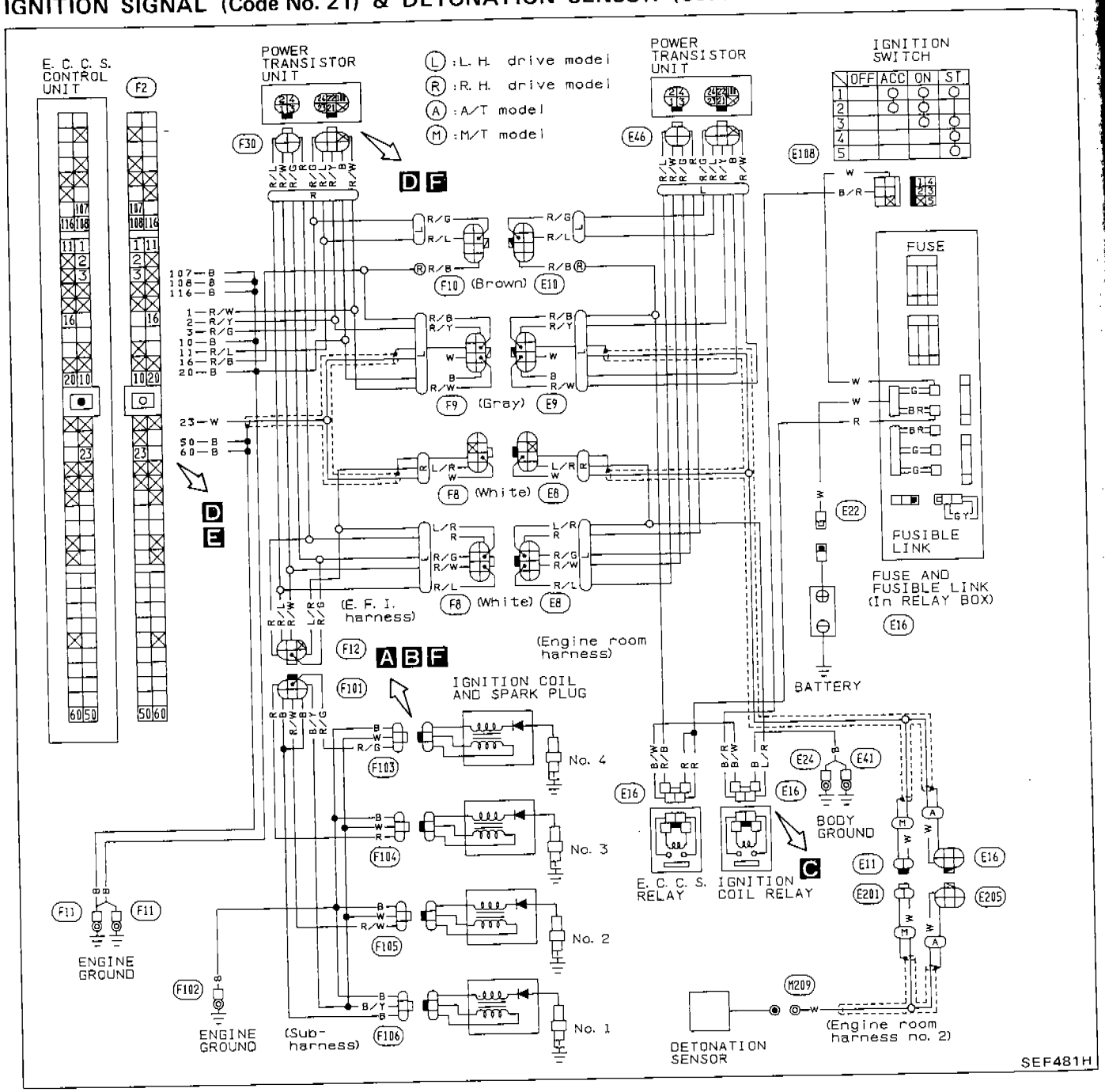
1) Perform switch ON/OFF diagnosis (in Mode IV) again.
2) Make sure green L.E.D. on E.C.U. comes "ON" when vehicle speed reaches 20 km/h (12 MPH).

↓

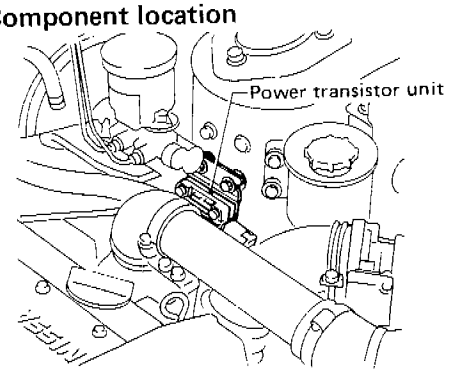
INSPECTION END

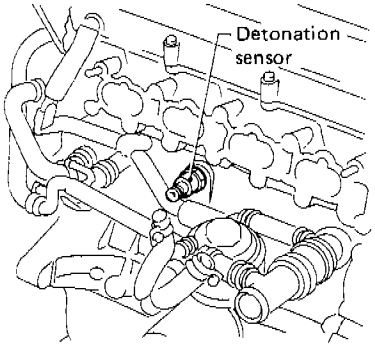
Diagnostic Procedure 6

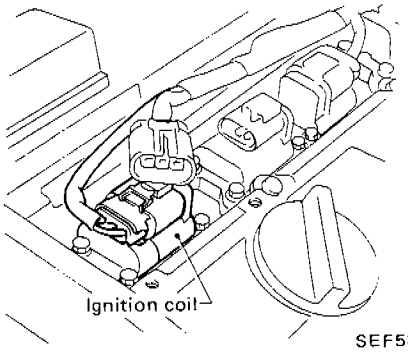
IGNITION SIGNAL (Code No. 21) & DETONATION SENSOR (Code No. 34)



Component location







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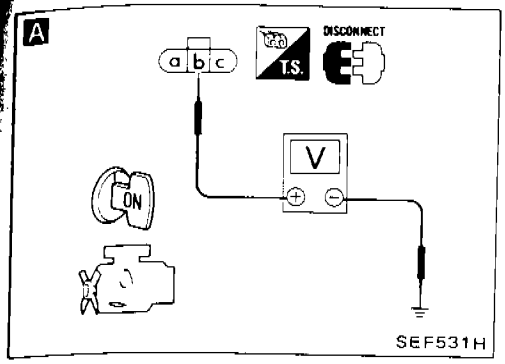
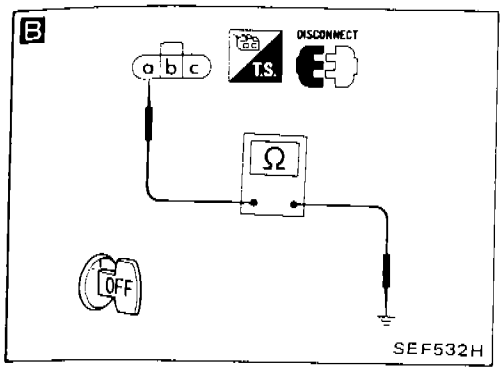
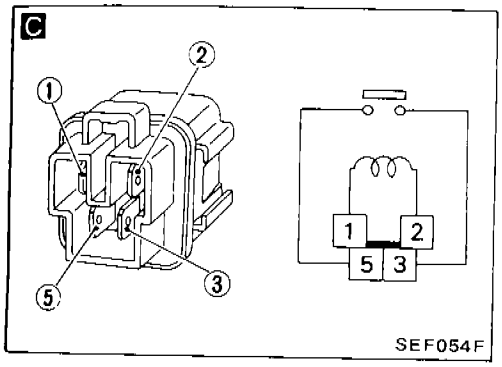
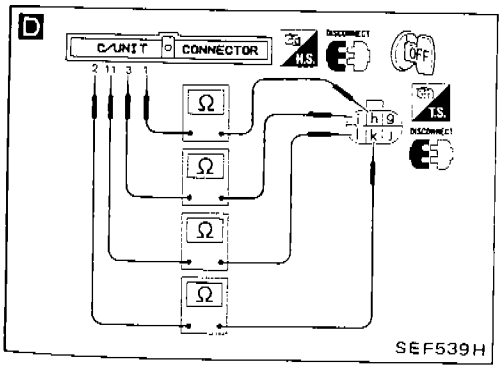
Diagnostic Procedure 6 (Cont'd)









INSPECTION START

Perform self-diagnosis (Mode III).
Is code No. 21 or 34 indicated?

No → INSPECTION END

Yes (Code 21)

Yes (Code 34) → CHECK COMPONENT (Detonation sensor). Refer to "Electrical Components Inspection". (See page EF & EC-128.)

CHECK COMPONENT (Ignition coil). Refer to "Electrical Components Inspection". (See page EF & EC-125.)

N.G. → Replace ignition coil.

O.K.

A

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

N.G. → **C**

Check ignition coil relay.

Condition	Continuity between terminals ③ and ⑤
Supply 12V direct current between terminals ① and ②	Yes
Not supply	No

If N.G., replace relay.

O.K. → Repair harness or connectors.

O.K.

B

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

N.G. → Repair harness or connectors.

O.K.

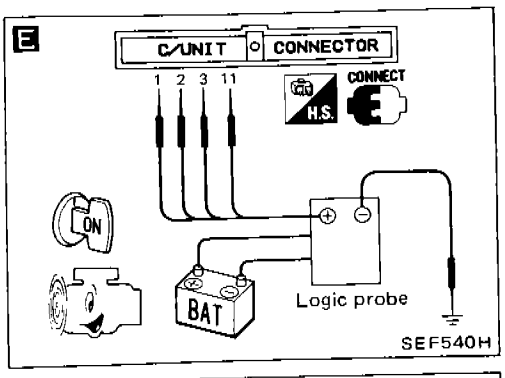
D

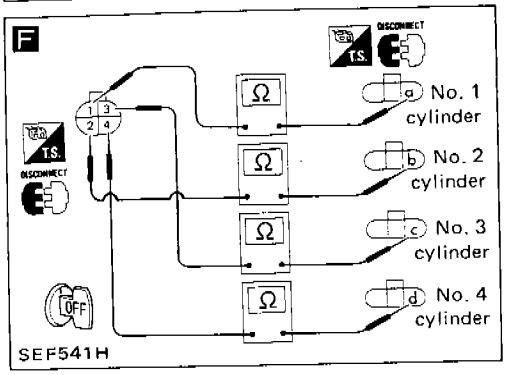
CHECK HARNESS CONTINUITY BETWEEN POWER TRANSISTOR AND E.C.U.
1) Disconnect E.C.U. harness connector.
2) Disconnect power transistor harness connector.
3) Check continuity between terminals ⓗ and ①, ⓘ and ③, ⓚ and ②, ⓙ and ⑪.
Continuity:
Approximately 0Ω

N.G. → Repair harness or connectors.

O.K.

Diagnostic Procedure 6 (Cont'd)





E

CHECK OUTPUT SIGNAL.
1) Reconnect power transistor harness connector.
2) Reconnect E.C.U. harness connector.
3) Reconnect ignition coil harness connector.
4) Start engine.
5) Make sure that pulse signals exist between E.C.U. terminals ①, ②, ③, ⑪ and ground with logic probe.
Pulse signal should exist.

N.G. → CHECK COMPONENT (Power transistor). Refer to "Electrical Components Inspection". (See page EF & EC-125.)

O.K. ↓

F

CHECK HARNESS CONTINUITY BETWEEN POWER TRANSISTOR AND IGNITION COIL.
1) Stop engine and turn ignition switch "OFF".
2) Disconnect power transistor harness connector and ignition coil harness connector.
3) Check continuity between terminals ⓐ and ①, ⓑ and ②, ⓒ and ③, ⓓ and ④.
Continuity:
Approximately 0Ω

N.G. → 1) Check middle harness connector. 2) Repair harness or connectors.

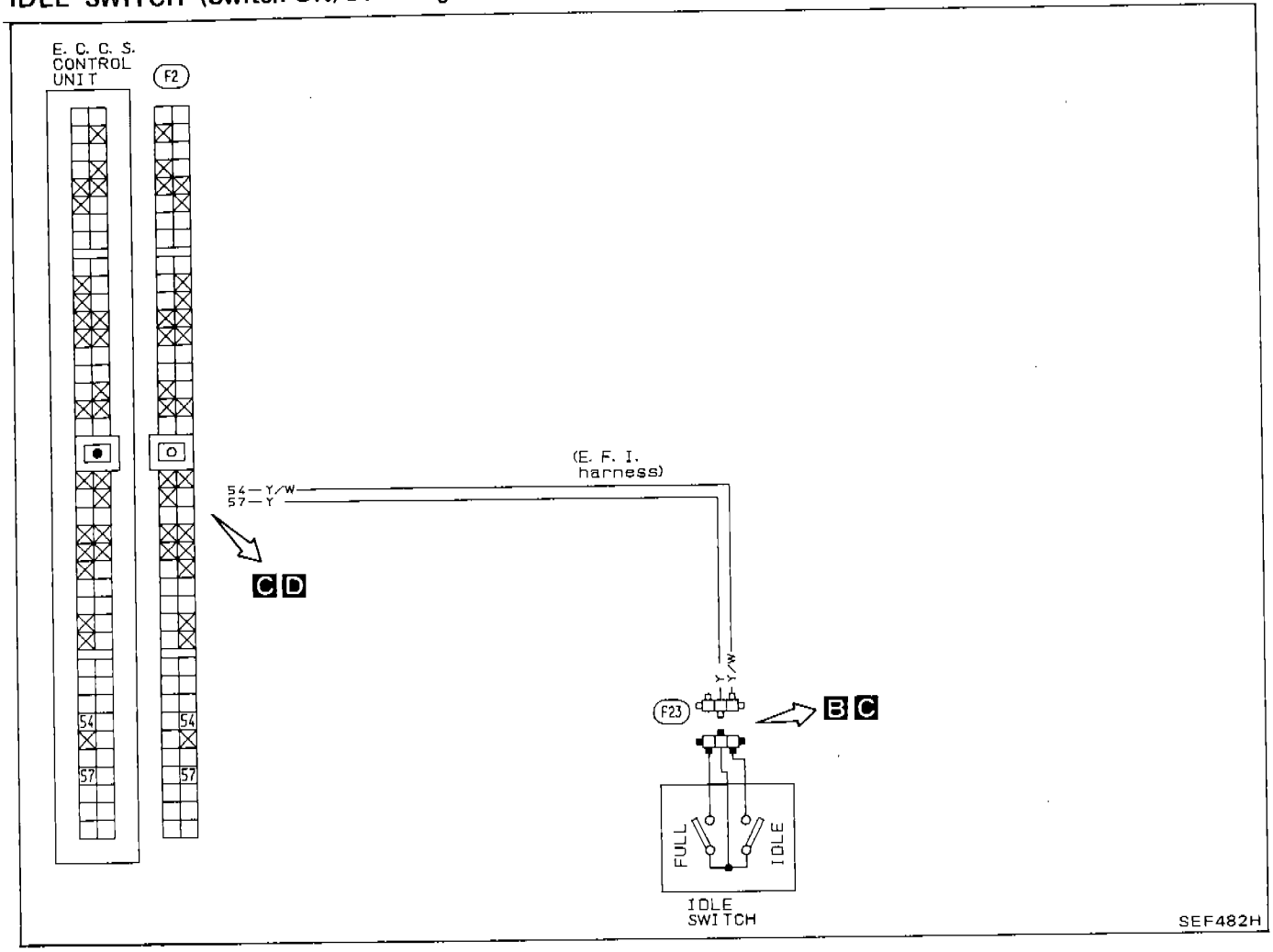
O.K. ↓

INSPECTION END

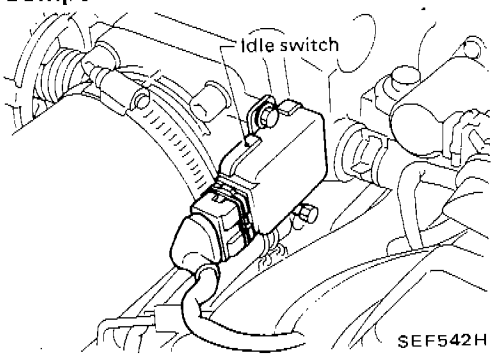
NOTE

Diagnostic Procedure 7

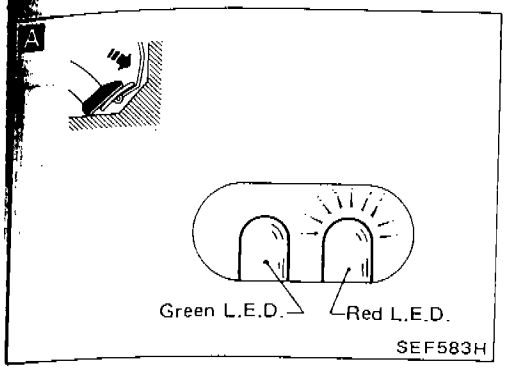
IDLE SWITCH (Switch ON/OFF diagnosis)

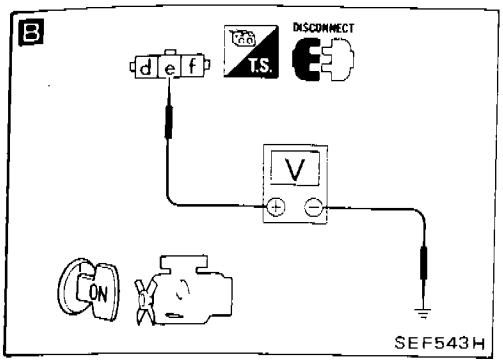


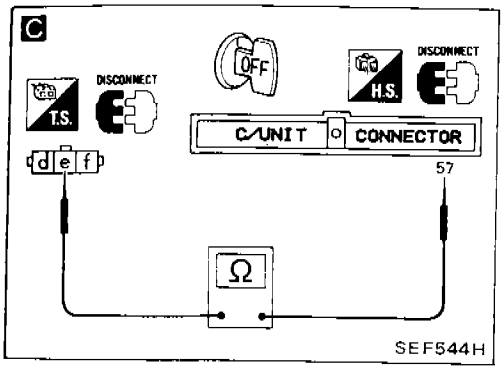
Component location

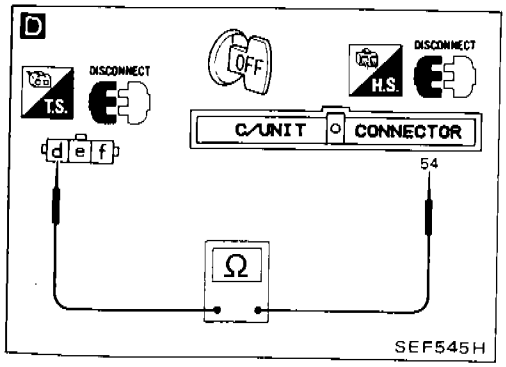


Diagnostic Procedure 7 (Cont'd)









INSPECTION START

A

CHECK INPUT SIGNAL.
1) Perform switch ON/OFF diagnosis (in Mode IV).
2) Make sure red L.E.D. comes "ON" or goes "OFF" when accelerator pedal is depressed.

O.K. → INSPECTION END

N.G. ↓

B

CHECK POWER SOURCE.
1) Disconnect idle switch harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal ⓔ and ground.
Voltage:
Approximately 9 - 10V

N.G. → **C**

CHECK CONTINUITY BETWEEN E.C.U. AND IDLE SWITCH.
1) Turn ignition switch "OFF".
2) Disconnect E.C.U. connector.
3) Disconnect idle switch harness connector.
4) Check resistance between E.C.U. terminal ⑰ and terminal ⓔ.
Resistance:
Approximately 0Ω
If N.G., repair or replace harness.

O.K. ↓

CHECK COMPONENT (Idle switch).
Refer to "Electrical Components Inspection".
(See page EF & EC-124.)

N.G. → Check if idle switch is installed in proper position.
If N.G., adjust it by turning idle switch.
If O.K., replace idle switch.

O.K. ↓

D

CHECK GROUND CIRCUIT.
Check resistance between E.C.U. terminal ⑭ and terminal ⓓ.
Resistance:
Approximately 0Ω

N.G. → Repair or replace harness.

O.K. ↓

Reinstall any part removed.

↓

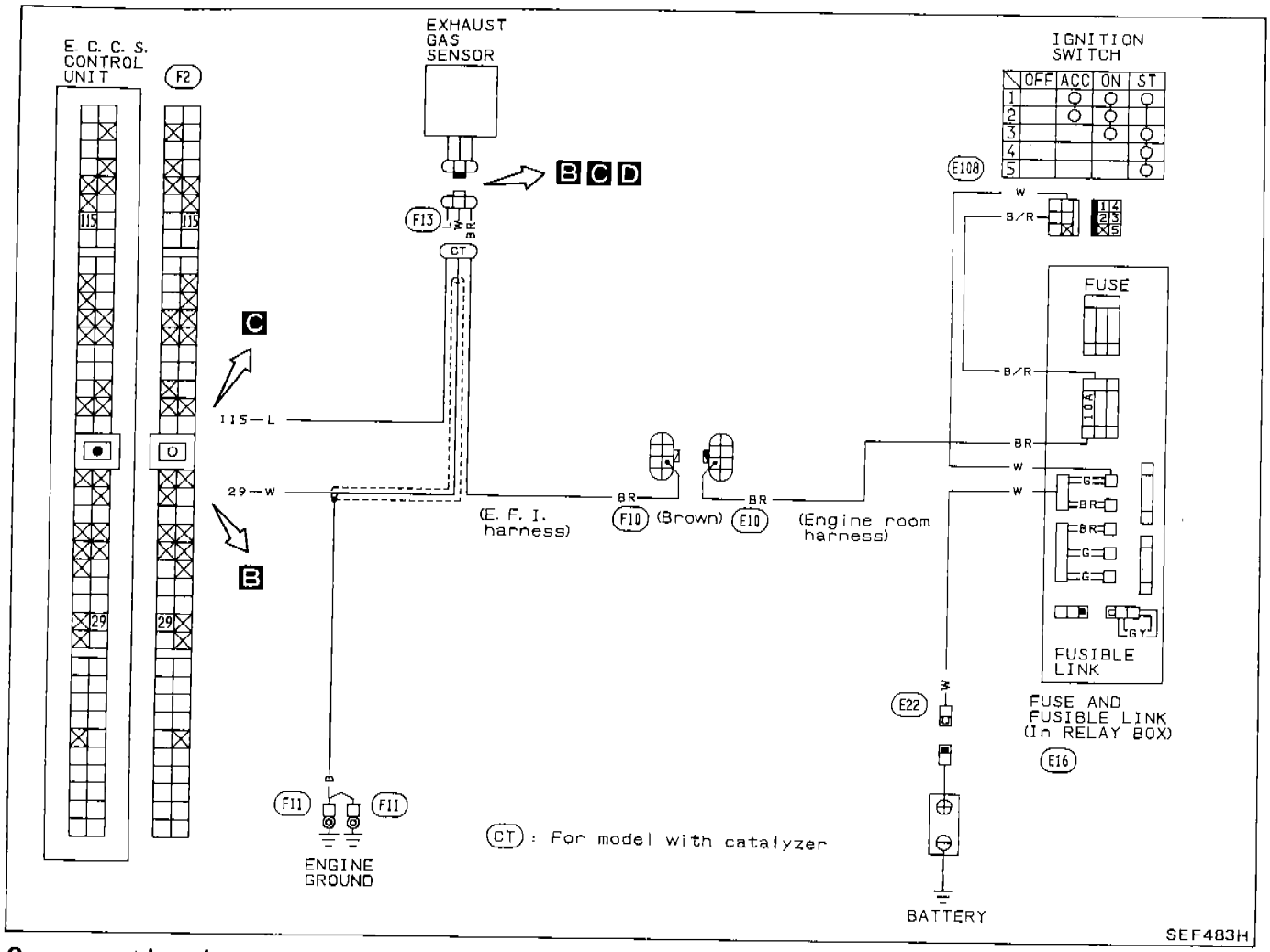
CHECK IDLE SWITCH OPERATION.
1) Perform switch ON/OFF diagnosis (in Mode IV).
2) Make sure that red L.E.D. comes "ON" or goes "OFF" when accelerator pedal is depressed.

↓

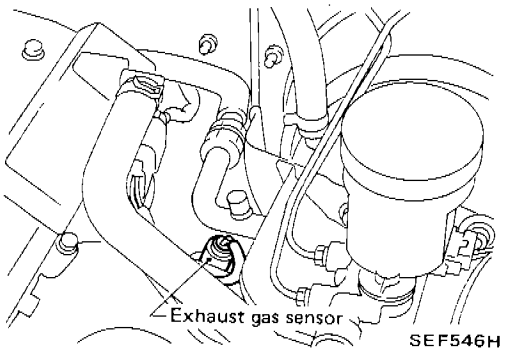
INSPECTION END

Diagnostic Procedure 8

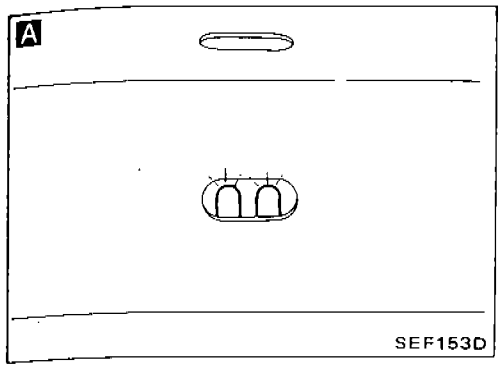
EXHAUST GAS SENSOR (Not self-diagnostic item)

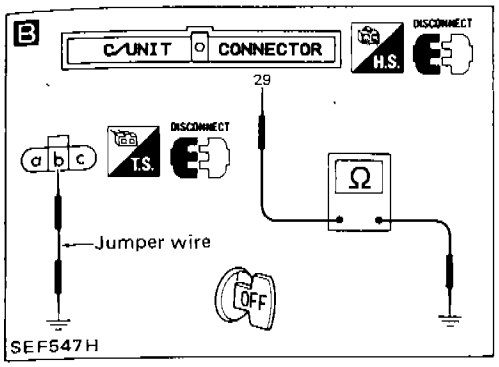


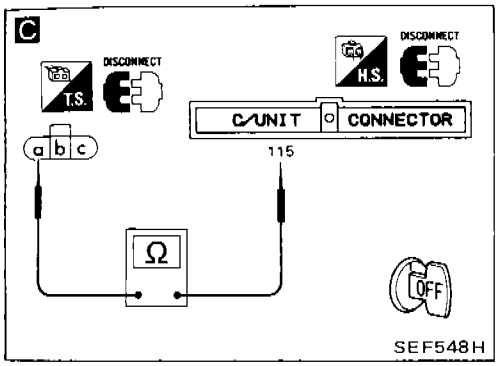
Component location

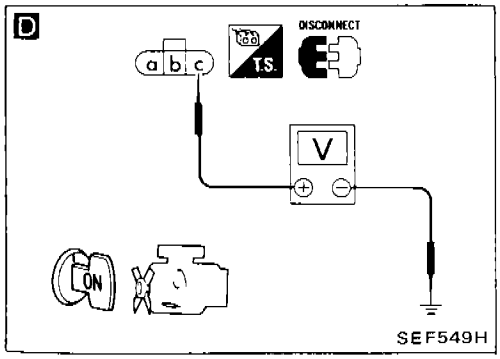


Diagnostic Procedure 8 (Cont'd)









INSPECTION START

A CHECK INPUT SIGNAL.
1) Start engine and warm it up sufficiently.
2) Make sure green L.E.D. on E.C.U. blinks at 2,000 rpm.

O.K. → INSPECTION END

N.G.

B CHECK EXHAUST GAS SENSOR CIRCUIT.
1) Turn off engine.
2) Disconnect E.C.U. harness connector.
3) Disconnect exhaust gas sensor harness connector.
4) Connect a jumper wire from exhaust gas sensor harness connector terminal ⓑ to ground.
5) Check resistance between E.C.U. terminal ㉙ and ground.
Resistance:
Approximately 0Ω

N.G. → Repair or replace harness.

O.K.

C CHECK EXHAUST GAS SENSOR HEATER CIRCUIT.
Check resistance between terminals ⓐ and ⑮.
Resistance:
Approximately 0Ω

N.G. → Repair or replace harness.

O.K.

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

N.G. →
1) Check fuse.
2) Check middle harness connector for proper connection.

O.K.

Replace exhaust gas sensor.

Reinstall any part removed.

1) Warm up engine sufficiently.
2) Set diagnosis mode to Mode I.
3) Make sure that inspection lamp (Green) on E.C.U. goes on and off periodically more than 9 times during 10 seconds at 2,000 rpm.

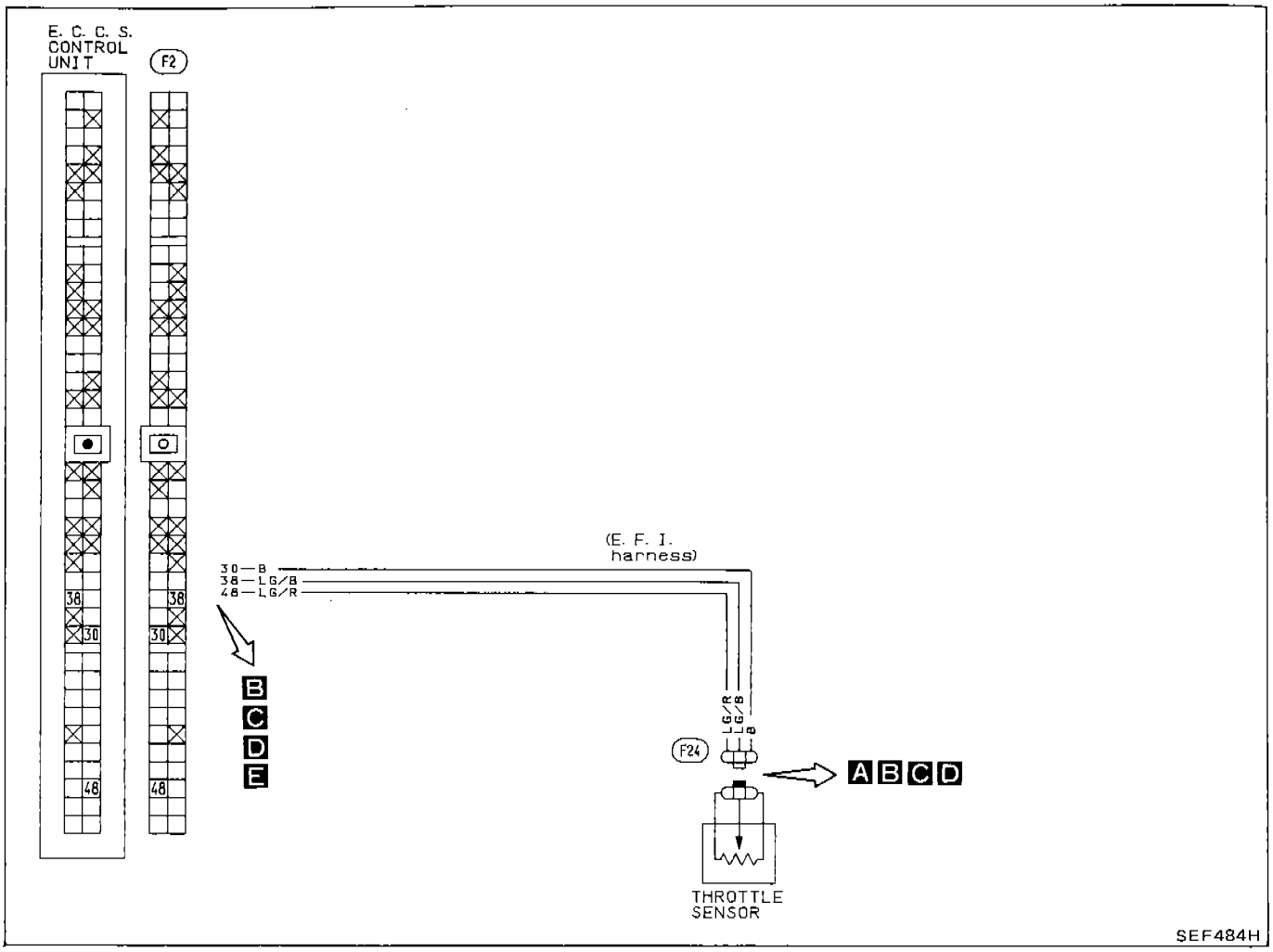
N.G. → Perform IDLE SPEED/IGNITION TIMING/IDLE MIXTURE RATIO INSPECTION.
(See page EF & EC-25.)

O.K.

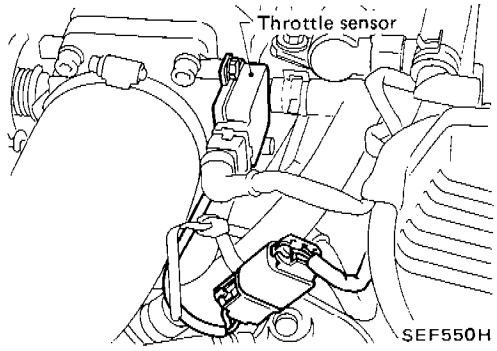
INSPECTION END

Diagnostic Procedure 9

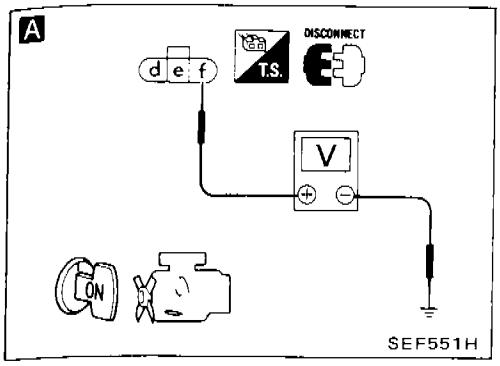
THROTTLE SENSOR (Code No. 43)

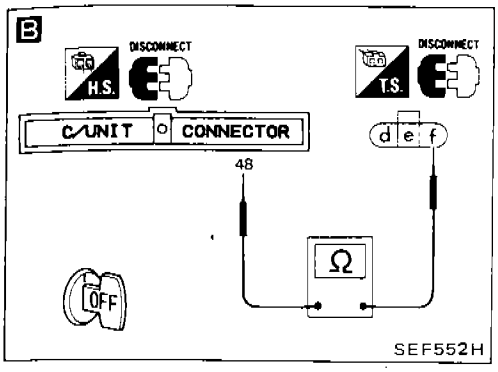


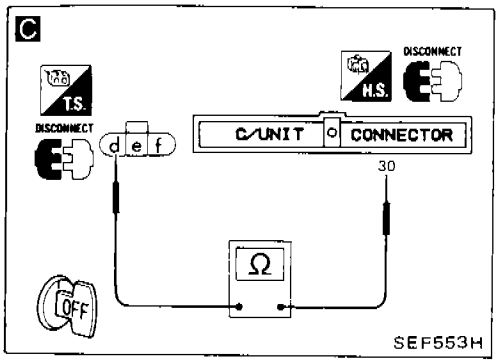
Component location

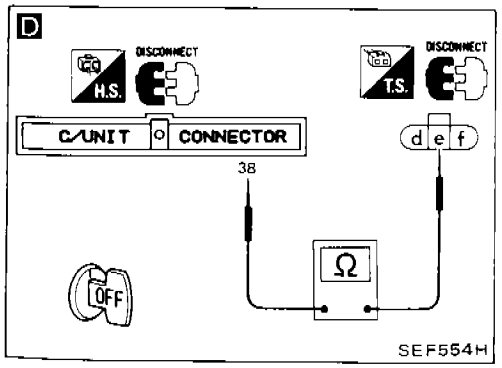


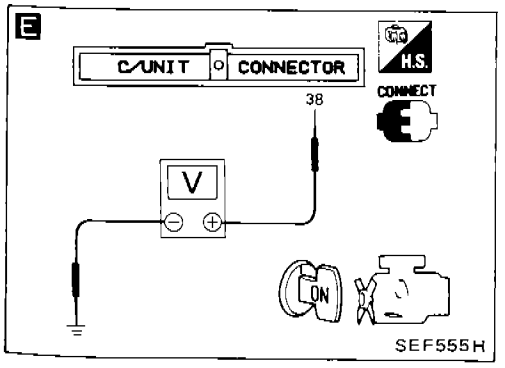
Diagnostic Procedure 9 (Cont'd)











INSPECTION START

Perform self-diagnosis (Mode III).
Is code No. 43 indicated?

N.G. → INSPECTION END

O.K.

A

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

N.G. →
Check the following items.
B 1) Harness continuity between throttle sensor harness connector and E.C.U.
a. Turn ignition switch "OFF".
b. Disconnect E.C.U. harness connector.
c. Check resistance between ⓕ and ㊽.
Resistance:
Approximately 0Ω
2) Middle harness connector
3) E.C.C.S. relay
(Refer to page EF & EC-128.)

O.K.

C

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF" and disconnect E.C.U. harness connector.
2) Disconnect throttle sensor harness connector.
3) Check resistance between terminal ⓓ and E.C.U. terminal ㉚.
Resistance:
Approximately 0Ω

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

O.K.

D

CHECK THROTTLE SENSOR CIRCUIT.
Check resistance between terminal ⓔ and E.C.U. terminal ㊳.
Resistance:
Approximately 0Ω

N.G. → Repair or replace harness.

O.K.

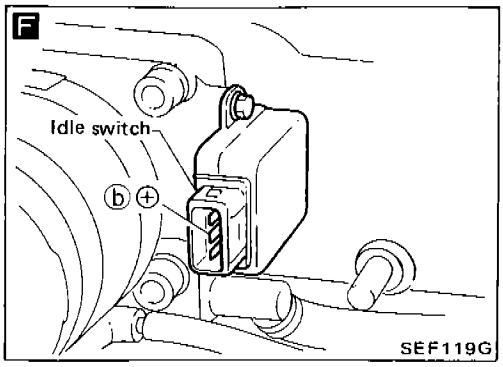
E

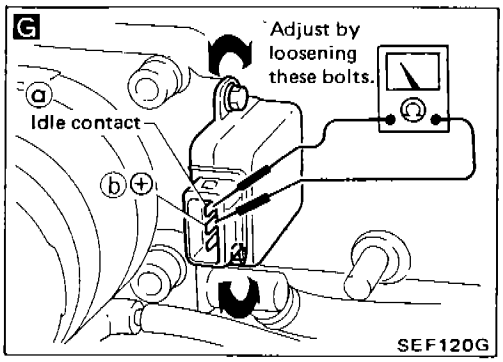
CHECK INPUT SIGNAL.
1) Reconnect E.C.U. harness connector and throttle sensor harness connector.
2) Turn ignition switch "ON".
3) Make sure that voltage between terminal ㊳ and ground changes when accelerator pedal is depressed.
Voltage:
Approximately 0.5 - 4.0V

O.K. → INSPECTION END

N.G.

Diagnostic Procedure 9 (Cont'd)





⊕

Disconnect throttle sensor harness connector.

CHECK COMPONENT (Throttle sensor).
Refer to "Electrical Components Inspection".
(See page EF & EC-124.)

CHECK IDLE SWITCH OFF → ON SPEED.

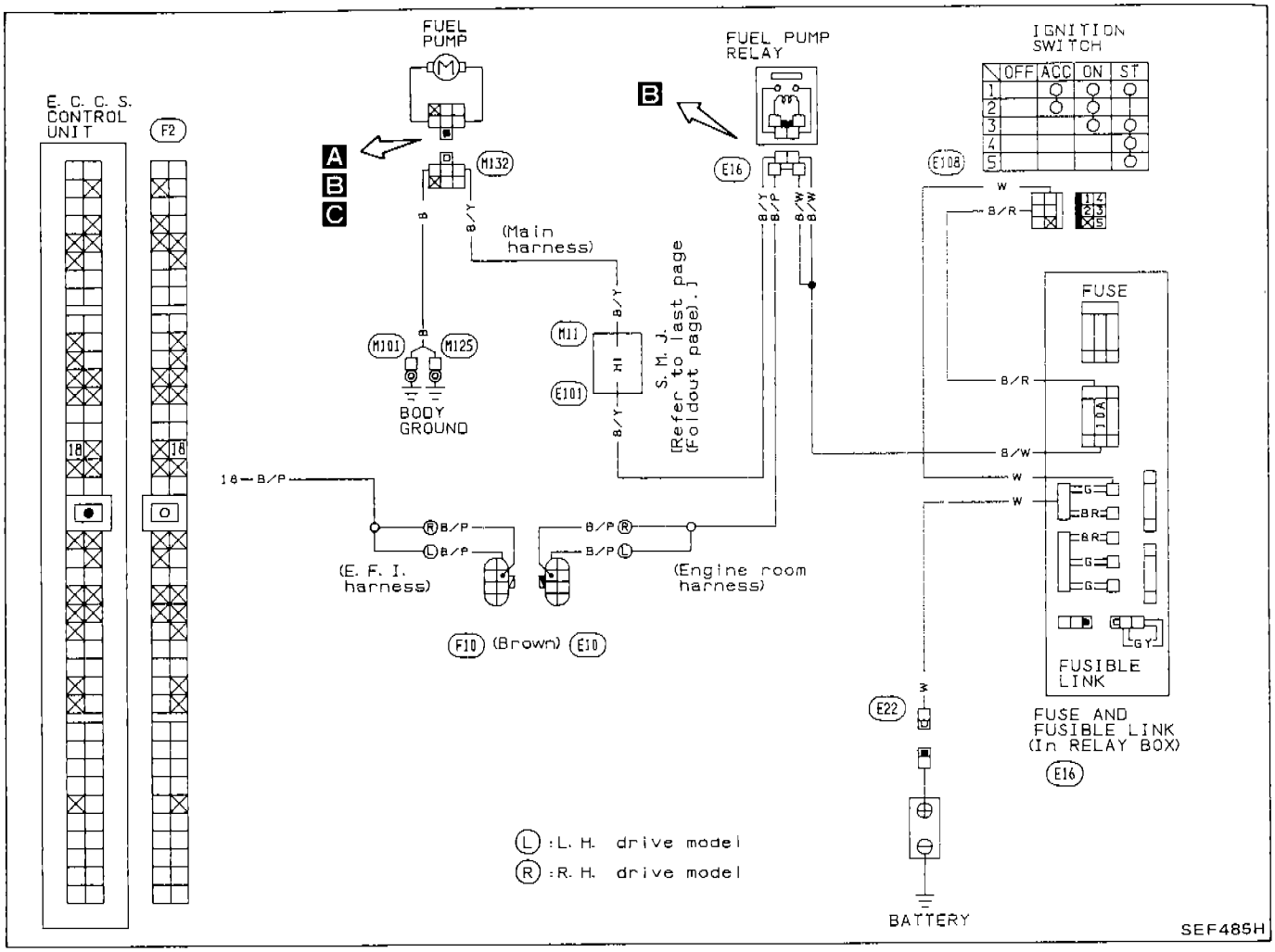
1) Reconnect throttle sensor harness connector.
F 2) Disconnect idle switch harness connector.
3) Start and warm up engine sufficiently.
4) Check idle switch OFF → ON speed with circuit tester, closing throttle valve manually.
   Idle switch OFF → ON speed:
   - M/T **Idle speed + 250±150 rpm**
   - A/T **Engine speed (Idle speed in "N" position) + 250±150 rpm**

G 5) If N.G., loosen throttle sensor installing screws, then set idle switch OFF → ON speed to the specified value by turning throttle sensor body. (Connect circuit tester with terminals ⓐ and ⓑ on idle switch side and find out OFF → ON point.)
6) Tighten throttle sensor installing screws after setting.

NOTE

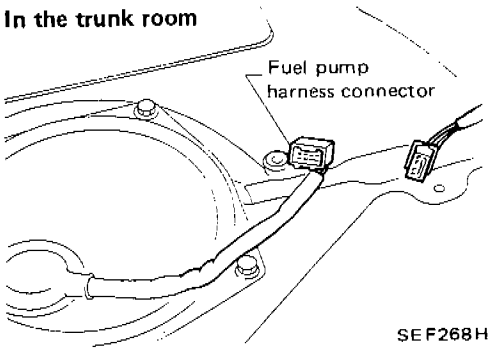
Diagnostic Procedure 10

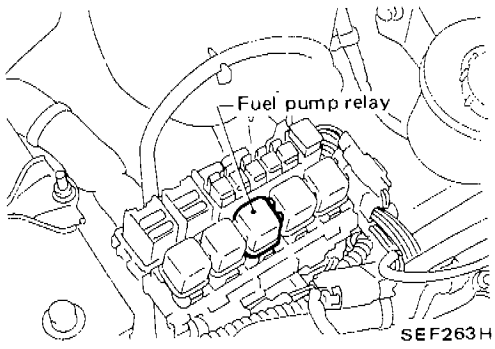
FUEL PUMP (Not self-diagnostic item)



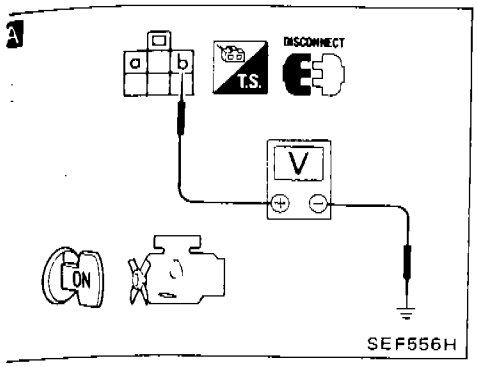
Component location

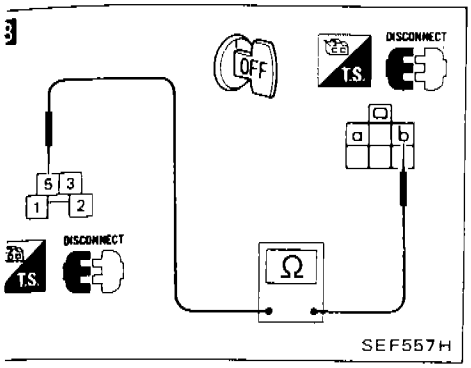
In the trunk room

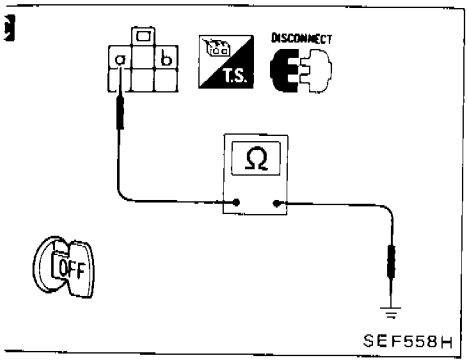




Diagnostic Procedure 10 (Cont'd)







INSPECTION START

A

CHECK POWER SOURCE.
1) Disconnect fuel pump harness connector.
2) Turn ignition switch "ON".
3) Make sure there is battery voltage between terminal ⓑ and ground for 5 seconds after turning ignition switch "ON".

N.G. →

B

CHECK HARNESS CONTINUITY BETWEEN FUEL PUMP AND FUEL PUMP RELAY.
1) Turn ignition switch "OFF".
2) Disconnect fuel pump relay.
3) Disconnect fuel pump harness connector.
4) Check continuity between terminals ⑤ and ⓑ.

O.K. ↓

CHECK COMPONENT
(Fuel pump relay).
Refer to "Electrical Components Inspection".
(See page EF & EC-128.)

O.K. ↓

C

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check continuity between terminal ⓐ and ground.
Continuity:
Approximately 0Ω

N.G. → Repair harness or connectors, if necessary.

O.K. ↓

CHECK COMPONENT
(Fuel pump).
Refer to "Electrical Components Inspection".
(See page EF & EC-126.)

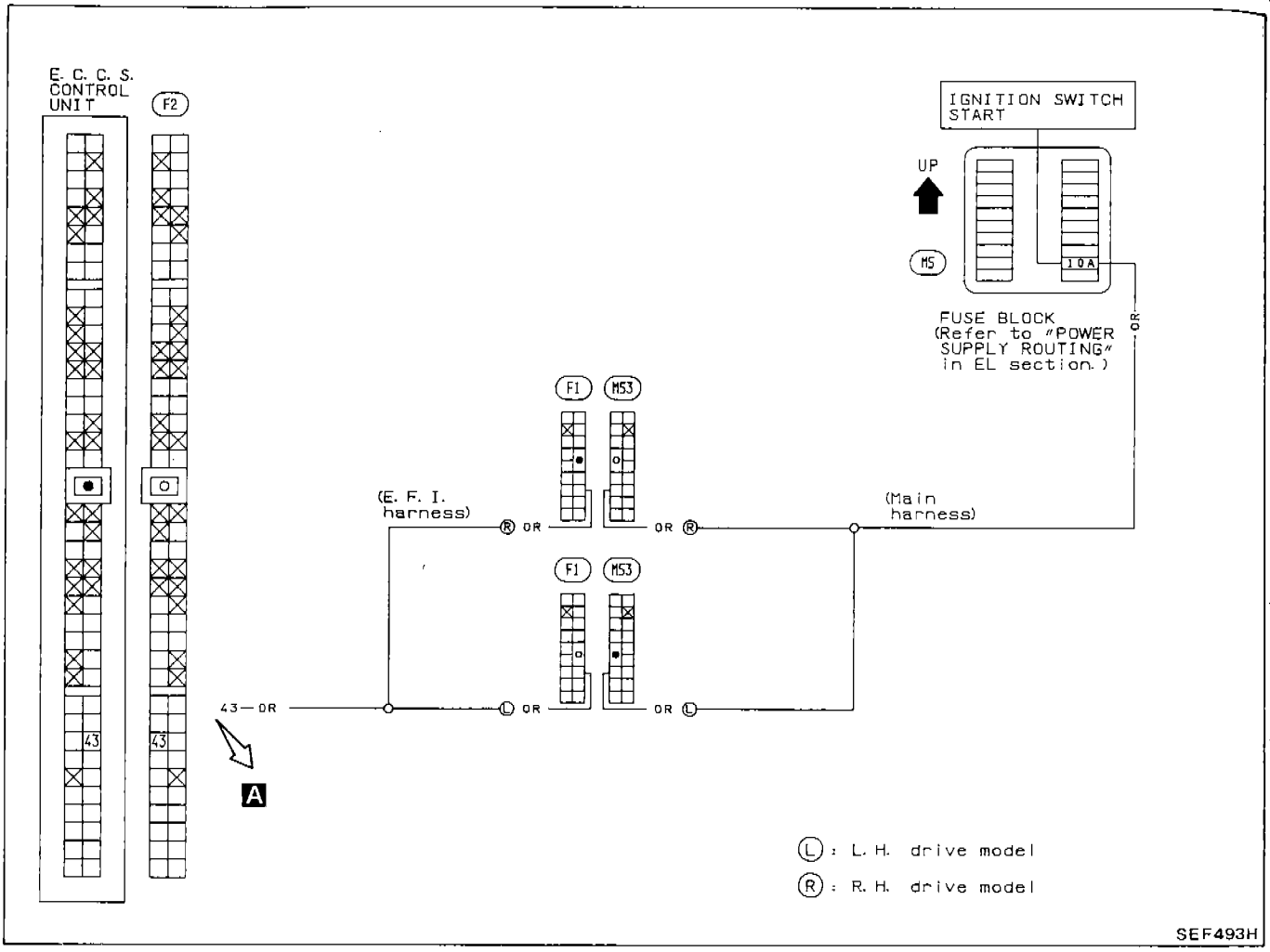
N.G. → Replace fuel pump.

O.K. ↓

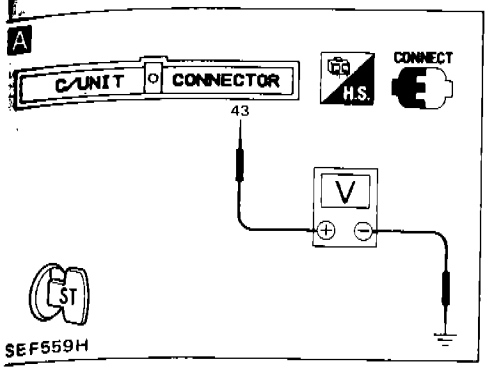
INSPECTION END

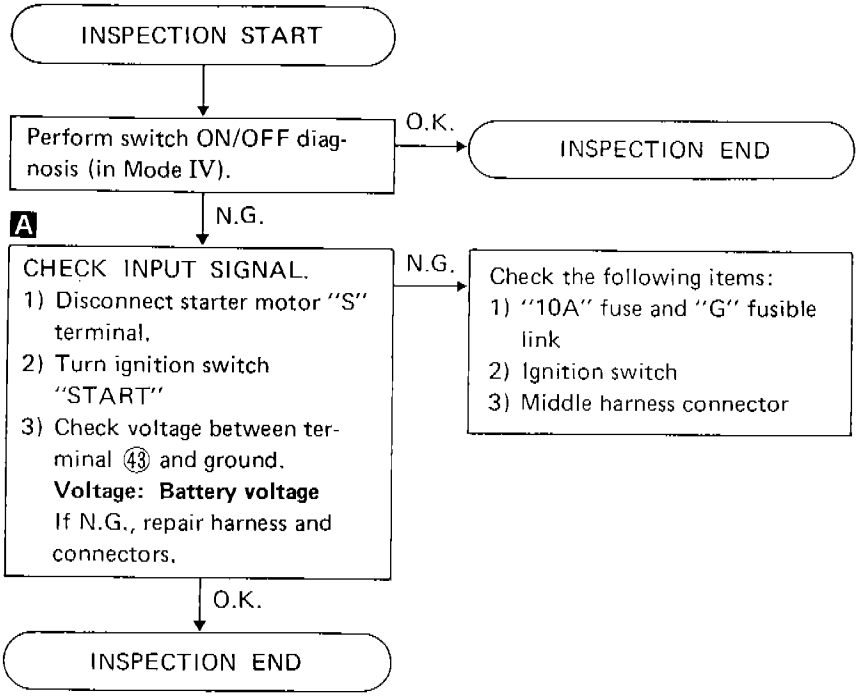
Diagnostic Procedure 11

START SIGNAL (Switch ON/OFF diagnosis)



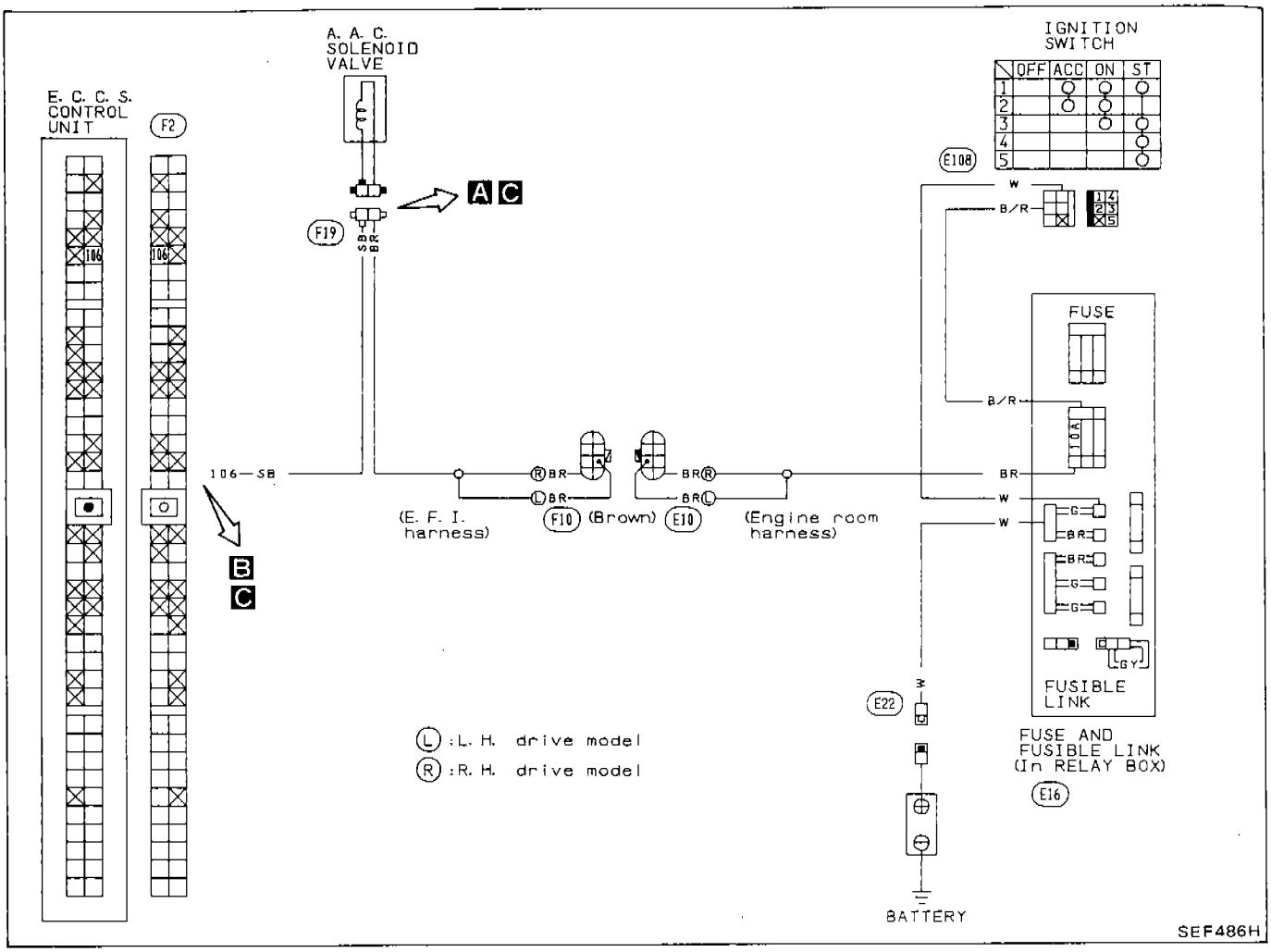
Diagnostic Procedure 11 (Cont'd)



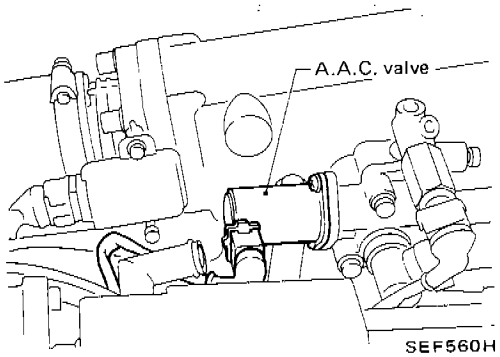


Diagnostic Procedure 12

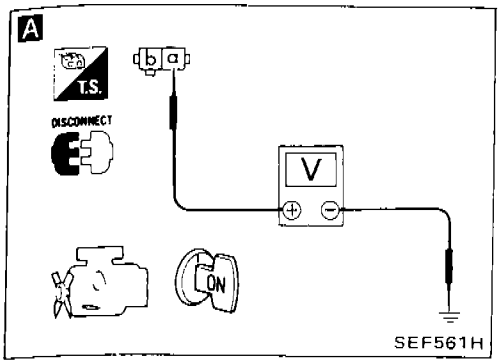
AUXILIARY AIR CONTROL (A.A.C.) VALVE (Not self-diagnostic item)

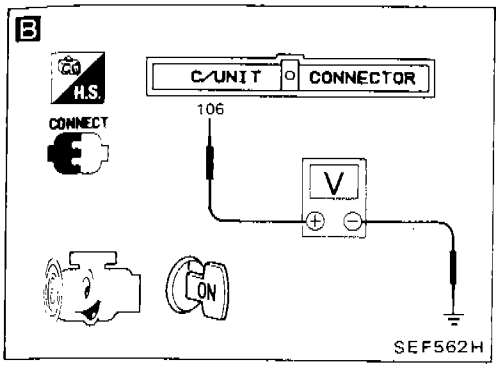


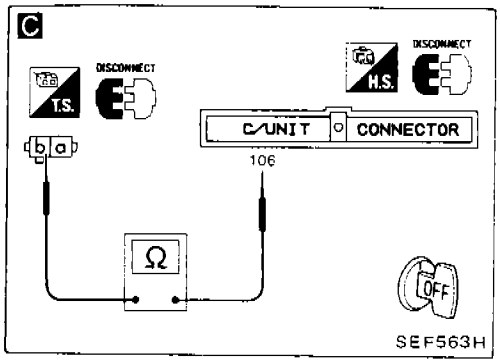
Component location



Diagnostic Procedure 12 (Cont'd)







INSPECTION START

CHECK COMPONENT
(A.A.C. valve).
Refer to "Electrical Components Inspection".
(See page EF & EC-125.)

A

CHECK POWER SOURCE.
1) Disconnect A.A.C. valve harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal ⓐ and ground.
Voltage: Battery voltage
If N.G., repair harness or connectors.

N.G. → Check the following items:
1) "10A" fuse
2) Ignition switch
3) Middle harness connector

O.K.

B

CHECK INPUT SIGNAL.
1) Reconnect A.A.C. valve harness connector.
2) Start engine and warm it up sufficiently.
3) Check voltage between E.C.U. terminal (106) and ground.
Voltage:
Approximately 6 - 12V

N.G. → C

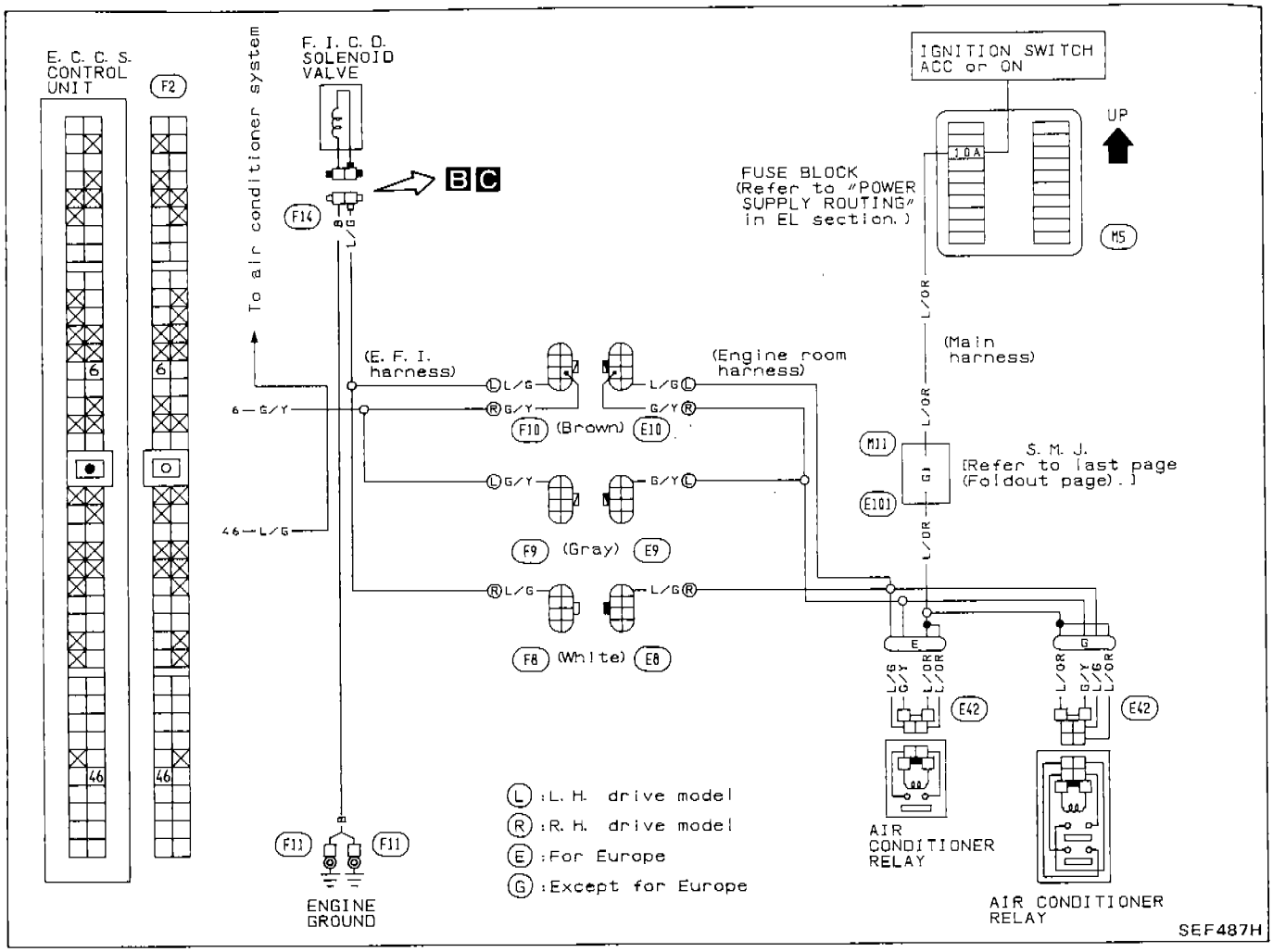
CHECK CONTINUITY BETWEEN E.C.U. AND A.A.C. VALVE.
1) Stop engine.
2) Disconnect E.C.U. harness connector.
3) Disconnect A.A.C. valve harness connector.
4) Check resistance between terminals (106) and ⓑ.
Resistance:
Approximately 0Ω

O.K.

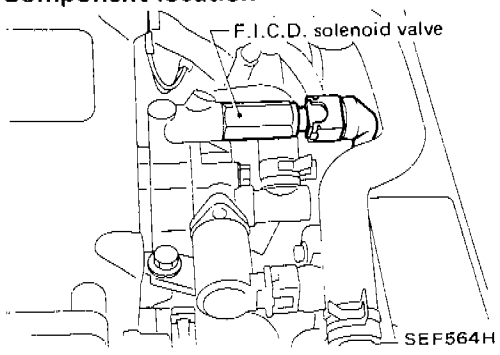
INSPECTION END

Diagnostic Procedure 13

I.A.A. CONTROL (F.I.C.D. CONTROL) (Not self-diagnostic item)

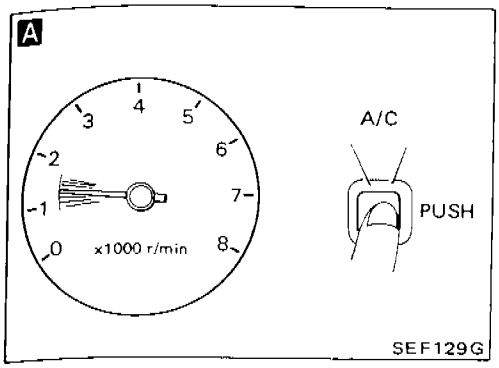


Component location

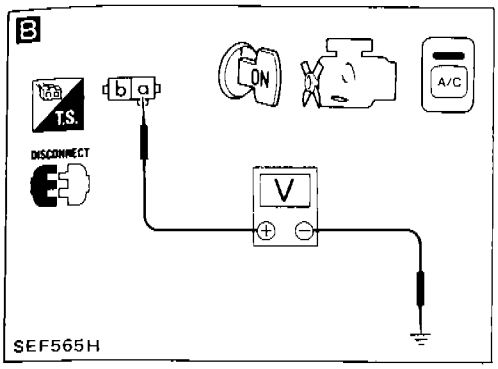


Diagnostic Procedure 13 (Cont'd)

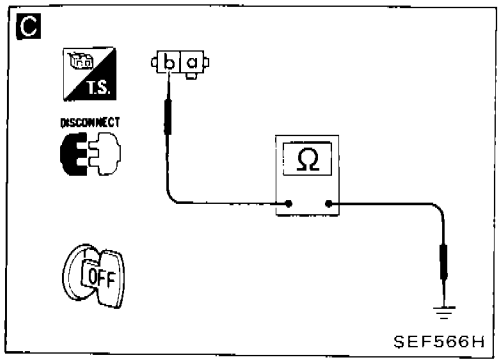
A



B



C



INSPECTION START

A

CHECK INPUT SIGNAL.
1) Start and warm up engine sufficiently.
2) Does engine revolution rise when air conditioner switch is turned "ON"?

Yes → CHECK IDLE SPEED WHEN AIR CONDITIONER SWITCH IS "ON".
M/T: 950±50 rpm
A/T: 900±50 rpm
If out of specification, adjust idle speed.
(See page EF & EC-25.)

O.K. → INSPECTION END

No

B

CHECK POWER SOURCE.
1) Stop engine.
2) Disconnect F.I.C.D. solenoid valve harness connector.
3) Turn ignition switch "ON".
4) Check voltage between terminal ⓐ and ground when air conditioner switch is turned "ON".

Air conditioner	Voltage between terminal ⓐ and ground
ON	Battery voltage
OFF	0V

N.G. → CHECK CONTINUITY BETWEEN AIR CONDITIONER RELAY AND F.I.C.D. SOLENOID VALVE.
Refer to HA section.

C

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check resistance between terminal ⓑ and ground.
Resistance:
Approximately 0Ω

N.G. → Repair harness or connectors.

O.K.

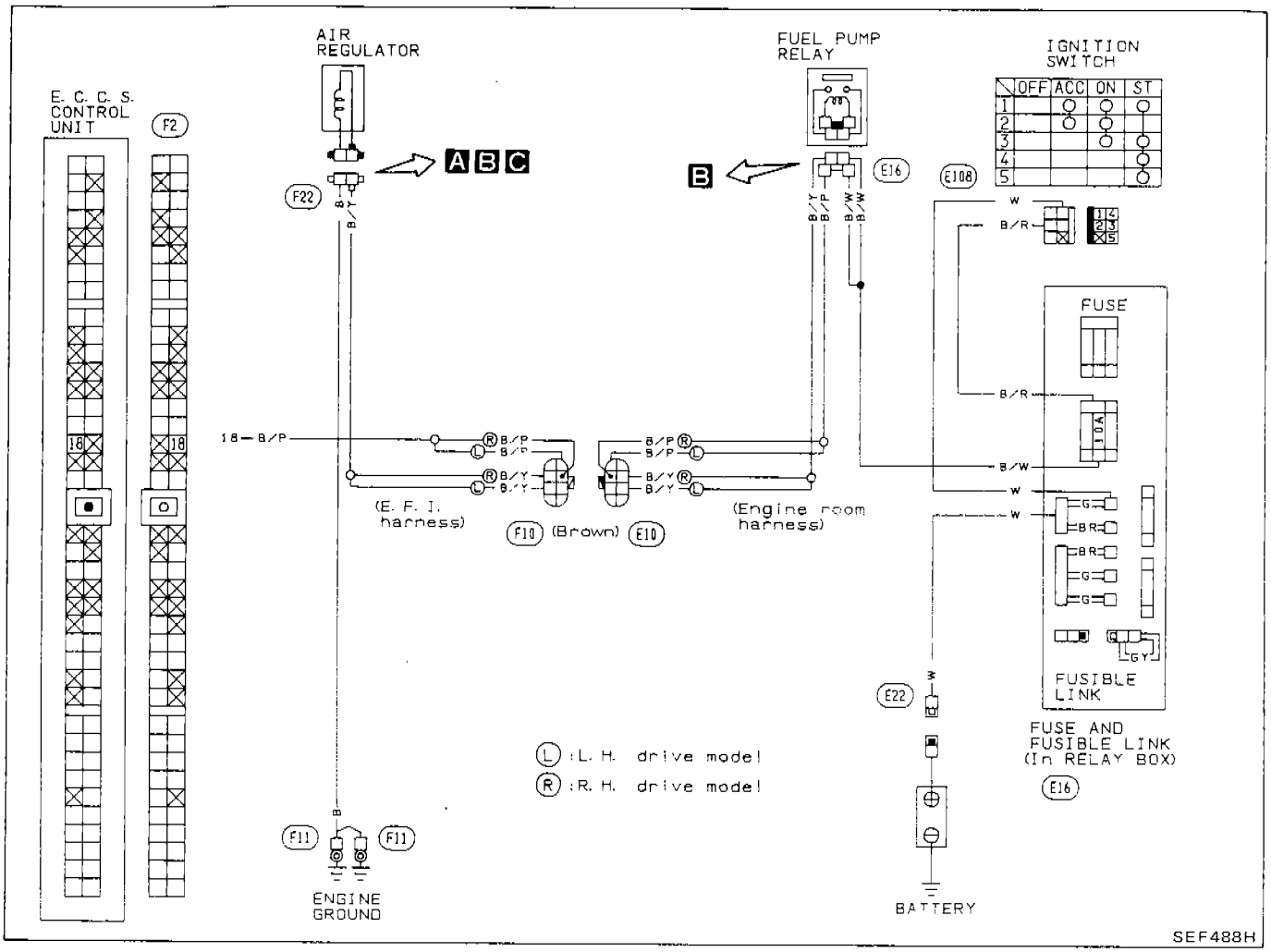
CHECK COMPONENT
(F.I.C.D. solenoid valve).
Refer to "Electrical Components Inspection".
(See page EF & EC-127.)

N.G. → Replace F.I.C.D. solenoid valve.

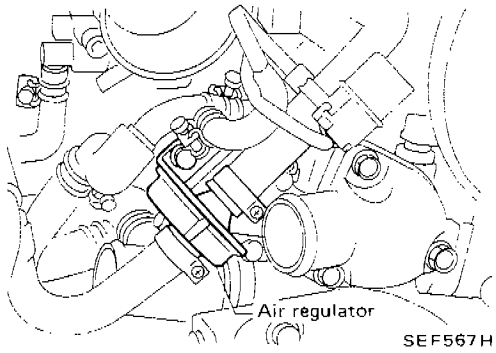
O.K. → INSPECTION END

Diagnostic Procedure 14

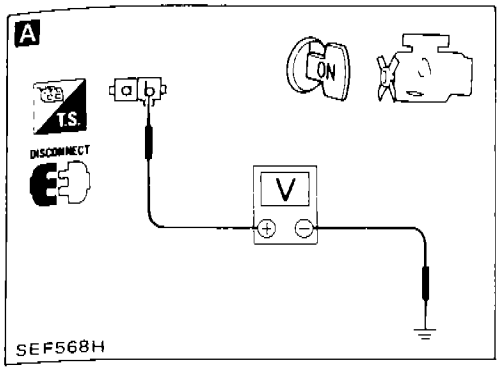
AIR REGULATOR (Not self-diagnostic item)

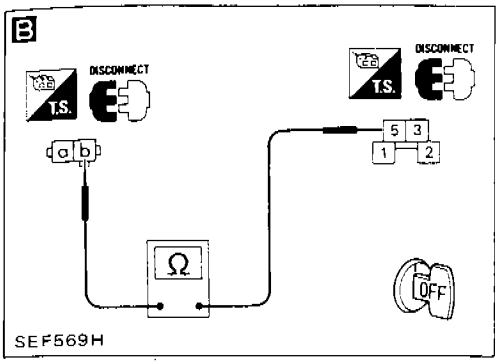


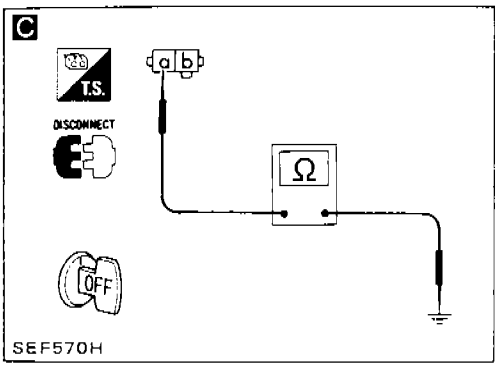
Component location



Diagnostic Procedure 14 (Cont'd)







INSPECTION START

A

CHECK POWER SOURCE.
1) Disconnect air regulator harness connector.
2) Turn ignition switch "ON".
3) Make sure there is battery voltage between terminal ⓑ and ground for 5 seconds after turning ignition switch "ON".

N.G. →

B

CHECK HARNESS CONTINUITY BETWEEN AIR REGULATOR AND FUEL PUMP RELAY.
1) Turn ignition switch "OFF".
2) Disconnect fuel pump relay.
3) Check continuity between terminals ⑤ and ⓑ.
Continuity should exist.

O.K. ↓

CHECK COMPONENT (Fuel pump relay).
Refer to "Electrical Components Inspection".
(See page EF & EC-128.)

O.K. ↓

C

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Check continuity between terminal ⓐ and ground.
Resistance:
Approximately 0Ω

N.G. → Repair harness or connectors, if necessary.

O.K. ↓

CHECK COMPONENT (Air regulator).
Refer to "Electrical Components Inspection".
(See page EF & EC-126.)

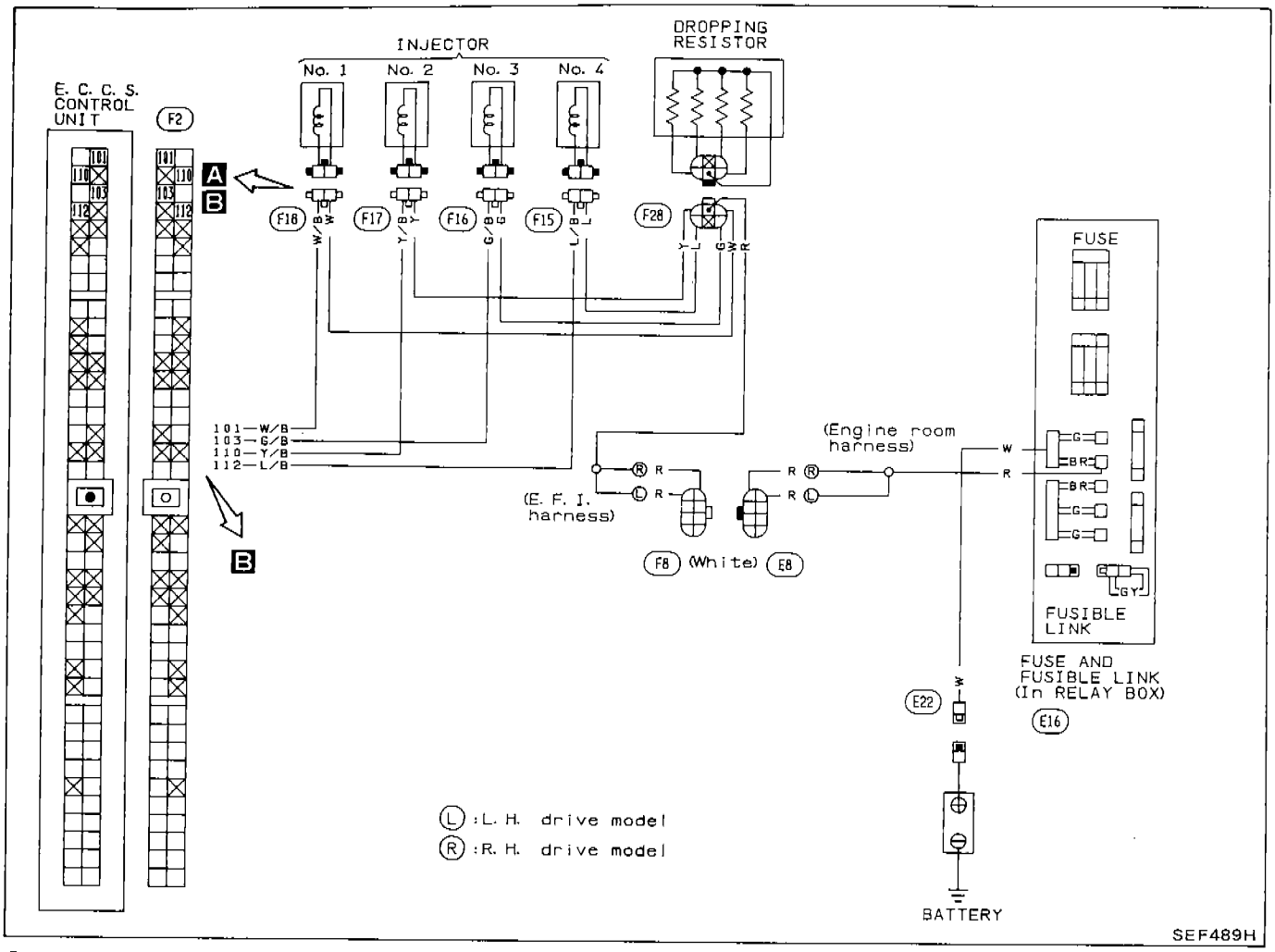
N.G. → Replace air regulator.

O.K. ↓

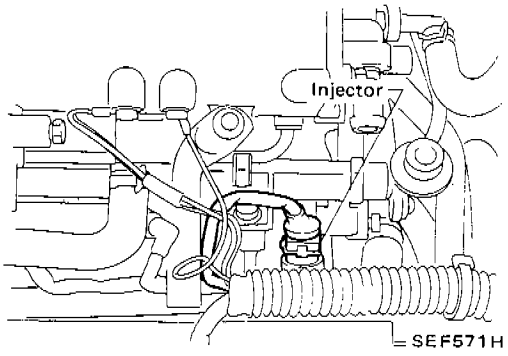
INSPECTION END

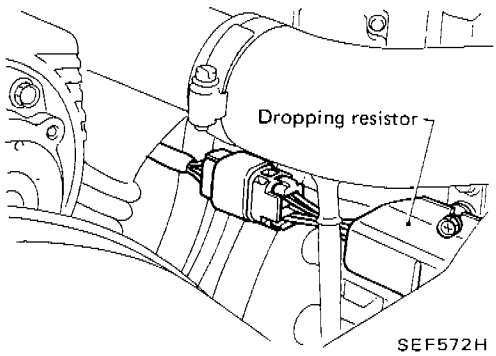
Diagnostic Procedure 15

INJECTOR (Not self-diagnostic item)

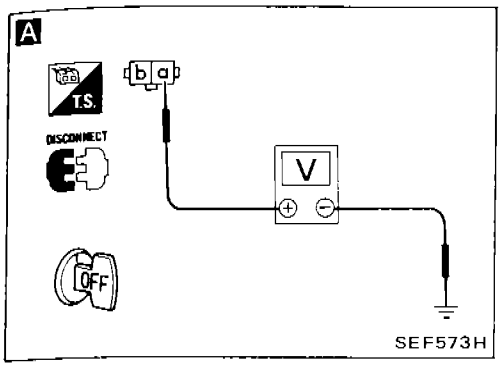


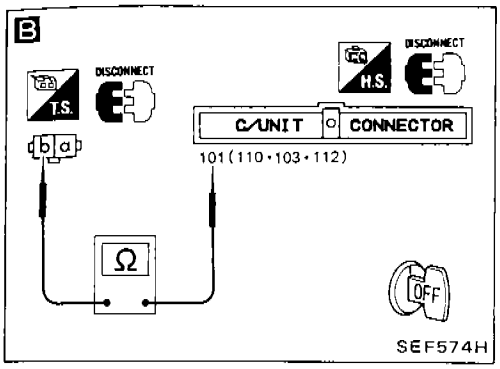
Component location





Diagnostic Procedure 15 (Cont'd)





INSPECTION START

A

CHECK POWER SOURCE.
1) Disconnect injector harness connector.
2) Check voltage between terminal ⓐ and ground.
Voltage: Battery voltage

N.G. → Check the following items:
1) Dropping resistor (See page EF & EC-128.)
2) "BR" fusible link
3) Middle harness connector

O.K.

B

CHECK GROUND CIRCUIT.
1) Disconnect E.C.U. harness connector.
2) Check resistance between terminals ⓑ and (101) (No. 1 cylinder), (110) (No. 2 cylinder), (103) (No. 3 cylinder), (112) (No. 4 cylinder).
Resistance:
Approximately 0Ω

N.G. → Repair harness or connectors.

O.K.

CHECK COMPONENT (Injector).
Refer to "Electrical Components Inspection".
(See page EF & EC-125.)

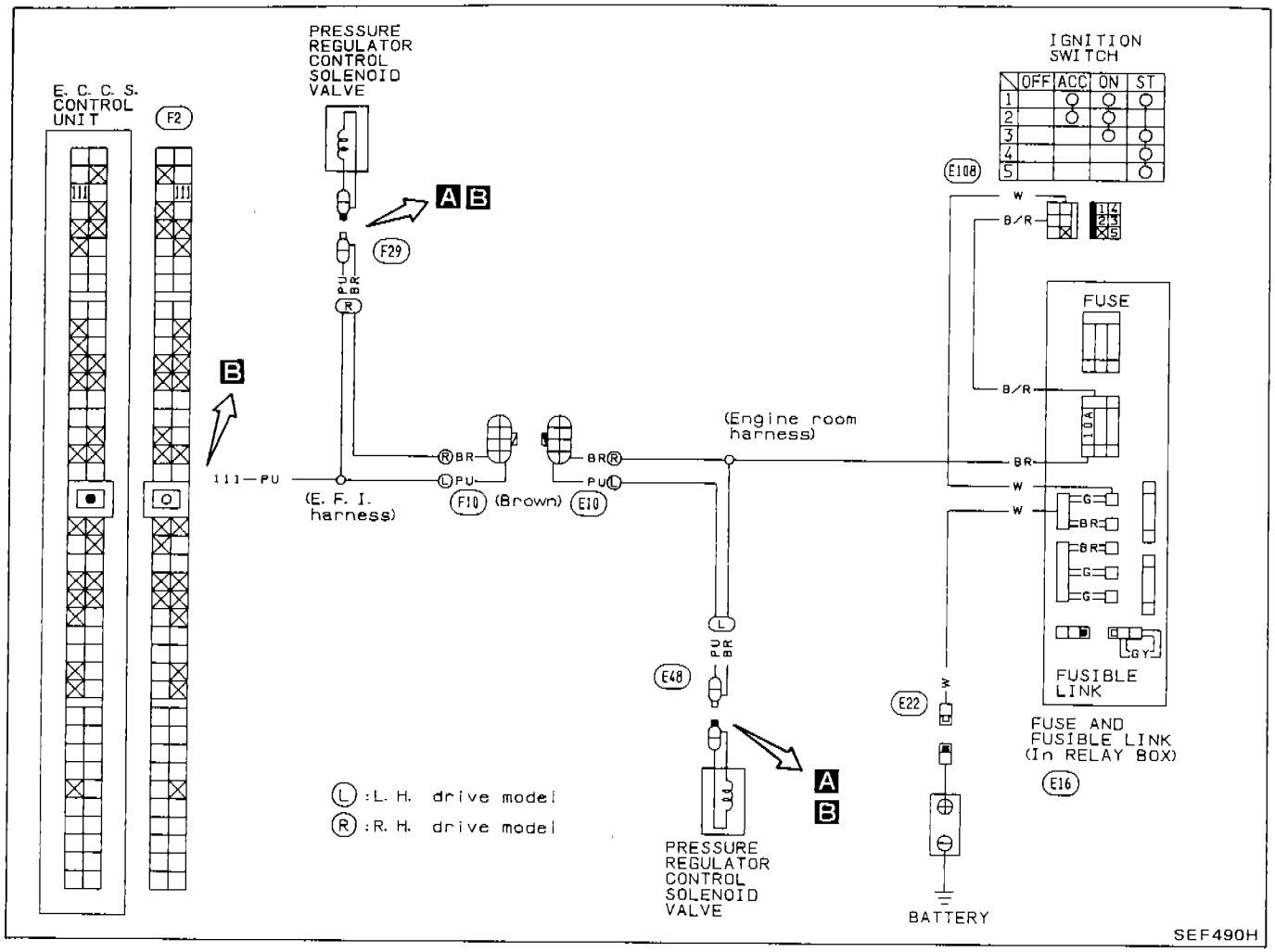
N.G. → Replace injector.

O.K.

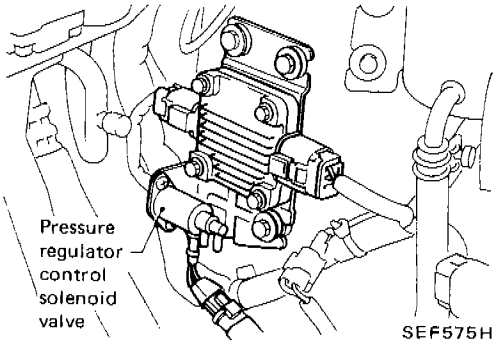
INSPECTION END

Diagnostic Procedure 16

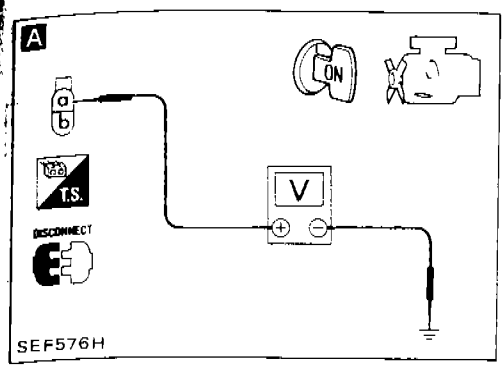
PRESSURE REGULATOR (P.R.) CONTROL SOLENOID VALVE (Not self-diagnostic item)

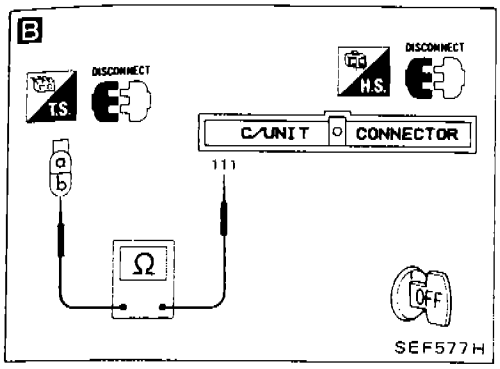


Component location



Diagnostic Procedure 16 (Cont'd)





INSPECTION START

A

CHECK POWER SOURCE.
1) Disconnect pressure regulator control solenoid valve harness connector.
2) Turn ignition switch "ON".
3) Check voltage between terminal ⓐ and ground.
Voltage: Battery voltage

N.G. → Check the following items:
1) "10A" fuse
2) Ignition switch
3) Middle harness connector

O.K.

B

CHECK GROUND CIRCUIT.
1) Turn ignition switch "OFF".
2) Disconnect E.C.U. harness connector.
3) Check resistance between terminals ⓑ and (111).
Resistance:
Approximately 0Ω

N.G. → Repair harness or connectors.

O.K.

CHECK COMPONENT
(Pressure regulator control solenoid valve).
Refer to "Electrical Components Inspection".
(See page EF & EC-126.)

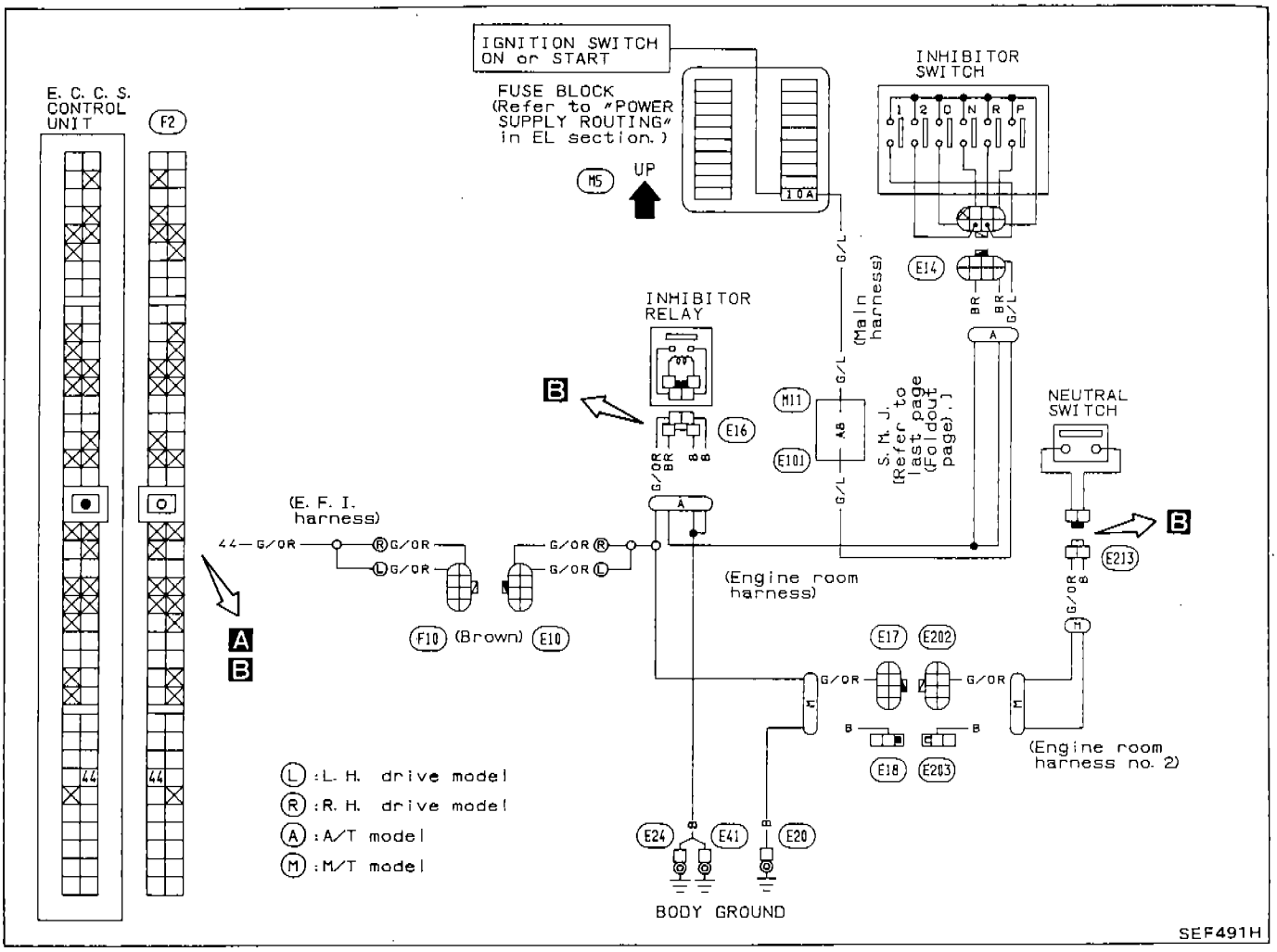
N.G. → Replace pressure regulator control solenoid valve.

O.K.

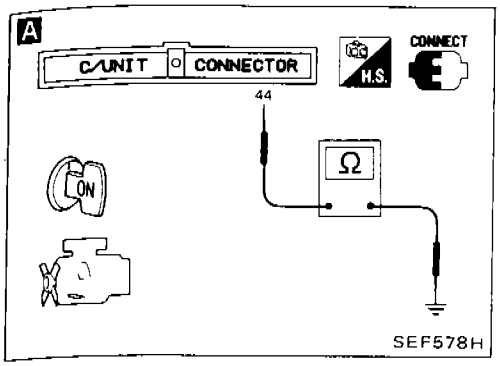
INSPECTION END

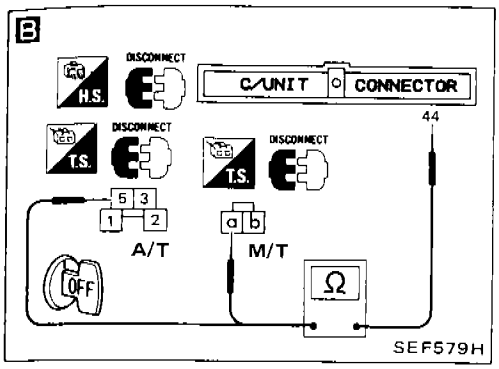
Diagnostic Procedure 17

NEUTRAL AND INHIBITOR SWITCH (Not self-diagnostic item)



Diagnostic Procedure 17 (Cont'd)





INSPECTION START

A

CHECK INPUT SIGNAL.
1) Turn ignition switch "ON".
2) Check continuity between terminal ㊹ and ground.

M/T model

Shift lever position	Continuity
"Neutral"	Yes
Except "Neutral"	No

A/T model

Shift lever position	Continuity
"Neutral" or "Park"	Yes
Except "Neutral" or "Park"	No

O.K. → INSPECTION END

N.G. ↓

B

1) Turn ignition switch "OFF".
— **M/T model** —
2) Disconnect E.C.U. harness connector and neutral switch harness connector.
3) Check resistance between terminals ㊹ and ⓐ.
— **A/T model** —
2) Disconnect E.C.U. harness connector and inhibitor relay.
3) Check resistance between terminals ㊹ and ⑤.
Resistance:
Approximately 0Ω

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

O.K. ↓

CHECK COMPONENT.
M/T model
- Neutral switch

A/T model
- Inhibitor switch and relay

(See page EF & EC-127.)

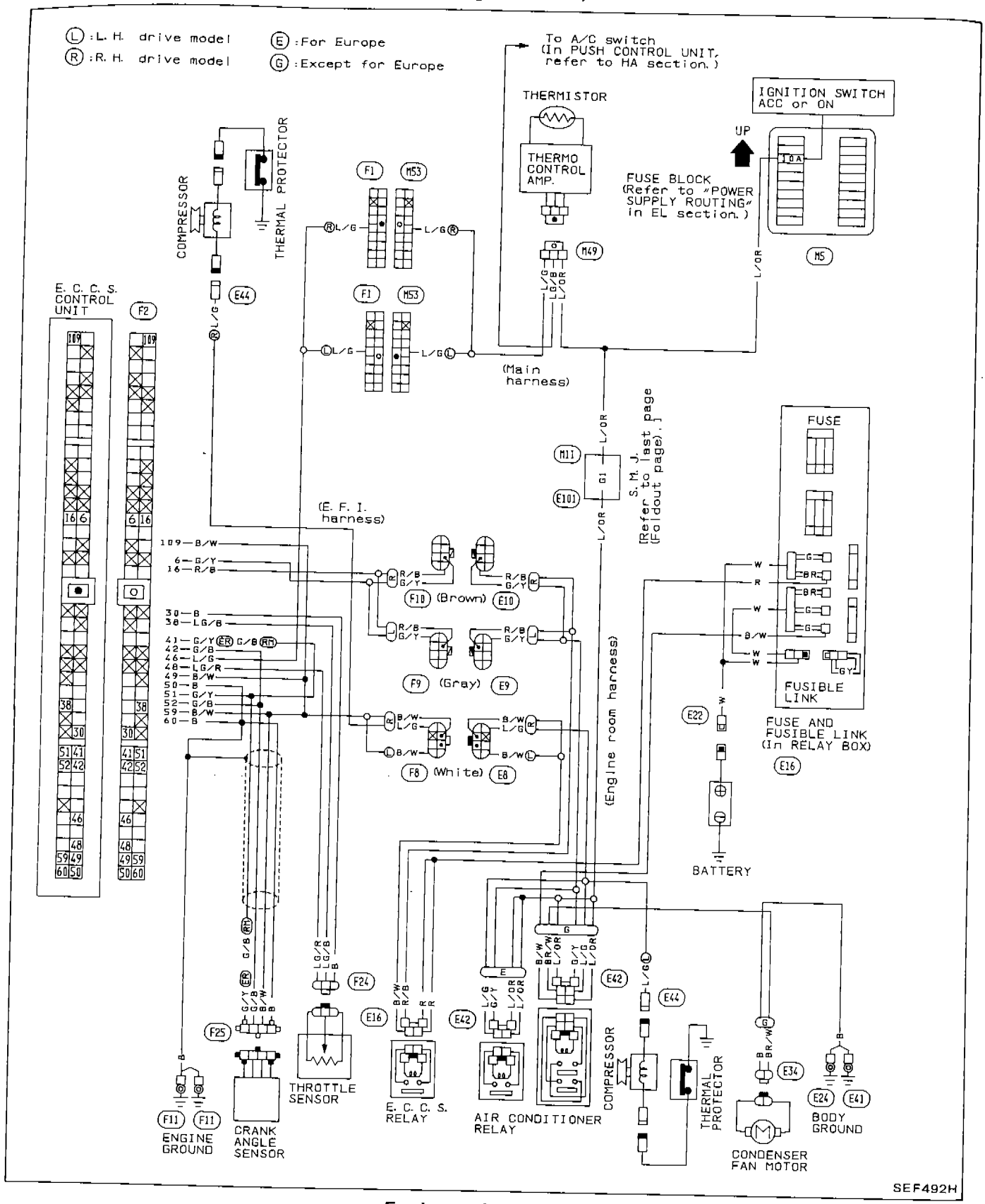
N.G. → Repair or replace.

O.K. ↓

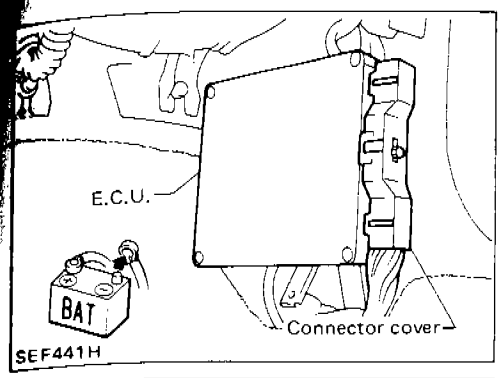
INSPECTION END

Diagnostic Procedure 18

ACCELERATION CUT CONTROL (Not self-diagnostic item)



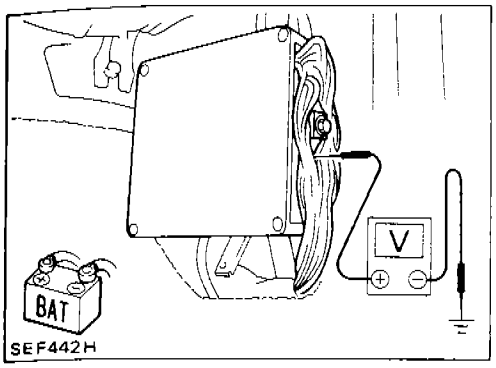
For inspection of this system, refer to HA section.



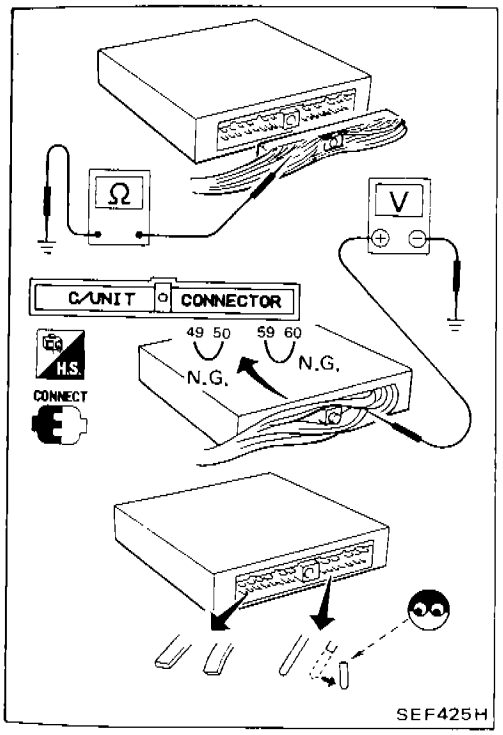
Electrical Components Inspection

MEASUREMENT VOLTAGE OR RESISTANCE OF E.C.U.

1. Disconnect battery ground cable.
2. Remove dash side panel from vehicle.
3. Disconnect connector cover from E.C.U.



4. Connect battery ground cable.
5. Measure the voltage at each terminal by following "E.C.U. inspection table".



CAUTION:

a. **Perform all voltage measurements with the connectors connected.**
b. **Perform all resistance measurements with the connectors disconnected.**
c. **Make sure that there are not any bends or breaks on E.C.U. pin terminal before measurements.**
d. **Do not touch tester probes between terminals ㊾ and ㊿, ㊾ and ㊿.**

Electrical Components Inspection (Cont'd)

E.C.U. INPUT/OUTPUT SIGNAL INSPECTION

E.C.U. inspection table

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	DATA*
1	Ignition signal for No. 1 cylinder	Engine is running. — Idle speed — Engine speed is approximately 2,500 rpm.	0.06V 0.12 - 0.13V
2	Ignition signal for No. 2 cylinder		
3	Ignition signal for No. 3 cylinder		
11	Ignition signal for No. 4 cylinder		
6	Air conditioner relay	A/C switch "OFF"	BATTERY VOLTAGE (11 - 14V)
		A/C switch "ON"	0 - 1.0V
7	Tachometer	Engine is running. — Idle speed — Engine speed is approximately 2,500 rpm.	0.9V 1.7V
16	E.C.C.S. relay	Ignition switch "ON"	0 - 1.0V
		Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
18	Fuel pump relay	Ignition switch "ON" — For 5 seconds after turning ignition switch "ON" Engine is running.	0.7 - 0.9V
		Ignition switch "ON" — In 5 seconds after turning ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
23	Detonation sensor	Engine is running. — Idle speed	3 - 4V

Electrical Components Inspection (Cont'd)

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	DATA*
27	Air flow meter	Engine is running. — Idle speed — Engine speed is approximately 2,500 rpm.	1.6V 2.2V Output voltage varies with engine revolution.
28	Engine temperature sensor	Engine is running.	1.0 - 5.0V Output voltage varies with engine coolant temperature.
29	Exhaust gas sensor	Engine is running. — After warming up sufficiently	0 - Approximately 1.0V
38	Throttle sensor	Ignition switch "ON"	0.5 - 4.0V Output voltage varies with the throttle valve opening angle.
41 51	Crank angle sensor (Reference signal)	Engine is running. **Do not run engine at high speed under no-load.**	0.6 - 0.8V
42 52	Crank angle sensor (Position signal)	Engine is running. **Do not run engine at high speed under no-load.**	2.0 - 2.6V
43	Start signal	Cranking	8 - 12V
44	Neutral switch & Inhibitor switch	Ignition switch "ON" — Neutral/Parking	0V
		Ignition switch "ON" — Except the above gear position	4 - 5V
45	Ignition switch	Ignition switch "OFF"	0V
		Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
46	Air conditioner	Engine is running. — Both air conditioner switch and blower switch are "ON".	0V

Electrical Components Inspection (Cont'd)

*Data are reference values.

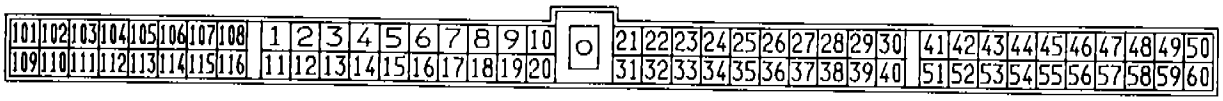
TERMINAL NO.	ITEM	CONDITION	DATA*
49 59	Power source for E.C.U.	Ignition switch "ON"	BATTERY VOLTAGE (11 - 14V)
54	Idle switch (⊖ side)	Ignition switch "ON" └ Throttle valve: idle position	Approximately 8 - 10V
		Ignition switch "ON" └ Throttle valve: Any position except idle position	0V
57	Idle switch (⊕ side)	Ignition switch "ON" └ Throttle valve: idle position	Approximately 8 - 10V
		Ignition switch "ON" └ Throttle valve: Any position except idle position	BATTERY VOLTAGE (11 - 14V)
58	Power source (Back-up)	Ignition switch "OFF"	BATTERY VOLTAGE (11 - 14V)
101	Injector No. 1	Engine is running.	BATTERY VOLTAGE (11 - 14V)
103	Injector No. 3		
110	Injector No. 2		
112	Injector No. 4		
106	Auxiliary air control (A.A.C.) valve	Engine is running. └ Idle speed	8 - 12V
		Engine is running. ├ Steering wheel is turned. ├ Air conditioner is operating. ├ Rear defogger is "ON". └ Headlamps are in high position.	6 - 8V

Electrical Components Inspection (Cont'd)

*Data are reference values.

TERMINAL NO.	ITEM	CONDITION	DATA*
111	Pressure regulator (P.R.) control solenoid valve	Ignition switch "ON" └For approximately 3 minutes after starting engine. Water temperature is above 60°C (140°F).	0.8 - 1.0V
		Ignition switch "ON" └In approximately 3 minutes after starting engine. [Water temperature is above 60°C (140°F).]	BATTERY VOLTAGE (11 - 14V)
		Ignition switch "ON" or "START". [Water temperature is below 60°C (140°F).]	

E.C.U. pin connector terminal layout

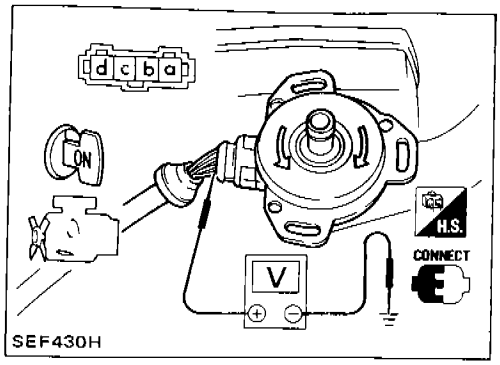


H.S.

SEF424H

Electrical Components Inspection (Cont'd)

CRANK ANGLE SENSOR



SEF430H

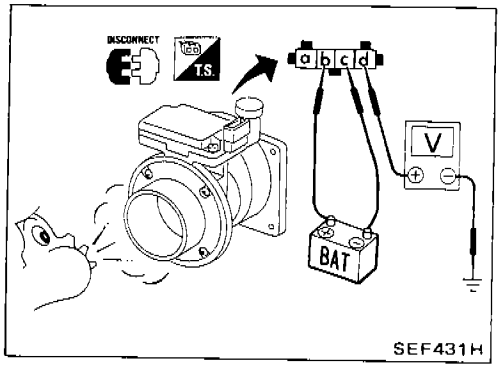
1. Remove crank angle sensor from engine.
2. Check voltage between terminal ⓐ and ground, and terminal ⓑ and ground while rotating the crank angle sensor shaft as shown. At this time make sure that injectors operating sound can be heard.

Voltage:

0V and approximately 5V appear alternately.

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



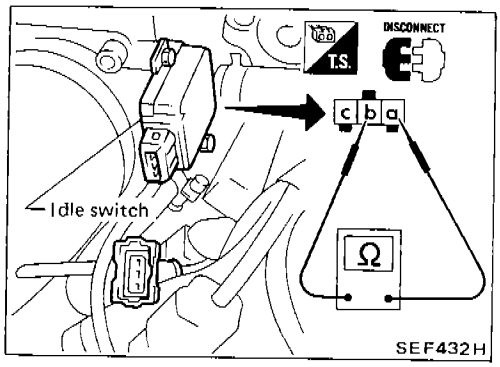
SEF431H

1. Remove air flow meter from vehicle and visually check hot wire air passage for dust.
2. Supply battery voltage between terminals ⓑ and ⓒ.
3. Check voltage between terminal ⓓ and ground while blowing air flow meter as shown.

Voltage:

When blowing Approximately 2V
Not blowing Approximately 1V

IDLE SWITCH

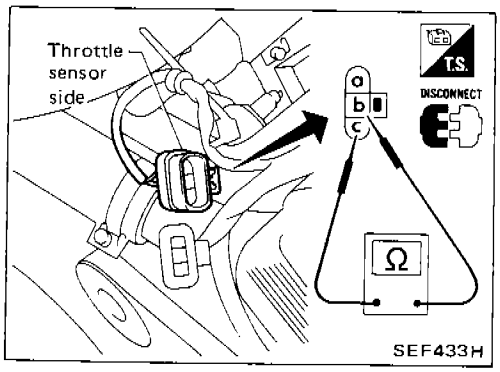


SEF432H

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

Accelerator pedal	Continuity
Completely released	Yes
Depressed	No

THROTTLE SENSOR

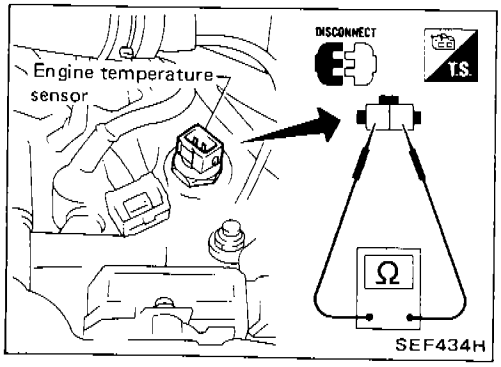


SEF433H

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

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

ENGINE TEMPERATURE SENSOR

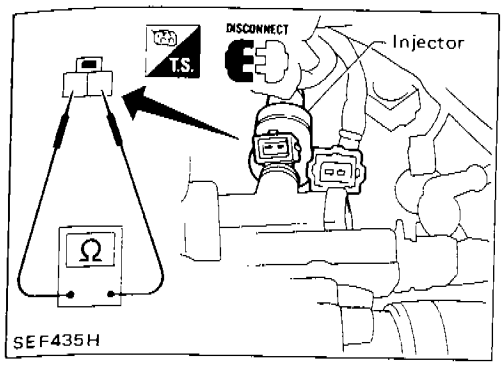


SEF434H

1. Disconnect engine temperature sensor harness connector.
2. Check engine temperature sensor resistance.

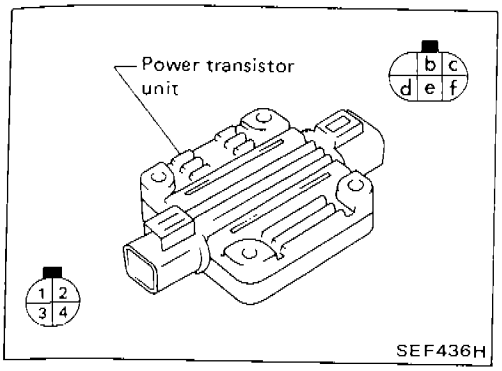
Temperature °C (°F)	Resistance (kΩ)
20 (68)	Approx. 2.5
80 (176)	Approx. 0.3

Electrical Components Inspection (Cont'd)



INJECTOR

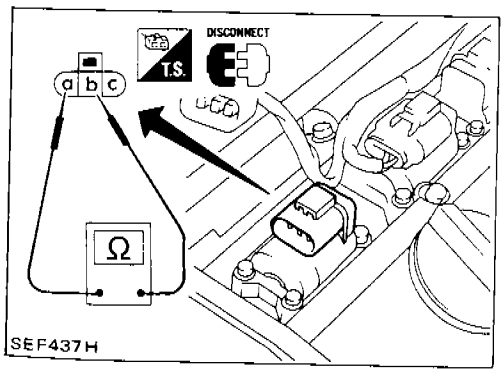
1. Disconnect injector harness connector.
2. Check injector resistnace.
   Resistance:
   2 - 3Ω
3. Remove injector and check nozzle for clogging if necessary.



POWER TRANSISTOR

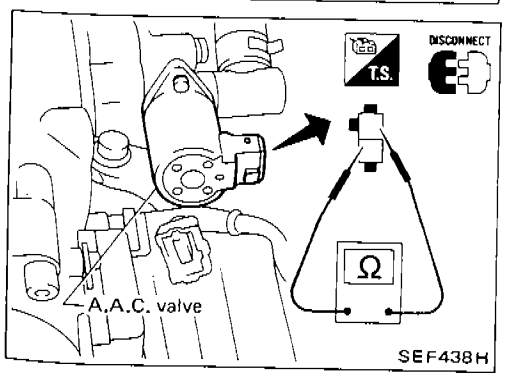
1. Disconnect power transistor harness connectors.
2. Check continuity between terminals as shown below:

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



IGNITION COIL

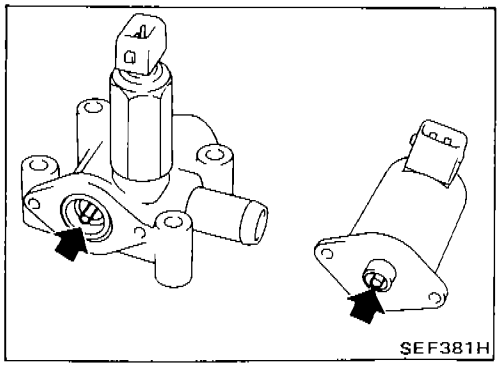
1. Disconnect ignition coil harness connector.
2. Check resistance between terminals ⓐ and ⓑ.
   Resistance:
   0.6 - 0.8Ω



A.A.C. VALVE

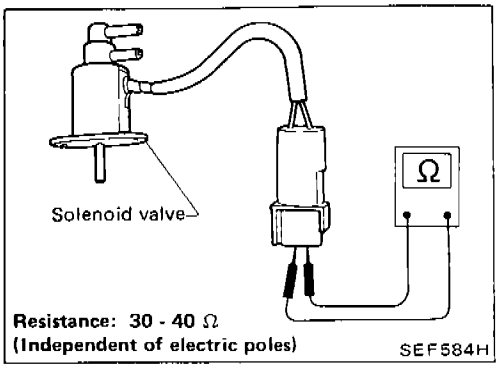
1. Disconnect A.A.C. valve harness connector.
2. Check A.A.C. valve resistance.
   Resistance:
   Approximately 9 - 10Ω

Electrical Components Inspection (Cont'd)


SEF381H

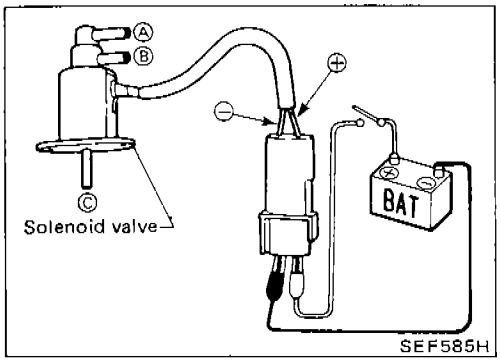
3. Remove A.A.C. valve
4. Check plunger for seizure or sticking.
5. Check spring for damage.

PRESSURE REGULATOR CONTROL SOLENOID VALVE



SEF584H

1. Check it for electric continuity.
   Resistance:
   30 - 40 Ω
   (Above resistance has no change even if the polarity of the circuit tester is changed when measuring it.)

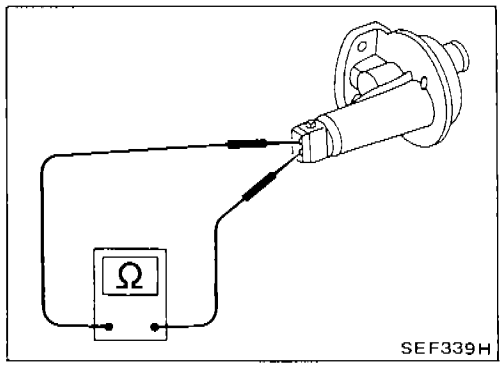


SEF585H

2. Check the solenoid valve for normal operation. Supply it with battery voltage, and check whether there is continuity between ports A, B and C.

Item \ Solenoid valve	OFF	ON
Continuity	B-C	A-B

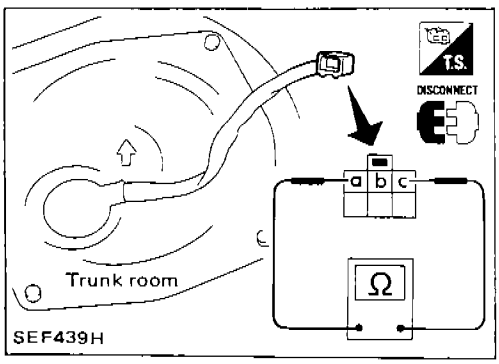
AIR REGULATOR



SEF339H

1. Check air regulator resistance.
   Resistance:
   Approximately 70 Ω
2. Check air regulator for clogging.

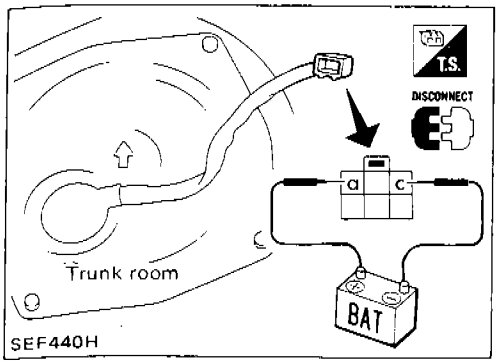
FUEL PUMP



SEF439H

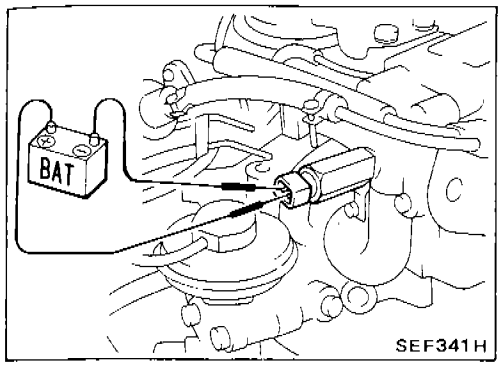
1. Disconnect fuel pump harness connector. Check resistance between terminals ⓐ and ⓒ.
   Resistance:
   Approximately 0.5 Ω

Electrical Components Inspection (Cont'd)

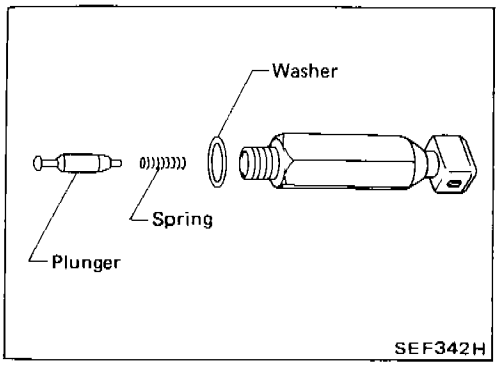


2. Check fuel pump for normal operation by supplying it with battery voltage between terminals ⓐ and ⓒ.

F.I.C.D. SOLENOID VALVE

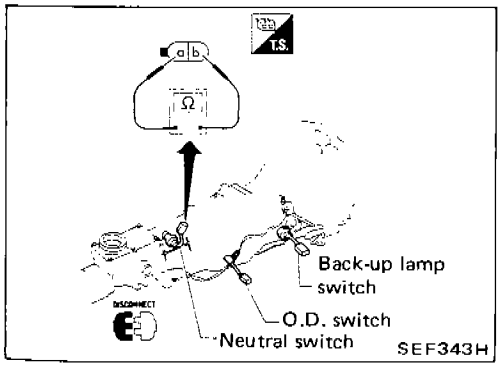


1. Check that clicking sound is heard when applying 12V direct current to terminals.



2. Check plunger for seizure or sticking.
3. Check for broken spring.

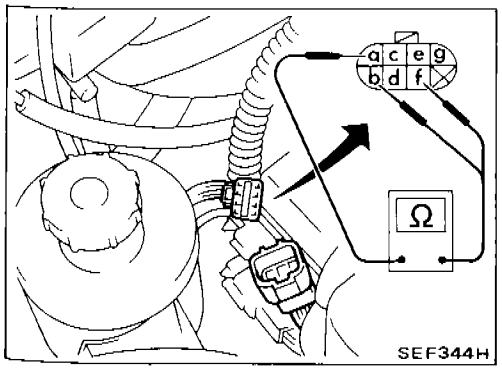
NEUTRAL SWITCH



Check continuity between terminals ⓐ and ⓑ.

Conditions	Continuity
Shift to Neutral	Yes
Shift to other position	No

INHIBITOR SWITCH

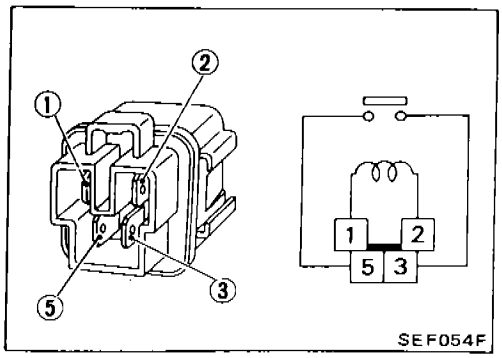


Check continuity between terminals ⓐ and ⓑ, ⓕ.

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)

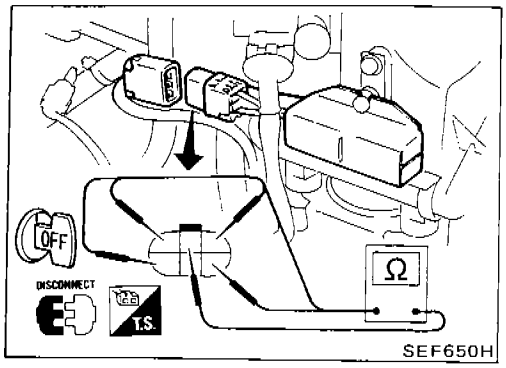
E.C.C.S. RELAY, FUEL PUMP RELAY AND INHIBITOR RELAY



SEF054F

Check continuity between terminals ③ and ⑤.

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



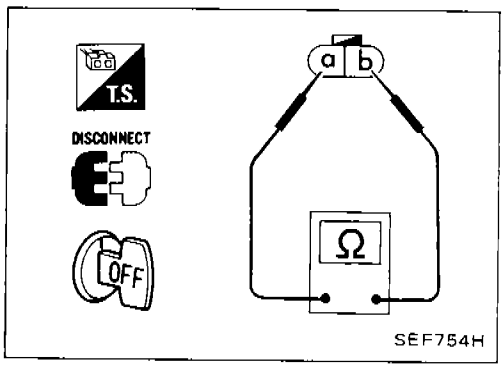
SEF650H

DROPPING RESISTOR

1. Disconnect dropping resistor harness connector.
2. Check dropping resistor resistance.

Resistance:

Approximately 6 Ω

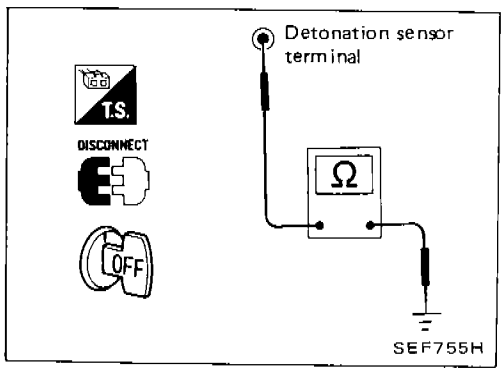


SEF754H

VEHICLE SPEED SENSOR

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

Continuity should be intermittent.

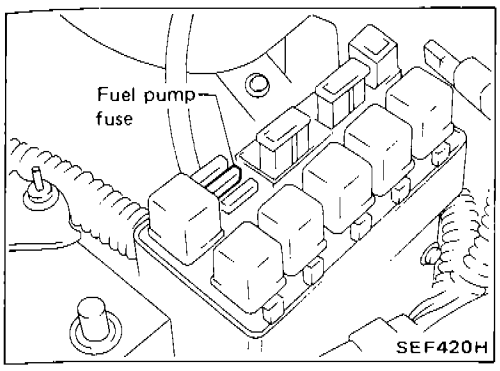


SEF755H

DETONATION SENSOR

1. Disconnect detonation sensor harness.
2. Check continuity between detonation sensor terminal and ground.

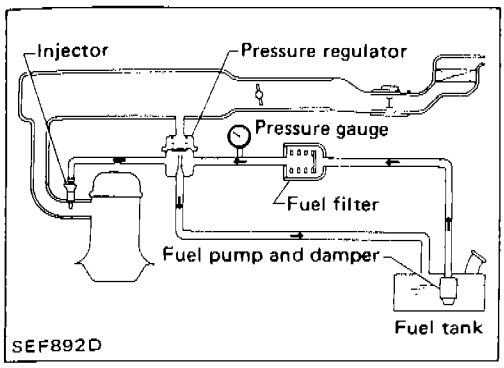
Continuity should exist.



Releasing Fuel Pressure

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

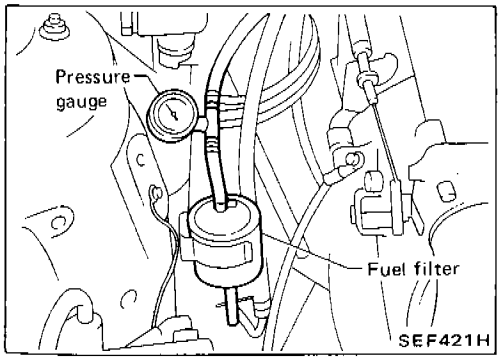
1. Remove fuse for fuel pump.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch off and reconnect fuel pump fuse.



Fuel Pressure Check

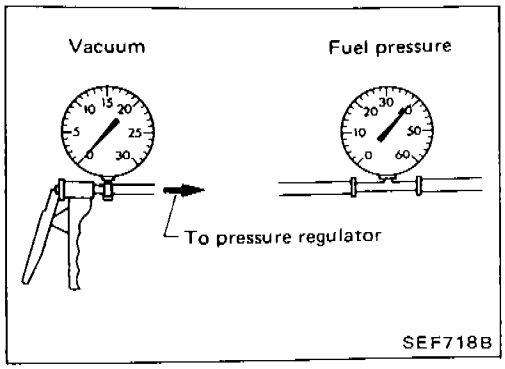
a. When reconnecting fuel line, always use new clamps.
b. Make sure that clamp screw does not contact adjacent parts.
c. Use a torque driver to tighten clamps.
d. Use Pressure Gauge to check fuel pressure.
e. Do not perform fuel pressure check while fuel pressure regulator control system is operating; 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 196 kPa (1.96 bar, 2.0 kg/cm^2, 28 psi)
   When fuel pressure regulator valve vacuum is disconnected.
   Approximately 245 kPa (2.45 bar, 2.5 kg/cm^2, 36 psi)
6. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
7. Plug intake manifold with a rubber cap.
8. Connect variable vacuum source to fuel pressure regulator.

Fuel Pressure Check (Cont'd)



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

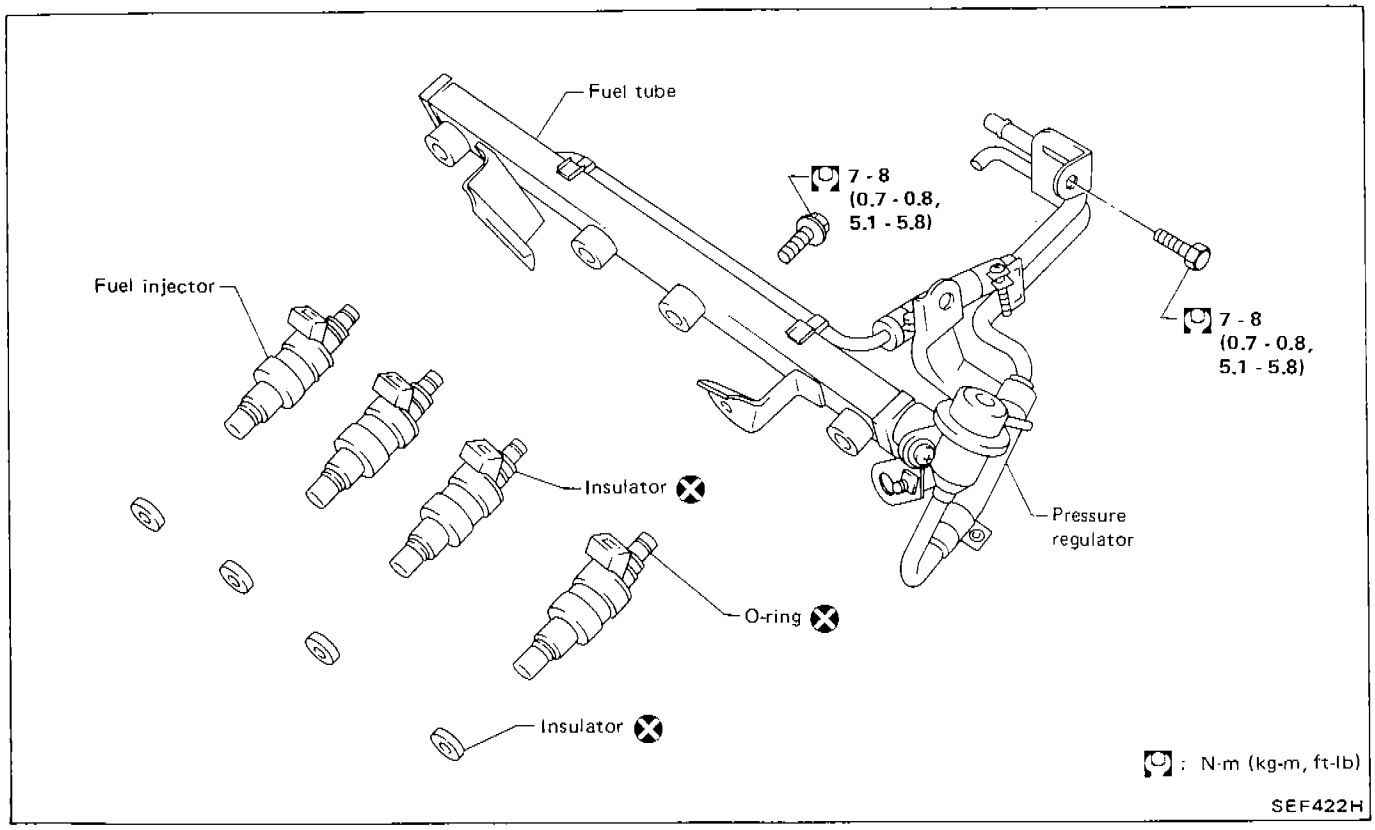
Fuel pressure should decrease as vacuum increases. If results are unsatisfactory, replace fuel pressure regulator.

Injector Removal and Installation

1. Release fuel pressure to zero.
2. Remove I.A.A. unit and intake manifold stay.
3. Disconnect pressure regulator vacuum hose.
4. Remove fuel tube assembly fixing bolts.

Be careful not to damage the injector, nor to deform the fuel tube.

5. Remove injectors from fuel tube.



CAUTION:

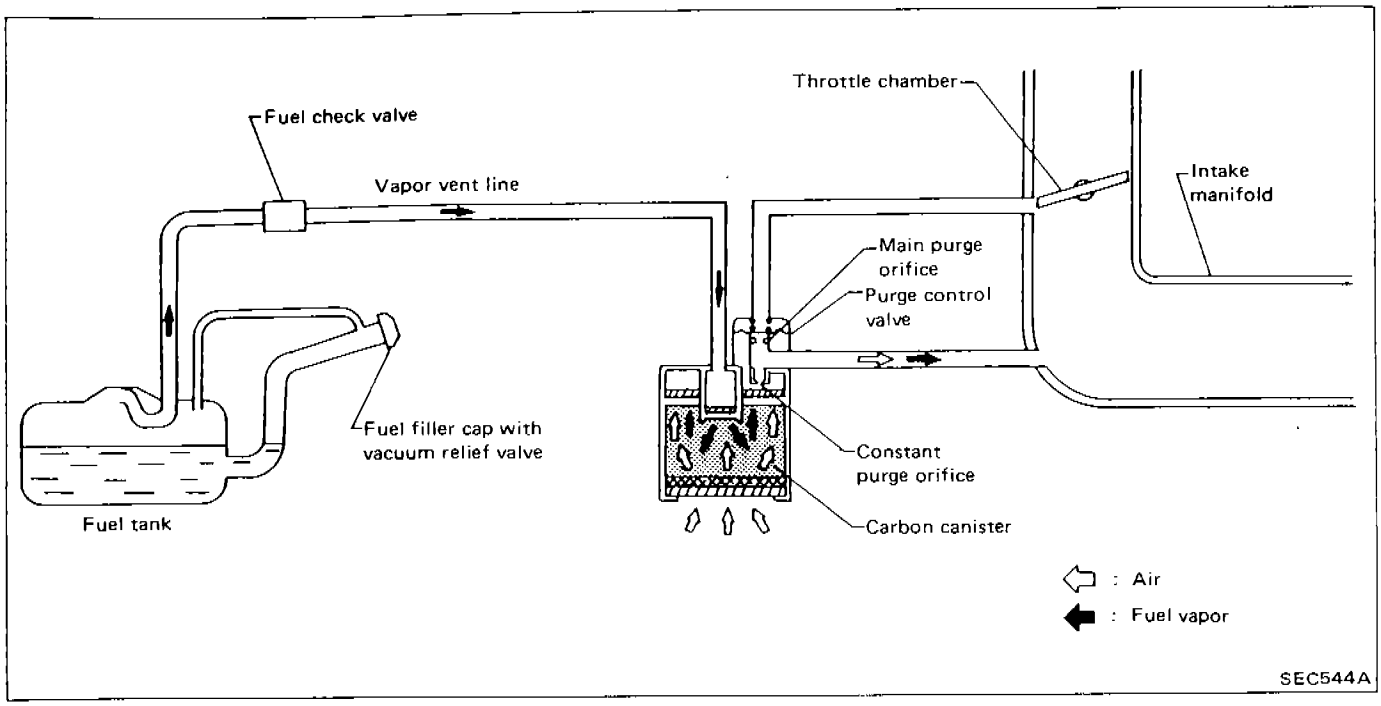
- **Do not reuse old O-rings.**
- **Apply a coat of engine oil (SAE 10W-30) to new O-rings. Do not use solvent for wiping.**
- **Keep O-rings and their mating parts clean and free from foreign particles (dirt, ravelings, etc.) before installation.**
- **Do not scratch the O-ring either with tools or finger nails during installation. Be careful not to expand or twist excessively. Do not insert into fuel tube immediately after expansion.**

Injector Removal and Installation (Cont'd)

- **Do not attempt to rotate or twist fuel injector and pressure regulator when inserting into fuel tube.**
- **Do not store O-rings in an area where ozone, oxygen, humidity, etc. are relatively high. Do not expose them to direct sunlight.**
- **After properly connecting fuel injector to fuel tube, check connection for fuel leakage.**

6. Assemble injectors with fuel tube.
7. Install fuel tube assembly.

Description

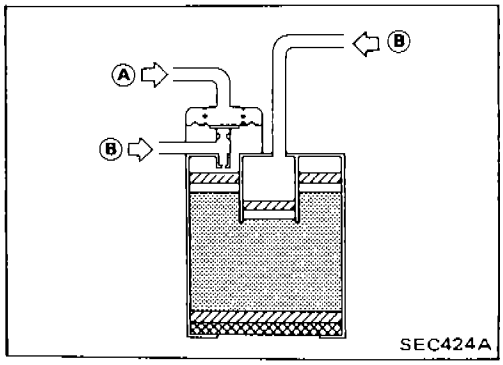


The evaporative emission control system is used to reduce hydrocarbons emitted to the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the carbon canister.

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

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

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

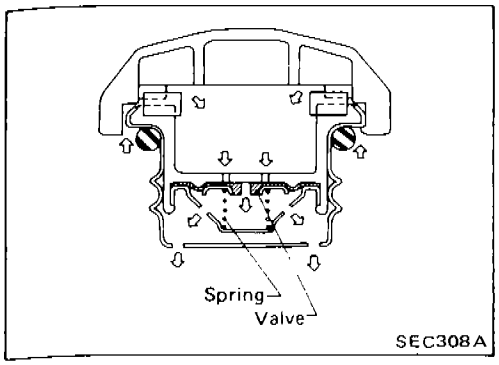


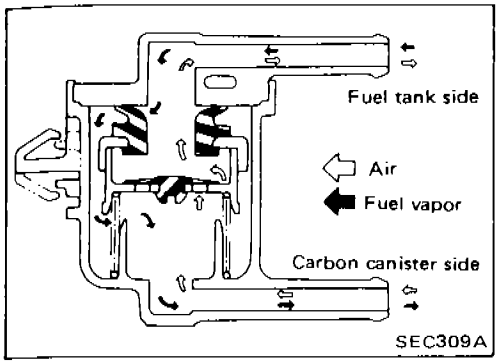
Inspection

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)

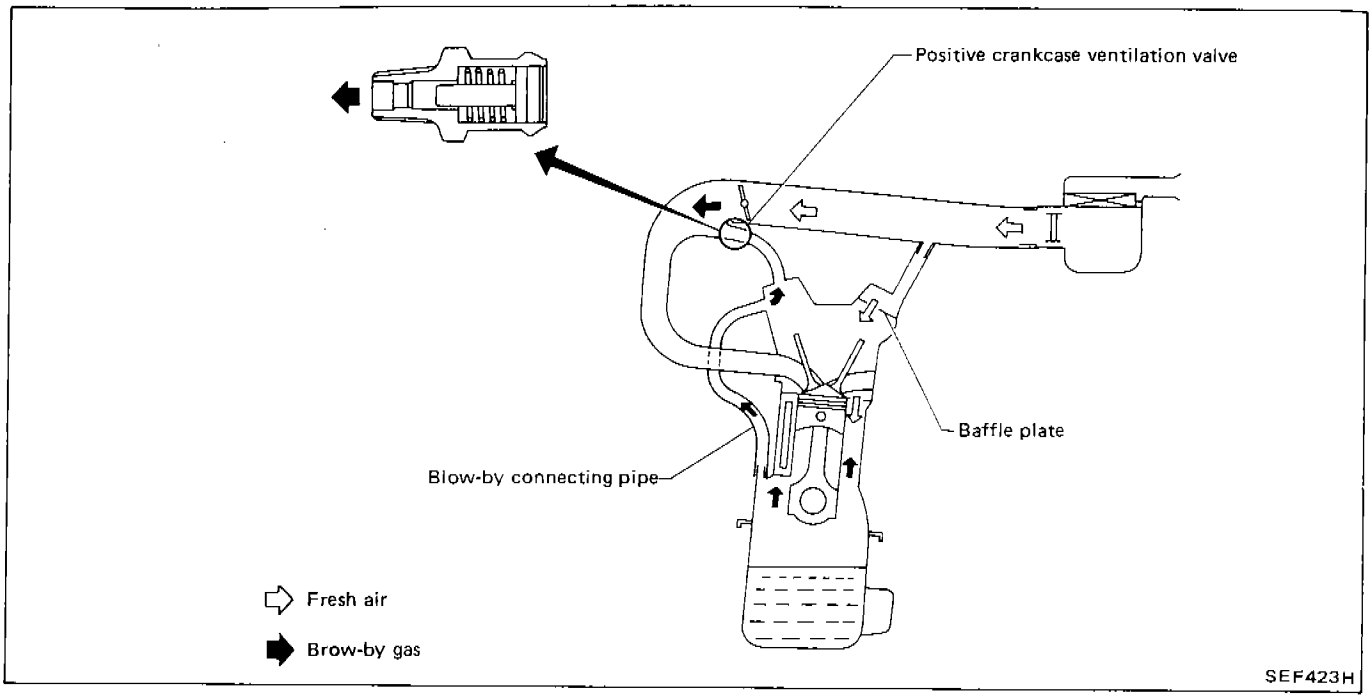
FUEL TANK VACUUM RELIEF VALVE

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

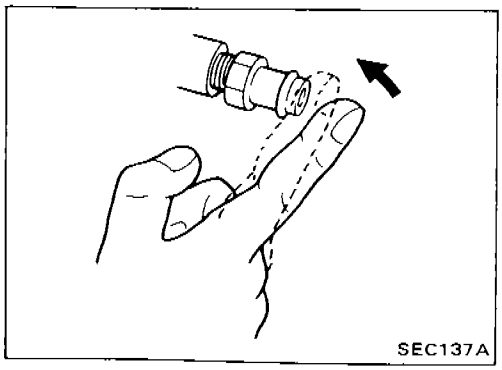
FUEL CHECK VALVE

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



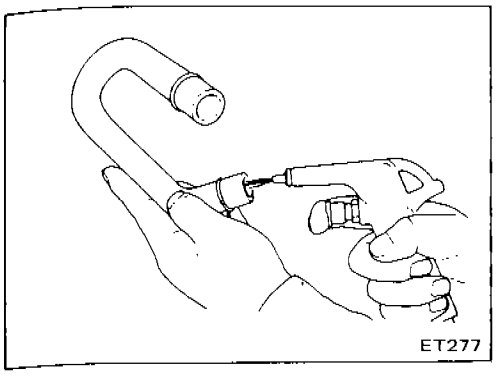
This system returns blow-by gas to the intake manifold.
The positive crankcase ventilation (P.C.V.) valve is provided to conduct crankcase blow-by gas to the intake manifold.
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the P.C.V. valve.
Normally, 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 cleaner, through the hose connecting air inlet 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 under all conditions.



Inspection

P.C.V. (Positive Crankcase Ventilation) VALVE

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


ET277

Inspection (Cont'd)

VENTILATION HOSE

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

General Specifications

PRESSURE REGULATOR Regulated pressure kPa (bar, kg/cm^2, psi)	250.1 (2.501, 2.55, 36.3)

Inspection and Adjustment

AIR FLOW METER Output voltage	V	1.0 - 3.0
ENGINE TEMPERATURE SENSOR Thermistor resistance at 20°C (68°F)	kΩ	Approx. 2.5
at 80°C (176°F)		Approx. 0.3
THROTTLE VALVE SWITCH Engine speed when idle switch is changed from "OFF" to "ON"	rpm	Idle speed + 250±150
FUEL PRESSURE At idle	kPa (bar, kg/cm^2, psi)	196 (1.96, 2.0, 28)
FUEL INJECTOR Coil resistance	Ω	2 - 3
IDLE SPEED M/T model A/T model in "N" position	rpm	850±50
IDLE SPEED (A/C ON) M/T model A/T model in "N" position		950±50 900±50
IGNITION TIMING (B.T.D.C.) M/T A/T		15°±2°
IDLE CO	%	Idle mixture is preset at factory.
AIR REGULATOR	Ω	Approx. 70
IGNITION COIL Primary resistance [at 20°C (68°F)]	Ω	0.6 - 0.8
Secondary resistance [at 20°C (68°F)]	kΩ	6 - 8