SERVICE MANUAL

DATSUN 280Z
MODEL S30 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION EC

EMISSION CONTROL SYSTEM

EC

GENERAL DESCRIPTION ..... EC- 2

CRANKCASE EMISSION CONTROL SYSTEM .....

EXHAUST EMISSION CONTROL SYSTEM .....

EVAPORATIVE EMISSION CONTROL SYSTEM .....

GENERAL DESCRIPTION

There are three types of emission control system. These are:

1. Closed type crankcase emission control system.
2. Exhaust emission control system.
3. Evaporative emission control system.

Periodic inspection and required servicing of these systems should be carried out to reduce harmful emissions to a minimum.

CRANKCASE EMISSION CONTROL SYSTEM

DESCRIPTION

This system returns blow-by gas to both the intake manifold and throttle chamber.

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 throttle chamber, through the tube connecting throttle chamber 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 tube connection in the reverse direction.

On cars with an excessively high blow-by, some of the flow will go through the tube connection to throttle chamber under all conditions.

INSPECTION

P.C.V. VALVE

Check P.C.V. valve in accordance with the following method.

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

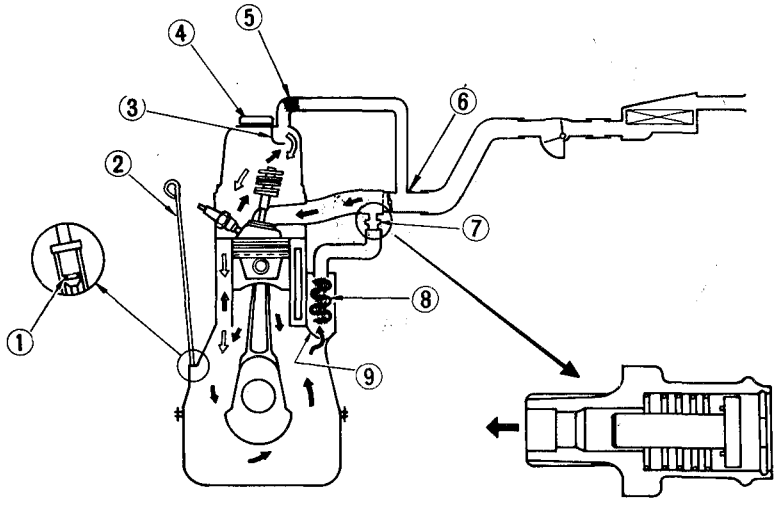
Replace P.C.V. valve in accordance with the maintenance schedule.

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.

Ensure that flame arrester is surely inserted in hose between throttle chamber and rocker cover.



⇨ Fresh air
^ Blow-by gas

1 O-ring
2 Oil level gauge
3 Baffle plate
4 Oil cap
5 Flame arrester
6 Throttle chamber
7 P.C.V. valve
8 Steel net
9 Baffle plate

EC366

Fig. EC-1 Crankcase emission control system

EXHAUST EMISSION CONTROL SYSTEM

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DESCRIPTION

The exhaust emission control system is made up of the following:

1. Boost controlled deceleration device (B.C.D.D.).
2. Transmission controlled vacuum advance system (Manual transmission models except California).
3. Spark timing control system (except California).
4. Exhaust gas recirculation (E.G.R.) system (for California).
5. Catalytic converter system (for California).
6. Floor temperature warning system (for California).

As regards the "Spark Timing Control System" in item 3 above, refer to the Engine Electrical section.

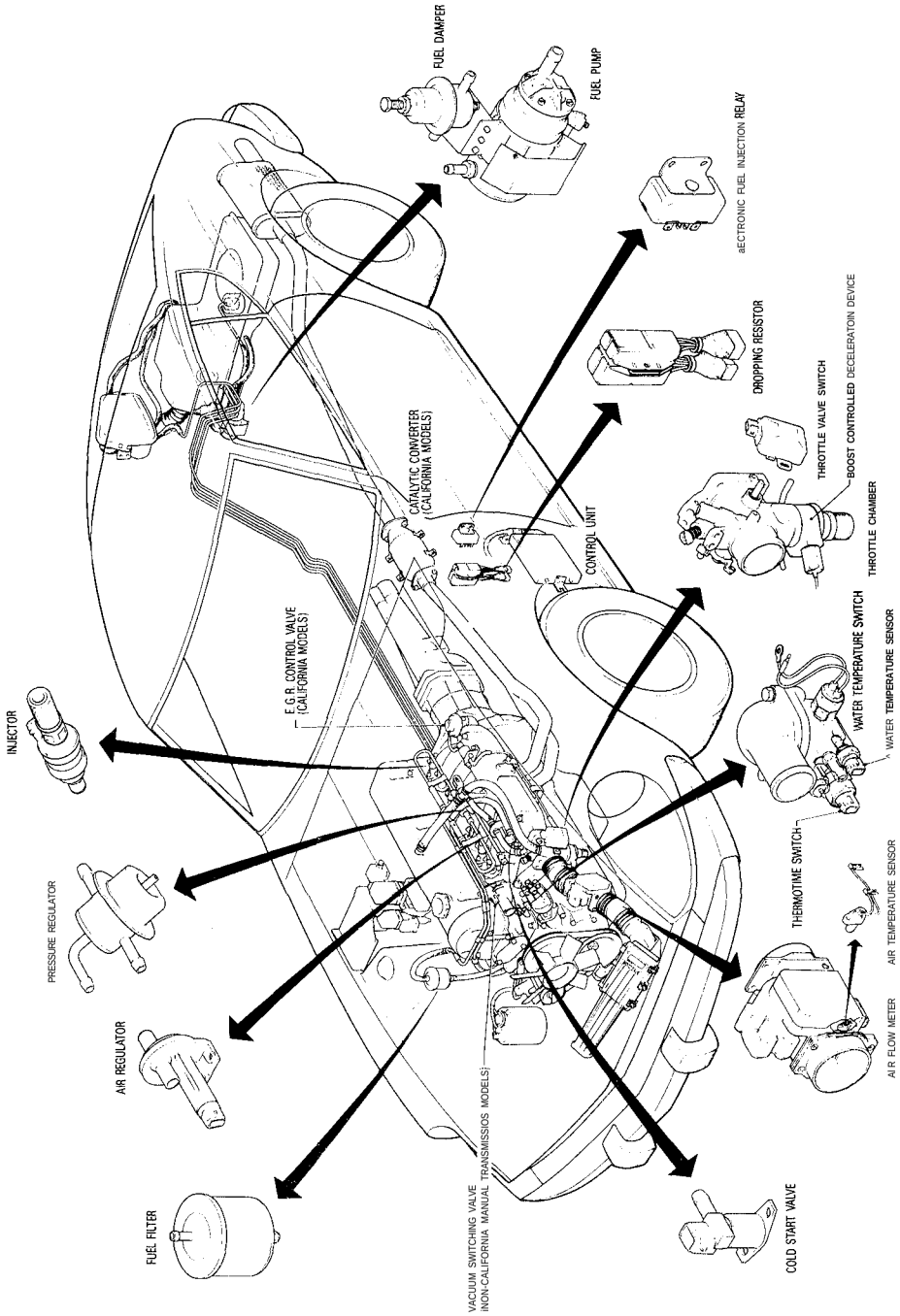


Fig. E0-5 Location of emission control system components

BOOST CONTROLLED DECELERATION DEVICE (B.C.D.D.)

DESCRIPTION

The Boost Controlled Deceleration Device (B.C.D.D.) is employed to reduce HC emissions emitted during coasting. The B.C.D.D., installed under the throttle chamber as a part of it, supplies additional air to the intake manifold during coasting to maintain the manifold vacuum at the proper operating pressure. [470 mmHg (18.5 inHg)]

There are two diaphragms in the device unit. Diaphragm I detects the manifold vacuum and makes the Vacuum Control Valve open when the vacuum exceeds the operating pressure. Diaphragm II operates the Air Control Valve according to- the vacuum transmitted through the Vacuum Control Valve. The Air Control Valve regulates the amount of additional air so that the manifold vacuum can be kept at the proper operating pressure. The operating pressure changes depending on altitude; thus, diaphragm II and control valve operations are adjusted automatically in coincidence with the altitude at which the vehicle is driven. The graph shown in Figure indicates change in operating pressure for changes in atmospheric pressure and altitude. See Figure EC-13.

On manual transmission models, this system consists of B.C.D.D., vacuum control solenoid valve, speed-detecting switch and amplifier.

On automatic transmission models, it consists of B.C.D.D., vacuum control solenoid valve and inhibitor switch.

OPERATION

B.C.D.D.

Diaphragm I @ monitors the manifold vacuum; when the vacuum exceeds a pre-determined value, it acts so as to open the vacuum control valve (9). This causes the manifold vacuum to be introduced into vacuum chamber II @ and actuates diaphragm II @.

When diaphragm II operates, the air control valve @ opens the passage and introduces the additional air into the manifold.

The amount of air is controlled by the servo-action of the air control valve (§) and vacuum control valve (9) so that the manifold vacuum may be kept at the pre-determined value.

The B.C.D.D. operates when engine speed is in the range of 1,800 to 2,000 rpm.

Vacuum controlled solenoid valve

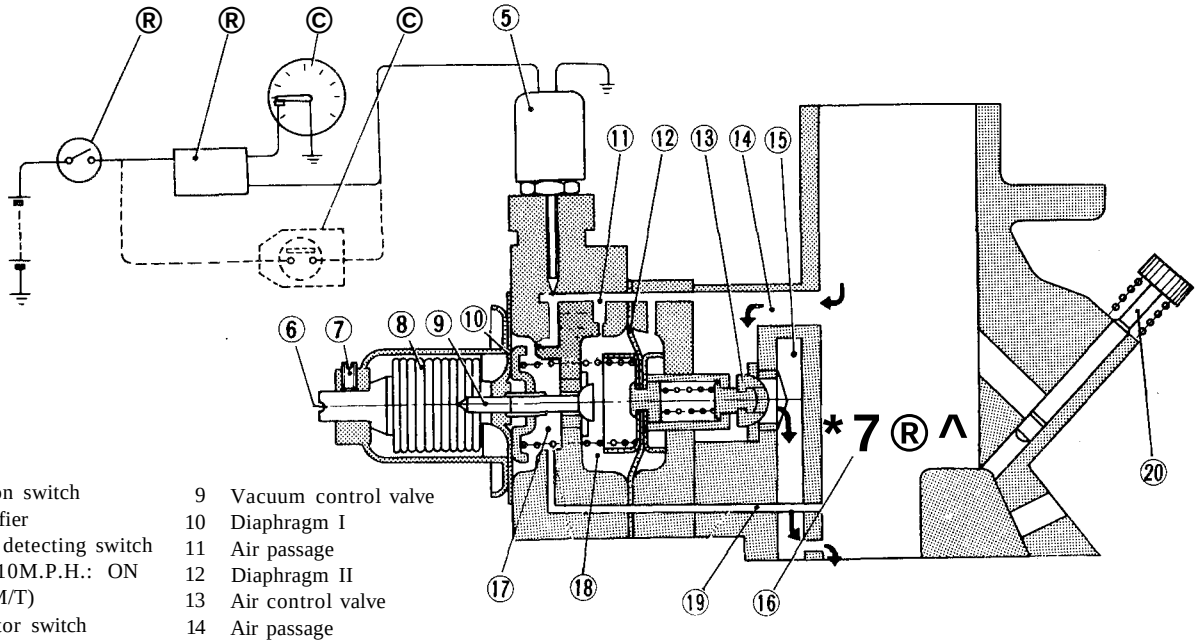
Manual transmission models:

The vacuum control solenoid valve is controlled by a speed detecting switch that is actuated by the speedometer needle.

As the car speed falls below 10 M.P.H., this switch is actuated, producing a signal. This signal actuates the amplifier to open the vacuum control solenoid valve.

Automatic transmission models:

When the shift lever is in the "N" or "P" range, the inhibitor switch mounted on the transmission turns on to open the vacuum control solenoid valve.



1 Ignition switch
2 Amplifier
3 Speed detecting switch Blow 10M.P.H.: ON (For M/T)
4 Inhibitor switch "N""P" range: ON (For A/T)
5 Vacuum control solenoid valve
6 Adjusting screw
7 Stopper screw
8 Altitude corrector
9 Vacuum control valve
10 Diaphragm I
11 Air passage
12 Diaphragm II
13 Air control valve
14 Air passage
15 Air passage
16 Throttle valve
17 Vacuum chamber I
18 Vacuum chamber II
19 Vacuum passage
20 Idle speed adjusting screw

EC371

Fig. EC 3 Schematic drawing of B.C.D.D.

REMOVAL

B.C. D.D.

Note: The B.C.D.D. cannot be disassembled. If it is found to be functioning unsatisfactorily, it must be replaced as an assembly.

1. Remove B.C.D.D. by unscrewing the three securing screw ©.

Do not unscrew the three B.C.D.D. assembly screws (2).

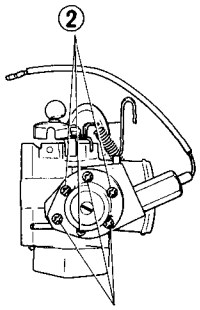


Fig. EC-4 Removing B.C.D.D.

2. To install, reverse the removal procedure.

Tightening torque:
20 to 40 kg-cm
(145 to 289 in-lb)

Vacuum controlled solenoid valve

1. Vacuum control solenoid valve can be easily removed with a wrench.
2. To install, reverse the removal procedure.

Tightening torque:
180 to 350 kg-cm
(156 to 304 in-lb)

INSPECTION

B.C.D.D. circuit with function test connector.

Caution: Do not attach test leads **of a circuit tester to those other than designated. Refer to Figure EC-5.**

Manual transmission models

1. Check for continuity between A and B when car is brough' to a complete stop. Refer to Figure EC-5.

B.C.D.D. circuit is functioning properly if continuity exists and voltmeter reading is 0 volts (d-c) in step 2 below.

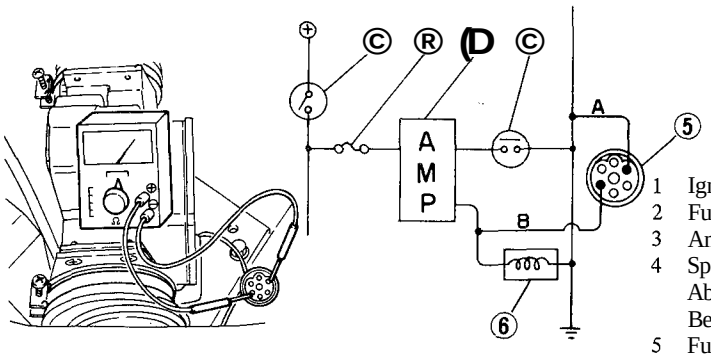
If continuity does not exist, check for disconnected connector and/or faulty amplifier, speed detecting switch or **B.C.D.D.** solenoid valve.
2. Check for presence of voltage across A and B [at a speed of more than 16 km/h* (10 MPH)]. Refer to Figure EC-5.

* Conduct this test by one of the following two methods.

1) Raising up rear axle housing with stand.
2) Chassis dynamometer test

- If voltmeter reading is 0 volt at a speed of more than 16 km/h (10 MPH), circuit is functioning properly.
- If voltmeter reading is not 0 volt, check for disconnected connector, burned fuse, faulty amplifier, B.C.D.D. solenoid valve or speed detecting switch.

3. If, by above checks, faulty part or unit is located, it should be removed and tested again. If necessary, replace.



1 Ignition key
2 Fuse
3 Amplifier
4 Speed detecting switch
Above 10 mph: OFF
Below 10 mph: ON
5 Function test connector
6 Vacuum control solenoid valve

Fig. EC-5 Checking B.C.D.D. circuit with function test connector (for manual transmission)

Automatic transmission models

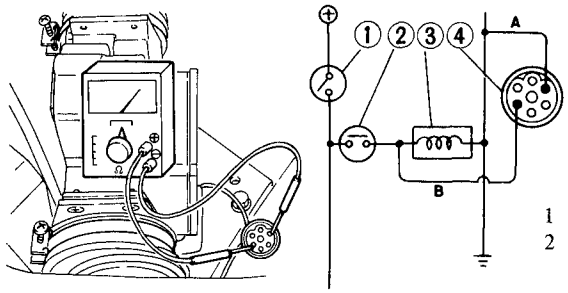
1. Turn ignition key to "ON" position. •
2. With inhibitor switch "ON" ("N" or "P" range), check for presence of voltage across A and B. Refer to Figure EC-6.

- If voltmeter reading is 12 volts (d-c), B.C.D.D. circuit is functioning properly.
- If voltmeter reading is zero, check for disconnected connector, faulty solenoid valve or inhibitor switch.

3. With inhibitor switch "OFF" ("1", "2", "D" or "R" range), check for resistance between A and B. Refer to Figure EC-6.

- If ohmmeter reading is 15 to 28 ohms, circuit is functioning properly.
- If ohmmeter reading is not above, check for poor connection of connector, faulty B.C.D.D. solenoid valve or inhibitor switch.

4. If, by above checks, faulty part or unit is located, it should be removed and tested again. If necessary, replace.

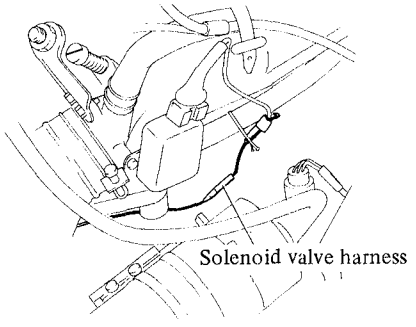


1 Ignition key
2 Inhibitor switch
N.P. range: ON
1, 2, D, R, range: OFF
3 Vacuum control solenoid valve
4 Function test connector

Fig. EC-6 Checking B.C.D.D. circuit with function test connector

B.C.D.D. solenoid valve

1. Turn on engine key. (Do not start engine.)
2. Ensure that solenoid valve clicks when intermittently electrified as shown in Figure EC-7.



EC375

Fig. EC-7 Checking solenoid valve

3. If a click is heard, solenoid valve is normal.
4. If a click is not heard at all, check for continuity with a circuit tester. If discontinuity is detected, replace solenoid valve.

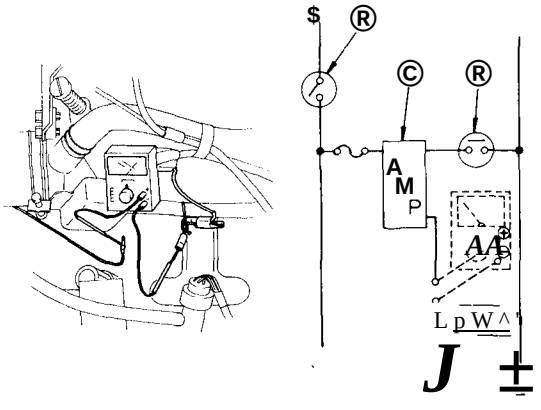
Amplifier (Manual transmission models)

The amplifier is installed at the rear of the speedometer. To check, proceed as follows:

1. Set circuit tester in D-C ampere range (1A min, full scale), connect test probes of tester as shown in Figure EC-8.

Do not confuse positive line with negative line.

2. Turn ignition key to "ON" position.
3. Ensure that tester pointer deflects when ignition key is turned on.
4. If tester pointer does not deflect when solenoid valve and speed detecting switch circuits are functioning properly, amplifier is faulty.



1 Ignition key
2 Amplifire
3 Speed detecting switch
Above lOmph : OFF
Below 10 mph : ON
4 B.C.D.D. solenoid valve

EC376

Fig. EC-8 Checking amplifier

Inhibitor switch (Automatic transmission models)

Refer to the TM section.

Set pressure of B.C.D.D.

Generally, it is unnecessary to adjust the B.C.D.D., however, if it should become necessary to adjust it, the procedure is as follows:

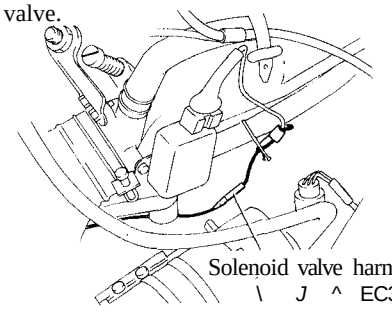
Prepare **the following tools**

1. Tachometer to measure the engine speed while idling, and a screwdriver.
2. A vacuum gauge and connecting Pipe-

Note: A quick-response type boost gauge such as Bourdon's type is recommended; a mercury-type manometer should not be used.

To properly set the B.C.D.D. set pressure, proceed as follows:

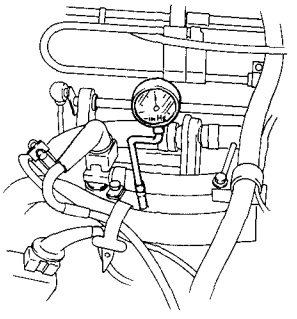
1. Remove the harness of solenoid valve.



\ J ^ EC377

Fig. EC-9 Removing harness of solenoid valve

2. Connect rubber hose between vacuum gauge and intake manifold as shown.



EC378

Fig. EC-10 Connecting vacuum gauge

3. Warm up the engine until it is heated to operating temperature.

Then adjust the engine at normal idling setting. (Refer to the item "Idling Adjustment" in page EF-18.)

Idling engine speed
Manual transmission
800 rpm
Automatic transmission
(in "D" position)
700 rpm

4. Run the engine under no load. Increase engine speed to 3,000 to 3,500 rpm, then quickly close throttle valve.
5. At that time, the manifold vacuum pressure increases abruptly to -600 mmHg (-23.62 inHg) or above and then gradually decreases to the level set at idling.
6. Check that the B.C.D.D. set pressure is within the specified pressure.

Specified pressure (0 m, sea level and 760 mmHg (30 inHg), atmospheric pressure)

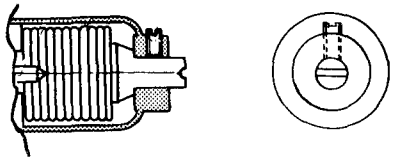
Manual transmission and
Automatic transmission:
-460 to -480 mmHg
(-18.1 to-18.9 inHg)

Notes:

a. When atmospheric pressure is known, operating pressure will be found by tracing the arrow line "A". See Figure **EC-13.** When altitude is known, operating pressure will be found by tracing the arrow line "B". See Figure **EC-13.**

b. When checking the set pressure of B.C.D.D., find the specified set pressure in Figure EC-13 from the atmospheric pressure and altitude of the given location.
For example, if the car is located at an altitude of 1,400 m (4,600 ft), the specified set pressure for B.C.D.D. is 396 mmHg (15.6 inHg).

7. **If** it is higher than the set level, **turn** the adjusting screw counterclockwise **until** correct adjustment is made.



EC409

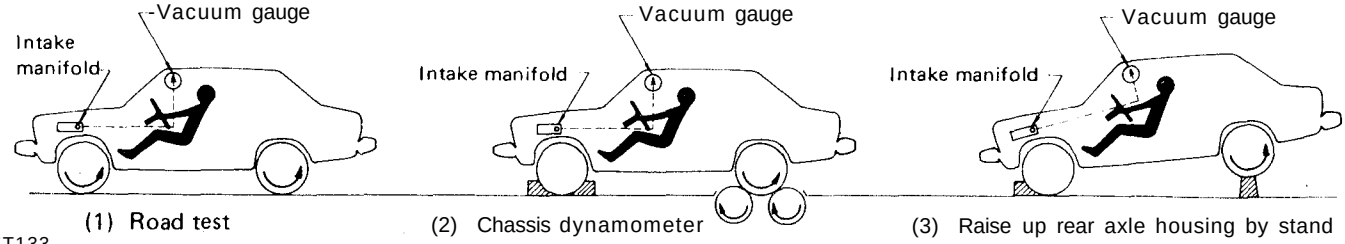
Fig. EC-11 Adjusting set pressure

8. Race the engine and check for adjustment.
9. If it is lower than the set level, turn the adjusting screw clockwise until correct adjustment is made.
10. Race the engine and check for adjustment.

If engine speed cannot be decreased to idling when checking B.C.D.D. set pressure, proceed as follows:

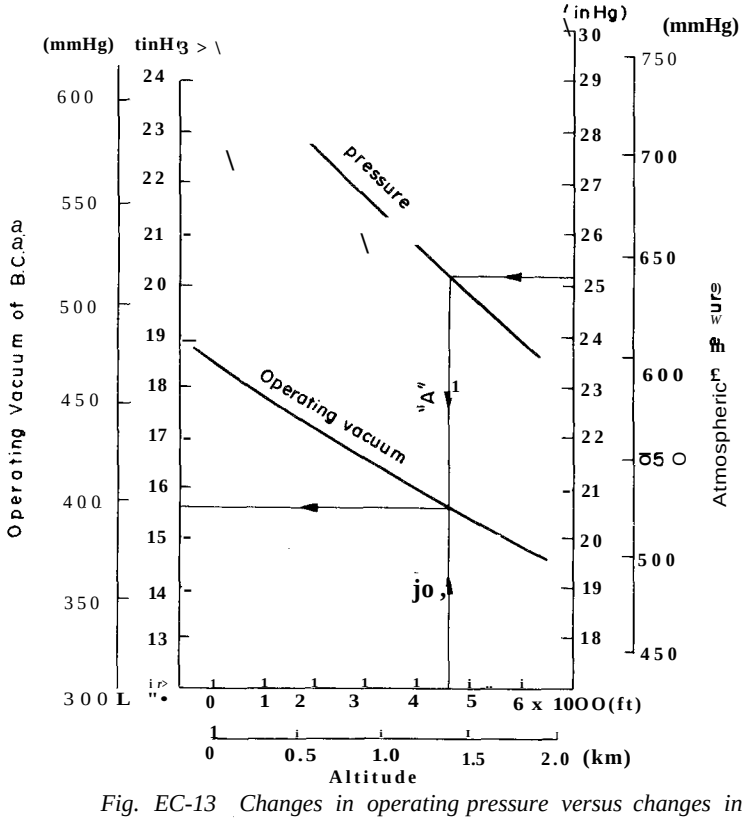
When the engine speed does no! fall to idling speed, it is necessary to reduce the negative idling pressure of the manifold to lower than the set pressure of the B.C.D.D. (The engine speed will not drop to idling speed when the negative idling pressure is higher than the set pressure of the B.C.D.D.).

In this case, the engine must be labored by (1) road test or (2) chassis dynamometer or (3) by raising up rear suspension member on a stand, accelerating the car to 64 to 80 km/h (40 to 50 MPH) in top gear (manual transmission) or in "D" range (automatic transmission), and then releasing the accelerator pedal and letting the car decelerate. After doing this, check whether the B.C.D.D. set pressure is at the predetermined value or not.



ET133

Fig. EC-12 Testing operating pressure of the B.C.D.D.



EC379

Fig. EC-13 Changes in operating pressure versus changes in atmospheric pressure altitude

TRANSMISSION CONTROLLED VACUUM ADVANCE SYSTEM

[Manual Transmission models only (Except California)]

DESCRIPTION

This system provides vacuum advance only when the gear is in the top (4th) position and retards spark timing at the other positions as shown in the following table.

Transmission	Top detecting switch	Vacuum switching valve	Spark timing
Top (4th) gear position	OFF	OFF	Advanced
Other gear position	ON	ON	Retarded

OPERATION

When electric current flows through the vacuum switching valve, the valve opens and introduces air into the vacuum controller of the distributor through a vacuum hose, and vacuum advance is eliminated. When the vacuum switching valve is deenergized, the valve closes and vacuum created by the throttle chamber is introduced into the vacuum controller of the distributor to provide usual vacuum advance.

The top detecting switch, located on the transmission case, operates so as to interrupt the flow of electric current when the gear is placed into "TOP", but allows it to flow in the other gear positions.

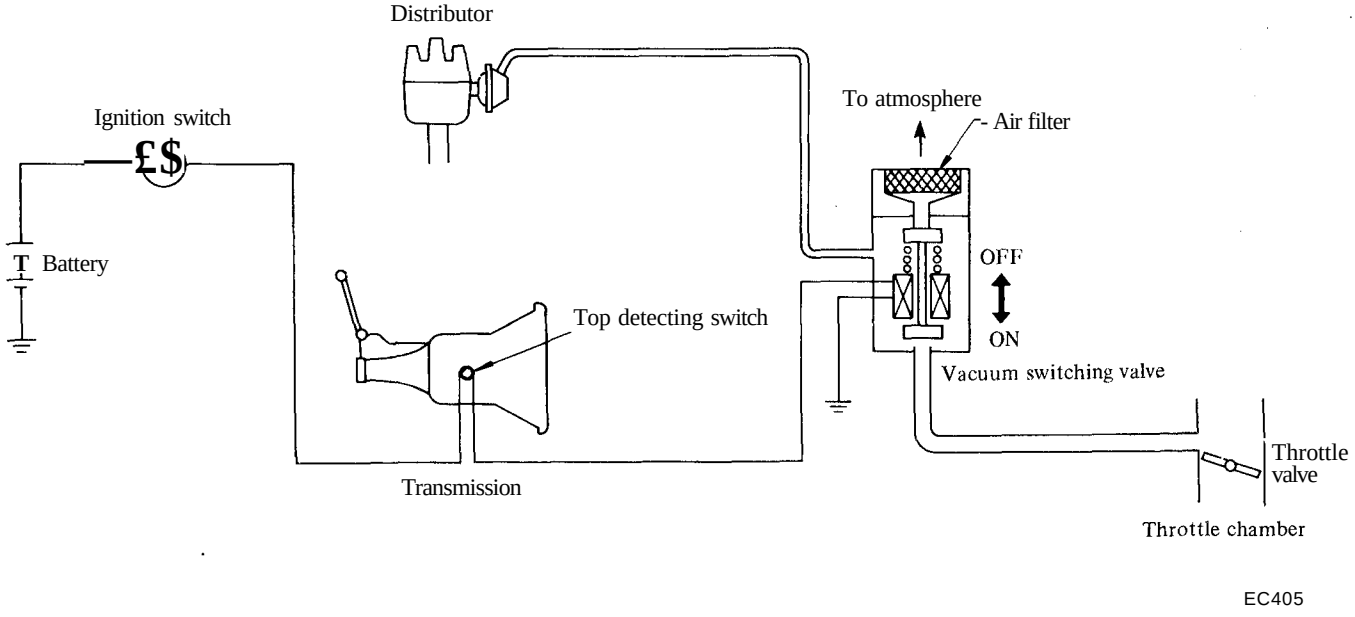


Fig. EC-14 Schematic drawing of transmission controlled vacuum advance system

REMOVAL AND INSTALLATION

Vacuum switching valve

1. Disconnect a pair of lead wires at connectors.
2. Disconnect vacuum hose from vacuum switching valve.
3. Remove two screws retaining valve to bracket and remove valve.

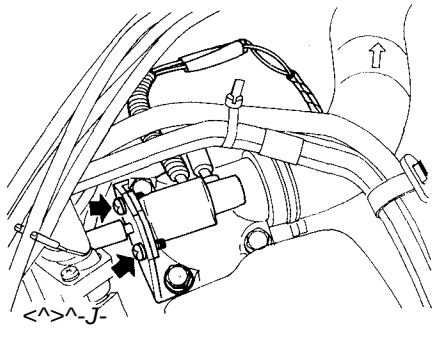
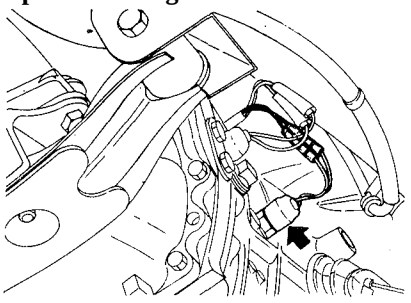


Fig. EC-IS Vacuum switching valve

4. Install valve in the reverse order of removal.

Note: Make sure that vacuum hoses are properly connected to their positions. See Figure ET-1 for vacuum hose piping.

Top detecting switch



EC407

Fig. EC-16 Top detecting switch

When installing switch, apply lock agent to threads.

INSPECTION

1. Ensure that wiring connectors are tight in place.
2. Ensure that vacuum hoses are properly connected to their positions. See Figure ET-1.
3. Ensure that distributor vacuum controller properly functions.
4. Set timing light.
5. Run engine and keep it at 3,200 to 3,500 rpm. Read spark timing.
6. Shift gears in top (4th) position, and read spark timing.

The system is properly functioning if spark timing in top (4th) position is approximately 5° greater than that in neutral position.

Note: To protect against accidental forward surge, engage parking brake firmly while above check is being made.

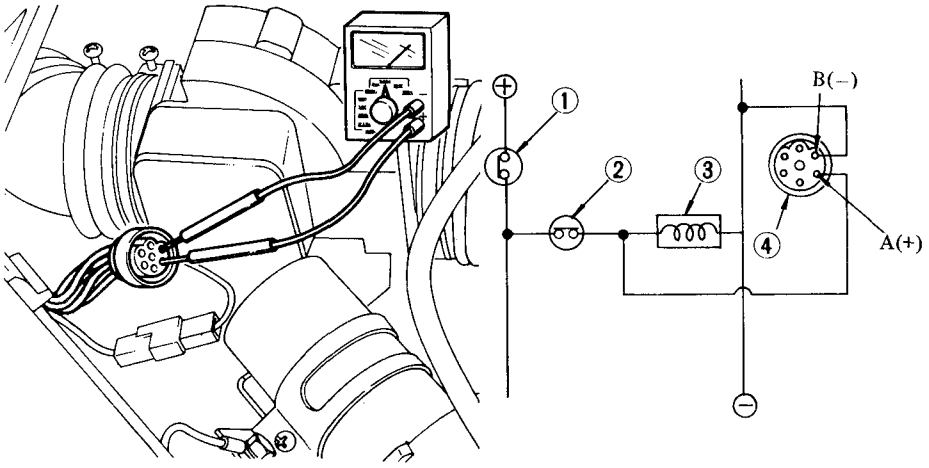
7. If spark timing does not vary at all in steps 5 and 6 above, proceed as follows:

(1) Disconnect vacuum switching valve white wire connector.
(2) Set timing light.
(3) Run engine and keep it at 3,200 to 3,500 rpm. Read spark timing.
(4) Connect vacuum switching valve white wire connector directly to battery positive (+) terminal and read spark timing.

Vacuum switching valve is normal if spark timing advances by 5° when connector is disconnected from battery positive (+) terminal. If not, top detecting switch is faulty and should be replaced. If spark timing does not vary at all in step 7 above, replace vacuum switching valve.

8. Check for continuity in electrical wiring with a function test connector.

Turn ignition switch on, but do not run engine. Check for voltage across terminals A and B as shown in Figure EC-17.



1 Ignition switch
2 Top detecting switch
3 Vacuum switching valve
4 Function test connector

EC408

Fig. EC-17 Checking for continuity in electrical wiring with function test connector

Electrical wiring circuit is normal if voltmeter readings are as shown in the chart below.

Transmission	Voltmeter indication
Top (4th) gear position	OV
Other gear position	12V

If readings are not shown, check for loose harness and burned fuse.

EXHAUST GAS RECIRCULATION (E.G.R.) CONTROL SYSTEM (FOR CALIFORNIA)

DESCRIPTION

In the exhaust gas recirculation system, a part of the exhaust gas is returned to the combustion chamber to lower the spark flame temperature during the combustion process. This results in a reduction of the nitrogen oxide content in the exhaust gas.

This system consists of an intake manifold, E.G.R. control valve, E.G.R. solenoid valve, water temperature switch, E.G.R. tube and hose.

When the E.G.R. control valve is open, some of the exhaust gas is led from the exhaust manifold to the E.G.R. control valve through the E.G.R. tube. The exhaust gas is then controlled in quantity by the E.G.R. control valve, and is introduced into the intake manifold.

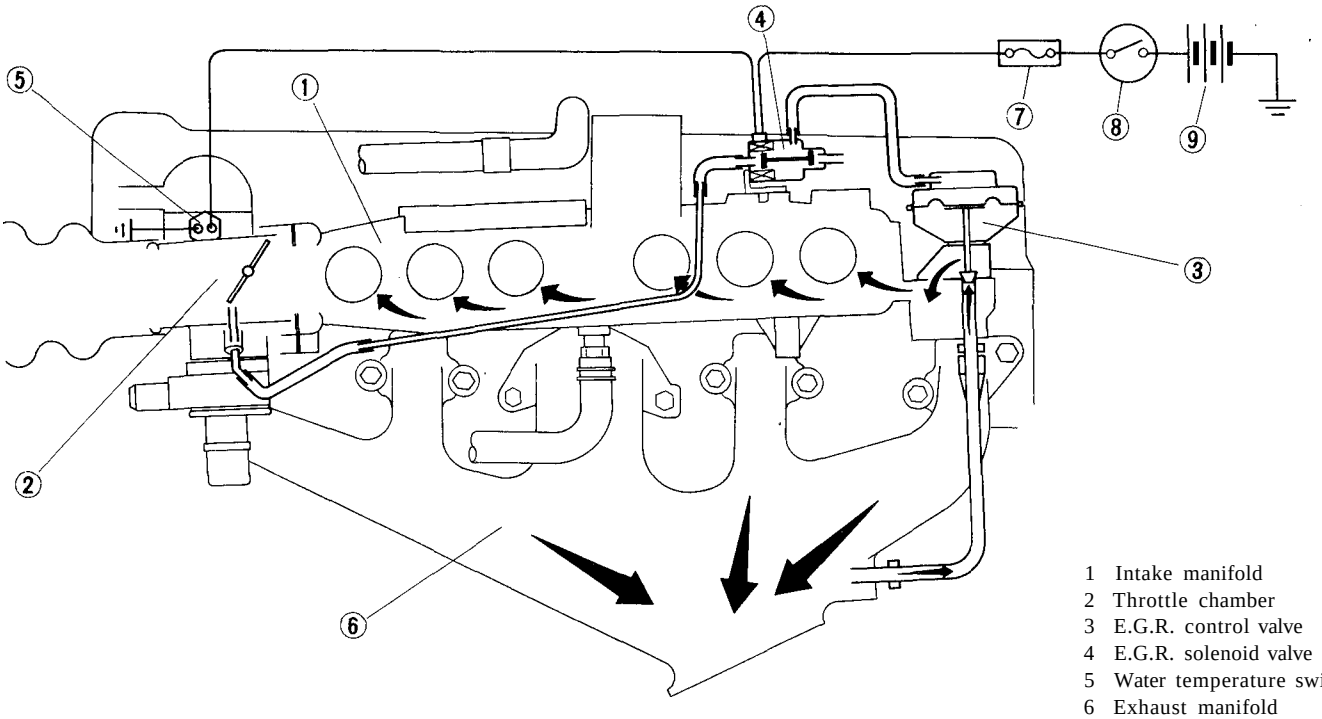


Fig. EC-18 Exhaust gas recirculation system

Open-close operation of the E.G.R. control valve is controlled by the throttle chamber vacuum.

The E.G.R. solenoid valve is operated by the water temperature switch operated by the engine coolant temperature.

OPERATION

The E.G.R. control system functions as shown in the following chart.

E.G.R.	Switch Operating Temperature		Water Temperature Switch	E.G.R. Solenoid Valve	Intake Manifold Vacuum	E.G.R. Control Valve	Driving Condition
Not Actuated	57 to 63°C (134 to 145°F)	Below	ON	ON	———	Close	All condition
		A	OFF	OFF	Above —50 mmHg (-1.969 inHg)	Close	Idling
		Above	OFF	OFF	Below —50 mmHg (-1.969 inHg)	Close	Full Throttle
Actuated		Above	OFF	OFF	Above -50 mmHg (-1.969 inHg)	Open	Partial Load

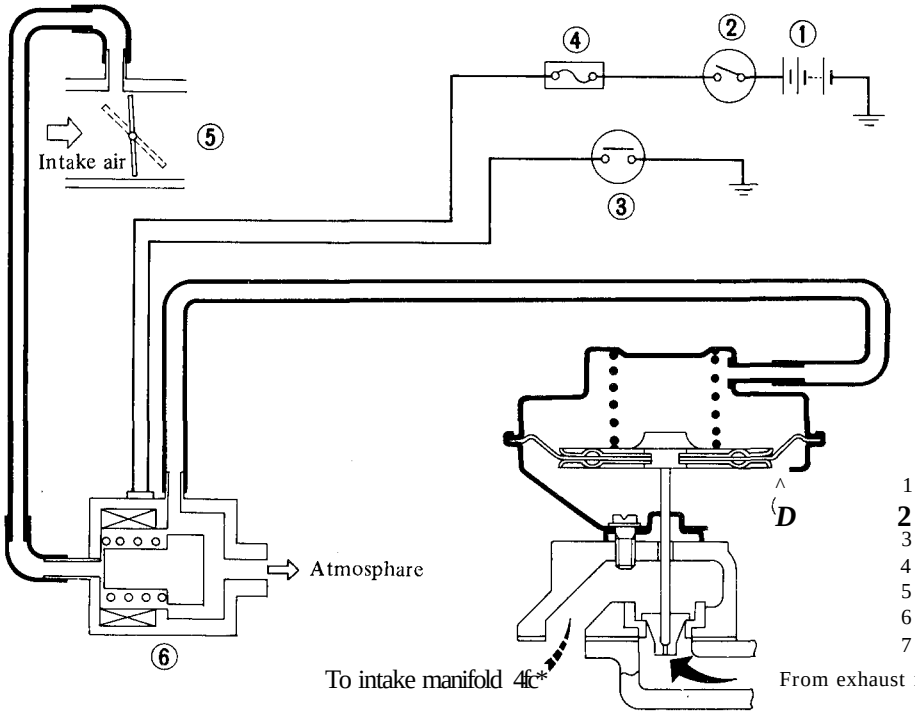


Fig. EC-19 Schematic drawing of E.G.R. control system

E. G. R. "OFF" operation

1. When the engine coolant temperature is low, recirculated exhaust gas causes irregular engine operation. To prevent this, recirculation of the exhaust gas must be cut off for a few minutes after the engine has been started. During this period, the E.G.R. solenoid valve remains closed and keeps the E.G.R. control valve closed, thereby cutting off the E.G.R. circuit.

2. When the engine coolant temperature is above the working temperature of the water temperature switch:

(1) The vacuum port comes to air cleaner side during engine idling for improved idling operation.

At this point, vacuum does not actuate the E.G.R. control valve though intake manifold vacuum is high, and the E.G.R. control valve remains closed.

(2) In the full throttle driving position, the suction vacuum on the vacuum passage is not sufficient to actuate the E.G.R. control valve.

E. G. R. "ON" operation

The E.G.R. circuit is completed only when the engine coolant temperature is above the working temperature of the water temperature switch and the suction vacuum on the vacuum passage is great enough to open the E.G.R. control valve.

E.G.R. Control valve

The E.G.R. control valve controls the quantity of exhaust gas to be led to the intake manifold through vertical movement of the taper valve connected to the diaphragm, to which vacuum is applied in response to the opening of the throttle valve. The E.G.R. control valve is installed on the intake manifold through a gasket.

The E.G.R. control valve has different flow rate of exhaust gas in response to the transmission type. For identification purposes, paint and flow rate number are found on the top of the valve.

The construction of the E.G.R. control valve is shown in the following figure.

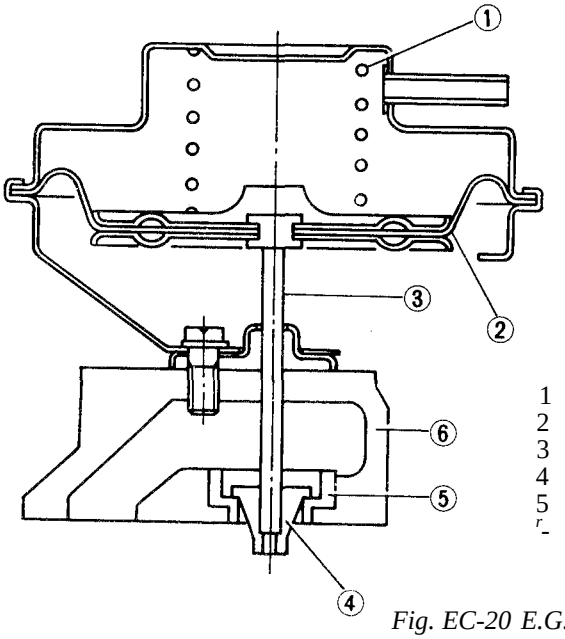


Fig. EC-20 E.G.R. control valve

Water temperature switch and E.G.R. solenoid valve

The water temperature switch is installed in the thermostat housing. The contact points of the thermo switch built in the water temperature switch open or close in response to the engine coolant temperature.

In other words, when the engine coolant temperature is lower than the working temperature of the water temperature switch, the contact points of the thermo switch close to flow electric current to the E.G.R. solenoid valve.

Therefore, the magnet coil of the E.G.R. solenoid valve is magnetized and the valve cuts off the suction vacuum on the vacuum passage. When the engine coolant temperature is above the working temperature of the water temperature switch, the contact points of the thermo switch open to cut off electric current to the E.G.R. solenoid valve. Therefore, the E.G.R. solenoid valve operated by spring force completes the vacuum passage between the throttle chamber and the E.G.R. control valve.

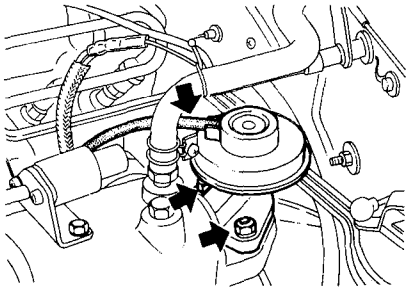
REMOVAL AND INSTALLATION

Removal

1. E.G.R. control valve

E.G.R. control valve is installed on intake manifold through a gasket. To dismount E.G.R. control valve, remove the following parts:

- Vacuum hose connecting E.G.R. control valve to E.G.R. solenoid valve
- Nuts attaching E.G.R. control valve to intake manifold



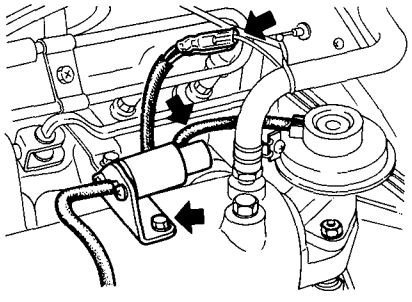
EC 358

Fig. EC-21 Removing E.G.R. control valve

2. E.G.R. solenoid valve

E.G.R. solenoid valve is installed on intake manifold. To dismount E.G.R. solenoid valve, remove the following parts:

- Solenoid valve harness
- Vacuum hose connecting E.G.R. control valve to E.G.R. solenoid valve
- Bolts attaching E.G.R. solenoid valve to intake manifold



EC359

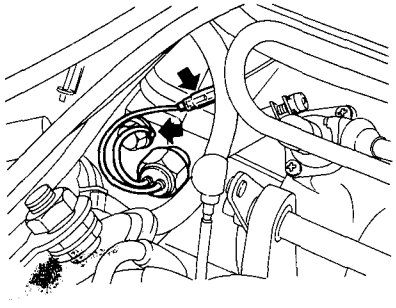
Fig. EC-22 Removing E.G.R. solenoid valve

3. Water temperature switch

Water temperature switch is installed in thermostat housing. To dismount water temperature switch, remove the following parts:

- Water temperature switch lead wires

Note: Drain engine coolant before dismounting water temperature switch from thermostat housing.



EC360

Fig. EC-23 Removing water temperature switch

Installation

To install E.G.R. control system components, reverse the order of removal.

INSPECTION

Check E.G.R. control system on engine.

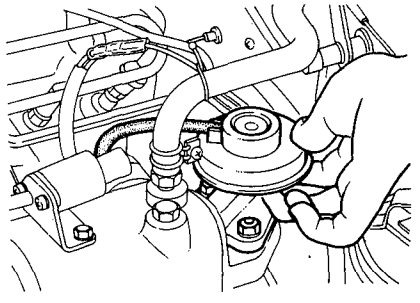
1. Visually check E.G.R. control system.

If necessary, wipe away oil to facilitate inspection. If any hoses are cracked or broken, replace.

2. With engine running, check E.G.R. control system for proper function.

- When engine coolant temperature is low:

(1) Make sure that E.G.R. control valve does not operate when engine speed is increased from idling to 3,000 - 3,500 rpm. To check the valve operation, place a finger on the diaphragm of E.G.R. control valve as shown in the figure below.

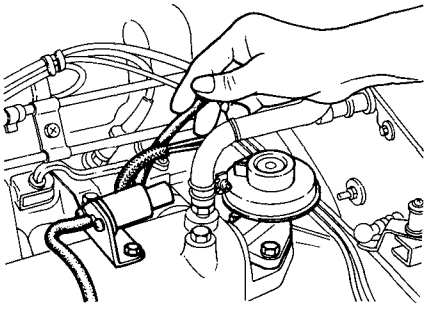


EC361

Fig. EC-24 Checking E.G.R. control valve

(2) Disconnect one end (E.G.R. control valve side) of the vacuum hose connecting E.G.R. solenoid valve to E.G.R. control valve. Then increase engine speed from idling to 3,000 - 3,500 rpm.

Make sure that E.G.R. solenoid valve is closed, and that throttle chamber vacuum is not present at the end (E.G.R. control valve side) of the vacuum hose. If vacuum is present, check E.G.R. solenoid valve and water temperature switch independently as described later.



EC362

Fig. EC-25 Checking E.G.R. solenoid valve

• When engine coolant temperature is high:

(1) Make sure that E.G.R. control valve operates when engine speed is increased from idling to 3,000 - 3,500 rpm. To check valve operation, place a finger on the diaphragm of E.G.R. control valve. See Figure EC-24.

(2) Disconnect one end (E.G.R. control valve side) of the vacuum hose connecting E.G.R. solenoid valve to E.G.R. control valve. Then, increase engine speed from idling to 3,000 - 3,500 rpm.

Make sure that E.G.R. solenoid valve opens, and that throttle chamber vacuum is present at the end of the vacuum hose. See Figure EC-25.

(3) With the engine idling, push the diaphragm of E.G.R. control valve up with your fingertips. Ascertain that the engine operates irregularly due to exhaust gases.

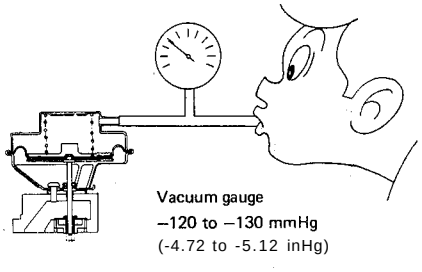
If the condition of the E.G.R. system is questionable, check each component independently.

• E.G.R. control valve

, Remove E.G.R. control valve and vacuum hose from engine.

(1) Visually check vacuum hose for deterioration or deformation. If the hose is damaged, vacuum leak may occur, resulting in improper operation of E.G.R. control valve. Damaged hose should be replaced.

(2) Apply a vacuum of 120 to 130 mmHg (4.72 to 5.12 inHg) to the E.G.R. control valve as shown in the figure below. The valve should move to the full position, and remain open for more than 30 seconds after the vacuum has cut off.

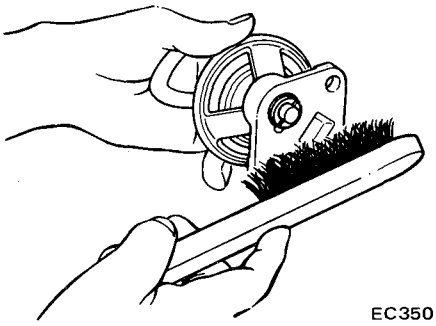


ET151

Fig. EC-26 Checking E.G.R. control valve

(3) Visually check E.G.R. control valve for damage, wrinkle or deformation.

(4) Clean the seating surface of E.G.R. control valve with a brush and compressed air, and remove foreign matter from around the valve and port.



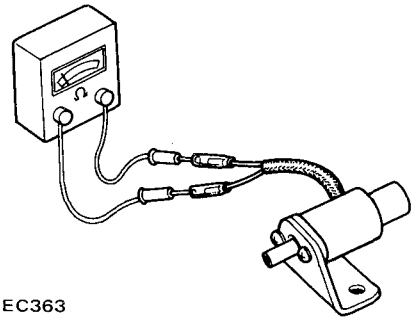
EC350

Fig. EC-27 Cleaning E.G.R. control valve

• E.G.R. solenoid valve

Check E.G.R. soelnoid valve with ohmmeter and battery, as follows:

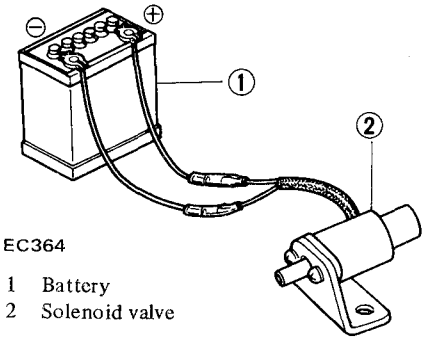
(1) Connect ohmmeter to solenoid lead wire and check continuity of the solenoid. If continuity does not exist, replace E.G.R. solenoid valve as a unit.



EC363

Fig. EC-28 Checking E.G.R. solenoid valve

(2) If continuity exists in step (1) above, apply electric current to the solenoid intermittently. Make sure that E.G.R. solenoid valve clicks. If clicks are heard, E.G.R. solenoid valve is functioning properly. If clicks are not heard, replace E.G.R. solenoid valve unit.



EC364

1 Battery
2 Solenoid valve

Fig. EC-29 Checking E.G.R. solenoid valve

• Water temperature switch

Remove water temperature switch from engine.

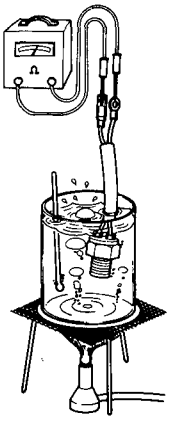
Check water temperature switch with thermometer and ohmmeter.

(1) Checking "ON" of water temperature switch

Starting from water temperature at 50°C (122°F) and below, check continuity of water temperature switch and ensure that a reading is almost zero, that is, switch is ON.

(2) Checking "OFF" of water temperature switch

Increasing water temperature from about 50°C (122°F), make continuity check of a water temperature switch. Operation is normal if an ohmmeter reading increases to infinite on condition that water temperature is somewhere between 57 to 63°C (134 to 145°F) and remains infinite at about 63°C(145°F) and above.



EC365

Fig. EC-30 Checking water temperature

(3) If it is satisfied both in steps (1) and (2) above, switch is good.

CATALYTIC CONVERTER SYSTEM

DESCRIPTION

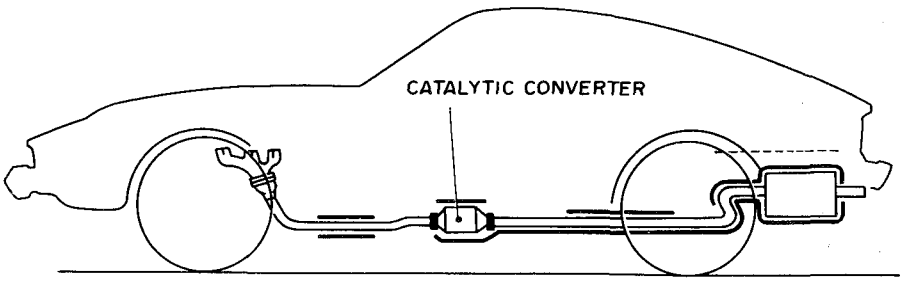
The catalytic converter accelerates the chemical reaction of hydrocarbons (HC) and carbon monoxide (CO) in the exhaust gas, and changes them into harmless carbon dioxide (CO_2) and water (H_20).

This chemical reaction process requires the proper amount of air.

By means of a chemical reaction process as it passes through the catalytic converter, the excess air in the air-fuel mixture (which has not been burned during the combustion process) is utilized to minimize HC and CO emissions.

The catalytic converter is provided with a warning device whose warning lamp located on the instrument panel lights if the temperature rises abnormally.

This converter is installed on all California models. Refer to Fig. EC-31. for the location of this unit.



EC380

Fig. EC-31 Location of catalytic converter

The catalyzer warning system is composed of a catalyzer temperature sensor, switching module, catalyzer relay, and catalyzer warning lamp. Refer to Figure CE-32.

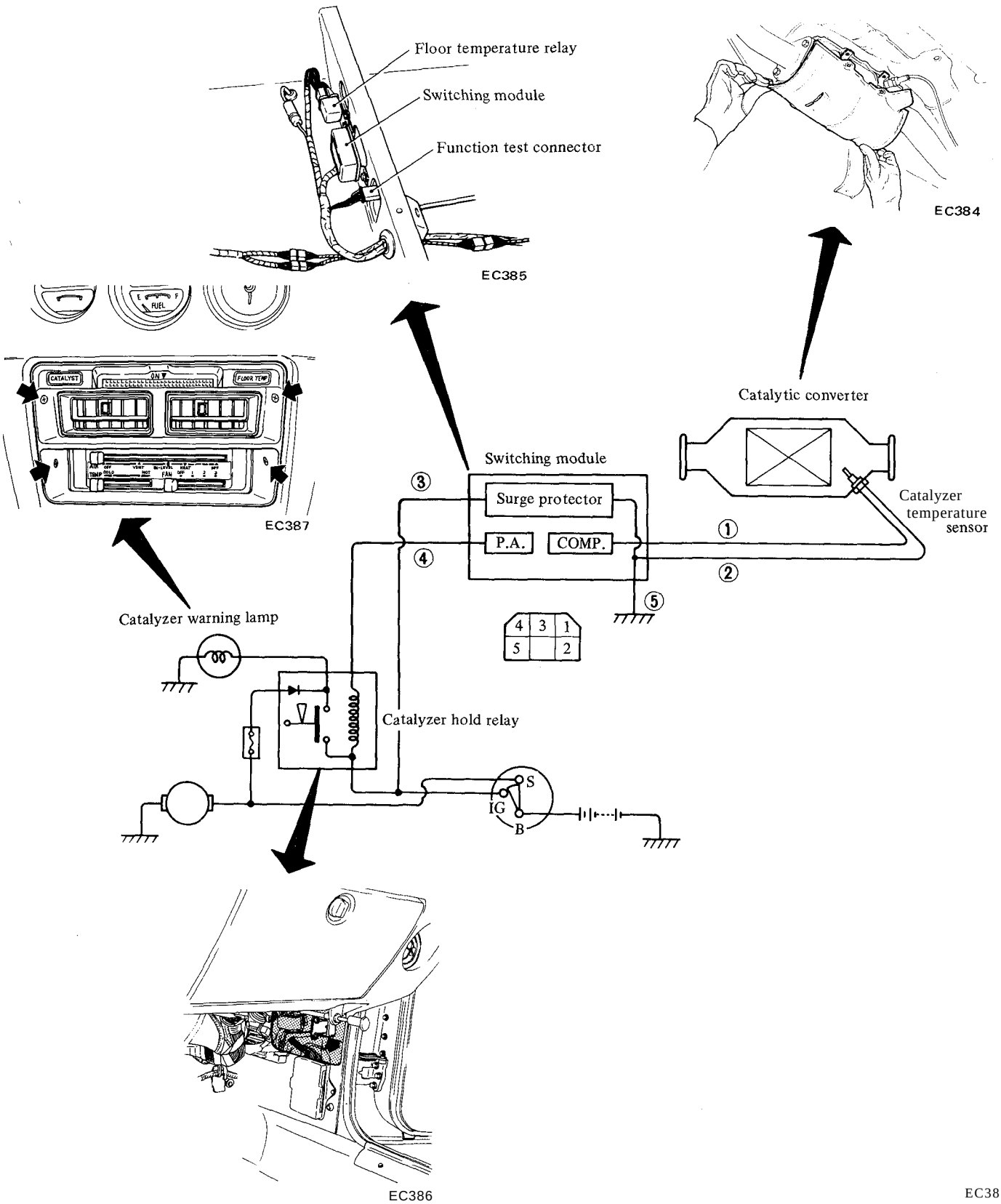
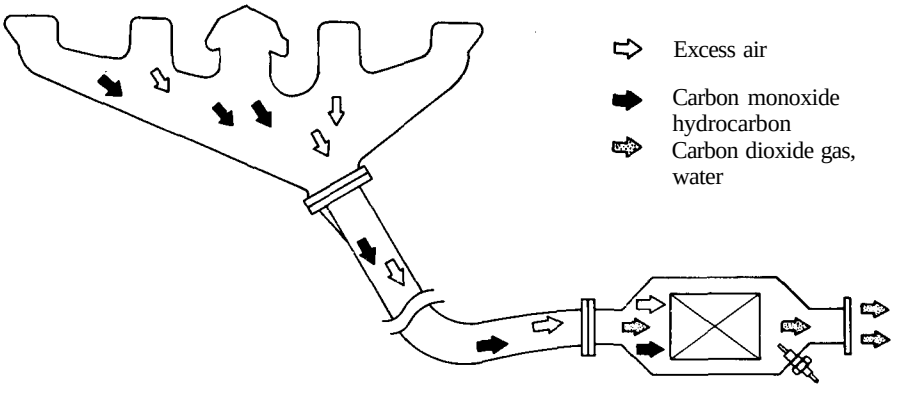


Fig. EC-32 Catalyzer warning system

OPERATION

Catalytic converter

The exhaust gas which is left unburned during combustion process is gradually oxidized with excess oxygen, and is converted into harmless carbon dioxide ($C0_2$) and water (H_20). The catalytic converter, located in the exhaust line, further cleans exhaust gases through catalytic action, and changes residual hydrocarbons (HC) and carbon monoxide (CO) contained in the exhaust gas into carbon dioxide ($C0_2$) and water (H_20) before the exhaust gas is discharged to the atomosphere.



EC382

Fig. EC-33 Operation of catalytic converter

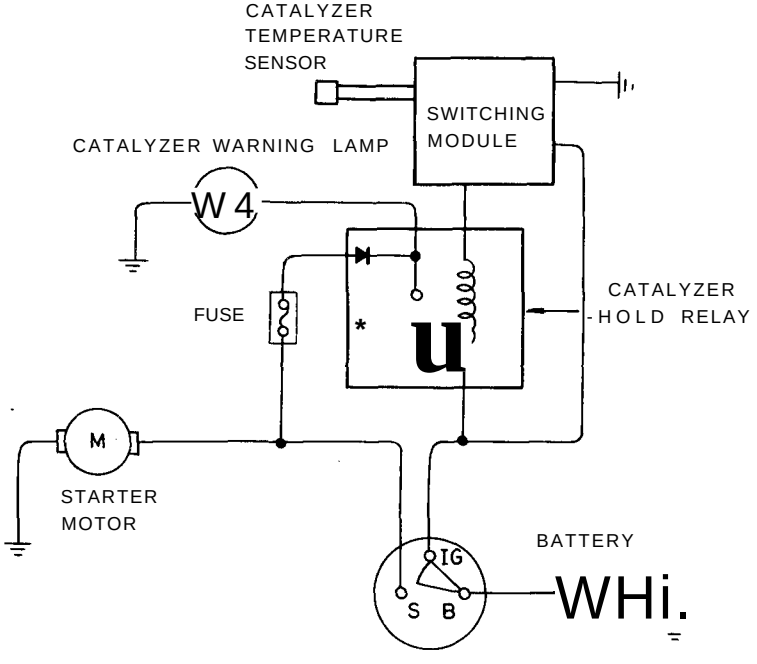
Catalyzer warning system

If the temperature of the catalyzer goes up abnormally, exceeding 1,100°C (2,012°F), the catalyzer warning lamp lights to indicate an abnormal condition in the engine. The warning lamp also lights during operation of the starter motor, permitting inspection of the lamp's condition. The lamp goes out after the engine starts.

The operation of the catalyzer warning device is controlled by the catalyzer temperature sensor. When the temperature of the catalytic converter exceeds the specified temperature level, the catalyzer temperature sensor attached to the catalytic converter issues a signal to actuate the switching module, and causes the catalyzer warning lamp to light through operation of the catalyzer hold relay. This catalyzer warning lamp, once lit up, remains lit as long as the ignition switch is turned on.

To turn off the lamp after inspection, the reset switch of the catalyzer hold relay should be depressed.

The catalyzer warning lamp remains lit while the stater motor is in operation because the starter circuit is directly connected to the catalyzer warning lamp through the hold relay. The catalyzer hold relay self-contains a diode which serves to prevent the starter from rotating while current flows through the ignition switch and the catalyzer hold relay is in operation.



EC383

Fig. EC-34 Catalyzer hold relay circuit

REMOVAL AND INSTALLATION

Removal and installation can be done as follows:

Removal

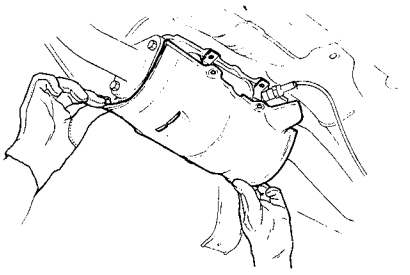
Catalytic converter

1. Apply parking brake.
2. Disconnect connectors of temperature sensor and pull connector terminals to the outside of floor.
3. Place wheel lock under each tire.
4. Jack up the car.
5. Remove lower shelter of catalytic converter.
6. Dismount catalytic converter.

Notes:

a. Be careful not to damage catalytic converter when handling.

b. Never wet catalyzer with water, oil, etc.



EC384

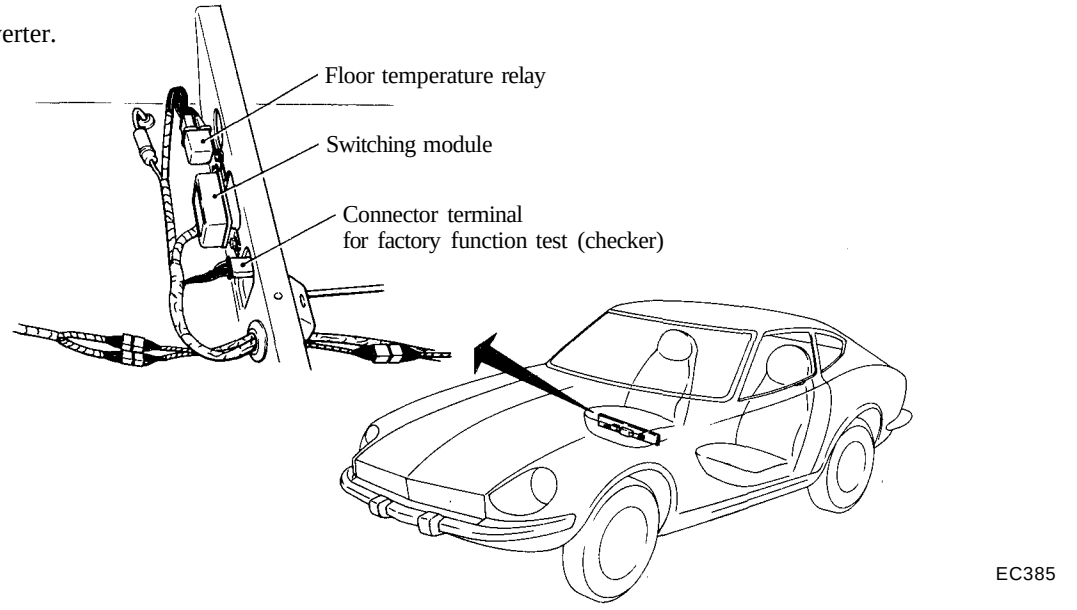
Fig. EC-35 Removing catalytic converter

Catalyzer temperature sensor

1. Apply parking brake.
2. Disconnect connectors of temperature sensor and pull connector terminal to the outside of floor.
3. Place wheel lock under each tire.
4. Jack up the car.
5. Remove lower shelter of catalytic converter.
6. Dismount catalyzer temperature sensor.

Switching module

Remove front passenger seat before removing switching module. Refer to Figure EC-36.

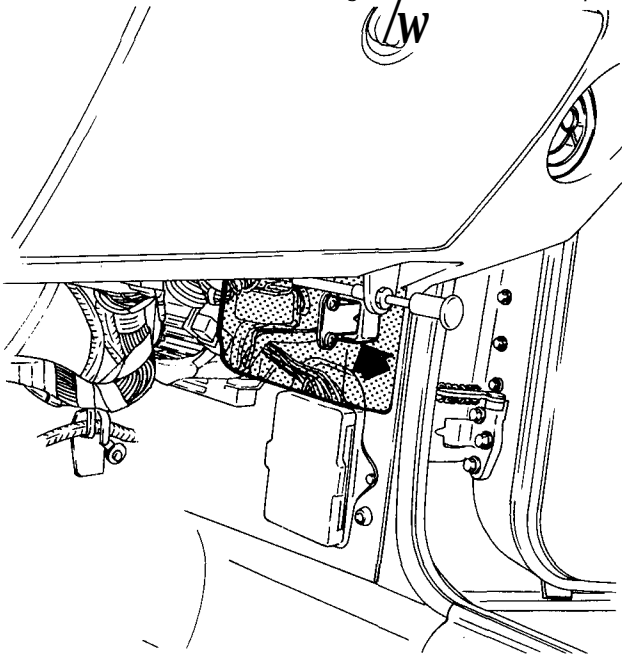


EC385

Fig. EC-36 Location of switching module

Catalyzer hold relay

Remove harness cover before removing catalyzer hold relay. Refer to Figure EC-37.

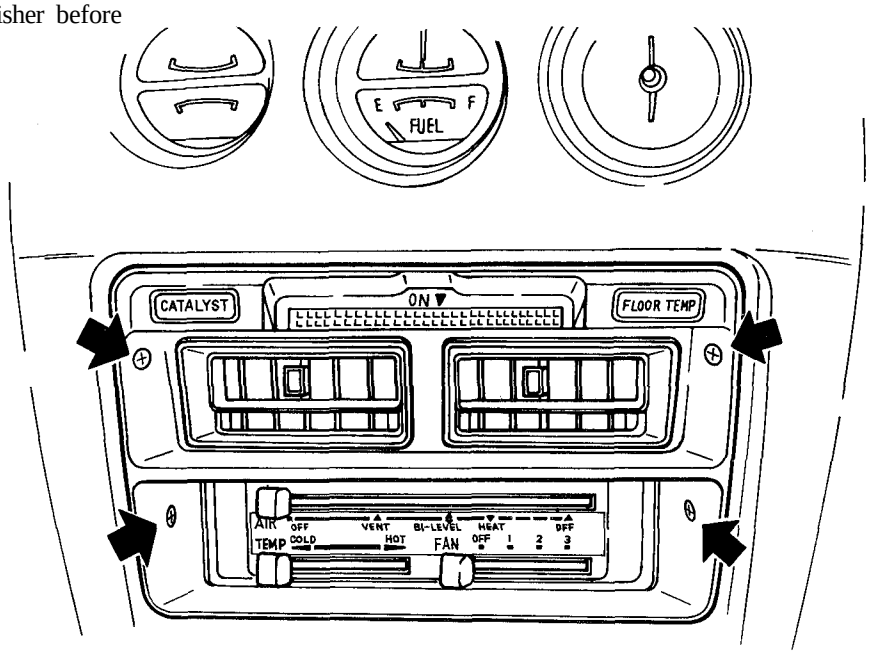


EC386

Fig. EC-37 Location of catalyzer hold relay

Catalyzer warning lamp

Remove instrument finisher before removing catalyzer warning lamp. Refer to Figure EC-38.



EC387

Fig. EC-38 Location of catalyzer warning lamp

Installation

To install, reverse the order of removal.

Tightening torque specifications chart

	Tightening torque
Catalytic converter	3.1 to 4.1 kg-m (22 to 30 ft-lb)
Catalyzer TEMP sensor	2.5 to 3.5 kg-m (25 to 28 ft-lb)

Cautions:

a. After installing catalyzer temperature sensor in place, clip sensor cord at mark.

b. When installing catalyzer temperature sensor, be careful not to allow rubber cover to get stuck between intermediate protector and car body.

INSPECTION

Checking catalyzer warning system

When checking catalyzer warning system and connectors, use function test connector. Refer to Figure EC-36.

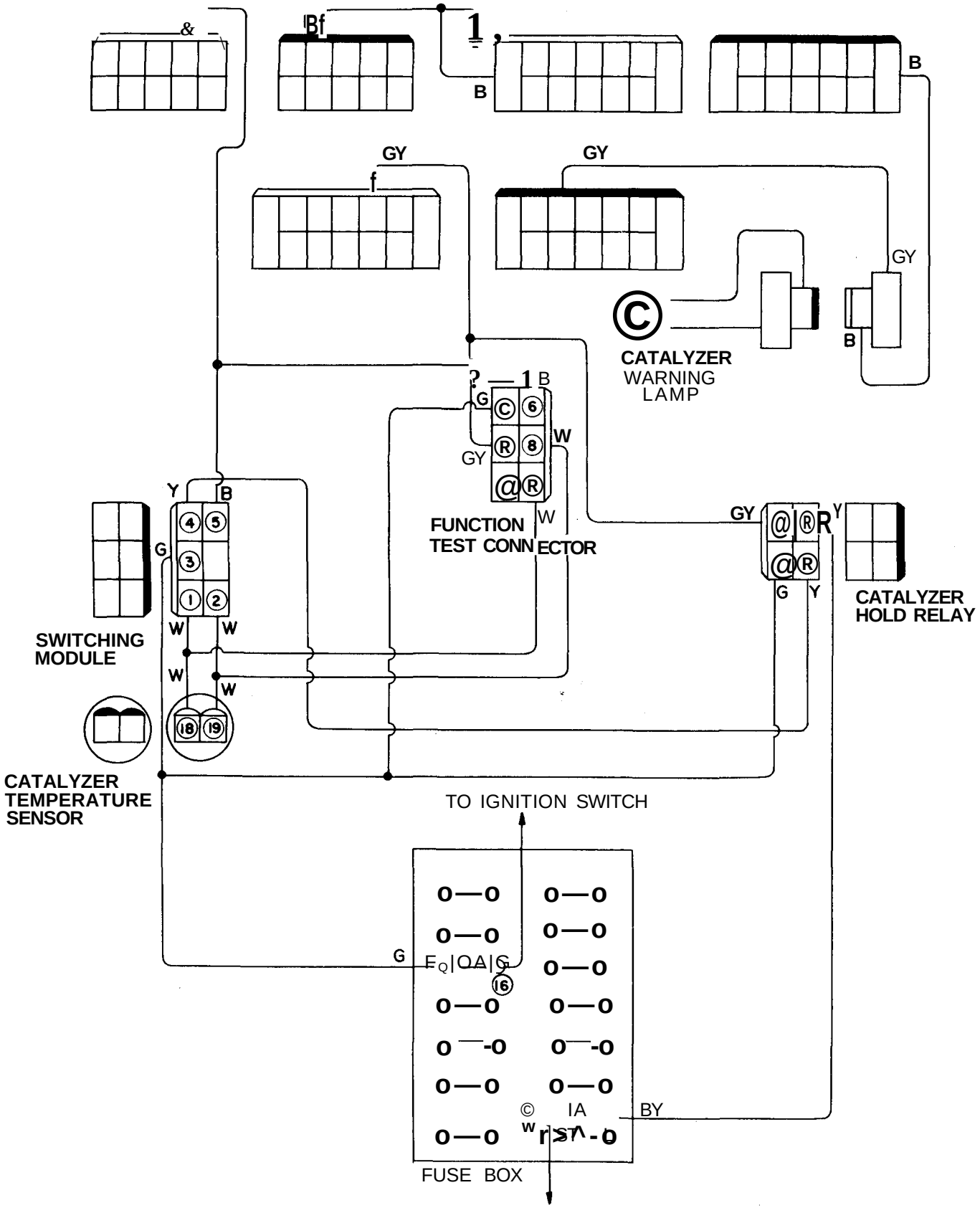


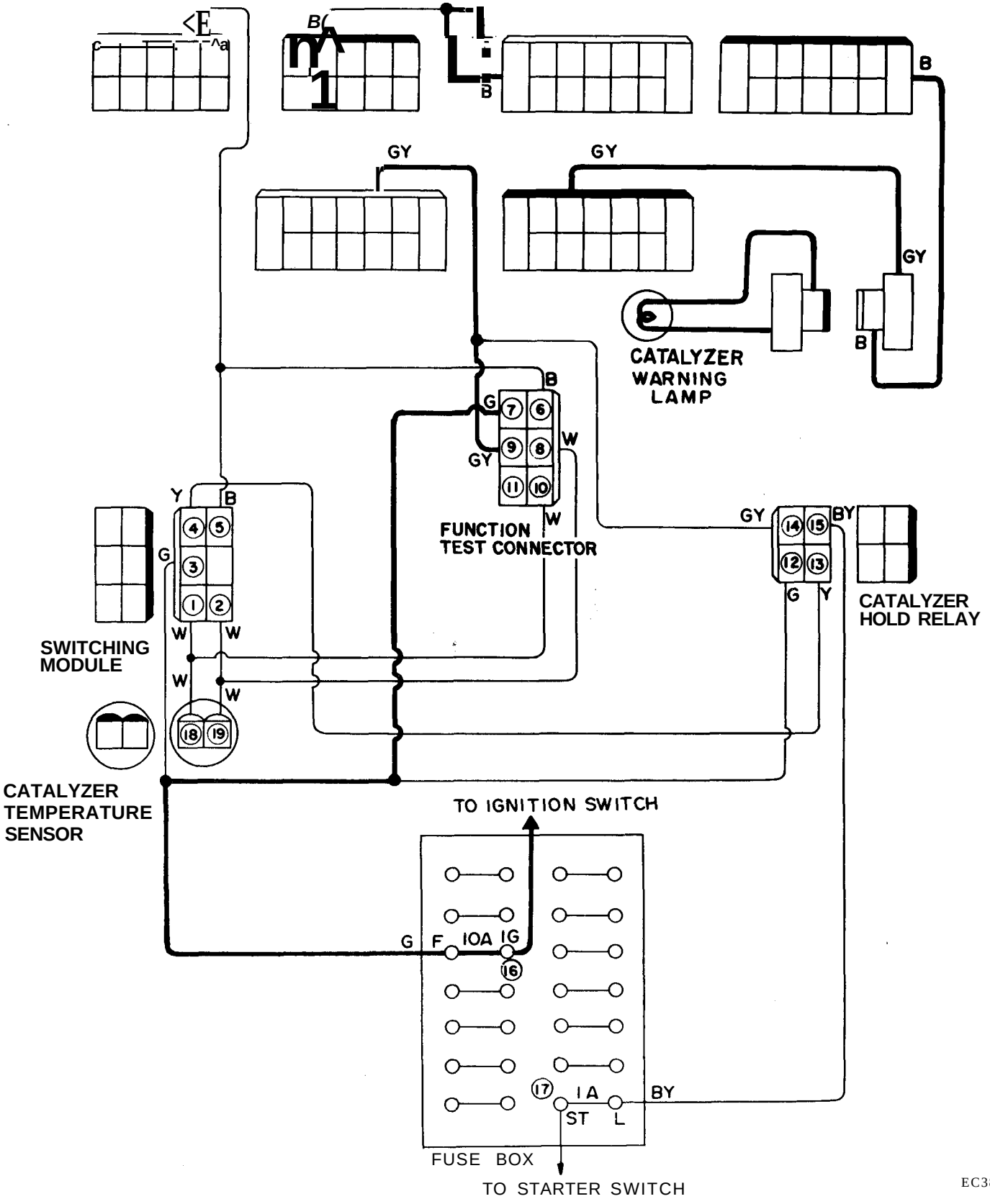
Fig. EC-39 Wiring diagram of catalyzer warning device

Turn ignition switch to the IG position, and short-circuit function test connector terminals between (§) and @ with a jumper wire. If warning lamp comes on, catalyzer warning system is functioning properly.

(The catalyzer temperature sensor should be checked as a single unit.)

If warning lamp does not come on, proceed as follows:

1. Turn ignition switch to the IG position. Connect voltmeter between terminals (7) (positive side) and (f) (negative side) of function test connector. If voltmeter reading is approximately 12 volts, the circuit indicated by large solid lines in Figure EC-40 is OK.



EC389

Fig. EC-40 Wiring diagram 1

2. If voltmeter reading is not as specified, check catalyzer warning lamp and the circuit indicated by large solid lines. If necessary, repair or replace faulty parts.

3. Turn ignition switch to the IG position, and short-circuit function test connector terminals between (8) and @ with a jumper wire. Connect voltmeter between terminals (?) (positive) and (§) (negative) of function test connector. If voltmeter reading is zero, the circuit indicated by large solid lines in Figure EC-41 is OK.

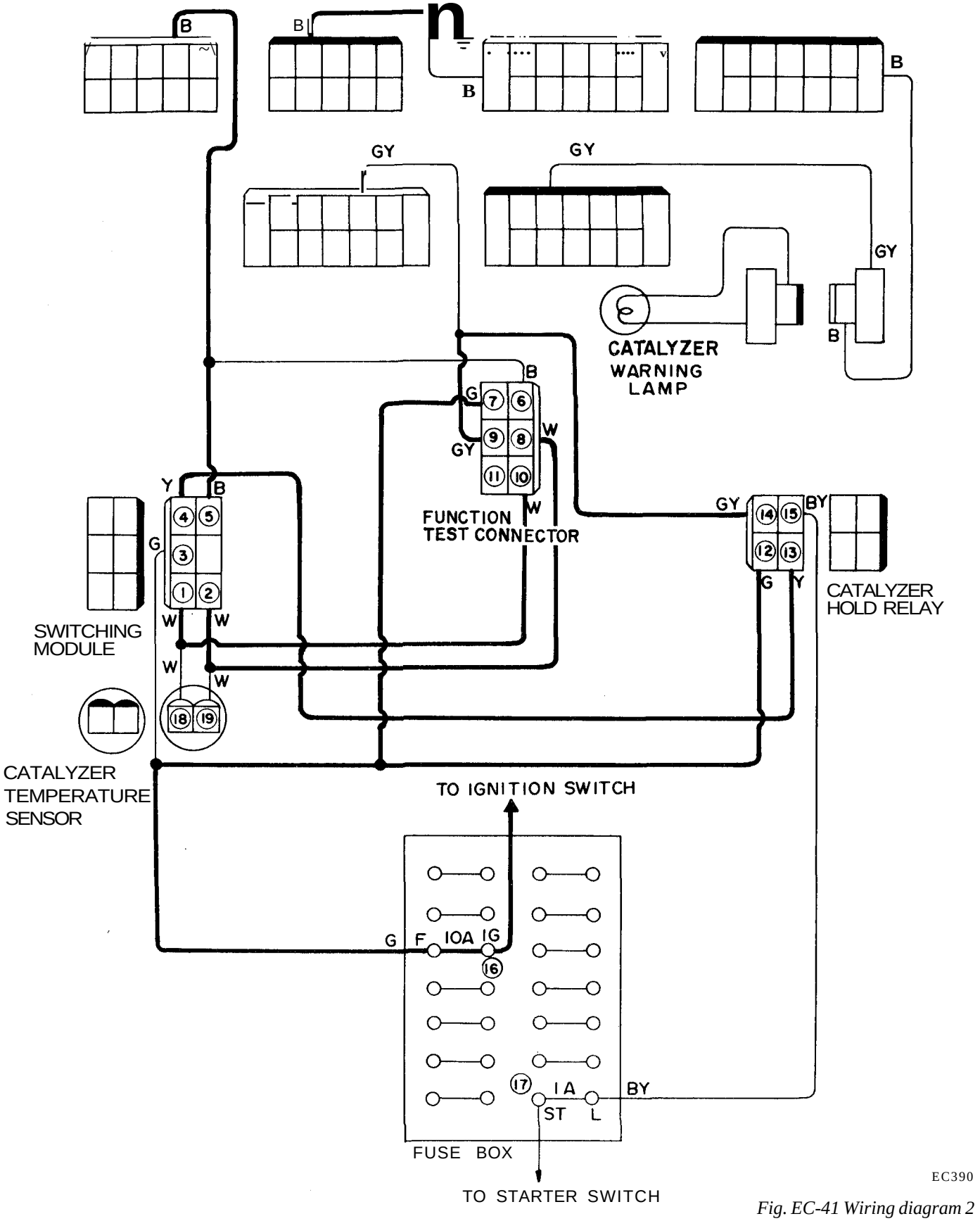
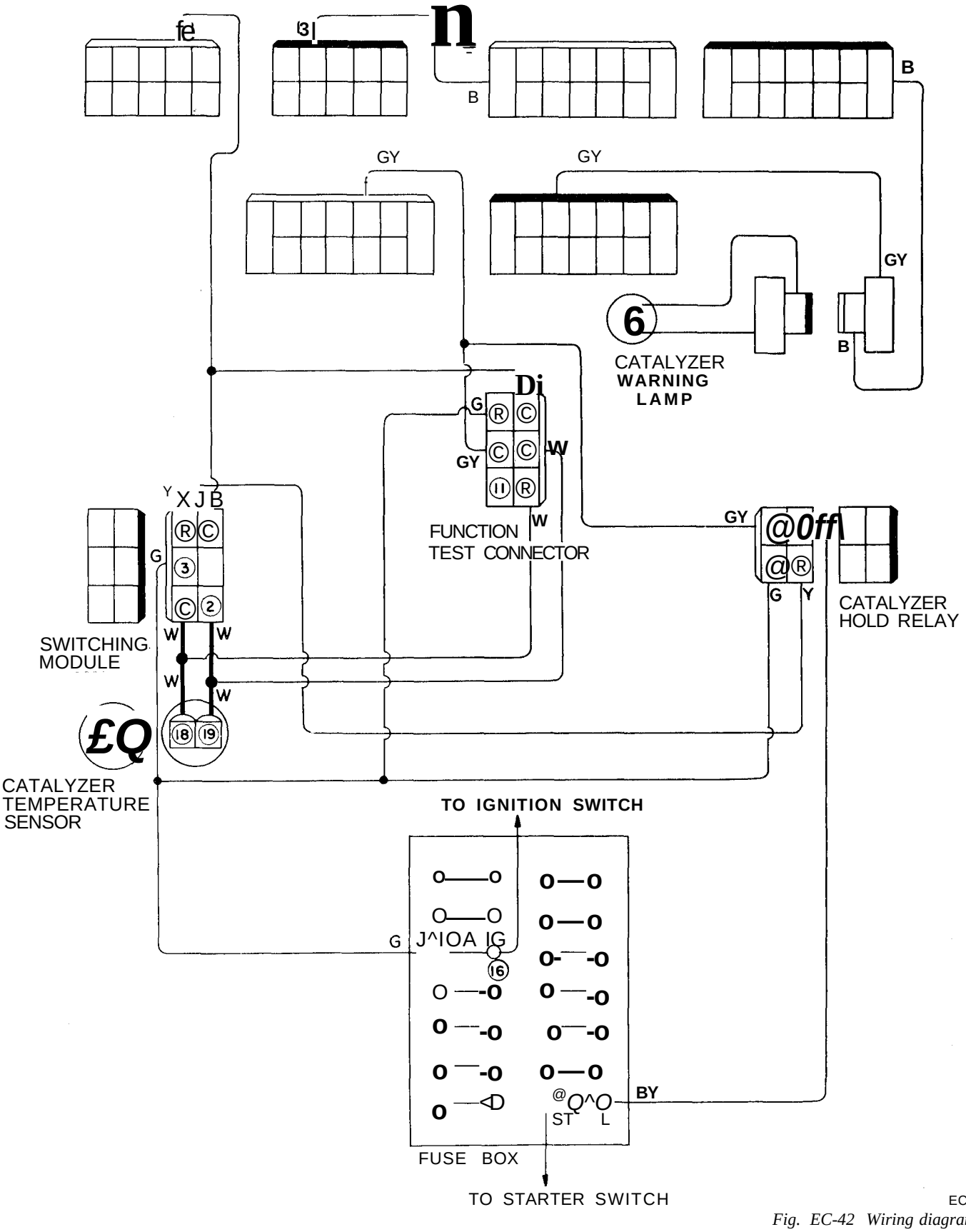


Fig. EC-41 Wiring diagram 2

4. If voltmeter reading is not as specified, check hold relay unit and wiring indicated by large solid lines. If the above unsatisfactory condition still exists, replace switching module.

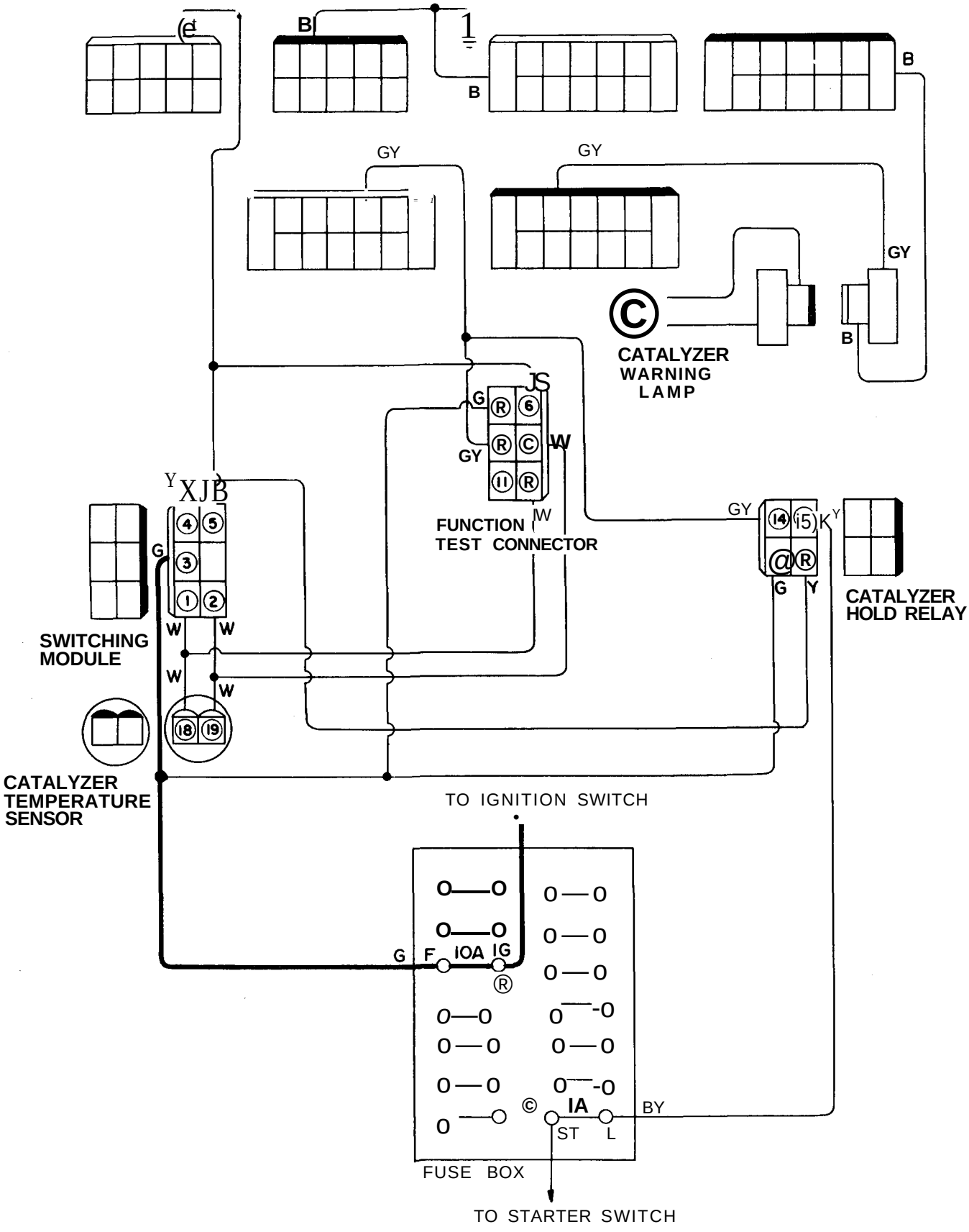
5. Check continuity between switching module terminal (1) and catalyzer temperature sensor terminal @, and between switching module terminal (2) and catalyzer temperature sensor terminal @. If continuity exists between two sets of terminals, the circuit indicated by large solid lines in Figure EC-42 is OK.



EC391

Fig. EC-42 Wiring diagram 3

6. Check continuity between switching module connector (f) and terminal © in fuse box. If continuity exists, the circuit indicated by large solid lines in Figure EC-43 is OK.



EC392

Fig. EC-43 Wiring diagram 4

7. Check continuity between hold relay terminal © and terminal @ in fuse box. If continuity exists, the circuit indicated by large solid lines in Figure EC44 is OK.

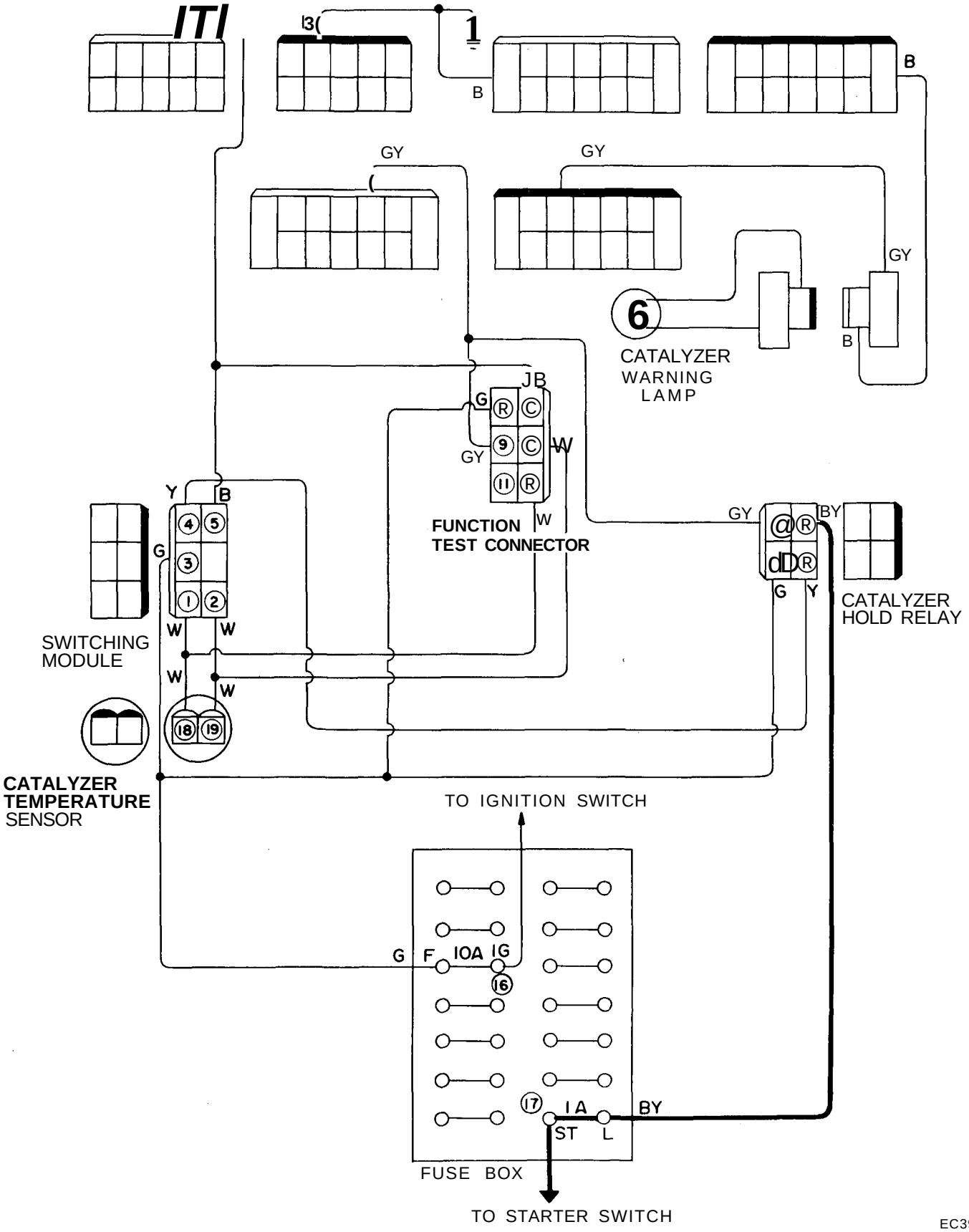


Fig. EC-44 Wiring diagram 5

Catalyzer temperature sensor

1. Apply parking brake.
2. Shift transmission into Neutral (for manual transmission) and Park or Neutral (for automatic transmission models).
3. Connect a tachometer to the engine.
4. Thoroughly warm up the engine.
5. Stop the engine after warm-up.
6. Disconnect high tension cord (to No. 1 cylinder) at distributor.

Caution: Do not disconnect high tension cord on plug side.

7. Ensure that catalyzer temperature sensor connector located under driver seat is tight in place.
8. Disconnect 2-pin catalyzer temperature sensor connector under passenger seat.
9. Turn circuit tester knob to 1,000 K£2 range and zero adjust.
10. Attach test leads of circuit tester to the sensor side of connector that has been disconnected in step 8 above, and take a tester reading.
11. Tester reading should be more than 100 *KD,*. If below this value, replace sensor.
12. Accelerate the engine and observe tachometer to ensure that engine speed is set at 2,500 rpm.

Note: Do not run the engine at more than 3,000 rpm.

13. Keep the engine running at 2,500 rpm for at least two minutes.
14. Observe tester reading during the operation in step 13 above. Resistance on tester scale should decrease. If not, replace sensor.
15. Reduce engine speed and stop the engine.

Note: After the above test has **been made, connect high tension cord (to No. 1 cylinder) to its original position in distributor.**

Catalyzer warning lamp

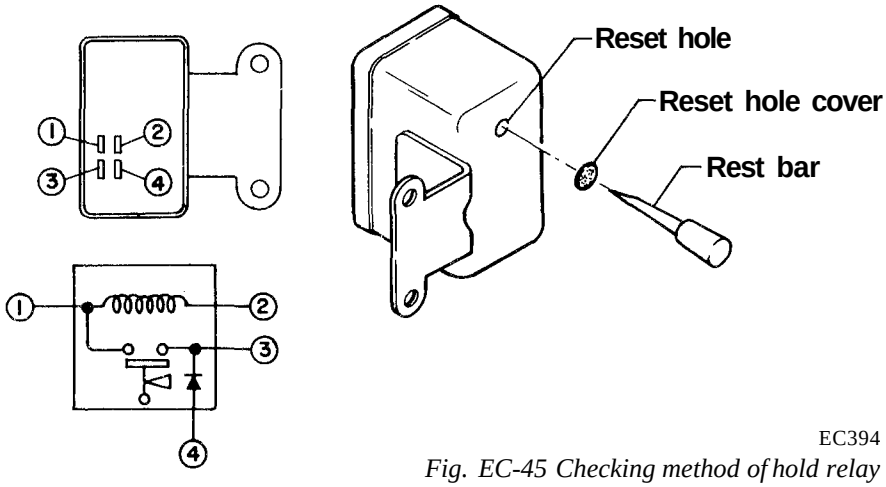
If catalyzer warning lamp does not go on when starter switch is turned on, check for a faulty lamp. If lamp is not faulty, check for discontinuity in the line between starter switch and warning lamp. Also check wires from the starter switch to the warning lamp. Repair or replace as necessary.

Catalyzer hold relay

1. Disconnect connectors of catalyzer hold relay.
2. Attach tester positive lead to terminal (3) and negative lead to terminal (4) • continuity should exist.
3. Attach tester positive lead to terminal (4) and. negative lead to terminal (3). Discontinuity should exist.
4. Make sure that continuity exists between terminals **(?)** and **(2).**

Note: Due inherent design of tester, continuity exists when positive and negative leads are reversed if diode is normal.

5. Make sure that discontinuity exists between terminals (I) and (3).
6. Apply a voltage of 12V to terminal 0, and make sure that continuity exists between terminals (I) and ®.
7. Reset catalyzer hold relay. To reset, remove reset hole cover of catalyzer hold relay, and insert a bar of 5 mm (0.197 in) dia. into reset hole.



EC394

Fig. EC-45 Checking method of hold relay

Switching module

The switching module cannot be inspected off the vehicle. To check, use a connector terminal for factory function test. If catalyzer warning system is found faulty through tests, check warning lamp, hold relay, and wiring. If nothing is wrong with them, replace switching module.

Catalytic converter

Check catalytic converter with an emission adjuster, as follows:

1. Apply parking brake with gear set in neutral.
2. Place wheel lock under each tire.
3. Warm up engine thoroughly. [About 80°C(176°F)]
4. Stop engine and turn ignition switch to "OFF" position.
5. Remove connector of water temperature sensor.
6. Connect emission adjuster to harness connector of water temperature sensor. See Figure EC-46.

Caution: Always keep emission adjuster lead wires away from high tension cable so as not to damage control unit.

7. Insert CO meter probe through exhaust diffuser end until a minimum insertion length of 500 mm (19.7 in) is reached.
8. Run engine at 2,000 rpm and adjust CO percent to 3 percent with emission adjuster.
9. Remove injector connector from number six cylinder.
10. Keep engine running at 2,000 rpm with no load.
11. If CO percent is less than 1 percent, catalytic converter is functioning properly. (If CO percent is more than 1 percent, catalytic converter must be replaced.)
12. Stop engine and turn ignition switch to "OFF" position.
13. Locate water temperature sensor connector and injector connector in place.

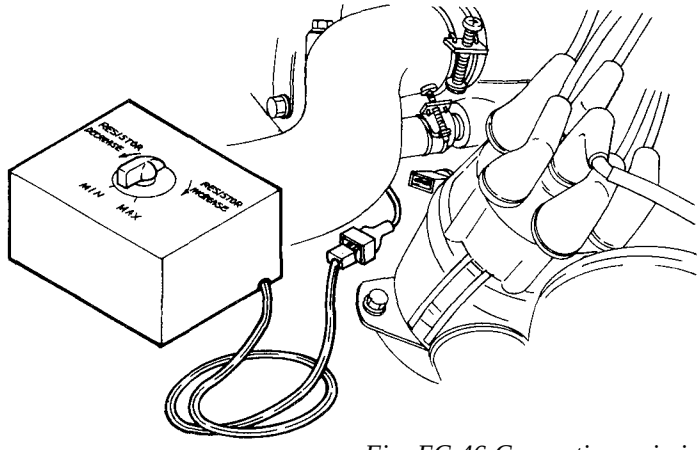


Fig. EC-46 Connecting emission adjuster

When catalyzer warning lamp lights

If catalyzer warning lamp lights, check the following items.

(1) Disconnect connectors of catalyzer temperature sensor (when catalytic converter is cold), and measure resistance of catalytic sensor with a circuit tester.

If tester reading is more than 100 Kfi, the unit is normal.

If tester reading is less than 100 K£2, replace catalyzer temperature sensor.

(2) Check catalyzer temperature warning device. (Refer to "Inspection of Catalytic Warning System".)

2. Check the pre-set value of Boost Controlled Deceleration Device and correct if necessary. (Refer to "Inspection of B.C.D.D.".)

3. Check ignition system for the following items, and correct if necessary. (Refer to "Inspection of Ignition System" in the "Engine Electrical" section.)

(1) Ignition Amp
  (l)-(a) Faulty circuit
  (l)-(b) Connections loose or disconnected
(2) Distributor
  (2)-(a) Open coil
  (2)-(b) Improper air gap
  (2)-(c) Electricity leak at cap and rotor head
(3) Ignition coil
  (3)-(a) Layer short circuit
(4) High tension cord
  (4)-(a) Electricity leak
  (4)-(b) Wire disconnected
(5) Spark plugs
  (5)-(a) Dirty
  (5)-(b) Electricity leak at upper porcelain insulator

4. Check catalytic converter. (Refer to "Inspection of Catalytic Converter".)

5. Check catalyzer temperature sensor. (Refer to "Inspection of Catalyzer Temperature Sensor".)

FLOOR TEMPERATURE WARNING SYSTEM

DESCRIPTION

The floor temperature warning system consists of a floor sensor installed on the car's floor, floor temperature relay and a floor temperature warning lamp on the instrument panel and wires that connect these parts.

When the floor temperature rises to an abnormal level, the warning lamp will light to call the attention of the driver. The wiring diagram of this system, and location of the floor sensor are illustrated in Figures EC-47 and EC-48.

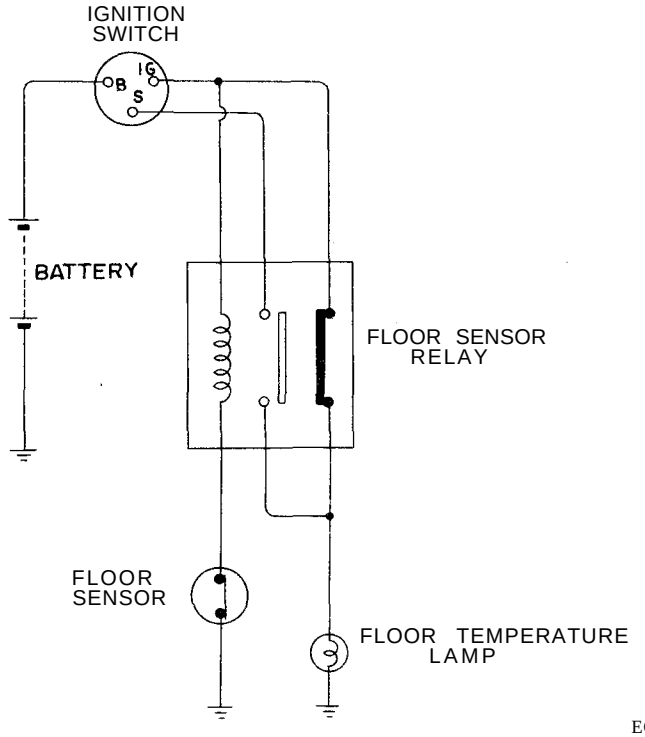


Fig. EC-47 Floor warning system circuit

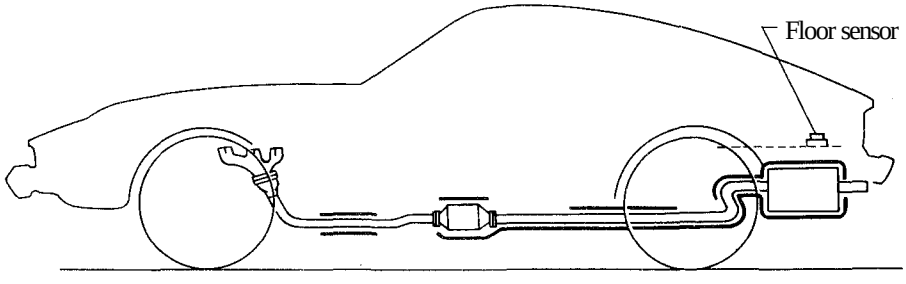


Fig. EC-48 Location of floor sensor

OPERATION

Floor temperature will exceed normal level when temperature rise in the exhaust system succeeding the catalytic converter is caused by either an engine problem or severe driving conditions. Under this condition the floor sensor turns off, causing the starting switch line of the floor sensor relay to turn off and the ignition switch line to turn on, as a result, the floor temperature warning lamp comes on.

When the floor temperature drops below the specified level, the floor sensor relay contacts close.

As the contacts close, the ignition line of the floor sensor relay turns off, while the starting switch side comes on. Thus, the floor temperature warning lamp goes out.

The lamp is functioning satisfactorily, if it remains on while the starting motor is in operation. The lamp goes out when the ignition switch is in "IG" position.

The following chart furnishes the information on the relationship between floor temperature warning lamp and floor sensor.

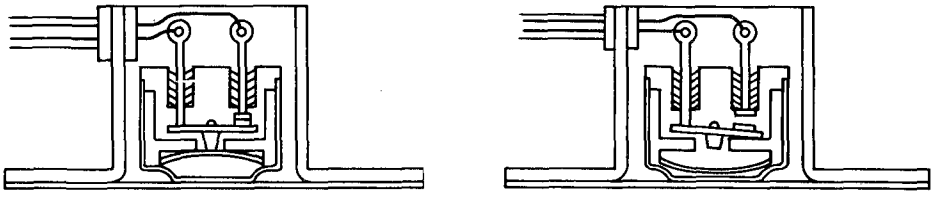


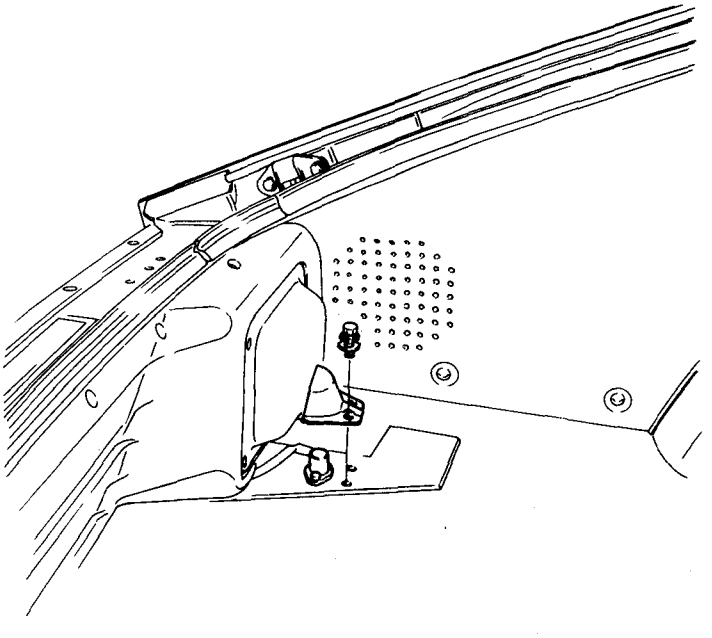
Fig. EC-49 Operation of floor sensor

REMOVAL AND INSTALLATION

Removal

Floor sensor

Remove protector before removing floor sensor. Refer to Figure EC-50.



EC400

Fig. EC-50 Removing floor sensor

Floor sensor relay

Remove front passenger seat before removing floor sensor relay. Refer to Figure EC-51.

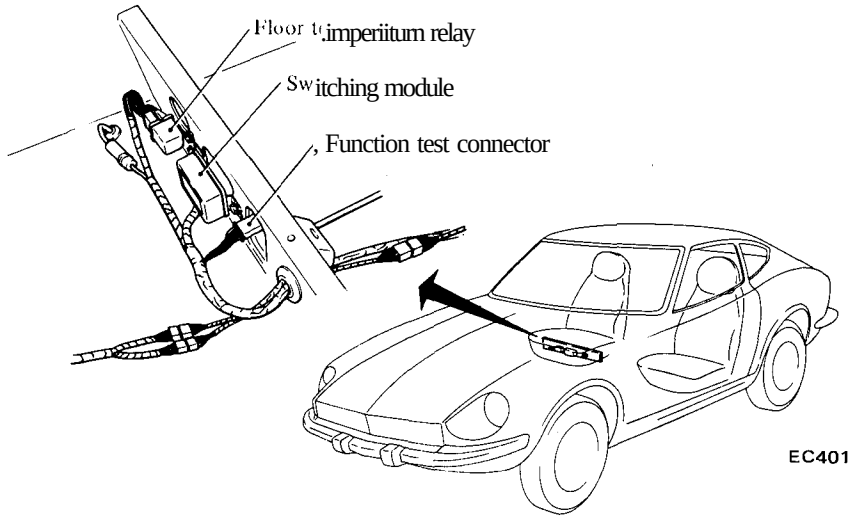


Fig. EC-SI Location of floor sensor relay

Floor temperature lamp

Remove instrument finisher before removing floor temperature warning lamp. Refer to Figure EC-52.

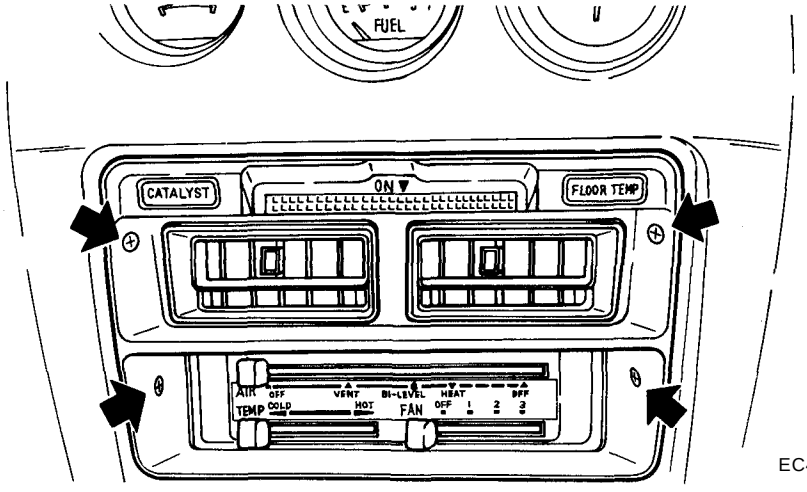


Fig. EC-52 Location of floor temperature lamp

Installation

To install, reverse the order of removal.

Inspection

Floor warning temperature system

Apply parking brake.

Shift gears into Neutral (for manual transmission) and Neutral or Park (for automatic transmission).

1. Ensure that floor temperature warning lamp lights when ignition switch is turned to the "S" position. If lamp does not light, check burned bulb. Replace burned out bulb. If bulb is not burned, trace wire(s) back to ignition switch.

Repair or replace if necessary.

2. Be sure that floor temperature sensor is cool [below 80°C (176°F)] before carrying out the following:

(1) Remove'rear seat.

(2) Turn ignition switch to the "IG" position.

(3) Ensure that floor temperature warning lamp goes out.

(4) Heat areas around floor sensor with a proper heater to ensure that floor temperature warning lamp comes on when floor is heated to specifications in the table below.

Floor sensor	Floor temperature warning lamp	Floor temperature
Contacts close	OFF	Below 115°C(239°F)
Contacts open	ON	Above 115°C (239°F)

If lamp does not come on, check floor sensor connector for continuity with a circuit tester.

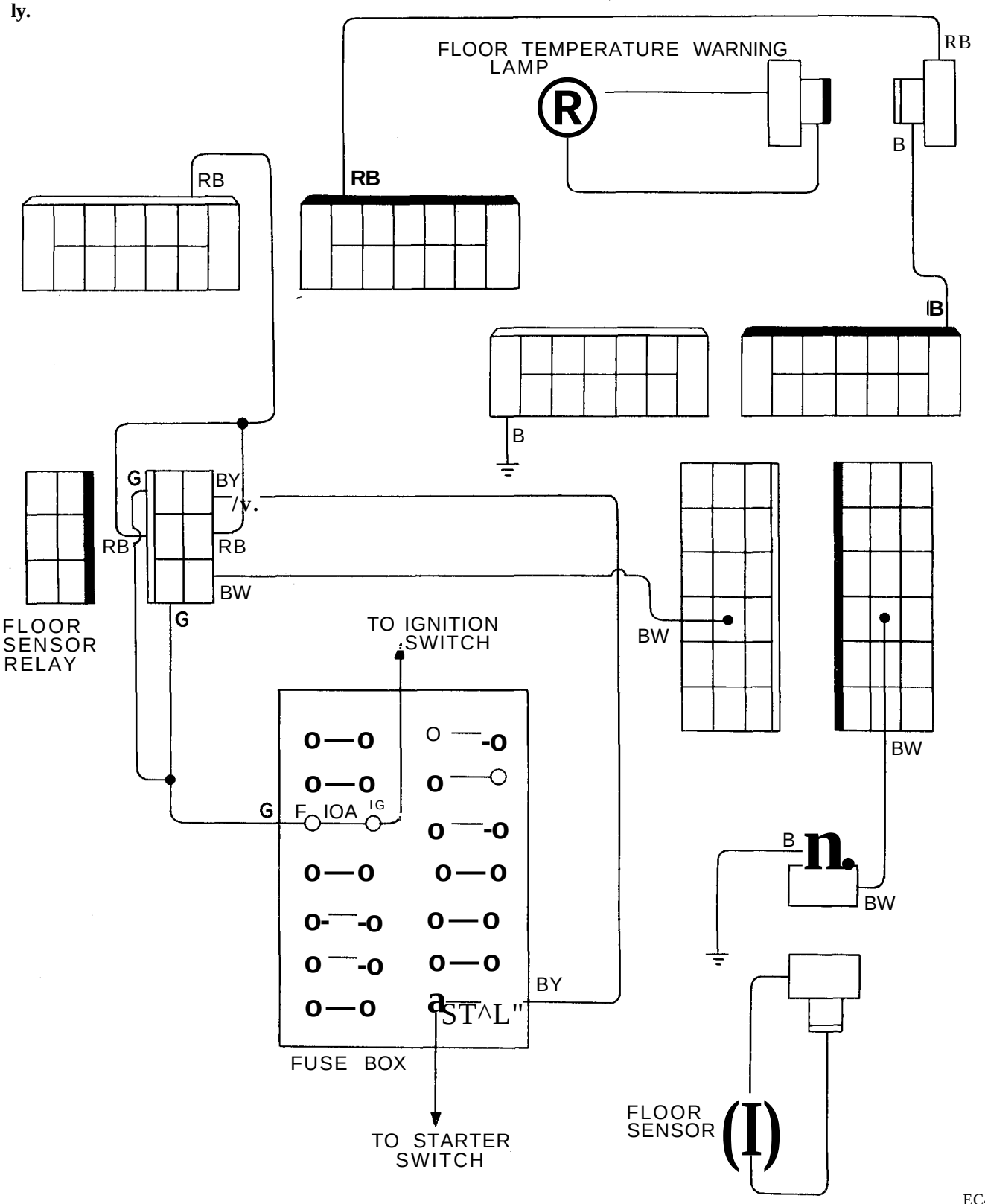
If continuity exists after heating areas around floor sensor, replace floor sensor.

If continuity does not exist, trace the wiring back to relay or proceed to step 3. Repair or replace wire(s) if necessary.

3. Turn ignition switch to the "IG" position, and disconnect floor sensor connector. The lamp should remain on. If not, check floor sensor relay for continuity with a circuit tester.

Conduct checks under the heading following "floor sensor relay", and if relay is found normal, trace wire(s) back to ignition switch. Repair faulty wiring if necessary. Refer to Figure EC-5 3.

Note: Do not heat floor sensor directly.



EC403

Fig. EC-53 Wiring diagram of floor warning system

Floor sensor relay

Refer to Figure EC-54.

When checking floor sensor relay unit, remove it, and conduct continuity and voltage tests as follows:

1. Terminals (5) and (g)
   Continuity should exist.
   Terminals (2) and (4)
   Continuity should exist.
   Terminals 0 and (3)
   Continuity should not exist.
2. Terminals (5) and *(§)*
   12 volt should be present.
   Terminals (j) and (3)
   Continuity should exist.
   Terminals (2) and (4)
   Continuity should not exist.

If test results are not as indicated above, replace faulty parts.

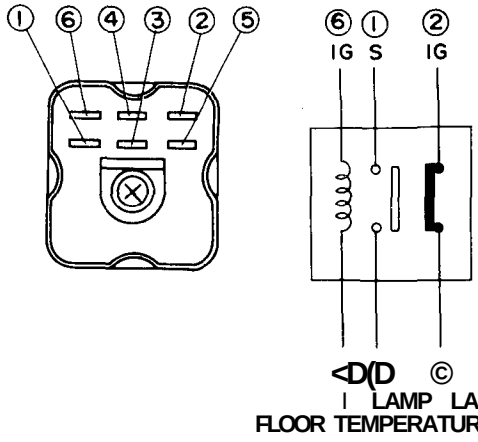


Fig. EC-54 Checking floor sensor relay

When floor temperature warning lamp lights

Check floor temperature warning lamp for the following items.

1. Open or short circuit in wiring harness.
2. Condition of ignition system. Refer to "Catalyzer Warning Lamp Lights" in the "Emission Control" section. Repair or replace faulty part(s) as necessary.

EVAPORATIVE EMISSION CONTROL SYSTEM

CONTENTS

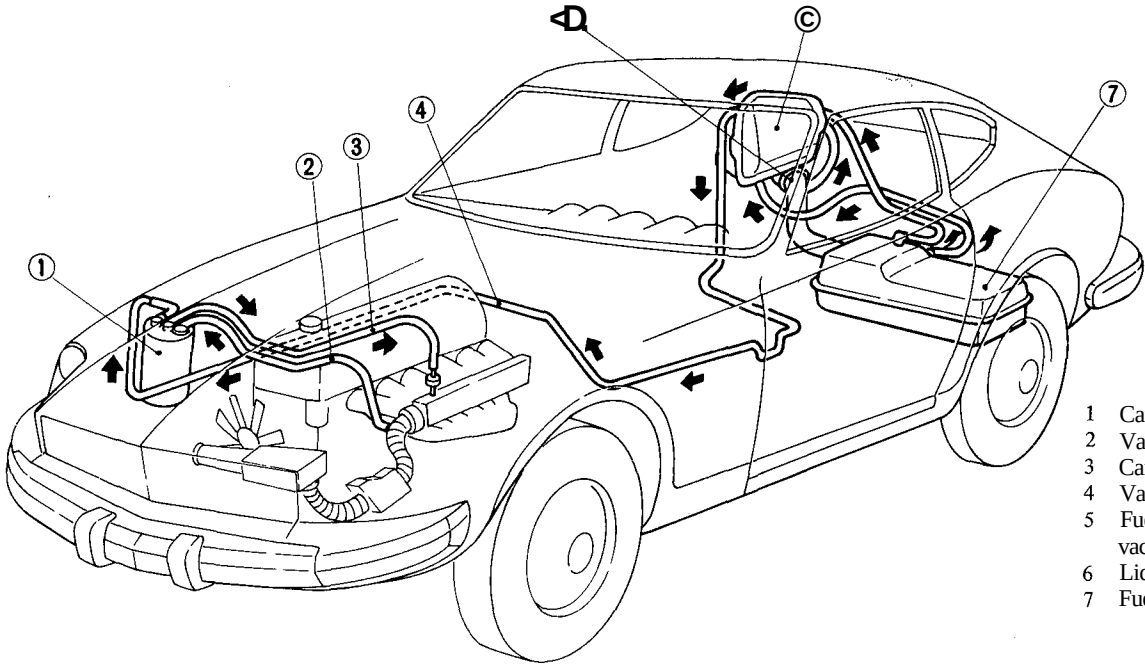
DESCRIPTION EC-45
OPERATION EC-46
INSPECTION EC-47
FUEL TANK, VAPOR LIQUID SEPARATOR AND VAPOR VENT LINE ——— EC-47
CARBON CANISTER PURGE CONTROL VALVE EC-47
CARBON CANISTER FILTER EC-48
FUEL TANK VACUUM RELIEF VALVE ... EC-48

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.

This system is made up of the following:

1. Fuel tank with positive sealing filler cap
2. Vapor-liquid separator
3. Vapor vent line
4. Carbon canister
5. Vacuum signal line
6. Canister purge line

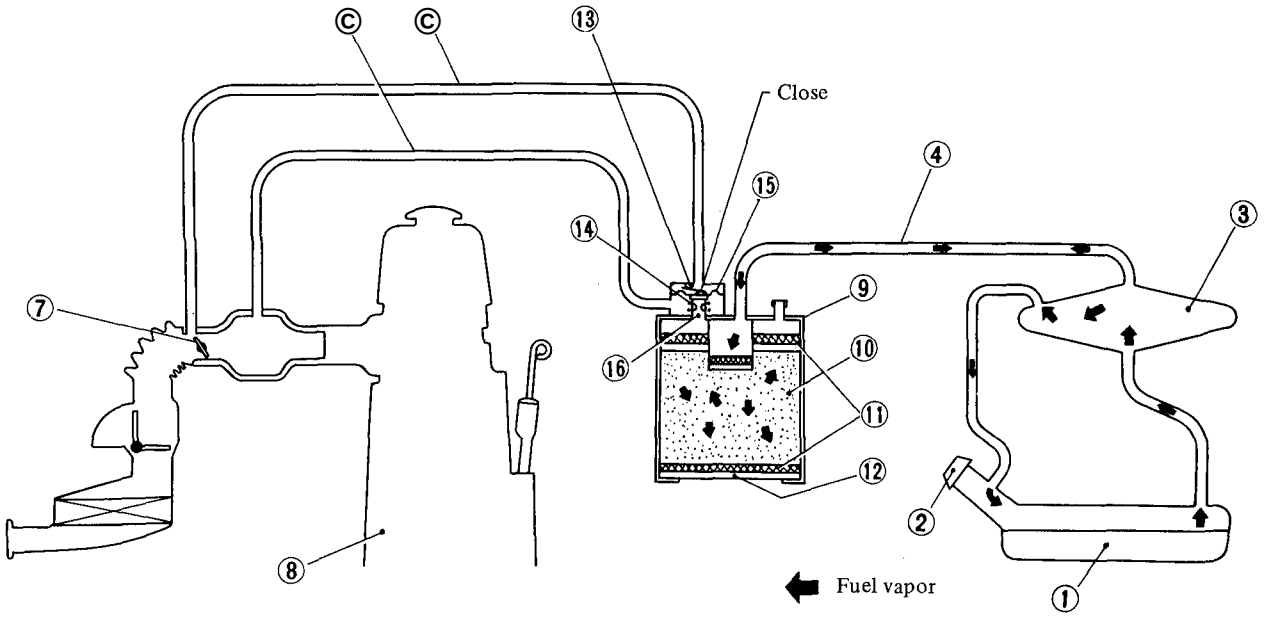


1 Carbon canister
2 Vacuum signal line
3 Canister purge line
4 Vapor vent line
5 Fuel filler cap with vacuum relief valve
6 Liquid/vapor separator
7 Fuel tank

Fig. EC-55 Schematic drawing of transmission controlled vacuum advance system

OPERATION

Fuel vapors from the sealed fuel tank are led into the carbon canister. The canister is filled with activated charcoals to absorb the fuel vapors when the engine is at rest or at idling. See Figure EC-56.



1	Fuel tank	6	Canister purge line	12	Filter
2	Fuel filler cap with vacuum relief valve	7	Throttle valve	13	Purge control valve
3	Liquid/vapor separator	8	Engine	14	Diaphragm spring
4	Vapor vent line	9	Carbon canister	15	Diaphragm
5	Vacuum signal line	10	Activated carbon	16	Fixed orifice
		11	Screen		

Fig. EC-56 Evaporative emission control system (Fuel vapor flow when engine is at rest or at idle.)

As the throttle valve opens and car speed increases, vacuum pressure in the vacuum signal line forces the purge control valve to open, and admits an orifice to intake manifold and fuel vapor is then drawn into the intake manifold through the canister purge line. See Figure EC-57.

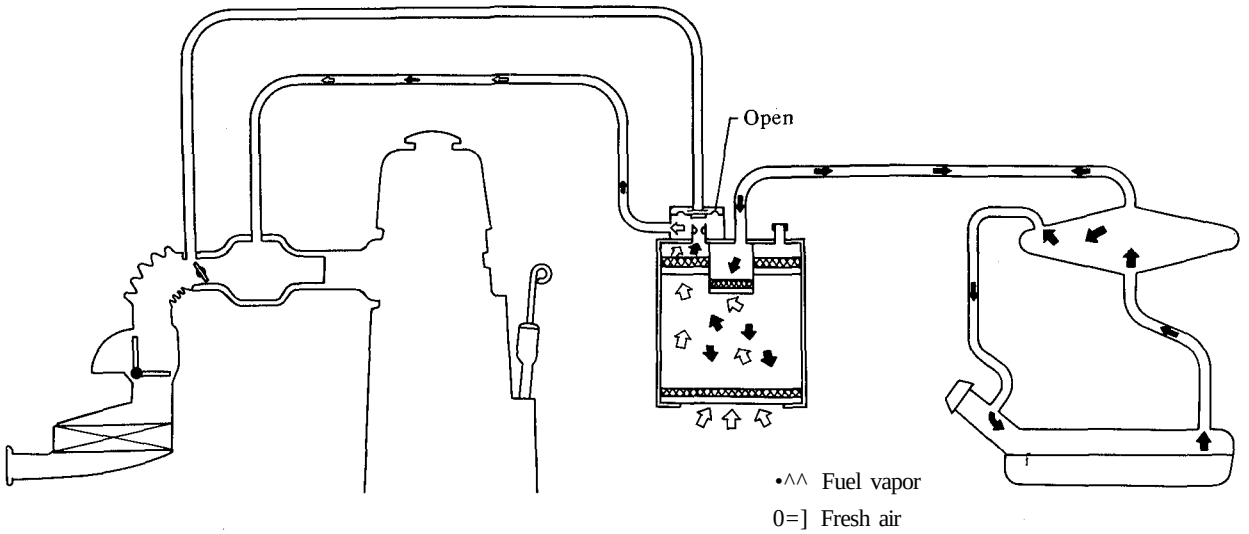


Fig. EC-57 Evaporative emission control system (Fuel vapor flow when engine is running)