

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 ..... EC- 2
EXHAUST EMISSION CONTROL SYSTEM ..... EC- 3
EVAPORATIVE EMISSION CONTROL SYSTEM EC-22

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.

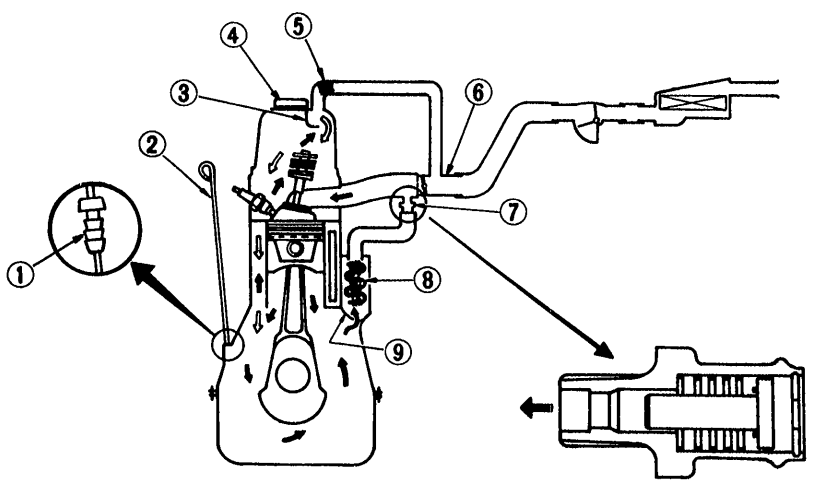
Replace P.C.V. valve in accordance with the maintenance schedule.

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 Seal rubber
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

EC805

Fig. EC-1 Crankcase emission control system

EXHAUST EMISSION CONTROL SYSTEM

CONTENTS

DESCRIPTION ..... EC- 3
BOOST CONTROLLED DECELERATION DEVICE (B.C.D.D.) ..... EC- 5
  DESCRIPTION ..... EC- 5
  OPERATION ..... EC- 5
  REMOVAL ..... EC- 6
  INSPECTION ..... EC- 6
EXHAUST GAS RECIRCULATION (E.G.R.) CONTROL SYSTEM ..... EC- 9
  DESCRIPTION ..... EC- 9
  STRUCTURE AND OPERATION EC-10
  REMOVAL AND INSTALLATION EC-12
  INSPECTION EC-13
CATALYTIC CONVERTER SYSTEM EC-15
  DESCRIPTION EC-15
  OPERATION EC-15
  REMOVAL AND INSTALLATION EC-16
FLOOR TEMPERATURE WARNING SYSTEM EC-16
  DESCRIPTION EC-16
  OPERATION EC-17
  REMOVAL AND INSTALLATION EC-18

DESCRIPTION

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

1. Boost controlled deceleration device (B.C.D.D.).
2. Exhaust gas recirculation (E.G.R.) system.
3. Catalytic converter system (California models).
4. Floor temperature warning system (California models).

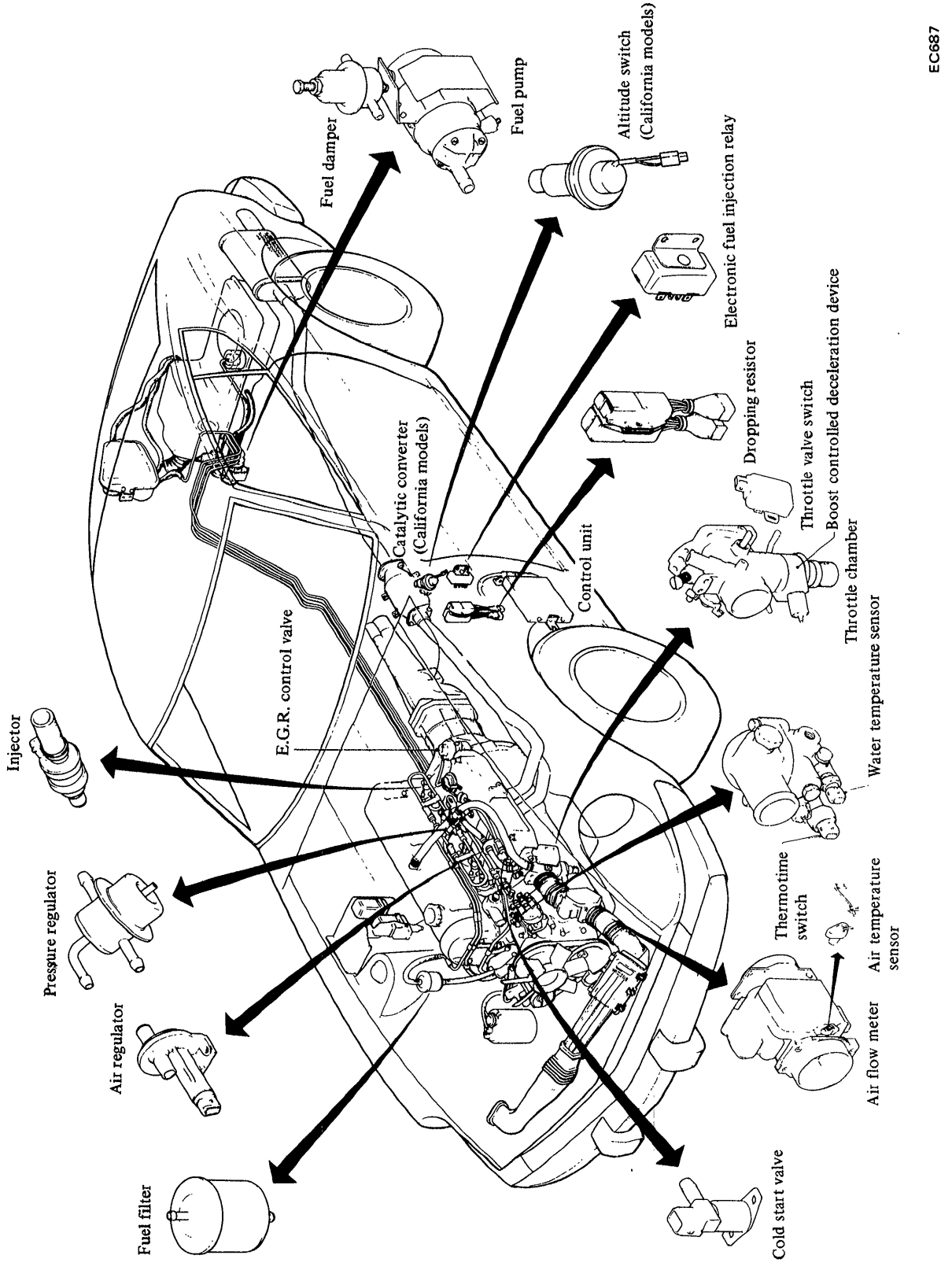


Fig. EC-2 Location of emission control system components

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 ⑩ 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 ⑱ and actuates diaphragm II ⑫.

When diaphragm II operates, the air control valve ⑬ 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 ⑬ 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

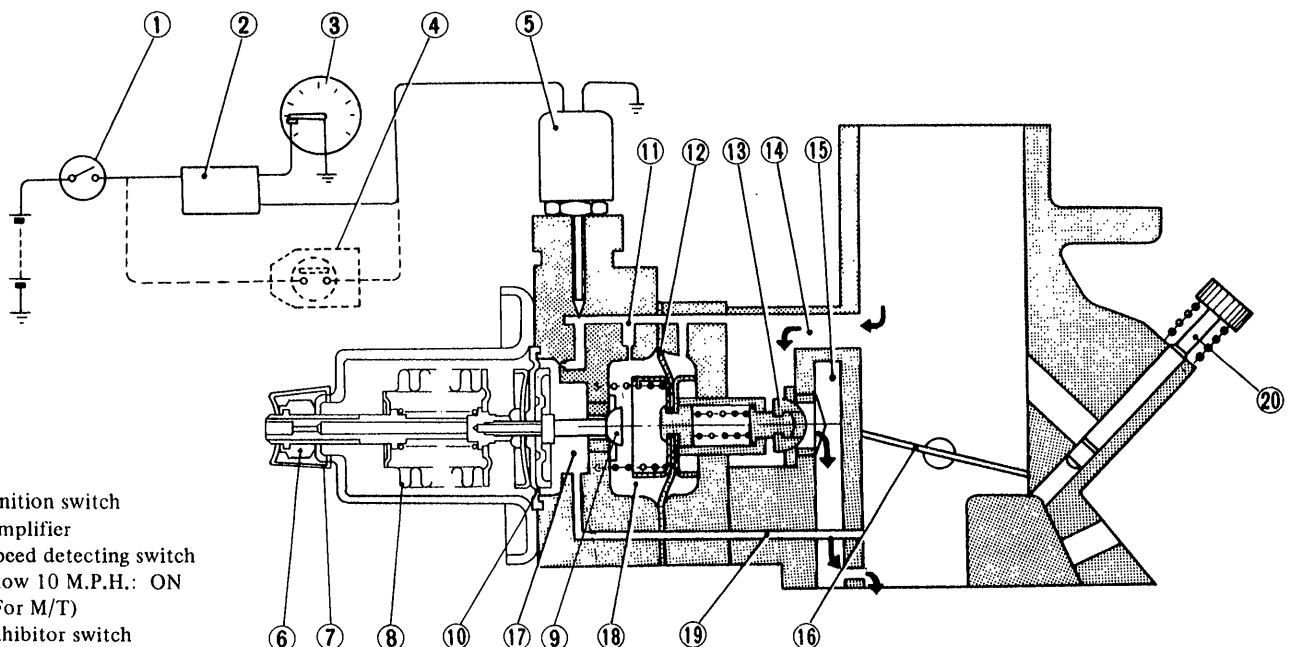
Manual transmission models:

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" position, 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 10 M.P.H.: ON (For M/T)
4 Inhibitor switch "N" or "P" position: ON (For A/T)
5 Vacuum control solenoid valve
6 Adjusting nut
7 Lock spring
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

EC688

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

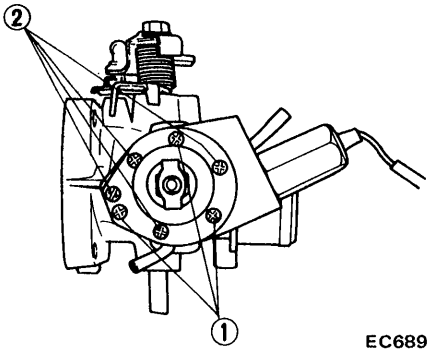
REMOVAL

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 ①.

Do not unscrew the four B.C.D.D. assembly screws ②.



EC689

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

2. To install, reverse the removal procedure.

Tightening torque:
20 to 40 kg-cm
(17 to 35 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 Figures EC-5 and EC-6.

Manual transmission models

1. Check for continuity between A and B when car is brought 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.

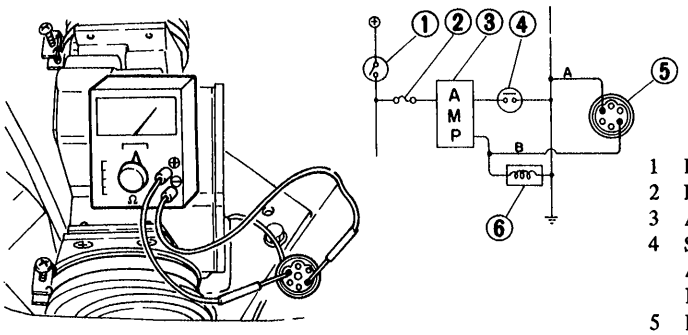
2. Check for presence of voltage across A and B [at a speed of more than 16 km/h* (10 MPH)]. Refer to Figure EC-5.

* 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.



EC373

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

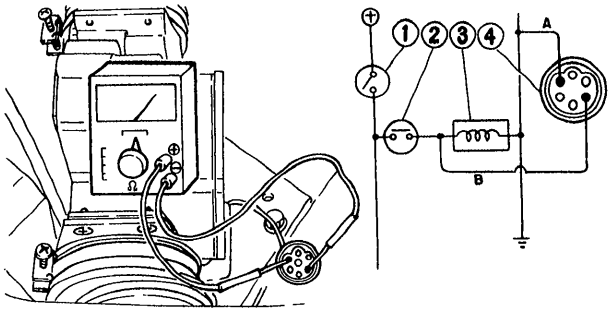
1. Turn ignition key to "ON" position.
2. With inhibitor switch "ON" ("N" or "P" position), check for presence of voltage across A and B. Refer to Figure EC-6.

- 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" position), 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.



EC374

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

Fig. EC-6 Checking B.C.D.D. circuit with function test connector (for automatic transmission)

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.

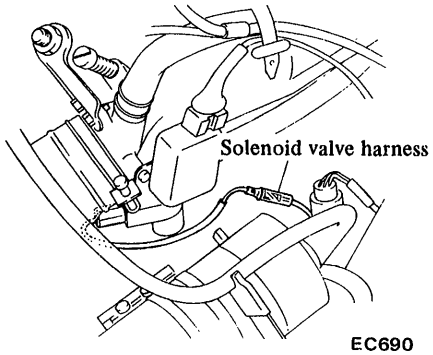


Fig. EC-7 Checking solenoid valve

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 (1 A 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.

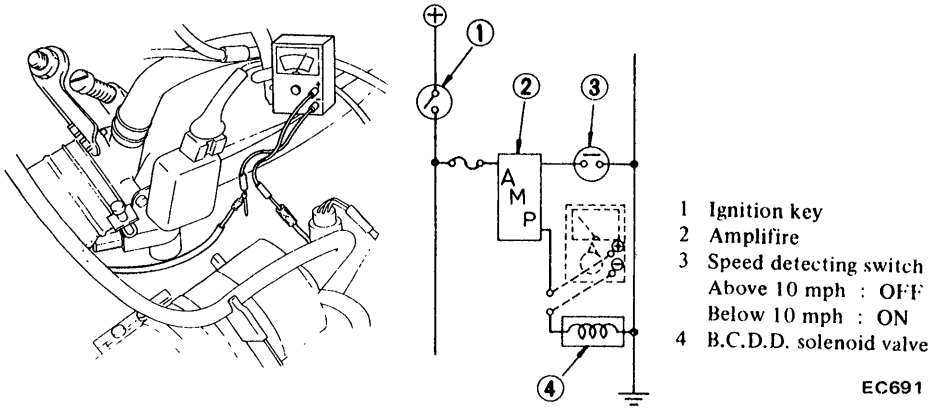


Fig. EC-8 Checking amplifier

Inhibitor switch (Automatic transmission models)

Refer to the AT 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.

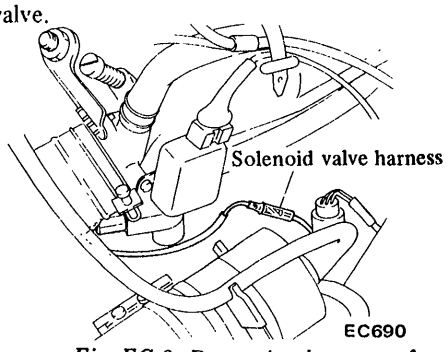


Fig. EC-9 Removing harness of solenoid valve

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

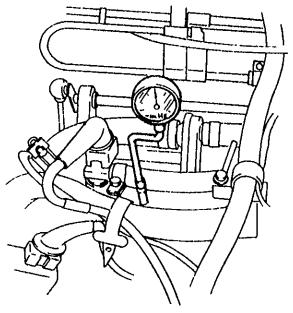


Fig. EC-10 Connecting vacuum gauge

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

Then adjust the engine at normal idling setting. (Refer to the item "Checking Engine Idle RPM and Mixture Ratio" in page ET-7.)

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 (−23.6 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.

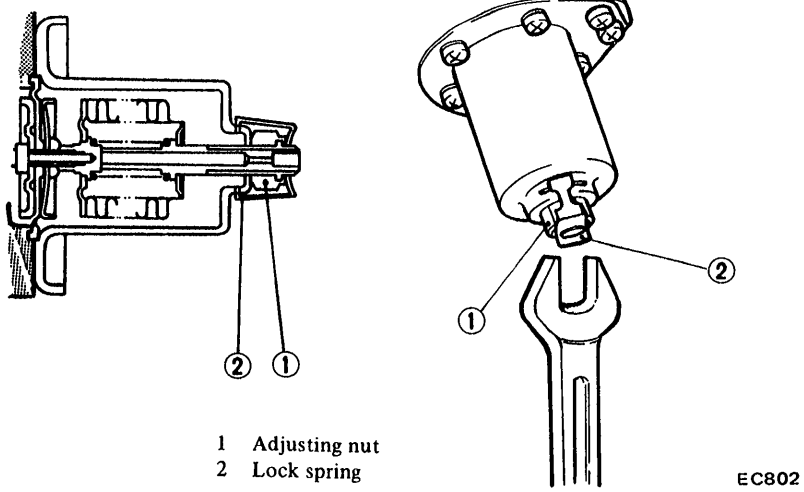
Specified pressure (0 m, sea level and 760 mmHg (29.9 inHg), atmospheric pressure)
Manual transmission and
Automatic transmission:
−460 to −480 mmHg
(−18.1 to −18.9 inHg)

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 375 mmHg (14.8 inHg).

7. If it is higher than the set level, turn the adjusting nut clockwise until correct adjustment is made.



1 Adjusting nut
2 Lock spring

Fig. EC-11 Adjusting set pressure

Note: When adjusting B.C.D.D., turn adjusting nut in or out with lock spring in place.

Always set lock spring properly to prevent changes in set pressure.

8. Race the engine and check for adjustment.
9. If it is lower than the set level, turn the adjusting screw counterclockwise 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 not 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" position (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.

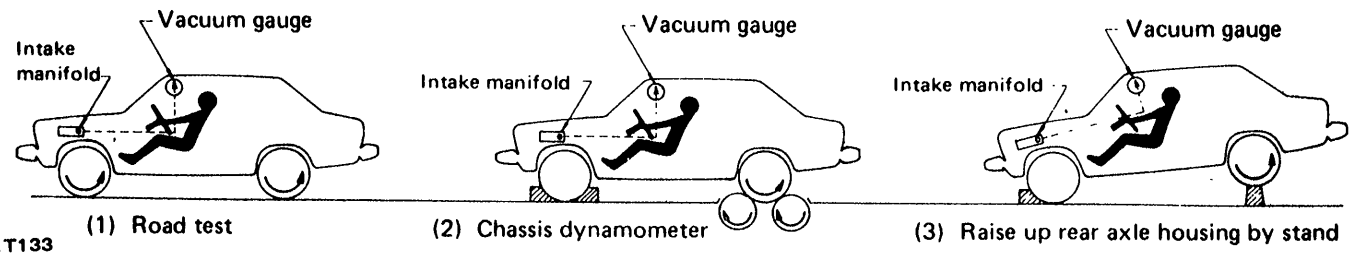


Fig. EC-12 Testing operating pressure of the B.C.D.D.

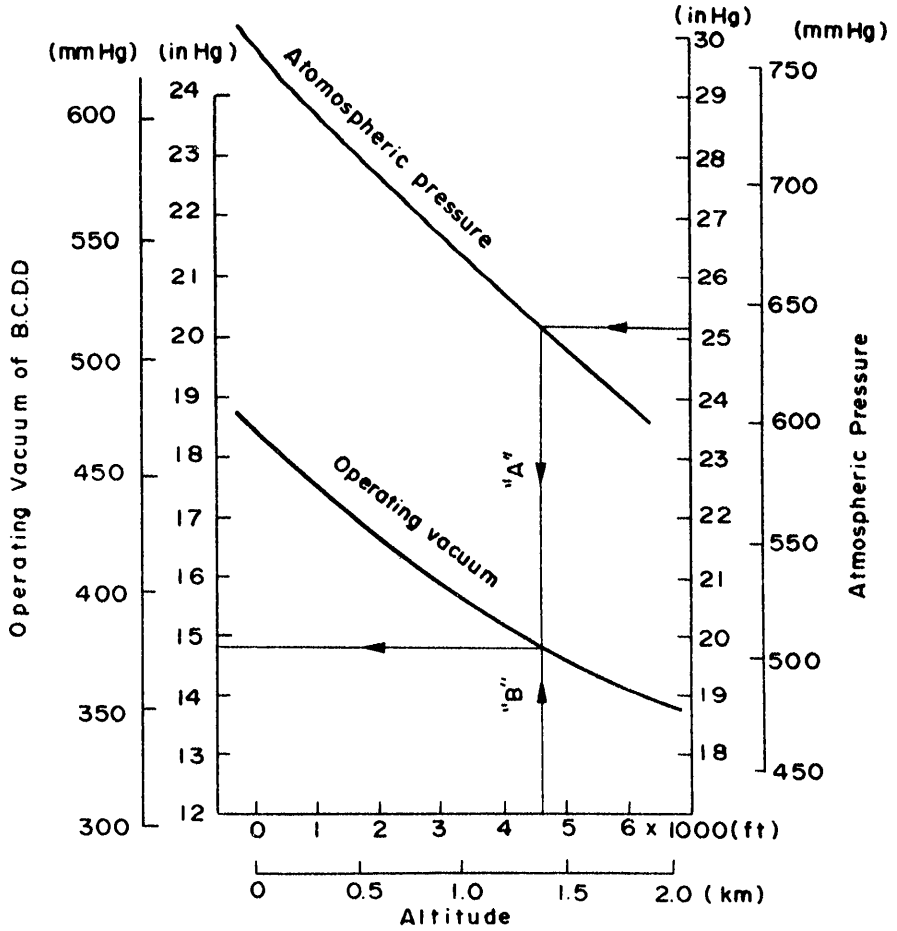


Fig. EC-13 Changes in operating pressure versus changes in atmospheric pressure and altitude

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

DESCRIPTION

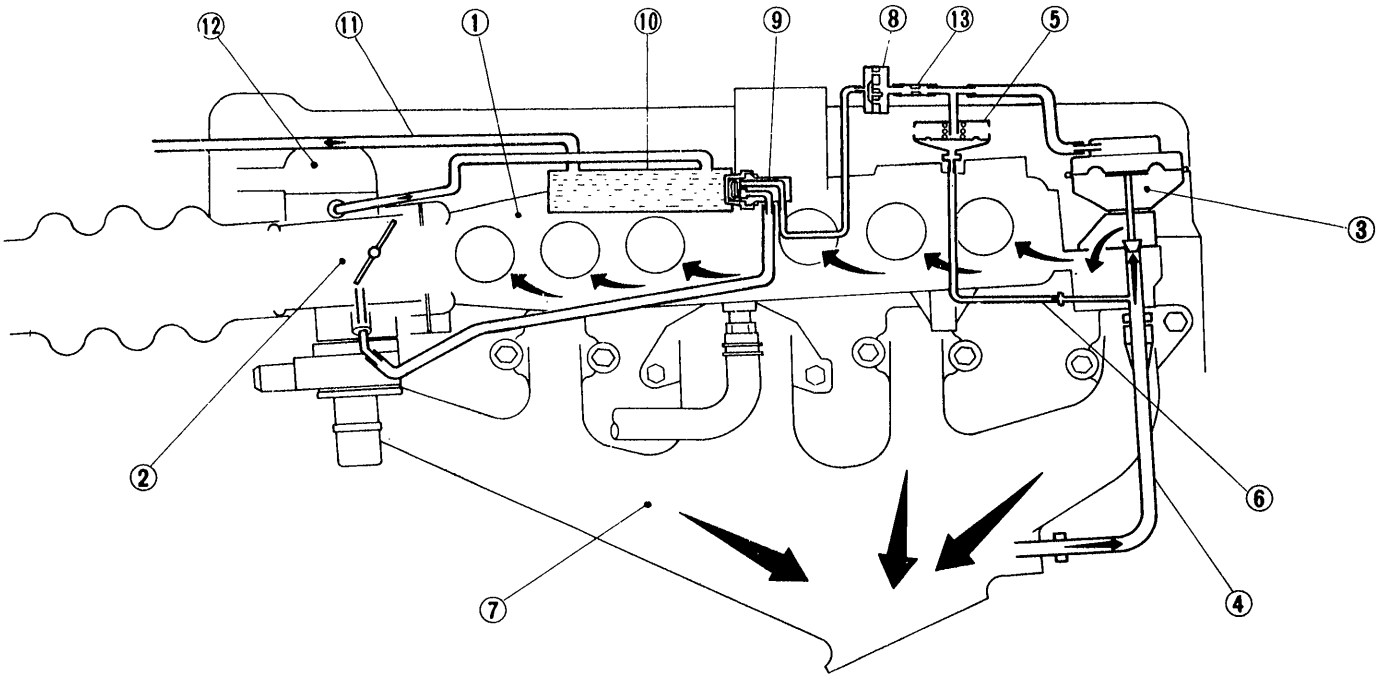
In the exhaust gas recirculation system, a part of the exhaust gas is returned to the combustion chamber to lower the spark flame temperature during combustion. This results in a reduction of the nitrogen oxide content in the exhaust gas.

The exhaust gas recirculation system consists of an intake manifold, an E.G.R. control valve, a thermal vacuum valve, a back pressure transducer (B.P.T.) valve, an E.G.R. tube, a B.P.T. valve control tube, a vacuum delay valve (California models only) and hoses.

The thermal vacuum valve, B.P.T. valve and vacuum delay valve (California models only) are located in the vacuum line between the throttle chamber and the E.G.R. control valve. The thermal vacuum valve and the B.P.T. valve are operated according to changes in water temperature and exhaust pressure, respectively.

Exhaust gases are recirculated in the intake manifold when intake manifold pressure is high enough [50 mmHg (2.0 inHg) min. inside the E.G.R. control vacuum chamber], the thermal vacuum valve is opened and the B.P.T. valve is closed.

Figure EC-14 shows a functional diagram of the E.G.R. control system.



1 Intake manifold
2 Throttle chamber
3 E.G.R. control valve
4 E.G.R. tube
5 B.P.T. valve
6 B.P.T. valve control tube
7 Exhaust manifold
8 Vacuum delay valve (California model only)
9 Thermal vacuum valve
10 Heater housing
11 Water return tube
12 Thermostat housing
13 Vacuum orifice

EC693

Fig. EC-14 E.G.R. control system

STRUCTURE AND OPERATION

Operation of E.G.R. system is as shown below.

Water temperature °C (°F)	Thermal vacuum valve	B.P.T. valve mmH2O (inH2O)		E.G.R. control valve	E.G.R.
40 to 47 (104 to 117) max.	Close	Exhaust pressure 17 to 37 (0.65 to 1.47) max.	Open	Close	Not actuated
		17 to 37 (0.65 to 1.47) min.	Close	Close	Not actuated
47 to 53 (117 to 127) min.	Open	Exhaust pressure 17 to 37 (0.65 to 1.47) max.	Open	Close	Not actuated
		17 to 37 (0.65 to 1.47) min.	Close	Open	Actuated

Note: With the engine at idle or at full throttle, the E.G.R. control valve closes to deactivate the E.G.R. system regardless of water temperature (operation of the thermal vacuum valve) and B.P.T. valve.

E.G.R. "OFF" operation

The E.G.R. system does not operate when the engine is under any of the following operating conditions:

1) Idle or full throttle

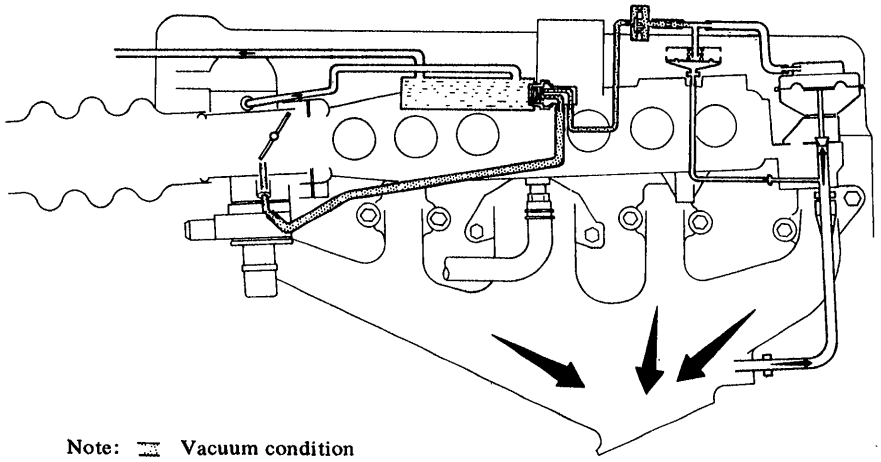
Intake manifold vacuum pressure is not high enough to lift the E.G.R. control valve.

2) Thermal vacuum valve in "closed" state

This valve is closed when the water temperature is below 40 to 47°C (104 to 117°F), admitting no intake manifold vacuum to the E.G.R. control valve vacuum chamber.

3) Exhaust pressure below 17 to 37 mmH2O (0.65 to 1.47 inH2O) applied to B.P.T. valve.

Intake manifold vacuum pressure is not high enough to lift the E.G.R. control valve since the B.P.T. valve vacuum chamber is open to atmosphere.



Note: ▤ Vacuum condition

EC694

Fig. EC-15 E.G.R. system in "OFF" operation

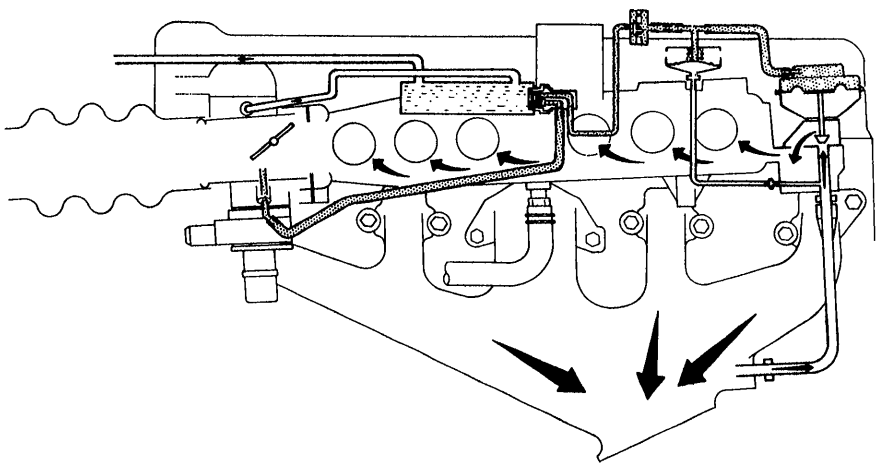
E.G.R. "ON" operation

The E.G.R. system operates when the engine is operating under the following three conditions:

1) Operating at other than idling or full throttle

2) Thermal vacuum valve in "open" state, that is water temperature above 47 to 53°C (117 to 127°F), and

3) Exhaust pressure applied to B.P.T. valve above 17 to 37 mmH2O (0.65 to 1.47 inH2O)



Note: ▤ Vacuum condition

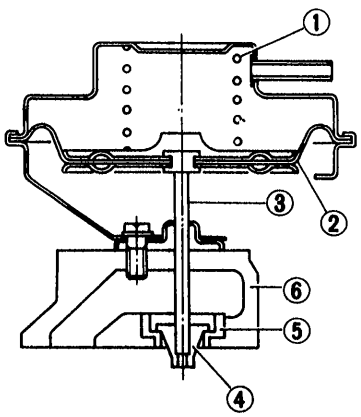
EC695

Fig. EC-16 E.G.R. system in "ON" operation

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 construction of the E.G.R. control valve is shown below. See Figure EC-17.



1 Diaphragm spring
2 Diaphragm
3 Valve shaft
4 Valve
5 Valve seat
6 Valve chamber

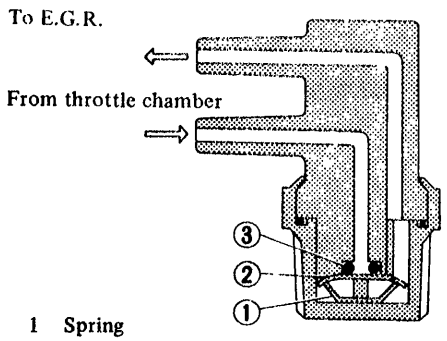
EC231

Fig. EC-17 E.G.R. control valve

Thermal vacuum valve

The thermal vacuum valve is mounted in the heater housing on the intake manifold. It detects engine coolant temperature by means of a built-in bi-metal, and opens or closes the vacuum passage in the thermal vacuum valve. When the vacuum passage is open, the throttle chamber suction vacuum is applied through the B.P.T. valve to the diaphragm of the E.G.R. control valve to actuate the taper valve connected to the diaphragm.

The construction of the thermal vacuum valve is shown below. See Figure EC-18.



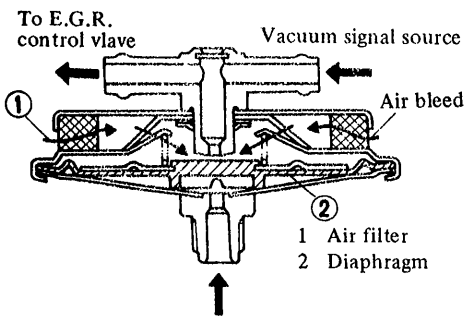
1 Spring
2 Bi-metal
3 O-ring

EC232

Fig. EC-18 Thermal vacuum valve

B.P.T. valve

The B.P.T. valve monitors exhaust pressure to activate the diaphragm, controlling intake manifold vacuum applied to the E.G.R. control valve. In other words, recirculated exhaust gas is controlled in response to positioning of the E.G.R. control valve or to engine operation.

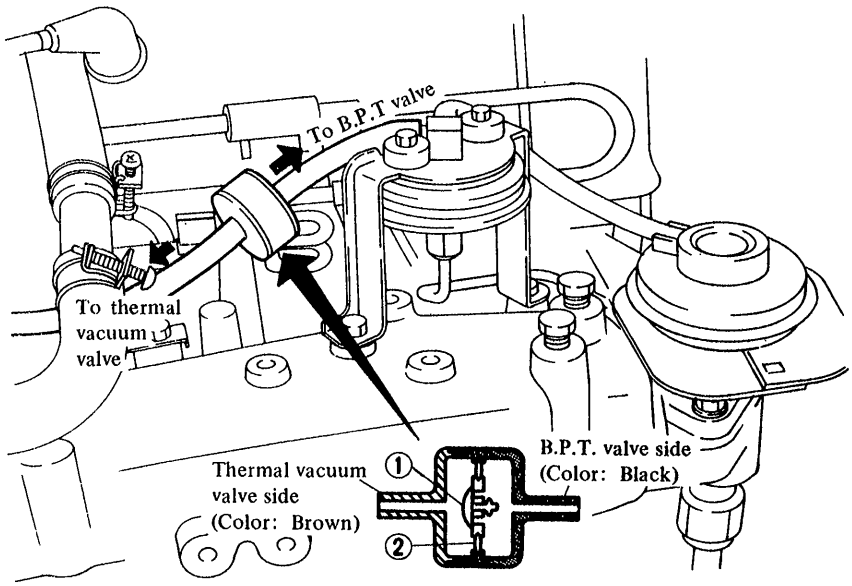


EC787

Fig. EC-19 B.P.T. valve

Vacuum delay valve (California models only)

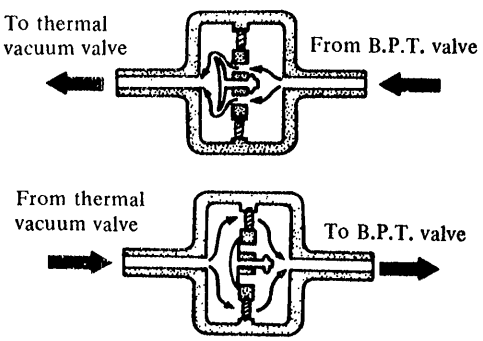
During rapid acceleration the vacuum delay valve prevents an abrupt escape of vacuum from the line between the throttle chamber and the length of E.G.R. operation. The valve is designed for one-way operation and consists of a one-way umbrella valve and a sintered steel fluidic restrictor.



EC796

Fig. EC-20 Vacuum delay valve

When installing this valve, ensure that it properly oriented.



EC697

Fig. EC-21 Operation of vacuum delay valve

REMOVAL AND INSTALLATION

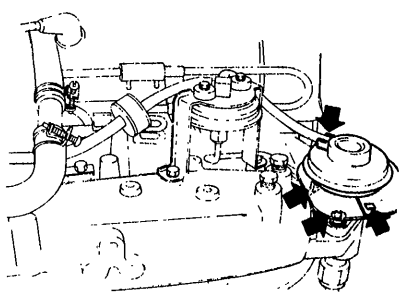
Removal

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 B.P.T. valve.
- Heat shield plate for E.G.R. control valve.
- Nuts attaching E.G.R. control valve to intake manifold.

Note: To remove vacuum hose, flatten clip connecting vacuum hose to E.G.R. control valve and remove hose with hand.



EC797

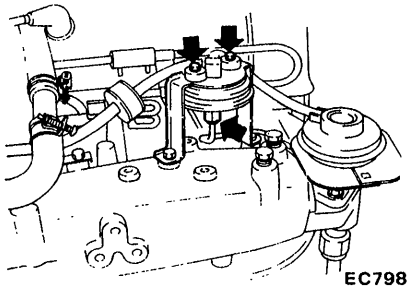
Fig. EC-22 Removing E.G.R. control valve

2. B.P.T. valve

The B.P.T. valve is attached to the intake manifold through the mounting bracket.

To dismount B.P.T. valve, remove following parts:

- Vacuum hose (E.G.R. valve to B.P.T. valve)
- Vacuum hose (Thermal vacuum valve to B.P.T. valve)
- B.P.T. valve control tube connector
- Bolts attaching B.P.T. valve to mounting bracket



EC798

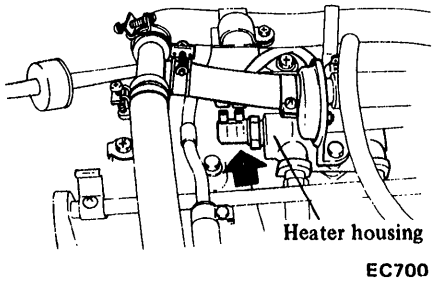
Fig. EC-23 Removing B.P.T. valve

3. Thermal vacuum valve

After removing following parts, thermal vacuum valve can be dismounted.

- Vacuum hose (throttle chamber to thermal vacuum valve)
- Vacuum hose (Thermal vacuum valve to B.P.T. valve)

Note: Drain engine coolant before dismounting thermal vacuum valve.



EC700

Fig. EC-24 Removing thermal vacuum valve

Note: When installing thermal vacuum valve, tighten to 2.2 kg-m (16 ft-lb) max. Make sure that valve is water-tight after installation.

Installation

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

INSPECTION

1. Make a thorough visual check of E.G.R. control system. It necessary, wipe away oil to facilitate inspection.

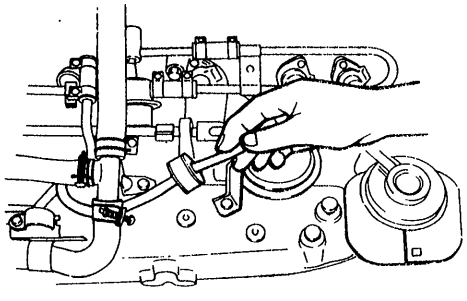
If any hoses are cracked or broken, replace.

2. With engine stopped, inspect E.G.R. control valve for any indication of binding or sticking by moving diaphragm of control valve upwards with finger.

3. With engine running, inspect thermal vacuum valve. When engine coolant temperature is below 40°C (104°F).

- Disconnect one end (B.P.T. valve side) of vacuum hose connecting thermal vacuum valve to B.P.T. valve.
- Increase engine speed from idling to 3,000 to 3,500 rpm.
- Make sure that thermal vacuum valve is close, and that throttle chamber vacuum does not exist at end of vacuum hose.

  If a vacuum is present, replace thermal vacuum valve.



EC799

Fig. EC-25 Checking thermal vacuum valve

4. With engine running, inspect thermal vacuum valve, B.P.T. valve, and E.G.R. control valve. When engine coolant temperature is above 53°C (127°F).

(1) Thermal vacuum valve

- Disconnect one end (B.P.T. valve side) of vacuum hose connecting thermal vacuum valve to B.P.T. valve.
- Increase engine speed from idling to 3,000 to 3,500 rpm.
- Make sure that thermal vacuum valve is open, and that throttle chamber vacuum is present at end of vacuum hose.

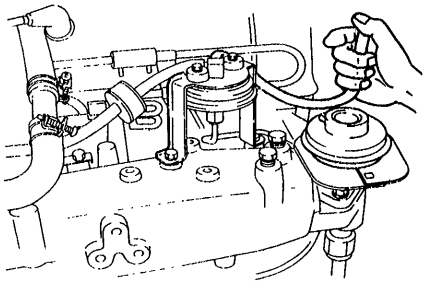
  See Figure EC-25.

  If vacuum is weak or is not present at all, replace thermal vacuum valve.

(2) B.P.T. valve

- Disconnect one end (E.G.R. control valve side) of vacuum hose connecting B.P.T. valve to E.G.R. control valve.
- Increase engine speed from idling to 3,000 to 3,500 rpm.
- Make sure that B.P.T. valve is operating, and that throttle chamber vacuum is present at end of vacuum hose.

  If vacuum is not present at all, replace B.P.T. valve.



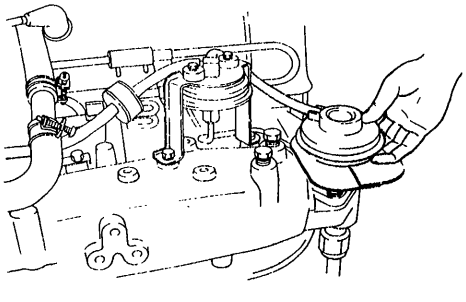
EC800

Fig. EC-26 Checking B.P.T. valve

(3) E.G.R. control valve

- Make sure that E.G.R. control valve is operated when engine speed is increased from idling to 3,000 to 3,500 rpm.

  Place a finger on diaphragm of E.G.R. control valve to check for valve movement. If diaphragm does not move, replace E.G.R. control valve.



EC801

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

If any difficulty is encountered in judging the condition of any component during above inspection, check the questionable component independently as follows:

Thermal vacuum valve

Dismount thermal vacuum valve from heater housing.

Note: Before dismounting, drain engine coolant from engine.

Check to be sure that thermal vacuum valve opens or closes in response to engine coolant temperature as specified.

Thermal vacuum valve should open at a temperature of 47 to 53°C (117 to 127°F) completing the vacuum passage.

Note: Do not allow water to get inside the thermal vacuum valve.

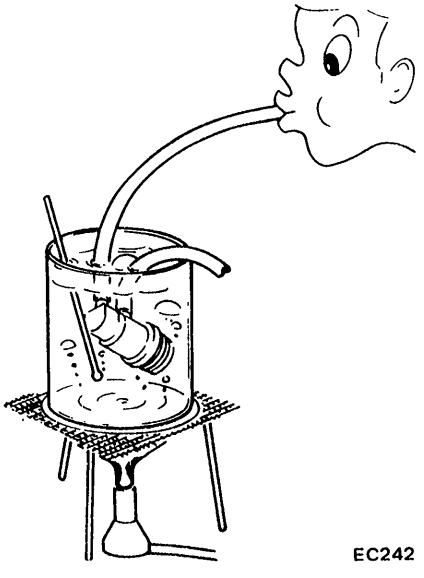


Fig. EC-28 Checking thermal vacuum valve

Vacuum delay valve (California models only)

1. Remove vacuum delay valve.
2. Blow air through port on B.P.T. valve side, then through the other port (on thermal vacuum valve side). Vacuum delay valve is in good condition if, when finger is placed over port on thermal vacuum valve side, air flow resistance is greater than that on the other side.

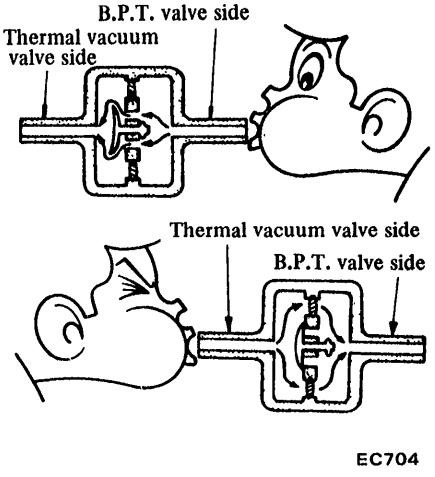


Fig. EC-29 Checking vacuum delay valve

3. If a considerable air flow resistance is felt at port on thermal vacuum valve side in step 2 above and if the condition of vacuum delay valve is questionable, dip port (on B.P.T. valve side) into a cup filled with water. Blow air through the other port. Small air bubbles should appear.

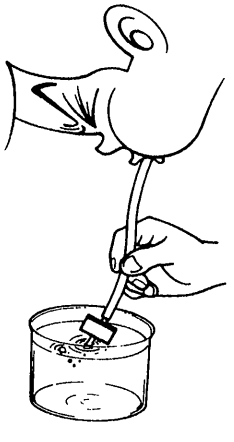


Fig. EC-30 Checking vacuum delay valve

Note: Be careful to avoid entry of oil or dirt into valve.

B.P.T. valve

Disconnect B.P.T. valve from engine.

1. Apply a pressure above 50 mm H_2O (2 inH_2O) to B.P.T. valve and orally suck port back, as shown in Figure EC-31, to check for leakage. If a leak is noted, replace valve.

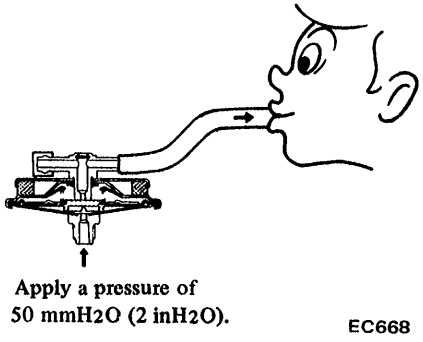


Fig. EC-31 Checking B.P.T. valve

E.G.R. control valve

Dismount E.G.R. control valve from engine.

1. Apply vacuum to E.G.R. control valve, referring to the following figure. If the valve moves to full position, it is normal.

E.G.R. control valve will remain open for more than 30 seconds after vacuum has cut off.

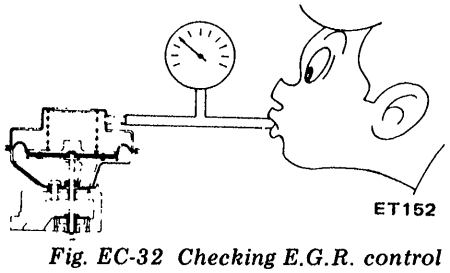


Fig. EC-32 Checking E.G.R. control valve

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

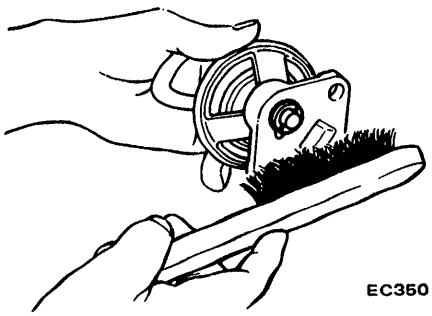


Fig. EC-33 Cleaning E.G.R. control valve

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_2O).

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.

This converter is installed on all California models. Refer to Figure EC-34 for the location of this unit.

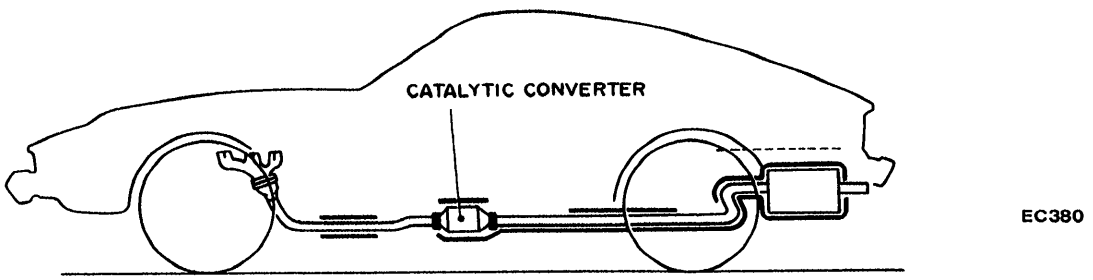


Fig. EC-34 Location of catalytic converter

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 (CO_2) and water (H_2O). 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 (CO_2) and water (H_2O) before the exhaust gas is discharged to the atmosphere.

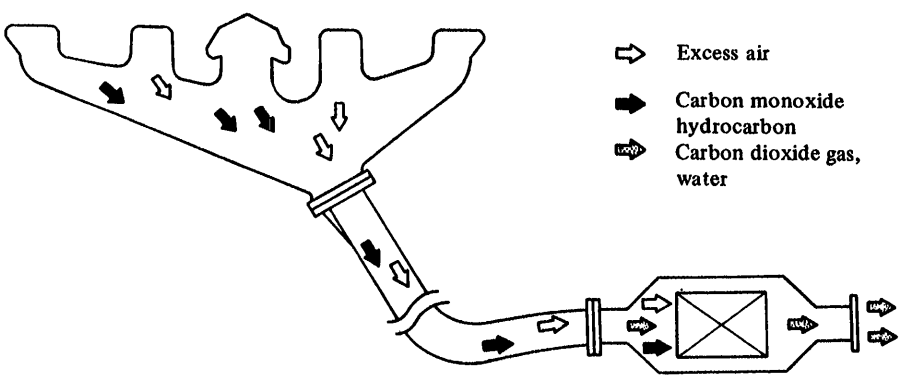


Fig. EC-35 Operation of catalytic converter

REMOVAL AND INSTALLATION

Removal and installation can be done as follows:

Removal

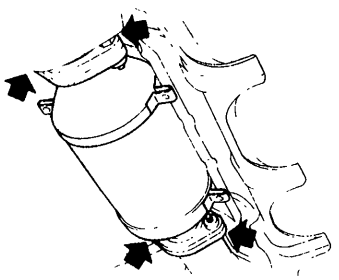
Catalytic converter

1. Apply parking brake.
2. Place wheel lock under each tire.
3. Jack up the car.
4. Remove lower shelter of catalytic converter.
5. Dismount catalytic converter.

Notes:

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

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



EC706

Fig. EC-36 Removing catalytic converter

Installation

Install catalytic converter to exhaust front and rear tubes. For installation procedures of catalytic converter, refer to Section "FE".

Tightening torque specifications chart

	Tightening torque
Catalytic converter to exhaust front and rear tubes	3.2 to 4.3 kg-m (23 to 31 ft-lb)

Inspection

Preliminary inspection

Visually check condition of ignition system, E.F.I. system and component parts including hoses, tubes, and wires, replace if necessary.

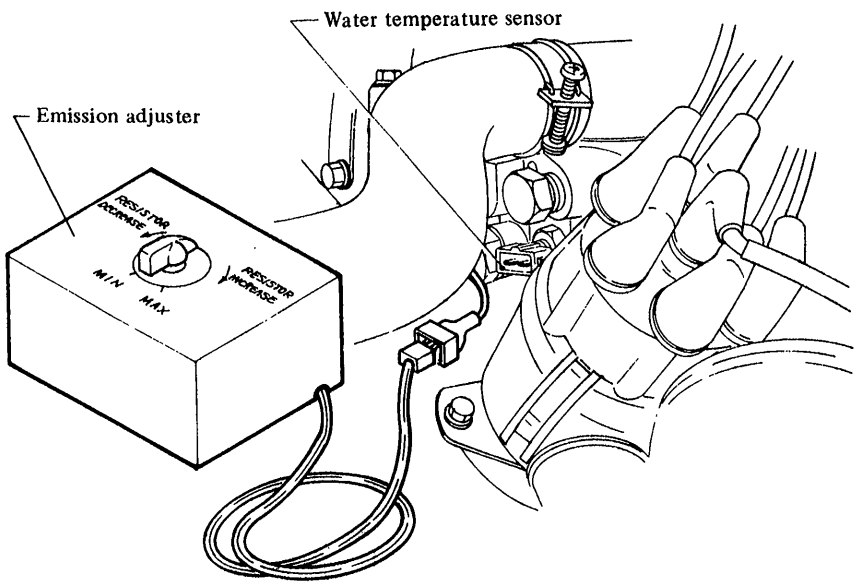
Catalytic converter

Whether catalytic converter is normal or not can be checked by observing variation in CO percentage. The checking procedure is as follows:

1. Apply parking brake. Shift gears into Neutral (for manual transmission) and Neutral or Park (for automatic transmission).

Place wheel chocks under each tire.

2. Visually check catalytic converter for damage or cracks.
3. Warm up engine thoroughly. [About 80°C (176°F)]
4. After engine has warmed up, run engine at 2,000 rpm for a few minutes under no load until catalytic converter reaches operating temperature.
5. Stop engine and turn ignition switch to "OFF" position.
6. Remove connector of water temperature sensor.
7. Connect **Emission adjuster** to harness connector of water temperature sensor. See Figure EC-37.
8. Insert CO meter probe through exhaust diffuser end until a minimum insertion length of 500 mm (19.7 in) is reached.
9. Run engine at 2,000 rpm and adjust CO percentage to 3 percent with emission adjuster.
10. Remove injector connector from number six cylinder.
11. Keep engine running at 2,000 rpm with no load.
12. If CO percentage is less than 1 percent, catalytic converter is functioning properly. (If CO percentage is more than 1 percent, catalytic converter must be replaced.)
13. Stop engine and turn ignition switch to "OFF" position.
14. Locate water temperature sensor connector and injector connector in place.



EC707

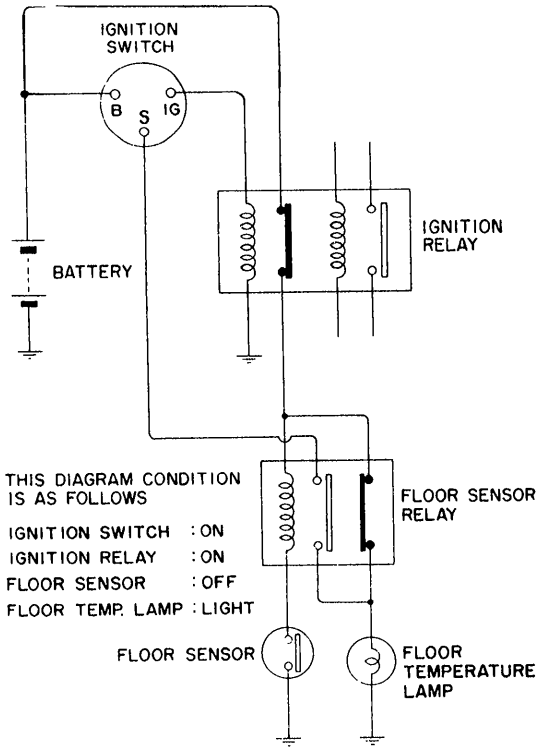
Fig. EC-37 Connecting emission adjuster

FLOOR TEMPERATURE WARNING SYSTEM

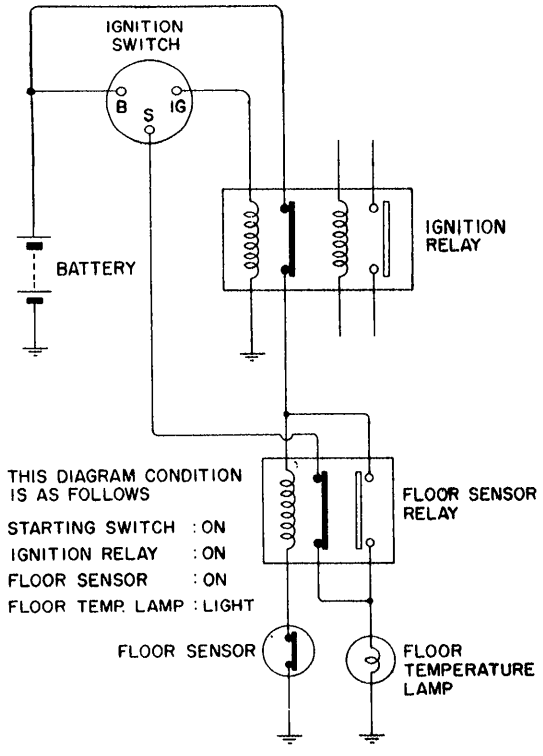
DESCRIPTION

The floor temperature warning system consists of a floor sensor installed on the car's floor, floor sensor relay installed on passenger seat bracket 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-38 and EC-39.

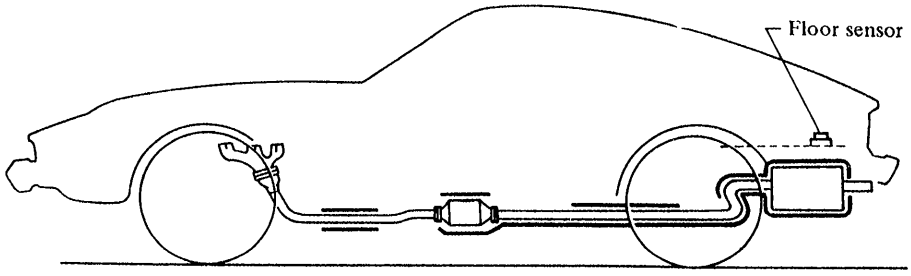


Floor sensor temperature high EC803



Ignition switch in START EC804

Fig. EC-38 Floor warning system circuit



EC398

Fig. EC-39 Location of floor sensor

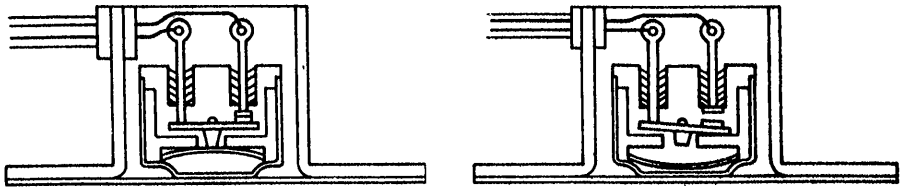
OPERATION

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.



Contact close Contact open

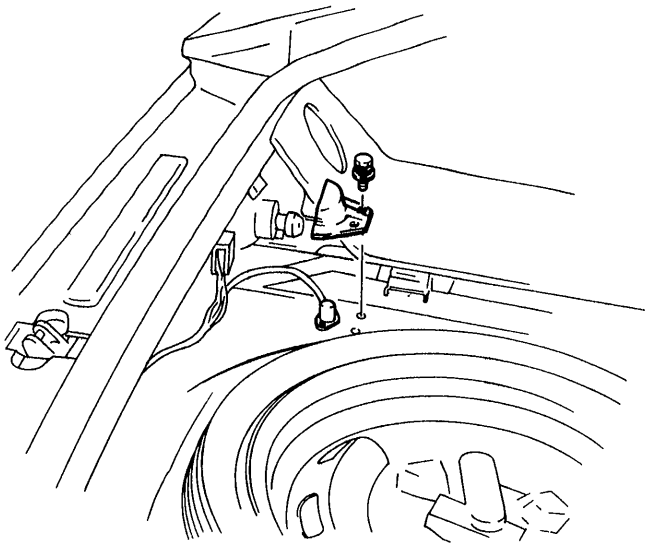
Fig. EC-40 Operation of floor sensor

REMOVAL AND INSTALLATION

Removal

Floor sensor

Remove protector before removing floor sensor. Refer to Figure EC-41.

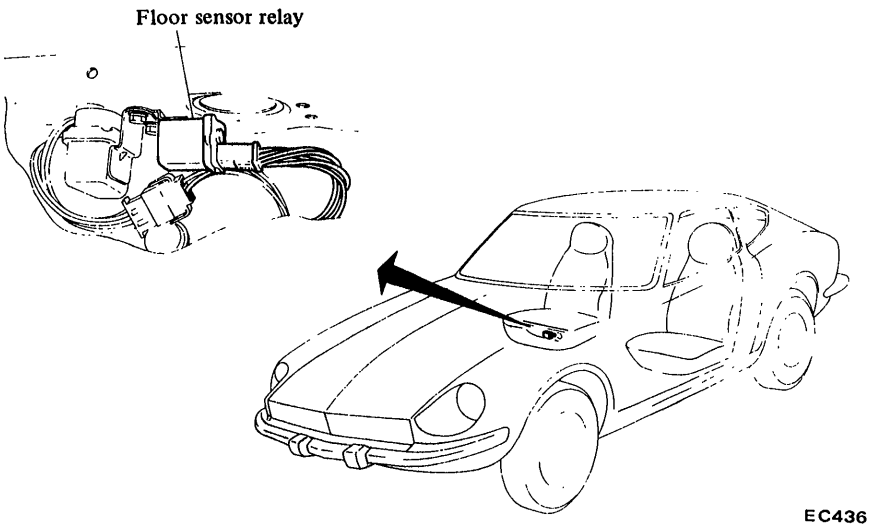


EC708

Fig. EC-41 Removing floor sensor

Floor sensor relay

Remove front passenger seat before removing floor sensor relay. Refer to Figure EC-42.

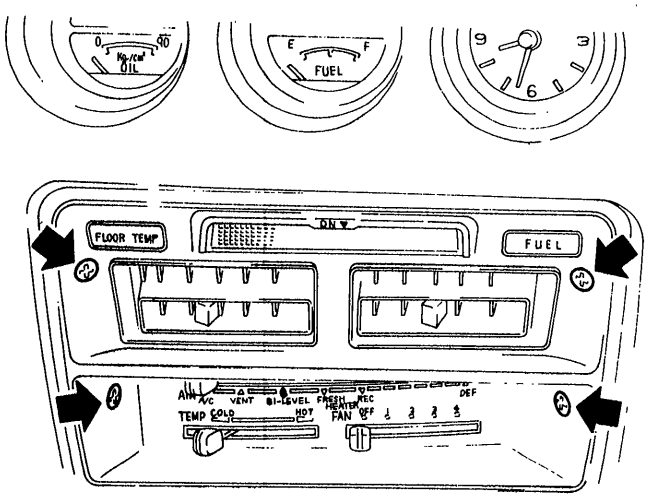


EC436

Fig. EC-42 Location of floor sensor relay

Floor temperature lamp

Remove instrument finisher before removing floor temperature warning lamp. Refer to Figure EC-43.



EC437

Fig. EC-43 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 is cool [below 80°C (176°F)] before carrying out the following:

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

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

(3) 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)

Note: Avoid heating floor sensor directly.

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

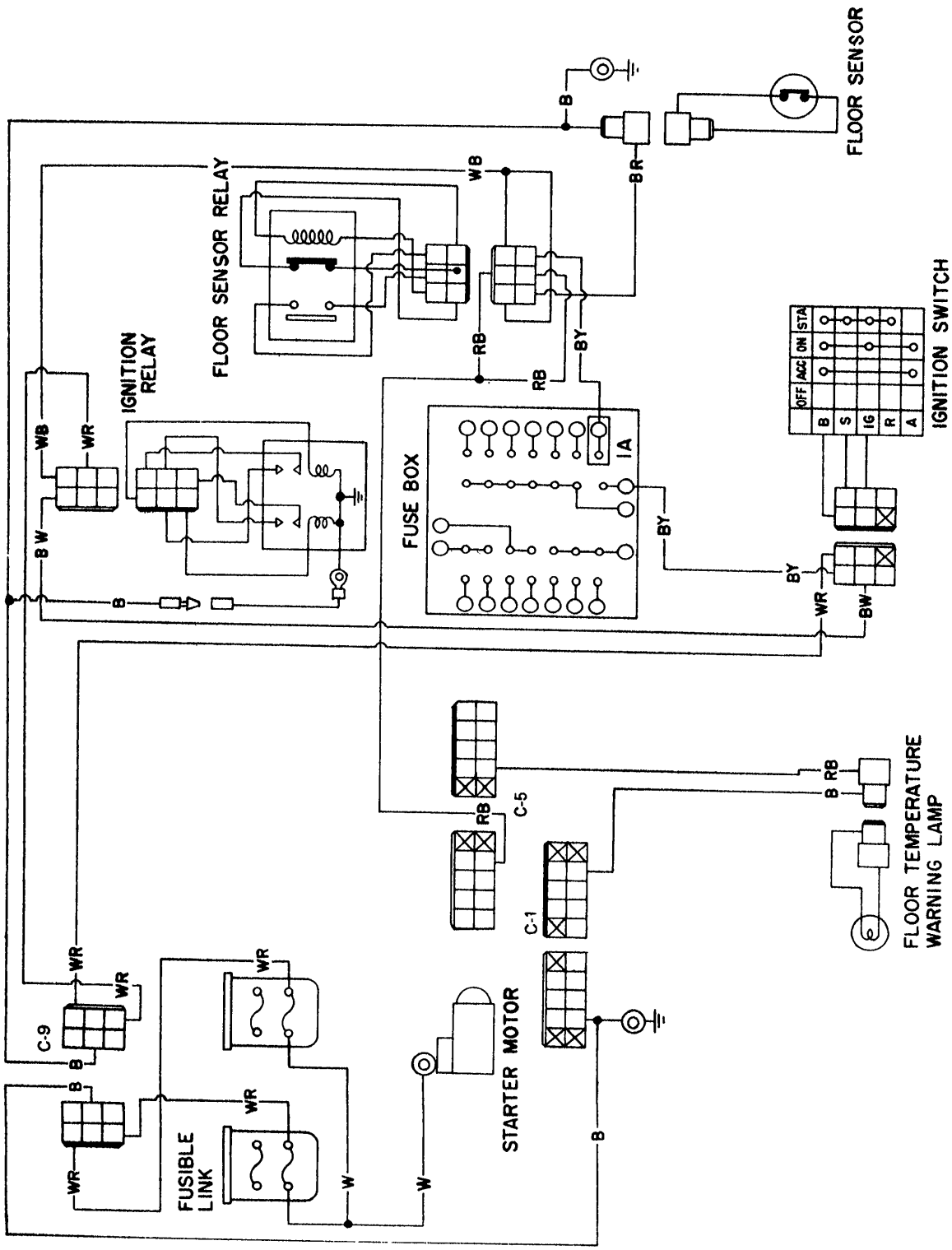
If continuity exists after heating areas around floor sensor, replace floor sensor.

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

Note: The floor sensor may be heated through the floor by a proper heater.

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-44.



EC709

Fig. EC-44 Wiring diagram of floor warning system

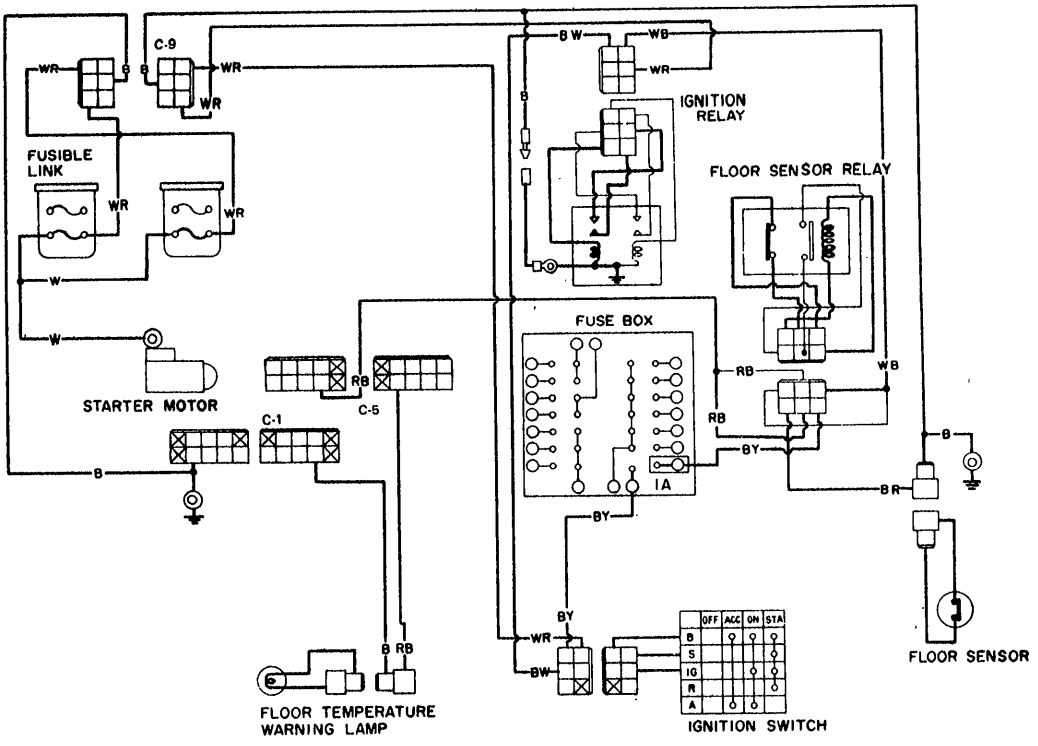


Fig. EC-45 Floor warning lamp ON with starter SW turned ON

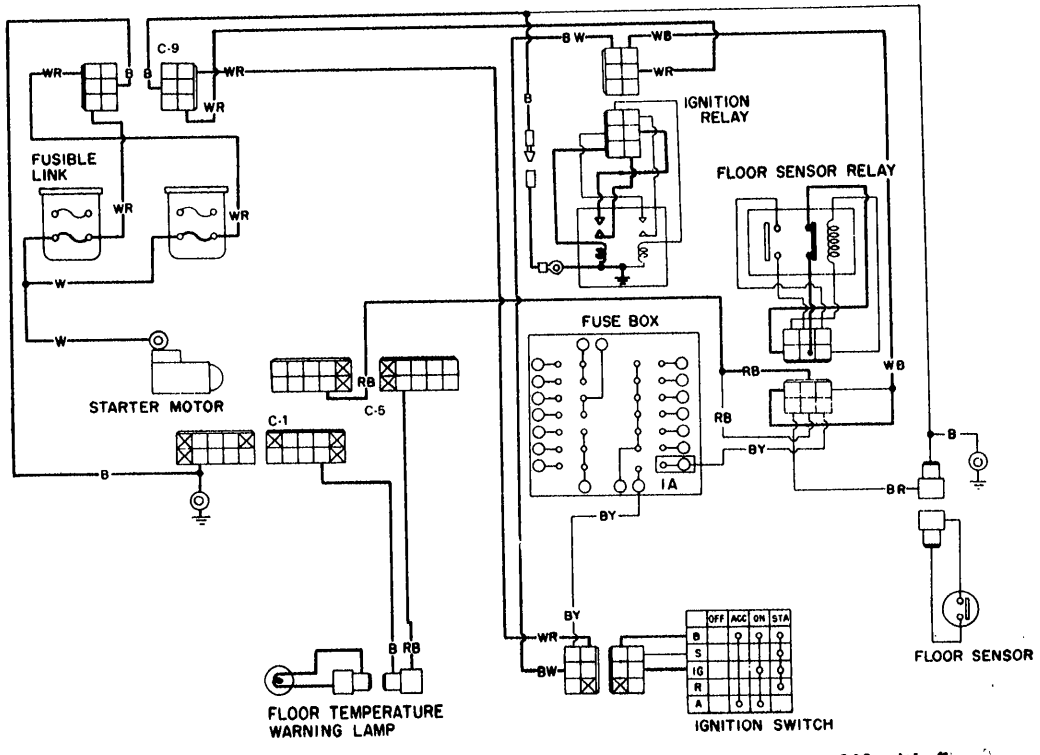


Fig. EC-46 Floor warning lamp ON with floor sensor turned OFF

Floor sensor relay

Refer to Figure EC-44.

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

1. Terminals ⑤ and ⑥
   Continuity should exist.
   Terminals ② and ④
   Continuity should exist.
   Terminals ① and ③
   Continuity should not exist.
2. Terminals ⑤ and ⑥
   12 volt should be present.
   Terminals ① and ③
   Continuity should exist.
   Terminals ② and ④
   Continuity should not exist.

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

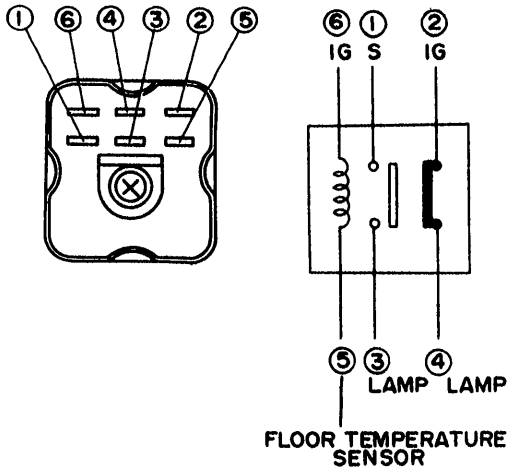


Fig. EC-47 Checking floor sensor relay

When floor temperature warning lamp lights

When warning lamp of this system is turned on frequently and further unusual power loss or abnormal engine vibration are noticed, following maintenance is to be performed.

1. Check for misactuation of warning lamp by short circuit of wiring harness.
2. Check ignition system for following items and correct if necessary. (Refer to Inspection of Ignition System.)
   (1) Ignition AMP (Transistor ignition unit)
   (2) Distributor
   (3) Ignition coil
   (4) High tension cable
   (5) Spark plug
3. Check E.F.I. System, B.C.D.D. and Air cleaner, and correct if necessary. (Refer to Inspection of E.F.I. System, B.C.D.D. and Air Cleaner.)

Note: Warning lamp will come on even if the engine is in good order if the car is being driven on a steep slope continuously in low gear at a high engine speed.

EVAPORATIVE EMISSION CONTROL SYSTEM

CONTENTS

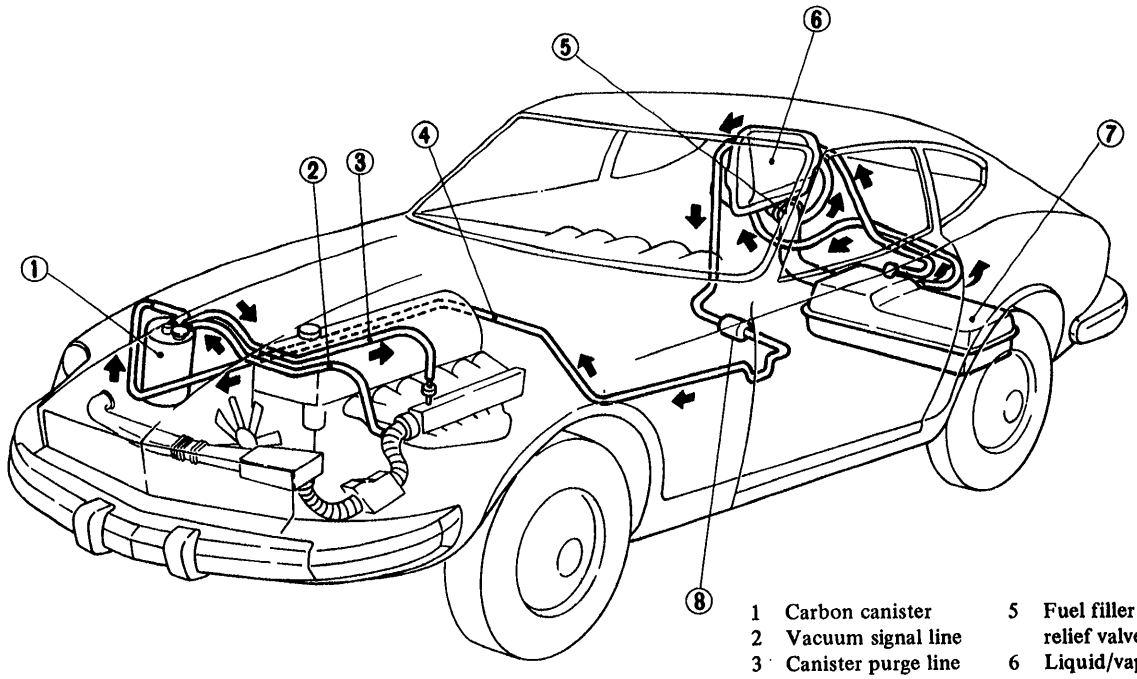
DESCRIPTION EC-22
OPERATION EC-22
INSPECTION EC-24
FUEL TANK, VAPOR LIQUID SEPARATOR AND VAPOR VENT LINE EC-24
CARBON CANISTER PURGE CONTROL VALVE EC-25
CARBON CANISTER FILTER EC-25
FUEL TANK VACUUM RELIEF VALVE ... EC-25

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. Check valve
4. Vapor vent line
5. Carbon canister
6. Vacuum signal line
7. Canister purge line



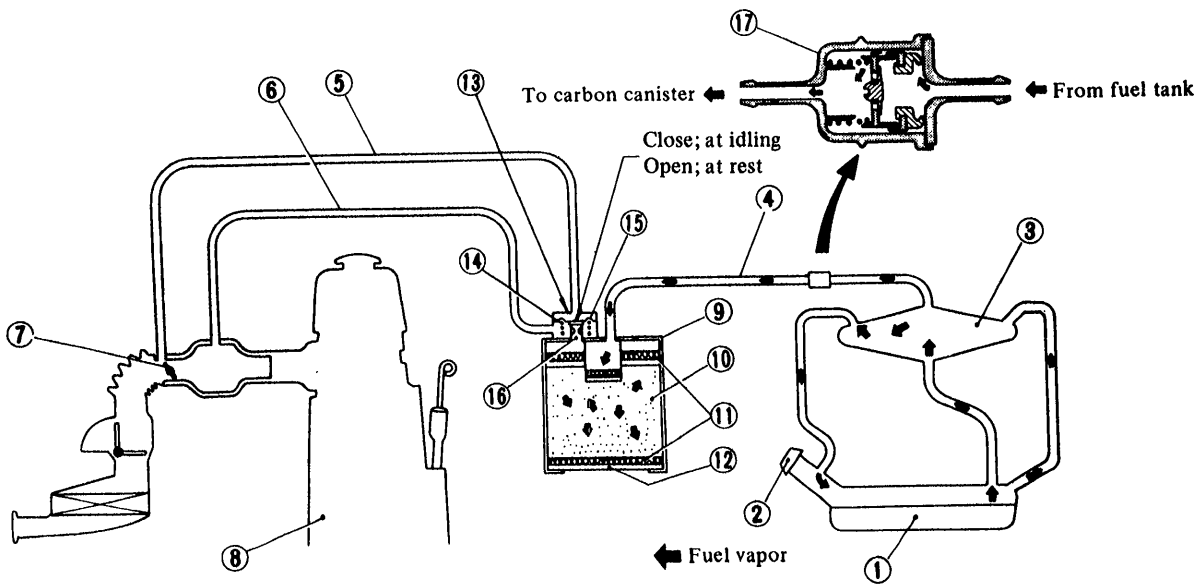
1 Carbon canister
2 Vacuum signal line
3 Canister purge line
4 Vapor vent line
5 Fuel filler cap with vacuum relief valve
6 Liquid/vapor separator
7 Fuel tank
8 Check valve

EC712

Fig. EC-48 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-49.

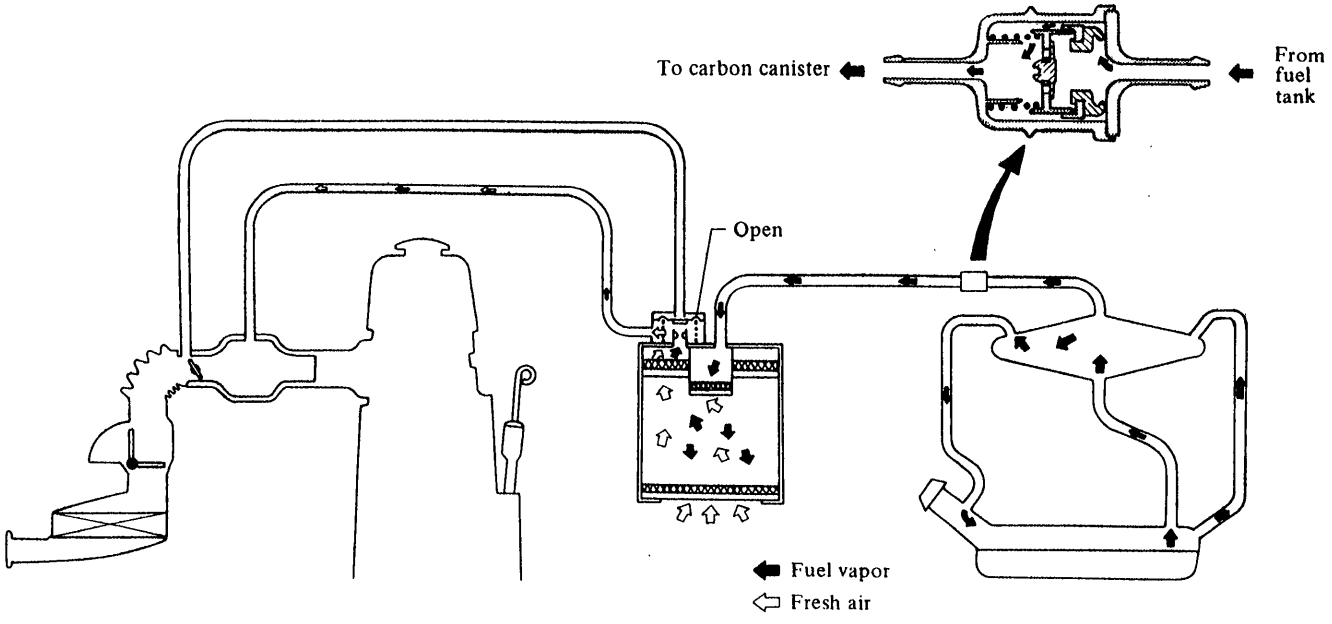


1 Fuel tank
2 Fuel filler cap with vacuum relief valve
3 Liquid/vapor separator
4 Vapor vent line
5 Vacuum signal line
6 Canister purge line
7 Throttle valve
8 Engine
9 Carbon canister
10 Activated carbon
11 Screen
12 Filter
13 Purge control valve
14 Diaphragm spring
15 Diaphragm
16 Fixed orifice
17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

EC713

Fig. EC-49 Evaporative emission control system (Fuel vapor flow when engine is at rest or at idling)

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-50.



EC714

Fig. EC-50 Evaporative emission control system (Fuel vapor flow when engine is running)

INSPECTION

FUEL TANK, VAPOR LIQUID SEPARATOR AND VAPOR VENT LINE

1. Check all hoses and fuel tank filler cap.
2. Disconnect the vapor vent line connecting carbon canister to vapor liquid separator.
3. Connect a 3-way connector, a manometer and a cock (or an equivalent 3-way charge cock) to the end of the vent line.
4. Supply fresh air into the vapor vent line through the cock little by little until pressure becomes 368 mmH2O (14.5 inH2O).
5. Shut the cock completely and leave it unattended.
6. After 2.5 minutes, measure the height of the liquid in the manometer.
7. Variation of height should remain with 25 mmH2O (0.98 inH2O).
8. When filler cap does not close completely, the height should drop to zero in a short time.
9. If the height does not drop to zero in a short time when filler cap is removed, it is the cause of a stuffy hose.

Note: In case the vent line is stuffy, the breathing in fuel tank is not thoroughly made, thus causing insufficient delivery of fuel to engine or vapor lock. It must, therefore, be repaired or replaced.

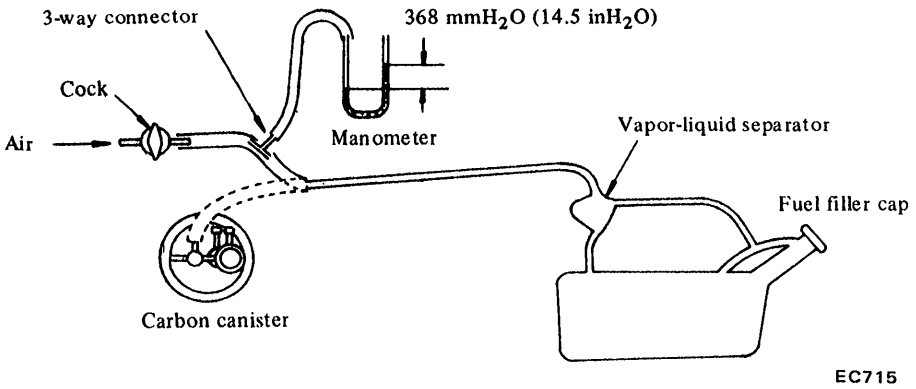


Fig. EC-51 Checking evaporative emission control system

CARBON CANISTER PURGE CONTROL VALVE

Check for fuel vapor leakage, in the distributor vacuum line, at diaphragm of carbon canister purge control valve.

To check for leakage, proceed as follows:

1. Disconnect rubber hose, in the line, between T-connector and carbon canister at T-connector.
2. Inhale air into the opening of rubber hose running to vacuum hole in carbon canister and ensure that there is no leak.

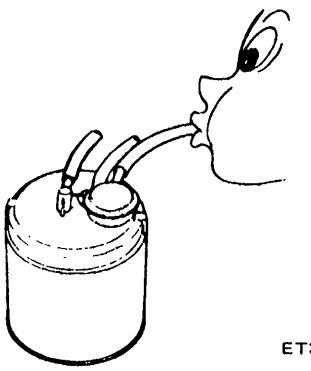
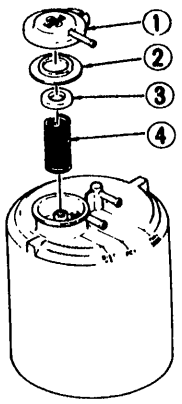


Fig. EC-52 Checking carbon canister purge control valve

3. If there is a leak, remove top cover from purge control valve and check for dislocated or cracked diaphragm. If necessary, replace diaphragm kit (which is made up of a retainer, diaphragm and spring).



1 Cover
2 Diaphragm
3 Retainer
4 Diaphragm spring

Fig. EC-53 Carbon canister purge control valve

CARBON CANISTER FILTER

Check for a contaminated element.

Element can be removed at the bottom of canister installed on car body.

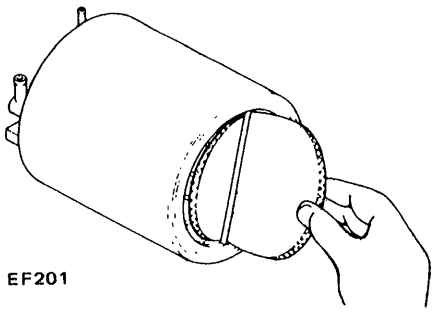


Fig. EC-54 Replacing carbon canister filter

FUEL TANK VACUUM RELIEF VALVE

Remove fuel filler cap and see that it functions properly.

1. Wipe valve housing clean and place it in your mouth.
2. Inhale air. A slight resistance accompanied by valve 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.

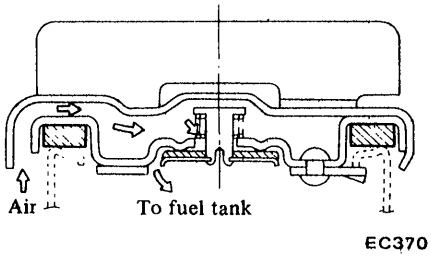


Fig. EC-55 Fuel filler cap