SERVICE MANUAL

DATSUN 280Z
MODEL S30 SERIES



NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION EC

EMISSION CONTROL SYSTEM

EC

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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.

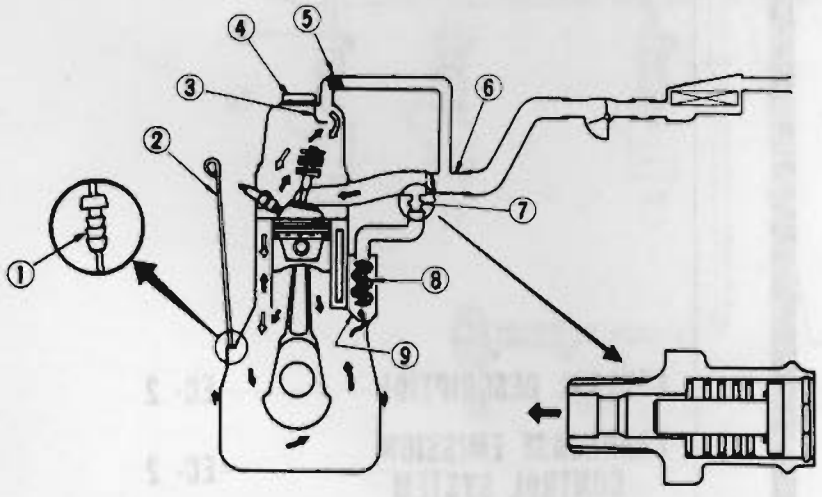
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the P.C.V. valve.

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.



⇨ 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

INSPECTION

P.C.V. VALVE

With engine running at idle, remove the ventilation 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.

VENTILATION HOSES

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.

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. Exhaust gas recirculation (E.G.R.) system.
3. Catalytic converter system (California models).
4. Floor temperature warning system (California models).

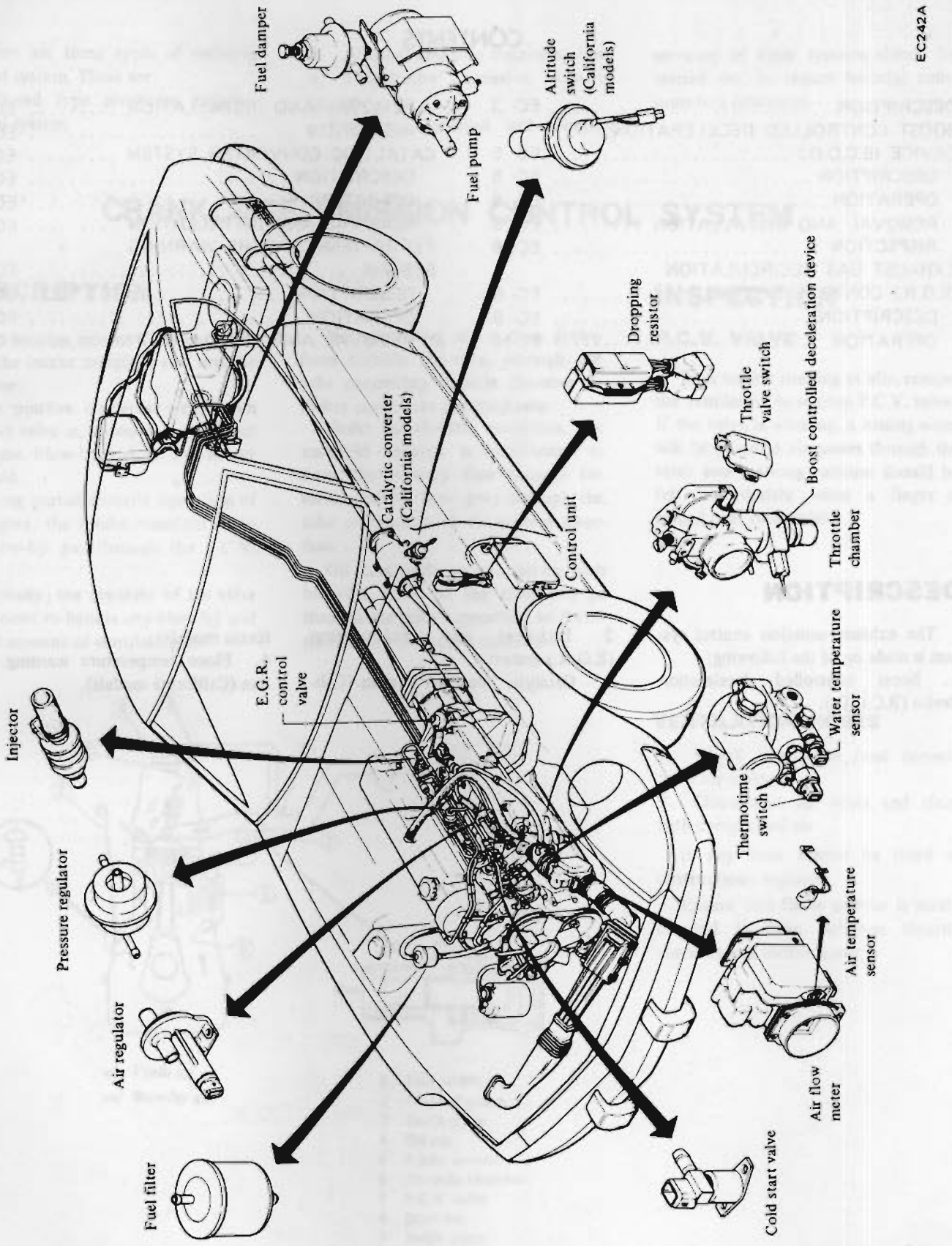


Fig. EC-2 Location of emission control system components

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.

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. On California models, 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 ⑪ monitors the manifold vacuum; when the vacuum exceeds a pre-determined value, it acts so as to open the vacuum control valve ⑩. This causes the manifold vacuum to be introduced into vacuum chamber II ⑲ and actuates diaphragm II ⑬.

When diaphragm II operates, the air control valve ⑭ 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 ⑭ and vacuum control valve ⑩ 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

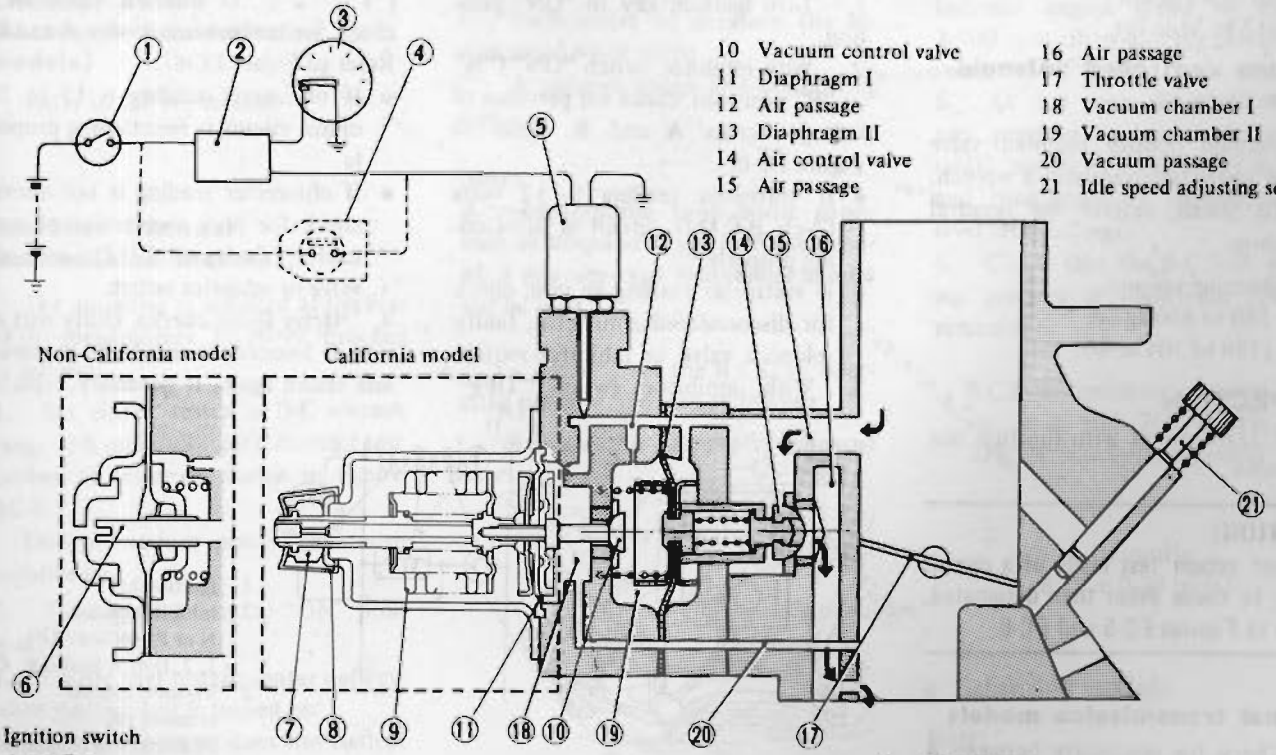
Manual transmission models:

The vacuum controlled 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
Below 16 km/h (10 MPH): ON (For M/T)
4 Inhibitor switch
"N" or "P" position: ON (For A/T)
5 Vacuum control solenoid valve
6 Adjusting screw
7 Adjusting nut
8 Lock spring
9 Altitude corrector
10 Vacuum control valve
11 Diaphragm I
12 Air passage
13 Diaphragm II
14 Air control valve
15 Air passage
16 Air passage
17 Throttle valve
18 Vacuum chamber I
19 Vacuum chamber II
20 Vacuum passage
21 Idle speed adjusting screw

EC243A

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

REMOVAL AND INSTALLATION

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.

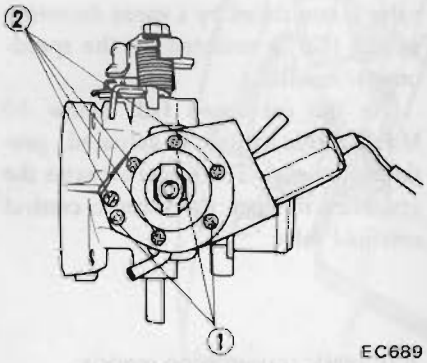


Fig. EC-4 Removing B.C.D.D.

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.

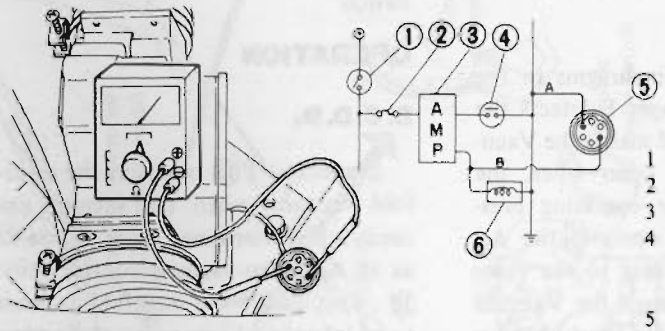
* Conduct this test by one of the following two methods.

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.



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

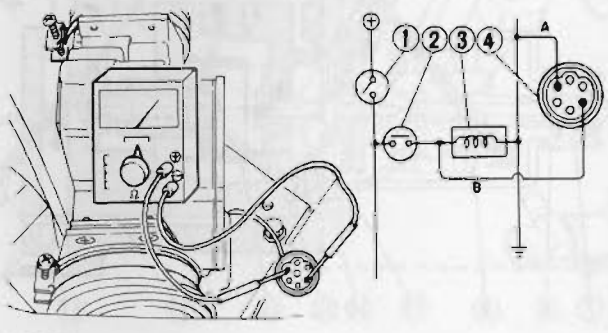
1. Turn ignition key to "ON" position.
2. With inhibitor switch "ON" ("N" or "P" position), check for presence of voltage across A and B. Refer to Figure EC-6.

- 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.



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.

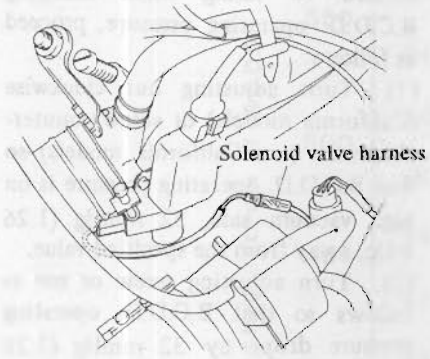


Fig. EC-7 Checking solenoid valve

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.

Inhibitor switch (Automatic transmission models)

Refer to the AT section.

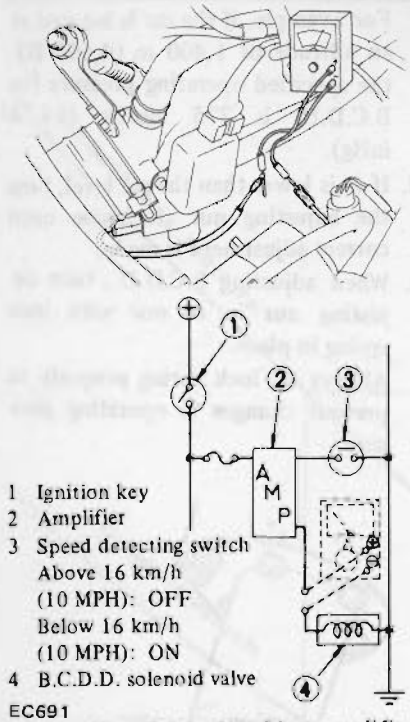
Amplifier (Manual transmission models)

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.



1 Ignition key
2 Amplifier
3 Speed detecting switch
Above 16 km/h (10 MPH): OFF
Below 16 km/h (10 MPH): ON
4 B.C.D.D. solenoid valve

Fig. EC-8 Checking amplifier

Operating pressure off 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.
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. operating pressure, proceed as follows:

1. Remove the harness of solenoid valve.

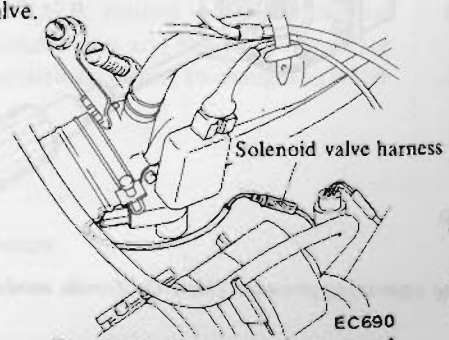


Fig. EC-9 Removing harness of solenoid valve

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

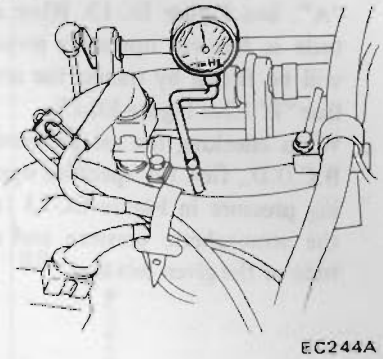


Fig. EC-10 Connecting vacuum gauge

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 and Adjusting Engine Idle RPM and Mixture Ratio".

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. operating pressure is within the specified pressure.

B.C.D.D. operating pressure (0 m, sea level and 760 mmHg (29.9 inHg), atmospheric pressure)

−470 ± 10 mmHg
(−18.50 ± 0.39 inHg)

- **California models**

Note:

a. In the case of California models, the operating pressure varies in proportion to altitude.

b. 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.
c. When checking the set pressure of B.C.D.D., find the specified operating 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 operating pressure for B.C.D.D. is 375 mmHg (14.76 inHg).
d. If it is lower than the set level, turn the adjusting nut clockwise until correct adjustment is made.
e. 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 operating pressure.

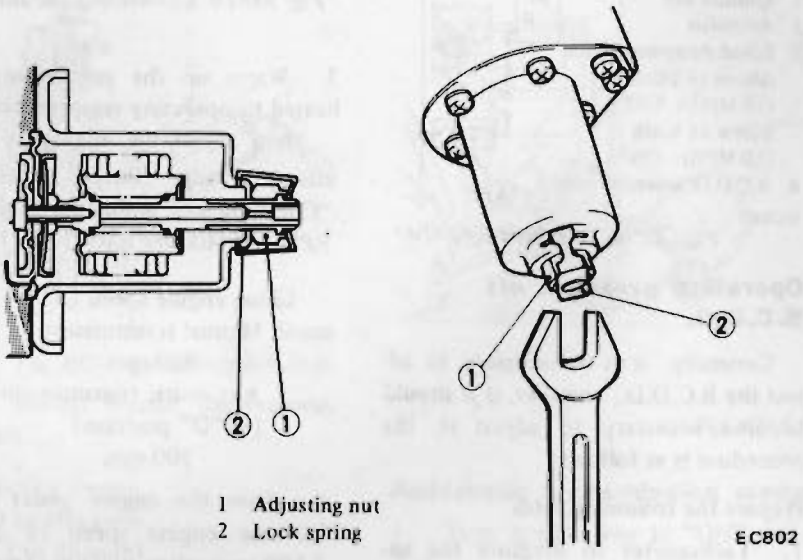


Fig. EC-11 Adjusting operating pressure (California models)

- Non-California models

Note:
If it is lower than the set level, turn the adjusting screw counterclockwise until correct adjustment is made.

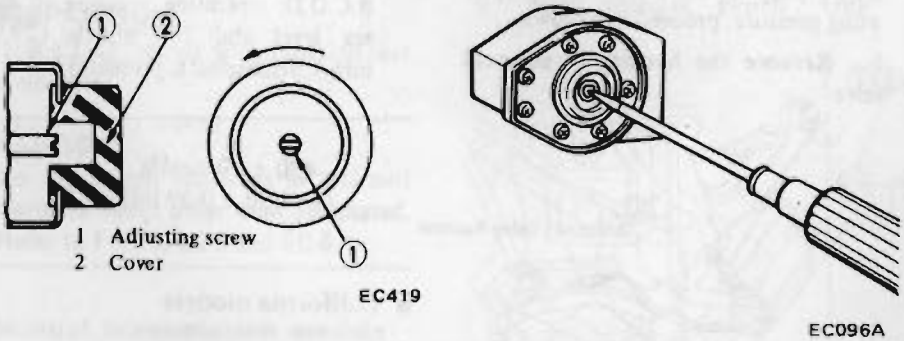


Fig. EC-12 Adjusting operating pressure (Non-California models)

7. Race the engine and check for adjustment.
8. If it is lower than the set level, turn the adjusting screw or nut until correct adjustment is made.
9. Race the engine and check for adjustment.
10. If engine speed cannot be decreased to idling when checking B.C.D.D. operating pressure, proceed as follows:
(1) Turn adjusting nut clockwise (California models) or screw counterclockwise (non-California models) so that B.C.D.D. operating pressure is on high vacuum side, 32 mmHg (1.26 inHg) away from the specified value.
(2) Turn adjusting screw or nut as follows so that B.C.D.D. operating pressure drops by 32 mmHg (1.26 inHg).

- California models
  Turn adjusting nut 1/4 of a turn counterclockwise.
- Non-California models
  Turn adjusting screw 1/4 of a turn clockwise.

11. If B.C.D.D. operating pressure cannot be observed clearly even in step 10 (1), proceed as follows.
(1) Turn adjusting nut clockwise (California models) or screw counterclockwise (non-California models) so that B.C.D.D. operating pressure is on high vacuum side, 64 mmHg (2.52 inHg) away from the specified value.
(2) Turn adjusting screw or nut as follows:

- California models
  Turn adjusting nut 1/2 of a turn counterclockwise.
- Non-California models
  Turn adjusting screw 1/2 of a turn clockwise.

Note:
The B.C.D.D. operating pressure should be correctly set within the specified range after the above adjustments, even if the engine speed cannot be decreased to idling.

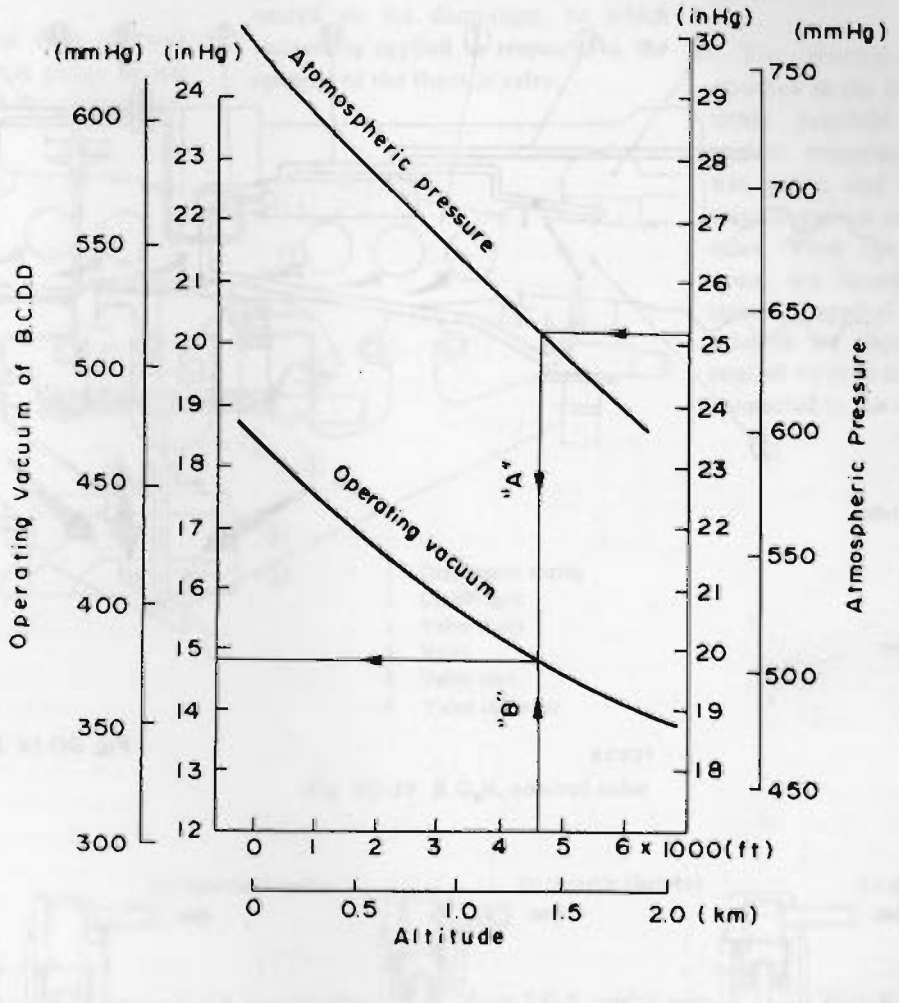


Fig. EC-13 Changes in operating pressure versus changes in atmospheric pressure and altitude (California models)

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

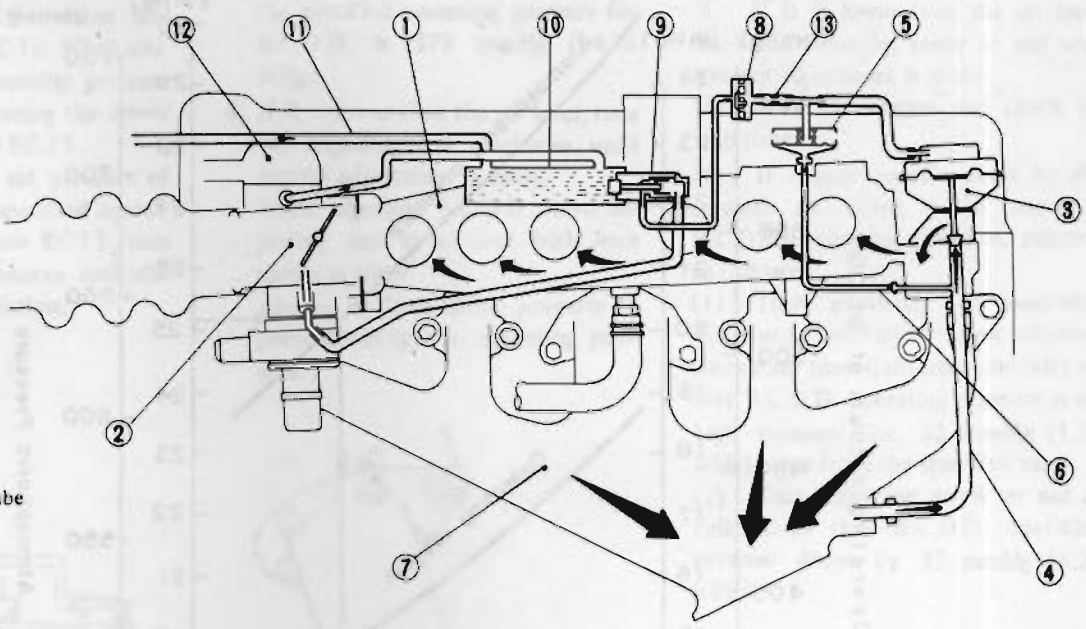
DESCRIPTION

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 thermal vacuum valve and B.P.T. valve 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 (1.97 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 models only)
9 Thermal vacuum valve
10 Heater housing
11 Water return tube
12 Thermostat housing
13 Vacuum orifice

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

OPERATION

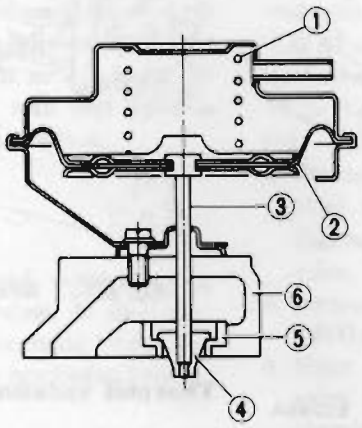
Operation of E.G.R. system is as shown below.

Water temperature °C (°F)	Thermal vacuum valve	B.P.T. valve mmH2O (inH2O)		E.G.R. control valve	E.G.R.
Below 47 to 53 (117 to 127) or Above 92 to 98 (198 to 208)	Closed	Exhaust pressure 21 to 33 (0.82 to 1.30) max.	Open	Closed	Not actuated
		21 to 33 (0.82 to 1.30) min.	Closed	Closed	Not actuated
Between 50 and 95 (122 to 203)	Open	Exhaust pressure 21 to 33 (0.82 to 1.30) max.	Open	Closed	Not actuated
		21 to 33 (0.82 to 1.30) min.	Closed	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. 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.



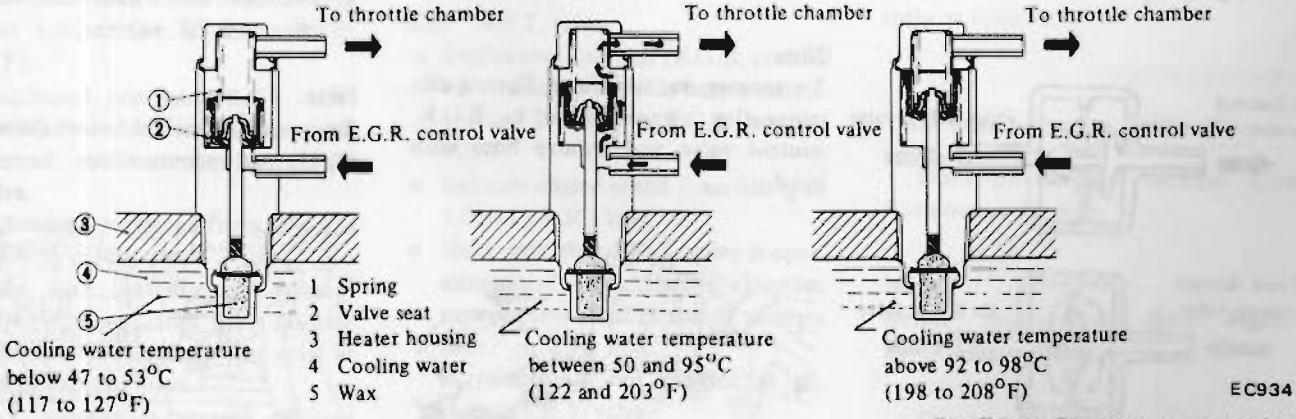
1 Diaphragm spring
2 Diaphragm
3 Valve shaft
4 Valve
5 Valve seat
6 Valve chamber

EC231

Fig. EC-15 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 wax pallet, and opens or closes the vacuum passage in the thermal vacuum valve. When the vacuum passage is open, the throttle chamber vacuum signal 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.



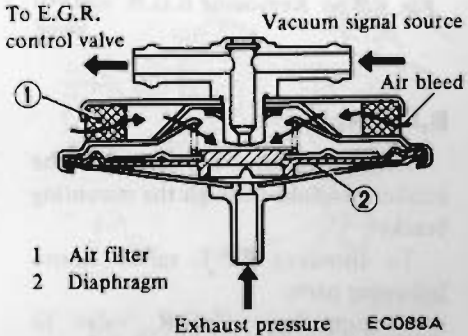
1 Spring
2 Valve seat
3 Heater housing
4 Cooling water
5 Wax

EC934

Fig. EC-16 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.



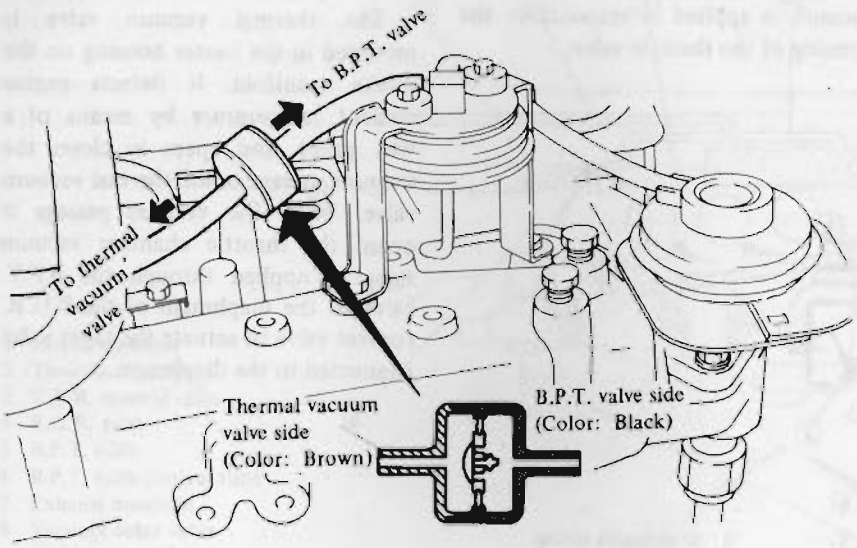
1 Air filter
2 Diaphragm

EC088A

Fig. EC-17 B.P.T. valve

Vacuum delay valve (California models only)

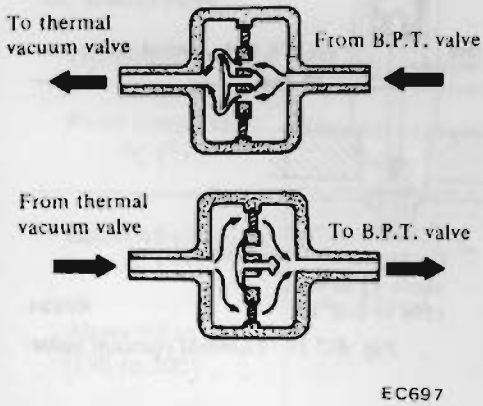
During rapid acceleration the vacuum delay valve prevents an abrupt escape of vacuum from the line between the throttle chamber and E.G.R. control valve, and increases the length of E.G.R. operation. The valve is designed for one-way operation and consists of a one-way umbrella valve and a sintered steel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



EC245A

Fig. EC-18 Vacuum delay valve

When installing this valve, ensure that it properly oriented.



EC697

Fig. EC-19 Operation of vacuum delay valve

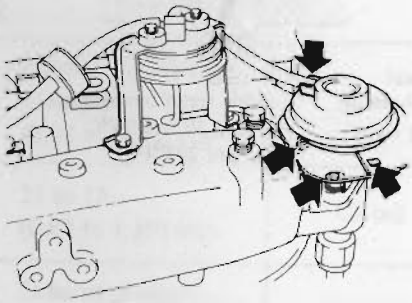
REMOVAL AND INSTALLATION

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.



EC246A

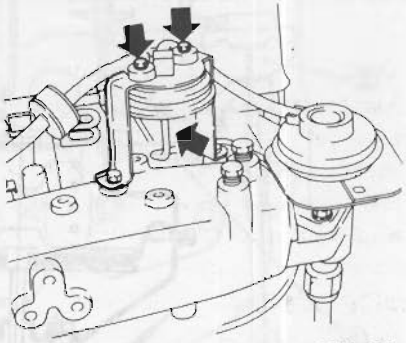
Fig. EC-20 Removing E.G.R. control valve

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.
- Bolts attaching B.P.T. valve to mounting bracket



EC247A

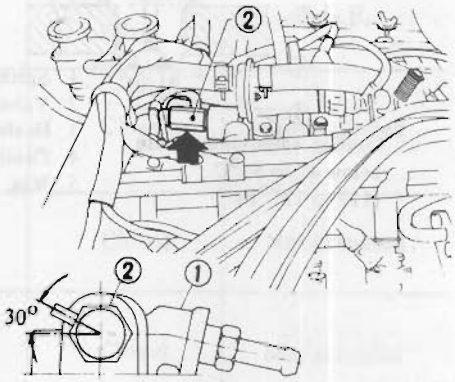
Fig. EC-21 Removing B.P.T. valve

Thermal vacuum valve

After removing following parts and loosening heater housing fixing bolts, 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.



1 Heater housing
2 Thermal vacuum valve

EC937

Fig. EC-22 Removing thermal vacuum valve

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

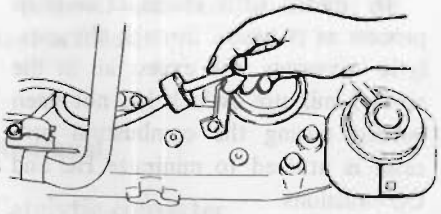
Model		Type	Identification
S30	M/T, A/T	EVK72-42	G

NOTE:
Install thermal vacuum valve at a tilt angle of 30° as shown in Figure EC-22, and tighten to 2.2 kg-m (16 ft-lb) max. Make sure that valve is water-tight after installation.

INSPECTION

Entire system

1. Make a thorough visual check of E.G.R. control system. If 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 47°C (117°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.



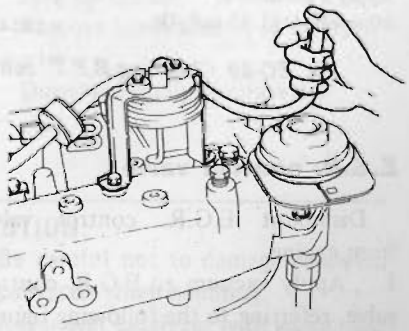
EC248A

Fig. EC-23 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 between 50 and 95°C (122 and 203°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-23.
  If vacuum is weak or is not present at all, replace thermal vacuum valve.

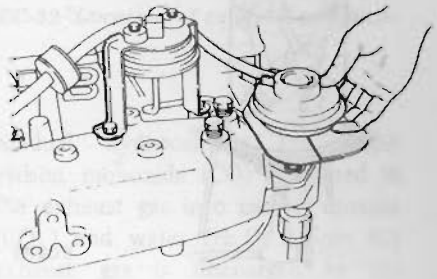
(2) B.P.T. valve
- Disconnect one end (E.G.R. control valve side) of vacuum hose connecting B.P.T. valve to E.G.R. control valve.
- Increase engine speed from idling to 3,000 to 3,500 rpm.
- Make sure that B.P.T. valve is operating, and that throttle chamber vacuum is present at end of vacuum hose.
  If vacuum is not present at all, replace B.P.T. valve.



EC249A

Fig. EC-24 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.



EC250A

Fig. EC-25 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.

If test results satisfy the following, thermal vacuum valve is properly functioning:

Coolant temperature	Vacuum passage
Below 47°C (117°F)	Closed
50 to 95°C (122 to 203°F)	Open
Above 98°C (208°F)	Closed

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

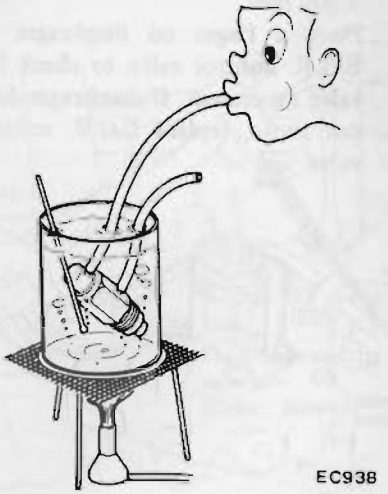


Fig. EC-26 Checking thermal vacuum valve

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.

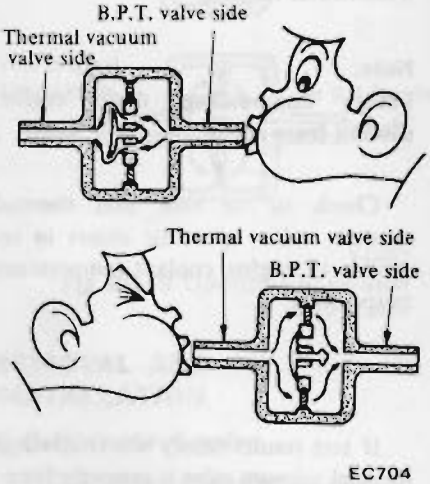


Fig. EC-27 Checking vacuum delay valve

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 vaccum 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-28 Checking vacuum delay valve

CAUTION:
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 H2O (1.97 inH2O) to B.P.T. valve and orally suck port back, as shown in Figure EC-29, to check for leakage. If a leak is noted, replace valve.

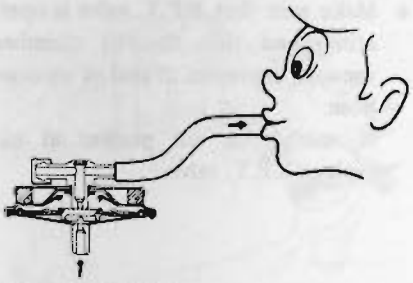


Fig. EC-29 Checking B.P.T. valve

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.

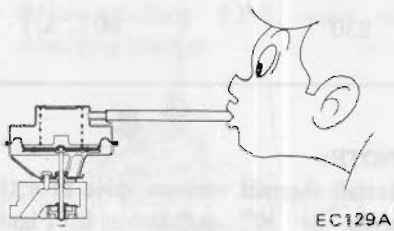


Fig. EC-30 Checking E.G.R. control valve

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-31 Cleaning E.G.R. control valve

CATALYTIC CONVERTER SYSTEM

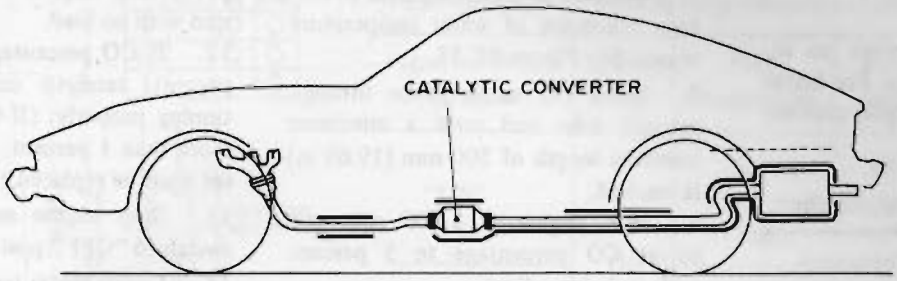
DESCRIPTION

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-32 for the location of this unit.



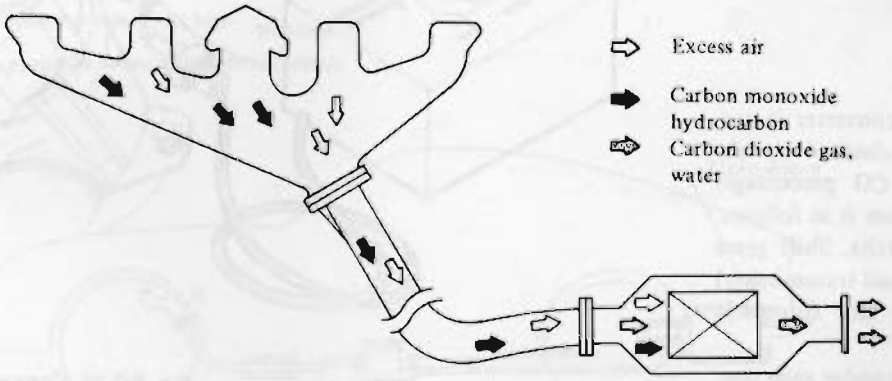
EC380

Fig. EC-32 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.



EC382

Fig. EC-33 Operation of catalytic converter

REMOVAL AND INSTALLATION

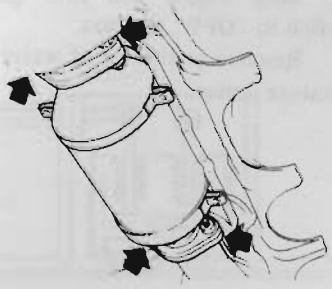
Removal and installation can be done as follows:

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.

CAUTION:
a. Be careful not to damage catalytic converter when handling.
b. Never wet catalyzer with water, oil, etc.



EC706

Fig. EC-34 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.

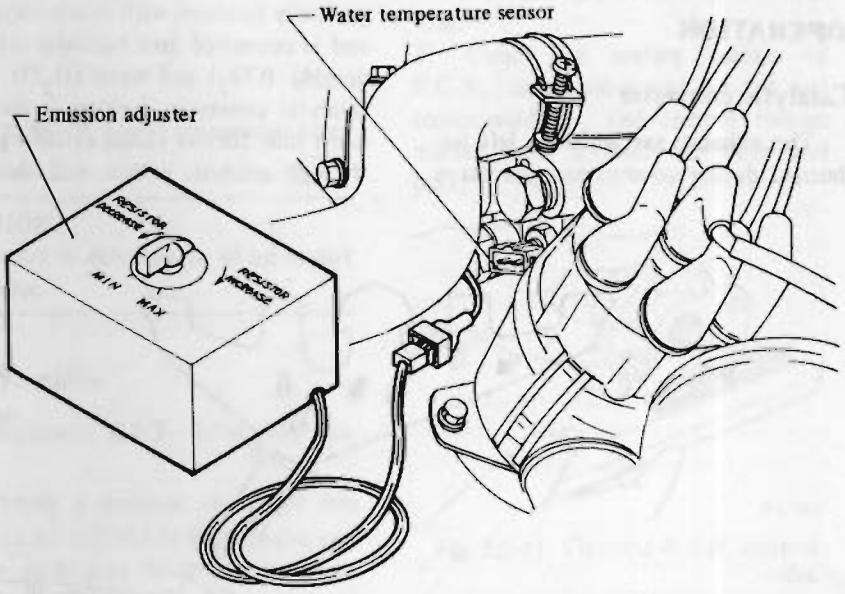
Catalytic converter

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-35.
8. Insert CO meter probe through exhaust tube end until a minimum insertion length of 500 mm (19.69 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-35 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-36 and EC-37.

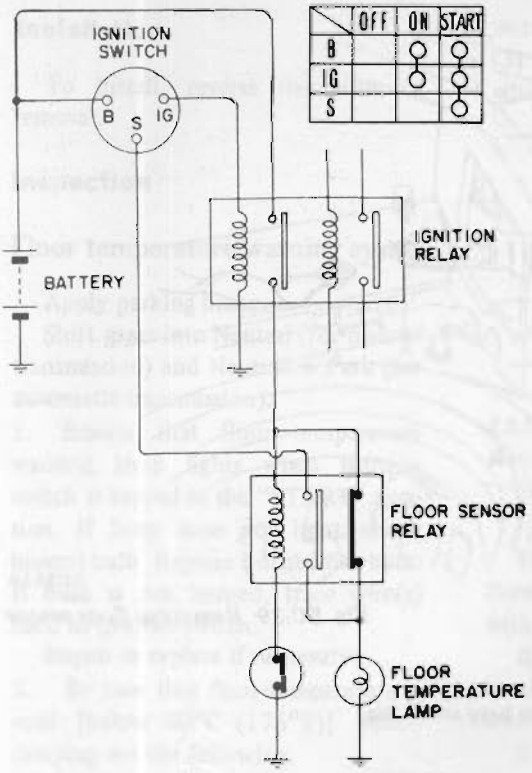


Fig. EC-36 Floor temperature warning system circuit

Floor temperature warning lamp operation chart

Ignition switch position	Ignition relay	Floor temperature	Floor sensor	Floor temperature warning lamp
"ON"	ON	Low	ON	OFF
		High	OFF	Light
"START"		Low	ON	
		High	OFF	

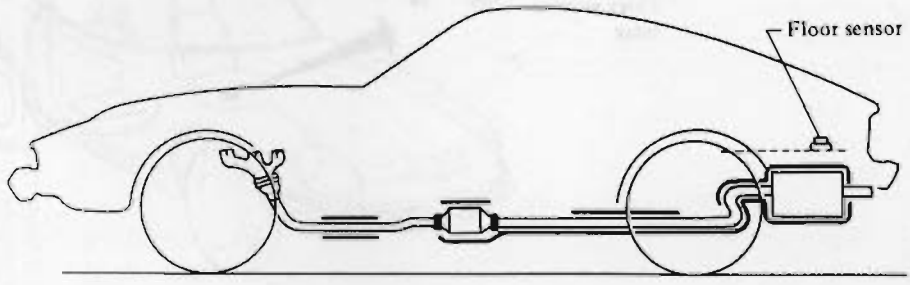


Fig. EC-37 Location of floor sensor

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 "ON" position.

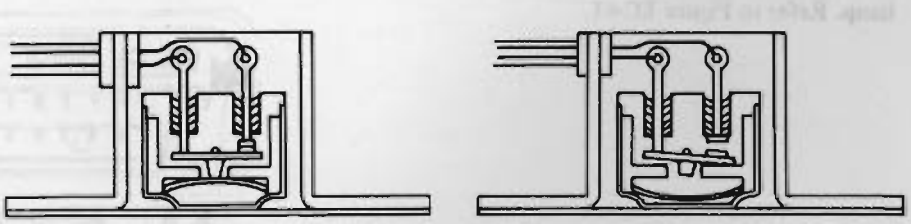


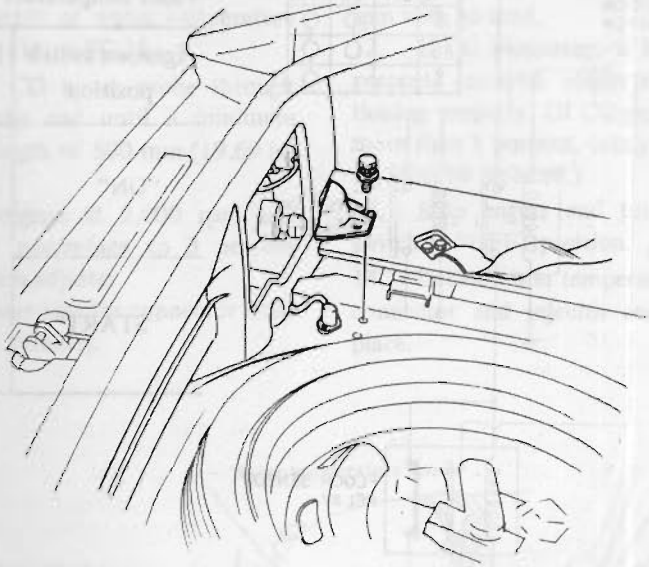
Fig. EC-38 Operation of floor sensor

REMOVAL AND INSTALLATION

Removal

Floor sensor

Remove protector before removing floor sensor. Refer to Figure EC-39.

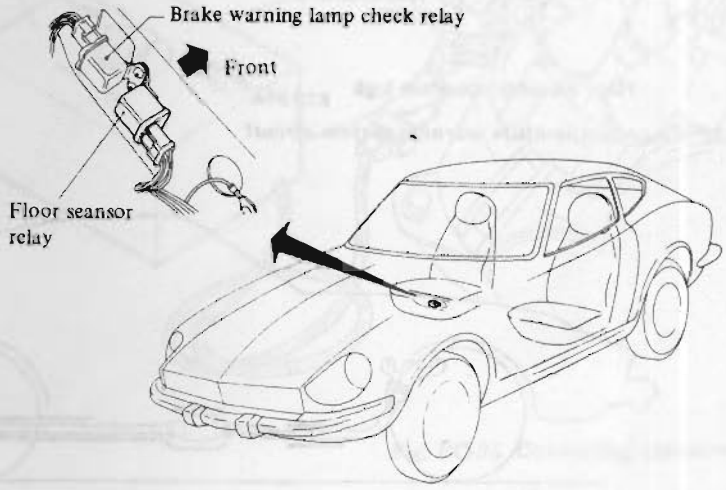


EC251A

Fig. EC-39 Removing floor sensor

Floor sensor relay

Remove front passenger seat before removing floor sensor relay. Refer to Figure EC-40.

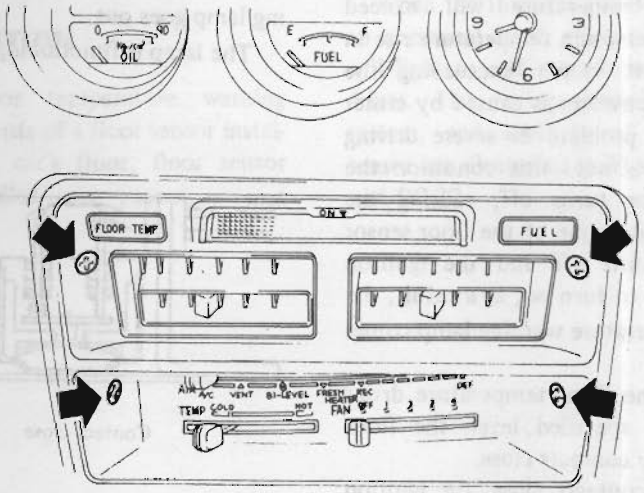


EC252A

Fig. EC-40 Location of floor sensor relay

Floor temperature warning lamp

Remove instrument finisher before removing floor temperature warning lamp. Refer to Figure EC-41.



EC437

Fig. EC-41 Location of floor temperature lamp

Installation

To install, reverse the order of removal.

Inspection

Floor temperature warning 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 "START" 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 "ON" 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 92°C (198°F)
Contacts open	ON	Above 115°C (239°F)

CAUTION:
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 "ON" 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-42.

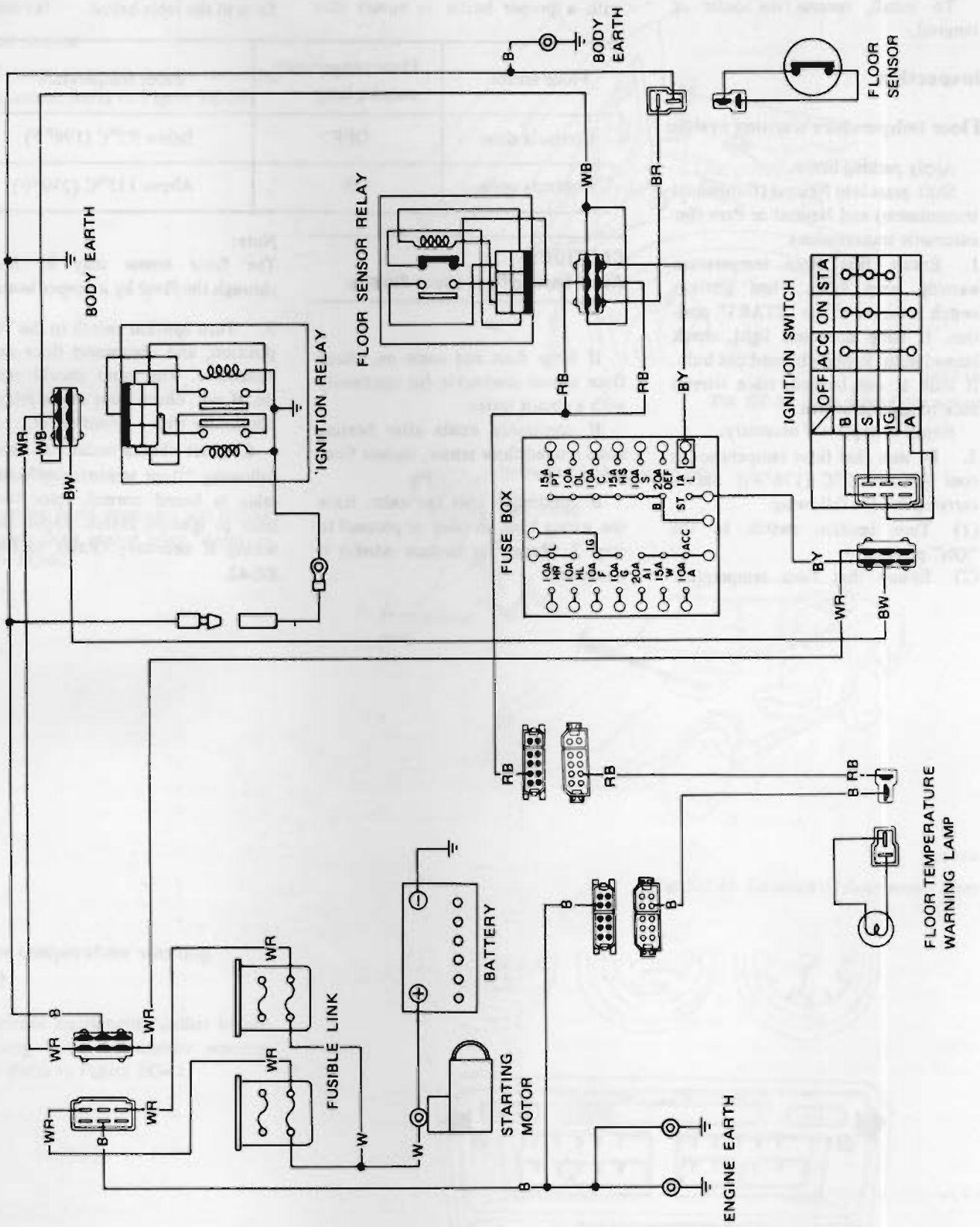


Fig. EC-42 Wiring diagram of floor temperature warning system

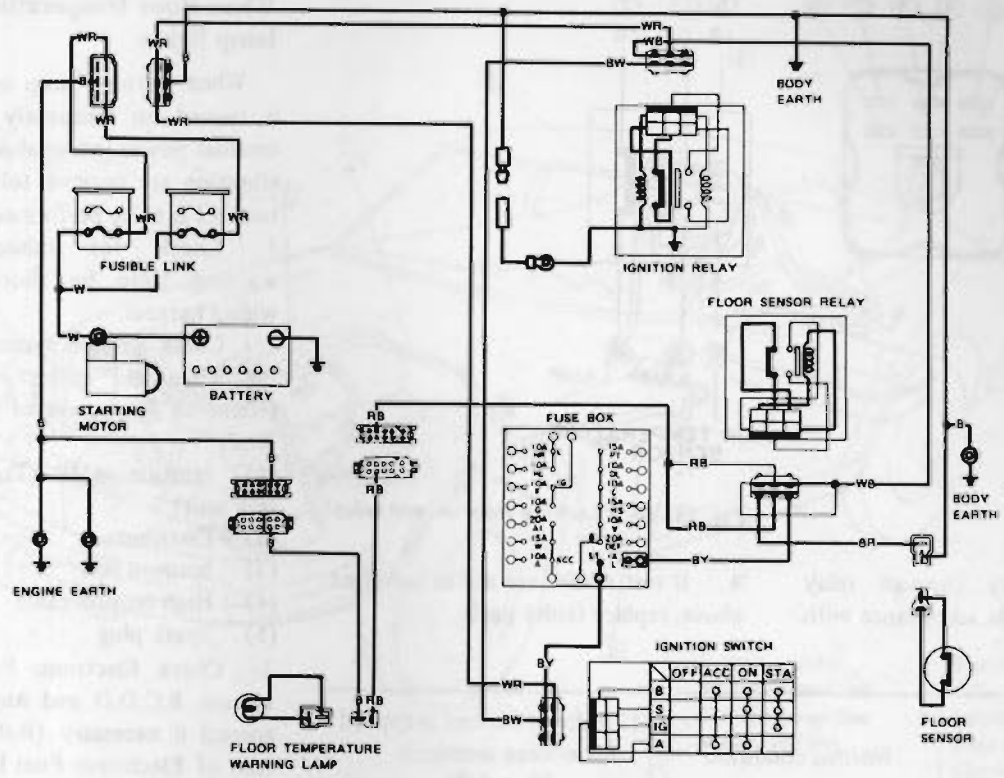


Fig. EC-43 Floor temperature warning lamp ON with ignition switch in "START" position

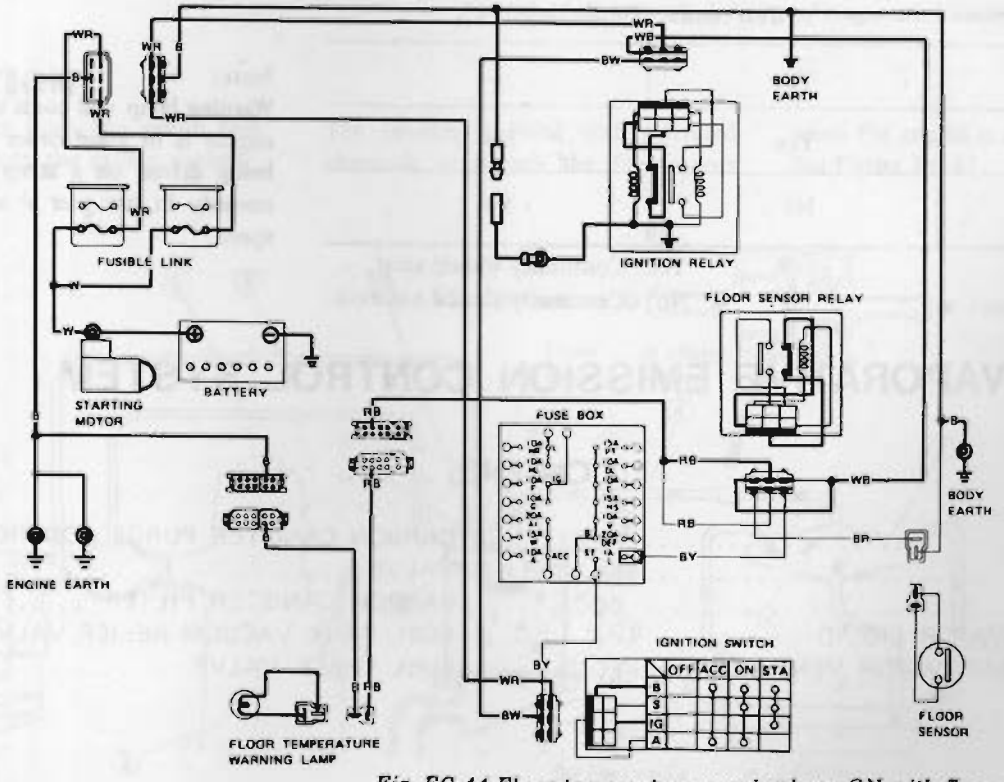


Fig. EC-44 Floor temperature warning lamp ON with floor sensor turned OFF

Floor sensor relay

CAUTION:
Before applying test voltage to relay, connect a fuse in series with lead wire to prevent damage to the circuit.

1. Disconnect ground cable from battery.
2. Remove relay from car.

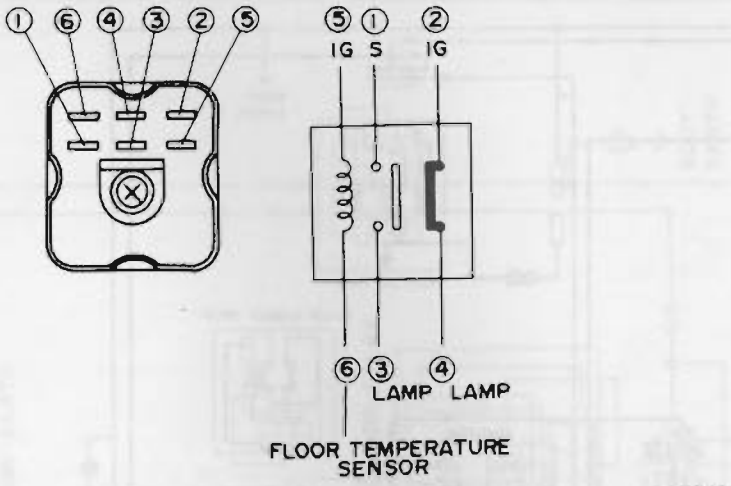


Fig. EC-45 Checking floor sensor relay

3. Test continuity through relay with an ohmmeter in accordance with the following chart.

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

Check terminals	Normal condition	12V direct current is applied between terminals ⑤ and ⑥.
	Test results : Continuity	
⑤ – ⑥	Yes	–
② – ④	Yes	No
① – ③	No	Yes

Yes: Continuity should exist.
No: Continuity should not exist.

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 Electronic Fuel Injection system, B.C.D.D. and Air cleaner, and correct if necessary. (Refer to Inspection of Electronic Fuel Injection 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

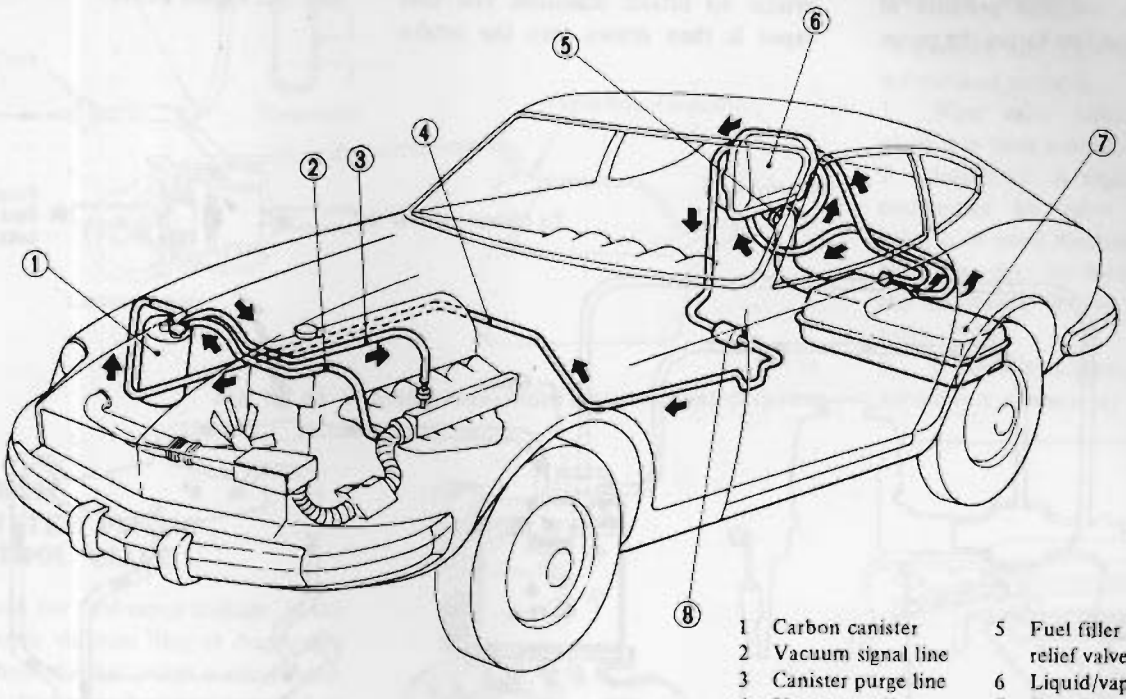
DESCRIPTION EC-22
OPERATION EC-23
INSPECTION EC-24
FUEL TANK, VAPOR LIQUID SEPARATOR AND VAPOR VENT LINE EC-24
CARBON CANISTER PURGE CONTROL VALVE EC-25
CARBON CANISTER FILTER EC-25
FUEL TANK VACUUM RELIEF VALVE ... EC-25
FUEL CHECK VALVE EC-25

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



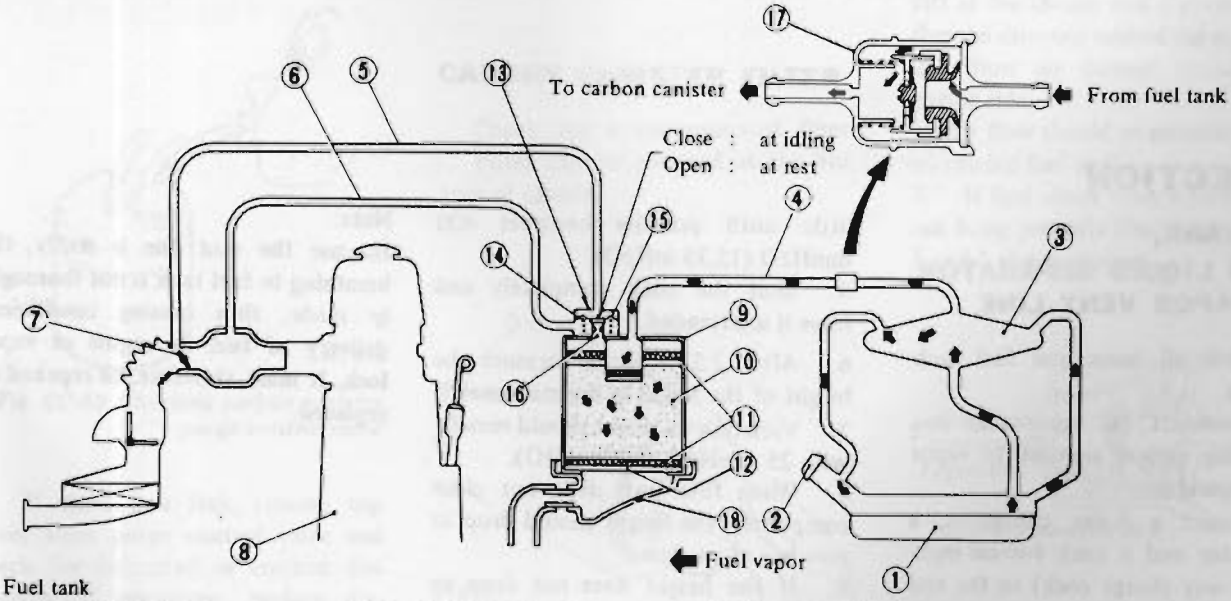
1 Carbon canister
2 Vacuum signal line
3 Canister purge line
4 Vapor vent line
5 Fuel filler cap with vacuum relief valve
6 Liquid/vapor separator
7 Fuel tank
8 Check valve

EC712

Fig. EC-46 Schematic drawing of evaporative emission control 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-47.

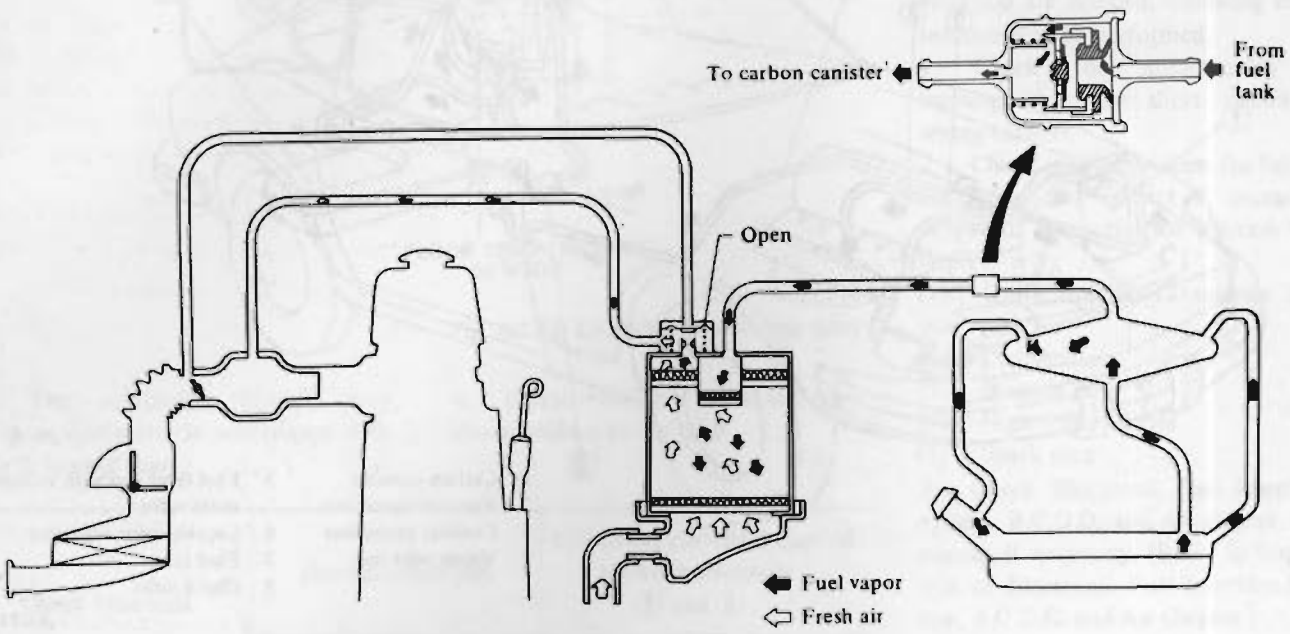


1 Fuel tank
2 Fuel filler cap with vacuum relief valve
3 Liquid/vapor separator
4 Vapor vent line
5 Vacuum signal line
6 Canister purge line
7 Throttle valve
8 Engine
9 Carbon canister
10 Activated carbon
11 Screen
12 Filter
13 Purge control valve
14 Diaphragm spring
15 Diaphragm
16 Fixed orifice
17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

EC121A

Fig. EC-47 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-48.



EC122A

Fig. EC-48 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 400 mmH2O (15.75 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 in 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.

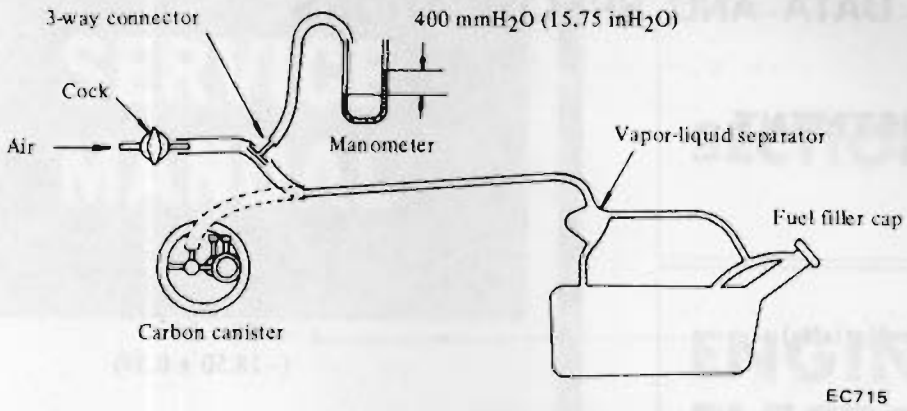


Fig. EC-49 Checking evaporative emission control system

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.

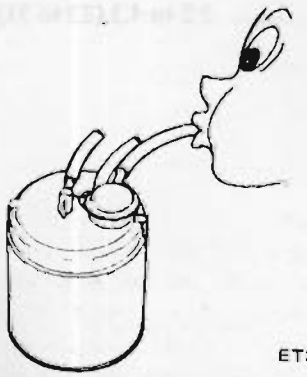
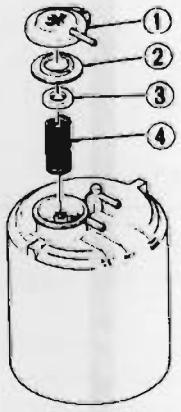


Fig. EC-50 Checking carbon canister purge control valve

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-51 Carbon canister purge control valve

CARBON CANISTER FILTER

Check for a contaminated filter.

Filter can be removed at the bottom of canister.

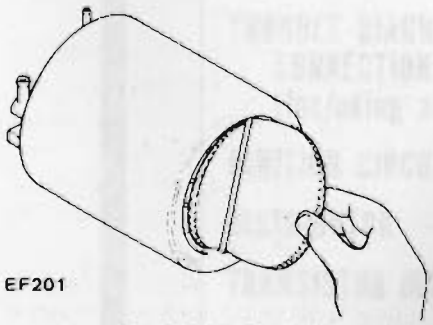


Fig. EC-52 Replacing carbon canister filter

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.

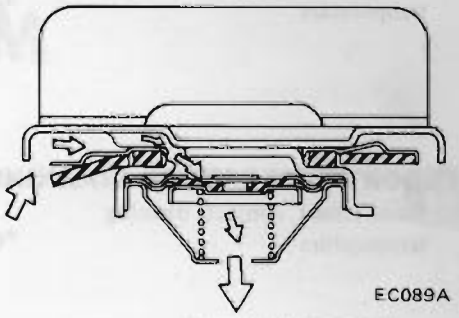


Fig. EC-53 Fuel filler cap

FUEL CHECK VALVE

1. Blow air through connector on fuel tank side.

A considerable resistance should be felt at the mouth and a portion of air flow be directed toward the engine.

2. Blow air through connector on engine side.

Air flow should be smoothly directed toward fuel tank.

3. If fuel check valve is suspected of not being properly functioning in steps 1 and 2 above, replace.

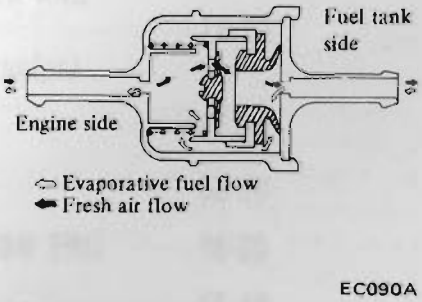


Fig. EC-54 Checking fuel check valve

SERVICE DATA AND SPECIFICATIONS

INSPECTION AND ADJUSTMENT

B.C.D.D.

B.C.D.D. operating pressure [0 m, sea level and 760 mmHg (29.9 inHg), atmospheric pressure]	mmHg (inHg)	−470 ± 10 (−18.50 ± 0.39)

E.G.R. SYSTEM

Thermal vacuum valve operating temperature — °C (°F)

Coolant temperature	Vacuum passage
Below 47 (117)	Closed
50 to 95 (122 to 203)	Open
Above 98 (208)	Closed

FLOORTEMPERATURE WARNING SYSTEM

Floor sensor, contacts opening temperature	°C (°F)	Above 115 (239)

TIGHTENING TORQUE

B.C.D.D.	kg-cm (in-lb)	20 to 40 (17 to 35)
B.C.D.D. vacuum control solenoid	kg-cm (in-lb)	180 to 350 (156 to 304)
E.G.R. thermal vacuum valve	kg-m (ft-lb)	Less than 2.2 (16)
Catalytic converter bolt	kg-m (ft-lb)	3.2 to 4.3 (23 to 31)