

## Section C3-B

# Enhanced Evaporative Emission (EVAP) Control System

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### General Description

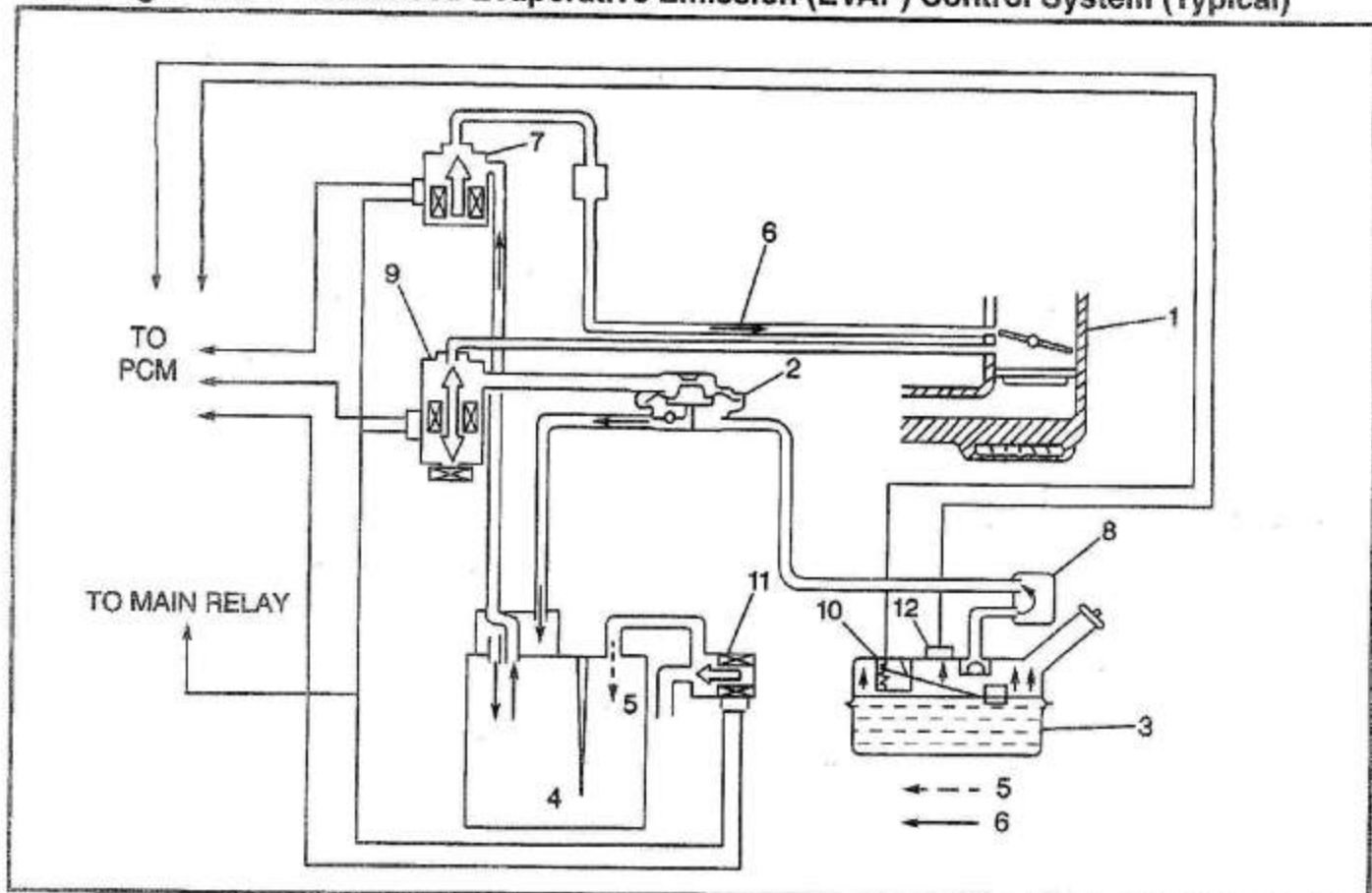
#### Purpose

The Evaporative Emission (EVAP) control system limits fuel vapors from escaping into the atmosphere. The EVAP transfers fuel vapor from the sealed fuel tank to an activated carbon (charcoal) storage device (EVAP canister). The EVAP canister will store the vapors until the engine is able to use the extra fuel vapor.

When the engine is able to use the extra fuel vapor, the fuel vapor is purged from the carbon element by intake air flow and consumed in the normal combustion process.

The system is required to detect evaporative fuel system leaks as small 0.040 between the fuel filler cap and purge valve. The system can test the evaporative system integrity by applying a vacuum signal (ported or manifold) to the fuel tank to create a small vacuum.

Figure C3-1 - Enhanced Evaporative Emission (EVAP) Control System (Typical)



TS 23870

**Legend**

1. Throttle Body
2. Tank Pressure Control Valve
3. Fuel Tank
4. EVAP Canister
5. Air
6. Vapor and air
7. EVAP Canister Purge Valve
8. Fuel Vapor Separator
9. EVAP Tank Pressure Control Solenoid Vacuum Valve
10. Fuel Level Sensor (gage)
11. EVAP Canister Vent Solenoid
12. Fuel Tank Pressure Sensor

**Enhanced Evaporative Emission (EVAP) Control System****Figure C3-1**

An Evaporative Emission (EVAP) control system is used to prevent emission of fuel vapor.

The vapor generated in the fuel tank while driving, or with the engine at a stop, passes through a Tank Pressure Control valve and enters the EVAP canister where charcoal absorbs and stores the fuel vapor.

The Enhanced EVAP canister is purged (cleaned) in the same way as non-Enhanced EVAP Control Systems.

- The Tank Pressure Control valve operates as follows:
  - As the EVAP Tank Pressure Control Solenoid vacuum valve closes under the following conditions, the vapor passage of the Tank Pressure Control valve also closes.
    - Engine "OFF".
    - Engine is running, vehicle stopped and fuel level is higher than specified value.

Therefore, when the pressure of the vapor generated in the fuel tank increases higher than specified pressure, it pushes open the Tank Pressure Control valve and enters the EVAP canister.

However, under the conditions that the engine is running and the fuel level is lower than the specified value (or the vehicle is running and the fuel level is higher than the specified value), the EVAP Tank Pressure Control Solenoid vacuum valve is turned "ON" by the ECM and vacuum is applied to the diaphragm of the Tank Pressure Control valve. Thus, the vapor passage of the Tank Pressure Control valve opens to allow continuity between the fuel tank and the EVAP canister.

The EVAP Canister Vent solenoid and the Fuel Tank Pressure sensor are installed so that the ECM diagnoses leakage of fuel vapor from the EVAP Control System. The EVAP Canister Vent solenoid is usually open but it is closed by the ECM when checking for any leakage.

### Results Of Incorrect Operation

Poor idle, stalling and poor driveability can be caused by:

- Damaged Evaporative Emission (EVAP) canister.
- Hoses split, cracked and/or not connected to the proper tubes.
- Malfunctioning purge solenoid.

## On-Vehicle Service

**Important:** A careful visual check of the Evaporative Emission (EVAP) canister, the connecting vacuum hose and the EVAP canister purge valve, should be made before diagnosis of the EVAP canister malfunction.

### Evaporative Emission (EVAP) Canister Hoses

Refer to "Vehicle Emissions Control Information Label" for proper routing of Evaporative Emission (EVAP) hoses.

### Evaporative Emission (EVAP) Canister Replacement

#### Remove or Disconnect

1. Negative (-) battery cable.
2. Three vacuum hoses from Evaporative Emission (EVAP) canister.
3. EVAP canister from engine compartment.

#### Install or Connect

1. EVAP canister to engine compartment.
2. Three vacuum hoses to EVAP canister.
3. Negative (-) battery cable.

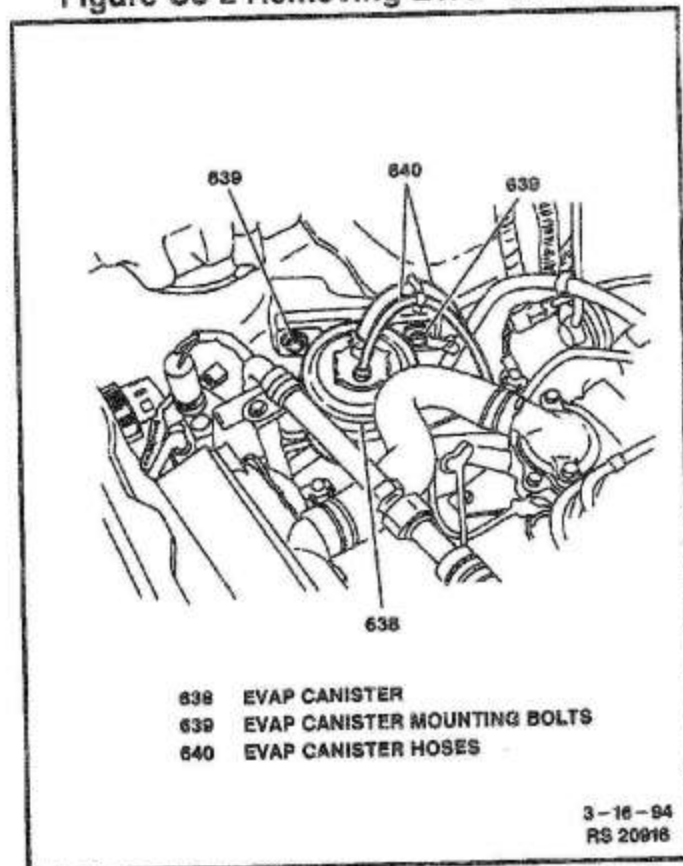
#### Tighten

- Negative (-) battery cable-to-negative (-) battery terminal retainer to 15 N•m (11 lb. ft.).

### Fuel Tank Pressure Sensor

The fuel tank vapor pressure sensor is similar to the Manifold Absolute Pressure (MAP) sensor. It is used to measure the difference between the air pressure (or vacuum) in the fuel tank and the outside air pressure. The ECM supplies a 5 volt reference and a ground to the sensor and the sensor sends a voltage signal between 0.1 and 4.9 volts back to the ECM. When the air pressure in the fuel tank is equal to the outside air pressure, as when the fuel cap is removed, the output voltage of the sensor will be from 2.0 to 2.5 volts.

Figure C3-2 Removing EVAP Canister



### Evaporative Emission (EVAP) Canister Inspection

**Caution:** Do not suck air through the Evaporative Emission (EVAP) canister purge valve tubes/hoses. Fuel vapor inside the EVAP canister purge valve is harmful.

1. Disconnect vacuum hoses from EVAP canister.
2. Blow air into the tank pipe of the EVAP canister, there should be no restriction of air flow through the purge pipe and air pipe.
  - If the EVAP canister should fail the above check, the EVAP canister must be replaced.
3. Connect hoses to EVAP canister.

## Evaporative Emission (EVAP) Canister Purge Valve Replacement

Figure C3-3

### Remove or Disconnect

1. Negative (-) battery cable.
2. Evaporative Emission (EVAP) canister purge valve electrical connector (Figure C3-3).
3. Two vacuum hoses from EVAP canister purge valve (Figure C3-3).
4. Two screws and EVAP canister purge valve from intake manifold (Figure C3-3).

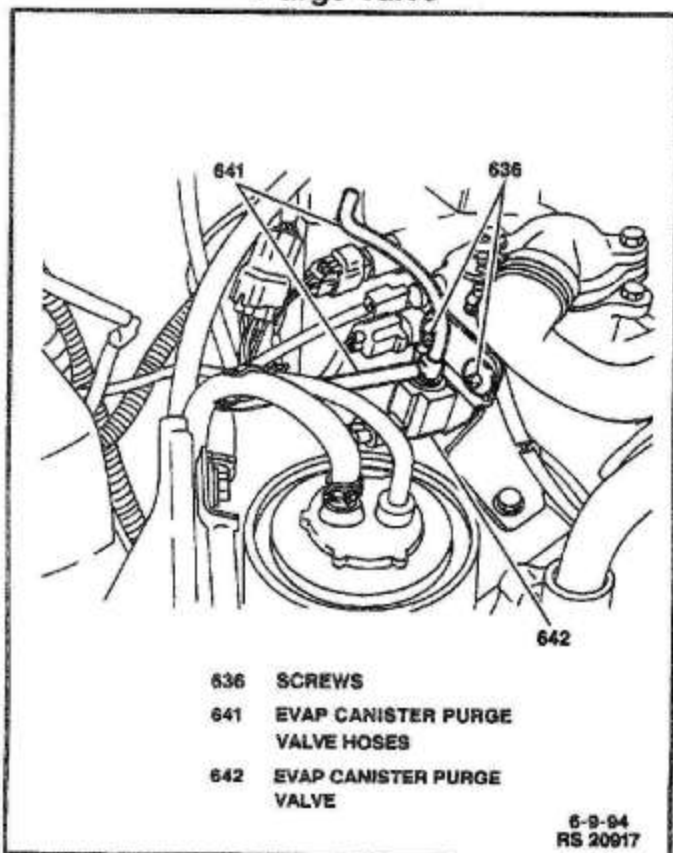
### Install or Connect

1. EVAP canister purge valve to intake manifold; secure with two screws.
2. Two vacuum hoses to EVAP canister purge valve.
3. EVAP canister purge valve electrical connector.
4. Negative (-) battery cable.

### Tighten

- Negative (-) battery cable-to-negative (-) battery terminal retainer to 15 N•m (11 lb. ft.).

Figure C3-3 - Removing EVAP Canister Purge Valve



## Evaporative Emission (EVAP) Canister Purge Valve Inspection

Figures C3-4 and C3-5

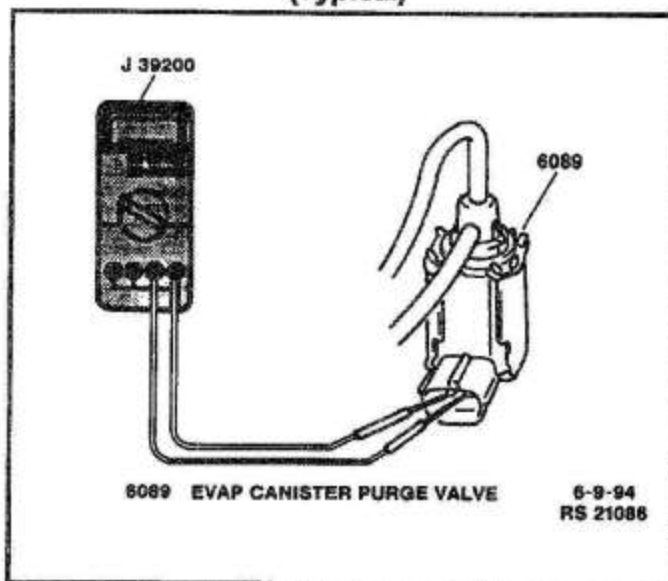
**Caution:** Do not suck air through the Evaporative Emission (EVAP) canister purge valve tubes/hoses. Fuel vapor inside the EVAP canister purge valve is harmful.

### Tool Required

J 39200 Digital Multimeter

1. Disconnect the EVAP canister purge valve electrical connector.
2. Using J 39200, measure resistance of the EVAP canister purge valve between both terminals (Figure C3-4). If resistance is not 28 to 36 ohms at 20°C (68°F), replace the EVAP canister purge valve. Refer to "Evaporative Emission (EVAP) Canister Purge Valve Replacement" earlier in this section. If the resistance is within specification, proceed with Step 3.

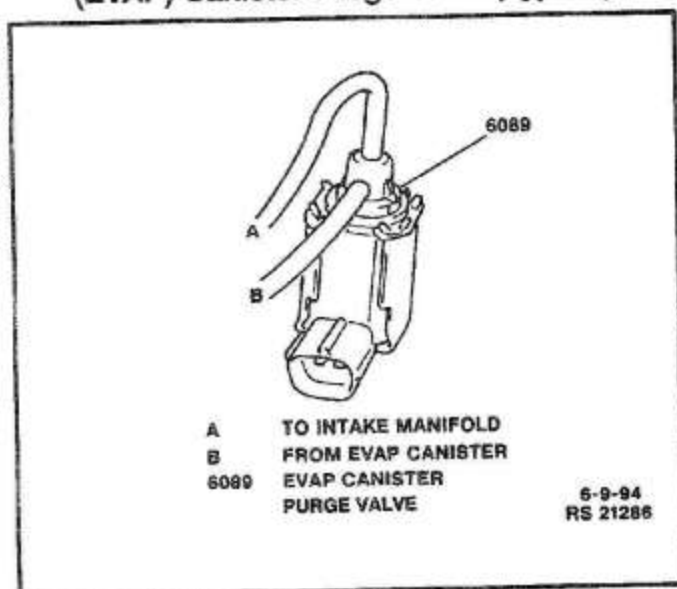
Figure C3-4 - Measuring Evaporative Emission (EVAP) Canister Purge Valve Resistance (Typical)



3. Disconnect the EVAP canister purge valve vacuum hoses from the intake manifold and from the EVAP canister.
4. Blow air into the EVAP canister purge valve vacuum hose that was disconnected from the EVAP canister. Air should not pass through the EVAP canister purge valve and exit from the intake manifold hose (Figure C3-5).
5. Connect 12 volts DC to the EVAP canister purge valve terminals.

6. Blow air into the EVAP canister purge valve vacuum hose that was disconnected from the EVAP canister. Air should pass through the EVAP canister purge valve and exit from the intake manifold hose (Figure C3-5).
7. If the EVAP canister purge valve failed this inspection, replace it. Refer to "Evaporative Emission (EVAP) Canister Purge Valve Replacement" earlier in this section. If the EVAP canister purge valve passed this inspection, reconnect the vacuum hoses and electrical connector.

**Figure C3-5 - Inspecting Evaporative Emission (EVAP) Canister Purge Valve (Typical)**



### Evaporative Emission (EVAP) Canister Vent Solenoid Replacement

The Evaporative Emission (EVAP) Canister Vent Solenoid is mounted next to the EVAP canister.

#### Remove or Disconnect

1. Negative (-) battery cable.
2. EVAP Canister Vent Solenoid electrical connector.
3. Two hose clamps.
4. Two vacuum hoses from EVAP Canister Vent Solenoid.
5. One bolt and EVAP Canister Vent Solenoid from RH fender.

#### Install or Connect

1. EVAP Canister Vent Solenoid to LH fender; secure with one bolt.
2. Two vacuum hoses to EVAP Canister Vent Solenoid.
3. Two hose clamps.
4. EVAP Canister Vent Solenoid electrical connector.
5. Negative (-) battery cable.

#### Tighten

- Negative (-) battery cable-to-negative (-) battery terminal retainer to 15 N•m (11 lb. ft.).

#### Evaporative Emission (EVAP) Canister Vent Solenoid Inspection

**Caution:** Do not suck air through the Evaporative Emission (EVAP) Canister Vent Solenoid tubes/hoses. Fuel vapor inside the Evaporative Emission (EVAP) Canister Vent Solenoid is harmful.

#### Tool Required

J 39200 Digital Multimeter

1. Disconnect the EVAP Canister Vent Solenoid valve electrical connector.
2. Using J 39200, measure resistance of the EVAP Canister Vent Solenoid valve between both terminals. If resistance is not 25 to 30 ohms at 20°C (68°F), replace the EVAP Canister Vent Solenoid. Refer to "Evaporative Emission (EVAP) Canister Vent Solenoid Replacement" earlier in this section. If the resistance is within specification, proceed with Step 3.
3. Disconnect the EVAP Canister Vent solenoid hose from the EVAP Canister.
4. Blow air into the EVAP Canister Vent Solenoid hose that was disconnected from the EVAP Canister. Air should pass through the EVAP Canister Vent Solenoid.
5. Connect 12 volts DC to the EVAP Canister Vent Solenoid terminals.
6. Blow air into the EVAP Canister Vent solenoid vacuum hose that was disconnected from the EVAP Canister. Air should not pass through the EVAP Vent solenoid and exit from the other end.
  - If the EVAP Canister Vent Solenoid failed this inspection, replace it. Refer to "Evaporative Emission (EVAP) Canister Vent Solenoid" earlier in this section. If the EVAP Vent solenoid passed this inspection, reconnect the vacuum hoses and electrical connector.



## Evaporative Emission (EVAP) Tank Pressure Control Solenoid Vacuum Valve Replacement

The EVAP Tank Pressure Control Solenoid vacuum valve is mounted next to the EVAP Canister Vent Solenoid.

### Remove or Disconnect

1. Negative (-) battery cable.
2. EVAP Tank Pressure Control Solenoid vacuum valve electrical connector.
3. Two vacuum hoses from EVAP Tank Pressure Control Solenoid vacuum valve.
4. One screw and EVAP Tank Pressure Control Solenoid vacuum valve from bulkhead.

### Install or Connect

1. EVAP Tank Pressure Control Solenoid vacuum valve to bulkhead; secure with one screw.
2. Two vacuum hoses to EVAP Tank Pressure Control Solenoid vacuum valve.
3. EVAP Tank Pressure Control Solenoid vacuum valve electrical connector.
4. Negative (-) battery cable.

### Tighten

- Negative (-) battery cable-to-negative (-) battery terminal retainer to 15 N•m (11 lb. ft.).

## EVAP Tank Pressure Control Solenoid Vacuum Valve Inspection

**Caution:** Do not suck air through the EVAP Tank Pressure Control Solenoid Vacuum valve tubes/hoses. Fuel vapor inside the EVAP Tank Pressure Control Solenoid Vacuum valve is harmful.

### Tool Required

J 39200 Digital Multimeter

1. Disconnect the EVAP Tank Pressure Control Solenoid vacuum valve electrical connector.
2. Using J 39200, measure resistance of the EVAP Tank Pressure Control Solenoid vacuum valve between both terminals. If resistance is not 28 to 36 ohms at 20°C (68°F), replace the EVAP Tank Pressure Control Solenoid vacuum valve. Refer to "EVAP Pressure Control Solenoid Vacuum Valve Replacement" earlier in this section. If the resistance is within specification, proceed with Step 3.
3. Disconnect the EVAP Tank Pressure Control Solenoid vacuum valve vacuum hoses from the intake manifold and the vacuum pipe (from Tank Pressure Control valve).

4. Blow air into the EVAP Tank Pressure Control Solenoid vacuum valve vacuum hose that was disconnected from the vacuum pipe. Air should not pass through the EVAP Tank Pressure Control Solenoid vacuum valve and exit from the intake manifold hose.
  5. Connect 12 volts DC to the EVAP Tank Pressure Control Solenoid vacuum valve terminals.
  6. Blow air into the EVAP Tank Pressure Control Solenoid vacuum valve vacuum hose that was disconnected from the vacuum pipe. Air should pass through the EVAP Tank Pressure Control Solenoid vacuum valve and exit from the intake manifold hose.
- If the EVAP Tank Pressure Control Solenoid vacuum valve failed this inspection, replace it. Refer to "EVAP Pressure Control Solenoid Vacuum Valve Replacement" earlier in this section.

## Fuel Tank Pressure Sensor

### Remove and Disconnect

1. Negative (-) battery cable.
2. Remove the fuel tank from vehicle, refer to *Fuel Tank Replacement* in Section 6C.
3. Fuel tank pressure sensor electrical connector.
4. Two bolts and Fuel Tank Pressure sensor from fuel tank.

### Install or Connect

1. Fuel tank pressure sensor to fuel tank; secure with two bolts.

**Notice:** Install fuel tank pressure sensor on the fuel tank with the sensor terminals facing the fuel level sensor (gauge) side.

### Tighten

- Fuel tank pressure bolts to 1.2-2.0 N•m (1.0 lb. ft.).
2. Fuel tank pressure sensor electrical connector.
  3. Negative (-) battery cable.

### Tighten

Negative (-) battery cable-to-negative (-) battery terminal retainer to 15 N•m (11 lb. ft.).

## Tank Pressure Control Valve

**Caution:** Do not suck air through the Tank Pressure Control valve tubes/hoses. Fuel vapor inside the Tank Pressure Control valve is harmful.

### Remove or Disconnect

1. Two clamps and three fuel vapor hoses from Tank Pressure Control valve.
2. Tank Pressure Control valve from engine compartment (next to EVAP canister).

**Inspect**

1. Connect a length of hose to Tank Pressure Control valve marked TANK.
2. Blow hard into hose; air should pass through to the side marked CAN of Tank Pressure Control valve.
3. Remove hose from TANK side and connect it to the CAN side of the Tank Pressure Control valve.
4. Blow into hose; air should pass through to the side marked TANK of Tank Pressure Control valve.
- If the Tank Pressure Control valve does not pass the above tests, replace Tank Pressure Control valve.

5. Apply vacuum, using J 23738-A hand vacuum pump, to vacuum port.
6. With vacuum applied, blow into hose marked TANK. Air should pass through to the side marked CAN of the Tank Pressure Control valve.
- If the Tank Pressure Control valve does not pass the above tests, replace Tank Pressure Control valve.

**Install or Connect**

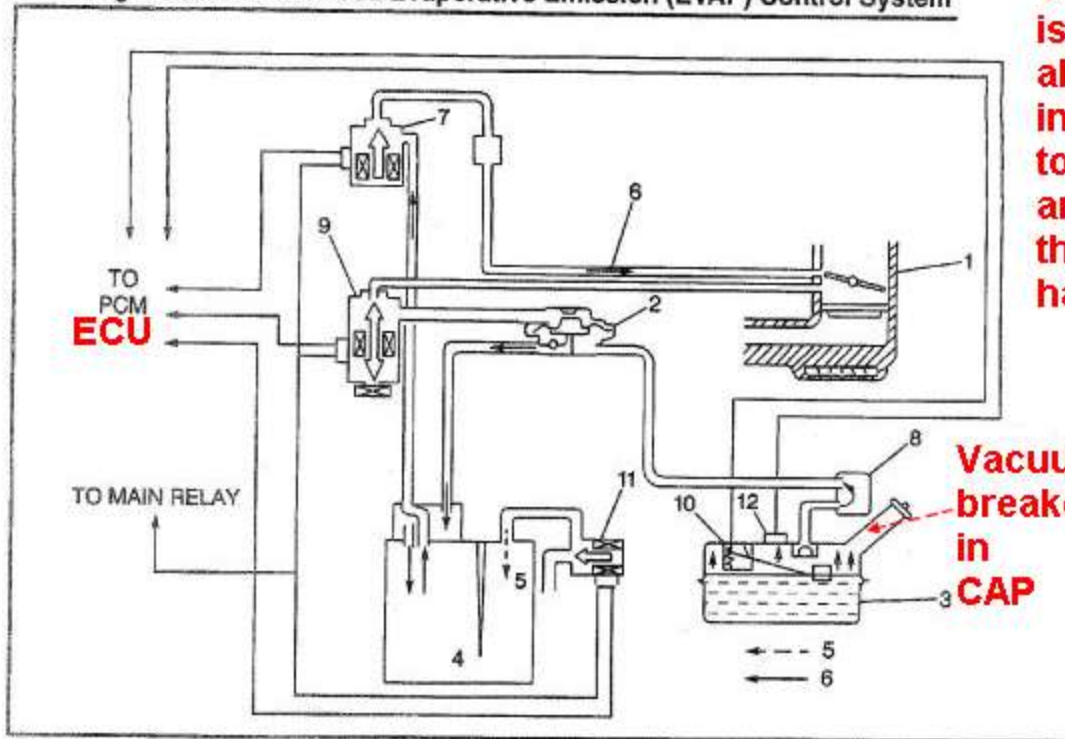
1. Three fuel vapor hoses to Tank Pressure Control valve; secure with two clamps.
2. Tank Pressure Control valve to engine compartment (next to EVAP canister).

**Specifications****Engine Fastener Tightening Specifications**

Application	N•m	Lb Ft	Lb In
Negative (-) Battery Cable-to-Negative (-) Battery Terminal Retainer	15	11	—

when driving  
**VSV 7**  
 is energized,  
 allowing  
 induction vacuum  
 to suck on canister  
 and the gas tank.  
 the filler cap must  
 have its breaker.

Figure C3-1 - Enhanced Evaporative Emission (EVAP) Control System



**Vacuum  
 breaker  
 in  
 CAP**

#### Legend

1. Throttle Body
2. Tank Pressure Control Valve
3. Fuel Tank
4. EVAP Canister
5. Air
6. Vapor and air
7. EVAP Canister Purge Valve
8. Fuel Vapor Separator
9. EVAP Tank Pressure Control Solenoid Vacuum Valve
10. Fuel Level Sensor (gage)
11. EVAP Canister Vent Solenoid
12. Fuel Tank Pressure Sensor

#### Enhanced Evaporative Emission (EVAP) Control System

Figure C3-1

An Evaporative Emission (EVAP) control system is used to prevent emission of fuel vapor.

The vapor generated in the fuel tank while driving, or with the engine at a stop, passes through a Tank Pressure Control valve and enters the EVAP canister

The Enhanced EVAP canister is purged (cleaned) in the same way as non-Enhanced EVAP Control Systems.

- The Tank Pressure Control valve operates as follows:
  - As the EVAP Tank Pressure Control Solenoid vacuum valve closes under the following conditions, the vapor passage of the Tank Pressure Control valve also closes.
    - Engine "OFF".
    - Engine is running, vehicle stopped and fuel level is higher than specified value.

Therefore, when the pressure of the vapor generated in the fuel tank increases higher than specified pressure, it pushes open the Tank Pressure Control valve and enters the EVAP canister.

However, under the conditions that the engine is running and the fuel level is lower than the specified value (or the vehicle is running and the fuel level is higher than the specified value), the EVAP Tank Pressure Control Solenoid vacuum valve is turned "ON" by the ECM and vacuum is applied to the diaphragm of the Tank Pressure Control valve. Thus, the vapor passage of the

**DO  
 NOT  
 USE  
 Generic  
 Gas  
 tank  
 filler  
 caps!**







**DO NOT USE  
Generic Gas tank  
filler caps!**