GENERAL MOTORS EVAPORATIVE CONTROL SYSTEM

DESCRIPTION

Carbon storage is the basic method of evaporative control used on all General Motors vehicles to reduce gasoline vapor emissions. Vapors are stored in a canister for burning during combustion, rather than being vented in the atmosphere.

The fuel tank and usually the carburetor fuel bowl are vented through a hose into a canister containing activated charcoal. The charcoal absorbs these vapors when vehicle is parked, and stores them until they are purged by air when the engine is running. Canisters can be of the open design, drawing fresh air from the filter in the canister base, or closed, drawing fresh air from the air cleaner.

The 2.8L engine uses an electric solenoid to control canister purging. The 2.5L and 3.0L engines use a thermostatically controlled vacuum valve combined with ported vacuum to control the purge function.

OPERATION

2-TUBE VAPOR CANISTER

The vapor storage canister has an inlet tube to permit vapors from carburetor float bowl and from fuel tank to enter. This tube also collects vapors from above float chamber in carburetor, when engine is shut off and cooling down. System has 2 controlling valves: 1) Canister Control Valve (CCV) mounted near carburetor with 4 hoses connected to it, and 2) Thermostatic Vacuum Switch (TVS), installed in intake manifold to sense engine coolant temperature.

TVS has 2 ports. When engine is off, vacuum is lost at CCV. This causes spring-loaded valve in CCV to interconnect carburetor bowl vent hose to hose leading to TVS. If engine temperature is above 170°F, TVS opens, connecting canister hose to hose leading to CCV. Carburetor float vapors may now pass into canister for storage.

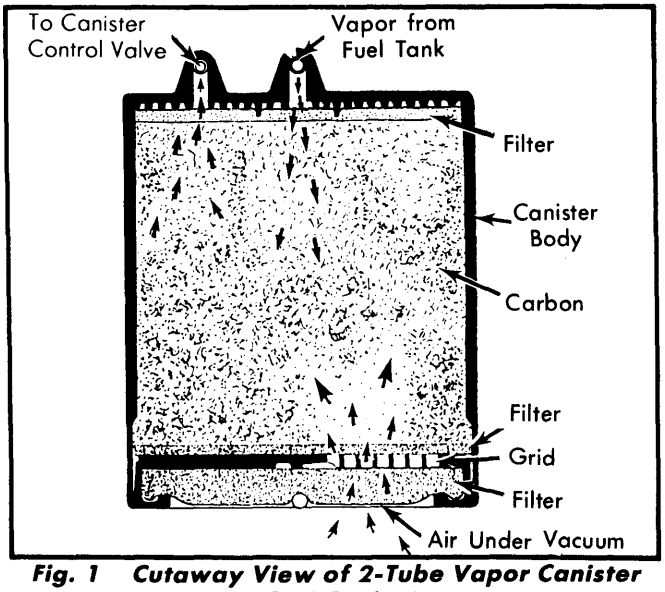

Fig. 1 Cutaway View of 2-Tube Vapor Canister (3.0L Engine)

When engine is restarted, manifold vacuum is sent to CCV, drawing controlling valve against spring pressure, closing bowl vent hose and interconnecting purge hose with hose leading to TVS. When TVS opens, canister is purged through carburetor throttle body, sending vacuum through purge hose. Vapor storage canister has filter element, located in canister bottom, which can be replaced if plugged.

CANISTER WITH VAPOR VENT VALVE

This canister has a vent valve that is part of the vapor canister. Canister collects vapor from carburetor float bowl and delivers it through vapor vent valve. Vacuum signal from engine when running closes the valve, shutting off vapor flow. Purging is controlled by a thermal vacuum switch or an electrical purge solenoid which delays purging until a specified engine coolant temperature is reached. Clean air is supplied to canister from air cleaner.

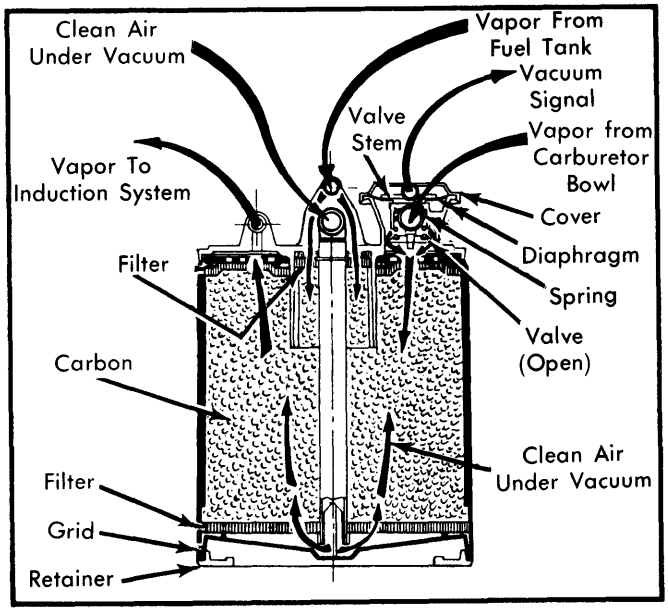

Fig. 2 Cutaway View of Carbon Canister With Vapor Vent Valve

CANISTER WITH PURGE VALVE & VAPOR VENT VALVE

This canister uses a vapor vent valve and purge control valve both mounted on canister body. Canister collects vapor from carburetor float bowl and delivers it through vapor vent valve. Vacuum signal from engine when running closes the valve, shutting off vapor flow. The purge control valve controls the rate at which fuel vapor enters engine. A ported vacuum signal is controlled by a thermal vacuum switch which delays canister purging until a specified engine coolant temperature is reached. When carburetor throttle blades are closed, (idle condition) the purge control valve seals the canister and no purging occurs. When throttle blades are open, the signal port located above the throttle blades is uncovered and vacuum signal opens purge valve, allowing vapor to be drawn from canister. Clean air is supplied to canister from air cleaner.

GENERAL MOTORS EVAPORATIVE CONTROL SYSTEM (Cont.)

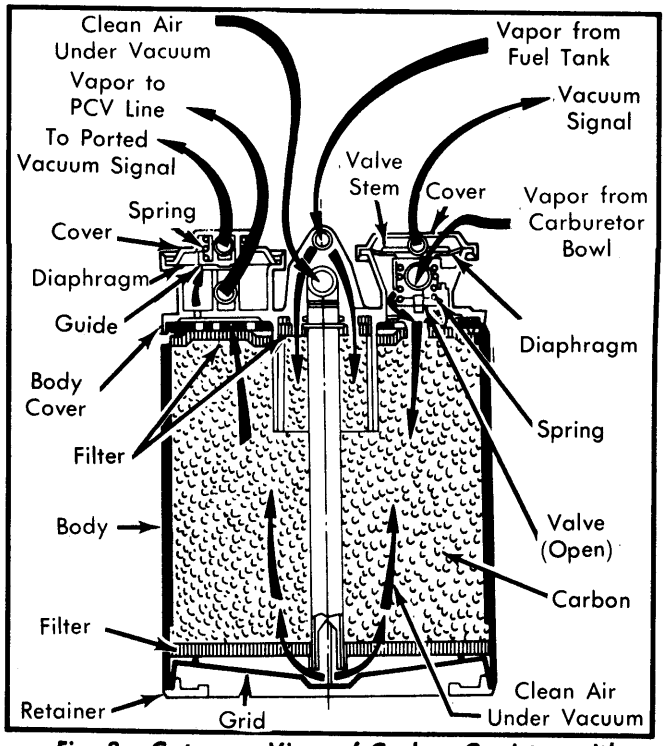

Fig. 3 Cutaway View of Carbon Canister with Purge Control Valve & Vapor Vent Valve

COMPUTER COMMAND CONTROL

Computer Command Control (CCC) system is an electronically-controlled exhaust emission system that monitors up to 15 different engine/vehicle functions and can control as many as 9 different operations including Evaporative Emission Control.

Vehicles equipped with CCC system have an Electronic Control Module (ECM) that controls vacuum to the canister purge valve by means of a solenoid valve. When system is in the open loop, solenoid is energized and blocks vacuum to purge valve. When system is in closed loop, above a specified RPM, solenoid is de-energized. Vacuum can then be applied to purge valve, releasing accumulated vapors into intake manifold.

MAINTENANCE

Check all fuel and vapor lines and hose for proper connections and correct routing as well as condition. Remove canister and check for cracks or damage. Replace damaged or deteriorated parts as necessary. Replace filter in canister bottom if dirty or plugged. Filter will require more frequent replacement if vehicle is operated in extremely dusty conditions.

CHECKING CANISTER PURGE VALVE

1) Remove purge valve control vacuum line. Check for a vacuum signal with engine operating above idle (1500 RPM). If no vacuum signal, perform EGR System Function Check. See *General Motor EGR System article in Exhaust Emission Systems section.*

2) Apply an external vacuum source to the purge valve control diaphragm. A good valve will hold vacuum. If valve will not hold vacuum, replace canister.

3) If valve holds vacuum, remove purge line and check for vacuum. If no vacuum, check PCV hoses and system. Repair or replace as necessary.

CHECKING CANISTER VAPOR VENT VALVE

1) With engine "OFF", remove bowl vent vapor hose from carburetor. Check the open condition of the valve by connecting to a manual vacuum pump. It should not be possible to obtain more than 7 in. Hg of vacuum if valve is open.

2) If a high resistance or plugged system is found, check for a plugged or restricted hose. Hose may be cleared with compressed air. If the hose is clear, remove canister filter and repeat step **1)**. If the restriction persists, replace the canister.

3) The valve closed condition can be checked using the same procedure as steps **1)** and **2)**, but with engine operating at normal temperature. Manifold vacuum will be applied to valve through the control line. The bowl vent line should exhibit a plugged condition.

4) If the valve is not closed, remove control vacuum line and check for vacuum. If no vacuum is present, check hose for restriction or vacuum leak. Repair or replace as required. If vacuum is present, replace canister.