

1975-79 EXHAUST EMISSION SYSTEMS

American Motors Fuel Tank Vapor Control (Cont.)

3-45

Fuel Return System - All AMC vehicles have a fuel return system. This system reduces the possibility of high temperature fuel vapor problems. System consists of a line connecting extra nipple on fuel filter to extra nipple on fuel tank sending unit. During normal operation, a small amount of fuel is returned to fuel tank. When underhood temperatures are high, vaporized fuel is returned to tank and does not pass through carburetor.

MAINTENANCE

Fuel Vapor Control System - Inspect check valve, hoses, connections and canister every 30,000 miles (replace as necessary). Replace fuel filter and charcoal canister filter at each inspection.

Chrysler Corp. Evaporation Control System

DESCRIPTION

The purpose of the Evaporation Control System is to prevent the emissions of gasoline vapors from the fuel tank and carburetor into the atmosphere. When fuel evaporates in the carburetor float chamber or fuel tank, the vapors pass through vent hoses or tubes to a charcoal canister where they are stored until they can be drawn into the intake manifold when the engine is running.

OPERATION

Carburetor Fuel Bowl - The fuel bowls on all carburetors are vented internally and on some models, do not require venting to the canister. In this case the bowl vent port on the canister will be capped. Most carburetors are also externally vented to the charcoal canister.

Vapor Separator Tank - 1975-76 models use a fuel tank with an internal separator. A tube from the separator carries fuel vapor from tank through the separator to charcoal canister.

Rollover/Vapor Separator Valve - All 1977-79 models are equipped with a rollover/vapor separator valve to prevent fuel leakage if vehicle is accidentally rolled over. This valve is located in top of fuel tank on all models except Aspen, Volare, Diplomat and LeBaron, where it is located in the fuel tank vent line.

Charcoal Canister - Canister is used on all models. Fuel vapors from fuel tank are stored in activated charcoal while engine is not operating. When engine is running, vapor is purged from charcoal canister into engine where it is burned with air/fuel mixture.

Fuel Tank Filler Cap - Relief valves in gas cap operate to prevent excessive pressure or vacuum in tank caused by system malfunction or damage. The proper replacement cap must be used if original is lost or damaged.

MAINTENANCE

Horizon & Omni - The only service required for this system is to replace the filter located in bottom of canister, but replacement is only required if vehicle is driven frequently in dusty areas. All hoses should be inspected periodically and replaced if cracked or leaking.

All Other Models - The only service normally required for this system is to replace the filter located in bottom of canister every 30,000 miles. More frequent replacement may be necessary if vehicle is driven in dusty areas.

NOTE: The hoses used in this system are specially manufactured and if replacement is necessary it is important to use only fuel resistant hose.

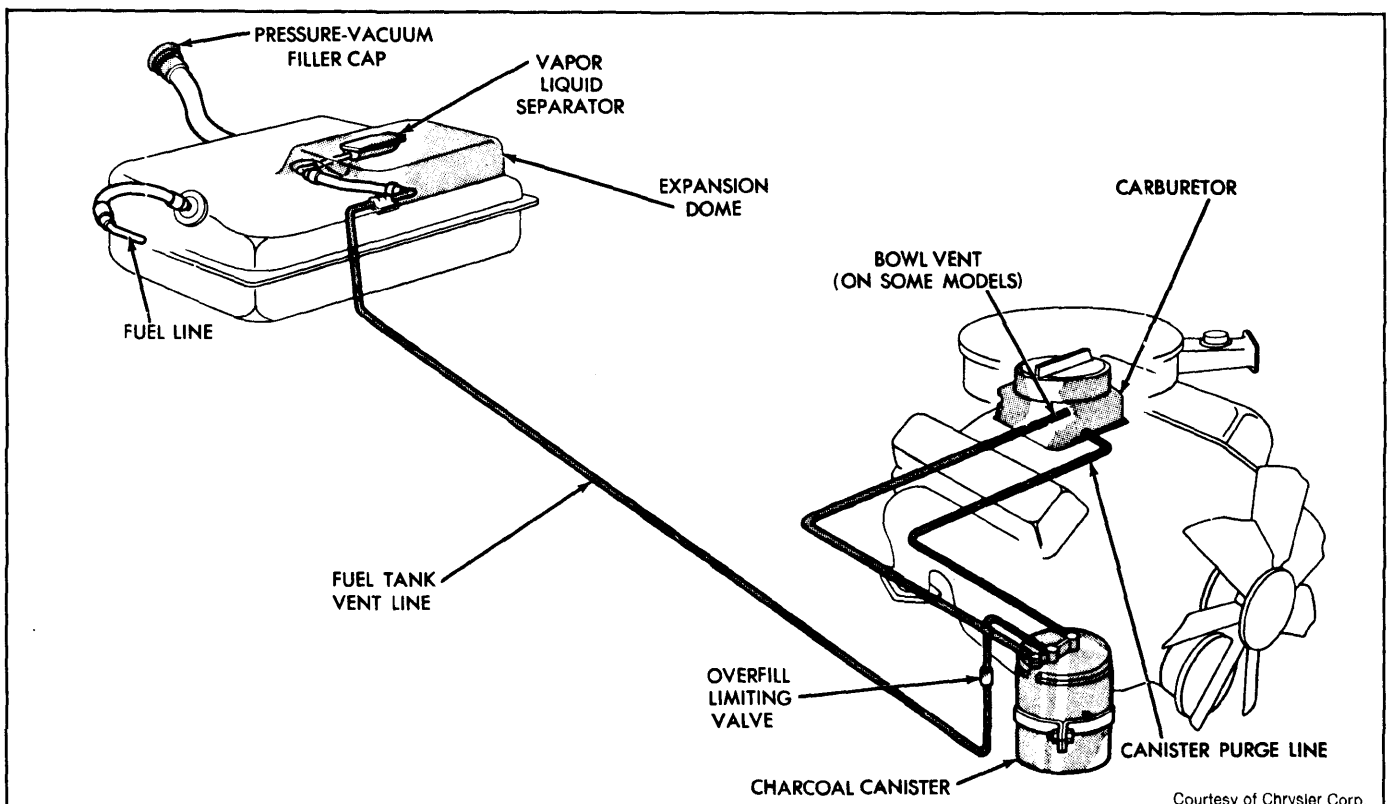
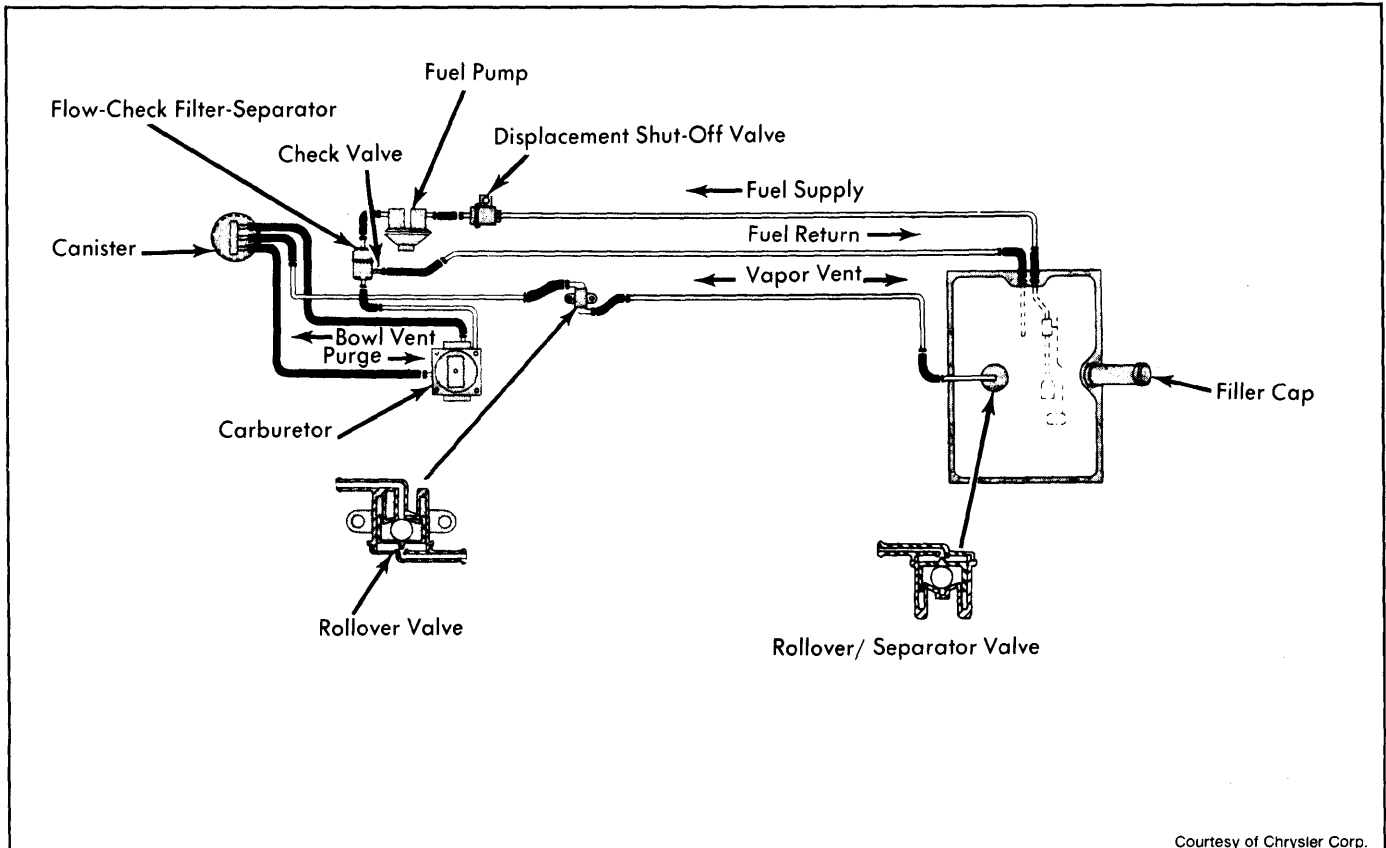


Fig. 1: 1975-76 Evaporation Control System

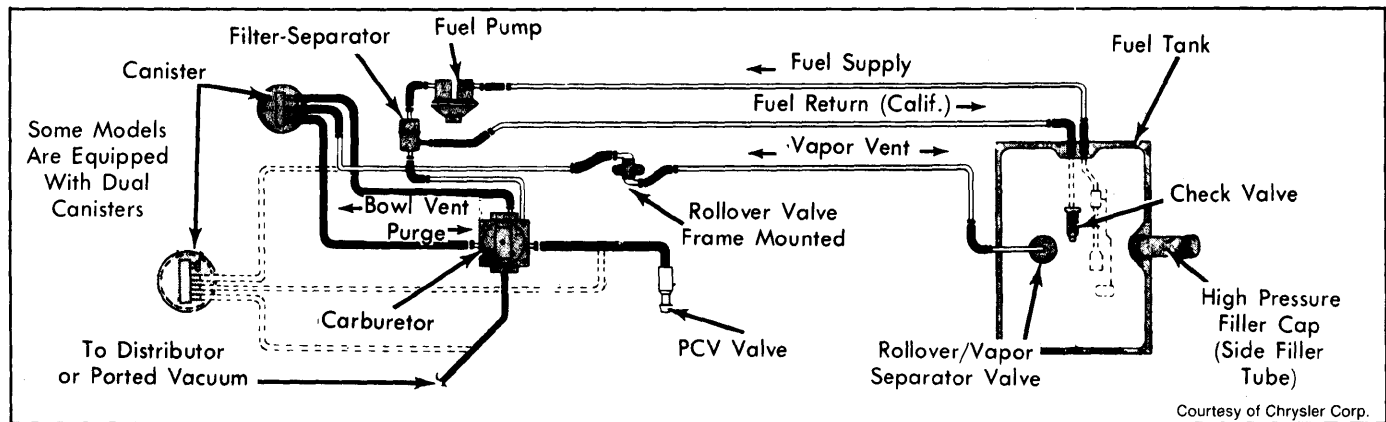
Courtesy of Chrysler Corp.

3-46 **1975-79 EXHAUST EMISSION SYSTEMS**
Chrysler Corp. Evaporation Control System (Cont.)



Courtesy of Chrysler Corp.

Fig. 2: 1977 Evaporation Control System

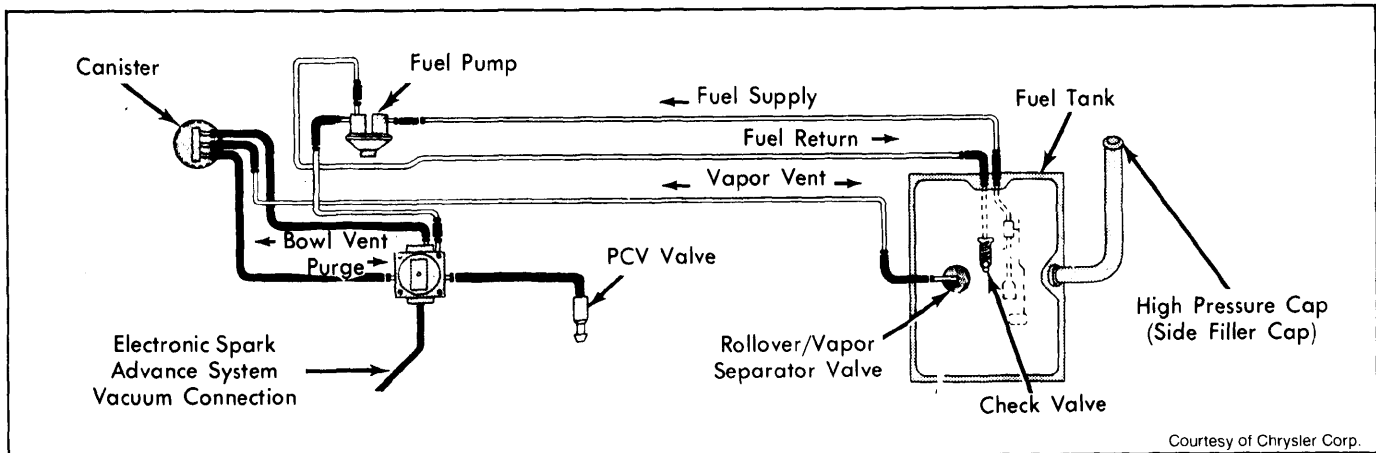


Courtesy of Chrysler Corp.

Fig. 3: 1978-79 Evaporation Control System For All Models Except Omni & Horizon

1975-79 EXHAUST EMISSION SYSTEMS

Chrysler Corp. Evaporation Control System (Cont.)



Courtesy of Chrysler Corp.

Fig. 4: 1978-79 Omni & Horizon Evaporation Control System

Ford Motor Co. Fuel Vapor Emission Control

DESCRIPTION

This system is designed to prevent fuel vapors from the fuel tank and carburetor from being emitted to the atmosphere. System consists of a sealed fuel tank, pressure/vacuum relief fuel cap, fuel tank vapor valve, carbon canister, purge control valve, solenoid vent valve and purge regulator valve (some models), and a Thermactor Idle Vacuum (TIV) valve.

NOTE: Not all of these components are used on any one system, since usage depends on the year and calibration of the complete vehicle. For engine vacuum hose routing, see appropriate vacuum hose diagram in the FORD VACUUM DIAGRAMS in this section.

OPERATION

FILL CONTROL/VENT SYSTEM

Fill limiting is accomplished through fill neck configuration and/or internal vent lines within the fill neck and tank. The vent system is designed to permit an approximate 10-12 percent tank volume air

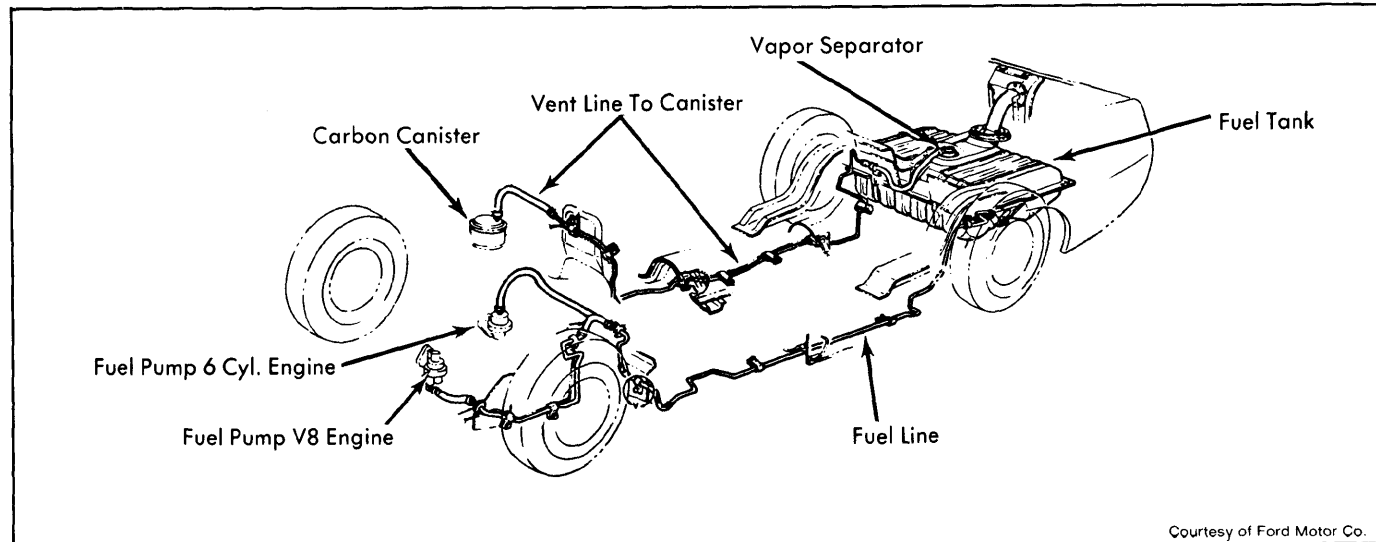
space when tank is filled to capacity. The air space provides for thermal expansion of fuel as well as being an aid to the in-tank vapor vent system.

VAPOR VENT SYSTEM

This system provides a vapor space above the gasoline surface in the fuel tank. This area is sufficient to permit adequate breathing space for the tank vapor valve assembly. All vapor valves make use of a small orifice that tends to allow only vapor and not fuel to pass into the line running forward to the vapor storage canister. This assembly mounts directly to the fuel tank using a rubber grommet. See Fig. 2.

Fuel vapors trapped in the sealed fuel tank are vented through the orificed vapor valve assembly in top of tank. The vapors leave the valve assembly through a single vapor line and continue to carbon canister in engine compartment for storage, until they are purged to the engine when engine is running.

In vehicles equipped with fuel/vapor return lines, vapor generated in fuel supply line is continuously vented back to the fuel tank. This



Courtesy of Ford Motor Co.

Fig. 1: Fuel Fuel Vapor Emission Control System

1975-79 EXHAUST EMISSION SYSTEMS

Ford Motor Co. Fuel Vapor Emission Control (Cont.)

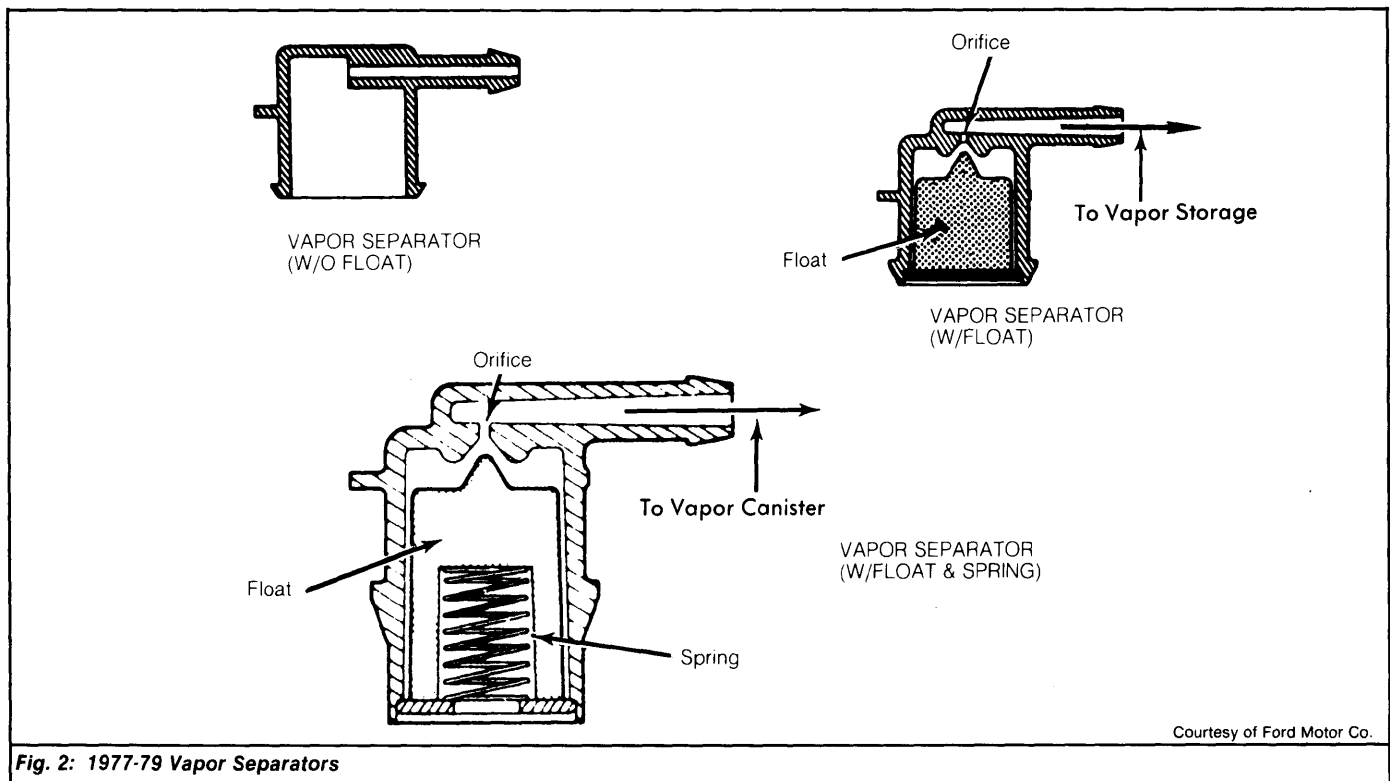


Fig. 2: 1977-79 Vapor Separators

action prevents engine surging from unwanted fuel enrichment and assists in hydrocarbon emission control.

CARBON CANISTER

Fuel vapor emitted through the fuel vapor valve and carburetor bowl vent is stored in a carbon-filled canister. Some models are equipped with two canisters, depending on fuel tank capacity and engine calibration.

CARBURETOR VENTING

Fuel vapors which might otherwise collect in the carburetor bowl and pass directly into the atmosphere are vented to the carbon canister when engine is stopped. Flow of these vapors is controlled by the fuel bowl vent valve, the purge control valve, or the fuel bowl thermal vent valve, depending on the particular carburetor and engine calibration used. When the engine is started, and depending on the operating mode when purging the system is most efficient, the vapors will be drawn into the engine for burning.

PURGE CONTROL VALVE (1978-79)

The purge control valve is mounted directly on the carbon canister and controls the flow of fuel vapors into and out of the canister.

FUEL BOWL SOLENOID VENT VALVE (1978-79)

The fuel bowl solenoid vent valve is a normally open valve located in the fuel bowl vent line. It is normally used with the Motorcraft 2150, 2700 VV, and 7200 VV carburetors, which do not have a built-in fuel bowl vent valve. The solenoid vent valve closes off the fuel bowl vent line when the engine is running, and returns to the normally open position when the ignition switch is turned off.

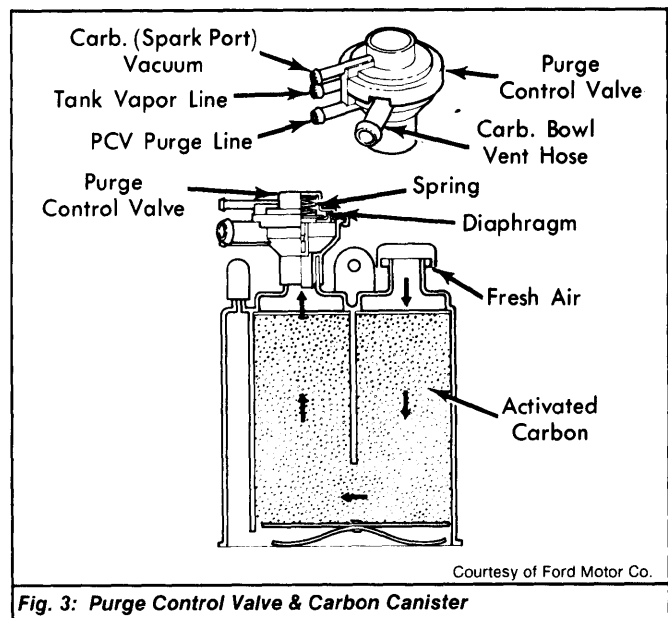


Fig. 3: Purge Control Valve & Carbon Canister

NOTE: If lean fuel mixture is suspected as the cause of a complaint, inspect either the solenoid vent valve or the fuel bowl vent valve for proper closing during engine operation. If the valve opens, allowing purge vacuum to affect fuel bowl balanced air pressure, the carburetor will give a leaner air/fuel mixture.

1975-79 EXHAUST EMISSION SYSTEMS

Ford Motor Co. Fuel Vapor Emission Control (Cont.)

3-49

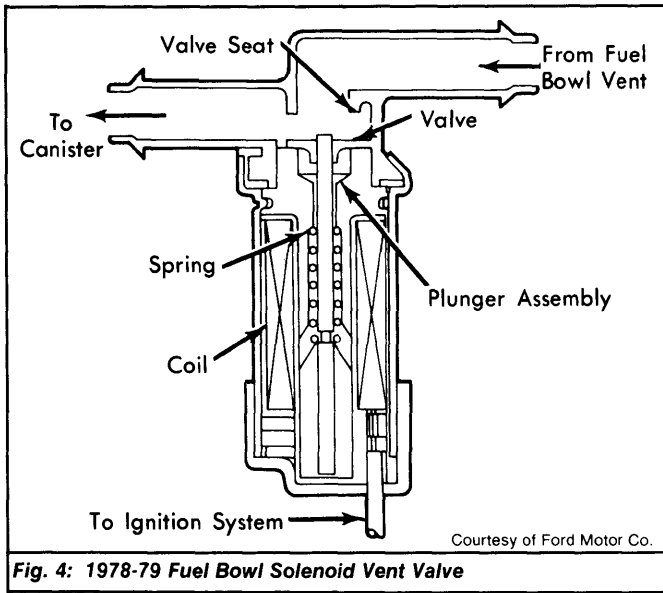


Fig. 4: 1978-79 Fuel Bowl Solenoid Vent Valve

FUEL BOWL THERMAL VENT VALVE

The thermal vent valve is inserted in the carburetor-to-canister vent line and is closed when the engine compartment is cold. This prevents fuel tank vapors generated when fuel tank heats up before the engine compartment does from being vented through the carburetor fuel bowl.

THERMACTOR IDLE VACUUM (TIV) VALVE

A Thermactor Idle Vacuum (TIV) valve is used with some evaporative emission systems to improve idle quality at hot start. To overcome this poor idle condition, the TIV valve bleeds air into the PCV tube, leaning the idle fuel mixture until the purge valve opens. The same vacuum that opens the purge valve closes the TIV valve.

PURGE REGULATOR VALVE

The purge regulator valve is installed in the purge tube between the purge control valve and the vacuum source, and regulates the amount of air being drawn into the intake manifold through the carbon canister.

NOTE: Since the purge regulator valve functions in the same manner as a PCV valve, it must be mounted in an upright or nearly upright position for proper operation.

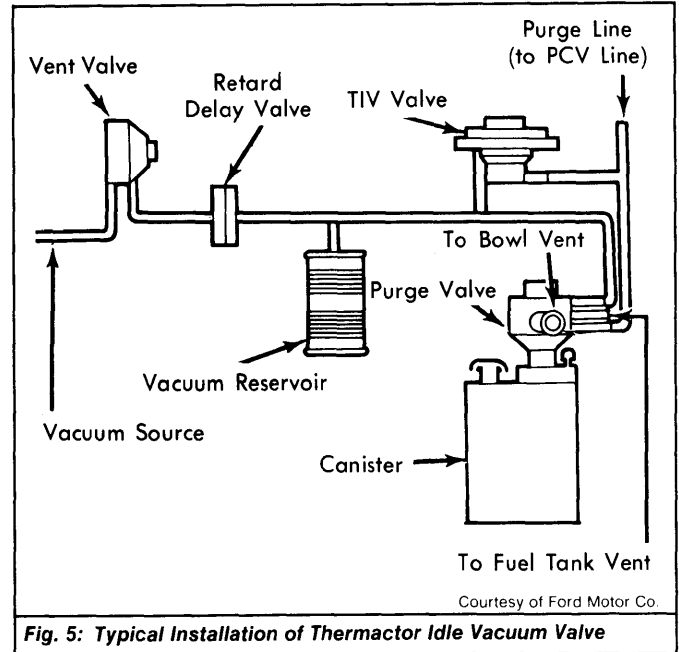


Fig. 5: Typical Installation of Thermactor Idle Vacuum Valve

PRESSURE & VACUUM RELIEF SYSTEM

This system consists of a sealed filler cap with an integral pressure/vacuum relief valve. Fuel system vacuum relief is provided after .5 in. Hg, and pressure relief after 1.8 psi. Under normal conditions, the fill cap allows air to enter the tank as fuel is used, while preventing vapors from escaping. In the event of a rollover, the valve prevents gasoline from escaping.

FUEL VAPOR RETURN SYSTEM

This system consists of a vapor return line from the fuel pump to the fuel return outlet of the fuel sender. This reduces the amount of fuel vapor entering the carburetor and is used on the 2300 cc engines.

AIR CLEANER ASSEMBLY

On some models an auxiliary fuel bowl vent tube runs to the air cleaner. A vapor dam inside the air cleaner keeps vapors in the air cleaner, where they are immediately burned when the engine is started.

MAINTENANCE

No scheduled maintenance is required. All hoses and connection should be checked periodically and replaced as necessary.

General Motors Evaporative Control System

NOTE: This article includes systems used on the 1980 Buick Skylark, Chevrolet Citation, Oldsmobile Omega and Pontiac Phoenix.

DESCRIPTION

An Evaporative Control System (ECS) is 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 to the atmosphere.

The fuel tank and usually the carburetor fuel bowl are vented through a hose into a canister containing activated charcoal. The

canister adsorbs these vapors when the vehicle is parked, and retains them until purged by air drawn through a filter at the bottom of the canister. Purging of the charcoal takes place when the engine is running.

OPERATION

FUEL TANK

Fuel tank includes an expansion chamber to allow for fuel expansion. Most fuel tanks also include an integral liquid-vapor separator. This acts as a standpipe to allow fuel vapors, but not liquid fuel to route to canister.

1975-79 EXHAUST EMISSION SYSTEMS

General Motors Evaporative Control System (Cont.)

SINGLE STAGE CANISTER

The single stage canister has either 2 or 3 inlet tubes to permit vapors from carburetor float bowl and from fuel tank to enter. On early 1975-77 models, air is sucked through a hose connected to the purge control port on the carburetor. As the air flows from the bottom of the canister and through a filter, it picks up fuel vapor stored in canister during engine operation. The 1978-79 models added a third tube connected to engine vacuum which draws vapors out of the charcoal canister when the engine is running.

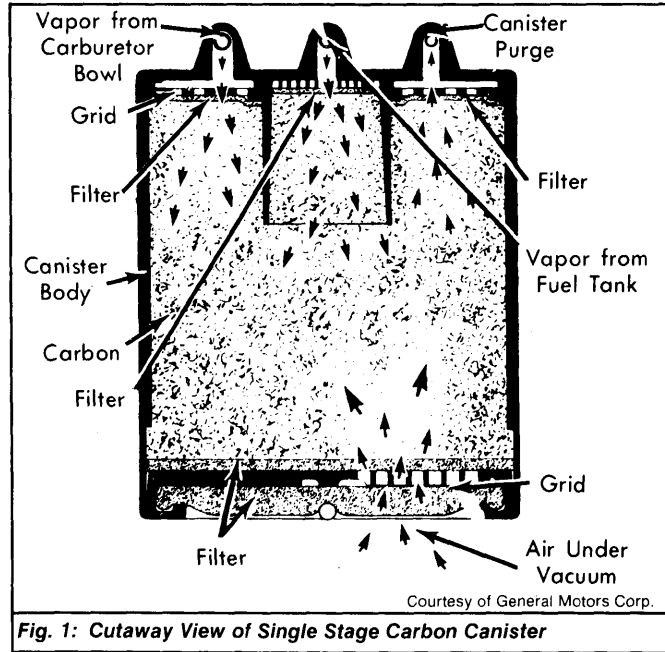


Fig. 1: Cutaway View of Single Stage Carbon Canister

CANISTER WITH VAPOR VENT VALVE (1978-79)

The vapor storage canister is designed to adsorb and store fuel vapors from the fuel tank and carburetor float bowl. It also contains a valve that opens or closes the float bowl vent on the carburetor.

When the engine is off, the spring force opens the valve and fuel vapors from the carburetor float bowl can flow into the charcoal canister. When the engine is running, manifold vacuum closes the vent valve and seals the passage of fuel vapors, allowing the float bowl to be vented directly to the intake air stream. When the engine is turned off, the valve opens and again vents vapors to the canister.

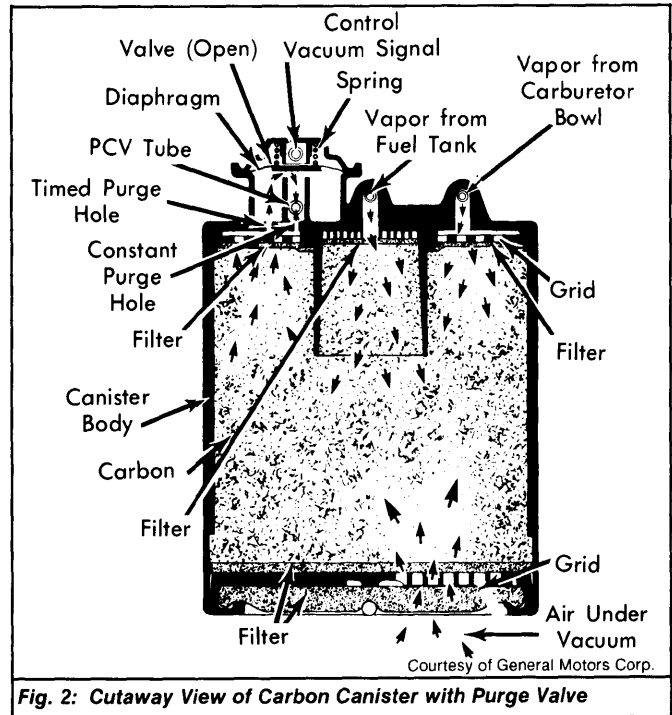


Fig. 2: Cutaway View of Carbon Canister with Purge Valve

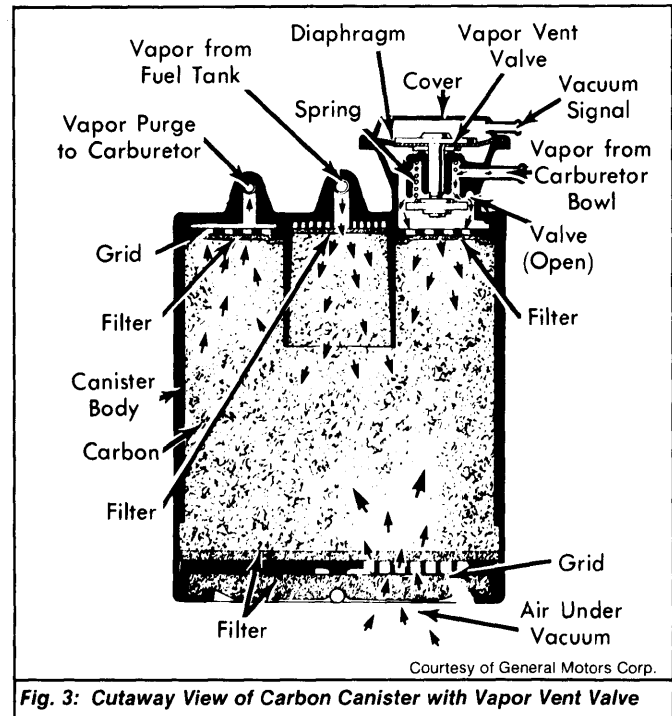


Fig. 3: Cutaway View of Carbon Canister with Vapor Vent Valve

CANISTER WITH PURGE VALVE & VAPOR VENT VALVE (1978-79)

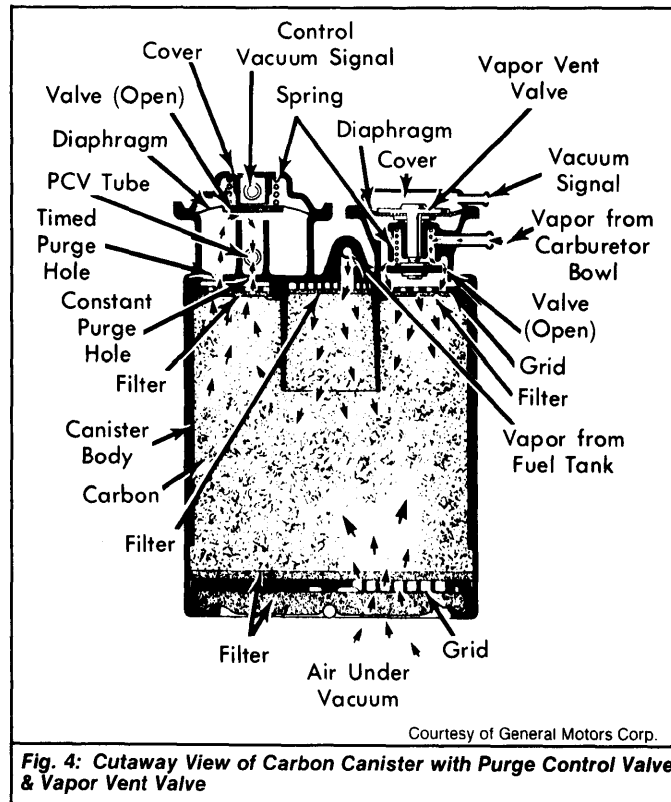
This canister design combines a float bowl vent valve with a vacuum controlled purge valve. Float bowl vapors are collected when the engine is off, along with fuel tank vapors. These emissions are stored in the charcoal bed until the engine is started.

1975-79 EXHAUST EMISSION SYSTEMS

General Motors Evaporative Control System (Cont.)

3-51

A Thermal Vacuum Switch (TVS) delays canister purging until a specified engine temperature is reached. At idle or with the engine cold, only a small amount of air is allowed through the bleed valve. As engine speed is increased and coolant temperature reaches normal, a vacuum signal opens the purge valve, allowing much greater air flow to purge the canister vapors.



NOTE: Canister filter should be changed more frequently 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

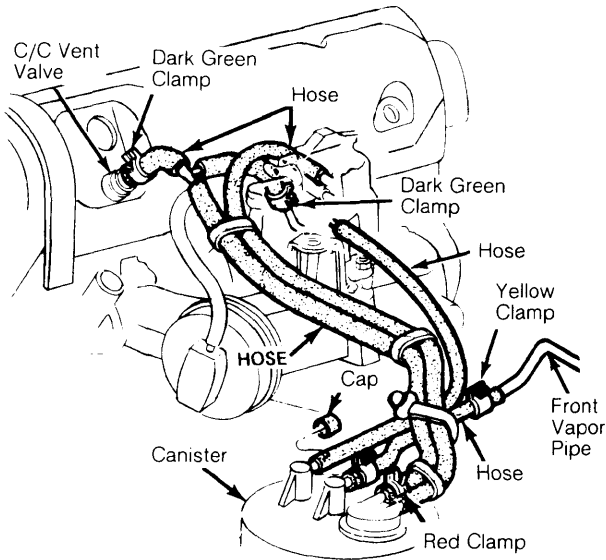
- 1) Remove bowl vent vapor hose from carburetor. Check the open condition of the valve by connecting to a manual vacuum pump. It should not be possible to obtain .5 in. Hg vacuum if valve is open.
- 2) If a high resistance or plugged system is found, check for a plugged or restricted hose. Hose may be cleared with compressed air. If the hose is clear, remove canister filter. If the restriction persists, replace the canister.
- 3) The valve closed condition can be checked using the same procedure, 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.

MAINTENANCE

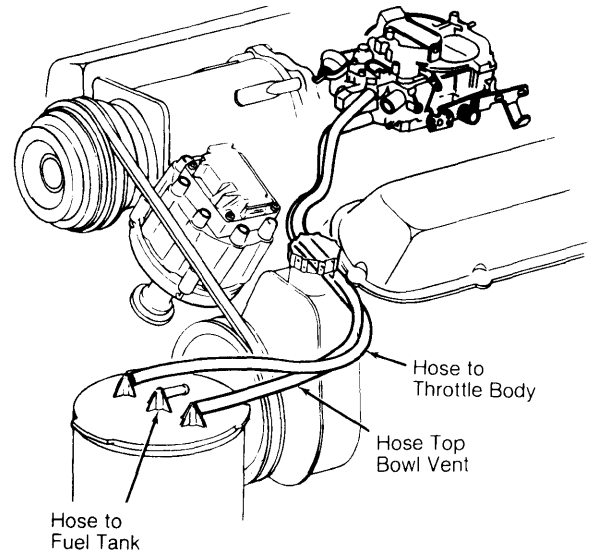
Check all fuel and vapor lines and hose for proper connections and correct routing as well as condition. Remove canister and check for cracks or damage. Replace damaged or deteriorated parts as necessary. Replace filter in bottom of canister every 30,000 miles or 24 months (whichever occurs first).

1975-79 EXHAUST EMISSION SYSTEMS

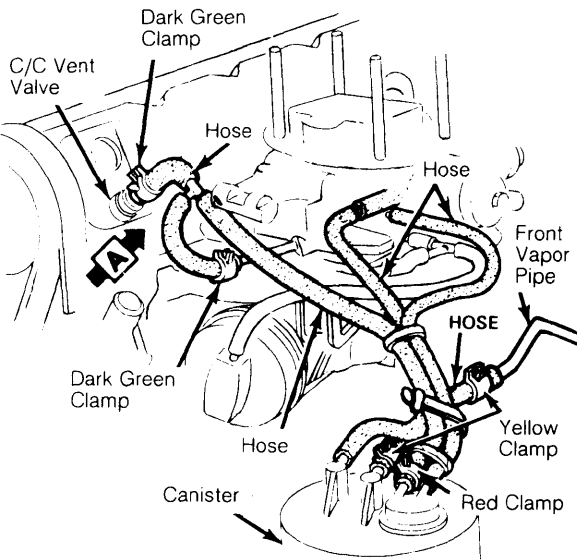
General Motors Evaporative Control System (Cont.)



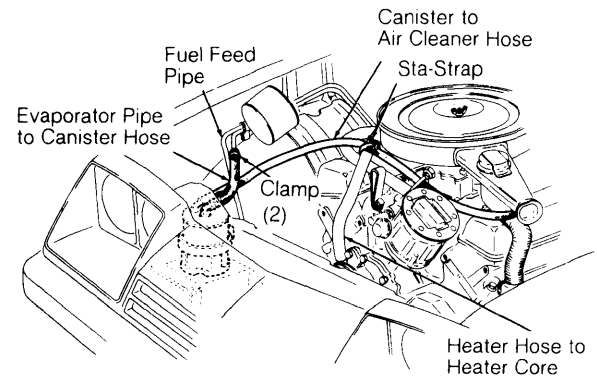
ASTRE & VEGA 1-Bbl. CARB.



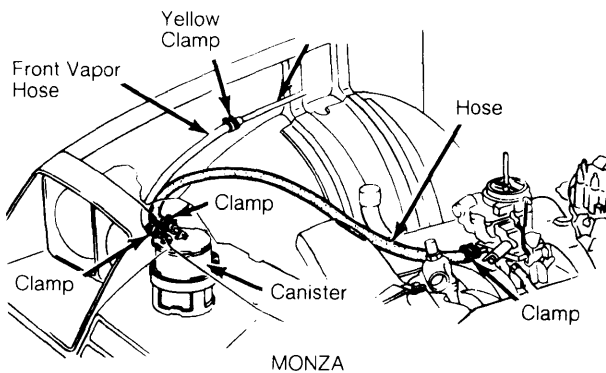
CADILLAC



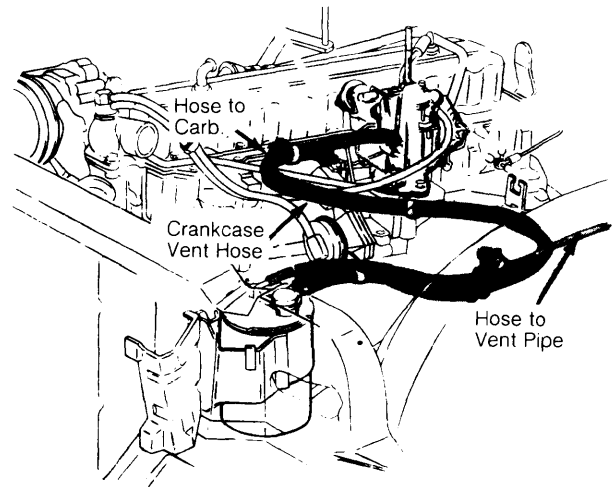
ASTRE & VEGA 2-Bbl. CARB.



STARFIRE & SKYHAWK



MONZA



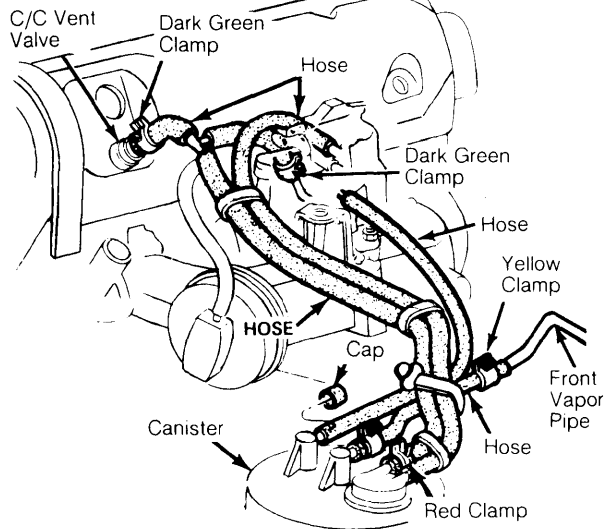
GENERAL MOTORS (6-CYL.)

Courtesy of General Motors Corp.

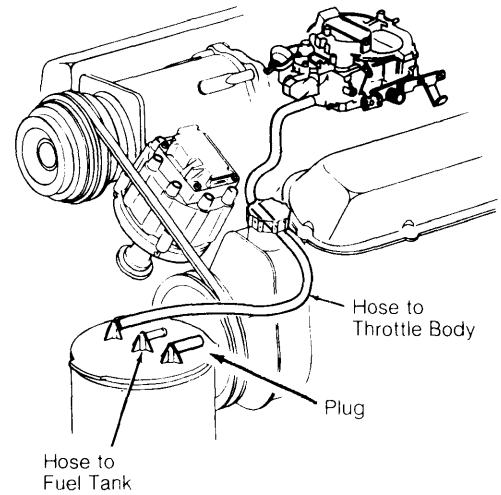
Fig. 5: 1975 General Motors Corp. Evaporation Control System

1975-79 EXHAUST EMISSION SYSTEMS

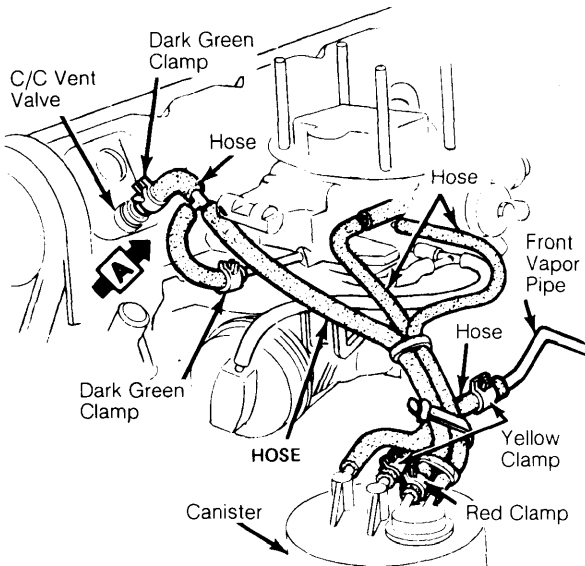
General Motors Evaporative Control System (Cont.)



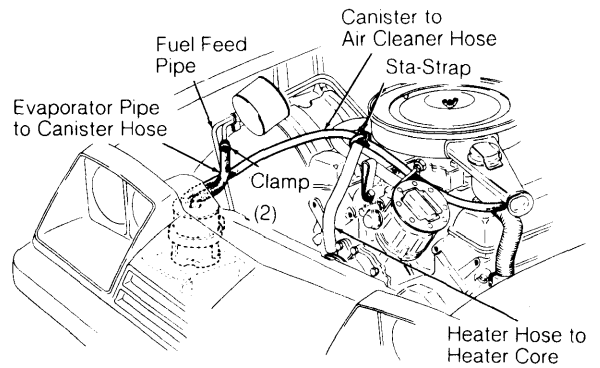
ASTRE, CHEVETTE & VEGA (1-Bbl.)



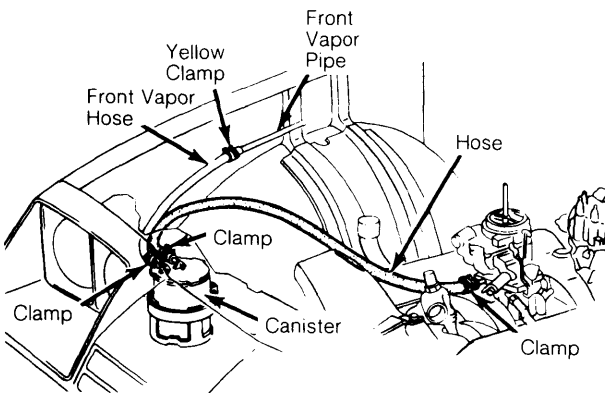
CADILLAC



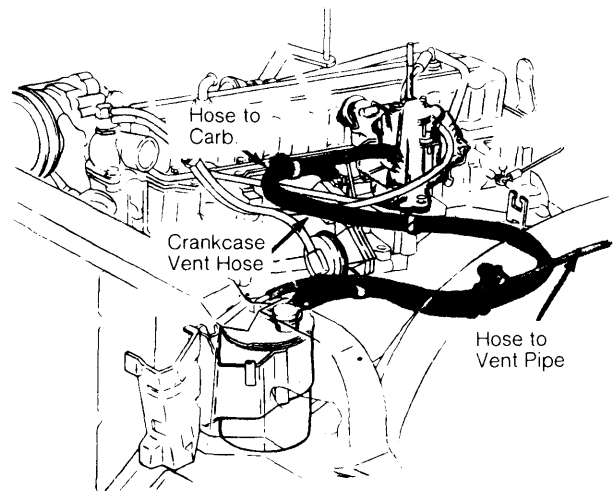
ASTRE & VEGA (2-Bbl.)



STARFIRE & SKYHAWK



MONZA



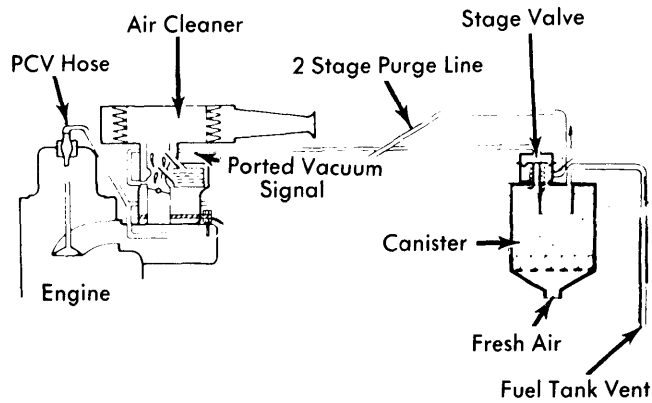
GENERAL MOTORS (6-CYL.)

Courtesy of General Motors Corp.

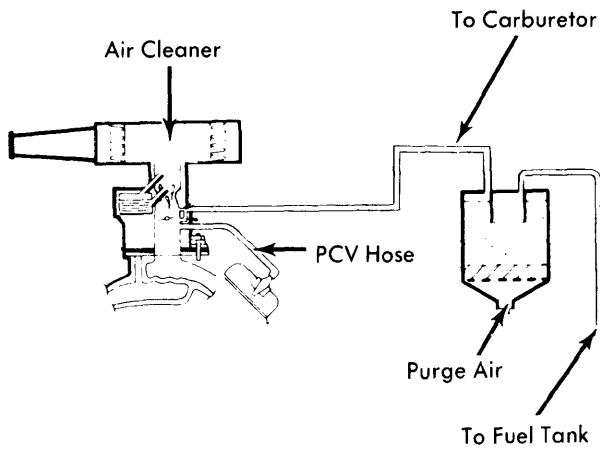
Fig. 6: 1976 General Motors Corp. Evaporation Control System

1975-79 EXHAUST EMISSION SYSTEMS

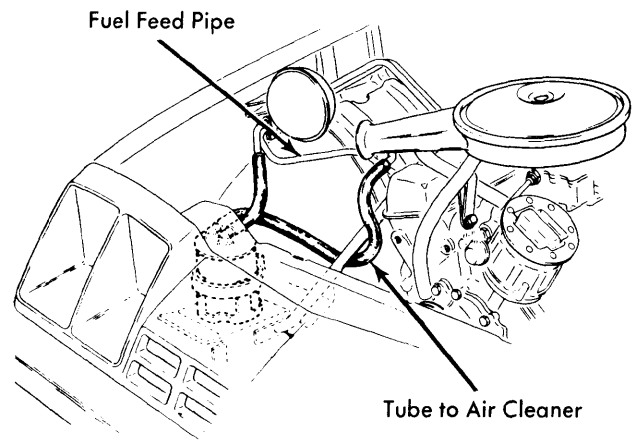
General Motors Evaporative Control System (Cont.)



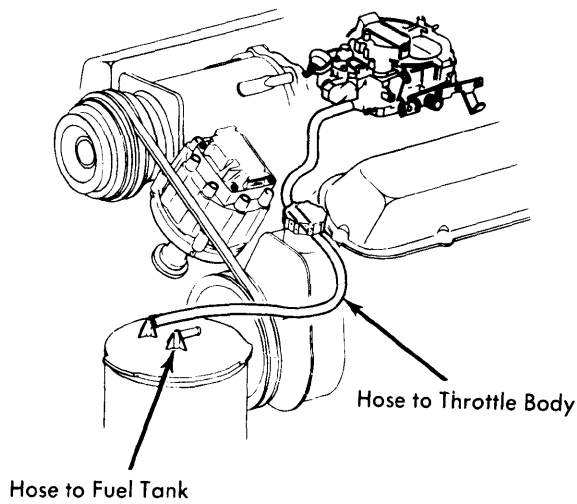
CHEVETTE & CHEVROLET 6-CYLINDER



VEGA & CHEVROLET V8



SKYHAWK & STARFIRE



CADILLAC

Courtesy of General Motors Corp.

Fig. 7: 1975 General Motors Corp. Evaporation Control System