

1970 GENERAL MOTORS EVAPORATION CONTROL (GMECS)

NOTE – This system installed on all General Motors cars sold in the State of California.

DESCRIPTION & OPERATION

The Evaporation Control System (GMECS) is designed to prevent emission to the atmosphere of fuel vapors from the vehicle fuel system. The same basic system is used on all cars with design differences on each model as detailed below. The fuel supply system is closed with a normally sealed fuel tank filler cap and a vent system is provided through which fuel vapors are conducted through a vent line to the engine compartment where they are burned in the engine. This system incorporates the following new or modified parts:

Fuel Tank – Fuel tanks have a baffle installed in upper half which acts as a fuel fill limiter and provides an air chamber to allow for fuel expansion due to temperature changes. These tanks have 1-2 gallons less capacity than standard tanks. Two or more vent lines are provided at tank (opening into front and rear of tank or other points) to provide positive venting with car at any angle and these lines are connected to the Liquid-Vapor Separator.

Fuel Tank Filler Cap & Pressure-Vacuum Relief Valve – Filler cap is not vented (except where pressure-vacuum relief valve located in cap) and normally seals the fuel tank. When replacing filler caps, the same type must be used on each car model as originally installed. A pressure-vacuum relief valve is used on most cars to vent the tank under conditions of excessive pressure or vacuum (to prevent tank damage). This valve is located in the fuel tank filler cap, directly in the tank top, in vent line to engine compartment (Buick only), or built in top of carbon canister in engine compartment (Pontiac only).

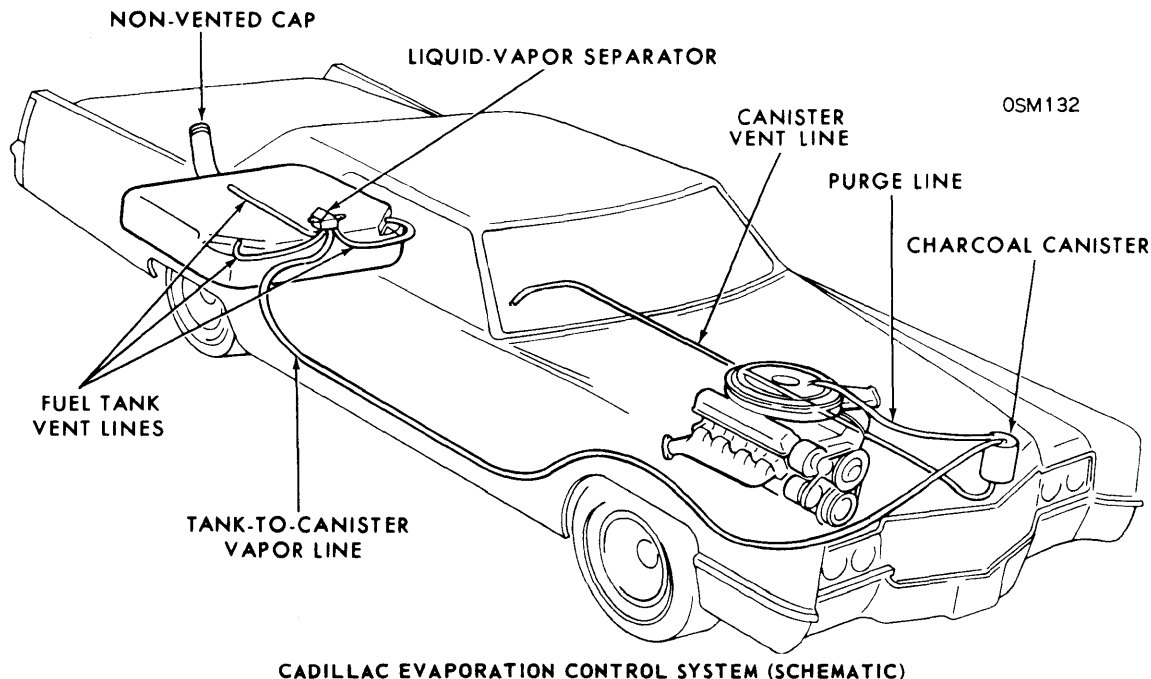
Liquid-Vapor Separator – Vent lines from fuel tank are connected to this separator assembly mounted above the tank (designs vary on different cars but all units operate similarly). Separator is designed to prevent liquid fuel flowing through the vent line to the carbon canister in the

engine compartment by providing a chamber in which liquid fuel is separated out and returned to the tank through the vent line. Vent line from forward part of tank opens into a closed chamber in the separator and outlet from this chamber is controlled by a float operated valve so that any fuel flow resulting from car being parked on a hill will be shut off at this point by the closing of the valve. Vapor line from top of separator is connected to carbon canister in engine compartment where vapors are collected when engine is not running.

Carbon Canister (Except Pontiac) – Vent line from vapor separator is connected to carbon canister in engine compartment. Canister is filled with activated charcoal and fuel vapors are absorbed by the charcoal when engine is not running. A second vent line connected to the same point on the canister (both vent lines open into small chamber in canister above charcoal) extends to a "Tee" connection in the crankcase ventilation line from the PCV valve connection to the manifold, and with the engine running, fuel vapors are drawn directly into the intake manifold and burned within the engine. (**NOTE** – On Cadillac and some Buick models, this line is not used and connection is capped. On these cars, canister is vented through "purge" line). On all models, a "purge" vent line is connected to the top of the canister to provide a flow of air through the charcoal in the canister when the engine is running. This air is admitted through a filter in the canister base and carries off the fuel vapors absorbed by the charcoal when the engine is not running. This action reactivates the charcoal and restores its vapor absorbing quality. Purge lines are connected differently on various car models as follows:

Buick & Oldsmobile – Purge line is connected to air cleaner snorkel and air flow when engine running induces air flow through purge line so that fuel vapors are carried into engine.

Cadillac – Purge line is connected to fitting on top of air cleaner so that fuel vapors are drawn through purge line when air cleaner operating. Air intake opening on bottom of canister is closed with an air line extending rearward under the car.



Fuel Evaporation

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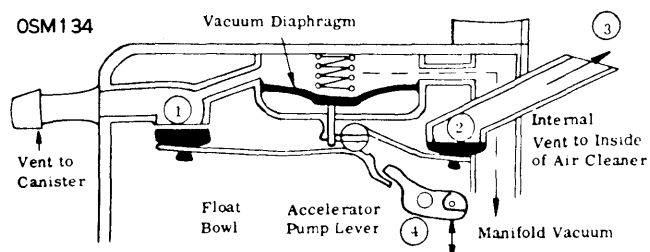
Chevrolet (except V8 Engines with 4-Bbl. Carb.) – Same as Buick and Oldsmobile with purge line connected to air cleaner snorkel.

Chevrolet (V8 Engines with 4-Bbl. Carb.) – Purge line is connected to regular canister vent line (which is "Teed" to engine crankcase ventilation line) through a purge valve which opens only when engine running above idle speeds (purge valve has vacuum diaphragm control with vacuum chamber connected above carburetor throttle valve to provide a "ported" vacuum signal). Purge valve is mounted on top of canister.

Carbon Canister (Pontiac) – Canister design is similar to that used on other car models except that vent line connections on top of canister are different and, in conjunction with special "bowl vent switch valve" in carburetor, provide a different flow pattern for fuel vapor and purge-air flow as follows:

Canister Connections – Vent line from liquid-vapor separator on tank is connected to a closed chamber on canister which has a "demand" valve and a "tank relief" valve. Demand valve opens in response to fuel vapor pressure in vent line to permit fuel vapors to flow into canister. Vacuum relief valve opens whenever a negative pressure occurs within the tank (as fuel is consumed) and allows atmospheric pressure to enter the vent system. A second vent line from the canister is connected to the carburetor (for bowl venting when engine not running) and also at a point below the throttle valve to provide a slight purge action for the canister (engine running). An additional purge line from the canister is connected to carburetor above throttle valve. Air flow through this line (with engine running above idle speed) purges fuel vapors from the canister charcoal.

Carburetor Switching Valve – This valve is built-in the carburetor fuel bowl cover and consists of a double bowl vent valve assembly operated by a spring-loaded diaphragm type control through which the bowl is vented to the air cleaner (engine running) or to the carbon canister (engine not running). This switching action is effected by applying manifold vacuum to valve diaphragm chamber (through internal passage in carburetor body) and is supplemented by an interconnecting linkage connected to the accelerating pump arm to prevent the internal bowl vent closing under conditions of low manifold vacuum such as wide-open throttle.



Engine Off – Bowl vent 1 open to canister.

Engine On (Part Throttle) – Bowl vent 2 opened by manifold vacuum diaphragm, vapors mixed with fuel charge at 3.

Engine On (Wide-open Throttle) – Bowl vent 2 opened by accelerator pump lever 4 (diaphragm not effective).

PONTIAC EVAPORATION CONTROL CARBURETOR SWITCHING VALVE (SCHEMATIC)

PERIODIC MAINTENANCE

Replace carbon canister filter at 12,000 mile or 12 month intervals (more often for operation in dusty areas). This is the only regular maintenance service required.

Canister Filter Replacement – Disconnect hoses from top of canister, remove canister from mounting bracket. Remove cover from bottom of canister by pulling it down to disengage clips. Remove and discard polyurethane filter element (squeeze element out from under retainer bar). Install new filter by squeezing element under retainer bar and positioning it evenly around entire bottom of canister with edges tucked under canister lip, snap bottom cover in place, reinstall canister on bracket and reconnect hoses.

Crankcase Ventilation System – Evaporation control system is interconnected with crankcase ventilation system.

PARTS REPLACEMENT

HOSE REPLACEMENT CAUTION – Hoses are special type and only hose marked "EVAP" should be used for replacement.

TROUBLE SHOOTING & DIAGNOSIS

Gasoline Odors or Loss of Fuel

- 1) Fuel tank overfilled or leaking, defective tank filler cap or filler neck.
- 2) Leaking or defective liquid-vapor separator, disconnected or leaking separator vent lines.
- 3) Fuel feed line or vapor return line leaking.
- 4) Vent lines or purge lines leaking, disconnected, pinched, plugged, or improperly connected.

Collapsed Fuel Tank or Pressure in Tank

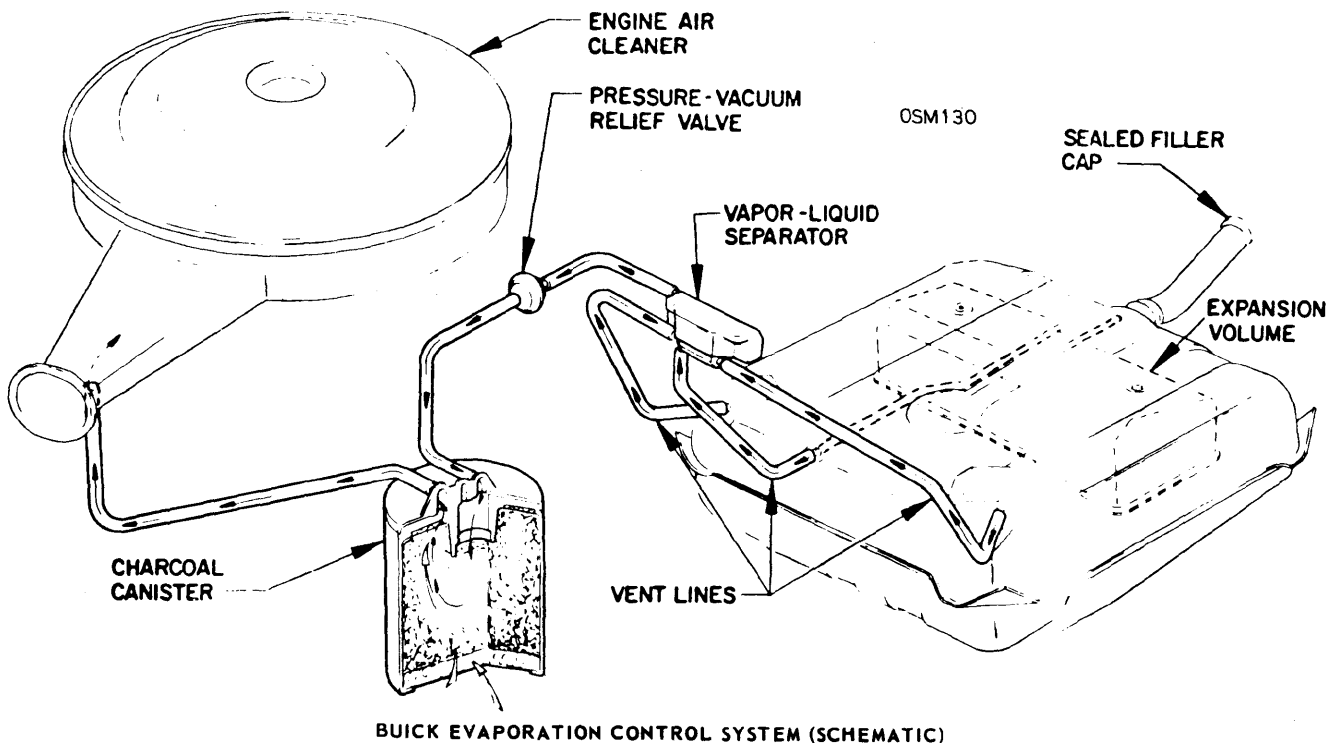
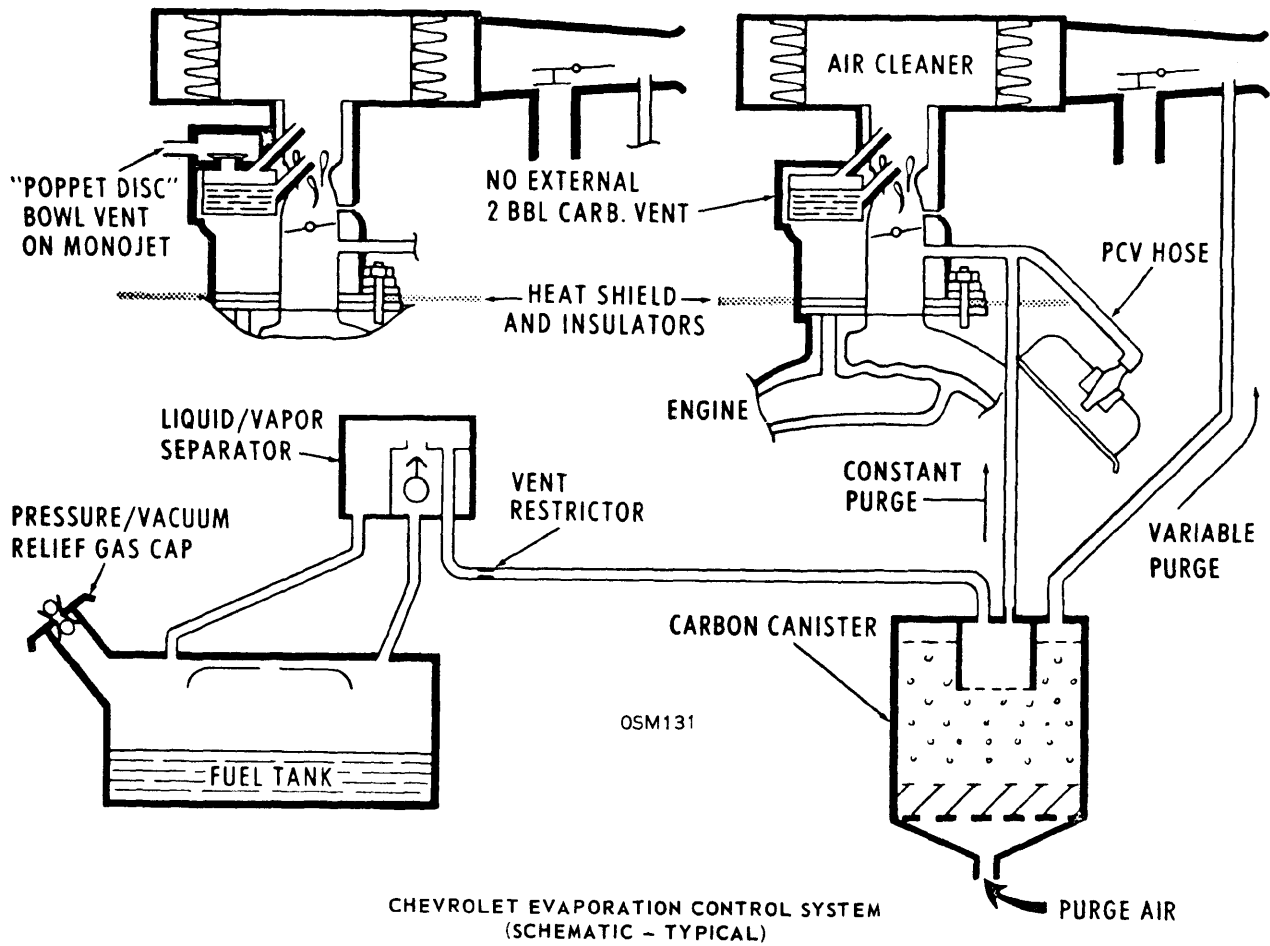
- 1) Defective pressure-relief valve. Vent lines or hoses plugged or pinched.
- 2) Liquid-vapor separator outlet plugged.
- 3) Defective canister (plugged internally) or incorrect vent line and purge line connections.

Car Does Not Idle Properly

- 1) Purge hose disconnected, not properly connected or routed.
- 2) Liquid fuel loss (see Gasoline Odors), or high volatility fuel being used.
- 3) Canister filter plugged.

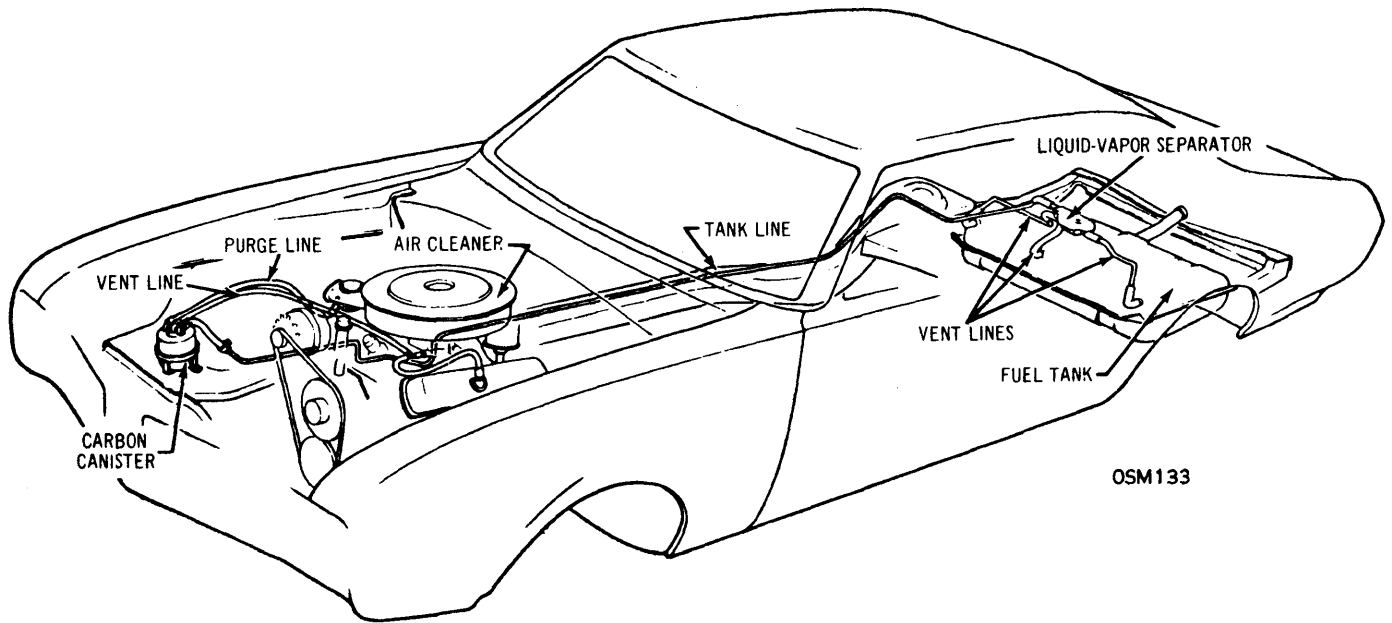
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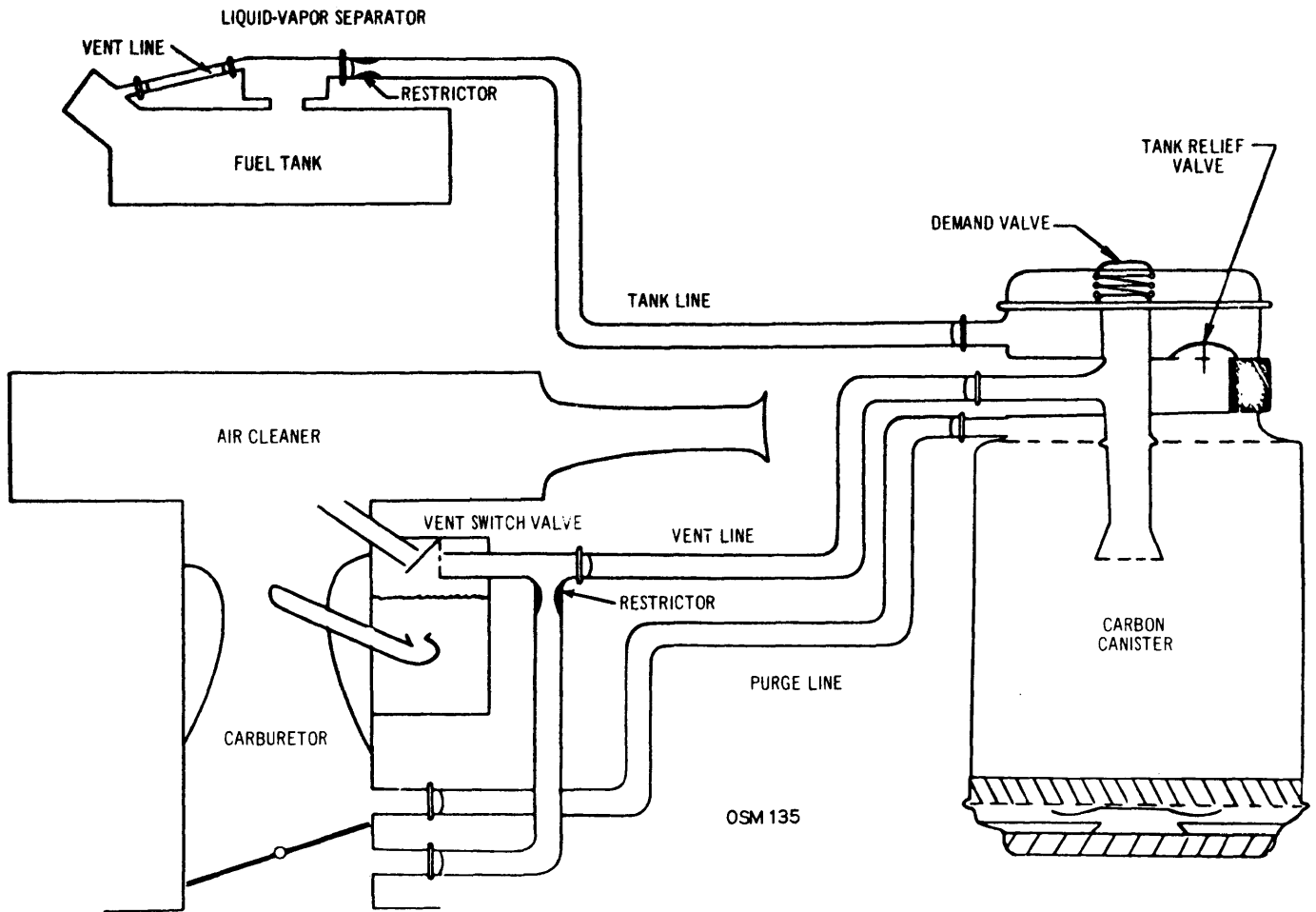


Fuel Evaporation

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OLDSMOBILE EVAPORATION CONTROL SYSTEM (SCHEMATIC)



PONTIAC EVAPORATION CONTROL (SCHEMATIC)