

Fuel Pump—Mechanical

PART
24-30

All Models

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CA4244-2A

DESCRIPTION

A single action fuel pump (mechanically operated) is standard equipment for all vehicle models.

The fuel pump on the I-6 engine is mounted on the lower left center of the engine cylinder block.

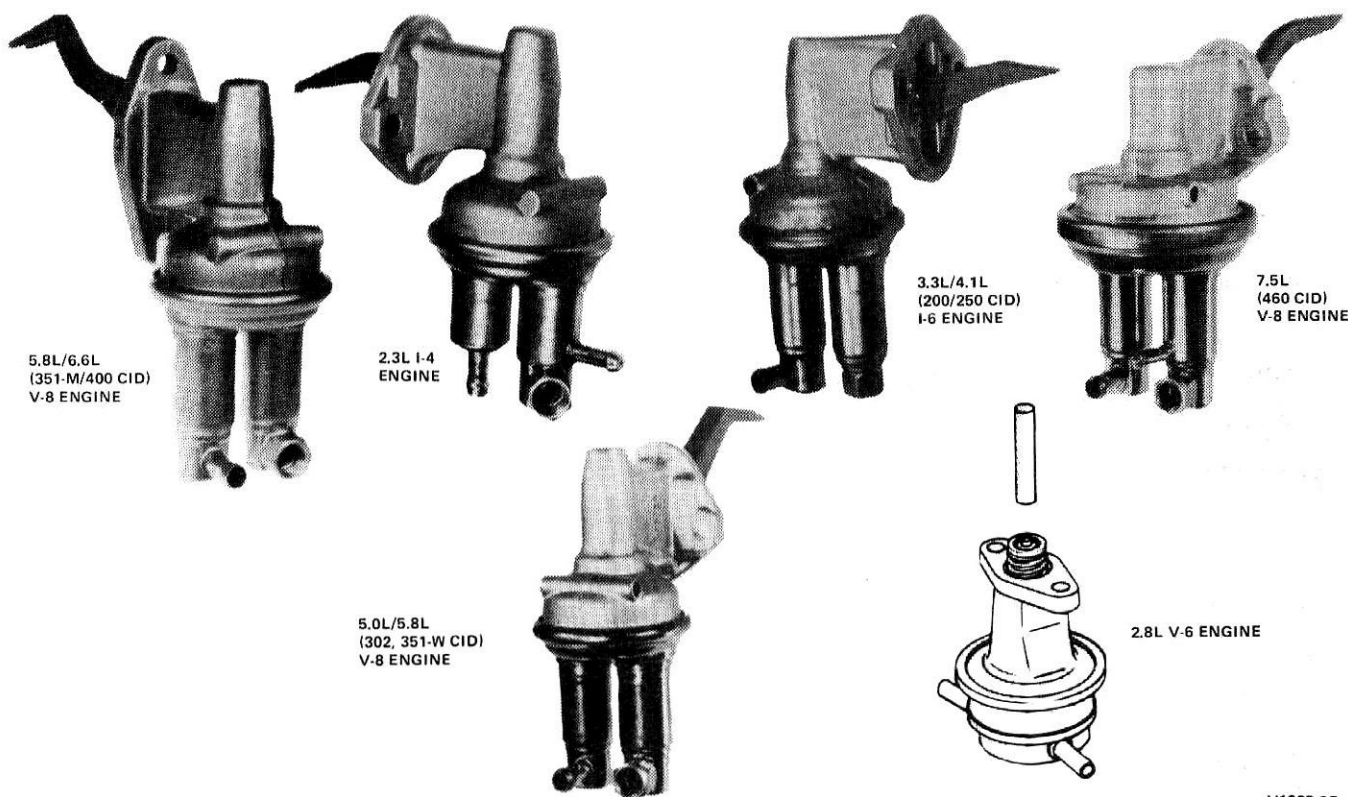
On all V-8 engines, the fuel pump is mounted on the left-side of the cylinder front cover. On the I-4 and V-6 engines the fuel pump is mounted on the left-front of the engine. The pump is actuated by an eccentric on

the auxiliary shaft on 2.3L I-4 engines, and on the camshaft on 2.8L V-6 engines.

A separate fuel filter is used on all engines. The filter is of one piece construction and does not contain a cleanable filter element.

All passenger car engines are equipped with a disposable-type fuel pump (Fig. 1).

These pumps have no serviceable parts, and must be replaced if out of specification.



V1937-2E

FIG. 1 Typical Mechanical Fuel Pumps

TESTING

Incorrect fuel pump pressure and low volume (capacity of flow rate) are the two most likely fuel pump troubles that will affect engine performance. Low pressure will cause a lean mixture and fuel starvation at high speeds. Excessive pressure will cause high fuel consumption and carburetor flooding. Low volume will cause fuel starvation at high speeds.

To determine that the fuel pump is in satisfactory operating condition, tests for both fuel pump pressure and fuel pump capacity (volume) should be performed.

The tests are performed with the fuel pump installed on the engine and the engine at normal operating temperature and at idle speed. **Before the tests, make sure the replaceable fuel filter has been changed within the recommended maintenance mileage interval.** When in doubt, install a new filter.

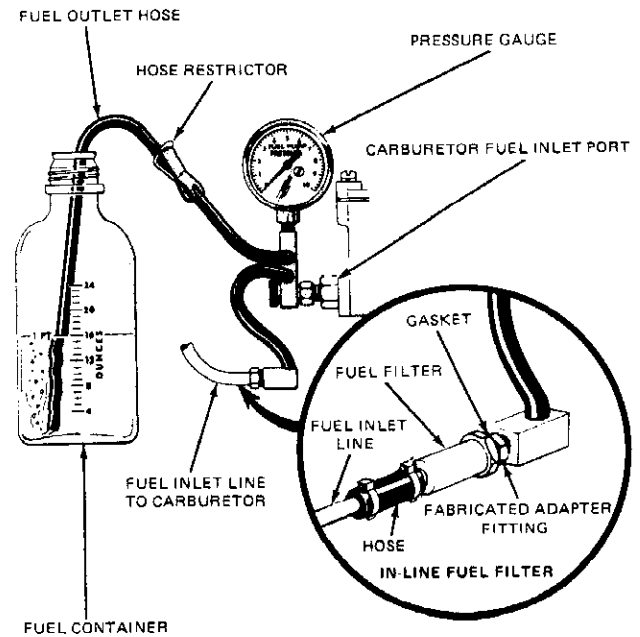
PRESSURE TEST

Refer to Fuel System Specifications at the end of this Part and note the fuel pump pressure and capacity (volume) specifications.

1. Remove the air cleaner assembly. Disconnect the fuel inlet line or the fuel filter at the carburetor. **Use care to prevent combustion from fuel spillage.**
2. Connect a pressure gauge, a restrictor and a flexible hose (Fig. 2) between the fuel filter and the carburetor.
3. Position the flexible hose and the restrictor so the fuel can be discharged into a suitable, graduated container (Fig. 2).
4. Before taking a pressure reading, operate the engine at the specified idle rpm and vent the system into the container by opening the hose restrictor momentarily.
5. Close the hose restrictor, allow the pressure to stabilize, and note the reading.

If the pump pressure is not within specifications, and the fuel lines and filter are in satisfactory condition, the pump should be replaced.

If the pump pressure is within specifications, perform the test for fuel capacity (volume).



B2630-1B

FIG. 2 Typical Fuel Pump Pressure and Capacity Test Equipment

CAPACITY (VOLUME) TEST

With the fuel pump pressure within specifications, test the capacity (volume) as follows:

1. Operate the engine at the specified idle rpm.
2. Open the hose restrictor and allow the fuel to discharge into the graduated container (Fig. 2) for the specified time; then, close the restrictor. **At least one pint of fuel should have been discharged within the specified time limit. If the pump volume is below specifications, repeat the test using an auxiliary fuel supply and a new fuel filter. If the pump volume meets specifications while using the auxiliary fuel supply, check for a restriction in the fuel supply from the tank and for improper tank ventilation.**

REMOVAL AND INSTALLATION

NOTE: Before removing or installing fuel pump, rotate engine so that low point of fuel pump cam lobe is against pump arm. This position can be determined by rotating the engine with the pump held loosely in position until tension is removed from arm.

Removal

1. Disconnect the inlet line and the outlet line at the fuel pump.
2. Remove the fuel pump attaching bolts and remove the pump and the gasket. Discard the gasket.

Installation

1. Remove all the gasket material from the mounting pad and pump. Apply oil-resistant sealer to both sides of a new gasket. Position the new gasket on the pump flange and hold the pump in position against the mounting pad. **Make sure the rocker arm or rod is riding on the camshaft or intermediate shaft eccentric.**
2. Press the pump tight against the pad, install the attaching bolts and alternately torque them to specifications.

3. Connect the fuel inlet line or hose (use a new clamp on the hose) and the outlet line. If a hose is used at the fuel pump connection, crimp the retaining clamp securely.
4. Operate the engine and check for fuel leaks.

SPECIFICATIONS

FUEL PUMP—MECHANICAL

FUEL PUMP — MECHANICAL

Engine		Static Pressure (PSI) ①	Min. Volume Flow ① ③	Eccentric Total Lift (Inches)
Litre	C.I.D.			
2.3		5.0 – 7.0 ②	1 Pt. in 25 Sec.	.304 – .326
2.8		3.0 – 6.0	1 Pt. in 25 Sec.	.193 – .213
3.3	200	5.0 – 7.0	1 Pt. in 30 Sec.	.290 – .310
4.1	250	5.0 – 7.0	1 Pt. in 20 Sec.	.290 – .310
5.0	302	6.0 – 8.0	1 Pt. in 20 Sec.	.690 – .710
5.8	351W	6.0 – 8.0	1 Pt. in 20 Sec.	.690 – .710
5.8	351M	6.0 – 8.0	1 Pt. in 20 Sec.	.602 – .622
6.6	400	6.0 – 8.0	1 Pt. in 20 Sec.	.602 – .622
7.5	460 ④	5.7 – 7.7	1 Pt. in 20 Sec.	.890 – .910

- ① On engine, with temperatures normalized and at normal curb idle speed, transmission in neutral.
- ② With the pump-to-tank fuel return line pinched off, and a new fuel filter installed in fuel line.
- ③ Inside diameter of smallest passage in test flow circuit must not be smaller than 0.220".
- ④ 7.5L (460 CID) Police Interceptor has in-tank electric fuel pump (see Part 24-31).

Fuel Pump - Electric

PART
24-31

Vehicles w/7.5L (460 CID) Police Interceptor V-8

SUBJECT	PAGE	SUBJECT	PAGE
DESCRIPTION	31-1	DIAGNOSIS	31-3
REMOVAL AND INSTALLATION			
Fuel Pump	31-3		

CA4489-2A

DESCRIPTION

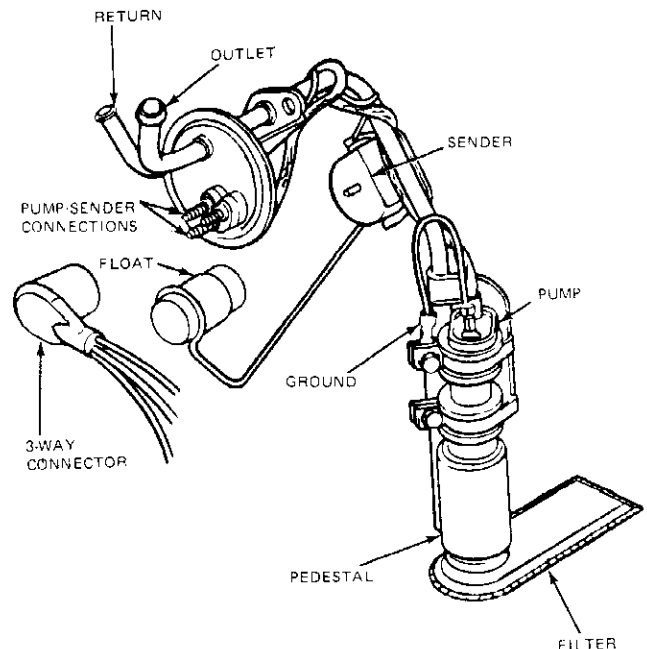
An in-tank electric fuel pump (Fig. 1) is used on all 7.5L (460 CID) Police Interceptor V-8 equipped vehicles. The circuit provides an interlock system that (1) provides power to the fuel pump during starting through a contact of the starter relay, (2) provides reduced operating voltage during normal operation, and (3) provides full battery voltage during wide open throttle (WOT) operation. In addition, should engine oil pressure be lost during operation, the fuel pump is automatically disconnected from the electrical circuit (Fig. 2).

With the ignition switch OFF, current is fed to the ignition switch only. Vacuum switch "F", relay "A" and oil pressure switch "B" are all closed. When the ignition switch is turned to the START position, current flows through fuse "C", diode "G", through the windings of the fuel pump to the tank ground (Fig. 1). The diode is required to prevent current supplied to the pump during normal operation from activating the starter relay.

When the starter switch is returned to the RUN position, current is supplied through the ignition module connector to fuse "D", through resistor "E", through the contacts of relay "A", through the windings of the fuel pump to the tank ground. If the engine is not running when the switch is turned to the RUN position, current will flow through the windings of the "A" relay and through the closed contacts of the oil pressure switch "B" to ground, opening the operating path of the fuel pump at the contacts of the "A" relay.

At wide open throttle (WOT), the vacuum operated switch "F" (Fig. 3) closes its internal contacts, allowing fuel pump operating current to bypass the voltage-dropping resistor "E".

An additional diode ("H") is required to prevent current flowing in the ENGINE warning lamp circuit from operating the relay "A" and cutting off the operating path of the fuel pump in the event of engine overheating.

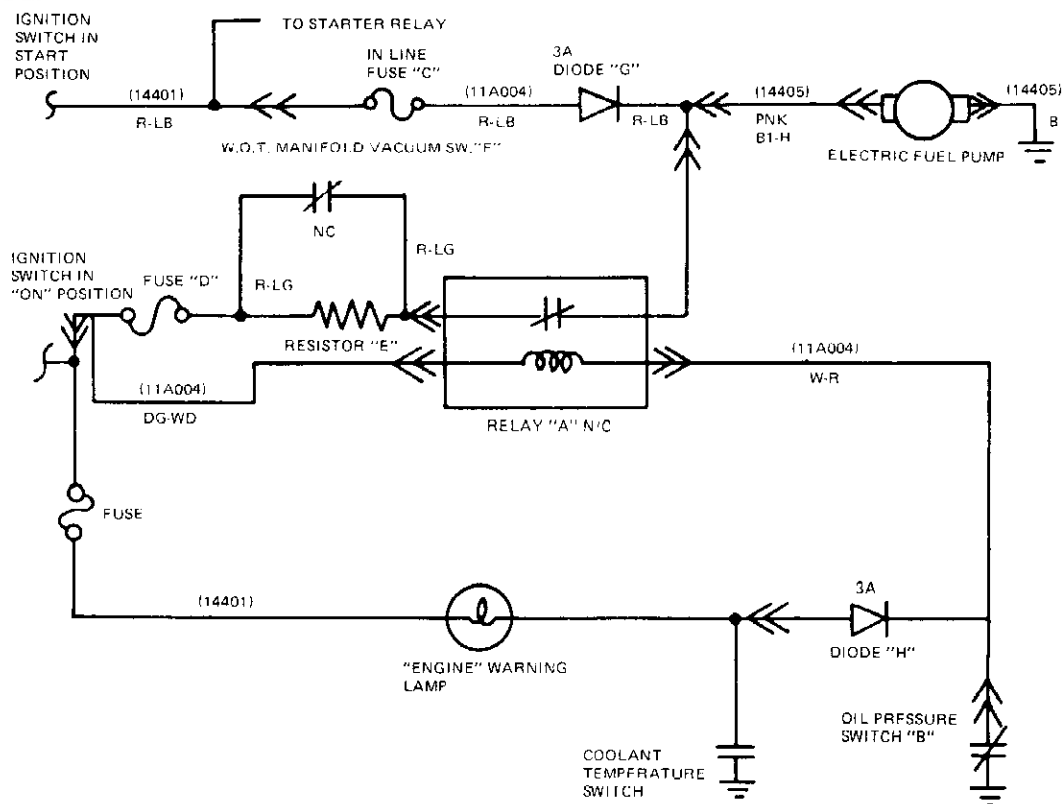


V2325-1A

FIG. 1 Electric Fuel Pump

A rollover valve located in the position normally occupied by the mechanical fuel pump controls fuel flow and has a 0.070" orifice for controlling fuel return to the fuel tank through a second line.

Some models are equipped with an oil pressure gauge instead of or in addition to the ENGINE warning lamp. In this case, a "Y" fitting is installed in the cylinder block, with one branch used for the oil pressure gauge sender and the other branch for the oil pressure switch.



V2401-2A

FIG. 2 Electric Fuel Pump Wiring Diagram

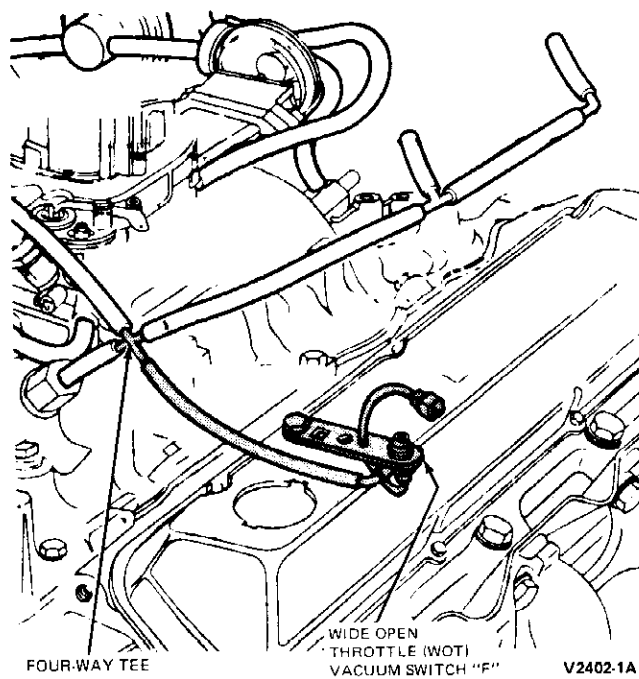


FIG. 3 Wide Open Throttle (WOT) Switch "F" Location

REMOVAL AND INSTALLATION

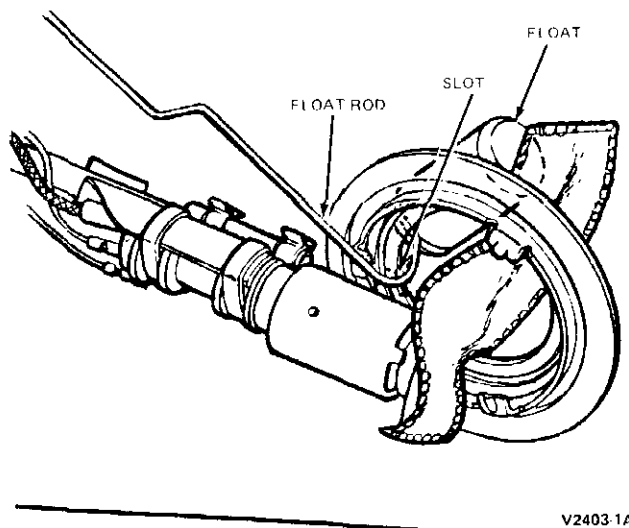
FUEL PUMP

Removal

1. Open the hood and install fender covers. Disconnect the positive battery cable.
2. Raise the vehicle on hoist.
3. Disconnect the fuel outlet and return line at the fuel pump.
4. Remove fuel from the tank as necessary to make sure fuel level is below fuel pump level.
5. Remove any dirt that has accumulated around the fuel pump attaching flange, so that it won't enter the tank during removal or installation.
6. Turn the fuel pump locking ring counterclockwise with tool T74P-9275-A and remove the locking ring, mounting gasket and fuel pump.

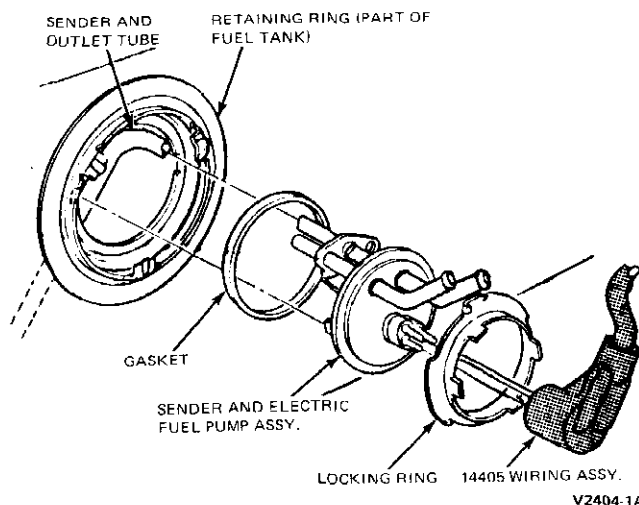
Installation

1. Clean the fuel pump mounting flange at the fuel tank. Position a new gasket on the mounting flange, making sure it is properly seated. NOTE: Put a light coating of heavy grease on the gasket to hold it in place during assembly.
2. Insert the float into the fuel tank and twist and feed the free end of the filter into the fuel tank hole. NOTE: Locating the float rod in the slot in the fuel tank will allow additional clearance for insertion of the pump assembly through the hole (Fig. 4).
3. Secure the fuel pump and sender unit with the locking ring by rotating the locking ring against the stop with tool T74P-9275-A (Fig. 5).
4. Connect the fuel tank lines to the electric fuel pump sender unit with hose clamps. Install the electrical wiring connector to the pump/sender unit (Fig. 5).
5. Lower the vehicle.
6. Connect the positive cable to the battery. Replace fuel in tank, if drained. Install fuel filler cap.
7. Start the vehicle and check electric fuel pump operation. Check for fuel leaks.



V2403-1A

FIG. 4 Positioning Float Rod



V2404-1A

FIG. 5 Securing Fuel Pump Assembly

DIAGNOSIS

Following are tests to be performed in diagnosing complaints of inoperative electric fuel pump:

1. Check fuel tank for adequate fuel supply.
2. Check fuel pump operation by removing fuel line at carburetor fuel filter and installing a fuel pressure gauge with a range of 0-15 PSI between the line and the carburetor. Turn ignition switch to START position momentarily.
3. If no fuel pressure is present in this test, check for blown in-line fuse in 11A004 wiring harness in engine compartment (Fig. 6).
4. Disconnect lead to oil pressure switch "B" at relay "A" (W-R). Turn ignition switch to RUN position and watch for fuel pressure. If no fuel pressure is present, check for 12V at relay "A" connector (red/light green wire). If no current, trace circuit back to source (Fig. 7).
5. If current in Step 4, replace relay.
6. If relay OK, check wire connector to taillight wiring harness near dimmer switch (Fig. 8).

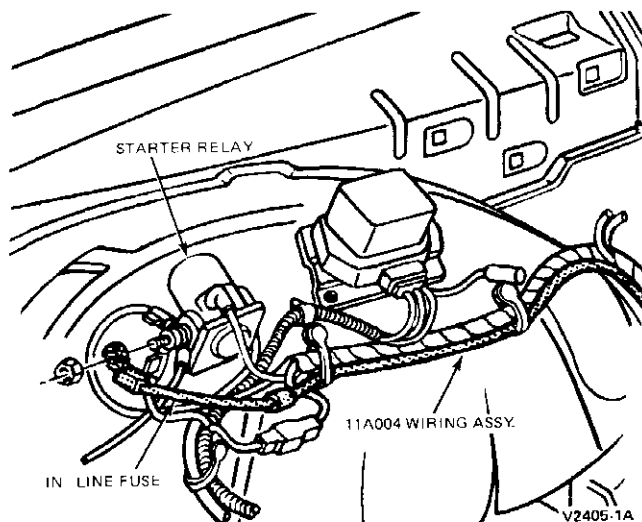


FIG. 6 In-line Fuse

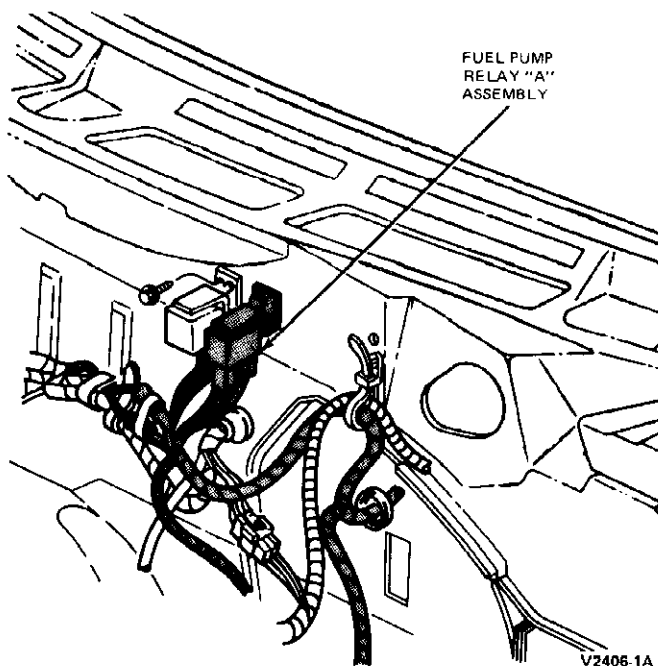


FIG. 7 Relay "A" Location

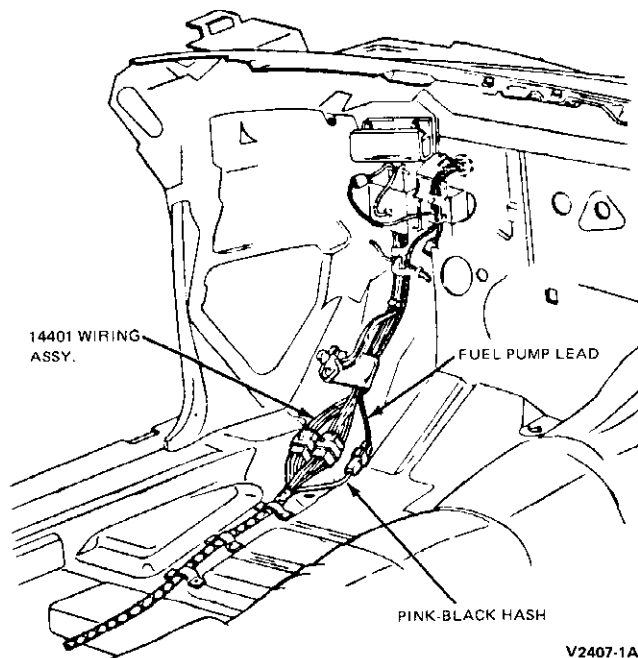


FIG. 8 Connection To Taillight Harness

7. Check power lead (pink with black hash) at fuel pump 3-way connector; check black wire for ground at fuel pump connector.
8. If 12V is present on pink/black hash wire and black wire is grounded, replace the fuel pump/sender assembly and retest (see Removal and Installation).
9. If engine starts, but runs for only a short time (1 minute or less), check engine for proper oil pressure. Check operation of oil pressure sender. An inoperative oil pump or switch will activate relay "A", stopping current flow to the fuel pump.
10. When complaint is resolved, remove test pressure gauge from fuel line and reconnect line to fuel filter.

Air Cleaner and Duct Systems

PART
24-41

All Models

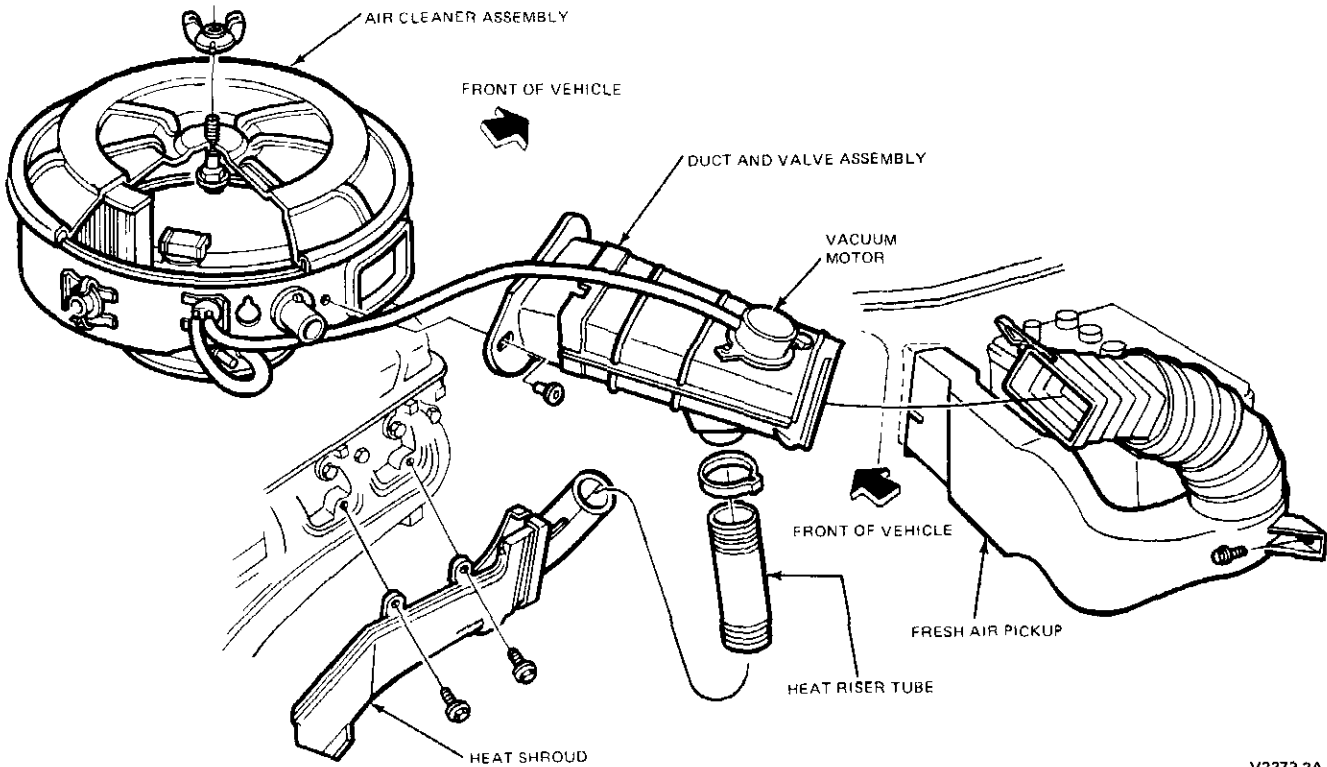
SUBJECT	PAGE	SUBJECT	PAGE
DESCRIPTION	41-1	REMOVAL AND INSTALLATION (Cont'd.)	
TESTING		Replacing Crankcase Ventilation	
Auxiliary Air Inlet Valve –		Replacing Air Filter Element	41-3
7.5L (460 CID) Police Interceptor V-8	41-2	SPECIFICATIONS	41-4
REMOVAL AND INSTALLATION			
Duct and Valve Assembly –			
Vacuum Operated	41-4		

DESCRIPTION

All passenger car engines are equipped with dry type air cleaners with replaceable air filter elements and replaceable crankcase ventilation system filter element. The air cleaner assembly is attached to the top of the carburetor and employs various sensors, switches and vacuum motors to control intake air temperature. In addition, sensors for other engine control systems are

mounted either in or on the air cleaner assembly (Fig. 1).

The air cleaner assembly intake duct is attached to a cold air intake and to a heat shroud around the exhaust manifold. Air flow through these two sources is controlled by a "door" in the duct operated by a



V2272-2A

FIG. 1 Typical Air Cleaner and Duct System—V-8 Shown

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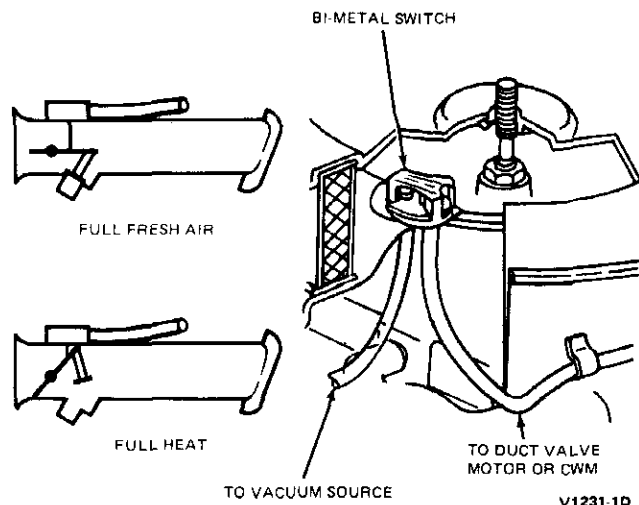


FIG. 2 Vacuum-Operated Duct and Valve Assembly

vacuum motor (Fig. 2). Operation of the motor is controlled by delay valves, temperature sensors and other vacuum control systems that vary with each application and engine calibration.

TESTING

AUXILIARY AIR INLET VALVE—7.5L (460 CID) P.I. V-8

In addition to checking the duct and valve assembly, the vacuum motor that is attached to the air cleaner should be checked for functional operation.

1. Start the engine, observe the vacuum motor plate. It should be fully closed (Fig. 3).
2. Disconnect the vacuum hose at the vacuum motor. The plate should be in the full-open position.
3. If the positions as described are not obtained, check for interference and alignment of plate and motor rod and vacuum for the hose at the vacuum motor (minimum of 10 inches Hg).

The positive crankcase ventilation (PCV) system takes air in through a filter pack mounted in the outside skin of the air cleaner assembly and connected to the engine valve cover either through an elbow and grommet or through the PCV valve and oil filler cap.

Police interceptor models feature an "auxiliary inlet valve" that allows increased air flow into the air cleaner assembly under wide open throttle conditions. Engine vacuum holds the auxiliary valve in the closed position during normal operation. Under heavy load or acceleration, vacuum drops and spring pressure opens the valve, admitting the required additional air.

Lincoln Continental and Continental Mark V engines have a cylindrical "resonator" attached to one side of the air cleaner assembly to help reduce air cleaner resonance under certain throttle and load conditions. There are no service or adjustment procedures required for the resonator.

If vacuum is not available, check the hose and connection for leaks.

4. If the vacuum motor plate still remains in one position, remove the vacuum motor from the air cleaner, connect it to another vacuum source to confirm that vacuum motor is not operating. If the motor rod does not move when vacuum is applied, the motor should be replaced.
5. Reassemble the motor to the air cleaner and repeat Steps 1 and 2.

FOR OTHER AIR CLEANER AND DUCT SYSTEM-RELATED TESTS AND ADJUSTMENTS, SEE PART 29-02, PROCEDURE SSD-9.

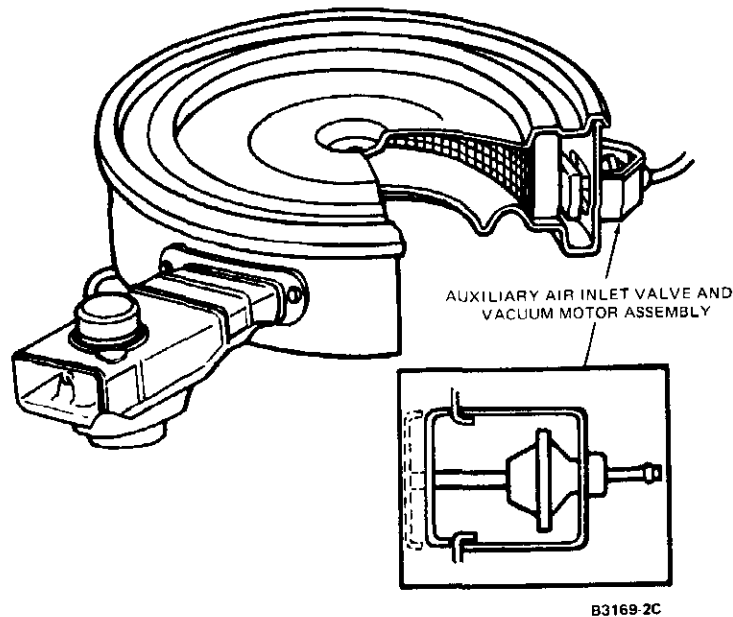


FIG. 3 Air Cleaner With Auxiliary Air Inlet Valve and Vacuum Motor

REMOVAL AND INSTALLATION

REPLACING AIR FILTER ELEMENT

Refer to Part 50-29 "Emissions Systems Maintenance Schedule" for frequency of filter inspection and/or replacement.

Removal

1. Disconnect the crankcase ventilation hose at the air cleaner body. Disconnect the cold air intake tube at the flexible duct (except 2.3L). On 2.3L engines, disconnect the vacuum hose from the vacuum motor and leave the vacuum motor and duct attached to the cold air intake tube.
2. Disconnect the temperature vacuum switch (TVS) vacuum supply hose at the TVS. On 2.8L V-6 engines, also disconnect the vacuum vent valve vacuum harness at the air cleaner body.
3. Disconnect the vacuum harness from the Cold Weather Modulator (CWM) on 4.1L (250 CID) I-6 engines so equipped. On 7.5L (460 CID) P.I. V-8 engines, disconnect the vacuum hose from the auxiliary air inlet valve vacuum motor.
4. Remove the wing nut(s) or screw(s) and grommet(s) (if equipped) and lift the air cleaner assembly off the carburetor. On all models except 2.3L I-4, disengage the duct assembly from the exhaust manifold heat shroud.
5. On Fairmont/Zephyr models equipped with the 3.3L (200 CID) I-6 and Pulse Air exhaust air injection system, disconnect the hose from the Pulse

Air filter to the bottom of the air cleaner body. Remove the air cleaner assembly cover and the filter element.

Inspection

Visually inspect the element and the air cleaner cover and body for signs of dust or dirt leaking through holes in the filter media or past the end seals. Place a light on the inside (clean side) of the filter and look through the filter at the light. Any hole in the element, even the smallest, is cause for replacement.

Also check the element for charred (burned) or brittle spots that could fail under engine operating vibration and cause a hole. *Discoloration only, caused by backfire, is not a cause for replacement.*

Installation

1. Wipe all inside surfaces of the air cleaner body and cover. Install the air filter element. Check the condition of the air cleaner assembly to carburetor gasket and replace as necessary.
2. Connect the vacuum hoses that were removed during removal of the air cleaner assembly and position and assembly to the exhaust manifold heat shroud (except 2.3L I-4) and to the carburetor. Install the wing nut(s) or screw(s) and grommet(s) and torque to specification.

NOTE: On 2.3L I-4 engines, it is necessary to recheck the torque on the first wing nut after the second one has been tightened to specification.

3. On 7.5L (460 CID) P.I. V-8, connect the auxiliary air inlet valve vacuum motor hose. On 4.1L (250 CID) I-6 engines so equipped, connect the Cold Weather Modulator (CWM) vacuum hose.
4. On 2.8L V-6 engines, connect the vacuum vent valve at the air cleaner assembly. Connect the TVS on those models so equipped.
5. On 2.3L I-4 engines, connect the vacuum hose from the duct vacuum motor. Connect the cold air intake tube to the air cleaner assembly at the flexible duct. Connect the crankcase ventilation hose to the air cleaner body.

REPLACING CRANKCASE VENTILATION FILTER IN AIR CLEANER

The crankcase ventilation system air filter is shown in Fig. 4.

Removal

1. Disconnect the air cleaner closure hose at the air cleaner by unsnapping the elbow from the retainer clip (except 2.3L) or sliding off the hose from the PCV filter adaptor (2.3L).
2. Remove the air cleaner body cover.
3. Remove the crankcase ventilation filter retainer clip and remove the filter retainer from the air cleaner body.
4. Remove the filter pack from the retainer, clean out the retainer and install a new filter pack.

Installation

1. Position crankcase ventilation filter assembly in air cleaner body and install retainer clip.
2. Connect closure hose at filter retainer clip.
3. Install air cleaner cover and secure with wing nut(s) or screw(s), and torque to specification.

NOTE: On 2.3L I-4 air cleaners, it is necessary to recheck the torque on the first wing nut tightened after tightening the second.

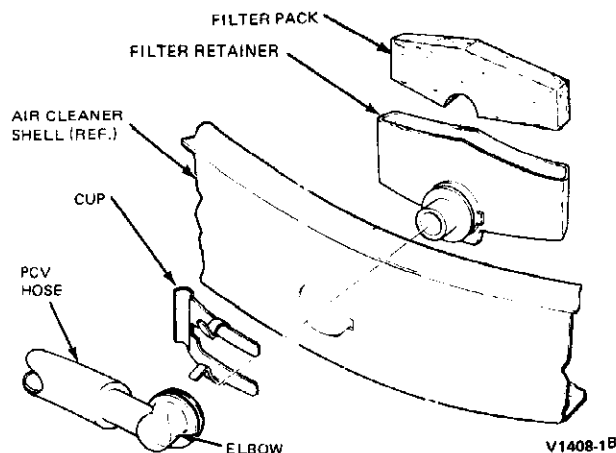


FIG. 4 Crankcase Ventilation System Filter

DUCT AND VALVE ASSEMBLY—VACUUM OPERATED

Removal

1. Disconnect the vacuum hose at the vacuum motor.
2. Remove either the hex cap screws or the pop rivets that secure the air intake duct and valve assembly to the air cleaner. The cap screws should be removed in the normal manner; the pop rivets can only be removed by grinding the rivet heads off and punching the rivet out.
3. Remove the duct and valve assembly from the engine.

Installation

1. Position the duct and valve assembly to the air cleaner and heat stove tube. Reinstall the previously removed cap screws, or when required, install new pop rivets.
2. Connect the vacuum line at the vacuum motor.

SPECIFICATIONS

TORQUE SPECIFICATIONS – AIR CLEANER WING NUTS OR BOLTS

Fastener Composition	Torque (In-Lb)
Steel	15-25
Plastic	25-35

CV2046-1B

Fuel Tanks and Lines

PART
24-50

All Models

SUBJECT	PAGE	SUBJECT	PAGE
DESCRIPTION AND OPERATION		DIAGNOSIS 50-7	
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REMOVAL AND INSTALLATION			
Auxiliary Fuel Tank	50-8		
Main Fuel Tanks.....	50-8		

CN4041-2B

DESCRIPTION AND OPERATION

FUEL TANKS AND FILLERS

All vehicles, except Canadian vehicles using leaded fuel, are equipped with a restricted fuel filler neck that allows only a non-leaded fuel nozzle to be inserted (Fig. 1).

The restrictor consists of a narrow opening in the filler covered by a spring steel trap door. The smaller non-leaded fuel nozzle will fit through the narrow opening and push the trap door aside, allowing normal filling. If the nozzle for leaded fuel is inserted, however, it does not fit through the narrow opening. The trap door being closed causes a fuel backup, and automatic nozzle shutoff.

The restricted fuel filler is serviced as an assembly, and cannot be repaired.

DOUBLE LOCKING FUEL CAP

A double set of locking tangs or tabs are used on the pressure/vacuum fuel cap on all vehicles except Granada with exposed styled fuel cap. These caps use a single set of tabs. These tangs require a two stage removal/installation procedure and provide for escape of any residual pressure in the system during cap removal. This system is also used with the optional locking-type fuel cap. Whenever a fuel cap is replaced, it should be being replaced with the proper pressure relief double locking cap to prevent possible system malfunction (Fig. 1).

FUEL VAPOR EMISSION CONTROL SYSTEM

As a part of the fuel system, all passenger cars are equipped with fuel evaporative emission control systems to meet federal requirements in effect at the time of production.

The evaporative emission control systems have been revised for 1978 to reflect the latest requirements of the new S.H.E.D. (Sealed Housing Evaporative Determi-

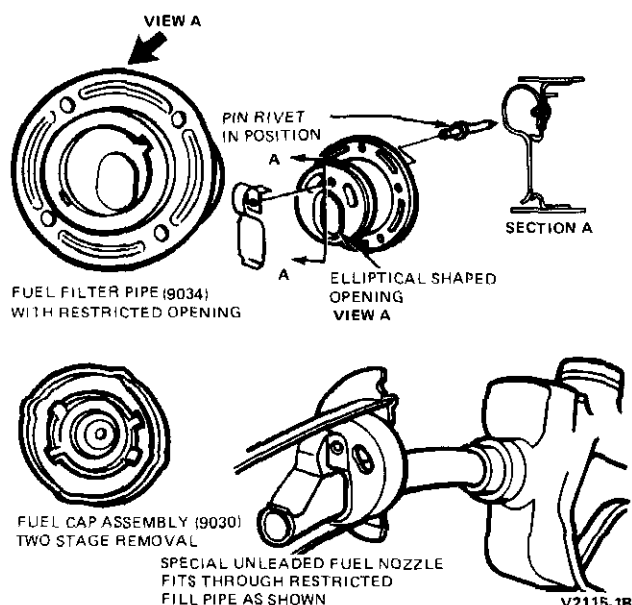


FIG. 1 Restricted Fuel Tank Filler Opening and Double Locking Fuel Cap

nation) specifications. The new test consists of placing a vehicle in a sealed housing and periodically sampling the air in the housing to measure the amount of vapors escaping from the fuel tank, carburetor or air cleaner.

The 1978 systems consist of:

- 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 Vehicles)
- Thermactor Idle Vacuum Valve (TIV)

Not all of these components are used on any one system, since usage depends on the calibration of the complete vehicle.

System control and operation are accomplished through six separate basic functions in the system which are:

- a. Fill Control Vent System
- b. Tank Vapor Vent and Storage System
- c. Carburetor Cowl Vent and Storage System
- d. Pressure and Vacuum Relief System (fuel cap)
- e. Fuel Vapor Return System
- f. Fuel Vapor Purge System

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

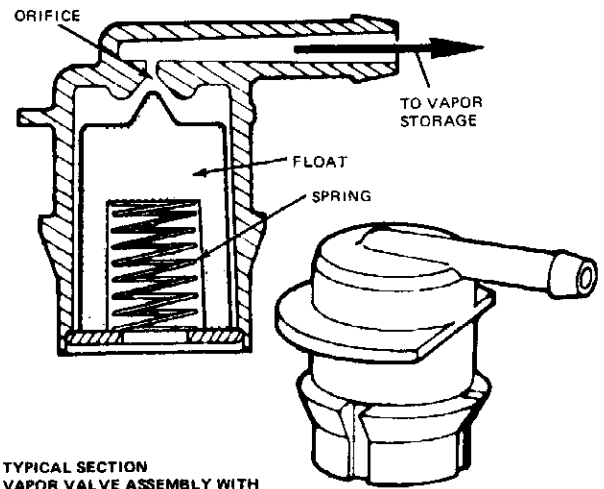
VAPOR VENT SYSTEM

In-Tank Venting

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 under all static and most dynamic conditions. Horizontally mounted tanks accomplish this by a raised mounting section for the vapor valve assembly that is centrally located on the upper surface of the tank. Vertically mounted tanks use a centrally mounted vapor valve assembly on the uppermost surface of the fuel tank.

Tank Vapor Valve (Orifice) Assembly

All fuel tank 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. (Fig. 2)



TYPICAL SECTION
VAPOR VALVE ASSEMBLY WITH
FLOAT VALVE AND INTERNAL SPRING

V1780-1E

FIG. 2 Fuel Tank Vapor Valve

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

In vehicles equipped with fuel/vapor return lines, vapor generated in the fuel supply line is continuously vented back to the fuel tank. This 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 (Fig. 3).

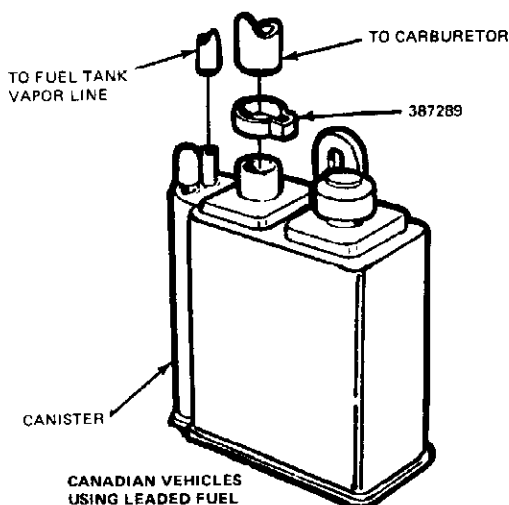
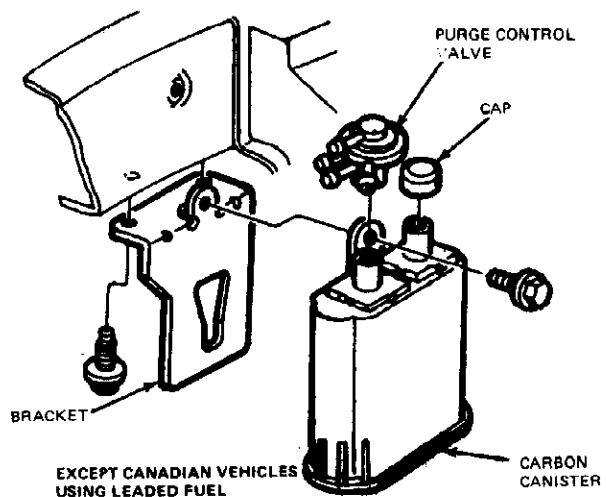
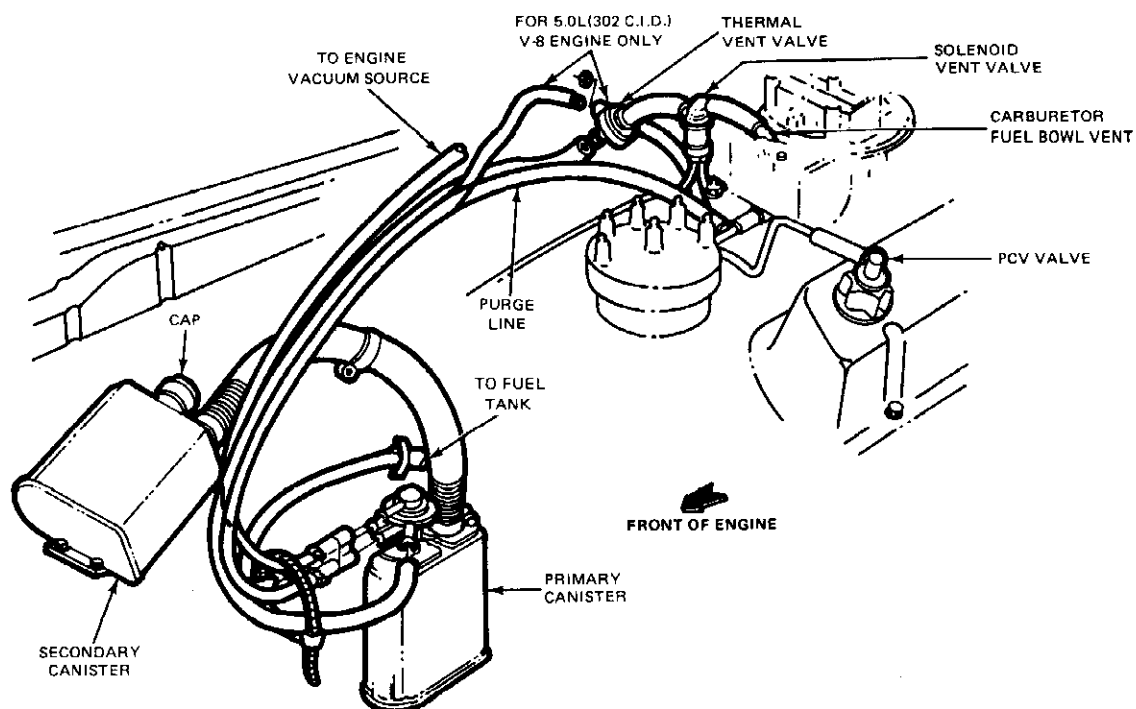


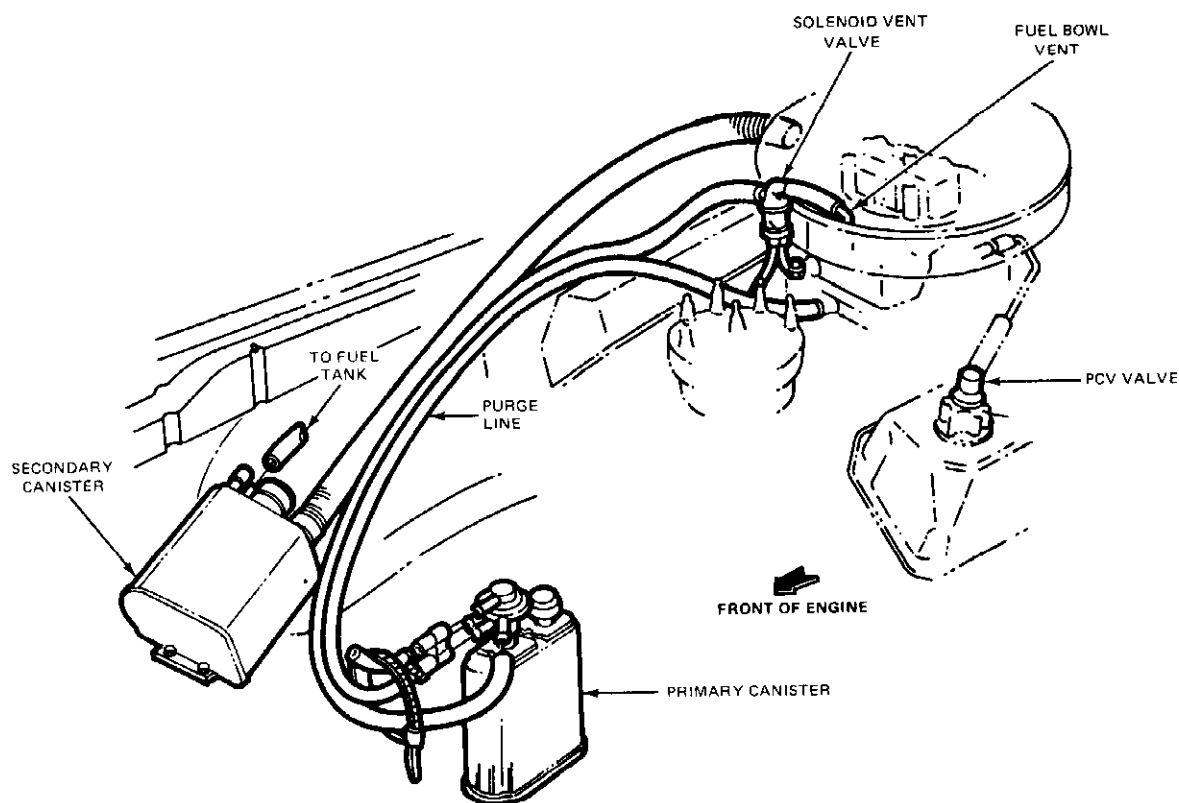
FIG. 3 Typical Canisters



V1619-2D



5.0L/6.6L (351 M/400 C.I.D.) V-8 (EXCEPT ALTITUDE) – NON UNITIZED VEHICLES
(EXCEPT LINCOLN CONTINENTAL AND CONTINENTAL MARK V)



5.0L/5.8L (302/351 C.I.D.), 5.8L/6.6L (351 M/400 C.I.D.) ALTITUDE,
7.5L (460 C.I.D.) – NON UNITIZED VEHICLES
(EXCEPT LINCOLN CONTINENTAL AND CONTINENTAL MARK V)

FIG. 4 Typical Dual Canister Carburetor Venting Systems

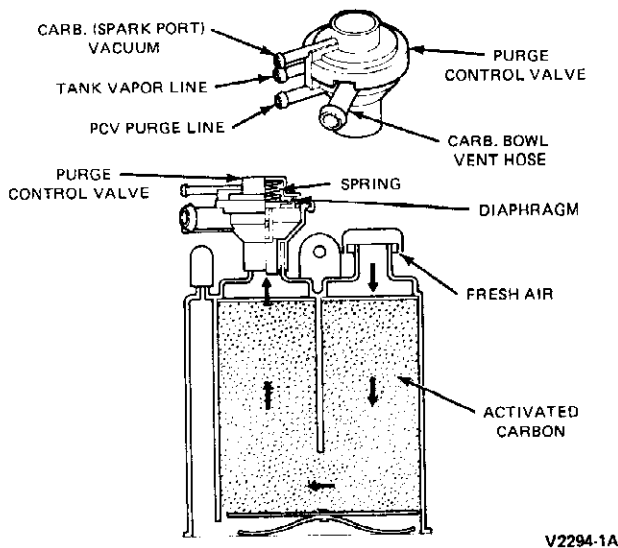
CARBURETOR VENTING

Fuel vapors which might otherwise collect in the carburetor bowl and pass directly into the atmosphere are vented to the carbon canister when the 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.

Typical storage and return systems for fuel vapors are shown in Fig. 4.

PURGE CONTROL VALVE

The Purge Control Valve is mounted directly to the carbon canister and controls the flow of fuel vapors into and out of the canister (Fig. 5).



V2294-1A

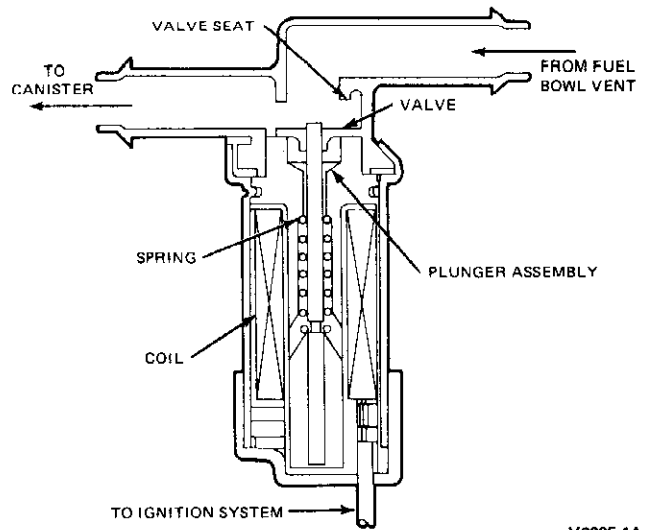
FIG. 5 Purge Control Valve

When the engine is stopped, vapors from the fuel tank and the carburetor fuel bowl flow through the purge valve into the canister. On systems using spark port or EGR port vacuum to actuate the purge control valve, the signal is strong enough during normal cruise to open the valve, and vapors are drawn from the canister to the engine vacuum connection. At the same time, vapors from the fuel tank are re-routed directly to the purge line and into the engine. On some systems where purging doesn't affect idle quality, the purge control valve is connected to engine manifold vacuum and opens any time there is enough manifold vacuum.

FUEL BOWL SOLENOID VENT VALVE

The Fuel Bowl Solenoid Vent Valve is a normally open valve located in the fuel bowl vent line, and is normally used with Motorcraft Model 2150 2V and Model 4350 4V carburetors, which don't 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 condition when the ignition switch is turned off. (Fig. 6).



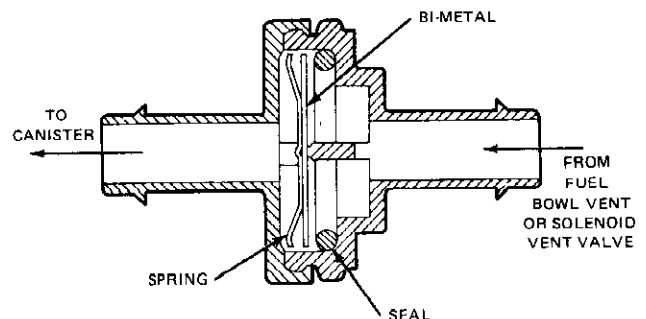
V2295-1A

FIG. 6 Fuel Bowl Solenoid Vent Valve

DIAGNOSIS NOTE: If lean fuel mixture is suspected as the cause of a customer 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.

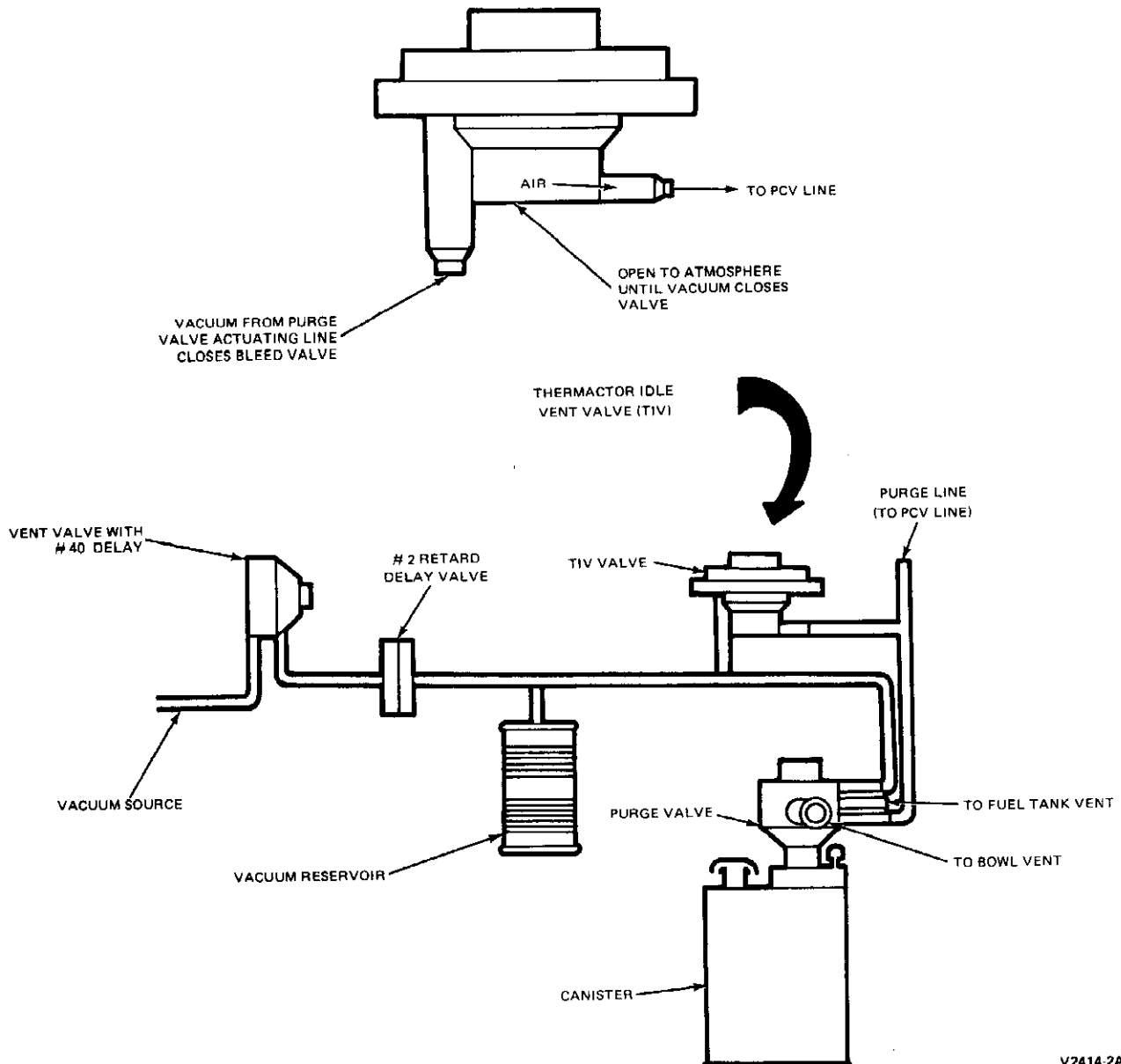
FUEL BOWL THERMAL VENT VALVE

The Thermal Vent Valve (Fig. 7) 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 the fuel tank heats up before the engine compartment does from being vented through the carburetor fuel bowl.



V2296-1A

FIG. 7 Fuel Bowl Thermal Vent Valve



V2414-2A

FIG. 8 Thermactor Idle Vacuum Valve (TIV)

This effect can occur, for instance, when sunlight strikes a vehicle which has been sitting out all night, and begins to warm the fuel tank. With the thermal vent valve closed, the vapors cannot enter the carburetor fuel bowl vent (now open) but must be routed to the carbon canister. As the engine compartment warms up, during normal engine operation, the Thermal Vent Valve opens. When the engine is again turned off, the fuel bowl vent valve (or solenoid vent valve) opens, allowing vapors to flow through the thermal vent valve (now open) and into the carbon canister. As the thermal vent valve cools, it again closes and the cycle begins again.

THERMACTOR IDLE VACUUM VALVE (TIV)

A thermactor Idle Vacuum Valve (TIV) is used with some evaporative emission systems to improve idle quality at hot start (Fig. 8).

When the engine is at normal operating temperature, the purge system is activated and purge air is drawn from the canister through the PCV tube and into the induction system via the carburetor spacer. The purge air flow into the carburetor spacer is taken into consideration when the idle air/fuel mixture is calibrated and set. However, under warm start conditions the purge valve is closed and the choke is off (no fast idle).

An overly rich mixture condition then exists, resulting in poor idle quality. The closed purge valve — choke off — no fast idle condition only exists for a few moments after a warm start, however, because actuation of the purge valve is delayed by the vacuum delay valve and by the time required to evacuate the vacuum reservoir.

To overcome this poor idle condition, the TIV 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.

AIR CLEANER ASSEMBLY

Auxiliary Fuel Bowl Vent Tube

On some models, an Auxiliary Fuel Bowl Vent Tube is connected to the fuel bowl vent tube to vent the fuel bowl when the internal fuel bowl vent or the solenoid vent valve are closed and the thermal vent valve is also closed. An air filter is installed on the air cleaner end of the tube to make sure contaminants don't enter the carburetor fuel bowl.

Vapor Dam

A Vapor Dam is installed in the air cleaner assembly at the fresh air tube opening (Fig. 8) to trap most of the vapors emitted by the carburetor while the engine is stopped. These heavy vapors lie in the bottom of the air cleaner tray and are purged when the engine starts.

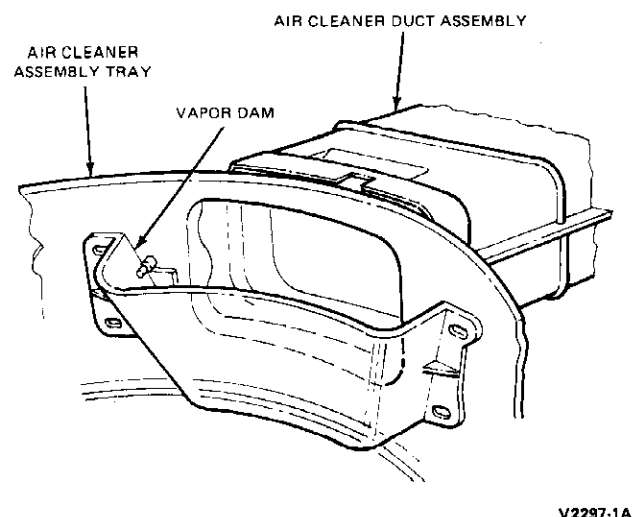


FIG. 9 Air Cleaner Assembly Vapor Dam

PURGE REGULATOR VALVE

The Purge Regulator Valve (Fig. 10) 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. The valve contains a plunger and spring which function in the same manner as a PCV valve. High engine vacuum draws the plunger upward against the calibrated spring, closing the orifice and controlling air flow. When the vacuum drops, the plunger is lowered and air flow restriction is reduced. The valve must be mounted in an upright or nearly upright position for proper function.

2-PORT OR 4-PORT PVS (PORTED VACUUM SWITCH)

The PVS used in the Evaporative System can be either a 2-port or a 4-port type. The 2-port type is the same as the EGR PVS, while the 4-port type is new and consists of two 2-port vacuum valves built into one body. The 4-port type performs the same function as two 2-port PVS valves. The PVS used in the evaporative emission control system turns the Purge Valve vacuum

on as the engine warms up, and allows the Purge Valve to close when the engine is turned off and vacuum is lost.

PRESSURE AND VACUUM RELIEF SYSTEM

Sealed Fill Cap

The fill cap is a sealed cap with a built in pressure-vacuum relief valve. Fuel system vacuum relief is provided after negative 0 to 1/4 psi and pressure relief from 3/4 to 1.8 PSI. Under normal operating conditions, the fill cap operates as a check valve, allowing air to enter the tank as gasoline is used, while preventing vapors from escaping the tank through the cap.

FUEL VAPOR RETURN SYSTEM

A fuel vapor return system has been added to 2.3L I-4 and 7.5L (460 CID) P.I. V-8 engines to reduce the amount of fuel vapor entering the carburetor (Figs. 10 and 11).

The system consists of a vapor return line from the fuel pump to the fuel return outlet of the fuel sender.

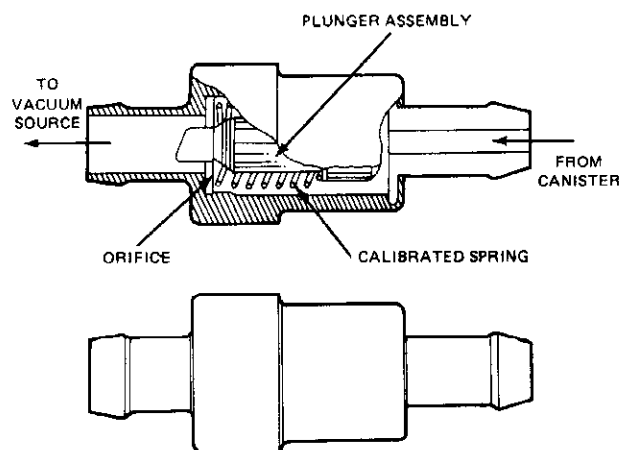


FIG. 10 Purge Regulator Valve

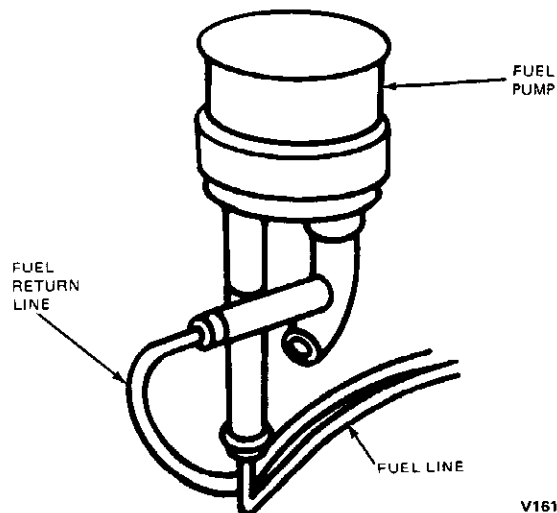
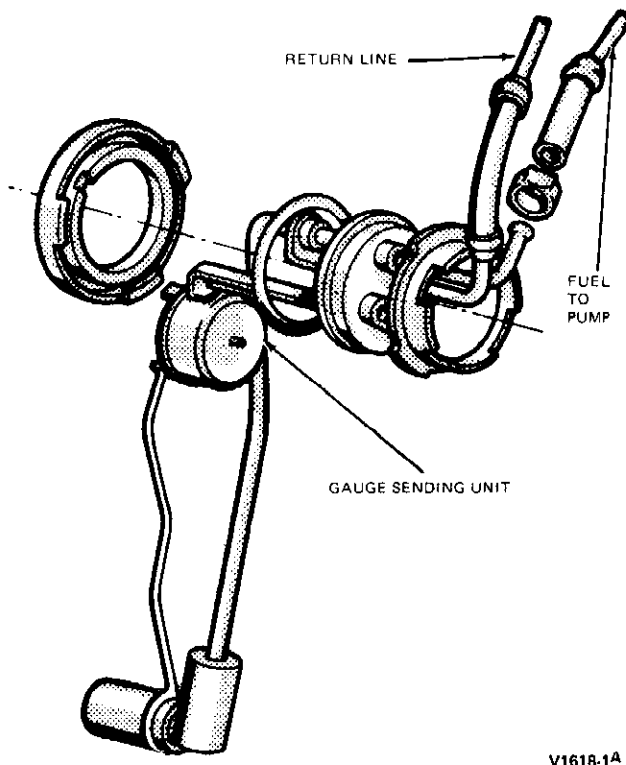


FIG. 11 Fuel Pump Vapor Separator



V1618-1A

FIG. 12 Fuel Return Line Connections At Sender Unit

AUXILIARY FUEL TANK

On all Mustang II equipped with the 5.0L (302 CID) V-8 engine, a separate auxiliary fuel tank is required (see Fig. 20).

Component parts required with Mustang II auxiliary fuel tanks include an upper filler pipe with rubber seal, lower filler pipe with hose connection between the auxiliary tank and main tank, a vapor separator, fill vent tube connector (in main and auxil-

iary tanks and connected by vent pipe and section of hose) and a restraining strap and hose clamps to complete the system between the fill opening and the main tank. The fuel/vapor separator is connected to the carbon canister. The fill vent tube connector is attached to another connector in the main tank. A unique retaining strap is also used on Mustang auxiliary tanks. When the bolt is torqued to 25-35 ft-lbs, the strap is properly positioned and becomes "bottomed out" on the outer wheel housing (Fig. 20).

DIAGNOSIS

Physical damage, leaks, and missing items are the major answers to diagnosis of emission system complaints. Fill cap damage or contamination that renders the pressure-vacuum valve inoperative may result in deformation of the tank. Care should always be exercised to be sure that a proper fill cap (in working order) is used.

REMOVAL AND INSTALLATION

MAIN FUEL TANKS

All component parts of the standard fuel system are serviced by a simple nut, bolt, or screw part removal and installation. Refer to individual systems drawings for specific part references.

AUXILIARY FUEL TANK

NOTE: Removal and installation procedures described here may also be required when removing and installing main fuel tanks associated with these auxiliary tanks. Connecting hoses and tubes will require following some of the steps, if only for removal and installation of common parts.

Mustang II vehicles will require care during auxiliary tank removal to ensure that the fuel level in the main tank is below the auxiliary fill pipe connection before it is disconnected. The main tank should be drained below the fill pipe by disconnecting the fuel sending unit hose at the point where it connects to the fuel line leading to the fuel pump.

MUSTANG II (SEE FIG. 20)

Removal

1. Siphon or pump out the auxiliary fuel tank.
2. Remove the four screws holding the filler tube to the body sheet metal at the fill opening. Remove the filler tube.
3. Inside the left rear wheelhousing, remove the three bolts holding the inner splash panel that covers the auxiliary fuel tank. Remove the panel.
4. Disconnect the hose between the main tank fuel sending unit and the fuel line at the fuel line. Drain a sufficient quantity of fuel to drop the main tank level below the auxiliary tank fill pipe connection.
5. Loosen the two clamps that hold the rubber hose located on the filler tube between the auxiliary and main tank.
6. Carefully slide the rubber hose off the auxiliary tank and downward on the metal pipe attached to

the main fuel tank. It may be necessary to put a drain can under the rubber hose during this operation to catch any gasoline that might be left in the auxiliary tank.

7. Remove the screw holding the auxiliary fuel tank retaining strap and remove the strap.
8. Lower the tank until the clamp holding the boot to the fill tube neck of the auxiliary tank can be loosened and the rubber boot removed.
9. Continue to lower the tank until the vapor separator and fill vent tube connector can be disengaged from the top of the tank.
10. Remove the auxiliary tank from the vehicle.

Installation

1. Install the vapor separator and fill vent tube connector, then the fill tube neck rubber boot using clamp 380153-S8. Be sure to correctly align the locating notch in the boot with the locating rib on the tank filler neck. Tighten the boot clamp and position the tank in the fender well.
2. Raise the tank sufficiently to install the rubber boot to the lip of the filler tube opening in the quarter panel.
3. Attach the tank retaining strap and loosely install the strap attaching screw.
4. Slide the rubber hose connecting the main and auxiliary tanks into position over the auxiliary tank outlet neck. Tighten the hose clamps and the tank retaining strap screw. Attach the hose from the fuel sending unit (on the main tank) to the fuel line using a new hose clamp.
5. Install the fuel filler tube into the auxiliary tank and attach the tube flange to the body sheet metal with the four attaching screws.

The removal/installation procedure will also be used in conjunction with removal/installation of the main fuel tank either in part or in its entirety to enable draining of the main tank for servicing.

MAJOR REPAIR OPERATIONS

MAIN FUEL TANKS

Fuel emission type fuel tanks do not require special repair procedures and may be steam-cleaned and/or repaired using standard procedures. After steaming, allow to thoroughly air dry. The orificed vapor separator assembly should be replaced, if found to be damaged or inoperative.

AUXILIARY FUEL TANKS

Maintenance and repair consists of replacement of damaged parts and cleaning. Repairs to the auxiliary

tank are not possible inasmuch as the material used for construction is high density polyethylene. Tanks that are damaged should be replaced. Cleaning of a tank is accomplished using a detergent solution to thoroughly flush the tank and clean water rinsing until all detergent is removed. The tank must be completely dry prior to re-installing in the system.

AUXILIARY FUEL TANKS MUST NOT BE STEAM CLEANED OR EXPOSED TO EXTREME HEAT OF ANY KIND.

FUEL LINES

REPAIR

With the exception of the pump-to-carburetor fuel supply tubes (Fig. 13) the various fuel lines are not serviced as assemblies. They must be cut, squared and formed out of rolls of fuel system service tubing and hose material available at dealerships.

A damaged section of tubing longer than 12 inches can be cut out of the existing line and replaced by a comparable metal service tubing section, spliced into the line by means of connecting hoses and retaining clamps. A damaged section of tubing shorter than 12 inches can be cut out of the line and replaced by a length of service hose and two retaining clamps.

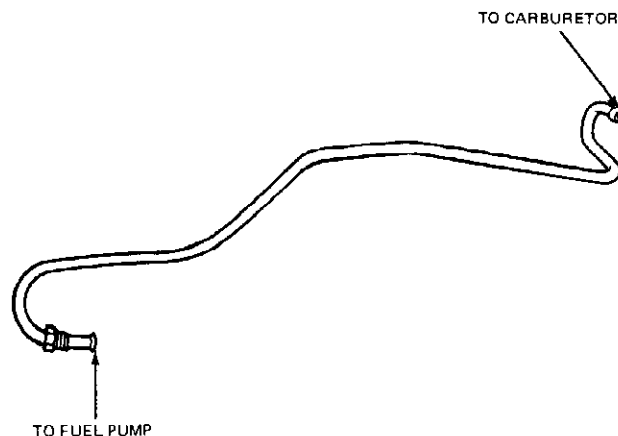
All replacement hoses must be cut to a length that will assure proper clamp retention beyond the flared ends of the connecting tubing.

Removal

1. Drain the fuel from the tank.
2. Disconnect the line at the fuel gauge sender unit and the fuel pump. Remove the lines from the holding clips along the underbody. Remove all damaged hose sections and tube sections.

Installation

1. Cut a new section of tubing to approximately the same length as the section to be replaced. Allow extra length for flaring the ends of the tubing. Square the ends of the cut tubing with a file.
2. Ream the inside edges of the cut tubing with the reamer blade on the tube cutter. Be sure metal chips are removed from inside the tube(s). Double flare the ends of the cut tubing, as required.
3. Bend the tube section to conform to the contour of the original tube. Cut an ample length of hose to form a coupling between the flared ends of the fuel lines. Connect the hose couplings to the tubing and install the retaining clamps.
4. Position the lines in the underbody clips and tighten the clips. Connect the line to the fuel gauge sender unit and the fuel pump. Fill the tank and check for leaks.



V1621-1C

FIG. 13 Fuel Supply Tube Assembly





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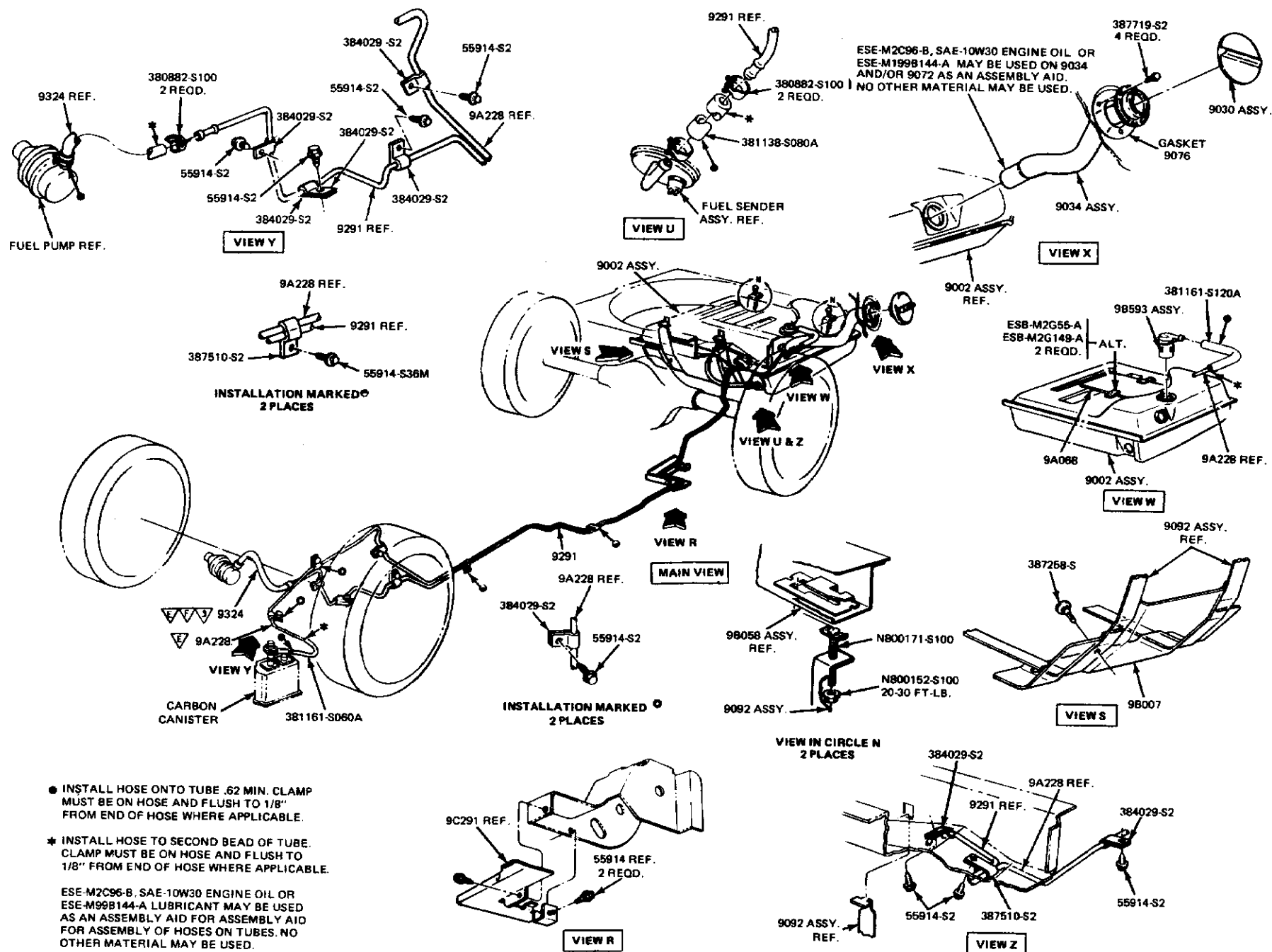


FIG. 17 Fuel and Vapor Emission Control Systems — Pinto and Bobcat Wagon w/2.8L I-4

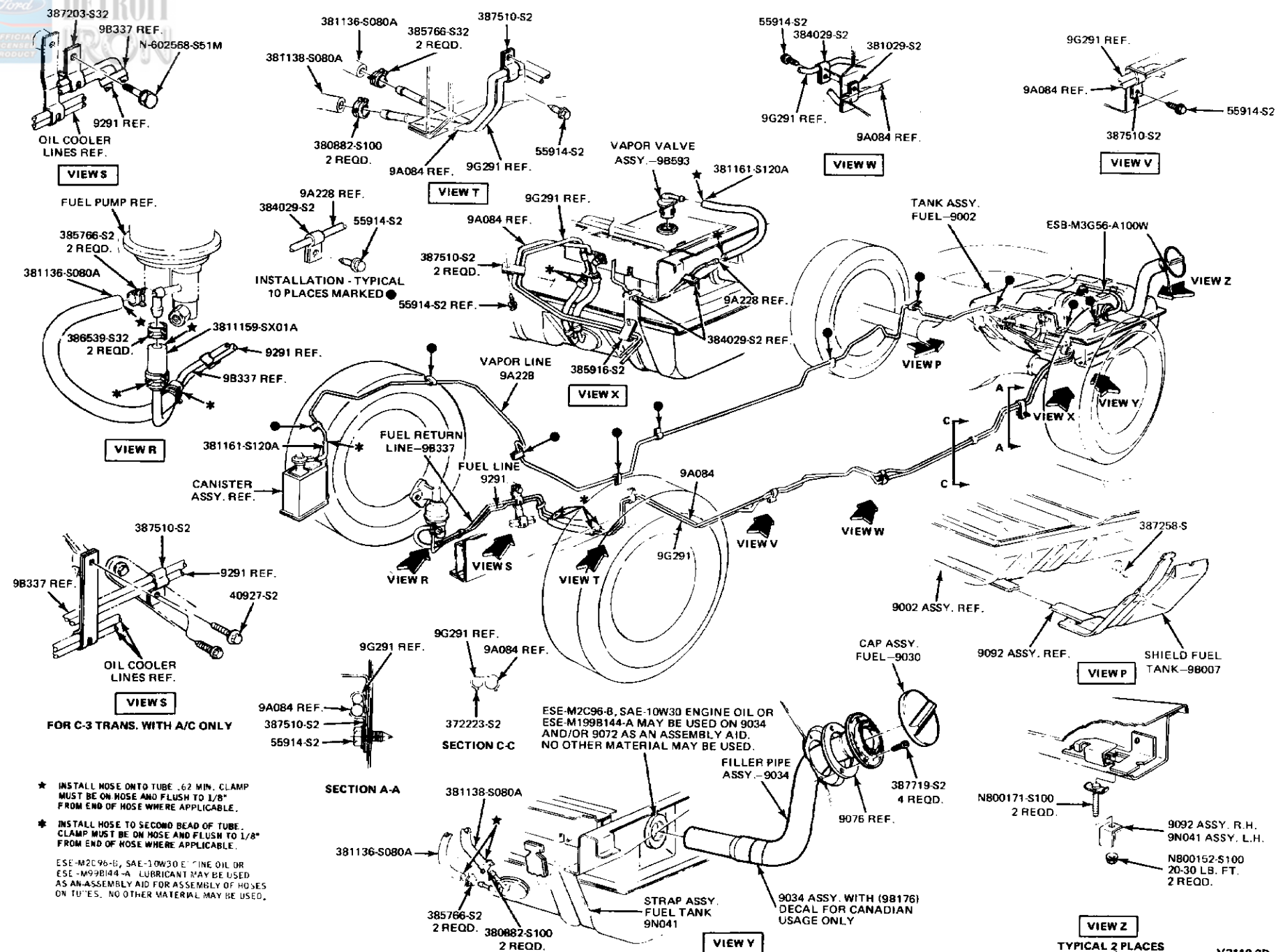


FIG. 18 Fuel and Vapor Emission Control Systems — Mustang II w/2.3L I-4

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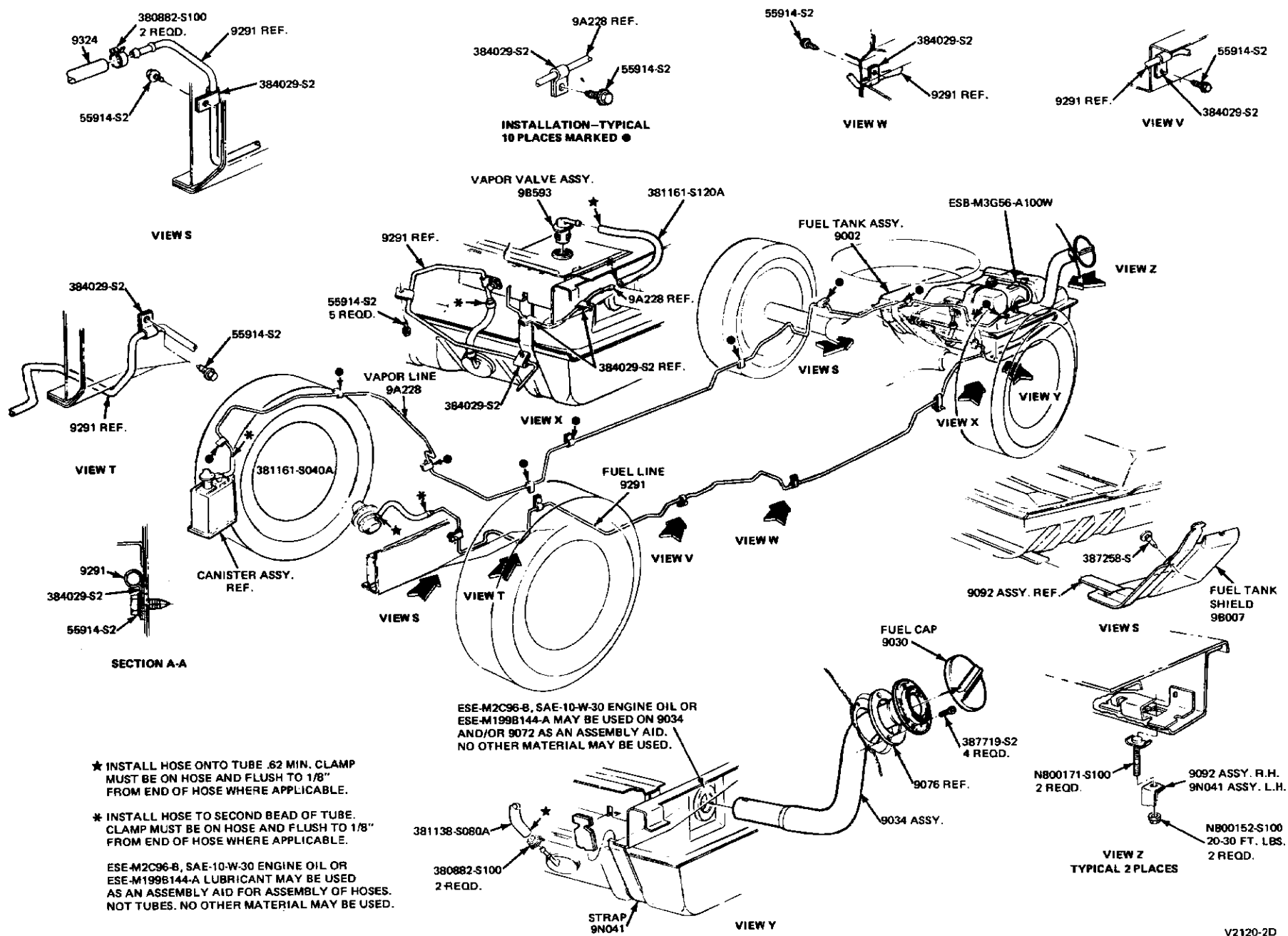


FIG. 19 Fuel and Vapor Emission Control Systems — Mustang II w/2.8L V-6

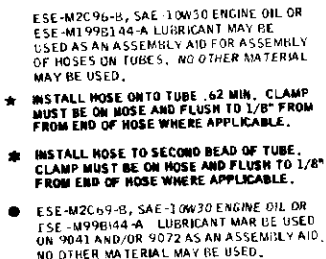
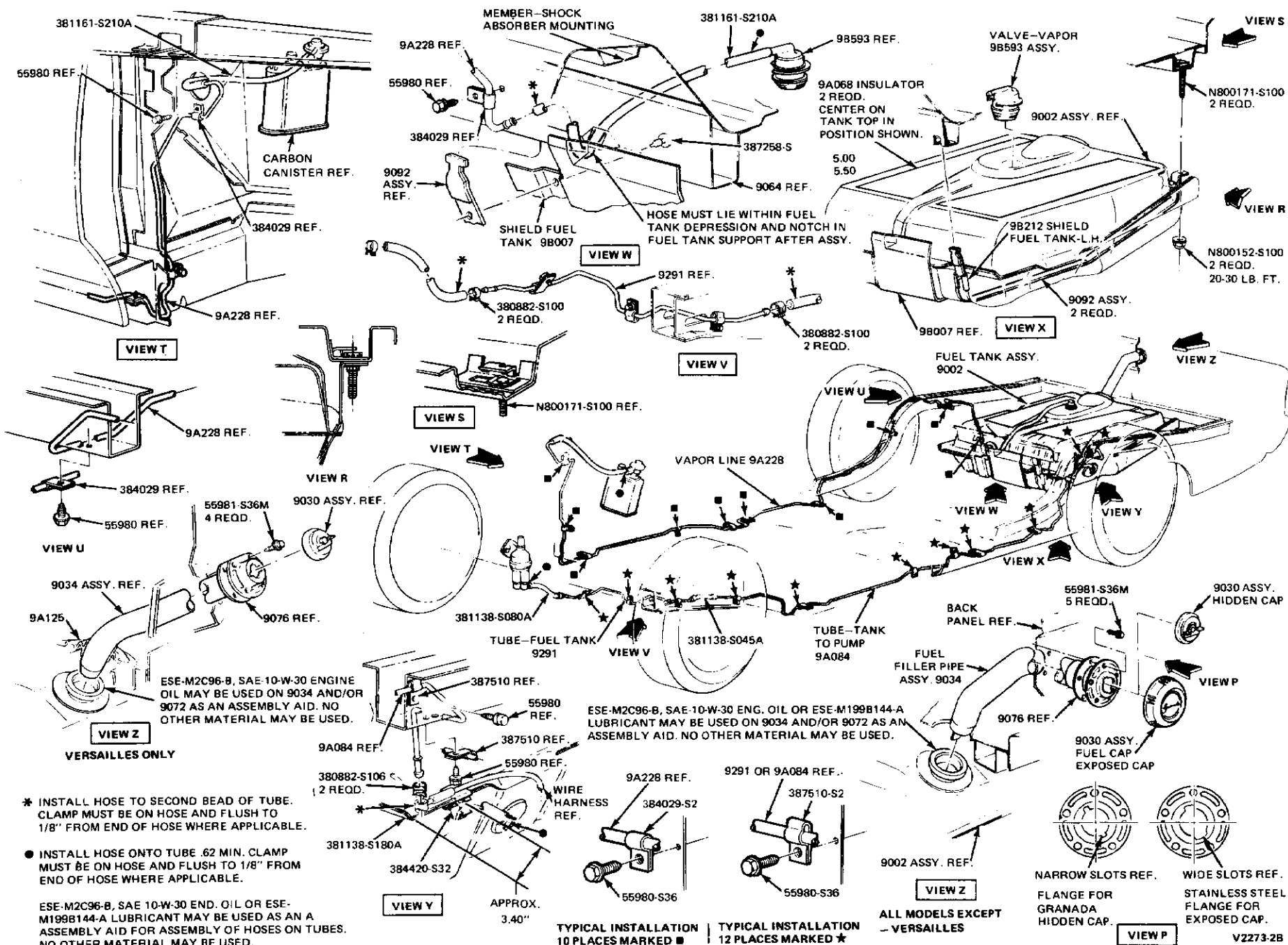
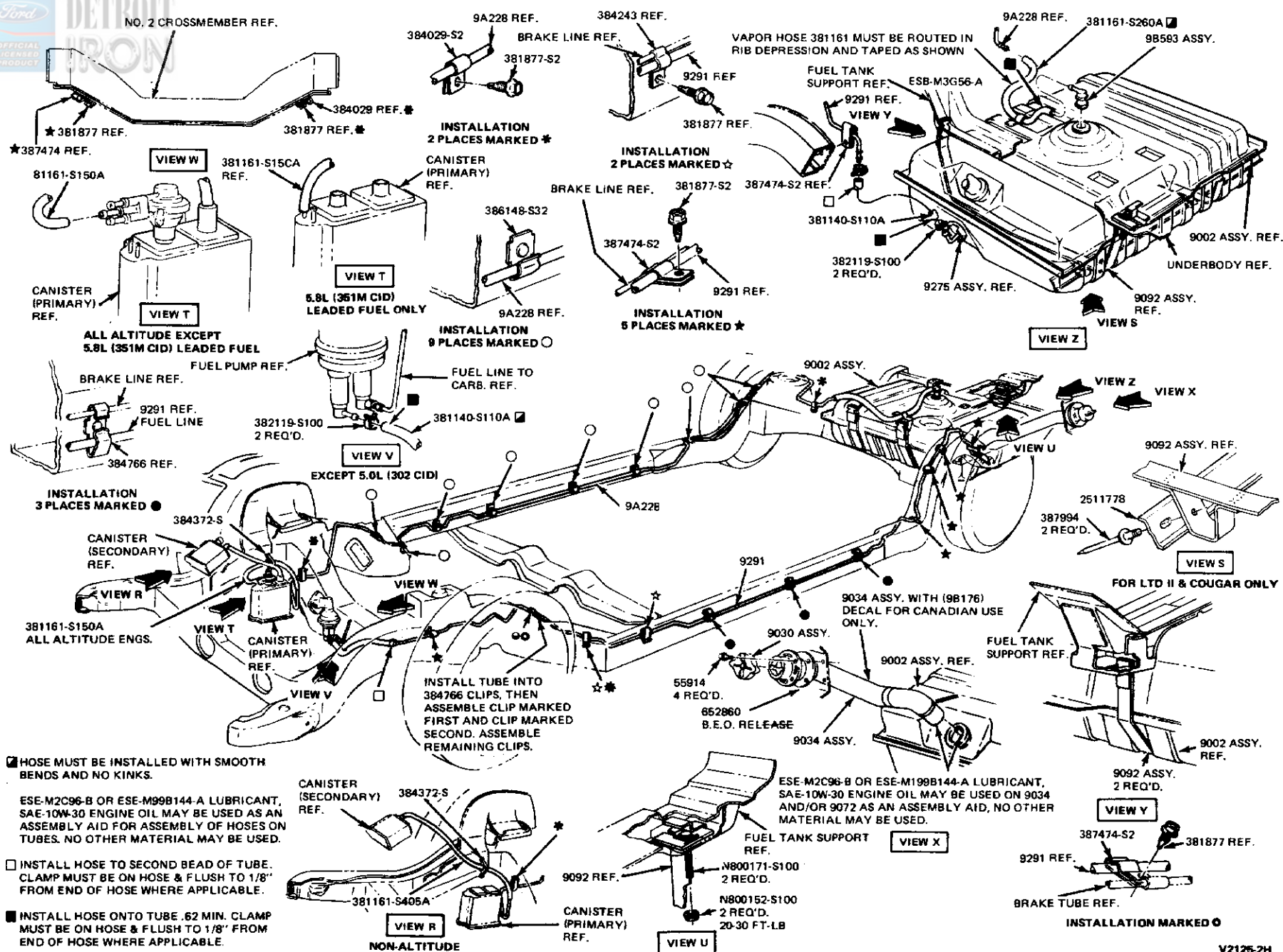


FIG. 20 Fuel and Vapor Emission Control Systems — Mustang II w/5.0L (302 CID) V-8







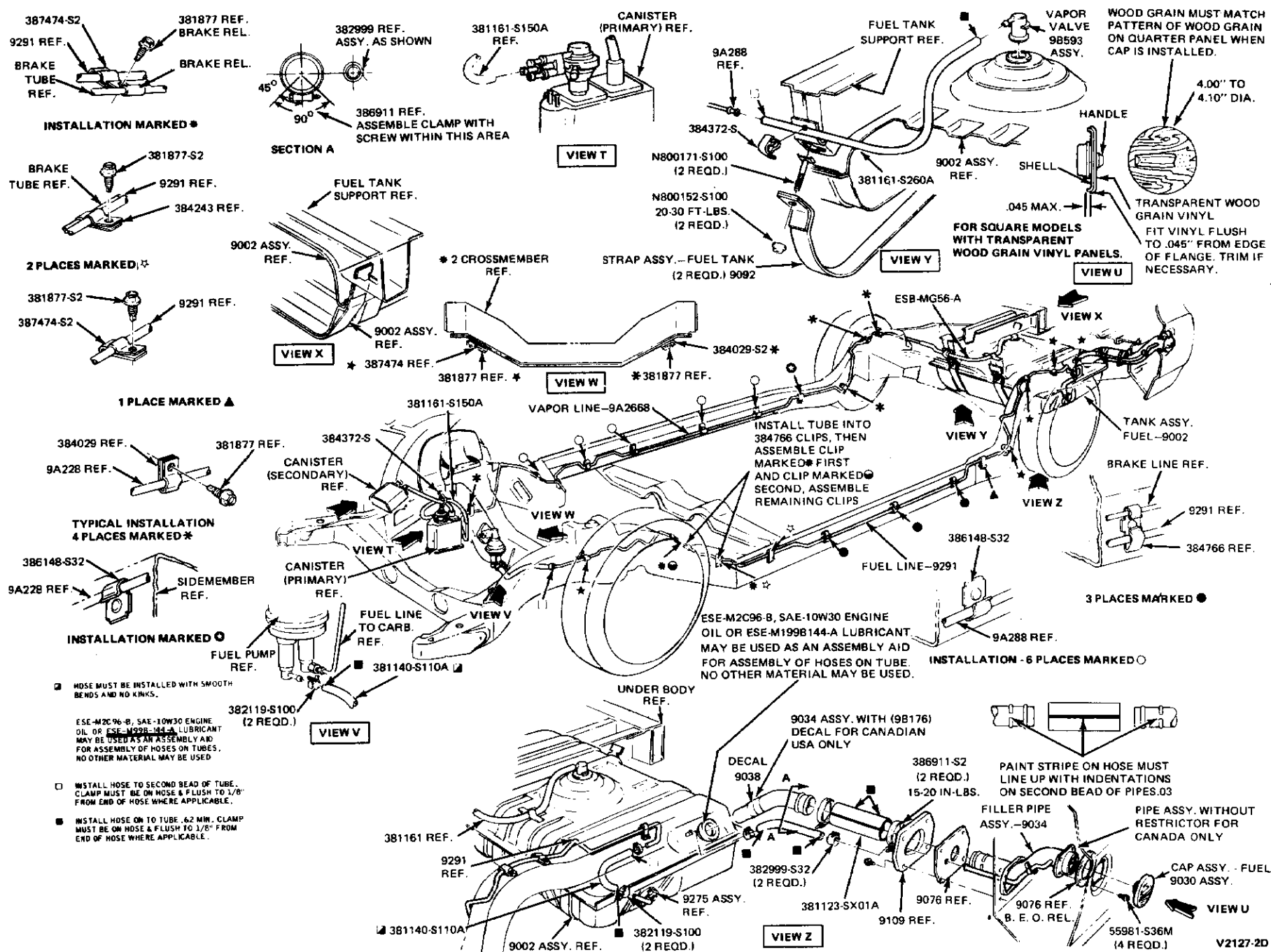


FIG. 25 Fuel and Vapor Emission Control System — LTD II Ranchero





FIG. 28 Fuel and Vapor Emission Control System — Ford and Mercury Wagon

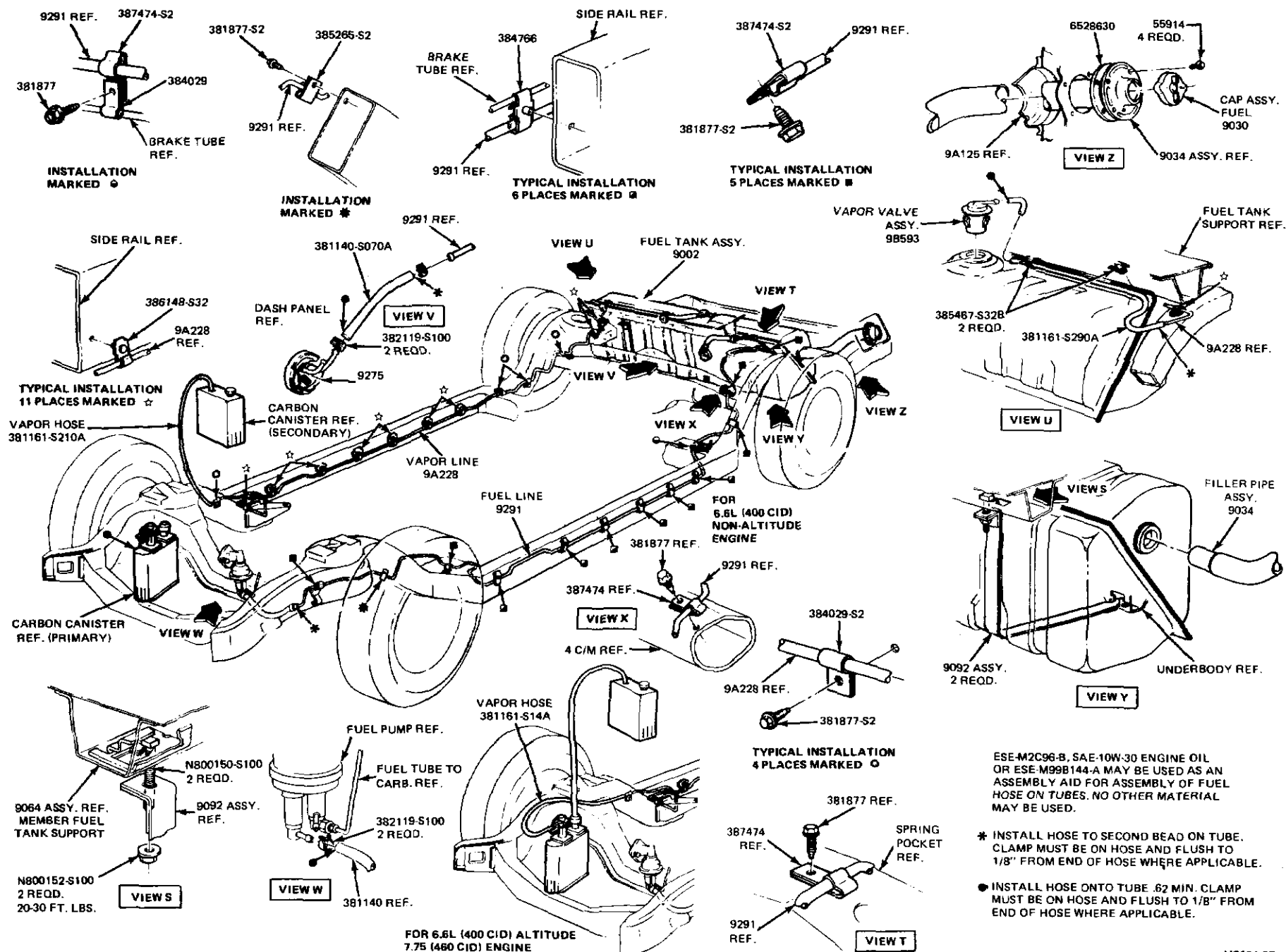


FIG. 29 Fuel and Vapor Emission Control System — Lincoln Continental

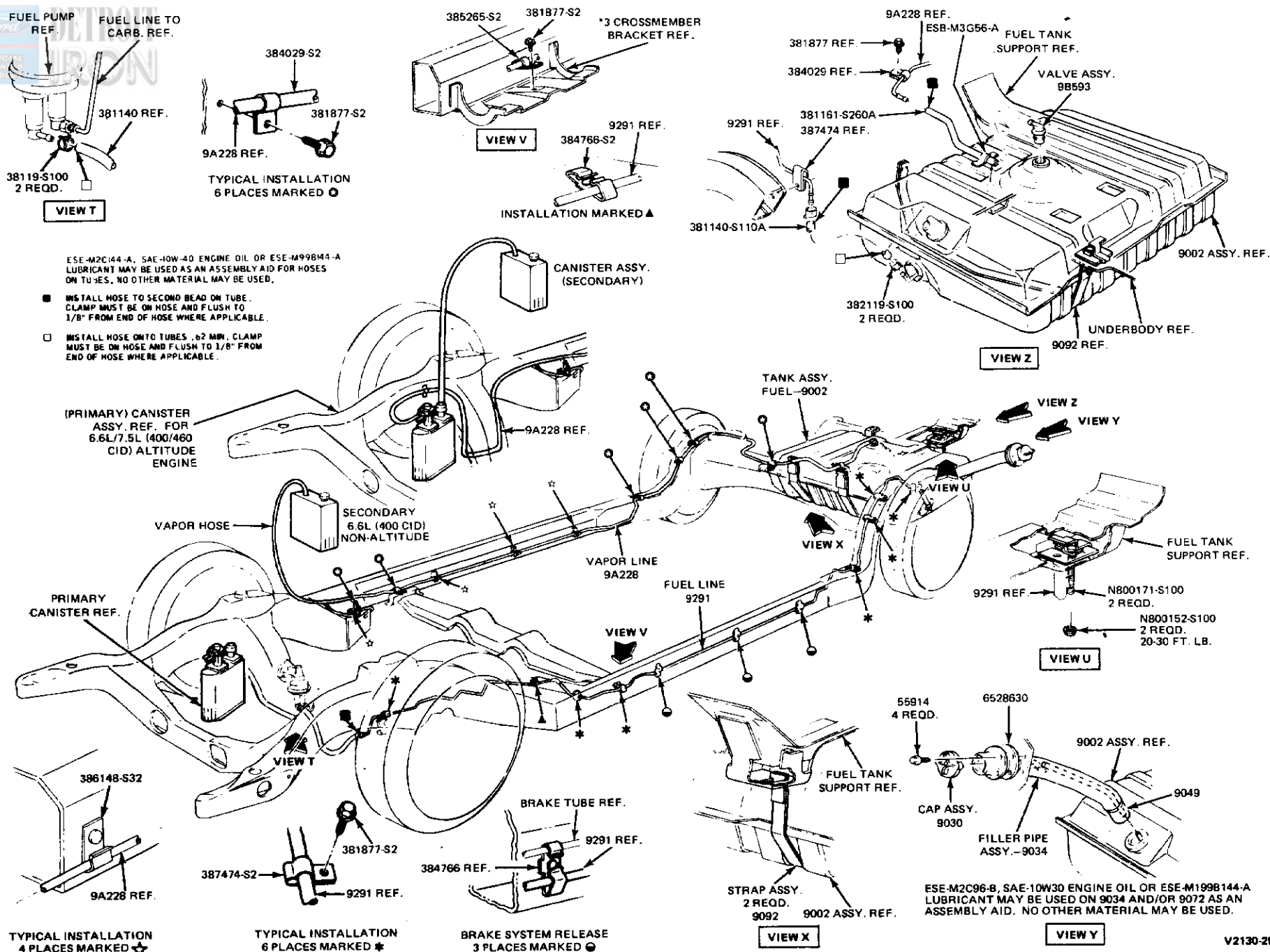


FIG. 30 Fuel and Vapor Emission Control System — Continental Mark V

SPECIFICATIONS

Car Line	Model/Usage	Approximate Fuel Tank Capacity (In U.S. Gallons) Usable	Car Line	Model/Usage	Approximate Fuel Tank Capacity (In U.S. Gallons) Usable
Bobcat	2.3L Calif. Sedan	11.7	LTD II/Cougar	All sedans	21.0
Pinto/Bobcat	All sedans except 2.3L Calif. Bobcat	13.0	Ranchero	All	26.0
Pinto/Bobcat	All station wagons	14.0	Thunderbird	All	21.0
Mustang II	Except 5.0L (302 CID) V-8	13.0	Mark V	All	25.0
Mustang II	5.0L (302 CID) V-8 with Auxiliary fuel tank	16.5	Ford/Mercury	All sedans	24.2
Fairmont/Zephyr	All	16.0	Ford/Mercury	All station wagons	21.0
Granada/Monarch	All	18.0	Lincoln	All	24.2
			Versailles	All	19.2

CV1114-2J

Fuel Filter

PART
24-51

DESCRIPTION

The fuel filters used on all engines except those using the Motorcraft model 2700 VV carburetor are of one-piece construction and cannot be cleaned. The model 2700 VV uses a replaceable element type filter in the fuel inlet of the carburetor. Inside the one-piece filter is a magnet to trap metallic particles which might be

present in the fuel. **Replace the filter at the specified service interval or if it becomes clogged or restricted.**

NOTE: When replacing fuel filters, make sure you have the correct one specified for the engine and carburetor being serviced.

REMOVAL AND INSTALLATION

FUEL FILTER

ALL MODELS EXCEPT 2700 VV CARBURETOR, ALL ENGINES

Removal

1. Remove the air cleaner.
2. Loosen (screw-type) or remove (spring-type) the clamp securing the inlet hose to the fuel filter line. If filter is located in line, loosen or remove outlet hose clamp.
3. Unscrew the fuel filter from the carburetor on those models that are so equipped. Disconnect the fuel filter hose from the metal line and discard the clamp, filter and hose.

Installation

1. Install new clamps on a new inlet hose and connect the hose to the filter and line. Thread the filter into the carburetor inlet port if so equipped. Tighten the filter.

2. Position the fuel line hose clamps and tighten the clamps securely (Fig. 1).
3. Start the engine and check for fuel leaks.

ENGINES EQUIPPED WITH 2700 VV CARBURETOR

Removal

1. Remove the air cleaner.
2. Loosen (screw-type) or remove (spring-type) the clamp securing the fuel line to the fuel-inlet fitting. Remove the line.
3. Unscrew the fuel-inlet fitting and remove the fuel filter, gasket and spring (Fig. 2).

Installation

1. Install the fuel filter spring, filter, inlet fitting gasket and the gasket into the carburetor.
2. Position the fuel line and clamp onto the fuel inlet fitting and tighten the clamp securely.
3. Start the engine and check for leaks.
4. Replace the air cleaner.

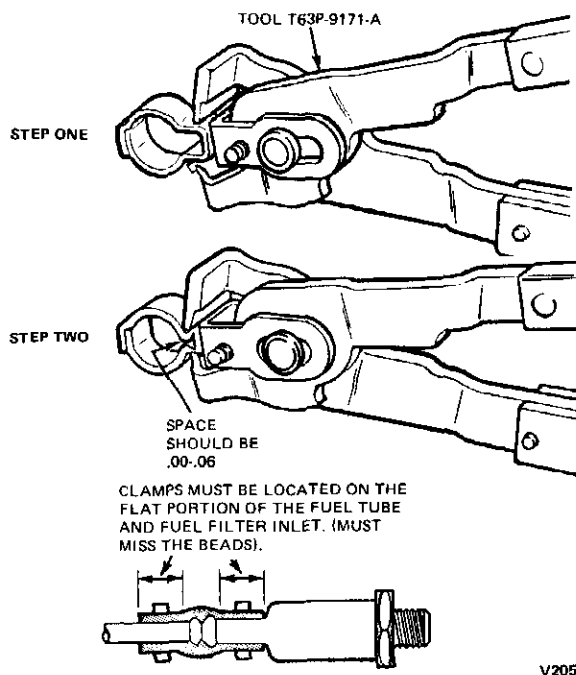


FIG. 1 Installing Crimp-Type Clamps

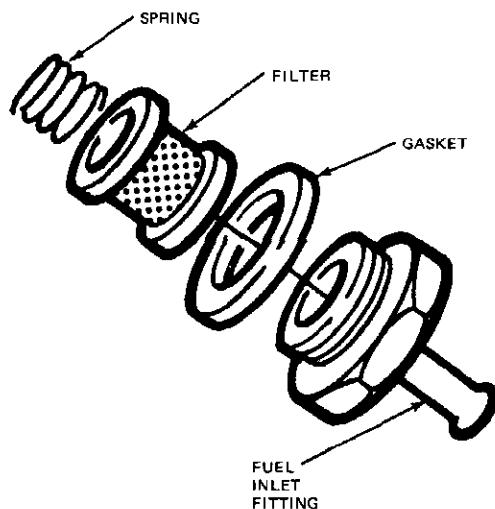


FIG. 2 Model 2700 VV Carburetor—Fuel Filter—Typical

Throttle Linkage

PART
24-60

SUBJECT	PAGE	SUBJECT	PAGE
ADJUSTMENTS		ADJUSTMENTS (Cont'd.)	
Accelerator Cable	60-1	Accelerator Pedal Assembly	60-1
Accelerator Cable Mounting Bracket	60-1	Downshift Linkage	60-1

CN4043-2A

ADJUSTMENTS

DOWNSHIFT LINKAGE—AUTOMATIC TRANSMISSION

All Models

Adjustment instructions are given on the illustrations, Figs. 1 through 10.

ACCELERATOR CABLE

ALL MODELS

Removal

1. Refer to the applicable illustration.
2. Using a suitable tool, push the accelerator cable nylon bushing out of the accelerator pedal arm. Remove the retaining clip attached to the cable at the dash panel inside the vehicle.
3. Disconnect the accelerator cable at the carburetor throttle lever. Be sure to pull on the connector and not the cable.
4. Disconnect the cable-attaching screw from the engine bracket.
5. Remove the screws attaching the cable to the dash panel.
6. Remove the cable from the dash panel.

Installation

1. Position the cable end through the dash panel and install the attaching screws.
2. Install the cable to the engine mounting bracket with one screw.
3. Connect the cable to the carburetor throttle lever. Install the cable sound absorber attaching clip.
4. Press the snap-in nylon bushing on the accelerator cable into the accelerator pedal arm.

ACCELERATOR CABLE MOUNTING BRACKET

ALL MODELS

Removal

1. Remove the accelerator cable mounting screw. Remove the cable from the bracket.
2. Remove the bolts securing the accelerator cable mounting bracket to the engine. On Pinto/Bobcat and Mustang II 2.3L engines, disconnect automatic transmission kickdown rod (if equipped).

Installation

1. Install the accelerator cable mounting bracket on the engine and torque the attaching bolts to specification. Reinstall the cable and attaching screw. On Pinto/Bobcat and Mustang II 2.3L engines, reconnect automatic transmission kickdown rod (if equipped).

ACCELERATOR PEDAL ASSEMBLY

ALL MODELS

Removal

1. Using a suitable tool, push the accelerator cable nylon bushing out of the accelerator pedal arm.
2. Remove the two nuts attaching the accelerator pedal assembly to the floor.
3. If replacing the assembly and if the vehicle is equipped with a pedal pad cover, uncrimp the pedal pad cover and remove from the pedal.

Installation

1. Install the pedal pad cover, if so equipped, and carefully crimp the retaining tabs.
2. Position the pedal assembly on the two mounting studs and install the two attaching nuts. Check to be sure that carpeting and/or sound deadener is properly assembled. Torque to specifications.
3. Install the snap-in nylon bushing of the accelerator cable into the accelerator pedal arm.

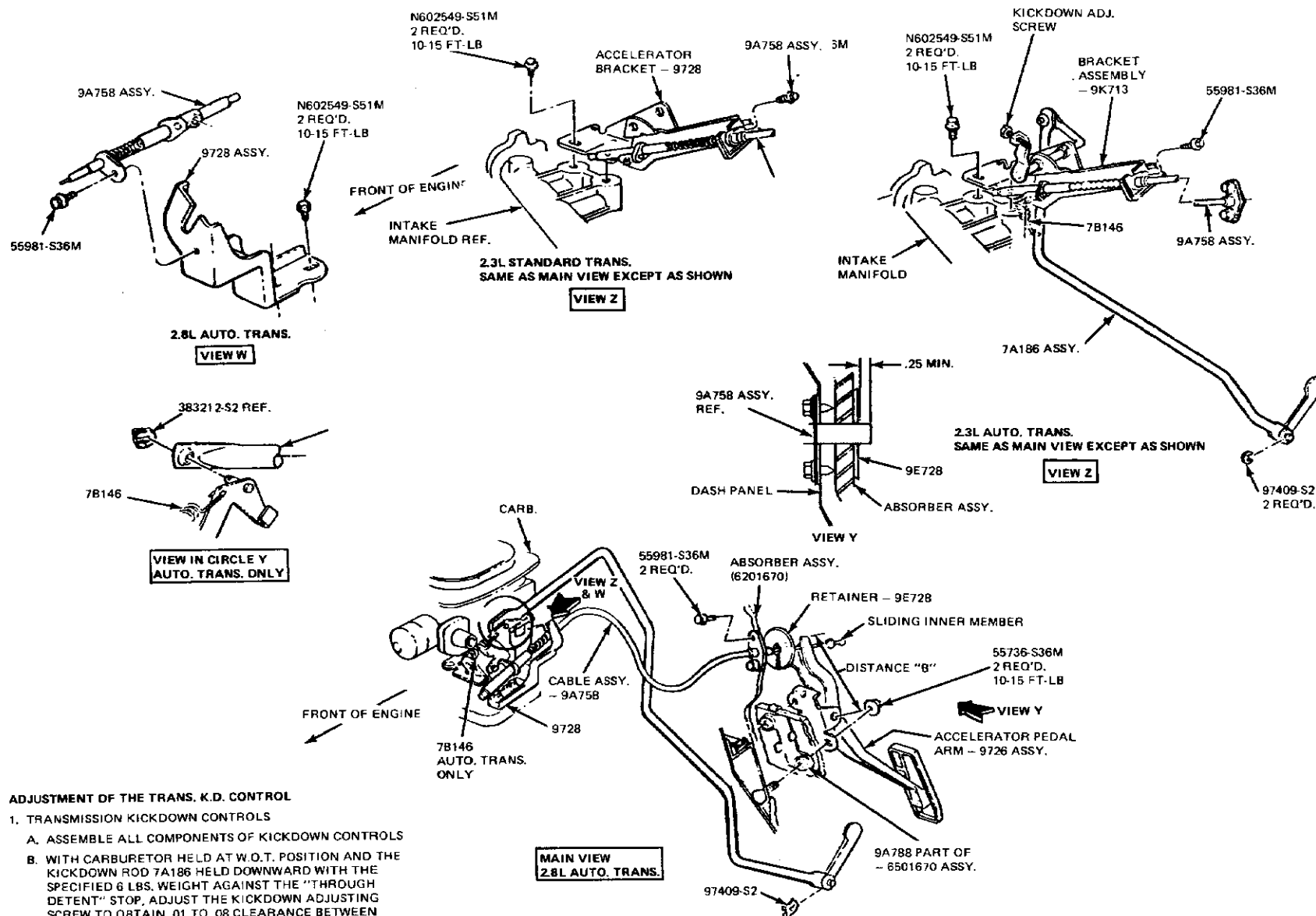


FIG. 1 Throttle and Downshift Linkage—Pinto and Bobcat with 2.3L and 2.8L Engines