

# FUEL SYSTEM GENERAL

## ALL SERIES

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## DESCRIPTION AND OPERATION

### FUEL SYSTEM

#### Fuel Filter

All engines have a pleated paper fuel filter located in the carburetor inlet.

All cars have a woven plastic fuel filter in the fuel tank on the lower end of the pick-up pipe.

#### Fuel Pump

An AC fuel pump is used on all engines. The pump assembly is mounted on the timing chain cover in an inverted position, and the pump rocker arm is actuated by an eccentric mounted on front end of the camshaft.

The fuel pump is a diaphragm type pump and is actuated by the rocker arm through a link and a pull rod. See Figure 6C-1.

The fuel pump draws gasoline from the tank and supplies it to the carburetor in sufficient quantity to meet engine requirements under all operating conditions. The principal parts of the fuel pump are shown in Figure 6C-1.

The rocker arm spring holds the rocker arm in constant contact with the eccentric on the engine camshaft so that the rocker arm swings up and down as the camshaft rotates. As the arm swings downward, it bears against a shoulder on the link which is pivoted on the rocker arm pin. The link swings upwards, thereby pulling the fuel diaphragm upward by means of the connecting pull rod.

Upward movement of the fuel diaphragm compresses the diaphragm spring and also creates a

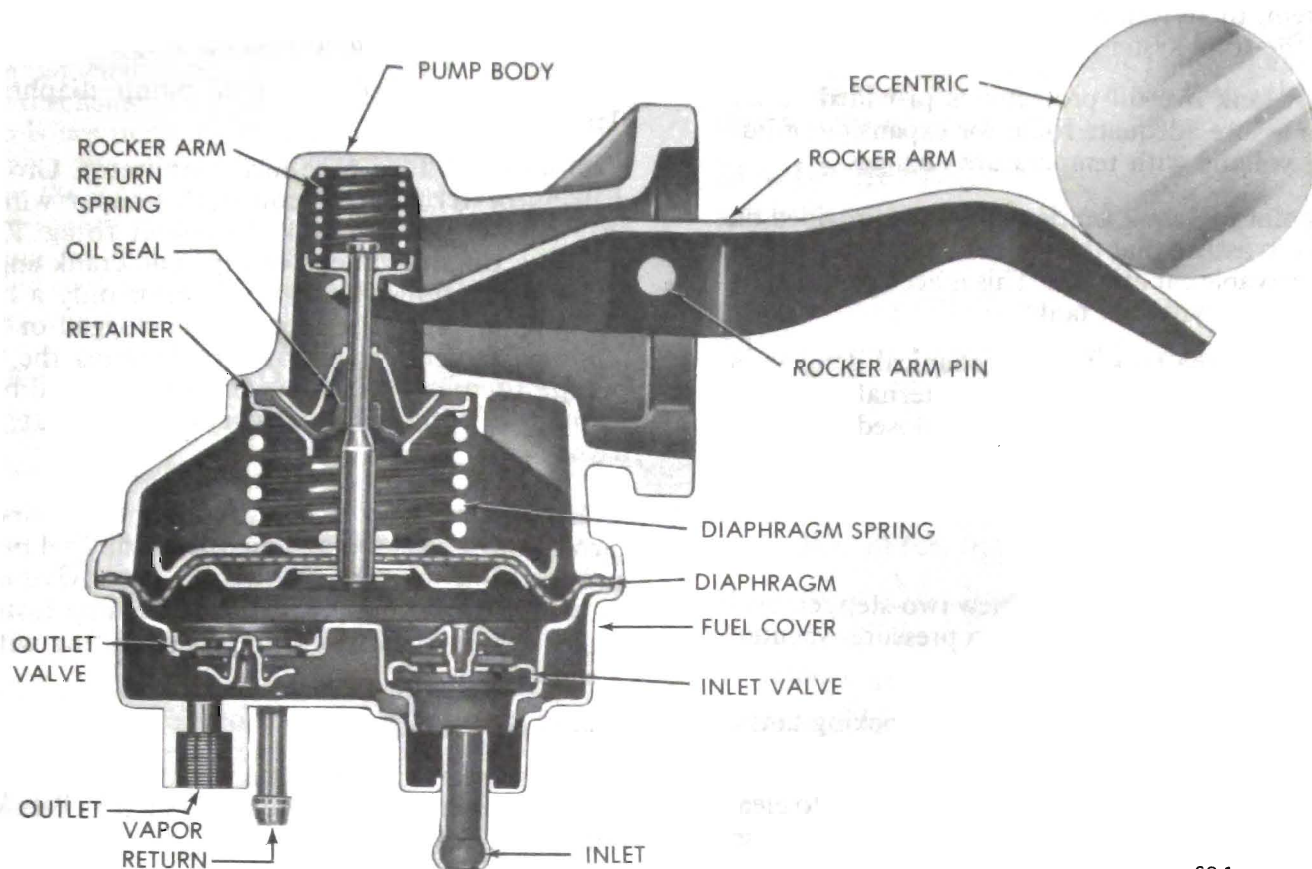
vacuum in the fuel chamber under the diaphragm. The vacuum causes the outlet valve to close and causes fuel from the gasoline tank to enter the fuel chamber through the inlet valve.

As the rotating eccentric permits the rocker arm to swing upward, the arm releases the fuel link; it cannot move the link downward. The compressed diaphragm spring then exerts pressure on the diaphragm and the fuel in the chamber below diaphragm. This pressure closes the inlet valve and forces fuel out through the outlet valve to the carburetor.

Since the fuel diaphragm is moved downward only by the diaphragm spring, the pump delivers fuel to the carburetor only when the pressure in the outlet line is less than the pressure maintained by the diaphragm spring. The condition arises when the carburetor float needle valve is not seated and the fuel passage from the pump into the carburetor float chamber is open. When the needle valve is closed and held in place by the pressure of the fuel on the float, the pump builds up pressure in fuel chamber until it overcomes the pressure of the diaphragm spring. This pressure results in almost complete stoppage of diaphragm movement until more fuel is needed.

The air space in the bottom of the fuel pump provides a pocket in which fuel under pressure can compress a certain volume of air. When the pressure is relieved (pump on suction stroke) the pocket of compressed air pushes the fuel on to its destination. The air pocket minimizes flow variation experienced with two-cycle pump stroke and increases the pump output.

All V-8 air conditioner equipped cars have a special



6C-1

Figure 6C-1 Fuel Pump

fuel pump which has a metering outlet for a vapor return system. Any vapor which forms is returned to the fuel tank along with hot fuel through a separate line alongside the supply line. This greatly reduces any possibility of vapor lock by keeping cool fuel from the tank constantly circulating through the fuel pump. All 455 engines have the vapor return system regardless of whether or not the car is equipped with an air conditioner.

#### Fuel Tank

In all models, except station wagons, the fuel tank is attached under the trunk pan by two (2) straps. On all series the filler neck extends from the rear upper center of the tank to a point just forward of the rear bumper. To fill the tank, pull down the spring-loaded license plate bracket and remove the filler cap.

All station wagons have the fuel tank mounted in the left rear quarter panel area. To fill the tank, lift the spring-loaded filler door and remove the filler cap.

Filler necks are soldered into the tank in all series cars.

In all series except station wagons, the tank is vented during filling by an internal baffle inside the filler.

In station wagons, the tank is vented during filling by the filler neck.

In all series the tank outlet consists of a combination fuel pickup, filter and fuel gage tank unit. The tank unit can be removed by removing a cam ring which retains the unit.

The fuel line is coated, welded steel tubing. Connections from the tank unit to the line and from the line to the fuel pump are made with synthetic rubber hose attached with spring clamps.

#### DISCRIPTION OF EVAPORATIVE EMISSION CONTROL SYSTEM

All 1973 Buicks will be equipped with a system designed to prevent escape of fuel vapor to the atmosphere. Vapor generated by evaporation of fuel in the tank, previously exhausted to atmosphere, will be transferred by an emission line to the engine compartment. During periods of operation, vapors are fed directly to the engine for consumption. During periods of inoperation, an activated charcoal canister located in the emission line stores any vapor generated, for consumption during the next period of operation.

The amount of vapor drawn into the engine at any time is too small to have any effect on fuel economy or engine operation.

With this closed system it is extremely important that only vapors be transferred to the engine. To avoid the possibility of liquid fuel being drawn into

the system, these following features are included as part of the total system:

1. A fuel tank overfill protector is provided on all series to assure adequate room for expansion of liquid fuel volume with temperature changes.
2. A 1 point fuel tank venting system is provided on all series to assure that the tank will be vented under any conceivable car attitude. This is accomplished by using a dome type fuel tank.
3. To protect the tank from mechanical damage in the event of excessive internal or external pressures resulting from the operation of this closed system, a pressure-vacuum relief valve, located in the gas cap, will control the tank internal pressure.

#### Gas Cap

1. The fuel tank filler cap has a new two-step removal and installation procedure, plus a pressure- vacuum safety relief valve.
2. It is equipped with a double set of locking tangs. To remove:
  - a. Rotate cap one-half turn counterclockwise to clear the first set of tangs from the slots inside the filler neck.
  - b. This will allow any residual pressure to escape.
  - c. Pull the cap outward and rotate one-quarter turn counterclockwise to clear second set of tangs, and remove the cap.
  - d. To install, reverse this procedure.

If this cap requires a replacement, only a cap with these same features should be used. Failure to use the correct cap can result in a serious malfunction of the system. Correct replacement caps may be obtained from your Buick or General Motors dealer.

Maintenance requirements demand only that the accumulator purge air filter, an oiled fiber-glass filter assembled in the bottom of the canister, be replaced every 12,000 miles or 12 months. Under extremely dusty conditions, more frequent attention may be required.

## DIAGNOSIS

### FUEL PUMP INSPECTION AND TEST

If the fuel system is suspected of delivering an improper amount of fuel to the carburetor, it should be inspected and tested in the car, as follows:

#### Inspection of Fuel System

1. Make certain that there is gasoline in the tank.
2. With engine running, inspect for leaks at all gasoline feed hose connections from fuel tank to carburetor. Tighten any loose connections. Inspect all hoses for flattening or kinks which would restrict the flow of fuel. *Air leaks or*

*restrictions on suction side of mechanical fuel pump will seriously affect pump output.*

3. Inspect for leaks at fuel pump diaphragm flange.
4. Disconnect feed pipe near carburetor. Ground distributor terminal of coil with jumper wire so that engine can be cranked without firing. Place suitable container at end of pipe and crank engine a few revolutions. If no gasoline, or only a little flows from pipe, the feed line is clogged or fuel pump is inoperative. Before condemning the fuel pump, disconnect feed line at both ends and blow through it with air hose to make sure that it is clear.
5. If gasoline flows in good volume from pipe at carburetor it may be assumed that the fuel pump and feed line are okay; however, it is advisable to make the following pressure and volume tests to make certain that fuel pump is operating within specifications.

#### Fuel Pump Pressure Test

1. Disconnect gasoline line near carburetor and connect a suitable pressure gage (such as Pressure-Leakdown Tester J-22109).
2. Start engine and check pressure with engine running at slow idle speed. Fuel pump pressure on 350 engines should be 3 lbs. minimum; on 455 engines it should be 4 1/2 lbs. minimum. On cars equipped with a vapor return system, squeeze off the return hose so that an accurate reading can be obtained.
3. If fuel pump pressure is below minimum, pump must be replaced.

#### Fuel Pump Flow Test

1. Disconnect fuel line from carburetor. Run fuel line into a suitable measuring container.
2. While observing the sweep second hand of a clock or watch, run the engine at idle until there is one pint of fuel in the container. One pint should be pumped in 30 seconds or less.
3. If flow is below minimum, check for restriction in the line.

#### FUEL PUMP DIAGNOSIS

Complete diagnosis of all possible causes of the trouble prior to replacement of the fuel pump will save time, expense and possibly prevent a repeat complaint.

#### Low Pressure Complaint

The only way to check fuel pump pressure is by connecting an accurate pressure gauge to the fuel line at carburetor level. Never replace a fuel pump without first making this simple check.

**Not Enough Fuel Flow Complaint**

When an engine has a "starving-out" condition, many mechanics jump to the conclusion that the fuel pump is not pumping enough fuel. Many times the "starving-out" condition is actually due to a weakness in the ignition system, since these two troubles are very hard to separate. Even when an engine is starving for fuel, the cause is more likely to be a plugged fuel filter or a restricted fuel line than a defective fuel pump.

**MAINTENANCE AND ADJUSTMENTS****AIR CLEANER AND FUEL FILTER SERVICE****Air Cleaner Service**

An air cleaner with a dirty element will not properly remove dirt from the air and the dirt entering the engine will cause abnormal formation of carbon, sticking valves, and wear of piston rings and cylinder bores.

Regular replacement of the element at 24,000 mile intervals (or more frequently in dusty territory) is necessary to prevent excessive engine wear.

**Fuel Filter - All Engines**

All engine fuel filters are located in the carburetor fuel inlet. These fuel filter elements are of pleated paper. Elements are placed in the inlet hole with the cupped end outward. A spring holds the element outward, sealing it by compressing a gasket surface against the inlet fitting. If the element should ever become plugged, pump pressure is sufficient to depress the spring slightly so that some fuel by-passes the element. Thus, a plugged element, instead of causing a car stoppage on the road, allows the engine to continue running on unfiltered fuel. However, the spring pressure is designed to allow only enough fuel to by-pass to let the car run 50 to 60 MPH at a constant speed, or to cut-out at a much lower speed with heavy acceleration. If surging is encountered in the 50 to 60 MPH range, try several hard accelerations; if the engine also runs out of fuel during acceleration, the problem is insufficient fuel, and the most likely reason is a plugged filter. If the owner has "put-up" with this trouble for some time, there is probably dirt in the carburetor due to usage of unfiltered fuel and also due to "dumping" of dirt from the plugged filter element.

The carburetor inlet fuel filter should be replaced every 12,000 miles.

After assembling any filter element in the carburetor, always start the engine and check for leaks in the fuel line and fittings before installing the air cleaner.

**Other Filters or Strainers**

A woven plastic filter is located on the lower end of the fuel pickup pipe in the gas tank. This filter prevents dirt from entering the fuel line and also stops water unless the filter becomes completely submerged in water. This filter is self cleaning and nor-

mally requires no maintenance. Fuel stoppage at this point indicates that the gas tank contains an abnormal amount of sediment or water; the tank should therefore be removed and thoroughly cleaned.

**MAJOR REPAIR****REMOVAL OF FUEL TANK OR FUEL GAUGE TANK UNIT***All Series (Except Station Wagons)*

The fuel gauge tank unit is combined with the pickup pipe and the tank filter. All series require lowering the fuel tank to replace the tank unit.

To lower a fuel tank, proceed as follows:

1. Disconnect battery.
2. Syphon all fuel from tank into a clean container.
3. Disconnect fuel hose and vapor return hose from gauge tank unit.
4. Remove ground (black) wire screw.
5. Unplug tan wire from gauge unit.
6. Disconnect vent hose.
7. Disconnect support straps and lower tank.
8. To install fuel tank, reverse above procedures.

To remove fuel gauge tank unit, proceed as follows:

1. Disconnect battery.
2. Unscrew cam ring using Wrench J-24187 for all series (except Wagons).
3. Remove fuel gauge tank unit. Install new tank unit, being careful not to bend or damage it.
4. Complete gauge unit installation by reversing above steps. Make sure tan wire and black wire connections are clean and tight.

*A and B Series Wagons*

1. Disconnect battery.
2. Drain gas from tank into suitable container and disconnect fuel gauge tank wire.
3. Raise car on hoist.
4. Remove left rear tire and wheel assembly.
5. Remove left quarter panel to wheelhouse filler panel (mud deflector) and bend lower attaching tab out of way.
6. Disconnect gas tank to wheelhouse ground wire.
7. Disconnect tail pipe hanger.
8. Disconnect fuel lines from gas tank.
9. Remove the end and bottom tank support straps.
10. Work tank forward and remove.
11. For installation reverse previous steps.

**Mechanical Fuel Pump Removal**

1. Disconnect fuel inlet hose from pump. Disconnect vapor return hose, if so equipped.
2. Disconnect fuel outlet pipe.
3. Remove two 1/2 inch hex head bolts, using a 3/8 inch drive deep socket and a ratchet handle.
4. Remove old fuel pump.

**Mechanical Fuel Pump Installation**

1. Install new fuel pump with new gasket.
2. Install two 1/2 inch hex head bolts, driving them in alternately and evenly.
3. Install fuel outlet pipe. If it is difficult to start fitting, time can be saved by disconnecting upper end of pipe from carburetor. Tighten fitting securely, meanwhile holding fuel pump nut with a wrench. Install and tighten fitting at carburetor, if removed.
4. Install fuel inlet hose. Install vapor return hose, if so equipped.
5. Start engine and check for leaks.

**CLEANING FUEL SYSTEMS - ALL SERIES**

If trouble is due to contaminated fuel or foreign material that has been put into the tank, it can usually be cleaned. If tank is rusted internally, it should be replaced.

1. Disconnect battery and ignition coil primary wire (plus wire on ignition coil).
2. Drain fuel tank.
3. Remove fuel tank.
4. Remove fuel inlet filter at carburetor and inspect for contamination. If filter is plugged, replace (leave fuel line disconnected).

**SPECIFICATIONS****Gasoline Tank Capacity (Approximately)**

- A Series (except wagon) 22 Gal.
- A Series Station Wagons 22 Gal.
- B-C-E Series (except wagons) 26 Gal.
- B Series Station Wagons 22 Gal.

Gasoline Gauge, Make and Type ..... A.C. Electric

Fuel Pump, Make ..... A.C.

Fuel Pump, Type and Location ..... Mechanical, Left Front Engine

Fuel Pump Pressure - At Carb. Level

350 Engine ..... 3 Lbs.Min.

455 Engine ..... 4-1/2 Lbs.Min.

Fuel Pump Volume ..... 1 Pt. in 30 Seconds or Less

Fuel Filter in Carb. Inlet, Make and Type

2-Barrel Carb. .... A.C., 1 In. Paper, GF-427

4-Barrel Carb. .... A.C., 2 In. Paper, GF-441

Fuel Filter in Fuel Tank ..... Woven Plastic

5. Locate tank away from heat, flame, or other source of ignition. Remove fuel gauge tank unit and inspect condition of filter. If filter is contaminated, a new filter should be installed upon reassembly.

6. Complete draining of tank by rocking it and allowing fuel to run out of tank unit hole.

7. Purge fuel tank with steam or running hot water for at least five minutes. Pour water out of tank unit hole (rock tank to assure complete removal of water).

**WARNING: This procedure will not remove fuel vapor. Do not attempt any repair on tank or filler neck where heat or flame is required.**

8. Disconnect inlet fuel line at pump and use air pressure to clean fuel line and fuel return line (if equipped). Apply air pressure in the direction fuel normally flows through line.

9. Use low air pressure to clean pipes on tank unit.

10. Clean filter on fuel tank unit, if required. Install fuel tank unit with new gasket into tank and install tank. Connect tank unit wires and all fuel lines, except pump to carburetor line (see "Removal of Tank" for proper procedure).

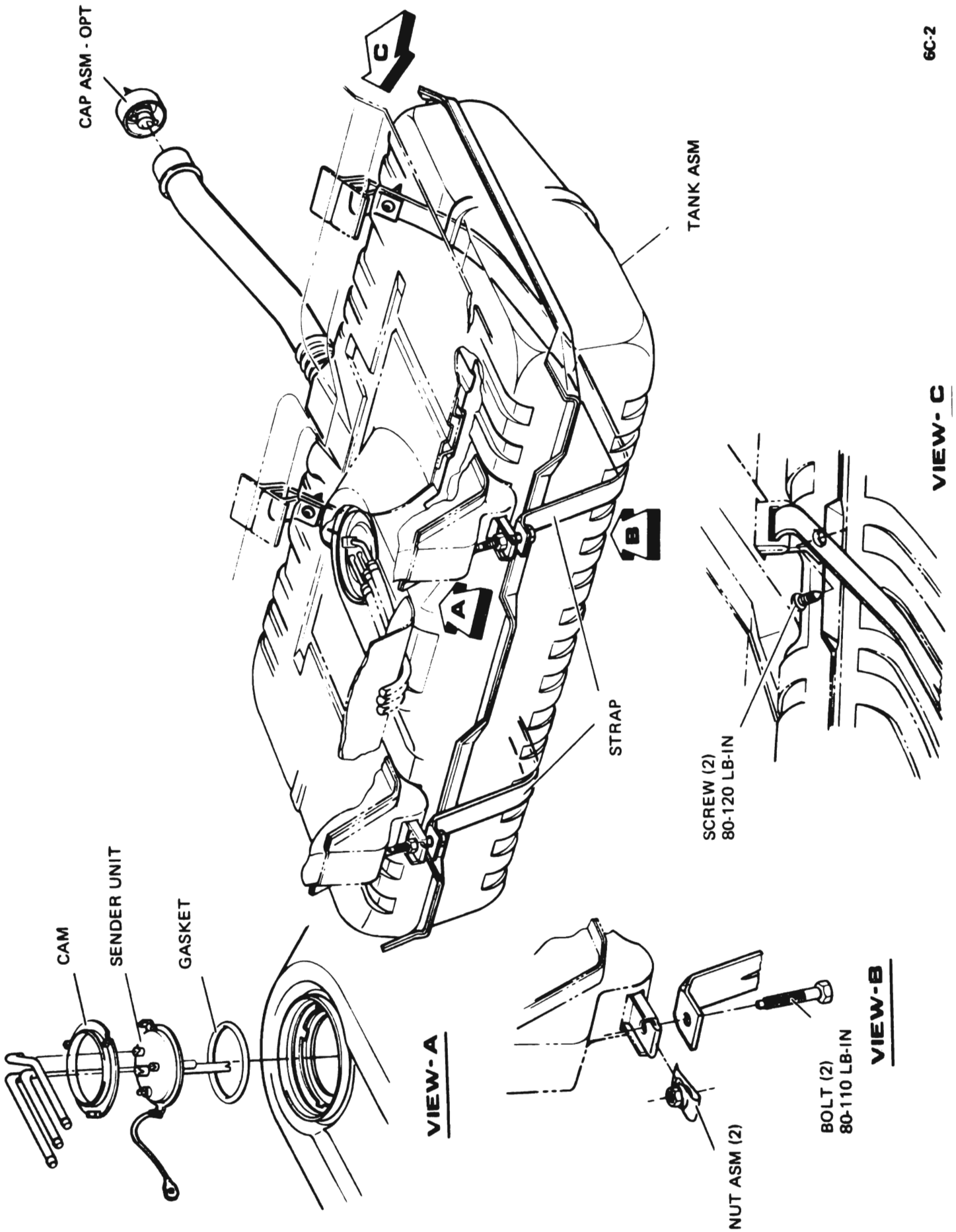
11. Connect a hose to fuel line at carburetor; insert other end of hose into a one gallon fuel can.

12. Connect battery cable. *Make sure ignition coil primary wire is disconnected.*

13. Put six gallons of clean fuel in tank and operate starter to pump two quarts of fuel into fuel can. This will purge fuel pump.

14. Remove hose and connect fuel line to carburetor.

15. Connect coil primary wire.



6C-2

VIEW-C

VIEW-A

VIEW-B

Figure 6C-2 "A" Series Fuel Tank Mounting and Sender Units (Sedans and Coupes)

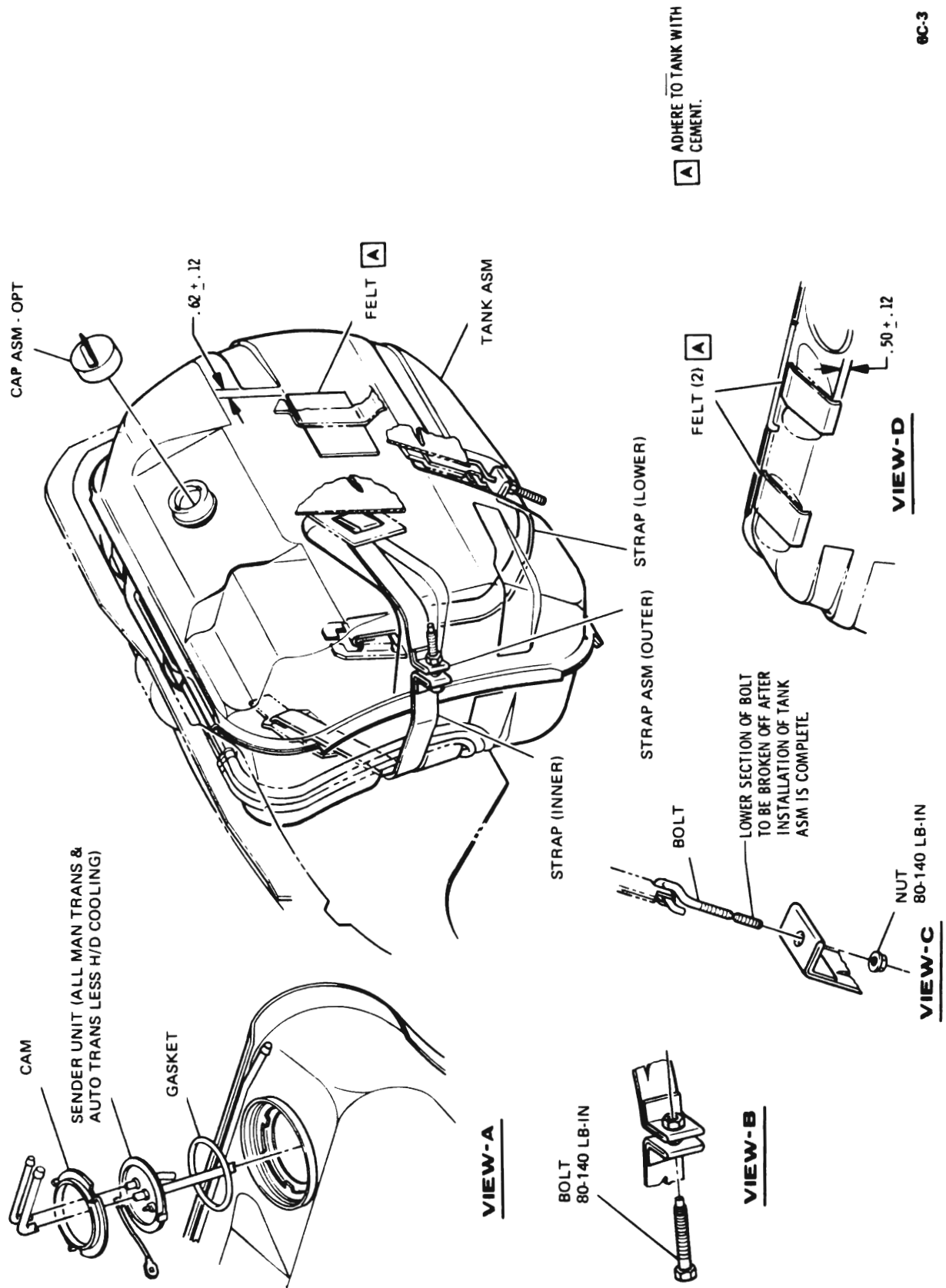
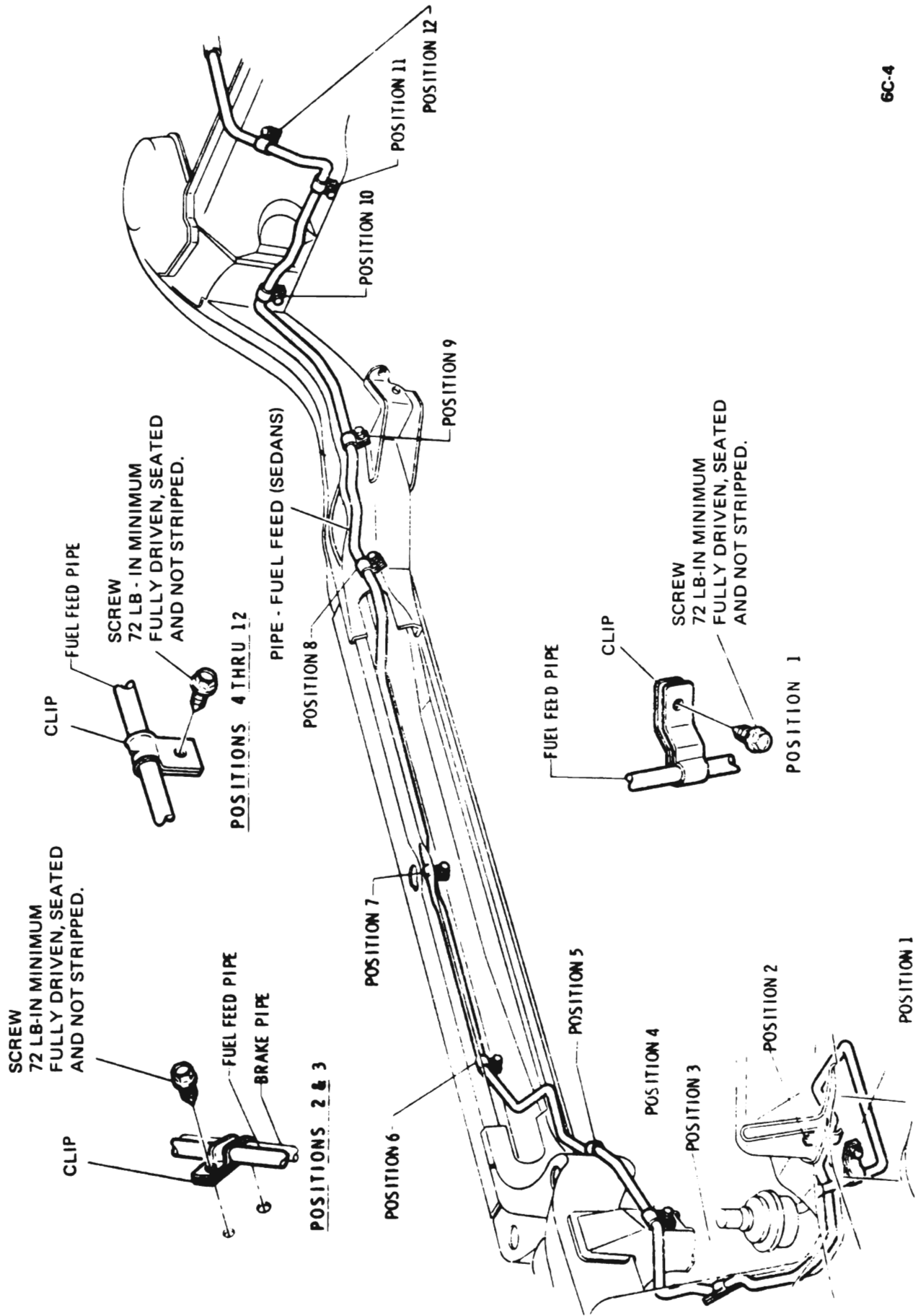


Figure 6C-3 "A" Series Fuel Tank Mounting and Sender Units (Wagon)



6C-4

Figure 6C-4 "A" Series Fuel Pipe Routing 350 Cu. In. Without AC (Sedans and Coupes)



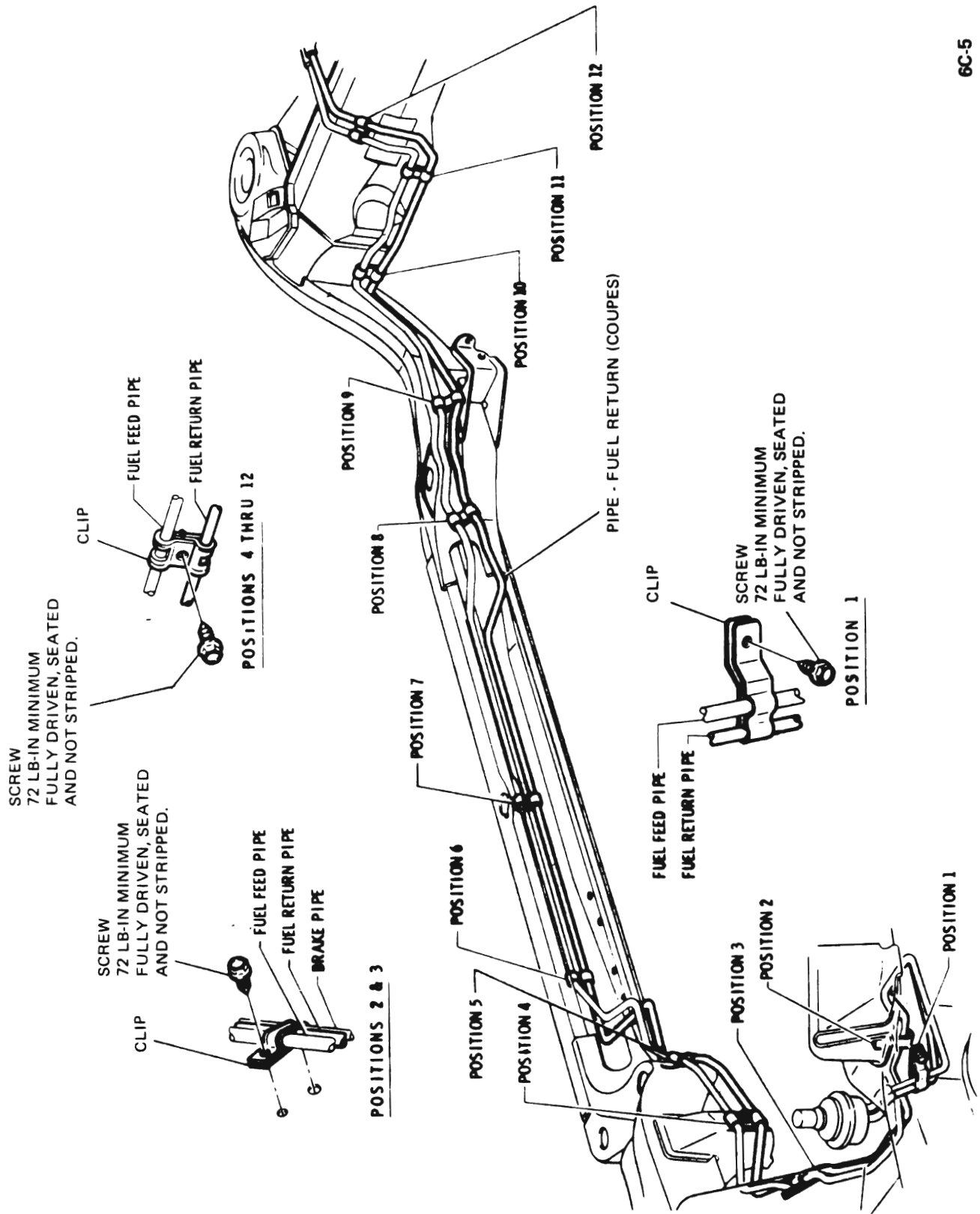


Figure 6C-5 "A" Series Fuel Pipe Routing 350 Cu. In. With AC, 455 Cu. In. With or Without AC (Sedans and Coupes)

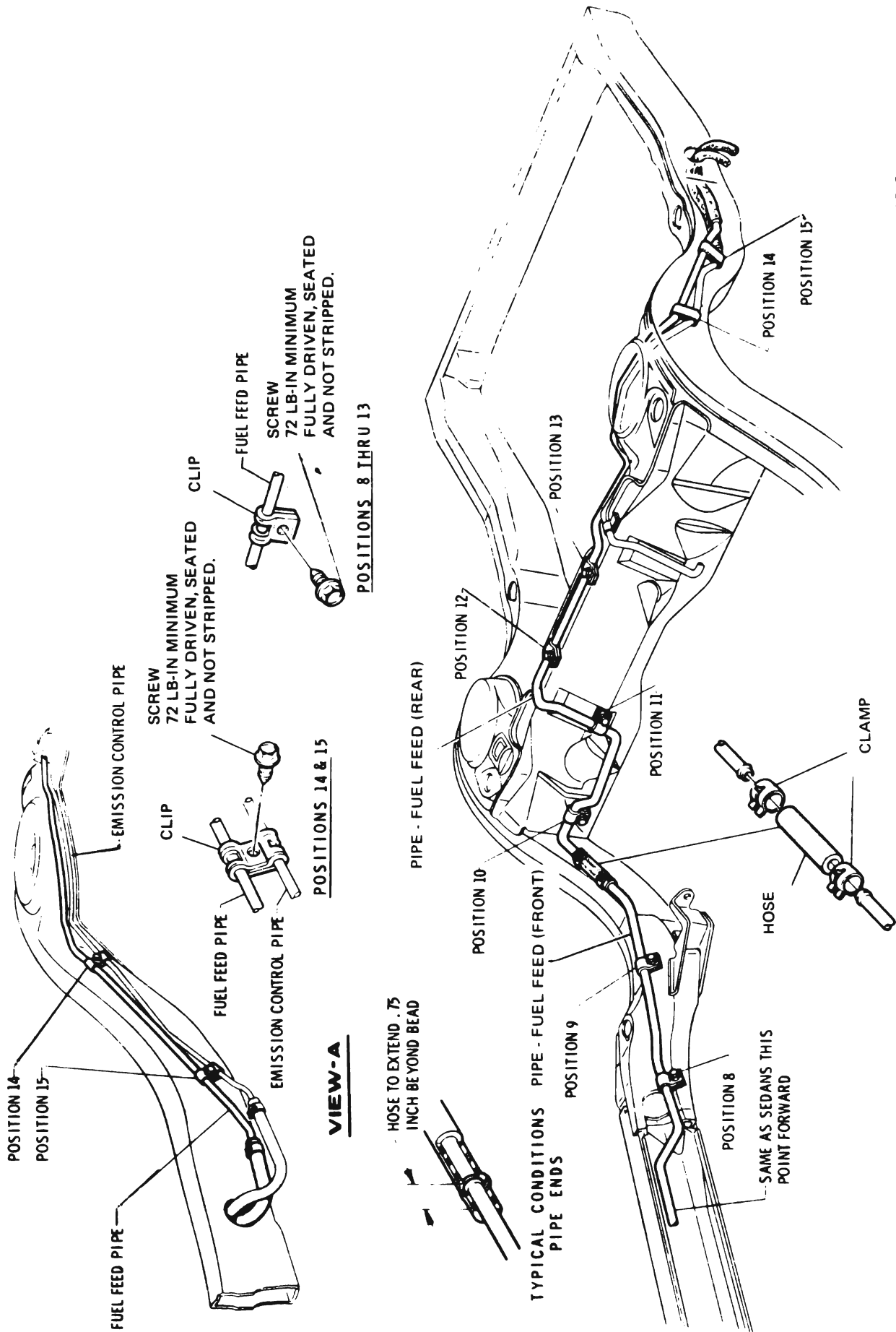
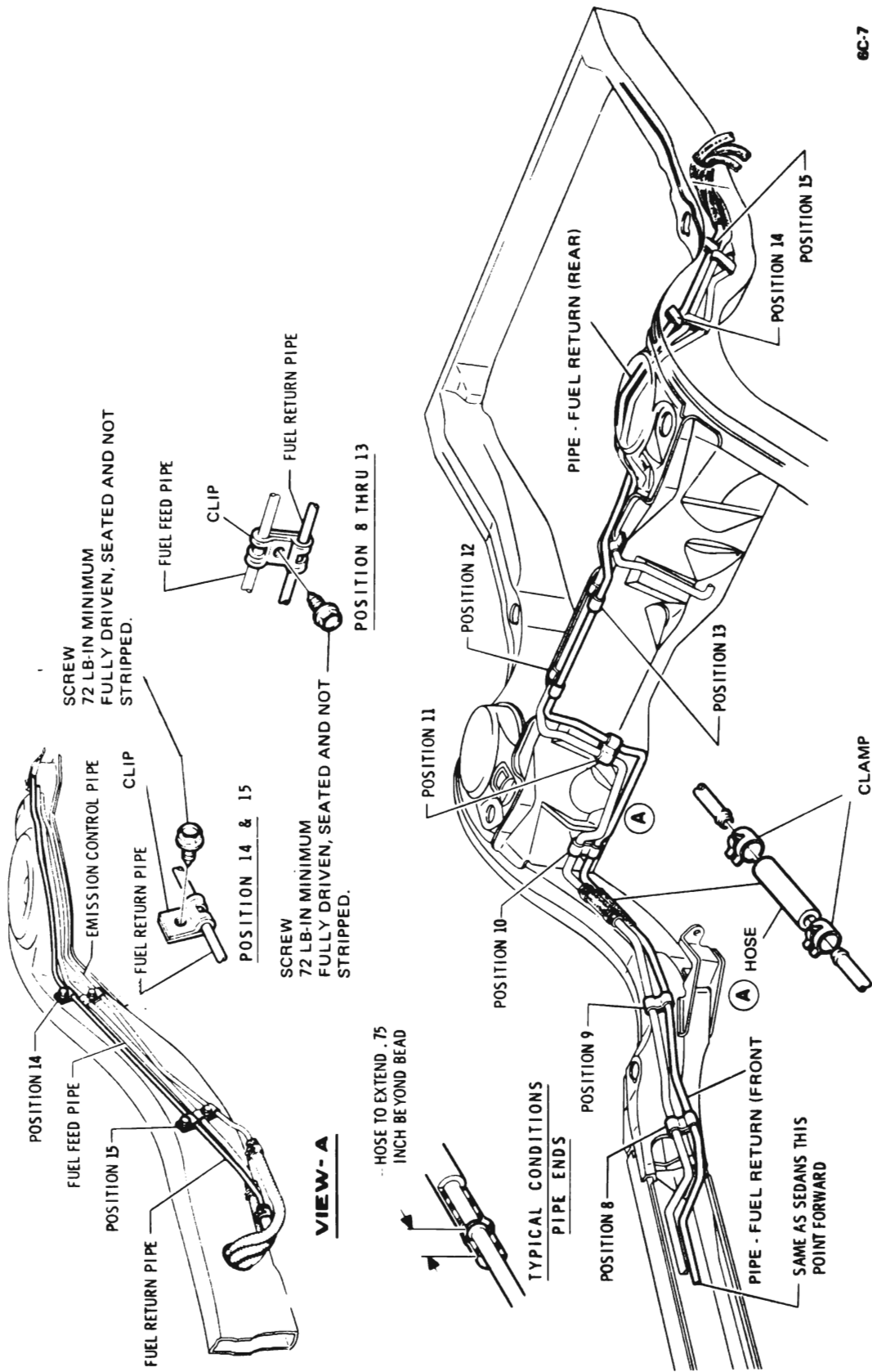


Figure 6C-6 "A" Series Fuel Pipe Routing 350 Cu. In. Without AC (Wagon)



6C-7

Figure 6C-7 "A" Series Fuel Pipe Routing 350 Cu. In. With AC, 455 Cu. In. With or Without AC (Wagon)

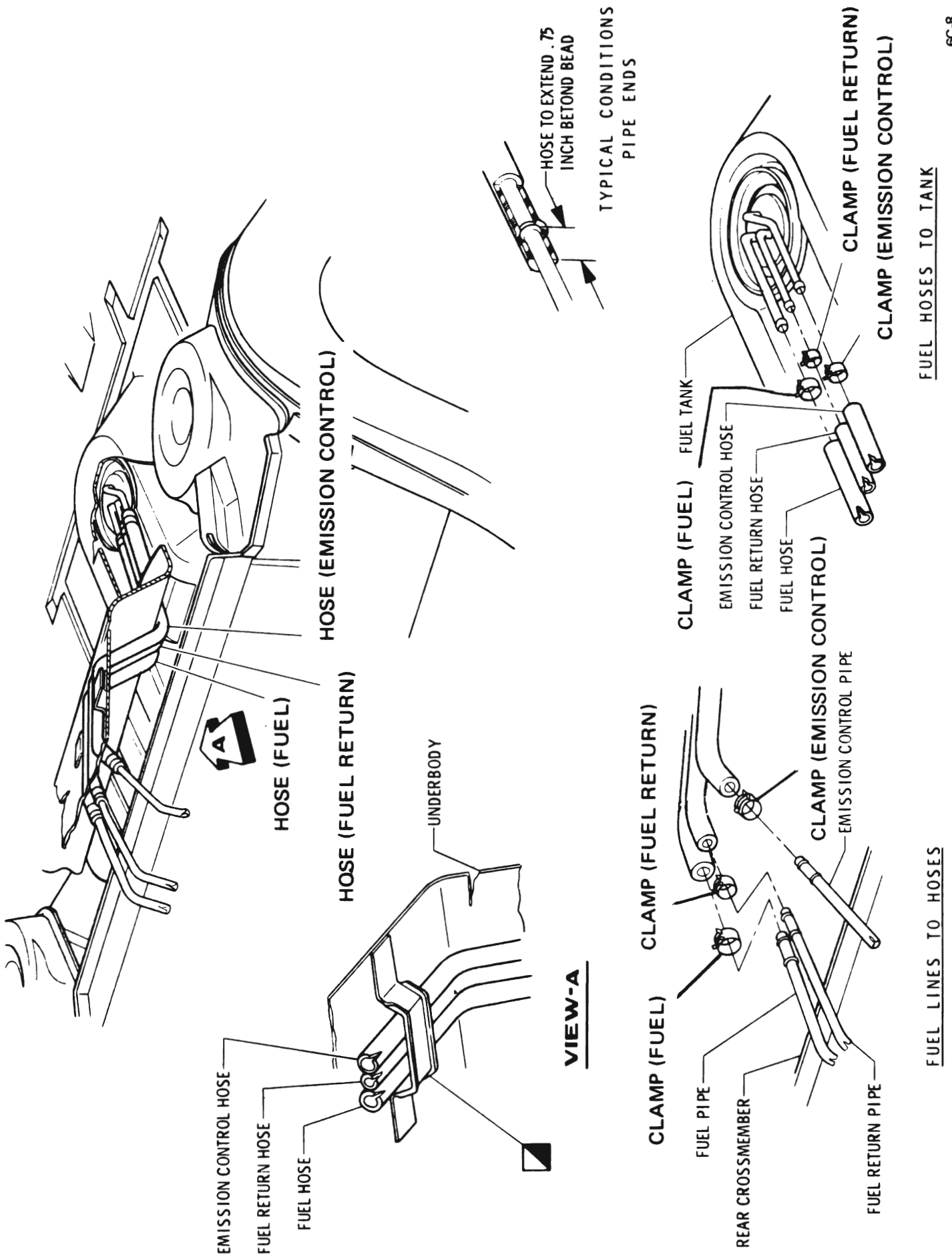


Figure 6C-8 "A" Series Fuel Tank Hose Routing (Sedans and Coupes)

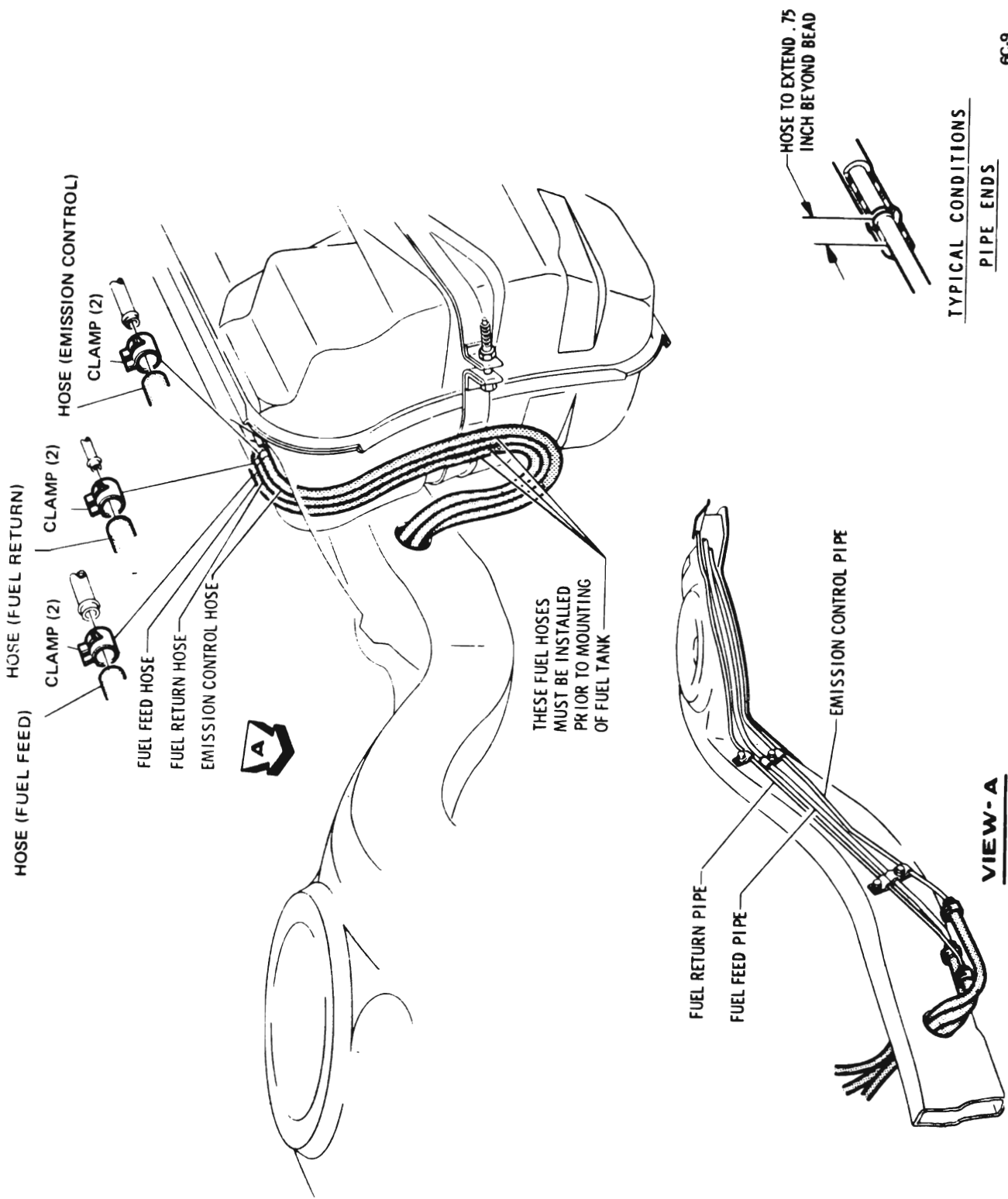
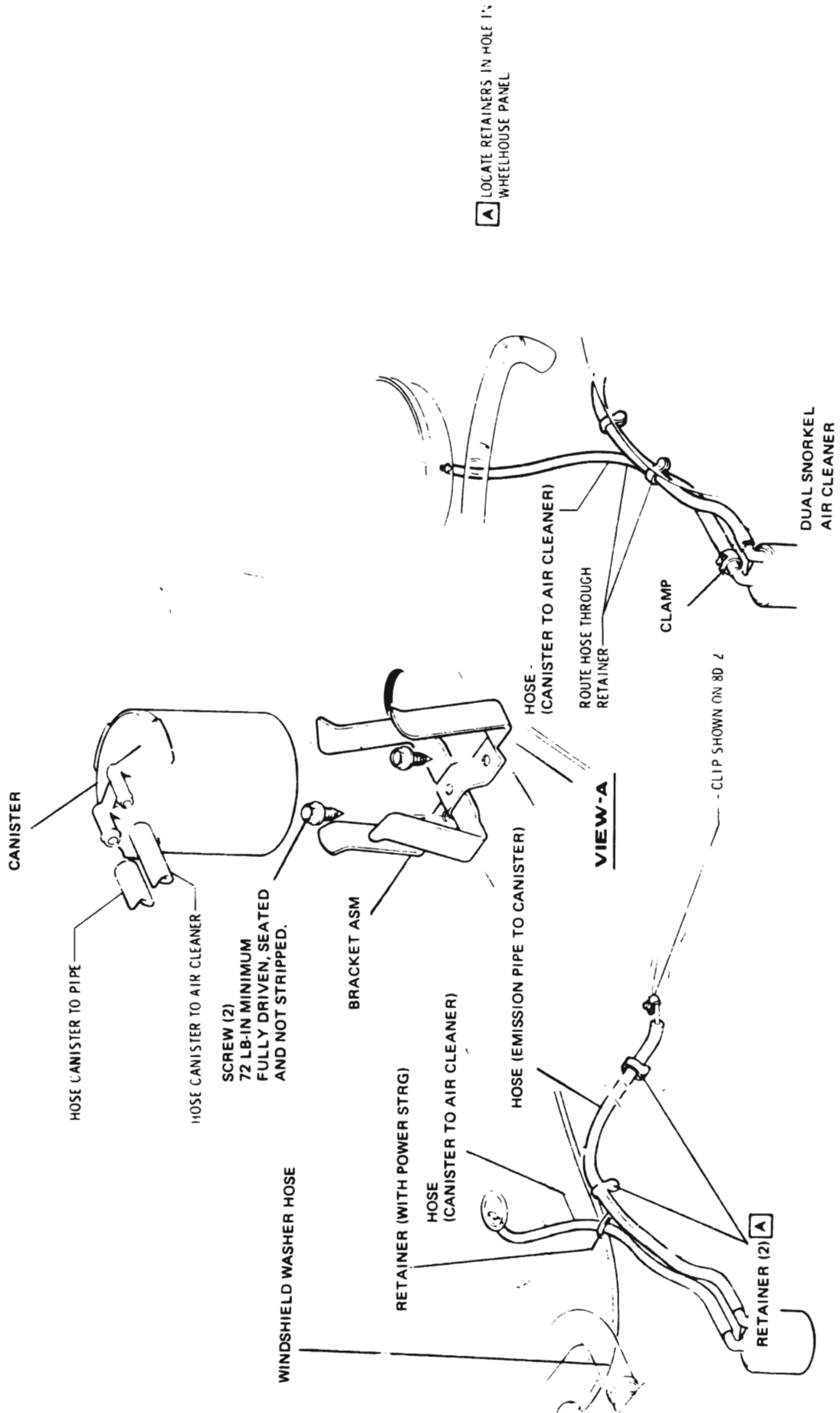


Figure 6C-9 "A" Series Fuel Tank Hose Routing (Wagon)



6C-10

Figure 6C-10 "A" Series Canister Mounting and Engine Hose Routing

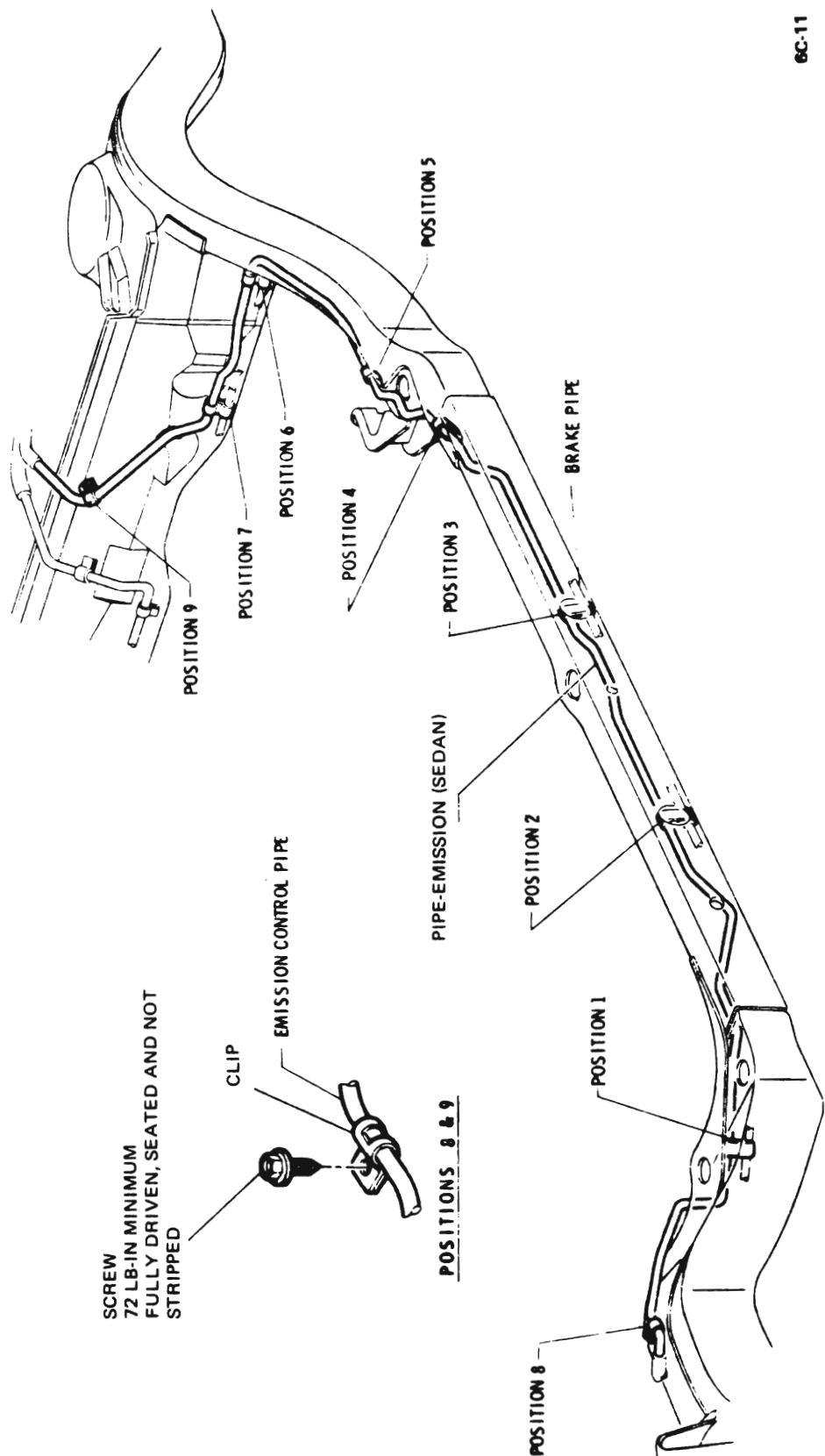
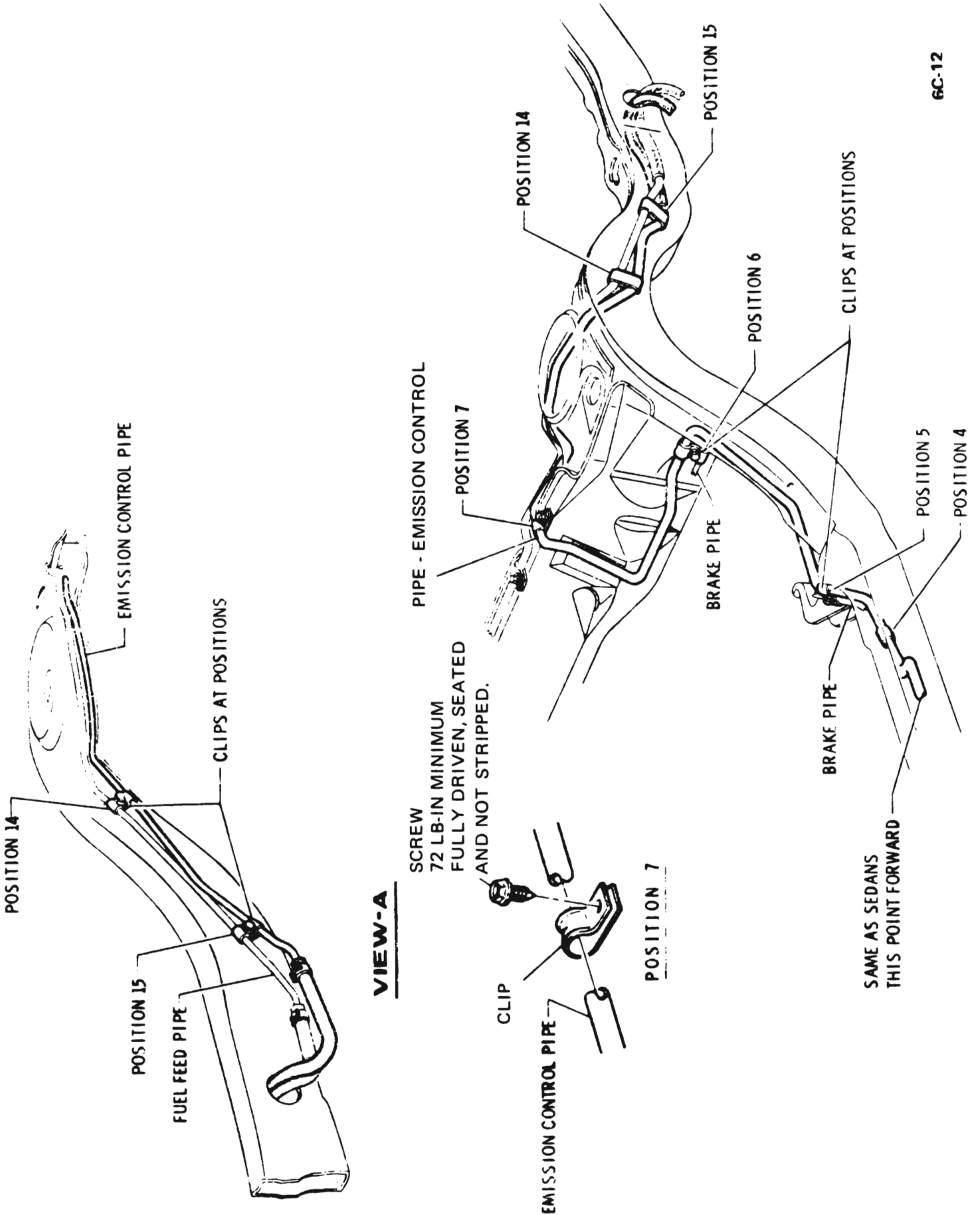


Figure 6C-11 "A" Series Evaporative Emission Control Pipe Routing (Sedans and Coupes)



6C-12

Figure 6C-12 "A" Series Evaporative Emission Control Pipe Routing (Wagon)



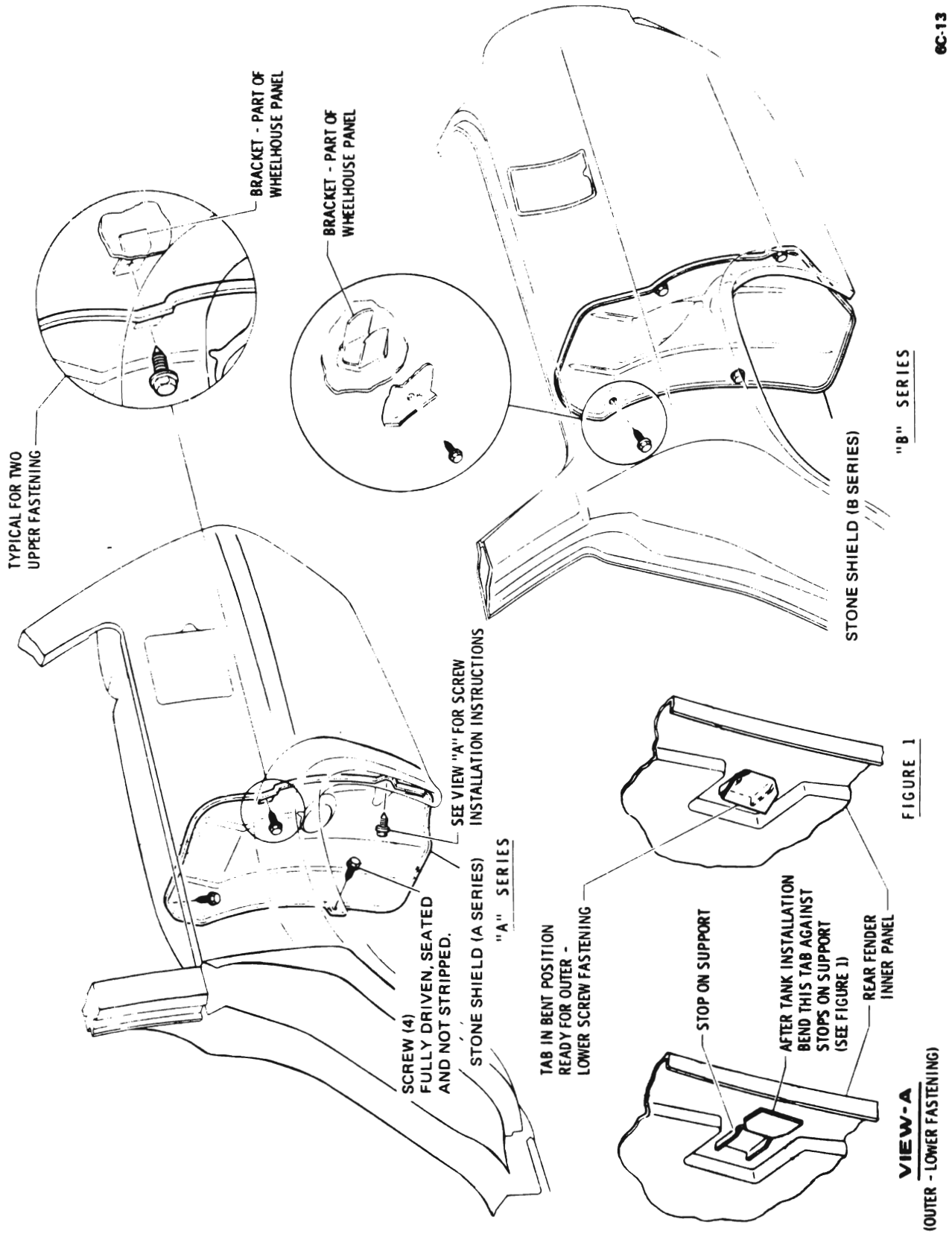


Figure 6C-13 "A" and "B" Series Fuel Tank Shield (Wagon Only)

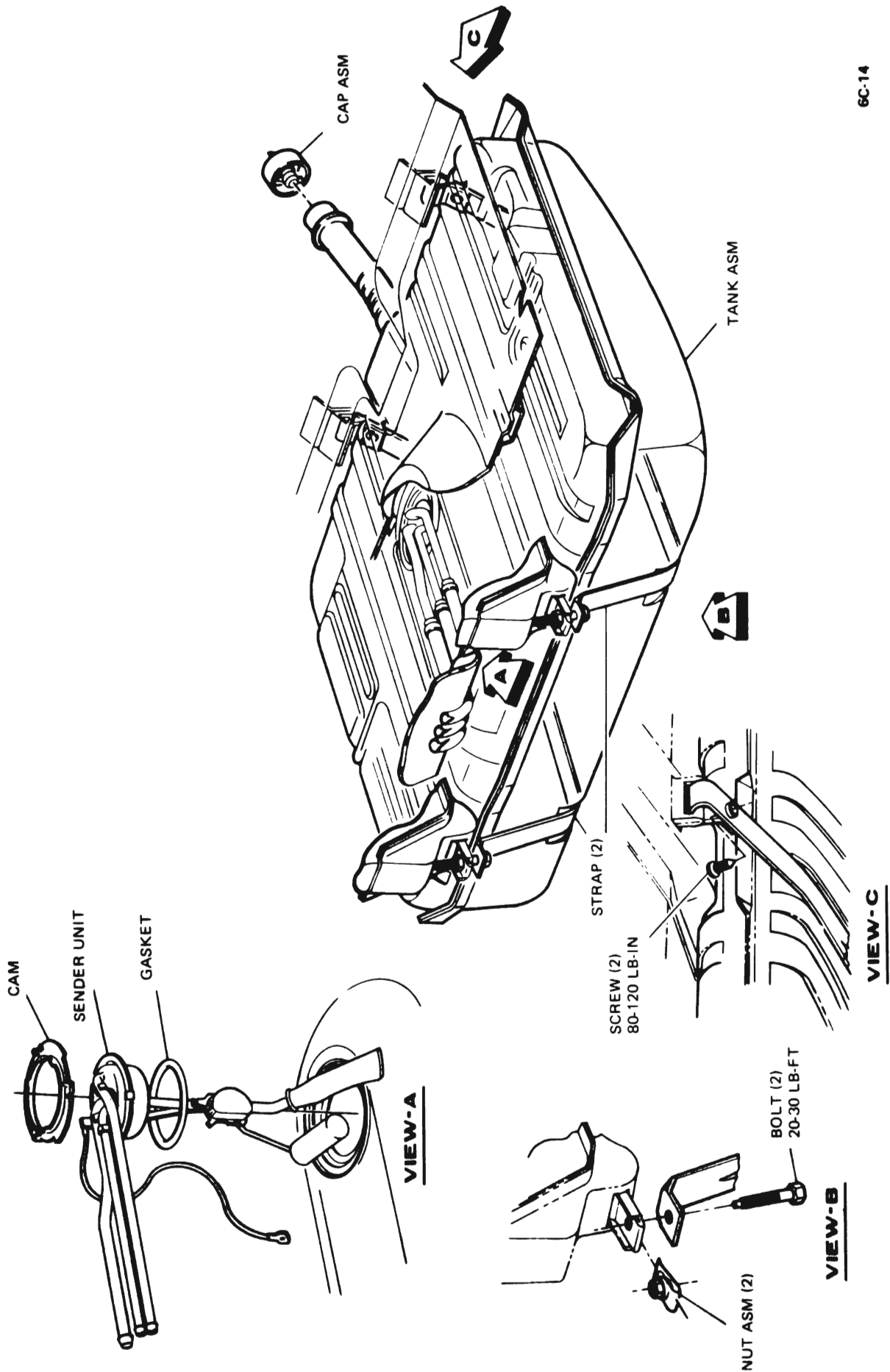


Figure 6C-14 B-C-E Series Fuel Tank Mounting and Sender Units (Sedans and Coupes)

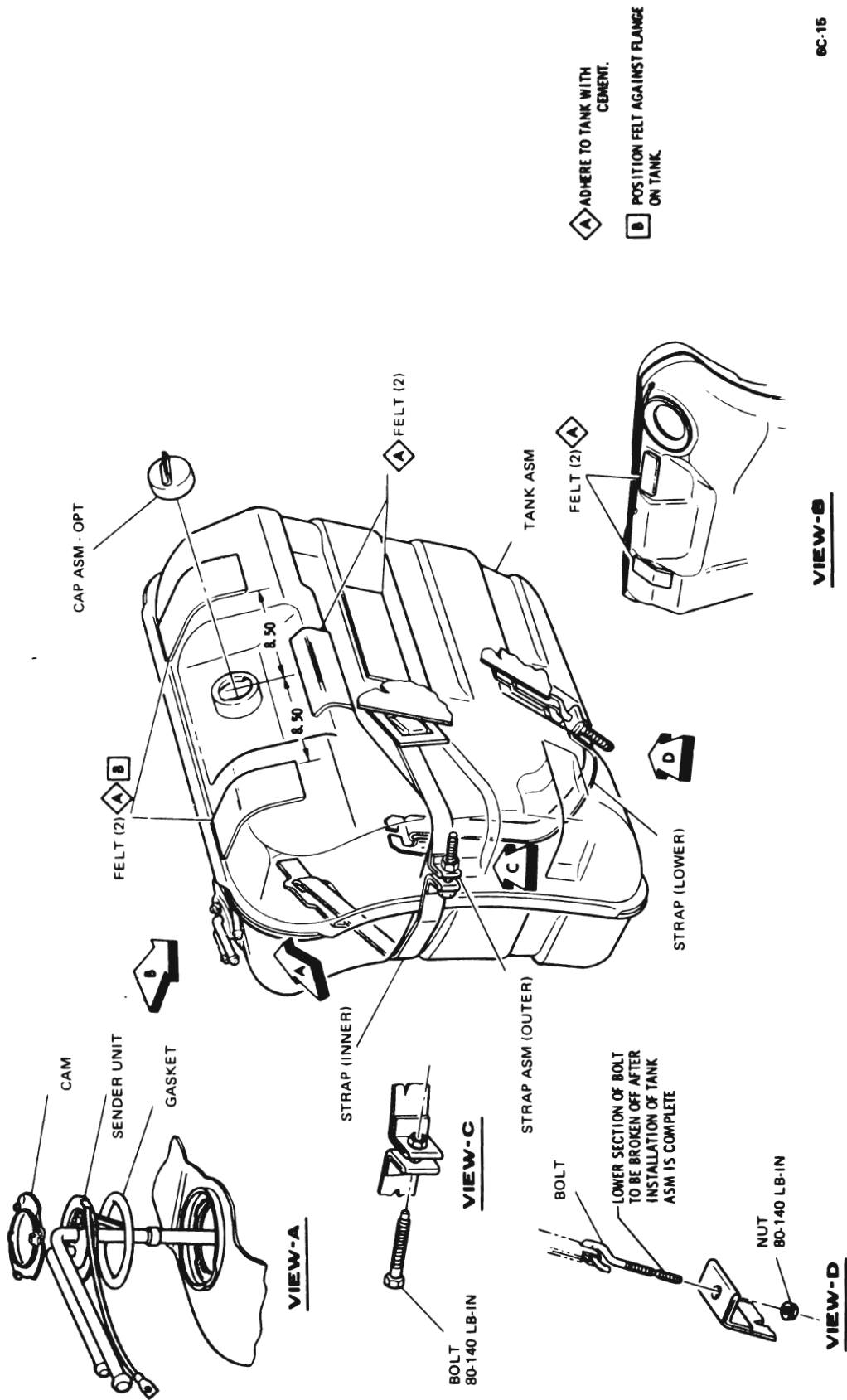


Figure 6C-15 "B" Series Fuel Tank Mounting and Sender Units (Wagon Only)

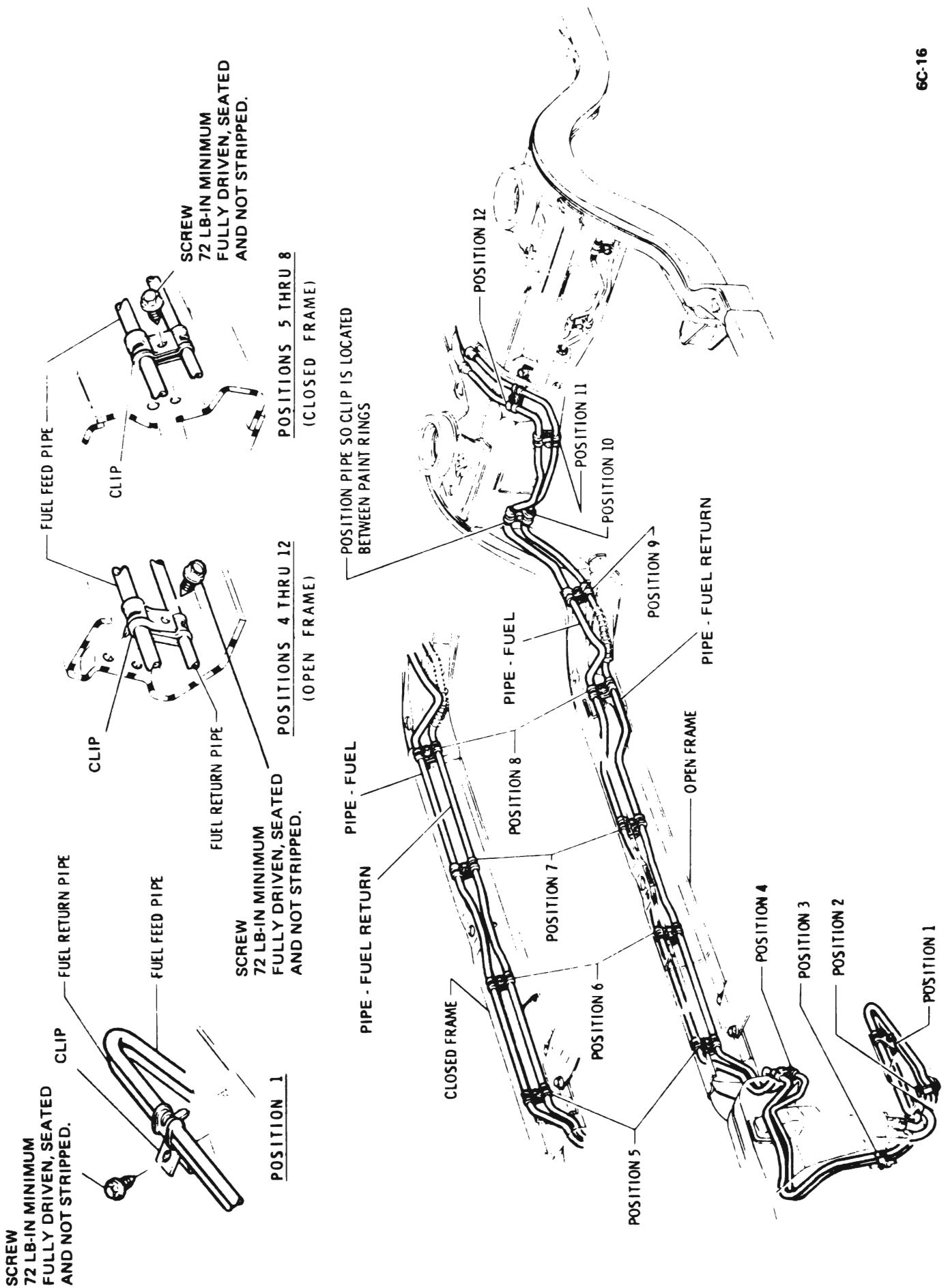


Figure 6C-16 B-C-E Series Fuel Feed and Fuel Return Pipe Routing

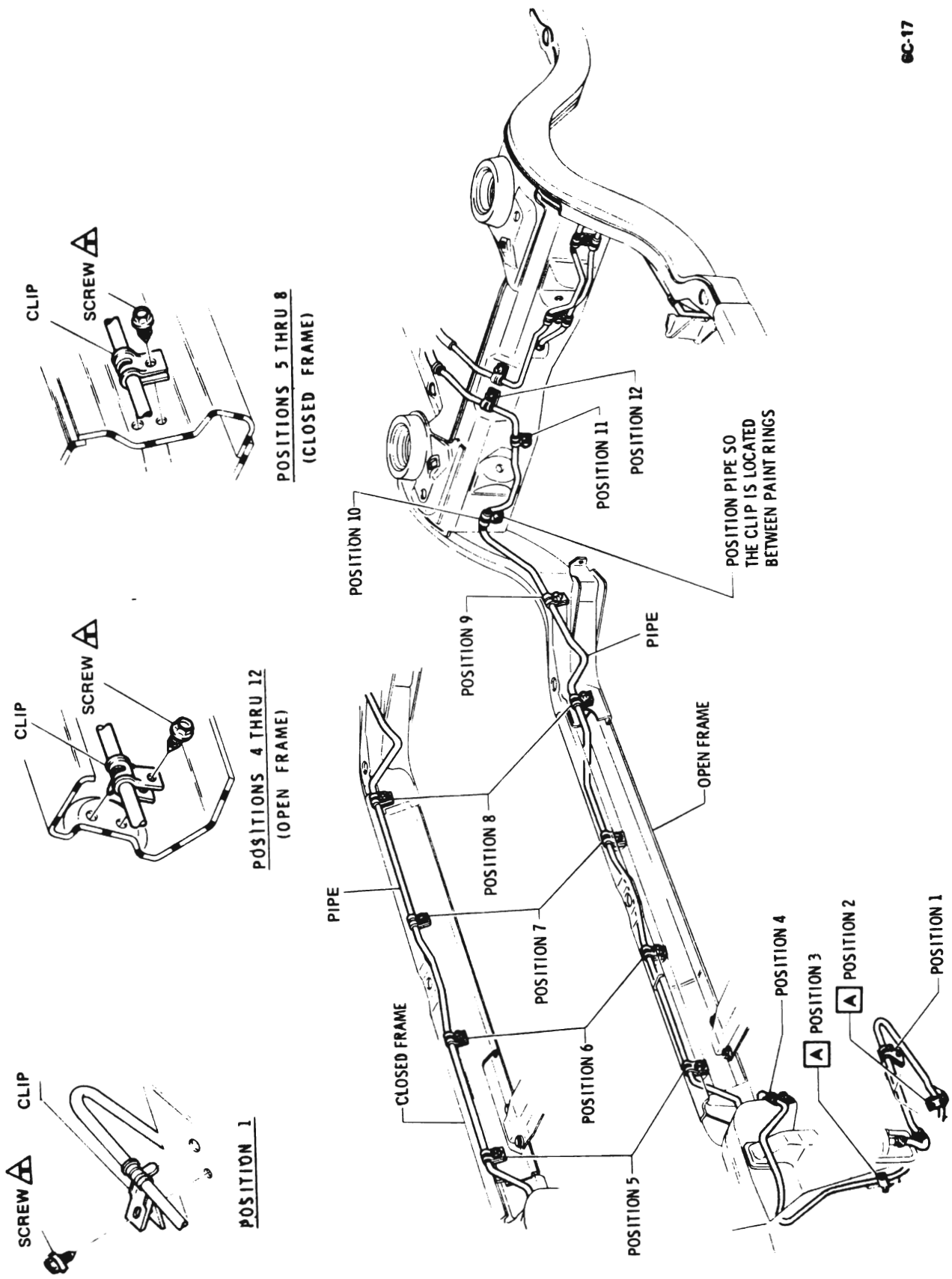


Figure 6C-17 "B" Series Fuel Pipe Routing Without Fuel Return (Used With 350 Cu. In. Less AC)

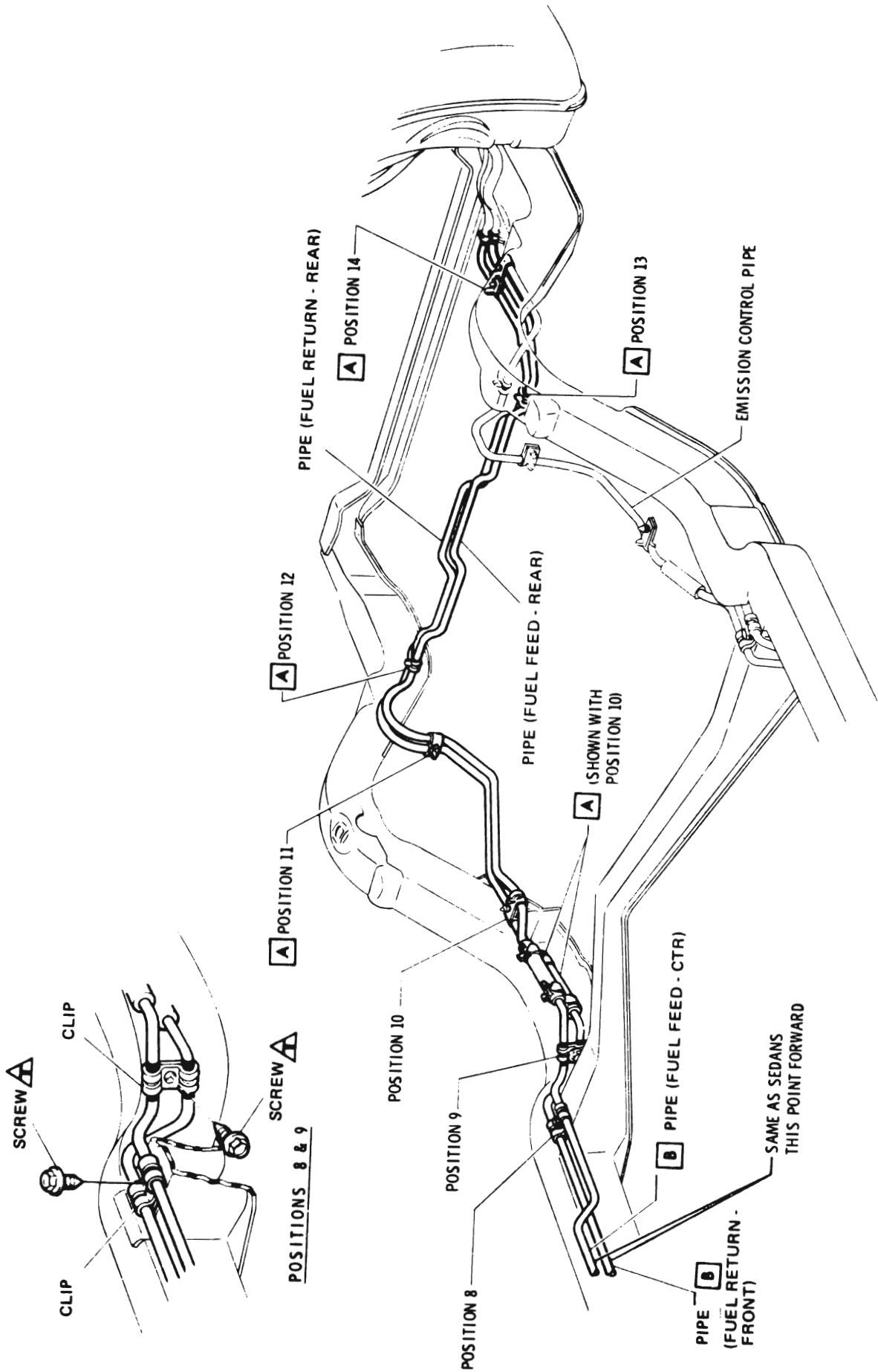


Figure 6C-18 "B" Series Fuel Pipe Routing (Wagon Only)

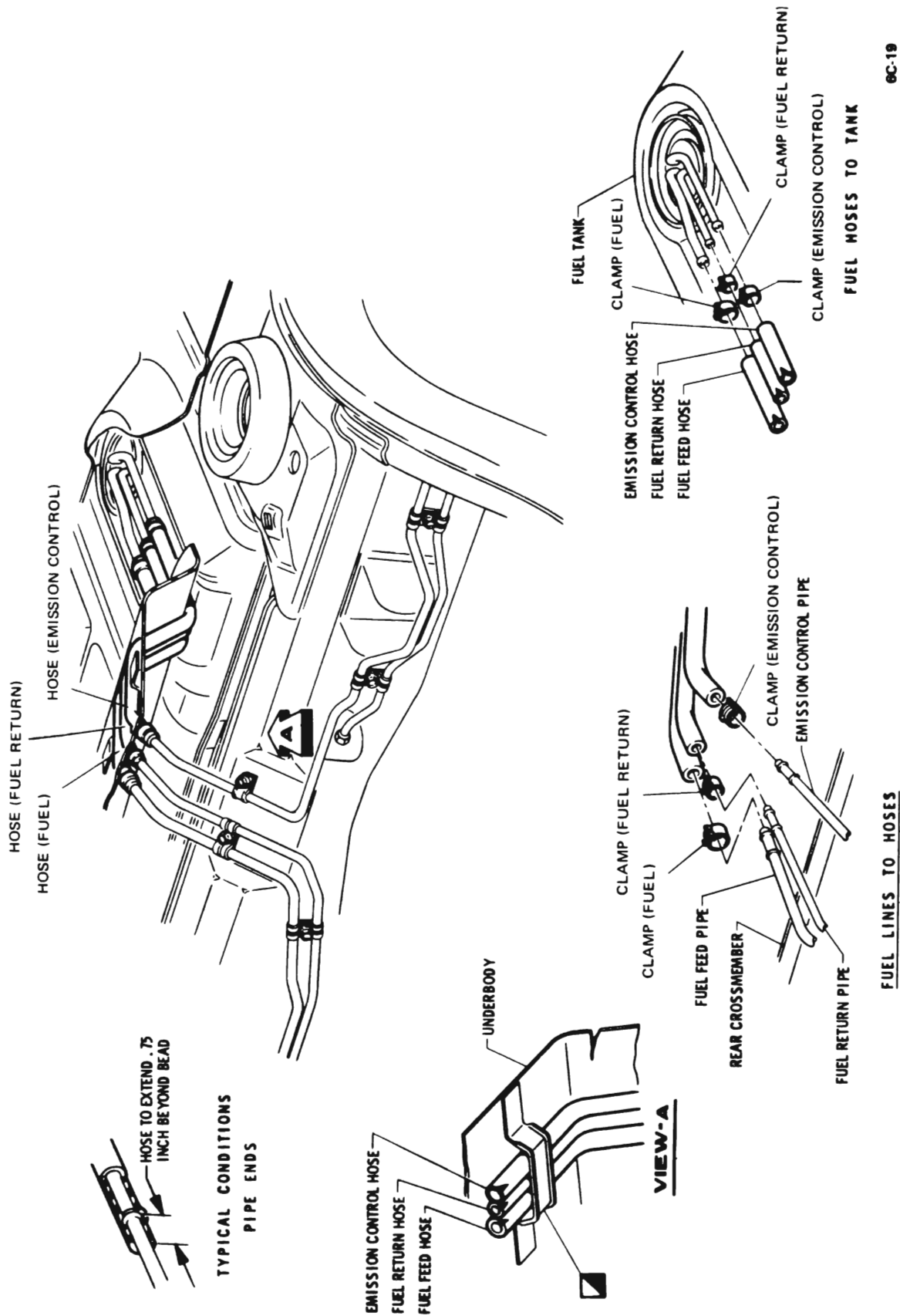
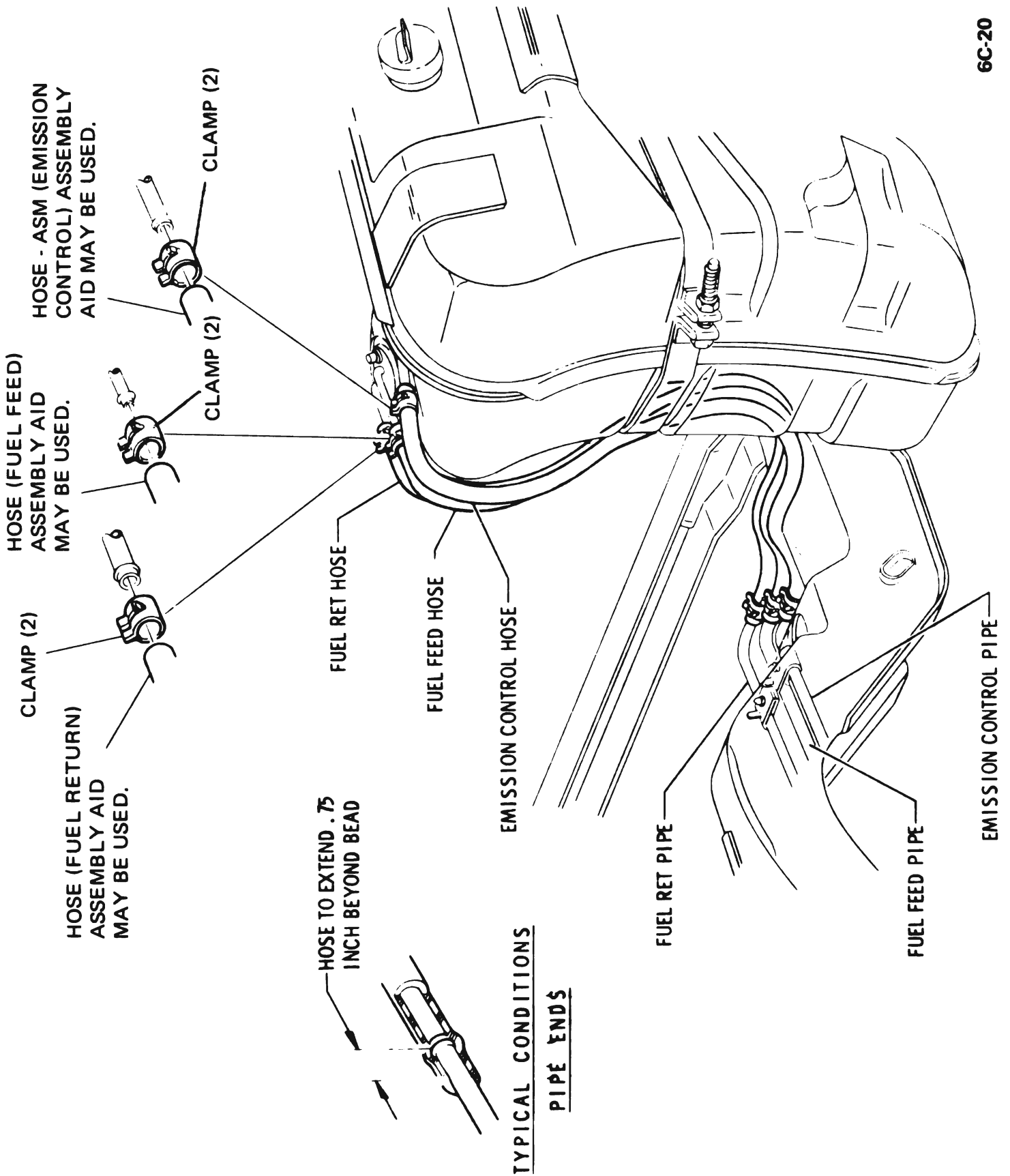


Figure 6C-19 B-C-E Series Fuel Tank Hose Routing (Sedans and Coupes)



6C-20

Figure 6C-20 "B" Series Fuel Tank Hose Routing (Wagon Only)



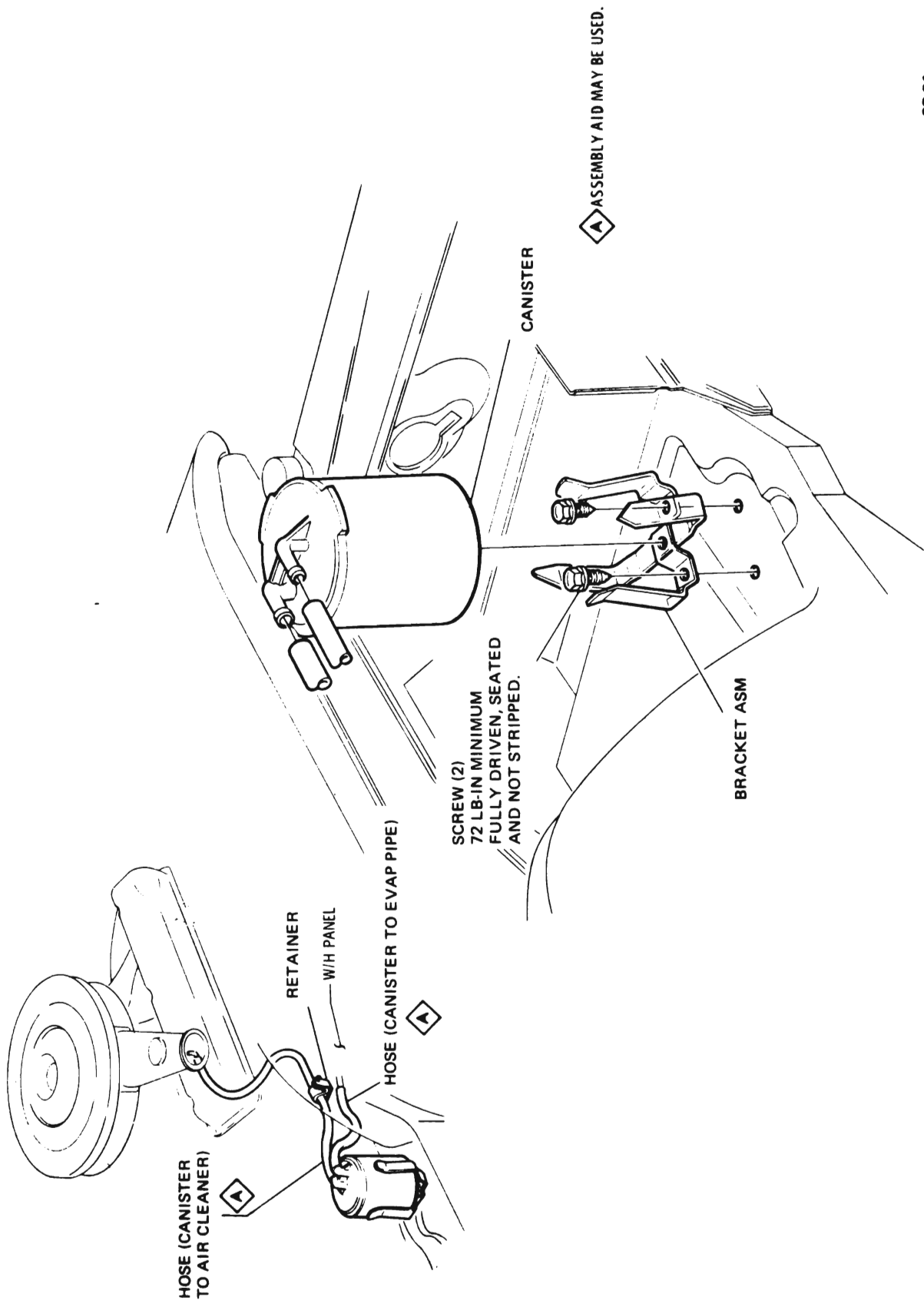
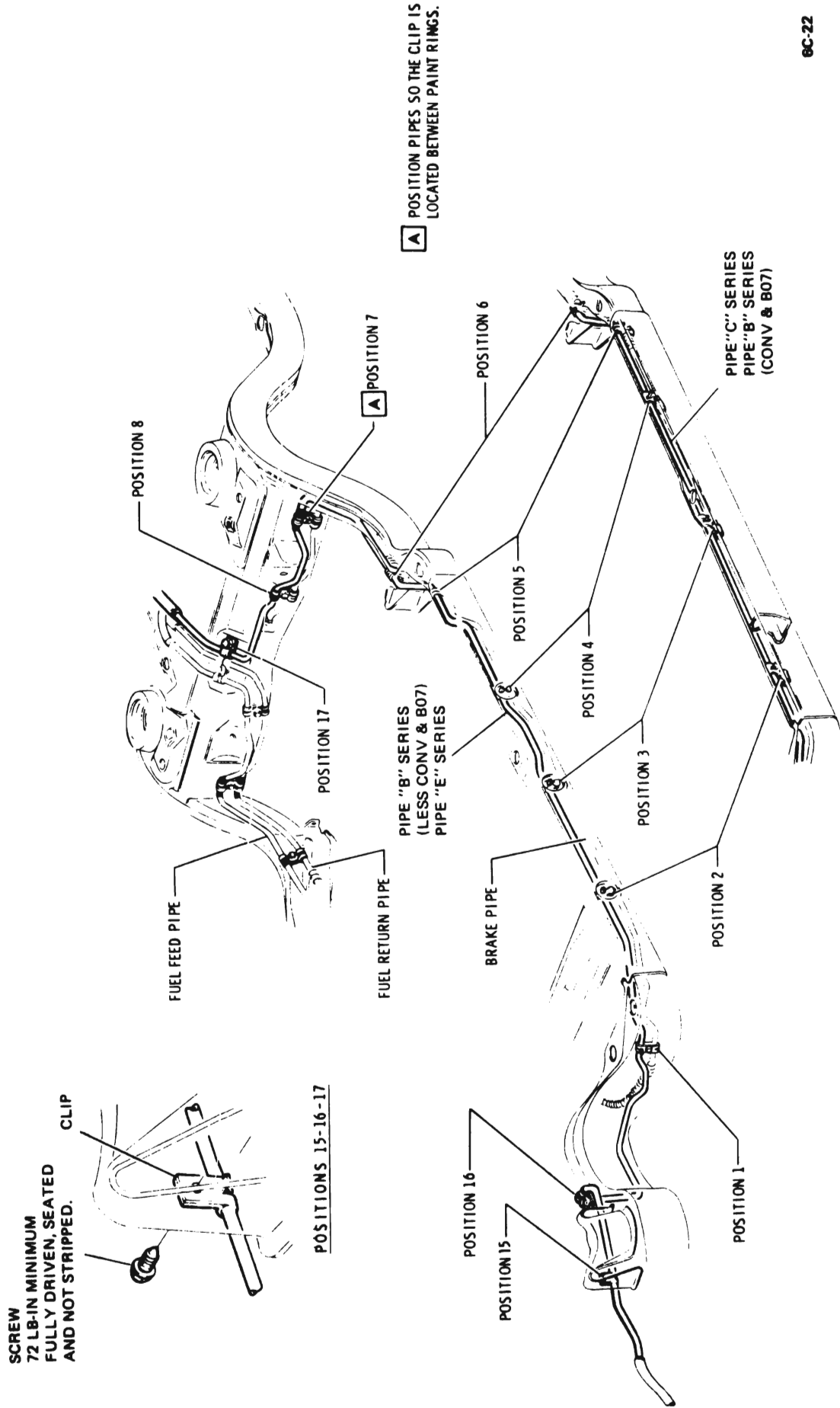


Figure 6C-21 B-C-E Series Canister Mounting and Engine Hose Routing



6C-22

Figure 6C-22 B-C-E Series Evaporative Emission Control Pipe Routing (Sedans and Coupes)

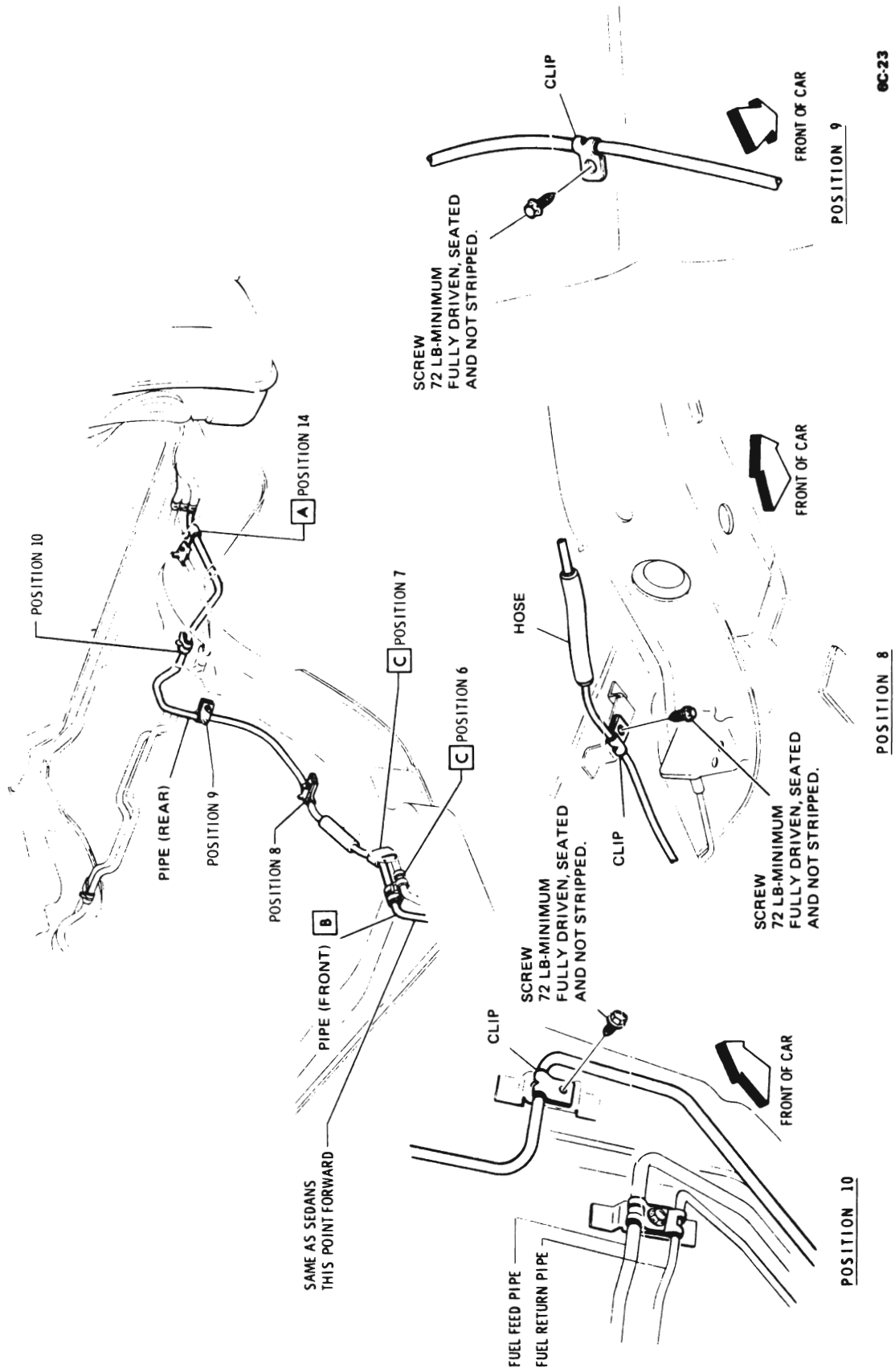


Figure 6C-23 "B" Series Evaporative Emission Control Pipe Routing (Wagon Only)