GROUP 3

ENGINE FUEL AND EXHAUST SYSTEMS

SECTIONS IN GROUP 3

SECTION 3-A

SPECIFICATIONS AND GENERAL DESCRIPTION

CONTENTS OF SECTION 3-A

3-1 SPECIFICATIONS, FUEL AND EXHAUST SYSTEMS

a. General Specifications

Gasoline, Grade Required (with 1 and 2-Bbl. Carburetors)	Regular
Gasoline, Grade Required (with 4-Bbl. Carburetor)	Premium
Gasoline Tank Capacity (gal.)	20
Gasoline Gauge, Make and Type	A.C., Electric
Fuel Pump - Make and Type	A.C., Mechanical
Drive	Eccentric at Camshaft Sprocket
Fuel Pump Pressure	
At Pump Outlet, pounds	4 1/2 to 5 3/4
At Carburetor Inlet, pounds	4 to 5 1/4
Fuel Filter, Near Carb. Inlet (V-8 Engine)	A.C., Can-Type Throw-Away
Fuel Filter, In Carb. Inlet (V-6 Engine)	Rochester, Sintered Bronze
Fuel Filter, In Gas Tank (All)	Woven Plastic
Carburetor, Make and Type	Carter and Rochester, Downdraft
Carburetor, Barrels and Compression Ratio	
1-Barrel (V-6 Engine)	9 to 1 Comp. Ratio
2-Barrel (V-8 Engine)	9 to 1 Comp. Ratio
4-Barrel (V-8 Engine)	10.25 to 1 Comp. Ratio
Air Cleaner, Make and Type	A.C., Plastic Foam Element
Intake Manifold Heat, Type	Hot Exhaust Passage in Manifold
Thermostat Wind-up @ 70 Deg., Valve Closed	1/2 Turn
Idle Speed, Automatic Trans. in Drive or Manual Trans. in Neutral	550 RPM
With Air Conditioner - Off Position	Add 50 RPM

b. Carburetor Calibrations

IMPORTANT: Calibrations are governed by the CODE number on the attached code tag.

ROCHESTER 2-BARREL (V-8) AND 1-BARREL (V-6)

	Syn. Trans.		Auto. Trans.	
	V-8	V-6	V-8	V-6
Model Designation	2GC	1BC	2GC	1BC
Number of Barrels	2	1	2	1
Code Number, for Following Calibrations	7025047	7025149	7025046	7025148
Throttle Bore	1 7/16"	1 9/16"	1 7/16"	1 9/16"
Small Venturi	1/8"	19/32"	1/8"	19/32"
Large Venturi	1 1/8"	1 11/32"	1 1/8"	1 11/32"
Main Metering Jet				
Production	.055"-60°	.061-Sq.	.052"-60°	.061-Sq.
High Altitude	.053"-60°	.060-Sq.	.049"-60°	.060-Sq.
NOTE: Use high Altitude Jets Above 3500 Feet				
Idle Tube Restriction	#69	#52	#70	#54
Idle Needle Hole	#56	#44	#56	#44
Spark Holes	2-#55	.030" x .200"	1 1/8"	.030" x .200"
Pump Discharge Holes	2-#68	2-#70	2-#71	2-#72
Choke Restriction				
Inlet	#42	3/16"	#42	3/16"
Outlet	1/8"	#37	1/8"	#44
Choke Setting	Index	Index	Index	Index
Choke Coil Number	27	28	12	28
Fast Idle Cam Number	7029501	7029502	7028970	7029554
Dome Vent	#70		#67	
Cluster Top Bleed	#67		#68	
Cluster Side Bleed	#69		#68	
Float Level Adjustment	.594"	1 9/32"	.594"	1 9/32"
Float Drop Adjustment	1 29/32"	1 3/4"	1 29/32"	1 3/4"
Pump Rod Adjustment (Outer Hole)	1 11/32"		1 11/32"	
Choke Rod Adjustment	.055"	.050"	.055"	.050"
Choke Unloader Adjustment	.136"	.230"	.136"	.230"
Initial Idle Speed	3 Turns In	2 Turns In	3 Turns In	2 Turns In
Initial Idle Mixture	1 Turn Out	1 3/4 Turns Out	1 Turn Out	1 3/4 Turns Out

CARTER 4-BARREL

IMPORTANT: Calibrations are governed by the CODE number.

	300 Eng. Auto. Trans.	300 Eng. Syn. Trans.
Model Designation	AFB	AFB
Number of Barrels	4	4
Code Number, for Following Calibrations	3826S	3827S
Bore Diameter, Primary	1 7/16	1 7/16
Large Venturi Diameter, Primary	1 1/8	1 1/8
Bore Diameter, Secondary	1 7/16	1 7/16
Large Venturi Diameter, Secondary	1 1/4	1 1/4
Float Level Adjustment	3/16	3/16
Float Drop Adjustment	3/4	3/4
Float Needle Seat	#42	#42
Low Speed Jet	#68	#66
Idle Discharge Port	.180" x .030"	.180" x .030"

CARTER 4-BARREL Con't.

	300 Eng. Auto. Trans.	300 Eng. Syn. Trans.
Lower Idle Port	#52	#52
Metering Jet, Primary	120-256	120-256
Metering Jet, Secondary		
Production	120-222	120-222
High Altitude		
Metering Rod		
Production	16-341	16-341
High Altitude		
NOTE: Use High Altitude Kit Above 3500 Feet		
Use Kit Consisting of Secondary Jets, Primary Rods and Springs.		
Throttle Bore Vents	#42	#42
Anti-Percolator or Main Bleed Hole	#64	#64
Pump Setting at Closed Throttle	7/16" Center Hole	7/16" Center Hole
Pump Discharge Jet	#72	#72
Vacuum Spark Control Hole	3/32"	.130" x .040"
Choke Coil Housing Number	170AZ478S	170AZ478S
Choke Thermostat Setting	One Notch Rich	Index
Choke Suction Hole	#40	#40
Choke Piston Setting (With .026" Wire)	.081"	.081"
Closing Shoe Clearance	.020"	.020"
F. I. Cam Setting, Choke Closed	Index	Index
F. I. Cam Number	181-354	181-356
Unloader Opening at Choke Valve Edge	1/8"	1/8"
Initial Idle Speed	1/2 Turn In	1/2 Turn In
Initial Idle Mixture	1 Turn Out	1 Turn Out
Fast Idle Speed in Drive (Hot, on Low Step)	600 RPM	600 RPM

3-2 DESCRIPTION OF FUEL SYSTEM

a. Gasoline Tank, Feed Pipe and Filter

The gasoline tank is attached by two strap type supports to the body under the trunk compartment, where it is seated in saddles. Two internal baffles spot-welded to the upper half at centerline of tank support seats act as struts to maintain the shape of tank and prevent flexing due to weight of gasoline and pull of the supporting straps.

In all models except station wagons, the gas tank filler is soldered into an opening at the rear center of the tank. The tank is vented at the front right corner. A special U-shaped vent pipe extends from the top of the tank to allow free movement of air without loss of fuel. This vent is designed to allow rapid filling of the tank. See Figure 3-2.

In station wagon models, the gas tank filler extends from the left side of the tank and is accessible through a door in the left rear quarter. The tank is vented at the filler cap. A special vent pipe extends from the top of the tank to a point in the filler neck just under the cap. See Figure 3-3.

The tank outlet is located in the forward top center of the tank. It consists of a combination fuel pickup, filter, and gas gauge tank unit. See Figure 3-2.

The fuel line is partly internal corrosion resistant metal line and partly synthetic rubber hose attached with clamps.

With all V-8 engines, a can-type throw-away filter is located just forward of the left cylinder bank in the line between the fuel pump and the carburetor. See Figure 3-5. On V-6 engines, a sintered bronze filter, located in the carburetor inlet, takes the place of the can-type filter. See Figure 3-16.

On all air conditioner equipped cars, a vapor by-pass system is installed. These cars have either a special tee or a special fuel filter which has a metering outlet. See Figure 3-5. All vapor which forms is bled off and returned to the gas tank through a separate line. This system greatly reduces any possibility of vapor lock.

b. Fuel Pump, Carburetor, and Automatic Choke

The fuel pump is mounted on the lower left side of the timing chain cover. It is actuated by a hardened, chrome-plated, stamped steel eccentric mounted on the front side of the camshaft sprocket. The pump is inverted, thereby placing it in a lower, cooler location. It has a built-in air dome with a diaphragm to dampen out pulsations in fuel pressure. The construction and operation of the pump are described in Section 3-D.

The Rochester 2-barrel carburetor is described in Section 3-E. The Carter 4-barrel carburetor is described in Section 3-F. The Rochester 1-barrel carburetor is described in Section 3-G. Idle and automatic choke adjustments are covered in paragraph 3-8.

c. Air Cleaner and Intake Silencer

All series engines are equipped with oil wetted polyurethane foam element air cleaners combined with intake silencers. The air cleaner removes abrasive dust and dirt from the air before it enters the engine through the carburetor. The intake silencer reduces to a very low level the roaring noise made by the air as it is drawn through the intake system. The cleaner and silencer also functions as a flame arrester in event of "backfire" through the intake system. See Figure 3-1.

It is important to securely tighten the air cleaner wing nut by hand after locating the air cleaner on the carburetor. Proper location of both 2-barrel and 4-barrel V-8 air cleaners is with the word "FRONT" located on the forward centerline of the engine; this locates the intake 30° left of center. The V-6 air cleaner is positively located 45° right of center by locating notches.

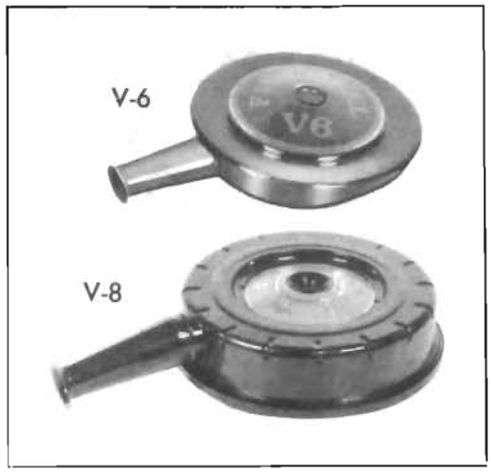

Figure 3-1—Air Cleaner and Silencer Assemblies

The air cleaner element is of the washable plastic foam type. It consists of a cylinder of polyurethane foam over a perforated sheet metal supporting screen. This screen also acts as a flame arrester in case of a backfire.

For normal operating conditions, the element should be cleaned every 12,000 miles (more often under dusty operating conditions). See paragraph 1-1, Step 3 for the cleaning procedure.

d. Carburetor Throttle Control Linkage

The carburetor throttle control linkage is designed to provide positive control of the throttle valves through their entire range without being affected by movement of the engine on its rubber mountings. See Figure 3-20.

The accelerator pedal is mounted on two ball studs which are screwed into weld nuts in the floor pan. Depressing the accelerator pedal causes the pedal to make a rolling contact with 3 rollers on the throttle operating lever, forcing the lower part of the lever to pivot forward and down. The lever pivots in a bearing mounted on the body cowl. See Figure 3-20.

As the lower part of the throttle operating lever is pushed forward by the accelerator pedal, the upper part of the lever is pulled rearward. This pulls the throttle rod rearward, causing the carburetor throttle lever to open the throttle valves.

The return spring returns the throttle linkage to idle position whenever pressure is released from the accelerator pedal. See Figure 3-20.

On all automatic transmission cars, a dash pot is mounted in position to be contacted by an arm of the carburetor throttle lever as the throttle is closed. The dash pot cushions the closing of the throttle to prevent engine stalling when the accelerator pedal is suddenly released.

On all automatic transmission cars, a transmission detent switch is mounted at the full throttle position of the carburetor throttle lever. When the throttle linkage is moved to wide open throttle position, the switch contacts are closed to cause the transmission to "down shift". This switch also has a second set of contacts which close slightly before wide open throttle position to cause the stator blades in the transmission to "switch-the-pitch" to high performance angle. See Figure 3-20.

On all automatic transmission cars, an idle stator switch is installed in a joint of the throttle linkage between the throttle lever and the throttle rod. Whenever the throttle linkage returns to curb idle position, the switch contacts are closed to cause the stator blades to "switch-the-pitch" to high angle. This reduces the transmission load on the engine at idle, thereby reducing the tendency of the car to creep. See Figure 3-20.

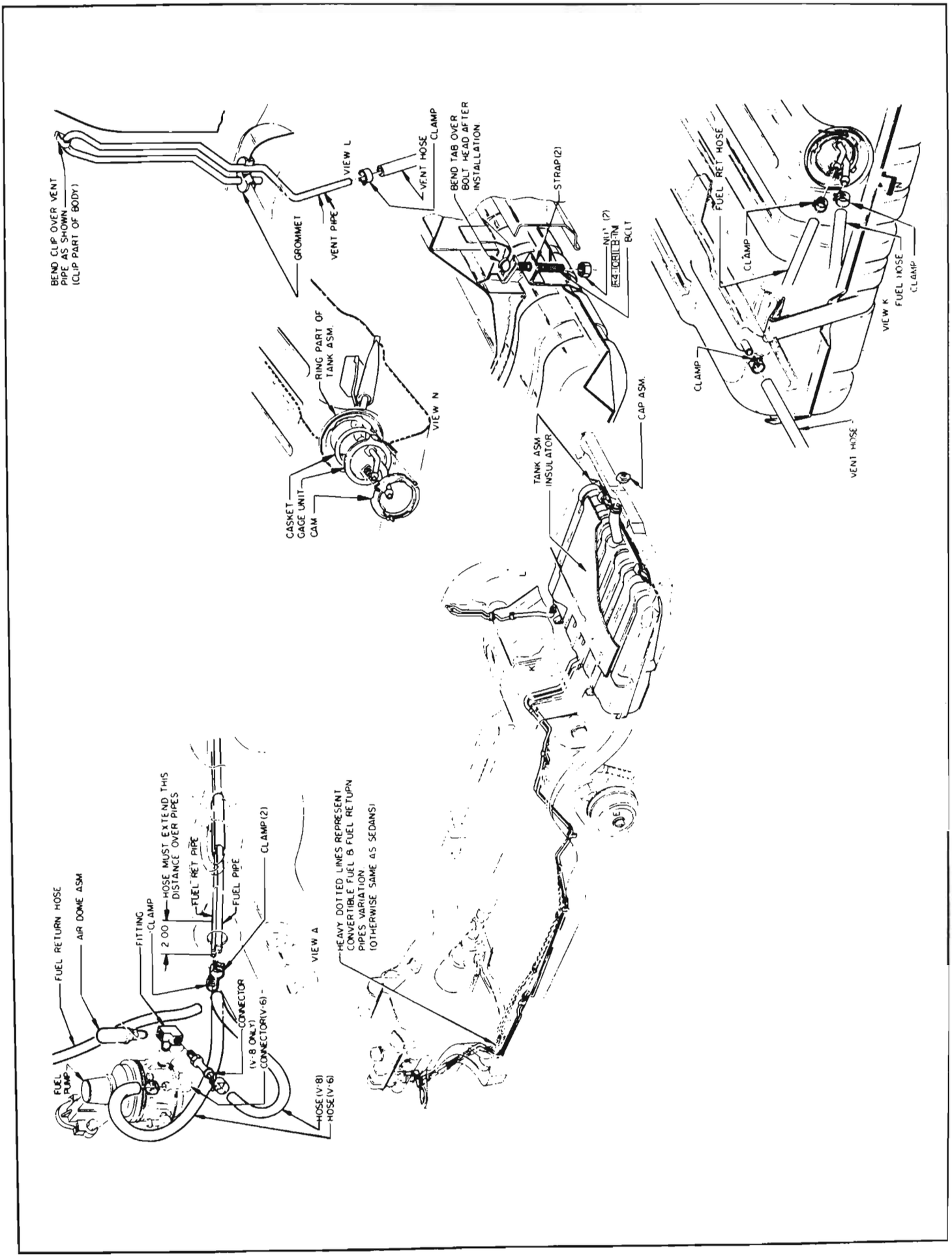

Figure 3-2—Fuel System - Air Cond. Except Wagons

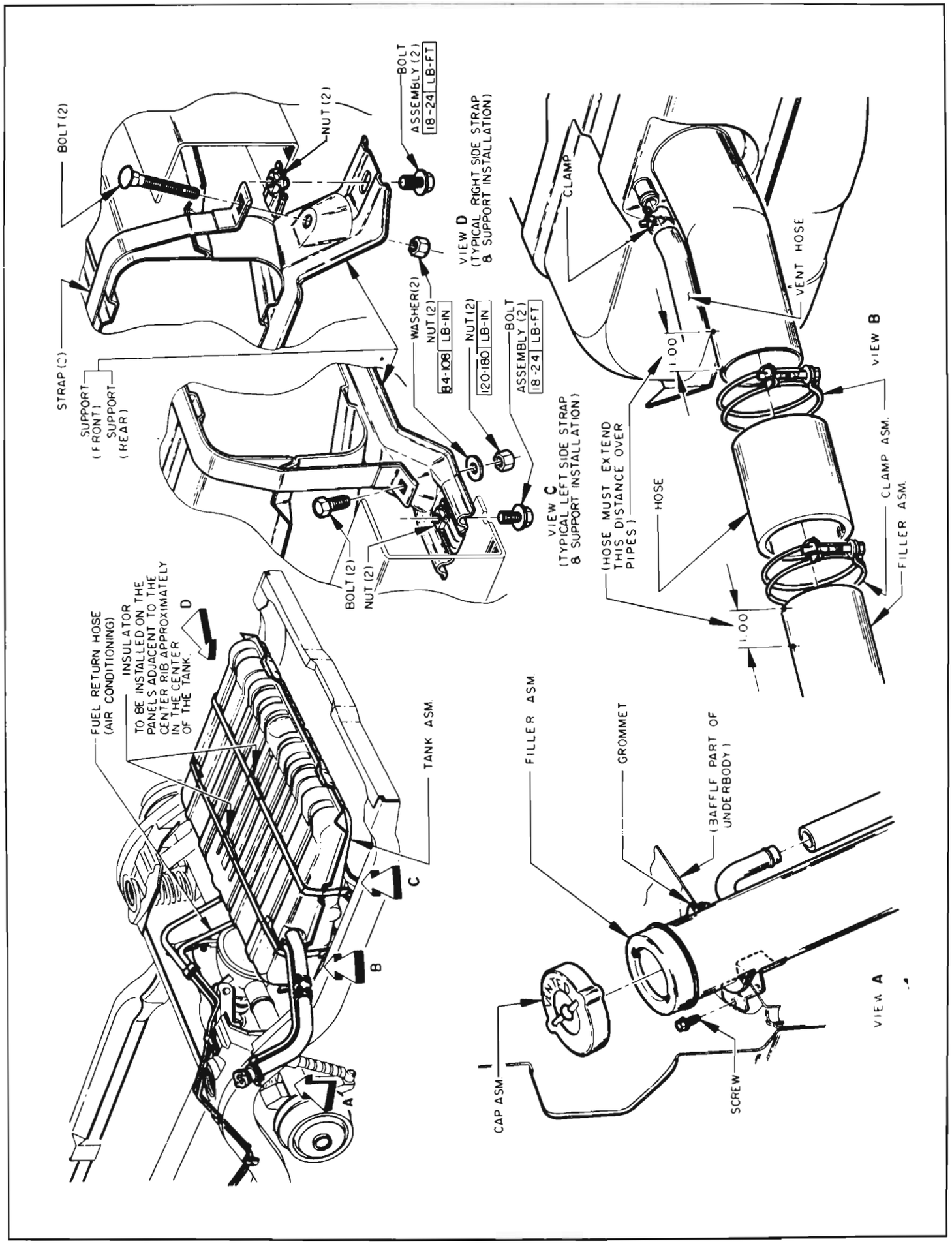

Figure 3-3—Fuel System - Air Cond. Special Wagons

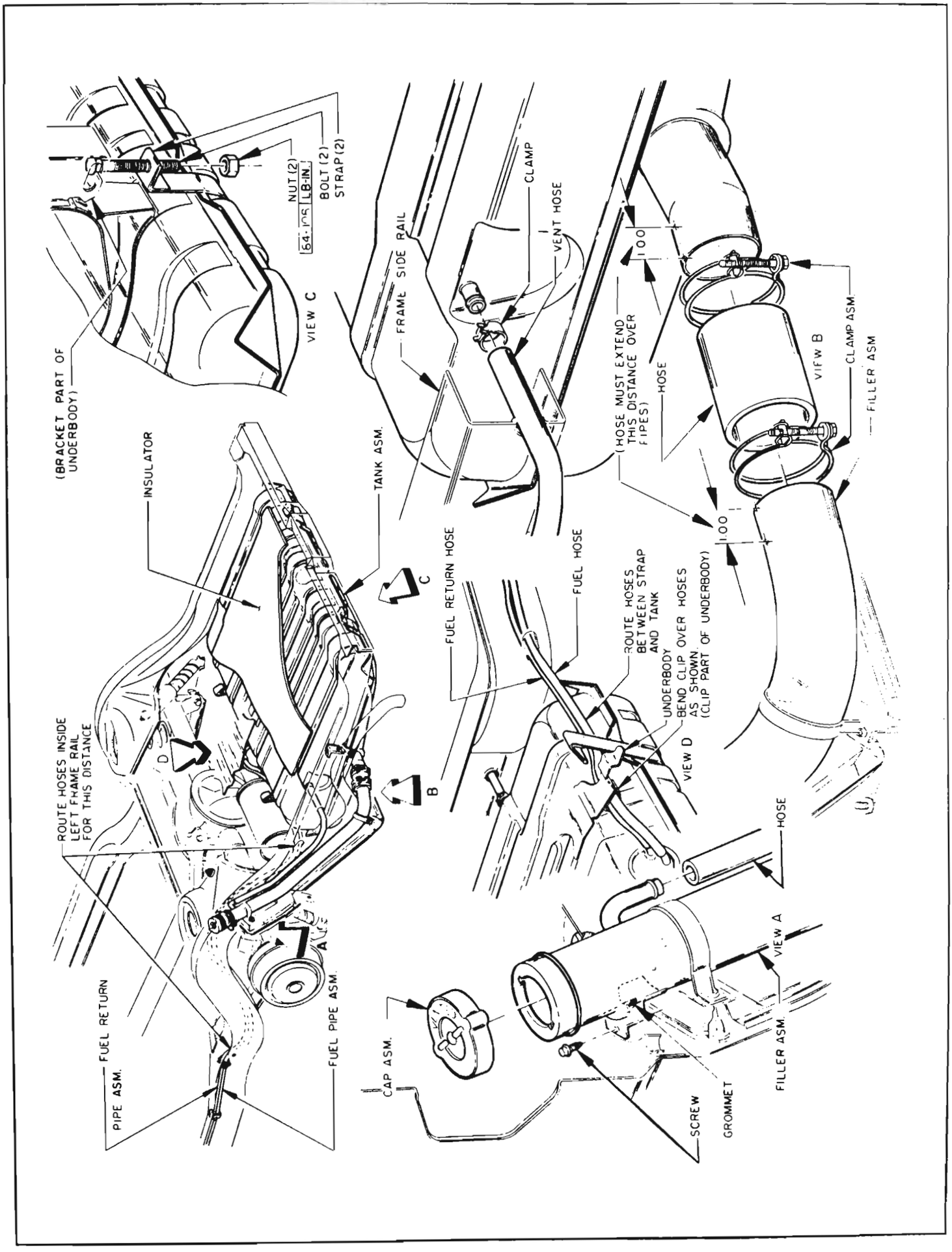

Figure 3-4—Fuel System - Air Conditioned Sportwagons

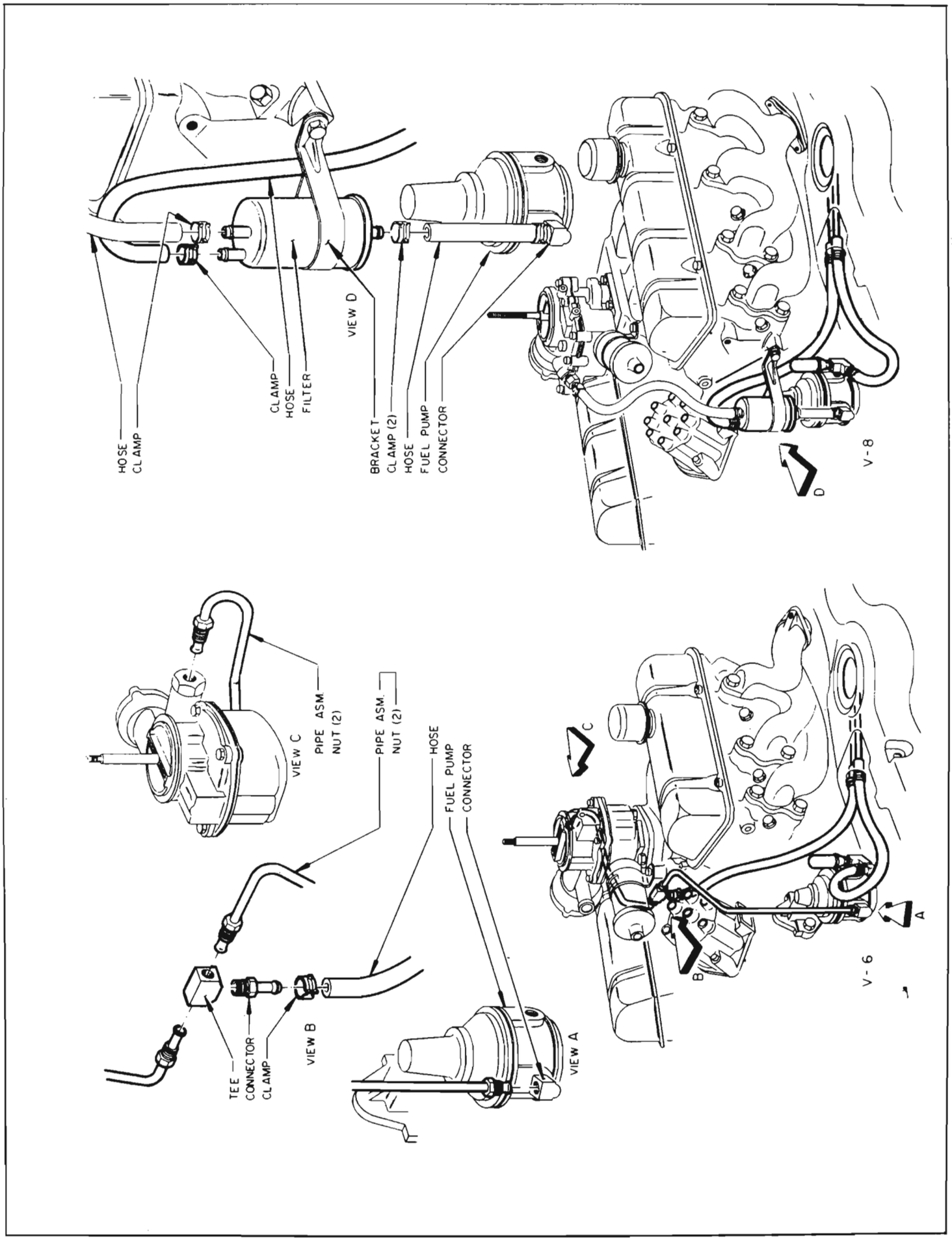

Figure 3-5—Fuel Pump to Carburetor Lines - Air Cond. Cars

3-3 DESCRIPTION OF INTAKE AND EXHAUST SYSTEMS

a. Intake Manifold and Manifold Heat

The V-8 engine has a low-restriction, dual intake manifold which is bolted to the inner edges of both cylinder heads, where it connects with all inlet ports. The end branches of each section run at 90 degrees to the connecting middle branch, thereby forming a T-junction at the dividing point which assures a uniform division and distribution of fuel to all cylinder inlets. Each manifold section feeds four cylinders -- two in each bank. See Figure 3-6.

Both V-6 and V-8 engines have a cast iron intake manifold and a cast iron throttle body on the carburetor. The intake manifold has a special exhaust passage to provide heat when needed.

The controlling source of the exhaust heat is a heat control valve located below the right exhaust manifold. This offset valve has a bi-metal thermostat spring which tends to hold the valve closed under cold operating conditions. See Figure 3-7.

This causes a pressure build-up in the right exhaust manifold

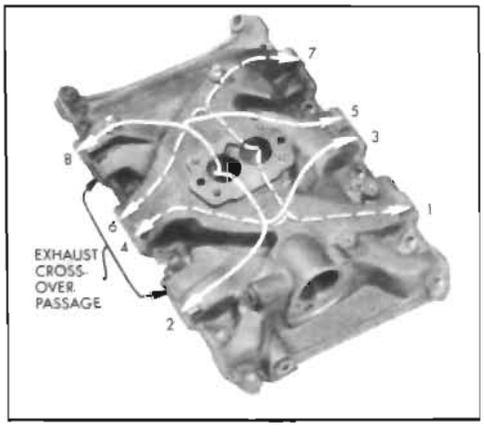

Figure 3-6—Intake Manifold Distribution - V-8 Engine

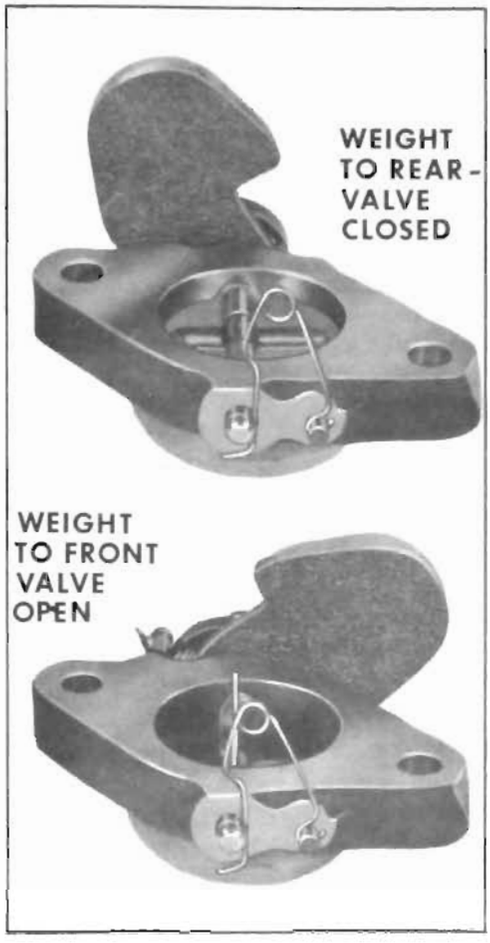

Figure 3-7—Exhaust Manifold Valve

which forces exhaust through the crossover passage under the carburetor to the left exhaust manifold and on out the exhaust system. See Figure 3-6.

As the exhaust manifold warms-up, the thermostat spring gradually releases the offset valve and the flow of hot exhaust through the crossover passage is gradually reduced. When the exhaust manifold gets hot, the valve opens wide and exhaust flow through the crossover passage is at a minimum. When operating at cold temperatures, the thermostat spring will never release the valve completely, thereby causing some exhaust to continue to cross over.

When the engine is cold and the heat control valve is closed, restricted openings in the metal intake manifold gaskets meter the

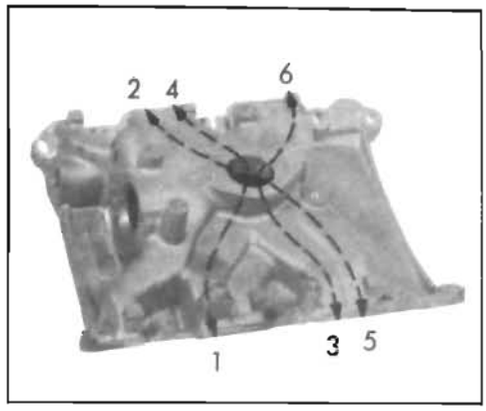

Figure 3-8—Intake Manifold Distribution - V-6 Engine

flow of exhaust through the crossover passage. At higher engine speeds and loads, the offset valve will be forced partially open to relieve the excess pressure built up in the right manifold.

Intake manifold heat is necessary for cold operating conditions to provide better fuel mixture vaporization and therefore more complete combustion. Carburetor heat is especially important during warm-up on cool, humid days; without heat in the throttle body, ice would form at the throttle valve edges and idle ports (called "carburetor icing") and would cause engine stalling.

b. Exhaust Manifolds, Pipes, and Mufflers

Each cylinder exhausts through an individual port into a separate branch of the exhaust manifold. These separate branches empty immediately into a main branch for each bank of cylinders. See Figure 3-9.

The right manifold contains the carburetor choke heat stove which consists of an alloy steel heating tube mounted in a drilled hole in the manifold and a heating chamber located on the outside of the manifold. Heated air is drawn from the heat stove through an insulated pipe into the automatic choke housing.

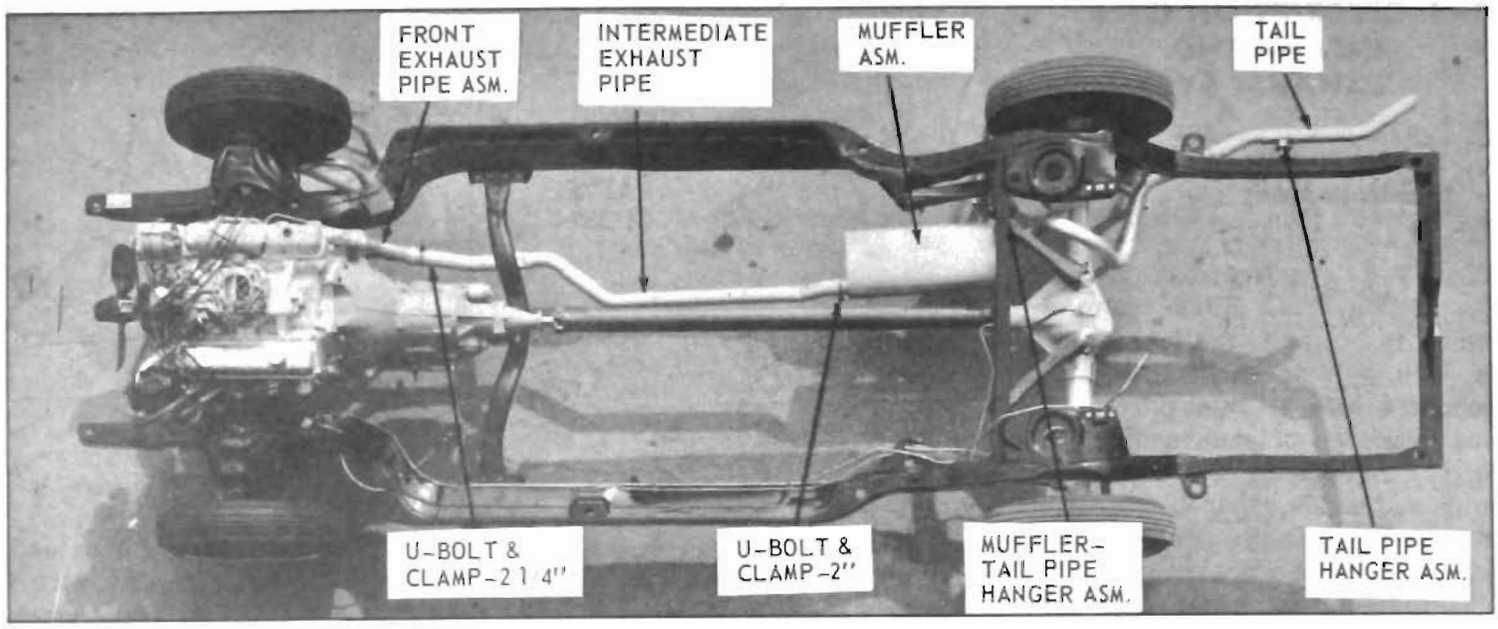

Figure 3-9—Exhaust System

All connections except at the exhaust manifold are of the slip joint type. Connections are made with U-bolts and clamps. See Figures 3-9 through 14.

The muffler is a round dynamic flow type having very low back pressure. It is double wrapped of heavy gauge galvanized steel with a layer of asbestos placed between wrappings to aid in reduction of noise transfer and to prevent any "oil-canning" effect. The muffler is supported by free hanging, rubber-fabric mountings which permit free movement but eliminate transfer of noise and vibration into the passenger compartment.

c. Dual Exhaust System

The dual exhaust system is optional on all V-8 engine equipped cars. The right side of the dual exhaust system is similar in appearance to the V-8 single exhaust system, but the parts are not interchangeable.

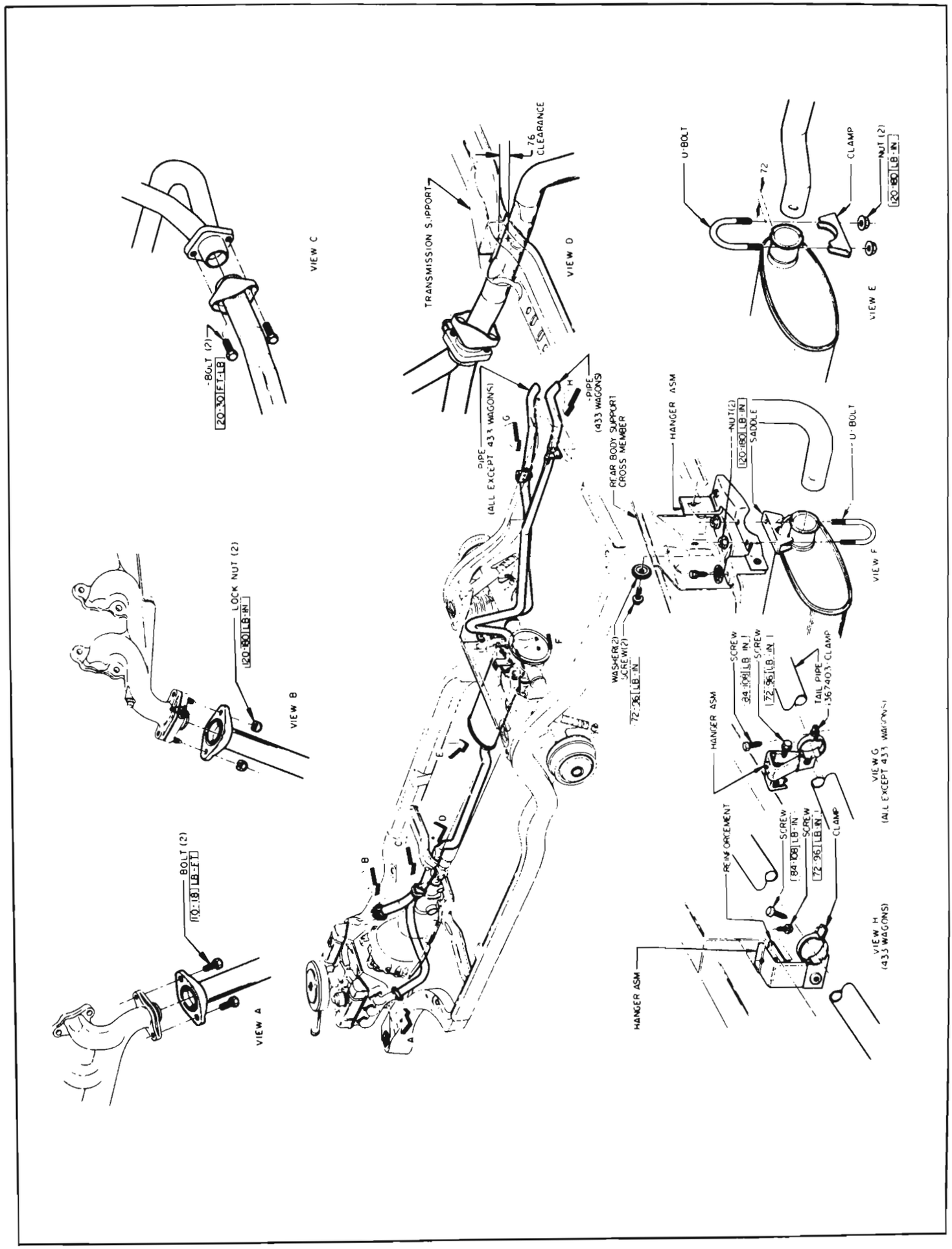

Figure 3-10—Single Exhaust System - V-6

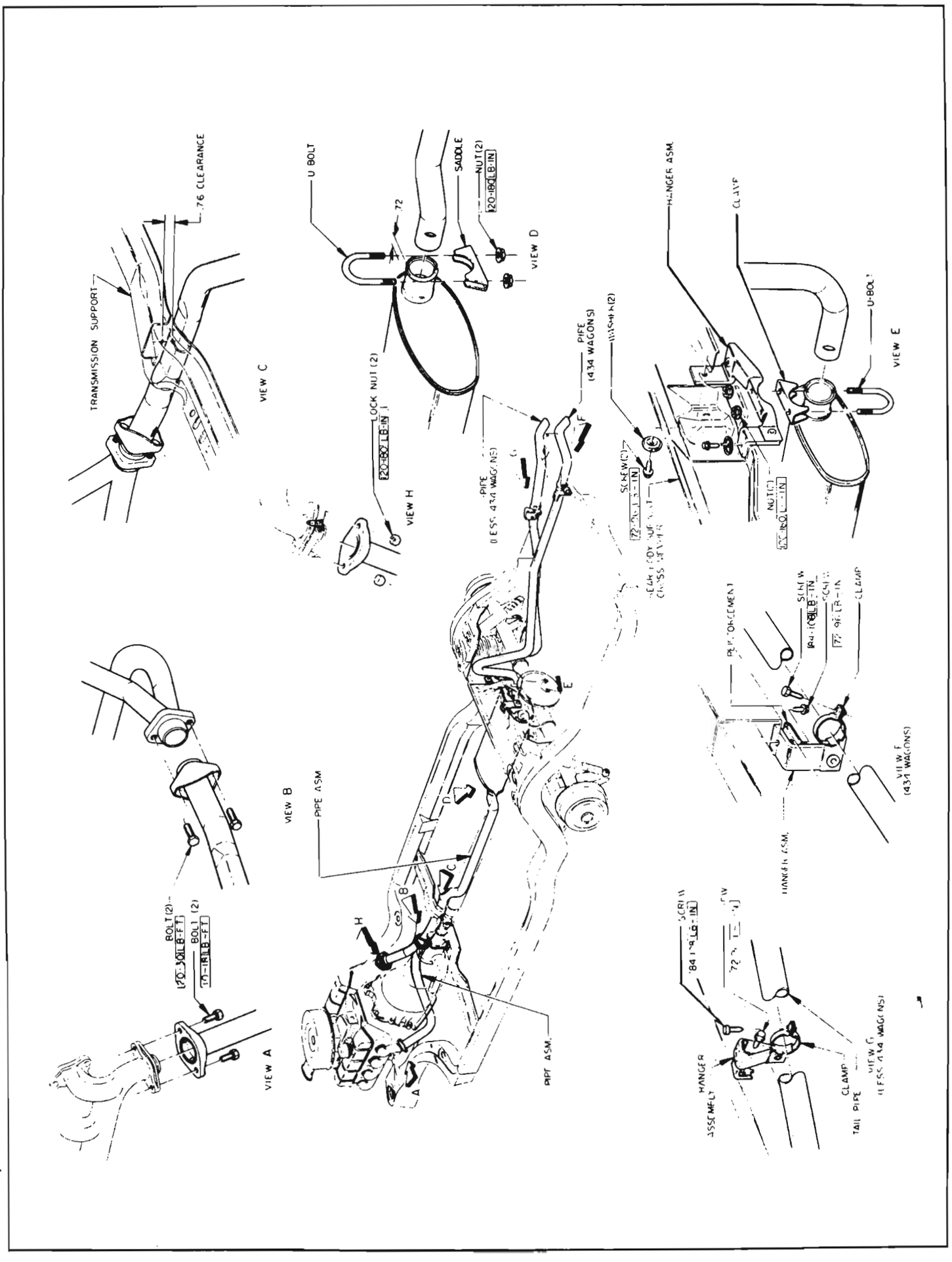

Figure 3-11—Single Exhaust System - V-8 (Except Sportwagons)

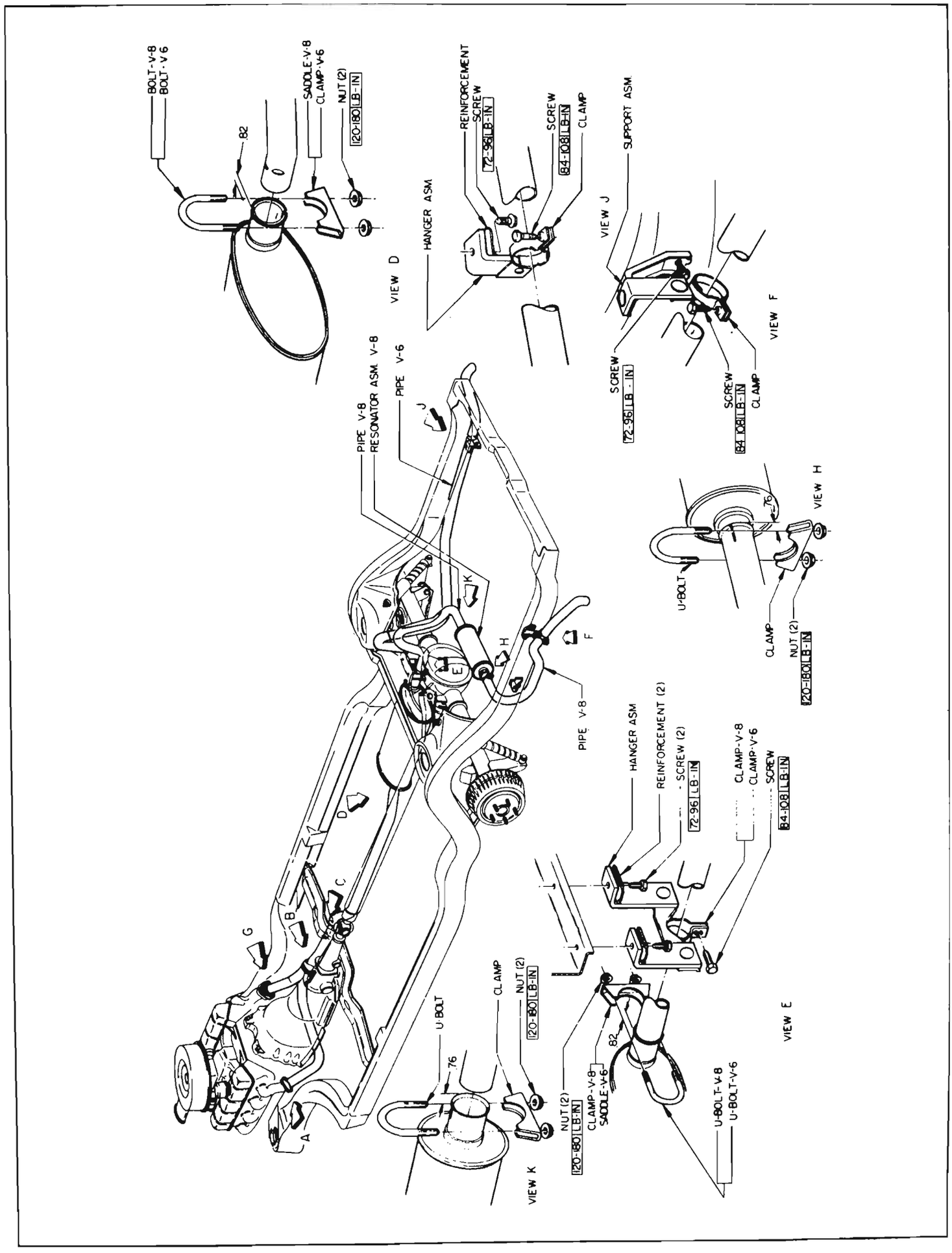

Figure 3-12—Single Exhaust System - Sportwagons

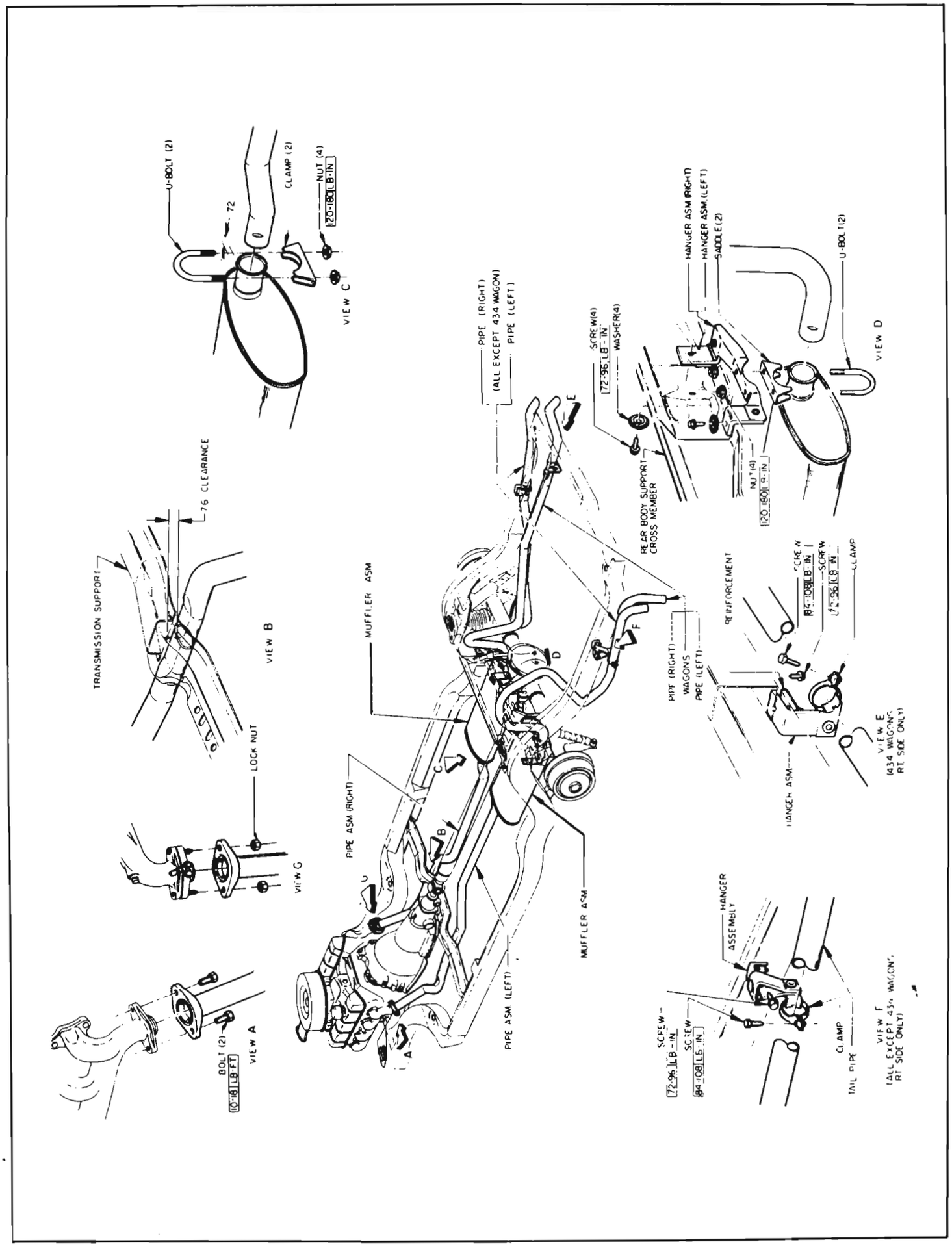

Figure 3-13—Dual Exhaust System - V-8 (Except Sportwagons)

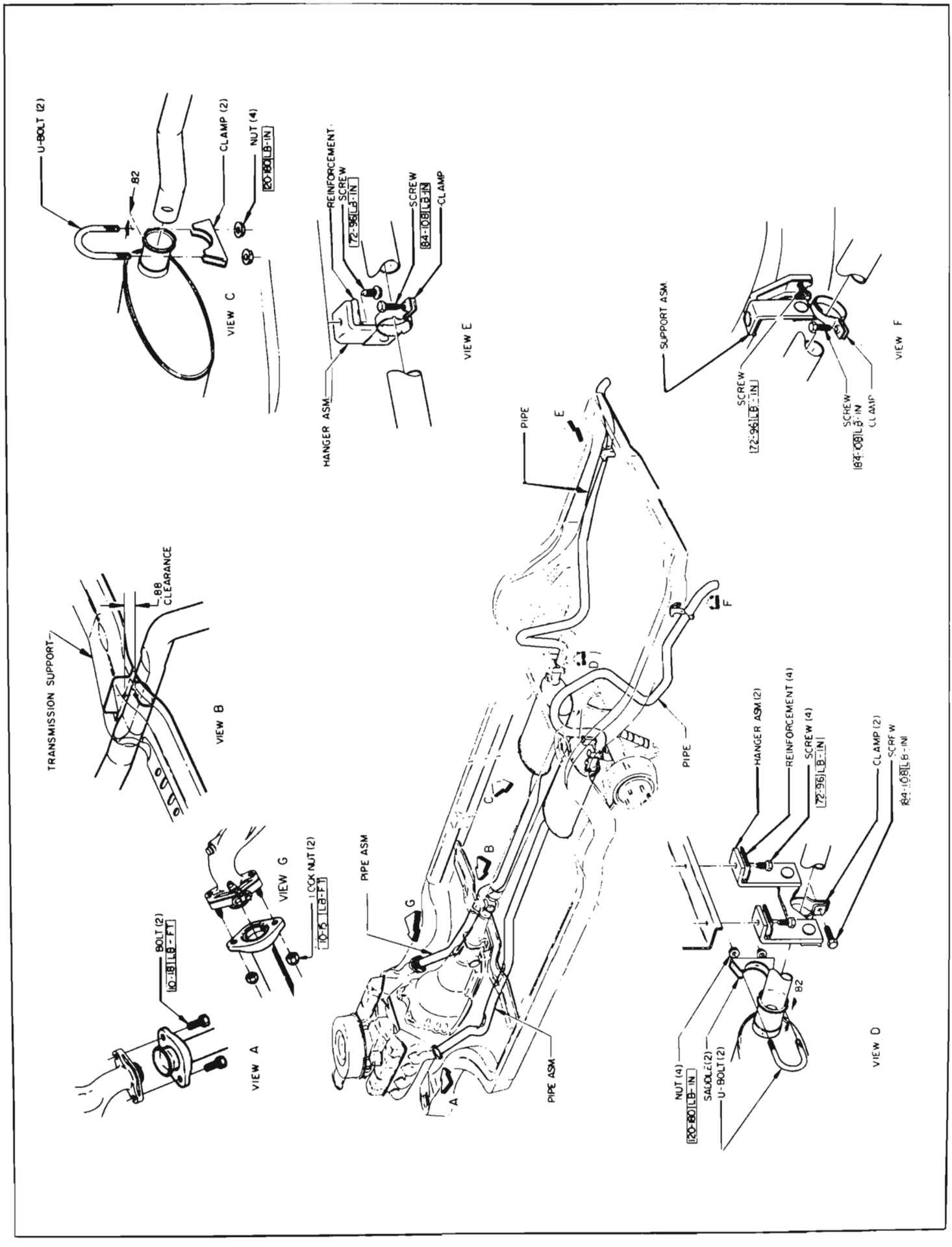

Figure 3-14—Dual Exhaust System - Sportwagons