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	Rochester, Downdraft
Carburetor, Barrels and Compression Ratio	
1-Barrel (V-6 Engine)	8.8 to 1 Comp. Ratio
2-Barrel (V-8 Engine)	9 to 1 Comp. Ratio
4-Barrel (V-8 Engine)	11 to 1 Comp. Ratio
Air Cleaner, Make and Type	A.C., Plastic Foam Element
Intake Manifold Heat, Type (V-8 Engine)	Hot Water Passage in Manifold
Intake Manifold Heat, Type (V-6 Engine)	Hot Exhaust Passage in Manifold
Thermostat Wind-up @ 70 Deg., Valve Closed	3/8 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	2GC 1BC
Number of Barrels	2	1	2	1
Code Number, for Following Calibrations	7024047	7024149	7024046	7024148
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	.054"-60°	.060-Sq.	.053"-60°	.060-Sq.
High Altitude	.052"-60°	.059-Sq.	.051"-60°	.059-Sq.
NOTE: Use high Altitude Jets Above 3500 Feet				
Idle Tube Restriction	#69	#52	#69	#53
Idle Needle Hole	#56	#44	#56	#44
Spark Holes	2-#55	.030" x .200"	1 1/8"	.030" x .200"
Pump Discharge Holes	2-#71	2-#70	2-#71	2-#72
Choke Restriction				
Inlet	#43	3/16"	#43	3/16"
Outlet	1/8"	#37	1/8"	#44
Choke Setting	Index	Index	2 Notches Rich	Index
Choke Coil Number	#39	#28	#15	#28
Fast Idle Cam Number	7026571	7026617	7017771	7026594
Main Well Vent	#69			
Dome Vent	#70		#67	
Cluster Top Bleed	#64		#67	
Cluster Side Bleed	#69		#68	
Float Level Adjustment	1/2"	1 9/32"	1/2"	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	.040"	.050"	.040"	.050"
Choke Unloader Adjustment	.085"	.230"	.085"	.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

ROCHESTER 4-BARREL

Model Designation		4GC	
Number of Barrels		4	
	Primary		Secondary
Code Number			
Automatic Transmission		7024044	
Synchromesh Transmission		7024045	
Throttle Bore	1 7/16"		1 7/16"
Small Venturi	1/4"		1/4"
Large Venturi	1 1/8"		1 1/4"
Main Metering Jets - Production			
Automatic Transmission	.053" - 60°		.065" - 60°
Synchromesh Transmission	.054" - 60°		.065" - 60°
Main Metering Jets - High Altitude			
Automatic Transmission	.051" - 60°		.063" - 60°
Synchromesh Transmission	.052" - 60°		.063" - 60°

NOTE: Use High Altitude Kit above 3500 feet. Kit consists of Primary Jets, Secondary Jets, and a Power Piston Assembly.

Idle Tube Restriction			
Automatic Transmission	#67		#72
Synchromesh Transmission	#70		#72
Idle Needle Hole		#55	
1st Idle Hole		#67	
2nd Idle Hole		#67	
3rd Idle Hole		#66	
4th Idle Hole		#66	
Spark Hole			
Automatic Transmission		1 1/8"	
Synchromesh Transmission		2-#55	
Pump Discharge Hole		2-#71	
Choke Restriction			
Inlet		#43	
Outlet		1/8"	
Choke Setting			
Automatic Transmission		2 Notches Rich	
Synchromesh Transmission		Index	
Choke Coil Number		#10	
Fast Idle Cam Number			
Automatic Transmission		7026748	
Synchromesh Transmission		7026749	
Primary Float Heel Adjustment		1 21/64"	
Primary Float Toe Adjustment		19/32"	
Primary Float Drop Adjustment		1 19/32"	
Secondary Float Heel Adjustment		1 3/8"	
Secondary Float Toe Adjustment		3/8"	
Secondary Float Drop Adjustment		1 3/16"	
Pump Rod Adjustment			
Automatic Transmission		7/8" in No. 3 Hole	
Synchromesh Transmission		1" in No. 1 Hole	
Choke Rod Adjustment		.050"	
Choke Piston Setting, Choke Closed		Must project 1/32"	
Choke Unloader Adjustment		.120"	
Secondary Contour Adjustment		#69 (.030")	
Secondary Lockout Adjustment		#78 (.015")	
Initial Idle Speed		1 Turn In	
Initial Idle Mixture		1 1/2 Turns Out	
Fast Idle Speed (Hot, on Low Step in Drive)		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 3-1.

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 3-2.

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 3-1.

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 3-3. On V-6 engines, a sintered bronze filter, located in the carburetor inlet, takes the place of the can-type filter. See Figure 3-14.

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 3-3. 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 Rochester 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 3-4.

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.

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 Figures 3-17 and 18.

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 Figures 3-17 and 18.

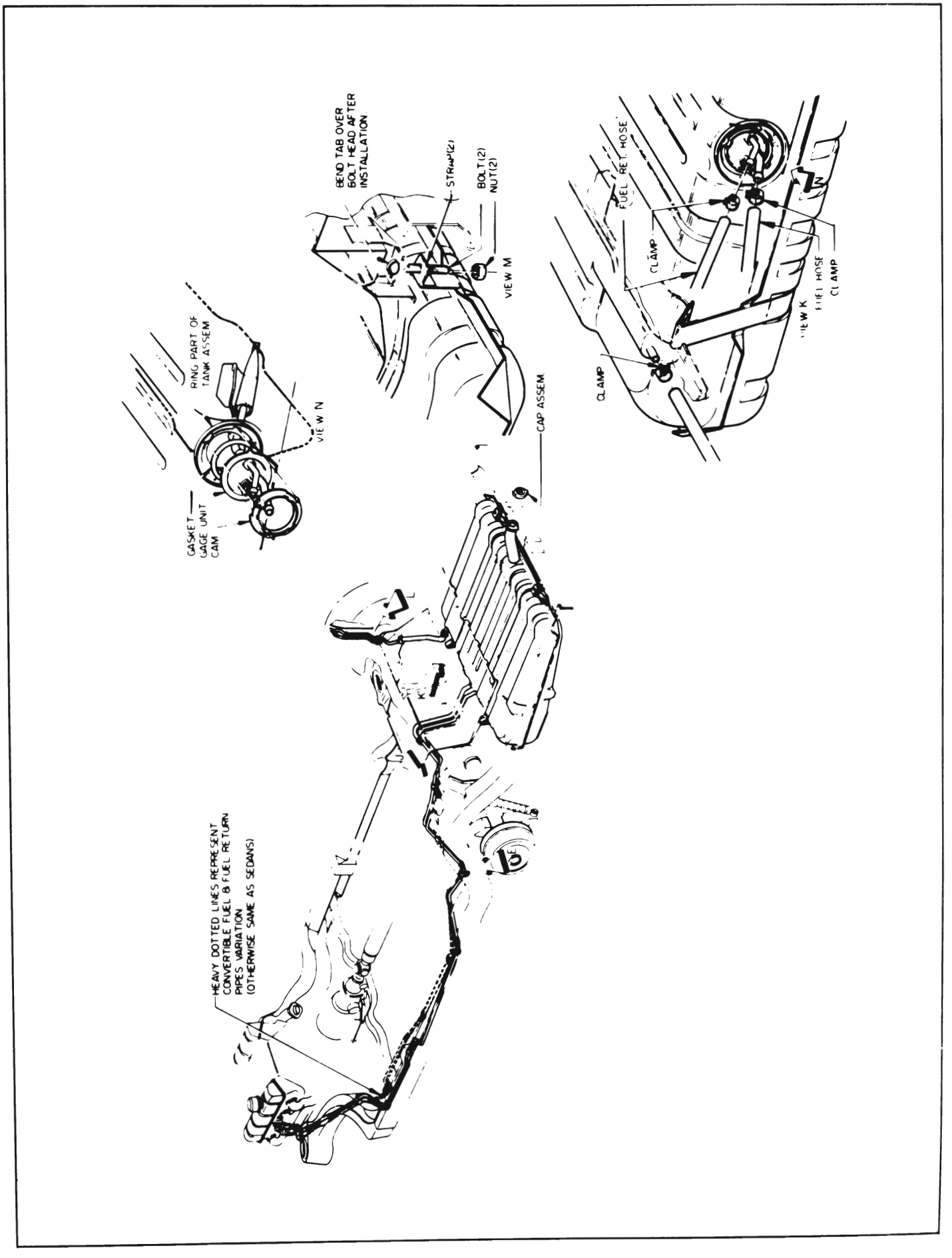

Figure 3-1—Fuel System - Air Cond. Except Wagons

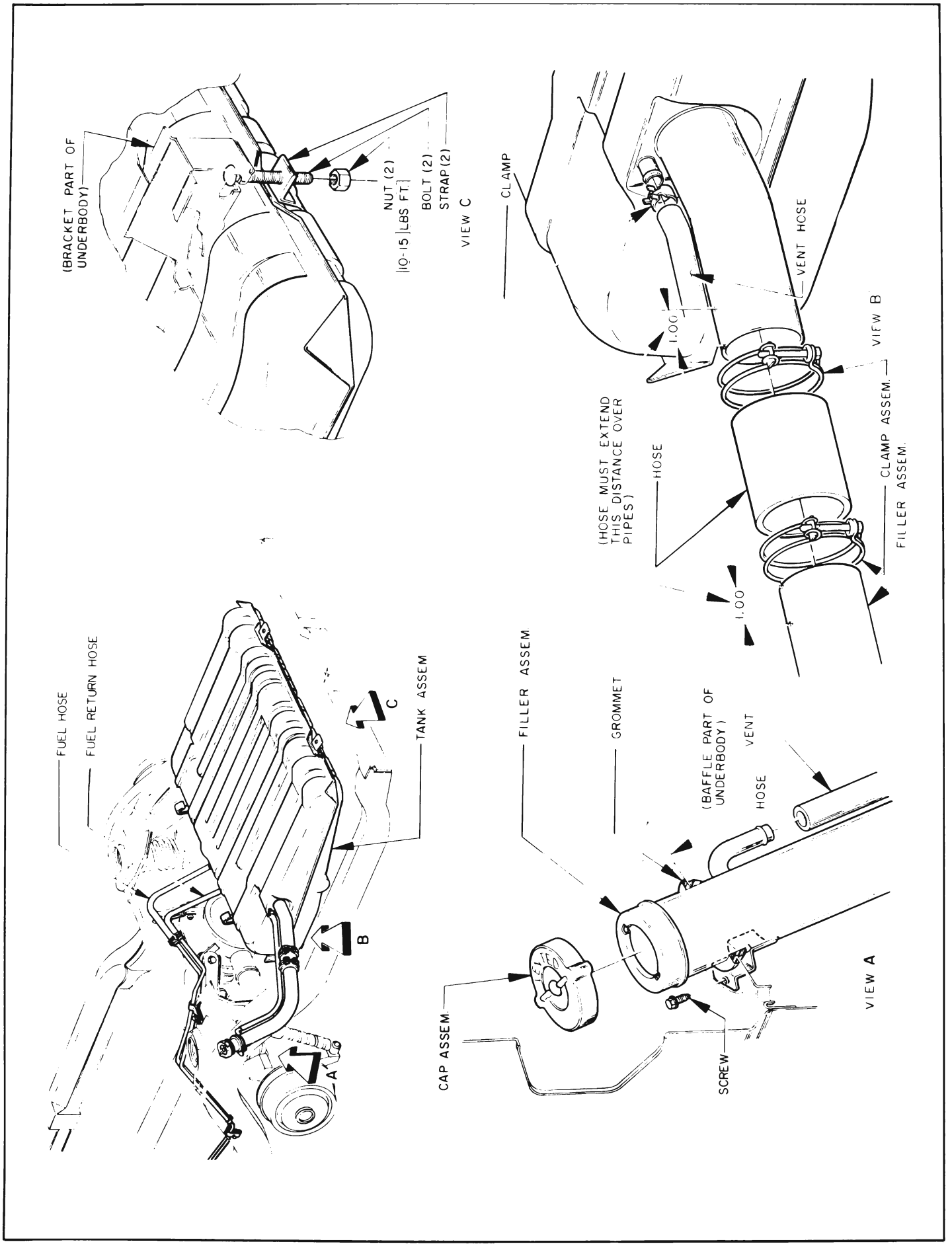

Figure 3-2—Fuel System - Air Cond. Wagons

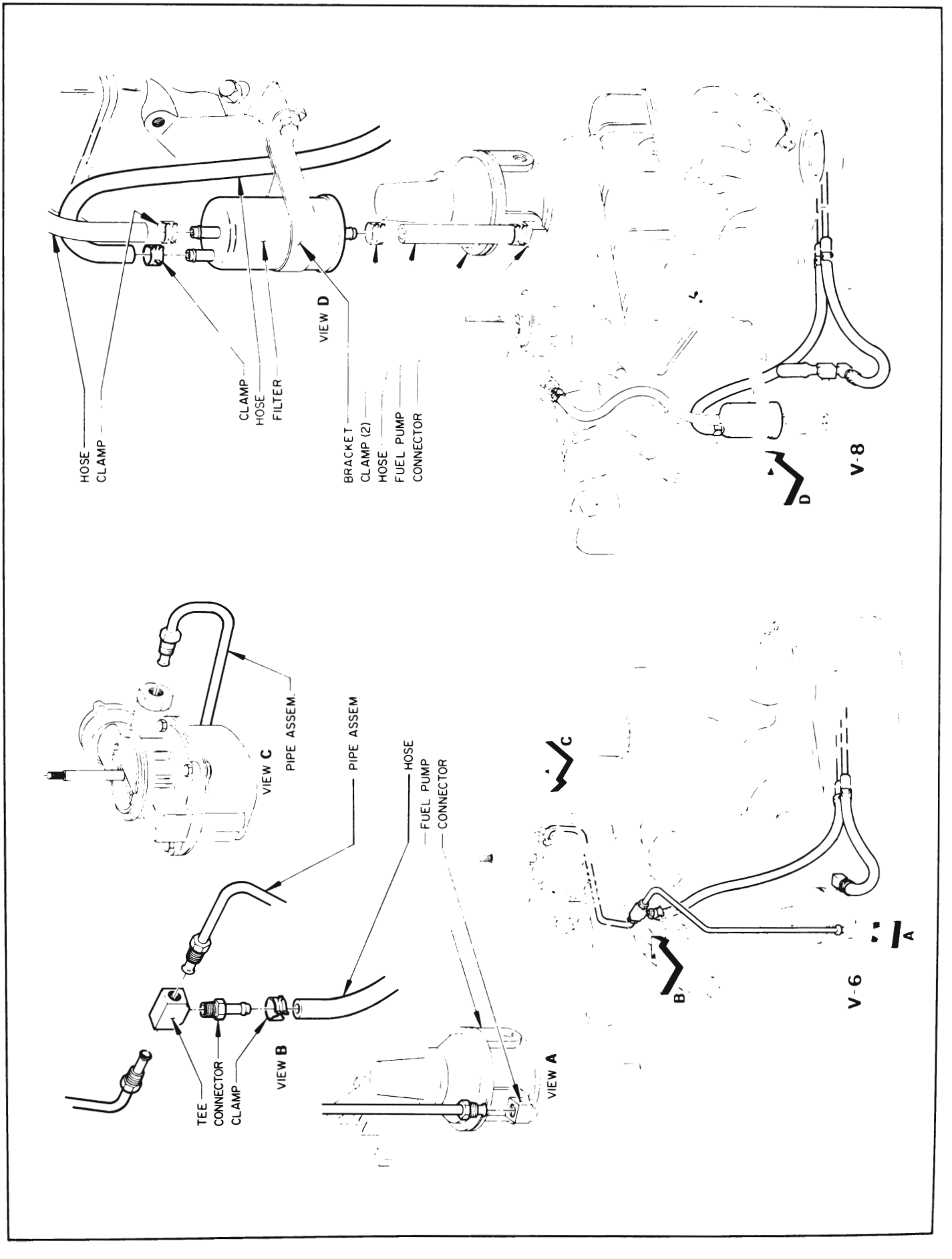

Figure 3-3—Fuel Pump to Carburetor Lines - Air Cond. Cars

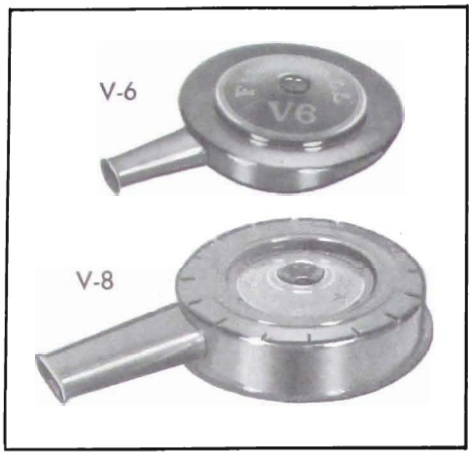

Figure 3-4—Air Cleaner and Silencer Assemblies

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 Figures 3-17 and 18.

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 Figures 3-17 and 18.

An idle stator switch is combined with the dash pot to make a dash pot and switch assembly which is mounted at the closed throttle position of the carburetor throttle lever. 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 Figures 3-17 and 18.

3-3 DESCRIPTION OF INTAKE AND EXHAUST SYSTEMS

a. Intake Manifold and Manifold Heat—V-8 Engine

A low-restriction, dual (2 section) intake manifold 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 3-5.

Figure 3-5—Intake Manifold Distribution-V-8 Engine

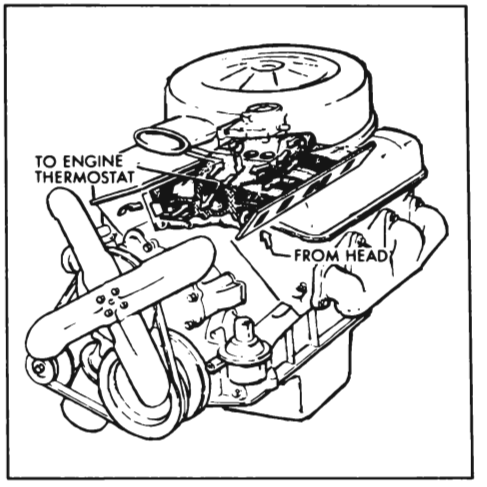

Figure 3-6—Hot Water Flow Through Intake Manifold - V-8 Engine

The aluminum intake manifold is heated by engine coolant which flows from the front of each head into the two front corners of the intake manifold. The coolant flows through a jacket along the lower level of the intake manifold to the rear of the manifold, then forward along the upper level of the manifold to the engine thermostat. Due to the superior heat

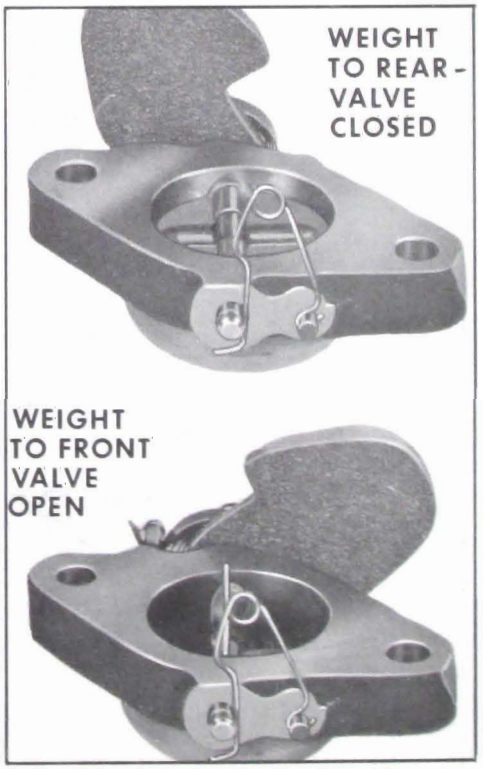

Figure 3-7—Exhaust Manifold Valve - V-6 Engine

transfer characteristics of aluminum plus the fact that the jacket surrounds all branches of the intake manifold, the complete manifold is maintained at coolant temperature. No exhaust manifold valve or special exhaust passages are used. See Figure 3-6.

During engine warm-up, the coolant temperature is not high enough to cause the engine thermostat to open. However, a thermostat by-pass allows a small amount of coolant to circulate continuously so that any heat available gets to the intake manifold. This heat helps prevent engine stalling due to carburetor icing.

b. Intake Manifold and Manifold Heat— V-6 Engine

The V-6 engine has 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 3-17.

This causes a pressure build-up in the right exhaust manifold which forces exhaust through the crossover passage under the carburetor to the left exhaust manifold and on out the exhaust system. See Figure 3-8.

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

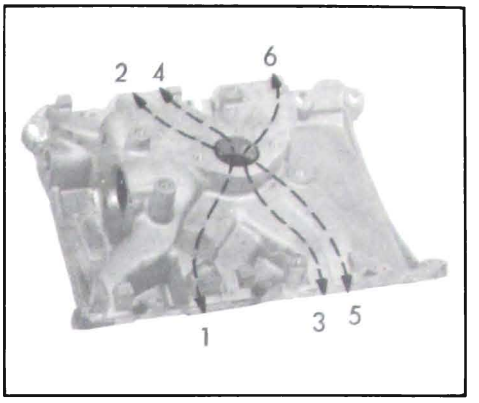

Figure 3-8—Intake Manifold Distribution - V-6 Engine

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.

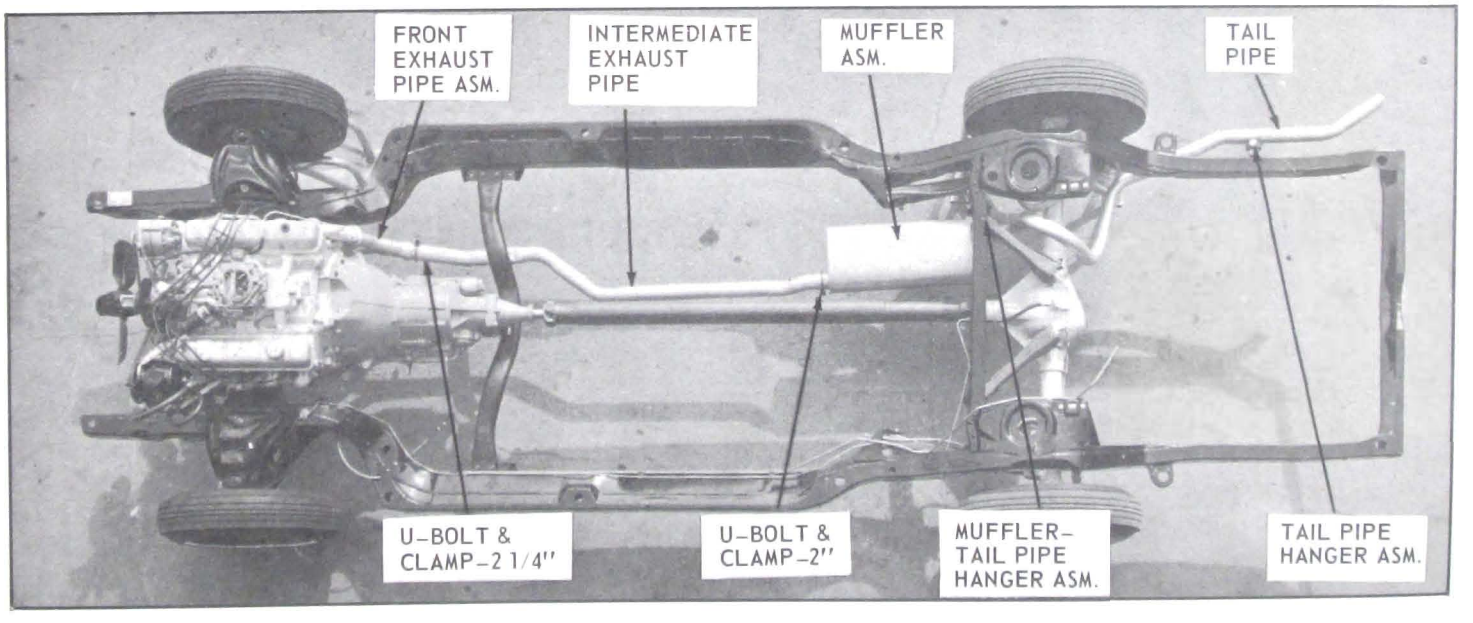

Figure 3-9—Exhaust System

c. 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.

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, 10, 11 and 12.

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.

d. 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.

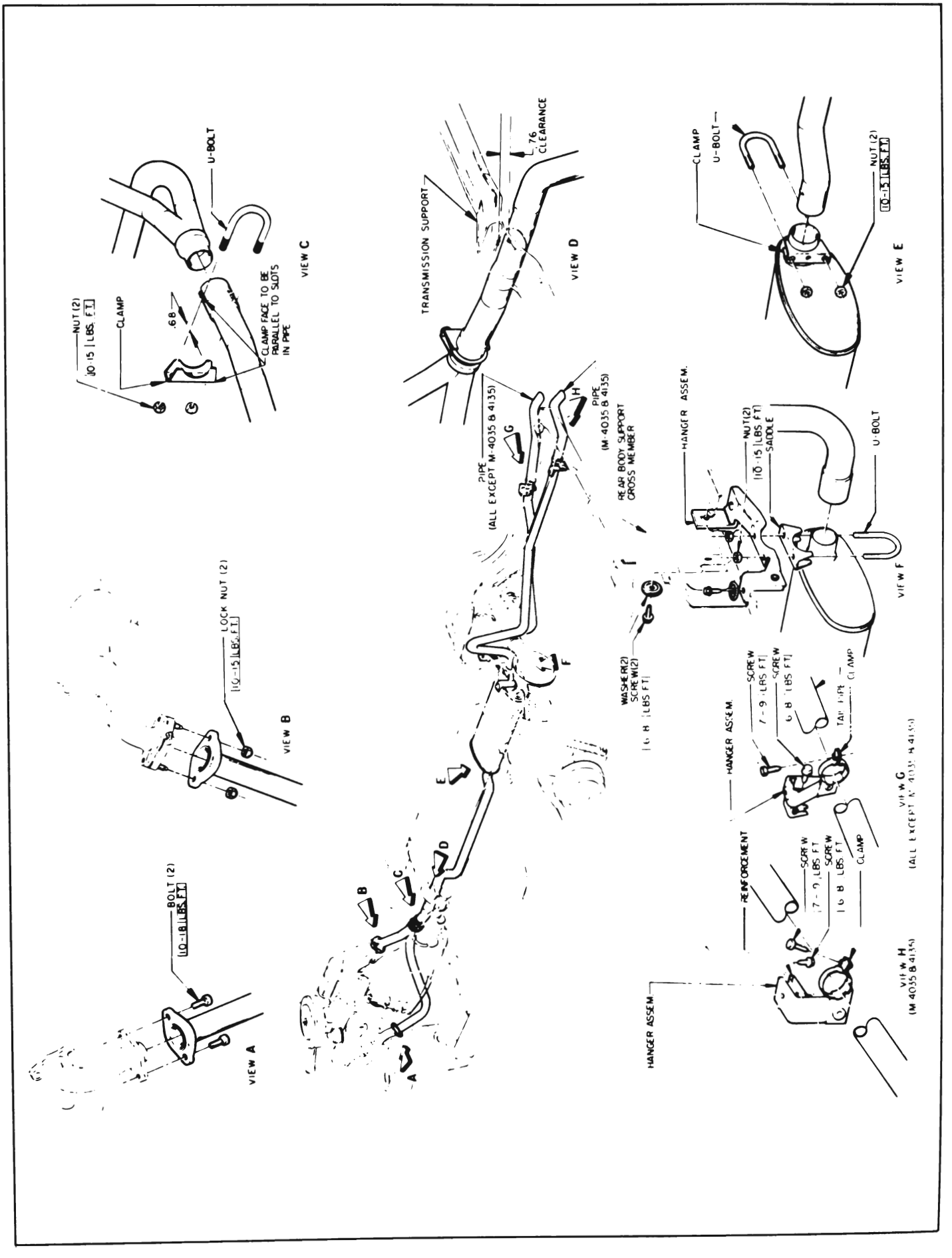

Figure 3-10—Single Exhaust System - V-6

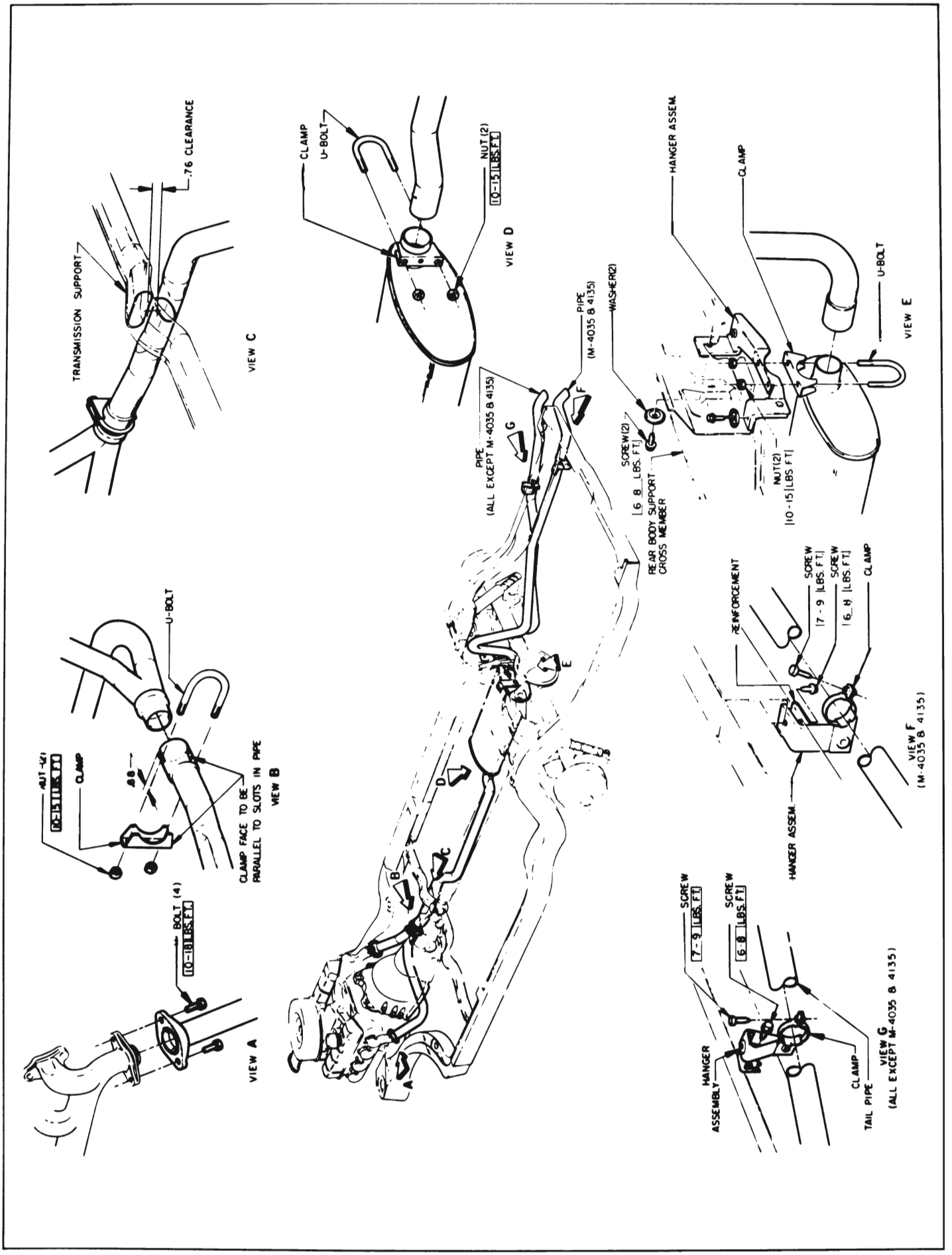

Figure 3-11—Single Exhaust System - V-8

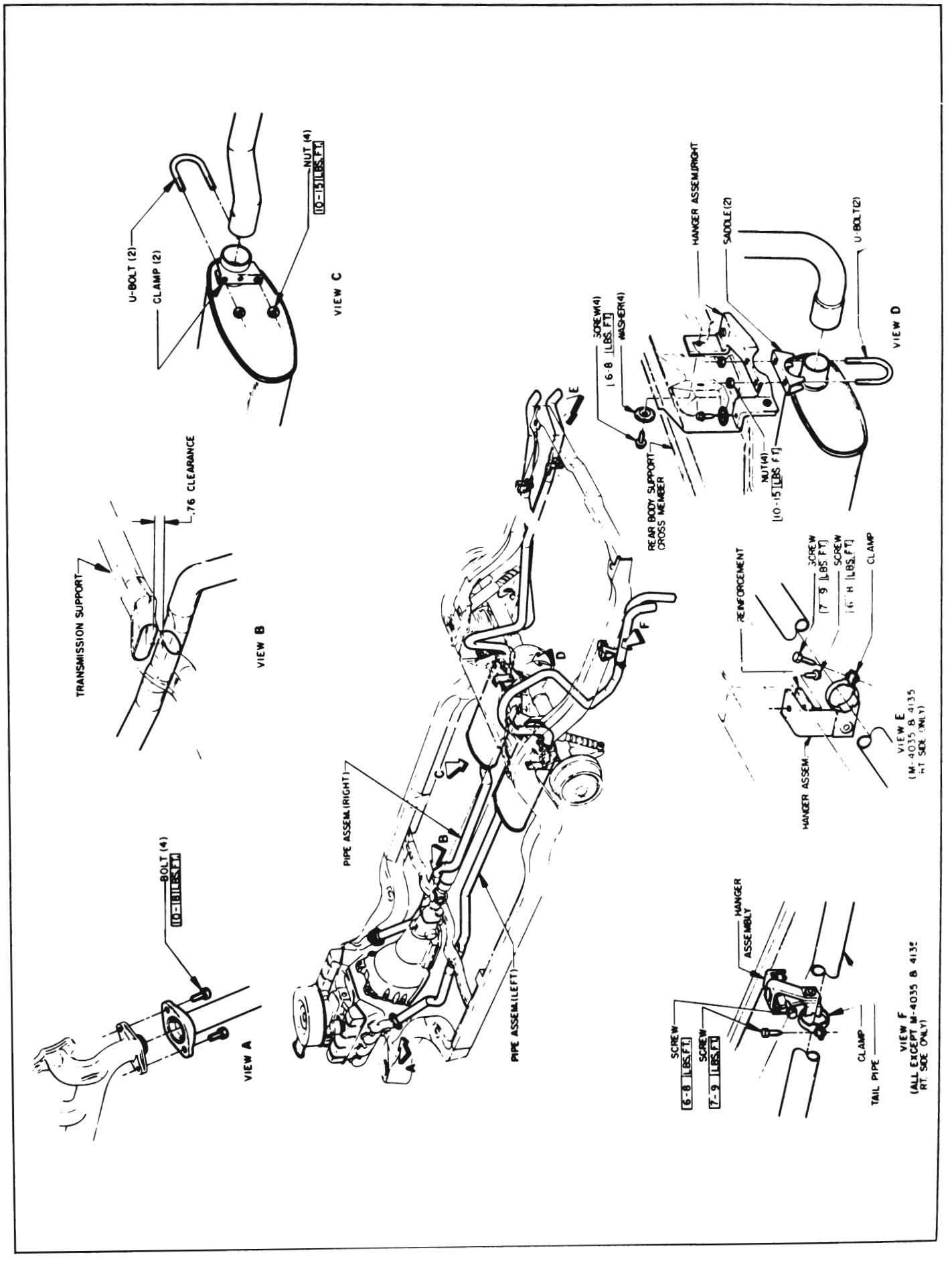

Figure 3-12—Dual Exhaust System - V-8