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 LeSabre 2-Barrel Carburetor Engine)	Regular
Gasoline, Grade Required (Other Engines)	Premium
Gasoline Tank Capacity (Gal.)	20-3/4
Gasoline Gauge, Make and Type	AC, Electric
Fuel Pump—Make and Type	AC, Mechanical
Drive	Eccentric at Camshaft Sprocket
Fuel Pump Pressure - At Carburetor Level, Pounds	
300 Engine	4 to 5 1/4
401-425 Engines	4 3/4 to 6 1/2
Fuel Filter, in Gas Line	AC, Can-Type Throw-Away
Type, Standard	GF-94
Type, Air Conditioned	GF-96
Fuel Filter, In Gas Tank	Woven Plastic
Carburetor, Make	Carter or Rochester
Type	Downdraft
Barrels	2, 4 or Dual 4
Air Cleaner, Make and Type (Except Dual 4-Barrel)	Dry or Oil Wetted Paper or AC, Plastic Foam Element
Air Cleaner, Make and Type (Dual 4-Barrel)	AC, Paper Element
Intake Manifold Heat - Type	Hot Exhaust Passage in Manifold
Thermostat Wind-Up @70 Degrees F., Valve Closed	1/2 Turn
Idle Speed	300 Cu. In. 550 RPM, All Others 500 RPM
Air Conditioned Car (Air Conditioner Off)	Add 50 RPM

b. Carter Carburetor Calibrations—401 and 425 Engines

IMPORTANT: Calibrations are governed by the CODE number.

	401 Eng. Auto. Trans.	425 Eng. Auto. Trans.	401-425 Eng. Syn. Trans.	Dual 4-Bbl. All Front	Dual 4-Bbl. Rear-Auto.	Dual 4-Bbl. Rear-Syn.
Model Designation	AFB	AFB	AFB	AFB	AFB	AFB
Number of Barrels	4	4	4	4	4	4
Code Number, for Following Calibrations	3921S	3923S	3922S	3645S	3925S	3924S
Bore Diameter, Primary	1 9/16"	1 9/16"	1 9/16"	1 9/16"	1 9/16"	1 9/16"
Large Venturi Diameter, Primary	1 3/16"	1 3/16"	1 3/16"	1 3/16"	1 3/16"	1 3/16"
Bore Diameter, Secondary	1 11/16"	1 11/16"	1 11/16"	1 11/16"	1 11/16"	1 11/16"
Large Venturi Diameter, Secondary	1 9/16"	1 9/16"	1 9/16"	1 9/16"	1 9/16"	1 9/16"
Float Level Adjustment	7/32"	7/32"	7/32"	7/32"	9/32"	7/32"
Float Drop Adjustment	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"
Float Needle Seat	#38	#38	#38	#38	#38	#38
Low Speed Jet	#65	#68	#68	#68	#68	#68
Idle Discharge Port	.200" x .030"	.185" x .030"	.185" x .030"	.150" x .030"	.150" x .030"	.180" x .030"
Lower Idle Port	#52	#52	#52	#69	#52	#52
Metering Jet, Primary	120-256	120-256	120-256	120-256	120-256	120-256
Metering Jet, Secondary						
Production	120-158	120-159	120-165	120-222	120-222	120-222
High Altitude	120-233	120-165	120-165	-	-	-
Metering Rod						
Production	16-219	16-167	16-219	16-286	16-219	16-298
High Altitude	16-255	16-256	16-255	-	-	-
NOTE: Use High Altitude Kit Above 3500 Feet Use Kit Consisting of Secondary Jets, Primary Rods and Springs.						
Throttle Bore Vents	#42	#42	#42	#42	#42	#42
Anti-Percolator or Main Bleed Hole	#64	#64	#64	#64	#64	#64
Pump Setting at Closed Throttle	7/16" Center Hole	7/16" Center Hole	7/16" Center Hole	1/2" Center Hole	1/2" Inner Hole	1/2" Inner Hole
Pump Discharge Jet	#72	#72	#70	#70	#70	#70
Vacuum Spark Control Hole	3/32"	3/32"	.130" x .040"	NONE	.130" x .040"	.130" x .040"
Choke Coil Housing Number	170BE478S	170BE478S	170AW478S	NONE	170AW478S	170AW478S
Choke Thermostat Setting	Index	Index	Index	NONE	Index	Index
Choke Suction Hole	#40	#40	#40	NONE	#40	#40
Choke Piston Setting (With .026" Wire)	.105"	.105"	.105"	NONE	.105"	.105"
Closing Shoe Clearance	.020"	.020"	.020"	.020"	.020"	.020"
F. I. Cam Setting, Choke Closed	Index	Index	Index	NONE	Index	Index
F. I. Cam Number	181-351	181-351	181-292	NONE	181-351	181-284
Unloader Opening at Choke Valve Edge	7/32"	7/32"	7/32"	NONE	7/32"	7/32"
Initial Idle Speed	1/2 Turn In	1/2 Turn In	1/2 Turn In	NONE	3 Turns Out	3 Turns Out
Initial Idle Mixture	3/4 Turn Out	3/4 Turn Out	3/4 Turn Out	NONE	1 Turn Out	1 Turn Out
Fast Idle Speed in Drive (Hot, on Low Step)	600 RPM	600 RPM	600 RPM	NONE	600 RPM	600 RPM

c. Carter Carburetor Calibrations—300 Engine

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"
Lower Idle Port	#52	#52
Metering Jet, Primary	120-256	120-256
Metering Jet, Secondary Production	120-222	120-222
Metering Jet, Secondary High Altitude		
Metering Rod Production	16-341	16-341
Metering Rod 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"	.180" x .040"
Choke Coil Housing Number	170AZ478S	170AZ478S
Choke Thermostat Setting	1 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

d. Rochester Carburetor Calibrations

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

	401 Eng. Auto. Trans.		300 Eng. Syn. Trans.	300 Eng. Auto. Trans.
Model Designation	4GC		2GC	2GC
Number of Barrels	4		2	2
Code Number, for Following Calibrations	7025040		7025047	7025046
	Primary	Secondary		
Throttle Bore	1 9/16"	1 11/16"	1 7/16"	1 7/16"
Small Venturi	1/4 "	1/4 "	1/8 "	1/8 "
Large Venturi	1 1/8 "	1 15/32"	1 1/8 "	1 1/8 "
Main Meeting Jet Production	.052"-60°	.080"-60°	.055"-60°	.052"-60°
Main Meeting Jet High Altitude	.049"-60°	.077"-60°	.053"-60°	.049"-60°

d. Rochester Carburetor Calibrations (Continued)

	401 Eng. Auto. Trans.	300 Eng. Syn. Trans.	300 Eng. Auto. Trans.
NOTE: Use High Altitude Jets Above 3500 Feet.			
Idle Tube Restriction	#68 #64	#69	#70
Idle Needle Hole	#55	#56	#56
Spark Holes	1/8"	2-#55	1 1/8"
Pump Discharge Holes	2-#70	2-#68	2-#71
Choke Restriction			
Inlet	3/16"	#42	#42
Outlet	#41	1/8"	1/8"
Choke Setting	Index	Index	Index
Choke Coil Number	30	27	12
Dome Vent	—	#70	#67
Cluster Top Bleed	—	#67	#68
Cluster Side Bleed	—	#69	#68
Float Level Adjustment	1 13/32"	.594"	.594"
Float Drop Adjustment	1 1/16"	1 29/32"	1 29/32"
Pump Rod Adjustment	1 1/64" (Center Hole)	1 11/32" (Outer Hole)	1 11/32" (Outer Hole)
Choke Rod Adjustment	#53 (.060")	#54 (.055")	#54 (.055")
Fast Idle Cam Number	7029553	7029501	7028970
Choke Unloader Adjustment	#31 (.120")	#29 (.136")	#29 (.136")
Initial Idle Speed	2 Turns In	3 Turns In	3 Turns In
Initial Idle Mixture	1 1/2 Turns Out	1 Turn Out	1 Turn Out
Choke Piston Setting, Choke Closed	Must Project 1/32"		
Secondary Contour Adjustment	.030"		
Secondary Lock-Out Adjustment	.015"		
Fast Idle Speed in Drive (Hot, on Low Step)	600 RPM		

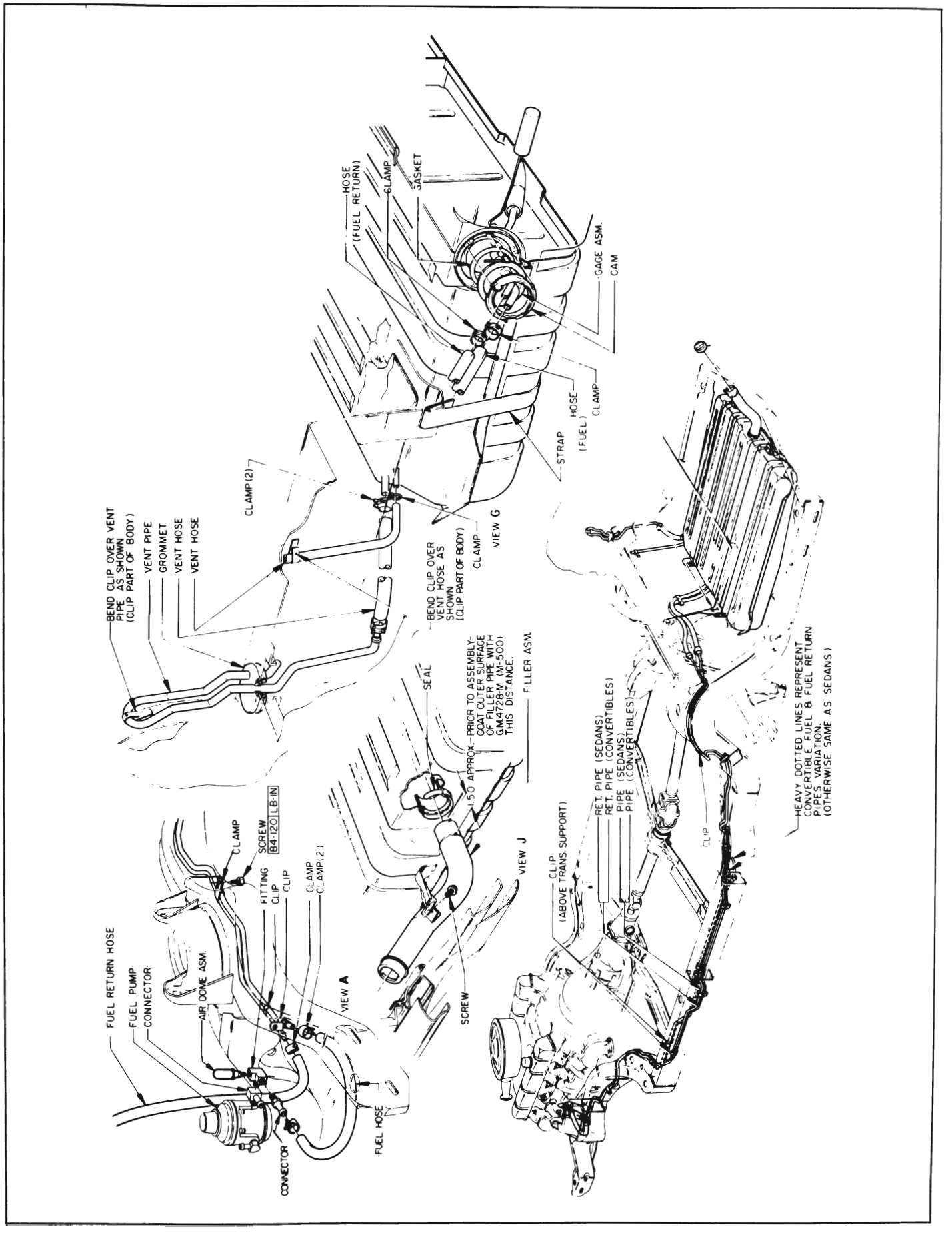

Figure 3-1—Fuel System - Air Cond. LeSabre

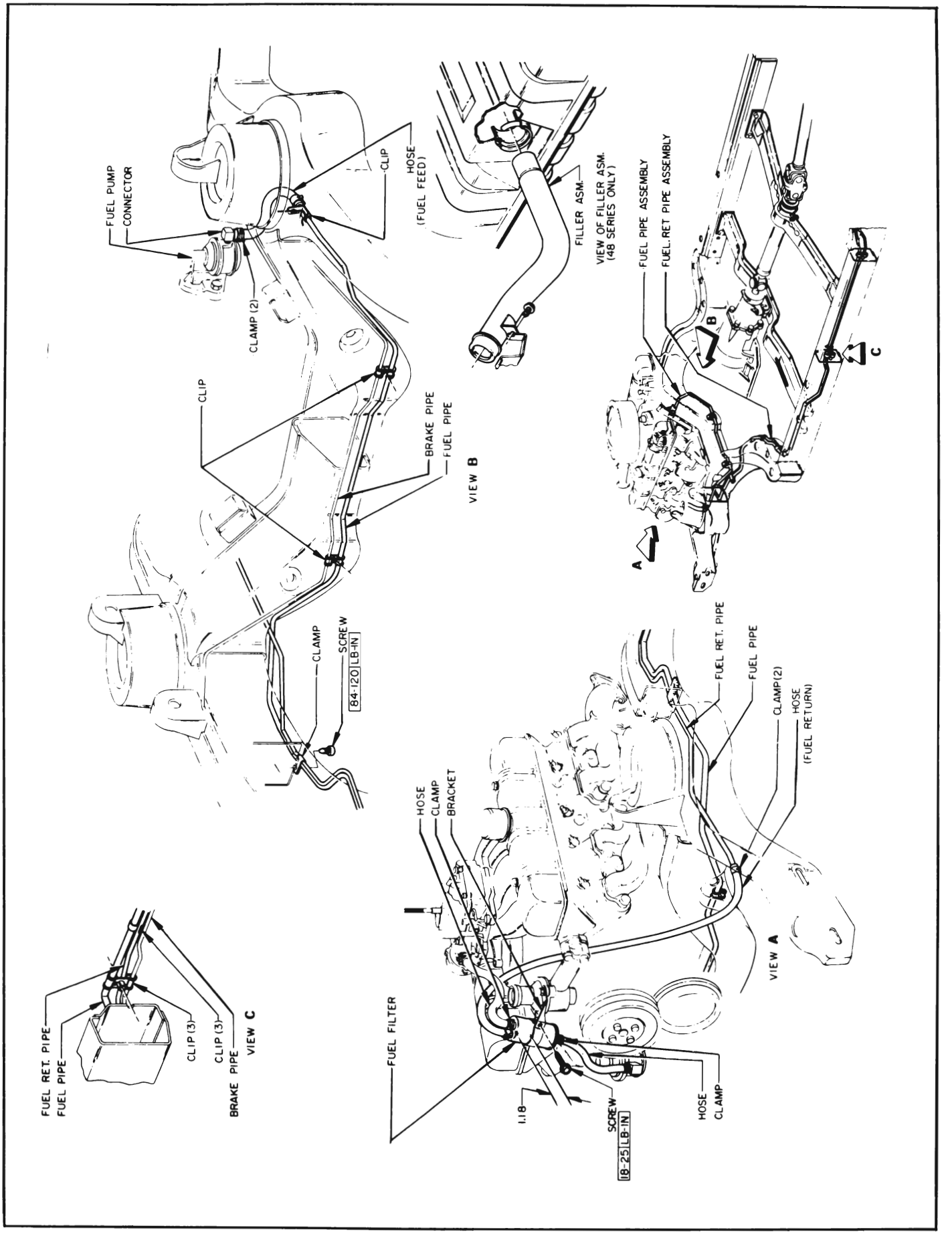

Figure 3-2—Fuel System - Air Cond. Wildcat and Electra

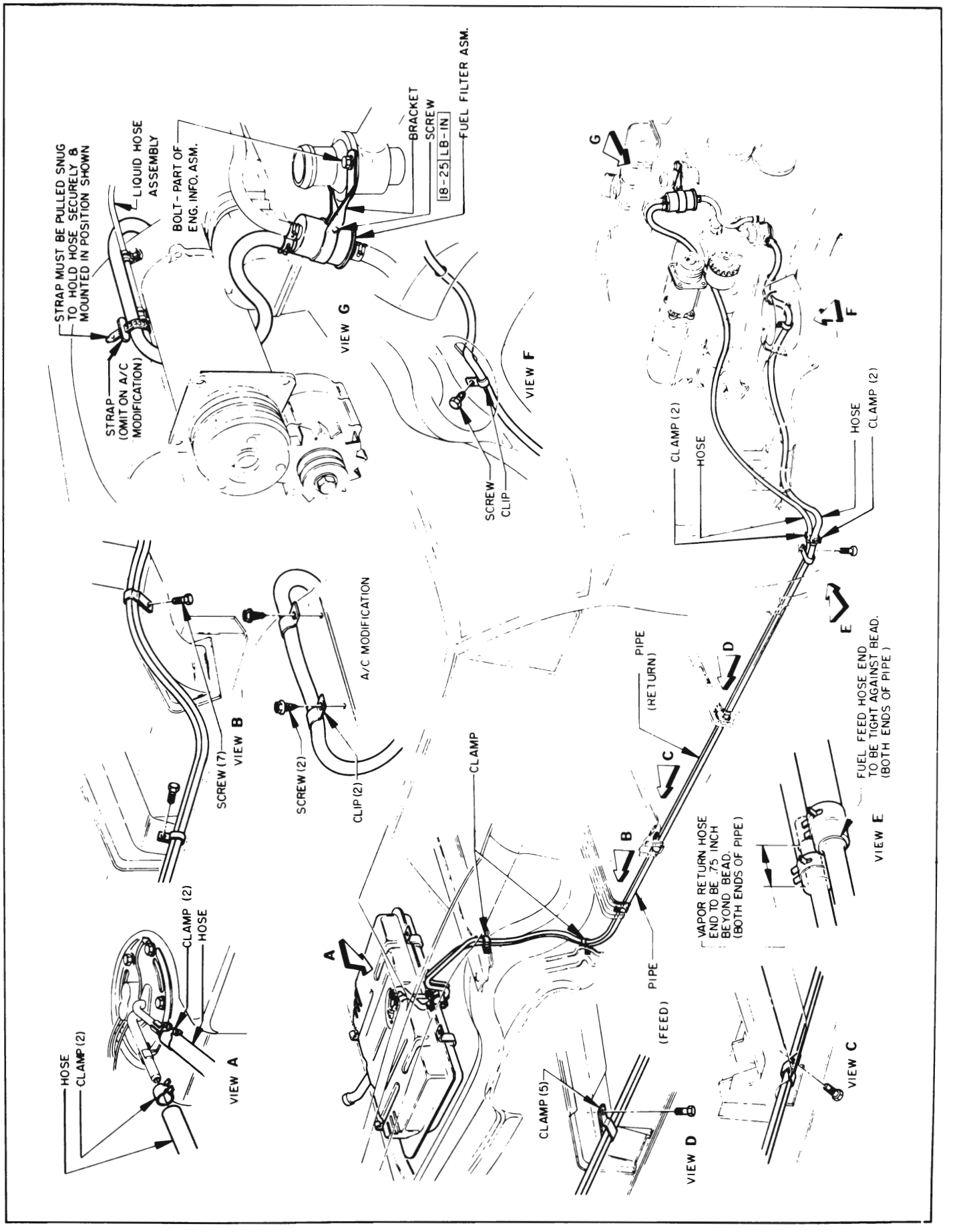

Figure 3-3—Fuel System - Air Cond. Riviera

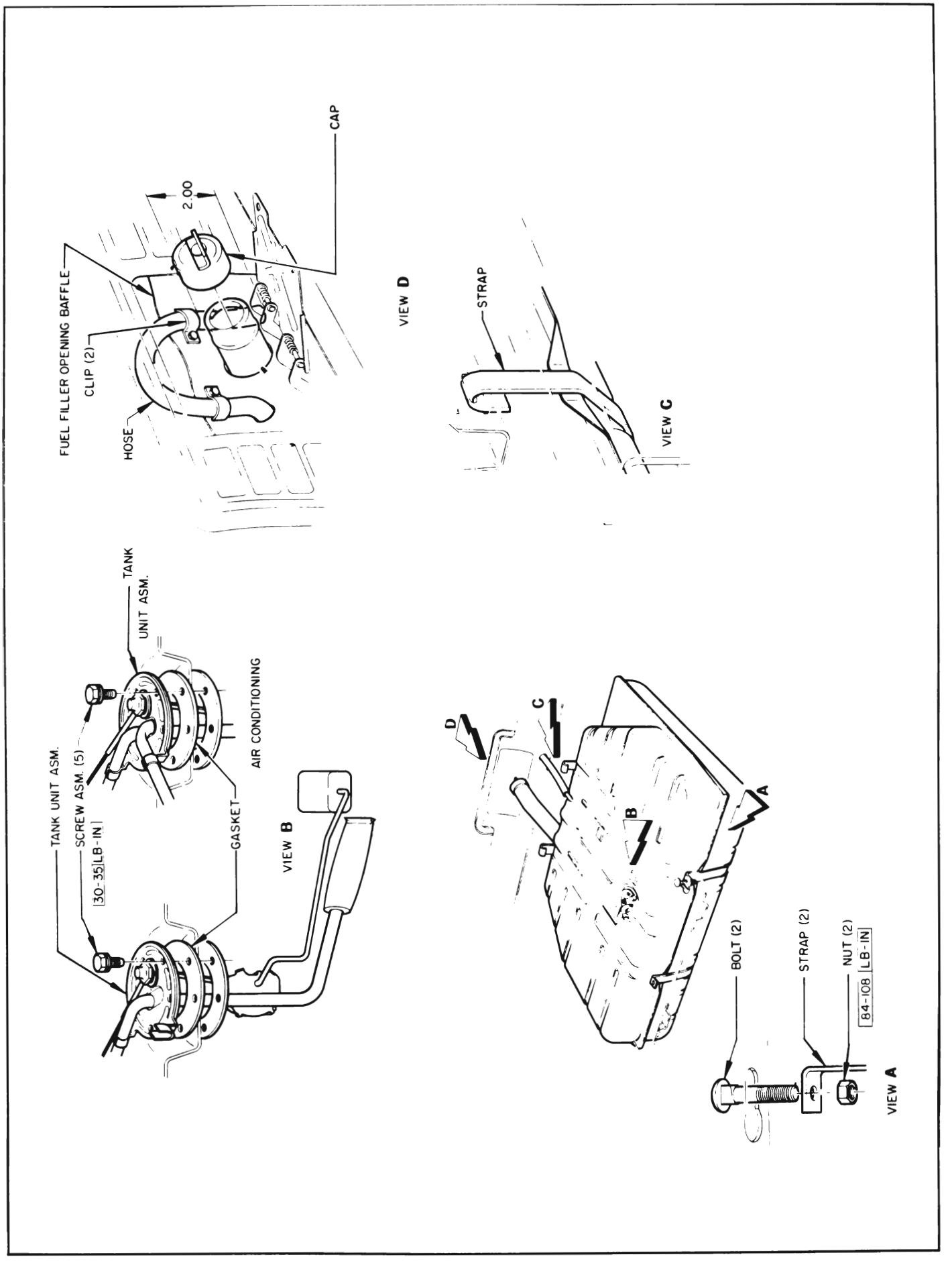

Figure 3-4—Fuel Tank Information - Riviera

3-2 DESCRIPTION OF FUEL SYSTEM

a. Gasoline Tank, Feed Pipe, and Filter

The gasoline tank is attached to the under side of the trunk floor pan. The tank is attached with two straps which have a hook at one end and are bolted at the other end.

The socket for the gas tank filler is soldered into an opening at the rear upper center of the tank. The lower end of the filler slides through an "O" ring seal and is held in position by a bracket and screw near the upper end. The tank is vented at a special pipe rather than at the filler cap. This breather pipe extends from the upper center of the tank and has a rubber hose extending from it to an inverted U-shaped pipe fastened into the body. A positive sealing filler cap is used.

The tank outlet is located at the upper front center of the tank. It consists of a combination fuel pick-up, filter, and gas gauge tank unit. The tank unit can be removed without lowering the gas tank by removing a cam ring which retains the unit (all except Rivieras).

The fuel line is welded steel tubing with a terne coat outside and a tin coat inside. Connections from the tank to the line and from the line to the fuel pump are made with synthetic rubber hose attached with spring clamps.

A can-type throw-away fuel filter is located in the line between the fuel pump and the carburetor.

In all air conditioner equipped cars, a vapor by-pass system is installed. These cars have a special fuel filter which has a metering outlet in the top. Any vapor which forms is bled off and returned to the gas tank through a separate line alongside the fuel supply line. This system greatly reduces any possibility of vapor lock. See Figures 3-1, 2 and 3.

b. Fuel Pump, Carburetor, and Automatic Choke

The fuel pump is mounted on the lower right side of the timing chain cover. It is actuated by a hardened, chrome-plated, stamped steel eccentric mounted on the front side of the crankshaft 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.

c. Air Cleaner and Intake Silencer

All engines (except 300 V8 and dual 4-barrel 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.

There are three basic air cleaner and silencer assemblies: one for two barrel carburetor cars, one for four barrel carburetor cars, and one for dual four barrel carburetor cars. See Figure 3-5.

Standard four barrel carburetor air cleaners have two locating tabs which engage two projections on the carburetor air horn to locate the large air inlet tube firmly in position about 15° to the right of the centerline of the engine.

Two barrel carburetor air cleaners have neither a support bracket nor locating tabs. Therefore it is important to securely tighten the wing nut by hand after locating the air cleaner on the carburetor to make sure the air cleaner remains stationary. Proper location is with the intake pointed about 45° to left of the centerline of the engine and with the word "FRONT" on the air cleaner forward.

The air cleaner (except for 300 V8 and dual 4-barrels) has a washable plastic foam type element. 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. 300 V8 and dual 4-barrel air cleaners have a disposable dry type fiber element

d. Carburetor Throttle Control Linkage

The carburetor throttle control linkage is designed to provide positive control of the throttle valves through their entire range

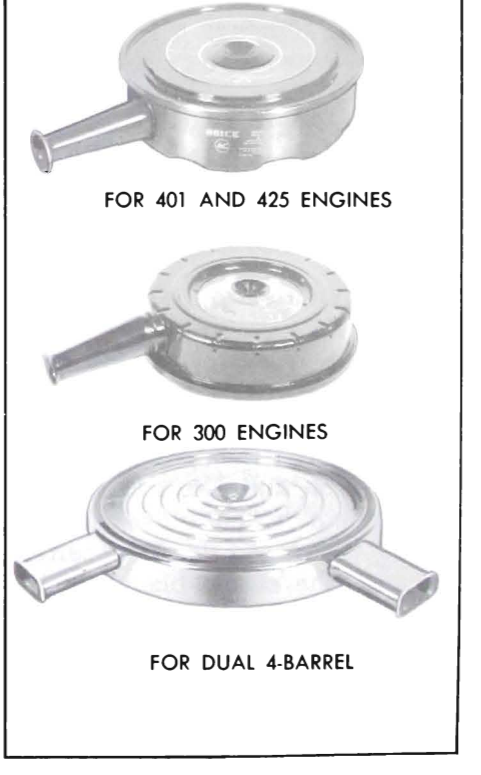

Figure 3-5—Air Cleaners and Silencer Assemblies

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. Depressing the accelerator pedal causes the pedal to make a rolling contact with a roller 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 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 valves 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 "downshift". 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 3-17.

3-3 DESCRIPTION OF INTAKE AND EXHAUST SYSTEMS

a. Intake Manifold Distribution

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 Figures 3-6 and 7.

The 2-barrel carburetor feeds one barrel into each section of its 2 port manifold. The 4-barrel carburetor feeds one primary and one secondary barrel into each section of its 4 port manifold.

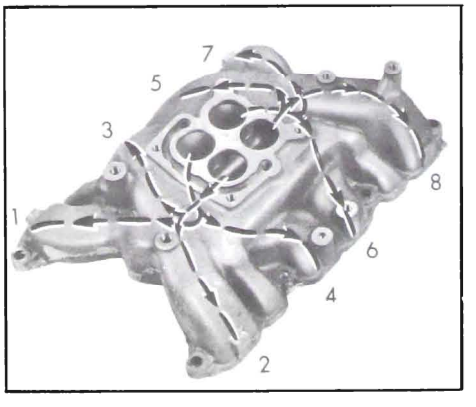

Figure 3-6—Intake Manifold Distribution - 401 and 425 Engines

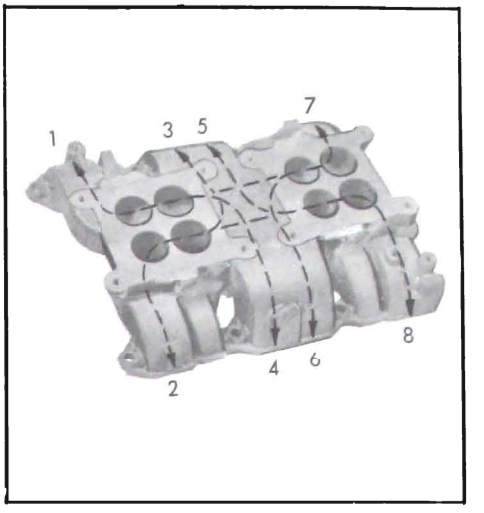

Figure 3-7—Intake Manifold Distribution - Dual 4-Barrel Engine

b. Intake Manifold Heat—401 and 425 Engines

The intake manifold is heated and hot spots are provided at the T-junction dividing points by crossover chambers cast along the outer walls of each end branch. These chambers connect to the two middle exhaust passages in each cylinder head. Hot spots located at the dividing junctions aid in vaporizing the heavier particles of fuel which are swept against the outer walls due to their greater momentum. The heated intake manifold also aids in obtaining a uniform fuel distribution.

The intake manifold is heated by exhaust gas crossover passages cast under the center section of the manifold. These passages connect to the two middle exhaust passages in each cylinder head. Exhaust heat is supplied directly to the carburetor mounting surface by two holes drilled from the mounting surface into the crossover passages. The carburetors are designed to conduct this heat around the throttle valve area to reduce engine stalling due to carburetor icing.

A heat control valve with a bimetal thermostat is located below

the right exhaust manifold. See Figures 3-14 and 15. When the engine is cold and the thermostat closes the valve, the resulting back pressure in the manifold forces exhaust gas through the crossover passages in the intake manifold to the left exhaust manifold. As the engine warms up and the thermostat releases the valve, the flow of hot gas through the crossover chamber is reduced.

Restricted openings in the metal intake manifold gaskets meter the flow of exhaust gases through the intake manifold when the engine is cold and the heat valve is closed.

c. Exhaust Manifolds,Pipes, and Mufflers

Each cylinder exhausts through an individual port into a separate branch of the exhaust manifold. This manifold, referred to as the double "Y" type, is designated to provide a separation of 270 degrees crankshaft rotation between any two exhaust impulses in one branch of the manifold. This elimination of overlap within any given branch of the manifold permits valve timing that improves engine efficiency, minimizes exhaust valve burning, and effects more complete scavanging of exhaust gas from the cylinder.

The right manifold contains the carburetor choke heat stove which consists of an alloy steel heating tube mounted in two drilled holes in the manifold. Heated air is drawn from the heat stove through an insulated pipe into the automatic choke housing.

All front and center exhaust pipe assemblies are made up of two layers (inner and outer) of welded pipe. Rear exhaust pipes and tail pipes use single layer pipe. The double layer pipe is used to muffle pipe "ring" which is set-up by the firing impulses of the individual cylinders; the life of the pipe is also greatly increased.

Most of the connections are of the ball joint type. These ball joints make for easy disconnection, connection, and alignment of the exhaust system without damage to the parts. No gaskets are used in the entire exhaust system. Connection of the tail pipe to the muffler is made with a U-bolt and clamp.

The muffler is of the oval-shaped, 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 exhaust system is supported by free hanging rubber-fabric mountings which permit free movement of the system but do not permit transfer of noise and vibration into the passenger compartment.

d. Dual Exhaust System

The dual exhaust system is optional on Series 45-46-48 cars. Dual exhaust is standard on Riviera models.

In Rivieras, a single muffler is placed crosswise at the rear of the car. See Figure 3-11. The muffler has an inlet and an outlet on each end. Each side of the dual exhaust system has a front exhaust pipe assembly having a resonator at the rear end. Each resonator is attached by a U-bolt and clamp. Each side has a short rear exhaust pipe just forward of the rear spring cross member. Each rear exhaust pipe is attached to the muffler inlet by a ball joint. A tail pipe is attached to each of the muffler outlets by a U-bolt and clamp. The muffler is supported by the rear exhaust pipe and tail pipe hangers. See Figure 3-11.

The exhaust gases from each bank of cylinders pass through individual resonating chambers in the muffler and then enter one common chamber. This common mixing of gases increases muffler silencing ability and eliminates the "cold side" muffler.

In Wildcats and Electras, there are two mufflers and two resonators. See Figure 3-10.

e. Single Exhaust System

The single exhaust system has a front exhaust pipe assembly consisting of a branch pipe from each exhaust manifold welded together. A long center exhaust pipe extends back to the muffler. The rear exhaust pipe extends up over the rear axle to the resonator. A short tail pipe extends back from the resonator. See Figures 3-8 and 9.

None of the parts are interchangeable between the single and dual exhaust systems except for some of the hangers. However, both right and left exhaust manifolds are the same for single or dual exhaust cars.

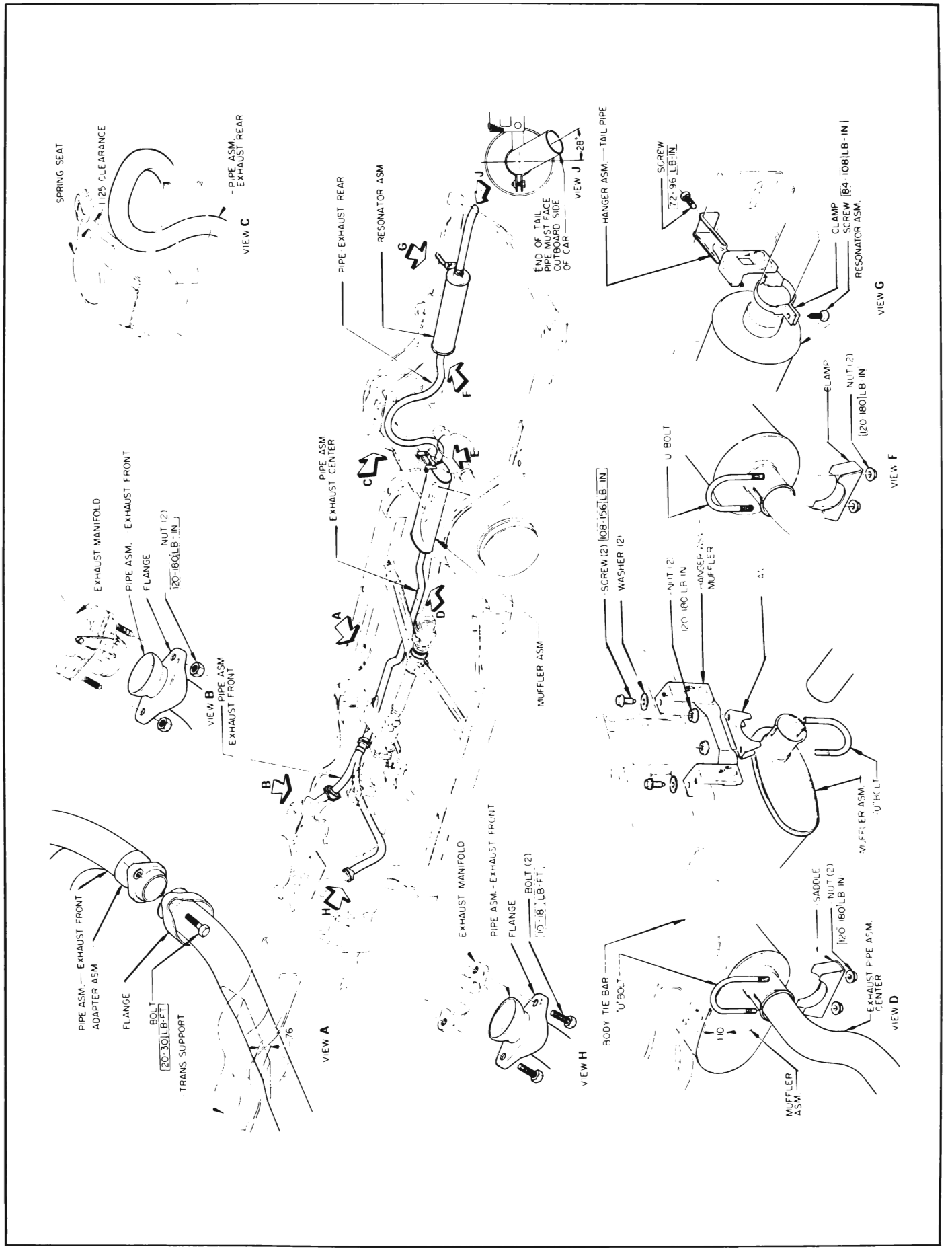

Figure 3-8—Single Exhaust System – LeSabre

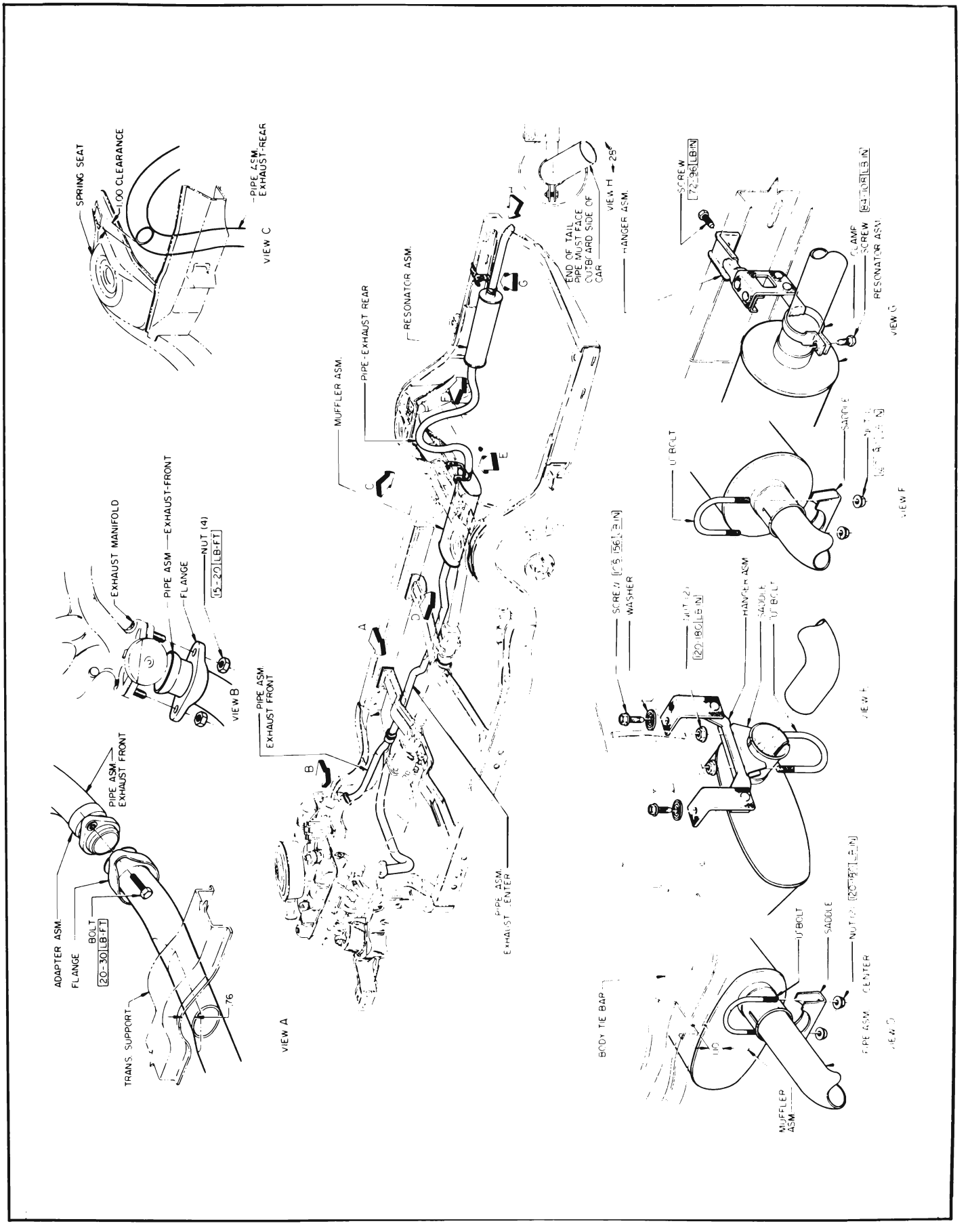

Figure 3-9—Single Exhaust System - Wildcat and Electra

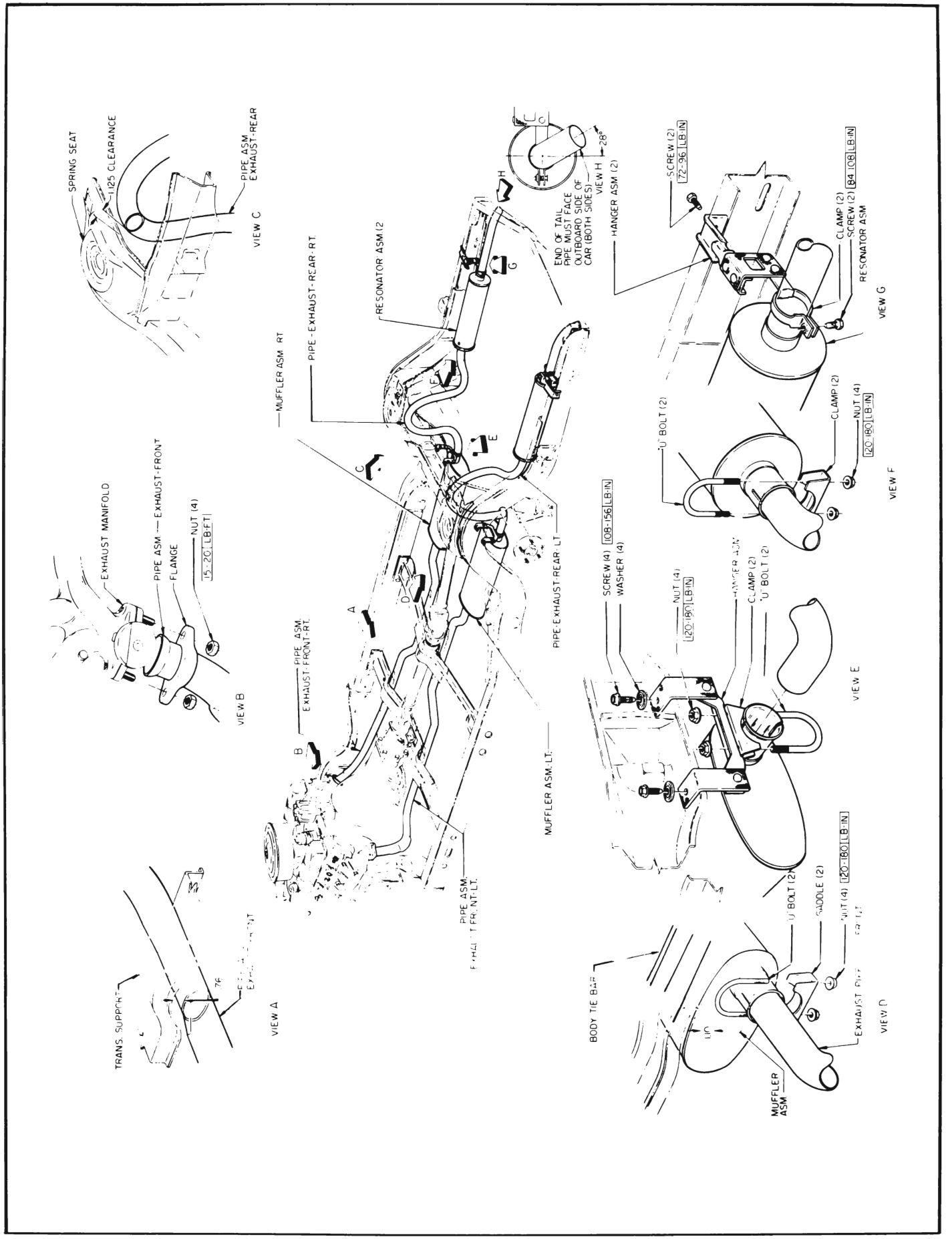

Figure 3-10—Dual Exhaust System - Wildcat and Electra

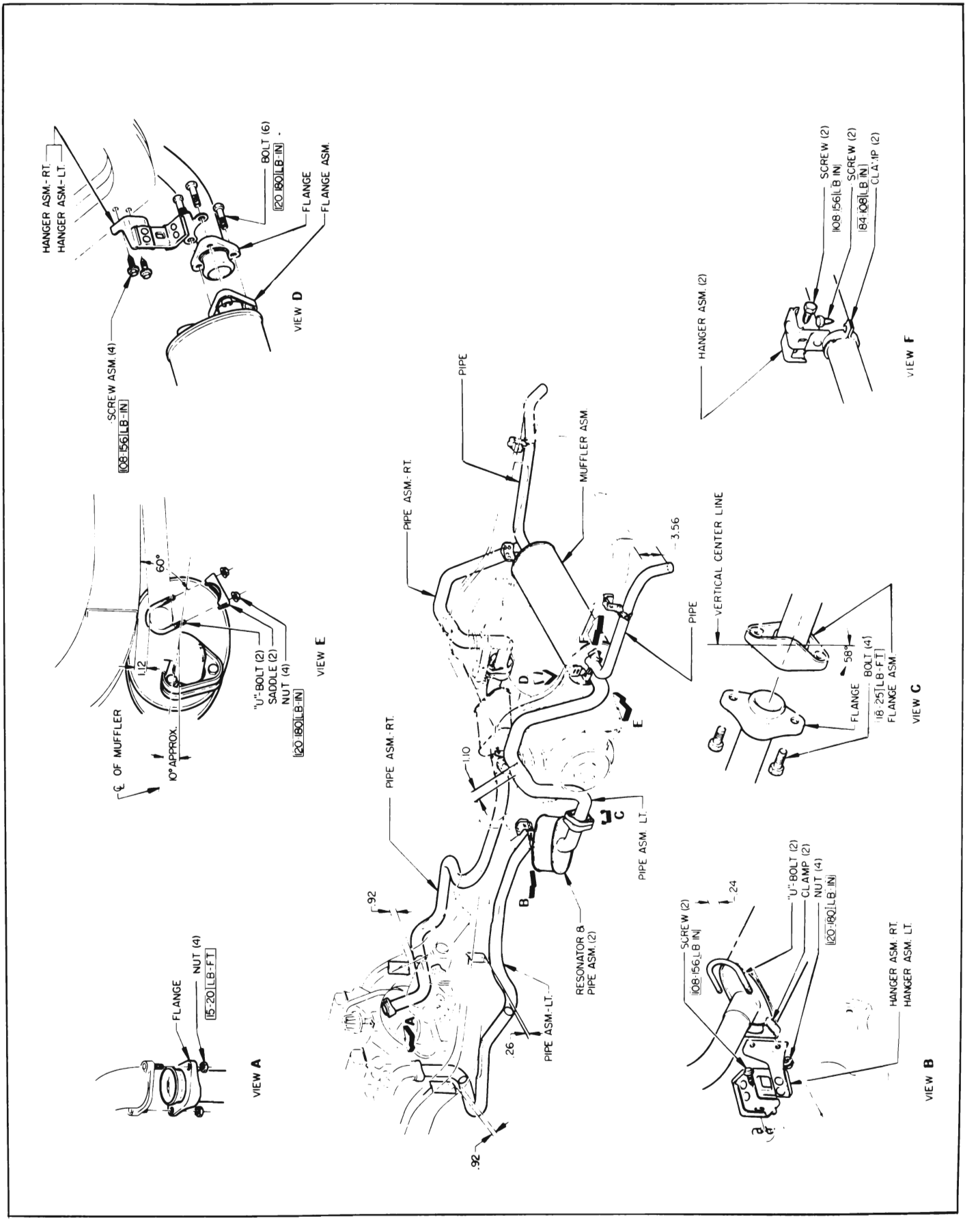

Figure 3-11—Dual Exhaust System - Riviera