GROUP 3

ENGINE FUEL AND EXHAUST SYSTEMS

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SECTION 3-A

SPECIFICATIONS AND GENERAL DESCRIPTION

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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
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 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	A.C., 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 (Standard)	A.C., Plastic Foam Element
Air Cleaner, Make and Type (Riviera or Dual 4-Barrel)	A.C., Paper Element
Intake Manifold Heat - Type (300 Engine)	Hot Water Passage in Manifold
Intake Manifold Heat --Type (401-425 Engines)	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 (Add 50 RPM if Air Cond.)
Air Conditioned Car (Air Conditioner Off)	Add 50 RPM

b. Carter Carburetor Calibrations

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	3633S	3665S	3635S	3645S	3646S	3634S
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	16-268	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	#70	#70	#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	170AW478S	170AW478S	170AW478S	NONE	170AW478S	170AW478S
Choke Thermostat Setting	Index	Index	Index	Index	Index	Index
Choke Suction Hole	#40	#40	#40	#40	#40	#40
Choke Piston Setting (With .026" Wire)	.115"	.115"	.115"	.115"	.115"	.115"
Closing Shoe Clearance	.020"	.020"	.020"	.020"	.020"	.020"
F. I. Cam Setting, Choke Closed	Index	Index	Index	Index	Index	Index
F. I. Cam Number	181-292	181-292	181-292	NONE	181-292	181-284
Unloader Opening at Choke Valve Edge	7/32"	7/32"	7/32"	7/32"	7/32"	7/32"
Initial Idle Speed	1/2 Turn In	1/2 Turn In	1/2 Turn In	1/2 Turn In	1/2 Turn In	1/2 Turn In
Initial Idle Mixture	3/4 Turn Out	3/4 Turn Out	3/4 Turn Out	3/4 Turn Out	2 Turns Out	2 Turns Out
Fast Idle Speed in Drive (Hot, on Low Step)	600 RPM	600 RPM	600 RPM	NONE	600 RPM	600 RPM

c. Rochester Carburetor Calibrations

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

ROCHESTER 2-BARREL

Items	300 Eng. Syn. Trans.	300 Eng. Auto. Trans.
Model Designation	2 GC	2 GC
Number of Barrels	2	2
Code Number, for Following Calibrations	7024047	7024046
Throttle Bore	1 7/16"	1 7/16"
Small Venturi	1/8"	1/8"
Large Venturi	1 1/8"	1 1/8"
Main Metering Jet		
Production	.054"-60°	.053"-60 Sq.
High Altitude	.052"-60°	.051"-60 Sq.

NOTE: Use high Altitude Jets Above 3500 Feet.

Idle Tube Restriction	#69	#69
Idle Needle Hole	#56	#56
Spark Holes	2-#55	1 1/8"
Pump Discharge Holes	2-#71	2-#71
Choke Restriction		
Inlet	#43	#43
Outlet	1/8"	1/8"
Choke Setting	Index	2 Notches Rich
Choke Coil Number	39	15
Main Well Vent	#69	NONE
Dome Vent	#70	#67
Cluster Top Bleed	#64	#67
Cluster Side Bleed	#69	#68
Float Level Adjustment	1/2"	1/2"
Float Drop Adjustment	1 29/32"	1 29/32"
Pump Rod Adjustment (Outer Hole)	1 11/32"	1 11/32"
Choke Rod Adjustment	#60(.040")	#60(.040")
Fast Idle Cam Number	7026571	7017771
Choke Unloader Adjustment	#44(.085")	#44(.085")
Initial Idle Speed	3 Turns In	3 Turns In
Initial Idle Mixture	1 Turn Out	1 Turn Out

c. Rochester Carburetor Calibrations

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

ROCHESTER 4-BARREL

Items	300 Eng. Syn. Trans. 4GC		300 Eng. Auto. Trans. 4GC		401 Eng. Auto. Trans. 4GC	
Model Designation	4		4		4	
Number of Barrels	7024045		7024044		7024040	
Code Number	Primary	Secondary	Primary	Secondary	Primary	Secondary
Throttle Bore	1 7/16"	1 7/16"	1 7/16"	1 7/16"	1 9/16"	1 11/16"
Small Venturi	1/8"	1/4"	1/8"	1/4"	1/4"	1/4"
Large Venturi	1 1/8"	1 1/4"	1 1/8"	1 1/4"	1 1/8"	1 15/32"
Main Metering Jets - Production	.054"-60°	.065"-60°	.053"-60°	.065"-60°	.052"-60°	.080"-60°
Main Metering Jets - High Altitude	.052"-60°	.063"-60°	.051"-60°	.063"-60°	.049"-60°	.077"-60°

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

c. Rochester Carburetor Calibrations (Continued)

Items	300 Eng. Syn. Trans. 4GC 4	300 Eng. Auto. Trans. 4GC 4	401 Eng. Auto. Trans. 4GC 4
Idle Tube Restriction	#70 #72	#67 #72	#68 #64
Idle Needle Hole	#55	#55	#55
1st Idle Hole	#67	#68	#68
2nd Idle Hole	#67	#66	#68
3rd Idle Hole	#66	#66	#68
4th Idle Hole	#66	#66	#67
Spark Hole	2-#55	1 1/8"	1/8"
Pump Discharge Hole	2-#71	2-#71	2-#71
Choke Restriction - Inlet	#43	#43	3/16"
Choke Restriction - Outlet	1/8"	1/8"	#41
Choke Setting	Index	2 Notches Rich	Index
Choke Coil Number	10	10	30
Primary Float Level Adjustment (Heel)	1 21/64"	1 21/64"	1 11/32"
Primary Float Level Adjustment (Toe)	19/32"	19/32"	17/32"
Primary Float Drop Adjustment	1 19/32"	1 19/32"	1 7/16"
Secondary Float Level Adjustment (Heel)	1 3/8"	1 3/8"	1 25/64"
Secondary Float Level Adjustment (Toe)	3/8"	3/8"	13/32"
Secondary Float Drop Adjustment	1 3/16"	1 3/16"	1 3/16"
Pump Rod Adjustment	1-No. 1 Hole	7/8"-No. 3 Hole	1 1/64"-Center Hole
Choke Rod Adjustment	#55(.050")	#55(.050")	#69(.030")
Fast Idle Cam	7026749	7026748	7026857
Choke Piston Setting, Choke Closed	Must Project 1/32"	Must Project 1/32"	Must Project 1/32"
Choke Unloader Adjustment	#31(.120")	#31(.120")	#31(.120")
Secondary Contour Adjustment	.030"	.030"	.030"
Secondary Lockout Adjustment	.015"	.015"	.015"
Initial Idle Speed	1 Turn In	1 Turn In	2 Turns In
Initial Idle Mixture	1 1/2 Turns Out	1 1/2 Turns Out	1 1/2 Turns Out
Fast Idle Speed in Drive (Hot, on Low Step)	600 RPM	600 RPM	600 RPM

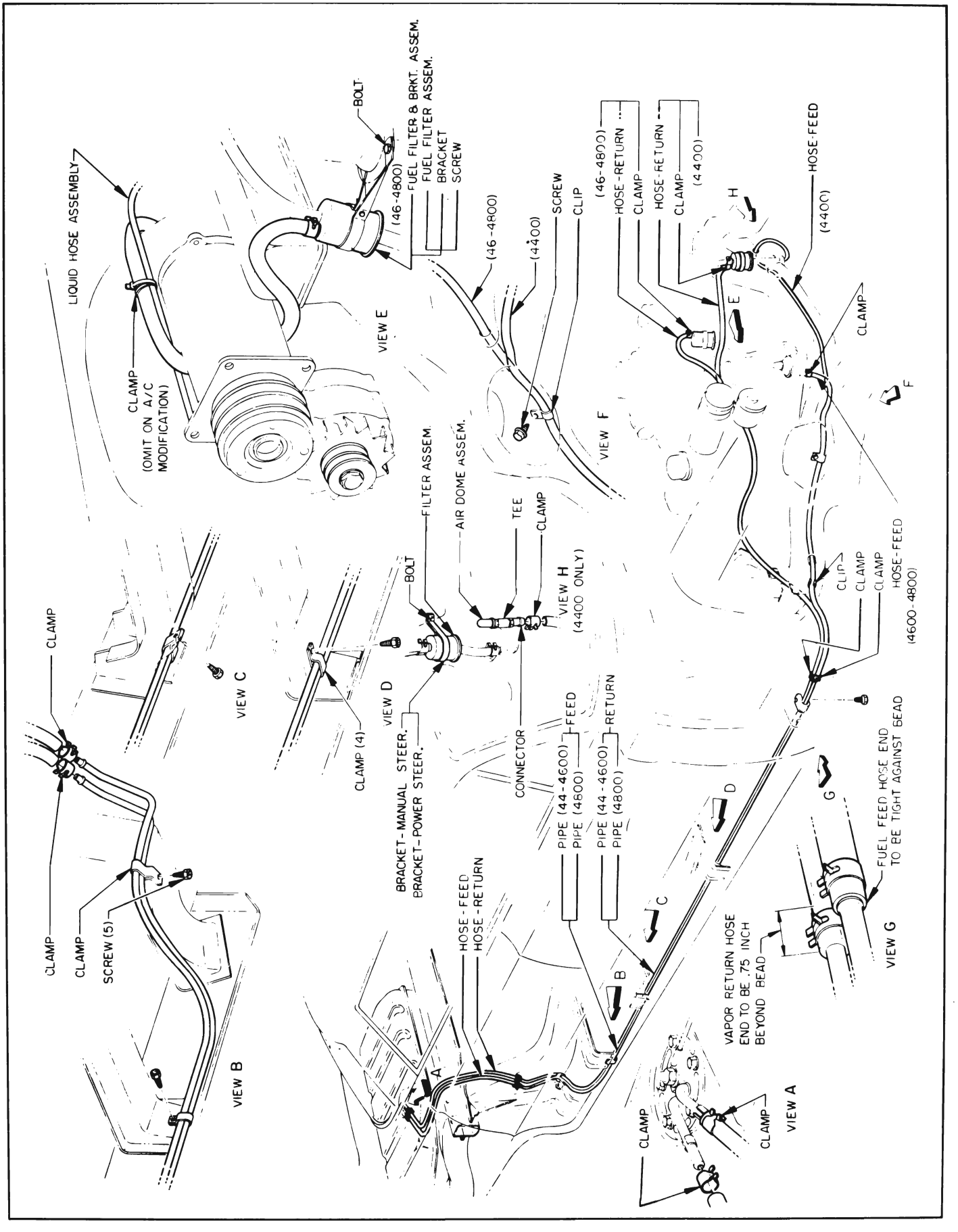

Figure 3-1—Fuel System-Air Conditioned Cars

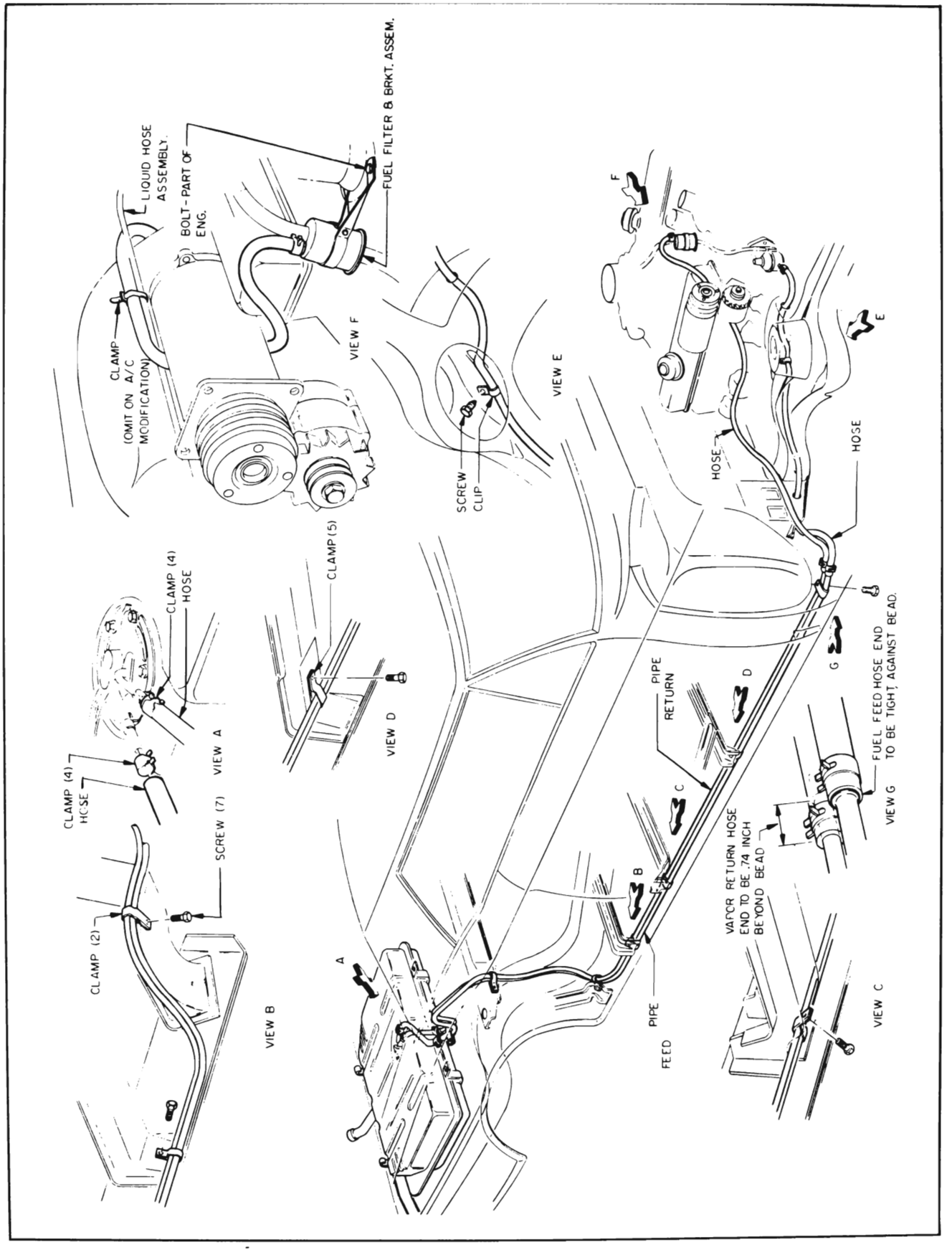

Figure 3-2—Fuel System-Air Conditioned Rivieras

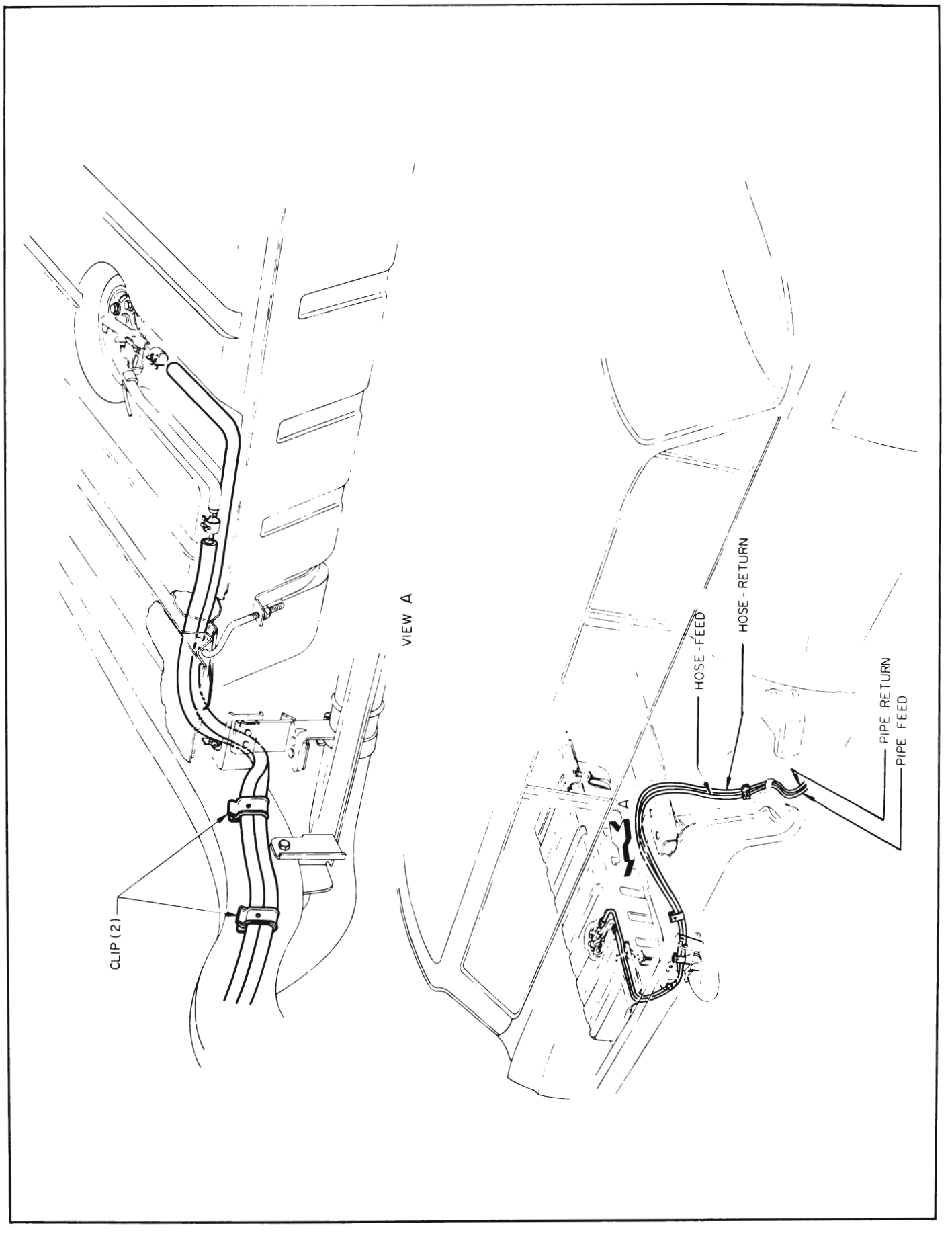

Figure 3-3—Fuel System—Air Conditioned Wagons

3-2 DESCRIPTION OF FUEL SYSTEM

a. Gasoline Tank, Feed Pipe and Filter

The gasoline tank is attached to the underbody in the kick-up area over the rear axle assembly (except Rivieras and estate wagons). The tank is attached directly by two bolts through the rear flange and two nuts at the front flange.

The lower section of the gas tank filler is soldered into an opening at the left upper center of the tank. A separate upper section of the tank filler is fastened to the body by four bolts. The upper and lower sections of the filler are joined with a short hose and two clamps. 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 top right 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 special access hole cover in the trunk compartment (all except Rivieras and estate wagons).

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 and 2.

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 Riviera 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 four basic air cleaner and silencer assemblies: one for two barrel carburetor cars, one for four barrel carburetor cars, one for Rivieras, and one for dual four barrel carburetor cars. See Figure 3-4.

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 center line 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 center line of the engine and with the word

Figure 3-4—Air Cleaners and Silencer Assemblies

"FRONT" on the air cleaner forward. On power steering cars, the intake will be located about one inch to the rear of the power steering pump.

The air cleaner (except for Rivieras 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. Riviera 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 without being affected by movement of the engine on its rubber mountings. See Figure 3-17.

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 3-17.

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 3-14.

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". On 2-speed automatic transmission cars only, the 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 3-17.

On 2-speed automatic transmission cars only, an idle stator switch 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 Figure 3-17.

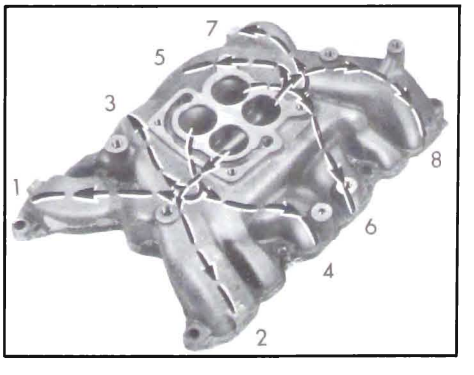

Figure 3-5—Intake Manifold Distribution-401 and 425 Engines

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 3-5, 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.

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

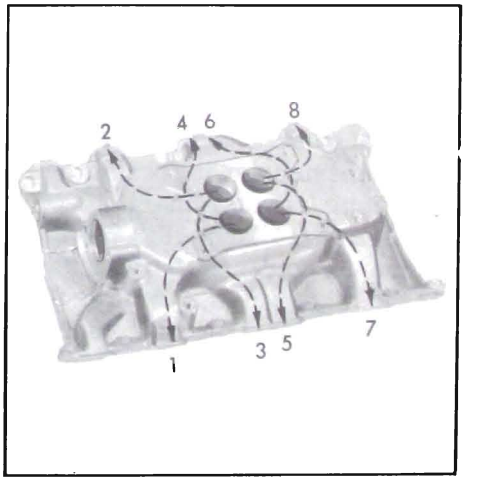

Figure 3-6—Intake Manifold Distribution-300 Engine

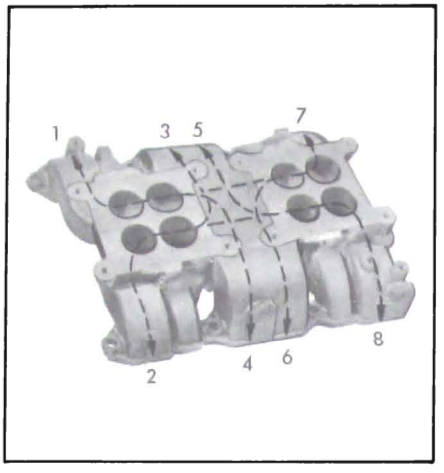

Figure 3-7—Intake Manifold Distribution-Dual 4-Barrel Engine

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. Intake Manifold Heat—300 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 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.

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.

d. 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.

e. Dual Exhaust System

The dual exhaust system is optional on Series 46-4800 cars except estate wagons. Because of the different location of the gas tank on the estate wagons, dual exhaust cannot be installed on these models. Dual exhaust is standard on Riviera models.

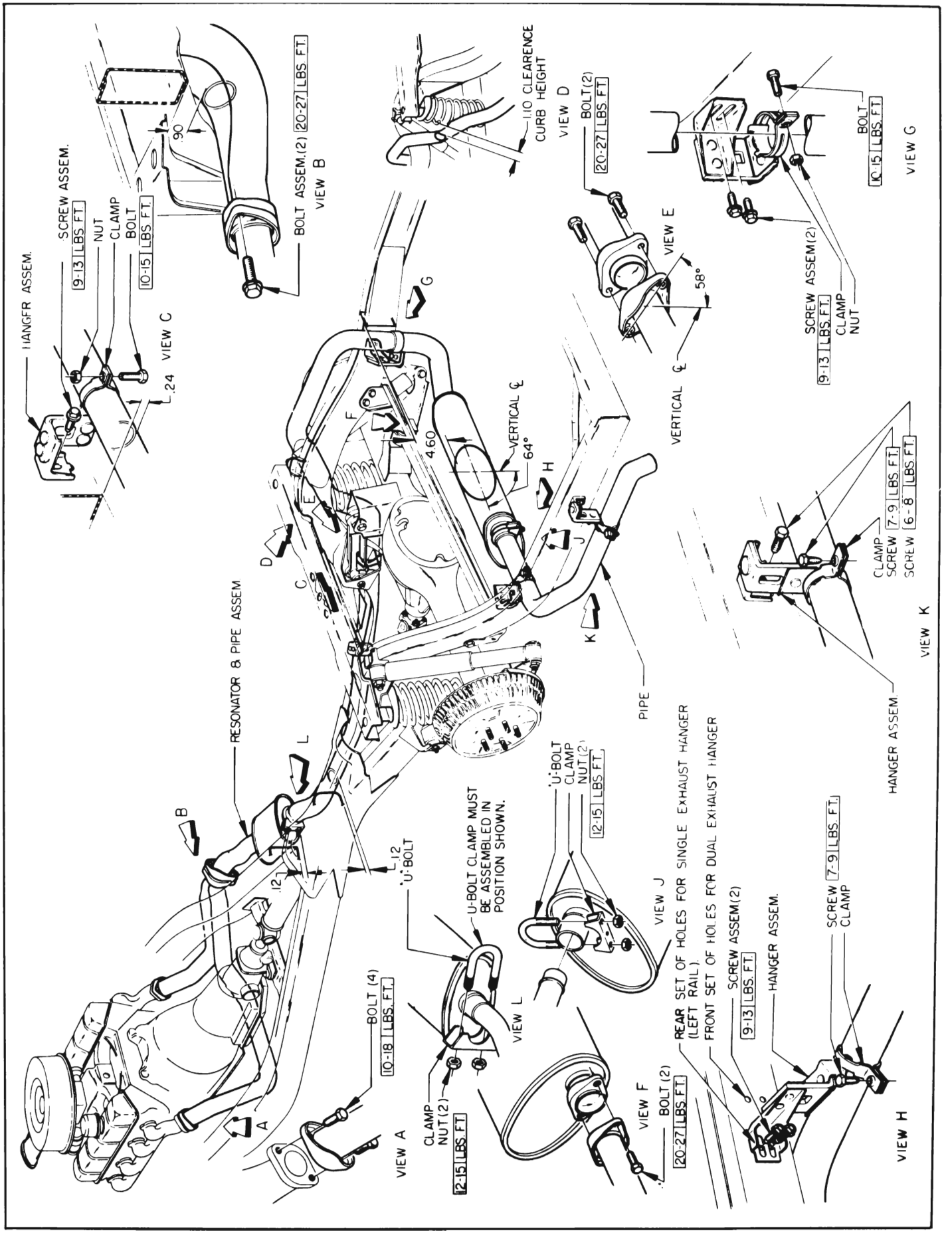

Figure 3-8—Single Exhaust System-4400 Series

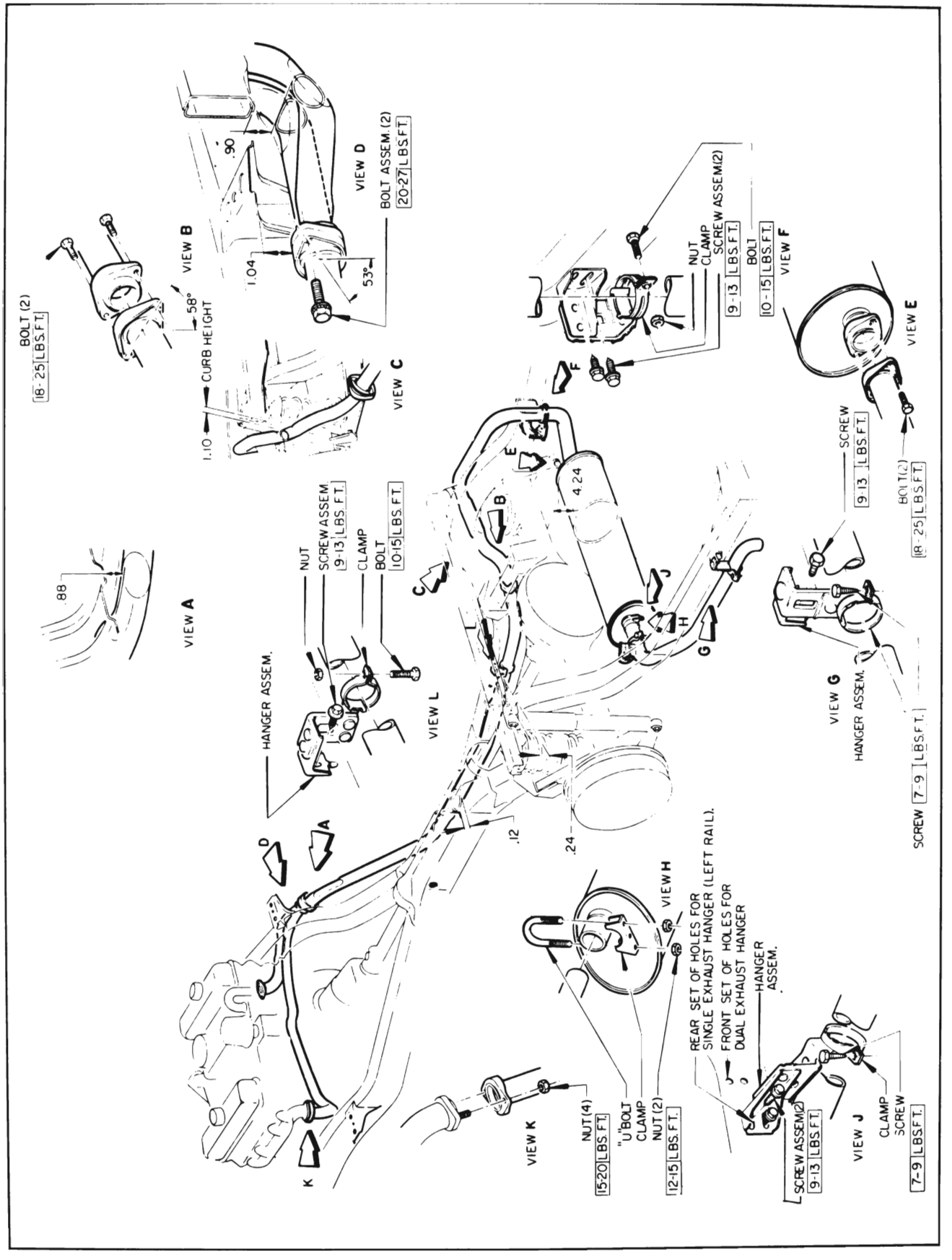

Figure 3-9—Single Exhaust System—46-4800 Series

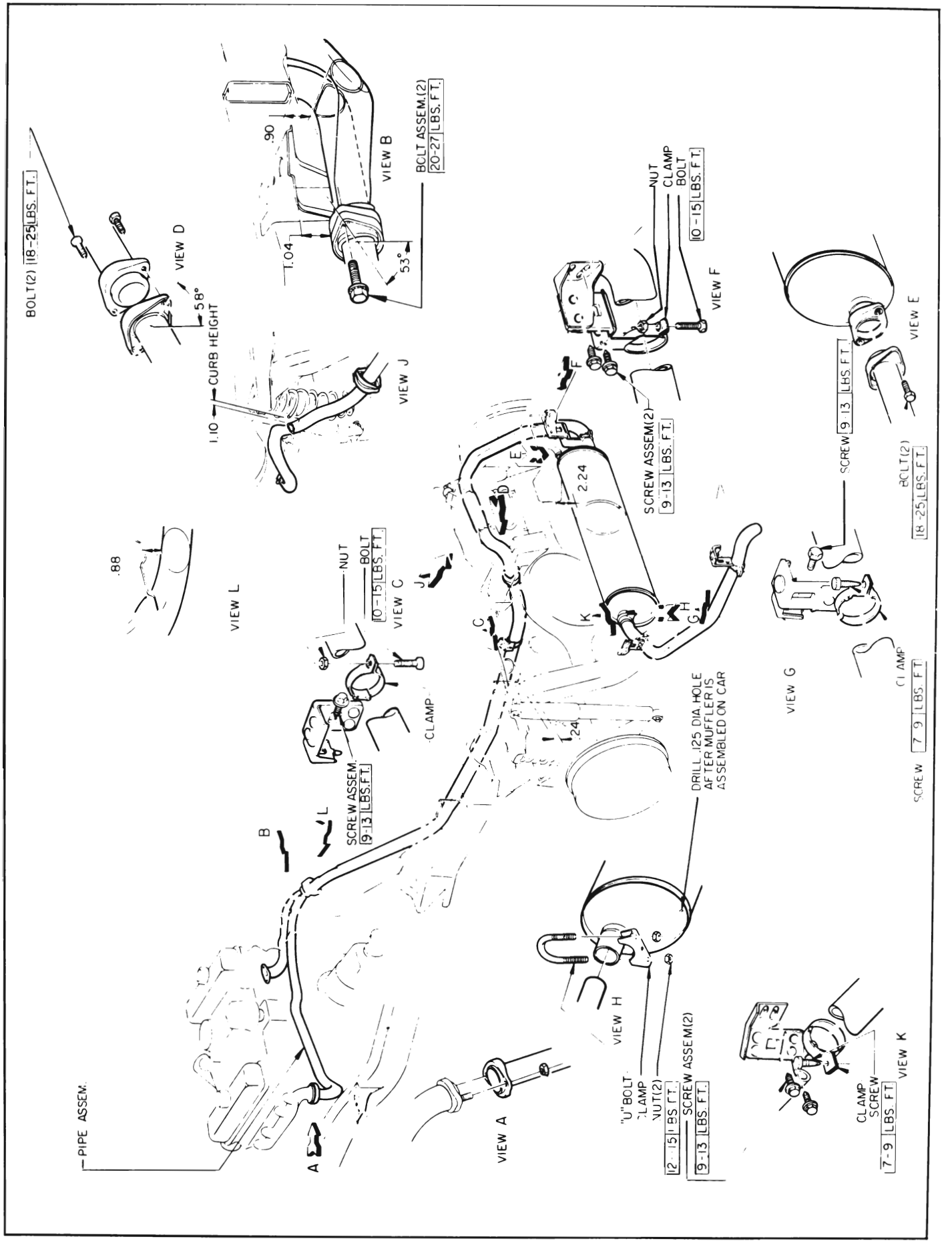

Figure 3-10—Single Exhaust System—Wagons

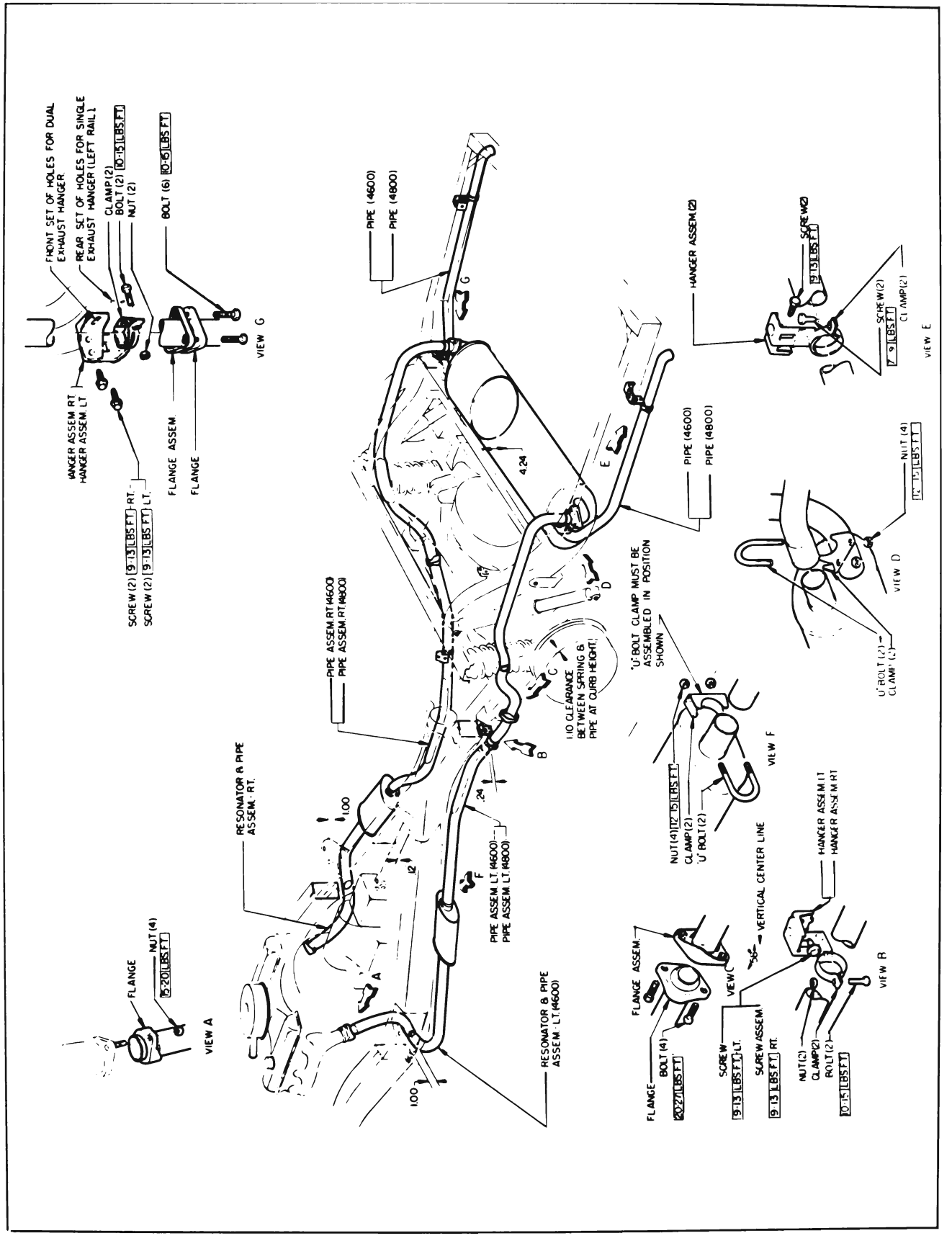

Figure 3-11—Dual Exhaust System—46-4800 Series

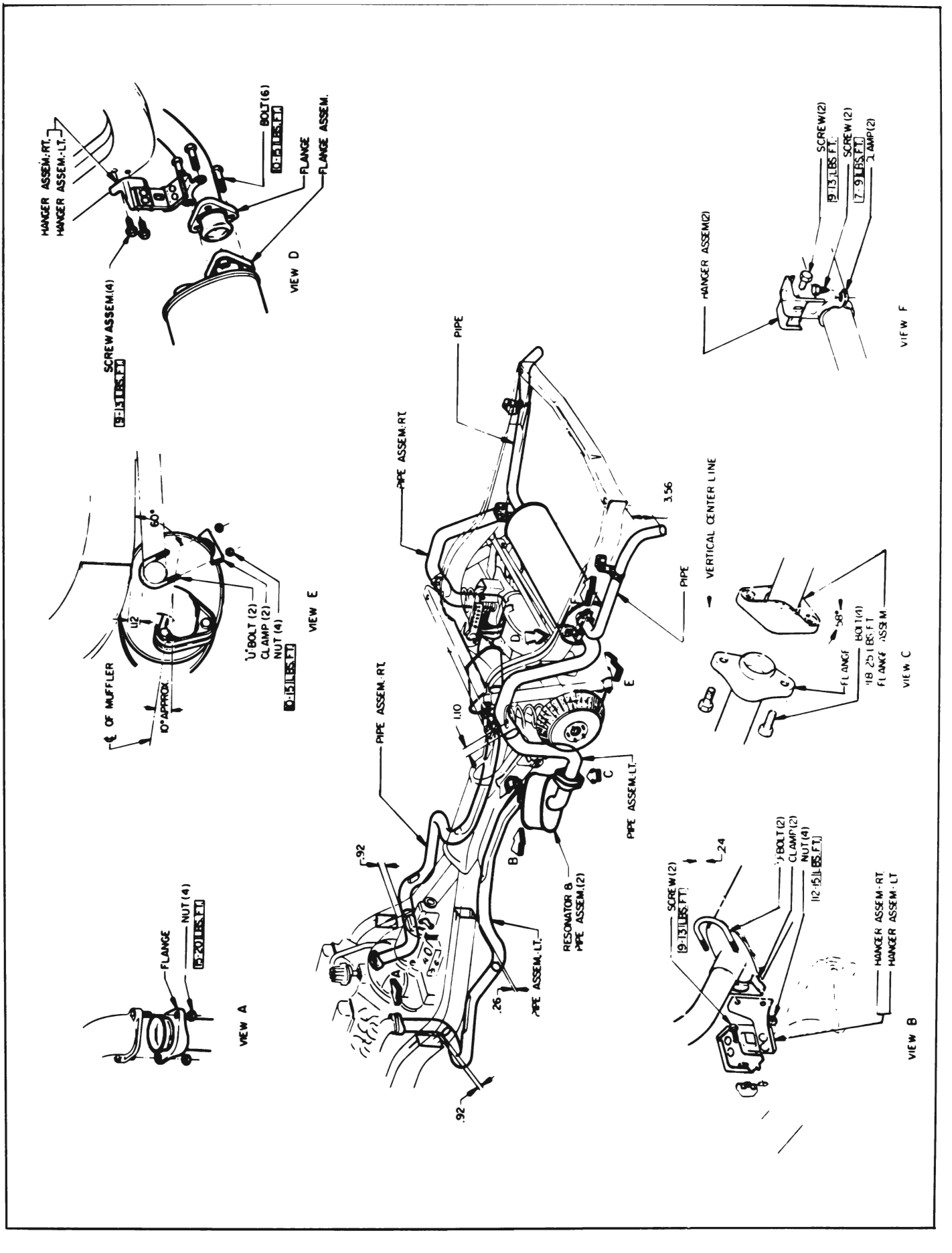

Figure 3-12—Dual Exhaust System-Rivieras

A single muffler is placed cross-wise at the rear of the car. See Figures 3-11 and 12. 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 Figures 3-11 and 12. Longer front and center exhaust pipes are used on the Series 4800 because of their longer wheel base. Also longer tail pipes are required on Series 4800 because of their longer rear overhang.

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.

f. Single Exhaust System

The single exhaust system has the same construction features as the dual exhaust system. A smaller cross-wise muffler is used which has the inlet located on the right end and the outlet on the left end. See Figures 3-8, 9 and 10.

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 along the right side of the frame back to the rear exhaust pipe. The rear exhaust pipe extends up over the rear axle along the outside of the frame, then crosses over the side rail and goes down to the right end of the muffler. A short tail pipe extends back from the left end of the muffler. All connections are ball joints except the tail pipe to muffler connection which is the U-bolt and clamp type. See Figures 3-8, 9 and 10.

A total of four hangers is used on the single exhaust system, the first located near the rear end of the center exhaust pipe, the second located near the muffler end of the rear exhaust pipe, the third at the muffler end of the tail pipe, and the last near the rear end of the tail pipe.

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.