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

Items	All Series
Gasoline, Grade Required (with Syn.)	Regular
Gasoline, Grade Required (with Auto. Trans.)	Premium
Gasoline Tank Capacity (gal.)	20
Gasoline Gauge, Make and Type	AC Electric
Fuel Pump—Make and Type	AC, HE
Drive	Eccentric at Camshaft Sprocket
Fuel Pump Pressure—	
At Pump Outlet, pounds	5¾ to 7
At Carburetor Inlet, pounds	5¼ to 6½
Fuel Filter, Near Carb. Inlet	A.C. Glass Bowl
Fuel Filter, In Gas Tank	Woven Plastic
Carburetor, Make	Carter, Stromberg, or Rochester
Type	Downdraft
Barrels	2 4
Air Cleaner, Make and Type	AC, Plastic Foam Element
Sump Capacity, Oil Used	None
Intake Manifold Heat Control	Valve and Thermostat
Heat Source	Exhaust Gas
Thermostat Wind-Up @ 70 Deg. F., Valve Closed	½ Turn
Idle Speed, in Neutral or Park	
Regular	485 RPM
Air Conditioned	550 RPM

b. Stromberg Carburetor Calibrations

IMPORTANT: *Calibrations are governed by the CODE number stamped on air horn directly above the fuel inlet.*

Items	Series 4400 Auto. Trans.
Model Designation	WW-2
Number of Barrels	2
Size	1¼″
Primary Venturi Diameter	1 9/32″
Code Number for Following Calibrations	7-113
Idle Tube Feed Hole	#68
Idle Air Bleeder	#42
Location	Main Body
Sec. Air Bleeder	#52
Location	Air Horn
Idle Discharge Holes	
1st (with Tube)	#46
2nd	#55
Main Metering Jets	
Production	.057″
High Altitude	.055″
NOTE: *Use High Altitude Jets Above 3500 Feet.*	
Main Discharge Jet	#28-36
High Speed Bleeder	#70
Power By-Pass Jet (2 Stage)	1st—.026″, 2nd—.048″
Pump Discharge Jet	#66
Vacuum Spark Control Port	#46
Thermostat Cover Ident. No.	36
Float Setting (for Normal Driving)	5/32″
Float Setting (for Extreme Grades)	3/16″
Pump Setting (Center Hole)	7/8″
Start Aid	#53 (.061″)
Choke Unloader	#26 (.146″)
Initial Fast Idle Setting (on High Step of Cam)	9 Turns In
Choke Spring Pick-Up Lever	7 Turns In
Fast Idle Cam Setting	Between Index Marks
Choke Positioning	#6 (.204″)
Choke	Index
Initial Idle Speed	1½ Turns In
Initial Idle Mixture	1 Turn Out
Fast Idle Speed (Hot, on Car)	1500 RPM

c. Carter Carburetor Calibrations

IMPORTANT: *Calibrations are governed by the CODE number.*

ITEMS	Series 4400 Syn. Trans.	Series 4400 Auto. Trans.	Series 4600 4700-4800	Series 4400 Power Pack
Model Designation	WGD	WGD	AFB	AFB
Number of Barrels	2	2	4	4
Code Number, for Following Calibrations	2979S	2980S	2982S	2981S
Large Venturi Diameter, Primary	1 3/16"	1 3/16"	1 3/16"	1 3/16"
Large Venturi Diameter, Secondary			1 9/16"	1 9/16"
Float Setting, Cover to Float	1/4"	1/4"		
Gasket to Float			7/32"	7/32"
Float Drop			3/4"	3/4"
Float Needle Seat	#38	#34	#34	#34
Low Speed Jet	#69	#69	#56	#56
Idle Discharge Port	.150" x .030"	.190" x .030"	.200" x .030"	.200" x .030"
Lower Idle Port	#52	#52	#52	#52
Metering Jet, Primary	120-240	120-240	120-243	120-243
Metering Jet, Secondary				
Production			120-194	120-175
High Altitude			120-177	120-222
Metering Rod				
Production	75-1478	75-1479	16-124	16-123
High Altitude	75-1484	75-1486	16-128	16-130
NOTE: *Use High Altitude Parts Above 3500 Feet. On 2 Bbl.—Use Rods Only. On 4 Bbl.—Use Kit Consisting of Secondary Jets, Primary Rods and Springs.*				
Metering Rod Setting at Closed Throttle	Bottomed	Bottomed		
Anti-Percolator or Main Bleed Hole	#70	#70	#70	#70
Pump Setting at Closed Throttle	Arm Level	Arm Level	1/2"	1/2"
Pump Discharge Jet	#68	#68	#70	#70
Vacuum Spark Control Port	.130" x .040"	.130" x .040"	.130" x .040"	.130" x .040"
Choke Coil Housing Number	170AD374S	170AA374S	170AD478S	170AD478S
Choke Thermostat Setting	Index	Index	1 Notch Rich	1 Notch Rich
Choke Suction Hole	#42	#42	#40	#40
Choke Piston Setting, Choke Closed			See Fig. 3-53	See Fig. 3-53
Closing Shoe Clearance			.020"	.020"
F.I. Cam Setting	Index	Index	Index	Index
F.I. Cam with Choke Closed	Must Clear Stop	Must Clear Stop	Must Clear Stop	Must Clear Stop
Initial Fast Idle Setting	#70 (.028")	#70 (.028")	#76 (.020")	#76 (.020")
Unloader Opening at Choke Valve Edge	3/16"	3/16"	3/16"	3/16"
Fast Idle Speed (Hot, on Car)	1500 RPM	1500 RPM	1500 RPM	1500 RPM
Initial Idle Speed	1 Turn In	1 Turn In	3/4 Turn In	3/4 Turn In
Initial Idle Mixture	3/4 Turn Out	3/4 Turn Out	1 1/2 Turns Out	1 1/2 Turns Out

d. Rochester Carburetor Calibrations

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

Items	Series 4600-4700-4800	
Model Designation	4GC	
Number of Barrels	4	
Code Number for, Following Calibrations	7015040	
	Primary	Secondary
Small Venturi	1/4"	1/4"
Large Venturi	1 1/8"	1 15/32"
Main Metering Jets		
Production	.051"-60°	.077"-60°
High Altitude	.048"-60°	.073"-60°
NOTE: *Use High Altitude Kit Above 3500 Feet. Kit Consists of Primary Jets, Secondary Jets, and a Power Piston Assy.*		
Idle Tube	#70	#69
Lower Idle Bleed	#64	#46
Idle Needle Holes	#60	

Items	Series 4600-4700-4800
2nd Idle Holes	2—#67
3rd Idle Holes	#66
4th Idle Holes	#66
Spark Drillings	#46
Pump Discharge Holes	#71
Power Restriction	#57
Choke Restriction	#43
Choke Setting	Index
Primary Float Setting	.140"
Primary Float Drop	1 3/8"
Secondary Float Setting	1 3/8"
Secondary Float Toe	3/8"
Secondary Float Drop	1 5/16"
Pump Setting (Center Hole)	1 1/64"
Fast Idle Cam Setting	#51 (.067")
Choke Piston Setting, Choke Closed	0 to 1/32"
Choke Unloader	#30 (.129")
Initial Fast Idle Setting	#70 (.028")
Secondary Contour	.030"
Secondary Lockout	.015"
Fast Idle (Hot, on Car)	1500 RPM
Initial Idle Speed	1 Turn In
Initial Idle Mixture	1 1/2 Turns Out

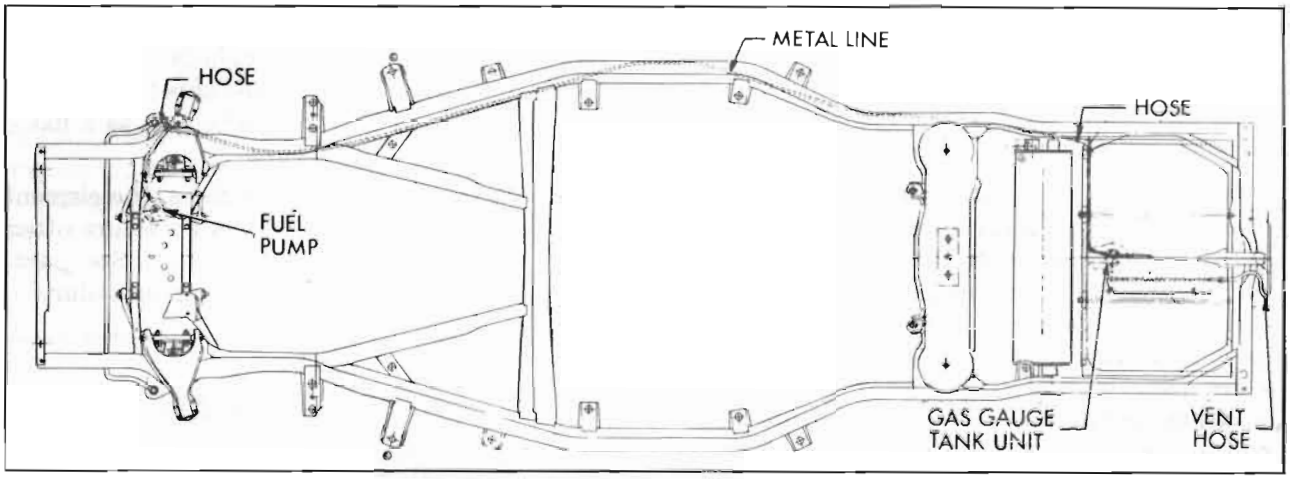

Figure 3-1—Fuel System (Top View)

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.

The gas tank filler is soldered into an opening at the rear upper center of the tank, and is accessible by tilting the license plate holder. The tank is vented at a special pipe rather than at the filler cap. This breather pipe extends rearward from the top center of the tank and has a rubber hose extending from it up into the filler pipe recess. See Figure 3-1.

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

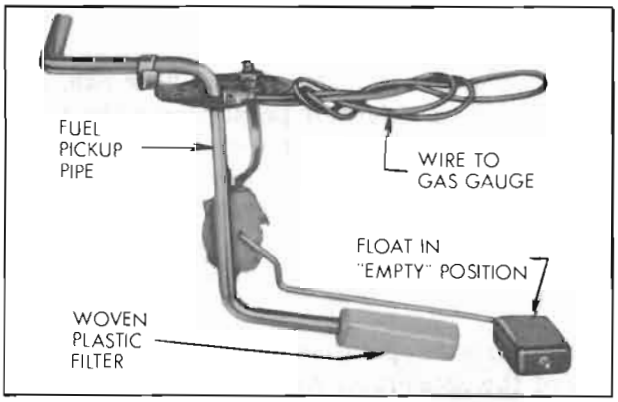

Figure 3-2—Gas Gauge Tank Unit

The fuel line is an internally corrosion resistant treated metal line assembled inside the right frame rail. Connections from the tank to the line and from the line to the fuel pump are made with synthetic rubber hose attached with clamps. A special clamp at the forward end of the metal line prevents any fore-and-aft movement of the line within the frame. See Figure 3-3.

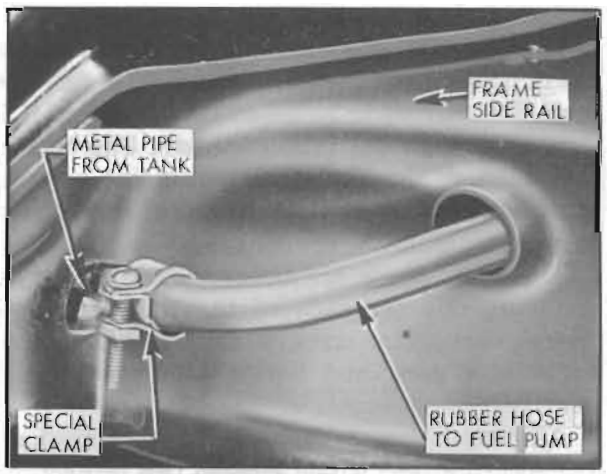

Figure 3-3—Front Fuel Line Clamp

A glass bowl fuel filter is located in the line between the fuel pump and the carburetor. In this location, the filter can be visually inspected or cleaned without removing the air cleaner.

On air conditioner equipped cars built in the Arlington and Kansas City plants only, a vapor by-pass system is installed. These cars have a special fuel filter which has a metering outlet in the top. All vapor which forms is bled off and returned to the gas tank through a rubber

hose along the *left* frame side rail. This system greatly reduces any possibility of vapor lock.

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 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 the fuel stream. The construction and operation of the pump are described in Section 3-D.

The Carter carburetors are described in Section 3-E (2-barrel) and Section 3-F (4-barrel). The Stromberg carburetor is described in Section 3-G. The Rochester carburetor is described in Section 3-H. The carburetor starter switches are described in Section 10-E.

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.

There are three air cleaner and silencer assemblies, one for each of the following: two barrel carburetor cars, standard four barrel carburetor cars, and Series 4400 power pack four barrel carburetor cars.

All 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. On power steering cars, the intake will be located about one inch to the rear of the power steering pump.

The air cleaner 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 5000 miles (more often under dusty operating conditions). See paragraph 1-2 step 2 for the cleaning procedure.

Figure 3-4—Air Cleaner and Silencer Assemblies

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. The linkage also serves to operate the carburetor starter switch when cranking the engine. See figure 3-11.

The accelerator pedal is mounted on two ball studs which are fastened in the floor pan. Depressing the accelerator pedal causes the pedal to make a sliding contact with the rear end of the accelerator rod, forcing the rod to pivot forward and down. The rod pivots in an equalizer link which extends between a pivot pin on the body cowl and a contact button on the rear of the engine. See figure 3-11.

The throttle operating lever is welded to the end of the accelerator rod. As the rod is pushed forward by the accelerator pedal, the operating 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 and also holds the lower end of the equalizer link in contact with the rear of the engine at all times. See figure 3-11.

On cars equipped with an automatic transmission, 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 throttle valves to prevent sudden shut off which might cause the engine to stall when the accelerator pedal is suddenly released. The throttle linkage also actuates a separate lever and rod connected to the stator control valve in the transmission.

3-3 DESCRIPTION OF INTAKE AND EXHAUST SYSTEMS

a. Intake Manifold and Heat Control

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.

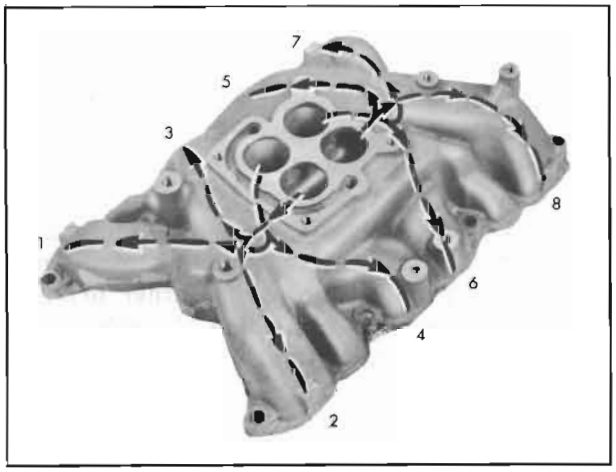

Figure 3-5—Intake Manifold Distribution

The *Series 4400* 2-barrel carburetor feeds one barrel into each section of its 2-port manifold. The *Series 4600-4700-4800* 4-barrel carburetor feeds one primary and one secondary barrel into each section of its 4-port manifold.

The intake manifold is heated and hot spots

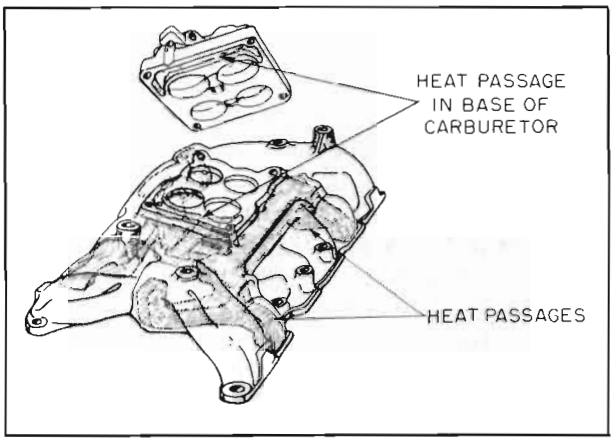

Figure 3-6—Intake Manifold Heat Chambers

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. See figure 3-6. 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 cross-over passages cast under the center section of the manifold. These passages connect to the two middle exhaust passages in each cylinder head. See figure 3-6. Exhaust heat is supplied directly to the carburetor mounting surface by two holes drilled from the mounting surface into the cross-over passages. The carburetors are designed to conduct this heat around the throttle valve area to reduce engine stalling due to carburetor icing.

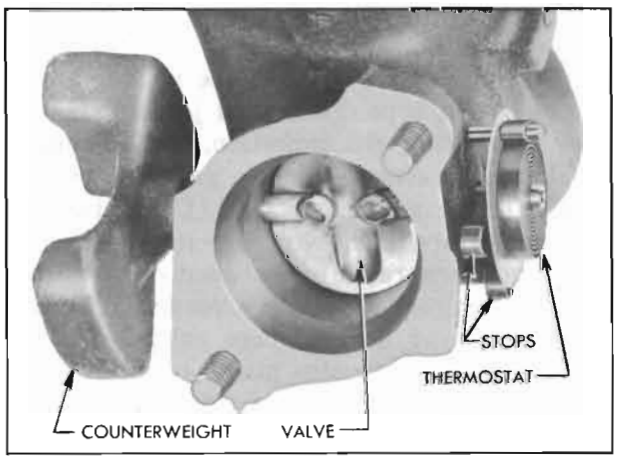

Figure 3-7—Exhaust Manifold Valve

A heat control valve with a bi-metal thermostat is located in the right exhaust manifold. See figure 3-7. 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. In a synchromesh engine, the intake manifold gasket holes are larger, resulting in more manifold heat during warm-up.

b. 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 designed 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 valve which controls the supply of exhaust heat to the intake manifold, as described above (subpar. a). It also 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 muffler are of the ball joint type. These ball joints make for easy connection, disconnection, and alignment of exhaust system parts. No gaskets are used in the entire exhaust system. Connections to the muffler are made with U-bolts and clamps.

The mufflers are 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 prevents any "oil-canning" effect. The mufflers are 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 standard on the 4700 and 4800 and optional on the 4400 and 4600. Exhaust gas flow resistance has been reduced by enlarging the size of the exhaust pipes from two inches to two and one-quarter inches. A single muffler is placed cross-wise at the rear of the car. See figure 3-8. A heat shield is attached to the body rear floor pan and placed between the muffler and gas tank.

The muffler has an inlet and an outlet on each end. Each side of the dual exhaust system has a long front exhaust pipe, connected by a ball joint to a short rear exhaust pipe just forward of the rear spring cross member. The rear exhaust pipe is attached to the muffler inlet by a "U" bolt and clamp. Attached to each of the muffler outlets by a "U" bolt and clamp is a one and three-quarter inch diameter tail pipe. Only two hangers are required on each side of the dual exhaust system, one located near the muffler end of the rear exhaust pipe and the other near the rear of the tail pipe. The muffler is supported by the exhaust and tail pipe hangers. Longer front exhaust pipes are used on the 4700 and 4800 because of their longer wheel base. Also longer tail pipes are required on the 4800 because of its extended quarter panels.

The exhaust gases from each bank of cylinders pass through individual resonating chambers in the new muffler and then enter one common chamber. This common mixing of gases materially increases muffler silencing ability and eliminates the "cold side" muffler. The cold side of the previously used dual exhaust system is the side in which the engine thermostatic heat control valve is located. During warm-up and some cold weather driving, the heat control valve is closed, directing most of the exhaust gas from the right bank of cylinders over into the left side of the exhaust system. The small amount of exhaust gas traveling through the "cold side" muffler does not have enough heat to evaporate the water vapor which is present in exhaust gas.

d. Single Exhaust System

The single exhaust has the same construction features as the dual exhaust system. A smaller muffler is used which has the inlet located on the right end and the outlet on the

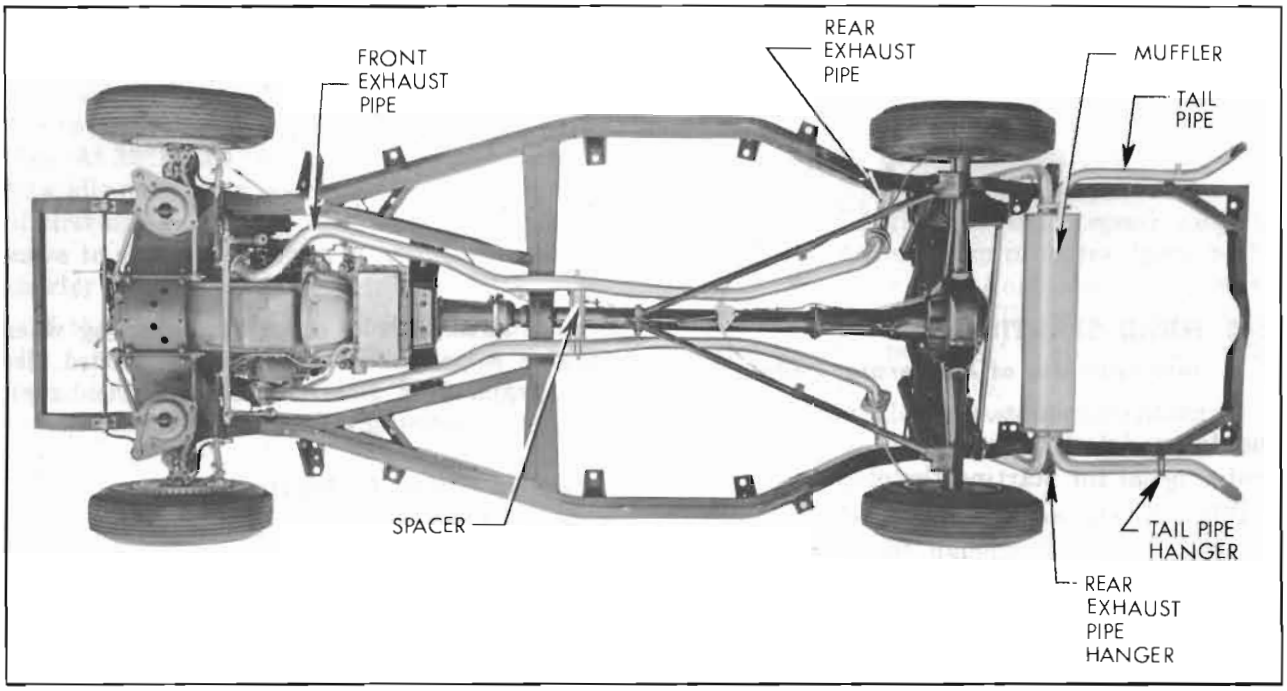

Figure 3-8—Dual Exhaust System

left end. Also the tail pipe on the single exhaust is a two-inch diameter pipe.

Due to the fact that a cross-over exhaust pipe (front exhaust pipe) is necessary on the single exhaust, a long center exhaust pipe is used to connect the cross-over pipe to the rear exhaust pipe. A total of four hangers are used, one located near the middle of the center exhaust pipe, one near the muffler end of the rear exhaust pipe, and two on the tail pipe.