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 Syn. or Auto. Trans.)	Regular
Gasoline Tank Capacity (gal.)	16
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. Glass Bowl
Fuel Filter, In Carb. Inlet (V-6 Engine)	Rochester Sintered Bronze
Fuel Filter, In Gas Tank (All)	Woven Plastic
Carburetor, Make	Rochester
Type	Downdraft
Barrels	2
Air Cleaner, Make and Type	A. C., Plastic Foam Element
Sump Capacity, Oil Used	None
Intake Manifold Heat Control Valve (V-8 Engine)	None
Heat Source	Hot Water from Heads
Intake Manifold Heat Control Valve (V-6 Engine)	Thermostat Type
Heat Source	Exhaust Gas
Thermostat Wind-up @ 70 Deg., Valve Closed	1/2 Turn
Idle Speed, in Neutral or Park	525 RPM
Air Conditioner	575 RPM

b Carburetor Calibrations

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

ROCHESTER 2-BARREL

	Syn. Trans.		Auto. Trans.	
	V-8	V-6	V-8	V-6
Model Designation	2GC	2GC	2GC	2GC
Number of Barrels	2	2	2	2
Code Number, for Following Calibrations	7019093	7020141	7019090	7020140
Throttle Bore	1 5/16"	1 5/16"	1 5/16"	1 5/16"
Small Venturi	1/8"	1/8"	1/8"	1/8"
Large Venturi	1"	1"	1"	1"
Main Metering Jet				
Production	.048"	.045"	.046"	.045"
High Altitude	.046"	.043"	.044"	.043"
NOTE: Use high Altitude Kit Above 3500 Feet.				
Idle Tube Restriction	#66	#66	#69	#66
Idle Needle Hole	#55	#56	#55	#56
Idle Slot (V-8 Only)	.020"Wide		.020" Wide	
Idle Port Holes (V-6 Only)				
1st Idle Hole		#69		#69
2nd Idle Hole		#69		#69
3rd Idle Hole		#70		#70
Spark Holes	2 - #55	2 - #55	2 - #55	2 - #55
Pump Discharge Holes	2 - #71	2 - #71	2 - #71	2 - #71
Choke Restriction	#42	#46	#48	#46
Choke Setting	Index	Index	Index	Index
Choke Coil Number	#27	#32	#28	#32
Main Well Vent	#70	#58	#70	#58
Cluster Top Bleed	#67	#65	#67	#65
Cluster Side Bleed	#68	#50	#68	#50
Float Level Adjustment	1 17/64"	1 17/64"	1 17/64"	1 17/64"
Float Drop Adjustment	1 29/32"	1 29/32"	1 29/32"	1 29/32"
Pump Rod Adjustment (Outer Hole)	1 3/32"	3/4"	1 3/32"	3/4"
Choke Rod Adjustment	#55 (.052")	#55 (.052")	#55 (.052")	#55 (.052")
Choke Unloader Adjustment	#22 (.157")	#22 (.157")	#22 (.157")	#22 (.157")
Initial Idle Speed	1 Turn In	1 Turn In	1 Turn In	1 Turn In
Initial Idle Mixture	1 Turn Out	1 Turn Out	1 Turn Out	1 Turn Out

ROCHESTER 4-BARREL

Model Designation		4GC	
Number of Barrels		4	
	Primary		Secondary
Code Number			
Automatic Transmission		7020144	
Synchromesh Transmission		7020145	
Throttle Bore	1 5/16"		1 7/16"
Small Venturi	1/4"		1/4"
Large Venturi	1"		1 1/4"
Main Metering Jets - Production			
Automatic Transmission	.047" - 60°		.054" - 60
Synchromesh Transmission	.048" - 60°		.055" - 60
Main Metering Jets - High Altitude			
Automatic Transmission	.046" - 60°		.052" - 60
Synchromesh Transmission	.047" - 60°		.052" - 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	#71		#70
Synchromesh Transmission	#70		#70
Idle Needle Hole		#56	
1st Idle Hole		#67	
2nd Idle Hole		#68	
3rd Idle Hole			
Automatic Transmission		#65	
Synchromesh Transmission		#68	
4th Idle Hole			
Automatic Transmission		#65	
Synchromesh Transmission		#66	
Spark Hole		2-#55	
Pump Discharge Hole		#71	
Choke Restriction		#44	
Choke Setting		Index	
Choke Coil Number		#30	
Primary Float Level Adjustment		.140"	
Primary Float Drop Adjustment		1 9/16"	
Secondary Float Level Adjustment		1 3/8"	
Secondary Float Toe Adjustment		3/8"	
Secondary Float Drop Adjustment		1 9/32"	
Pump Rod Adjustment (Center Hole)		61/64"	
Choke Rod Adjustment		#56 (.045")	
Choke Piston Setting, Choke Closed		0 to 1/32"	
Choke Unloader Adjustment		#30 (.129")	
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)		625 RPM	
Slow Idle Speed (Hot)		525 RPM	
Slow Idle Speed (Hot, A/C Car)		575 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.

The gas tank filler is soldered into an opening at the center of 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 just under the cap. This vent is designed to allow rapid filling of the tank. See Figures 3-1 and 3-2.

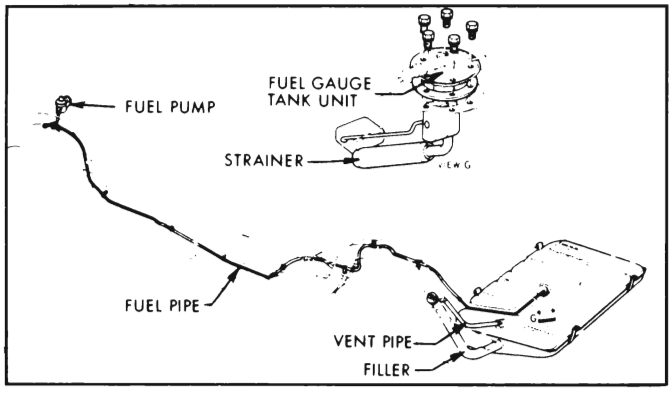

Figure 3-1—Fuel System (Except 4045).

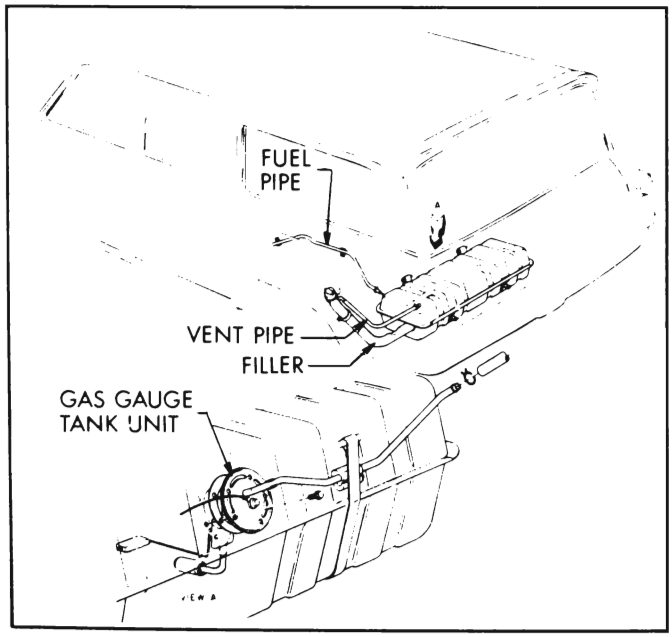

Figure 3-2—Fuel System (4045).

The tank outlet is located just forward of the top center of the tank. It consists of a combination fuel pickup, filter, and gas gauge tank unit. See Figures 3-1 and 3-2.

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

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 without removing the air cleaner. On the V-6 engine, a sintered bronze filter, located in the carburetor inlet, takes the place of the glass bowl filter.

On 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. 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.

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 3-3.

The carburetor air cleaner has 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 word "FRONT", located on the forward center line of the engine.

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 8,000 miles (more often under dusty operating conditions). See paragraph 1-1, step 3 for the cleaning procedure.

Figure 3-3—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. See Figure 3-14.

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 sliding contact with the rear end of 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 3-14.

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.

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 cars equipped with an automatic transmission, the throttle linkage also actuates a separate linkage which is connected to a valve in the transmission. See Figure 3-14.

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 3-4.

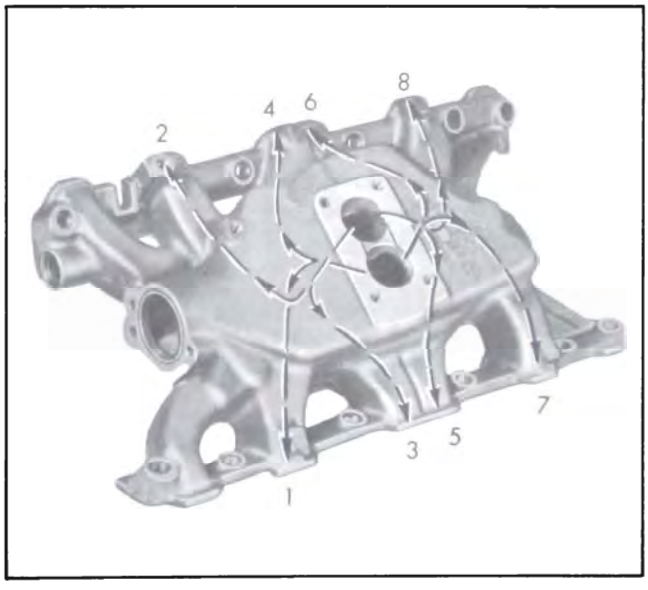

Figure 3-4—Intake Manifold Distribution-V-8 Engine

The aluminum intake manifold is heated by engine coolant which flows from the front of each head into the two front corners of the in-

take 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. See Figure 3-5.

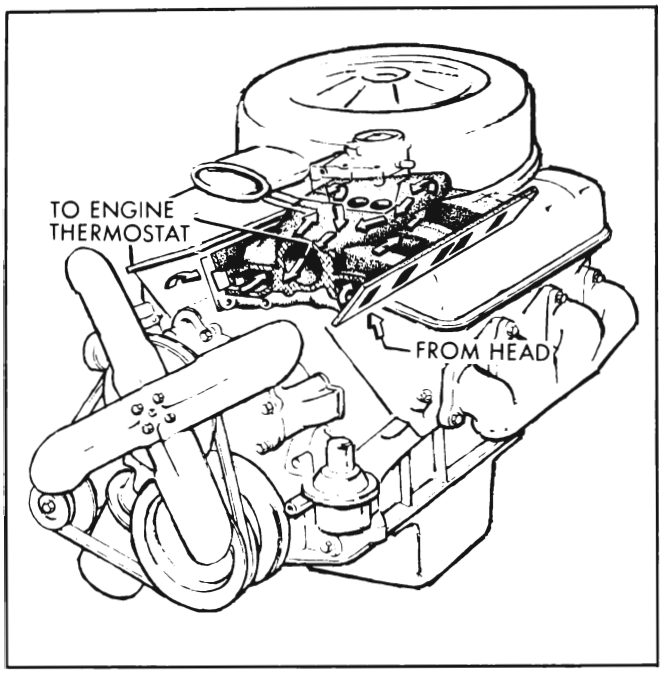

Figure 3-5—Hot Water Flow Through Intake Manifold - V-8 Engine

During engine warm-up, the coolant temperature is not high enough to cause the engine thermostat to open. However, a thermostat bypass 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. Both the intake manifold and the carburetor base have a special exhaust passage to provide heat when needed.

The controlling source of the exhaust heat is a heat control valve located in 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 3-6.

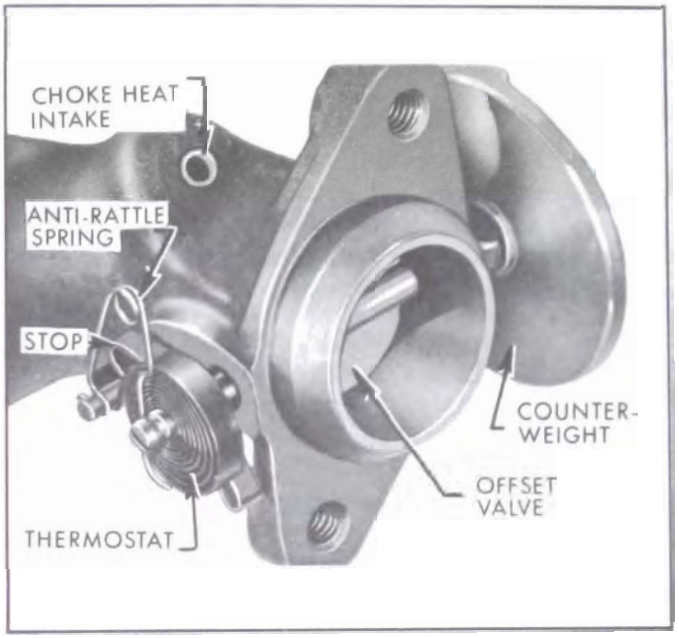

Figure 3-6—Exhaust Manifold Valve - V-6 Engine

This causes a pressure build up in the right exhaust manifold which forces exhaust through the cross-over passage under the carburetor to the left exhaust manifold and on out the exhaust system. See Figure 3-7.

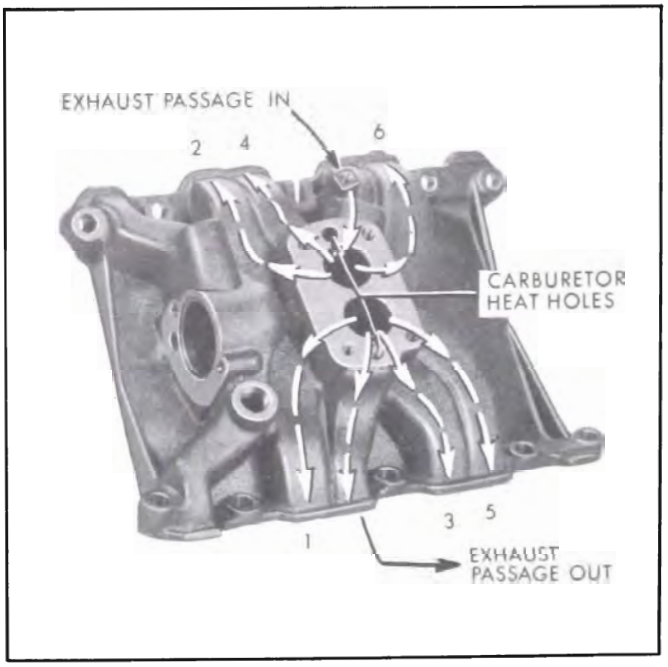

Figure 3-7—Intake Manifold V-6 Engine

Exhaust is supplied directly to the carburetor throttle body by two holes drilled from the mounting surface of the intake manifold into the cross-over passage. A passage across the mounting surface of the carburetor connects these two holes, thereby allowing a portion of the cross-over exhaust to supply heat directly to the carburetor. See Figure 3-8.

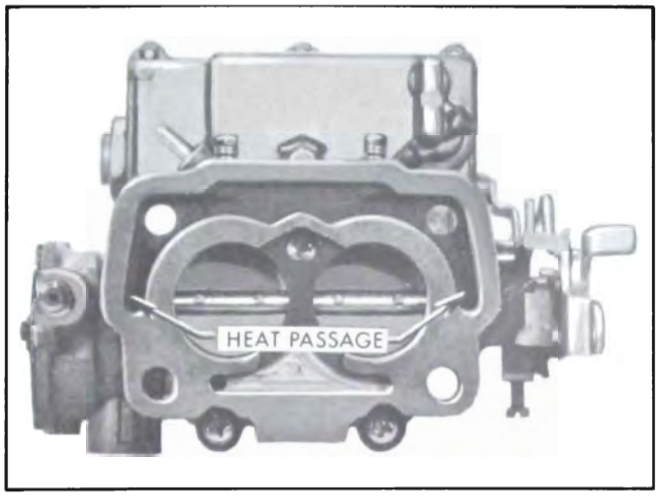

Figure 3-8—Exhaust Heat Passage - V-6 Carburetor

As the exhaust manifold warms-up, the thermostat spring gradually releases the offset valve and the flow of hot exhaust through the cross-over passage is gradually reduced. When the exhaust manifold gets hot, the valve opens wide and exhaust flow through the cross-over 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 flow of exhaust through the cross-over 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.

c. Positive Crankcase Ventilation

All cars built for sale in California have a positive crankcase ventilating system to help reduce air pollution. The regular crankcase ventilating system has a vent pipe which projects down into the slip-stream under the car to draw fumes from the crankcase. The positive crankcase ventilating system replaces the vent pipe with a hose which connects to a plate sandwiched between the carburetor and the intake manifold. See Figure 3-9. This causes crankcase fumes to be drawn into the intake manifold to be burned in the engine.

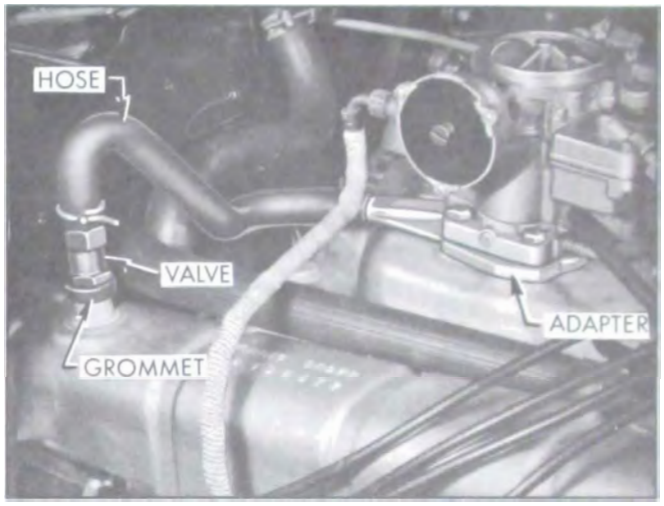

Figure 3-9—Positive Crankcase Ventilating System

When air flow through the carburetor is high, added air from the positive ventilating system has no noticeable effect on engine operation; however, at idle speed, air flow through the carburetor is so low that any large amount added by the ventilating system would upset the air-fuel mixture, causing rough idle. For this reason, a spring-loaded check valve is used which restricts the ventilating system flow whenever intake manifold vacuum is high.

d. 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 3-10.

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

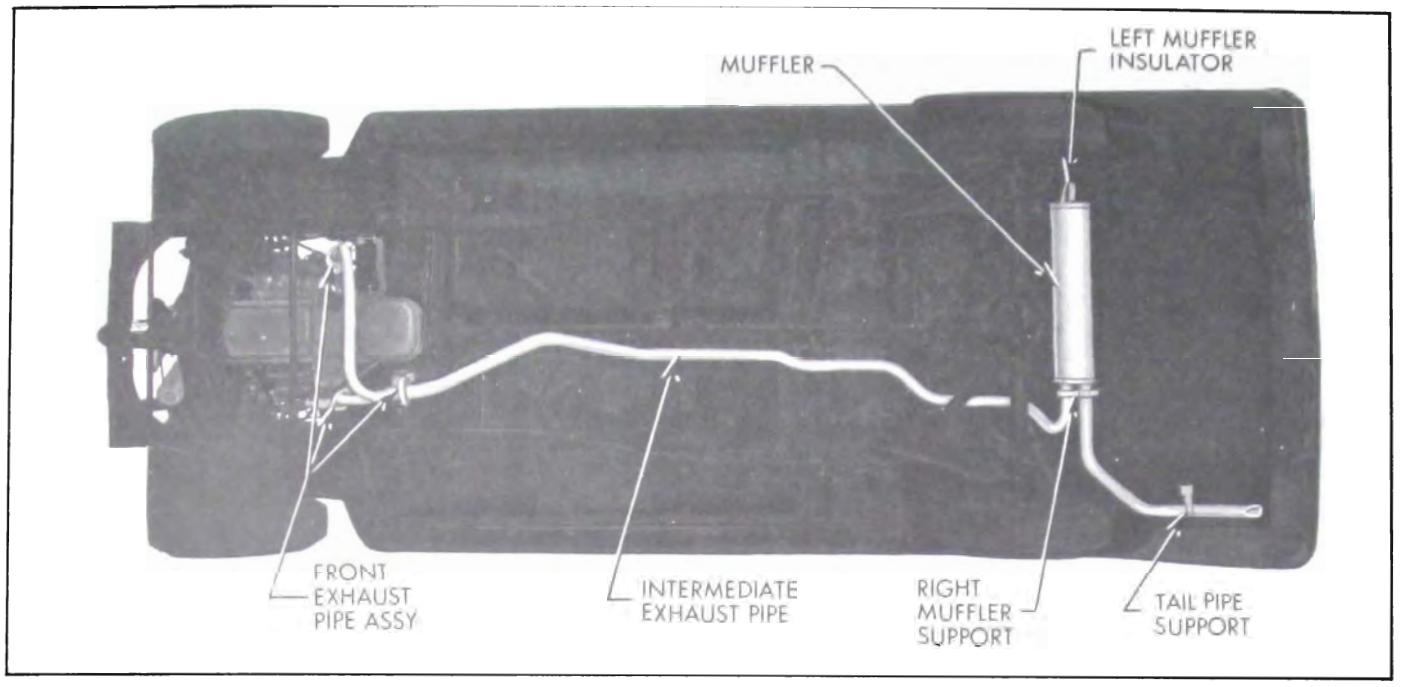

Figure 3-10—Exhaust System

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 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 prevents 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.