GROUP 3
ENGINE FUEL AND EXHAUST SYSTEMS

SECTIONS IN GROUP 3

SECTION 3-A

SPECIFICATIONS AND GENERAL DESCRIPTION

CONTENTS OF SECTION 3-A

NOTES

3-1 SPECIFICATIONS, FUEL AND EXHAUST SYSTEMS

a. General Specifications

Items	All Series
Gasoline, Grade Required	Premium
Gasoline Tank Capacity (gal.)	19 Minimum
Gasoline Gauge, make and Type	AC Electric
Fuel and Vacuum Pump—Make and Type	AC, FL
Drive	Eccentric on Camshaft Sprocket
Fuel Pump Pressure—	
At Pump Outlet, pounds	4 ½ to 7
At Carburetor Inlet, pounds	4 to 6 ½
Fuel Filter, Make and Location	Moraine, at Carb. Inlet
Carburetor, Make	Carter, Stromberg, or Rochester
Type	Downdraft
Barrels	2 4
Air Cleaner, Make and Type	AC, H.D. Oil Bath
Sump Capacity, Oil Used	1 Pint, SAE 50
Intake Manifold Heat Control	Valve and Thermostat
Heat Source	Exhaust Gas
Thermostat Wind-Up @ 70 Deg. F., Valve Closed	⅜ Turn

b. Carter Carburetor Calibrations

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

ITEMS	Series 40 Synchromesh	Series 40 Dynaflow	Series 50-60-70 Primary	Series 50-60-70 Secondary
Model Designation	WGD	WGD	WCFB	
Number of Barrels	2	2	4	
Large Venturi Diameter	1 3/16	1 3/16	1 3/16	
Code Number, for Following Calibrations	2378S	2400S	2347S	
Float Setting, Cover to Float	1/4	1/4	3/16	3/16
Float Needle Size, Drill Size	No. 38	No. 38	No. 34	No. 34
Low Speed Jet Size, Drill Size	No. 70	No. 70	No. 66	No. 66
By-Pass	No. 55	No. 55	←1.45mm (.057")→	
Economizer	←1.3mm (.051")→		←1.15mm (.045")→	
Idle Air Bleed, Drill Size	No. 50	No. 50	No. 46	No. 46
Idle Discharge Port	.130" x .030"	.130" x .030"	.140" x .030"	.103" x .030"
Lower Idle Port, Drill Size	No. 52	No. 52	No. 53	No. 58
Idle Mixture Screw, Average	3/4 turn	3/4 turn	1 1/8 turn	
Metering Jet				
Production	120-165	120-165	120-224	120-165
Lean	120-165	120-165	120-224	120-165
High Altitude	120-165	120-165	120-224	
Metering Rod				
Production	75-1239	75-1238	75-1231	
Lean	75-1245	75-1246	75-1235	
High Altitude	75-1246	75-1234	75-1236	
NOTE: *Use High Altitude Rods Above 3500 Feet.*				
Anti-Percolator Bleed Hole	No. 71	No. 71	No. 70	No. 70
Pump Stroke at Full Throttle	21/64"	21/64"	7/16"	
Pump Discharge Jet Drill Size	No. 70	No. 70	No. 70	
Vacuum Spark Control Port	.130" x .040"	.130" x .040"	.130" x .040"	
Choke Coil Housing Number	170AA374S	170AA374S	170AC374S	
Choke Thermostat Setting	Index	Index	Index	
Choke Suction Hole, Drill Size	No. 45	No. 48	No. 45	
F. I. Cam, Choke Closed	.020"	.020"	.020"	
F. I. Setting Valve to Barrel Wall	.015"	.015"	.015"	
Unloader Opening at Choke Valve Edge	3/16"	3/16"	5/32"	

c. Stromberg Carburetor Calibrations

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

Items	Series 40 Dynaflow
Model Designation	WW
Number of Barrels	2
Size	1 1/4"
Primary Venturi Diameter	1.227
Code Number, for Following Calibrations	7-105A
Float Needle Valve Seat	.093"
Idle Tube Feed Hole	No. 66
Idle Air Bleeder	No. 36
Location	Main Body
Sec. Air Bleeder	No. 42
Location	Air Horn
Idle Discharge Holes, Upper (2)	No. 63
Idle Discharge Holes, Lower (with tube)	No. 51
Idle Needle Valve Aver. Open Turns	1 3/4"
Main Metering Jet, Production	No. P-19442 (.054")
High Altitude	.052"
NOTE: *Use High Altitude Jets Above 3500 Feet.*	
Main Discharge Jet	28-36
High Speed Bleeder	No. 70
Power By-Pass Jet	2 No. 57's
Pump Discharge Jet	No. 66
Vacuum Spark Control Port	No. 46 (.081")
Thermostat Cover Ident. Number	36
Float Level	3/16"
Pump Stroke	Medium (Middle Hole)
Pump Plunger	7/8"
Start-Aid	No. 53
Choke Unloader	No. 27
Fast Idle Speed (5 Turns in)	No. 55
Choke Spring Pick-Up Lever	7 Turns in
Fast Idle Cam	0—.020"
Choke Positioning Lever	No. 21
Choke	At Index Mark
Initial Idle Speed	1 Turn in
Initial Idle Mixture	1 3/4 Turns Out

d. Rochester Carburetor Calibrations

IMPORTANT: *Calibrations are governed by the CODE number stamped on air horn.*

Items	Series 50-60-70 Primary	Series 50-60-70 Secondary
Model Designation	4GC	
Number of Barrels	4	
Code Number for Following Calibrations	7009200	
Small Venturi	1/8"	1/4"
Large Venturi	1 3/16"	1 1/4"
Main Metering Jets	.056"—60°	.078"
Idle Needle Holes	.046"	
2nd Idle Holes	.026"	
3rd Idle Holes	.028"	
4th Idle Holes	.028"	
Spark Drillings	.081"	
Pump Discharge Holes	.024"	
Power Restriction	.045"	
Choke Restriction	.089"	
Idle Tube Restriction	.027"	.026"
Supplementary Idle Holes	.025"	.025"
Throttle Body Restrictions	.048" (2)	.020" (4)
Lower Idle Speed	.036"	.081"
Float Level	1 35/64"	
Float Drop	2 1/4"	
Pump Rod	1 11/32"	
Choke Rod	.140" (No. 28 drill)	
Unloader	.115" (No. 32 drill)	
Fast Idle	.020"	
Secondary Contour	.030"	
Secondary Lockout	.015"	
Damper Valve No. 1	51/64"	
Damper Valve No. 2	53/64"	
Fast Idle (Hot, on Car)	1700 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 against strips of anti-squeak material. Two internal baffles spot-welded to the upper half at centerline of tank at the 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 filler is soldered into its opening in the upper half of tank and the inner end is supported by the left baffle. An internal passage and a groove in the upper end of filler, where the cap seats, provide a protected air vent for the tank. See figure 3-10.

The feed pipe connects to the gasoline gauge tank unit at top of tank and is supported on the left side of car frame by clips. The front end of feed pipe is connected to the fuel pump by a rubber hose which provides the flexibility required by movement of the engine on its rubber mountings.

A Moraine gasoline filter is located at the gasoline inlet of the carburetor for the purpose of removing any dirt and water which may be present in the gasoline. The filter contains a porous bronze filtering disk and is provided with a plug for draining out the accumulated dirt and water.

b. Fuel Pump, Carburetor, and Automatic Choke

The combination fuel and vacuum pump is mounted on the right side of the timing chain cover and is actuated by a hardened, chrome-plated, stamped steel eccentric mounted on front side of the camshaft sprocket. The fuel section is mounted above the vacuum section, has extra large valves, and has a built-in air dome with diaphragm to dampen out pulsations in the fuel stream. The pump construction and operation is described in Section 3-D.

Engines of all series are equipped in production with either a Carter, Stromberg, or Rochester downdraft type carburetor. *Each make is considered standard and it is not intended that these units be interchanged to provide "optional" equipment.*

Series 40 engines use a 2-barrel carburetor and *Series 50-60-70* engines use a 4-barrel carburetor. All carburetor assemblies include automatic choke mechanism and an accelerator vacuum switch.

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 accelerator vacuum switches are described in Section 10-E.

c. Air Cleaner and Intake Silencer

All series engines are equipped with heavy duty oil bath 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.

The *Series 40* air cleaner and silencer is mounted on top of the carburetor. Air enters the cleaner first and then passes through the silencer.

The *Series 50-60-70* inverted elbow type air cleaner and silencer is mounted lengthwise on top of the engine. Air enters the silencer first and then passes through the air cleaner located directly above the carburetor. See figure 3-1.

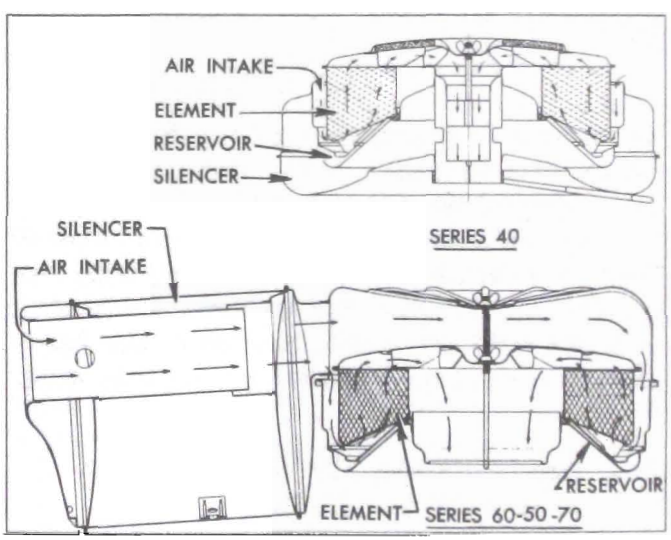

Figure 3-1—Air Cleaner and Silencer Assemblies

The air cleaner consists of an oil reservoir and a cleaner element containing a filtering mesh which nests down into the reservoir above the oil level. The reservoir is filled with S.A.E. 50 engine oil to a predetermined level.

Incoming air passes downward through the passage between the oil reservoir and cleaner element, impinges on the surface of the oil and turns upward into the cleaner element. The air carries oil into the element to coat the finely divided filtering mesh. The air thus exposed to a large oil wetted surface to which the dirt and impurities adhere. The cleaned air then passes through the silencer and into the carburetor. See figure 3-1.

When the throttle is closed, any excess oil on the filtering mesh drips back into the reservoir carrying the collected dirt with it. This dirt then settles to the bottom of the reservoir.

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 accelerator vacuum switch when cranking the engine.

The accelerator pedal rod is connected to a lever on the lower end of an equalizer shaft which is mounted between the body cowl and the rear end of engine. Movement of the pedal rotates the equalizer shaft, which actuates the carburetor throttle shaft through an upper lever and connecting rod. The throttle return spring is connected to the equalizer shaft upper lever and to an anchor bracket on engine. See figure 3-8.

On cars equipped with *Dynaflow Drive*, a dash pot is mounted in position to be contacted by an arm of the carburetor throttle lever as the throttle lever 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 Dynaflow high accumulator.

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 3-2.

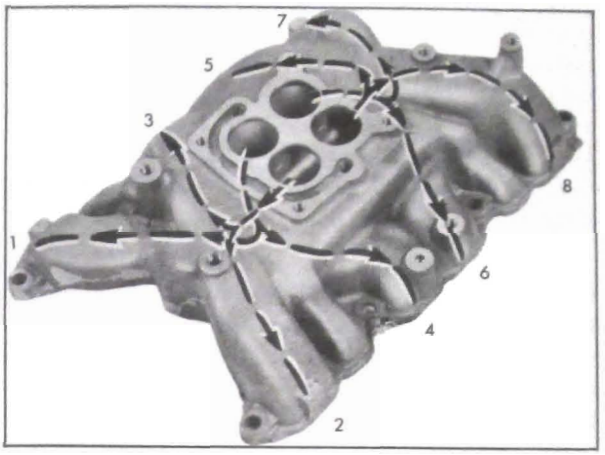

Figure 3-2—Intake Manifold Distribution

The *Series 40* 2-barrel carburetor feeds one barrel into each section of its 2-port manifold. The *Series 50-60-70* 4-barrel carburetor feeds one primary and one secondary barrel into each section of its 4-port manifold.

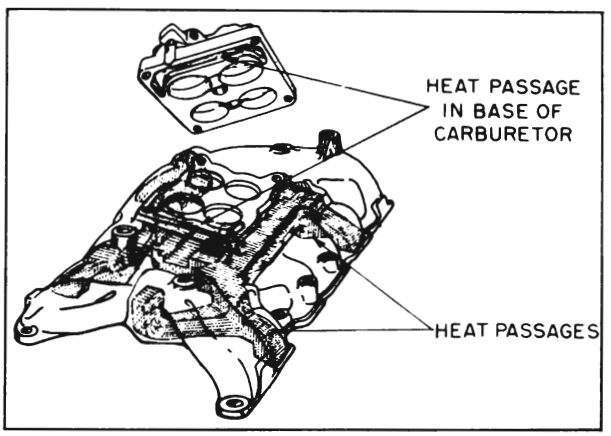

Figure 3-3—Intake Manifold Heat Chambers

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. See figure 3-3. 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 sec-

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

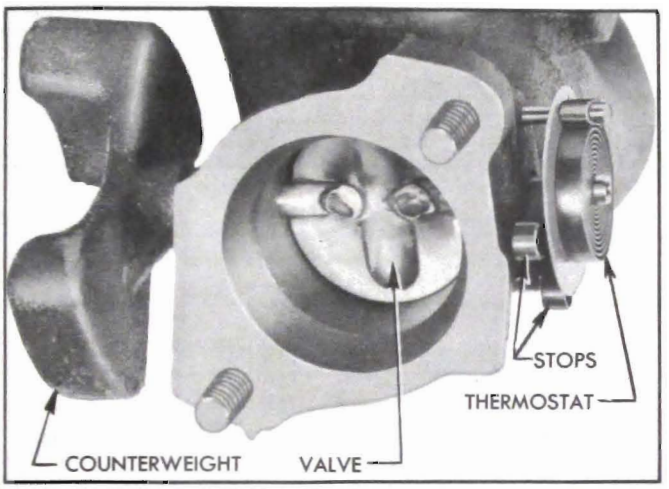

Figure 3-4—Manifold Valve

A heat control valve with a bi-metal thermostat is located in the right exhaust manifold. See figure 3-4. 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 further reduce the flow of gases through the manifold when the engine is warm and the heat valve is open.

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.

A dual exhaust system is standard equipment on Series 70 cars and is optional on Series 40-50-60 cars. It is not available on Synchromesh cars, however. The right exhaust manifold is the same on either single or dual exhaust cars. The left exhaust manifold, the exhaust pipes, the mufflers, and the tail pipes are not interchangeable between single and dual exhaust cars.

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 joints between exhaust manifolds, exhast pipes, mufflers, and tail pipes are of the ball joint connector type. These joints make for easy connection, disconnection, and alignment of exhaust system parts. No gaskets are used in the entire exhaust system.

The muffler is an oval-shaped, dynamic flow type having very low back pressure. It is double wrapped of heavy gauge sheet steel with a layer of asbestos placed between wrappings to aid in reduction of noise transfer and prevents any "oil-canning" effect. The muffler and exhaust pipes are supported by free hanging, rubber-fabric mountings which permit free movement but eliminate transfer of noise and vibration into the passenger compartment.