GROUP 3
ENGINE FUEL AND EXHAUST SYSTEMS

SECTIONS IN GROUP 3

SECTION 3-A
SPECIFICATIONS, DESCRIPTION, SERVICE RECOMMENDATIONS

CONTENTS OF SECTION 3-A

SERVICE BULLETIN REFERENCE

Bulletin No.	Page No.	SUBJECT

3-1 SPECIFICATIONS

a. Tightening Specifications

Use a reliable torque wrench to tighten the parts listed to insure proper tightness without straining or distorting parts. These specifications are for *clean and lightly lubricated threads only;* dry or dirty threads produce increased friction which prevents accurate measurement of tightness.

Part	Name	Thread Size	Torque-Ft. Lbs.
Nut	Manifold	3/8-24	25-30
Nut	Exhaust Pipe Flange to Valve Body Bolt	3/8-24	18-20
Nut	Exhaust Pipe Clamp Bolt	5/16-18	7-10
Nut	Muffler Support Clamp Bolt	5/16-18	7-10
Nut	Muffler Support to Frame Bolt	5/16-18	7-10
Nut	Tail Pipe Hanger Clamp Bolt	5/16-18	7-10
Bolt	Tail Pipe Front Hanger to Frame	5/16-18	7-10
Screw	Tail Pipe Rear Hanger to Frame	5/16-18	15-18

b. General Specifications

Items	Series 40-50	Series 70
Gasoline Tank Capacity (gal.)	19	19
Gasoline Gauge—Make and Type	←AC, Electric→	
Fuel Pump—Make and Type	←AC, Type AJ, Comb. Fuel and Vacuum→	
Fuel Pump Drive	Direct from Camshaft	
Fuel Pump Location	←Right Side Front→	
Fuel Pump Pressure, Pounds:		
At Pump Outlet Port	←4½ to 5½→	
At Carburetor	←4 to 5→	
Fuel Filter—Make and Type	←Carter, Ceramic or AC Paper-Edge Type→	
Fuel Filter Location	←At Carburetor Inlet→	
Carburetor Make	←Stromberg or Carter→	
Carburetor Type	←Downdraft—Dual→	
Air Cleaner—Make and Type	←AC Heavy Duty Oil Bath→	
Air Cleaner Sump Capacity and Grade of Oil Used	←1 pt. S.A.E. 50→	
Intake Manifold Heated by	←Exhaust Gas→	
Manifold Heat Control	Valve and Thermostat	
Wind up of Valve Thermostat at 70° F., with Valve Closed	←¼ Turn→	
Exhaust Pipes, O. D.	2"	2¼"
Tail Pipe, O. D.	2"	2"

Muffler, Type	←Straight Thru Resonance→
Muffler, 1948, Diam. x Length	←5 9/16" x 37 3/8"→
Muffler, 1949, Diam. x Length	←5" x 43 7/8"→

c. Carter Carburetor and Choke Calibrations

IMPORTANT: *Calibrations are identified by the CODE NUMBER and not by model number. Carburetors of same model number but different code numbers are not interchangeable.*

Model	WCD	WCD
Code Number	663S	664S
Size	1"	1 1/4"
Large Venturi Diameter	1 1/16"	1 3/16"
Float Bowl Fuel Level	←At bottom of sight hole→	
Float Setting	←5/32", Cover to Float→	
Metering Rod Jet	.082"	.082"
Metering Rod, (see note below)		
Production	75-614	75-615
High Altitude	75-634	75-636
Low Speed Jet	#65	#65
By-pass	.049"	.051"
Economizer	#65	#60
Idle Bleed	.049"	.051"
Idle Discharge Port	.030"x.100"	.030"x.125"
Idle Adjustment Screw Port	.0655"	.0655"
Float Needle Seat	#42	#38
Pump Jet	#71	#72
Pump Strokes	21/64"	21/64"
Pump Spring	#61-171	#61-171
Pump Plunger Spring	#61-328	#61-328
Vacuum Spark Control Port	.040"	.040"
Choke Thermostat Setting	Index	Index
Choke Suction Hole	#45	#36
Fast Idle Setting, Throttle Valve to Barrel, Wall	.015"	.018"
Choke Unloader Setting, Edge of Valve to Air Horn	3/16"	3/16"

NOTE: *Use production metering rods for altitudes up to 3500 feet. Use high altitude metering rods for altitudes above 3500 feet.*

d. Stromberg Carburetor Calibrations

IMPORTANT: *Calibrations are identified by the CODE NUMBER and not by model number. Carburetors of same model number but different code numbers are not interchangeable.*

Model	AAV-167	AAV-267
Code Number	7-69	7-70
Size	1"	1 1/4"
Throttle Diameter	1 3/16"	1 7/16"
Primary Venturi Diameter	1 1/32"	1 1/8"
Float Bowl Fuel Level	←At bottom of sight hole→	
Main Discharge Jet	#32-28	#32-28
Main Metering Jet (see note below)		
Production	.045"	.051"
High Altitude	.042"	.048"
Power By-pass Jet	#60	#54
High Speed Bleeder	#70	#70
Float Needle Seat	.101"	.101"
Idle Air Bleeder		
Main Body	#70	#70
Throttle Valve Body	#42	#42
Idle Tube Feed Hole	#70	#70
Idle Discharge Holes		
Upper	#60	#60
Lower	#54	#54
Pump Discharge Nozzle Holes	#68	#68
Pump Blow-off Hole	#60	#56
Holes in Throttle Valve	2—#56	2—#60
Pump Bottoming	1/32"	1/8"
Vacuum Spark Control Port	#58	#58
Choke Thermostat Setting	1 Notch Lean	Index
Drill Size for Checking Fast Idle Cam Setting	#26	#26
Drill Size for Checking Start Air Lock and Loose Levers	#53	#53
Drill Size for Checking Choke Unloader Setting	←#17 or 11/64"→	

NOTE: *Use production main metering jet for altitudes up to 3500 feet. Use high altitude jet for 3500 to 9000 feet. Above 9000 feet use jet .002" smaller than specified for high altitude.*

3-2 DESCRIPTION OF FUEL SYSTEM

a. Gasoline Tank and Feed Pipes

The gasoline tank is made of two halves ribbon-welded together at the central flanges. Two internal braces spot-welded to the upper half on the centerline of tank at the support seats act as struts to maintain the shape of tank and prevent its flexing from the weight of gasoline and pull of supporting straps.

The filler is securely soldered into an opening in upper half of tank and is supported by an upper and a lower brace soldered to filler and tank. An external vent pipe soldered into the highest point of tank and into the upper end of the filler, and a groove formed in the upper end of filler where the filler cap seats, provide a protected air vent for the tank.

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. The rear feed pipe, which is connected to the gasoline gauge tank unit is supported by clips on the body. The rear feed pipe and the front feed pipe, which is connected to the fuel pump, are joined by a rubber hose which provides the flexibility required by movement of the engine on its rubber mountings. Flared type fittings are used at all other feed pipe connections.

b. Fuel Pump and Gasoline Filter

The combination fuel and vacuum pump is mounted in the right side of crankcase at the front end and is driven directly from the engine camshaft. The construction and operation of the pump assembly is described in Section 3-D (par. 3-16).

A gasoline filter is located at the gasoline inlet of the carburetor for the purpose of removing any dirt and water which may pass the filter built into the fuel pump. The filter may be a Carter ceramic type or an AC Paper-edge type. Either type consists of a glass sediment bowl and a strainer which may be removed for periodic cleaning. See figures 3-11 and 3-12. The incoming gasoline flows into the sediment bowl and then flows upward through the strainer and into the carburetor.

c. Carburetor and Automatic Choke Assembly

Engines on all series are equipped in production with either Stromberg or Carter carburetors of the dual-barrel down draft type. *Either make of carburetor is considered "standard" and it is not intended that these units be interchanged to provide "optional" equipment.*

The carburetor assembly incorporates an automatic choke and an accelerator vacuum switch. The construction and operation of the Carter carburetor and choke assembly is described in Section 3-E (par. 3-21 and 3-22) and the Stromberg assembly is described in Section 3-F (par. 3-28 and 3-29). The accelerator vacuum switches on both carburetors are described in Section 10-E (par. 10-32 and 10-33).

A thick fibre gasket is used between the carburetor and the intake manifold to insulate the carburetor from the heat of the manifold.

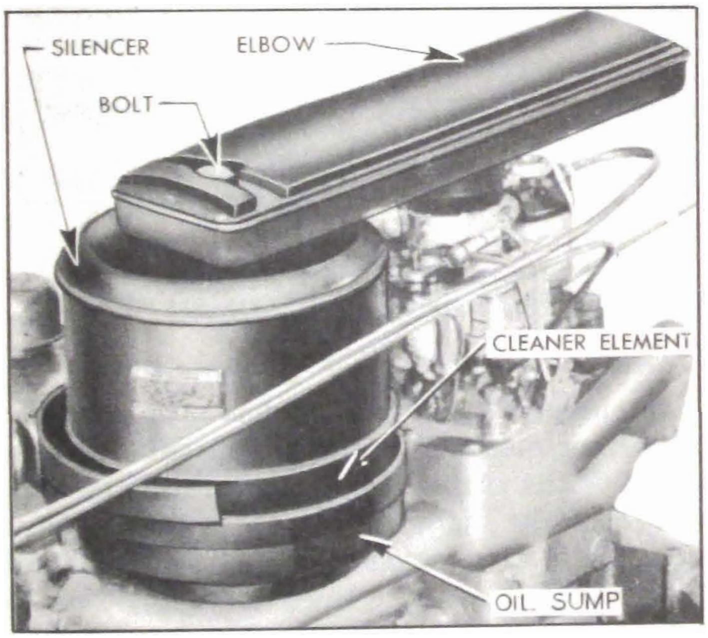

Figure 3-1—Air Cleaner and Intake Silencer—Series 40-50

d. 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.

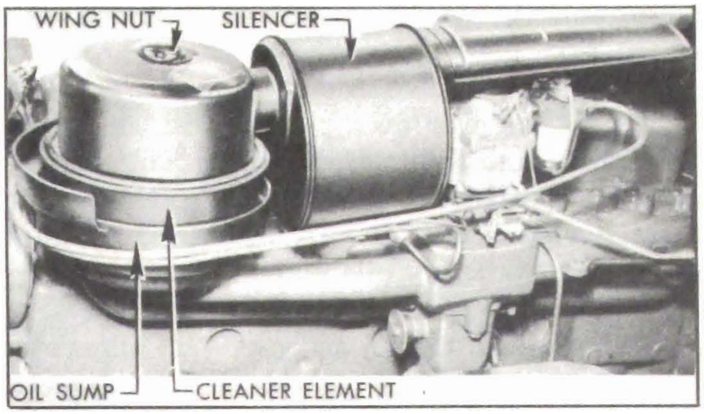

Figure 3-2—Air Cleaner and Silencer—Series 70

The air cleaner consists of a sump containing oil and a cleaner element containing a filtering mesh which nests down in the sump. *On Series 40-50 engines,* the silencer rests on top of the cleaner element and is connected to the carburetor by a sheet metal elbow. See figure 3-1. *On Series 70 engines,* the silencer is incorporated in the elbow which connects the cleaner to the carburetor. See figure 3-2. A bolt and wing nut holds the cleaner and silencer or elbow together.

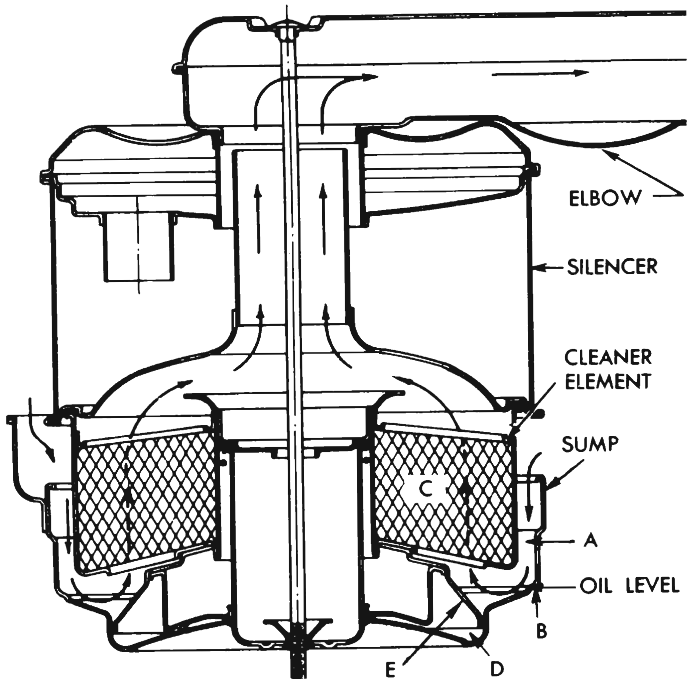

Figure 3-3—Air Cleaner Action—Series 40-50

The sump of air cleaner must be filled to oil level line with one pint of S.A.E. 50 engine oil. Incoming air passes downward through the annular passage "A" between the oil sump and cleaner element until it strikes the shelf on oil sump at "B", where it is suddenly reversed and directed upward into and through the cleaner element filtering mesh "C". The perforated baffle "E" on bottom of cleaner element extends down into the oil and prevents oil in the sump from pulling over into the air stream. See figure 3-3.

The sudden change in direction of air at "B" causes the heavier dust particles in the air to be thrown into the oil in sump. Oil mist is carried upward by the air stream into the cleaner element in a predetermined amount which automatically oils and washes the filtering mesh. The lighter dust particles which were not thrown into the oil sump at "B" adhere to the oily surfaces of the oil-wetted filtering mesh and are washed back into the oil sump as the oil drains back from the cleaner element. All dirt particles settle to the bottom of the oil sump at "D" (fig. 3-3).

Cleaned air leaving the cleaner element passes through the silencer which muffles the noise.

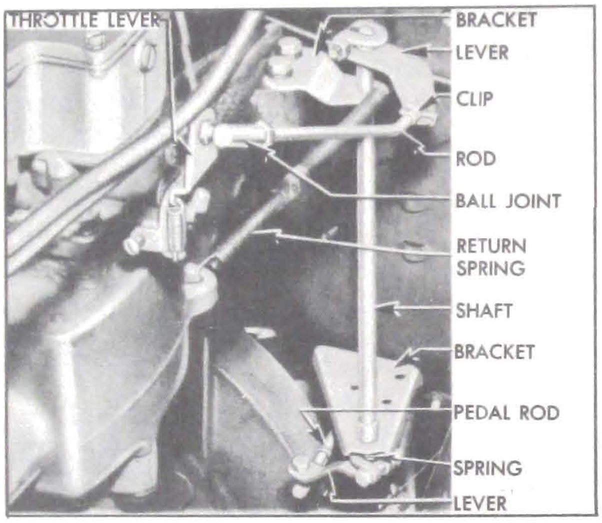

Figure 3-4—Carburetor Throttle Control Linkage

e. 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 in its rubber mountings. The linkage also serves to operate the accelerator vacuum switch when cranking the engine.

The accelerator pedal is connected by a rod and ball joint to an accelerator lever on the lower end of a vertically mounted equalizer shaft. The equalizer shaft is supported at the lower end by a bracket attached to the dash and supported at upper end by a bracket attached to the intake manifold. A throttle operating lever on upper end of equalizer shaft is connected by a rod and ball joint to the throttle shaft lever on carburetor. The throttle return spring is connected to the throttle operating lever on equalizer shaft and to a boss on intake manifold. See figure 3-4.

On cars equipped with Dynaflow Drive, a dash pot is included in the throttle control linkage to prevent engine stalling when the accelerator pedal is suddenly released while driving. The dash pot cushions the closing of the throttle to prevent sudden shut off. The dash pot operating lever and adjusting screw are mounted on the lower end of accelerator equalizer shaft so that the adjusting screw contacts the plunger of dash pot, which is mounted on the equalizer shaft lower bracket. A pipe connects the dash pot to the intake manifold. The dash pot action is controlled by a spring and vacuum operated diaphragm, ball check valve, and a calibrated bypass bleed.

3-3 DESCRIPTION OF INTAKE AND EXHAUST SYSTEM

a. Intake and Exhaust Manifolds

The intake and exhaust manifolds are separate units joined together by a valve body through which hot exhaust gasses may be directed into a heat jacket cast on the intake manifold to heat the area below the carburetor.

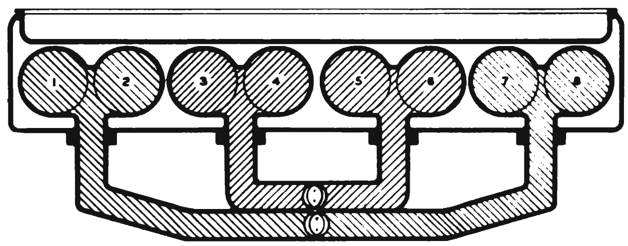

Figure 3-5—Fuel Distribution Through Intake Manifold

The intake manifold is of dual type with the carburetor mounted at the middle. The outside barrel of the carburetor feeds into the outside branch of the manifold to supply fuel to Nos. 1, 2, 7, and 8 cylinders while the inside barrel feeds into the inside branch to supply fuel to Nos. 3, 4, 5, and 6 cylinders. See figure 3-5.

b. Intake Manifold Heat Control

The amount of heat supplied to the intake manifold below the carburetor is regulated in accordance with operating requirements by means of the exhaust manifold valve. The valve is controlled by a bi-metal thermostat wound around the valve shaft so as to act as a spring to close the valve when engine is cold. The inner end of the thermostat engages a slot in valve shaft and the hooked outer end engages an anchor stud on the valve body.

When the engine is cold, the valve is held in closed position by the thermostat. Hot exhaust gasses strike the valve and are deflected upward into the heat jacket on intake manifold, where they pass around the intake passages and then pass downward to the exhaust pipe. See figure 3-6.

counterweight on the shaft. An anti-rattle spring is provided to prevent the valve from fluttering and rattling against the valve body in the open and closed position.

c. Exhaust Pipes, Muffler, and Tail Pipe

The muffler is connected to the exhaust manifold by a front and a rear exhaust pipe which

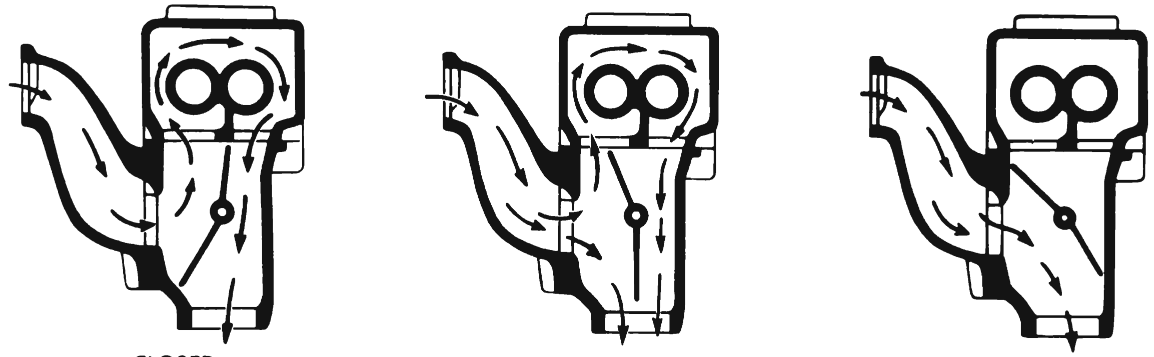

Figure 3-6—Exhaust Manifold Valve Operation—Sectional View

As the engine warms up, heat conducted to the thermostat through the valve shaft as well as by the increasing air temperature under the hood causes the thermostat to lose spring tension and allow the valve to move toward the open position, thereby reducing the amount of exhaust gas deflected into the heat jacket and consequently reducing the amount of heat to the intake manifold. See figure 3-6.

are joined together by a split clamp. The front exhaust pipe is connected to the manifold by a bolted flange and a gasket. The rear exhaust pipe is joined to the muffler by the muffler front support. The tail pipe is connected to the muffler by the muffler rear support. See figure 3-7.

The muffler and tail pipe are flexibly mounted in the frame to allow for engine movement and

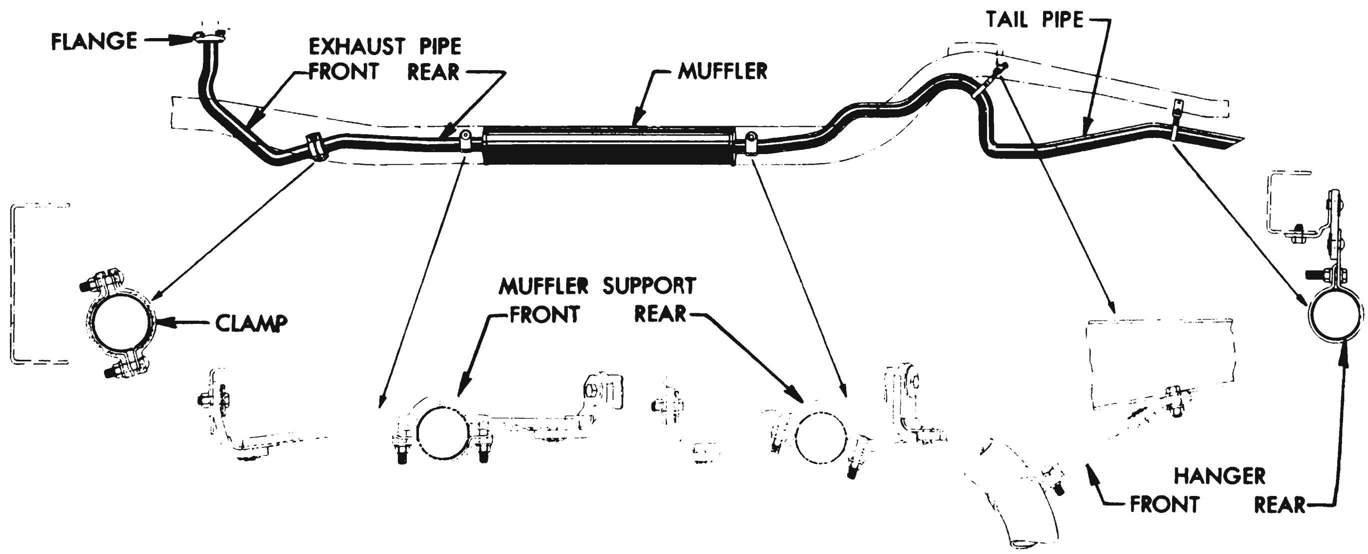

Figure 3-7—Exhaust System and Mountings—All Series

The exhaust manifold valve is offset or longer on the lower side of the shaft. This allows exhaust gas pressure to force the valve open when the engine is accelerated or operated with wide open throttle, thus reducing the heat to the intake manifold.

The valve is prevented from fluttering by a

for expansion and contraction due to temperature changes. The muffler supports and the tail pipe hangers are attached to the frame by fabric straps which provide the required flexibility and also serve to insulate exhaust system vibration from the chassis.

The muffler is a "straight through" type with resonance chambers which absorb and dampen out the exhaust sound waves. A slip joint at one end allows for expansion and contraction due to temperature changes. See figure 3-8.

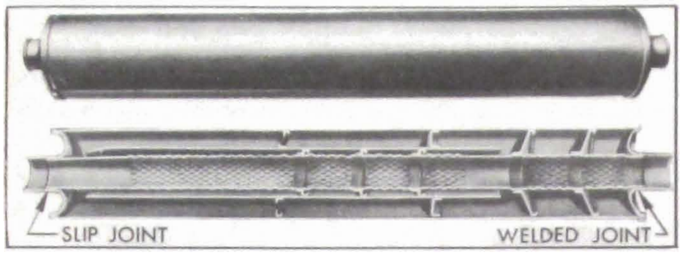

Figure 3-8—Muffler—Sectional View

The word "Front" is stamped on one end of the outer shell of muffler to indicate the end to place toward front of car during installation. The drain hole in outer shell should always be located at the bottom.

There should be a minimum clearance of 1" between the tail pipe and the rear seat pan at the closest point.

3-4 SERVICE RECOMMENDATIONS

a. Use of Accelerator Pedal for Starting Engine

To avoid complaints of hard starting, owners should be advised on the proper use of the accelerator pedal for starting the engine.

When the engine is cold, depress the accelerator pedal just far enough to cause cranking motor to engage and crank the engine. Do not pump the pedal as this will cause the accelerating pump to flood the manifold.

When the engine is partially warm, hot, or flooded, depress accelerator pedal to the floor and hold it until engine fires regularly. This procedure actuates the choke unloader on the carburetor to prevent or to clear up a flooded condition.

b. Fuel Selection

The compression ratio of the Series 40 engine is such that a grade of fuel having an octane rating of 72 to 74 can be used satisfactorily. Under certain conditions such as high temperature and carbon accumulations, higher octane number fuel will result in less detonation or spark rap. Fuel having an octane rating of 78 to 80 is required in Series 50-70 engines because of higher compression ratios.

c. Fuel Additives

Gasoline extenders, carbon removers, valve and ring freeing additives to the fuel may seriously affect lubrication or may cause corrosion of the engine parts and generally do more harm than good. The addition of any compound to the fuel for break-in or otherwise is unnecessary and should not be used unless the supplier can furnish satisfactory proof that the compound does not contain harmful ingredients.

d. Cars in Storage

When car is stored for any length of time, fuel should be drained from the tank, feed pipes, fuel pump, and carburetor in order to avoid gum formation.

e. Changing Carburetor Calibrations

Under no circumstances should the jet sizes, metering rods and other calibrations of a carburetor be changed from factory specifications. The calibrations given in paragraph 3-1 must be adhered to unless these are later changed by a bulletin issued from the Buick Factory Service Department.

Carburetor calibrations have been determined after exhaustive tests with laboratory equipment and instruments which accurately measure overall performance and economy. Since equipment and instruments of identical accuracy are not available for field use, it is not possible to properly measure the effect of a change in calibrations by any means available in service stations.