FUEL SYSTEM

Standard JB and JC engines use a gasoline-carbureted fuel system to deliver a mixture of fuel and air to the combustion chamber. The system draws fuel from a tank, delivers it through a filter and fuel pump (Figure 12), to the carburetor float chamber. Air passing through the carburetor venturi draws fuel from the float chamber.

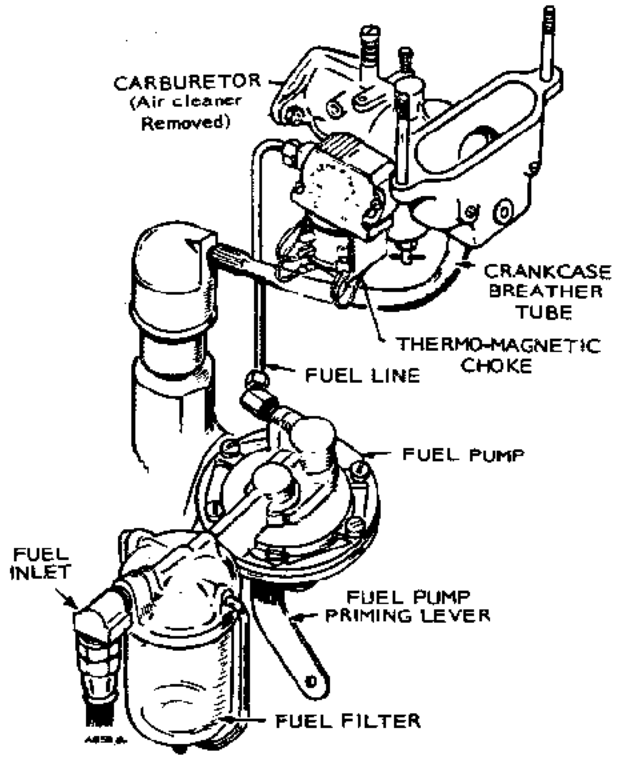


FIGURE 12. GASOLINE FUEL SYSTEM

Options: A combination gasoline-gaseous fuel carburetor or straight gaseous fuel carburetors are available for use with gaseous fuels. A gaseous fuel system uses a fuel regulator (Figure 13) to control the flow of gas from the lines to the carburetor. At the carburetor, the gaseous fuel is mixed with the incoming air.

All fuel system components are described in the following paragraphs. Select the components that apply to your engine.

FUELS

Use regular grade gasoline. Premium fuels contain more Tetra Ethyl lead than regular; the lead quantity also varies between fuel brands. In constant-speed operation, the buildup of deposits in the combustion chambers is proportional to the amount of lead in the gasoline.

Excessive lead causes more deposits and more frequent head removal for cleaning. Engines then require frequent combustion chamber cleaning.

If fuel is stored for any great length of time, it oxidizes, forms gums and becomes stale. ONAN recommends changing fuel as often as every season to ensure fresh fuel, especially where there is a great change in weather between seasons.

MAINTENANCE

On gasoline fuel systems, periodic maintenance consists of cleaning the fuel strainer, cleaning or replacing the air cleaner, carburetor adjustment and complete carburetor cleaning.

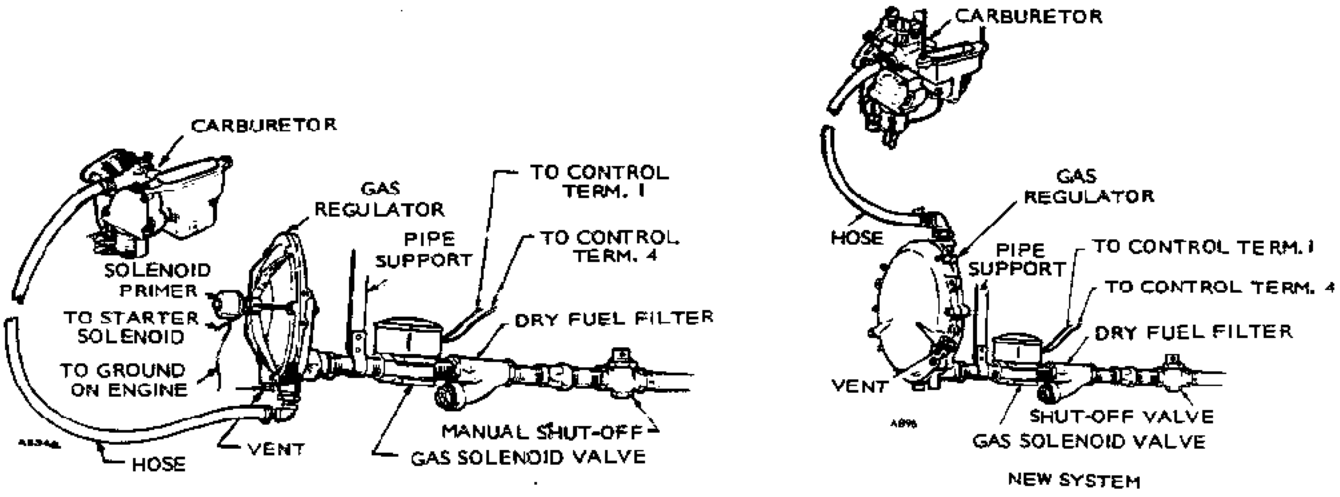


FIGURE 13. GASEOUS FUEL CARBURETION SYSTEMS

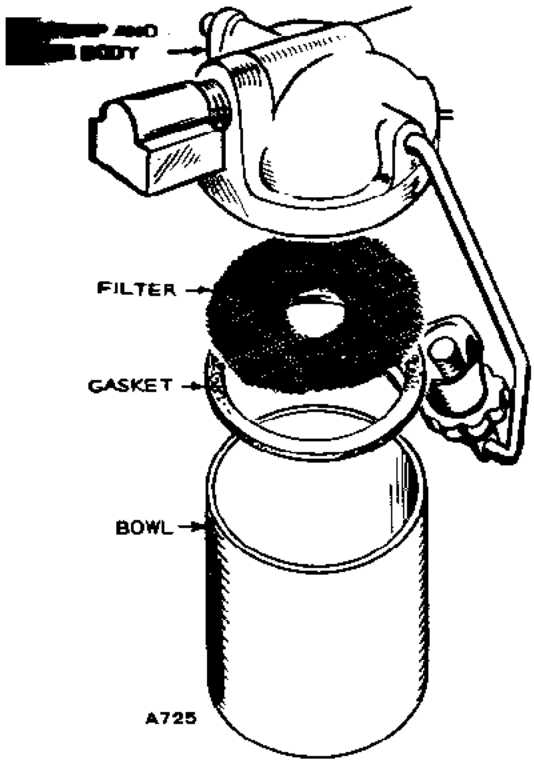


FIGURE 14. FUEL STRAINER CLEANING

To clean the fuel strainer, remove the fuel sediment bowl and the screen (Figure 14) and thoroughly wash the screen. At the same time, remove and clean carburetor float bowl. Assemble and check for leaks.

On gaseous fuel systems, periodic service should include cleaning or replacing the air cleaner, carburetor adjustment, inspection of hoses, etc. and cleaning the optional dry fuel filter.

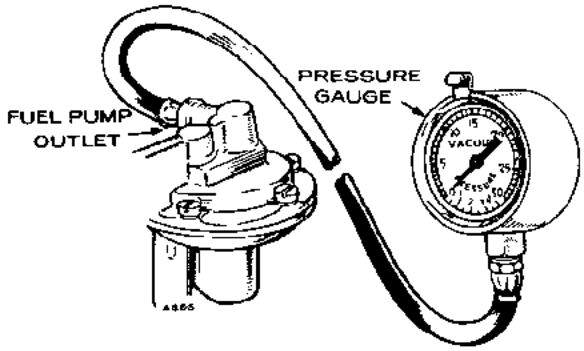


FIGURE 16. TESTING FUEL PUMP PRESSURE

Fuel Pump (Gasoline Fuel System)

The fuel pump (Figure 15) is located on the left side of the engine. If fuel doesn't reach the carburetor, make the following checks:

1. Check fuel tank and see that shut-off valve is open.
2. Remove fuel line from pump outlet and crank engine over several times. On manual models, operate priming lever instead of cranking engine. Fuel should spurt out of pump. If not, remove pump for repair or replacement.

Testing: Perform these tests before removing the pump from the engine. If the fuel pump delivers fuel, test it with a pressure gauge or manometer.

1. Disconnect pump outlet line and install the pressure gauge (Figure 16).
2. Test valves and diaphragm by operating priming lever a few times. The pressure shouldn't drop off rapidly after priming has stopped.
3. Run engine at governed speed on fuel remaining

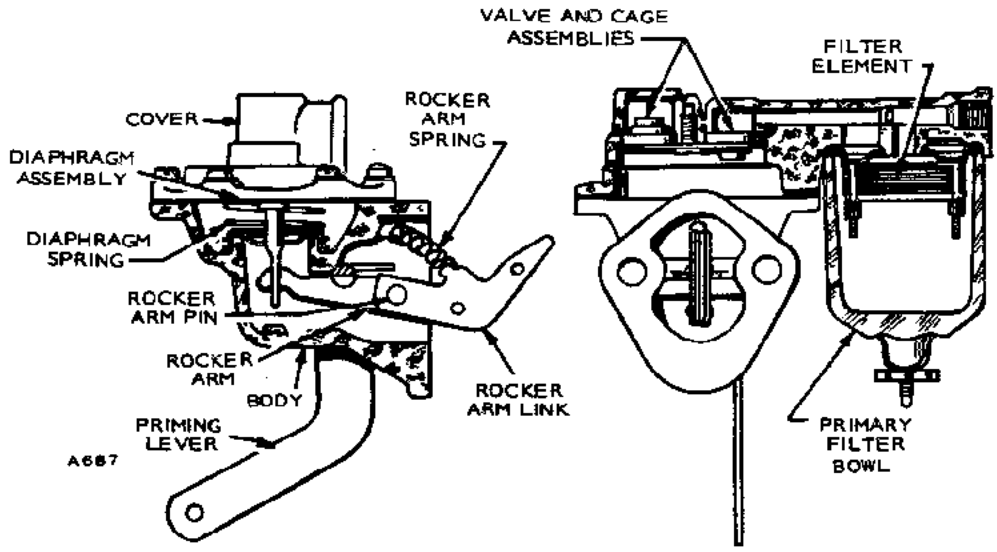


FIGURE 15. FUEL PUMP

in carburetor and measure fuel pump pressure developed. Pressure should be between 2 and 3 psi with gauge held 16 inches above fuel pump.

A low pressure reading indicates extreme wear in one part or some wear in all parts; overhaul or replace the pump. If the reading is above maximum, the diaphragm is probably too tight or the diaphragm spring too strong. This can also be caused by fuel seeping under the diaphragm retainer nut and between the diaphragm layers, causing a bulge in the diaphragm. Overhaul the pump and replace the defective parts.

Low pressure with little or no pressure leak after pumping stops indicates a weak or broken spring or worn linkage, and in most cases the pump should be replaced.

Removal and Disassembly:

1. Remove pump inlet and outlet (Figure 16). Remove two capscrews holding pump to engine and lift it off.
2. Notch pump cover and body with a file for assembly in same relative position, and remove six screws holding them together.
3. Tap body with a screwdriver to separate two parts. Don't pry them apart; this may damage diaphragm.
4. Lift out diaphragm assembly and diaphragm spring.

Repair: Fuel pump failure is usually due to a leaking diaphragm, valve or valve gasket. A kit is available for replacement of these parts. Because the extent of wear cannot easily be detected, replace all parts in the kit. If the diaphragm is broken or leaks, check for diluted crankcase oil. Occasionally, failure is due to a broken or weak spring, or wear in the linkage. In this case, install a new pump.

Assembly:

1. Before installing a new diaphragm, soak it in fuel. Insert diaphragm spring and soaked diaphragm into pump body.
2. Compress rocker spring and install between body and rocker arm.
3. Assemble cover to body with notch marks lined up. Install the screws but don't tighten. Push the rocker arm in full stroke and hold in this position to flex diaphragm.

   The diaphragm must be flexed, or it will deliver too much fuel pressure.

4. Tighten cover screws alternately and securely, then release rocker arm.
5. Install pump on the engine and repeat pressure test.

Choke (Gasoline Fuel System)

Electric-starting engines use an automatic electric choke (Figure 12); manual-starting engines use a hand choke (Figure 17). An electric element controls the automatic electric choke. Before the engine starts, the choke is partially closed. When the engine starts, the charging generator supplies current to the heating element which heats the bimetal coil, opening the choke.

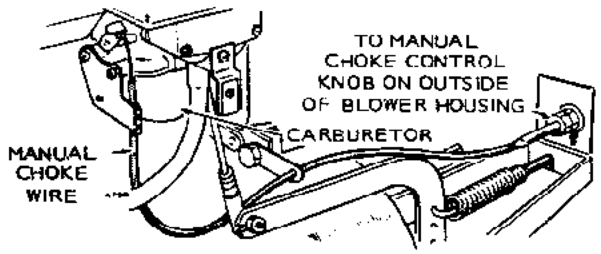


FIGURE 17. HAND CHOKE FOR MANUAL STARTING ENGINES

Operation and Adjustment, Thermo-Magnetic Choke: This choke uses a strip heating element and a heat-sensitive bimetal spring to control the choke position. A solenoid, actuated during engine cranking, closes the choke all or part way, depending on ambient temperature.

The bimetal is calibrated to position the choke to the proper opening under any ambient condition. The choke is adjusted at the factory. If, for any reason, readjustment is required, use the following procedure.

Adjustment must be made with the bimetal at ambient temperature. Do not attempt adjustments until the engine has been shut down for at least one hour. Remove the air cleaner to expose the carburetor throat. Loosen the screw which secures the choke body assembly. Refer to Figure 18 for correct choke setting according to temperature. Use a drill bit to measure the choke opening. Rotating the choke body clockwise richens the mixture and rotating it counterclockwise leans the choking effect. Tighten screw that secures choke body.

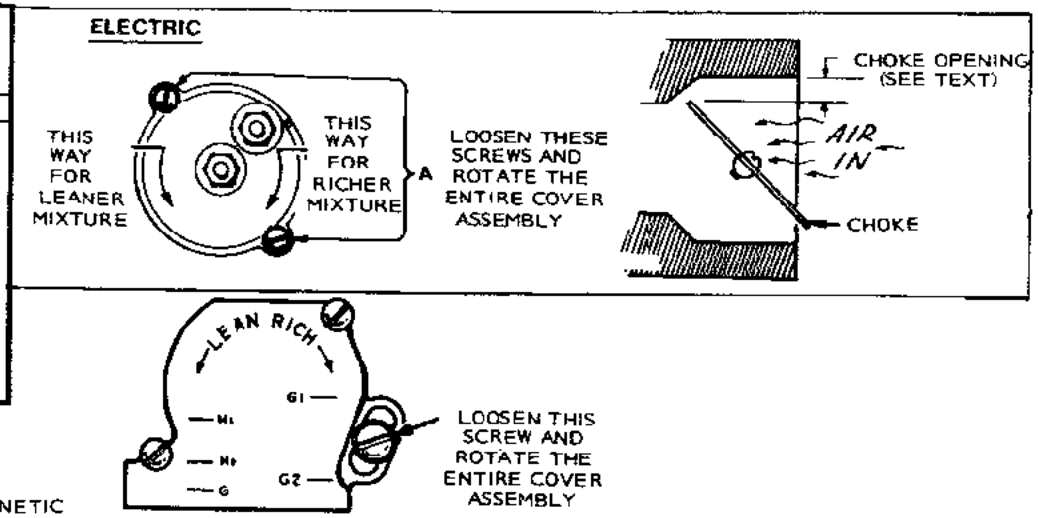
Disassembly and Repair, Electric and Thermo-Magnetic Choke: If the choke does not operate, or will not maintain its adjustment, disassemble it for repair. If it will not close, check for binding, incorrect adjustment or incorrect assembly of the coil. If it will not open after the engine starts, check for heating. The choke should be warm to the touch within a minute or two of engine starting. To disassemble choke, refer to Figure 19.

Electric Choke: If the choke will not heat properly, check for a broken heating coil or high-resistance electrical connections. Check the coil resistance with

an ohmmeter. With the element at room temperature, resistance should be about 5 to 6 ohms for 12 volt models, about 25 ohms for 24 volt models and about 16 ohms for 32 volt models. If the coil is defective, replace the thermostat cover.

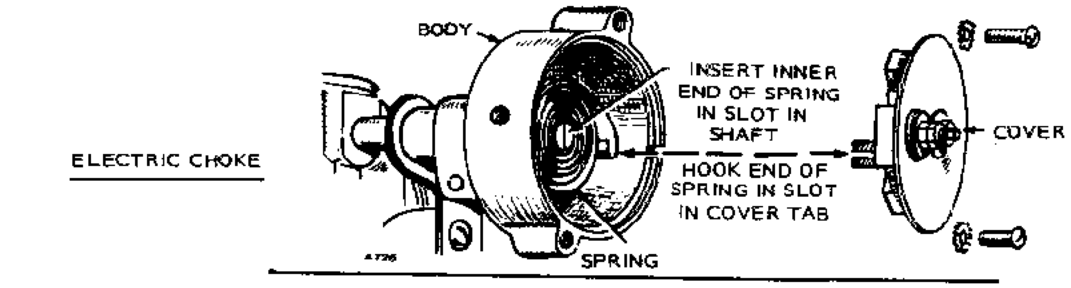
When assembling electric choke be sure the slot in the cover tab straddles and holds the outer end of the coil spring and that the spring winds in a clockwise direction from center.

AVERAGE CHOKE SETTINGS		
AMBIENT TEMP. - F	CHOKE TO BODY JB	JC
68	3/16	0
72	7/32	1/64
76	1/4	3/64
80	9/32	1/16
84	5/16	3/32
88	11/32	7/64
92	3/8	1/8
96	13/32	9/64
100	7/16	11/64



AMBIENT TEMP. (°F)	60	65	70	75	80	85	90	95	100
CHOKE OPENING (Inches)	1/8	9/64	5/32	11/64	3/16	13/64	7/32	15/64	1/4

FIGURE 18. CHOKE ADJUSTMENTS



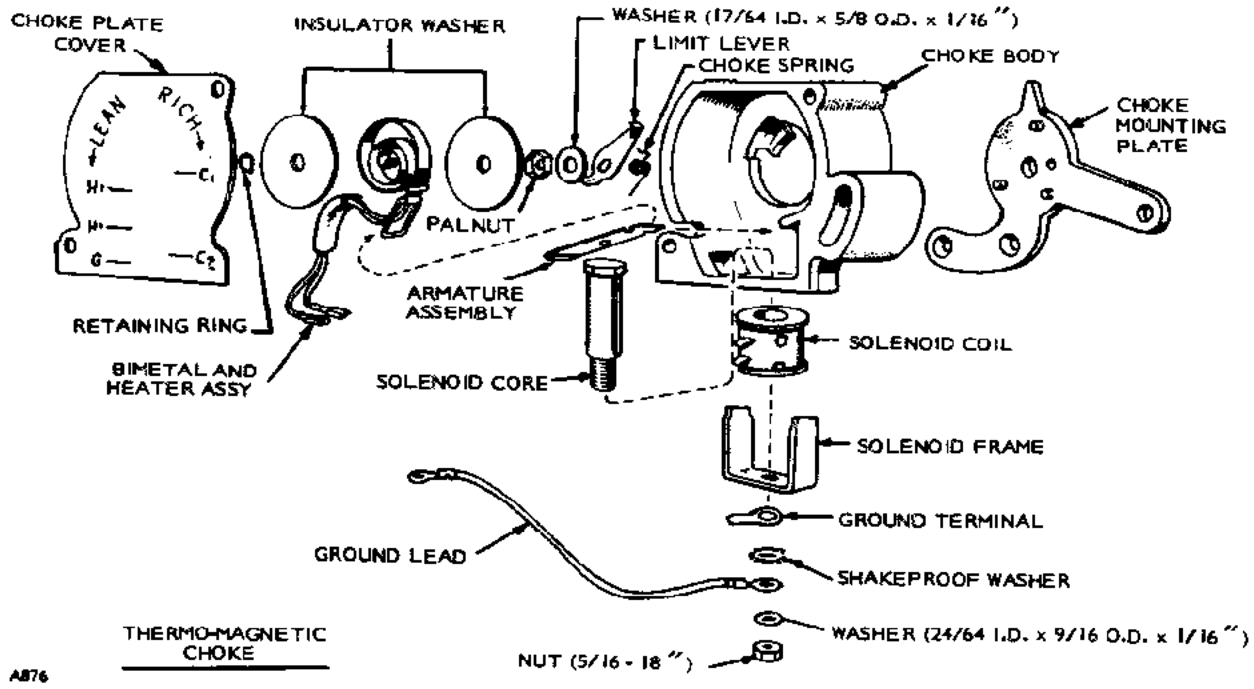


FIGURE 19. DISASSEMBLY OF ELECTRIC AND THERMO-ELECTRIC CHOKE

Thermo-Magnetic Choke: If choke will not heat properly, check for broken heater wire, high-resistance connections or broken lead wires to the bimetal and heater assembly. With the element at room temperature, check the heater resistance with an ohmmeter. The resistance should be about 30.6 to 37.4 ohms for a 12 volt system. If the heater is defective, replace it with a new one. When the start button is engaged, the solenoid should cause the spring-loaded armature to contact the solenoid core.

If this does not occur, check for broken lead wires or a defective solenoid coil. There must be slack in the lead wires between the choke body and the bimetal and heater assembly. The solenoid coil resistance should be 2.09 to 2.31 ohms in a 12 volt system.

When replacing the cover on the thermostat and heater assembly, be certain that the choke heater lead wires have been correctly installed in the choke housing. Improper replacement of the lead wires can cause the choke assembly to malfunction.

The wires enter the choke assembly through a small notch that is cut in the edge of the housing. A cover holds the wires in place and prevents movement when tightened. When properly installed, the lead wires will hang freely under the bimetal coil when the choke is in either the open or closed position. The end of the heater wire sleeve should be located from 1/8 inch inside the choke housing to flush with the inside wall.

When assembling the thermo-magnetic choke, the bimetal and heater assembly is connected as follows:

1. Lead tagged G goes to ground terminal on coil solenoid.
2. Lead tagged H goes to either H^1 terminal on solenoid core.

GASOLINE CARBURETOR

The gasoline carburetor is a horizontal draft type. It consists of three major sections: the bowl and float, idle circuit, and load circuit.

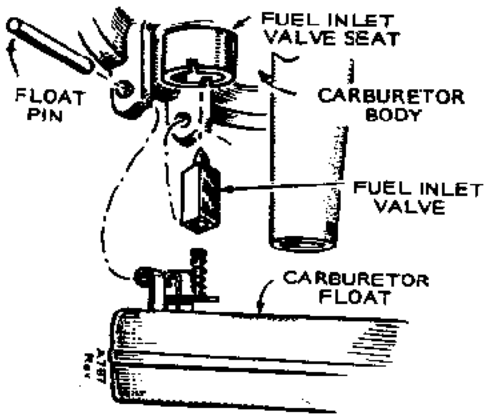


FIGURE 20. CARBURETOR INLET VALVE

Fuel enters the carburetor through the valve (Figure 20) and passes into the float chamber. The float controls fuel level in the bowl by closing the inlet valve when fuel reaches a certain height and opening it when the fuel level drops.

The idle circuit (Figure 21 and 22) supplies fuel during no-load operation and for small loads. the throttle is nearly closed at no load, and the intake manifold vacuum is high. The pressure difference between the manifold and float chamber causes fuel to flow through the idle circuit. The pressure difference draws fuel up through the hollow center of the main adjusting needle, through passages in the carburetor body to the idle port. Bleed holes in the main adjusting needle allow air to mix with the fuel. When the throttle is almost completely closed, the fuel passes out through the idle port. As the throttle is opened to increase power, fuel is also drawn out through the idle transfer port in the hollow main adjusting needle.

When the load increases, the engine governor opens the throttle further. The carburetor air flow increases, which produces a low pressure at the venturi (narrow

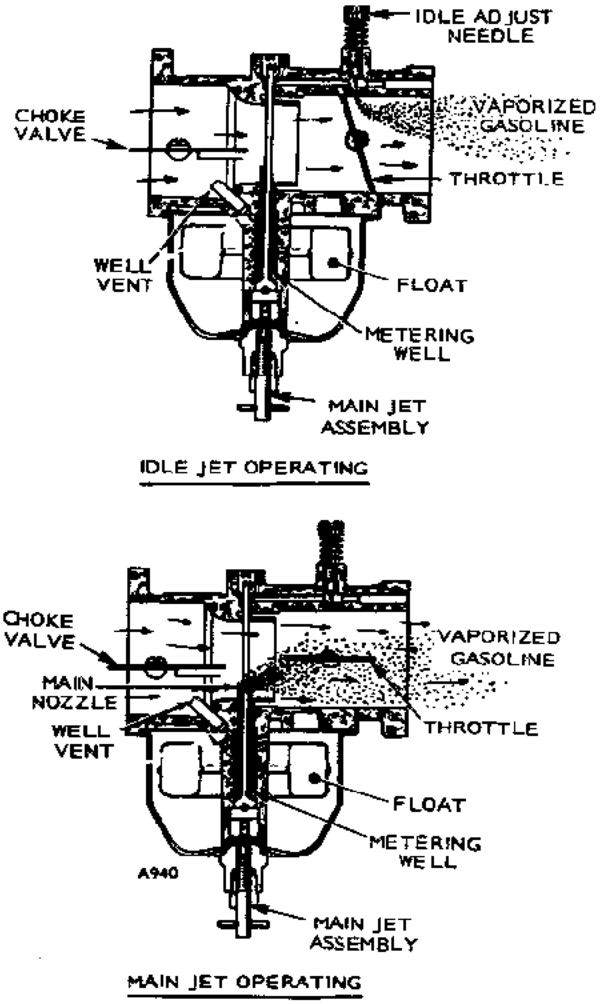


FIGURE 21. CARBURETOR CIRCUITS BEGIN SPEC R

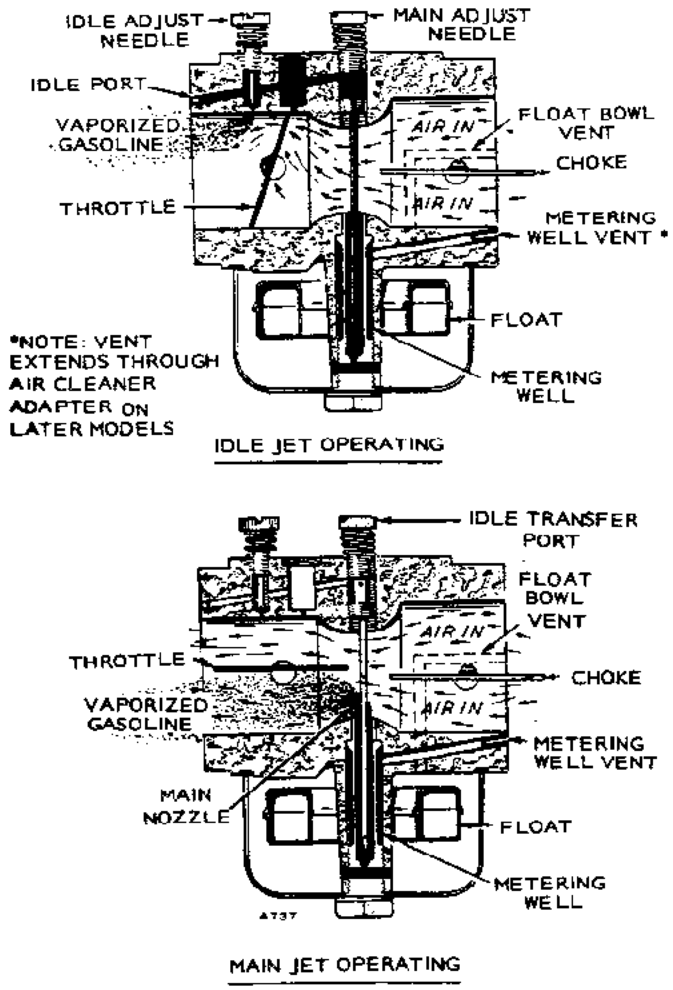


FIGURE 22. CARBURETOR CIRCUITS PRIOR TO SPEC R

section of the carburetor throat). This pressure drop operates the load circuit drawing fuel up the main nozzle where it mixes with air at the nozzle opening. The main adjusting needle controls fuel delivery.

As the throttle opens, the manifold vacuum decreases so the idle circuit becomes less effective. In a certain range, the two circuits blend, both delivering fuel, but as load is increased, the load circuit takes over.

With the load circuit in operation, as the load is increased, the throttle opens to deliver more fuel. The main nozzle won't immediately deliver this increased fuel because of the jets controlled by the adjusting needle. To prevent lag when load is increased, a metering well around the outside of the nozzle delivers fuel until the main jet can catch up with the increased demand.

Adjustment, Electric Choke: Under normal operation, adjust the choke so the distance measured between the choke and carburetor throat (Figure 18) is as shown in the table with the engine cold. Use the straight shank end of a drill bit to measure the gap. The upturned air cleaner must be removed for choke adjustment. To adjust the choke, loosen the two screws on the cover plate and rotate the cover assembly.

CAUTION **Forcing the needle against its seat will bend the needle. The needle does not shut off fuel completely when turned all the way in.**

Adjustment, With Load: The carburetor should be adjusted in 2 steps — first the idle adjustment and then the load adjustment. See Figure 23.

If the carburetor is completely out of adjustment so the engine won't run, open both needle valves 1 to 1-1/2 turns off their seats to permit starting. Don't force the needle valves against their seats. This will damage the needle.

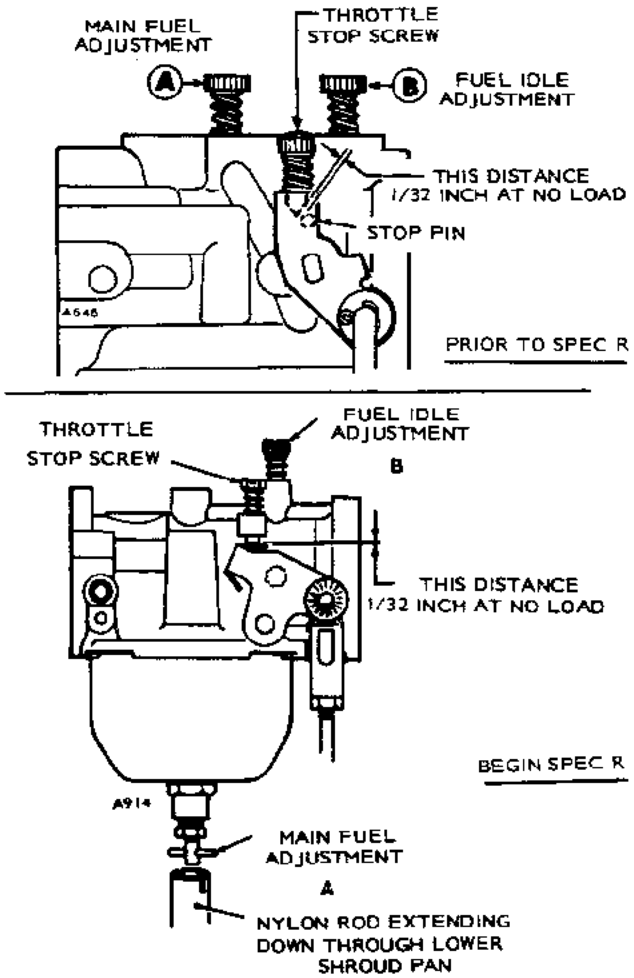


FIGURE 23. ADJUSTING GASOLINE CARBURETOR

Before adjusting the carburetor, be sure the ignition system is working properly and the governor is adjusted. Then allow the engine to warm up.

1. With no engine load, turn idle adjustment out until engine speed drops slightly below normal. Then turn needle in until speed returns to normal.
2. Apply a full load to engine. Carefully turn main adjustment in until speed drops slightly below normal. Then turn needle out until speed returns to normal.