Section VIII

FUEL AND EXHAUST SYSTEMS

SERVICE BULLETIN REFERENCE

NUMBER	DATE	SUBJECT	CHANGES

FUEL AND EXHAUST SYSTEMS

DATA AND SPECIFICATIONS

Item	C-67	C-68, C-69, C-70	C-300
FUEL PUMP			
Make	Auto Lite	Auto Lite	Auto Lite
Model	FB-4006	FB-4006	FB-4006
Type	Diaphragm With Dual Air Domes	Diaphragm With Dual Air Domes	Diaphragm With Dual Air Domes
Driven By	Camshaft	Camshaft	Camshaft
Pump Pressure (Pounds)	4½ to 6½	4½ to 6½	4½ to 6½
CARBURETOR			
Make	Ball and Ball	Carter	Carter
Type	Dual Throat Downdraft	4 Barrel Downdraft	4 Barrel Downdraft
Nominal Size (SAE)	1¼ inches	1⅛" 4 bore 4 bolt	1⅛" 4 bore 4 bolt
MODEL			
Standard Trans.	BBD-2180S + SA + SB	———	———
PowerFlite	BBD-2180S + SA + SB	WCFB-2126S	WCFB-2317S
THROTTLE BORE			
Primary	1 7/16 inch	1 5/16 inch	1 5/16 inch
Secondary	———	1 5/16 inch	1 5/16 inch
MAIN VENTURI			
Primary	1 3/16 inch	1 1/16 inch	1 1/16 inch
Secondary	———	1 1/16 inch	1 1/16 inch
LOW SPEED JETS			
Primary	.75 MM-S	No. 69 drill	No. 69 drill
Secondary	———	No. 69 drill	No. 69 drill
MAIN METERING JETS			
Primary	360 cc	No. 42 drill	No. 42 drill
Secondary	———	.057 inch drill	.057 inch drill

FUEL AND EXHAUST SYSTEMS—Cont'd

ITEM	C-67	C-68, C-69, C-70	C-300
ADJUSTMENTS			
Idle Mixture (Both Screws)	One Full Turn Open	One Full Turn Open	One Full Turn Open
Idle Speed	475 to 500 rpm	500 rpm	600 to 650 rpm
Accelerator Pump	$2\frac{7}{32}'' \pm \frac{1}{64}''$	Long Stroke	Long Stroke
Pump Capacity	———	19 cc/10 Strokes	19 cc
Float Setting (Casting to Top of Floats)			
Primary	$\frac{7}{32}$ inch	$\frac{1}{8}$ inch	$\frac{3}{16}$ inch
Secondary	———	$\frac{3}{16}$ inch	$\frac{5}{16}$ inch
Float Travel	———	$\frac{1}{2}'' \pm \frac{1}{16}''$	———
Unloader	$\frac{1}{4}$ inch	$\frac{3}{16}$ inch	———
Fast Idle	.022 to .026" Wire Gauge	.018 inch	.010 inch
Choke Rod Adjustment	———	.020 inch	———
Control	Integral Automatic	Integral Automatic	Integral Automatic
Choke Setting	Index Mark	Index Mark (Std Setting)	Index Mark (Std Setting)

SPECIAL TOOLS REQUIRED FOR SERVICING FUEL PUMP AND CARBURETOR

FUEL PUMP

Tool Number	Tool Name
T-109-43	Rivet Extractor
T-C-483	Gauge

CARBURETOR

Tool Number	Tool Name
C-3225	Stand—Carburetor Repair
C-3400	Stand—Carburetor Repair
T-109-28	Gauge—Choke Unloader ($1\frac{1}{64}$ in.)
T-109-29	Gauge—Wire (.020 in.) (Choke Rod Adjustment)
T-109-41	Bending Tool—Tang
T-109-44	Gauge—Wire (.018 in.) (Fast Idle)
T-109-58	Screwdriver Bit—(Jet Removing)
T-109-97	Bending Tool—(Bowl Vent Cap)
T-109-166	Gauge—Unloader ($1\frac{1}{64}$ in.)
T-109-197	Gauge—Vent Cap Setting ($\frac{1}{16}$ in.)
T-109-200	Gauge—(.010 in. Wire) (Primary Throttle)
T-109-220	Level—Secondary Float
T-109-213	Bending Tool—(Pump Rod)
T-109-222	Gauge—Float Level (Secondary) ($\frac{3}{16}$ in.)
T-109-232	Gauge—Float Level (Primary) ($\frac{1}{8}$ in.)
T-109-239	Gauge—Float
T-109-242	Gauge—Velocity Valve ($2\frac{7}{64}$ in.)

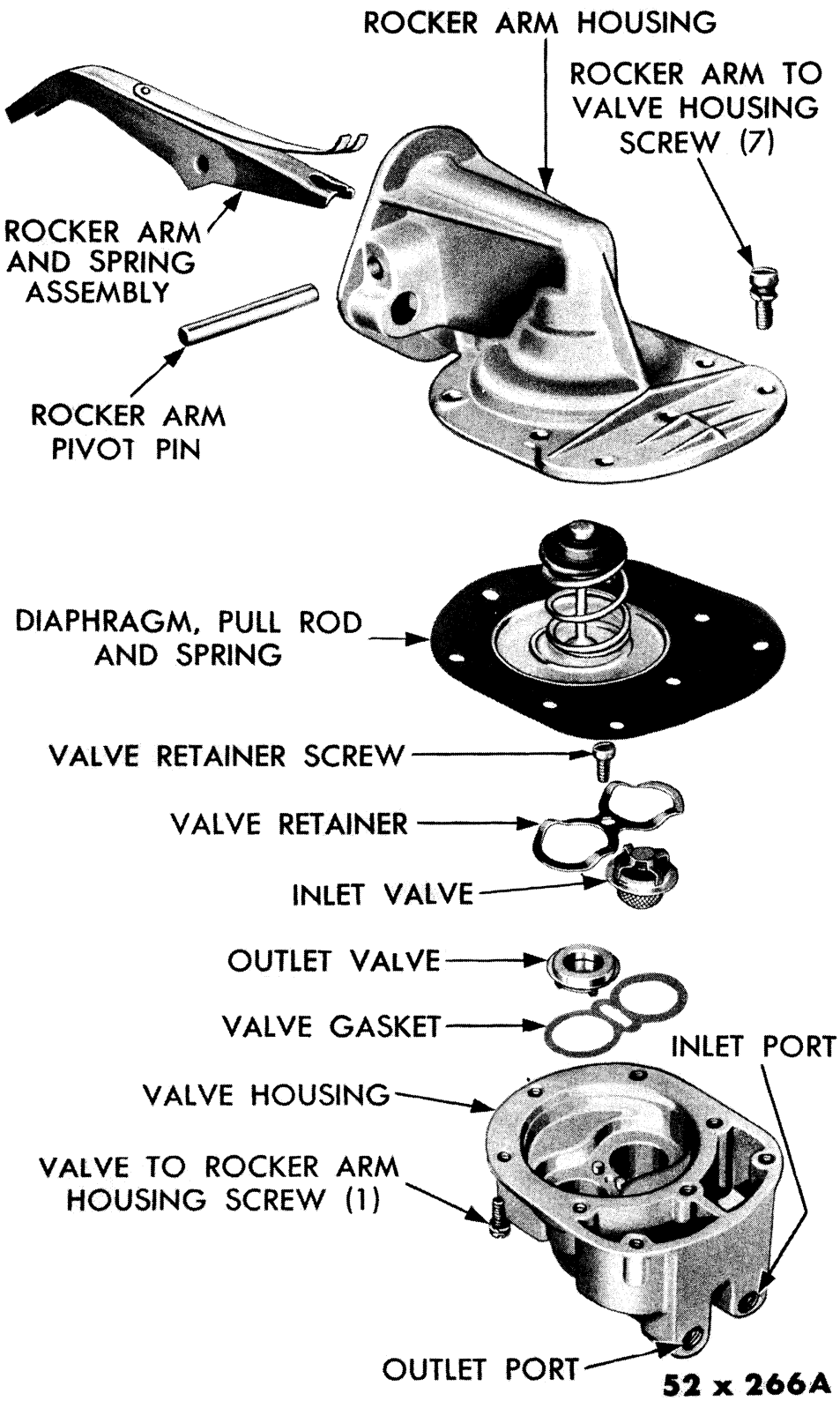


Fig. 1—Fuel Pump (Exploded View)

Section VIII

FUEL AND EXHAUST SYSTEMS

FUEL PUMP

(All Models)

1. DESCRIPTION

The fuel pump, as shown in Figure 1, is driven by an eccentric on the camshaft, which actuates the rocker arm. This action lifts the pull rod and diaphragm assembly upwards against the main spring, thus creating a vacuum in the valve housing, which opens the inlet valve and fuel is drawn into the valve housing chamber from the fuel tank.

On the return stroke of the rocker arm, the main spring pressure forces the diaphragm to the down position, which expels the fuel in the valve chamber through the outlet valve, to the carburetor.

When the carburetor float chamber is filled with fuel, the float in the carburetor shuts off the needle valve, creating pressure in the fuel pump chamber. This pressure holds the fuel pump diaphragm upward against spring pressure until the carburetor requires more fuel.

When the engine consumes the fuel and the float chamber in the carburetor becomes empty, the needle valve will again open to admit fuel into the float chamber, release pump pressure and start the pumping cycle again.

2. TESTING FUEL PUMP (ON CAR)

If the fuel pump fails to pump fuel to the carburetor, the following checks should be made to determine the cause of the failure before removing the fuel pump from the car.

a. Fuel Lines

Make certain that the fuel lines are not blocked and that the fittings are tight. Check the flexible hoses for cracks or deterioration which would cause leakage or retard the flow of fuel to the fuel pump.

b. Fuel Pump Breather Hole

Check for gasoline or oil leakage at the fuel pump breather hole. A gasoline leak at this point indicates a defective diaphragm. An oil leak at this point indicates the presence of a deteriorated or damaged oil seal on the diaphragm pull rod. In either case, the diaphragm assembly should be replaced.

c. Fuel Pump Pressure

If leakage is not apparent at the fuel pump breather hole, test fuel pump pressure by inserting "T" fitting into the fuel line at the carburetor. Connect pressure gauge, Tool C-483, to the "T" fitting and check fuel pump pressure while rotating the engine.

Fuel pump pressure should be from 4½ to 6½ pounds. This pressure should remain constant, or return to zero very, very slowly when the engine is stopped. An instant drop to zero on the testing gauge indicates that the outlet valve is leaking. Inlet and outlet valves are not serviceable. If necessary, replace the complete valve housing assembly.

If the Pressure Is Too Low—A weak diaphragm main spring, or improper assembly of the diaphragm, may be the cause.

If the Pressure Is Too High—The diaphragm spring may be too strong. Check the main spring for correct tension and replace the diaphragm assembly if necessary.

d. Inlet Valves

To test the inlet valves for proper functioning, disconnect the fuel line to the fuel pump and start the engine, or turn the engine with the starting motor. Place finger over the inlet fitting of the fuel pump while the engine is turning. There should be a noticeable suction—not alter-

nated by blow-back—at this point. If blow-back is present, one or both inlet valves are not seating properly. The inlet and outlet valves are not serviceable. If necessary, replace the complete valve housing assembly.

e. Additional Checks

Check for leakage at the fuel pump diaphragm which might be caused by loose mounting screws.

Check fuel pump mounting bolts to insure that no oil leakage exists around the mounting flange.

If the fuel pump fails to operate satisfactorily, disconnect the fuel pump inlet and outlet lines and remove the fuel pump assembly from the engine. Service as outlined in Paragraph 3.

SERVICING PROCEDURES

3. DISASSEMBLY AND ASSEMBLY OF FUEL PUMP

a. Disassembly

To disassemble fuel pump, refer to Figure 1, and proceed as follows:

NOTE

Before disassembly, mark housings in such manner that the mark "Inlet" will be facing inlet fuel line when reassembled. This is important!

(1) Remove the pivot pin retainer by spinning out with either a No. 1 drill or any proper size Easy Out. Remove pivot pin.

(2) Remove screws that hold valve housing and rocker arm housing together. Separate housings.

(3) Remove diaphragm assembly and main spring.

(4) Remove screw holding valve retainer in position.

(5) Remove inlet valve and strainer, outlet valve and gasket from valve housing.

NOTE

The component parts of the inlet and outlet valves are not available for service and should be serviced as an assembly.

CAUTION

Never use shellac or any other adhesive on the diaphragm.

b. Assembly

When assembling rocker arm housing and diaphragm to valve housing, insert screws and lockwashers, but do not tighten. Push rocker arm to its full travel. Hold in this position and tighten screws securely. (This will prevent the tearing of the diaphragm when pump is operated and permit the pump rocker arm to travel its full stroke.)

NOTE

When reassembling pump, be sure and insert the inlet valve and strainer in the port of the inlet side of pump.

4. PERFORMANCE AND ECONOMY TESTS

When a car is being tested for performance or economy, a good, hard-surfaced road should be used whenever possible. In addition to the condition of the road, other factors that may affect the accuracy of the test results are: wind resistance, the grade of the road, tire pressure, vehicle load, etc. Test results will be more accurate if the test is made in one direction and then in the opposite direction in order to obtain a balance of varying conditions, such as wind and road resistance and grades. The average of the two tests made in this manner is far more accurate than the result of a one-way check.

SERVICE DIAGNOSIS
CONDITIONS - POSSIBLE CAUSES

5. FUEL PUMP LEAKS—FUEL

Possible Causes:

a. Loose housing screws.

b. Worn, ruptured or torn diaphragm.

c. Loose diaphragm mounting plates.

d. Loose inlet or outlet line fittings.

6. FUEL PUMP LEAKS—OIL

Possible Causes:

a. Cracked or deteriorated pull rod oil seal.

b. Loose rocker arm pivot pin.

c. Loose pump mounting bolts.

d. Defective pump to block gasket.

7. INSUFFICIENT FUEL DELIVERY

Possible Causes:

a. Vent in tank filler neck restricted. (This will also cause collapsed fuel tank.)

b. Leaks in fuel line or fittings.

c. Dirt or restriction in fuel tank.

d. Worn, ruptured, or torn diaphragm.

e. Frozen gas lines.

f. Improperly seating valves.

g. Vapor lock.

h. Weak main spring.

i. Incorrect fuel pump.

8. FUEL PUMP NOISE

Possible Causes:

a. Loose mounting bolts.

b. Scored or worn rocker arm.

c. Weak or broken rocker arm spring.

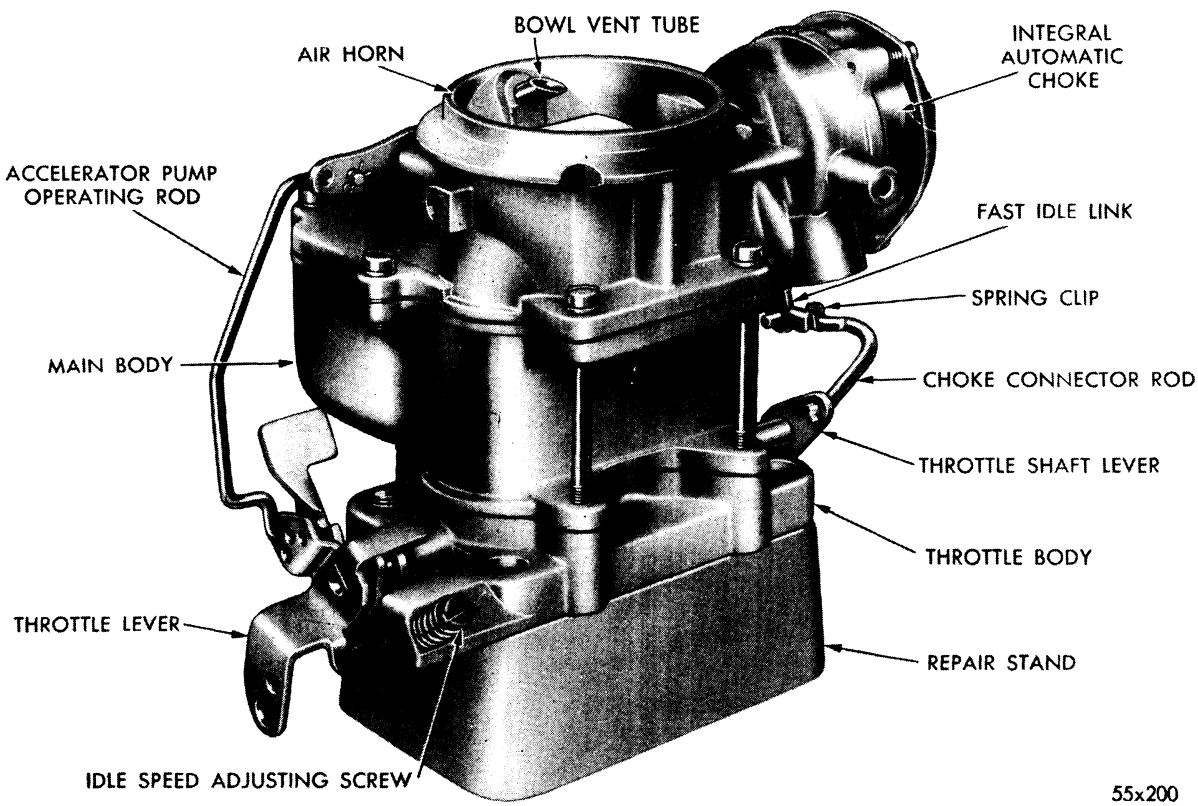
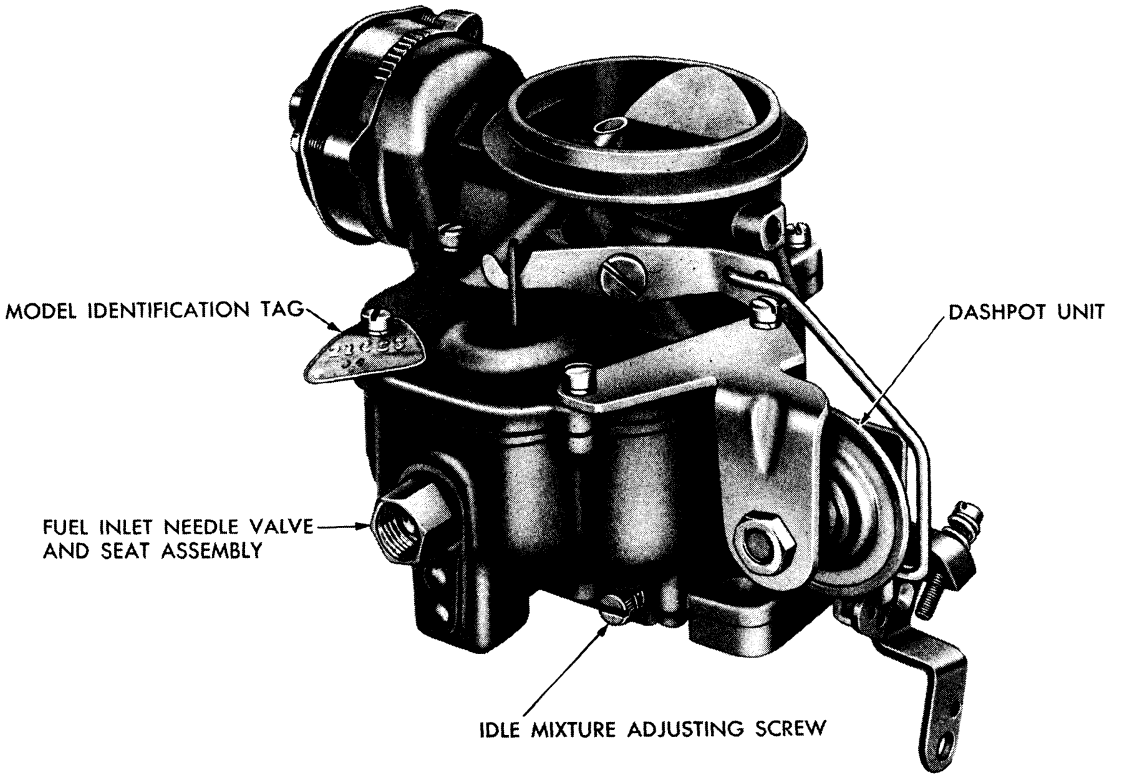


Fig. 1—Carburetor Assembly (BBD-2180S)



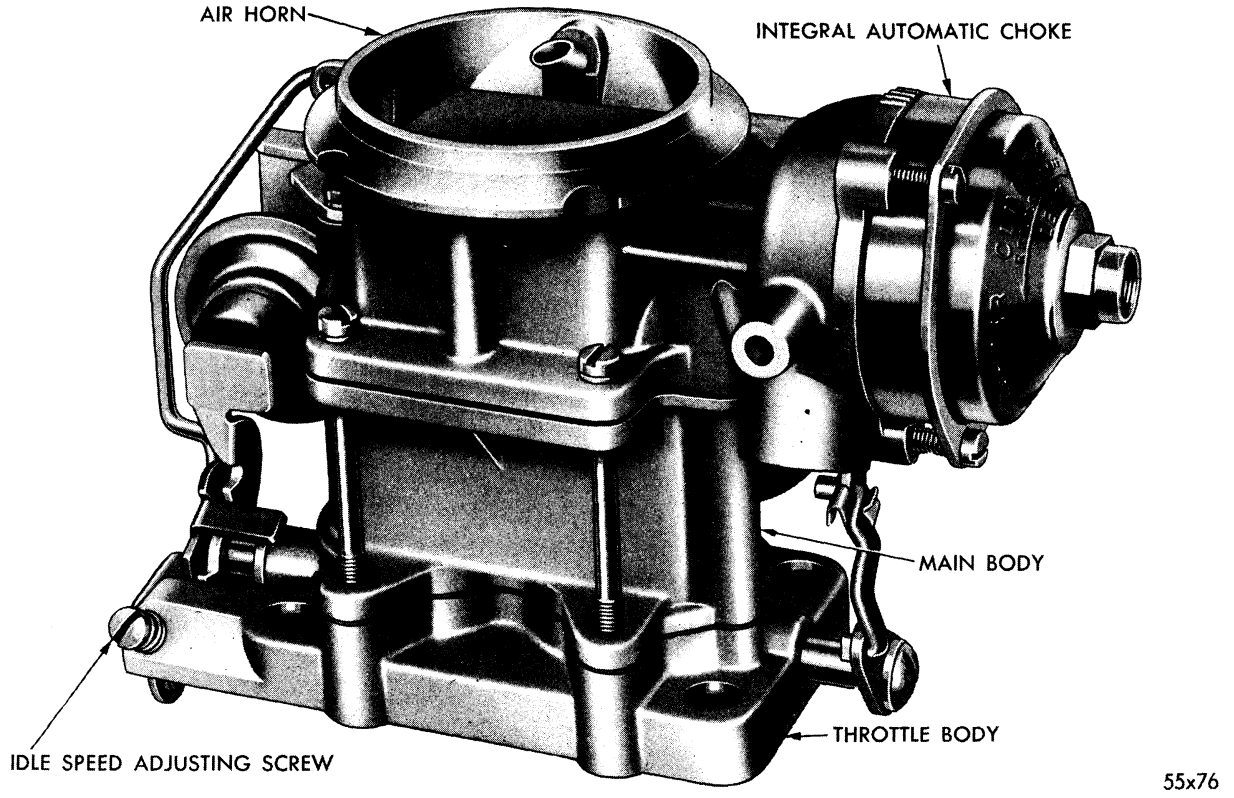


Fig. 2—Carburetor Assembly (BBD-2162S)

CARBURETOR

1. DESCRIPTION

The Ball and Ball BBD Series carburetor is of the dual throat, down-draft type with each throat having its own idle system, main metering system, and throttle valve. The idle system and main metering systems are supplemented by the float system, the accelerating system and the power system.

There are two models of the Ball and Ball carburetors used, depending on the type of transmission with which the car is equipped. The same basic design applies to these carburetors regardless of adaptions. Refer to "Specifications" for detailed information.

The carburetors are classified by transmission application as follows:

(1) Model BBD 2180S, SA and SB is used on C-67 (Standard) equipped with a standard three speed transmission. (See Fig. 1.)

(2) Model BBD 2162S, SA and SB is used on C-67 (Deluxe) equipped with a PowerFlite transmission. This carburetor is equipped with a mechanical dashpot. (See Fig. 2.)

The service procedures for the disassembly, overhaul, cleaning and assembly of these carburetors are the same, with the exception of the dashpot.

Incorporated in the carburetor is an automatic integral choke of the heated air type, that is cast with the air horn and connected to the choke and throttle shafts through a series of rods and levers. The fast idle mechanism is incorporated in the choke housing. The operation of the five basic systems, as well as the operation of the dashpot and the automatic integral choke is described briefly in the following paragraphs.

2. THE FLOAT SYSTEM

The function of the float system is to maintain a constant level of fuel in the float chamber at all times and under all conditions of operation. Fuel enters the carburetor at the fuel inlet and follows through the inlet needle valve and seat into the float chamber, where the fuel is maintained at a determined level by the float. The float chamber is vented through an internal vent tube which connects the float chamber to the air inlet of the carburetor.

Since the float chamber and the air inlet are inter-connected, the same pressure is maintained in the float chamber as in the air horn, therefore, any accumulation of dirt in the air cleaner, causing restrictions to the air flow, will not upset the mixture ratio.

3. THE IDLE SYSTEM

During engine idle or part-throttle operation, fuel is supplied to the engine through the idle system. Fuel enters through the main metering jets and is metered at the idle orifice tubes where it mixes with air drawn through the idle air bleed. The idle restriction breaks up the fuel as it mixes with air drawn through the idle air bleed. This provides an air-fuel mixture at the idle port and the idle adjusting screw port. It is important that the idle air bleed, idle orifice tubes, idle restriction, idle passages, idle ports, and idle mixture adjusting screws be kept clean. Any clogging will result in poor idle or part-throttle operation.

4. HIGH-SPEED SYSTEM

During part- or full-throttle operation, fuel is supplied to the engine through the high-speed system. When the engine is under a heavy load, sudden acceleration or operated at wide open throttle, the step-up system supplies additional fuel. Fuel flow through the passage in the main metering jet is controlled by the movement of the step-up rods which are moved by a spring and a vacuum controlled piston. A vacuum passage to the intake manifold is provided for by a drilled passage in the main and throttle bodies and a slotted flange gasket.

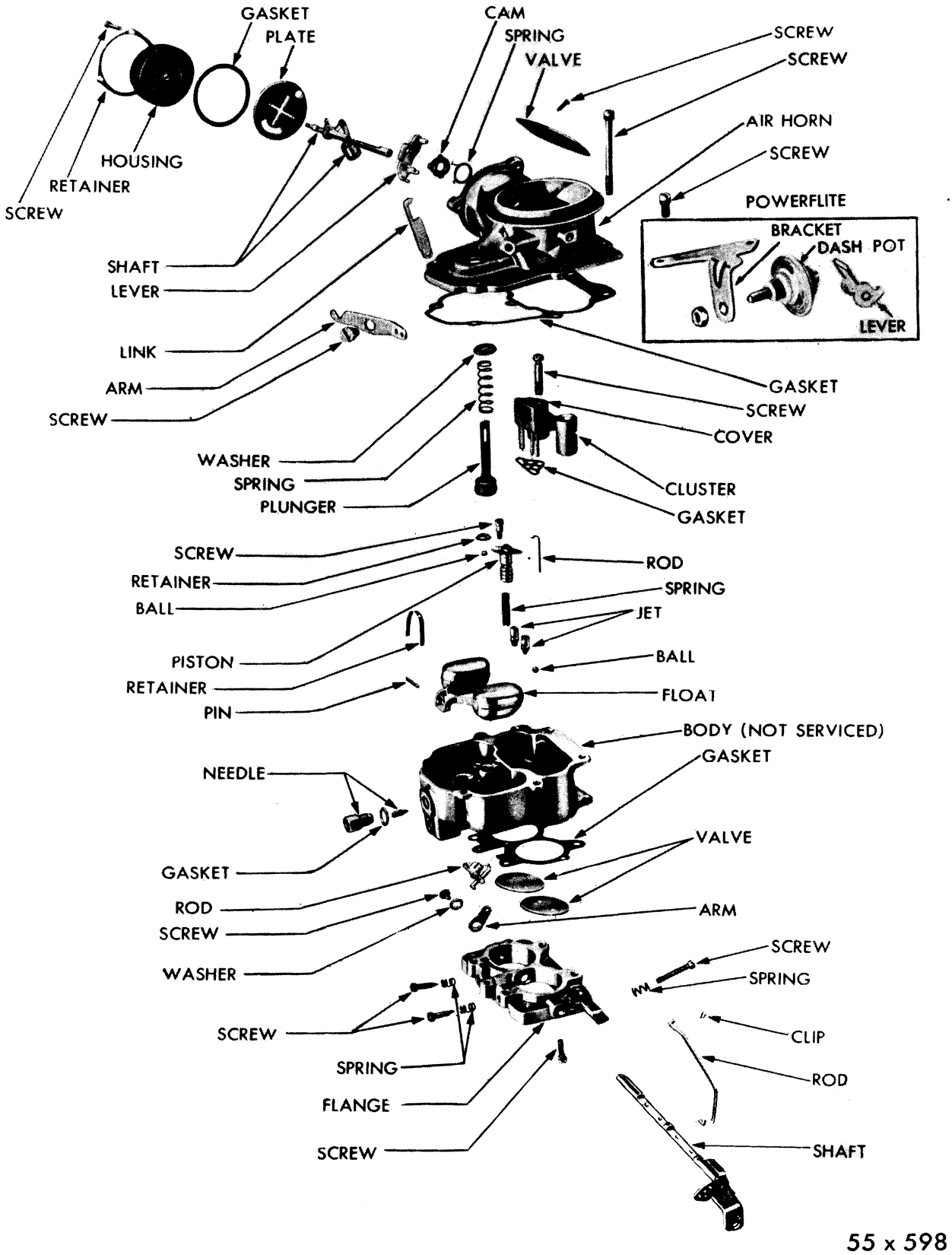


Fig. 3—Carburetor Assembly (Disassembled View)

Under normal driving conditions, the manifold vacuum exerts a strong pull on the step-up piston. This holds the piston down, keeping the step-up rods in the fuel passage of the main metering jets. Fuel then flows around the rods, through the jets, to the discharge nozzles.

When manifold vacuum falls off, due to heavy load, sudden acceleration, or at wide-open throttle, the spring moves the piston up, lifting the step-up rods out of the main metering jets. Additional fuel is then supplied to the engine.

Air is drawn through the high-speed air bleed and mixes with the fuel surrounding the main vent tubes. The mixture is then drawn from the discharge nozzles. **It is very important that the vent tubes be clean.**

5. ACCELERATOR PUMP SYSTEM

The accelerator pump system momentarily supplies an extra charge of fuel to the engine when the throttle is opened. The amount of fuel added is directly proportional to the amount the accelerator pedal is depressed. The pump plunger spring forces the plunger down and the fuel is discharged past the discharge check ball through the discharge ports and into the venturi air stream. The inlet passage is closed by the inlet check ball as this occurs.

When the accelerator pedal returns, the pump plunger is pulled up, drawing a new charge of fuel past the inlet check ball. The discharge check ball is closed, preventing any air from bleeding into the passage when the pump plunger is pulled up.

6. AUTOMATIC INTEGRAL CHOKE

The automatic integral choke used in this series of carburetors is of the mechanical, heated-air type. The operation is a combination of linkage connecting the throttle shaft to the offset choke valve and thermostatic coil spring. A tube from the thermostat cover to the exhaust manifold "stove" provides heated air to govern the tension of the thermostatic coil spring. The fast idle mechanism is incorporated in the choke housing and provides the correct throttle opening to prevent the engine from stalling during the warm up period.

7. THE DASHPOT CONTROL

The function of the dashpot control is to retard the closing action of the throttle valves on PowerFlite Transmission equipped cars, thus preventing the stalling of the engine upon sudden release of the accelerator pedal. By retarding the closing of the throttle valves, sufficient time is allowed to clear the induction chamber of the fuel charge before the throttle returns to the slow idle position.

8. CARBURETOR MODEL IDENTIFICATION

All BBD carburetors have the model code number and date stamped on a metal tag, attached to the air horn. **Do not destroy or remove tag from the carburetor as this is the only lead to the model identification.** Before attempting to repair or overhaul a carburetor, refer to the model code number and secure a repair kit for the number indicated on the metal tag.

SERVICE PROCEDURES

9. REMOVAL OF CARBURETOR (from Engine)

(1) Remove the air cleaner and gasket.

(2) Disconnect the fuel line, choke heat tube, and vacuum spark advance tube.

(3) Disconnect the throttle linkage, then remove carburetor from intake manifold and discard the gasket. The dashpot can be serviced without removing the carburetor from the engine.

10. SERVICING THE CARBURETOR

The servicing of the carburetor should **only** be done by an experienced carburetor mechanic and with the **proper** tools.

Dirt, dust, water, and gummy deposits are

some of the main causes for poor carburetor operation. However, proper cleaning and the installation of new parts, where required, will return the carburetor to its originally designed performance.

Often the carburetor is blamed for a great variety of trouble which is classed as "Poor Car Performance." Therefore, be definitely sure the trouble is not located elsewhere before disassembling the carburetor.

When overhauling the carburetor, several items of importance should be observed to assure a good job: The carburetor must be disassembled, all parts carefully cleaned in a suitable solvent, and inspected for damage or wear. Use air pressure **only,** to clear the various orifices and channels.

Replace questionable parts with **NEW** ones. When checking parts removed from the carburetor, it is at times rather difficult to be sure they are satisfactory for further service. It is, therefore, recommended that in such cases, **NEW** parts be installed.

11. DISASSEMBLY OF CARBURETOR

To disassemble the carburetor for cleaning or overhaul, refer to Figure 3, (depending on model of carburetor), and proceed as follows:

Place the carburetor assembly on repair stand Tool C-3225. (This tool is used to protect the throttle valves from damage and to provide a suitable base for working.)

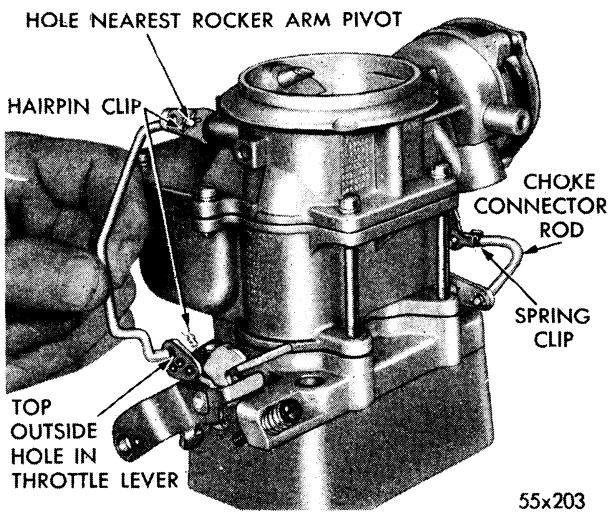


Fig. 4—Removal or Installing Accelerator Pump Rod

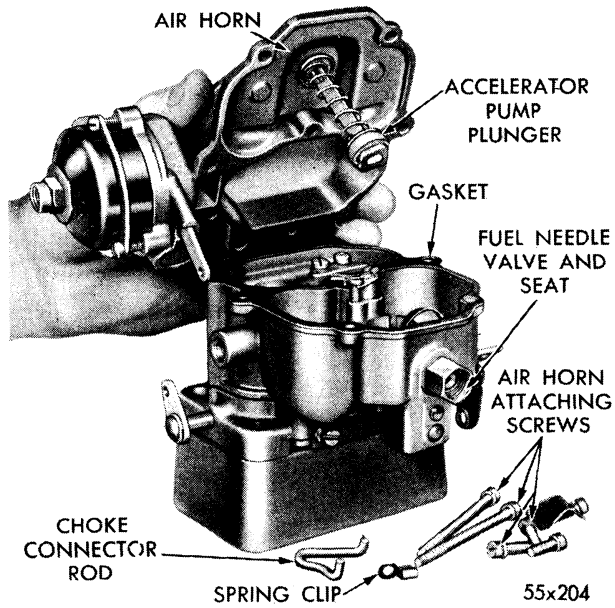


Fig. 5—Removing or Installing Air Horn

12. DISASSEMBLY OF MAIN BODY

(1) Remove the hairpin clips that retain the accelerator pump operating rod, as shown in Figure 4.

(2) Remove the dashpot (if so equipped).

(3) Remove the spring clip that holds the choke connector rod to the fast idle link.

(4) Disengage the rod from the link and throttle shaft lever.

(5) Remove the air horn and integral automatic choke as an assembly, as shown in Figure 5, and discard the gasket.

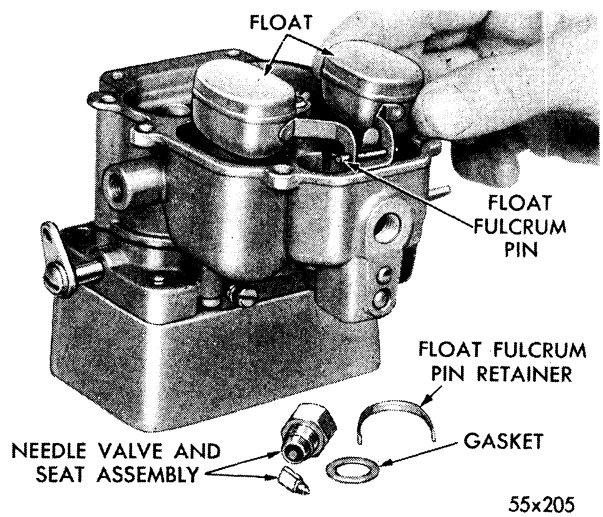


Fig. 6—Removing or Installing Float

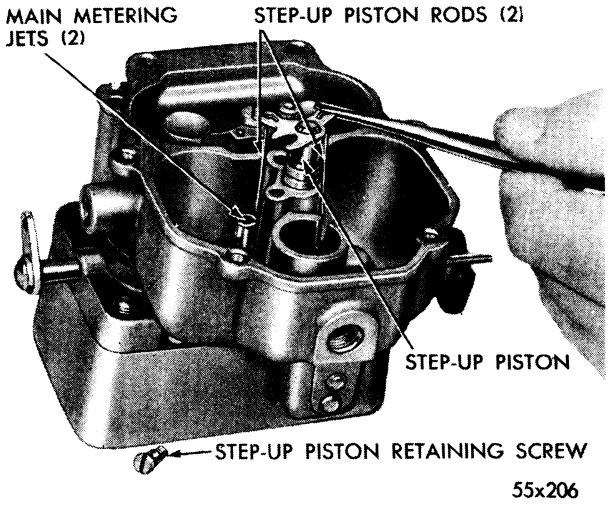


Fig. 7—Removing or Installing Step-Up Piston and Rods

(6) Remove the fuel inlet needle valve and seat, float and fulcrum pin, step-up piston, and rods from the main body. (See Figs. 6 and 7.)

(7) Remove the step-up piston spring and gasket from the bottom of the piston well.

(8) Remove the main metering jets, gaskets, and venturi cluster and cluster cover (with idle and main vent tubes) and discard the gasket.

(9) Invert the carburetor and drop out the pump discharge check ball. (The metering of fuel from the accelerator pump is controlled by two drilled holes in the venturi cluster, see Fig. 8). **Do not remove the idle orifice or main vent tubes from the cluster.** They can easily be cleaned, using a suitable solvent and dried with compressed air. The discharge cluster is serviced only as an assembly.

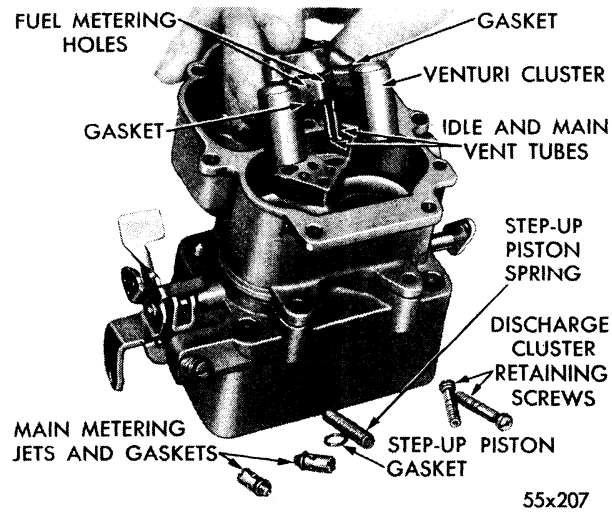


Fig. 8—Removing or Installing Venturi Cluster

a. Disassembly of Throttle Body

Remove the idle adjusting screws and springs from the throttle body, then invert carburetor and remove the screws that attach the throttle body to the main body. Separate main and throttle bodies and discard the gasket.

b. Disassembly of Air Horn

(1) Disengage the accelerator pump plunger from the rocker arm by pushing up on the bottom of plunger and sliding it off rocker arm hook. If the pump plunger leather is hard, worn, or cracked, a new accelerator pump plunger should be installed.

(2) **Place the accelerator pump plunger in a jar of gasoline or kerosene to prevent the leather from drying out.**

(3) Remove the screws that attach thermostatic coil housing to the air horn. Remove the bakelite housing and coil spring, gasket, and baffle plate.

(4) Slide out the unloader arm and fast idle link.

(5) Remove the screws that hold the choke valve to the choke shaft. **The screws are staked to prevent loosening and extreme care is necessary to avoid breaking in the shaft.**

(6) Turn the choke shaft counter-clockwise

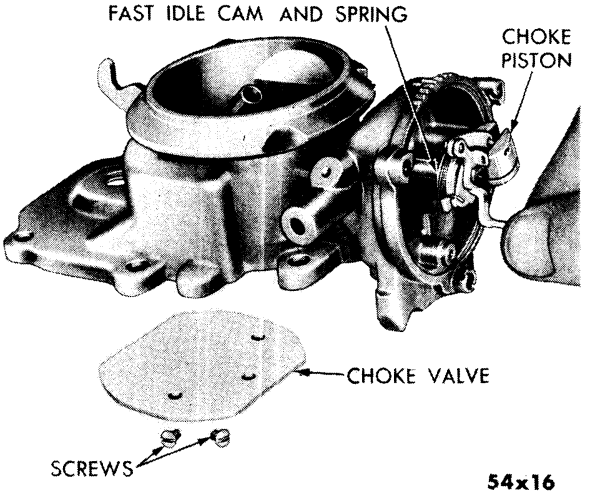


Fig. 9—Removing or Installing Choke Shaft and Piston

until the choke piston clears the top of its cylinder.

(7) Withdraw the choke piston, link, and shaft out of the air horn, as shown in Figure 9.

(8) Disengage the fast idle cam and spring from the choke shaft by lifting the ends of the spring over the short lever, as shown in Figure 10; then, slide off the choke shaft.

(9) The carburetor now has been disassembled into three units, the air horn, main body and throttle body, and the component parts of each disassembled as far as necessary for cleaning and inspection.

NOTE

It is usually not advisable to remove the throttle shaft or valves unless wear or damage necessitates installation of new parts. To install new valves or throttle shaft, refer to Inspection and Reassembly, Paragraph 14.

13. CLEANING CARBURETOR PARTS

The recommended solvent for gum deposits is denatured alcohol which is easily obtainable. However, there are other commercial solvents which may be used with satisfactory results. **If the commercial solvent or cleaner recommends the use of water as a rinse, it should be "HOT." After rinsing, all trace of water must be blown from the passages with air pressure. It is further advisable to rinse all parts in clean kerosene or gasoline to be certain no trace of moisture remains.**

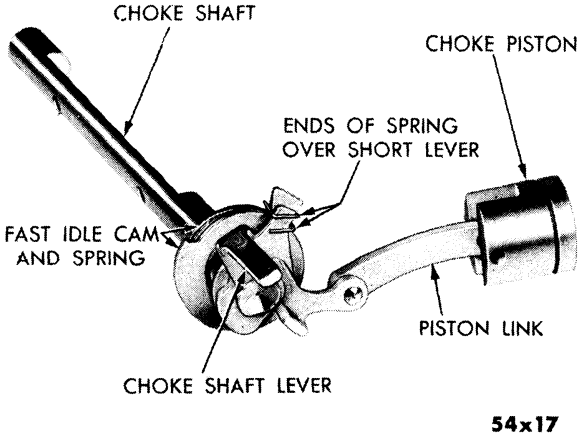


Fig. 10—Choke Shaft, Piston, Sleeve and Spring

A soft brush should be used while the parts are soaking in the solvent to remove gum and carbon deposits. After cleaning, all parts should be rinsed in clean solvent and then all passages blown out with compressed air. **Do not immerse the bakelite choke housing in the solvent because of possible damage.**

NOTE

Never clean jets with a wire, drill, or other mechanical means because the orifices may become enlarged, making the mixture too rich for proper performance.

14. INSPECTION AND ASSEMBLY

Check the throttle shaft for excessive wear in the throttle body. If wear is extreme, it is recommended that the throttle body be replaced, rather than installing a new throttle shaft in the old body.

During manufacture, the location of the idle transfer port and the spark advance control ports to the valves is carefully established for one particular assembly (See Fig. 11). If a new shaft should be installed in an old worn throttle body it would be very unlikely that the original relationship of these ports to the valves would be obtained. Changing the port relationship would adversely affect normal car operation between speeds of 15 and 30 miles per hour. If it has been decided that a new shaft is to be installed, adhere closely to the following instructions:

Mark the valves to be sure each is replaced in the same bore from which it was removed. Remove the screws that hold the throttle valves to the throttle shaft, then slide the valves out of

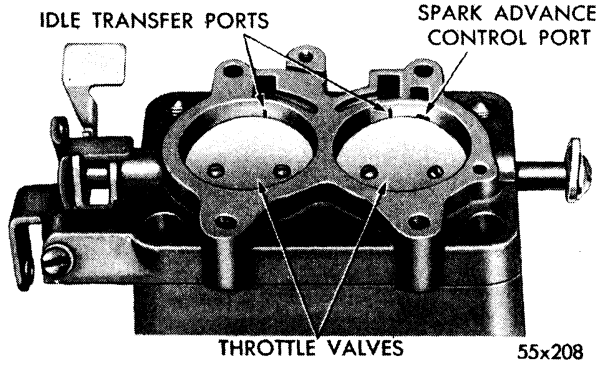


Fig. 11—Ports in Relation to Throttle Valves

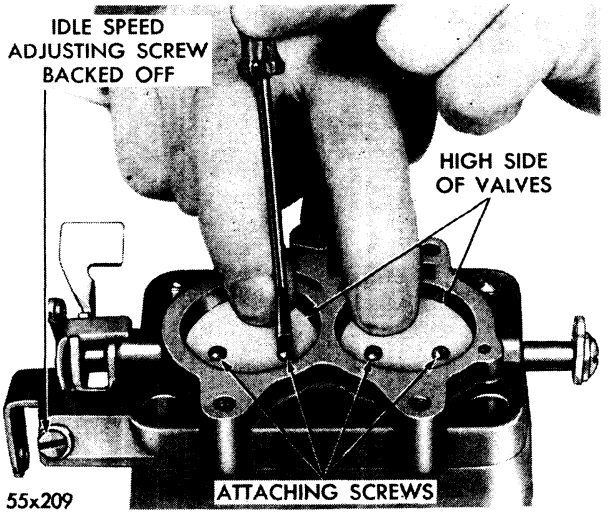


Fig. 12—Installing Throttle Valves

bore in throttle body. **These screws are staked on the opposite side to prevent loosening. Using a file, remove upset metal and then remove screws. This will prevent screws from breaking in the throttle shaft.**

Slide the throttle shaft out of the throttle body. Position the new shaft in body and back out the idle speed adjusting screw. (This will allow the valves to be fully seated for the installation operation.)

The "C" in a circle stamped on the valves must be toward the idle port and visible from the bottom of the throttle body when the valves are installed. Slide the valves into their respective bores, and insert **NEW** screws, but do not tighten. Hold the valves in place with the fingers, as shown in Figure 12. (Fingers pressing on the high side of valves.)

Tap the valves lightly with a screwdriver to seat fully in the bores. Holding the valves in this position, tighten screws securely and stake by squeezing the pliers. Install the two idle mixture adjusting screws and springs in the throttle body. (The tapered portion must be straight and smooth. If the tapered portion is grooved or ridged, new idle mixture adjusting screws should be installed to insure having correct idle mixture control.)

15. IDLE MIXTURE SCREW ADJUSTMENT

DO NOT USE A SCREWDRIVER. The adjustment should be made with the fingers. Turn the idle mixture adjusting screws **lightly** against their seats, then back off one full turn for approximate adjustment.

16. ASSEMBLING THE AUTOMATIC CHOKE

To function properly, it is important that all choke parts be clean and move freely when installed. It is possible, under extremely dusty conditions, that fine particles of dirt may be found deposited on the various choke parts. **A heavy, black, hard carbon deposit on the choke parts will indicate the possibility of a leak in the heat tube.** Check tube and replace if necessary.

Before assembling the automatic choke, be sure all parts are clean and free from any trace of grit or dirt. Clean all choke parts, using a suitable solvent and blow dry with compressed air. Examine all choke parts for wear or damage. Worn or damaged parts must be replaced with new in order to insure proper choke operation.

The thermostatic coil spring, heat retainer plate, and the bakelite choke housing are serviced as an assembly only. If the housing is cracked or broken, install a complete new assembly. The indicator mark cut on the rim of the housing is only correct for the one thermostatic coil spring originally installed. **Do not attempt to separate the thermostatic coil spring from the heat retainer plate.**

(1) To remove the thermostatic coil and heat retainer plate from the choke housing, hit the choke housing sharply against the palm of the hand (coil side down).

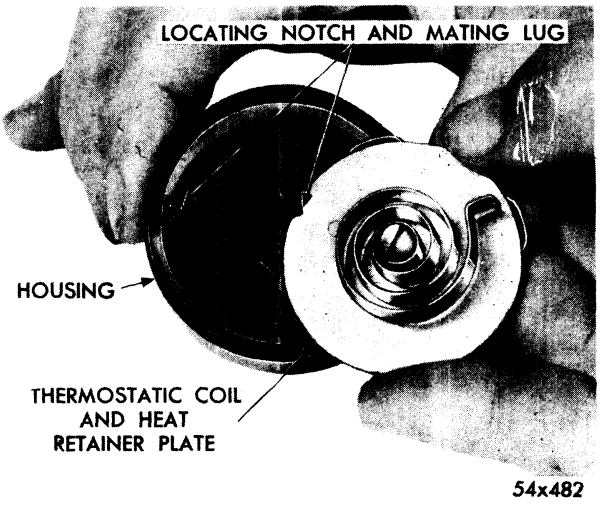


Fig. 13—Installing Heat Retainer Plate

(2) Clean any dirt, dust, or other foreign material that may be present, from the retainer plate and out of the choke housing.

(3) When reassembling, match the notch in the plate with the lug in the housing, as shown in Figure 13.

(4) Install the plate and press down until seated in choke housing. **Be sure the retaining spring in the plate is clear of the notch.**

(5) Slide the fast idle cam and spring over the choke shaft and down against the choke lever.

(6) Slide the ends of the spring over the short tang on the lever.

(7) Slide the choke shaft and piston into the air horn. (Be sure that the groove around the choke piston is perfectly clean.)

(8) Turn the lever counter-clockwise until the choke piston clears the choke cylinder.

(9) At the same time, guide the fast idle cam and spring over the shoulder of the shaft opening in the air horn.

(10) Push in slightly on the end of choke shaft to seat the fast idle cam; then the piston will drop into its cylinder.

(11) Slide the choke valve into position and start new screws. Holding the valve in the closed position, tap gently with screwdriver to center and locate the valve. Tighten screws securely, then stake by squeezing with pliers.

(12) Hold the air horn in an upright position and close the choke valve. The valve should open freely of its own weight. **Do not lubricate any of the choke operating parts.**

(13) Slide the fast idle link up through the slot in the air horn with the hook portion toward the choke piston.

(14) Hold the fast idle link in the uppermost position, then install the unloader arm and trip lever.

(15) Allow the fast idle link to drop slightly and engage the unloader arm.

(16) Install baffle plate, gasket, coil spring housing, and housing retaining ring.

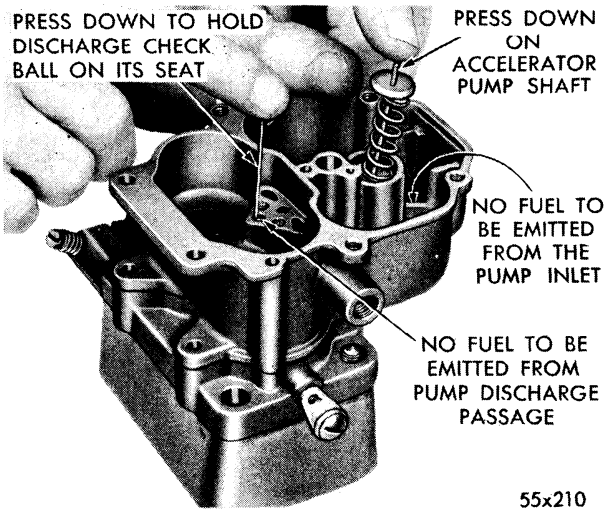


Fig. 14—Accelerator Pump Test

17. ASSEMBLING THE MAIN BODY

Place the discharge check ball on its seat, and make the accelerator pump test as follows:

(1) Remove the accelerator pump plunger from the jar of gasoline. Flare back the leather several times, then slide into the pump well.

(2) Pour clean gasoline into the float chamber (approximately ½ inch deep).

(3) Raise the pump plunger and press lightly on plunger shaft, forcing the plunger down into the well. Do this several times until all air is removed from the discharge passage.

(4) Using a small clean brass rod, hold the discharge check ball firmly on its seat, as shown in Figure 14.

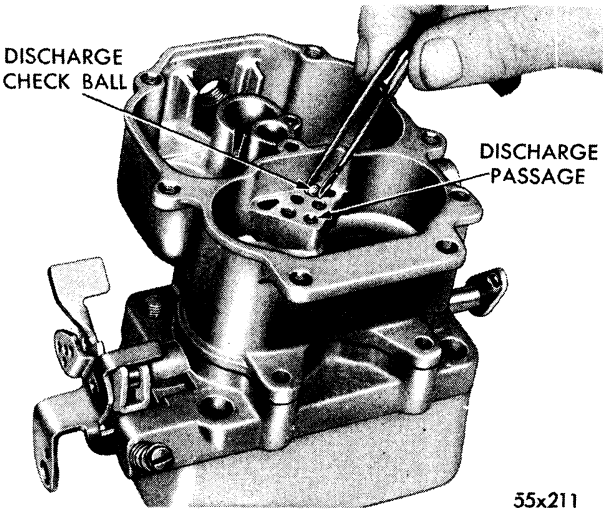


Fig. 15—Installing Accelerator Pump Discharge Check Ball

(5) Raise the pump plunger and press downward. **No fuel should be emitted from either the accelerator pump intake or discharge passage. If any fuel does emit it is an indication of dirt or a damaged check ball.**

(6) Remove the ball, reclean the passage, and, if necessary, install a new check ball.

(7) Retest as described above. Remove the plunger and pour out the gasoline after test.

(8) Reinstall the venturi cluster and cluster cover, gaskets, and the idle bleed screws. Tighten screws securely.

(9) Install the main metering jets and new gaskets, step-up piston gasket, spring and piston, and rods. Install retaining screw.

(10) Before installing step-up piston, be sure that the step-up rods are straight and true. The rods must hang true and be able to move freely each side of their vertical position.

(11) **Be sure the step-up piston slides freely in its cylinder.** A step-up piston stuck in the **UP** position will cause a **rich** mixture at part-throttle. A piston stuck in the **DOWN** position will cause a lean mixture and poor acceleration at wide open throttle. Again, be sure that the piston slides freely in its cylinder.

(12) Place a new gasket on the throttle body, then, lower the main body down on throttle body.

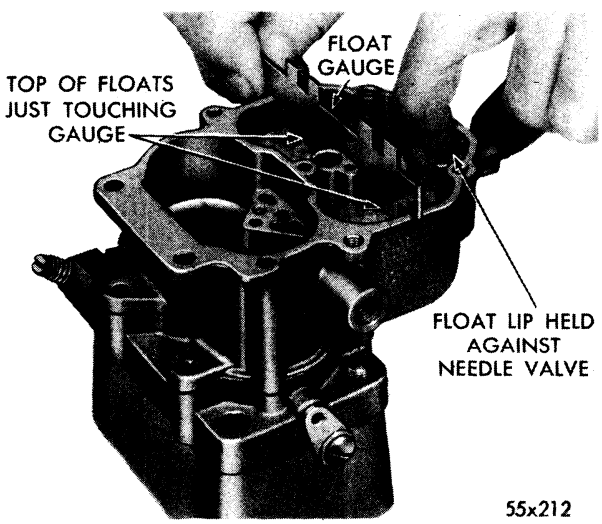


Fig. 16—Checking Float Height

(13) Invert the assembly and install retaining screws; snug down but do not tighten.

(14) Install the float, fulcrum pins, retainer, fuel inlet needle valve, seat, and new gasket. If the needle valve is ridged, grooved, or shows signs of wear, a new needle valve, seat and gasket should be installed.

18. CHECKING FLOAT HEIGHT

(1) When checking the float height, be sure the air horn gasket is removed.

(2) Place Float Gauge Tool T-109-239 in position over floats, as shown in Figure 16. Both floats should just touch the gauge when the float lip is held firmly against inlet needle.

(3) To adjust, bend the float lip to raise or lower the floats until correct setting has been obtained. If one float is lower than the other, equalize by bending the float arm.

(4) If Tool T-109-239 is not available, use a steel scale and measure the distance from the crown of the float (in the center) to the top of the fuel bowl. This measurement should be $\frac{7}{32}$ inch.

(5) Remove the accelerator pump plunger from the jar of gasoline, slide spring and cup washer over plunger shaft, then install in position in air horn.

(6) Using a new gasket, place air horn on main body and install screws. (Be sure the pump leather enters the pump well evenly.)

(7) Install the accelerator pump operating rod, choke connector rod, and dashpot (if so equipped).

(8) Tighten all attaching screws securely (including the two that attach throttle body to the main body).

19. CARBURETOR ADJUSTMENTS

It is very important that the following adjustments be made on a reconditioned carburetor and in the sequence listed: **Fast Idle, Unloader, Accelerator Pump, Dashpot (if so equipped).**

20. FAST IDLE ADJUSTMENT

To make the fast idle adjustment, back out the idle speed adjusting screw so that the throttle

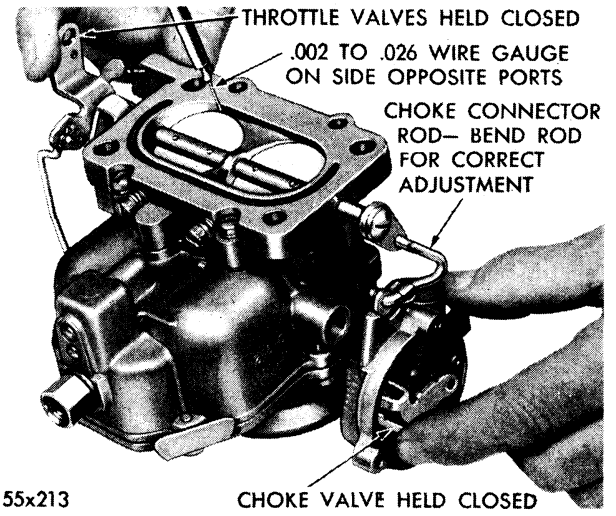


Fig. 17—Fast Idle Adjustment

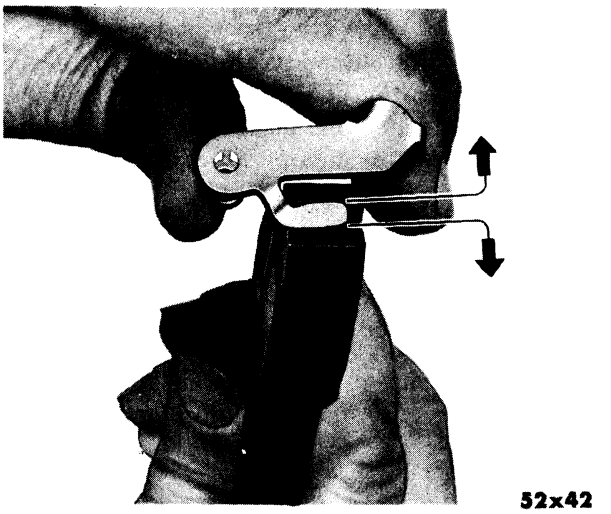


Fig. 19—Bending Choke Trip Lever Arm

valves can close. Remove the thermostatic coil spring housing, gasket, and baffle plate. Open the throttle valves partially and hold the choke valve in the fully closed position. Close the throttle valves. This will allow the fast idle cam to revolve to the fast idle position. Invert the carburetor. It should be possible to insert a .022 to .026 inch wire gauge between the throttle valves and bore of the throttle body (side opposite ports), as shown in Figure 17. If the opening is not correct, bend the lower end of the choke connector rod, using Tool T-109-213, until the correct clearance has been obtained.

21. UNLOADER ADJUSTMENT

To make the unloader adjustment, hold the choke valve **lightly** closed with a finger and then open the throttle valves to wide open position. The choke valve should open sufficiently to allow a $\frac{9}{64}$ inch gauge to be inserted between the choke valve and the inside bore of the air horn, as shown in Figure 18. To adjust, bend the unloader arm lever, as shown in Figure 19, until the desired unloader action has been obtained.

Reinstall the choke baffle plate, gasket, and choke housing. Install retaining ring and screws and tighten securely.

22. ACCELERATOR PUMP ADJUSTMENT

With the throttle valves fully closed (idle speed adjusting screw backed out), the distance from the top of the plunger rod to the top of the air horn should be 1 inch for Carburetor, BBD 2162S

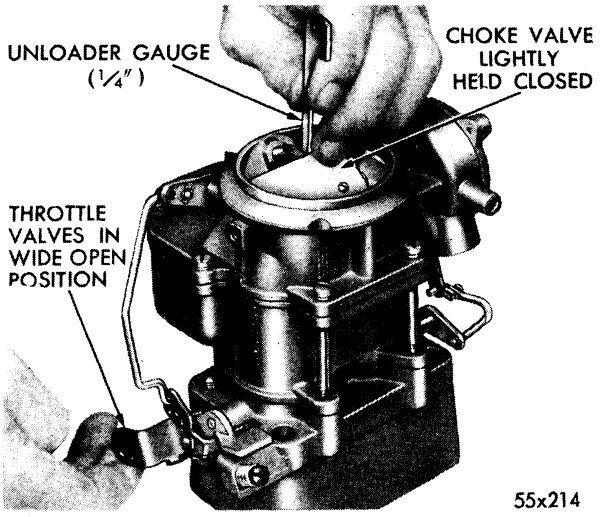


Fig. 18—Choke Unloader Adjustment

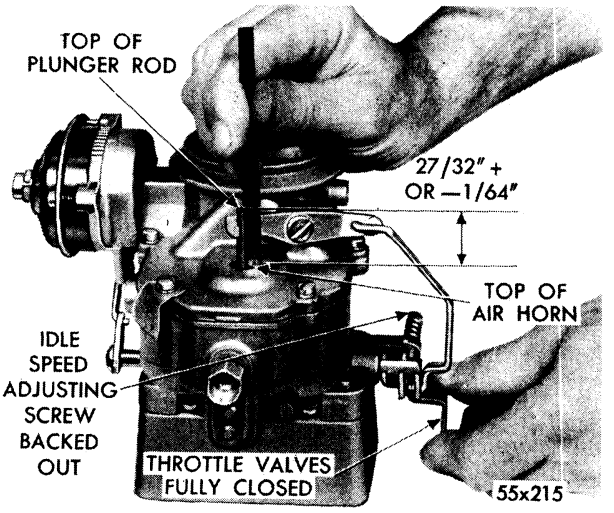


Fig. 20—Checking Accelerator Pump

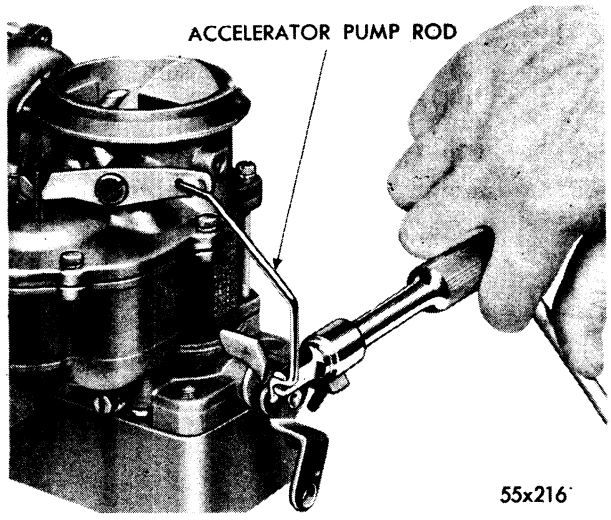


Fig. 21—Bending Pump Rod for Correct Pump Setting

and 2180S and $^{2}9/_{32}$ inch for BBD 2162SA and SB and 2180SA and SB$\pm 1/64$ inch, when measured with a scale, as shown in Figure 20. The accelerator pump rod should be located in the hole nearest the rocker arm pivot and the lower end in the outside hole in the series of three in the throttle shaft lever.

To adjust, bend the pump rod, using Tool T-109-213, as shown in Figure 21, until the correct pump setting has been obtained.

23. DASHPOT ADJUSTMENT

The maximum retarding action is obtained by adjusting the dashpot mounting stud. To assure full dashpot plunger travel, loosen the stud lock nut and then turn the dashpot out, or in, until the plunger can be depressed $3/32$ inch (under travel) after the throttle valves are in fully closed position. After adjustment has been made, tighten lock nut securely. The dashpot is serviced only as an assembly.

24. ENGINE IDLE SPEED ADJUSTMENT

Adjust the engine idle speed from 475 to 500 rpm using an electric tachometer with the engine at normal operating temperature.

25. ADJUSTING THE CARBURETOR (On the Engine)

NOTE

No amount of carburetor adjustment will give a smooth engine idle unless the following are known to be in good condition and/or adjusted correctly.

Spark plugs, distributor points, good high tension terminal connections, no leaks in high tension leads, engine ignition timing, valves and valve timing, and manifold heat control valve.

If not made during reassembly of the carburetor, make the preliminary setting of the idle mixture adjusting screws by turning IN (clockwise) until seated, and then backing out one full turn. **To prevent damage to the needles and seats, use finger pressure only to make this adjustment.**

Start engine and run until its normal operating temperature has been reached. Attach an electric tachometer and adjust the idle speed to from 475 to 500 rpm. (This is free idle with the shift lever in neutral position.) Make the idle mixture adjustment as follows:

Try to turn each adjusting needle the same amount. There is very little interconnection between the two branches of the intake manifold. The cylinders on each branch will, therefore, react to changes in the idle mixture as much as if we had two four-cylinder engines. It is assumed that the idle mixture delivered by each barrel of the carburetor will be approximately the same if each idle adjusting needle is opened the same amount. The final fine adjustment may vary slightly from this setting, but it is best to start with the two needles in the same physical locations.

With the engine warmed up, the idle speed set from 475 to 500 rpm,, and both idle mixture needles set at one turn open, observe the roughness of the engine and the absence or presence of fluffs at the tail pipe (or pipes). Turn both idle mixture needles clockwise (leaner) $1/8$ turn.

If the rpm increases slightly, the engine runs smoother, and there are fewer fluffs in the exhaust, the leaner adjustment is in the right direction.

Try turning both needles clockwise another $1/8$ turn or a total of $1/4$ turn from the initial trial setting. This setting may further improve the idle or make it worse. If with this setting the idle was improved, reset the idle speed from 475 to 500 rpm and then try individual adjustments of each needle $1/8$ turn clockwise (leaner) and counter-clockwise (richer) to find the exact best adjustment for each needle.

If the ⅛ turn (leaner) clockwise adjustment of both needles produced a drop in engine rpm, rougher operation, and more fluffs at the tail pipe (or pipes) try adjusting both needles ⅛ turn counter-clockwise (richer) from the initial setting. Repeat the procedure as described above.

The best idle operation will normally be found with the idle mixture needles set somewhere between ¾ and 1¼ turns open. **The final best setting should result in both needles being open the same number of turns, plus or minus ⅛ turn.**

CARBURETOR (Model WCFB-2126S)

1. DESCRIPTION

The Chrysler FirePower V-8 engines are equipped with the new carburetor Model WCFB-2126S as shown in Figures 1, 2 and 3.

The Carter Model WCFB Carburetor is basically two dual carburetors contained in one unit. The section containing the metering rods, accelerating pump, and choke is termed the primary side of the carburetor; the other section, the secondary side. The primary side of the carburetor houses a low-speed system, a high speed system, a float system, the pump system and the choke system. The secondary side has only three systems; a float system, a low-speed system and a high-speed system.

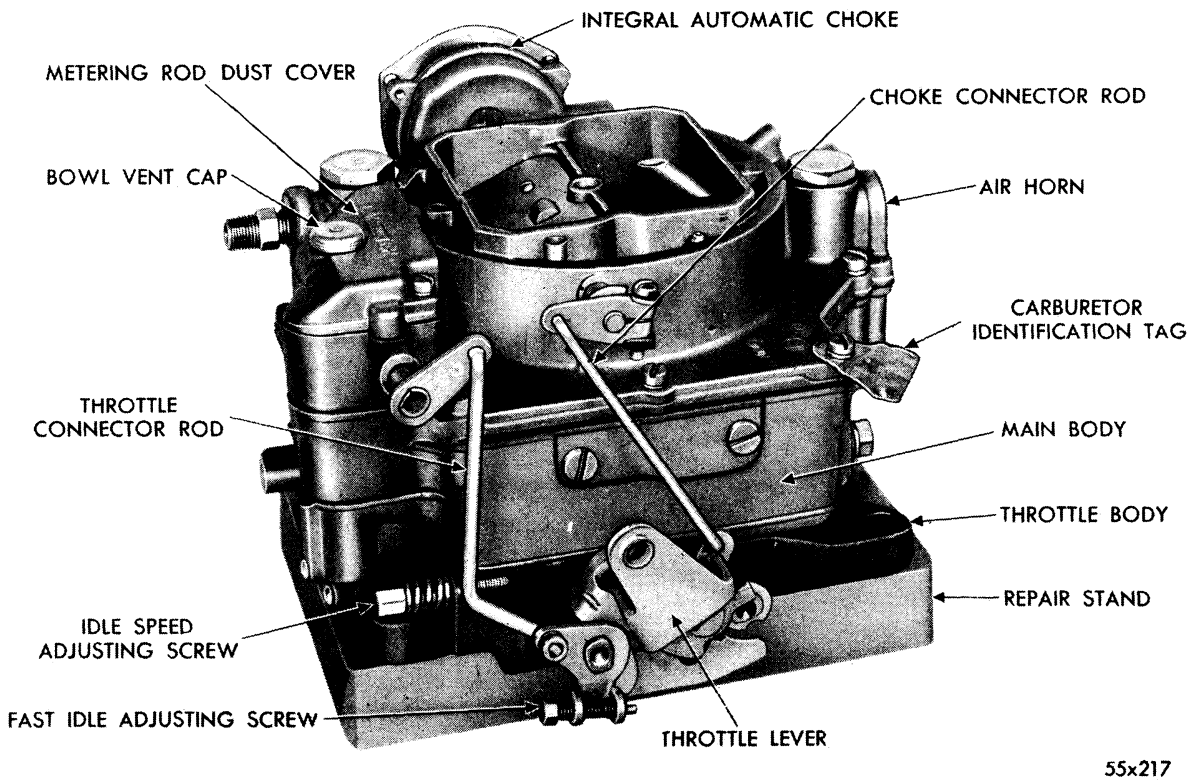


Fig. 1—Carburetor Assembly (WCFB-2126S) (Throttle Lever Side)

2. FLOAT SYSTEMS

The purpose of the float systems is to maintain an adequate supply of fuel at the proper level in the bowls for use by the low-speed, high-speed, pump, and choke systems. The primary and secondary bowls are separated by a partition. The fuel line connection is above the primary inlet needle and seat. Fuel is supplied to the secondary inlet needle and seat through a passage in the air horn.

Setting the floats to specifications assures an adequate supply of fuel in the bowls for all operating conditions. Float adjustments must be made with the air horn gasket removed and should be checked vertically (specified distance between air horn and floats) and laterally (sides of floats should just clear the arms of gauge). Correct lateral adjustment is important. If the floats are misaligned, they may bind or drag against the inner walls of the bowl.

The needle valves and seats are carefully matched during manufacture. Do not use the primary needle in the secondary seat or vice versa. To avoid unnecessary bending, both floats should be reinstalled in their original positions and then adjusted.

The bowls are vented to the inside of the air horn and, also, to the atmosphere. The bowl vents are calibrated to provide proper air pressure above the fuel at all times. To assure a positive seal, always use a new air horn gasket when reassembling the carburetor. An air leak at this point can result in a mileage complaint.

A connecting passage along one side of the main body maintains a balance of the fuel levels and air pressures between the two bowls.

3. LOW-SPEED SYSTEMS

Fuel for idle and early part-throttle operation is metered through the low-speed systems. Gasoline enters the idle wells through the metering rod jets on the primary side of the carburetor and through the main metering jets on the secondary side.

The low-speed jets measure the amount of fuel for idle and early part throttle operation. The air by-pass passages, economizers and idle air bleeds are carefully calibrated and serve to break up the liquid fuel and mix it with air as it moves through the passages to the idle ports and idle adjustment needle ports. Turning the idle adjustment needles **toward** their seats reduces the quantity of fuel mixture supplied by the idle system. There are no idle adjustment needles on the secondary side of the carburetor.

The idle ports are slot shaped. As the throttle valves are opened, more of the idle ports are uncovered, allowing a greater quantity of the gasoline and air mixture to enter the carburetor bores.

All by-passes, economizers, idle ports, and idle adjustment needle ports, as well as the bore of the carburetor flange, must be clean and free of deposits. Obstructions will cause poor low speed engine operation. Worn or damaged idle mixture adjusting needles or low speed jets should be replaced.

4. HIGH-SPEED SYSTEM

Fuel for part-throttle and full-throttle operation is supplied through the high-speed system.

5. PRIMARY SIDE

The position of the metering rods in the metering rod jets controls the amount of fuel flowing in the high-speed system of the primary side of the carburetor. The position of the metering rods is controlled mechanically by movement of the throttle and manifold vacuum applied to the vacuum piston on the vacuumeter link.

6. SECONDARY SIDE

Fuel for the high-speed system of the secondary side is metered at the main metering jets (no metering rods are used).

The secondary throttle valves are operated automatically by venturi vacuum from closed to wide open when the primary throttle is open no more than 70 degrees. When the primary throttle is wide open, 80 degrees, the secondary throttle is mechanically opened 10 degrees during the last 10 degrees of travel of the primary. The secondary then operates automatically to wide open.

A mechanical linkage between primary and secondary throttles is provided to positively close the secondary whenever the primary is closed and also to open the secondary 10 degrees when the primary is wide open.

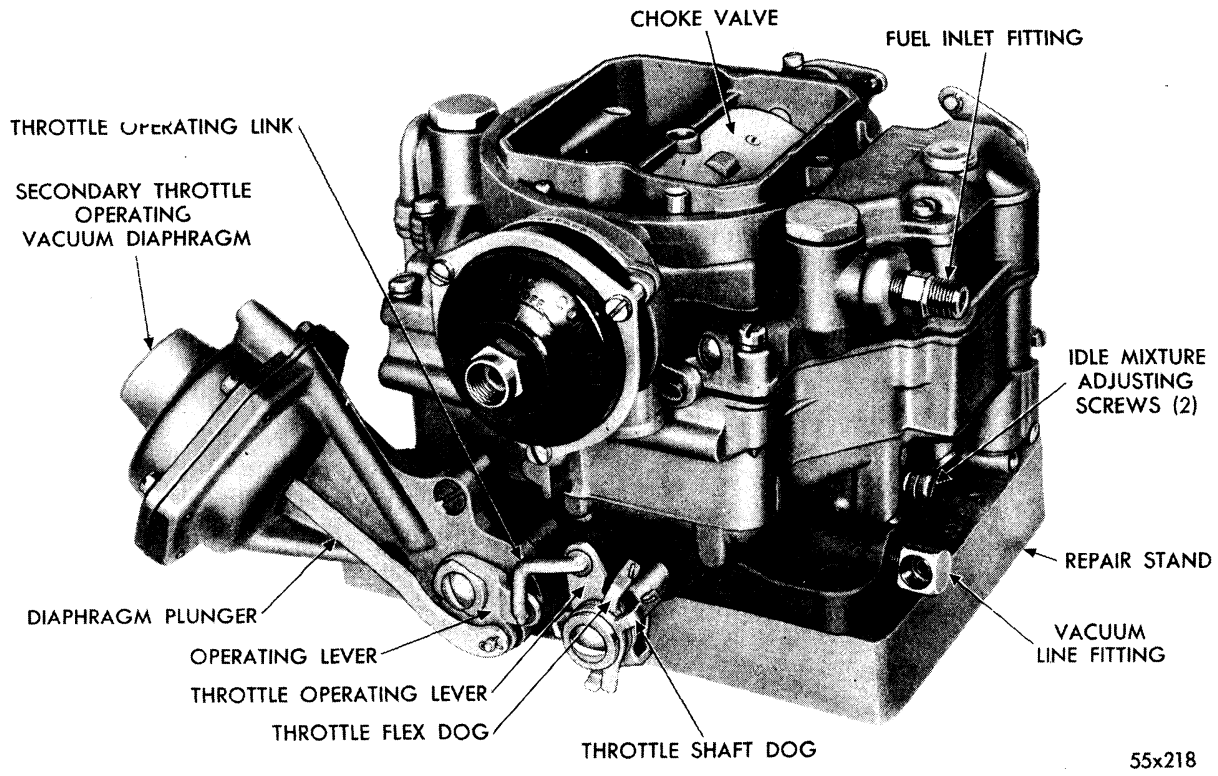


Fig. 2—Carburetor Assembly (WCFB-2126S) (Choke Side)

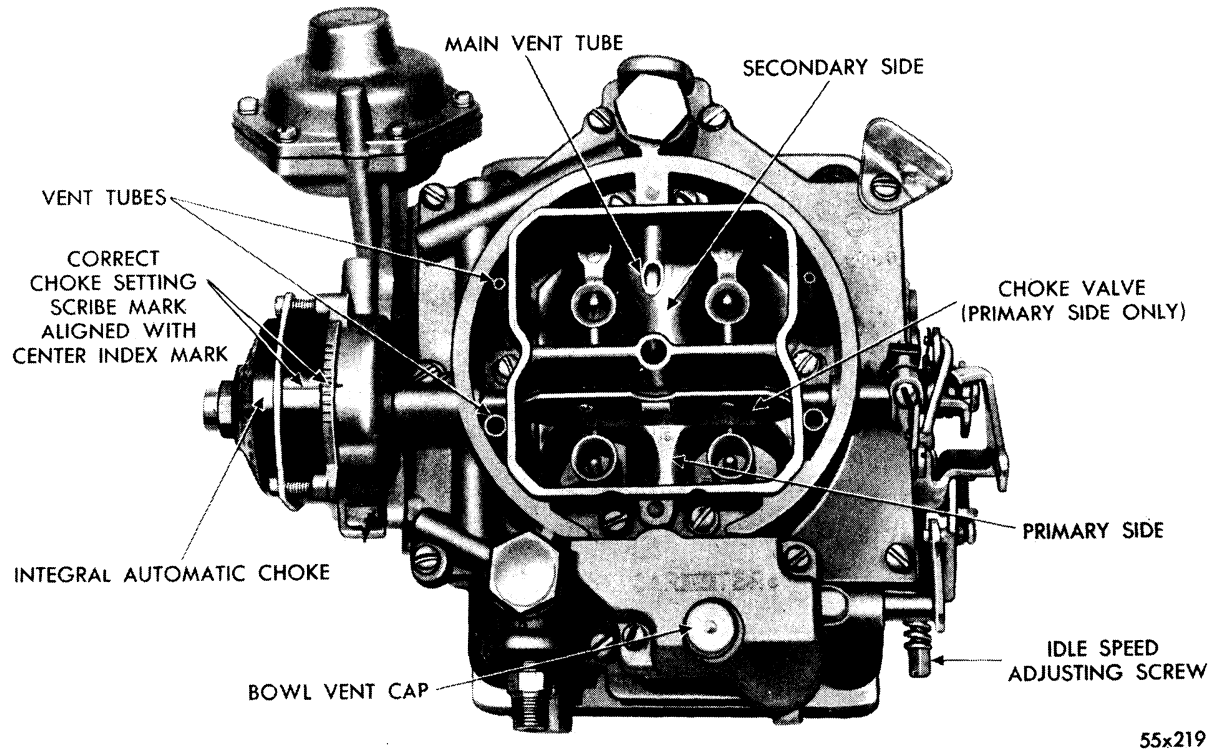


Fig. 3—Carburetor Assembly (WCFB-2126S) (Top View)

The full opening of the secondary valves is controlled by vacuum. A nozzle in one barrel of the primary side and another in a barrel of the secondary side helps to control this movement. (See Fig. 3). As the vacuum builds up in the venturi, it acts on the vacuum unit diaphragm through these two nozzles. Movement of the diaphragm arm pulls the secondary throttle valves to the wide open position. The engine operates at idle and the low-speed range on the two primary barrels **only.** Upon rapid acceleration or wide-open throttle all four barrels are used.

When the engine is cold and the choke is in the closed position, a mechanical latch prevents the secondary side valves from opening so that only the primary side of the carburetor is used during the warm-up period. After the choke is opened fully, the latch is released and allows operation of the secondary valves according to engine requirements.

7. ANTI-PERCOLATOR

To prevent the vapor bubbles (caused by heat) in the nozzle passage and low-speed wells from forcing fuel out of the nozzles, anti-percolator passages and calibrated plugs or bushings are used. Their purpose is to vent the vapors and relieve the pressure before it is sufficient to push the fuel out of the nozzles and into the intake manifold. Anti-percolator plugs, bushings, and main nozzles are permanently installed and must not be removed in service.

8. PUMP SYSTEM

The pump system is found only in the primary side of the carburetor and provides a measured amount of fuel, which is necessary to insure smooth engine operation for acceleration.

When the throttle is closed, the pump plunger moves upward in its cylinder and fuel is drawn into the pump cylinder and past the intake check ball. The discharge check needle is seated at this time to prevent air being drawn into the cylinder. When the throttle is opened, the pump plunger moves downward forcing fuel out through the discharge passage, past the discharge check needle, and on out of the pump jets. When the plunger moves downward the intake check ball is closed, preventing fuel from being forced back into the bowl.

If the throttle is opened suddenly, the upper pump spring will be compressed by the plunger shaft telescoping, resulting in a smoother pump discharge of longer duration. When the throttle valves are opened a predetermined amount, the pump plunger bottoms in the pump cylinder, eliminating pump discharge due to the pump plunger movement at high speeds.

During high speed operation, a vacuum exists at the pump jets. To prevent fuel from being drawn through the pump system, the passage to the pump jets is vented by a cross passage to the carburetor bowl above the fuel level. This allows air, instead of fuel, to be drawn off the pump jets.

9. INTEGRAL AUTOMATIC CHOKE

The integral automatic choke automatically provides satisfactory engine operation under all conditions of starting and warm-up. Manifold vacuum draws air into the choke housing, through a heater tube that projects through the exhaust manifold. This heated air acts on the thermostatic coil so that as the engine warms up, the choke moves toward the "off" position. The position of the choke valve is further controlled by the action of manifold vacuum on the choke piston. The choke valve is offset so that the air flowing into the carburetor tends to position the valve according to speed and load conditions. The combination of these features provides the required mixture calibration. To prevent over choking a warm or hot engine, a heat retainer plate keeps the thermostatic coil from cooling off too quickly and closing the choke valve while the engine is still hot. The choke is connected to the fast idle cam, which provides the necessary increased idle speeds during the warm-up period.

SERVICE PROCEDURES

10. DISASSEMBLING THE CARBURETOR

To disassemble the carburetor for cleaning or overhaul, refer to Figure 4, and proceed as follows:

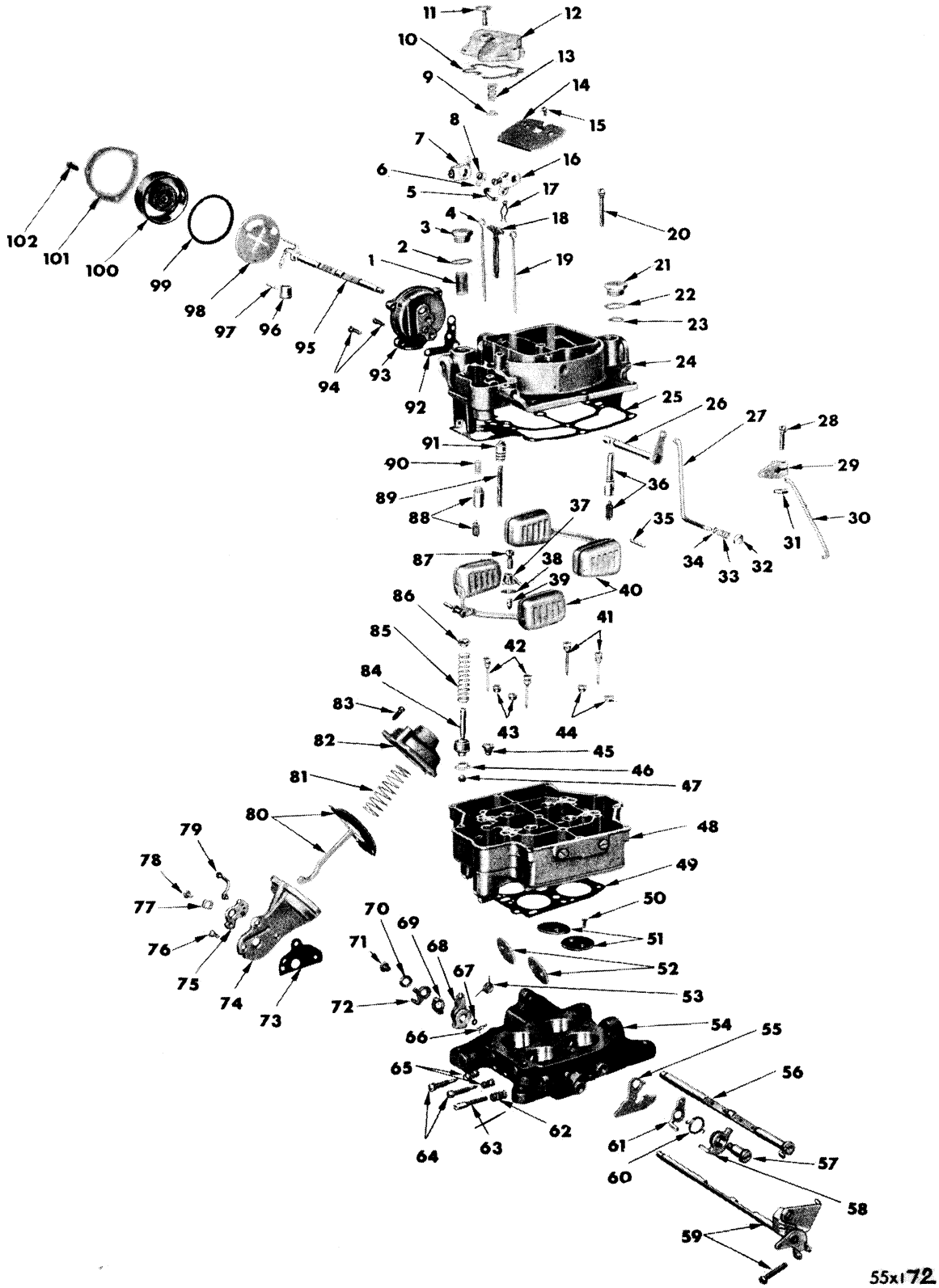


Fig. 4—Carburetor Assembly (Disassembled View)

1—Strainer, bowl
2—Gasket, fuel inlet strainer plug
3—Plug, fuel inlet strainer
4—Rod, metering
5—Link, pump arm
6—Arm, vent
7—Arm, metering rod, w/screw
8—Screw, vent arm
9—Retainer, bowl vent spring
10—Gasket, dust cover
11—Pin, dust cover vent, w/valve cap
12—Cover, dust
13—Spring, bowl vent
14—Valve, choke
15—Screw, choke valve
16—Arm, pump, w/screw
17—Spring, metering rod
18—Link, vacuumeter piston
19—Rod, metering
20—Screw, air horn
21—Plug, strainer
22—Gasket, strainer plug
23—Strainer, fuel inlet secondary
24—Air horn
25—Gasket, air horn to body
26—Countershaft, w/lever
27—Rod, throttle connector
28—Screw, choke lever
29—Lever, choke
30—Rod, choke connector
31—Nut, choke lever clamp screw
32—Washer, primary throttle shaft
33—Spring, pump connector rod
34—Retainer, pump connector rod spring
35—Pin, float lever
36—Needle, w/seat, secondary
37—Jet, pump, w/housing
38—Gasket, pump discharge nozzle
39—Needle, pump discharge check
40—Float, w/lever
41—Jet, low-speed
42—Jet, low-speed
43—Jet, primary metering rod
44—Jet, metering rod secondary
45—Plug, pump relief
46—Retainer, pump intake check ball
47—Ball, pump intake check
48—Body (not serviced)
49—Gasket, body to flange
50—Screw, secondary throttle valve
51—Valve, secondary throttle
52—Valve, primary throttle
53—Spring, throttle flex
54—Flange
55—Arm, lockout
56—Shaft, throttle secondary
57—Screw, fast idle cam
58—Cam, fast idle
59—Shaft, throttle primary
60—Spring, fast idle cam
61—Lever, cam trip
62—Spring, throttle lever adjusting screw
63—Screw, throttle lever adjusting
64—Screw, idle adjusting
65—Spring, idle adjusting screw
66—Clip, rod
67—Washer, throttle operating rod
68—Lever, primary throttle operating
69—Dog, primary throttle flex (loose)
70—Washer, primary throttle shaft
71—Screw, throttle shaft lever
72—Dog, throttle shaft
73—Gasket, secondary throttle shaft diaphragm housing mounting
74—Housing, secondary throttle diaphragm
75—Lever, secondary throttle shaft operating
76—Screw, secondary throttle shaft diaphragm housing
77—Washer, secondary throttle shaft
78—Screw, throttle shaft lever
79—Rod, throttle operating
80—Diaphragm, secondary throttle shaft
81—Spring, secondary throttle diaphragm return
82—Cap, secondary throttle diaphragm housing
83—Screw, secondary throttle diaphragm housing cap
84—Plunger, pump, w/rod
85—Spring, pump upper
86—Retainer, pump spring
87—Screw, pump jet housing
88—Needle, w/seat (primary)
89—Spring, vacuumeter piston
90—Strainer, primary needle
91—Piston, primary needle
92—Gasket, choke piston housing to air horn
93—Housing, choke piston, w/plug
94—Screw, choke piston housing to air horn
95—Shaft, choke
96—Piston, choke
97—Pin, choke piston
98—Plate, choke baffle
99—Gasket, choke coil housing to air horn
100—Housing, choke w/coil
101—Retainer, choke coil housing
102—Screw, choke coil housing retainer

Fig. 4—Carburetor Assembly (Disassembled View) (WCFB-2126S)

(1) Place the carburetor assembly on the carburetor repair stand, Tool C-3400. (This tool is used to protect the throttle valves from damage and to provide a suitable base for working.)

(2) Remove the choke connector rod, throttle operating rod, and metering rod dust cover. (When removing the throttle operating rod, first remove the hairpin clip that holds rod to the pump shaft lever for ease in removal.

(3) Carefully unhook the metering rods from the vacuumeter link.

(4) Remove the air horn-to-main body attaching screws, then lift air horn straight up and away from main body. (See Fig. 5.)

(5) Remove the float fulcrum pins and lift floats off air horn. Remove needle valves and seats. Disconnect the vacuum piston by rotating 90 degrees in either direction. Slide out the vacuumeter piston link, and discard the air horn gasket.

CAUTION

It is absolutely necessary to keep the parts from the primary side of the carburetor separated from those of the secondary.

(6) Disconnect the accelerator pump connector link and slide the accelerator pump plunger, spring, and spring guide washer out of air horn.

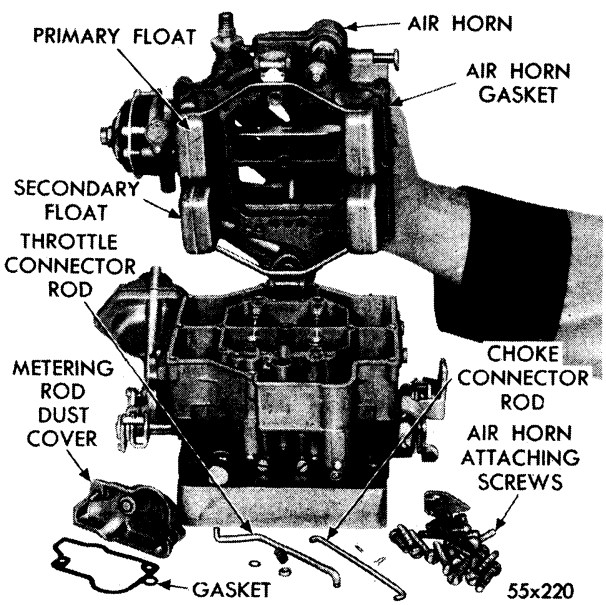


Fig. 5—Removing or Installing Air Horn

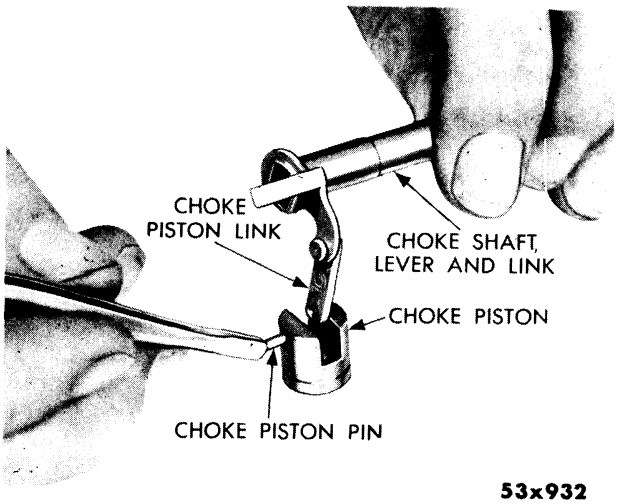


Fig. 6—Removing or Installing Choke Piston Pin

(7) Place plunger in a jar of clean gasoline to prevent the leather from drying out.

(8) Remove the fuel inlet plug (primary and secondary), gasket, and screen. Loosen the metering rod arm screw, the vent cap arm screw, and the accelerator pump arm screw; then slide the accelerator pump shaft out of air horn.

(9) Remove the filter screen from the secondary inlet and discard.

11. DISASSEMBLY OF INTEGRAL AUTOMATIC CHOKE

(1) Remove the screws and retainer ring that attach the thermostatic coil housing to the air horn.

(2) Remove housing, coil spring, gasket, and baffle plate to expose the choke piston.

(3) Loosen the choke shaft lever screw and remove lever.

(4) Using a file, remove the staking that holds the choke valve retaining screws.

(5) Remove screws and lift out choke valve. **These screws are staked to prevent loosening and care should be used to avoid breaking off in the choke shaft.**

(6) Rotate the choke shaft counter-clockwise, far enough to withdraw the choke piston out of its cylinder. As piston clears cylinder, withdraw choke shaft and piston out of air horn.

(7) Using a suitable tool, push out the piston pin and separate the piston from link. (See Fig. 6.)

(8) Remove the screws that hold the choke housing to the air horn. Remove housing and discard gasket.

12. DISASSEMBLY OF MAIN BODY

(1) Remove the vacuumeter piston spring, accelerator pump discharge cluster, gasket and discharge check needle. (It will be necessary to invert the main body to drop out needle.)

(2) Using Tool T-109-58, remove the main metering jets (primary and secondary). (Be sure and keep primary and secondary jets separate, as they are different and **are not interchangeable.)**

(3) Again using Tool T-109-58, remove the primary and secondary idle jets. (These jets are interchangeable.)

(4) Invert the main and throttle bodies and remove the throttle body attaching screws (short screw on primary side-center). Remove throttle body and discard gasket.

13. DISASSEMBLY OF THROTTLE BODY

(1) Remove the throttle operating link (don't lose washers), primary throttle shaft dog, throttle shaft flex dog, throttle operating lever, and spring.

(2) Disconnect the vacuum diaphragm from the secondary operating lever assembly, and remove operating lever and diaphragm assembly. Discard the gasket.

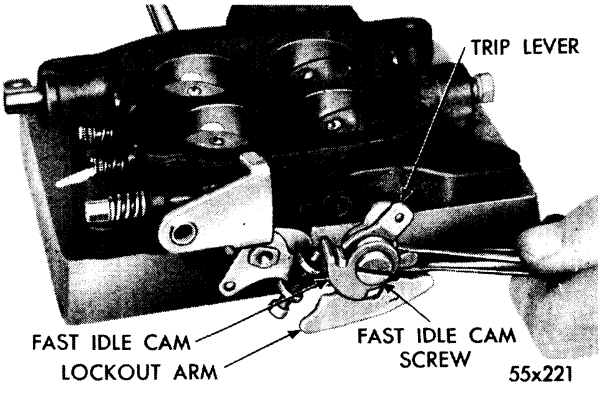


Fig. 7—Removing or Installing Fast Idle Cam Assembly

(3) Remove the screw that attaches the fast idle cam assembly to the throttle body boss, then lift off the fast idle cam assembly, cam trip lever, lockout arm, and screws as shown in Figure 7. **When removing the fast idle cam and trip lever, be sure and note the position of the fast idle cam spring and tangs on the trip lever.**

NOTE

It is usually not advisable to remove the throttle shafts or valves unless wear or damage necessitates the installation of new parts.

(4) During manufacture, the location of the idle transfer port and the spark advance control port to the valves is carefully established for one particular assembly (See Fig. 8). If a new shaft should be installed in an old, worn throttle body, it would be very unlikely that the original relationship of these ports to the valves would be obtained. Changing the port relationship would adversely affect normal carburetor operation between the speeds of 15 and 30 miles per hour. If it has been decided that new shafts are to be installed, adhere closely to the following instructions:

NOTE

It is suggested that the throttle valves be marked in order that each may be returned to the same bore from which it was removed. The screws that attach the throttle valves are staked on the opposite side and care should be used in removal

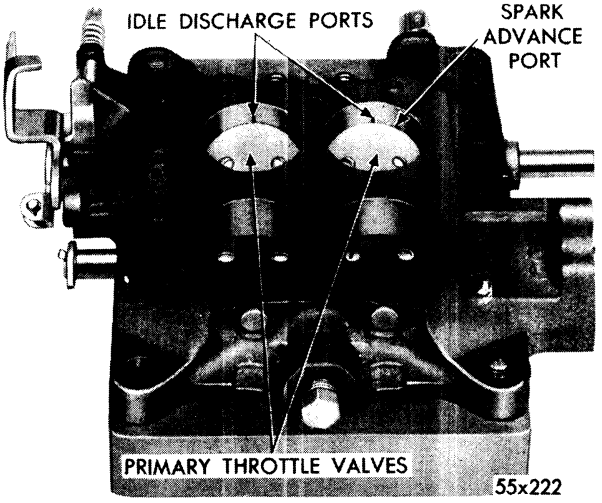


Fig. 8—Ports in Relation to Primary Throttle Valves

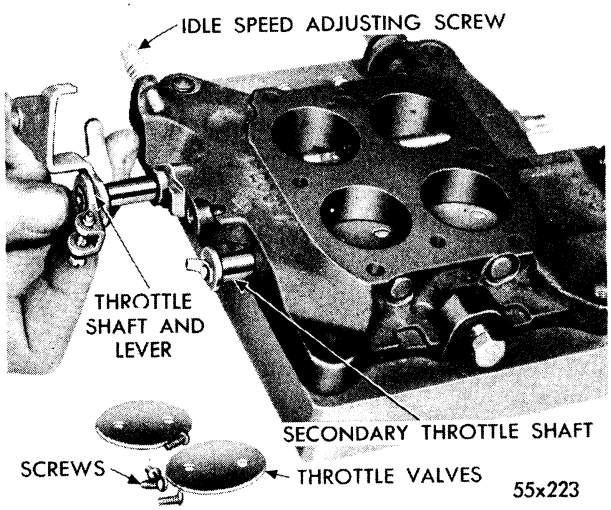


Fig. 9—Removing or Installing Primary Throttle Shaft and Lever

so as not to break the screws in the throttle shafts.

(5) Remove the screws that hold the primary throttle valves to the throttle shaft.

(6) Lift out valves, then withdraw the throttle shaft, using a twisting motion, as shown in Figure 9.

(7) Remove the screws that hold the secondary throttle valves to the throttle shaft.

(8) Lift out valves, then withdraw the throttle shaft using a twisting motion, as shown in Figure 10.

(9) **The primary and secondary valves are not interchangeable and should be kept separate in order that they may be replaced in their original bores.**

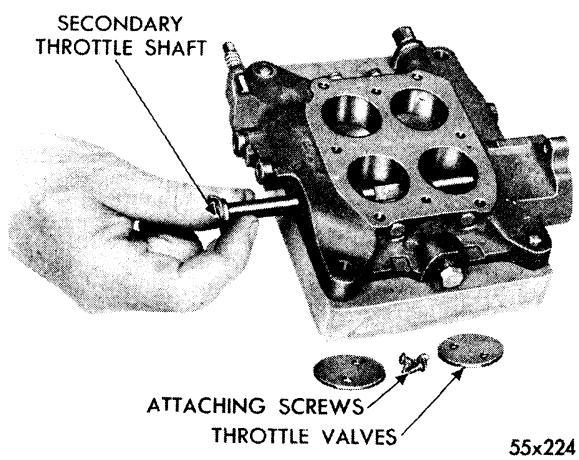


Fig. 10—Removing or Installing Secondary Throttle Shaft

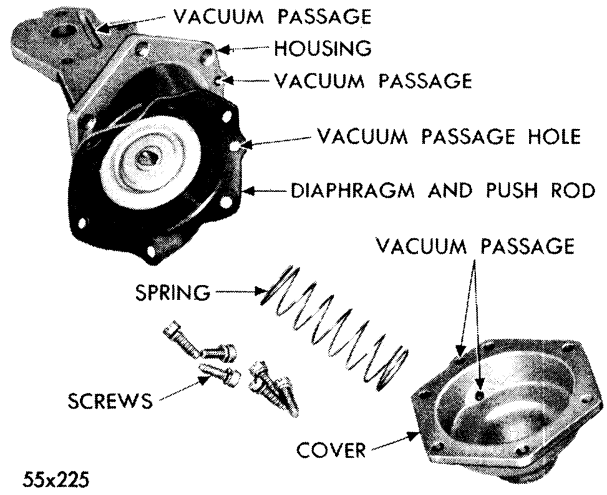


Fig. 11—Vacuum Diaphragm Assembly (Disassembled View)

14. DISASSEMBLY OF VACUUM DIAPHRAGM

(1) Remove the screws that attach diaphragm housing cover to the housing. Separate cover and housing and lift out diaphragm, plunger, and spring, as shown in Figure 11.

(2) Check the diaphragm for wear, rupture, or tearing. If necessary, install new diaphragm and plunger assembly.

(3) Remove the two idle mixture adjusting needles and springs from the throttle body, as shown in Figure 12.

(4) The carburetor now has been disassembled into four units; namely, the air horn, main body, throttle body, and automatic choke. The component parts have been disassembled as far as necessary for cleaning and inspection.

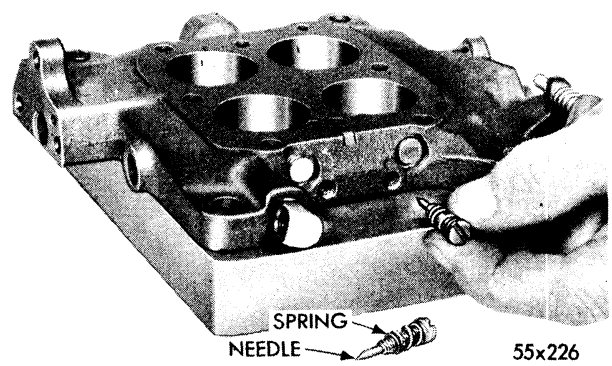


Fig. 12—Removing or Installing Idle Mixture Adjusting Needles

15. AUTOMATIC CHOKE INSPECTION

For the automatic choke to function properly, it is important that all parts be clean and move freely. It is possible, under extremely dusty conditions, that fine particles of dirt may be found deposited on the various choke parts. A heavy, black, hard carbon deposit on the choke parts indicates the possibility of a leak in the heat tube. Check the tube in the exhaust manifold and repair as required.

Examine all choke parts for wear or damage. Worn or damaged parts must be replaced with new, to insure the proper operation of the choke. **Do not attempt to separate the thermostatic coil from the heat retainer plate.** The thermostatic coil spring, heat retainer plate and moulded bakelite housing are serviced as an assembly only. If the housing is cracked or broken replace with a complete new assembly, as the index mark cut on the rim of the housing is only correct for the one thermostatic coil spring originally installed.

To remove the thermostatic coil spring and the heat retainer plate from the housing, hit the housing sharply against the palm of the hand. (Coil side down.)

Clean any dirt, dust or other foreign material that may be present from the retainer plate and out of the housing. When assembling, install new gasket, then match the notch in the plate with the lug in the housing, as shown in Figure 13. Install plate and press down until seated in housing.

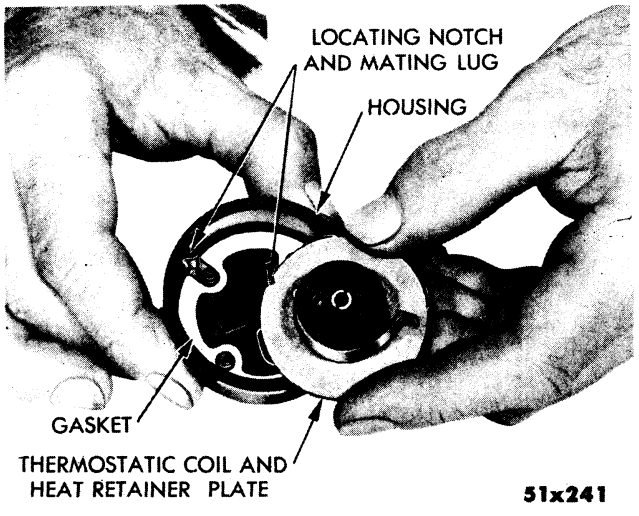


Fig. 13—Installing Coil in Housing

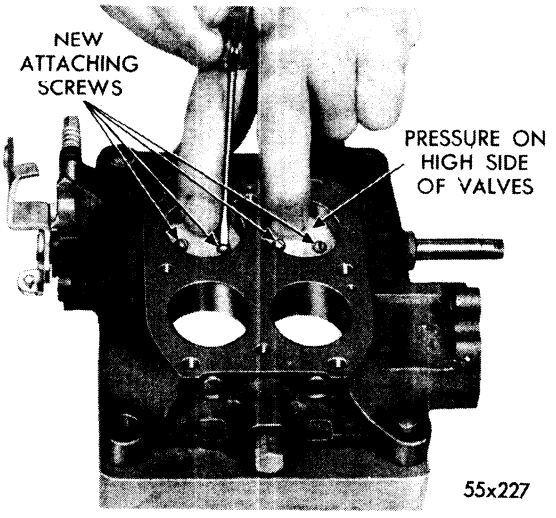


Fig. 14—Installing Primary Throttle Valves

16. INSPECTION AND REASSEMBLY

(1) Check the throttle shaft for excessive wear in the throttle body. If wear is extreme, it is recommended that the throttle body be replaced rather than installing a new throttle shaft in the old body.

(2) Slide the primary throttle shaft and lever in the throttle body, as shown in Figure 9.

(3) Slide the primary valves into position, then install new screws; do not tighten.

(4) Hold the valves in place with the fingers, as shown in Figure 14. (Fingers pressing on the high side of valves.)

(5) Tap the valves lightly with a screwdriver to seat in the throttle bores. Holding the valves

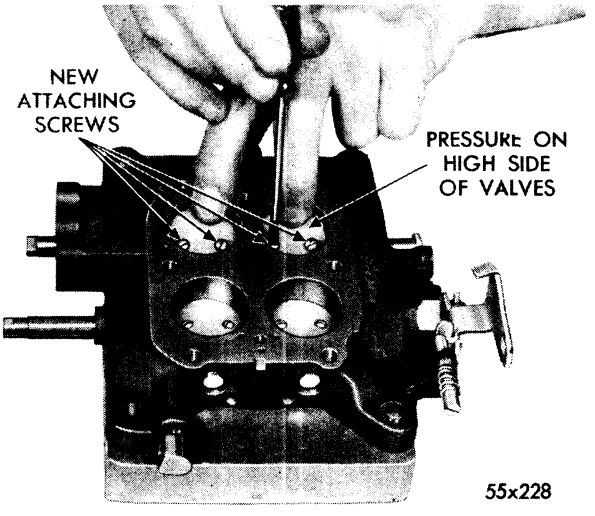


Fig. 15—Installing Secondary Throttle Valves

in this position, tighten screws securely and stake by squeezing with pliers.

(6) Slide the secondary throttle shaft and lever into the throttle body with the tang on the lever pointing toward the fast idle cam boss, as shown in Figure 10.

(7) Slide the secondary valves into position, then install new screws; do not tighten. Hold the valves in place with the fingers, as shown in Figure 15. (Fingers pressing on the high side of valves.)

(8) Tap the valves lightly with a screwdriver to seat in the bores. Holding the valves in this position, tighten screws securely, and stake by squeezing with pliers.

(9) Install the two idle mixture adjusting needles and springs in the throttle body. (Refer to Fig. 12). The tapered portion must be straight and smooth. If the tapered portion is grooved or ridged, a new idle mixture adjusting screw should be installed to insure having correct idle mixture control. **DO NOT USE A SCREWDRIVER.** The adjustment should be made with the fingers. Turn the needles lightly against their seats, then back off one full turn for approximate adjustment.

(10) Slide the fast idle cam retaining screw through the fast idle cam (the threaded shank of screw on spring side).

(11) Slide the fast idle cam trip lever over shoulder on screw, guiding the tang between the fast idle spring and cam.

(12) Slide the lockout arm over screw then insert pivot screw in position in throttle body and tighten securely. Be sure all parts move freely. (See Fig. 7.)

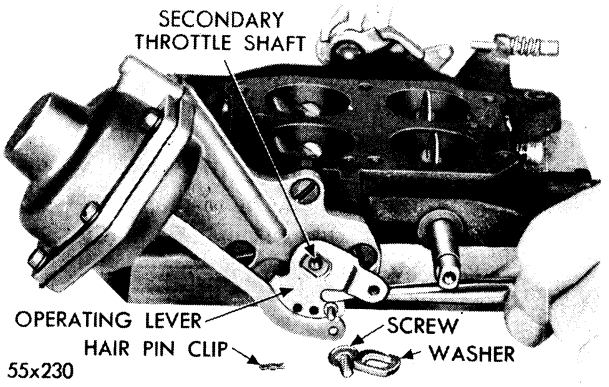


Fig. 17—Installing Diaphragm Operating Lever

(13) Slide the diaphragm plunger rod through the slot in diaphragm housing with the hook portion facing up as shown in Figure 16. (Be sure the vacuum hole in the diaphragm is aligned with vacuum passage.)

(14) Install spring, cover and screws, then tighten securely. Install vacuum unit over the secondary throttle shaft and against the throttle body, using a new gasket as shown in Figure 16. Tighten screws securely.

(15) Slide the operating lever over end of secondary throttle shaft with the arm pointing toward the primary throttle shaft as shown in Figure 17.

(16) Install spacer, washer, and screw; then connect the diaphragm plunger rod with the operating lever and install hairpin clip. To check the diaphragm for operation, release the secondary lockout arm; then open the secondary throttle, using the

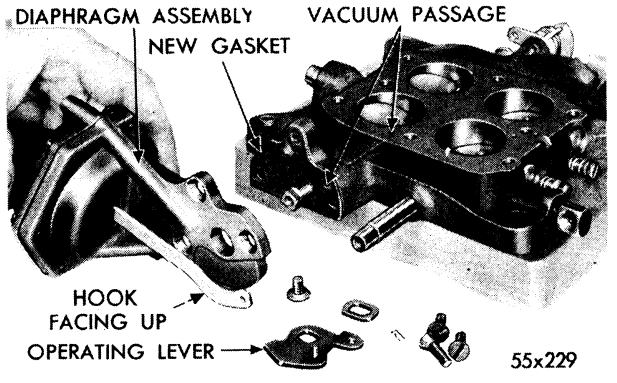


Fig. 16—Installing Vacuum Diaphragm Assembly

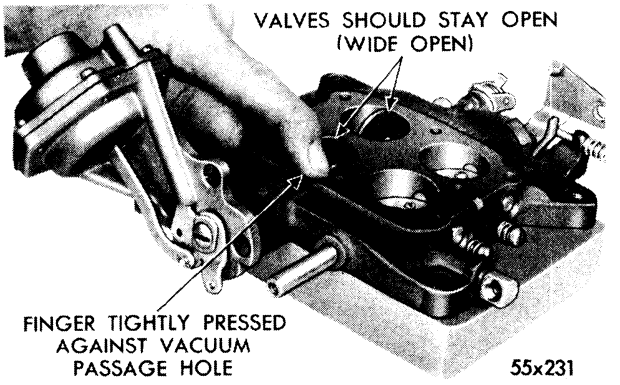


Fig. 18—Checking Vacuum of Diaphragm

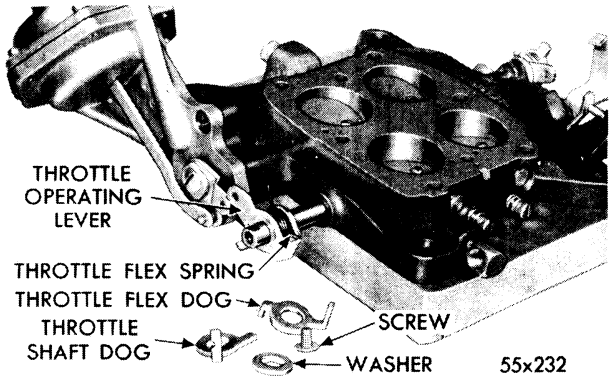


Fig. 19—Installing Throttle Flex Spring and Operating Lever

operating lever. Place a finger over the vacuum passage hole in the throttle body as shown in Figure 18. Release the operating lever. The throttle valves should hold the wide-open position or close very, very slowly. If the throttle valves snap shut, it is an indication of a leak in the diaphragm or housing mounting gasket. Correct as necessary.

(17) Slide the flex spring into position in the throttle operating lever and over end of primary shaft. Be sure the lever arm is toward the secondary shaft as shown in Figure 19.

(18) Slide the throttle flex dog over shaft and down against operating lever. Slide the throttle shaft dog over shaft and down against flex dog.

(19) Install washer and screw, then tighten securely. (Be sure the notched tangs are pointing toward the throttle body; see Fig. 20.)

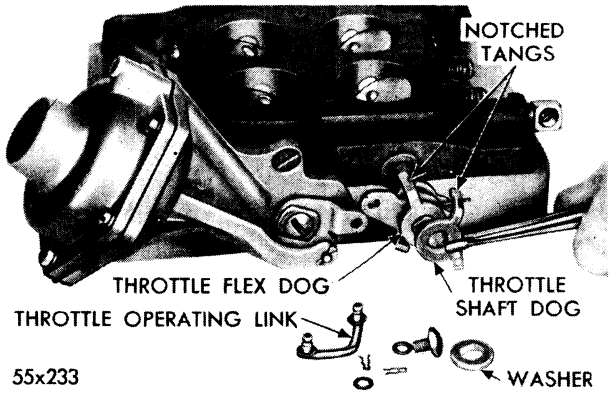


Fig. 20—Installing Throttle Shaft Dogs

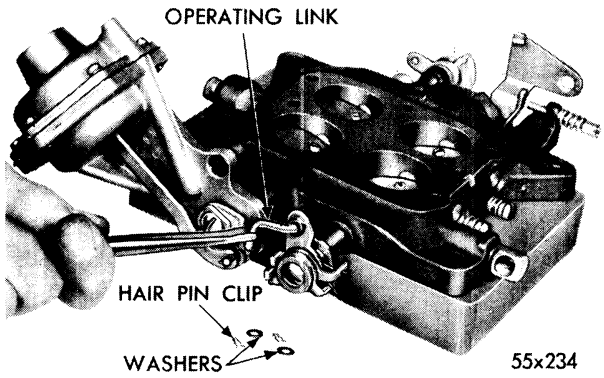


Fig. 21—Installing Throttle Operating Link and Washers

(20) Engage flex spring ends with notches on each lever, then install the throttle operating link as shown in Figure 21.

(21) Place the main body upside down on bench, and install a new throttle to main body gasket. Lower the throttle body down on the main body. (Refer to Fig. 22.)

(22) Install screws and tighten securely. **The accelerator pump well should be on the same side as the idle mixture adjusting needles. Remember, the short attaching screw should be installed on the primary side.** Invert the carburetor and mount in repair stand, then assemble the main body.

17. MAIN BODY ASSEMBLY

(1) Install the accelerator pump discharge check needle in the discharge passage as shown in Figure 23.

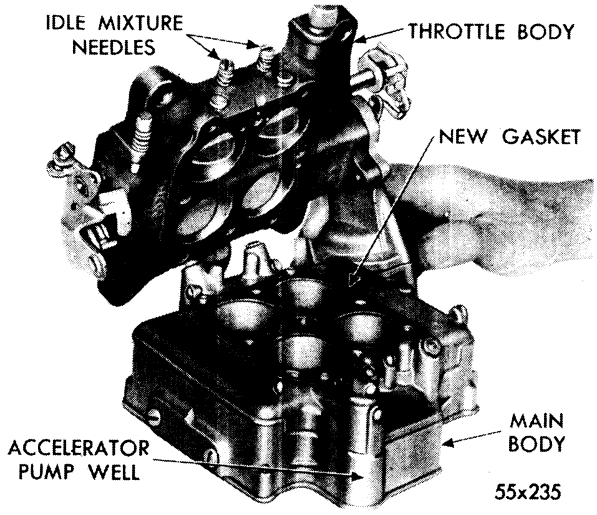


Fig. 22—Installing Throttle Body

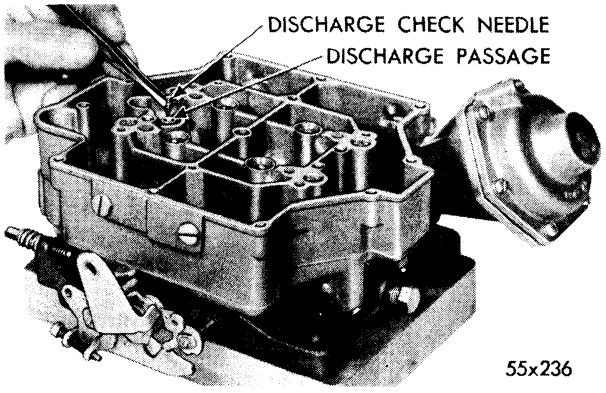


Fig. 23—Installing Accelerator Pump Discharge Check Needle

(2) Install the primary and secondary idle jets (refer to Fig. 24).

(3) Tighten securely, using Tool T-109-58.

(4) Install the primary and secondary main metering jets (refer to Fig. 25). Tighten securely, using Tool T-109-58.

(5) Remove the accelerator pump plunger from the jar of gasoline and flex the leather several times. Check to see if the leather is hard, cracked, or worn. If any of the aforementioned conditions exists, install a new accelerator pump plunger. Test the operation of the accelerator pump as follows:

18. ACCELERATOR PUMP TEST

Pour clean gasoline into the carburetor bowl (approximately ½ inch deep). Insert plunger into its cylinder, then press lightly on plunger

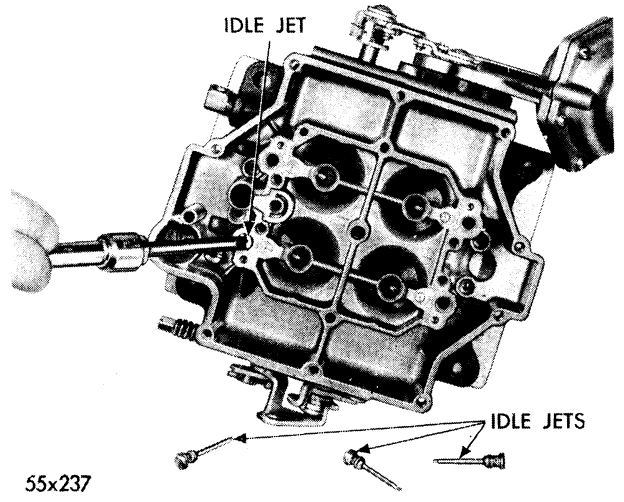


Fig. 24—Installing Primary and Secondary Idle Jets

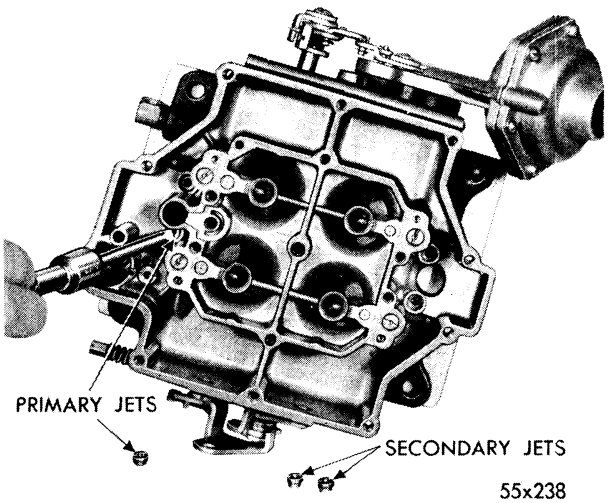


Fig. 25—Installing Primary and Secondary Main Metering Jets

shaft to expel air from the pump passages. Using a small, clean, brass rod, hold the discharge check needle firmly down on its seat. Raise the pump plunger and press downward. No fuel should be emitted from either the intake or discharge passage. (See Fig. 26.)

If any fuel does emit from the intake ball check, it should be cleaned and thoroughly blown out with compressed air. Fuel leakage at the discharge needle indicates the presence of dirt or a damaged needle or seat. Clean again and then install a new needle. Recheck for leakage. If either the intake check ball or discharge needle leaks after the above test, attempt to reseat as follows:

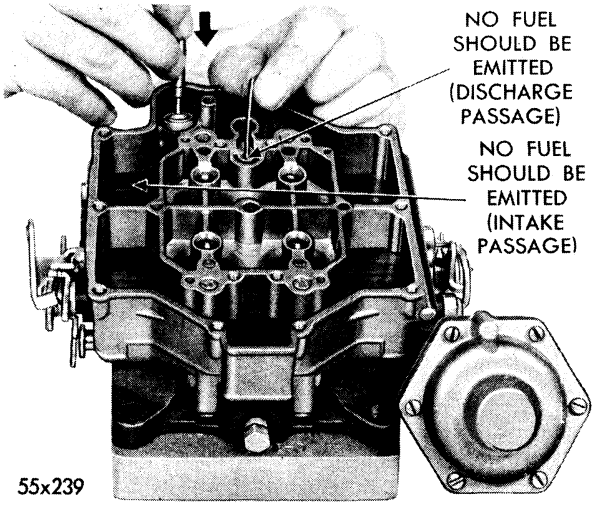


Fig. 26—Accelerator Pump Test

a. Intake Check Ball

Remove the check ball retainer from the bottom of the accelerator pump cylinder. Insert a piece of drill rod down on the check ball. Lightly tap with a hammer to form a new seat. Install a new check ball and retainer, then retest as described previously.

b. Discharge Check Needle

Insert a small piece of drill rod down on needle. Lightly tap drill rod with a hammer to form a new seat. Discard old needle and install a new one. Retest as described previously. If the above instructions do not correct the condition, a new carburetor main body assembly will have to be installed.

Install the accelerator pump discharge cluster, gasket, and screw, as shown in Figure 27. Tighten screw securely. Now depress the accelerator pump plunger. A clear straight stream should emit from each jet. If the streams are not identical, (if either one is diverted or restricted) a new accelerator pump discharge cluster should be installed. After test, pour the gasoline from the carburetor bowl and remove the accelerator pump plunger.

19. AIR HORN ASSEMBLY

(1) Place a new gasket over sleeve on rear of choke housing, and install housing in position on air horn. Tighten screws securely.

(2) Slide the choke piston pin through piston and choke piston link (See Fig. 6) ; slide assembly into air horn.

(3) Slide choke shaft into air horn far enough to allow choke piston to be aligned with center of cylinder, then turn shaft slightly clockwise and allow piston to enter its cylinder. (See Fig. 28.)

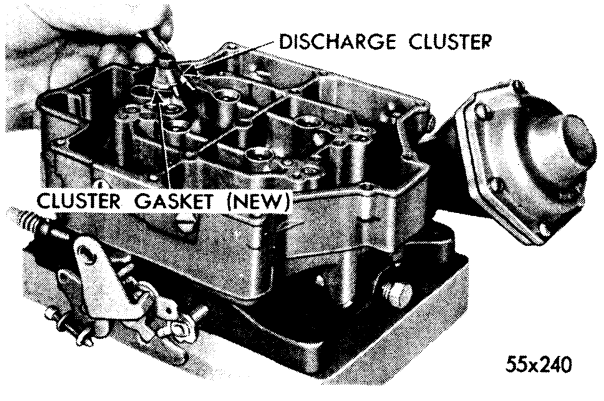


Fig. 27—Installing Accelerator Pump Discharge Cluster

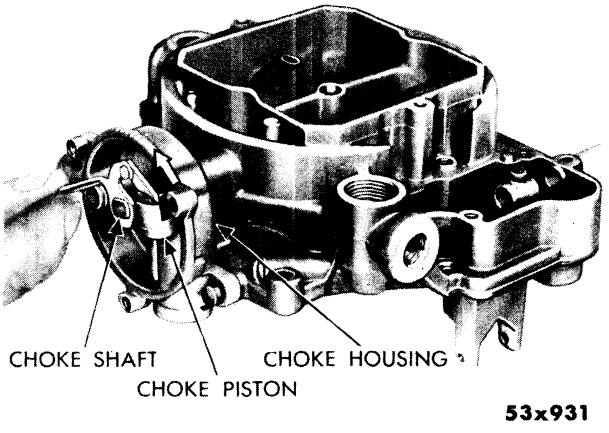


Fig. 28—Removing or Installing Choke Piston and Shaft

(4) Slide the choke valve down into position (numbered side up) and start **NEW** screws.

(5) Holding the valve in the closed position, tap gently with a screwdriver to center and locate the valve. Tighten screws securely, as shown in Figure 29.

(6) With the valve in the open position, stake the screws using a pair of pliers. **DO NOT LUBRICATE ANY OF THE CHOKE OPERATING PARTS.**

(7) Hold the air horn in an upright position and close the choke valve. The valve should open freely of its own weight.

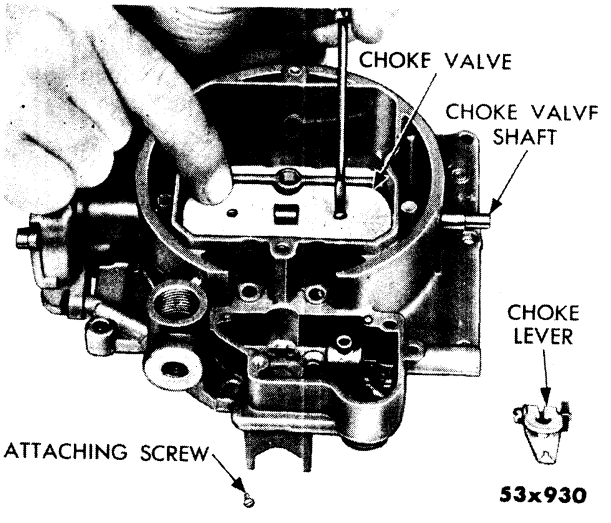


Fig. 29—Removing or Installing Choke Valve Retaining Screws

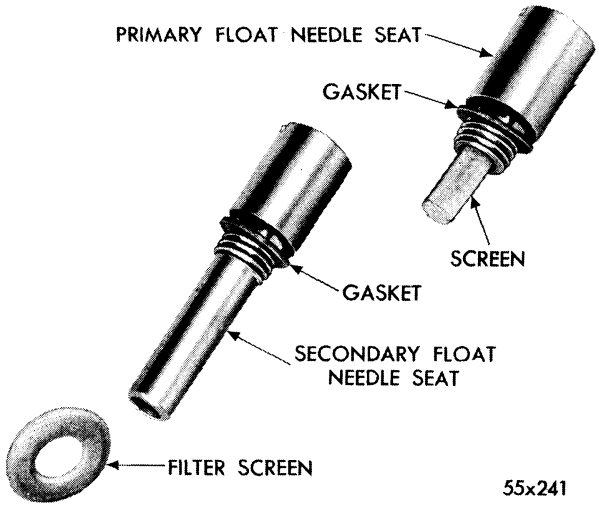


Fig. 30—Primary and Secondary Float Needle Seats

(8) Install choke baffle plate and gasket.

(9) Place the coil housing retaining ring over housing and, with the index mark in the down position, install coil housing.

(10) Turn housing counter-clockwise until the index mark on the rim of housing is in line with the center index mark on choke housing as shown in Figure 4.

(11) Install screws and tighten securely. **To secure the desired performance from the choke during starting and warm-up, the index mark on the coil housing must always be in line with the center index line on the choke housing.**

(12) Invert the air horn and install the primary and secondary needle seats and gaskets. (The secondary seat has a tube extension, the primary a small filter screen on the end; see Figure 30.)

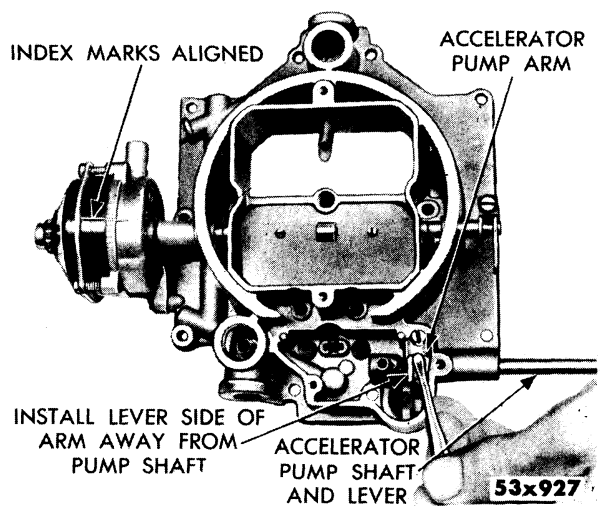


Fig. 31—Removing or Installing Accelerator Pump Arm

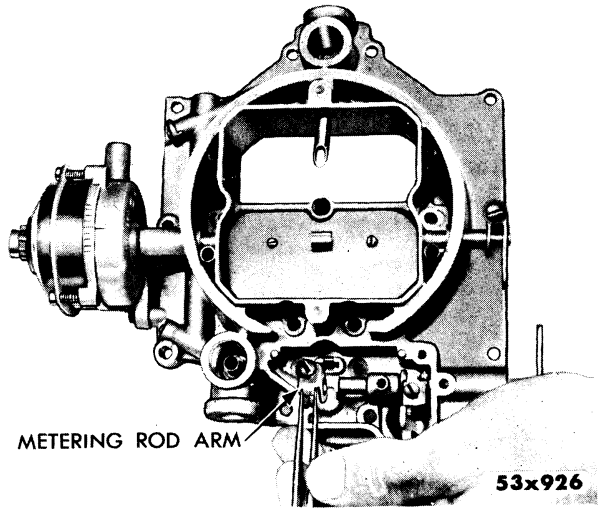


Fig. 32—Removing or Installing Metering Rod Arm

(13) Tighten seats securely. Invert the air horn and install new secondary filter screen and plug. Make sure screen is firmly seated.

(14) Slide the accelerator pump shaft and lever into the air horn, just far enough to allow the installation of the accelerator pump arm. (See Fig. 31.)

(15) Install the pump arm with the lever portion facing away from the pump shaft. (See Fig. 31).

(16) Continue to slide the pump shaft into air horn until shaft protrudes from the support boss.

(17) Now install the metering rod arm. (See Fig. 32.) The lifter portion must be aligned with the vacuumeter piston link slot in the air horn casting.

(18) Install the bowl vent operating arm with the lever portion facing away from the pump shaft, as shown in Figure 33. Install screw and lockwasher **but do not tighten.**

(19) Install the fuel inlet filter screen, plug, and gasket. Tighten securely.

(20) Slide the vacuumeter piston link down into slot in air horn with the lifter lip facing away from the pump shaft. Be sure the metering rod tension spring is centered in

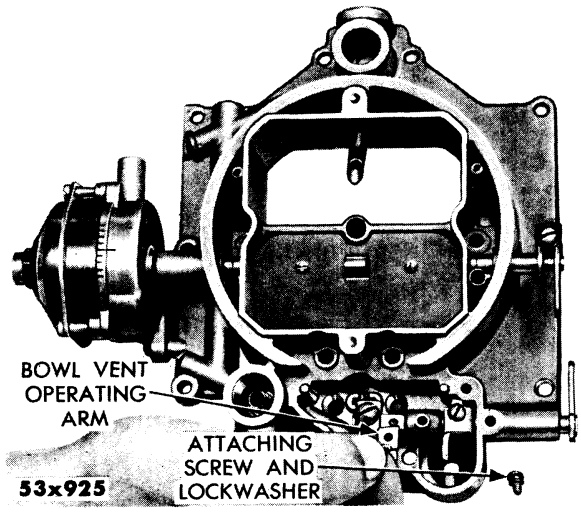


Fig. 33—Removing or Installing Bowl Vent Operating Arm

the hole at top of link. (As the link is being lowered, engage the lifter portion of arm in the slot in link.) Snug down clamp screw.

(21) Slide the choke lever over end of choke shaft with the lever pointing toward accelerator pump shaft. Snug down screw (to be adjusted and positioned later).

(22) Invert the air horn and install the primary needle valve in its seat.

(23) Slide the primary float in position and install fulcrum pin. (See Fig. 34.) Check the float setting as follows: **Be sure each needle is installed in its original seat.**

20. FLOAT LEVEL ADJUSTMENT

When making the float level adjustment, be sure the air horn gasket is removed. The primary and

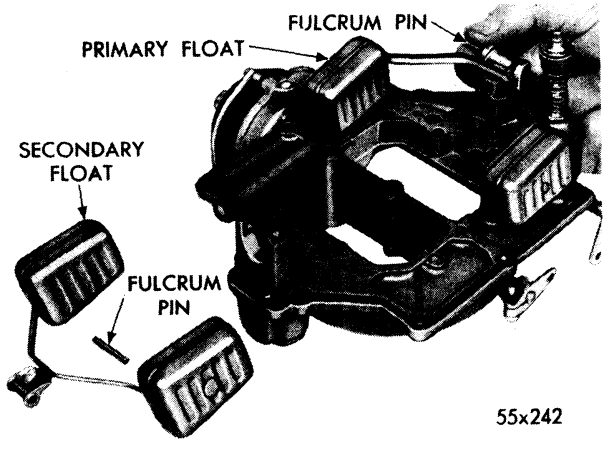


Fig. 34—Installing Primary Float

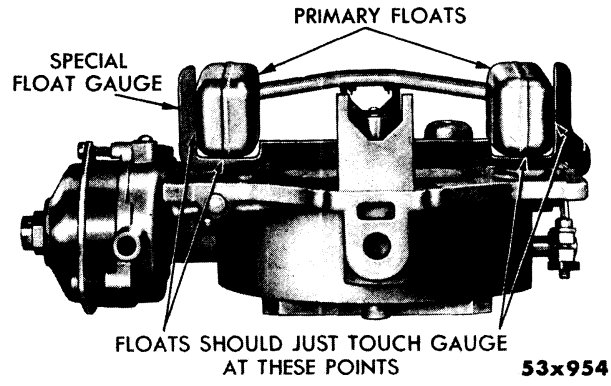


Fig. 35—Checking Primary Float Setting

secondary floats are set at different heights, using two separate gauges. Place the primary float level gauge, Tool T-109-232 (1/8"), in position as shown in Figure 35. Both floats should just clear the horizontal section in the gauge. Bend float arm as required to obtain correct setting. With the notch end of gauge fitting against the side of air horn casting, float arm should be bent for sideways adjustment until floats barely touch the vertical upright of float gauge. (See Fig. 35.) Repeat the above instructions for the secondary floats using Tool T-109-222 (3/16"), as shown in Figure 36. It should be noted that the distance between the float and casting machined surface is 1/8 inch for the primary and 3/16 inch for the secondary floats.

21. FLOAT DROP ADJUSTMENT

(1) After performing the float level adjustment, hold the air horn assembly in an upright

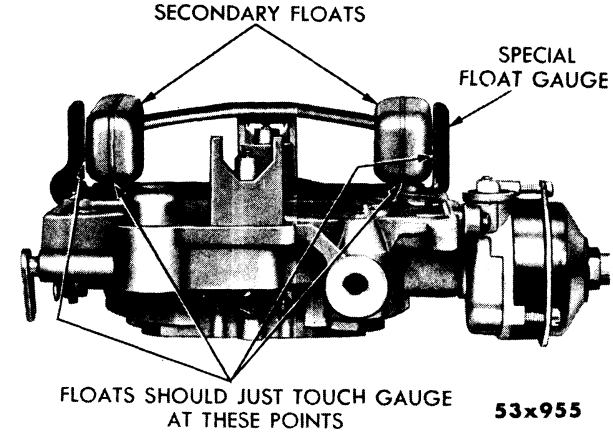


Fig. 36—Checking Secondary Float Setting

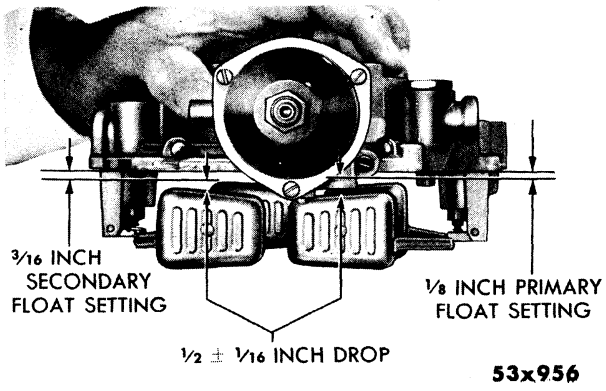


Fig. 37—Float Drop Adjustment

position and note the distance in which the floats drop, as shown in Figure 37. Both the primary and secondary floats should drop ½ inch from gauge setting (plus or minus 1/16") when measured at the center of floats, as shown in Figure 37. Adjust as necessary by removing float and bending the small tang which contacts the float needle seat. Bend tang towards needle seat to lessen drop, or away from seat to increase drop.

(2) Invert the air horn and remove floats. Install a new air horn gasket, then reinstall the primary and secondary floats, and the vacuumeter piston. Tilt piston approximately 90° to either side. For correct installation position on the vacuumeter piston link. (See Fig. 38.)

(3) Remove the accelerator pump plunger from the jar of gasoline and flex the leather several times. Check to see if the leather is hard, cracked, or worn. If any of the aforementioned conditions exists, install a new accelerator pump plunger.

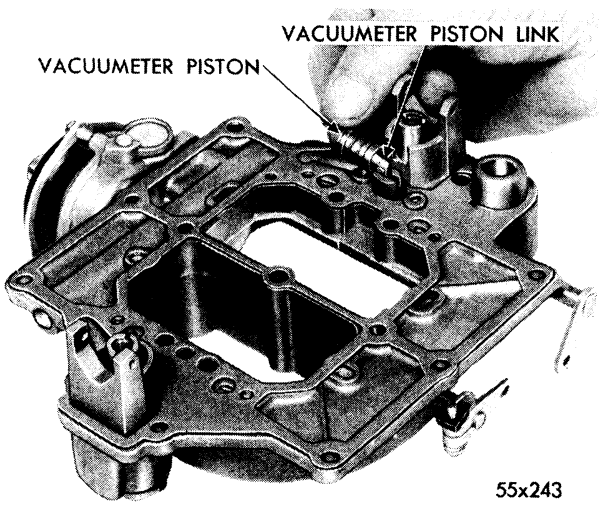


Fig. 38—Installing Vacuum Piston

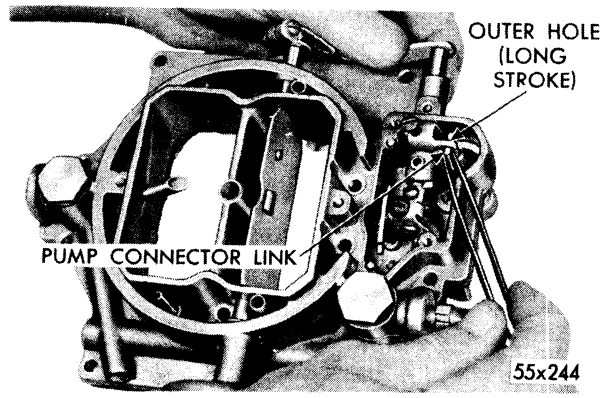


Fig. 39—Installing Accelerator Pump Connector Link

(4) Slide the accelerator pump plunger spring over plunger shaft, followed by the spring seat (shoulder on seat toward spring). With the spring compressed, slide the shaft end into the opening in air horn. With pressure on the bottom of plunger, invert air horn and install accelerator pump connector link in the top hole in the arm and plunger shaft. (See Fig. 39.) Install hairpin clip to secure. **Before installing link, be sure the hole in the plunger shaft is parallel to the pump shaft. Install link with the hairpin clip groove end entering the hole in the pump arm.**

(5) Install the pump inlet jet in position in the main body, then slide the vacuumeter piston spring in the piston well. (See Fig. 40.)

(6) Carefully lower the air horn down on the main body, guiding the accelerator pump

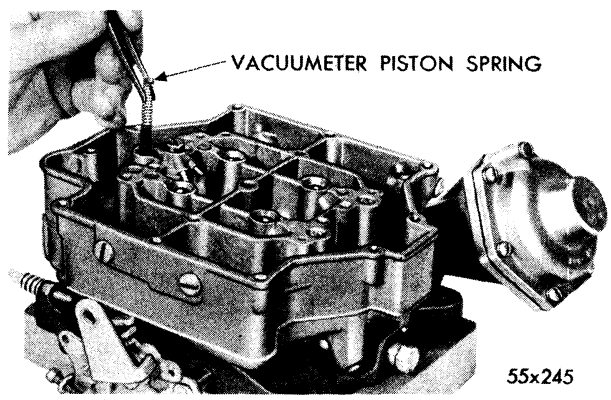


Fig. 40—Installing Vacuumeter Piston Spring in Cylinder

plunger into its well. **Caution: Be sure the leather on the plunger does not curl or wrinkle. Accelerator pump operation will be affected if this precaution is not taken.**

Now install the air horn attaching screws as follows:

(7) Insert the six 1¼ inch screws around the inside diameter of the air horn; tighten securely. Insert the remaining 1¼ inch screw in its hole in the metering rod chamber. Tighten securely.

(8) Insert the inch screw in the thick boss at the corner of the air horn casting, between the automatic choke housing and the fuel inlet port.

(9) Insert the remaining screws (¾ inch) around the outside of air horn and tighten securely.

(10) Install the metering rods, being careful to engage in the loops on the metering rod tension spring.

(11) Install the throttle connector rod and secure with clips.

(12) Engage the keyed end of the choke connector rod with the slot in the choke lever, rotate rod and engage in hole in the cam trip lever. Install clip to secure.

(13) The carburetor now has been completely assembled with the exception of the metering rod dust cover, and is now ready to make the following adjustments in the order listed:

22. CARBURETOR ADJUSTMENTS

a. Accelerator Pump Adjustment

Before making this adjustment, be sure that the

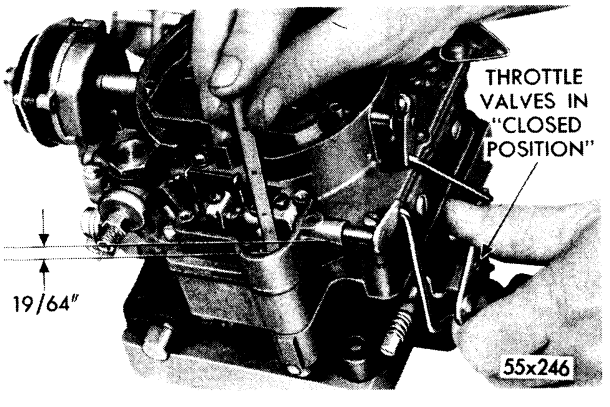


Fig. 41—Accelerator Pump Plunger Travel

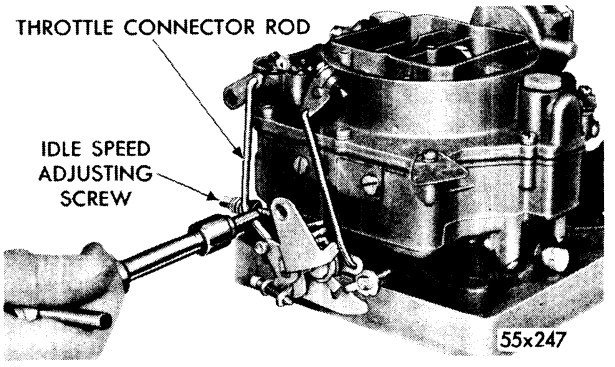


Fig. 42—Bending Throttle Connector Rod

pump connector link is installed in the outer hole (long stroke of the pump arm), with the ends pointing toward the pump shaft arm.

Back off the idle speed adjusting screw (if not previously done) until the primary throttle valves are fully seated in their bores. (Make sure the fast idle adjusting screw is off the fast idle cam.) With the throttle valves seated, the distance from the top of the plunger shaft to the top of the dust cover boss should be 1 9/64 inch as shown in Figure 41. When making this adjustment be sure that the fast idle adjusting screw does not hold the throttle open.

To adjust the pump setting, bend the throttle connector rod at the lower angle using Tool T-109-213 as shown in Figure 42.

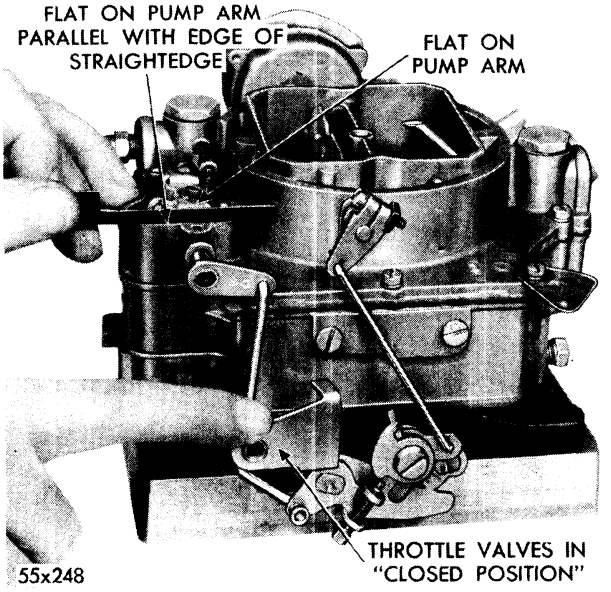


Fig. 43—Accelerator Pump Plunger Travel (Optional Adjustment)

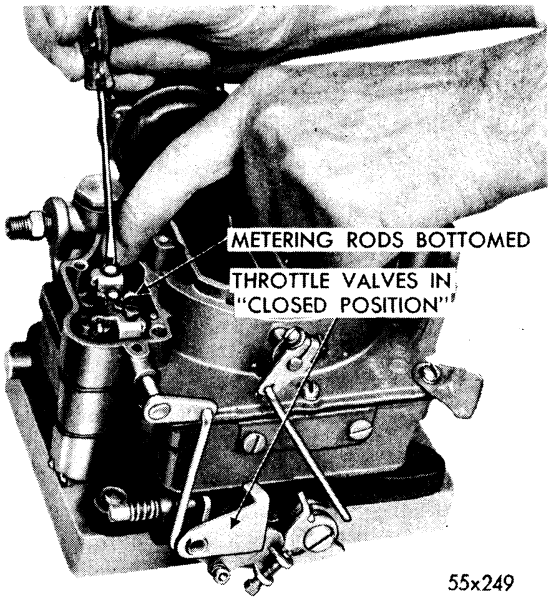


Fig. 44—Metering Rod Adjustment

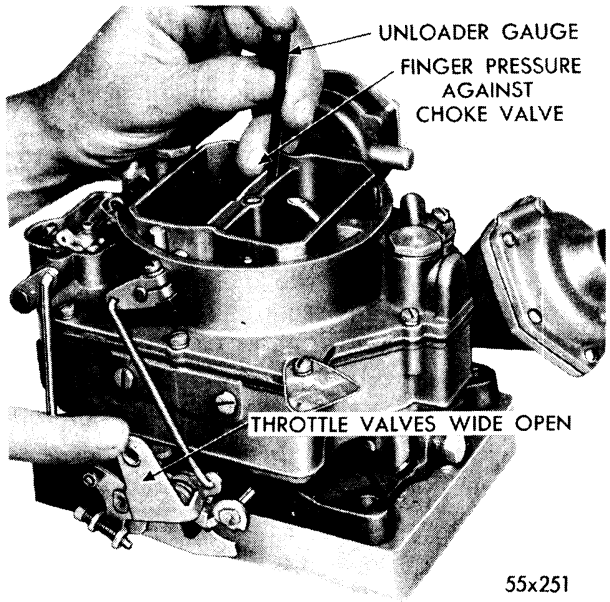


Fig. 46—Choke Unloader Adjustment

b. Optional Accelerator Pump Adjustment

Hold a straightedge across top of dust cover boss as shown in Figure 43, and adjust length of connector as in the preceding adjustment until the flat on the top of pump arm (under set screw) is parallel with upper edge of straight edge.

c. Metering Rod Adjustment

Loosen the set screw in the metering rod arm (if previously tightened) enough to obtain a slight bind on the pump shaft. Lift arm slightly. With the primary throttle valves seated in their bores, depress the metering rod link until the metering rods bottom, as shown in Figure 44. Keeping the arm in contact with the metering rod link, tighten the set screw securely.

d. Choke Rod Adjustment

Loosen the choke shaft lever clamp screw. Insert a .010 inch wire gauge, Tool T-109-200, between tang on the fast idle cam and boss on the throttle body casting. Hold this gauge in place by pressure of screwdriver exerted on the choke shaft lever clamp screw, as shown in Figure 45. This will take up all slack in the linkage. Now hold the choke valve tightly closed and tighten the clamp screw securely.

e. Choke Unloader Adjustment

With the primary throttle valves held in the wide open position, insert a $\frac{3}{16}$ inch drill, or unloader gauge Tool T-109-28, between upper edge of

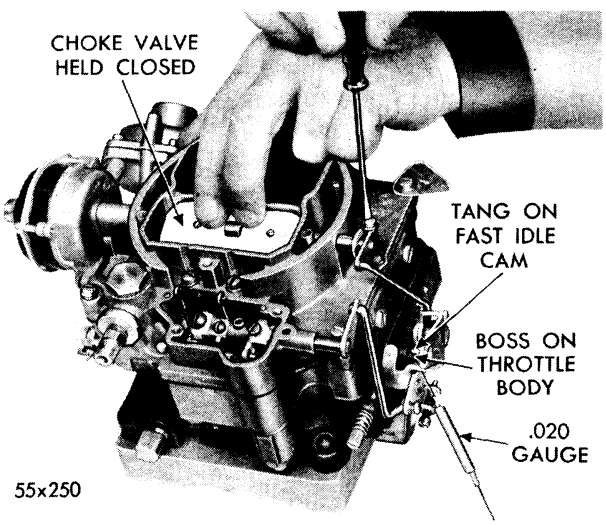


Fig. 45—Choke Rod Adjustment

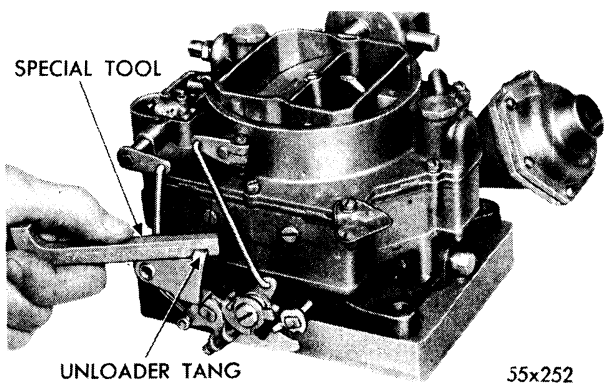


Fig. 47—Bending Unloader Tang

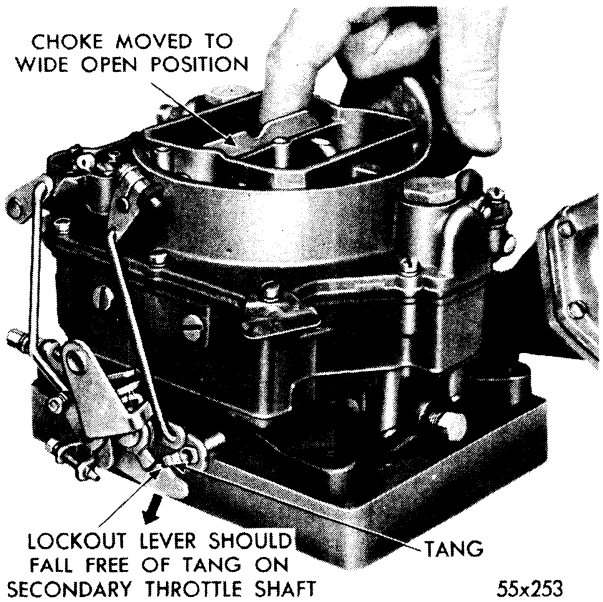


Fig. 48—Secondary Throttle Lockout Adjustment

choke valve and inner dividing wall of the air horn, as shown in Figure 46. With the finger pressing lightly against the upper part of choke valve, a slight drag should be felt on the gauge as it is being withdrawn. If no drag is felt, or if too much drag is apparent, bend the unloader tang on the throttle lever, as shown in Figure 47, until correct clearance has been obtained. Use Tool T-109-41 to bend tang.

f. Secondary Throttle Lockout Adjustment

Move the choke valve to the wide open position, the lockout lever should fall free of the tang on the secondary throttle shaft, as shown in Figure 48. Bend tang on secondary throttle lever

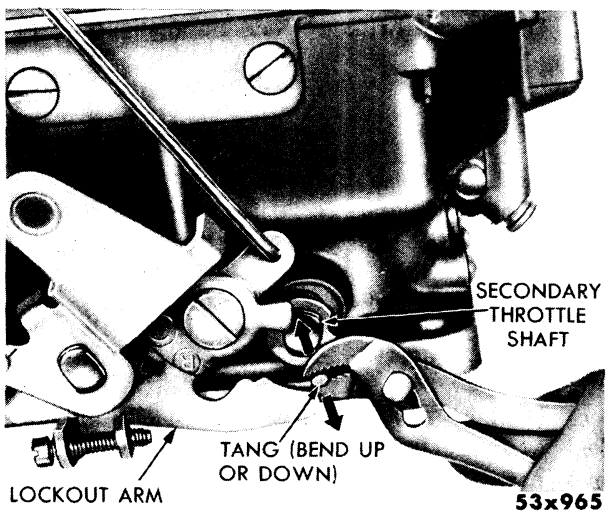


Fig. 49—Bending Secondary Throttle Shaft Tang

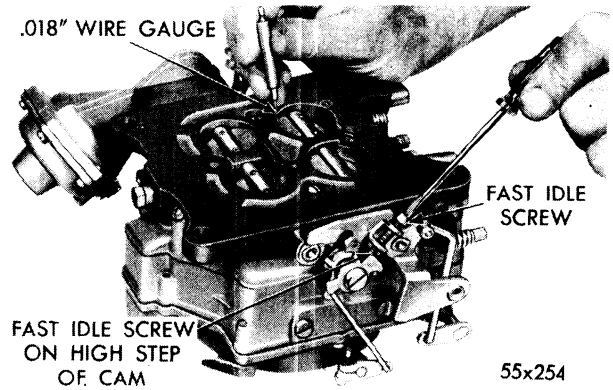


Fig. 50—Fast Idle Adjustment

until clearance has been obtained, as shown in Figure 49.

g. Fast Idle Adjustment

Insert a .018 inch wire gauge, Tool T-109-44, between the primary throttle valves and side of bore, opposite idle adjusting screws. Move the choke valve to the fully closed position, and adjust the fast idle screw to give a slight drag on the wire gauge when the screw is resting on the high step of the fast idle cam, as shown in Figure 50.

The idle speed and mixture adjustments must be performed after installation of the carburetor on the engine.

After these adjustments have been checked and corrected, install the metering rod dust cover and gasket. Tighten screws securely.

h. Bowl Vapor Vent Cap Adjustment

With the throttle at idle position, the bowl vent cap should be lifted approximately $\frac{1}{16}$ inch off its seat. Use Tool T-109-97, as shown in Figure 51, to check the clearance. To increase clearance, remove metering rod dust cover and bend actuating arm. To decrease lift, press down on cap until correct lift has been obtained.

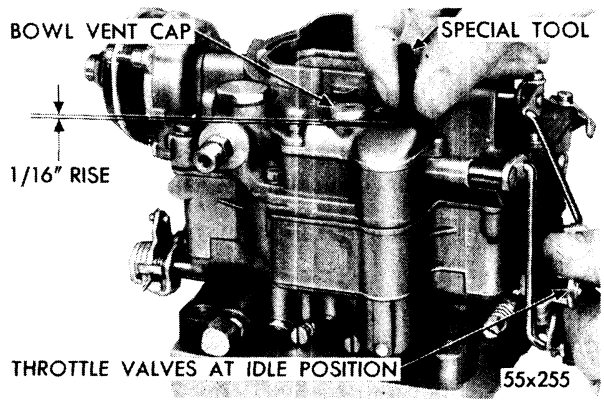


Fig. 51—Checking Bowl Vent Cap Lift

SERVICE DIAGNOSIS

23. INSUFFICIENT FUEL DELIVERY

Possible Causes:

a. Vent in tank filler cap restricted.

b. Leaks in fuel line fittings.

c. Worn, ruptured or torn diaphragm.

d. Improperly seating valves.

e. Weak main spring.

f. Defective fuel pump.

Remedies:

a. Remove restriction from filler cap or replace cap.

b. Check fittings for leaks, and tighten or replace as required.

c. Replace damaged diaphragm assembly.

d. Check valves for operation. Replace parts as required.

e. Replace weak main spring after testing pump.

f. Replace fuel pump.

24. FUEL PUMP LEAKS—FUEL

Possible Causes:

a. Loose housing screws.

b. Worn, ruptured or torn diaphragm.

c. Loose diaphragm mounting plates.

d. Loose inlet or outlet line fittings.

Remedies:

a. Tighten loose housing screws securely after checking diaphragm for possible damage. If necessary, replace diaphragm assembly.

b. Replace damaged diaphragm assembly after testing pump.

c. Replace diaphragm assembly after testing pump.

d. Check inlet and outlet fittings for stripped or crossed threads. Replace and tighten fittings.

25. FUEL PUMP LEAKS—OIL

Possible Causes:

a. Cracked or deteriorated oil seal.

b. Loose rocker arm pivot pin.

c. Loose pump mounting bolts.

d. Defective pump to block gasket.

Remedies:

a. Replace diaphragm assembly. Oil leakage at breather hole in rocker arm housing will indicate a defective oil seal.

b. Replace loose rocker arm pin. When removing old pin, avoid enlarging pin hole.

c. Tighten loose mounting bolts after checking pump to block gasket. Always install new gasket when servicing pump. Tighten bolts to 20 foot-pounds torque.

d. Replace defective gasket and tighten the mounting bolts as indicated in **c** above.

26. FUEL PUMP NOISE

Possible Causes:

a. Loose mounting bolts.

b. Scored or worn rocker arm.

c. Weak or broken rocker arm follower spring.

Remedies:

a. Tighten loose mounting bolts (after installing new gasket), to 20 foot-pounds torque. Check pump for leaks after tightening.

b. Replace scored or worn rocker arm. Then, test spring load of arm follower spring. Replace spring if necessary.

c. Replace weak or broken follower spring. Test weak spring as in **b** above. (A weak or broken follower spring will not allow rocker arm to follow eccentric cam on camshaft and a rapping noise will result.)

27. POOR IDLING

Possible Causes:

a. Idle air bleed carbonized or of incorrect size.

b. Idle discharge holes plugged or gummed.

c. Throttle body carbonized or throttle shaft worn.

d. Damaged or worn idle mixture needle.

e. Incorrect fuel level.

f. Loose main body to throttle body screws.

Remedies:

a. Disassamble carburetor. Then, use compressed air to clear idle bleed after soaking it in a suitable solvent.

b. Disassamble carburetor. Then, use compressed air to clear idle discharge holes after soaking main and throttle bodies in suitable solvent.

c. Disassemble carburetor. Check throttle valve shaft for wear. If excessive wear is apparent, replace throttle body assembly.

d. Replace worn or damaged idle needle. Adjust air mixture.

e. Check fuel level in carburetor. Adjust as necessary to obtain correct float level.

f. Tighten main body to throttle body screws securely to prevent air leaks and cracked housings.

28. POOR ACCELERATION

Possible Causes:

a. Accelerator pump by-pass seat corroded or bad.

b. Accelerator pump piston (or plunger) leather too hard, worn, or loose on stem.

c. Faulty accelerator pump discharge.

d. Faulty accelerator pump inlet check valve.

e. Incorrect fuel level.

f. Worn or corroded needle valve and seat.

g. Worn accelerator pump and throttle linkage.

h. Automatic choke not operating properly.

Remedies:

a. Disassemble carburetor. Clean and inspect accelerator pump by-pass jet. Replace by-pass jet, if it is in questionable condition.

b. Disassemble carburetor. Replace accelerator pump assembly if leather is hard, cracked or worn. Test follow-up spring for compression.

c. Dissassemble carburetor. Use compressed air to clear the discharge nozzle and channels, after soaking main body in a suitable solvent. Check the pump capacity.

d. Disassemble carburetor. Check accelerator pump inlet check valve for poor seat or release. If part is faulty, replace.

e. Check fuel level in carburetor. Adjust as necessary to obtain correct float level.

f. Clean and inspect needle valve and seat. If found to be in questionable condition, replace assembly. Then, check fuel pump pressure. Refer to Data and Specifications for correct fuel pump pressure.

g. Disassemble carburetor. Replace worn accelerator pump and throttle linkage and check for correct position.

h. Check adjustment and operation of automatic choke. If necessary, replace the choke.

29. CARBURETOR FLOODS OR LEAKS

Possible Causes:

a. Cracked body.

b. Defective body gaskets.

c. High float level.

d. Worn needle valve and seat.

e. Excessive fuel pump pressure.

Remedies:

a. Disassemble carburetor. Replace cracked body. Make sure main to throttle body screws are tight.

b. Disassemble carburetor. Replace defective gaskets and check for leakage. Be sure screws are tightened securely.

c. Check fuel level in carburetor. Make necessary adjustment to obtain correct float level.

d. Clean and inspect needle valve and seat. If found to be in a questionable condition, replace complete assembly and check fuel pump pressure. Refer to Data and Specifications for correct fuel pump pressure.

e. Test fuel pump pressure. If pressure is in excess of recommended pressure (refer to Data and Specifications), replace fuel pump.

30. POOR PERFORMANCE—MIXTURE TOO RICH

Possible Causes:

a. Restricted air cleaner.

b. Excess oil in air cleaner.

c. Leaking float.

d. High float level.

e. Excessive fuel pump pressure.

f. Worn metering jet.

Remedies:

a. Remove and clean air cleaner.

b. Remove and clean air cleaner. Refill reservoir to proper level with correct lubricant. Refer to Lubrication Section in this manual.

c. Disassemble carburetor. Replace leaking float. Check float level and correct as necessary to obtain proper float level.

d. Adjust float level as necessary to secure proper level.

e. Check fuel pump pressure. Refer to Data and Specifications for recommended pressure. If pressure is in excess of recommended pressure, replace fuel pump assembly.

f. Disassemble carburetor. Replace worn metering jet, using a new jet of the correct size and type.

CARBURETOR (Model WCFB-2317S) (C-300 SERIES)

1. DESCRIPTION

Twin Carter WCFB-2317S four-barrel carburetors are used on the Chrysler C-300 V-8 engine, as shown in Figures A and B.

The service procedures covering the two carburetors are identical.

The Carter Model WCFB carburetor is basically two dual carburetors contained in one assembly (or four per engine). The section containing the metering rods, accelerating pump and choke is termed the primary side of the carburetor, the other section, the secondary side. It has five conventional systems, as have been used in previous carburetors. They are:

2—Float System

2—Low-Speed System

2—High-Speed System

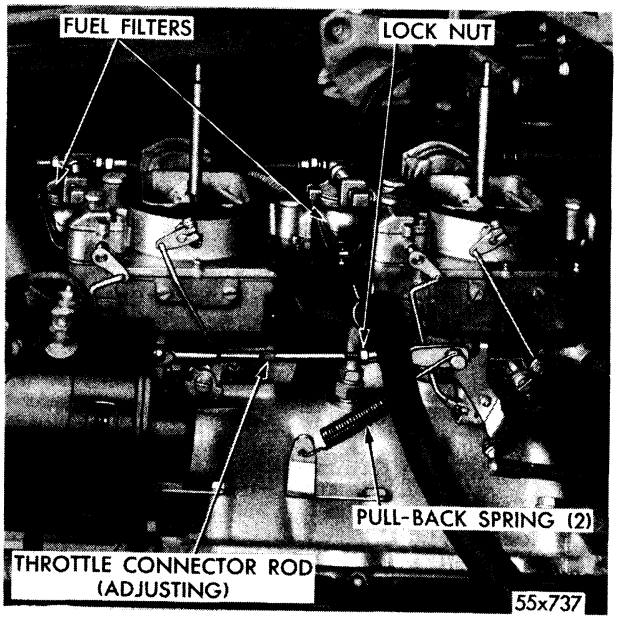


Fig. A—Air Cleaner and Silencer Removed

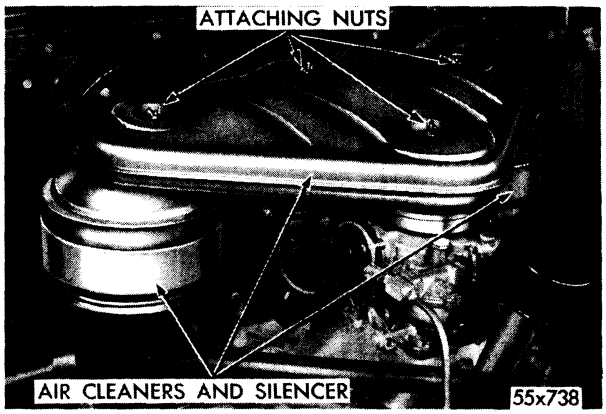


Fig. B—Air Cleaner and Silencer Installed

1—Pump System

1—Integral Automatic Choke System

2. FLOAT SYSTEMS

The purpose of the float systems is to maintain an adequate supply of fuel at the proper level in the bowls for use by the low-speed, high-speed, pump and choke systems. Primary, and secondary bowls are separated by a partition. The fuel line connection is above the primary needle and seat. Fuel is supplied to the secondary needle and seat through the passage in the air horn.

Setting the floats to specifications assures an adequate supply of fuel in the bowls for all operating conditions. Float adjustments must be made with the air horn gasket removed and should be checked vertically (specified distance between air horn and floats) and laterally (sides of floats should just clear the arms of gauge). Correct lateral adjustment is important. If the floats are misaligned, they may bind or drag against the inner walls of the bowl. Adjust by bending the float arms.

Needle valves and seats are carefully matched during manufacture. Do not use the primary needle in the secondary seat or vice versa. To avoid unnecessary bending, both floats should be reinstalled in their original positions and adjusted.

The bowls are vented to the inside of the air horn and also to atmosphere. Bowl vents are calibrated to provide proper air pressure above the fuel at all times. To assure a positive seal, always use a new air horn gasket when assembling. An air leak at this point can result in a mileage complaint.

A connecting passage along one side of the body effects a balance of the fuel levels and air pressures between the two bowls.

3. LOW-SPEED SYSTEM

Fuel for idle and early part throttle operation is metered through the low-speed system.

Gasoline enters the idle wells through the metering rod jets on the primary side of the carburetor and through the main metering jets on the secondary side.

The low-speed jets measure the amount of fuel for idle and early part-throttle operation. The air by-pass passages, economizers and idle air bleeds are carefully calibrated and serve to break up the liquid fuel and mix it with air as it moves through the passages to the idle ports and idle adjustment screw ports. Turning the idle adjustment screws toward their seats reduces the quantity of fuel mixture supplied by the idle system.

There are no idle adjustment screws on the secondary side of the carburetor.

The idle ports are slot shaped. As the throttle valves are opened more of the idle ports are uncovered allowing a greater quantity of the gasoline and air mixture to enter the carburetor bores.

All by-passes, economizers, idle ports, idle adjustment screw ports, as well as the bore of the carburetor flange must be clean and free of carbon. Obstructions will cause poor low speed engine operation. Worn or damaged idle adjustment screws or low-speed jets should be replaced.

4. HIGH-SPEED SYSTEM

Fuel for part-throttle and full throttle operation is supplied through the high-speed system.

5. PRIMARY SIDE

The position of the metering rods in the metering rod jets control the amount of fuel flowing in the high speed system of the primary side of the carburetor. The position of the metering rods is controlled mechanically by movement of the throttle and by manifold vacuum applied to the vacuum piston on the vacuumeter link.

6. SECONDARY SIDE

Fuel for the high-speed system of the secondary side is metered at the main metering jets (no metering rods used).

Throttle valves in the secondary side remain closed until the primary throttle valves have been opened a pre-determined amount. They reach the wide open throttle position at the same time the primary throttle does. This is accomplished by linkage between the throttle levers.

The WCFB-2317S Carburetors are equipped with a pair of velocity valves, which control the secondary valve operation. The throttle valves of the secondary half of the carburetor are mechanically connected to the primary valves and open with the primary, after an approximate 60° lag; and continue to open until both primary and secondary throttle valves reach the wide open position simultaneously. As engine speed increases, the forces exerted by the velocity of intake air down through the venturis of the carburetor increases, and tends to overcome the counterweight attached to the velocity valve shaft, permitting the offset velocity valves to position themselves according to engine requirements.

When the engine is cold and the choke is in closed position, a mechanical latch prevents the velocity valves from opening, so that only the primary side of the carburetor is used during the warm-up period. After the choke is opened fully, the latch is released, and allows operation of the velocity valves according to engine requirements.

7. ANTI-PERCOLATOR

To prevent the vapor bubbles in the nozzle passages and low-speed wells caused by heat from forcing fuel out of the nozzles, anti-percolator passages, and calibrated plugs or bushings are used. Their purpose is to vent the vapors and relieve the pressure before it is sufficient to push the fuel out of the nozzles and into the intake manifold. Anti-percolator plugs, bushings, and main nozzles are permanently installed and must not be removed in service.

8. PUMP SYSTEM

The pump system is found only in the primary side of the carburetor.

The accelerating pump system provides a measured amount of fuel, which is necessary to insure smooth engine operation for acceleration.

When the throttle is closed, the pump plunger moves upward in its cylinder and fuel is drawn into pump cylinder, and past the intake checkball. The discharge check needle is seated at this time to prevent air being drawn into the cylinder. When the throttle is opened the pump plunger moves downward forcing fuel out through the discharge passage, past the discharge check needle, and out of the pump jets. When the plunger moves downward the intake checkball is closed preventing fuel from being forced back into the bowl.

If the throttle is opened suddenly, the upper pump spring will be compressed by the plunger shaft telescoping, resulting in a smoother pump discharge of longer duration.

When the throttle valves are opened, a predetermined amount, the pump plunger bottoms in the pump cylinder eliminating pump discharge due to pump plunger movement at high speeds.

During high speed operation a vacuum exists at the pump jets. To prevent fuel from being drawn through the pump system the passage to the pump jets is vented by a cross passage to the carburetor bowl above the fuel level. This allows air instead of fuel to be drawn off the pump jets.

9. INTEGRAL AUTOMATIC CHOKE

The automatic choke used on this carburetor embodies features developed exclusively by Chrysler Corporation. It automatically provides satisfactory engine operation under all conditions of starting and warm-up. Manifold vacuum draws air into the choke housing, through a heater tube projecting into the exhaust manifold. This heated air acts on the thermostatic coil so that, as the engine warms up, the choke moves toward the "off" position. The position of the choke valve is further controlled by the action of manifold vacuum on the choke piston. The choke valve is offset so that the air flowing into the carburetor tends to position the valve according to speed and load conditions. The combination of these features provides the required mixture calibration. To prevent overchoking a

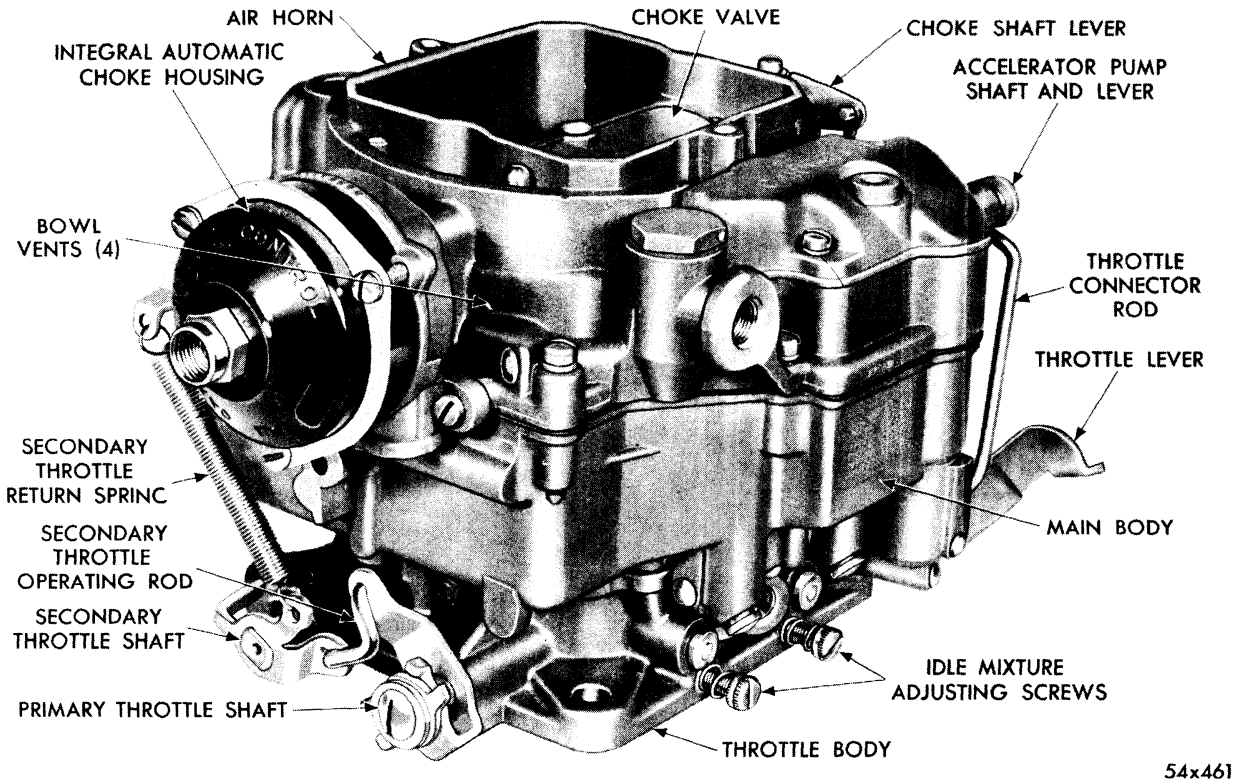


Fig. 1—Carburetor Assembly (WCFB 2317S)

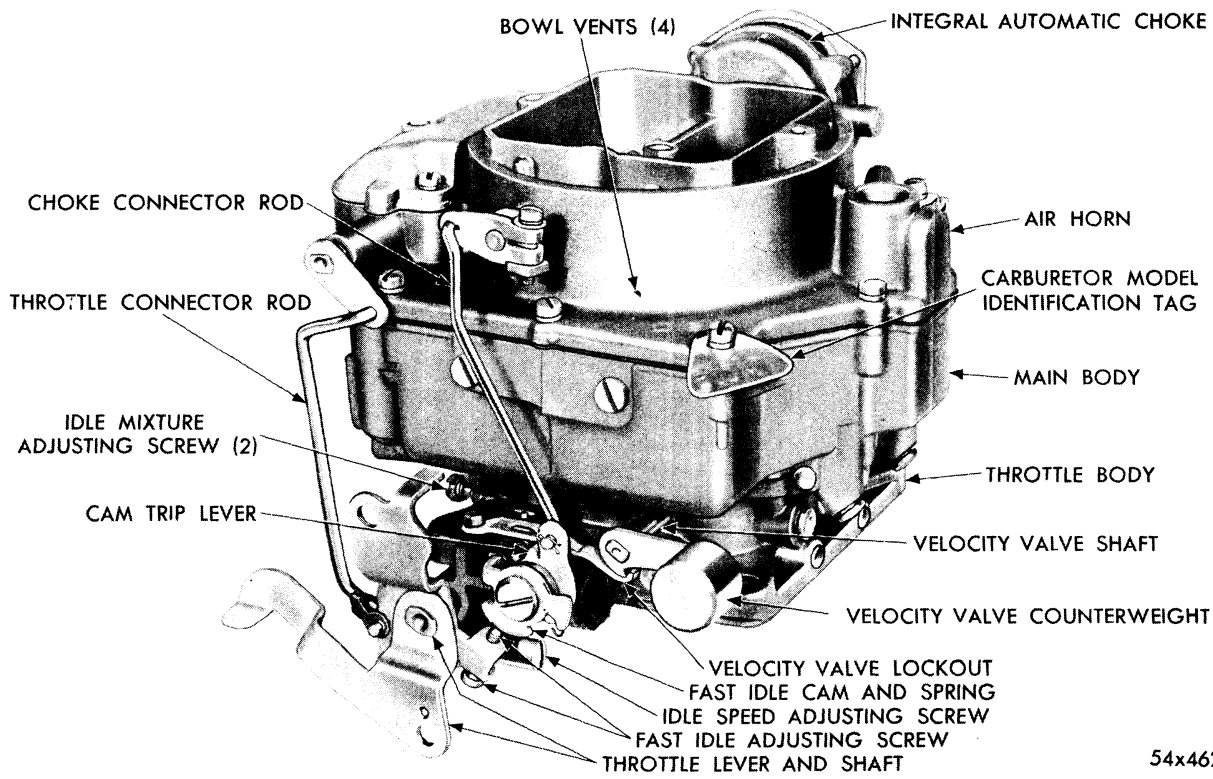


Fig. 2—Carburetor Assembly (WCFB 2317S)

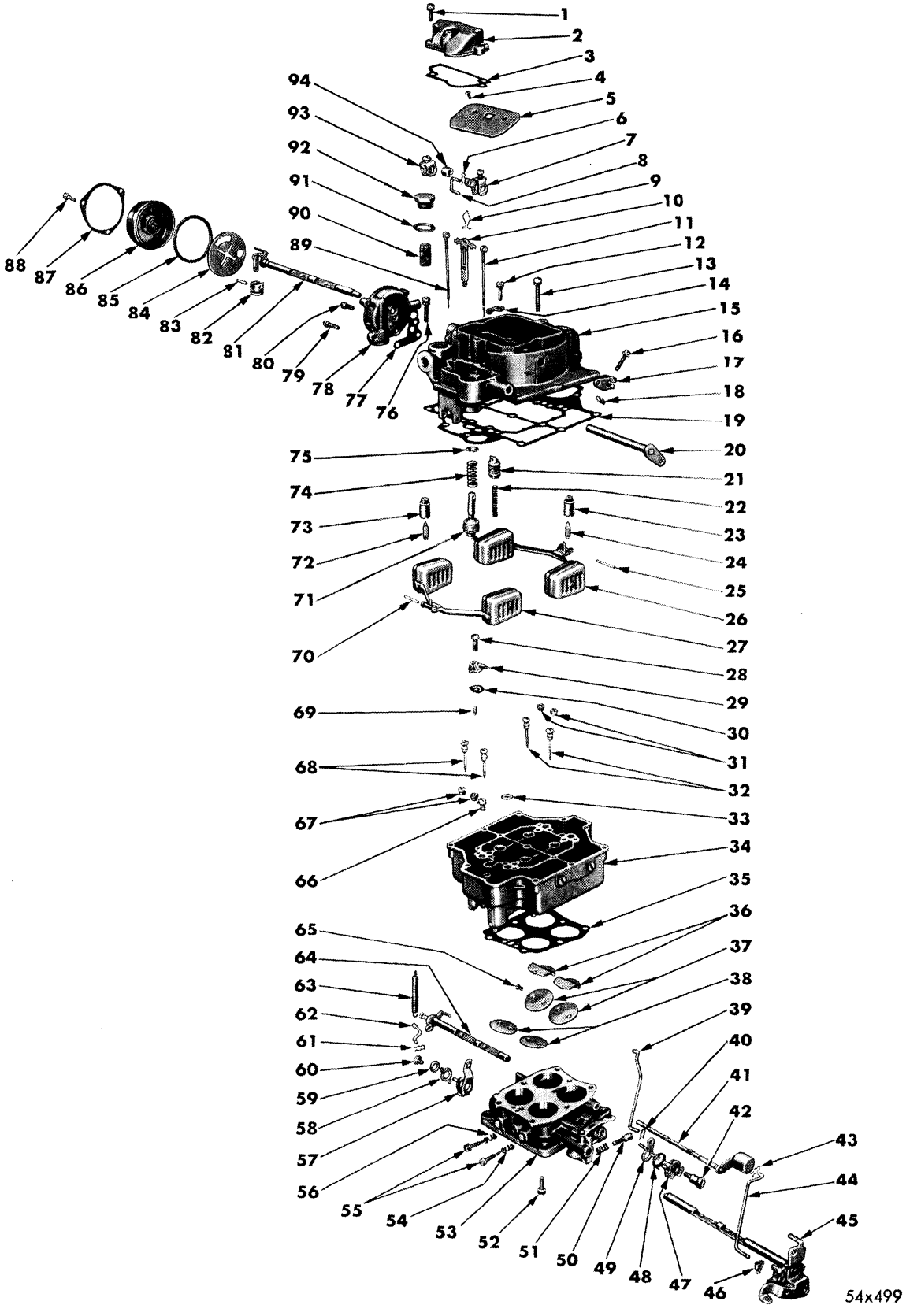


Fig. 3—Carburetor Assembly (WCFB 2317S) (Exploded View)

1—Screw, dust cover
2—Cover, dust
3—Gasket, dust cover
4—Screw, choke valve
5—Valve, choke
6—Clip, hairpin
7—Arm, accelerator pump
8—Link, pump connector
9—Spring, metering rod
10—Link, vacuumeter piston
11—Metering rod
12—Screw, spring bracket
13—Screw, air horn retaining
14—Bracket, spring
15—Air horn
16—Screw, choke shaft lever
17—Lever, choke shaft
18—Nut, choke shaft lever screw
19—Gasket, air horn
20—Shaft, accelerator pump
21—Piston, vacuumeter
22—Spring, vacuumeter piston
23—Needle valve and seat assembly, fuel inlet
24—Valve, fuel inlet needle
25—Pin, float fulcrum
26—Float, secondary
27—Float, primary
28—Screw, pump jet housing
29—Housing, pump jet
30—Gasket, pump jet housing
31—Jets, secondary main
32—Jets, secondary idle
33—Retainer, ball check
34—Main body, carburetor
35—Gasket, main body
36—Valves, velocity
37—Valves, secondary throttle
38—Valves, primary throttle
39—Rod, choke connector
40—Clip, hairpin
41—Shaft, velocity valve
42—Screw, fast idle cam
43—Clip, hairpin
44—Rod, throttle connector
45—Shaft and lever, throttle
46—Clip, throttle connector rod
47—Cam, fast idle
48—Spring, fast idle cam
49—Lever, cam trip
50—Screw, idle speed
51—Spring, adjusting screw
52—Screw, throttle body
53—Throttle body
54—Spring, idle mixture needle
55—Needle, idle mixture
56—Spring, idle mixture needle
57—Arm, throttle shaft
58—Dog, throttle shaft
59—Washer, throttle shaft spacer
60—Screw, dog and arm retainer
61—Clip, hairpin
62—Rod, throttle operating
63—Spring, secondary throttle lever
64—Shaft, secondary throttle
65—Screw, throttle valve retaining
66—Plug, accelerator pump passage
67—Jets, primary main
68—Jets, primary idle
69—Needle, pump discharge
70—Pin, float fulcrum
71—Pump, accelerator
72—Valve, fuel inlet needle
73—Seat, fuel inlet needle valve
74—Spring, accelerator pump
75—Retainer, accelerator pump spring
76—Screw, air horn
77—Gasket, choke housing
78—Housing, choke
79—Screw, choke housing
80—Screw, choke housing
81—Shaft, choke
82—Piston, choke
83—Pin, choke piston
84—Plate, choke baffle
85—Gasket, coil housing
86—Housing, integral choke
87—Ring, choke housing retaining
88—Screw, retaining ring
89—Rod, metering
90—Screen, fuel inlet
91—Gasket, fuel inlet plug
92—Plug, fuel inlet passage
93—Arm, metering rod
94—Spacer, metering rod arm

Fig. 3—Carburetor Assembly (WCFB 2317S)

warm or hot engine, a heat retainer plate keeps the thermostatic coil from cooling off too quickly and closing the choke valve while the engine is still hot. The choke is connected to the fast idle cam, which provides the necessary increased idle speeds during the warm-up period.

SERVICE PROCEDURES

10. SERVICING THE CARBURETOR

Servicing the carburetor should only be done by an experienced carburetor mechanic and with the PROPER TOOLS.

Dirt, dust, water and gummy deposits are some of the main causes for poor carburetor operation. However, proper cleaning and installation of new parts, where required, will return the carburetor to its originally designed performance.

The carburetor is a very dependable unit and will continue functioning properly for long periods without attention.

Often, the carburetor is blamed for a great variety of trouble, which is classed as **"POOR CAR PERFORMANCE."** Therefore, be definitely sure that the trouble is not located elsewhere before disassembling the carburetor.

When overhauling the carburetor, several items of importance should be observed to assure a good job:

(1) The carburetor must be disassembled.

(2) All parts should be cleaned in a suitable solvent and inspected for damage or wear.

(3) Use air pressure only, to clean the various orifices and channels.

(4) Replace questionable parts with **NEW ONES.** When checking parts removed from the carburetor, it is difficult at times to be sure they are satisfactory for further service. It is therefore recommended that in such cases, NEW parts be installed.

11. DISASSEMBLING THE CARBURETOR

To disassemble the carburetor for cleaning or overhaul, refer to Figures 1, 2, 3, and 4, and proceed as follows:

(1) Place the carburetor assembly on repair block Tool C-3400. (This Tool is used to protect the throttle valves from damage and to provide a suitable base for working.)

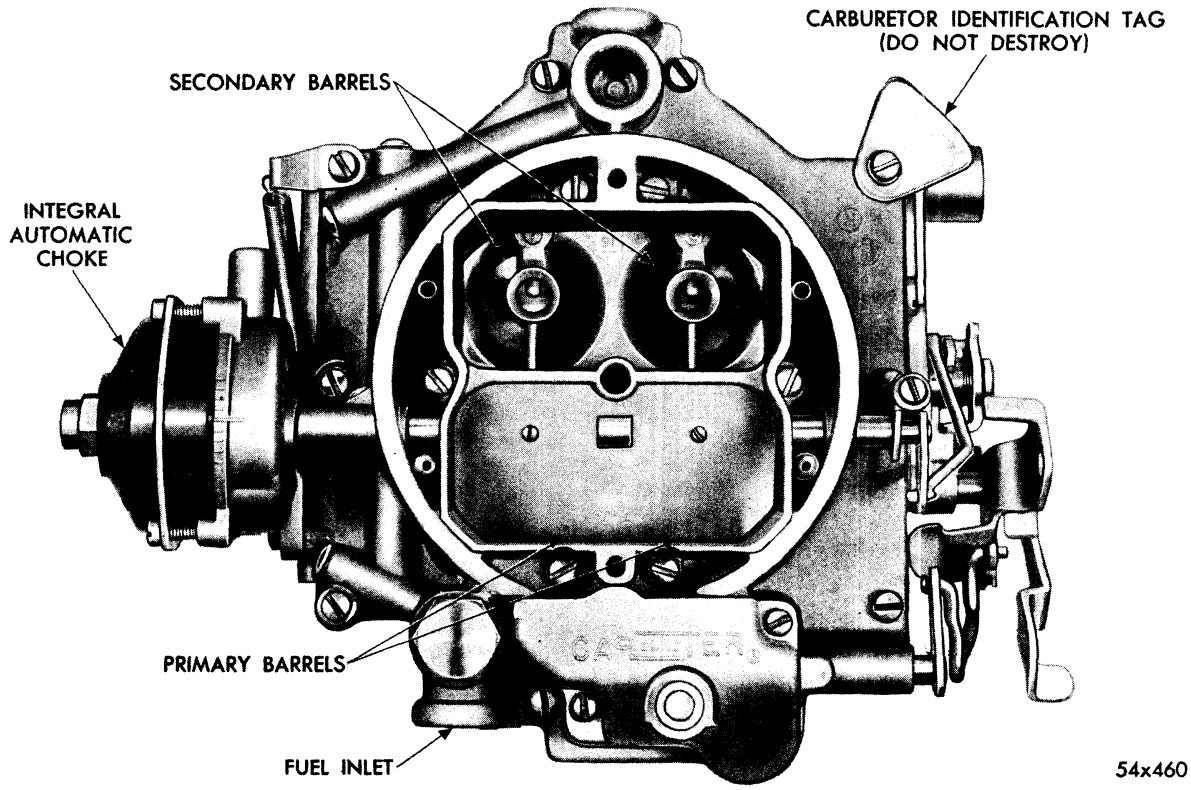


Fig. 4—Four Barrel Carburetor (Top View) WCFB 2317S

(2) Remove the choke connector rod, as shown in Figure 5.

(3) Remove the throttle connector rod, as shown in Figure 6. Remove the metering rod dust cover, as shown in Figure 7.

(4) Unhook the metering rods from the vacumeter piston link and remove, as shown in Figure 8.

(5) Of the sixteen bowl cover attaching screws and lockwashers, six of these are found around the inside air horn, nine around the flange of the bowl cover and one within the metering rod and pump countershaft enclosure.

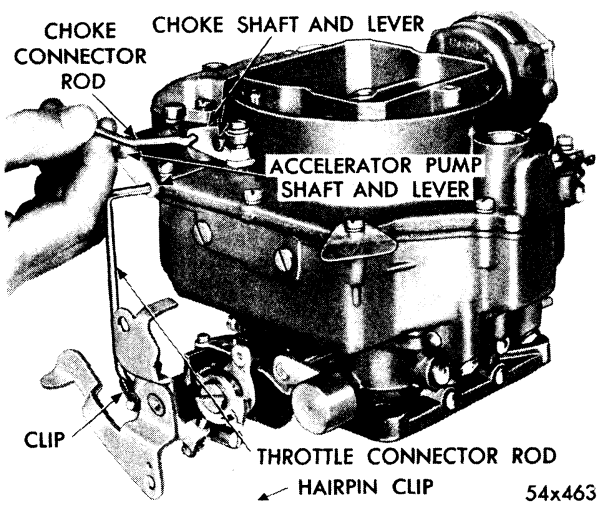


Fig. 5—Removing or Installing Choke Connector Rod

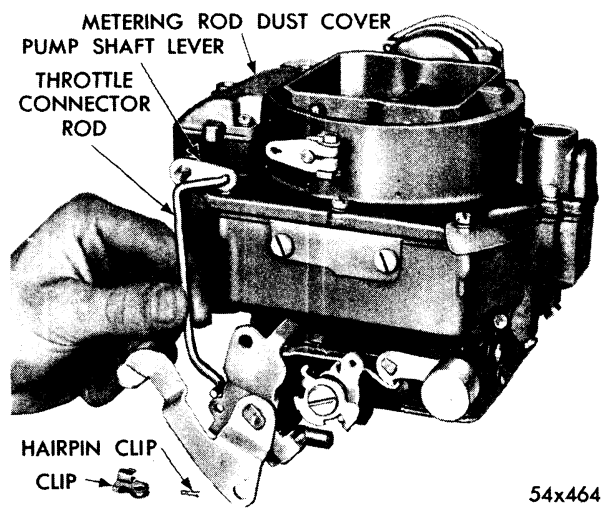


Fig. 6—Removing or Installing Throttle Connector Rod

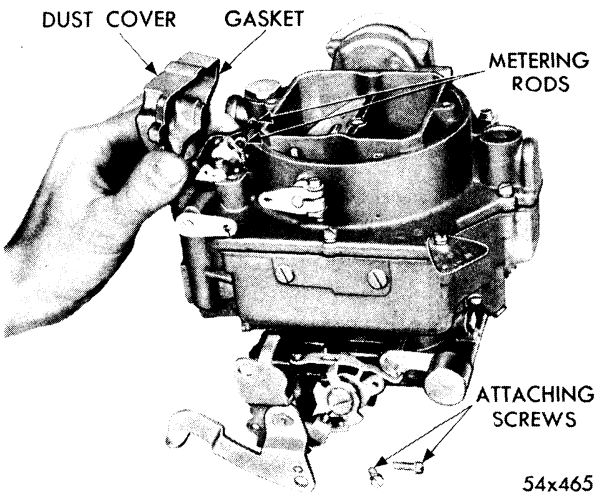


Fig. 7—Removing or Installing Metering Rod Dust Cover

(6) Remove the sixteen screws and lockwashers that hold the air horn to the main body, and disconnect the secondary throttle return spring.

(7) Using finger pressure only, lift air horn assembly up and away from main body, as shown in Figure 9.

(8) Removing the air horn assembly, be sure and lift air horn straight up and away from main body in order not to bend or damage the floats, accelerator pump plunger or vacuumeter piston.

12. AIR HORN DISASSEMBLY

(1) Lay the air horn in an inverted position on the bench and proceed to disassemble as follows:

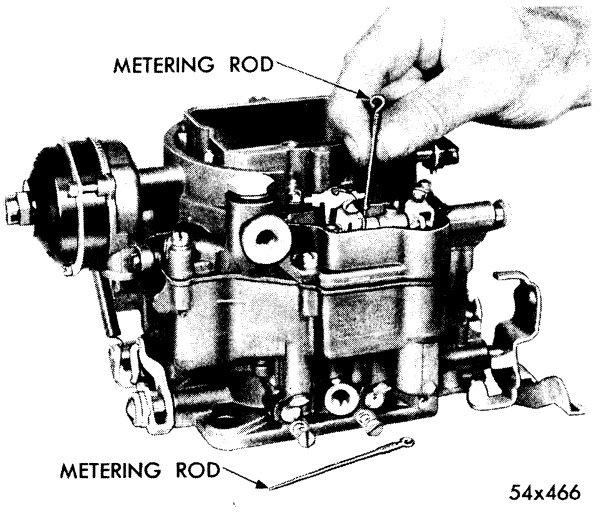


Fig. 8—Removing or Installing Metering Rods

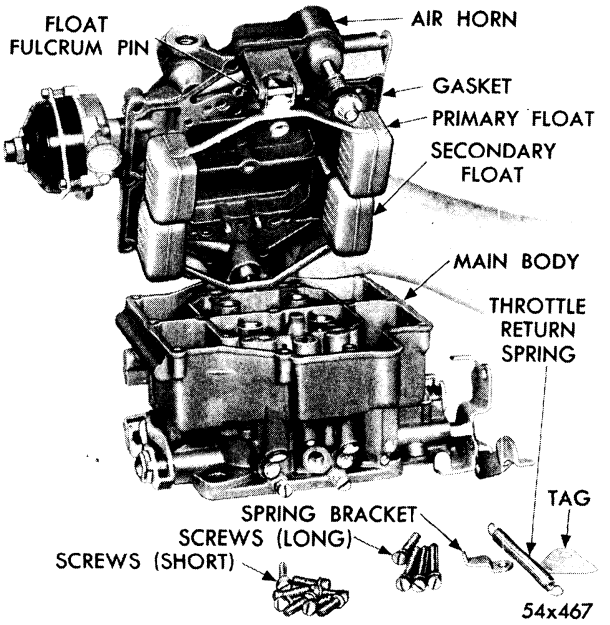


Fig. 9—Removing or Installing Air Horn

(2) With a suitable tool, push out the primary float fulcrum pin. Lift primary float up and away from air horn, as shown in Figure 10.

NOTE

It is absolutely necessary to keep parts from the primary side of the carburetor separated from those of the secondary side.

(3) Push out the secondary float fulcrum pin,

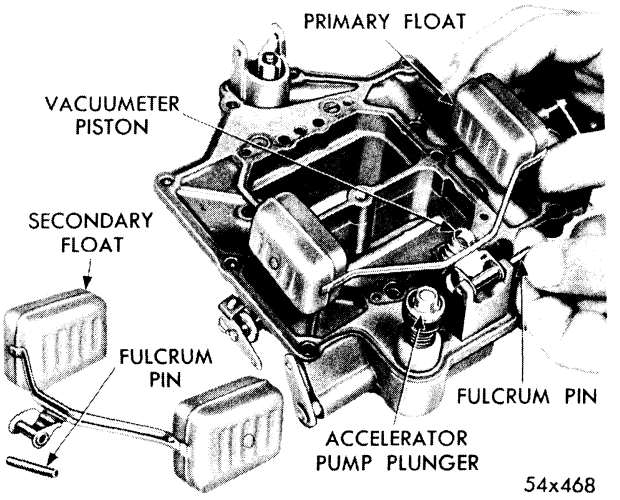


Fig. 10—Removing or Installing Primary and Secondary Floats

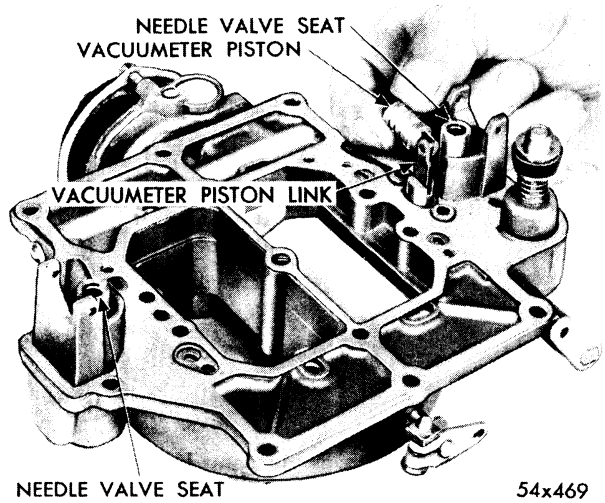


Fig. 11—Removing or Installing Vacuumeter Piston

lift the secondary float up and away from the carburetor air horn.

(4) Rotate the vacuumeter piston 90° to either side and remove, as shown in Figure 11. Remove the gasket from the bottom of the air horn and discard.

(5) Remove the two needle valves from their respective seats. Remove the primary and secondary seats and gaskets, as shown in Figure 12. Be sure each needle valve is returned to its original seat if it is to be used again at assembly.

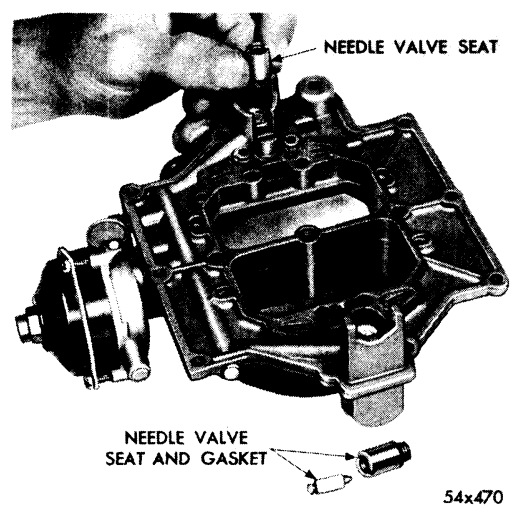


Fig. 12—Removing or Installing Needle Valve, Seat and Gasket

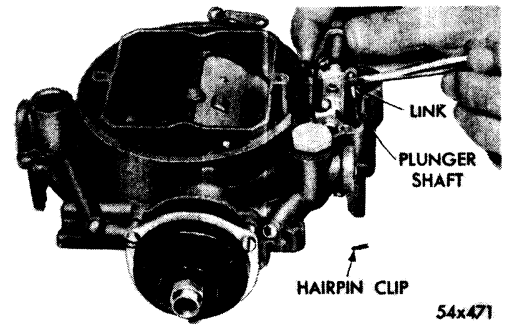


Fig. 13—Removing or Installing Pump Connector Link

(6) Invert the carburetor air horn, and remove the hairpin clip from the pump connector link.

(7) Disengage pump connector link from the accelerator pump arm, as shown in Figure 13.

(8) Slide the accelerator pump plunger spring and spring guide washer out from under air horn.

(9) Remove the fuel inlet plug, gasket and screen from the air horn, as shown in Figure 14.

(10) Loosen the metering rod arm screw then, disengage the vacuumeter piston link from the metering rod arm and withdraw vacuumeter link directly out of metering rod chamber.

(11) Loosen the screws that hold the metering rod arm and the accelerator pump arm to the accelerator pump shaft.

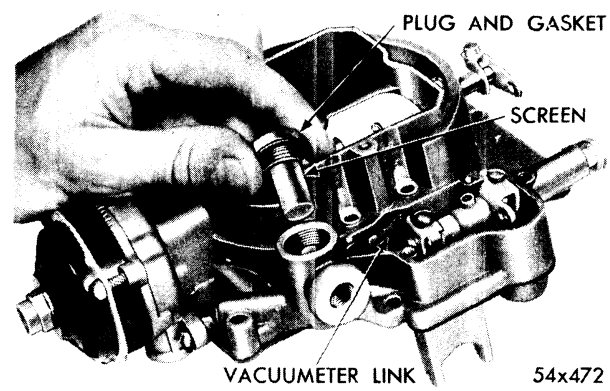


Fig. 14—Removing or Installing Filter Screen and Plug

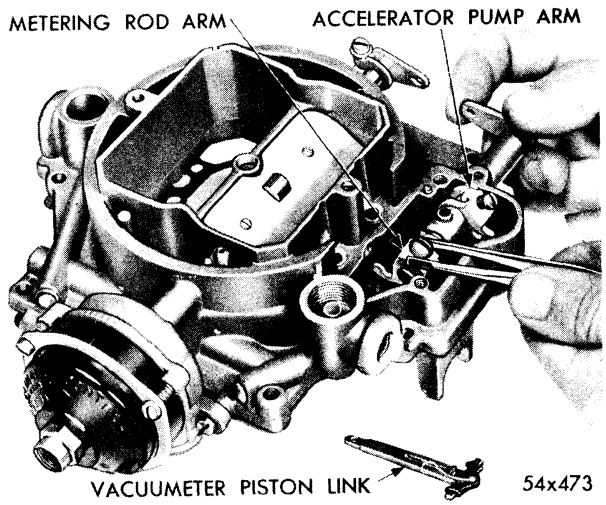


Fig. 15—Removing or Installing Metering Rod Arm

(12) Slowly withdraw shaft and lift out metering rod spacer and accelerator pump arms, as shown in Figures 15 and 16.

13. INTEGRAL AUTOMATIC CHOKE DISASSEMBLY

(1) Remove the three screws and retainer ring that hold the thermostatic coil housing to the air horn.

(2) Lift off the housing and thermostatic coil spring, as shown in Figure 17.

(3) Remove the housing gasket and lift out baffle plate.

(4) Loosen the choke shaft lever clamp screw and slide lever off end of choke shaft.

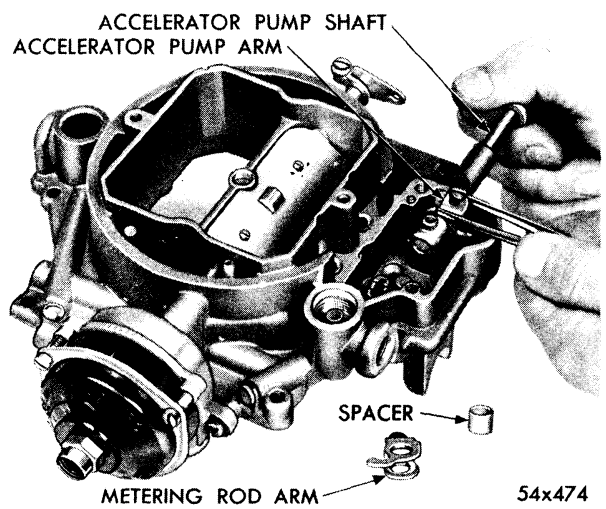


Fig. 16—Removing or Installing Accelerator Pump Arm

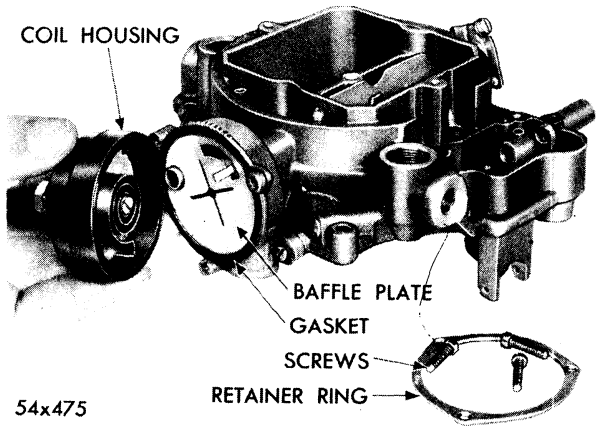


Fig. 17—Removing or Installing Thermostatic Coil Spring Housing

(5) Remove the two choke valve retaining screws that hold the choke valve to the choke shaft, as shown in Figure 18. Lift out the choke valve.

These screws are staked to prevent loosening, and extreme care is necessary to avoid breaking in choke shaft.

(6) Rotate the choke shaft enough to withdraw choke piston out of its cylinder, as shown in Figure 19. As the choke clears cylinder, withdraw shaft and piston out of air horn.

(7) Using a suitable tool, withdraw the choke piston pin, as shown in Figure 20.

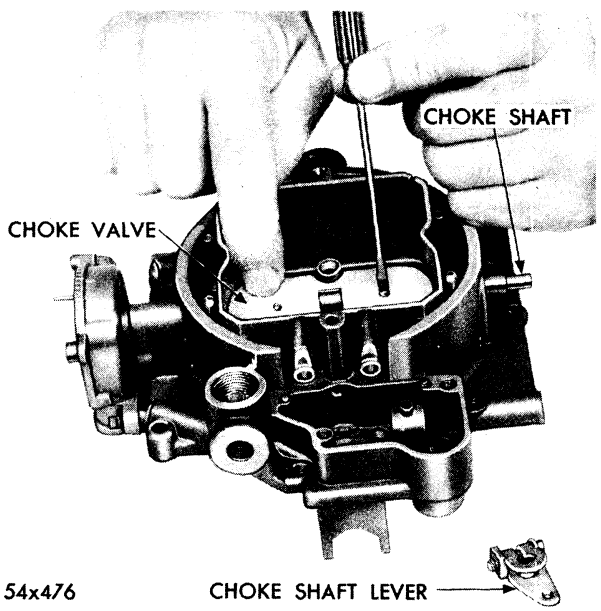


Fig. 18—Removing or Installing Choke Valve Retaining Screw

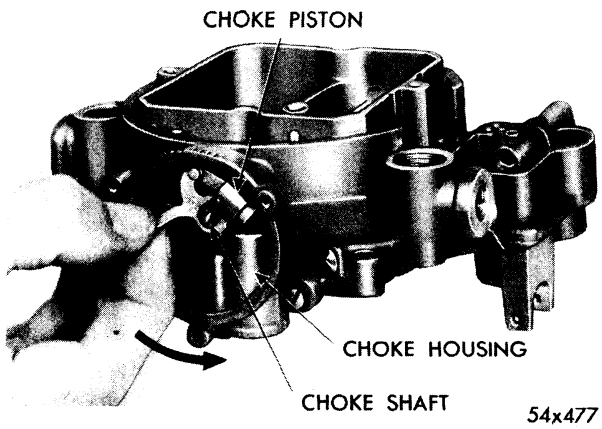


Fig. 19—Removing or Installing Choke Piston and Shaft

(8) Separate choke piston from link. Remove the three screws that hold the choke housing to the air horn.

(9) Work choke housing directly out and away from air horn, as shown in Figure 21. Discard gasket.

14. MAIN BODY DISASSEMBLY

(1) Lift the vacuumeter piston spring out of the vacuumeter piston cylinder in the main body, as shown in Figure 22.

(2) Remove the screw from the accelerator pump discharge cluster, then lift off cluster and gasket, as shown in Figure 23.

(3) Invert the carburetor main body and drop out the accelerator pump discharge check needle.

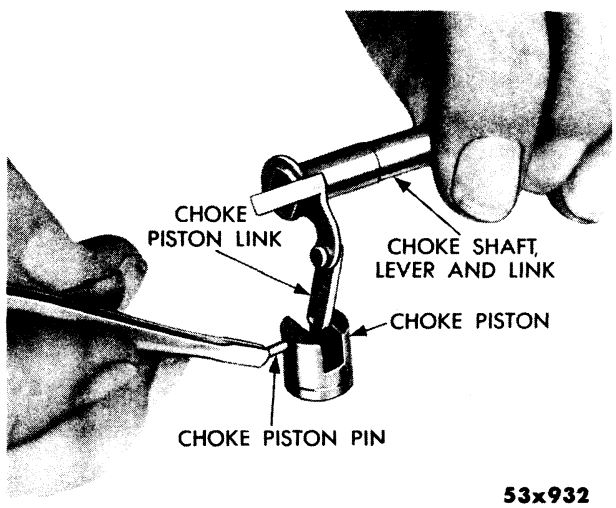


Fig. 20—Removing or Installing Choke Piston Pin

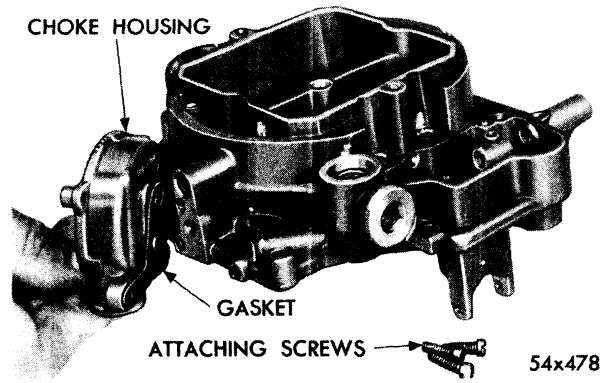


Fig. 21—Removing or Installing Choke Housing

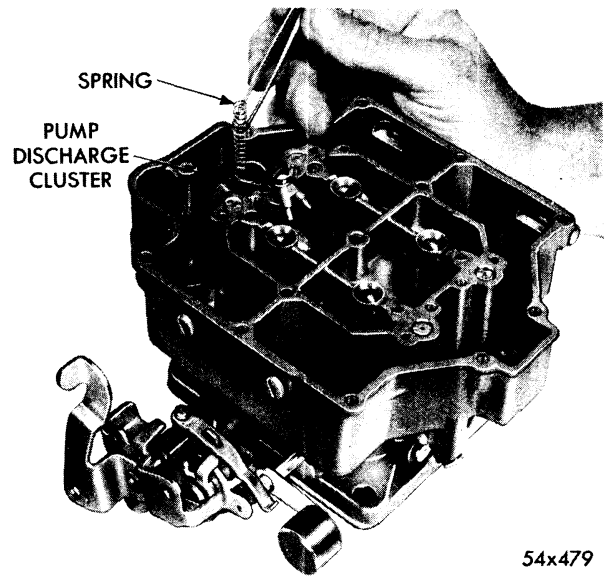


Fig. 22—Removing or Installing Vacuumeter Piston Spring

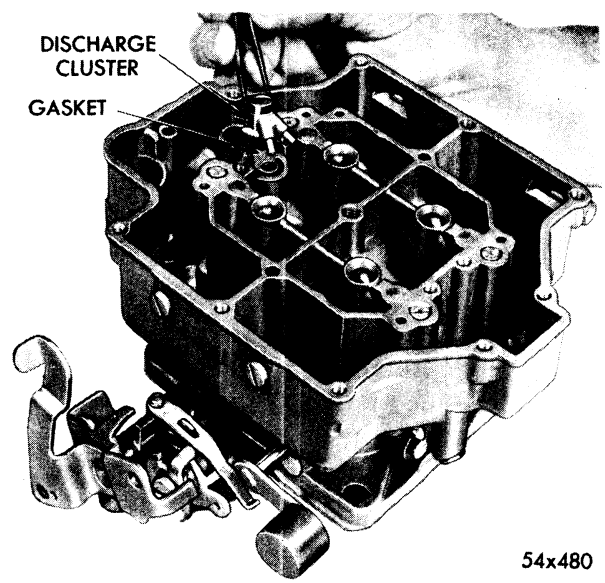


Fig. 23—Removing or Installing Discharge Cluster and Gasket

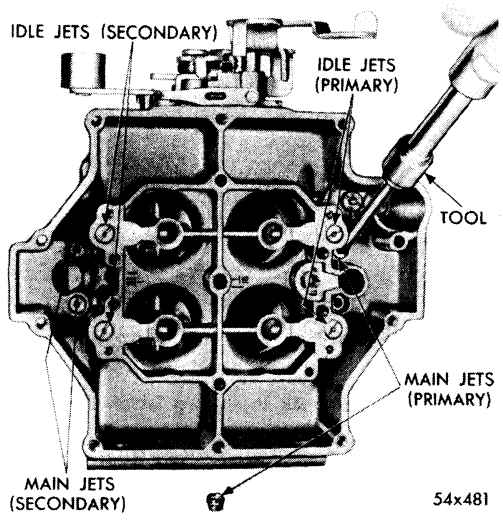


Fig. 24—Removing or Installing Main Metering Jets (Primary Side)

(4) Using Tool T-109-58, remove the main metering jets (primary side), as shown in Figure 24. **The primary and secondary main metering jets are not interchangeable.**

(5) It is very important at reassembly, that these jets be installed in their respective positions in the carburetor main body.

(6) Again, using Tool T-109-58, remove the main metering jets (secondary side), as shown in Figure 25.

(7) Using a wide blade screwdriver, remove the two fuel sight plugs from the carburetor main body. **This need be done, only if screwdriver slots are damaged or a leak is indicated.**

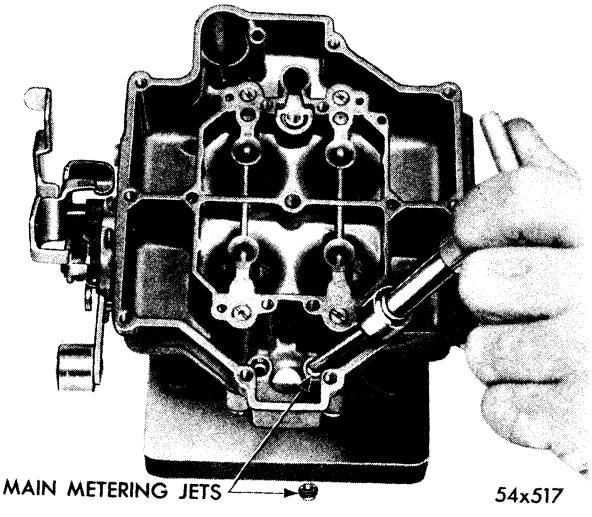


Fig. 25—Removing or Installing Main Metering Jets (Secondary Side)

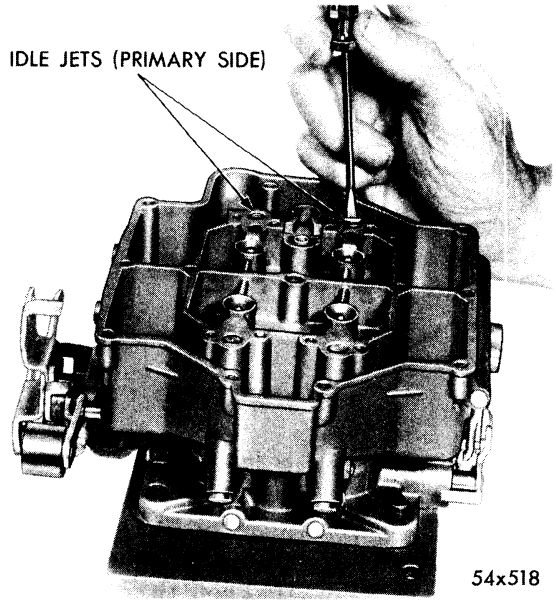


Fig. 26—Removing or Installing Idle Jets (Primary Side)

(8) Using Tool T-109-58, remove the idle jets (primary side), as shown in Figure 26.

(9) Remove the idle jets (secondary side), as shown in Figure 27.

The idle jets on the primary and secondary side of the carburetor are interchangeable.

(10) Invert the carburetor on the bench, then remove the four throttle body to main body attaching screws. Lift throttle body

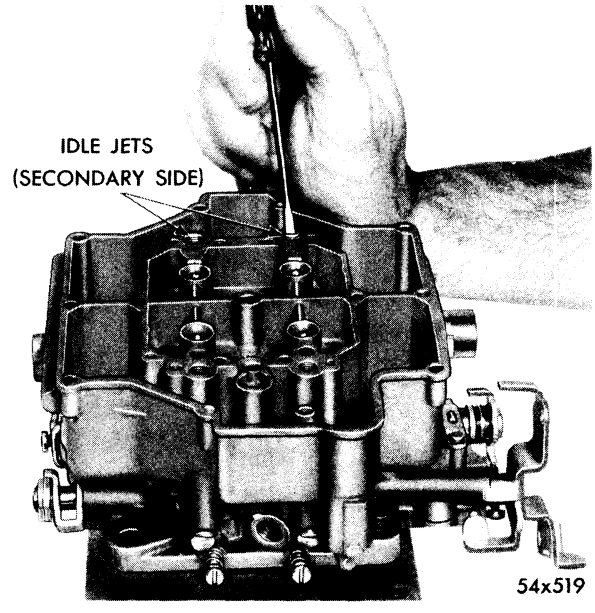


Fig. 27—Removing or Installing Idle Jets (Secondary Side)

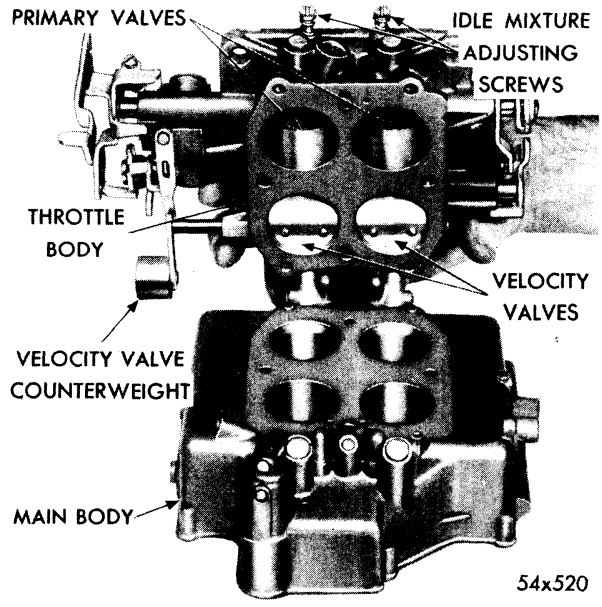


Fig. 28—Removing or Installing Throttle Body

up and away from main body, as shown in Figure 28. Discard gasket.

15. THROTTLE BODY DISASSEMBLY

(1) Remove the hairpin clip that holds the throttle operating rod to the primary operating lever.

(2) Slide rod out of lever, and disengage from the secondary throttle shaft lever, as shown in Figure 29.

(3) Remove the screw that holds the throttle shaft washer, primary throttle shaft dog and primary operating lever to the primary

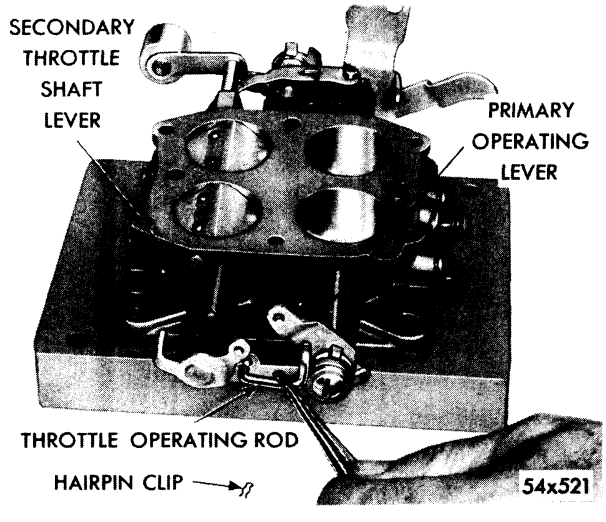


Fig. 29—Removing or Installing Throttle Operating Rod

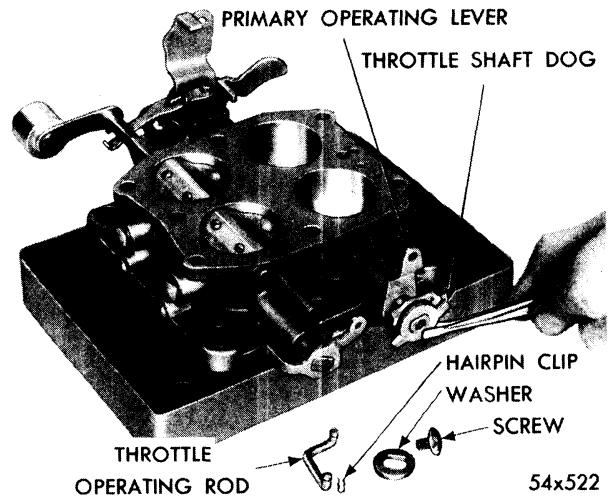


Fig. 30—Removing Throttle Shaft Dog

throttle shaft. Slide washer, dog and lever off end of throttle shaft, as shown in Figure 30.

(4) Remove the screw that attaches the fast idle cam assembly to the throttle body boss, and lift off the fast idle cam assembly, cam trip lever and screw, as shown in Figure 31.

(5) When removing cam and trip lever, be sure and note the position of the fast idle cam spring and tangs on trip lever.

(6) It is usually not advisable to remove the throttle shafts or valves, unless wear or damage necessitates installation of new parts. During manufacture, the location of the idle transfer port and the spark ad-

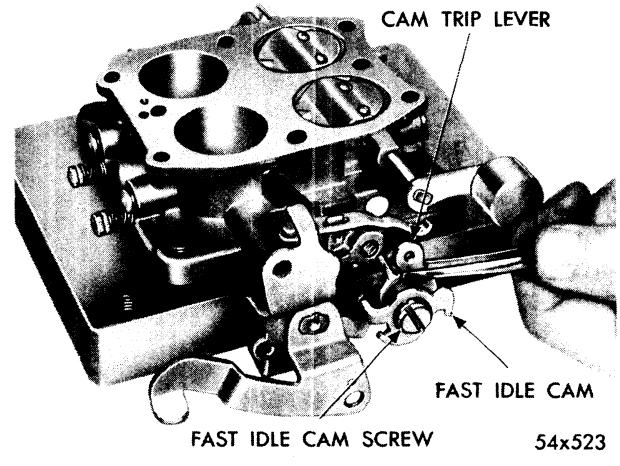


Fig. 31—Removing or Installing Fast Idle Cam Assembly

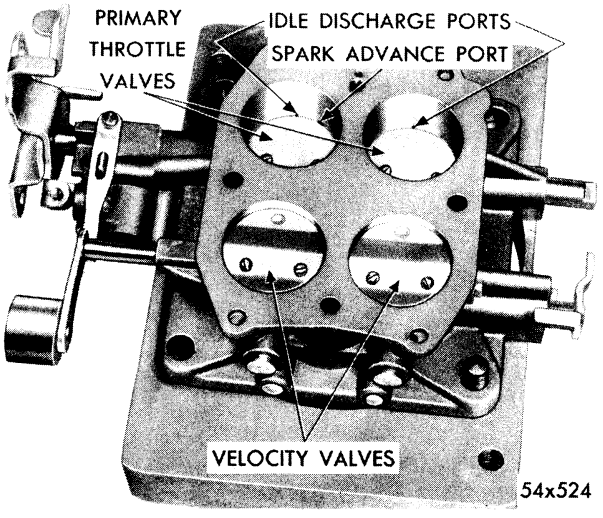


Fig. 32—Ports in Relation to Throttle Valves

vance control port to the valves is carefully established for one particular assembly. (See Fig. 32.)

If new shaft should be installed in an old worn throttle body, it would be very unlikely that the original relationship of these ports to the valves would be obtained. Changing the port relationship would adversely effect normal carburetor operation between the speeds of 15 and 30 miles per hour. However, if it has been determained the new shaft is to be installed, adhere closely to the following instructions:

(7) Remove the four screws that hold the primary throttle valves to the throttle shaft. Lift out valves, then withdraw primary throttle shaft using a twisting motion, as shown in Figure 33.

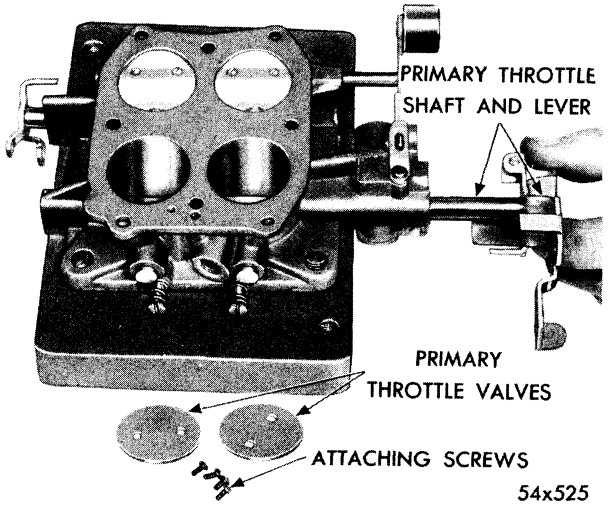


Fig. 33—Removing or Installing Primary Throttle Shaft

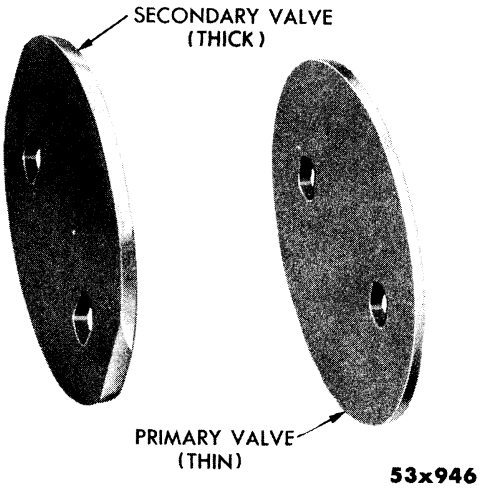


Fig. 34—Throttle Valve Identification

These screws are staked on the opposite side and care should be used in removal so as not to break the screws in the shaft. It is suggested, that the throttle valves be marked in order that each may be returned to the same bore from which it was removed.

The primary and secondary throttle valves are not interchangeable and should be kept separate in order that they may be replaced in their original bores. (Refer to Fig. 34.)

(8) Remove the four screws that hold the velocity valves to the velocity valve shaft.

(9) Lift out the velocity valves, and withdraw the velocity valve shaft, with a twisting motion, as shown in Figure 35.

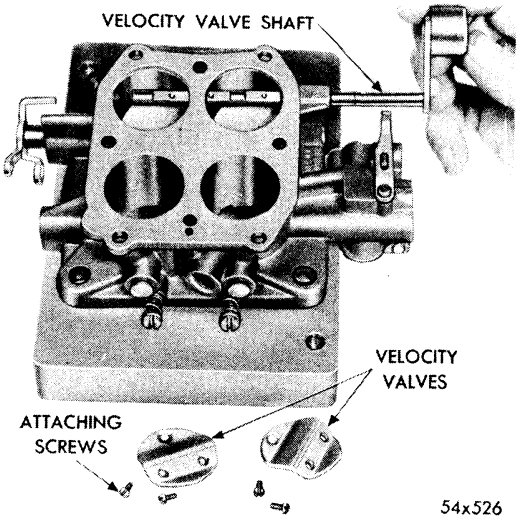


Fig. 35—Removing or Installing Velocity Valve Shaft

(10) Remove the four screws that attach the secondary throttle valves to the throttle shaft.

(11) Lift out valves, and withdraw secondary throttle shaft with a twisting motion, as shown in Figure 36.

(12) Remove the two idle mixture adjusting screws and the springs from the throttle body, as shown in Figure 37.

The carburetor now has been disassembled into four units namely the air horn, main body and throttle body, and the component parts disassembled as far as necessary for cleaning and inspection.

16. CLEANING CARBURETOR PARTS

The recommended solvent for gum deposits is denatured alcohol which is easily obtainable. However, there are other commercial solvents which may be used with satisfactory results.

NOTE

If the commercial solvent or cleaner recommends the use of water as a rinse, it should be "HOT." After rinsing, all traces of water must be blown from the passages with air pressure. It is further advisable to rinse all parts in clean kerosene or gasoline to be certain no trace of moisture remains.

To remove gum and carbon deposits, a soft brush should be used while the parts are soaking

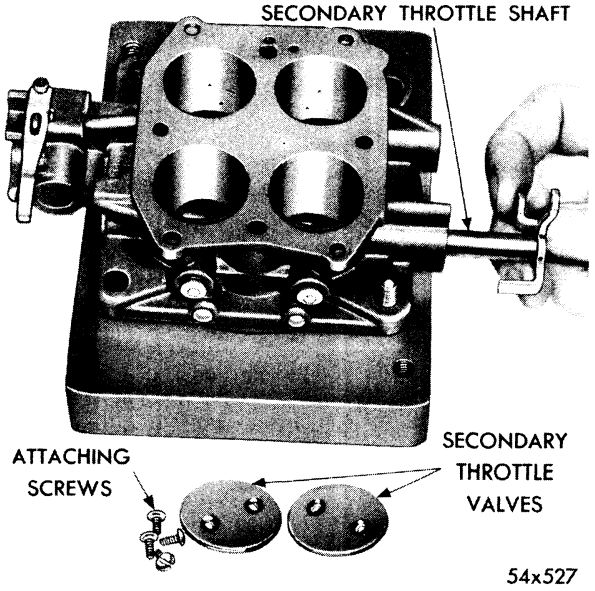


Fig. 36—Removing or Installing Secondary Throttle Shaft

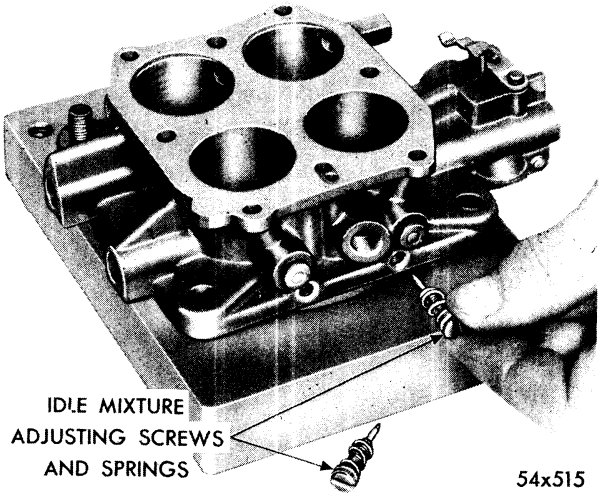


Fig. 37—Removing or Installing Idle Mixture Adjusting Screws

in the solvent. After cleaning, all parts should be rinsed in clean solvent and then all passages blown out with compressed air. Do not immerse the bakelite choke housing in the solvent because of possible damage.

Never clean jets with a wire, drill or other mechanical means because the orifices may become enlarged, making the mixture too rich for proper performance.

Incorporated in the air horn, is the integral automatic choke. To function properly, it is important that all parts be clean and move freely. It is possible, under extremely dusty conditions, that fine particles of dirt may be found deposited on the various choke parts.

A heavy, black hard carbon deposit on the choke parts will indicate the possibility of a leak in the heater tube. Check tube in manifold and repair as required.

Examine all choke parts for wear or damage. Worn or damaged parts must be replaced with new, to insure proper operation of choke.

Do not attempt to separate thermostatic coil from heat retainer plate.

The thermostatic coil, heat, retainer plate and moulded housing are serviced as an assembly only. If the housing is cracked or broken, replace with a complete new assembly, as the index mark cut on the rim of housing is only correct for the one thermostatic coil originally installed.

To remove the thermostatic coil and heat retainer plate from the housing, hit coil housing

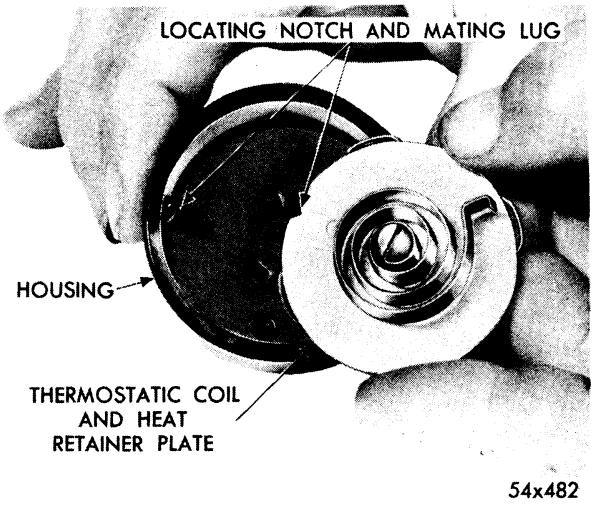


Fig. 38—Removing or Installing Coil in Housing

sharply against palm of hand (coil side down). Clean any dirt or dust that may be present from retainer plate and out of coil housing. Match the notch in plate with lug in the coil housing, as shown in Figure 38. Install plate and press until seated in housing.

17. INSPECTION AND REASSEMBLY—THROTTLE BODY

(1) Check the throttle shaft for excessive wear in the throttle body. If wear is extreme it is recommended that the throttle body be replaced rather than installing a new throttle shaft in the old body.

(2) Install the new primary throttle shaft and lever (if needed) in the throttle body, as shown in Figure 33.

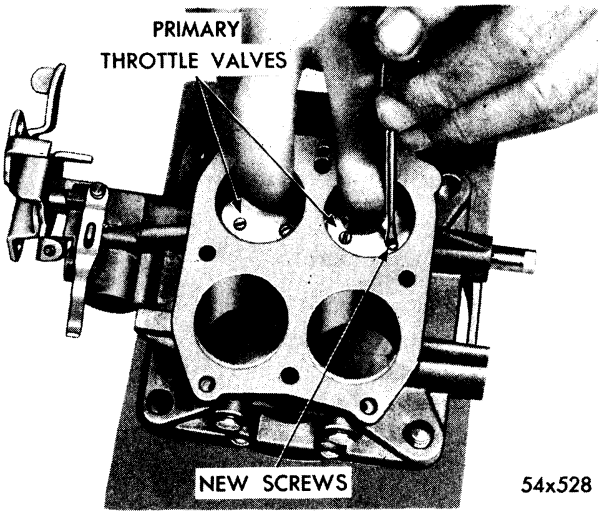


Fig. 39—Installing Primary Throttle Valves

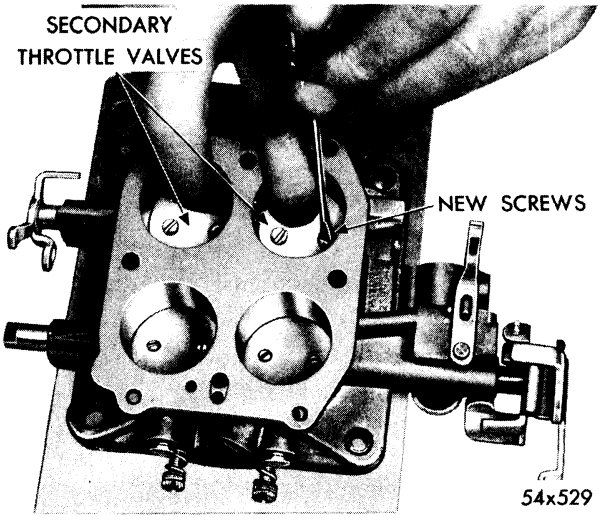


Fig. 40—Installing Secondary Throttle Valves

(3) **The idle speed adjusting screw must be backed out when seating valves in the following operation.** Slide the valves in position in the throttle shaft and insert the new screws but do not tighten.

(4) Hold the valves in place with the fingers, as shown in Figure 39. (Fingers pressing on the high side of valves.)

(5) Tap the valves lightly with a screwdriver to seat in the throttle bores. Holding the valves in this position, tighten the screws securely and stake by squeezing with pliers.

(6) Slide the secondary throttle shaft in the throttle body with tang on the lever pointing toward the fast idle cam boss (see Fig. 36).

(7) Center the secondary throttle shaft with the bores, and install the secondary throttle valves.

(8) Hold the valves in this position, and insert "NEW" screws (large heads), but do not tighten.

(9) Hold the valves in place with the fingers, as shown in Figure 40. (Fingers pressing on the high side of the valves.)

(10) Tap the valves lightly with a screwdriver to seat in the throttle bores. Holding the valves in this position, tighten screw securely, as shown in Figure 40. Stake screws by squeezing with pliers.

(11) Install the two idle mixture adjusting screws and springs in the throttle body

(See Fig. 37). The tapered portion must be straight and smooth. If the tapered portion is grooved or ridged, a new idle mixture adjusting screw should be installed to insure having correct idle mixture control. **DO NOT USE A SCREWDRIVER.** The adjustment should be made with the fingers. Turn the idle mixture adjusting screws lightly against their seats, and back off one full turn for approximate adjustment.

(12) Slide the fast idle cam retaining screw through fast idle cam (with threaded shank of screw on spring side). (See Fig. 31.)

(13) Slide the fast idle cam trip lever over shoulder on screw, guiding the tang between fast idle spring and cam.

(14) Insert pivot screw into boss and tighten securely. (Be sure tang on trip lever slides between the boss and lockout arm. See that all parts move freely.)

(15) Slide the velocity valve shaft and counterweight into the throttle body.

(16) Slide the velocity valves into position, then insert new screws but do not tighten.

(17) Hold the valves in place with the fingers, as shown in Figure 41. (Fingers pressing on high side of valves.)

(18) Tap the valves lightly with a screwdriver to seat the valves in the bores.

(19) Holding the valves in this position, tighten

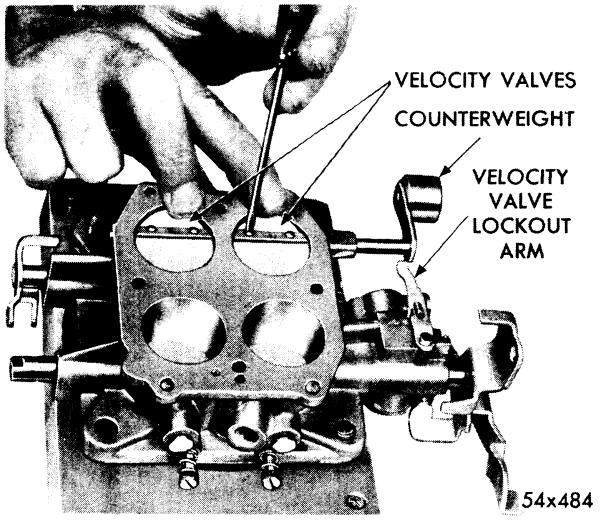


Fig. 41—Installing Velocity Valves

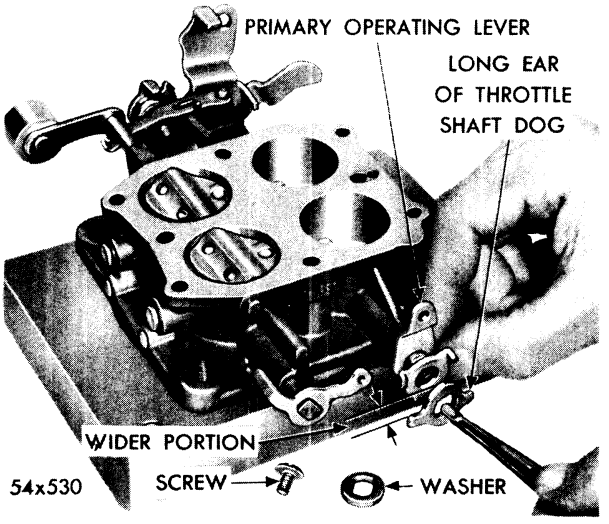


Fig. 42—Installing Primary Operating Lever and Throttle Shaft Dog

the screws securely and stake by squeezing with pliers.

(20) Slide the primary operating lever over end of primary shaft with tangs facing away from throttle body.

(21) Slide throttle shaft dog over shaft and down against operating lever. The larger curved portion of the dog should be facing up, with the ears of the dog making an approximate 45° angle in relation to the base of the valve body when the valves are closed, as shown in Figure 42. Install washer and screw and tighten securely.

(22) Engage the throttle operating rod with the secondary throttle lever, and slide other end into hole in primary operating lever and install hairpin clip to secure.

(23) Place the main body upside down on bench, and install a new throttle body to main body gasket. Lower throttle body down on main body. (See Fig. 28.)

(24) Install screws and tighten securely.

The fuel level sight screws should be on the same side as the velocity valve counterweight when properly installed.

(25) Turn carburetor right side up on bench, and install the accelerator pump discharge check needle, as shown in Figure 43. Install the secondary and primary idle jets. (See Figs. 26 and 27.) Tighten securely, using Tool T-109-58. Install the main jets

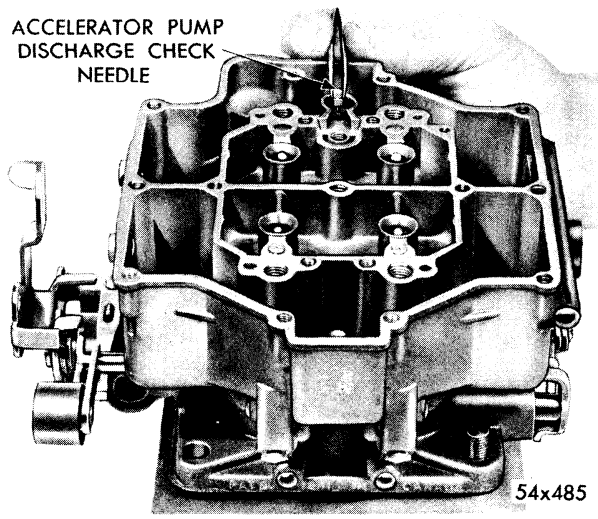


Fig. 43—Installing Accelerator Pump Discharge Check Needle

(secondary) in the bottom of main body. Tighten securely, using Tool T-109-58. (See Fig. 25.) Install the main jets (primary) in the bottom of main body. Tighten securely, using Tool T-109-58. (See Fig. 24. (Install the vacuumeter piston spring in the piston well. (See Fig. 22.)

18. AIR HORN ASSEMBLY

(1) Place a new gasket over sleeve on rear of choke housing, and install housing in position on air horn.

(2) Install screws and tighten securely. Use long screw outside of housing and the 2 short screws inside the housing.

(3) Slide the choke piston pin through piston and choke piston link (See Fig. 20) and slide choke shaft assembly into air horn.

(4) Slide choke shaft into air horn far enough to allow choke piston to be aligned with center of cylinder.

(5) Slightly twist choke lever clockwise and allow piston to enter cylinder. (See Fig. 19.)

(6) Slide choke valve down into position (numbered side up) in air horn and start (NEW) screws.

(7) Holding the valve in the closed position, tap gently with screwdriver to center and locate the valve. Tighten screws securely as shown in Figure 18. With the valve open, stake the screws with a pair of pliers.

NOTE

Do not lubricate any of the choke operating parts.

(8) Hold the air horn in an upright position and close the choke valve. The valve should open freely of its own weight.

(9) Install baffle plate and gasket in choke housing. (See Fig. 17.) Slide the choke housing ring clamp over the housing. Place the choke housing assembly with the index mark in a straight down position. (See Fig. 17.)

(10) Holding the choke thermostatic coil and housing assembly in place, start the ring clamp screws. Slowly turn the assembly counter-clockwise until the index mark on the housing is in line with the index center mark (on air horn), as shown in Figure 4.

(11) Tighten the retaining ring clamp screws securely, being careful not to distort ring clamp.

(12) To secure the desired performance from the choke during starting and warm-up, index mark on the choke housing must **always** be in line with the center index line in the air horn.

(13) Invert the air horn and install both the primary and secondary needle valve seats and gaskets. (See Fig. 12.) Tighten securely. Be sure each needle is installed in its original seat.

(14) Invert air horn, then slide the accelerator pump shaft and lever into the air horn just far enough to allow the installation of the accelerator pump arm. (See Figs. 15 and 16.)

(15) Install accelerator pump arm with the lever portion facing away from pump shaft. (See Fig. 16.)

(16) Continue to slide pump shaft into air horn until shaft protrudes from support boss.

(17) Install the spacer and metering rod arm; the lifter portion must be aligned with the vacuumeter piston link slot in air horn casting. (See Fig. 15.)

(18) Install the fuel inlet filter screen, plug and

gasket. (See Fig. 14.) Tighten plug securely.

(19) Slide the vacuumeter piston link down into slot in air horn with the lifter lip facing away from pump shaft. Be sure the metering rod tension spring coil is centered in the hole at top of link. (As the link is being lowered, engage the lifter portion of arm in slot in link.) Snug down clamp screw.

(20) Slide the choke lever over end of choke shaft with lever pointing toward the accelerator pump shaft lever. (See Fig. 13.) Snug down screw. (To be adjusted and positioned later.)

(21) Install the primary float needle valve in seat.

(22) Slide the primary float in position and install fulcrum pin. (See Fig. 10.) Check float setting as follows: **Be sure each needle is installed in its original seat.**

19. FLOAT LEVEL ADJUSTMENT

When making the float level adjustment, be sure the air horn gasket is removed.

The primary and secondary floats are set at different heights, using two separate gauges.

Place the primary float level gauge Tool T-109-222 (3/16"), in position, as shown in Figure 44. Both floats should just clear the horizontal section in the gauge. Bend float arm as required to obtain correct setting.

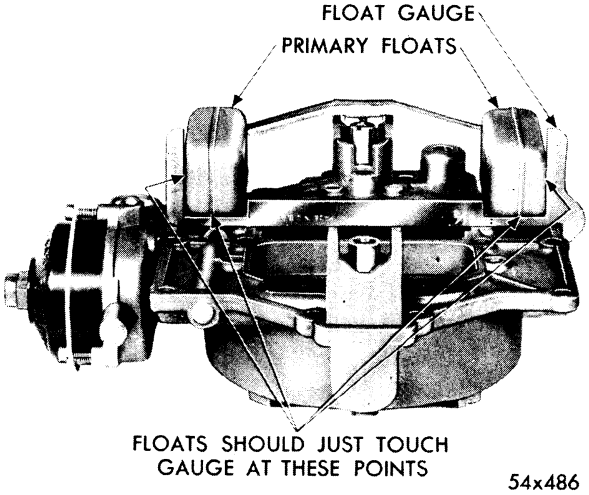


Fig. 44—Checking Primary Float Setting

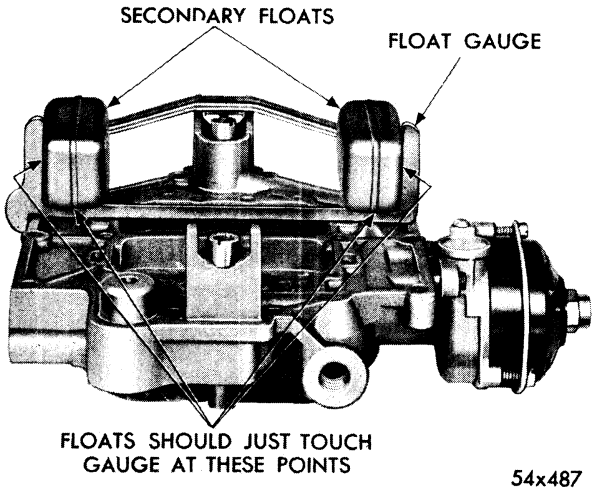


Fig. 45—Checking Secondary Float Setting

With notch end of gauge fitting against the side of air horn casting, float arm should be bent for sideways adjustment until floats barely touch the vertical upright of float gauge. (See Fig. 44.) Repeat steps for secondary floats, using secondary float level Tool T-109-220 (5/16 inch), as shown in Figure 45. It should be noted that the distance between the float and casting machined surface is 3/16 inch for the primary and 5/16 for the secondary floats.

20. FLOAT DROP ADJUSTMENT

(1) After performing the float level adjustment, hold the air horn assembly in an upright position and note the distance with which the floats drop, as shown in Figure 46. Both the primary and secondary floats should drop 1/2 inch from gauge setting (plus or minus 1/16 inch) when measured at center of float, as shown in Figure 46.

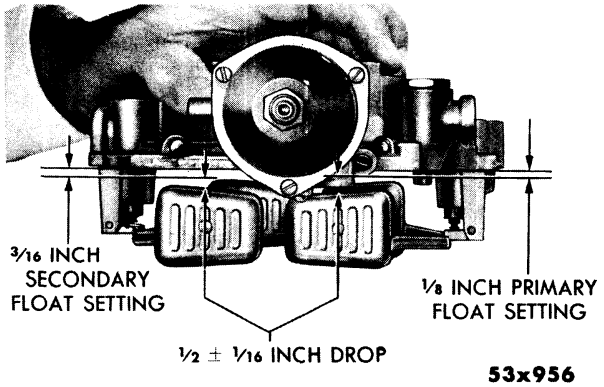


Fig. 46—Float Drop Adjustment

(2) Adjust as necessary by removing float and bending the small tang which contacts the float needle seat.

(3) Bend tang towards needle seat to lessen drop, or away from seat to increase drop.

(4) Invert air horn assembly and remove floats.

(5) Install a new air horn to main body gasket then reinstall the primary and secondary floats and the vaccumeter piston.

(6) Tilt piston approximately 90 degrees to either side. (For correct installation position on vaccumeter piston link. (See Fig. 11.)

(7) Remove the accelerator pump plunger from jar of gasoline and flex the leather several times.

(8) Check to see if the leather on the accelerator pump is hard, cracked or worn. If any of the aforementioned conditions exist, install a new accelerator pump plunger.

21. ACCELERATOR PUMP TEST

Pour clean gasoline into the carburetor bowl (approximately ½ inch deep). Raise the plunger and press lightly on plunger shaft to expel air from the pump passages. Using a small, clean brass rod, hold discharge check needle firmly down on its seat. Again raise the plunger and press downward. No fuel should be emitted from either the intake or discharge passage.

If any fuel does emit from the intake check ball, it should be recleaned and thoroughly blown out with compressed air. Fuel leakage at the discharge indicates the presence of dirt or a damaged check needle. Clean again and install a new needle. Recheck for leakage. If either the intake check ball or discharge needle leaks after above test, attempt to reseat as follows:

22. INTAKE CHECK BALL

Remove retainer from bottom of accelerator pump cylinder. Insert a piece of drill rod down on check ball. Lightly tap with hammer to form new seat. Install a new check ball and retest as described above.

23. DISCHARGE CHECK NEEDLE

(1) Remove jet housing (if not removed), and insert drill rod down on needle. Lightly tap drill rod to form a new seat. Discard old needle and install a new one. Retest as described above. If the above instructions do not correct the condition, a new carburetor main body assembly must be installed.

(2) Install the accelerator pump jet housing gasket, and screw, as shown in Figure 23. Tighten securely. Again as the plunger is being depressed, a clear straight stream should emit from each jet. If the streams are not identical, (if either one is diverted or restricted) a new accelerator jet housing pump should be installed. After test, pour the gasoline from the carburetor bowl and remove the accelerator pump plunger.

(3) Slide accelerator pump plunger spring over plunger shaft followed by the spring seats. (Shoulder on seat toward spring.) With the spring compressed, slide the plunger end into plunger opening in air horn. With pressure on bottom of plunger, invert air horn and install accelerator pump connector link in the top hole in arm and plunger. (See Fig. 13.) Install hairpin clip to secure.

(4) Before installing link, be sure the hole in the plunger shaft is parallel to the pump shaft. Install link with the hairpin clip groove end entering hole in pump arm.

(5) Lower the air horn assembly carefully down on the main body guiding the accelerator pump plunger into the well. (See Fig. 9.)

(6) Be sure the leather on the plunger does not curl or wrinkle. Accelerator pump operation will be affected if this precaution is not taken.

(7) Install the air horn attaching screws as follows: Insert the six 1¼ inch screws around the inside diameter of the air horn and tighten securely.

(8) Insert the remaining 1¼ inch screw in its hole in the metering rod chamber. Tighten securely.

(9) Insert the 1 inch screw in the thick boss at the corner of the air horn casting, between the automatic choke housing and fuel inlet port. Insert the remaining screws (¾ inch) around the outside of air horn, and tighten securely.

(10) Install metering rods being careful to engage in loops on metering rod spring.

(11) Slide end (45°) of throttle connector rod into pump shaft arm, and install hairpin clip.

(12) Position rod retaining clip over throttle shaft lever, and insert end of rod through clip into lever. (See Fig. 6.) Snap clip over rod to secure.

(13) Engage the keyed end of the choke connector rod with the slot in the choke lever, rotate rod and engage in hole in the cam trip lever. (See Fig. 5.) Install hairpin clip to secure.

(14) The carburetor now has been completely assembled with the exception of the metering rod cover. Be sure and make the adjustments to the carburetor in the following order.

24. ACCELERATOR PUMP ADJUSTMENT

Before making this adjustment, be sure that the pump connector link is installed in the outer hole (long stroke of the pump lever), with ends extending toward the accelerator pump shaft arm.

Back off the idle speed adjusting screw until primary throttle valves are fully seated in their bores. (Make sure that the fast idle adjusting screw is off the fast idle cam.) With the throttle valves seated, the distance from the top of the plunger shaft to the top of dust cover boss should be $1\frac{19}{64}$ inch, as shown in Figure 47.

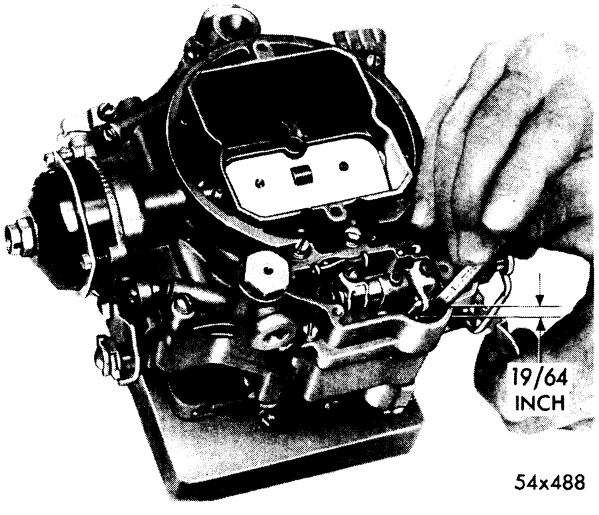


Fig. 47—Checking Accelerator Pump Travel

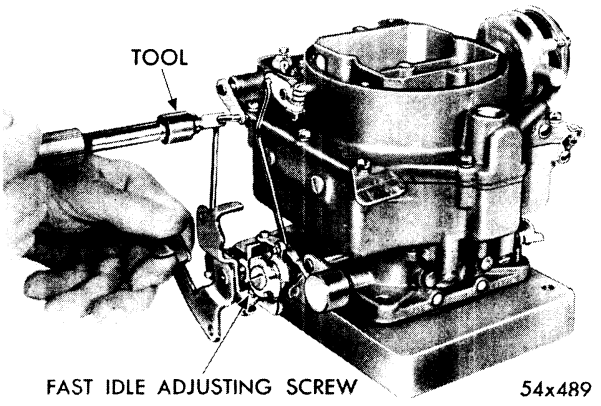


Fig. 48—Bending Throttle Connector Rod

When making this adjustment, be sure that the fast idle adjusting screw does not hold the throttle open. To adjust the pump setting, bend the throttle connector rod at the upper angle using Tool T-109-213, as shown in Figure 48.

25. OPTIONAL ACCELERATOR PUMP ADJUSTMENT

Hold a straightedge across top of dust cover boss as shown in Figure 49, and adjust length of pump rod as in preceding adjustment until the flat on the top of the pump arm (under set screw) is parallel with upper edge of straightedge.

26. METERING ROD ADJUSTMENT

Loosen the set screw in the metering rod arm (if previously tightened) enough to obtain a slight bind on the pump shaft. Lift lever slightly.

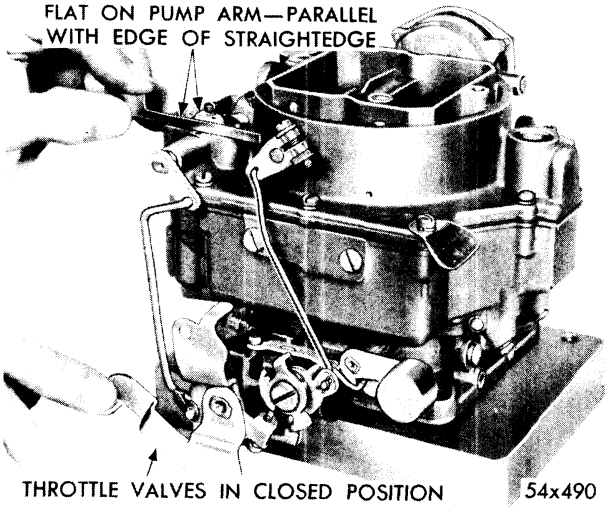


Fig. 49—Accelerator Pump Adjustment (Optional)

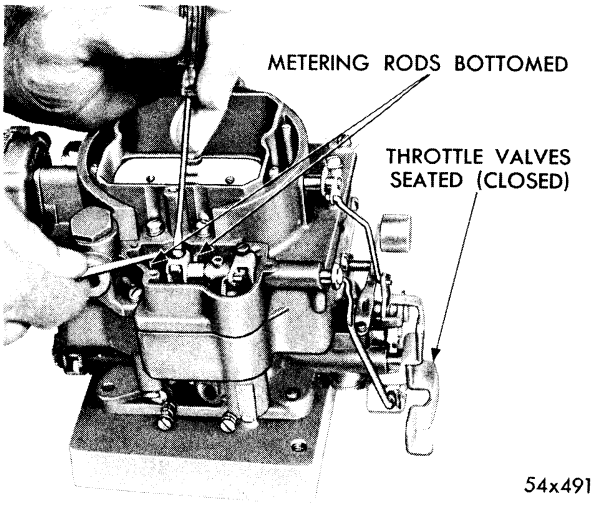


Fig. 50—Metering Rod Adjustment

With the primary throttle valves seated in their bores, depress the metering rod link until metering rods bottom, as shown in Figure 50.

Keeping the lever in contact with the metering rod link, tighten the set screw securely.

27. CHOKE ROD ADJUSTMENT

Loosen the choke lever clamp screw. Insert a .020 inch wire gauge Tool T-109-29, between tang on the fast idle cam and boss on throttle body casting. Hold this gauge in place by pressure of screwdriver exerted on choke lever clamp screw, as shown in Figure 51. This will automatically take up all slack in the linkage.

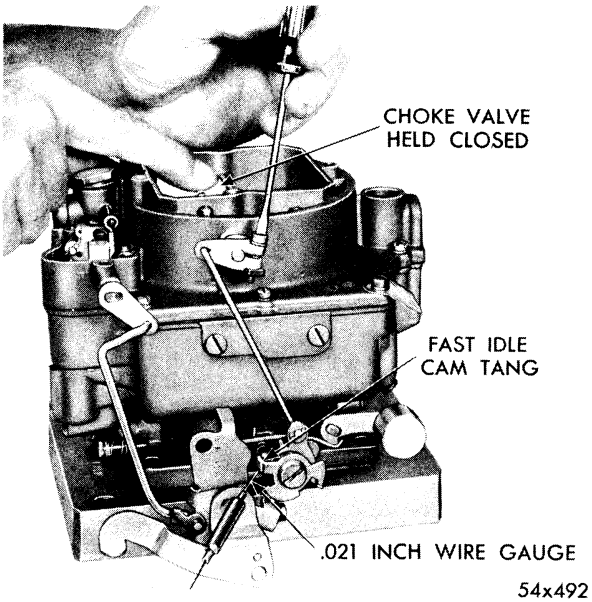


Fig. 51—Choke Rod Adjustment

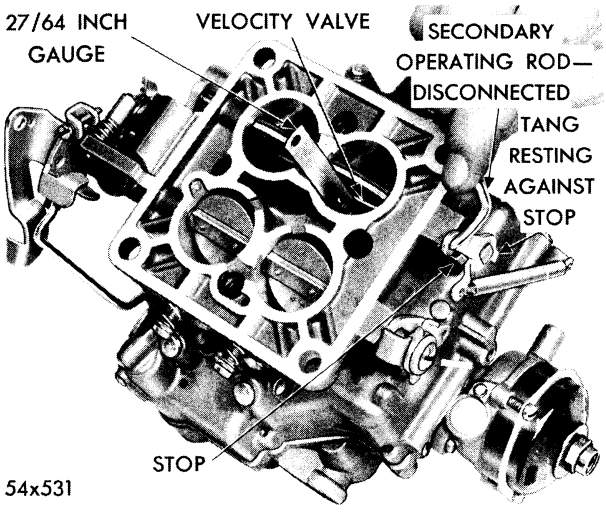


Fig. 52—Checking Velocity Valve Clearance

Hold the choke valve tightly closed, and tighten clamp screw.

28. VELOCITY VALVE ADJUSTMENT

To check the position of the velocity valves, disconnect the secondary throttle operating rod from the primary operating lever by removing hairpin clip. Insert Gauge T-109-242 ($^{27}/_{64}$ inch) between the lower edge of velocity valve and bore, as shown in Figure 52. In this position, the tang of secondary throttle lever should be resting against its stop.

To adjust position, bend tang on secondary throttle lever, using Tool T-109-41 until correct clearance of $^{27}/_{64}$ inch has been obtained, when

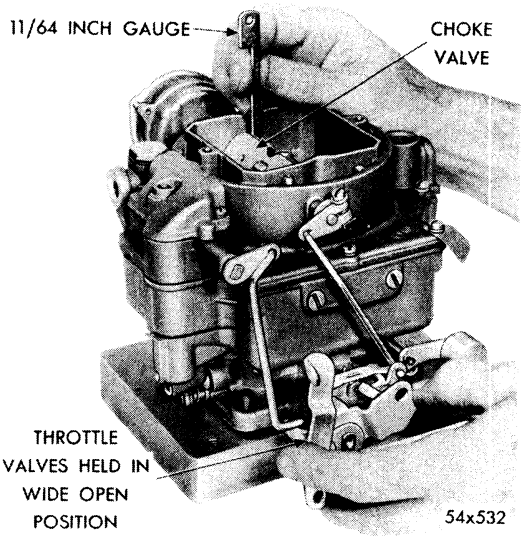


Fig. 53—Choke Unloader Adjustment

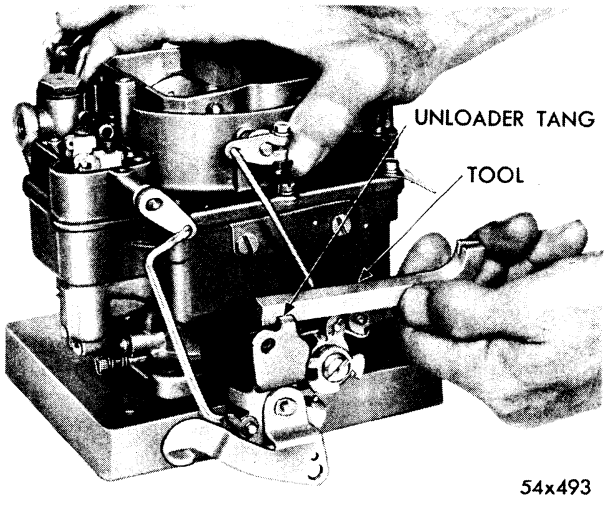


Fig. 54—Bending Unloader Tang

the tang is resting against its stop. Reconnect secondary throttle operating rod to primary operating lever, and install hairpin clip.

29. CHOKE UNLOADER ADJUSTMENT

With the primary throttle valves held in the wide open position, insert $^{11}/_{64}$ inch unloader gauge Tool T-109-166 or a No. 17 drill between upper edge of choke valve and inner dividing wall of air horn, as shown in Figure 53. With the finger pressing against the upper part of choke valve, slight drag should be felt on the gauge as it is being withdrawn.

If no drag is felt, or if too much drag is apparent, bend the unloader tang on the throttle lever, as shown in Figure 54, using Tool T-109-41.

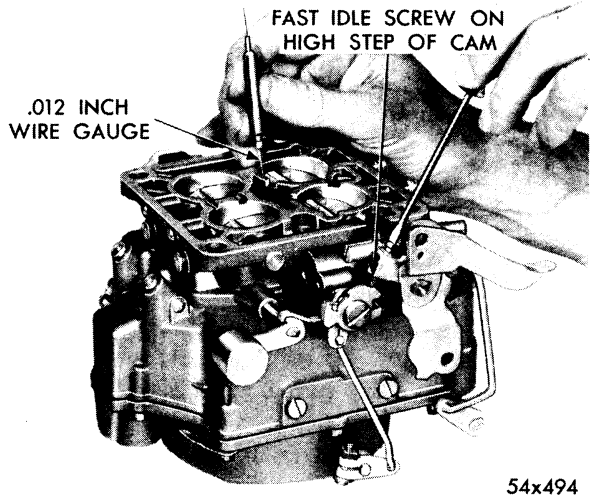


Fig. 55—Fast Idle Adjustment

30. FAST IDLE ADJUSTMENT (On Work Bench)

Insert a .006 to .010 inch wire gauge, Tool T-109-200 or drill between the primary throttle valves and side of bore opposite idle adjusting screws. Move the choke valve to the fully closed position, and adjust the fast idle screw to give a slight drag on the wire when the screw is resting on the high step of the fast idle cam, as shown in Figure 55.

31. FAST IDLE ADJUSTMENT (Carburetor on Engine)

(1) Before setting fast idle, engine should be fully warmed and running at 600 to 650 rpm.

(2) Remove the air cleaner.

(3) Remove hairpin clips from the choke connector rods.

(4) Stop the engine and open throttles halfway. Close both choke blades fully, while holding throttles open.

(5) Let the throttle close making certain fast idle adjusting screws contact highest step of fast idle cams.

(6) Remove the lower ends of choke connector rods from the fast idle cams and let choke blades go fully open.

(7) Start the engine without touching the throttle and check the engine rpm. Adjust the fast idle adjusting screws until the desired 1400 rpm has been obtained.

(8) If the engine fast idle speed is not already 1400 rpm with the engine running hot, it will be necessary to proceed as follows:

(9) Open throttles until fast idle adjusting screws can be reached easily with a screwdriver.

(10) Turn screws in or out and repeat steps 4 through 7 until desired fast idle speed is obtained.

(11) Install the choke connector rods, hairpin clips, and the air cleaner.

32. VELOCITY VALVE LOCKOUT ADJUSTMENT

Make this adjustment after completing the fast

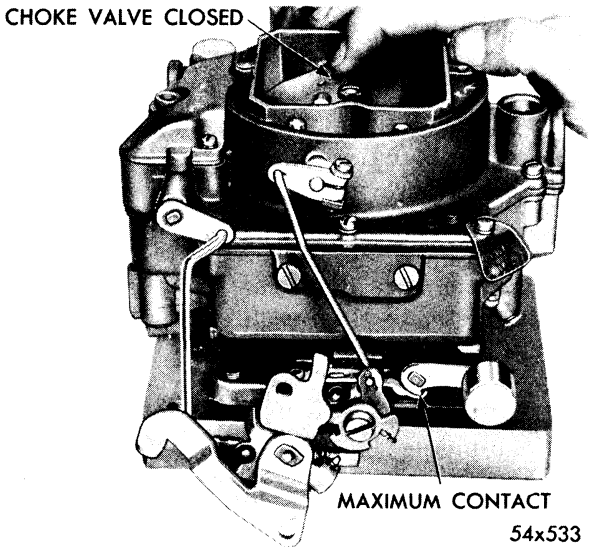


Fig. 56—Velocity Valve Lockout Adjustment—Maximum

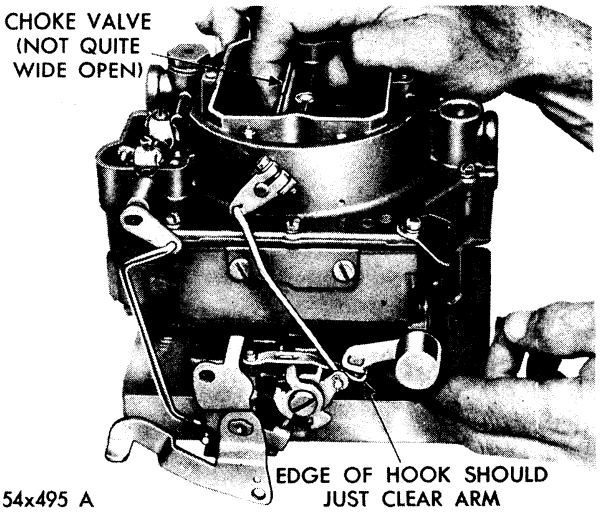


Fig. 57—Velocity Valve Lockout Adjustment—Minimum

idle adjustment. With the choke valve in the closed position, the edge of the hook on the lockout arm should contact the velocity valve shaft lever, making a maximum contact of the locking step on the lever, as shown in Figure 56. Bend lockout arm until desired contact has been obtained. Slowly open the choke valve. The velocity valves should become unlocked a few degrees before the choke valve reaches the wide open position, as shown in Figure 57. Bend the tang on the fast idle cam (that raises or lowers the lockout arm) until correct release has been obtained.

Idle speed and mixture adjustment must be performed after installation of the carburetor on the engine.

After adjustments have been checked and corrected, install the metering rod dust cover and gasket. Install screws and tighten securely.

33. INSTALLATION OF CARBURETORS ON ENGINE

(1) Place new carburetor to manifold gaskets of the proper size on the intake manifold, and install the carburetors.

(2) Install the dashpot and bracket assembly under the left front attaching nut in front of the carburetor.

(3) Before tightening the attaching nuts, start the fuel lines and vacuum spark line. This will prevent a possibility of stripping the threads on these connections. Complete tightening of the manifold stud nuts, fuel and spark control.

(4) Attach the heat tubes to the integral choke housings and tighten the air cleaner and gasket.

(5) Adjust the carburetor.

34. IDLE SPEED AND MIXTURE ADJUSTMENTS

Connect a tachometer to the engine and set the hand brake securely. Place the transmission in neutral. Start and warm the engine to normal operating temperature, making sure that the choke is fully off and that the carburetor is on the slow idle. Set the engine at 600 to 650 rpm, adjusting both idle screws until a smooth engine idle is obtained.

In order to synchronize both carburetors, remove the throttle control rod and throttle connector rod. Install the connector rod studs and return springs. Starting with the closed throttle valves, open each an equal amount. Open all four mixture screws one turn. Start engine and adjust speed and mixture as necessary to obtain an idle speed of 600 to 650 rpm. Install connector rod, adjusting length so there is slight end play, and no binding with both carburetors at idle. Attach the throttle control rod, making sure it is adjusted, so that the carburetor position is not disturbed.

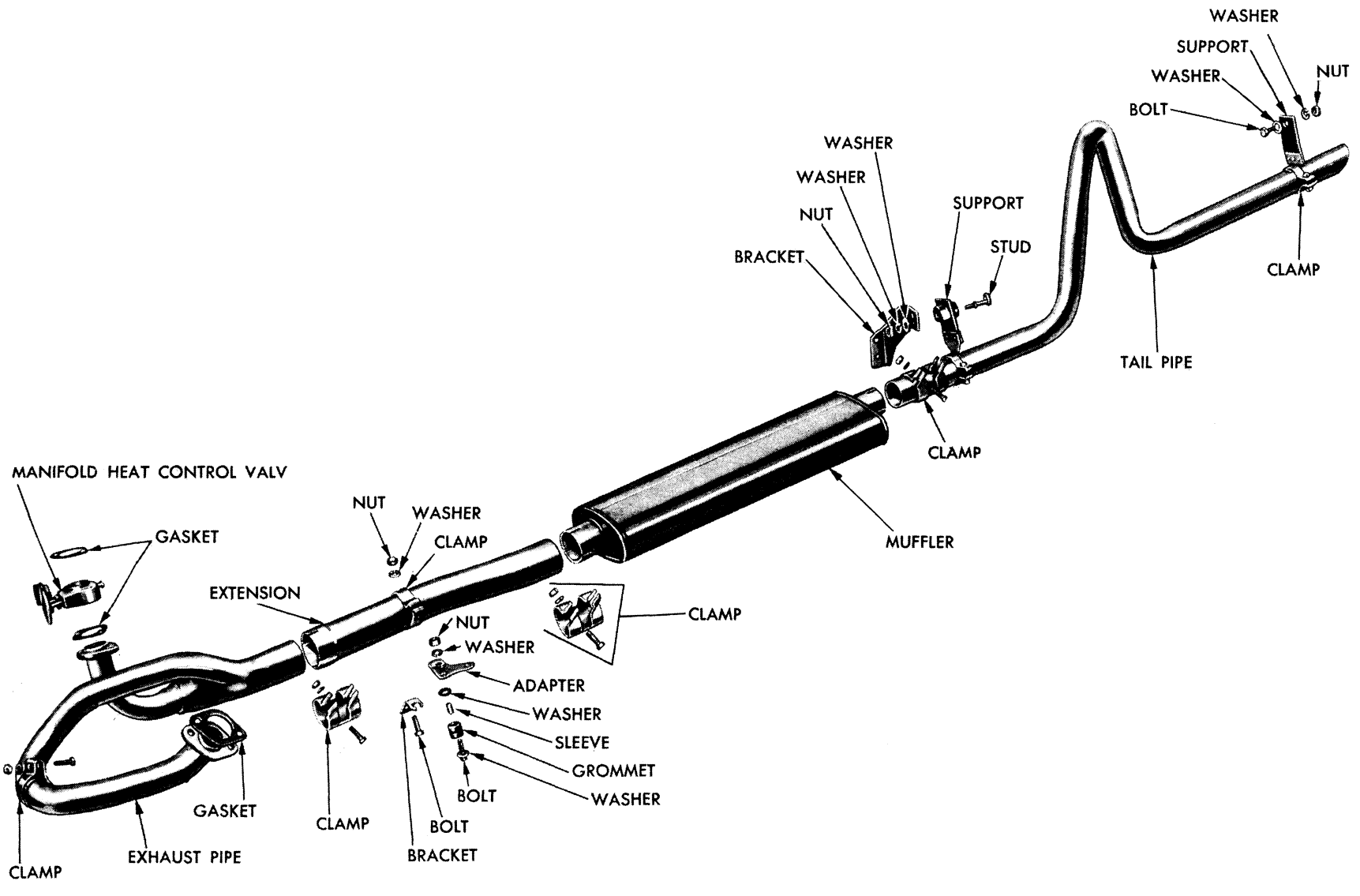


Fig. 1—Exhaust System—Disassembled View (Single Rocker Shaft Engine)

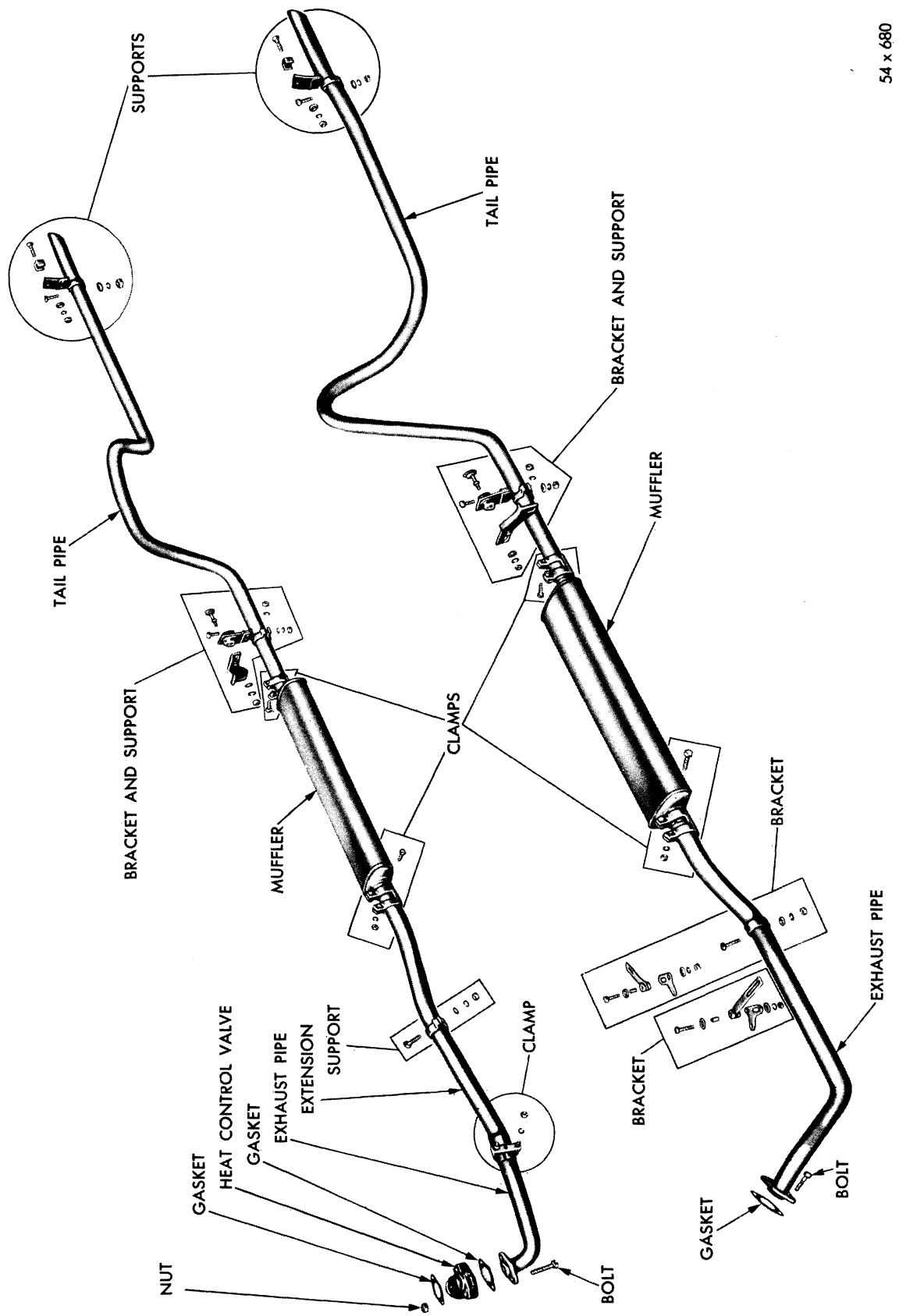


Fig. 2—Typical Dual Exhaust System—Disassembled View

EXHAUST SYSTEM

1. DESCRIPTION

The C-67 Model (single rocker shaft engine) exhaust system consists of the exhaust and intake manifolds, heat control valve, cross-over pipe, "Y" exhaust pipe, exhaust extension pipe, muffler, and tail pipe, as shown in Figure 1.

The exhaust system of the C-68, C-69 and C-70 Models (double rocker shaft engine) is a dual exhaust system which consists of exhaust and intake manifolds, heat control valve, 2 exhaust pipes, 2 mufflers and 2 tail pipes, as shown in Figure 2.

SERVICE PROCEDURES

2. INTAKE AND EXHAUST MANIFOLDS (All Models)

Figures 3, 4, 5 and 6 show the intake manifold and cross-over passages, illustrating the flow of exhaust gases through the intake manifold. This action tends to warm the intake risers, which helps to vaporize the fuel-air mixture in the intake manifold.

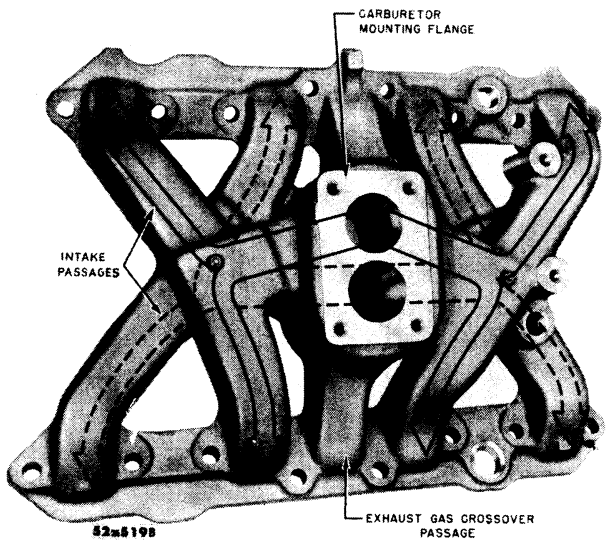


Fig. 3—Intake Manifold (Single Rocker Shaft Engine)

a. Removal of the Intake Manifold

(1) Remove air cleaner.

(2) Drain radiator.

(3) Remove generator.

(4) Disconnect carburetor linkage.

(5) Disconnect vacuum line at manifold (if so equipped).

(6) Disconnect distributor vacuum advance line and fuel line at carburetor.

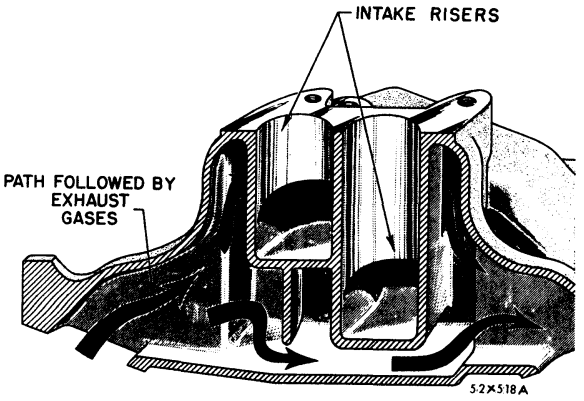


Fig. 4—Exhaust Cross-over Passage Through Intake Manifold (Single Rocker Shaft Engine)

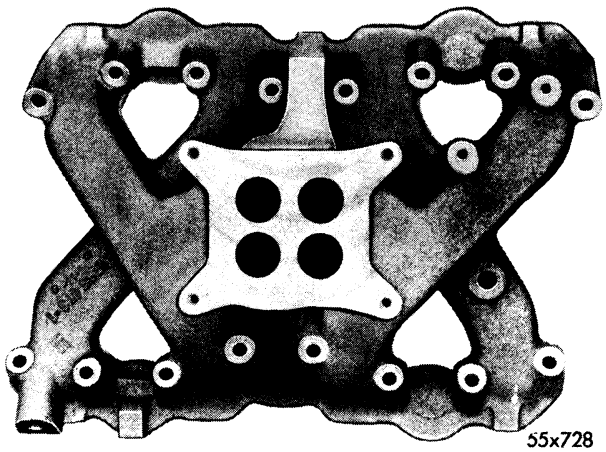
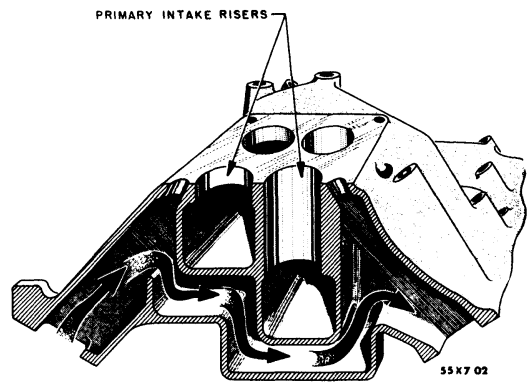


Fig. 5—Intake Manifold (Double Rocker Shaft Engine)



ig. 6—Exhaust Cross-over Passage Through Intake Manifold (Double Rocker Shaft Engine)

(7) Disconnect automatic choke heat tube at carburetor.

(8) Disconnect wires at coil.

NOTE

If car is equipped with air conditioning remove bracket from intake manifold to compressor.

(9) Remove bolts holding intake manifold to cylinder head.

NOTE

If car is equipped with air conditioning lift off fast idle mechanism and carefully place it out of way.

(10) Remove intake manifold.

NOTE

Carburetor and coil may be removed more conveniently on bench, if manifold is to be inspected or replaced.

b. Removal of Left Side Exhaust Manifold

(1) Remove the nuts and bolts that hold the exhaust pipe to the manifold flange.

(2) Remove and discard gasket.

(3) Remove the exhaust manifold retaining nuts, then slide manifold off studs and out and away from cylinder head.

CAUTION

Use care when removing the manifold attaching nuts and bolts, because the constant heating and cooling of the manifolds may have caused them to freeze. Lubricate with a good grade of penetrating oil and allow to stand for several minutes before attempting removal.

c. Removal of Right Side Exhaust Manifold

(1) Remove automatic integral choke heat tube from exhaust manifold. (Be careful not to bend tube when removing.)

(2) Remove the bolts and nuts that hold the manifold heat control valve and the exhaust pipe to the exhaust manifold flange. Lift off the heat control valve and gaskets. Discard gaskets.

(3) Remove the oil filter cover and element.

(4) Remove bolt and clamp that hold ground cable and heat tube to cylinder head.)

(5) Remove the nuts that hold the exhaust manifold to the cylinder head, then slide manifold off studs and away from cylinder head.

NOTE

On all "after" cars the exhaust pipe to transmission clamp and bracket have been eliminated so be sure the exhaust pipe is sufficiently supported before removing exhaust pipe from exhaust manifold.

3. INSPECTION OF INTAKE AND EXHAUST MANIFOLDS (All Models)

Clean the intake and exhaust manifolds in a suitable solvent; blow dry with compressed air.

Inspect manifolds for cracks, distortion, or any other condition which would make the manifolds unfit for further service.

Particular attention should be given to the "hot spot" chamber in the intake manifold. If the chamber is coated with hard black carbon, it must be scraped or sand blasted to remove the deposit. The layers of carbon act as an insulator and retard the heating action of the exhaust gases on the "hot spot" chamber which, in turn, affects the vaporization rate of the fuel passing through the intake manifold.

When inspecting the exhaust manifolds, be sure to check the choke heat tube cavity and the cavity inlet passage. The passage and cavity must be clean and free from any obstructions. (See Fig. 7.)

New gaskets should be used when installing the exhaust and intake manifolds and all mating surfaces must be clean and smooth.

4. EXHAUST PIPES, MUFFLERS AND TAIL PIPES

The exhaust system normally requires little service. The system should be checked periodically for leaking gaskets, broken supports or insulators and burned or blown out muffler or pipes.

The exhaust pipe, muffler, and tail pipe are mounted by clamps which are insulated to eliminate vibration.

The exhaust pipes are bolted to the exhaust manifold flanges, and supported at the transmission by an insulated bracket and clamp. This bracket and clamp has been eliminated on all "after" cars.

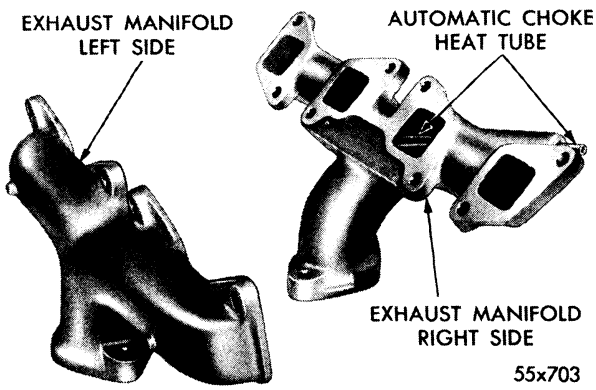


Fig. 7—Exhaust Manifolds

A support, with a special insulator and clamp, supports the tail pipe at the rear of the muffler, while another clamp and support mounted on the rear of the frame supports the rear of the tail pipe. The front support is adjustable.

5. EXHAUST SYSTEM (C-67 MODEL)

When servicing the exhaust system, it is rather difficult to remove clamps and disconnect pipes because of the rust, dirt, or other foreign matter which has adhered to these parts. Lubricate the nuts and bolts, which are to be removed, with a good grade of penetrating oil and wait several minutes before attempting removal. Hit the connecting clamps several sharp blows with a soft hammer if clamps are rusted to the pipes.

The production muffler and exhaust pipe are welded as an assembly.

NOTE

When installing a replacement muffler, it is necessary to remove exhaust pipe. Replacement mufflers are attached with a connecting clamp and a short extension permitting the old muffler to be cut from the exhaust pipe.

6. REMOVAL

Refer to Figure 1 and proceed as follows:

a. Cross-over Exhaust Pipe

(1) Remove clamp bolt from clamp at the "Y" pipe and cross-over pipe connection.

(2) Remove bolts from left-hand exhaust manifold flange. Discard gasket. Remove cross-over pipe.

b. "Y" Exhaust Pipe

(1) Remove clamp bolt from clamp connecting "Y" pipe and exhaust pipe.

(2) Remove bolts from right-hand exhaust manifold flanges.

(3) Remove manifold heat control valve. Discard gasket.

NOTE

On all "after" cars be sure that the exhaust system is sufficiently supported.

(4) Remove "Y" pipe.

c. Exhaust Extension Pipe and Muffler

(1) Remove clamp bolt from bracket attached to transmission.

(2) Loosen or remove clamp bolts at muffler-to-tail pipe connection.

(3) Remove muffler and exhaust extension pipe.

NOTE

If only the muffler is to be replaced, cut exhaust extension pipe at muffler with hack saw. It is unnecessary to remove exhaust pipe.

d. Tail Pipe

(1) Remove clamp bolt from front tail pipe bracket.

(2) Remove clamp bolt from rear tail pipe bracket.

(3) Jack up frame to relieve body weight from rear springs, then remove tail pipe.

NOTE

In most instances where clamps are used, they will have to be spread before pipes can be removed.

7. INSTALLATION

When installing components of the exhaust system start at the exhaust manifolds and work toward the rear until muffler is to be installed. Position the tail pipe, then install muffler.

NOTE

If the exhaust pipe has been cut for replacement of muffler, remove the burrs left by hack saw before installing muffler.

If the entire exhaust system, or any component of it is being replaced, clamps and brackets should be tightened only to the extent necessary to hold the exhaust system in position. The final tightening is done after the system has been properly aligned.

8. DUAL EXHAUST SYSTEM (C-68, C-69 and C-70 Models)

The dual exhaust system is standard equipment on the C-68, C-69, and C-70 Models.

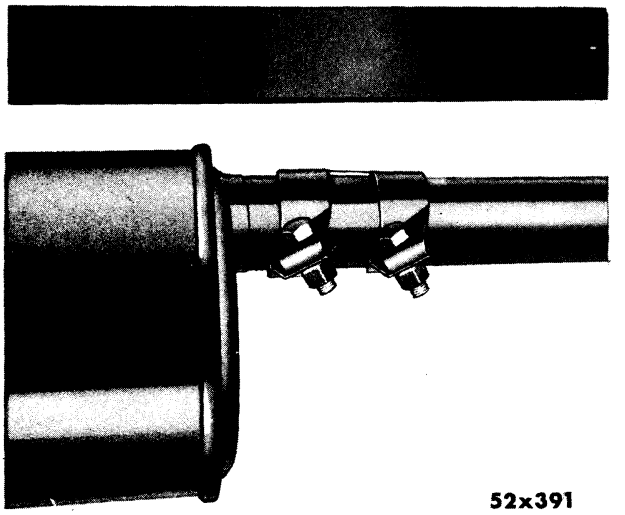


Fig. 8—Tail Pipe-to-Muffler Connection Clamp

The service procedure for the dual exhaust system (removal, installation and alignment) will be comparable to the exhaust system for the C-67 Model with the following exceptions.

In the dual exhaust system, the cross-over and "Y" exhaust pipes are not used; there is an individual exhaust pipe, muffler, and tail pipe for each cylinder bank. Refer to Figure 2.

9. ALIGNMENT OF EXHAUST SYSTEMS

Figures 1, 2, 8, 9, 10 and 11 illustrate the various types of supports, insulators and clamps with the procedures as follows:

(1) Tighten the exhaust manifold flange bolts and nuts evenly, to a torque of 40 foot-pounds.

(2) Install muffler and tail pipes and leave the

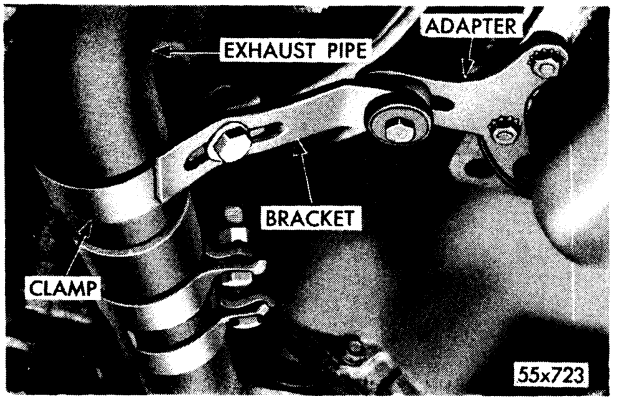


Fig. 9—Exhaust Pipe-to-Transmission Clamp and Bracket

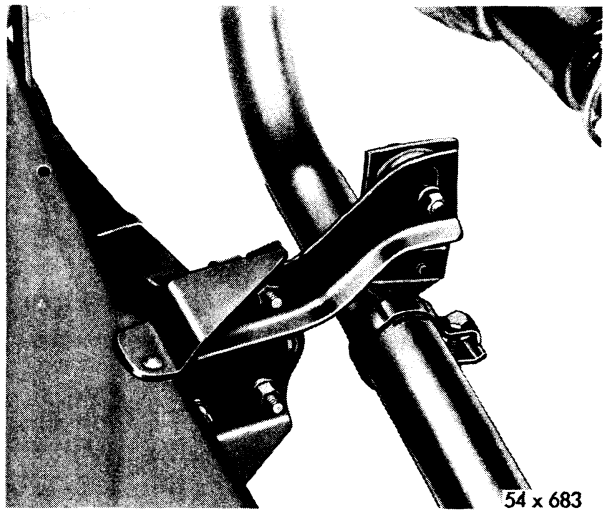


Fig. 10—Tail Pipe Front Support, Bracket and Clamp

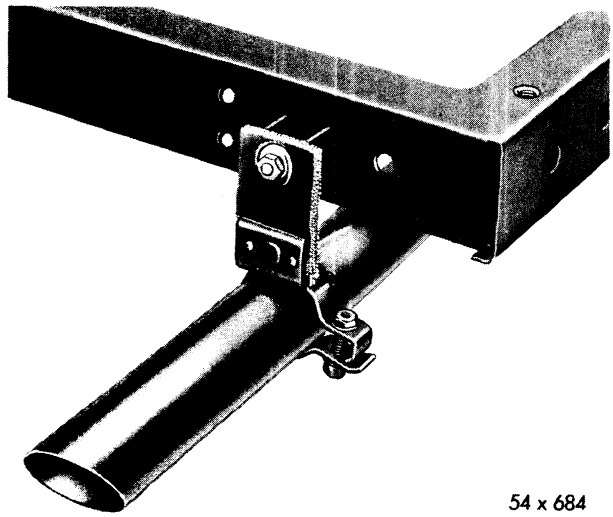


Fig. 11—Tail Pipe Rear Support and Clamp

clamp bolts loose in order to align the entire system.

(3) Check the muffler and tail pipes so that a clearance of ½ inch is maintained between the frame, floor pan, bumper, shock absorber and the fuel tank.

(4) Tighten all the clamp bolts and brackets to a torque of 20 foot-pounds.

MANIFOLD HEAT CONTROL VALVE

10. DESCRIPTION

The manifold heat control valve, as shown in Figure 12, is controlled by a thermostatic coil spring, a counterweight, and the velocity of the exhaust gas through the exhaust manifold. The thermostatic coil spring is installed in a manner which will maintain sufficent tension on the valve shaft to keep the valve in the closed position when the engine is cold.

In the closed position, hot gases circulate up and around the "hot spot" chamber in the intake manifold. This, in turn, preheats the vaporized fuel passing down through the intake manifold, resulting in smooth engine performance.

NOTE

Should the heat control valve become stuck in

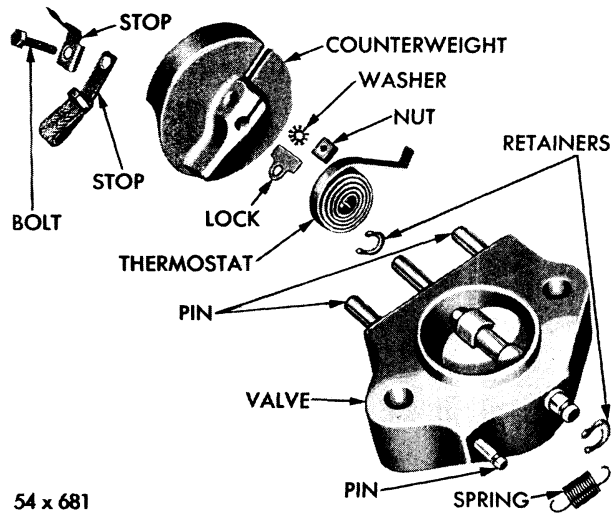


Fig. 12—Typical Manifold Heat Control Valve —Disassembled View

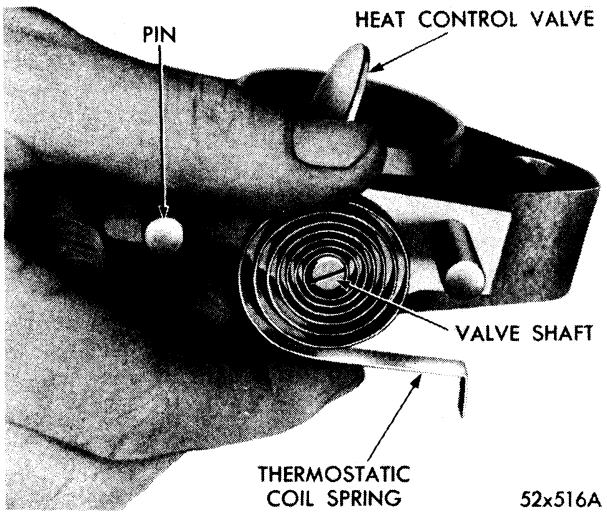


Fig. 13—Installing Thermostatic Coil Spring

either the open or closed position car performance would be affected.

11. TESTING MANIFOLD HEAT CONTROL VALVE (On Engine)

Inspect the operation of the heat control valve periodically. With the engine idling (car standing) accelerate to wide open throttle and release quickly. The counterweight should respond by moving clockwise approximately ½ inch and returning to its normal position. If no movement is observed, the valve shaft may be frozen or the coil spring is weak or broken. In either case, the heat control valve should be disassembled and repaired.

a. Disassembly

Refer to Figure 12 and proceed as follows:

(1) Loosen retaining nut and remove counterweight, lock and stop from end of shaft exposing the thermostatic coil spring.

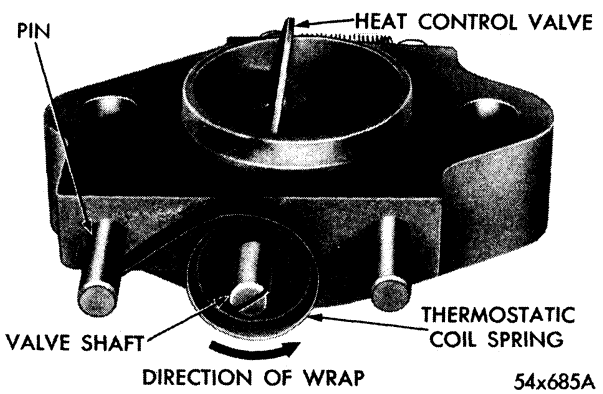


Fig. 14—Positioning Thermostatic Coil Spring

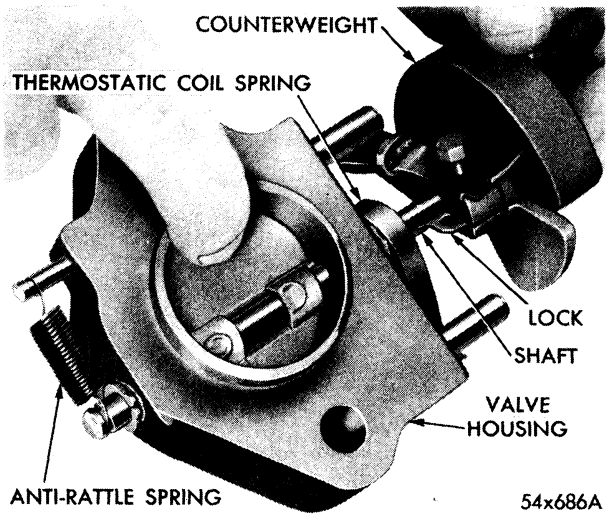


Fig. 15—Installing Heat Control Valve Counterweight

(2) Unhook the coil spring from pin and remove by prying out of valve shaft slot.

(3) If valve shaft is frozen in manifold, lubricate both ends with a good grade of penetrating oil and allow to stand several minutes. Loosen by turning shaft clockwise or counter-clockwise (depending on frozen position) until shaft is free. Work shaft from closed to open position several times until shaft can be turned very easily with the fingers.

b. Assembly

NOTE

Before installing the heat control valve on the

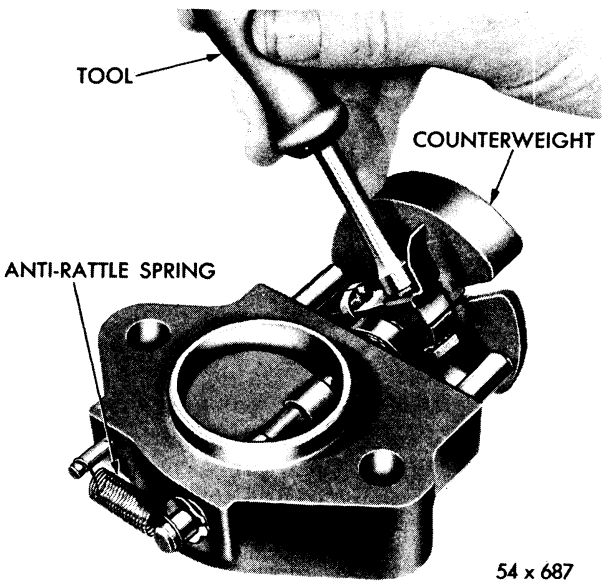


Fig. 16—Tightening Counterweight Bolt with Tool T-109-173

engine, lubricate the valve shaft with graphite paste.

(1) Position the valve shaft in the extreme counter-clockwise position. Place new coil spring in position over shaft slot, with outer end tongue of spring in the upper left-hand position, as shown in Figure 13. Press the inner end of the coil into slot of the shaft and seat firmly.

(2) Move outer end tongue of spring around and hook under pin, as shown in Figure 14.

(3) Place counterweight over shaft (with the shield in upward position) and insert lock in shaft slot, as shown in Figure 15.

(4) Center counterweight on shaft and turn assembly clockwise until stop passes the pin.

(5) Press counterweight on shaft until seated, install stop, and tighten nut securely with Tool T-109-173, as shown in Figure 16. Test valve for proper operation.

SERVICE DIAGNOSIS

12. EXCESSIVE EXHAUST NOISE

Possible Causes:

a. Burned or blown out muffler.

b. Exhaust manifold cracked or broken.

c. Blown gasket between exhaust manifold and cylinder block.

d. Blown gasket between exhaust pipe and manifold outlet flange.

e. Improper register between manifold and cylinder block.

f. Burned, broken, or cracked exhaust pipe.

g. Leaks at pipe joints.

Remedies:

a. Install new muffler, check complete exhaust system for signs of failure, repair as required.

b. Install new manifold. Be sure manifold registers evenly with cylinder block before tightening nuts and bolts.

c. Install new gaskets as required after checking manifold for distortion. Be sure manifold registers evenly with cylinder block. Tighten nuts to 25 foot-pounds torque.

d. Install new gasket after checking flange for cracks or foreign material that will not allow gasket to seat properly. Tighten bolts evenly.

e. Remove manifold and check mating surfaces. Place manifold on smooth surface and check mating flanges for alignment. If manifold shows sign of distortion (more than .004 inch), install new manifold and gaskets.

f. Replace exhaust pipe.

g. Tighten clamps or replace as necessary.

13. LEAKING EXHAUST GASES

Possible Causes:

a. Cracked exhaust manifold.

b. Loose exhaust pipe connection.

c. Burned or blown out muffler or exhaust pipes.

d. Loose manifold mounting nuts.

e. Distortion or misalignment at gasket surfaces.

f. Damaged or improperly installed gaskets.

g. Restrictions in muffler or tail pipe.

h. Loose tail pipe connection.

Remedies:

a. Install new manifold and gaskets.

b. Install new gasket and tighten connections securely. Check complete system for alignment

and adjust as required. A leaking connection will be indicated by black streaks along pipes.

c. Install new muffler and tail pipes if needed. Check alignment of exhaust pipes, muffler and tail pipe. Align as necessary.

d. If necessary, install new manifold gaskets. Tighten nuts to 25 foot-pounds torque.

e. Remove manifold and check alignment of both intake and exhaust manifold mounting flanges. If misaligned, loosen bolts holding intake to exhaust manifold and install assembly.

f. Remove manifold and install new gaskets, after carefully inspecting both cylinder block and manifold mating surfaces. Tighten manifold nuts and bolts evenly, working from center to outer ends of manifold.

g. Check for bent or pinched exhaust or tail pipes. Such conditions will retard the flow of exhaust gases. Install new parts as required. If excessive amount of carbon is present or if car is sluggish, install new muffler.

h. Tighten clamp at rear muffler connection.

14. ENGINE HARD TO WARM UP

Possible Cause:

Heat control valve frozen in the open position.

Remedy:

Check operation of heat control valve and make necessary repairs.

15. ENGINE WILL NOT RETURN TO IDLE

Possible Cause:

Heat control valve frozen in the open position so that the heat tube does not become heated. As a result, the integral choke will hold the throttle on the high idle cam.

Remedy:

Remove the manifold heat control valve and check operation of the unit. Make necessary repairs.

16. MANIFOLD HEAT CONTROL VALVE RATTLE

Possible Causes:

a. Broken thermostatic spring.

b. Weak or broken anti-rattle spring.

c. Heat control valve shaft loose in body.

Remedies:

a. Check for broken thermostatic spring and make necessary correction.

b. Check for weak or broken anti-rattle spring and make necessary repairs or replacement.

c. Check shaft for looseness in body and correct condition as necessary.