

CHAPTER 4. FUEL SYSTEM

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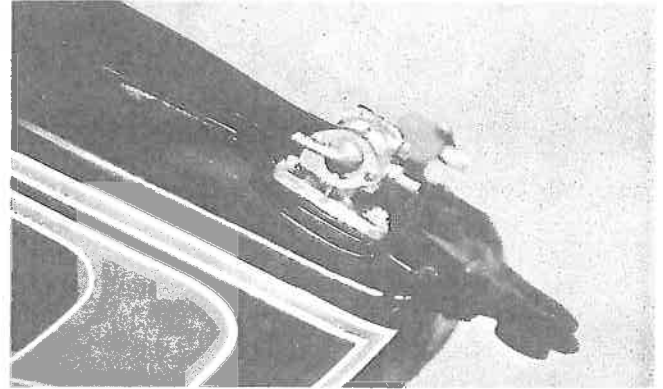
CHAPTER 4. FUEL SYSTEM

The fuel system consists of fuel tank, (petcock with integral filter), fuel delivery lines, and two constant vacuum carburetors. Each section of the fuel system should be checked for possible incorrect operation. Trace for fuel flow from the tank, through the petcock, and through the carburetor. Also check for possible air restrictions or leaks.

4-1. PETCOCK

A. Removal and Installation

1. The two petcocks are bolted to the rear underside of the fuel tank. Remove the two screws holding each petcock.



2. A neoprene O-ring fitted into a groove in the petcock mating surface seals the petcock to the fuel tank. Check the condition of this O-ring and replace it if it is broken, flattened, or chipped.
3. Petcock installation is accomplished by fitting the O-ring in position and securing the petcock with the two screws.

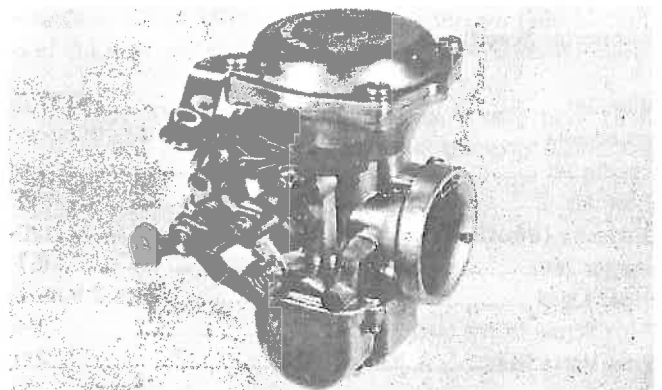


B. Cleaning

1. Sediment from the fuel tank (including water) can collect in the petcock chamber. A bolt beneath the fuel outlet can be removed to drain the petcock chamber. Larger obstructions can be removed by removing the screw-held plate at the opposite side of the fuel outlet.

4-2. CARBURETOR

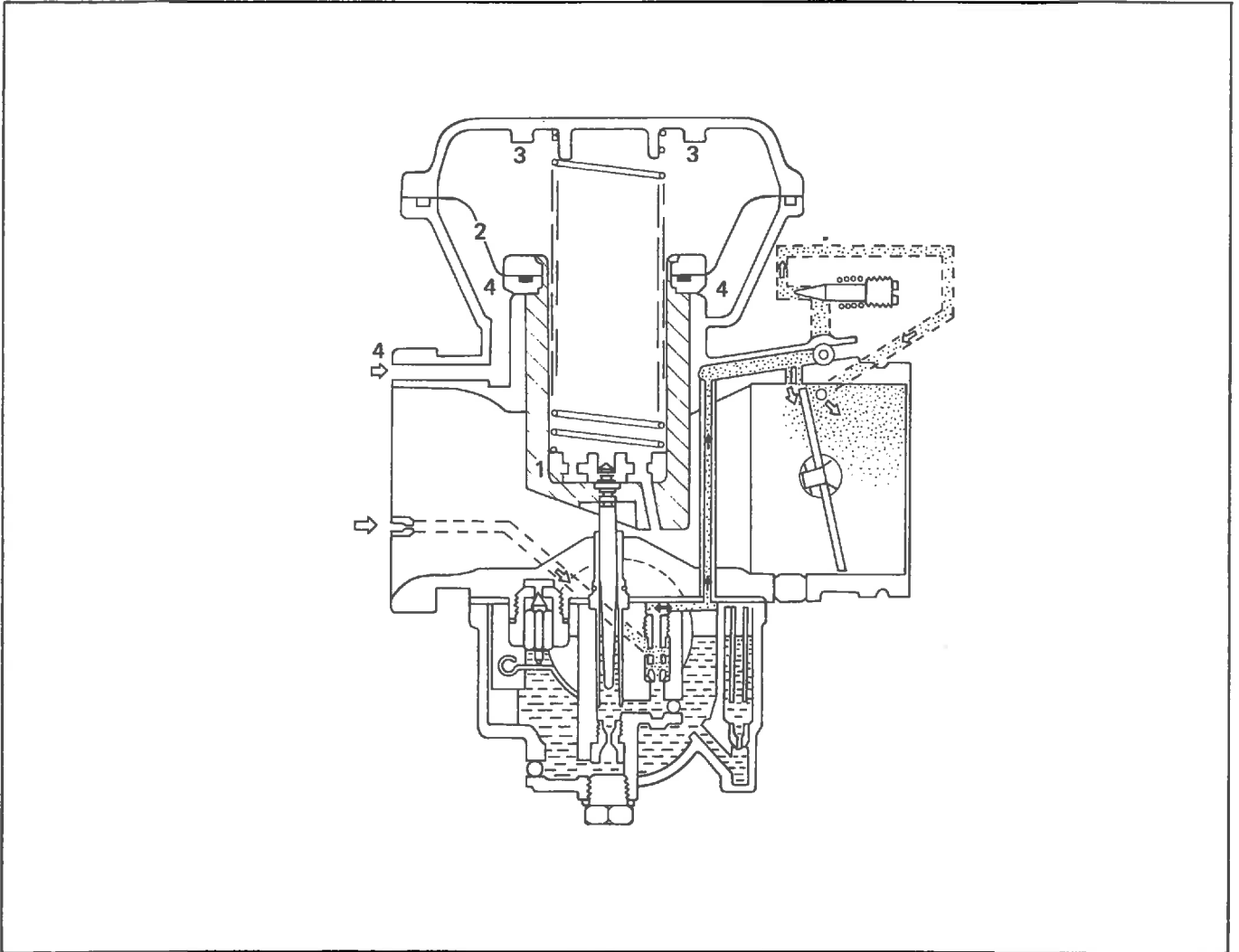
The XS650B is equipped with two "constant vacuum" carburetors (design is similar in operation to the SU type carburetor) mounted on rubber intake manifolds. Air flow through the venturi is controlled by a throttle slide (vacuum piston). The slide is lifted and lowered by engine vacuum rather than a cable directly linked to the throttle grip.



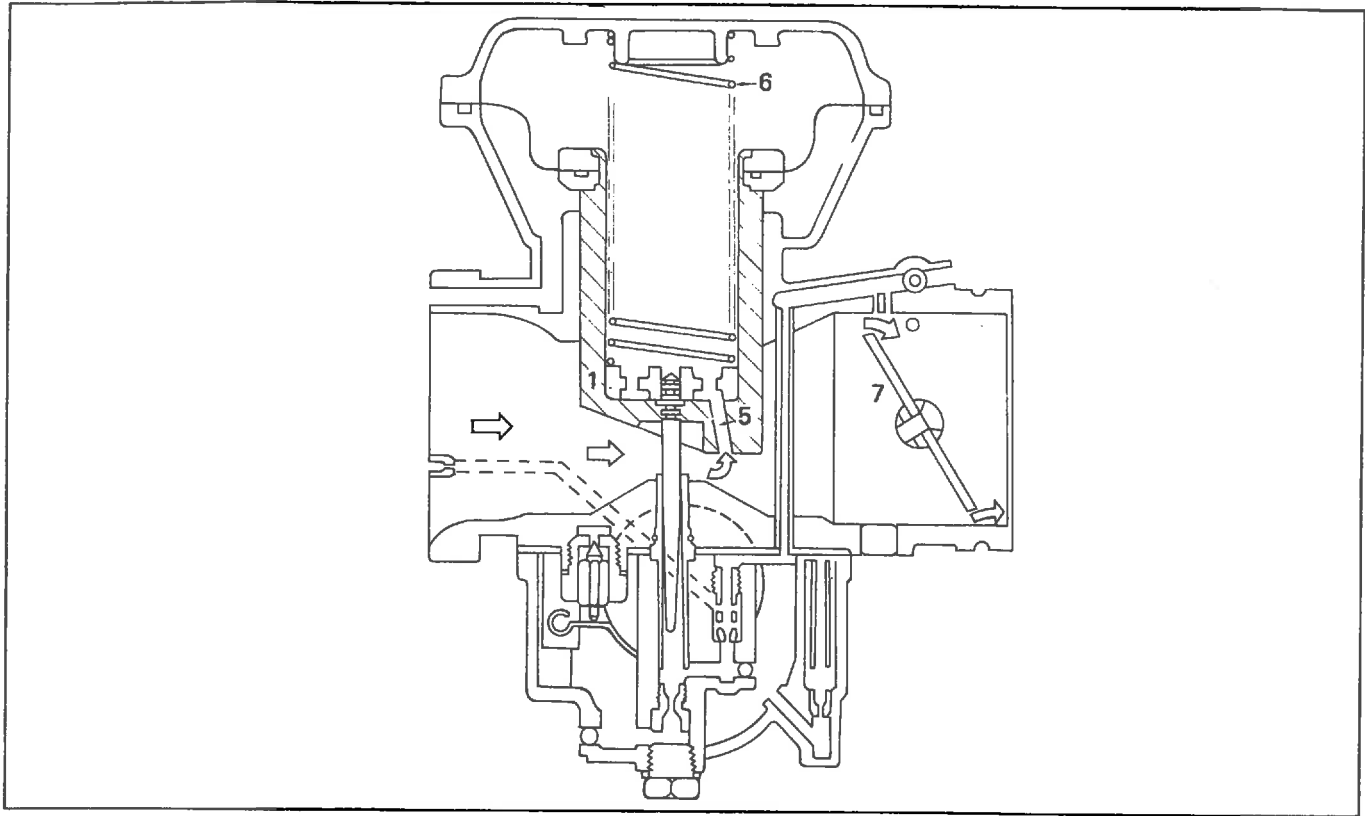
A. Method of Operation

1. Vacuum piston actuation:

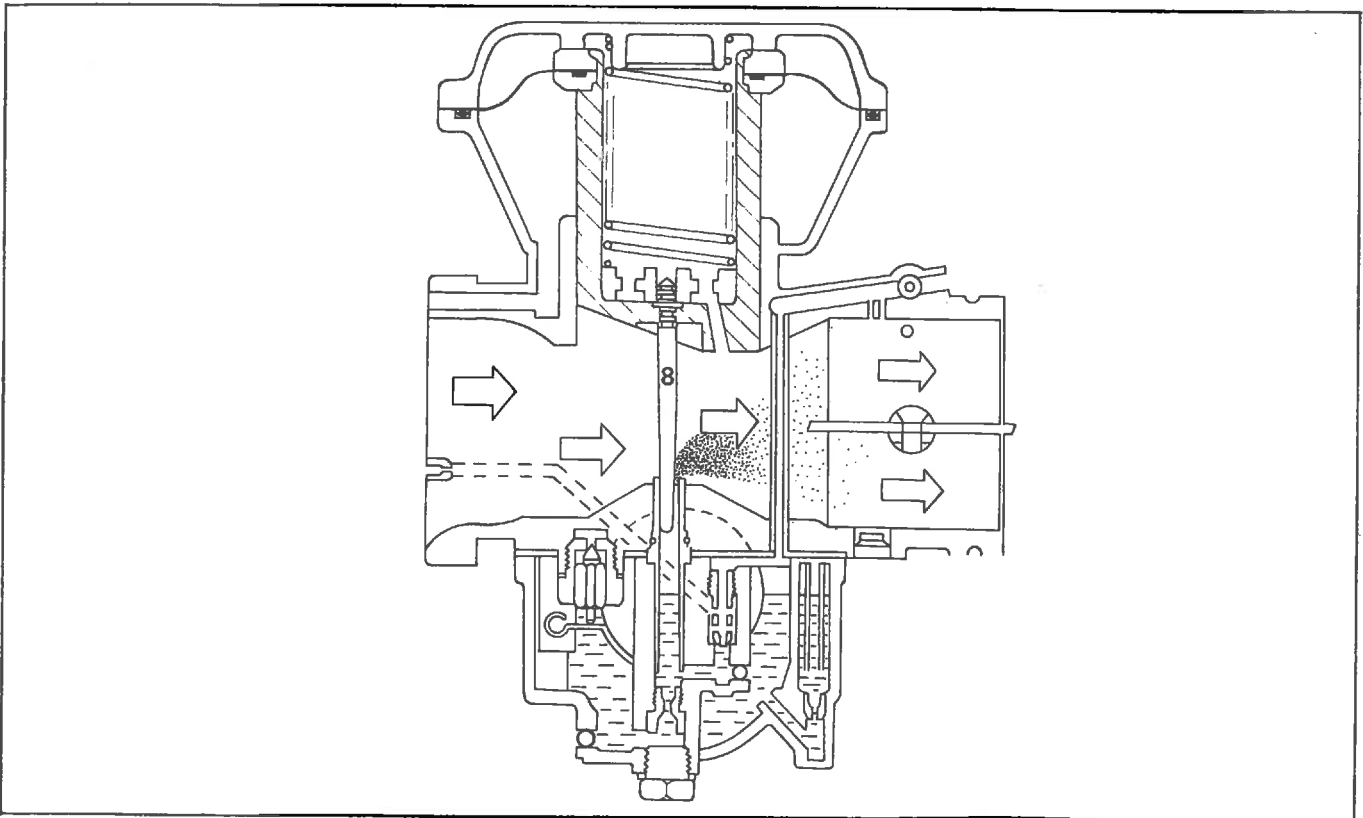
The vacuum piston (#1) is lifted by engine vacuum. A flexible rubber diaphragm (#2) is attached to the piston top and to the piston top and to the housing. This diaphragm divides the top part of the carburetor into a vacuum chamber (#3) above the diaphragm, and an atmospheric pressure chamber (#4) below the diaphragm.



2. Atmospheric air pressure (approximately 15 lbs/in²) passes through the air passage and occupies the space below the diaphragm. A drilled hole in the vacuum piston (#5) provides an unobstructed path up to the vacuum chamber. As air is pulled past the vacuum piston by engine vacuum — creating a low pressure area at this point — the piston hole permits this low pressure to fill the vacuum chamber. Unequal air pressure exists on either side of the diaphragm. Atmospheric pressure pushes up on the diaphragm, lifting the vacuum piston (#1) as well. The diaphragm (and piston) continues to lift until the vacuum piston return spring (#6) and the low air pressure match the pushing atmospheric pressure below.
3. Air speed through the venturi, which controls the amount of low pressure in the vacuum chamber, is controlled by a butterfly valve (#7). A cable connects the throttle grip directly to this butterfly valve. Twisting the grip opens the butterfly valve.



4. As the butterfly valve opens, engine vacuum sucks air through the venturi at a greater speed. Faster air speed causes a greater air pressure drop. This dropping pressure immediately occupies the vacuum chamber, lifting the vacuum piston higher. The vacuum piston will continue to lift as the butterfly is opened further.
5. When the vacuum piston lifts it also lifts the jet needle (#8) below. This permits additional fuel to flow up the fuel outlet nozzle and to the engine in the standard method.

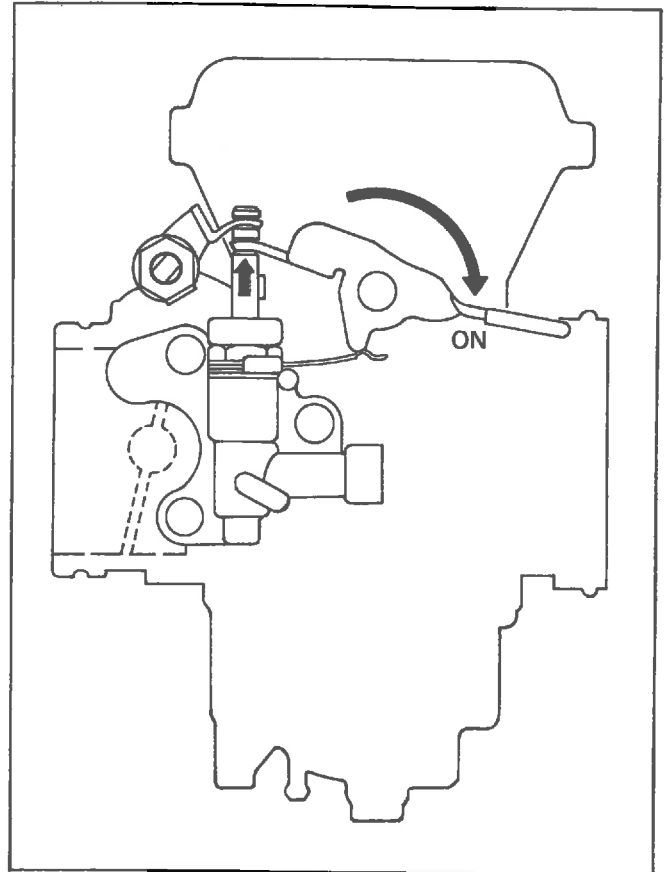


B. Starter System

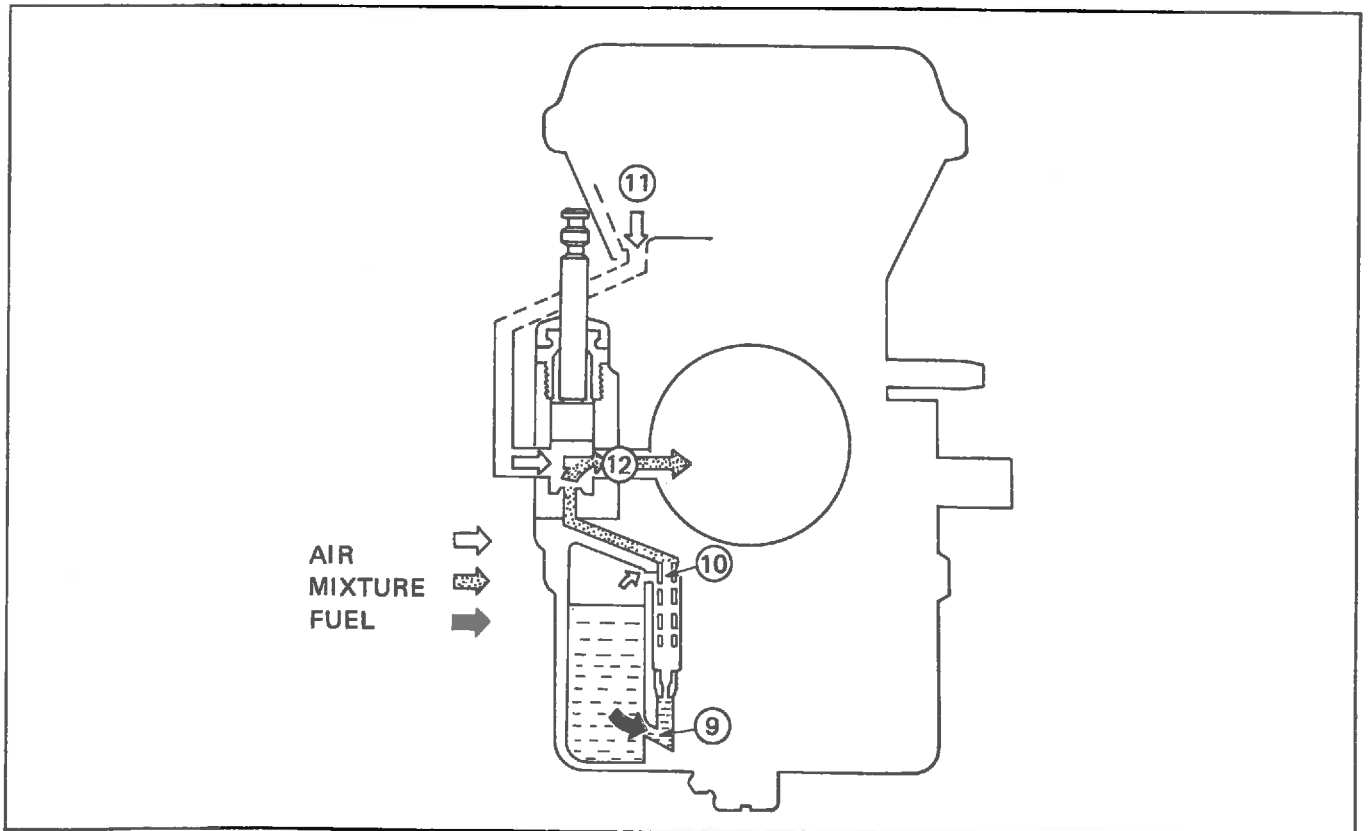
1. This system is identical to the starter system used on all our two-stroke Yamahas. It consists of a separate fuel/air circuit that enriches the fuel/air mixture for easier starting. The starter housing, however, can be removed from the main carburetor body.

When the starter lever is pushed down, a rich starting mixture ratio of approximately 9:1 enters the engine.

2. Fuel for this starter system comes from the float bowl, through a drilled passage through the starter jet (#9). The fuel continues up through a mixing chamber (#10) where air begins to mix with the fuel. Air for the starter system is drawn down through a passage (#11) from the atmospheric chamber below the diaphragm.

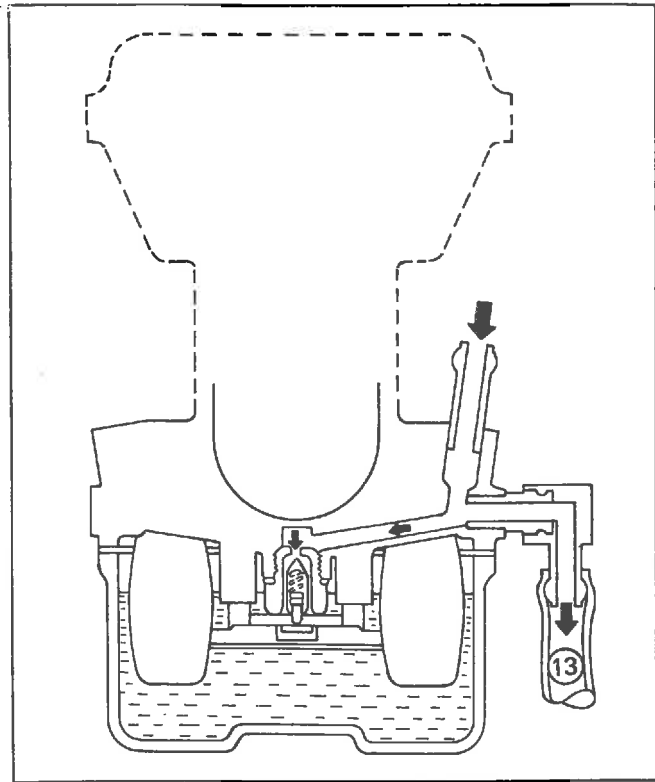


3. The fuel and air meet and mix at the starter plunger chamber and are sucked out through the outlet passage (#12) into the venturi.

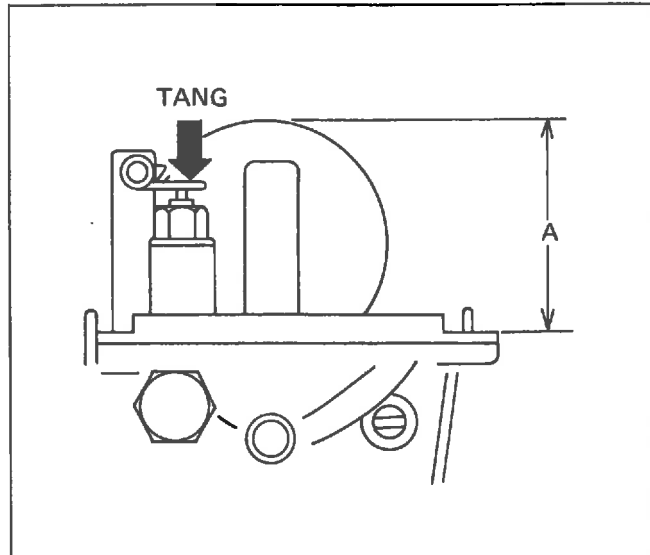


C. Float System

1. Proper fuel level is maintained in the float bowl via the standard method. Two interconnected floats pivot when the level of fuel rises until float/fuel level is high enough to force the inlet valve firmly against its seat. This shuts off the fuel supply from the gas tank.
2. An interconnecting fuel equalizer tube (#13) between both carburetors permits fuel to flow between them.



3. Gas flows from the tank, through both petcocks, and then to each carburetor. If fuel should cease to flow from one petcock, due to any sort of stoppage, fuel will still continue to flow to both carburetors through the equalizer tube. This eliminates the danger of one cylinder running lean due to lack of fuel.
4. Float level adjustment
The float level may change because of a worn needle valve or a bent float arm. If the fuel level rises above a specified level, the air/fuel mixture becomes rich. If the fuel level drops, the mixture becomes lean.



5. Remove the float chamber body and float bowl gasket. Invert the mixing chamber body. Slowly lower the float with your fingers until the float just contacts the top of the float needle, do not compress the spring in the float needle.
6. Measure height "A" from the top of the float chamber gasket seat (gasket removed).
Standard measurement: 0.98 in.±0.098 in.(25±2.5mm.)
7. Bend the tang (which contacts the float needle) so that a correct measurement is obtained.

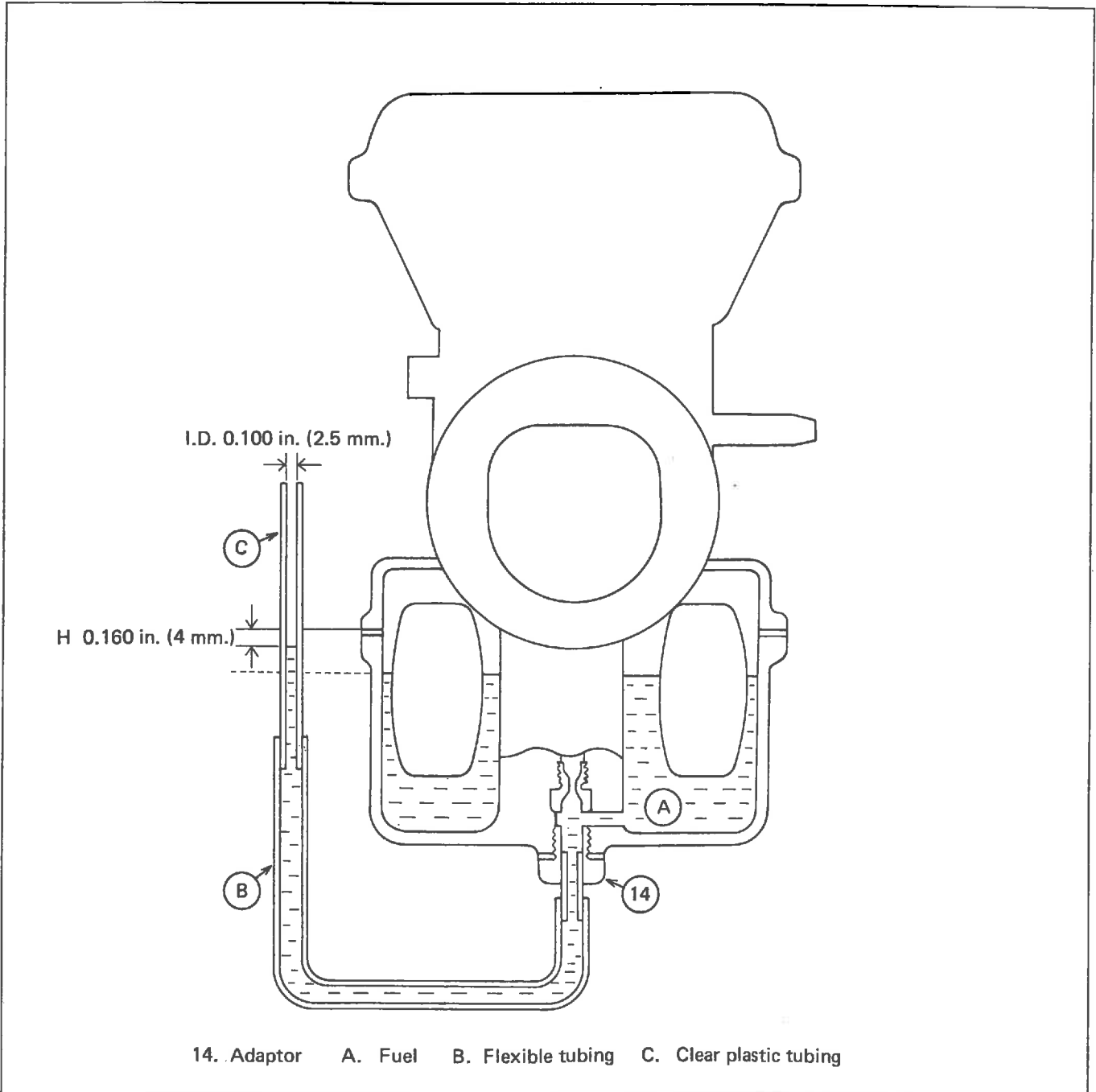
Caution:

Both floats must be identical in height. If they are not, carefully bend the interconnecting bar between both floats until they have identical heights.

- Carburetor fuel level can also be checked without removing the float bowl. Construct a special tool using a spare main jet cover nut (#14), rubber tubing (B), and a short length of clear plastic tubing (C). It MUST have an inside diameter of 0.100 in. (2.5 mm.).
- After constructing and installing the special tool, hold the clear tubing to the float bowl gasket surface on the main body (see drawing). The fuel level in the tubing must be 0.160 in. (4 mm.) below the main body gasket surface (can be checked with the engine stopped).

Note:

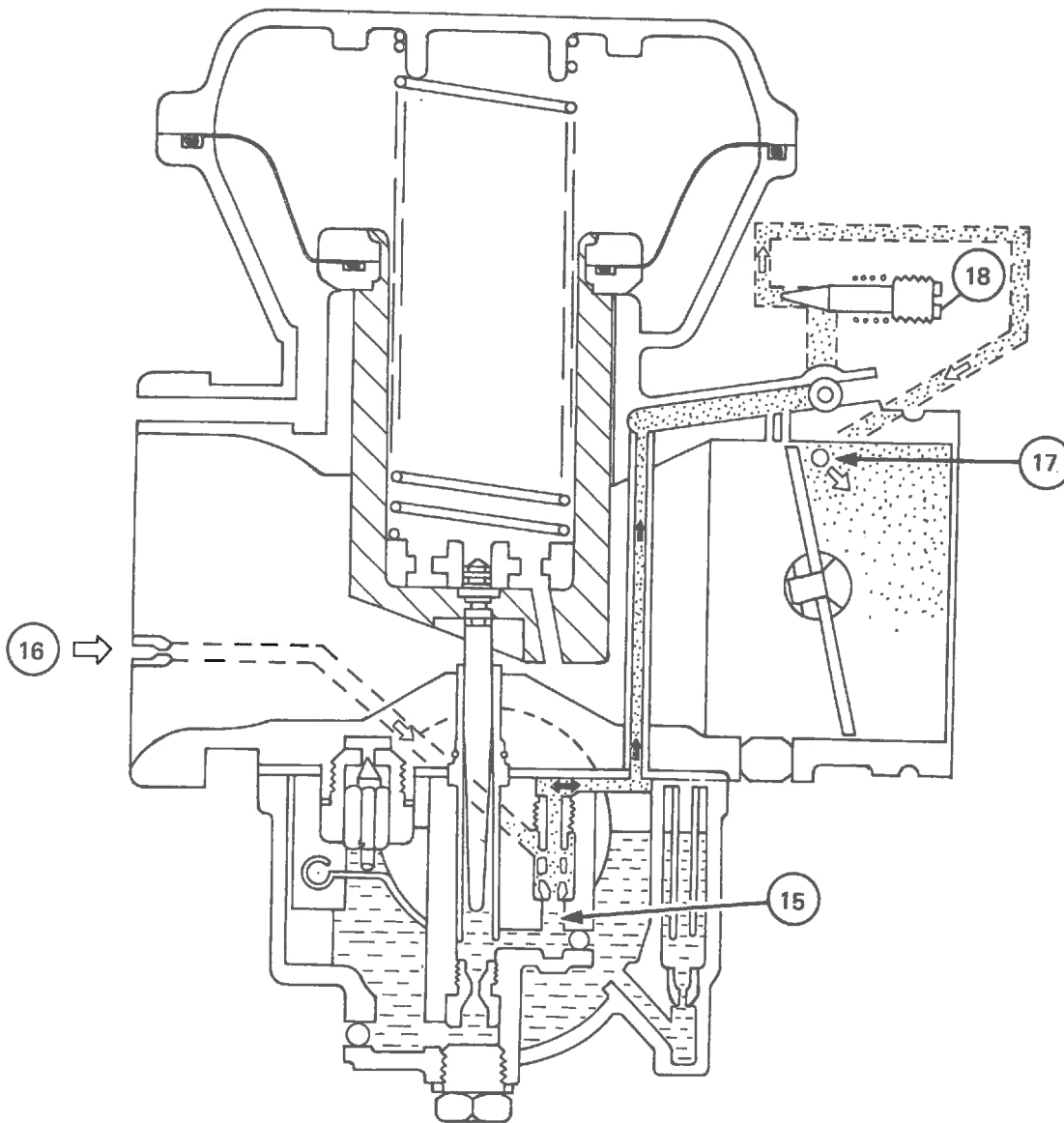
The carburetor must be positioned straight up (not tilted to one side, forward, or backward) to obtain an accurate reading. Also, if the clear tubing inside diameter is other than 0.100 in. (2.5 mm.), the fuel level shown will not be accurate.



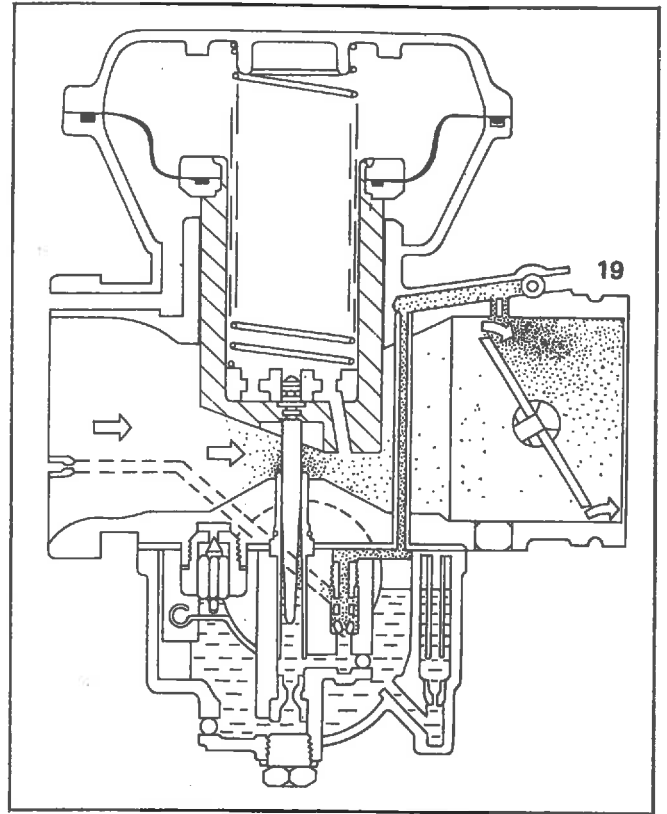
D. Idle Circuit

1. At idling rpm., air pressure in the venturi is not sufficiently low enough to draw fuel flow up through the needle jet nozzle. Fuel travels up through the main jet to the pilot jet (#15). At the same time air passes through the pilot air jet (#16) down through a drilled passage to the pilot jet, where it mixes with the fuel. This mixture passes up through a drilled passage to the pilot outlet (#17) at the upper edge of the venturi, just in front of the butterfly. The amount of fuel/air mixture to the engine is controlled by the pilot screw (#18).

2. To increase engine rpm, the butterfly valve is opened further. The top edge of the butterfly uncovers first one bypass outlet (#19) (next page) and then a second bypass outlet. This permits more fuel to progressively enter the venturi and to mix with the additional air that begins to flow past the partially opened butterfly valve. In addition, fuel still flows out the pilot outlet.



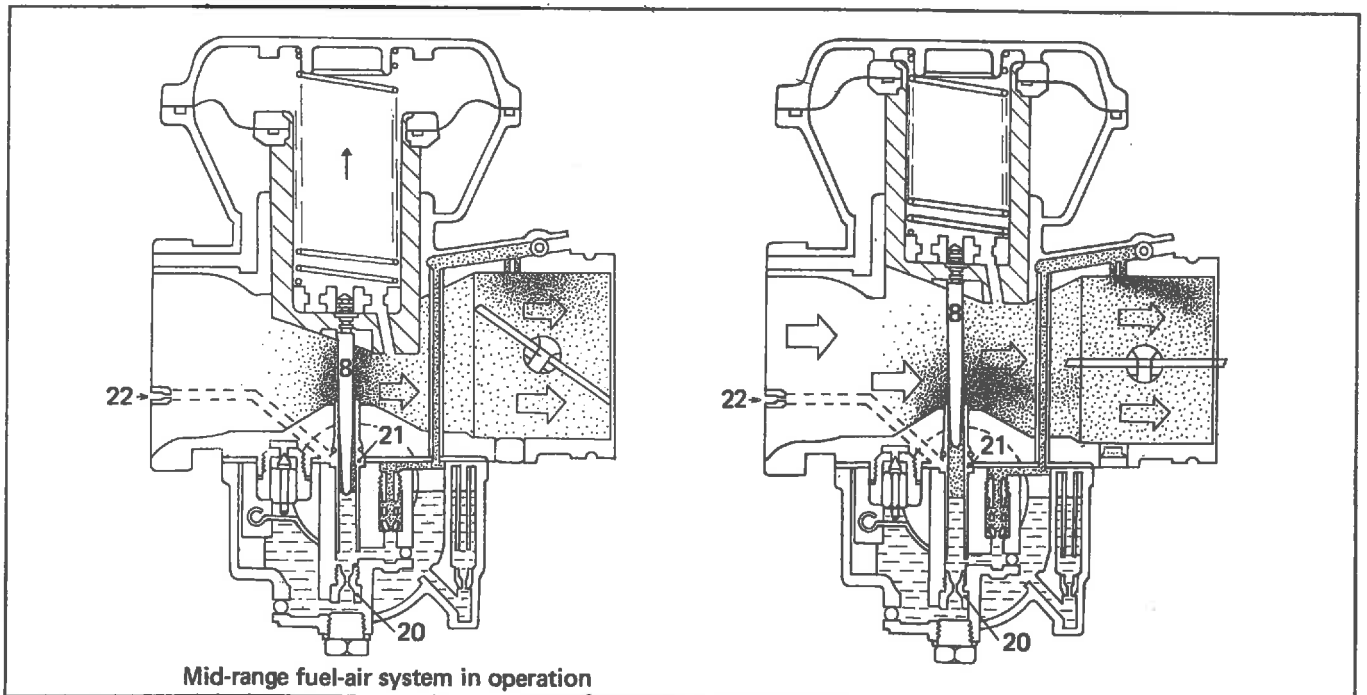
- Fuel quantity through body bypass outlets is controlled by the diameter of the drilled passages. Both bypass outlets are drilled from the venturi straight into the pilot fuel/air mixture delivery passage.



E. Mid and High Speed System

- Fuel flow for mid-range and high speed operation comes through the main jet (#20), through the needle jet (#21), and around the jet needle (#8) into the venturi. As engine rpm. increases, venturi vacuum also increases (the butterfly valve is opened further). This causes the vacuum piston to lift, which in turn lifts the tapered jet needle. More fuel flows past the needle and to the engine.

- Air enters the primary air jet (#22) and travels down a drilled passage to the needle jet. It mixes with the fuel at this point. Final air/fuel mixing is accomplished when this primary air/fuel mixture enters the venturi and mixes with the air passing through.

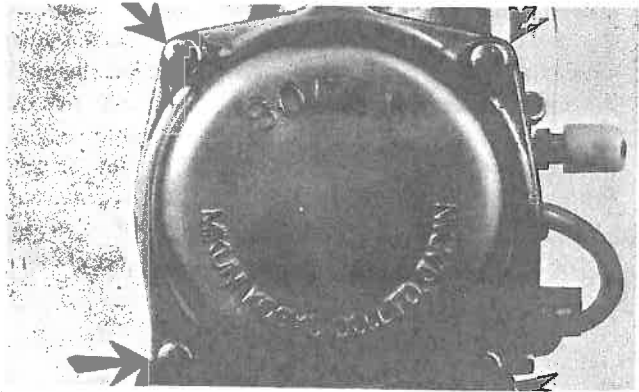


**F. Disassembly and Assembly Procedure
(for replacement or cleaning)**

1. The vacuum chamber cover on top is held in place by four screws. Remove these screws and lift off the chamber cover.

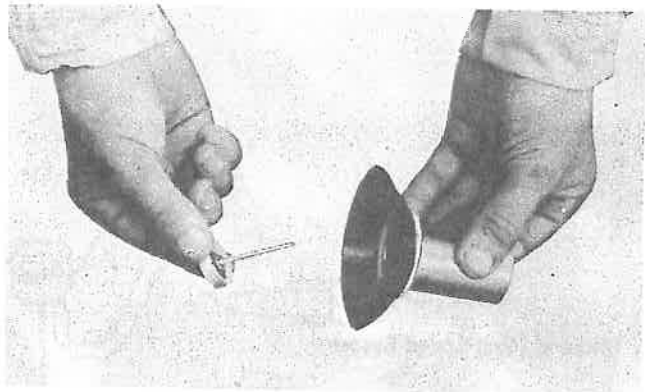
Note:

When installing the set screws, be sure to correctly position the throttle cable anchor bracket.

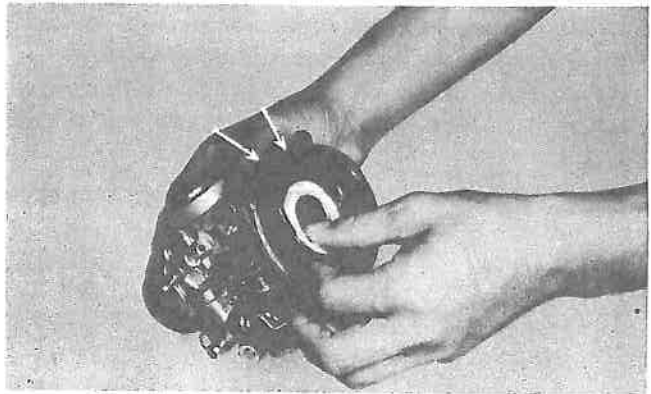


Removing cover securing screws

2. Once the cover has been removed, the spring, jet needle retainer, jet needle, and vacuum piston can be removed.

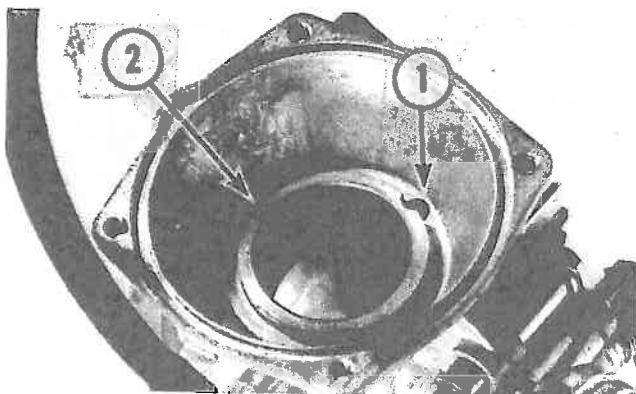


3. Installation of the vacuum piston is accomplished by inserting it into the carburetor body and lining up the small projection on the outer edge of the rubber diaphragm with the corresponding notch in the outer edge of the carburetor top mating surface.



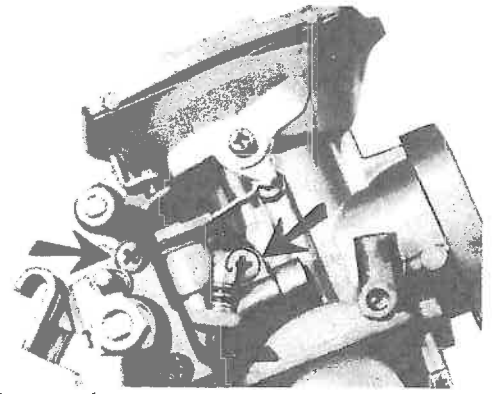
Vacuum piston and associated parts

4. With the top removed, the inlet passage (#1) and air passage to the starter jet (#2) are visible.



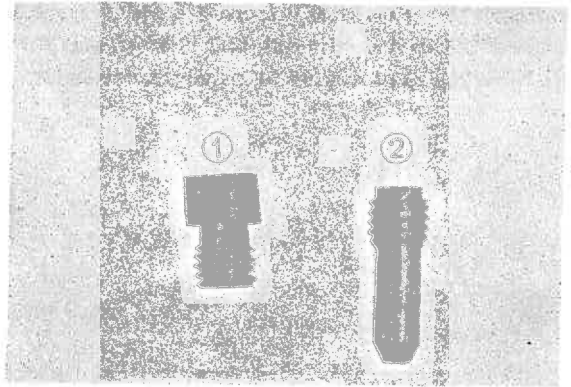
View of atmospheric pressure chamber

5. The starter jet housing mounts to the left side of the carburetor. It is held by three screws. A gasket fits between the starter jet housing and main housing.

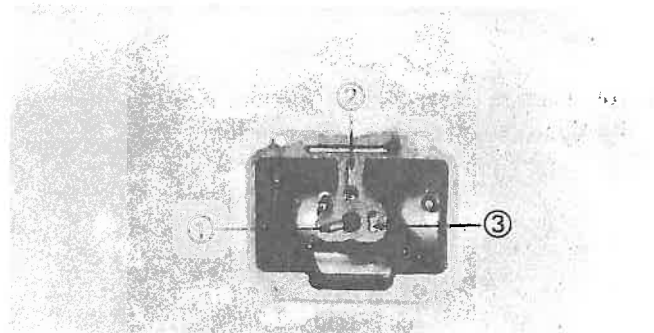


Starter housing securing screws

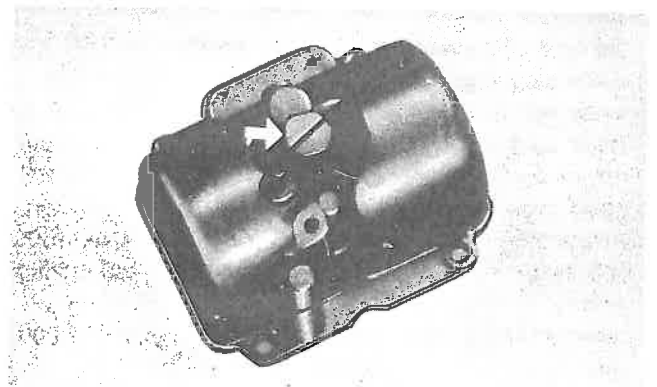
6. The float bowl mounts to the bottom of the main housing. Remove the four retaining screw and then remove the float bowl.
7. Both the pilot jet and the main jet are screwed into orifices in the float bowl. The pilot jet is removed from the inside, the main jet is removed from the bottom, after first removing the cover screw.



1. Main jet 2. Pilot jet



1. Primary air passage to needle jet 3. Pilot jet
2. Pilot air passage to pilot jet

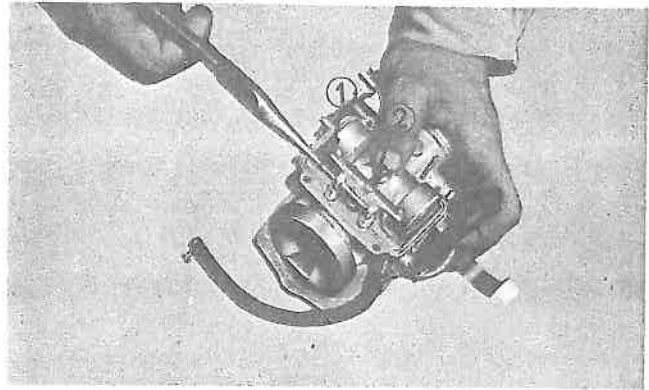


Main jet cover

- Turn the carburetor upside down, pull out the float pivot pin, and remove the float.

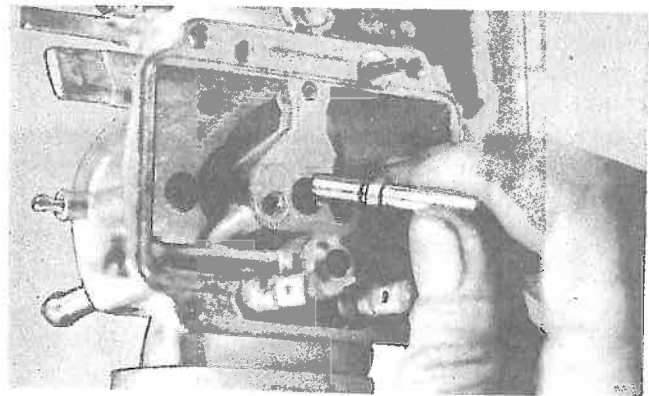
Caution:

Directly beneath the float adjustment tang is the float valve. Remove this part immediately to prevent its loss.



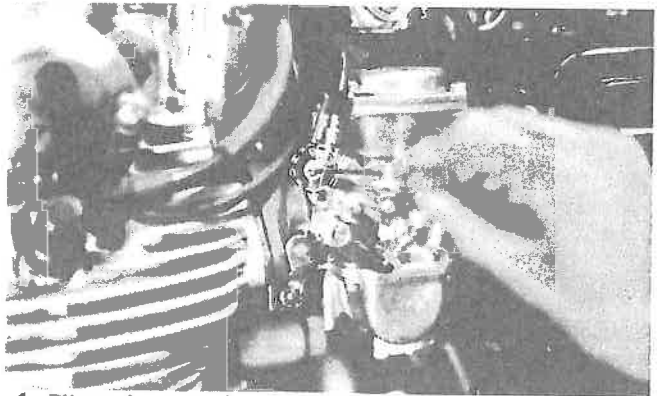
- Pivot pin
- Float level adjustment tang

- The needle jet fits into the main housing from the bottom. If removal is required, pull it down and out by hand. Reverse this procedure to install the needle jet.



G. Adjustments

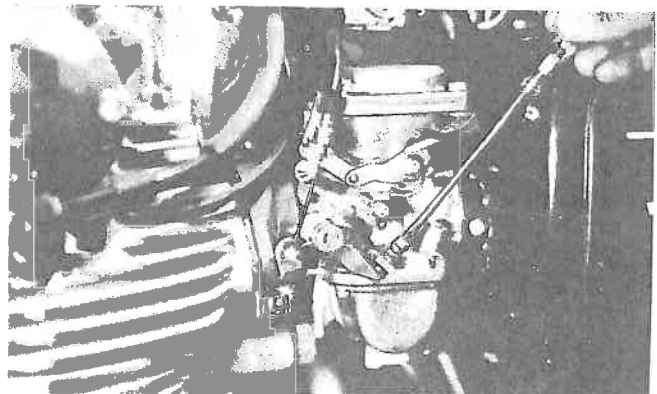
- Idle mixture:** turn the idle mixture screw in until it is lightly seated, then back it out 3/4 turn.



- Pilot mixture adjusting screw
- Idle speed adjusting screw

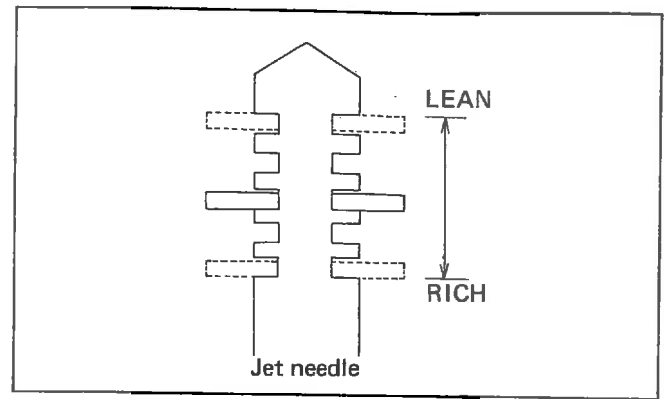
- Idle speed:**

Set both idle screws so the engine idles fast. Pull off one spark plug high tension lead. Back out the idle speed screw on the running cylinder until the engine dies. Hook up the spark plug lead, start the engine, and pull off the opposite spark plug lead. Slowly back off the idle speed screw of the running cylinder until the engine dies. Attach the loose spark lead and start the engine. Both cylinders should be idling at the same speed, pulling evenly. If engine rpm. is too high, back off both idle speed screws an even amount until idle is 900 ~ 1,000 rpm.



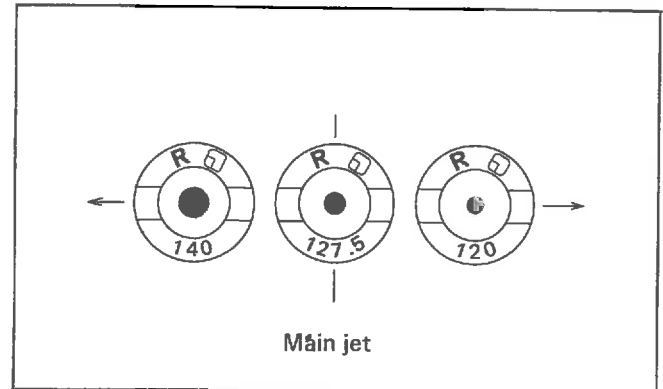
3. Jet needle (mid-range):

Mid-range fuel supply is controlled by the position of the needle in the needle jet. The needle clip comes standard in the 4th groove from the top (4th stage). To lean out the mid-range mixture, move the clip one groove higher (dropping the needle). To enrich the mixture, place the clip one groove lower (raising the needle).



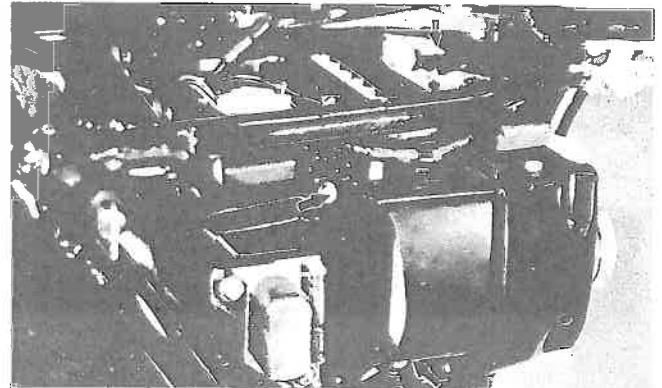
4. Main jet (high speed):

The carburetor comes equipped with a #130 main jet. Install a one step larger main jet (#140) to enrich the high speed mixture. Install a one step smaller main jet (#120) to lean out the mixture.



H. Air filter

1. Disconnect the air cleaner mounting bolts: one on top, under the seat, one on the side cover.



2. The element is made of foam rubber damp with oil. The removed element should be washed in a detergent. Then apply motor oil (10W-30 or equivalent) to the element, and squeeze it lightly.

