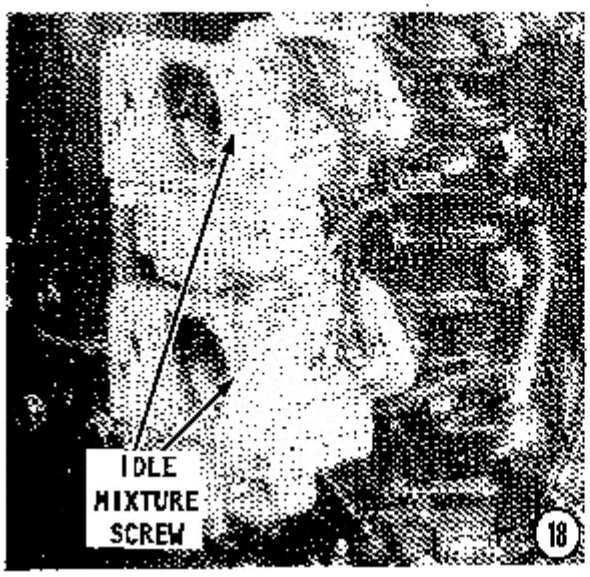
*Square-bowl Type "C" carburetors. The unit on the left **MUST** be installed as the top carburetor because of unique linkage arrangement.*

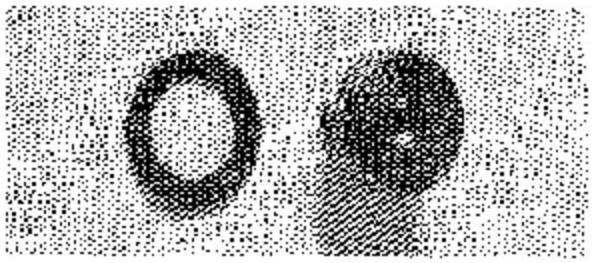
High-Speed Adjustment

The main fuel jet (high-speed) is changeable but not adjustable. Refer to the Carburetor Jet Size/Elevation Chart in the Appendix.

Idle Mixture Adjustment

18- After the conditions have been met as listed in the first portion of this step, including the engine run until it has reached operating temperature, set the idle mixture screw one turn open from the lightly seated position. Now, with the engine operating at idle speed (750 to 800 rpm), **SLOWLY** turn the idle mixture screw counterclockwise until the affected cylinder starts to load up or fires unevenly due to the over-rich mixture. **SLOWLY** turn the idle mixture screw clockwise until the affected cylinder fires evenly and the engine rpm increases.





High-speed jet and gasket.

SOME ADVICE: Do not adjust to a leaner position than necessary. It is better to have the mixture set slightly on the rich side, rather than too lean. Too lean a mixture is often the cause of hard starting.

MORE ADVICE: If the engine hesitates during acceleration after adjusting the idle mixture, the mixture is set too lean and should be changed to the richer side until engine acceleration is smooth.

Idle Speed Adjustment

19- After the conditions listed at the beginning of this ADJUSTMENT section have been met, and the idle mixture adjustment has been properly made, as described in the previous step, then adjust the idle speed stop screw on the stop bracket until the engine idles at the recommended rpm given in the Tune-up Specifications in the Appendix. Continue running the engine in forward gear at the recommended wide open throttle (WOT) range to clear the engine, and then recheck the idle speed. Install the wrap around and front engine covers.

4-10 SERIES WME CENTER SQUARE BOWL CARBURETOR REFERENCED "D" IN APPENDIX

This section provides complete detailed procedures for removal, disassembly, cleaning and inspecting, assembling including bench adjustments, installation, and operating adjustments for the Series WME square bowl carburetor, identified as Carburetor **"D"** in the Appendix. This carburetor is installed on 3-cylinder 50hp (1991 and on), 60hp (1991 and on), 70hp, 75hp, 80hp, 90hp, and 4-cylinder 100hp and 115hp powerheads. To synchronize the fuel and ignition systems, see Chapter 6.

Replacement Carburetors

If a carburetor is no longer serviceable, the replacement carburetor must bear the same series number as the original. This number is stamped on the top of the carburetor mounting flange. On some very early models, this number will be found on the face of the air box mounting flange.

Series WME-23 carburetors are used on 50hp powerheads with a standard 0.052 main jet size.

Series WME-22 carburetors are used on 60hp powerheads with a standard 0.070 main jet size.

Series WME-7 carburetors are used on 70hp powerheads with a standard 0.070 main jet size.

Series WME-9 carburetors are used on 80hp powerheads with a standard 0.064 main jet size.

Series WME-10 carburetors are used on 90hp powerheads with a standard 0.072 main jet size.

Carburetor "D" removed from the powerhead and ready for an overhaul.

The carburetor used on the 50hp powerhead has a 0.92 bowl vent jet. The carburetor used on the 60hp powerhead has a .090 bowl vent jet.

Each of the carburetors installed on 70hp, 75hp, 80hp, and 90hp powerheads have 0.094 bowl vent jets and are interchangeable if the standard jets are changed to the correct value. If the top carburetor is being replaced, the old fuel bowl can be reused.

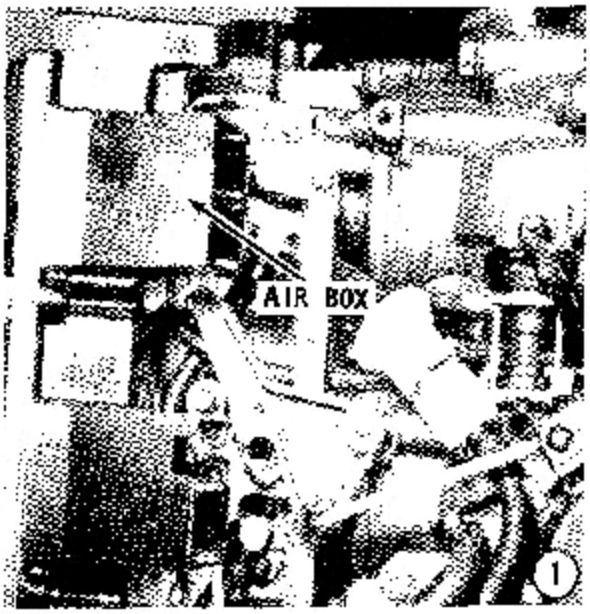
Series WME-11 carburetors are used on 100hp and 115hp powerheads with a standard 0.054 main jet size and no bowl vent jet. The manufacturer and Seloc do not recommend a Series WME-11 be used to replace either a Series WME-8, Series WME-9, or Series WME-10 carburetor.

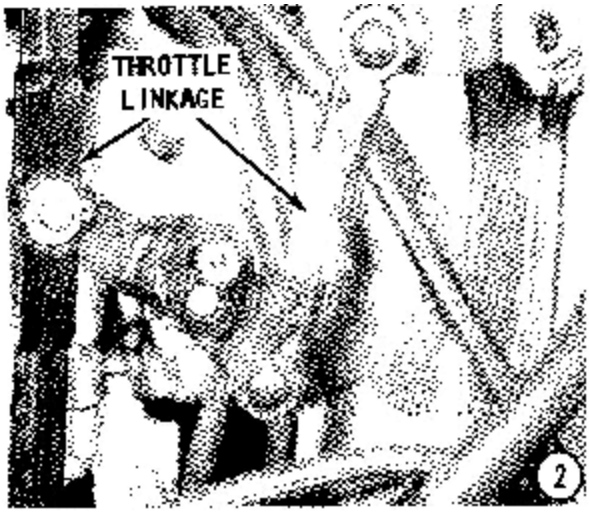
If replacing a Series WME-11 carburetor, be sure to specify the carburetor location to the parts person, because the lower two carburetors do not have an idle circuit and therefore they do not have an adjustable idle mixture screw. The opening has a non-removeable plug installed at the factory.

REMOVAL AND DISASSEMBLING CARBURETOR "D"

Check to be sure the carburetor/s being serviced are identified as Carburetor **"D"** from the Appendix and identifying illustrations at the beginning of this chapter. Only by proper carburetor identification can the reader be assured the correct procedures are being performed.

1- Remove the battery leads from the battery terminals. Remove the front engine





cover. Take off the wrap around cowl cover. Remove the air box.

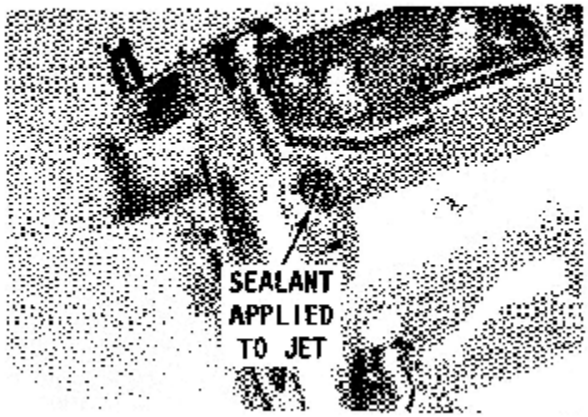
2- Take time to identify each carburetor to ensure each will be installed back in its original position, because each carburetor is **DIFFERENT.**

a- Each carburetor has slightly different linkage.

b- Only the top and second carburetors installed on 100hp or 115hp powerheads have an adjustable idle screw. The third and bottom carburetors have a non-removeable plug in place of the idle screw. This plug is clearly identified with a colored sealer, is preset at the factory, and **MUST** not be disturbed.

c- The fuel bowl of the top carburetor is unique from the others. The enrichener valve is fed by fuel from only the top carburetor float bowl.

Disconnect the throttle linkage from each carburetor. Disconnect the fuel line from the engine. Remove the hose clamps on each fuel line to each carburetor. Remove the fuel line from each carburetor.



*Red sealant applied to screws or plugs are the manufacturer's method of giving the message: **"DO NOT DISTURB".***

Remove the attaching nuts securing each carburetor to the intake manifold. Remove each carburetor from the powerhead. Apart from the specific differences mentioned above, which in most cases do not affect service procedures, the carburetors are identical, the following procedures are to be repeated for each carburetor. Where the differences affect service procedures, they will be clearly identified.

SPECIAL WORDS

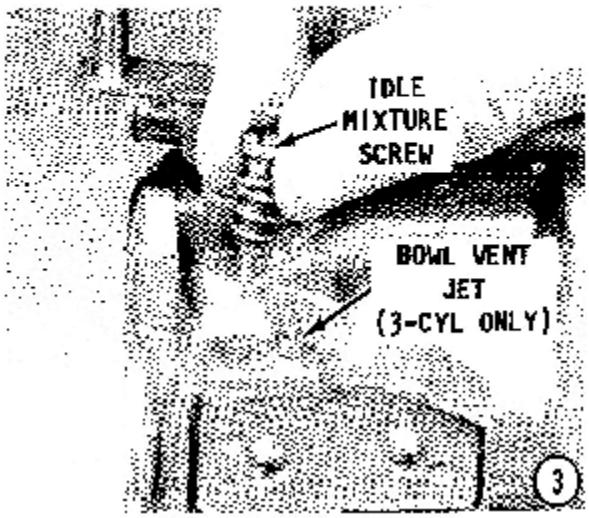
This carburetor does not have a traditional choke system. Instead, the choke function is performed by an enrichener system fed from the fuel bowl of the top carburetor. The extra fuel needed for cold powerhead startup is supplied to the intake manifold by an electrically operated device called the enrichener valve. Service procedures for this system are outlined in detail in Chapter 7, beginning on Page 7-20.

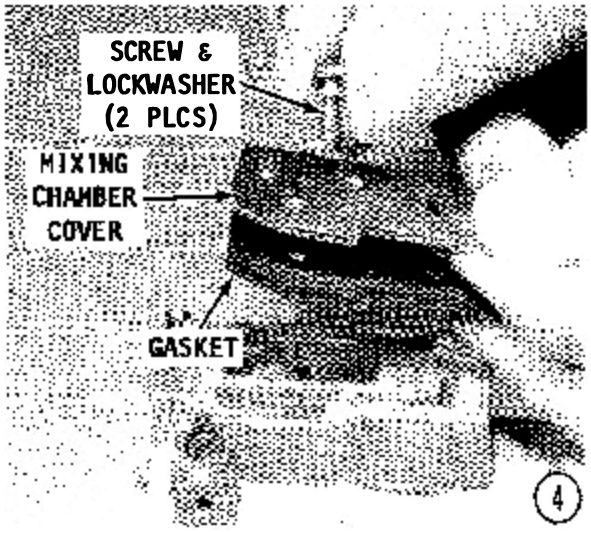
VERY IMPORTANT WORDS

Notice the application of Red sealant on certain adjustment screws or plugs. This sealant was applied at the factory and is the manufacturer's method of instructing anyone servicing the carburetor not to **DISTURB** the screw or plug.

The sealant is not affected by carburetor cleaner and should remain in place on the plug or screw and the carburetor for the entire useful life of the carburetor.

3- Back out the idle mixture screw. If servicing a 4-cylinder powerhead, the idle mixture screw on the two lower carburetors exist, but is **NOT** adjustable and must **NOT** be disturbed, as just described in the "Very Important Words".





If servicing a 3-cylinder powerhead, remove the bowl vent jet located next to the idle mixture screw. This jet is identical on all three carburetors. The 4-Cylinder powerheads are not equipped with this jet.

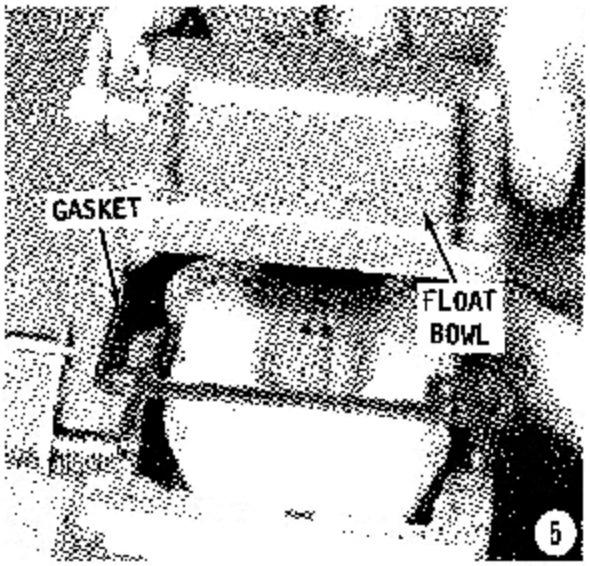
4- Remove the two Phillips head screws and captive lockwashers, and then remove the mixing chamber cover and gasket.

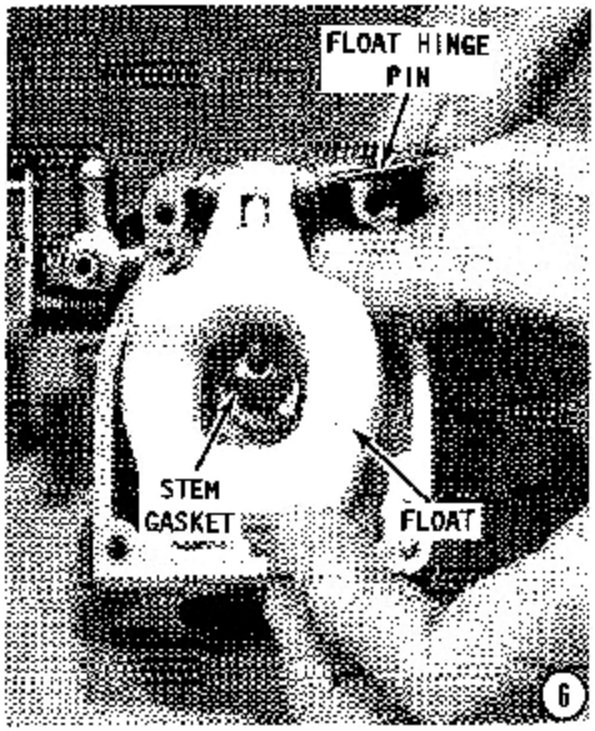
5- Remove the four Phillips head screws with captive lockwashers from the float bowl. Lift off the fuel bowl. Remove and discard the gasket.

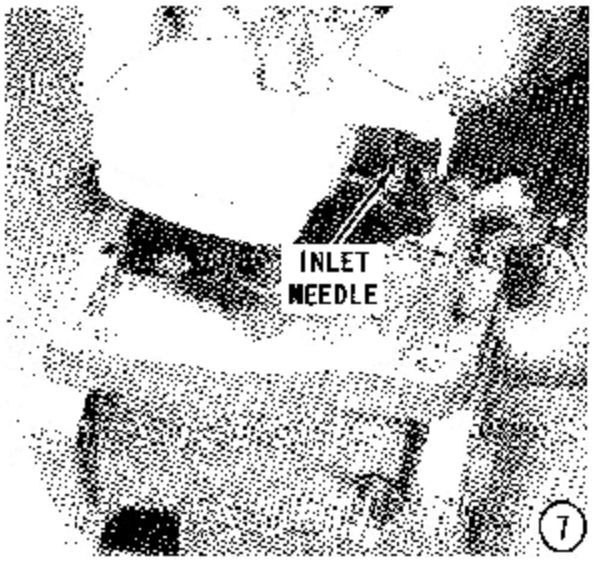
6- Remove the stem gasket from the center of the fuel bowl. Support the float and at the same time push the float hinge pin free of the mounting posts.

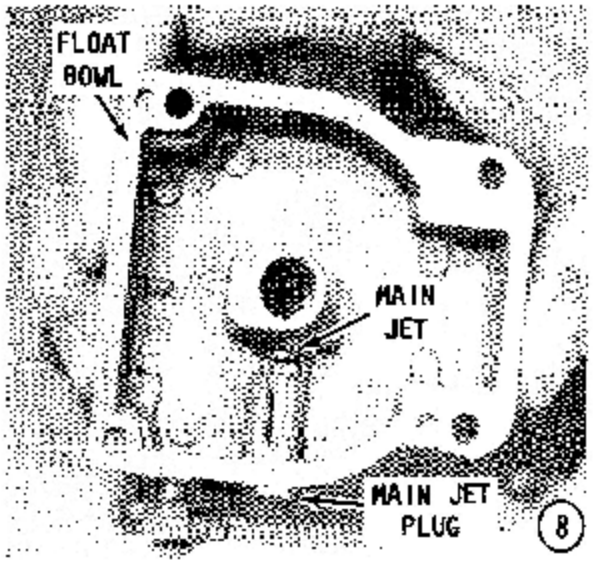
7- Carefully lift the float with the inlet needle attached from the needle seat. Detach the inlet needle from the float. The needle seat is not removable on this carburetor.

8- Remove the main jet plug and gasket from the exterior wall of the float bowl.









This plug provides access for a screwdriver to be inserted into the opening and allows removal of the main jet from the side of the center turret. This design facilitates changing the size of the main jet, without removal of the carburetor from the powerhead. Main jet sizes must be changed when operating the powerhead at elevations higher than 2,500 feet above sea level. Consult the table in the Appendix for the correct main jet sizes for various elevations.

GOOD WORDS

Further disassembly of the carburetor is not necessary in order to clean it properly.

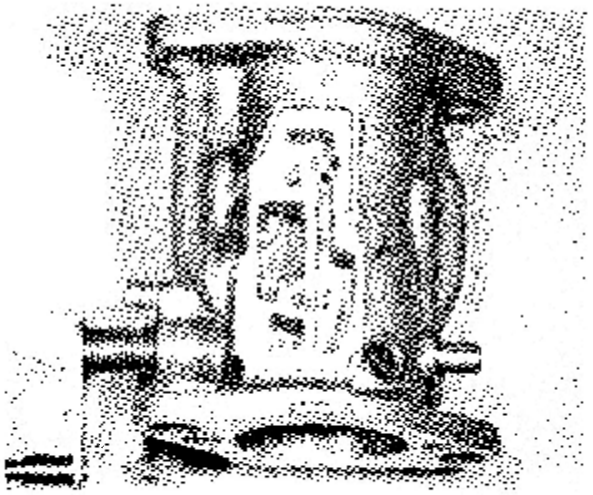
CLEANING AND INSPECTING

NEVER dip rubber parts or plastic parts in carburetor cleaner. These parts should be cleaned **ONLY** in solvent, and then blown dry with compressed air.

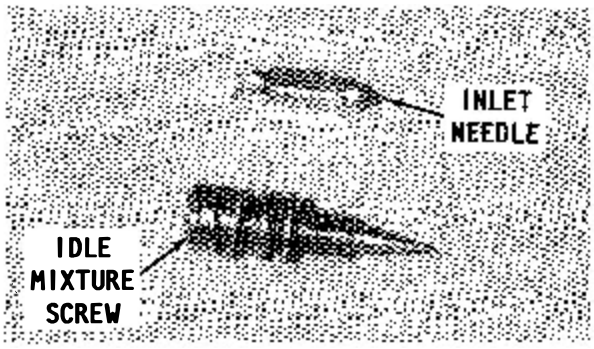
Place all metal parts in a screen-type tray and dip them in carburetor cleaner until they appear completely clean, then blow them dry with compressed air.

Blow out all passages in the castings with compressed air. Check all of the parts and passages to be sure they are not clogged or contain any deposits. **NEVER** use a piece of wire or any type of pointed instrument to clean drilled passages or calibrated holes in a carburetor.

Move the throttle shaft back-and-forth to check for wear. If the shaft appears to be too loose, replace the complete throttle body because individual replacement parts are **NOT** available.



***NEVER** use a piece of wire or any type of pointed instrument to clean drilled passages or calibrated holes in a carburetor, particularly those in the mixing chamber.*



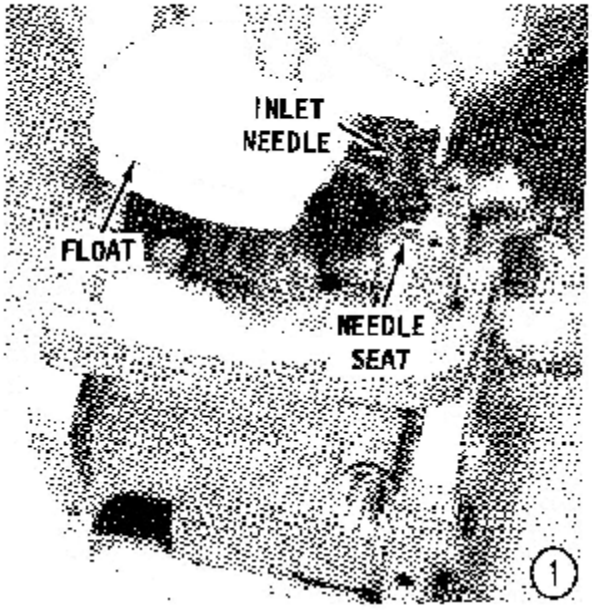
Inspect the taper of the inlet needle and the idle mixture screw for evidence of a worn groove.

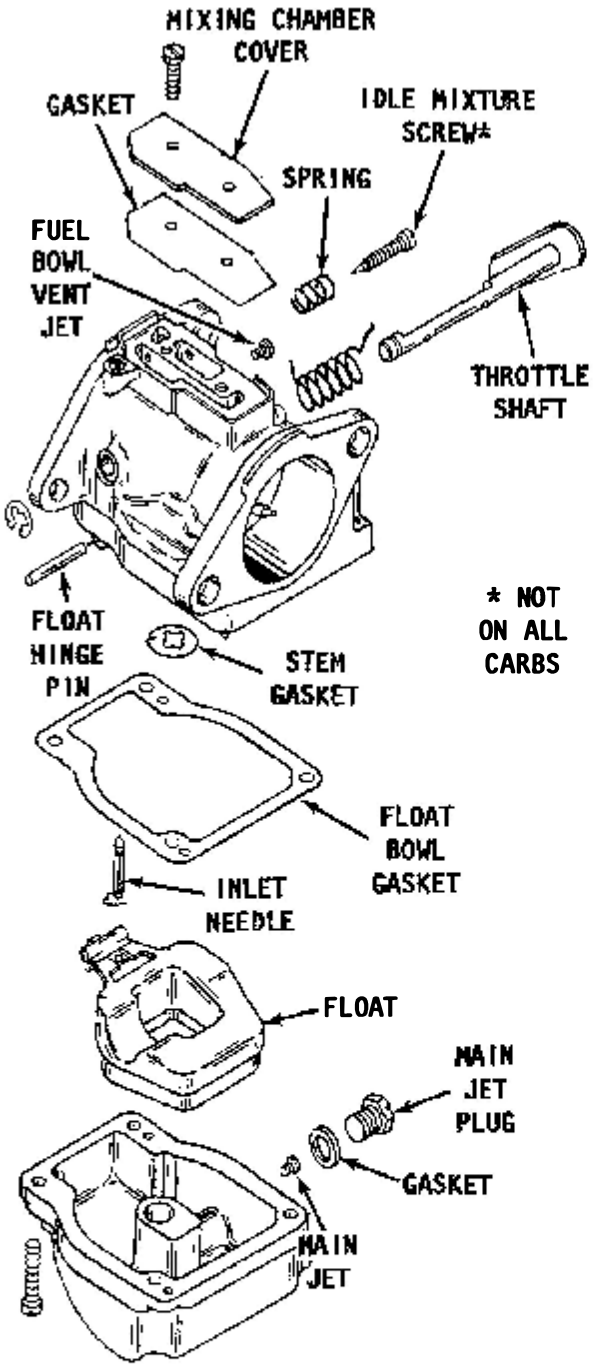
Inspect the main body, airhorn, and venturi cluster gasket surfaces for cracks and burrs which might cause a leak. Check the float for deterioration. If hollow floats are used, check to be sure they do not contain any fluid. Check to be sure the float tab is in good condition. If any part of the float is damaged, the unit must be replaced. Check the float arm needle contacting surface and replace the float if this surface has a groove worn in it.

Inspect the tapered section of the idle adjusting needles and replace any that have developed a groove.

Most of the parts that should be replaced during a carburetor overhaul are included in an overhaul kit available from your local marine dealer.

Check the jet sizes with a drill of the proper size. **ALWAYS** hold the drill in a pin vise to avoid enlarging the jet orifice. Refer to the Carburetor Jet Size/Elevation Chart in the Appendix for the proper size for your engine, carburetor, and anticipated elevation of operation.



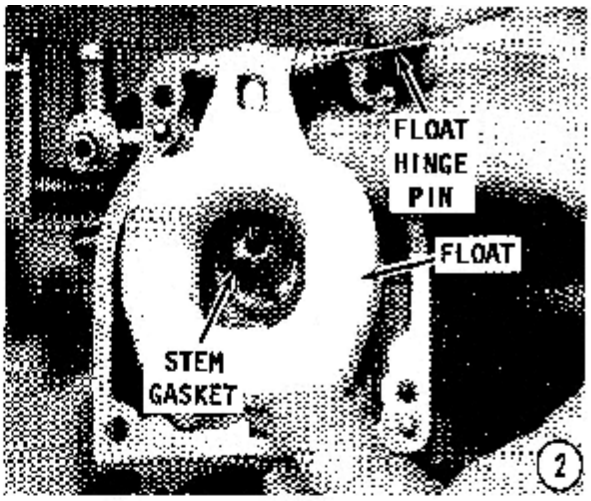


Exploded drawing of Carburetor "D", with major parts identified.

ASSEMBLING CARBURETOR "D"

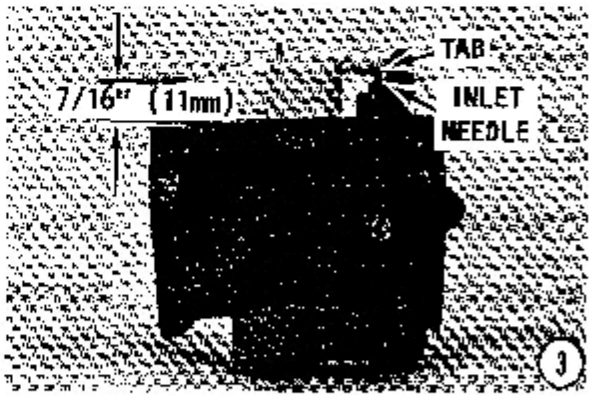
1- Hook the inlet needle spring over the float tab and lower the needle into its seat with the float hinge between the mounting posts.

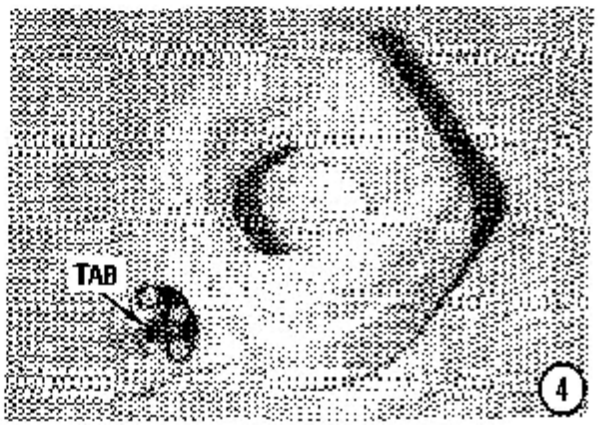
2- Slide the float hinge pin through the posts to secure the float. Center the pin between the posts. Place the stem gasket over the center turret.

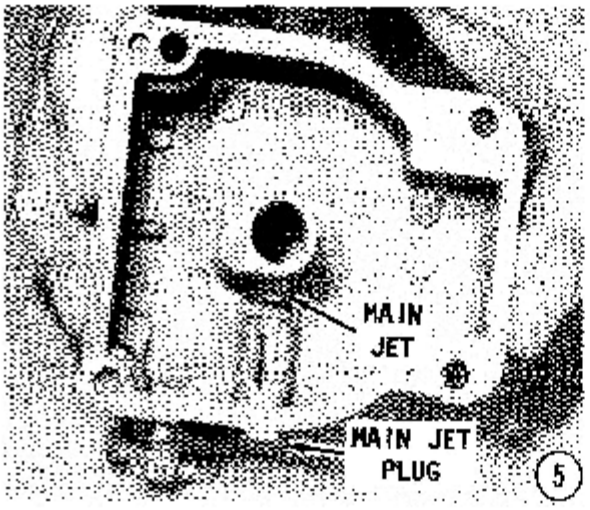


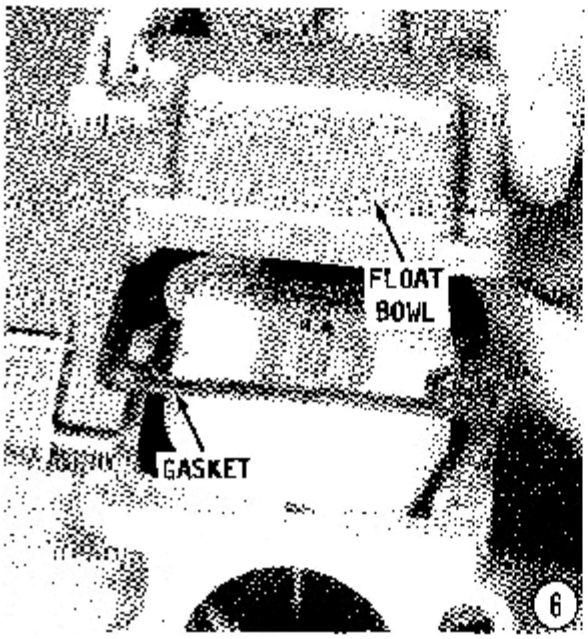
3- Hold the carburetor body in the inverted position -- the same position it has been in since the start of the assembling procedures -- with the float resting on the inlet needle. Measure the distance between the float bowl gasket surface and a point on the float directly opposite the hinge. Notice the surface of the float curves downward. Therefore, the measurement point is the lowest on the horizontal surface. The distance should be 7/16" (11mm).

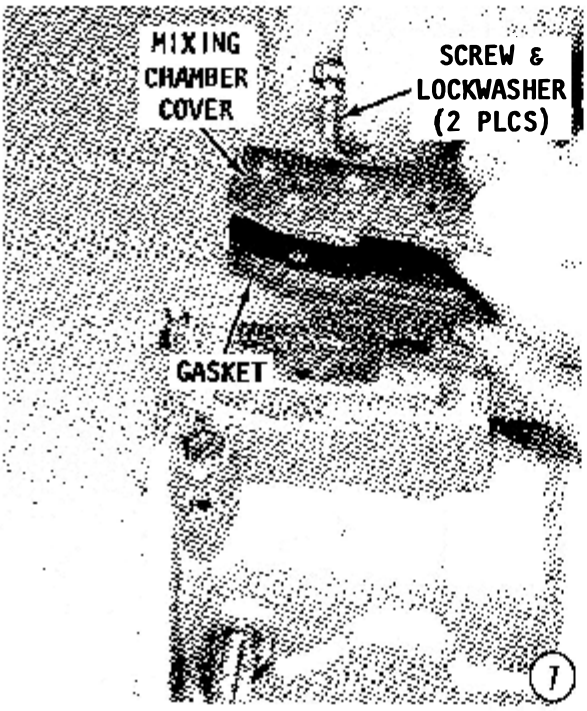
4- If the distance is not as specified, then remove the float hinge pin to free the float. The float height adjustment may be made by bending the tab on which the inlet needle hangs. Repeat Step 2 and 3 until the











specified distance between the float bowl gasket surface and the lowest edge of the float is obtained.

5- Install the main jet into the center turret of the fuel bowl. Tighten the jet securely. Install the gasket and main jet plug in the exterior wall of the float bowl and tighten the plug securely.

6- With the carburetor still inverted, position a new gasket onto the body. Place the fuel bowl in position and secure it in place with the four Phillips head screws and captive lockwashers.

7- Position a new gasket over the mixing chamber. Install the cover and secure it in place with the attaching hardware.

8- Thread the idle mixture screw into the carburetor until the screw is **LIGHTLY** seated. From this lightly seated position, back the screw out approximately 1-1/4 turns as a preliminary adjustment at this time.

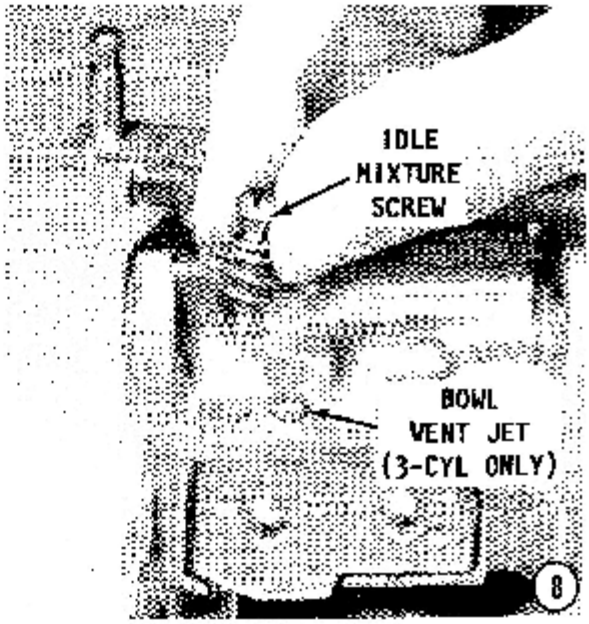
CRITICAL WORDS

The idle mixture screw on the two lower carburetors on a 4-cylinder powerhead are non-adjustable. The idle mixture screw is preset at the factory and then covered with a colored sealant. This is the manufacturer's method of communicating with everyone, **NOT** to disturb the adjustment.

If servicing a 3-cylinder powerhead, install and tighten the bowl vent jet.

INSTALLATION

9- Position **NEW** gaskets in place on the intake manifold. Install each carburetor



onto the manifold in the same position from which it was removed. Each carburetor should have been identified as instructed during the removal procedures. Secure the carburetors in place with the retaining nuts. Tighten the nuts alternately and evenly to a torque value of 100 in lb (11.3 Nm).

10- Connect all of the fuel lines to the carburetors and tighten the clamps securely. Connect the fuel line from the fuel tank. Activate the fuel line squeeze bulb several times and check the carburetors and fuel lines for leaks. Connect the throttle linkage to and between the carburetors. Connect the battery leads to the battery.

OPERATING ADJUSTMENTS

FIRST, THESE WORDS

Before fine carburetor adjustments can be properly made, the following conditions must exist:

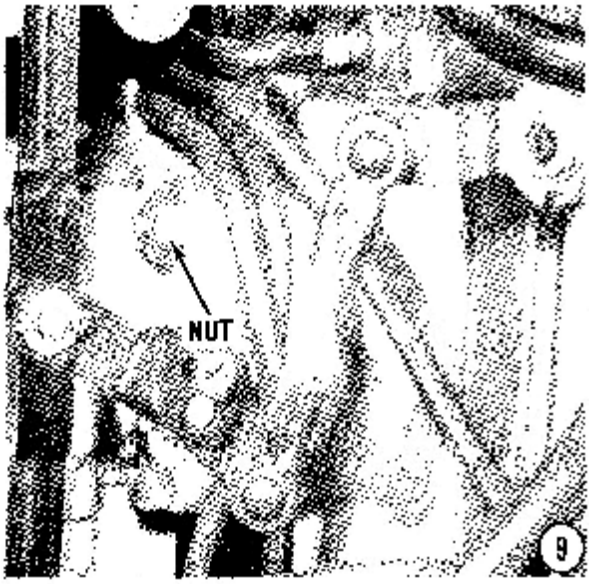
a. The correct engine-propeller combination must be used.

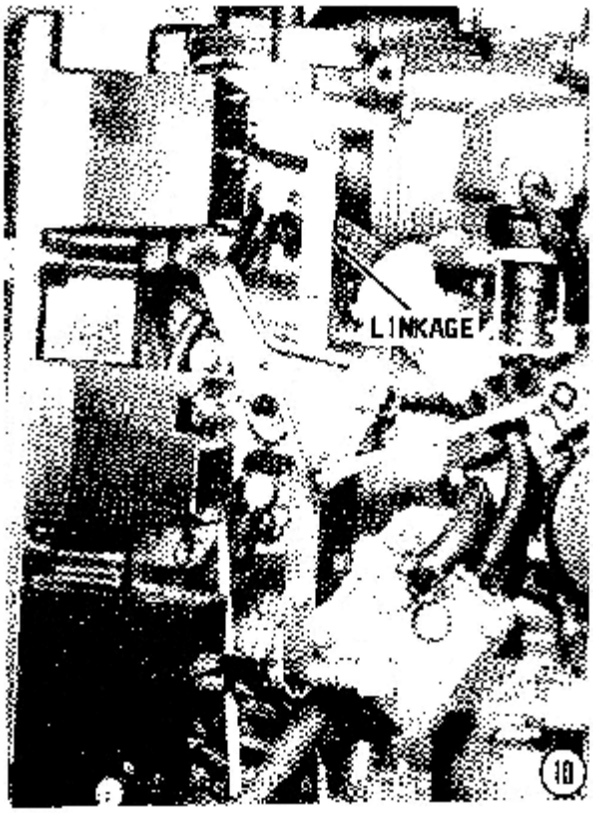
b. The power unit must be in forward gear.

c. The lower unit must be in the water.

d. The engine must be warmed to normal operating temperature.

e. The proper size fuel jet must be used for the elevation of operation. Main fuel jet size recommendations are intended as a guide only. If in doubt, try a size larger or smaller. Refer to the Carburetor Jet Size/Elevation Chart in the Appendix. Spark advance change is **NOT** recommended for changes in elevation. In order to obtain proper engine rpm at higher elevation, a lower pitch propeller is suggested.





High-Speed Adjustment

The main fuel jet (high-speed) is changeable but not adjustable. Refer to the Carburetor Jet Size/Elevation Chart in the Appendix.

Synchronizing

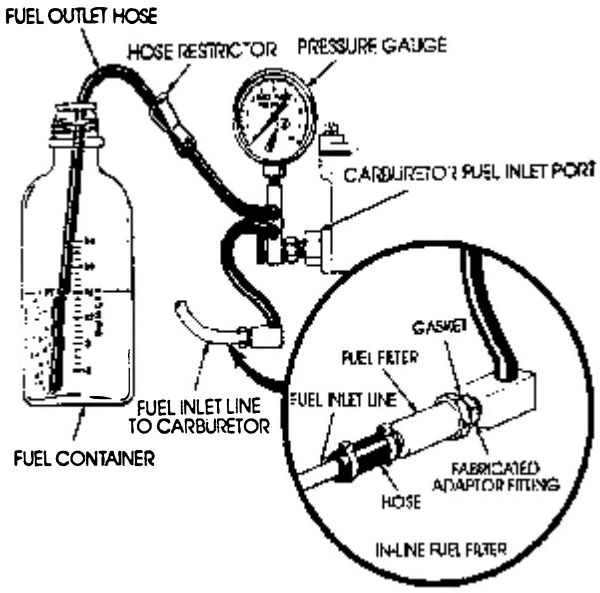
To synchronize the fuel and ignition systems, including the idle mixture adjustment, see Chapter 6. Consult the Table of Contents for the powerhead being serviced.

4-11 FUEL PUMP

THEORY OF OPERATION

The next few paragraphs briefly describe operation of the fuel pump used on the outboard units covered in this manual. This description is followed by detailed procedures for testing the pressure, testing the volume, removing, and installing the fuel pump.

The fuel pump used is a diaphragm displacement type. The pump is attached to the cylinder bypass. Therefore, it is operated by crankcase impulses. A hand-operated squeeze bulb is installed in the fuel line to fill the fuel pump and carburetor with fuel before the engine starts. After engine start, the pump is able to supply an adequate supply of fuel to the carburetor to



Test setup to check fuel pump pressure.

meet engine demands under all speeds and conditions.

The pump consists of a diaphragm, two similar spring loaded disc valves, one for inlet (suction) and the other for outlet (discharge), and a small opening leading directly into the crankcase bypass. The suction and compression created, as the piston travels up and down in the cylinder, causes the diaphragm to flex.

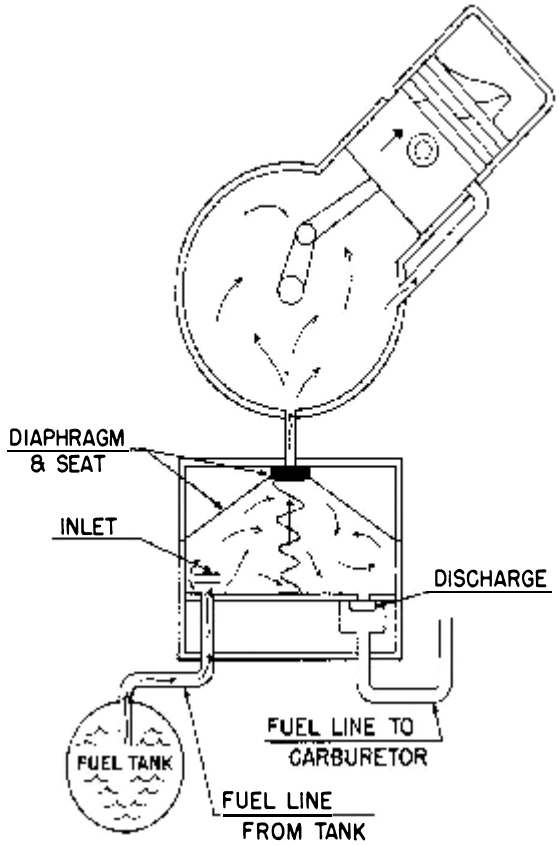
As the piston moves upward, the diaphragm will flex inward displacing volume on its opposite side to create suction. This suction will draw liquid fuel in through the inlet disc valve.

When the piston moves downward, compression is created in the crankcase. This compression causes the diaphragm to flex in the opposite direction. This action causes the discharge valve disc to lift off its seat. Fuel is then forced through the discharge valve into the carburetor.

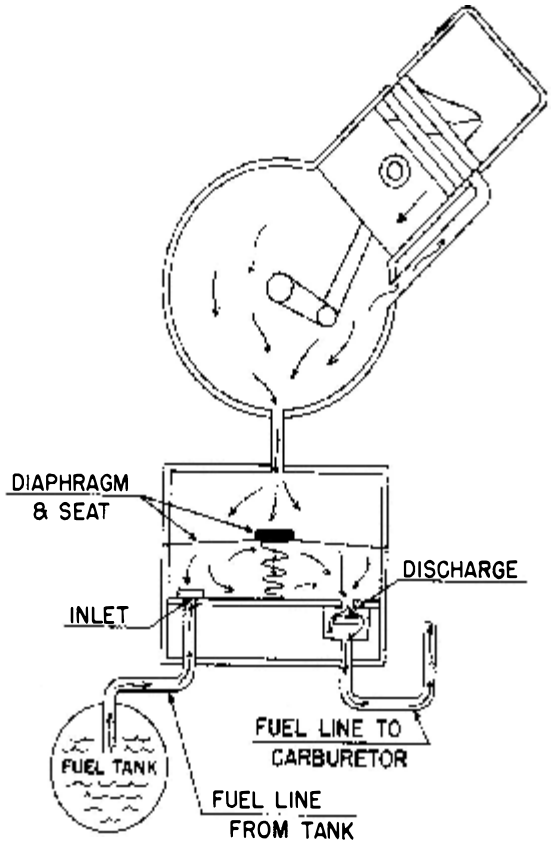
The pump has the capacity to lift fuel two feet and deliver approximately five gallons per hour at 4 psi pressure.

Problems with the fuel pump are limited to possible leaks in the flexible neoprene suction lines; a punctured diaphragm; air leaks between sections of the pump assembly, or possibly from the disc valves not seating properly.

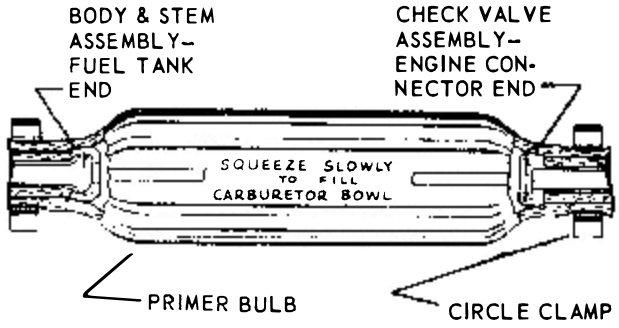
The pump is activated by one cylinder. If this cylinder indicates a wet fouled condi-



Simplified drawing of the fuel pump with the powerhead piston on the upward stroke. Notice the position of the diaphragm; the inlet disc is open; and the discharge disc is closed. The springs to preload the discs are not shown for clarity.



Drawing similar to the one to the left, with the powerhead piston on the downward stroke. Notice the position of the diaphragm; inlet disc is closed; and the discharge disc is open. Again, the springs to preload the discs are not shown for clarity.



Major parts of a typical fuel line squeeze bulb, used to prime the system and deliver fuel to the carburetor until the engine is operating and the pump/s can deliver fuel on their own.

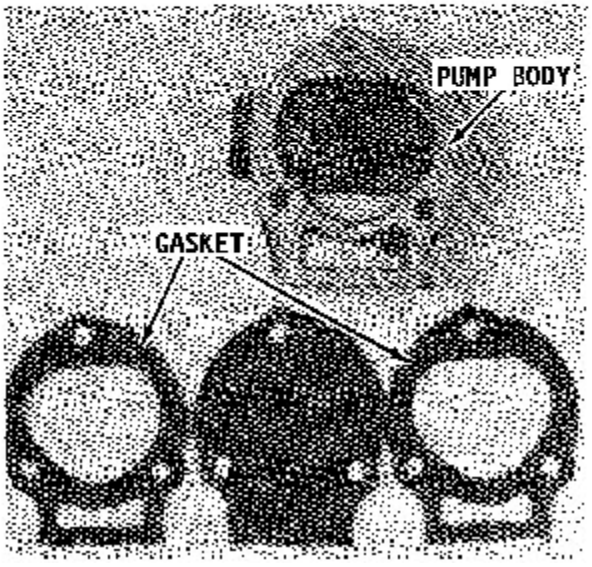
tion, as evidenced by a wet fouled spark plug, be sure to check the fuel pump diaphragm for possible puncture or leakage.

PUMP PRESSURE CHECK

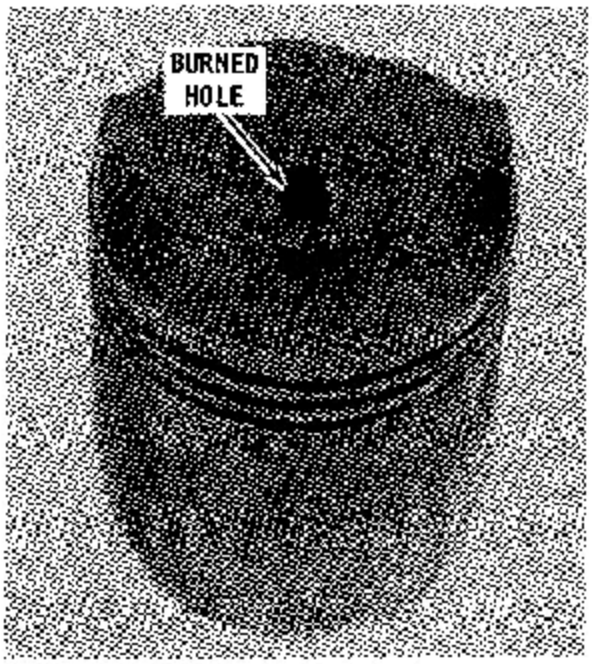
First, these words: Lack of an adequate fuel supply will cause the engine to run lean, lose rpm, or cause piston scoring. If an integral fuel pump carburetor is installed, the fuel pressure **cannot** be checked.

With a multiple carburetor installation, fuel pressure at the top carburetor should be checked whenever insufficient fuel is suspected.

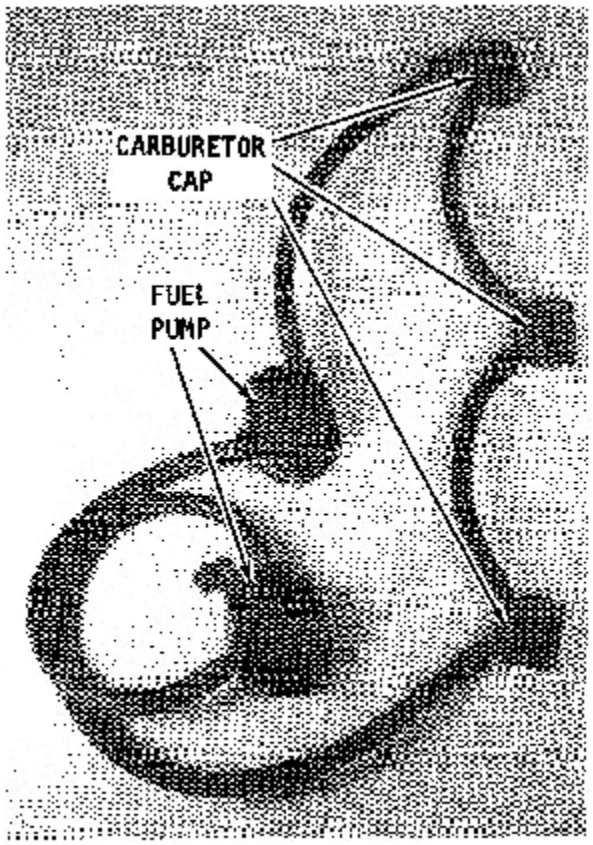
Fuel pressure should be checked if a fuel tank, other than the one supplied by the outboard unit's manufacturer, is being used. When the tank is checked, be sure the fuel cap has an adequate air vent. Verify that the fuel line from the tank is of sufficient size to accommodate the engine demands. An adequate size line would be one measuring from 5/16" to 3/8" (7.94 to 9.52mm) ID (inside diameter). Check the fuel filter on the end of the pickup in the fuel tank, to be sure it is not too small and that it is not clogged. Check the fuel pickup tube. The



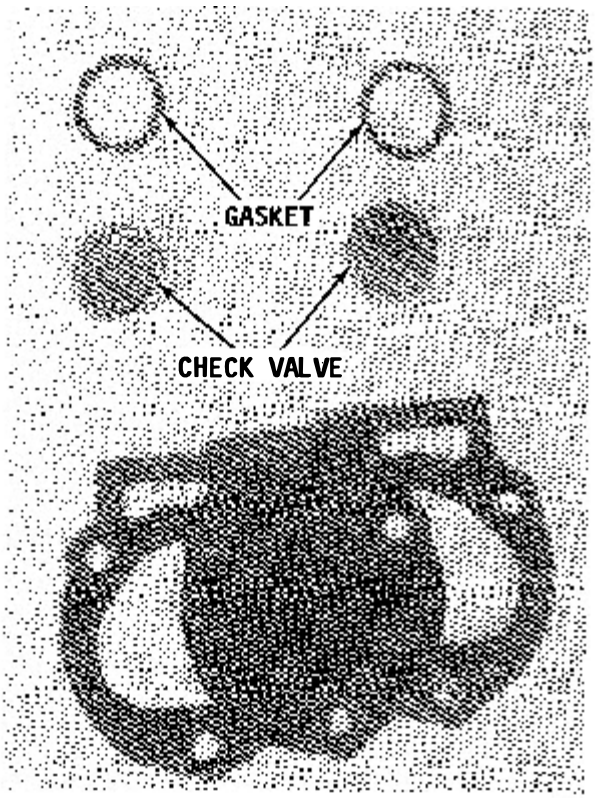
Major parts of a typical early model fuel pump.



Lack of adequate fuel, possibly a defective fuel pump, caused the burn condition damage to this piston.



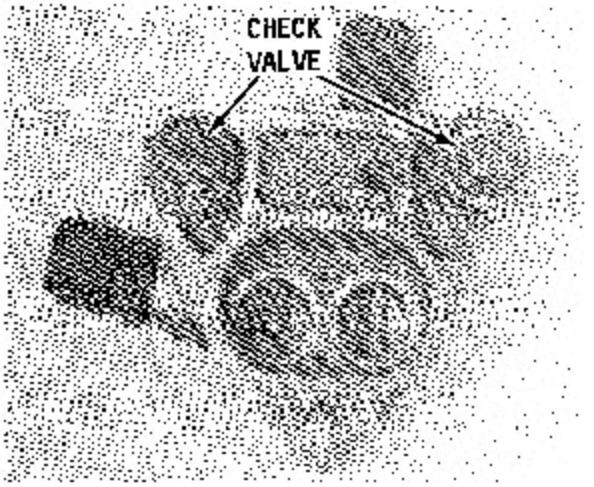
Fuel pump assemblies removed from the powerhead. Notice how the fuel lines are still connected to the pumps. Further disassembling may be performed on the work bench.



Major parts required to properly rebuild a fuel pump and return it to satisfactory service.

tube must be large enough to accommodate the fuel demands of the engine under all conditions. Be sure to check the filter at the carburetor. Sufficient quantities of fuel cannot pass through into the carburetor to meet engine demands if this screen becomes clogged.

To test: Install the fuel pressure gauge in the fuel line between the fuel pump and the carburetor. If multiple carburetors are installed, connect the gauge in the line to the top carburetor. Operate the engine at full throttle and check the pressure reading. The gauge should indicate at least 2 psi.



Typical fuel pump with the check valves removed. Notice how the valves face in opposite directions.

REMOVAL AND DISASSEMBLING EARLY TYPE FUEL PUMP PRIOR TO ABOUT 1989

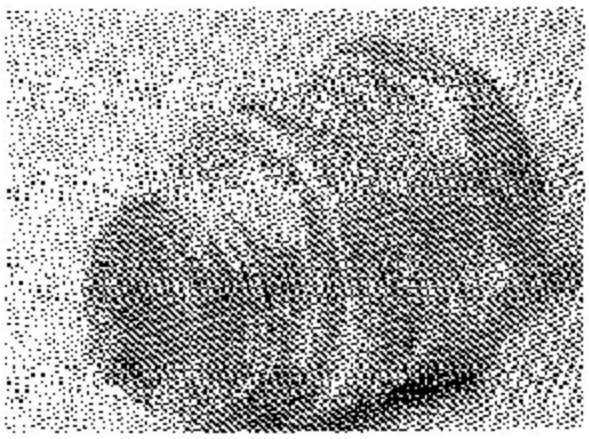
Turn the fuel shut-off valve to the **OFF** position or disconnect the fuel line either at the fuel tank or at the engine.

TAKE CARE: In most cases the bolts attaching the pump to the engine also secure the pump together. Therefore, hold the pump together with one hand and remove the attaching bolts with the other.

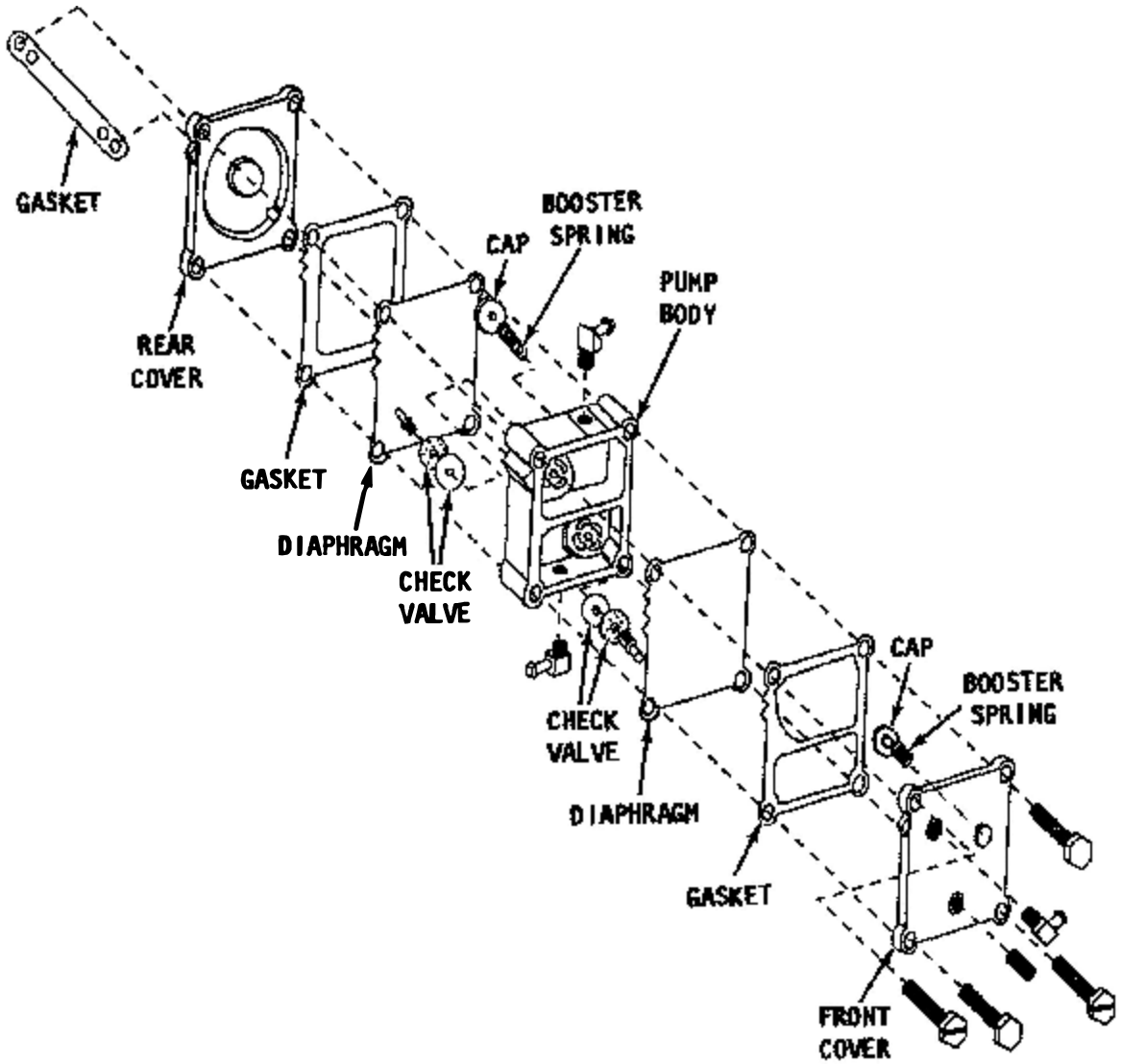
Remove the pump and lay it on a suitable work surface. Now **CAREFULLY** separate the parts and keep them in **ORDER** as an assist in assembling. As you remove the check valves **TAKE TIME** to **OBSERVE** and **REMEMBER** how each valve faces, because it **MUST** be installed in exactly the same manner, or the pump will not function.

REMOVAL AND DISASSEMBLING SQUARE TYPE FUEL PUMP SINCE ABOUT 1989

Turn the fuel shut-off valve to the **OFF** position. Cut away the sta-straps from the three hoses at the fuel pump. Disconnect the top and bottom fuel lines. Use a golf tee or a stubby pencil to plug the end of each disconnected hose to prevent the loss of fuel. Disconnect the pulse hose from the front surface of the pump. Observe the four bolts. Notice two of the bolts have slotted heads and two are just plain. The two bolts with slotted heads secure the pump to the block. The other two bolts will hold the pump components together while the pump



If the diaphragm in the fuel pump should rupture, an excessive amount of fuel would enter the cylinder and foul the spark plug, as shown.



Exploded drawing of the fuel pump installed on most powerheads -- 1989 and on -- major parts are identified.

is being removed. Therefore, remove the two slotted bolts and lift the pump clear of the block. Remove and discard the mounting gasket.

Lay the pump on a suitable work surface and remove the two remaining bolts. Now **CAREFULLY** separate the parts and keep them in **ORDER** as an assist in assembling. Do not remove the check valves unless they are defective. Once removed the valves cannot be used again. If the check valves are to be replaced, **TAKE TIME** to **OBSERVE** and **REMEMBER** how each valve faces, because it **MUST** be installed in exactly the same manner, or the pump will not function.

To remove a check valve, grasp the retainer with a pair of needlenose pliers and pull the valve from the valve seat.

CLEANING AND INSPECTING

Wash all parts thoroughly in solvent, and then blow them dry with compressed air. **USE CARE** when using compressed air on the check valves. **DO NOT** hold the nozzle too close because the check valve can be damaged from an excessive blast of air.

Inspect each part for wear and damage. Verify that the valve seats provide a flat contact area for the valve disc. Tighten all elbows and check valve connections firmly as they are replaced.

Test each check valve by blowing through it with your mouth. In one direction the valve should allow air to pass through. In the other direction, air should not pass through.

Check the diaphragm for pin holes by holding it up to the light. If pin holes are detected or if the diaphragm is not pliable, it **MUST** be replaced.

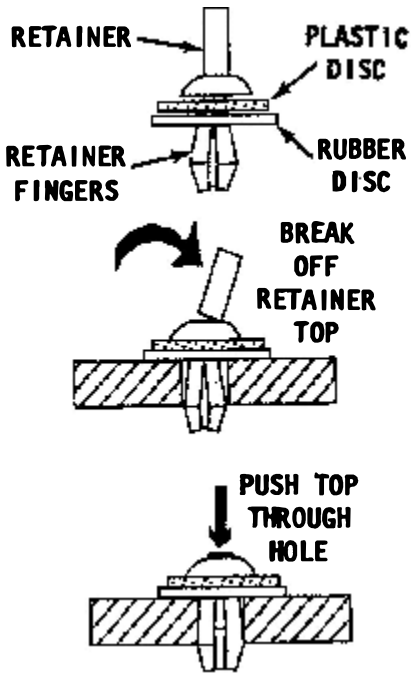
A fuel pump that is an integral part of the carburetor is covered in this Chapter, Section 4-8, Integral Fuel Pump Carburetor.

ASSEMBLING AND INSTALLATION EARLY TYPE FUEL PUMP PRIOR TO ABOUT 1989

Proper operation of the fuel pump is essential for maximum performance of the powerhead. Therefore, always use **NEW** gaskets.

NEVER use any type of sealer on fuel pump gaskets.

Place **NEW** check valve gaskets in position in their seats. Insert the check valve discs in their seats. The inlet check valve



Line drawing to illustrate the installation of new check valves into a late model square fuel pump.

seat is identified by the protruding tip in the casting. The flat side of the check valve seats over this tip. The outlet check valve is set in opposite, with the flat end up. In this position the tension is against the valves.

Install the retainer on the check valves in the housing and secure it in place with the two retaining screws.

Place a **NEW** gasket on the pump body, then the neoprene diaphragm, and finally another **NEW** gasket. Mate the fuel pump cover to the body and hold it all together.

CAREFULLY place the fuel pump on the engine base. Install the retaining screws through the pump and into the engine block. Tighten the screws alternately to a torque value of 85in lb (10Nm).

Connect the fuel lines or turn the fuel valve to the **ON** position.

ASSEMBLING AND INSTALLATION SQUARE TYPE FUEL PUMP SINCE ABOUT 1989

The fuel pump rebuild kit will contain new gaskets, diaphragms, and check valve components. Each check valve consists of a large rubber disc, a smaller plastic disc and a valve retainer.

Insert the fingers of the retainer into the smaller plastic disc and then the larger rubber disc. Install the two discs and

Insert the fingers of the retainer into the smaller plastic disc and then the larger rubber disc. Install the two discs and retainer onto the fuel pump body. Push in the retainer until the collar and both discs are tightly pressed against the pump body. Bend the end of the retainer from side to side until it breaks away from the collar. Install the broken off end through the hole in the collar and through the discs. Use a hammer and tap the retainer end down into place. As this piece is forced down, it will spread the fingers of the retainer and secure the check valve within the pump body.

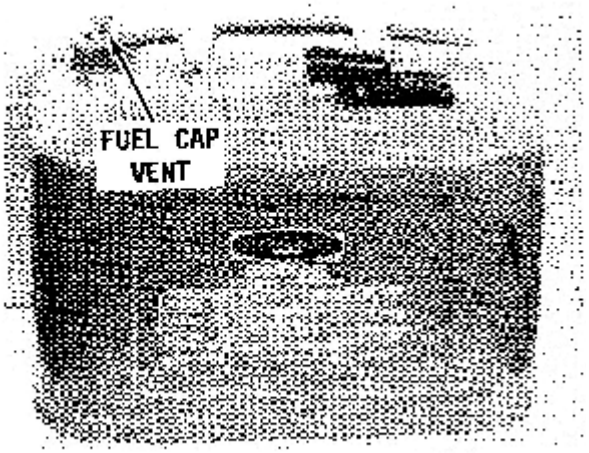
Place the larger of the two caps and boost springs into place on the back side of the pump body. All the layered components of the fuel pump have notches which **MUST** be aligned during assembling.

Place a **NEW** diaphragm on the pump body over the large booster spring and cap, followed by a new gasket and the rear cover. Make sure all the notches align.

Position a new diaphragm and gasket over the front of the pump body. Install the smaller booster spring and cap into the front cover. Mate the fuel pump front cover to the body and hold it all together. Secure the pump components together with the two plain head bolts installed in the top right and bottom left bolt holes.

Place the fuel pump on the powerhead base using a new mounting gasket. Install the two retaining screws with slotted heads through the pump and into the engine block. Tighten the screws alternately to a torque value of 50-60 in lb (5.5-6.8Nm).

Connect the fuel lines or turn the fuel valve to the **ON** position.



*The vent screw on top of the fuel tank **MUST** be opened to allow air to enter the tank and thus prevent a vacuum condition and lack of fuel flow in the system. Failure to open this vent screw has resulted in many frustrated moments for a countless number of boaters.*

4-12 OIL INJECTION

Oil injection systems replace the age old method of manually mixing oil with the fuel for lubrication of internal moving parts in the powerhead.

Since outboard units have grown in number of cylinders with accompanying increases in horsepower, and because the size of the fuel tanks also grew to handle the increased demand of these larger powerheads, the requirement for a more sophisticated method of mixing oil with the fuel for internal lubrication became a primary design objective.

Almost all outboard manufacturers have now developed their own method to provide adequate oil delivery to the cylinders under all demands of the powerhead. Each system has its own trade name.

"Auto Blend"

Mercury engineers designed and developed their oil injection system to "blend" the correct amount of oil with the fuel prior to delivery to the carburetors. Therefore, the trade name used is "Auto Blend", because the blending is accomplished automatically for all powerhead demands and conditions.

Fuel from the tank moves to the "Auto Blend" unit where it mixes with the oil and is then pumped to the powerhead.

Advanced Oil Injection

Since 1984 a new oil injection system has been installed on some 3- and 4-cylinder powerheads. The oil pump and an oil reservoir are mounted on the powerhead. The pump is driven by a worm gear directly off the crankshaft. Oil is pumped just a short distance to an oil/fuel mixing chamber and then routed to the carburetors.

System Description

"Auto Blend" was the first oil injection system installed on the outboard units covered in this manual. Originally it was used on only the larger horsepower outboards. Over the years, the system has been upgraded including the addition of an electronic control module, movement of the warning horn, and other improvements.

"Auto Blend" is not considered an optional accessory by the manufacturer and is not

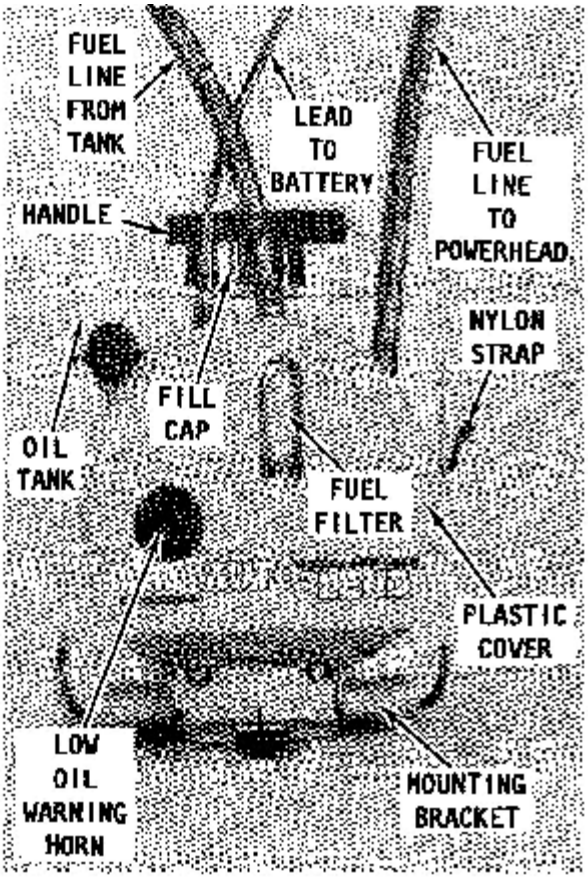
recommended to be installed on units not equipped with the system from the factory.

The system consists of an oil reservoir (tank), oil screen, diaphragm vacuum-operated fuel "pump", low oil warning horn, fuel filter, and the necessary fittings and hoses for efficient operation. The reservoir and associated parts are supported in a bracket mounted on a bulkhead or the boat transom. The unit is secured in the bracket with a nylon strap and Velcro fastener. This arrangement provides quick and easy removal from the boat for refilling, testing, or for security reasons.

Oil Reservoir (Tank)

The tank is constructed of slightly transparent material and the quantity of oil can be determined by a quick glance at the tank. The tank has sight level lines in half quart (0.47L) increments. **ONLY** 2-cycle outboard oil with a BIA rating of TC-W should be used.

Since 1987, an external sight gauge has been incorporated into the cowling. The oil level may now be checked without removing the cowling.



The Auto Blend unit ready to be secured in the bracket for service. Usually, short pieces of clear plastic support tubing (not shown), are placed over the end of the fuel lines to prevent kinking at the fittings.

A screen installed in the tank filters the oil mixing with the fuel. Normally, this screen does not require service.

Fuel "Pump"

A positive displacement diaphragm vacuum-operated fuel "pump" is mounted on the front of the oil tank. (In the strict sense of the word, it is not a pump because it is dependent on operation from another source.) The "pump" mixes oil with the fuel and is operated under vacuum supplied by the fuel pump mounted on the powerhead. The "pump" is provided with a drain plug.

Low Oil Warning Horn

A warning horn will sound to indicate one of two conditions:

a- The level of oil in the tank is dangerously low.

b- The oil screen in the tank has become clogged.

The horn circuit is connected to a 12-volt battery through leads and a harness plug. The **RED** lead is connected to the positive terminal of the battery. This lead has a 0.5 amp fuse installed as protection against damage to more expensive parts in the circuit. The black lead is connected to the negative battery terminal.

The harness plug should **NOT** be connected until the tank is filled with oil to prevent the horn from automatically sounding.

Fuel Lines

A 5/16" (7.87mm) I.D. hose is used to connect the fuel tank to the oil injection unit and also from the unit to the powerhead. The hose between the oil injection tank and the powerhead pump should never exceed 5 feet (1.50 meters). Clear plastic support tubing (not shown in the accompanying illustration) is usually used over the fuel lines and secured with standard hose clamps. These support tubes will prevent kinking at the fittings and subsequent restriction of fuel flow through the fuel lines.

The inlet fitting of the oil tank also serves as a fuel filter. With this arrangement, the fuel must pass through the filter before mixing with the oil in the tank. The filter is transparent, therefore, sediment can quickly be identified when it is present. The filter can be easily removed, cleaned, and installed, without any special tools.

A primer bulb must be installed between the oil injection unit and the fuel pump on the powerhead. **NEVER** connect the primer bulb between the fuel tank and the oil tank. This error could cause serious damage to the oil injection unit by providing excessive pressure.

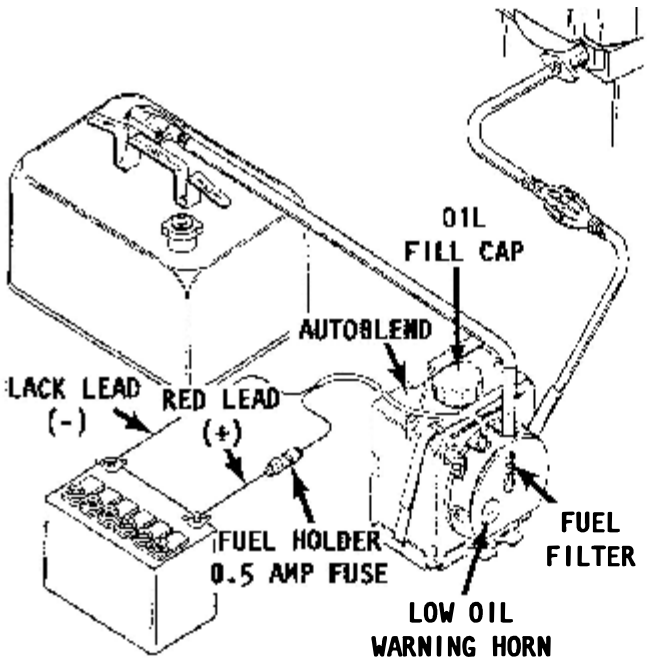
OPERATION

While the powerhead is operating, the oil injection unit provides a variable fuel/oil mixture to the fuel pump in a ratio of 50:1 at full throttle. This is standard mixture for normal operation.

During the break-in period for a new or overhauled powerhead, oil should be added to the fuel tank in a ratio of 50:1. This ratio of oil in the fuel tank, added with the ratio of 50:1 from the oil injection unit will provide a mixture of 25:1 to the powerhead. This ratio is recommended by the manufacturer during the break-in period.

During normal operation, the level of oil in the tank will drop at a steady rate.

The unit must be positioned where the helmsperson may occasionally notice the decreasing amount in the tank. The decreasing oil level indicates the system is functioning properly and is supplying the correct proportions of fuel and oil to the powerhead.



Functional diagram depicting complete hookup of the Auto Blend oil injection system.

TROUBLESHOOTING

Lack of Fuel

If the powerhead fails to operate properly and troubleshooting indicates a lack of fuel to the fuel pump, the problem may be blockage of fuel in the fuel lines, in the fuel passageway, in the oil injection unit, or a clogged fuel filter.

First, check the fuel lines to be sure they are free of stress, kinks, and nothing is laying on them, i.e.: tackle box, bait tank, etc.

Next, check the filter at the oil injection unit. Because the filter is transparent, any foreign material may be quickly discovered. The filter may be removed, cleaned, and installed quickly, without the use of any special tools.

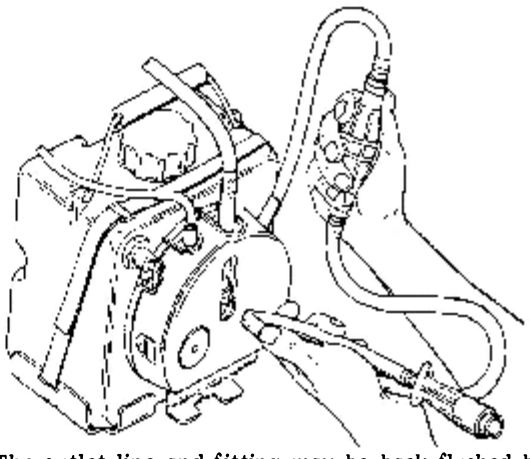
Finally, the fuel passageway in the "Auto Blend" unit may need to be back-flushed. This is accomplished by simply kinking the line and at the same time slowly squeezing the primer bulb, as shown in the accompanying illustration. The primer bulb should only be squeezed a few times to prevent building up excessive pressure in the unit.

Warning Horn Sounds

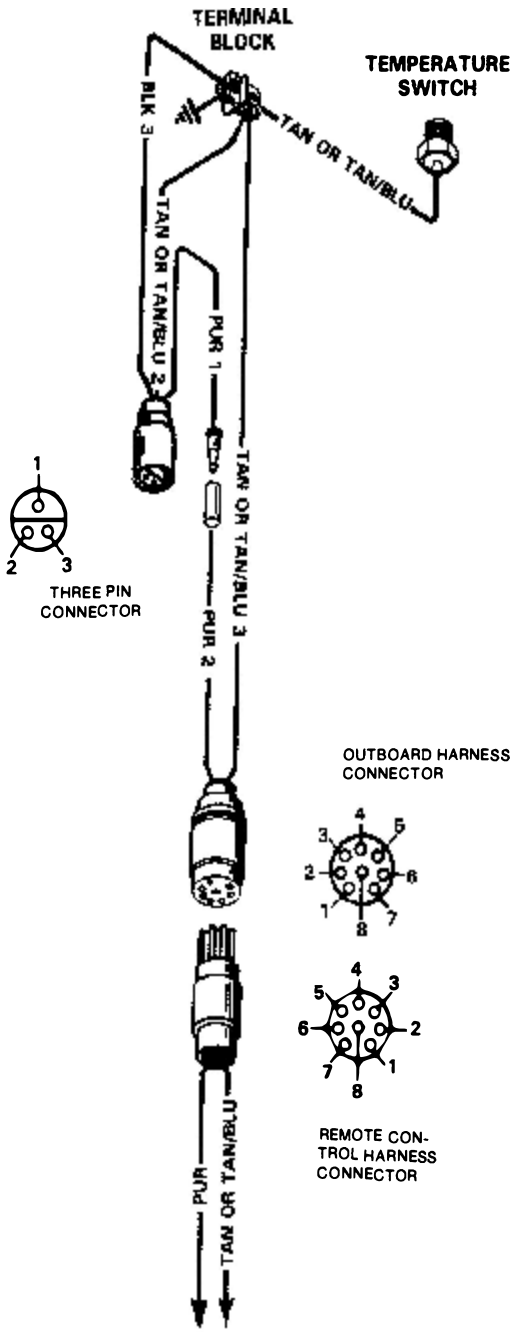
If the horn should sound during operation of the outboard unit, shut down the unit immediately and make a couple of quick checks.

First, check the oil level in the tank and replenish as required.

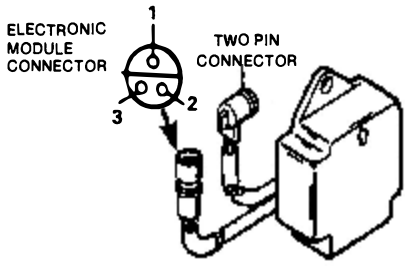
Next, check the oil screen in the tank. If it is clogged with sediment, remove the filter, clean it, and install it back in the tank.



The outlet line and fitting may be back-flushed by kinking the hose and using the squeeze bulb, as explained in the text.



Auto Blend harness identification for resistance tests outlined in the text.



The electronic module and harnesses for the later version of Auto Blend.

If the warning horn sounds when it should, but is intermittent, or weak, the indication is an excessive resistance or a loose connection in the circuit.

Warning Horn Fails To Sound (When it should — low or no oil)

Models W/O Electronic Module

If the warning horn does not sound when the "Auto Blend" unit is inverted: First, check the 0.5 amp fuse in the in-line holder of the positive lead to the battery. Then, disconnect the two prong plug between the battery and the warning horn on the unit. Obtain and set a voltmeter to the 12V DC scale. Insert the two meter leads into the battery end of the disconnected plug. The meter should register at least 9V. If less than 9V is registered, the fault lies in the battery harness, the connector plug or the battery terminals. Correct or repair as necessary.

If the meter registers at least 9V, check for loose or dirty connections at the warning horn and repeat the test once more using two jumper leads in place of the battery harness.

Obtain and set an ohmmeter to the RX1000 scale. Insert one meter lead into the two prong connector leading from the warning horn. Make contact with the other meter lead to a suitable ground on the powerhead. The meter should register continuity. If continuity is not indicated, the horn is defective and must be replaced.

If continuity is indicated, check the battery connections and then the charge condition of the battery.

If the problem still persists, inspect the internal oil filter and finally replace the warning horn.

Models W/Electronic Module

If the warning horn does not sound a self test "beep" when the ignition switch is rotated to the **"ON"** position, proceed as follows: Identify the Purple lead between the main outboard harness connector and the three prong connector to the electronic module. Disconnect this lead at the quick disconnect fitting. Obtain and set a voltmeter to the 12V DC scale. With the ignition switch in the **"ON"** position, make contact with the Black meter lead to the negative battery terminal and the Red me-