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During high-speed operation, gas quantity is limited, the plug is not foul and will therefore fire in a satisfactory manner.

If the fuel pump fails to perform properly, an insufficient fuel supply will be delivered to the carburetor. This lack of fuel will cause the engine to run lean, lose rpm or cause piston scoring.

**Tune-up Task**

Remove the fuel filter on the carburetor. Wash the parts in solvent and then dry them with compressed air. Install the clean element. A fuel pump pressure test should be made any time the engine fails to perform satisfactorily at high speed.

**NEVER** use liquid Neoprene on fuel line fittings. Always use Permatex when making fuel line connections. Permatex is available at almost all marine and hardware stores.

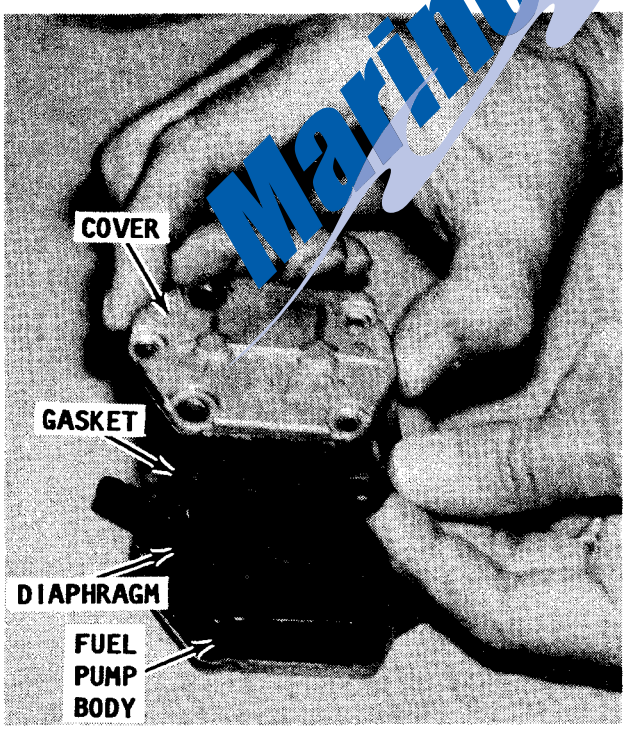
To service the fuel pump, see Chapter 4.

## 2-11 CRANKING MOTOR

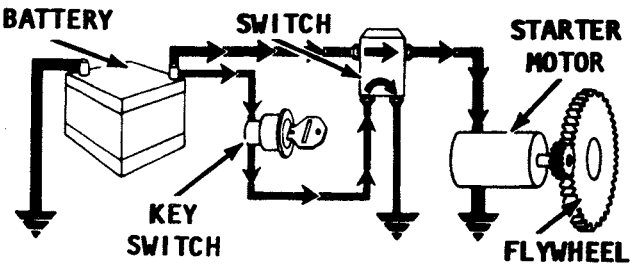
**Cranking Motor Test**

Check to be sure the battery has a 70-ampere rating and is fully charged. Would you believe, many cranking motors are needlessly disassembled, when the battery is actually the culprit.

Lubricate the pinion gear and drive shaft with No. 10 oil.




*Arrangement of vacuum operated fuel pump parts. A tiny hole in the diaphragm can affect performance.*




*Functional diagram of a typical cranking circuit.*

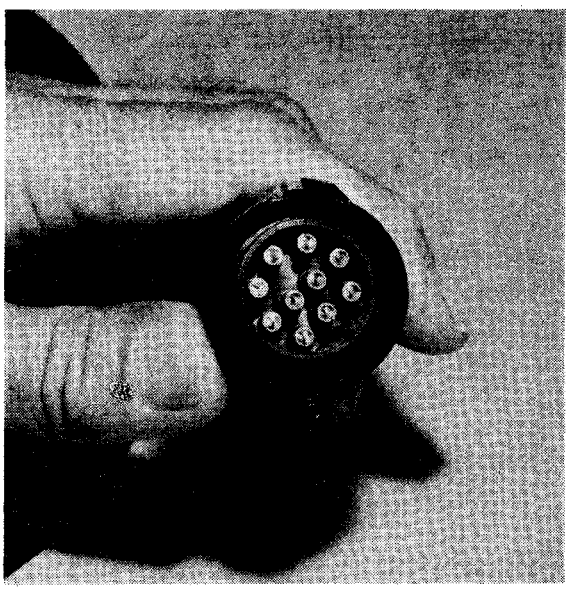
Connect one lead of a voltmeter to the positive terminal of the cranking motor. Connect the other meter lead to a good ground on the engine. Check the battery voltage under load by turning the ignition switch to the **START** position and observing the voltmeter reading.

If the reading is 9-1/2 volts or greater, and the cranking motor fails to operate, repair or replace the cranking motor. See Chapter

## 2-12 INTERNAL WIRING HARNESS

Check the internal wiring harness if problems have been encountered with any of the electrical components. Check for frayed or chafed insulation and/or loose connections between wires and terminal connections.

Check the harness connector for signs of corrosion. Inspect the electrical "prongs" to be sure they are not bent or broken. If the harness shows any evidence of the foregoing problems, the problem must be corrected before proceeding with any harness testing.



*Harness connector, with the prongs properly cleaned, ready for continued service.*

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Verify the "prongs" of the harness connector are clean and free of corrosion. Convince yourself a good electrical connection is being made between the harness connector and the remote control harness.

## 2-13 WATER PUMP CHECK

### FIRST, SOME GOOD WORDS

The water pump **MUST** be in very good condition for the engine to deliver satisfactory service. The pump performs an extremely important function by supplying enough water to properly cool the engine. Therefore, in most cases, it is advisable to replace the complete water pump assembly at least once a year, or anytime the lower unit is disassembled for service.

Sometimes during adjustment procedures, it is necessary to run the engine with a flush device attached to the lower unit. **NEVER** operate the engine over 1000 rpm with a flush device attached, because the engine may **"RUNAWAY"** due to the no-load condition on the propeller. A "runaway" engine could be severely damaged.

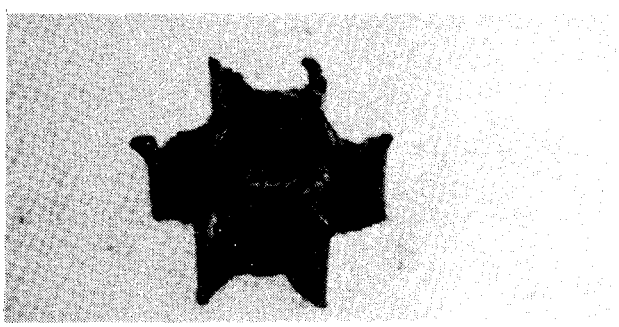
As the name implies, the flush device is primarily used to flush the engine after use in salt water or contaminated fresh water. Regular use of the flush device will prevent salt or silt deposits from accumulating in the water passage-way. During and immediately after flushing, keep the unit in an upright position until all water has drained from the intermediate housing. This will prevent water from re-entering the powerhead by way of the intermediate housing and the exhaust during the flush. It will also prevent additional water from being trapped in the intermediate housing and other passageways.

All powerheads covered in this manual have water exhaust ports which deliver a tattle-tale stream of water, if the water pump is functioning properly during engine operation. Water pressure at the cylinder block should be checked if an overheating condition is detected or suspected.

To test the water pump, the lower unit **MUST** be placed in a test tank or the boat moved into a body of water. The pump must now work to supply a volume to the engine. A tattle-tale stream of water should be visible from the pilot hole beneath the cover cowling.

Lack of adequate water supply from the water pump thru the engine will cause any number of powerhead failures, such as stuck rings, scored cylinder walls, burned pistons, etc.

For water pump service, see Chapter 9.

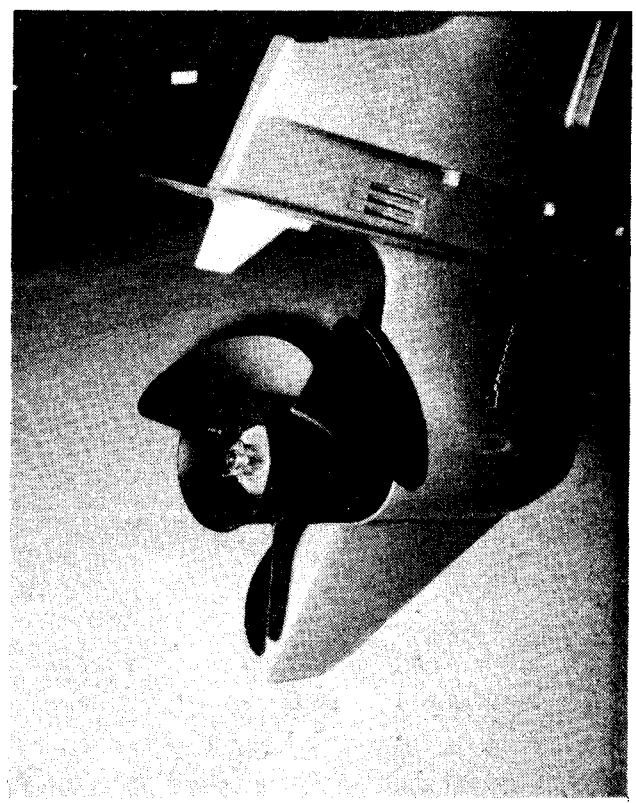


*Worn water pump impeller, unfit for further service.*

## 2-14 PROPELLER

Check the propeller blades for nicks, cracks, and bent condition. If the propeller is damaged the local marine dealer can make repairs or send it out to a shop specializing in this work.

Remove the propeller and the thrust hub. Check the propeller shaft seal to be sure it is not leaking. Check the area just forward of the seal to be sure a fish line is not wrapped around the shaft.



*Lower unit and propeller of a Model 30hp unit, cleaned, serviced, and ready for work.*

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from which an item is viewed is of no consequence, because **starboard** and **port** **NEVER** change no matter where the individual is located or his position -- even standing on his/her head.

## 3-2 OUTBOARD SERIAL NUMBERS

The outboard serial number and the engine serial number are the manufacturer's key to engine changes. These numbers identify the year of manufacture, the qualified horsepower rating, and the parts book identification. If any correspondence or parts are required, the engine serial number **MUST** be used or proper identification is not possible. The accompanying illustration will be very helpful in locating the engine identification tag for the various models.

The outboard number is stamped on the plate usually attached to the port side of the clamp bracket.

The powerhead serial number is usually stamped on the port side of the cylinder block.

### ONE MORE WORD

As a theft prevention measure, a spec[ial] label with the outboard serial numb[er] is bonded to the starboard side of t[he] c[lamp] bracket. Any attempt to remove t[he] l[abel] will result in cracks across the [serial] number.

## 3-3 EMERGENCY TETHE[R]

Late model outb[oard] u[nits] covered in this manual are e[quipped] with an emergency tether by the m[anufacturer]. This tether must be in place behind the "kill" switch or the powerhead cannot be started. If the powerhead is operating and the tether is removed, the unit will immediately shut down.


*Serial numbers on the identification plate of a late model outboard unit covered in this manual. This is a standard location for the plate, although some units may have it elsewhere.*

### Explanation

The plastic tether acts as a spacer, moving the "kill" button out slightly and allowing an internal contact to be closed, permitting the ignition circuit to be completed and the powerhead to be started.

The "kill" button may now be depressed to shut the powerhead down with the tether in place. If the t[ether] is pulled free from behind the "kil[l] b[utton], the button pops inward and th[e] i[gnition] circuit is opened. With the "k[ill]" switch in this position, no amount of c[ran]king will result in powerhead startup.

The p[ur]pose of this tether is two fold.

### As a Safety Feature

When this tether is used as intended by the manufacturer, the boat operater attaches the belt hook onto his/her clothing at any convenient location. Should the operator be thrown overboard or knocked forward away from the outboard unit, the tether will be pulled free of the "kill" button, and the powerhead will be shut down.

### As a Security Feature

If the boat is moored and will be left unattended, the owner may take the entire emergency tether with him/her. Without the tether in place behind the "kill" button, the powerhead cannot be started. Any attempt to start the powerhead and steal the boat will be unsuccessful -- unless the thief is familiar with this particular security device.

### Temporary Replacement

If the boat owner loses the emergency tether and is unable to obtain one immediately from the local Mariner dealer, an emergency substitute tether may be made using only a common knife and a couple pieces of plastic.

First, obtain a piece of plastic from the cover of a container of margarine, whipped topping, or similar product.

Next, using the pattern shown on the following page cut out about four shapes, as shown. Stack the four cutouts together,

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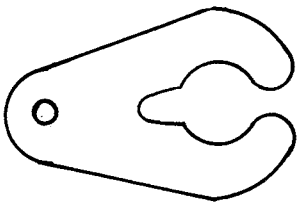


*Pattern to be used to fabricate a "homemade" emergency tether, as explained in the text.*

secure them with a paper clip, or similar object, and then insert them behind the "kill" switch.

**SPECIAL WORDS**

If the material described is not available, obtain some other pliable material and cut the shape indicated. The thickness of the substitute tether device should be approximately 1/8" (3mm). About 100 pages (50 sheets) of this manual is approximately the proper thickness.

**REMEMBER,** use this device only in an emergency situation and purchase the proper tether from the local Mariner dealer at the first opportunity. By substituting this "home made" tether, both the safety and th security features intended by the manuf turer have been lost.

## 3-4 LUBRICATION - COMPLETE N

As with every type mech a tion with moving parts, lubrica s a prominent role in operation, nt, and longevity of the unit.

If an outboa operated in salt water the freq ng lubricant to fittings is usu n half for the same fitting if the u is used in fresh water. The few minutes involved in moving around the outboard applying lubricant and at the same time making a visual inspection of its general condition will pay in rich rewards with years of continued service.

It is not uncommon to see outboard units well over 20-years of age moving a boat through the water as if the unit had recently been purchased from the current line of models. An inquiry with the proud owner will undoubtedly reveal his main credit for its performance to be regular periodic maintenance.

The accompanying chart can be used as a guide to periodic maintenance while the outboard is being used during the season.

In addition to the normal lubrication listed in the lubrication chart, the prudent owner will inspect and make checks on a regular basis as listed in the accompanying chart.

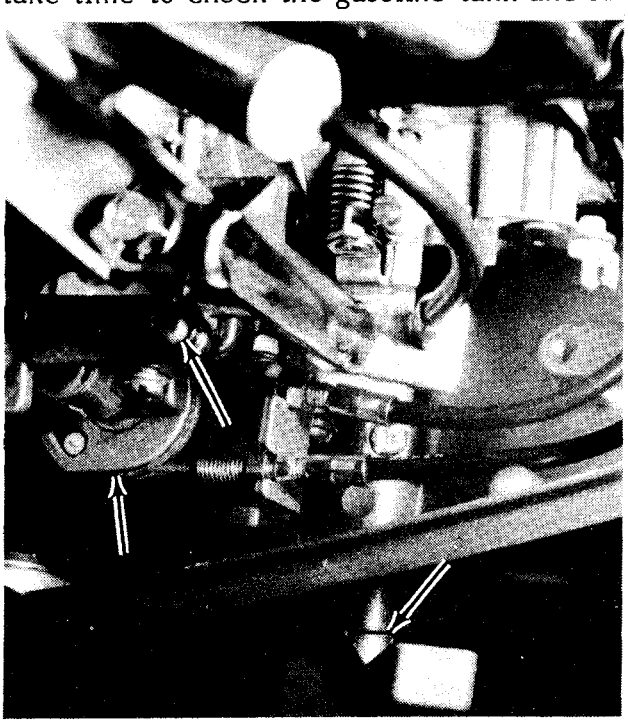
## 3-5 PRE-SEASON PREPARATION

Satisfactory performance and maximum enjoyment can be realized if a little time is spent in preparing the outboard unit for service at the beginning of the season. Assuming the unit has been properly stored, as outlined in Section 3-12, a minimum amount of work is required to prepare the unit for use.

The follow ps outline an adequate and logical seq of tasks to be performed before e outboard the first time in a new

1- L cate the outboard according to the an cturer's recommendations. Refe the lubrication chart. Remove, clean, adjust, and install the spark plugs w new gaskets (if they require gaskets). ak a thorough check of the ignition sys- . This check should include: the points, l, condenser, stator assembly, condition of the wiring, and the battery electrolyte level and charge.

2- If a built-in fuel tank is installed, take time to check the gasoline tank and all



*Various lubrication points called out in the chart on the following page.*

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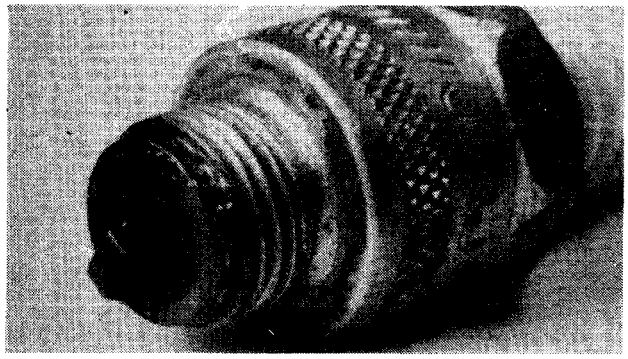


*Fouled spark plug, possibly caused by the operator's habit of overchoking or a malfunction holding the choke closed. Either of these conditions delivered a too-rich fuel mixture to the cylinder.*

to perform a tune-up to eliminate such areas as: defective points; faulty spark plugs; and timing out of adjustment.

Other problems that can prevent an engine from running smoothly include: An air leak in the intake manifold; uneven compression between the cylinders; and sticky or broken reeds.

Of course any problem in the carburetor affecting the air/fuel mixture will also prevent the engine from operating smoothly at idle speed. These problems usually include: Too high a fuel level in the bowl; a heavy float; leaking needle valve and seat; defective automatic choke; and improper adjustments for idle mixture or idle speed.

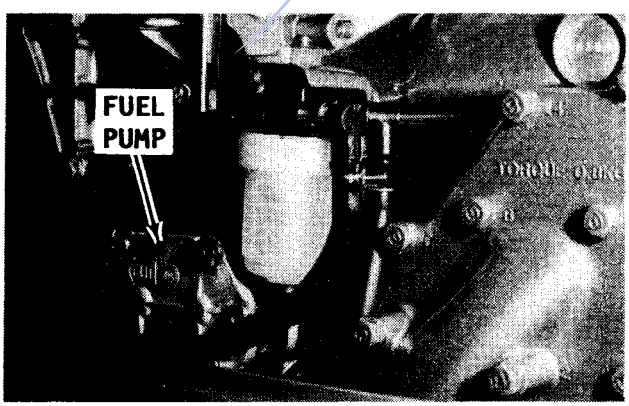
## EXCESSIVE FUEL CONSUMPTION

Excessive fuel consumption can be the result of any one of three conditions, or a combination of all three.

1- Inefficient engine operation.

2- Faulty condition of the hull, including excessive marine growth.

3- Poor boating habits of the operator.




*Vacuum operated fuel pump installation on a 25hp or 30hp two-stroke powerhead.*

If the fuel consumption suddenly increases over what could be considered normal, then the cause can probably be attributed to the engine or boat and not the operator.

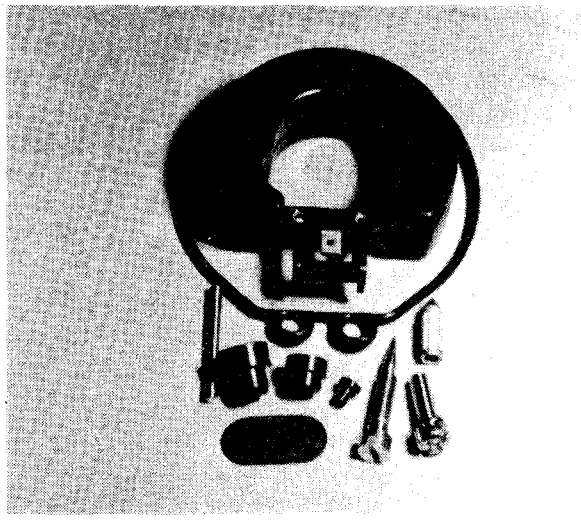
Marine growth on the hull can have a very marked effect on boat performance. This is why sail boats always try to have a haul-out as close to race time as possible. While you are checking the bottom, take note of the propeller condition. A bent blade or other damage will definitely cause poor boat performance.

If the hull and propeller are in good shape, then check the fuel system for possible leaks. Check the line between the fuel pump and the carburetor while the engine is running and the line between the fuel tank and the pump while the engine is not running. A leak between the tank and the pump many times will not appear when the engine is operating because the suction created by the pump drawing fuel will not allow the fuel to leak. Once the engine is turned off and the suction no longer exists, fuel may begin to leak.

If a minor tune-up has been performed and the spark plugs, points, and timing are properly adjusted, then the problem most likely is in the carburetor and an overhaul is in order. Check the needle valve and seat for leaking. Use extra care when making any adjustments affecting the fuel consumption, such as the float level or automatic choke.

## ENGINE SURGE

If the engine operates as if the load on the boat is being constantly increased and



*Major parts found in a typical carburetor repair kit.*

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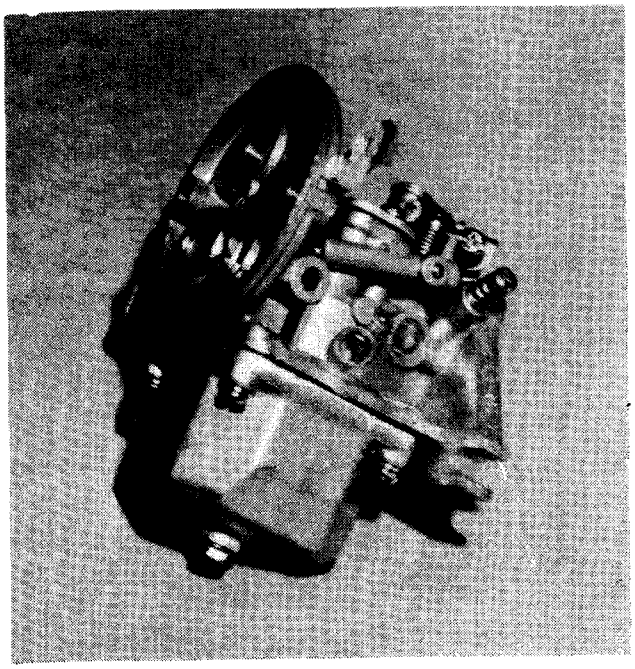


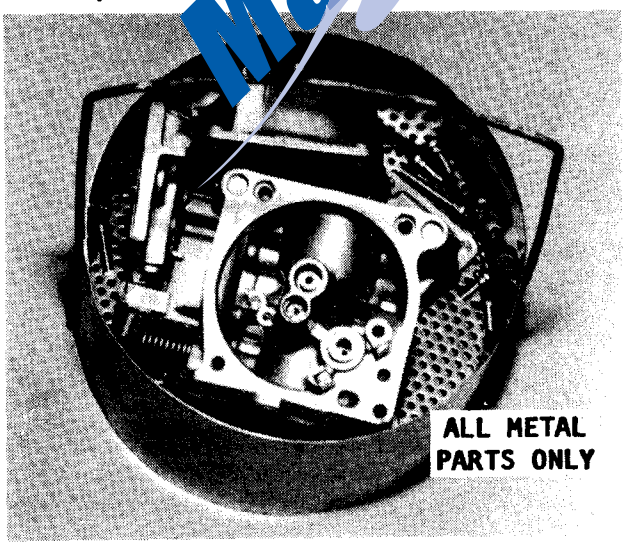
*Carburetor "C" cleaned, properly serviced with new parts, assembled, and ready for installation on the powerhead.*

decreased, even though an attempt is being made to hold a constant engine speed, the problem can most likely be attributed to the fuel pump, or a restriction in the fuel line between the tank and the carburetor.

Operational description and service procedures for the fuel pump are given in Section 4-17.

## 4-5 CARBURETOR MODEL

Eleven, yes, eleven different carburetors have been used over the years on the outboard powerheads covered in this manual.




*Metal carburetor parts in a basket ready to be immersed in a carburetor cleaning solution.*

Complete, detailed, illustrated procedures for each carburetor are presented in separate sections of this chapter. To determine which carburetor is installed on the outboard unit being serviced, check the following table under powerhead size and year of production. Sometimes two different carburetors were installed on the same model. The letter designation in the third column is used throughout this chapter and in the Appendix.

| HP MODEL | YEAR | CARB | COMMENTS |
|---|---|---|---|
| 2 | 1977 & On | A | |
| 3.5 | 1978 & On | B | Air Cooled |
| 4 | 1977 & On | C | |
| 5 | 1977-79 | D | Air Cooled |
| 5 | 1979 & On | C | Water Cooled |
| 8 & 8W | 1977-79 | E | |
| 8 & 8W & Mariner 8 | 1979 & On | F/G | Both Used |
| 9.9C & 15C | 1977 & On | F/G | Both Used |
| 8C | 1979 & On | G | |
| 15W & 15 | 1977-79 | H | |
| 20 | 1977 & On | J | |
| 25 | 1980 & On | J | |
| 28 | 1977-79 | J | |
| 30 | 1980 & On | J | |
| 40 | 1978 & On | K | |
| 48 | 1977-79 | L | |
| 55 | 1986 & On | L | |
| 60 | 1977-83 | L | |

Complete detailed service procedures for each carburetor are presented in separate sections.

### SPECIAL GOOD WORDS

Carburetor repair kits, available at the local service dealer, contain the necessary parts to perform a proper carburetor overhaul. In most cases, an illustration showing the parts contained in the package is included in the Cleaning and Inspecting portion for each carburetor.

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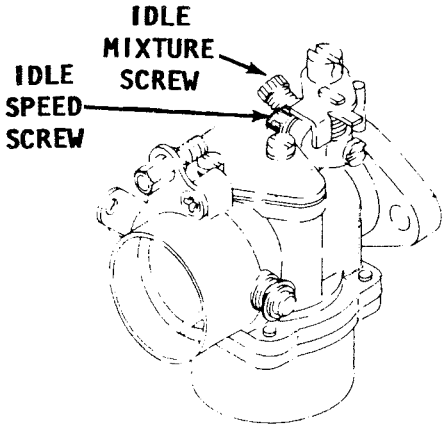



*Line drawing of Carburetor "D", used on 5hp air cooled powerheads, with adjustment screws identified.*

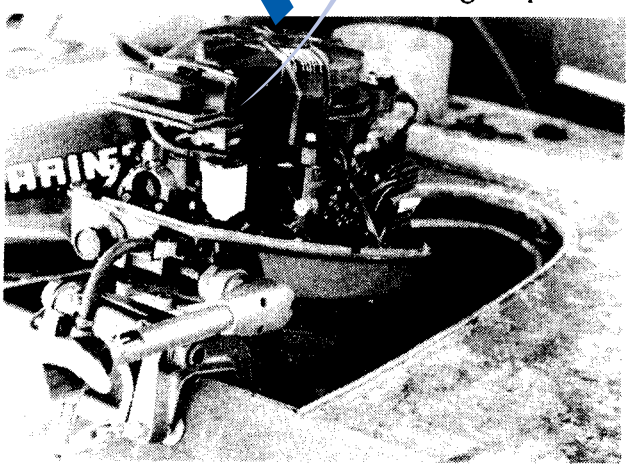
CAUTION

**Water must circulate through the lower unit to the powerhead anytime the powerhead is operating to prevent damage to the water pump in the lower unit. Just five seconds without water will damage the water pump impeller.**

Obtain a tachometer. Connect the Red tachometer lead to the primary windings of the ignition coil (mounted on the starboard side of the block). Connect the Black tachometer lead to a suitable ground on the powerhead.

Start the powerhead and allow it to idle for a few minutes, and then shut down the powerhead and remove the silencer.

Obtain about one foot (3[illegible] 1/4" (6mm) inner diameter transparent vinyl tubing and connect one end to the fitting at the base of the float bowl. Bend the other end up to prevent fuel from draining from the float bowl. Back out the knurled drain screw next to the tubing on the bowl and allow fuel to drain into the tubing loop.



*Unit in a test tank ready for fine carburetor adjustments to be made, after the cowling is removed.*

The distance between the level of fuel in the line and the carburetor bore centerline must be 1 1/8" (28mm). If the distance is less than specified, the float is dropping down too far inside the float bowl. The float tab must be pushed toward the float "just a whisker" to correct the level. If the distance is greater than specified, the float level is too high inside the bowl and the float tab must be pulled away from the float "just a whisker" to correct the level.

If the float level is incorrect, the float bowl must be completely drained and removed. Make the necessary adjustments to the float tab and repeat this step until the float level matches specifications.

**Idle Speed Adjustment**

Connect a tachometer to the powerhead, as previously directed. If the carburetor was not overhauled, rotate the idle mixture screw (the screw threaded into the carburetor body, not to be confused with the idle speed screw, threaded into the throttle shaft linkage), to lightly seat the screw. Back the screw out 1 3/8 turns. This screw is left as set and must not be rotated to adjust powerhead rpm.

Allow the powerhead to warm to normal operating temperature. Shift the unit into **FORWARD** gear, and adjust the idle speed screw, located at the top of the throttle shaft linkage, on the starboard side, until the powerhead idles between 1550 and 1650 rpm.

**High Speed Adjustment**

There is no high speed adjustment possible on this type carburetor. A fixed main jet is located on the top of the mixing chamber center turret. The standard size of the main jet on this carburetor is gauge No. 82.

If the outboard is to be consistently operated in cold climates or at high speeds between 4500-5500 rpm, then the owner may consider replacing the main jet with a jet having a smaller gauge number.

If the outboard is to be consistently operated at low idle speeds or at elevations higher than 2500 ft above sea level, then the main jet should be replaced with one having a higher gauge number.

Detailed timing and synchronizing procedures are presented in Chapter 6.

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## 4-10 CARBURETOR "E" USED ON 8A AND 8HP POWERHEADS 1977-79

This section provides complete detailed procedures for removal, disassembly, cleaning and inspecting, assembling including bench adjustments, installation, and operating adjustments for Carburetor "E", as used originally on early 8A and 8hp units. This carburetor is a single-barrel, float feed type with a manual choke.

### FIRST, THESE WORDS

Good shop practice dictates a carburetor repair kit be purchased and new parts be installed any time the carburetor is disassembled.

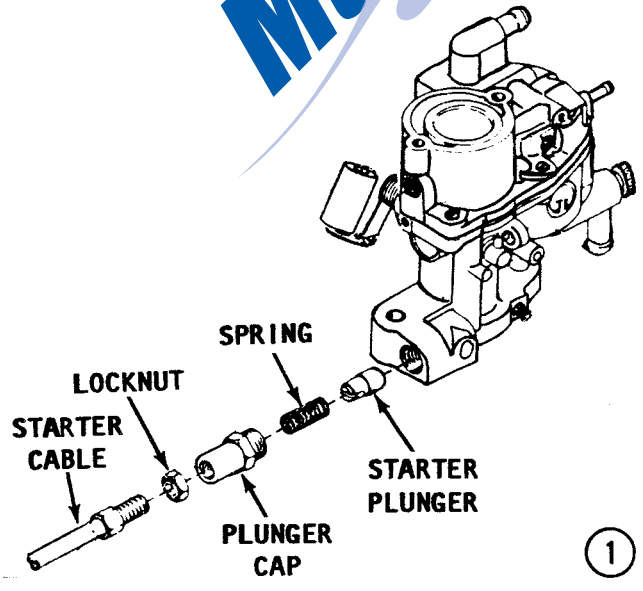
Make an attempt to keep the work area organized and to cover parts after they have been cleaned. This practice will prevent foreign matter from entering passageways or adhering to critical parts.

### REMOVAL

1- Remove the two screws and the air box from the top of the carburetor. Squeeze the wire type fuel hose clamp and move it back along the fuel line. Work the fuel line free of the fitting. Disconnect the second fuel line to the carburetor in a similar manner. Plug the fuel line from the fuel pump to prevent loss of fuel.

Use two open end wrenches and back off the nut from the plunger cap. Remove the starter cable adjusting fitting from the plunger cap. Remove the nut and cap. Reach in with a pair of needle nose pliers and remove the spring and starter plunger.

Remove the two securing nuts from the vertically mounted studs and lift off the carburetor. Remove and discard the mounting gasket.



1

### DISASSEMBLING

### FIRST, THESE SPECIAL WORDS

Seven screws are found on the exterior of this carburetor, not counting the four float bowl securing screws. Three screws are located above the float bowl parting line and four below the line. Take time to make arrangements to identify and tag each screw as it is removed to ensure it is installed back in its original location.

Above the parting line on the forward face: identify a single pan head screw and lockwasher securing a plate to the carburetor. There is no reason to remove this screw during a carburetor overhaul.

Above the parting line on the starboard side: identify the idle jet plug, threaded into the carburetor body.

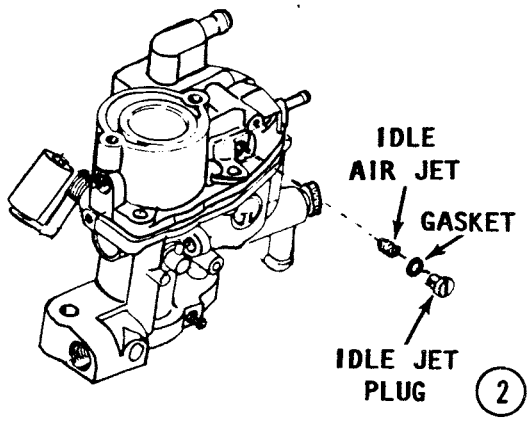
Above the parting line on the aft side: identify the main nozzle plug.

Below the parting line on the forward face: identify a screw with a knurled head and spring. This screw is the float bowl drain screw.

Below the parting line on the starboard side: identify the throttle stop screw and spring, threaded into a boss on the carburetor body.

Below the parting line on the starboard side: identify the idle mixture screw, threaded into the carburetor body.

Below the parting line on the port side: identify the throttle shaft friction screw, threaded into the carburetor body. This screw is not normally removed during a



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