

SERVICE MANUAL
1966-1967

6 and 9.2 H.P. OUTBOARD MOTORS

CHRYSLER OUTBOARD CORPORATION

HARTFORD, WISCONSIN, U. S. A.

CHRYSLER CANADA OUTBOARD LTD.

BARRIE, ONTARIO, CANADA



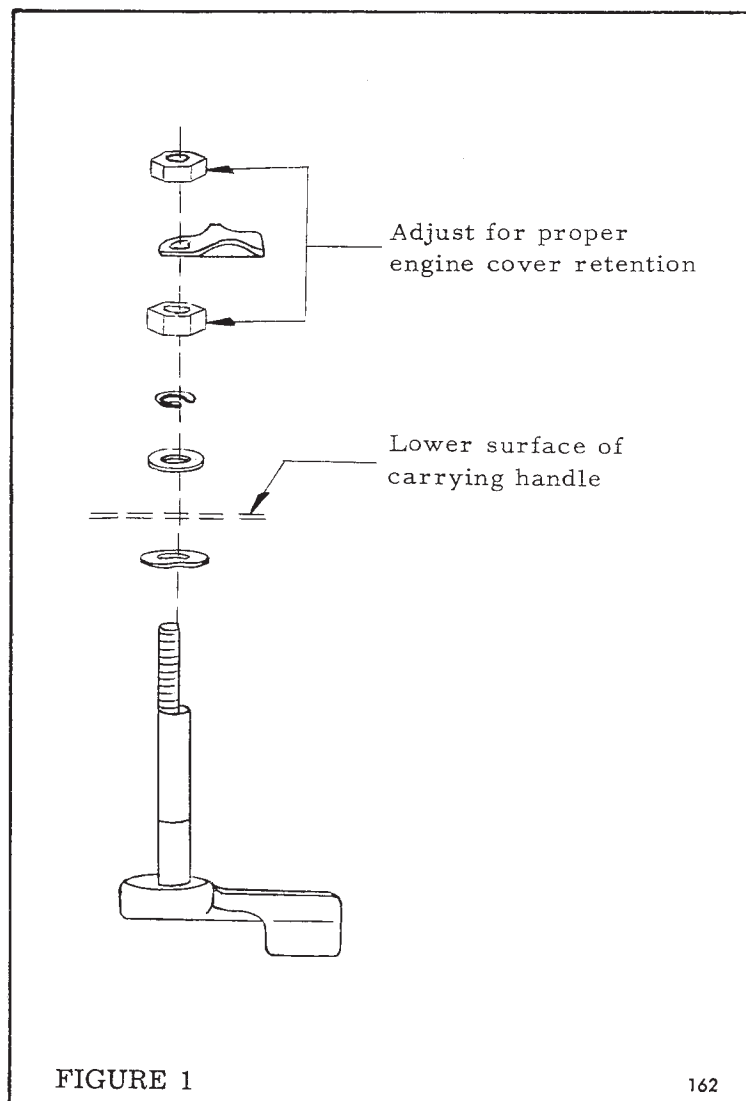
ENGINE COVER

ENGINE COVER

The engine cover is constructed of pigmented polyester resin, impregnated with glass fibres for increased strength. It is 50% lighter than aluminum, has 2½ times the impact strength of steel and is highly sound absorbent.

ADJUSTING ENGINE COVER LATCH MECHANISM

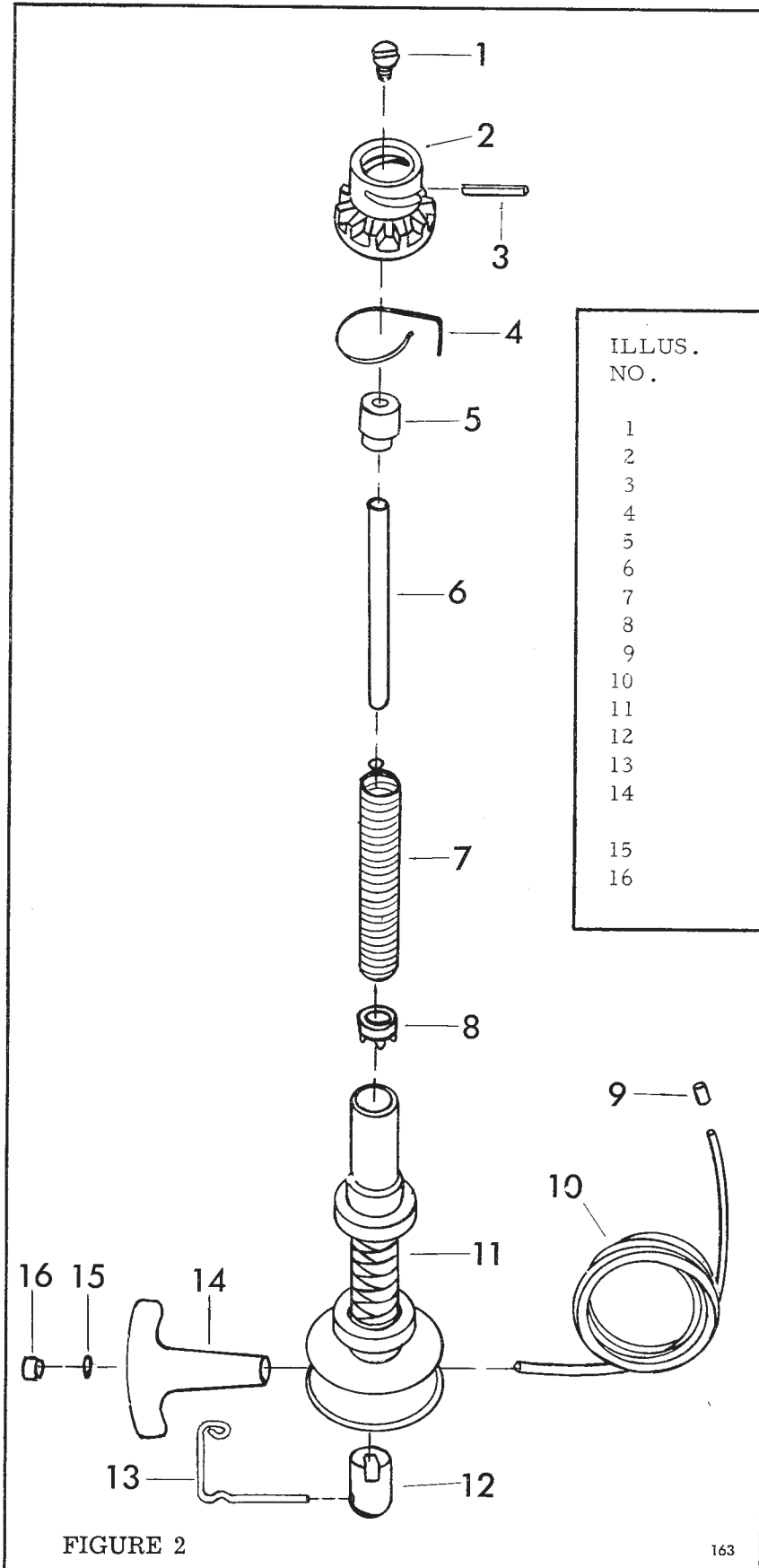
The engine cover latch mechanism is adjusted at the factory for proper engagement. If the latch mechanism is removed or is in need of adjustment, it must be assembled and adjusted as illustrated in Figure 1.



ENGINE COVER PACKING

When replacing the engine cover packing (glued to support plate), apply Armstrong #N-171 Industrial Adhesive to packing prior to installing on lip of support plate.

6 AND 9.2 H.P. MODELS



ILLUS. NO.	QTY.	DESCRIPTION
1	1	Pinion pin retaining screw
2	1	Starter pinion pin
3	1	Starter pinion gear
4	1	Starter pinion spring
5	1	Rewind spring drive
6	1	Guide post
7	1	Rewind spring
8	1	Lower spring retainer
9	1	Starter spool
10	1	Starter handle
11	1	Plain washer
12	1	Starter handle plug
13	1	Starter rope guide
14	1	Rewind spring retain- er extension
15	1	Starter rope
16	1	Starter rope end

FIGURE 2

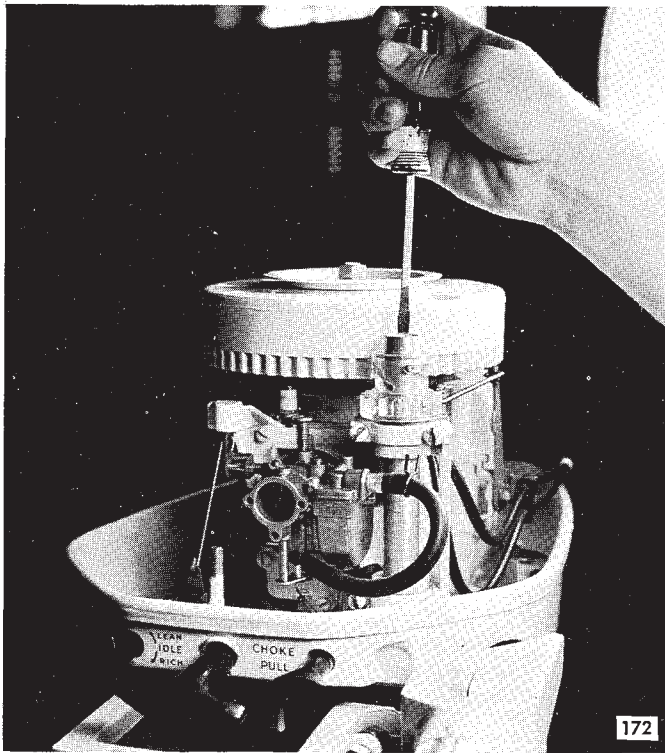


FIGURE 3—REMOVING PINION PIN
RETAINING SCREW

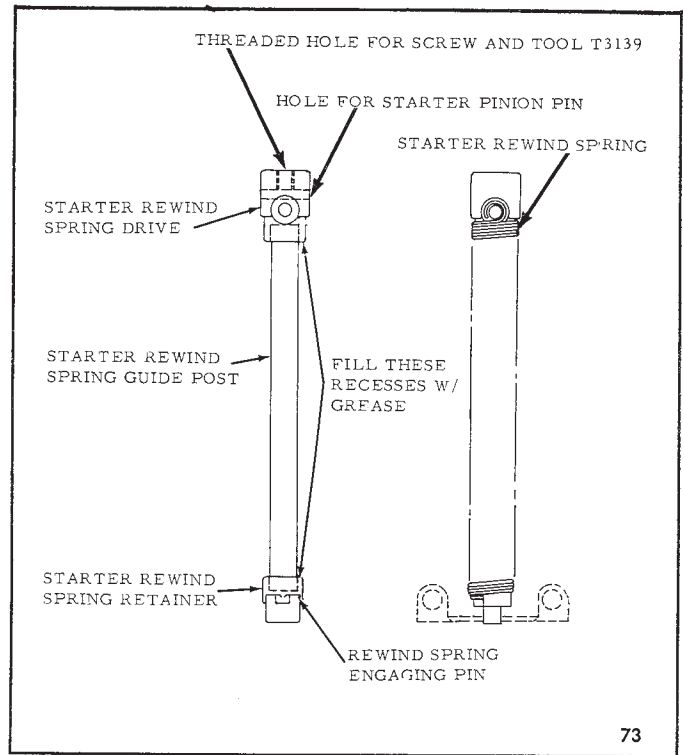


FIGURE 5—SPRING AND GUIDE POST
ASSEMBLY

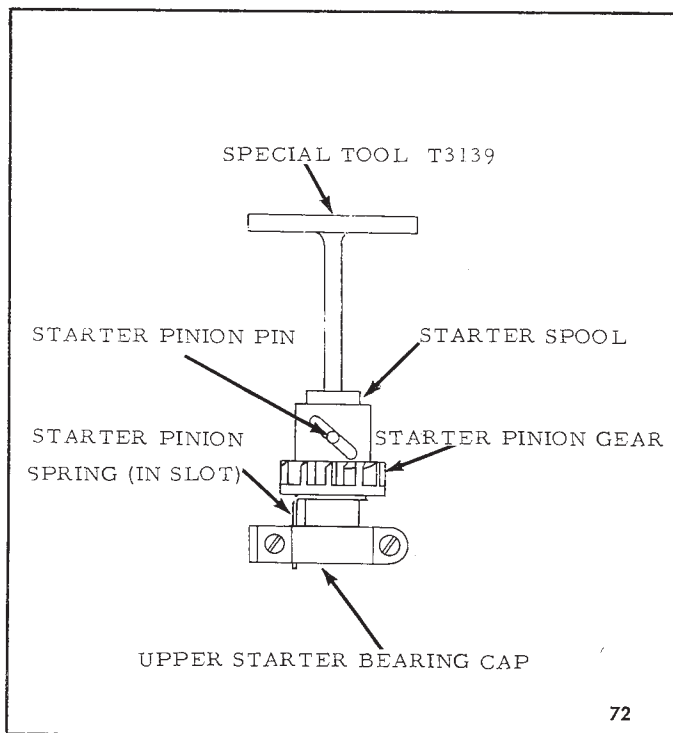


FIGURE 4—STARTER REWIND TOOL
INSTALLED

REWIND SPRING REPLACEMENT

1. Remove pinion pin retaining screw as shown in Figure 3.
2. Insert Special Tool No. T-3139 into the hole from which this screw was removed. Tighten tool securely. Push starter pinion pin out carefully.
3. Lift starter rewind spring drive, rewind spring, guide post, and lower retainer out of starter spool bore.
4. Grease the starter spool bearings, rewind spring, spring guide post, spring drive, and retainer liberally with Aero Shell No. 14 Cam Grease, or its equivalent.
5. Insert the rewind spring retainer inside the rewind spring with the rectangular lug toward the flat end of the rewind spring. Turn the spring retainer until the rectangular lug extends beyond the flat end of the rewind spring. Engage the lower eye of the rewind spring with the pin on the rewind spring retainer. Refer to Figure 5.
6. Insert rewind spring guide post inside of rewind spring. Engage upper eye of rewind spring with pin on rewind spring drive. Refer to Figure 5 for proper assembly methods.
7. Insert the entire assembly inside of starter spool with the retainer end down. Refer to Figure 6.

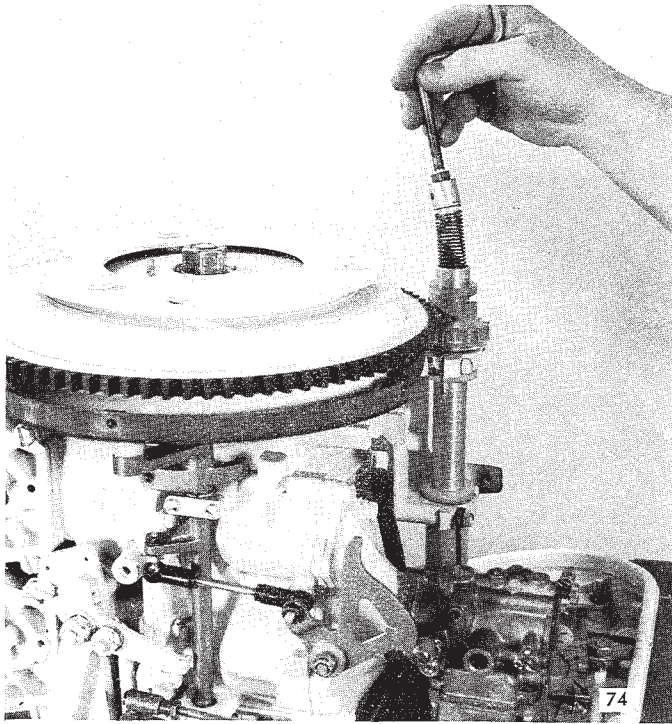


FIGURE 6—INSTALLING STARTER SPRING

NOTE: If the starter retainer extension, located on the bottom of the starter assembly has been removed for any reason, it must be inserted into the bottom of the starter spool prior to installing starter spring-retainer assembly.

8. Install the starter retainer extension to the bottom of the starter spool and then insert the starter rope guide through the hole in the starter retainer extension and install guide to lower inside screw which retains the lower starter bearing cap.
9. Make sure the starter rope is fully wound on spool. (Ref: "Starter Rope Replacement," below.) Hold spool firmly with rope fully wound, then:
10. Turn Special Tool T-3139 and rewind spring assembly eight (8) turns counter-clockwise to establish the proper initial tension on rewind spring. See Figure 7.
11. Align hole in starter rewind spring drive with hole in spool and insert starter pinion pin through diagonal slot in starter pinion gear so pinion pin engages all parts. Ref: Figures 3 and 4.

NOTE: Inspect the starter pinion pin for burrs. Remove burrs or replace with new pin.

12. Remove Special Tool T-3139 and install screw used to retain starter pinion pin.

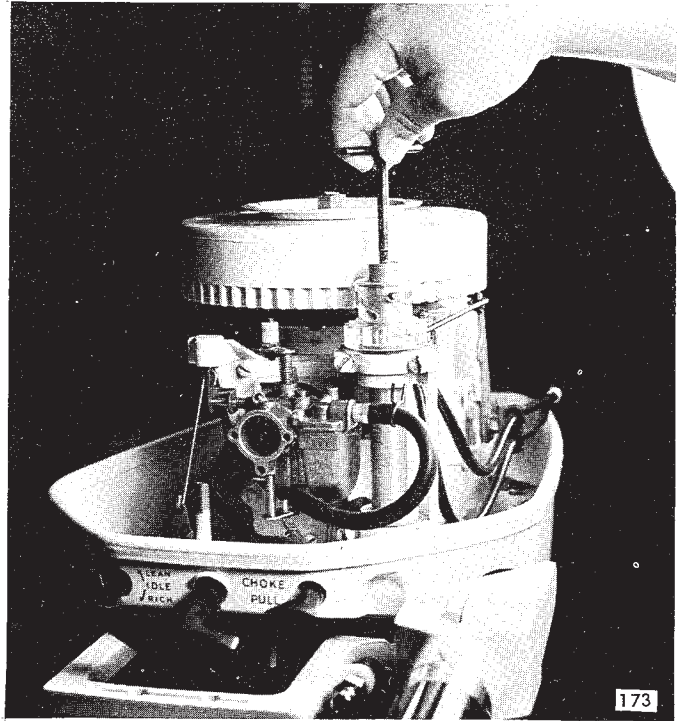


FIGURE 7—ESTABLISHING INITIAL TENSION

STARTER ROPE REPLACEMENT

1. Remove starter rope handle plug button and handle. Allow rope to rewind on starter spool.
2. Remove screw which retains starter pinion pin. Insert Special Tool No. T-3139 into the hole from which the screw was removed. Tighten tool securely.
3. Drive starter pinion pin out carefully. The starter rewind spring will unwind when this pin is removed.

NOTE: It is not necessary to remove starter from engine to replace starter rope. Simply allow the rewind spring to unwind, remove old starter rope and replace with new rope. Then, follow winding procedure for starter spring. If the starter is removed from the engine, follow all steps as listed below.

4. Lift starter spring drive, spring, and retainer out of starter spool as an assembly.
5. Remove the four (4) screws which attach the starter bearing caps. Remove starter bearing caps and starter rope guide.

NOTE: When removing the starter bearing caps, they should be marked so as to identify them as to original location.

6. Lift starter spool from bracket and remove damaged starter rope.
7. Install new starter rope.

NOTE: If the starter rope is cut for any reason, the frayed or cut portion of the rope must be sealed to prevent it from unraveling. To do this, light a match and burn end of rope to seal nylon fibers.

IMPORTANT: IF THE STARTER ROPE SHOULD HAVE TO BE CUT FOR ANY REASON, DO NOT REMOVE MORE THAN ½ INCH, AS THE STARTER RE-COIL ACTION WILL BE ADVERSELY AFFECTED.

8. Rewind new starter rope on spool.
9. Inspect the starter pinion gear for wear. If worn excessively, replace. The starter pinion spring should have only a light tension on the gear, as the function of the spring is to apply only enough tension to prevent the gear from turning with the shaft. Lubricate the shaft portion of the starter spool before installing the starter pinion gear.
10. Lubricate the bearing surface of the starter spool, then assemble spool and rope to the carburetor adapter flange (or mounting bracket).

NOTE: Be sure to install the starter retainer extension to the bottom of the starter spool and then insert the starter rope guide through the hole in the starter retainer extension and install guide to lower inside screw which retains the lower starter bearing cap.

11. Install the starter bearing caps, making sure that match marks are together. The leg of the starter pinion spring should be inserted in the slot formed by the upper bearing cap. Ref: Figure 4.

NOTE: The upper bearing cap can be identified by the chamfer adjacent to the bearing.

After bearing cap screws have been tightened, the starter spool should rotate freely without binding. The spool should have about 1/16" end float.

12. Lubricate the starter rewind spring and insert entire spring assembly inside spool with retainer end down. Make sure retainer extension is inserted in lower end of spool before installing rewind spring.
13. Pull starter rope through engine control panel and attach starter handle and plain washer. Tie knot in end of starter rope and pull knot securely into cavity of handle. Install plug button to starter handle.
14. Perform Steps 8, 9, 10, 11 and 12 as listed under "Rewind Spring Replacement," this section.

NOTE

If full throttle operation cannot be obtained, the probable cause is the starter pinion gear restricting the throttle cam operation by riding up on the starter spool shaft. This condition can be corrected as follows:

1. Remove starter pinion gear and spring from starter.
2. Remove pinion spring from gear.
3. Compress pinion spring until ends contact each other. This will increase the tension on the starter pinion gear.
4. Lubricate groove in pinion gear with Rykon grease, T-2961, and reinstall spring.
5. Reinstall starter pinion and rewind starter.
6. Check starter and full throttle operation. If pinion is too tight, simply spread spring ends until spring has firm drag, but does not cause a sluggish recoil action.

6 - 9.2 H.P. MANUAL START 1966 MODELS

ELECTRICAL

A. Breaker Point Adjustment

1. Remove flywheel nut.
2. Install flywheel knock-off nut to crankshaft. See list below for proper tool number. Turn knock-off nut down to within two turns of the flywheel. Lift up on edge of flywheel when striking nut. Strike knock-off nut with a medium eight hammer. The blow should be centered as much as possible. Do not use a heavy hammer or strike too hard, as possible damage to the crankshaft and bearings could result.
 - a. 6 and 9.2 H.P. Models T-18091.
3. Inspect the breaker point contact surfaces visually. If they are burned or pitted they should be replaced. Do not file breaker points, REPLACE WITH NEW PARTS.

NOTE: IF THE BREAKER POINTS ARE EXCESSIVELY PITTED, CHECK THE CONDENSER, AS THIS CONDITION IS USUALLY CAUSED BY A WEAK OR DEFECTIVE CONDENSER.

4. When setting breaker points after a number of hours of operation, they must be cleaned before adjusting according to the following procedure:
 - a. A small strip of 320 grit emery cloth, or its equivalent, is folded and inserted between the points. The points are held closed on the emery cloth, and the cloth rotated, using the points as a pivot. The points are OPENED before removing the cloth, and then held open while inserting a clean piece of hard surface cardboard. Hold the points closed on the cardboard, and rotate the cardboard using the points as a pivot, to remove oxide and other foreign matter loosened by the emery cloth. The cardboard should be used in several spots until no further dirt can be removed.
 - b. Adjust breaker points as outlined above.

5. Set the engine controls or throttle at the "wide open" position. This will establish a common, stationary location for setting all breaker points.
6. Re-install flywheel nut to crankshaft. Using a box end wrench, rotate crankshaft in the direction of engine rotation two (2) full revolutions to establish a uniform grease film, plus an additional part of a revolution sufficient to bring the breaker point follower arm of number one (1) cylinder to the proper point on the breaker cam for adjustment. For purpose of breaker point adjusting, the crankshaft is always rotated in the direction of engine rotation. If the crankshaft is moved too far, it must be rotated an additional revolution in the direction of engine rotation, and not backed up.
7. Rotate the crankshaft to open the breaker point being adjusted, stop at mark on cam. (The mark on the cam is that point where further crankshaft or cam rotation produces no further breaker point opening.)

NOTE: WHEN SETTING BREAKER POINT, BE SURE EACH SET OF POINTS ARE SET EXACTLY ALIKE, AS A VARIANCE IN SETTINGS BETWEEN POINTS CAN CHANGE THE TIMING SEVERAL DEGREES.

8. Breaker points are set to specifications as follows: Correct spacing will be closely approximated when a feeler gauge of .020" thickness will have a slight drag when slipped between the points. Only a steel gauge which is smooth and unworn must be used.
9. Installing flywheel.

NOTE: Whenever the flywheel is removed for any reason the tapered bore must be inspected for evidence of fretting or working. If there is evidence of fretting or working, or if the engine has had in excess of twenty-five (25) hours of operation, the flywheel bore must be lapped as follows:

- a. Apply a light coat of valve grinding compound to the tapered portion of the crankshaft.
- b. Assemble flywheel to crankshaft and rotate flywheel gently back and forth about $\frac{3}{4}$ turn. Do not spin flywheel completely around the crankshaft.
- c. Move flywheel 90° and repeat above operations.
- d. Remove flywheel, wipe compound off crankshaft and flywheel and inspect. The tapered bore in the flywheel should have a minimum of 90% surface contact to the taper on the crankshaft.
- e. If the above conditions are satisfactory, wipe all grinding compound from the flywheel and crankshaft and install flywheel key, fly-

wheel, lock washer (if used) and flywheel nut to crankshaft as listed below:

- (1) 6 and 9.2 H.P. Models — 40 foot pounds.

NOTE: Whenever a flywheel is removed, the old lock washer should be discarded and replaced with a new one. Refer to Parts Book for correct part number.

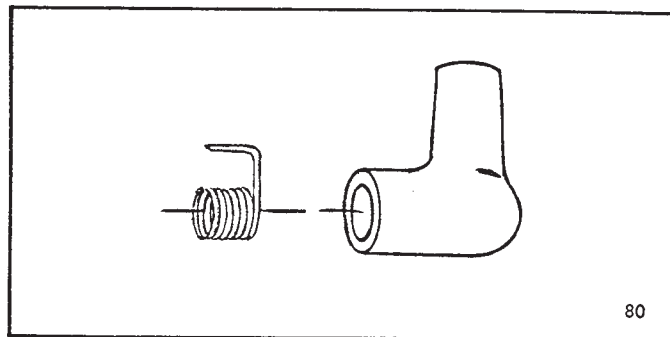


FIGURE 8

SPARK PLUGS

All models use a two-cycle marine type spark plug. This type of plug has a short side electrode which extends only to the center of the center electrode instead of beyond the center as in the standard automotive spark plug.

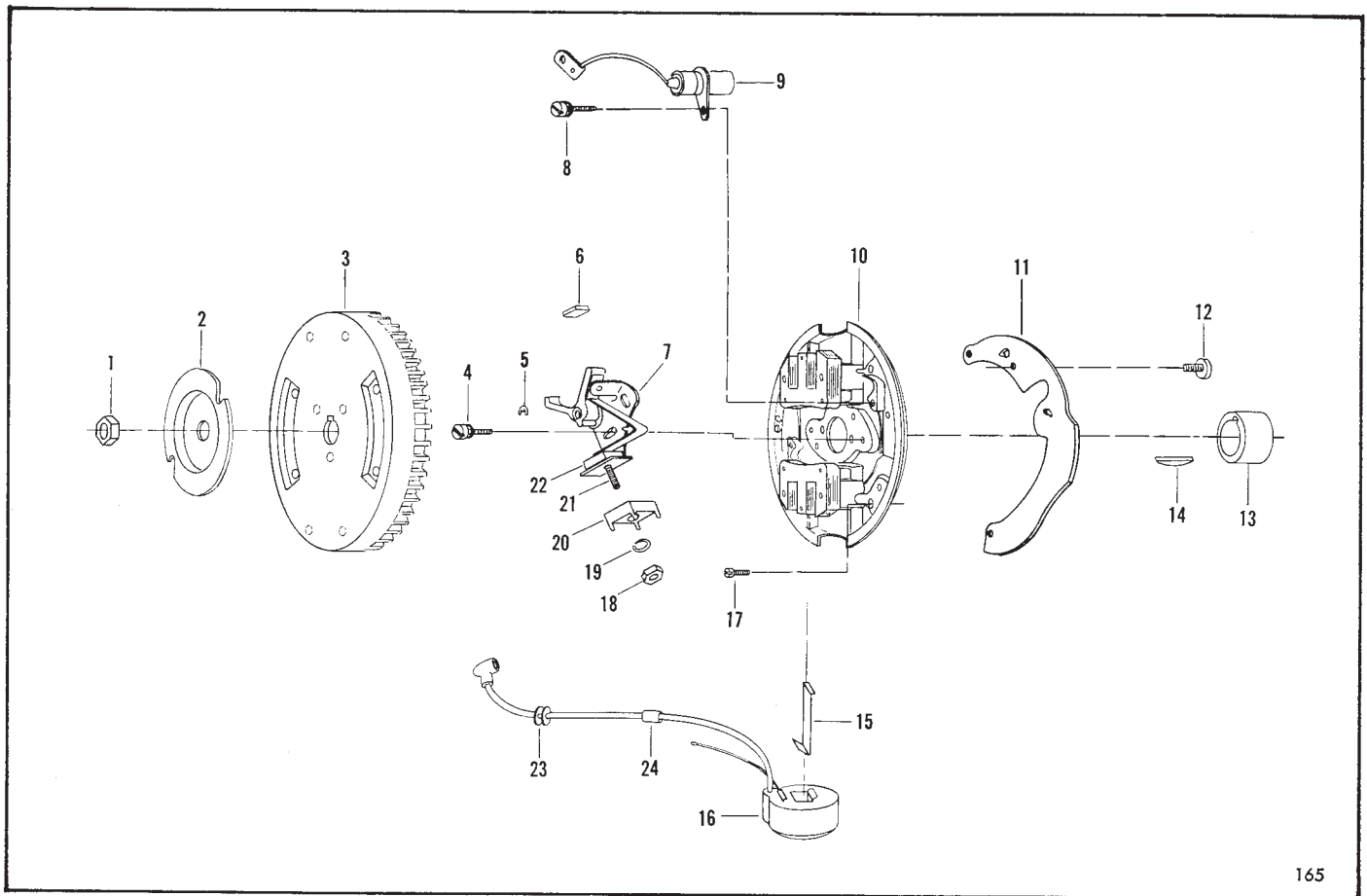
When replacing spark plugs, always use that recommended by the engine manufacturer or its equivalent. Gap all spark plugs at .030".

Refer to the parts book for the specific model being worked on for the correct spark plug type and number. Torque all spark plugs to 10-15 Ft. Lbs.

SERVICING SPARK PLUGS

1. Remove spark plugs and clean with a petroleum solvent. If sand blasting equipment is available, clean all deposits of gum, carbon or varnish from plugs.
2. Inspect porcelain for cracks or breaks, replace if any are found.
3. Inspect electrodes and replace spark plug if electrodes are badly burned or pitted.
4. Set spark plug gap at .030" and install to engine, using a new gasket.

NOTE: Spark plugs of the proper heat range will show deposits ranging from rusty brown to grayish tan on the firing end. Gasoline fouling can usually be identified by dry, black, fluffy deposits caused by incomplete combustion. A hotter spark plug may correct this condition. Oil-fouled spark plugs usually have wet, sludgy deposits caused by too much oil in the combustion chamber. A hotter spark plug may help this condition. Burned or overheated spark plugs usually have a white, burned appearance and badly eroded electrodes. A colder plug may correct this condition.



165

FIGURE 9—6 AND 9.2 H.P. MAGNETO

ILLUS. NO.	QTY.	DESCRIPTION
1	1	Flywheel nut
2	1	Starter collar
3	1	Flywheel
4	4	Contact screw
5	2	Retaining ring
6	1	Cam wiper felt
7	2	Breaker contact set
8	2	Condenser screw
9	2	Condenser
10	1	Stator plate
11	1	Throttle cam
12	4	Fillister head screw
13	1	Breaker cam
14	1	Magneto key
15	2	Coil wedge spring
16	2	Coil w/lead wire
17	4	Fillister head screw
18	2	Stud nut
19	2	Lockwasher
20	2	Insulator - outside
21	2	Connection stud
22	2	Insulator - inside
23	4	Grommet
24	1	Sleeve
		Magneto ground wire (not shown)

COIL REPLACEMENT

The coils are held in place with coil wedge springs which pass between the coil and core. To remove coil, disconnect primary and secondary lead wires and pry on end of coil wedge spring attached to coil core. It may be necessary to bend one of the coil core laminations to remove coil. After removing spring and bending lamination, using two screwdrivers, pry coil from core.

NOTE: When replacing coil, bend core lamination down to insure against the coil moving out and striking the flywheel.

CONDENSER REPLACEMENT

The function of the ignition condenser is to reduce point arc and bring primary current to a halt when the points open. Therefore, a condenser that leaks, or one that has little or too high a capacity will have a direct bearing on breaker point life and consequently engine performance.

To remove condenser, disconnect lead wire attached to breaker point and remove screw securing it to stator plate.

6 AND 9.2 H.P. MANUAL START MODELS

1. Remove flywheel using proper knock-off nut.
2. Remove four (4) screws which retain magneto to stator ring.
3. Remove spark plug lead wire and magneto ground wire from top forward screw on fuel pump.
4. Remove magneto shorting wires from clamp on top of carburetor adapter flange if used.
5. Remove magneto control link.
6. Lift magneto up and off the engine.
7. If power head repairs are to be made, remove magneto cam and key.

MAGNETO ASSEMBLY

1. Lubricate all moving parts, linkages, magneto pilot bore, stator plate, and cam wiper felts with Rykon #2EP, Part No. T-2961, when reassembling.
2. Install magneto breaker cam and key, if removed. Install cam with arrow or part number "up".
3. Reassemble magnetos in reverse order as listed above.
4. Torque flywheel nut.

The following instructions are to be used in conjunction with the wiring diagram following these instructions.

Refer to the parts book for the model being worked on for methods of assembly, hardware sizes and locations.

CARBURETOR AND FUEL SYSTEM

FUEL SYSTEM — INTRODUCTION

The fuel is transferred from the fuel tank to the engine by means of two separate systems:

1. A prime pump in the fuel line which charges the fuel line and carburetor prior to starting the engine.
2. A fuel pump which delivers fuel to the carburetor when the engine is running is used on all 6 and 9.2 H.P. models.

SERVICING FUEL LINE

If the engine does not prime properly, make the following checks:

1. Check fuel supply in tank. Fuel must cover the lower end of the filter on the pick-up tube in the tank, which is approximately $\frac{1}{2}$ " from the bottom.
2. Check and make sure that the fuel tank vent screw on the filler cap or gauge, is open.
3. Check fuel line, prime pump and connections for leaks.
4. Check entire fuel line for kinks or restrictions.
5. Check fuel line coupler to make sure it is functioning properly, and that it is fully engaged with the bushing on the fuel tank and/or engine.

NOTE: The rubber seals in the fuel line couplers, after prolonged use, sometimes become distorted, cracked, or swelled up to a degree, which will prohibit sufficient fuel flow. These seals are available as service replacement parts from the factory. Refer to the parts book for the particular model being worked on for the correct part number and description.

6. Check fuel tank adapter in fuel tank. On models not having the fuel line check valve in the prime bulb, the check valve is located in the fuel tank adapter. In some cases, small deposits of sealant accumulated on the check valve and caused it to stick in the open or closed position. A sticking check valve will cause difficult priming, hard starting and on electric start models, starter motor failure due to prolonged cranking. If faulty adapters are found, replace complete adapter.

Fuel line components are replaceable as individual parts, as indicated in the illustrations in the front of this section. Refer to the parts book for the specific model being worked on for the correct part number and description.

FUEL PUMP

The fuel pump is attached to the side of the crankcase or to the transfer port cover, and consists of a diaphragm, reed plate with two reeds, cover and necessary gaskets, screws and washers. When the engine starts, the piston moves upward, enlarging the volume of the crankcase. This reduces the pressure in the crankcase, causing the diaphragm to flex inward and to draw fuel into the fuel pump through the inlet reed. See Figure 10.

As the piston moves downward, the volume of the crankcase becomes smaller, increasing crankcase pressure. The diaphragm flexes outward, closing the inlet reed and opening the discharge reed, thus forcing fuel to flow to the carburetor.

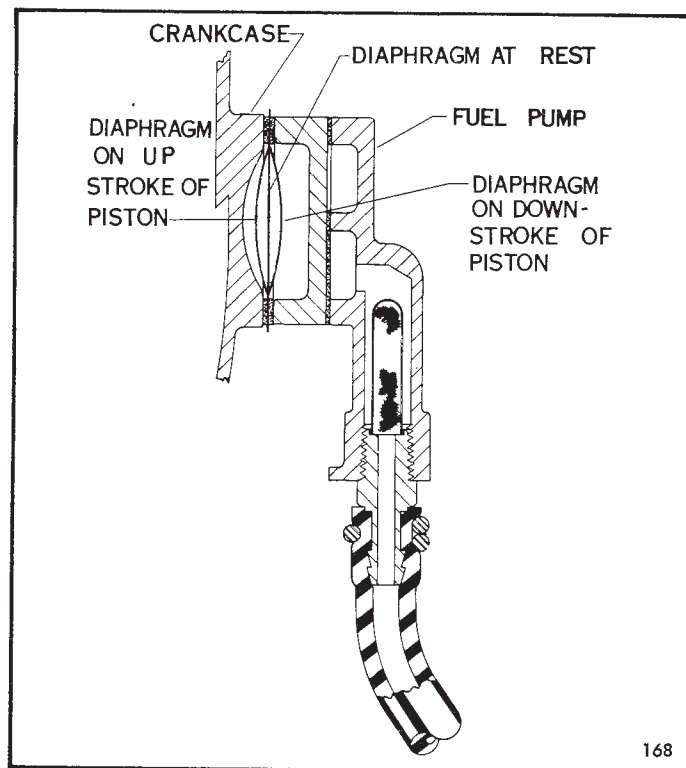


FIGURE 10 — FUEL PUMP ACTION

SERVICING FUEL PUMP

Because of the relatively small volume displaced by the flexing of the diaphragm, there must be no leaks in the fuel system and there must be no restriction to the flow of fuel.

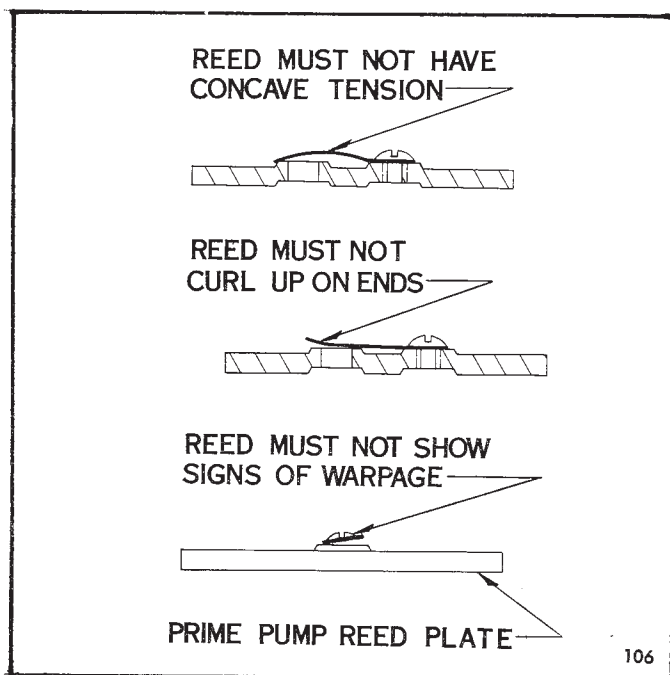


FIGURE 11 — PROPER INTSALLATION

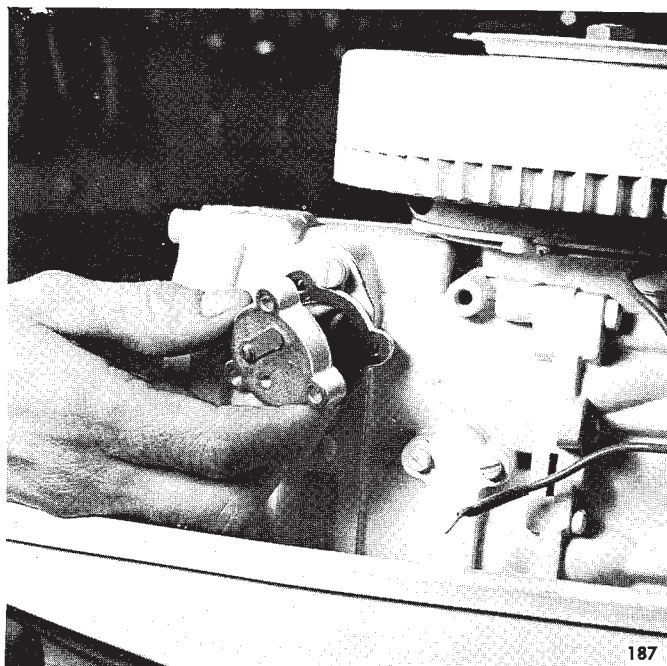
The important things to look for when servicing the fuel pump are:

1. Diaphragm must be free from holes or breaks, of any kind and must completely cover the crankcase gasket surface.
2. When assembling diaphragm to crankcase, be sure it is not wrinkled and that it extends beyond the gaskets all the way around. The screw holes in the diaphragm, reed plate, gaskets and cover are irregularly spaced; therefore, they must be properly indexed to fit the crankcase boss. Tighten all screws before squeezing bulb. Do not use gasket cement.
3. Examine all gaskets, connections and fuel lines for leaks.
4. Check tension of fuel pump reeds. The reeds should be flat, and cover the holes in the reed plate. Check reeds for flatness — maximum warp- age at center not to exceed .0015". Straighten, if necessary. When reeds are assembled to plate, they must seat flush with no initial tension, to a mixi- mum of .003" open. The reeds should not stand open, should not be warped, bent or bowed, as il- lustrated in Figure 11.

ADJUSTING CARBURETOR CARBURETOR SETTING

A. Point of Throttle Opening

1. The amount of throttle opening is synchronized with the degree of spark advance through the throttle cam and related linkage. This adjust- ment varies with the different models and should be checked when servicing a motor.

FIGURE 12 — SEPARATING FUEL PUMP
BODY HALVES

2. Set the throttle cam follower so that the throttle shutter in the carburetor will be closed, and all slack removed from the linkage, when the throt- tle cam follower is on the adjusting mark on the throttle cam plate. On 20 H.P. models, connect the throttle link to the inner hole in the throttle shaft on the carburetor.

B. Idle Adjustment

1. Loosen screw which retains the idle adjustment arm to the idle shaft on carburetor and remove adjustment arm.
2. Turn idle screw in (clockwise) until it rests lightly (DO NOT OVERTIGHTEN). Back idle screw out one (1) full turn.
3. Install adjustment arm to idle shaft on car- buretor so that it butts up against shoulder. The hole in the arm must point to the starboard (outside) of the engine. Lock the arm to the shaft with the set screw provided, so that arm is pointing forward and horizontal in relation to cylinder fore-aft center line.
4. Install link to hole in idle adjustment arm on carburetor and adjustment arm, which is to be installed to idle adjustment shaft in control panel.
5. After arm on carburetor has been set and the link installed, assemble arm to idle shaft in control panel so that the hole in the arm is fac- ing to the rear. Position arm so that it is hori- zontal while pointing to the starboard (outside) of engine. (This arm should now be approxi- mately parallel to the arm on the carburetor.)

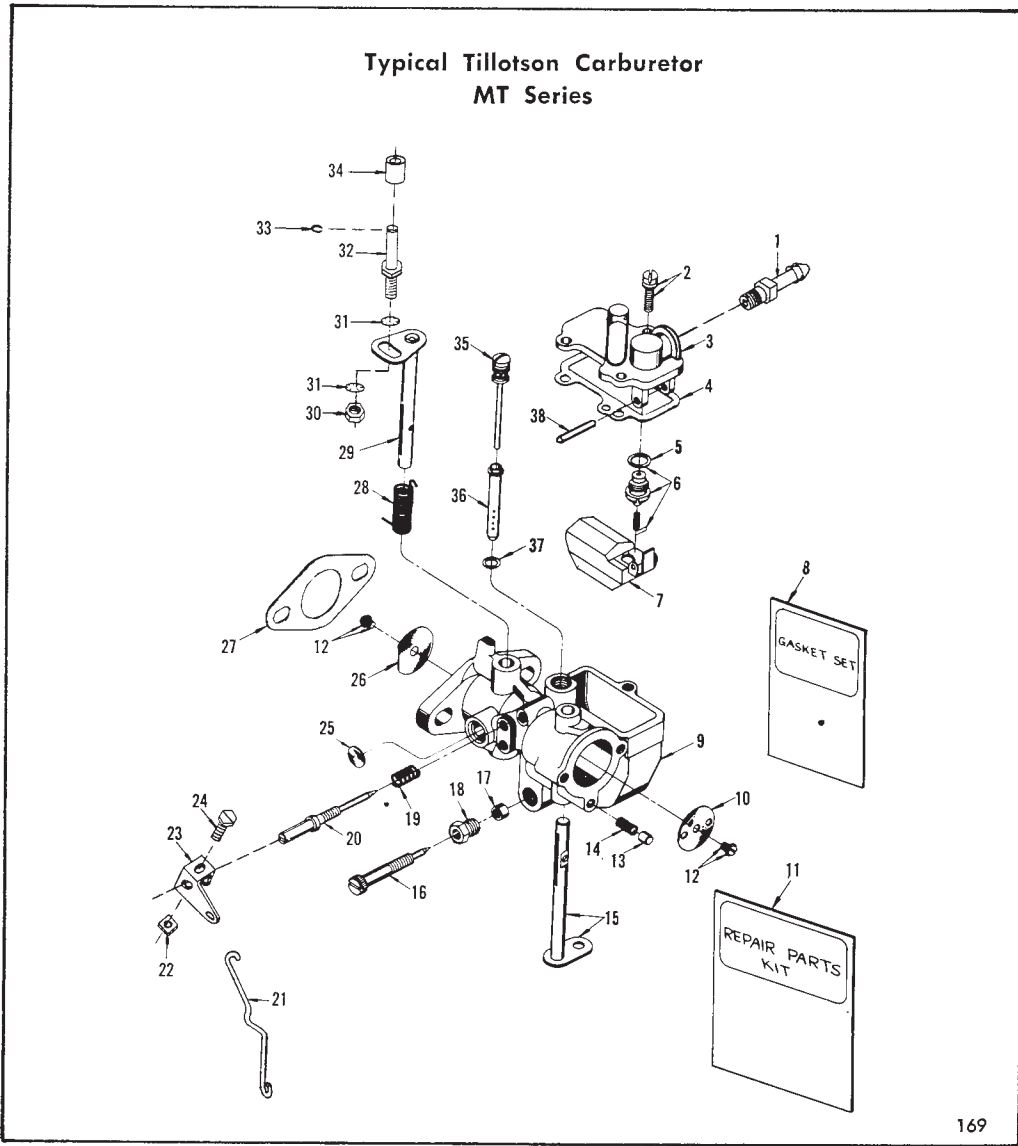


FIGURE 13

ILLUS. NO.	QTY.	DESCRIPTION	ILLUS. NO.	QTY.	DESCRIPTION
1	1	Fuel line connector	20	1	Idle adjustment screw
2	3	Bowl cover screw	21	1	Link, idle adjustment
3	1	Bowl cover	22	1	Square nut
4	1	Bowl cover gasket	23	1	Idle adjustment arm
5	1	Inlet seat gasket	24	1	Hex slot. hd. screw
6	1	Inlet needle seat and gasket	25	2	Body channel welch plug
7	1	Float	26	1	Throttle shutter
8	1	Gasket set	27	1	Carburetor gasket
9	1	Body	28	1	Throttle shaft return spring
10	1	Choke shutter	29	1	Throttle shaft and lever
11	1	Repair parts kit	30	1	Hex nut
12	2	Choke and throttle shutter screw	31	2	Int. tooth lockwasher
13	1	Choke friction pin	32	1	Throttle cam follower
14	1	Choke friction spring	33	1	Retaining ring
15	1	Choke shaft and lever	34	1	Throttle cam follower roller
16	1	Main adjustment screw	35	1	Idle tube
17	2	Main adjustment screw packing	36	1	Main nozzle
18	1	Main adjustment packing screw nut	37	1	Main nozzle gasket
19	1	Idle adjustment screw spring	38	1	Float lever pin

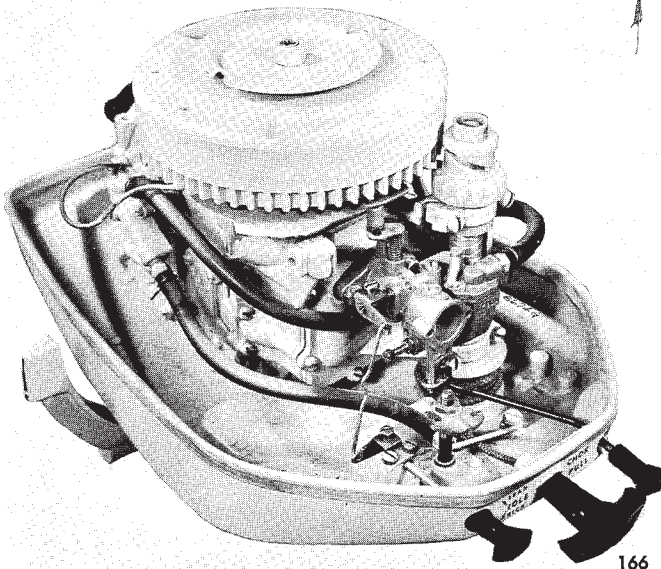


FIGURE 14 — CARBURETOR LINKAGE
INSTALLED

6. Turn the knob on the idle adjustment shaft in the control panel so that the long surface is horizontal. Lock arm to shaft using set screw provided, taking up all shaft end play. Maximum end play allowed is .005" to insure proper operation.

C. Final Adjustment

1. Start engine and run until fully warmed up.
2. Shift engine to "Forward" and advance throttle to wide-open position.
3. Turn high speed adjustment screw counter-clockwise (open) until motor loses power and begins to "roll" or "gallop" due to an over-rich mixture. Then slowly turn the screw clockwise (closed) until cylinder(s) fire evenly and motor picks up speed. Continue turning clockwise until motor "pops" or "stalls" because of too lean a mixture. Set adjustment screw halfway between these two points, favoring the rich mixture.
4. Retard throttle and shift motor to "Neutral." Turn the idle adjustment needle as necessary to obtain smooth idling. It is better to have the idle setting a little rich rather than too lean.

POINT OF THROTTLE OPENING

The amount of throttle opening is synchronized with the degree of spark advance through the throttle cam and related linkage. This adjustment varies with the different models and should be checked when servicing a motor.

6 AND 9.2 H.P. MODELS

Set the throttle cam follower so that the throttle shutter in the carburetor will be closed, and all slack

removed from the linkage, when the throttle cam follower is on the adjusting mark on the throttle cam plate.

REMOVING CARBURETOR

NOTE: When disconnecting throttle link from carburetor, exercise caution, as the link must not be bent out of shape. If the link is bent, it is recommended that it be replaced with a new one, as it is extremely important that the correct geometry be maintained for this setting.

Removing Carburetor — 6 and 9.2 H.P. Models

1. Disconnect fuel line from carburetor.
2. Remove idle adjustment arm from idle adjustment needle on carburetor.
3. Remove choke rod from carburetor choke shaft.
4. Remove (2) hex nuts which retain carburetor to adapter flange and remove carburetor.

6 and 9.2 H.P. Models

The inlet needle, seat and float are located in the fuel bowl cover. To inspect, disassemble as follows:

1. Remove the three (3) screws which retain the cover to the fuel bowl.
2. Remove the float lever pin from the bowl cover and lift out float and inlet needle and spring. (The inlet needle is attached to the float by a spring which is hooked over the float arm.)
3. Check the inlet needle for excessive wear on the point. If the needle point is notched or pitted, replace both the inlet needle and seat with new parts.
4. Reassemble inlet needle and spring to the float, making sure to hook the spring over the float arm.
5. Install float to cover and install float lever pin.
6. Install cover to bowl, tighten screws securely.

CHECKING FLOAT LEVEL

1. Remove the fuel bowl cover and float assembly from fuel bowl.
2. Turn the cover-float assembly upside-down and measure the distance from the flange of the cover (with gasket removed) to the top edge of the float, as shown in Figure 15. This dimension must be $1-7/64"$ + $1/64"$.



FIGURE 15 — CHECKING FLOAT LEVEL

When making the float setting, check to see that tab on float stamping clears fitting by approximately 1/16" (min.). This adjustment normally is not required, but if inlet needle spring has been over-stretched or has lost tension, the setting would be affected. Replace needle and spring, if necessary. When adjusted correctly, the inlet needle will open at least 3/64".

CLEANING IDLE TUBE

The idle tube used in Tillotson carburetors is located in the upper half of the carburetor, is replaceable, and can be serviced as follows:

1. Remove the idle adjustment needle from the top half of the carburetor.
2. Remove the plug screw located in the center-top half of the carburetor. This will allow access to the idle tube screw.
3. Using a slim screwdriver, remove the idle tube from the bore from which the plug screw in Step 2 above was removed.
4. Soak the idle tube in fresh gasoline or a carburetor cleaning solution, and blow out with compressed air to remove dirt and foreign particles.
5. Reassemble, reversing steps listed above.

THROTTLE SHUTTER

If the throttle shutter is removed for any reason, care must be exercised when it is re-installed to the carburetor, as the edges of the shutter are beveled to fit the contour of the carburetor throat.

When replacing throttle shutters, or any carburetor repair parts, refer to the parts book for the specific model being worked on for a parts breakdown and description. Using parts which are not interchangeable will result in poor operation throughout the entire operating range.

6 and 9.2 H.P. Models

To adjust the position of the throttle shutter, loosen the screw which retains shutter to shaft and turn shutter until it fits properly.

In salt water areas, corrosion on the throttle shaft, throttle shutter or throttle bellcrank, may cause the shutter to stick. To correct this condition, remove shaft and polish. Lubricate liberally upon reassembly. If the throttle shutter is removed, be sure to re-install it with the identifying punch mark toward the rear. The shutter has beveled edges which must match the sides of the carburetor bore when the shutter is closed.

"MT" SERIES CARBURETORS

To correctly disassemble, the following parts must be removed in the order indicated:

1. Float bowl cover.
2. Float, inlet needle and seat from cover.
3. Main (high speed) adjustment screw from cover.
4. Idle adjustment screw and spring.
5. Idle tube.

6. Main nozzle and gasket. (If stuck, invert body casting and pry out.)
7. The throttle and choke shaft need not be removed unless carburetor has been used excessively and examination discloses undue wear of throttle shaft and bearings, permitting air leakage, in turn affecting idle performance. If the throttle shaft is worn, it should be replaced.

CAUTION: If, or when, necessary to remove the choke shaft, be careful not to lose choke shaft friction pin and spring located inside casting channel behind lower end of shaft — hold thumb over channel opening while withdrawing shaft. When re-installing shaft, first the friction spring, then the pin, must be reinserted into original position, and held in place until the choke shaft is carefully slid down and beyond this point.

CLEANING AND INSPECTING: Submerge carburetor body casting in clean gasoline or other recommended cleaning solution and thoroughly wash out all possible grit or sediment. Carefully blow compressed air through all internal fuel and air bleed channels. If necessary, remove welch plug and check Idle Mixture Discharge Ports to be certain they are not wholly or partially plugged, then **TIGHTLY** install new welch plug. Wash and blow out Main nozzle and Idle Tube. Carefully inspect Main Adjustment Screw, Idle Adjustment Screw and Inlet Needle, Seat and Gasket. If the pointed surface has become grooved, especially the Inlet Needle, which will wear more rapidly and possibly prevent correct fuel level maintenance, completely replace. Always replace Gaskets and Main Adjustment Screw Packing. A complete Repair Parts Kit (including Gasket and Packing Set) is available for each model carburetor, and recommended when servicing excessively used or worn units to guarantee accurate work and performance.

REASSEMBLING: To reassemble, reverse the above disassembly instruction when installing parts indicated. Be sure to carefully and tightly install Main Nozzle, Idle Tube and Inlet Seat. Also see that Float moves freely and is set at specified level.

CAUTION: Do not blow compressed air into carburetor bore or channels when not disassembled, as damage to float will result.

REED VALVES

INTRODUCTION

The reed valves of a two-cycle engine perform a very important function. They open to permit fuel to enter the crankcase on the upstroke of the piston; and close to seal the crankcase and prevent the escape of fuel on the downstroke of the piston.

Motors of 6 and 9.2 H.P. have six individual reeds on the reed plate. All reeds are treated to prevent corrosion.

A reed stop limits the amount of reed opening. If a reed cracks or breaks off, it can always be detected by the presence of blow-back through the carburetor and an engine that blubbers and misses on one cylinder. Blow-back will occur when the piston for the cylinder that has the broken reed is on the downstroke. The pressure created by this reduced crankcase volume will escape through the hole left by the broken reed and will pass to the outside through the carburetor.

CHECKING REEDS

To visually inspect or replace the intake reed valves, proceed as follows:

1. Remove starter rope handle and tie knot in rope to prevent starter rope from rewinding on spool.
2. Disconnect any attaching linkage.
3. Remove carburetor as outlined under "Removing Carburetor," this section.
4. Remove carburetor adapter flange attaching screws.
5. Inspect reeds — replace any that are cracked, broken or warped. A reed must seat tightly against the reed plate along the entire reed length and should completely cover the holes in the reed plate.
6. Inspect reed stop spacing. Measure the reed height, as shown in Figure 16. Correct reed stop spacing is $3/16" + .010"$. The spacing should be checked from the reed plate to the lower side of the reed, as shown. Reeds must not stand open more than $.005"$. If broken reeds have been found, check reed stop spacing, as this is one of the contributing causes of reed failure.

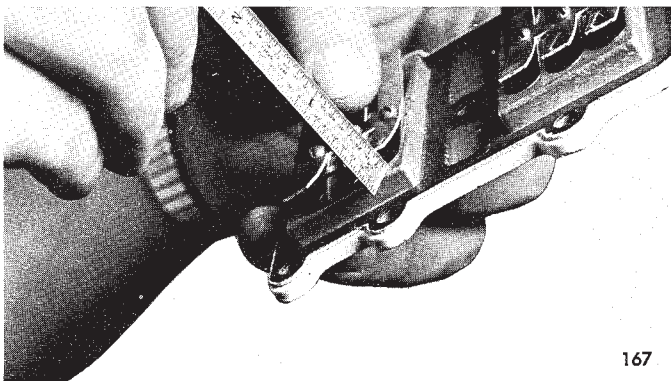


FIGURE 16 — CHECKING REED STOP SPACING

RECOVERY OF BROKEN REEDS

Should reed breakage occur, the pieces may be recovered without disassembly of the power head. Perform the following steps to recover the broken portion of the reed to prevent it from entering and damaging the engine.

1. Remove reed plate and examine crankcase.
2. Remove transfer port cover (s) and look for broken reed.
3. Remove cylinder head and examine combustion chamber. Rotate flywheel slowly during examination.

4. Replace cylinder head and transfer port cover (s), using new gaskets.

It is not necessary to disassemble the power head further than outlined above, even though the broken portion of the reed is not found. Experience at the factory shows that large pieces of the broken reed will be found either in the crankcase or in the transfer port passage. Small pieces will probably pass through the combustion chamber and be discharged with the exhaust.

NOTE: Any time the reed plate or carburetor is removed, when re-installing, new gaskets should be used.

PUDDLE DRAIN SYSTEM

The puddle drain system on a two-cycle engine performs a very important role. The puddle drain keeps the crankcase free of excess raw fuel which normally accumulates in the lower portions of the crankcase cavities. These puddles of raw fuel are formed by the condensation of the fuel mixture on the cylinder walls while the fuel charge is present in the crankcase. The severity of the puddle accumulation is greatest in the low R.P.M. ranges, or when the engine is operated at low speeds for any length of time. This is due to the fuel charge being delayed in the crankcase for longer periods of time, and has more opportunity to condense on the cylinder walls.

If the raw fuel were allowed to remain in the crankcase, the puddles of raw fuel would tend to enrich the fuel mixture within the crankcase, and the engine would tend to load up and display characteristics of an over-rich fuel mixture. An engine which has a faulty puddle drain system will stutter and falter during acceleration and will generally run rough. The fuel which accumulates in the crankcase is drained out through metering cups and reed valves, passed down to the motor leg, and discharged along with the exhaust gases.

The puddle drain system is located just forward of the transfer port cover (s) on the starboard side of the engine.

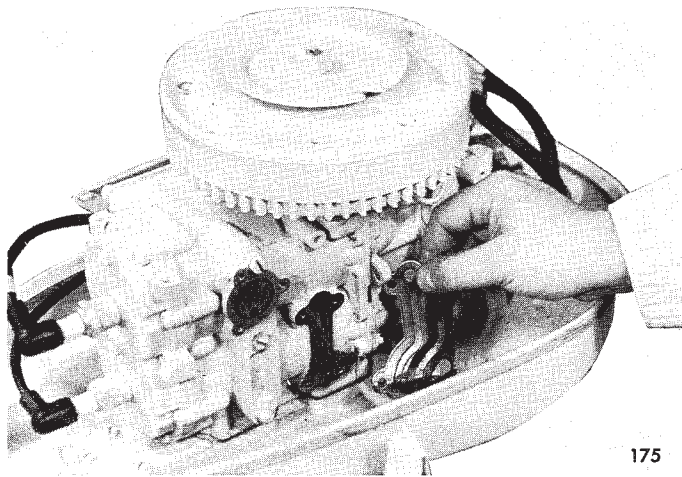


FIGURE 17 — PUDDLE DRAIN

CLEANING

Due to the fact that the puddle drain system serves such an important function, it is important that it be kept clear of build-up or foreign objects. The puddle drain system can be cleaned by blowing the passages and valves clear with compressed air and by cleaning the screen in clean gasoline. If compressed air is not available, a wire of the correct size may be pushed through the passages to clear the system.

ILLUS. NO.	QTY.	DESCRIPTION
1	1	Cylinder head gasket
2	1	Cylinder head
3	8	Fill hd screw
4	2	Spark plug
5	2	Cylinder head screw
6	5	Fill hd screw
7	5	Fill hd screw
8	1	Exhaust port cover
9	1	Gasket, exhaust port cover
10	1	Exhaust port plate
11	1	Gasket, exhaust port plate
12	6	Piston ring
13	2	Piston
14	4	Lock ring
15	2	Connecting rod
16	1	Link, magneto control lever
17	1	Lever, magneto control
18	1	Washer, magneto control lever
19	4	Hex nut
20	1	Lead wire clip
21	1	Flat hd screw
22	1	Starter rewind spring drive
23	1	Starter rewind spring guide post
24	1	Starter rewind spring
25	1	Starter spring retainer
26	1	Starter retainer extension
27	1	Starter rope guide
28	1	Starter rope handle plug
29	1	Plain washer
30	1	Starter rope handle
31	1	Starter rope
32	1	Starter rope end
33	1	Starter spool
34	1	Starter pinion spring
35	1	Starter pinion gear
36	2	Fill hd screw
37	1	Bearing, magneto control lever
38	1	Pivot pin
39	2	Plain washer
40	1	Gasket, reed plate
41	1	Reed plate
42	1	Starter pinion pin
43	2	Starter bearing cap
44	3	Fill hd screw
45	1	Carburetor adapter plate
46	1	Fill hd screw
47	1	Carburetor adapter flange
48	1	Fill hd screw
49	2	Carburetor stud
50	6	Fill hd screw
51	6	Reed
52	2	Reed stop
53	6	Rd hd screw
54	2	Connecting rod needle bearing, not used on 5 and 6 H.P.
55	4	Connecting rod screw
56	2	Seal
57	2	Dowel pin
58	1	Crankcase cover (order cylinder)
59	2	Fill hd cap screw
60	2	Fill hd screw
61	6	Fill hd screw
62	3	Fill hd screw
63	2	Connecting rod cap (order connecting rod)
64	1	Crankshaft
65	1	Magneto stator ring
66	1	Bearing, crankshaft upper
67	1	Gasket, crankshaft bearing cage

ILLUS. NO.	QTY.	DESCRIPTION
68	1	Crankshaft bearing cage
69	4	Fill hd screw
70	2	Piston pin
71	2	Cylinder drain valve
72	1	Gasket, cylinder drain cover
73	1	Cylinder drain cover
74	1	Fill hd screw
75	3	Fill hd screw
76	2	Fill hd screw
77	1	Cylinder
78	1	Gasket transfer port cover
79	1	Transfer port cover
80	1	Fuel pump diaphragm
81	2	Pan hd screw
82	2	Plain washer
83	2	Reed
84	1	Fuel pump reed plate
85	1	Gasket, fuel pump
86	1	Fuel pump cover
87	4	Fuel line clamp
88	2	Fuel line
89	1	Fuel pump filter
90	2	Tab lock, not used on 8 and 9 H.P.

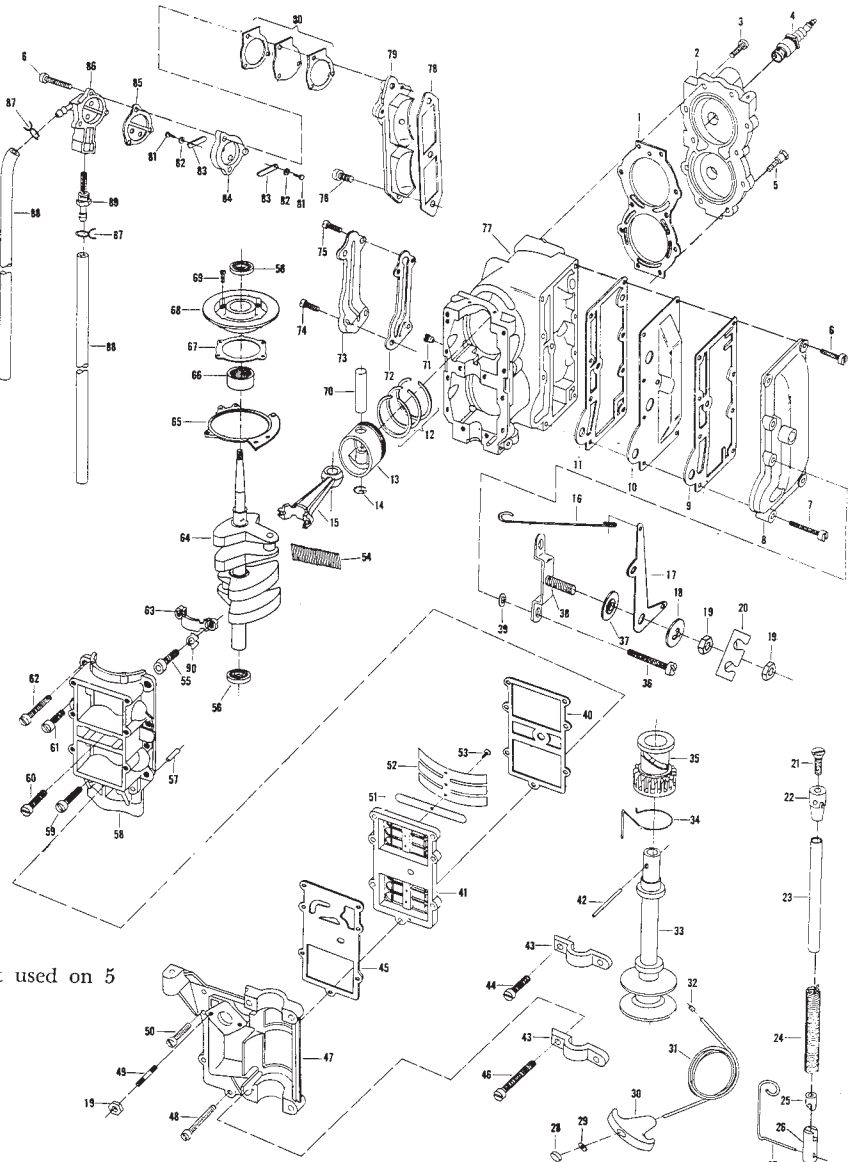


FIGURE 18

POWER HEAD

REMOVAL

1. Remove the magneto, carburetor and related linkage, and starter, as outlined in the appropriate sections.

NOTE: It is not necessary to disassemble the starter unless the adapter flange is disassembled or replaced. Simply remove the starter handle and tie a knot in the starter rope to prevent it from rewinding on the starter spool. This procedure will eliminate rewinding starter spring when reassembling power head.

2. Remove fuel inlet line from fuel pump.
3. Disconnect throttle control by removing the magneto control lever assembly from the exhaust port plate. The lever is retained by two (2) screws in the exhaust post cover. By disconnecting the linkage at these points, the throttle control settings will remain the same, and will therefore eliminate re-setting when re-installing power head.
4. Remove spark plugs and cylinder head.
5. If the cylinder is to be replaced, remove as many components as possible from the power head before removing power head from motor leg. This will allow you much better leverage when removing heavily torqued screws.
6. Remove the eight (8) power head attaching screws, as shown in Figure 20, and lift power head up and off.

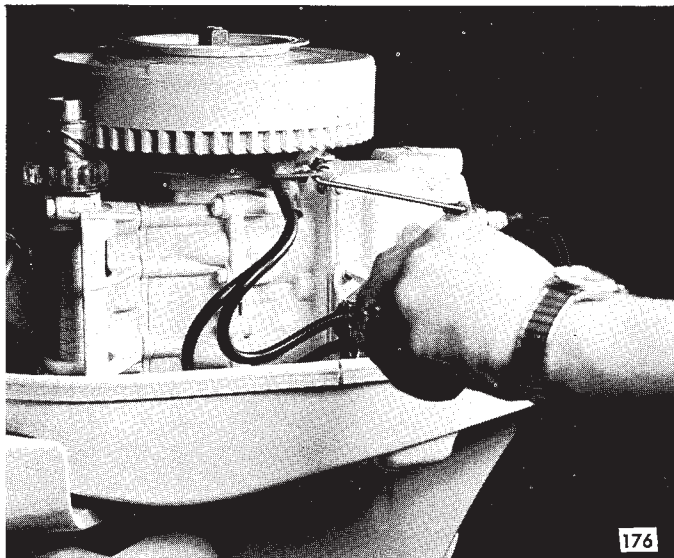


FIGURE 19 — REMOVING MAGNETO CONTROL LEVER

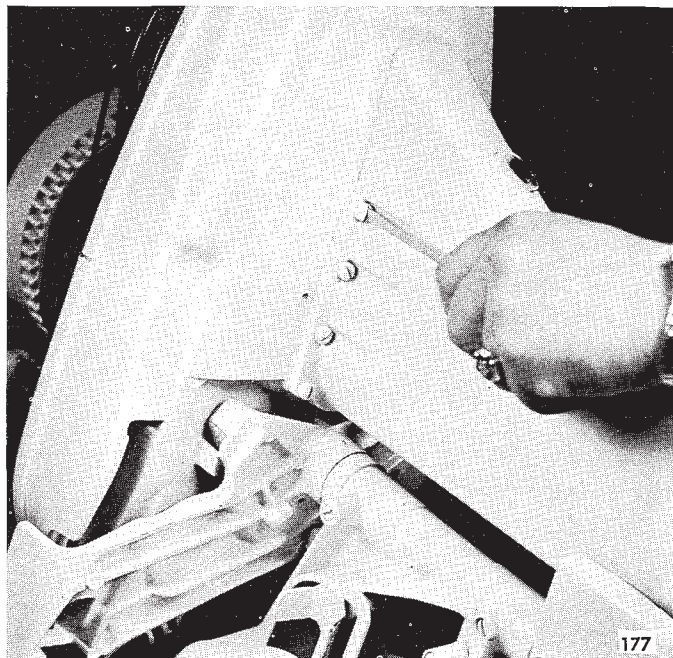


FIGURE 20 — REMOVING POWER HEAD ATTACHING SCREWS

INSPECTION OF POWER HEAD COMPONENTS

1. Inspect cylinder bore for rust, scoring or pitting. Replace if scored, out-of-round or tapered. Inspect all water passages for obstructions.
2. Inspect crankshaft journals, keyway and splines. Replace if scored, rusted, pitted or discolored from excessive heat.
3. Check all bearings for rust, corrosion or pitting. Replace as indicated. Under normal conditions, all bearings will last the life of the engine.
4. Inspect the connecting rod and cap, piston and piston pin for wear. Replace piston if scored or pitted. Replace connecting rod if rusty, pitted or discolored from excessive heat.
5. Inspect piston rings for wear at gap and also for side clearance. New piston rings should be installed only when absolutely necessary. Cylinder walls, after running, acquire a hard, tough glaze, causing new piston rings to require an abnormally long break-in period to attain top engine performance.

DISASSEMBLY

1. Remove four (4) crankshaft bearing cage attaching screws and remove bearing cage.

2. Remove all main bearing bolts and crankcase cover attaching screws.
3. Separate the crankcase cover from the cylinder by inserting a screwdriver into the slotted openings on either side of the crankcase and pry halves apart. It may be necessary to drive out the crankcase cover locating dowel pins before separating crankcase halves.
4. Loosen connecting rod cap screws, using T-2953, and remove cap and screws from rod. Mark the caps so as to identify the mating connecting rod. To prevent loss of the connecting rod needles, lay the cylinder on its side and place a cloth below it. Rotate the crankshaft to the bottom of one stroke. This will permit the needles to drop free instead of dropping into the cylinder when the rod cap is removed.
5. Remove crankshaft.
6. Pull connecting rod and piston assemblies out of cylinder and mark with a "T" and "B" to identify as top or bottom cylinder.
7. If the piston is to be removed from the connecting rod, remove the piston pin lock rings and remove piston pin.

ASSEMBLY OF POWER HEAD

1. Inspect cylinder bore for rust, scoring or pitting. Small amounts of the above can be removed with a light honing. If the cylinder bores are out-of-round, scored severely or tapered, the cylinder and pistons will have to be replaced.
2. Inspect all water passages for obstructions.
3. Check the main bearing locating pins in the cylinder. They should be tight, and protrude a sufficient amount to properly retain the main bearings. Remove any burrs visible.
4. Clean all old sealer from crankcase and cylinder mating surfaces.
5. Clean all carbon and water by-product deposits from cylinder exhaust chamber and water jackets.
6. Inspect connecting rod and cap, piston and piston pin for wear. Replace piston if scored or pitted. Replace connecting rod if rusty, pitted or discolored from excessive heat.
7. Inspect piston rings for wear at gap and also for side clearance. New piston rings should be installed only when absolutely necessary. Cylinder walls, after running, acquire a hard, tough glaze, causing new piston rings to require an abnormally long break-in period to attain top engine performance.

NOTE: The glaze on the cylinder walls can be removed through the use of a cylinder hone or de-glazer. If this procedure is used, extreme care must be exercised, as only a very minute amount can be removed from the cylinder walls.

ASSEMBLY OF PISTONS

1. Install new piston, pin or connecting rod, as necessary. Insert piston pin into piston until end of pin is flush with pin boss inside piston.

2. Push piston pin through connecting rod.
3. Install piston pin lock rings on both sides of piston. After lock rings are installed to piston, they must resist, with considerable drag, when rotated in the direction which tends to expand the ring.

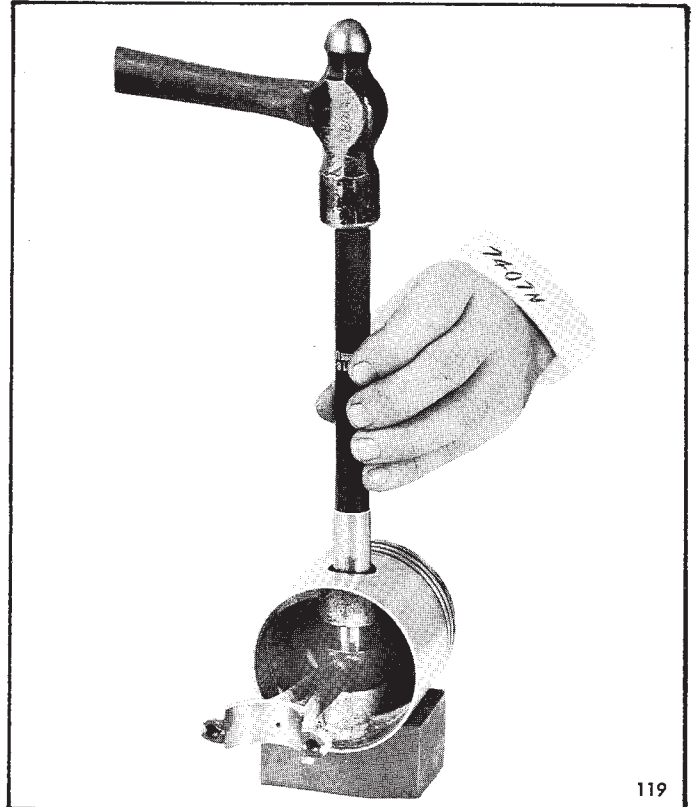


FIGURE 21 — INSTALLING PISTON PIN

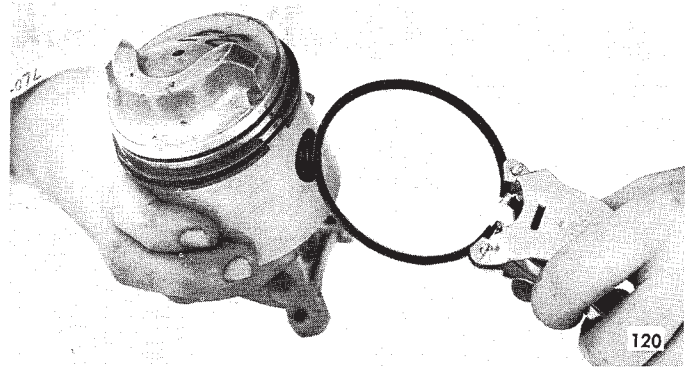
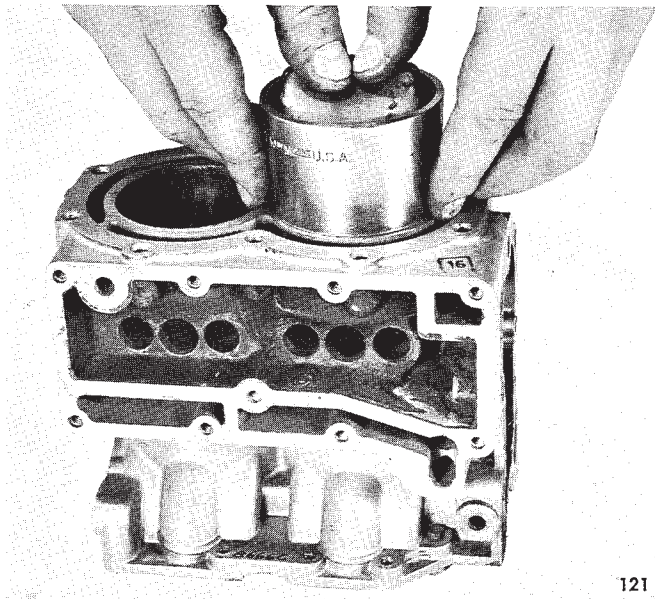


FIGURE 22 — INSTALLING PISTON RINGS

4. Coat pistons, rings and cylinder walls with a light coating of oil, and install pistons in cylinder using the correct Piston Ring Compressor as listed below, and as shown in Figure 23.
 - A. 6 H.P. Models — J-8786
 - B. 9.2 H.P. Models — J-8787



121

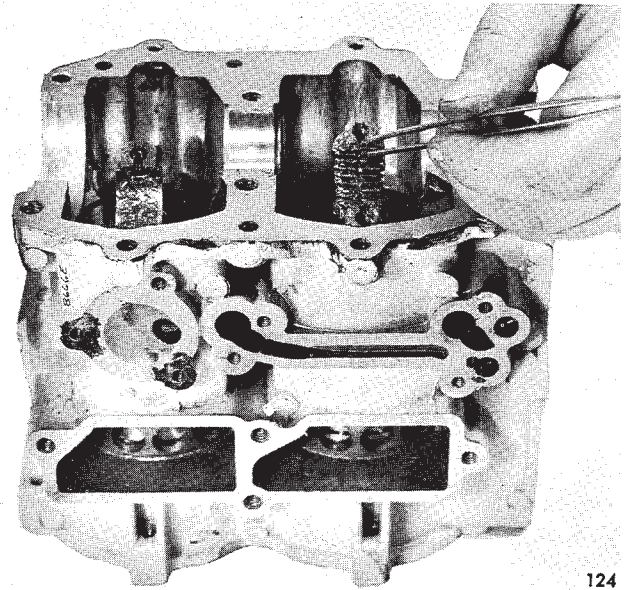
FIGURE 23 — INSTALLING PISTONS

ASSEMBLY OF CRANKSHAFT

Inspect the crankshaft journals, keyway, spline, bearings and seal. Replace crankshaft, bearings or seal if scored, rusted, pitted, discolored from excessive heat, torn, cracked or, distorted.

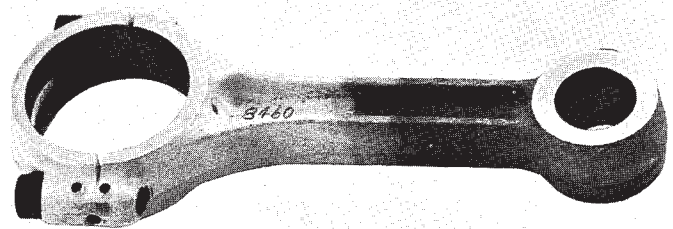
NOTE: The bearing cages are machined together for accuracy. For this reason, the cages are packaged together in pairs and must be installed in pairs.

4. Repeat Step 3 for upper connecting rod.
5. Carefully set crankshaft in position on cylinder so as not to disturb the needles on the connecting rods. Rotate center main bearing race and lower main bearing until locating pins in cylinder fit into the holes in the bearings.
6. Apply a light coating of grease the top half of the crankshaft journal.
7. Install balance of needles to exposed half of crankshaft journal, making sure the correct quantity is used. Refer to Figure 24.
8. Install connecting rod caps carefully so that loose needles are not disturbed. The caps must be installed to the connecting rod from which they were removed, as the caps are separated from the rods by the fracture method. They must also be installed with the marks on the rod and cap together and "up", toward the flywheel.
9. Install connecting rod screws. Tighten screws, using T-2953, gradually and move cap back and forth gently until it is properly aligned with the connecting rod. Inspect joint — if joint is visible, improper alignment is indicated. Refer to Figure 26 for illustration of proper joint alignment. Torque connecting rod screws as noted below:



124

FIGURE 24 — INSTALLING CONNECTING ROD NEEDLE BEARINGS



125

FIGURE 25 — CONNECTING ROD MATCH MARKS

- A. Model 6601, 6 H.P. Model — Install tab locks to rod screws, torque to 70 Inch Pounds and then bend ears of tab locks back against screw heads.
- B. Models 6602 and 6603, 6 H.P. and all 9.2 H.P. — 80 Inch Pounds.

CLOSING AND SEALING CRANKCASE

1. Using a clean rag, preferably soaked in cleaning solution or pure grain alcohol, wipe cylinder/crankcase parting line, crankshaft bearing cage mounting surface and "O" ring recess clean. These surfaces must be free of all foreign particles and oil base substances in order for sealers to "take."
2. Apply sealers to cylinder and crankcase parting line as indicated below. Wipe all excess sealer from crankshaft bearing cage mounting surface and "O" ring recess. Keep sealers away from bearing surfaces.
 - A. 6 and 9.2 H.P. Models — Use Gasoila Varnish Type Sealer. This sealer is available from the factory in one-pint containers. Order Part No. T-2959.

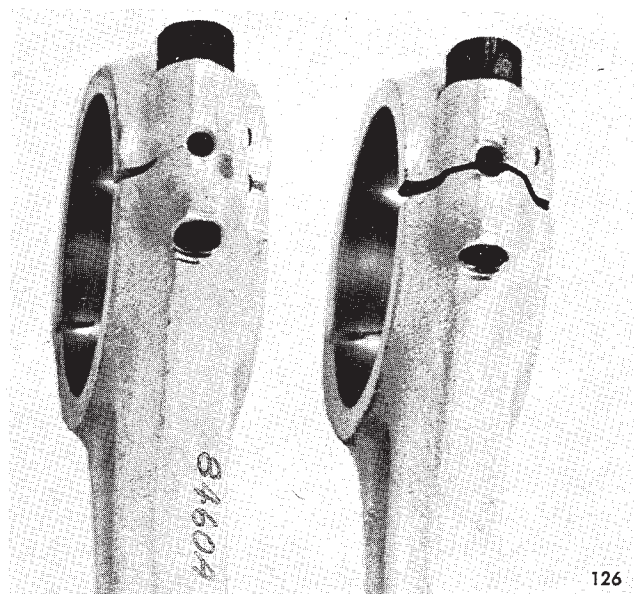


FIGURE 26 — CONNECTING ROD JOINTS
RIGHT AND WRONG

Apply 3M, EC70 type sealer from O.D. of Upper Main Bearing Bore to Outside Edge of $\frac{3}{8}$ " tapped hole, avoiding parting line seal by $\frac{1}{8}$ " on both sides. Apply from O.D. of Center Main Bearing Bore to within $\frac{1}{8}$ " of parting line seal, entire web, both sides.

Apply $\frac{1}{2}$ " band along side Lower Main Bearing Bore, avoiding parting line seal by $\frac{1}{8}$ " on both sides.

Apply Permatex #1 to all cylinder head screws, motor leg to power head screws on exhaust side that break into exhaust cavity, all screws with holes through crankcase and two (2) $\frac{3}{8}$ " screws at center main bearing.

3. Install and torque all main bearing bolts holding crankcase cover to cylinder. **IMPORTANT:** At this time turn the engine over by using a vice block, as listed below and as shown in Figure 27, to insure that all parts are free and that there aren't any unusual noises or knocks. If any binding or unusual sounds occur the power head must be disassembled and the fault found before proceeding with assembly process.

A. 6 and 9.2 H.P. Models — T-2924

CRANKSHAFT BEARING CAGE

1. Inspect the bearing and seals in and on the crankshaft bearing cage. If the bearings are scored, pitted or rusted, the complete bearing cage must be replaced, as specialized equipment is required to install the bearing. There are two seals on the

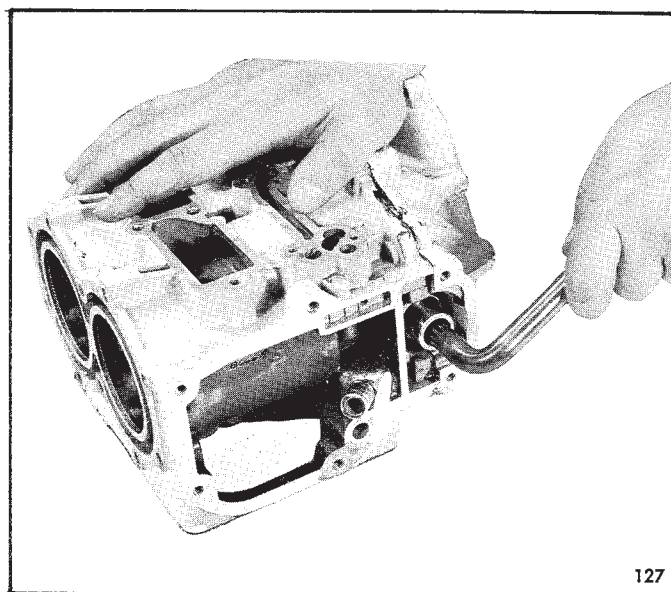


FIGURE 27 — TURNING ENGINE OVER
USING VICE BLOCK

bearing cage. One seal is pressed into the top of the cage, and the other is an "O" ring seal which is installed to the lower diameter of the cage. If the seals are cracked, torn or distorted, replace with new seals. If the pressed in seal must be replaced, simply pry old seal out, being careful not to gouge the seal bore. Apply Gasoila Varnish Type Sealer, Part No. T-2959, or Loctite Type "H" — Non Drying Sealer, Part No. T-2962, to O.D. of seal prior to installing. Grease sealing lip of seal liberally with Aero Shell 14 Cam Grease before installing seal.

Assemble seal with garter spring down (toward cylinder) using seal punch #T-3012. The seal must be installed per the dimensions given as follows:

- A. 6 and 9.2 H.P. Models — The top of the seal must be .015" depressed to flush with top of crankshaft bearing cage.

Press the seal into the seal bore so that the lower edge (sealing lip or garter spring) extends to within .150" from recess on bottom of bearing cage.

NOTE: The crankshaft bearing cage can be serviced without removing the power head. Simply remove flywheel, stator, magneto key and cam, and top two screws attaching crankcase cover to cylinder. The bearing cage is now completely accessible and can easily be removed.

The crankshaft bearing cage gasket is a flat fabric type of gasket. When installing, orient tab of gasket to front of cylinder to permit ease of assembly.

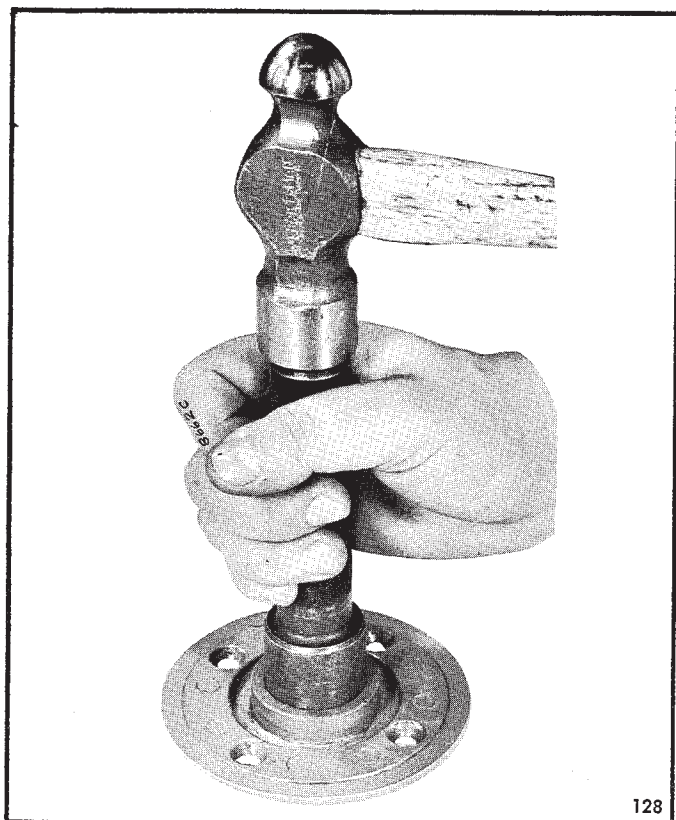


FIGURE 28 — INSTALLING CRANKSHAFT SEAL

2. Apply sealer, as listed below, to crankshaft bearing cage mounting surface on cylinder.
 - A. Apply Gasoila Varnish Type to top of bearing cage mounting surface and to threads of bearing cage attaching screws.
3. Install Special Tool #T-2917 seal protector over end of crankshaft.
4. Apply Rykon #2EP Lubricant, Part No. T-2961, to recess on I.D. of magneto stator ring and hold ring to underside of crankshaft bearing cage.
5. Install bearing cage/stator ring assembly to cylinder using four (4) flat head screws. Before installing bearing cage, make sure rubber "O" ring seal is installed to lower side.

INSTALLING LOWER CRANKSHAFT SEAL

1. Apply Aero Shell 14 Cam Grease to inside sealing lip of lower crankshaft seal.
2. Install seal to lower end of crankshaft with garter spring "down," toward motor leg. The seal must be installed so top of seal is flush with lower cylinder bore and flush with lowest flat surface of cylinder.

NOTE: Refer to last page in this section for proper screw torque specifications. Refer to the parts book for the model being worked on for correct screw sizes and locations unless otherwise specified.

INSTALLING POWER HEAD TO MOTOR LEG

1. Lubricate lightly the spline in lower end of crankshaft and spline on drive shaft down to rubber "O" ring seal with Aero Shell #14 Cam Grease. Make sure the "O" ring seal is in place on the drive shaft, as shown in Figure 29.

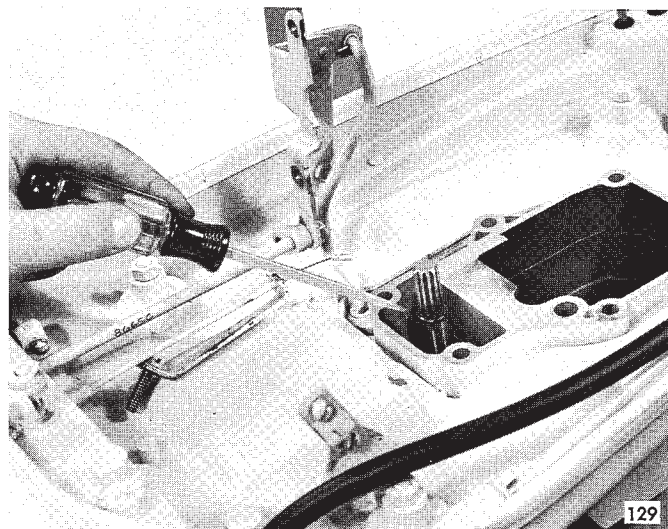


FIGURE 29 — UPPER DRIVE SHAFT SEAL

2. Place new cylinder exhaust gasket on motor leg and install power head using screws removed in "Removal of Power Head." Tighten securely.
3. Clean all carbon build-up from dome cavities in cylinder head. Check flatness of cylinder head and mating surface with a straight edge to insure against warpage, subsequent unsatisfactory operation and power head damage.
4. Using a new cylinder head gasket, install cylinder head. Make sure head gasket is positioned properly. Some head gaskets are marked to facilitate installation. Others must be laid up against the gasket surface of the cylinder to match the configurations. Incorrect installation can and will cut off power head cooling water supply. Apply Loctite "H" (T-2962) sealer to cylinder head bolts.

Torque cylinder head bolts, as listed below, in order, starting from the center of the cylinder head and working outward in either direction.

The cylinder head bolts must be re-torqued after run-in after the engine has cooled. When re-torquing bolts, hold torque for fifteen (15) seconds to allow torque to set.

- A. 6 and 9.2 H.P. Models — 70 Inch Pounds.
5. Check condition of spark plugs. If satisfactory, check plug gap. Correct gap for all plugs is .030". Torque spark plugs to 10-15 foot pounds. Refer to parts book for correct type spark plug for each engine.
6. Install exhaust port plate gasket, exhaust port plate, exhaust port cover gasket, and exhaust port cover on cylinder, in order as listed.

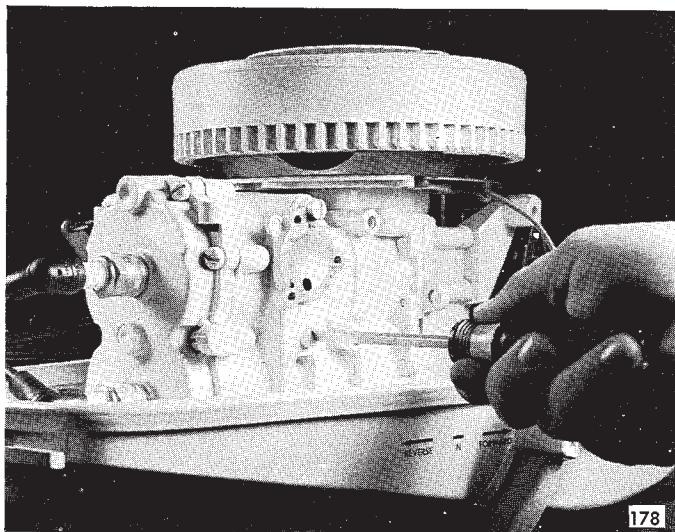


FIGURE 30 — INSTALLING TRANSFER PORT COVER

7. Using a new gasket(s), install transfer port cover(s) to starboard side of engine.
8. Using new gaskets, install puddle drain reed plate and cover. Apply Permatex #1 to both sides of lower half of gasket immediately prior to installing on cylinder. Apply sparingly so that no sealer gets into cylinder drains.
Refer to parts book for correct method of assembly, screw size and location. Refer to "Puddle Drain System" of "Fuel System" Section of Manual for cleaning and adjusting procedures to be followed.
9. Install fuel pump to engine in following order: Install diaphragm gasket to cylinder, then pump diaphragm, another diaphragm gasket, fuel pump reed plate assembly, pump cover gasket and fuel pump cover. The fuel pump is assembled to the upper portion of the transfer port cover, as shown in Figure 31.

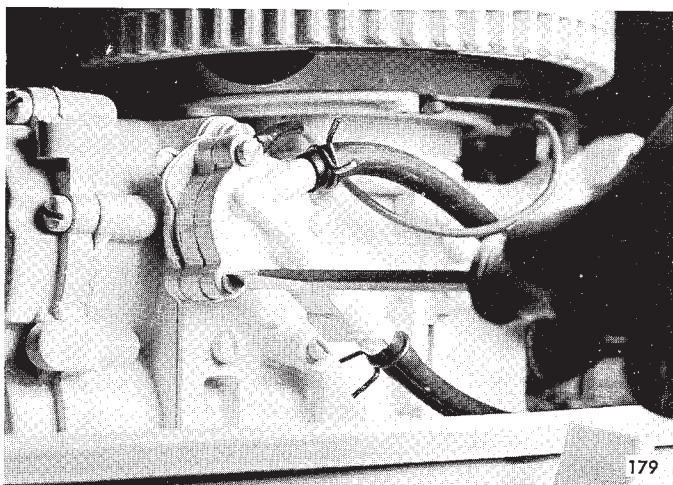


FIGURE 31 — FUEL PUMP

Refer to "Fuel Pump" of "Fuel System" Section of Manual for cleaning and adjustment procedures to be followed. Refer to parts book for specific model being worked on for correct screw sizes and locations.

10. Using new gaskets, install carburetor reed plate, adapter flange and carburetor to engine. Refer to "Fuel System" Section of Manual for cleaning and adjustment procedures to be followed. Refer to parts book for specific model being worked on for correct screw sizes and locations.
11. Install choke rod to choke shaft arm on carburetor.

INSTALLING MAGNETO AND LINKAGE

1. Apply Rykon #2EP, Part No. T-2961, to top surface of crankshaft bearing cage.
2. Install magneto breaker cam to crankshaft with lettering "up," toward flywheel. Apply a light coating of Rykon #2EP to cam.
3. Install complete magneto stator plate group to stator ring under crankshaft bearing cage using four (4) attaching screws. Position stator ring, as shown in Figure 32, to facilitate the installation.

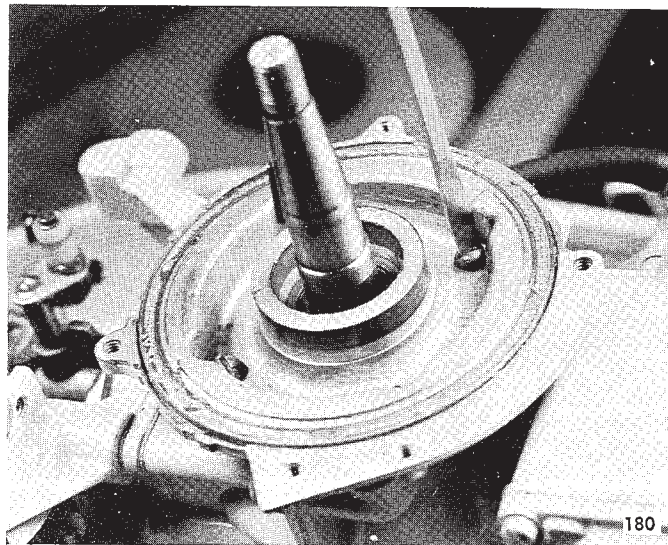


FIGURE 32 — INSTALLING STATOR PLATE

If the stator plate has been disassembled, refer to "Magneto" Section of Manual.

4. Make all adjustments to magneto as outlined in "Magneto" Section.
5. Install magneto key to crankshaft.
6. Install flywheel, emergency starter collar and nut. Torque flywheel nut to 40 foot pounds.

NOTE: Check flywheel and crankshaft for proper surface engagement, as outlined in "Magneto" Section.

7. Install magneto control lever link to hole in throttle cam plate.
8. Install magneto control lever to exhaust port cover. Refer to "Power Head Removal." Install other

end of magneto control lever link to magneto control lever. If the magneto control lever was disassembled from the exhaust port cover as an assembly, the adjustments should have remained the same. However, if it was disassembled for any reason, proceed as follows:

- A. Install magneto control lever bracket to two (2) center-forward screws on exhaust port cover.
- B. Assemble following parts to pivot pin on magneto control lever bracket in order as listed: Magneto control lever bearing, magneto control lever, control lever washer, $\frac{1}{4}$ -20 hex nut, magneto lead wire clip with fingers forward and another $\frac{1}{4}$ -20 hex nut.
- C. Install link between magneto control shaft from steering handle and lower end of magneto control lever, as shown in Figure 33.
- D. Install link from throttle cam plate to top of magneto control lever.

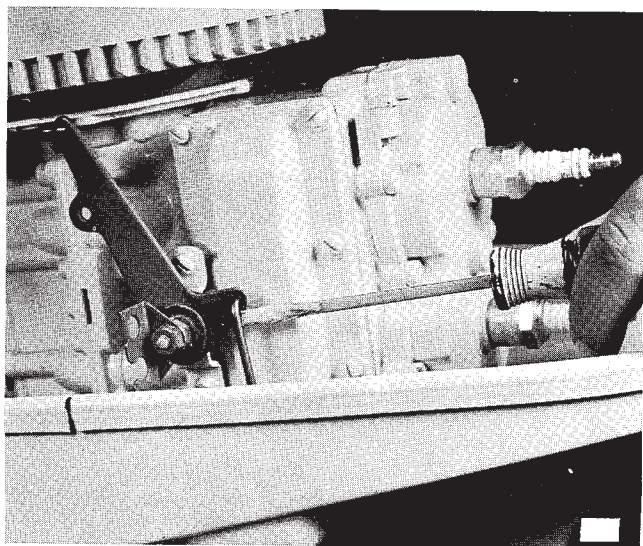


FIGURE 33 — MAGNETO CONTROL LEVER

- E. Adjust assembly as follows: Tighten "inside" $\frac{1}{4}$ -20 hex nut so that 18 to 30 inch pounds of "starting torque" is required to turn speed selector grip on steering handle. Make this check by turning grip in both directions from position where the throttle cam follower is at the base of steep rise in throttle cam.

NOTE: These readings should be taken after first working grip back and forth a few times. After this adjustment has been made, hold inner $\frac{1}{4}$ -20 nut with a wrench and tighten outer $\frac{1}{4}$ -20 nut to lock in place. Recheck torque at grip and readjust as necessary.

- F. Install magneto ground wire from under throttle cam on starboard side of engine with terminal facing back. Loop wire around fuel line one turn counter-clockwise and install opposite end

of wire to top-forward screw of fuel pump. Make sure wire does not bind when magneto advances and retards.

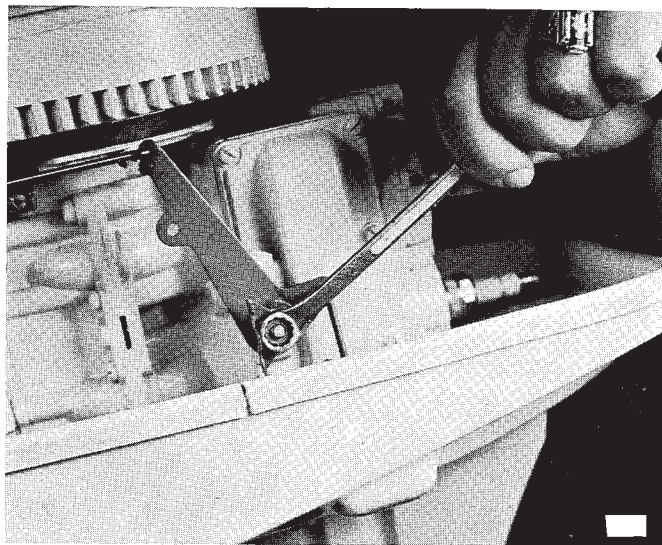


FIGURE 34 — MAGNETO CONTROL LEVER ASSEMBLY

INSTALLING FUEL LINES

1. FUEL LINE — BUSHING TO FUEL PUMP: Route fuel line from bushing on carrying handle, under handle, through hole in support plate, and attach to fuel pump inlet. Fuel line must not contact stern or swivel brackets when engine is turned or tilted.
2. FUEL LINE — FUEL PUMP TO CARBURETOR: Route fuel line from fuel pump outlet, under carburetor adapter flange, through upper hole in starter bracket, around outside of starter, and attach to carburetor inlet.

IMPORTANT

If new parts have been installed to the power head, it is good practice to break the engine in as outlined below before attempting sustained full power operation.

BREAK-IN PERIOD — 6 AND 9.2 H.P. MODELS

During the first few hours of operation, care should be taken to properly break in your new engine. Observe the following instructions carefully:

Operate engine at idle to one-quarter throttle for the first thirty (30) minutes. Engine may now be operated at wide open throttle for periods of not more than one (1) minute at a time, alternating with fifteen (15) minute periods of one-half ($\frac{1}{2}$) to three-quarter ($\frac{3}{4}$) throttle, until two (2) hours of running time have been accumulated. Engine may now be operated at whatever speed desired.

The correct gasoline to oil ratio is $\frac{1}{3}$ pint of high grade SAE 30 outboard engine oil with each gallon of Marine White or Regular Grade Automotive gasoline.

IMPORTANT

When the engine is used in COMMERCIAL or HEAVY DUTY applications, DO NOT USE THE 50 to 1 GASOLINE TO OIL RATIO. USE ONLY THE 24 TO 1 GASOLINE TO OIL RATIO.

RECOMMENDED FUEL MIXTURE

IMPORTANT: BEFORE ATTEMPTING TO RUN THE ENGINE, REFER TO THE "BREAK-IN" PERIOD.

The MINIMUM recommended fuel mixture after the break-in period has been completed (10 hours of operation), is one (1) part of SAE 30 Outboard Engine Oil to fifty (50) parts of MARINE WHITE or REGULAR GRADE automotive gasoline. For easy measurement, mix one (1) pint of oil to six (6) gallons of gasoline. THIS MIXTURE MUST NOT BE USED UNTIL AFTER THE BREAK-IN PERIOD IS COMPLETED.

TORQUE SPECIFICATIONS

(Inch Pounds Unless Otherwise Specified)

H.P.	CYLINDER HEAD	FLYWHEEL	CONNECTING ROD SCREWS
6 - 9.2	65	40 Ft. Lbs.	Aluminum Rod - 70 Steel Rod - 80

ALL OTHER HARDWARE

SCREW SIZE	TORQUE
6-32	9
10-24	30
10-32	35
12-24	45
1/4-20	70
5/16-18	160
3/8-16	270

COMPRESSION RANGES

NEW ENGINE, COOLED DOWN,
IMMEDIATELY AFTER RUNNING.

NOTE: Add 5 P.S.I. to the compression range for an engine with 15 hours or more running time. This increased compression is due to carbon build-up in the combustion chamber and the healing or seating of the piston rings. Do not take compression reading with rust preventative or other oil present in the combustion chamber or spark plug hole. Readings taken under these conditions will increase 10 - 15 P.S.I. above the maximums stated and will be unreliable.

HORSEPOWER	COMPRESSION RANGE
6	55 - 65
9.2	75 - 90

SUPPORT PLATE

DISASSEMBLY

1. Remove complete power head and related linkage.
2. Loosen set screw and magneto control shaft gear at pivot point of steering handle. Remove gear, spring and washer.
3. Loosen two (2) screws retaining magneto control shaft bearing cap to support plate.
4. Slide magneto control shaft back, toward rear of support plate and remove shaft. Install washer, spring and gear to shaft removed in Step 2 above, to prevent their loss.
5. Remove three (3) screws indicated by arrow in Figure 35. Lift support plate up and off motor leg.

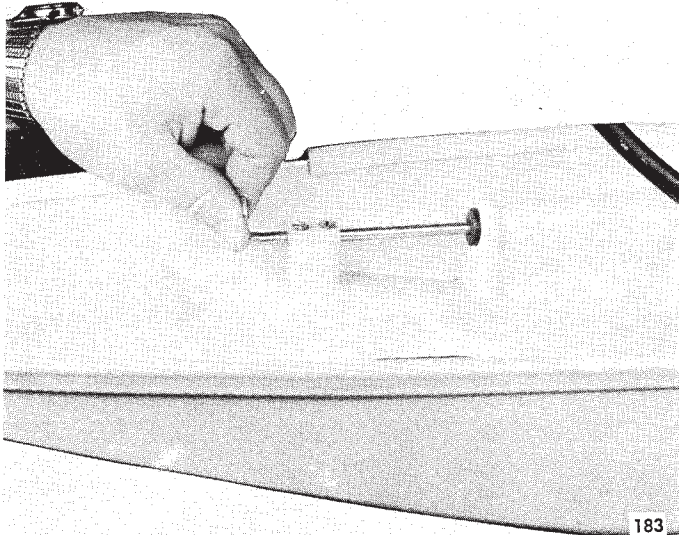


FIGURE 35 — REMOVING SUPPORT PLATE

ASSEMBLY

6. Clean gasket surface on top and bottom of support plate, gasket surface on motor leg and power head.
7. Using a new gasket, set support plate on motor leg. Secure in place using three (3) screws removed in Step 5 under "Disassembly."

NOTE: Make sure rubber "O" ring seals are in place on water line and drive shaft before proceeding farther.
8. Slide magneto control shaft back into support plate.
9. Using a new cylinder exhaust gasket, install power head to support plate.
10. Install and adjust carburetor and magneto control linkage.

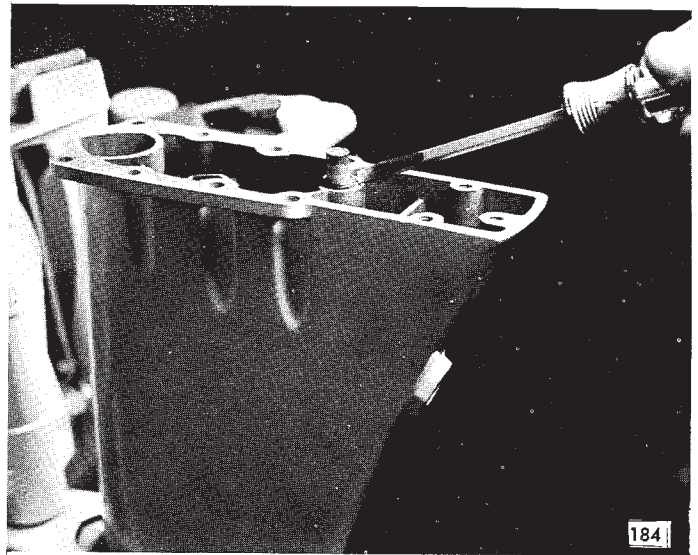


FIGURE 36 — WATER LINE SEAL INSTALLED

11. Make sure nylon magneto control shaft bearing is in place in kingpin mounting plate where control rod passes through. Install washer, spring and gear to end of magneto control shaft. Tighten set screw in gear finger tight.

NOTE: Before installing gear to shaft, set steering handle indicator so that word "Start" is at arrow on steering handle. With handle "up," install gear to shaft so that head of set screw is pointed down for easy access. Install gear onto shaft so that end of shaft is flush to .015" depressed from gear face. Apply Loctite "D" (T-2963) to threads of steering handle gear set screw when installing.

12. ADJUSTING MAGNETO CONTROL LINKAGE.

Adjust the gear on the magneto control shaft so that when the pointer on the steering handle is centered on the word "Start," the starter pinion gear engages the flywheel. The starter pinion gear must NOT, at any time, engage the flywheel when the pointer on the handle is beyond the "Start" line toward the "Fast" position.

KINGPIN MOUNTING PLATE

DISASSEMBLY

1. Perform steps listed under "Removal of Support Plate."
2. Remove upper shock mount from mounting plate.

3. Drive spring pin out of mounting plate and kingpin using a drift punch. Remove mounting plate.

NOTE: If any of the components attached to the mounting plate have to be replaced, refer to the parts book for the model being worked on for parts breakdown and method of assembly.

ASSEMBLY

4. Reverse steps listed above.
5. If the steering handle has been removed, refer to the parts book for correct assembly methods and then adjust as follows:
 - A. Make sure the magneto control shaft bearing is in place as omission can cause steering handle grip rattling.
 - B. After installing handle on pivots, align port and starboard castings for minimum mismatch of halves. Make sure that there is no binding of the steering handle grip when turned.
 - C. Adjust large screw in starboard half to provide suitable tilting friction.
 - D. When installing gear to steering handle shaft, push control shaft through gear until a maximum of .005" end float is obtained. Apply Loctite "D" to threads of set screw and torque to 70 inch pounds.

MOTOR LEG

DISASSEMBLY

1. Remove gear housing from motor leg.
2. Remove complete power head.
3. Remove two (2) bolts securing lower shock mount covers to kingpin. Remove covers and shock mount, lift motor leg clear of swivel bracket.

ASSEMBLY

1. Clean gasket surface on lower side of support plate and top surface of motor leg.
2. Using new exhaust gaskets, reassemble, performing steps listed above in reverse order.

NOTE: Allow weight of engine to rest on upper shock mount prior to tightening lower shock mount cover bolts. Tap the covers downward lightly prior to tightening bolts to take up clearance in a downward direction.

DRIVE SHAFT

REMOVAL

1. Disassemble gear housing upper from motor leg and remove water pump.
2. Pull drive shaft up and out of gear housing upper, being careful not to damage drive shaft seal.

3. Inspect drive shaft seal, replace if worn or damaged.

ASSEMBLY

4. Install drive shaft from top side of gear housing upper. Dip lower end of drive shaft in oil and assemble carefully to prevent damage to drive shaft seal.
5. Assemble water pump to gear housing, gear housing to motor leg.

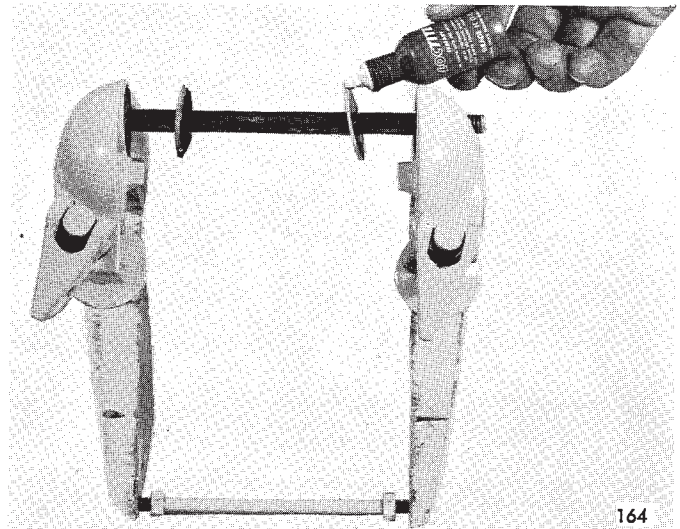


FIGURE 37 — STERN BRACKET INSTALLATION

STERN BRACKET

DISASSEMBLY

1. Remove angle adjusting bar from holes in lower end of stern brackets.
2. Remove hex nut and washer from stern bracket pivot bolt and remove bolt.
3. Remove screw and stop nut securing reverse lock link to reverse lock.
4. Loosen hex nuts and turn stern bracket stabilizer stud out of stern brackets.
5. Remove tilt stop pivot and spacer from port side of swivel bracket.
6. If the port stern bracket is to be replaced, remove tilt stop mechanism. Make note of the assembly detail of tilt stop parts when removing to facilitate assembly.

ASSEMBLY

NOTE: When reinstalling, lubricate bearing and friction surfaces liberally.

7. Stern Bracket — Port: Install tilt stop mechanism to stern bracket as follows:

- A. Install bowed washer under tilt stop pivot screw head.
 - B. Install tilt stop pivot screw through hole in tilt stop lever from side opposite finger tab.
 - C. Install spacer to pivot screw.
 - D. Install spring over spacer with long hooked end away from lever.
 - E. Install assembly to stern bracket.
 - F. Position long hooked end of spring in forward-bottom corner formed by boss and rib in stern bracket.
 - G. Tighten pivot screw securely, being careful not to burr up screw head. A burr on the screw head will cause the tilt stop lever to bind when activated.
 - H. Engage small hooked end of spring over rear edge of stop bracket when bracket is in "down" position.
8. Insert stern bracket pivot bolt through starboard stern bracket.
 9. Insert stern bracket pivot bolt through reverse lock link assembly with loop in reverse lock link pointed back.
 10. Install stern bracket — pivot bolt assembly to swivel bracket.
 11. Start threads of stern bracket stabilizer link in starboard stern bracket.
 12. Install port stern bracket to pivot bolt, making sure the friction washer is between stern bracket and swivel bracket and at same time, threading stern bracket stabilizer stud into stern bracket.
 13. Turn stabilizer stud into stern brackets until arriving at a dimension of 4-25/32" between inside faces of stern brackets, as shown in Figure 37.
 14. Install washer and hex nut to pivot bolt. Refer to "Friction Adjustments," this section, before tightening.
 15. Install reverse lock link to reverse lock using screw and nut removed in Step 3 above.
 16. Install free end of tilt stop mechanism to swivel bracket as follows:
 - A. Insert tilt stop pivot screw through slot in lever.
 - B. Assemble spacer over screw and turn screw into swivel bracket. Tighten pivot screw securely being careful not to burr up screw head.
 17. After the installation is complete, check the operation of the tilt stop mechanism. Tilt engine until pivot screw engages in slot of lever. Engine must stay in tilted position. Disengage lever and allow engine to slowly return to the normal operating position. The lever should disengage easily and slide in pivot slot without binding or scraping.

SWIVEL BRACKET

REMOVAL

1. Remove stern brackets as outlined in this section.
2. Remove two (2) steering friction set screws from port side of swivel bracket.
3. Remove two (2) bolts securing lower shock mount covers to kingpin. Remove covers and shock mounts.
4. Remove screw and clamp or screw and nut which secures reverse lock cable or wire to reverse lock.
5. Pull swivel bracket down and off kingpin.

DISASSEMBLY

REVERSE LOCK — It is not necessary to remove the swivel bracket to service the reverse lock.

6. Drive reverse lock groove pin out of swivel bracket from starboard side using a punch slightly smaller in diameter than the diameter of the reverse lock groove pin, as shown in Figure 38.
Before driving pin out, note the position of the reverse lock spring and spacer to facilitate reassembly.

NOTE: The initial force required to drive the pin out will be quite high as the pin is a heavy press fit to the swivel bracket.

7. Replace worn parts as necessary.
8. Inspect nylon swivel bracket bearing in top and bottom of bracket. Replace as necessary.

ASSEMBLY

NOTE: When reinstalling, lubricate bearing and friction surfaces liberally.

9. Place reverse lock and spring in position on swivel bracket. Make sure spring is positioned properly.

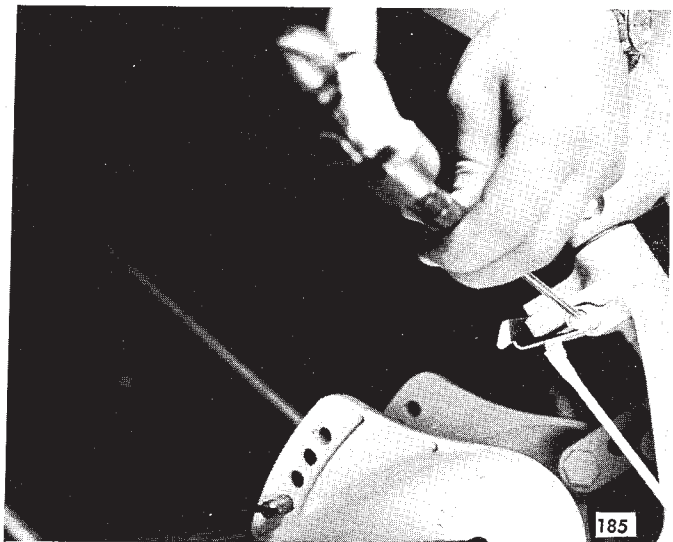


FIGURE 38 — REMOVING REVERSE LOCK GROOVE PIN

10. Drive groove pin through swivel bracket. Drive pin in until centered in reverse lock bracket. Make certain springs and spacer are not damaged during assembly.
11. Route reverse lock cable through holes in swivel bracket, down to reverse lock or connect reverse lock release wire using screw and nut removed in Step 4 of removal procedure.
12. Install reverse lock cable retainer and screw to reverse lock. The retainer is installed to the underside of the reverse lock and secured in place with a screw from top side of reverse lock.
13. Route reverse lock cable between retainer and reverse lock, around screw and tighten screw finger tight.
14. If the swivel bracket has been removed from the engine, proceed as follows:
 - A. Coat swivel bracket washer with grease and install on kingpin.
 - B. Coat swivel bracket bearings in top and bottom of swivel bracket with grease and install swivel bracket to kingpin.
 - C. Install shock mount lower thrust and covers to motor leg and kingpin.
 - D. Install stern brackets.
 - E. Adjust reverse lock cable or bend reverse lock release wire so that when the reverse lock lever is in the locked position (reverse lock down over lock bar) the reverse lock will clear the lock bar by $1/32$ ". Flip the reverse lock lever to the "Release" position, tilt motor, reverse lock must clear lock bar when engine is tilted.

FRICION ADJUSTMENTS

STEERING FRICTION

Steering friction is controlled through two set screws in the top and bottom — port side, of the swivel

bracket. The top set screw also incorporates the use of a friction spring. The spring under the top screw and the lower screw exert pressure on the nylon swivel bracket bearing which in turn apply pressure on the kingpin.

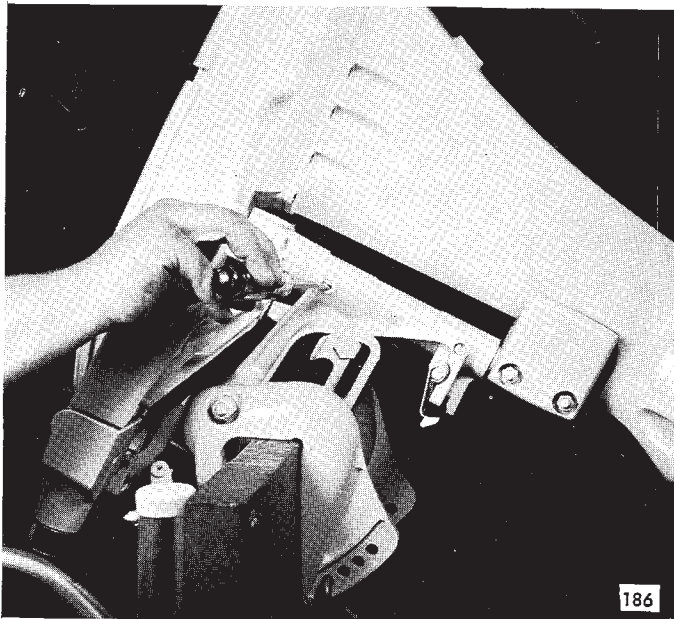


FIGURE 39 — ADJUSTING STEERING FRICTION

TILT HOLD FRICTION

In addition to adjusting the steering friction, all 6 and 9.2 H.P. models must be adjusted to enable the motor to remain in the tilted position. Turn the nut on the stern bracket pivot bolt in the direction required to allow the engine to remain in the tilted position. Do not over-tighten as this will tend to hold the engine down in the running position if an underwater obstruction is hit while in operation.

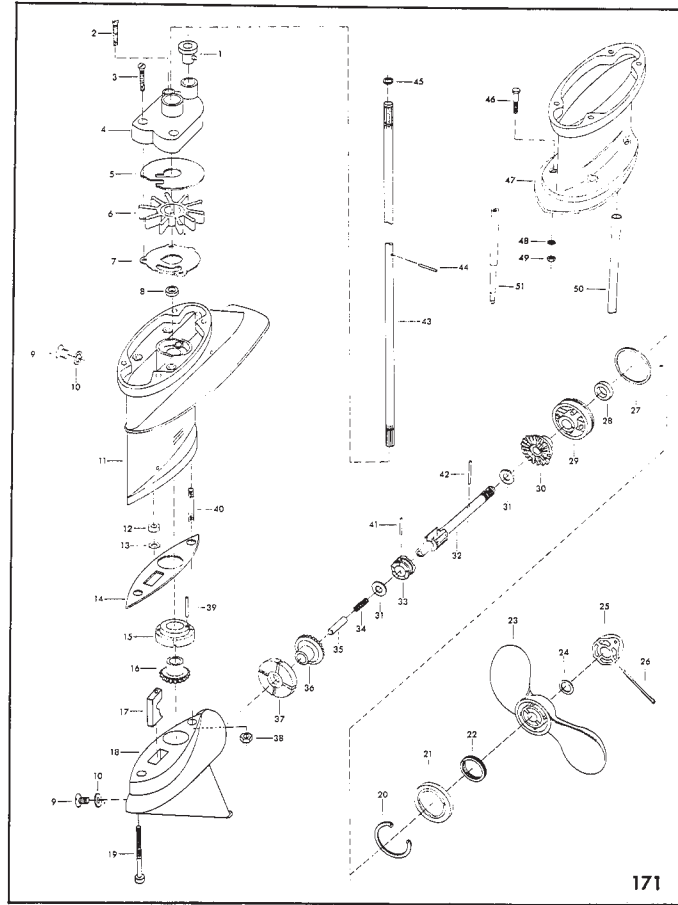


FIGURE 40

ILLUS. NO.	PART NO.	QTY.	DESCRIPTION
1	55914	1	Seal, water line lower
2	1150	1	Flat hd screw, S.S., 1/4-20 x 1-1/8
3	1138	2	Flat hd screw, S.S., 1/4-20 x 1
4	A144060	1	Water pump body w/seals
5	144537	1	Water pump top plate
6	50065-1	1	Water pump impeller
7	144562-1	1	Water pump back plate
8	50307	1	Seal, drive shaft lower
9	* 50109	2	Plug, gear housing
10	* 8077	2	Washer, gear housing plug
11	A197554-2	1	Gear housing, upper w/seal, plug and washer
12	901618-2	1	Seal, gear shift rod
13	901671	1	Seal retainer
14	78555	1	Gasket, gear housing
15	* 50738	1	Thrust bearing, bevel pinion w/spring pin
16	* 197266	1	Bevel pinion
17	* 901721	1	Clutch shift cam
18	* A50054-2	1	Gear housing lower w/bearing, plug and washer
19	* 1258	1	Hex socket hd cap screw, 5/16-18 x 2-5/16
20	* 50411	1	Retaining ring, propeller shaft bearing cage
21	54262	1	Weed guard
22	53993	1	Retaining ring, weed guard
23	A50265-4	1	Propeller (7-1/2" x 7-1/2")
24	40342	1	Seal, propeller nut
25	A50094-1	1	Propeller shaft nut w/cotter pin
26	1023	1	Cotter pin, S.S.
27	* 74305	1	Seal, propeller shaft bearing cage
28	* 901307-2	1	Seal, propeller shaft
29	* A50298-1	1	Propeller shaft bearing cage w/bearing and seals
30	* A197662	1	Bevel gear w/bearing
31	* 50717	2	Thrust washer, bevel gear
32	* 50098-2	1	Propeller shaft
33	* 50521	1	Clutch
34	* 291719	1	Clutch spring
35	* 901728	1	Clutch shift pin
36	* A197023	1	Bevel gear front w/bearing
37	* 50100	1	Propeller shaft thrust bearing
38	1516	1	Hex nut, 5/16-18
39	* 8550	1	Spring pin
40	901008	1	Stud, gear housing
41	8555	1	Spring pin
42	K-238	1	Shear pin, pack of 6 w/cotter pin
43	197128	1	Drive shaft, for standard shaft model
	198128	1	Drive shaft, for long shaft extension
44	50563	1	Water pump impeller drive pin
45	50342-1	1	Seal, drive shaft upper spline
46	1501	4	Hex hd cap screw, 5/16-18 x 1-9/16
47	193845	1	Motor leg extension
48	8096	4	Spring lockwasher
49	1515	4	Hex nut, 5/16-18
50	S901244	1	Inlet water line extension
51	198616	1	Gear shift rod extension

WATER PUMP

DESCRIPTION

The water pump used acts as a positive displacement type at low engine speeds and a centrifugal type pump at higher engine speeds. It is located at the top of the gear housing upper, and consists of a water pump body, impeller, and a top and back plate of stainless steel. The impeller is driven by the drive shaft, which passes through the center of the water pump body.

OPERATION

The water pump impeller, keyed to the drive shaft, turns within a cam-shaped cavity in the water pump body. As the impeller turns, water is picked up from the intake, forced through the pump body and up the water inlet line to the power head.

This section applies only to 6 and 9.2 H.P. models using a two (2) piece gear shift rod.

REMOVING GEAR HOUSING FROM MOTOR LEG

1. Place gear shift handle in "Reverse" position.
2. Remove four (4) screws and nuts securing gear housing to motor leg and allow gear housing to drop.
3. Remove two (2) screws securing shift rod lower to upper and remove gear housing.

DISASSEMBLY OF WATER PUMP

1. Remove three (3) screws that attach water pump body to gear housing.
2. Slide water pump body and impeller off drive shaft.
3. Remove impeller drive pin and water pump back plate.

REASSEMBLY OF WATER PUMP

1. Install water pump back plate to gear housing upper.
2. Install water pump drive pin and slide impeller down over drive shaft.
3. Place water pump top plate in pump body. Use a small amount of grease on back of top plate to retain it to pump body.
4. Slide pump body down over drive shaft. Rotate drive shaft and push pump body over impeller. Install three (3) pump body retaining screws.

INSTALLING GEAR HOUSING TO MOTOR LEG

1. Install screw, lock nut and square nut to gear shift lever arm on end of the shift rod.
2. Install drive shaft upper spline seal to drive shaft.
3. Position nylon gear shift rod guide with "V" pointing to drive shaft. The notches on the guide must be to the top.

4. Apply a coating of grease to end of water line so it will engage easily into water pump body boss. Apply a generous coating of grease to spline on drive shaft.
5. Attach a piece of wire or string to arm on end of shift rod. Feed wire up through motor leg.
6. Pull on wire to guide shift rod lever arm up through motor leg while assembling gear housing to motor leg.
7. Be sure inlet water line is properly seated in pump body and then proceed to install and tighten four (4) screws and nuts retaining gear housing to motor leg.

DISASSEMBLY OF GEAR HOUSING

1. Remove gear housing from motor leg as outlined under "Water Pump Servicing."
2. Drain lubricant from gear housing.
3. Remove water pump and drive shaft.
4. Remove propeller, weed guard retaining ring, and weed guard from gear housing, lower.
5. Using Special Tool #T-1750 snap ring pliers, remove large snap ring retaining the propeller shaft bearing cage.
6. Install two (2) 1/4-20 screws in propeller shaft bearing cage and remove cage, using Special Tool #T-1904, as shown in Figure 41.

NOTE: Before removing bearing cage, be sure to remove all burrs on propeller shaft with a file. This will prevent damage to seal during removal and reassembly of bearing cage.

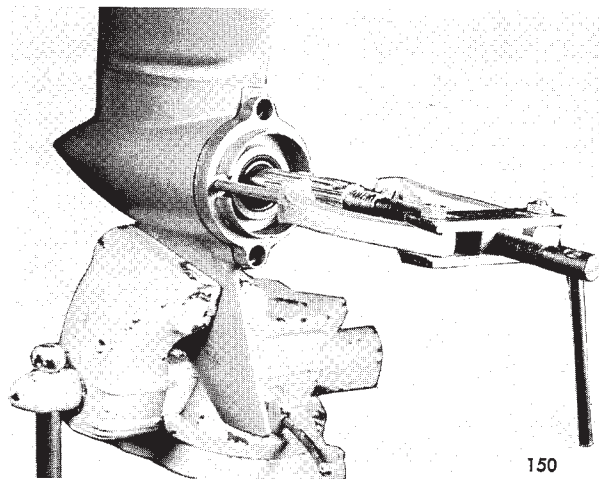
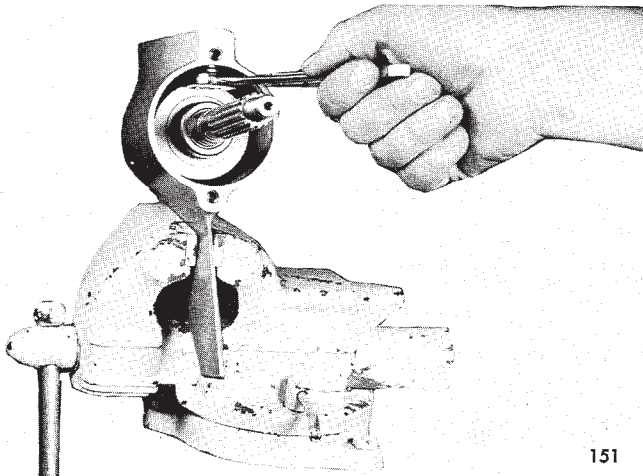


FIGURE 41 — REMOVING PROPELLER SHAFT BEARING CAGE

7. Remove nut from gear housing stud, as shown in Figure 42, and allen head screw from front of gear housing, and separate gear housing lower approximately $\frac{1}{4}$ inch from gear housing upper.
8. Remove propeller shaft assembly and separate gear housing lower from upper.
9. Remove bevel pinion gear and bearing from gear housing lower.
10. To remove the front bevel gear and bearing, rap the open face of the gear housing lightly on a block of wood.



151

FIGURE 42 — GEAR HOUSING STUD NUT

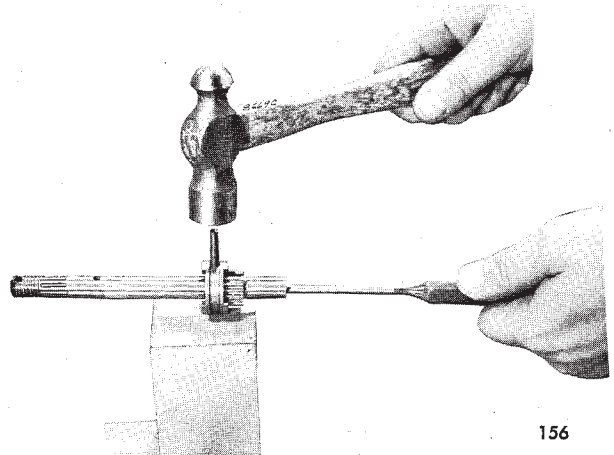
NOTE: The bearing has a light press fit to the gear housing. The bearing can usually be removed by rapping the open face of gear housing on a block of wood. If this is unsuccessful, apply a small amount of heat with a torch.

11. To remove clutch from propeller shaft, use a drift punch to drive out spring pin retaining clutch and clutch spring.

ASSEMBLY OF GEAR HOUSING

Installing Clutch to Propeller Shaft

1. Assemble clutch, with spring pin part way installed, to splined portion of propeller shaft. Insert clutch spring into propeller shaft. Use a drift punch to compress clutch spring and drive spring pin into clutch until it strikes drift punch. See Figure 43. A portion of the spring pin should now retain clutch spring. Remove drift punch and drive spring pin flush with bottom of groove in clutch.



156

FIGURE 43 — INSTALLING CLUTCH

Installing Propeller Shaft Assembly to Gear Housing

2. Assemble thrust washer front bevel gear bearing and thrust washer and rear bevel gear to propeller shaft. Insert clutch shift pin into propeller shaft. Slide propeller shaft bearing cage over propeller shaft using Special Tool #T-2917 seal sleeve.
3. Install clutch shift cam to gear housing with cam contour to the inside and threaded portion to the top.
4. Remove propeller shaft bearing cage outer "O" ring seal and insert propeller shaft assembly into gear housing, as shown in Figure 44. The bearing cage will serve as a guide to align the front bevel gear bearing. The front bevel gear bearing should slide into place when properly aligned.

NOTE: The propeller shaft thrust bearing must be installed so that the face with groove is toward front, away from gear face.

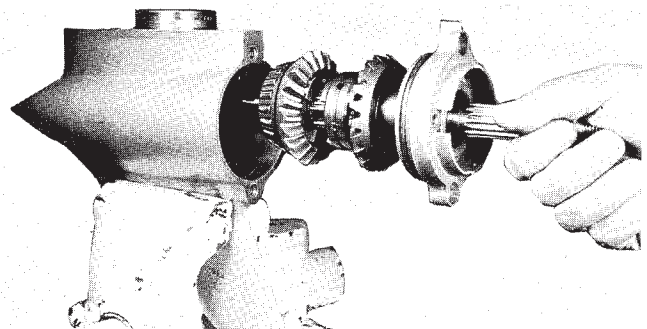


FIGURE 44 — INSTALLING BEVEL GEAR BEARING

NOTE: The front bevel gear thrust bearing has a light press fit to the gear housing. It may be necessary to drive bearing into place, as shown in Figure 45.

5. Install bevel pinion gear and bearing assembly to the lower gear housing.
6. Remove propeller shaft bearing cage from lower gear housing.

Assembly of Gear Housing Lower to Upper

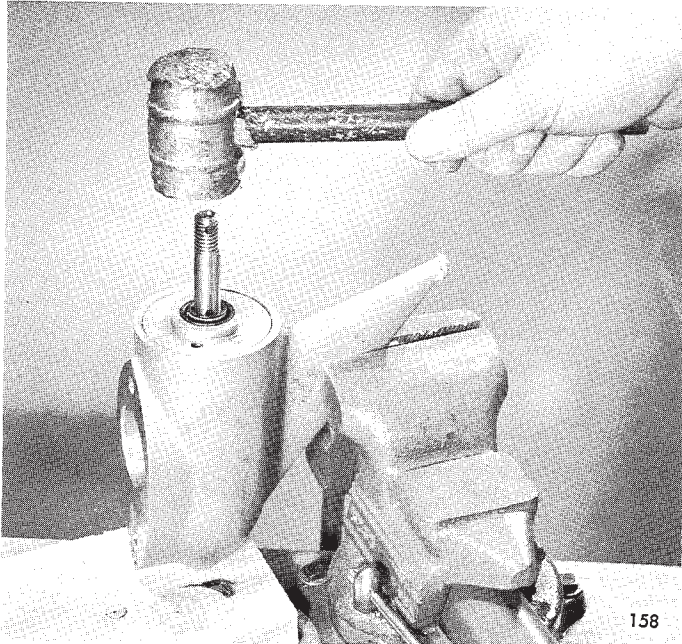


FIGURE 45 — INSTALLING BEVEL GEAR BEARING

7. Install shift rod seal and seal retainer to the bottom side of upper gear housing. A small amount of grease will retain seal and seal retainer.
8. Coat both sides of a new gear housing gasket with Permatex #1 or Gasoila Varnish Sealer and install to lower gear housing.
9. Assemble lower housing to upper and tighten inside stud nut and allen head screw alternately until secure.

NOTE: After the lower gear housing is fully assembled, the propeller shaft end float should be .028" to .003" MINIMUM.

Replacement of Propeller Shaft Seal

10. If the propeller shaft seal, located in propeller

shaft bearing cage, is in need of replacement, proceed as follows:

- A. Use a screwdriver to pry old seal out of bearing cage.
 - B. Install new seal with spring on sealing lip to the outside.
 - C. Apply a generous amount of grease to the area between lips of the seal.
 - D. Use a socket or pipe of proper size to drive seal in place.
11. Replace propeller shaft bearing cage outer "O" ring seal and apply a light coating of grease to outside of seal. Assemble bearing cage to lower gear housing using Special Tool #T-2917, seal protector over end of propeller shaft.
 12. Install propeller shaft bearing cage retaining ring with tapered side out, and then weed guard. Replenish gear lubricant supply. Install small end of vent screw washer to underside of screw head. When installing propeller nut, adjust tight to nearest cotter pin hole.

Replacement of Drive Shaft Seal

13. If the drive shaft seal, located in gear housing upper, is in need of replacement, proceed as follows:
 - A. Use a screwdriver to pry old seal out from the top. CAUTION: Do not damage machined surface of gear housing.
 - B. Install new seal with spring on sealing lip to the bottom.
 - C. Apply a generous amount of grease to area between lips of seal.
 - D. Use a socket or pipe of proper size to drive seal in place.
14. Install lower gear shift rod to clutch shift cam in lower gear housing. Turn shift rod until tight. Check gear shift mechanism to be sure lower unit can be shifted to "Forward," "Neutral" and "Reverse."
15. Install drive shaft and water pump assembly and install gear housing to motor leg as previously outlined under "Water Pump Servicing."

INSTALLING LONG SHAFT EXTENSION KIT ON 6 AND 9.2 H.P. MODELS

When installing long shaft extension kits, the following special instructions must be observed.

1. Remove power head and/or gear housing, as outlined under "Water Pump Servicing." Be sure to follow the instructions for specific model being worked on. Then, refer to the instructions listed below.

(Models Using Single Piece Shift Rod)

1. Remove water pump body, impeller and drive shaft.
2. Remove gear shift rod from gear housing by turning shift rod in a counter-clockwise direction.
3. Install new long drive shaft and reassemble water pump. Be sure water pump impeller drive pin is properly engaged through drive shaft and impeller.
4. Assemble motor leg extension to gear housing, but do not tighten in place at this time.

NOTE: The motor leg extension must be installed with the "Spray Plate" pointing forward and toward the skeg of the lower gear housing.

5. Assemble gear shift rod extension to shift rod and install to gear housing. The gear shift rod (and extension) should be turned all the way down and then backed out to correct position. The nylon gear shift rod guide will now be positioned on the top side of the motor leg extension.
6. Apply a small amount of grease to end of water line extension and insert in water pump body seal.
7. Tighten four (4) screws and nuts which secure the motor leg extension to gear housing.

INSTALLING GEAR HOUSING AND MOTOR LEG EXTENSION TO MOTOR LEG

1. Install screw, lock nut and square nut to gear shift lever arm on end of the shift rod.
2. Install drive shaft upper spline seal to drive shaft.
3. Position nylon gear shift rod guide with "V" pointing to drive shaft. The notches on the guide must be to the top.
4. Apply a coating of grease to end of the water line so it will engage easily into water line extension. Apply a generous coating of grease to spline on drive shaft.
5. Attach a piece of wire or string to arm on end of shift rod. Feed wire up through motor leg.
6. Pull on wire to guide shift rod lever arm up through motor leg while assembling gear housing to motor leg.
7. Be sure water line and water line extension are properly engaged and then proceed to install and tighten four (4) screws and nuts which secure motor leg extension to motor leg.

(Models Using Two (2) Piece Shift Rod)

1. Remove water pump body, impeller and drive shaft.
2. Install new long drive shaft and reassemble water pump. Be sure water pump impeller drive pin is properly engaged through drive shaft and impeller.
3. Remove shift rod lower from gear housing and reassemble to new gear shift rod extension.

4. Install gear shift rod and extension to gear housing. The gear shift rod and extension should be turned all the way down and then backed out to correct position.
5. Apply a small amount of grease to end of water line extension and insert in water pump body seal.
6. Assemble motor leg extension to gear housing and tighten securely.

NOTE: The motor leg extension must be installed with the "Spray Plate" pointing forward and toward the skeg of the lower gear housing.

INSTALLING GEAR HOUSING AND MOTOR LEG EXTENSION TO MOTOR LEG

1. Install upper drive shaft spline seal to shaft and apply a generous coating of grease on spline.
2. Apply a light coat of grease to end of water line to enable it to easily fit into water line extension.
3. Assemble gear housing and motor leg extension to motor leg. Install two (2) screws which retain gear shift rod lower to upper.
4. Be sure water line and water line extension are properly engaged and then proceed to install and tighten four (4) screws and nuts which secure motor leg extension to motor leg.

LUBRICATING LOWER GEAR HOUSING

The grease in the lower gear housing should be checked after every thirty (30) hours of operation and replaced every 100 hours or at least once each season with a Non-Corrosive Leaded Outboard Gear Oil — EP90, such as Texaco Outboard Gear Oil — EP90 or equivalent. DO NOT USE A CORROSIVE HYPOID OIL UNDER ANY CIRCUMSTANCES.

TO DRAIN:

With engine in an upright position, remove both the upper and lower plug screws and allow grease to drain completely.

TO REFILL:

1. When all water and diluted grease has drained, insert nozzle of gear lubricant into lower screw hole.
2. Add lubricant until it appears at the top hole.
3. Reinstall top plug screw and washer.
4. Reinstall lower plug screw and washer. Tighten securely.
5. Allow engine to stand in an upright position for at least one-half ($\frac{1}{2}$) hour to permit the gear lubricant to completely fill all cavities in gear housing.
6. Remove top plug screw and washer and recheck gear lubricant level. Add grease, as outlined below, if necessary, to bring lubricant level up to top hole. Reinstall top screw and washer, tighten securely.

TO ADD GREASE:

1. Remove lower plug screw and washer and insert nozzle of gear lubricant into lower screw hole.
2. Remove upper plug screw and washer.
3. Add lubricant until it appears at the upper hole.
4. Reinstall the upper plug screw and washer and tighten securely.
5. Reinstall the lower plug screw and washer and tighten securely.

