MERCURY

KIEKHAEFER CORP.

(General Offices)
Fond du Lac, Wisc.

(Parts and Service Division)
Beaver Dam, Wisc.

CONDENSED SERVICE DATA

Series Year Produced	6 hp
1955	Mark 5 Mark 6
1956	Mark 6
1957	Mark 6
1958	Mark 6
1959	Mark 6A

TUNE-UP

Hp @ rpm	6 @ 4500
Bore — Inches	1¾
Stroke — Inches	1½
Number of cylinders	2
Displacement — Cu. In.	7.2

Spark Plug

Champion	J7J
AC	M45
Electrode gap	0.025

Magneto

Make	Scintilla or Phelon
Point gap	0.018
Timing	See Text

Carburetor

Make	Tillotson
Model	AJ-30B or AJ-46A
Adjustment	See Text
Fuel — Oil Ratio	20:1

SIZES—CLEARANCES
POWER HEAD

Publication Not Authorized by Manufacturer

- Piston Rings
  - End Gap
  - Side Clearance
- Piston Skirt Clearance
- Crankshaft Bearing Journal Diameter
  - Upper main bearing
  - Center main bearing
  - Lower main bearing
  - Crankpin

Crankshaft Bearing Diametral Clearance

Upper main bearing	Roller Brng.
Center main bearing	
Lower main bearing	Roller Brng.
Crankpin	Roller Brng.
Piston Pin Diameter	
Clearance	Roller Brng.

TIGHTENING TORQUES
(All Values In Inch—Pounds)

Connecting Rod	80
Flywheel Nut	480
Spark Plug	180

LUBRICATION

The power head is lubricated with oil mixed with the fuel. If "Kiekhaefer Quicksilver" 2-cycle engine oil is used, one 12 ounce can should be mixed with each 2 gallons of gasoline. If "Quicksilver" oil is not available a good grade non-detergent SAE 30 motor oil may be substituted by mixing ½ pint with each gallon of fuel. Gasoline and oil should be thoroughly mixed. Marine white, automotive white, or light-aircraft gasoline is recommended. If not available, use a suitable "Regular" gasoline.

The lower unit gears and bearings are lubricated by oil contained in the gear case. Special "Quicksilver Outboard Gear Lubricant" or a non-channeling, waterproof marine gear lubricant should be used. Gearcase is filled through the forward plug hole on starboard side of case, with motor in an upright position. The vent plug (located aft of fill plug) should be removed when filling. Lubricant should be maintained at level of vent plug.

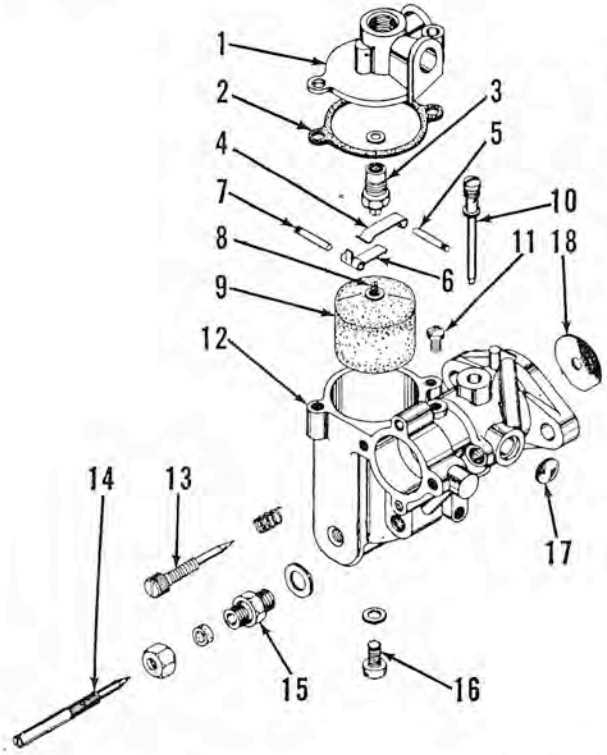

Fig. M1 — Exploded view of Tillotson carburetor of the type used on all models.

1. Bowl cover
2. Gasket
3. Inlet needle & seat
4. Secondary lever
5. Shaft
6. Primary lever
7. Shaft
8. Float spring
9. Float
10. Idle tube
11. Channel plug
12. Body
13. Idle needle
14. High speed needle
15. Gland nut
16. Drain plug
17. Plug
18. Throttle valve

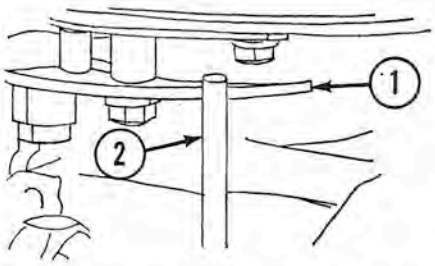

Fig. M3—Schematic view of speed control linkage. Refer to text for details of adjustment.

1. Throttle cam
2. Follower lever

FUEL SYSTEM

CARBURETOR. Tillotson, AJ series, float fed carburetors are used. Refer to Fig. M1. Initial setting is one turn open from closed position for the idle needle (13), and 1½ turns open for the high speed needle (14). Run motor until operating temperature is reached, then shift to forward gear and open the throttle. Slowly turn high speed needle (14) clockwise until motor falters or slows because of a too lean mixture; then back needle out approximately ½-turn. After high speed needle has been properly adjusted, regulate the idle needle until engine runs smoothly **under load** at slow speed. Turning idle needle clockwise will lean the mixture.

The recommended fuel level is approximately $\frac{1}{16}$-inch below gasket surface of float bowl. To adjust the fuel level, remove bowl cover (1) and refer to Fig M2. Invert the cover, and with inlet needle (6) closed, measure the distance between primary lever (9) and gasket surface of bowl cover as shown at (A). This dimension should be $\frac{3}{32}$-inch, if it is not, bend the curved tang on secondary lever (8) until correct measurement is obtained. After adjusting the float height, bend the vertical tang on primary lever (9) to allow a maximum clearance (B) of 0.040 between secondary lever (8) and inlet needle (6).

Model numbers and Tillotson parts lists are as follows:

Model AJ-30B

Repair kit	RK-226
Gasket set	GS-113
Inlet needle & seat	08669
Float	08215
Idle adjustment screw	09019
Idle tube	07113
Main adjusting screw	09441

Model AJ-46A

Repair kit	RK-155
Gasket set	GS-107
Inlet needle & seat	010400
Float	09085
Idle adjustment screw	010155
Idle tube	010232
Main adjusting screw	010327

SPEED CONTROL LINKAGE. The speed control grip or lever moves the magneto stator plate to advance or retard the ignition timing. The throttle valve is synchronized to open as timing is advanced. It is extremely important that ignition timing and throttle valve opening be correctly synchronized to obtain satisfactory operation. To synchronize the linkage, move the speed control grip until the throttle cam (1—Fig. M3), attached to bottom of the magneto stator plate, is at the front centerline of the power head. Loosen the cam attaching screws and move the cam on stator plate until it contacts follower lever (2) and just starts to open the throttle valve.

REED VALVES. The inlet reed valves are located on the crankshaft center main bearing assembly as shown in Fig. M4. Crankshaft must be removed before reed valves can be serviced.

Reed petals (RP) should be perfectly flat and have no more than 0.007 clearance between free end of reed petal and seating surface of center main bearing. The reed stop (RS) must be carefully adjusted to provide 7/64-inch clearance between end of stop and seating surface on bearing housing as shown at (A). Seating surface of bearing must be smooth and flat, and may be refinished on a lapping plate after removing reed valves and dowels. Do not attempt to bend or straighten a reed petal to modify performance, and never install a bent petal. Lubricate the reed valve units with "Quicksilver" Multipurpose lubricant or a light distributor cam grease when reassembling.

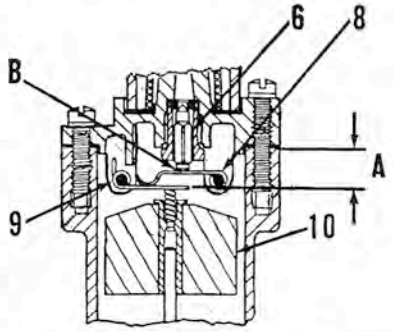

Fig. M2—Schematic view of float mechanism showing method of adjustment. Refer to text.

A. Closing adjustment
B. Open adjustment
6. Inlet needle
8. Secondary lever
9. Primary lever
10. Float

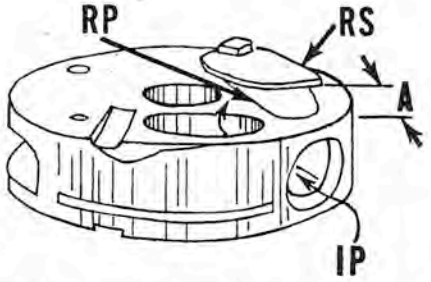

Fig. M4—Center main bearing showing inlet reed valves. Adjustment (A) of reed stop (RS) is 7/64 inch.

A. Adjustment
IP. Inlet port
RP. Reed petal
RS. Reed stop

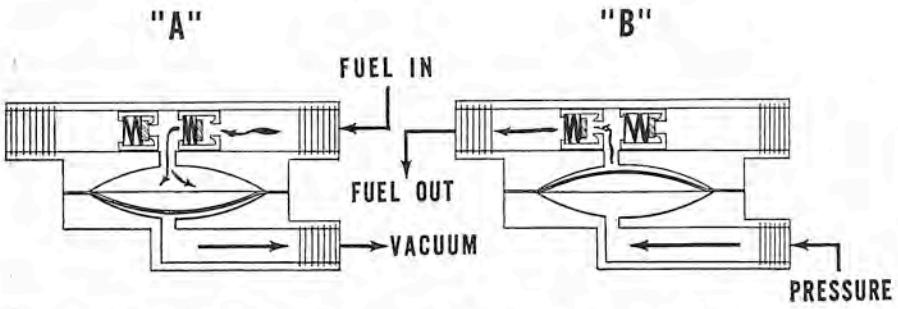

Fig. M5—Schematic view of diaphragm type fuel pump showing method of operation. Vacuum - Pressure line attaches to lower crankcase. When powerhead piston moves upward in cylinder, vacuum in crankcase draws diaphragm out and fuel in as shown in view "A". Crankcase pressure resulting from power stroke forces diaphragm in and fuel out as shown in view "B".

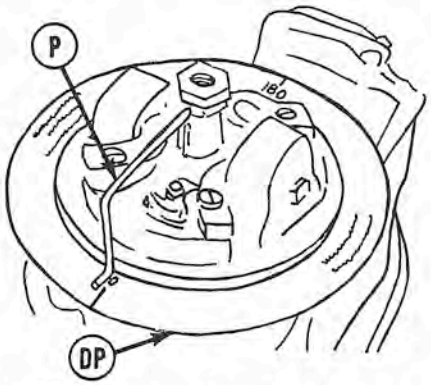

Fig. M8—Synchronizing tool installed for adjusting the magneto points. Refer to text for details.

DP. Degree plate P. Pointer

FUEL PUMP. A diaphragm type fuel pump is used, which is operated by pressure and vacuum pulsations in the lower crankcase as shown in Fig. M5. Vacuum in the crankcase draws the diaphragm down, pulling fuel past the inlet check valve as shown in view "A." Crankcase pressure forces the diaphragm out and the trapped fuel enters the carburetor line past the outlet check valve as shown in view "B."

All defective or questionable parts should be renewed. Check valves must both be pressed out at the same time, working from the OUTLET side of fuel passage. Press valves in from inlet side to the depths shown in Fig. M7.

IGNITION

Breaker point gap should be set at approximately 0.018 on highest lobe of cam. The two sets of points should be set to open at exactly 180 degree intervals. The points may be synchronized by using the Mercury Synchronizing Tool set, part number 91-28619A1 shown in Fig. M8 (or equivalent), plus a timing test light such as that shown in Fig. M9. To adjust the timing, remove the flywheel and install the degree plate (DP—Fig. M8) and pointer (P). Set the contact points for top cylinder at 0.018. Remove the spark plugs and install the test light by attaching one clip to insulated point connection and the other clip to a suitable ground. Turn the crankshaft clockwise slowly until the points just open as indicated by the test light bulb going out. Turn the degree plate until the 0° timing mark is aligned with the pointer as shown. Attach the test light to the other set of points and turn the crankshaft until timing pointer is aligned with the 180° timing mark on degree plate; then adjust the second set of points to barely open. Recheck both sets of points with the degree plate and timing light. If the synchronizing tools are not available, renew the points or dress the contacts to remove any irregularities, then set each set of points to exactly 0.018 working from the same position on the magneto cam.

A quick check of magneto condition can be made without disassembly by removing the spark plugs and holding one spark plug wire about ⅛-inch away from cylinder head. Have someone spin the motor and note the condition of the spark. Although, in bright daylight, the spark may not be visible, a distinct snap will be noted as spark jumps the gap. If spark is weak or erratic, adjust the points as outlined above. Be sure to note point condition. While flywheel is off, carefully examine the wiring and the insulation of the magneto coils. Look for broken or worn insulation or broken wires. Also check for loose or corroded connections. Renew any parts which are damaged or in poor condition. Lubricate the cam wick and breaker arm pivot with a high meling point distributor or magneto grease.

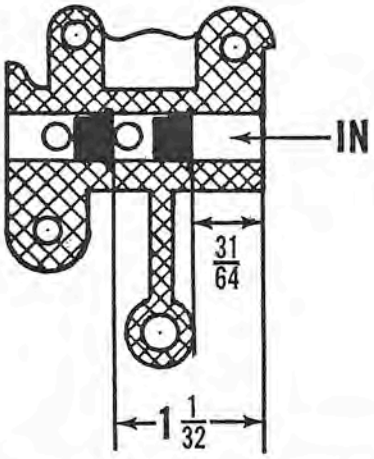

Fig. M7—When renewing the fuel pump check valves, press both valves in from inlet side to the distances shown.

COOLING SYSTEM

WATER PUMP. The rubber impeller type water pump is housed in the lower drive shaft housing. Impeller is mounted on and driven by the lower unit drive shaft. The pump housing is offset with relation to drive shaft as shown in Fig. M10. Flexing of the impeller blades varies displacement volume between the blades which causes water to be drawn through inlet and forced upward into power head. At high speeds, the impeller blades remain partially curved as indicated by the broken lines (HS), and the pump operates partially by centrifugal action.

When cooling system problems are encountered, first check the water inlet for plugging or partial stoppage, then if not corrected, remove and disassemble the lower unit as outlined in the LOWER UNIT section and examine the water pump, water tubes and seals. The water inlet is located on the sides of the lower unit gearcase, the water passing up through a housing which surrounds the propeller shaft.

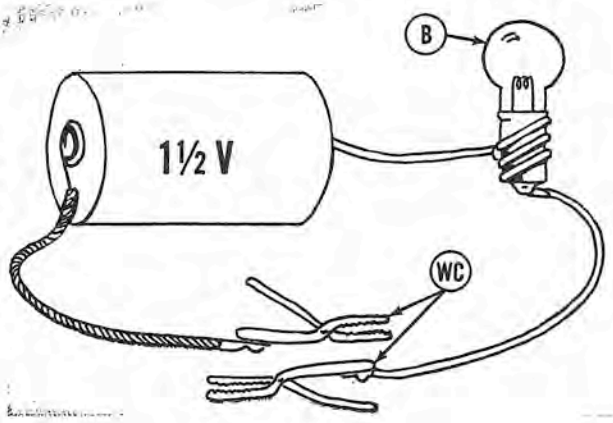

Fig. M9 — A timing test light can be constructed as shown, using a flashlight battery, bulb (B), two wire clips (WC) and short pieces of wire.

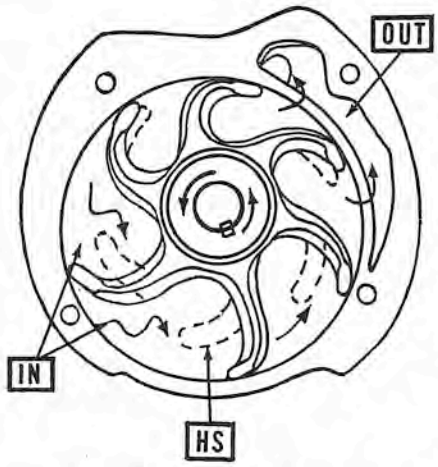

Fig. M10—Schematic view of the rubber impeller type water pump. Flexing of the impeller blades in offset housing causes water to be drawn into pump through inlet ports (IN) and forced into power head through outlet ports (OUT). At high speeds, blades remain partially curved as shown by broken lines (HS) and pump becomes a centrifugal pump.

POWER HEAD

R&R AND DISASSEMBLE. To remove the power head assembly, first remove the top cowl, then disconnect and remove the shift cable. Remove the slotted special screw in front top of lower unit driveshaft housing, loosen the clamping bolt at top rear of driveshaft housing, then withdraw the lower unit assembly downward out of swivel bracket and power head assembly. Loosen the clamping screw in co-pilot locking ring (10—Fig. M11) and withdraw the power head assembly upward out of swivel bracket and lower cowl.

The powerhead stand, Mercury part number 91-24282, or equivalent is required to disassemble the removed power head. Place the stand in a vise and set the powerhead on the stand; then remove the flywheel, magneto, carburetor and inlet manifold. Remove the housing cap (1) and dished thrust washer (3) from upper bearing housing, remove flywheel key, then unscrew and remove the upper bearing retaining nut (2). NOTE: Nut is secured with LEFT HAND thread.

Remove the screws retaining bearing housing (5), then remove housing using a puller with legs which will screw into threaded holes in housing.

Remove the spark plugs, then unbolt and remove the cylinder assembly from the crankcase, crankshaft and pistons assembly. Cylinder block cover (6—Fig. M12) and inlet port cover (2) should be removed for inspection and cleaning of the block.

Remove the screws retaining water inlet cap (13—Fig. M11) from crankcase pivot tube using Mercury tool number 91-24279, or a No. 1 Phillips screwdriver socket and extension. Remove the water inlet cap (13).

Hold the connecting rod cap with the formed cap holder (Tool Number 91-24281), remove the retaining screws, then remove the connecting rod and piston assemblies. Keep the assemblies together and make sure they are properly marked for reinsertion in the same cylinder. There are 23 loose needle rollers in each connecting rod crankpin bearing. Make sure all bearings are removed from crankcase and kept with the assembly.

Remove the center main bearing locking screw from side of crankcase and scribe a line across center main bearing and center bridge of crankcase to aid in alignment of bearing when reinstalling. Refer to Fig. M13. Place spacers or jacks (J) between counterweights of crankshaft to prevent springing or breakage of shaft. Jacks may be fashioned of brass, hardwood blocks, or a short bolt and nut may be used. Use the Mercury powerhead stand as an arbor, and press the crankshaft and center main bearing out the top of the crankcase assembly. Inspect and overhaul the power head components as outlined in the appropriate following paragraphs.

ASSEMBLY. Because of the two-cycle design, crankcase and inlet manifold must be completely sealed against both vacuum and pressure. Exhaust manifold and water

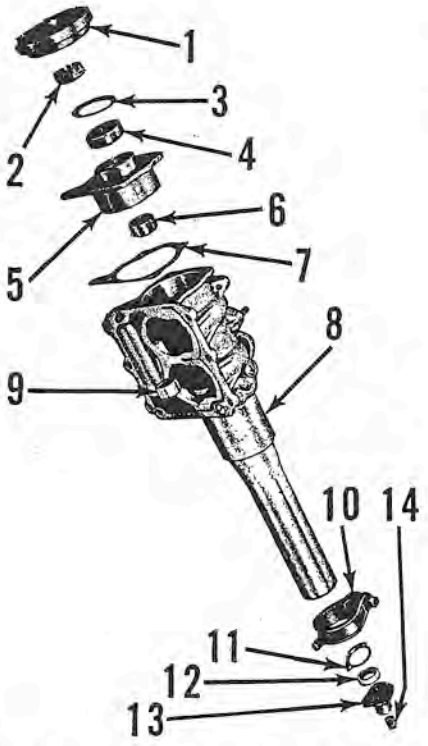

Fig. M11—Exploded view of the one-piece crankcase and associated parts.

1. Housing cap
2. Bearing nut
3. Thrust washer
4. Ball bearing
5. Housing
6. Roller bearing
7. Gasket
8. Crankcase
9. Roller bearing
10. Co-pilot ring
11. Gasket
12. Oil seal
13. Water inlet cap
14. Bushing

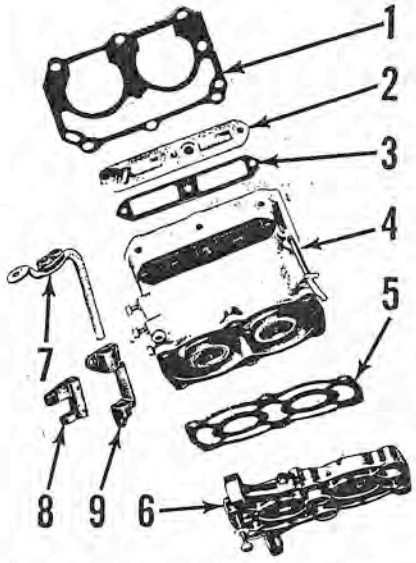

Fig. M12—Exploded view of power head cylinder and component parts.

1. Gasket
2. Transfer port cover
3. Gasket
4. Cylinder
5. Gasket
6. Cylinder cover
7. Pivot lever
8. Link lever
9. Clutch bracket

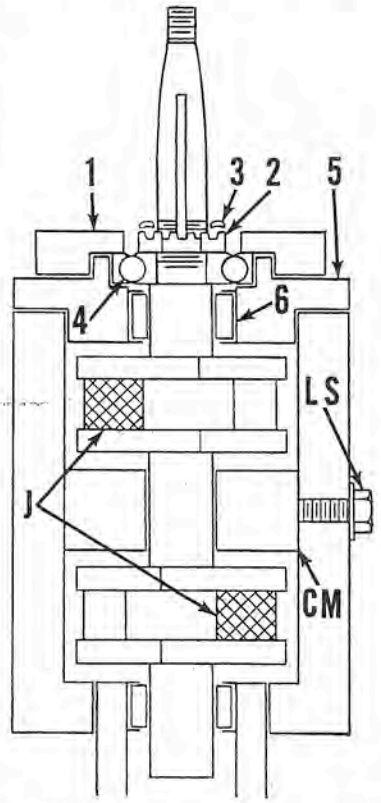

Fig. M13 — Schematic view of crankcase showing method of removing and installing crankshaft. Refer to text.

1. Housing cap
2. Bearing nut
3. Thrust washer
4. Ball bearing
5. Bearing housing
6. Roller bearing
J. Jacks
CM. Center main bearing
LS. Locking screw

passages must be sealed against water leakage. Whenever powerhead is disassembled, it is recommended that all gasket surfaces be carefully checked for nicks and burrs which might interfere with a tight seal. Slight damage can sometimes be remedied by lightly lapping the surfaces on a lapping block using No. 00 emery cloth. Remove only the high spots without lowering the surface.

Coat gasket surfaces lightly and evenly with a non-hardening type gasket cement. Lubricate all friction surfaces with new engine oil before assembly. A light, non-fibrous grease should be used to retain loose needle bearings.

Make sure scribe lines on center main bearing and crankcase are aligned and press the crankshaft assembly in place, using the jacks (J—Fig. M13), until the threaded lockscrew hole in center main bearing is aligned with the hole in crankcase. Install and tighten the locking screw (LS). Reinstall upper bearing housing (5), bearing (4) and the crankshaft nut (2). Tighten nut until the clearance between center main bearing and crankshaft is equal at top and bottom; then align one castellation of nut with the crankshaft key slot, and install key with lower end locking the nut in position as shown.

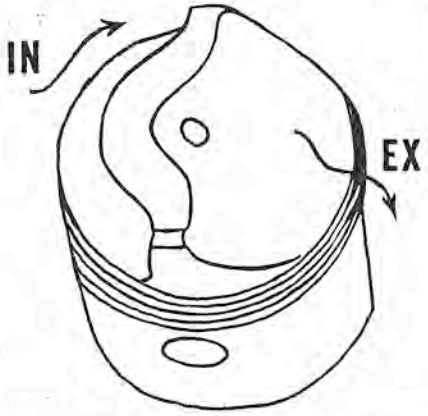

Fig. M14—Piston crown design improves scavenging efficiency. Be sure piston is installed as indicated with relation to inlet and exhaust ports.

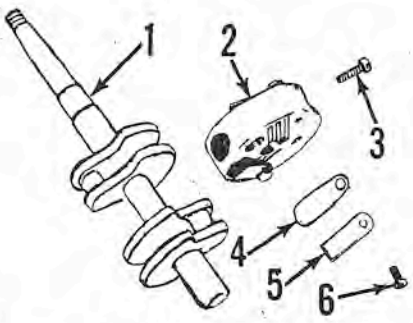

Fig. M15—Exploded view of crankshaft and center main bearing assembly.

1. Crankshaft
2. Center main bearing
3. Locating screw
4. Reed petal
5. Reed stop
6. Retaining screw

Install connecting rods, using the formed holding tool (91-24281), making sure that alignment marks on rod and cap are matched. Piston must be installed with sharp vertical side of deflector to starboard (intake) side of cylinder. See Fig. M14. Tighten the connecting rod screws to a torque of 80 inch pounds. Install the cylinder assembly using a ring compressor, install the retaining screws loosely, then rotate the crankshaft to align the block before tightening the retaining screws.

PISTONS, PINS, RINGS & CYLINDERS. Before detaching connecting rods from crankshaft, make sure that rod and cap are properly identified for correct assembly to each other and in the correct cylinder.

Each piston is fitted with three rings which are interchangeable in the ring grooves and are pinned in place.

Piston pin is pressed in piston bosses and secured with retaining rings. Piston end of connecting rod is fitted with 17 loose needle bearings which use the connecting rod bore and the piston pin as bearing races. Install bearing washers and needle bearings in upper end of connecting rod, then install and center the piston pin using Mercury tool (91-24263). Piston must be installed so that sharp vertical side of deflector will be to starboard (intake) side of cylinder when powerhead is assembled. Thoroughly lubricate all friction surfaces during assembly.

CONNECTING RODS, BEARINGS AND CRANKSHAFT. Upper end of crankshaft is carried by a ball bearing which also controls end thrust, plus a caged needle bearing. The unbushed center main bearing (2—Fig. M15) also contains the inlet reed valves. Lower main bearing is a caged needle roller type which should be pressed into crankcase until upper edge is $\frac{3}{32}$-inch below bottom of crankcase.

Connecting rod rides in 17 loose needle rollers at piston end and 23 loose needle rollers at crankpin end of rod. Check rod for alignment, using Mercury alignment tool (91-28441A1), or by placing rod on a surface plate and checking with a light.

If bearing surface of rod and cap is rough, scored, worn, or shows evidence of over-heating, renew the connecting rod. Inspect crankpin and main bearing journals. If scored, out-of-round, or worn, renew the crankshaft. Check crankshaft for straightness using a dial indicator and Vee-blocks.

Inspect and adjust the reed valves as outlined in REED VALVE paragraph, and reassemble as outlined in ASSEMBLY paragraph.

MANUAL STARTER

Refer to Fig. M16. To install a new starter cord (cable) or spring, remove and invert the top cowl assembly. Pry the cable bushing insert from handle with a screwdriver, slip handle (12) back on starter cable and cut the retaining knot. Release the cable and allow the recoil spring to unwind. Unbolt and remove the friction plate (14) and the starter pawls (10); then remove the sheave retaining screw (4). Slowly pull the sheave (3) down, working behind sheave to make sure the recoil spring (1) remains

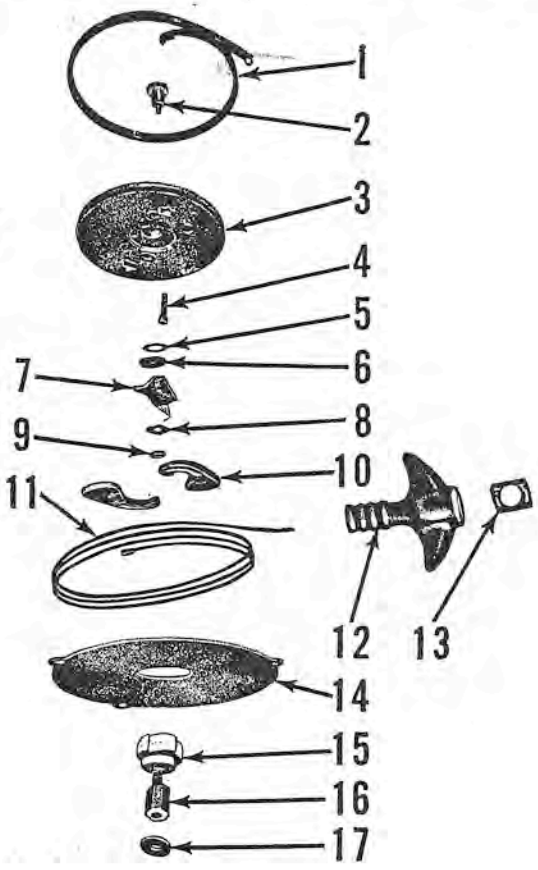

Fig. M16—Exploded view of recoil starter showing component parts.

1. Recoil spring
2. Sheave shaft
3. Sheave
4. Retaining screw
5. Shim
6. Washer
7. Pawl retainer
8. Wave washer
9. Collar
10. Pawl
11. Cable
12. Handle
13. Anchor
14. Friction plate
15. Ratchet
16. Spacer
17. Washer

in recess in housing. Spring can be removed from recess after sheave is removed. NOTE: Wear cotton gloves or protect the hands with a cloth, then grasp and remove the spring, allowing it to unwind slowly after removal.

Unwind the cable (11) from sheave and remove the two anchor screws to release the cable. Install new cable by inserting anchor end in cable slot and twisting ½-turn to lock in place. Wind cable 1 full turn around sheave, then fasten with the 2 locking screws and thread guards. Continue to wind cable in sheave, leaving enough cable free of sheave to insert through cover opening. Lubricate the recoil spring (1) lightly with "Quicksilver" Multipurpose Lubricant and engage inner loop of spring on sheave anchor pin. Position sheave in cover and secure with the locking screw (4); then wind the recoil spring 3 full turns, pull cable through cover and tie a lose knot on outside of housing, leaving sufficient free end to install the handle (12). Complete the assembly by reversing the disassembly procedure.

To renew the sheave (3), shaft (2) or pawl retainer (7), first remove the sheave as previously outlined, grind off the peened end of shaft (2) and drive the shaft out of collar (9) with a punch. Use Fig. M16 as a guide for disassembly and reassembly, and peen the collar (9) to shaft (2), making sure sheave is free to turn.

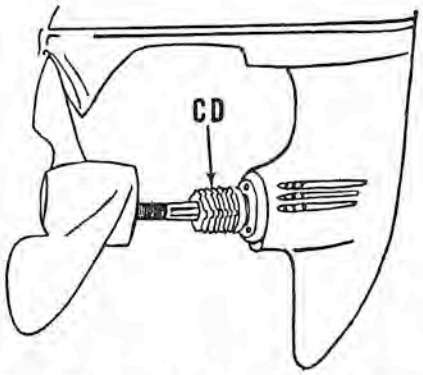

Fig. M17—Lower unit gearcase with propeller removed showing the multiple disc drive clutch. Refer to text for details.

CD. Clutch discs

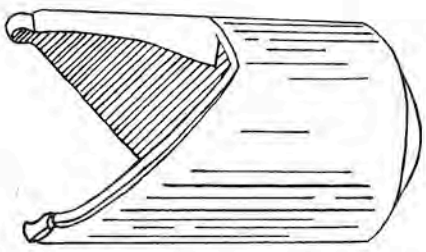

Fig. M18—Checking and adjusting the drive clutch torque requires the use of the special pronged tool. Refer to text.

LOWER UNIT

PROPELLER AND DRIVE CLUTCH. Protection for the motor is provided by the multiple disc clutch located in the propeller hub. To check the clutch torque, first remove the complete lower unit assembly as outlined in the following R&R AND OVERHAUL paragraph, then separate the gearcase housing from drive shaft lower housing. Clamp the neutral clutch drum (upper end of lower drive shaft) in a soft jawed vise and use the special Torque Adapter Tool, 91-24106 (See Fig. M18) and a torque wrench to check the torque. Propeller should turn on shaft at a torque of 170-240 inch-pounds.

If clutch tension must be increased, straighten the tabs on the propeller nut locking washer (26—Fig. M20) and tighten the propeller nut until the proper torque is applied. If propeller nut bottoms on shaft, remove the nut and place a shim behind the compression spring (27). Shims are available in thicknesses of 0.015 and 0.031. An inoperative clutch can be cleaned or the parts renewed by removing the propeller after tension nut is off. Clutch contains 8 externally splined friction discs (23) and 8 internally splined discs (24) which must be alternated on shaft. Motors are equipped with a 6¾ inch diameter, 7 inch pitch, 2 blade aluminum propeller.

R&R AND OVERHAUL. To remove the complete lower unit, first remove the top cowl and disconnect and remove the shift cable. Remove the slotted special screw in front top of lower unit driveshaft housing, loosen the clamping screw at top rear of housing; then pull the complete lower unit downward out of power head.

Clamp the gearcase housing in a vise (above the propeller shaft) using formed wood blocks to protect the housing. Remove the stud nuts (1 & 3—Fig. M19) and the Phillips head screw (2).

Hold the upper driveshaft, if necessary, and turn the propeller counter-clockwise while pulling the housings apart, to allow the neutral clutch to separate.

To disassemble the gearcase, remove the propeller and drive clutch as outlined previously, then remove the gearcase cover (21—Fig. M20) using Mercury tool 91-24267 or a suitable spanner wrench. NOTE: Gearcase cover is secured with left-hand thread.

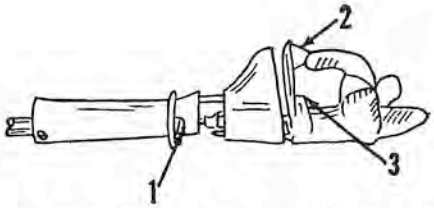

Fig. M19—Partially disassembled view of the three-piece lower unit showing location of the two stud nuts (1 & 3) and the retaining screw (2) which hold lower unit together. Refer to text for disassembly procedure.

Withdraw the propeller shaft assembly and remove the shims (10) from gearcase housing, if used. Bend down the tab washer retaining the drive pinion cap screw (8) and remove the cap screw and pinion (7). Clamp upper end of shaft (6) in a soft jawed vise and tap the gearcase housing from shaft assembly using a soft hammer. Remove and save the shims (5).

To disassemble the propeller shaft assembly, remove snap ring (14) and shims (13); then press bearing (12) from gear. Gear can be pressed from shaft after removing the loose locating pin (15). When reassembling, adjust gear backlash to 0.003-0.005 by means of shims (10). Adjust propeller shaft end play to a minimum by means of shims (13).

When reassembling, hold the upper drive shaft if necessary, and turn the propeller shaft counter-clockwise while moving the housings together, to allow the neutral spring to feed into place.

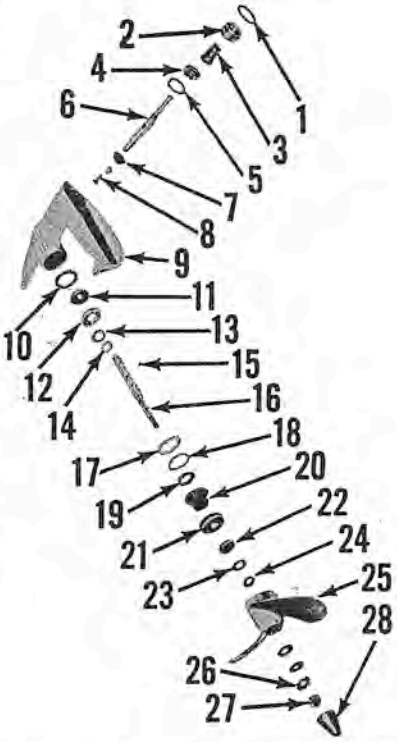

Fig. M20 — Exploded view of lower unit gearcase and associated parts.

1. "O" ring
2. Spacer
3. Clutch drum
4. Ball bearing
5. Shim
6. Lower drive shaft
7. Drive pinion
8. Screw
9. Gearcase
10. Shim
11. Driven gear
12. Ball bearing
13. Shim
14. Snap ring
15. Locating pin
16. Propeller shaft
17. Sealing washer
18. Sealing washer
19. Oil seal
20. Water intake housing
21. Gearcase cover
22. Thrust plate
23. Clutch disc
24. Clutch disc
25. Propeller
26. Tab washer
27. Clutch spring
28. Propeller nut