MERCURY

KIEKHAEFER CORP.

(General Offices)
Fond Du Lac, Wisc.

(Parts and Service Division)
Beaver Dam, Wisc.

CONDENSED SERVICE DATA

Series / Year Produced	6 hp	9.8 hp
1960	Merc 60	.....
1961	Merc 60	.....
1962	Merc 60	Merc 110
1963	Merc 60	Merc 110

TUNE-UP

Rated Horsepower	6	9.8
Rated rpm	4500	
Bore — Inches	1¾	2
Stroke — Inches	1½	1¾
Number of cylinders	2	2
Displacement — Cu. In.	7.2	11
Compression @ Cranking Speed	*	*
Spark Plug		
Champion	J7J	J7J
AC	45M	
Electrode gap	0.025	0.025
Magneto		
Make	Phelon	Phelon
Point gap	0.018	0.018
Timing	See Text	See Text
Carburetor		
Make	Tillotson	Tillotson
Model	See Text	KB5A
Adjustment	See Text	See Text
Fuel—Oil Ratio	20:1	20:1

*Not more than 15 psi variation between cylinders.

SIZES—CLEARANCES

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

Publication Not Authorized by Manufacturer

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 "Type MM," SAE 30 motor oil may be substituted by mixing ½-pint of oil 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.

FUEL SYSTEM

CARBURETOR. Tillotson, float type carburetors are used on all models. Early Merc 60 uses a Model AJ-57A carburetor. Late Merc 60 uses Model KB-6A, while Merc 110 uses model KB-5A. Refer to Fig. M25.

All carburetors employ a fixed, high-speed jet, with optional sized jets available for adjusting the calibration for altitude or other special conditions. Motor should perform satisfactorily with the standard jet at altitudes below 4000 feet. At higher altitudes, a jet of smaller diameter should be installed. Optional jets must be ordered separately, as only the standard jet is included in repair kit. Refer to parts lists for the standard and optional jets available.

Initial setting for the idle adjustment needle (16) is one turn open. Readjust **under load** at slow speed after engine is warm. Turning needle clockwise will lean the mixture.

The recommended fuel level is approximately $\frac{11}{16}$-inch below gasket surface of float bowl. To adjust the float, remove bowl cover (5) and refer to Fig. M26. 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 distance should be $\frac{13}{32}$-inch; if it is not, bend the curved tang on secondary lever (8) until correct measurement is obtained. After adjusting float height, bend the vertical tang on primary lever (9) to allow a maximum clearance of 0.040 between secondary lever (8) and inlet needle (6) as shown at (B).

Tillotson parts lists are as follows:

Model AJ-57A

Repair kit	RK-461
Gasket set	GS-123
Inlet needle & seat	010790
Filter element	010741
Main fuel jet (0.049)	011763
Main fuel jet (0.047)	012027
Main fuel jet (0.045) Std.	012101
Main fuel jet (0.043)	012284
Main fuel jet (0.041)	012370

Model KB-5A

Repair kit	RK-513
Gasket set	GS-149
Inlet needle & seat	010790
Filter element	012107
Main fuel jet (0.051)	011764
Main fuel jet (0.049) Std.	011763
Main fuel jet (0.047)	012027
Main fuel jet (0.045)	012101
Main fuel jet (0.043)	012284

Model KB-6A

Repair kit	RK-539
Gasket set	GS-149
Inlet needle & seat	010790
Filter element	012107
Main fuel jet (0.047)	012027
Main fuel jet (0.045) Std.	012101
Main fuel jet (0.043)	012284
Main fuel jet (0.041)	012370

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. M27), 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.

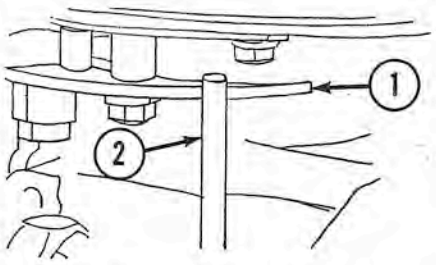


Fig. M27—Schematic view of speed control linkage. Refer to text for details of adjustment.

1. Throttle cam
2. Follower lever

REED VALVES. The inlet reed valves are located on the crankshaft center main bearing assembly as shown in Fig. M28. 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 correct clearance between end of stop and seating surface on bearing housing as shown at (A). The recommended clearance is 7/64-inch for Merc 60 or $\frac{5}{192}$-inch for Merc 110. 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.

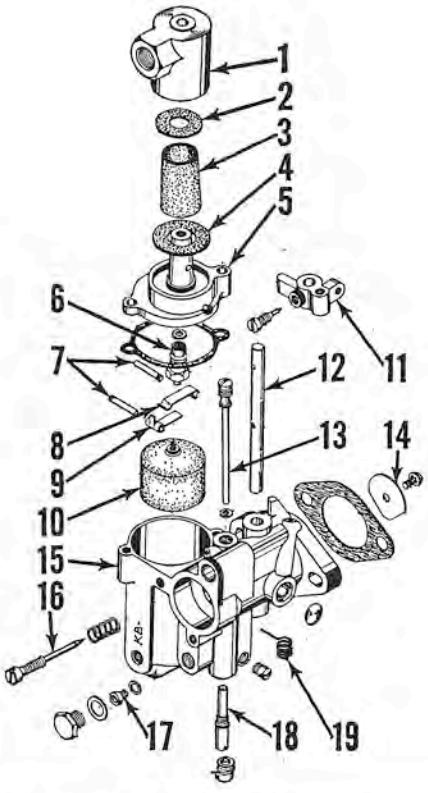


Fig. M25—Exploded view of Tillotson carburetor of the type used.

1. Strainer cover
2. Gasket
3. Strainer
4. Gasket
5. Bowl cover
6. Inlet needle & seat
7. Shaft
8. Secondary lever
9. Primary lever
10. Float
11. Throttle lever
12. Throttle shaft
13. Idle tube
14. Throttle valve
15. Body
16. Idle needle
17. High speed jet
18. Main nozzle
19. Spring

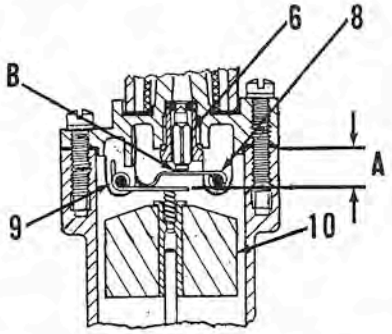


Fig. M26—Schematic view of float mechanism showing method of adjustment. Refer to text.

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

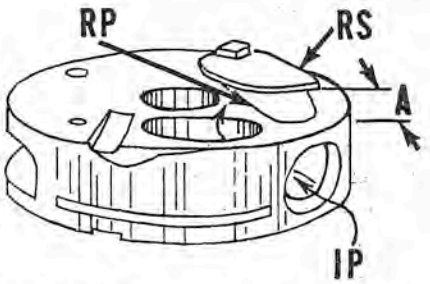


Fig. M28—Center main bearing showing inlet reed valves. Refer to text for adjustment.

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

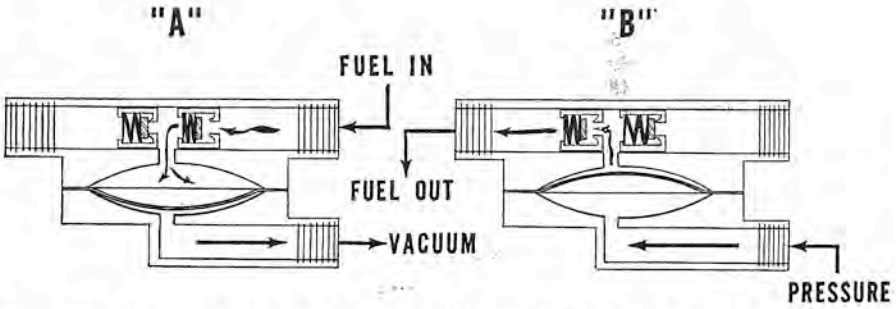


Fig. M29—Schematic view of diaphragm type fuel pump showing method of operation. Vacuum - Pressure line attaches to lower crankcase. When powerhead piston moves upward in cylinder, vacuum in crankcase draws diaphragm out and fuel in as shown in view "A". Crankcase pressure resulting from power stroke forces diaphragm in and fuel out as shown in view "B".

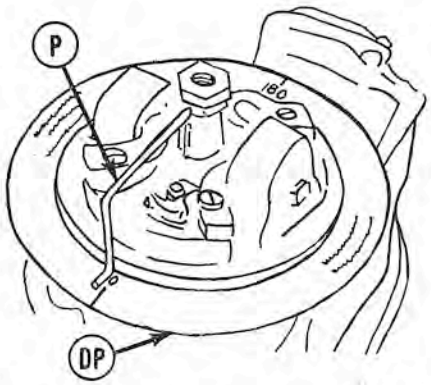


Fig. M31—Synchronizing tool installed for adjusting the magneto points. Refer to text for details.

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. M29. 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.

IGNITION

Breaker point gap should be set at approximately 0.018. 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. M31 (or equivalent), plus a timing test light such as that shown in Fig. M32. To adjust the timing, remove the flywheel and install the degree plate (DP—Fig. M31) 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 pointer as shown. Attach the test light to the other set of points and turn the crankshaft ½-turn until the 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, then set each set of points to exactly 0.018 with a feeler gage.

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 melting point distributor or magneto grease.

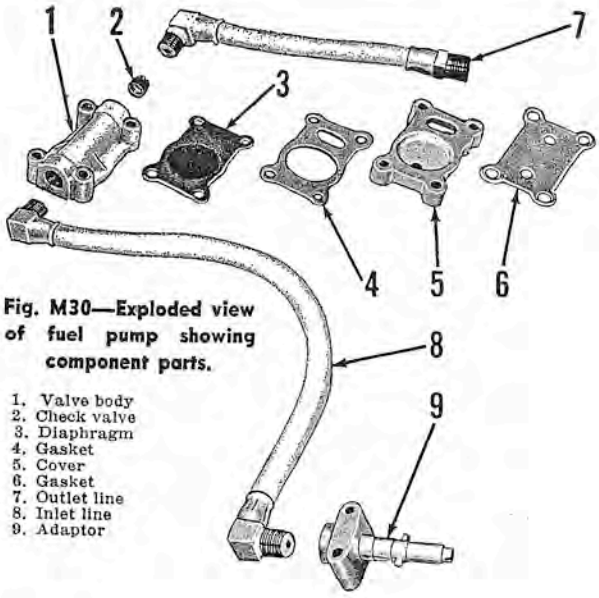


Fig. M30—Exploded view of fuel pump showing component parts.

1. Valve body
2. Check valve
3. Diaphragm
4. Gasket
5. Cover
6. Gasket
7. Outlet line
8. Inlet line
9. Adaptor

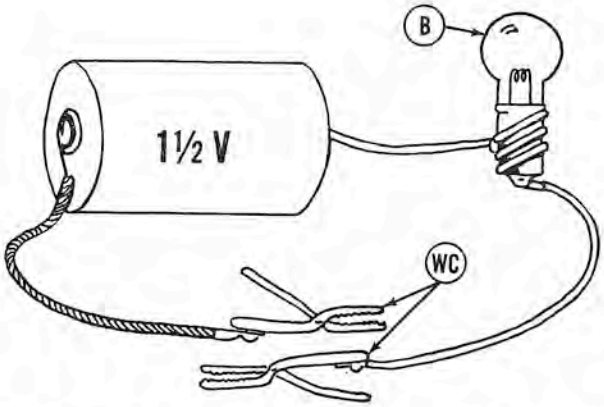


Fig. M32—A timing test light can be constructed as shown, using a flashlight battery, bulb (B), two wire clips (WC) and short pieces of wire.

COOLING SYSTEM

WATER PUMP. The rubber impeller type water pump is housed in the gearcase housing. The impeller is mounted on and driven by the lower unit drive shaft. The pump housing is offset with relation to driveshaft as shown in Fig. M33. Flexing of the impeller blades varies the displacement volume which causes water to be drawn into water pump through inlet (IN) and forced upward into power head (OUT). At high speeds the impeller blades remain partially curved as shown by the broken lines (HS) and pump operates in part by centrifugal force.

When cooling system problems are encountered, first check the water inlet for plugging or partial stoppage, then if not corrected, remove the gearcase housing as outlined in LOWER UNIT section and examine the water pump, water tubes and seals. The water inlet is located on the anti-cavitation plate immediately above the propeller.

POWER HEAD

R&R AND DISASSEMBLE. To remove the power head assembly, first remove the top cowl and disconnect stop wire switch, speed control linkage and choke shutter spring. Remove the screws which secure fuel line check unit to lower cowl and the nuts securing power head to lower unit; then lift off the complete power head assembly.

Place the unit on Mercury powerhead stand 91-24282, or equivalent, and remove fuel pump, carburetor, flywheel and magneto. Exhaust manifold cover plate, cylinder block cover plate and transfer port cover should be removed for cleaning and inspection.

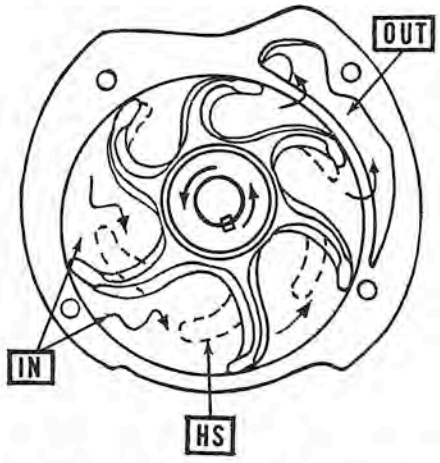


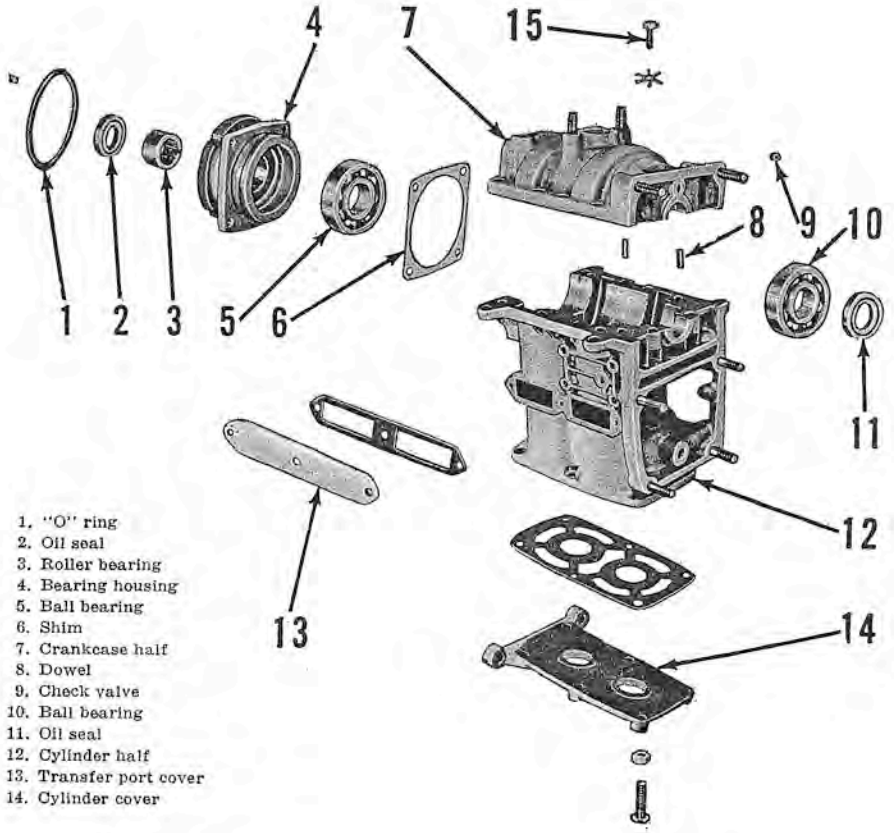
Fig. M33—Schematic view of rubber impeller type water pump. Flexing of impeller blades in offset housing causes water to be drawn into pump through inlet ports (IN) and forced into power head through outlet ports (OUT). At high speeds, blades remain partially curved as shown by broken lines (HS) and pump becomes a centrifugal pump.

Remove the capscrews which retain upper end cap (4—Fig. M34) to power head, remove center main bearing locking screw (15); then unbolt and remove crankcase front half (7). NOTE: A special recess is located at the center on each side of crankcase half (7). Loosen the crankcase by carefully prying at these points ONLY with a screwdriver. Use extra care not to spring the parts or to mar the machined, mating surfaces. Crankcase half (7) and cylinder (12) are matched and align bored, and are available only as an assembly.

The crankshaft and bearings assembly, with pistons and connecting rods attached, can now be lifted out of cylinder block for service and overhaul as outlined in the appropriate following paragraphs. Assemble by following the procedures outlined in the ASSEMBLY paragraph.

ASSEMBLY. Because of the two-cycle design, crankcase must be completely sealed against both vacuum and pressure. Exhaust manifold and water passages must be sealed against water leakage. Whenever power head is disassembled, it is recommended that all gasket surfaces and machined joints without gaskets be carefully checked for nicks and burrs which might interfere with a tight seal. Slight damage can sometimes be remedied by lapping the surfaces on a lapping block using No. 00 emery cloth. Remove only the high spots without lowering the surface. If parts are warped, sprung or excessively damaged, renew the parts.

Completely assemble the crankshaft, bearings (except upper main bearing and cap), connecting rods, pistons and rings; and install the assembly by inserting pistons in lower ends of cylinders. The two angle ring compressers of Mercury Ring Compressor Kit 92-28891A2, should be used. If ring compressor kit is not available, two men must work together and use extreme care in installing the crankshaft and pistons assembly. Thoroughly lubricate the pistons, rings and bearings using new engine oil and make sure that ring end gaps are aligned with the locating pins in ring grooves. Work each piston ring individually into cylinder, taking special precautions not to distort or break the rings or score the surfaces of rings or pistons. After crankshaft is installed, turn the shaft until each ring appears in the exhaust ports and test the ring for tension, using a blunt tool. If the ring does not spring back when released, it is probably broken or distorted and the assembly should be removed and rechecked.



1. "O" ring
2. Oil seal
3. Roller bearing
4. Bearing housing
5. Ball bearing
6. Shim
7. Crankcase half
8. Dowel
9. Check valve
10. Ball bearing
11. Oil seal
12. Cylinder half
13. Transfer port cover
14. Cylinder cover

Fig. M34—Exploded view of powerhead crankcase and associated parts.

Make sure the center main bearing dowel (6—Fig. M35) is in place and that main bearing (5) is properly located over dowel. Assemble the upper main bearing cap (4—Fig. M34) and install over crankshaft using the shim pack (6) which was removed. Install and tighten the two cap screws which retain the cap to cylinder block, tap the crankshaft back and forth using a soft mallet, then measure the gap between bearing (5) and the crankshaft. The clearance should be 0.008-0.012. If it is not, remove the end cap and vary the thickness of shim pack (6) until the proper end play is obtained. Shims are available in thicknesses of 0.002, 0.003, 0.005 and 0.010.

Remove the end cap to cylinder block screws, withdraw cap slightly and coat the seating surface of cap with gasket sealer (92-28804) or similar impervious liquid sealer. Coat joint surface of crankcase with a thin coat of the gasket sealer then install the crankcase on the cylinder assembly. Tighten the crankcase cap screws by working each way from the center, to prevent possible distortion.

Turn the engine several times before installation to distribute the oil and to make certain the parts are free and do not bind.

PISTONS, PINS, RINGS & CYLINDERS. Before detaching connecting rods from crankshaft assembly, 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 in piston.

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 piston end of connecting rod using light non-fibrous grease to hold them in place, 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 block. See Fig. M36. Thoroughly lubricate all friction surfaces during assembly.

CONNECTING RODS, BEARINGS & CRANKSHAFT. Upper end of crankshaft is carried by a ball bearing which also controls end play, plus a caged needle bearing. The unbushed center main bearing (5—Fig. M35) also contains the inlet reed valves. Lower main bearing is a ball bearing which is interchangeable with the upper ball bearing.

Connecting rod rides in 17 loose needle rollers at piston end and 25 loose needle rollers at crankpin end. Check rod for alignment, using Mercury Alignment Tool (91-28441A1), or by placing rod on a surface plate and checking with a light.

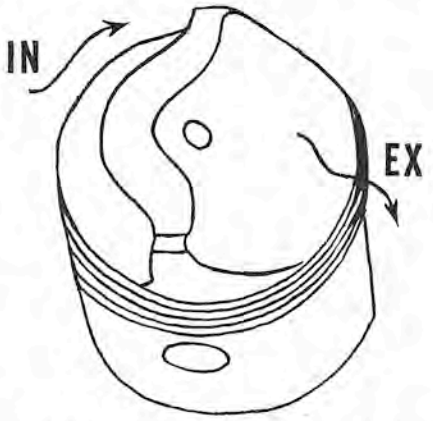
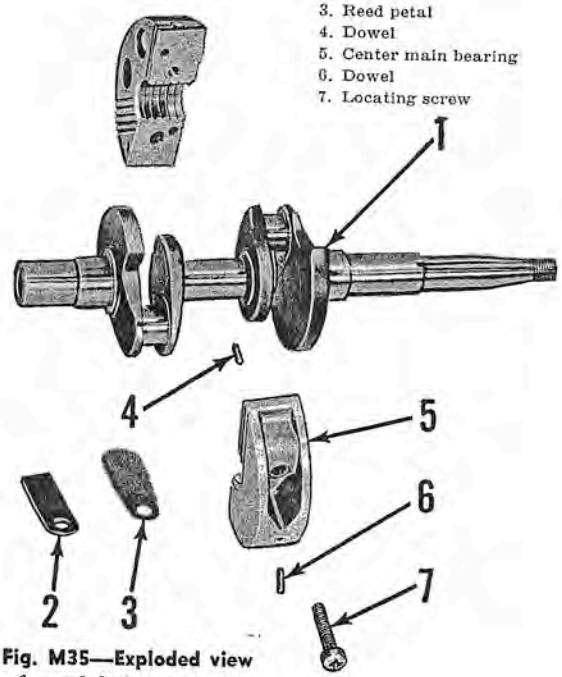


Fig. M36—Piston crown is designed to improve scavenging efficiency. Be sure piston is installed as indicated, with relation to inlet and exhaust ports.

If bearing surface of rod and cap is rough, scored, worn, or shows evidence of overheating, renew the conecting rod. Inspect crankpin and main bearing journals. If scored, out-of-round, or worn, renew the crankshaft. Check the 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.



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

Fig. M35—Exploded view of crankshaft and center main bearing assembly.

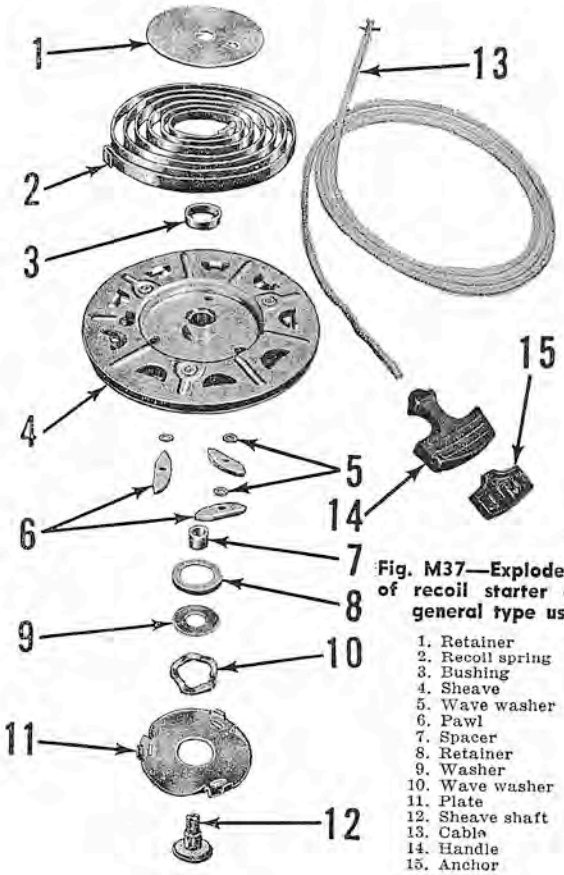


Fig. M37—Exploded view of recoil starter of the general type used.

1. Retainer
2. Recoil spring
3. Bushing
4. Sheave
5. Wave washer
6. Pawl
7. Spacer
8. Retainer
9. Washer
10. Wave washer
11. Plate
12. Sheave shaft
13. Cable
14. Handle
15. Anchor

MANUAL STARTER

Refer to Fig. M37 for a starter of the general type used. To disassemble the manual starter, remove the top cowl; then remove the screw and trim cap from top of cowl. Insert a screwdriver in slot in top of sheave shaft (12) and loosen the shaft nut (left hand thread). Allow the screwdriver and shaft (12) to turn clockwise until recoil spring (2) is completely unwound. Pry the anchor (15) out of starter handle (14) and remove the anchor and handle. Remove the nut from upper end of sheave shaft (12), invert the assembly and remove the parts, making sure that recoil spring (2) remains in housing recess as sheave (4) is removed. Protect hands with cotton gloves or a cloth, grasp recoil spring (2), remove spring and allow it to unwind slowly to prevent personal injury.

Lubricate the parts with Multipurpose Lubricant, and assemble by reversing the disassembly procedure. Make sure that pawls (6) are all installed the same way, with flat radius to outside. Install wave washer retainer (9) with cup end up and make sure the tab in spring retainer (1) engages slot in sheave shaft (12). Loosely install the shaft nut, pull free end of cable through top cowl and install handle (14) and anchor (15). After handle is installed, turn sheave shaft (12) counter-clockwise until cable handle is pulled against top cowl; then turn shaft an additional 1¼ turns and tighten the shaft retaining nut.

LOWER UNIT

PROPELLER AND DRIVE CLUTCH. Protection for the motor is built into a special cushioning clutch built into the propeller hub. Propeller is splined to the shaft. No adjustment is possible of the propeller or cushioning clutch. Two-blade aluminum propitch and a special 6-inch pitch for Merc 60; or optional 9 or 10 inch pitch for Merc 110. Propellers other than those designed for the motor must not be used.

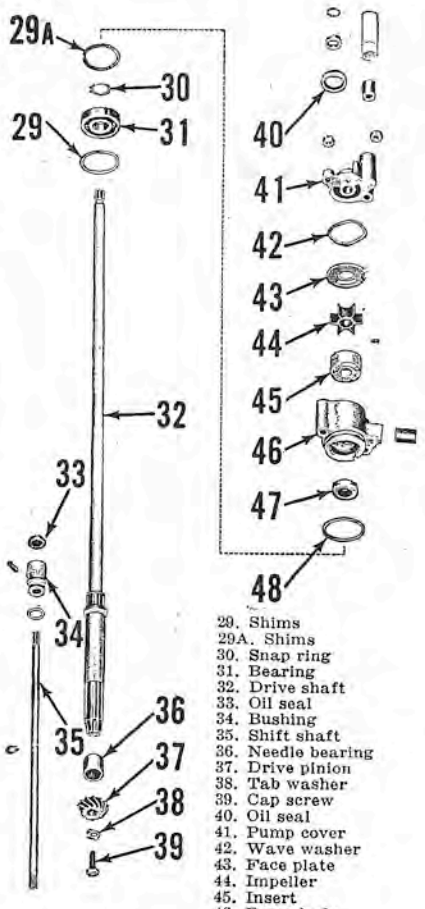
R&R AND OVERHAUL. Most service on the lower unit can be performed by detaching the gearcase housing from the driveshaft housing. To remove the housing, remove the two stud nuts (A—Fig. M38) and withdraw the lower unit gearcase assembly.

Remove the housing plugs and drain the housing, then secure the gearcase in a vise between two blocks of soft wood, with propeller up. Wedge a piece of wood between propeller and anti-cavitation plate, remove the propeller nut, then remove the propeller.

Check the backlash of the propeller drive gears before disassembly by pulling out on the drive shaft and pushing in on the propeller shaft, then rotating drive shaft lightly while noting backlash by feel. No more than 0.003-0.005 backlash should exist if gears are properly adjusted.

Disassemble the gearcase by removing the gearcase housing cover nut (27—Fig. M39) using the Gear Housing Cover Tool (91-30798). Nut is secured with left hand thread. Clamp the outer end of propeller shaft in a soft jawed vise and remove the gearcase by tapping with a rubber mallet. Forward gear (13) will remain in housing. Withdraw the propeller shaft from bearing carrier (23) and reverse gear (18). Remove and save the shims (19) and thrust washer (20) from inside of gear housing. Shims should be reinstalled if gear backlash was within limits before disassembly.

Clamp the bearing carrier (23) in a soft jawed vise and remove reverse gear (18) and bearing (21) with an internal expanding puller and slide hammer. Remove and discard the propeller shaft rear seal (25).



29. Shims
29A. Shims
30. Snap ring
31. Bearing
32. Drive shaft
33. Oil seal
34. Bushing
35. Shift shaft
36. Needle bearing
37. Drive pinion
38. Tab washer
39. Cap screw
40. Oil seal
41. Pump cover
42. Wave washer
43. Face plate
44. Impeller
45. Insert
46. Pump body
47. Oil seal
48. "O" ring

Fig. M40—Exploded view of lower unit drive shaft and associated parts. Refer also to Fig. M39.

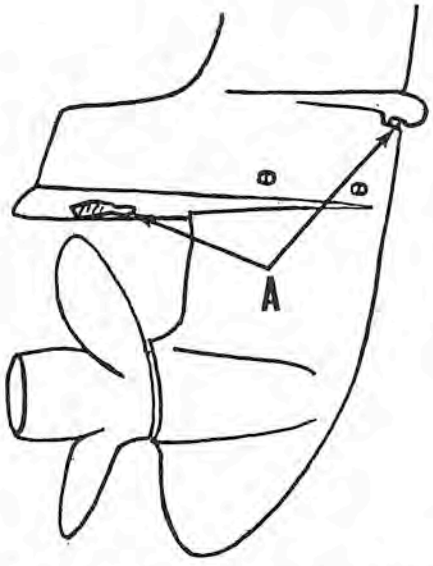


Fig. M38—To remove the lower unit gearcase assembly, first remove the attaching stud nuts (A).

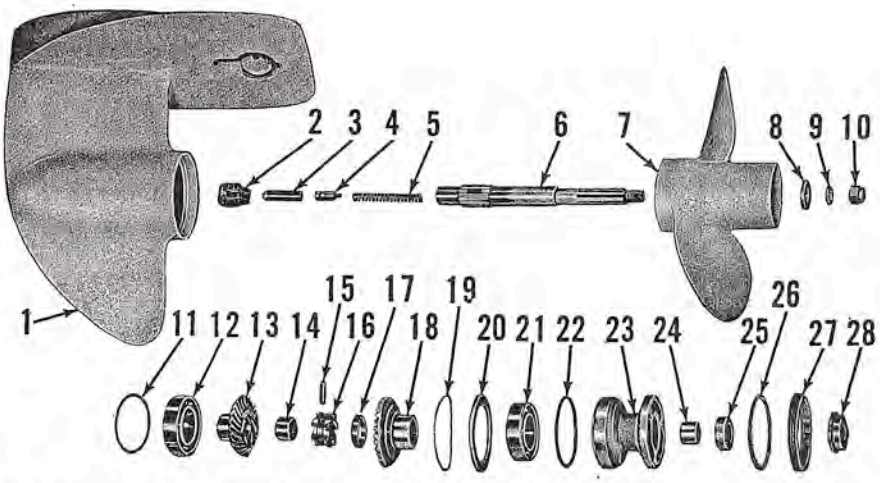


Fig. M39—Exploded view of lower unit gearcase and associated parts. See also Fig. M40.

1. Gearcase
2. Shift cam
3. Plunger
4. Slide
5. Spring
6. Propeller shaft
7. Propeller
8. Splined washer
9. Washer
10. Propeller nut
11. Shim
12. Bearing
13. Forward gear
14. Needle bearing
15. Cross pin
16. Clutch dog
17. Retaining ring
18. Reverse gear
19. Shim
20. Thrust washer
21. Bearing
22. "O" ring
23. Bearing carrier
24. Roller bearing
25. Oil seal
26. Washer
27. Housing cover
28. Guide collar

To remove clutch dog (16) from propeller shaft, insert the cam follower (3) in hole in shaft and apply only enough pressure on end of cam follower to remove the spring pressure. Remove retaining ring (17), then push out the pin (15) with a small punch. The pin passes through drilled holes in clutch dog (16) and slide (4), and operates in slotted holes in propeller shaft.

To disassemble the drive shaft and associated parts, reposition gearcase in vise with drive shaft projecting upward, remove the rubber slinger from upper end of shaft; then unbolt and remove the water pump cover (41 — Fig. M40). Remove the wave washer (42) and face plate (43); then remove impeller (44) and impeller drive pin. Withdraw the remainder of the water pump parts. Clamp upper end of drive shaft in a soft jawed vise, remove the pinion retaining cap screw (39); then tap the gearcase off the drive shaft and bearing. Note the position and thickness of shims (29 & 29A) on drive shaft upper bearing. Mesh position of pinion is controlled by shims (29) placed underneath the bearing, while shaft end play is controlled by total shim pack thickness. The shims are identical but should not be interchanged or mixed, except to adjust the mesh position of drive pinion.

After drive shaft has been removed, the forward gear (13—Fig. M39) and bearing (12) can usually be dislodged by jarring open end of gearcase against a block of soft wood. Remove and save the shim pack (11).

Shift shaft (35—Fig. M40) can be removed after removing the set screw retaining bushing (34). When installing, make sure that long shaft splines are on upper end, and that shift cam (2—Fig. M39) is installed with the notches up and on starboard side as shown.

Increasing the thickness of shim pack (11) decreases the backlash of forward gear (13). Increasing the thickness of shim pack (19) INCREASES the backlash of reverse gear (18). The number and thickness of shims (29—Fig. M40) controls mesh position of drive pinion. Shims are available in thicknesses of 0.002, 0.003, 0.005 and 0.010.

When renewing gearcase housing, or when correcting backlash and mesh of drive gear train, first install drive shaft (32 —Fig. M40), bearing (31), shims (29 & 29A) and water pump housing (46). Adjust total thickness of shims (29 & 29A) so that water pump will seat on housing with no shaft end play. Remove the shaft and lay shims (29 & 29A) aside for reinstallation during assembly. Make a trial assembly of forward gear (13—Fig. M39) and bearing (12) using the removed shims (11). Install drive shaft (32—Fig. M40), bearing (31) and shims (29). Install drive pinion (37) and install and tighten locking screw (39). Coat gears with bearing blue then check mesh pattern by pressing drive shaft down and turning clockwise to rotate the gears. If pressure is heavy on lower end of pinion tooth, remove one shim from pack (29). Place the removed shim with pack (29A) to retain end play adjustment. Reverse the procedure if pressure is heavy on upper end of tooth. After adjusting mesh position, check and adjust backlash to 0.003-0.005 by adding or removing shims (11—Fig. M39). Install reverse gear (18) and bearing (21) in bearing carrier (23); then install assembled parts in gearcase without propeller shaft. Adjust to minimum backlash without binding, by adding or removing shims (19).

Complete the assembly by reversing disassembly procedure.