

SCOTT

McCULLOCH CORPORATION
6101 West Century Blvd.
Los Angeles 45, California

CONDENSED SERVICE DATA

Series	5 Hp	7.5 Hp	10 Hp	16 Hp
Year Produced			Model	
1955 & 1956	5 Bail- A-Matic	7.5 Bail- A-Matic	10 Bail- A-Matic	16 Bail- A-Matic
1957	3775	3375	3875	3975
1958	1237	1233	1238	1239
1959	137A	133A	136A
TUNE-UP				
Hp @ rpm	5 @ 4200	7.5 @ 4200	10 @ 4200	16 @ 4200
Bore—Inches	1 11/16	2	2 11/64	2 11/32
Stroke—Inches	1 43/64	1 3/4	2	2 5/16
Displacement—Cu. In.	7.48	11.0	14.82	19.95
Spark Plug				
Champion	H10J	H10J	H10J	5MJ
Electrode Gap	0.035	0.035	0.035	0.035
Magneto				
Point Gap	0.020	0.020	0.020	0.020
Timing	See Text			
Carburetor				
Make	Carter or Tillotson			
Model	See Text			
Adjustment	See Text			
Fuel - Oil Ratio	16:1	16:1	16:1	16:1
SIZES—CLEARANCES				
Cylinder—Diameter				
Piston Rings				
End Gap				
Side Clearance				
Piston to Cylinder Clearance				
Piston Pin Diameter				
Crankshaft Journal Diameters				
Top Main Bearing				
Center Main Bearing				
Lower Main Bearing				
Crankpin				
TIGHTENING TORQUES (All Values in Inch-Pounds)				
Connecting Rod	70-80	70-80	70-80	120
Crankcase Halves	60-84	60-84	60-84	60-84
Crankcase to Cylinder	60-84	60-84
Cylinder Head	60-84	96-144	60-84	96-144
Power Head to Lower Unit	60-80	60-80	60-80	60-80
Flywheel Nut	500	500	500	500
Spark Plug	250	250	250	250

NOTE: Publication not authorized by manufacturer.

See Note.

LUBRICATION

The power head is lubricated by oil mixed with the fuel. One-half (1/2) pint of two-cycle engine oil should be mixed with each gallon of unleaded gasoline. If outboard motor oil is not available, a good grade of regular (Type MM) SAE 30 engine oil may be substituted. Regular gasoline may be used instead of unleaded gasoline, however, the anti-knock components may shorten spark plug life. Mix gasoline and oil thoroughly, using a separate container, before pouring mixture into fuel tank.

The lower unit gears and bearings are lubricated by oil contained in the gearcase.

Only EP 90 outboard gear lubricant should be used. Use a pressure oil can with rubber seal on spout, remove upper (vent) plug and lower (drain) plug from gearcase, and with motor in upright position, fill through lower plug hole until lubricant reaches level of upper (vent) plug hole. Reinstall vent plug, remove oil can, then reinstall lower plug. Tighten both plugs securely, using new gaskets if necessary, to ensure a water-tight seal. Lubricant should be maintained at level of vent plug and drained and renewed at least once a year.

FUEL SYSTEM

CARBURETOR. Tillotson Model MD and

Carter Model N carburetors are used. Refer to the appropriate following paragraphs for service and adjustment procedures.

Carter Model N: Refer to Fig. Mc20. Carburetors are provided with two mixture adjustment needles. The idle mixture needle (6) and high speed adjustment needle (20) should both be initially adjusted to approximately 3/4-turn open, then readjusted under load for best performance after motor is warm. When engine is at normal operating temperature and under load, high speed needle should be adjusted to leanest position which will allow satisfactory acceleration. Clockwise rotation of the needle leans

the mixture. Readjust the idle mixture needle for smoothest and fastest idle speed whenever a major adjustment is made of high speed needle. Recheck high speed setting after adjusting idle mixture.

To disassemble the carburetor, first scribe a mark on body and bowl for proper location when reassembling. Remove high speed needle, packing nut and packing, then remove bowl retaining screw (17), gasket (13) and bowl (16). Bowl is fitted with a spring-loaded drain plug (15). Make sure sealing surfaces of plug and bowl are even and smooth, and that spring (14) applies sufficient tension for a good seal. Float setting should be 11/64-inch, measured from nearest surface of float to carburetor body gasket flange, with body in inverted position and inlet needle valve closed. Adjust by bending the tab which contacts inlet needle.

Main nozzle and slow speed jet are installed permanently and cannot be renewed.

Model designations and Carter part numbers are as follows:

Models N-2678S, N-2679S, N-2763S

Flange gasket	1A73
Throttle valve (N-2678S, N-2763S)	2-213
Throttle valve (N-2679S)	2-214
Throttle shaft	3-1169S
Choke valve (N-2678S)	7-201
Choke valve (N-2679S, N-2763S)	7-230
Bowl drain plug	11B-375S
Choke shaft	14-590S
Float & lever	21-183S
Bowl	23-65
Inlet needle & seat	25-317S
Idle adjustment screw	30A-82
High speed needle	37-75
Bowl drain spring	61-800

Tillotson Model MD: Refer to Fig. Mc21.
Carburetors are provided with two mixture

adjustment needles. For initial adjustment, open the main adjustment needle (HN) approximately 1 1/2 turns and the idle mixture needle (IN) approximately 3/4-turn. Motor must be readjusted under load after motor is warm. When operating temperature is reached, close main needle by turning clockwise as far as possible without slowing engine speed. After main needle is adjusted, turn idle needle either way as required to obtain most even slow-speed operation, then recheck main needle adjustment. Counter-clockwise rotation of idle needle (IN) leans the mixture.

Two tabs projecting from float (10) fit an annular slot in the needle of float valve (13). To check and/or adjust the float level, remove the bowl (16) with attached float. When the carburetor bowl is inverted, float adjustment is correct if 1/64-inch of free end of float is visible below gasket surface of bowl. To adjust, remove float shaft (16), withdraw the float and bend the vertical float lever. To remove the float valve (13), first remove plug (14).

Parts are available in kit form for Tillotson carburetors. Tillotson model numbers and the corresponding kits are as follows:

MD-36B	Repair kit	RK-270
	Gasket set	GS-114
	Inlet needle and seat	.08601
MD-43B	Repair kit	RK-119
	Gasket set	GS-105
	Inlet needle and seat	.07895
MD-48B	Repair kit	RK-292
	Gasket set	GS-120
	Inlet needle and seat	.08601

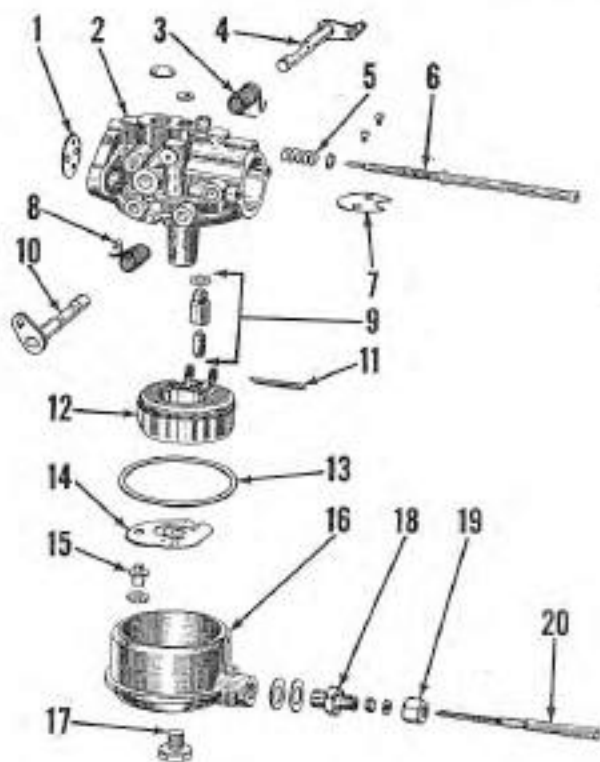


Fig. Mc20 — Exploded view of the N type Carter carburetor typical of the type used on some models.

1. Throttle valve
2. Body
3. Spring
4. Throttle shaft
5. Spring
6. Slow speed needle
7. Choke valve
8. Spring
9. Inlet needle & seat
10. Choke shaft
11. Float shaft
12. Float
13. Gasket
14. Spring
15. Drain plug
16. Float chamber
17. Retaining screw
18. Packing nut
19. High speed needle
20. High speed needle

MD-74A, MD-75A	Repair kit	RK-118
	Gasket set	GS-114
	Inlet needle and seat	.08601
MD-85A, MD-86A	Repair kit	RK-299
	Gasket set	GS-105
	Inlet needle and seat	.07895
MD-101A	Repair kit	RK-327
	Gasket set	GS-120
	Inlet needle and seat	.08601
MD-102A	Repair kit	RK-328
	Gasket set	GS-114
	Inlet needle and seat	.08601

SPEED CONTROL LINKAGE. The speed control lever on all models is connected to the magneto stator plate, and moves the plate to advance or retard the ignition timing. The carburetor throttle valve is synchronized to open as the ignition timing is advanced. It is very important that ignition timing and throttle valve opening be properly synchronized to obtain satisfactory operation. To adjust the speed control linkage remove the upper shroud, refer to Fig. Mc22, and proceed as follows:

On all except 16 horsepower models, turn the speed control grip until the first cam spacer (1) is aligned with the cam follower (5) as shown. Turn the adjusting screw (5) until cam follower (5) just contacts the speed control cam (3).

On 16 horsepower models, turn the speed control grip until cam follower (5) is aligned with a point midway between the two cam spacers (1), then turn adjusting screw (5) until cam follower (5) just contacts the speed control cam (3).

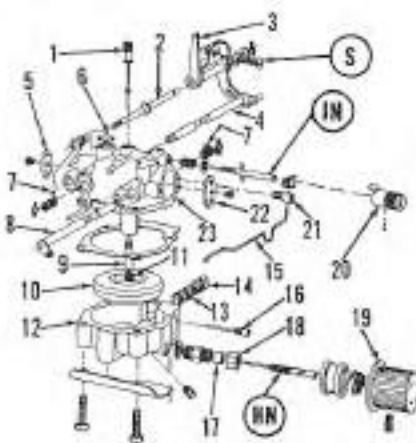


Fig. Mc21 — Exploded view of Tillotson model MD carburetor used on some models.

- | | |
|-----------------------|-------------------------|
| IN. Idle needle | 11. Plug |
| HN. High speed needle | 12. Fuel bowl |
| 1. Idle tube | 13. Inlet needle & seat |
| 2. Follower shaft | 14. Plug |
| 3. Throttle shaft | 15. Link |
| 4. Throttle valve | 16. Float shaft |
| 5. Spring | 17. Packing |
| 6. Plug | 18. Packing nut |
| 7. Spring | 19. Knob |
| 8. Choke shaft | 20. Knob |
| 9. Main nozzle | 21. Pivot screw |
| 10. Float | 22. Choke valve |
| | 23. Body |

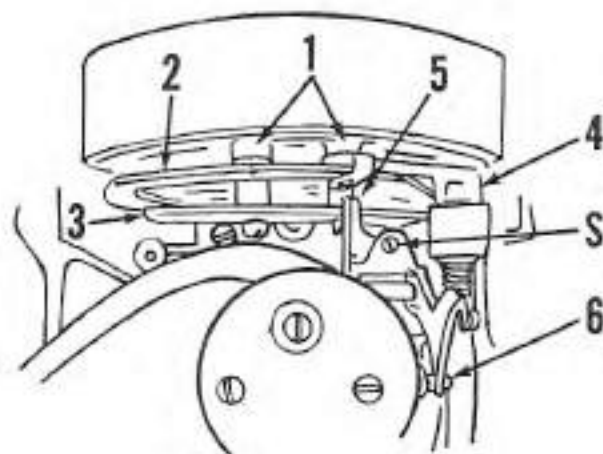


Fig. Mc22 — Schematic view of speed control linkage. Refer to text for details of adjustment.

1. Cam spacers
2. Magneto link
3. Synchronous cam
4. Speed control arm
5. Follower arm
6. Throttle shaft
8. Adjusting screw

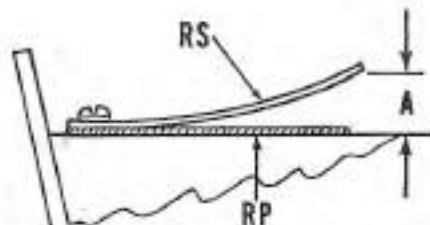


Fig. Mc24 — Cross sectional view of reed-type inlet valve. Reed petal (RP) should make full contact with plate. Reed stop (RS) should be adjusted so that distance (A) measures 5/16 inch.

When speed control grip is turned further toward the "FAST" position, throttle linkage should begin to move the throttle shaft (6). If cam follower fails to stay in contact with cam, check for binding or damaged linkage.

REED VALVES. The inlet reed valve unit is located between inlet manifold and crankcase. Reed petals should seat very lightly against reed plate throughout their entire length, with the least possible pressure. Check seating visually and/or by blowing and drawing air lightly through ports with mouth. Reed stop setting should be $\frac{1}{16}$ -inch when measured between end of stop and reed plate as shown at (A—Fig. Mc24). Renew the reed petals if broken, cracked, warped, rusted or bent. A broken reed petal is sometimes caused by a bent or damaged reed stop. Seating surfaces of plate should be smooth and flat.

FUEL PUMP. All motors are equipped with a diaphragm type fuel pump as shown in Fig. Mc25. Pressure and vacuum pulsations in one crankcase of the power head are directed through hose (1) to rear of

pump diaphragm (3). When the powerhead piston moves upward in its cylinder, vacuum in crankcase draws the diaphragm outward as shown in view "A". Diaphragm movement draws fuel in past the inlet check valve (7) as shown. As powerhead piston moves downward in cylinder (View "B"), the pressure forces diaphragm down and fuel passes out through outlet check valve (4) into carburetor.

All defective or questionable parts should be renewed. Diaphragm (3—Fig. Mc25) should be renewed if air leaks or cracks are found, or if its condition is in any way questionable.

IGNITION

Breaker point gap should be 0.020 and can be adjusted after recoil starter and fly-wheel are removed.

For a quick test of magneto condition, remove the spark plugs and hold spark plug wire about $\frac{1}{8}$ -inch away from cylinder head. Have someone spin the motor and note the condition of spark. Although spark may not be visible in bright daylight, 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. If spark is weak at

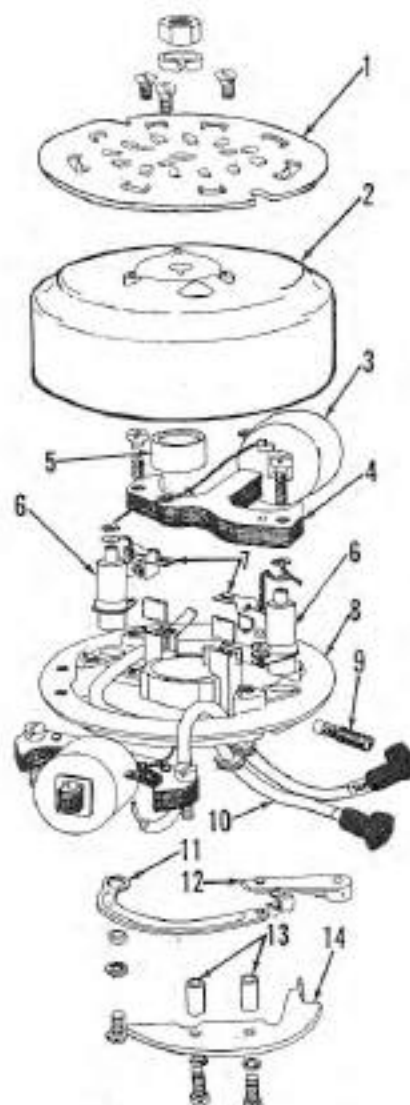


Fig. Mc23 — Exploded view of magneto assembly and associated parts.

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|-------------------|------------------------|
| 1. Hathead plate | 8. Stator plate |
| 2. Flywheel | 9. Friction shoe |
| 3. Coil | 10. Primary wires |
| 4. Laminated core | 11. Speed control link |
| 5. Magneto cam | 12. Speed control arm |
| 6. Condenser | 13. Cam spacers |
| 7. Point set | 14. Synchronous cam |

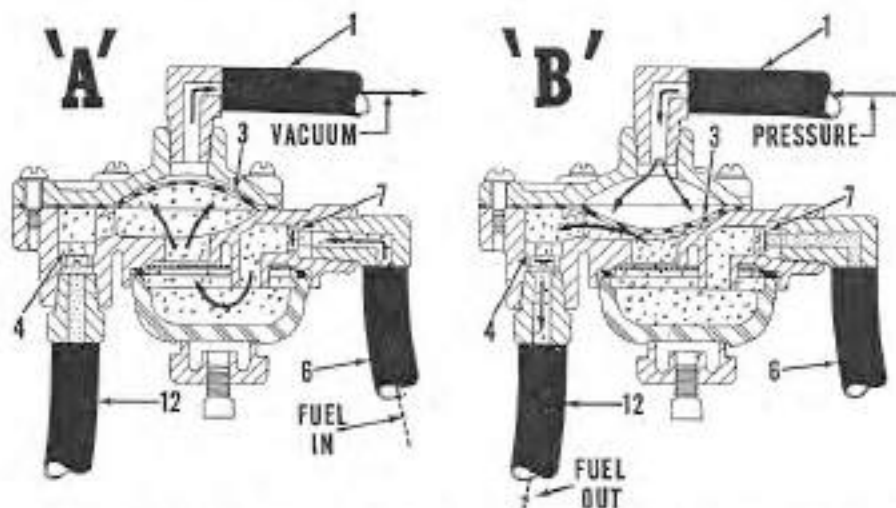


Fig. Mc25 — Schematic view of the single stage fuel pump used on all models. Fuel pump is operated by vacuum and pressure pulsations from one crankcase of the power head. Check valves (4 and 7) permit fuel to pass only one way through the fuel pump. Refer to Fig. Mc26 for an exploded view of pump and for legend. Refer to text for details of operation.

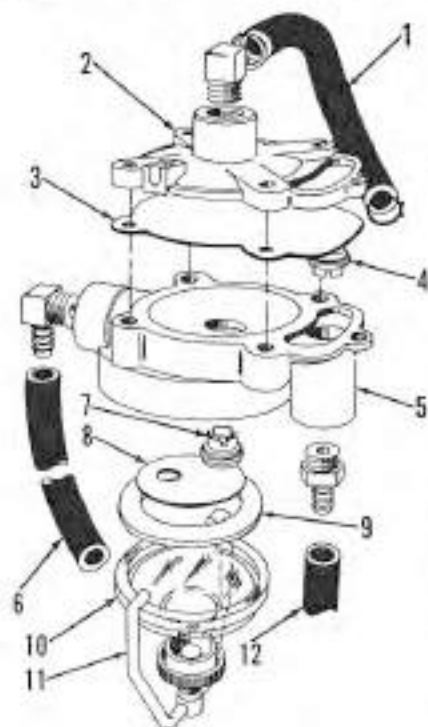


Fig. Mc26 — Exploded view of diaphragm type fuel pump used on all models. Refer also to Fig. Mc25.

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|-------------------|------------------|
| 1. Crankcase hose | 7. Check valve |
| 2. Upper body | 8. Filter screen |
| 3. Diaphragm | 9. Gasket |
| 4. Check valve | 10. Filter bowl |
| 5. Lower body | 11. Clamp |
| 6. Inlet hose | 12. Outlet hose |

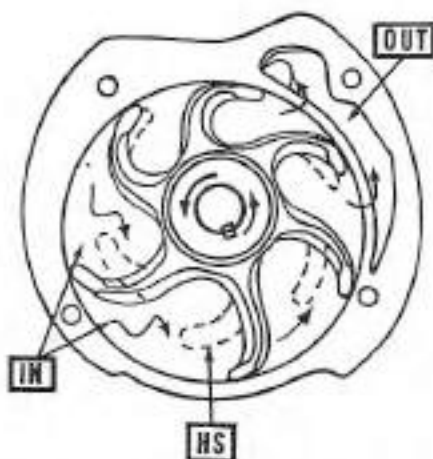


Fig. Mc27 — Schematic view of the rubber impeller type water pump used for cooling and for the automatic bailer unit. Impeller blades flex at slow speeds as shown by solid lines. The offset housing causes water to be drawn into pump body at (IN) and forces water out (OUT) as rotor area narrows. At high speeds, blades remain curved as shown by broken lines (HS) and pump operates by centrifugal action.

though points are in good condition and properly adjusted, examine the condition of point, condenser and coil wiring, and the insulation on 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. Tighten the flywheel nut to a torque of 500 inch-pounds when reassembling.

COOLING SYSTEM

WATER PUMP. All motors are equipped with a rubber impeller water pump of the general type shown in Fig. Mc27. An identical pump is mounted directly above the cooling system pump which operates the "Bail-A-Matic" bilge pump. Operation and service procedures of the two pumps are identical. The pumps are mounted on and driven by the lower unit drive shaft and impeller housing is offset in relation to drive shaft. At slow engine speeds, the tips of impeller blades bend to follow contour of housing as shown by solid lines. Water is drawn into impeller (IN) as area between impeller blades increases. As area decreases due to shape of housing, water is forced into outlet (OUT) passage of pump. At high engine speeds, the flexible blades remain curved as shown by broken lines (HS) and the pump operates by centrifugal action. Coolant flow is thus maintained at an approximately constant level at most engine speeds.

The cooling system inlet is located above and aft of the propeller. When cooling system problems are encountered, first check the water inlet for plugging or partial stoppage, then if not corrected, remove powerhead from lower unit and check the condition of the water pump, water passages, gaskets and sealing surfaces.

To disassemble the "Bail-A-Matic" and water pumps after power head is removed from lower unit, remove the shift lever (23—Fig. Mc28) and the "Bail-A-Matic" con-

necter (21); then unbolt and remove the "Bail-A-Matic" pump cover (1). Remove impeller (4), drive pin (3), body (5) and plate (8). Disassemble cooling system pump in the same manner.

When reassembling, install impellers with side marked "TOP" toward power head. Bleeder hole in cover plate (8) should be toward starboard side of lower unit. A groove on front of cover plate (8) should also be aligned with a similar mark on bailer pump body (5). Pump bodies and impellers should be liberally coated with water pump grease during installation.

POWER HEAD

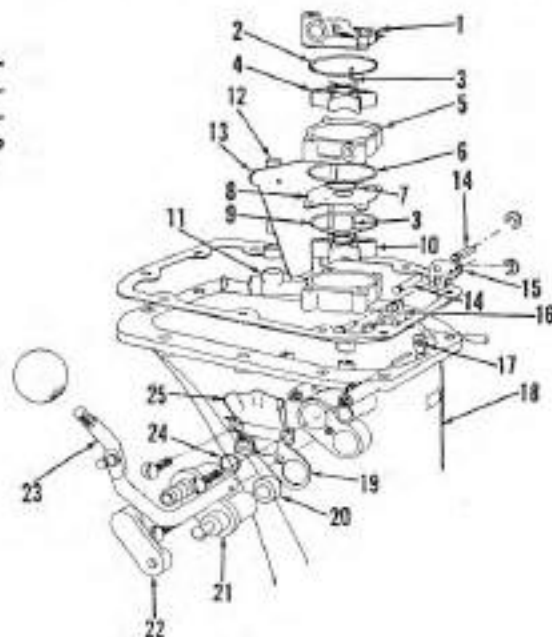
R&R AND REASSEMBLE. To overhaul the power head, clamp the motor on a stand or support and remove the starter assembly, shrouds and flywheel. Remove magneto armature plate, carburetor and inlet manifold. The rear carrying handle and powerhead adapter plate is suspended from swivel bracket and front carrying handle by two springs and a rubber mount. After removing the cap screws which secure the power head to lower unit, unhook the two springs and lift the power head and adapter plate from lower unit. Disassemble the power head as outlined in the appropriate following paragraphs:

3 Horsepower Models: Refer to Fig. Mc30. One half of the crankcase is integral with the cylinder block. Upper and lower main bearings are of the needle roller type enclosed in a cage. The center main bearing of die-cast bronze is integral with the cylinder block. To disassemble, remove the cylinder head (8), inlet manifold (1) and transfer port covers (6); then unbolt and remove the crankcase front half. Pistons, rods, crankshaft and bearings are now accessible for removal and overhaul as outlined in the appropriate following paragraphs.

When reassembling, follow the procedure outlined in the ASSEMBLY paragraph.

Fig. Mc28 — Upper section of lower motor housing showing cooling system pump, bailer pump and associated parts.

1. Bailer cover
2. Seal
3. Impeller key
4. Impeller
5. Bailer body
6. Seal
7. Seal
8. Pump cover
9. Seal
10. Impeller
11. Pump body
12. Water tube
13. Exhaust baffle
14. Pivot shaft
15. Shift link
16. Actuator
17. Shift rod
18. Housing
19. Gasket
20. Seal
21. Bailer outlet
22. Cover
23. Shift lever
24. Seal
25. Shift detent



7.5 Horsepower Models: Refer to Fig. Mc31. Cylinder block is separate from the split crankcase. Main bearings are all of bronze, integrally cast with the crankcase. If bearings are worn or scored, the crankcase must be renewed.

To disassemble the removed power head, first remove the cylinder head (8), inlet manifold (1), the exhaust covers (25 & 26) and the transfer port covers (6). Unbolt and remove the cylinder block (5B), by sliding it off the piston assemblies, then separate the crankcase halves.

Pistons, rods and crankshaft are now accessible for overhaul as outlined in the appropriate following paragraphs.

Assemble by following the procedures outlined in the ASSEMBLY paragraph, and reversing the disassembly procedure.

10 Horsepower Models: Refer to Fig. Mc32. One half of crankcase is integral with the cylinder block. Upper and lower main bearings are of the caged needle roller type. The bronze center main bearing is cast into crankcase halves and is not renewable. To disassemble the removed power head, remove the cylinder head (8), inlet manifold (1), exhaust covers (25 & 26) and transfer port covers (6), then unbolt and remove the crankcase front half.

Pistons, rods, crankshaft and bearings are now accessible for removal and overhaul as outlined in the appropriate following paragraphs. When reassembling, follow the procedures outlined in the ASSEMBLY paragraph.

15 Horsepower Models: Refer to Fig. Mc33. Cylinder block is separate from the split crankcase. Main bearings are all of the needle roller type; the center bearing uses a split cage and loose needle rollers. Upper and lower main bearings are of the caged roller type.

To disassemble the removed power head, remove cylinder head (28), the inlet manifold and reed plate, and exhaust covers (23 & 24). Remove the flywheel, magneto armature plate, magneto retainer (5) and the advance mechanism (3 & 6); then unbolt and remove the upper bearing retaining flange (8). Remove the capscrews retaining cylinder block (25), and withdraw cylinder block from crankcase and pistons. To clean the cylinder block, remove the transfer port covers (28). Separate the crankcase halves.

Pistons, rods, crankshaft and bearings are now accessible for removal and overhaul as outlined in the appropriate following paragraphs.

Center main bearing outer race (13) and lower bearing retainer (16) are doweled to crankcase. When reassembling, make certain dowels are properly aligned, and follow the procedure outlined in the ASSEMBLY paragraph.

ASSEMBLY. Because of the two-cycle design, crankcase and inlet manifold must be completely sealed against both vacuum and pressure. Exhaust manifold and cylinder head must be sealed against water leakage and pressure. Mating surfaces of water intake, and exhaust areas between power head and lower unit must form a tight seal.

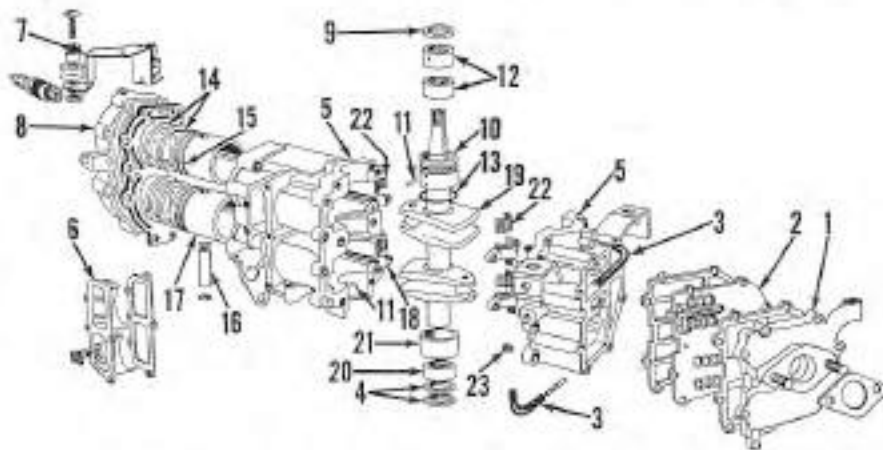


Fig. Mc30 — Exploded view of power head used on 5 horsepower models.

- | | | | |
|------------------------|---------------------|------------------------|---------------------|
| 1. Inlet manifold | 7. Bracket | 12. Upper main bearing | 13. Connecting rod |
| 2. Reed plate | 8. Cylinder head | 13. Seal | 19. Crankshaft |
| 3. Oil hose | 9. Oil seal | 14. Piston rings | 20. Lower bearing |
| 4. Oil seal | 10. Bearing housing | 15. Locating pin | 21. Bearing housing |
| 5. Cylinder assembly | 11. Dowel pin | 16. Piston pin | 22. Needle roller |
| 6. Transfer port cover | | 17. Piston | 23. Bleeder valve |

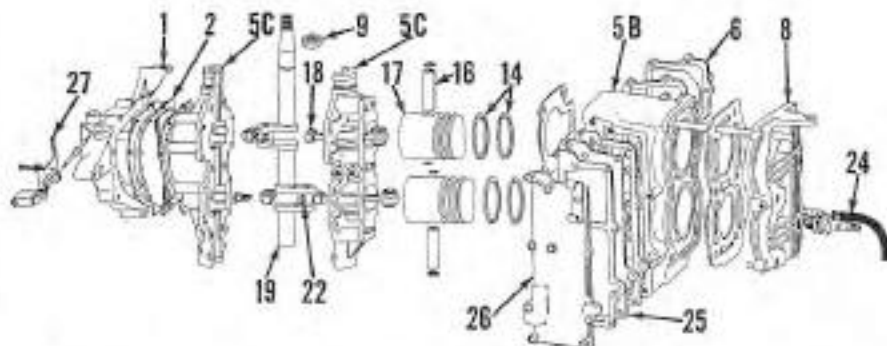


Fig. Mc31 — Exploded view of power head assembly used on 7.5 horsepower models.

- | | | |
|------------------------|--------------------|-------------------|
| 1. Inlet manifold | 9. Oil seal | 22. Needle roller |
| 2. Reed plate | 14. Piston rings | 24. Oil line |
| 3B. Cylinder | 15. Piston pin | 25. Exhaust cover |
| 10. Crankcase | 17. Piston | 26. Exhaust cover |
| 6. Transfer port cover | 18. Connecting rod | 27. Cam follower |
| 8. Cylinder head | 19. Crankshaft | |

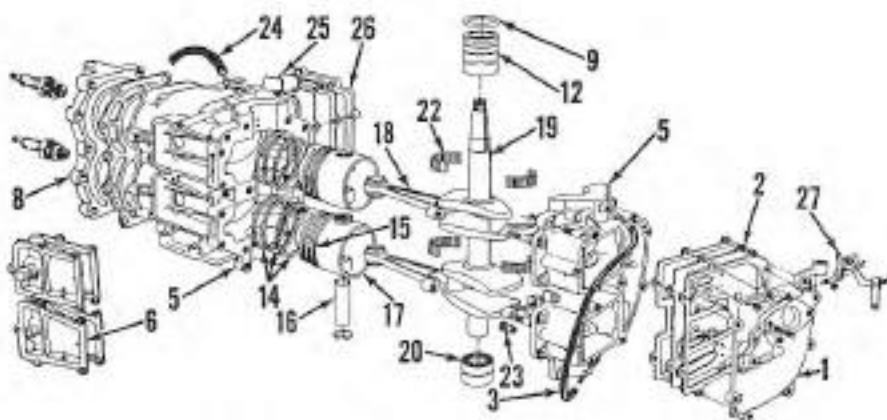


Fig. Mc32 — Exploded view of the 10 horsepower power head assembly.

- | | | |
|------------------------|--------------------|--------------------|
| 1. Inlet manifold | 12. Upper bearing | 20. Lower bearing |
| 2. Reed plate | 14. Piston rings | 22. Bearing needle |
| 3. Oil hose | 15. Locating pin | 23. Bleeder valve |
| 5. Cylinder assembly | 16. Piston pin | 24. Oil line |
| 6. Transfer port cover | 17. Piston | 25. Exhaust cover |
| 8. Cylinder head | 18. Connecting rod | 26. Exhaust cover |
| 9. Oil seal | 19. Crankshaft | 27. Cam follower |

Whenever the power head is disassembled, it is recommended that all gasket surfaces, and mating surfaces without gaskets, be carefully checked for nicks and burrs and warped surfaces which might interfere with a tight seal. The cylinder head, head end of cylinder block, and some mating surfaces of manifolds and crankcase may be checked, and lapped if necessary, to provide a smooth surface. Use a regular lapping block or a sufficiently large piece of smooth plate glass. Lay a sheet of No. 00 emery cloth on the lapping block then place the surface to be lapped on the emery cloth. Apply very light pressure and use a figure-eight motion, checking frequently to determine progress. Do not remove any more metal than is necessary. Finish lap using lapping compound or worn emery cloth. Thoroughly clean the parts with new oil on a clean, soft rag then wash with soap and clean rags.

Mating surfaces of crankcase may be checked on the lapping block, and high spots or nicks removed, but surface must not be lowered. If extreme care is used, a slightly damaged crankcase may be salvaged in this manner. In case of doubt, renew the crankcase assembly.

A heavy, non-fibrous grease should be used to hold loose needle bearings in position during assembly. All other friction surfaces should be lubricated with new engine oil. Check frequently for binding of the moving parts during assembly. If binding or locking is encountered, remove the cause before proceeding with the assembly. On models with separate cylinder, assemble the crankcase, crankshaft, bearings, connecting rods and pistons, then slip the cylinder block down over pistons, using a ring compressor if necessary. Make sure rings are properly assembled with end gap surrounding the locating pins.

Gasket and sealing surfaces should be lightly and carefully coated with a gasket

cement such as Permatex No. 3. Make sure entire surface is coated, but avoid letting excess cement squeeze out into crankcase, bearings or other passages. Refer to the CONDENSED SERVICE DATA table for tightening torques.

PISTONS, PINS, RINGS AND CYLINDERS. Before detaching connecting rods from crankshaft, make certain rod and cap are properly marked for correct assembly to each other and in the correct cylinder.

Each piston is fitted with three rings which are interchangeable in grooves. Rings are pinned to prevent rotation in ring grooves as shown at (P)—Fig. Mc34). NOTE: Middle ring is pinned at opposite side of piston from upper and lower rings.

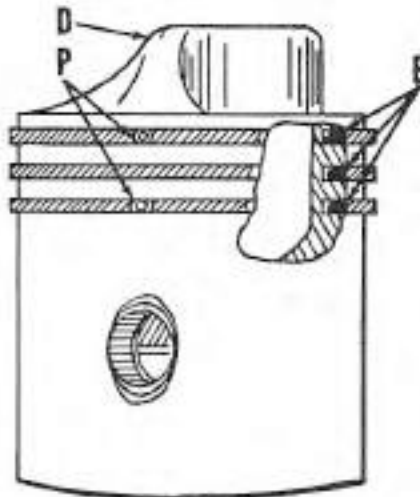


Fig. Mc34 — Cross sectional view of piston showing two of the three piston ring locating pins (P). The other pin is in opposite side of piston. Rings are installed with beveled inner edge (B) to the top. Deflector (D) directs the flow of incoming fuel charge for proper scavenging.

Rings have a beveled inner edge which should be installed toward closed end of piston as shown at (B). Head end of piston is provided with a deflector (D) which directs the flow of the incoming fuel charge for proper scavenging of the cylinder. The long, sloping side of the deflector should be installed to the exhaust (Port) side of cylinder block.

The full floating piston pin is a tight push fit in piston bosses and a slightly looser fit in rod. Fit is correct when piston will rock of its own weight on the rod, with no noticeable looseness. Connecting rod is marked "TOP" for proper assembly. All bearing and friction surfaces should be lubricated during assembly.

CONNECTING ROD, CRANKSHAFT AND BEARINGS. Before detaching connecting rod from crankshaft, make certain that rod and cap are properly marked for correct assembly to each other and in the proper cylinder.

On all except the 16 horsepower models, the connecting rod is provided with 24 individual uncaged needle roller bearings at crankshaft end of rod. Connecting rods on 16 horsepower models have two rows of loose needle bearings in each rod, with a total of 56 rollers per bearing. If surface of rod and cap which forms outer race for needle bearings is rough, scored, worn or badly heat discolored, renew the connecting rod. Inspect crankpin, and if scored, out of round, or worn, renew the crankshaft. The side of connecting rod marked "TOP" should face flywheel end of crankshaft. Parting faces of rod and cap are not machined, but are fractured at point of arrows, Fig. Mc35, to provide positive location. Rod cap should be shifted back and forth a slight amount while tightening, until fractured sections of joint are in perfect mesh. When tightened completely, the parting line of rod and cap is practically invisible.

Inspect crankshaft crankpin and main bearing journal surfaces and if rough,

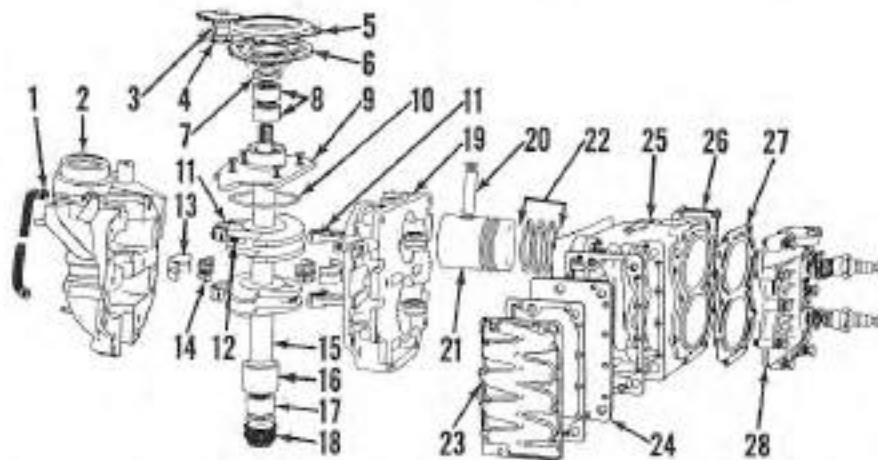


Fig. Mc33 — Exploded view of power head used on 16 horsepower models.

- | | | | |
|-------------------|--------------------|---------------------|-------------------------|
| 1. Oil line | 8. Upper bearing | 15. Crankshaft | 22. Piston rings |
| 2. Crankcase half | 9. Mounting plate | 16. Bearing housing | 23. Exhaust cover |
| 3. Advance pinion | 10. "O" ring | 17. Lower bearing | 24. Exhaust cover |
| 4. Retainer | 11. Connecting rod | 18. Boot | 25. Cylinder |
| 5. Mounting plate | 12. Bearing needle | 19. Crankcase half | 26. Transfer port cover |
| 6. Advance gear | 13. Bearing race | 20. Piston pin | 27. Head gasket |
| 7. Oil seal | 14. Bearing roller | 21. Piston | 28. Cylinder head |

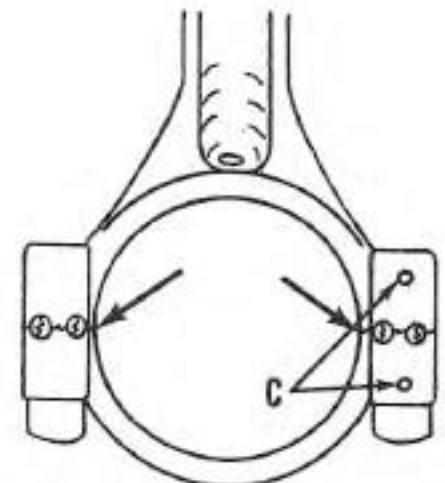


Fig. Mc35 — Uneven fractured parting line of rod and cap (shown by arrows) assures positive fit after assembly. Be sure correlation marks (C) are aligned.

scored, worn, cut-around, or show evidence of overheating, renew the crankshaft. Renew main bearings if needle rollers are worn or pitted, or if crankshaft must be renewed because of a damaged main bearing. On models or locations without anti-friction main bearings, examine the bushing surfaces for wear or damage, and renew the crankcase if indicated. All friction surfaces should be lubricated during assembly.

MANUAL STARTER

Fig. Mc36 shows an exploded view of the recoil starter assembly. To renew the starter pawls (8) or friction spring (9), remove and invert the assembled starter on a bench. Remove friction spring (9) with snap-ring pliers and withdraw the pawls.

Pulley (7) can be removed after removing friction spring (9). Be careful that recoil spring (5) remains in cavity of housing (4) when pulley is removed. If spring is to be removed, clamp spring to prevent uncoiling, using a pair of vise grip pliers. Replacement spring is coiled and secured with a band clip. Leave clip in place until spring is installed in housing. When reassembling, make sure there is sufficient tension on recoil spring to completely rewind starter rope.

LOWER UNIT

PROPELLER AND DRIVE PIN. Shear pin protection is carefully engineered for each unit. Protection depends on shear pin material as well as size. Although, in an emergency, the shear pin may be replaced by one of any available material, the correct shear pin should be installed as soon as possible to insure maximum performance and protection. All motors except 16 horsepower use a $\frac{1}{8} \times \frac{1}{16}$ brass shear pin, manufacturers part number 462-3122. The 16 horsepower motor uses a $\frac{1}{8} \times \frac{1}{8}$ brass

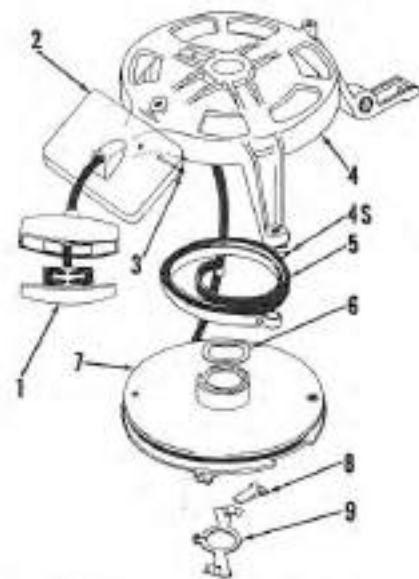


Fig. Mc36—Exploded view of recoil starter assembly.

- | | |
|-------------|--------------------|
| 1. Handle | 5. Recoil spring |
| 2. Pawl | 6. Washer |
| 3. Roll pin | 7. Pulley |
| 4. Housing | 8. Pawl |
| 4S. Shim | 9. Friction spring |

Fig. Mc37 — Exploded view of gearcase housing and associated parts.

- | |
|----------------------|
| 37. Bearing |
| 38. Retainer |
| 39. Retainer |
| 39P. Pin |
| 40. Forward gear |
| 41. Clutch dog |
| 42. Reverse gear |
| 43. Thrust washer |
| 44. Bearing |
| 45. Seal |
| 46. Shift rod |
| 47. Shift fork |
| 48. Oil seal |
| 49. Gearcase housing |
| 50. Bearing |
| 51. Shim |
| 52. Propeller shaft |
| 53. Snap ring |
| 54. Bearing |
| 55. Retainer |
| 56. Pin |
| 57. Driven gear |
| 58. Gearcase housing |
| 59. Ring dowel |
| 60. Seal |
| 61. Drive shaft |

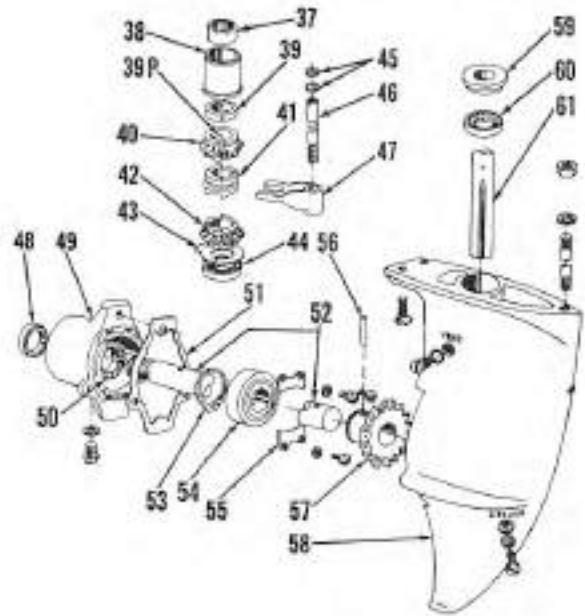
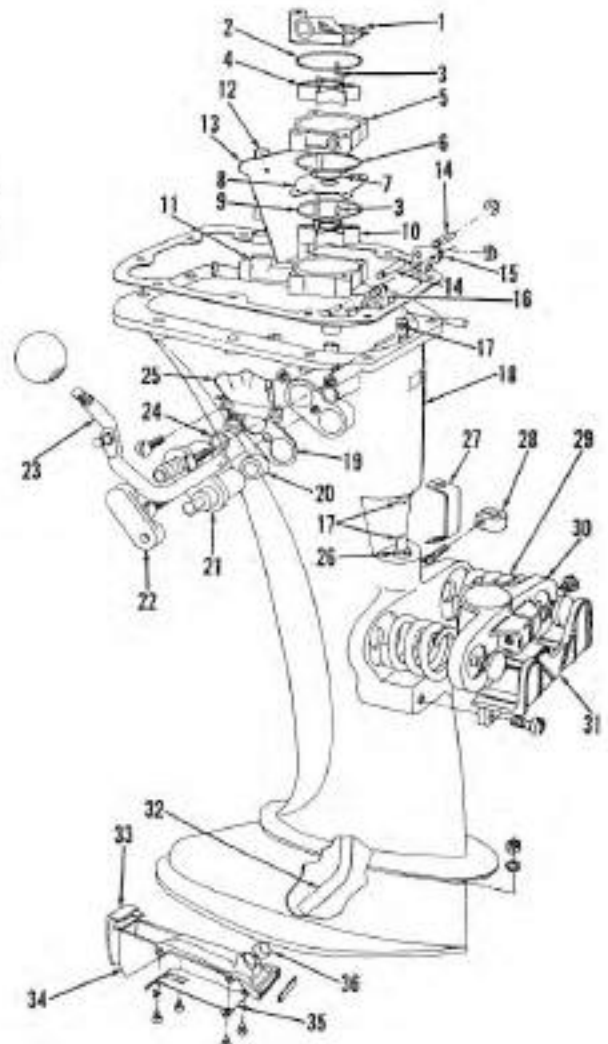


Fig. Mc38 — Exploded view of lower motor housing and associated parts.

- | |
|---------------------------|
| 1. Baller cover |
| 2. Seal |
| 3. Impeller key |
| 4. Impeller |
| 5. Baller body |
| 6. Seal |
| 7. Seal |
| 8. Pump cover |
| 9. Seal |
| 10. Impeller |
| 11. Pump body |
| 12. Water tube |
| 13. Exhaust baffle |
| 14. Pivot shaft |
| 15. Shift link |
| 16. Actuator |
| 17. Shift rod |
| 18. Housing |
| 19. Gasket |
| 20. Seal |
| 21. Baller outlet |
| 22. Cover |
| 23. Shift lever |
| 24. Seal |
| 25. Shift detent |
| 26. Grommet |
| 27. Retainer |
| 28. Reverse lock actuator |
| 29. Spring |
| 30. Mount |
| 31. Bracket |
| 32. Water tube |
| 33. Exhaust valve |
| 34. Inlet plate |
| 35. Water inlet |
| 36. Grommet |



pin, manufacturers part number 3965-3122. A spare supply of shear pins should be kept on hand. Factory equipment propeller sizes are as follows:

Motor	Propeller	
	Diameter	Pitch
5 hp	7½ In.	6 In.
7.5 hp	8 In.	7 In.
10 hp (before 1956)	8½ In.	9¼ In.
10 hp (after 1957)	7¾ In.	9¼ In.
18 hp	9 In.	10 In.

R&R AND OVERHAUL. Most service on the lower unit can be performed by detaching the gearcase housing from drive shaft and exhaust housing. When servicing the lower unit, pay particular attention to water pump and water tubes with respect to air or water leaks. Leaky connections may interfere with proper cooling and performance of motor.

Use Figs. Mc37 and Mc38 as a guide when overhauling the lower unit. To renew or service the propeller shaft, gear or bearings, first drain the lubricant and remove the propeller and shear pin. Remove the cap screws retaining housing (49) and remove the housing. On 16 horsepower models, housing extends into body (58). On these models, remove housing by turning and tapping with a soft hammer, and not by prying on gasket surfaces. The 16 horsepower model contains two bearings (54), and gear (57) is secured to shaft by Woodruff key and shaft nut.

To service the drive shaft, shift mechanism or forward or reverse gears, first remove the water pump and boler pump as outlined in previous COOLING SYSTEM section, drain the lower unit and clamp unit in a vise in upright position. Loosen the set screw in reverse lock actuator (28—Fig. Mc38) and, while counting the turns, unscrew and slip out the shift rod (17). After shift rod has been removed, lower unit gear housing (Fig. Mc37) can be unbolted, removed and disassembled.

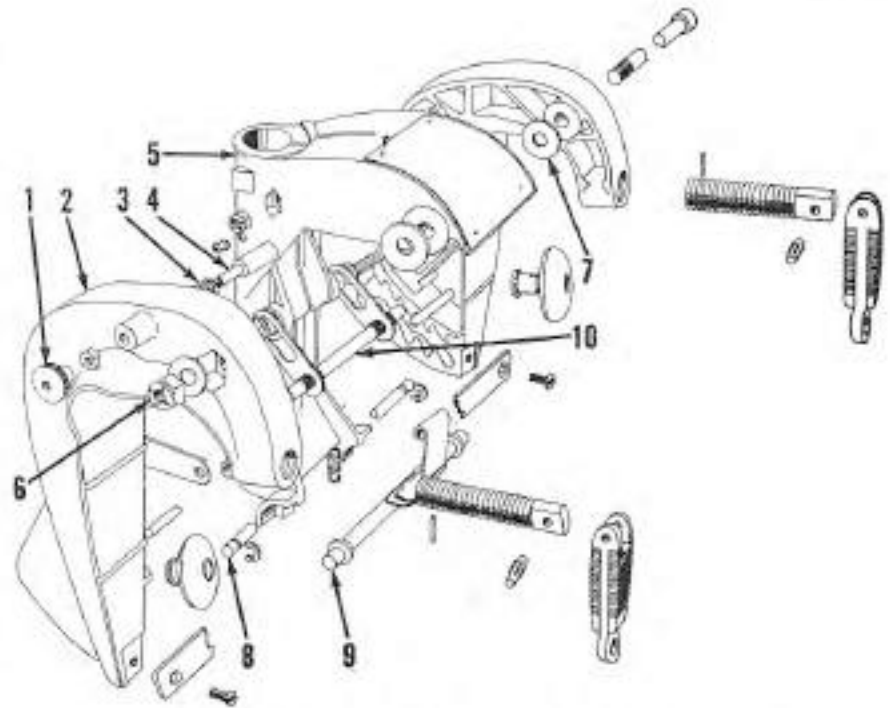


Fig. Mc40 — Exploded view of stern bracket and associated parts.

- | | | |
|------------------|-------------------|---------------------|
| 1. Knob | 4. Plunger | 8. Reverse lock pin |
| 2. Stern bracket | 5. Swivel bracket | 9. 7/16 pin |
| 3. Spring | 6. Locknut | 10. Shift stop |
| | 7. Washer | |

When reassembling, screw shift rod (17) into shifter fork the same number of turns as before disassembly, then adjust the shift mechanism as outlined in the following paragraph.

ADJUSTMENT. To adjust the gear shift linkage, proceed as follows: With power head removed from lower unit, move shift lever into forward position. While holding the drive shaft, check and note the amount

of backlash in the propeller shaft. Move shift lever to reverse position and again check backlash. The amount of backlash should be **EXACTLY** the same in forward and reverse. If it is not, loosen the set screw in reverse lock actuator (28—Fig. Mc38), remove pin from top of shift rod (17) and screw shift rod in or out of shift fork. Turning shift rod clockwise (viewed from top) increases backlash in forward gear.