EVINRUDE

EVINRUDE MOTORS DIVISION OF
OUTBOARD MARINE CORP.
4143 N. 27th St., Milwaukee 16, Wisconsin

CONDENSED SERVICE DATA

Series / Year Produced	Lightwin Ducktwin	Fisherman	Fleetwin	Sportwin	Fastwin	Fastwin
1955	3014, 3015, 3016	.....	7518, 7519	.....	15014, 15015	.....
1956	3018, 3019, 3020	5512, 5513	7520, 7521	10012, 10013	15016, 15017, 15918, 15919	.....
1957	3022, 3023, 3024	5514, 5515	7522, 7523	10014, 10015	.....	15020, 15021, 15922, 15923
1958	3026, 3027, 3028	5516, 5517	7524, 7525	10016, 10017	.....	15024, 15025, 15926, 15927
1959	3030, 3031, 3032	5518, 5519	.....	10018, 10019	.....	15028, 15029 .....
1960	3034, 3035, 3036	5520, 5521	.....	10020, 10021	.....	15032, 15033 .....
1961	3038, 3039, 3040	5522, 5523	.....	10022, 10023	.....	15034, 15035 .....
1962	3042, 3043, 3044	5524, 5525	.....	10024, 10025	.....	15036, 15037 .....
1963	3302, 3303, 3312	5302, 5303	.....	10302, 10303	.....	18302, 18303 .....
TUNE-UP						
HP @ rpm	3 @ 4000	5.5 @ 4000	7.5 @ 4000	10 @ 4000	15 @ 4000	18 @ 4000
Bore—Inches	$1\frac{9}{16}$	$1\frac{15}{16}$	$2\frac{1}{8}$	$2\frac{3}{8}$	$2\frac{3}{8}$	$2\frac{1}{2}$
Stroke—Inches	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{3}{4}$	$1\frac{7}{8}$	$2\frac{1}{4}$	$2\frac{1}{4}$
Number of Cylinders	2	2	2	2	2	2
Displacement—Cubic Inches	5.28	8.84	12.40	16.60	19.94	22.00
Spark Plug						
Champion	J4J	J4J	J4J	J4J	J4J	J4J
AC	M42K	M42K	M42K	M42K	M42K	M42K
Auto-Lite	A21X	A21X	A21X	A21X	A21X	A21X
Electrode Gap	0.030	0.030	0.030	0.030	0.030	0.030
Magneto						
Point gap	0.020	0.020	0.020	0.020	0.020	0.020
Timing	See Text	See Text	See Text	See Text	See Text	See Text
Carburetor						
Make	Own	Own	Own	Own	Own	Own
Adjustment	See Text	See Text	See Text	See Text	See Text	See Text
Fuel-Oil Ratio	24:1	24:1	16:1	24:1	24:1	24:1
SIZES — CLEARANCES						
POWER HEAD						
Piston Rings						
End gap	0.005-0.015	0.005-0.015	0.007-0.017	0.007-0.017	0.007-0.017	0.007-0.017
Side Clearance				0.001-0.0035		
Piston Skirt Clearance	0.0013-0.0025	0.0018-0.0030	0.0015-0.0030	0.002-0.0035	0.0025-0.004	0.003-0.0045
Crankshaft Bearings—Diameter						
Top Main Bearing	0.6849-0.6854	0.8080-0.8085	0.8120-0.8125	0.8120-0.8125	0.9995-1.0000	0.9995-1.0000
Center Main Bearing	0.6849-0.6854	0.8080-0.8085	0.8120-0.8125	0.8120-0.8125	0.9995-1.0000	0.9995-1.0000
Lower Main Bearing	0.6849-0.6854	0.8080-0.8085	0.8120-0.8125	0.8120-0.8125	0.9995-1.0000	0.9995-1.0000
Crankpin	0.6250-0.6255	0.8100-0.8105*	0.8120-0.8125	0.8145-0.8150	1.0000-1.0005**	1.0000-1.0005
*For 1961-63 models, crankpin journal is 0.6685-0.6690.				**For 1955 models, crankpin journal is 0.9995-1.0000.		
Crankshaft Bearings—Diameter Clearance						
Top Main Bearing	0.0013-0.0023	0.001-0.002	0.0025-0.0035	Roller Brng.	Roller Brng.	Roller Brng.
Center Main Bearing	0.0013-0.0023	0.001-0.002	0.0025-0.0035	0.003-0.004	Roller Brng.	Roller Brng.
Lower Main Bearing	0.0012-0.0023	0.001-0.002	0.0025-0.0035	Roller Brng.	0.0025-0.0035	Roller Brng.
Crankpin	0.0007-0.0017	Roller Brng.	0.001-0.002	Roller Brng.	Roller Brng.	Roller Brng.
Piston Pin—Diametral Clearance in Rod	0.0004-0.0011	0.0003-0.0010	0.0003-0.0010	0.0007-0.0014	0.0007-0.0014	Roller Brng.
LOWER UNIT						
Drive Shaft Bearing Diametral Clearance	0.001-0.003	0.0015-0.0035	0.001-0.0025	0.002-0.0035	0.002-0.0035	0.002-0.0035
Propeller to Shaft Diametral Clearance	0.003-0.0043	0.004-0.006	0.004-0.006	0.007-0.0095	0.007-0.0095	0.0011-0.0023
TIGHTENING TORQUES						
(All Values in Inch Pounds)						
Connecting Rod	60-66	60-66	60-66	180-186	180-186	180-186
Crankcase Halves	60-80	60-80	60-80	120-130	120-130	120-130
Cylinder Head	60-80	60-80	60-84	96-120	96-120	96-120
Flywheel Nut	360-480	480-540	480-540	480-540	480-540	480-540
Spark Plug	240-246	240-246	240-246	240-246	240-246	240-246

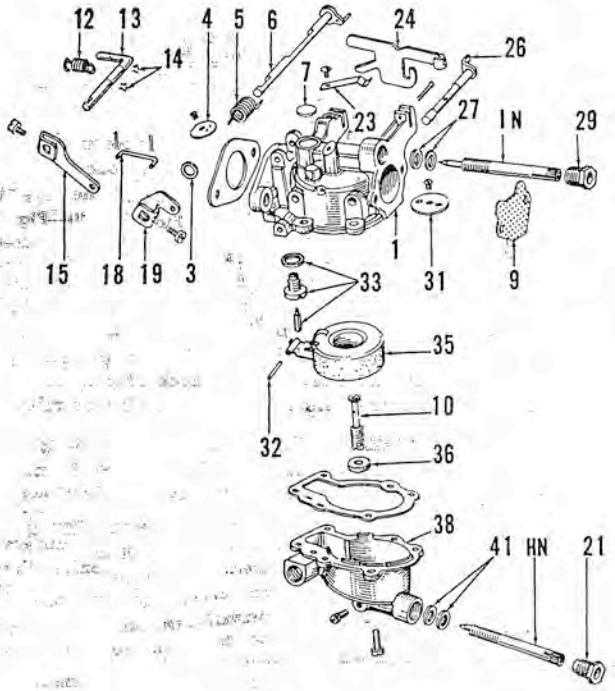


Fig. E1—Exploded view of carburetor used on Lightwin, Ducktwin models.

1. Body
3. Washer
4. Throttle valve
5. Spring
6. Shaft & Lever
7. Plug
9. Screen
10. Nozzle
12. Spring
13. Follower
14. Spring clip
15. Lever
18. Link
19. Lever
21. Nut
23. Spring
24. Choke rod
26. Choke shaft
27. Packing
29. Nut
31. Choke valve
32. Float shaft
33. Inlet valve & seat
35. Float
36. Gasket
38. Float chamber
41. Packing
HN. High speed needle
IN. Slow speed needle

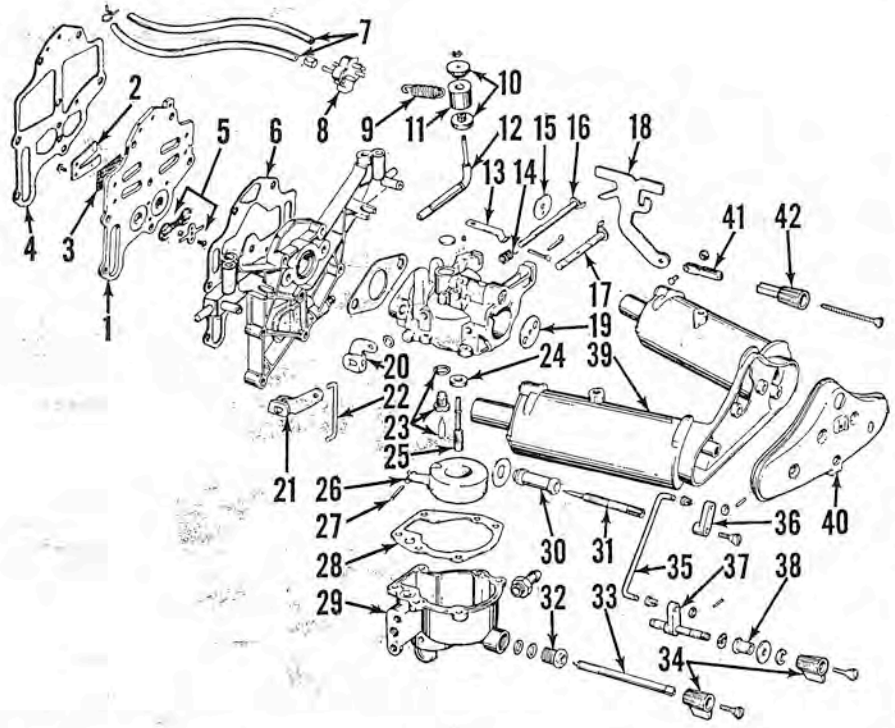


Fig. E2—Exploded view of late model Fisherman carburetor. Early models are similar.

1. Reed plate
2. Reed stop
3. Reed petals
4. Gasket
5. Check valve
6. Gasket
7. Fuel lines
8. Connector
9. Spring
10. Bushing
11. Roller
12. Cam follower
13. Choke spring
14. Spring
15. Throttle valve
16. Throttle shaft
17. Choke shaft
18. Choke rod
19. Choke valve
20. Throttle lever
21. Follower lever
22. Link
23. Inlet valve & seat
24. Gasket
25. Nozzle
26. Float
27. Float shaft
28. Gasket
29. Float chamber
30. Nut
31. Slow speed needle
32. Nut
33. High speed needle
34. Adjusting knob
35. Link
36. Valve arm
37. Adjusting arm
38. Bushing
39. Air Silencer
40. Cover plate
41. Choke link
42. Choke knob

LUBRICATION

The power head is lubricated by oil mixed with the fuel. On Fleetwin series, mix ½-pint outboard motor oil with each gallon of unleaded gasoline. On all other motors, use ⅓-pint oil with each gallon of gasoline. If outboard motor oil is not available, use a good grade of regular "Type MM," SAE 30 motor oil. 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 gear case. Special "Outboard Marine Corporation, Type 'C' Lubricant" should be used. This lubricant is supplied in a tube and filling procedures are as follows: Remove plug from lower gearcase and attach tube. Remove upper (vent) plug from case and, with motor in upright position, fill gearcase until lubricant reaches level of upper (vent) plug hole. Reinstall vent plug, then remove lubricant tube and reinstall lower plug. Tighten both plugs securely, using new gaskets if necessary, to provide a water tight seal. If OMC Type C Lubricant is not available, gearcase may be temporarily filled with outboard motor oil through vent (top) plug opening. If outboard oil is used, drain and refill with OMC Type C Lubricant as soon as possible. Lower gear lubricant should be maintained at level of vent plug, and drained and renewed every 100 hours of operation.

FUEL SYSTEM

CARBURETOR. Float type carburetors are used on all models. Refer to the appropriate following paragraphs for adjustment and overhaul notes.

Lightwin & Ducktwin Motors are equipped with a carburetor of the type shown in Fig. E1. Normal initial setting for the low speed needle (IN) is 1⅛ turns open. Initial setting for high speed needle (HN) is ½-turn open. Final adjustment must be made when motor is in operation, by turning knobs on control panel. Clockwise rotation of both needles leans the mixture.

To set the carburetor float level, remove the lower shroud, then unbolt and remove the carburetor. Refer to Fig. E1 and unbolt and remove float chamber (38). Invert the carburetor body (1) and check the natural position of the float while carburetor is inverted. Upper surface of float (lower when assembly is inverted) should be level and flush with gasket surface of carburetor body. If it is not, carefully bend float lever; then check after assembly to be sure float does not bind or rub.

Fisherman, Fleetwin, Sportwin & Fastwin Motors are equipped with a carburetor of the type show in Fig. E2, E3 or E4.

Normal initial setting for the low speed needle (31—Figs. E2 & E3 or 32—Fig. E4) is 1⅛ turns open. Initial adjustment for high speed needle (33—Fig. E2, 42—Fig. E3 or 44—Fig. E4) is ½-turn open. Final adjustment must be made after motor is in operation.

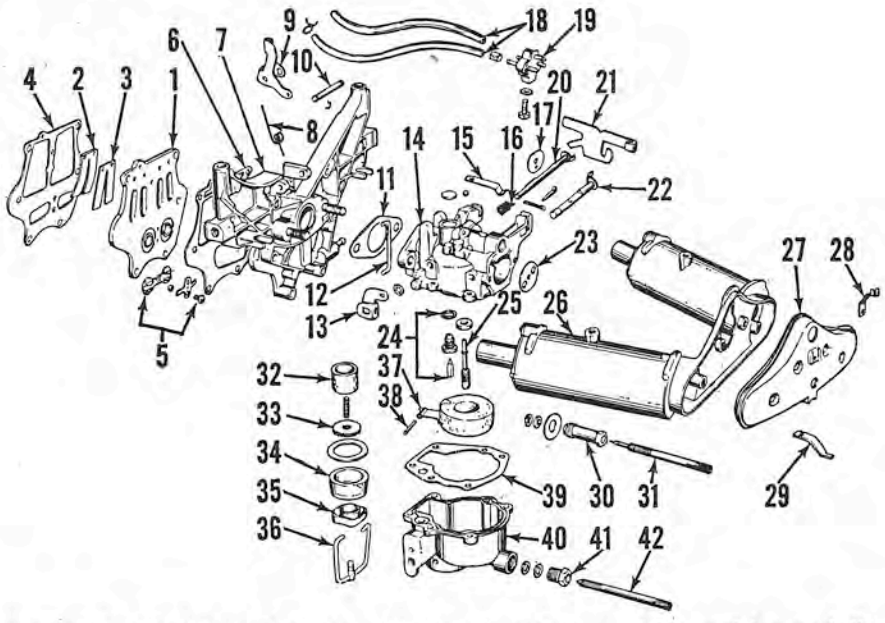


Fig. E3—Exploded view of 1958 model Fleetwin carburetor. Other models are similar.

1. Reed plate
2. Reed stop
3. Reed petals
4. Gasket
5. Check valve
6. Gasket
7. Inlet manifold
8. Spring
9. Cam follower
10. Follower pin
11. Gasket
12. Link
13. Throttle lever
14. Body
15. Choke spring
16. Spring
17. Throttle valve
18. Fuel hoses
19. Connector
20. Throttle shaft
21. Choke lever
22. Choke shaft
23. Choke valve
24. Inlet valve & seat
25. Nozzle
26. Air Silencer
27. Cover
28. Stop
29. Stop
30. Nut
31. Slow speed needle
32. Filter
33. Nut
34. Bowl
35. Clamp nut
36. Clamp
37. Float
38. Float shaft
39. Gasket
40. Float chamber
41. Nut
42. High speed needle

Late model Sportwin and Fastwin motors are equipped with a slow idle stop screw (Fig. E6) to adjust idle speed. This adjustment should only be made with engine at operating temperature. NOTE: Screw is located on port side of motor below the shroud.

To set the carburetor float level, remove the shroud then unbolt and remove the carburetor. Remove the float chamber (29—Fig. E2, 40—Fig. E3 or 28—Fig. E4) and invert the carburetor body. The upper surface of float (lower, when assembly is inverted) should be level and flush with gasket surface of body. If it is not, carefully bend float lever; then check after assembly to make sure float does not bind or rub.

SPEED CONTROL LINKAGE. The speed control lever on all models rotates the magneto armature plate to advance the timing. The throttle valve is synchronized with the plate to open throttle the proper amount as timing is advanced. To synchronize the speed control linkage, refer to the appropriate following paragraphs:

Lightwin & Ducktwin. A cam (C—Fig. E8) attached to bottom of magneto armature plate actuates follower (13) which works through levers (15 & 19—Fig. E1) to open the throttle valve. To synchronize the speed linkage, remove the lower shroud and proceed as follows: Slightly loosen both screws that attach the speed control cam to underside of magneto armature plate. Move speed

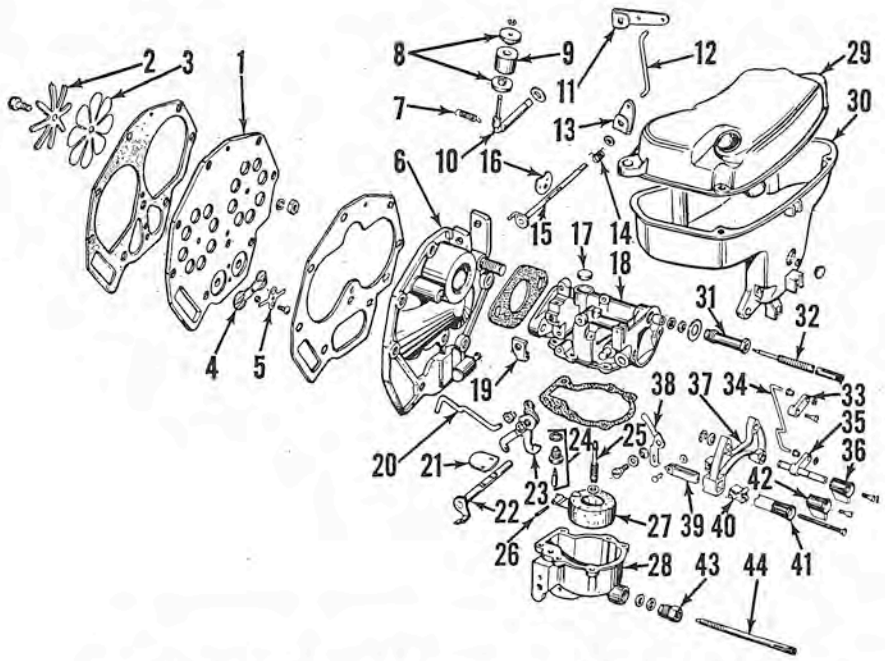


Fig. E4—Late model Sportwin carburetor. Fastwin models are similar.

1. Reed plate
2. Reed stop
3. Reed petals
4. Check valve
5. Valve stop
6. Inlet manifold
7. Spring
8. Bushing
9. Roller
10. Cam follower
11. Follower arm
12. Link
13. Throttle arm
14. Spring
15. Throttle shaft
16. Throttle valve
17. Plug
18. Body
19. Support
20. Link
21. Choke valve
22. Choke shaft
23. Bellcrank
24. Inlet valve & seat
25. Nozzle
26. Float shaft
27. Float
28. Float bowl
29. Cover
30. Air silencer
31. Nut
32. Slow speed needle
33. Adjusting arm
34. Link
35. Adjusting arm
36. Knob
37. Support
38. Choke arm
39. Choke link
40. Detent
41. Choke knob
42. Knob
43. Nut
44. High speed needle

Fig. E6—Slow idle speed can be adjusted by turning the stop screw located on speed control vertical shaft gear as shown.

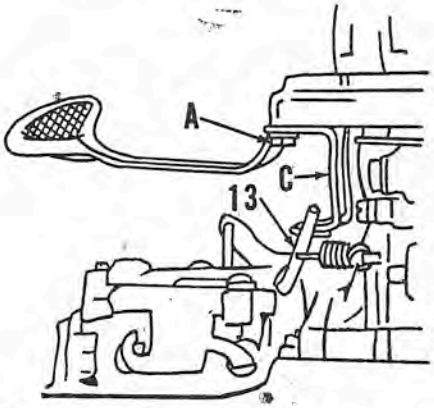


Fig. E8—On Lightwin motors a cam (C) is attached to bottom of armature plate as shown. When speed control lever is moved, cam follower (13) is actuated to open carburetor throttle valve. To synchronize, loosen screws (A) and proceed as outlined in text.

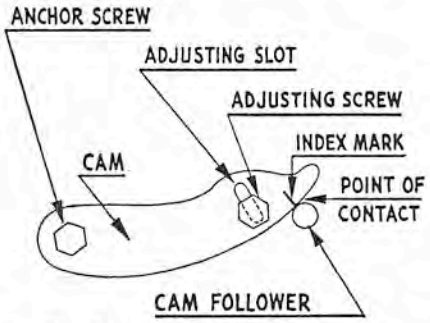


Fig. E9—To synchronize the throttle linkage with magneto advance, index mark on cam must register with cam follower as throttle valve starts to open.

control lever to position between the dots on control quadrant (approximately the "Slow" position). Move free end of cam until it contacts follower at index mark as shown in Fig. E9, and just begins to open carburetor throttle valve. Tighten the cam retaining screws; then, recheck to make sure that throttle valve starts to open as speed control lever moves past the dots on quadrant.

Fisherman, Fleetwin, Sportwin & Fastwin. Hand grip rotates shaft (70—Fig. E10) and pinion (72) which is meshed with gear (75). Link (L) is connected to gear (75) and armature plate (A). Rotation of hand grip thus moves armature shaft to advance or retard ignition timing. Cam (C) is attached to lower side of armature plate and is contacted by cam follower roller (30). Movement of the armature plate acts through linkage (15, 16 & 17) to open or close throttle shaft (13). Synchronization is correct when throttle valve just starts to open when index mark on cam is aligned with cam follower (See Fig. E9) and is completely open when timing is fully advanced.

To make the adjustment, remove the cowl and rotate the hand grip until index mark on cam is aligned with follower arm as shown in Fig. E9; then, slightly loosen the cam retaining screws on underneath side of armature plate. Move the cam in or out until all slack is removed from throttle linkage and throttle shaft (13—Fig. E10) just starts to move. Tighten the cam retaining screws at this point. To further check the adjustment, rotate the hand grip to the "Fast" position and check to make sure that throttle valve is fully open.

REED VALVES. The inlet reed valve unit is located between carburetor and crankcase, and should be checked whenever the carburetor is removed for service. Refer to Figs. E16, E2, E3 and E4 for location of reed valves.

Reed petals (3) should seat very lightly against reed plate (1) throughout their entire length, with the least possible tension. Check seating visually and by blowing and drawing air through ports. Renew reed petals (3) if broken, cracked, warped, rusted or bent. A broken reed petal is sometimes caused by a bent or damaged reed stop. Seating surface of plate (1) should be smooth and flat. On the circular type used in series

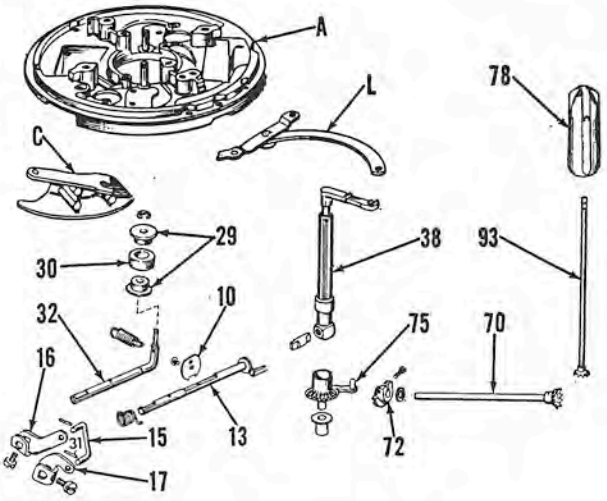


Fig. E10—Exploded view of speed control mechanism used on most motors.

A. Armature plate
C. Throttle cam
L. Link
10. Throttle valve
13. Throttle shaft
15. Link
16. Lever
17. Lever
29. Bushings
30. Roller
32. Follower shaft
38. Lever
70. Shaft & gear
72. Pinion
75. Gear
78. Grip
93. Shaft & gear

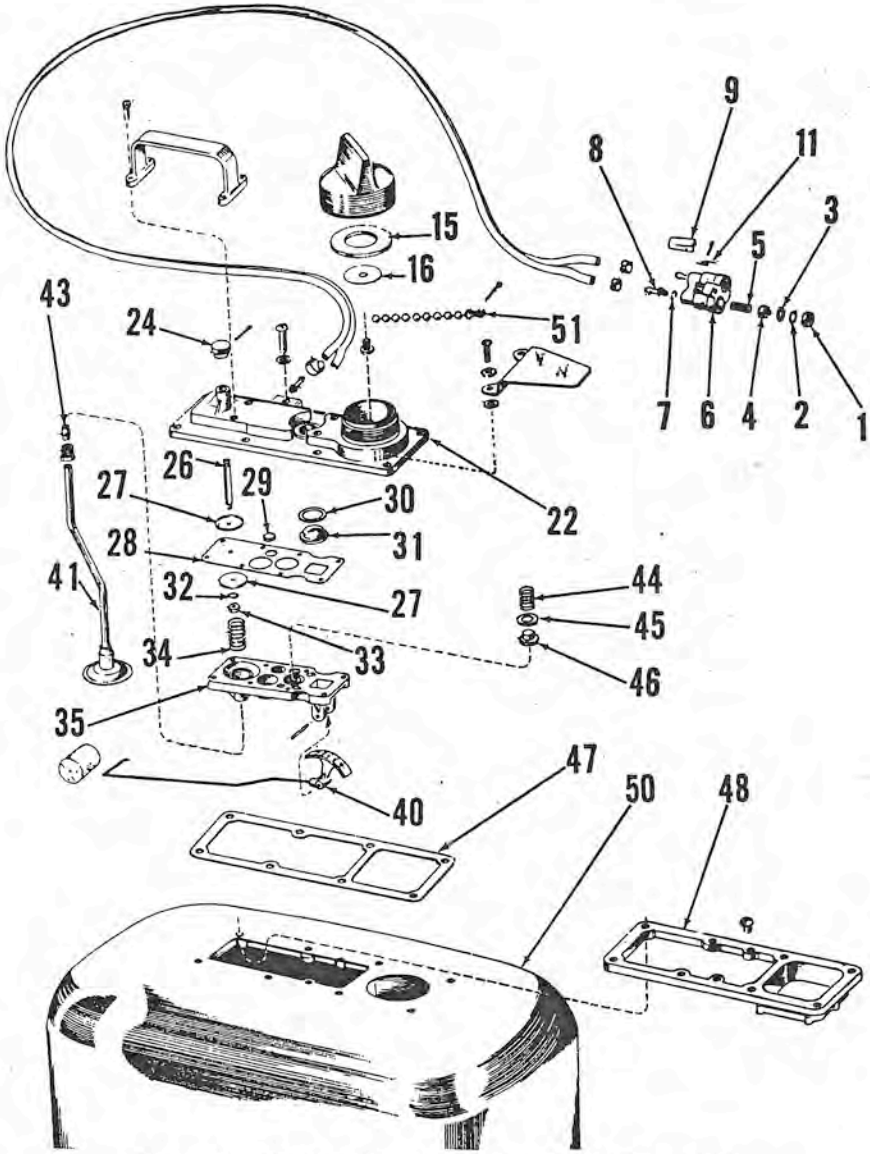


Fig. E11—Exploded view of pressurized fuel tank assembly.

1. Retainer
2. "O" ring
3. Washer
4. Valve
5. Spring
6. Connector
7. Washer
8. Nipple
9. Lock
11. Spring
15. Gasket
16. Plate
22. Housing
24. Primer button
26. Push rod
27. Support washers
28. Pump diaphragm
29. Disc valve
30. Seal
31. Glass
32. Lock washer
33. Nut
34. Spring
35. Lower housing
40. Fuel gage
41. Inlet tube
43. Gland
44. Spring
45. Washer
46. Valve

Sportwin and Fastwin, reed petals must be centered over holes in plate.

PRESSURIZED FUEL TANK. A pressurized fuel tank is used on Fisherman, Fleetwin, Sportwin and Fastwin motors manufactured before 1960. Pressure from the power head crankcase is conducted to the fuel tank through one of the passages in the dual passage hose (Fig. E11). The air pressure thus developed forces fuel back through the other hose passage to the carburetor float chamber. Check valve (5—Fig. E2 or E3) is provided to prevent air pressure returning to crankcase. A hand operated, diaphragm type fuel pump (See Fig. E11) is used to provide starting fuel to the carburetor.

Overhaul of the fuel pumping system consists of renewal of the damaged parts; however, the following should be checked: The tank must maintain about 2 to 5 psi air pressure to force fuel to the carburetor. Any leak in the air hose, fuel tank (around screws), tank cap gasket (15) or pressure relief valve (46) would release pressure. In the event of failure, operate the engine by using the hand pump; then check these items by using a soap solution or light oil. Tank may also be pressurized by an outside source while checking for leaks. Use care, however, not to use excessive pressure. A further cause of lack of pressure could be failure of the check valves (5—Fig. E2 or E3). If the other items fail to correct the trouble, remove and visually examine these valves.

FUEL PUMP. Some late motors are equipped with a diaphragm type fuel pump as shown in Fig. E13. Pressure and vacuum pulsations in the upper crankcase are directed through a passage to one side of the pump diaphragm (11). Vacuum in the crankcase draws the diaphragm inward as shown in View "A", Fig. E12. This diaphragm movement draws fuel past the inlet check valve (5) as shown by arrow. As piston moves downward in cylinder (View "B"), pressure is introduced to the back side of the diaphragm, forcing fuel out past the outlet check valve (4) as shown.

All defective or questionable parts should be renewed. Diaphragm (11—Fig. E13) should be renewed if air leaks or cracks are found; or, if its condition is in any way questionable.

CRANKCASE BLEEDER VALVE. Fisherman, Fleetwin, Sportwin and Fastwin motors are equipped with a reed type bleeder valve (LV—Fig. E14), designed to remove any liquid fuel or oil which might build up in crankcase. The bleeder valve thus provides smoother operation at all speeds and lessens the possibility of spark plug fouling during slow-speed operation.

There is a small passage leading from the bottom of each crankcase to the bleeder valve location at bottom of power head. Any condensed liquid thus accumulates in the bleeder pocket and passage until the piston travels its downward stroke. The crankcase pressure caused by the downward stroke of piston forces check valve (LV) off its seat and blows the liquid out into the exhaust passage.

When engine is overhauled, bleeder passages should be blown out with compressed air. Valve (LV) should exert slight pressure against its seat. Seating surface on crankcase should be smooth and flat. Valve reed should be renewed if broken, cracked, warped, rusted or bent.

IGNITION

Breaker point gap should be 0.020 and can be adjusted through the inspection opening in flywheel after recoil starter assembly is removed.

For a quick test of magneto condition, remove the spark plugs and hold spark plug wires about ⅛-inch away from cylinder head. Have someone spin the motor and note the condition of 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. If points are in good condition and properly adjusted, remove the flywheel and carefully examine the condition of the points, 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. Check the stop button and wire for shorts. Renew any parts which are damaged or in poor condition. Renew crankshaft upper seal whenever magneto is overhauled.

COOLING SYSTEM

WATER PUMP. All models are equipped with a rubber impeller type water pump. Impeller is mounted on and driven by the drive shaft in the lower unit. Refer to Fig. E15.

On Lightwin and Ducktwin motors, water enters the lower unit through slots in the forward and side areas of gear case. On all other motors, the main water scoop is located below the exhaust outlet 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 the lower unit as outlined

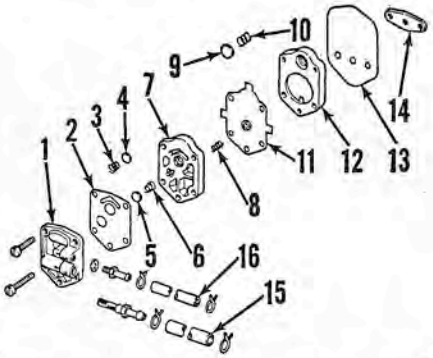


Fig. E13—Exploded view of fuel pump assembly typical of that used on some late motors.

1. Valve housing
2. Gasket
3. Spring
4. Outlet check valve
5. Inlet check valve
6. Spring
7. Inner housing
8. Spring
9. Support
10. Spring
11. Diaphragm
12. Outer housing
13. Deflector
14. Gasket
15. Inlet hose
16. Outlet hose

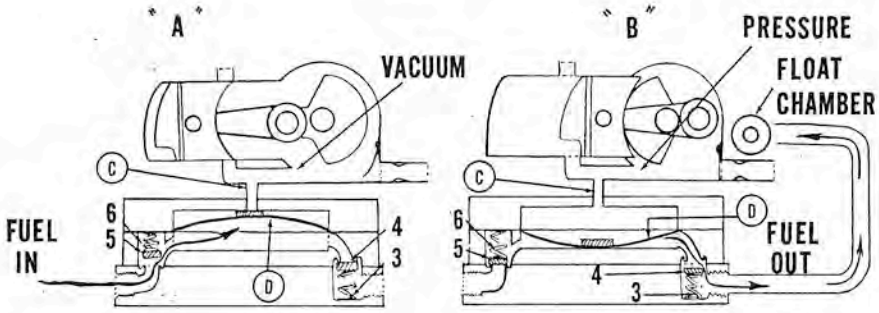


Fig. E12—Schematic view of the crankcase operated, diaphragm type fuel pump. Pressure and vacuum pulsations from crankcase pass through connection (C) to rear of diaphragm (D) which induces pumping action on fuel line as shown.

3. Valve spring
4. Outlet check valve
5. Inlet check valve
6. Valve spring

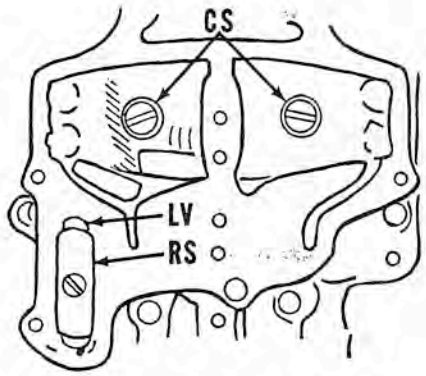


Fig. E14 — Crankcase typical of larger motors, with carburetor and inlet valve removed. The reed-type crankcase bleeder valve (LV) and reed stop (RS) can be removed for service after manifold is off. To disassemble the crankcase, the two center main bearing screws (CS) in inlet ports must be removed.

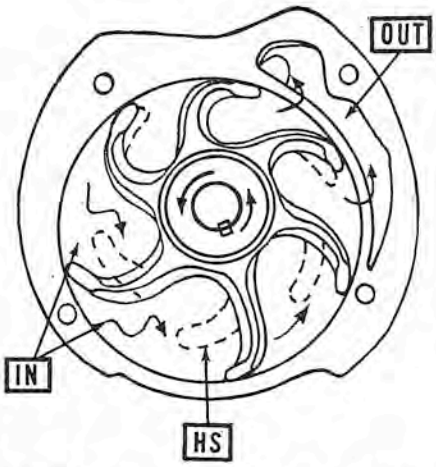


Fig. E15—Schematic view of the rubber impeller type water pump used on all models. Impeller mounts on lower unit drive shaft and rotates in offset pump housing. At slow speeds impeller blades follow the outline of housing. Water is drawn into pump (IN) as area between blades increases, and is forced into power head (OUT) as area narrows. At high speeds, blades remain curved as shown by broken lines (HS) and pump operates by centrifugal action.

in the appropriate section and check the condition of the water pump, water passages, gaskets and sealing surfaces. On motors so equipped, also check the thermostat as outlined in the following paragraph:

THERMOSTAT. All 1959 and later motors except Lightwin and Ducktwin are equipped with a cooling system thermostat. Refer to (3—Fig. E17 and 4—Fig. E19). Thermostat opening temperature should be 130-150 degrees F.

POWER HEAD

R&R AND DISASSEMBLE Lightwin and Ducktwin. Overhaul service on the power head is best performed by first removing the power head from the lower unit.

First remove the starter unit, shroud, flywheel and magneto. Remove carburetor and manifold, then unbolt and remove the power head from lower unit. Refer to Fig. E16.

Remove armature plate support (5), retainer (7) and crankcase lower flange (14). Remove cylinder head and the two tapered aligning pins (12); then unbolt and remove crankcase from cylinder assembly.

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

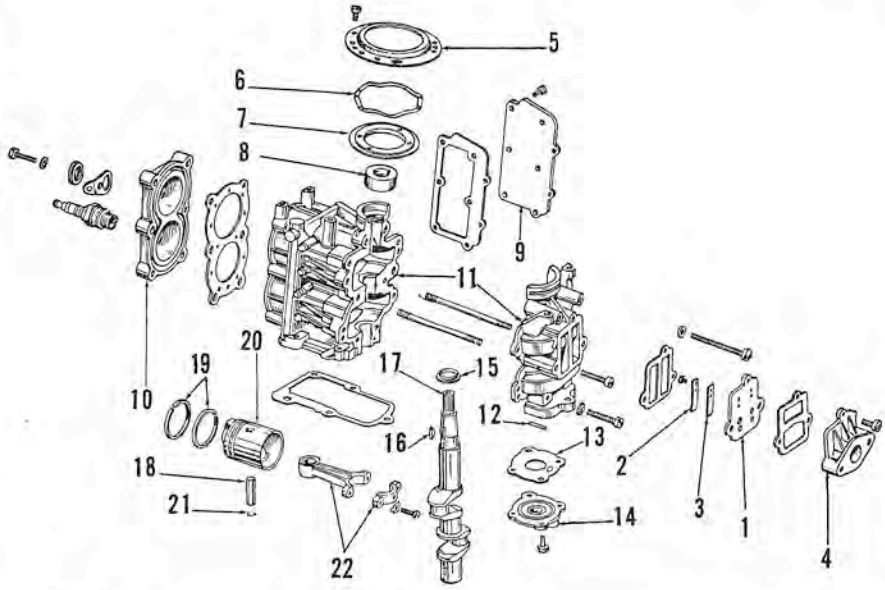


Fig. E16—Exploded view of Lightwin power head assembly and reed valves.

1. Reed plate
2. Reed stop
3. Reed petals
4. Inlet manifold
5. Support
6. Wave washer
7. Retainer
8. Cam
9. Exhaust passage cover
10. Cylinder head
11. Cylinder & crankcase
12. Dowel pin
13. Gasket
14. Lower flange
15. Slinger
16. Woodruff key
17. Crankshaft
18. Piston pin
19. Piston rings
20. Piston
21. Retaining ring
22. Connecting rod

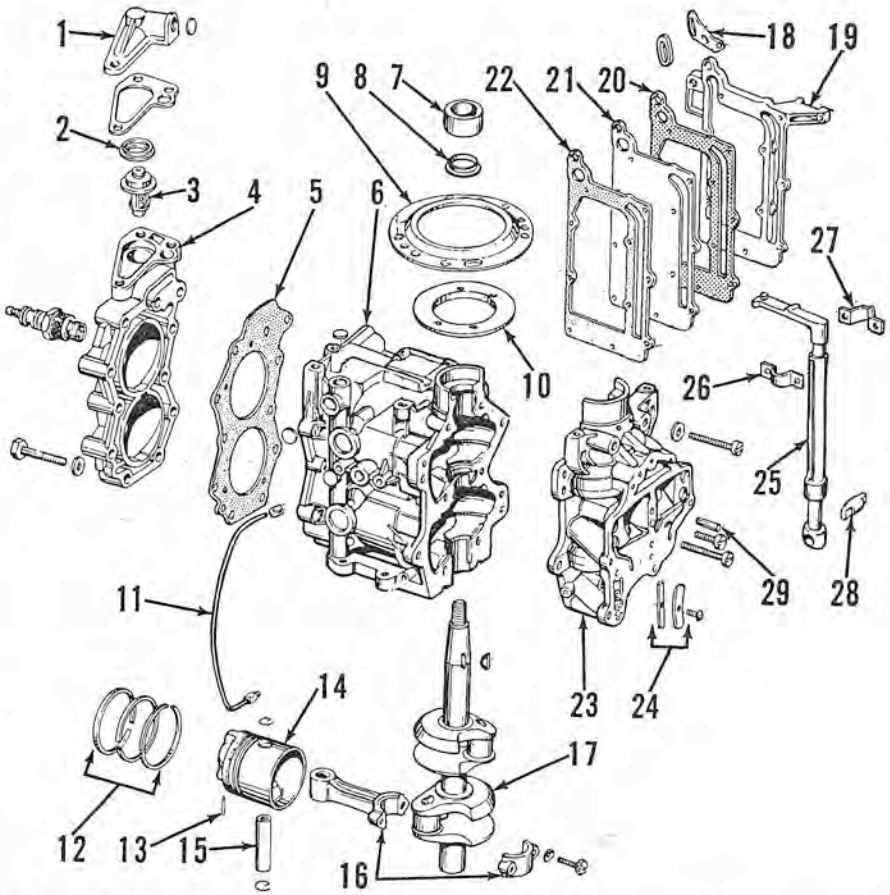


Fig. E17—Exploded view of late model Fisherman power head. Early model is similar except thermostat is not used.

1. Cap
2. Seal
3. Thermostat
4. Cylinder head
5. Gasket
6. Cylinder half
7. Magneto cam
8. Slinger
9. Support
10. Retainer
11. Oil line
12. Piston rings
13. Pin
14. Piston
15. Piston pin
16. Connecting rod
17. Crankshaft
18. Anchor
19. Exhaust cover
20. Gasket
21. Exhaust cover
22. Gasket
23. Crankcase half
24. Bleeder valve
25. Speed control arm
26. Clip
27. Clip
28. Pin
29. Taper pin

When reassembling, follow the procedures outlined in ASSEMBLY paragraph at end of this section and observe the following special precautions:

When installing lower flange (14), make sure that water passages in flange and gasket (13) are properly aligned, and installed toward forward (carburetor) side of engine as shown.

Fisherman Series. Clamp the motor to a convenient support and remove the shroud, control panel and intake silencer. Remove starter unit, flywheel, magneto armature plate, carburetor and inlet manifold. Refer to Fig. E17.

Remove armature plate support (9) and retainer (10), speed control lever (25) and outer and inner exhaust covers (19 & 21). Before power head can be detached from lower unit, it is necessary to remove exhaust silencer (rear cover) from exhaust housing on lower unit to obtain access to power head retaining screw. Remove the silencer; then unbolt and remove power head from lower unit.

Remove cylinder head and tap out the two tapered aligning pins; then, unbolt and remove crankcase from cylinder assembly.

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

When reassembling, follow the procedures outlined in ASSEMBLY paragraph at end of this section, and observe the following special precautions.

Remove crankcase bleeder valve (24) and oil line (11) and blow out oil line, oil passages and bleed passages using compressed air. Refer to CRANKCASE BLEEDER VALVE paragraph in previous FUEL SYSTEM section for further information concerning bleeder valve.

Fleetwin Series. Clamp the motor to a convenient support and remove the shroud, control panel and intake silencer. Remove starter unit, flywheel, magneto armature plate, carburetor and intake manifold. Refer to Fig. E18.

Remove armature plate support (3) and retainer (4), speed control lever (19) and outer and inner exhaust covers (17 & 18). Unbolt and remove power head from lower unit.

Use a small punch to tap out the crankcase aligning pins (22); then unbolt and remove crankcase and cylinder head.

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

When assembling, follow the procedures outlined in ASSEMBLY paragraph at end of this section, and observe the following special precautions.

Remove oil line (16) and blow out line and oil passages with compressed air. Re-

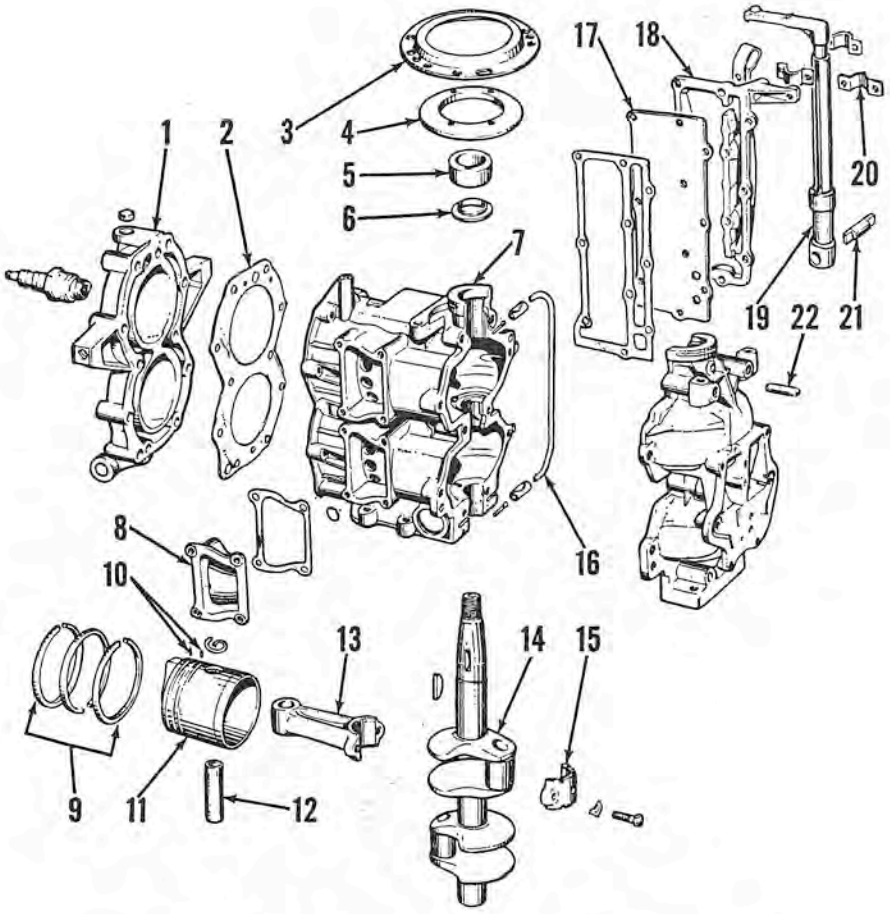


Fig. E18—Fleetwin power head and associated parts.

1. Cylinder head
2. Gasket
3. Support
4. Retainer
5. Magneto cam
6. Slinger
7. Cylinder half
8. Transfer passage cover
9. Piston rings
10. Pins
11. Piston
12. Piston pin
13. Connecting rod
14. Crankshaft
15. Cap
16. Oil line
17. Exhaust cover
18. Exhaust cover
19. Speed control shaft
20. Clip
21. Pin
22. Taper pin

move transfer passage covers (8) and make sure passages and ports are clean. Use the same care in reinstalling covers (8) as is used in remainder of crankcase assembly. These transfer passages are subjected to crankcase vacuum and pressure.

Sportwin Series. Clamp the motor to a convenient support and remove the shroud, control panel and intake silencer. Remove starter unit, flywheel and magneto armature plate. Refer to Fig. E19.

Remove carburetor. Lift out speed control lever (47), unbolt and remove shifter lock (38) and unbolt and remove port and starboard brackets (40 & 45). Remove armature plate support (17) and retainer (18); then unbolt and lift off the power head.

Remove cylinder head (5), outer and inner exhaust covers (48) and upper and lower transfer passage covers (8 & 9). Use a small punch to tap out the tapered crankcase aligning pins (44); then unbolt and remove the front crankcase half.

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

When reassembling, follow the procedure outlined in ASSEMBLY paragraph at end of this section, and observe the following special precautions:

Remove and blow out oil line (43) and oil line passages, using compressed air. Remove and check the crankcase bleeder valve (42) using procedures outlined in CRANKCASE BLEEDER VALVE paragraph of previous FUEL SYSTEM section of this manual.

Fastwin Series. Clamp the motor to a convenient support and remove the shroud, control panel, air intake silencer and carburetor. Remove starter units, flywheel and magneto armature plate. Refer to Fig. E20.

Lift out speed control lever (51) and unbolt and remove shifter lock (14). Unbolt and remove starboard bracket (42), armature plate support (10) and retainer (11); then unbolt and lift off the power head.

Remove cylinder head (5), outer and inner exhaust covers (49 & 50) and transfer passage covers (18 & 19). Use a small punch to drive out the tapered crankcase aligning pins (43), remove intake manifold, then unbolt and remove the crankcase front half.

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

When reassembling, follow the procedure outlined in ASSEMBLY paragraph at end of this section, and observe the following special precautions:

Remove oil line (47) and blow out line and passages in crankcase with compressed air. Remove and check the crankcase bleeder valve (45), using the procedures outlined in CRANKCASE BLEEDER VALVE paragraph of previous FUEL SYSTEM section of this manual.

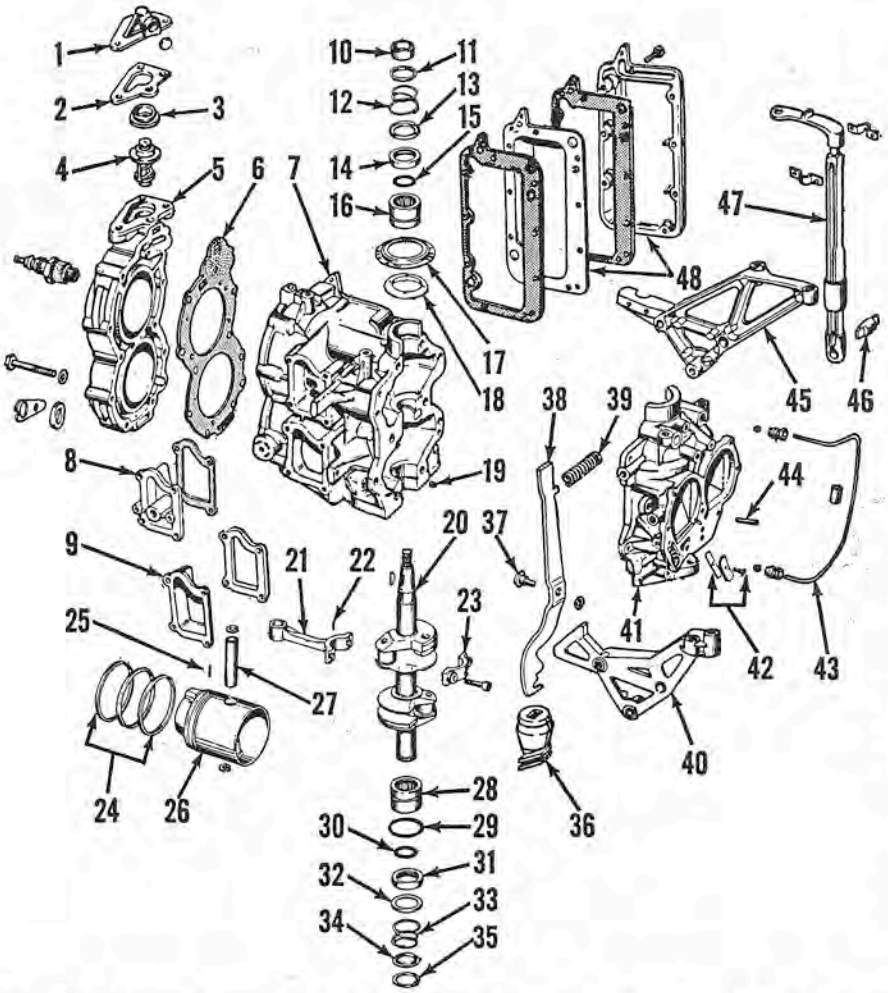


Fig. E19—Sportwin power head and associated parts used on late models. Early models are not equipped with thermostat.

1. Cap
2. Gasket
3. Seal
4. Thermostat
5. Cylinder head
6. Gasket
7. Cylinder half
8. Transfer port cover
9. Transfer port cover
10. Magneto cam
11. Washer
12. Spring
13. Washer
14. Seal
15. "O" ring
16. Bearing
17. Support
18. Retainer
19. Dowel pin
20. Crankshaft
21. Connecting rod
22. Bearing roller
23. Rod cap
24. Piston rings
25. Pin
26. Piston
27. Piston pin
28. Lower bearing
29. "O" ring
30. Sealing ring
31. Seal
32. Washer
33. Spring
34. Retainer
35. Retaining ring
36. Grommet
37. Pivot pin
38. Shifter lock
39. Spring
40. Starboard bracket
41. Crankcase half
42. Bleeder valve
43. Oil line
44. Taper pin
45. Port bracket
46. Pin
47. Speed control shaft
48. Exhaust covers

REASSEMBLE. Because of the two-cycle design, crankcase and intake 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.

Whenever the power head is disassembled, it is recommended that all gasket surfaces and the mating surfaces of crankcase halves be carefully checked for nicks and burrs or warped surfaces which might interfere with a tight seal. The cylinder head, head end of cylinder block, or mating surfaces of manifolds and crankcase may be checked and lapped, if necessary, to provide a smooth surface. For lapping, 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 soapsuds 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 can be salvaged in this manner. In case of doubt, renew the crankcase assembly.

The crankcase halves are positively located during assembly by the use of two tapered dowel pins. Check to make sure that the dowel pins are not bent, nicked or distorted, and that dowel holes are clean

and true. When installing dowel pins, make sure they are fully seated, but do not use excessive force.

The mating surfaces of crankcase halves must be sealed during assembly by using a hardening cement such as "Sealer 1000" (available from Marprox Corp., P. O. Box 955, Sheboygan, Wisconsin). Make sure that all old cement is removed and that surfaces are flat and free from nicks and burrs. Apply cement sparingly and evenly to cylinder half of crankcase only; then immediately install front half. Install the locating dowel pins; then install and tighten the crankcase screws and/or nuts. Tightening torques are as follows:

All Screws ..... 60- 80 Inch-lbs.
Crankcase Nuts .....120-130 Inch-lbs.

When installing gaskets, check to make sure correct gasket is used and that ALL water passage holes are open. On Lightwin and Ducktwin models, use extra caution because it is possible to turn head gasket over or turn head end for end. On later models, aligning bosses are cast into cylinder and head, and an aligning tab is cut into gasket. Align bosses and aligning tab during installation to insure proper performance.

All gasket surfaces must be sealed, using a non-hardening type cement such as "Perfect Seal No. 4." Tightening torques for each model and application are given in the CONDENSED SERVICE DATA table.

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 aluminum piston is fitted with three rings which are interchangeable and may be installed either side up. Pistons and rings are available in standard size and oversizes of 0.020 for all motors. Oversizes of 0.040 are available for Sportwin and Fastwin motors only. The recommended piston ring end gap is 0.005-0.015 on Lightwin, Ducktwin and Fisherman, and 0.007-0.017 on other models. Ring to groove clearance is 0.001-0.0035 for all models. Piston to cylinder wall clearance is 0.0013-0.0025 for Lightwin and Ducktwin; 0.0018-0.0030 for Fisherman; 0.0015-0.003 for Fleetwin; 0.002-0.0035 for Sportwin; 0.0025-0.004 for early Fastwin; and 0.003-0.0045 for late Fastwin. Renew piston, rings and/or cylinder assembly if clearance is excessive.

When reassembling, piston should be installed with long, tapering side of piston head toward exhaust port side of cylinder. Refer to Fig. E21. On Sportwin models, straight side of connecting rods should be together, facing center main bearing. When installing connecting rods, tighten the cap screws to a torque of 60-66 inch pounds on Lightwin, Ducktwin, Fisherman and Fleetwin motors and 180-186 inch pounds on other models.

Thoroughly lubricate all friction surfaces during assembly.

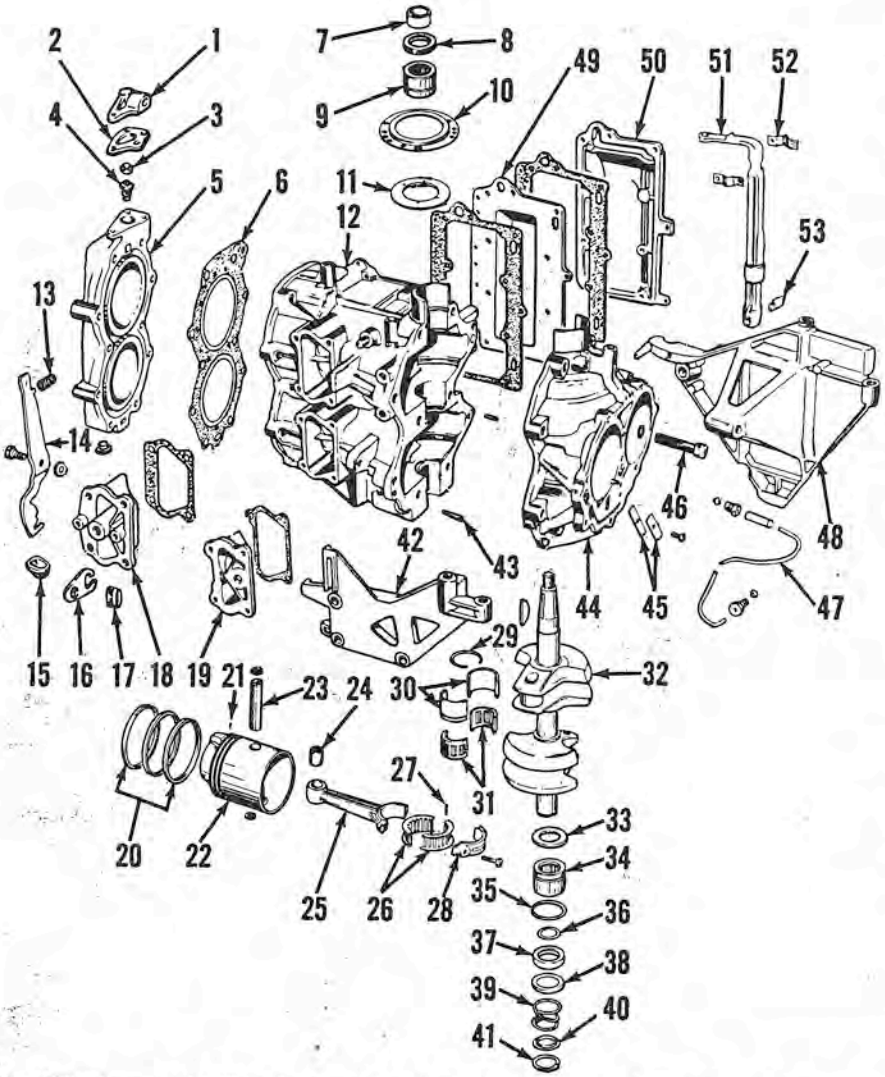


Fig. E20—Late model Fastwin power head. Early models are similar except thermostat is not used.

1. Cap
2. Gasket
3. Seal
4. Thermostat
5. Cylinder head
6. Head gasket
7. Magneto cam
8. Upper seal
9. Upper bearing
10. Support
11. Retainer
12. Cylinder half
13. Spring
14. Shifter lock
15. Grommet
16. Anchor
17. Grommet
18. Transfer port cover
19. Transfer port cover
20. Piston rings
21. Locating pin
22. Piston
23. Piston pin
24. Needle bearing
25. Connecting rod
26. Bearing cage
27. Bearing roller
28. Bearing cap
29. Retaining ring
30. Outer race
31. Bearing assembly
32. Crankshaft
33. Thrust washer
34. Lower bearing
35. "O" ring
36. Retainer
37. Carbon seal
38. Retainer
39. Spring
40. Retainer
41. Snap ring
42. Starboard bracket
43. Taper pin
44. Crankcase half
45. Bleeder valve
46. Crankcase screw
47. Oil line
48. Port bracket
49. Exhaust cover
50. Exhaust cover
51. Speed control snaft
52. Clamp
53. Pin

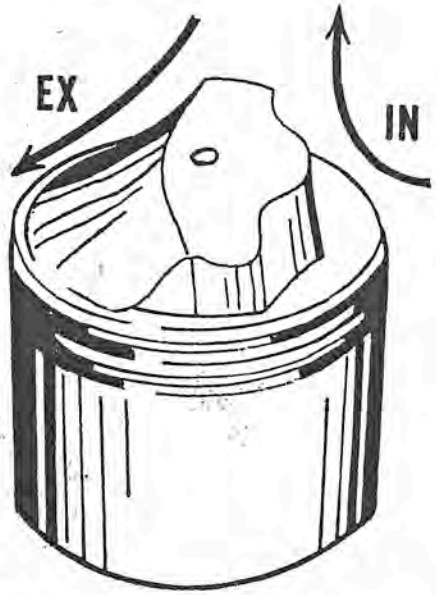


Fig. E21—Baffle on top of piston head is designed to direct the flow of incoming mixture for proper scavenging. Pistons must be installed as shown with relation to cylinder ports.

EX. Exhaust ports IN. Inlet ports

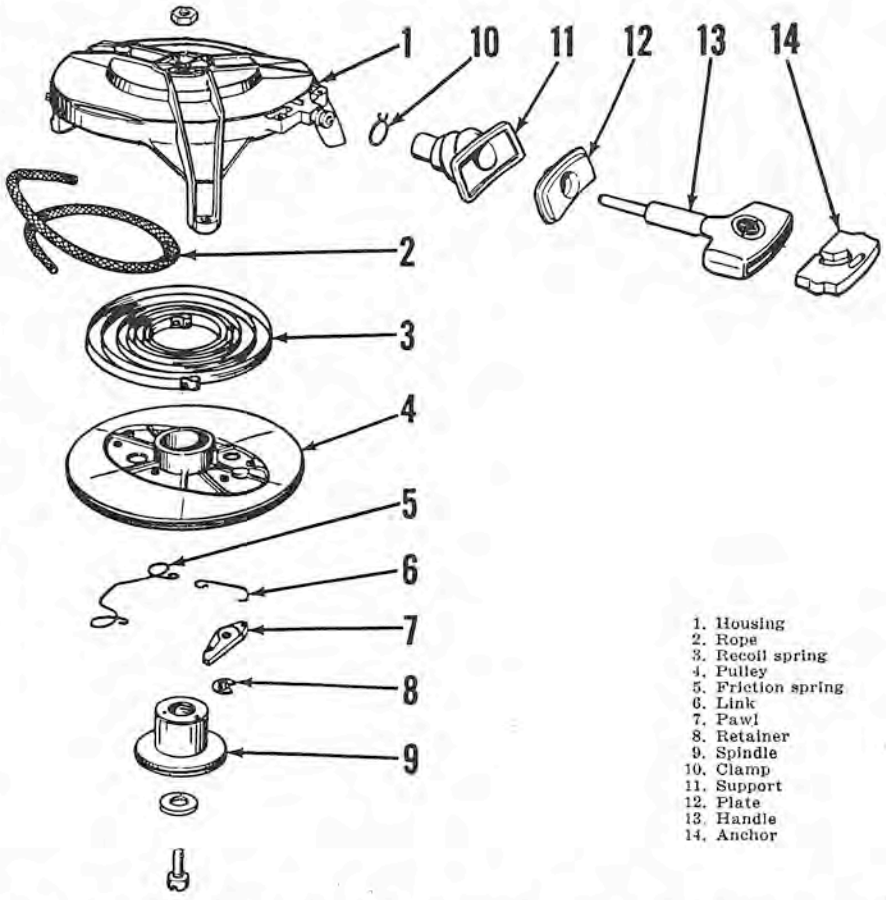
CONNECTING RODS, BEARINGS AND CRANKSHAFT. Before detaching connecting rods from crankshaft, make sure rod and cap are properly marked for correct assembly to each other and in the correct cylinder.

On Lightwin, Ducktwin, Fisherman and Fleetwin motors, the connecting rod rides directly on the crankshaft crankpin. The crankshaft is carried in three bronze bushings cast into the crankcase halves.

Sportwin motors are fitted with a forged steel connecting rod with 29 individual uncaged needle rollers at crankpin end of rod. Caged needle bearings are used in each end main bearing, while center bushing is cast into crankcase. Straight side of rods should face each other (toward center main bearing).

Fastwin motors are fitted with 15 needle rollers installed in a two-piece bearing cage at crankpin end of each rod. Motors after 1956 use a caged (cartridge) needle bearing at piston end of rod. On 1956 models, the lower main bearing is a bronze bushing cast into crankcase halves. The top and center main bearings on all models, and the lower main bearing on 1957 and later models are all of the needle roller type.

On all models, refer to the CONDENSED SERVICE DATA table for dimensional data and recommended torque values. If bearing surface of rod and cap is rough, scored, worn, or shows evidence of overheating, renew the connecting rod. Inspect crankpin and main bearing journals. If scored, out-of-round, or worn, renew the crankshaft. All bearings and friction surfaces should be lubricated during assembly. Renew crankshaft seals whenever power head is disassembled.



1. Housing
2. Rope
3. Recoil spring
4. Pulley
5. Friction spring
6. Link
7. Pawl
8. Retainer
9. Spindle
10. Clamp
11. Support
12. Plate
13. Handle
14. Anchor

Fig. E23—Exploded view of starter used on Fisherman motors. Other models are similar.

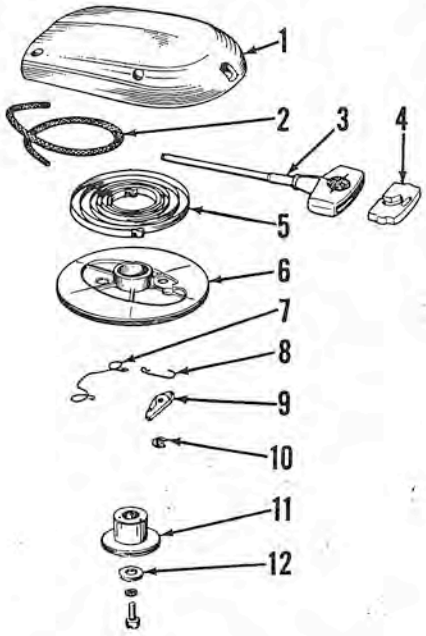


Fig. E22—Exploded view of starter assembly of the type used on Lightwin motors.

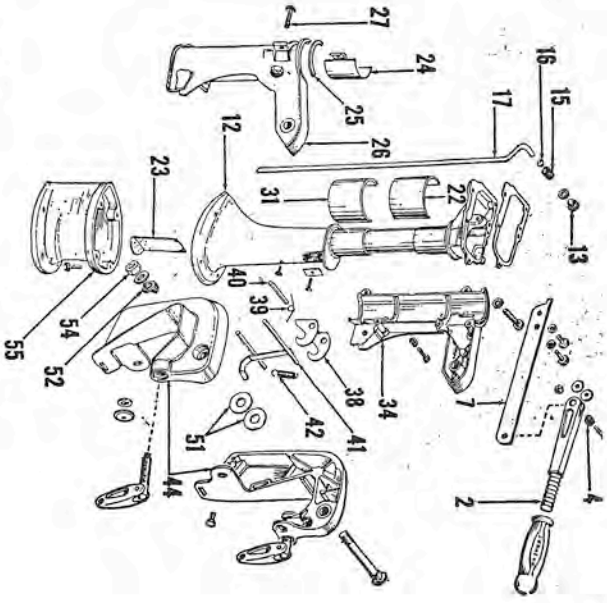
1. Starter housing
2. Starter rope
3. Starter handle
4. Anchor
5. Recoil spring
6. Pulley
7. Friction spring
8. Link
9. Pawl
10. Retainer
11. Spindle
12. Washer

MANUAL STARTER

Figs. E22 or E23 show starters typical o those used. When installing a new starte cord or spring, invert the assembly in c vise and wind the spring by turning the starter pulley counter-clockwise until spring is completely wound. Reverse the pulley one complete turn and install the cord.

Fig. E27—Exploded view of Lightwin stern bracket, drive shaft and associated parts. Spacer (55) is used on "Long" models.

2. Steering handle
4. Spring
7. Support
12. Driveshaft housing
13. Screw
15. Nut
16. Packing gland
17. Water tube
22. Upper lining
23. Baffle
24. Clamp
25. Thrust washer
26. Swivel bracket
27. Tension screw
31. Lower lining
34. Swivel bracket
38. Reverse lock
39. Spring
40. Pin
41. Tilting lever
42. Spring
44. Stern bracket
51. Friction washer
52. Spring
54. Nut
55. Spacer



1. "O" ring
2. Drive shaft
3. Grommet
4. Pump housing
5. Screw
6. Plate
7. Impeller
8. Drive pin
9. Gear case
10. Oil seal
11. Cover
15. Thrust bearing
19. Pinion gear
20. Propeller shaft
21. "O" ring
22. Gearcase head
24. Seal
25. Drive pin
26. Clutch hub
27. Ring
28. Bushing
29. Propeller
30. Washer
31. Nut

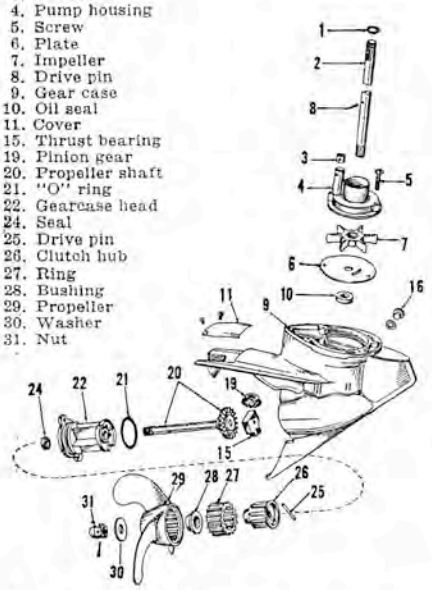


Fig. E28—Exploded view of lower unit gear case, propeller and water pump assembly used on Lightwin motors. "O" ring (1) seals upper drive shaft splines.

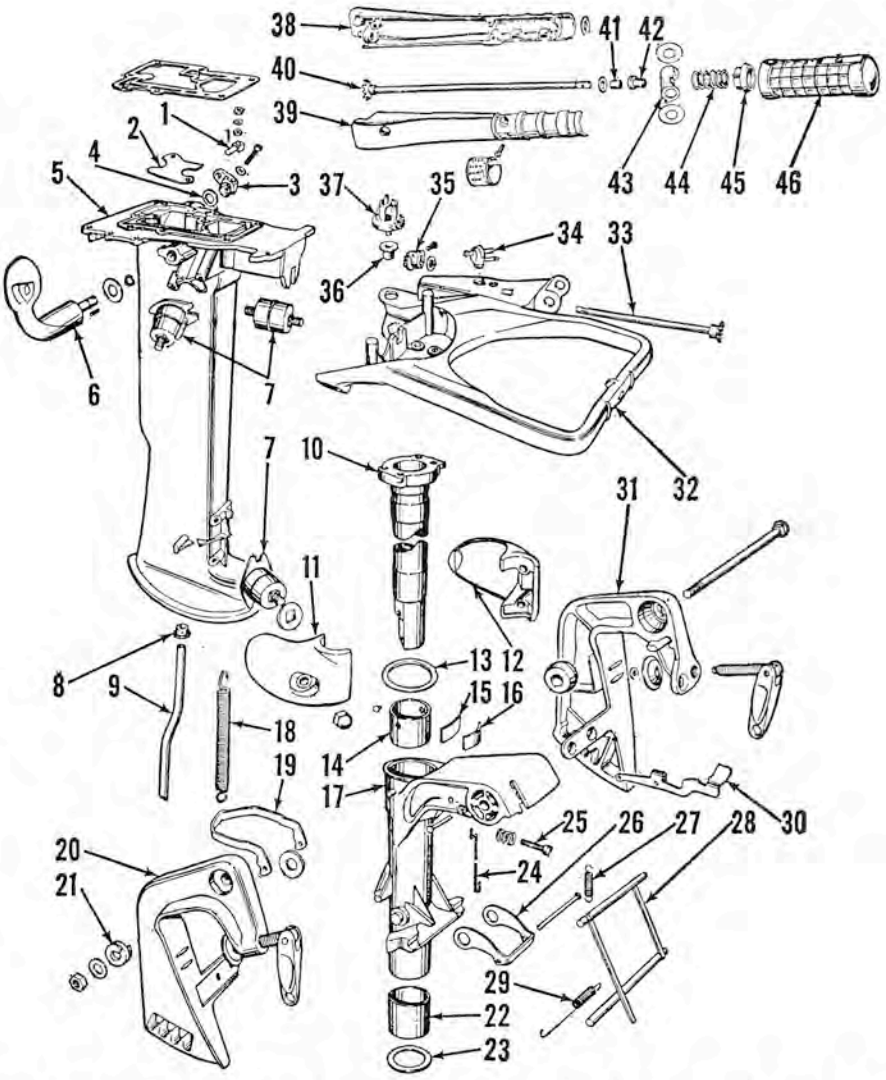


Fig. E29—Exploded view of Fisherman exhaust tube, swivel bracket, stern bracket and associated parts.

1. Connector
2. Cover plate
3. Shift lever
4. Washer
5. Exhaust housing
6. Shift handle
7. Rubber mount
8. Grommet
9. Water tube
10. Pilot shaft
11. Lower mount
12. Lower mount
13. Thrust washer
14. Upper liner
15. Spacer
16. Plate
17. Swivel bracket
18. Spring
19. Reverse lock
20. Stern bracket
21. Spring
22. Lower liner
23. Thrust washer
24. Link
25. Tension screw
26. Link
27. Spring
28. Tilting lever
29. Spring
30. Release arm
31. Stern bracket
32. Steering bracket
33. Speed control shaft
34. Connector
35. Speed control pinion
36. Bushing
37. Speed control gear
38. Steering handle
39. Steering handle
40. Speed control shaft
41. Bushing
42. Bushing
43. Gear cover
44. Spring
45. Friction Block
46. Grip

LOWER UNIT

PROPELLER AND DRIVE PIN. Cushioning protection of propeller and drive unit is provided by a shock absorber built into drive shaft on Fisherman and Fleetwin motors; and into propeller hub on all other models. Service consists of renewing rubber clutch ring (27—Fig. E28) on Lightwin and Ducktwin; the pinion shaft (10—Fig. E30) on Fisherman and Fleetwin; or the propeller on other models. The lower drive shaft clutch should release at a torque of 155-225 inch-pounds on Fisherman and Fleetwin. Propeller slip clutch should release at a torque load of 84-104 ft.-lbs. on Sportwin motors; or 65-100 ft.-lbs. on Fastwin.

REMOVE AND REINSTALL. Most service on the lower unit can be performed by detaching the gearcase housing from driveshaft housing. When servicing 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 of the motor. Water leaks also may permit the inside of driveshaft casing to fill up with water which can eventually find its way into motor crankcase through the lower bearing, and/or into the gearcase where it washes out the lubricant. Look for water leaks if the gearcase requires an abnormal amount of lubricant.

Use the appropriate exploded views (Fig. E27 through E33) as a guide when overhauling the lower unit, together with the special precautions listed below. All gasket surfaces must be smooth, free from nicks and burrs, and assembled using a non-hardening type sealer such as Perfect Seal No. 4. All joints without gaskets must be smooth and free from nicks and burrs and old cement, and sealed with a hardening sealer such as "Sealer 1000." Refer to the CONDENSED SERVICE DATA table for repair specifications and recommended tightening torques.

Lightwin and Ducktwin. When reassembling lower unit, check "O" ring seal (21—Fig. E28) to make sure it and seating surface is in good condition. Renew oil seal (10) whenever unit is disassembled. Coat splined upper end of drive shaft (2) with water resistant grease and renew "O" ring (1) in groove in upper end of shaft. The grease and the "O" ring prevents water from corroding splines which would make later disassembly difficult.

NOTE: Propeller shaft (20) does not operate in a position parallel to direction of travel on these motors. Adjust tilt angle so that anti-cavitation plate is parallel to water surface.

Fisherman and Fleetwin. The propeller shaft (53—Fig. E30) and drive gears (47 & 54) can be removed after first draining lubricant from gear housing, removing pivot

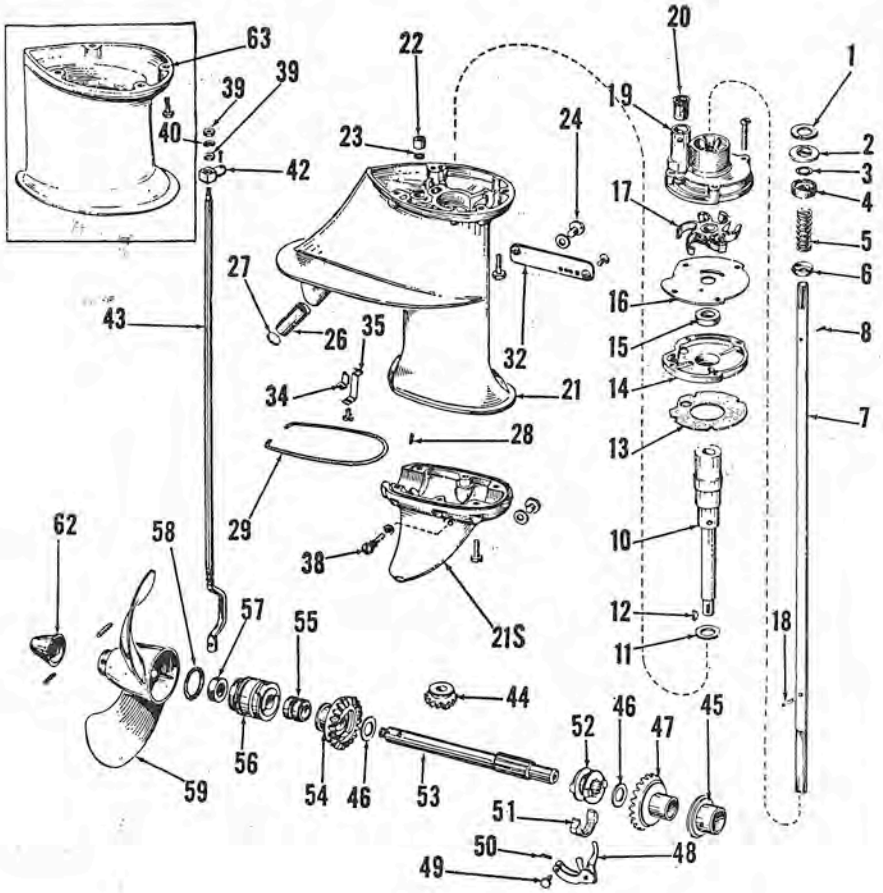


Fig. E30—Lower unit gear case and water pump assembly used on Fisherman motor. Fleetwin lower unit is similar.

1. Gasket
2. Plate
3. "O" ring
4. Seal
5. Spring
6. Washer
7. Drive shaft
8. Pin
10. Pinion shaft
11. Thrust washer
12. Woodruff Key
13. Gasket
14. Bearing housing
15. Seal
16. Plate
17. Impeller
18. Pin
19. Housing
20. Seal
21. Gear case
21S. Lower housing
22. Bushing
23. "O" ring
26. Screen
27. Plug
28. Dowel pin
29. Seal
32. Cover
34. Spring
35. Spring
38. Pivot pin
39. Nut
40. Lock washer
42. Connector
43. Shift rod
44. Pinion gear
45. Bearing
46. Thrust washer
47. Forward gear
48. Shift yoke
49. Pin
50. Cotter pin
51. Cradle
52. Clutch dog
53. Propeller shaft
54. Reverse gear
55. Gear bushing
56. Gearcase head
57. Seal
58. "O" ring
59. Propeller

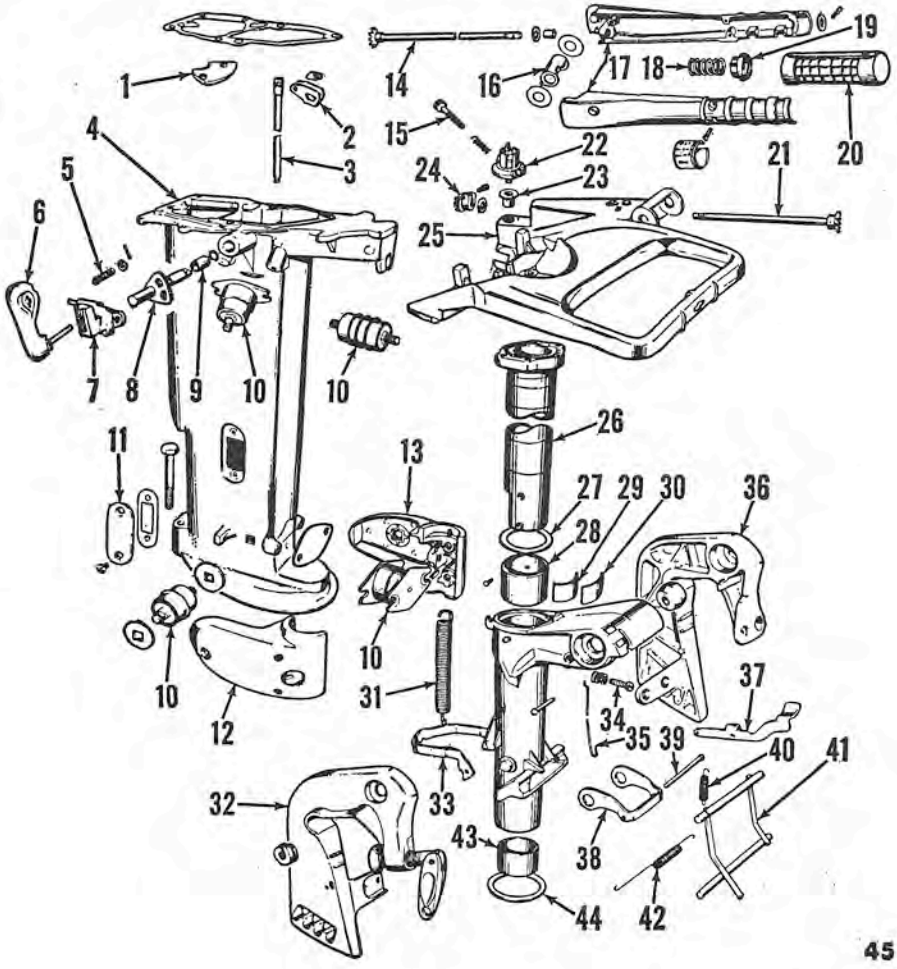


Fig. E31—Exploded view of exhaust tube, swivel bracket, stern bracket and associated parts used on Sportwin motors. Fastwin unit is similar.

1. Plate
2. Shift arm
3. Shift rod
5. Spring
6. Shift handle
7. Shift follower
8. Shifter shaft
9. Bushing
10. Rubber mount
11. Cover plate
12. Lower mount
13. Lower mount
14. Speed control shaft
15. Adjusting screw
16. Gear cover
17. Steering handle
18. Spring
19. Friction block
21. Speed control shaft
22. Speed control gear
23. Bushing
24. Speed control pinion
25. Steering bracket
26. Pilot shaft
27. Thrust washer
28. Upper liner
29. Spacer
30. Plate
31. Spring
33. Reverse lock
34. Tension screw
35. Link
37. Release arm
38. Link
39. Pin
40. Spring
41. Tilting lever
42. Spring
43. Lower liner
44. Thrust washer

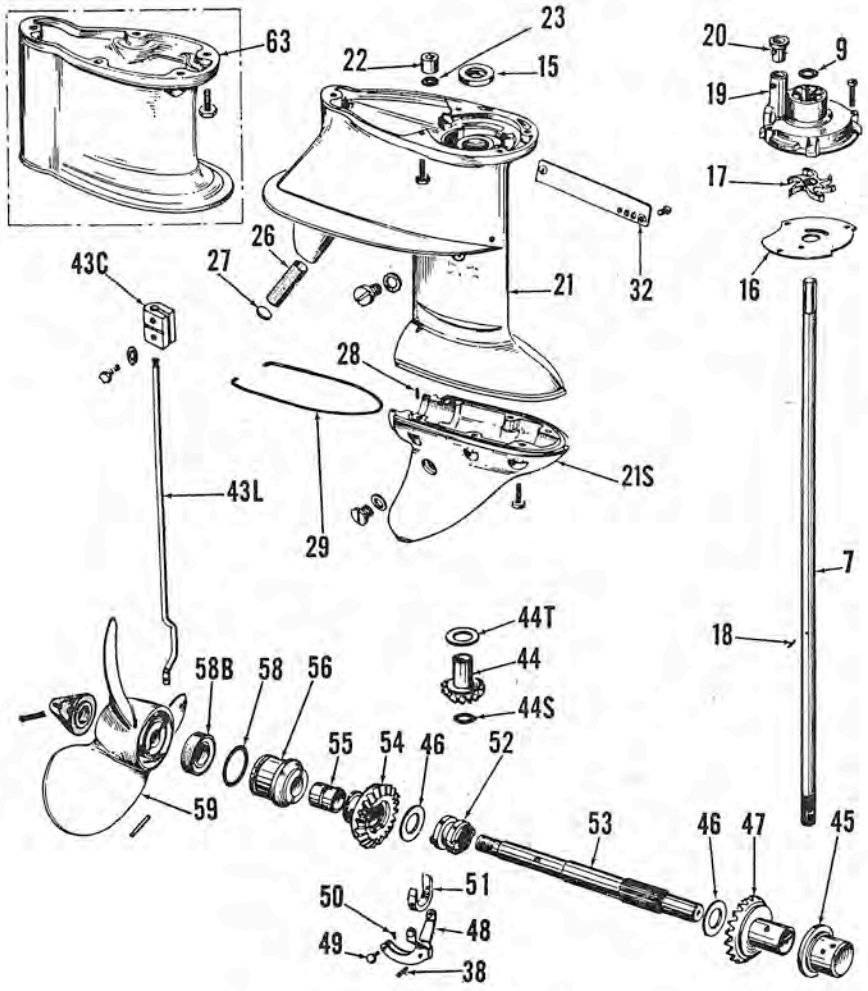


Fig. E33—Exploded view of Sportwin gearcase assembly and water pump. Fastwin unit is similar.

7. Drive shaft
9. "O" ring
15. Seal
16. Plate
17. Impeller
18. Pin
19. Housing
20. Grommet
21. Gearcase
21S. Gearcase half
22. Bushing
23. "O" ring
26. Screen
27. Plug
28. Dowel
29. Seal strip
43C. Connector
43L. Shift rod
44. Drive pinion
44S. Snap ring
44T. Thrust washer
45. Bushing
46. Thrust washer
47. Forward gear
48. Shift lever
49. Pin
50. Cotter pin
51. Cradle
52. Clutch dog
53. Propeller shaft
54. Reverse gear
55. Bushing
56. Gearcase head
58. "O" ring
58B. Seal
59. Propeller
63. Extension

screw (38) (or pin) and unbolting and removing gearcase lower housing (21S). To separate gearcase from drive shaft housing, it is first necessary to remove power head. Remove nuts (39) and connector (42). Remove powerhead seal assembly (1 through 6) and pin (8); then, unbolt and detach gearcase.

When assembling, use new sealing strip (29) with ends trimmed to extend $\frac{1}{16}$-inch from housing groove, and coat surfaces with hardening type sealer.

Fastwin and Sportwin. The propeller shaft (53—Fig. E33) and drive gears (47 & 54) can be removed after first draining lubricant from gear housing, removing pivot screw and unbolting and removing gearcase lower housing (21S). To separate the gearcase from exhaust housing, remove cover (11—Fig. E31) and loosen screw in shifter rod coupling (43C—Fig. E33). Reassembly can be simplified if the shift rod coupling (43C) is attached to lower shift rod (43L), and the water tube is installed in pump housing. Coat upper end of water tube with oil or liquid soap for easier installation in grommet. Be sure "O" ring (9—Fig. E33) is in place on upper end of drive shaft (7).

STEERING TENSION. Steering tension can be adjusted by turning screw (34—Fig. E31) until motor is easy to steer, but will maintain a set course.

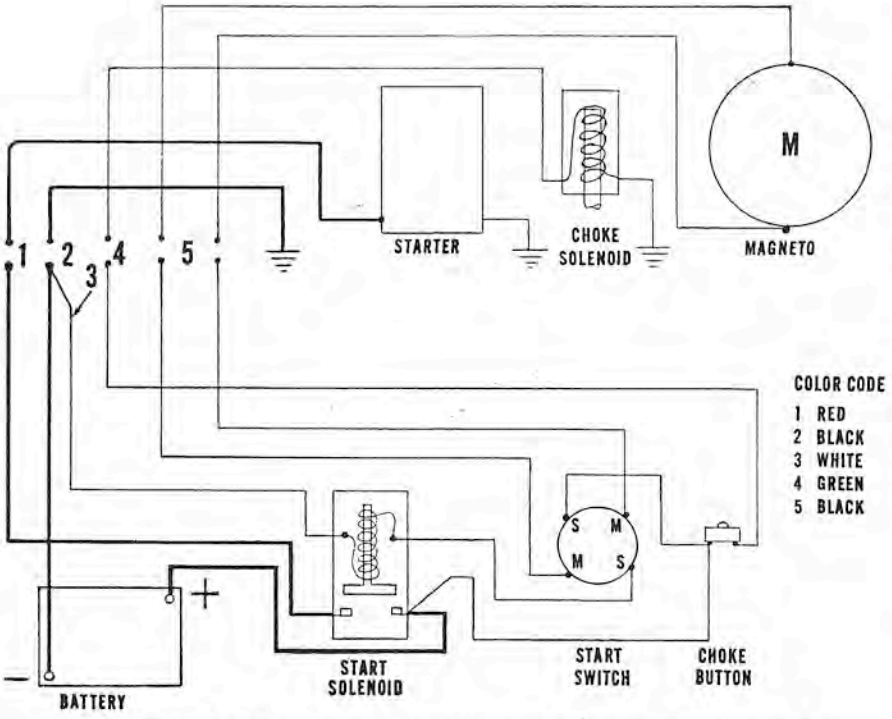


Fig. E34 — Wiring diagram of starting system used on some FASTWIN models.

ELECTRICAL SYSTEM

Some Fastwin motors are equipped with an electrical starting system. Refer to Fig. E34 for wiring diagram, and to ELECTRICAL SYSTEM at end of Evinrude section, for overhaul data.