

Hydro-drive **Champion**

SERVICE INSTRUCTIONS

Champion Motors Company
Minneapolis, Minn.

HYDRO-DRIVE

The Hydro-drive unit is essentially a positive displacement pump which is used as a hydraulic clutch by regulating intake and discharge ports. . In the neutral position the intake is closed and the discharge open. As the Hydro-drive Control Lever is moved toward the conventional drive position, the intake is gradually opened and the discharge closed so as to create a positive driving pressure. In the conventional drive position the mechanical lock comes into place so that there is positively no slippage under maximum power.

PRELIMINARY INSTRUCTIONS

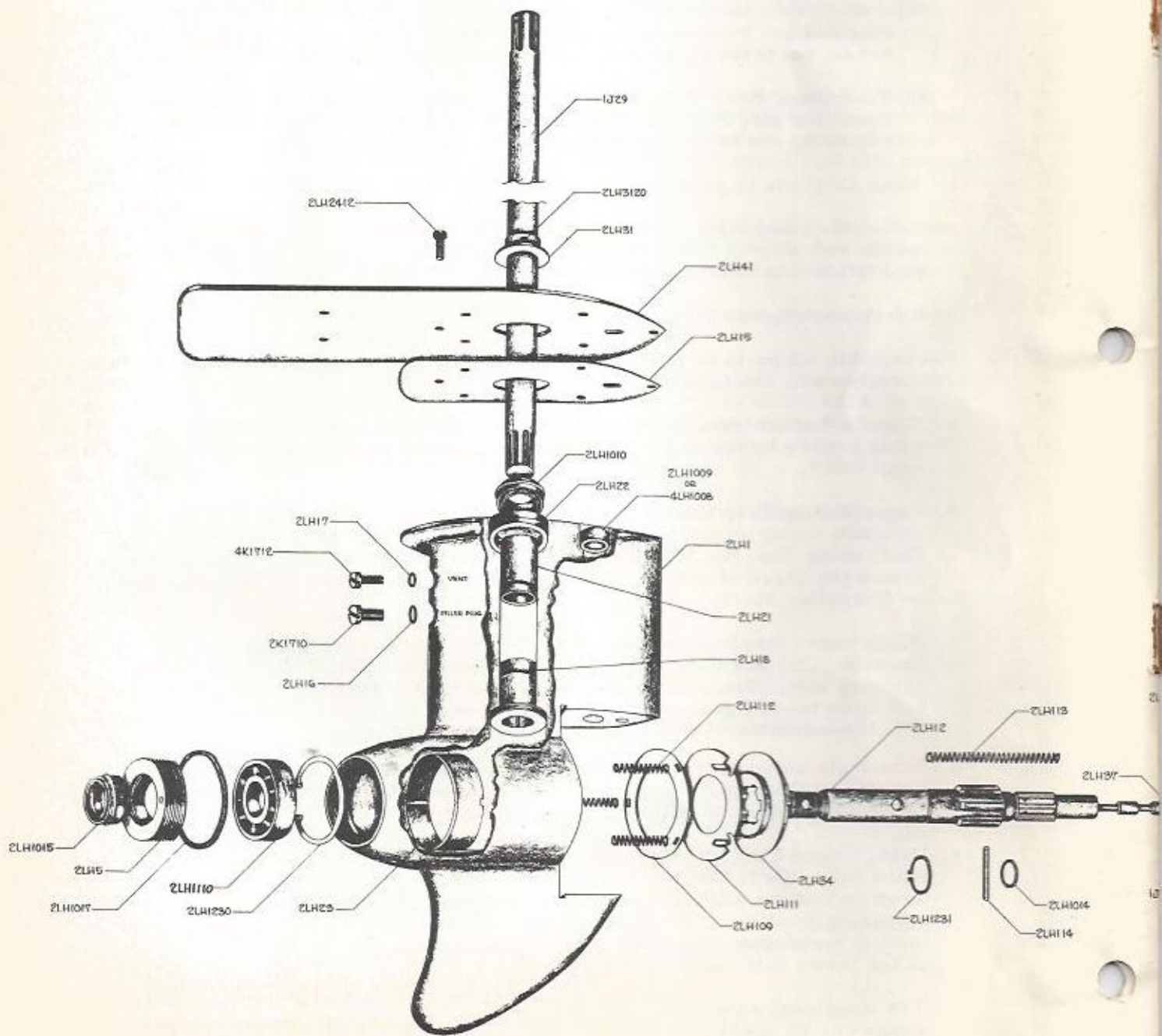
The Hydro-drive lower unit consists of parts which are machined to close tolerances; therefore, it is extremely important that no dirt particles or metal chips enter the unit while it is being assembled. In addition to keeping the parts clean it is equally important that all parts be free of nicks or burrs before being assembled. It is for this reason that we recommend using the service tools which will be referred to in the following instructions. Clamping the lower unit skeg in a vise, having jaws covered with soft aluminum, will simplify disassembly and assembly of the unit.

1. Installing Water Pump Rotor.
 - a. Remove Lower Unit Assembly from motor by removing the 6 screws under the Anti-Cavitation Plate. Be sure Driveshaft does not come out of Lower Unit. It is important that this be done before attempting to remove Lower Unit Cap, since the Hydro-drive Control Rod will prevent the Cap from turning.
 - b. Remove Lower Unit Cap Locating Screw, Part No. 2LH116 (on Motors 2LHD 1500 to and including 2LHD 6123 and 4LHD 1500 to and including 4LHD 7881; on Motors thereafter this part has been eliminated).
 - c. To unlock Lower Unit Cap, turn it counter-clockwise about one-fourth turn, then remove it from Lower Unit Body.
 - d. Remove Water Pump Rotor from Pump Housing. On Hydro-drive motors number 2LHD 1500 to 2LHD 3296 and 4LHD 1500 to 4LHD 4724, be sure the Pump Shaft 'O' Ring, Part No. 2LH1013, is not left in the brass housing as there is a tendency for this part to slip out of the groove in the pump shaft when the Rotor is removed.
 - e. Install new Pump Rotor without the Pump Shaft 'O' Ring as this part can be eliminated.
 - f. Reassemble all parts.
2. Complete Overhaul of Hydro-drive Unit.
 - a. Pull out Driveshaft, remove Anti-cavitation Plate and Propeller. Turn unit upside down and allow oil to drain out.
 - b. Follow instructions for installing Water Pump Rotor through Figure 1, letter d.
 - c. Clamp Pump Housing Puller (Service Tool No. 102) on Pump Housing Flange. Remove Pump Housing from Lower Unit by slightly rotating or tapping tool handles with a small hammer.
 - d. Remove pinion gear.
 - e. Using Service Tool No. 107, hook into hole provided for in the outside diameter of gear mounting end plate, Part No. 2LH26. Pull Clutch Housing Assembly out of Unit.
 - f. Remove Control Valve, Part No. 2LH37 from Propeller Shaft.
 - g. Using Service Tool No. 101, remove Ball Bearing Lock Ring. (Caution: This part has a left-hand thread.)

- h. Remove Propeller Shaft Snap Ring, Part No. 2LH1231, using Service Tool No. 108.
- i. Remove Propeller Shaft by tapping threaded end with a soft headed hammer. Remove Friction Collar, Part No. 2LH111, Friction Spring Collar 2LH109 and (3) Friction Springs 2LH112 from inside of unit.
- j. To remove ball bearing take out Ball Bearing Lock Ring Seal, 2LH1017, and push out bearing.
- k. Disassembling Clutch Housing Assembly.
 - (1) Remove 4 Allen Head Screws, Part No. 2LH2213.
 - (2) Pull off Clutch Housing End Plate.
 - (3) Take Clutch Rotor Part 2LH27 out of Clutch Housing and remove vanes.
 - (4) If necessary to remove gear due to damage, place Tool No. 106 in a vise and set housing on spline end of tool. Using a square piece of brass, tap teeth of the gear to unscrew (right hand thread).
 - (5) To remove Rear Clutch Plate, Part No. 2LH34, from Propeller Shaft, knock out pin, Part No. 2LH114, with a pin punch. (Use caution when removing pin as spring in shaft is compressed by this pin.
- l. Wash all parts in good cleaning fluid.
- m. Before reassembling check size of vanes. They must be .246 - .247 in width, and .807 - .808 in length. This is important. Use No. 320 grade emery cloth to reduce oversize vanes.
- n. Check and replace all worn seals.

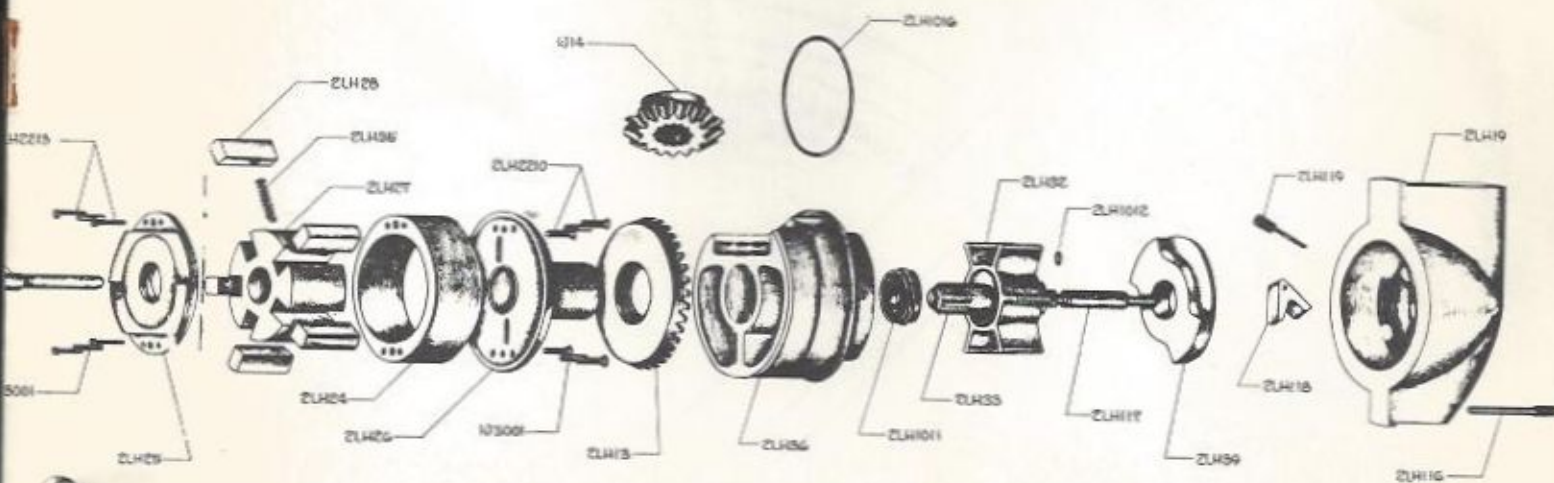
Reassemble all parts in reverse order from the above instructions in conjunction with the following:

- a. Repack Rocker Arm, Part No. 2LH118, with automotive type water pump grease by forcing it through hole in water pump end plate, Part No. 2LH39.
- b. To assemble Rear Clutch Plate to Propeller Shaft, slip Clutch Plate on shaft, lining up pin hole with slot in shaft. Insert spring in Propeller Shaft using Tool No. 105. Compress spring enough to be able to insert clutch pin ahead of spring. Be sure 'O' ring, No. 2LH1014, is assembled on Propeller Shaft.
- c. Place vanes into bronze rotor with the flat side toward the bottom of the slot. The one vane with a spring must be in the slot having a spring locating hole. Place rotor and vanes into Clutch Housing with splined end down toward gear end. Fill Housing with Champion Lower Unit Oil. Reassemble Clutch Housing End Plate to Housing.
- d. Before attaching Anti-cavitation Plate, place lower unit in an upright position in the vise. Fill with Champion Lower Unit Oil through the reservoir having the filler plug.
- e. Using Crank Tool No. 103, revolve propeller shaft clockwise. At the same time insert Control Rod Tool No. 104 into control rod cavity, push down on rod and hold driveshaft. Alternate pushing down on rod and releasing to allow oil to enter all sections of the unit. Keep adding oil until it maintains a constant level approximately 1/2 inch from the top of the lower unit casting.
- f. The maximum amount of power which will be obtained in the Hydro-drive range can be checked by releasing the Control Rod to the point just before clutch plates lock into conventional drive.



Parts List

<u>Part No.</u>	<u>Description</u>	<u>No. Req'd.</u>	<u>Part No.</u>	<u>Description</u>	<u>No. Req'd.</u>
2LH1	Lower Unit Body	1	2LH118	Rocker Arm	1
2LH5	Ball Bearing Lock Ring	1	2LH119	Rocker Arm Hinge Pin	1
2LH12	Propeller Shaft	1	4LH1008	Water Line Seal (used on 4LH990-6)	1
2LH13	Drive Gear	1	2LH1009	Water Line Seal (used on 2LH990-6)	1
1J14	Pinion Gear	1	2LH1010	Driveshaft Seal	1
2LH15	Lower Unit Gasket	1	2LH1011	Water Pump Seal	1
2LH16	Filler Plug Gasket	1	2LH1012	Control Pin 'O' Ring	1
2LH17	Vent Screw Gasket	1	2LH1014	Propeller Shaft 'O' Ring	1
2LH18	Pinion Gear Bearing	1	2LH1015	Propeller Shaft Seal	1
2LH19	Lower Unit Cap	1	2LH1016	Water Pump Seal	1
2LH21	Driveshaft Center Bearing	1	2LH1017	Ball Bearing Lock Ring Seal	1
2LH22	Driveshaft Thrust Bushing	1	2LH1110	Propeller Shaft Ball Bearing	1
2LH23	Clutch Housing Bearing	1	2LH1230	Lower Unit Ball Bearing Snap Ring	1
2LH24	Clutch Housing	1	2LH1231	Propeller Shaft Snap Ring	1
2LH25	Clutch Housing End Plate	1	2K1710	Lower Unit Filler Plug	1
2LH26	Gear Mounting End Plate	1	4K1712	Lower Unit Vent Screw	1
2LH27	Clutch Rotor	1	2LH2210	Gear Mtg. End Plate Screw	4
2LH28	Vanes	5	2LH2213	Clutch Hsg. End Plate Screw	4
2LH30	Driveshaft	1	2LH2412	Lower Unit and Anti-Cavitation Plate Screw	5
2LH31	Driveshaft Collar	1	1J3001	Clutch Housing Dowel Pin	4
2LH32	Water Pump Rotor	1	2LH990-6	Lower Unit Assembly	1
2LH34	Rear Clutch Plate	1	4LH990-6	Lower Unit Assembly	1
2LH35	Clutch Starter Spring	1	2LH990-33	Clutch Housing Assembly (Includes 2LH24, 2LH25, 2LH26, 2LH27, 2LH28, 2LH35, 2LH2210, 2LH2213 and 1J3001)	1
2LH36	Pump Housing Bearing	1			
2LH37	Control Valve	1			
2LH39	Water Pump End Plate	1			
2LH41	Anti-Cavitation Plate	1			
2LH109	Friction Spring Collar	1			
2LH111	Friction Collar	1			
2LH112	Friction Spring	3			
2LH113	Control Valve Return Spring	1			
2LH114	Rear Clutch Plate Pin	1			
2LH116	Lower Unit Cap Locating Pin	1			
2LH117	Control Pin	1			



HYDRO-DRIVE ADJUSTMENT INSTRUCTIONS

The Hydro-Drive Control Bracket casting is set in the proper position at the factory so that when the Hydro-Drive Control Lever is moved from 'Neutral' to the 'Conventional Drive' position, the step between the two positions will allow the hydraulic pressure to build up before going into 'Conventional Drive'.

It has been found that an additional notch, as shown on the diagram, will keep the lever in the position at which the maximum amount of driving power can be obtained in the Hydro-Drive range. This notch is being incorporated on all motors now being manufactured and should be added to the motors built prior to this change. A small round file is the only tool needed.

To check the setting of the Control Bracket, set the Control Lever in the notch which has been added, loosen the Control Bracket Anchor Screw and move the Control Bracket until a maximum amount of drag is felt when the Propeller is turned clockwise by hand. This indicates that a pumping action is taking place but the mechanical lock is not engaged. Lock the Control Bracket in place by tightening Anchor Screw.

