

**Remember** to install the boat drain plug before putting the boat into the water.

### ALL UNITS

5- Close all water drains. Check and replace any defective water hoses. Check to be sure the connections do not leak. Replace any spring-type hose clamps, if they have lost their tension, or if they have distorted the water hose, with band-type clamps.

6- The engine can be run with the lower unit in water to flush it. If this is not practical, a flush attachment may be used. This unit is attached to the water pick-up in the lower unit. Attach a garden hose to the water, allow the water to flow into the engine for awhile, and then stop the engine.



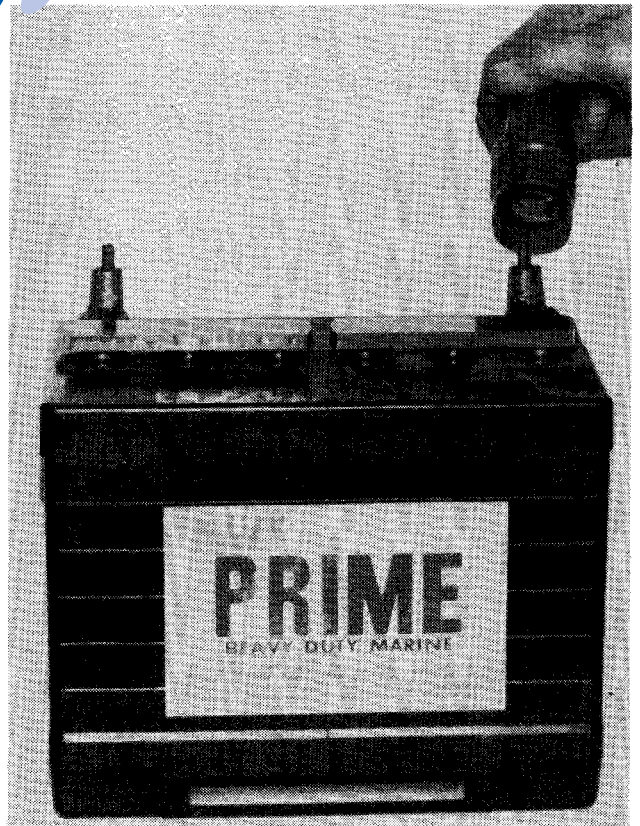
Flushing with a flush attachment connected to the lower unit. The powerhead should **NEVER** be run above idle speed with this type device attached.

**CAUTION:** Water must circulate through the lower unit to the engine any time the engine is run to prevent damage to the water pump in the lower unit. Just five seconds without water will damage the water pump.

Check the exhaust outlet for water discharge. Check for leaks. Check operation of the thermostat.

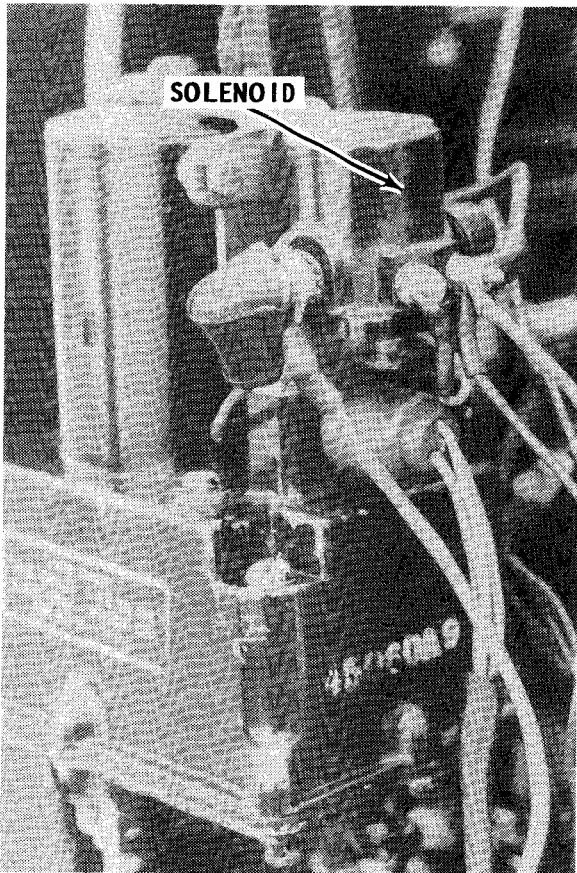
7- Check the electrolyte level in the battery and the voltage for a full charge. Clean and inspect the battery terminals and cable connections. **TAKE TIME** to check the polarity, if a new battery is being installed. Cover the cable connections with grease or special protective compound as a prevention to corrosion formation. Check all electrical wiring and grounding circuits.

8- Check all electrical parts on the engine and other portions of the hull to be sure they are not of a type that could cause ignition of an explosive atmosphere. Rubber boots help keep spark insulators clean and reduce the possibility of arcing. Starters, generators, distributors, alternators, electrical fuel pumps, voltage regulators, and

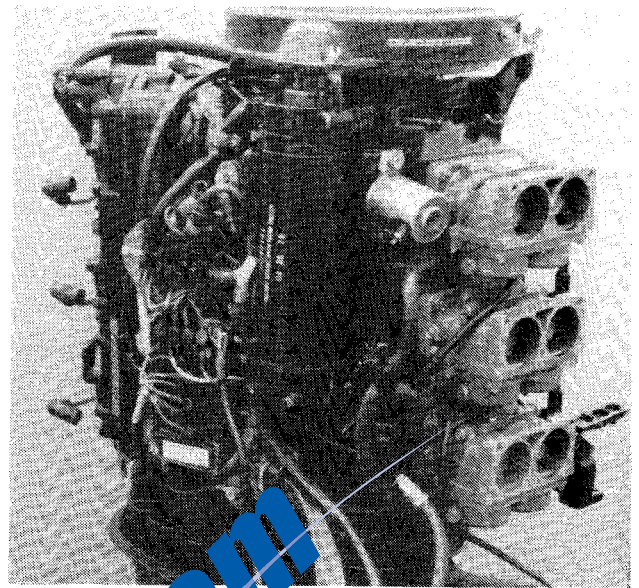


An inexpensive two-part tool will do an excellent job of cleaning the battery terminals and the inside of the cable connectors.





Typical early model power trim/tilt pump installation with one solenoid.

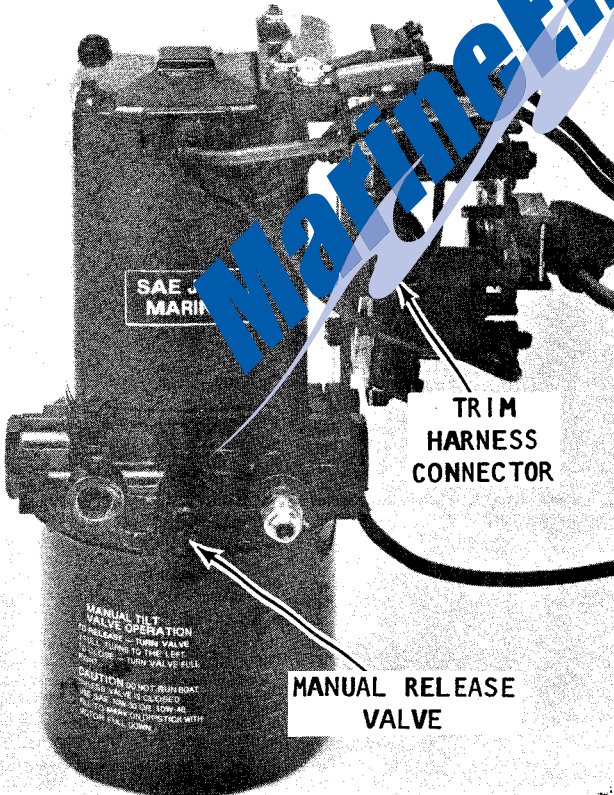


Remember to check even the most obvious electrical connections at the beginning of each season.

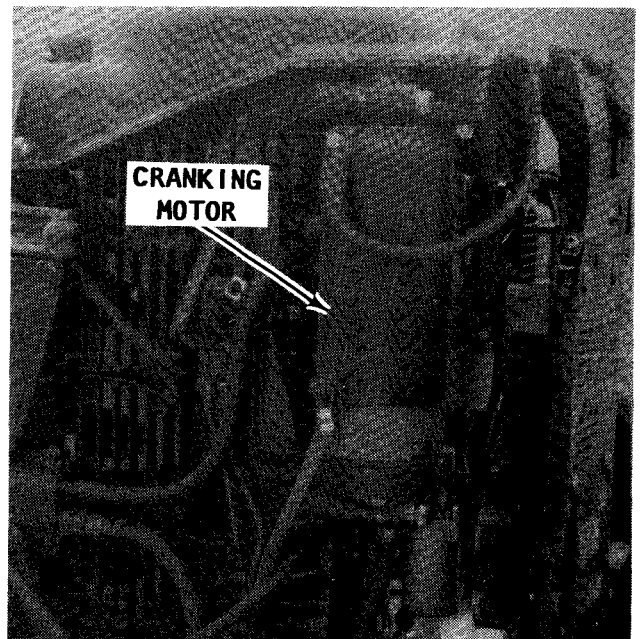
high-tension wiring harnesses should be of a marine type that cannot cause an explosive mixture to ignite.

**THE FINAL WORD**

Before putting the boat in the water, **TAKE TIME** to **VERIFY** the drain plugs are installed. Countless number of boating excursions have had a very sad beginning because the boat was eased into the water only to have the boat begin to fill with the "wet stuff" from the river, lake, reservoir, etc.



Typical late model trim/tilt up and down solenoids installed on the pump motor.



Typical cranking motor installation on the powerhead of outboard units covered in this manual.



the tank should be left with a small amount of slack to enable the tank to expand slightly when it is under pressure.

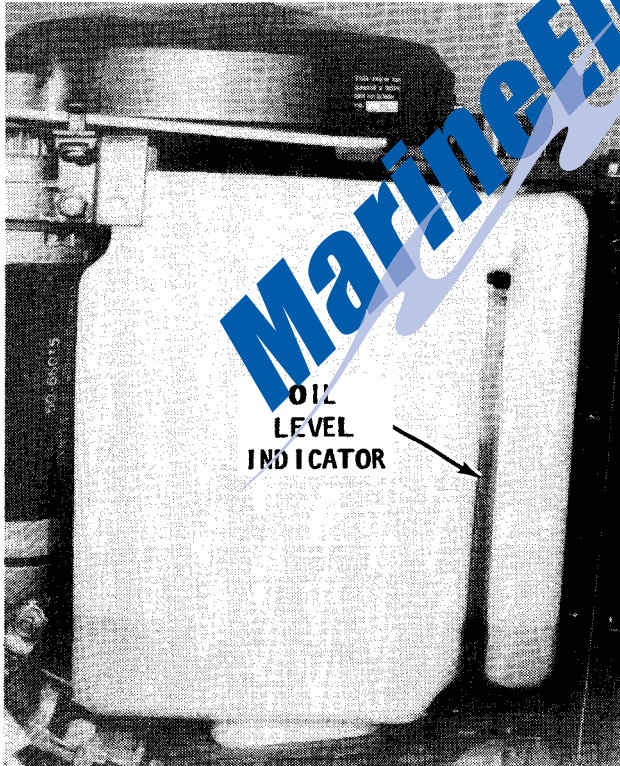
Another factor to be considered when placing the remote tank in the boat, is easy access for unlatching the quick disconnect fitting and removal of the tank for filling. However, it is not necessary to remove the tank for filling.

### Oil Reservoir

The oil reservoir is much smaller than the remote tank and is attached to the powerhead under the cowling. The reservoir will only hold enough oil to mix with the fuel for about 30 minutes of powerhead operation at WOT, after the remote tank is drained. The prudent boat owner will consider the reservoir capacity as an emergency ration and will not rely on using it after the remote tank is empty.

### Low Oil Sensor

The low oil sensor is installed in the top of the oil reservoir. This sensor operates on a magnetic float principle. As the oil level



Since 1987, 75hp and 90hp 3-cylinder and 100hp and 115hp 4-cylinder powerheads are equipped with a single large oil tank mounted on the powerhead. The tank is provided with an oil level indicator which is visible through a window in the cowling.

drops to the dangerous level, a circuit is closed and the warning horn will sound.

### Oil Pump

The oil pump is mounted on the powerhead and is driven by a gear and shaft arrangement off the crankshaft. Therefore, as soon as the crankshaft begins to rotate, even during the cranking process, the pump also rotates and begins to deliver oil to the fuel/oil mixer. The pump will meter oil for a mixture with the fuel of approximately 50:1 at wide open throttle and increases the ratio to 100:1 at idle speed.

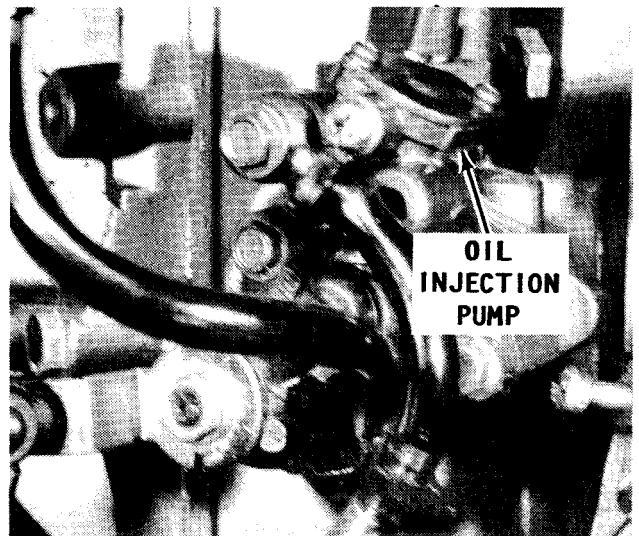
### Motion Sensor

The motion sensor is considered a part of the oil pump and pump drive system. If the pump drive system fails to operate for any reason, the sensor will signal the warning module and the warning horn will sound.

### Check Valves

Three check valves are used in the system. One 2 psi valve is connected to a Tee fitting in the oil line from the remote tank to the oil reservoir. The third side of the Tee fitting is vented to atmosphere. This check valve prevents pressure in the tanks and the lines from increasing above 2 psi.

The second check valve is also rated at 2 psi and is installed in the oil line just before it enters the fuel/oil mixer. This



The oil injection pump is driven off the crankshaft and supplies oil to the fuel pump. The oil pump is gravity fed from the oil tank mounted high on the powerhead.

## ASSEMBLING CAM SHIFT TYPE II

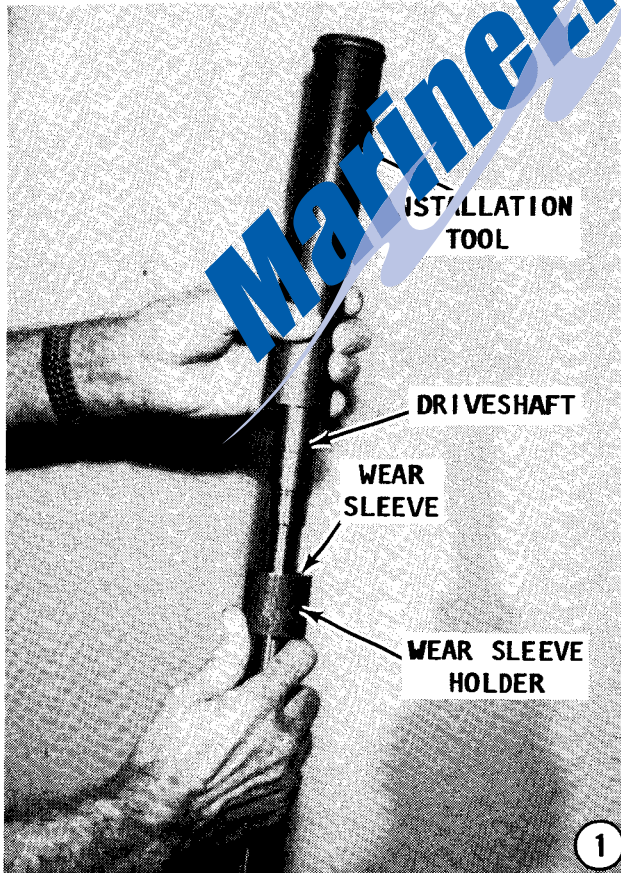
The following procedures outline complete detailed instructions to install virtually all parts of the lower unit. If a particular part was found to be in satisfactory condition and was not removed, simply skip the steps involved and proceed with the required tasks to return the lower unit to efficient operation.

### CRITICAL WORDS

Before beginning the installation work, count the number of teeth on the pinion gear and on the reverse gear. Not necessary to count the forward gear. Knowing the number of teeth on the pinion and reverse gear will permit obtaining the correct tool setup for the shimming procedure.

### Driveshaft and Wear Sleeve Installation

1- If the wear sleeve was removed in Step 12 of disassembling, obtain Wear Sleeve Installation Tool C-91-14310A1. Insert the new wear sleeve into the sleeve holder. Slide the bottom end of the driveshaft into the sleeve and holder. Slide the long collar portion of the installation tool over the top end of the driveshaft.



Move the assembled tool and driveshaft to an arbor press. Position the base of the sleeve holder onto a suitable support which will allow the bottom end of the driveshaft to pass through. Press on the top surface of the long collar until the bottom surface of the collar seats against the top surface of the sleeve holder.

Install a new sealing ring around the driveshaft, and then apply a light coating of Loctite Grade "A" around the ring.

Set the driveshaft aside for later installation.

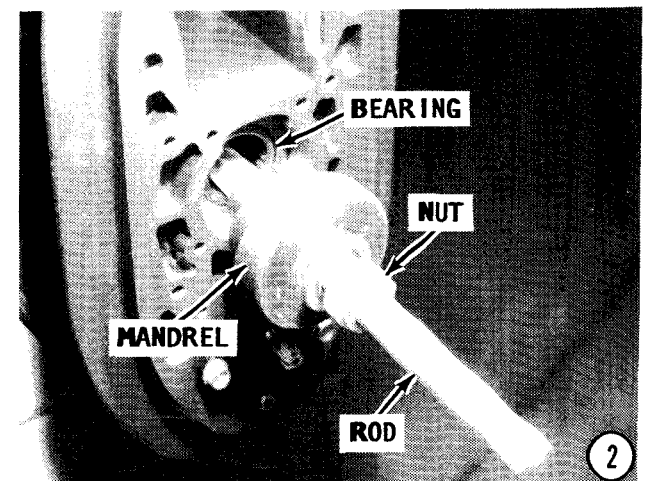
### Upper Driveshaft Bearing Installation

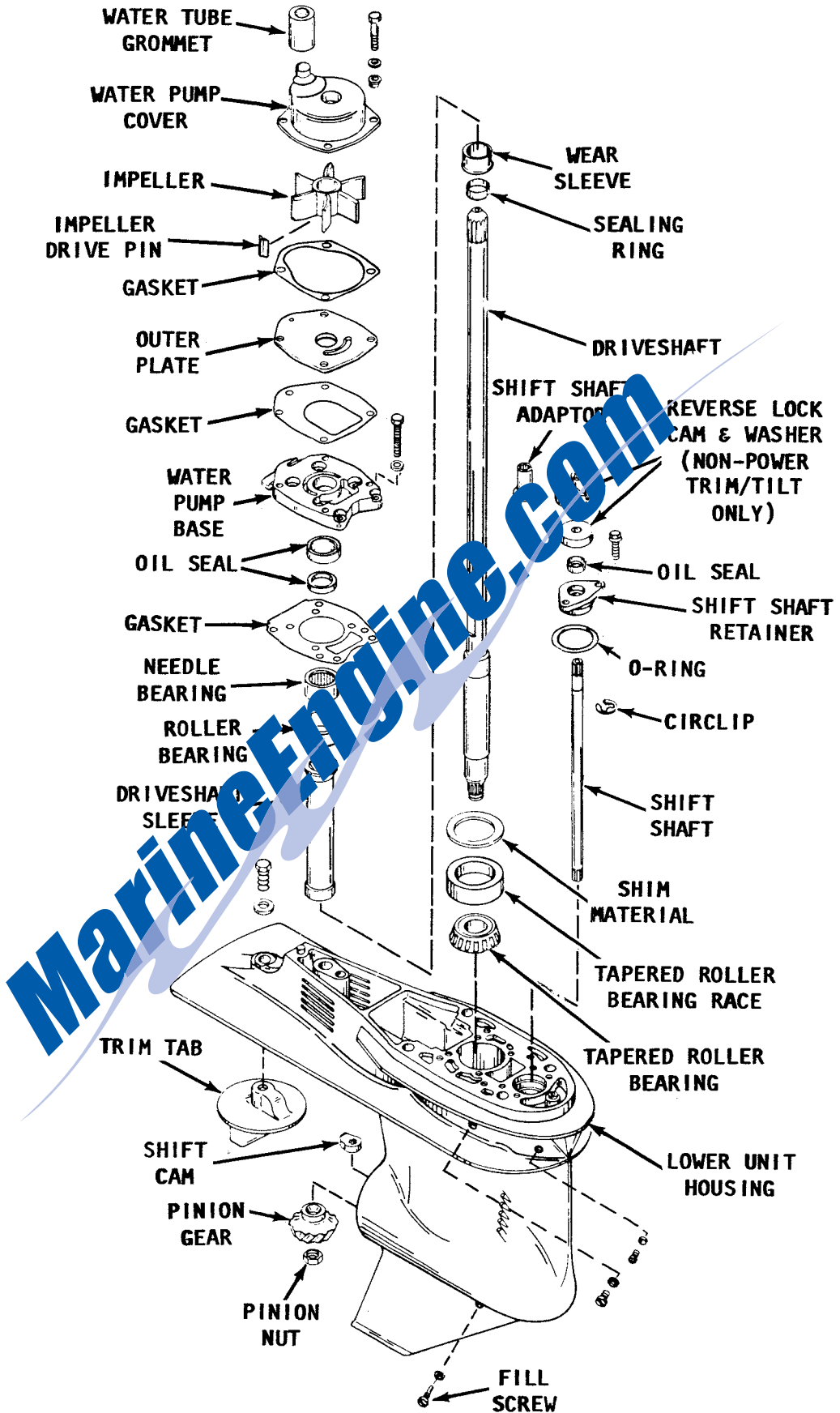
2- Apply a light coating of Quicksilver Needle Bearing Lubricant to the inner surface of the bearing sleeve.

Identify the end of the new roller bearing with the embossed numbers. Identify the end of the bearing sleeve with a slight taper. Place the tapered end down on the arbor press support plate. Insert the new roller bearing down into the larger end of the bearing sleeve with the numbered end facing UPWARD. Obtain a suitable mandrel and press the bearing in until it is flush with the sleeve.

If the oil sleeve was removed from the driveshaft bore in Step 17 of disassembly, install the sleeve into the bore with the tab on the upper portion of the sleeve facing AFT. This sleeve **MUST** be in place **BEFORE** the upper driveshaft bearing is installed.

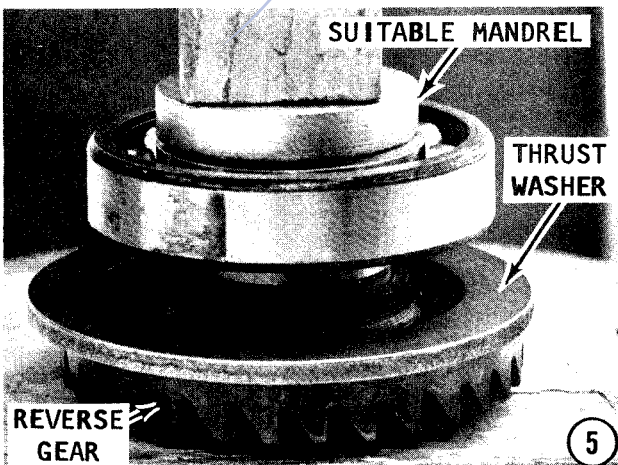
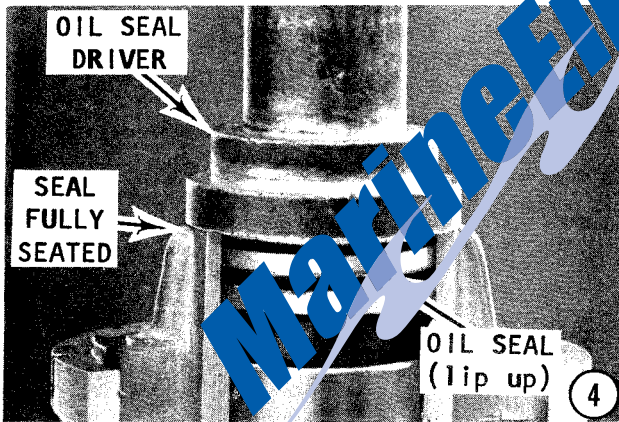
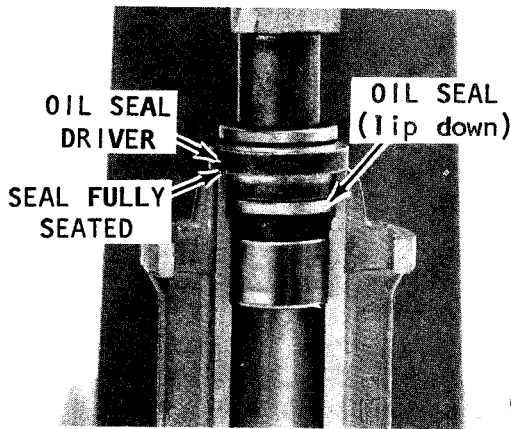
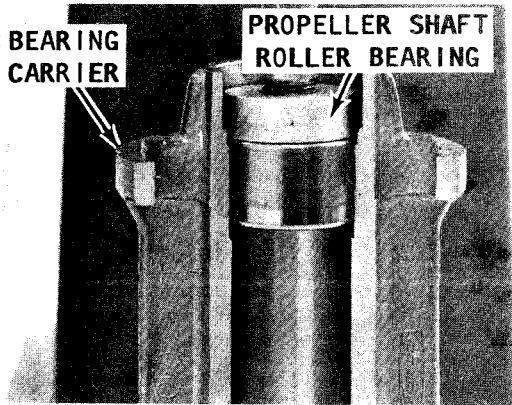
To install the upper driveshaft bearing, obtain the following special tools: Two mandrels from Bearing Installation Tool Kit C-91-14309A1, a long threaded rod C-91-31229, and a special nut C-11-24156.





Exploded drawing of the driveshaft and water pump of a Cam-Shift Type II lower unit. Major parts are identified.





3- Coat the outer diameter of the propeller shaft oil seals with Blue Loctite. Obtain Oil Seal Driver C-91-31108. Place one seal on the longer shoulder side of the driver tool with the lip of the seal **AWAY** from the shoulder. Press the seal into the bearing carrier until the seal driver bottoms against the bearing carrier. Place the second seal on the short shoulder side of the seal driver with the lip of the seal **TOWARD** the shoulder.

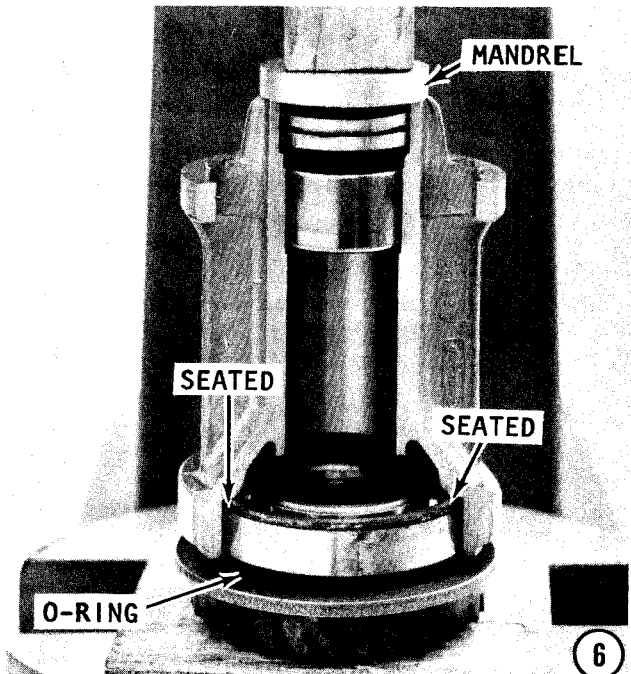
4- Press the seal into the bearing carrier until the seal driver bottoms against the bearing carrier. Clean excess Loctite from the seals.

5- Position the reverse gear on a press with the gear teeth facing **DOWN**. Place the thrust washer over the gear, beveled side **DOWN**. Place the ball bearing over the gear with the numbered side **UP**. Now, press the ball bearing onto the gear with a suitable mandrel.

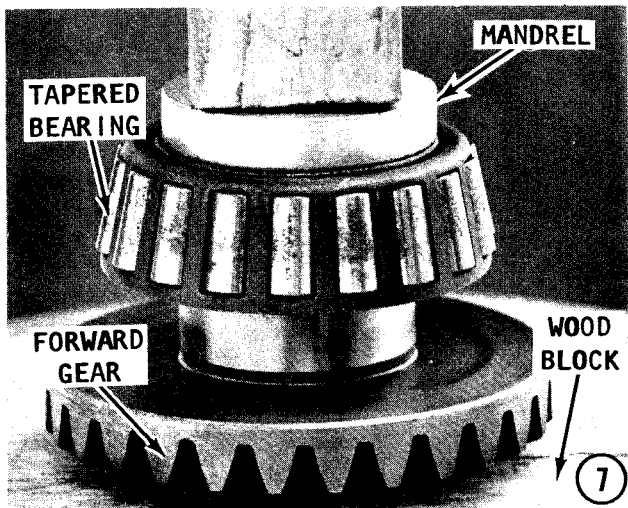
6- Place the bearing carrier over the gear and bearing assembly. Press the bearing carrier onto the bearing. Place a **NEW** O-ring over the bearing carrier and position it between the bearing carrier and the thrust washer. Coat the O-ring and oil seals with Multipurpose Lubricant, or equivalent. Set the unit aside for installation later.

**Forward Gear and Bearing Assembling**

7- Place the forward gear on a press with the gear teeth **DOWN**. Position the forward gear tapered bearing over the gear.





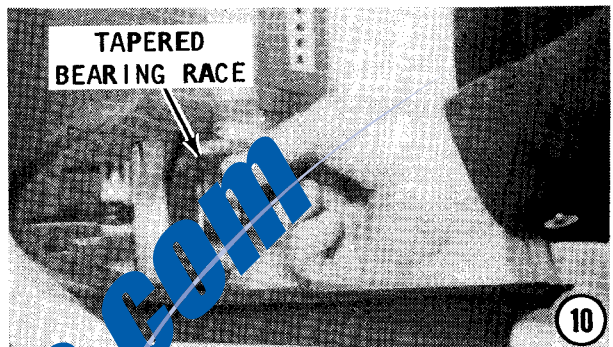
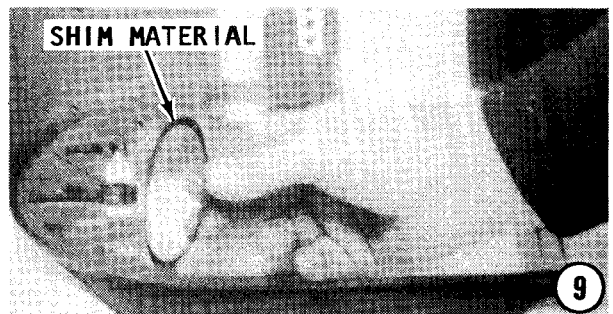
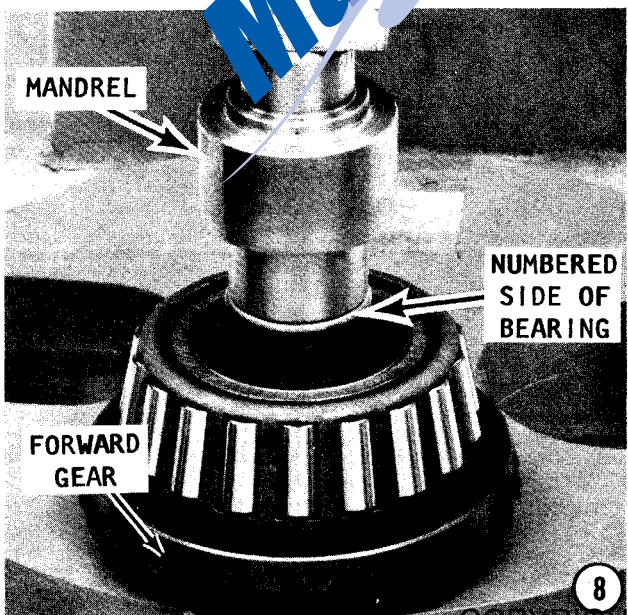


Now, press the bearing onto the gear with a suitable mandrel until the bearing is firmly seated. Check for clearance (gap) between the inner bearing race and the shoulder of the gear. There should be **NO** clearance.

8- Position the roller bearing over the center bore of the forward gear with the numbered side of the bearing facing **UP**. Use a suitable mandrel and press the roller bearing into the gear until the bearing is seated against the shoulder.

**CRITICAL WORDS**

The bearing carrier is used as a support while installing the forward gear and bearing cup in the next step. Therefore, the bearing carrier must have been checked to include at least the propeller shaft roller bearing as outlined in Step 6.



**Forward Bearing Race Installation**

9- Place the same amount of shim material saved during disassembly into the lower unit. If the shim material was lost, or if a new lower unit is being used, begin with approximately 0.010" (0.25mm) material. Coat the forward bearing race bore with Quicksilver Formula 50-D lubricant, or equivalent.

10- Position the tapered bearing race squarely over the bearing bore in the front portion of the lower unit. Obtain Bearing

