

REMOVAL OF OLD REVERSING GEAR:

RECOMMENDED TOOLS:

18" Pipe Wrench (or slightly larger.) 1 1/8" socket and breaker bar. (3) 3/8" x 2" Fine Thread Bolts - Threaded all the way to the head.

STEP 1: With the square reversing gear cover removed, loosen the 3/4" hex adjusting nut on the reversing band pin (as if you were adjusting it) until the ramp plate which slides back and forth in the opposite end of this pin can be removed. Because you have to loosen this nut almost all of the way to the end of the threads, I find it easier to remove the restraining spring clip from around the adjusting nut so I can turn the nut with my fingers once its loose.

Be very careful to hold the head of the 5/16" bolt as you're removing the nut because this spring clip can be broken fairly easily. I find many clips with one of the two fingers broken off. While they seem to work with one of their "legs" broken off, you'll want to leave your engine as unblemished as you can.

STEP 2: Remove the output coupling. This step is much easier if you hold the coupling itself with an 18" pipe wrench (or larger) and work the nut with a breaker bar and 1 1/8" socket. These nuts are usually quite tight. Be sure to fold back the tabs of the restraining washer before loosening the nut

After the coupling nut is removed, turn the three 3/8" x 2" fine threaded bolts (listed in "specific tools" above) into the bolt holes in the output coupling until the bolts press against the oil seal flange directly in front of the coupling. Tighten the three bolts evenly as you push the coupling off of its shaft. If you can't find fully- threaded bolts, the ones normally used to join the prop and engine couplings together can be used, but they are not quite long enough if the output coupling hangs on to the shaft to the bitter end.

NOTE: The reversing gear can be removed without removing the propeller drive coupling. I find it a little bit more of a hassle to reassemble with the coupling left installed, but it may save you some time, particularly if you don't feel the need to check the big ball thrust bearing which supports the coupling. The delicate part of reassembly is keeping the gear cluster on the crank shaft splines while getting the two fingers of the shifting yolk over the throw out bearing - while trying to get the tapered pin on the aft housing to line up with the block - all at once.

STEP 3: Remove (14) 5/16" bolts securing the reversing gear housing to the block and oil pan, and the (6) bolts in the round rear bearing and oil seal housings. If the accessory drive is in place at this point, remove the (2) 3/8" bolts securing it to the aft housing. The bearing and oil seal housings pry off quite easily, but the aft housing may need a bit of encouragement. The aft housing is pined to the block with two tapered pins, with their thin ends facing the flywheel. One pin is located between bolts 2 and 3, and the other is directly below number 6, counting from the manifold side. Pry the housing rearward by

tapping a thin screw driver between it and the block. The reversing gear housing must slide aft about 1/4" before it will clear the pins and can be lifted off. If necessary, try to tap out one, or both, of the tapered pins.

STEP 4: As you lift the aft housing upward, you'll have to reach in through the square opening and unhook the connecting link (called the "brace") between the shifting yolk and the reversing band pin. This link hooks over the same end of the reversing band pin from which you removed the sliding ramp plate in Step 1. When the housing is free, you can slide the reversing gear cluster out quite easily; and with it, the reversing band.

NOTE: Be careful when you remove the reversing gear cluster. It will contain quite a bit of oil within its housing which will run out as soon as you hold it vertically with the forward end (toward the engine) facing down.

INSTALLING NEW REVERSING GEAR:

Step 1: Be certain that the small pilot bearing is installed in the recessed area in the center of the aft end of the crankshaft. Then, slip the reversing band over the round reversing gear case and slide both (together) over the end of the crank shaft. When installed correctly, the reversing band will be resting on both sides of the upper ledge of the oil pan and the reversing gear case will be cradled in the center of the band. The adjusting bolt assembly will be in place as discussed above.

Step 2: If the oil pan bolts (six on each side) were tightened previously, loosen them at this time. Then tap a small screw driver or wooden wedge careful under each corner of the block, opposite the flywheel end, and just in front of where the reversing gear housing will meet the block on the oil pan. The best places to pry are under the oil pressure regulating valve on the fuel pump side of the block, and under the accessory drive mounting opening on the other side. The purpose of these wedges is to relieve the weight of the block on the oil pan just enough so that the reversing gear housing can be slid into place against the back of the block without gouging into the oil pan gasket. The block seldom needs to be raised to the point of actual separation from the oil pan. The wedges should be installed between the block and the outer ledge of the oil pan so as not to damage the oil pan gasket; and from the front, so as not to interfere with installation of the reversing gear housing.

Step 3: Position the throw-out bearing on the operating cone (code number 35) so that its two small round pivot arms are extending out to either side. Then, with the reversing gear housing gasket in place, carefully lower the housing itself from above making sure that the concave lower feet of the yoke settle down over the pivot arms of the throw-out bearing, and that the brace is held up and laying loosely over the reversing band. Work patiently until the housing is in place on the oil pan and can easily be slid forward against the block. With the reversing gear housing in place, install the seven bolts into the block; and, after tapping the tapered pins back in place, snug the bolts down and remove the wedges from under the block.

Step 4: Slide the flat locking bar (code number 29) into the roller end of the adjusting bolt of the reversing band as shown in the manual and then work the end of the brace down over the adjusting bolt - between the ear of the reversing band and the locking bar. Be certain that the 5\16" hole in the front part of the brace slips over the small pin pressed into the right ear of the reversing band, and that the pin itself is secure. If the pin becomes loose, it will eventually work itself out and then the brace will no longer be held in place over the adjusting bolt, and the reversing mechanism will not function.

IMPORTANT NOTE: No part of the overhaul process requires more fineness and patience than that exercised during installation of the reversing gear. Most importantly, the assembly should not require the use of much force. Therefore, if you find yourself reaching for a "bigger hammer" it probably means that something is merely misaligned.

Step 5: Slide the two round rear flanges in place with a gasket between and in front of the flanges. Install all six bolts. Use flat washers (brass or copper are best) on the lower three bolts to prevent oil leaks. Lock washers will work on the upper three bolts.

Step 6: Slip the propeller shaft coupling over the rear shaft being sure to line up the key-way in its slots. Gently tap the coupling over the shaft until the locking flat washer can be installed and the nut can be started on the threads. Then use the nut to push the coupling fully into place. Also, check inside the housing as the coupling is nearing its final resting place to make sure that it seats securely against the special flat washer which goes between the raised ring machined on the shaft itself and the coupling. I can find no reference to this washer in the Westerbeke Manual, but the coupling will not seat correctly without it. An 18" pipe wrench (or larger) and a 1-1\8" socket and bar are very convenient for holding the coupling and securely tightening the coupling nut.

Step 7: Go back and tighten all housing bolts at this time. There are no torque values established for these bolts.