

Gearcase Bushing Repairs

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The majority of outboards I restore are 1950's & 60's Johnson and Evinrude 5.5hp to 35hp motors, with a few Merc's and Gale products as well. More and more often they are arriving with damaged bushings in the gearcase. Primarily the upper bushing for the driveshaft, though often both the upper and lower. Even when fully filled, the oil level is about 2.5" below the upper bushing. Under normal conditions the spinning driveshaft and gears are depended upon to fling oil up to that bushing. If the oil level is allowed to run low the upper bushing is the first to run dry and then wear out and usually also damaging the driveshaft in the area of the bushing at the same time.

The upper bushing is relatively easy to repair (see picture #1) because of the machined surface for the oil seal which is concentric with bushing. So even if the bushing is damaged you can find the original center spot by taking a reading off of the machined surface for the oil seal. Then bore out a larger hole and press in a new bushing. Fairly straight forward. One additional wrinkle is that the new bushings come without oiling holes and grooves, these have to be cut in manually.

The lower bushing is not so simple because there is nothing concentric to the original hole and since the bushing is worn you can't line up with that surface. I thought about it for a while and this is what I came up with. I would make a jig out of aluminum that is concentric with the original hole. Since the original rear bushing is aluminum with a bronze core I can use it as is. The original front bushing is solid bronze so I made a replica out of aluminum on my lathe. (see picture #2) I cut out a plate of 1/4" aluminum and on the milling machine drilled out bolt holes to match the pattern on the gearcase. Then I machines out two holes to fit over the bushings. (see picture #3) Then I clamped everything together (see picture #4)and welded the bushings to the plate. (see picture #5)



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2.

3.



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The next step is to remove the plate from the gearcase. I then took a damaged driveshaft and cut it down so it was just longer than the height of the gearcase. In my drawer of bushings I found two that fit together over the shaft equal to the size of the pinion gear, I had to take a couple of thousandths off of the OD of the outside bushing to make it fit. I then inserted the driveshaft into the gearcase and slid the bushings over the shaft to take the place of the pinion gear. (see picture #6) This had to be a gearcase where both bushings were in good condition. Of the 5 gearcases I have, only one had two good bushings. This holds the driveshaft in the proper position centered on the holes for both bushings.



6.



7.

Now I can clamp the gearcase to the milling machine table & center it on the protruding shaft. (see picture #7) . Then lower the table, remove the shaft and bolt the plate with the bushings back on the gearcase. I put a milling bit in the machine cut a hole in the plate which will be concentric with the bushing hole. (see picture #8) Then on the lathe I made a piece about 1" in diameter with a step on it the size of the hole and welded it in place. (see picture #9)



8.



9.

Picture #10 is a top side view of the plate with the centering button in place and the top half of the bushings milled off. The top half is not needed, the bottom half is the part that is used to keep the plate in alignment. Picture #11 is a side view of the plate. Picture #12 shows the plate clamped in place on a gearcase. So now when a gearcase comes in with a bad lower bushing. I can bolt the plate to the gearcase, center it under the mill, remove the plate and bore out the old damaged bushing.



10.



11.

I ended up making two jigs like this and those two fit the majority of the motors that come my way. The 25-30-35hp motors from the 50's have a steel race pressed into place for the pinion gear, which can be pulled and replaced if damaged, so no need to do build a jig for those motors. The first one I made fits the 1952-57 10hp, the 1953-56 15hp and the 1957-84 18-20-25hp motors. The second one fits 1954-79 5.5 and 6hp, 1954-58 7.5hp, and 1958-63 10hp motors. I believe the 9.5hp used the same casting for the gearcase as the 58-63 10hp motors. I am not 100% sure at this time and will have to acquire one to check.



12.