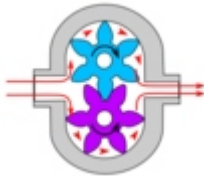


# Rebuilding the N-series Oil Pump

by TOH



## What are we trying to accomplish?



Before we start lets quickly review what our objective is. Shown above is a picture of an N-series oil pump. The gear teeth pull the oil around the periphery of the housing as they rotate. There are two critical clearances in this mechanism. The first is the clearance between the tips of the teeth and the pump housing. Tip clearance should be on the order of .001/.002" for optimal performance and under no circumstances should the teeth scrape on the housing. The second is the clearance between the teeth of the gears where they mesh – again just a couple thousandths of an inch and absolutely no interference. To obtain this precise geometry the center spacing of the gears must be exactly right. Too far apart or offset to one side and they scrape the housing - too close together and they bind where they mesh. We are going to replace the old gears with new ones to bring them back to factory specifications and restore our clearances. We are also going to replace the brass bushing in the housing where the camshaft gear shaft runs as it too wears over time. This bushing comes slightly undersize on the ID and must be reamed to the proper size – nominally 9/16". The reaming assures a good snug fit to the shaft put it is equally imperative that the reamed hole be accurately located with respect to the bore in the housing. If the reamed hole is off center by more than a few thousandths the clearances in the pump will be off and the gears may bind or scrape the housing.

## Step 1 – Remove the gears

We first remove the gears. The idler gear will simply fall out when we invert the pump. The driven gear is a press fit on the shaft and to remove it we clamp the pump in a sturdy vise and use a suitable drift to drive the shaft out of the gear. When the gears are removed this is what we have left.



## Step 2 – Remove the old bushing

The bushing is a light press fit in the housing and has an OD of .625. I fabricated a stepped drift with appropriate diameters to facilitate removal and installation of the bushing. The old bushing is simply driven out of the housing with the drift



### Step 3 – Centering the bushing bore

Once the old bushing has been removed we use the bore in the housing to find the exact center of the new bushing. I used an indicator chucked in the spindle of the milling machine that I will use to ream the bushing. If you are using one of the oil pump rebuild jigs it would be bolted to the housing and the alignment dowel that comes with the jig would be used to center the jig over the bore.



#### Step 4 – Install new bushing in housing

Once the pump is centered on the machine table the new bushing is gently driven in using the same stepped drift I used to remove the old bushing taking care not to disturb the position of the pump housing on the machine table. If using a rebuild jig the bushing would be driven in from the backside of housing.



## Step 5 – Ream the bushing

Using a 9/16” reamer chucked in the spindle of the mill the bushing is reamed to size. The reamed hole is precisely centered inside the OD of the bushing ensuring it is properly located with respect to the idler gear and the pump housing. If hand reaming using a jig the reamer would be inserted through the guide tube on the jig. After reaming all that remains is to clean the housing to remove any swarf left from the machining operation and install the new gears.

