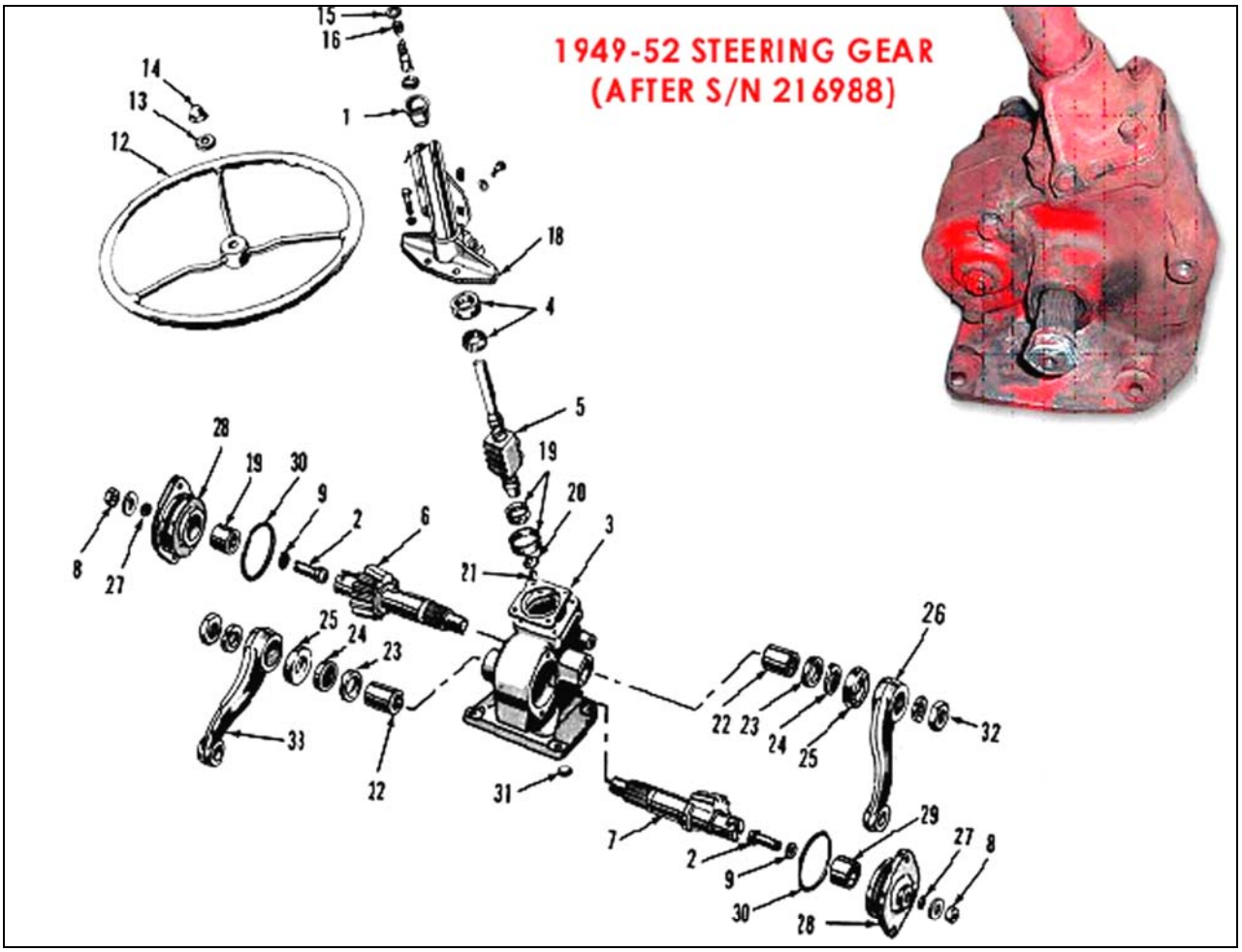
Steering Box - Late 8N Steering System Rebuild

By Mark Williams (aka Mark N Biloxi)

If you notice excessive pressure is required to turn your tractor, the problem could be several issues. One common problem with the N series steering systems is the thrust bearings lack of sufficient lubrication and most particularly the upper thrust bearings. These bearings wear out quickly without lubrication. Throughout the years Ford revised the way to provide lubrication to the thrust bearings.

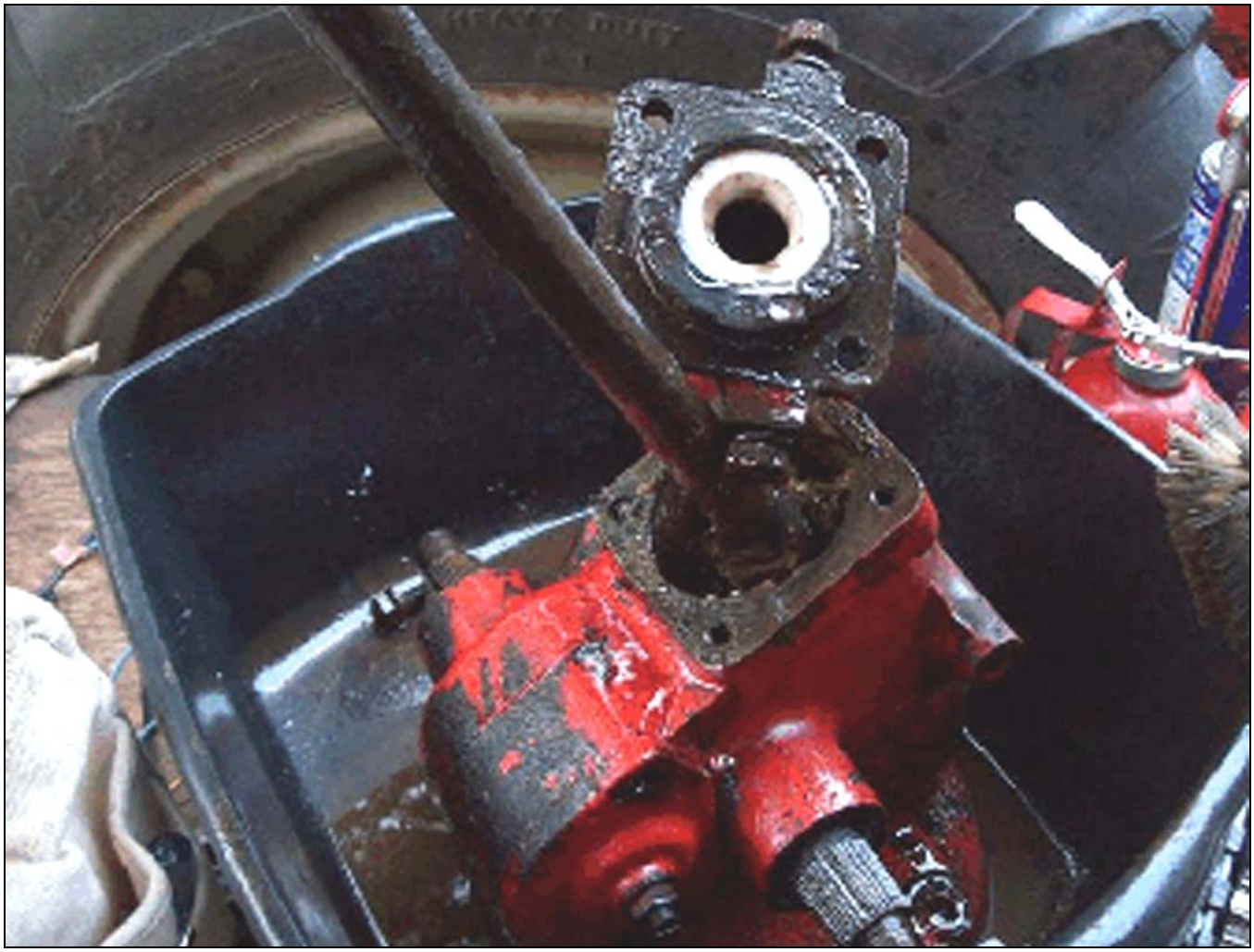
I will be addressing the late model 8N steering box (after serial number 216988). This steering box gets its lubrication thru the bolt hole at the base of the shaft tube on the right hand side. This bolt also attaches thru and secures the dash panel.



Keep a print out of "Servicing the Steering Assembly from the FO-4 manual along with this exploded view/diagram of the steering assembly on your workbench for reference.

Step 1 - I removed the steering box from the tractor. This allows access to the Welch plug at the base of the unit.

Step 2 - With the unit on my workbench and sitting in a small rubber tub, I removed the old sectors and shaft/nut tube assembly. Disassemble each sector by removing the 2 bolts that secure them to the steering box and carefully drive them out using a rubber mallet or wooden block and hammer. Remove the spring (8N 3520, steering column bearing spring) and spring seat (8N 3518, steering column bearing spring seat) from the top of the tube. Pry out the steering column bearing (8N 3517, steering column bearing assembly) and discard it. Remove the tube by backing out the 4 bolts at the flange base. Notice the collection of steel shims between the tube and steering base. This is the method by which the correct pressure is exerted from the shaft to the bearings. Count the shims, clean them and set them aside (you will need them if you don't purchase replacements). I used diesel fuel and a small paint brush to assist in removing the grease, oil and other debris from within the steering box and from the sector arms and shaft/nut assembly.



Step 3 - I then pressure washed all parts, but a good hosing off will do fine. You want the unit as clean as possible. Handle the unit with care and be sure to remove any grit and oil. The last thing you want is to drop the box and crack or break something.

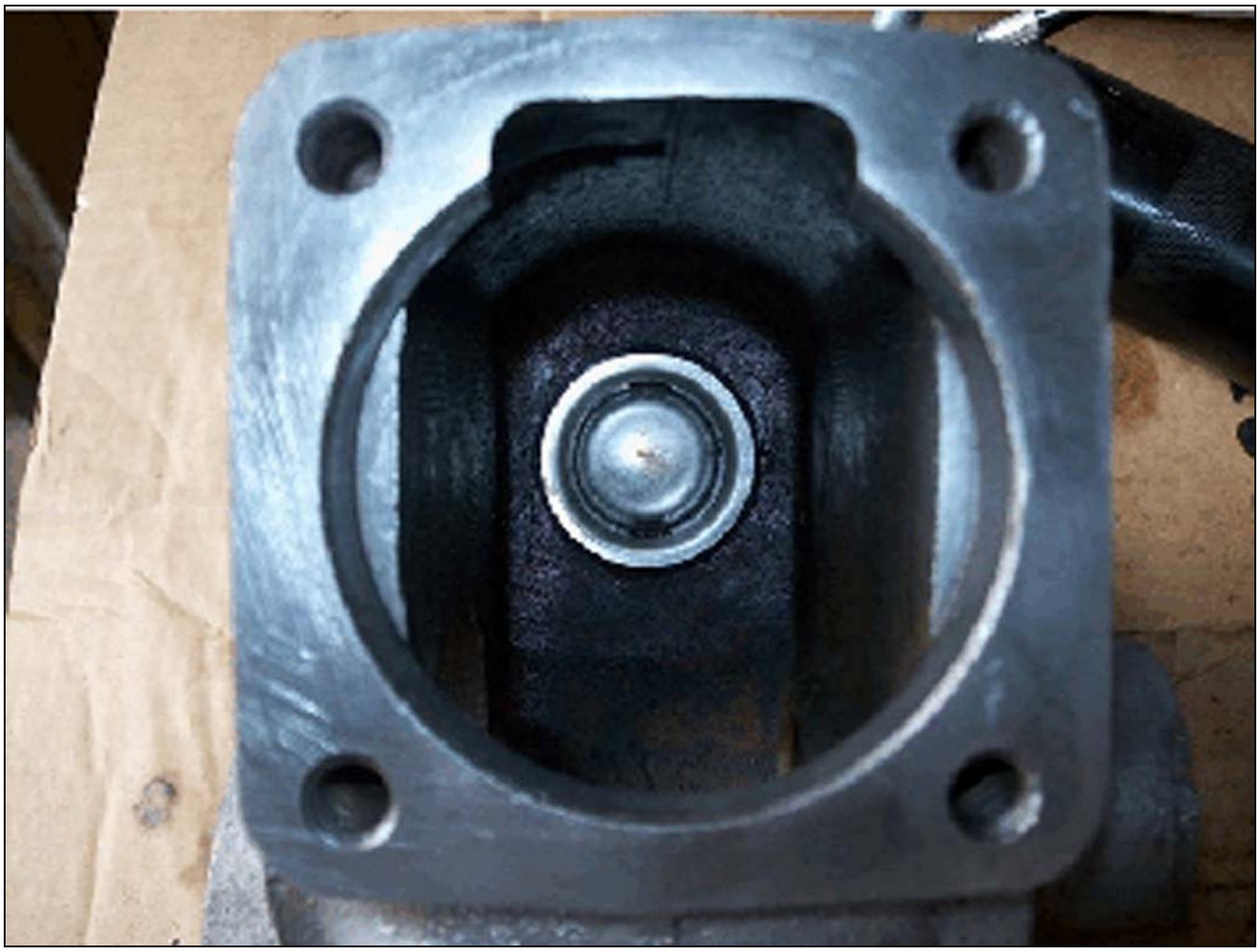
Step 4 - With the steering box, sectors, tube, and shaft/nut assembly clean, remove the worthless nylon thrust bearings from the inside of the steering box base and base of the tube assembly (as my unit had, the white disc shown above). Someone thought it was a good idea to produce a nylon combination cup/bearing as a replacement to the steel bearing cup and thrust bearings. Don't use these nylon replacements as they are truly worthless. The original unit came with a metal bearing cup and a set of thrust bearings. This may still be in your unit. In order to access the bearing cup or nylon bearing, flip the unit upside down and look for the bottom of the welsh plug (a 1-1/4" dia. thin steel disc driven into place from the topside).

You want to drive this disc out from the bottom toward the top of the unit. Be careful to apply equal pressure to all sides of the plug in order to keep from twisting the bearing cup in its seat. As you drive the plug out drive the bearing cup out next. Take your time. Remove the same nylon bearings or the steel bearing cup and thrust bearings from the base of the steering tube. Place the tube upright with the flanges sitting on top of your bench vise and allowing the bearing cup to fall between the jaws of the vise. I used a long small dia. steel rod as a drift, but a pipe would work also. Drive the cup out from the top of the tube squarely. Carefully review your progress from beneath as you go. Also, remove the old sector seals from each side of the steering box if they haven't already been removed.

Step 5 – I sand blasted just the tube assembly and steering box and then lightly filed the top face of the steering box that mates with the bottom of the tube assembly for a tight fit. Do not remove too much material as the shims that fit between these pieces are set to allow correct pressure. You can and should, purchase new shims as a kit. (8N 3595 Kit, shim kit). Using a small wire wheel fixed in a drill, dress the inside faces of the steering box openings where the sector "O" rings seat. This is important in creating an oil tight seal.

Step 6 - Inspect the bearing cup seats in both the steering box and the bottom of the tube assembly. No rust or burrs should be present. Remove them with a small wire wheel or small fine grind rock fixed in a drill. Now blow out the box and tube assembly good with compressed air to remove any steel filings.

Step 7 - Place a dab of silicone sealant on your index finger, and apply it to the inside of the welsh plug seat. Drive the welsh plug (74121, 1 1/4" expansion plug) in squarely with a large socket and long extension affixed to the end making sure not to deform the plug. This is critical in forming an oil tight seal. The oil tight seal will allow you to use the recommended heavy oil in lieu of grease (which separates from the gear teeth and bearings after use). Grease the bearing seats with a light coat of grease in preparation for driving in the new bearing cups. Lay the cup (8N 3552, thrust bearing cup) in the seat with the dished out surface facing up towards you. Place a large socket and long extension affixed to the end over the cup and drive it into the seat paying close attention to its position in the seat. It should remain parallel to the seat as you drive it in. This cup must absolutely bottom out in its seat, so, take a drift and drive against the rim of the cup in alternating sides until it is set in the seat firmly. Do not deform the cup rim. You can tell it has bottomed out as the pitch of the ring while driving will dull out.



Step 8 - Drive the bearing cup (8N 3552, thrust bearing cup) into the seat of the tube bottom using the same procedure. Fix the tube assembly in a vise lightly clamped while you work.

Step 9 - Now you are ready to begin re-assembly. Place the new bearing (8N 3571, steering gear worm thrust roller) (smaller opening down) on the bottom end of the shaft and installed the new bearing retainer on the shaft end. This comes as 2 components; (8N 33581, steering shaft bearing retainer and the 356937 S, steering shaft bearing retainer eyelet). I had to clip the brass flange of the eyelet with wire cutters to get it to fit in the hole in the end of the steering shaft. Drive it in, and then set the cut edges tight against the tube hole with a nail set. Make sure the retainer seats appropriately with the bottom of the bearings. This retainer and eyelets job is simply to hold the bearings onto the bottom of the shaft.

Step 10 - Place the steering shaft into the steering box carefully positioning the bearings into the cup at the base of the steering box. Place the shims on the base of the steering tube aligning them carefully using the bolts as an alignment jig. I lubed each of the shims with grease and stacked all of them together. (Once the unit is back on the tractor, you will adjust the pressure on the bearings by adding or removing shims.) Bolt the tube assembly back onto the steering box. Do not torque the bolts down, you just want the tube secured. Turn the shaft until the nut runs up to half way of the threaded shaft and the center gap between the teeth on the nut is centered in the hole that the left sector passes through.

Step 11- Replace the “O” rings on each sector carefully lubing them before positioning them into the groove on the sectors. I did not replace the sector bushings because mine were still snug around my newly acquired second hand sectors. However, you should definitely replace the sector seal and retainer (8N 3591 B, 1 piece retainer and seal). Drive the seals in place with a socket and hammer. Start with the left sector (the one closest to the shaft) and turn the sector teeth so that the large center tooth meshes with the center gap on the shaft nut. Drive the left sector in from the left side with a rubber hammer or wood blocking and hammer monitoring the position of the gear teeth. Adjust sector mesh as outlined in the FO-4 manual - Temporarily install steering wheel and hold it in place while rotating the bolt holes into alignment with the housing. Bolt the left sector back onto the steering box securely. Next perform the same procedure with the right sector, meshing the right sector teeth with the left. Note the third tooth space on the left sector gear meshes with the third tooth on the right sector gear. Bolt the right sector back onto the steering box securely.

Step 12 - Position the steering arms correctly and install the washers and nuts.

Step 13 - Drop the steering column bearing assembly (8N 3517, steering column bearing assembly) over the steering shaft and down into the tube itself. Drive the assembly carefully into the tube using a socket until its top flange bottoms out against the tube. Place the steering column bearing spring seat (8N 3518, steering column bearing spring seat), spring (8N 3520, steering column bearing spring) and felt seal (8N 3570, felt dust seal) over the shaft and into the bearing assembly.

Your re-built unit is now ready for installation. Once installed, perform the steering adjustment check in the FO-4 manual, (step 12). Also, you may have to adjust the set screw and locknut assembly on each sector end for proper adjustment.