Removal and Replacement of the Power Steering Cylinder

CAUTION: Slowly remove the hydraulic lines from the cylinder. Test for pressure in the lines before removal.

1. Place an oil pan directly under the steering cylinder. This will catch the hydraulic fluid that will be drained from the lines and the cylinder.
2. Remove both hydraulic line connectors from the fittings on the cylinder using an 11/16 and a 5/8 open end wrench. See figure 1.
3. Lower the hydraulic lines down into the oil pan and allow to drain.

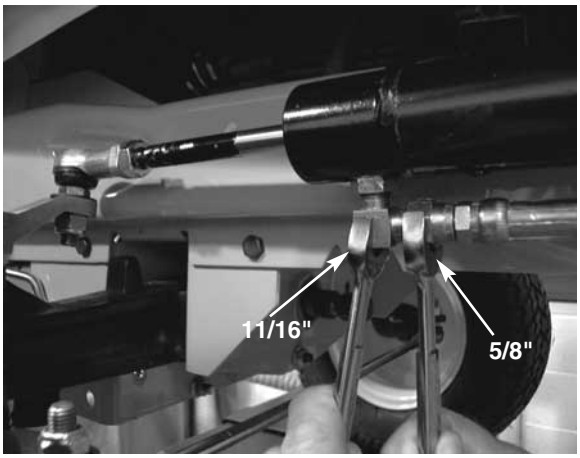


FIGURE 1.

4. Remove the front ball joint NUT from the steering arm using a 17mm and 3/4" open end wrench. See figure 2.

   NOTE: Remove the ball joint NUT only!!!

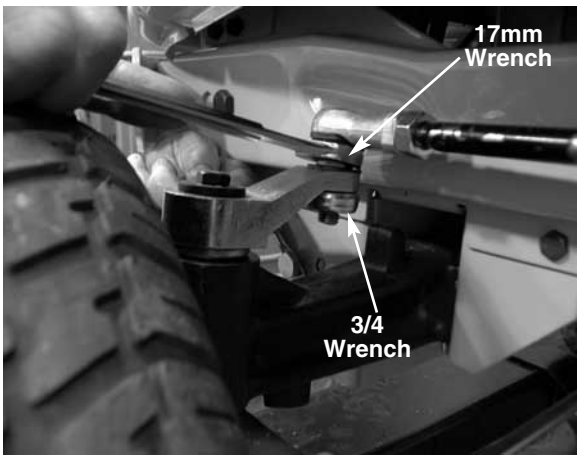


FIGURE 2.

5. Remove both of the hex head screws and the hex flange nuts from the cylinder mounting bracket using a 9/16 socket and a 9/16 wrench. See figure 3.

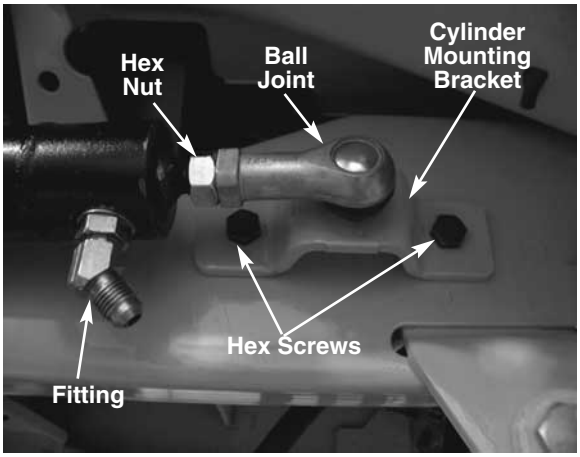


FIGURE 3.

6. Tilt the cylinder down into a pan and allow the oil to drain.
7. Remove the front ball joint from the steering arm.
8. Remove the flat washer from the top of the steering arm.
9. Place the cylinder on a bench and remove the hex nut securing the cylinder to the mounting bracket using a 17mm wrench and a 3/4" open end wrench.
10. Slowly push the cylinder rod into the cylinder until it is fully closed.

    NOTE: At this point, the cylinder and both ball joints are still in the original positions.
11. Record the exact positions of all the ball joints, hex nuts and fittings on the cylinder. See figure 4.
12. Measure the distance from the inner edge of the ball joint hex nut to the cylinder end. Repeat this step for the opposite end. Write both distances down. See figure 4.

    NOTE: The proper measurements are needed to keep the steering adjusted properly during reassembly. These measurements should be approximately 2.75" on the rod end, and 7/16" on the mounting bracket end. See figure 4.
13. Remove the ball joints and hex nuts from the cylinder.

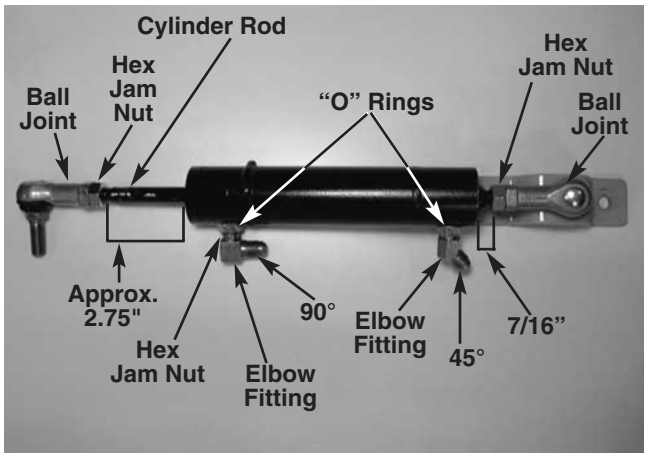


FIGURE 4.

CAUTION ON THE NEXT STEP: There are "O" rings between the cylinder block and the fittings. Extreme care should be used to hold the fittings in place while loosening the hex jam nuts, or damage will occur to the "O" rings. Replacement of the "O rings" is recommended.

14. Hold the hydraulic cylinder elbow fittings in place with a 5/8 wrench, and loosen the hex jam nuts with an 11/16 wrench. Slowly back the fittings out of the cylinder.
15. Replace the "O" rings at this point.

    NOTE: The front fitting is a 90 degree and the rear fitting is a 45 degree.

Reinstallation of the Hydraulic Fittings to the Cylinder

1. Set the new hydraulic steering cylinder on a bench.
2. Loosen the hydraulic fitting jam nut until it bottoms out on the threads.
3. Press the flat washer snug up against the hex jam nut.
4. Inspect the "O" ring for damage. If damaged, replace.
5. Press the "O" ring snug up against the flat washer.
6. Gently screw the fitting into place until the fitting becomes snug.

   NOTE: Do not tighten!!! At this time the "O" ring will be seated properly in the cylinder port. If it is over tightened, damage will occur.
7. Slowly unscrew the hydraulic fitting to the correct recorded position.

   NOTE: Do not unscrew the fitting more than one full turn, because the cylinder may leak at the "O" ring.
8. Hold the fitting in place with a 5/8 wrench, and tighten the hex nut with an 11/16 wrench.

INSTALL THE SECOND FITTING BY REPEATING STEPS ONE THROUGH EIGHT IN THIS SECTION.

Cub Cadet 3000 Series Char-Lynn 2 Series Steering Control

The following information may be used in the inspection and repair of Eaton's Char-Lynn 2 series steering control units.

When ordering replacement parts, give the product number and date code. The product and date code is noted on the serial number tag, which is located on the side of the valve housing.

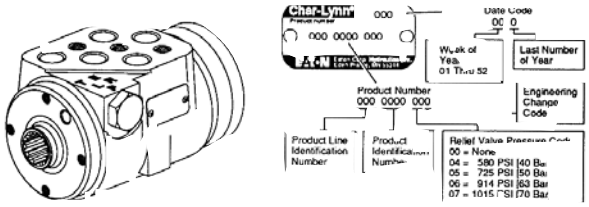


Figure 1.

Tools required for disassembly and reassembly: 10 mm socket, 7/8 in. socket, ratchet wrench, torque wrench (160 lb. in. capacity)

Tool List

- 10 mm Socket
- 7/8 in Socket
- Torque Wrench (160 lb-in Capacity)
- Small Blade Screwdriver

The following disassembly procedures may be used to disassemble the 2 series steering control. The configuration of your steering control may vary from the pictures shown in this program. The configuration of each control is determined by model. Different models may incorporate different component parts and/or assemblies. These differences may be the width of the gerotor assembly, spool/sleeve assembly, housing configuration and etc.

It is recommended that the steering control be thoroughly cleaned before any repairs are attempted. When cleaning, be sure all open ports are sealed.

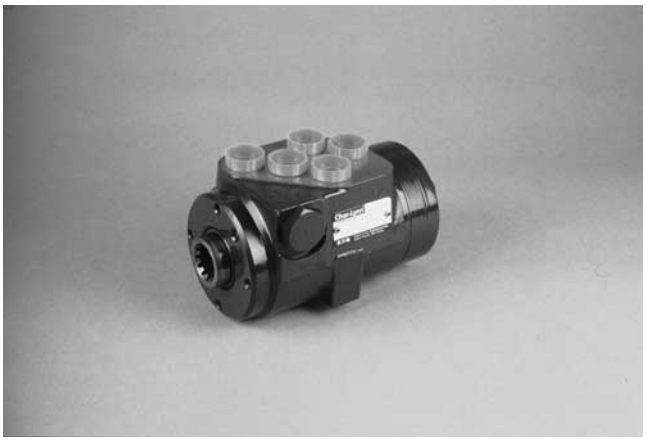


Figure 2.

To disassemble the steering control, first support the control in a vertical position with the metering (gerotor) section end up. Using a 10 mm socket wrench, remove the metering section end cap retaining cap screws.

NOTE: When using a bench vise to support the control, caution must be used not to use excessive clamping pressure on the control housing that could cause housing distortion.

Figure 3.

Remove the end cap from the gerotor assembly.

Figure 4.

Remove the o-ring seal from the gerotor assemblies outer ring.

Figure 5.

Remove the gerotor assemblies outer ring.

NOTE: The gerotor assembly may/may not remain intact during removal.

Figure 6.

Remove both the seal ring and o-ring seal from the gerotors inner star.

Figure 7.

Remove the gerotors inner star from the drive.

Figure 8.

Remove the spacer.

Figure 9.

Remove the drive from the spool/sleeve assembly.

Figure 10.

Remove the o-ring seal from the wear plate.

Figure 11.

Remove the wear plate from the housing assembly.

Figure 12.

Remove the o-ring from the control housing.

Figure 13.

The spool/sleeve assembly may be removed from the control valve housing in either the vertical or horizontal position.

VERTICAL POSITION

Carefully reposition the control valve assembly in the vertical position with the meter end of the control valve housing pointing upward. Remove the spool/sleeve assembly from the control valve housing.

IMPORTANT: Do not bind the spool/sleeve assembly in the control housing.

Rotate the spool/sleeve assembly slightly and slowly when removing from the control housing.

HORIZONTAL POSITION

Rotate the spool/sleeve assembly until the cross pin is horizontal with the porting face flange. Position the control valve assembly with the porting face on a clean flat surface.

Remove the spool/sleeve assembly from the metering section end of the control housing keeping the cross pin in the horizontal position.

IMPORTANT: Do not bind the spool/sleeve assembly in the control housing.

Rotate the spool/sleeve assembly slightly back and forth when removing from the control housing.

Figure 14.

Using a small screwdriver or similar type tool, remove the cross pin from the spool/sleeve assembly.

Figure 15.

Push or pull the spool forward to remove it from the sleeve.

NOTE: Caution must be used not to dislodge the spring retaining ring during removal of the spool from the sleeve.

Figure 16.

Carefully remove the spring retaining ring from the centering springs.

Figure 17.

Carefully remove the centering springs from the spool.

NOTE: It is not necessary nor recommended to remove the external ring from the spool.

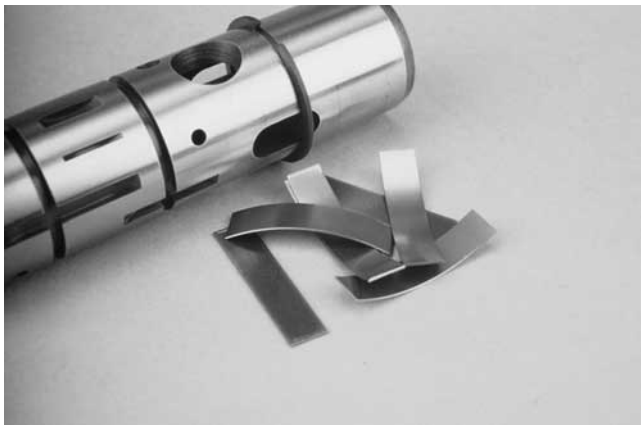


Figure 18.

Turn the valve housing over and remove the two bearing races and thrust bearing.

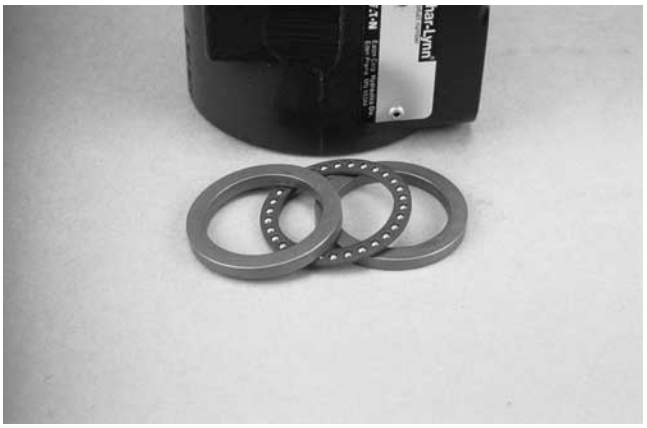


Figure 19.

Using the small screwdriver or similar tool, remove the dust seal. Caution must be used not to scratch or damage the dust seals counter bore when removing the dust seal.

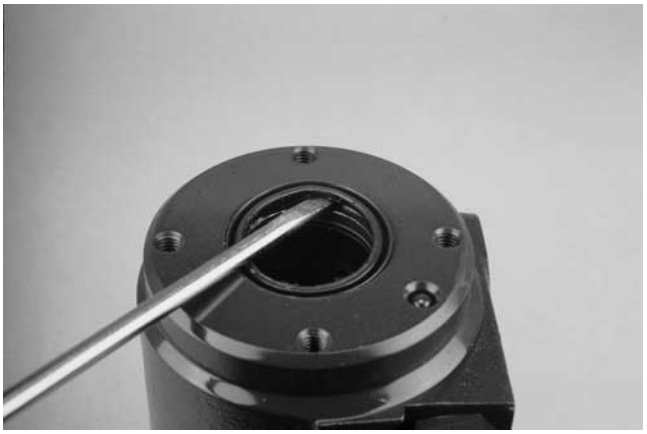


Figure 20.

Again using a small screwdriver or similar tool, remove the quad ring seal from the valve housing.

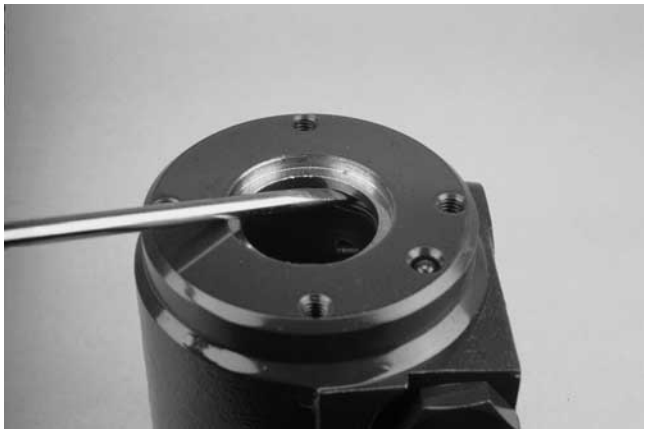


Figure 21.

Using a 7/8 in. socket or end wrench, remove the relief valve check or check ball plug.

Figure 22.

Shown here are both the relief valve check and check ball assemblies.

The relief valve check assembly is optional.

Figure 23.

REASSEMBLY

Prior to the reassembly of the steering control, replace all worn and damaged parts and/or assemblies along with all seals and sealing rings. Clean all parts in clean solvent and blow dry with compressed air.

Lubricate all finished parts surfaces freely with clean hydraulic fluid during assembly to provide instant lubrication between rotating surfaces at start-up.

Lubricate all seals and sealing rings with petroleum jelly to help retain the sealing rings during reassembly and provide lubrication to the dust and spool seals.

Install the two bearing races and thrust bearing into the valve housing.

Figure 24.

Install the sleeve into the valve housing.

Figure 25.

Using caution to retain the races, bearing and sleeve in the valve housing, carefully turn the assembly over and set it on a clean flat surface. Together, the housing, races, bearing and sleeve create a groove into which the quad seal can be installed. Lubricate and install the quad seal in its seat through the input end of the valve housing.

CAUTION: When installing, be sure the quad seal is not twisted.

Figure 26.

After the seal is installed, turn the valve housing over and remove the sleeve, races and bearing.

Figure 27.

Turn the valve housing over and press the dust seal into its bore, located in the face of the valve housing.

NOTE: The lip of the dust seal must point away from the valve housing.

Figure 28.

Shown here is the correct orientation of the spool/sleeve centering springs. Two sets of (3) each curved springs in the center and (1) each flat piece on the outside.

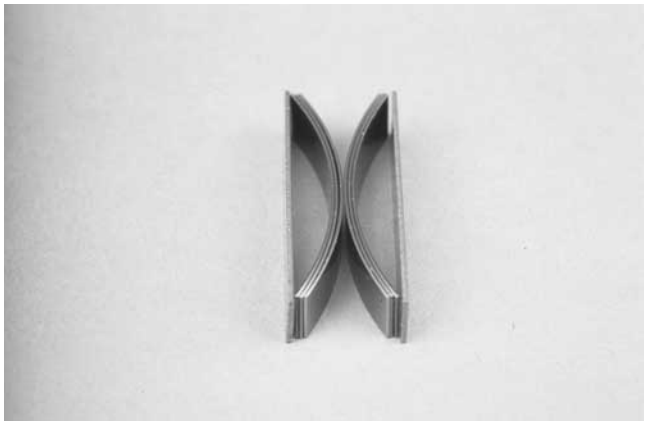


Figure 29.

To install the centering springs on the spool, first install the two flat pieces.

Figure 30.

Next install one set of the 3 curved centering springs between the two flat pieces.

Figure 31.

Then install the final set of 3 curved centering springs between the flat piece and the previously installed curved centering springs.

NOTE: The bowed side of the two sets of 3 centering springs must point toward each other.

Figure 32.

Center the centering springs and install the spring retaining ring over the springs.

Figure 33.

Lubricate the spool assembly and install into the sleeve, aligning the centering springs with the notches machined in the sleeve.

Figure 34.

Push the spool assembly into the sleeve until the centering springs are firmly positioned into the notches located in the sleeve.

Figure 35.

Insert the cross pin into the spool/sleeve assembly.

Figure 36.

Supporting the valve housing in the upright position, lubricate and install the bearing races and thrust bearing.

NOTE: The thrust bearing must be installed between the two bearing races.

Figure 37.

Lubricate and install the spool/sleeve assembly into the valve housing.

Figure 38.

Lubricate and install the o-ring seal into the groove located in the control valve housing.

Figure 39.

Install the wear plate by aligning the holes in the wear plate with the cap screw and porting holes in the control housing.

NOTE: The grooved side of the wear plate must point upward.

Figure 40

Lubricate and install the o-ring seal into the groove located in the wear plate.

Figure 41.

Install the drive, making sure you fully engage the slot on end of drive with the cross pin in the spool/sleeve assembly.

Figure 42.

Lubricate and install both the gerotor star and outer ring. Install by aligning the splines of the star with the drive. After installation, rotate the gerotors outer ring to align with the housing cap screw holes.

NOTE: The grooved side of both gerotor star and outer ring must face upward.

Figure 43.

Install drive spacer in gerotor star.

Figure 44.

Lubricate and install both the o-ring seal and seal ring into the gerotor star. Install the o-ring in the groove located in the star first and then the seal ring.

Figure 45.

Lubricate and install the o-ring seal into the groove located in the gerotors outer ring.

Figure 46.

Prior to the installation of the end cap, freely lubricate the gerotor star seal ring.

Figure 47.

Install the end cap onto the gerotor assembly by aligning the cap screw holes.

Figure 48.

Install the end cap retaining cap screw and tighten in a crisscross sequence. Torque to 140-160 in. lbs.

Figure 49.

Install the check ball or optional relief valve check as shown here.

Figure 50.

Torque plug to 15 in. lbs.

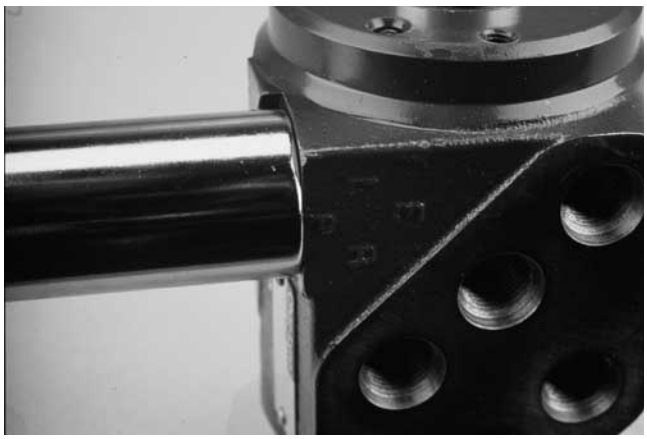


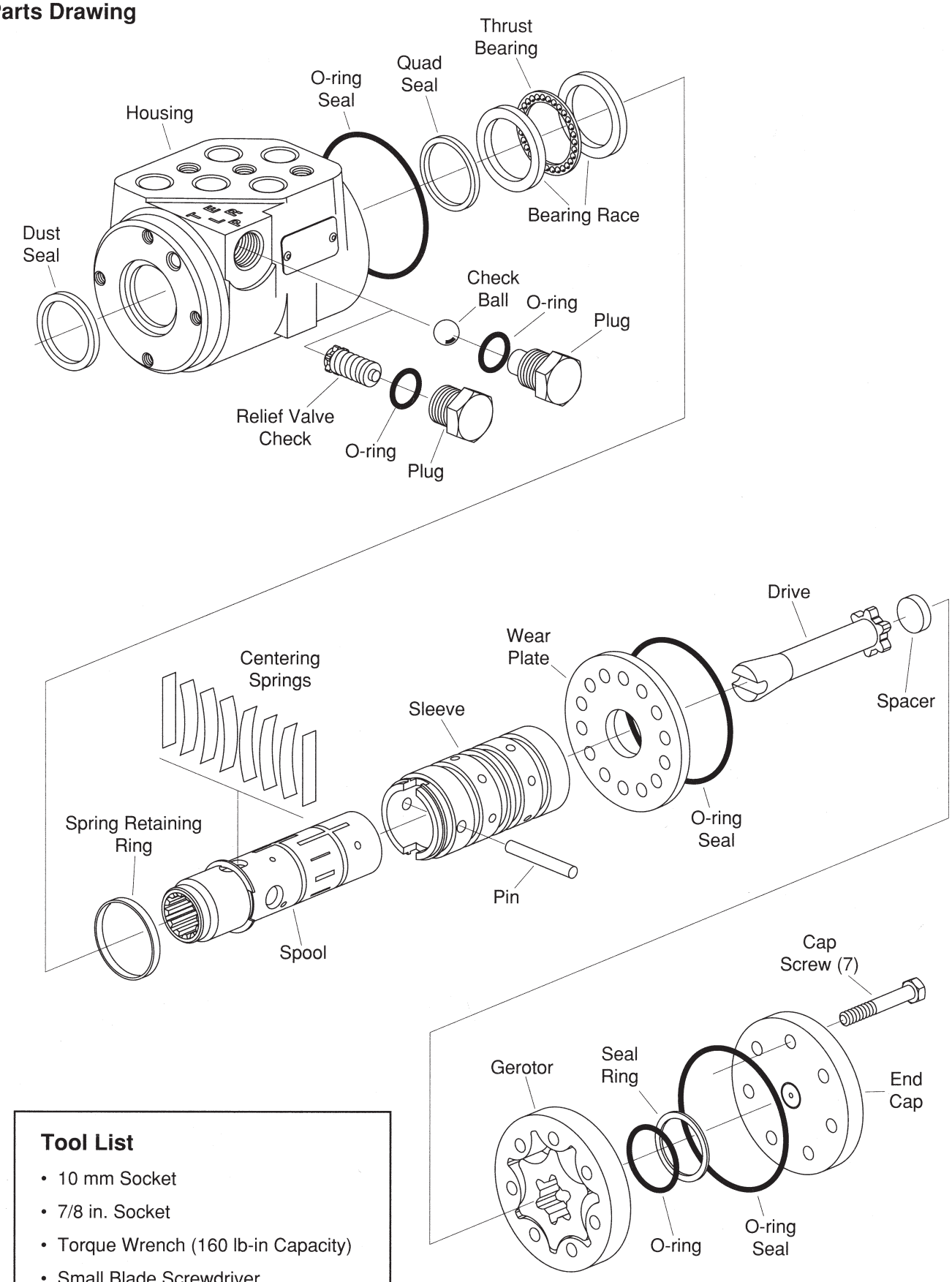
Figure 51.

The steering control is now ready for test and installation.

Figure 52.

Cub Cadet 3000

Parts Drawing



Tool List

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- Small Blade Screwdriver