

**HEAVY-DUTY NFPA CYLINDERS  
MAINTENANCE INSTRUCTIONS****ROD BEARING SEALS OR ROD BEARING-****DISASSEMBLE**

Remove all port connections. If cylinder is being used hydraulically, drain all fluid.

Inspect the end of the cylinder rod (part "S"), especially around the wrench flats. Remove any burrs that may be present.

Remove the retaining ring (part "P") using snap ring removal pliers

Pull the rod bearing (part "Q") out of the head of the cylinder. If this procedure is difficult to accomplish by hand it may be necessary to grip the rod bearing with a pair of channel locks. If channel locks are used be careful not to nick or score the rod bearing.

Note: On 1-1/2 bore cylinders, as well as some mount configurations, it will be necessary to remove the four tie rod nuts (part "A") on the rod end of the cylinder.

Remove the bearing seal o-ring (part "O"), the rod seal u-cup (part "N"), and the rod wiper (part "R") with a seal extraction/installation tool. If a seal tool is unavailable a tool with a flat blunt edge can be used. Do not use a tool with a sharp edge so as to avoid damaging the seals, rod wiper or the rod bearing.

**CLEAN AND INSPECT**

Thoroughly clean the area of the cylinder head exposed by the removal of the rod bearing, the rod bearing itself, and as much of the cylinder rod as feasible. Inspect the rod bearing for any damage or wear. If any wear or damage is observed, it is advisable to replace the rod bearing along with the seals and rod wiper.

**REASSEMBLE**

Repack the lubrication reservoir on the inside diameter of the rod bearing. Use Teflon based grease for lubrication. It is recommended that the grease be purchased from FLAIRLINE to avoid any problem of lubrication compatibility. Prior to installation, lightly lubricate the seals and rod wiper to be installed in the rod bearing with grease.

Fully pack the rod seal u-cup with grease. Re-install the seals and rod wiper. Be sure that the seals and rod wiper are seated correctly in the appropriate grooves. It may be necessary to use a seal extraction/installation tool to insure proper seating of seals and rod wiper. When installing the rod seal u-cup, make certain that the cup faces away from the rod wiper.

When replacing the rod bearing, carefully slip it over the cylinder rod end so as not to damage the seal and rod wiper on the rod threads or wrench flats. Work the rod seal u-cup onto the cylinder rod carefully so that the sealing lip does not roll under. Continue sliding the rod bearing onto the cylinder rod until the rod wiper is also seated on the cylinder rod. This procedure may require some force to properly seat both the rod seal u-cup and the rod wiper.

Fit rod bearing into head of cylinder. This procedure may require some force to seat the cartridge properly. Be sure that the bearing seal (part "O") remains in the seal groove and is not pinched or cut during installation. Replace the retaining ring.

**PISTON AND BARREL SEALS-****DISASSEMBLE**

Remove all port connections. If cylinder is being used hydraulically, drain all fluid.

Remove tie rod nuts (part "A") and tie rods (part "E").  
Remove the cylinder cap (part "B") and barrel (part "K").

Remove the piston seals (part "G") using a seal extraction/installation tool to stretch the seals over the piston. If a seal tool is unavailable, a tool with a flat blunt edge can be used. Do not use a tool with a sharp edge to avoid damaging the seals or piston.

Remove the wear ring (part "H") by spreading it apart at the split cut. Spread the wear ring apart just enough to be able to slide it off of the end of the piston. Spreading the wear ring too much could result in breakage. The wear ring is not supplied in the packing kit and can be reused indefinitely.

**MAGNET OPTION-**

If the cylinder being repaired incorporates a magnet, the magnet is located under the wear ring. Before removing the magnet, mark the side that is facing out of the piston. This is to insure that the magnet is replaced in the same way as it came from the factory. Failure to do so may mean that the magnet will not trip the switches attached to the cylinder.

Remove the magnet and wipe clean.

Reinstall the magnet, hold both ends down and install the wear ring over the magnet.

Position the wear ring so that the split cut in the wear ring is 180 degrees from the split in the magnet.

Remove the barrel seals (part "C") from the cap (part "B") and the head (part "L") of the cylinder. It may be necessary to use a seal tool in removing the seals.

**CLEAN AND INSPECT**

Thoroughly clean the piston, head, cap, barrel and wear ring. Check all parts for any wear or damage that may require replacement.

**REASSEMBLE**

Use Teflon based grease for lubrication. It is recommended that the grease be purchased from FLAIRLINE to avoid any problem of lubrication compatibility. Prior to installation, lightly lubricate the seals to be installed with grease.

Fully pack the cups of the piston seals, the reservoir under the wear ring and lightly lubricate the wear ring with grease. Install the wear ring and one of the piston seals on the head end (rod end) of the piston. The cup of the seal should be oriented towards the rod end. Place grease on the inside top of the barrel approximately ½ inch wide around the entire diameter.

Slide the piston into the barrel starting opposite from the rod end. Push the piston through the barrel until the groove for the remaining piston seal is exposed. Install the remaining piston seal with the cup facing toward the cap end away from the rod end. Pull the piston back into the barrel so that both seals are inside.

**Heavy Duty NFPA Tie Rod Cylinders****REASSEMBLE** (CONTINUED)

Install the barrel seals in the head and the cap. Reassemble the barrel, head and cap. Replace the tie rods and tighten the tie rod nuts as far as possible by hand.

Place the cylinder on a flat surface and tighten the tie rod nuts to the appropriate torque as indicated below. It may be necessary to hold the tie rod with vise grips while tightening the tie rod nuts. Tighten the nuts evenly and gradually so as to insure proper assembly.

<b><u>BORE</u></b>	<b><u>TORQUE IN FOOT POUNDS</u></b>
1-1/2	10
2	18
2-1/2	18
3-1/4	30
4	30
5	80
6	80
8	190

**CUSHION SEALS-****DISASSEMBLE**

Remove all port connections. If cylinder is being used hydraulically, drain all fluid.

Remove the cushion nut (part "V"). The cushion needle (part "W") should come out with the cushion nut. On occasion, the cushion needle will remain in the cylinder. In this case, use a pair of needle nose pliers to carefully remove the cushion needle.

Disassemble the cushion nut and needle (if this has not been done). Remove the needle seal (part "X") and the Teflon washer (part "Y") from the cushion needle.

**CLEAN AND INSPECT**

Thoroughly clean the cushion nut, cushion needle and the cushion port in the head or cap. Inspect all parts for any damage or wear that may require replacement.

**REASSEMBLE**

Lightly lubricate the needle seal with grease prior to installation. Use Teflon based grease for lubrication. It is recommended that the grease be purchased from FLAIRLINE to avoid any problem of lubrication compatibility.

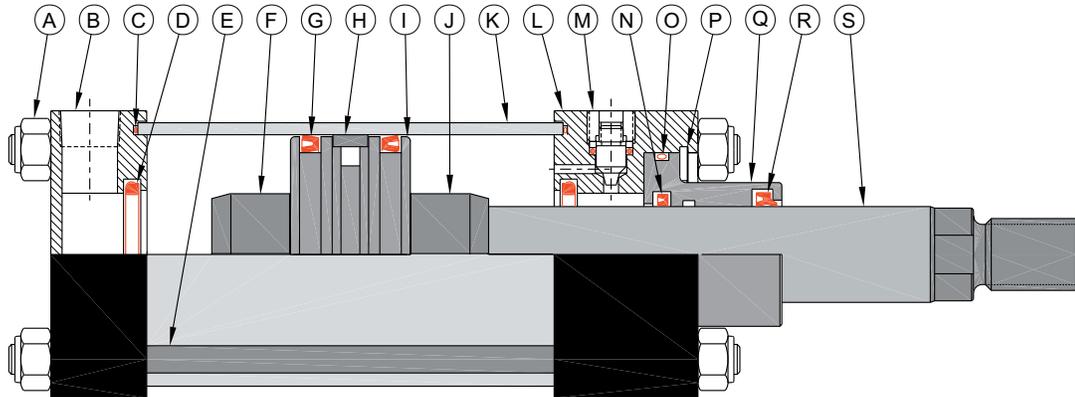
To correctly reassemble the cushion nut and needle, the nut must first be threaded on with the end opposite of the hex. Screw the nut onto the needle as far as it will go.

Place the Teflon washer and then the needle seal on the cushion needle.

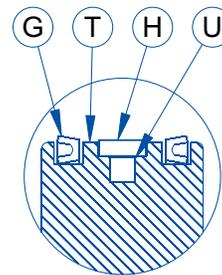
Screw the cushion nut into the cushion port on the head or cap and tighten.

Adjust the cushioning of the cylinder by screwing the cushion needle down to the required position.

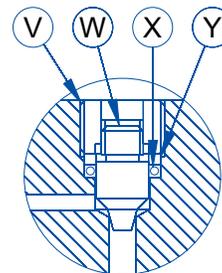
### CUT-AWAY VIEW OF CYLINDER



- A TIE ROD NUT
- B CAP
- C O-RING, BARREL SEAL (2 PER CYLINDER)
- D CUSHION SEAL
- E TIE ROD
- F REAR CUSHION SPUD
- G U-CUP, PISTON SEAL (2 PER CYLINDER)
- H WEAR RING
- I T TYPE PISTON
- J CUSHION SPUD
- K BARREL
- L HEAD
- M CUSHION NEEDLE ASS'Y
- N U-CUP, ROD SEAL
- O O-RING, BEARING SEAL
- P RETAINING RING
- Q ROD BEARING
- R ROD WIPER
- S ROD
- T TM TYPE PISTON (MAGNETIC OPTION)
- U MAGNETIC STRIP
- V CUSHION NUT
- W CUSHION NEEDLE
- X NEEDLE SEAL
- Y TEFLON WASHER



OPTIONAL  
MAGNETIC PISTON



CUSHION NEEDLE  
ASSEMBLY (ENLARGED)