

# IOM: INSTALL-OPERATE-MAINTAIN

## QS and QD Series Rack & Gear Actuators

### Single and Double Cylinder Types

### Double Acting

### IOM QS/QDxxDA 011110-1

#### OVERVIEW:

All QTRCO actuators are designed and built with the intent that they will last forever. Numerous design features reduce friction for enhanced operation, less wear and longer life. Other features result in there being fewer dynamic seals - a seal that does not exist can not fail. Also, we employ readily available off the shelf seals that cost far less than other's proprietary parts, and we do so in a design that allows piston seal replacement while the actuator remains in line (see Maintenance section)



**Single Cylinder Models**  
**QS/QD**  
**03DA, 04DA, 07DA, 12DA**

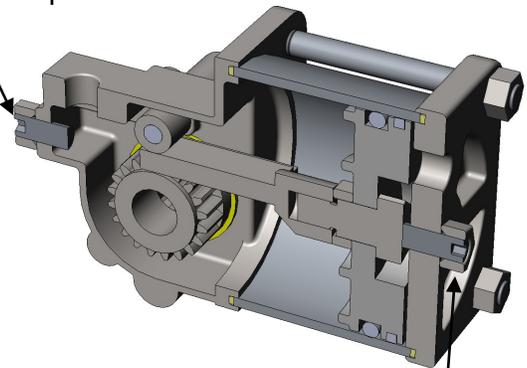
**QS (Stainless Steel) and QD (Ductile Iron)**  
**Series Rack & Gear Actuators**  
**Single and Double Cylinder Types**  
**Double Acting**



**Double Cylinder Models**  
**QS/QD**  
**05DA, 10DA, 14DA**

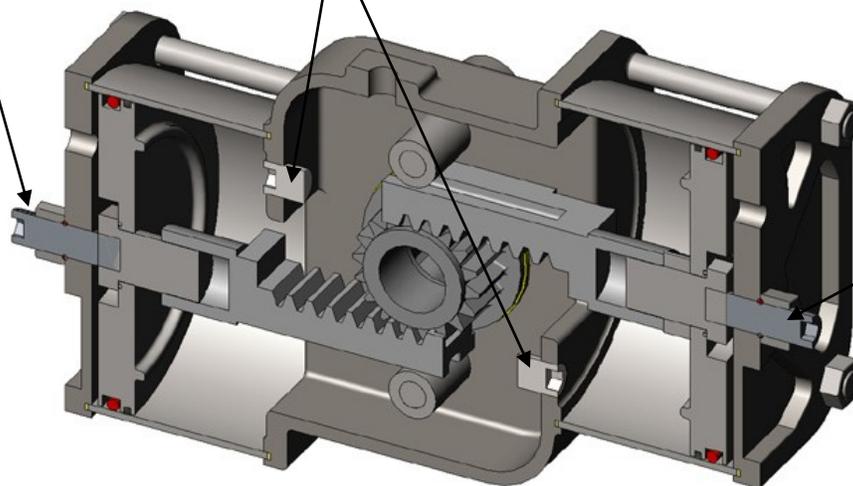
Single and Double Cylinder models are identical except for the cylinder quantity and travel stop location

Inward travel stop



Inward travel stop

Outward travel stop



Outward travel stop



**INSTALLATION:**

- QTRCO actuators may be installed in any position / orientation.
- Looking down on the actuator, a cylinder in the upper right quadrant will result in clockwise rotation of the shaft when pressure is applied through the end cap ports, forcing the pistons to move inward.
- The body port on all QTRCO QD/QD series Rack & Gear actuators is for applying pressure to the inner sides of the pistons. Pressure to the end cap ports (one for each end cap) forces the pistons to move inward.
- All QTRCO actuators have identical drive geometries on both faces of the body, therefore they may have their action reversed simply by turning the top side down.
- QS/QD actuators include NAMUR mounting pads and drive adapters however, unlike competitor's actuators, the NAMUR drive may be mounted to either side of the QS/QD to enable action reversal.
- Sizes 03, 04 and 05 have minimal body size, thus plate adapters provide the NAMUR mounting pattern. All other sizes incorporate NAMUR mounting patterns directly in the body machining - on both faces.
- Sizes 03, 04 and 05 have body mounting surfaces even with the cylinder flanges allowing all size brackets to mount. Sizes 07, 10, 12 and 14 have cylinder flanges that extend outward past the body mounting surface when the actuator is provided without a Universal Mounting Plate (UMP). Bracket width is an important consideration unless a UMP is included in the assembly.

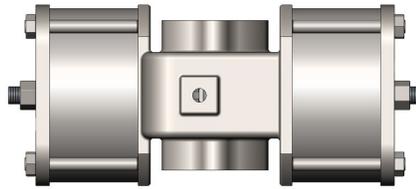
In this view, outward movement of the piston causes clockwise shaft rotation



In this view, outward movement of the piston causes counter-clockwise shaft rotation



03, 04 and 05



07, 10, 12, 14 Without UMP



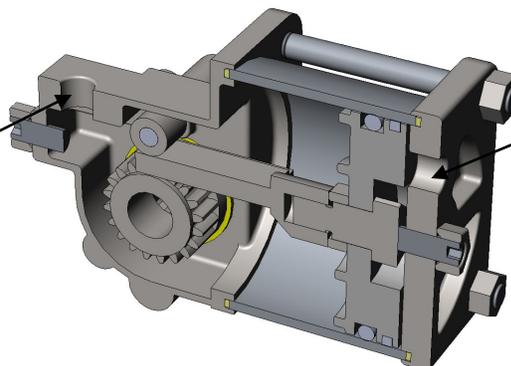
07, 10, 12, 14 With UMP

- UMPs are a standard option for all sizes. UMPs permit actuator mounting bolt patterns to match that of the user's valve or to replicate the dimensions of a competitor's actuator for ease of replacement. UMPs also raise the mounting surface such that cylinder flanges no longer are a bracket width consideration.
- QS/QD actuators require no user lubrication.

**PIPING:**

Single cylinder types  
(sizes 03, 04, 07 and 12)

Apply pressure to the body port to push the piston outward

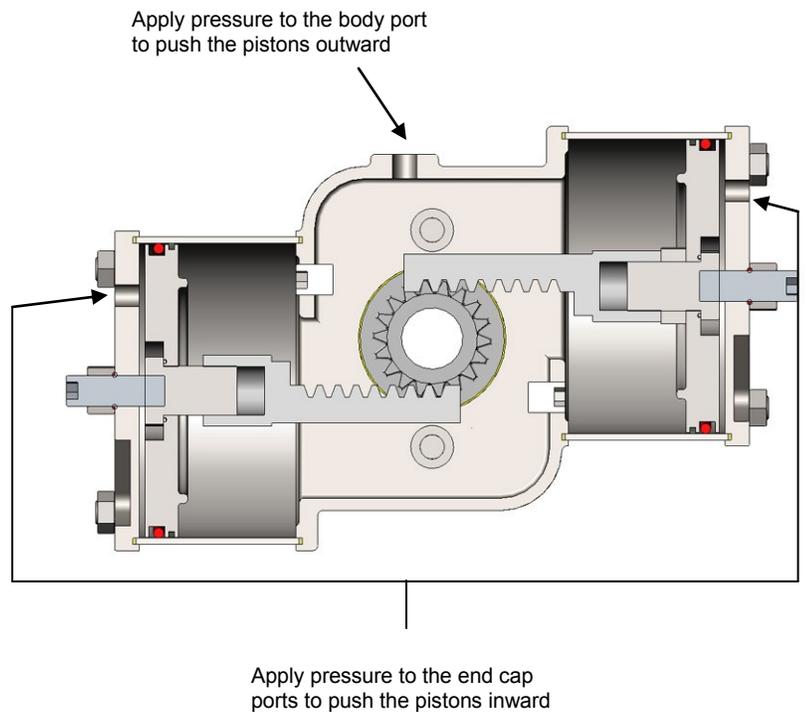


Apply pressure to the end cap port to push the piston inward



**PIPING continued**

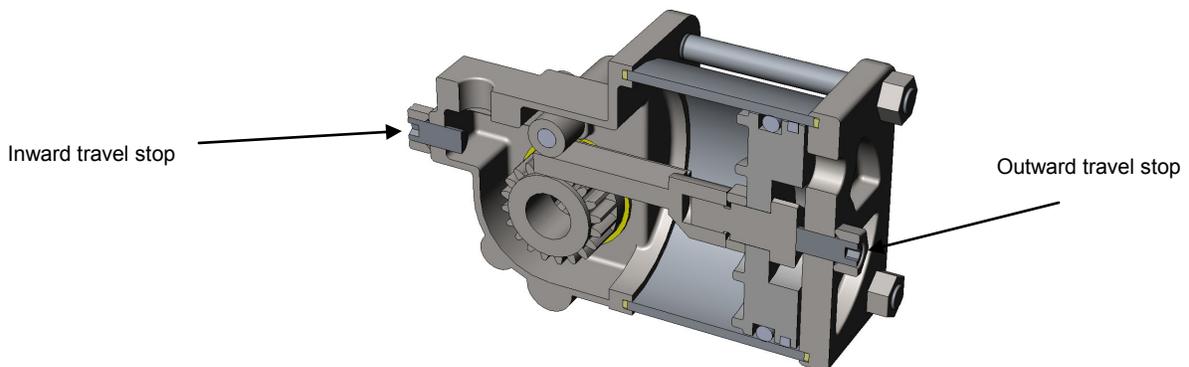
Double cylinder types (sizes 05,10 and 14)



**TRAVEL ADJUSTMENT:**

Single cylinder types (sizes 03,04, 07 and 12)

- Travel adjustment screws are located on the end cap and the body
- Hex nuts are provided with relief for a sealing o-ring that is forced into the screw threads when tightened, thereby preventing loss of pressure.
- Loosen the hex nuts before attempting to adjust the screws
- Clockwise screw rotation reduces actuator travel, counter clockwise rotation increases travel.
- When travel adjustment is complete, re-tighten the hex nuts to seal the threads and to secure the screw position



**TRAVEL ADJUSTMENT continued:**

Double cylinder types (sizes 05, 10 and 14)

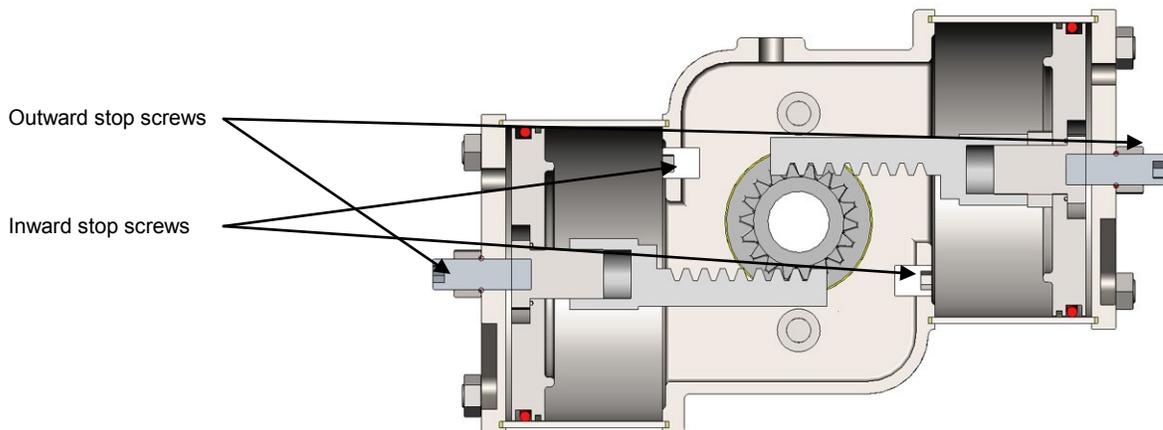
- Travel adjustment screws are located on the end caps and the body such that each piston's travel is stopped independently but simultaneously
- The end cap stops are readily adjusted but the body stops are for factory assembly adjustment and not intended for user adjustment unless absolutely necessary, as they require removal of the cylinders

**Outward travel adjustment**

- End cap stops include hex nuts which are provided with relief for a sealing o-ring that is forced into the screw threads when tightened, thereby preventing loss of pressure.
- Loosen both hex nuts before attempting to adjust the end cap screws
- Back off (turn counter clockwise) one of the stop screws, using the other to set travel
- Clockwise screw rotation reduces actuator travel, counter clockwise rotation increases travel.
- Apply 5 psig pressure to the body port to force the pistons outward. Adjust the one screw for proper outward travel
- When travel adjustment is complete using the one screw, turn the other screw clockwise until contact is made with the piston, then an additional 1/4 turn
- Using a hex wrench to hold the screws, re-tighten the hex nuts to seal the threads and to secure the screw positions.

**Inward travel adjustment**

- Removal of both cylinders is required and multiple adjustments may be required - for this reason we recommend against attempting to adjust inward motion, preferring to achieve adjustment via bracket motion, followed by resetting the end cap travel screws



**OPERATION:**

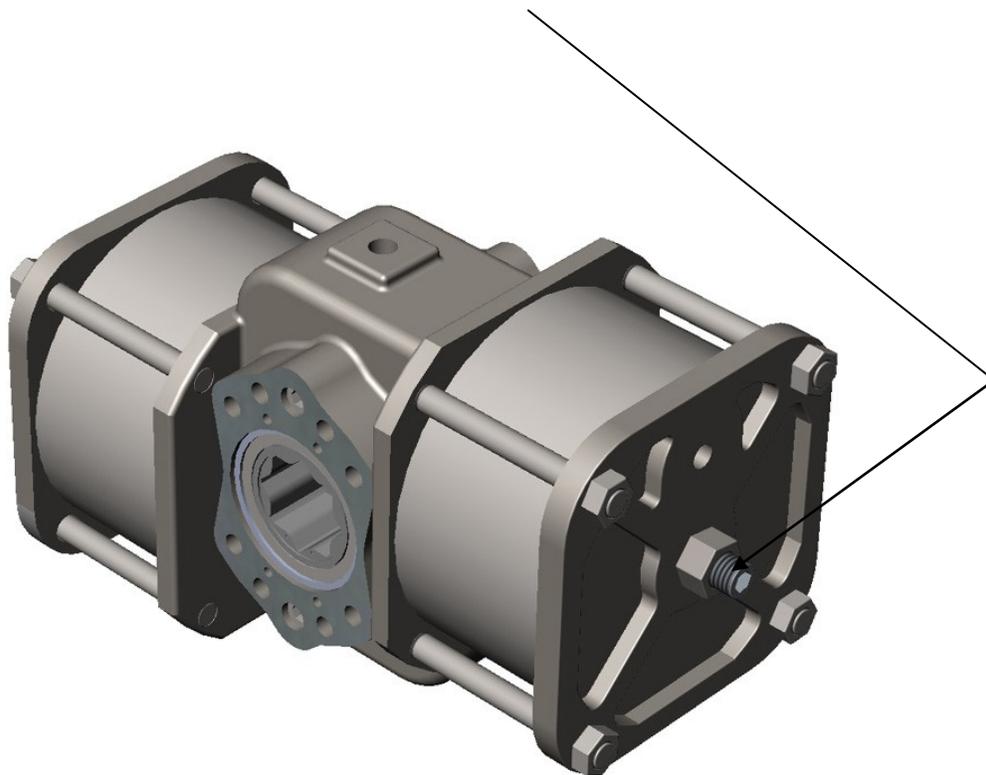
- Water and hydraulic fluids may be used to pressure QS/QD actuators provided the seal materials were selected accordingly.
- Air driven QS stainless steel actuators with stainless steel or Amalgon cylinders are not harmed by wet air (so long as freezing does not occur). Available aluminum and chrome plated steel cylinders may be harmed by the presence of water.



**MAINTENANCE:**

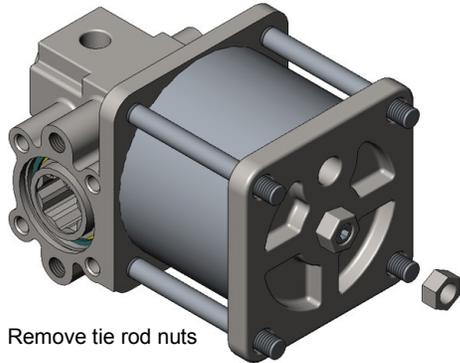
**Piston seal replacement:**

- All QTRCO actuator piston seals may be replaced while the actuator remains in line
    - This offers the advantage of not having to remove the actuator from the valve and eliminates concern about valve damage as a result of having to disengage the actuator and valve shafts.
    - It also is beneficial because accessory settings are not disrupted and therefore should not require subsequent adjustment / calibration post repair.
    - **CAUTION: WHEN PRESSURE IS EXHAUSTED FROM THE PRESSURE PORTS IN PREPARATION FOR DISASSEMBLY, THE DA TYPE ACTUATOR NO LONGER EXERTS CONTROL OF THE VALVE. DO NOT ATTEMPT TO CHANGE THE PISTON SEALS WITH PRESSURE IN THE PIPELINE.**
    - Single and double cylinder models require identical procedures for piston seal replacement, except that for the double cylinder models, complete one cylinder including reassembly prior to performing seal replacement on the second.
1. Exhaust pressure from all pressure ports.
  2. Remove tubing/piping
  3. Do not remove or change setting of the travel stop screws.

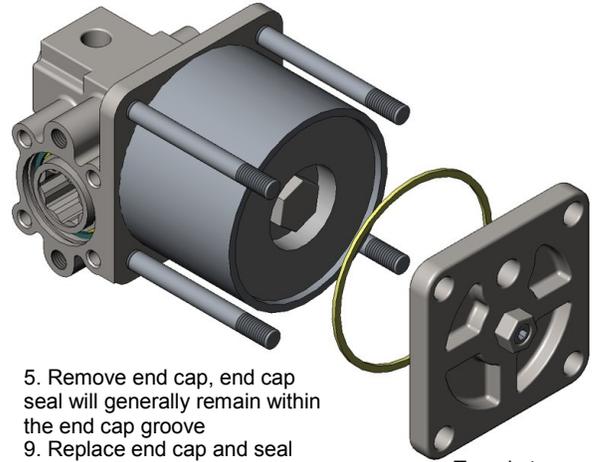


**Piston seal replacement continued:**

4 Remove tie rod nuts (tie rods should remain in place for convenience, but no harm occurs should they be removed as well), then follow the below sequence. For double cylinder types, complete service on one cylinder before starting the other.



4. Remove tie rod nuts

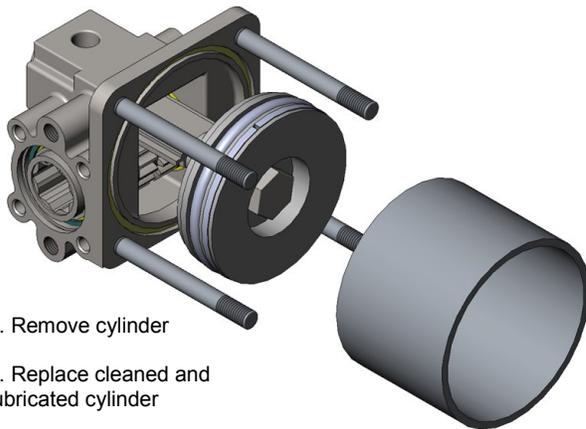


5. Remove end cap, end cap seal will generally remain within the end cap groove  
9. Replace end cap and seal

Travel stop screw, nut and o-ring

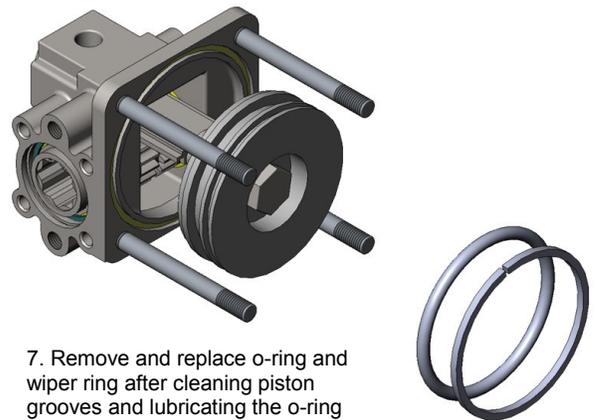
10. Replace tie rod nuts. Torque:

Size	03	04&05	07&10	12&14
Foot Pounds	10	15	20	25

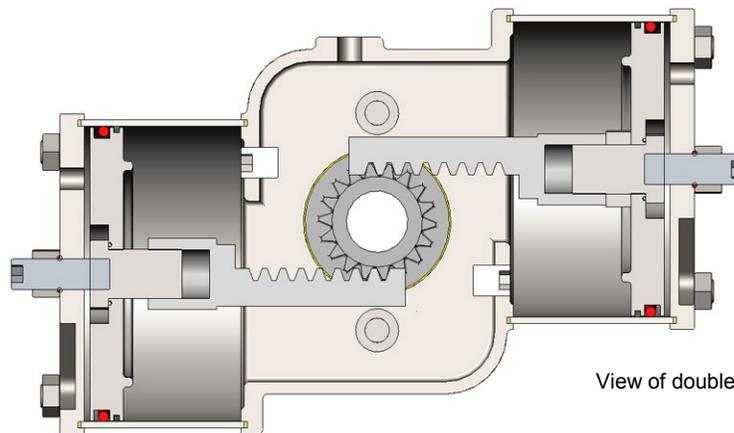


6. Remove cylinder

8. Replace cleaned and lubricated cylinder



7. Remove and replace o-ring and wiper ring after cleaning piston grooves and lubricating the o-ring

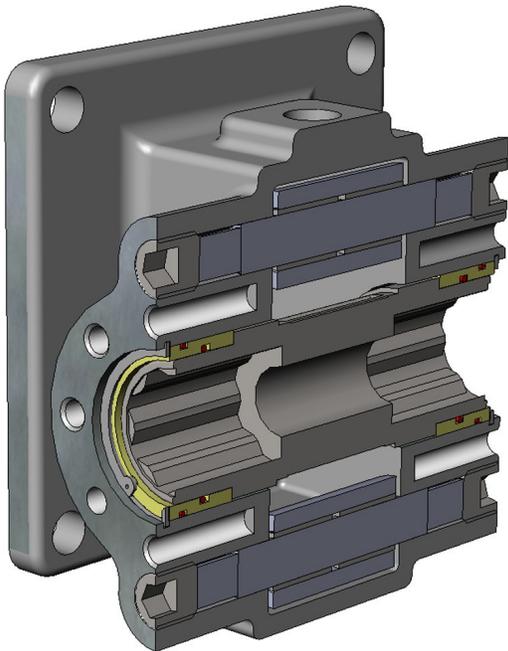


View of double cylinder type

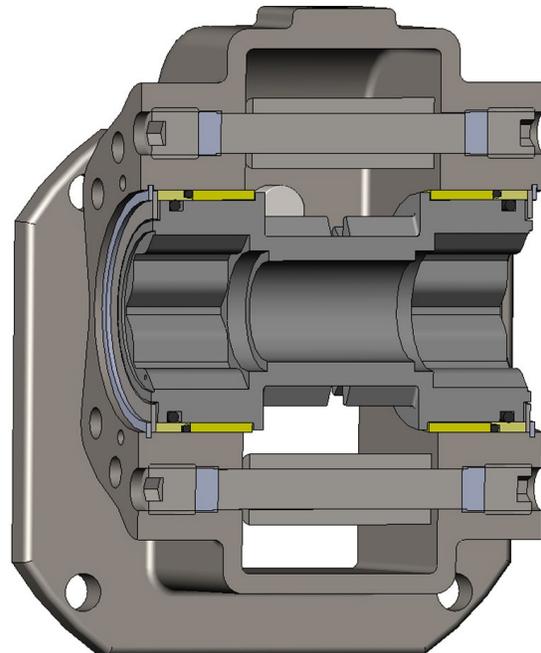


**Shaft seal replacement:**

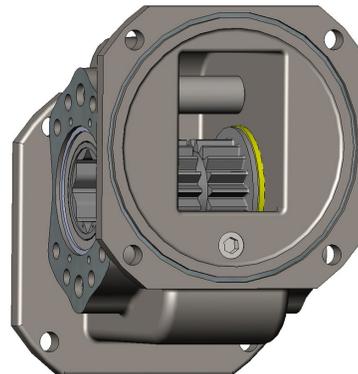
- Because QTRCO actuator springs are located inward of the pistons, there is no pressure applied to the shaft seals. If they should wear, there is no negative consequence.
- Should you decide to replace the shaft seals, the actuator must be removed from the valve.
- Parts required
  - Kit - Retaining rings, bushings and seals
- Shaft seal differences between assemblies
  - 03, 04 and 05 place shaft o-rings in grooves in the bushings
  - 07, 10, 12 and 14 place the dynamic o-ring in a shaft groove. The static o-ring is captured between two separate bushings.



03, 04, 05



07, 10, 12, 14



**Procedure:**

1. Remove shaft retaining ring. Size 12 and 14 have locking rings, requiring care to prevent ring damage. Along with the ring is a thrust bushing.
2. Push entire shaft assembly out through one side of body.
3. Remove bushings from shaft and remove o-rings from bushings.
4. Note sizes 07, 10, 12 and 14 have two bushings on each end.
5. Clean shaft. Smooth any imperfections with a scotch brite pad.
6. Remove saddle pin and bushing:
7. Remove set screws
8. Push pin and end plugs (rubber) through. Use hammer and punch to force through.

**Re-assembly:**

1. Install saddle pins and bushings with rubber plugs at pin ends. Tighten set screws securely and evenly on each end.
2. Install one shaft retaining ring (temporary)
3. Stand body on end with shaft bore vertical. Drop thrust washer and bare shaft onto the temporary retaining ring (no lower bushings).
4. Insert lower bushing into top end of shaft bore followed by lubricated shaft o-ring, which falls into the shaft groove.
5. Insert lubricated OD o-ring using thin rod to seat it against face of first bushing.
6. Insert outer bushing with lip end first. Lip slides under OD o-ring forcing a seal between the bushings and body.
7. Insert thrust washers this end followed by retaining ring.
8. Turn actuator over, remove temporary retaining ring.
9. Insert lower bushing, shaft o-ring, OD o-ring, outer bushing, thrust washers and permanent retaining ring in same sequence.

