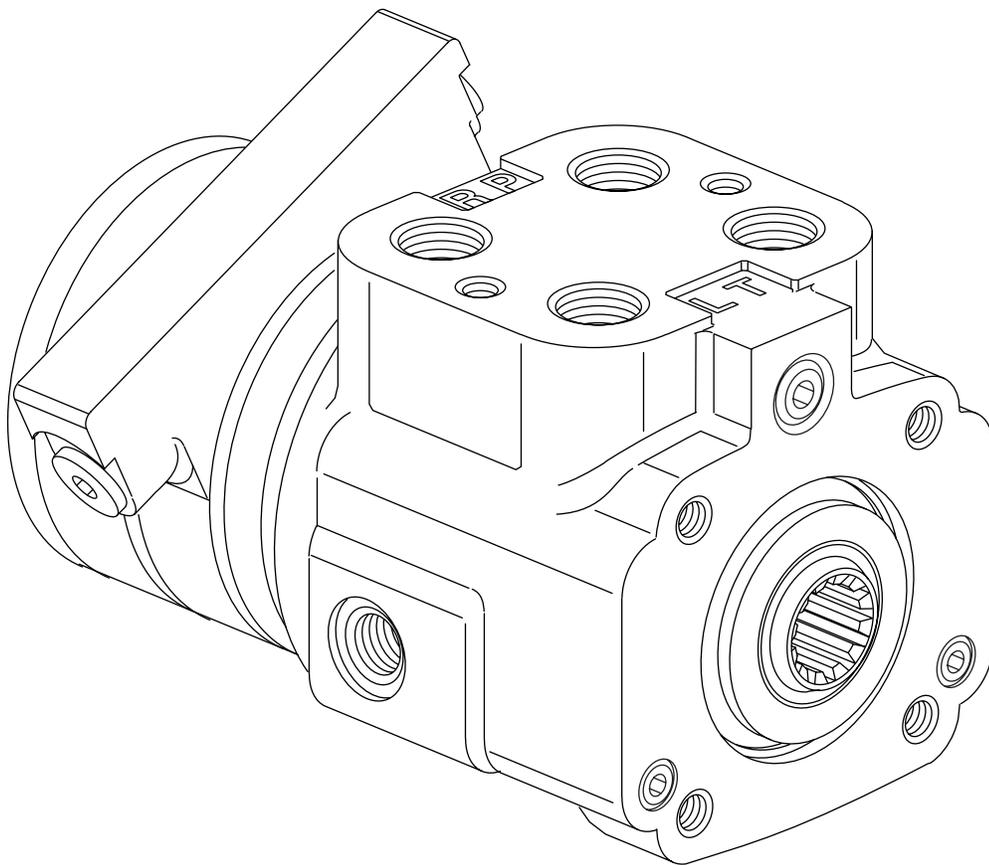
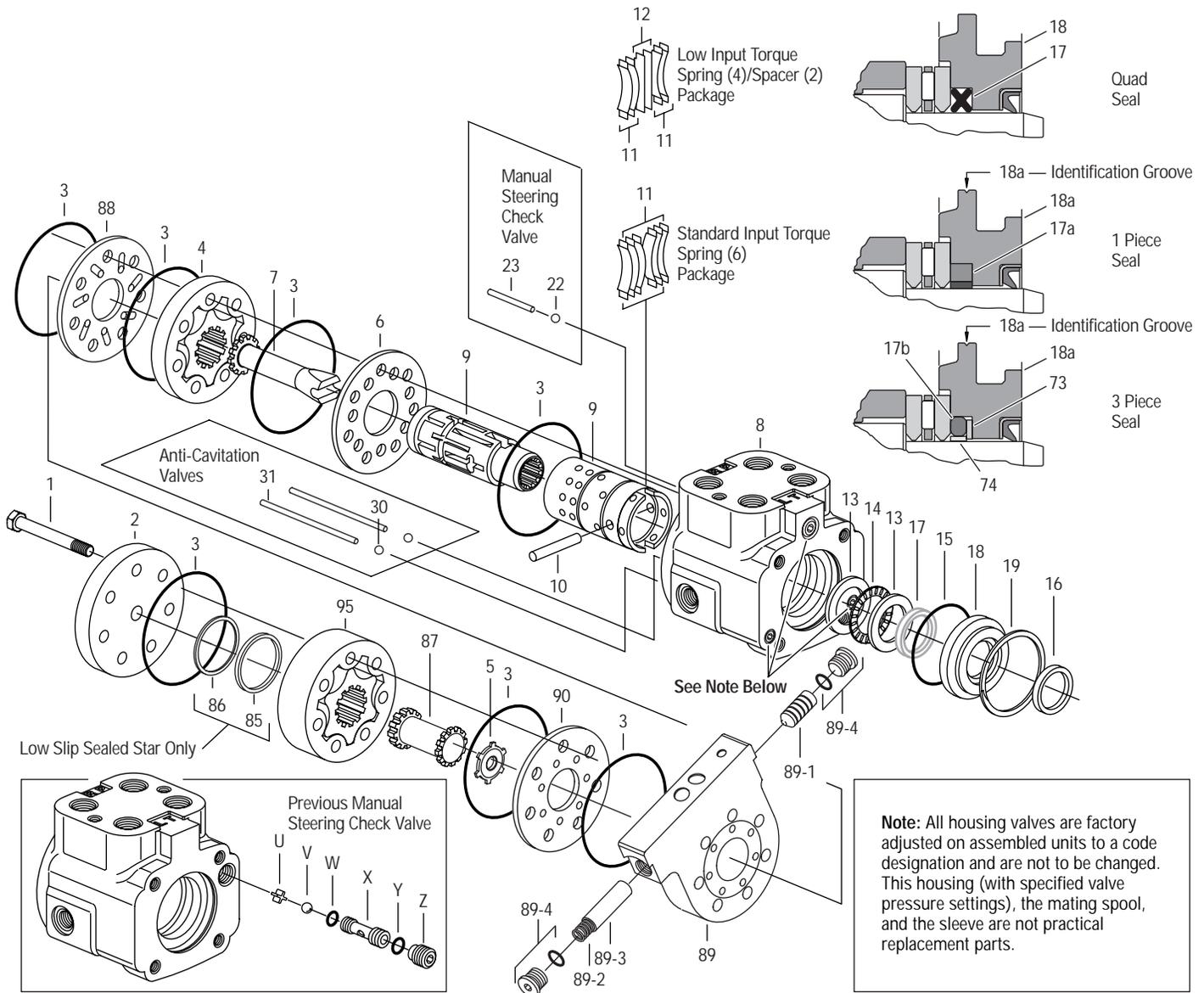




Repair Information

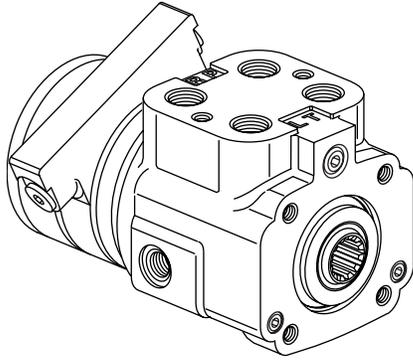




Ref. No.	Description
1	Cap Screw, Hex Head
2	Cap, End
3	Seal, 72,6 mm [2.86 in.] ID
4	Gerotor
5	Spacer (when required)
6	Plate, Spacer
7	Drive
8	Housing
9	Sleeve, Control/Spool, Control
10	Pin, Centering
11	Spring, Centering
12	Spring, Spacer
13	Bearing Race
14	Bearing, Needle Thrust
15	Seal — 47,2 mm [1.86 in.] ID

Ref. No.	Description
16	Seal – 24,9 mm [.98 in.] ID
17	Seal, Quad Ring – 26,7 mm [1.05 in.] ID
17a	Seal, Low Torque – 25,4mm [1.00 in.] ID
17b	O-ring – 26,7 mm [1.05 in.] ID
18	Bushing, Seal Gland
18a	Bushing, Seal Gland – with Ident. Groove
19	Ring, Retaining
22	Ball, Check – 6,35 mm [.250 in.] OD
23	Pin, Roll – 34,92 mm [1.375 in.] Length
30	Ball – 4,762 mm [.1875 in.] OD
31	Pin, Roll – 40,00 mm [1.575 in.] Length
73	Ring, Back-up
74	Seal
85	Ring, Back-up
86	Ring, Seal

Ref. No.	Description
87	Drive
88	Plate, Valve
89	Valve S/A
89-1	Piston
89-2	Spring, Compression
89-3	Piston, Guide Spring
89-4	Plug/O-ring S/A
90	Plate Valve
95	Gerotor
U	Retainer, Check Ball
V	Ball, Check
W	Seal — 7,6 mm [.30 in.] ID
X	Seat, Check Ball
Y	Seal — 9,2 mm [.36 in.] ID
Z	Screw, Set



Tools required for disassembly and reassembly.

- Screwdriver (102-152 mm [4 in. - 6 in.] long, x 3 mm [1/8 in.] wide flat blade).
- 6 Point (E10) Drive part No. 64489-000* or 1/2 inch socket for current hex head cap screws.
- Breaker bar wrench.
- Torque wrench (30 Nm [275 lb-in] capacity).
- Plastic hammer or rubber hammer.
- 1/4 inch Hex key.
- #10-24 machine screw, 38 mm [1-1/2 in.] long.
- Needle nose pliers.

The following tool is not necessary for disassembly and reassembly, but is extremely helpful.

Spring installation tool 600057*

* Tools available—by special order—through our service department.

Cleanliness is extremely important when repairing a steering control unit. Work in a clean area. Before disconnecting lines, clean port area of unit thoroughly. Use a wire brush to remove foreign material and debris from around exterior joints of the unit.

We recommend that you keep the unit in a vise during disassembly. Follow the clamping procedures explained throughout the manual.

Gerotor (Meter) End

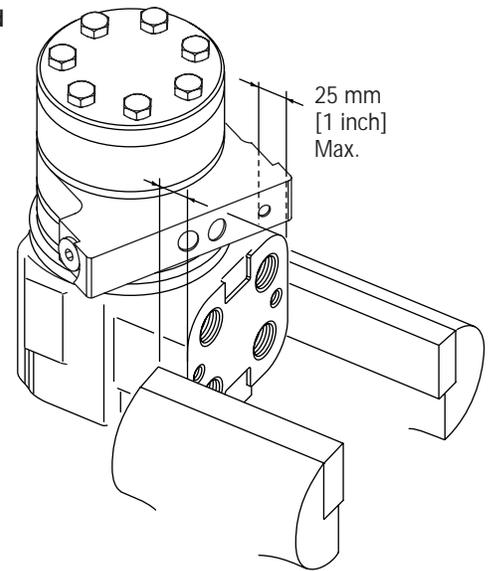


Figure 1

1 Clamp unit in vise, meter end up. Clamp lightly on edges of port face sides (see figure 1). Use protective material on vise jaws. Housing distortion could result if jaws are overtightened.

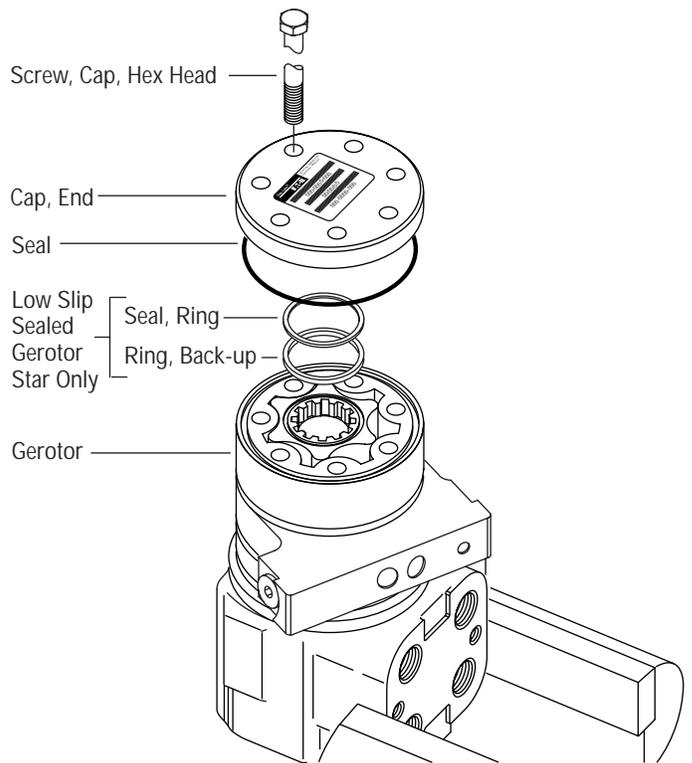


Figure 2

- 2 Remove 5/6 in. cap screws.
- 3 Remove end cap.
- 4 Remove seal.

Note: Some units may have a *low slip sealed gerotor star*, this unit includes a ring seal and a back-up ring (remove these parts if applicable).

Disassembly

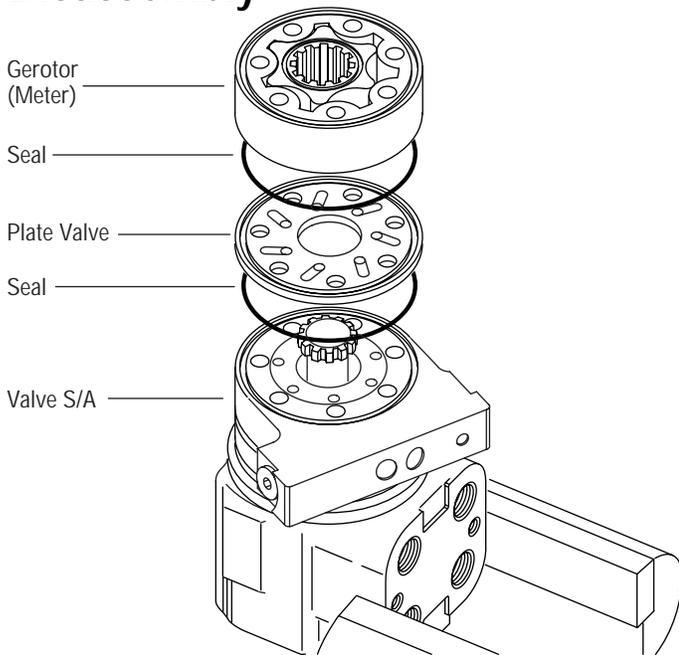


Figure 3

- 5 Remove gerotor (meter). Be careful not to drop star.
- 6 Remove seal from valve plate.
- 7 Remove valve plate.
- 8 Remove seal from valve S/A.

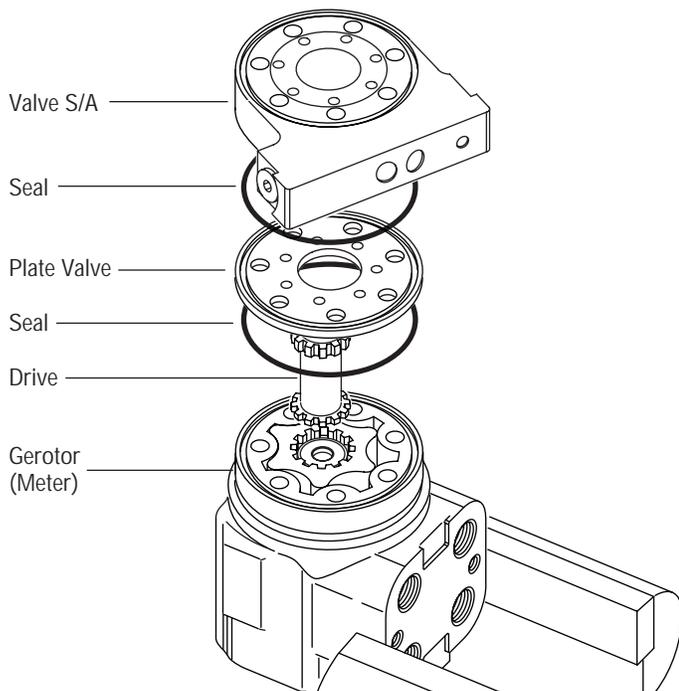


Figure 4

- 9 Remove valve S/A
- 10 Remove seal from valve plate.

- 11 Remove valve plate
- 12 Remove the first of the two drives.
- 13 Remove seal from gerotor (meter).

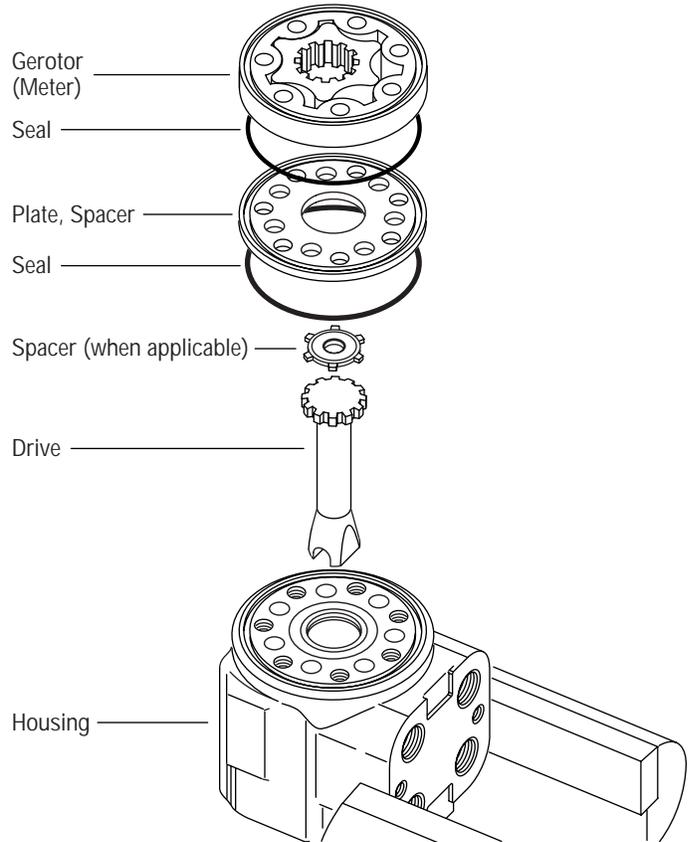


Figure 5

- 14 Remove gerotor (meter). Be careful not to drop star.
- 15 Remove seal from spacer plate.
- 16 Remove drive spacer. Spacer is not used on some models. Refer to Parts Information No. 6-327 to determine if spacer is used on your particular model.
- 17 Remove the second drive.
- 18 Remove seal from housing.
- 19 Remove housing from vise.

Disassembly

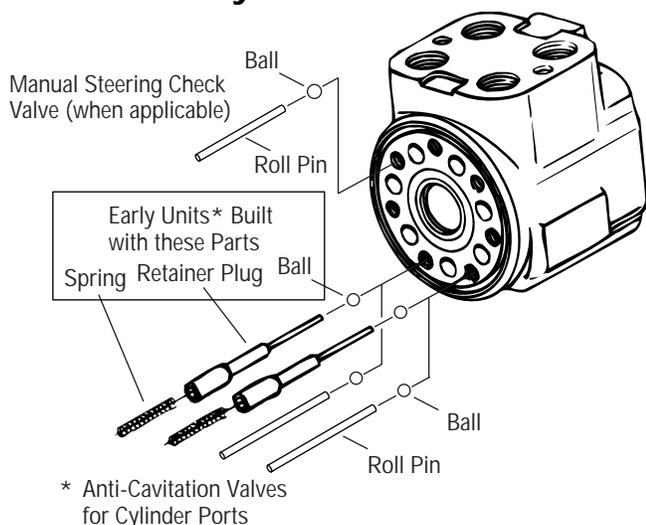


Figure 6

20 Carefully remove anti-cavitation valves and manual steering check valve (roll pin and ball – if applicable) from bolt holes by tipping housing as shown (see figure 6).

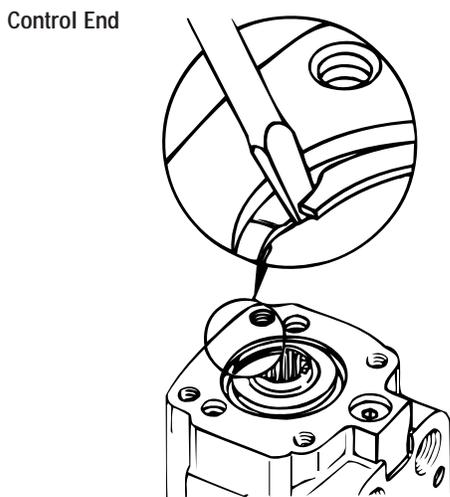


Figure 7

21 Place housing on clean soft cloth (gerotor end down) to protect surface finish. Use thin bladed screwdriver to pry retaining ring from housing, as shown in figure 7.

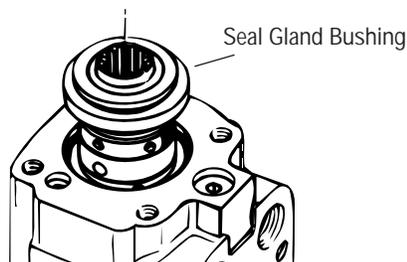
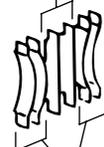


Figure 8

22 Lift spool and sleeve assembly up just far enough to free gland bushing from housing (figure 8). Remove bushing.

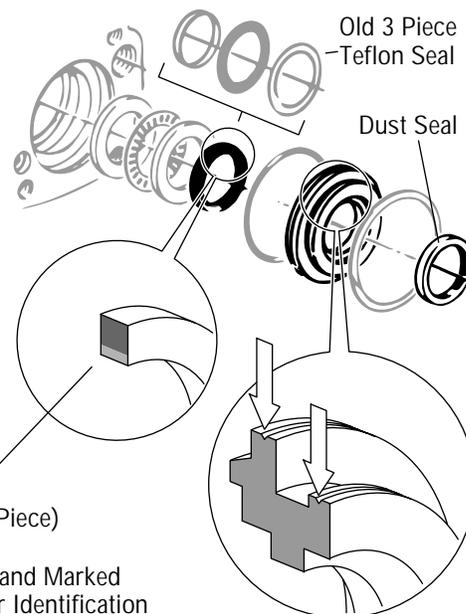
Low Input Torque Steering Control Units

Spring Spacers (2)



Replacement Teflon Seal (1 Piece)

Special Seal Gland Marked with Groove for Identification



Standard Input Torque Steering Control Units



Quad Ring Seal

Standard Seal Gland **Not** Marked with Groove (Special Seal Gland Shown with Groove Above)

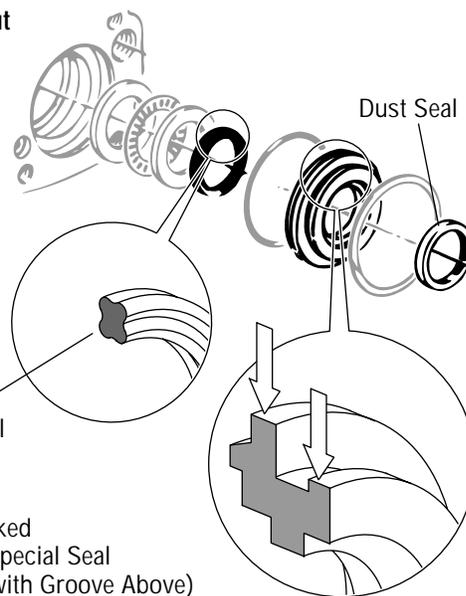


Figure 9

Note: Examine bushing to determine whether you are repairing low torque or standard torque unit. Low torque unit has grooves on seal gland bushing while standard torque unit has no grooves on bushing. Seal gland bushings for low input torque and standard torque units are not interchangeable (see figure 9).

23 *Low Input Torque Units:* Remove back-up ring, o-ring and Teflon seal from seal gland bushing. *Standard Input Torque Units:* Remove quad ring seal from seal gland bushing.

24 Use thin bladed screwdriver to pry dust seal from seal gland bushing. Do not damage bushing.

Disassembly

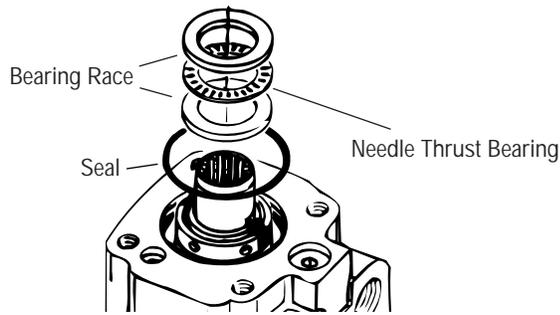


Figure 10

25 Remove two bearing races and needle thrust bearing and seal from spool and sleeve assembly.

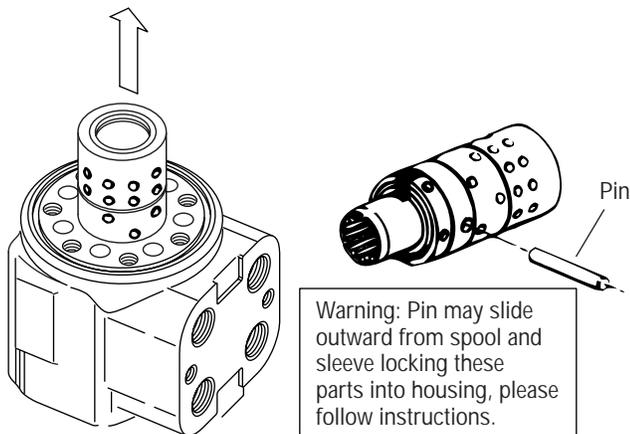


Figure 11

26 Tip housing onto port face. Remove spool and sleeve assembly from 14 hole end of housing (figure 11).

Attention: Do not bind spool and sleeve in housing. Rotate spool and sleeve assembly slowly when removing it from housing.

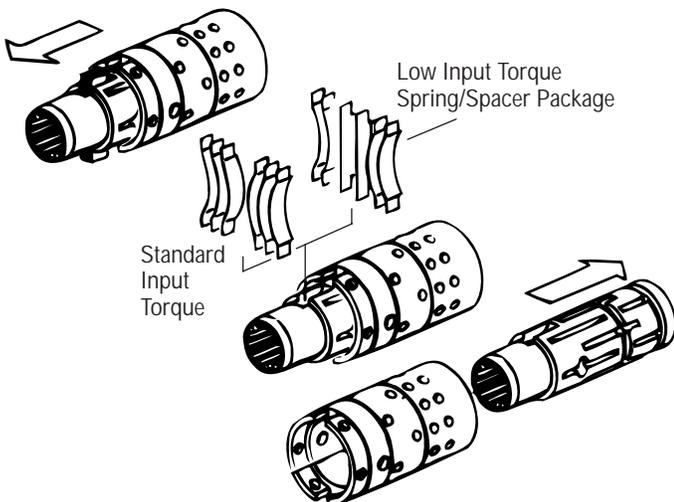


Figure 12

27 Push pin from spool and sleeve assembly.

28 Push spool partially from control end of sleeve, then carefully remove centering springs from spool by hand (figure 12). Low input torque unit uses four centering springs and two spacers. Standard input torque unit uses six centering springs.

Note: Steps 29 -32 apply only to early design of manual steering check valve.

29 Remove manual steering check valve from housing (when applicable) by removing set screw with 1/4 in. hex key.

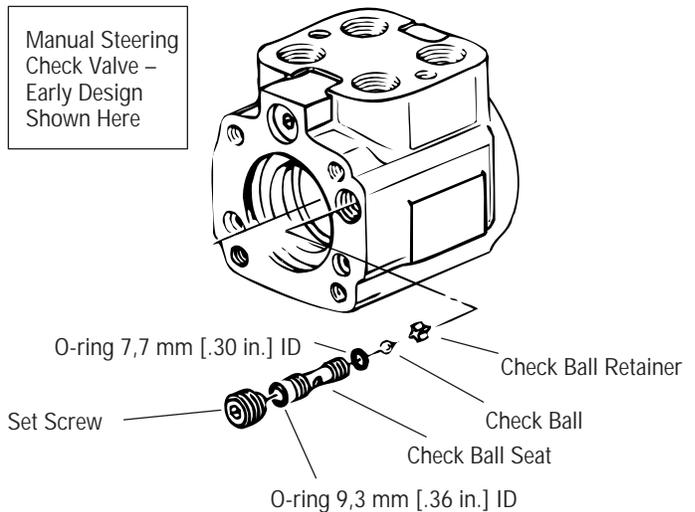


Figure 13

30 Screw a #10-24 machine screw into end of check ball seat. Then lift seat out of housing by pulling on screw with pliers.

31 Remove two seals from check valve seat.

32 Tip housing to remove check ball and check ball retainer.

33 Do not remove any valves other than manual steering check valve assembly and anti-cavitation valve assembly. All other valves are factory preset and are non-serviceable.

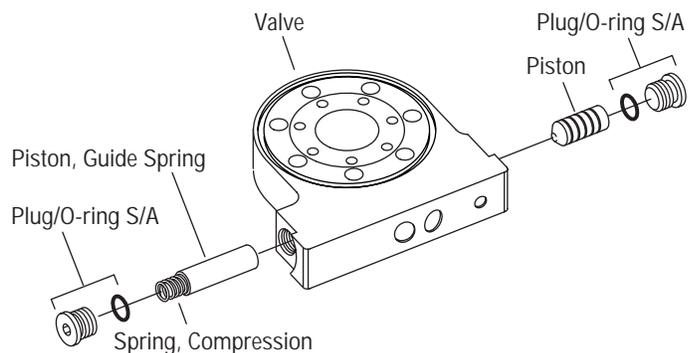


Figure 14

34 Disassemble valve subassembly as shown above.

Reassembly

Check all mating surfaces. Replace any parts that have scratches or burrs that could cause leakage. Clean all metal parts in clean solvent. Blow dry with air. Do not wipe dry with cloth or paper towel because lint or other matter can get into the hydraulic system and cause damage. Do not use grit paper or file or grind these parts.

Note: Lubricate all seals with clean petroleum jelly (Vaseline). A good service policy is to replace all old seals with new seals. **Do not use excessive lubricant on seals for meter section.**

Refer to parts lists covering your steering control unit when ordering replacement parts.

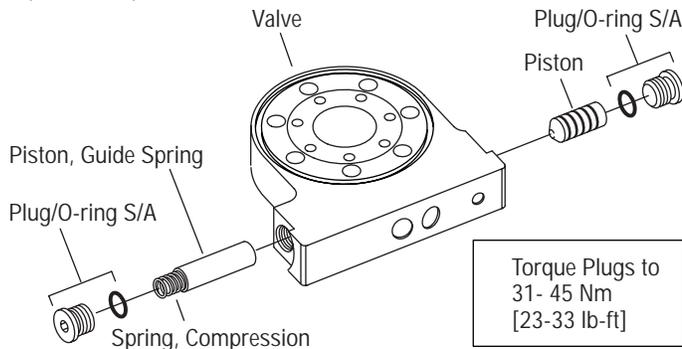


Figure 15

1 Reassemble valve parts with new o-rings on plugs.

Control End

You may skip steps 2 through 6 if the early design manual steering check valve does not apply in the unit you are servicing.

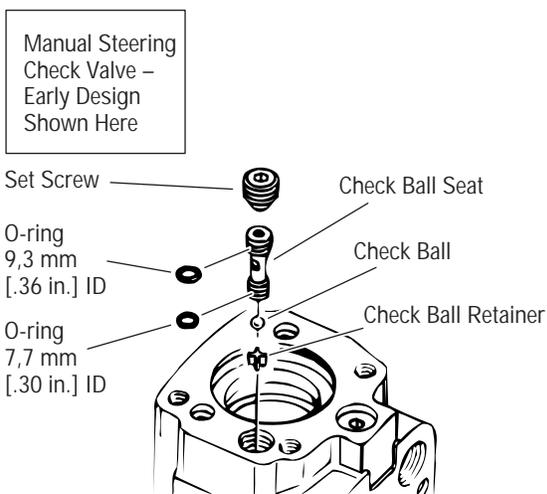


Figure 16

2 Use a needle nose pliers to lower check ball retainer into check valve hole in housing (when applicable). Make sure retainer is straight in housing (not tilted on edge – see figure 16).

3 Install check ball in housing.

4 Lubricate 9,2 mm [.36 in.] ID seal and 7,6 mm [.30 inch] ID seals. Install seals on check ball seat as shown in figure 16.

5 Lubricate check ball seat and seals thoroughly before installing seat in housing. When installing seat do not twist or damage seals. Install check ball seat in housing, inserting open end of seat first (figure 16). Push check ball seat to shoulder of hole.

6 Install set screw. Use a 1/4 in. hex key to torque set screw to 11 Nm [100 lb-in] maximum. To prevent interference, make sure top of set screw is slightly below housing mounting surface.

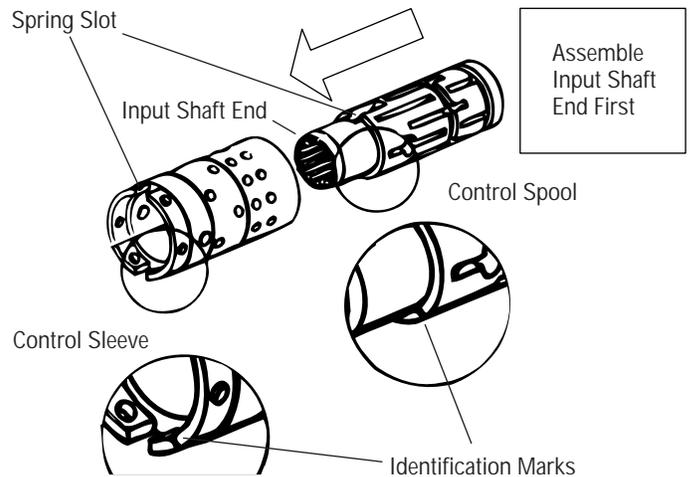


Figure 17

7 Assemble spool and sleeve carefully so that spring slots line up at the same end. Rotate spool while sliding parts together. Some spool and sleeve sets have identification marks; align these marks as shown in figure 17. Test for free rotation. Spool should rotate smoothly in sleeve with fingertip force applied at splined end. Align spring slots in spool and sleeve and stand parts on end of bench.

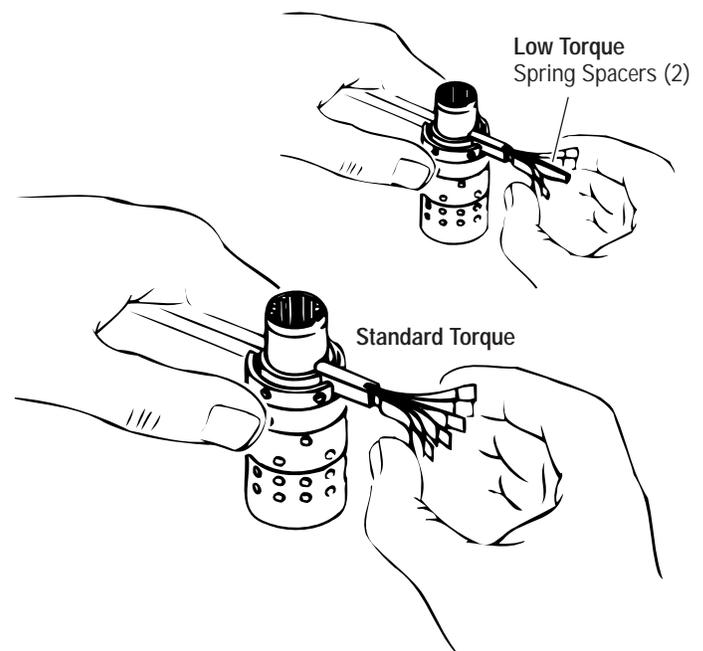


Figure 18

8 Centering Springs for Low Input Torque Units: *Low input torque units use four centering springs with two spring spacers in the center, as shown in Figure 18.*

Centering Springs for Standard Input Torque Units:

Standard input torque units use six centering springs, as shown in figure 18. Insert spring installation tool (PartNo. 600057) through

Disassembly

spring slots of spool and sleeve. Position centering springs on bench so that extended edge is down and arched center section is together (figure 18). Next, with spring notches facing sleeve, insert one end of entire spring set into spring installation tool.

9 Compress extended end of centering spring set and push into spool and sleeve assembly. Keep pressure on spring ends while withdrawing installation tool and pushing forward on springs at same time.

10 Center spring set in spring slots. Seat springs down evenly and flush with upper surface of spool and sleeve.

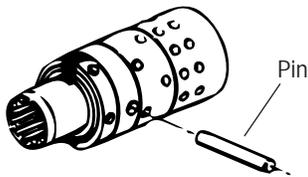


Figure 19

11 Insert pin through spool and sleeve assembly until pin is flush at both sides of sleeve.

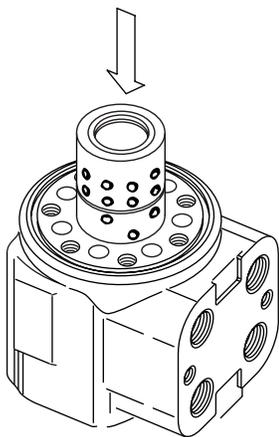


Figure 20

12 Position spool and sleeve assembly so that splined end of spool enters 14 hole end of housing first (figure 20).

Attention: While inserting spool and sleeve assembly into housing, make sure parts do not tilt out of position. Push assembly gently into place with slight rotating action, keeping pin nearly horizontal.

Bring spool assembly entirely within housing bore until parts are flush at 14 hole end of housing. To prevent cross pin from dropping into discharge groove of housing, do not pull spool assembly beyond this point. With spool assembly in this flush position, check for free rotation within housing by turning assembly with fingertip force at splined end.

13 Place housing on clean lint free cloth. Install 47,2 mm [1.86 in.] ID seal in housing (figure 21).

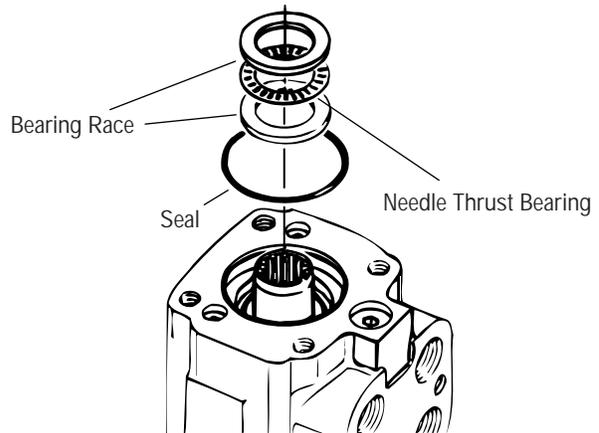


Figure 21

14 Install two bearing races and needle thrust bearing as shown in figure 21.

15 Install 24,9 mm [.98 in.] ID dust seal in seal gland bushing, with smooth side of seal facing down towards bushing (see figure 22).

16 Low Input Torque Units: Lightly lubricate seal before installation. Install Teflon seal (see figure 23).

Standard Input Torque Units: *Install quad ring seal in seal gland bushing. Smooth seal in place with finger. Do not use any seal that falls freely into pocket of bushing.*

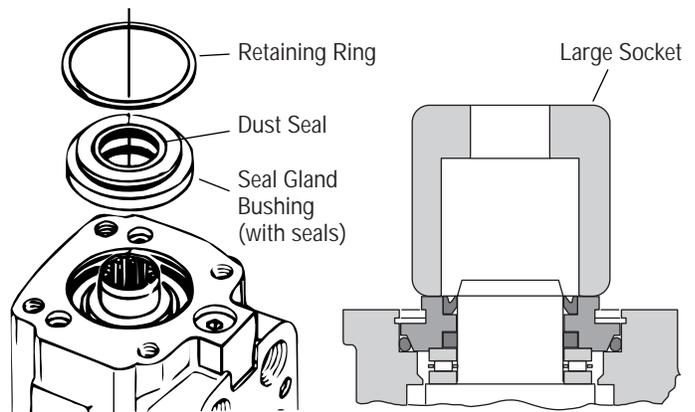
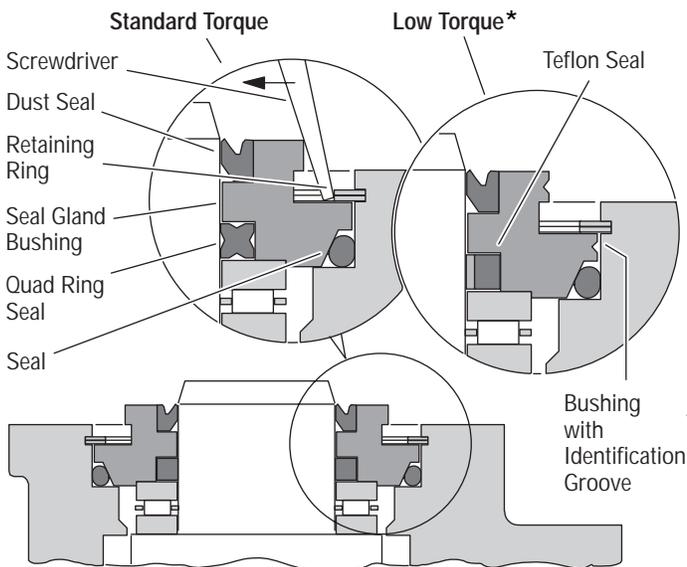


Figure 22

17 Install seal gland bushing over spool end with twisting motion. Tap bushing in place, use a large socket (see figure 22) and a rubber hammer. Make sure bushing is flush against bearing race.

Reassembly



* **Low Input Torque Seal Package** — One Piece Teflon Seal use on -002 Unit and is Replacement Seal for 3 Piece Seal on Older Low Input Torque Units.



Cross Section of Old and New Seal

Figure 23

18 Install retaining ring in housing (figures 22 and 23). After installing ring, pry around ring circumference with screwdriver to properly seat ring in groove.

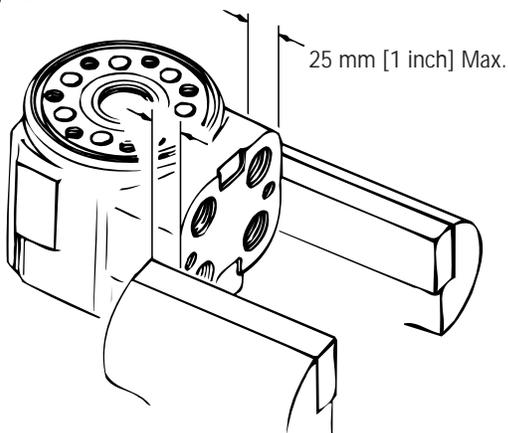


Figure 24

19 Clamp housing in vise, as shown in figure 24. Clamp lightly on edges of mounting area; do not overtighten jaws.

Note: Check to insure that spool and sleeve are flush or slightly below 14 hole surface of housing.

Attention: Clean upper surface of housing by wiping with palm of clean hand. Clean each of the flat surfaces of meter section parts in a similar way just before reassembly. Do not use cloth or paper to clean surfaces.

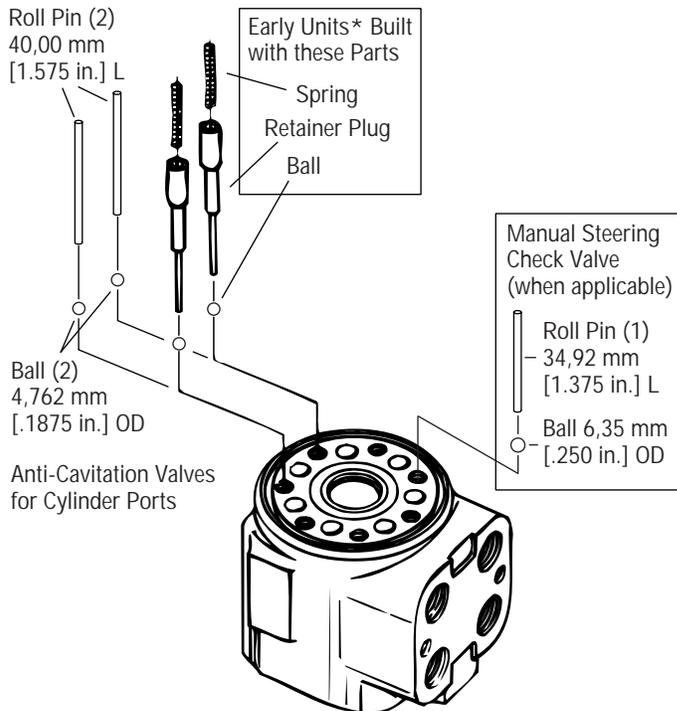


Figure 25

20 Install 72,6 mm [2.86 in.] ID seal in housing (figure 25).

21 Install anti-cavitation valves and manual steering check valve (if used) in holes, as shown in figure 25.

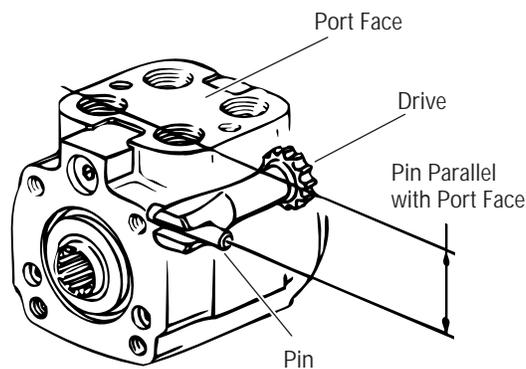


Figure 26

22 Rotate spool and sleeve assembly until pin is parallel with port face (figure 26). Install drive, making sure drive is engaged with pin. To assure proper alignment, mark drive as shown in figure 27, reference B. When marking drive, note relationship of slotted end of drive to splined end of drive.

Reassembly

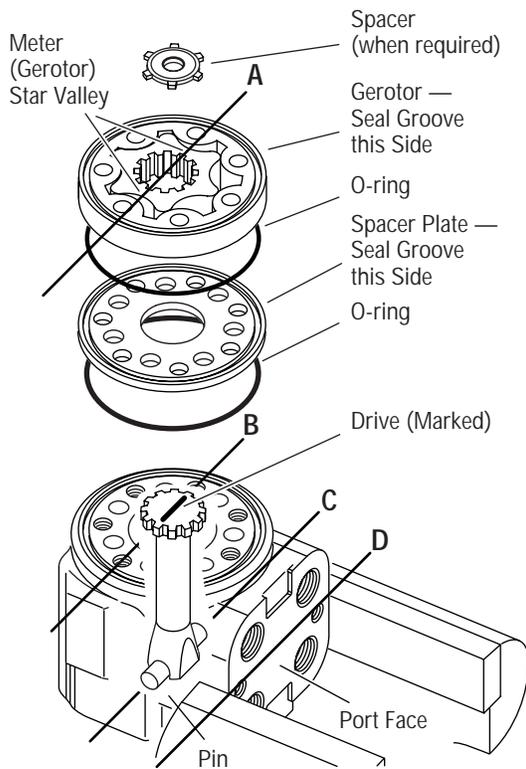


Figure 27

Timing Reference Data — Align star valleys (reference A) with marked drive 1 and drive 2 (reference B). Valleys must align with pin. Note parallel relationship of reference lines A, B, C, and D in figure 25 and 27. Align bolt holes without disengaging gerotor (meter) from drive.

- 23 Lubricate and install 72,6 mm [2.86 in.] ID seal in gerotor (meter).
- 24 Install spacer plate. Align bolt holes in spacer plate with tapped holes in housing.
- 25 Install Drive.
- 26 Lubricate and install 72,6 mm [2.86 in.] ID seal in spacer plate.
- 27 Install gerotor (meter) seal groove up, note position of star valleys in relation to marked drive.
- 28 Install drive spacer when required.

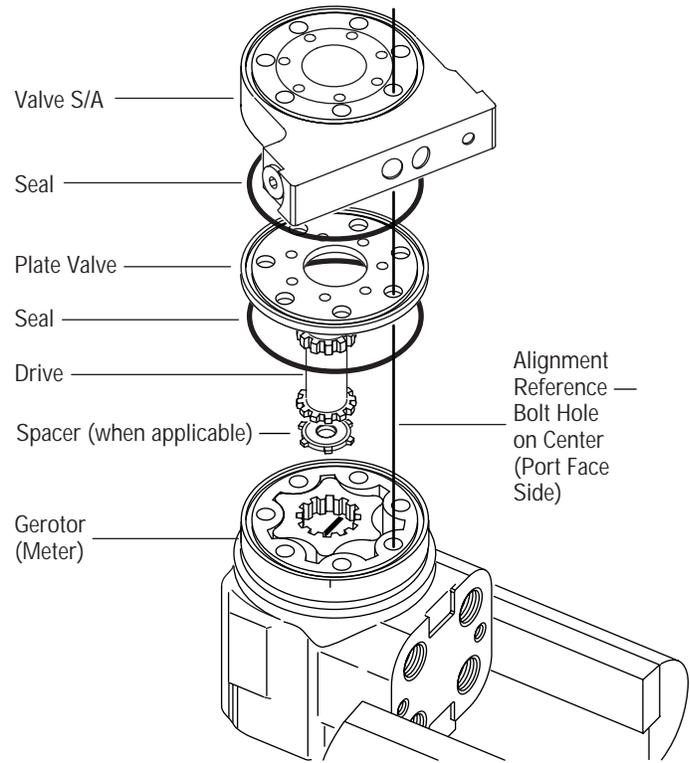


Figure 28

- 29 Lubricate and install 72,6 mm [2.86 in.] ID seal in gerotor ring.
- 30 Position second marked drive correctly over marked first drive.
- 31 Install Valve plate.
- 32 Lubricate and install 72,6 mm [2.86 in.] ID seal in valve plate.
- 33 Install valve S/A, see figure 28 for correct position.

Resassembly

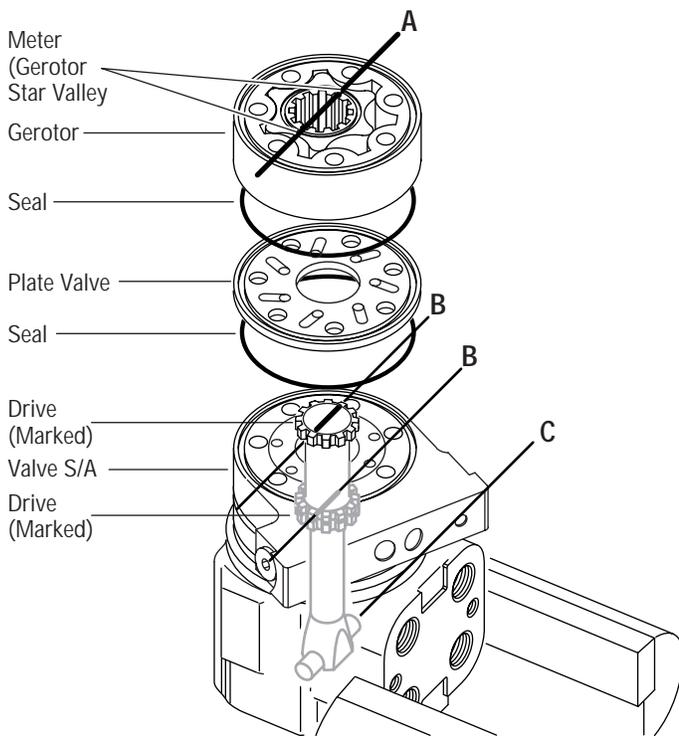


Figure 29

- 34 Lubricate and install 72,6 mm [2.86 in.] ID seal in valve S/A.
- 35 Install valve plate.
- 36 Lubricate and install 72,6 mm [2.86 in.] ID seal in valve plate.
- 37 Install second gerotor (should be the thicker of the two) seal groove up, note position of star valleys in relation to marked drives.
- 38 When used, install back-up ring and seal ring in gerotor star.

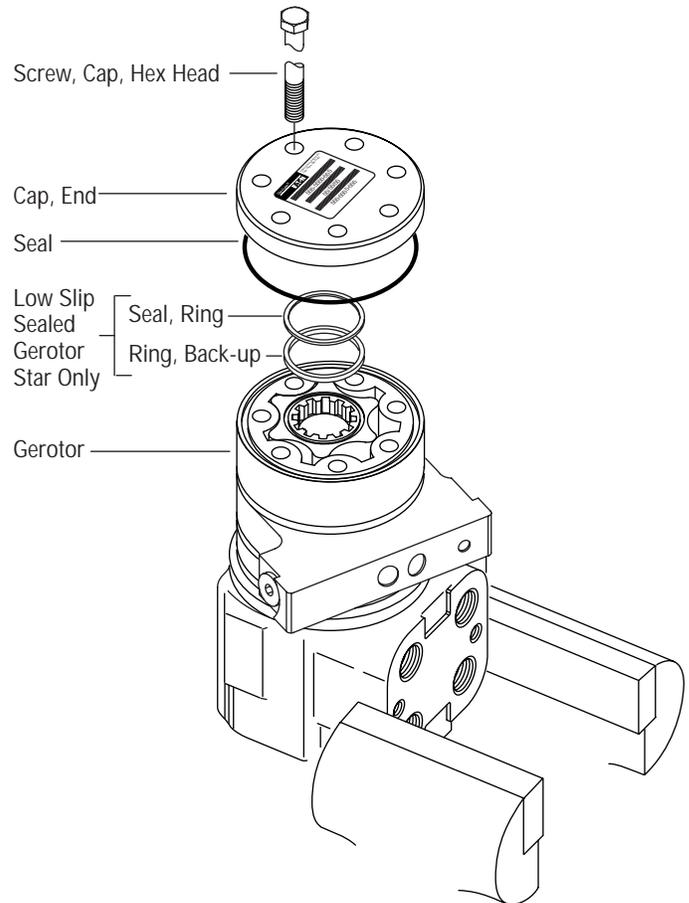


Figure 30

- 39 Lubricate and install 72,6 mm [2.86 in.] ID seal in gerotor (meter).
- 40 Install end cap on gerotor, aligning holes.
- 41 Install 7 dry cap screws in end cap. Pretighten screws to 17 Nm [150 lb-in], then torque screws to 25-30 Nm [225-275 lb-in] in sequence shown in figure 31.

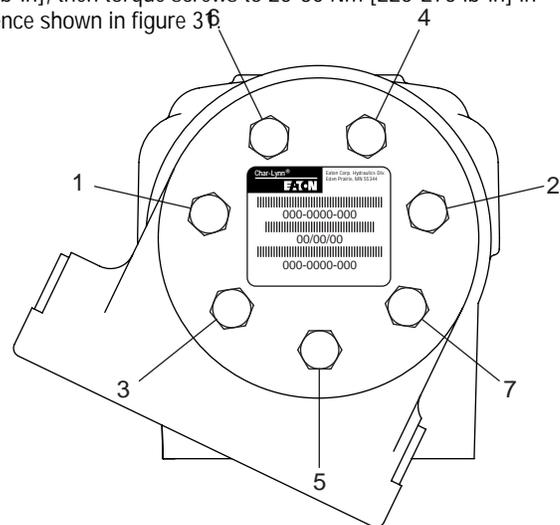


Figure 31

Steering Control Units — Dual Displacement

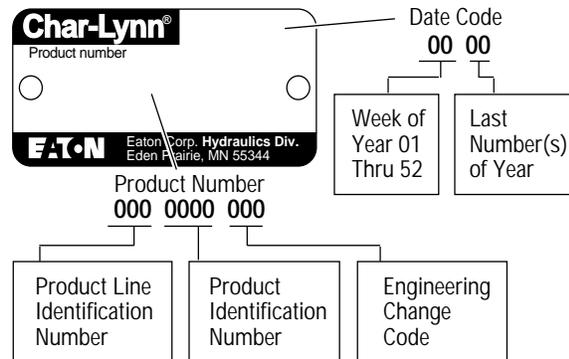
How to Order Replacement Parts

Each Order Must Include the Following:

1. Product Number
2. Date Code
3. Part Name
4. Part Number
5. Quantity of Parts

For additional literature contact Eaton Corp. Hydraulics Division 15151 Highway 5 Eden Prairie, MN 55344.

- Specifications and performance data, Catalog No. 11-872
- Replacement part numbers and kit information — Parts Information No. 6-327

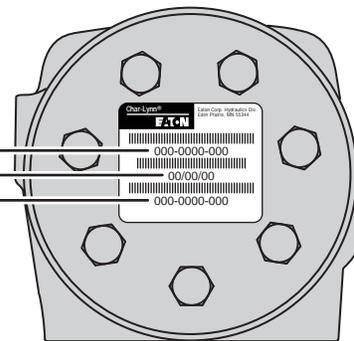


Bar Code Label — Launch Date June, 1999

Customer part number or base unit number if it has a column or valve assembled

Month / Day / Year

Eaton Part Number



Port Face

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