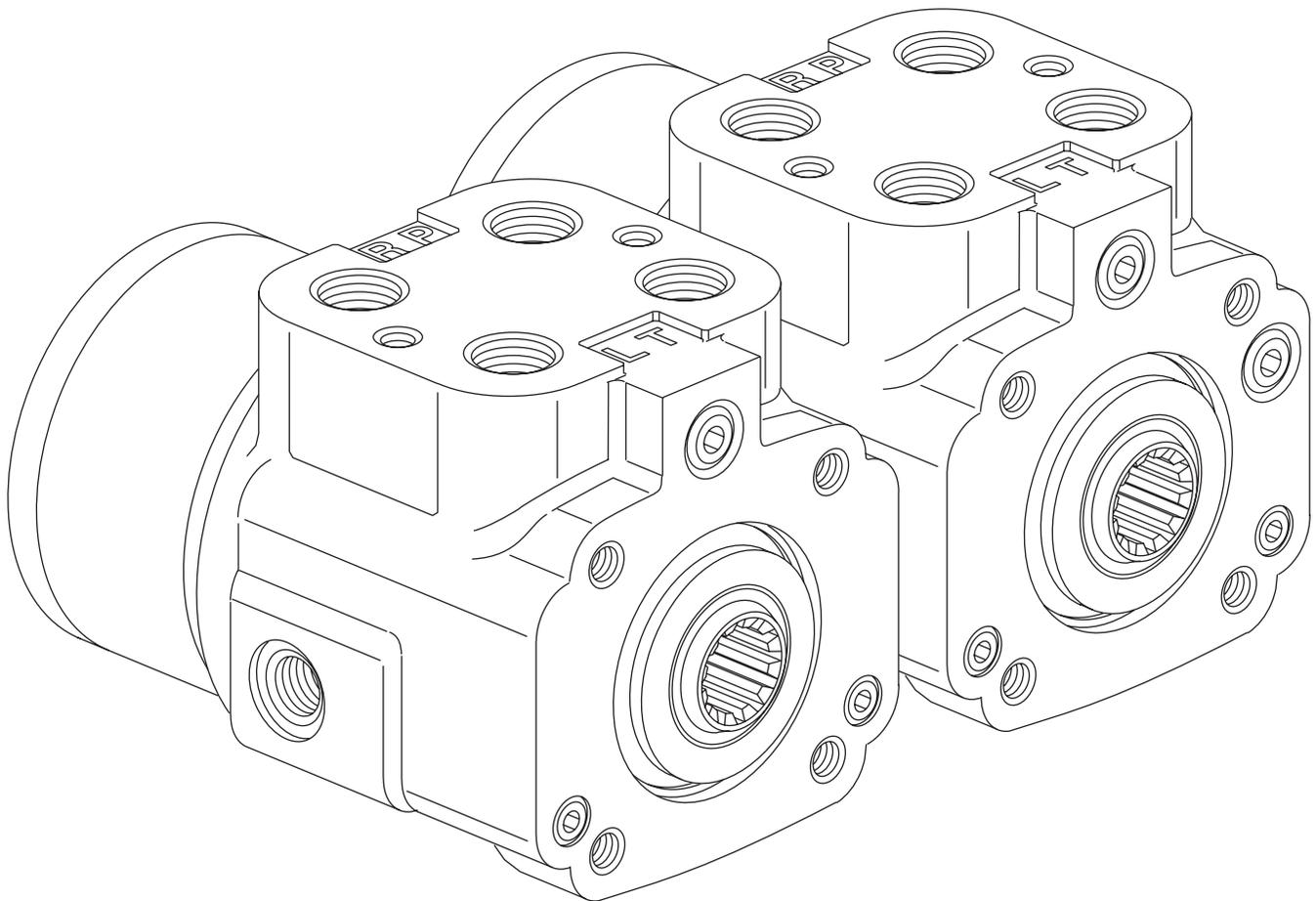


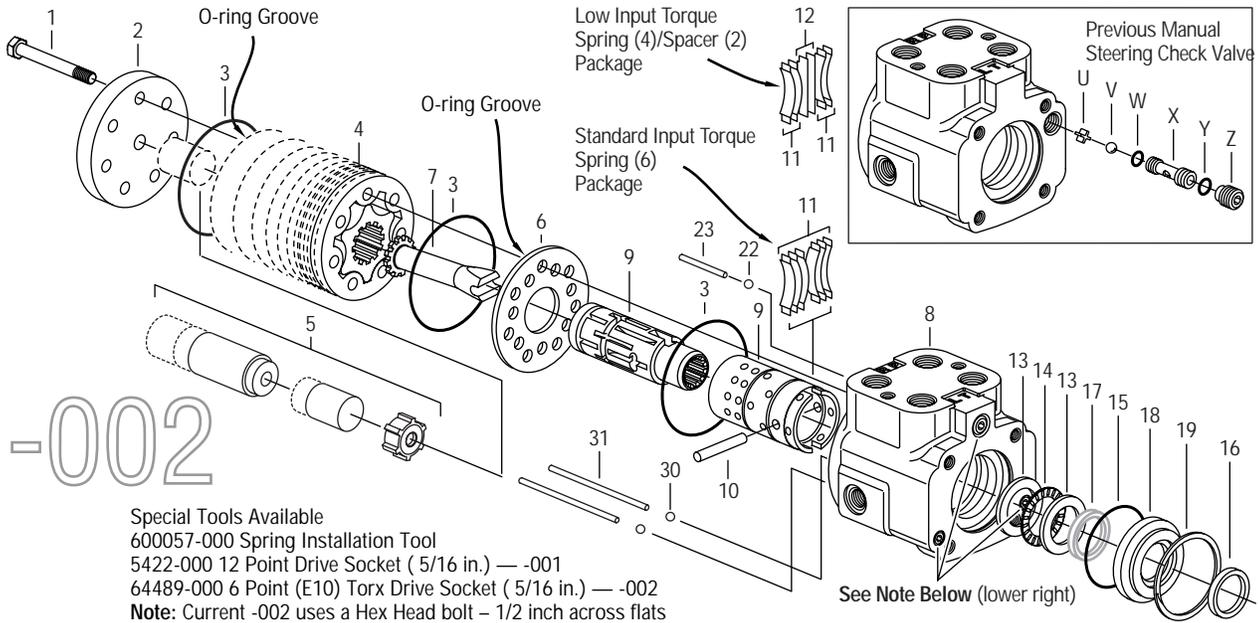


Repair Information

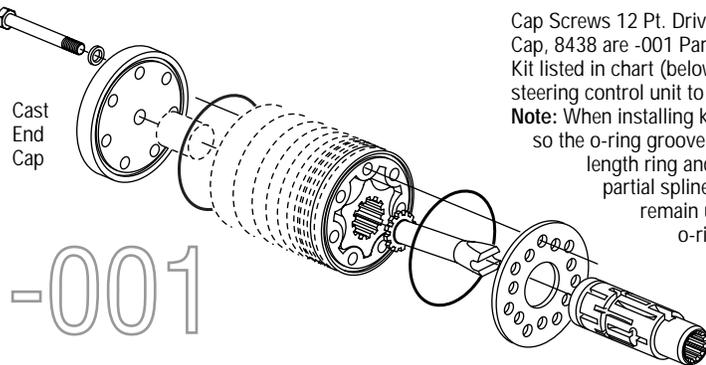


110, 230 and 450 Series
Steering Control Units

001 002



Special Tools Available
 600057-000 Spring Installation Tool
 5422-000 12 Point Drive Socket (5/16 in.) — -001
 64489-000 6 Point (E10) Torx Drive Socket (5/16 in.) — -002
Note: Current -002 uses a Hex Head bolt – 1/2 inch across flats



Cap Screws 12 Pt. Drive No. 5389-XXX, Spacer Plate 7970, and End Cap, 8438 are -001 Parts. If any one of these parts needs replacing, order Kit listed in chart (below) by displacement. Kit parts will update your steering control unit to -002 design level.

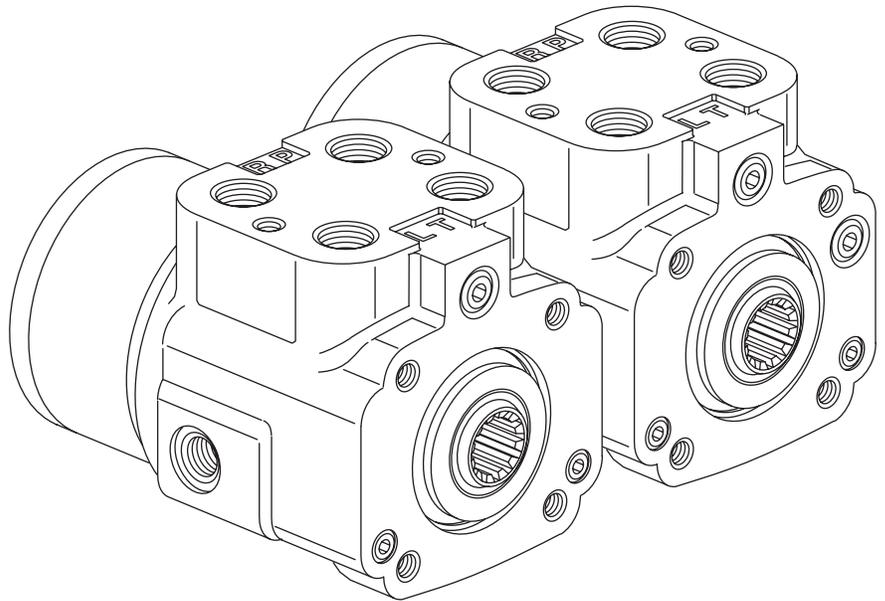
Note: When installing kit parts, gerotor outer ring will have to be turned so the o-ring groove faces the end cap (gerotor star—if the spline is full length ring and star can be turned together, but if star has a partial spline turn ring only, this partial splined star must remain unturned). Replacement spacer plate will have a o-ring groove, position this groove toward gerotor.

Note: All housing valves are factory adjusted on assembled units to a code designation and are not to be changed. This housing (with specified valve pressure settings), the mating spool, and the sleeve are not practical replacement parts.

Ref. No.	Description
1	Cap Screw, Hex Head
2	Cap, End
3	Seal, 72,6 mm [2.86 in.] ID
4	Gerotor
5	Spacer
6	Plate, Spacer
7	Drive
8	Housing
9	Sleeve, Control/Spool, Control
10	Pin, Centering

Ref. No.	Description
11	Spring, Centering
12	Spring, Spacer
13	Bearing Race
14	Bearing, Needle Thrust
15	Seal, 47,2 mm [1.86 in.] ID
16	Seal, 24,9 mm [.98 in.] ID
17	Seal, Quad Ring, 26,7 mm [1.05 in.] ID
18	Bushing, Seal Gland
19	Ring, Retaining
22	Ball, 6,35 mm [.250 in.] OD

Ref. No.	Description
23	Pin, Roll, 34,92 mm [1.375 in.] Length
30	Ball, Check
31	Pjn, Roll, 40,00 mm [1.575 in.] Length
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 [118 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.

Disassembly

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.

Although not all drawings show the unit in a vise, we recommend that you keep the unit in a vise during disassembly. Follow the clamping procedures explained throughout the manual.

Gerotor (Meter) End

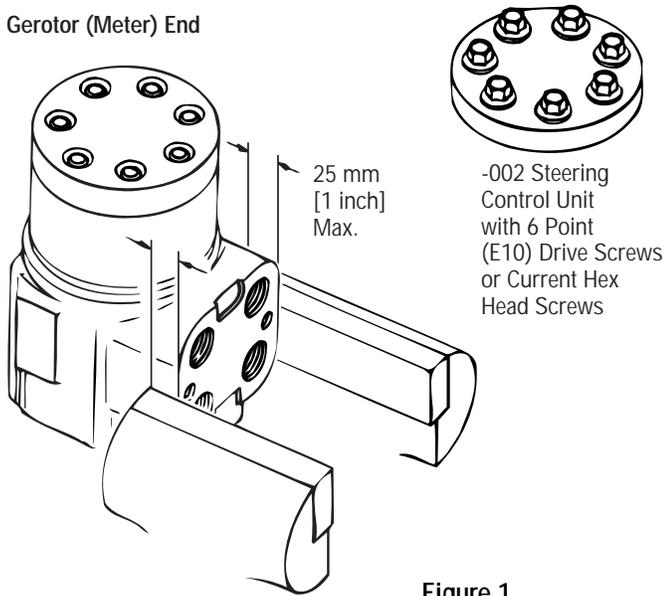


Figure 1

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.

Seal washers are not used with 6 point (E10) drive screws or current hex head screws and -002 end cap (-002 end cap does NOT have the o-ring groove)

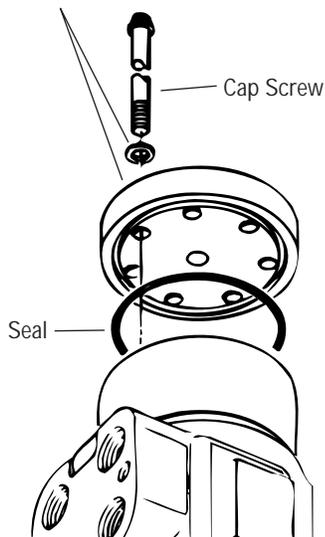


Figure 2

- 2 Remove 5/6 in. cap screws and sealing washers, if used.
- 3 Remove end cap.
- 4 Remove seal.

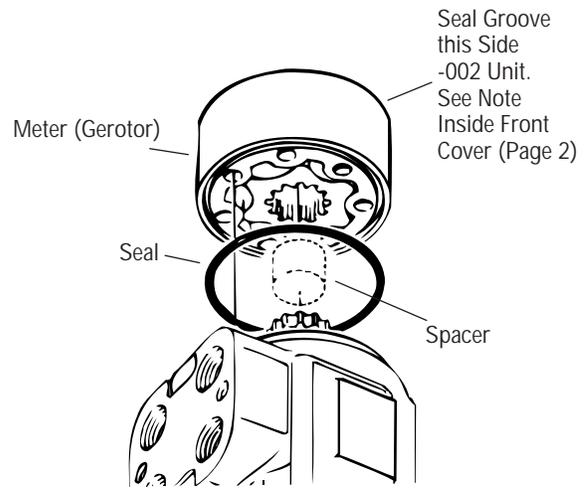


Figure 3

- 5 Remove meter. Be careful not to drop star.
- 6 Remove seal.
- 7 Remove drive spacer. Spacer is not used on some models. Refer to Parts Information No. 6-321 to determine if spacer is used on your particular model.

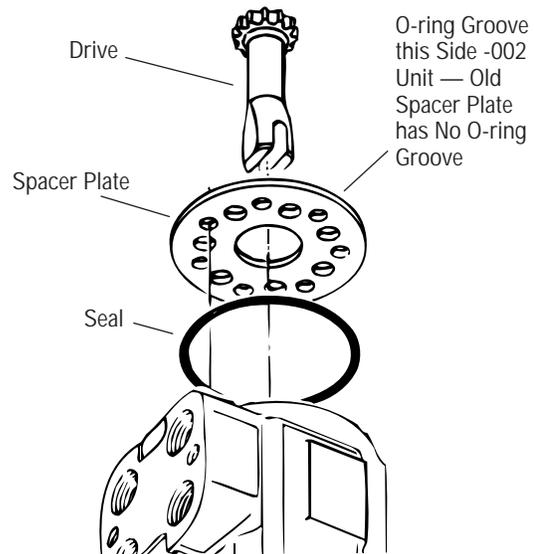


Figure 4

- 8 Remove drive.
- 9 Remove spacer plate.
- 10 Remove seal from housing.
- 11 Remove housing from vise.

Disassembly

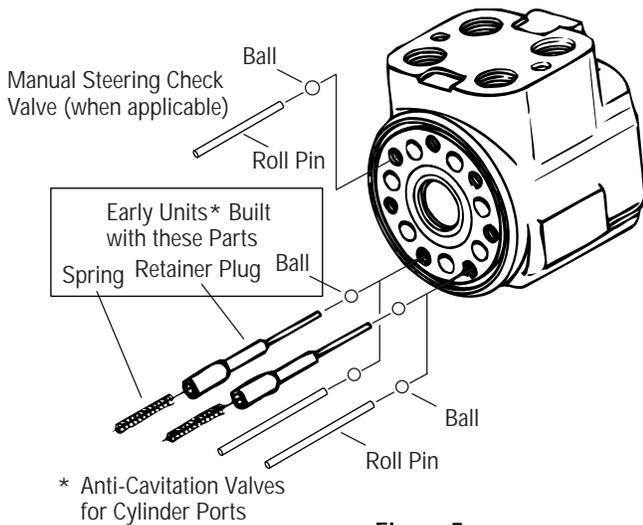


Figure 5

12 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 5).

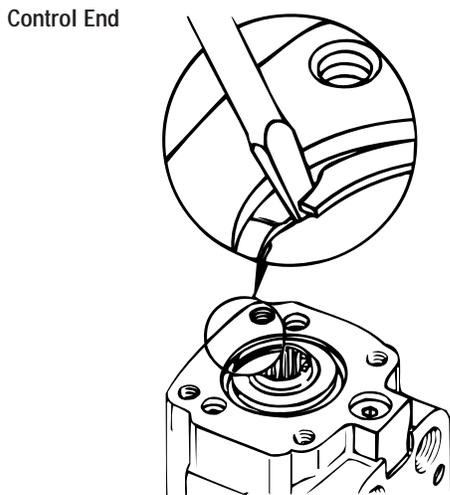


Figure 6

13 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 6.

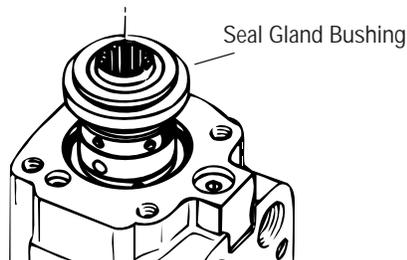
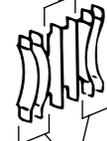


Figure 7

14 Lift spool and sleeve assembly up just far enough to free gland bushing from housing (figure 7). Remove bushing.

Low Input Torque Steering Control Units

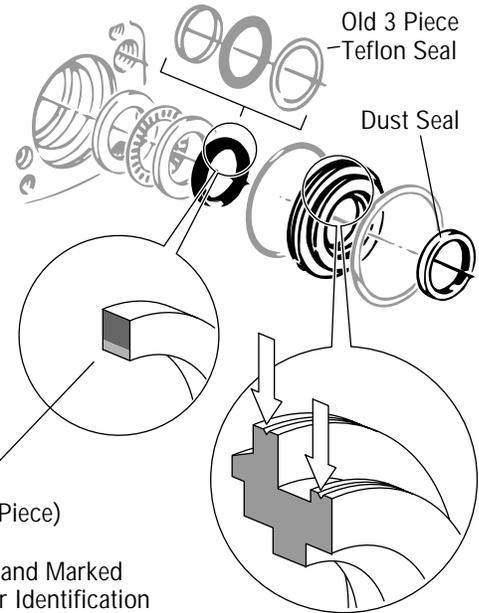
Spring Spacers (2)



Springs (4)

Replacement Teflon Seal (1 Piece)

Special Seal Gland Marked with Groove for Identification



Standard Input Torque Steering Control Units



Springs (6)

Quad Ring Seal

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

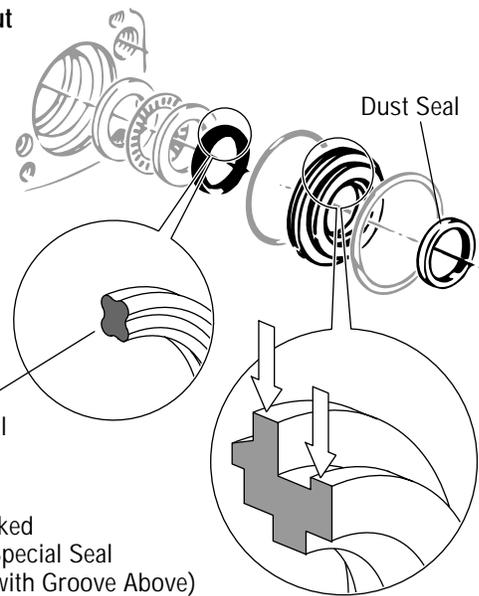


Figure 8

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 8).

15 *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.

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

Disassembly

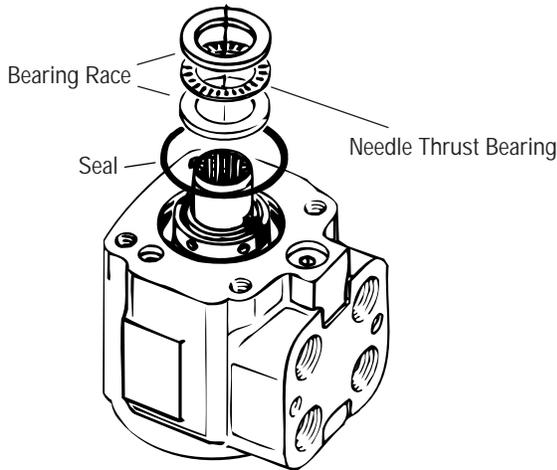


Figure 9

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

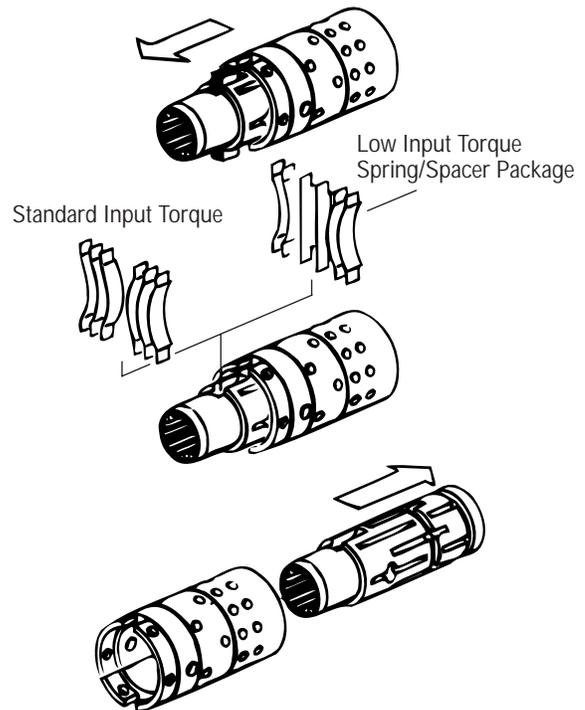


Figure 11

19 Push pin from spool and sleeve assembly.

20 Push spool partially from control end of sleeve, then carefully remove centering springs from spool by hand (Figure 11). Low input torque unit uses four centering springs and two spacers. Standard input torque unit uses six centering springs.

21 Remove seal from housing (see figure 12).

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

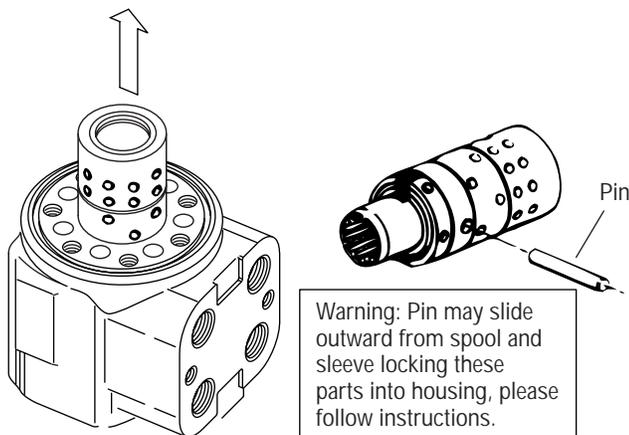


Figure 10

18 Tip housing onto port face. Remove spool and sleeve assembly from 14 hole end of housing (Figure 10).

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

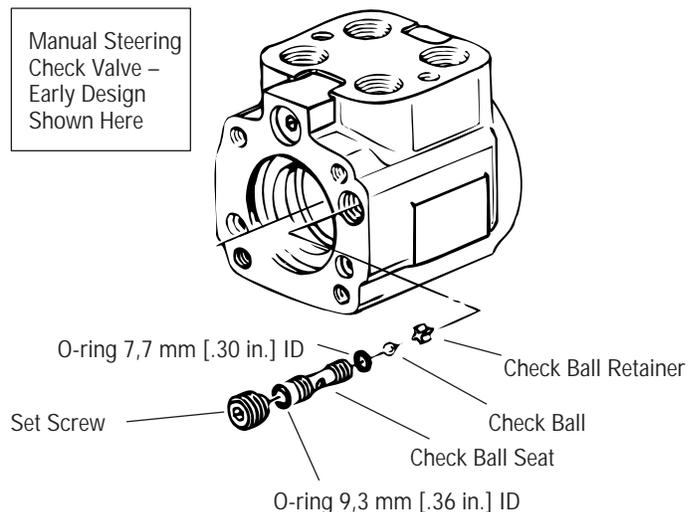


Figure 12

Disassembly/Reassembly

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

24 Remove two seals from check valve seat.

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

26 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.

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.

Control End

You may skip steps 1 through 5 if the early design manual steering check valve does not apply in the unit you are servicing.

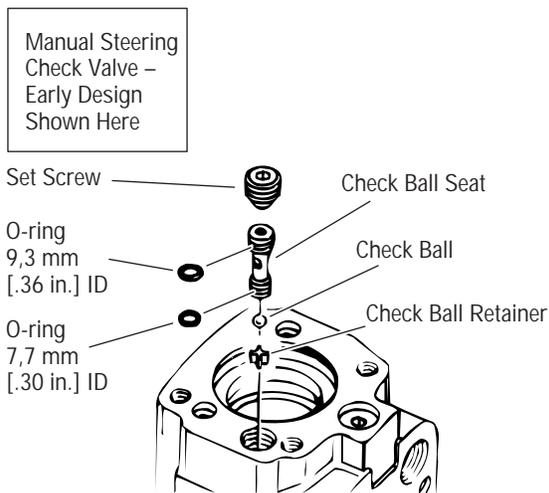


Figure 13

1 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 13).

2 Install check ball in housing.

3 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 13.

4 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 13). Push check ball seat to shoulder of hole.

5 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.

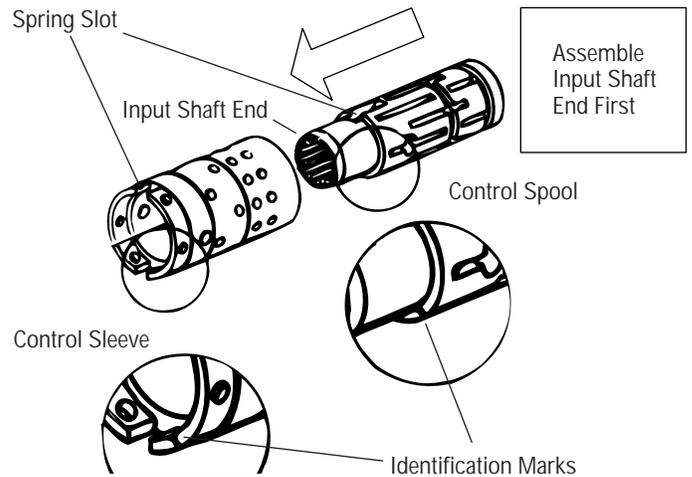


Figure 14

6 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 14. 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.

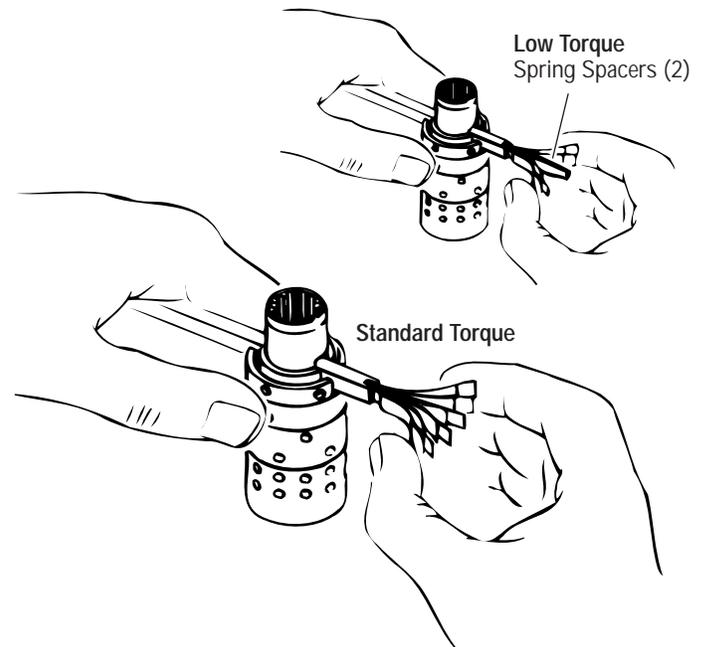


Figure 15

7 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 15.*

Centering Springs for Standard Input Torque Units:

Standard input torque units use six centering springs, as shown in figure 15. 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 15). Next, with spring notches facing sleeve, insert one end of entire spring set into spring installation tool.

8 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.

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

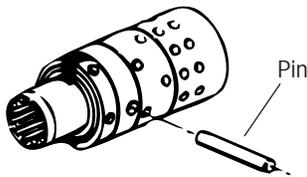


Figure 16

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

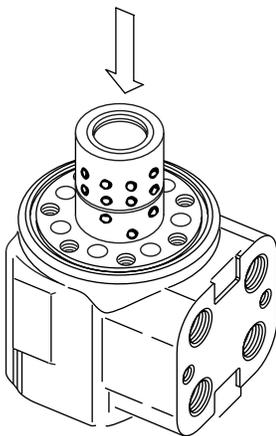


Figure 17

11 Position spool and sleeve assembly so that splined end of spool enters 14 hole end of housing first (figure 17).

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 4 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.

12 Place housing on clean lint free cloth. Install 47,2 mm [1.86 in.] ID seal in housing (figure 18).

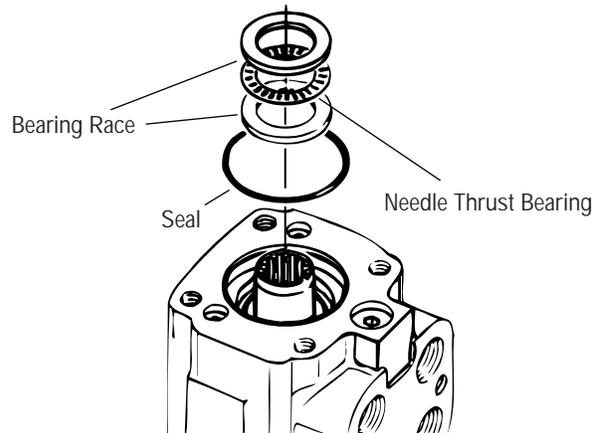


Figure 18

13 Install two bearing races and needle thrust bearing as shown in figure 18.

14 Install 24,9 mm [.98 in.] ID dust seal in seal gland bushing, with smooth side of seal facing down towards bushing (see figure 19).

15 Low Input Torque Units: Lightly lubricate seal before installation. Install Teflon seal (see figure 20).

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.*

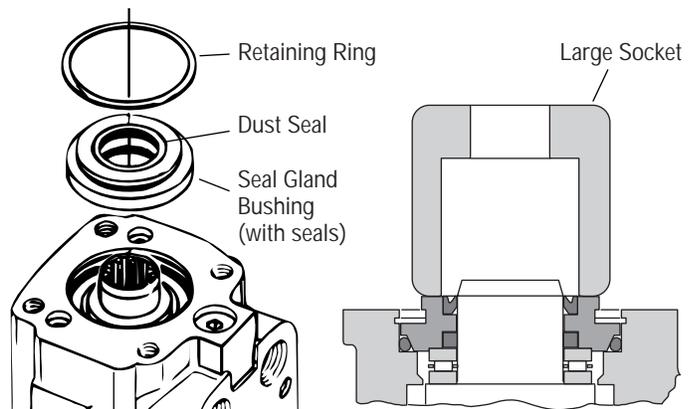
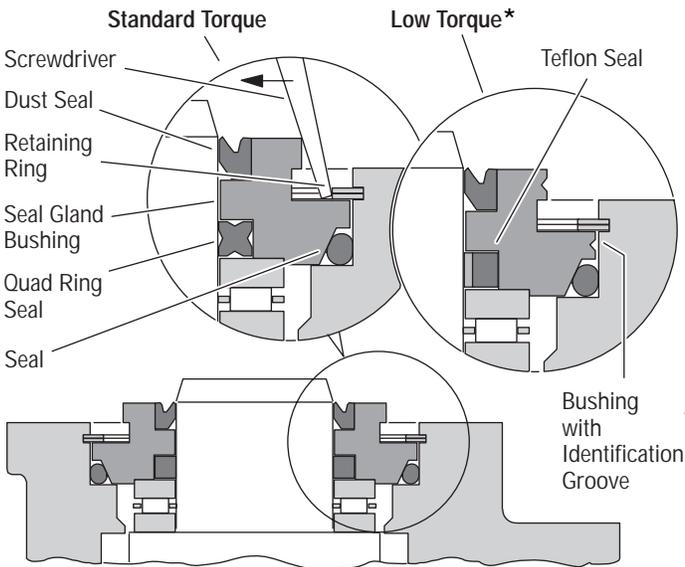


Figure 19

16 Install seal gland bushing over spool end with twisting motion. Tap bushing in place, use a large socket (see figure 19) 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 20

17 Install retaining ring in housing (figures 19 and 20). After installing ring, pry around ring circumference with screwdriver to properly seat ring in groove.

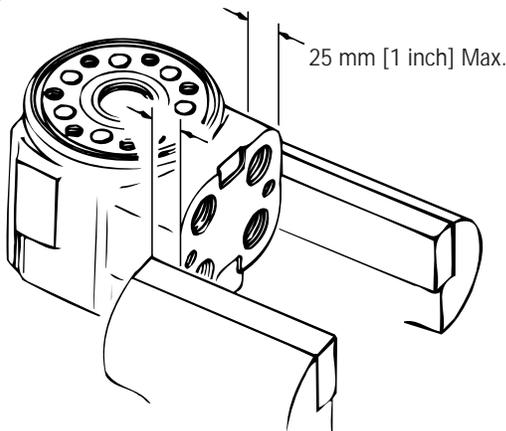


Figure 21

18 Clamp housing in vise, as shown in Figure 21. 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.

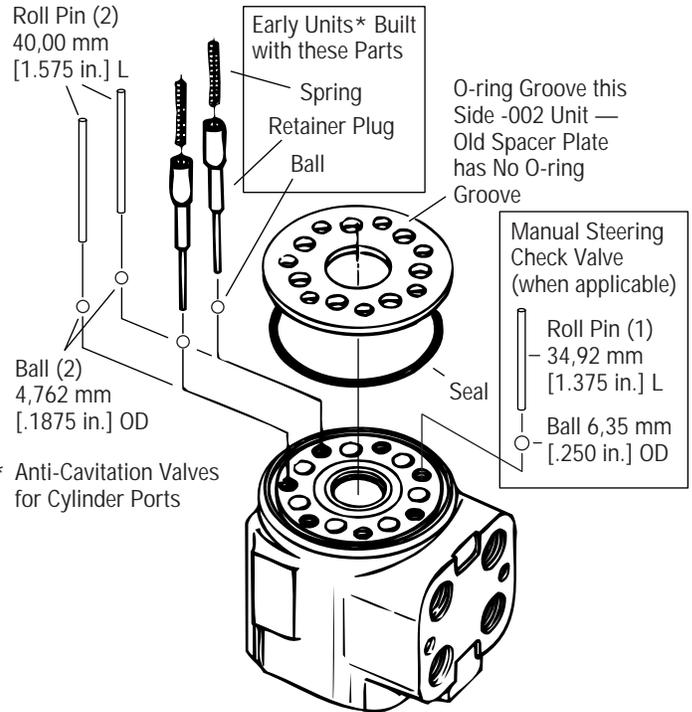


Figure 22

19 Install 72,6 mm [2.86 in.] ID seal in housing (figure 22).

20 Install anti-cavitation valves and manual steering check valve (if used) in holes, as shown in figure 22.

21 Install spacer plate. Align bolt holes in spacer plate with tapped holes in housing.

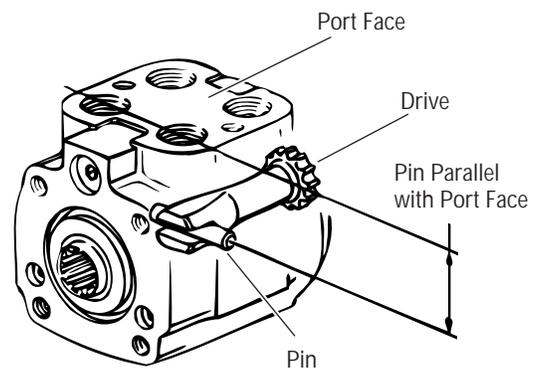


Figure 23

22 Rotate spool and sleeve assembly until pin is parallel with port face (figure 23). Install drive, making sure drive is engaged with pin. To assure proper alignment, mark drive as shown in figure 25, reference B. When marking drive, note relationship of slotted end of drive to splined end of drive.

Reassembly

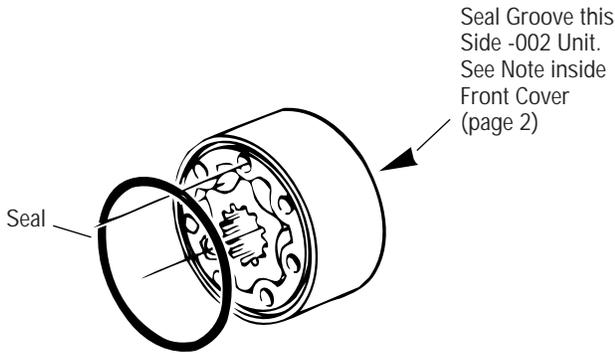


Figure 24

23 Lubricate and install 72,6 mm [2.86 in.] ID seal in spacer plate or gerotor (meter), (ref.) see note page 2. The lubrication will hold seal in place.

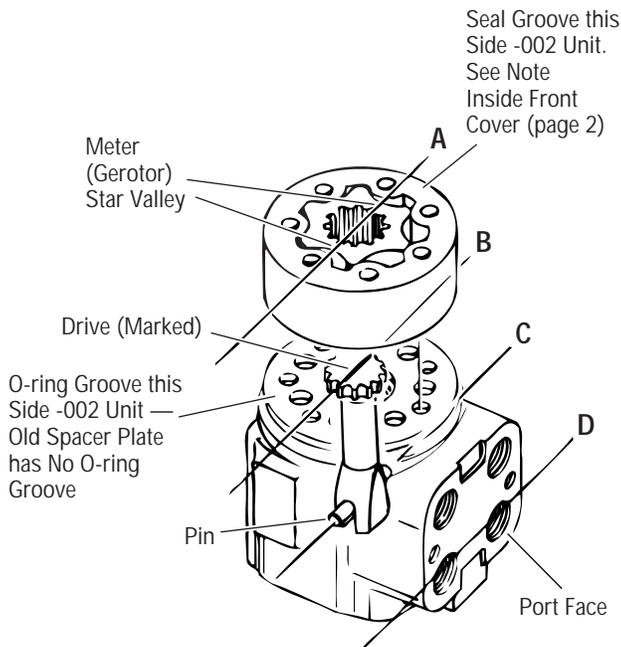
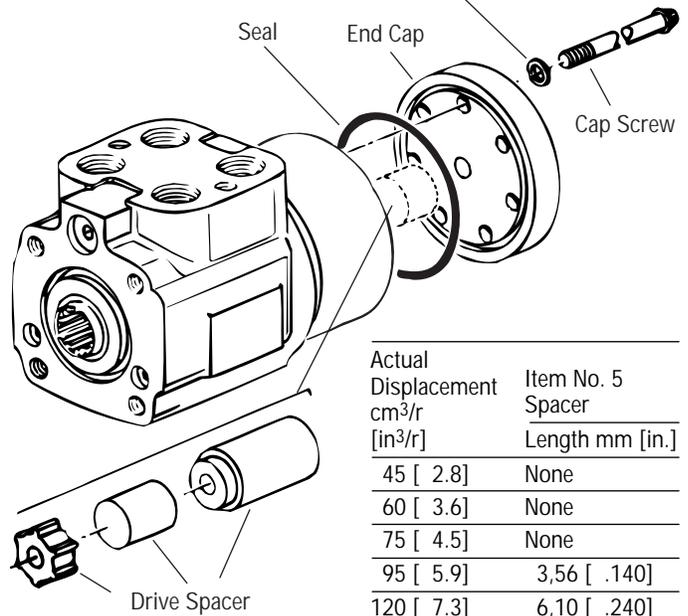


Figure 25

24 Align star valleys (reference A) with marked drive (reference B). Valleys must align with pin. Note parallel relationship of reference lines A, B, C, and D in figure 25. Align bolt holes without disengaging gerotor (Meter) from drive.

Seal washers are not used with 6 point (E10) or hex head screws and -002 end cap (-002 end cap does not have a o-ring groove).



Actual Displacement cm ³ /r [in ³ /r]	Item No. 5 Spacer Length mm [in.]
45 [2.8]	None
60 [3.6]	None
75 [4.5]	None
95 [5.9]	3,56 [.140]
120 [7.3]	6,10 [.240]
145 [8.9]	10,29 [.405]
160 [9.7]	12,19 [.480]
185 [11.3]	15,62 [.615]
230 [14.1]	21,97 [.865]
295 [17.9]	28,45 [1.120]
370 [22.6]	41,15 [1.620]
460 [28.2]	53,67 [2.113]
590 [35.9]	66,37 [2.613]
740 [45.1]	91,77 [3.613]

Figure 26

25 When used, install drive spacer in gerotor (meter), see chart figure 26.

26 Lubricate and install 72,6 mm [2.86 in.] ID seal in gerotor (meter) or end cap, current end cap does not have the o-ring groove (ref. – see note page 20).

27 Install end cap on gerotor, aligning holes.

Resassembly

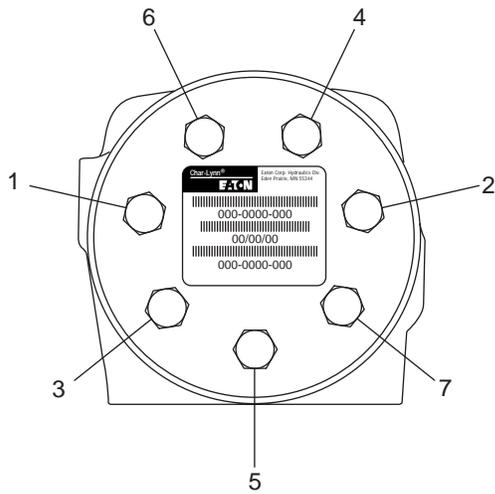


Figure 27

28 Install 7 dry cap screws (and seal washers if applicable – see figure 26) 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 27.

110, 230, and 450 Series Steering Control Units

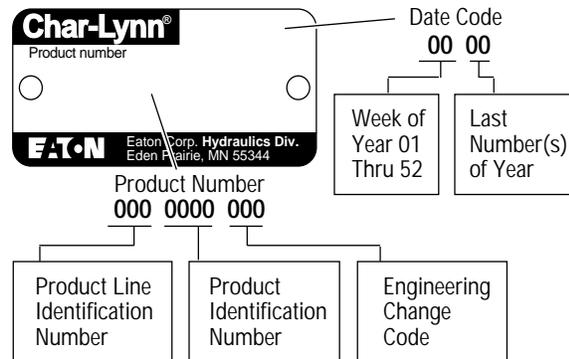
How to Order Replacement Parts

Each Order Must Include the Following:

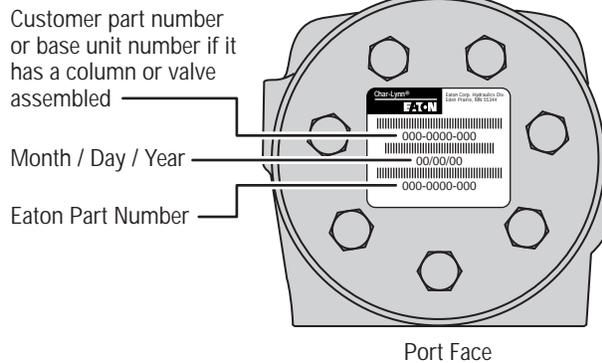
1. Product Number
2. Date Code
3. Part Name
4. Part Number
5. Quantity of Parts

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. 6-321



Bar Code Label — Launch Date June, 1999



Eaton Corporation
Hydraulics Division
 15151 Hwy. 5
 Eden Prairie, MN 55344
 Telephone: 612/937-7254
 Fax: 612/937-7130

Eaton Ltd.
Hydraulics Division
 Glenrothes, Fife
 Scotland, KY7 4NW
 Telephone: [+44] (0)1592-771-771
 Fax: [+44] (0)1592-773-184

Eaton B.V.
 Boeing Avenue 11
 1119 PC Schiphol-Rijk
 The Netherlands
 Telephone: [+31] (0)20-655 6776
 Fax: [+31] (0)20-655 6800

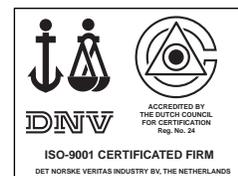
Sumitomo Eaton Hydraulic Co.
 8 Temasek Blvd.
 42-01 Suntec Tower Three
 Singapore 03988
 Telephone: [+65] 832-7727
 Fax: [+65] 832-7733

Sumitomo Eaton
 Hydraulic Company Ltd.
 Ooi-Cho Kameoka-Shi
 621-0017 Kyoto
 Japan
 Telephone: [+81] 771-22-9601
 Fax: [+81] 771-29-2020

Eaton Ltd.
 7th Floor, Woo Duk Building
 832-2 Yeoksam-Dong, Kangnam-Ku
 Seoul 135-750
 Korea
 Telephone: [+82] 2-557-0595
 Fax: [+82] 2-557-1634

Eaton Hydraulics (Shanghai) Co. Ltd.
 388 Aidu Road, Waigaogiao FTZ
 Pudong New Area
 Shanghai 200137
 Peoples Republic of China
 Telephone: [+86] 21-5046 0758
 Fax: [+86] 21-5046 0767

Jining Eaton Hydraulic Co. Ltd.
 6 Ji Da Road
 Jining City
 Shandong Province 272131
 Peoples Republic of China
 Telephone: [+86] 537-2221288
 Fax: [+86] 537-2221557



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