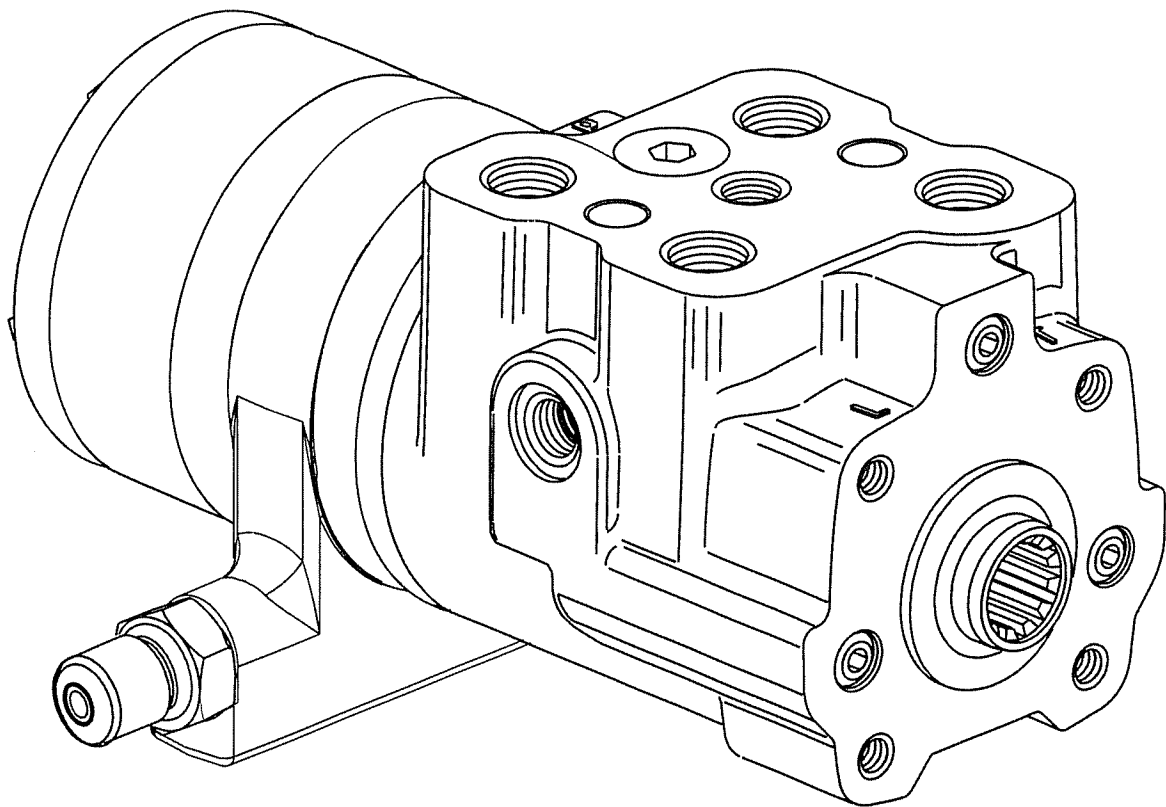




Char-Lynn

Series 20 VersaSteer™
Parts and Repair Information



Series 20 VersaSteer

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Introduction

This manual provides service information for Char-Lynn® Series 20 VersaSteer™ Steering Control Units. Step by step instructions for complete disassembly, inspection and reassembly of the control unit are given.

The following recommendations should be followed to insure successful repairs.

- Most repairs require the removal of the control unit from the vehicle.
- Cleanliness is extremely important.
- Clean the port areas thoroughly before disconnecting the hydraulic lines.
- Plug the control unit ports and cover open hydraulic lines immediately after they have been disconnected.
- Drain the oil and clean the exterior of the control unit before making repairs.
- Wash all metal parts in clean solvent.
- Use filtered, moisture-free compressed air to dry the parts.
Do not wipe them dry with paper towels or cloth – lint in a hydraulic system will cause damage.
- Always use new seals when reassembling hydraulic control units.
- Lubricate new rubber seals with a petroleum jelly before installation.
- Torque all bolts over gasketed joints, then repeat the torquing sequence to make up for gasket compression.

After all repairs are complete it is essential to verify the accuracy of control unit repairs on an authorized test stand.

ID Tag

Ordering Parts

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

Refer to specific part listings for your Char-Lynn® VersaSteer™ Steering Control Unit when ordering replacement parts. Listings are available from Eaton.

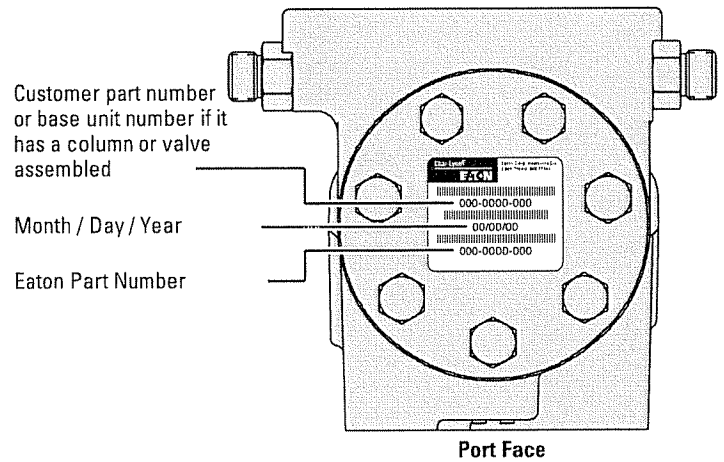
Sample tag shows identification

When ordering replacement parts, you must include the following information:

For additional literature contact:

Danfoss Power Solutions US Company
2800 East 13th Street
Ames, IA 50010 USA
Phone: +1 515 239 6000

Bar Code Label — Launch Date January, 2004



Tools

Tools Required For Disassembly and Assembly

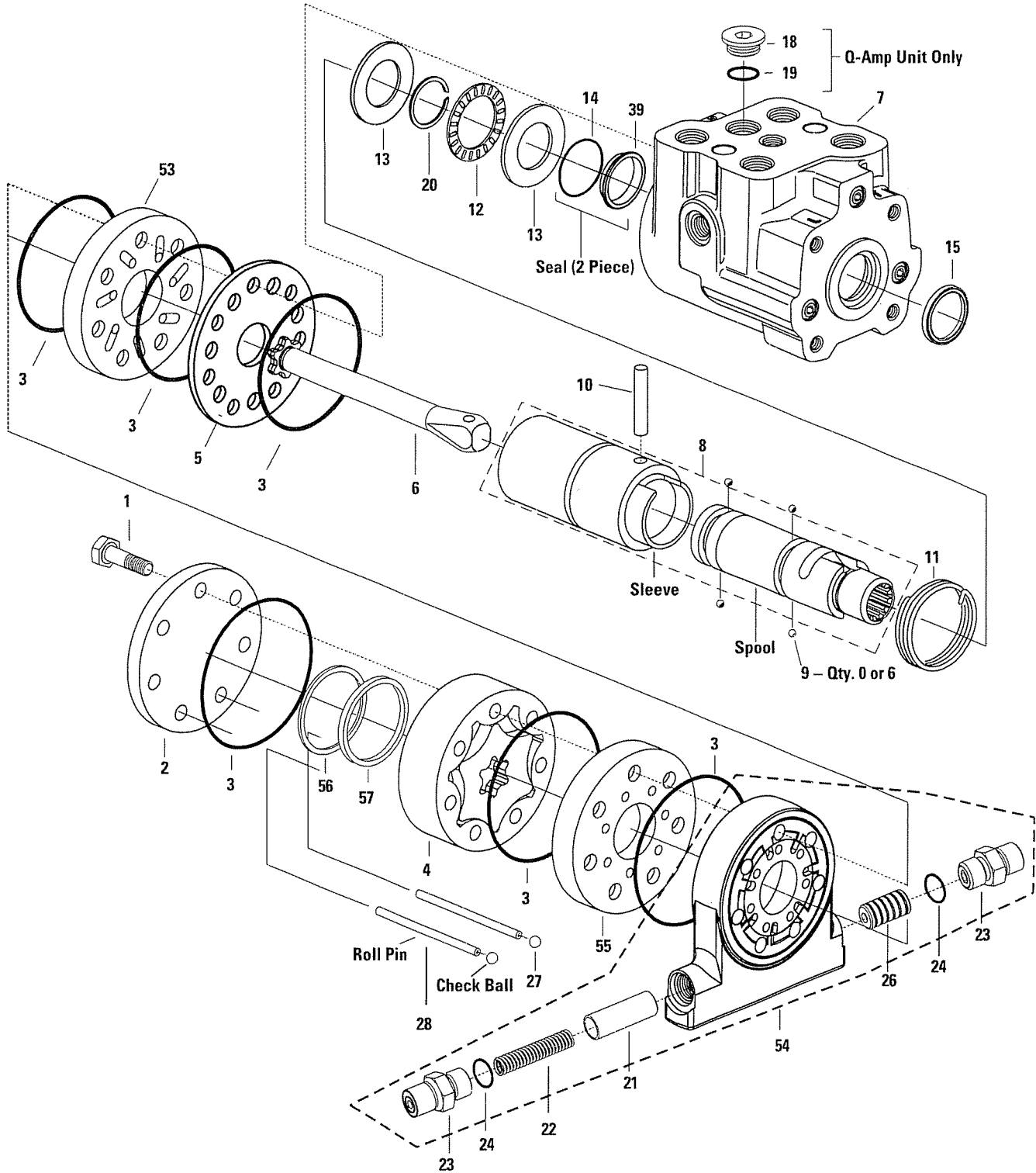
- Screwdriver (102-152 mm [4 in. - 6 in.] long, x 3 mm [118 in.] wide flat blade).
- 13mm socket for current hex head cap screws.
- Breaker bar wrench.
- Retaining ring pliers tool No. 600610.
- Torque wrench (30 Nm [300 lb-in] capacity).
- 15/16 inch Hex key
- 11/16 inch wrench

Special Tools:

- Plunger and Sleeve Tool No 600794-001*

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

Parts
Assembly
Drawing



Parts

Table 1.0 Parts List

Series 20

VersaSteer

ITEM NO.	PART NO.	QTY.	DESCRIPTION	REFERENCE PAGE
1	See Table 2.0	7	Cap Screw, Hex Head	6
2	202530-000	1	Cap, End	
3	201139-000	6	Seal, O-ring 72,6 mm [2.86 in.] ID	
4	See Table 2.0	1	Gerotor Sub-assembly	6
5	23903-000	1	Plate, Spacer	
6	4998734-001	1	Drive	
7	-----	1	Housing	
8	-----	1	Control Sleeve	
		1	Control Spool	
9	18015-000	0 or 6	Ball, Check 6,35mm [.250 in.] O.D.	
10	14606-000	1	Pin, Centering	
11	230415-000	1	Spring, Centering	
	113726-000	1	Spring, Centering (See specifications)	
12	7537-000	1	Bearing, Needle Thrust	
13	14607-000	2	Bearing Race	
14	4999651-001	1	O-ring	
15	844-000	1	Dust Seal	
18	9214-000	1	Plug	
19	250003-908	1	O-ring	
20	265018-024	1	Retaining Ring	
21	4992809-001	1	Piston, Guide Spring	
22	230397-000	1	Compression Spring	
23	112114-010	2	Fitting	
24	250003-906	2	O-ring	
26	4998914-001	1	Piston	
27	18015-000	2	Ball	
28	16026-436	2	Pin, Roll	
39	9332-000	1	Seal	
53	4998731-001	1	Plate, Valve	
54	4999057-001	1	Valve S/A	
55	4998732-001	1	Plate, Valve	
56	202038-000	1	Seal ring	
57	16101-322	1	Washer, Backup	

Parts

Gerotor

Table 2.0

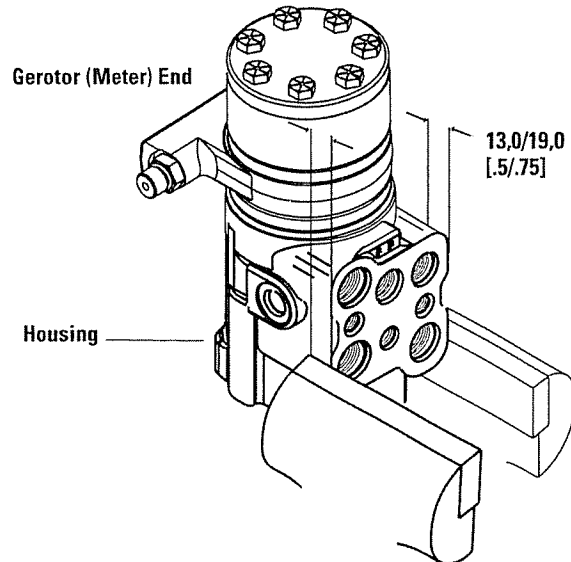
ACTUAL DISPL. cm ³ /r [in ³ /r]	REF. NO. 4 GEROTOR		REF. NO. 1 CAP SCREW	
	PART NO.	Length mm[in]	PART NO.	LENGTH mm[in]
95 [5.9]	4994097-004	10,2[.40]	14643-018	80,0[3.15]
120 [7.3]	4994097-005	12,7[.50]	14643-018	80,0[3.15]
145 [8.9]	4994097-006	15,5[.61]	14643-019	85,0[3.35]
161 [9.7]	4994097-007	16,8[.66]	14643-019	85,0[3.35]
185 [11.3]	4994097-008	19,6[.77]	14643-019	85,0[3.35]
230 [14.1]	4994097-009	24,4[.96]	14643-009	90,0[3.54]
295 [17.9]	4994097-010	31,0[1.22]	14643-020	100,0[3.94]
370 [22.6]	4994097-011	39,1[1.54]	14643-010	105,0[4.13]
460 [28.2]	4994097-012	48,8[1.92]	14643-021	115,0[4.53]
590 [35.9]	4994097-013	62,2[2.45]	14643-011	130,0[5.12]
740 [45.1]	4994097-014	78,2[3.08]	14643-022	145,0[5.71]
983 [60.0]	4994097-015	101,9[4.09]	14643-023	170,0[6.69]

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.

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

1. Clamp unit in vise, meter end up. Clamp lightly on edges of port face sides (see figure1). Use protective material on vise jaws. Housing distortion could result if jaws are overtightened.



Note: Steering control units with anti-cavitation valves require special handling in both disassembly and reassembly. Ball valves (2) can end up in a cavity in the housing were they are not supposed to be. These unit must be disassembled and reassembled in the vertical position; removal of anti-cavitation valves is outlined in step 26.

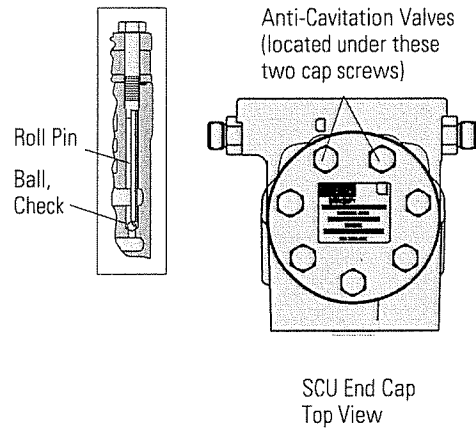
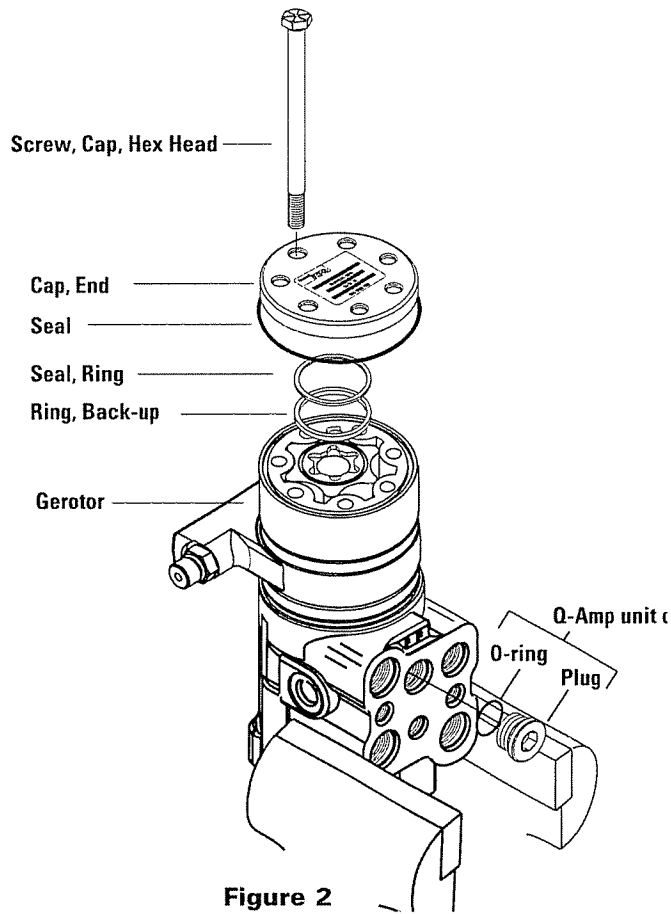


Figure 1

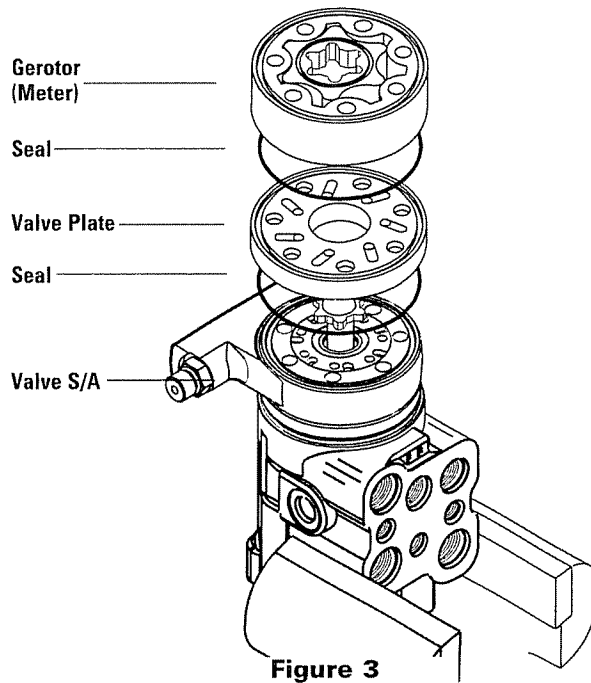
Disassembly

2. Remove MB-1.5 in. cap screws.
3. Remove end cap.
4. Remove seals.

Note: All Series 20VersaSteer™ steering control units have a low slip sealed gerotor star, this unit includes a ring seal and a back-up ring (remove these parts if applicable).



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.



Disassembly

9. Remove valve Sub-assembly
10. Remove seal from valve plate.
11. Remove valve plate
12. Remove seal from spacer plate.
13. Remove spacer plate.
14. Remove seal from housing.

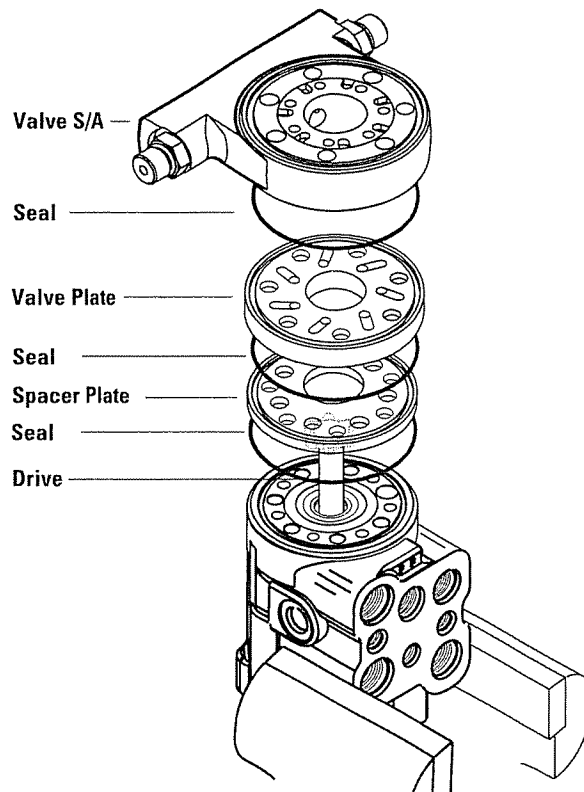


Figure 4

Disassembly

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

15. Pull drive and twist to remove SP/SL drive assembly from housing.

Note Hidden Pin. If tension on this pin is released before these parts are fully disengaged and the pin is not horizontal, the pin can drop and lockup can occur like a deadbolt. Positioning unit vertically is a safe option and is required if the unit has anti-cavitation valves.

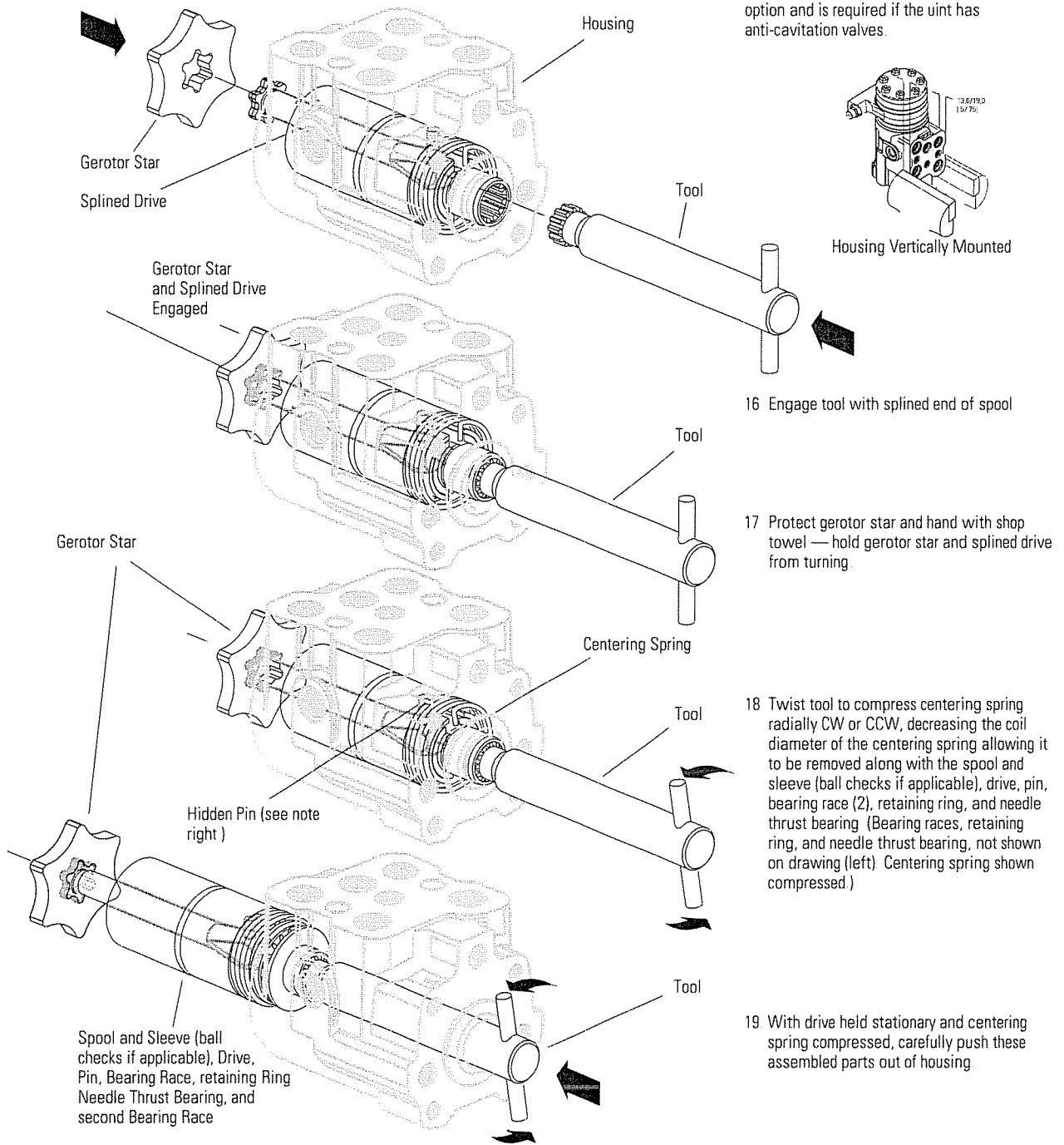
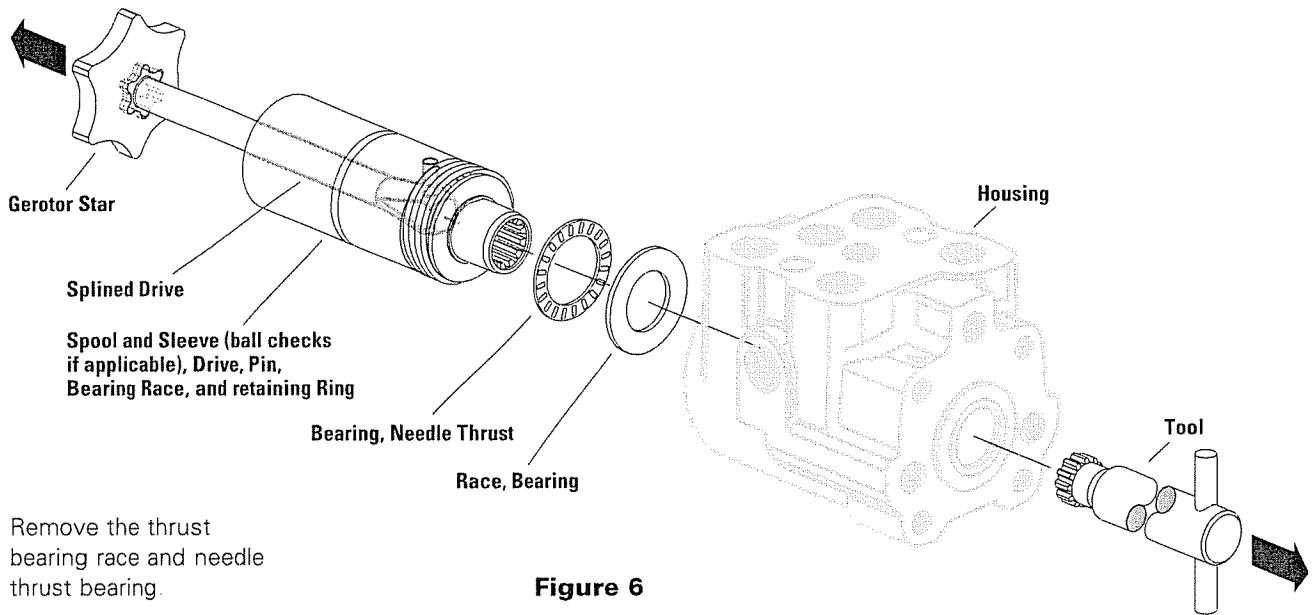


Figure 5

Disassembly



20. Remove the thrust bearing race and needle thrust bearing.
21. Remove the retaining ring (use retaining ring pliers Danfoss part no. 600610) or equivalent, bearing race, centering spring, pin, drive, spool, sleeve, and ball checks if applicable.
22. Do not remove any valves other than manual steering check valve balls and anti-cavitation valve assembly. All other valves are factory preset and are non-serviceable.

Figure 6

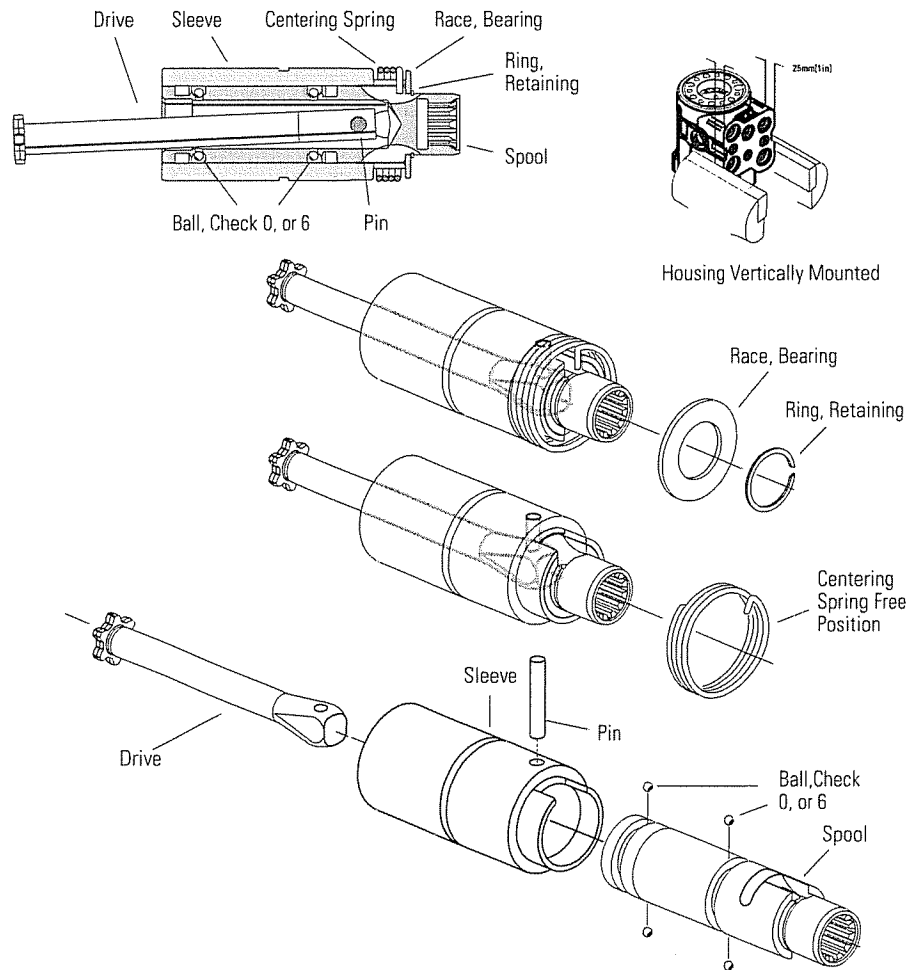


Figure 7

Disassembly

26. Insert two soda straws, one in each of two threaded holes, as a safety measure for removal of two small ball check valves and roll pins (correct threaded holes identified in illustration right). Remove housing from vise, tilt the housing and bring the port face upward. Continue turning the housing until the roll pins and ball checks slide through the straws from the meter (Gerotor) end of the housing.

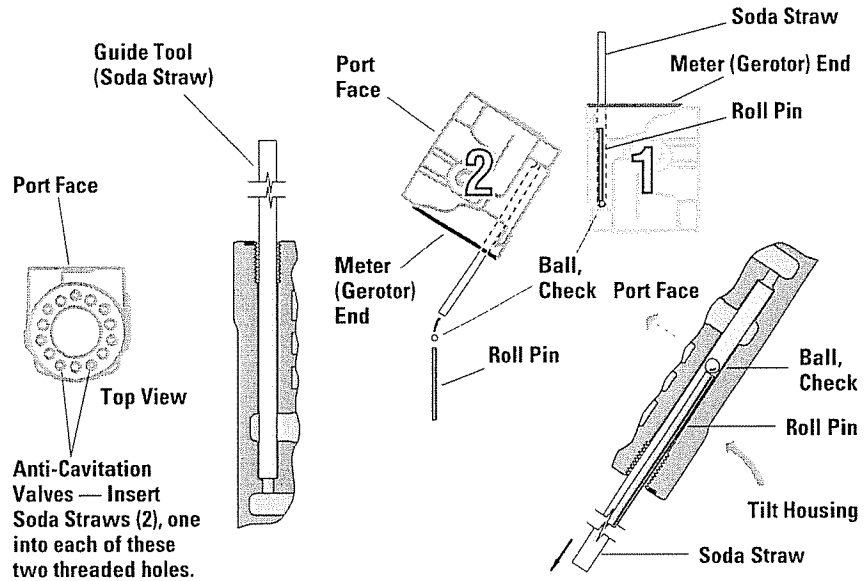


Figure 8

27. Carefully remove the shaft seal. These two parts may or may not still be in the housing. These parts include an o-ring and L-shaped seal ring.

28. Using a thin blade screwdriver, carefully pry the dust seal from the housing. Do not scratch seal groove with screw driver.

Important: Do not damage the dust seal seat.

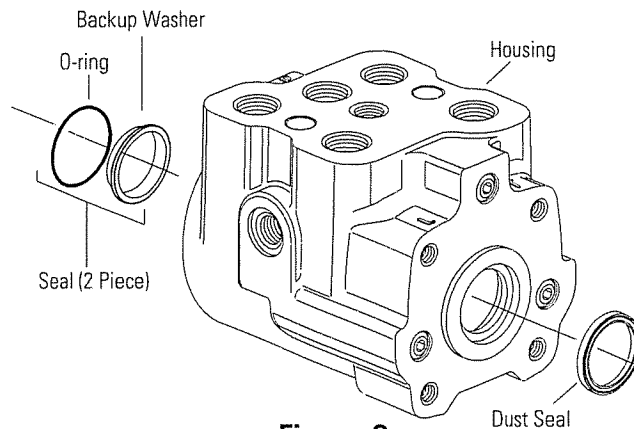


Figure 9

29. Disassemble valve sub-assembly as shown in figure 10.

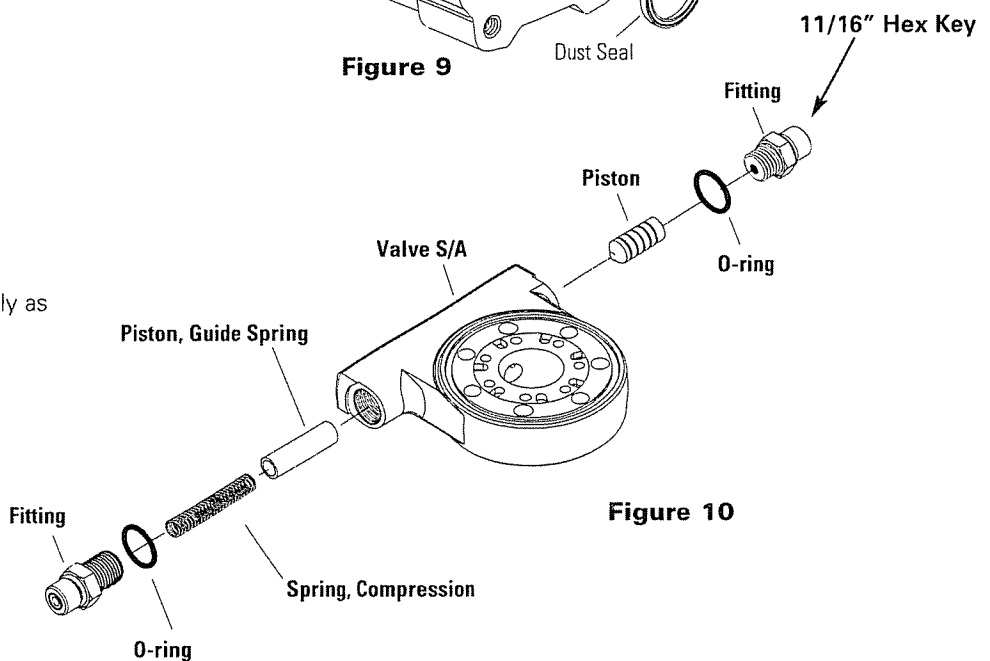


Figure 10

Assembly

Assembly Cleanliness

Recommendations

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. 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.

1. Place housing on a flat work area on a clean lint free cloth.
2. Install press-fit 24,9 mm [.98 in.] ID seal in housing with metal surface of seal facing toward housing (figure 11).

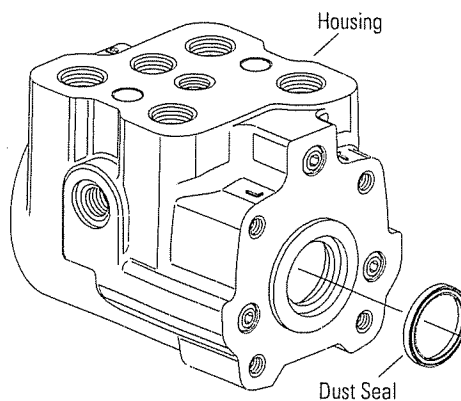


Figure 11

3. Reassemble valve parts with new o-rings on plugs (See figure 12).

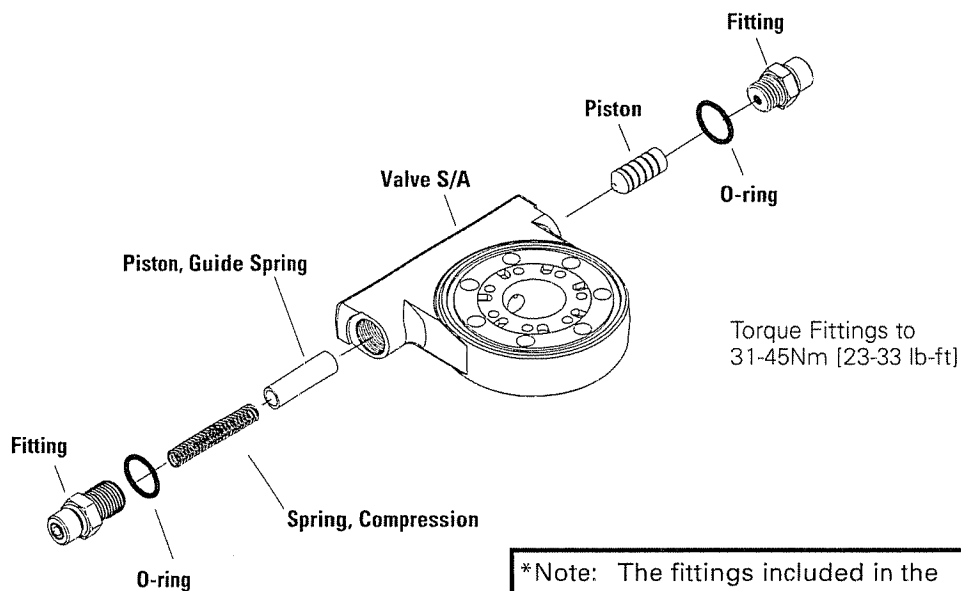


Figure 12

***Note:** The fittings included in the valve assembly are critical in the operation of the valve, and must not be switched with another style.

Assembly

2-Piece Shaft Seal Installation

2-Piece Shaft Seal Installation

For installation of
o-ring: 4999651-001

and

Seal 9332-000

4. Place housing on a flat work area as shown in figure 13.
5. Lubricate seal and o-ring with hydraulic oil before installation
6. Align sleeve with housing bore (figure 13)
7. Insert sleeve into housing bore (Figure 14)
8. Place o-ring on plunger (Figure 15).

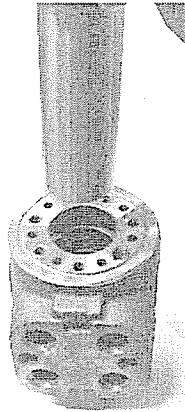
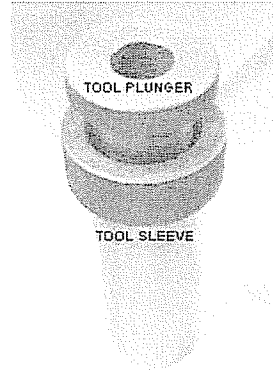


Figure 13



Tool No. 600792-001

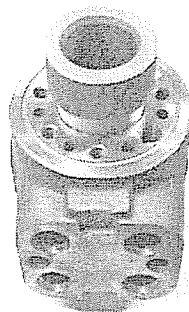


Figure 14

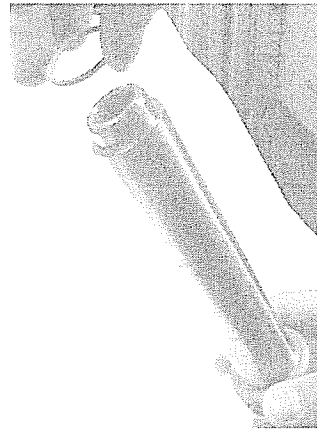


Figure 15

9. Align seal with plunger. cross section "L" shape of seal should be upside down (figure 16).



Figure 16

Assembly

2-Piece Shaft Seal Installation

10. Push seal onto plunger. Lip of seal should be between o-ring and plunger. No gap should exist between o-ring and seal (figure 17).

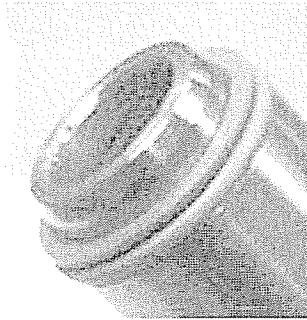


Figure 17

15. Inspect seal installation. Seal and o-ring must both be within shaft seal counter bore of housing (figure 20)

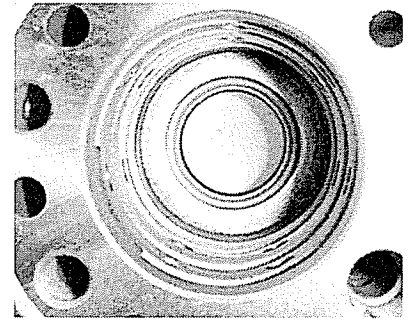


Figure 20

11. Align plunger with sleeve (figure 18).
12. Push plunger into sleeve until it bottoms out, rotate 1/4 turn (figure 19).
13. While holding sleeve in housing, withdraw plunger.
14. Withdraw sleeve.

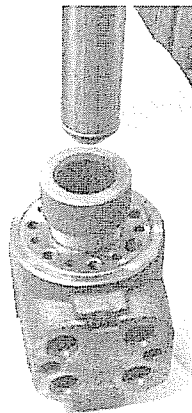


Figure 18

16. Clamp housing in vice (figure 21).

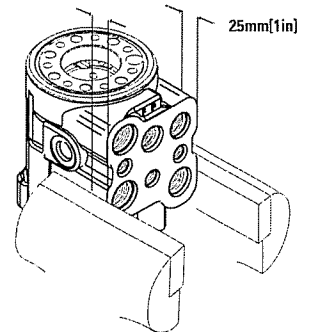


Figure 21

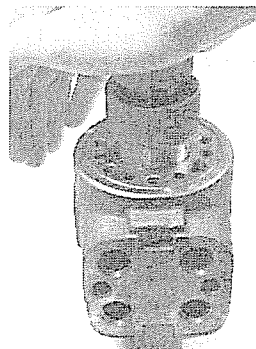


Figure 19

Assembly

17. If applicable install 6 check balls into sleeve with coating of petroleum jelly
18. Assemble spool and sleeve carefully so that spring slots line up at the same end. Rotate spool while sliding parts together. Test for free rotation. Spool should rotate smoothly in sleeve with fingertip force applied at splined end. Align spring slots (Figure 22) in spool and sleeve and stand parts on end of bench.
19. Hold spool and sleeve assembly firmly and twist centering spring to assemble.
20. Assembly 1 bearing race onto spool.
21. Install retaining ring using Danfoss tool 600610 or equivalent
22. Insert pin through spool and sleeve assembly through hole in drive, until pin is flush at both sides of sleeve.

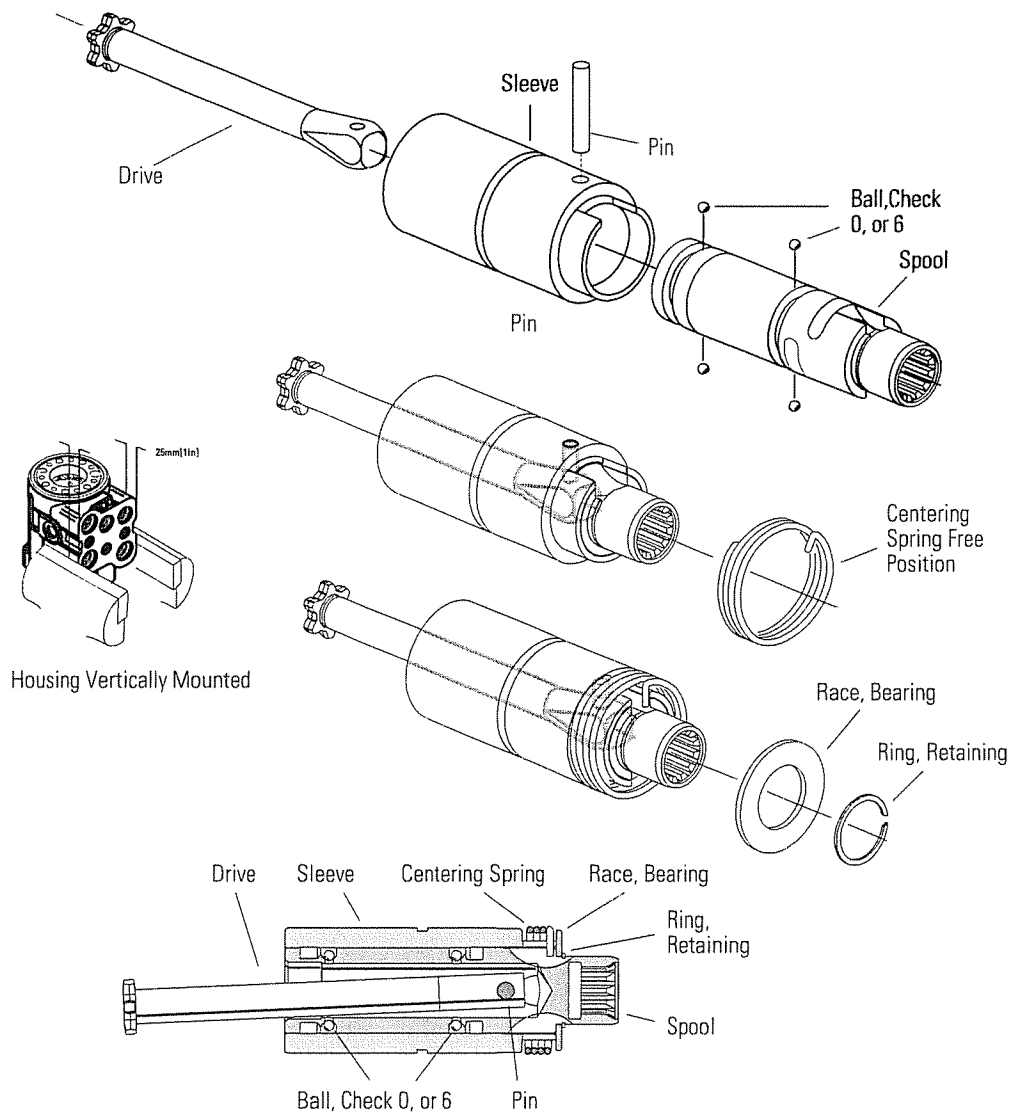


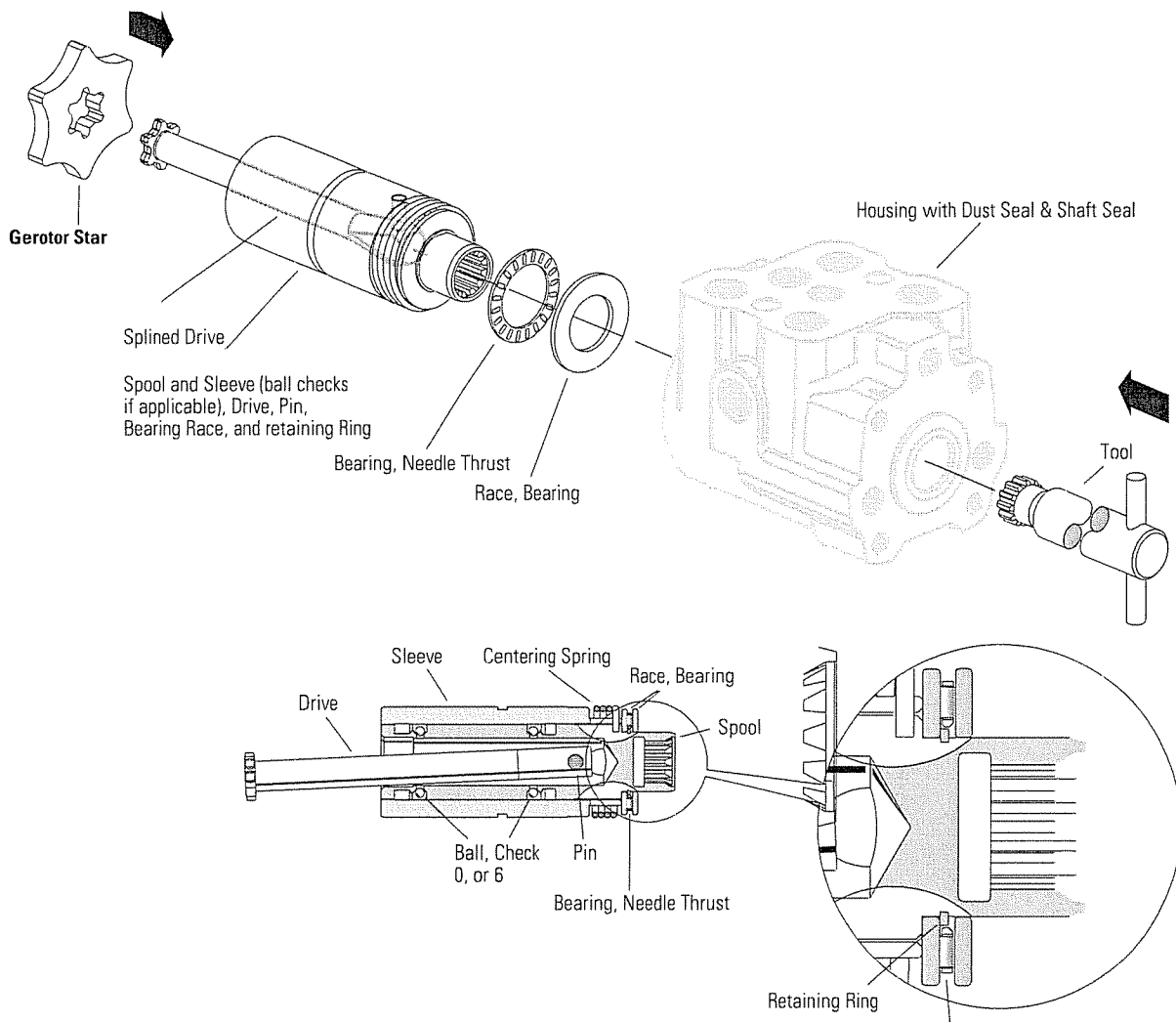
Figure 22

Assembly

23. Apply a light coating of petroleum jelly to the inside diameter of the previously mounted dust seal in the housing.
24. Apply a light coating of petroleum jelly to the needle thrust bearing, second bearing race, and three part shaft seal. Position each part onto the spool as shown in enlarged section drawing below. The needle thrust bearing goes between the two bearing races and must be centered around retaining ring
25. Apply a light coating of clean hydraulic fluid to the spool and sleeve assembly and slide it into the housing (see steps 26-31).

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. Bring spool assembly entirely within housing bore until parts are flush at 14 hole end of housing. With spool assembly in this flush position, check for free rotation within housing by turning assembly with fingertip force at splined end.

Important: Do not damage the dust or shaft seals.



Note Needle Thrust Bearing MUST Be Centered Around Retaining Ring Use Petroleum Jelly to Hold Parts in Place.

Figure 23

Assembly

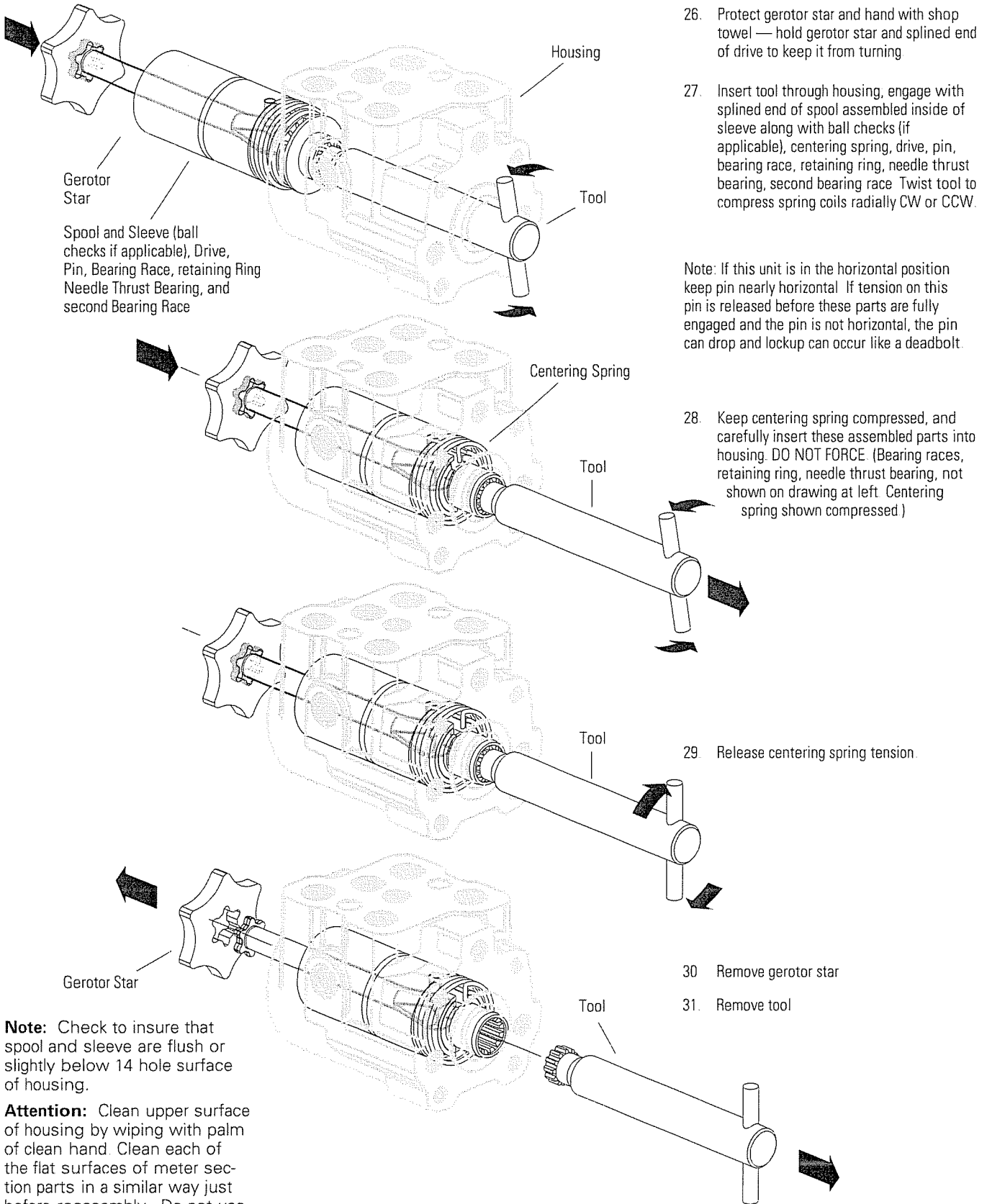
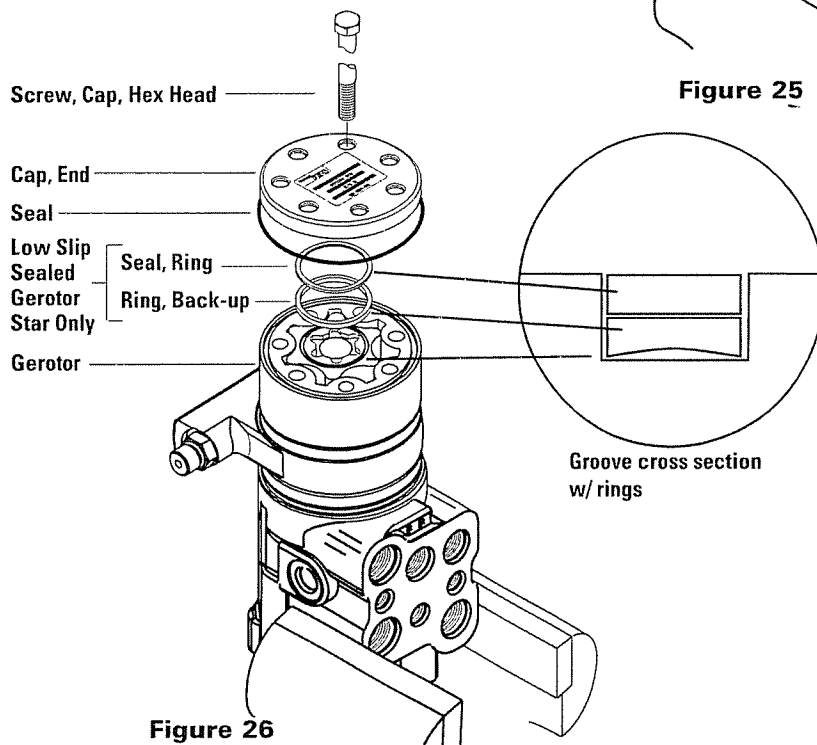
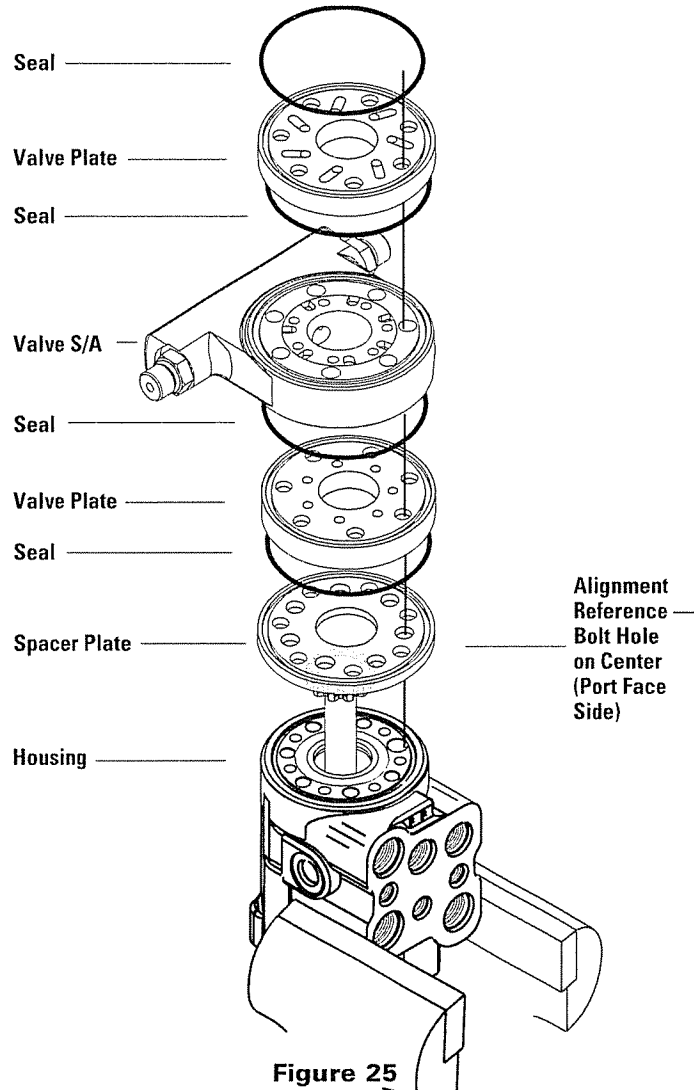


Figure 24

Assembly

32. Lubricate and install 72,6 mm [2.86 in.] ID seal in housing.
33. Install spacer plate. Align bolt holes in spacer plate with tapped holes in housing.
34. Lubricate and install 72,6 mm [2.86 in.] ID seal in spacer plate.
35. Install valve plate.
36. Lubricate and install 72,6 mm [2.86 in.] ID seal in valve plate.
37. Install valve S/A, see figure 25 for proper alignment.
38. Lubricate and install 72,6 mm [2.86 in.] ID seal in valve S/A.
39. Install valve plate.
40. Install back-up ring and sealring in gerotor star.
41. Lubricate and install 72,6 mm [2.86 in.] ID seal in valve plate.
42. Install gerotor.



43. Lubricate and install 72,6 mm [2.86 in.] ID seal in gerotor (meter).
44. Install end cap on gerotor, aligning holes.

Assembly

45. Install 7 dry cap screws in end cap. Pretighten cap screws to 17Nm [150 lb-in], then torque screws to 28-34 Nm [250-300 lb-in] in sequence shown in figure 27.

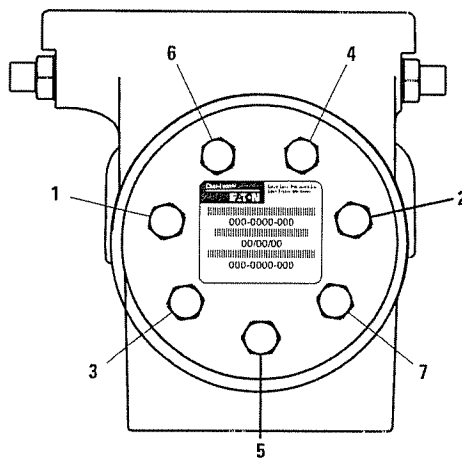


Figure 27



Char-Lynn