

STEERING CONTROL VALVE

Removal

NOTE: Clean steering control unit and surrounding area carefully to help avoid contamination of hydraulic oil when lines are opened.

1. Shut off engine and bleed down steering circuit.

NOTE: To insure the hydraulic oil has completely drained from the accumulators, turn the steering wheel. If the wheels do not turn, all the hydraulic pressure has been drained from accumulators.

2. Disconnect hydraulic lines. Plug lines securely to prevent spillage and possible contamination to the system. Tag each line as removed for proper identification during installation.



Use care to avoid contact with hot oil. Avoid spillage and contamination.

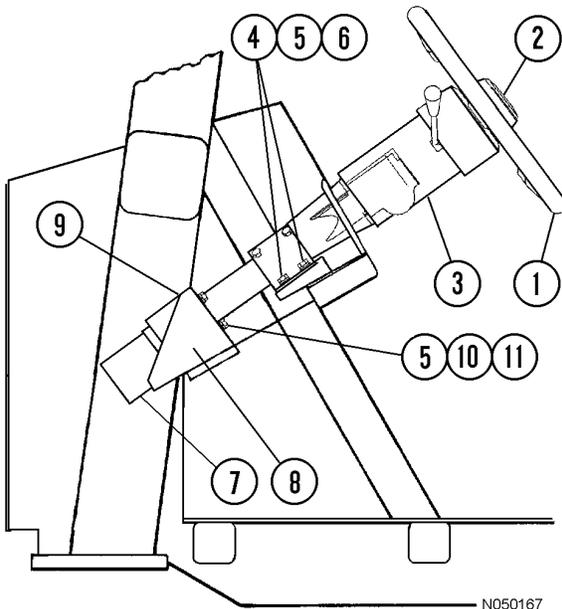


FIGURE 5-1. STEERING CONTROL VALVE INSTALLATION

- | | |
|--------------------|---------------------------|
| 1. Steering Wheel | 7. Steering Control Valve |
| 2. Button Horn | 8. Bracket L.H. |
| 3. Steering Column | 9. Bracket R.H. |
| 4. Capscrew | 10. Capscrew |
| 5. Flat Washer | 11. Lock Washer |
| 6. Lock Washer | |

3. Remove capscrews (10, Figure 5-1) from steering unit mounting bracket and remove steering control unit (7).

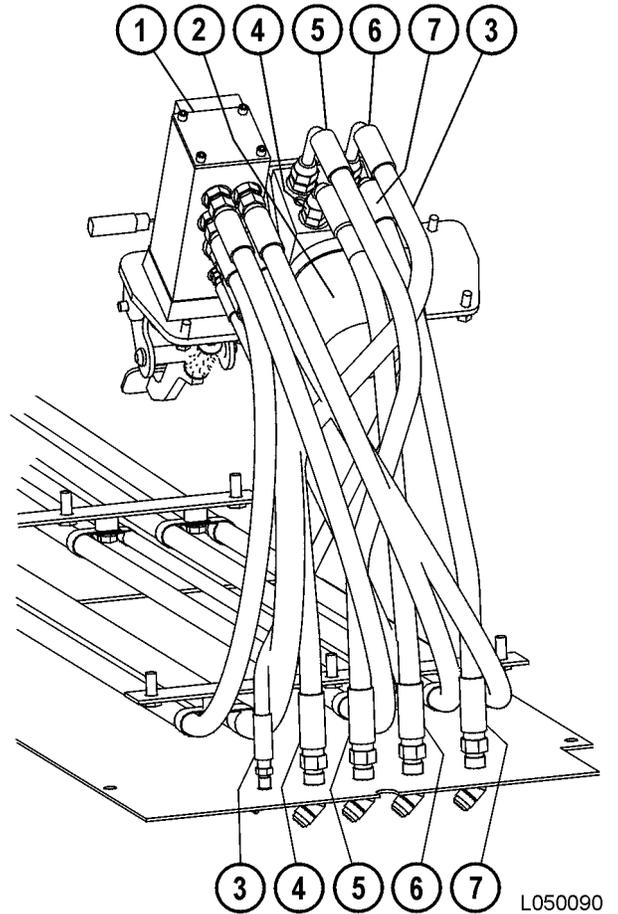


FIGURE 5-2. STEERING CONTROL VALVE

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|---------------------------|------------------|
| 1. Brake valve | 5. "T" Port Hose |
| 2. Steering Control Valve | 6. "P" Port Hose |
| 3. "LS" Port Hose | 7. "R" Port Hose |
| 4. "L" Port Hose | |

Installation

1. Lubricate the male splines on the end of the steering column shaft.

NOTE: There is no lower end bearing in this new steering column assembly, therefore the male end of the shaft will have to be guided into the mating female part of the steering control unit (7).

2. Move the steering control unit (7) into place and start each of the capscrews (10) without removing them from the holes in either the steering column four bolt flange or the brackets.
3. Tighten the four capscrews (10) to standard torque.
4. Remove plugs from the hydraulic lines. Be certain that the previously tagged hydraulic lines are connected to their respective ports according to the markings on the steering control unit.

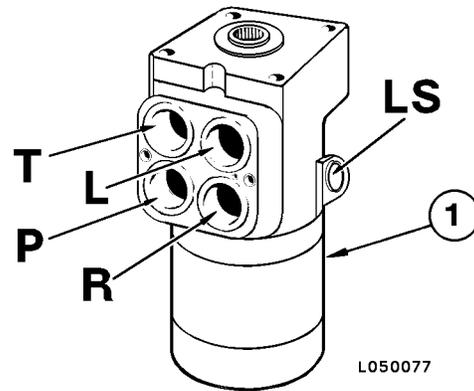


FIGURE 5-3. VALVE PORT IDENTIFICATION

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|---------------------------|----------------------|
| 1. Steering Control Valve | "R" - Right Steering |
| "T" - Return to Tank | "LS" - Load Sensing |
| "P" - Supply from Pump | |
| "L" - Left Steering | |

⚠ WARNING

Serious personal injury to the operator or to anyone positioned near the front wheels may occur if a truck is operated with the hydraulic steering lines improperly installed. Improperly installed lines can result in uncontrolled steering and/or SUDDEN AND RAPID rotation of the steering wheel as soon as the steering wheel is moved. It will turn rapidly and cannot be stopped manually.

After servicing the steering control unit, hydraulic steering lines should be checked for correct hook-up before starting the engine.

5. Check for proper steering wheel rotation without binding. Be certain wheel returns to neutral after rotating 1/4 turn left and right.

STEERING CONTROL VALVE REBUILD

Disassembly

The steering control unit is a precision unit manufactured to close tolerances, therefore complete cleanliness is a must when handling the valve assembly. Work in a clean area and use lint free wiping materials or dry compressed air. Clean type C-4 hydraulic oil should be used during reassembly to insure initial lubrication.

1. Allow oil to drain from valve ports.
2. Match mark gear wheel set and end cover to insure proper relocation during reassembly. Refer to Figure 5-4.

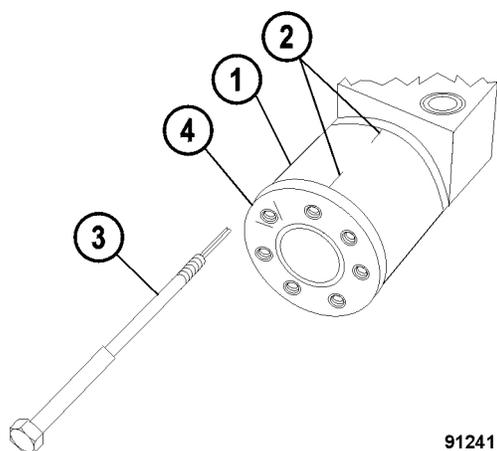


FIGURE 5-4. MARKING VALVE COMPONENTS

- | | |
|-------------------|-----------------------------|
| 1. Valve Assembly | 3. Capscrew With Rolled Pin |
| 2. Match Marks | 4. End Cover |

3. Remove end cover capscrews and washers. Remove capscrew with rolled pin (3, Figure 5-4). Mark hole location of capscrew with rolled pin on end cover to facilitate reassembly.

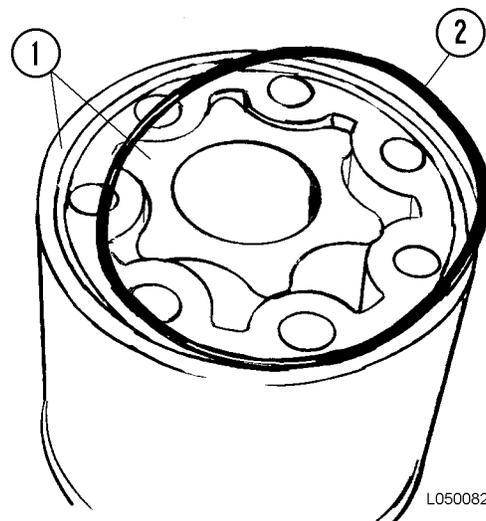


FIGURE 5-5. END COVER REMOVAL

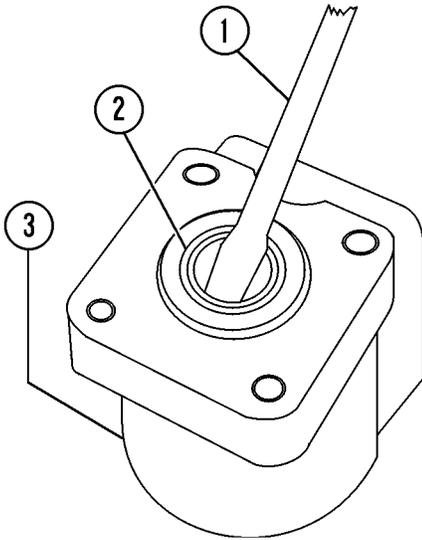
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|-------------------|-----------|
| 1. Gear Wheel Set | 2. O-Ring |
|-------------------|-----------|

4. Remove end cover (4) and O-ring (2, Figure 5-5).
5. Remove outer gear of gear wheel set (1) and O-ring between gear set and distribution plate.
6. Lift inner gear off cardan shaft.
7. Remove cardan shaft (11, Figure 5-7), distribution plate (15) and O-ring (14).
8. Remove threaded bushing (4) and ball (3).
9. With valve housing positioned with the spool and sleeve vertical, carefully lift spool assembly out of housing bore.

▲ IMPORTANT ▲

If housing is not vertical when spool and sleeve are removed, pin (9) may slip out of position and trap spools inside housing bore.

10. Remove O-ring (5), kin ring (6) and bearing assembly (7).
11. Remove ring (8) and pin (9) and carefully push inner spool out of outer sleeve.
12. Press the neutral position springs (10) out of their slot in the inner spool.
13. Remove the dust seal (2, Figure 5-6) using a screwdriver. Take care not to scratch or damage the dust seal bore.



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FIGURE 5-6. DUST SEAL REMOVAL

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|----------------|------------|
| 1. Screwdriver | 3. Housing |
| 2. Dust Seal | |

Cleaning and Inspection

1. Clean all parts carefully with fresh cleaning solvent.
2. Inspect all parts carefully and make any replacements necessary.

NOTE: All O-rings, seals and neutral position springs should be replaced with new. Prior to reassembly thoroughly lubricate all parts with clean type C-4 hydraulic oil.

Assembly

NOTE: When assembling the spool and sleeve, only one of the two possible matching positions of the spring slots can be used. The reason is that in the other end of the sleeve and spool (opposite end of the spring slots) there are three slots in the spool and three holes in the sleeve. These must be opposite each other on assembly so that the holes are partly visible through the slots in the spool, refer to Figure 5-8.

1. To install the neutral position springs, place a screwdriver in the spool slot as shown in Figure 5-9.
2. Place one flat neutral position spring on each side of the screwdriver blade. Do not remove screwdriver.
3. Push two curved neutral position springs in between one side of the screwdriver blade and a flat spring. Repeat for the opposite side. Remove the screwdriver.
4. Slide the inner spool in the sleeve. Compress the ends of the neutral position springs and push the neutral position springs in place in the sleeve.
5. Install the cross pin (9, Figure 5-7).

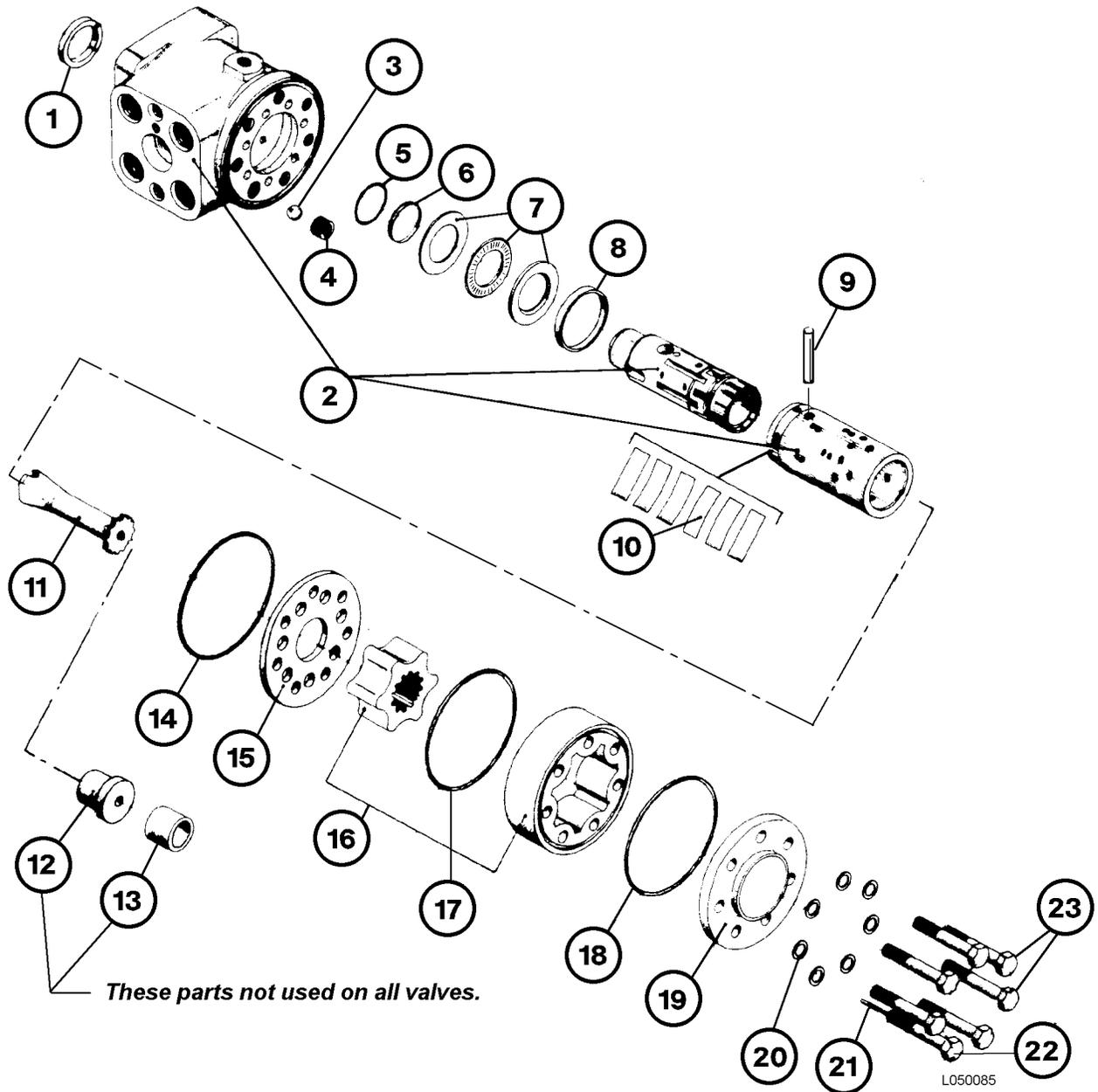


FIGURE 5-7. STEERING CONTROL VALVE

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|---------------------|------------------------------|------------------------|-----------------------|
| 1. Dust Seal | 7. Bearing Assembly | 13. Tube | 19. End Cover |
| 2. Housing & Spools | 8. Ring | 14. O- ring | 20. Washers |
| 3. Ball | 9. Pin | 15. Distribution Plate | 21. Rolled Pin |
| 4. Threaded Bushing | 10. Neutral Position Springs | 16. Gear Wheel Set | 22. Capscrew With Pin |
| 5. O-ring | 11. Cardan Shaft | 17. O-ring | 23. Capscrews |
| 6. Kin Ring | 12. Spacer | 18. O-ring | |

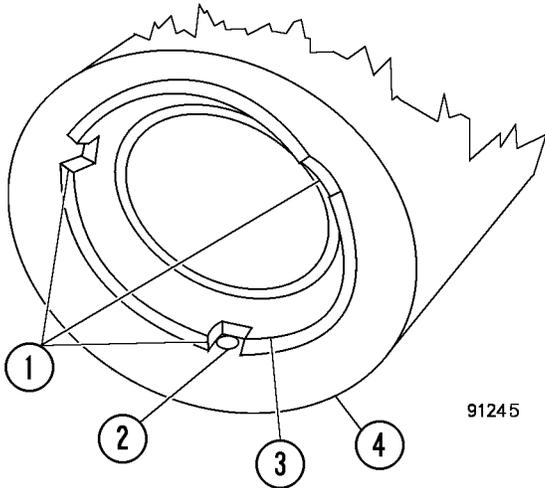


FIGURE 5-8. SPOOL AND SLEEVE ASSEMBLY

- 1. Slots
- 2. Hole
- 3. Spool
- 4. Sleeve

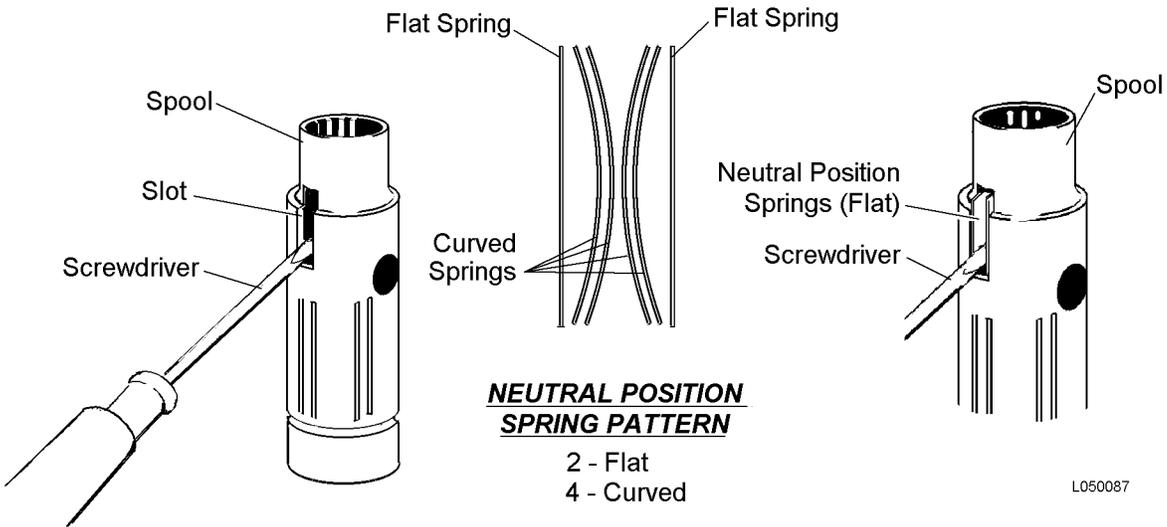


FIGURE 5-9. NEUTRAL POSITION SPRING INSTALLATION

6. With neutral position springs (7, Figure 5-10) centered in spool and sleeve, install ring (3), rear bearing race (4), thrust bearing (5) and front bearing race (6) in that order. The chamfer on the rear bearing must be facing away from the bearing.

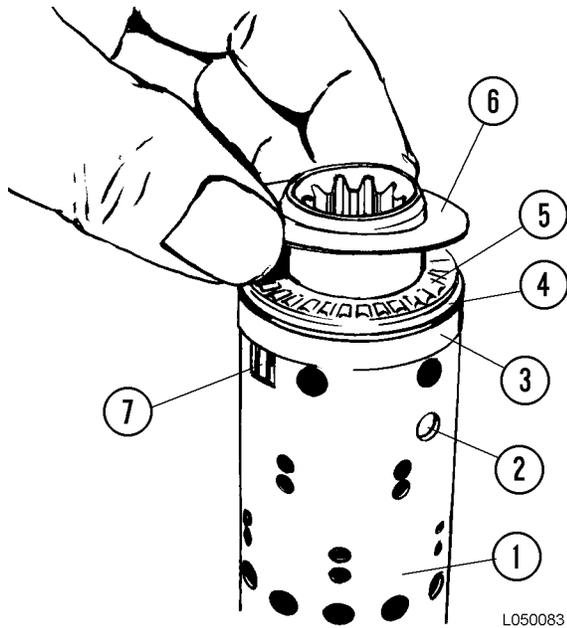


FIGURE 5-10. BEARING INSTALLATION

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|--------------------------------|-----------------------------|
| 1. Sleeve | 5. Thrust Bearing |
| 2. Cross Pin | 6. Bearing race |
| 3. Ring | 7. Neutral Position Springs |
| 4. Bearing Race (with chamfer) | |

7. Place the dust seal (1, Figure 5-7) in position. Using a flat iron block over the seal, tap into position.
8. Position the O-ring and kin ring on the spool.

9. Position the steering unit with the housing horizontal. Slowly guide the (lubricated) spool and sleeve with fitted parts, into the bore using light turning movements. Refer to Figure 5-11.

▲ IMPORTANT ▲

Cross pin must remain horizontal when spool and sleeve are pushed into bore to prevent pin from dropping out of spool.

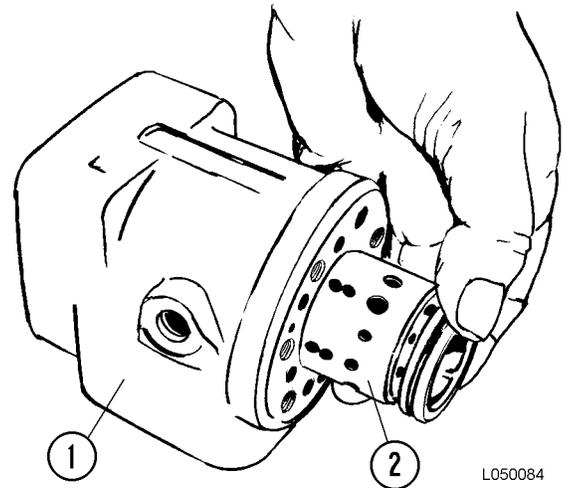
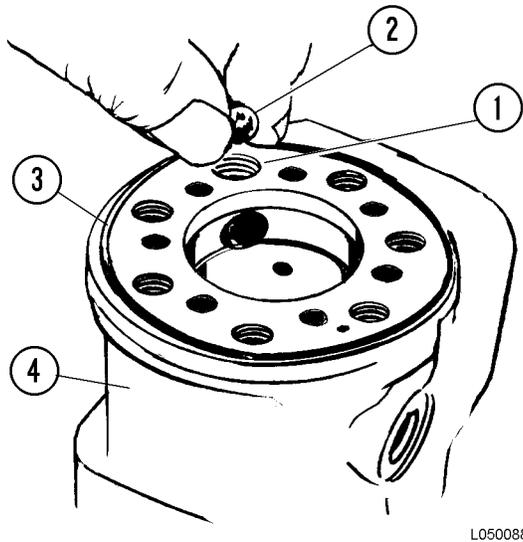


FIGURE 5-11. SPOOL INSTALLATION

- | | |
|------------|-------------------|
| 1. Housing | 2. Spool Assembly |
|------------|-------------------|

10. Install the check ball in the hole shown in Figure 5-12. Install threaded bushing and lightly tighten.
11. Grease the housing O-ring (3) with Vaseline and install in the housing groove.
12. Install the distribution plate (15, Figure 5-7) with plate holes matching the corresponding holes in the housing.



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FIGURE 5-12. CHECK BALL INSTALLATION

- | | |
|--------------------|------------|
| 1. Check Ball hole | 3. O-Ring |
| 2. Check Ball | 4. Housing |

13. Guide the cardan shaft (11) down into the bore with the slot in the cardan shaft aligned with the cross pin (9).
14. Position inner gear wheel onto cardan shaft. It may be necessary to rotate the gear slightly to find the matching splines on the cardan shaft. (Splines are machined to insure proper alignment of cardan shaft and inner gear wheel.)
15. Grease the O-rings (17 & 18) on both sides of the outer gear wheel with Vaseline and install.
16. Align outer gear wheel bolt holes with tapped holes in housing and match marks.
17. Align cover (19) using match marks as a reference and install using capscrews (23) and washers (20).
18. Install capscrew with pin (22) into proper hole.
19. Tighten cover capscrews in a criss-cross pattern to 2 ± 0.4 ft. lbs. (3 ± 0.5 N.m) torque.

BRAKE / STEERING PUMP

Removal

NOTE: Clean the brake / steering pump and surrounding area carefully to help avoid contamination of hydraulic oil when lines are opened.

⚠ DANGER

Relieve pressure before disconnecting hydraulic and other lines. Tighten all connections before applying pressure.

Hydraulic fluid escaping under pressure can have sufficient force to enter a person's body by penetrating the skin and cause serious injury and possibly death if proper medical treatment by a physician familiar with this injury is not received immediately.

1. Turn keyswitch "Off" and allow 90 seconds for the accumulator to bleed down. Turn the steering wheel to be sure no oil remains under pressure.

NOTE: If oil in the hydraulic tank has not been contaminated, the shut-off valve between the tank and steering pump can be closed, eliminating the need to completely drain the tank.

2. Drain the hydraulic tank by use of the drain located on the bottom side of the tank.

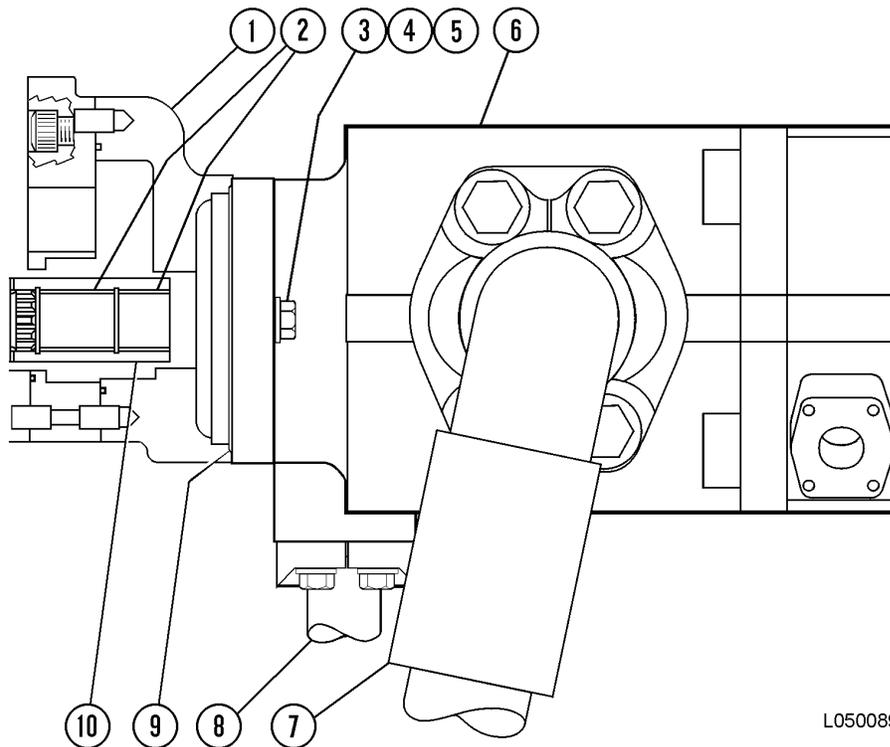
NOTE: Be prepared to contain approximately 193 gal. (731 L) of hydraulic oil. If the oil is to be reused, clean containers must be used with a 3 micron filtering system available for refill.

3. Disconnect the suction and discharge lines at the steering pump. Plug all lines to prevent oil contamination.

CAUTION

The brake / steering pump weighs approximately 120 lbs. (54.5 kgs). The hoist and steering pumps together weigh approximately 270 lbs. (122.6 kgs). Use a suitable lifting or support device that can handle the load safely.

4. Support the brake / steering pump and the rear section of the hoist pump. Remove capscrews and rear support bracket. Remove the two pump mounting capscrews.
5. Move the brake / steering pump rearward to disengage the drive coupler splines and remove pump.
6. Clean exterior of steering pump.
7. Move the brake / steering pump to a clean work area for disassembly.



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FIGURE 5-13. BRAKE /STEERING PUMP

1. Hoist Pump
2. Snap Ring
3. Capscrew
4. Flatwasher
5. Lockwasher

6. Brake/Steering Pump
7. Inlet Hose
8. Outlet Hose
9. O-Ring
10. Coupling

Installation

1. Install a new O-ring on pump mounting flange.
2. Make sure the steering pump spline coupler is in place (inside hoist pump) prior to steering pump installation.



The brake / steering pump weighs approximately 120 lbs (54.5 kgs). Use a suitable lifting device capable of handling the load safely.

3. Move the brake / steering pump into position. Engage steering pump shaft with hoist pump spline coupler.
4. Install rear support bracket with capscrews. Do not tighten capscrews at this time.
5. Align capscrew holes and install steering pump mounting capscrews. Tighten mounting capscrews and rear support capscrews to standard torque.
6. Remove plugs from inlet and outlet hoses and install to steering pump using new O-rings. Tighten capscrews securely.
7. Replace hydraulic filter elements. Refer to "Hydraulic Filters" elsewhere in this section.
8. Open shut-off valve in brake / steering pump suction line completely.
9. With the body down and the engine shut off, fill the hydraulic tank with clean C-4 hydraulic fluid (as specified on the truck Lubrication Chart) to the upper sight glass level.
10. With suction line shut-off valve open, loosen suction (inlet) hose capscrews (at the pump) to bleed any trapped air (or if equipped with bleed port at the hose connection at the pump, loosen or remove plug to bleed any trapped air). Then loosen pressure (outlet) hose capscrews (at the pump) to bleed any trapped air. Tighten hose connection capscrews to standard torque.

NOTE: If trapped air is not bled from steering pump, possible pump damage and no output may result.

11. If required, top-off the oil level in the hydraulic tank, to the level of the upper sight glass.
12. In the hydraulic brake cabinet, open both brake accumulator needle valves completely to allow the steering pump to start under a reduced load.
13. Move the hoist pilot control valve to the "Float" position.
14. Start the truck engine and operate at low idle for one (1) to two (2) minutes.



Do not allow the engine to run with the needle valves in the open position for longer than this recommendation: excessive hydraulic system heating will occur.



DO NOT start any hydraulic pump for the first time after an oil change, or pump replacement, with the truck dump body raised. Oil level in the hydraulic tank may be below the level of the pump(s) causing extreme pump wear during this initial pump start-up.

15. Shut off the engine and fully close both brake accumulator needle valves in the brake cabinet.
16. Verify that the oil level in the hydraulic tank is at the upper sight glass when the engine is off and the body is resting on the frame. If the hydraulic oil level is not at the upper sight glass, follow service manual instructions for filling/adding oil.
17. Start engine and check for proper pump operation. If necessary, refer to "Steering Circuit Checkout Procedure", elsewhere in this Section, or the "Trouble Shooting Chart" or "Pressure Check and Adjustment Procedure."

Disassembly

When servicing the unit, choose a work area where no traces of dust, sand or other abrasive particles which could damage the unit are in the air. Do not work near welding, sand-blasting, grinding benches and the like. Place all parts on a clean surface. To clean parts which have been disassembled, it is important clean solvents are used. All tools and gauges should be clean prior to working with these units and new, clean and threadless rags used to handle and dry parts.

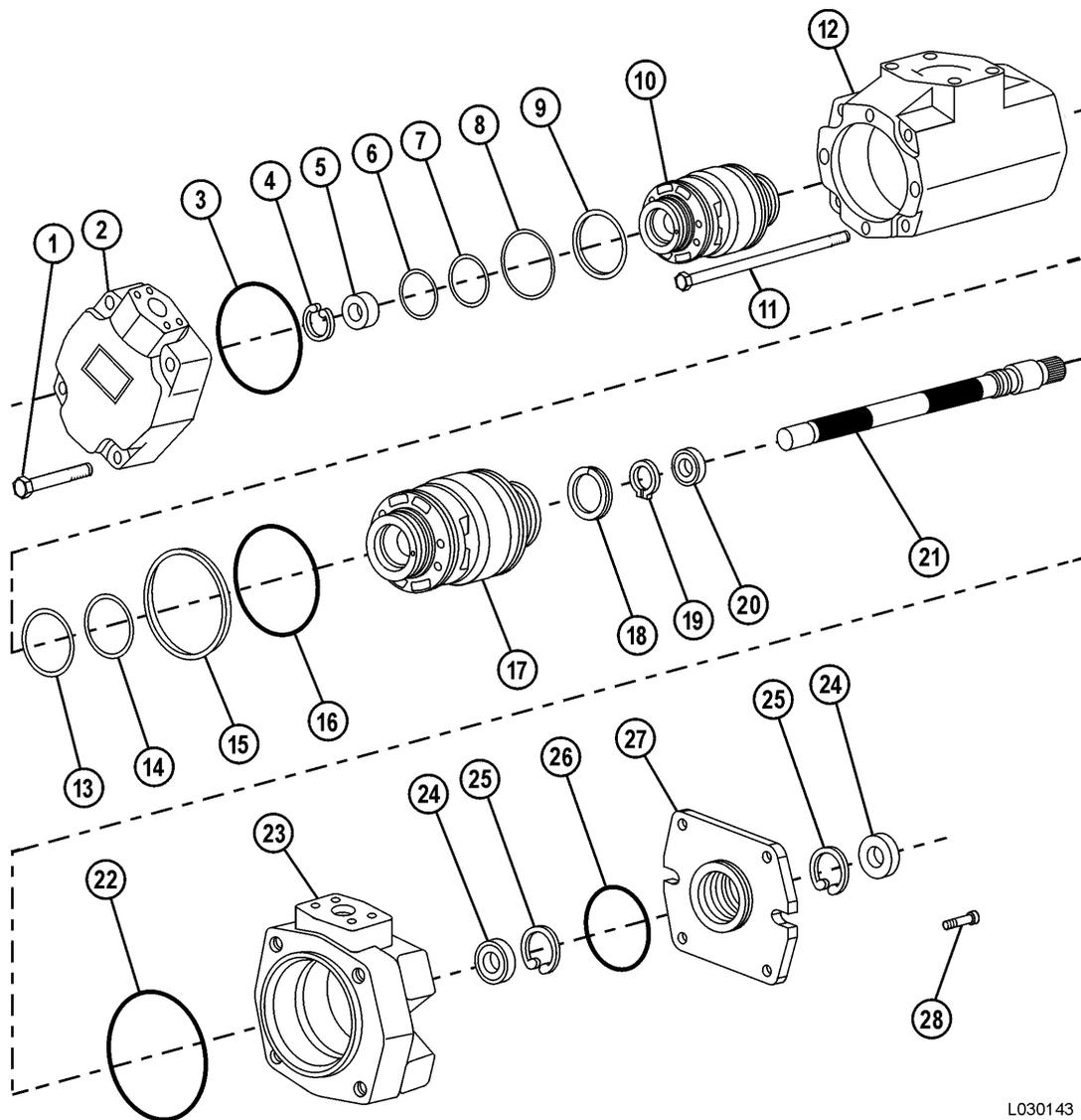
NOTE: To aid in disassembly, position the pump vertically with the inlet cover (2, Figure 5-14) end supported by wooden blocks.

1. Loosen the four inlet cover capscrews (1) until screw threads are disengaged from the housing (12). It is not necessary to remove the capscrews completely.
2. Remove two diagonally opposed capscrews (28) from the flange (27).
3. Using the two diagonally opposed capscrew holes in the flange, attach a suitable lifting device and lift the entire shaft and components from the inlet cover (2) and place it on a suitable surface for further disassembly.
4. Remove the two remaining capscrews (28) holding the flange plate (27) to the body and remove the flange plate.
5. Remove flange O-ring (26), seal retaining ring (25) and internal shaft seal (24).
6. Loosen four housing capscrews (11) until screw threads are disengaged from the outlet body.
7. Remove the outlet body (23) and remove the O-ring (22) from the body.
8. Remove the bearing retaining ring (19) and cartridge retaining ring (18).
9. Remove bearing (20) from shaft (21).
10. Slide the cartridge (17) off of the shaft, being careful to avoid damaging the splines.

11. Remove the backup ring (15) and O-Ring (16) from the cartridge (17).
12. Remove the remaining O-Ring (14), backup ring (13).
13. Slide cartridge (10) off the shaft, being careful to avoid damaging the splines.
14. Remove backup ring (9) and O-ring (8) from the cartridge (10).
15. Remove remaining O-ring (7), backup ring (6), bearing retaining ring (4) and carrier bearing (5).
16. Remove O-ring (3).

Inspection of Parts

1. If any of the internal parts show excessive wear, replace with new. Replace all O-rings and seals with new.
2. Inspect the splines on the shaft. If they show deformity, pits, chips, or scarring, replace shaft.
3. Inspect seal and bearing surfaces on the shaft. If there is excessive scoring or other visible damage, replace shaft.
4. Inspect bearings for damage. Replace if necessary.
5. Inspect seal surfaces in body and flange. If surfaces are extremely rough or scored, replace the body and flange.



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FIGURE 5-14. BRAKE / STEERING PUMP

- | | | | |
|--------------------|------------------|--------------------|--------------------|
| 1. Bolt | 8. O-Ring | 15. Back-Up Ring | 22. O-Ring |
| 2. Inlet Cover | 9. Back-Up Ring | 16. O-Ring | 23. Outlet Body |
| 3. O-Ring | 10. Cartridge | 17. Cartridge | 24. Oil Seal |
| 4. Retaining Ring | 11. Bolt | 18. Lock Ring | 25. Retaining Ring |
| 5. Bearing Carrier | 12. Housing | 19. Retaining Ring | 26. O-Ring |
| 6. Back-Up Ring | 13. Back-Up Ring | 20. Ball Bearing | 27. Flange |
| 7. O-Ring | 14. O-Ring | 21. Shaft | 28. Screw |