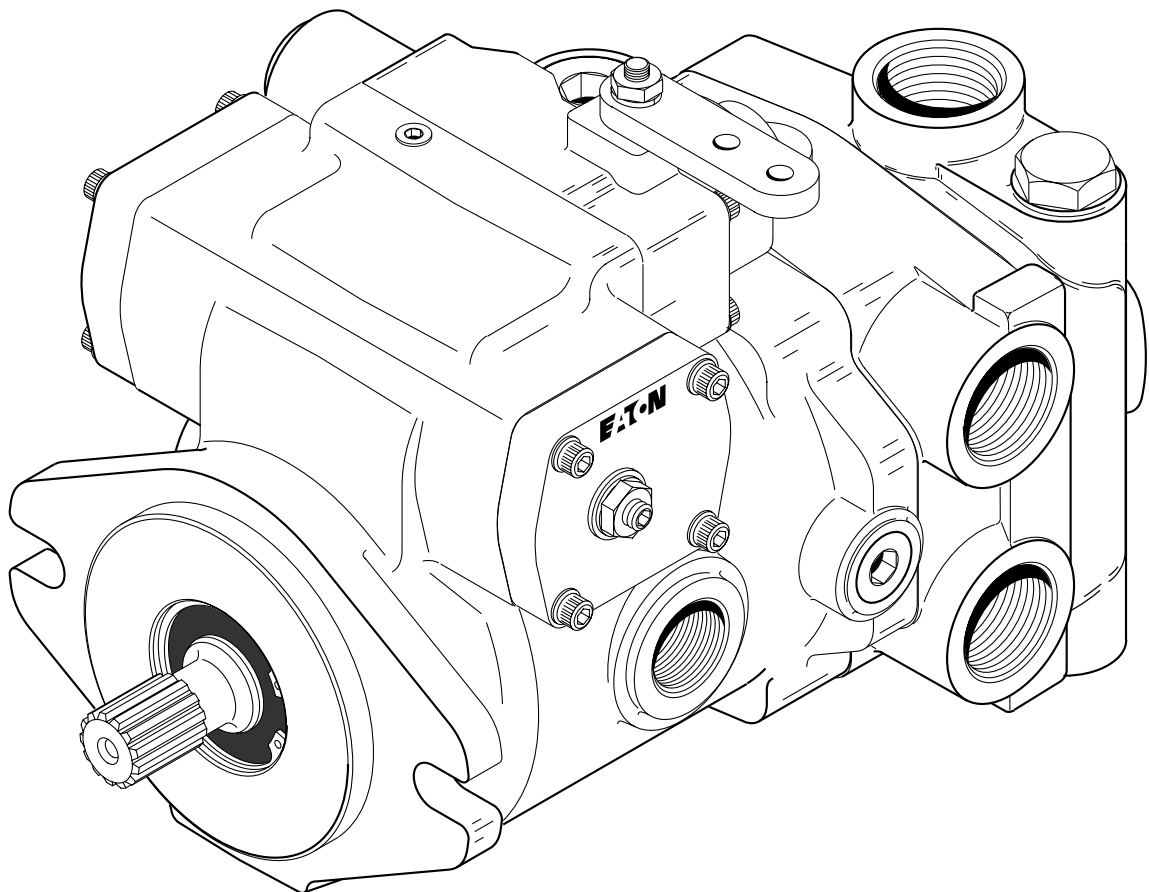


Eaton®
Medium Duty Piston Pump

No. 7-622



Repair Information



Model 72400
Servo Controlled Piston Pump

03

Introduction

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Introduction

This manual provides service information for the Eaton Model 72400 Servo Controlled Piston Pumps. Step by step instructions for the complete disassembly, inspection, and reassembly of the pump are given. The following recommendations should be followed to insure successful repairs.

- Remove the pump from the vehicle.
- Cleanliness is extremely important.
- Clean the port areas thoroughly before disconnecting the hydraulic lines.
- Plug the pump ports and cover the open hydraulic lines immediately after they're disconnected.
- Drain the oil and clean the exterior of the pump before making repairs.
- Wash all metal parts in clean solvent.
- Use compressed air to dry the parts. Do not wipe them dry with paper towels or cloth.
- The compressed air should be filtered and moisture free.
- Always use new seals when reassembling hydraulic pumps.
- For replacement parts and ordering information refer to parts list 6-633.
- Lubricate the new rubber seals with a petroleum jelly (vaseline) before installation.
- Torque all bolts over gasketed joints, then repeat the torquing sequence to make-up for gasket compression.
- Verifying the accuracy of pump repairs on an authorized test stand is essential.

Identification and Tools Required

Identification Numbers

Stamped on each unit.

- A - Product Number Description
72400 = Single Piston Pump
78461 = Tandem Piston Pump
78462 = Single or Tandem
Piston Pump with Gear Pump
- B - Sequential Numbering
- C - Design Code Number

Single Pump - Product Number

7 2 4 0 0 - 0 0 1 - 0 3

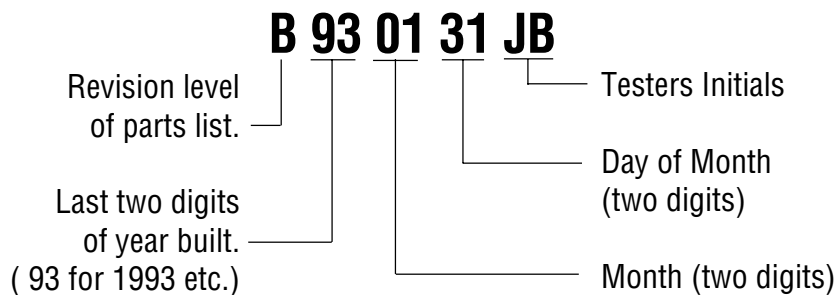
A B C

Tandem Pumps - Product Number

7 8 4 6 1 - 0 0 1 - 0 3

A B C

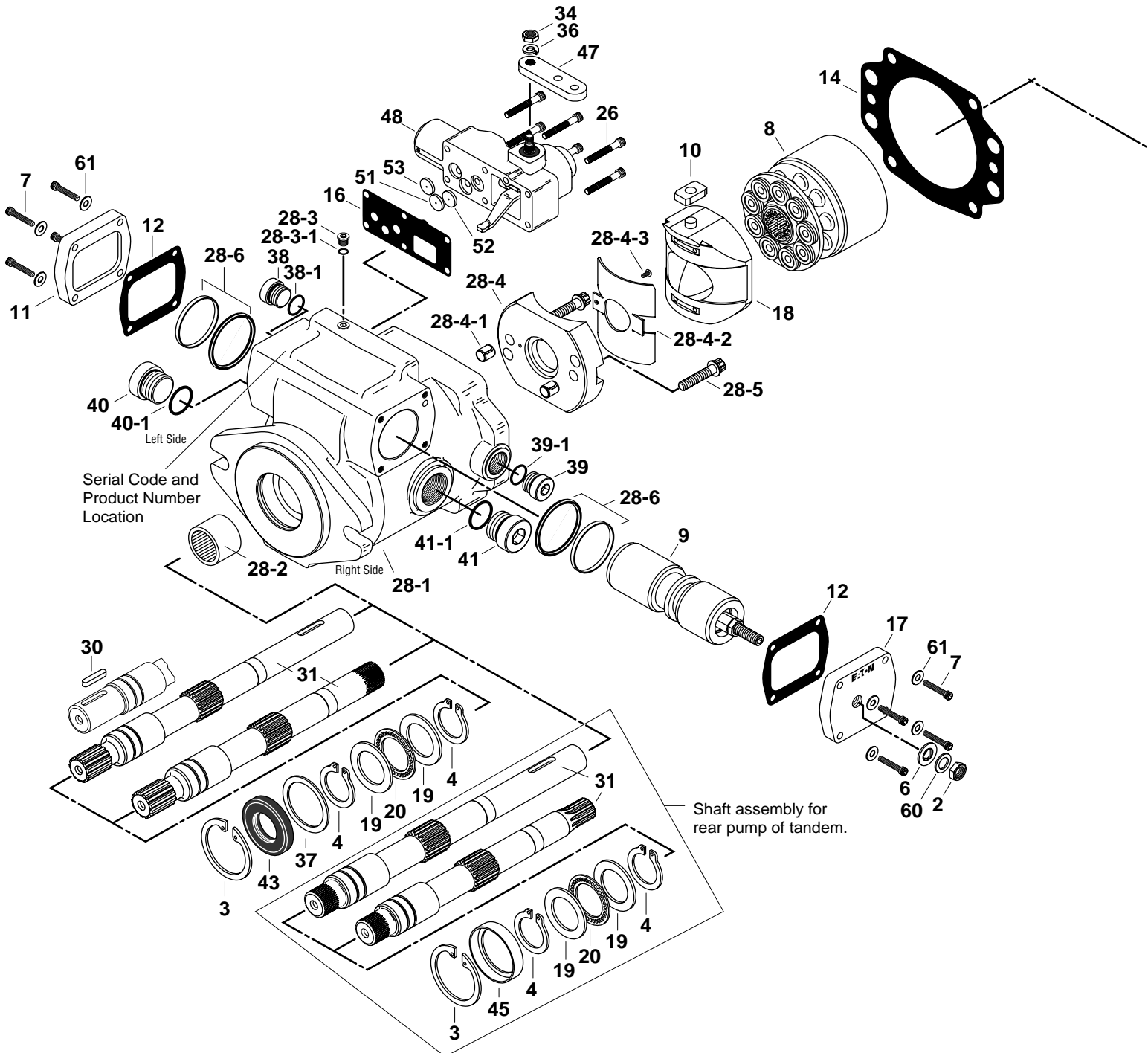
Serial Number Code:



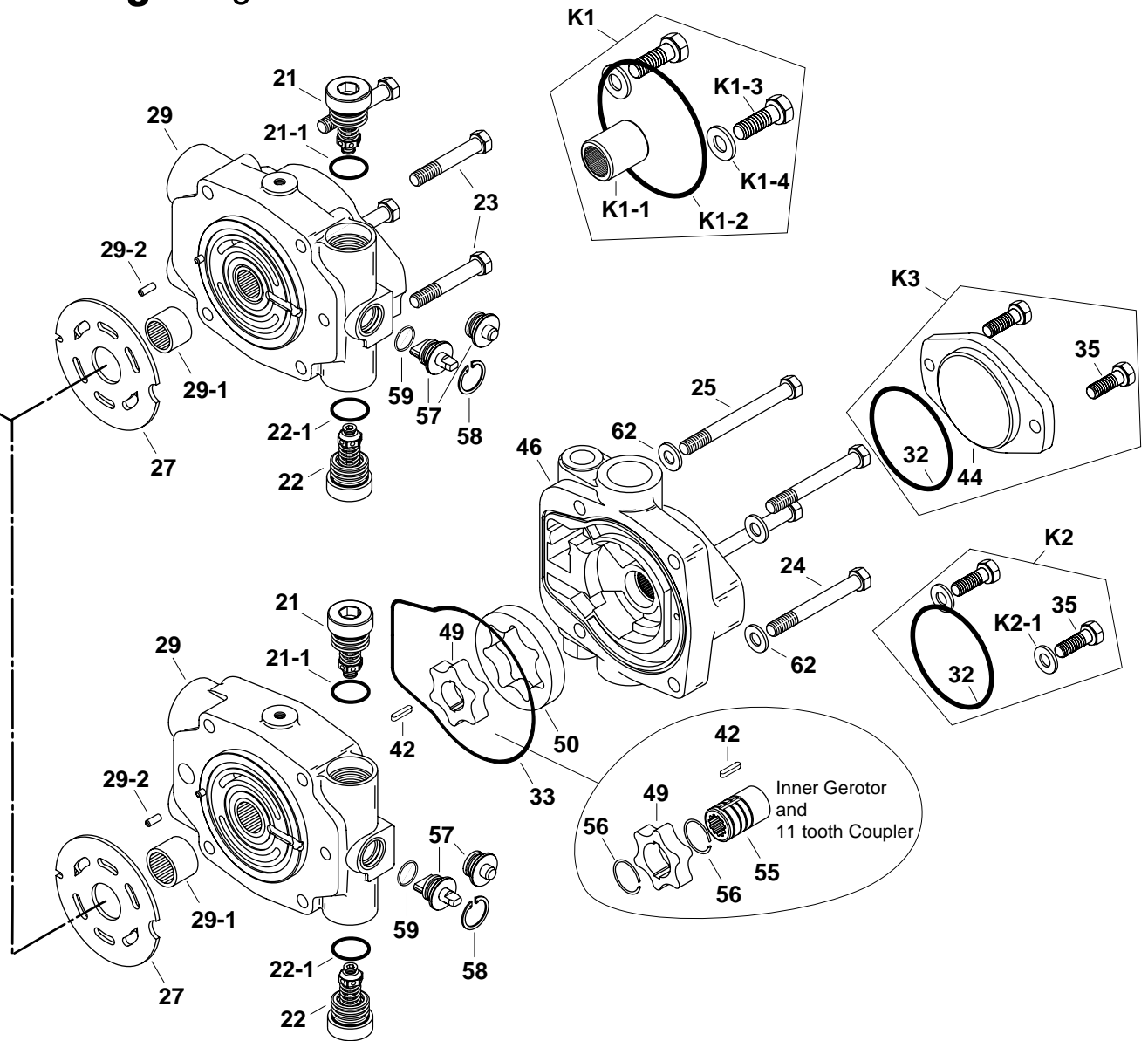
Required Tools

- 9/16 in. Hex Key (Allen)
- 5/32 in. Hex Key (Allen)
- 5/16 in. Hex Key (Allen)
- 3/32 in. Hex Key (Allen)
- 5/64 in. Hex Key (Allen)
- 7/16 in. End Wrench
- 9/16 in. End Wrench
- 3/4 in. End Wrench
- 1 in. End Wrench
- 9/16 in. Socket
- 3/4 in. Socket
- 7/16 in. Socket
- Internal Retaining Ring Pliers (straight .070 tip)
- Internal Retaining Ring Pliers (straight .090 tip)
- External Retaining Ring Pliers (straight .090 tip)
- 9/32 in. retaining E-ring, applicator
- 1/2 in. retaining E-ring, applicator
- O-ring Pick
- Torque Wrench (135.6 N•m [100 lbf•ft] capacity)
- Hammer (soft face)
- Light Petroleum Jelly
- Seal Driver
- Arbor Press
- Loctite (#222, #242, and #277 or equivalent)

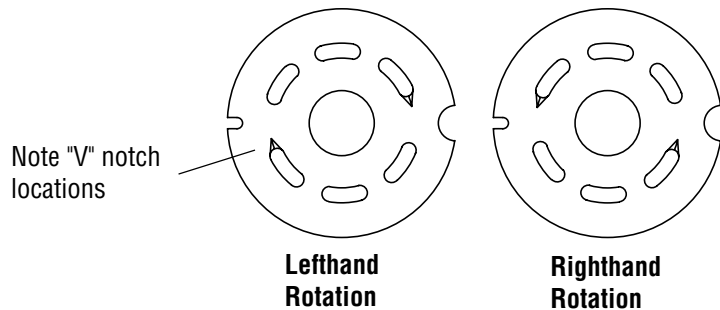
Parts Drawing - Figure 1-1



Parts Drawing - Figure 1-1



Valve Plate Identification



Parts List

Item	Qty.	Description
	2	1 Jam Nut
+	3	1 Retaining Ring
+	4	2 Retaining Ring
+	6	1 Seal Washer
	7	8 Cap Screw, #10-24, 25.4mm [1.0 in.] Long
	8	1 Rotating Kit Assenbly
	9	1 Servo Piston Assembly
	10	1 Servo Piston Follower
	11	1 Cover Plate
+	12	2 Cover Plate Gasket
+	14	1 Housing Gasket
+	16	1 Control Housing Gasket
	17	1 Cover Plate
	18	1 Camplate
	19	2 Thrust Race
	20	1 Thrust Bearing
	21	1 Relief Valve for Port "C"
+	21-1	1 O-ring, 2.46 mm Dia. x 19.18 mm I.D. [.097 in. Dia. x .755 in. I.D.]
	22	1 Relief Valve for Port "D"
+	22-1	1 O-ring, 2.46 mm Dia. x 19.18 mm I.D. [.097 in. Dia. x .755 in. I.D.]
	23	4 Cap Screw, 3/8-16, 57.2 mm [2.25 in.] Long
	24	2 Cap Screw, 3/8-16, 88.9 mm [3.5 in.] Long
	25	2 Cap Screw, 3/8-16, 101.6 mm [4.0 in.] Long
	26	6 Cap Screw
	27	1 Valve Plate
	28	1 Housing Assembly
	28-1	1 Housing
	28-2	1 Bearing (press fit)
	28-3	1 Plug Sub-Assembly
+	28-3-1	1 O-ring, 1.63 mm Dia. x 6.1 mm I.D. [.064 in. Dia. x .239 in. I.D.]
	28-4	1 Cradle Sub-Assembly
	28-4-1	2 Dowel Bushing
	28-4-2	1 Bushing
	28-4-3	1 Cap Screw, Button Head
	28-5	2 Cap Screw
	28-6	2 Seal Sub-Assembly
	29	1 Backplate Assembly
	29-1	1 Bearing (press fit)
	29-2	1 Roll Pin
	31	1 Drive Shaft
+	32	1 O-ring, 1.59 mm Dia. x 82.55 mm I.D. [.0625 in. Dia. x 3.25 in. I.D.]
+	33	1 Molded O-ring
	34	1 Nut
	35	2 Cap Screw, 3/8-16, 25.4 mm [1.0 in.] Long
	36	1 Lockwasher
	37	1 Washer
	38	1 Plug
+	38-1	1 O-ring, 2.21 mm Dia. x 16.36 mm I.D. [.087 in. Dia. x .644 in. I.D.]

Parts List

Item	Qty.	Description
39	1	Plug
+ 39-1	1	O-ring, 2.21 mm Dia. x 16.36 mm I.D. [.087 in. Dia. x .644 in. I.D.]
40	1	Plug
+ 40-1	1	O-ring, 2.95 mm Dia. x 23.47 mm I.D. [.116 in. Dia. x .924 in. I.D.]
41	1	Plug
+ 41-1	1	O-ring, 2.95 mm Dia. x 23.47 mm I.D. [.116 in. Dia. x .924 in. I.D.]
42	1	Key
+ 43	1	Shaft Seal
44	1	Cover Plate
45	1	Spacer
46	1	Charge Pump Adapter Assembly
47	1	Control Arm
48	1	Manual Servo Control Assembly
49	1	Inner Ring Gerotor
50	1	Outer Ring Gerotor
51	1	Supply Orifice
52	1	Control Valve Orifice
53	1	Control Valve Orifice
57	1	Dump Valve Actuator or Plug
+ 58	1	Retaining Ring
+ 59	1	Quad-ring, 1.59 mm Dia. x 15.9 mm I.D. [.0625 in. Dia. x .625 in. I.D.]
60	1	Washer
61	8	Washer
62	3	Washer

Kits

K1	1	Tandem Servo Piston Pump Mounting Kit
K1-1	1	Coupler
+ K1-2	1	O-ring, 1.59 mm Dia. x 101.6 mm I.D. [.0625 in. Dia. x 4 in. I.D.]
K1-3	2	Cap Screw, 1/2-13, 25.4 mm [1.0 in.] Long
K1-4	2	Washer
K2	1	Gear Pump Mounting Kit Includes Items 32 and 35
K2-1	2	Washer
K3	1	Cover Plate Kit for "A" SAE Flange Series 82-2 Mount Includes Items 32, 35, and 44
	1	72400-908, Seal Repair Kit for single pumps (Two Required for Tandem Units)
	1	72400-900, Dump Valve Kit, includes items 57 (Actuator), 58, & 59
	1	72400-901, Dump Valve Plug Kit, includes items 57 (plug), 58, & 59

+ Parts included in 72400-908 Seal Repair Kit

Disassembly

Disassembly - Servo Controlled Piston Pump

The following instructions apply to a single servo controlled piston pump with or without a gerotor charge pump. A tandem pump assembly should be separated into individual pumps before disassembly.

1 Position the pump into a protected jaw vise, clamping onto the outer portion of the flange, with the cap screws up. Mark the relationship of the working ports (for reassembly identification) to the servo control assembly with a scribe. Remove the four cap screws retaining backplate.

No gerotor charge pump skip to step 6.

2 Lift the charge pump adapter assembly straight up off backplate, shaft, and gerotor. Gerotor may stay in adapter or on backplate.

3 Remove o-ring from charge pump adapter.

4 Remove outer gerotor ring from either the charge pump adapter or the inner gerotor ring.

Refer to Appendix A for disassembly and inspection of charge pump adapter assembly.

5 Remove the inner gerotor ring and key from drive shaft or inner gerotor ring and coupler assembly from shaft.

6 Lift backplate straight up off shaft and housing. Remove valve plate from backplate or from rotating kit assembly, still in housing.

7 From backplate, remove dump valve retaining ring, dump valve or plug, and relief valve assemblies. Note: Mark the relief valve in relationship to the cavity it was removed, for reassembly purposes.

Backplate Inspection:

- Check the bearing (press fit) in backplate. If needles remain in cage, move freely, and setting is at the dimension shown in figure 1-3, removal not required.

- Check roll pin in backplate. If tight and set to the dimension shown in figure 1-3, removal not required.

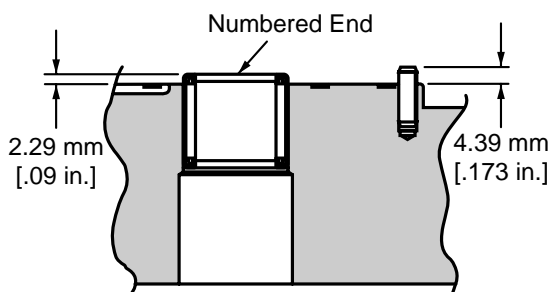


Figure 1-3

8 Remove housing gasket from housing or backplate.

9 With pump still in vise, remove the six cap screws retaining the manual servo control assembly. Remove the control assembly and control housing gasket from the housing. Remove orifice plates, noting location for reassembly. Remove nut and lock washer from control arm, remove arm. Note position of control arm for reassembly.

Refer to Appendix B for disassembly and Inspection of control assembly.

10 To remove rotating kit assembly from housing, first remove pump from vise holding the rotating kit assembly in position. Lower pump so that the shaft end (flange end) is up. Set the rear of housing onto table with housing flat and rotating kit assembly at rest on table. (Hole in table, for protruding shaft, is required.) Lift and remove the housing and shaft from rotating kit assembly, and camplate.

11 Remove camplate from rotating kit assembly and servo piston follower from camplate.

Refer to Appendix C for disassembly and Inspection of rotating kit.

Camplate Inspection:

- The finish on the piston shoe surfaces of the camplate should show no signs of scoring.

- Inspect camplate bushing surface for wear and surface for coating transfer from bushing.

12 To remove servo piston assembly from housing, start with the four each cap screws and washers retaining each cover plate.

13 In removing the cover plate from the servo piston bolt, remove jam nut, washer, and seal washer. Hold the servo piston bolt with hex key and unscrew cover plate off of bolt.

14 Remove servo piston assembly and seal sub-assemblies (two sets) from housing. Note: Disassembly of servo piston assembly is not required.

15 Remove retaining ring from the front of housing. Press the shaft, shaft seal or spacer, and washer from housing. Remove retaining ring, thrust washer, thrust bearing, second thrust washer, and second retaining ring from shaft.

Disassembly and Reassembly

Housing Inspection:

- Check the bearing (press fit) in housing. If needles remain in cage, move freely, and setting at the dimension shown in figure 1-4, removal not required.

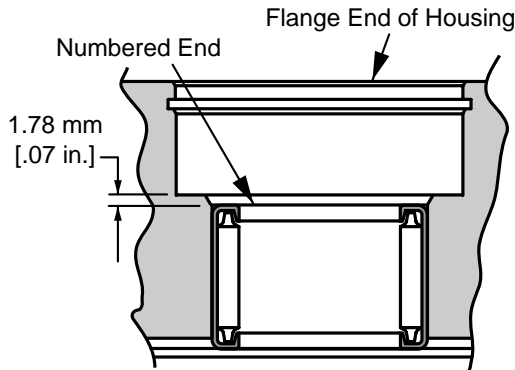


Figure 1-4

16 To remove cradle sub-assembly, remove the two cap screws retaining cradle inside housing. Move the cradle sub-assembly back-an-forth to release dowel bushings and removing cradle sub-assembly from housing.

17 Remove button head cap screw to remove bushing from cradle.

Bushing Inspection:

- Inspect bushing for contamination embedment within coating of bushing surface coming in contact with camplate.

18 Remove all plugs from housing.

19 Discard the shaft seal, gaskets, and o-rings from all assemblies. Replace with new seals upon reassembly.

Reassembly - Servo Controlled Piston Pump

1 All parts should be cleaned and critical moving parts lubricated before reassembly.

2 If necessary, Press new bearing in housing to dimension shown in figure 1-4 with the numbered end of bearing outward.

3 Install the two new seal sub-assemblies into the servo piston cavity of housing.

4 Screw the cover plate onto the servo piston assembly. Install new cover plate gasket in place on housing. Install servo piston assembly and cover plate into servo piston bore in right side of housing (as shown in figure 1-1 and figure 1-5). Retain cover plate with four each washers and cap screws. Torque cap

screws 4.5 to 5.4 N•m [40 to 48 lbf•in.]. To obtain neutral, centering the servo piston assembly is required. Measure in from the left side and set servo piston 12.7 mm [.5 in.] from surface of housing servo bore as shown in figure 1-5.

Note: Re-adjustment may be required for neutral at unit start-up.

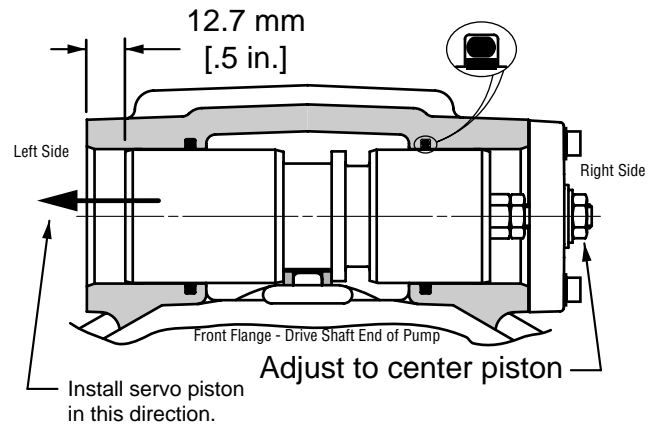


Figure 1-5

5 Install new seal washer, washer, and jam nut to servo piston bolt. Holding servo piston bolt with hex key wrench Torque jam nut 17 to 18 N•m [150 to 160 lbf•in]. Check the centering of servo piston assembly. Install new cover plate gasket and cover plate to left side of servo piston and retain with four each washers and #10-24 cap screws. Torque cap screws 4.5 to 5.4 N•m [40 to 48 lbf•in.].

6 To assemble cradle sub-assembly, press dowel bushings into cradle and install bushing onto cradle retaining with button head cap screw. Torque button head cap screw 1.6 to 1.8 N•m [14 to 16 lbf•in.]

7 Place cradle sub-assembly into housing making sure dowel bushings and cradle are completely seated into housing. Retain cradle sub-assembly with two cap screws after applying loctite #277 (or equivalent) to the end of threads. Torque cap screws 34 to 38 N•m [25 to 28 lbf•ft].

8 To install shaft, place exterior retaining ring, thrust race, thrust bearing, second thrust race, and second retaining ring onto shaft. Position washer and shaft seal or spacer onto shaft.

9 Install shaft assembly into front of housing: For units with spacer, retain with interior retaining ring and go on to step 10. For units with shaft seal, seat seal into position with seal driver and retain with interior retaining ring.

Reassembly

10 Install servo piston follower onto camplate dowel pin. Install camplate carefully onto bushing (coat bushing surface with hydraulic oil), aligning servo piston follower with slot in servo piston assembly.

Refer to Appendix C for reassembly of rotating kit assembly.

11 To install rotating kit assembly, leave housing and shaft in the horizontal position. Holding camplate into position with screw driver thru controller linkage passageway at the top of housing, place rotating kit assembly over shaft and into housing until pistons are in against camplate. Make sure all parts are in housing completely and properly positioned. Return the pump to the vise with open end of housing up, clamping housing on the outer portion of the flange.

12 Install gasket on to housing.

13 If necessary, press new bearing and roll pin in backplate to dimension shown in figure 1-3. Bearing installed with the numbered end outward. Roll pin installed with split oriented away from bearing.

14 Install new o-ring on relief valves. Install relief valve in its original cavity in backplate that it was removed. Torque 136 to 149 N•m [100 to 110 lbf•ft.]

15 Install new Quad-ring on dump valve or plug. Install dump valve or plug and retain with retaining ring into backplate. Note: Make sure paddle of dump valve is perpendicular to relief valve axis prior to installing or damage could result.

16 Apply a small amount of petroleum jelly to the steel side of valve plate to hold in place for installation. Aligning the index pin, place the valve plate in position onto the backplate, with steel side against backplate.

17 Install backplate assembly onto housing assembly. Make sure ports are positioned correctly, valve plate and gasket stay in place.

No gerotor charge pump, skip to step 20.

18 Install key and inner ring gerotor onto shaft or coupler assembly. Lubricate inner ring gerotor.

Refer to Appendix A for reassembly of Charge relief valve in adapter plate.

19 Install o-ring and outer ring gerotor onto adapter plate.

Lubricate both o-ring and outer ring to hold in position during assembly of adapter plate. Install adapter plate onto backplate. Make sure o-ring and gerotor ring stay in place.

20 Retain backplate and adapter plate (when used) with four cap screws, Torque 37 to 42 N•m [27 to 31 lbf•ft].

Refer to Appendix B for reassembly of manual servo control assembly.

21 Install control housing gasket onto housing. Install orifices into control assembly and retain in position with petroleum jelly. Position the feedback link at 90 degrees from control housing. Install Manual servo control assembly onto housing making sure feedback link entered small groove in servo piston assembly.

22 Retain control assembly with six cap screws, torque 4.5 to 5.4 N•m [40 to 48 lbf•in].

23 Install control arm onto control assembly input arm. Retain with lock washer and nut, torque 5 to 8 N•m [4 to 6 lbf•ft]

24 Install new o-rings on all plugs. Install plugs into housing. Torque 3/4 in. plug 28 to 32 N•m [21 to 24 lbf•ft]. Torque 1-1/4 in. plug 54 to 61 N•m [40 to 45 lbf•ft].

25 Refer to start-up procedures on page 23.

Appendix A - Charge Pump Adapter Assembly

Disassembly - Charge Pump Adapter Assembly

1 Remove plug, shims, spring, and poppet from adapter assembly.

Inspection:

- Inspect the charge pump relief valve seat inside the charge pump adapter. Check to insure that seat is smooth and free of burrs or other defects.
- Inspect the charge pump relief valve spring.
- Inspect the bearing or bushing inside the charge pump adapter. The bearing needles must remain in the bearing cage and bearing at dimension shown in figure 1-2. The bushing must have no excessive scoring.
- Inspect the gerotor pocket inside the charge pump adapter assembly. It should not be scored excessively.

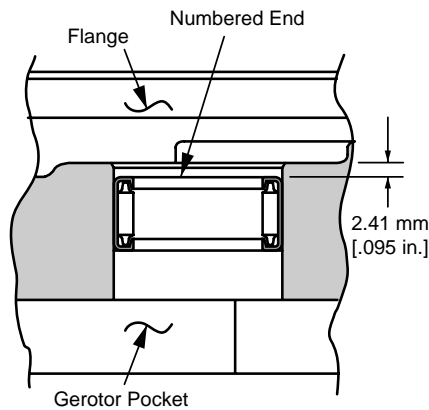
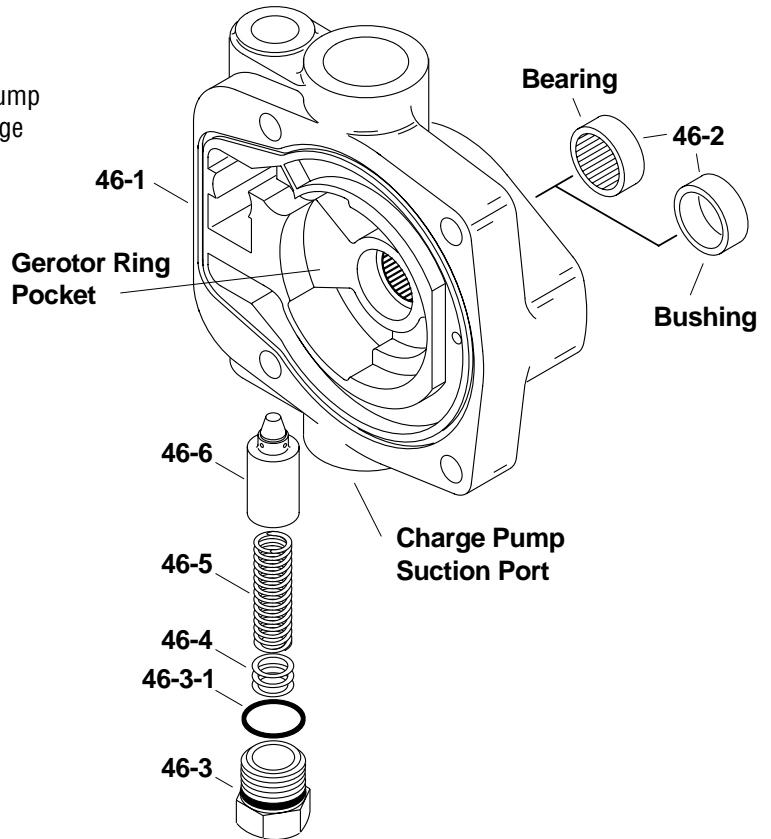


Figure 1-2



Reassembly - Charge Pump Adapter Assembly

1 If necessary, press new bearing or bushing in adapter assembly. The bearing to dimension shown in figure 1-2 with the numbered end of bearing outward and closest to mounting flange. The bushing is to be pressed flush to .254 mm [.010 in.] recessed.

2 Install poppet, spring, shims, new o-ring on plug, and plug into adapter assembly. Torque plug 40.7 to 36.6 N•m [30 to 27 lbf•ft.]

Item	Qty.	Description
46-1	1	Charge Pump Adapter
46-2	1	Bearing (press fit)
46-2	1	Bushing (press fit)
46-3	1	Plug
+ 46-3-1	1	O-ring
46-4	<i>f</i>	Shims
46-5	1	Spring
46-6	1	Poppet

f Shim as required

Appendix B - Manual Servo Control Basic Assembly

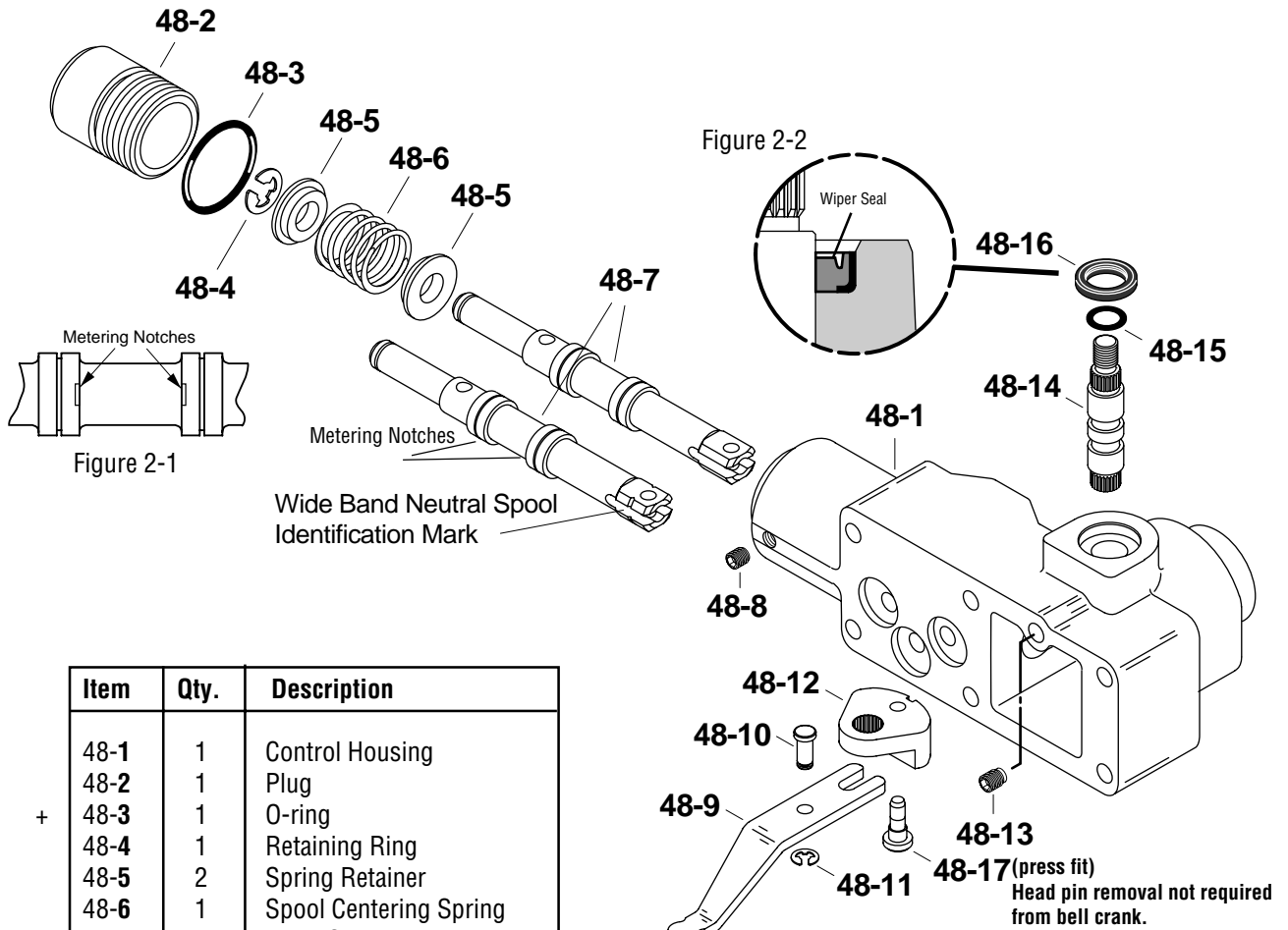
Disassembly - Manual Servo Control Assembly

- 1 Remove wiper seal with screw driver. Remove set screw retaining input shaft and remove input shaft from control housing.
- 2 Remove set screw from plug retaining valve spool and remove plug.
- 3 Remove E-ring from pin retaining feedback link and valve spool. Remove pin, feedback link, valve spool, and bell crank from control housing.
- 4 Compress spring and remove E-ring, spring retainer, spring, and second spring retainer from valve spool.
- 5 Remove o-rings from plug and input shaft. Clean all parts and lubricate in prep for reassembly.

Reassembly - Manual Servo Control Assembly

- 1 Install spring retainer, spring, and second spring retainer onto spool. Compress spring with retainer and retain with E-ring onto valve spool.
- 2 Install valve spool into control housing making sure that metering notches on valve spool can be seen in the metering ports. Notches shown in figure 2-1.
- 3 Position bell crank in housing. Slide feedback link into position between clevis on valve spool, aligning holes, and install dowel pin retaining with E-ring.
- 4 Install new o-ring onto input shaft. Hold bell crank in position with feedback link slot and align splined hole of bell crank with input shaft cavity. Install input shaft into control housing and bell crank.
- 5 Apply Loctite #242 or equivalent to set screw and install, retaining input shaft. Adjust set screw until it bottoms out on input shaft and back out one-quarter turn.
- 6 Install wiper seal on input shaft as shown in figure 2-2.
- 7 Install new o-ring onto plug, retaining valve spool, and install plug. Adjust plug until there is no play in the valve spool with input shaft held stationary. Lock in place with set screw. Torque set screw 2 to 3 N•m [17 to 25 lbf•in].

Appendix B - Manual Servo Control Basic Assembly



Item	Qty.	Description
48-1	1	Control Housing
48-2	1	Plug
+ 48-3	1	O-ring
48-4	1	Retaining Ring
48-5	2	Spring Retainer
48-6	1	Spool Centering Spring
48-7	1	Valve Spool
48-8	1	Set Screw
48-9	1	Feedback Link
48-10	1	Dowel Pin
48-11	1	Retaining Ring
48-12	1	Bell Crank
48-13	1	Set Screw
48-14	1	Input Shaft
+ 48-15	1	O-ring
+ 48-16	1	Wiper Seal
48-17	1	Head Pin (press fit)

Appendix B - Manual Servo Control Assembly Options

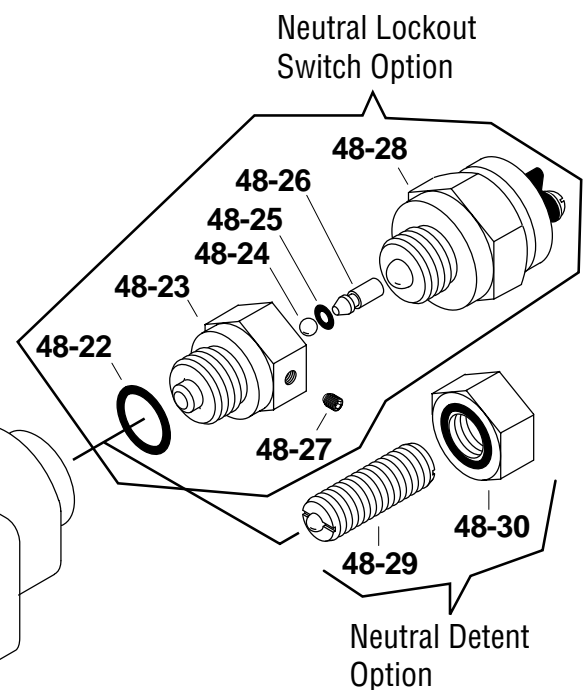
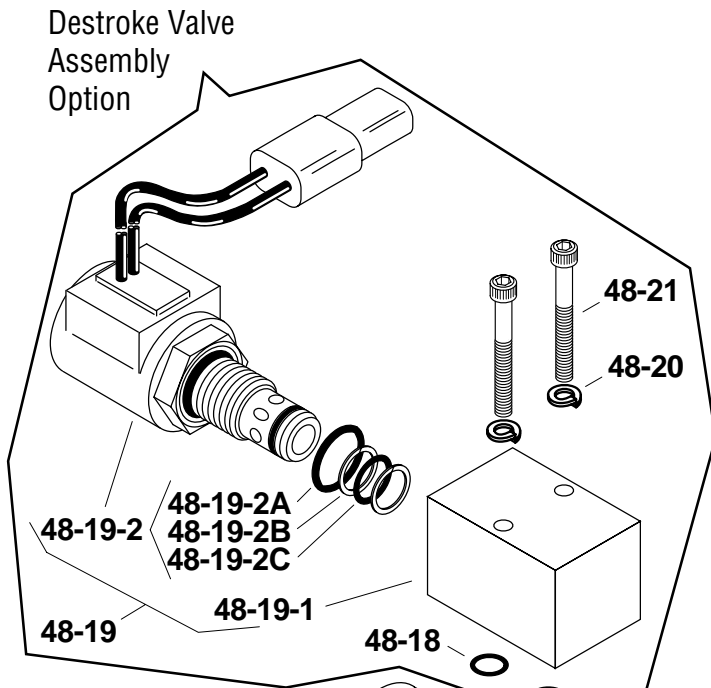
Disassembly - Destroke Valve Assembly Option

- 1 Remove the two cap screws and lock washers from manifold. Removing destroke valve assembly and two o-rings.
- 2 Remove destroke valve from manifold in order to remove o-rings and back-up washers. Note in order to remove destroke valve the solenoid may need to be removed from core first (not shown).

Reassembly - Destroke Valve Assembly Option

- 1 Install new o-rings and back-up washers onto destroke valve.
- 2 Install destroke valve into manifold by hand until top o-ring is met by manifold. Then wrench tighten to 34 N•m [25 lbf•ft.] max. Loosen Nut retaining coil to reposition if necessary and re-torque 5.4 to 7 N•m [4 to 5 lbf•ft.].
- 3 Lubricate the two o-rings and install onto manifold. Install destroke valve assembly onto control assembly. Retain with lock washers and cap screws. Torque 3 to 3.5 N•m [27 to 31 lbf•in.].

Item	Qty.	Description
48-18	2	O-ring
48-19	1	Destroke Valve Assy.
48-19-1	1	Manifold
48-19-2	1	Destroke Valve
48-19-2A	1	O-ring
48-19-2B	2	Back-up Washer
48-19-2C	1	O-ring
48-20	2	Lock Washer
48-21	2	Cap Screw
48-22	1	O-ring
48-23	1	Adapter, Neutral Lockout
48-24	1	Ball
48-25	1	O-ring
48-26	1	Pin
48-27	1	Set Screw
48-28	1	Neutral Lockout Switch
48-29	1	Ball Plunger
48-30	1	Nut, Seal



Appendix B - Manual Servo Control Assembly Options

Disassembly - Neutral Lockout Switch Assembly Option

- 1 Loosen set screw in adapter and remove neutral lockout switch from adapter.
- 2 Remove Neutral lockout adapter from control assembly.
- 3 Remove pin, ball, and o-rings from adapter.

Reassembly - Neutral Lockout Switch Assembly Option

- 1 Install new o-ring onto adapter and new o-ring onto pin.
- 2 Install ball and pin into adapter. Lubricate with petroleum jelly to hold in place during installation.
- 3 Install adapter into control assembly. Torque 60 to 70 N•m [44 to 53 lbf•ft].
- 4 Apply Loctite #222 or equivalent to threads of switch and install neutral lockout switch into adapter. The adjustment procedures for the switch are as follows.

a) Install switch, while moving control arm back and forth, until "detent" action is detected. Back out the switch until the "detent" action is very slight.

b) Obtain a test light or use a multimeter. Attach the leads from the test light to the switch or the wiring connector.

c) Move the control arm out of the detent position. The test light will go on. Screw in the switch until the light goes off. Mark this as position "A". See figure 2-3. Move the control arm to the detent position and the test light should come back on.

d) Leaving the control arm in the detent position, the light will remain on. Screw in the switch until the light goes off. Mark this position "B".

e) Unscrew the switch one third of the distance between "B" and "A". Install and tighten the hex socket head set screw in one of the upper quadrants of the hex of the switch adapter. See figure 2-3. Torque set screw 3.2 to 3.8 N•m [28 to 34 lbf•in.]

5 Test the switch by moving the control arm to the detent position, the light should be on. Move the control arm out of detent, the light should go off.

6 Remove test light and put servo control Assembly into operation.

Disassembly - Neutral Detent Option

- 1 Loosen seal nut and remove ball plunger from control housing.

Reassembly - Neutral Detent Option

- 1 Install ball plunger into control housing until contact with bell crank detent is detected. After contact, screw in 1/2 turn and retain with seal nut. Torque nut 14 to 30 N•m [10 to 22 lbf•ft].

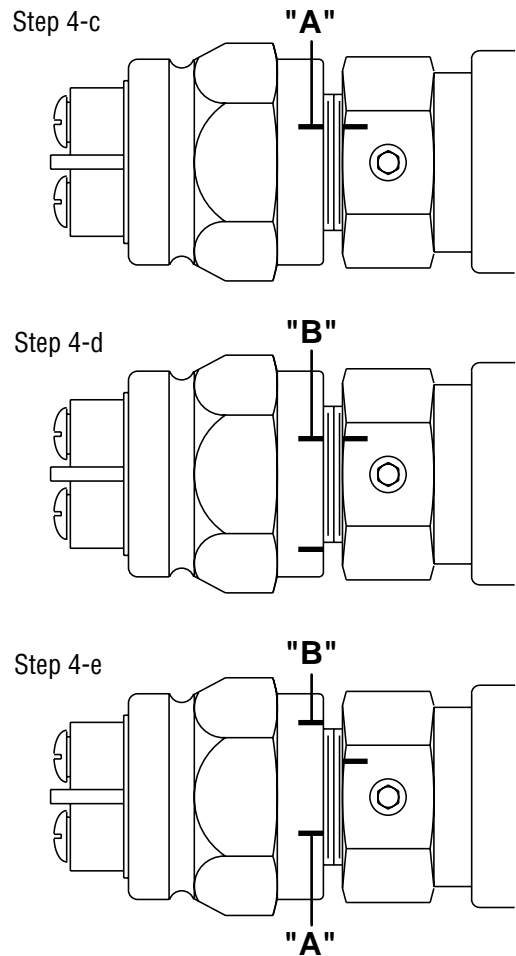


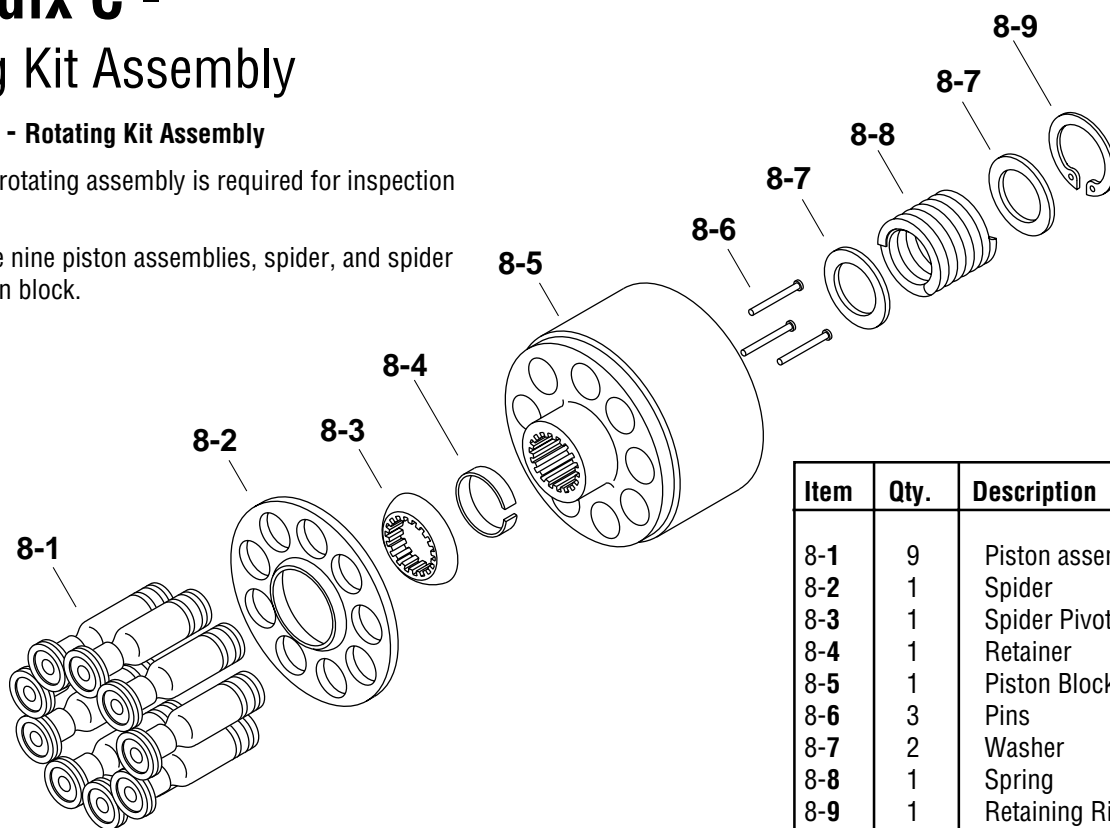
Figure 2-3

Appendix C - Rotating Kit Assembly

Disassembly - Rotating Kit Assembly

Disassembly of rotating assembly is required for inspection only.

1 Remove the nine piston assemblies, spider, and spider pivot from piston block.



Item	Qty.	Description
8-1	9	Piston assemblies
8-2	1	Spider
8-3	1	Spider Pivot
8-4	1	Retainer
8-5	1	Piston Block
8-6	3	Pins
8-7	2	Washer
8-8	1	Spring
8-9	1	Retaining Ring

Inspection:

- Examine the O.D. of the pistons for finish condition. They should not show wear or deep scratches. Inspect the shoes for a snug fit on the ball end of the pistons and a flat smooth surface that comes in contact with the camplate. **Do not lap piston shoes.**

- Examine the spider for wear in the pivot area.
- Examine the pivot to insure smoothness and no signs of wear.

- Inspect the piston block surface that makes contact with valve plate. This surface should be smooth and free of deep scratches. **Do not lap piston block.**

- The pistons should move freely in the piston block bore. If they are sticky in the bore, examine the bore for scoring or contamination.

2 To inspect pins and spring **Caution** should be taken in removing spring. The **spring is highly compressed** and the retaining ring should not be removed without compressing the spring safely.

The following parts are required to disassemble the piston block:

- 2 ea. 3/8 in. I.D. x 1-1/8 in. O.D. flat washers
- 1 ea. 3/8 in. x 3-1/4 in. N.C. cap screw, and
- 1 ea. 3/8 in. N.C. nut

To remove spring, place one of the flat washers over the 3/8 in. x 3-1/4 in. cap screw. Put cap screw through the center of the piston block and apply the second washer. Let washer rest on the three pins and retain with nut. Turning nut and compressing spring inside the block. Use a pair of retaining ring pliers and remove the internal retaining ring. Remove nut, bolt, and the two washers from block. Removing the washer, spring, second washer, three pins, and pin keeper at the same time.

Reassembly - Rotating Kit Assembly

1 To reassemble the rotating kit assembly complete the following: Compress the pin keeper and install in the spline of the piston block. Install the three pins with head end to the inside of the block and position in the special grooves of the piston block spline.

2 Install the washer, spring, and second washer into the piston block. Use the two 3/8 in. I.D. washers, nut, and 3/8 in. x 3-1/4 in. cap screw to compress the spring and retain with retaining ring. Remove the nut, cap screw, and the two washers.

3 Install the pivot onto the three pins, spider on the pivot, and piston assemblies thru the spider and into piston block, resting on spider.

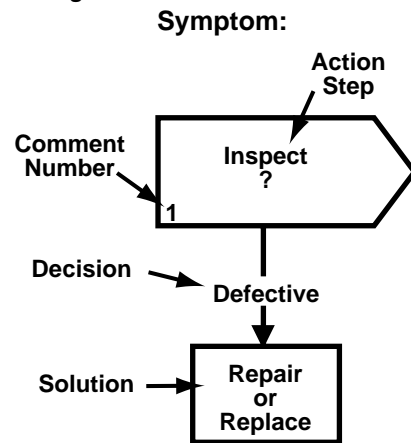
Fault - Logic Troubleshooting

This fault - logic troubleshooting guide is a diagnostic aid in locating transmission problems.

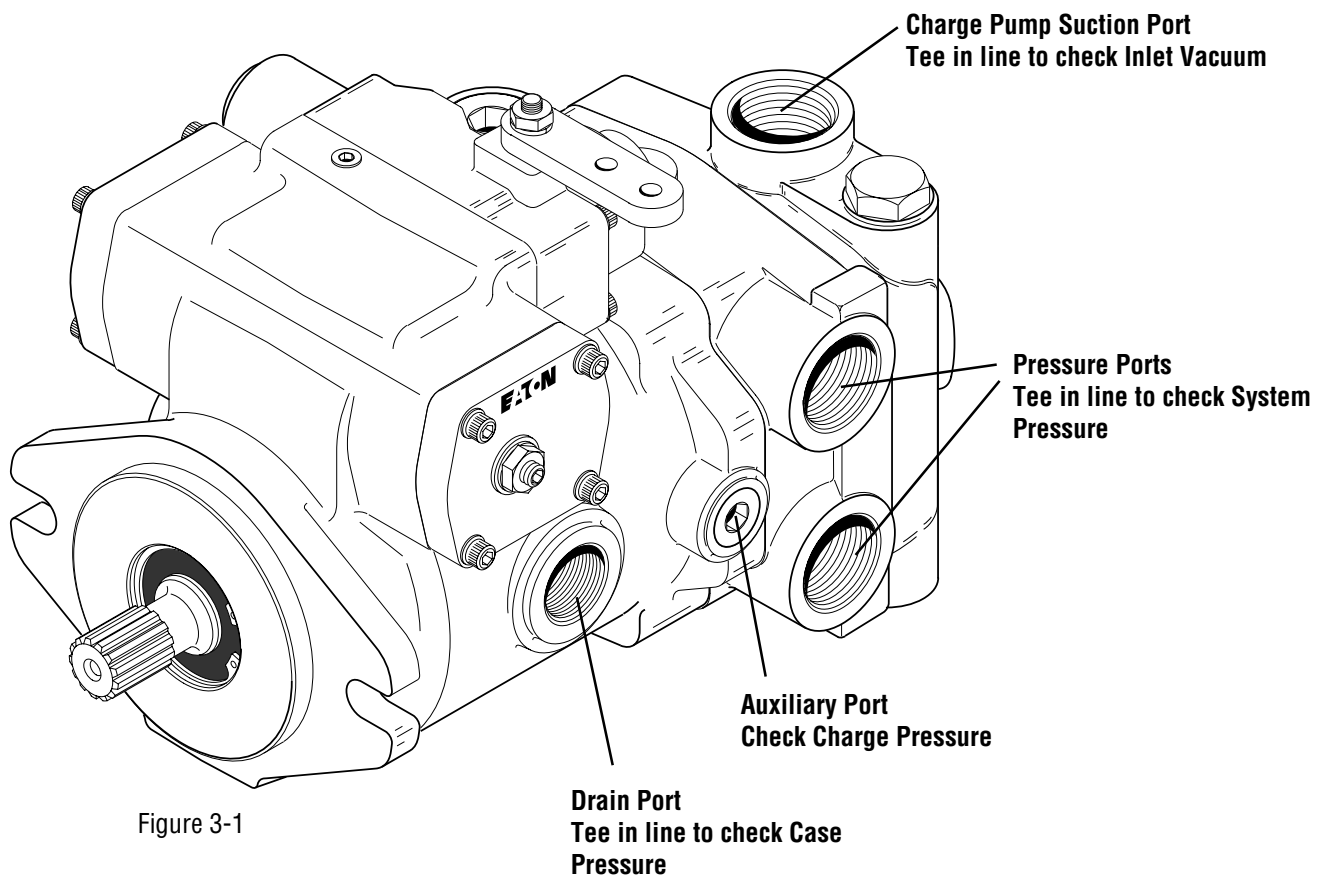
Match the transmission symptoms with the problem statements and follow the action steps shown in the box diagrams. This will give expedient aid in correcting minor problems eliminating unnecessary machine down time.

Following the fault - logic diagrams are diagram action comments of the action steps shown in the diagrams. Where applicable, the comment number of the statement appears in the action block of the diagrams.

Explanatory Diagram



Recommended Gauge Locations



Gauges Recommended

Inlet vacuum gauge: 2 bar to 1 bar [30 PSI to 30 inHg]

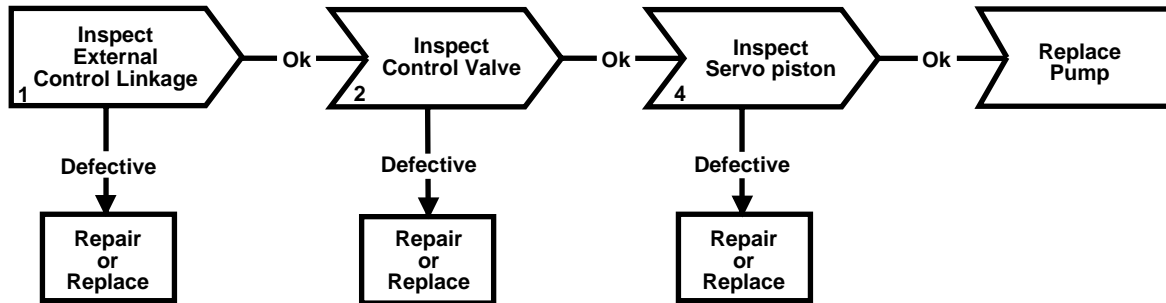
System pressure gauge: 700 bar [10,000 PSI]

Charge pressure gauge: 0 to 50 bar [0 to 600 PSI]

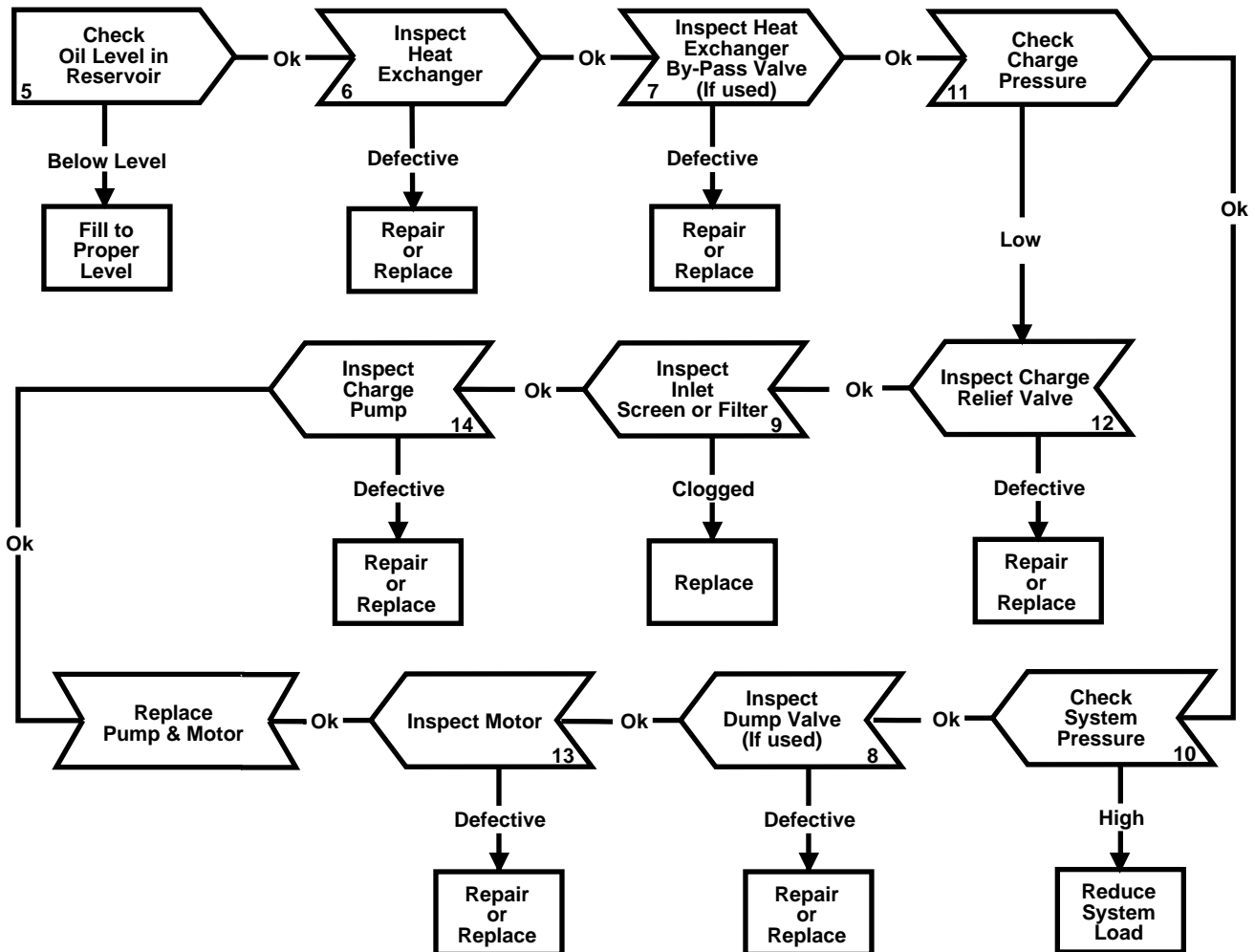
Case pressure gauge: 0 to 25 bar [0 to 300 PSI]

Fault - Logic Trouble Shooting

Symptom: Neutral Difficult or Impossible to Find

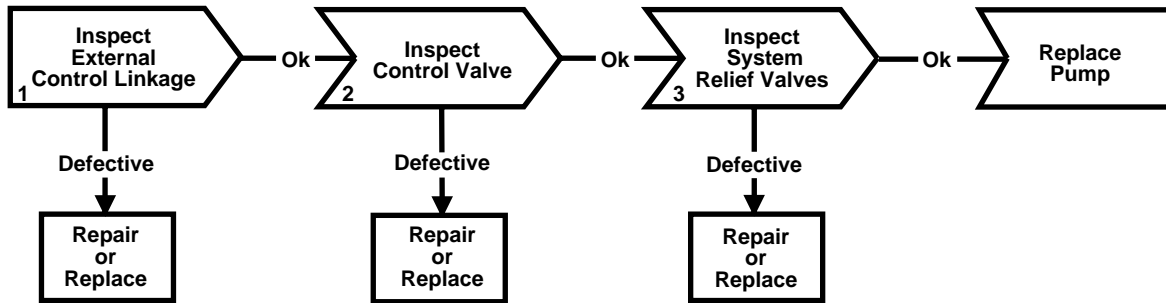


Symptom: System Operating Hot

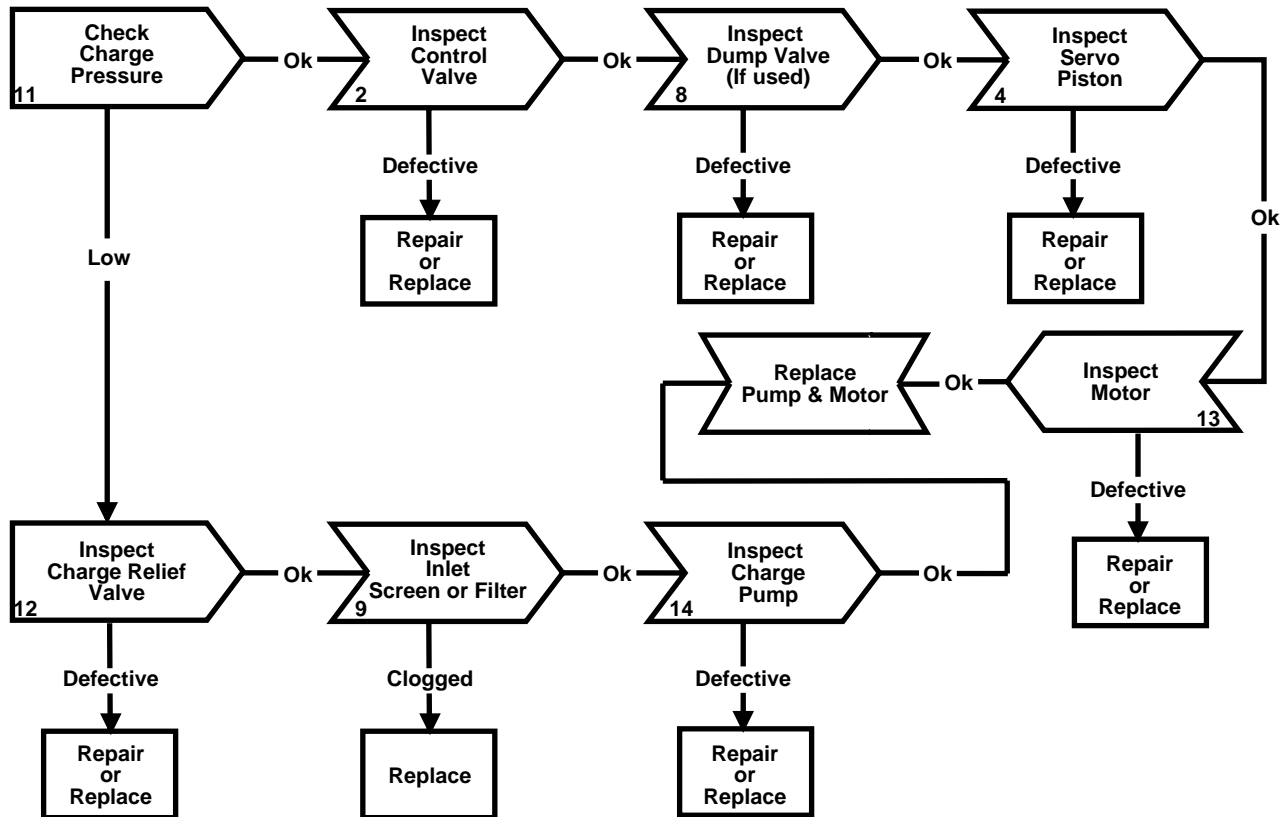


Fault - Logic Trouble Shooting

Symptom: Operates in One Direction Only

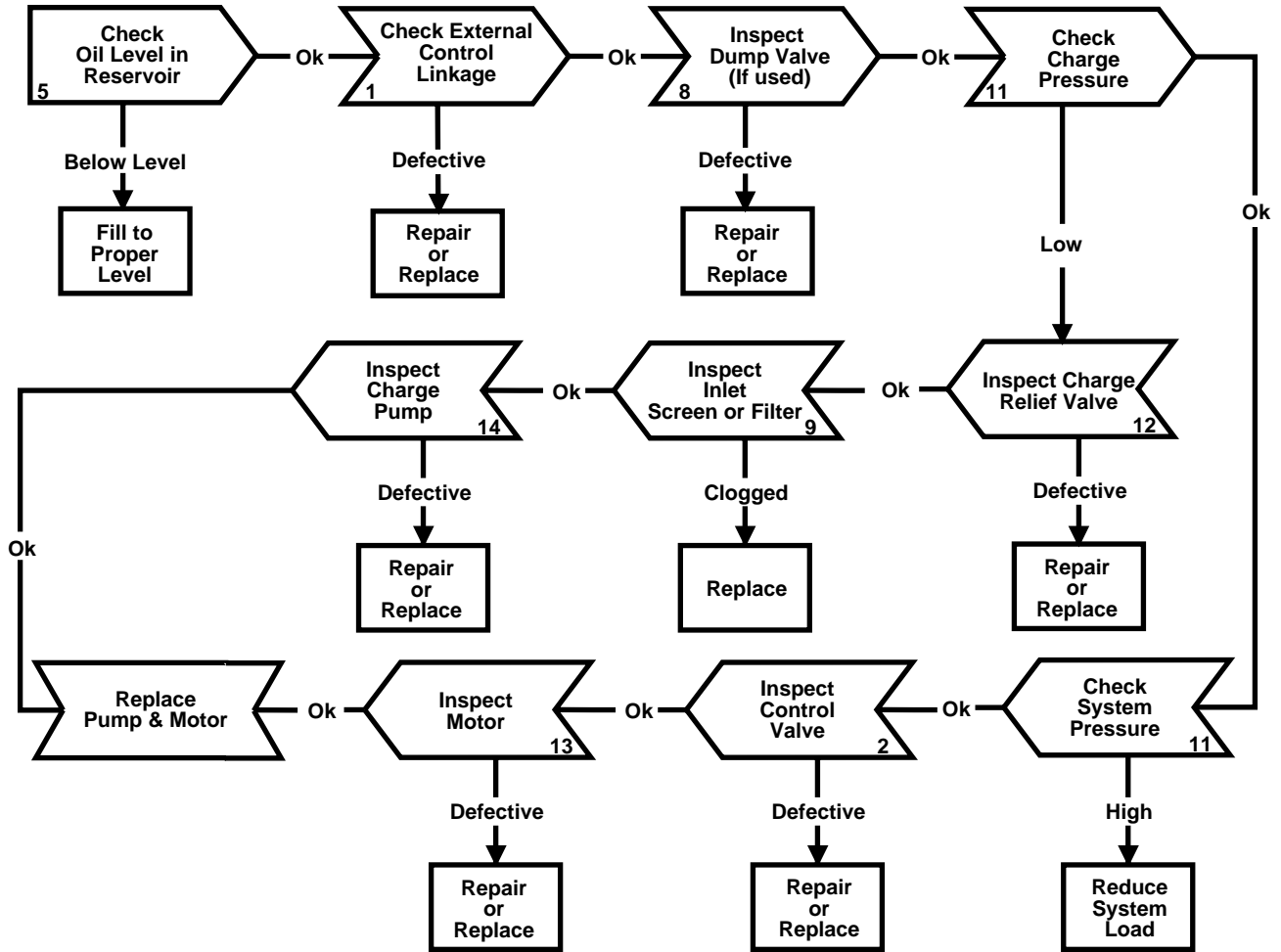


Symptom: System Response Sluggish



Fault - Logic Trouble Shooting

Symptom: System Will Not Operate in Either Direction



Fault - Logic Trouble Shooting

Diagram Action Step Comments

- 1 **Inspect External Control Linkage for:**
 - a. misadjusted or disconnected
 - b. binding, bent, or broken
- 2 **Inspect Control Valve for:**
 - a. plugged control orifice(s)
 - b. damaged mounting gasket
 - c. misadjusted, damaged or broken neutral return spring
 - d. broken control connector pin
 - e. faulty destroke valve (if used)
 - f. galled or stuck control spool
 - g. neutral detent or lockout switch misadjusted (if used)
- 3 **Inspect System Relief Valves * for:**
 - a. improper pressure relief setting
 - b. damaged or broken spring
 - c. valve held off seat
 - d. damaged valve seat
- 4 **Inspect Servo Piston for:**
 - a. misadjusted, damaged or broken neutral return spring assembly
 - b. galled or stuck servo piston
 - c. damaged or missing o-ring and/or back-up ring
- 5 **Check Oil Level in Reservoir:**
 - a. consult owner/operators manual for the proper type fluid and level
- 6 **Inspect Heat Exchanger for:**
 - a. obstructed air flow (air cooled)
 - b. obstructed water flow (water cooled)
 - c. improper plumbing (inlet to outlet)
 - d. obstructed fluid flow
- 7 **Inspect Heat Exchanger By-Pass Valve for:**
 - a. improper pressure adjustment
 - b. stuck or broken valve
- 8 **Inspect Dump Valve for: (if used)**
 - a. held in a partial or full open position
- 9 **Inspect Inlet Screen or Filter for:**
 - a. plugged or clogged screen or filter element
 - b. obstructed inlet or outlet
 - c. open inlet to charge pump
- 10 **Check System Pressure:**
 - a. See figure 3-1 for location of pressure gauge installation
 - b. consult owner/operators manual for maximum system relief valve settings
- 11 **Check Charge Pressure:**
 - a. See figure 3-1 for location of charge pressure gauge installation
 - b. consult owner/operators manual for maximum charge relief valve settings
- 12 **Inspect Charge Relief Valve for:**
 - a. improper charge relief pressure setting *
 - b. damaged or broken spring
 - c. poppet valve held off seat
- 13 **Inspect Motor for:**
 - a. consult owner/operator manual for motor operation and trouble shooting
- 14 **Inspect Charge Pump for:**
 - a. broken or missing drive key
 - b. damaged or missing o-ring
 - c. excessive gerotor clearance
 - d. galled or broken gerotor set

*** System/Charge Relief Valve Pressure Settings**

Inlet Vacuum	.203 bar [6 inHg] max.
Case Pressure	1.7 bar [25 PSI] maximum
Charge Pressure	17.24 to 20.68 bar [250 to 300 PSI]
System Pressure	345 bar [5000 PSI] maximum 207 bar [3000 PSI] continuous

The high pressure relief valves are all factory preset and cannot be readjusted.

The pressure setting is stamped on each valve with a three digit number. To identify, multiply the noted number by 10 to get the valves pressure setting.
Example: 10 x 500 = [5000 PSI] 345 bar

Start-up Procedure

When initially starting a new or a rebuilt transmission system, it is extremely important that the start-up procedure be followed. It prevents the chance of damaging the unit which might occur if the system was not properly purged of air before start-up.

- 1** After the transmission components have been properly installed, fill the servo pump housing at least half full with filtered system oil. Connect all hydraulic lines and check to be sure they are tight.
- 2** Install and adjust all control linkage.
- 3** Fill the reservoir with an approved oil that has been filtered through a 10 micron filter. Refer to Eaton Hydraulics Technical Data sheet number 3-401 titled [Hydraulic Fluid Recommendations](#).
- 4** Gasoline or L.P. engines: remove the coil wire and turn the engine over for 15 seconds. Diesel engines: shut off the fuel flow to the injectors and turn the engine over for 15 seconds.
- 5** Replace the coil wire or return the fuel flow to the injectors. Place the transmission unit in the neutral position, start the engine and run it at a low idle. The charge pump should immediately pick up oil and fill the system. If there is no indication of fill in 30 seconds, stop engine and determine the cause.
- 6** After the system starts to show signs of fill, slowly move pump camplate to a slight cam angle. Continue to operate system slowly with no load on motors until system responds fully.
- 7** Check fluid level in the reservoir and refill if necessary to the proper level with an approved filtered oil.
- 8** Check all line connections for leaks and tighten if necessary.
- 9** The machine is now ready to be put into operation.
- 10** Frequent filter changes are recommended for the first two changes after placing the machine back into operation. Change the first filter in 3-5 hours and the second at approximately 50 hours approx. hours. Routinely scheduled filter changes are recommended for maximum life of the hydraulic system.

Notes

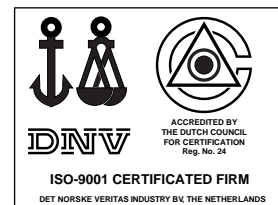
**Order parts from number 6-633 Parts Information booklet.
Each order must include the following information.**

1. Product and/or Part Number
2. Serial Code Number
3. Part Name
4. Quantity

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