

EATON 751, 781 HYDROSATIC TRANSAXLE

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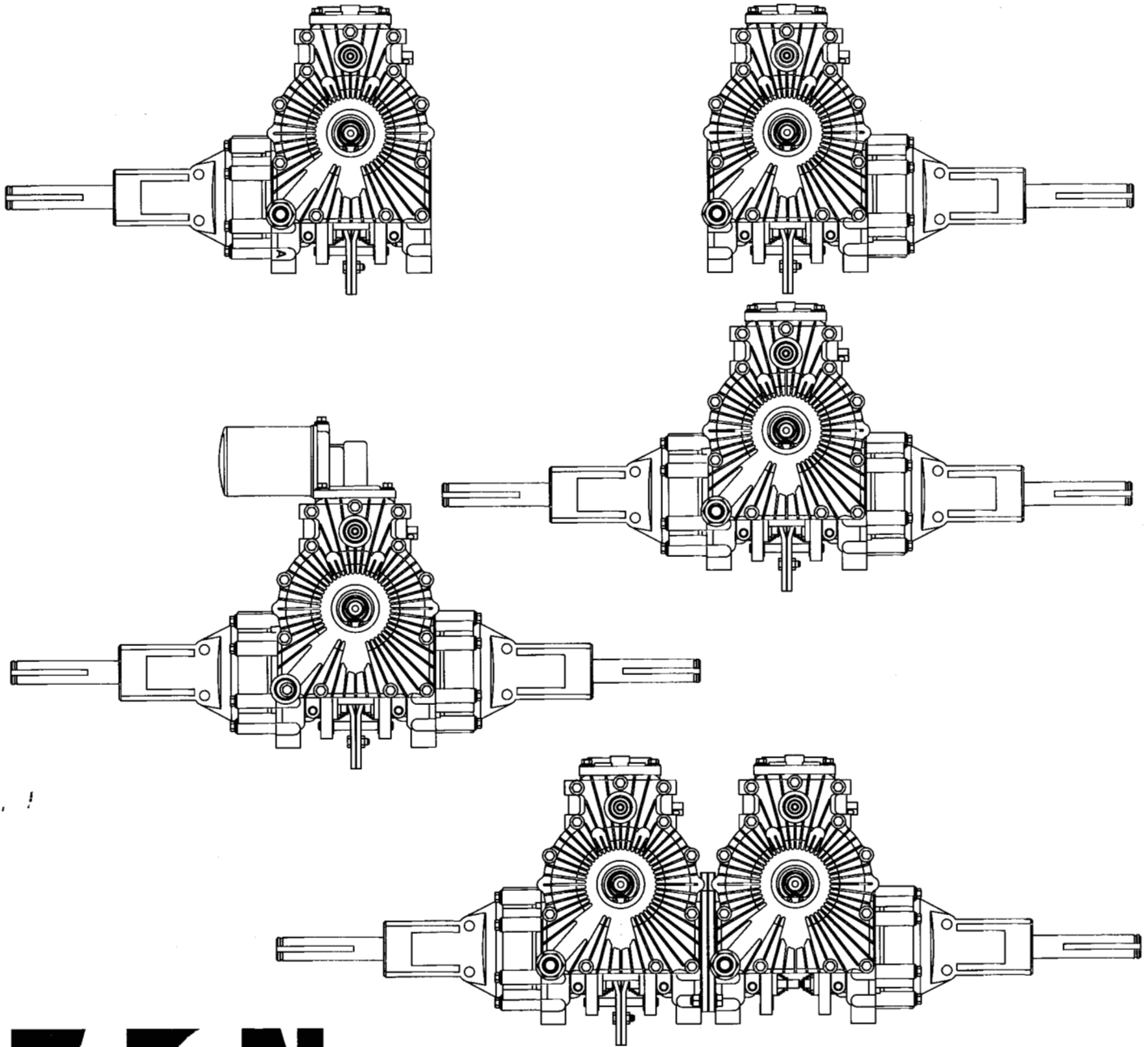
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**Eaton
Hydraulics
Division**

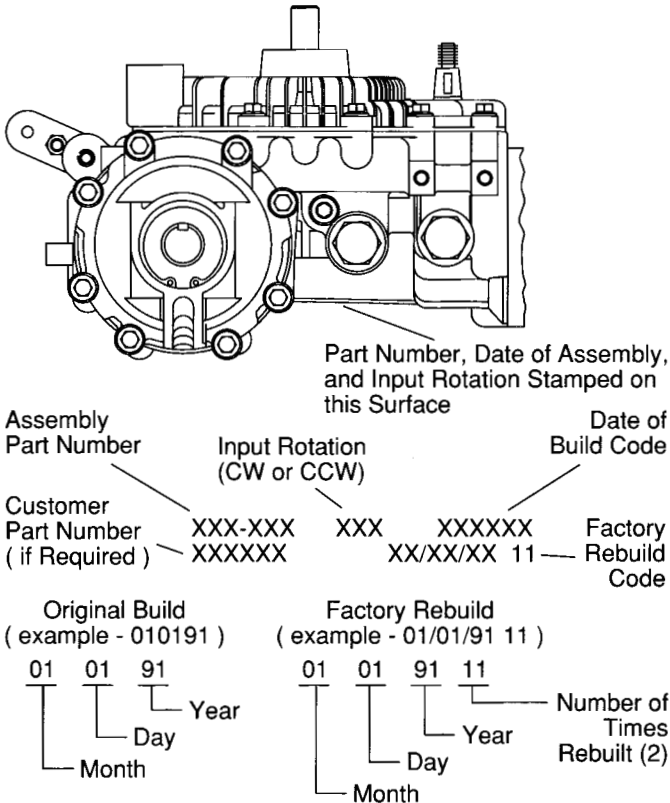
Repair Information

751, 851, 771, and 781 Hydrostatic Transaxle



EATON

1 The following repair information applies to the Eaton 751, 851, 771, and 781 series hydrostatic transaxles.



2 The transaxle identification information is located opposite the input shaft, on the back of the housing assembly.

3 The build code of the transaxles identifies the month, day and year of the transaxle manufacture. This information is found in the same area as the identification code.

4 When ordering replacement parts for a transaxle, the part(s) order must include the part name, part number, quantity of parts and also the transaxle model number, input rotation and date code.

Transaxles 751, 851, 771, and 781

5 The following procedures describe complete and disassembly and reassembly of the transaxle.

The level of cleanliness maintained while servicing the transaxle could affect its perfor-

mance. Work in a clean area. After disassembly, wash all parts with clean solvent and blow the parts dry with air. Inspect all mating surfaces. Replace any damaged parts that could cause internal leakage. Do not use grit paper, files or grinders on finished parts.

Note: Whenever a transaxle is disassembled, our recommendation is to replace all seals. Lubricate the new seals with petroleum jelly before installation. Use only clean, recommended hydraulic fluid on the finished surfaces at reassembly.

6 The following tools are required for disassembly and reassembly of the transaxle.

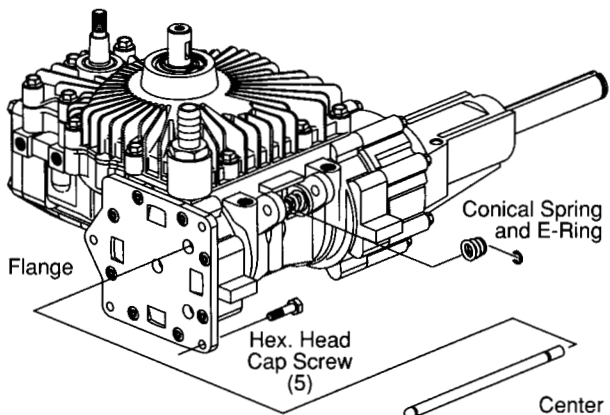
- 3/8 in. Socket or End Wrench
- 1 in. Socket or End Wrench
- Ratchet Wrench
- Torque Wrench 300 lb-in [34 Nm]
- 5/32 Hex Wrench
- Small screwdriver (4 in [102 mm] to 6 in. [150 mm] long)
- No. 5 or 7 Internal Retaining Ring Pliers
- No. 4 or 5 External Retaining Ring Pliers
- 6 in. [150 mm] or 8 in. [200 mm] C-clamp
- Piece of Pipe or Hydraulic Tubing (1 in. O.D. x 6 inches long)
- Piece of Pipe or Hydraulic Tubing (1-1/8 in. [29 mm] O.D. x 6 in. [150 mm] long)
- Small Arbor or Hydraulic Press
- 3 or 4 Large Rubber Bands
- Light Petroleum Jelly (such as Vaseline)

7 Seal all open ports before cleaning. Thoroughly clean the transaxle exterior.

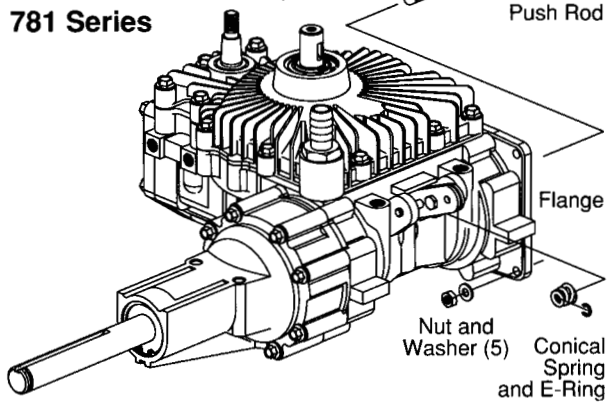
Transaxle with Charge Pump

8 After draining the transaxle, use your hand or a filter wrench to remove the filter from the filter base.

Note: It is best to drain the transaxle through the case drain port with the input shaft in the down position.



781 Series



781 Series Hydrostatic Transaxle

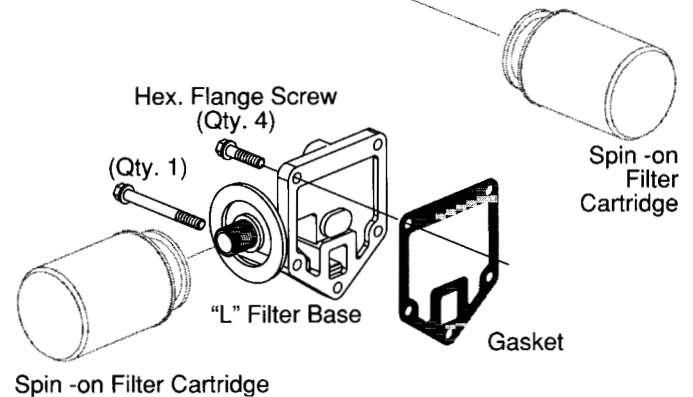
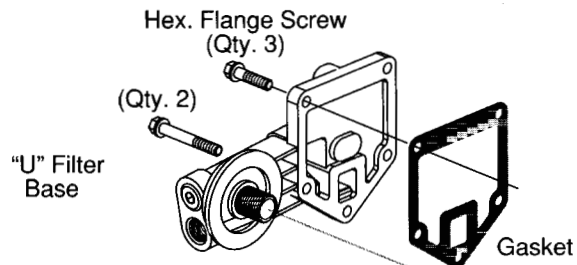
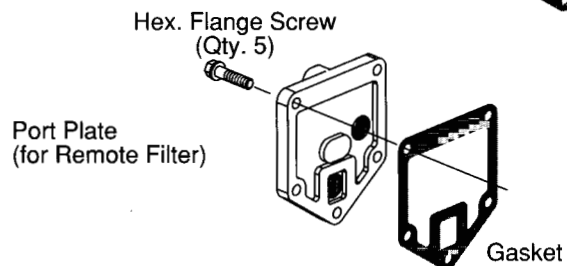
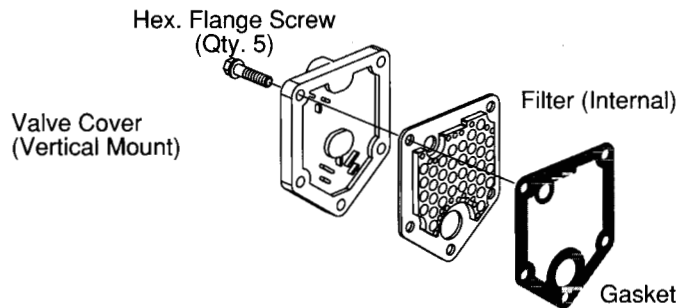
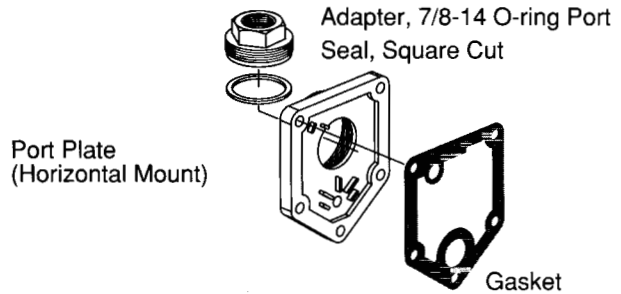
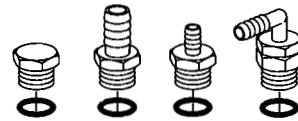
9 Divide the transaxle halves by removing only one E-ring retaining the conical spring on *each* end of the center brake push rod, then remove four 1/2 inch hex. nuts, the lock washers and bolts. Pull the two halves apart carefully, the push rod is the only adjoining link. Remove the two conical springs. Safely store these small parts for final assembly after servicing each transaxle half. Each half has a flange attached with eight .25 Torx But. Head screws. These screws have been secured with Loctite (torque ref.— 125 ±12.5 lb-in [14 ±1,4 Nm]), flange removal is not recommended. Service each half separately as outlined in the following text.

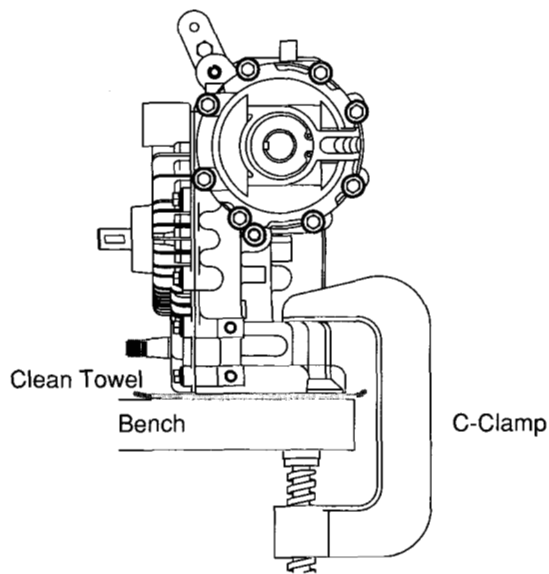
- 10** Using a 3/8 inch socket or end wrench, remove the cap screws from ...
- ... filter base.
- ... valve cover and internal filter.
- ... port plate.

11 Remove gasket.

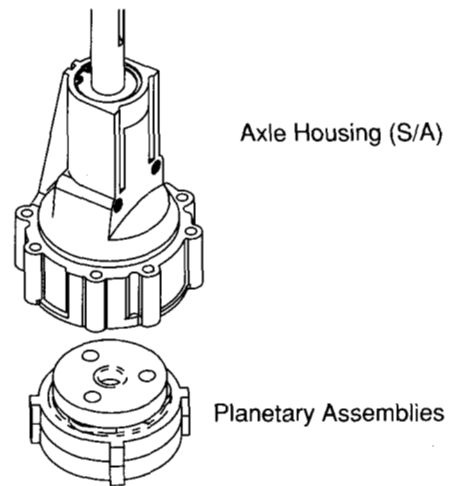
Note: This gasket may be on the part just removed or on the housing assembly.

Plugs and Fittings

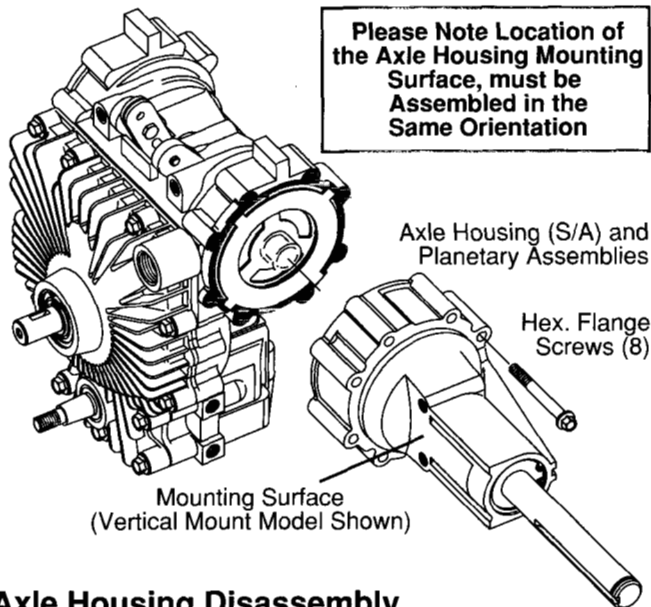




12 Position transaxle with this gasket surface toward the bench. Place a clean towel between the transaxle and the bench. This towel protects the sealing surface from possible damage during repositioning. Use a 6 inch [150 mm] to 8 inch [200 mm] C-clamp to secure the transaxle to a suitable work surface. Be careful not to over tighten the C-clamp when securing the transaxle.



15 To disassemble the axle housing assembly, carefully position the axle housing assembly on a clean flat surface, then separate axle housing from the planetary assemblies as shown.

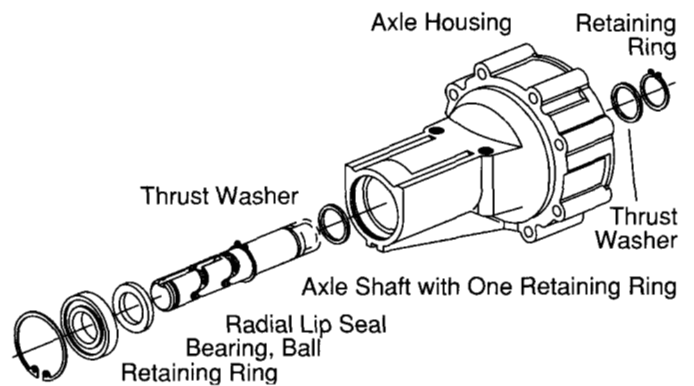


Axle Housing Disassembly

13 With the transaxle secure, use a 3/8 inch socket or end wrench to remove the flange screws from one (A-side or B-side) axle housing assembly.

14 After removing the flange screws, carefully remove the axle housing assembly from the housing assembly.

Caution: Retain the planetary assemblies in the axle housing assembly during removal.



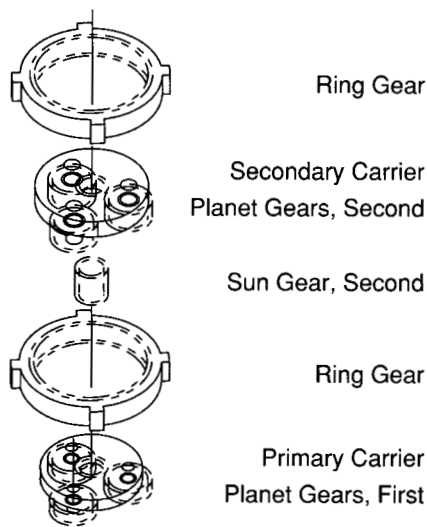
16 Position the axle housing assembly with the output end of the axle shaft in the up position. Using a No. 5 or 7 internal retaining ring pliers, remove the ball bearing retaining ring from the axle housing.

17 Re-position the axle housing with the splined end of the axle in the up position. Using a No. 4 or 5 external retaining ring pliers, remove the retaining ring and thrust washer from the axle shaft.

18 Remove the axle from the axle housing by using a small press or by tapping the splined end of the axle shaft with a plastic head hammer. This will dislodge the seal and bearing from the axle housing.

19 After separating the axle shaft from the axle housing, remove the ball bearing, seal and thrust washer from the axle shaft. The thrust washer may be in the axle housing.

Note: The retaining ring remaining on the axle shaft need not be removed.



20 To disassemble the planetary assemblies for inspection and cleaning, first remove the ring gear (from the secondary carrier/ planet gears).

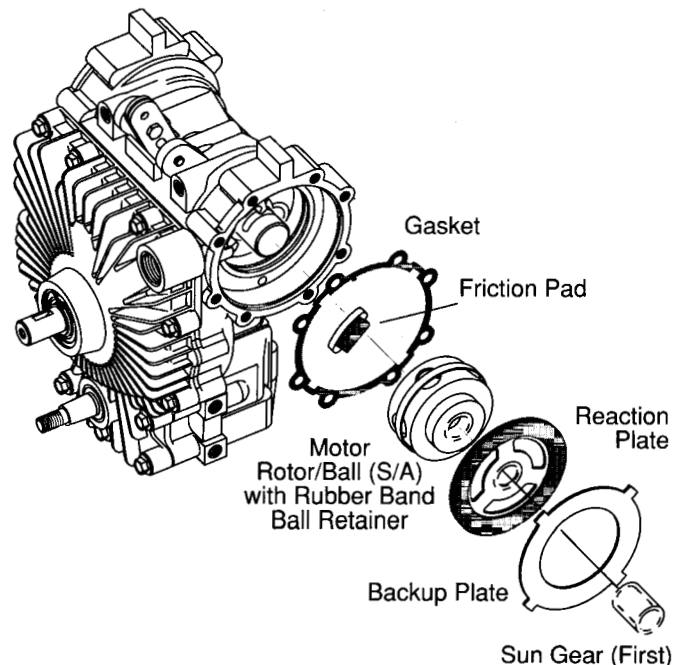
21 Next, putting a slight squeeze on the secondary carrier planet gears, remove the three secondary planet gears, and carrier.

22 Turn the assembly over and remove the secondary planet gears for inspection and cleaning.

23 Remove the sun gear and remaining ring gear.

24 Again, putting a slight squeeze on the remaining carrier planet gears, remove planet gears, and carrier from the backup plate.

25 Shown above are both the primary and secondary carrier assemblies. The planet gears may be removed for inspection and cleaning.



26 Next, remove the reaction plate from the primary sun gear.

27 Remove the primary sun gear from the motor rotor assembly.

28 Remove the small friction brake pad assembly from its recessed pocket located in the axle housing.

29 Shown in previous drawing are the three major parts used in the Eaton transaxle wet brake assembly, the friction pad assembly, reaction plate and backup plate. When the brake is applied, the rotating reaction plate is squeezed between the stationary friction pad and the backup plate.

30 Remove the axle housing assembly gasket.

Note: This gasket may have remained on the axle housing.

31 Normally any further disassembly of the brake levers, push rods and etc. is not necessary nor recommended. The brake lever shims located between the two brake levers is used to adjust the brake lever movement. This adjustment was made during the initial transaxle assembly.

Note: Standard single handle brake arrangement shown.

Motor Rotor Disassembly

32 Important: Be extremely careful when removing the motor rotor assembly. The ball pistons are spring loaded in the bores and must remain intact because each ball piston is matched to its respective bore.

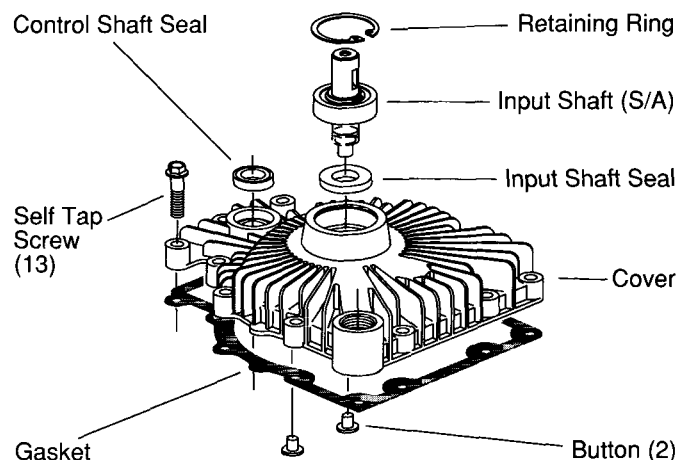
The best way to remove the motor rotor assembly is to place a separate motor race on top of the existing motor race in the housing assembly. Hold the separate race securely in position. Then carefully pull the motor rotor assembly outward until the ball pistons are fully engaged in the groove located in the center of the separate race. Carefully remove the rotor assembly and race together as a set, handling the motor rotor assembly only.

Note: If a separate motor race is not available, work a wide rubber band around the outside of the motor rotor to hold the ball pistons in their bores.

33 It is essential that the ball pistons be retained in their bores during handling. This is

especially true for the motor rotor(s), as the motor ball pistons are spring loaded in the bores.

Note: The remaining transaxle axle housing assembly, if applicable, can be serviced at this time (ref. steps 12-34).



34 Reposition the housing assembly. Using a 3/8 inch socket or end wrench, remove the self tap screws from the cover assembly.

Note: One self tap screw is located in the case drain port.

35 With all self tap screws removed (13), carefully separate and remove the cover from the housing assembly.

36 Turn the cover assembly over and remove the two buttons.

Note: These two buttons may have dropped out into the housing assembly during removal of the cover.

37 Turn the cover assembly back over and using a No. 5 or 7 internal retaining ring pliers, remove the input shaft retaining ring.

38 Reposition and support the cover allowing room for shaft removal. With the input shaft in the down position, use a plastic head hammer or press to remove the input shaft assembly from the cover.

39 No further disassembly of the shaft and bearing assembly is required as they are serviced as an assembly.

40 Using a screwdriver or similar tool, drive the input shaft seal from the cover.

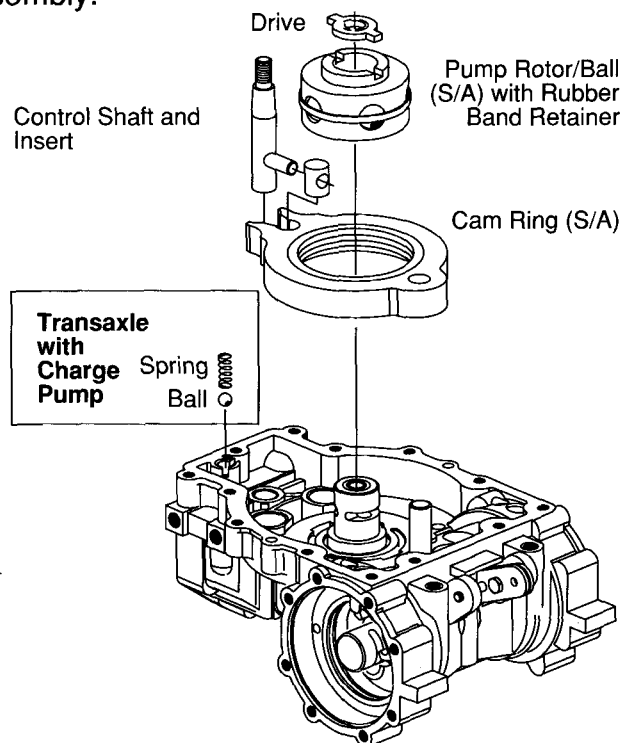
41 To remove the control shaft seal, reposition the cover. Using a small screwdriver or similar

tool, pry the control shaft seal from the cover.

42 Remove the cover gasket from the housing.

Note: The gasket may have remained on the cover.

43 Remove the drive from the pump rotor assembly.



Transaxle with Charge Pump

44 Remove the charge pressure relief valve spring from the housing.

45 Using a pencil magnet or similar tool, remove the charge pressure relief ball from its seat in the housing.

46 Remove the control shaft and insert from the housing and cam ring assembly.

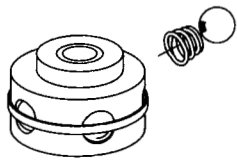
47 Remove the cam ring insert from the control shaft.

48 Remove the cam ring assembly from the housing.

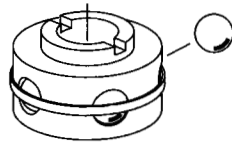
49 Carefully remove the pump rotor assembly from the housing, making sure the ball pistons are not dislodged from their bores.

Important: It is essential that the pump rotor assembly remain intact during handling as each ball piston is matched to its respective bore.

50 Install a wide rubber band around the pump rotor to retain the ball pistons in their bores.



Motor Rotor/Ball (S/A)



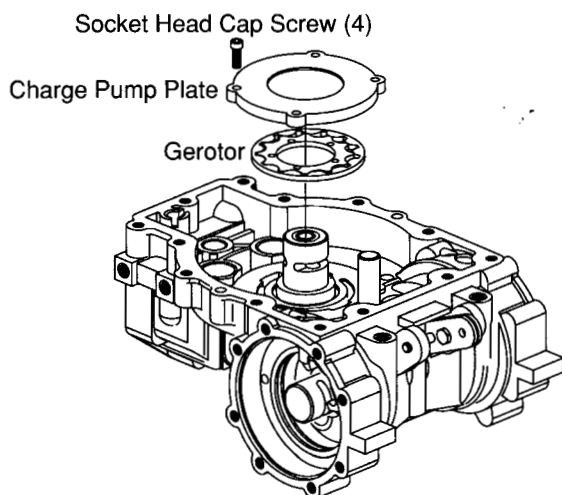
Pump Rotor/Ball (S/A)

Pump and Motor Rotor Inspection

51 Disassemble and inspect the rotor assembly in the following manner. Remove the piston balls from the rotor, one at a time, working clockwise from the letter stamped in the rotor face. Place the piston balls in a prepared container (use a container such as an egg carton or ice cube tray to hold the balls).

Note: The balls must be replaced in the same bores from which they were removed because they are all select fit.

Check for broken or collapsed springs in the motor rotor. When broken or collapsed springs are found with no other irregularities, the springs may be replaced individually without replacing the complete motor rotor assembly. Inspect the piston balls. They must be smooth and completely free of any irregularities. Inspect the rotor bores, rotor bushing and pintle journals for irregularities or excessive clearance. The ball piston to rotor bore clearance is select fit electronically from .0002 inch [.005 mm] to .0006 inch [.015 mm]. When irregularities are noted, replace the complete rotor assembly. Install the ball pistons in their matching bores. Hold them in place with a rubber band or separate race.



Transaxle with Charge Pump

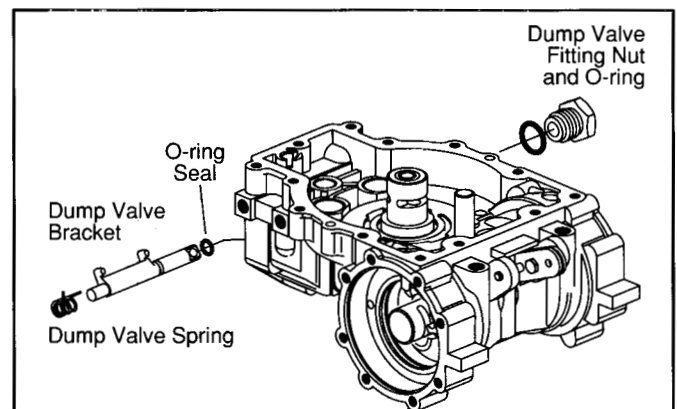
52 To inspect the charge pump assembly,

use a 5/32 hex key to remove the cap screws from the charge pump plate.
53 Remove the charge pump plate from the housing.
54 Remove the charge pump gerotor from the housing.

55 The pump and motor journals and cam ring dowel cannot be removed once they have been installed in the housing.

Note: Inspect the pump and motor journals for any irregularities. If any are found, the housing must be replaced.

56 In most cases, we do not recommend removal of the dampening pistons for inspection or cleaning. Normal flushing should be all that is required for cleaning.



Transaxle with Dump Valve

57 To remove the dump valve assembly, first use a 1 inch socket or end wrench to remove the dump valve nut from the housing.

58 Remove the o-ring from the dump valve nut.

59 After removing the dump valve nut, remove the dump valve bracket and spring from the housing by sliding them over and lifting upward.

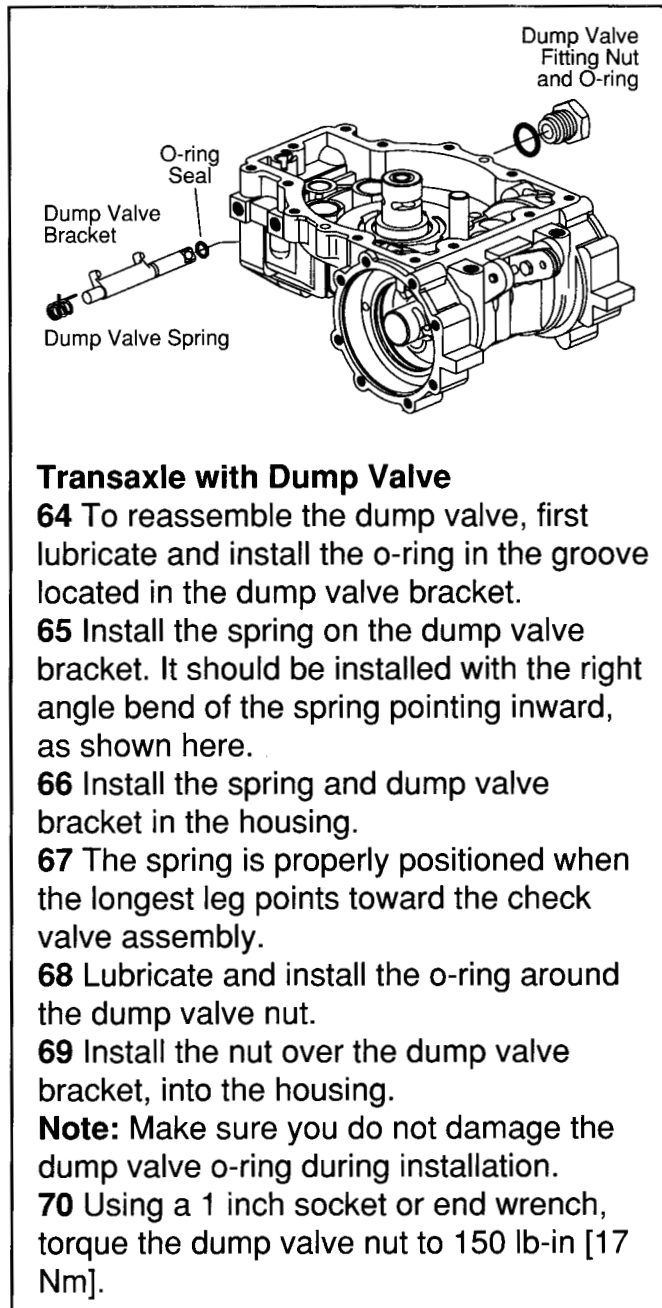
60 Remove the spring from the dump valve bracket.

61 Remove the o-ring from the dump valve bracket.

62 We do not recommend removal of the check valve assemblies for inspection or cleaning. Once again, normal flushing should be all that is required to clean the check valves.

Transaxle Reassembly

63 Before reassembling the transaxle, clean all parts and assemblies with clean solvent and blow them dry with compressed air. Inspect and replace all scratched or damaged parts. Replace all gaskets, seals and seal rings. Lubricate all seals with petroleum jelly (Vaseline) for retention during assembly. Freely lubricate all bearings and finished part surfaces with clean hydraulic fluid to provide lubrication at start-up.



Transaxle with Dump Valve

64 To reassemble the dump valve, first lubricate and install the o-ring in the groove located in the dump valve bracket.

65 Install the spring on the dump valve bracket. It should be installed with the right angle bend of the spring pointing inward, as shown here.

66 Install the spring and dump valve bracket in the housing.

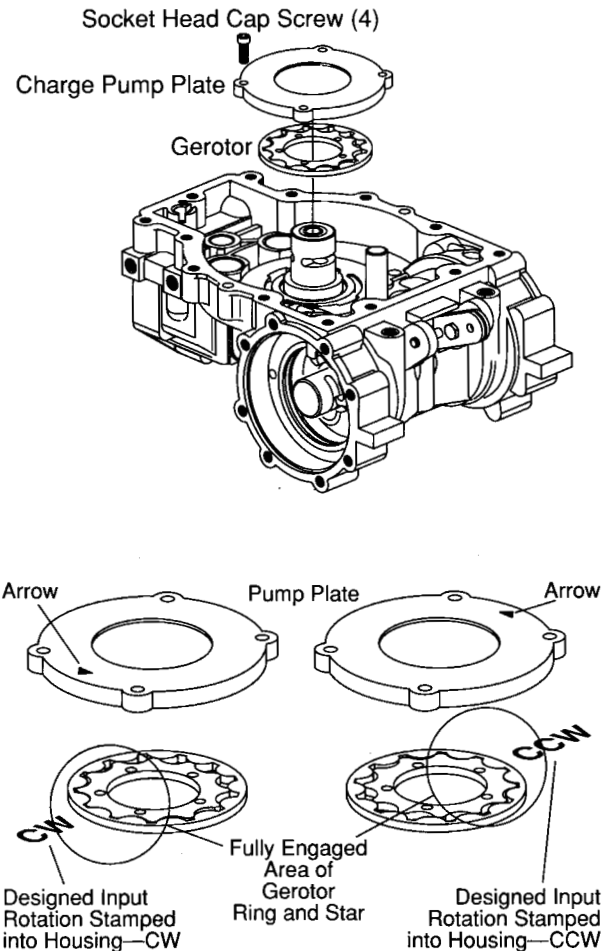
67 The spring is properly positioned when the longest leg points toward the check valve assembly.

68 Lubricate and install the o-ring around the dump valve nut.

69 Install the nut over the dump valve bracket, into the housing.

Note: Make sure you do not damage the dump valve o-ring during installation.

70 Using a 1 inch socket or end wrench, torque the dump valve nut to 150 lb-in [17 Nm].



Transaxle with Charge Pump

71 Install the gerotor on the housing.

Note: The gerotor ring and star have been marked with a dot on each, the ring and star can be placed with these marks up or down but both marks should be on the same side.

72 For easier assembly, rotate the gerotor outer ring to fully engage with the inner star. The fully engaged side of the gerotor should point towards the designed input rotation (CW or CCW as noted on the housing).

Note: The designed input rotation is stamped on the back side of the housing and also next to the gerotor on the inside.

73 Freely lubricate the gerotor with clean hydraulic fluid to provide lubrication at start-up.

74 The charge pump plate has a small arrow cast into the outer face of the plate.

At assembly, this arrow must face toward the input rotation designated in the housing.

Note: High pressure charge pump—gerotor and plate is a matched set and is not sold separately. Class II gerotor and plate are not a matched set.

75 Aligning the rotation arrow with the input rotation, install the pump plate over the gerotor.

76 Install the four cap screws in the pump plate finger tight.

77 The bottom side of the pump rotor assembly incorporates five drive pins. At assembly, these pins must be engaged with the inner star of the charge pump gerotor.

78 Lubricate and install the pump rotor assembly on the pump journal, engaging the drive pins with the inner star of the gerotor.

79 Rotate the pump rotor assembly several times to center the pump plate on the gerotor.

While continuing to rotate the pump rotor assembly, alternately tighten the charge pump plate cap screws to 49 lb-in [6 Nm].

80 Remove the rubber band from the pump rotor assembly. Install the cam ring assembly in the housing with the flush side of the cam ring facing outward.

81 Install the cam ring insert on the control shaft pivot dowel.

82 Install the control shaft assembly, first aligning the cam ring insert with the cam ring assembly and then with the housing.

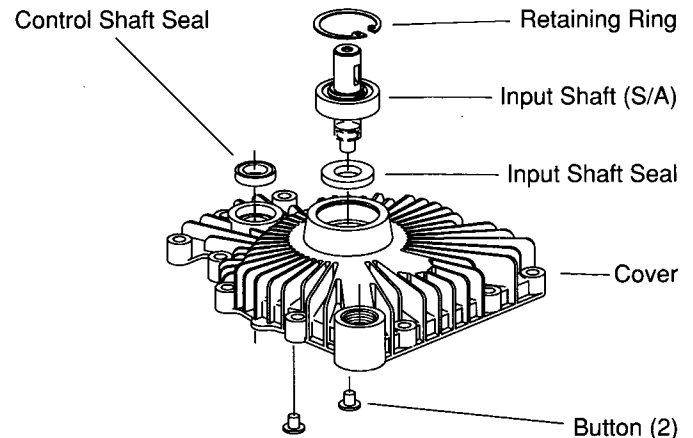
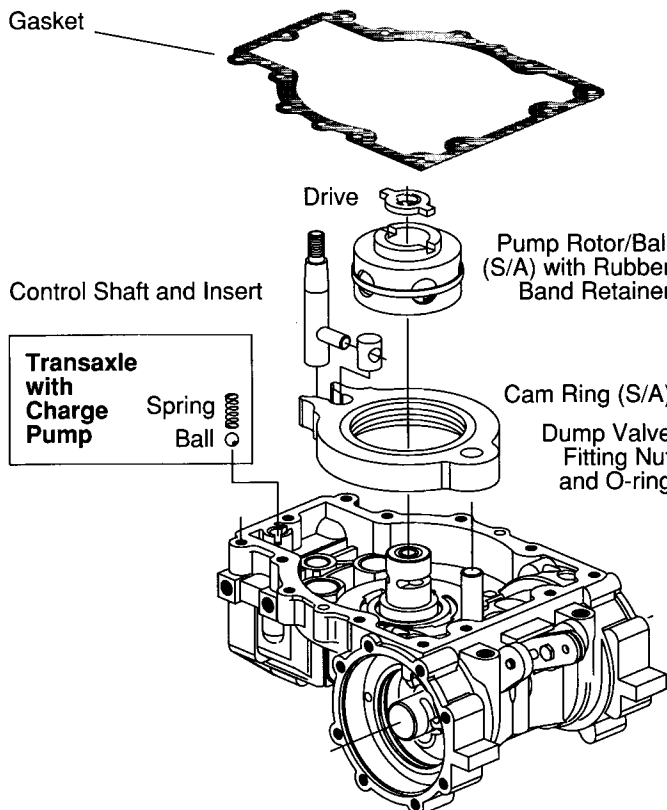
Transaxle with Charge Pump

83 Drop the charge pressure relief valve ball in its bore.

84 Install the charge pressure relief valve spring in its bore.

85 Install the drive in the pump rotor assembly.

86 Install the cover gasket on the housing assembly.



Cover Reassembly

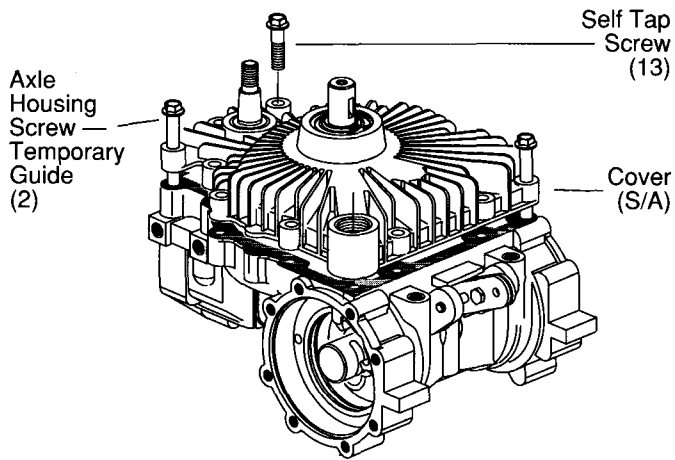
87 Lubricate and install the control shaft oil seal with the seal lip pointing inward. Press or drive the seal into the seal counterbore.

88 Lubricate and install the input shaft seal with the seal lip pointing inward. Press or drive the seal into the counterbore.

89 Press or drive the input shaft assembly into the cover.

90 Install the input shaft assembly retaining ring, making sure it is firmly seated in the retaining ring groove.

91 To help retain the buttons during assembly, apply a small amount of petroleum jelly to them. Install the buttons in the holes located in the cover assembly.



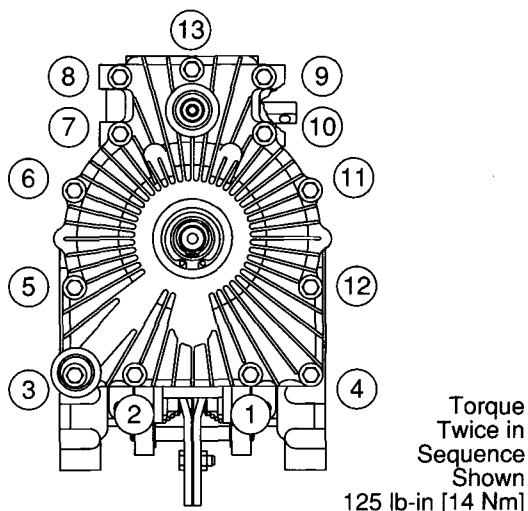
92 Install the cover assembly by carefully aligning it with the control shaft, cam ring pivot dowel and pump rotor drive.

Transaxle with Charge Pump

Caution: During installation of the cover assembly, be careful not to dislodge the charge pressure relief valve from its bore.

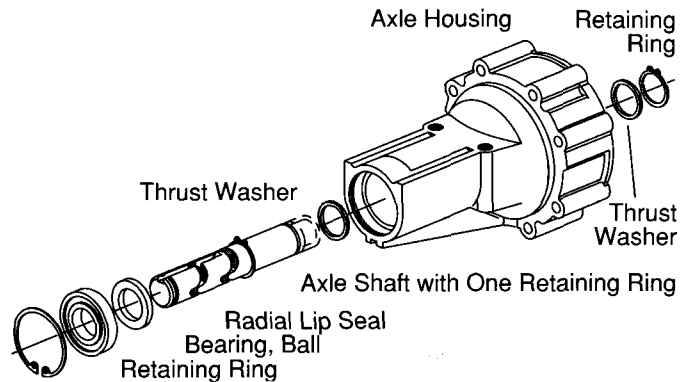
Note: Two axle housing flange screws may be used to help retain the cover, gasket and housing in position during assembly.

93 After engaging the control shaft and pivot dowel in the cover assembly, carefully rotate the input shaft to engage the pump rotor drive. When all mating parts are aligned and engaged, the cover assembly should fall into position on the housing assembly.



94 With the cover assembly in the proper position, remove the two alignment flange

screws (if used) and install the self tap screws (13), and alternately tighten to 125 lb-in [14 Nm]. Torque each screw a second time to compensate for gasket compression set.



Axle Housing Reassembly (one axle housing or two, use the same procedure for each).

95 Lubricate and install the thrust washer in the axle housing.

96 Lubricate and install the axle shaft into the axle housing.

97 Reposition the axle housing with the output end of axle pointing downward. Install the inner thrust washer and axle shaft retaining ring.

Important: The round-cornered side or die-rolled side of the retaining ring must point toward the axle housing.

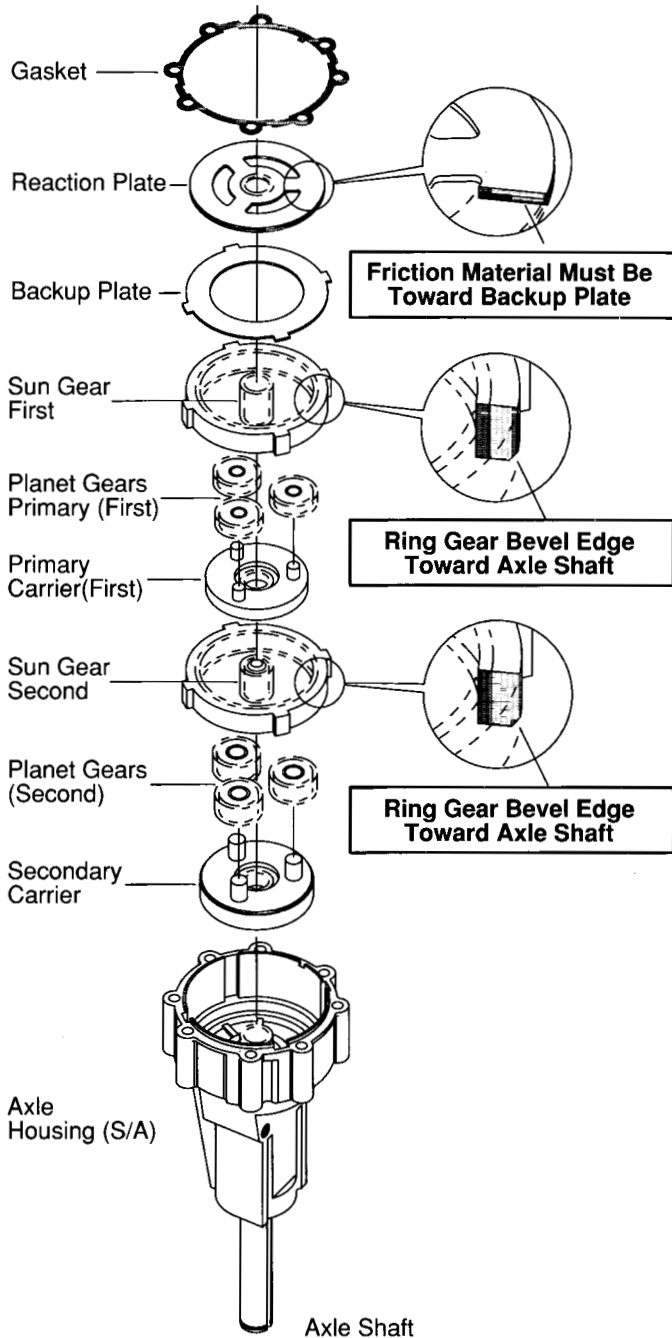
98 Reposition the axle housing with the output end pointing upward. Protecting the lip of the axle seal from the retaining ring groove and keyway, lubricate and install the seal with the lip pointing inward towards the axle housing.

99 Using a piece of pipe or hydraulic tubing (1.5 inch [38mm] O.D. x 6 inch [150mm] long), press the seal into the counterbore.

100 Again, using a piece of pipe or hydraulic tubing (1.125 inch [29mm] O.D. x 6 inch [150mm] long), press the ball bearing over the axle shaft and into the axle housing.

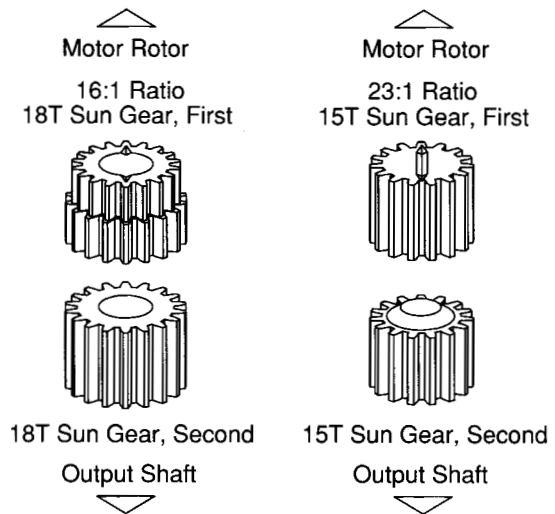
101 Using a pair of No. 5 or 7 internal retaining ring pliers, install the ball bearing retaining ring in the axle housing.

102 Lubricate and assemble the three planetary gears on the secondary carrier assembly.



- 103** Aligning the splines, install the secondary carrier assembly on the splined end of the axle shaft located in the housing assembly.
- 104** Please note that one side of each ring gear has a bevel on one side. This bevel side of the ring gear must be toward the output end of the axle shaft.
- 105** Install one of the two ring gears into the axle housing. Install by aligning the ears on the outside of the ring gear with the notches in the housing assembly.
- 106** Rotate the secondary carrier assembly planet gears to align with the ring gear teeth.

When they are all in alignment, the ring gear will fall into place.



107 Shown here are the first and second sun gears for 16:1 and 23:1 Gear ratios.

108 Install the sun gear (second) into the secondary Planetary assembly.

109 Lubricate and assemble the three planetary gears on the primary carrier assembly.

110 Aligning the splines, install the primary carrier assembly on the sun gear (second).

111 Install the next ring gear into the axle housing. Install by again aligning the ears on the outside of the ring gear with the notches in the housing assembly.

Note: Rotate the primary carrier assembly and the ring gear will fall into position.

112 Install the primary sun gear (first) into the primary planetary assembly.

113 Lubricate and install the backup plate in the axle housing assembly. Install by aligning the ears with the notches in the axle housing.

114 Aligning the splines, install the reaction plate on the primary sun gear (**friction material must be toward backup plate**).

115 Aligning the screw holes and notches, install the axle housing gasket on the axle housing assembly.

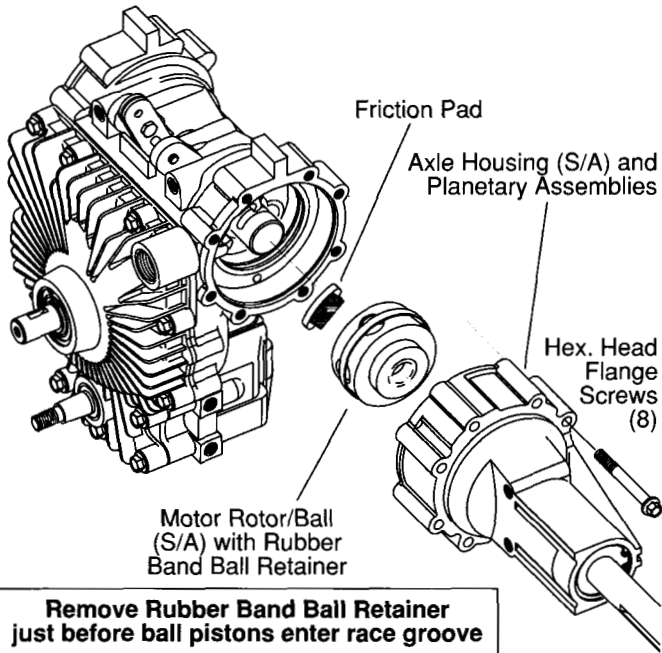
116 Reposition and clamp the housing assembly to the bench as in step 12. Install the motor rotor assembly.

117 Install the friction brake pad into its recess located in the housing assembly.

118 Carefully retain the planetary assemblies in position, install the axle housing assembly

on the housing assembly.

119 Install the axle housing flange screws and torque to 125 lb-in [14Nm].



120 Reposition the transaxle and install the gasket and (one of the following)...

...filter base.

...internal filter and valve cover (position metal side of filter toward housing and gasket).

...port plate.

121 Aligning the screw holes, install 5 flange screws.

122 Cross torque screws to 125 lb-in [14mm].

781 Series Transaxle

123 After servicing both transaxle halves, the two halves, center push rod, conical springs (2), bolts, washers and nuts (4 each) can be installed. Torque the bolt and nut to 16 ± 1.6 lb-ft [22 ± 2 Nm]. Replace E-ring retaining the conical spring at each end of center push rod.

Transaxle with Charge Pump and Spin-on Filter

124 Lubricate the filter seal, install filter, hand tight (3/4 to 1 full turn after gasket/base contact).

125 Fill transaxle with an approved hydraulic fluid (781 Series—both halves must be filled separately). The transaxle is now ready for test and installation.

Fluid Recommendations

Premium hydraulic oil having a viscosity equivalent to SAE 20w-20, SAE 30 or SAE 40.

The fluid should be chemically stable, incorporating rust and oxidation inhibitors.

A reputable supplier can help you make the best selection of hydraulic fluid for use in your Eaton transaxle.

Note: If the natural color of the fluid has become black or milky, it is possible that an overheating or water contamination problem exists.

Transaxle Parts Lists

Hydrostatic Transaxle Series 751 — No. 6-425

Hydrostatic Transaxle Series 851 — No. 6-426

Hydrostatic Transaxle Series 771-A — No. 6-427

Hydrostatic Transaxle Series 771-B — No. 6-428

Hydrostatic Transaxle Series 781 — No. 6-429

Fault-Logic Trouble Shooting

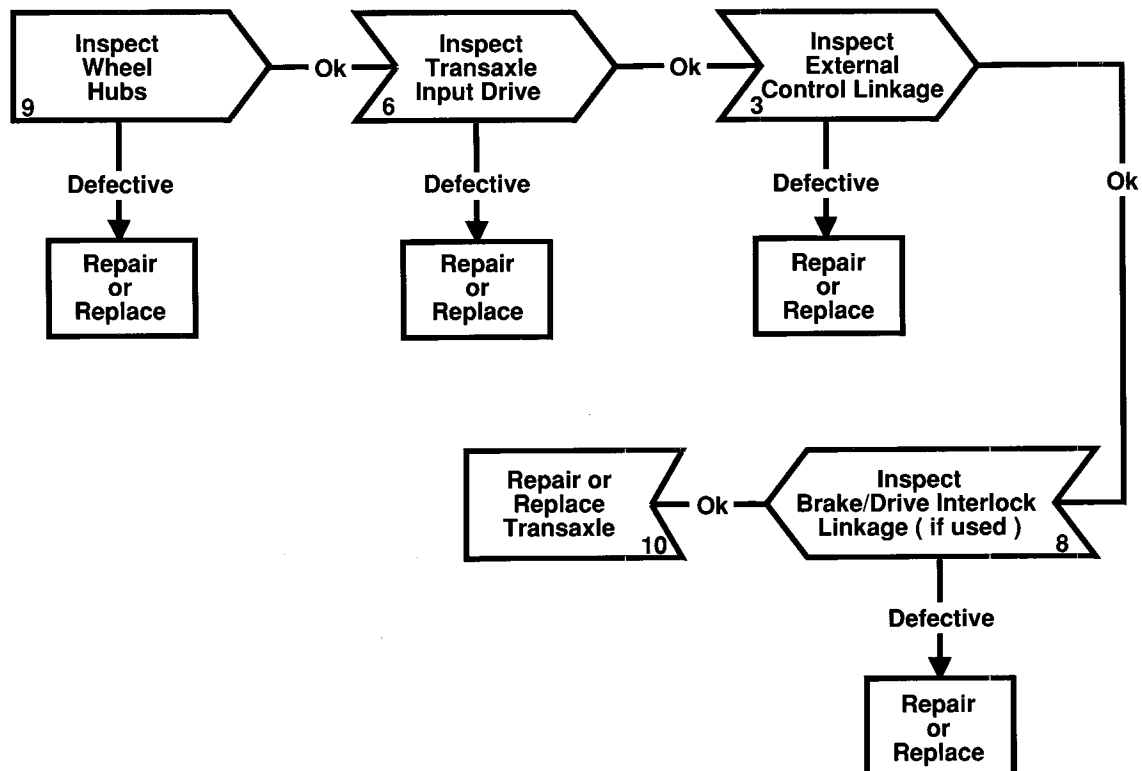
This Fault Logic Troubleshooting Guide is designed as a diagnostic aid in locating possible transaxle problems by the user.

To use this Fault-Logic Troubleshooting Guide, simply match the transaxle symptoms with the problem statements and follow the action steps shown in the box diagrams. This will give the user unnecessary machine down time.

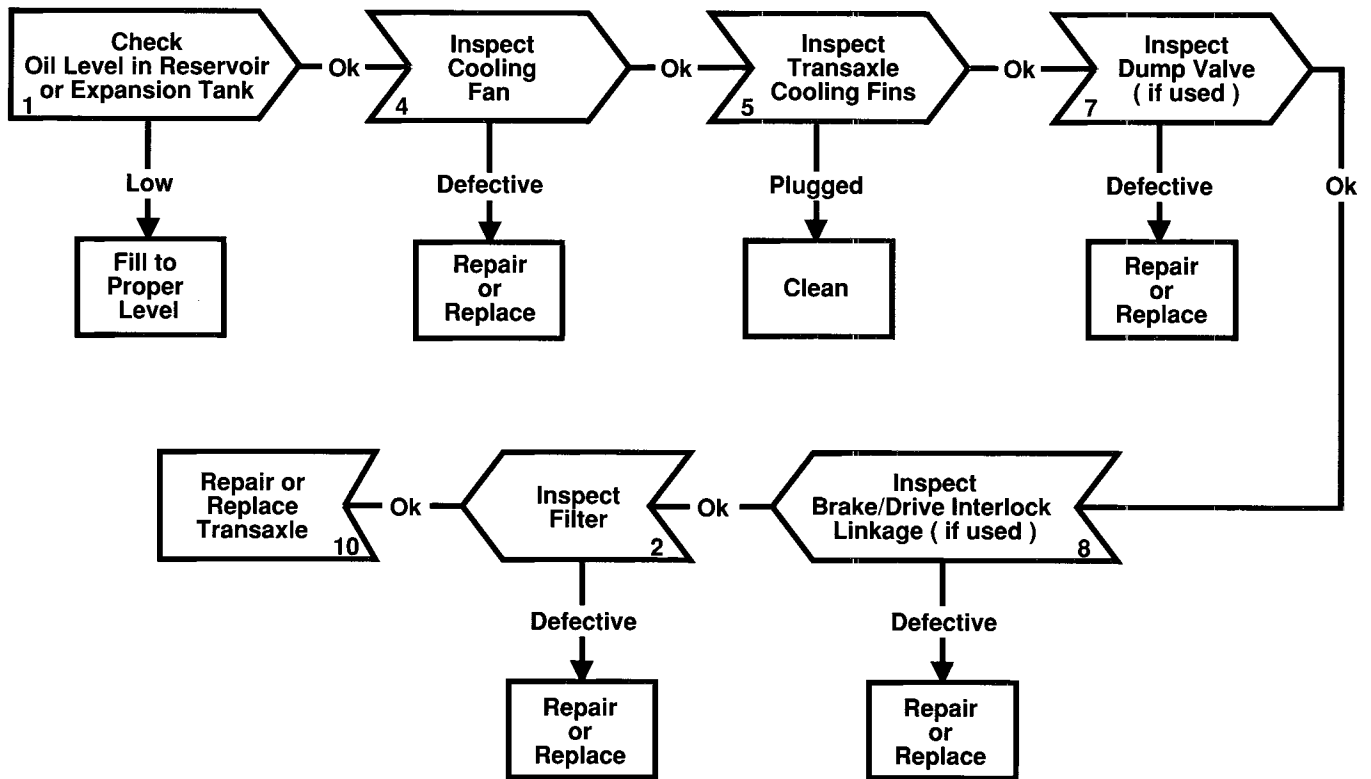
Following the Fault-Logic diagrams are diagram action comments to further help explain the action steps shown in the diagrams.

Where applicable, the comment number of the statements appear in the action block of the diagrams.

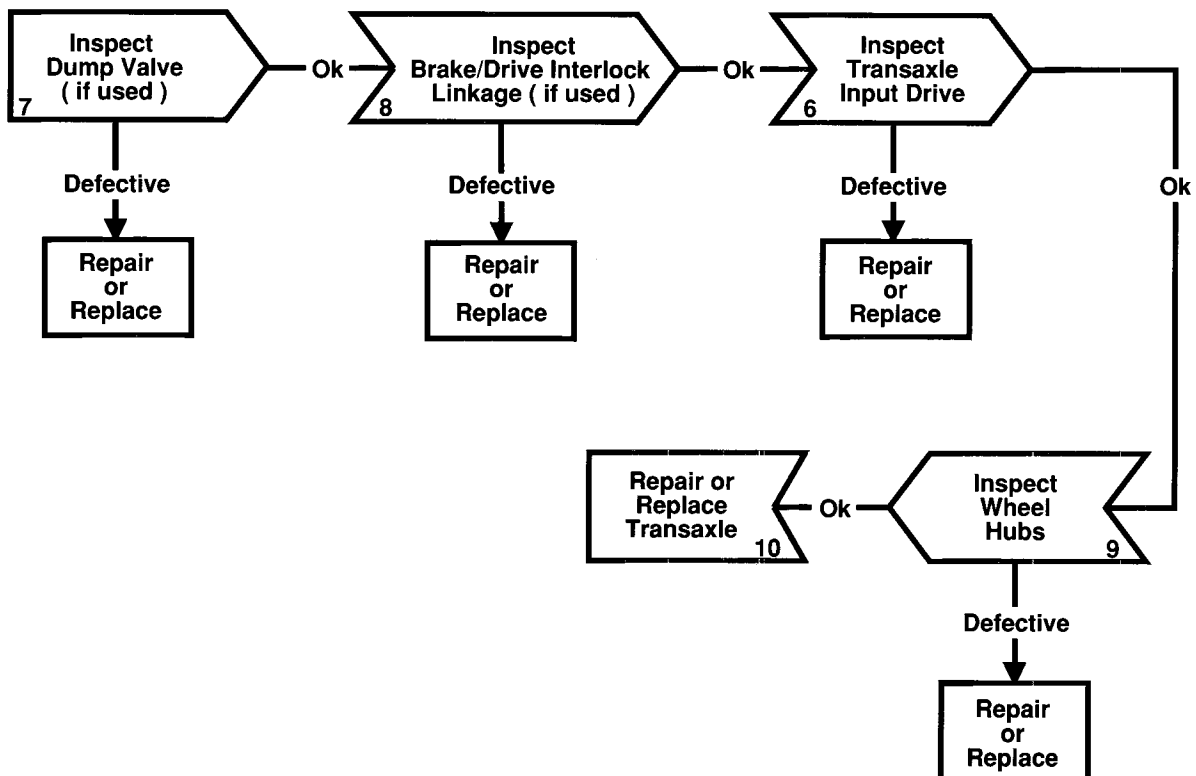
System Jerky when Starting



System Operating Hot



System will not Hold or Free Wheels on Incline



Loss of Power or System (Will not operate in either direction)

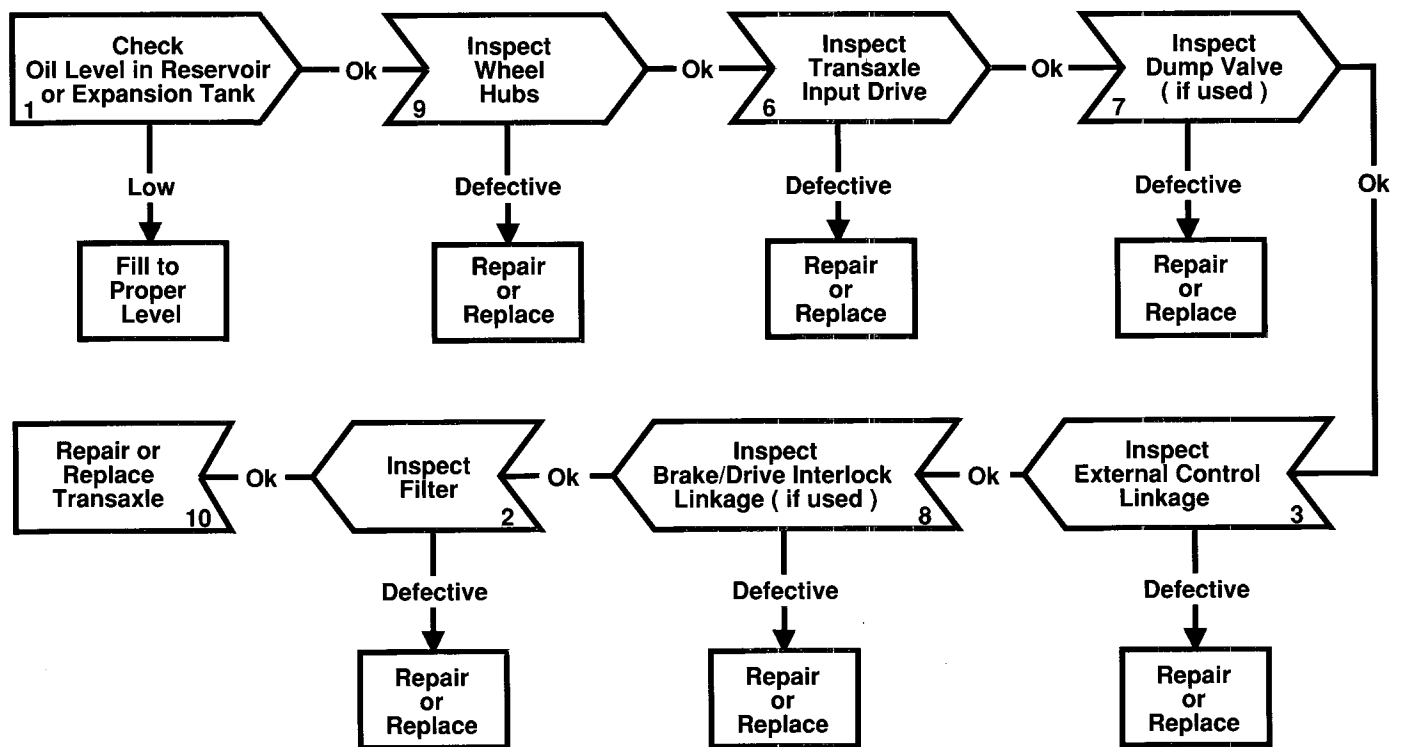


Diagram Action Step Comments

1 Check oil Level in Reservoir or Expansion Tank for:

A Consult own/operators manual for the proper type fluid and level

2 Inspect Filter for:

A Plugged or clogged filter element (see Transaxle Repair Information for filter location)

3 Inspect External Control Linkage for:

A Misadjusted or disconnected
B Worn, binding, bent or broken

4 Inspect Transaxle Cooling Fan for:

A Sheared or missing drive screws
B Broken or missing fan blades

5 Inspect Transaxle Cooling Fins for:

A Plugged or clogged cover cooling fins

6 Inspect Transaxle Input Drive for:

A Drive belt worn, loose or broken
B Drive pulley key sheared or missing

7 Inspect Dump Valve for:

A Misadjusted or disconnected
B Drive pulley key sheared or missing

8 Inspect Brake/Drive Interlock Linkage for:

A Misadjusted or disconnected
B Worn, binding, bent or broken

9 Inspect Wheel Hubs for:

A Drive key worn, sheared or missing

10 Repair or Replace Transaxle

A When Transaxle is under warranty return to dealer for warranty consideration
B All non warranty repairs should be preformed by trained personel

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