



Transaxle
117 & 118 Tractors
Service Manual No. 9-50241

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JI Case
A Tenneco Company



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SECTION I

GENERAL SERVICE PROCEDURES AND TROUBLE SHOOTING

GENERAL SERVICE PROCEDURE

1. Before removal of unit from equipment, look for:
 - a. Loose drive belts.
 - b. Improperly adjusted or badly worn clutch.
 - c. Loose or lost setscrews and/or sheared keys in drive and driven pulleys.
 - d. Oil saturated drive belts and clutches.
 - e. Bad operating habits, such as clutch riding.
 - f. Oil leaks.
 - g. Any trouble, which might be pointed up by operating the unit and equipment, IF POSSIBLE.
2. Removal and installation of the transaxle from the tractor.
 - a. Jack up tractor so that transaxle is accessible. Use wood blocks to prevent equipment movement. Do not use bricks, cement, or cinder blocks.
 - b. Visually inspect transaxle for oil leaks, cracked housing, binding or rubbing of parts, or other symptoms of malfunction.
 - c. Disconnect brake linkage and hydrostatic transmission linkage.
 - d. Remove drive belt.
 - e. Remove rear frame plate.
 - f. Remove "U" bolts at axle housing and two cap screws at frame cross-member in front of transaxle housing.
 - g. Pull transaxle and hydrostatic transmission as a unit, out the rear of tractor.
 - h. With transaxle free and supported, remove it from the area of the tractor to the work bench.
 - i. Reverse removal procedure to install.
3. Preparing for dis-assembly:
 - a. Visually inspect for evidence of oil seepage, tampering, misalignment, freedom of rotating shafts, etc.

- b. Clean unit thoroughly of dirt, oil, debris.
- c. Remove shift housing and drain oil from unit. Observe oil to see if metal particles are present.
- d. Check axle shafts carefully for smoothness. Use a stone or suitable hard abrasive to rub down high spots and eliminate rust or paint.
- e. Check model number at appropriate spot. It is advisable to have the exploded parts view handy.
- f. Have seal sleeves, driver, tools, shop clothes and informational material at hand.

OIL LEAKS, SEAL AND GASKET SERVICE

1. Other than leaking seals, gaskets and "O" rings, leakage can occur due to a cracked case or cover, flats on shafts, porosity (rarely, if ever), and worn bushings and shafts.
2. Single lip inward sealing can be salvaged by use of the proper seal protector when pulling the seal over a shaft. Outward sealing seal (both single and double lip) must be replaced since there is no assurance that the initial sealing surface can be protected.
3. If you can't protect the sealing lip, replace the entire seal. The cost of the seal is small in comparison to a return repair due to reuse for seals.
4. Check seals for cracks, scuffs, cuts, and distortion. Check seal areas for evidence of oil leak both at sealing surface and between metal-to-metal contact surface areas.
5. Some seals have a "Redicoat" sealant applied, while others may need a thin coat of this or a similar sealant.
6. The surface over which the seal lips must slide must be free of all cuts, scratches, high spots, or rust. The shafts should be smooth, shiny, and a thin film of light oil applied. Sleeves should be used to clear keyways, splines, or other sharp edges machined into shafts.

TORQUE VALUES-TROUBLE SHOOTING

1. All torque values must be applied. The torque value for any fastener will be found in the assembly instruction where that fastener is used.
2. Overtightening - Can strip threads, compress the gasket excessively, possibly causing binding.
3. Cross tightening sequence to half the torque then finally to full torque value.
4. Undertightening - Oil leakage, loosening of attaching parts, possible shifting of the internal part causing complete failure.
5. Since all bolts are readily accessible, there is no reason that a torque wrench can not be used for all bolt and screw tightening. To use guess or chance, any of the previous can result:

TORQUE VALUES

PART	TORQUE READING FT LBS
Socket Head Cap Screws (Case-to-Cover)	10
Hex Cap Screws (Differential)	7

TROUBLE SHOOTING

CAUSE	REMEDY
UNIT IS NOISY	
Gearing overly noisy - chatter, etc.	Check lubrication is at proper content.
Metallic pieces and/or other foreign objects in unit.	Check for and remove bits of broken metal, loose washers, etc.
Worn gears.	Remove and replace with new gears.
Worn bearings - mainly input shaft ball bearing.	Replace bearing.
AXLES CANNOT BE TURNED (SAME DIRECTION) WITH UNIT IN NEUTRAL GEAR	
Axle housing not installed (or not tightened).	Seal retainers are not properly seated. Tighten axle housing bolts.
Burrs on gearing.	Remove gear and hone with a stone.
Parts missing.	Install missing parts.
Broken shifter stop allowing unit to be shifted into two speeds at the same time.	Replace snap rings on shift rod out of groove.

(Continued on next page.)

CAUSE	REMEDY
AXLES CANNOT BE TURNED (SAME DIRECTION) WITH UNIT IN NEUTRAL GEAR (Continued)	
Thrust washers in wrong position.	Recheck thrust washer and reposition, if wrong.
Bearings not pressed in deep enough.	Use the proper bearing tool to seat the bearing.
Improper fit of case to cover.	Recheck positioning of thrust washers. A misplacement or omission of washer can cause binding.
Dowel pins not installed.	Install dowel pins.
Gears improperly installed.	Check unit for correct assembly of parts.
Input shaft not properly installed.	Input shaft spline must be fitted into gear and must be tapped completely into the case.
Differential installed improperly.	Re-check positioning of bolts in differential - must be opposite output shaft gear.
Seal retainers improperly positioned.	Determine seals are correctly installed.
UNIT DOES NOT DRIVE	
Differential bevel gears broken.	Replace.
Stripped teeth on gears.	Replace.
Keys sheared in drive pulleys.	Replace.
Broken input gear.	Replace.

1. TESTING

The absence of binding and oil leakage are the best indications that the unit has been properly reassembled. Though other more elaborate tests can be done, this would be the prerogative of the servicing agency, since the following checks are considered adequate.

With the shift fork in neutral, rotate both axle ends in the same direction. They should turn smoothly although a little effort may be necessary. The brake shaft should rotate whenever the axles turn together, but in neutral, the input shaft should not turn.

By moving any shifter gear into mesh, a greater drag should be felt on the axles and both the input and brakeshaft should turn.

To ease in turning of the various shafts, insert a tool (such as a punch or a socket head screw key) into the keyway, however, do not force if the shaft is binding.

Reason for unit binding:

1. Reused or lack of gasket.
2. Oil seal retainers installed backward.
3. Mis-installed thrust washers.
4. Differential installed backward.
5. Mis-assembly of shifting parts.
6. Mis-placement of spacers.
7. Foreign matter blocking gear teeth mesh.
8. Shifter stop installed backwards.
9. Input shaft not completely in case.
10. Mis-alignment of case and cover. Align with dowels before tightening cap screws.

SECTION 2 TRANSAXLE DISASSEMBLY AND ASSEMBLY

A. GENERAL

1. The transaxle assembly is driven by a hydrostatic motor connected to the unit case. The transmission function is accomplished by the hydrostatic controls. The unit, therefore, only reduces input shaft speed to the differential and axle assembly.

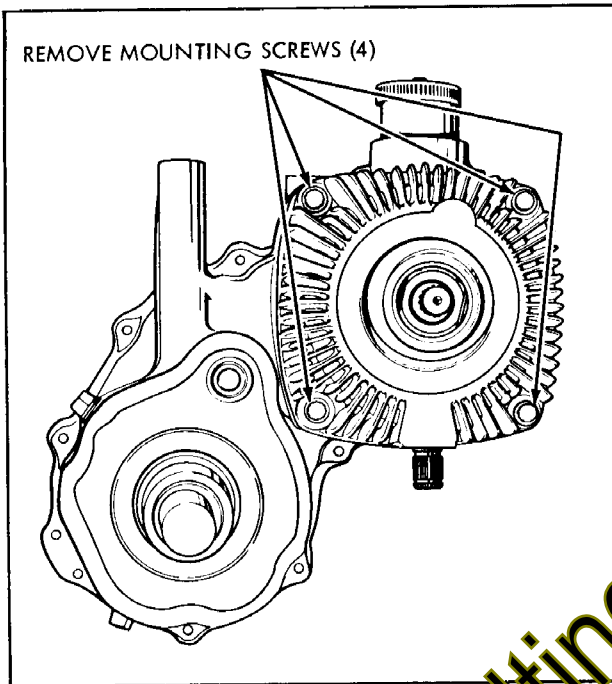


Figure 2-1

2. To separate the hydrostatic unit from the transaxle assembly, support both parts, then remove the four mounting screws, and separate parts. Drain oil from the transaxle. Any hydraulic repair must be done through the equipment brand dealer.

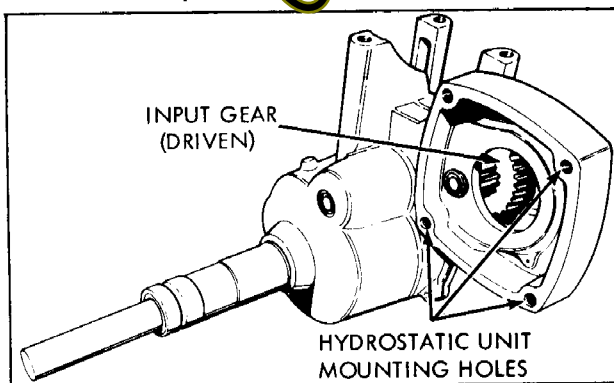


Figure 2-2

3. Axle supports, pressed from the inside out, must be removed with the case and cover.

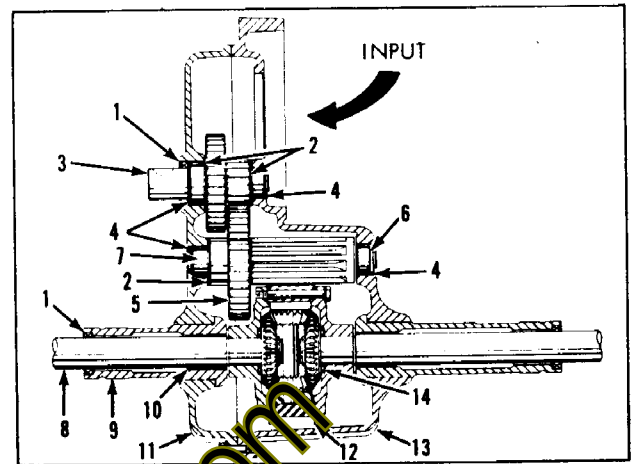


Figure 2-3

4. Legend for Figure 2-3.

1 - Oil Seal	8 - Axle
2 - Thrust Washer	9 - Axle Support
3 - Brakeshaft	10 - Bushing
4 - Needle Bearing	11 - Cover
5 - Output Gear	12 - Differential Gear
6 - Output Shaft	13 - Case
7 - Spacer	14 - Thrust Bearing

B. PRE-DISASSEMBLY

Clean the reduction unit exterior surfaces. Drain lubricant, then separate the reduction and hydrostatic units. Check axle shafts for cutting edges and high spots. Due to the hardness of the shafts, a stone may be necessary to take off metal. Check for any evidence of oil leakage at gasket or bearing surfaces.

C. DISASSEMBLY

1. Remove lockscrews and tap dowel pins out of cover. Lift off cover and discard gasket.
2. Lift out brake shaft, gear, and thrust washers on each side of gears.

3. Lift output shaft, gear, spacer, and thrust washer from case. At the same time, lift out the differential assembly.

NOTE: No thrust washer is located between the output shaft and case.

D. GENERAL BEARING AND BUSHING CARE

1. Bearings, bushings and bearing surfaces should be thoroughly cleaned prior to examination. Examine closely for scuffing, wear, pitting and abnormal conditions. Replace if any conditions mentioned appear.
2. Use a good grade of clean solvent to clean bearings. After cleaning, always use clean lint-free cloth to dry and wipe bearings. Immediately coat cleaned bearing with lubricant to prevent rusting or corrosion.
3. Take care of bearings in the case and cover. Cover them to keep out foreign matter. Place gasket surface down on clean paper and cover with clean cloth.

Never clean the lubricant from new bearings. This lubricant prevents damage before the transaxle lubricant enters the bearing.

E. NEEDLE BEARING SERVICE

It is advisable to use an arbor press to remove and install needle bearings.

1. Use a bearing tool to press out the bearing. Insert the proper tool in the bearing and with an arbor press, press out the bearing from the inside.
2. When installing open end needle bearings, always apply pressure to the stamped side.
3. Use only the recommended tools to insert bearings. The opposite end of the same tool used for removal is used for replacement.
4. The inside face of the bearing housing should be below the thrust face on the case or cover. This distance is controlled by the design of the inserting

tool. By using the proper tool, bearing life will be extended. Bearings should be pressed into the case or cover .015 to .020 below the thrust surface.

F. BUSHING SERVICE

When removing bushings use the combined bushing remover and installation tool. Position the piece to be serviced on the table of an arbor press with an opening to allow the bushing to pass through.

1. Use the proper tools as illustrated.
2. After new bushings are pressed into the piece they must be sized. See the tool list for the proper sizing ball and driver. Use an arbor press and push the steel ball through the new bushing to expand it to the required size.
3. To service differential, refer to SECTION 3.
4. To service bearings, refer to paragraph D.
5. To separate axle supports from the case and cover, use an arbor or hydraulic press. A piece of bar stock should be used to protect the support from the press ram.

G. INSPECTION AND REPAIR

1. Inspect case and cover for cracks, stripped threads, marred sealing surfaces, and bearing condition. Cause of any oil leakage should be corrected. If parts can't be repaired, replace them.
2. Check shafts and gears for worn or chipped teeth. Check bearing surfaces for scratches which might affect oil seal performance. Check for wear.
3. Check differential for rigidity. Wobble indicates wear. Refer to SECTION 3 for service.
4. Check needle bearing for presence, seal, and smoothness. Also, be sure bearings are not corroded or rusty. Replace bearings of doubtful condition.

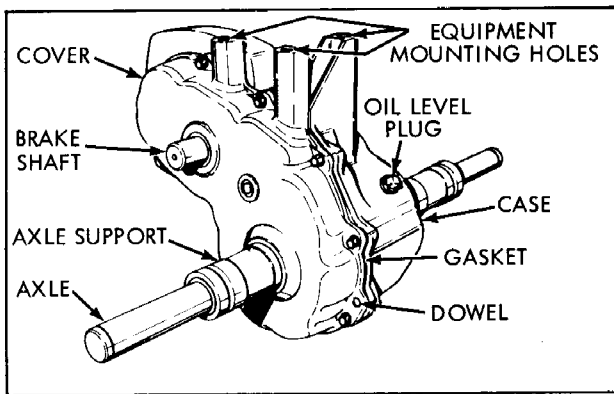


Figure 2-4

H. REASSEMBLY

1. When installing axle support, be sure case and cover alignment is true with the press. Press supports in until flanged surfaces contact case and cover. (Figure 2-4).
2. Install differential and output shaft simultaneously. Position gear $3/4$ " I.D. spacer, and thrust washer on shaft (Fig. 2-5)
3. Center one $3/4$ " I.D. thrust washer over case needle bearing then install brake-shaft gear, and other $1-1/8$ " I.D. thrust washer.
4. Position a new gasket on the mounting surface of the case, then install cover. Align cover and case by tapping dowel pins into cover and secure with lock-screws torqued to 10 lbs. ft.

5. Install new brakeshaft oil seal using sleeve Peerless number 670179 and driver number 670180.
6. Install new axle support oilseals using sleeve Peerless number 670179 and driver number 670180.
7. Add $2-3/4$ (44 oz.) pts. oil (S.A.E. EP 90) before securing hydrostatic drive to the unit. Clean mounting surfaces and use a new gasket between the units. Torque 4 mounting bolts to standard torque for bolt used.

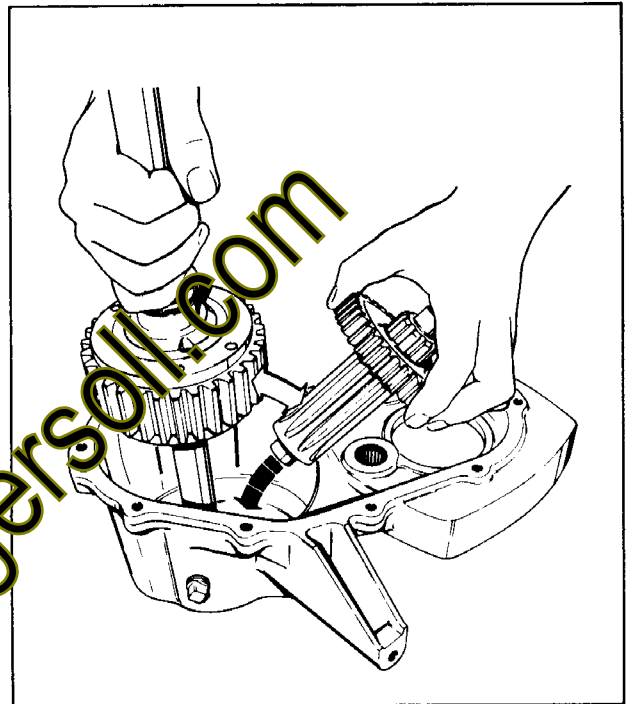


Figure 2-5

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SECTION 3
DIFFERENTIAL ASSEMBLY SERVICE

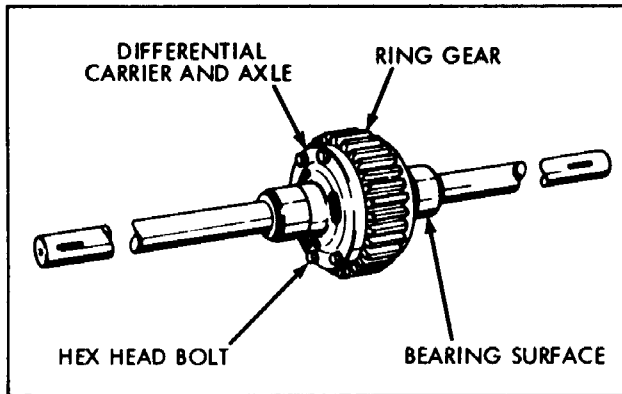


Figure 3-1

D. DIFFERENTIAL USED IN MODEL 117 AND 118 TRANSAXLE

1. The differential carrier (Figure 3-2) carrier is supported directly on the axle (1). Roller thrust bearings (2) are used between the bevel gear (3) and the differential carrier (4). This illustration shows axles with snap ring (5) retainers, some earlier production had rolled over axle ends to secure the assembly. Thrust washers (6) are used at the ends of the differential carriers and case/cover thrust face. Replace the differential carrier if worn in excess of .075 at point A.

2. Disassembly

a. Clean the differential assembly, then check and note the axle lengths and their relation to the heads of the four hex head bolts.

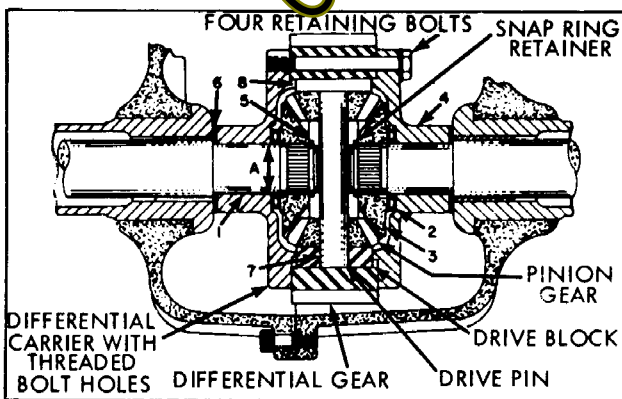


Figure 3-2

b. If the unit will not turn freely, note where the unit binds. Check and replace those parts.

c. Place the differential in a large vise with soft jaws (hex head bolts up). Do not clamp the vise on the bearing race of a differential carrier. (Figure 3-3)

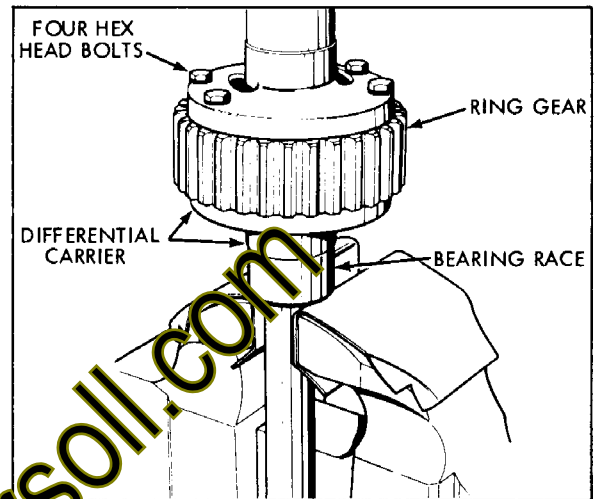


Figure 3-3

1. Remove the four hex head bolts and the upper axle and differential carrier. Remove the drive blocks, pinions, drive pin and thrust spacer if used, by lifting out of the ring gear. Tap the ring gear lightly with a mallet to loosen from the differential carrier. (Figure 3-4)

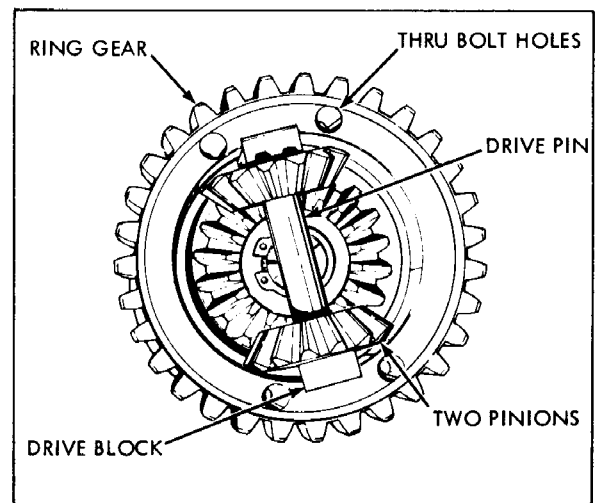


Figure 3-4

2. If a snap ring is used, the axle assembly may be disassembled. If the axle end has been rolled, do not attempt to break the rolled retaining edge. The parts are to be replaced as an assembly.
3. Remove the snap ring and the thrust washer, if used. Separate the bevel gear and differential carrier from the axle. (Figure 3-5)

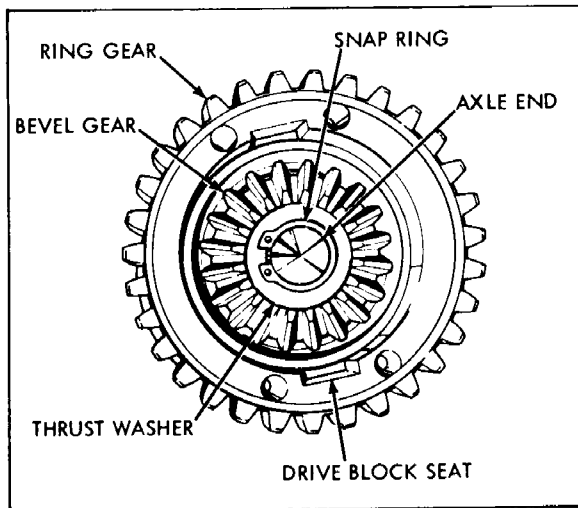


Figure 3-5

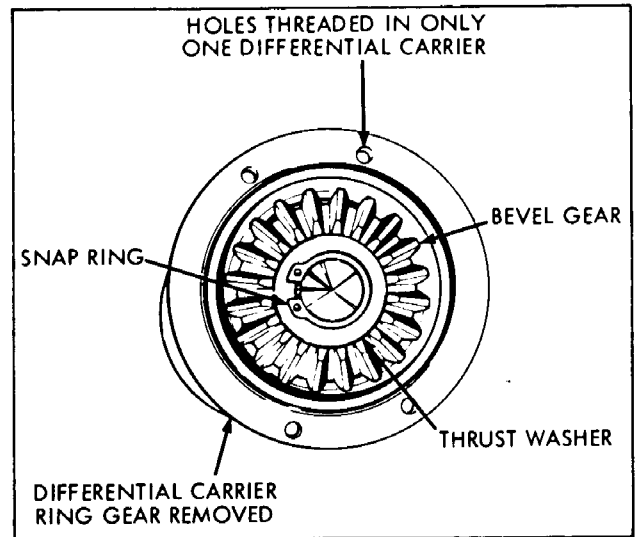


Figure 3-6

7. Inspection

- a. See SECTION 2, paragraph D, for Bushing and Bearing Service.
- b. Examine gear for wear, cracked or chipped teeth. Check the internal splines of the gears and the axle if the gear is removeable. If excess play is noted, it may be necessary to replace the individual parts or both the gear and axle.
- c. Examine drive pinions, drive pins and drive blocks for wear and damage. Replace excessively worn pinion or the drive pin.

- d. Examine the differential carriers. One has threaded holes and the other has larger holes so that the bolts will pass through. Be sure to order the correct replacement piece.

- e. Examine the internal bearing diameter of the differential carriers. If wear is in excess of the tolerance noted at point A, replace the differential carrier or bushing, if used. See SECTION 2, paragraph F, Bushing and Bearing Service, if it is necessary to replace the bushing.

- f. When assembling thrust bearings, always place a hardened thrust washer on each side of the caged thrust rollers. Never use the caged thrust rollers without the thrust washers.

8. Reassembly

- a. Oil all parts during reassembly.
 1. Select the correct axle for the side of the differential opposite the hex head bolts. If the wrong axle is used, it will require complete tear down of the differential, or possibly the entire transaxle if the error is not detected until later.
 2. Clamp the axle, in a soft jaw vise (not bearing or oil seal surfaces). The differential carrier with threaded holes is assembled to this axle.

3. Refer to Figure 3-8 for the proper arrangement of parts.

4. Torque the four hex head bolts to 7 lbs. ft.

9. Testing

- a. Test differential action by holding the upper axle vertically, and spinning the differential. The unit should spin and rotate freely. Place the assembly on the bench and rotate both axles in different directions. If any binding is noted in either test check retaining bolt torque, gear meshing, or bearing surfaces in the differential carriers. Little or no end-play should be apparent between the axles and carriers.

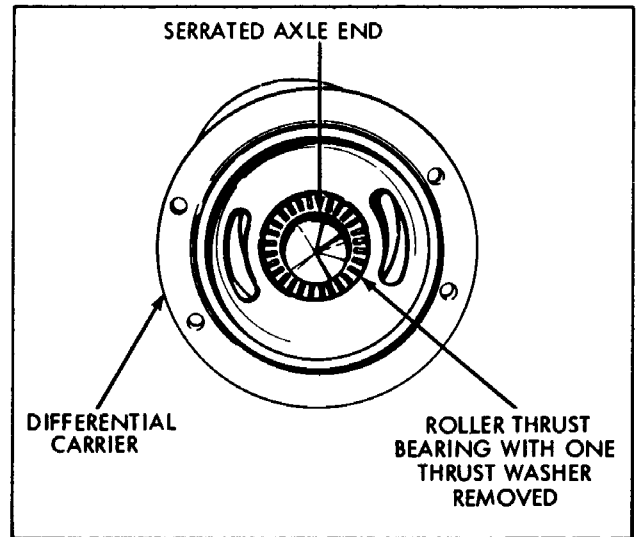


Figure 3-7

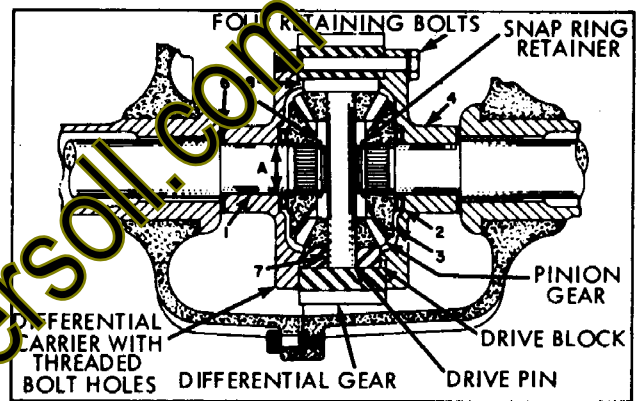


Figure 3-8

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