



**Transaxle
108 Tractor
Service Manual No. 9-50231**

casecoltingersoll.com

J I Case
A Tenneco Company



TABLE OF CONTENTS

SECTION I - GENERAL SERVICE

General Service Procedures	1
Oil Leaks, Seal and Gasket Service	1
Torque Valves - Trouble Shooting	2
Testing	4

SECTION II - TRANSAXLE DISASSEMBLY AND ASSEMBLY

Transaxle Disassembly	5
Transaxle Assembly	7
Bearing Tools	8

SECTION III - SHIFTING ASSEMBLY SERVICE

Shifting Pattern	9
Shift Lever Assembly	9
Shifting Assembly	9

SECTION IV - DIFFERENTIAL ASSEMBLY SERVICE

Disassembly and Assembly	13
--------------------------------	----

SECTION 1
GENERAL SERVICE PROCEDURE AND TROUBLESHOOTING

GENERAL SERVICE PROCEDURES

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. Use a jack under the transaxle to support its weight.
- d. Remove wheels and drive belt. Be aware of positioning of parts. Scribe mark, if in doubt as to ability to re-assemble parts quickly.
- e. If shifter lever will interfere with unit in any way, remove it before unit is removed.
- f. Remove "U" bolts holding transaxle to tractor frame.
- g. With transaxle free and supported, remove it from the area of the tractor to the work bench.
- h. 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. 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 (Shift Lever Housing)	10
Socket Head Cap Screws (Case-to-Cover)	7-9
Hex Cap Screws (Axle Support Housing)	13-15

CAUSE	REMEDY
UNIT CANNOT BE SHIFTED (OR DIFFICULT TO SHIFT)	
Gears improperly installed.	Review positioning of gearing.
Forks and Rod assembly not correctly installed.	Remove assembly. Recheck and correctly position parts.
Axle Housing not installed or not tightened.	Seal retainers are not properly seated. Tighten axle housing bolts.
Same items covered under heading, "Axles Cannot Be Turned (Same Direction) While Unit In Neutral Gear".	Review remedy listed.
Shifting lever improperly positioned.	Determine finger of shifting lever is correct for the unit and correctly installed. Check to make sure shift lever housing has required gasket.
Shift lever housing misaligned to case.	Check to determine if alignment marks are on unit that they are correctly positioned. Also, determine if bend on shaft is in correct position.

(Continued on next page.)

CAUSE	REMEDY
UNIT CANNOT BE SHIFTED (OR DIFFICULT TO SHIFT) (Continued)	
Parts missing.	Install missing parts.
Equipment clutch not disengaging.	Adjust clutch according to equipment instructions.
Shifter stop assembled backwards.	Check to determine that notch in STOP aligns with shifter forks in NEUTRAL position.
Chamfer on shift gears on wrong side.	Check to determine that bevels on shifter gears are correct (fork flanges should be toward each other). On 3 gear cluster, small gear and medium gear chamfers go down toward big gear.
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.
UNIT JUMPS OUT OF GEAR	
Shifting lever improperly assembled in housing.	Disassemble shifting lever and determine if properly assembled.
Teeth of gears are worn beyond tolerances.	Check gears. Replace worn gears.
Spring in shifter fork weak or broken.	Replace spring.
Attaching screws for shift lever and housing assembly not properly torqued.	Torque screws to 10 lbs. ft.
Shift lever bent and hitting unit frame.	Replace shift lever.
Shift rod grooves worn.	Replace shift rods.
Shift rod of improper length or grooving installed.	Check rod length. Replace rod with correct part.
Constant mesh gears improperly installed on counter shaft.	Reposition gears.
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.
3 gear cluster counter shaft key sheared	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 forks 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 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

TRANSAXLE DISASSEMBLY

1. Clean the outside surface of the transaxle, away from the area where the disassembly will take place. (Position shift lever in neutral position to help disassembly. See Figure 2-2.) Remove screws (3) holding shift lever and shift lever housing. Remove shift lever housing (Fig. 2-1.) Drain oil through the shift lever opening (for service of shift lever assembly, refer to SECTION 3.) Remove all keys from keyways, remove all burrs and dirt from shafts. On hardened shafts, use a stone to remove burrs. All seals should be replaced whenever a shaft is pulled through a seal. Always use a new gasket whenever the gasket surfaces have been separated.

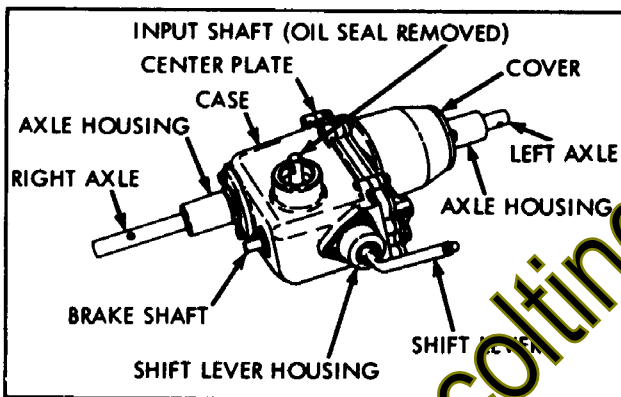


Figure 2-1

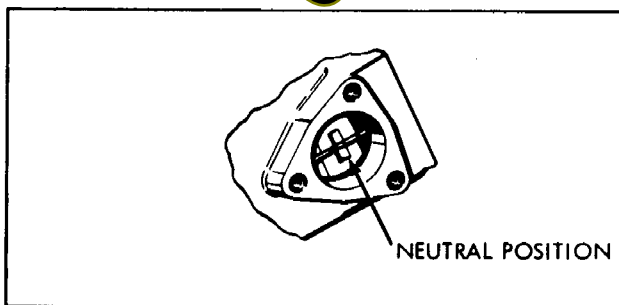


Figure 2-2

2. After removing axle housings, Fig. 2-1, place the unit in a receptacle, bench or clamp the transaxle in a soft jaw vise. Position the transaxle so that the socket head cap screws are facing up. (Fig. 2-3).
3. Remove the socket head capscrews holding the case and cover together. Drive out the dowel pins used for alignment of the case and cover. (Fig. 2-3).

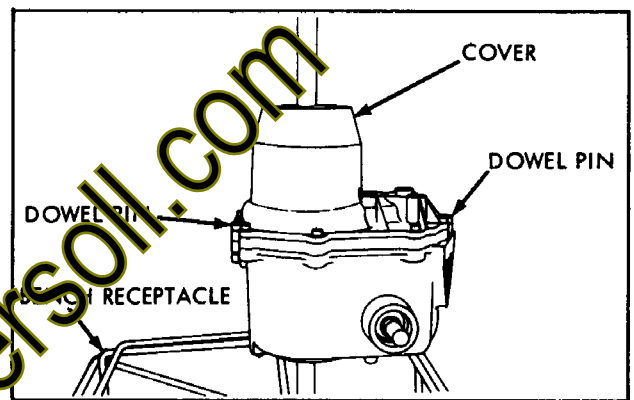


Figure 2-3

4. Lift off the cover assembly. Use a seal protector on axle shaft and lift off transaxle cover assembly. (Fig 2-4). Because this seal is a single lip type, it may be reused, if care is taken to see that it isn't scratched or cut. Discard gasket.

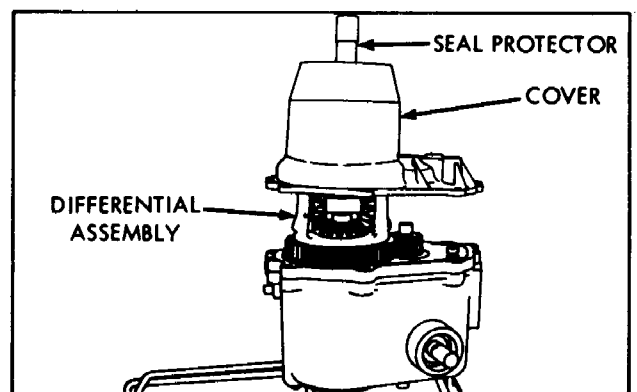


Figure 2-4

- To remove differential assembly, it may be necessary to replace two or three screws to hold center plate assembly down. Pull assembly straight up. (Fig. 2-5). If tight, tap on lower axle with soft mallet. CAUTION: DO NOT USE STEEL HAMMER. Refer to Section 4 for differential assembly service. Remove gear on top of shifter shaft.

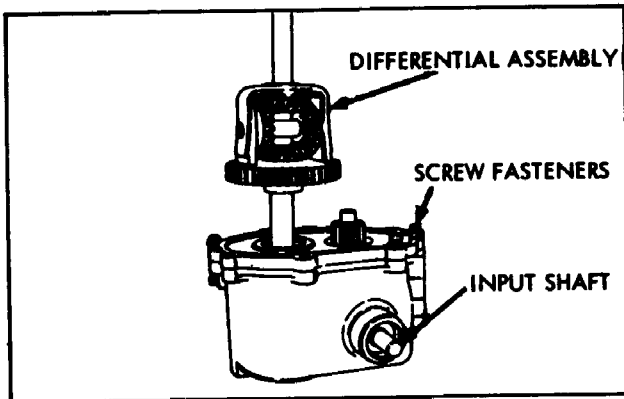


Figure 2-5

- Remove temporary holding screws, if used, and lift off center plate assembly. Discard gasket.

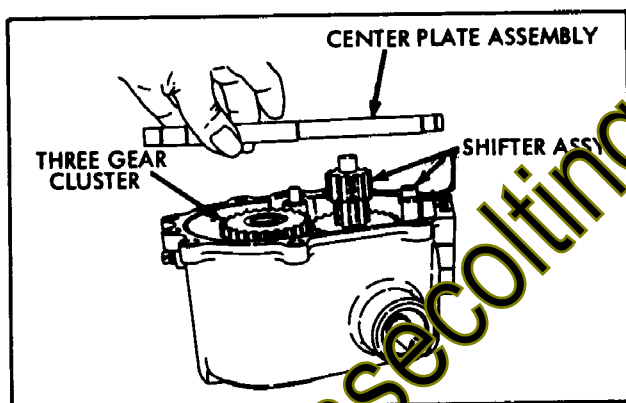


Figure 2-6

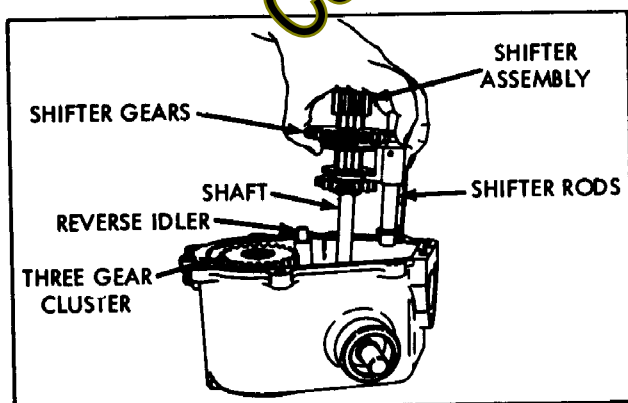


Figure 2-7

- Remove complete shifter assembly by grasping shifter gears, shaft and both shifter rods as a unit. (Fig. 2-7).

NOTE: Examine assembly carefully; if no service is required, retain assembly as a unit for easy reassembly. If service is necessary, refer to SECTION 3. Also, refer to illustrations 2-11 and 2-12 and paragraph (12) in this section.

- Remove reverse idler shaft and spacer, cluster gear assembly and thrust washer. (Fig. 2-7 and 2-10). For removal and replacement of gears on cluster, see paragraph (11) in this section.

- Lift idler gear assembly out of case. (Fig. 2-8).

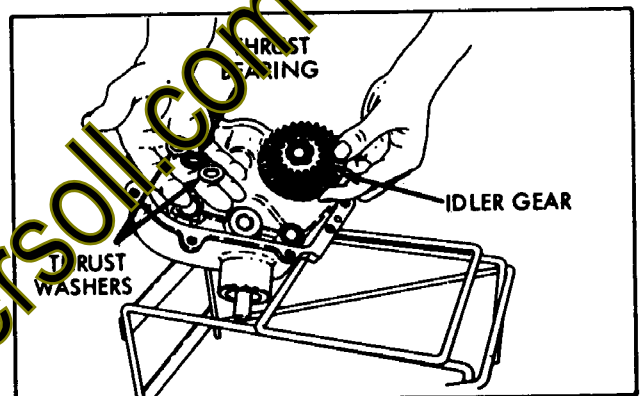


Figure 2-8

NOTE: For sequence of thrust washers and bearings, see Figure 2-8.

NOTE: Caution required as needles from shifter and brake shaft bearing may fall out.

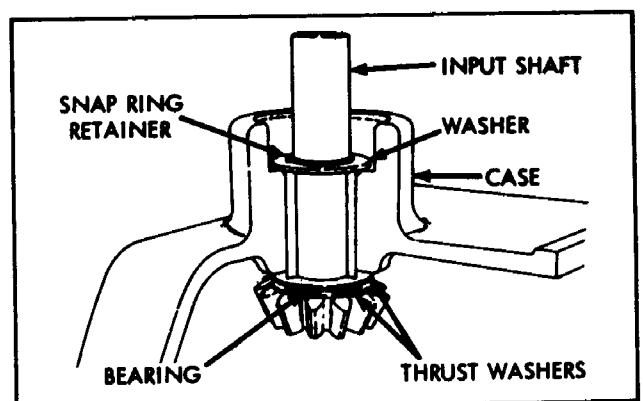


Figure 2-9

10. Remove input shaft oil seal to allow access to snap ring. Remove snap ring and input shaft will slide out. (Fig. 2-9). A removed seal must be replaced by a new seal.

11. Cluster Gear Sub-Assembly

- The cluster gear (Fig. 2-10) can be disassembled. All gears are replaceable if damaged or worn. Preferably use a press to drive the gears squarely.
- The small and middle gear bevel faces down, there is no beveled edge on large gear. Shorter section between middle and large gear. (Fig. 2-10).
- Key edge ends must align with shaft ends. (Fig. 2-10).

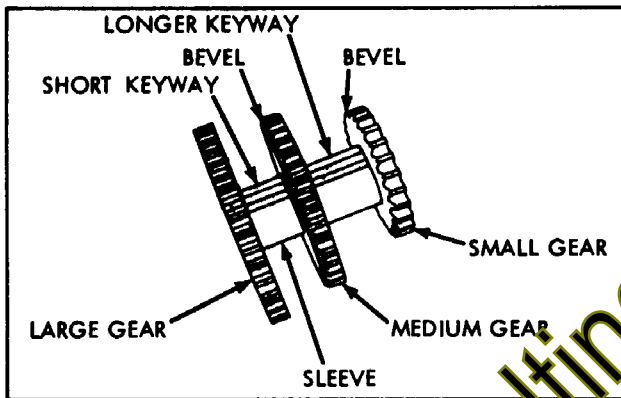


Figure 2-10

12. Shifting Assembly

The shifting assembly (Fig. 2-11) is usually removed from and installed into the transaxle assembly unit. The assembly is removed and replaced by grasping the shifter rods firmly. (Fig. 2-11). This will cause the binding necessary to hold the assembly together. Before removal or installation of the shifting assembly, notches in the shifter forks should be aligned with notches in the shifter stop. (Fig. 2-12). This indicates that shifting assembly is in a neutral position. The shifter stop must be so positioned that the notch aligns with notches in shifter forks. For service of the shifting assembly, refer to SECTION 3.

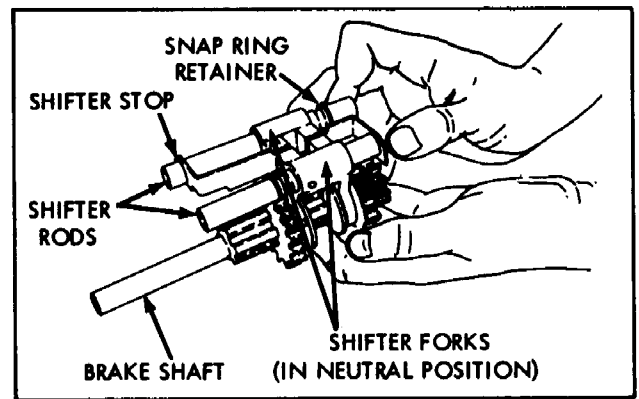


Figure 2-11

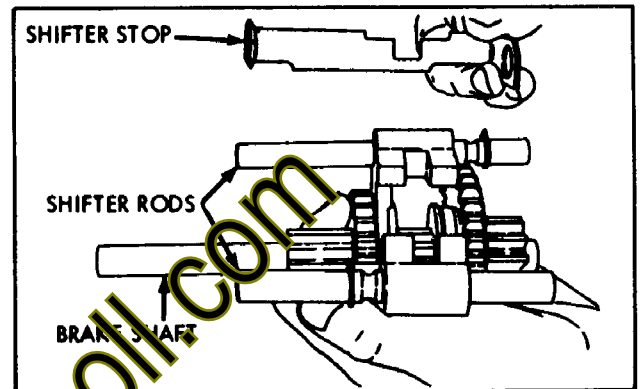


Figure 2-12

Transaxle Assembly

- Install thrust washers and bearing on input shaft. Note sequence, Fig. 2-13.
- Install input shaft into case assembly. Lock on with snap ring retainer. Install oil seal, (Fig. 2-13).

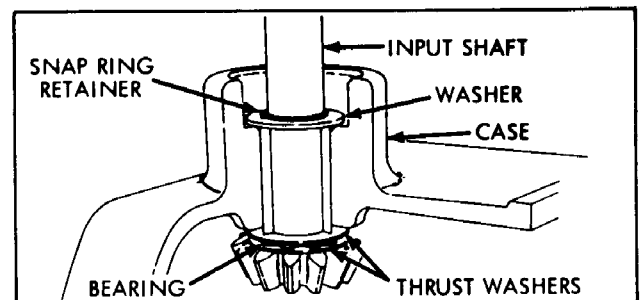


Figure 2-13

- Set case assembly open side up. Insert the idler shaft gear assembly, thrust washers and bearing. Note sequence of washers and bearings (Fig. 2-8).

Note: Place reverse idler shaft into bearing to aid in holding washers, thrust bearing, idler shaft and gear assembly prior to installing shifter assembly.

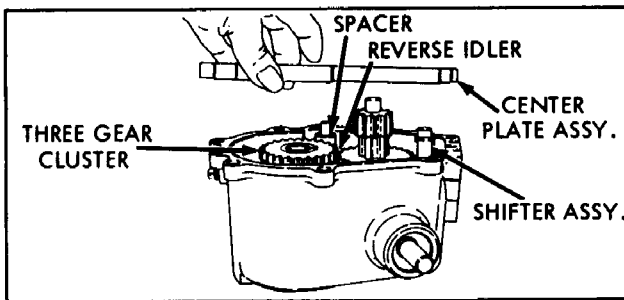


Figure 2-14

4. Insert the washer and then the three gear cluster assembly. (Fig. 2-14).
5. Insert shifter assembly. (Fig. 2-17.) Check that rods are seated properly. Note: Reverse idler shaft will be pushed out at this time.
6. Install reverse idler. Make sure beveled edge is up. Spacer on top of gear.

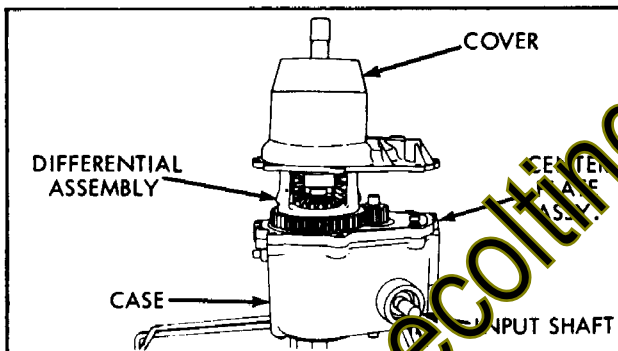


Figure 2-15

BEARING TOOLS

PART LOCATION	TOOL REMOVE & REPLACE	TOOL BEARING SIZER
Brake Shaft	670210	(27 needles)
Axle	670204	670214
*Input Shaft	*670207	670208
Center Plate	670205	
Brake Shaft	670213	(30 needles)
Differential	670204	670214
Cluster Gear	670204	670214
Idler Gear	670210	670212
Axle Housing	670204	670214
Reverse Idler		

* Bearing must be flush with top of case. Secure with Loctite.

7. Place new gasket on case and install center plate. (Fig. 2-14).
8. Place new gasket on center plate and install differential assembly, longer axle in down position. Be sure gear on shifter shaft is on shaft.
9. Install gear case dowel pins. Leave dowel pins slightly exposed on top to locate cover assembly.
10. Install transaxle cover assembly, (Fig. 2-15), and secure with eight (8) cap screws.
11. Install bearings and/or bushings, if necessary, using bearing driver and bushing tool. See bearing chart below.
12. Install axle housing assembly. Fill with 1-1/2 pints S.A.E. EP90 oil.
13. Inspection Note: For a neutral position, shift notches in forks and notch in shifter stop must be aligned and centrally located. (Fig. 2-16).

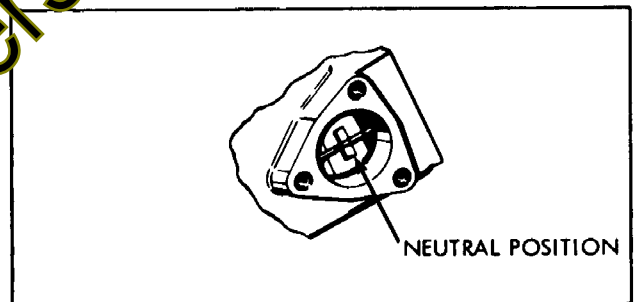


Figure 2-16

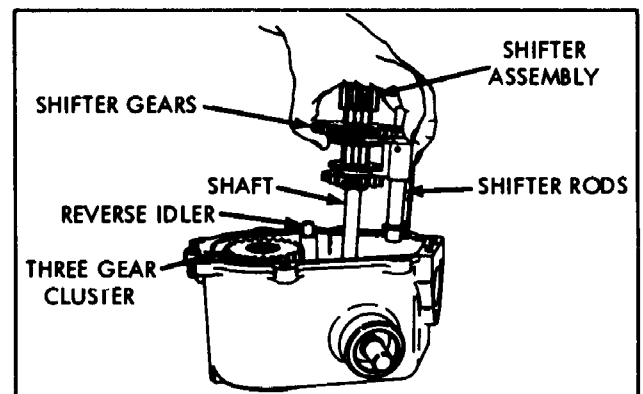


Figure 2-17

SECTION 3
SHIFTING ASSEMBLY SERVICE

A. SHIFT PATTERN
FRONT OF EQUIPMENT

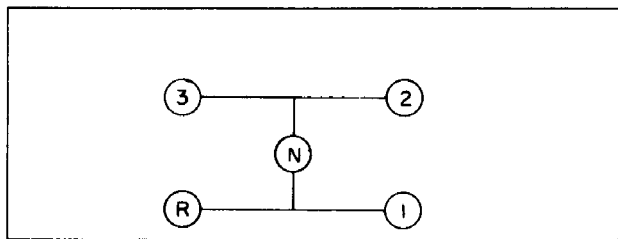


Figure 3-1

B. Shift Lever Assembly

1. General

- a. Prior to removing the shift lever assembly from the transaxle, make note of the position of the shift lever so that it may be assembled correctly to the shift lever housing.
- b. Move the shift lever to Neutral, if possible, before removing it from the transaxle. Clean around the lever housing to prevent dirt from falling into the transaxle. Cover this opening, if possible.

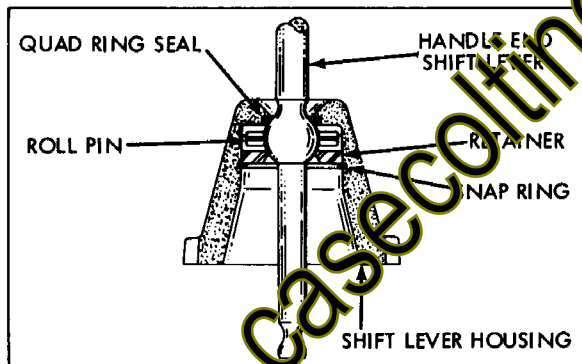


Figure 3-2

2. Disassembly

- a. Place the shift lever in a vise so that the shift lever housing is at least one inch from the top of the vise jaws.
- b. Use the proper compressing type tool for removing the snap ring. Loosen the vise and disassemble the pieces (Fig. 3-2).

c. Remove the shift lever from the shift lever housing. Examine the roll pin in the ball of the shift lever, (Fig. 3-2) if bent or worn, replace. When inserting a new roll pin in the ball, position so that equal lengths protrude from both sides of the ball.

d. Oil leakage past the point where the shift lever enters the shift lever housing will require replacement of the quad ring seal in the shift lever housing (Fig. 3-2).

e. Prior to reassembly, be sure that bends in the shift lever correspond to the mounting on the vehicle.

3. Reassembly

- a. Secure parts with the snap ring. Before installing the shift lever and housing to the transaxle housing, check the shifting forks for Neutral position.
 - b. Always use new gaskets between the shift lever housing and the transaxle.

C. SHIFTING ASSEMBLY

1. Removal

- a. Shifting assemblies are removed from and installed into transaxles by squeezing the top end of the shifter rods. This causes a binding that retains all parts during removal or installation.

2. Disassembly

Follow the illustrations in order. Figures 3-8, 3-7, 3-6, 3-5, 3-4, 3-3. Prior to disassembly compare the assembly with the illustrations. This will aid during the reassembly.

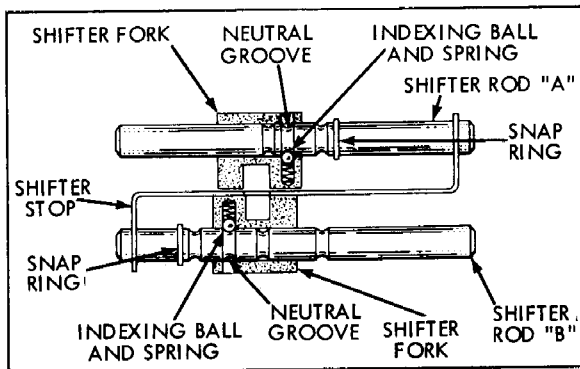


Figure 3-3

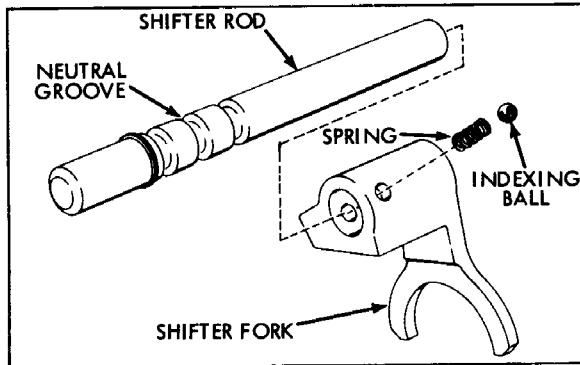


Figure 3-4

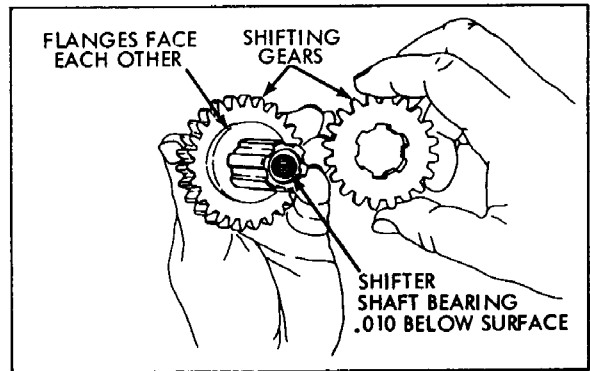


Figure 3-6

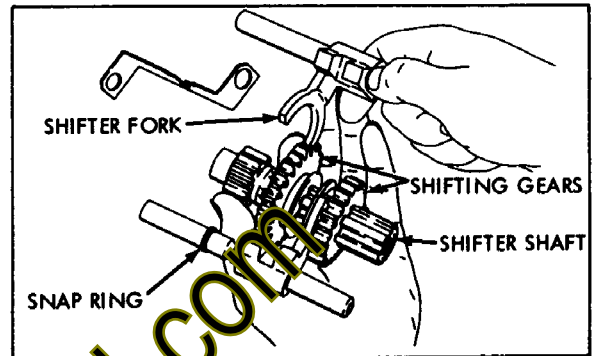


Figure 3-7

3. Inspection

- a. Replace the shifter stop if worn or damaged, Fig. 3-8.
- b. Examine the teeth and internal splines of the two shifter gears. Replace damaged gears. The gears must slide freely on the shifter shaft. Excessive wear of the internal spline in the gears will create locking and difficult shifting. Replace the gear if this condition is present.
- c. Replace the shifter shaft needle bearing as follows if wear is evident. Replace shifter shaft if the bearing surface is scored, pitted or worn to a diameter less than .750".

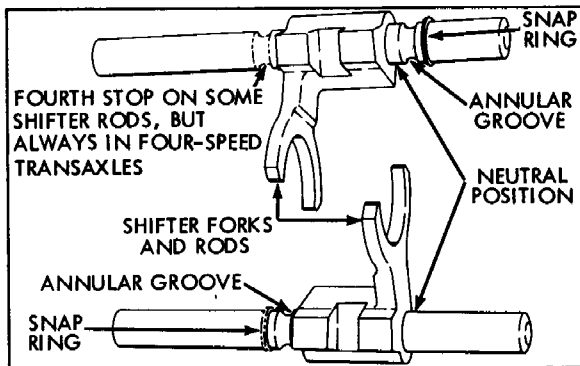


Figure 3-5

1. To remove the needle bearing in the splined shifter shaft proceed as follows:

NOTE: Blind bearing pullers are available to remove this bearing. There is a space between the bottom of the drilled hole and the inside end of the bearing to accommodate the ridges of the bearing puller. If puller is not available proceed as follows:

- 1a. With the needle bearing up, clamp the splined shifter shaft vertically in a soft jaw vise so that the lower end of the shaft rests on a block of wood.
- 1b. Prepare some pieces of paper toweling, newspaper, etc. by soaking in water.
- 1c. Tear paper into pieces, approximately one to two inches square. Stuff these wet pieces of paper into the needle bearing until full.
- 1d. Insert a 7/16" metal rod into this bearing. With a mallet strike the rod sharply. This will compress the wet paper. Continue to add more wet paper, this will hydraulically lift the bearing out of the shaft.

- 1e. Use the authorized tool to install the new bearing. Needle bearings in shifter shafts should be installed .010 below flush.

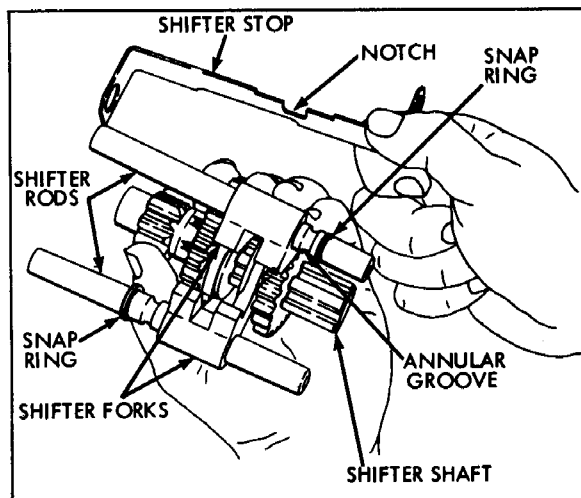


Figure 3-8

- d. Replace other parts showing wear, looseness, cracks, etc.

4. Assembly

- a. Reassemble the shifting assembly by following the illustrations beginning with Fig. 3-3 through 3-11. Pay particular attention to Fig. 3-3 during the reassembly of the shifter forks and shifter rods. Lay the parts on the bench in the same manner as illustrated in Figure 3-3 on a clean paper or shop cloth. Pay particular attention to the annular grooves in the shifter rods and the snap ring.

1. Assemble the shifter forks to the shifter rods as illustrated in Figure 3-4. The shifter forks are interchangeable.
2. Refer to Figure 3-4. Slide the shifter fork onto the shifter rod until it comes to the hole with the indexing ball and spring. With a flat blade screw driver press the indexing ball into the hole and move the shifting fork completely onto the shifter rod.

3. Move the shifting fork to the Neutral position. The neutral groove is the center groove. This neutral groove can be seen through the hole in the shifter fork. See Figure 3-3, the arrow from the words "Neutral Groove" is passing through the hole for viewing.

4. When the shifter forks are properly assembled to the shifter rods and positioned in neutral, the ends of the notches in the shifter forks are in alignment. (Figure 3-9)

- b. Assemble the two flanged gears onto the shifter shaft. (Figure 3-6) Note that the large gear is placed on the shaft first with the flange side toward the needle bearing in the end of the shifter shaft. Slide on the smaller gear with the flange toward that of the larger gear. (Figure 3-6, 3-7)

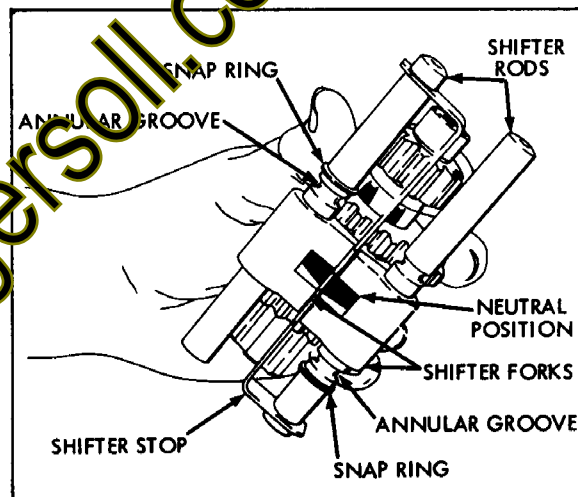


Figure 3-9

- c. When assembling the shifter fork and rod to the flanged gears on the shifter shaft, Figure 3-7, that shifter fork which is on shifter rod "A" always engages in flange in the larger gear. To determine which is shifter rod "A" compare the parts to illustration. Figure 3-3. Hold the shifter shaft in the hand as illustrated (Figure 3-7) during assembly.

d. After the shifter fork and rod assemblies have been engaged with the flanged gears allow the shifter rods to lay open in the hand and position the shifter stop. (Figure 3-10). The notch in the shifter stop is the guide for correct positioning. Align this notch with the corresponding notches in the shifter forks and insert the shifter stop. Move the shifter rods together, (Figure 3-11) and insert into the transaxle. Remember to squeeze the ends

of the shifter rods to cause the assembly to bind and stay together.

e. The needle bearing end is inserted first into the case to engage the end of input shaft.

f. The shifter assembly is correctly installed in the transaxle if the notches in the shifter forks are just about in the center of the opening in the case or cover of the transaxle.

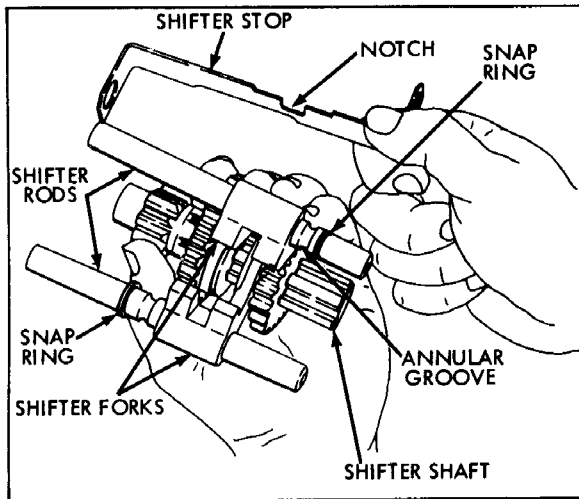


Figure 3-10

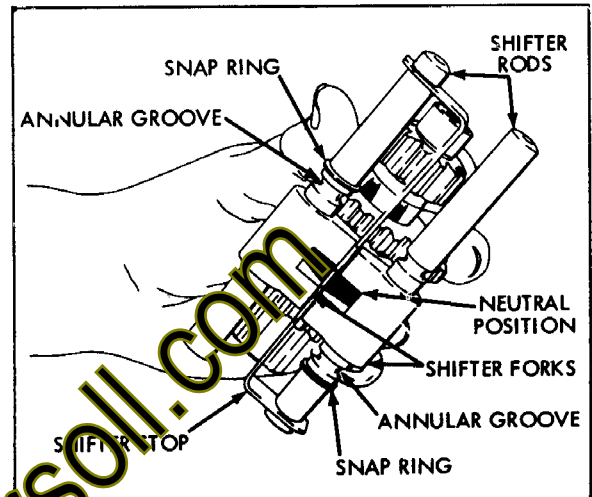


Figure 3-11

casecoltingersoil.com

SECTION 4
DIFFERENTIAL ASSEMBLY SERVICE

1. Disassembly

- a. Drive out roll pin that secures drive pin with suitable driver. (Figure 4-1)

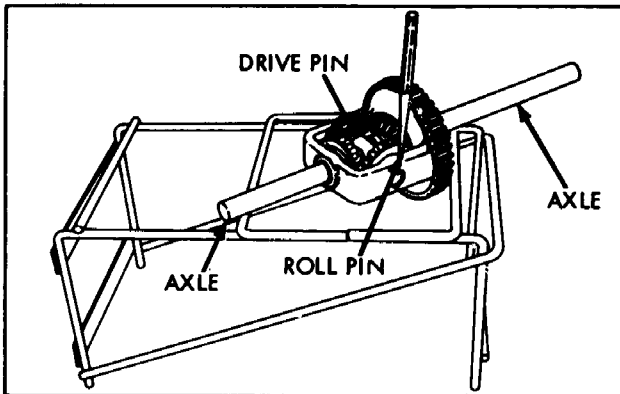


Figure 4-1

- b. Remove drive pin. (Figure 4-2)

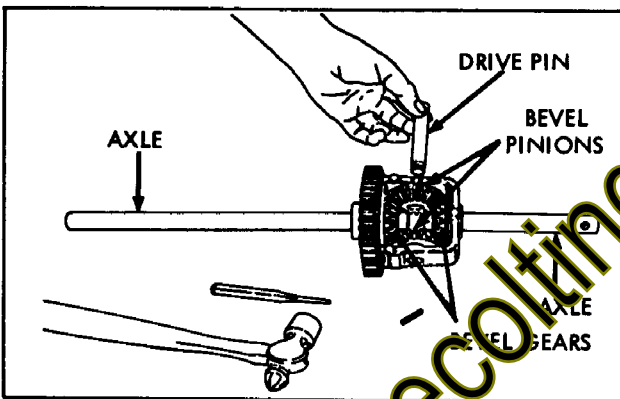


Figure 4-2

- c. Thrust washers must be removed before attempting to remove the pinions. Remove bevel pinions simultaneously by rotating the gears in opposite directions; gears will move out of position. (Figure 4-3)
- d. Remove snap ring, bevel gear and thrust washer. Slide axle out. See Figure 4-4.
- e. Inspect bushings and gears for wear and replace when necessary.

2. Reassembly of Differential Assembly

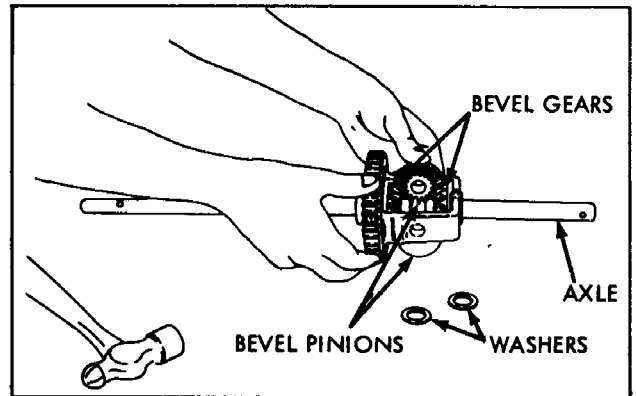


Figure 4-3

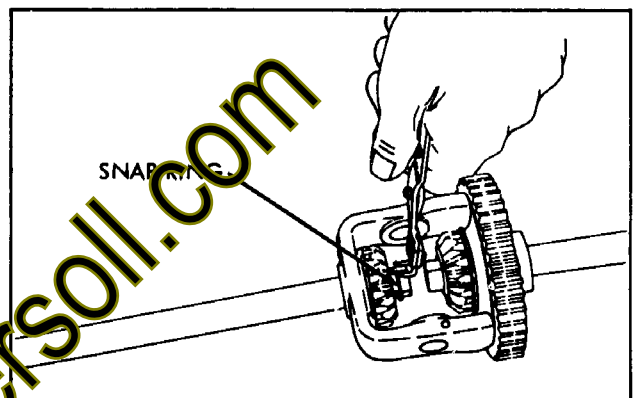


Figure 4-4

- a. Place axles (left and right) into differential gear assembly. Install thrust washers.

NOTE: The axles differ in length so select the proper axle.

- b. Place bevel gears on the shaft and install snap ring in groove on the shaft. See Figure 4-4.
- c. Install bevel pinions **SIMULTANEOUSLY FROM OPPOSITE SIDES** by rotating pinions in opposite directions while sliding into position in gear assembly. See Figure 4-3. Check alignment by inserting fingers into drive pin holes. If not aligned, drive pin cannot be inserted. Remove and replace bevel pinions as only one tooth out of position will cause misalignment.
- d. After aligning, insert thrust washers behind each pinion. Insert drive pin and secure with roll pin.

casecoltingersoll.com

Printed In U.S.A.