



**5 SPEED TRANSAXLE
108, 110, 116 TRACTOR
Service Manual No. 8-55180**

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A Tenneco Company



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TORQUE VALUES

1. Use the correct torque value on all fasteners.
2. Overtightening can strip threads.
3. Undertightening can cause lubricant leakage, loosening of attaching parts, damage to threads, and possible shifting of the internal parts causing complete failure.

4. Use a cross tightening sequence to half the torque then finally to the full torque value.

PART	TORQUE VALUE	IN - LBS (Nm)
Bolt 1/4-20 (Case to Cover)	90 - 100	(10.1 - 11.2)
Bolt 1/4-20 (Brake Disc)	85 - 110	(9.6 - 12.3)

GENERAL SERVICE PROCEDURE

Perform the following checks before removing the transmission from the tractor:

1. Check for loose or slipping drive belts.
2. Check for an improperly adjusted or badly worn clutching mechanism.
3. Check for loose or lost set screws and sheared keys in pulleys and rear wheels.
4. Check for other problems by operating the tractor if possible.

REMOVAL AND INSTALLATION

1. Place the gear shift lever in the neutral position.
2. Raise the tractor so that the transaxle is accessible.

Use jackstands to support the tractor.

3. Inspect the transaxle for damage and binding.
4. Remove the drive belt, rear wheels, shift rod and brake rod.
5. Support the transaxle and remove the bolts holding it to the tractor frame.
6. Remove the transaxle.
7. Reverse the removal procedure to install the transaxle.

CLUTCH/BRAKE ADJUSTMENT

The clutch/brake is adjusted correctly when:

1. The first part of pedal travel disengages the clutch.
2. The remainder of pedal travel actuates the brake.

Use the following procedure for correct adjustment of the clutch/brake.

Stop the engine. Remove the key from the ignition.

1. Release the clutch/brake pedal.
2. Adjust rear "backside" idler pulley so that a distance of $3/4"$ (19 mm) is between the parking brake lock slot and the brake lock tab.

Moving "backside" idler toward the center of the tractor increases the distance. Moving "backside" idler away from the center of the tractor decreases this distance.

3. Manually check the brake lever for free movement. Correct free movement can be from $1/2"$ (12 mm) to $3/4"$ (19 mm).
4. If adjustment is necessary use the following procedure:
 - a. Tighten the brake lever locknut to decrease free movement, or loosen to increase free movement.
5. Hold clutch/brake pedal against its travel stop. Adjust brake rod adjusting nut until it is within one to two turns of collapsing the spring to its solid height.

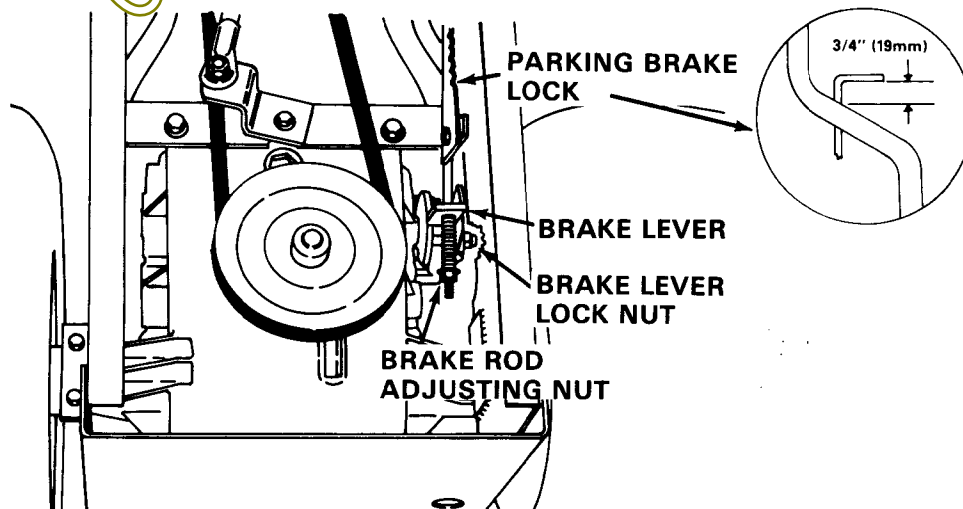


FIGURE 1

TROUBLESHOOTING

TRANSAXLE DIFFICULT TO SHIFT OR CANNOT BE SHIFTED

CAUSE	REMEDY
1. Tractor clutch not disengaging.	1. Adjust tractor clutch according to tractor operator's manual.
2. Shift lever, detent ball or spring improperly installed or adjusted.	2. Install or adjust correctly.
3. Shifting keys bent or broken.	3. Disassemble transaxle and replace shifting keys.
4. Thrust washers in shifter and brake shaft assembled incorrectly.	4. 45° Chamfer on thrust washers must face the shifting keys.

AXLES CANNOT BE TURNED IN SAME DIRECTION WITH TRANSAXLE IN NEUTRAL

1. Burrs on gear or foreign object stuck in gears.	1. Disassemble transaxle and clean and repair as required.
2. Binding resulting from damaged or improperly installed bearing or thrust washer.	2. Disassemble transaxle and clean and repair as required.

TRANSAXLE DOES NOT DRIVE

1. Key sheared in pulleys or rear wheels.	1. Repair as required.
2. Broken shifter keys in shifter and brake shaft.	2. Disassemble transaxle and replace shifter keys.
3. Broken or stripped gears.	3. Disassemble transaxle and replace damaged gears.

TRANSAXLE JUMPS OUT OF GEAR

1. Shift lever or linkage interfering with tractor part preventing full engagement.	1. Check for and eliminate interference.
2. Detent ball and spring for shifter fan weak, broken or missing or improperly adjusted.	2. Replace spring and ball and adjust.
3. Damaged shifter keys in shifter and brake shaft.	3. Disassemble transaxle and replace shifter keys.

TRANSMISSION

IMPORTANT: To avoid premature transmission failure declutching is required when shifting.

Before Disassembly:

1. Clean outside surface of transaxle thoroughly.
2. Position shift lever in neutral position. Remove the shift lever.
3. Remove setscrew, spring and index ball.
4. The input pulley can remain installed if input shaft is not being replaced.

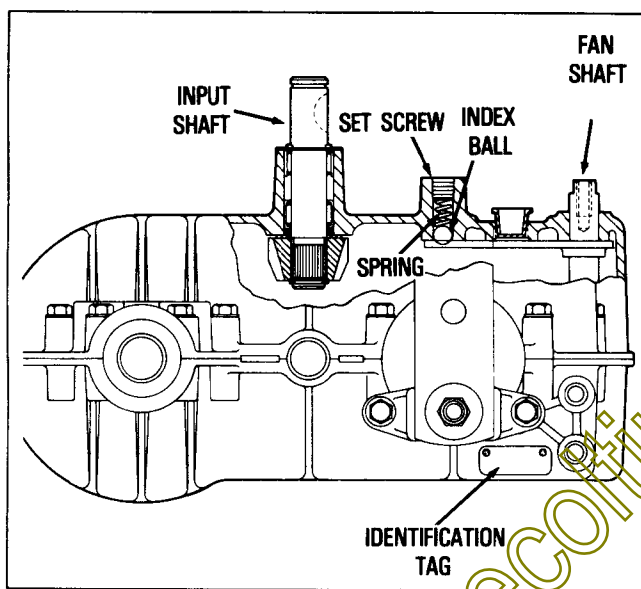


FIGURE 2

DISASSEMBLY

1. Remove 17 Hex screws that hold cover to case. (See Figure 3).
2. Push shift lever rod in while pulling cover off of case. Shifting assembly may temporarily remain in case. Remove cover.

NOTE: Remove grease from the unit as parts are removed.

3. Remove two brake bracket screws (Figure 3), and remove brake assembly.

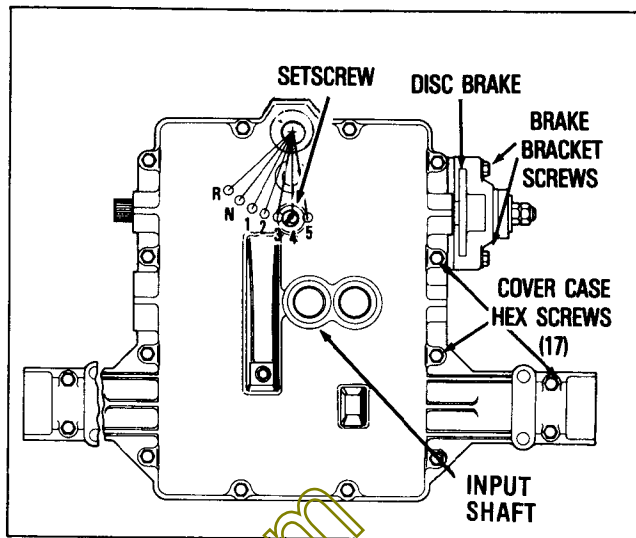


FIGURE 3

NOTE: Prior to removal of gear shaft assemblies from the case, the shifter fan may be removed. It will be difficult to keep parts from falling off the assemblies. Note position of parts before removal.

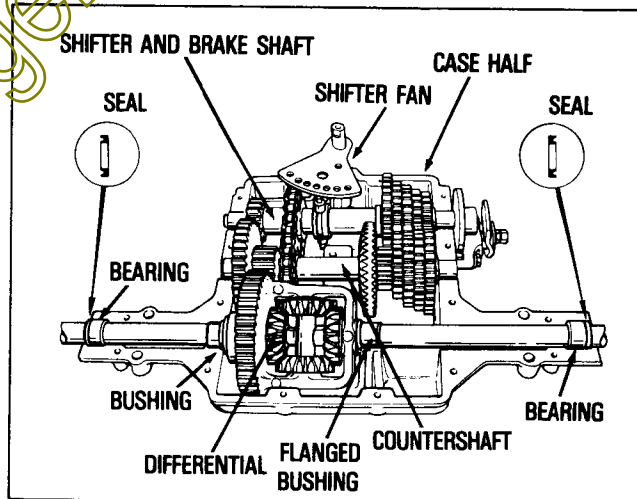


FIGURE 4

NOTE: Before disassembly, observe how "V" tabs on the flanged bushings fit into recess "V" of case. (See Figure 4).

4. Remove gear and shaft assemblies from case half by lifting the two shafts out of the bearing supports taking care not to disturb drive chain relationship with sprockets. (See Figure 4).

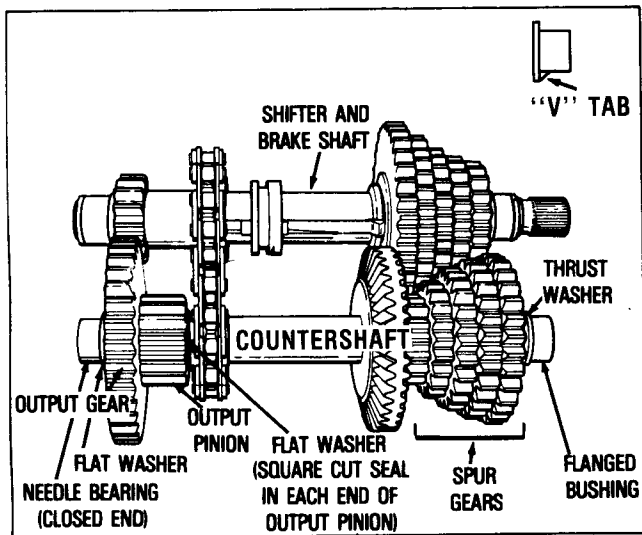


FIGURE 5

- From counter shaft, remove the needle bearing (closed end), square cut seal, flat washers, output gear and output pinion, and 2 square cut seals and flat washers from the countershaft (Figure 5) (2 seals in output pinion - 1 in needle bearing cap). Seals in countershaft are larger than those on brake shaft ends. Always replace with new seals whenever removed.

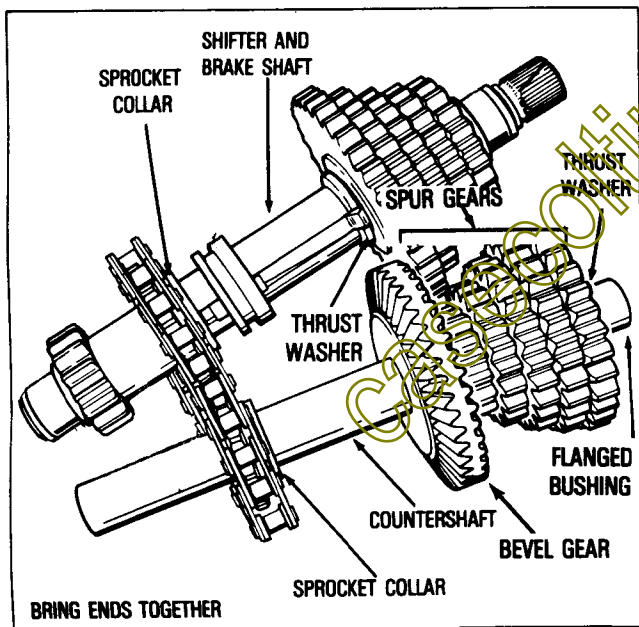


FIGURE 6

- Angle the shifter and brakeshaft and countershaft chain sprocket ends toward each other. (Figure 6) Note the collar on the sprockets face the bevel gear. Remove chain.

- From the countershaft, remove the sprocket, flanged bushing, thrust washer, spur gears, and bevel gear. (See figure 6). The gears are splined to the countershaft.

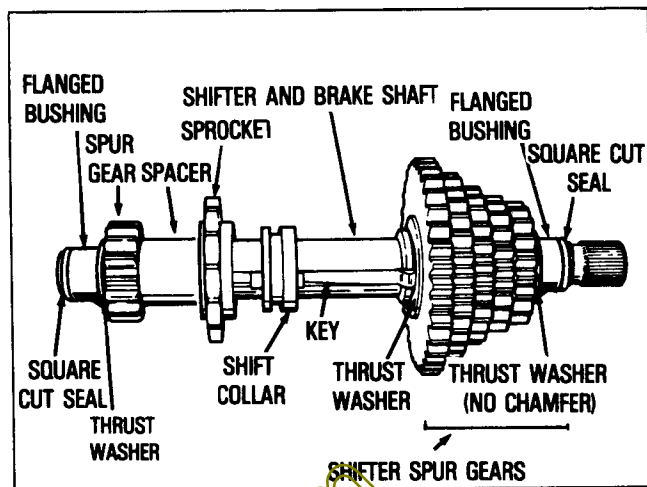


FIGURE 7

- From the shifter and brake shaft, remove the square cut seals (2) and flanged bushings (2), thrust washers (2) on shaft ends, spur gear, spacer, sprocket, shift collar with keys, shifter spur gears and thrust washer. (See Figure 7).

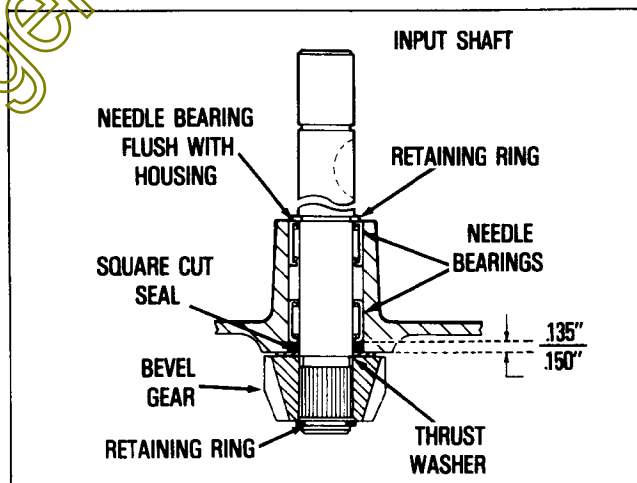


FIGURE 8

- Remove differential from case. Remove seals (2), bearings (2), and bushings (2).
- Remove retaining ring on bevel gear end from input shaft, remove bevel gear and pull shaft through case. (Figure 8). The square cut seal must be replaced, if removed.

ASSEMBLY

NOTE: Always use new seals when assembling the transaxle.

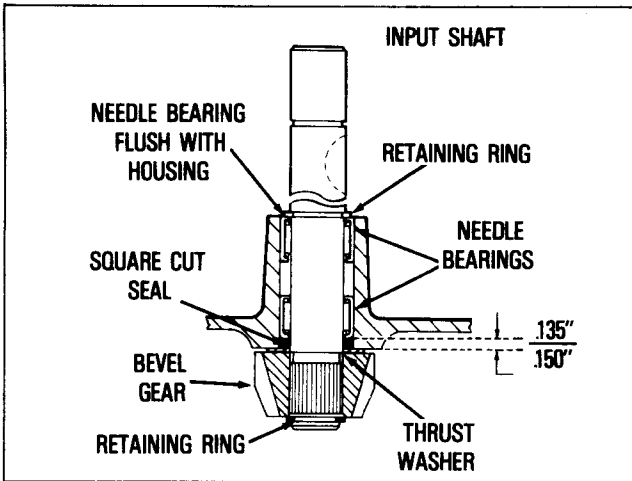


FIGURE 9

1. Apply grease between bearings and install and secure the input shaft and bevel gear in the cover.

Tool, Peerless Part No. 670251 is used for removal and installation of needle bearings for the input shaft. The needle bearing on inboard side is installed .135/.150" below flush. (See Figure 9).

2. Grease both keyways and slide keys and collar on shifter and brake shaft (as shown in Figure 10). Thick side of shifter collar **MUST** face shoulder on shaft as shown in Figure 10.
3. When ready to install thrust washers and shifting gears on shifter and brake shaft (as shown in the upper view in Figure 11), the 45° chamfer in the inside diameter of the thrust washers **MUST** face the shoulder on the shifter and brake shaft. See inset (Figure 11). The flat side of the shifting gears **ALWAYS** face the shoulder on the shifter and brake shaft.

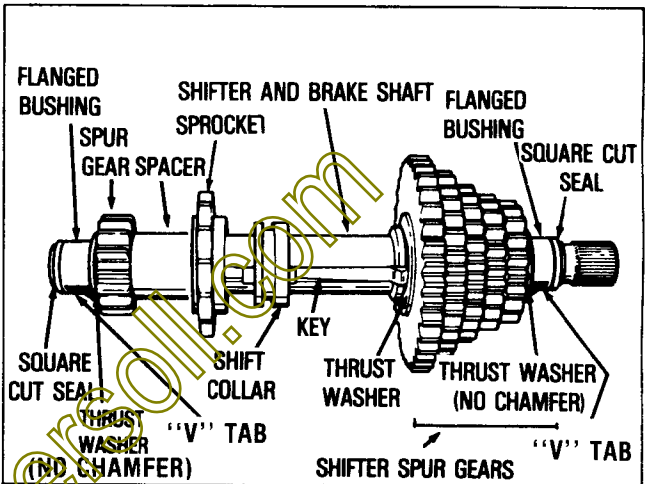


FIGURE 12

NOTE: The thrust washer on the spur gear end of the shifter and brake shaft does not have a chamfer on the inside diameter and must be positioned as shown in Figure 12. Install sprocket, spacer, spur gear, and thrust washer on shifter and brake shaft, (as shown in Figure 12). Be sure collar on sprocket faces the shift collar. Install flanged bushings on both ends of shifter and brake shaft, install square cut seal on end of flanged bushings.

When correctly assembled, the shifter and brake shaft should appear as shown in Figure 12.

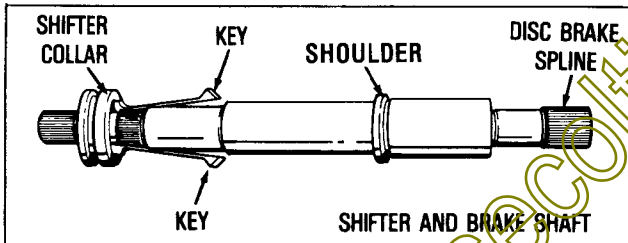


FIGURE 10

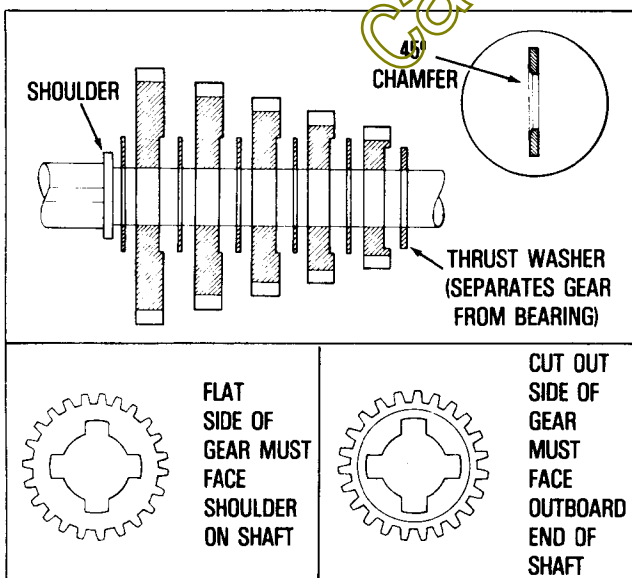


FIGURE 11

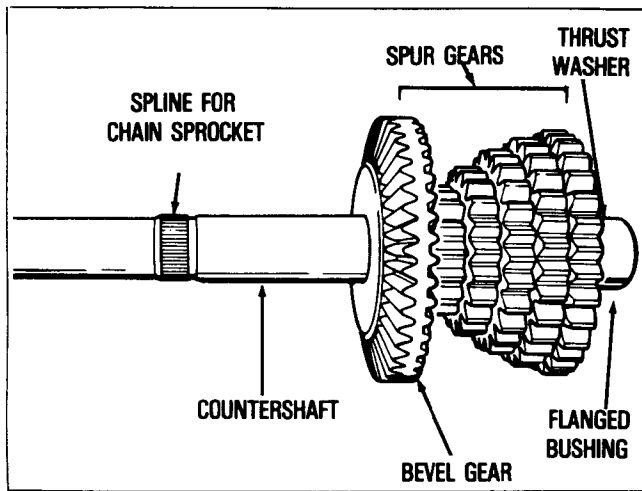


FIGURE 13

- On the countershaft, install bevel gear with the wide angle of the gear teeth facing the sprocket and smallest to largest spur gears, thrust washer and bushing to the countershaft. Install the sprocket with the collar facing the bevel gear. See Figure 13.

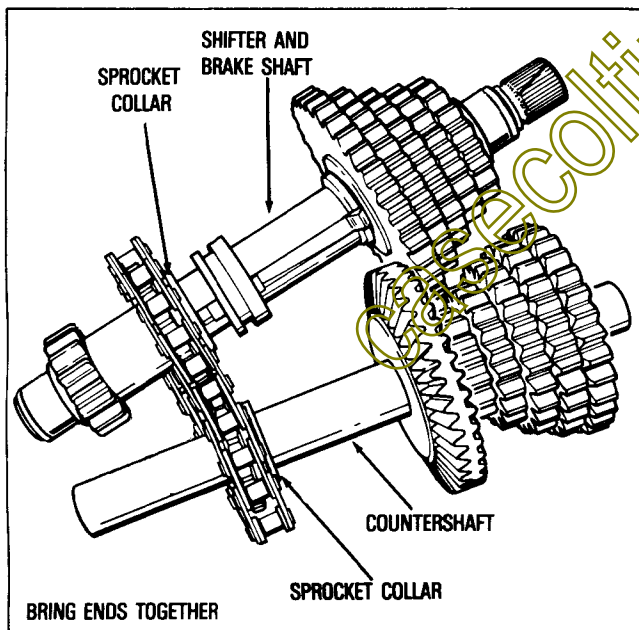


FIGURE 14

- With the shifter and brakeshaft and countershaft ends angled together (as shown in Figure 14), install the chain on the sprockets.

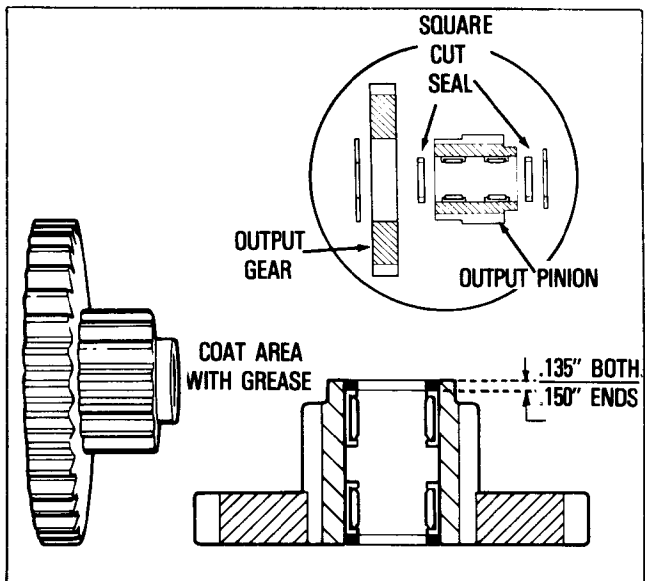


FIGURE 15

- Use Peerless tool P/N 670252 to correctly position the needle bearings in the output pinion. Fill the area between the needle bearings with grease before installing on the countershaft.

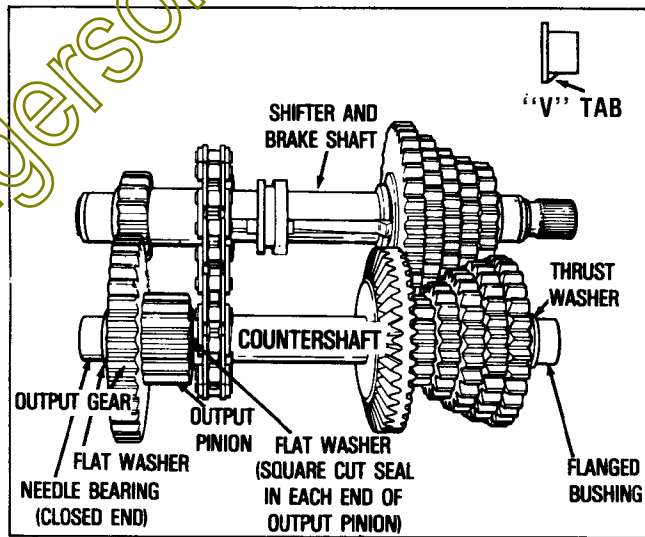


FIGURE 16

- Install the following on the sprocket end of countershaft: flat washer, output pinion (with needle bearings and square cut seals installed -See Figure 16), output gear, flat washer and closed end needle bearing (with square cut seal installed).

Install the following on the spur gear end of the countershaft: thrust washer, flanged bushing.

NOTE: The "V" tab on the bushing fits into the recess "V" in the case.

Install shafts into case. See Figure 17.

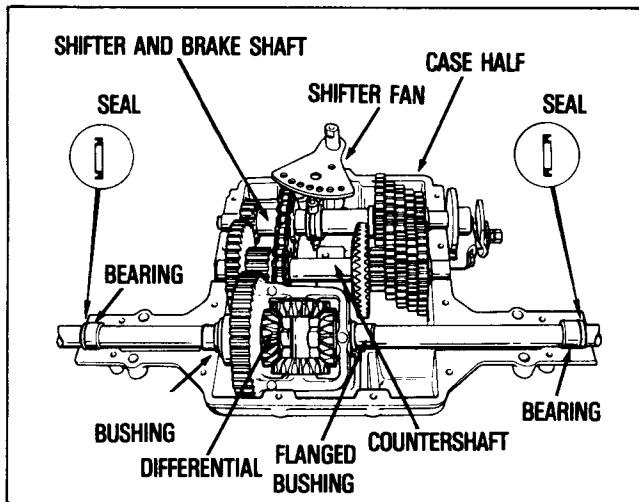


FIGURE 17

8. Install the following on the differential and axles: bushing, flanged bushing, bearings, seals (if needle bearings used) with grooves facing out. See Figure 17. Install differential in case.
9. Install shifter fan assembly (Figure 17). Pack 36 oz. E.P. Lithium grease around bearings and gearing, and reinstall cover on case. Tighten cap screws to a torque of 90-100 inch pounds (10.1-11.2 Nm).

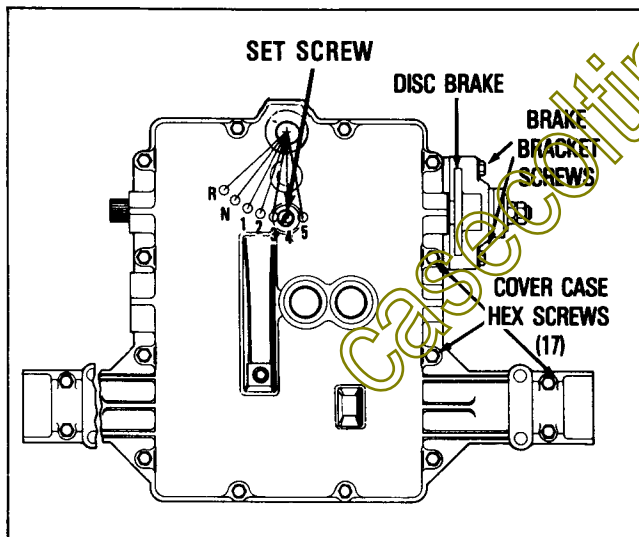


FIGURE 18

10. Install index ball, spring and setscrew in that order into cover, and slowly tighten the screw 1 turn below flush. See Figure 18.

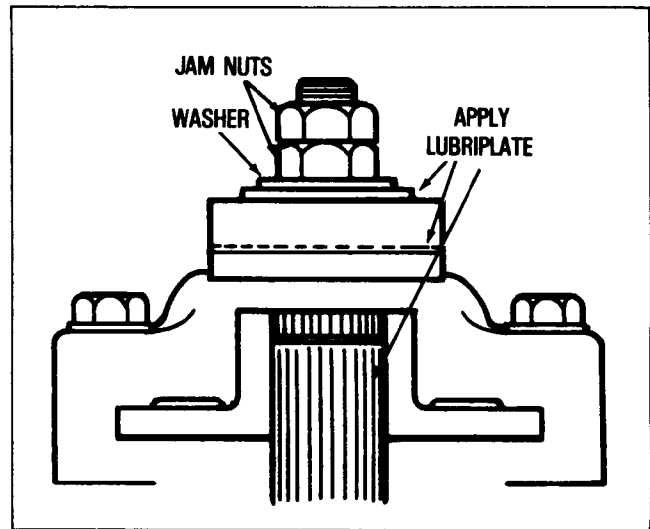


FIGURE 19

11. Prior to installing the brake assembly, apply a film of lubriplate to the inside of lever portion which contacts pins (Figure 19), also to outside of lever which contacts flat washer and between shaft O.D. and bore of brake disc. Brake pads and brake disc must be free of grease and oil.

Check for binding by turning input shaft.

NOTE: To secure brake lever, hold bottom nut and torque top nut to 100 in. lbs. (11.2Nm) (See Figure 22).

NOTE: If adjusted incorrectly, the brake will do one of two things:

- a. It will not brake (stop) the tractor when the brake is applied or,
- b. If adjusted too tightly, a drag or continued braking effect will be evident until the brake wears out or damage to brake lever or housing will occur.

Install transaxle.

Adjust Clutch/Brake. See the the General Service Procedure section of this Manual.

DIFFERENTIAL

DISASSEMBLY

1. Use a suitable pin punch to drive out the roll pin that secures the drive pin. (See Figure 20).

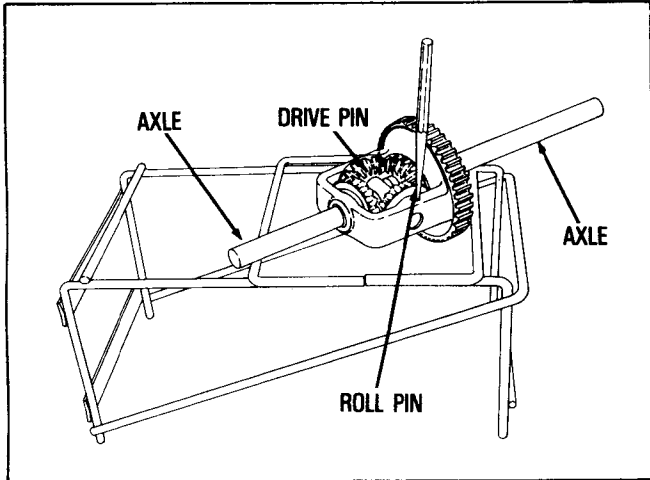


FIGURE 20

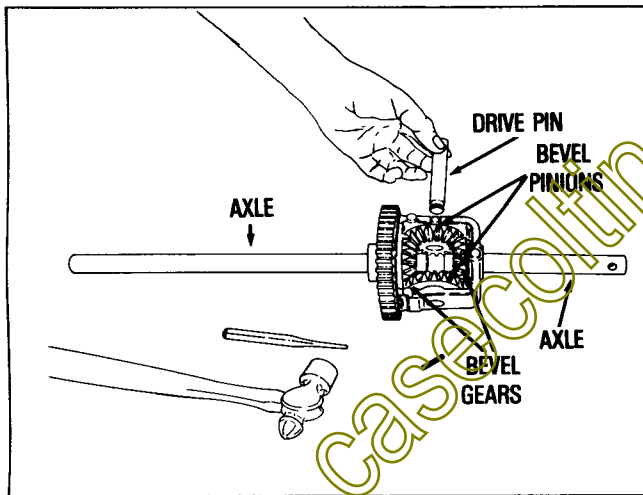


FIGURE 21

2. Remove drive pin. (See Figure 21).

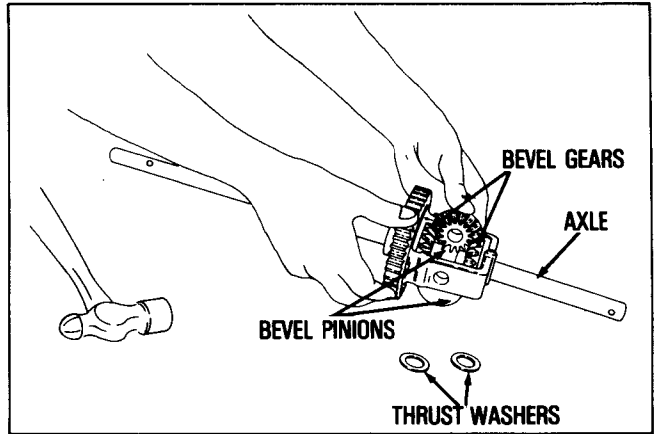


FIGURE 22

3. 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. (See Figure 22).

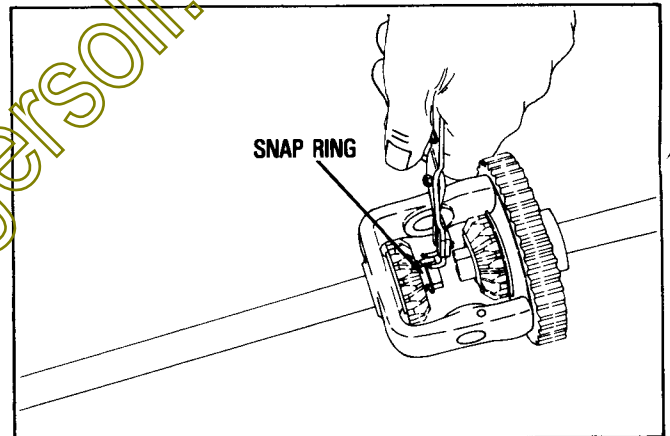


FIGURE 23

4. Remove snap ring, bevel gear and thrust washer. Slide axle out. (See Figure 23).
5. Inspect bushings and gears for wear and replace when necessary.

ASSEMBLY

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

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

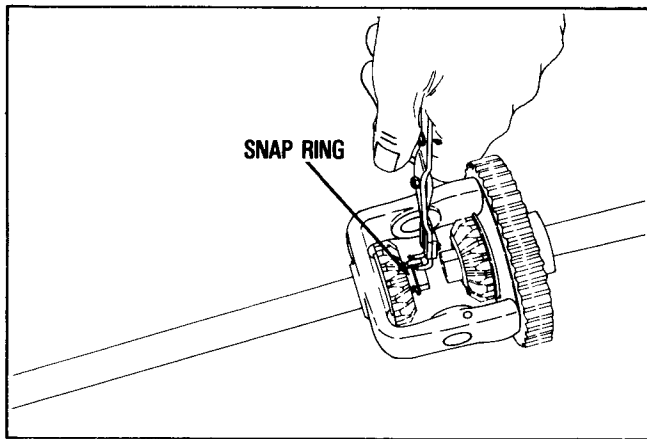


FIGURE 24

2. Place bevel gears on the shaft and install snap ring in groove on the shaft. (See Figure 24).

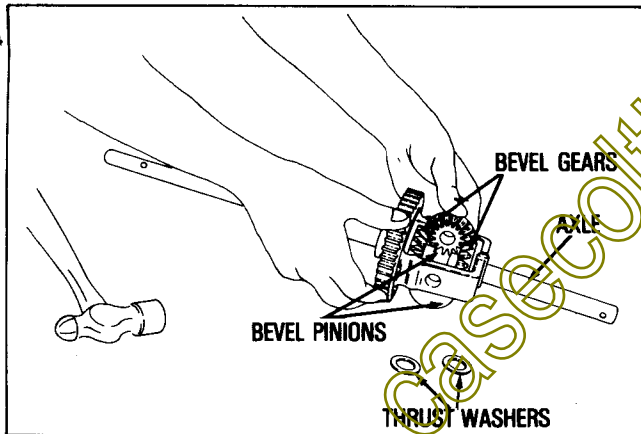


FIGURE 25

3. Install bevel pinions SIMULTANEOUSLY FROM OPPOSITE SIDES by rotating pinions in opposite directions while sliding into position in gear assembly. (Figure 25). 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.

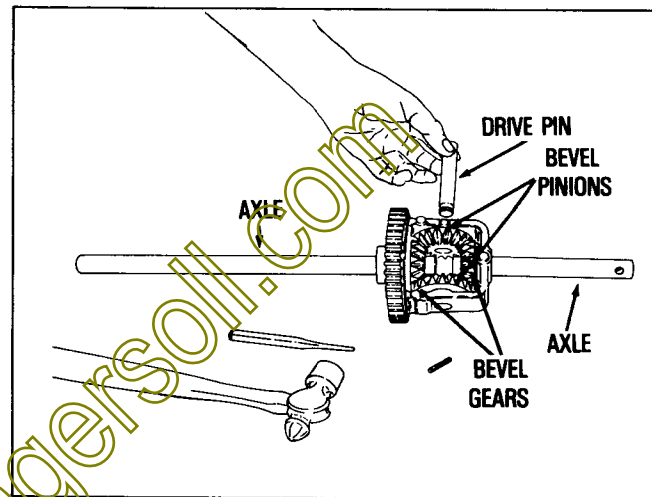


FIGURE 26

4. After aligning, insert thrust washers behind each pinion. Insert drive pin and secure with roll pin. (See Figure 26).

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