

34, 35, 38 and 3800 Forage Harvester Gear Cases



TECHNICAL MANUAL 34, 35, 38 and 3800 Forage Harvester Gear Cases

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34, 35, 38, and 3800 FORAGE HARVESTERS

GEAR CASES Technical Manual TM-1104 (Jan-74)

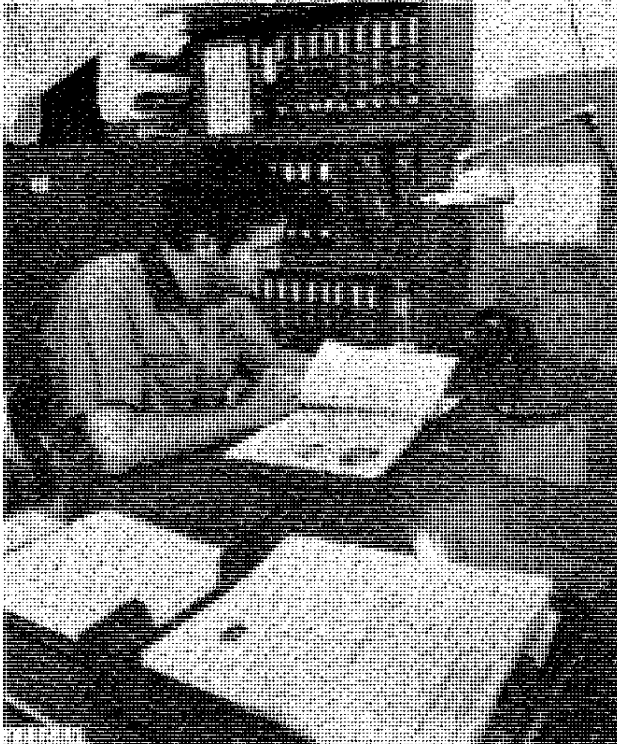
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INTRODUCTION



Use FOS Manuals for Reference



Use Technical Manuals for Actual Service

This technical manual is part of a twin concept of service:

- **FOS Manuals—for reference**
- **Technical Manuals—for actual service**

The two kinds of manuals work as a team to give you both the general background and technical details of shop service.

Fundamentals of Service (FOS) Manuals cover basic theory of operation, *fundamentals* of trouble shooting, *general* maintenance, and *basic* types of failures and their causes. FOS Manuals are for training new men and for reference by experienced men.

Technical Manuals are concise service guides for a *specific* machine. Technical Manuals are on-the-job guides containing only the vital information needed by a journeyman mechanic.



When a serviceman should refer to a FOS Manual for more information, a FOS symbol like the one at the left is used in the TM to identify the reference.

Some features of this technical manual:

- *Table of contents at front of manual*
- *Exploded views showing parts relationship*
- *Photos showing service techniques*
- *Specifications grouped for easy reference*

This technical manual was planned and written for you—a journeyman mechanic. Keep it in a permanent binder in the shop where it is handy. Refer to it whenever in doubt about correct service procedures or specifications.

Using the technical manual as a guide will reduce error and costly delay. It will also assure you the best in finished service work.



This safety alert symbol identifies important safety messages in this manual. When you see this symbol, be alert to the possibility of personal injury and carefully read the message that follows.

**Thanks very much for your reading,
Want to get more information,
Please click here, Then get the complete
manual**

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GENERAL

INTRODUCTION

This technical manual was planned and written for you—a journeyman mechanic. Keep this manual in the shop where it is readily accessible and refer to it whenever in doubt about correct maintenance procedures.

DESCRIPTION

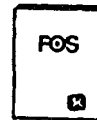
On the pull-type forage harvesters, the power is transmitted from the tractor through a powerline to a 90° bevel gear case which is connected to the feed roll gear case with a drive shaft assembly. From the feed roll gear case the power is distributed to the cutterhead and feed rolls. Also, the harvesting attachment is driven from the feed roll gear case.

The tractor is protected from damage, which could be caused by the harvester, with two devices: A shear device which is located between the bevel gear case and the feed roll gear case; and the over-running clutch which is located between the feed roll gear case and cutterhead to provide protection from the cutterhead.

When servicing the drive cases of the pull-type forage harvesters particular attention should be paid to the tractor-harvester hookup geometry.

Unequal angles occur if the tractor drawbar is not set for the proper length relative to the PTO operating speed. The tractor hookup U-joints must operate at equal angles whether turning a corner or passing over uneven terrain. If the equal angles are not maintained, the following problems could occur:

1. Premature failure of the powerline components.
2. Excessive noise and vibration.
3. Speed-up of the harvester.



For basic theory of power transmitted with a tractor PTO hookup, see FOS manual 40 - POWER TRAINS.

Forage harvesters require high horsepower tractors to provide more uniform distribution of input power. The proper hookup dimensions are illustrated by Figs. 1 and 2. Use Fig. 1 for a harvester using hitch straps and Fig. 2 for a harvester with an equal angle hitch.

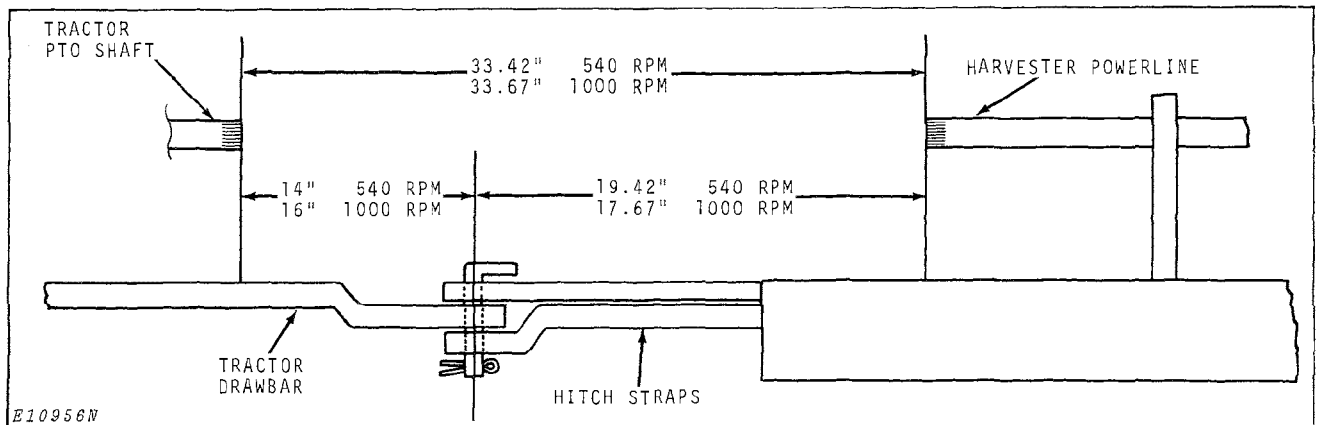


Fig. 1-Hookup Dimensions for Hitch Straps

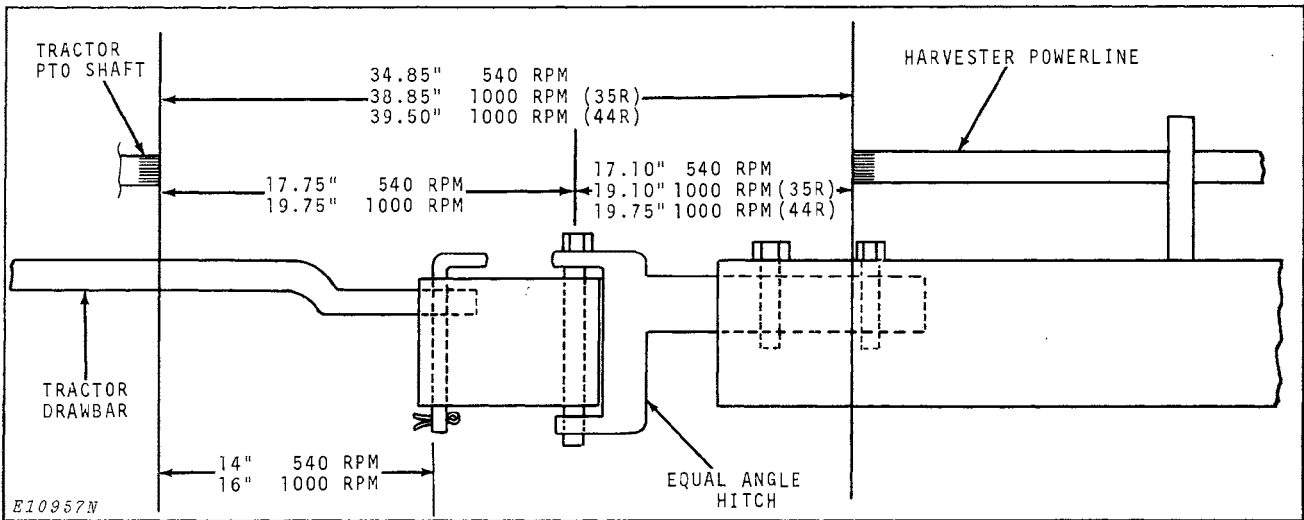


Fig. 2-Hookup Dimensions for an Equal Angle Hitch

LUBRICATION

Gear cases can operate efficiently only if clean lubricants are used. Use clean containers to handle all lubricants. Store them in an area protected from dust, moisture, and other contamination.



For more information on lubricants, refer to FOS Manual 50 - GENERAL INFORMATION.

Fill the gear cases to the check plug with SAE 90 API-GL5 Gear Lubricant. The capacity of the bevel gear case is 1 U.S. gallon. The capacity of the feed roll drive gear case is 3 U.S. quarts for the sprocket-type and 7 U.S. quarts for the shift-type.

BEVEL GEAR CASE

GENERAL INFORMATION

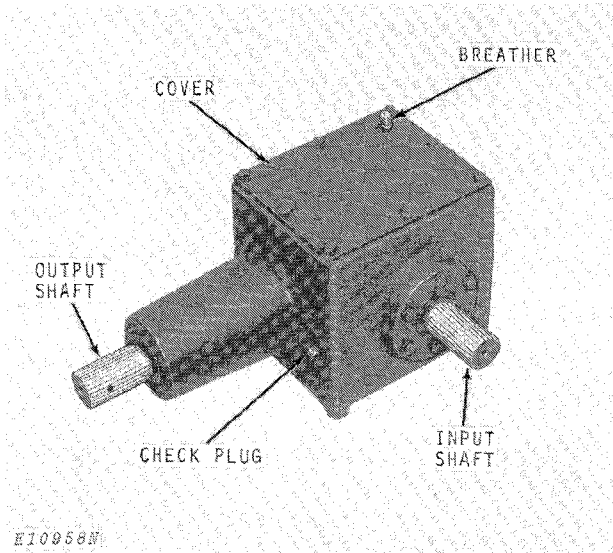


Fig. 1-Bevel Gear Case

The bevel gear case transmits power from the powershaft around a 90° corner to the feed roll gear case.

The input shaft has a bevel gear which drives another bevel gear on the output shaft. The bevel gear case assembly also consists of four bearings and two oil seals.

DIAGNOSING MALFUNCTIONS

FOS Refer to FOS Manual 40 - POWER TRAINS for more information about diagnosing malfunctions of gear cases.

Problem	Possible Cause
Gear Case Noisy	
	Lack of lubricant
	Gears not meshing properly
	Excessive backlash
	Binding of gears
Gear Case Excessively Hot	
	Lack of lubricant
	Binding of gears
	Defective bearings
	Improperly installed bearing caps
End Cap Leaking Oil	
	Defective oil seal
	Too much lubricant in gear case
	End cap hardware not properly torqued.

REMOVAL

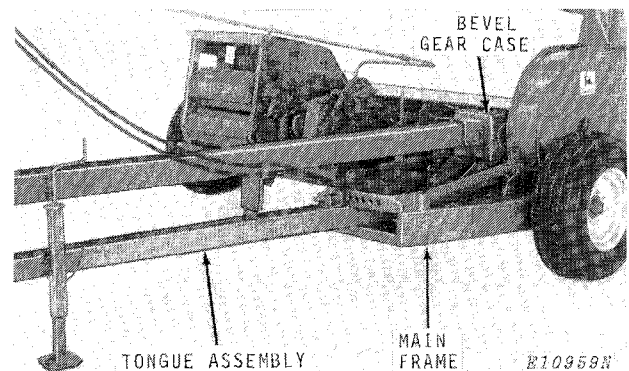


Fig. 2-Removing the Bevel Gear Case

Jack up the harvester under the front of the harvester main frame.

Remove tongue pivot bolt and the two cap screws which secure the powershaft shield. Slide the tongue assembly forward until U-joint on powershaft disengages the input shaft of bevel gear case.

Remove the four cap screws from the bottom of the bevel gear case and remove gear case.

REPAIR

Disassembly

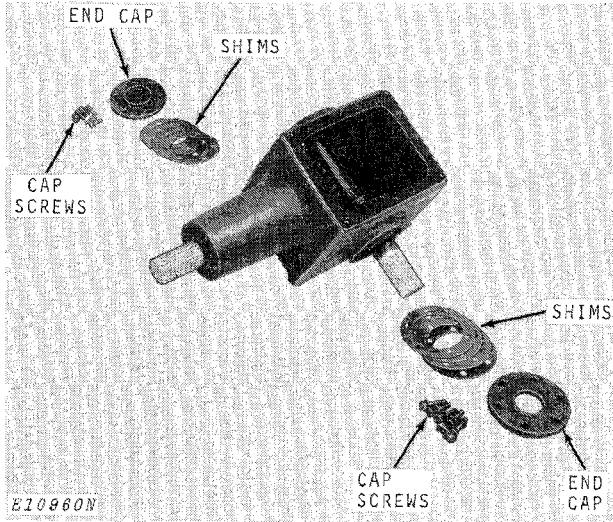


Fig. 3-Removing Input Shaft End Caps

Remove the cover, end caps, and shims. Keep the shims so they can be used to adjust the bevel gear backlash and the rolling torque of the input shaft bearings.

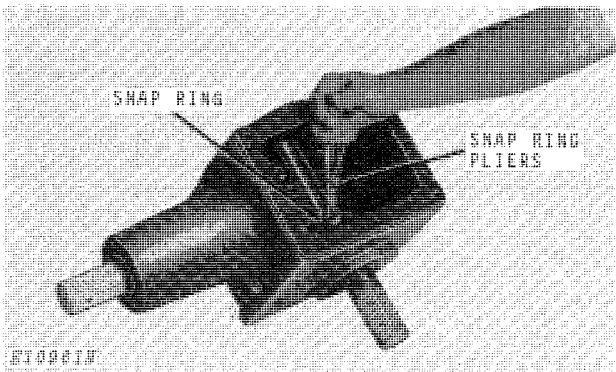


Fig. 4-Removing Input Gear Snap Ring

Remove snap ring which retains the input bevel gear.

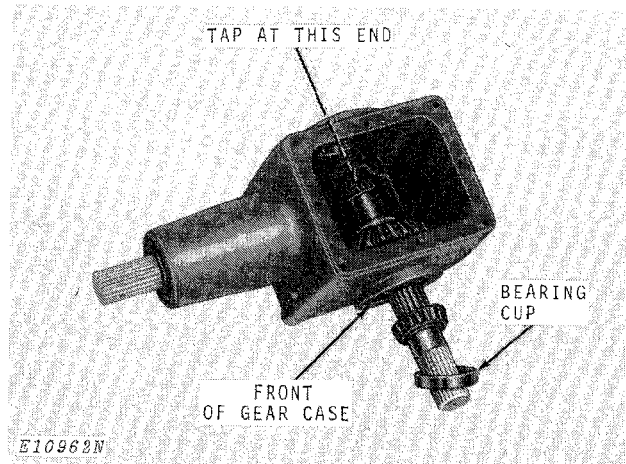


Fig. 5-Moving Input Shaft Outward

Tap the input shaft towards the front of the gear case to unseat the bearing cup.

IMPORTANT: Be careful not to damage the end of the input shaft.

Remove front bearing cup.

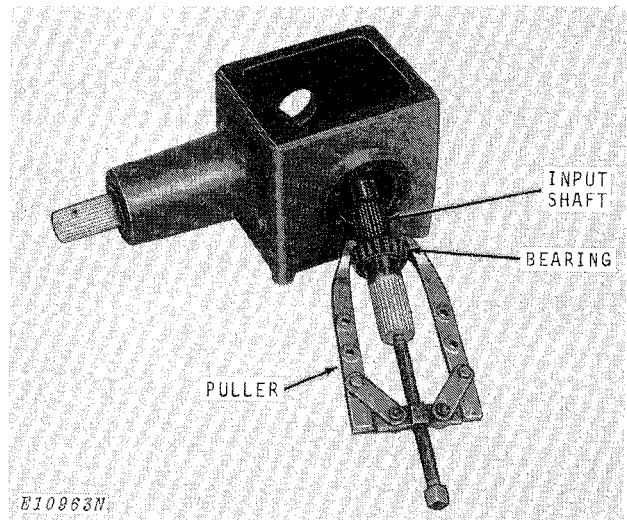


Fig. 6-Removing Front Bearing from Input Shaft

Remove the front bearing from the input shaft with a puller.

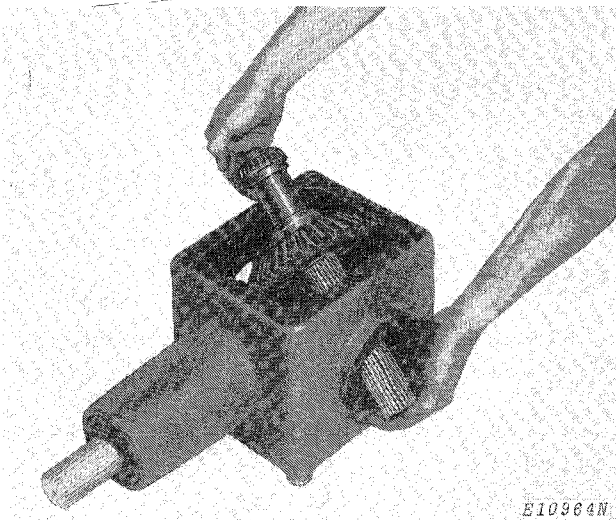


Fig. 7-Removing Input Shaft Assembly From Gear Case

Lift the input shaft assembly out of the gear case through the top opening. The bevel gear may need to be relocated on the shaft to facilitate the removal.

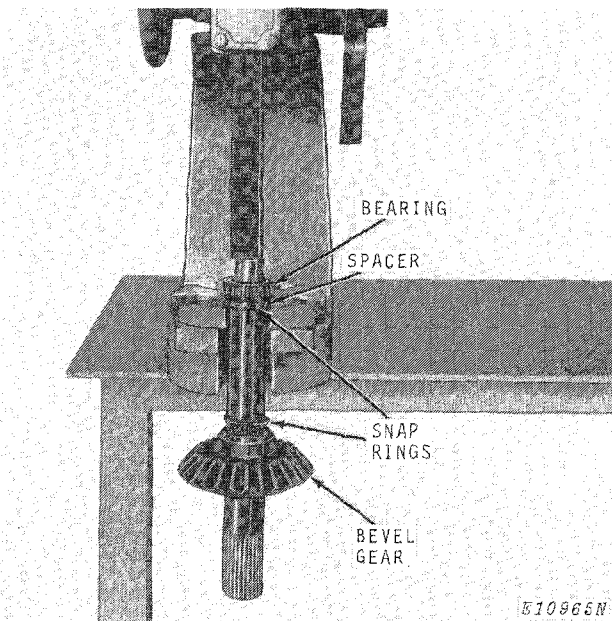


Fig. 8-Removing the Ring Bearing, Spacer, Snap Rings, and Bevel Gear from the Input Shaft

Press the bearing and spacer off the input shaft. Be certain the spacer is against the table of the press.

Remove the two snap rings with snap ring pliers.

Slide the bevel gear off the input shaft.

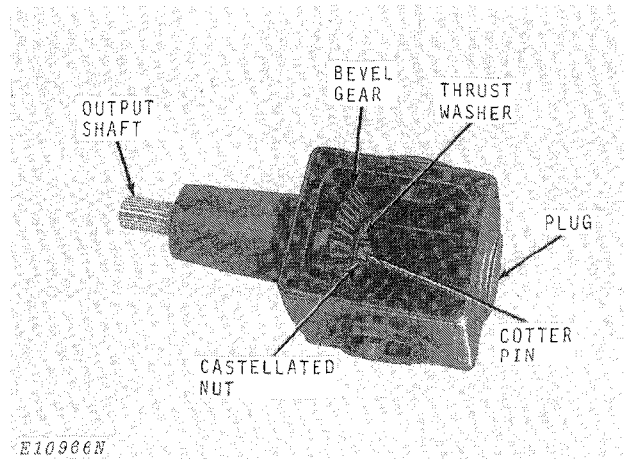


Fig. 9-Removing Cotter Pin, Castellated Nut, Thrust Washer, and Bevel Gear from Output Shaft

Remove cotter pin, castellated nut, thrust washer and bevel gear.

Remove plug from access opening with a hammer. Gently tap the plug from inside the gear case. Be careful not to damage plug because its ability to seal could be affected.

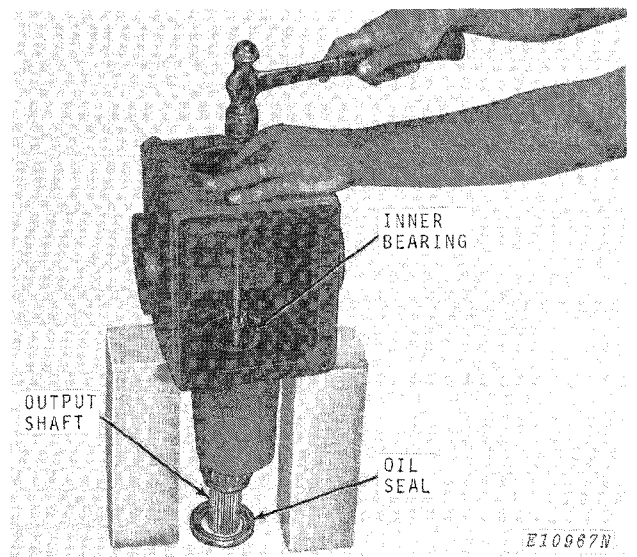


Fig. 10-Removing Output Shaft Assembly, Oil Seal, and Inner Bearing

Press or drive the output shaft assembly out of the gear case. Install the castellated nut to prevent damage to the threads or the shaft.

Remove the inner bearing from gear case.

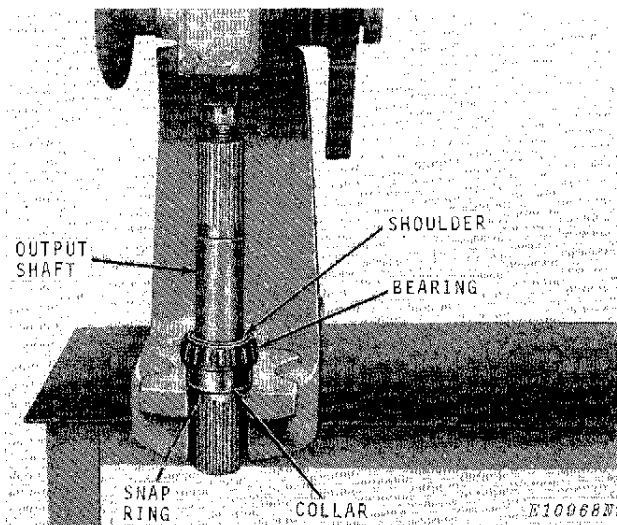


Fig. 11-Backseating the Outer Bearing and Collar on the Output Shaft

Press the bearing and collar back against the shoulder of the shaft. Be careful not to press against the snap ring which is inside the bearing collar.

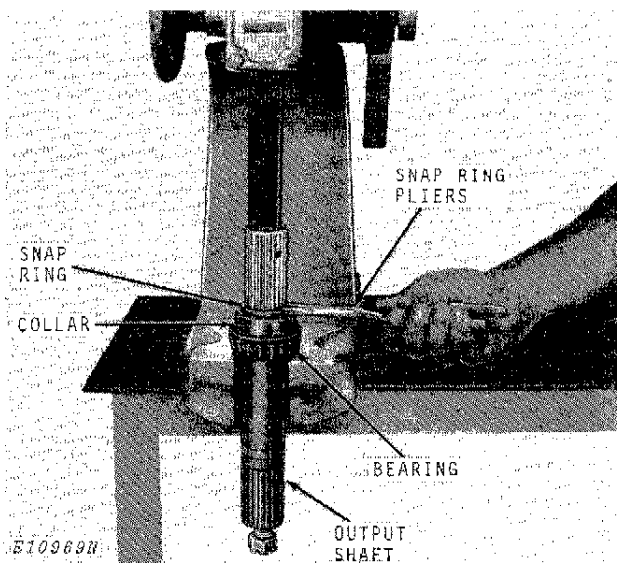


Fig. 12-Removing Snap Ring, Collar, and Bearing From Output Shaft

Remove snap ring with snap ring pliers.

Press bearing and collar off the output shaft. Be careful not to damage the bearing.

Inspection

Wash all parts thoroughly in a clean solvent and dry. Clean all oil out of gear case.

Inspect all parts for wear or damage. Replace if necessary.

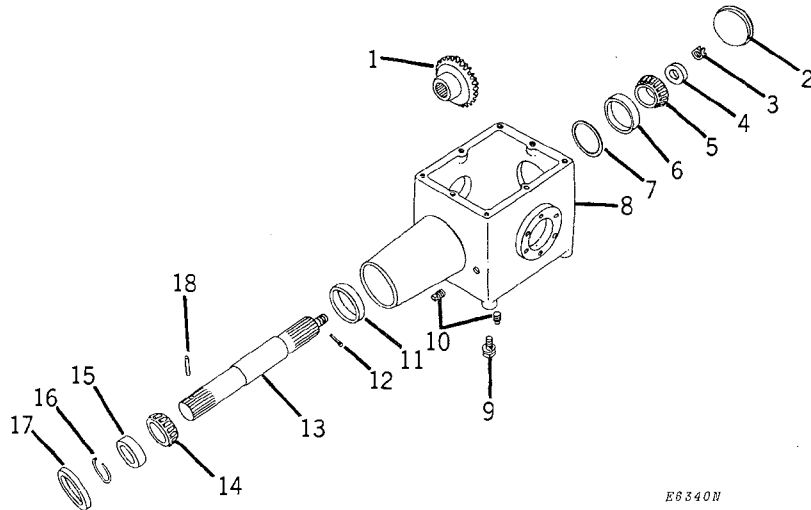
Check the bevel gears for irregular wear patterns, nicks, broken teeth, etc.

Check bearings for roughness. Be certain they rotate freely, and all rollers are in place.

When servicing the bevel gear case, always replace the oil seals.

Assembly

Refer to Figs. 13 and 14 to assemble the bevel gear case. Use Fig. 15 and the procedure directly following this illustration to adjust gear backlash, and bearing preload.



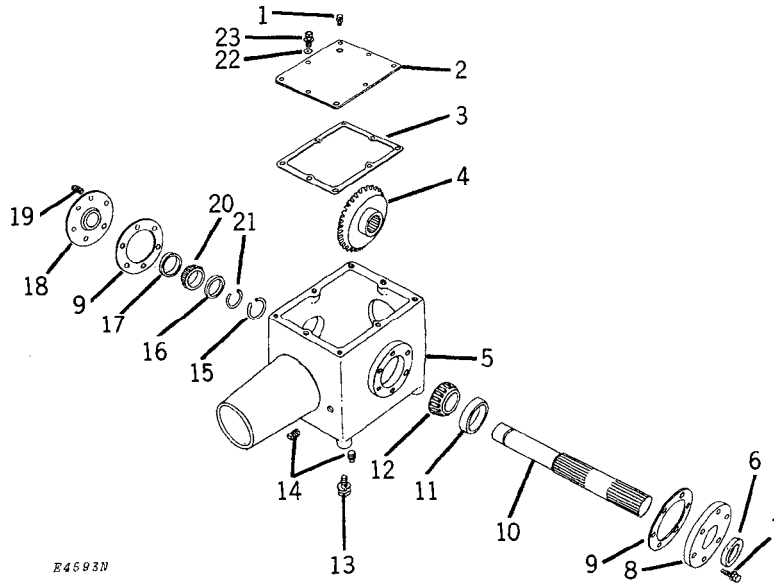
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- 1—Bevel Gear
- 2—Plug
- 3—Slotted Nut
- 4—Washer
- 5—Bearing
- 6—Bearing Cup

- 7—Shim, .005" (use as needed)
- Shim, .020" (use as needed)
- Shim, .0075" (use as needed)
- 8—Gear Case
- 9—Cap Screw (4 used)
- 10—Pipe Plug (2 used)
- 11—Bearing Cup

- 12—Cotter Pin
- 13—Output Shaft
- 14—Bearing
- 15—Seal Adapter
- 16—Retainer Ring
- 17—Seal
- 18—Spring Pin

Fig. 13—Exploded View of Output Shaft



- | | | | |
|----------------|--------------------------------------|-----------------------|-----------------------|
| 1—Relief Valve | 7—Cap Screw and Lock Washer (6 used) | 12—Bearing | 19—Cap Screw (6 used) |
| 2—Case Cover | 8—Front Cap | 13—Cap Screw (4 used) | Lock Washer (8 used) |
| 3—Gasket | 9—Shim, .005" (use as needed) | 14—Pipe Plug (2 used) | 20—Bearing |
| 4—Bevel Gear | Shim, .0075" (use as needed) | 15—Retainer Ring | 21—Snap Ring |
| 5—Gear Case | Shim, .020" (use as needed) | 16—Bearing Spacer | 22—Washer (6 used) |
| 6—Seal | 10—Input Shaft | 17—Bearing Cup | 23—Cap Screw (8 used) |
| | 11—Bearing Cup | 18—Rear Cap | Lock Washer (8 used) |

Fig. 14—Exploded View of Input Shaft

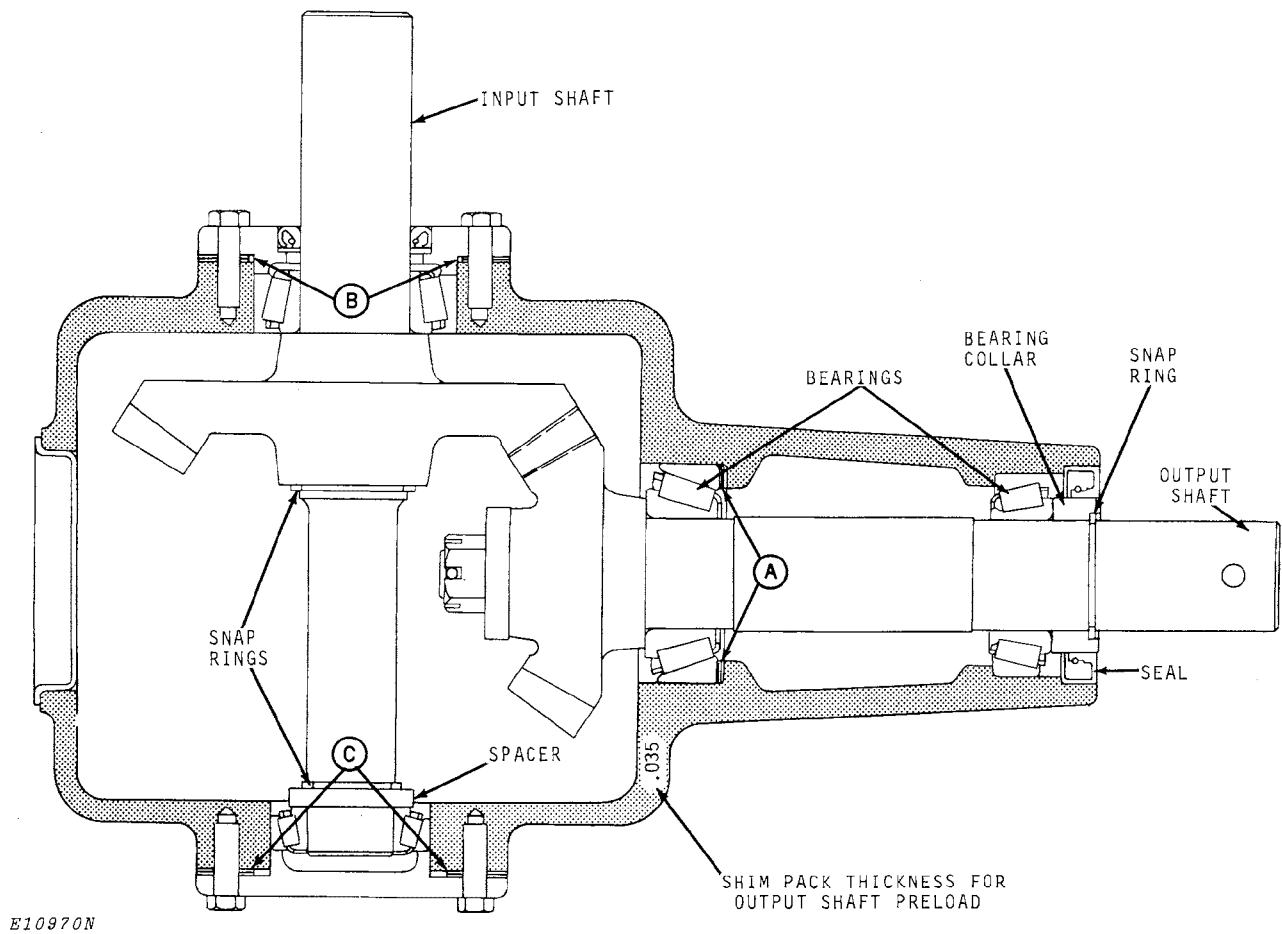


Fig. 15-Adjusting Bevel Gear Backlash and Bearing Preload

Install shim pack "A" of thickness indicated by number etched on machined surface of gear case below cover.

Install output shaft with bearing collar, bearings, snap ring, bevel gear, washer, and castellated nut. Check preload on bearings by tightening the castellated nut until a force of 10 to 20 in-lbs is required to rotate the shaft without seal installed.

Install cotter pin to secure castellated nut.

Install input shaft, bevel gear, snap rings, bearing spacer and bearings.

Install front end cap, less seal. Use shim pack "B" of thickness necessary for .006 to .018 inch backlash between bevel gears. Minimal backlash is preferable.

NOTE: Bearing cup at opposite end of input shaft must be in place to support shaft when checking bevel gear backlash.

Tighten front end cap screws to 35 ft-lbs torque.

Adjust the input shaft bearings preload with shim pack "C" between gear case and rear end cap. Use the proper thickness of shims so the force required to rotate the input shaft is 5 to 10 in-lbs greater when the rear end cap screws are tight than before the cap screws are tightened.

Tighten rear end cap screws to 35 ft-lbs torque.

Install seals with lip facing in. Use seal sleeves to protect the seals from the sharp edges of the splines on the shafts. Lubricate the seal lip.

Fill gear case with SAE 90 API-GL5 Gear Lubricant. The capacity is 1 U.S. gallon.

Install cover and gasket. The breather is located on the left-hand rear corner of the case as it is positioned on the harvester. Tighten cap screws to 20 ft-lbs torque.