

Fig. 5 - Axle Shaft and Oil Seal in Position
(Wide Ring Gear)

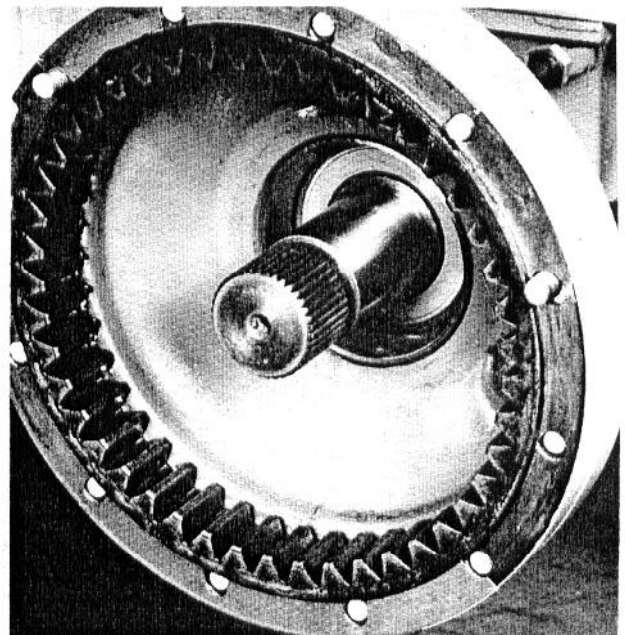


Fig. 6 - Axle Shaft and Oil Seal in Position
(Narrow Ring Gear)

NOTE: Thoroughly clean after using emery cloth. Replace the shaft if the scratches cannot be removed.

3. Examine the oil seal for damage. Replace if damaged, or if excessive leakage indicates a faulty seal.

NOTE: On "Wide Planetary Ring Gear" Models, examine the oil seal drain hole in the axle housing for excessive leakage or obstruction. Refer to Fig. 4.

INSTALLATION

1. Install the axle shaft outer oil seal as follows:

- a. Thoroughly clean the oil seal seat.
- b. Lightly coat the outer edge of the oil seal case with gasket cement.
- c. Turn oil seal so the seal lip faces the axle planetary.

NOTE: On axle housings used with "Wide Ring Gear" planetaries, turn the oil seal drain hole down to align with the drain hole in the axle housing. Refer to Fig. 4.

- d. Carefully press the seal into position.
- e. Remove any excess cement.

2. Carefully insert the axle shaft in the axle housing. See Figs. 1 and 2. Do not damage the oil seal. Figs. 5 and 6 show axle and seal in place.

3. Install the axle planetary assembly as described in that heading. Be certain to check planetary bearing pre-load.

4. Install the wheel and remove all blocks.

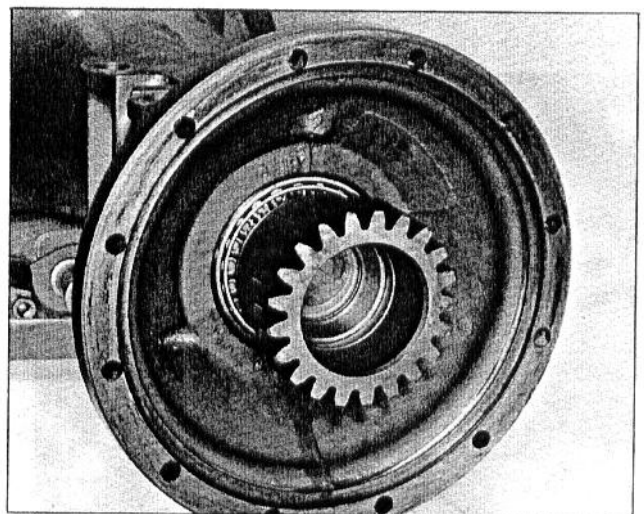


Fig. 6A - "Cup" Axle Shaft in Position
(Narrow Ring Gear - Narrow Drive Cover)

CARRIER PLATE ASSEMBLY—Planetary Type Axle

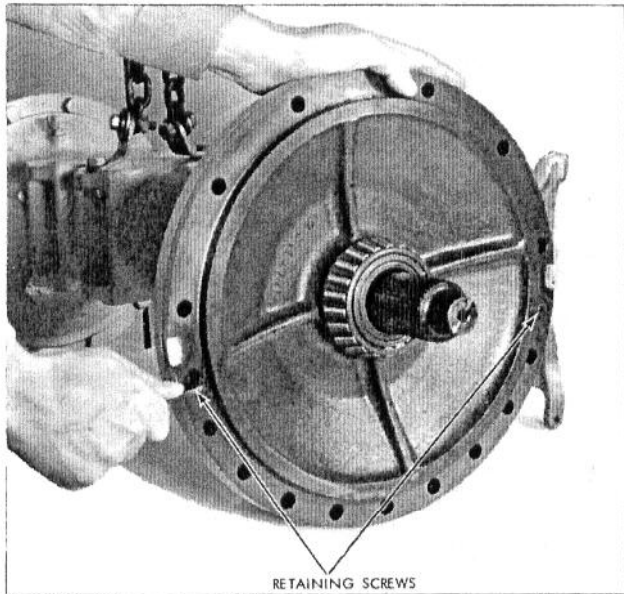


Fig. 7 — Carrier Plate Retaining Screw Removal or Installation

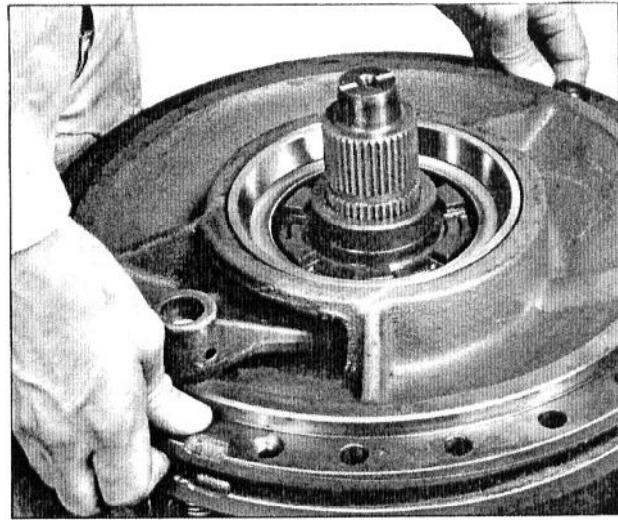


Fig. 9 — Removing or Installing Carrier Plate (Diff. Lock)

REMOVAL AND DISASSEMBLY

1. Remove the 2 Allen-head screws attaching the carrier plate to the axle housing. Refer to Fig. 7.

NOTE: On right-hand axle housing, the pin securing the differential lock actuating fork to the diff. lock shaft must be driven out as shown in Fig. 8.

2. Separate the carrier plate from the axle

housing and carefully lift it from the axle shaft. Avoid damaging the oil seal with the axle shaft splines. See Figs. 9 and 10. Remove the actuating fork and diff. lock coupler from the R. H. carrier plate as shown in Fig. 11, if tractor is so equipped.

3. Remove the inner axle oil seal, if inspection shows that it is damaged or leaking.

4. Remove the differential carrier bearing cone as shown in Fig. 12. (Non-diff. lock.)

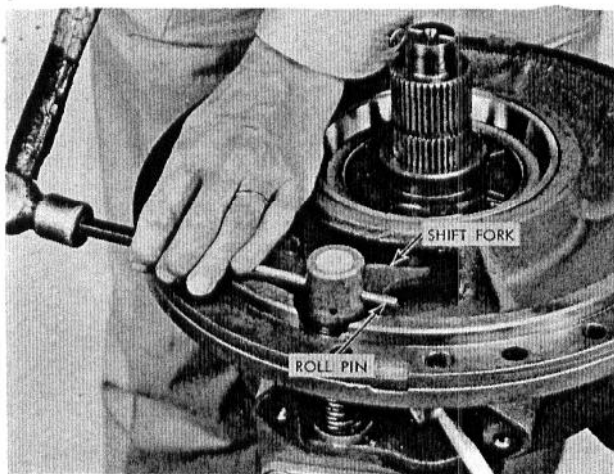


Fig. 8 — Removing Differential Lock Shift Fork Pin

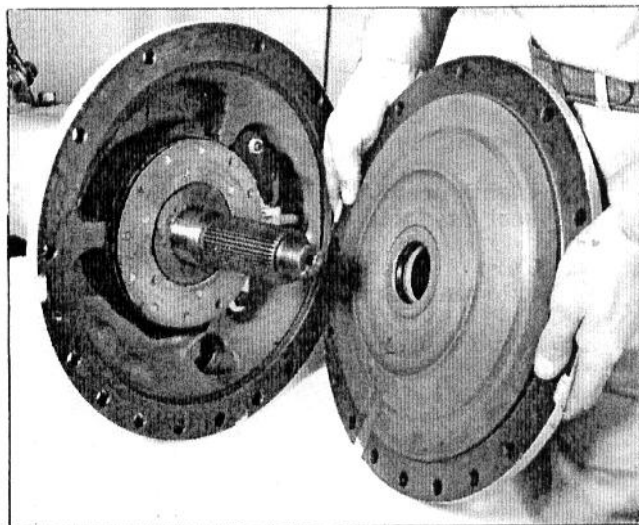


Fig. 10 — Removing or Installing Carrier Plate

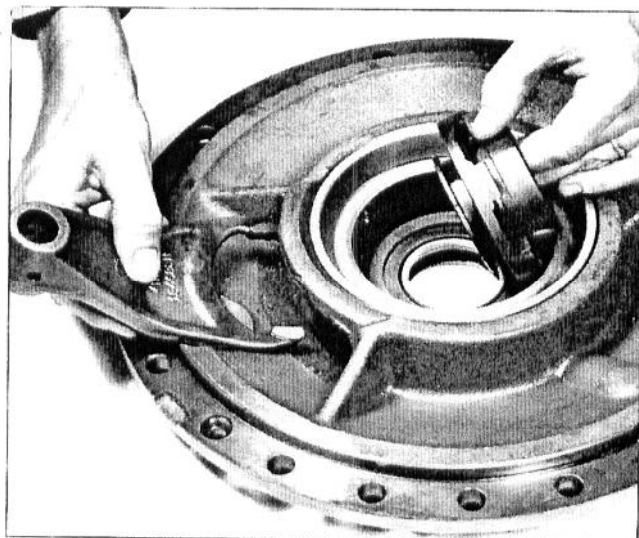


Fig. 11 - Shift Fork and Diff. Lock Coupler Removal or Installation

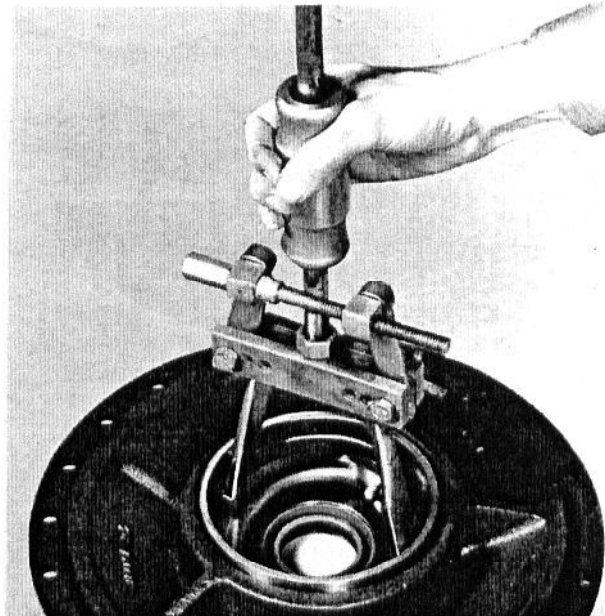


Fig. 13 - Carrier Bearing Cup Removal (Diff. Lock)

5. Right side differential lock models only: Remove the R. H. carrier bearing cup as shown in Fig. 13.

NOTE: The bearing shield must be distorted and forced away from behind the bearing cup to permit fitting of the puller. Refer to Fig. 14.

INSPECTION

1. Examine the carrier bearing for damage or excessive wear. Remove the bearing cup or cone and press the cone into the cup. Rotate the cone within the cup. If roughness or flat

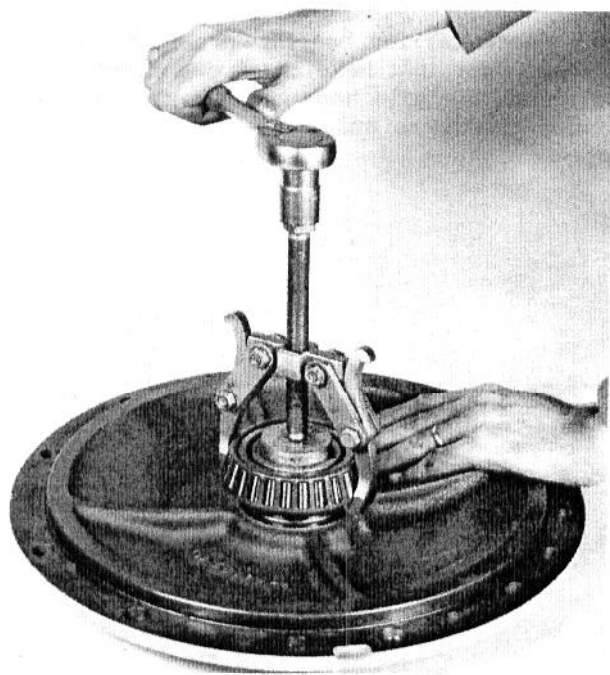


Fig. 12 - Carrier Bearing Cone Removal

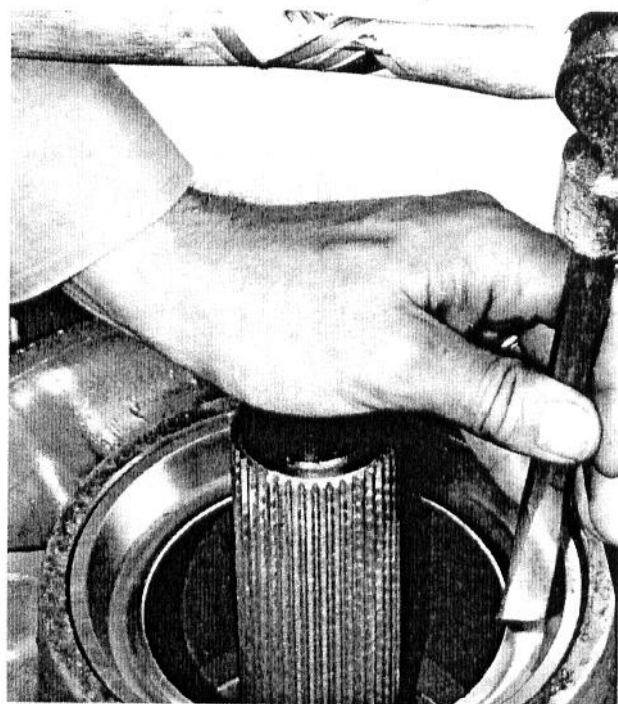


Fig. 14 - Bearing Shield Removal

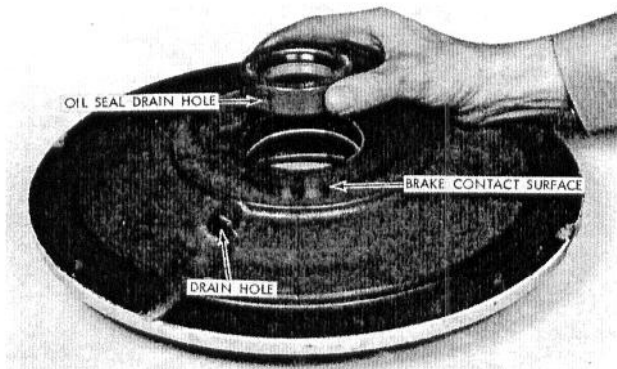


Fig. 15 - Inner Axle Shaft Oil Seal Installation

spots are felt, replace both bearing cone and cup.

2. Examine the carrier plate for warping, cracks, and wear, particularly at the brake contact surface.

3. Examine the oil seal drain hole in the carrier plate and be certain that it is clear. See Fig. 15. If evidence of excessive oil leakage exists, replace the oil seal.

4. Examine the inner axle oil seal for damage or wear. Replace if required.

ASSEMBLY AND INSTALLATION

1. Install the inner axle oil seal. See Fig. 15.

- a. Thoroughly clean the oil seal drain hole and the oil seal seat.

- b. Coat the circumference of the oil seal case with a light coat of gasket cement.
- c. Turn the oil seal so the seal lips will face the center housing.
- d. Align the small hole in the oil seal case with the oil seal drain passage in the carrier plate.
- e. Press the seal in until it is flush with the brake contact surface.

2. *Left side only:* Install the carrier bearing cone with a suitable tool.

NOTE: The R.H. carrier bearing cup or cone and bearing shield, or shim(s), will be installed after carrier bearing pre-load has been determined.

3. Carefully place the carrier plate over the axle shaft (and diff. lock shaft on R.H. side of differential lock models) and align the retaining screw holes. Do not damage the oil seals. Refer to Figs. 9 and 10.

4. *Diff. lock side only:* Install the roll pin holding the shift fork to the shift rod.

5. Install the carrier plate retaining screws and tighten to 15 to 18 ft.-lbs. torque.

6. Check carrier bearing pre-load as described under that heading of this divider tab and install the axle housing assembly as described elsewhere under the specific tractor model.

DIFFERENTIAL LOCK ASSEMBLY—Planetary Type Axle

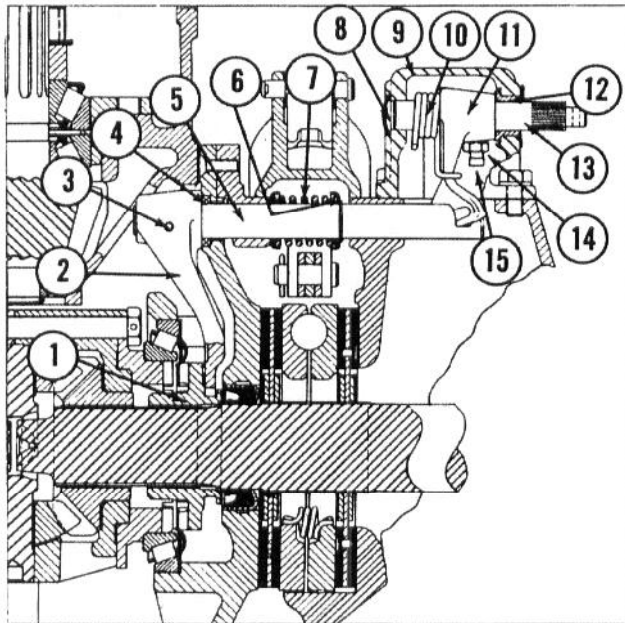


Fig. 16 - Differential Lock Mechanism

- | | |
|-----------------------|---------------------------|
| 1. Diff. Lock Coupler | 8. Cam Housing Plug |
| 2. Shift Fork | 9. Cam Housing |
| 3. Shift Fork Pin | 10. Cam Return Spring |
| 4. Oil Seal | 11. Differential Lock Cam |
| 5. Shaft | 12. Bushing |
| 6. Spring Guides | 13. Arm Shaft |
| 7. Engaging Spring | 14. Cam Screw Nut |
| | 15. Cam Screw |

REMOVAL AND DISASSEMBLY

1. Remove the differential lock coupler and shift fork as follows:

- a. Drive the roll pin from the actuating fork as shown in Fig. 17.

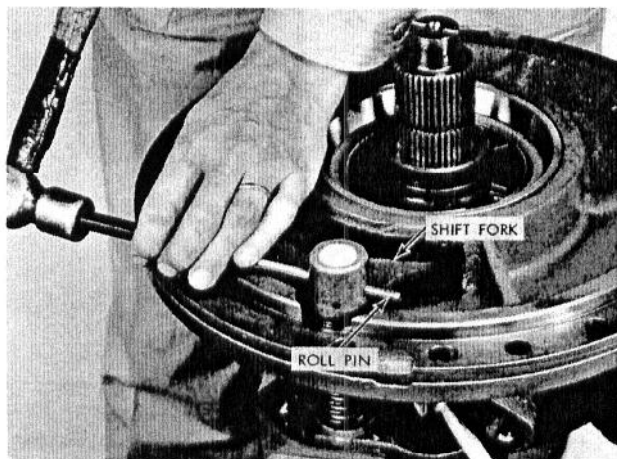


Fig. 17 - Removing Differential Lock Shift Fork Pin



Fig. 18 - Removing or Installing Carrier Plate

- b. Remove the carrier plate as described under that heading. Refer to Fig. 18.

- c. Lift the differential lock coupler and operating fork from the carrier plate, as shown in Fig. 19.

2. Remove the differential lock shaft as follows:

- a. Remove the differential lock coupler

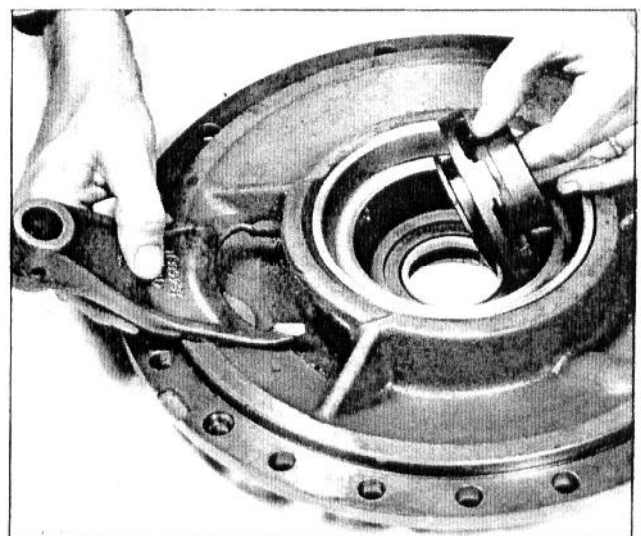


Fig. 19 - Shift Fork and Diff. Lock Coupler Removal or Installation

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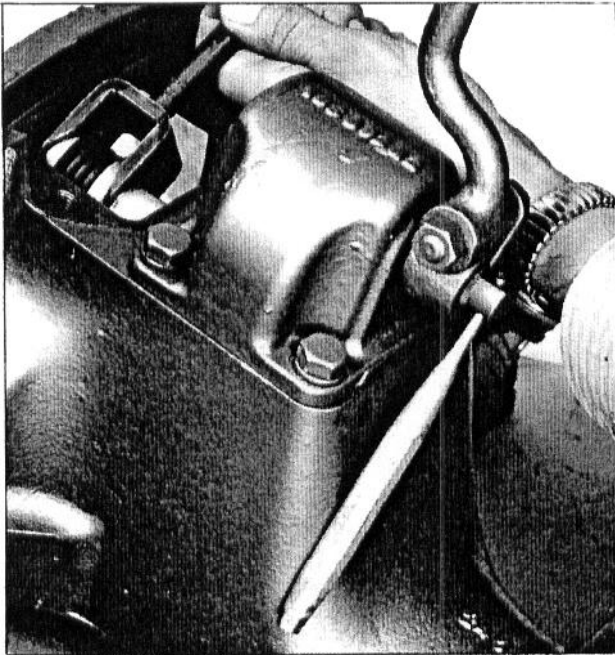


Fig. 20 - Compressing Differential Lock Engaging Spring

and operating fork as described in Step 1.

- b. Move differential lock arm to the engaged position and hold there. Note punch used in Fig. 20.
- c. Tap tool MFN 684A over the spring caps and spring as shown in Fig. 20.

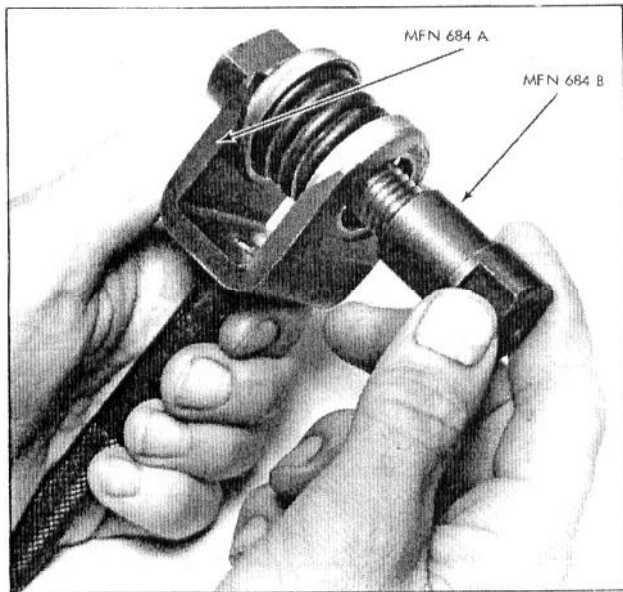


Fig. 22 - Special Tool MFN 684 in Use

- d. Release differential lock arm.
- e. Move the snap ring out of its groove and slide the differential lock shaft out as shown in Fig. 21. Be very careful not to dislodge the spring from the tool.
- f. Fit tool MFN 684B into the spring and

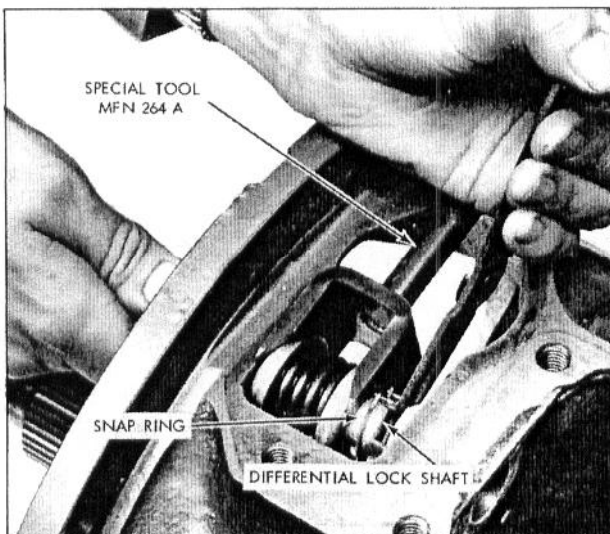


Fig. 21 - Differential Lock Shaft Removal or Installation

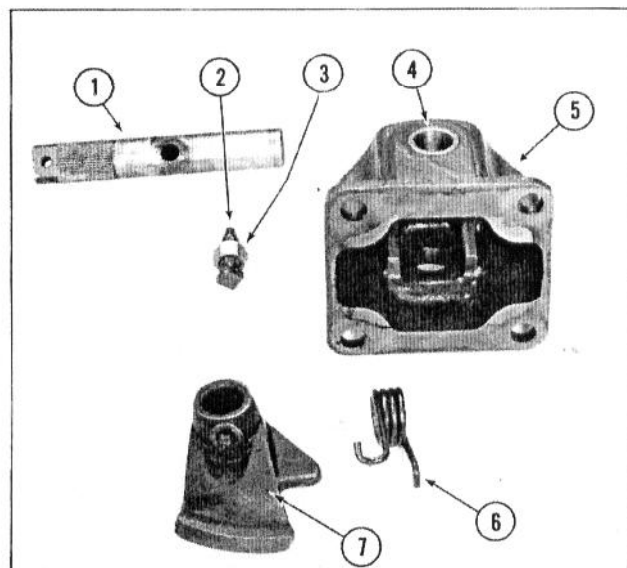


Fig. 23 - Differential Lock Cap Assembly

- | | |
|--------------------------------|----------------------------------|
| 1. Cam Actuating Shaft | 5. Differential Lock Cam Housing |
| 2. Cam Lock Screw | 6. Cam Return Spring |
| 3. Cam Lock Screw Nut | 7. Differential Lock Cam |
| 4. Cam Actuating Shaft Bushing | |

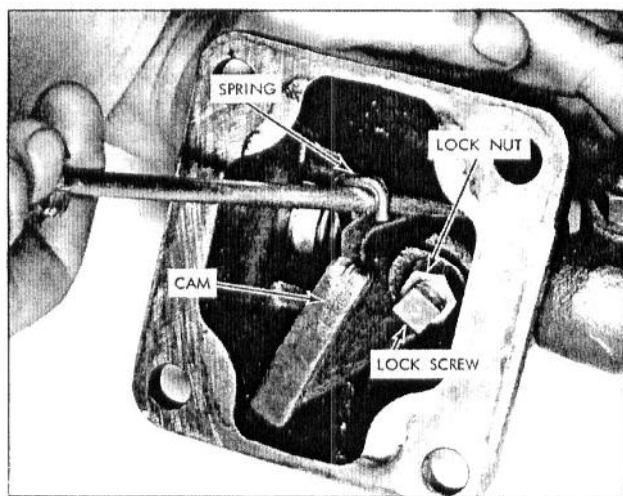


Fig. 24 - Differential Lock Arm Return Spring Removal or Installation

tighten to prevent the spring from releasing. Refer to Fig. 22.

3. Remove and disassemble the differential lock cam and housing assembly as follows:

- a. Remove the 4 capscrews attaching the diff. lock cam housing and lift the housing off.
- b. Release the spring hook from the differential lock cam shoulder as shown in Fig. 24.
- c. Loosen the lock nut and remove the lock screw.
- d. Withdraw the cam actuating shaft from the housing and remove the cam and the spring.
- e. If the shaft bushing is excessively worn, drive the old bushing and the expansion plug out.
- f. Loosen the arm or pedal clamping bolt and remove from the shaft.

4. Remove the diff. lock shaft oil seal from the carrier plate with a suitable puller (if damaged or leaking and requires replacement).

INSPECTION

Examine all parts for damage or excessive wear. Replace the necessary parts.

Check the coupler dogs for breakage. Examine the shift fork for bent or broken fingers and a worn or damaged shaft bore and roll pin hole. Examine the diff. lock shaft for scoring that would cause oil leakage at the shaft seal.

REASSEMBLY

1. Press a new bushing into position in the pedal housing (flange inside).

2. Install a new expansion plug.

3. Install the diff. lock pedal shaft, cam, and spring in the housing. Refer to Fig. 24.

- a. Insert the pedal return spring and cam in the housing and locate as shown in Fig. 24.
- b. Slide the shaft thru the housing, cam, and spring until it contacts the expansion plug.
- c. Withdraw the shaft about 1/8", position the cam against the housing and tighten the lock screw and nut.

NOTE: The lock screw point fits in the depression in the shaft.

- d. Hook the return spring over the cam. Refer to Fig. 24.
- e. Lubricate both sides of the cam, and the bore of the differential lock shaft, with Multi-Purpose Lithium Base Grease.

4. Install the differential lock shaft.

- a. Remove the retaining bolt, (tool MFN 684B) from the shaft return spring.



CAUTION: Be certain that the spring is securely in place in the spring retainer Tool MFN 684A so the spring does not accidentally release and cause injury.

- b. Insert the spring in the axle housing and slide the slotted (or rounded) end thru the axle housing and spring.
- c. Insert snap ring and continue sliding the shaft into position. Refer to Fig. 21.

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d. Position the snap ring in the groove on the shaft.

e. Remove spring retainer Tool MFN 684A.

5. Install a new diff. lock shaft oil seal in the carrier plate.

a. Coat the O.D. of the seal case with gasket cement.

b. Press the seal into place with the seal lips facing inward.

c. Remove excess cement.

d. Fill the seal lips with a good grade of Multi-Purpose Lithium base grease.

6. Install the differential carrier plate. Refer to Figs. 18 and 19.

NOTE: Install the diff. lock coupler and the shift fork in the carrier plate,

then start the diff. lock shaft into the oil seal. Align the shift fork bore with the shaft and work the carrier plate down. Align the roll pin holes in the shift fork and shaft. Install the roll pin. Be careful not to damage the axle shaft and differential lock oil seals.

7. Install the carrier plate retaining screws and tighten to 15 to 18 ft.-lbs. torque.

8. Install the diff. lock housing assembly on the axle housing as follows (if axle housing installation permits):

a. Install a housing assembly gasket.

b. Install the diff. lock housing and insert and tighten the 4 retaining cap-screws to 50 to 55 ft.-lbs. torque.

NOTE: When a differential lock shaft with a slotted end is used, be certain that the cam fits into the shaft slot when assembling.

AXLE PLANETARY ASSEMBLY—"Wide Ring Gear" (1.404"/1.409")

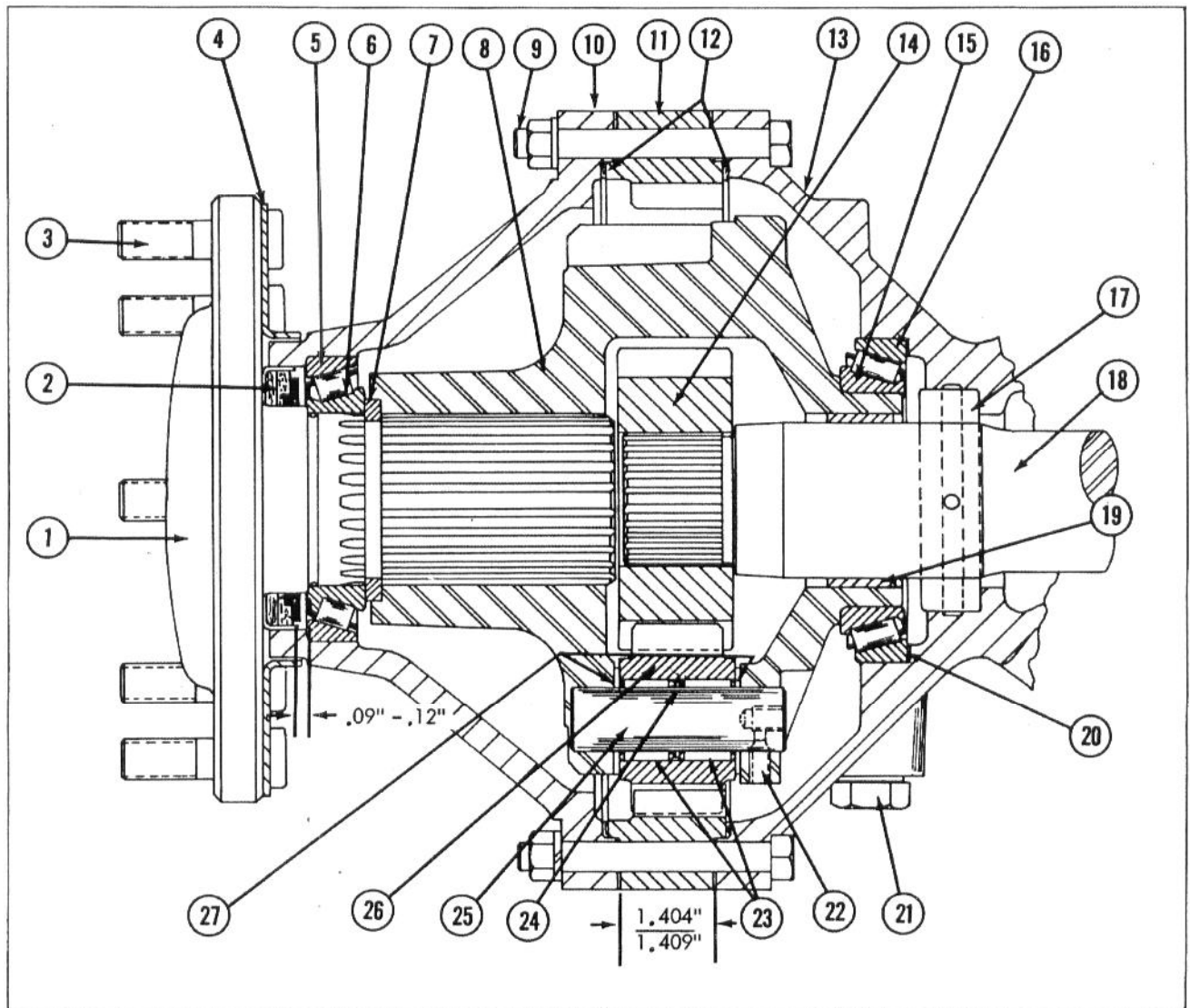


Fig. 25 - Axle Planetary Assembly - Wide Ring Gear

- | | | |
|--|------------------------------------|---|
| 1. Wheel Axle | 10. Drive Axle Cover | 19. Planetary Carrier Bushing |
| 2. Drive Cover Oil Seal | 11. Planetary Ring Gear | 20. Planetary Carrier Bearing Cup Shim(s) |
| 3. Wheel Bolt | 12. Planetary Ring Gear Gaskets | 21. Oil Filler Plug |
| 4. Dust Shield | 13. Axle Housing | 22. Pinion Shaft Retaining Screw |
| 5. Wheel Axle Bearing Cup | 14. Sun Gear | 23. Needle Bearing Rollers |
| 6. Wheel Axle Bearing Cone | 15. Planetary Carrier Bearing Cone | 24. Spacer Washer |
| 7. Bearing Support Split Ring | 16. Planetary Carrier Bearing Cup | 25. Planetary Pinion Shaft |
| 8. Planetary Carrier | 17. Main Axle Shaft Outer Oil Seal | 26. Planetary Pinion |
| 9. Planetary Assembly Retaining Bolt, Nut and Washer | 18. Main Axle Shaft | 27. Thrust Washers |

Most axle housings used with "Wide Ring Gear" type planetary assemblies are 5-5/8" deep at the fender mounting pads. Axle housings with casting numbers 894 773 M1 and 894 774 M1 are 5-1/8" deep at the fender mounting pads.

REMOVAL

Before removal, examine the assembly for

oil leakage from the wheel axle oil seal, the ring gear seals and from the outer, main axle shaft seal. If main axle shaft seal leakage is present, it will appear from a drain hole in the bottom of the axle housing beneath the oil seal. Refer to "Disassembly" and "Inspection" headings and replace the necessary parts.

1. Raise the axle housing, remove the wheel and block the axle housing securely.

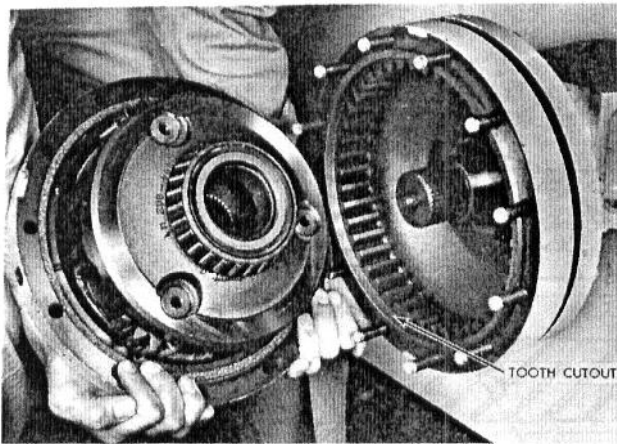


Fig. 26 - Removing Axle Planetary Assembly

2. Remove the drain plug and drain the axle planetary case. Remove, or loosen the filler plug to break the air lock in the case.

3. Remove the retaining nuts and lift the planetary assembly from the axle housing as shown in Fig. 26.

4. Remove the ring gear and the ring gear gaskets.

5. Remove the inner axle planetary carrier bearing cup from the axle housing as shown in Fig. 27. If shims located behind the cup are not damaged, save them for possible use when pre-loading and reinstalling the planetary assembly.

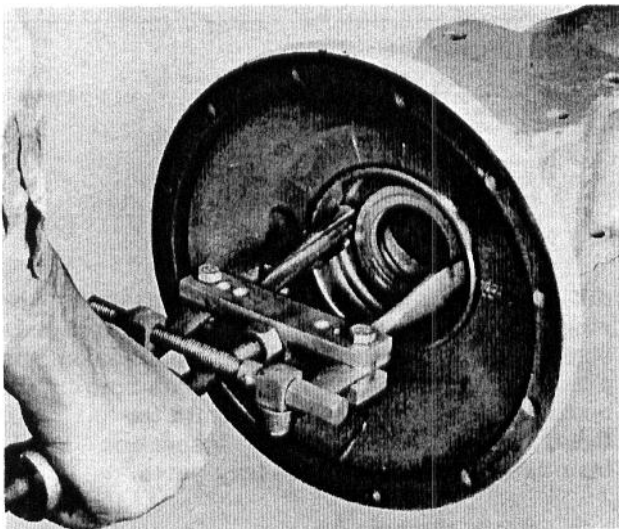


Fig. 27 - Removing Inner Axle Planetary Carrier Bearing

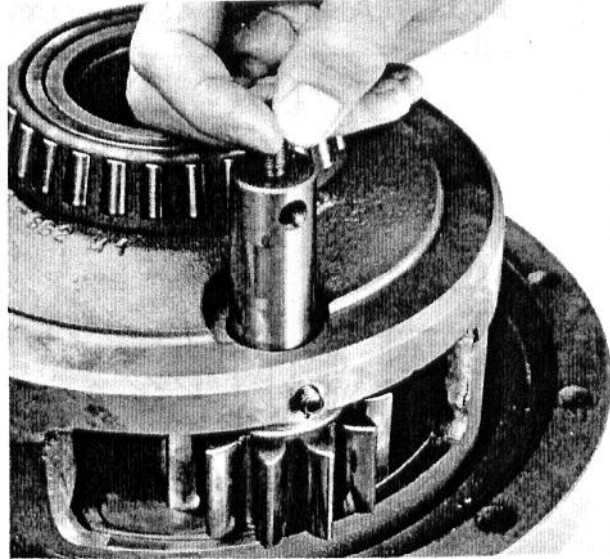


Fig. 28 - Planetary Pinion Shaft Removal or Installation

DISASSEMBLY

1. Remove the axle planetary as described in "Axle Planetary Assembly Removal". See Fig. 26.

2. Remove the planetary gear from the largest opening in the planetary carrier. Refer to Fig. 28.

- a. Remove the Allen-head setscrew that retains the pinion shaft.

NOTE: The retaining screws are fixed in place with "Loctite" in addition to staking.

- b. Lift out the pinion shaft with the aid of a 3/8" UNF capscrew.
- c. Slide the top thrust washer out first, then the pinion and lower thrust washer.

NOTE: There are 58 loose needle bearings in each pinion, separated into two paths by a spacer washer.

3. Remove the sun gear.

4. Slide the nut, special tool MFN 265, thru the opening in the top of the planetary carrier, insert the forcing screw, MFN 764-3, and turn in until the ball end is snug in the center of the wheel axle. Refer to Figs. 29 and 30.



Fig. 29 - Special Tool MFN 265 and MFN 764-3
Installation or Removal

5. Force the planetary carrier from the axle by turning the forcing screw in with a suitable wrench.

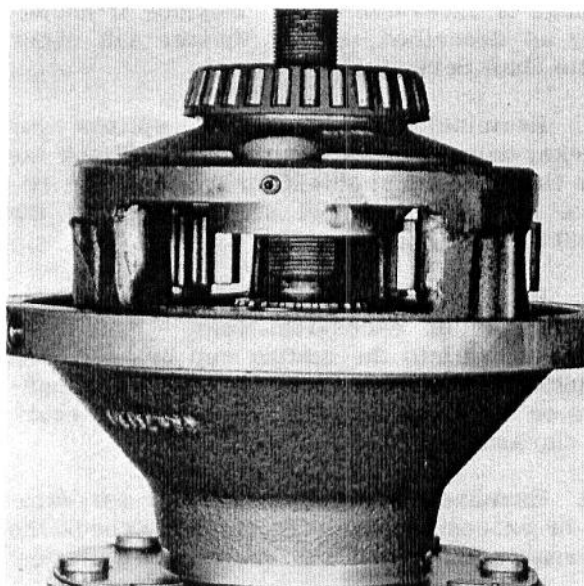


Fig. 30 - Special Tool MFN 265 and MFN 764.3 in Position

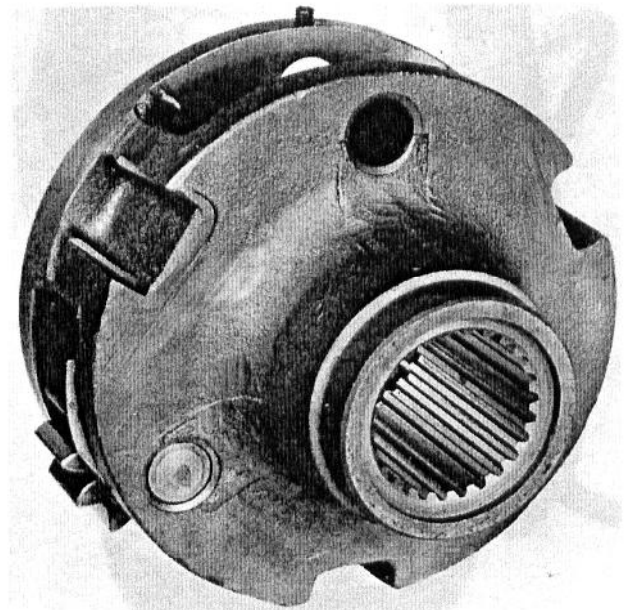


Fig. 31 - Planetary Carrier

NOTE: It is necessary to secure the wheel axle to prevent it from moving while turning the forcing screw.

Lift the carrier from the axle and remove the forcing screw and nut. See Fig. 31.

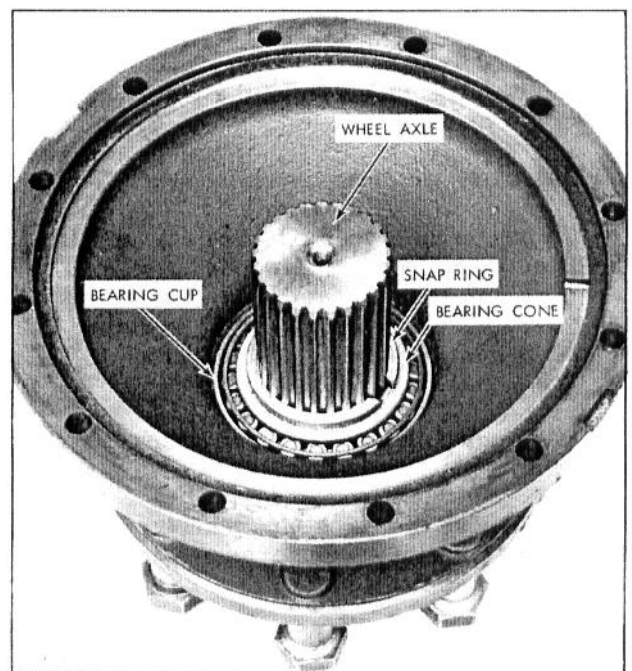


Fig. 32 - Drive Cover and Axle Assembly

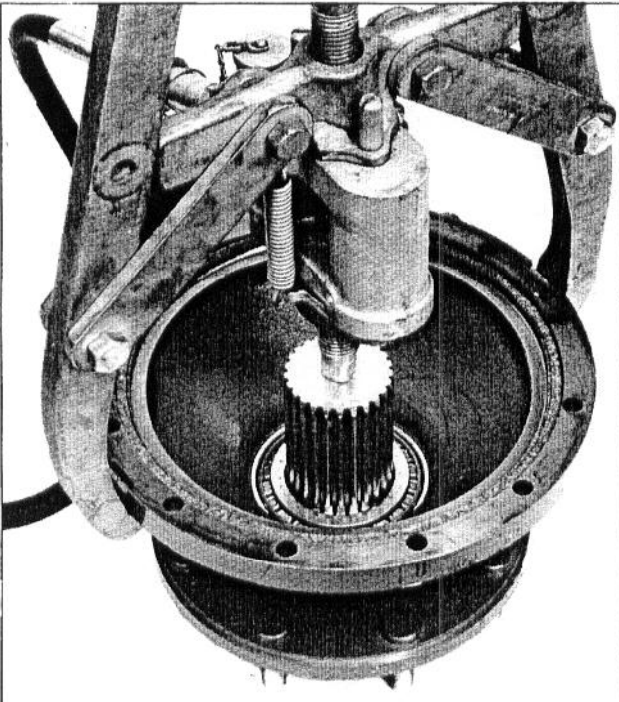


Fig. 33 - Removing Drive Cover and Axle Bearing Cone

6. Remove the split ring, (or snap ring) from the wheel axle groove. Refer to Fig. 32.

NOTE: Some models made use of a 1-piece snap ring; most models utilize a 2-piece split ring.

7. Pull the wheel axle bearing and planetary assembly drive cover from the wheel axle as shown in Fig. 33.

8. Remove the drive cover oil seal.

9. Remove the wheel axle bearing cup from the drive axle cover.

NOTE: The oil seal must be removed first to allow access to the outside of the bearing cup.

10. Remove the planetary carrier bearing cone with a suitable puller.

11. Remove the remaining planetary pinions from the planetary carriers previously described in Step 2. Refer to Fig. 28.

12. Remove the carrier bushing if inspection shows it is excessively worn. Refer to Fig. 34.

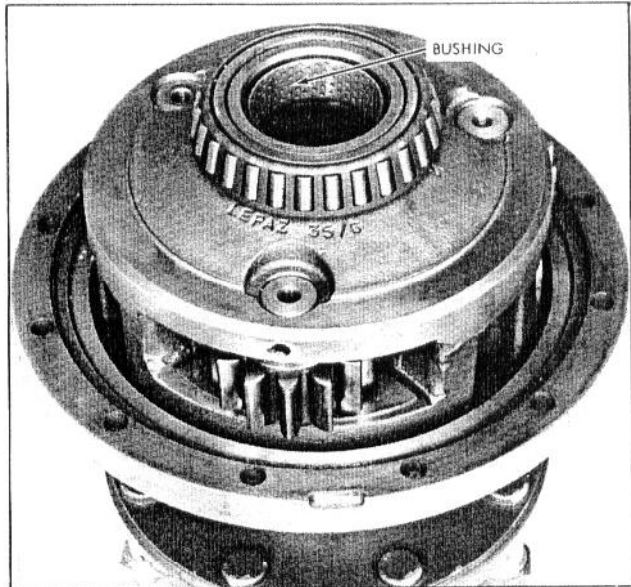


Fig. 34 - Axle Planetary Assembly

INSPECTION

1. Clean all parts in a suitable solvent and dry thoroughly.

2. Examine the ring gear, sun gear and planetary pinion for damage or excessive wear. Replace any or all gears if required.

NOTE: Replace planetary pinions in sets of 3.

3. Examine the main axle shaft splines for damage or excessive wear. Replace if necessary as described in this divider tab under "Axle Shaft Servicing".

4. Examine the wheel axle splines for cracks, damage or excessive wear. Check the axle flange and dust shield for warping and replace any broken wheel studs. Replace the wheel axle if necessary.

5. Examine the planetary carrier bearing for damage or excessive wear. Press the bearing cone into the mating cup by hand, and maintaining pressure, turn the cone. If roughness or flat spots are felt, replace both bearing cup and cone.

6. Examine the planetary carrier for damage or excessive wear. Particularly check the internal splines and the pinion shaft bores.

7. Examine the planetary carrier bushing

for damage or excessive wear. Replace if necessary.

8. Examine the oil seal drain hole in the bottom of axle housing to see if it is plugged or if excessive leakage indicates a faulty oil seal. Clean the drain hole, taking care not to damage the oil seal. Replace the oil seal if necessary.

REASSEMBLY

1. Be sure that all parts are clean and dry.
2. Install the wheel axle bearing cup in the drive axle cover with a suitable tool.
3. Carefully install a *new* drive cover oil seal as follows:
 - a. Lightly coat the outside edge of the seal case with gasket cement before installation.
 - b. Locate the seal on the drive axle cover with the open side of the seal facing in and the felt dust seal to the outside.
 - c. Install the seal so that its inside edge is from .09" to .12" from the outside edge of the bearing cup. Refer to Fig. 25.
 - d. Coat the seal lips and fill the cavity between the lips with a good grade of Multi-Purpose Lithium Base Grease, N. L. G. I. No. 2.
4. Carefully place the drive cover assembly over the axle shaft. Do not damage the oil seal.
5. Press the wheel axle bearing into place. Be *certain* that it is fully seated.
6. Install a split ring of the proper thickness in the wheel axle groove. Refer to Fig. 35. The ring may be selectively fitted, using the thickest that will fit the groove, or determined as follows, using the original snap ring:

NOTE: Some models used a 1-piece ring. Most models and Parts use a split ring.

- a. Install a snap ring or split ring segment in the wheel axle groove.
- b. Determine the clearance between the

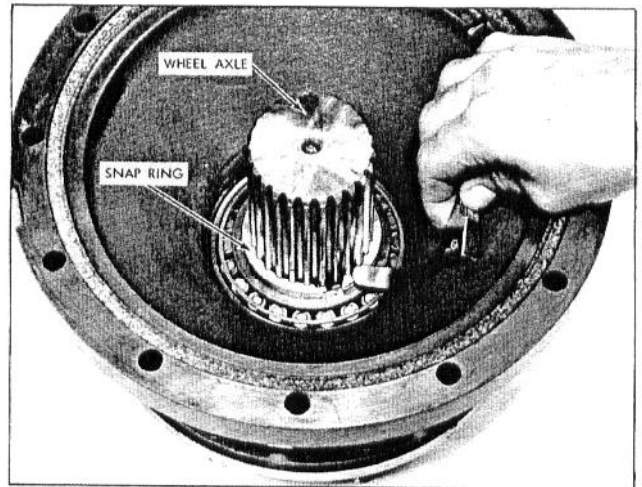


Fig. 35 - Measuring Gap Between Wheel Axle and Snap Ring

- ring and the wheel axle groove with a feeler gauge as shown in Fig. 35.
- c. Remove the ring and measure its thickness with a micrometer.
- d. Add the thickness of the ring to the thickness of the feeler gauge determined in Step b. This distance is the gap between the bearing and the edge of the wheel axle groove.
- e. Find the gap determined in Step 6d under "Gap" in the Wheel Axle Retaining Ring Table.
- f. Select the split ring from the Table and install. The ring number is etched on each segment.

NOTE: Always install split ring segments of the same thickness.

WHEEL AXLE RETAINING RING TABLE	
If Gap is:	Use Ring No.
.232" - .234"	0
.234" - .236"	1
.236" - .238"	2
.238" - .240"	3
.240" - .242"	4
.242" - .244"	5
.244" - .246"	6
.246" - .248"	7
.248" - .250"	8

7. Press the planetary carrier into position on the wheel axle with a suitable press of at least 20 tons capacity.

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NOTE: The counterbore of Planetary Pinion Carrier number 894 862 M1 may have a narrow, spring ring fitted to reduce the radial float of the wheel axle retaining ring. Use the spring ring that is .200"/.220" wide with retaining ring numbers 0, 1 and 2. Use a spring ring .230"/.236" wide with retaining ring number 3, 4, 5, 6, 7 and 8.

The spring ring must always be narrower than the width of the retaining ring used. This allows proper seating of the retaining ring against the planetary carrier.

Do not use a spring ring on 894 862 M2 planetary carrier. An attempt to do so will prevent seating of the planetary carrier over the retaining ring.

- a. Align the splines and start the carrier onto the axle.
- b. Using a press, force the planetary carrier into contact with the axle retaining ring. The inner end of the wheel axle will protrude about 1/8 of an inch from the inside of the planetary carrier when in position. Fig. 30, shows location before pulling.

NOTE: Be careful not to dislodge the split ring from the wheel axle groove when pressing the planetary carrier into position.

8. Install the planetary carrier bearing cone with a suitable press. Be certain that the bearing cone is fully seated.

9. Install the planetary carrier bushing with a suitable press. The bushing is prefinished and should have an I. D. of 2.3775" to 2.3823" when installed.

10. Install the sun gear in the planetary carrier.

11. Install each of the planetary pinions as follows:

- a. Place the 58 loose needle bearings in the pinion in 2 rows of 29 bearings separated by a washer. Use petroleum jelly to hold them in position.
- b. Place the planetary pinion, with needle bearings in place, on the lower thrust

washer and slide into position in the planetary carrier. Insert the top thrust washer.

NOTE: The two large thrust washers must be installed in the large opening in the planetary carrier.

- c. Clean the pinion shaft retaining screw and the retaining screw hole with a non-petroleum base solvent in preparation for installing the retaining screw.
- d. Coat the retaining screw with a locking sealant such as "Loctite" grade EV (purple).
- e. Insert the planetary pinion shaft in the carrier and thru the pinion with the aid of a 3/8 UNF cap screw screwed into the end of the shaft. Refer to Fig. 28.
- f. Align the recess in the pinion shaft with the pinion shaft retaining screw.
- g. Install the screw and tighten to 10 to 13 ft.-lbs. torque.
- h. Stake the edge of the retaining screw hole with a blunted chisel.

12. Install a new main axle shaft outer oil seal as follows (if required as determined during inspection):

- a. Clean the oil seal drain hole and the oil seal seat.
- b. Lightly coat the outer edge of the oil seal case with gasket cement.
- c. Turn the oil seal so the lips (closed side) face the axle planetary.
- d. Align the small drain hole in the seal with the drain hole in the axle housing.
- e. Press the oil seal into position.
- f. Remove any excess cement.

13. Using tool MFN 267Y determine the shims necessary to pre-load the planetary carrier bearings to .006" to .016". See the paragraph "Planetary Bearing Pre-Load Adjustment" for procedures.

14. Install the axle planetary assembly, as described under that heading.

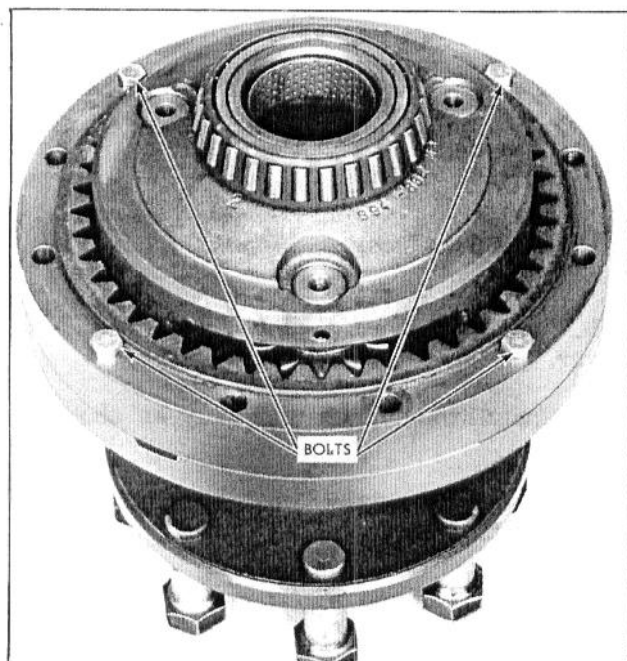


Fig. 36 - Axle Planetary with Ring Gear Attached for Pre-Load Adjustment

AXLE PLANETARY CARRIER BEARING PRE-LOAD ADJUSTMENT— Wide Ring Gear

Axle planetary carrier bearing pre-load must be checked, and adjusted if necessary, whenever the axle planetary assembly is removed. Shims are installed behind the inner planetary carrier bearing cup to arrive at the correct pre-load of .006" to .016". Set tool MFN 267Y on a firm, level surface. Be sure that the bearing seat in the tool is clean, and will allow the carrier bearing to fit easily. The larger of the two seats, without the adapter ring, will be used for this planetary.

1. Remove the axle planetary assembly as described in that heading.

2. Remove the ring gear and both ring gear gaskets. Clean the gasket and ring gear mating surfaces.

3. Securely fasten the ring gear to the planetary drive cover with 4 equally spaced bolts and tighten to 50 to 55 ft.-lbs. torque. Refer to Fig. 36.

4. Place the bearing cup in position on Tool MFN 267Y as shown in Fig. 37. Leave all shims out.

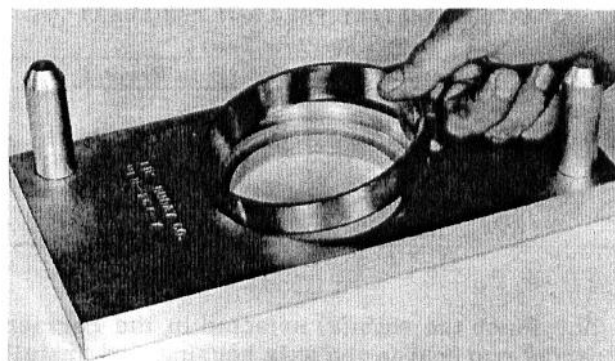


Fig. 37 - Placing Bearing Cup in Special Tool MFN 267-Y

5. Turn the planetary assembly over and seat the bearing cone in the cup as shown in Fig. 38. Rotate the assembly back and forth to center the bearing.

6. Insert a feeler gauge between each gauge post and the ring gear and measure the gap as shown in Fig. 38. Use the same thickness feeler gauge in both positions.

7. Find the gap, measured in Step 6, in the following Chart and select the correct shim(s). Shims are available in .005", .010" and .015" thickness.

8. Lift the axle planetary assembly from the tool and remove the 4 bolts holding the ring gear to assembly.

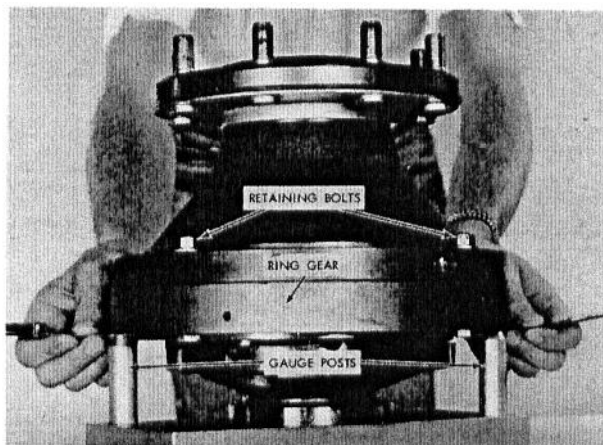


Fig. 38 - Measuring Gap between Ring Gear and Gauge Post

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AXLE PLANETARY PRE-LOAD SHIM CHART (Wide Ring Gear Type)	
Gap Measured	Shims Required
.001" - .005"	.030"
.006" - .010"	.025"
.011" - .015"	.020"
.016" - .020"	.015"
.021" - .025"	.010"
.026" - .030"	.005"
.031" - .035"	None

9. Place the shim(s) selected in the carrier bearing cup seat in the axle housing and install the bearing cup.

10. Complete the installation of the planetary assembly as described under that heading.

INSTALLATION

1. Adjust the planetary carrier bearing pre-load as described under that heading.

2. Install the carrier bearing cup, (if not previously done) with the proper pre-load shims behind it, in the axle housing. Be certain that the cup is fully seated.

3. Install a ring gear gasket in the axle housing.

4. Install the ring gear on the axle housing and insert the retaining bolts. Refer to Fig. 26.

NOTE: The cut-out (shoulder) portion of the ring gear teeth must face the outside.

5. Install a ring gear gasket in the drive cover.

6. Install the carrier assembly as shown in Fig. 26.

7. Install the retaining nuts and tighten to 50 to 55 ft.-lbs. torque.

8. Install and tighten the drain plug.

9. Fill the planetary case to the filler plug level with M-1129 or M-1129A lubricant. Capacity is approximately 1 quart.

10. Install the wheel and remove the blocking and jack.

**AXLE PLANETARY ASSEMBLY—Narrow
Ring Gear (1.034"/1.029") (W/Wide Drive Cover)**

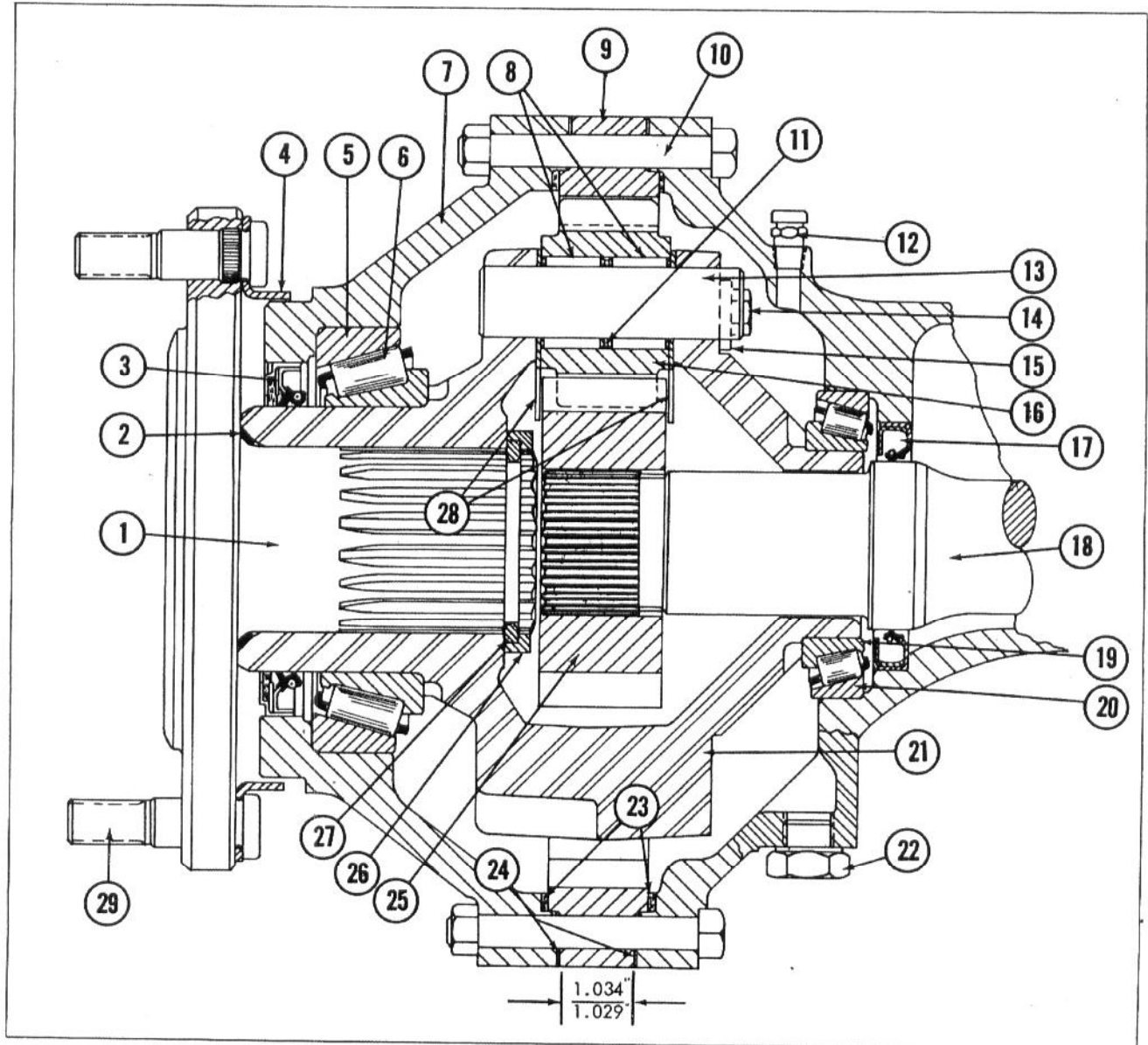


Fig. 39 - Axle Planetary Assembly - Narrow Ring Gear

- | | | | |
|---|--------------------------------------|--|-------------------------|
| 1. Wheel Axle | 8. Needle Roller Bearings (loose) | 14. Retaining Plate Capscrew | 22. Fill Plug |
| 2. Axle "O"-Ring | 9. Planetary Ring Gear | 15. Pinion Shaft Retaining Plate | 23. Ring Gear Gaskets |
| 3. Planetary Carrier Oil Seal | 10. Retaining Bolt, Nut and Washer | 16. Planetary Pinion | 24. Shim(s) |
| 4. Dust Shield | 11. Needle Bearing Spacer | 17. Main Axle Shaft Outer Oil Seal | 25. Sun Gear |
| 5. Outer Planetary Carrier Bearing Cup | 12. Breather (Shown Out of Position) | 18. Main Axle Shaft | 26. Split Ring Retainer |
| 6. Outer Planetary Carrier Bearing Cone | 13. Planetary Pinion Shaft | 19. Inner Planetary Carrier Bearing Cone | 27. Split Ring |
| 7. Planetary Drive Cover | | 20. Inner Planetary Carrier Bearing Cup | 28. Thrust Washers |
| | | 21. Planetary Carrier | 29. Wheel Bolts |

This heading covers the "Narrow Ring Gear" type axle planetary with a wide drive cover. This type is the same as installed with axle planetary kit 1004 M91.

Axle housings used with this planetary as-

sembly are 5-1/8" deep at the fender mounting pads.

REMOVAL

Before removal, examine the assembly for

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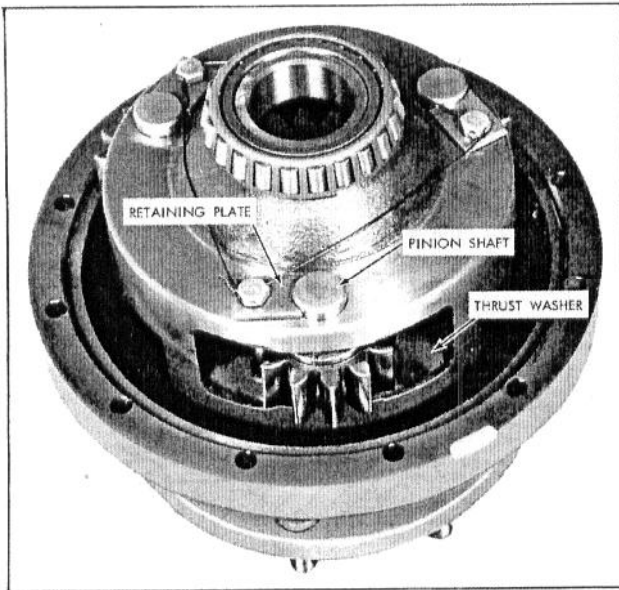


Fig. 40 - Axle Planetary Assembly - Narrow Ring Gear

oil leakage from the wheel axle oil seal and the ring gear seals. Refer to "Disassembly" and "Inspection" headings and replace the necessary parts.

1. Raise the axle housing, remove the wheel and *block the axle housing securely*.
2. Remove the planetary assembly retaining nuts. Partially remove the planetary assembly and allow the oil to drain.
3. Lift the assembly from the axle housing.
4. Remove the planetary ring gear, retaining bolts and shims.

DISASSEMBLY

1. Remove the axle planetary carrier bearing cup located in the axle housing (if not previously done).
2. Remove the planetary pinion from the large opening of the planetary carrier. Refer to Fig. 40.
 - a. Remove the locking wire.
 - b. Remove the pinion shaft retainer bolt.
 - c. Lift out the pinion shaft, with the pinion shaft retaining plate.
 - d. Remove the planetary pinion and thrust washers with the loose needle bearings.

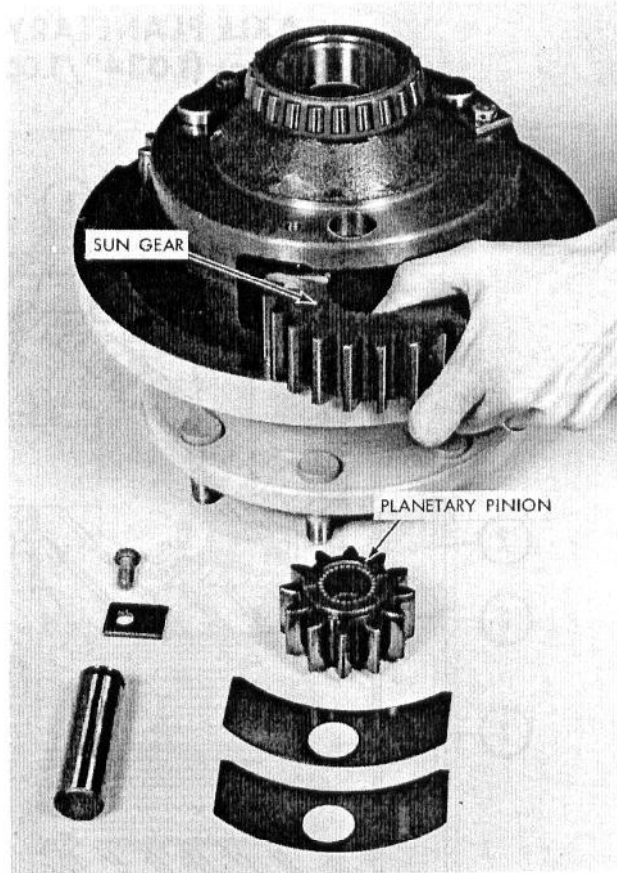


Fig. 41 - Sun Gear Removal or Installation

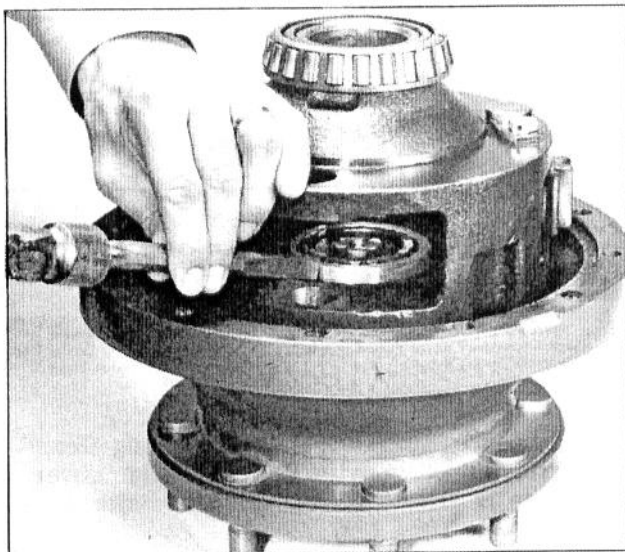


Fig. 42 - Retaining Ring Removal

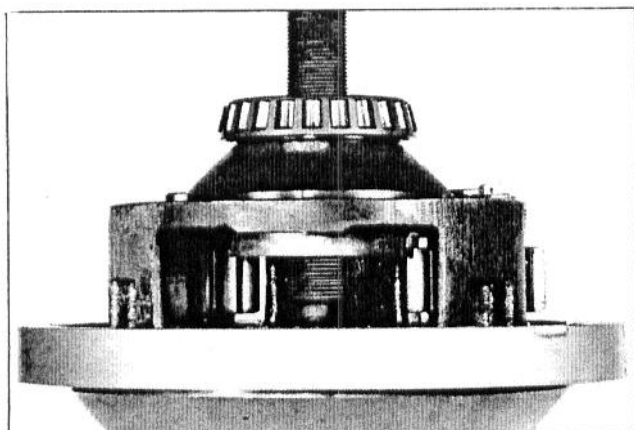


Fig. 43 - Planetary Carrier Puller Setup

NOTE: There are 58 loose needle bearings in each pinion, separated into two paths by a spacer washer.

3. Remove the sun gear through the large opening. See Fig. 41.

4. Remove the shrunk-on ring with a chisel, as shown in Fig. 42.

5. Remove the retaining ring (2 segments).

6. Press the wheel axle from the planetary carrier using Special Tool MFN 265 with MFN 764-3 forcing screw. Refer to Fig. 43.

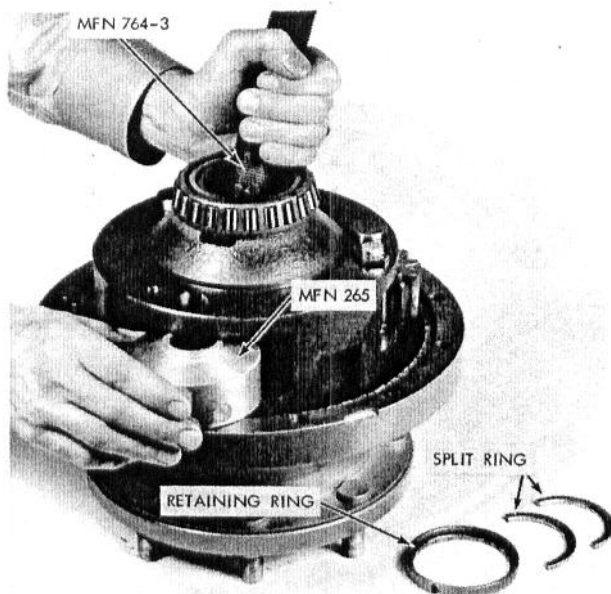


Fig. 44 - Planetary Carrier Puller MFN 265Y & MFN 764-3 Installation or Removal

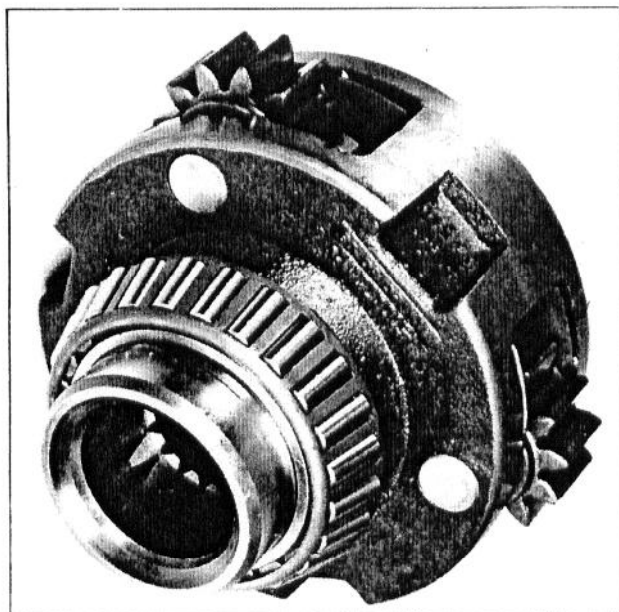


Fig. 45 - Planetary Carrier

NOTE: It is necessary to secure the wheel axle to prevent it from moving while turning the forcing screw.

- a. Slide the nut, MFN 265, thru the opening in the planetary carrier. Refer to Fig. 44.
 - b. Start the forcing screw MFN 764-3 in MFN 265 and turn until the nut is evenly centered in the carrier and the ball is positioned in the axle center.
 - c. Insert a stay rod in the nut to prevent the nut from turning.
 - d. Turn the forcing screw until the axle is forced from the carrier.
 - e. Lift the carrier from the axle and remove the forcing screw and nut.
7. Remove the inner planetary carrier bearing cone with a suitable puller.
 8. Remove the outer planetary carrier bearing cone with a suitable puller. See Fig. 46.
 9. Remove the two remaining planetary pinions, as described under Step 2.
 10. Remove the planetary carrier oil seal from the drive cover with a suitable puller. Refer to Fig. 47.

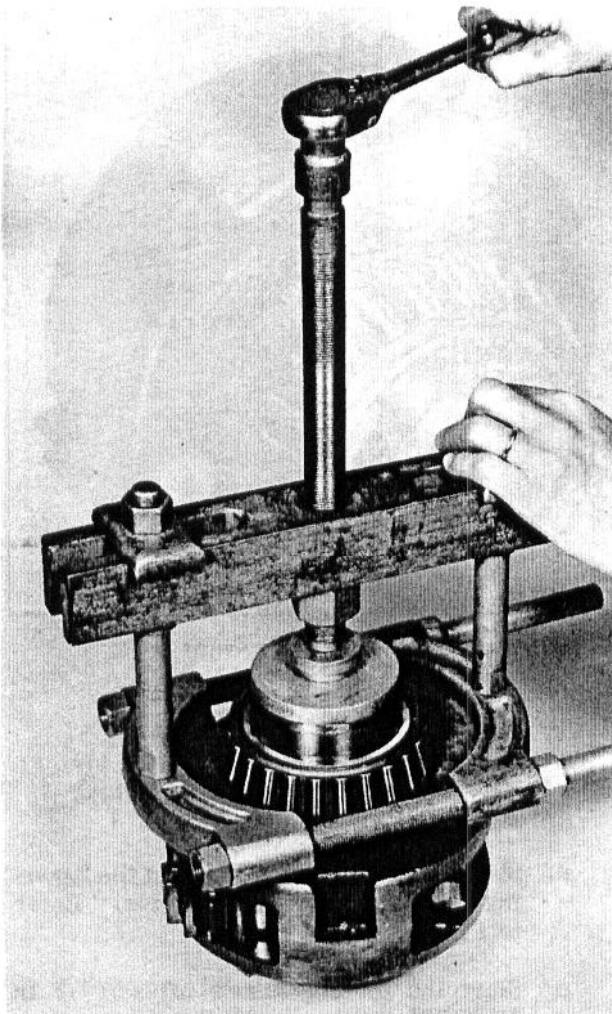


Fig. 46 - Removing Outer Planetary Carrier Bearing Cone

11. Remove the outer planetary bearing cup with a suitable puller. Refer to Fig. 48.

INSPECTION

1. Examine the bearing cones and cups for wear or damage. Press the cone into the mating cup and rotate while applying pressure. If any flat spots or roughness are felt, replace *both* bearing cup and cone.

2. Examine the sun gear and planetary gears for damage or excessive wear. Replace if necessary.

NOTE: Replace planetary gears in sets of 3.

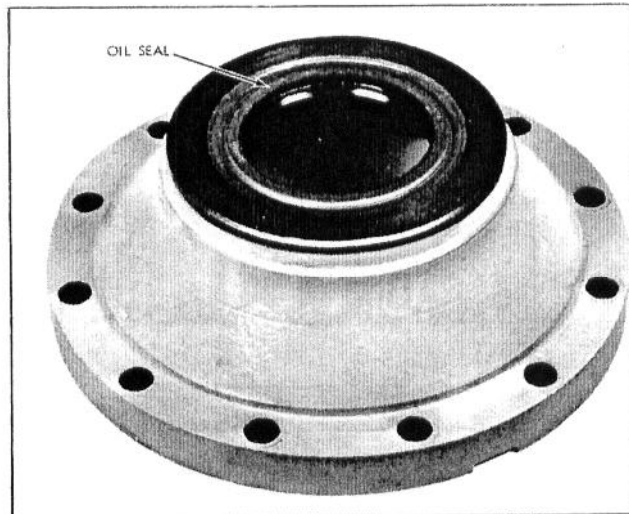


Fig. 47 - Planetary Carrier Oil Seal Location

3. Examine the planetary ring gear for damage or excessive wear. Replace if necessary.

NOTE: If there is extensive gear tooth damage or wear, replace all gears.

4. Examine the axle shaft for damage or excessive wear. Replace if necessary.

5. Check the planetary outer case for cracks and dented flanges. Replace if necessary.

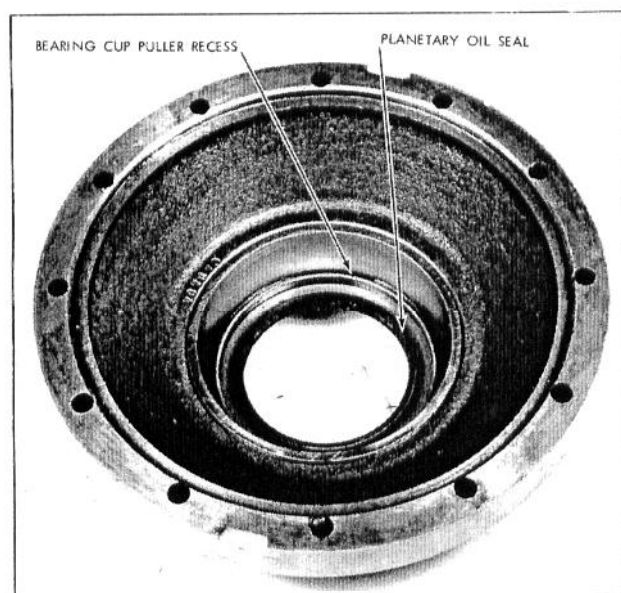


Fig. 48 - Drive Cover with Oil Seal and Bearing Cup in Position

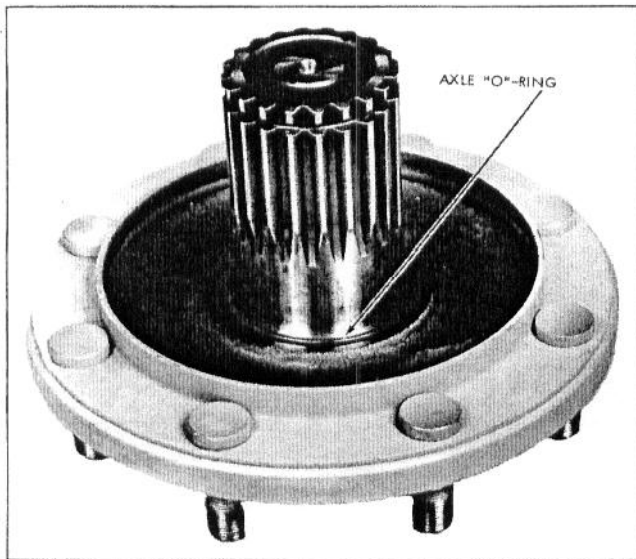


Fig. 49 - "O"-Ring Position

6. Inspect the wheel bolts for breakage and stripped or damaged threads. Replace if necessary.

REASSEMBLY

1. Install a new, or serviceable, outer planetary bearing cup in the outer case.

2. Install a *new* planetary carrier oil seal. Refer to Fig. 47. Press the seal in until it is flush with the outer edge of the drive cover. Seals must face planetary.

3. Place the "O"-ring seal on the wheel axle. See Fig. 49.

4. Install the outer axle planetary carrier bearing cone on the planetary carrier.

5. Carefully place the outer case over the planetary carrier. Do not damage the outer seal when fitting it over the planetary hub.

6. Press the wheel axle into the planetary carrier far enough to install the split ring. Install the ring. See Fig. 50.

7. Install the retaining ring over the axle shaft and split ring as follows:

- a. Heat the ring. *Do not exceed 700° F.* (gun metal color). Use a temperature indicating material such as "Tempilstix" to determine.

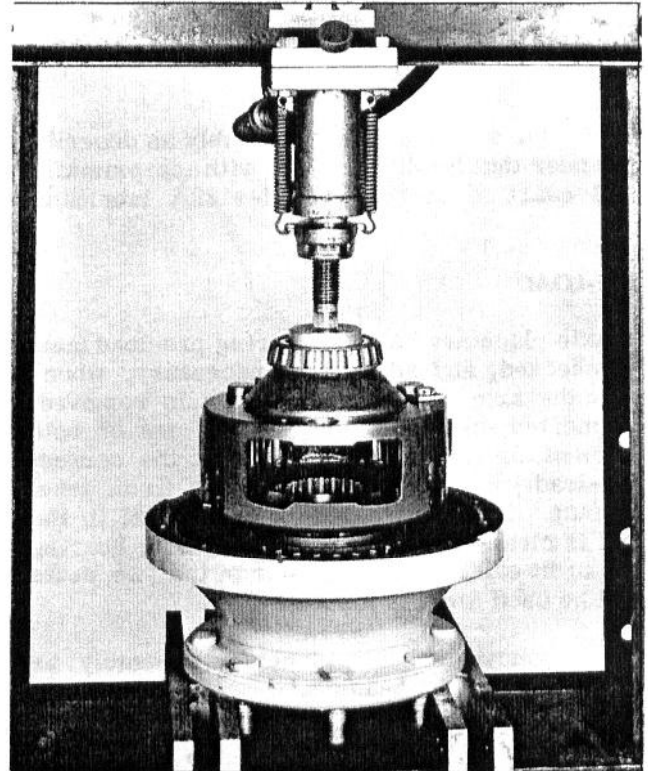


Fig. 50 - Pressing Planetary Carrier onto Wheel Axle

b. Place the ring over the end of the axle shaft and the segmented ring. Be sure that it is fully seated.

c. Allow to cool.

d. Install a new, or serviceable, bearing cone on the inner end of the planetary carrier.

NOTE: If a new bearing cone is installed, be sure that the mating cup is also replaced.

8. Install the sun gear.

9. Install the planetary gears.

NOTE: In each gear there are 2 rows of loose needle bearings separated by a washer. There are 29 rollers in each row. Use petroleum jelly to hold them in position during assembly.

- a. Insert the pinion shaft in each gear and install the shaft retainer.

10. Install and tighten the retainer bolts to 30 to 35 ft.-lbs. torque. Install the lock wire.

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11. Adjust the axle planetary carrier bearing pre-load to .005" to .012" as described under that heading.

12. Install the carrier assembly as described under that heading and fill with approximately 1 quart of M-1129 or M-1129A lubricant.

PRE-LOAD

Axle planetary carrier bearing pre-load must be checked, and adjusted if necessary, whenever the axle planetary assembly is removed. Segmented shims are installed on one or both sides of the ring gear to arrive at the correct pre-load. Set tool MFN 267Y on a firm, level surface. Be sure that the bearing seat in the tool is clean, and will allow the carrier bearing cup to fit easily. The smaller of the two seats will be used for this planetary.

1. Remove the axle planetary assembly as described in that heading.

2. Remove the ring gear and both ring gear gaskets. Clean the gasket and ring gear mating surfaces.

3. Remove all shims from the ring gear, drive cover and axle housing.

4. Fit the ring gear to the drive cover and fasten in place with 4 equally spaced bolts. Tighten the bolts to 50 to 55 ft.-lbs. torque (no shims in place).

5. Remove the inner planetary carrier bearing cup from the axle housing.

6. Fit the bearing cup into the small seat in tool MFN 267Y. **BE CERTAIN THAT IT IS FULLY SEATED.**

7. Turn the planetary assembly over and seat the bearing cone in the cup as shown in Fig. 51.

NOTE: This figure shows a different planetary, but the procedure is similar.

Rotate the assembly to center the bearing.

8. Insert a feeler gauge between each gauge post and the ring gear and measure the gap. Use the same thickness feeler gauge in both positions. See Fig. 51. This gap should be from .005" thru .007" for proper bearing pre-load.

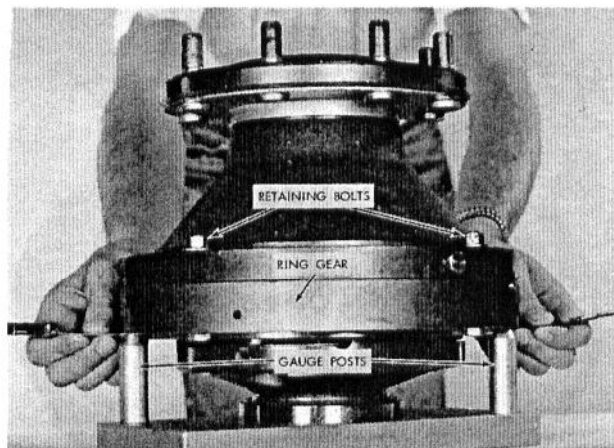


Fig. 51 - Measuring Gap between Ring Gear and Gauge Post - MFN267Y

NOTE: Maximum pre-load without use of the tool is .012". When tool MFN 267Y is used, a gap of .005" provides a maximum of .010" pre-load, and a gap of .007" provides a minimum of .012" pre-load.

9. Loosen the 4 bolts installed in Step 4 and retighten after adding enough shims between the ring gear and drive cover to arrive at a .005" thru .007" gap between the ring gear and the gauge posts.

NOTE: Shims are available in .002" .005" and .010" thickness. A complete circular shim is made up of 4 segments. Be certain that each shim is made up of segments of the same thickness.

Determine shims as follows:

- Subtract .006" (average gap) from the gap measured in Step 8.
- Select a combination of shims that will equal the figure found in Step a.
- Loosen the 4 assembly retaining bolts and insert the selected shims.

NOTE: Be careful not to overlap shim ends.

- Tighten the 4 retaining bolts and measure the gap as in Step 8. This gap should now be from .005" thru .007". If the gap is not within this range, add or remove shims as necessary.

10. Remove the assembly retaining bolts and carefully set the shim pack aside.

11. Install the planetary bearing cup in the axle housing. Be certain that it is fully seated.

12. Complete installation of the axle planetary assembly with the shim pack as described under that heading.

NOTE: If several shims must be installed, place approximately half of the total thickness of the shims on each side of the ring gear. Stagger the segment ends when 2 shims are placed together.

INSTALLATION

1. Determine axle planetary carrier bearing pre-load as described under that heading.

2. Install the carrier bearing cup in the axle housing.

3. Install a ring gear gasket in the axle housing.

4. Install the ring gear on the axle housing and insert the retaining bolts. The ring gear is non-directional.

5. Install a ring gear gasket in the drive cover.

6. Install the carrier assembly.

7. Install the retaining nuts and insert the pre-load shims between the ring gear and the axle housing and/or drive cover. Tighten the nuts to 50 to 55 ft.-lbs. torque.

8. Fill the planetary case to the filler plug level with approximately 1 quart M-1129 or M-1129A lubricant.

9. Install the wheel and remove the blocking and hoist. Tighten wheel nuts to 180 to 200 ft.-lbs. torque.

DRIVE PINION ASSEMBLY—Planetary Type Axle

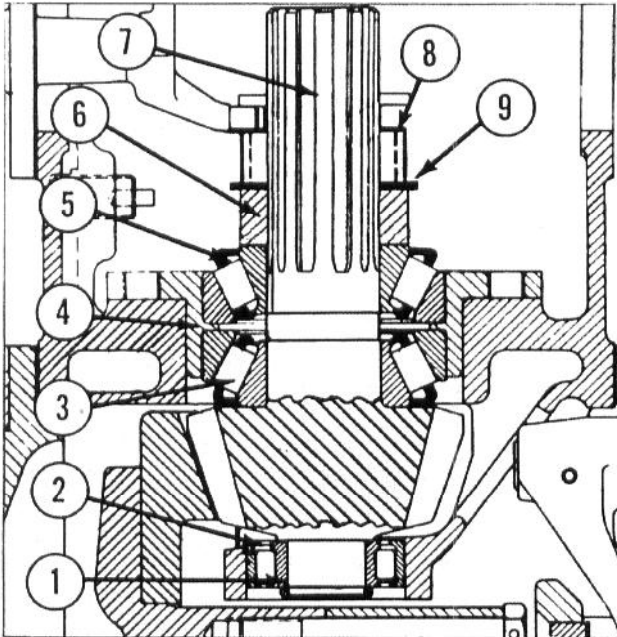


Fig. 52 - Drive Pinion Assembly - Sectional View

- | | |
|--------------------------------------|--------------------------|
| 1. Pilot Bearing Retaining Snap Ring | 5. Front Bearing Cone |
| 2. Pilot Bearing | 6. Spacer |
| 3. Rear Bearing Cone | 7. Drive Pinion |
| 4. Pinion Bearing Flange | 8. Bearing Retaining Nut |
| | 9. Tab Lock Washer |

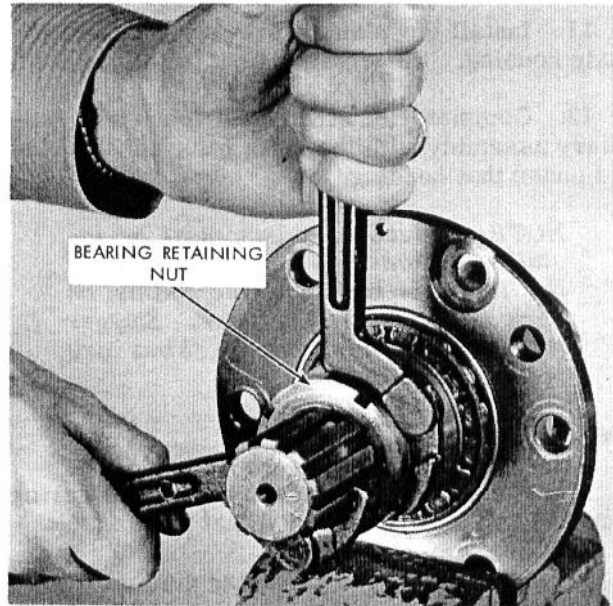


Fig. 54 - Loosening Bearing Retaining Nut

DISASSEMBLY

1. Raise the locking tab, as shown in Fig. 53.
2. Loosen the bearing retaining nut, as shown in Fig. 54.
3. Remove the bearing retaining nut, tab washer, spacer and bearing from the pinion shaft, as shown in Fig. 55.

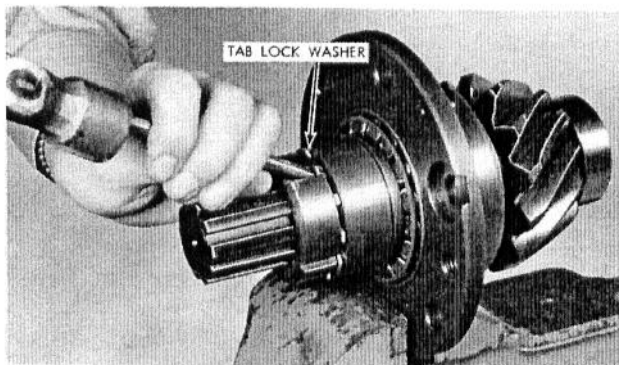


Fig. 53 - Raising Lockwasher Tab

NOTE: Proceed to "Inspection" if there appears to be no reason for further disassembly.

4. Remove the pilot bearing retaining ring, as shown in Fig. 56.

NOTE: It will be necessary to start the bearing by driving against the inner race so that there is space to install the bearing puller plate.

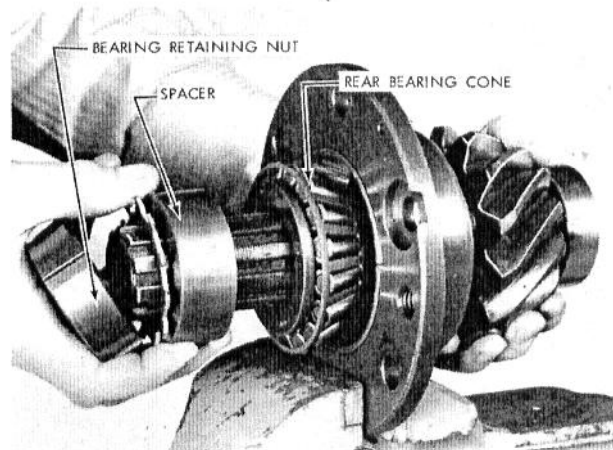


Fig. 55 - Drive Pinion Disassembly

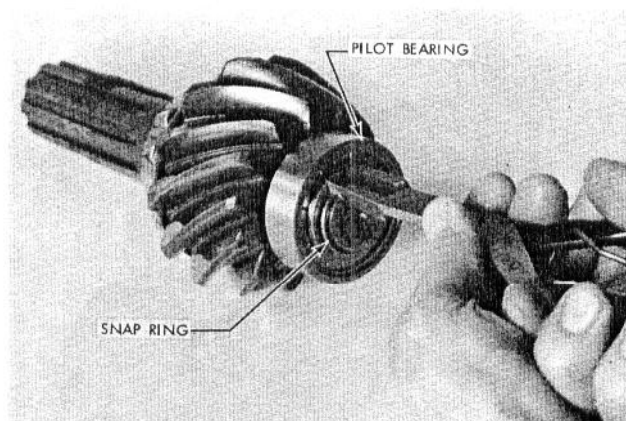


Fig. 56 - Pilot Bearing Snap Ring Removal or Installation

5. Press the pinion shaft from the pilot bearing as shown in Fig. 57.

6. Remove the rear pinion bearing cone, as shown in Fig. 58.

NOTE: The bearing must first be separated from the pinion using a hammer and punch on the inside race of the bearing.

The pinion bearing flange assembly with the two bearing cups is not to be disassembled for service. The sleeve portion of the assembly is machined after the bearing cups are installed

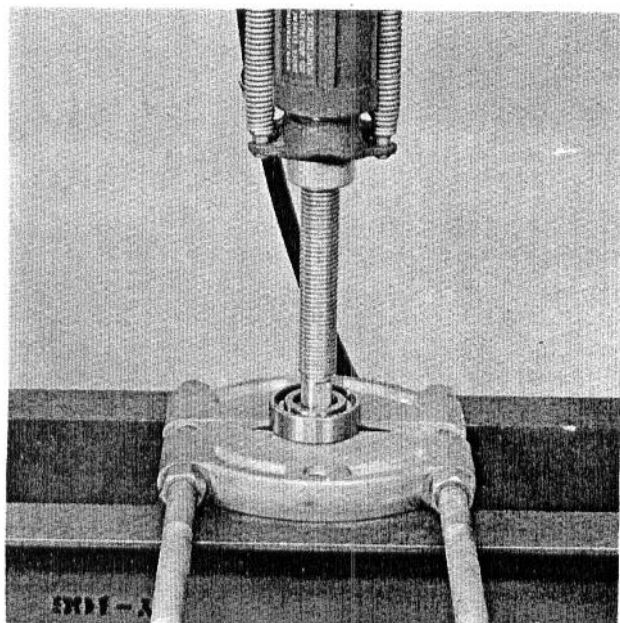


Fig. 57 - Removing Pilot Bearing

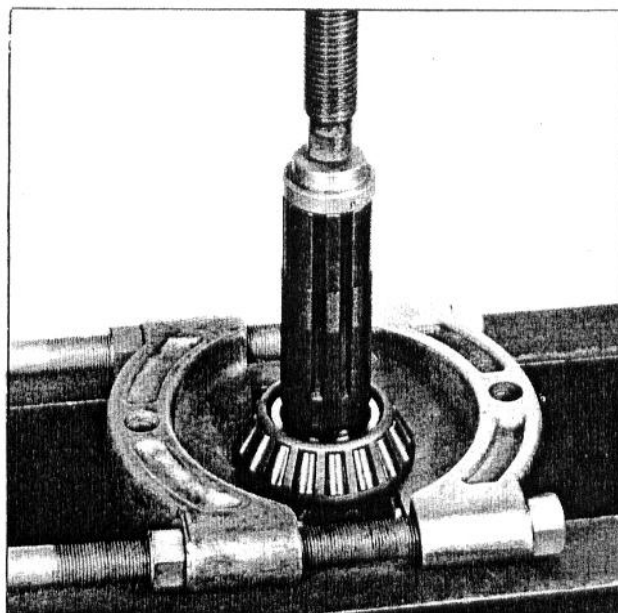


Fig. 58 - Removing Rear Pinion Bearing Cone

and replacing either cup would alter the original dimensions.

INSPECTION

1. Thoroughly clean all parts in a suitable solvent and dry.

2. Examine the pinion teeth, splines and threads for damage and excessive wear. Replace, if necessary, along with a matching ring gear.

NOTE: Always replace drive pinion and ring gear in matched sets.

3. Rotate pilot bearing. If any roughness, flat spots, sticking, or looseness is felt, replace the bearing.

4. Check the tapered roller bearings by turning the bearing cone in its mating cup while applying hand pressure to the bearing. If roughness, flat spots or sticking are felt, replace *both* bearing cones and retaining flange with cups in place.

NOTE: Check manufacturer's number on bearing cones to insure correct replacement.

5. Examine the drive pinion retainer flange assembly for a warped or damaged flange and damage to the O.D. of the sleeve portion of the

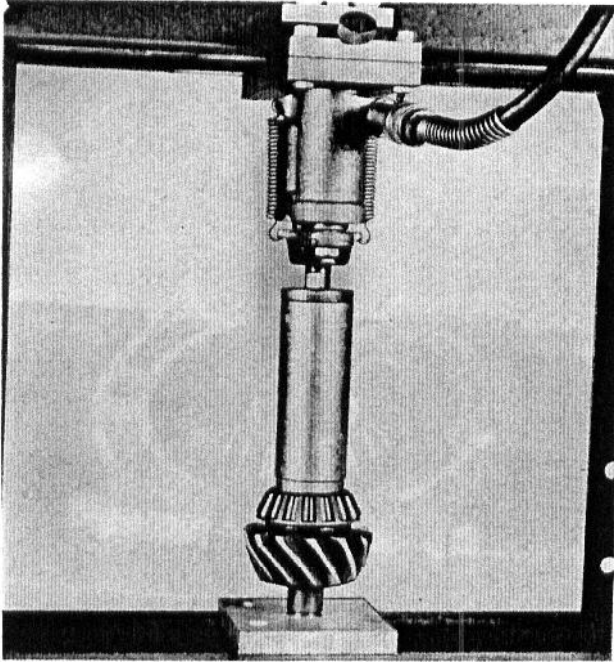


Fig. 59 - Installing Rear Pinion Bearing Cone

assembly. Replace if necessary, along with the mating bearing cones.

6. Examine the tab lock washer for an excessive number of broken tabs. Break off any tabs that have been used. They will not hold a second time. Use a new washer if the remaining tabs will not align with a slot in the retaining nut.

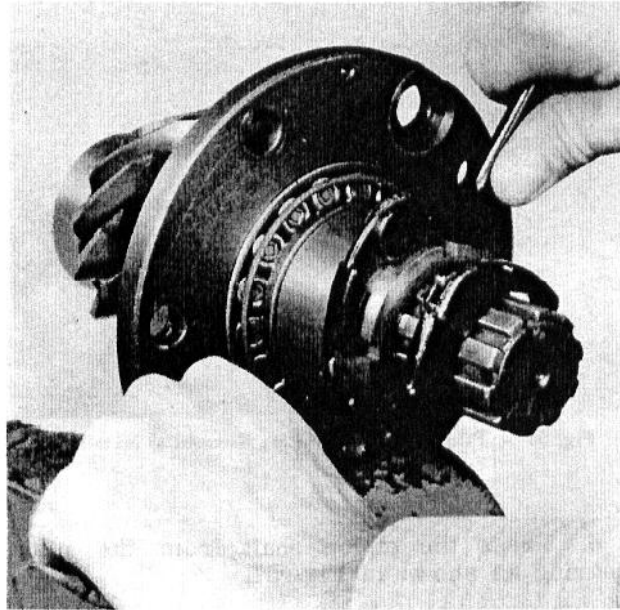


Fig. 61 - Tightening Bearing Retaining Nut

7. Examine the bearing retaining nut for stripped threads, replace if necessary.

REASSEMBLY

1. Install the rear tapered roller bearing on the drive pinion shaft as shown in Fig. 59.

NOTE: Both bearing cups are install-

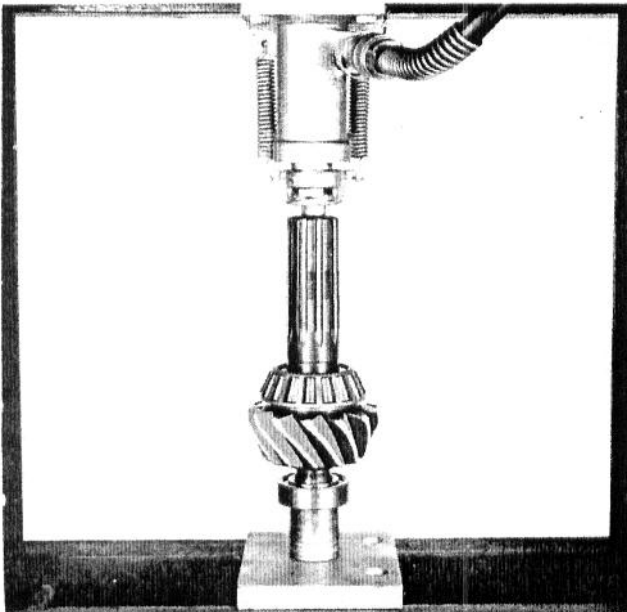


Fig. 60 - Installing Pinion Pilot Bearing

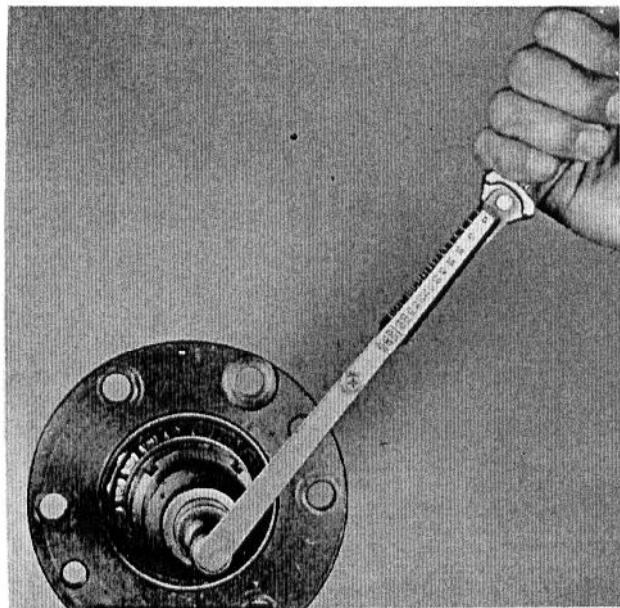


Fig. 62 - Checking Pinion Bearing Pre-Load

ed in the pinion retainer flange during production of the flange and are not to be replaced without replacing the entire flange assembly.

If one bearing cup or cone is damaged, both cones and the flange assembly must be replaced to avoid running a new part against an old.

2. Install the pinion pilot bearing as shown in Fig. 60. Use a section of tubing (socket shown) to permit full seating of the bearing. Be certain that tubing contacts only the inner race.

NOTE: Install with chamfered I.D. facing the snap ring groove.

3. Install the pilot bearing snap ring, as shown in Fig. 56.

4. Install the pinion shaft in the retainer flange and assemble the front bearing, spacer, tab washer and retaining nut on the pinion shaft as shown in Fig. 55.

5. Tighten the nut enough to load the pinion bearings to 18 - 22 in.-lbs. of torque on the pinion shaft. Refer to Fig. 61.

NOTE: This is the torque required to turn the pinion shaft, not that required to tighten the retaining nut.

6. Check the bearing pre-load using a torque wrench as shown in Fig. 62. Tighten or loosen the bearing retaining nut to obtain 18 - 22 in.-lbs. of torque.

7. With bearing pre-load set, bend a tab on the lock washer into a mating slot in the bearing retaining nut.

DIFFERENTIAL CARRIER ASSEMBLY (45-Tooth Ring Gear)—Planetary Type Axle

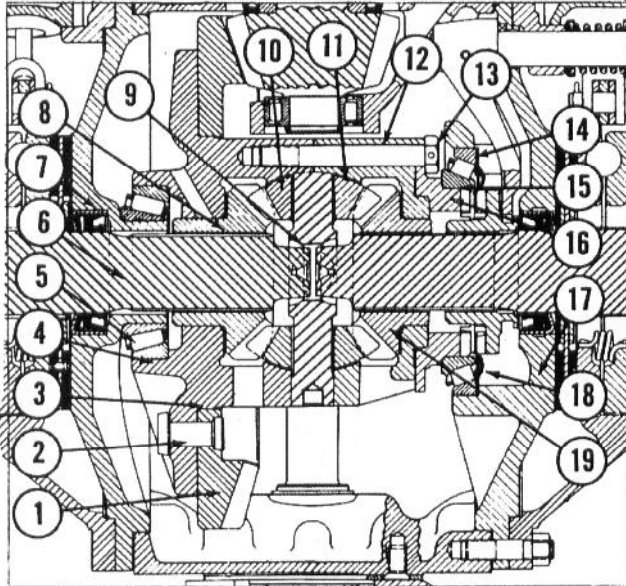


Fig. 63 - Differential Assembly - Sectional View-W/Diff. Lock

- | | |
|--------------------------------|-----------------------------------|
| 1. Ring Gear | 10. Differential Gear(s) |
| 2. Rivet (Bolt) | 11. Thrust Washer(s) |
| 3. L.H. Differential Case Half | 12. R.H. Differential Case |
| 4. L.H. Carrier Bearing Cone | 13. Differential Case Capscrew |
| 5. L.H. Carrier Bearing Cup | 14. R.H. Carrier Bearing Cup |
| 6. Main Axle Shaft(s) | 15. R.H. Carrier Bearing Cone |
| 7. Carrier Plate | 16. Differential Lock Coupler Cap |
| 8. Side Gear | 17. Carrier Plate |
| 9. Differential Cross | 18. Bearing Shield |
| | 19. Side Gear |

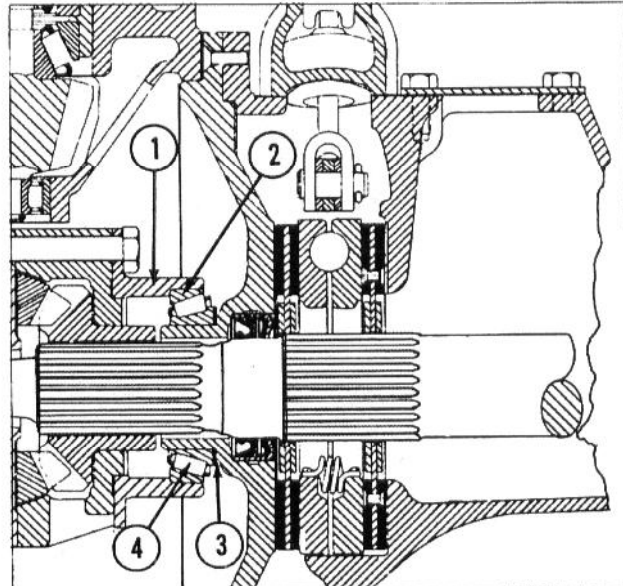


Fig. 64 - Differential Assembly - Partial Section - Non-Diff. Lock

- | | |
|-------------------------|------------------------|
| 1. Differential Adapter | 3. Pre-Load Shim(s) |
| 2. Carrier Bearing Cone | 4. Carrier Bearing Cup |

DISASSEMBLY

1. Remove the ring gear as follows:

- a. Remove the bolts attaching the ring gear to the differential case.

NOTE: "Loctite" has been used in assembling the bolts.

- b. If the ring gear is riveted to the differential case, drill part way thru the butt end of the rivet and drive the rivet out with a punch.

2. Remove the right; non-differential lock, carrier bearing cup, using a suitable puller as shown in Fig. 65, or remove the diff. lock bearing cone as shown in Fig. 66.

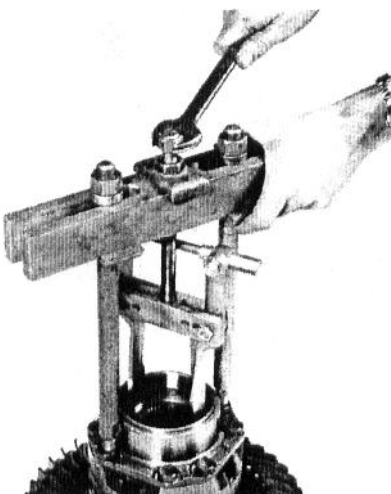


Fig. 65 - Removing R.H. Carrier Bearing Cup (Non-Diff. Lock)

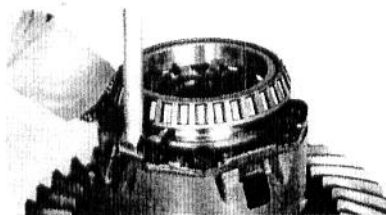


Fig. 66 - Removing R.H. Carrier Bearing Cone (Diff. Lock)

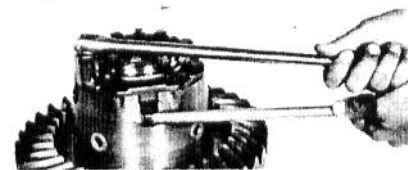


Fig. 67 - Removing Differential Case Capscrews

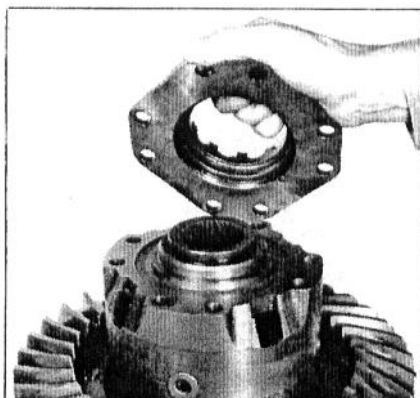


Fig. 68 - Differential Lock Coupler Cap Removal or Installation

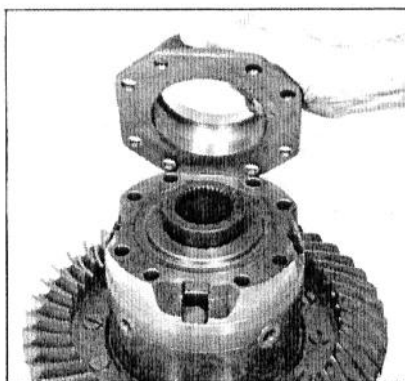


Fig. 69 - Differential Case Adapter Removal or Installation

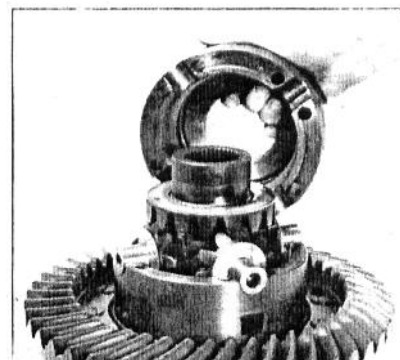


Fig. 70 - R.H. Differential Case Half Removal or Installation



Fig. 71 - Thrust Washer Removal or Installation

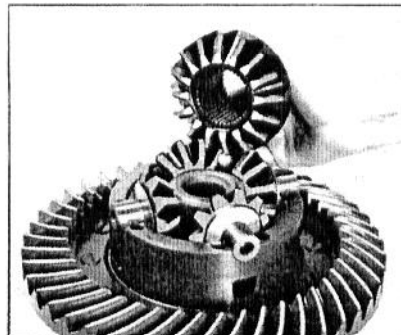


Fig. 72 - R.H. Side Gear Removal or Installation

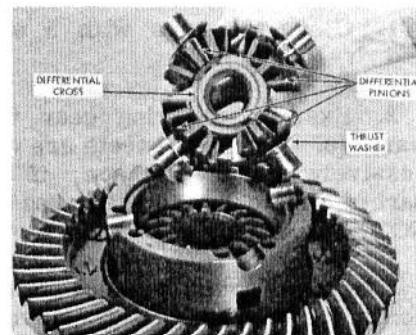


Fig. 73 - Differential Cross, Pinions and Thrust Washers Removal or Installation

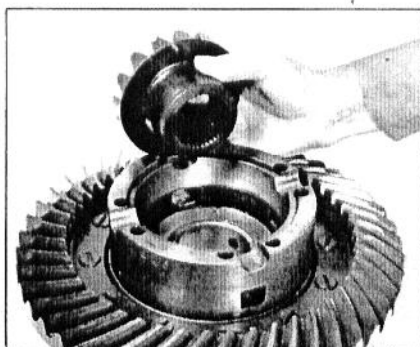


Fig. 74 - L.H. Side Gear Removal or Installation

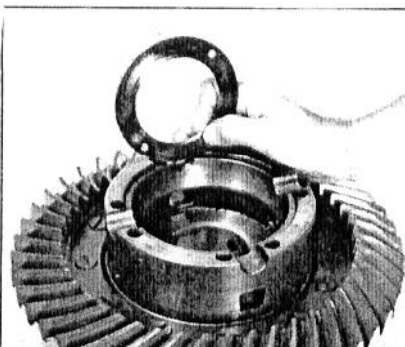


Fig. 75 - L.H. Thrust Washer Removal or Installation

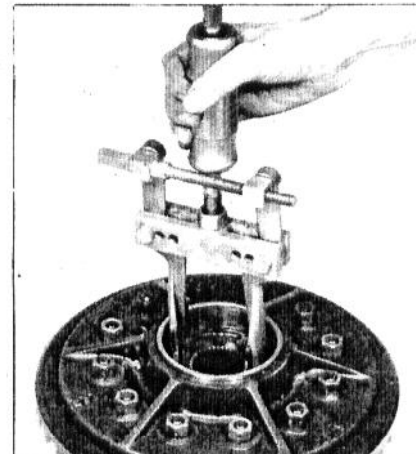


Fig. 76 - L.H. Bearing Cup Removal or Installation

3. Remove the differential case capscrews. Refer to Fig. 67.

NOTE: Remove the lock wire used on some assemblies before removing the case capscrews.

4. Remove the differential lock coupler cap, or bearing adapter, as shown in Figs. 68 or 69.

5. Remove the right-hand differential case half as shown in Fig. 70.

NOTE: Mark the case halves if no match marks are present.

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6. Lift off the side gear thrust washer as shown in Fig. 71.

7. Remove the differential side gear as shown in Fig. 72.

8. Remove the differential cross, pinions and pinion thrust washers as shown in Fig. 73.

9. Remove the other side gear and thrust washer as shown in Figs. 74 and 75.

10. Remove the left carrier bearing cup as shown in Fig. 76.

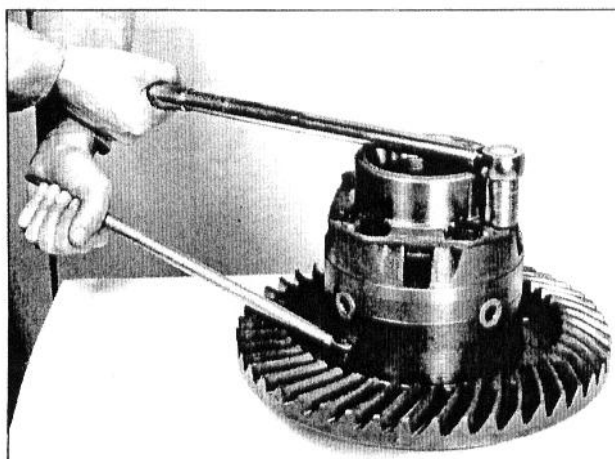


Fig. 77 - Tightening Differential Case Capscrews

INSPECTION

1. Clean all parts with a suitable solvent and dry thoroughly.

2. Examine the ring gear for cracks and warp. Note if the teeth are damaged or excessively worn. Replace, if necessary, as part of a matched ring gear and pinion set. DO NOT replace ring gear alone.

3. Examine the carrier bearing cups and cones for damage or excessive wear. Place the bearing cone in its mating cup, press the cone firmly against the cup, and rotate the cone back and forth. If roughness, flat spots or sticking are felt, replace both the cup and cone.

4. Examine the differential case halves for damage or excessive wear. Check carefully the bores that the side gears, and the differential cross, fit into. Also check the spherical seat beneath the differential gear thrust washers. Replace case halves if required.

NOTE: Case halves are available in matched sets only.

5. Examine the side gears for damaged or excessively worn teeth and internal splines. If replacement is required, replace both side gears at the same time.

NOTE: Check the number of internal splines in the side gear before obtaining replacement parts.

6. Examine the differential gears for damaged or excessively worn teeth. Check the gear bores and spherical face for damage and wear. Replace if necessary.

NOTE: Replace all 4 differential

gears even if only one appears damaged.

7. Examine the differential cross for damage or excessive wear. Replace if necessary.

8. Examine the differential lock coupler cap for damaged or worn coupler dogs and bearing seat. Replace if necessary.

REASSEMBLY

1. Install the ring gear on the left differential case half.

NOTE: Always install a new ring gear with a new drive pinion in a matching set.

a. Place the ring gear on the differential case, teeth toward the case center.

b. Thoroughly clean the special ring gear attaching bolts and nuts.

c. Insert the bolts, (heads in the ring gear) and apply a locking sealant, such as "Loctite", grade AV (red), to the threads.

d. Install the nuts and tighten to 110 to 120 ft.-lbs. torque.

2. Install a new side gear thrust washer and the side gear in the left differential case. Refer to Figs. 74 and 75. Install long side gear in left differential case on differential lock models.

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3. Install new differential pinion thrust washers after placing the differential pinions on the differential cross. Install this assembly in the differential case. Refer to Fig. 73.

4. Install the right side gear. Refer to Fig. 72.

5. Install a new side gear thrust washer. Refer to Fig. 71.

6. Install the right-hand differential case half. Refer to Fig. 70.

7. Install the differential lock coupler cap, (or differential adapter on non-diff. lock models). See Figs. 68 or 69.

8. Install the 8 differential case capscrews and tighten to 76 - 85 ft.-lbs. torque. Refer to Fig. 77.

9. Install the right-hand carrier bearing cone (or cup on non-diff. lock models) with a suitable step plate.

10. Install the left-hand carrier bearing cup with a suitable step plate. Be certain that the bearing cone and cup are fully seated.

DIFFERENTIAL CARRIER BEARING PRE-LOAD ADJUSTMENT—Planetary Type Axle Assembly

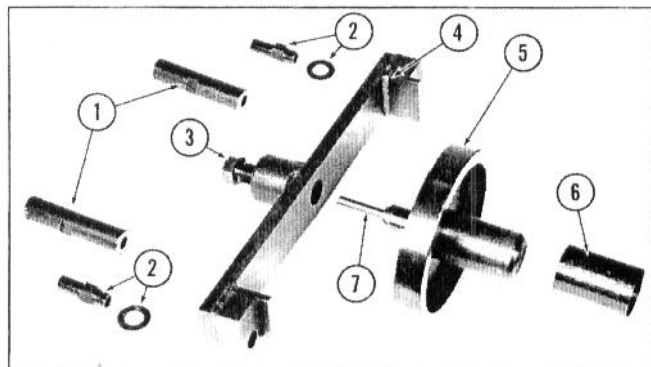


Fig. 78 - MFN 245UK Pre-Load Tool (As Used for Planetary Type Axles)

- | | |
|-------------------------------------|---------------------------|
| 1. Gauge Spools (Short) | 4. Clamping Bar |
| 2. Special Nuts and Washers (Short) | 5. Centering Hub |
| 3. Loading Screw | 6. Adapter Sleeve (Small) |
| | 7. Center Pin |

Carrier bearing pre-load should be checked whenever either axle housing assembly is removed, and *must* be checked and set when carrier plates, carrier bearings, differential carrier or center housing is replaced. Measurement and setting must be done *only* on the right-hand side of the tractor. The left-hand axle housing assembly must be in position before proceeding. Refer to Fig. 78, Special Tool MFN 245UK. This figure shows only the parts required for planetary type axles.

1. Remove the right-hand axle housing assembly and gasket, (if not previously done), as described under "Axle Housing Assembly Removal" for each tractor model.

2. Remove the right-hand carrier bearing cup or cone, from the carrier plate (if not previously done). Refer to "Carrier Plate Assembly" in this divider tab for details.

NOTE: The bearing shield must be distorted, and forced away from behind the bearing cup to permit fitting the puller.

3. Thoroughly clean the center housing surface around the studs where the clamping bar and gauge spools are to be attached. Refer to Fig. 80.

4. Slip the adapter sleeve MF 245D/11 (with the smaller O.D.) over the centering hub.

5. Hold the carrier bearing cup (or cone on

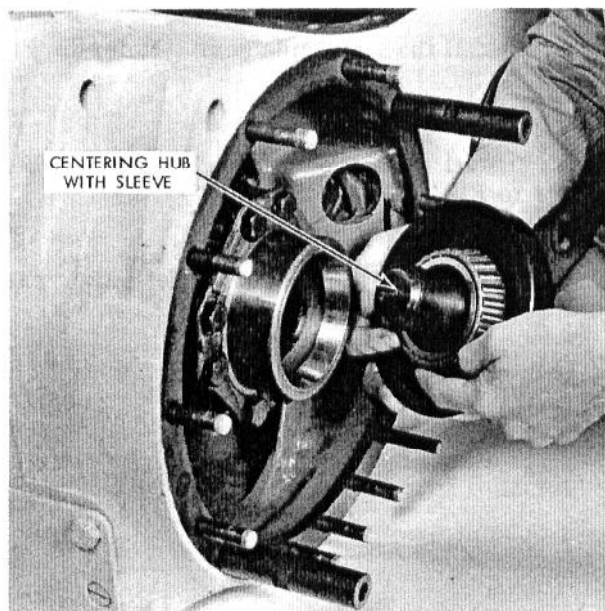


Fig. 79 - Locating Bearing on Centering Hub (Non-Diff. Lock)

non-diff. lock models) in position on the centering hub. Insert the centering hub in the differential carrier and push the hub in until the bearing cup is located on the bearing cone. Refer to Figs. 79 and 80.

6. Install the clamping bar over the centering hub and the two center housing studs as shown in Fig. 81.

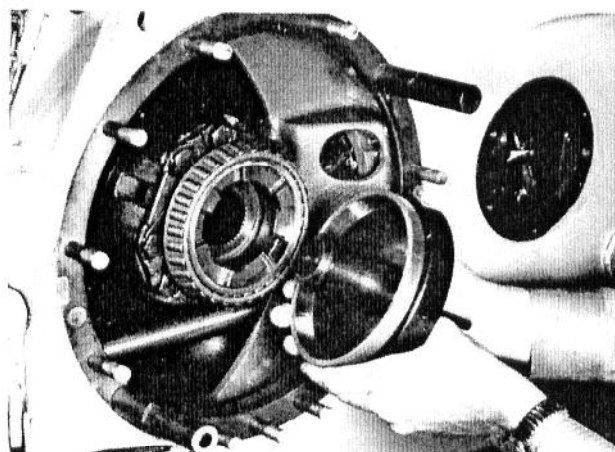


Fig. 80 - Locating Bearing on Centering Hub (Diff. Lock)

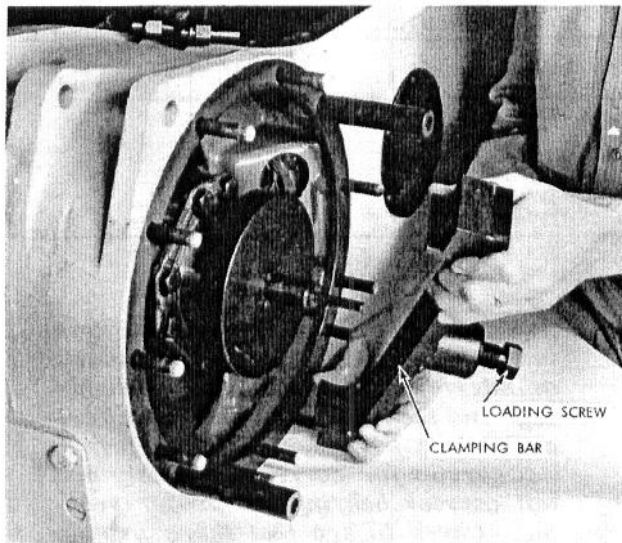


Fig. 81 - Installing Clamping Bar

IMPORTANT: Turn the loading screw out so the screw does not contact the centering hub.

7. Attach the clamping bar with the special nuts and washers and tighten.

8. Screw the two short gauge spools onto the center housing studs shown in Fig. 82. Tighten to 20 ft.-lbs. torque.

NOTE: Use the end of the spool with the deepest thread location.

9. Tighten the loading screw to 20 ft.-lbs. torque, while turning the differential. Refer to Fig. 83.

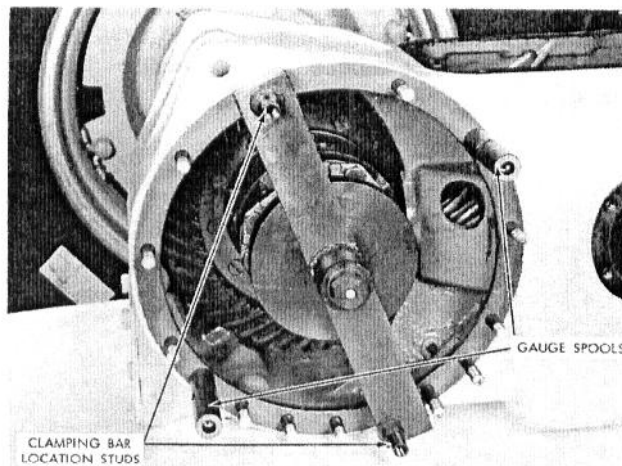


Fig. 82 - Clamping Bar and Gauge Spool Locations

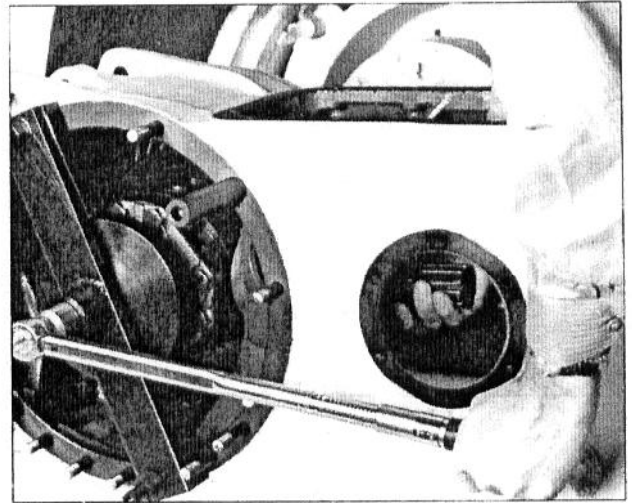


Fig. 83 - Tightening Loading Screw

10. Place the straightedge across the gauge spools, and with a feeler gauge, measure the gap between the center pin and the straight-edge. Refer to Fig. 84.

NOTE: Carefully store the straight-edge after use to prevent damaging it.

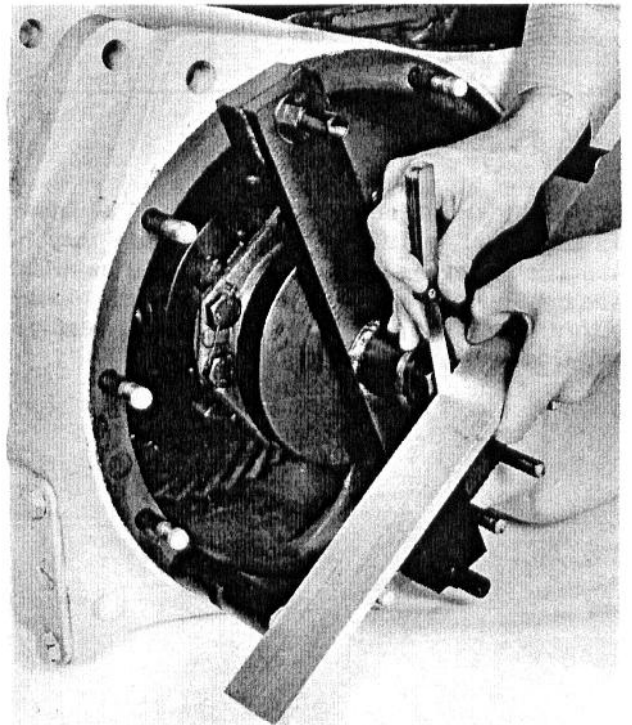


Fig. 84 - Measuring Center Pin - Straightedge Gap

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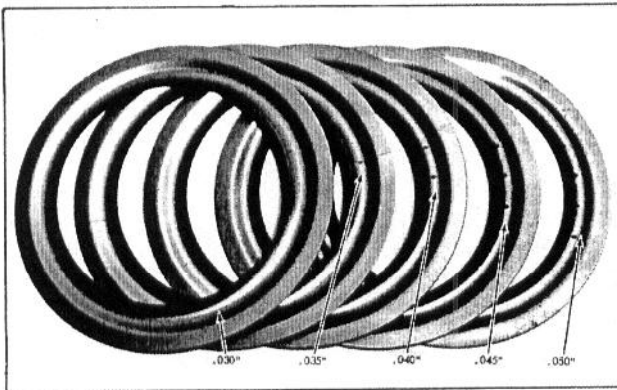


Fig. 85 - Bearing Shield Identification

11. Refer to the shield, or shim, selection chart, and choose the proper part. Differential lock models require the use of a bearing shield at least .030\" thick. Shields are available in .005\" increments from .030\" thru .050\". Use only one shield at a time. Non-differential lock models require use of one or more .005\" shims.

DIFFERENTIAL LOCK BEARING SHIELD CHART		
When Gap is:	Use Shield Thickness	Shield Identification
.030\" - .034\"	.030\"	No Dots
.035\" - .039\"	.035\"	1 Dot
.040\" - .044\"	.040\"	2 Dots
.045\" - .049\"	.045\"	3 Dots
.050\" - .054\"	.050\"	4 Dots

If a thicker shield is required than is shown in the chart, a differential case shim may be installed between the right differential case and the coupler cap (or adapter on non-diff. lock). After the shim has been installed, perform pre-load adjustment again.

NON-DIFFERENTIAL LOCK BEARING SHIM CHART		
When Gap is:	Use Shim Thickness	Shims Required
.000\" - .004\"	None	0
.005\" - .009\"	.005\"	1
.010\" - .014\"	.010\"	2
.015\" - .019\"	.015\"	3
.020\" - .024\"	.020\"	4
.025\" & Up	.025\"	5

NOTE: If there is less than .030\" gap in Step 10 on a differential lock model, or interference between the straight-edge and the center pin on non-differential lock models, recheck differential carrier for correct assembly and left carrier bearing for proper seating. Check to see that there are no shims under the left carrier bearing or the differential adapter. Be sure that a gasket is installed on the left side of the axle housing.

12. Loosen the forcing screw and remove tool MFN 245UK from the center housing.

13. Install the shim(s) or shield selected from the chart.

- Differential Lock: Place the bearing shield in the carrier plate with the dish down and install the carrier bearing cup. Be certain that the bearing is fully seated.
- Non-differential Lock: Place the bearing shim(s) in position on the bearing cone seat, and install the carrier bearing cone. Be certain the bearing is fully seated.

14. Install a new center housing gasket and install the axle housing assembly as described in that heading under the specific tractor model.

RING GEAR AND PINION BACKLASH ADJUSTMENT—Planetary Type Axle

Ring gear and pinion backlash may be adjusted on new ring gear and pinion installations by use of shims between the ring gear and the differential case half. Shims 190 027 M1 (.003") and 190 028 M1 (.007") are available for this adjustment.

NOTE: Do not adjust backlash on a ring gear and pinion that have been in service. When backlash is changed on worn-in assemblies, the tooth contact pattern established by normal wear is altered. Any change from the wear pattern creates high stress points on the teeth and can cause early failure of the ring gear and pinion.

Measure and adjust backlash to .003" to .019" after carrier bearing per-load has been set and the axle housings installed.

1. Remove the hydraulic lift cover or top cover (if not previously done).

2. Attach a dial indicator to the center housing and rest the dial indicator on a ring gear tooth at the pitch diameter of the gear, on a line toward the center of the differential. Refer to Fig. 86.

NOTE: The pitch diameter is approximately half way between the inner and outer diameters of the gear teeth.

3. Hold the drive pinion stationary and turn the ring gear to contact the pinion.

4. Zero the dial indicator or note the indicator reading.

5. Rotate the ring gear away from the pinion until it makes contact again with the drive pinion. Note the dial indicator reading. Check backlash at four equally spaced points on the ring gear. Backlash should be from .003" to .019". If it is not within this range, add or remove ring gear shims to obtain the proper backlash as follows:

- a. Remove the differential carrier and remove the ring gear as described in "DIFFERENTIAL CARRIER ASSEMBLY".
- b. Install the proper shim(s) between the differential case half and the ring gear.

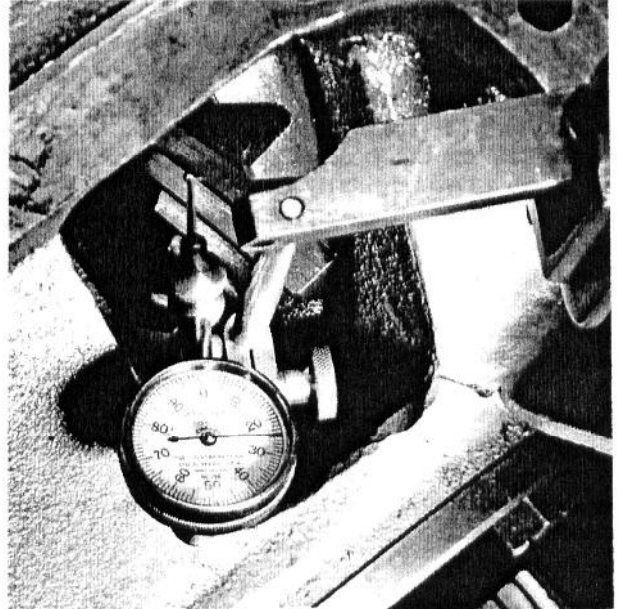


Fig. 86 — Ring Gear and Pinion Backlash Measurement Setup

NOTE: Backlash is changed by approximately the same amount as the thickness of the shim removed or installed. Adding shims decreases backlash, removing them increases backlash.

- c. Reinstall the ring gear and differential carrier as described in "DIFFERENTIAL CARRIER ASSEMBLY".
- d. Check backlash again in four places. If not within the range given, again remove the differential carrier and make the necessary shim corrections.
- e. Reinstall the hydraulic lift cover or top cover as described under the proper heading for the appropriate tractor model.

Insufficient backlash may be caused by any one, or all of these items.

1. Too many shims between ring gear and differential case half. Remove the number of shims necessary to arrive at the proper backlash.
2. Lack of a left-hand center housing-to-

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axle housing gasket. Install a new gasket and tighten the attaching nuts to 76 to 85 ft.-lbs. torque, and check carrier bearing pre-load as described under that heading.

3. Left-hand carrier bearing cup or cone is not fully seated. Be sure the cup and cone are pressed fully against their seats. Remove any shims that may have been placed under the bearing cup or the bearing cone. Bearing cup shims were not originally fitted behind the left-hand carrier bearing cup, but may be used to decrease backlash.

Always fit shims behind the right-hand carrier bearing when establishing carrier bearing pre-load.

Perform the carrier bearing pre-load adjustment (as described under that heading) again if a gasket is installed between the center housing and the axle housing, or if the bearing cup or cone is repositioned.

ALTERNATE BACKLASH ADJUSTMENT PROCEDURE

The following method of moving the ring gear in relation to the drive pinion may be used. This method requires the shifting of carrier bearing shims from one side to the other **AFTER CARRIER BEARING PRE-LOAD HAS BEEN SET.**

On non-differential lock models, a shim may be removed from beneath one carrier bearing

cone and reinstalled under the other. On differential lock models, the carrier bearing shield must be changed, and shim(s) equal to the change of shield thickness added to, or removed from behind the *left* carrier bearing cone.

NOTE: Shim No. 892 180 M1 (.005") is used.

Carrier bearing shims can be used to decrease backlash *if* the right-hand bearing shield is at least .035" thick. (The thinnest shield available is .030" thick.) In this case, install the next smaller shield (.030") and install a shim behind the left-hand carrier bearing, equal to the change in thickness of the bearing shield.

Backlash may be increased by removing bearing cup shim(s) from behind the left carrier bearing cone; *if any are installed*, and adding this shim thickness to the right carrier bearing shield, or shim, thickness. Use the appropriate shield or shim(s).

One extra center housing gasket may be added to the side that does not have a shim to remove. One extra gasket will approximately balance a .005" shim (compressed thickness of one gasket is about .006").

NOTE: Be certain that the shim thickness added to one side is equal to the thickness removed from the other. This must be done to maintain correct carrier bearing pre-load.

AXLE PLANETARY ASSEMBLY — Narrow Ring Gear (1-1/32") With Narrow Drive Cover (.90")

IDENTIFICATION

Axle planetary assemblies with ring gear and drive cover having the external measurements shown, contain an assembly with a sun gear integral with the axle shaft. This main axle shaft is sometimes referred to as "cup" or "bell" ended. The main axle shaft has 39 splines on the inner end. Early production axle assemblies used a 19-spline axle.

The axle housing that this assembly is at-

tached to is 5-1/8" deep at the fender mounting pads, has a breather at the top and a filler plug located at the front of the axle housing. No oil drain hole is present under the outer main axle shaft oil seal.

This type of planetary pinion carrier may have either two or three planetary pinions. Both the two and the three pinion assemblies are serviced and pre-loaded in the same way. The Tractor or Unit Model determines which one is used.

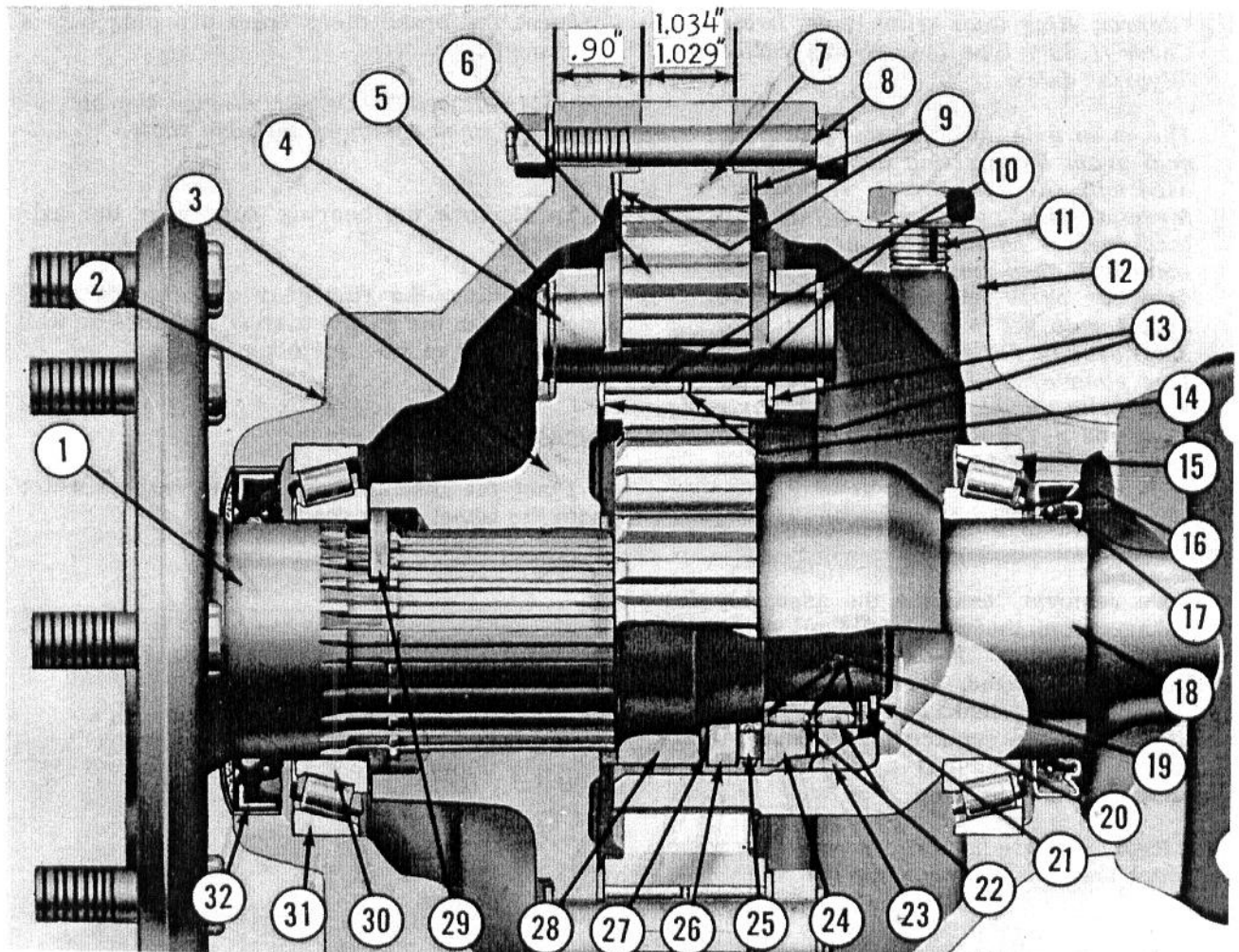


Fig. 87 — Axle Planetary Assembly — Sectional View — Narrow Ring Gear — Narrow Drive Cover

- | | | | | |
|---------------------------|-------------------------|----------------------------------|----------------------------|--------------------------------|
| 1. Wheel Axle | 8. Bolt | 14. Spacer Washer | 20. Snap Ring | 26. Bearing Race |
| 2. Drive Cover | 9. Ring Gear Gaskets | 15. Axle Housing Bearing Cup | 21. Thrust Washer | 27. Pre-Load Shim(s) |
| 3. Planetary Carrier | 10. Needle Rollers (58) | 16. Main Axle Shaft Bearing Cone | 22. Needle Rollers (68) | 28. Sleeve (loose) |
| 4. Planetary Pinion Shaft | 11. Filler Plug | 17. Main Axle Shaft Oil Seal | 23. Spherical Bearing Cup | 29. Bearing Support Split Ring |
| 5. Snap Ring | 12. Axle Housing | 18. Main Axle Shaft | 24. Spherical Bearing Cone | 30. Wheel Axle Bearing Cone |
| 6. Planetary Pinion | 13. Thrust Washers | 19. Roller Spacer Washers | 25. Thrust Bearing | 31. Drive Cover Bearing Cup |
| 7. Ring Gear | | | | 32. Drive Cover Oil Seal |

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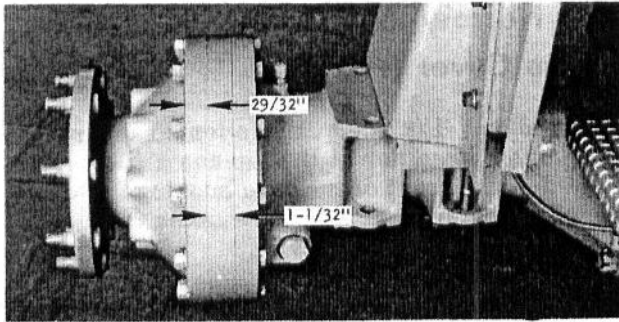


Fig. 88 - Axle Planetary Assembly - Front View

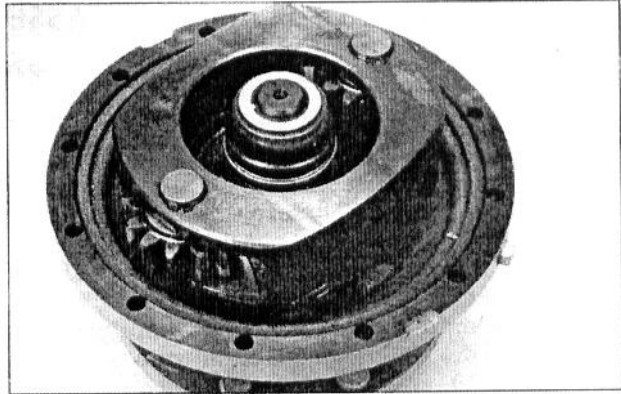


Fig. 89 - Planetary Assembly Removed

NOTE: These axle planetary assemblies may be serviced with like parts, but may also be converted to the "Narrow Ring Gear with Wide Drive Cover (1.13") type (sometimes called "Hybrid" axles).

The main axle housing and the ring gear from the existing planetary are used with the new parts. If the differential side gears and differential lock coupler have 19 splines on the inner end, they must also be replaced with like parts having 39 splines to accommodate the 39 spline main axle shaft used in the "Wide Drive Cover" type planetary. Refer to the Narrow Ring Gear Planetary page in the Parts Book for a Tractor such as the MF 302-304 or MF 356.

REMOVAL

Before removal, examine the assembly for oil leakage from the wheel axle oil seal, and the ring gear seals. If the outer, main axle shaft seal is damaged, the brakes are likely malfunctioning. If leakage is present, determine the cause and replace the damaged seals or parts. Always install new seals when a complete overhaul is done.

1. Raise the axle housing, remove the wheel and block the axle housing securely.
2. Drain the planetary case.
3. Remove the axle planetary assembly retaining nuts, lift the planetary assembly from the axle housing and remove the planetary ring gear.

4. Remove the axle shaft. Set the brake to prevent the brake discs from dropping out of alignment.

IMPORTANT: Do not damage the oil seal when removing the axle shaft.

5. Remove the bearing cup from the axle housing.
6. Remove the ring gear gaskets and thoroughly clean the gasket mating surfaces as well as the metal mating surfaces.

DISASSEMBLY

Place the assembly on a sturdy work surface with the wheel bolts down.

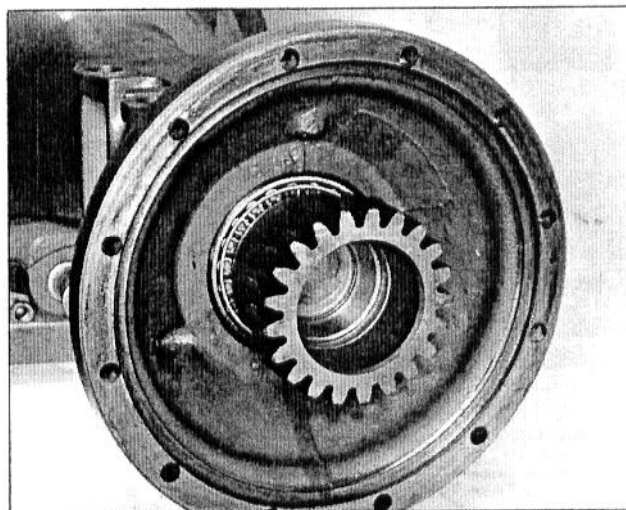


Fig. 90 - Axle Housing With Axle Shaft in Place

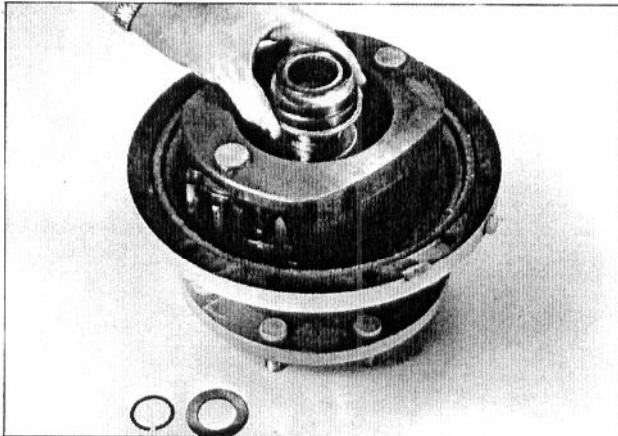


Fig. 91 - Spherical Bearing and Thrust Bearing Removal or Installation

1. Remove the snap ring and thrust washer from the end of the wheel axle. Refer to Fig. 91.

2. Lift the spherical bearing cone with needle bearings and thrust bearing from the axle shaft.

NOTE: There are 68 bearing needles inside the spherical cone, separated into two rows of 34 each. A spacer washer is used between the rows and on each end.

3. Remove the thrust bearing race, shims and the wheel axle sleeve.

4. Lift the planetary carrier assembly from the axle shaft.

NOTE: Some planetary carriers are

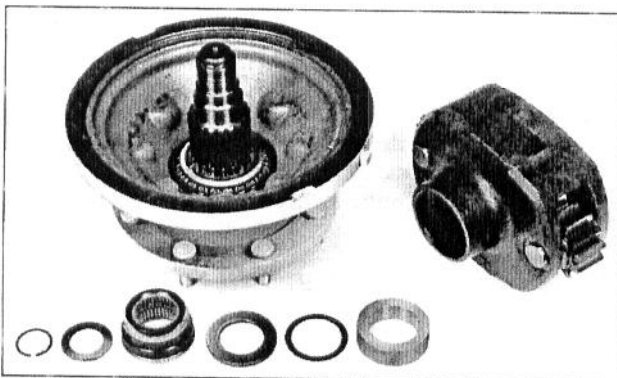


Fig. 92 - Planetary Carrier Assembly Removed

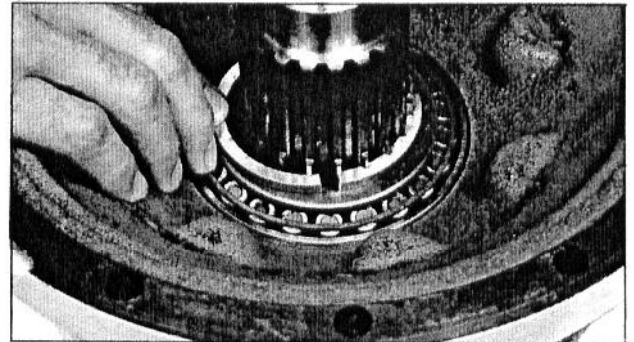


Fig. 93 - Bearing Support Ring Removal or Installation

held on the wheel axle with a snap ring. Remove the snap ring if present.

5. Remove the split ring (bearing support ring) from the axle shaft.

6. Press the wheel axle from bearing cone as shown in Fig. 94.

7. Remove the drive cover oil seal and the outer wheel axle bearing cup.

8. Remove the planetary pinions.

a. Remove the snap ring from the pinion shaft and press the shaft out as shown in Fig. 95.

b. Slide the pinion and the two thrust washers from the carrier.

NOTE: There are 56 loose bearing needles inside each pinion.

9. Remove the spherical bearing cup from inside the axle shaft. Refer to Fig. 96.

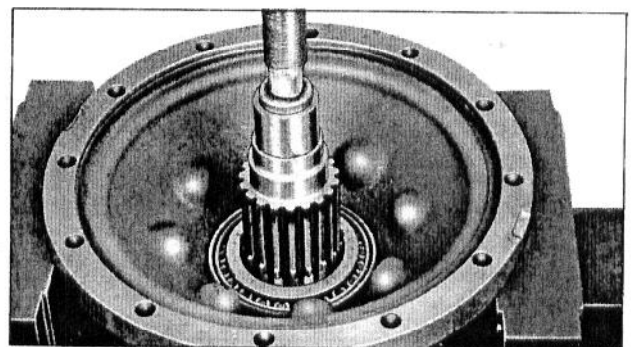


Fig. 94 - Wheel Axle Removal

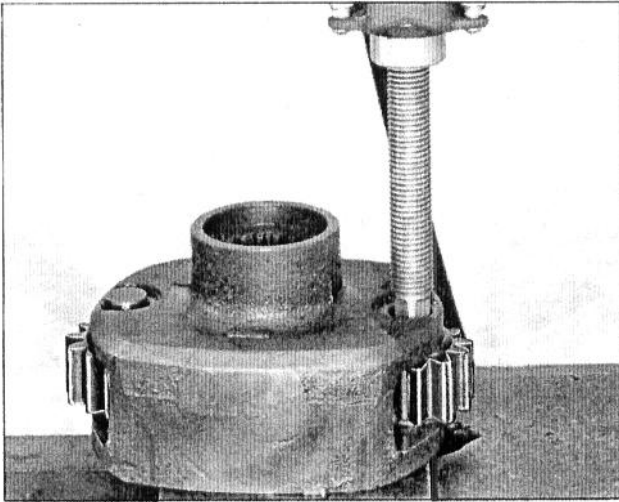


Fig. 95 - Planetary Pinion Shaft Removal

10. Remove the bearing cone from the axle shaft. Refer to Fig. 97.

INSPECTION

Thoroughly clean and dry all parts before inspection.

Examine the bearing cones and cups for wear or damage. Press the cone into the mating cup and rotate while applying pressure. If flat spots or roughness are felt, replace *both* bearing cup and cone.

Examine the planetary ring gear and planetary gears for damage or excessive wear.

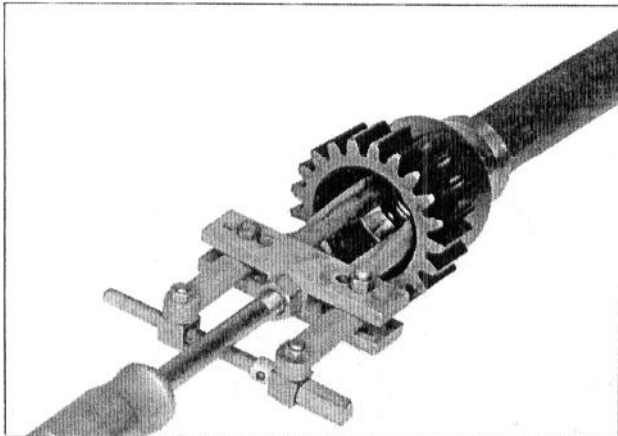


Fig. 96 - Spherical Bearing Cup Removal

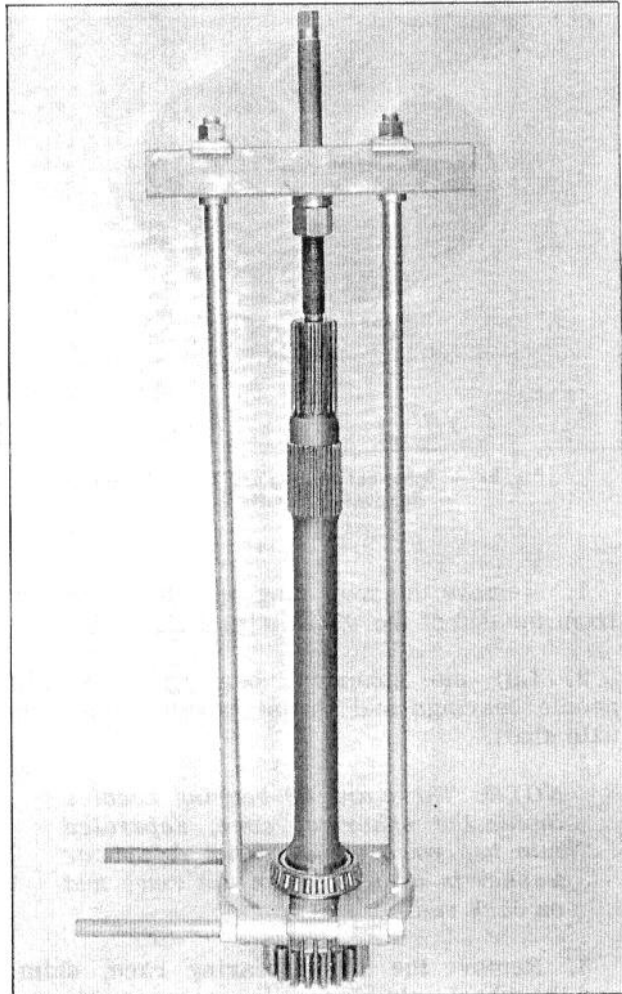


Fig. 97 - Axle Bearing Cone Removal

NOTE: Replace planetary gears in sets. Do not replace only one. If there is extensive gear tooth damage or wear, replace all gears, including the axle shaft with integral sun gear.

Examine the axle shaft for damage or excessive wear. Check all splines and oil seal surfaces.

Examine the drive cover and the axle housing for cracks and dented flanges. Examine the wheel bolts for breakage and stripped or damaged threads. Replace the necessary parts.

HEAVY-DUTY BEARING INSTALLATION

When a heavy-duty bearing has been installed in the drive cover, it should be identified by the number 192 158 M1 stamped on the outer

face of the drive cover in the bolt circle. This modified drive cover has the bearing cup seat machined approximately 7/8" deep. The standard drive cover bearing seat is approximately 3/4" deep.

Install the oil seal for the modified cover so that the seal case rests against the edge of the bearing cup, after the bearing cup is fully seated. Position the oil seal lip toward the planetary carrier. Be sure that the drive cover is correctly identified and check the Parts Book carefully to be sure the right parts are ordered.

REASSEMBLY

1. Install the bearing cup in the drive cover. Be certain that it is fully seated. Check to see if a standard or heavy-duty bearing is required.
2. Install a *new* oil seal in the drive cover. Position the seal with the lip toward the planetary carrier. Use a non-hardening gasket cement (or hydraulic type "Loctite" sealant) on the seal O.D. before installing.

NOTE: On modified drive covers, the oil seal will rest against the rear of the bearing cup.

3. Install the planetary pinions. Refer to

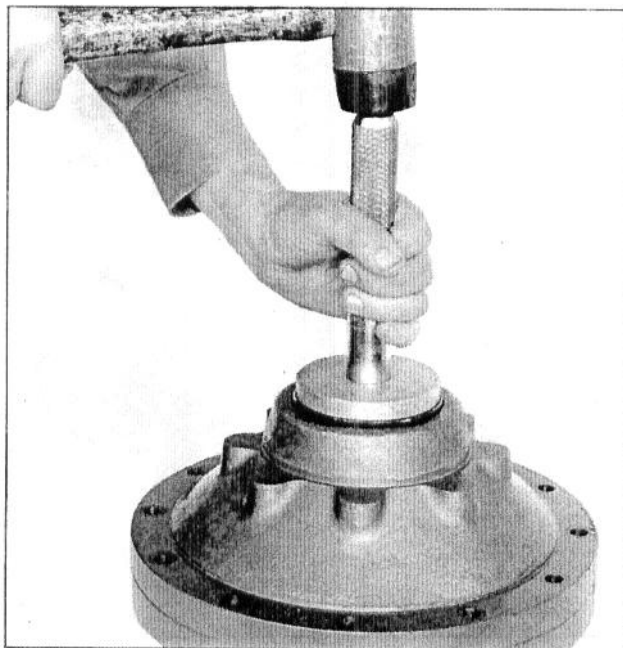


Fig. 98 - Drive Cover Oil Seal Installation

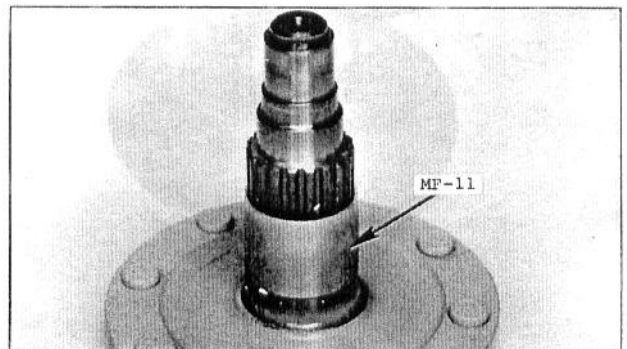


Fig. 99 - Special Tool MF-11 Positioned

Fig. 95. Position the two rows of needle bearings in each pinion. Use a heavy grease or petroleum jelly to hold them in place (29 needles in each row). Place a spacer washer between the two rows. Fit the pinion with needle bearings and thrust washers into place in the planetary carrier, then press the pinion shaft into place. Install the snap ring(s) on the pinion shaft.

4. Place Special Tool MF-11 over the wheel axle splines, lubricate the seal lips with grease and slide the drive cover over the wheel axle. Remove the Special Tool.

5. Press the wheel axle bearing cone onto the axle shaft far enough to install the split ring. Refer to Fig. 100. Install the split ring.

IMPORTANT: Install the split ring with chamfered I.D. up (toward the planetary carrier). Refer to Fig. 93.

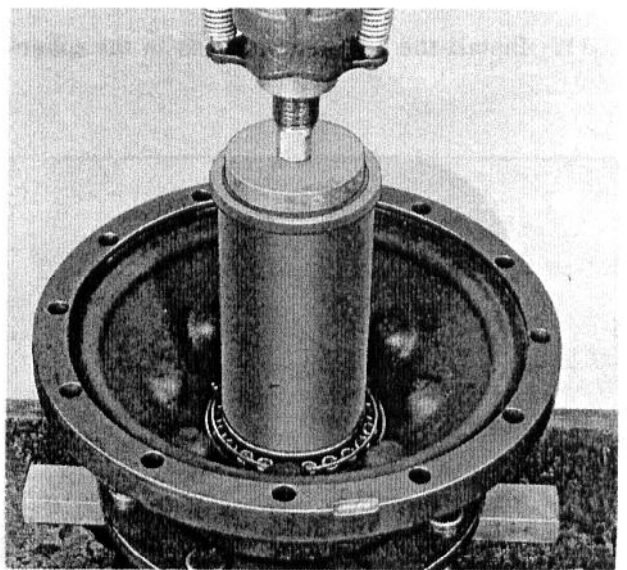


Fig. 100 - Wheel Axle Bearing Cone Installation

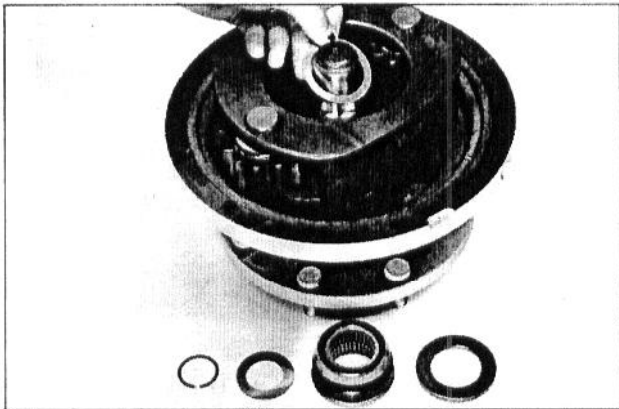


Fig. 101 - Pre-Load Shim Installation

6. Press the wheel axle out, forcing the split ring into contact with both the bearing cone and the axle splines.

IMPORTANT: This is necessary to accurately set bearing pre-load.

7. Place the planetary carrier on the wheel axle. (Install the snap ring, if used.)

8. Place the wheel axle sleeve on the wheel axle.

9. Install several shims (about .040" total). This is necessary to provide a clearance when using Special Tool MFN 267Y for determining planetary bearing pre-load. Refer to Fig. 101.

10. Install the thrust bearing race and the radial thrust bearing. Refer to Fig. 102.

11. Install the 68 loose needles in the spher-

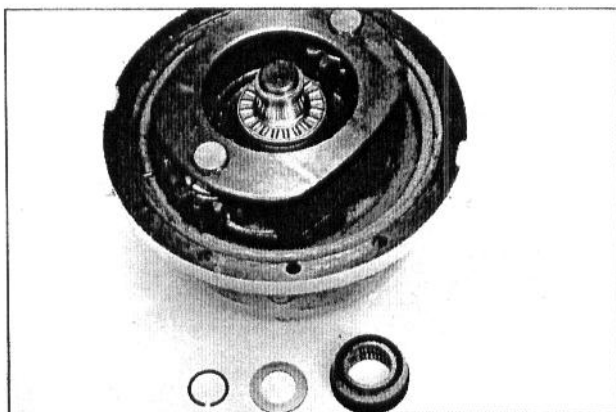


Fig. 102 - Radial Thrust Bearing Installed

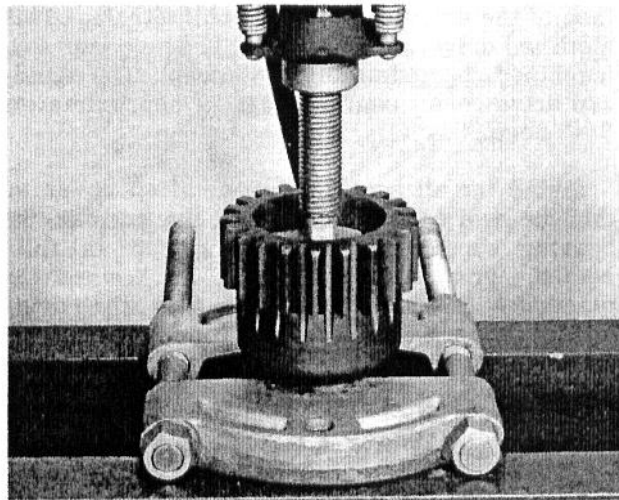


Fig. 103 - Spherical Bearing Cup Installation

ical bearing cone in two rows of 34 each, separated by a spacer washer. Use petroleum jelly or bearing grease to hold the needle bearings in place. Install a spacer washer on the top and bottom.

12. Install the spherical bearing cone on the end of the wheel axle shaft.

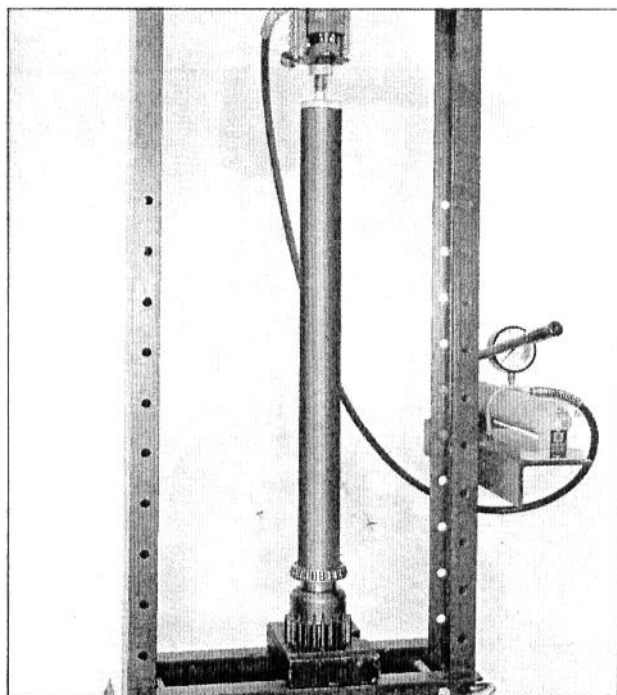


Fig. 104 - Axle Bearing Cone Installation

13. Install the thrust washer and the snap ring.

14. Install the spherical bearing cup in the main axle shaft and install the axle tapered bearing cone. Refer to Figs. 103 and 104.

15. Check and adjust bearing pre-load and install as described under those headings.

PLANETARY CARRIER BEARING PRE-LOAD ADJUSTMENT

This pre-load should be checked each time the planetary assembly is removed. Pre-load *must* be checked whenever new components are installed in the planetary assembly, or if the rear wheel may be moved in and out with a noticeable sound.

NOTE: Movement can indicate a total lack of pre-load, but will not indicate low pre-load.

1. Remove the main axle shaft and the axle housing bearing cup. Remove the ring gear gaskets and clean gasket seats, ring gear and housing mating surfaces.

2. Bolt the ring gear to the drive cover with four (4) equally spaced bolts and tighten to 50-55 ft.-lbs. torque.

3. Place Special Tool MFN 267Y over a hole in a solid bench or between two benches to allow the axle shaft to be placed thru the Special Tool.

4. Fit the planetary bearing cup into the small seat in the tool, slide the axle shaft thru the hole in the tool and seat the bearing cup in the bearing cone. Refer to Figs. 105 and 106.

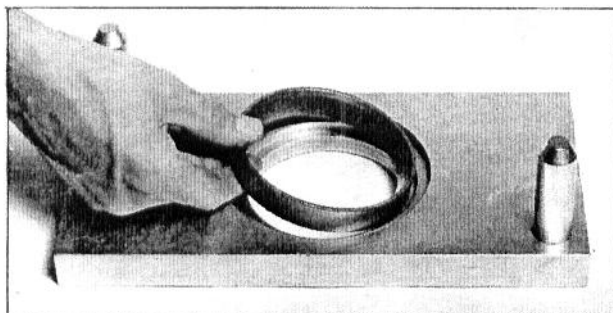


Fig. 105 - Bearing Cup Position in Special Tool MFN-267Y

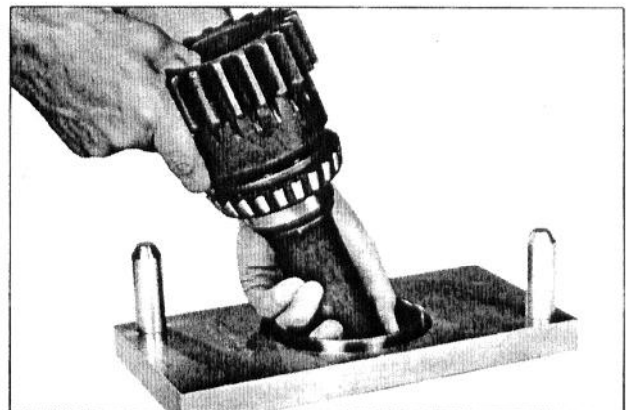


Fig. 106 - Axle Shaft Positioning in MFN-267Y

5. Fit the carrier assembly into the bearing and tool. Rotate the assembly back and forth to seat the bearings. Attempt to center the spherical bearing at right angles to the gauge posts. Refer to Fig. 107.

6. Fit a feeler gauge between each of the gauge posts and the ring gear. Use the same thickness feeler gauge on each side to measure the gap. This gap should be .004". Rock the assembly around, with the feeler gauges in position, to be certain that you are using the thickest gauges possible.

NOTE: The assembly may be tipped away from you and bind on the feeler gauges, giving an inaccurate reading.

7. If the gap is not .004", then remove or install additional shims under the radial bearing race to arrive at the correct gap. This gap must be set quite accurately when pre-load is determined with this tool. The gap of .004"

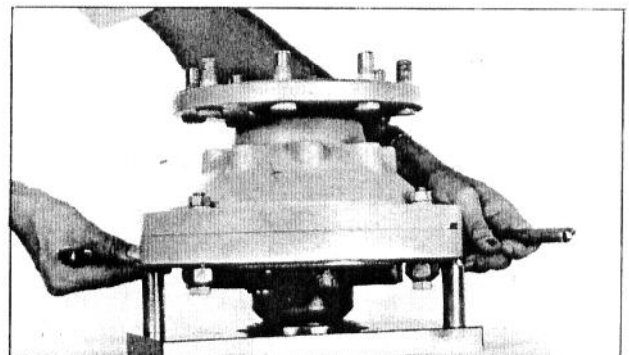


Fig. 107 - Measuring Gap Between Ring Gear and Gauge Posts

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provides a maximum of .009" pre-load when this tool is used.

If the "screwdriver and dial indicator" method is used for pre-load determination (with the assembly installed on the tractor) set within the pre-load range of .001" to .005". On new bearings particularly, the pre-load should be close to .005" as possible.

NOTE: Pre-load on planetaries with a heavy-duty outer bearing is .001" to .008". Use the same procedures and feeler gauge size, given here using MFN 267Y.

INSTALLATION

1. Determine axle planetary bearing pre-load as described under that heading. Bearing pre-load is .004" thru .009" when using Special Tool MFN 267Y.

2. Install the inner planetary bearing cup in the axle housing and install a new outer axle shaft oil seal.

3. Carefully install the axle shaft, taking care not to damage the oil seal. Release the brake.

4. Install a new ring gear gasket in the axle housing and install the ring gear on the retaining bolts.

5. Install a new ring gear gasket in the drive cover and install the axle planetary assembly. If the drive cover has a drain plug, be sure that it is pointed down and is securely tightened.

6. Install the attaching lockwashers and nuts and tighten to 50-55 ft.-lbs. torque. Refill the planetary case to the oil fill plug level with the proper lubricant.

NOTE: Install lockwashers if none were present when the planetary was removed.

7. Install the wheel and remove blocking and jacks.

DISC BRAKES (7")

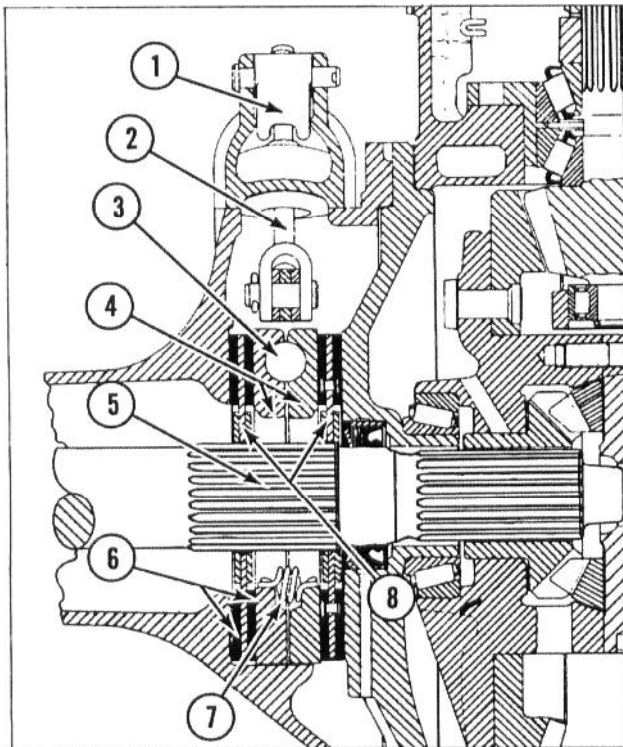


Fig. 1 - Brake Assembly

- | | | |
|-------------------|--------------------|---------------------------|
| 1. Brake Lever | 4. Actuating Discs | 6. Brake Linings |
| 2. Pull Rod | 5. Axle Shaft | 7. Actuating Disc Springs |
| 3. Actuating Ball | | 8. Brake Discs |

DESCRIPTION

The 7" double disc brakes are located in each axle housing near the differential. An oil seal at each end of the axle shaft prevents oil from entering the inside of the axle housing. One seal is located in the carrier plate, the other in the axle housing. Models with differential lock also have an oil seal around the differential lock shaft.

Machined surfaces on the carrier plate and the axle housing serve as the stationary brake surfaces. The two brake discs are moveably splined to each axle shaft and are separated by the brake actuating disc. The actuating disc is loosely held by lugs in the axle housing. The actuating disc expands and engages the brake when the two halves are counter-rotated by the pull rod and linkage. This expansion is caused by balls that are forced to roll up sunken ramps in the actuating discs.

The brake pull rods extend thru each axle housing, and are operated by the brake levers.

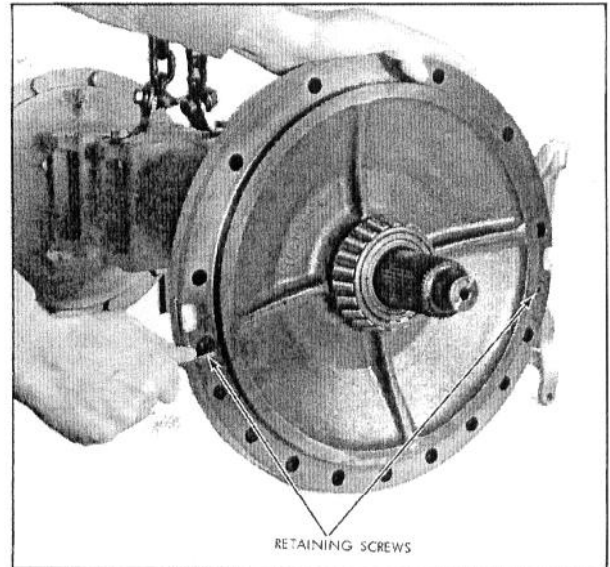


Fig. 2 - Carrier Plate Retaining Screw Removal or Installation

Various brake lever arrangements are used to operate the pull rod, depending on tractor model. The brake lever may be actuated mechanically, hydraulically, or by both.

In order to reach the brakes, the axle housing and the differential carrier plate must be removed. Refer to the specific tractor model for axle housing assembly removal and installation procedures. Detail procedures for removing the carrier plate are found in the "Car-

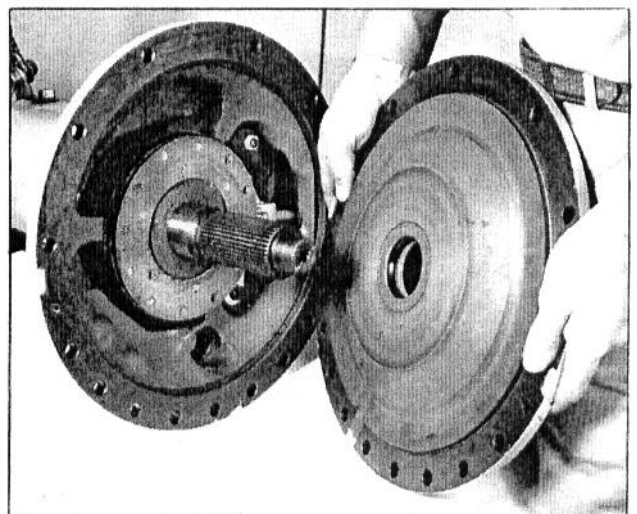


Fig. 3 - Carrier Plate Removal or Installation

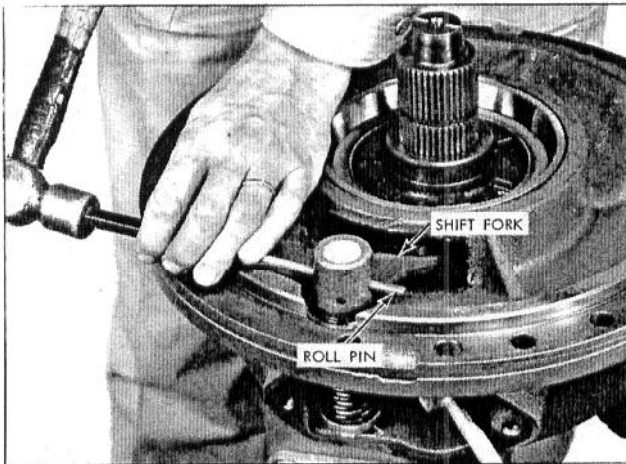


Fig. 4 - Differential Lock Shift Fork Pin Removal

rier Plate Assembly" heading under this Divider Tab.

DISASSEMBLY

1. Remove the carrier plate retaining screws and carrier plate. Refer to Figs. 2 and 3. Remove the differential lock carrier plate as shown in Figs. 4 and 5.

2. Remove the inner brake disc.

NOTE: Do not allow oil or grease to touch the brake contact surfaces.

3. Remove the brake adjusting nut and ad-

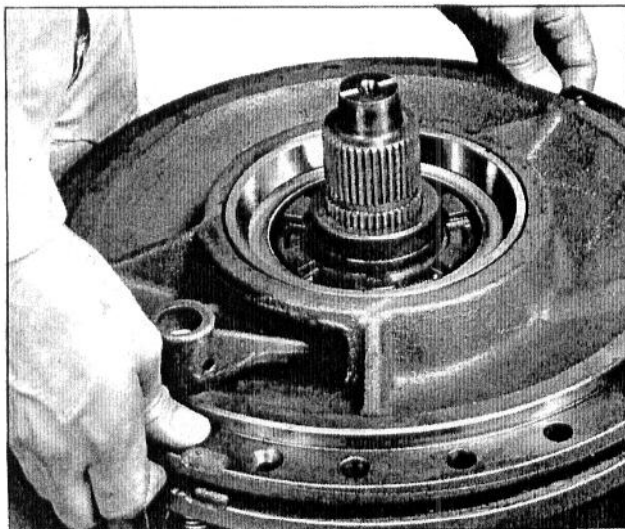


Fig. 5 - Carrier Plate (Diff. Lock) Removal or Installation

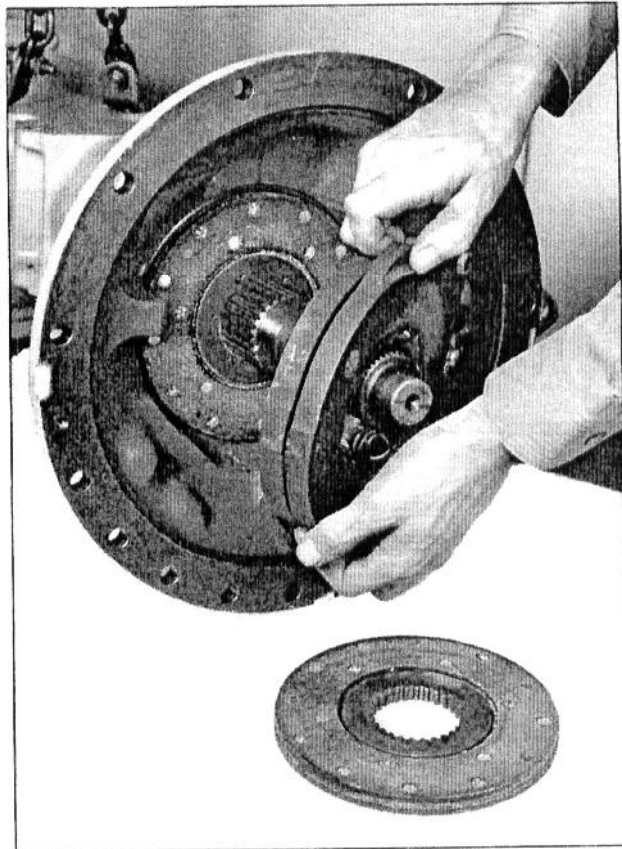


Fig. 6 - Actuating Disc Assembly Removal or Installation

justing block, and remove the brake actuating disc assembly. Refer to Fig. 6.

4. Remove the outer brake disc.

INSPECTION

1. Examine the disc linings for damage, loose rivets, wear and oil. Reline the discs, or install new discs with bonded linings, if required.

2. Examine the disc splines for damage and excessive wear. Install new discs if necessary.

3. Check the actuating linkage for worn, sticking, or broken parts.

4. Examine the brake engaging faces on the carrier plate and the axle housing for scoring, warping, and cracks. Replace the axle housing or carrier plate if necessary.

5. Examine the axle shaft splines for damage

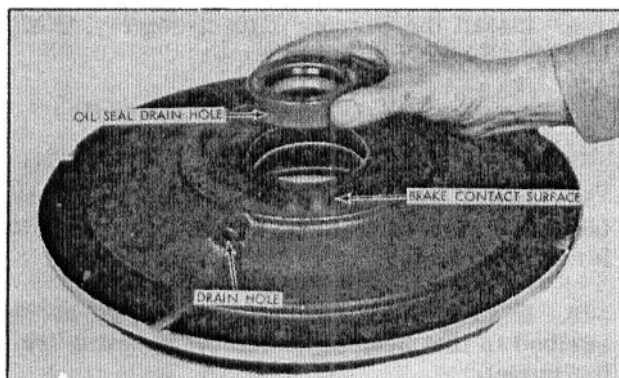


Fig. 7 - Carrier Plate Drain Hole

or excessive wear. Replace the shaft if necessary.

6. Examine the actuating disc faces for scoring, overheating and excessive wear. Replace if necessary.

7. Examine the brake side of the carrier plate for oil leakage from the center housing. Replace the oil seal, if needed, as described under the "Carrier Plate Assembly" heading in this Divider Tab. Be sure that the oil drain hole is not plugged. See Fig. 7.

8. Examine the inside of the axle housing for oil leakage from the axle planetary assembly. If oil is present, replace the oil seal at the outer end of the axle housing. Refer to "Axle Shaft Servicing" in this Divider Tab.

ACTUATING DISC ASSEMBLY SERVICING

Refer to Fig. 8.

1. Remove the cotter pin and clevis pin attaching the pull rod to the yoke link.
2. Remove the three actuating disc springs.
3. Separate the actuating disc halves and remove the five steel balls.
4. Examine the steel balls, ball seats, contact faces and actuating linkage for excessive wear, rust, overheating, dirt and damage. Replace the necessary parts.
5. Install the five steel balls in the recesses in one of the actuating discs.
6. Place the other actuating disc on top (ball

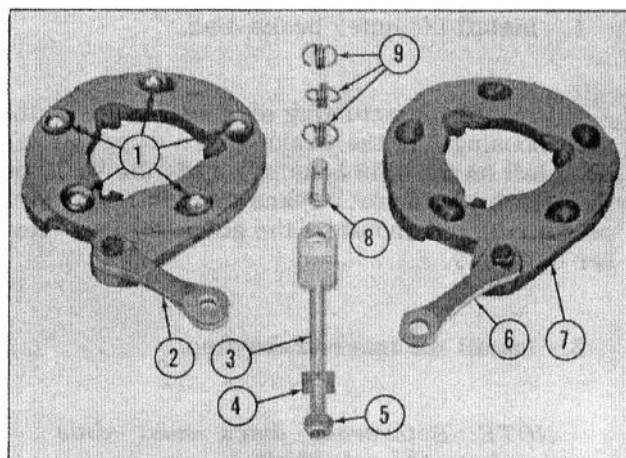


Fig. 8 - Brake Actuating Disc Assembly

- | | | |
|----------------|--------------------|--------------------------|
| 1. Steel Balls | 4. Adjusting Block | 7. Actuating Disc |
| 2. Yoke Link | 5. Adjusting Nut | 8. Clevis Pin |
| 3. Pull Rod | 6. Straight Link | 9. Actuating Disc Spring |

seats down) with the actuating disc lug to the right of the lower lug.

7. Install three *new*, actuating disc springs.
8. Install the clevis pin and cotter pin.

INSTALLATION

Replace the necessary brake parts and install new axle shaft oil seals if needed. *Be careful not to touch brake surfaces with oil or grease.*

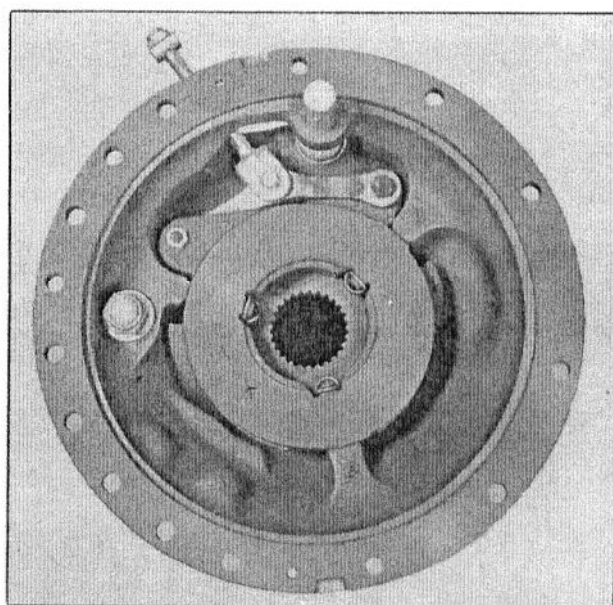


Fig. 9 - Actuating Disc Assembly in Position

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DISC BRAKES (7")

1. Install the outer brake disc.

2. Install the actuating disc assembly in the axle housing. If the brake lever support has been left on the axle housing, slide the pull rod thru the brake lever. Place the adjusting block on the pull rod and start the adjusting nut. Refer to Fig. 9.

3. Install the inner brake disc.

NOTE: Both brake discs must slide freely on the axle shaft.

4. Install the carrier plate assembly. Refer to Figs. 3 and 5.

NOTE: Do not damage the oil seal(s) located in the carrier plate.

5. Install, and tighten, the carrier plate retaining screws to 15 to 18 ft.-lbs. torque. Refer to Fig. 2.

6. Install the axle housing assembly as described in that heading under the specific tractor model.

7. Adjust the brakes as described under the specific tractor model.

STEERING SYSTEM

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STEERING PUMP	3
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FILLING THE STEERING SYSTEM RESERVOIR

1. Position steering wheels in a straight forward direction.

2. Remove filler plug (diesel models) or cover (gas models) and fill reservoir with oil conforming to MF specifications M-1110 until oil level is even with the filler opening (diesel models) or 1/2 inch over filter (gas models).

3. Replace filler plug and operate steering wheel in both directions to insure the entire system is filled. Do not race engine or turn steering wheel with plug removed.

4. Repeat these operations until the oil level remains even with the filler opening.

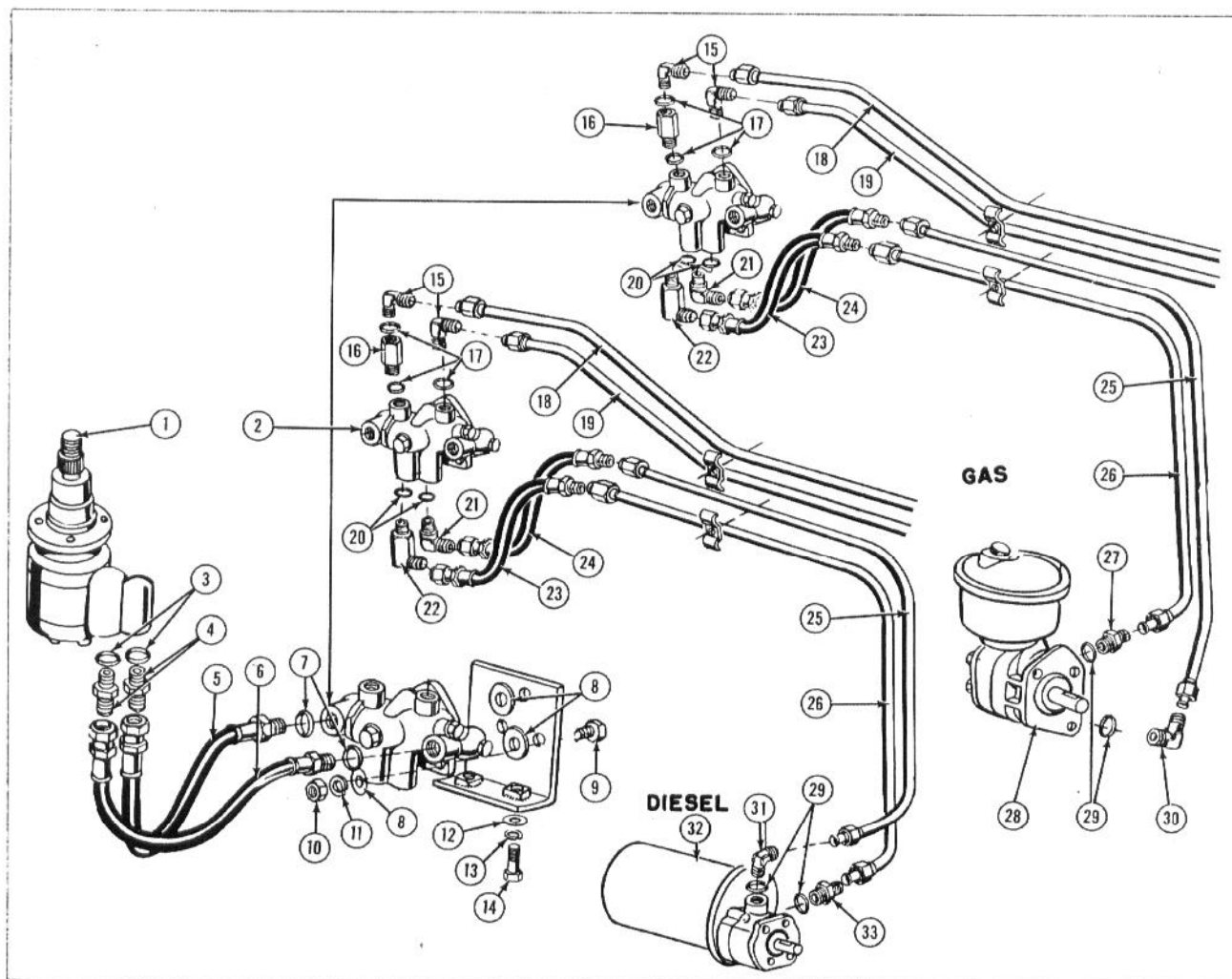


FIG. 1 — HYDROSTATIC STEERING SYSTEM

- | | |
|---------------------------------------|--|
| 1. Hydrostatic Hand Pump | 18. Tube Assembly — Valve to Right Turn Port |
| 2. Steering Valve | 19. Tube Assembly — Valve to Left Turn Port |
| 3. "O"-Rings | 20. "O"-Rings |
| 4. Connector | 21. Elbow Assembly — Pressure Line to Valve |
| 5. Hose Assembly — Hand Pump to Valve | 22. Elbow Assembly — Return Line to Valve |
| 6. Hose Assembly — Hand Pump to Valve | 23. Hose Assembly — Return |
| 7. "O"-Rings | 24. Hose Assembly — Pressure |
| 8. Flatwasher | 25. Tube Assembly — Pressure (Pump to Valve) |
| 9. Bolt (Bracket to Valve) | 26. Tube Assembly — Return (Valve to Pump) |
| 10. Nut | 27. Connector Assembly |
| 11. Lockwasher | 28. Pump Assembly — Engine Driven (Gas) |
| 12. Flatwasher | 29. "O"-Rings |
| 13. Lockwasher | 30. Elbow Assembly |
| 14. Bolt (Bracket to Housing) | 31. Elbow Assembly |
| 15. Elbow (Valve to Cylinder Line) | 32. Pump Assembly — Engine Driven (Diesel) |
| 16. Reducer (Valve to Elbow) | 33. Connector Assembly |
| 17. "O"-Rings | |

STEERING PUMP

REMOVAL (Gasoline and Diesel Models)

1. Disconnect hydraulic lines, remove mounting bolts, remove pump from unit and plug ports and lines.

2. Remove pump mounting gasket from timing gear housing (or mounting surface of pump) and thoroughly clean the mounting surface.

INSTALLATION (Gasoline and Diesel Models)

1. Apply a thin coating of petroleum jelly to pump mounting surface on timing gear housing and place new pump gasket into position.

2. Install pump and tighten mounting bolts to 30-35 ft.-lbs. torque.

3. Remove plugs from ports and lines. Connect lines to their respective ports. Fill the reservoir as explained under the heading "Filling the Steering System Reservoir".

DISASSEMBLY (Gasoline Model)

Refer to Fig. 2.

1. Remove cover from reservoir.

2. Remove retainer bolt spring, No. 4, seal-cup, No. 5, filter element, No. 6, and sealing cup, No. 7.

3. Remove retaining stud, No. 8, screw, No. 9, and reservoir from pump body.

4. Remove snap ring securing drive gear, No. 26, to leading gear shaft and pull gear and key from shaft.

5. Remove bolts securing pump assembly together.

6. Separate assembly and remove gears, bearings and seals.

7. The internal relief valve has been pre-set by the manufacturer to open at 1500 psi and should not be disassembled unless a malfunction of the valve has been experienced. The valve may then be disassembled, as follows:

a. Secure the rear body, No. 24, in a holding fixture.

b. Drill a small pilot hole into the center of the expansion plug, No. 19, and insert a sharp pointed tool into the hole to pry out the plug.

NOTE: Use care when drilling the pilot hole to prevent damage to the port threads and the setscrew.

c. Remove the relief valve setscrew, No. 20, while counting the number of turns to aid in reassembly.

d. Take out the relief valve spring and remove the body from the holding fixture.

e. Tap the relief port against a wooden block to remove the ball retainer and the relief valve ball.

REASSEMBLY (Gasoline Model)

1. Saturate new "O"-ring seals, gasket seals and drive gear shaft seal with clean hydraulic oil. Apply a film of clean hydraulic oil to the metal parts of the pump.

2. Apply a light coating of Permatex #3 form-a-gasket to bore of drive gear shaft seal in the front body. Press new drive gear shaft seal into position flush to surface of bore, and stake in three places.

3. Install bearings, No. 17, on the gear shaft assemblies, toward the front body ends of the shafts. Check that tapers of bearings are toward the gear faces.

4. Place new gasket seals into their respective grooves in the front body.

5. Insert the drive gear shaft, No. 18 through the shaft bore in the front body using care to prevent damage to the shaft seal. Check that

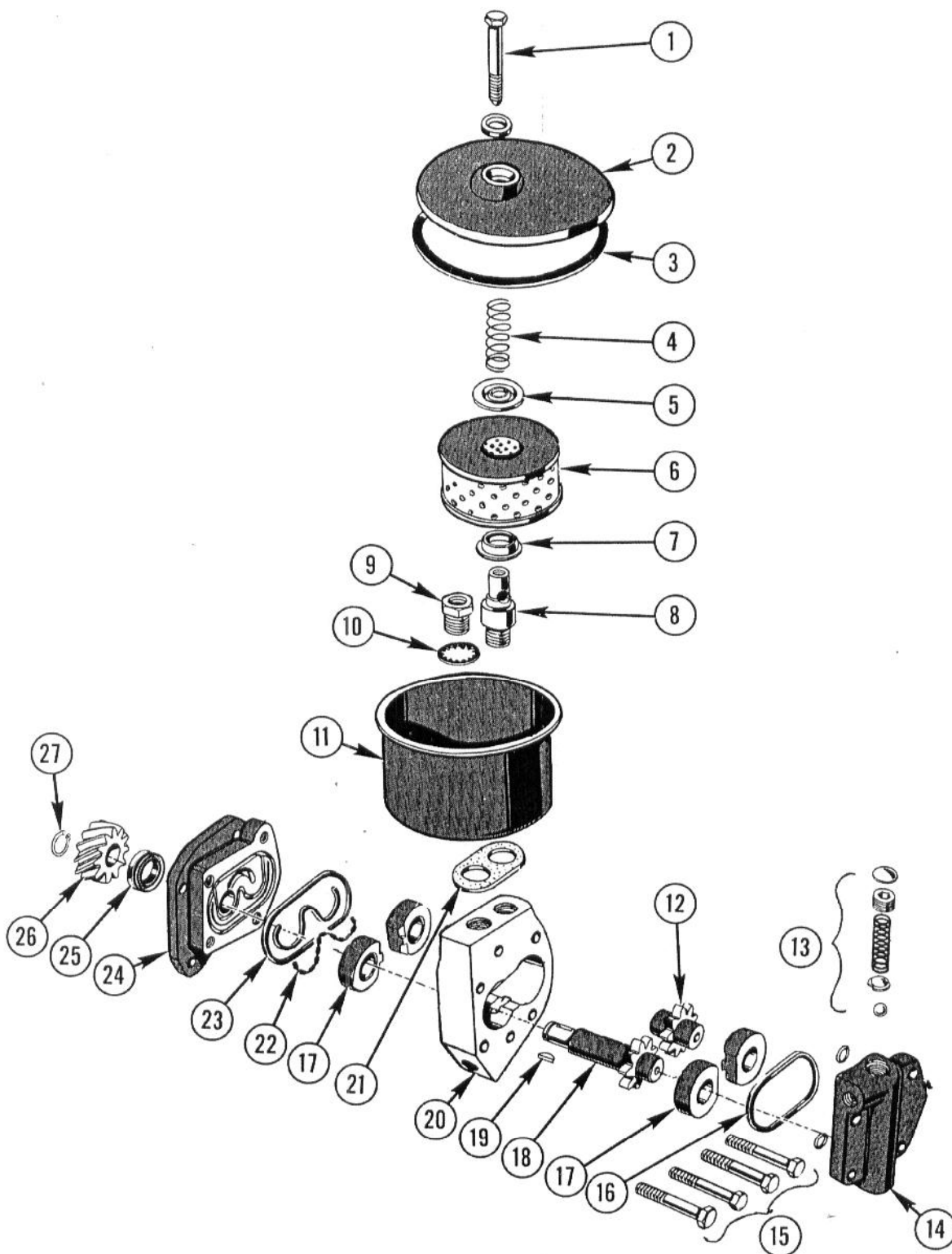


FIG. 2 — EXPLODED VIEW OF ENGINE-DRIVEN STEERING PUMP — GAS

- | | | | | |
|--------------------------|-------------------|------------------|--------------------|---------------------------|
| 1. Cover Bolt and Washer | 7. Sealing Cup | 12. Follow Gear | 17. Bushings (4) | 22. Seal Spacer |
| 2. Reservoir Cover | 8. Retaining Stud | 13. Relief Valve | 18. Leading Gear | 23. Gasket Seals |
| 3. Cover Gasket | 9. Special Screw | 14. Rear Cover | 19. Shaft Key | 24. Front Cover |
| 4. Retainer Bolt Spring | 10. Washer | 15. Cover Screws | 20. Center Body | 25. Drive Gear Shaft Seal |
| 5. Sealing Cup | 11. Reservoir | 16. Gasket Seal | 21. Sealing Gasket | 26. Drive Gear |
| 6. Filter Element | | | | 27. Snap Ring |

the shaft bearings are flush against surface of front body.

6. Place the center body, No. 20, over the gear shaft assemblies with the port openings in the facing surface of the center body away from the front body. Position the center body over the bearings and against the facing surface of front body with the reservoir openings upward when the pump is reinstalled on the tractor.

7. Install bearings, No. 17, over the gear shaft assemblies with the taper toward the gear faces. Check that bearings are flush with the facing surfaces of the center body.

8. Place new gasket seal and "O"-ring seals into their respective grooves in the rear body, No. 14.

9. Position the rear body against the bearings and the facing surface of the center body. Check that relief valve is in the same direction of the reservoir ports.

10. Align the bolt holes through the body assemblies and install tie bolts. Tighten the tie bolts evenly to 28-30 ft.-lbs. torque.

11. If the relief valve has been disassembled, reassemble the valve to its port in the rear body, as follows:

a. Drop relief valve ball into its seat in the rear body, No. 14.

b. Insert ball retainer and relief valve spring into the opening.

c. Thread the relief valve setscrew into the relief opening the same number of turns counted during the disassembly of the valve.

12. Secure the pump in a holding fixture with the reservoir openings upward.

13. Apply a thin coating of heavy grease to the surface of the center body, around the reservoir openings, and place the new sealing gasket, No. 21, in position.

14. Place the reservoir against the sealing gasket while aligning the openings.

15. Install retaining stud, and screw, through the reservoir and thread to the pump body.

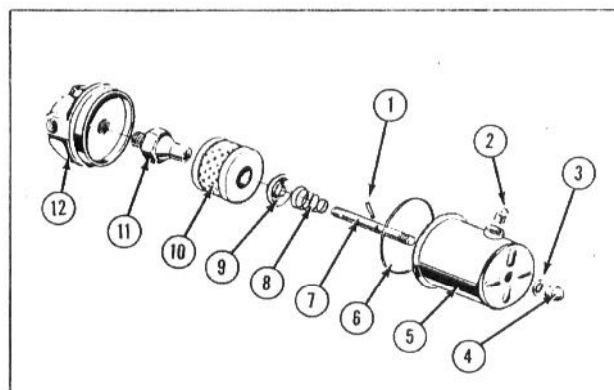


FIG. 3 — EXPLODED VIEW OF PUMP RESERVOIR — DIESEL

- | | |
|------------------------------------|------------------------|
| 1. Spring Retaining Pin | 7. Center Stud |
| 2. Filler Plug | 8. Element Spring |
| 3. Nut Seal | 9. Seating Cup |
| 4. Retaining Nut — Reservoir Cover | 10. Filter Element |
| 5. Reservoir Cover | 11. Reservoir Retainer |
| 6. "O"-Ring — Reservoir | 12. Pump Body |

Tighten the screw and retaining stud evenly to secure the reservoir to the pump and to prevent leaks.

16. Rotate the pump drive shaft by hand and check for freedom of movement. (The pump may have a certain amount of drag, but should rotate freely after a short period of turning.)

17. Install key into its groove and slide pinion gear, No. 26, over the end of the pump drive shaft. Install new snap ring.

DISASSEMBLY (Diesel Model)

1. Drain the reservoir and clean the outside of the pump.

2. Remove acorn nut, washer, reservoir and "O"-ring. Remove stud, spring and filter.

3. Remove snap ring, drive gear and key.

4. Remove bolts securing pump bodies together and separate the front body from the center body as shown in Fig. 4. Remove the seals and gaskets as shown in Fig. 5.

5. Separate the center body from the rear body as shown in Fig. 6. Remove the two gears and four bearings from the center body and the "O"-rings and seal from the rear body.

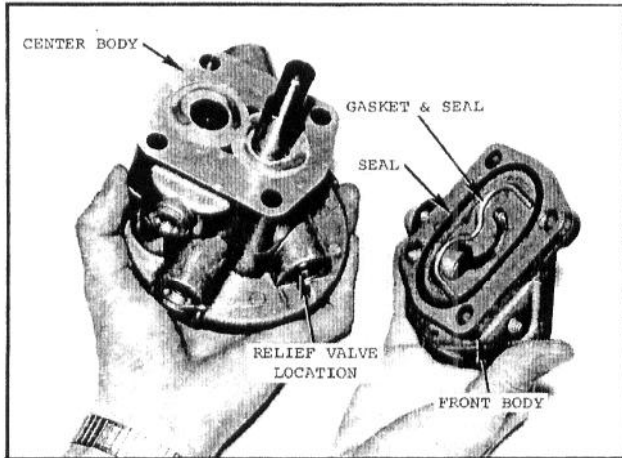


FIG. 4 — FRONT BODY REMOVAL

6. Inspect the components for wear and damage. Replace all "O"-rings, seals, gaskets and the filter element with new components.

7. The relief valve has been pre-set by the manufacturer to open at 1500-1600 psi and should not be disassembled unless a malfunction of the valve has been experienced. If servicing is necessary, proceed as follows:

- a. Remove the plug sealing the opening.
- b. Unscrew the screw and remove the spring, retainer and ball.
- c. Inspect the components and install back in the cavity, making sure that retainer seats on ball properly.

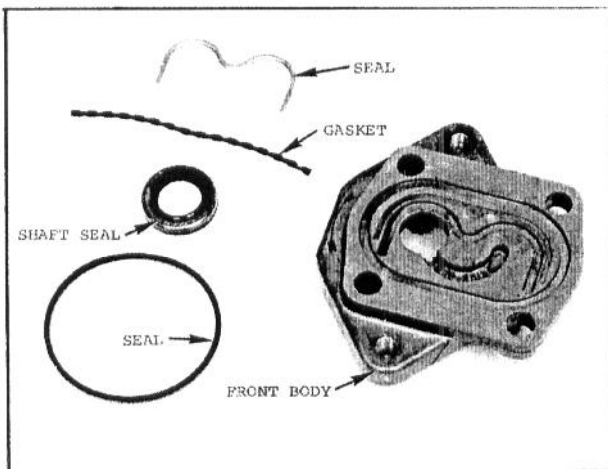


FIG. 5 — SEALS AND GASKET REMOVED FROM FRONT BODY

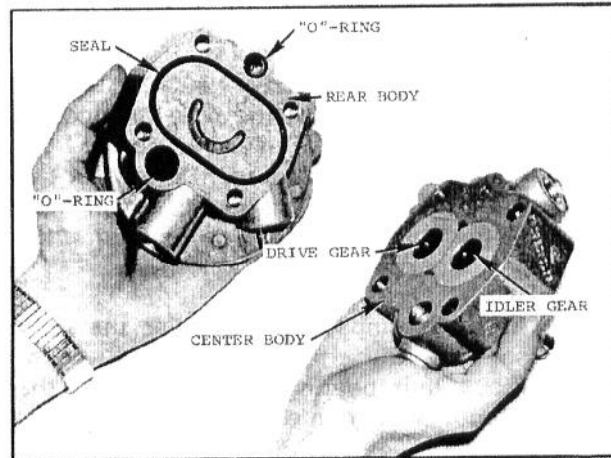


FIG. 6 — REAR AND CENTER BODY SEPARATED

REASSEMBLY (Diesel Model)

1. Coat bearings, gears and center body with clean hydraulic oil. Install two bearings into the center section so the chamfer will be next to the gears. See Fig. 7.

2. Install the two gears and the remaining two bearings in the center section (chamfer next to gears).

NOTE: Notched end of idler gear shaft is to be next to rear body.

3. Dip new "O"-rings and new seals into clean hydraulic oil and install into rear body. Position center body onto rear body as shown in Fig. 6.

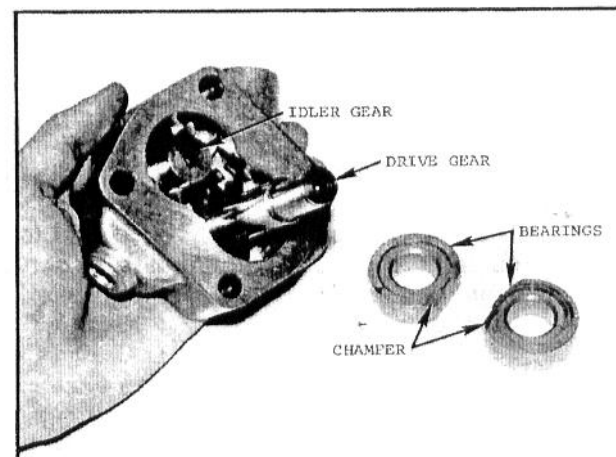


FIG. 7 — CENTER BODY DISASSEMBLED

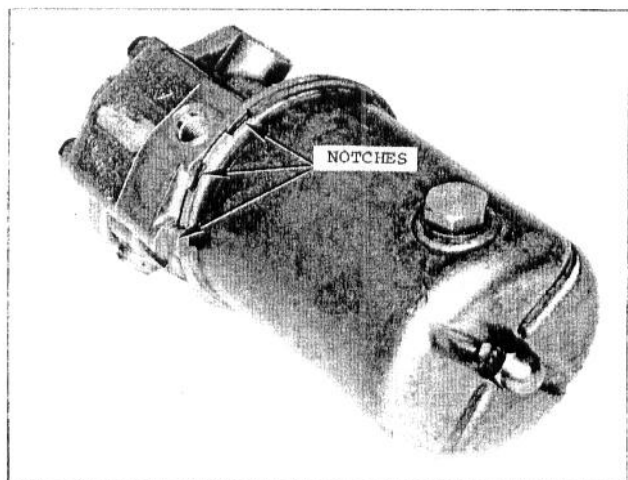


FIG. 8 — RESERVOIR LOCATING NOTCHES

4. Dip new seals into clean hydraulic oil and install into front body. See Figs. 4 and 5. Position front body onto center body and install capscrews. Tighten to 30 ft.-lbs. torque.

5. Remove burrs from drive shaft keyway, dip new seal in clean hydraulic oil and slide down the shaft. Gently tap seal into place.

6. Install key and drive gear. Install snap ring.

7. Install new reservoir "O"-ring onto outer edge of rear body. Install new filter, spring (large end next to filter) and stud.

8. Position reservoir on pump body as shown in Fig. 8, and install washer and acorn nut.

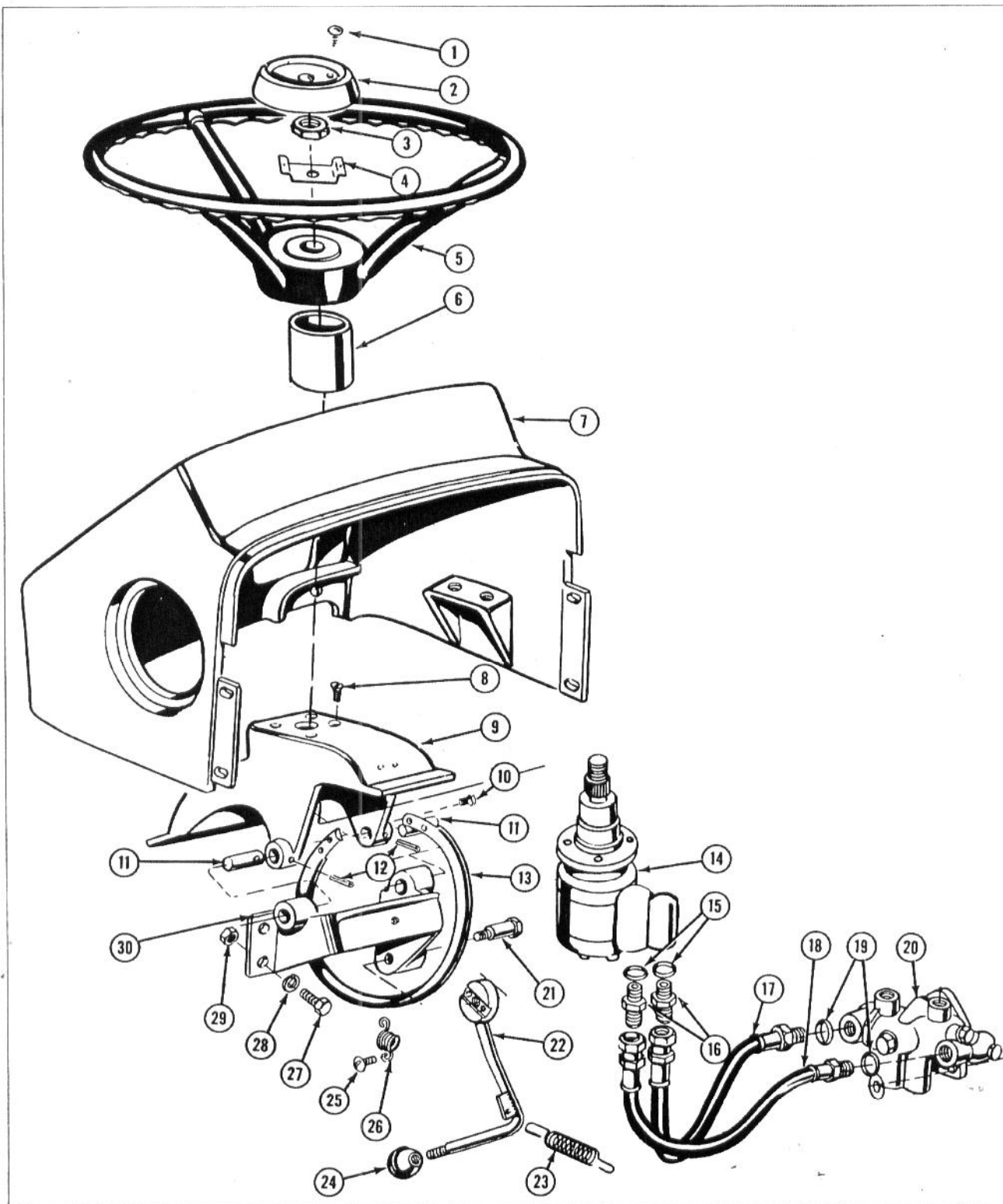


FIG. 9 — EXPLODED VIEW OF STEERING WHEEL AND PIVOT HOUSING

- | | | | | |
|--------------------------|---------------------------|---------------------------|--------------------------------|-----------------------------|
| 1. Screw — Cowl | 7. Instrument Housing | 13. Pivot Lock Rail | 19. "O"-Rings — Steering Valve | 25. Screw |
| 2. Steering Wheel Cowl | 8. Screw — Pump Retaining | 14. Hydrostatic Hand Pump | 20. Steering Valve | 26. Spring — Torsional Lock |
| 3. Nut — Wheel Retaining | 9. Pivot Housing | 15. "O"-Rings — Hand Pump | 21. Special Bolt | 27. Bolt — Pivot Support |
| 4. Cowl Bracket | 10. Bolt — Pivot Rail | 16. Connectors | 22. Pivot Lock Handle | 28. Lockwasher |
| 5. Steering Wheel | 11. Pins — Pivot Lock | 17. Hose — Pump to Valve | 23. Return Spring | 29. Nut |
| 6. Collar | 12. Pins — Retaining | 18. Hose — Pump to Valve | 24. Knob — Lock Handle | 30. Pivot Support |

HYDROSTATIC HAND PUMP

REMOVAL

1. Unscrew knob, No. 3, Fig. 10, from the pivot lock handle, No. 2, and remove the lower rear, LH side panel, No. 1, from the tractor.

2. Refer to Fig. 9, and remove the steering wheel, No. 5, as follows:

a. Remove the two screws, No. 1, fastening the steering wheel cowl, No. 2, to the cowl bracket, No. 4, and remove the cowl.

b. Remove nut, No. 3, securing the steering wheel to the shaft of the hand pump, No. 14, and lift the cowl bracket, No. 4, and steering wheel, No. 5, from the splined shaft. Remove collar, No. 6, from the pump shaft.

3. Open the tractor hood and disconnect hose assemblies, Nos. 17 and 18, from the steering valve, No. 20. Drain the oil from the hoses.

4. Place the pivot housing in the lowered position and insert a wooden block between the hand pump and the pivot support. (This procedure will prevent the hand pump from dropping downward when it is detached from the pivot housing.)

5. Remove the four screws, No. 8, to detach the hand pump from the pivot housing.

6. Remove the wooden block supporting the hand pump and place the pivot housing in the raised position. (Holding the protruding end of the pump shaft, while placing the pivot housing in the raised position, will prevent the pump from falling downward into the instrument support.)

7. Remove the pump from the tractor through the opening provided by the removal of the lower rear, LH side panel.

REINSTALLATION

1. Insert the hand pump through the opening, provided by the removal of the lower LH side panel, and place into position with the pump shaft through the pivot housing, No. 9, Fig. 9.

2. Check that the pump ports are toward

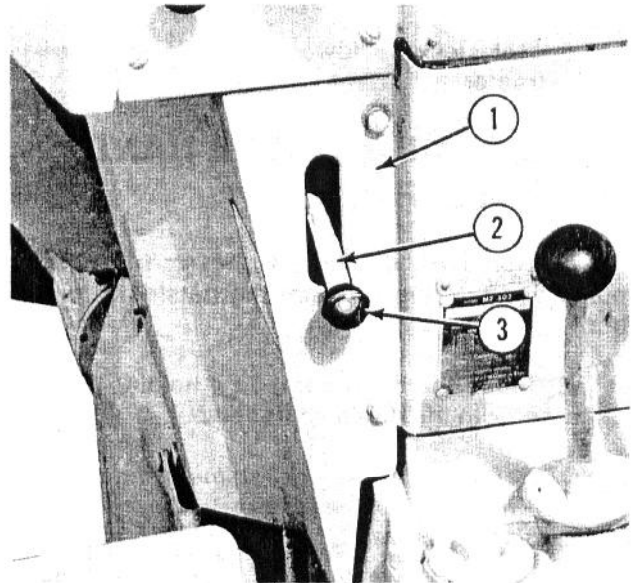


FIG. 10 — LOWER REAR SIDE PANEL — LEFT-HAND

1. L.H. Rear Side Panel 2. Pivot Lock Handle 3. Knob — Lock Handle

the front of the tractor and install the four attaching screws, No. 8, Fig. 9. Tighten the screws evenly to secure the pump to the pivot housing.

3. Install new "O"-rings, No. 19, Fig. 9, in the steering valve end ports and connect hose assemblies, Nos. 17 and 18, Fig. 9, to their respective ports. (Hose assembly, No. 18, connects to the valve port toward the front of the tractor and hose assembly, No. 17, connects to the valve port toward the rear of the tractor.)

4. Reinstall the steering wheel, as follows:

a. Slide collar, No. 6, Fig. 9, over the protruding end of pump shaft.

b. Position the steering wheel, No. 5, over the splines on the pump shaft and press firmly into position.

c. Install cowl bracket, No. 4, and thread steering wheel retaining nut, No. 3, to the pump shaft. Tighten nut to secure the steering wheel to the pump shaft.

d. Position the steering wheel cowl, No. 2, over the cowl bracket and align screw holes. Install two screws, No. 1, to fasten the cowl to the bracket.

5. After the system has been filled, inspect the hose connections and the pump body for evidence of leaks.

6. Reinstall the lower rear, LH side panel on the tractor.

DISASSEMBLY OF THE HAND PUMP (See Fig. 11)

1. Remove "O"-ring, No. 14, from hand pump and thoroughly clean the outside of pump body.

2. Place the hand pump in a holding fixture, or a vise, with the pump shaft down.

NOTE: Do not place the splined shaft between the jaws of the vise or use excessive clamping pressure.

3. Remove the hose assemblies, Nos. 17 and 18, Fig. 9, connectors, No. 16, Fig. 9, and "O"-rings, No. 15, Fig. 9, from the pump ports.

4. Refer to Fig. 11 and remove the seven bolts, No. 17, from the top of the pump cover plate, No. 16.

5. Lift the cover plate, No. 16, the body-to-cover spacer, No. 22, and spacer seal, No. 23, from the pump body.

6. Separate the two-piece rotor assembly, Nos. 18 and 19, and body-to-rotor spacer, No. 24, from the pump.

7. Lift upward on the rotor-to-pump shaft link, No. 20, to remove the cylindrical vane, No. 25, from the center of the pump body. (If the vane begins to bind against the pump body, turn the vane slightly and remove upward.)

8. Slide link pins, No. 21, from the link and remove the link from the cylindrical vane.

9. Remove the pump from the holding fixture and, with one hand over the pump cavity, lightly tap the protruding end of the pump shaft, No. 1, to remove it from the pump body, No. 4.

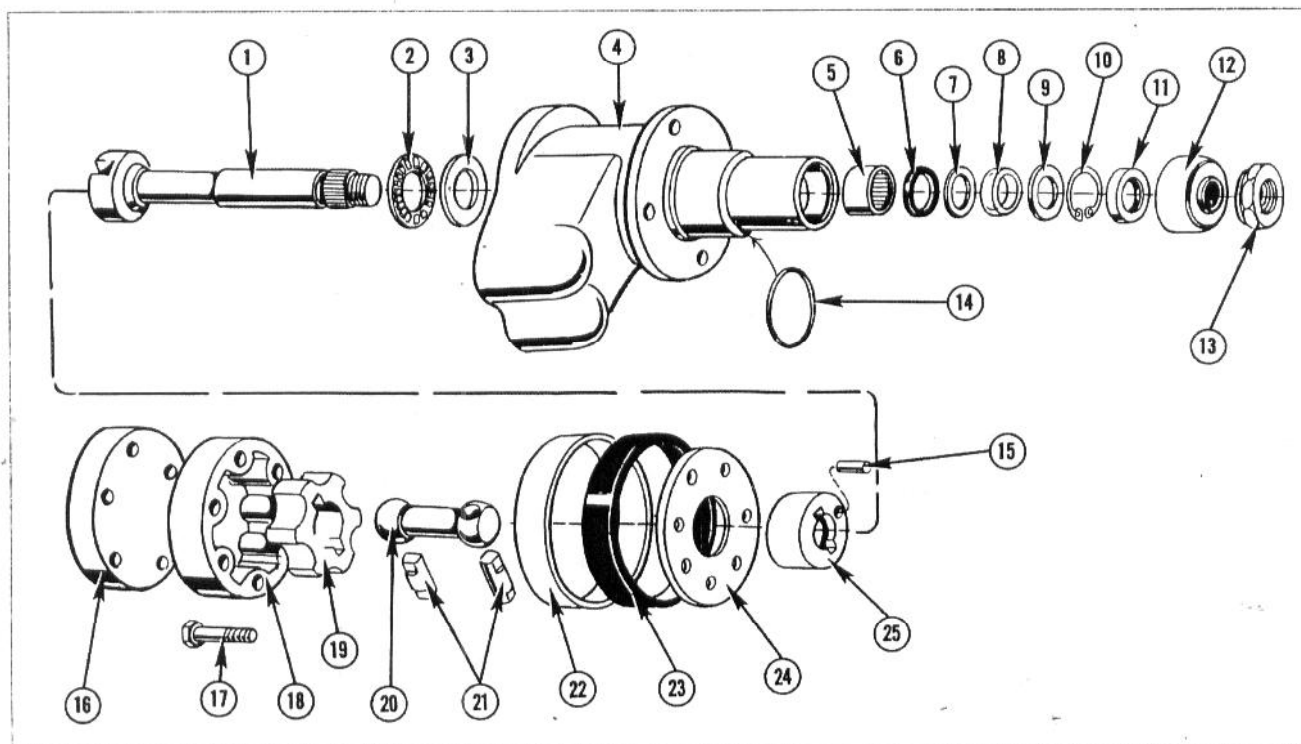


FIG. 11 — EXPLODED VIEW OF HYDROSTATIC HAND PUMP

1. Pump Shaft
2. Thrust Bearing
3. Bearing Race
4. Pump Body
5. Needle Bearing — Pump Shaft
6. "V" Packing

7. Back-Up Washer (Leather)
8. Nylon Washer (Red)
9. Washer — Seal Retaining
10. Snap Ring
11. Dust Seal (Felt)
12. Water Seal (Rubber)

13. Nut — Steering Wheel Retaining
14. "O"-Ring — Pump Body
15. Drive Pin — Commutator
16. Cover Plate
17. Bolts — Cover Plate
18. Rotor Assembly (Stator)

19. Rotor Assembly (Rotor Gear)
20. Link — Rotor to Pump Shaft
21. Link Pins
22. Spacer — Body to Cover
23. Seal — Body to Cover Spacer
24. Spacer — Body to Rotor
25. Cylindrical Vane

10. Slide the bearing race, No. 3, and the thrust bearing, No. 2, from the pump shaft.

11. Place the pump body on the bench and remove the rubber water seal, No. 12, and the felt dust seal, No. 11, from the shaft end of the pump.

12. Remove snap ring, No. 10, and take out the seal retaining washer, No. 9.

13. Remove red colored nylon washer, No. 8, leather back-up washer, No. 7, and "V" packing, No. 6.

14. Inspect the needle bearing, No. 5, for damage or loss of "needles".

15. If the needle bearing is damaged and requires replacement, insert a 1-1/8 O.D. brass sleeve into the shaft end of the pump body and tap the bearing from the pump.

NOTE: Use care to prevent damage to the milled surface of the pump and do not remove needle bearing, unless replacement is necessary.

INSPECTION OF THE HAND PUMP (See Fig. 11)

The shaft dust seal, No. 11, and pump shaft seal kit, comprising red nylon washer, No. 8, leather back-up washer, No. 7, and "V" packing, No. 6, should be replaced with new parts.

1. Thoroughly clean and dry all parts of the hand pump.

2. Inspect the pump body, No. 4, for damaged threads and obstructions to the external ports, obstructions to the internal ports and scoring to the inner milled surfaces.

3. Inspect the pump shaft, No. 1, for scratches and the end of the shaft for nicked or burred threads and damage to the splines.

4. Check the pump body "O"-ring, No. 14, and the rubber water seal, No. 12, for damage or deterioration.

5. Inspect the thrust bearing, No. 2, for excessive wear and check that snap ring is not broken.

6. Inspect cylindrical vane, No. 25, for excessive wear and obstructions and ensure that commutator drive pin, No. 15, is installed. (Cylindrical vane is not available as a separate item.)

7. Check the body-to-rotor spacer, No. 24, for scoring and obstructions to the openings.

8. Inspect the two piece rotor assembly, Nos. 18 and 19, for nicks or burrs.

NOTE: Rotor set must rotate without binding and rotor tip clearance must not accept .004 shim in any position of rotor with respect to stator.

9. Ensure that body-to-cover spacer, No. 22, and spacer seal, No. 23, are not distorted or damaged.

REASSEMBLY OF THE HAND PUMP (See Fig. 11)

The pump shaft dust seal and seal kit should be replaced with new parts.

1. If the needle bearing, No. 5, has been removed, replace the bearing, as follows:

a. Place the pump body, No. 4, in a holding fixture with the shaft end of body upward.

b. Insert the new needle bearing, No. 5, into the shaft end of the body and, using a 1-1/8 O.D. brass sleeve, tap the bearing until nearest edge of bearing measures approximately 15/32 of an inch from the inner tapered surface of the body.

2. Insert new "V" packing, No. 6, into the shaft end of the pump body with the cupped surface toward the needle bearing.

3. Install new leather back-up washer, No. 7, and red-colored nylon washer, No. 8, into the shaft end of pump. (Back-up washer is to be against "V" packing.)

NOTE: If the needle bearing, No. 5, has been replaced, check to ensure that nylon washer, No. 8, is even with the lowest edge of the inner tapered surface.

4. Insert the seal retaining washer, No. 9,

into the body, next to the nylon washer, and install snap ring, No. 10.

5. Position the pump in the holding fixture with the shaft end of body down.

6. Slide thrust bearing, No. 2, and bearing race, No. 3, over the pump shaft, No. 1.

7. Carefully insert pump shaft into pump body while piloting splined end of shaft through needle bearing, seal kit and retaining washer. Push the shaft firmly against its seat.

8. Install one link pin, No. 21, in the rotor-to-pump shaft link, No. 20. Insert the pump shaft link into pump while positioning the link pin into the slotted end of the pump shaft.

9. Check that commutator drive pin, No. 15, is installed in cylindrical vane, No. 25, and insert the vane into the body cavity. Slowly turn the cylindrical vane until the commutator drive pin drops into the slotted end of the pump shaft. (The drive pin is to be in the same slot as the link pin. When properly installed, the cylindrical vane will be flush with the milled surface of the pump body.)

10. Install the remaining link pin, No. 21, into the rotor-to-pump shaft link, No. 20, and place the body-to-rotor spacer, No. 24, against the milled facing surface of the pump body, with the center opening over the pump shaft link. Align the outer holes of the spacer with the tapped holes in the body.

11. Position the rotor assembly, Nos. 18 and 19, against the spacer while piloting the link pin into the inner slot of the rotor gear. Align bolt holes.

12. Place the spacer seal, No. 23, and body-to-cover spacer, No. 22, around the rotor assembly and position the cover plate, No. 16, over the spacer while aligning bolt holes.

13. Insert the seven tie bolts, No. 17, through the cover plate, the rotor plate, the outer holes of the body-to-rotor spacer and thread to the pump body. Tighten the tie bolts evenly to 18-22 ft.-lbs. torque.

14. Install new "O"-rings, No. 15, Fig. 9, in pump ports and reinstall connectors, No. 16, and hose assemblies, Nos. 17 and 18.

15. Remove pump from holding fixture and place on bench with pump shaft up.

16. Place new felt dust seal, No. 11, Fig. 11, over pump shaft and slide the seal downward into the pump body.

17. Slide the rubber water seal, No. 12, Fig. 11, over end of pump shaft and position around the shaft end of the pump body.

18. Rotate the protruding end of pump shaft by hand to check for freedom of movement and reinstall "O"-ring, No. 15, Fig. 11, around the shaft end of the pump.

HYDROSTATIC HAND PUMP — CHAR-LYNN

1. If the hand pump is going to be completely disassembled and reassembled, it will be necessary to clean all paint and surface contamination from the pump at the points of separation. This is extremely important at the metering end (Fig. 12) of the pump. Do not allow paint flakes or any other contamination to enter the precision-fitted components as they are being reassembled.

To clean the hand pump adequately, insure that port plugs are installed, then wire brush around the metering area (Fig. 12). Rinse in solvent and blow away all surface contamination before disassembly is begun.

When reassembling, clean the components

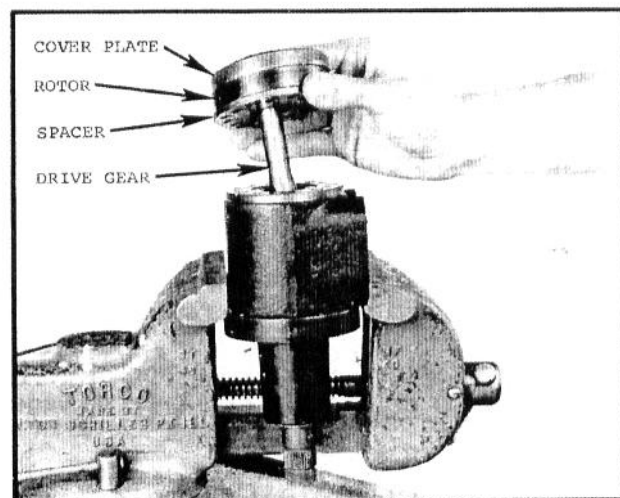


FIG. 12 — REMOVING THE METERING END