

PART 2. FRONT AXLE ASSEMBLIES MF 50 AND 65 TRACTORS

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SERVICING MF 50 & 65 MULTI-PURPOSE, STANDARD, HI-ARCH, AND UTILITY FRONT AXLE ASSEMBLIES

Similarities between front axle assemblies of the Multi-Purpose, Standard, Hi-Arch and Utility description permit servicing procedures of these assemblies to be combined and discussed as one.

Single wheel front axle assemblies and twin wheel front axle assemblies each deserve separate discussions of servicing procedures. The procedures concerning axles of this type will include servicing the front pedestal and support assemblies.

Consult the Parts Book for information regarding the inter-change features of parts.

REMOVING FRONT AXLE AS A UNIT

Front axle assemblies of this description are removed as a unit when complete disassembly is not necessary.

Support the tractor with front wheel slightly touching the ground, refer to Fig. 1, and remove:

1. Lower grill panel.
2. Lower steering arm, No. 3, from pedestal shaft.
3. Thrust plate, No. 20, and shims from end of front pivot pin.
4. Front pivot support.

5. Front axle assembly by rolling the unit forward and out from tractor (a floor jack supporting the front axle center member facilitates easy handling when following this procedure). See Fig. 5.

Install the assembly as a unit by reversing the procedures for removing.

REMOVING FRONT AXLE TO DISASSEMBLE

When front axles of this description are to be completely disassembled, remove the assemblies as follows:

1. Slightly loosen the wheel lug nuts.
2. Support tractor with front wheels clearing the ground.
3. Remove:
 - a. Front wheels.
 - b. Lower grill panel.
 - c. Grease fittings.
 - d. Tie rods ends, Nos. 1 and 9, from spindle steering arms, Nos. 10 and 27. Fig. 1.
 - e. Tie rods end No. 6, from main steering arm, No. 3.
 - f. Main steering arm from pedestal shaft.
 - g. Both R.H. and L.H. axle extension assemblies, Nos. 15 and 25, Fig. 1, (if so equipped).
 - h. Pivot thrust plate, No. 20, and shims, No. 21.

NOTE: Save the shims.

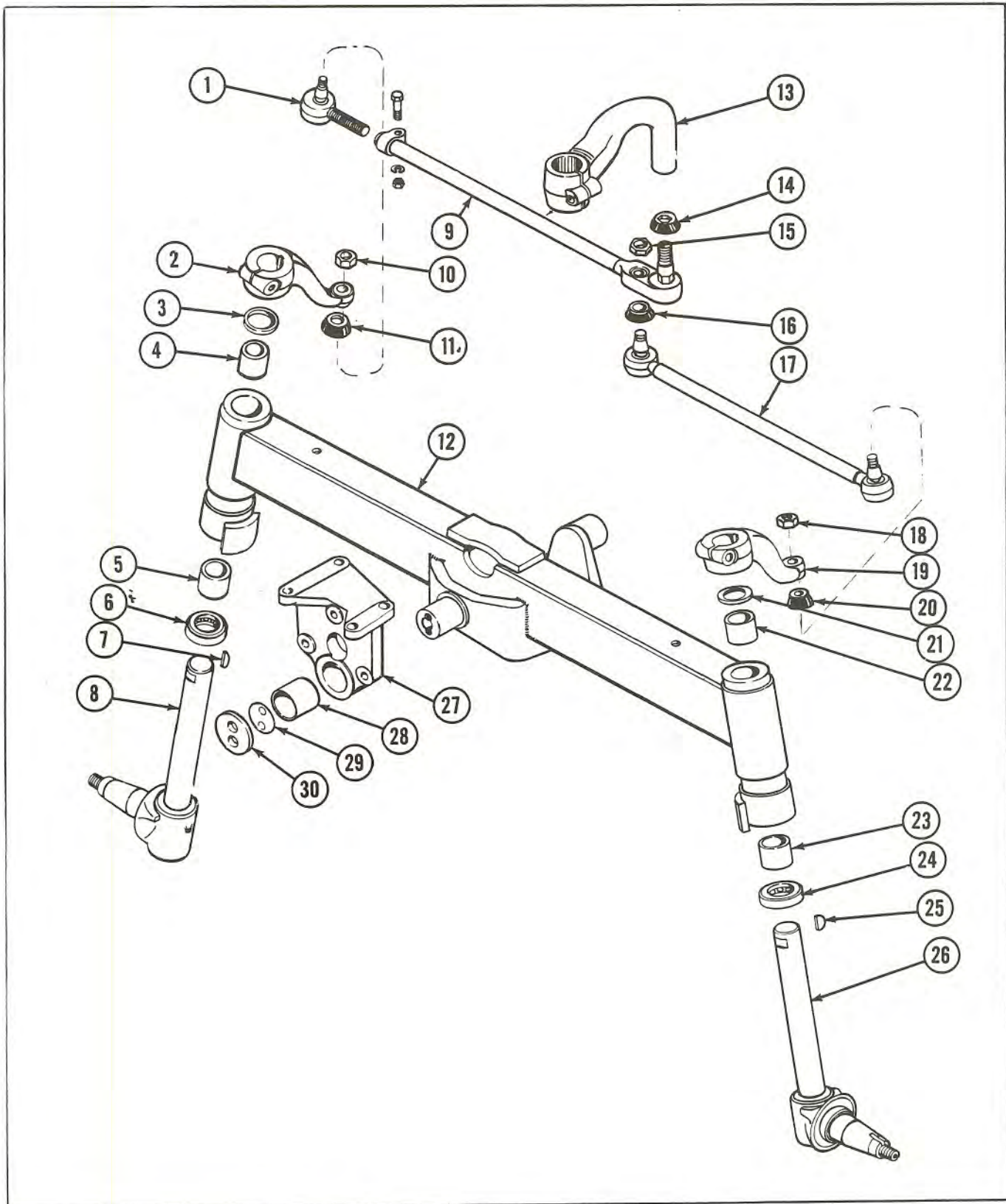


Fig. 3 — MF 65 Utility Front Axle Assembly Nomenclature.

- 1. Tie Rod End
- 2. Spindle Steering Arm
- 3. Felt Dust Seal
- 4. Spindle Bushing
- 5. Spindle Bushing
- 6. Thrust Bearing

- 7. Woodruff Key
- 8. Spindle Assembly
- 9. Tie Rod Assembly
- 10. Nut
- 11. Dust Seal
- 12. Front Axle Assembly

- 13. Main Steering Arm
- 14. Dust Seal
- 15. Nut
- 16. Dust Seal
- 17. Tie Rod Assembly
- 18. Nut

- 19. Spindle Steering Arm
- 20. Dust Seal
- 21. Felt Dust Seal
- 22. Spindle Bushing
- 23. Spindle Bushing
- 24. Thrust Bearing

- 25. Woodruff Key
- 26. Spindle Assembly
- 27. Pivot Support Assembly
- 28. Pivot Bushing
- 29. Shim Pack
- 30. Thrust Plate

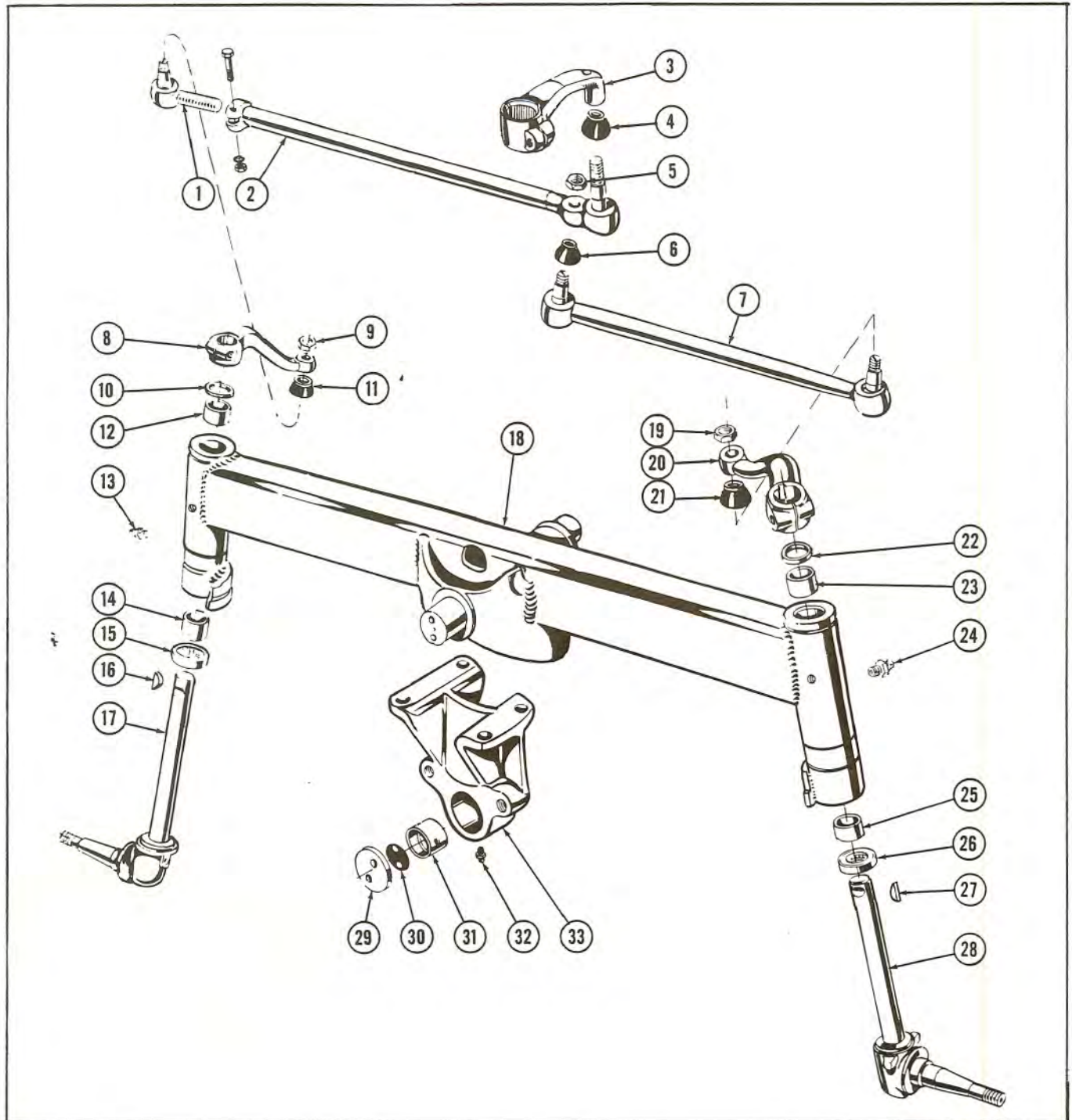


Fig. 4 - MF 50 Multi-Purpose Front Axle Assembly Nomenclature

- | | | | |
|-------------------------|----------------------|--------------------------|---------------------------|
| 1. Tie Rod End | 10. Dust Seal | 19. Nut | 28. Spindle Assembly |
| 2. Tie Rod Assembly | 11. Dust Seal | 20. Spindle Steering Arm | 29. Thrust Plate |
| 3. Main Steering Arm | 12. Spindle Bushing | 21. Dust Seal | 30. Shim Pack |
| 4. Dust Seal | 13. Grease Fitting | 22. Dust Seal | 31. Pivot Bushing |
| 5. Nut | 14. Spindle Bushing | 23. Spindle Bushing | 32. Grease Fitting |
| 6. Dust Seal | 15. Thrust Bearing | 24. Grease Fitting | 33. Axle Support Assembly |
| 7. Tie Rod Assembly | 16. Woodruff Key | 25. Spindle Bushing | |
| 8. Spindle Steering Arm | 17. Spindle Assembly | 26. Thrust Bearing | |
| 9. Nut | 18. Front Axle | 27. Woodruff Key | |

entering through grease fitting hole, to drill a spot in the bore 1/64" deep. When installing the bushing, line up the grease holes and insert a long punch to stake bushing into drill spot.

Replacement pivot bushings are pre-sized and do not require reaming when installed carefully with the proper tool.

Spindle bushings are renewable but require sizing after installation.

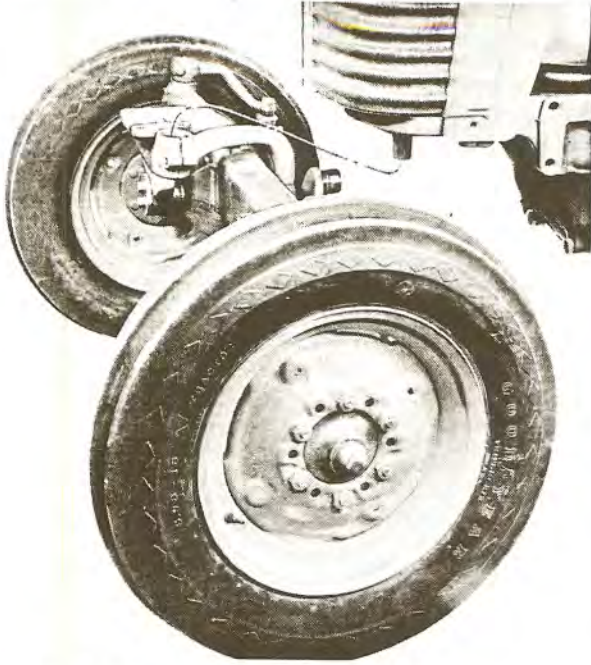


Fig. 5 — Removing Wide Front Axle Assembly

Tie rod ends are not adjustable for wear. Recommended toe-in adjustment is 0-1/4 inch.

End-play adjustment is 0.002-0.008 inch between support housing front face and front pivot bracket rear face.

ASSEMBLING THE AXLE

1. Install: (Refer to Fig. 1).
 - a. Bearing, No. 17, to spindle, No. 19.
 - b. Spindle bushings, Nos. 14 & 16, and ream to size.
 - c. Spindle through axle spindle tube, No. 15.
 - d. Dust seal, No. 13.
 - e. Woodruff key, No. 18, to spindle.
 - f. Spindle steering arm, No. 10, to spindle.
 - g. Tighten spindle, bolt arm clamp.
 - h. Repeat procedure for spindle assembly on other side.

INSTALLING THE AXLE

1. Install: (Refer to Fig. 1).
 - a. Rear pivot bushing, making certain grease holes are in alignment.
 - b. Axle main center-member, No. 24, by carefully inserting the rear pivot pin of center-member into support casting pivot pin bore.

c. Steering arm, No. 3, onto pedestal shaft and tighten clamp.

d. Front pivot bushing, No. 22, in front pivot bracket, No. 23.

e. Front pivot bracket to front pivot pin and attach to support casting.

f. Tie rods, No. 6, to main steering arm, No. 3.

g. Axle extensions, Nos. 15 and 25, to main center-member.

h. Tie rods Nos. 1 and 9, to spindle steering arms Nos. 10 and 27.

i. Shims, No. 21, (which are available in 0.002, 0.005 and 0.010 inch thickness) to the end of front pivot pin and secure with thrust plate, No. 20.

NOTE: End-play should be 0.002-0.008 inch between pivot bracket and center-member.

- j. Wheels.
- k. Lower grill panel.
- l. Grease fittings.
2. Lubricate all grease fittings.
3. Adjust toe-in 0-1/4 inch.

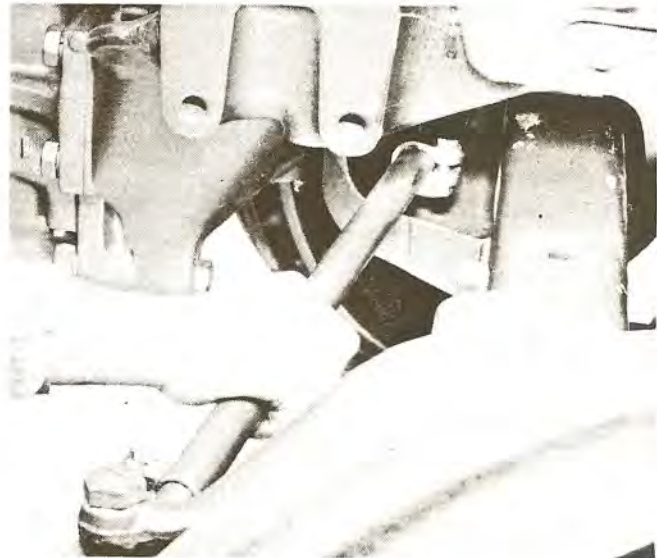


Fig. 6 — Adjusting Toe-In

ADJUSTING THE TOE-IN

To adjust the toe-in of all wide front axle models, loosen the right tie rod set screw at the outer end and the clamp bolt at the inner end. Turn the tube assembly, No. 2, Fig. 1, in (or out) to obtain the desired toe-in. See Fig. 6.

The toe-in is measured between the center tire ribs (at hub height) at both front and rear. Proper toe-in is obtained when the distance across the front is 0 to 1/4 inch less than the distance across the back. See Fig. 7.

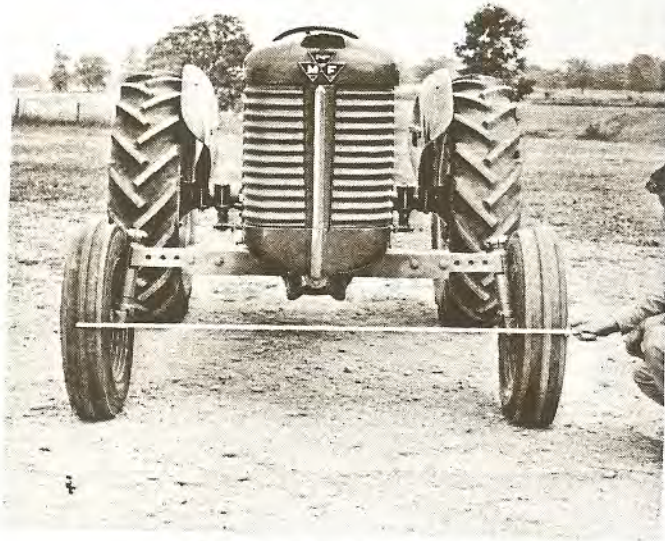


Fig. 7 — Measuring Toe-In

SERVICING THE ROW CROP SINGLE WHEEL FRONT AXLE REMOVING

To remove the single wheel fork axle assembly, proceed according to the following instructions, and refer to Fig. 8.

1. Support the tractor so that front wheel barely touches the ground, and then remove:
 - a. Lower grill panel.
 - b. Sheet metal dust cap, No 1.
 - c. Thrust plate, No. 2, by removing the cap screws.
 - d. Shims, No. 3.
 - e. Steering arm, No. 24, by working through opening in support casting, and loosening clamp bolt retaining the arm to wheel fork.

2. Carefully raise front end of tractor, while at the same time, withdrawing the wheel fork from below. See Fig. 9.

NOTE: Do not permit wheel fork shaft to become cocked out of line while removing.

3. Your purpose may or may not require removal of wheel; if it should be required, then do so as the first step of removal, refer to Group IV, Section B, Part 4 for instructions on removing wheel.

4. Remove the front axle support, No. 6, by removing the six cap screws.

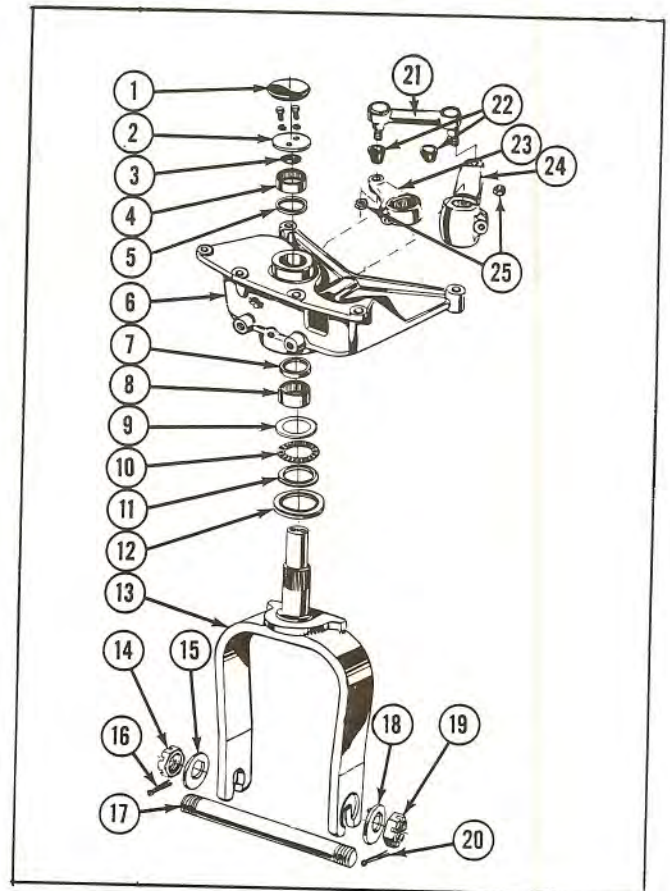


Fig. 8 — Single Front Wheel Axle Nomenclature

- | | |
|---------------------------|-----------------------|
| 1. Dust Cap | 13. Yoke Assembly |
| 2. Thrust Plate | 14. Castellated Nut |
| 3. Shim Pack | 15. Eccentric Washer |
| 4. Needle Bearing | 16. Cotter Pin |
| 5. Oil Seal | 17. Front Axle Shaft |
| 6. Front Support Assembly | 18. Eccentric Washer |
| 7. Oil Seal | 19. Castellated Nut |
| 8. Needle Bearing | 20. Cotter Pin |
| 9. Upper Bearing Race | 21. Arm Link Assembly |
| 10. Thrust Bearing | 22. Dust Seals |
| 11. Lower Bearing Race | 23. Spindle Arm |
| 12. Oil Seal | 24. Main Steering Arm |

DISASSEMBLING

Remove: (Refer to Fig. 8).

1. The upper needle bearing, No. 4, from support casting No. 6.
2. Oil seal, No. 5, from support casting.
3. Oil seal, No. 7, from support casting.

4. Lower needle bearing, No. 8, from fork shaft, No. 13.
5. Bearing race, No. 9, from fork shaft.
6. Needle thrust bearing, No. 10, from fork shaft.
7. Bearing race, No. 11, from fork shaft.
8. Oil Seal, No. 12.

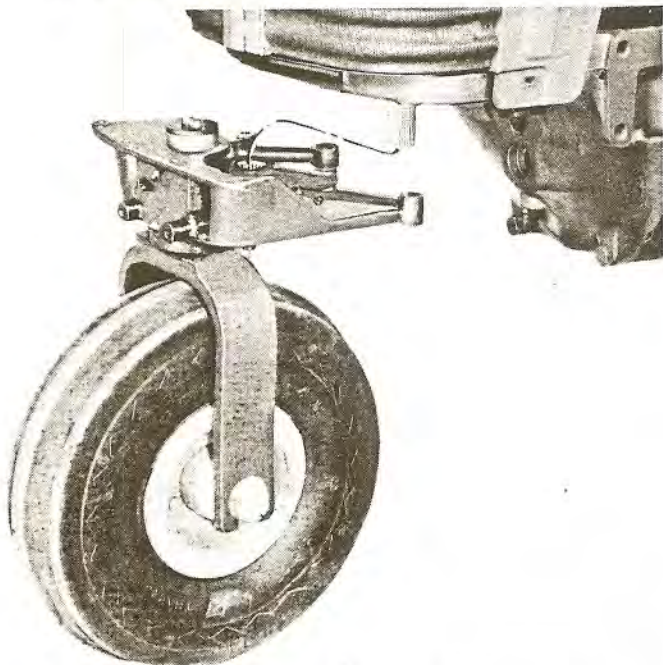


Fig. 9 - Removing Single Front Wheel Axle Assembly

INSPECTING

Clean all parts thoroughly; examine needle bearings and the needle thrust bearing. Replace new parts and oil seals if necessary.

ASSEMBLING AND INSTALLING

1. To assemble and install the wheel fork, simply reverse the steps of the disassembly procedure. A blind spline on the wheel fork and the steering arm will facilitate correct alignment of the two parts.

2. Adjust the up and down end-play of the wheel fork to 0.002-0.008 inch measuring clearance between lower face of support casting and upper face of wheel fork. Shims provide for this adjustment.

3. Adjust the front wheel (which has a taper roller bearing) to have a slight rotational drag.

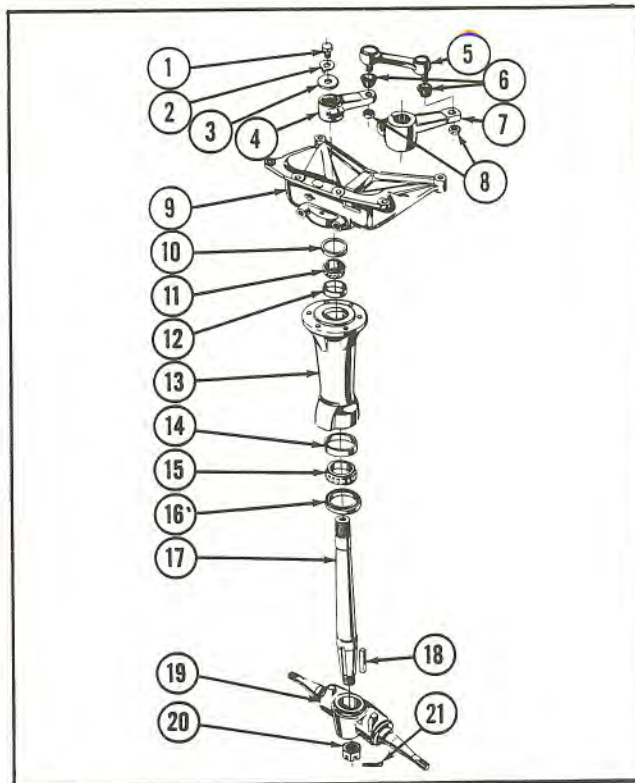


Fig. 10 - Twin Front Wheel Axle Nomenclature

- | | |
|---------------------------|----------------------------|
| 1. Cap Screw | 12. Upper Bearing Cup |
| 2. Lip Washer | 13. Pedestal Housing |
| 3. Flat Washer | 14. Lower Bearing Cup |
| 4. Spindle Arm | 15. Lower Bearing Cone |
| 5. Arm Link Assembly | 16. Oil Seal |
| 6. Dust Seals | 17. Spindle Shaft |
| 7. Steering Arm | 18. Shaft Key |
| 8. Nut | 19. Front Spindle Assembly |
| 9. Front Support Assembly | 20. Castellated Nut |
| 10. Oil Seal | 21. Cotter Pin |
| 11. Upper Bearing Cone | |

4. Lubricate the assembly thoroughly.

NOTE: Always press or drive a needle bearing from the lettered side of bearing.

SERVICING ROW CROP TWIN WHEEL FRONT AXLES
REMOVING

To remove the twin wheel axle, proceed as follows:

1. Support the tractor with front wheels touching the ground (complete disassembly is more easily accomplished when wheels are removed).

2. Remove: (Refer to Fig. 10).

a. Lower grill panel.

b. Cap screw, No. 1, after unlocking lip washer, No. 2.

- c. Flat washer, No. 3.
 - d. Steering arm, No. 7, working through support casting.
3. Carefully raise tractor, and at the same time, withdraw from below, the spindle shaft, No. 17, axle, No. 19, and wheels as an assembly. (See Fig. 11).
4. Remove:
- a. Lower pedestal assembly, No. 13, from support casting, No. 9.
 - b. Front axle support, No. 9.

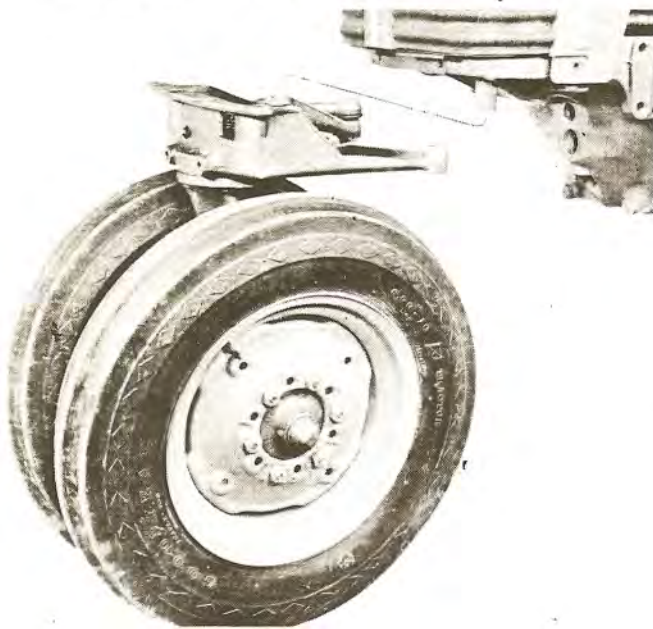


Fig. 11 — Removing Twin Front Wheel Axle Assembly

DISASSEMBLING

Remove: (Refer to Fig. 10)

- 1. Oil seals, Nos. 10 and 16, from pedestal, No. 13.

- 2. Upper and lower bearing cones, Nos. 11 and 15, from pedestal.
- 3. Upper and lower bearing cups, Nos. 12 and 14, from pedestal.
- 4. Cotter pin and castellated nut, No. 20, from spindle shaft, No. 17.
- 5. Axle, No. 19 and key, No. 18, from spindle shaft.

INSPECTION

Clean all parts thoroughly and examine for wear. Replace new parts and oil seals if necessary.

ASSEMBLING AND INSTALLING

- 1. Reverse the disassembly procedures and tighten cap screw No. 1, Fig. 10 until all end-play is removed from spindle, leaving a slight drag on the bearings.
- 2. Blind splines on the lower spindle shaft in the steering arm provide for a correct installation.

See Group IV, Section B, Part 4 for wheel and hub information.

NOTE: When assembling, install new oil seals, and lightly grease the sealing surfaces. Rotate the shaft as it passes through seals.

- 3. Lubricate the assembly thoroughly.

PART 5—POWER STEERING PUMPS—MF 35, 50 AND 65 TRACTORS

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DESCRIPTION

The power steering pump is constant running, gear type and is driven by the camshaft gear train. The pump delivers a volume of oil to the system with a regulated pressure of 1100 to 1200 psi, except on the MF 65 Diesel with the direct injection engine, tractor Serial No. 685 996 and up, which has a regulated pressure of 1500 psi. A relief valve is located in the pump to maintain this pressure.

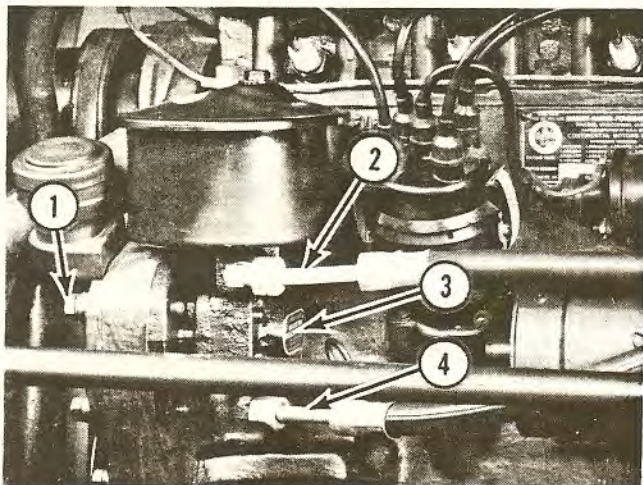


Fig. 1 - Barnes Power Steering Pump

1. Mounting Bolt 2. Return Line 3. Name Plate 4. Pressure Line

SERVICING PUMP (Gas Tractors)

The power steering pumps listed in this section are used on MF and TO 35, 40 and 50 Tractors, also MF 65 Tractors. The early model 35, 40, 50 and 65 Gas Tractors use the Barnes pump, which can be identified by a tag on the housing; see Fig. 1. This pump can be replaced for service by a Cessna pump which is also used on late model gas tractors. See Fig. 2 for identification of this pump.

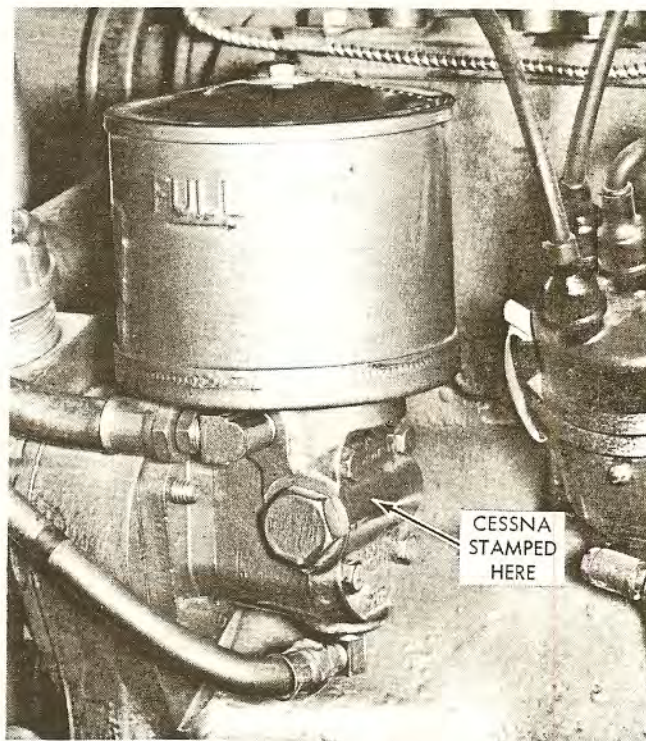


Fig. 2 - Cessna Power Steering Pump

NOTE: The pump drive gear used on the 35, 40 and 50 gasoline model tractors is different from that used on the 65 gasoline tractors.

REMOVING PUMP FROM TRACTOR

1. Disconnect pressure and return lines from pump.
2. Remove the three mounting bolts holding pump to engine block and remove pump assembly.

DISASSEMBLE BARNES PUMP

The Barnes Power steering pump can be identified by the Barnes tag located on the pump housing; see Fig. 1. This pump is driven by the timing gear train and delivers approximately 4 gallons per minute at an engine speed of 2000 rpm. It has a relief valve pressure of 1100 to 1200 psi.

The Barnes power steering pump can be repaired as far as replacing the internal parts such as shaft, gears, bearings, or seals. If the housing is damaged, the complete unit will have to be replaced. The pump bodies, Nos. 8 and 12, Fig. 3, are not available through parts. If the complete pump is to be replaced, it can be replaced by the Cessna pump shown in Fig. 2.

To disassemble the pump, proceed, as follows, and refer to Fig. 3 for description of parts.

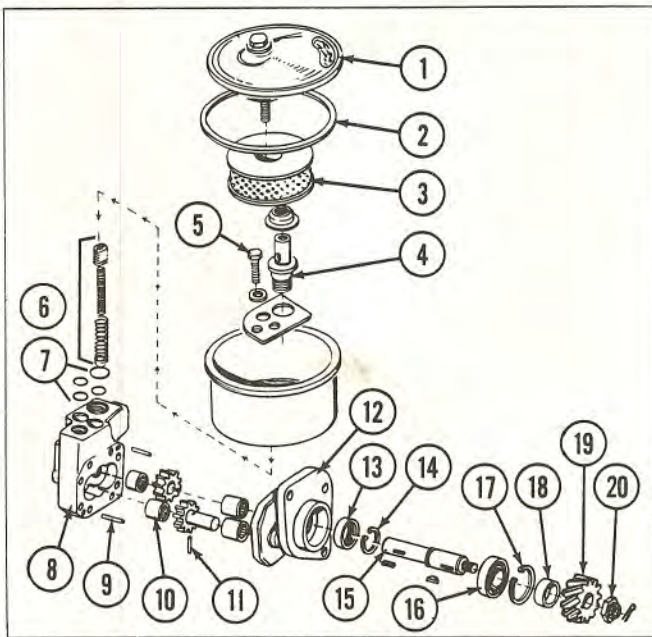


Fig. 3 - Barnes Power Steering Pump - Description and Sequence of Parts

- | | | |
|--------------------------|--------------------|---------------|
| 1. Cover | 8. Pump Body | 14. Snap Ring |
| 2. Gasket | 9. Dowel Pin | 15. Shaft |
| 3. Filter | 10. Needle Bearing | 16. Bearing |
| 4. Retaining Stud | 11. Shear Pin | 17. Snap Ring |
| 5. Capscrew | 12. Front Plate | 18. Spacer |
| 6. Relief Valve Assembly | 13. Oil Seal | 19. Gear |
| 7. "O"-Rings | | 20. Nut |

1. Remove reservoir retaining stud, No. 4, Fig. 3, and capscrew, No. 5, and remove reservoir.

2. Remove adjusting screw and pressure relief valve assembly, No. 6.

3. Remove the 8 screws securing the pump bodies together.

4. Remove nut securing drive gear, No. 19, and remove gear, key and spacer from shaft.

5. Remove snap ring, No. 17, from housing and remove shaft, No. 15, and bearing, No. 16, from housing.

6. Remove seal, No. 13.

REASSEMBLE BARNES PUMP

Inspect all parts for wear or damage. If housing, No. 8 or No. 12, Fig. 3, is damaged, replace the complete pump assembly. (These housings are not available in parts.) The Barnes pump can be replaced with the Cessna pump shown in Fig. 2.

1. Install new seal, No. 13, Fig. 3.

2. Install bearing, No. 16, on shaft, No. 15, against snap ring, No. 14.

3. Lubricate seal, No. 13, and insert shaft with bearing into housing and seal.

4. Secure shaft and bearing in housing with snap ring, No. 17.

5. Install pump drive gear, No. 19, with spacer, No. 18, and secure with nut, No. 20.

6. Place pump gears in place, as shown in Fig. 3; lubricate with light oil and place pump bodies together and secure with 8 screws.

NOTE: A gasket between the pump bodies is available, Part No. 1019 977 M1.

7. Install relief valve assembly, No. 6. Turn adjusting screw in about 3 turns (this will have to be adjusted when the pump pressure is set). Refer to heading "Checking Pump Pressure".

8. Place new "O"-rings, No. 7, in place and install oil reservoir.

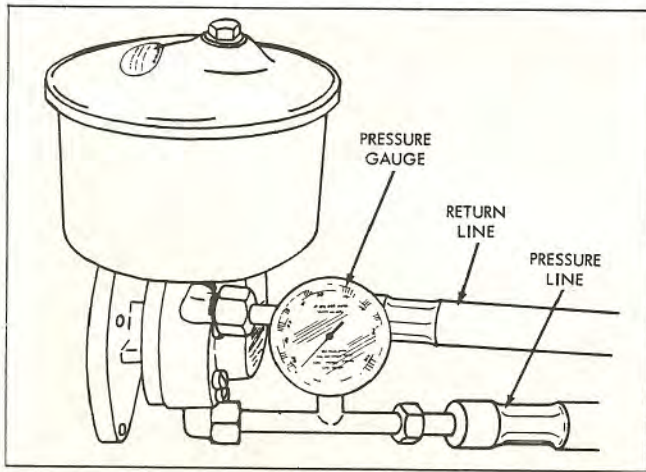


Fig. 4 - Diagram Illustration of Installed Pressure Gauge

9. Install pump on engine block and attach pressure and return lines.

10. Fill oil reservoir with type "A" transmission oil.

CHECKING PUMP PRESSURE

1. Install a pressure gauge in series with the pump pressure line, as shown in Fig. 4.

2. Run engine at low idle until oil in system is warm.

3. Advance engine speed to 2000 rpm and turn steering in either direction against stop to obtain a reading on the gauge.

Pressure reading should be 1100 to 1200 psi. To increase pressure, turn adjusting screw on relief valve in, to decrease, turn out.

NOTE: One turn of the adjusting screw will change the pressure approximately 300 psi.

If the relief valve adjustment will not correct the pressure, the possible cause may be in the pump.

DISASSEMBLE CESSNA PUMP

The Cessna power steering pump can be identified by an M-F part number on the outside portion of the mounting base; also, it has a deeper reservoir than the Barnes pump with the name FULL on the side; see Fig. 2.

To disassemble, refer to Fig. 5, and proceed, as follows:

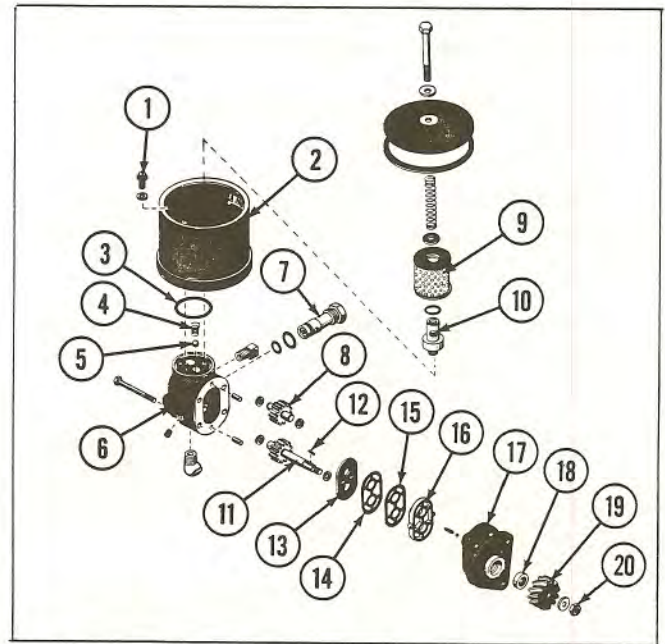


Fig. 5 - Cessna Power Steering Pump - Identification and Sequence of Parts

- | | | |
|-----------------|-----------------------------|----------------------|
| 1. Capscrew | 8. Idler Gear | 14. Back-Up Gasket |
| 2. Reservoir | 9. Filter | 15. Gasket Protector |
| 3. "O"-Ring | 10. Reservoir Seat Core | 16. Diaphragm Seal |
| 4. Spring | 11. Gear and Shaft Assembly | 17. Front Plate |
| 5. Ball | 12. Key | 18. Seal |
| 6. Pump Housing | 13. Diaphragm | 19. Gear |
| 7. Relief Valve | | 20. Nut |

1. Remove cover and filter element from reservoir.

2. Remove the reservoir seat core, No. 10, capscrew, No. 1, and remove reservoir. Note the check ball, No. 5, and spring which can be removed at this time.

3. Remove nut, No. 20, securing drive gear to the pump shaft and pull gear and key from shaft.

4. Remove the four bolts securing pump housings together.

5. Separate housings and remove gears and shafts.

6. Remove relief valve, No. 7, and remove relief valve assembly.

REASSEMBLE CESSNA PUMP

Inspect all parts for wear or damage. Replace worn or damaged parts. If gear or housing is worn or damaged, in most cases, the mating part will also be damaged and replacing the complete pump will be profitable. In cases where "O"-rings or seals have failed, the as-

sembly of the pump is as follows; refer to Fig. 5 for description and sequence of parts.

1. Install seal, No. 18, with lip toward inside of pump.
2. Place diaphragm seal, No. 16, in groove in front plate, No. 17. (Work seal all the way into this groove.)
3. Place gasket protector, No. 15, firmly into diaphragm seal and next to this protector, the back-up gasket, No. 14.
4. Place metal diaphragm, No. 13, against back-up gasket with bronze side toward gears and oil grooves toward the two mounting holes in the front plate assembly.
5. Lubricate seal in front plate and place shaft and gear assembly, No. 11, in place.
6. Install key, No. 12, and gear, No. 19, on shaft and secure with nut.
7. Place idler gear and shaft, No. 8, into front plate assembly with unpainted end of shaft toward front plate.
8. Place pump housing over gears and secure with 4 bolts.
9. Inspect relief valve and install in pump housing.
10. Install check valve ball, No. 5, with spring, place "O"-ring, No. 3, in place and install reservoir.

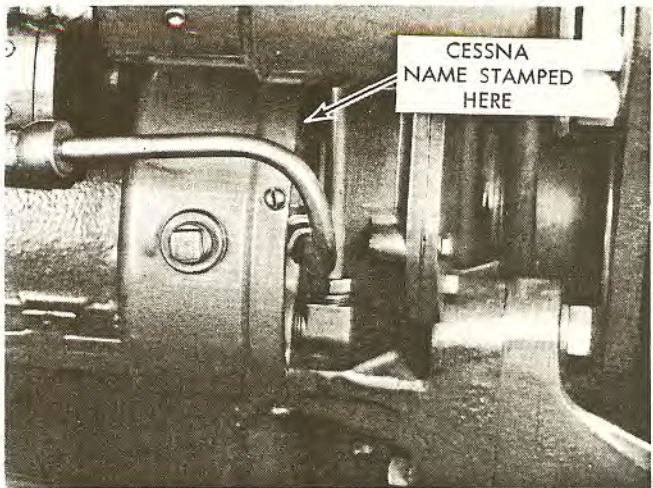


Fig. 7 - Cessna Pump Identification

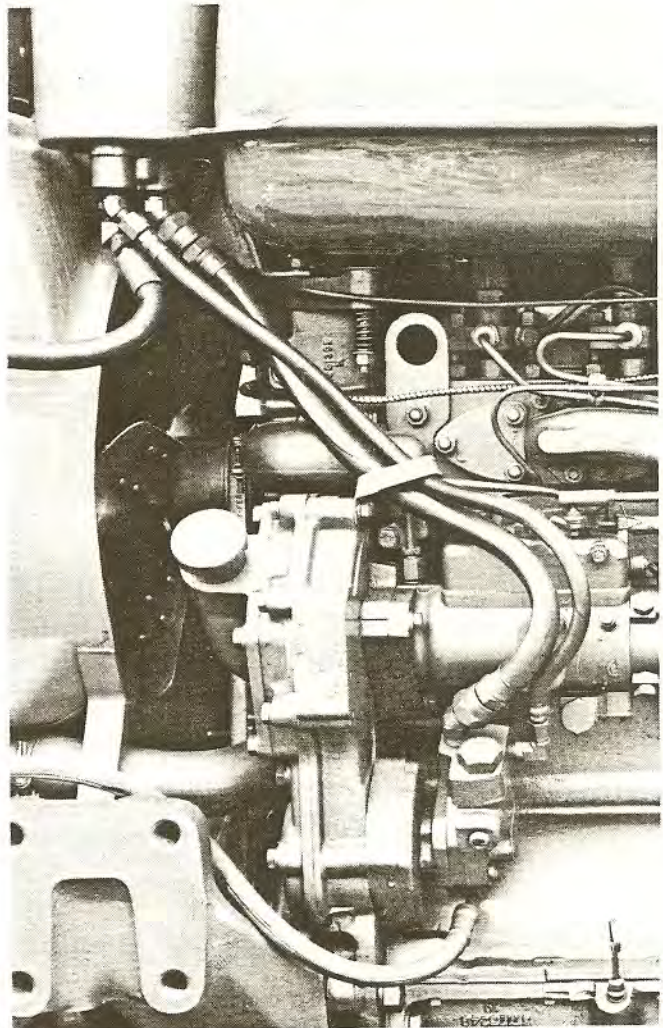


Fig. 8 - Barnes Pump Used on Early MF 65 Diesel Tractors

SERVICING PUMP (Diesel Tractors)

The power steering pumps listed in this section of the manual are used on MF 35, 50 and 65

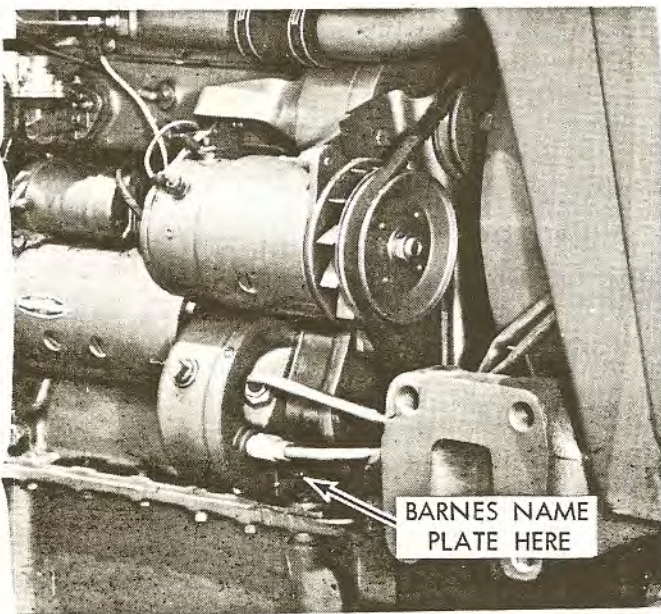


Fig. 6 - Barnes Pump Identification

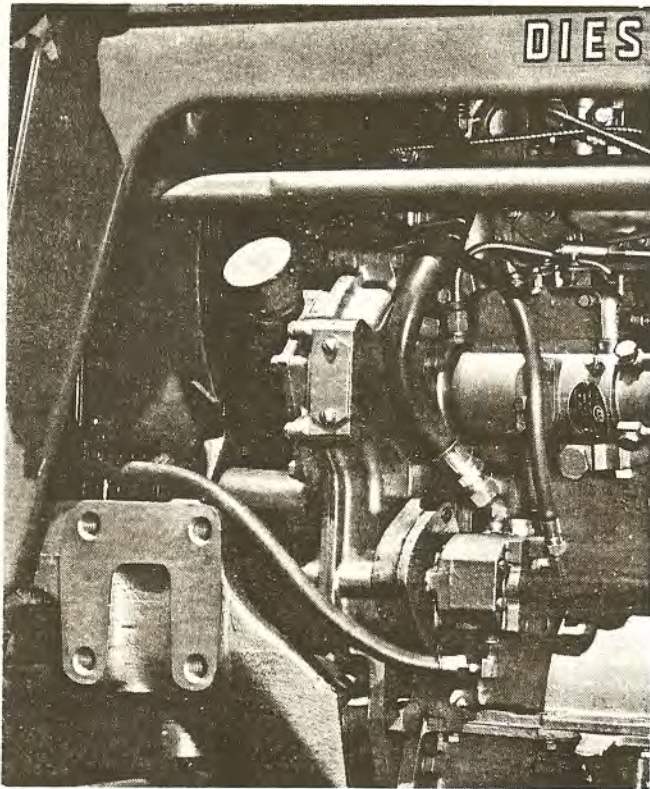


Fig. 9 - Hobourn-Eaton Pump Used on Early MF 65 Diesel Tractors

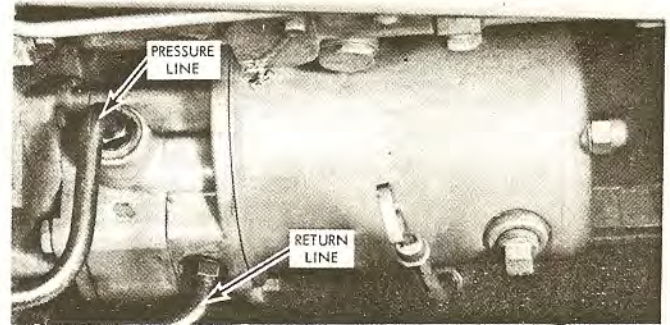


Fig. 10 - Wooster Pump Used on Late MF 65 Diesel Tractors

Diesel Tractors. Early models of MF 35 and 50 Diesel Tractors use a Barnes pump, which can be identified by the tag on the pump housing; see Fig. 6. For service, this pump can be replaced by the same Cessna pump used on the later models. This Cessna pump can be identified by the name "Cessna" stamped on the upper side of the front cover; see Fig. 7. These two pumps look similar, but can be identified by the manufacturer's name on the front cover, as shown in Figs. 6 and 7.

Early MF 65 Diesel Tractors prior to Serial No. 685 996 used a separate reservoir and pump. Two types of pumps were used. A Barnes pump, shown in Fig. 8, and a Hobourn-Eaton pump, shown in Fig. 9.

For servicing of Barnes pump, refer to paragraph "Disassemble Barnes Pump", gas tractors.

SERVICING SEPARATE RESERVOIR

For servicing the separate reservoir used on the early MF 65 Diesel Tractors prior to Serial No. 685 996, refer to Fig. 11 for description and sequence of parts. If it is necessary to

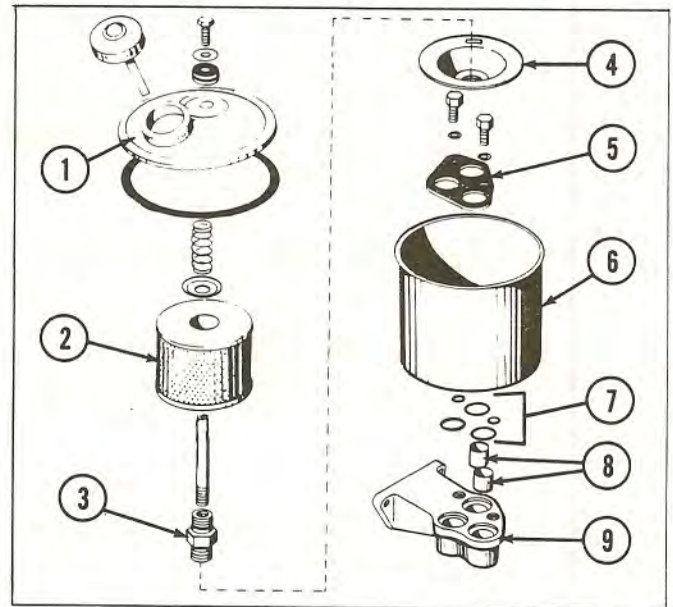


Fig. 11 - Reservoir Assembly - Identification and Sequence of Parts

- | | |
|---------------------------|------------------------|
| 1. Cover | 5. Reinforcement Plate |
| 2. Filter | 6. Reservoir |
| 3. Retaining Stud | 7. "O"-Rings |
| 4. Filter Element Support | 8. "O"-Ring Retainers |
| | 9. Reservoir Base |

repair the power steering pump, the reservoir should be checked and the filter element changed. After cleaning reservoir and replacing element, fill with type "A" automatic transmission oil to full mark on gauge assembly.

The MF 65 Diesel Tractors after Serial No. 685 996 uses a Wooster power steering pump, shown in Fig. 10.

DISASSEMBLE WOOSTER PUMP

Refer to Fig. 12 and proceed, as follows:

1. Remove nut, No. 16, and special seal washer, No. 15.

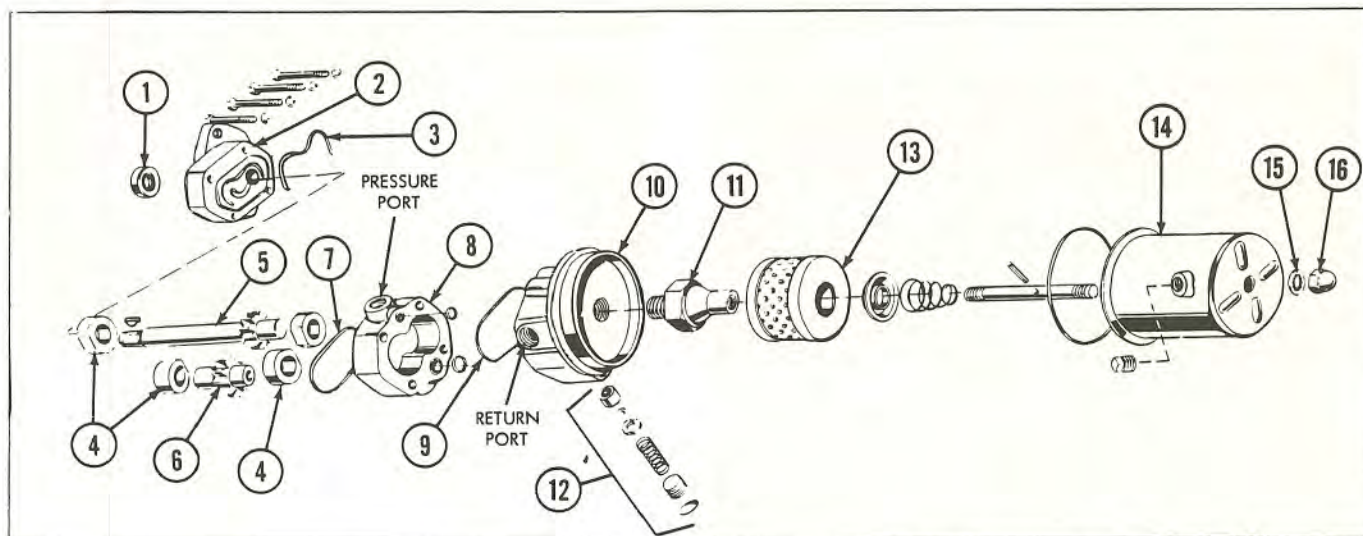


Fig. 12 - Wooster Power Steering Pump - Identification and Sequence of Parts

- | | | | | | | | |
|---------------|------------|--------------------------|----------------|---------------|---------------------------|---------------|----------|
| 1. Oil Seal | 3. Seal | 5. Drive Gear and Shaft | 7. Seal | 9. Seal | 11. Reservoir Retainer | 13. Filter | 15. Seal |
| 2. Front Body | 4. Bearing | 6. Driven Gear and Shaft | 8. Center Body | 10. Rear Body | 12. Relief Valve Assembly | 14. Reservoir | 16. Nut |

2. Remove reservoir and filter assembly.

3. Remove the 4 capscrews securing the pump bodies together. The shafts, gear and bearings, Nos. 4, 5 and 6, will remain in the center body, No. 8.

4. Remove pump drive gear and key from shaft, No. 5.

5. Bump end of shaft, No. 5, on wood block to remove bearings, No. 4, and gears out of center body, No. 8.

REASSEMBLE WOOSTER PUMP

If the gears or bearings are damaged, check the center housing, No. 8, Fig. 12, which will probably be damaged. If this is the case, it will be necessary to replace the complete pump, because the center housing is not available in parts.

To assemble the Wooster pump, inspect all parts for wear or damage; refer to Fig. 12 and proceed, as follows:

1. If removed, apply a coat of sealing compound to the outer surface of seal, No. 1, and place in housing, No. 2

2. Install reservoir retainer, No. 11, on rear pump housing, No. 10, and clamp in vise with return port in housing, to left side.

3. Place seal ring, No. 9, and two "O"-rings in place on rear housing.

4. Install 2 bearings, No. 4, in center housing, No. 8, on oil passage side with grooves in bearings toward pump gears.

5. Place center housing, No. 8, with the oil passages down and the pressure port 90° counterclockwise from the return port, as shown in Fig. 12.

6. Place two retaining bolts in the center housing to hold in place while making this assembly.

7. Install long shaft, No. 5, in center housing on right side and short shaft, No. 6, on left side with the identification marks on the shaft down.

8. Place the 2 remaining bearings on the shafts and in the housing with grooves toward the pump gears.

9. Place seal, No. 3, in groove in front pump housing, No. 2.

10. Remove the 2 bolts previously installed to hold center housing in place, lubricate oil seal, No. 1, and carefully slide over shaft, No. 5.

11. Install 4 bolts to secure housings together and torque 28 to 32 ft.-lbs.

12. Install filter, spring, center stud and reservoir.

DISASSEMBLE AND REASSEMBLE CESSNA PUMP

To disassemble the Cessna Pump on Diesel model tractors, refer to paragraph "Disassemble Cessna Pump", in the gas tractor section, which is similar; also refer to this section for reassembly procedures.

GROUP IV — SECTION A — PART 6

**MANUAL AND POWER STEERING GEAR HOUSING
MF 50 AND MF 65 TRACTORS**

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The power and manual steering gear housing are exactly the same. There are slight variations between the 50 (MF and MH) (Utility, Multi-Purpose, Hi-Arch Axle) models, the MF 65 (Standard and Hi-Arch Axle) models and the 50 (MF and MH) and MF 65 Row Crop models. As this difference is slight, servicing instructions will be given only once.

NOTE: Be sure to note the type of axle and model of tractor and the tractor serial number before ordering parts.

SERVICING THE STEERING GEAR HOUSING

REMOVING AND DISASSEMBLING THE STEERING GEAR HOUSING

If repair of the steering mechanism only is involved, it is desirable to leave the steering gear housing attached to the top of the transmission. Remove the instrument panel and battery carrier as a unit as outlined in Group IV, Section C, Part 3. This completely exposes the steering gear housing (see Fig. 1).



Fig. 1 — Steering Gear Housing

If it is deemed necessary to remove the steering gear housing from the transmission, however, simply remove the attaching cap

screws and lift off the steering gear housing.

NOTE: Be sure to lift the steering gear housing straight up far enough to disengage the gear shift levers from the shift forks.

To disassemble the steering gear housing, proceed as follows:

1. Remove the steering mechanism as outlined in "Removing and Disassembling the Steering Mechanism".

2. Separate the steering gear housing from the top of the transmission.

3. Collapse the spring (No. 23) and remove the retaining collar (No. 24, Fig. 2) and the spring from the gear selection shift lever.

4. Raise up the rubber boot (No. 27) and drift out the gear selection shift lever pin (No. 21, Fig. 2).

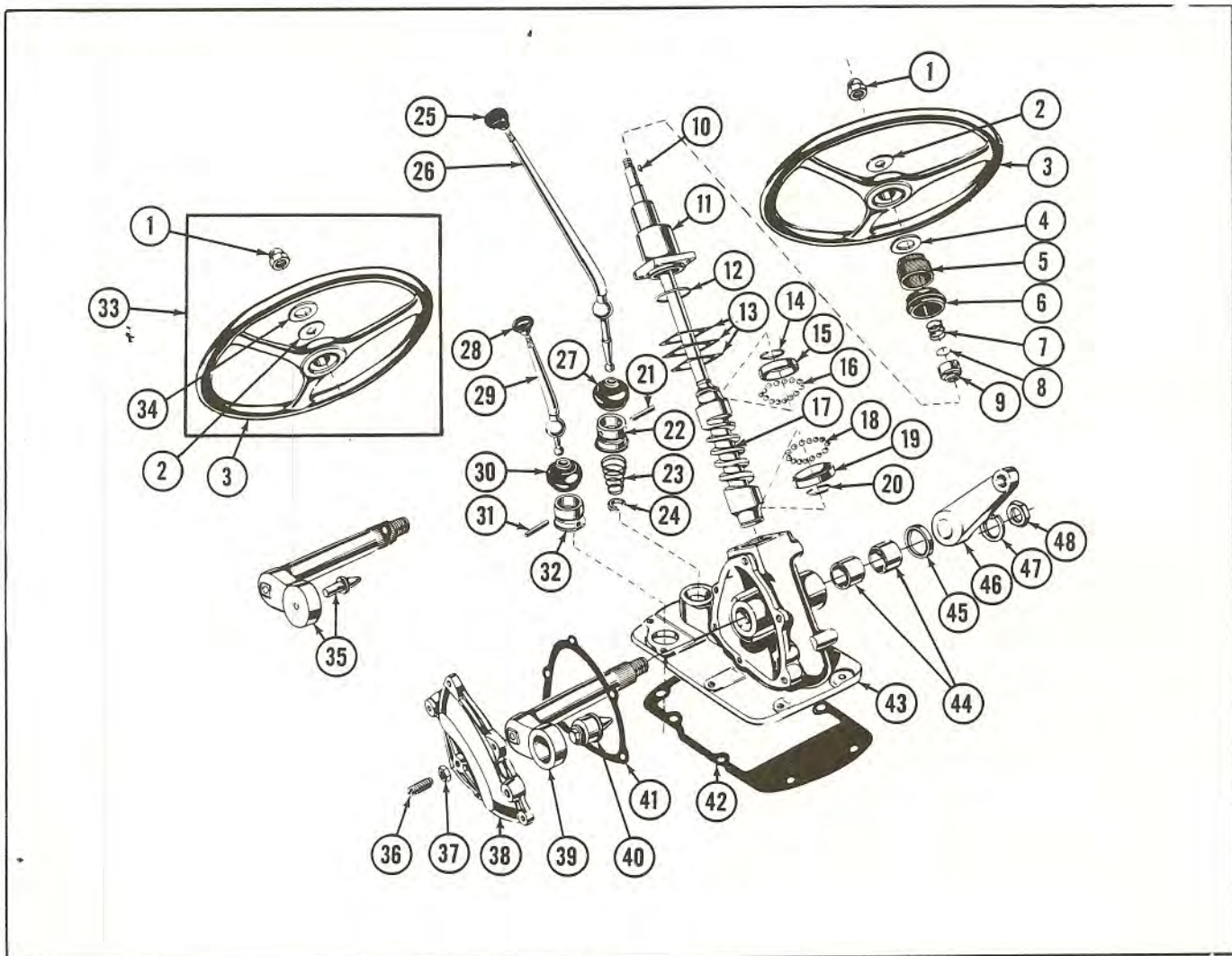


Fig. 2 — Steering Gear Housing Nomenclature

- | | | | |
|------------------------------|-------------------------|-----------------------------|--------------------------|
| 1. Dome Nut | 13. Shim Pack | 25. Knob | 37. Lock Nut |
| 2. Steel Washer | 14. Snap Ring | 26. Shift Lever | 38. Side Cover |
| 3. Steering Wheel | 15. Retainer Cup | 27. Rubber Boot | 39. Levershaft |
| 4. Felt Dust Seal | 16. Loose Ball Bearings | 28. Knob | 40. Pin Bearing Assembly |
| 5. Chrome Cap | 17. Steering Shaft | 29. Planetary Shift Lever | 41. Gasket |
| 6. Rubber Dust Seal | 18. Loose Ball Bearings | 30. Rubber Boot | 42. Gasket |
| 7. Spring | 19. Retainer Cup | 31. Shift Lever Pin | 43. Housing |
| 8. Snap Ring | 20. Snap Ring | 32. Shift Lever Cup | 44. Bushings |
| 9. Shaft Top Support Bearing | 21. Shift Lever Pin | 33. Steering Wheel Assembly | 45. Oil Seal |
| 10. Woodruff Key | 22. Shift Lever Cup | 34. Fiber Washer | 46. Pitman Arm |
| 11. Cover Tube | 23. Spring | 35. Levershaft Assembly* | 47. Lock Washer |
| 12. "O" Ring | 24. Spring Retainer Cup | 36. Adjusting Screw | 48. Nut |

*Used on row crop (narrow front axle) models only. See Text.

5. Raise the rubber boot (No. 30) and tap the planetary shift lever cup (No. 32) down until the shift lever pin (No. 31, Fig. 2) is below the bottom of the steering gear housing.

NOTE: Support the housing with a cylindrical sleeve so that the housing is not distorted.

6. Drift out the planetary shift lever pin.

7. The shift lever cups may be tapped down through the housing or pulled from the bottom side.

NOTE: Support the housing with a cylindrical sleeve so that the housing is not distorted.

SERVICING THE STEERING GEAR HOUSING

Oil Leaks at the Planetary Shift Lever

Under some conditions there may be some transmission oil seep out of the planetary shift lever cup on the MF 65 Tractor. This is due to a splash effect and not to the transmission breathing.

This leakage can easily be corrected in the following manner:

1. Remove the rubber boot from the shift lever.

2. Clean the shift lever ball and cup with a suitable cleaner.

3. With the shift lever in neutral, place an "O" ring (Part No. 851 145 M1) over the shift lever ball.

CAUTION: Do not force the "O" ring down against the ball.

4. Cement the outside of the "O" ring to the housing with a suitable cement similar to 3M Sealer Compound, EC 750 (the Minnesota Mining Co.). Use the cement sparingly. The purpose of cementing is not to seal but to hold the "O" ring in position.

5. Allow a suitable time for the cement to dry before operating the tractor.

6. Install the rubber boot.

Gear Selection Shift Lever Cup

Under some circumstances, there may be some lifting of the gear selection shift lever cup experienced. When lifted far enough, the shift lever may lock in gear.

This problem may be easily corrected by:

1. Lift the rubber boot and remove the shift lever pin and engage the shift lever back into the fork.

NOTE: By pulling up against the spring mounted on the bottom of the shift lever, more freedom of movement may be obtained.

2. Tap the shift lever cup back into position shown in Fig. 5.

3. Stake the cup and housing at several points around the circumference of the cup.

4. Install the gear selection shift lever and pin.

5. Replace the rubber boot to its original position.

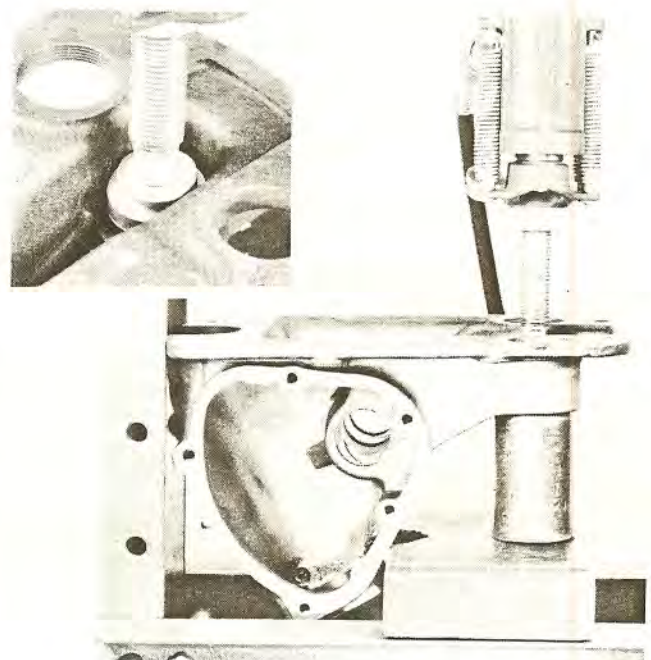


Fig. 3 — Installing Shift Lever Cups



Fig. 4 – Shift Lever Cup – Old Type
1. Bottom Edge of Groove 2. "O" Ring

ASSEMBLING THE STEERING GEAR HOUSING

1. Mount the housing in a press as shown in Fig. 3 and press in the shift lever cups.

NOTE: Support the housing around the cup opening with a cylindrical sleeve to prevent distorting the housing. Press the cups in until the bottom edge of the groove (No. 1, Fig. 4) is even with the top of the housing as shown in Fig. 5. Make sure that the pin openings (No. 2, Fig. 6) are 90° to the direction of operation of the shift levers.

2. Install the following:

- a. Shift levers and pins.
- b. Spring assembly on bottom of gear selection shift lever.
- c. "O" ring on top of planetary shift lever cup, as shown in Fig. 4. See "Servicing the Steering Gear Housing", Page 3. In newer model tractors, the shift lever cup has been modified, adding the shoulder (No. 1, Fig. 6) so that the "O" ring may be positioned in the cup and then the planetary shift lever installed.
- d. Rubber boots over top of shift levers.
- e. Threaded knobs to top of shift levers.

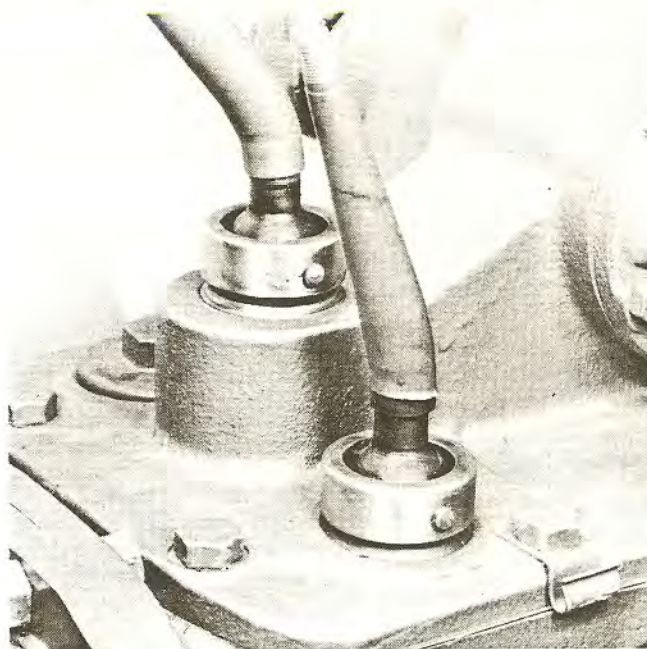


Fig. 5 – Shift Lever Cups Installed

3. Install the steering mechanism into the housing as outlined in "Assembling and Installing the Steering Mechanism".

INSTALLING THE STEERING GEAR HOUSING

1. Attach the steering gear housing to the top of the transmission. Use a new gasket.

NOTE: Make sure detent springs are in place. Lower the steering housing carefully into position, engaging the shift levers into the shift forks.

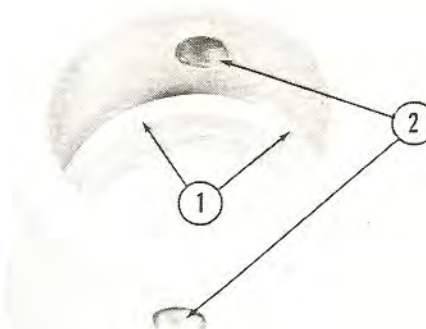


Fig. 6 – Shift Lever Cup – New Type
1. Shoulder 2. Pin Openings

2. Install the instrument panel and battery carrier as a unit.

3. Install the steering wheel.

SERVICING THE STEERING GEAR MECHANISM

REMOVING THE STEERING WHEEL

1. Remove the dome nut (No. 1), fiber washer (No. 34), and steel washer (No. 2, Fig. 2).

NOTE: Fibre washer is not used in MF 65 models.

2. Using a puller, remove the steering wheel from the steering shaft.

3. Complete removal by lifting the Woodruff key (No. 10), the dust washer (No. 4), the chrome cap (No. 5), the rubber dust seal (No. 6) and the bearing spring (No. 7, Fig. 2) off the steering shaft assembly.

REMOVING AND DISASSEMBLING THE STEERING MECHANISM

1. Remove the following:

a. The drag link from the pitman arm.

b. The pitman arm (No. 46) from the levershaft assembly (No. 39, Fig. 2).

c. The gear housing side cover (No. 38, Fig. 2).

d. The levershaft and stud assembly.

e. The cap screws attaching the column cover to the gear housing and remove the column housing (No. 11, Fig. 2).

NOTE: Notice the shim pack (No. 13) and carefully remove it and the sealing "O" ring (No. 12, Fig. 2) from the steering shaft cover.'

f. The steering shaft assembly (No. 17, Fig. 2) from the gear housing.

NOTE: Carefully work the steering shaft thrust bearings, out through the opening in the steering gear housing.

g. Tap out the cover tube bearing assembly (No. 9) from the steering shaft cover as shown in No. 1, Fig. 7.

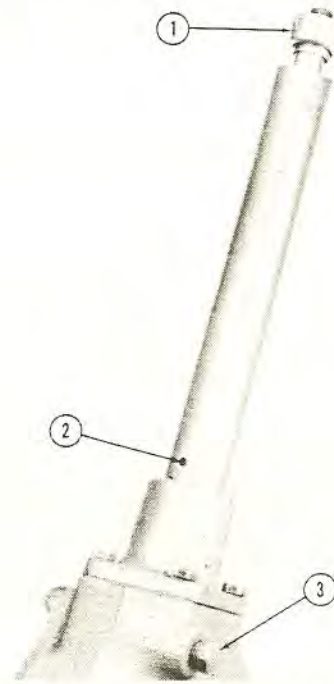


Fig. 7 – Steering Shaft Cover Tube

- 1. Shaft Top Support Bearing
- 2. Vent Hole
- 3. Lubricant Filler and Oil Level Plug

2. Lay the steering shaft in a shallow pan and release the snap rings (Nos. 14 and 20, Fig. 2).

NOTE: The 28 balls (14 in each race) will fall into the pan. See Fig. 8.

3. Remove the ball retaining cups (Nos. 15 and 19, Fig. 2) from the steering shaft.

4. Using a step plate and driver, drive out the oil seal (No. 45) and the two bushings (No. 44, Fig. 2).

INSPECTING AND SERVICING THE STEERING MECHANISM

1. Thoroughly clean all of the parts and examine them for excessive wear and damage.



Fig. 8 – Removing the Shaft Thrust Bearings

2. After installation of the levershaft bushings, they must be reamed to give a clearance of 0.0005 to 0.003 inch between the levershaft and the bushings.

3. Always replace the sealing gaskets, oil seal and "O" ring.

4. Examine the stud bearing assembly on wide axle models. It must not show signs of damage or flat spots on the rollers. The proper bearing load is when it requires a slight drag (6-8 in.-lbs.) to turn the stud in its rollers.

NOTE: If bearing load must be adjusted, release the locking tabs and tighten (or loosen) the nut to adjust the load. Install a new locking tab washer before adjusting. Lock the nut into position when the adjustment is completed.

CAUTION: Whenever converting a wide axle model tractor to a narrow axle model, be sure to replace the levershaft assembly (No. 39, Fig. 2) with the solid pin levershaft assembly (No. 35, Fig. 2).

ASSEMBLING AND INSTALLING THE STEERING MECHANISM

1. Install the following:

a. Levershaft bushings. Ream the bushings to provide a 0.0005 to 0.003 inch clearance. Clean thoroughly after reaming the bushings.

b. Levershaft assembly oil seal. Lubricate the oil seal with brake fluid.

c. Ball retaining cups, balls (14) and snap rings.

d. The cover tube bearing assembly into the steering shaft cover tube.

2. Insert the steering shaft into the housing. Using the original shim pack, install the cover tube with the vent hole (No. 2, Fig. 7) to the front. Do not install an "O" ring on the cover tube at this time.

3. Install the Woodruff key, steering wheel, washer(s) and dome nut.

4. Attempt to pull up and push down on the steering wheel to check for steering shaft end-play.

NOTE: If end-play is present, remove sufficient thickness of shims to place a slight drag on the shaft as it is turned. Shims are available in thicknesses of 0.002, 0.003 and 0.010 inch.

5. Remove the steering wheel and cover tube.

6. Position a lubricated "O" ring into the groove in the cover tube. Install the cover tube and the adjusted shim pack onto the housing, being careful not to damage the "O" ring. Install the cover tube so that the vent hole (No. 2, Fig. 7) is towards the front of the tractor.

7. Lubricate the levershaft and install it through the bushings and lubricated oil seal.

NOTE: Use care not to cut or damage the oil seal while installing the levershaft.

8. Back the adjusting screw (No. 36, Fig. 2) out of the side cover a few turns and install the side cover. Use a new gasket.

9. Install the pitman arm on the levershaft.

NOTE: Master splines must be aligned for proper timing.

10. Fill the gear housing to the correct level with recommended lubricant.

11. Adjust the steering mechanism as outlined in "Adjusting the Steering Mechanism".

INSTALLING THE STEERING WHEEL

Install the following onto the steering shaft:

1. Bearing spring.

2. Rubber dust seal.

3. Chrome cap.

4. Felt dust washer.

5. Woodruff key.

6. Steering wheel.

7. Steel washer.
8. Fiber washer (used only in MF 50 models).
9. Dome nut.

ADJUSTING THE STEERING MECHANISM

1. Adjust the steering shaft end-play as outlined in Steps 2 through 6 of "Assembling and Installing the Steering Mechanism". If the mechanism has not been disassembled, remove the drag link from the pitman arm and back the adjusting screw out of the side cover a few turns; check the steering shaft for end-play. Adjust the thickness of the shim pack according to the amount of end-play discovered.

NOTE: The use of a dial indicator would be helpful in determining approximately how much to alter the shim pack. The steering shaft operates under a slight preload.

2. After the steering shaft preload has been adjusted, place the steering mechanism in its center or straight-ahead position. Turn in the

adjusting screw until there is a slight drag (felt at the rim of the steering wheel) as the steering mechanism passes through its center or straight-ahead position. See Fig. 9. Tighten the lock nut.

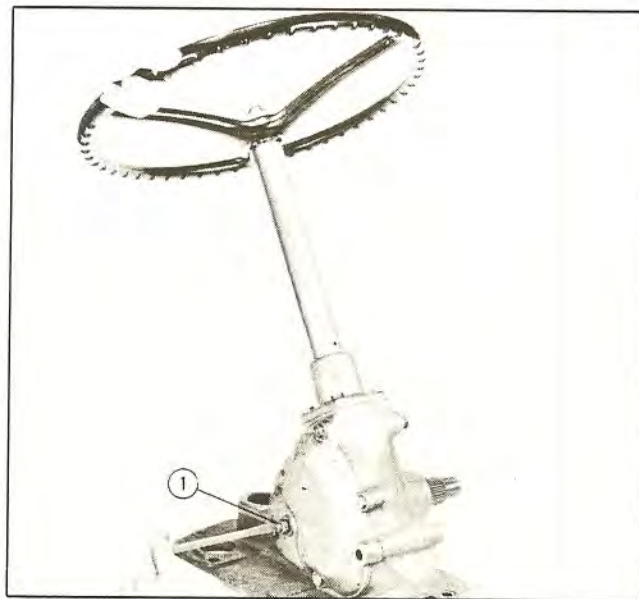


Fig. 9 — Adjusting the Steering Mechanism
1. Adjusting Screw

GROUP IV — SECTION A — PART 7

SERVICING THE MANUAL STEERING PEDESTAL AND DRAG LINK ASSEMBLY MF 50 & 65 TRACTORS

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The manual steering pedestal and drag link assembly information found in this part of the Shop Manual, concerns the assembly required by axles of the wide type. Pedestal assemblies for Row Crop Single and Twin Front Axles are discussed in Group IV, Section A, Part 2.

Certain preparations must be made before this assembly can be completely removed and disassembled. Refer to Group IV, Section C, Part 6, and remove the grill, hood and side panels, and lower grill panel. Refer to Group IV, Section C, Part 6, and remove fan shroud and radiator assembly. Refer to Group IV, Section A, Part 2, and remove the front axle assembly from the front axle support (remove front axle as a unit, including wheels). Figs. 2, 3 and 4 show cut-away views of the pedestal, drag link and steering for the various front axle assemblies.

REMOVING THE PEDESTAL

Support the tractor at the rear of the front axle support casting. Refer to Fig. 1, and proceed to remove:

1. Drag link, No. 15, from upper arm, No. 5.
2. Upper pedestal assembly, No. 9, pedestal shaft, No. 6, and upper arm as a unit by removing the cap screws securing the unit to front axle support, No. 12.

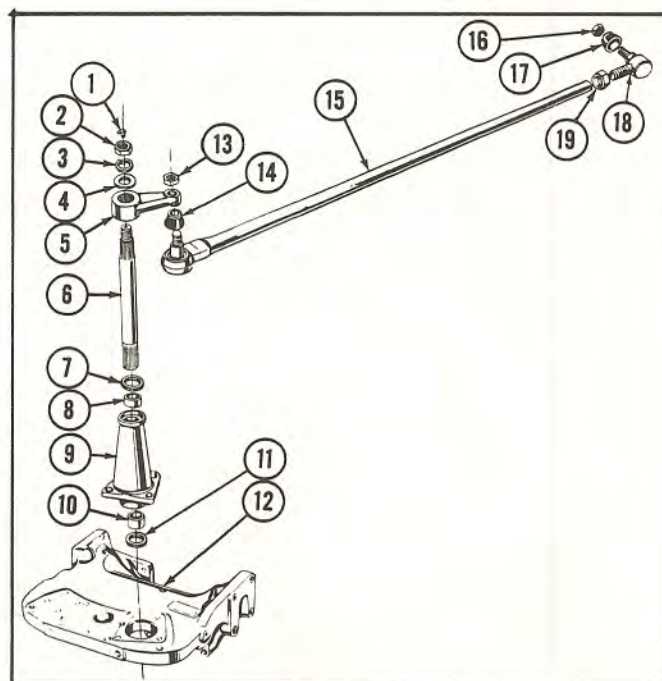


Fig. 1 — Pedestal and Drag Link Assembly Nomenclature

- | | |
|---------------------|---------------------------|
| 1. Grease Fitting | 11. Lower Dust Seal |
| 2. Nut | 12. Axle Support Assembly |
| 3. Lock Washer | 13. Nut |
| 4. Flat Washer | 14. Dust Seal |
| 5. Upper Arm | 15. Drag Link |
| 6. Pedestal Shaft | 16. Nut |
| 7. Upper Dust Seal | 17. Dust Seal |
| 8. Upper Bushing | 18. Tie Rod End |
| 9. Pedestal Housing | 19. Lock Nut |
| 10. Lower Bushing | |

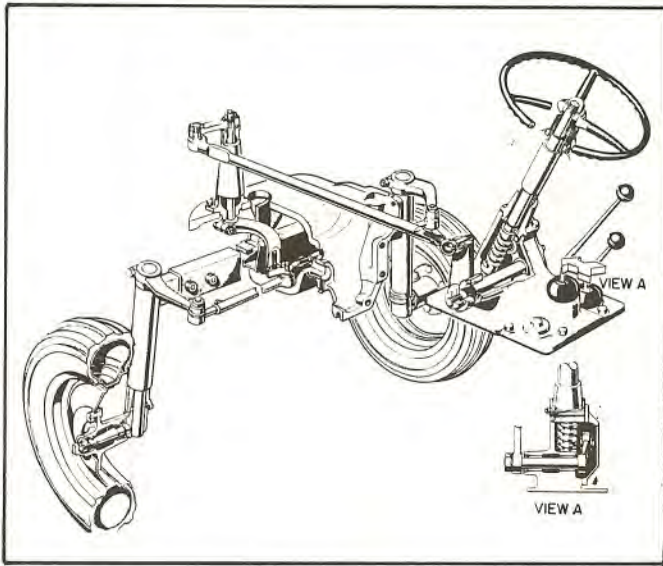


Fig. 2 - Four Wheel Front End and Steering Mechanism

3. Front axle support from tractor by removing the attaching bolts.

NOTE: The location and position of the R.H. and L.H. spacers should be installed in same order as removed.

DISASSEMBLING THE PEDESTAL

Refer to Fig. 1, and remove:

1. Upper arm, No. 5, from the pedestal shaft, No. 6, by removing the grease fitting, nut, lock washer, and flat washer.
2. Pedestal shaft by pulling it through pedestal assembly, No. 9, from lower end.
3. Upper and lower dust seals, Nos. 7 and 11, from their seats in the upper pedestal assembly.
4. Upper and lower bushings Nos. 8 and 10, from pedestal assembly (remove only when necessary).

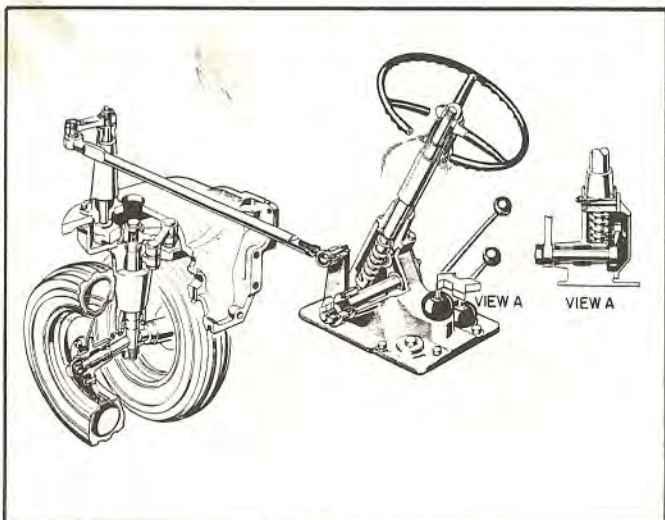


Fig. 3 - Twin Wheel Front End and Steering Mechanism

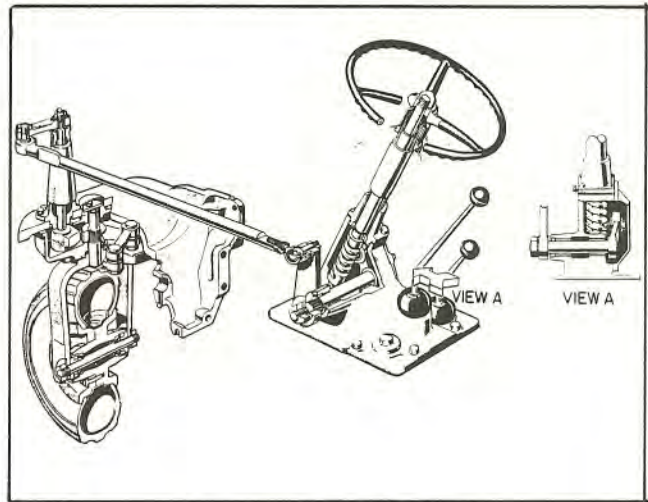


Fig. 4 - Single Wheel Front End and Steering Mechanism

5. Grease fitting from the front axle support, No. 5, Fig. 5.

6. Rear pivot pin bushing No. 4, Fig. 5, from the pivot pin hole located in the support casting.

7. R.H. and L.H. spacers.

INSPECTING THE PEDESTAL

Clean all parts thoroughly and inspect for wear and damage.

Pedestal shaft should have a 0.0005-0.002 inch clearance in the bushings.

New pedestal shaft bushings should be reamed to 1.5005-1.5015 inch after being installed in the upper pedestal assembly.

NOTE: Inspect the rear pivot bushing bore located in the front axle support. If a correction has not been made to prevent pivot bushing from working out of place, use a long 7/32" drill, entering through the grease fitting (No. 5, Fig. 5) hole, to drill a 1/64" deep spot in the bore. When installing the bushing, line up the grease holes, and with a long punch inserted through grease hole, stake the bushing into the drill spot.

ASSEMBLING THE PEDESTAL

Refer to Fig. 1, and install:

1. Upper and lower pedestal bushings, Nos. 8 and 10, into the pedestal assembly, No. 9. Press them into place evenly and ream to size.

2. Upper and lower dust seals, Nos. 7 & 11, into their respective seats in the pedestal assembly. Use new dust seals whenever possible.

3. Pedestal shaft, No. 6, into the pedestal assembly. Lightly grease the shaft and start it through lower base of pedestal assembly.

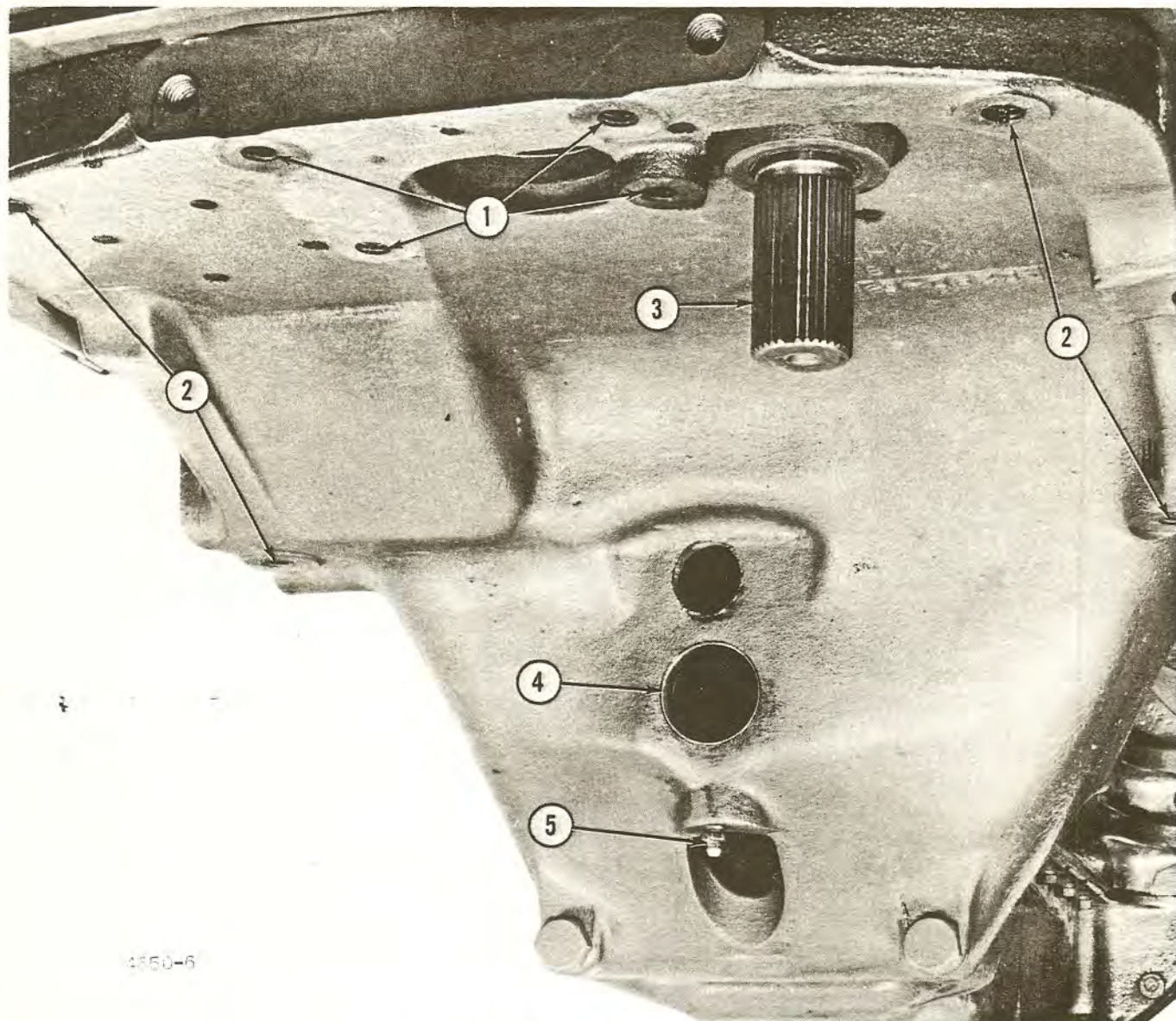


Fig. 5 — Front Axle Support Assembly

- | | |
|-------------------------------------|---------------------------|
| 1. Tapped Holes for 4-Wheel Models | 3. Pedestal Shaft |
| 2. Tapped Holes for Tricycle Models | 4. Rear Pivot Pin Bushing |
| | 5. Grease Fitting |

4. Upper arm, No. 5, to the upper end of pedestal shaft; a blind spline provides for proper alignment. Secure with flat washer, lock washer and nut.

5. Pivot bushing, No. 4, Fig. 5, into the bore in front axle support as described in note. (See "Inspecting").

INSTALLING THE PEDESTAL

Refer to Fig. 1, and install:

1. Front axle support assembly, No. 12, to tractor as follows:

a. Insert attaching bolts through the holes provided in the front axle support.

b. Place the R.H. and L.H. spacers in position on the bolts now protruding from rear side of support assembly.

c. Line up the holes in the support with holes in the tractor and tighten the bolts.

2. Upper pedestal assembly, No. 9, pedestal shaft, and upper arm as one unit. Position the unit to its proper location on front axle support and secure with cap screws.

3. Front axle assembly, referring to Group IV, Section A, Part 2 for instructions.

4. Drag link, No. 15, after aligning front wheels in a straight line position and centering steering wheel.

5. Lubricate all grease points thoroughly.

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