

SHOP MANUAL

JOHN DEERE

SERIES 4050-4250-4450-4650-4850

Each tractor has the following serial number plates: basic tractor, engine short block, mechanical front-wheel drive, transmission, hydraulic pump, Roll-Gard and Sound-Gard body.

The basic tractor serial number plate is located at the rear of the transmission case. The engine serial number plate is located on right side of engine behind the injection pump. The mechanical front-wheel

drive serial number plate is located on the axle housing. The transmission serial number plate is located on left side of transmission case. The hydraulic pump serial number plate is located on the right side of pump housing. The Roll-Gard serial number plate is located on right-hand front post. The Sound-Gard body serial number plate is located on the windshield wiper motor access door header.

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DUAL DIMENSIONS

This service manual provides specifications in both the U.S. Customary and Metric (SI) system of measurements. The first specification is given in the measuring system used during manufacture, while the second specification (given in parenthesis) is the converted measurement. For instance, a specification of "0.011 inch (0.28 mm)" would indicate that the equipment was manufactured using the U.S. system of measurement and the metric equivalent of 0.011 inch is 0.28 mm.

CONDENSED SERVICE DATA

GENERAL	4050	4250	4450	4650	4850
Engine Make	OWN				
Engine Model	6466D	6466T	6466T	6466A	6466A
Number of Cylinders	6				
Bore	4.56 in. (115.8 mm)				
Stroke	4.75 in. (120.7 mm)				
Displacement	466 cu. in. (7.6 L)				
Compression Ratio	17.0:1	15.8:1	15.8:1	15.8:1	15.0:1
Cylinder Sleeves	WET				
TUNE-UP					
Firing Order	1-5-3-6-2-4				
Valve Clearance—					
Intake	0.018 in. (0.46 mm)				
Exhaust	0.028 in. (0.71 mm)				
Injection Timing-Static	TDC				
Governed Engine Rpm—					
Low Idle	850				
High Idle	2375				
Full Load	2200				
Engine Power at Pto	100.95 hp (75.28 kW)	120.86 hp (90.13 kW)	140.43 hp (104.72 kW)	165.52 hp (123.43 kW)	192.99 hp (143.91 kW)
Battery—					
Volts	12				
Ground Polarity	Negative				
SIZES-CLEARANCES					
Crankshaft Main Journal					
Diameter	3.372-3.373 in. (85.65-85.67 mm)				
Main Bearing Clearance	0.0012-0.0042 in. (0.03-0.10 mm)				
Crankpin Diameter	2.998-2.999 in. (76.15-76.18 mm)				
Rod Bearing Clearance	0.0012-0.0042 in. (0.03-0.10 mm)				
Crankshaft End Play	0.002-0.015 in. (0.05-0.38 mm)				
Camshaft Journal Clearance	0.002-0.005 in. (0.05-0.127 mm)				
Camshaft End Play	0.0045-0.0095 in. (0.11-0.24 mm)				
Piston Skirt Clearance	0.004-0.005 in. (0.10-0.127 mm)				
CAPACITIES					
Cooling System	27 qts. (25.6 L)	27 qts. (25.6 L)	27 qts. (25.6 L)	32 qts. (30.3 L)	32 qts. (30.3 L)
Fuel Tank	65 gals. (246 L)	65 gals. (246 L)	65 gals. (246 L)	102 gals. (386 L)	102 gals. (386 L)

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Cylinder Sleeves	WET				
TUNE-UP					
Firing Order	1-5-3-6-2-4				
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Intake	0.018 in. (0.46 mm)				
Exhaust	0.028 in. (0.71 mm)				
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Fuel Tank	65 gals. (246 L)	65 gals. (246 L)	65 gals. (246 L)	102 gals. (386 L)	102 gals. (386 L)

CONDENSED SERVICE DATA (CONT.)

CAPACITIES (CONT.)	4050	4250	4450	4650	4850
Crankcase with Filter	18 qts. (17.0 L)	18 qts. (17.0 L)	18 qts. (17.0 L)	21 qts. (19.9 L)	21 qts. (19.9 L)
Transmission-Hydraulic System*—					
Power Shift	13.5 gals. (51 L)	13.5 gals. (51 L)	13.5 gals. (51 L)	18.5 gals. (70.5 L)	18.5 gals. (70.5 L)
Power Shift with MFWD	16.0 gals. (60.5 L)	16.0 gals. (60.5 L)	16.0 gals. (60.5 L)	20.0 gals. (75 L)	20.0 gals. (75 L)
Quad-Range	16.0 gals. (60.5 L)	16.0 gals. (60.5 L)	16.0 gals. (60.5 L)	26.9 gals. (101.8 L)	...
Quad-Range with MFWD	17.2 gals. (65.1 L)	17.2 gals. (65.1 L)	17.2 gals. (65.1 L)

*John Deere Hy-Gard transmission and hydraulic oil or equivalent is recommended for use in all models.

Mechanical Front-Wheel Drive**—

Axle Housing

ZF Axle	9 qts. (8.5 L)	9 qts. (8.5 L)	9 qts. (8.5 L)	9.5 qts. (9 L)	9.5 qts. (9 L)
John Deere Axle	12 qts. (11.4 L)	12 qts. (11.4 L)	12 qts. (11.4 L)	12 qts. (11.4 L)	12 qts. (11.4 L)

Wheel Hub

ZF Axle	2 qts. (1.9 L)	2 qts. (1.9 L)	2 qts. (1.9 L)	4.75 qts. (4.5 L)	4.75 qts. (4.5 L)
John Deere Axle	4 qts. (3.8 L)	4 qts. (3.8 L)	4 qts. (3.8 L)	6 qts. (5.7 L)	6 qts. (5.7 L)

**SAE 85W-140, GL5 gear lubricant is recommended for use in all models.

FRONT SYSTEM

ADJUSTABLE TREAD FRONT AXLE

1. AXLE HOUSING AND PIVOT BRACKET. The front axle attaches to the front support (1—Fig. 1). Clearance between axle pivot pins (13—Fig. 1 and 2—Fig. 2) and bushings (14—Fig. 1 and 1—Fig. 2) should not exceed 0.080 inch (2 mm).

When renewing pivot bushings, be sure center of “X” pattern inside bushing is aligned with grease fitting in housing. Grease hole in bushing will be slightly offset from grease fitting. Install bushing flush with bottom of chamfer.

Install front pivot pin flush with rear edge of pin bore in axle. Install shims (3—Fig. 2) on axle front pivot bolt to provide a minimum amount of clearance between front axle and support. Maximum allowable clearance is 0.015 inch (0.38 mm). Tighten nuts on pivot bolts to 220 ft.-lbs. (298 N·m). Tighten tie rod end retaining nuts to 100 ft.-lbs. (136 N·m). Lubricate pivot pins and bushings with multipurpose grease.

2. SPINDLES AND BUSHINGS. The steering arms (6—Fig. 2) are splined to spindles (10) and re-

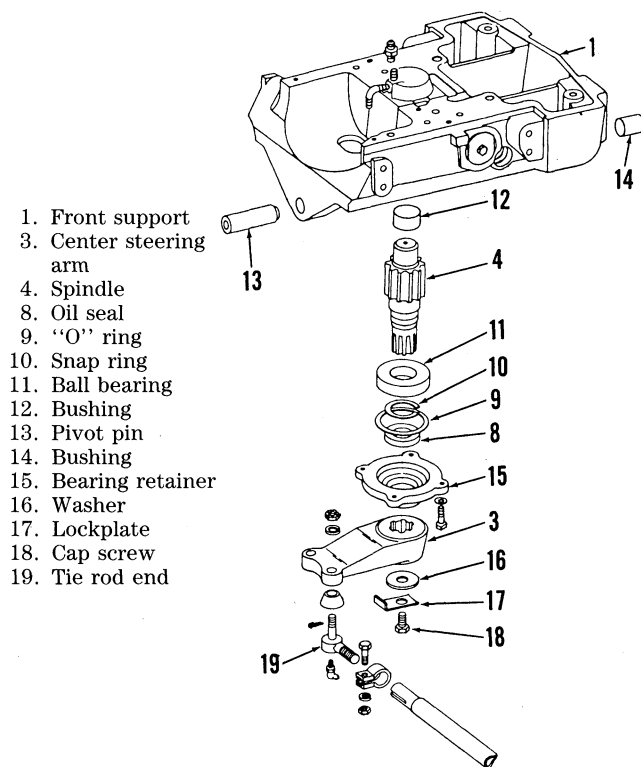


Fig.1—Partially exploded view of front axle support assembly used on 4050, 4250 and 4450 tractors. Support assembly used on 4650 and 4850 tractors is similar.

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Power Shift with MFWD	16.0 gals. (60.5 L)	16.0 gals. (60.5 L)	16.0 gals. (60.5 L)	20.0 gals. (75 L)	20.0 gals. (75 L)
Quad-Range	16.0 gals. (60.5 L)	16.0 gals. (60.5 L)	16.0 gals. (60.5 L)	26.9 gals. (101.8 L)	...
Quad-Range with MFWD	17.2 gals. (65.1 L)	17.2 gals. (65.1 L)	17.2 gals. (65.1 L)

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Wheel Hub					
ZF Axle	2 qts. (1.9 L)	2 qts. (1.9 L)	2 qts. (1.9 L)	4.75 qts. (4.5 L)	4.75 qts. (4.5 L)
John Deere Axle	4 qts. (3.8 L)	4 qts. (3.8 L)	4 qts. (3.8 L)	6 qts. (5.7 L)	6 qts. (5.7 L)

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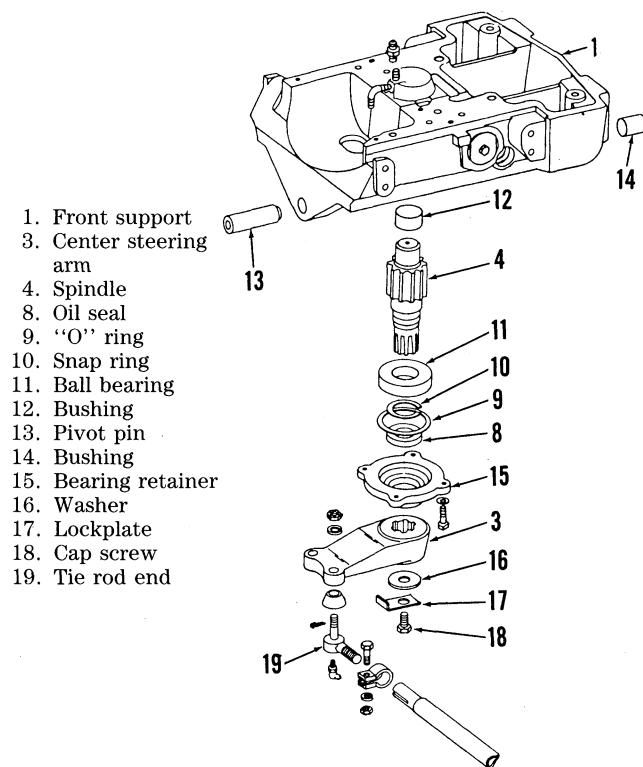


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MECHANICAL FRONT-WHEEL DRIVE

tained by a cap screw. Spindle bushings (8) are renewable. When installing new bushings, be sure hole in bushing is aligned with grease fitting in axle knee (9).

Align notches in thrust washers (12) with dowel pins (11) when reinstalling spindles. Shim washers (7) are used to adjust spindle end play to 0.010-0.040 inch (0.25-1.0 mm). Tighten steering arm retaining cap screw to 170 ft.-lbs. (230 N·m), then strike steering arm several times with lead hammer. Retorque retaining screw to 170 ft.-lbs. (230 N·m). Lubricate spindles with multipurpose grease.

To adjust front wheel bearings, tighten spindle nut to 35 ft.-lbs. (47 N·m). Back off spindle nut, if necessary, until cotter pin can be inserted.

3. TIE RODS AND TOE-IN. The tie rod outer ends (19—Fig. 2) are adjustable with several holes provided for changing axle width. Tie rod inner ends (15) are threaded to provide adjustment for toe-in. To adjust toe-in, remove bolts (18) and loosen clamp (16). Rotate tie rod tubes (17) to provide 1/8-3/8 inch (3-9 mm) toe-in. Be sure to adjust both tie rods to equal lengths. Tighten clamps and bolts to 35 ft.-lbs. (47 N·m).

Service procedures for John Deere 1100 Series front-wheel drive axle are located at the rear of this service manual, beginning with paragraph 250. Service procedures for ZF front-wheel drive axle used on early production tractors are contained in paragraphs 9 through 21. Paragraphs 4 through 8, containing information on operation, trouble-shooting, solenoid valve and front-wheel drive clutch, apply to all front-wheel drive tractors.

OPERATION

All Models So Equipped

4. Some models may be equipped with mechanical front-wheel drive (MFWD) unit. Power is supplied from the differential drive gear through the MFWD clutch (mounted on bottom of transmission housing). The clutch unit is hydraulically released and spring applied.

An electrically actuated solenoid valve controls flow of oil to clutch unit. Power from the clutch is transmitted through an external drive shaft to the front axle limited slip differential unit. A planetary gear reduction system is located in front wheel hubs to provide final drive to front wheels.

CAUTION: When servicing mechanical front-wheel drive tractors with engine running and rear wheels supported off the ground and turning, always support front wheels in a similar manner. A loss of electrical power or hydraulic system pressure will engage front-wheel drive and pull rear wheels off supports if front wheels are not properly supported.

TROUBLE-SHOOTING

All Models So Equipped

5. If mechanical front-wheel drive (MFWD) malfunctions, the following trouble-shooting procedure should be followed to isolate the problem.

With key switch "ON" and MFWD switch "OFF," there should be a strong magnetic attraction at clutch solenoid housing. With the MFWD switch "ON," there should be only slight residual magnetism evident at solenoid housing. If necessary, repair switch, wiring or solenoid.

Raise and support left front wheel. With engine running at 1000 rpm, transmission in "PARK" and MFWD switch "OFF," it should be possible to rotate left front wheel by hand. If wheel will not rotate, check for failure of differential or planetary gears

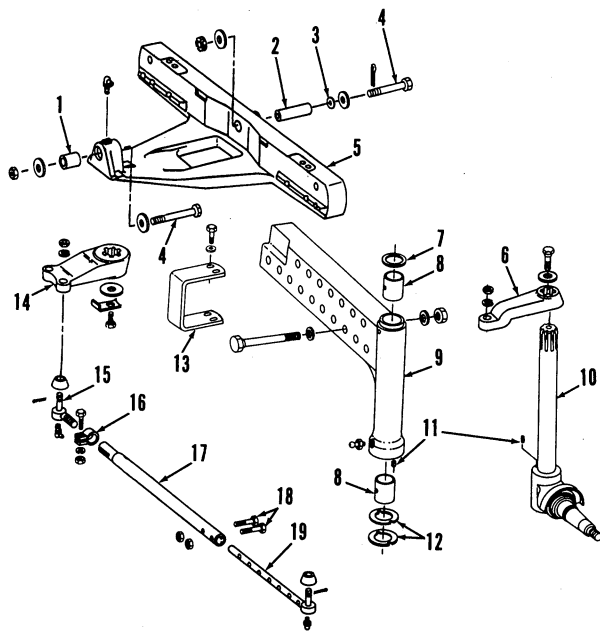


Fig. 2—Exploded view of adjustable tread front axle assembly.

- | | |
|--------------------|------------------------|
| 1. Bushing | 11. Dowel pins |
| 2. Pivot pin | 12. Thrust washers |
| 3. Shim | 13. Clamp |
| 4. Retaining bolts | 14. Steering motor arm |
| 5. Axle housing | 15. Tie rod end |
| 6. Steering arm | 16. Clamp |
| 7. Shim washer | 17. Tube |
| 8. Bushings | 18. Bolts |
| 9. Axle knee | 19. Tie rod end |
| 10. Spindle | |

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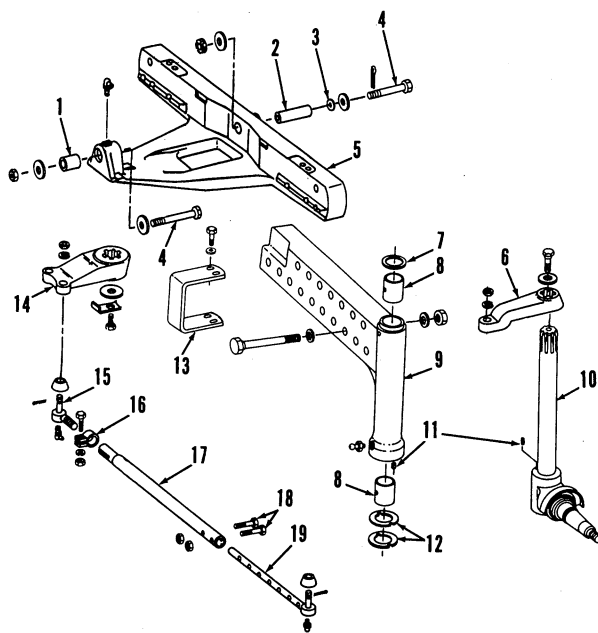


Fig. 2—Exploded view of adjustable tread front axle assembly.

- | | |
|--------------------|------------------------|
| 1. Bushing | 11. Dowel pins |
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| 3. Shim | 13. Clamp |
| 4. Retaining bolts | 14. Steering motor arm |
| 5. Axle housing | 15. Tie rod end |
| 6. Steering arm | 16. Clamp |
| 7. Shim washer | 17. Tube |
| 8. Bushings | 18. Bolts |
| 9. Axle knee | 19. Tie rod end |
| 10. Spindle | |

(disconnect drive shaft to isolate front axle components from clutch assembly), clutch pack piston could be stuck or the clutch pressure circuit could be blocked (clutch is hydraulically released).

With engine running at 1000 rpm, transmission in "PARK" and MFWD switch "ON," left front wheel should not rotate by hand. If wheel will rotate, check clutch pressure circuit.

To check clutch pressure, install a 300 psi (2000 kPa) pressure gage at system pressure test port (1—Fig. 3 or Fig. 4) on traction clutch valve housing. In-

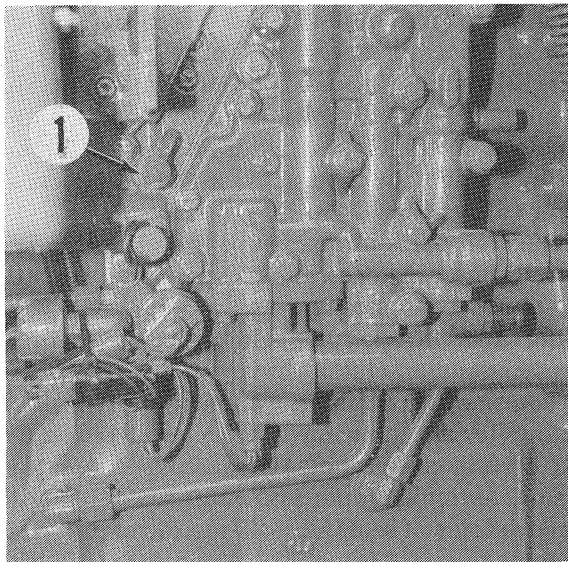


Fig. 3—When trouble-shooting mechanical front-wheel drive, install a 300 psi (2000 kPa) pressure gage at system pressure test port (1) on traction clutch valve housing. Power shift model is shown; refer to Fig. 4 for Quad-Range models.

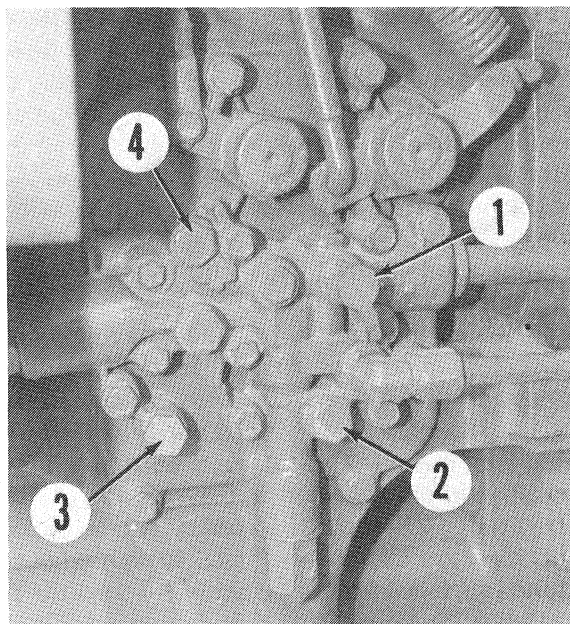


Fig. 4—View of pressure control valve used on Quad-Range models. Install 300 psi (2000 kPa) pressure gage at test port (1) to check system pressure.

stall another 300 psi (2000 kPa) pressure gage at MFWD clutch test port (3—Fig. 5). Note that MFWD test port may have standard or metric threads. If 5/8 inch wrench is used to remove plug, threads are standard. If a 3/4 inch wrench is used to remove plug, threads are metric. With engine running at 1000 rpm and MFWD switch "OFF," difference between system pressure and clutch pressure should not be more than 20 psi (140 kPa). If clutch pressure is low, the solenoid valve could be sticking or oil may be leaking past clutch shaft or piston sealing rings. With engine at 1000 rpm and MFWD switch "ON," there should be no pressure at clutch test port. If there is pressure to clutch unit, solenoid valve is defective.

To check MFWD clutch for slippage, disconnect drive shaft at clutch shaft yoke. Install a second yoke to the clutch shaft, then insert pipe 6 feet (1.8 m) long through opening of yokes. With engine off, apply force of 175-200 pounds (780-890 N) to end of pipe. This will produce approximately 1000 ft.-lbs. (1355 N·m) torque load on clutch pack. If clutch slips under this load, overhaul clutch as outlined in appropriate paragraph 7 or 8.

SOLENOID VALVE

All Models So Equipped

6. To remove solenoid valve assembly (S—Fig. 5), disconnect wiring connector. Remove retaining ring or nut from end of electrical coil, then withdraw coil assembly (2—Fig. 6 or 6A). On late model tractors with Power Shift transmission, remove valve assembly (3—Fig. 6A) from clutch housing. On early model Power Shift tractors and all tractors equipped with Quad-Range transmission, remove screws securing retainer plate (3—Fig. 6) and pull insert (4) from housing. Remove valve spool (7), spring (9) and sleeve (8).

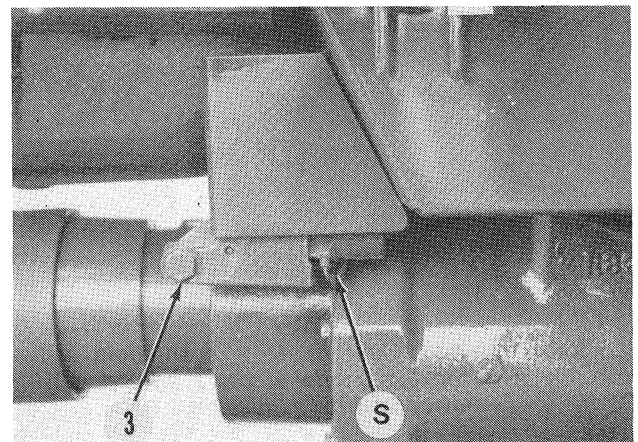


Fig. 5—Install a 300 psi (2000 kPa) gage at MFWD clutch test port (3) to check clutch hydraulic pressure. Refer to text.

Inspect all components for scoring, excessive wear or other damage. Be sure to renew all "O" rings.

To reinstall valve assembly, reverse the removal procedure.

CLUTCH

Models Equipped With Quad-Range Transmission

7. R&R AND OVERHAUL. To remove clutch assembly, first drain oil from clutch housing. Remove drive shaft. Disconnect solenoid wiring and clutch pressure oil line. Remove cap screws securing clutch housing. Support clutch assembly with two alignment

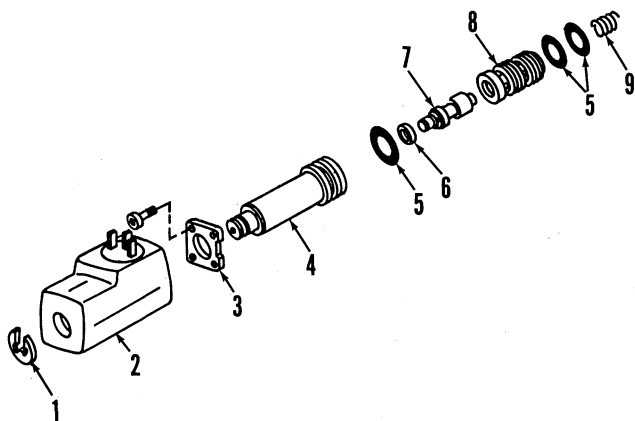


Fig. 6—Exploded view of MFWD solenoid valve assembly used on early Power Shift tractors and all Quad-Range tractors.

- | | |
|--------------------|----------------|
| 1. Snap ring | 6. Washer |
| 2. Electrical coil | 7. Valve spool |
| 3. Retainer plate | 8. Sleeve |
| 4. Insert | 9. Spring |
| 5. "O" rings | |

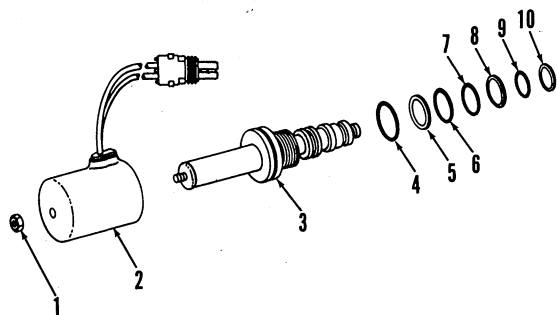


Fig. 6A—Exploded view of MFWD solenoid valve assembly used on late model tractors equipped with Power Shift transmission.

- | | |
|--------------------|------------------|
| 1. Nut | 6. "O" ring |
| 2. Electrical coil | 7. "O" ring |
| 3. Control valve | 8. Back-up ring |
| 4. "O" ring | 9. "O" ring |
| 5. Back-up ring | 10. Back-up ring |

dowels and a floor jack (clutch weighs about 90 pounds [41 kg]), then withdraw clutch assembly. Remove clutch drum (30—Fig. 7) from clutch housing if it does not come out with clutch assembly.

To disassemble, remove washer (29) and straighten locking tabs on nut (28). Use a suitable horseshoe shaped tool (T—Fig. 9) to compress Belleville springs (26), then unscrew nut (28). Release Belleville spring tension, then remove nut (28—Fig. 7), washer (27), springs (26), pressure plate (25), clutch discs (24) and plates (23) and plate (22). Remove snap ring (21), washer (20) and hub (19) with pins (17). Pry piston housing (13) from quill (2). Tap piston housing on a block of wood to remove piston (16). Remove seal rings (12) and piston seals (14 and 15). Remove shaft retaining ring (11), then tap end of clutch shaft (1) on a block of wood to remove from housing. Remove bearing (8) and bushing (10). Remove oil seal (7), spacer (6), washer (5) and "O" rings (9).

Inspect all parts for excessive wear or other damage and renew if necessary. It is recommended that all "O" rings and sealing rings be renewed. Coat all sealing rings with petroleum jelly during reassembly.

To reassemble clutch, reverse the disassembly procedure while noting the following items. Install bushing (10) into housing (2) with beveled side first. Make certain clutch shaft (1) is completely seated in housing. Assemble inner and outer seals (14 and 15) so grooved side of seals faces offset side of piston (16). Assemble piston housing (13), piston, hub (19), washer (20) and snap ring (21), then use a dial indicator (Fig. 10) to check end play of hub (19). If necessary, adjust end play by changing thickness of washer (20—Fig. 7) to obtain 0.008 inch (0.2 mm) end play. Install pressure plate (22) with beveled edge toward piston. Install discs (24) and plates (23) alternately, starting with a disc and ending with a plate. Install clutch release pins (17) into hub (19). Install rear pressure plate (25) with offset side toward clutch pack. Assemble Belleville springs alternately so outer diameter of first spring (1—Fig. 11) is against pressure plate (2) and spring with measurement (3) is located on top as shown. Use drum (30—Fig. 7) to align clutch disc tangs, then remove drum making sure tangs remain aligned.

Belleville spring pack height must be adjusted as follows: Measure and record the thickness of nut (28) and washer (27). Then, compress springs with a horseshoe shaped tool and thread nut onto shaft until locking ring on nut is about even with notches on clutch shaft. Remove compression tool and position a straightedge (C—Fig. 12) across machined surface of nut. Measure distance between straightedge and machined surface of pressure plate. Subtract the nut and washer thickness from this dimension. The result should equal the dimension marked on the top spring (Fig. 11). Note that dimension on spring is given in millimeters and a decimal point should be put

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1. Clutch shaft
2. Housing
3. Solenoid valve
4. Ball
5. Washer
6. Spacer
7. Oil seal
8. Bearing
9. "O" rings
10. Bushing
11. Snap ring
12. Seal rings
13. Piston housing
14. Inner seal
15. Outer seal
16. Piston
17. Pin
18. Cap
19. Hub
20. Washer
21. Snap ring
22. Plate
23. Splined plates
24. Discs
25. Pressure plate
26. Belleville springs
27. Washer
28. Nut
29. Washer
30. Drum
31. Snap ring
32. Drive gear
33. Bushing
34. Bearing
35. Gasket

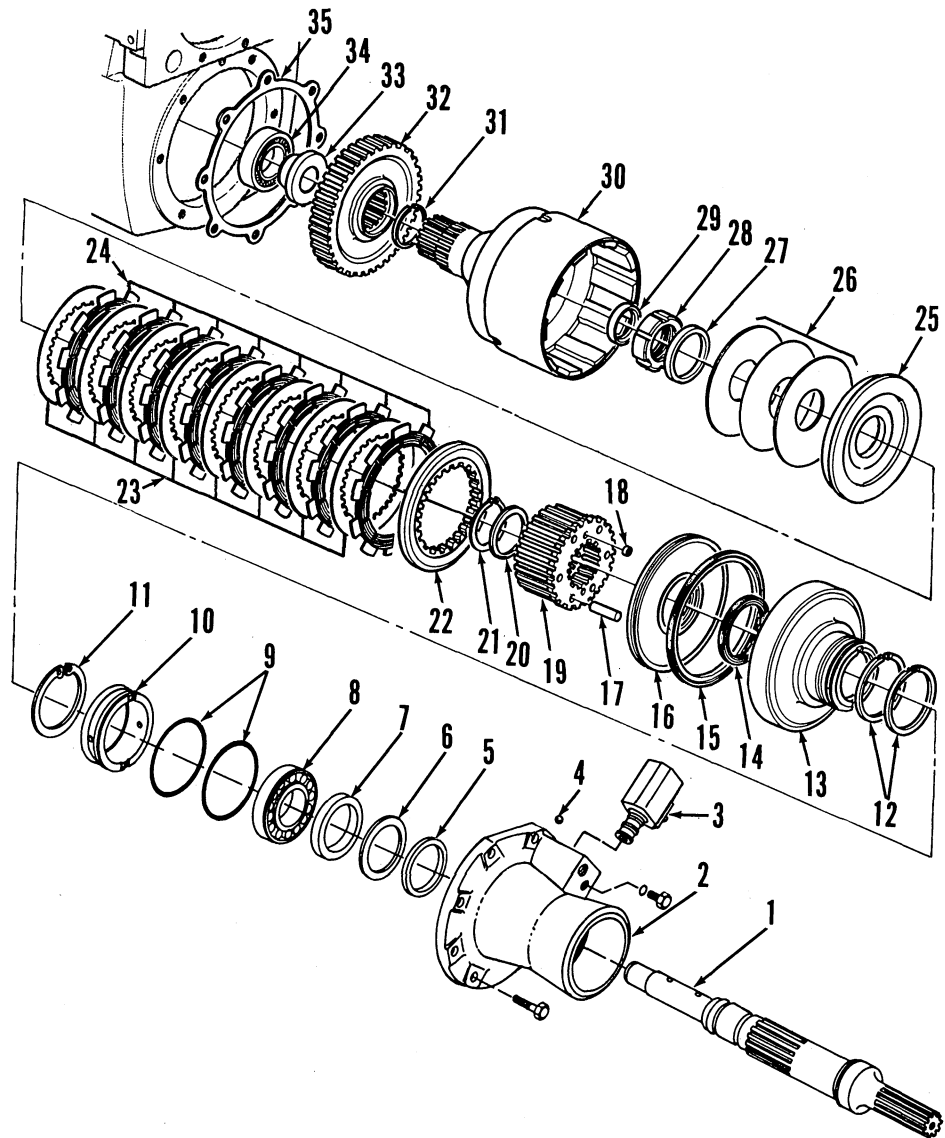


Fig. 7—Exploded view of MFWD clutch assembly used on tractors equipped with Quad-Range transmission.

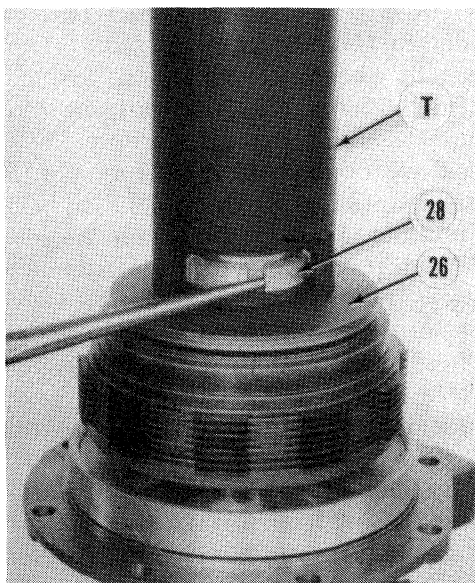


Fig. 9—Use horseshoe shaped tool (T) and a press to compress Belleville springs.

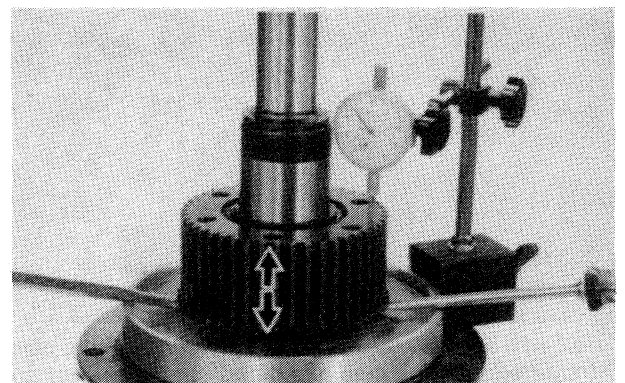


Fig. 10—Use dial indicator to check end play of clutch hub.

Illustrations for Fig. 7, Fig. 9 and Fig. 10 reproduced by permission of Deere & Company. Copyright Deere & Company.

after the first two digits (example: 19.20 mm). If necessary, adjust nut up or down until dimensions match. Turning the nut one slot changes height approximately 0.010 inch (0.25 mm). After spring height is correctly adjusted, bend locking ring into notch in shaft to secure nut.

Free play between clutch shaft and clutch drum is adjusted by changing thickness of spacer washer (29—Fig. 7). If clutch shaft, drum or clutch housing is renewed, free play must be adjusted. When renewing any other parts, original washer should be installed. To adjust free play to recommended 0.020 inch (0.5 mm) dimension, proceed as follows: Install thinnest washer available on shaft. Washers are available in thicknesses from 0.270 inch (6.8 mm) to 0.380 inch (9.6 mm). Shape a piece of soft lead wire with diameter of 0.118 inch (3 mm) into a ring and position on top of spacer washer. Install clutch drum. Reinstall clutch assembly using a new gasket and tighten mounting cap screws to 80 ft.-lbs. (108 N·m). Then, remove clutch assembly and measure compressed thickness of lead wire. To calculate required

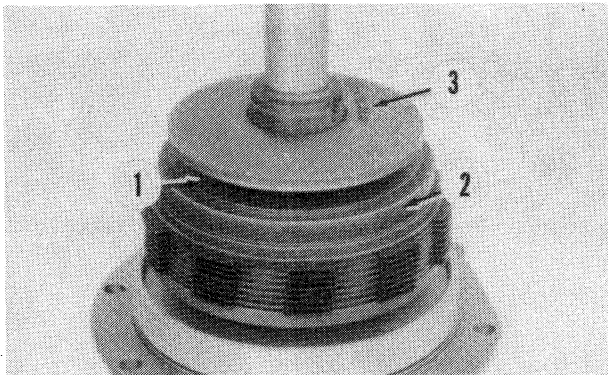


Fig. 11—Install Belleville springs so outer diameter of first spring (1) is against pressure plate (2) and spring with measurement (3) is on top.

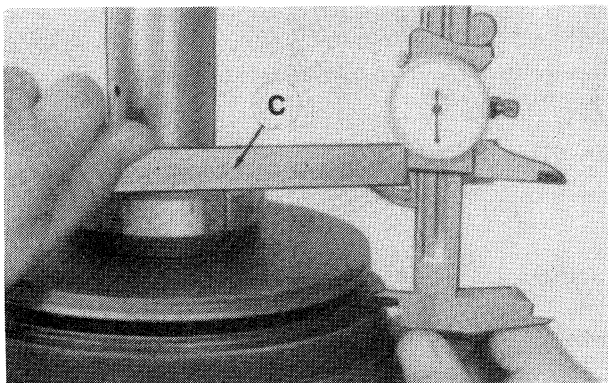


Fig. 12—To adjust Belleville spring installed height, place a straightedge (C) across machined surface of nut and measure between straightedge and surface of pressure plate. Refer to text.

washer thickness, add wire thickness to spacer washer thickness and subtract 0.020 inch (0.5 mm) from the total. The result is the required washer thickness.

To reinstall clutch assembly, reverse the removal procedure. Tighten mounting cap screws to 185 ft.-lbs. (250 N·m).

Models Equipped With Power Shift Transmission

8. R&R AND OVERHAUL. To remove clutch assembly, first drain oil from clutch housing. Remove drive shaft and yoke. Disconnect solenoid wires and clutch oil pressure line. Install a piece of pipe with 2-1/4 inch (60 mm) inside diameter and at least 3 inches (76 mm) long over end of clutch shaft and secure to shaft with a washer and cap screw. This will prevent clutch drum and clutch cover from separating during removal. Adequately support clutch assembly, then remove mounting cap screws and withdraw clutch assembly. Remove pipe from clutch shaft, then separate clutch cover (8—Fig. 14) from clutch assembly.

To disassemble clutch, first use a suitable puller to remove gear (23) and bearing cone (25). Use a press and suitable compressing tool to compress springs (20) until snap ring (22) can be removed. Release spring tension, then remove clutch pack components from clutch drum. Remove snap ring (15) and remove plate (14), thrust washer (16) and drum (10) from clutch shaft. Tap drum on a wood block to remove piston (13). Press bearing cone (7) off shaft if necessary.

Inspect all parts for excessive wear or other damage and renew if necessary. Thickness of a new clutch plate (17) is 0.060 inch (1.5 mm) and thickness of a new disc (18) is 0.072-0.074 inch (1.8-1.9 mm). It is recommended that seal rings and oil seals be renewed. When installing bearing retainer seals, install narrow seal (2) first with open side toward front of retainer (1). Be sure seal is bottomed in the bore. Then install wider seal with open side toward rear of retainer. Press seal in until it is 3/16 inch (4.5 mm) below rear face of retainer. Fill cavity between the seals with grease. When renewing clutch cover front bearing cup (6), press new cup only part way into cover. The cup will be properly located when retainer is installed. Rear cup (26) should be bottomed in its bore in clutch housing.

To reassemble, proceed as follows: If bearing cone (7) was removed, heat bearing to 300° F (150° C) maximum, then install on shaft. Lubricate piston seals (11 and 12) with oil. Stretch new outer seal (12) over outside diameter of clutch drum (10) for a few minutes, then install into groove in drum and immediately install piston. Be sure slots in piston are aligned

with slots in drum. Position drum onto clutch shaft. Install plate (14) so recessed side faces outward. Install snap ring (15) and thrust washer (16). Assemble clutch discs and plates alternately beginning with a disc (18). Use special JDG315 alignment tool or other suitable tool to align teeth of clutch discs. Make certain missing tooth on clutch discs is not aligned with rib on special tool. Install piston return plate (19—Fig. 14). Assemble spring washers (20) alternately beginning with outside diameter of first spring against return plate (19). Install washer (21) with stepped side facing up. Use a press and a compressing tool to compress spring washers until snap ring (22) can be installed. Make certain snap ring is fully seated in groove before releasing press. Be sure that clutch disc teeth are aligned, then install gear (23). Heat bearing cone (25) to 300° F (150° C) maximum, then install onto clutch shaft.

To reinstall clutch, first install clutch cover over clutch assembly being careful not to damage seals. Install pipe used in removal over end of clutch shaft and secure with a washer and cap screw. Be sure seal washer (27) is in place in recess of clutch housing. Install clutch assembly and tighten mounting cap screws to 35 ft.-lbs. (47 N·m). Use a dial indicator to check clutch shaft end play. If necessary, add or re-

move shims (5) between quill and housing to provide 0.001-0.005 inch (0.03-0.13 mm) end play.

AXLE AND FINAL DRIVE

Models With ZF Axle

9. R&R AXLE ASSEMBLY. To remove axle, first remove front weights and front fenders (if equipped). Disconnect drive shaft at front axle.

NOTE: Before loosening hydraulic lines, relieve system pressure by loosening brake bleed screw and pumping brake until pedal goes all the way down.

Disconnect hoses from steering assist cylinders, if so equipped. Disconnect tie rods. Place wood blocks between knuckles and steering stops. Support front of tractor and axle housing with suitable stands. Remove front and rear axle mounting bolts noting shims used on front bolt. Move axle rearward to disengage pivot pins, then remove from under tractor.

Inspect pivot pins and bushings for excessive wear. If clearance between pin and bushing exceeds 0.080 inch (2 mm), renew parts as necessary. When install-

1. Retainer
2. Seal
3. Seal
4. "O" ring
5. Shims
6. Bearing cup
7. Bearing cone
8. Clutch cover
9. Seal rings
10. Drum Assy.
11. Seal
12. Seal
13. Piston
14. Plate
15. Snap ring
16. Washer
17. Clutch plates
18. Clutch discs
19. Plate
20. Springs
21. Washer
22. Snap ring
23. Gear
24. Clutch shaft
25. Bearing cone
26. Bearing cup
27. Seal washer

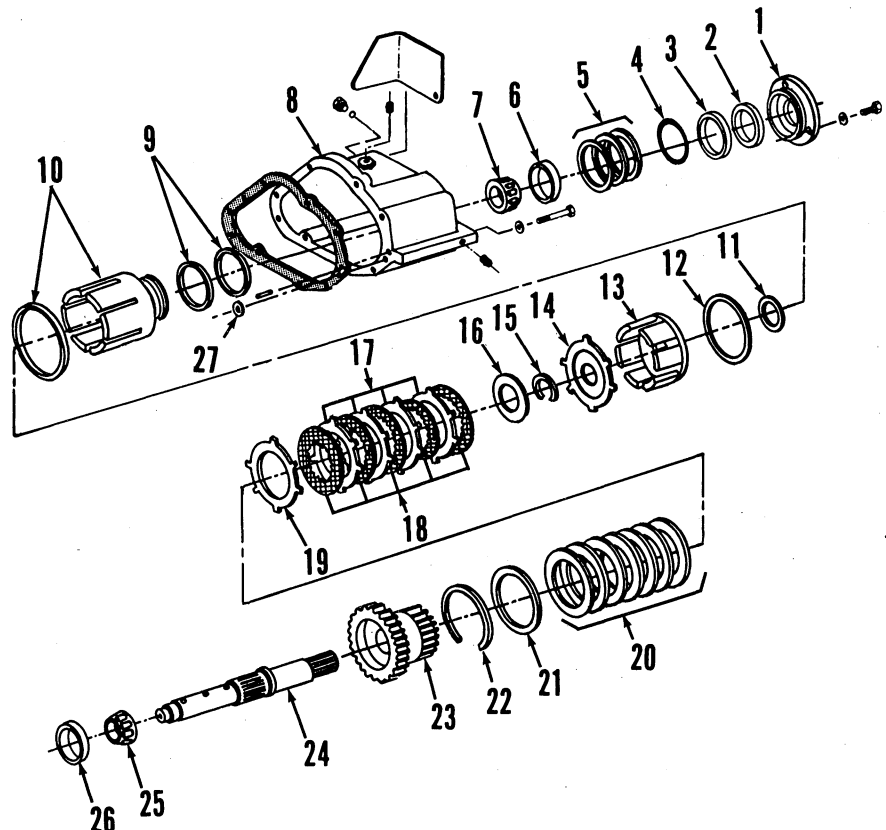


Fig. 14—Exploded view of mechanical front-wheel drive clutch assembly used on tractors equipped with Power Shift transmission.

ing new bushings, be sure center of "X" pattern inside bushing is aligned with grease fitting. Install bushing flush with bottom chamfer in housing bore.

To reinstall axle, reverse the removal procedure while noting the following items: Clearance between front axle and support is adjusted using shims on front pivot retaining bolt. Add or remove shims to obtain minimum amount of clearance. Maximum allowable clearance is 0.015 inch (0.38 mm). Tighten mounting bolts to 220 ft.-lbs. (298 N·m), tie rod end nuts to 100 ft.-lbs. (136 N·m) and drive shaft yoke cap screws to 50 ft.-lbs. (68 N·m). Lubricate pivot pins and bushings with multipurpose grease.

10. TIE RODS AND TOE-IN. Tie rod ends are nonadjustable. If ends are excessively worn, they should be renewed.

Tie rod ends are threaded to provide adjustment for toe-in. To adjust toe-in, first measure length of both tie rods. If difference in length exceeds 1/16 inch (1.5 mm), shorten the longest rod until lengths are equal. Turn steering wheel to center bellcrank, then measure distance between center of tires at the front and at the rear. Recommended difference between measurements is zero with a tolerance of 1/8 inch (3 mm) toe-in or toe-out. If necessary, loosen tie rod end jam nuts and turn each tie rod tube equally to obtain desired setting. Turning tie rod 1/8 turn will change tire centerline approximately 1/16 inch (2 mm).

11. PLANETARY ASSEMBLY. To remove, first raise and support front axle using suitable stands. Remove front wheel. Remove drain plug (2—Fig. 15) and drain oil from planetary housing. Scribe a line on planetary cover (3) and hub (4) for alignment pur-

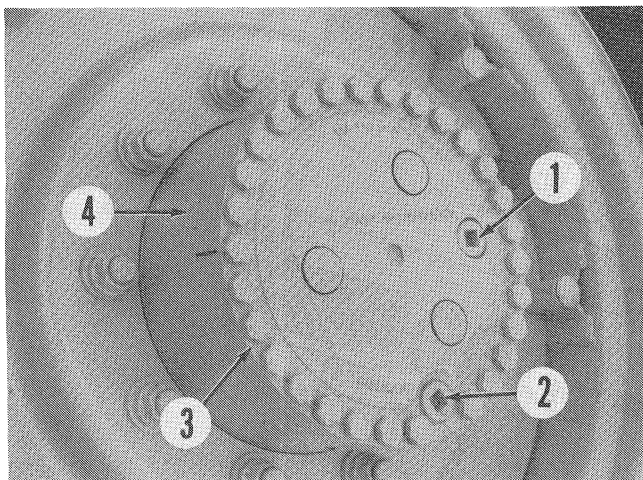


Fig. 15—Prior to removing planetary unit, scribe a line on planetary cover (3) and hub (4) for alignment when reassembling.

- | | |
|--------------------|--------------------|
| 1. Oil level plug | 3. Planetary cover |
| 2. Drain/fill plug | 4. Hub |

poses when reassembling. Remove planetary cover cap screws, then install two jack screws into threaded holes in cover to remove planetary carrier. Remove snap ring (8—Fig. 17), sun gear (7) and thrust washer (6). Straighten tangs of lockplate (5), then remove slotted nuts (4) using a suitable spanner wrench. Withdraw ring gear (3) and carrier (2) as an assembly. Remove snap ring (1) to separate carrier from ring gear. Note that late models use a one-piece ring gear and carrier.

To disassemble planetary carrier, first remove inner snap ring (18) from pinion shaft (19A) on models so equipped. On all models, press pinion shaft toward outside of housing until pinion gear (15) can be removed. Be careful not to lose bearing rollers (14). Each gear has 40 bearing rollers and three thrust washers (13).

Inspect all parts for scoring, wear or other damage and renew if necessary.

To reassemble, proceed as follows: Install ring gear and carrier and secure with inner slotted nut. Beveled side of slotted nuts should face outward. Tight-

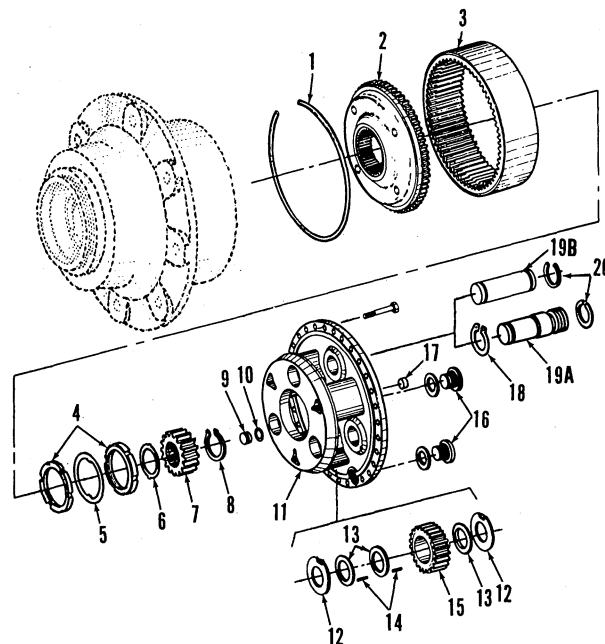


Fig. 17—Exploded view of typical planetary drive assembly. Late models use planet pin (19A) with inside snap ring (18), and ring gear (3) and carrier (2) is a one-piece unit.

- | | |
|-----------------------|-------------------------|
| 1. Snap ring | 12. Thrust washers |
| 2. Carrier | 13. Thrust washers |
| 3. Ring gear | 14. Bearing rollers |
| 4. Slotted nuts | 15. Planet gear |
| 5. Lockplate | 16. Plugs |
| 6. Thrust washer | 17. Dust plug |
| 7. Sun gear | 18. Snap ring |
| 8. Snap ring | 19A. Pin (late models) |
| 9. Thrust plug | 19B. Pin (early models) |
| 10. Shim | 20. Snap ring |
| 11. Planetary carrier | |

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en inner nut while rotating wheel hub to seat the bearings. Install a new lockplate and outer slotted nut. Tighten nuts to obtain recommended rolling drag torque specification indicated in table. Use one of the following methods to check rolling torque. The first method uses a fabricated spanner bar which is attached to the wheel hub. A nut is welded to the center of the bar to accommodate a torque wrench. The second method uses a string wrapped around wheel hub with a spring scale attached to the string. The recommended rolling torques are listed in the table below for both test methods.

Models 4050-4250-4450

Torque Wrench Method—	
Bearings renewed	35-62 in.-lbs. (4-7 N·m)
Bearings reused	17-31 in.-lbs. (2-4 N·m)
Spring Scale Method—	
Bearings renewed	6.5-11 lbs. (30-49 N)
Bearings reused	3.25-5.5 lbs. (16-24.5 N)

Models 4650-4850

Torque Wrench Method—	
Bearing renewed	62-115 in.-lbs. (7-13 N·m)
Bearings reused	31-57 in.-lbs. (3.5-6.5 N·m)
Spring Scale Method—	
Bearings renewed	8.5-16 lbs. (38-71 N)
Bearings reused	4.3-8 lbs. (19-35.5 N)

After adjusting rolling torque, bend tabs of lockplate to secure nuts. Install thrust washer, sun gear and snap ring. Assemble roller bearings and inner thrust washer (13—Fig. 17) into pinion gear using grease to hold components in place. Assemble gear and outer thrust washers (12) into carrier housing. Note tangs on thrust washers and locating slots in housing. Press pin into carrier until outer snap ring (20) contacts the housing. Install inner snap ring (18) on models so equipped.

NOTE: If wheel hub, bearings, wheel spindle or planetary carrier is renewed, the U-joint shaft end play must be checked and adjusted as follows:

Remove dust plug (17—Fig. 17) from planetary carrier. Drive brass plug (9) and shims (10) from the bore. Reinstall brass thrust plug and bottom it in the bore. Temporarily install planetary carrier and secure with

two mounting cap screws. Use a depth micrometer to measure distance from carrier surface to plug. Mark position of the micrometer on carrier surface so second measurement can be taken in the same place. Using a brass drift, tap thrust plug inward against shaft until shaft is seated against sun gear snap ring. Again, measure distance to brass plug. Subtract the first measurement from the second measurement. Then, subtract an additional 0.050 inch (1.3 mm) from the difference. The result is the required shim pack thickness. Actual shim pack thickness may vary by plus or minus 0.004 inch (0.1 mm). Remove carrier and thrust plug and install appropriate shim pack. Apply sealing compound to outer diameter of brass plug. Install new dust plug.

Apply sealing compound to mounting surface of planetary carrier. Reinstall carrier aligning match marks (Fig. 15) made during removal. Tighten mounting cap screws to 63 ft.-lbs. (86 N·m). Refill planetary housing with SAE 85W-140, GL5 gear lubricant.

12. WHEEL HUB, SPINDLE AND AXLE SHAFT.

To disassemble, drain oil from axle housing and planetary carrier. Remove planetary carrier, sun gear and ring gear as previously outlined. Withdraw wheel hub (12—Fig. 22) with bearings. Unbolt and remove spindle (7). Pull axle shaft (6) and U-joint assembly out of axle housing.

Inspect all parts for excessive wear or other damage and renew if necessary. To remove bearing cups

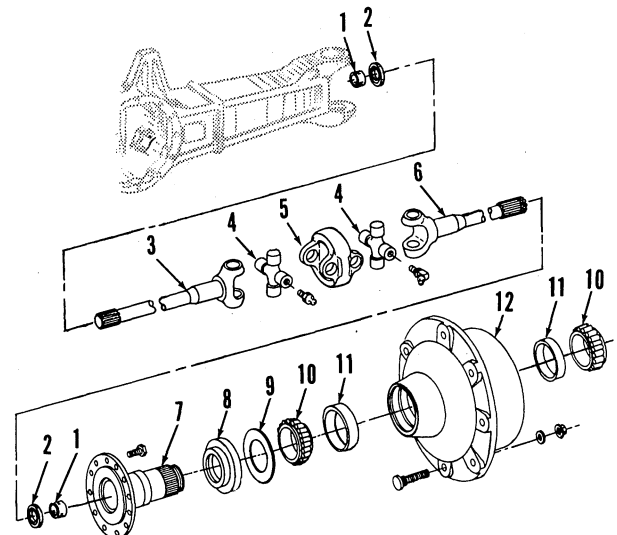


Fig. 22—Exploded view of wheel hub assembly and axle shaft assembly. Washer (9) is not used on 4650 and 4850 tractors.

- | | |
|------------------|------------------|
| 1. Bushing | 7. Spindle |
| 2. Seal | 8. Seal |
| 3. Inner shaft | 9. Washer |
| 4. U-joint cross | 10. Bearing cone |
| 5. Yoke | 11. Bearing cup |
| 6. Outer shaft | 12. Wheel hub |

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Paragraphs 13-14

(11), use a brass drift at notches provided inside wheel hub and drive cups out of hub. Note that outer bearing cup and cone are slightly wider than inner bearing cup and cone. Use suitable drivers to install new bearing cups and oil seal. Pack inside of seal lip with lithium base EP grease.

Inside diameter of spindle and axle bushings (1) should be 1.576-1.578 inches (40.03-40.08 mm). A JT01733 collet and slide hammer may be used to remove oil seals (2) and bushings. Drive new bushings into spindle and axle housing until bottomed in bores. Pack seal lips about half full of special grease supplied with seals. Apply gasket maker compound to outer diameter of seals. Drive seal into spindle until face of seal is 1/4 inch (6 mm) below surface of spindle. Drive seal into axle housing until face of seal is 5/16 inch (8 mm) below end of housing.

To disassemble axle shaft U-joints, remove snap rings, plugs and grease fittings from U-joints. Use a suitable slide hammer puller to remove bearing caps, or clamp yoke in a vise and tap on U-joint flange to drive bearing caps out of yokes.

Renew U-joint assembly if any part shows damage or wear. To reassemble, hold U-joint cross in position in yoke and tap bearing caps into yoke until snap rings can be installed. Be careful not to dislodge bearing needles in caps. Lubricate with grease after assembly.

To reassemble, reverse the disassembly procedure. Install the two shorter spindle mounting cap screws in the bottom two holes. Tighten all spindle mount-

ing cap screws to 218 ft.-lbs. (295 N·m). Adjust wheel hub rolling torque as outlined in paragraph 11.

13. STEERING KNUCKLE. To service steering knuckle, first drain oil from axle housing. Remove front wheel. Support hub and planetary assembly with a suitable hoist. Remove cap screws securing spindle to knuckle housing, then withdraw planetary assembly with axle shaft. Remove bottom cover (12—Fig. 23), shim washer (9), king pin (10) and bearing (3). Remove steering arm (8) and washer (9), then use a suitable puller to remove upper king pin. To remove bearing cups (4), drive on dust plugs (6).

To reassemble, install lower king pin and bearing with original shim washer. Tighten bearing cap retaining screws to 100 ft.-lbs. (135 N·m). Install upper bearing, king pin and shim washer. Install steering arm and drive in spring pins (7). Tighten cap screws to 170 ft.-lbs. (230 N·m). Reinstall planetary and spindle assembly.

Check knuckle rolling drag torque as follows: Fabricate a spanner bar (2) with a nut in the center and attach bar to steering arm as shown in Fig. 23A. Then, use a torque wrench to measure torque required to rotate knuckle. Vary thickness of shim washers (9—Fig. 23), if necessary, to obtain rolling torque of 13-16 ft.-lbs. (18-21 N·m). Increasing shim thickness will increase rolling torque and decreasing shim thickness will decrease rolling torque. Be sure upper and lower shims are of equal thickness.

DIFFERENTIAL

Models With ZF Axle

14. REMOVE AND REINSTALL. The differential assembly can be removed with the axle assembly on the tractor. Properly support front of tractor, then remove front wheels. Drain oil from axle housing. Support planetary and wheel hub assembly with a suitable hoist. Remove spindle mounting cap screws,

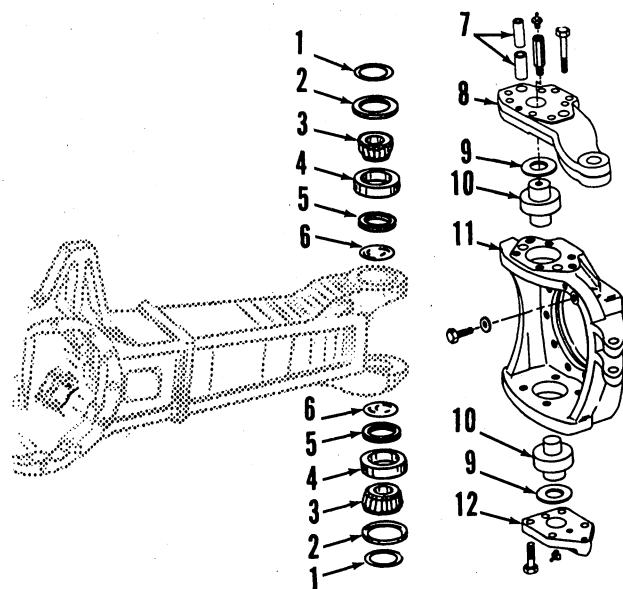


Fig. 23—Exploded view of steering knuckle assembly.

- | | |
|-----------------|---------------------|
| 1. "O" ring | 7. Spring pins |
| 2. Cap | 8. Steering arm |
| 3. Bearing cone | 9. Shim washer |
| 4. Bearing cup | 10. King pin |
| 5. Washer | 11. Knuckle housing |
| 6. Dust plug | 12. Cover |

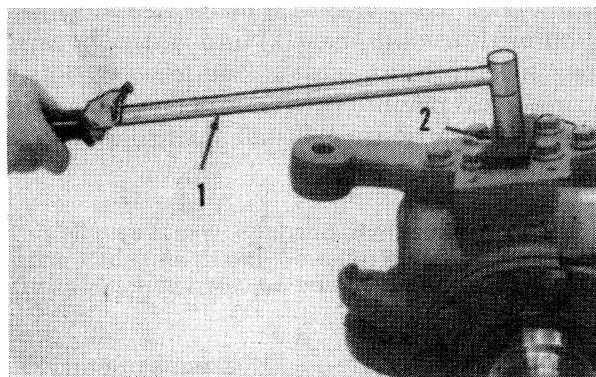


Fig. 23A—Use a spanner bar (2) with a nut welded in the center and a torque wrench (1) to measure torque required to rotate steering knuckle.

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