

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)

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-

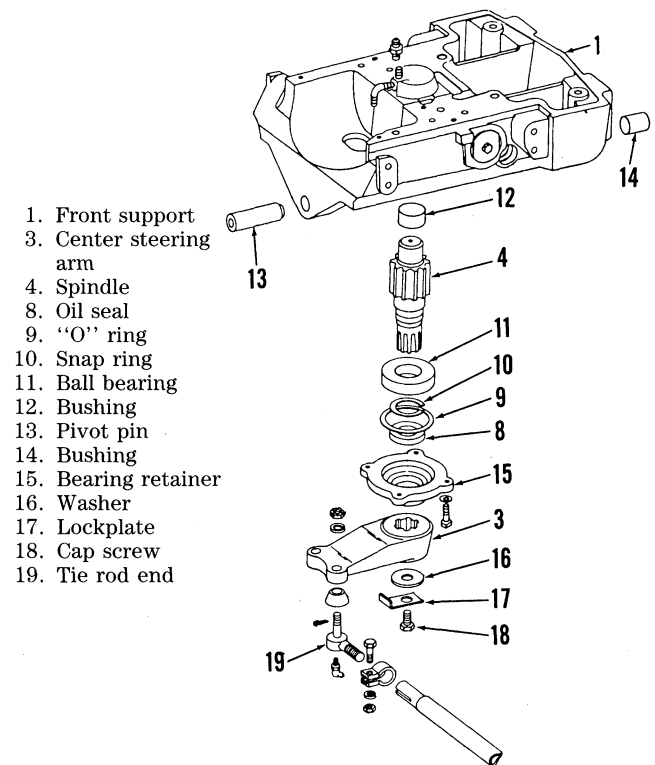


Fig.1—Partially exploded view of front axle support assembly used on 4050, 4250 and 4450 tractors. Support assembly used on 4650 and 4850 tractors is similar.

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).

MECHANICAL FRONT-WHEEL DRIVE

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

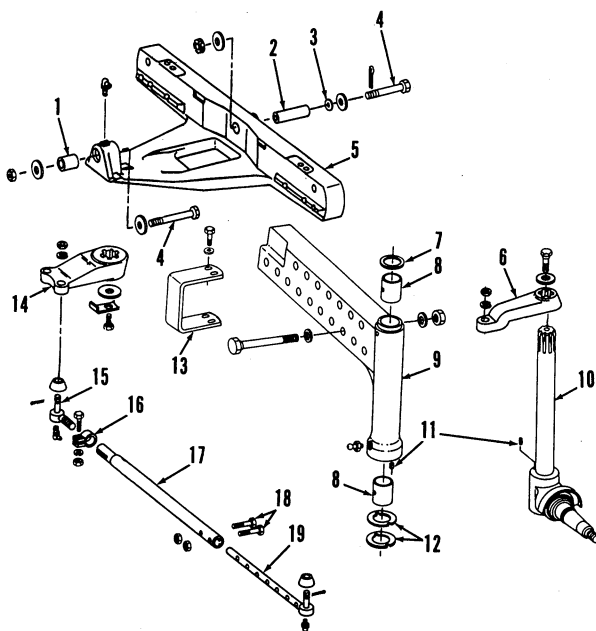


Fig. 2—Exploded view of adjustable tread front axle assembly.

- | | |
|--------------------|------------------------|
| 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 | |

(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-

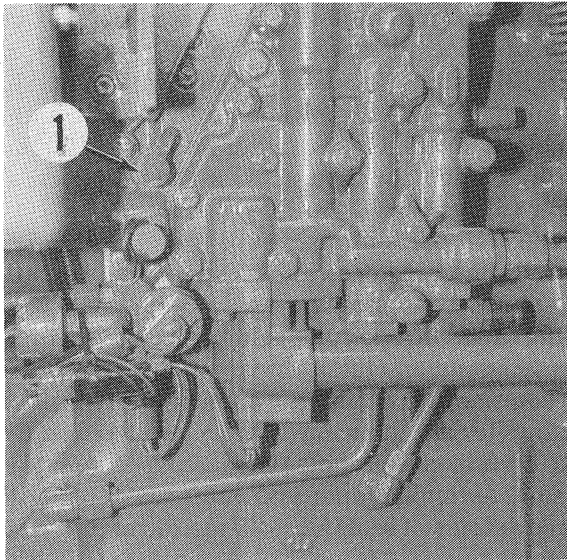


Fig. 3—When trouble-shooting mechanical front-wheel drive, install a 300 psi (2000 kPa) pressure gage at system pressure test port (1) on traction clutch valve housing. Power shift model is shown; refer to Fig. 4 for Quad-Range models.

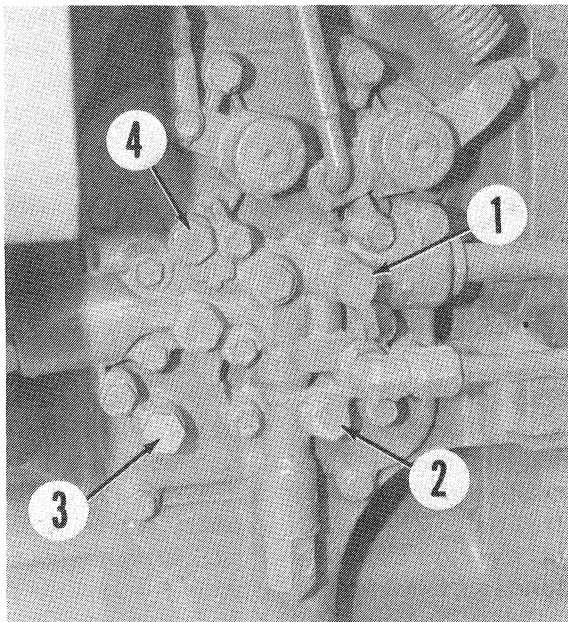


Fig. 4—View of pressure control valve used on Quad-Range models. Install 300 psi (2000 kPa) pressure gage at test port (1) to check system pressure.

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).

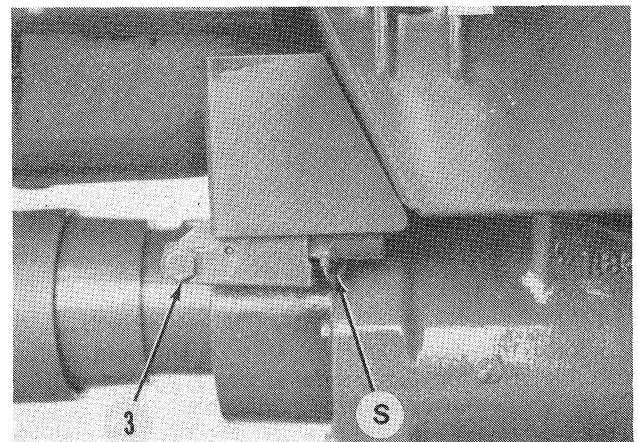


Fig. 5—Install a 300 psi (2000 kPa) gage at MFWD clutch test port (3) to check clutch hydraulic pressure. Refer to text.

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

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—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

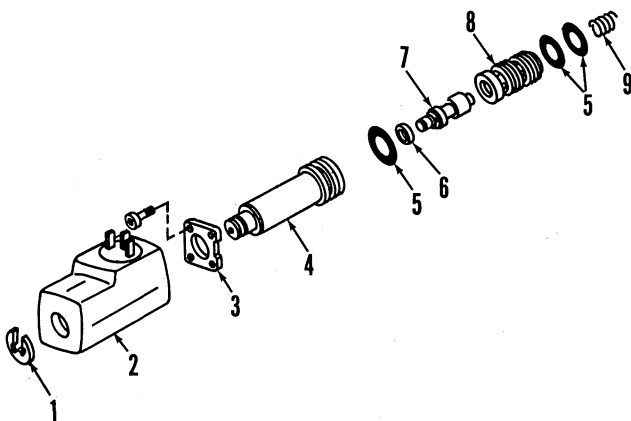


Fig. 6—Exploded view of MFWD solenoid valve assembly used on early Power Shift tractors and all Quad-Range tractors.

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

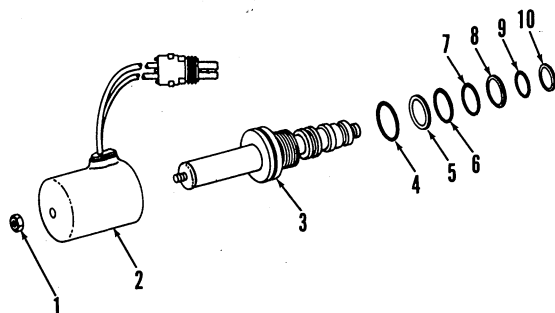


Fig. 6A—Exploded view of MFWD solenoid valve assembly used on late model tractors equipped with Power Shift transmission.

- | | |
|--------------------|------------------|
| 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 |

- 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

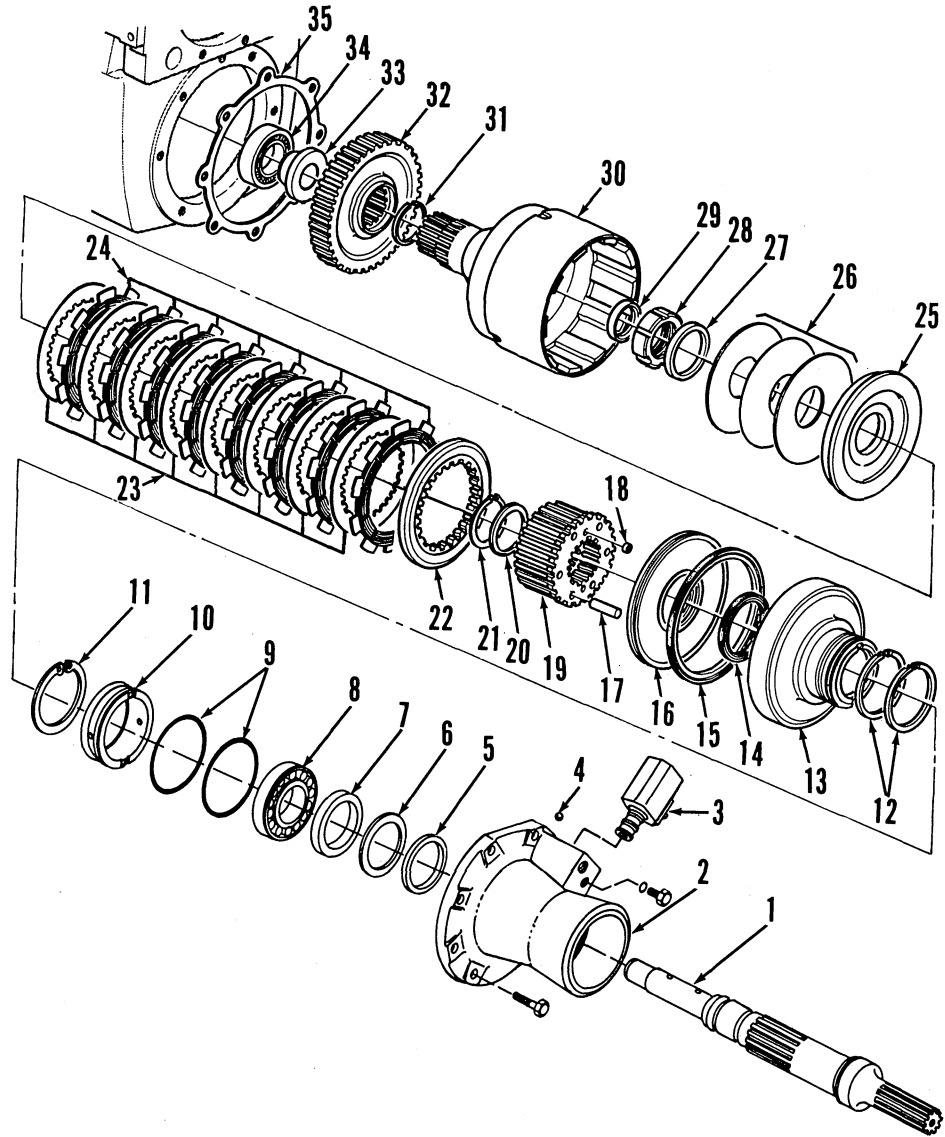


Fig. 7—Exploded view of MFWD clutch assembly used on tractors equipped with Quad-Range transmission.

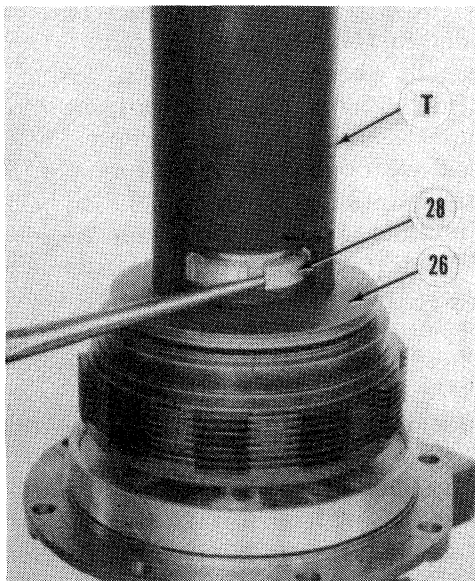


Fig. 9—Use horseshoe shaped tool (T) and a press to compress Belleville springs.

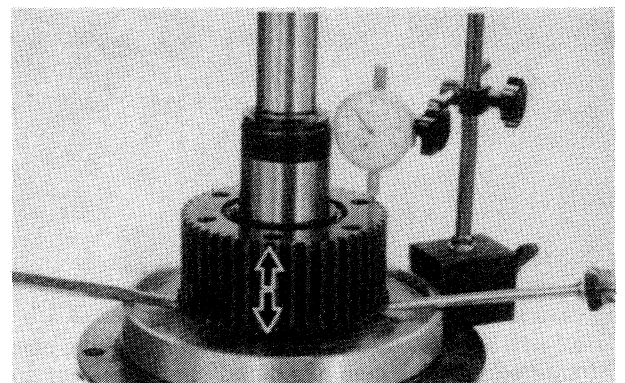


Fig. 10—Use dial indicator to check end play of clutch hub.

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

Paragraph 8

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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

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

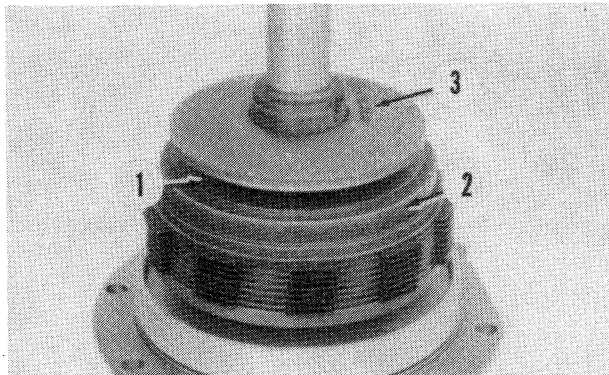


Fig. 11—Install Belleville springs so outer diameter of first spring (1) is against pressure plate (2) and spring with measurement (3) is on top.

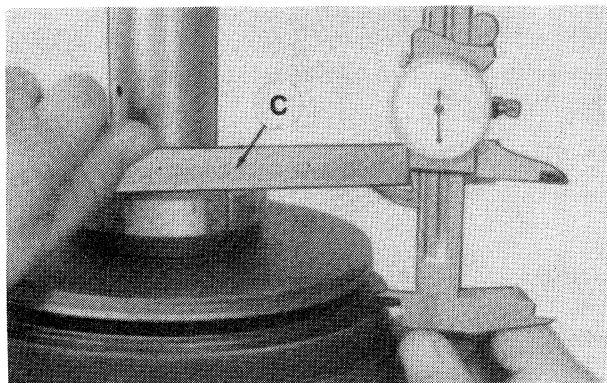


Fig. 12—To adjust Belleville spring installed height, place a straightedge (C) across machined surface of nut and measure between straightedge and surface of pressure plate. Refer to text.

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-

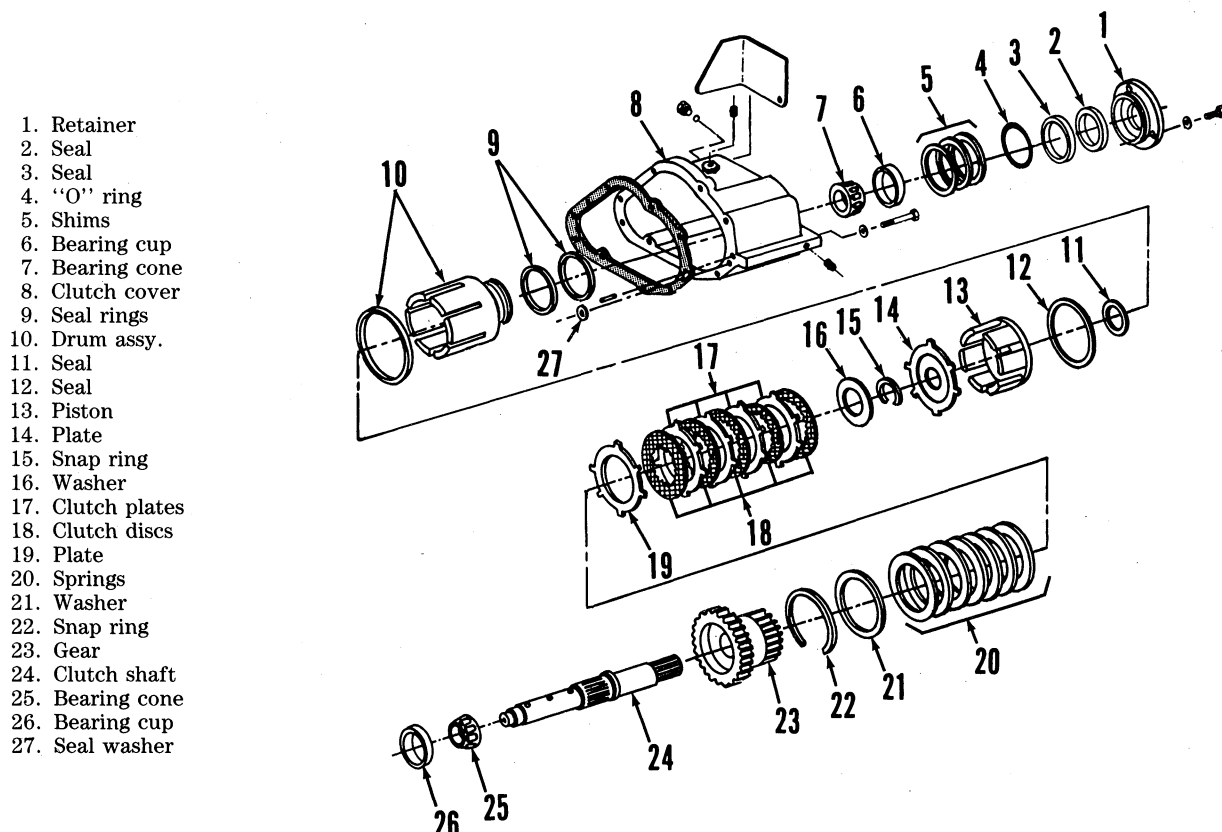


Fig. 14—Exploded view of mechanical front-wheel drive clutch assembly used on tractors equipped with Power Shift transmission.