

# SHOP MANUAL

# JOHN DEERE

SERIES 4055—4255—4455—4555—4755—4955

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 block behind the injection pump. The transmission serial number plate is located on the left side of transmission case. The front-wheel drive serial number plate is located on the right rear of axle housing. The hydraulic pump serial number plate is located on the top right side of pump housing. The Sound-Gard body serial number plate is located on the windshield wiper motor access door header.

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# CONDENSED SERVICE DATA (CONT.)

4055 4255 4455 4555 4755 4955

## TUNE-UP

|                               |                             |                   |                    |                    |                    |                    |
|-------------------------------|-----------------------------|-------------------|--------------------|--------------------|--------------------|--------------------|
| Firing Order .....            | 1-5-3-6-2-4                 |                   |                    |                    |                    |                    |
| Valve Clearance—              |                             |                   |                    |                    |                    |                    |
| Intake .....                  | 0.015 in.<br>(0.038 mm)     |                   |                    |                    |                    |                    |
| Exhaust .....                 | 0.020 in.<br>(0.051 mm)     |                   |                    |                    |                    |                    |
| Fuel Injection Pump—          |                             |                   |                    |                    |                    |                    |
| Make .....                    | Robert Bosch or Nippondenso |                   |                    |                    |                    |                    |
| Injection Timing-Static ..... | TDC                         |                   |                    |                    |                    |                    |
| Governed Engine Rpm—          |                             |                   |                    |                    |                    |                    |
| Low Idle .....                | 850                         |                   |                    |                    |                    |                    |
| High Idle .....               | 2400                        |                   |                    |                    |                    |                    |
| Full Load .....               | 2200                        |                   |                    |                    |                    |                    |
| Engine Power at Pto .....     | 105HP<br>(78.3kW)           | 120HP<br>(89.5kW) | 140HP<br>(104.4kW) | 155HP<br>(115.6kW) | 175HP<br>(130.5kW) | 200HP<br>(149.2kW) |
| Battery—                      |                             |                   |                    |                    |                    |                    |
| Volts .....                   | 12                          |                   |                    |                    |                    |                    |
| Ground Polarity .....         | Negative                    |                   |                    |                    |                    |                    |

## SIZES-CLEARANCES

|                                        |                                         |
|----------------------------------------|-----------------------------------------|
| Crankshaft Main Journal Diameter ..... | 3.372-3.373 in.<br>(85.65-85.67 mm)     |
| Main Bearing Clearance .....           | 0.0012-0.0042 in.<br>(0.03-0.10 mm)     |
| Crankpin Diameter .....                | 2.998-2.999 in.<br>(76.15-76.18 mm)     |
| Rod Bearing Clearance .....            | 0.0012-0.0044 in.<br>(0.03-0.11 mm)     |
| Crankshaft End Play .....              | 0.0015-0.015 in.<br>(0.038-0.38 mm)     |
| Camshaft Journal Clearance .....       | 0.0025-0.0045 in.<br>(0.0635-0.1143 mm) |
| Camshaft End Play .....                | 0.0045-0.0095 in.<br>(0.11-0.24 mm)     |
| Piston Skirt Clearance .....           | See Paragraph 40                        |

## CAPACITIES

|                                  |                                   |                                   |      |
|----------------------------------|-----------------------------------|-----------------------------------|------|
| Cooling System. ....             | 27 U.S. qts. _____<br>(25.6 L)    | 32 U.S. qts. _____<br>(30.3 L)    |      |
| Fuel Tank . . . . .              | 65 U.S. gals. _____<br>(246 L)    | 102 U.S. gals. _____<br>(386 L)   |      |
| Crankcase with Filter* . . . . . | 18 U.S. qts. _____<br>(17.0 L)    | 22 U.S. qts. _____<br>(21.0 L)    |      |
| Transmission-Hydraulic System**— |                                   |                                   |      |
| Power Shift . . . . .            | 13.5 U.S. gals. _____<br>(51.0 L) | 18.5 U.S. gals. _____<br>(70.5 L) |      |
| Power Shift with FWD . . . . .   | 15.9 U.S. gals. _____<br>(60.0 L) | 20 U.S. gals. _____<br>(75.0 L)   |      |
| Quad-Range . . . . .             | 16 U.S. gals. _____<br>(60.5 L)   | 26.9 U.S. gals. ____<br>(101.8 L) | .... |
| Quad-Range with FWD . . . . .    | 17.2 U.S. gals. _____<br>(65.1 L) | ....                              | .... |

procedure. Add or remove shims (11) as necessary to provide a clearance of 0.001-0.015 inch (0.03-0.38 mm) between front support and front axle. Shims are available in thickness of 0.015 inch (0.38 mm).

Tighten front axle to front support bolts to a torque of 220 ft.-lbs. (298 N·m). Tighten axle extension to axle main member bolts to a torque of 445 ft.-lbs. (600 N·m) on 4255 Hi-Crop models, or 370 ft.-lbs. (500 N·m) on all other models.

## FRONT-WHEEL DRIVE SYSTEM

### OPERATION

#### All Models So Equipped

5. All Power Shift models except 4255 Hi-Crop and Models 4555 and 4755 equipped with Quad-Range transmission are available with a mechanical front-wheel drive. Front-wheel drive can be engaged or disengaged in all gears during operation and under full load. The front-wheel drive is controlled by an electric solenoid/hydraulic valve that operates a multiple disc clutch. The clutch is engaged mechanically by preloaded Belleville springs and is disengaged hydraulically. The control switch (A—Fig. 6) is a three position rocker switch located on right side of instrument panel. Depress top of switch to center "ON" position to engage front-wheel drive. Switch will be lighted showing engagement. Depress top of switch again to "AUTO" position. Switch will be lighted showing "AUTO" engagement. When switch is in this mode, front-wheel drive will automatically disengage during turning with either brake applied and at speeds above 8.5 mph (14 kph). Front-wheel drive will automatically engage when both brake pedals are depressed, to improve braking. Depress bottom of switch to disengage front-wheel drive. When in this mode, front-wheel drive will come on during speeds above 8.5 mph (14 kph) when both brake pedals are applied and stays on as long as both brake pedals remain applied, even when speed drops below 8.5

mph (14 kph). Front-wheel drive is "OFF" when both brake pedals are applied below 8.5 mph (14 kph). The front drive axle is equipped with a limited slip differential to keep both front wheels pulling in poor traction conditions.

**CAUTION:** When servicing front-wheel drive equipped tractor with rear wheels supported off the ground, engine running and transmission in gear, always support front wheels off the ground too. Loss of electric power or hydraulic system pressure will engage front driving wheels. Rear wheels will be pulled off support if front wheels are not raised.

### TROUBLE-SHOOTING

#### All Models So Equipped

6. Some problems that may occur with front-wheel drive and their possible causes are as follows:

1. Front-wheel drive not engaging. Could be caused by:
  - a. Disc clutch pack worn.
  - b. Solenoid defective.
  - c. Hydraulic valve spool worn or sticking open.
  - d. Mechanical failure in front drive axle.
2. Front-wheel drive not disengaging. Could be caused by:
  - a. Electrical fault (switch, relay, fuse or wiring).
  - b. Defective solenoid.
  - c. Hydraulic pressure too low.
  - d. Faulty piston seal rings.
3. Excessive front tire wear. Could be caused by:
  - a. Toe-in incorrect.
  - b. Front-rear tire combination not as specified.
  - c. Incorrect tire inflation.



Fig. 6—The three-position rocker switch (A) for front-wheel drive is located on right side of instrument panel.

ameter of first spring against return plate (19). Install washer (21) with stepped side facing up. Use a press and compressing tool (JDG312 or equivalent) to compress Belleville springs until snap ring (22) can be installed, See Fig. 33. Make sure snap ring is fully seated in groove before releasing press. Be sure clutch disc teeth are aligned, then install gear (23—Fig. 32). Heat bearing cone (25) and install on 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 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 a torque of 35 ft.-lbs. (47 N·m). Use a dial indicator to check shaft end play. If necessary, add or remove shims (5) between seal retainer (1) and clutch cover (2) to provide 0.001-0.005 inch (0.03-0.13 mm) end play. Tighten retainer cap screws to a torque of 35 ft.-lbs. (47 N·m).

## POWER STEERING SYSTEM

### OPERATION

#### All Models

**20.** The power steering system consists of a metering pump (3—Fig. 34), a control valve assembly (4) and a steering motor assembly (5). No mechanical linkage exists between the steering wheel and front axle. However, steering can be manually accomplished by hydraulic pressure without normal tractor hydraulic pressure. The power steering system, in normal operation, uses pressure oil from the main hydraulic system pump to turn the front wheels.

The metering pump (3—Fig. 34) is located at the lower end of the steering wheel shaft. The oil in the metering circuit is trapped. Turning the steering wheel and metering pump gears forces the oil trapped in the metering circuit to apply pressure to one end

of the control valve spool (4). The control valve spool will then move to one end of the valve body (depending on direction of turn), which opens a passage allowing pressurized main hydraulic system fluid to flow from inlet (1) through the control valve into one end of steering motor cylinder (5). As the cylinder moves, oil from the feedback piston (6) returns to the control valve and centers the valve spool after steering wheel is stopped and turn is completed. The steering system is equipped with check valves that trap oil in the system. When engine is not running or in case of hydraulic system failure, the trapped oil is circulated within the steering system by the metering pump and pressure is exerted against both the steering motor piston and the feedback piston to turn the wheels.

There are some differences between control valves and steering motors used. The steering motor on

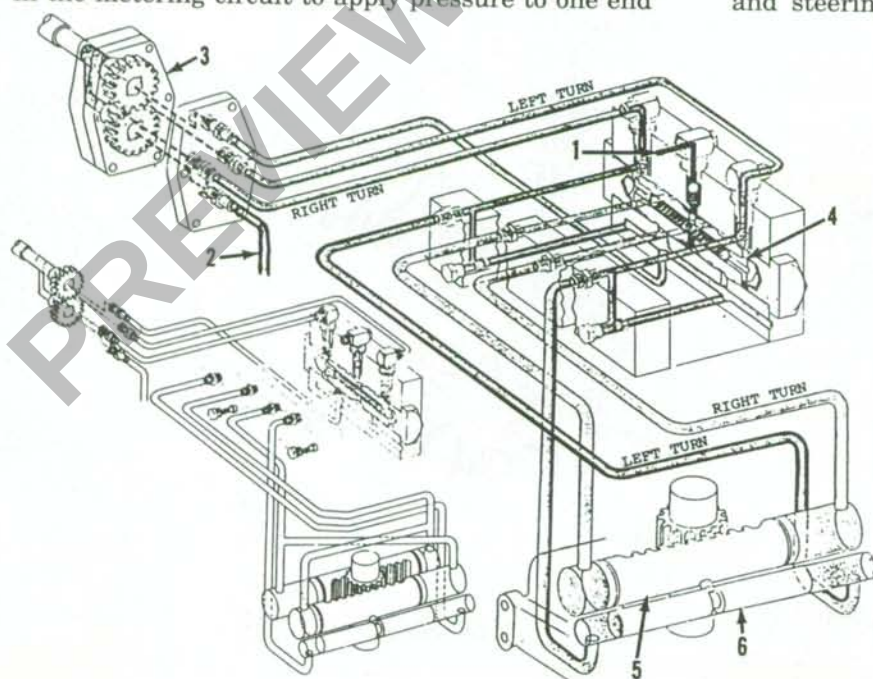


**Fig. 34—Schematic view of power steering system. The dual steering motor system shown at lower left is used on Models 4555, 4755 and 4955, and all models equipped with front-wheel drive.**

1. Pressure inlet
2. Metering fluid inlet
3. Metering pump
4. Control valve
5. Steering motor
6. Feedback piston

# QUAD-RANGE TRANSMISSION

**105.** The Quad-Range transmission consists of an eight-speed mechanically engaged transmission and a hydraulically shifted, two-speed planetary unit to provide 16 forward speeds. Two hand levers control speed selection.

The two-speed planetary unit is controlled by a direct drive clutch and an underdrive brake (overdrive brake is used on Model 4455). Oil to the planetary unit is supplied from the transmission pump through the clutch operating piston housing.

If problems occur after an extended period of proper operation, check condition of hydraulic oil, oil filter and filter relief valve. Without adequate hydraulic pressure and volume, planetary will not operate properly. Refer to paragraph 96 to check clutch pressure.

## TWO-SPEED PLANETARY

### Quad-Range Models

**106. REMOVE AND REINSTALL.** To remove the planetary unit, tractor must be split between engine and clutch housing as outlined in paragraph 101. Remove clutch operating piston housing as outlined in paragraph 104. Remove hex bushing (14—Fig. 97) from planetary unit if it did not come out with the clutch shaft (20). Note position of shifter arm shaft for correct reassembly, then drive the spring pin upward until shaft can be separated from the shift arm.

A special tool can be fabricated to remove planetary input shaft as follows: Use a piece of rod about 12

inches (305 mm) long and bend one end to form a hook that is small enough to go through the input shaft. Insert tool through input shaft and hook rear end of shaft. Pull shaft forward, while aligning shaft splines with sun gear splines, and remove from planetary.

If equipped with front-wheel drive, remove cap screw from pto idler gear shaft. Use a slide hammer puller to remove idler shaft, then move idler gear out of the way. The pto drive gear does not need to be removed.

Planetary assembly can now be removed by pulling forward and tipping unit to clear pto gear. The clutch shaft may be inserted into planetary unit to serve as a handle when lifting out unit.

Reinstall planetary assembly in reverse order of removal. Make sure arm on outer end of shifter arm shaft is positioned correctly as shown in Fig. 96, as it is possible to install shaft incorrectly by 180 degrees. If equipped with front-wheel drive, tighten pto idler gear shaft cap screw to 65 ft.-lbs. (85 N·m).

**107. OVERHAUL.** To disassemble planetary unit, remove the six cap screws securing planetary pinion carrier to clutch drum and lift off carrier assembly. The planet gears (3—Fig. 97) can be removed by pushing planet shafts (5) out of the carrier. Be sure to catch retainer balls (6) as shafts are removed. The low range sun gear (12) can be removed after planet gears are out of carrier. On Model 4455, remove thrust washers (10 and 15) and thrust bearings (11 and 16).

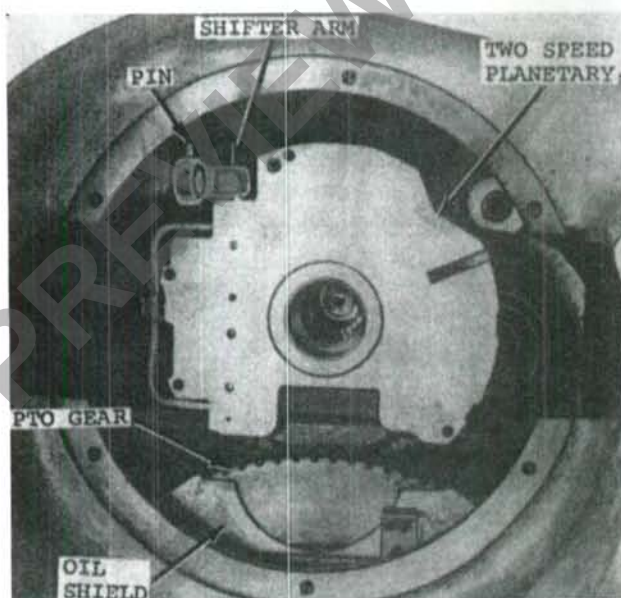


**Fig. 96—View of Quad-Range two-speed planetary with clutch operating piston housing removed. Fabricate a tool with a hook on one end to remove planetary input shaft. Refer to text.**

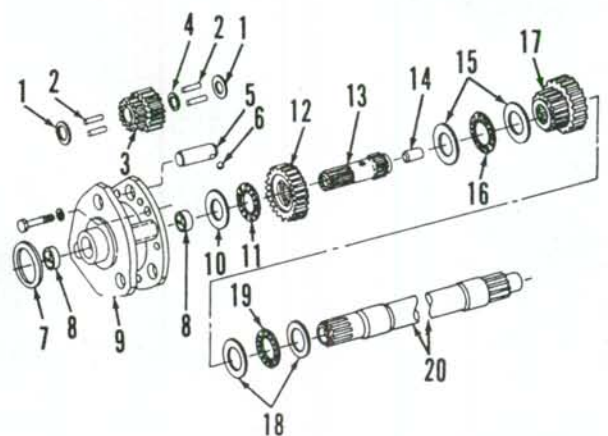


**Fig. 97—Exploded view of two-speed planetary unit.**

- |                      |                           |
|----------------------|---------------------------|
| 1. Thrust washers    | 11. Thrust bearing (4455) |
| 2. Needle rollers    | 12. Sun gear (low range)  |
| 3. Pinion gear       | 13. Input shaft           |
| 4. Spacer            | 14. Hex bushing           |
| 5. Pinion shaft      | 15. Washers (4455)        |
| 6. Retaining ball    | 16. Thrust bearing (4455) |
| 7. Thrust washer     | 17. Sun gear (high range) |
| 8. Bushings          | 18. Washers (4455)        |
| 9. Planetary carrier | 19. Thrust bearing (4455) |
| 10. Washer (4455)    | 20. Clutch shaft          |

# FRONT SYSTEM (TWO-WHEEL DRIVE)

## WHEEL BEARINGS

### All Models So Equipped

**1. REMOVE AND REINSTALL.** To remove front wheel hub and bearings, remove cap (14—Fig. 1). Raise and support under axle extension. Remove cotter pin (11), slotted nut (13), washer (12) and bearing cone (8). Remove wheel and hub assembly, bearing cone (3) and oil seal (1) from spindle. Clean and inspect all parts. If wear ring (2) is scored, drive ring from hub and install new ring. Hub is slotted to aid in removal of bearing cups (4 and 7).

Install new oil seal (1) on spindle with numbered side of seal outward against driving tool. Fill space between seal lips with EP multipurpose grease. Pack bearings liberally with wheel bearing grease. Reassemble by reversing disassembly procedure. Tighten slotted nut to 35 ft.-lbs. (47 N·m) while rotating hub. Back nut off to nearest slot and install cotter pin. Install cap (14).

## SPINDLES AND BUSHINGS

### All Models So Equipped

**2. REMOVE AND REINSTALL.** To remove spindle (11—Fig. 2), first remove wheel and hub as outlined in paragraph 1. Disconnect tie rod end (14—Fig. 3) from steering arm (8). Remove cap screw (6) and washer (7) from top of spindle, then remove steering arm (8) and shim (7—Fig. 2). Lower spindle (11) out of axle extension (6). Thrust washers (13 and 14) will be removed with spindle. Clean and inspect all parts

for excessive wear or other damage and renew as necessary.

Install new bushings (8 and 15) until flush with bottom of chamfer in bores, aligning lube holes in bushings with lube fittings in axle extension. Bushings are presized and should require no final sizing if carefully installed. Use grease to stick thrust washers (13 and 14) in position on roll pins (12). Install spindle and original shim (7). Install steering arm and tighten retaining cap screw to a torque of 170 ft.-lbs. (230 N·m). Using a dial indicator, check up and down end play of spindle in axle extension. Add or remove shims (7) to obtain an end play of 0.010-0.040 inch (0.3-1.0 mm). Balance of reassembly is the reverse of disassembly. Lubricate spindle and bushings with multipurpose grease.

## TIE RODS AND TOE-IN

### All Models So Equipped

**3. R&R AND ADJUST.** All models are equipped with two adjustable tie rods extending from left and right steering arms to center steering arm. Removal

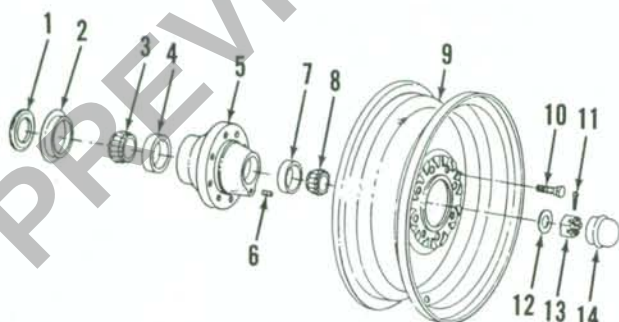


Fig. 1—Exploded view of front wheel hub, bearings and relative components.

- |                 |                 |
|-----------------|-----------------|
| 1. Oil seal     | 8. Bearing cone |
| 2. Wear ring    | 9. Front wheel  |
| 3. Bearing cone | 10. Lug bolt    |
| 4. Bearing cup  | 11. Cotter pin  |
| 5. Hub          | 12. Washer      |
| 6. Plug         | 13. Nut         |
| 7. Bearing cup  | 14. Cap         |

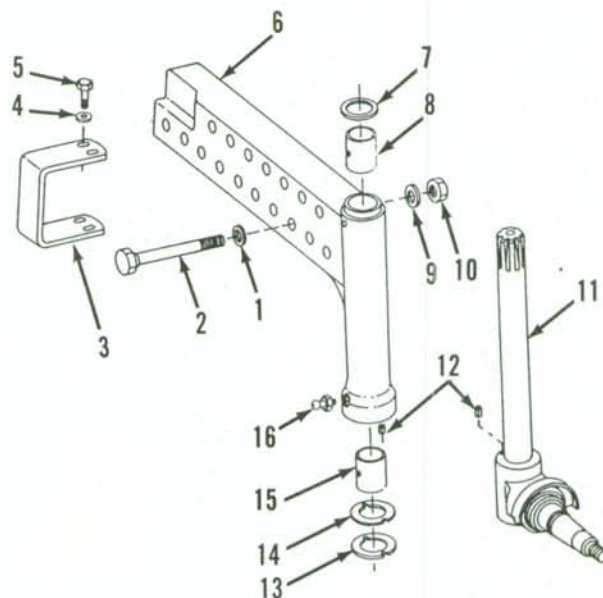


Fig. 2—Exploded view of axle extension, spindle and relative components.

- |                   |                   |
|-------------------|-------------------|
| 1. Washer         | 9. Washer         |
| 2. Bolt           | 10. Nut           |
| 3. Clamp          | 11. Spindle       |
| 4. Washer         | 12. Roll pins     |
| 5. Cap screw      | 13. Thrust washer |
| 6. Axle extension | 14. Thrust washer |
| 7. Shim           | 15. Bushing       |
| 8. Bushing        | 16. Lube fitting  |

by reversing the removal procedure. Tighten cap screws securing side frames to engine to 425 ft.-lbs. (578 N·m) torque for 12-point screws and 480 ft.-lbs. (650 N·m) torque for 6-point screws. Tighten hydraulic pump support mounting cap screws to 85 ft.-lbs. (115 N·m) torque. Tighten lower frame to side frame cap screws to 103 ft.-lbs. (140 N·m) torque. On tractors equipped with front-wheel drive, tighten lower frame to steering motor housing cap screws to a torque of 350 ft.-lbs. (475 N·m).

## CYLINDER HEAD

### All Models

**29.** To remove the cylinder head, first drain cooling system and remove side panels, grille screens, air stack, exhaust stack and hood. Turn steering wheel in both directions several turns to relieve hydraulic system pressure. Disconnect and remove auxiliary reservoir hydraulic line and steering lines. Remove ether starting aid assembly. Remove lube line to turbocharger. Remove air inlet elbow from air cleaner. Disconnect wiring harness. Remove air cleaner assembly. Remove alternator, fan and viscous fan clutch.

Remove water manifold, turbocharger, after cooler (if equipped), intake manifold and exhaust manifold. Remove fuel injection pipes and injector nozzles. Remove rocker arm cover. Remove cap screws and clamps securing rocker arm shaft, then lift rocker arm assembly off cylinder head. Identify push rods as they are removed so they can be reinstalled in their original positions. Remove cylinder head cap screws, then lift cylinder head from block using suitable lifting equipment.

**NOTE:** Be sure cylinder liners are held down with flat washers and bolts if crankshaft is to be turned while cylinder head is removed.

Thoroughly clean cylinder head and inspect for cracks or other damage. Use a straightedge and feeler gage to check head surface for flatness. If cylinder is

warped in excess of 0.004 inch (0.10 mm), resurface head as required. A maximum of 0.030 inch (0.762 mm) may be removed to true cylinder head surface. However, if distance from valve cover mounting surface to combustion face is less than 6.090 inches (154.68 mm), cylinder head must be renewed.

Install the cylinder head gasket dry. Cylinder head cap screws should be lubricated with clean engine oil. Note different lengths of cap screws and make certain they are installed in proper locations. Tighten cap screws to specified torque as follows:

First, tighten cap screw (17—Fig. 45) to 165 ft.-lbs. (224 N·m) to prevent head from moving during tightening sequence. Tighten remaining cap screws, following sequence shown in Fig. 45, to 165 ft.-lbs. (224 N·m). Then, retighten all cap screws in the recommended sequence to a final torque of 180 ft.-lbs. (245 N·m).

Complete installation by reversing the removal procedure. Tightening torques are as follows:

|                              |                               |
|------------------------------|-------------------------------|
| Rocker shaft clamps. . . . . | 55 ft.-lbs.<br>(75 N·m)       |
| Rocker cover. . . . .        | 6 ft.-lbs.<br>(8 N·m)         |
| Injector nozzle . . . . .    | 55-65 ft.-lbs.<br>(75-88 N·m) |
| Water manifold . . . . .     | 45 ft.-lbs.<br>(61 N·m)       |
| Exhaust manifold. . . . .    | 35 ft.-lbs.<br>(47 N·m)       |
| Intake manifold . . . . .    | 35 ft.-lbs.<br>(47 N·m)       |
| Turbocharger . . . . .       | 35 ft.-lbs.<br>(47 N·m)       |

## VALVE ADJUSTMENT

### All Models

**30.** The two-position method of valve clearance adjustment is recommended. Specified valve clearance is 0.015 inch (0.38 mm) for intake valves and 0.020 inch (0.51 mm) for exhaust valves. Refer to Fig. 46 and proceed as follows: Turn crankshaft by hand using JDE81-1 flywheel turning tool until number 1 and 6 pistons are at TDC. The TDC location can be determined by inserting JDE81-4 timing pin through hole in flywheel housing and engaging timing hole in flywheel. Check valves to determine whether number 1 or 6 piston is at TDC of compression stroke (both valves closed). Use the appropriate diagram in Fig. 47 and adjust valves indicated. Turn crankshaft one complete revolution until TDC mark is again aligned, then adjust remainder of valves indicated in other diagram in Fig. 47.

Valves should be readjusted after the first 750 hours of operation, then every 1500 hours thereafter.

FRONT ➡

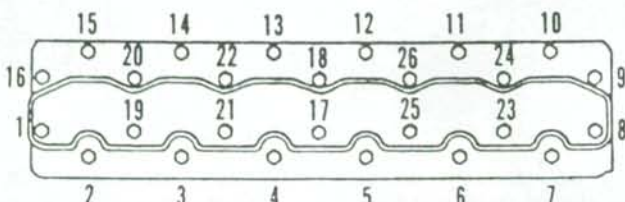


Fig. 45—Use the sequence shown to tighten the cylinder head retaining cap screws.

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PREVIEW - YOUFIXTHIS.COM

Check sleeves visually for wear and renew if any of the following conditions are found: If the crosshatch honing pattern is not visible at upper end of top ring travel, if sleeves are pitted or if sleeves contain vertical scores or scratches that can be detected with your fingernail.

With sleeves removed, inspect for fatigue cracks in the flange area and ring travel area. Check exterior of sleeve for pitting or erosion. Sleeve may be reused if depth of pits or erosion is less than half the thickness of the sleeve wall, which is 0.238-0.242 inch (6.05-6.15 mm). When reinstalling these sleeves, rotate sleeve 90 degrees from original position.

Out-of-round or taper of sleeve should not exceed 0.002 inch (0.05 mm). Maximum allowable clearance between piston and sleeve is 0.006 inch (0.152 mm). Specifications for new pistons and sleeves are as follows:

**Piston skirt diameter—**

Zollner piston\* ..... 4.5575-4.5582 in.  
(115.760-115.778 mm)

Mahle piston\*\* ..... 4.5581-4.5588 in.  
(115.775-115.793 mm)

Sleeve bore diameter ..... 4.5616-4.5628 in.  
(115.865-115.895 mm)

**Piston skirt to sleeve clearance—**

Zollner piston ..... 0.0034-0.0053 in.  
(0.087-0.135 mm)

Mahle piston ..... 0.0028-0.0047 in.  
(0.072-0.120 mm)

\*Measure piston skirt at right angle to piston pin 0.236 inch (6.0 mm) from bottom of skirt.

\*\*Measure piston skirt at right angle to piston pin 0.472 inch (12.0 mm) from bottom of skirt.

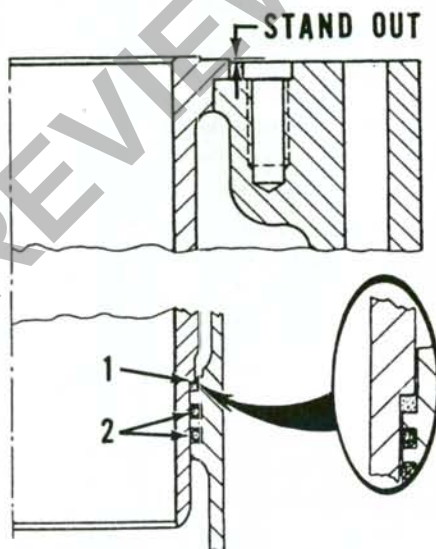


**Fig. 52—Cross-sectional view of cylinder sleeve showing square section packing (1) and round "O" rings (2). Refer to text for correct installation of sleeves and "O" rings.**

When installing sleeves, first make sure sleeve and block bore are clean. Carefully remove all rust and scale from seating surfaces and packing grooves in block. If sleeves are being reused, use a flexible ball-type hone to deglaze sleeve bore and obtain a 45 degree crosshatch pattern. Install sleeves without seals and secure with short cap screws and flat washers. Tighten cap screws to a torque of 50 ft.-lbs. (68 N.m). Check sleeve stand out (Fig. 52) at several locations around each sleeve. Stand out should be 0.001-0.005 inch (0.025-0.127 mm) for used sleeves and 0.002-0.005 inch (0.050-0.127 mm) for new sleeves. If stand out is excessive, check for scale or burrs. If stand out is less than specified, install shims under sleeve flange to obtain correct stand out. Shims are available in thickness of 0.002 inch (0.05 mm). After setting sleeve stand out, remove and mark sleeves.

Install packing and "O" rings as follows: Apply liquid soap, such as part number AR54749, to square packing and "O" rings before installation.

**NOTE: DO NOT use oil on packing and "O" rings as oil can cause red "O" ring to swell.**

Slide square packing ring (1—Fig. 52) up against shoulder on sleeve. Make sure ring is not twisted. Install red "O" ring in upper groove in cylinder block and black "O" ring in lower groove in cylinder block. Be sure "O" rings are completely seated in the grooves so they will not be damaged when installing the sleeve. Coat sealing area of the sleeve and cylinder block with liquid soap, then install sleeves carefully into correct cylinder bores. If sleeves are not pitted or eroded, rotation will not be necessary. Install sleeves so "L3" or "LC" marking is toward front of engine. Work sleeves into position using hand pressure until upper flange is nearly flush with top of block. Then, use a hardwood block and a hammer to finish seating sleeves into their bores. Hold sleeves in place with flat washers and cap screws during reinstallation of pistons.

**NOTE: Sleeves will protrude over top of cylinder block more than normal due to uncompressed packing and "O" rings.**

## PISTON PINS

### All Models

**41.** The full floating-type piston pins are retained in piston bosses by snap rings. The recommended fit of piston pins is a hand push fit in piston bores and a slip fit in connecting rod bushings. Standard diameter and clearances are as follows:

170-180 psi (1170-1240 kPa). To check pressure, proceed as follows: With engine running at 2000 rpm, engage pto clutch gradually. Clutch pressure should rise gradually to 130 psi (890 kPa), then jump to system pressure. Move pto lever to brake position. The clutch pressure should immediately drop to zero and brake pressure should jump to system pressure.

If there is a pressure differential greater than 20 psi (140 kPa) between clutch pressure and brake pressure, excessive leakage would be indicated in the circuit with lower pressure. Do not place a load on pto until low pressure condition has been corrected.

## CLUTCH PRESSURE REGULATING VALVE AND HOUSING

### Quad-Range Models

**99.** The clutch pressure regulating valve housing is mounted on the left side of the transmission housing. The pressure regulating valve (14—Fig. 88), pto clutch valve (13—Fig. 89), traction clutch control valve (17) and clutch shut-off valve (15) are contained in the valve housings. The clutch shut-off valve prevents tractor from moving until clutch pedal is de-

pressed and released. The valve resets itself to neutral each time engine is stopped.

**100. R&R AND OVERHAUL.** Before removing regulator valve, first drain oil from auxiliary reservoir and oil cooler as follows: Connect a hose to one of the selective control valve outlets and secure other end of the hose in transmission filler tube. Operate engine at 800 rpm and move selective control valve lever to direct oil into filler tube. Shut off engine when hydraulic pump begins to cavitate. Move control lever to neutral and remove hose.

Disconnect clutch rod, return spring, pto rod and hydraulic lines from valve housing. Remove eight housing retaining cap screws, then withdraw valve housing.

Remove plug (18—Fig. 88), shims (16), spring (15) and pressure regulator valve spool (14). Inspect valve spool and housing bore for nicks, burrs or scoring. Free length of spring (15) should be 5.43 inches (138 mm) and should test 55-67 lbs. (243-297 N) when compressed to a length of 4.48 inches (114 mm). Regulating valve pressure setting is adjusted using shims (16). Refer to paragraph 96.

Drive out roll pins (4—Fig. 88) and remove control valve arms (2 and 3). Remove cap screws securing regulating valve housing to control valve housing and separate housings. Remove valve shield (1—Fig. 89). Remove valve pins (2), shafts (3) and operating arms (4 and 5). Remove links (7), thrust washers (8), springs (9 and 11), pins (12) and valve spools (13 and 17). Keep parts from each valve assembly separated as they are not interchangeable. Note that traction clutch valve springs are color-coded red. Remove pto lever lock piston (18). Remove plug (14), clutch shut-off valve (15) and spring (16).

Inspect all parts for wear or other damage. Compare springs with the following specifications and renew if necessary.

### Traction Clutch Valve Springs

#### Inner Spring—

|                   |            |
|-------------------|------------|
| Free length ..... | 1.12 in.   |
|                   | (29 mm)    |
| Test load .....   | 14-18 lbs. |
|                   | (64-78 N)  |

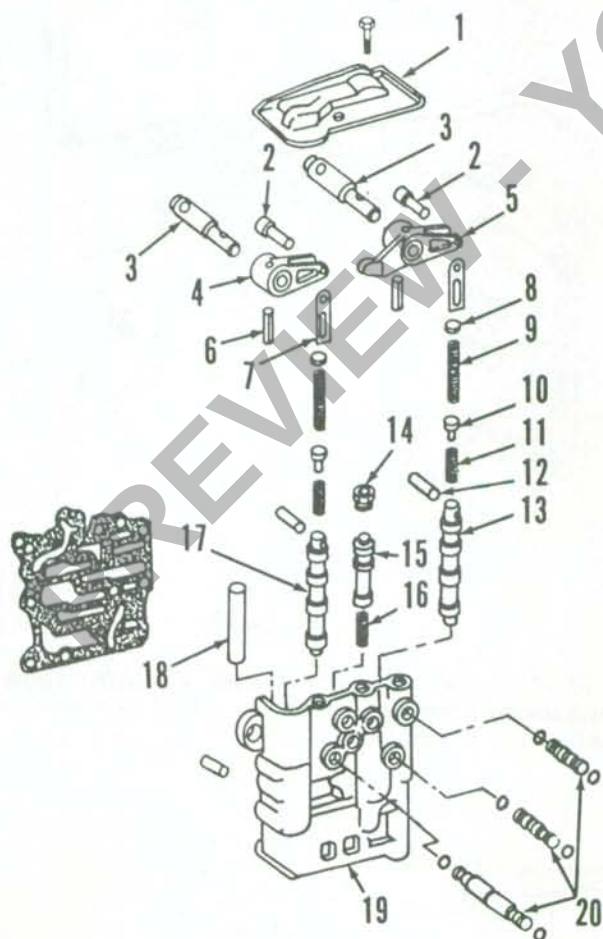


**Fig. 89—Exploded view of clutch valve inner housing assembly.**

- |                        |                           |
|------------------------|---------------------------|
| 1. Cover               | 12. Pin                   |
| 2. Pin                 | 13. Pto clutch valve      |
| 3. Shaft               | 14. Plug                  |
| 4. Pto arm             | 15. Clutch shut-off valve |
| 5. Traction clutch arm | 16. Spring                |
| 6. Spring pin          | 17. Traction clutch valve |
| 7. Link                | 18. Lock piston           |
| 8. Thrust washer       | 19. Housing               |
| 9. Outer spring        | 20. Oil tubes             |
| 10. Spring guide       |                           |
| 11. Inner spring       |                           |

4955, five Belleville washers are used on each clutch piston. Assemble clutch discs and drive plates alternately, beginning with a disc and ending with a disc. On Models 4055, 4255 and 4455, two discs (11—Fig. 151) and one plate (12) are used on low-range clutch, while three discs (11A) and two plates (12A) are used on high-range clutch. On Models 4555, 4755 and 4955, three discs and two plates are used on low-range clutch pack, while four discs and three plates are used on high-range clutch pack. When assembling low-range drum onto high-range drum, be sure spring pin (14), pins (17A) and springs (17) are in place. Tighten drum retaining cap screws to a torque of 37 ft.-lbs. (50 N·m). Assemble pto drive shaft and clutch oil manifold to clutch drum.

**144. INPUT PLANETARY AND HI-LO BRAKE AND CLUTCH ASSEMBLY.** Refer to paragraph 134 for removal procedure. Lift planetary carrier (39—Fig. 154) from brake piston housing if not done during removal. Remove Allen head cap screws and retaining pins (35) from each planet pinion shaft. Push pinion shafts (36) from pinion gears (32), then withdraw gears with thrust washers (31), spacer (34) and needle bearings (33).

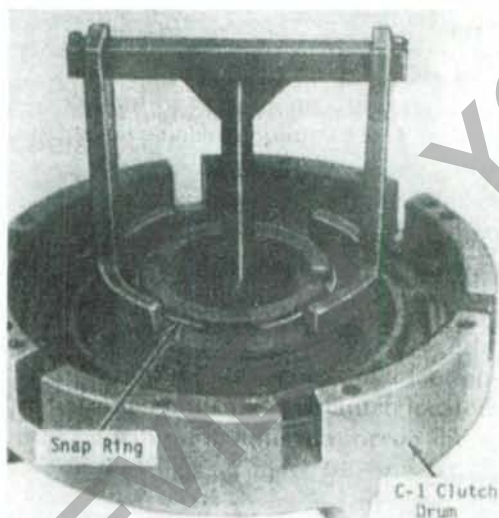


**Fig. 152—Use a suitable horseshoe-shaped tool, such as JDG303, to compress Belleville washers when removing and installing retaining ring.**

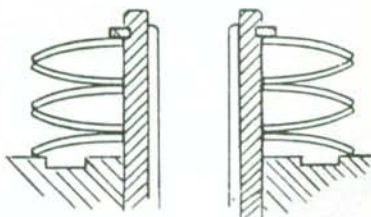


**Fig. 153—Cross-sectional schematic showing correct method of installing five Belleville washers in clutch drum. Regardless of number of washers used (3 or 5), the inner diameter of the outer washer must always contact snap ring as shown.**

Inspect all parts for wear or other damage. Pinion shaft (36) diameter should be 0.8342-0.8346 inch (21.198-21.199 mm). Thrust washer (31) thickness should be 0.035-0.037 inch (0.88-0.93 mm). Inspect bore of planetary ring gear shaft (41) for wear in area where low-range drive shaft seal rings contact shaft bore. Outside diameter of planetary gear shaft should be 2.494-2.496 inches (63.3-63.4 mm). Inspect thrust surfaces of planetary gear and planetary carrier for scoring or wear and renew as necessary.

The lube relief valve (44) is located in the lube manifold (45). Free length of valve spring (43) should be 2.03 inches (52 mm) and should test 16-20 pounds (71-89 N) when compressed to a length of 1.37 inches (35 mm). Inside diameter of lube manifold bushings (42) should be 2.498-2.501 inches (63.46-63.53 mm). When installing new bushings, make sure grooves in bushings point toward center of the manifold. Press front bushing in 0.137-0.157 inch (3.5-4.0 mm) below thrust washer surface. Press rear bushing in 0.059-0.078 inch (1.5-2.0 mm) below thrust washer surface.

The Hi-Lo shift valve is located on the brake piston housing. To disassemble, remove plug and withdraw detent spring and ball (1—Fig. 155). Remove plug (2), then use a pencil magnet to withdraw valve spool (3). Inspect for wear or other damage.

To disassemble clutch and brake assembly, remove cap screws securing backing plate (29—Fig. 154) to brake piston housing (7), then separate backing plate from piston housing. Remove thrust washer (27). Remove clutch backing plate (26) mounting cap screws and pry backing plate from clutch drum (16). Remove brake disc (13) and separator plate (12). Remove clutch hub (25), clutch disc (24) and separator plate (23). (Two clutch discs and plates are used on Models 4555, 4755 and 4955.) Thread two cap screws into clutch drum (16), then lift drum from brake piston housing (7). Pull the brake piston (10) from the housing. Use a suitable horseshoe-shaped tool (T—Fig. 155), such as JDT24A, to compress Belleville washers (21), then remove snap ring (22) and remove spring pressure. Remove clutch piston (19) from clutch drum (16).

Inspect clutch and brake piston seal rings and renew if necessary. Inspect all parts for excessive wear or other damage. Inside diameter of brake piston housing bushing (9—Fig. 154) should be 3.437-3.440 inches (87.3-87.4 mm) and outside diameter of clutch drum sleeve should be 3.433-3.435 inches (87.21-87.25 mm). Inside diameter of backing plate bushing (28) should be 3.755-3.757 inches (95.3-95.4 mm). Thickness of brake separator plate (12) when new is 0.114-0.122 inch (2.9-3.1 mm) and thickness of brake disc (13) when new is 0.114-0.118 inch (2.9-3.0 mm). Thickness of clutch separator plate (23) when new is 0.118-0.122 inch (3.0-3.1 mm) and thickness of clutch disc (24) is 0.111-0.118 inch (2.8-3.0 mm).

remove snap ring (15). Remove spring washers and piston from drum.

Inspect all parts for wear or other damage and renew as necessary. Renew inner seal (11—Fig. 197) in drum and outer seal (13) in piston. Thickness of clutch discs when new is 0.127-0.133 inch (3.22-3.38 mm). If clutch disc facing chips, flakes or scratches off easily, renew discs regardless of facing thickness.

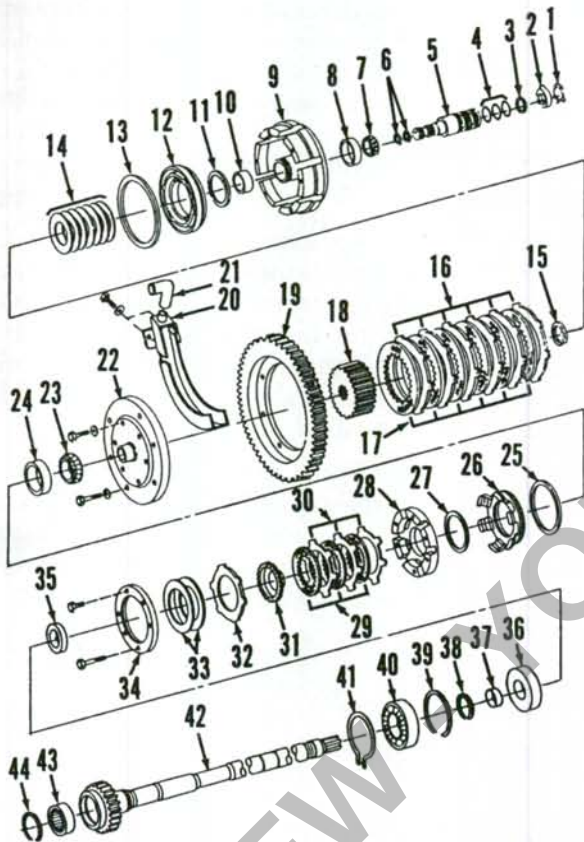


**Fig. 197—Exploded view of pto clutch and brake assembly used on models equipped with Power Shift transmission. Drive shaft (42) and related components are used on Models 4055, 4255 and 4455 with dual-speed pto.**

- |                   |                                |
|-------------------|--------------------------------|
| 1. Snap ring      | 23. Bearing cone               |
| 2. Cap            | 24. Bearing cup                |
| 3. Shims          | 25. Seal                       |
| 4. "O" rings      | 26. Brake piston               |
| 5. Support shaft  | 27. Seal                       |
| 6. Seal rings     | 28. Piston housing             |
| 7. Bearing cone   | 29. Discs                      |
| 8. Bearing cup    | 30. Plates                     |
| 9. Clutch drum    | 31. Brake hub                  |
| 10. Bushing       | 32. Back plate                 |
| 11. Seal          | 33. Springs                    |
| 12. Clutch piston | 34. Cover                      |
| 13. Seal          | 35. Sleeve                     |
| 14. Springs       | 36. Support                    |
| 15. Snap ring     | 37. Bushing                    |
| 16. Plates        | 38. Snap ring                  |
| 17. Discs         | 39. Snap ring                  |
| 18. Clutch hub    | 40. Bearing                    |
| 19. Pto gear      | 41. Snap ring                  |
| 20. Oil trough    | 42. Pto shaft (540 & 1000 rpm) |
| 21. Oil tube      | 43. Bearing                    |
| 22. Back plate    | 44. Snap ring                  |

Thickness of separator plates when new is 0.117-0.123 inch (2.97-3.12 mm). Be sure oil passages in support shaft (5) are open. Renew seal rings (6) if worn or damaged. Renew all "O" rings (4).

To reassemble clutch, reverse the disassembly procedure while noting the following special instructions: The wavy separator plates (16) have a punch mark on one of the tangs to identify the high side of the plate. Install plates so high side tangs are positioned in alternating slots around clutch drum. Tighten cap screws securing backing plate to drum and backing plate to gear to a torque of 40 ft.-lbs. (54 N·m).

Reinstall pto clutch assembly, bearings and support shaft. Check bearing end play as follows: Install retaining cap (2) without shims and secure with snap ring (1). Push retainer cap and support shaft rearward while rotating pto gear to seat bearings. Install a dial indicator with indicator probe against retainer cap and zero the indicator. Insert a long bar through pto opening in rear of case and push clutch support shaft forward. Note indicator reading, then remove cap and install shims (3) to provide 0.001-0.006 inch (0.03-0.15 mm) end play. Reinstall retaining cap and snap ring, then recheck end play. After correct end play is obtained, clean retaining cap and housing. Apply a bead of gasket sealing compound around outer edge of retaining cap to seal the opening between cap and clutch housing.

Reinstall oil tube (21) and oil trough (20) using new copper washers on trough retaining screws. Install oil pump and tighten retaining screws to a torque of 20 ft.-lbs. (27 N·m). After 10 minutes, retorque oil pump cap screws to 20 ft.-lbs. (27 N·m). If pto drive gear (2—Fig. 198), bearings or support (1) were renewed, check and adjust end play as follows:

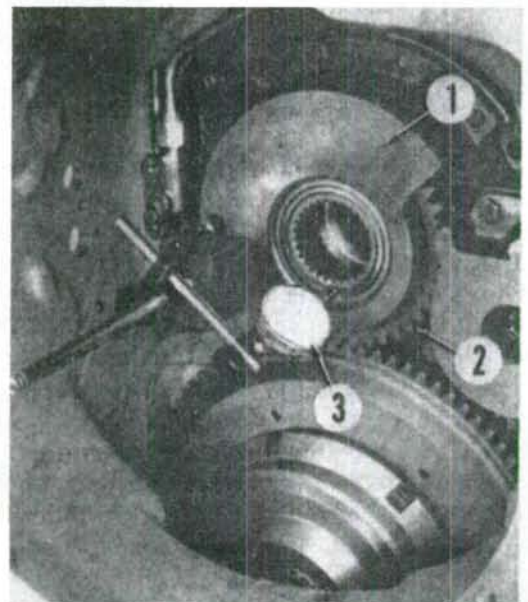


**Fig. 198—Use a dial indicator (3) to check end play of pto drive gear (2).**

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