

# SHOP MANUAL FORD

MODELS 5640-6640-7740-7840-8240-8340

The tractor identification plate is located on right side under the tractor hood. Serial and model numbers of the tractor, engine, transmission, rear axle, hydraulic pump and the hydraulic lift are recorded on this identification plate. If equipped with front-wheel drive, a similar plate is attached to the rear surface of the front drive axle housing.

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## DUAL DIMENSIONS

This service manual provides specifications in both U.S. Customary and Metric (SI) systems of measurement. The first specification is given in the measuring system perceived by us to be the preferred system when servicing a particular component, 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 we feel the preferred measurement in this instance is the U.S. Customary system of measurement and the Metric equivalent of 0.011 inch is 0.28 mm.



# CONDENSED SERVICE DATA

	5640	6640	7740	7840	8240	8340
<b>GENERAL</b>						
Number of Cylinders .....	4			6		
Bore .....	111.8 mm (4.4 in.)					
Stroke .....	111.8 mm (4.4 in.)	127.0 mm (5.0 in.)	111.8 mm (4.4 in.)	127.0 mm (5.0 in.)		
Displacement .....	4390 cc (268 cu. in.)	4987 cc (304 cu. in.)	6585 cc (401 cu. in.)	7480 cc (456 cu. in.)		
Compression Ratio .....	17.5:1					
<b>TUNE-UP</b>						
Firing Order .....	1-3-4-2			1-5-3-6-2-4		
Valve Clearance, Cold —						
Inlet .....	0.36-0.46 mm (0.014-0.018 in.)					
Exhaust .....	0.43-0.53 mm (0.017-0.021 in.)					
Compression Pressure —						
Minimum .....	2585 kPa (375 psi)					
Injector Opening						
Pressure .....	23,995-24,755 kPa (3480-3590 psi)		29,165-29,995 kPa (4230-4350 psi)			
Engine Low Idle RPM .....	725 - 775					
Engine High Idle RPM .....	2295-2375		2195-2275			
Engine Rated Speed RPM .....	2200		2100			
Engine Rated Power						
at Pto .....	49 kW (66 hp)	56.5 kW (76 hp)	64 kW (86 hp)	67 kW (90 hp)	71.5 kW (96 hp)	83.5 kW (112 hp)
Battery —						
Voltage .....	12					
Ground .....	Negative					
<b>SIZES</b>						
Crankshaft Main						
Journal Diameter .....	See Paragraph 53					
Crankshaft Crankpin						
Diameter .....	See Paragraph 52					
Piston Pin Diameter .....	38.095- 38.10 mm (1.4998- 1.500 in.)	41.270- 41.275 mm (1.6248- 1.6250 in.)	38.095- 38.10 mm (1.4998- 1.500 in.)	41.270- 41.275 mm (1.6248- 1.6250 in.)		
Valve Seat Angle —						
Inlet .....	30.0-30.5°					
Exhaust .....	45.0-45.5°					
Valve Face Angle —						
Inlet .....	29.25-29.5°					
Exhaust .....	44.25-44.5°					
Valve Stem Diameter —						
Inlet .....	9.426-9.446 mm (0.3711-0.3719 in.)					
Exhaust .....	9.401-9.421 mm (0.3701-0.3709 in.)					
Cylinder Bore Diameter .....	111.778-111.841 mm (4.4007-4.4032 in.)					



# CONDENSED SERVICE DATA (Cont.)

	5640	6640	7740	7840	8240	8340
<b>CLEARANCES</b>						
Main Bearing, Diametral Clearance.....	_____		0.055-0.117 mm (0.0021-0.0046 in.)	_____		
Rod Bearing, Diametral Clearance.....	_____		0.035-0.094 mm (0.0014-0.0037 in.)	_____		
Camshaft Bearing, Diametral Clearance.....	_____		0.025-0.076 mm (0.001-0.003 in.)	_____		
Crankshaft End Play.....	_____		0.10-0.20 mm (0.004-0.008 in.)	_____		
<b>CAPACITIES</b>						
Cooling System .....	_____		16 L (16.9 U.S. qt.)	_____		21.5 L (22.7 U.S. qt.)
Crankcase — With Filter.....	_____		11.4 L (12.1 U.S. qt.)	_____		20.9 L (22.1 U.S. qt.)
Fuel tank .....	_____		94.6 L Std. (25.0 U.S. gal.)	_____		217.7 L Std. (57.5 U.S. gal.)
Transmission/Hydraulic — 8 x 2 and 16 x 4	_____					
540 Pto.....	_____		62 L (65.5 U.S. qt.)	_____		
540/1000 Pto .....	_____		66 L (69.7 U.S. qt.)	_____		
12 x 12 .....	_____		56.8 L (15.0 U.S. gal.)	_____		
16 x 16 .....	_____		60.6 L (16.0 U.S. gal.)	_____		
Front Drive Axle .....	_____		6.2 L (6.6 U.S. qt.)	_____		8.0 L (8.5 U.S. qt.)
Front Drive Hub (each).....	_____		3.0 L (3.2 U.S. qt.)	_____		2.6 L (2.7 U.S. qt.)
<b>TIGHTENING TORQUES</b>						
Cylinder Head .....	_____		217 N•m (160 ft.-lbs.)	_____		
Connecting Rod .....	_____		149 N•m (110 ft.-lbs.)	_____		
Main Bearings .....	_____		197 N•m (145 ft.-lbs.)	_____		
Intake Manifold .....	_____		35 N•m (28 ft.-lbs.)	_____		
Exhaust Manifold .....	_____		38 N•m (28 ft.-lbs.)	_____		
Flywheel.....	_____		197 N•m (145 ft.-lbs.)	_____		
Crankshaft Pulley .....	_____		224 N•m (165 ft.-lbs.)	_____		
Oil Pan .....	_____		38 N•m (28 ft.-lbs.)	_____		
Camshaft Idler Gear .....	_____		237 N•m (175 ft.-lbs.)	_____		
Camshaft Gear.....	_____		69 N•m (51 ft.-lbs.)	_____		
Fuel Injectors.....	_____		23 N•m (17 ft.-lbs.)	_____		
Water Pump.....	_____		65 N•m (50 ft.-lbs.)	_____		



# FRONT AXLE SYSTEM (TWO-WHEEL DRIVE)

## FRONT AXLE ASSEMBLY AND STEERING LINKAGE

### Two-Wheel Drive Models

**1. WHEELS AND BEARINGS.** To remove front wheel hub and bearings, first raise and support the front axle extension, then unbolt and remove the tire and wheel assembly. Remove the cap (1—Fig. 1), cotter pin (3), slotted nut (2), washer (4) and outer bearing cone (5). Slide the hub assembly (6) from spindle axle shaft (10). Remove grease retainer (8) and inner bearing cone (7). Hub is slotted to facilitate removal of bearing cups.

Pack wheel bearings liberally with Ford M1C137-A, M1C75-B or equivalent grease. Reassemble by

reversing disassembly procedure. Grease retainer (8) and inner bearing cone (7) should be positioned on spindle, then install wheel hub (6). Tighten slotted nut (2) to a torque of 27-40 N·m (20-30 ft.-lbs.), then rotate hub several turns. Tighten nut (2) to 61-74 N·m (45-50 ft.-lbs.), then back nut off less than one flat and install cotter pin (3). Be sure to install cap (1) securely.

**2. TIE ROD, TOE-OUT AND TREAD ADJUSTMENT.** All models are equipped with one tie rod extending between left and right steering arms. The hydrostatic steering cylinder (19—Fig. 2) is attached between the front axle and the center of the tie rod. Left end (18) of tie rod and both ends of steering cylinder are automotive type and should be renewed if wear is excessive. The procedure for removing and installing the ends is self evident. Automotive end of right tie rod is renewable only as an assembly with the right tie rod.

All two-wheel drive models are equipped with adjustable tread axle. Tie rod is equipped with locating screws (15) for quick adjustment of tie rod length when changing tread width. To adjust tread width, raise and support front axle. Remove tie rod locating screws (15) and clamp screws (9) from axle extensions (5 and 12), then slide axle extensions in or out of axle center member (8). Tighten the track adjusting clamp screws (9) which attach axle extensions inside the axle center section to 400 N·m (300 ft.-lbs.) torque. Tighten tie rod locating screws (15) to 150 N·m (110 ft.-lbs.) torque and locknuts to 75 N·m (55 ft.-lbs.) torque. After resetting axle tread width, check and adjust front wheel toe-out as described below.

Recommended front wheel toe-out is 0-13 mm (0-½ in.) for two-wheel drive models. To check toe-out, turn steering wheel so that front wheels are in straight ahead position. Measure distance (A—Fig. 3) between wheel rims on centerline of axle, parallel to ground. Rotate wheels ½ turn, then measure between wheels at front of wheels in position (B). Dimension (A) should be 0-13 mm (0-½ in.) smaller than dimension (B). To adjust toe-out, remove locating bolt (15—Fig. 2) from left end of tie rod tube (16). Loosen clamp bolt in left tie rod end (18). Turn threaded section of tie rod (17) in or out to obtain desired toe-out. Tighten tie rod locating bolt to 150 N·m (110 ft.-lbs) torque and clamp bolt to 75 N·m (55 ft.-lbs.) torque.

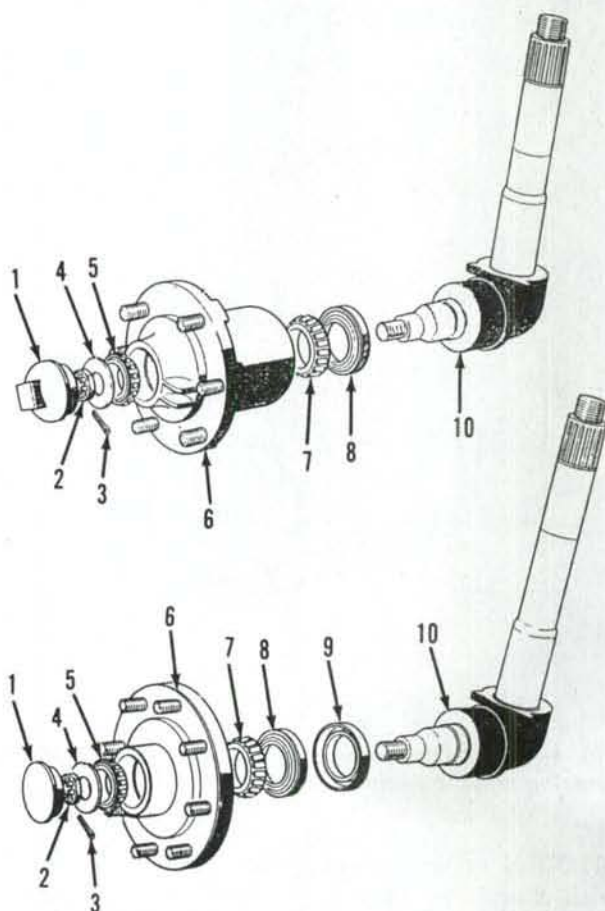
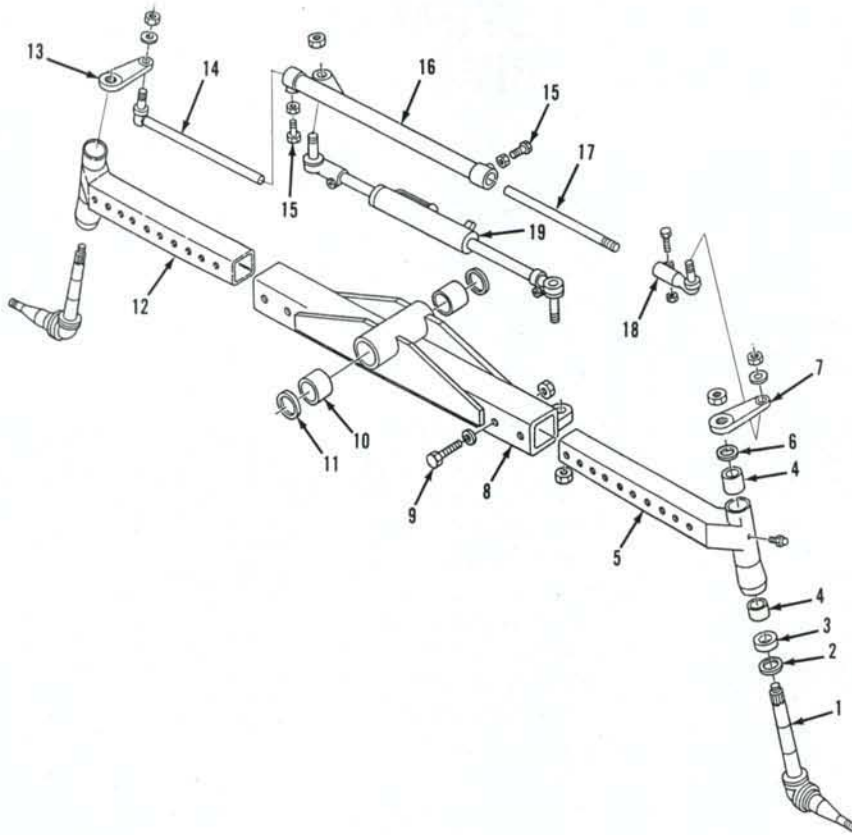


Fig. 1—Exploded view of front wheel hub used on two wheel drive models. Mud shield (9) is used only on 8240 and 8340 models.

- |                       |                       |
|-----------------------|-----------------------|
| 1. Cap                | 6. Hub                |
| 2. Slotted nut        | 7. Inner bearing cone |
| 3. Cotter pin         | 8. Grease retainer    |
| 4. Washer             | 9. Mud shield         |
| 5. Outer bearing cone | 10. Spindle           |

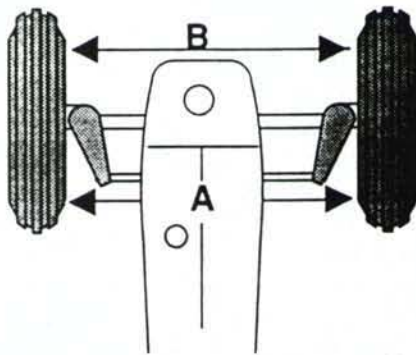
**3. SPINDLES, AXLE EXTENSIONS AND BUSHINGS.** To remove spindle (1—Fig. 2), first remove the wheel and hub, then disconnect tie rod end from steering arm (7 or 13). Check threaded end





**Fig. 2—Exploded view of adjustable axle typical of two-wheel drive models.**

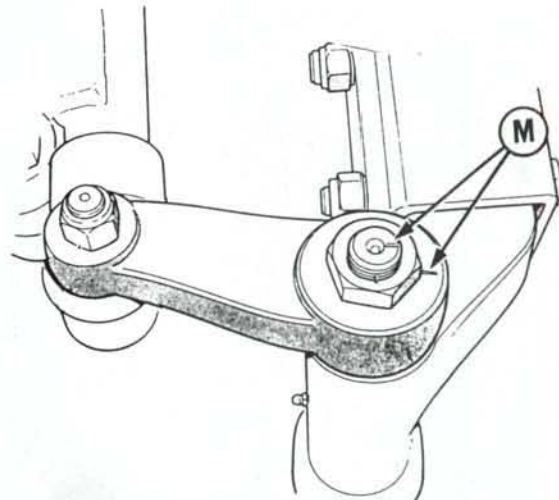
1. Spindle
2. Washer
3. Thrust bearing
4. Bushings
5. Left axle extension
6. Felt sealing washer
7. Left steering arm
8. Axle center member
9. Track clamp bolt
10. Bushings
11. Washers
12. Axle right extension
13. Right steering arm
14. Right tie rod
15. Locking screws
16. Tie rod tube
17. Left tie rod
18. Tie rod end
19. Power steering cylinder



**Fig. 3—On two-wheel drive models, front wheels should be toed out 0-13 mm (0-1/2 in.).**

of spindle and steering arm for alignment marks (M—Fig. 4) before removing steering arm. Note that it may be necessary to use a thread file to clean the threads of spindle since they are deformed during assembly at the factory in order to lock the spindle nut in place. Remove nut retaining steering arm (7 or 13—Fig. 2), then pull steering arm from splines of spindle. Lower spindle (1) from axle extension (5 or 12). Remove thrust bearing (3) and chamfered washer (2) from spindle. Clean and inspect parts for wear or other damage and renew as necessary.

When reassembling, lubricate bushings (4) and pack thrust bearing (3) with Ford M1C137-A,



**Fig. 4—Marks (M) are provided on the spindles and the steering arms to assist in correct assembly.**

M1C75-B or equivalent grease. Install washer (2) with chamfered edge down toward boss of spindle, then install thrust bearing (3) on spindle so that numbered side of bearing is facing upward. Insert spindle through axle extension. Install new felt washer (6), then locate steering arm on top of spindle. Align marks on threaded end of spindle and steering arm as shown (M—Fig. 4). Tighten steering arm retaining nut to 488-597 N·m (360-440 ft.-lbs.)



torque, then stake threads to prevent loosening. Refer to paragraph 2 for tread width and toe-out adjustment. Balance of reassembly is the reverse of disassembly. Tighten the track adjusting clamp screws (9—Fig. 2) which attach axle extensions inside the axle center section to 400 N·m (300 ft.-lbs.) torque. Tighten tie rod locating bolts (15) to 150 N·m (110 ft.-lbs.) torque and locknuts to 75 N·m (55 ft.-lbs.) torque. Tighten left tie rod end clamp bolt to 100 N·m (75 ft.-lbs.) torque after toe-out is correctly set.

#### 4. AXLE CENTER MEMBER, PIVOT PIN AND BUSHINGS.

To remove front axle assembly, raise front of tractor in such a way that it will not interfere with the removal of the axle. A hoist may be attached to front support or special stands can be attached to sides. Removal of the axle center member (8—Fig. 2) may be easier if the axle extension and spindle assembly is first removed from each side; however, the complete assembly can be removed as a unit. Remove front wheels and weights, then support the axle with a suitable jack or special safety stand to prevent tipping while permitting the axle to be lowered and moved safely. Disconnect hoses from the steering cylinder and cover openings to prevent the entry of dirt. Unbolt and remove the front axle pivot pin. Lower axle until axle is free from front support, then carefully roll axle away from under tractor.

## FRONT-WHEEL DRIVE

Mechanical front-wheel drive is available which uses a front drive axle manufactured by Carraro. Models 5640, 6640, 7740 and 7840 are equipped with standard type 709 axle; Models 8240 and 8340 are equipped with heavy duty type 709 axle. Some differences in the front-wheel drive systems will be noted in the following service instructions.

The transfer gearbox engagement is controlled by an electric solenoid/hydraulic valve which directs oil pressure to move a dog clutch and engage the front wheel drive. The transfer gearbox is attached to the bottom of the rear axle center housing of all models. A drive shaft connects the transfer gearbox to front axle.

### ADJUSTMENTS

#### All Four-Wheel Drive Models

**6. FRONT WHEEL TREAD WIDTH.** Front-wheel drive axle is a fixed assembly. However, track width can be adjusted by changing the wheel rim relative to the center disc, the rim and/or disc relative to axle hub or by interchanging the front wheels. The drawings shown in Fig. 5 illustrate different wheel

Check axle pivot bushings (10) and renew if necessary. Reverse removal procedure when assembling. Lubricate pivot bushings with Ford M1C137-A, M1C75-B or equivalent grease. Tighten screws retaining the axle pivot pin to 70-90 N·m (52-66 ft.-lbs.) torque, then bend locking tabs around screws to prevent loosening.

**5. FRONT SUPPORT.** To remove the front support, the axle must be removed, the radiator must be removed from the support and the front support must be unbolted from the front of engine. The front axle, the front support and the remainder of the tractor must each be supported separately while removing, while separated and while assembling. Be sure that sufficient equipment is available before beginning.

Refer to paragraph 67 and remove the main fuel tank, then refer to paragraph 87 and remove the radiator. Support front of tractor in such a way that it will not interfere with removal of either the front support or the front axle. Remove axle as outlined in paragraph 4. Attach a hoist or other supporting device to the front support, then unbolt and separate the front support from the front of the engine. Be careful not to lose or damage shims located between front support and engine. Keep shims separate and label for installation in same location.

rim and disc positions relative to the hub and the resulting track width settings.

**NOTE: When interchanging front wheels from side to side, make sure that "V" of tire tread is pointing in the direction of forward travel.**

Tighten disc to hub mounting nuts to 475 N·m (350 ft.-lbs.) torque and disc to rim mounting nuts to 240 N·m (177 ft.-lbs.) torque. Recheck the disc and rim mounting nut torque after driving the tractor about 200 meters (200 yards), after one hour of operation, after eight hours of operation and at 50 hour intervals.

After resetting track width, check toe-in setting as outlined in paragraph 7 and steering stop setting as outlined in paragraph 8.

**7. TIE RODS AND TOE-IN.** Tie rod ends are not adjustable for wear and faulty units must be renewed. To check toe-in, first turn steering wheel so that front wheels are in straight ahead position. Measure distance between front wheels at front and rear of wheels from rim flange to rim flange at hub height. Distance measured at front of wheels should be 0-6 mm (0-1/4 in.) less (toed in) than distance measured at rear of wheels. To adjust, loosen clamp



Disc/Rim Position	Track Setting	
	24 in. wheels	28 in. wheels
	55.6 in. (1412 mm)	54.7 in. (1389 mm)
	59.7 in. (1516 mm)	58.8 in. (1493 mm)
	63.6 in. (1615 mm)	62.7 in. (1592 mm)
	67.7 in. (1718 mm)	66.8 in. (1696 mm)
	71.3 in. (1812 mm)	71.9 in. (1825 mm)
	75.4 in. (1916 mm)	75.9 in. (1929 mm)
	79.3 in. (2015 mm)	79.9 in. (2028 mm)
	83.4 in. (2119 mm)	83.9 in. (2132 mm)

Fig. 5—Front-wheel drive axle track width is adjusted by changing position of wheel rim and disc.

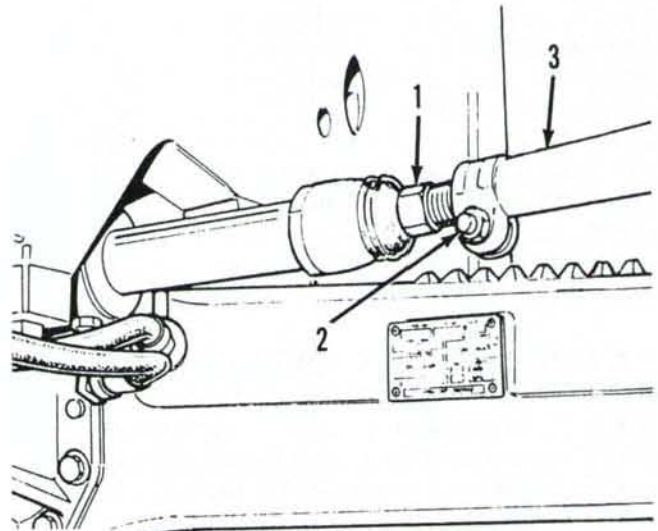


Fig. 6—View of toe-in adjustment points for four-wheel-drive models. Be sure to adjust both sides equally. Refer to text.

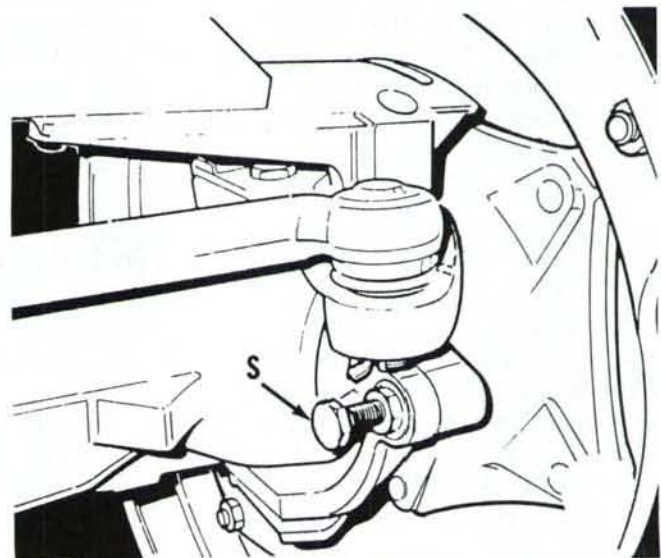


Fig. 7—Steering stop screws (S) should be adjusted to prevent tires from touching any part of tractor when wheels are turned.

bolt (2—Fig. 6), then turn tie rod (1) in or out of tie rod end (3) as required. Adjust both sides evenly. When adjustment is correct, tighten clamp bolt (2) to 56 N·m (41 ft.-lbs.) torque.

**8. STEERING STOPS AND ARTICULATION.**

The front axle is provided with adjustable steering and articulation stops to prevent the front tires from contacting the tractor. Adjusted setting should not change during operation, but different tire sizes or tread and changes in track width may make adjustment necessary. The steering stop screws (S—Fig. 7) should be adjusted to provide a minimum clearance of 20 mm (3/4 in.) between tire and frame. Tighten



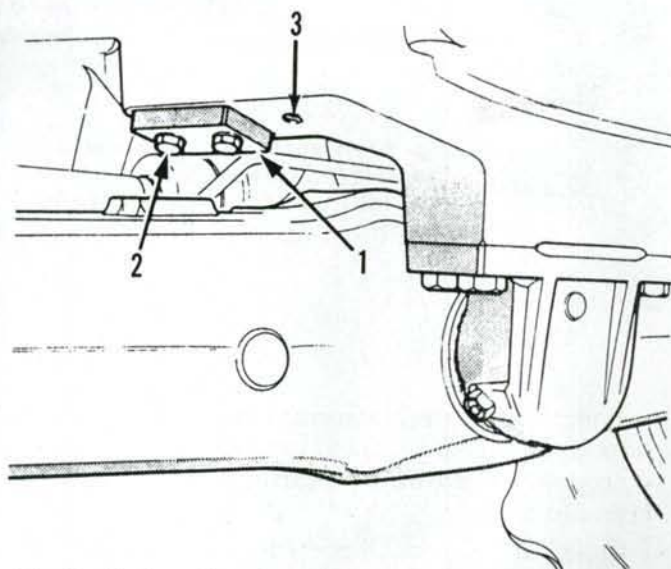


Fig. 8—Articulation stops (1) can be installed using the center and rear (2) mounting holes as shown or the center and front (3) threaded holes can be used. Refer to text.

locknut to 150 N·m (110 ft.-lbs.) torque when adjustment is correct.

Articulation stops (1—Fig. 8) should prevent the tires from contacting the tractor when the front axle is tipped against stops. When stop is attached to the rear two screws (2) as shown, the axle should be limited to approximately 8° of movement. When the stop is attached to the center and front hole (3), articulation is limited to about 12° from horizontal. Stops (1) should be positioned at same location on both sides.

## DRIVE SHAFT

### All Four-Wheel Drive Models

**9. REMOVE AND REINSTALL.** Two different drive shafts have been used as shown in Fig. 9, depending upon transmission used.

To remove drive shaft (5), first unbolt and remove the shield assembly (1). To remove drive shaft shown in the lower view, remove screw (4) and slide couplings (2 and 3) until drive shaft can be withdrawn. Clamps (7) must be removed before front universal joint can be separated from yoke (6) of models with 8 × 2 and 16 × 4 transmissions.

When installing drive shaft on models with 12 × 12 and 16 × 16 speed transmissions, grease coupling splines, slide couplings onto drive shaft, position drive shaft, then slide couplings into position and install screws (4).

On models with 8 × 2 and 16 × 4 speed transmissions, grease rear coupling splines before installing drive shaft. Tighten clamp bolts of front universal joint to 57 N·m (42 ft.-lbs.) torque.

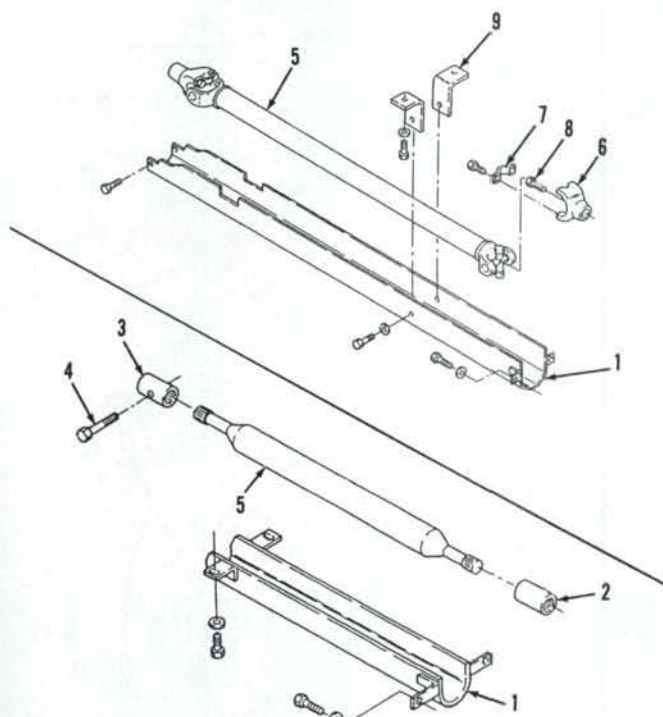


Fig. 9—The drive shaft and shield at top are typical of models with 8 × 2 and 16 × 4 transmissions. The drive shaft and shield shown in the lower view are typical of models with transmissions providing 12 × 12 and 16 × 16 speed transmissions.

- |                           |                         |
|---------------------------|-------------------------|
| 1. Shield                 | 6. Yoke                 |
| 2. Front splined coupling | 7. Clamp                |
| 3. Rear splined coupling  | 8. Yoke retaining screw |
| 4. Screw                  | 9. Bracket              |
| 5. Drive shaft            |                         |

## FRONT DRIVE AXLE

### All Four-Wheel Drive Models

**10. R&RASSEMBLY.** First remove the drive shaft and shield as outlined in paragraph 9. If differential unit is to be serviced, it is recommended that the bevel pinion shaft nut be loosened at this time. Pry out pinion shaft oil seal, then loosen nut using special pinion nut wrench FT3168 or equivalent. Remove front weights. Raise front of tractor in such a way that it will not interfere with the removal of the axle. A hoist may be attached to front support or special stands can be attached to sides. Remove front wheels, then support the axle with a suitable jack or special safety stand to prevent tipping while permitting the axle to be lowered and moved safely. Disconnect hoses from the steering cylinder and cover openings to prevent the entry of dirt. Unbolt and remove front and rear pivot brackets (1 and 17—Fig. 10), lower axle until free, then carefully roll axle away.

Reinstall front drive axle by reversing the removal procedure. Tighten screws attaching front and rear pivot brackets (1 and 17) to 317-388 N·m (234-286



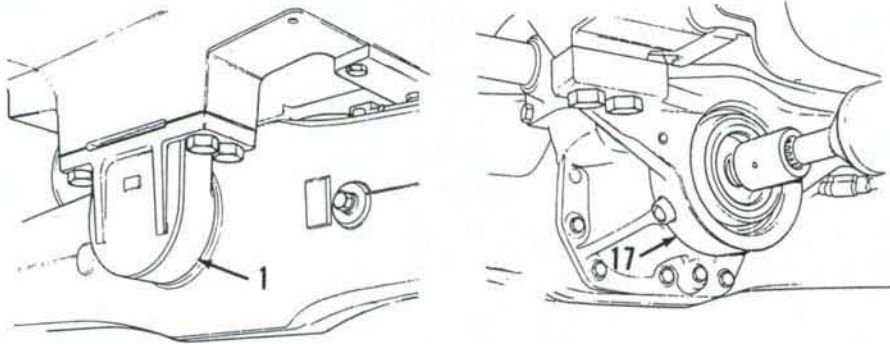


Fig. 10—View of front and rear pivot brackets (1 & 17) installed. Four screws are used to attach each bracket to front support.

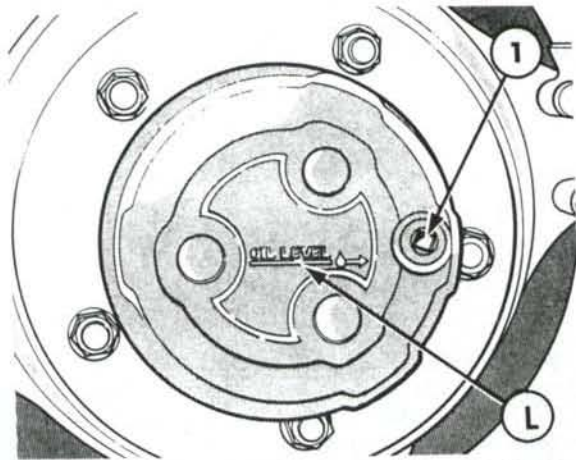


Fig. 11—View of "OIL LEVEL" mark (L) and drain plug (1) of front wheel drive front hub.

ft.-lbs.) torque. Tighten steering hose connections to 34 N·m (25 ft.-lbs.) torque if removed or disconnected.

## WHEEL HUB AND PLANETARY

### Models 5640-6640-7740

**11. R&R AND OVERHAUL.** Either front wheel hub and planetary can be serviced without removing the steering knuckle housing from axle. Support front axle housing and remove front wheel. Remove drain plug (1—Fig. 11) from planet carrier and drain oil from hub assembly. Remove the two Allen screws from planet carrier (2—Fig. 12) and lift planet carrier from knuckle housing (30).

Remove snap rings (7) and retainer plate (8). Mark shafts (4) and planet gears (6), then keep bearings (5) and thrust washers (3) separate so that they can be reinstalled as a set in the same location.

Before removing the ring gear (14), mark relative position of ring gear (14) and steering knuckle housing (30) to facilitate installation in same location. Remove snap ring (10), sun gear (11), spacer (12) and washer (13). Unscrew retaining screws (16), then use four of the removed screws as jackscrews in threaded holes of the ring gear carrier (18) to push carrier (18) and ring gear (14) from hub (21).

Bump hub (21) from steering knuckle (30). Remove cups for bearings (20 and 22) and seal (23) from hub. If necessary, remove inner bearing cone from knuckle housing.

Clean and inspect all parts for excessive wear or other damage and renew as necessary.

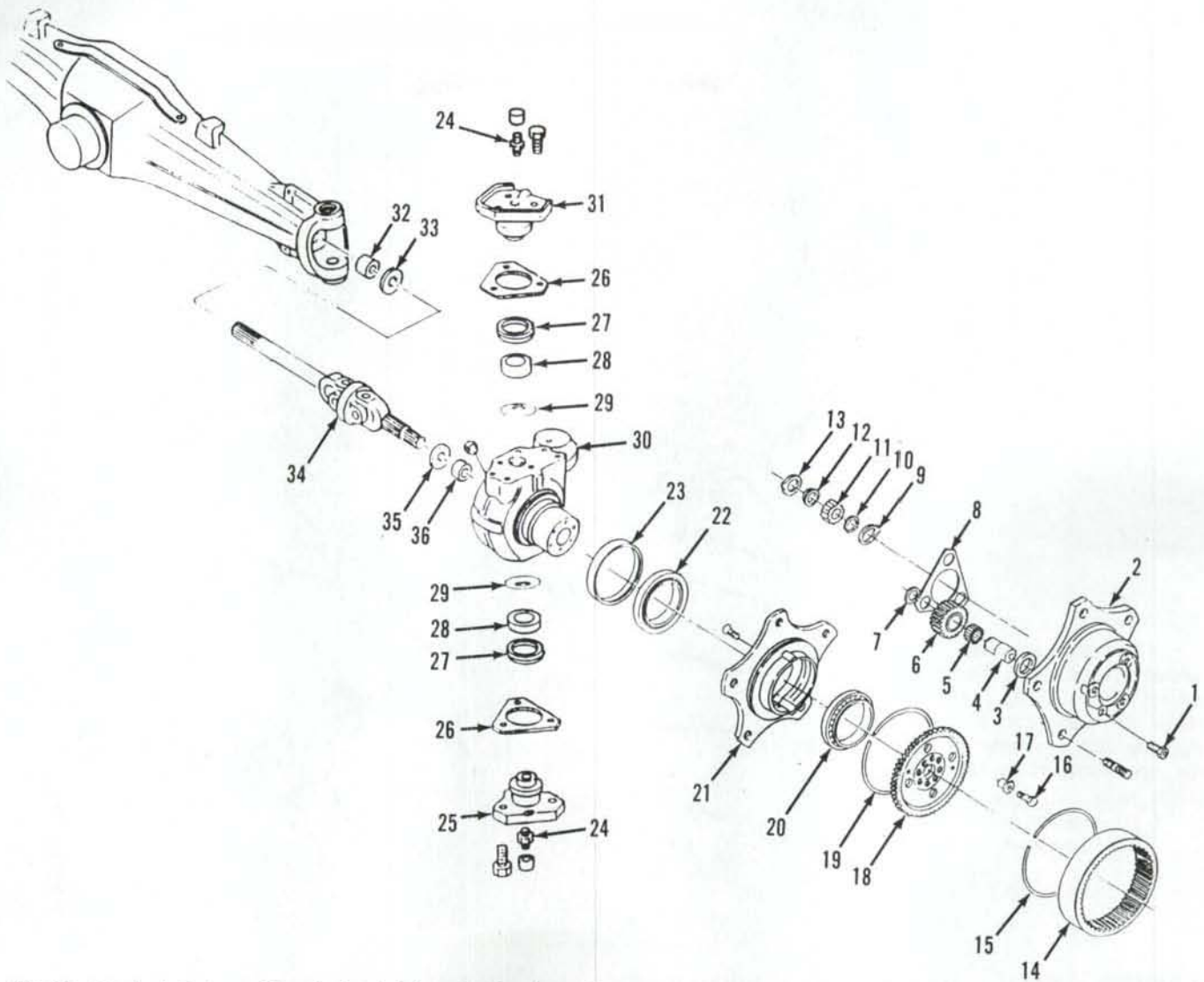
When reassembling, drive cups for bearings (20 and 22) and oil seal (23) into hub (21). If removed, install cone for inner bearing (22) on knuckle housing (30). Install hub (21) and cone for outer bearing (20) onto knuckle housing. Assemble ring gear (14) to carrier (18) and secure with retaining ring (19). Install ring gear (14) and gear carrier (18) and tighten mounting cap screws (16) to 220 N·m (162 ft.-lbs.) torque. Install washer (13), spacer (12), sun gear (11) and snap ring (10). Stick thrust washer (9) in place on carrier (2) with "Loctite 638" or equivalent and install new "O" ring (15) in groove of hub (2). Install thrust washers (3), bearings (5), planet gears (6) and retainer plate (8), then secure with snap rings (7). Install planetary carrier assembly. Install the two Allen screws. Fill hub and planetary to the level of opening for drain/fill plug (1—Fig. 11) in carrier with "OIL LEVEL" mark (L) on carrier horizontal. Fill with Ford ESN-M2C134-D or equivalent. Install front wheel and tighten disc to hub nuts to 270 N·m (200 ft.-lbs.) torque. Disc to wheel rim nuts should be tightened to 240 N·m (177 ft.-lbs.) torque.

### Models 7840-8240-8340

**12. R&R AND OVERHAUL.** Either front wheel hub and planetary can be serviced without removing the steering knuckle housing (30—Fig. 13). Support front axle housing and remove front wheel. Remove drain plug (1—Fig. 11) from planet carrier and drain oil from hub assembly. Remove the two Allen screws from planet carrier (2—Fig. 13) and lift planet carrier from knuckle housing (30).

Remove planet gear retaining screws and washers (8—Fig. 13). Mark planet gears (6) and shafts (4), then remove planet gears, bearings (5) and thrust washers (3). Keep bearings (5) and thrust washers (3) separate with their respective planet gears so that they can be reinstalled as a set in the same location.





**Fig. 12—Exploded view of front-wheel drive steering knuckle and standard planetary assembly. Refer to Fig. 13 for heavy duty planetary assembly. Axles will not be equipped with both shims (26) and Belleville washers (29). Early axles use shims (26) to adjust vertical play of steering knuckle and later models use Belleville washers (29).**

- |                             |                       |                                 |                       |
|-----------------------------|-----------------------|---------------------------------|-----------------------|
| 1. Magnetic drain plug      | 10. Snap ring         | 19. Retaining ring              | 28. Bearing           |
| 2. Planet carrier           | 11. Sun gear          | 20. Bearing                     | 29. Belleville washer |
| 3. Thrust washer            | 12. Spacer            | 21. Hub                         | 30. Steering knuckle  |
| 4. Planet shaft             | 13. Thrust washer     | 22. Bearing                     | 31. Upper retainer    |
| 5. Needle rollers (30/gear) | 14. Ring gear         | 23. Oil seal                    | 32. Bushing           |
| 6. Planet gear              | 15. "O" ring          | 24. Grease fitting              | 33. Seal              |
| 7. Snap ring                | 16. Screws (M10 x 30) | 25. Lower retainer              | 34. Axle shaft assy.  |
| 8. Planet carrier plate     | 17. Bushing           | 26. Shims (0.10, 0.19, 0.35 mm) | 35. Seal              |
| 9. Thrust pad               | 18. Ring gear carrier | 27. Seal                        | 36. Bushing           |

Before removing the ring gear (14), mark relative position of ring gear (14) and steering knuckle housing (30) to facilitate installation in same location. Remove snap ring (10) from drive shaft sun gear. Unscrew retaining screws (16), then use four of the removed screws as jackscrews in threaded holes of the ring gear carrier (18) to push carrier (18) and ring gear (14) from hub (21).

Bump hub (21) from steering knuckle (30). Remove cups for bearings (20 and 22) and seal (23) from hub.

If necessary, remove inner bearing cone from knuckle housing.

Clean and inspect all parts for excessive wear or other damage and renew as necessary.

When reassembling, drive cups for bearings (20 and 22) and oil seal (23) into hub (21). If removed, install cone for inner bearing (22) on knuckle housing (30). Install hub (21) and cone for outer bearing (20) onto knuckle housing. Assemble ring gear (14) to carrier (18) and secure with retaining ring (19). Install ring gear (14) and gear carrier (18) and tighten



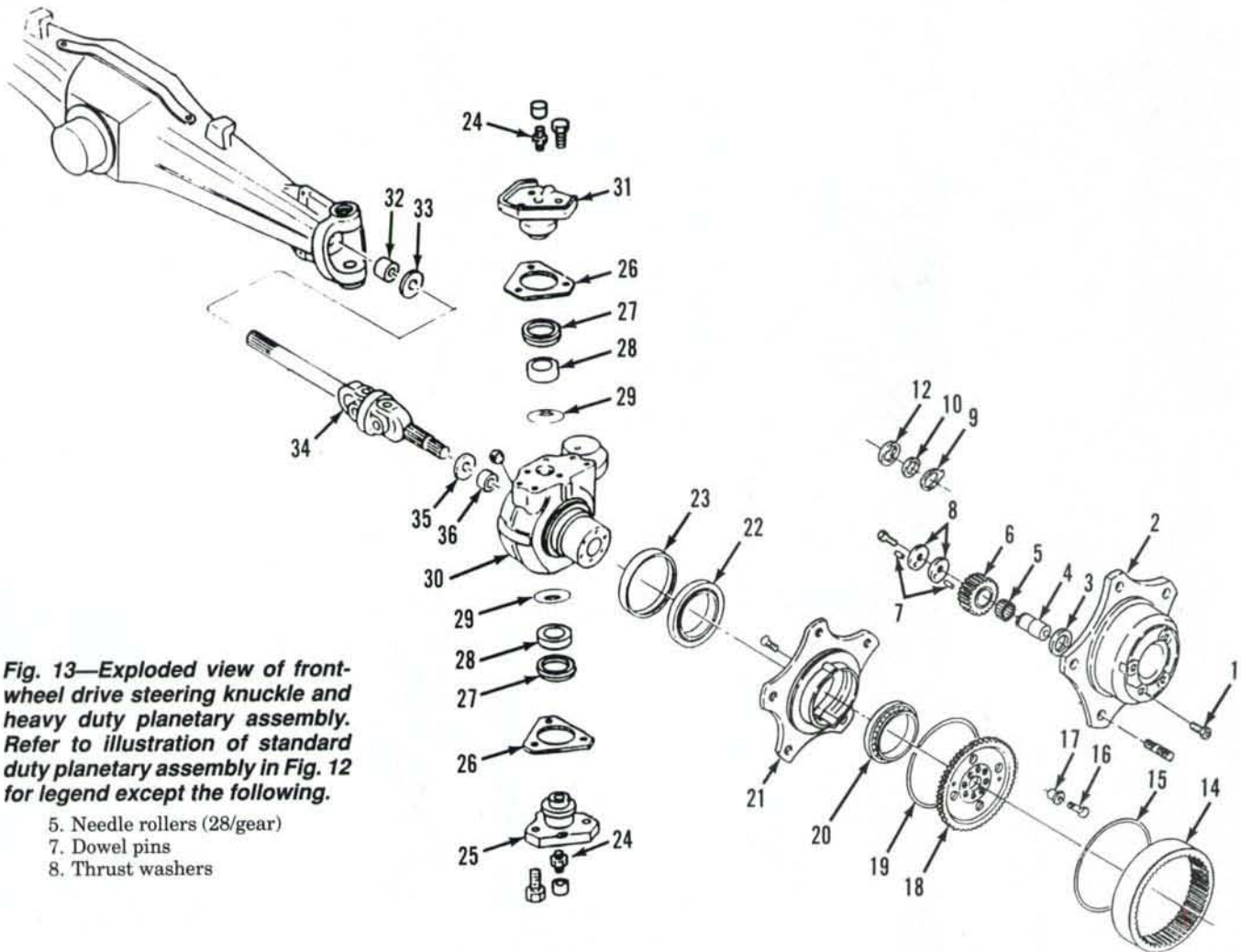


Fig. 13—Exploded view of front-wheel drive steering knuckle and heavy duty planetary assembly. Refer to illustration of standard duty planetary assembly in Fig. 12 for legend except the following.

- 5. Needle rollers (28/gear)
- 7. Dowel pins
- 8. Thrust washers

mounting cap screws (16) to 220 N·m (162 ft.-lbs.) torque. Install washer (12) and snap ring (10). Stick thrust washer (9) in place on carrier (2) with "Loctite 638" or equivalent and install new "O" ring (15) in groove of hub (2). Install thrust washers (3), bearings (5), planet gears (6) and thrust washers (8), then secure with retaining screws. Install planetary carrier assembly and secure with the two Allen screws. Fill hub and planetary to the level of opening for drain/fill plug (1—Fig. 11) in carrier with "OIL LEVEL" mark (L) on carrier horizontal. Fill with Ford ESN-M2C134-D or equivalent. Install front wheel and tighten disc to hub nuts to 270 N·m (200 ft.-lbs.) torque. Disc to wheel rim nuts should be tightened to 240 N·m (177 ft.-lbs.) torque.

## STEERING KNUCKLE HOUSING

### All Four-Wheel Drive Models

**13. R&R AND OVERHAUL.** To remove either steering knuckle housing (30—Fig. 12 or Fig. 13), first remove planetary and wheel hub as outlined in

paragraph 11 or 12. Disconnect tie rod from steering knuckle arm. Unbolt and remove steering knuckle retainers (25 and 31). Note that early axles use shims (26) to adjust vertical play of steering knuckle (30) and thickness of shims (26) located under each retainer should be recorded when disassembling to aid in reassembly. Later models are equipped with Belleville washers (29) that automatically adjust vertical play. The upper Belleville washer is the thicker of the two washers.

Carefully remove steering knuckle housing (30) from all models. Axle shaft and double "U" joint assembly (34) may be withdrawn with knuckle housing. Lower bearing cone (28) may fall from lower retainer (25). Remove upper bearing cone (28), cap (31) and seal (27). Bearing cups can be removed if necessary.

If desired, axle shaft and "U" joint assembly can be withdrawn for inspection or repair. If renewal is required, oil seal (35) and bushing (36) can be removed from knuckle housing (30). Oil seal (33) and bushing (32) can be removed from axle housing. Bushings (32 and 36) should be pressed into position with external



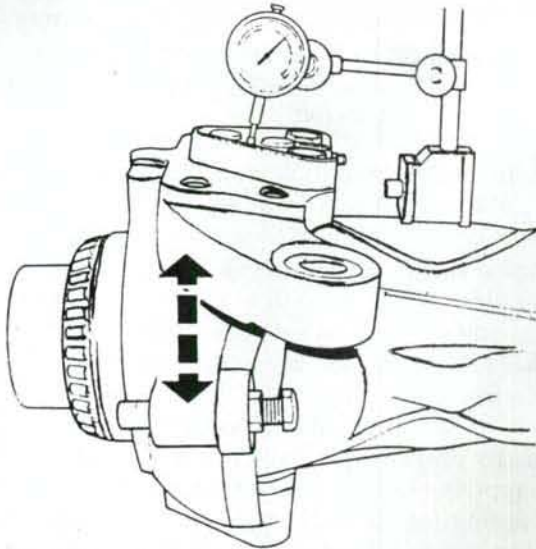


Fig. 14—Adjust the king pin bearings to obtain free play of 0-0.10 mm (0-0.004 in.). Refer to text.

groove toward top and internal arrow-shaped grooves pointing toward inside of oil-filled housing (away from seal). Be careful not to damage seals (33 and 35) when installing axle and knuckle housing.

Reassemble by reversing the disassembly procedure. On early axle originally equipped with shims (26), sufficient thickness of shims must be installed to provide king pin with 0-0.1 mm (0-0.016 in.) free play. To determine shim pack thickness required to set free play within specified limits, first position knuckle housing on axle housing and install upper retainer (31) without shims. Install lower retainer (25) with enough shims (26) to provide some end play and tighten upper and lower retainer mounting screws to 190 N·m (140 ft.-lbs.) torque. Position a dial indicator as shown in Fig. 14 and check vertical play

of king pin bearings. For example, if measured end play is 0.15 mm (0.006 in.), remove 0.10 mm (0.004 in.) shim to obtain end play within the desired limits. Divide shims (26—Fig. 13) equally at top and bottom, to center the assembly. Shims are available in 0.10, 0.19 and 0.35 mm (0.0039, 0.0075 and 0.0138 in.) thicknesses.

Vertical play of steering knuckles on later models is controlled by Belleville washers (29) located between axle center housing and cup of bearings (28) and no adjustment is necessary. The thicker of the two Belleville washers is installed on top knuckle bearing.

Refer to paragraph 11 or paragraph 12 when reassembling hub and planetary.

## AXLE PIVOT BEARINGS

### All Four-Wheel Drive Models

**14. REMOVE AND REINSTALL.** To remove the axle pivot bearings, refer to paragraph 9 and remove the drive shaft, then refer to paragraph 10 and lower the front axle assembly. The front pivot bracket (1—Fig. 15) and rear pivot bracket (17) can be withdrawn from the axle.

Clean all parts, complete disassembly, if required, and inspect all parts for wear or damage. Use new “O” rings and seals when assembling. Tighten screws attaching front and rear pivot brackets (1 and 17) to 317-388 N·m (234-286 ft.-lbs.) torque. Tighten steering hose connections to 34 N·m (25 ft.-lbs.) torque.

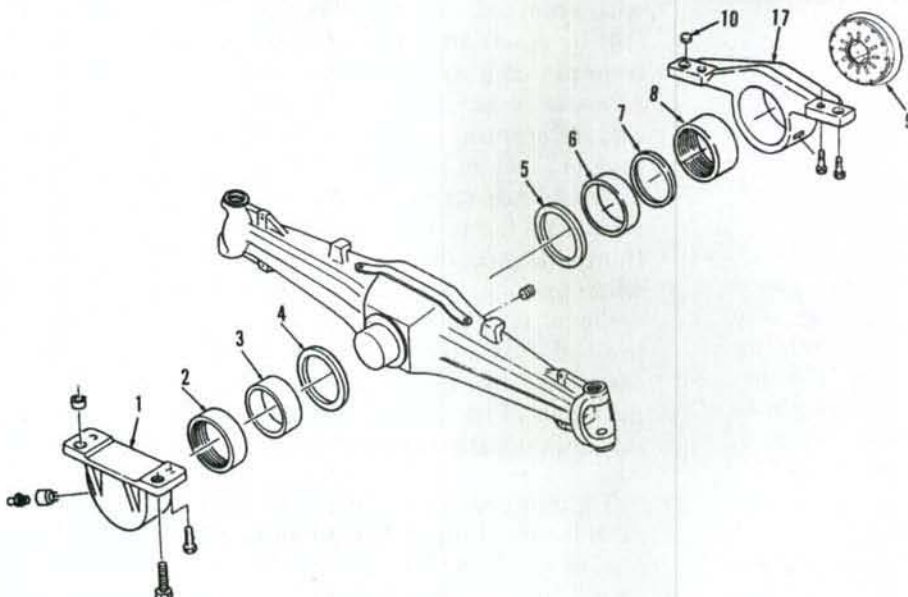
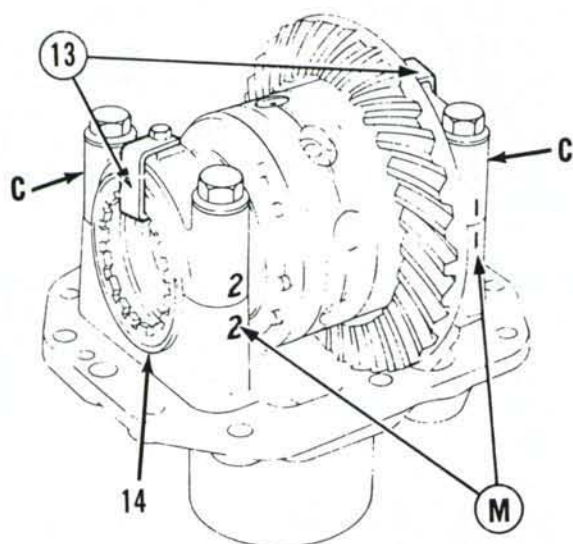


Fig. 15—Partially exploded view of front-wheel drive pivot brackets.

- |                        |                        |
|------------------------|------------------------|
| 1. Front pivot bracket | 7. “O” ring            |
| 2. Bushing             | 8. Bushing             |
| 3. Sleeve              | 9. Oil seal            |
| 4. Thrust washer       | 10. Locating dowel     |
| 5. Thrust washer       | 17. Rear pivot bracket |
| 6. Sleeve              |                        |





**Fig. 16—View of removed differential assembly, showing marks (M) on the caps (C) and housing. Mark the caps so that they can be quickly identified for assembly to the correct side and in the correct position.**

## DIFFERENTIAL

### All Four-Wheel Drive Models

**15. REMOVE AND REINSTALL.** To remove the differential assembly, refer to paragraph 9 and remove the drive shaft. Refer to paragraph 10 and remove the front axle assembly. Refer to paragraph 13 and remove steering knuckle (30—Fig. 12 or Fig. 13) and axle shaft assembly (34) from both sides. Some mechanics prefer to remove the steering knuckles and axle shafts before removing the axle from the tractor, to reduce the weight of the unit. The differential housing contains the hydrostatic steering cylinder which must be removed as outlined in paragraph 27. Unbolt and remove the differential carrier housing (1—Fig. 17) from the axle center housing.

When installing, apply Loctite 510 or equivalent sealer to mating surface of differential carrier housing and axle housing. Tighten the ten retaining screws to 169 N·m (125 ft.-lbs.) torque. Remainder of assembly and installation is reverse of disassembly procedure.

**16. OVERHAUL.** Before disassembling, mark both bearing caps and housing as shown at (M—Fig. 16) to facilitate alignment when reassembling. Straighten tabs of both lock plates (13—Fig. 17), then remove both cap screws (12), washers and lock plates. Loosen, but do not remove, the four screws attaching caps (C—Fig. 16), then unscrew adjusting rings (14). Remove both bearing caps and lift differential, bearing cups and adjusting rings from housing.

Mark halves of differential case (16) before disassembling to facilitate alignment when reassembling.

Remove screws (17) and remove ring gear (11). Case halves can be separated after removing screws (17). Assembly of original parts is easier if side gears (22) and clutch parts (23, 24 and 25) are kept together for each side and not mixed.

Clean and inspect all parts for wear or other damage. Lubricate all parts while assembling. Alternate the five external splined plates (24) and four internal splined discs (25). The internally splined thrust disc (23) is thicker (2.8 mm) than other discs and should be assembled next to side gear (22). Install thrust washers (18), pinions (19) and shaft (20). Drive pin (21) in from ring gear side of differential case on two pinion differential. When assembling all models, align any previously affixed marks. Install ring gear (11), applying Loctite 270 or equivalent to screws (17) and tightening to 78 N·m (58 ft.-lbs.) torque. Press bearing cones (15) onto case (16) until seated.

When installing the differential and ring gear assembly, it is necessary to check and adjust both backlash and carrier bearing preload as follows: First measure rotating drag of bevel pinion shaft (10) using a spring scale with a string wrapped around the pinion shaft as shown in Fig. 18. Do not measure starting torque (force necessary to start pinion shaft turning), only measure the force necessary to keep pinion turning. Record the rotating drag measurement for later use, then install differential assembly in carrier housing and tighten bearing cap (C—Fig. 16) bolts tight enough to hold caps in place but allow adjuster rings (14) to be rotated. Turn adjuster rings to remove all free play between ring gear and bevel pinion gear. Preload of differential carrier bearings and gear backlash are both adjusted by turning adjusting rings (14L and 14R). Backlash between bevel pinion and ring gear should 0.18-0.25 mm (0.007-0.010 in.) and can be measured at face of ring gear with a dial indicator (D—Fig. 19). Turn adjuster rings (14) by equal amounts to move ring gear (11) away from pinion gear until desired backlash is obtained. Adjuster rings (14L and 14R—Fig. 17) should be tight and differential should rotate freely in carrier bearings (15) when checking backlash. Carrier bearing preload is correct when 3.2-4.7 Kg. (7-10 lbs.) more rotational force is necessary to turn the pinion shaft than was necessary to turn only the pinion shaft when previously measured. Turn adjuster ring (14L) opposite ring gear to increase or decrease bearing preload. It is important to check both rotational drag (as shown in Fig. 18) and bevel pinion to ring gear backlash (Fig. 19) after changing the position of either adjusting ring (14L or 14R—Fig. 17).

Tighten bearing cap (C—Fig. 16) bolts to 266 N·m (196 ft.-lbs.) torque. Install adjuster ring lock plates (13—Fig. 17 or Fig. 18) and tighten locking plate retaining screws to 12 N·m (9 ft.-lbs.) torque.



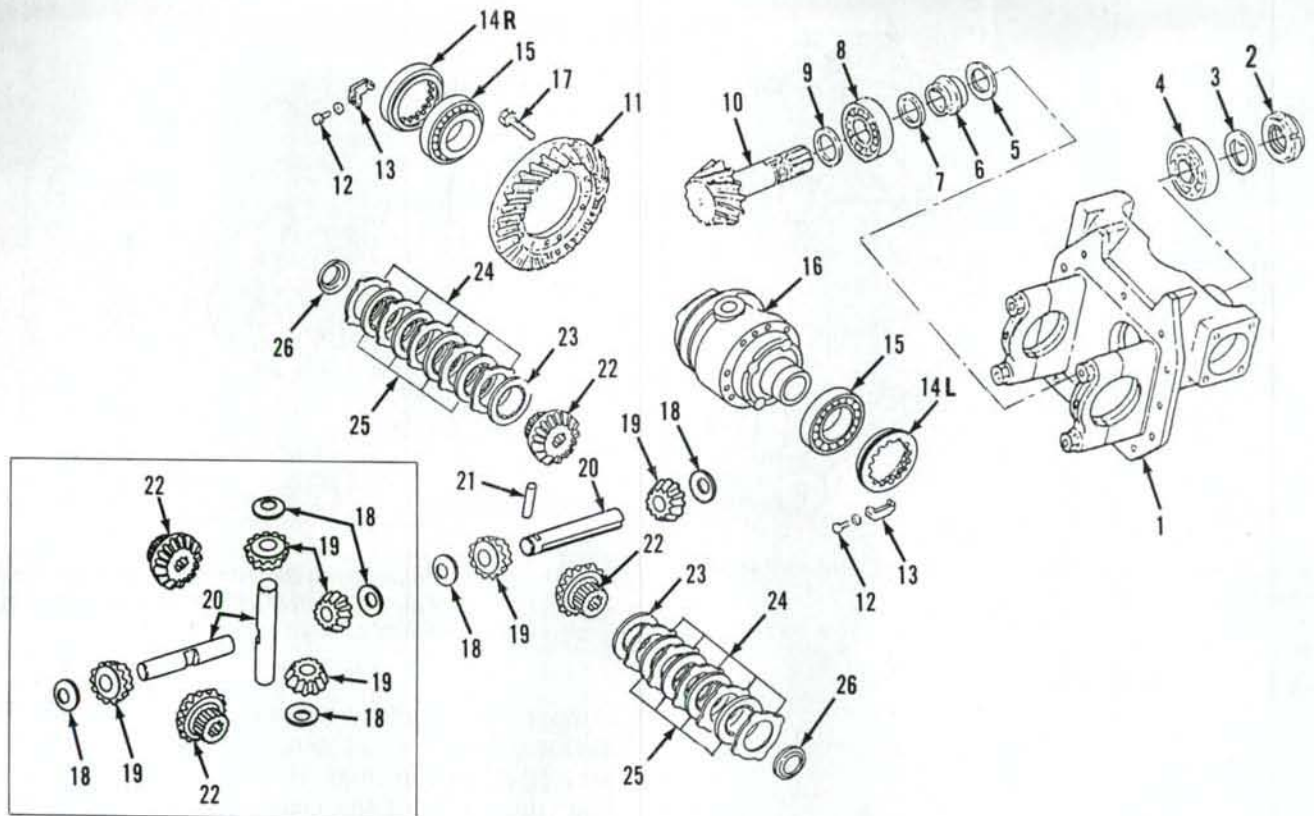


Fig. 17—Exploded view of standard, two pinion differential assembly. Hydrostatic steering cylinder is attached to housing (1). Gears (10 & 11) are available only as matched set. The four pinion differential assembly shown in inset is used with heavy duty axle.

- |                                   |                                   |                                       |  |
|-----------------------------------|-----------------------------------|---------------------------------------|--|
| 1. Housing                        | 8. Bearing cup & cone (Same as 4) | 14R. Adjusting ring                   | 21. Roll pin                             |
| 2. Nut                            | 9. Shim (2.5-3.4 mm)              | 15. Bearing cup & cone                | 22. Side gears                           |
| 3. Lock washer                    | 10. Bevel pinion                  | 16. Differential case (1 or 2 pieces) | 23. Spacer (1 each side)                 |
| 4. Bearing cup & cone (Same as 8) | 11. Ring gear                     | 17. Screws                            | 24. External spline plates (5 each side) |
| 5. Washer (Same as 7)             | 12. Screws                        | 18. Thrust washers                    | 25. Internal spline discs (4 each side)  |
| 6. Spacer                         | 13. Locking clips                 | 19. Pinion gears                      | 26. Belleville washer                    |
| 7. Washer (Same as 5)             | 14L. Adjusting ring               | 20. Pinion shaft                      |  |

## BEVEL PINION GEARS

### All Four-Wheel Drive Models

**17. REMOVE AND REINSTALL.** To remove the bevel pinion gears (10 and 11—Fig. 17), refer to paragraph 9 and remove the drive shaft. Pry out pinion shaft oil seal (9—Fig. 15), then loosen pinion shaft nut (2—Fig. 17) using pinion nut wrench FT3168 or equivalent. Refer to paragraph 15 and remove the differential assembly. Refer to paragraph 16 and remove ring gear from differential.

To remove the bevel pinion (10—Fig. 17), remove nut (2) and washer (3), then push pinion out toward inside. Cone of bearing (4) will slide from shaft as pinion is removed. The bevel pinion and ring gear must be renewed as a set.

Thickness of shims (9) should be selected to adjust mesh position of bevel pinion (10) if gear set (10 and 11), pinion bearings (4 and 8) and/or differential hous-

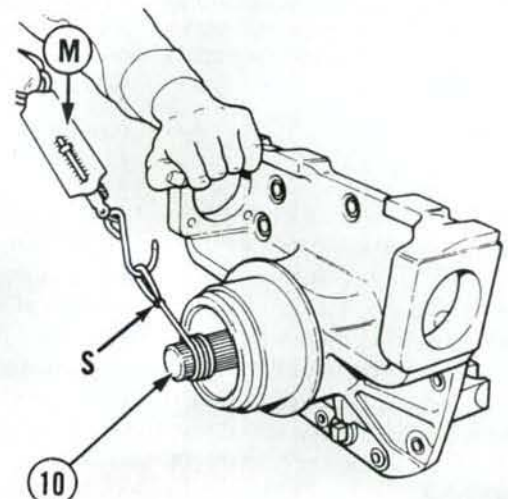
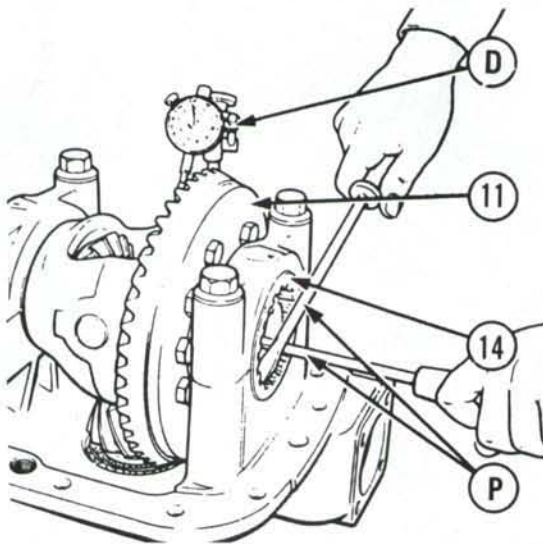


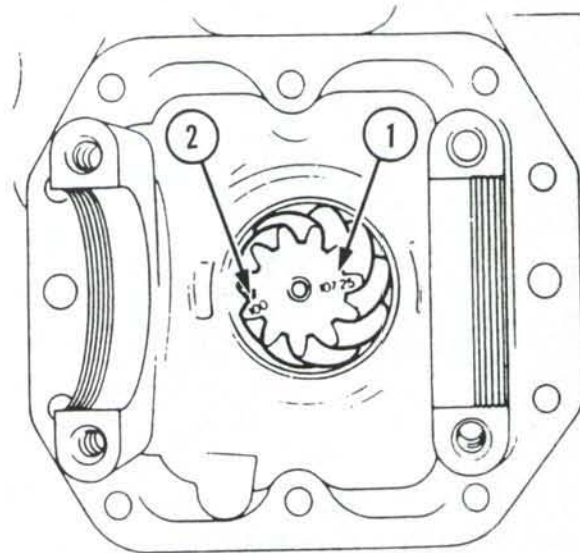
Fig. 18—Measure rolling drag of bevel pinion shaft (10) using a spring scale (M) and string (S) as shown.



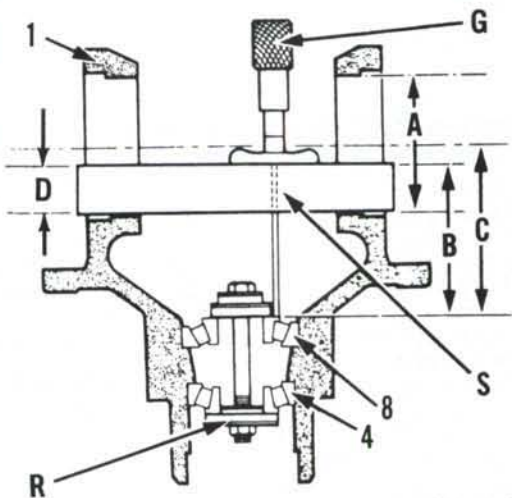


**Fig. 19—Measure backlash between ring gear and bevel pinion gear using a dial indicator.**

- |                   |                   |
|-------------------|-------------------|
| D. Dial indicator | 11. Ring gear     |
| P. Pry bars       | 14. Adjuster ring |



**Fig. 21—Bevel pinion mesh dimension (in millimeters) is etched on end of pinion shaft (1). Pinion serial number (2) is also etched on end of shaft.**



**Fig. 20—Cross section of differential housing showing measurements required to accurately set pinion position. Refer to text for measuring distance (C) from bearing inner race to center of carrier bearing bore.**

- |                     |                         |
|---------------------|-------------------------|
| G. Depth gauge      | 1. Differential housing |
| R. Bearing retainer | 4. Pinion bearings      |
| S. Bar gauge        | 8. Pinion bearing       |

ing (1) is renewed or if previous mesh position is questioned. Install cups for bearings (4 and 8) in housing (1), then position bearing cones in cups as shown in Fig. 20. Use a retainer as shown at (R) to hold cones tight in cups while measuring. Install both carrier bearing caps and tighten the retaining nuts securely. Measure the diameter of the bearing bores (A). Both bearing bores should be the same diameter. Position bar gauge (S), part of tool No. 3135, in bearing bores. Note that bar gauge can be fabricated using a metal or wooden dowel with a hole drilled through it so that depth gauge (G) can be inserted

through the gauge as shown in Fig. 20. Measure the distance from the bar gauge to the inner flange of bearing (8) as shown at (B). Determine distance (C) from the center of the bearing bore to the bearing flange using formula  $B - D + (A + 2) = C$ .

The following is an example of the shim thickness calculation: Divide bearing bore (A) diameter by 2, subtract diameter of gauge bar (D) from measurement (B), then add the results of these two calculations to obtain dimension (C). If measurement (A) is 90.00 mm, measurement (B) is 90.35 mm and measurement (D) is 25 mm;  $90.35 \text{ mm} - 25 \text{ mm} + 45 \text{ mm} = 110.35 \text{ mm}$  (C).

To determine the thickness of shims to be installed at (9—Fig. 17), subtract the value (1—Fig. 21) stamped on pinion face from the calculated distance (C—Fig. 20). The result is the correct thickness of shim (9—Fig. 17). Example:  $110.35 \text{ mm}$  (C) -  $107.25 \text{ mm}$  (value on pinion gear) =  $3.10 \text{ mm}$  (shim thickness required).

Install selected shim (9—Fig. 17) on pinion shaft (10) with chamfer toward pinion gear. Remove carrier bearing caps and bearing cones (4 and 8) from carrier housing (1). Install inner bearing cone (8) on pinion (10) against selected shim.

Install washer (7), new (not yet collapsed) spacer (6) and washer (5) on pinion shaft (10) and insert into housing through the installed bearing cups. Install one cone for bearing (4), lockwasher (3) and nut (2). Tighten nut (2) until all play in bearings is just taken up, then measure rotating drag with a spring scale and string wrapped around the pinion shaft as shown in Fig. 18. Do not measure starting torque (force necessary to start pinion shaft turning), only measure force necessary to keep pinion turning. Correct amount of rotational force measured by the spring



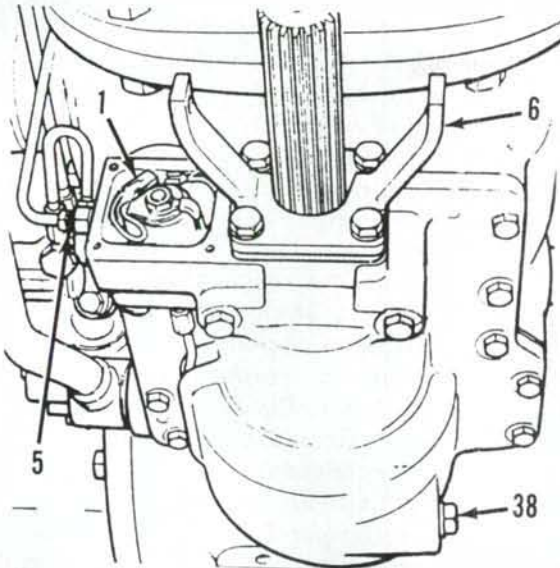


Fig. 22—View of front-wheel drive transfer case installed. Solenoid energizing wire (1) is routed through tube to housing. Bracket (6) attaches drive shaft shield.

scale should be within the range of 10.1-15.2 Kg. (22-33 lbs.). Tighten nut (2—Fig. 17) to tighten bearings and increase rotational force. Note that bearing adjustment is accomplished by crushing spacer (6),

and nut (2) should not be loosened unless a new spacer is installed.

## TRANSFER GEARBOX

### All Four-Wheel Drive Models

18. On SL and SLE model tractors, drive from the 12 × 12 or 16 × 16 transmission to power front wheel drive axle is incorporated in the transmission. Refer to appropriate transmission paragraphs for service.

Drive from transmission for front drive axle is from a transfer gearbox attached to bottom of transmission housing of models with 8 × 2 and 16 × 4 transmissions (S model tractors). Refer to the following paragraphs for service to the transfer gearbox.

### Models With 8 × 2 And 16 × 4 Transmissions

19. **R&R AND OVERHAUL.** To remove the transfer gearbox, remove drain plug (38—Fig. 22) and allow oil to drain. Remove drive shaft as described in paragraph 9. Remove cover, disconnect wire (1) from the solenoid and disconnect wiring tube from side of housing. Detach hydraulic lines (5), position floor jack

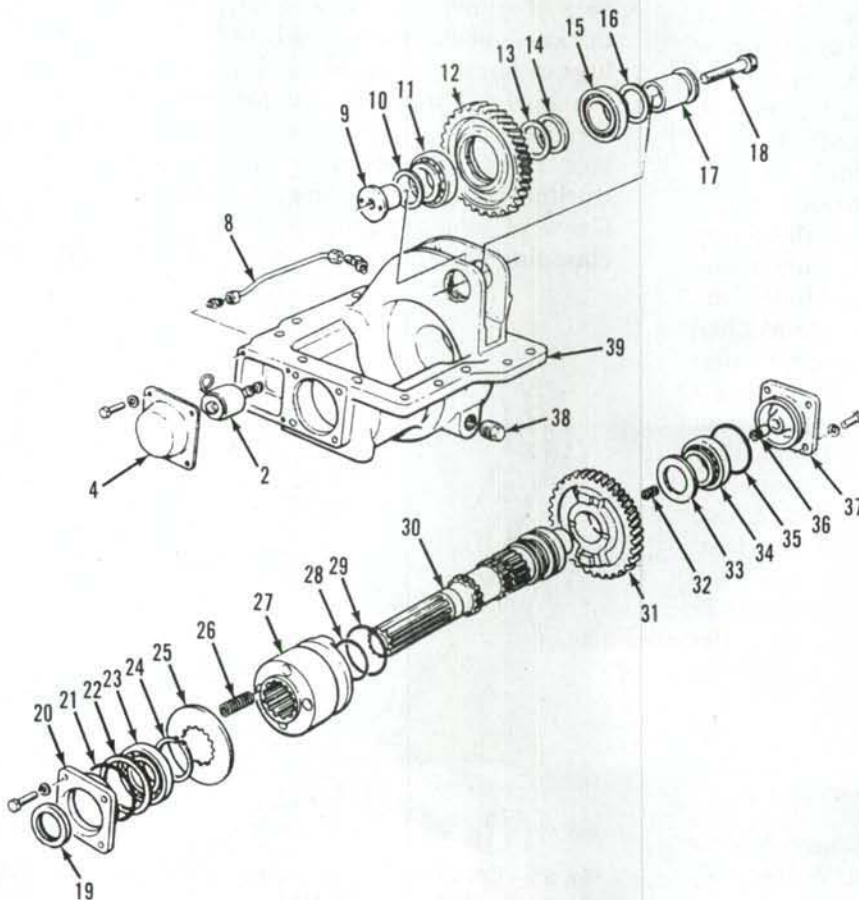


Fig. 23—Exploded view of four-wheel drive transfer gearbox used on models with 8 × 2 and 16 × 4 transmissions.

- |                            |                              |
|----------------------------|------------------------------|
| 2. Control solenoid        | 24. Snap ring                |
| 4. Cover                   | 25. Spring keeper            |
| 8. External oil line       | 26. Springs (4 used)         |
| 9. Retainer                | 27. Dog clutch coupler       |
| 10. Shim                   | 28. "O" ring                 |
| 11. Bearing                | 29. "O" ring                 |
| 12. Idler gear             | 30. Output shaft             |
| 13. Shim                   | 31. Gear and clutch assembly |
| 14. Spacer                 | 32. Pilot valve assembly     |
| 15. Bearing                | 33. Thrust washer            |
| 16. Shim                   | 34. Tapered roller bearing   |
| 17. Shaft                  | 35. "O" ring                 |
| 18. Screw                  | 36. Oil transfer tube        |
| 19. Oil seal               | 37. End plate                |
| 20. End plate              | 38. Drain plug               |
| 21. "O" ring               | 39. Housing                  |
| 22. Shim                   |                              |
| 23. Tapered roller bearing |                              |



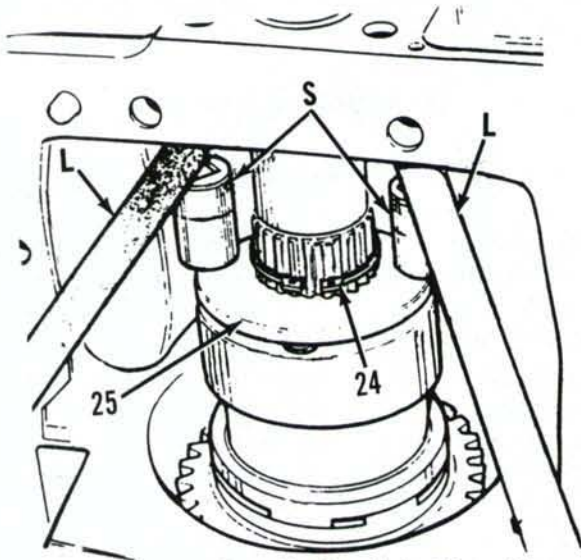


Fig. 24—Use appropriate sized sockets (S) and levers (L) to press against spring keeper (25) so that snap ring (24) can be removed.

under the transfer gearbox, remove retaining screws and lower transfer gear case from the tractor.

To disassemble the unit, remove the external oil line (8—Fig. 23), remove the nut from the solenoid and remove solenoid coil (2). After the solenoid coil is removed, the core and valve assembly can be removed from the housing. Remove socket head screw (18). **It may be necessary to heat nut end (9) of screw to soften thread locking compound.** Mark front side of idler gear (12) to assist reinstallation with same side toward front, then bump shaft (17) out. After shaft is removed, idler gear and shaft assembly (9-17) can be lifted out. Unbolt and remove output shaft end plate (20), being careful to collect and identify shims (22) to assist assembly. Unbolt and remove end plate (37) and oil transfer tube (36). Gently bump the output shaft (30) toward front, then toward rear to remove outer races of tapered roller bearings (23 and 34). Use sockets (S—Fig. 24) of a suitable size and levers (L) to depress spring keeper (25) far enough to remove snap ring (24). Remove the four springs (26—Fig. 23) after snap ring is removed from groove. Support gear (31) with spacers located between front of gear and front of housing (39), then press shaft (30) toward front out of bearing (34). Remove bearing, thrust washer (33) and gear (31). With shaft extending from front, use a suitable puller to remove bearing (23). Slide snap ring (24) forward on shaft until it is removed. Move shaft (30) out toward rear, while removing spring keeper (25) and clutch coupler (27). Be careful not to lose or damage pilot valve (32).

Clean and inspect all parts and renew any showing excessive wear or other damage. Pilot valve assembly (32) can be removed by blowing into the cross passage

with compressed air. Springs (26) should be 48 mm (1.889 in.) long and must not be distorted.

When reassembling, renew all "O" rings, seals and gaskets. Be sure that pilot valve assembly (32) is installed in end of output shaft (30) so that oil will pass through valve from transfer tube in end cover (37) into the shaft toward dog clutch (27), but will not flow the other direction. Reassemble by reversing disassembly procedure. Use oil on seals and make sure that "O" rings are not damaged while assembling. Assemble using shims (22) which were originally used, but without oil seal (19) and "O" ring (21). Install and tighten cap screws retaining end plates (20 and 37) to 51 N·m (38 ft.-lbs.) torque. Add or remove sufficient shims (22) to provide 0.1 mm (0.004 in.) preload. Check for correct bearing adjustment by using a string wrapped around shaft and spring scale to measure rolling torque of shaft as shown in Fig. 25. When properly assembled using the correct thickness of shims (22—Fig. 23), measured rolling torque without seal (19) will be 1.9-4.5 Kg. (4.2-9.9 lbs.). When correct shims have been selected, remove plate (20), install and lubricate new seal (19) and "O" ring (21), then reassemble. Tighten retaining screws to 51 N·m (38 ft.-lbs.) torque.

Install transfer tube and solenoid (2). Special tool FT 3169 (available from Ford) or equivalent is necessary to check and adjust idler gear bearings. Thickness of shims (13) adjust bearings (11 and 15) and thickness of shims (10 and 16) adjusts for fit between lugs of housing (39). Make sure that outer races of bearings (11 and 15) are pressed tightly against shoulders of gear (12). Assemble bearings (11 and 15), spacer (14) and approximately 0.3 mm (0.012 in.) thickness of shims (13) on special tool. Make sure that screw of tool is tightened to 68 N·m (50 ft.-lbs.) clamping bearing inner races, spacer and shims

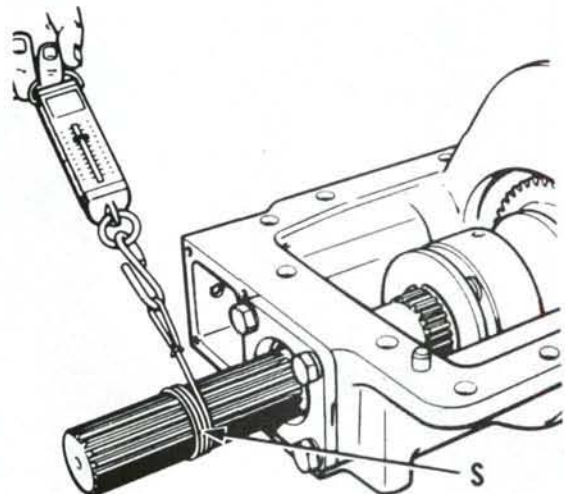


Fig. 25—Check rolling torque of transfer gearbox output shaft with string (S) and scale as shown.



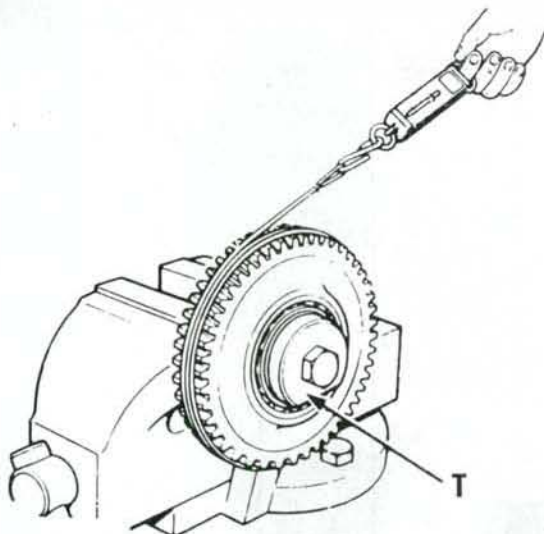


Fig. 26—Check rolling torque of idler gear as described in text. Special tool FT 3169 is shown at (T).

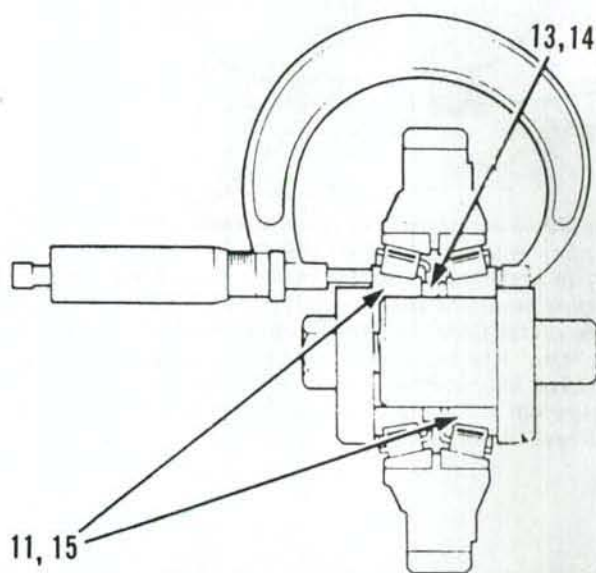


Fig. 27—Measuring distance between idler gear bearing races.

tightly together, then clamp the tool in a vise and check rolling torque as shown in Fig. 26. Correct rolling resistance is 0.45-1 Kg (1.0-2.2 lbs.) and is changed by varying the thickness of shims (13—Fig. 23). After the measured rolling resistance has been correctly set by installing the proper thickness of shims, measure distance between inner races as shown in Fig. 27. Measure distance between mounting lugs of housing as shown in Fig. 28. Subtract the thickness of bearings from the distance between lugs, then add shims (10 and 16—Fig. 23) equal to the result. Shims should be evenly divided (10 and 16) to center the gear.

After selecting shims (10, 13 and 16), remove gear and bearing assembly from special tool and install

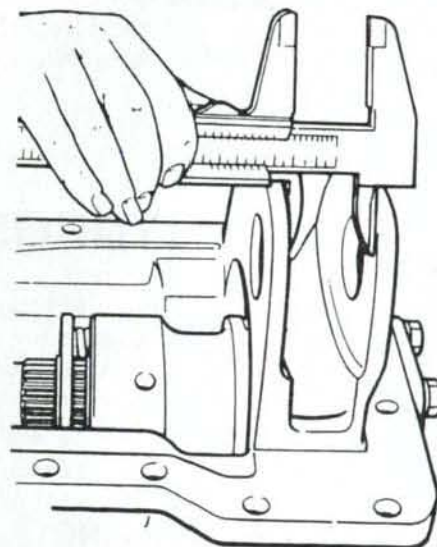


Fig. 28—Measuring width of idler gear mounting lugs.

using the correct shims and shaft (17). Tighten screw (18) to 80 N·m (59 ft.-lbs.) torque.

Reinstall transfer gearbox by reversing the removal procedure. Use only approved gasket between transfer gearbox and rear axle center housing, because its thickness sets the mesh position of idler gear (12) and mating gear. Tighten transfer gearbox retaining screws to 66 N·m (49 ft.-lbs.) torque. Apply Loctite 542 or equivalent thread locking compound to threads of drive shaft retaining screws and tighten to 57 N·m (49 ft.-lbs.) torque. Fill rear axle center housing to level of dipstick with Ford ESN-M2C134-D or equivalent.

## FRONT SUPPORT

### All Four-Wheel Drive Models

**20. REMOVE AND REINSTALL.** To remove the front support, the axle must be removed, the radiator must be removed from the support and the front support must be unbolted from the front of engine. The front axle, the front support and the remainder of the tractor must each be supported separately while removing, while separated and while assembling. Be sure that sufficient equipment is available before beginning.

Refer to paragraph 67 and remove the main fuel tank, then refer to paragraph 87 and remove the radiator. Support front of tractor in such a way that it will not interfere with removal of either the front support or the front axle. Refer to paragraph 9 and remove the drive shaft, then refer to paragraph 10 and remove the front axle assembly. Attach a hoist or



Paragraphs 21-22

other supporting device to the front support, then unbolt and separate the front support from the front of the engine. Be careful not to lose or damage shims

located between front support and engine. Keep shims separate and label for installation in same location.

## HYDROSTATIC STEERING

21. Hydrostatic steering system is used on all models and consists of a steering valve assembly, and one double-acting steering cylinder. In the event of hydraulic failure or engine stoppage, manual steering can be accomplished by the gerotor pump in the steering valve.

### FLUID AND BLEEDING

#### All Models

22. Recommended steering fluid is Ford ESN-M2C134-D hydraulic fluid or equivalent, which is contained in the rear axle center housing. The same fluid is also used for the transmission, rear axles and hydraulic lift system. Maintain fluid level between marks on dipstick (D—Fig. 29). Drain and refill reservoir with new fluid every 1200 hours of operation or once each year. Drain plug is located at bottom center of rear axle center housing. It is recommended that hydraulic filters be changed every 300 hours of operation or whenever fluid is suspected of contamination.

On models with tandem gear pumps, main hydraulic system filter (1—Fig. 30) is located on right side under the floor. Auxiliary hydraulic filter (2—Fig. 31)

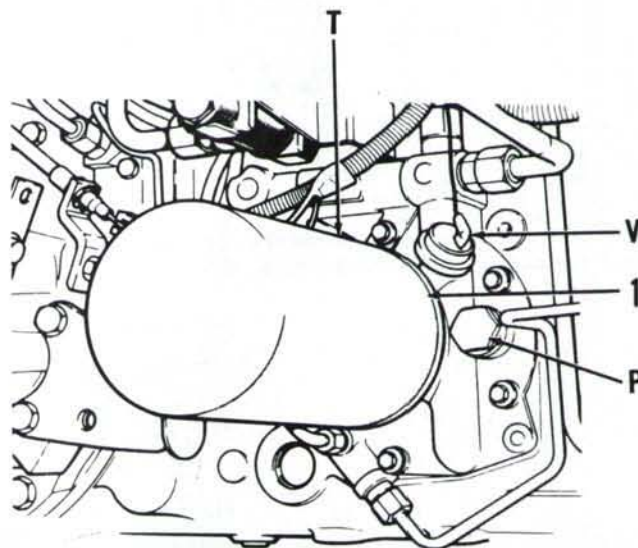


Fig. 30—View of main hydraulic system filter installed on models with tandem gear pump. Auxiliary filter (2—Fig. 31) is installed on these models if also equipped with engine mounted auxiliary pump. Filter is located on right side under floor. Switch (V) indicates blocked filter, and switch (T) is the low temperature switch which stops blocked filter indicator from lighting when temperature is below 40° C (104° F). Low pressure switch is located to the rear of switch (T).

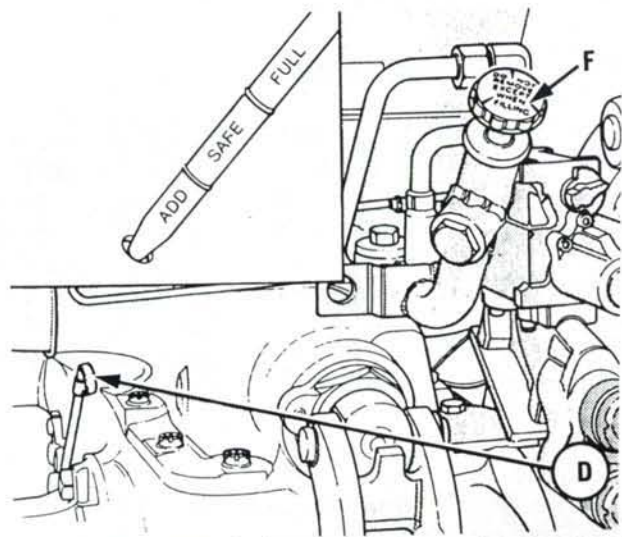


Fig. 29—The transmission, rear axles and hydraulic lift system share a common fluid that uses the rear axle center housing as a reservoir. Maintain fluid level between marks on dipstick (D) and fill through opening for plug (F).

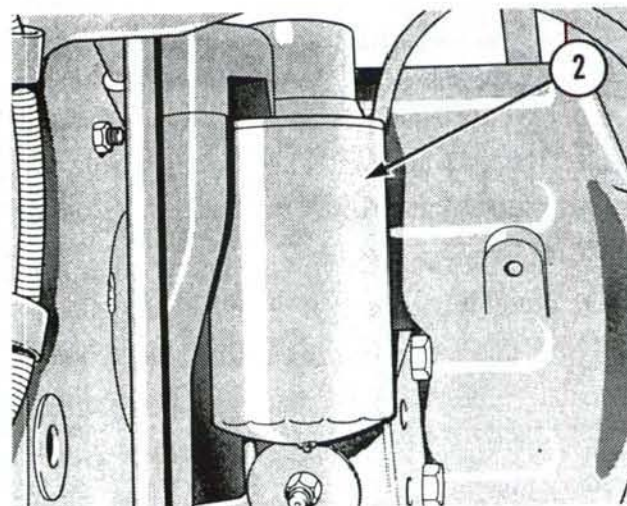


Fig. 31—View of auxiliary hydraulic filter installed on models with tandem gear pump and engine mounted auxiliary pump. Filter is located on left side under floor.