SHOP MANUAL

FORD

MODELS TW-5—TW-15—TW-25—TW-35

These Ford tractors are equipped with a six-cylinder diesel engine. An eight-speed gear type transmission and disc type clutch is standard on all models. A Dual Power planetary gear assembly which provides an underdrive ratio in all transmission speeds is standard on Model TW-35 and is available as an option on all other models.

Tractor identification numbers are located on a plate mounted on the frame behind the right-hand radiator side panel. For access to the identification plate, remove side panel on Models TW-5 and TW-15 or slide panel forward on Models TW-25 and TW-35. On tractors equipped with front wheel drive axle, a front axle identification plate is located on rear of front axle housing.

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DUAL DIMENSIONS

This service manual provides specifications in both the U.S. Customary and Metric (SI) system of measurements. The first specification is given in the measuring system used during manufacture, while the second specification (given in parenthesis) is the converted measurement. For instance, a specification of "0.011 inch (0.279 mm)" would indicate that the equipment was manufactured using the U.S. system of measurement and the metric equivalent of 0.011 inch is 0.279 mm.

CONDENSED SERVICE DATA

	TW-5	TW-15	TW-25	TW-35
GENERAL				
Engine	6 Cylinder, Direct Injection Diesel			
Make	Own			
Bore	4.4 in. (111.75 mm)			
Stroke	4.4 in. (111.75 mm)			
Displacement	401 cu. in. (6.6 L)			
Compression Ratio	16.3:1	15.6:1	15.6:1	15.6:1
Alternator Make	Motorola			
Starter Make	Own			
Battery	12-volt, Negative Ground			
Rating	128 Ampere Hours			
Forward Speeds	8			
With Dual Power	16			
Reverse Speeds	2			
With Dual Power	4			
TUNE-UP				
Firing Order	1-5-3-6-2-4			
Compression Pressure at Cranking Speed of 200 Rpm	300-400 psi (2069-2758 kPa)		275-375 psi (1896-2585 kPa)	
Valve Tappet Gap (Cold)—				
Intake	0.014-0.016 in. (0.36-0.41 mm)			
Exhaust	0.017-0.019 in. (0.43-0.48 mm)			
Injection Timing	25° BTDC			
Governed Engine Rpm—				
Low Idle	700-800		700-800	
Maximum (No-Load)	2525-2575		2425-2475	
Rated (Full Load)	2300		2200	
Rated Power at Pto	105.7 hp (78.8 kW)	121.4 hp (90.5 kW)	140.7 hp (104.9 kW)	170.3 hp (127.0 kW)
SIZES-CLEARANCES				
Crankshaft Journal Diameter	See Paragraph 66			
Crankpin Diameter	See Paragraph 64			

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FRONT AXLE (TWO WHEEL DRIVE)

All Models So Equipped

An adjustable tread width front axle (Fig. 1) is standard on all models. On some tractors, the center member (12) is reversed to provide a shorter wheelbase.

1. R&R FRONT AXLE ASSEMBLY. To remove front axle, first remove front weights (all models) and carrier (TW-5 and TW-15). Raise front of tractor and support with safety stands. Remove front wheels. Disconnect hydraulic hoses from steering cylinder and plug all openings. Support axle assembly, then remove front pivot support bracket (10—Fig. 1). Withdraw axle assembly from front support housing.

To reinstall axle, reverse the removal procedure. Be sure that a thrust washer (11) is placed on each pivot pin. Tighten pivot support bracket cap screws to 200 ft.-lbs. (271 N·m) torque.

2. FRONT WHEEL SPINDLE. To remove spindle (1—Fig. 1), raise and support front of tractor. Remove wheel and tire. Remove nut retaining steering arm (8 or 13) to spindle. Note that threads of spindle are staked at the nut to prevent the nut from loosening and it may be difficult to remove. Remove steering arm and withdraw spindle from axle.

To remove front wheel hub (6—Fig. 2) and bearings, remove hub cap (1) and retaining nut (2). Withdraw hub, bearings, seal (9) and dirt shield (10) if necessary.

Clean all parts and inspect for wear or damage. To renew spindle bushings (4 and 6—Fig. 1), drive old bushings out of axle extension and install new bushings using a suitable piloted bushing driver. Bushings

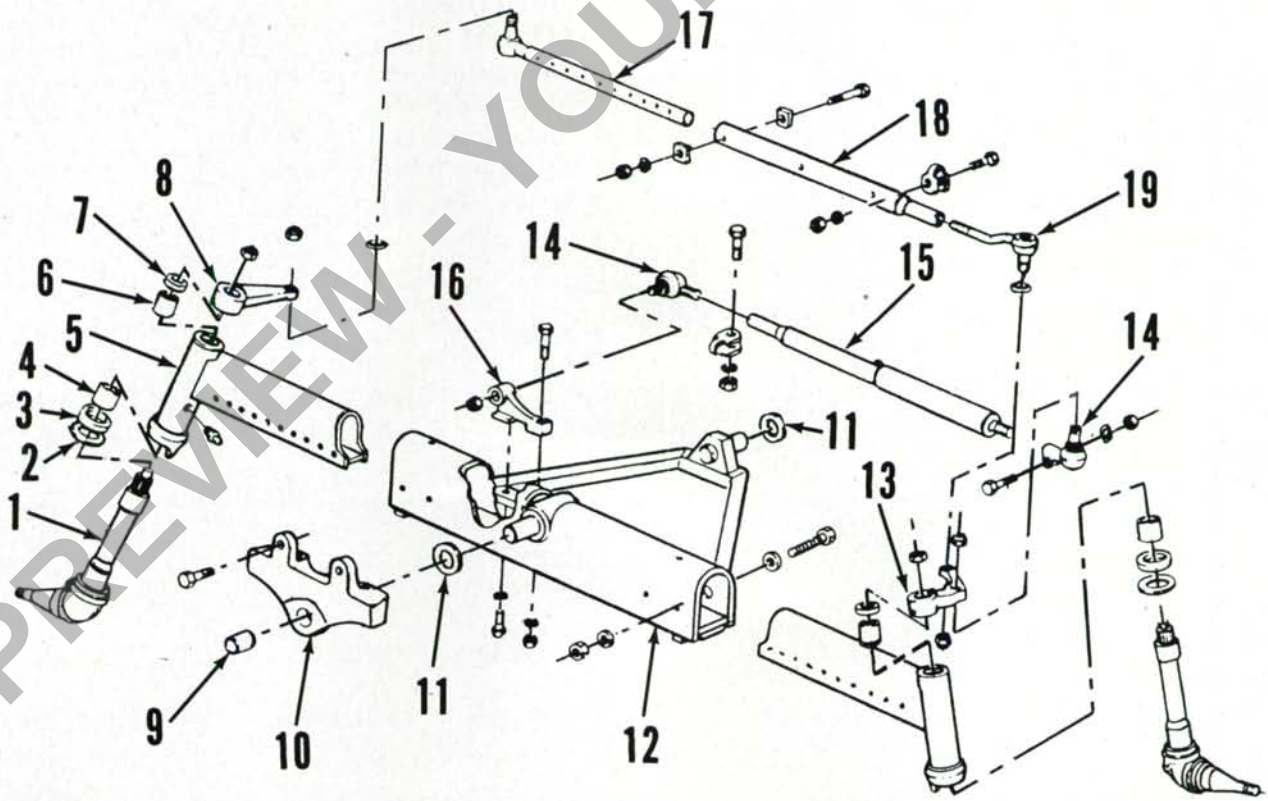


Fig. 1—Exploded view of adjustable front axle assembly. The center member (12) may be reversed to provide a shorter wheelbase on some models.

1. Spindle
2. Spacer
3. Thrust bearing
4. Bushing
5. Axle extension
6. Bushing
7. Seal
8. Steering arm
9. Bushing
10. Pivot support
11. Thrust washer
12. Axle center member
13. Steering arm
14. Ball joint ends
15. Steering cylinder
16. Cylinder anchor bracket
17. Tie rod
18. Tube
19. Tie rod end

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(10690-11375 kPa) on Models TW-5, TW-15 and TW-25; 1950-2100 psi (13445-14480 kPa) on Model TW-35.

To check system relief pressure, install a 0-3000 psi (0-20000 kPa) pressure gage in pump to motor high pressure tube (4—Fig. 57) using a tee fitting (5). Start the engine, turn steering wheel to hold front wheels against the stop and note pressure gage reading.

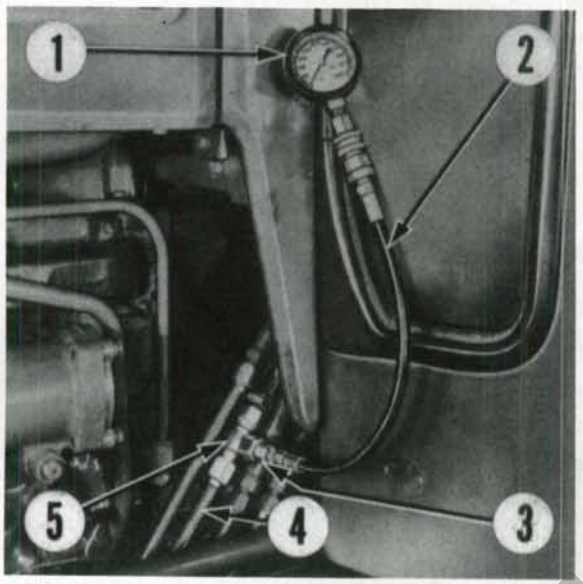


Fig. 57—To check power steering relief valve pressure, install a 0-3000 psi (0-20000 kPa) pressure gage in pump to steering motor pressure line using a tee fitting.

1. Pressure gage
2. Hose
3. Reducer
4. Pressure line
5. Tee fitting

If pressure is not within specified range, the pump must be removed from the engine as outlined in paragraph 40 to adjust relief valve. Remove the reservoir and filter. Remove plug (24—Fig. 58) from pump body and add or remove shims (25) to obtain specified relief pressure. Changing shim thickness 0.007 inch (0.17 mm) will change relief pressure setting about 70-80 psi (483-550 kPa).

Reinstall pump and retest relief valve pressure. If pressure cannot be correctly adjusted, remove pump and overhaul as outlined in paragraph 40.

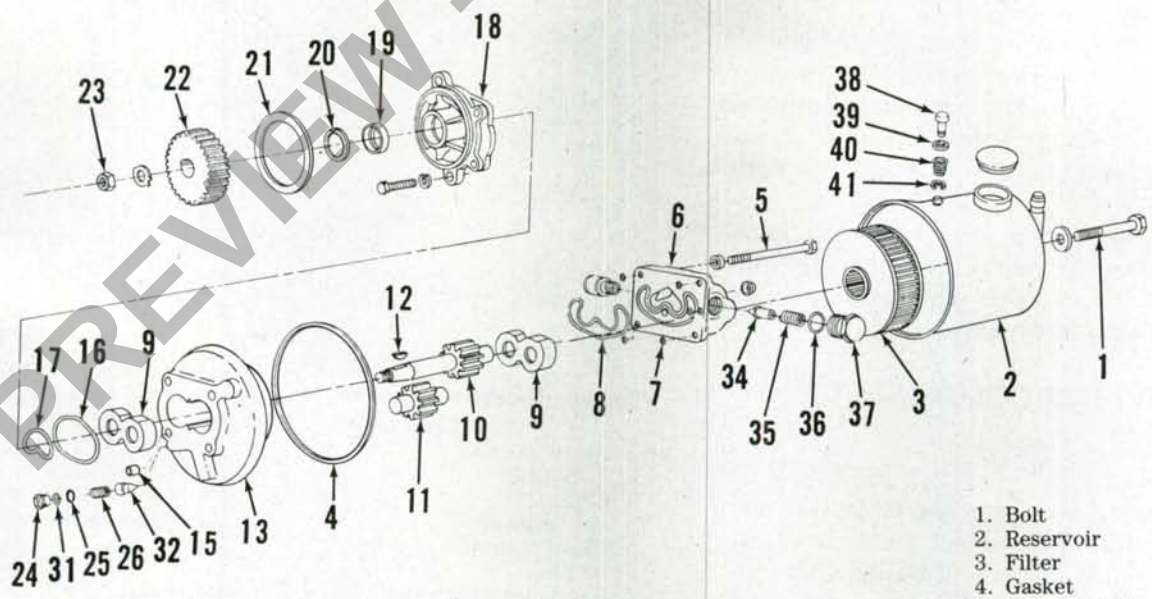
TROUBLE-SHOOTING

All Models

39. Refer to the following for checking possible causes of steering system malfunction:

1. HARD STEERING. Could be caused by:
   a. Misadjusted or faulty pump relief valve.
   b. Worn or damaged pump.
   c. Worn or damaged motor.
   d. Steering column components binding.
   e. Front axle binding.

2. NO STEERING OR SLOW STEERING RESPONSE. Could be caused by:
   a. Low oil level in reservoir.
   b. Incorrect grade of oil being used.
   c. Damaged pump or motor.



1. Bolt
2. Reservoir
3. Filter
4. Gasket
5. Through-bolt
6. Cover
7. "O" ring
8. Seal ring
9. Bearing block
10. Driven gear
11. Follow gear
12. Woodruff key
13. Body
15. Ring dowel
16. Seal ring
17. Seal ring
18. Flange housing
19. Oil seal
20. Snap ring
21. "O" ring
22. Drive gear
23. Nut
24. Plug
25. Shim
26. Spring
31. "O" ring
32. Relief valve
34. Flow control valve
35. Spring
36. Seal
37. Plug
38. Vent
39. Seal
40. Spring
41. "E" ring

Fig. 58—Exploded view of power steering pump and reservoir assembly used on all models.

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brake housing. Subtract the previously measured distance from face of transfer case to shoulder of output shaft (Fig. 53) from brake shaft dimension. The result is the total thickness of thrust needle bearing (42—Fig. 51) and two washers (41) needed to obtain desired end clearance. Thrust washers are available in the following thicknesses: 2.38 mm, 2.5 mm, 2.8 mm, 3.0 mm and 3.15 mm.

Coat thrust needle bearing and thrust washers with petroleum jelly and install on rear end of transfer case output shaft. Polished face of thrust washers must face the needle bearing.

Install a new needle bearing in bore of brake driven shaft if necessary. Apply suitable sealer to housing mounting gasket (40), then install transfer case assembly and control valve plate onto brake housing. Tighten housing retaining cap screws to a torque of 40 ft.-lbs. (54 N·m). Tighten control valve retaining plate bolts to a torque of 18 ft.-lbs. (24 N·m). Connect oil lines and install transfer case drain plug.

HYDROSTATIC POWER STEERING

FLUID AND FILTER

All Models

37. The integral power steering pump and reservoir are mounted on left-hand side of engine. It is recommended that power steering fluid and filter be renewed after every 600 hours of service as follows: Disconnect return line hose (R—Fig. 56) from reservoir. Remove retaining bolt (1), then withdraw reservoir (2) while catching the oil in a suitable container. Renew filter (3—Fig. 58) and O ring (4). Reinstall reservoir and fill with new oil to a level ¾ inch (19 mm) below bottom of filler opening.

Recommended power steering fluid is Ford M2C134-C. Capacity is approximately 4 U.S. quarts (3.7 L).

The power steering system is self-bleeding. After filling reservoir, start engine and cycle steering from lock to lock several times. Check fluid level and add oil as required to maintain oil level ¾ inch (19 mm) below bottom of filler opening.

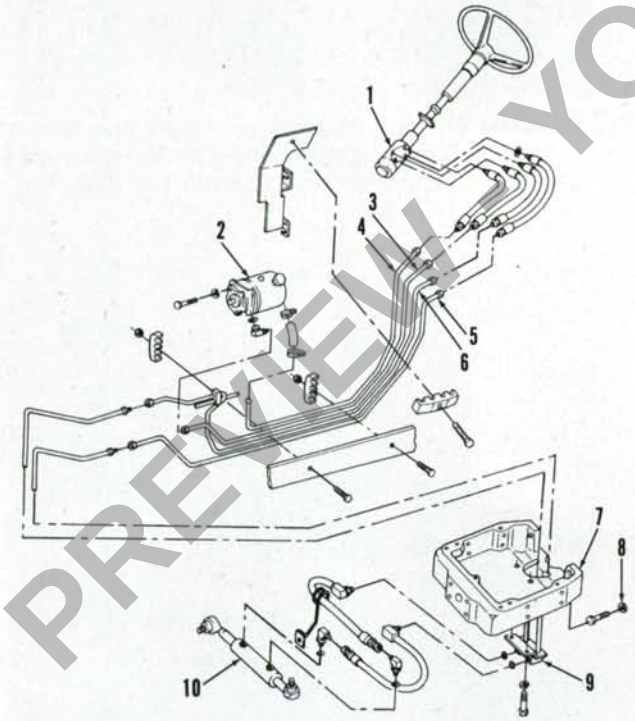


Fig. 55—Hydrostatic power steering system with an integral hydraulic pump and reservoir is used on all models. On tractors with front drive axle (except early TW-35), steering cylinder is integral with front axle housing.

1. Steering motor
2. Hydraulic pump & reservoir assy.
3. Pressure tube
4. Return tube
5. Right turn tube
6. Left turn tube
7. Axle support
8. Shims
9. Tube assy.
10. Steering cylinder

SYSTEM PRESSURE TEST

All Models

38. The power steering pump incorporates a pressure relief valve (32—Fig. 58) which is located in the pump body (13) within the reservoir housing. Relief valve opening pressure should be 1550-1650 psi

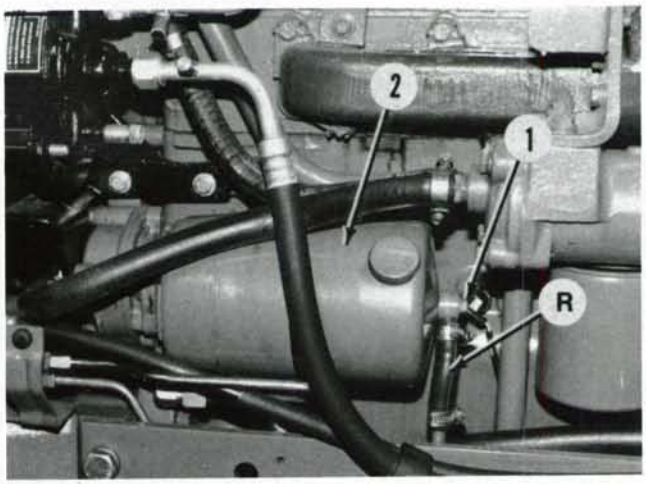


Fig. 56—Power steering pump and reservoir assembly is located on left side of engine.

R. Return line
1. Retaining bolt
2. Reservoir housing

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CONDENSED SERVICE DATA (CONT.)

	TW-5	TW-15	TW-25	TW-35
SIZES-CLEARANCES (CONT.)				
Camshaft Journal Diameter		2.3895-2.3905 in. (60.6933-60.7187 mm)		
Piston Pin Diameter	1.4997-1.500 in. (38.092-38.100 mm)		1.6246-1.6251 in. (41.267-41.277 mm)	
Valve Stem Diameter— Intake		0.3711-0.3718 in. (9.4259-9.4437 mm)		
Exhaust		0.3701-0.3708 in. (9.4005-9.4183 mm)		
Main Bearing Running Clearance		0.0022-0.0045 in. (0.056-0.114 mm)		
Rod Bearing Running Clearance— Copper-Lead Bearings		0.0017-0.0038 in. (0.043-0.096 mm)		
Aluminum Bearings		0.0021-0.0042 in. (0.053-0.106 mm)		
Camshaft Bearing Running Clearance		0.001-0.003 in. (0.025-0.076 mm)		
Crankshaft End Play		0.004-0.008 in. (0.102-0.203 mm)		
Camshaft End Play		0.001-0.007 in. (0.025-0.178 mm)		
Piston Skirt Clearance		See Paragraph 63		
CAPACITIES				
Cooling System— Less Heater	21 U.S. Qts. (20.0 L)	22 U.S. Qts. (21.0 L)	22 U.S. Qts. (21.0 L)	22.75 U.S. Qts. (21.5 L)
With Heater	22.75 U.S. Qts. (21.5 L)	23.25 U.S. Qts. (22.0 L)	23.25 U.S. Qts. (22.0 L)	24.25 U.S. Qts. (23.0 L)
Crankcase— With Filter Change		20 U.S. Qts. (19 L)		
Power Steering		4 U.S. Qts. (3.7 L)		
Transmission, Rear Axle and Hydraulic System		See Paragraph 191 or 226		
Front Wheel Drive Hub (Each)	1.6 U.S. Pts. (0.75 L)	1.6 U.S. Pts. (0.75 L)	3.8 U.S. Pts. (1.8 L)	3.8 U.S. Pts. (1.8 L)
Front Wheel Drive Differential Case	8 U.S. Qts. (7.5 L)	8 U.S. Qts. (7.5 L)	9.5 U.S. Qts. (9.0 L)	9.5 U.S. Qts. (9.0 L)
Fuel— Main Tank	33 U.S. Gals. (125 L)	33 U.S. Gals. (125 L)	75 U.S. Gals. (284 L)	75 U.S. Gals. (284 L)
Auxiliary Tank		24.5 U.S. Gals. (93 L)		

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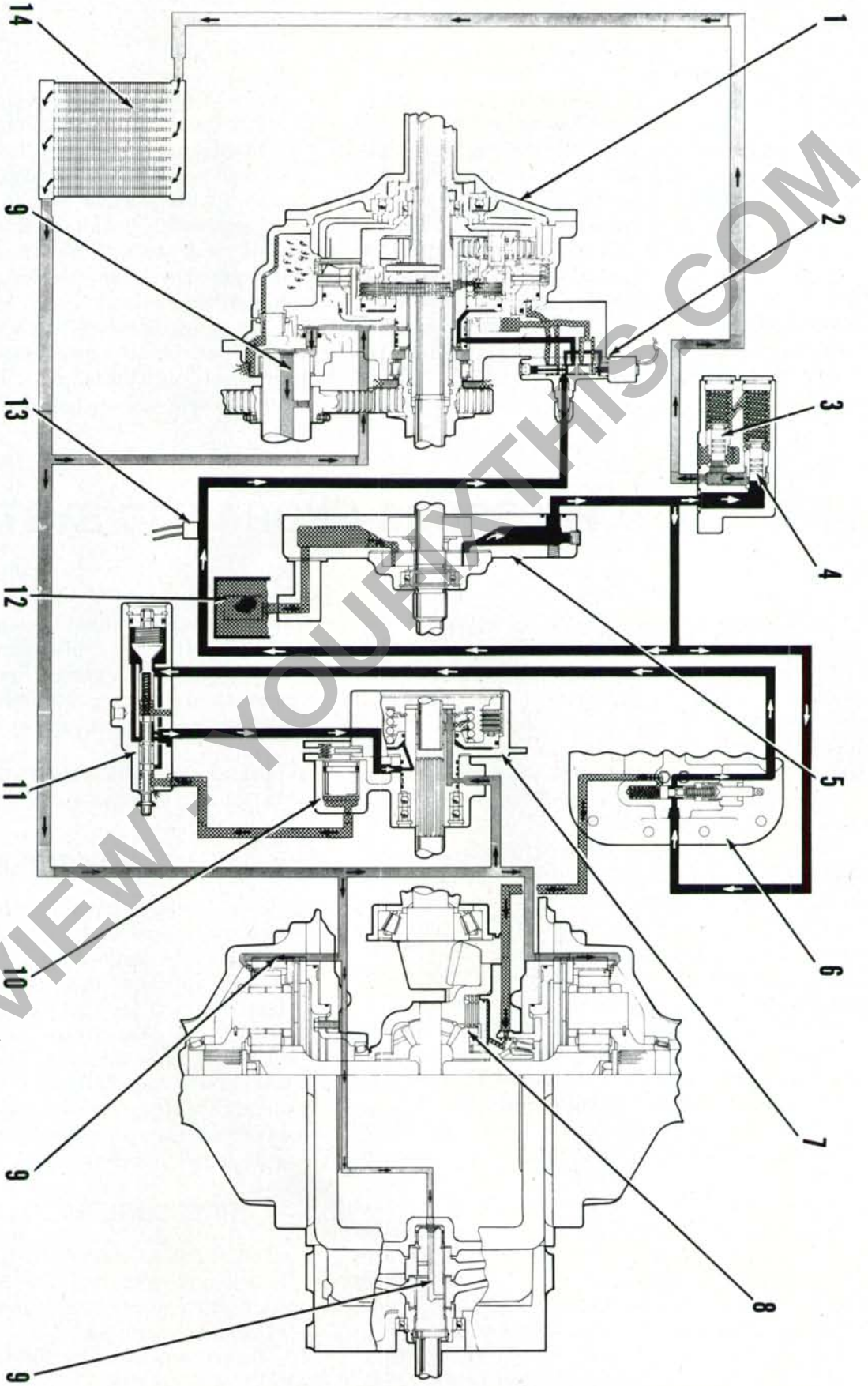


Fig. 190A—Schematic of Model TW-5, TW-15 and TW-25 low pressure hydraulic system.

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Unscrew plug (39) and remove exhaust valve pressure spring (37), exhaust pressure valve (36), valve control spring (35) and exhaust control valve (34).

Carefully clean and inspect all parts and renew any that are scored, excessively worn or damaged. If valve body (24) is worn or damaged beyond further use, a complete new valve assembly must be installed; all other parts are available separately. Renew all "O" rings.

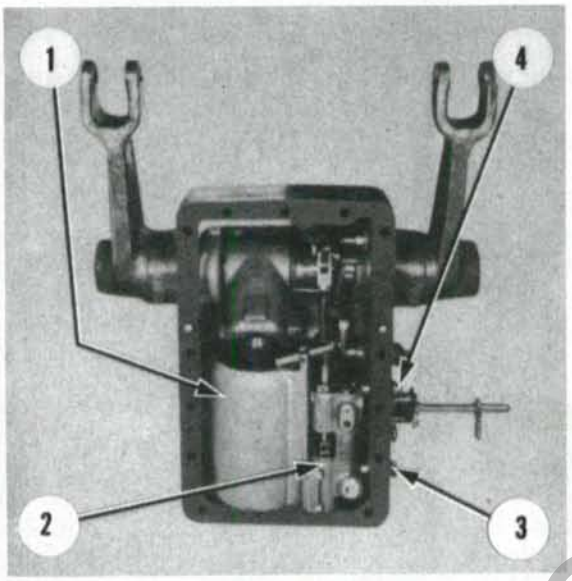


Fig. 286—Bottom view of lift cover assembly.

1. Lift cylinder
2. Control valve assy.
3. Oil pressure connecting sleeve
4. Pilot pressure sleeve

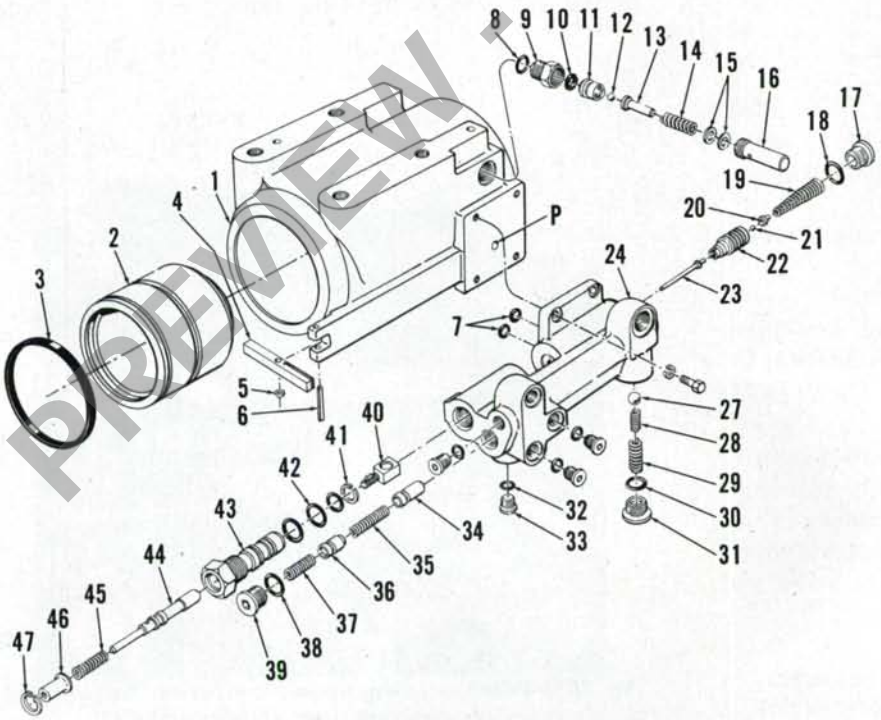
To reassemble valve, reverse disassembly procedure while observing the following special instructions. Be sure that exhaust pressure valve (36) is installed small end first; if valve is installed backward, the lift arms will not raise or lower. Tighten exhaust valve plug (39) to a torque of 65 ft.-lbs. (88 N·m). Tighten poppet valve plug (17) and check valve plug (31) to a torque of 90 ft.-lbs. (122 N·m). Tighten lift control valve bushing (43) to a torque of 135 ft.-lbs. (183 N·m).

After reassembly, adjust control valve keeper (40) as follows: Insert a 1/8 inch (3 mm) diameter pin or drill bit through hole in control valve (44—Fig. 288) and bushing (43) to lock control valve in neutral position. Measure gap between keeper and drop poppet actuator with a feeler gage. Turn keeper into or out of control valve spool to obtain a gap of 0.013-0.016 inch (0.3-0.4 mm), then remove drill bit.

NOTE: If keeper threads into valve freely, either renew keeper or apply Loctite 262 Threadlocker or other suitable thread locking compound to threads of keeper. Be sure that threads of keeper and valve are clean before applying locking compound.

Assemble valve block to cylinder using new "O" rings. Tighten retaining screws to a torque of 22 ft.-lbs. (30 N·m).

209. OVERHAUL SAFETY VALVE. With lift cylinder and control valve assembly removed as outlined in paragraph 208, unscrew safety valve body (9—Fig.



P. Pressure port
1. Lift cylinder
2. Piston
3. Piston seal ring
4. Shut-off pivot arm
5. Washer
6. Roll pin
7. "O" rings
8. "O" ring
9. Safety valve body
10. Seal ring
11. Valve seat
12. Valve ball
13. Spring guide
14. Safety valve spring
15. Shims
16. Valve cap
17. Plug
18. "O" ring
19. Drop poppet spring
20. Ball seat
21. Ball
22. Drop poppet valve
23. Actuator rod
24. Control valve body
27. Check valve ball
28. Check valve spring
29. Guide
30. "O" ring
31. Plug
32. "O" rings
33. Plug
34. Exhaust control valve
35. Control spring
36. Exhaust pressure valve
37. Spring
38. "O" ring
39. Plug
40. Control valve keeper
41. Back-up ring
42. "O" rings
43. Control valve bushing
44. Control valve spool
45. Spring
46. Spring seat
47. Snap ring

Fig. 287—Exploded view showing hydraulic lift cylinder and control valve assemblies. When in fully raised position, piston skirt (2) contacts pivot arm (4) moving control valve (44) to neutral position. Safety valve (items 8 through 16) limits pressure in lift cylinder to 2650-2750 psi (18270-18960 kPa), preventing damage due to shock loads.

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plate (1—Fig. 272) on top of pump adapter plate can be modified as shown in Fig. 270 and flow meter inlet hose installed in tapped hole in the plate. Insert flow meter return hose in rear axle housing oil filler plug opening. Be sure the return hose is securely fastened in filler opening to prevent it from coming out during flow test.

Fully open flow meter load valve, then start engine and operate until hydraulic fluid temperature is approximately 120° F (50° C). Set engine speed at 2200 rpm and manually hold remote control valve lever to direct pump flow to flow meter. Record flow meter reading under no load (pressure), then slowly close flow meter load valve until pump pressure reaches 2200 psi (15170 kPa) and record flow meter reading.

To calculate percentage of pump efficiency, divide flow reading under pressure by flow reading with no pressure and multiply the result by 100. If pump efficiency is less than 80 percent, pump is excessively worn or damaged and should be overhauled or renewed. Example: Flow under pressure is 14 U.S. gpm (53 lpm) and flow with no pressure is 15.5 U.S. gpm (58.7 lpm); 14 divided by 15.5 equals .90, multiplied by 100 equals 90 percent efficiency.

ADJUSTMENTS

NOTE: The adjustments outlined in following paragraphs 195 through 198 are those that can be made externally; internal adjustments are outlined in reassembly procedure in paragraphs outlining overhaul of the system components. Inability to make system function properly by external adjustment will indicate need of system overhaul and/or internal adjustment.

195. LOWER LINK HANGER STOP. An adjustable eccentric stop (Fig. 273) is located behind left-hand lift link hanger to limit rearward movement of hanger and twist of torsion bar.

Gap (G) between left-hand lower link hanger and eccentric stop should be 0.330-0.340 inch (8.4-8.6 mm). To adjust, loosen cap screw and turn eccentric stop until correct gap is obtained. Hold stop in position and retighten cap screw securely.

196. LIFT CONTROL LEVER LINKAGE ADJUSTMENT. The lift control console lever (L—Fig. 274) should move control lever (6—Fig. 275) on lift cover through full range of travel without the lever (L) contacting either end of slot in console. If control lever can be moved against end of slot, adjust link (1—Fig. 275) as follows:

Disconnect lower end of link (1) from lever (6), then rotate end of lever on lift cover fully clockwise. Move console lever (L) so front edge of lever is 1/8 to ¼ inch (3-6 mm) from lower end of slot in console. Adjust turnbuckle on lift control link (1) to lengthen or shorten rod until rod fits into control lever on lift cover without moving either the console lever or control lever.

After adjusting and reconnecting linkage, check to be sure control lever can be moved through full range of travel without contacting either end of slot in console.

197. POSITION CONTROL ADJUSTMENT. After adjusting lift control valve linkage as outlined in paragraph 196, check position control as follows: Move selector lever (S—Fig. 275) fully rearward to position control setting. Start engine and move lift control lever (L) fully forward; the lift arms should then move to fully lowered position. Slowly move lift control lever rearward; lift arms should start to raise when

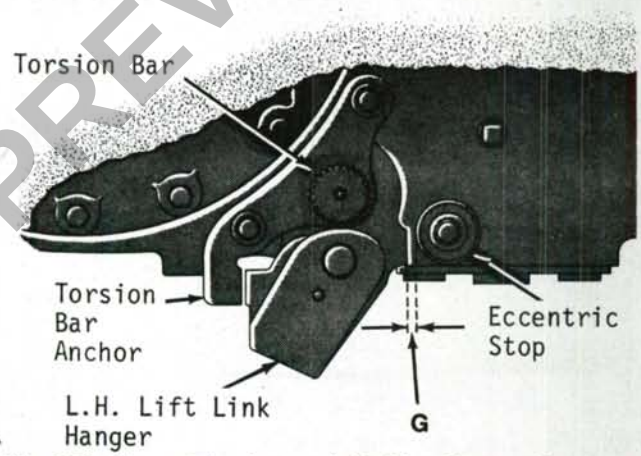


Fig. 273—Eccentric stop on left side of rear axle center housing is adjusted to provide a gap (G) of 0.330-0.340 inch (8.4-8.6 mm) between stop and left lift link hanger.

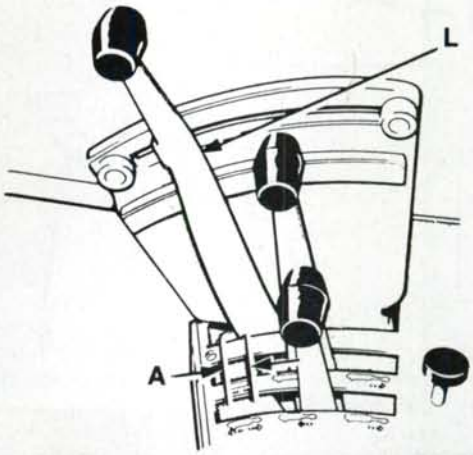


Fig. 274—Lift control lever (L) linkage must be adjusted to provide full travel of lift control lever on lift housing while maintaining clearance (A) of 1/8-1/4 inch (3-6 mm) between lever and end of console slot.

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or misadjusted external linkage, incorrect hydraulic oil level, plugged hydraulic filters or external oil leaks.

1. FAILURE TO LIFT UNDER ALL CONDITIONS. Could be caused by:
   a. Faulty hydraulic pump or relief valve.
   b. Flow control valve stuck in open position.
   c. Exhaust pressure valve installed backward or stuck.
   d. Control linkage damaged or disconnected.
   e. Leak in pump suction (intake) pipe.

2. FAILURE TO LIFT UNDER LOAD. Could be caused by:
   a. Faulty hydraulic pump or relief valve.
   b. Safety relief valve faulty.
   c. Exhaust pressure valve sticking.
   d. Damaged or missing "O" ring seals between lift cylinder and control valve, between pump and adapter plate or on oil pressure connecting sleeve.

3. EXCESSIVE LIFT CORRECTIONS (WILL NOT HOLD LOAD AFTER STOPPING ENGINE). Could be caused by:
   a. Safety valve leaking.
   b. Damaged lift cylinder piston seal.
   c. Lift drop poppet leaking.
   d. Damaged "O" ring seals between lift cylinder and control valve.

4. LIFTS TOO SLOWLY. Could be caused by:
   a. Lift control linkage incorrectly adjusted.
   b. Variable flow control valve stuck in slow lift position.

5. OVER CORRECTS IN DRAFT CONTROL. Could be caused by:
   a. Lift control valve not properly adjusted.
   b. Binding draft control linkage.

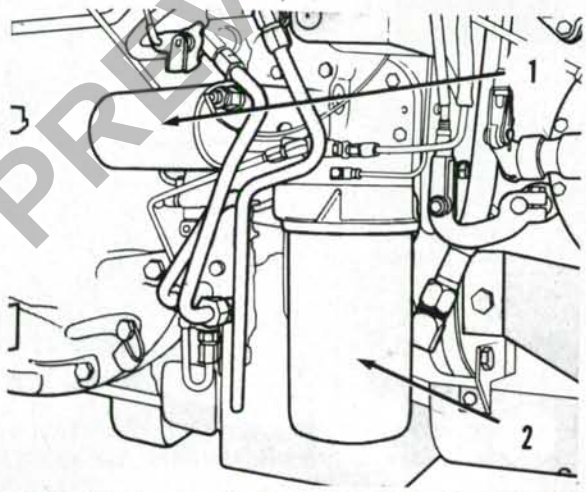


Fig. 305—Hydraulic oil return filter (1) and suction filter (2) should be changed after every 300 hours of operation.

PRESSURE TESTING

228. SYSTEM RELIEF VALVE PRESSURE TEST. The hydraulic system incorporates a system relief valve, located in main pump adapter plate, that protects main pump and lift circuit from excessive pressure. Hydraulic system relief pressure should be 2500-2600 psi (17240-17930 kPa) for all models.

To check system pressure, connect a 0-5000 psi (0-35000 kPa) pressure gage into "Raise" coupler of a remote valve as shown in Fig. 306. Start engine and set speed at 1400 rpm for TW-5, TW-15 and TW-25 tractors, or 1200 rpm for TW-35 tractor. Move and hold remote valve control lever in "Raise" position and observe pressure gage reading.

If pressure setting is not within specifications, pressure can be adjusted by adding or removing shims (8—Fig. 307) between relief valve body cap and spring. To remove relief valve, first disconnect differential lock pedal linkage (TW-5, TW-15 and TW-25 tractors only) from actuating rod (2). Unscrew differential lock valve guide cap (1) and remove actuating rod to provide access to relief valve body (13). Unscrew relief valve from pump cover. Use a press or vise to depress relief valve cap (7) and spring (9), then remove snap ring (6) to disassemble valve.

Every 0.010 inch (0.25 mm) change in shim thickness will change relief valve pressure setting approximately 100 psi (700 kPa). Maximum allowable shim pack thickness is 0.080 inch (2 mm). If specified system relief pressure cannot be obtained with maximum thickness of shims installed, relief valve ball and seat are not sealing properly, remote control valve circuit relief valve opening pressure is too low or a worn hydraulic pump should be suspected.

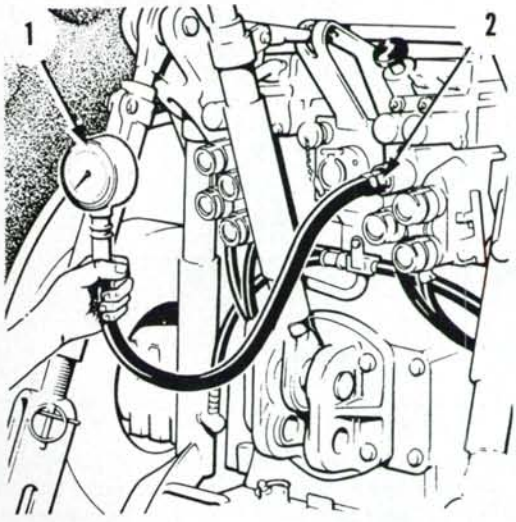


Fig. 306—To check system relief valve opening pressure, connect a 0-5000 psi (0-35000 kPa) pressure gage (1) to "Raise" outlet of remote control valve (2). Refer to text.

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(46), then install thrust washer (31) and direct drive clutch and planetary assembly into planetary housing (19). Make sure that direct drive clutch and planetary is fully seated in the housing and that rear end of planetary shaft (46) does not contact workbench. Install ring gear and shaft (51) without shim (52) or bearing (53). Place gage tool (Nuday No. 1303) on step of ring gear shaft. Place cover (56) on planetary housing, then use a feeler gage to measure gap between cover and housing at three different locations. If the average of the three measurements is within the range of 0.046-0.060 inch (1.17-1.52 mm), no shims are needed. If gap is less than 0.046 inch (1.17 mm), refer to following table for correct shim size.

Average Gap Measurement	Required Shim Thickness
0.001-0.013 in.	0.045 in.
(0.025-0.33 mm)	(1.14 mm)
0.014-0.026 in.	0.032 in.
(0.35-0.66 mm)	(0.81 mm)
0.027-0.032 in.	0.026 in.
(0.68-0.81 mm)	(0.66 mm)
0.033-0.045 in.	0.013 in.
(0.83-1.14 mm)	(0.33 mm)

Shims are available in thicknesses of 0.013 inch (0.33 mm) and 0.032 inch (0.18 mm).

If tool No. 1303 is not available, assemble Dual Power unit with bearing (53) and original shim (52) on ring gear shaft. Install cover, then measure end play of ring gear shaft. Remove bearing and install shims as required to obtain specified end play of 0.004-0.020 inch (0.10-0.50 mm).

Remove cover, ring gear, planetary carrier, sun gear and direct drive clutch assembly from planetary housing. Dual Power unit may now be installed in transmission case as outlined in paragraph 138.

LOW PRESSURE HYDRAULIC SYSTEM

All models are equipped with a low pressure hydraulic system. A gerotor type pump, rated at 8 U.S. gallons/minute (30.3 liters/minute), supplies low pressure oil to operate pto clutch and brake, differential lock clutch, Dual Power clutches and power assisted brakes (TW-35 tractor). The pump also provides lubricating oil to the drive train components. The pump is mounted on rear end of transmission and is driven by the main pto shaft.

Refer to Fig. 190A for schematic drawing of Models TW-5, TW-15 and TW-25 low pressure hydraulic system. System pressure is regulated by a pressure regulating valve (4), which is mounted on right-hand side of transmission housing just above the shift cover. After requirements of Dual Power (2), differential lock (6) and pto (11) circuits have been satisfied, the pressure regulating valve opens allowing remainder of oil flow to pass to transmission oil cooler (14) and lubrication circuit (9). A relief valve (3) located in the pressure regulating valve housing protects the oil cooler and lubrication system from excess pressure by allowing surplus oil to return to sump.

Refer to Fig. 190B for schematic drawing of Model TW-35 low pressure hydraulic system. Pressurized oil from the pump (7) is first directed to regulating valve (5) and brake priority valve (4). After power brake circuit (1) requirements have been satisfied, brake priority valve opens allowing pressure oil to pass to Dual Power control valve (3), differential lock valve (17) and pto control valve (13). After these components have been actuated, pressure regulating valve opens and allows pressure oil to pass to transmission oil cooler (18) and lubrication circuit (11). A relief valve (6) located in pressure regulator valve housing protects oil cooler and lubrication circuit from excess pressure by allowing surplus oil to return to sump.

141. PRESSURE TESTING. Refer to paragraph 136 for low pressure system pressure testing.

GEROTOR PUMP

142. The gerotor pump can be removed after splitting tractor between transmission and rear axle center housing as outlined in paragraph 162. Remove retaining cap screws from pump housing, then withdraw pto shaft (2—Fig. 191) and pump (4) as an assembly from rear of transmission housing.

Remove outer snap ring (1) and tap pto shaft and bearing out of pump housing. Remove two screws retaining backing plate to pump housing and separate inner and outer rotor from housing. If pump is worn or damaged, it must be replaced as a complete unit.

PRESSURE REGULATING VALVE

143. R&R AND OVERHAUL. To remove regulating valve (2—Fig. 192), first disconnect oil lines to valve, then remove cap screws retaining valve to transmission housing.

When disassembling valve, tag spools (Fig. 193A or 193B) and springs for later identification, as the spools and springs are not interchangeable. Note that

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