DAVID BROWN /CASE TRACTOR MANUAL

COVERS MODELS:-

- 770
- 870
- 970
- 1070
- 1090
- 1170
- 1175

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SHOP MANUAL

J. I. CASE

SERIES
770, 870, 970, 1070, 1090, 1170, 1175

IDENTIFICATION

The serial number is stamped on left side of steering support (firewall) and engine serial number on right rear of cylinder block

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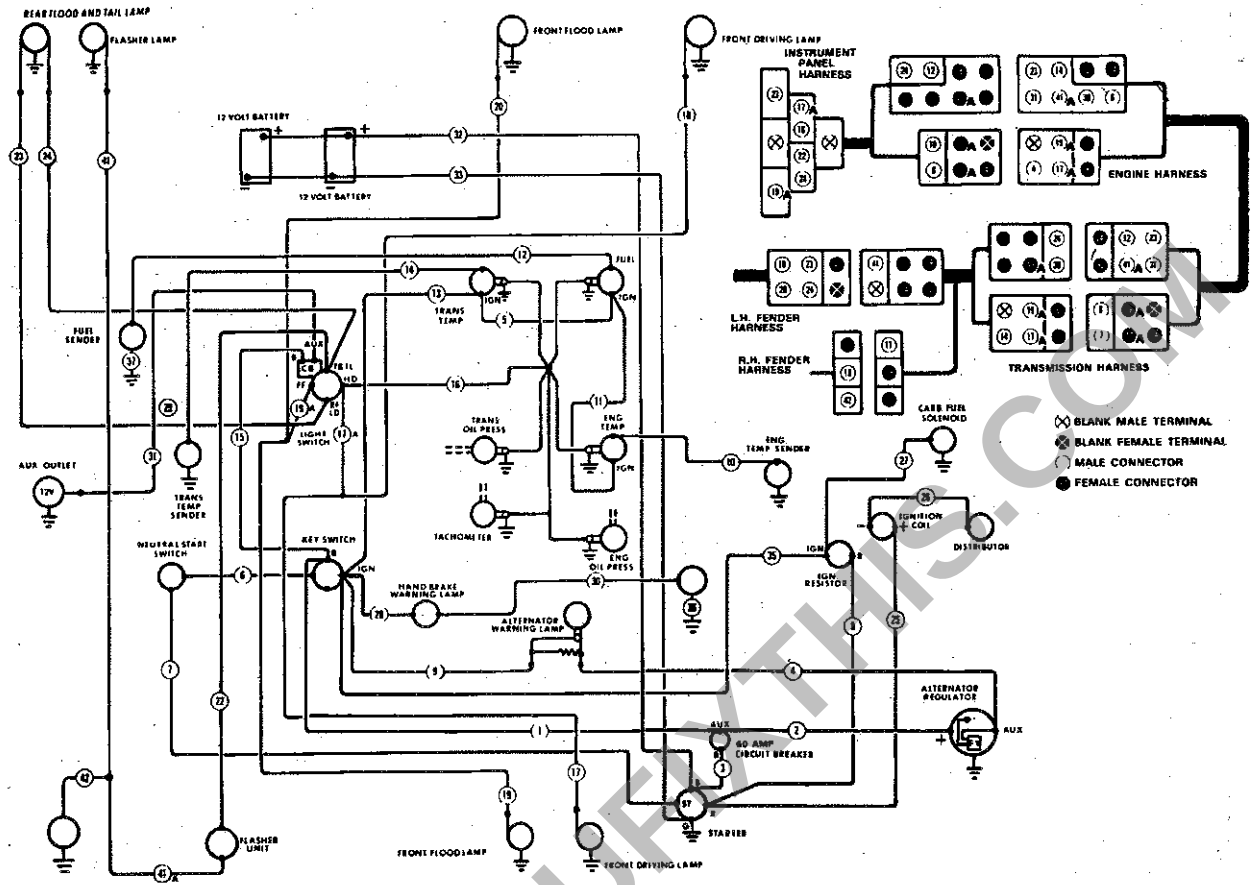


Fig. 90—Wiring diagram typical of all gasoline models. Numbers key to quick-disconnect plugs and to color code which follows.

1. Red—Key switch to circuit breaker
2. Red—Circuit breaker to alternator
3. Orange—Circuit breaker to starter
4. Brown—Alternate to warning lamp
5. Purple—Trans. Temp. gage to fuel gage
6. Yellow—Key switch to safety switch
7. Yellow—Safety switch to starter
8. White—Ignition resistor to starter
9. Purple—Key switch to charge lamp
10. Lt. Gr.—Engine temp. gage to sender
11. Purple—Fuel gage to eng. temp. gage
12. Lt. Bl.—Fuel gage to sender
13. Purple—Key switch to trans. temp.
14. Dk. Bl.—Trans. temp. gage to sender
15. Red—Key switch to lights
16. Gray—Light switch to panel lamps
17. Pink—Right front lamp to splice
17A. Pink—Light switch to splice
18. Pink—Left front lamp to splice
19. Dk. Gr.—Right flood lamp to splice
19A. Dk. Gr.—Light switch to splice
20. Dk. Gr.—Left flood lamp to splice
22. Tan—Flasher unit to light switch.
23. Dk. Bl.—Rear flood lamp to switch
24. Yellow—Rear flood lamp to switch
25. White/Black—Ign. coil to starter
26. Black—Ign. coil to distributor
27. Red—Ign. resistor to carburetor
28. Purple—Key switch to hand brake warning
30. Tan—Warning lamp to switch
31. Pink—Light circuit breaker to aux. outlet
32. Black—Battery terminal to starter
33. Black—Battery terminal to starter
35. White—Key switch to resistor
36. Black—Brake lamp switch to ground
37. Black—Fuel sender to ground
41. Tan—Left flasher lamp to splice
41A. Tan—Flasher unit to splice
42. Tan—Right flasher lamp to splice

and wiring color code. Refer to appropriate following paragraphs for data on system components.

DISTRIBUTOR

All Models

All models use a PRESTOLITE distributor with centrifugal advance mechanism.

91. **TIMING.** Recommended static timing is TDC for Model 970 and 5° ATDC for Models 770 and 870. Timing marks are located on crankshaft pulley and a timing pointer is cast into timing gear cover as shown in Fig. 92.

To time the engine, first make sure breaker points are correctly adjusted, No. 1 piston is on compression stroke and that indicated timing mark is aligned with timing pointer. Loosen clamp screws, turn ignition switch to "ON" position and disconnect No. 1 spark plug wire at plug. Hold wire terminal about ¼-inch from engine block and rotate distributor clockwise about 1/8-turn; then slowly counterclockwise until spark jumps the gap from No. 1 spark plug wire to ground. Tighten the distributor clamp screws.

Timing should be checked with a power timing light at engine rated speed (1900 rpm). Advance timing should be 28° BTDC for Models 770 and 870, and 27° for Model 970.

92. **REMOVE AND REINSTALL.** To remove the distributor, mark position of No. 1 spark plug terminal (Normally, forward terminal). Remove distributor cap and turn crankshaft until distributor rotor points toward No. 1 terminal position and correct static timing mark aligns with timing pointer. Disconnect tachometer drive shaft and primary

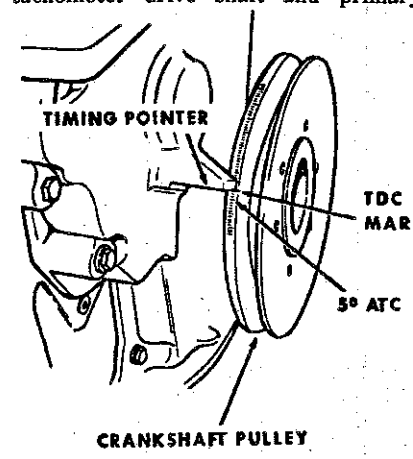


Fig. 92—Recommended static timing is TDC for Model 970 and 5° ATC for other models.

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CLUTCH C2 (Fig. 115) when hydraulically engaged, couples the planet carrier (PC) to output gear (O). Output gear thus delivers power to the transmission at the same speed and in the same direction as planet carrier turns. Clutch C2 is hydraulically engaged in Low (1) and High (3) forward speeds and in Reverse.

CLUTCH C3 (Fig. 116) when hydraulically engaged, couples the planetary ring gear (PR) to output gear (O). Clutch C3 is hydraulically engaged in Intermediate (2) and High (3) forward speeds.

CLUTCH C4 (Fig. 117) when hydraulically engaged, couples the planetary ring gear (PR) to carrier housing (C), thus making the planetary ring gear the stationary drive member. Clutch C4 is engaged in Reverse speed; Clutch C2 is also engaged (Fig. 115) coupling planet carrier to output gear. In reverse speed, power enters the clutch from input shaft and input sun gear driving the small pinion which in turn drives the large pinion. The large pinion walks around the stationary planetary ring gear turning the planet carrier at the same speed as the input shaft but in the opposite direction. Clutch C4 is also pressurized when the inching pedal is depressed and serves as a brake to stop transmission overspin, permitting easy shift of the mechanical transmission without clashing of gears.

Output gear ratios relative to input shaft (engine) speed are as follows:

Low	1.67:1
Intermediate	1.25:1
High	1:1
Reverse	1:1

NOTE: High (forward) speed is obtained by pressurizing Clutch C2 (Fig. 115) and Clutch C3 (Fig. 116), coupling both the Planet Carrier (PC) and Planetary Ring Gear (PR) to Output Gear (O).

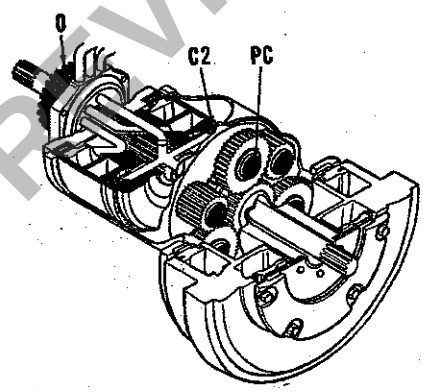


Fig. 115—With C2 clutch engaged, planet carrier (PC) is coupled to output gear (O) as shown by black shading. Planet carrier thus becomes the output drive unit.

It is a recognized feature of any planetary drive unit that when any two elements are locked together, the planetary drive ceases to operate and becomes, in effect a solid drive member. In High (forward) speed the input shaft, planetary drive members and output gear turn as a single unit driving output gear with the crankshaft at crankshaft speed.

The transmission is designed to permit manual selection of any of the three forward speeds by moving a lever, without stopping the tractor. To shift to reverse, it is necessary to depress the inching pedal and stop the tractor before control lever can be moved to Reverse. This prevents accidental overshifting into Reverse when downshifting in the forward gears. The inching pedal is also depressed to shift the mechanical range shift lever to any of the four speed ranges or to neutral. When inching pedal is depressed, power shift selector lever is automatically moved to "Low" position so that tractor always starts out in low when starting up after selecting the operating range.

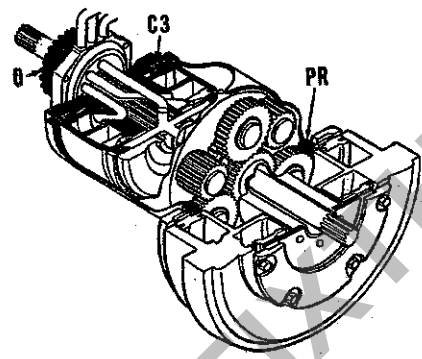


Fig. 116—With clutch C3 engaged, output gear (O) is coupled to planetary ring gear (PR) (black shading), making planetary ring gear the output drive unit.

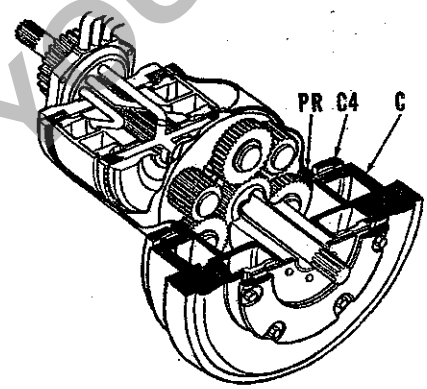


Fig. 117—With clutch C4 engaged, planetary ring gear (PR) is coupled to carrier (C) making planetary ring gear a stationary drive member and causing planet carrier to turn in a reverse direction.

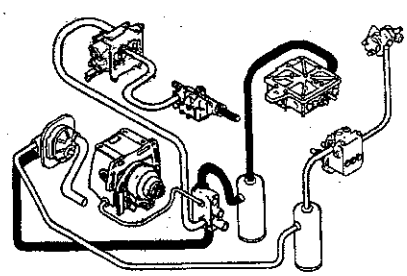


Fig. 118—Schematic pictorial of tractor hydraulic system. Power clutch circuit is shown by black shading.

112. **CONTROL SYSTEM.** The control valve consists of a manually actuated speed and direction selector valve which operates through hydraulically controlled shift (pilot) valves to direct hydraulic fluid under pressure to the appropriate clutch units. Also contained in the valve unit is a foot operated dump valve which interrupts hydraulic flow to clutch units and power flow to drive wheels; a reverse lockout spool which prevents accidental overshifting into reverse from a forward speed; a separate lubrication circuit; and retard, check and shuttle valves which monitor sequential flow to clutch units to control engagement rate.

Power to operate the transmission system is provided by the main hydraulic system pump through a flow divider valve while pressure lubrication is supplied by return oil from the hydrostatic steering system.

Refer to Fig. 118 for a pictorial schematic of the hydraulic system and to Fig. 119 for a partially exploded

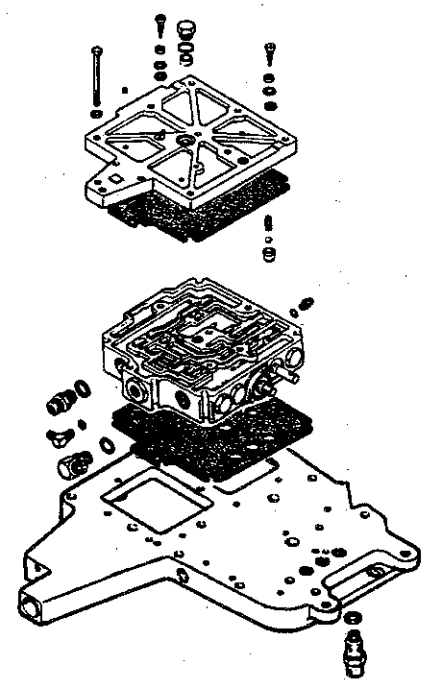


Fig. 119—Partially exploded view of transmission cover and power shift clutch control valve.

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FRONT SYSTEMS

DUAL WHEEL TRICYCLE

Models So Equipped

1. The dual wheel tricycle pedestal attaches to steering motor shaft flange. To remove the unit, support front of tractor and remove the attaching cap screws.

Install by reversing the removal procedure. Tighten the retaining cap screws to a torque of 225-250 ft.-lbs. Refer to Fig. 1 for exploded view of dual wheel pedestal and associated parts.

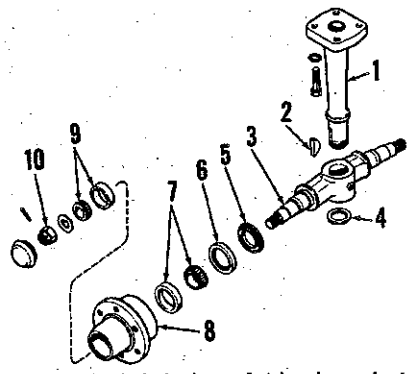


Fig. 1—Exploded view of tricycle pedestal and associated parts used on all models so equipped.

1. Pedestal
2. Woodruff key
3. Spindle
4. Snap ring
5. Inner seal
6. Outer seal
7. Inner bearing
8. Hub
9. Outer bearing
10. Nut

ADJUSTABLE AXLE AND SUPPORT

Models So Equipped

2. **STEERING KNUCKLES.** Steering spindles ride in renewable, presized bushings on 1090 and 1170 Models, and needle roller bearings on all other types.

On bushing type refer to Fig. 2. Press upper bushing into axle extension until flush with bushing bore as shown at (A). Press in the seal as shown until it bottoms and distance (B) measures 1/16-inch. Press lower bushing in until flush with bore as shown at (C). Temporarily install steering arm without shims and measure clearance (D), then install shims equal to the measured clearance less 0.040-0.060 to provide the correct spindle end play. Install steering arm with outer end pointing rearward and outward at about an angle of approximately 80° from spindle centerline as shown at (E). Tighten steering arm cap screws to a torque of 250-300 ft.-lbs., which should reduce spindle end play to 0.010-0.030. Shims are available in thicknesses of 0.036, 0.060 and 0.135. Make sure spindle does not bind after retaining cap screw is tightened.

On needle bearing type, refer to Fig. 3. Pressing on lettered end, install upper needle bearing until distance (1) from top of bearing to end of bore measures 13/32-inch, then install seal until distance (2) measures 5/32-inch. Install lower needle bearing until distance (3) measures 1/32-inch. Temporarily install steering arm without shims and measure clearance (4), then install shims equal to measured clearance minus 0.040-0.060. Steering arm should point to rear and out at about an 80° angle as shown at (E—Fig. 2). Tighten steering arm retaining cap screw to a torque of 250-300 ft.-lbs., which should reduce spindle shaft end

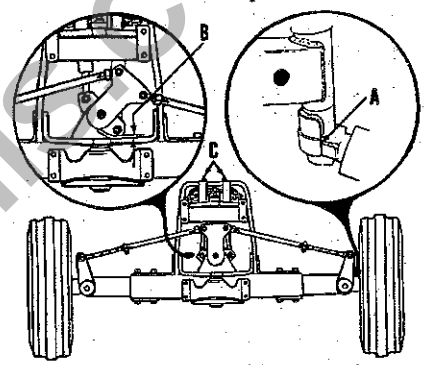


Fig. 4—On tractors with external power steering cylinders, toe-in is correct when spindle is against stop as shown at (A) and distance (B) between lower center arm and cross member measures 1/8-inch. Adjust anchor nuts (C) if cylinders bottom when fully retracted or extended.

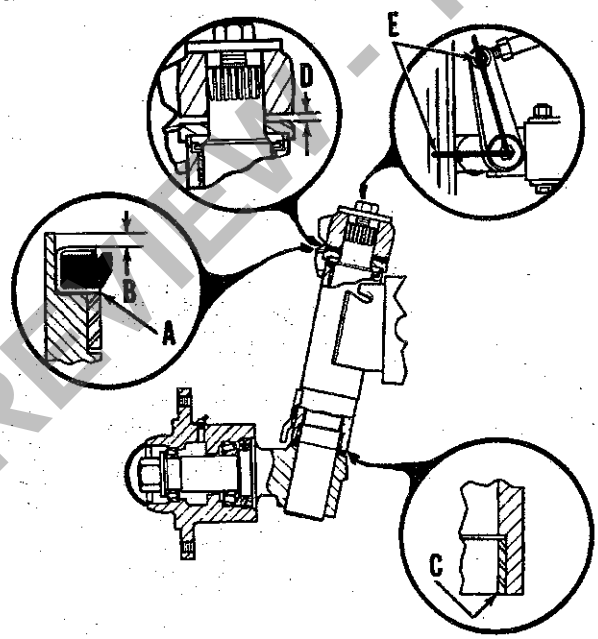


Fig. 2—Cross sectional view of bushing type steering knuckle used on Series 1090 and 1170.

A. Bushing height (flush)
B. Seal height (1/16 inch)
C. Bushing height (flush)
D. End clearance (shim to 0.050)
E. Installation angle (80°)

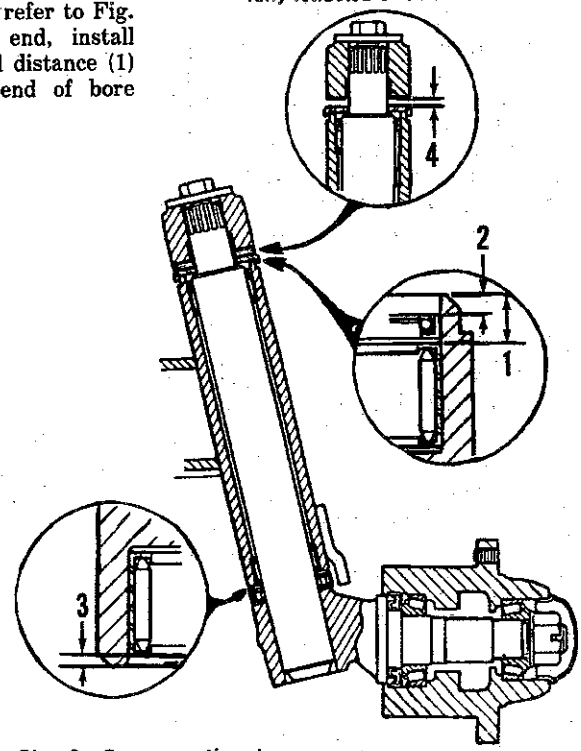


Fig. 3—Cross sectional view of needle bearing type steering knuckle used on Series 770, 870, 970, 1070 and 1175.

1. Bearing depth (13/32-inch)
2. Seal depth (5/32-inch)
3. Bearing depth (1/32-inch)
4. End clearance (shim to 0.020)

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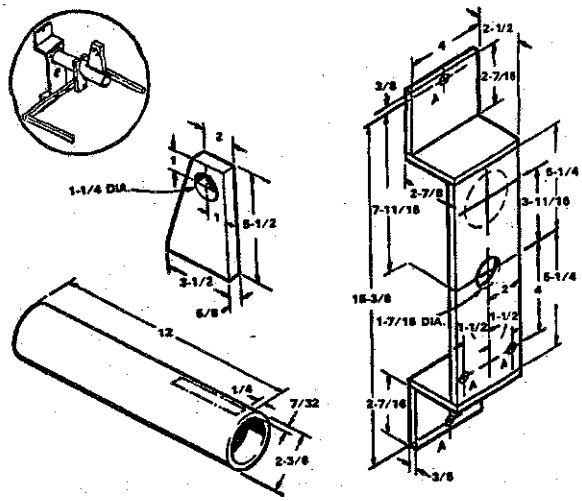


Fig. 131—Major dimensions for constructing a clutch removal tool. Refer also to Fig. 130.

screws (3 & 10) to a torque of 35-40 ft.-lbs. Note the torque required for full thread engagement of retaining sleeves (8) and tighten sleeves until torque INCREASES 150 inch pounds.

Install transmission cover making sure range shift levers properly engage detent locks in shift forks and oil supply tubes (4) enter counterbores in cover.

NOTE: On early models, oil supply tubes (12) can be dropped down through holes for plugs (11) after cover is installed.

Install dowel bolt (9—Fig. 132) and tighten finger tight. Install remainder of cap screws and tighten all cap screws evenly using the sequence shown in Fig. 132. Dowel bolt (9) should be torqued to 55-65 ft.-lbs. and remainder of cap screws to 85-95 ft.-lbs. On early models so equipped, install and tighten plugs (11—Fig. 129) to 50-75 inch pounds.

Install and adjust control valve as outlined in paragraph 116.

OVERHAUL

All Power Shift Models

121. **CONTROL VALVE.** Refer to Fig. 133 for an exploded view of power shift control valve. Springs, spools and associated parts except for body (2) are available individually. The body is only available as a complete valve assembly. A seal kit which contains all necessary O-rings and seals is also available. Also, a poppet type modulating valve (M—Fig. 134) is available for inching spool (5) on early models with ball type check valve as shown at (6—Fig. 133). Pilot valve spools and springs (9) are interchangeable for all four positions. All valves should fit freely in body bores without binding or excessive looseness. Springs can be identified from the following data. Numbers in parenthesis correspond to valve location given in Fig. 133.

	Free Length	Lbs. at Length (In.)
Pilot valve (9)	1-11/64 In.	5.5 at 1-1/32
Retard check (10)	15/16 In.	5/8 at 11/16
Reverse lockout (12)	1¾ In.	17 at 5/8
Pressure regulator (3)	1-3/8 In.	13.5 at 1
Check valve (6)	1-11/16 In.	10 at 31/32
Modulating valve (M—Fig. 134)		
Primary	1-39/64 In.	8.5 at 1-13/64
Secondary	¾ In.	1.2 at 7/16

Tightening torques are as follows. All torques are given in ft.-lbs.

Shuttle valve (1) (sleeve or plug)	17-20
Pressure regulator (3) (plug)	13-15
Selector valve (8) (cap screws)	7-9
Reverse lockout (12) (sleeve)	22-25
Pilot valve (9) (plugs)	13-15

122. **LUBRICATION RELIEF VALVE.** The lubrication relief valve (Fig. 135) is located on transmission top cover as shown in inset. Valve should be checked if correct lubrication operating pressure cannot be obtained when tested as outlined in paragraph 114. All parts of relief valve are available individually.

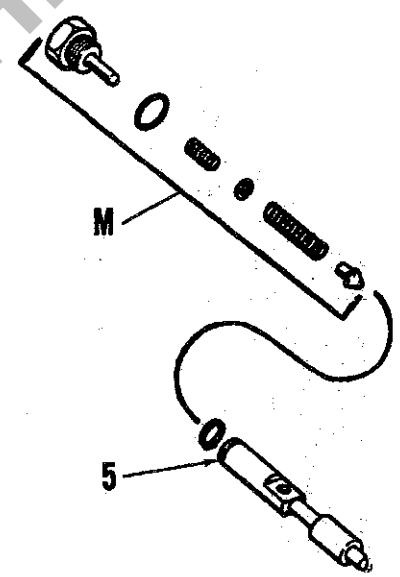


Fig. 134—Exploded view of late type (poppet) modulating valve (M) which replaces ball check (6—Fig. 133).

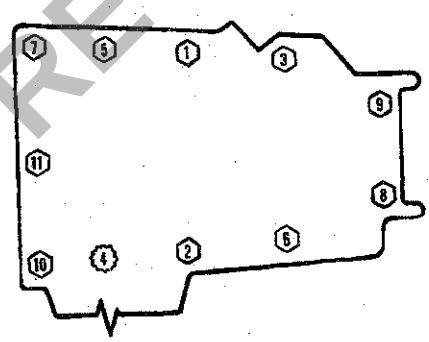


Fig. 132—Use the indicated sequence for tightening transmission cover screws. Refer to paragraph 120 for tightening torques.

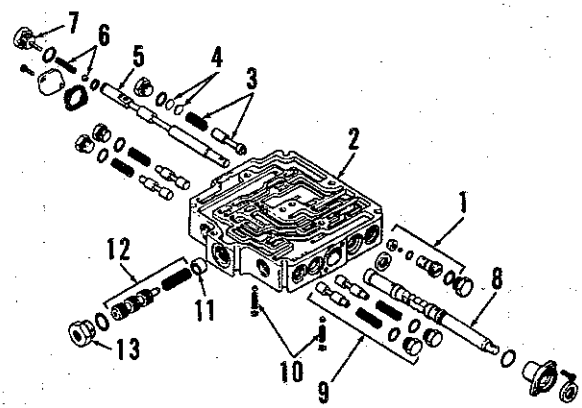


Fig. 133—Exploded view of power shift control valve showing component parts.

1. Shuttle valve
2. Valve housign
3. Pressure regulator
4. Adjusting shims
5. Inching spool
6. Check valve (early)
7. Modulator plug
8. Selector spool
9. Pilot valve
10. Retard check valve
11. Spool sleeve
12. Lockout spool
13. Lube passage fitting

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play to 0.010-0.030. Shims are available in thicknesses of 0.036, 0.060 and 0.135.

3. **TIE RODS AND TOE-IN (EXTERNAL).** To adjust the tie rods on tractors with external power steering cylinders, refer to Fig. 4. Turn steering wheel to right until left spindle stop contacts axle stop as shown at (A); then adjust left tie rod until clearance (B) between center steering arm and cross member plate is 1/8-inch. Turn steering wheel fully left and repeat the adjustment on right tie rod.

NOTE: It may be necessary to adjust steering cylinder anchor nuts (C) if cylinders reach limit of their travel before 1/8-inch clearance (B) is obtained. Toe-in should be 1/8-1/2 inch when adjustment is completed.

4. **TIE RODS AND TOE-IN (INTERNAL).** On tractors with internal power steering cylinders, toe-in should be 1/4-3/8 inch; adjust as follows: Turn steering wheel in either direction until steering motor limit stops contact as shown at (1—Fig. 5); then adjust the appropriate tie rod until spindle stop clearance (2) is 0.003-0.009. Turn steering wheel fully in opposite direction and adjust the other tie rod.

On all models, tighten tie rod jam nuts to a torque of 150 ft.-lbs. and tie rod clamp bolts to 65 ft.-lbs.

POWER STEERING SYSTEM

All models are equipped with hydrostatic power steering using a Ross steering unit and a section of the main hydraulic system pump as the power source. Model 1175 has the steering control valve built-in to steering unit. Turning power is delivered to the wheels by an actuator (steering motor) on Models 770, 870, 970, 1070 and late 1175; and by two double acting cylinders on Models 1090, 1170 and early 1175.

LUBRICATION AND BLEEDING

All Models

5. The transmission and hydraulic system fluid is used, and sight gages located on left side of transmission indicate fluid level; refer to Fig. 8. Use only CASE TCH fluid or Automatic Transmission Fluid—Type "A". Refer to CONDENSED SERVICE DATA Tables for reservoir capacity and to paragraph 162 for additional hydraulic system information.

Steering hydraulic circuit is combined with brake circuit and filter unit is located on right side of clutch housing (forward of power shift filter on Power Shift Models). On 770, 870, 970, 1070 and 1175 Models, renew filter element each 240 hours using a 25 micron filter. Models 1090 and 1170 are provided with a dash-mounted warning light, and filter element should be renewed when warning light flashes, using a 10 micron element.

To bleed the steering hydraulic system, run engine at half throttle and turn steering wheel from lock to lock several times until steering action is firm and solid. Brake hydraulic system may also need to be bled as outlined in paragraph 164. Do not hold front wheels against steering stops unnecessarily when bleeding system.

TROUBLE SHOOTING

All Models

6. **LEAKAGE.** Internal leakage in the steering system can generally be ignored unless sufficient to cause slow or erratic steering.

Leakage at recirculating check valve ball in steering control valve or manual steering pump on Model 1175 will not affect manual steering but can cause loss of power assist.

Internal leakage in manual pump will not materially affect power steering but may not allow the tractor to be steered manually.

7. **STEERING CONTROL VALVE.** On all models except 1175 if unusual initial effort is required to start the turn, a partially sticking control valve may be indicated and valve assembly should be removed and overhauled as outlined in paragraph 18. Because considerable pressure can be exerted by the hand pump, the control valve will rarely completely stick or freeze.

8. **FRONT WHEEL SHIMMY.** On all models except 1175 if the front wheels shimmy, the trouble is probably caused by a broken or weak control valve centering spring or bent centering

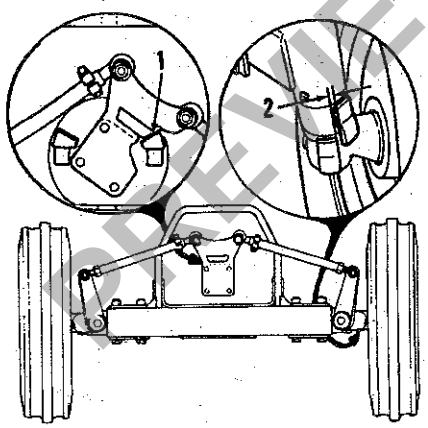


Fig. 5—On tractors with internal power steering cylinders (steering actuator motor), clearance (2) at spindle stop should be 0.003-0.009 when center steering arm is against stop as shown at (1). Toe-in should be 1/4-3/8 inch.

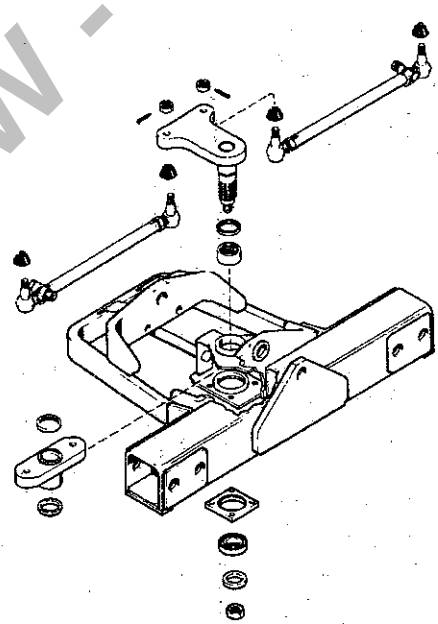


Fig. 6—Exploded view of front axle center member and associated parts used on Series 1090, 1170 and early 1175.

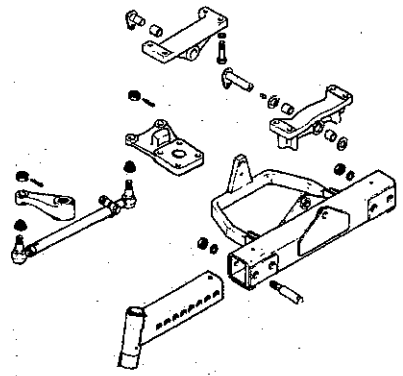


Fig. 7—Exploded view of front axle center member and associated parts used on Series 770, 870, 970, 1070, and late 1175.



Fig. 8—Sight glasses are used on left side of transmission housing to indicate fluid level.

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CONDENSED SERVICE DATA

	Gasoline Models			Diesel Models					
Tractor Series	**770**	**870**	**970**	**770**	**870**	**970**	**1070 & 1090**	**1170**	**1175**
GENERAL									
Engine Make	Own	Own	Own	Own	Own	Own	Own	Own	Own
Engine Model	251BG	301BG	377BG	267BD	336BD	401BD	451BD	451BDT	451BDT
Cylinders, Number of	4	4	6	4	4	6	6	6	6
Bore—Inches	4	4-3/8	4	4-1/8	4-5/8	4-1/8	4-3/8	4-3/8	4-3/8
Stroke—Inches	5	5	5	5	5	5	5	5	5
Displacement—Cu. In.	251	301	377	267	336	401	451	451	451
Compression Ratio	7.5:1	7.5:1	7.5:1	16.5:1	16.5:1	16.5:1	16.5:1	16.5:1	15.8:1
Rated Horsepower	.....	.....	.....	.....	.....	93.5	108.1	.....	.....
Main Bearings, No. of	5	5	7	5	5	7	7	7	7
Cylinder Sleeves—Type	Wet	Wet	Wet	Wet	Wet	Wet	Wet	Wet	Wet
Forward Speeds	8(12*)	8(12*)	8(12*)	8(12*)	8(12*)	8(12*)	8(12*)	8	8

*12 Forward Speeds on Power Shift Models.

TUNE-UP									
Firing Order	1-3-4-2	1-3-4-2	1-5-3-6-2-4	1-3-4-2	1-3-4-2	1-5-3-6-2-4	1-5-3-6-2-4	1-5-3-6-2-4	1-5-3-6-2-4
Valve Tappet Gap									
Intake	0.015C	0.015C	0.015C	0.015C	0.015C	0.015C	0.015C	0.015C	0.015C
Exhaust	0.025C	0.025C	0.025C	0.025C	0.025C	0.025C	0.025C	0.025C	0.025C
Compression at Cranking Speeds PSI	140	140	140	400	400	400	400	400	400
Ignition Distributor									
Make	Prestolite	Prestolite	Prestolite	.....	.....	.....	.....	.....	.....
Breaker Gap	0.020	0.020	0.020	.....	.....	.....	.....	.....	.....
Static Timing	5°ATC	5°ATC	TDC	.....	.....	.....	.....	.....	.....
Running Timing	28°BTC	28°BTC	27°BTC	.....	.....	.....	.....	.....	.....
Timing Mark Location	Flywheel								
Spark Plug Gap	0.025	0.025	0.025	.....	.....	.....	.....	.....	.....
Injection Pump									
Make	.....	.....	.....	R. Bosch	R. Bosch	R. Bosch	R. Bosch	R. Bosch	R. Bosch
Model	.....	.....	.....	PES	PES	PES	PES	PES	PES
Timing	.....	.....	.....	29 BTC	29 BTC	29 BTC	30 BTC	30 BTC	30 BTC
Injection Nozzles									
Make	.....	.....	.....	Roosa Master					
Orifice Size	.....	.....	.....	0.013					
Valve Lift Adj.	.....	.....	.....	0.0135 (¾ turn)					
Opening Pressure—PSI	.....	.....	.....	3150-3250 psi					
Turbocharger Make	.....	.....	.....	.....	.....	.....	.....	Garrett	Garrett
Engine Governed Speeds									
Slow Idle	600	600	600	725	725	725	725	725	725
High Idle	2060	2060	2060	2040	2040	2040	2040 (2160*)	2260	2260
Rated Load	1900	1900	1900	1900	1900	1900	1900 (2000*)	2100	2100
Battery Terminal Grounded	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.

*On Model 1090

LIQUID CAPACITIES									
Cooling Systems—Qts.	28	28	38	28	28	38	38(40*)	40	40
Crankcase—Qts. (W/Filter)	9	9	13	9	9	13	13	13	17
Transmission & Hyd. System									
Manual Shift Qts.	68	68	64	68	68	64	64	64	64
Power Shift Qts.	64	64	64	64	64	64	64	.....	.....
Planetary Final Drive (Qts. Ea.)	.....	.....	.....	.....	.....	.....	.....	8¼	10
Fuel Tank—Gallons	50	50	50	50	50	50	50	50	50

*On Model 1090

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