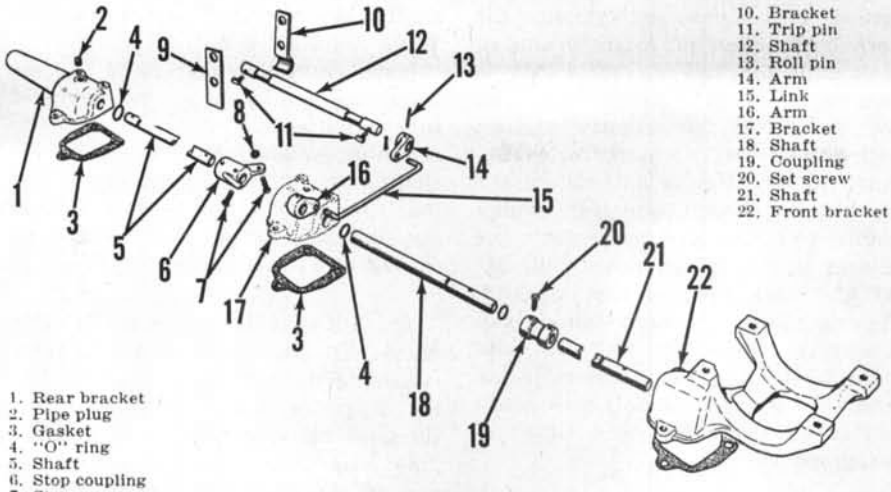


Fig. C150 — Exploded view of decompressor linkage used on some diesel models. Six cylinder unit is shown; bracket (17), coupling (19) and shaft (21) are not used on four cylinder models.

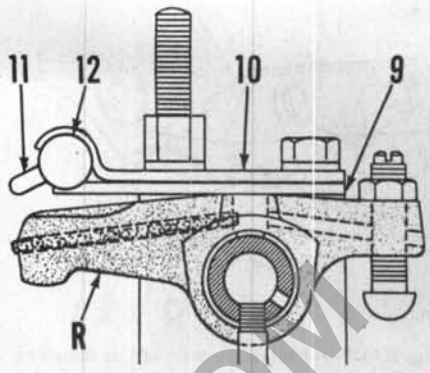


Fig. C151 — Cross sectional view of rocker arm showing decompressor mechanism. Trip pin (11) contacts rocker arm (R), holding exhaust valves slightly open when decompressor is actuated. Refer to Fig. C150 for parts identification.

Check bushings after installation, and remove any burrs or high spots with a hone.

When reassembling the rocker arms unit, refer to Fig. C149. Intake valve rocker arms (without the wick) are identical and should be installed between the brackets, separated by the spring (8). Front and rear exhaust valve rocker arms (1 & 10) for each head are not interchangeable. Oil holes in rocker arm shaft and split side of brackets (2) must each be installed toward push rod side of head. Vary the number of washers (12) on each end of shaft after installation, until end rocker arms are free on shaft without noticeable end play. Tighten rocker arm shaft retaining cap screws to a torque of 40 ft.-lbs. and adjust the tappet gap as outlined in paragraph 40. On diesel models so equipped, install and/or check decompressor linkage as outlined in paragraph 46.

DECOMPRESSOR

Diesel Models So Equipped

46. Some diesel models are equipped with a decompressor unit which, when actuated, holds the exhaust valves off their seats allowing crankshaft to be more easily turned for service or injection timing.

The decompressor control shaft is mounted in housings on right side of cylinder heads and is connected by links (15—Fig. C150) to actuating shafts mounted on rocker arm shaft brackets as shown in Fig. C151.

Decompressor mechanism can be inspected after removing rocker arm covers and can be overhauled without removing cylinder heads. NOTE: Fuel system final filter bracket is a part of decompressor control shaft front housing (22—Fig. C150). Filter must be removed if service on front unit is indicated.

Inspect the unit for loose set screws, sheared pins in control levers, or bent or damaged linkage. All parts, including trip pins (11) are available for service. Control shafts are sealed in housing bores by "O" rings (4) which fit in grooves in shafts.

Adjust stop screws (7) in control shaft coupling so that exhaust valves are held open when decompressor is engaged and all trip pins (11) completely clear rocker arms as shown in Fig. C151, when decompressor is disengaged and exhaust valve is closed.

CAM FOLLOWERS

All Models

47. The mushroom type cam followers ride directly in the unbushed cylinder block bores and can be removed after first removing camshaft as outlined in paragraph 55.

The 0.8097-0.8102 diameter standard size followers have a normal clearance of 0.0013-0.0043 in cylinder block bores. If clearance is excessive with new standard size followers, bores can be resized to 0.8215-0.8225 and 0.010 oversize cam followers installed.

Before reinstalling cam followers, be sure breather hole in each follower is open and clean.

TIMING GEAR COVER

All Models

48. To remove the timing gear cover, first drain cooling system and remove hood and radiator. On standard, non-adjustable axle models, disconnect drag link and rear end of radius rod. On general purpose models, disconnect steering shaft front universal joint and power steering pressure and return lines if so equipped. On all models, unbolt front support (radiator bracket) from engine and roll front support and wheels assembly away from tractor. On non-diesel models, disconnect governor spring and throttle rod from governor cover.

On all models, remove fan blades, belt and crankshaft pulley. Remove capscrews from front end of oil pan which thread into timing gear cover and loosen remainder of oil pan cap screws. Unbolt timing gear cover from engine block, carefully separate timing gear cover and oil pan gasket, then pry cover from block. NOTE: Cover is positioned on block by two dowel pins. Be careful not to damage timing pointer or lose the spring-loaded thrust plunger from front end of camshaft (all models) and injection pump drive gear (diesel models) when removing cover.

The crankshaft front oil seal can be renewed at this time Lubricate seal with grease and install in timing gear cover with lip of seal to rear (inside). Inspect crankshaft pulley to be sure seal wear surface is in good condition; remove any burrs which could damage seal.

Inspect the oil pan gasket; if damaged, a new gasket can be cut to fit exposed flange area of pan and cemented into place with Permatex or similar sealer.

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To disassemble the torque motor, remove the ten Allen head cap screws from bottom of unit and lift off torque motor upper cover (26—Fig. C132). Use a marking pen or crayon and identify the stationary vanes (29) and vane slots in body (30), so vanes can be reinstalled in their original positions with same end up. Lift out the vanes and dowels (28), and discard the vane seals. New seals must be installed when unit is reassembled. Lift off vane body (30), vane (31) and lower cover (32).

Torque motor vane (31) is available only in a kit which includes upper cover (26), stationary vanes (29), body (30), lower cover (32), needle bearing (33) and all torque motor "O" rings and seals. All other parts are available separately. Clean all parts in a suitable solvent and renew any which are worn, scored or otherwise damaged. Renew vane seals and all "O" rings when assembling the unit.

On 830, 930 and 1030, spindle shaft (35A) has stepped splines and torque motor parts are not interchangeable with Series 730. Spindle shaft bearing (33) does not bottom in lower cover (32). The needle bearing can be correctly positioned by using the special Case Arbors and proceeding as follows: On Series 730, use Case arbor A-8352 and press bearing into position working from bottom of bore; on other models, use Case arbor A-33993 and press bearing into position from inside (top) of cover bore. If special arbor is not available, note the position of original bearing before removal and install the new bearing in the same approximate position. Install lower seal (34) until it bottoms in counterbore, with spring loaded lip toward needle bearing.

Assemble torque motor by reversing the disassembly procedure, using Figs. C133 through C135 as a guide. Tighten the ten Allen head cap screws evenly to a torque of 75-85 ft.-lbs. Install the steering valve as outlined in paragraph 28 and the assembled torque motor and gear unit as in paragraph 29.

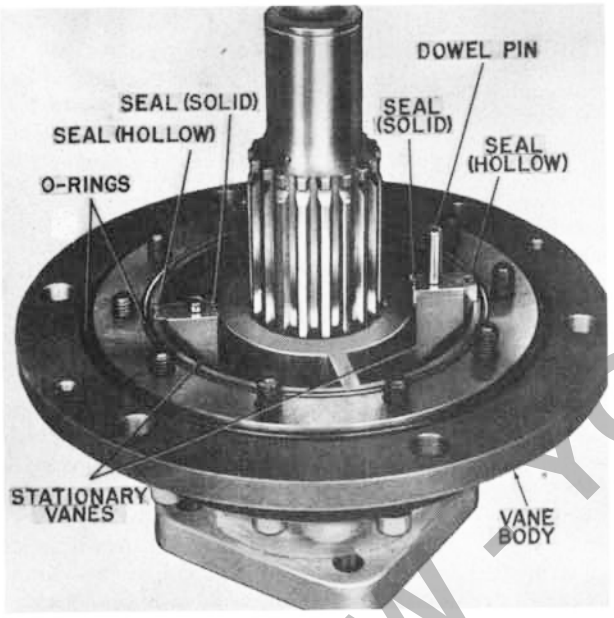


Fig. C134A — Installing stationary vanes. Vanes must be installed in same grooves with same end up before disassembly and after reassembly. Mark the vanes as outlined in text.

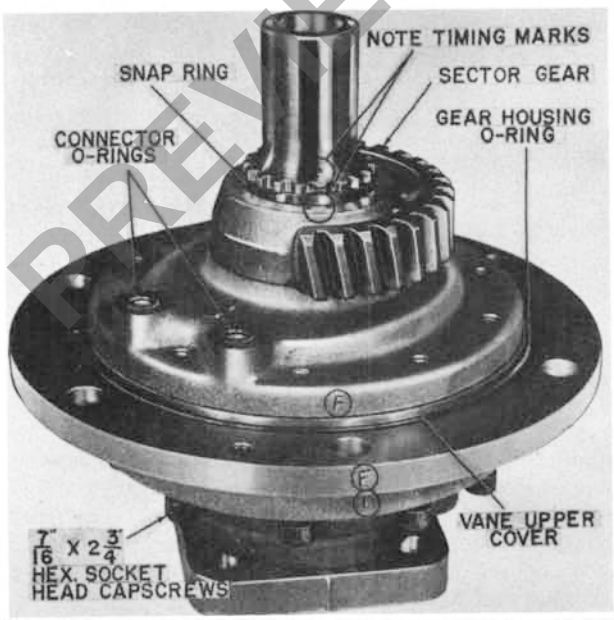


Fig. C135—When installing vane upper cover, be sure sealing "O" ring is positioned and assembly marks aligned. Note timing marks on sector gear and spindle.

CYLINDER & VALVE UNIT

Early Models (Monroe Unit)

31. **ADJUSTMENT.** Ordinarily the only adjustment required on the Monroe cylinder and valve unit is the maintenance of 1-inch clearance (A—Fig. C136) when connecting front drag link (D) to cylinder (C). To make the adjustment, disconnect drag link from steering arm ball and loosen clamp bolt (B); then turn drag link on threaded end of cylinder plug as required.

The valve actuating stud (S—Fig. C136A) is self centering in valve body when hoses are connected and pressure applied. For satisfactory operation, the stud should also center in oblong holes in cylinder as shown at (A). This adjustment is pre-set at the factory and should not normally need to be changed unless the original setting has been disturbed.

If the power steering unit operates equally well in right-hand and left-hand turns, it may be assumed that the valve unit is correctly centered in cylinder.

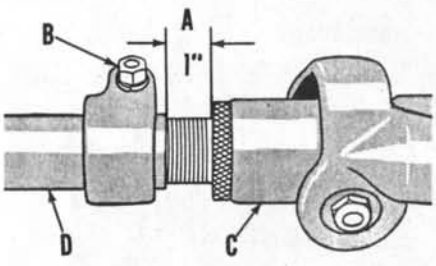


Fig. C136 — On standard models which use Monroe power steering, adjust drag link to 1-inch clearance as shown at (A).

C. Cylinder
D. Drag link
A. Clearance
B. Clamp bolt

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FRONT SYSTEMS

DUAL WHEEL TRICYCLE

All Models So Equipped

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

The wheel axle (6—Fig. C100) is keyed to spindle and retained by snap ring (2). Wheel axle and/or wheel bearing can be serviced without removing pedestal from tractor. The tapered wheel bearings should be adjusted to provide a slight rotational drag.

SINGLE WHEEL TRICYCLE

All Models So Equipped

2. The single wheel tricycle fork attaches to steering spindle shaft flange and can be removed after supporting tractor and removing attaching cap screws.

Single wheel tricycle models may be equipped with a 9.00 x 10 tire which uses a split rim or a 6.50 (7.50) x 16 tire which uses a drop center rim detachable from hub. Wheel bearings are identical on all models. Refer to Fig. C101.

Shims (9) control wheel bearing adjustment. Vary shim pack thickness on each end of axle to provide a noticeable drag when wheel is turned on axle. Shims are available in thicknesses of 0.003 and 0.005.

AXLE AND SUPPORT

All Models So Equipped

3. **STEERING KNUCKLES.** On all axle models, the king pin (vertical spindle) is carried in two caged type needle bearings which press into axle or axle extension, plus a roller type thrust bearing which carries the load. Refer to Fig. C102 for cross sectional view of adjustable axle type and to Fig. C103 for standard type with non-adjustable tread.

Needle bearings (4 & 6) can be removed with a suitable drift after spindle is out. On adjustable axle models, upper needle bearing (6) should be installed using special Case arbor A-8346. On standard axle units, Case arbor A-8354 should be used for upper bearing (6). On all models, lower needle bearing should be installed using Case arbor A-8351. If special arbors are not used, be careful not to bottom needle bearings in bore. Upper bearing should be installed to sufficient depth to allow for installation of oil seal (7), and lower bearing just beyond flush with lower thrust face of spindle bore. Press only on the hardened, lettered end when installing needle bearings. Install oil seal (7) with lip away from needle bearing on all models.

4. **TIE-RODS AND DRAG LINK.** Tie-rod ends on all models are of the non-adjustable automotive type. Tie rods should be adjusted to provide a toe-in of ¼—⅜ inch. On models with two tie-rods, each rod should be adjusted an equal amount.

The ball and socket type drag link used on standard, non-adjustable axle models should be adjusted to remove all free play without binding.

5. **AXLE PIVOT PINS AND BUSHINGS.** The axle center section on adjustable axle models is suspended on two pivot pins (P—Fig. C104). On standard axle models the axle member (A—Fig. C105) is supported by a single pivot pin (P), assisted by a ball-mounted, wishbone type radius rod. The pivot pins on all models, ride in a lubricated bushing in axle member and directly in pin bore of support.

To renew pivot pins and/or bushings, support the tractor to take the weight off pivot pins, remove snap ring (R—Fig. C105) on standard axle models; or snap ring (R—Fig. C104) and retaining cap screw (C) on adjustable axle models; then drive pivot pins from support using a suitable

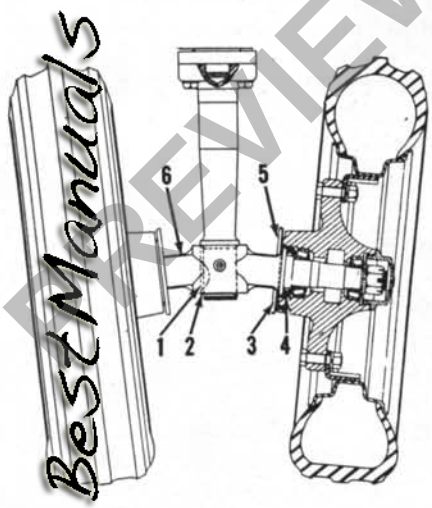


Fig. C100 — Sectional view of dual wheel tricycle type front system.

1. Woodruff key
2. Snap ring
3. "O" ring
4. Seal
5. Retainer
6. Axle

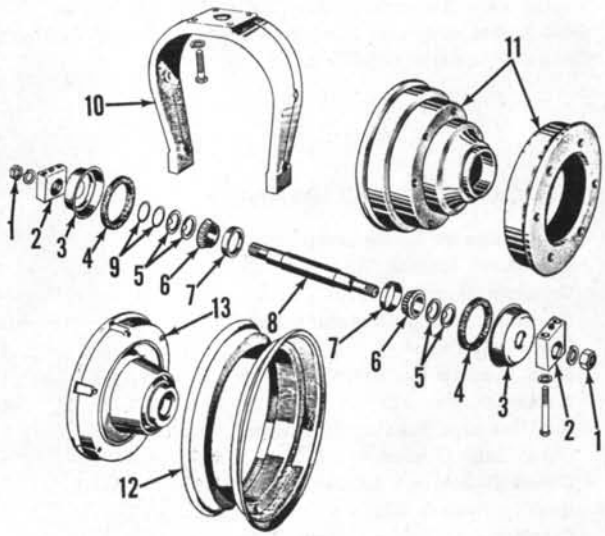


Fig. C101 — Exploded view of wheel fork, wheel axle and associated parts used on single wheel tricycle models. Split rim (11) is used with 9.00 x 10 tire; drop center rim (12) with 6.50 or 7.50 x 16 tire.

1. Axle nut
2. Block
3. Retainer
4. Dust seal
5. Washer
6. Bearing cone
7. Bearing cup
8. Axle shaft
9. Adjusting shims
10. Fork
11. Hub & rim
12. Rim
13. Hub

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move the valve, disconnect fluid lines from valve body and remove valve cap as shown in Fig. C129. Unlock and remove thrust bearing nut and front thrust bearing assembly as shown in Fig. C130, then withdraw valve body and spool. Be careful not to lose any of the valve centering springs and plungers. Valve spool (1—Fig. C130A) and body (5) are mated parts and must be renewed as an assembly. Check valve (6) in the return port can be removed with a screwdriver and must be renewed as an assembly.

Inspect the brass tube seats (7) in body ports. If seats are damaged, tap seat bore with a suitable bottoming tap and use a cap screw, nut and washer as a puller. The seat may be pressed into position by reinstalling the hydraulic line.

When reassembling the valve, make sure the two inactive plungers (4) are separated by an active plunger and spring assembly. Active plungers (2) may be installed either end out, but must be separated by spring (3). Port identification symbols (RT & PR) and identification groove on inside of spool must both be toward threaded end of wormshaft. These locating marks are identified by (L) in Fig. C130A.

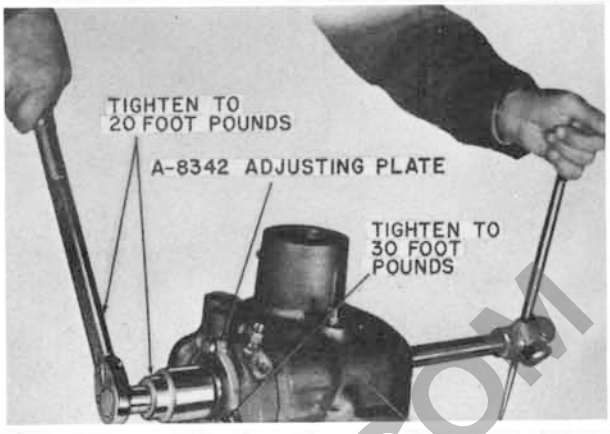


Fig. 131 — To adjust the valve, tighten shaft nut to 20 ft.-lbs. as shown; then back nut off 1/6-turn. Refer to text.

Thrust bearings (Fig. C130) should both be installed with the larger washer toward valve body. Loosely install nut, lock washer and thrust bearing nut. If the special Case adjusting plate (A-8342) is available, install plate using the valve cap retaining screws as shown in Fig. C131. If adjusting plate is not available, secure valve to gear housing using shorter cap screws, with flat washers to protect the machined surface of valve. Tighten valve retaining cap screws to a torque of 30 ft.-lbs.; then,

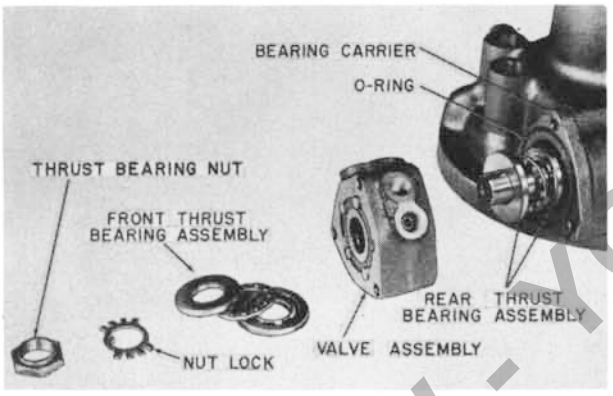


Fig. C130 — Valve assembly can be withdrawn after removing shaft nut.

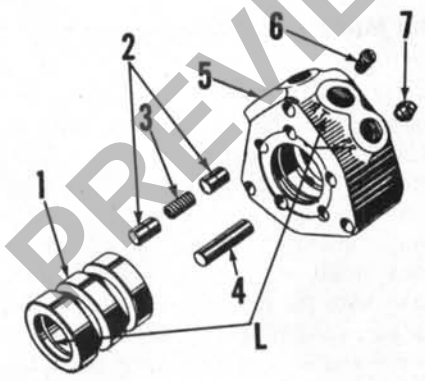


Fig. C130A — Exploded view of steering valve and associated parts. Locating marks (L) should be to front when valve is installed.

L. Locating marks
1. Spool
2. Plunger
3. Spring
4. Plunger
5. Body
6. Check valve
7. Tube seat

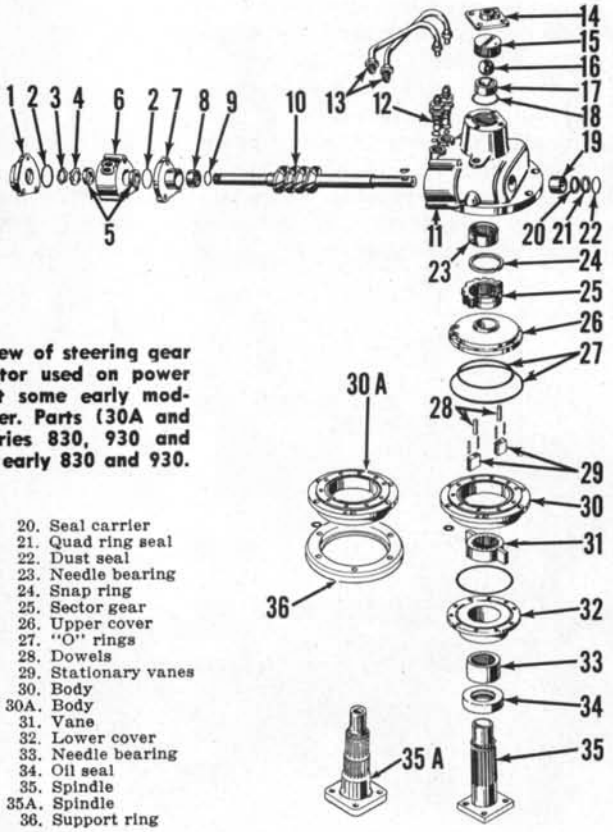


Fig. C132—Exploded view of steering gear housing and torque motor used on power steering tractors except some early models using linkage cylinder. Parts (30A and 35A) are used on Series 830, 930 and 1030 and part (36) on early 830 and 930.

1. Valve cap
2. "O" ring
3 Thrust bearing nut
4. Nut lock
5. Thrust bearings
6. Steering valve
7. Bearing housing
8. Needle bearing
9. "O" ring
10. Wormshaft
11. Gear cover
12. Connectors
13. Pressure lines
14. Top cover
15. Adjusting plug
16 Thrust ball
17. Saddle
18. "O" ring
19. Needle bearing
20. Seal carrier
21. Quad ring seal
22. Dust seal
23. Needle bearing
24. Snap ring
25. Sector gear
26. Upper cover
27. "O" rings
28. Dowels
29. Stationary vanes
30. Body
30A. Body
31. Vane
32. Lower cover
33. Needle bearing
34. Oil seal
35. Spindle
35A. Spindle
36. Support ring

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LUBRICATION AND BLEEDING

All Models

22. Fluid capacity of the power steering system is approximately 3¾-quarts for models with torque motor; and 2 quarts for Standard models with linkage cylinder. Reservoir capacity of all models is approximately 1½ pints, the remainder of the fluid being required to fill valves, cylinders and lines; and gear unit on models with torque motor.

Only Case Hi-Lo TCH Oil or Automatic Transmission Fluid, Type "A" should be used in the power steering system. Filter element in fluid reservoir should be renewed every 1,000 hours; or more often in severe dust conditions. Spring in reservoir cover should exert a downward seating pressure on filter cartridge to assure filtration of fluid.

Maintain power steering fluid level at full (F) mark on dipstick attached to filler cap. Because reservoir capacity is only ⅛ to ⅜ of total system capacity, care must be used in filling the system if cylinder is dry. Proceed as follows:

On tractors equipped with torque motor, remove grille screen and filler plug (Fig. C121), and fill gear reservoir with the same fluid used in power steering reservoir. On early models with bleed plug on torque motor top cover, loosen bleed plug a few turns while bleeding system, then tighten the plug. Late models are equipped with a bleed tube (B—Fig. C122) and are self-bleeding.

On all models, fill reservoir and, with engine running at slow idle speed, recheck and refill if necessary, after pump has run a few moments in neutral position. Make only partial turns at first, refilling reservoir as fluid level drops. Repeat the procedure until fluid level ceases to drop and full turns are accomplished in both directions. When making full turns, do not hold front wheels against the stops.

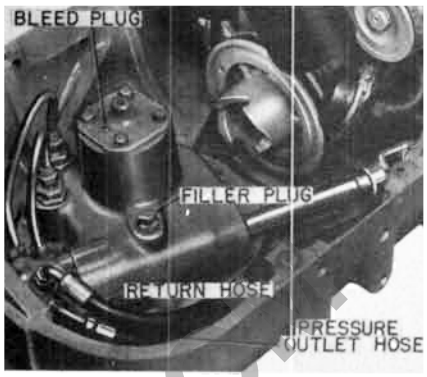


Fig. C121 — Power steering components installed on early general purpose and high clearance models. Notice the location of bleed plugs and filler plugs. The radiator is removed for illustrative purposes only. Late models differ in having a bleed tube as shown in Fig. C122.

TROUBLE SHOOTING

All Models

23. The accompanying table lists troubles which may be encountered in the operation of the power steering system. The procedure for correcting most of the troubles is evident; for those not readily remedied, refer to the appropriate subsequent paragraphs.

POWER STEERING SYSTEM TROUBLE SHOOTING CHART

	Loss of Power Assistance	Power Assistance in One Direction Only	Unequal Turning Radius	Erratic Steering Control	Fluid Foaming Out of Reservoir	Steering Cylinder Bottoming
Binding, worn or bent mechanical linkage	★		★	★		
Insufficient fluid in reservoir	★					
Faulty fan belt or pump drive belt	★			★		
Low pump pressure	★					
Internal leakage in torque motor	★					
Faulty or improperly installed control valve thrust bearing	★	★		★		
Valve thrust bearing nut improperly tightened	★			★		
Sticking or binding valve spool	★	★		★		
Faulty valve plungers and/or springs	★			★		
Improperly positioned steering shaft, restricting spool travel	★	★				
Check valve ball not seating	★				★	
Damaged or restricted hose or tubing	★	★			★	
Vane inlet and outlet connectors not seating on "O" rings, or "O" rings missing (Torque Motor)	★	★				
Pump to valve hose lines reversed	★					
Plugged balance passage at front of worm (Torque Motor)	★			★		
Wrong fluid in system	★			★	★	
Improperly adjusted tie rods			★	★		
Steering arms not positioned properly			★			
Timing marks on sector and shaft not aligned			★			
Vane and spindle timing marks not aligned (Torque Motor)			★			
Air in system				★	★	
Faulty flow control valve in pump				★		
Plugged filter element					★	
Internal leak in valve	★				★	
Faulty cylinder (Standard Non-Adjustable Axle models)				★		
Faulty stop screw adjustment (Standard Non-Adjustable Axle models)			★			★
Timing marks on sector shaft and arm not aligned (Standard Non-Adjustable Axle models)			★			
Faulty adjustment of cylinder retracted length (Standard Non-Adjustable Axle models)			★			★

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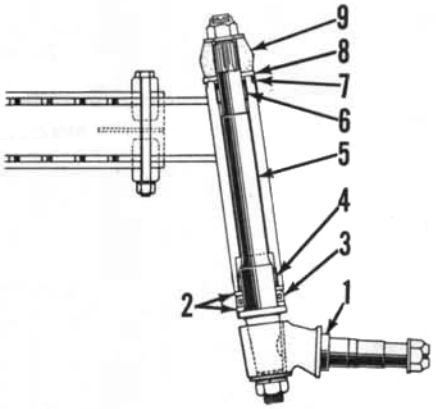
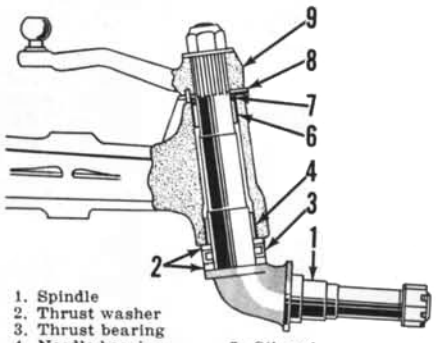


Fig. C102 — Cross sectional view of typical adjustable axle steering spindle. Refer to Fig. C103 for parts identification.

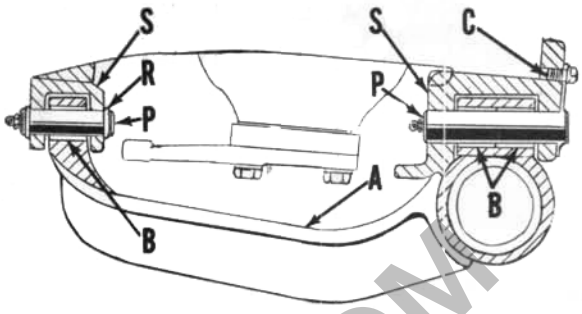


1. Spindle
2. Thrust washer
3. Thrust bearing
4. Needle bearing
5. Vertical spindle
6. Needle bearing
7. Oil seal
8. Shim
9. Steering arm

Fig. C103 — Cross sectional view of typical non-adjustable standard axle.

Fig. C104 — Cross sectional view of axle support used on adjustable axle models.

A. Axle member
B. Bushing
C. Cap screw
P. Pivot pin
R. Snap ring
S. Support



drift. Raise tractor until bushings (B) are exposed, and renew by pressing old bushing out and new bushings in with a piloted arbor. New bushings should be final sized, if necessary, to provide a free running fit for pivot pins. Pivot pin diameters are as follows:

Series 730-830-930	
Standard Axle Models	1.735-1.736
General Purpose Models	
Front	1.246-1.247
Rear	0.997-0.998
High Clearance Models	
Front	1.745-1.747
Rear	1.495-1.497
Series 1030	
All pins	1.246-1.247

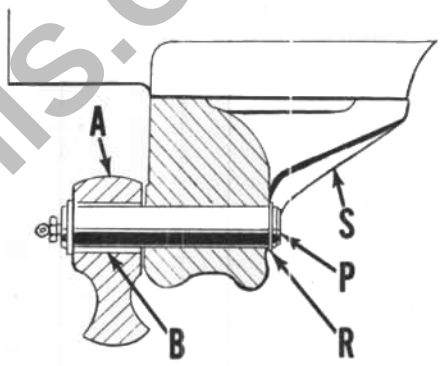


Fig. C105 — Cross sectional view of axle support and front pivot pin used on standard models. Ball-type rear support is not shown. Refer to Fig. C104 for parts identification.

STEERING GEAR

NOTE: On General Purpose and High Clearance models with power steering, the steering gear is combined with the rotary vane type steering cylinder (torque motor) and service on the combined unit is covered separately in paragraphs 27-30. On Standard Axle units, the steering gear unit is identical on manual and power steering models and service on the steering gear is covered in this section. Refer to POWER STEERING SYSTEM section for steering pump and cylinder and valve unit on Standard Axle models so equipped.

ADJUSTMENT

General Purpose and High Clearance Models With Manual Steering

6. The manual steering gear is provided with end play adjustments for steering spindle and worm shaft. Mesh of worm and sector gear is fixed and not adjustable. To adjust end play, remove grille screen and, on tricycle models, raise front of tractor slightly to remove thrust load from spindle; then proceed as follows:

7. **WORM SHAFT END PLAY.** To adjust the steering worm shaft bearings, remove cover (1—Fig. C106) and remove worm shaft front bearing carrier (2). Vary the thickness of shim pack (3) located between bearing carrier and housing to remove all end play without binding, when bearing carrier cap screws are tightened to a torque of 30 ft.-lbs. Shims are available in thicknesses of 0.003, 0.005 and 0.010.

8. **UPPER SPINDLE END PLAY.** To adjust the upper spindle end play, remove gear housing top cover (20—Fig. C107) and tighten plug (19) to

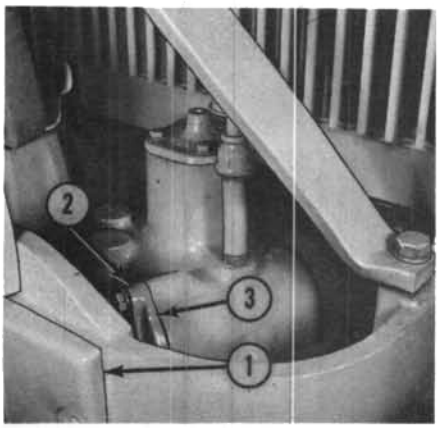


Fig. C106—General purpose manual steering gear showing method of adjusting worm shaft end play. Refer to text.

1. Cover
2. Bearing carrier
3. Shim pack

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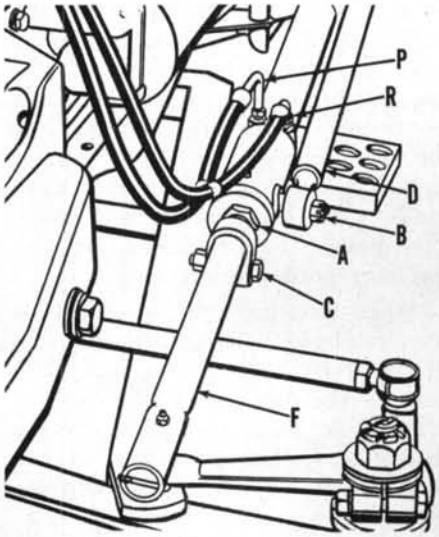


Fig. C143 — Assembled view of Ross power steering cylinder used on late units.

A. Clearance
B. Ball stud
C. Clamp bolt
D. Drag link
F. Front link
P. Pressure hose
R. Return hose

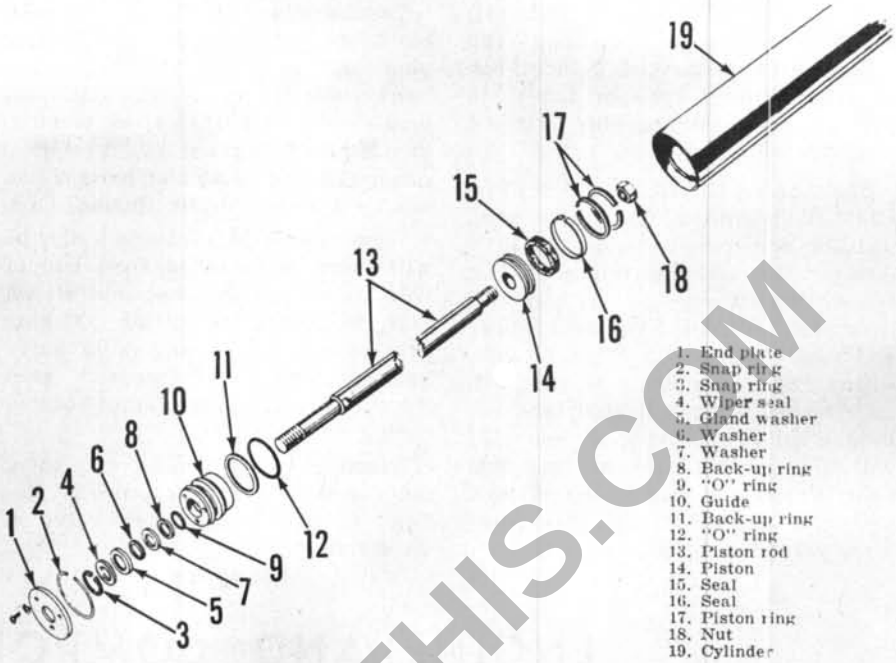


Fig. C144 — Exploded view of cylinder end of Ross cylinder and valve unit. Refer also to Fig. C145.

body as shown. Bleed system after installation of cylinder as outlined in paragraph 22.

35. **OVERHAUL.** Before disassembling the removed unit, drain cylinder by manually extending and retracting piston rod while cylinder ports are held over a container.

Either the cylinder or valve unit may be overhauled without disturbing the other unit. Refer to the appropriate following paragraphs.

36. CYLINDER UNIT. Refer to Fig. C144. Piston rod guide (10) is retained in cylinder (19) by retaining snap ring (2) and end plate (1). To disassemble the cylinder, remove retaining screws and end plate (1). Push rod guide (10) into cylinder a slight amount and unseat and remove snap ring (2); then withdraw piston, rod and guide assembly as a unit.

Clamp the milled flats on rear end of piston rod (13) in a soft jawed vise, support the rod on a wood block next to piston, and remove piston retaining nut (18). Withdraw piston (14) and rod guide (10) from rod.

Some early pistons were equipped with cast iron sealing rings (17). Most pistons use Teflon seals (15 & 16). Whenever early unit is disassembled, it is recommended that the late piston and Teflon seals be installed.

Remove snap ring (3) and sealing components (4 through 9) from inner bore of rod guide, and back-up ring (11) and "O" ring (12) from outer groove. When reassembling, install wiper seal (5) with lip to outside and be sure back-up rings (8 & 11) are to outside of "O" rings (9 & 12). Install rod guide (10) from piston end of rod, making sure lip of wiper seal (5) is not turned back during installation. Install piston (14) and install and tighten nut (18) to a torque of 30-35 ft.-lbs.

Carefully examine outer end of cylinder inner tube for sharp edges which might damage Teflon piston seals; and outer tube including snap ring groove, for burrs which might damage "O" ring (12). Insert piston approximately half way into cylinder, push guide (10) into position and in-

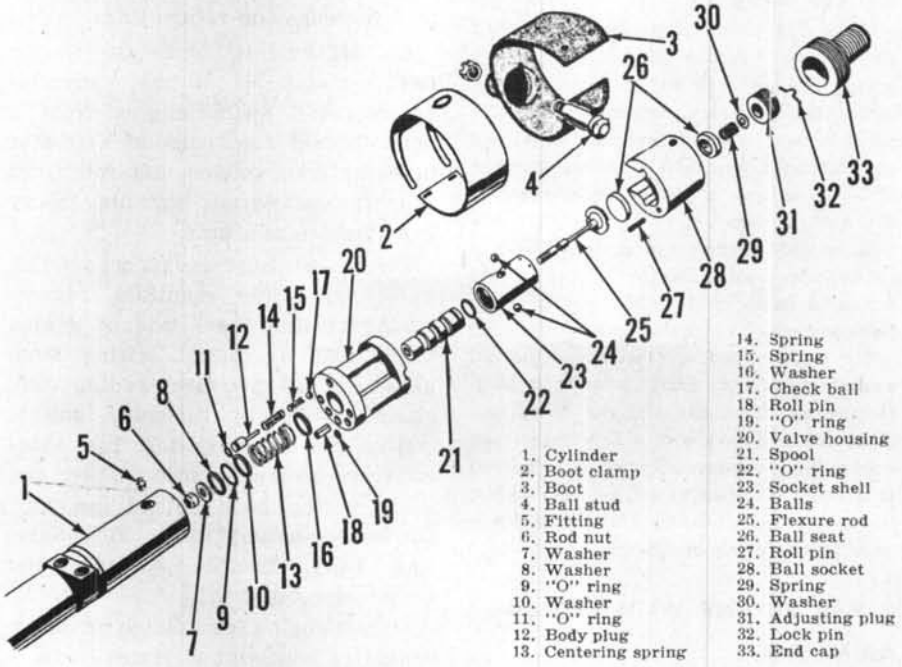


Fig. C145 — Exploded view of valve end of Ross power steering cylinder. Refer also to Fig. C144.

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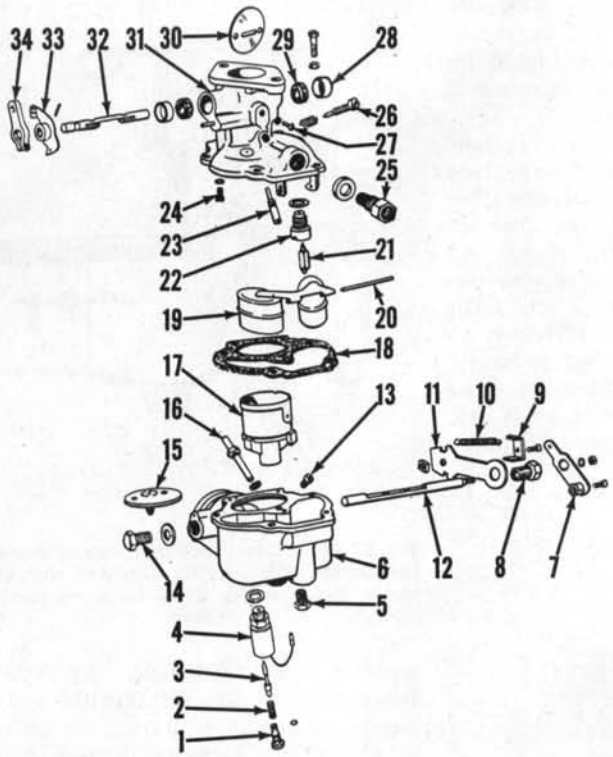


Fig. C176 — Exploded view of Zenith carburetor.

1. Adjusting screw
2. Spring
3. Load needle
4. Solenoid
5. Plug
6. Fuel bowl
7. Choke lever
8. Screw
9. Clamp
10. Spring
11. Bracket
12. Shaft
13. Well vent
14. Plug
15. Choke plate
16. Main jet
17. Venturi
18. Gasket
19. Float
20. Shaft
21. Needle valve
22. Seat
23. Idle jet
24. Economizer jet
25. Inlet screen
26. Idle needle
27. Lock screw
28. Retainer
29. Packing
30. Throttle plate
31. Throttle body
32. Throttle shaft
33. Lever
34. Lever

throttle body (31—Fig. C176) to fuel bowl (6) and remove fuel bowl. Remove float shaft (20), float (19) and float valve needle (21). NOTE: Float shaft (20) is a tight fit in slotted side of hinge bracket and should be removed from other side.

Remove venturi lock screw (27) and withdraw venturi (17). Remove float valve seat (22), idle jet (23), economizer jet (24), main nozzle (16) and well vent jet (13), and discard all removed gaskets.

Remove choke and throttle plates and shafts, inlet strainer (25) and idle mixture adjusting screw (26). Remove main adjusting screw (1) and withdraw spring (2) and main needle (3); then unscrew and remove solenoid (4).

Immerse all parts except solenoid (4) in a suitable carburetor cleaner, then rinse in mineral solvent. Blow out passages in body and bowl with compressed air and renew any parts which are worn or damaged. Inspect needle valve bore of solenoid (4). If deposits are present, dip THREADED END ONLY in carburetor cleaner or solvent, and remove the deposits. Needle valve must move freely in bore for satisfactory operation. Do not allow lead wire or plastic insulation to contact solvent.

Assemble by reversing the disassembly procedure, using new gaskets and packing. Throttle plate (30) has beveled edges to prevent binding. Make sure throttle plate is correctly installed and that edge of plate farthest from mounting flange aligns with idle port when closed. (See Fig. C175). Adjust float to 1 39/64-inch, measured from gasket surface to farthest edge of float. Adjust by carefully bending float arms with a bending tool or needle nose pliers, keeping the two float halves parallel and even.

Main valve needle (3—Fig. C176) is held against adjusting screw (1) by magnetic action when ignition switch is turned on; and closed against its seat by spring (2) when switch is off. Both the opening and closing of valve should be audible with carburetor installed and lead wire connected. Check mixture adjustments after installation as outlined in paragraph 78.

FUEL PUMP

Series 930CK (Gasoline)

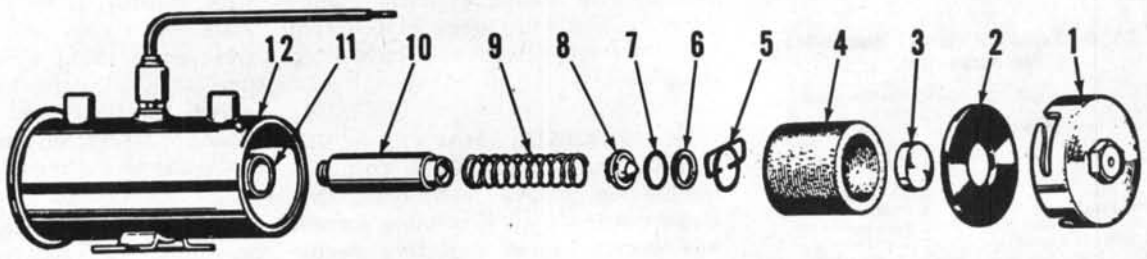
81. Series 930 Comfort King gasoline tractors are equipped with a Bendix electric fuel pump which is mounted underneath fuel tank on right side. Filter element (4—Fig. C177) should be renewed every 500 hours or when contaminated or plugged.

Service normally consists of renewing the complete pump, however the working parts can be disassembled and cleaned, which will often restore pumping efficiency.

Electrical system can be checked with an ohmmeter. Connect one lead of ohmmeter to fuel pump lead and ground the other ohmmeter lead. Coil resistance should be 4.87 - 6.4 ohms; if it is not, renew the pump.

To disassemble the pump, first shut off fuel and disconnect inlet and outlet fuel lines and the lead wire, then unbolt and remove pump. Use a wrench to release bottom cover (1) from bayonet fittings, then twist off cover and remove gasket (2), magnet (3) and filter (4).

Spread the hooked ends of retainer (5); then remove washer (6), "O" ring (7), cup valve (8), spring (9) and plunger (10). Clean all parts with a suitable solvent and blow out with air pressure, using care to protect lead wire from solvent.



1. Bottom cover
2. Gasket
3. Magnet
4. Filter
5. Retainer
6. Washer
7. "O" ring
8. Cup valve
9. Spring
10. Plunger
11. Tube
12. Body

Fig. C177 — Exploded view of Bendix electric fuel pump used on Series 930 Comfort King gasoline tractors.

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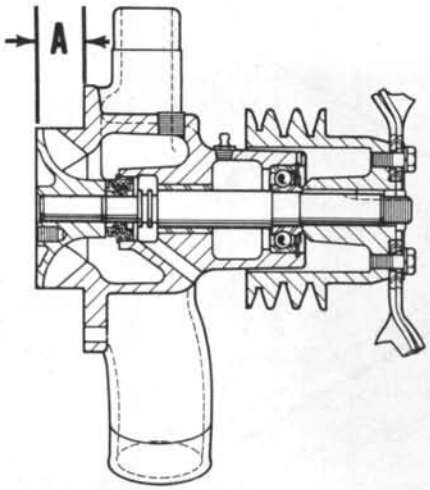


Fig. C215—Cross sectional view of water pump of the type used on all models except Series 1030. When assembling the pump, press impeller on shaft until distance (A) from gasket surface of housing to face of impeller measures 1.130—1.140 on Series 730 or 830; or 1.155-1.165 on Series 930.

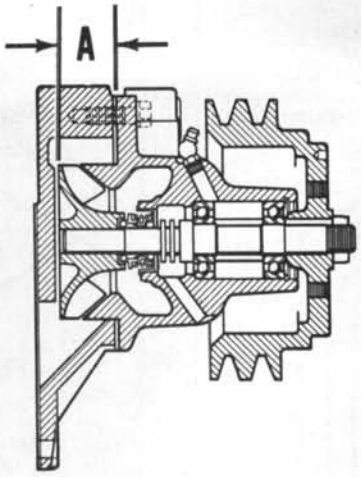


Fig. C215A—Cross sectional view of water pump of the type used on Series 1030. When assembling pump press impeller on shaft until distance (A) measures 1.424-1.434. Both shaft bearings are installed with shielded side towards front (pulley) end of shaft.

Remove the four screws retaining fan assembly to water pump shaft and lay fan blades forward against radiator; then unbolt and remove the pump.

Install by reversing the removal procedure. Tighten water pump mounting cap screws to a torque of 25 ft.-lbs. Be sure nut lock (2—Fig. C214) is properly positioned when installing fan. Adjust fan belts to provide a deflection of approximately ½-inch when measured midway between fan and generator pulley.

121. **OVERHAUL.** Impeller is a tight press fit on shaft and is drilled and tapped for attaching a puller. Fan pulley is keyed to shaft and retained by a nut. Remove impeller and fan pulley using suitable pullers.

Insert a small punch or similar tool through the hole provided in pump housing, and unseat and remove snap ring (7—Fig. C214). Shaft (12) and bearing (8) can now be removed.

Press out seal (13) using a ¾-inch diameter rod. Oilite bushing (11) can be removed and installed using a piloted arbor such as OTC C653, if clearance between bushing and shaft exceeds 0.006. Normal clearance is 0.002-0.004 in the 0.874-0.875 ID bushing.

Install seal in housing using a press and a short piece of 1⅝-inch OD steel tubing which will apply pressure to outer wall of seal only, until metal lip seats against wall of housing. Impeller used on Series 1030 has a renewable seat.

If ball bearing (8) is removed from shaft, install on threaded end of shaft open side first, and seat bearing against shaft shoulder. Pack the bearing with No. 2 gun grease (not water pump grease), working the grease into cage area around the balls. Fill body cavity of housing between bushing and bearing with No. 2 gun grease, press shaft and bearing assembly into housing using care not to damage bearing shield; then install snap ring. Install key (4), fan pulley (6) and retaining nut (5). Tighten nut to a torque of 60 ft.-lbs.

NOTE: Position nut lock (2) over nut and pulley at this time, and check to be sure retaining bolt holes can be aligned with threaded holes in pulley face. Tighten nut an additional amount, if necessary, to obtain perfect alignment.

Support fan end of water pump shaft on body of a press, and install impeller until distance is as shown at (A—Fig. C215 or C215A).

ELECTRICAL SYSTEM

CIRCUIT DESCRIPTION

All Models

122. All models use a 12-volt system with negative ground. Refer to Figs. C216 through C219 for typical wiring diagrams and wiring color code. Refer to the appropriate following paragraphs for data on system components.

DISTRIBUTOR

All Models

123. Prestolite and Wico systems are used. All models use a resistor and 6 volt coil. CAUTION: Wico and Prestolite system components are not interchangeable. If the distributor, coil or resistor are renewed, make sure parts are matched as shown in the following table:

Identification	Distributor	Coil	Resistor
Prestolite No.	IBT-4403	200576	.....
(Case No.)	(A 24506)	(A 24503)	(A 24504)
Prestolite No.	IBT-6403	200576	.....
(Case No.)	(A 24505)	(A 24503)	(A 24504)
Wico No.	X 30234	X 30089B	X 30061
(Case No.)	(A 20910)	(A 20949)	(A 20934)
Wico No.	X 30164	X 30089B	X 30061
(Case No.)	(A 21164)	(A 20949)	(A 20934)

124. **TIMING.** Recommended static timing is as follows: Series 730 Gasoline (Standard Clutch)—2° ATDC; Series 730 Gasoline (Case-O-Matic), all Series 730 LP-Gas—5° ATDC; Series 830 Gasoline—2° ATDC; Series 830 LP-Gas—TDC; Series 930 Gasoline—4° BTDC; Series 930 LP-Gas—2° ATDC.

Timing marks are located on crankshaft pulley and align with timing pointer on right side of timing gear cover cap (governor cover). To time the engine, first make sure points are correctly adjusted, No. 1 piston is on compression stroke; and the correct timing mark is aligned with timing pointer. Loosen distributor clamp, turn ignition switch to "ON" position

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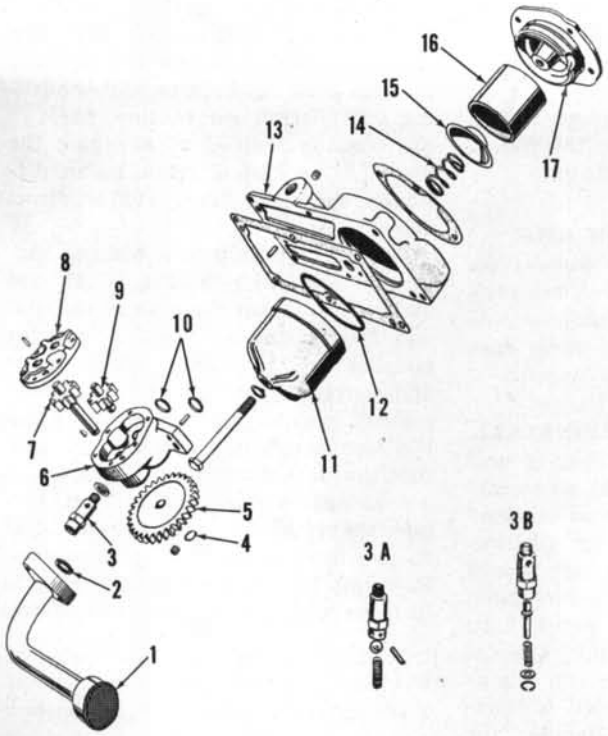


Fig. C251—Exploded view of Case-O-Matic oil pump, oil manifold and associated parts.

1. Intake pipe
2. Quad ring
3. Relief valve
3A. Early valve
3B. Late valve
4. Snap ring
5. Drive gear
6. Pump housing
7. Pump gear
8. Cover
9. Pump gear
10. Quad rings
11. Filter cover
12. "O" ring
13. Manifold
14. Spring
15. Retainer
16. Filter element
17. Filter body

unit was disassembled. Place the assembled unit in a spring tester and apply a pressure of 37 lbs. At the indicated pressure, the compressed height measured from extreme tips of plungers should be $2\frac{13}{16}$-inches.

No more than two shim washers (8) should be used. Never use a solid shim instead of a washer, as bleed hole in large plunger will be covered. Make sure bleed holes are open and clean by passing a small wire through the holes.

Check the plungers for free movement in their bores. A ½-inch wood dowel may be wedged in cup of small plunger (11) for checking fit in inner bore.

Orifice plug (14) will seldom need to be removed from housing, however, make sure orifice is open and clean and that plug is bottomed in its bore.

Assemble by reversing the disassembly procedure. Install as outlined in paragraph 147 and check clutch pressure as in paragraph 145.

149. **OVERHAUL (LATE VALVE).** Refer to Fig. C250. Withdraw plunger (14), spring (13) and detent ball (12). Remove the two snap rings (22) and interlock plates (21 and 23); then carefully withdraw direct drive spool (25).

Remove the cap screws retaining oil seal carrier (19) and remove carrier, being careful not to lose or damage clutch pressure adjusting shims (18). Remove snap ring (1), plug (2), pressure balance sleeve (4), pressure regulator sleeve (7) and spring (8).

Clean all metal parts in a suitable solvent. Examine valve spools (15 & 25), pressure regulator sleeve (7) and bores in valve body (9) for scoring and all parts for wear or damage. Slight irregularities can sometimes be removed with a fine hone or crocus cloth. Sleeve (7) and spools (15 & 25) must operate smoothly without binding. Regulator valve spring (8) should have a free length of approximately 1 29/64-inches and test 77-83 lbs. when compressed to a height of 1.04.

Install new seals (20 & 24) with spring loaded lip to inside. Renew "O" rings and gasket when valve is reassembled. Reassemble by reversing the disassembly procedure using Fig. C250 as a guide. Install the assembled valve as outlined in paragraph 147; adjust linkage as in paragraph 143 and clutch pressure as in paragraph 145.

OIL MANIFOLD

150. The oil manifold assembly is located on the right side of the torque convertor housing and includes the oil pump, suction pipe and the oil filter assembly (Refer to Fig. C251). Removal can be accomplished after removing the retaining cap screws and pulling the manifold from the dowel pins.

OIL PUMP

151. **R&R AND OVERHAUL.** The pump can be removed after first unbolting and removing the oil manifold then removing the two pump retaining cap screws. Remove snap ring (4—Fig. C251) from end of drive shaft, remove Allen head screw from gear (5) and remove the gear. Remove the retaining cap screws, then separate the pump cover (8) from the pump body (6). Gears (7 and 9) are pressed on shafts. Renew the two square section sealing rings (10) and all questionable parts. When reassembling, use a light coat of sealing compound on the mating surfaces of the pump body and cover and tighten the cover to body cap screws to a torque of 6 ft.-lbs.

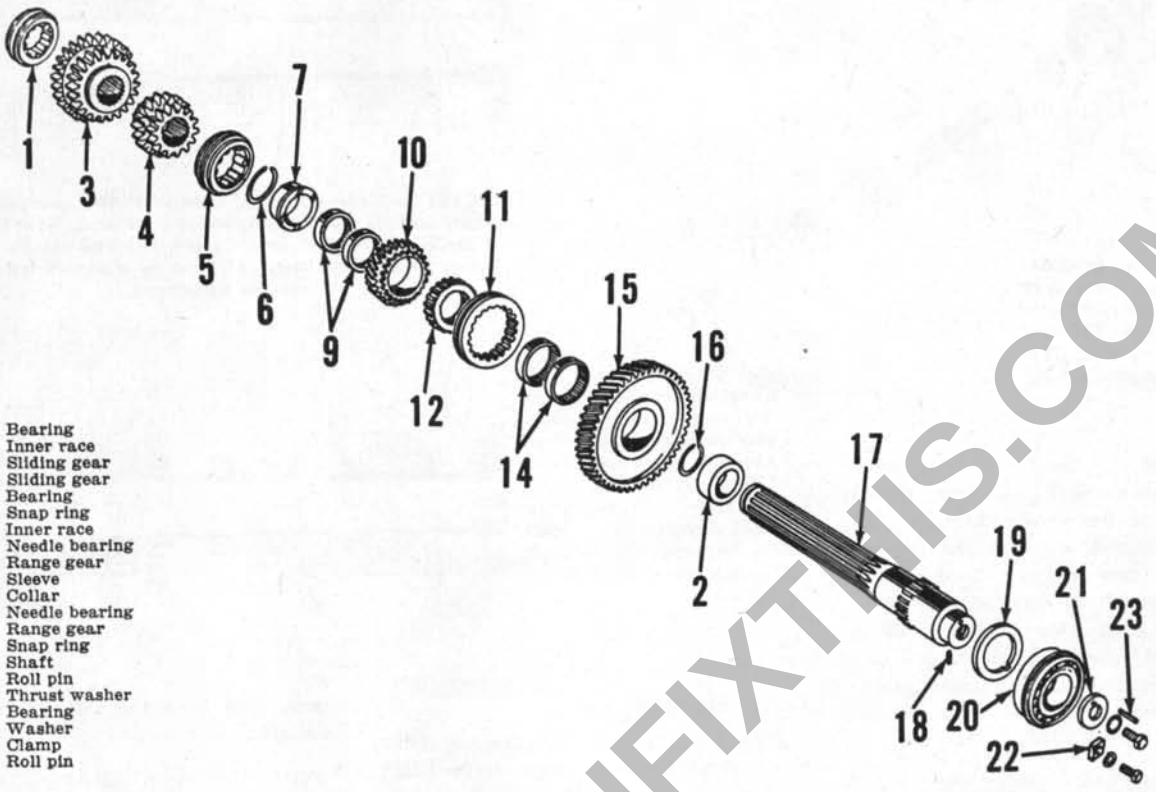
Two types of relief valve have been used; the ball-type relief valve (3A) was used in early models and the piston type relief valve (3B) in late models. Relief valves may be disassembled and parts renewed. The spring used in ball-type relief valve (3A) should have a free length of approximately $1\frac{31}{32}$-inches and should test 13 lbs. when the spring and steel ball are compressed to a combined height of 1.58 inches. The spring used in piston type relief valve (3B) should have a free length of approximately 1¼-inches and should test 12½ lbs. when spring (only) is compressed to a height of $\frac{13}{16}$-inch.

TRACTOR SPLIT

152. To detach the engine from the torque convertor housing, first drain cooling system, remove the hood and disconnect the head light wires. On models equipped with a radiator shutter, remove the grille and disconnect the shutter control wire. On standard, non-adjustable front axle models, disconnect the drag link and rear end of radius rod. On all models, disconnect heat indicator sending unit from water manifold, ammeter wire from generator, battery cables from batteries, starter solenoid wire from solenoid and oil cooler tubes from torque convertor control valve and oil manifold. Disconnect the hour meter cable and oil line from the engine block. On tricycle and adjustable axle models, loosen the clamp bolt on the steering shaft universal joint and unbolt the steering shaft support from the torque convertor housing.

On diesel models, shut off fuel and disconnect fuel lines at top of tank and shut-off valve. Decompress the engine and disconnect the decompression linkage at lower right front end

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1. Bearing
2. Inner race
3. Sliding gear
4. Sliding gear
5. Bearing
6. Snap ring
7. Inner race
9. Needle bearing
10. Range gear
11. Sleeve
12. Collar
14. Needle bearing
15. Range gear
16. Snap ring
17. Shaft
18. Roll pin
19. Thrust washer
20. Bearing
21. Washer
22. Clamp
23. Roll pin

Fig. C301 — Exploded view of sliding gear shaft used in early models. Refer to Fig. C297 for cross sectional view.

Examine range gear needle bearings (9 and 14). New bearings should be installed with a piloted arbor and a press, pressing only on lettered side of bearing cage and installing bearings slightly below flush with edges of gear bore. The special Case arbor A8347 is recommended for bearing installation in low range gear (10); and arbor A8356 for bearing installation in high range gear (15).

Install the shaft by reversing the removal procedure, using Fig. C301 as a guide. It will probably be necessary to bump the shaft the final distance into center bearing inner race (7); however, be sure collar (12) is not binding on shaft splines, and be careful not to damage bearings.

Late Models

181. To remove the sliding gear shaft, first remove range drive shaft as outlined in paragraph 177, 178 or 179. Refer to Fig. C302.

Remove bearing retainer plate (21) and clamps (22). Slide the range sleeve (11) forward and remove set screw (13); then slide the shaft forward out of transmission case, gears and bearings.

NOTE: It may be necessary to use sliding gear (3) to bump bearing inner race (2) off shaft.

Bearings (1 and 5) must be pressed forward out of their bores, if renewal is indicated. The retaining snap ring fits a groove in bearing outer race and enters a counterbore in housing walls. Series 930 and 1030 tractors use thrust bearing (8A) between center bearing and low range gear, instead of thrust washer (8) used on other models.

Front bearing (20) must be pressed from shaft before front thrust washer (19) can be removed. When installing, make sure roll pin (18) is in place in shaft, and that notch in thrust washer (19) fits over roll pin.

Install by reversing the removal procedure, using Fig. C302 as a guide. To prevent damage to rear bearing or snap ring (1), rear bearing inner race (2) must be installed and seated against shaft shoulder before inserting shaft into rear bearing. Use the special Case installing tool A33948, and proceed as follows: Pilot the tool in bearing (1) and insert race (2) in front bore of tool. Press shaft rearward until race (2) contacts shoulder of shaft (17). Slide the assembled shaft forward far enough to remove the tool; then complete the shaft installation.

REVERSE IDLER AND OIL SLINGER SHAFT

Two different reverse idler and oil slinger units have been used. Early units (Before Serial No. 8253501) use a one-piece shaft and bronze bushings in reverse idler gear as shown in Fig. C303. Late units (After Serial No. 8253500) use a two-piece shaft as shown in Fig. C304, and reverse idler gear is equipped with needle roller bearings. Refer to the appropriate following paragraphs for service procedures.

Early Models

182. To remove the reverse idler and oil slinger gears, first remove sliding gear shaft as outlined in paragraph 180. Using an Allen wrench as shown in Fig. C305, remove locking screw (4—Fig. C306); then, withdraw shaft (1) forward out of housing while lifting reverse idler gear (3) and oil slinger gear (2) out top opening.

The 1.435-1.436 diameter reverse idler shaft (1) should have a clearance of 0.0025-0.0045 in bushings of reverse gear (3). Bushings are factory

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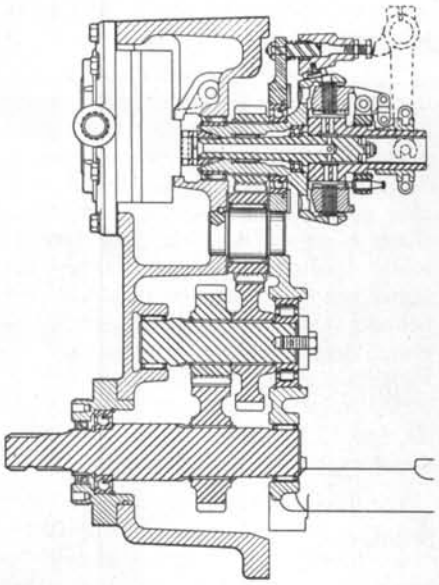


Fig. C340 — Cross sectional view of pto drive train used on late models. PTO clutch is located on input shaft and is equipped with a brake.

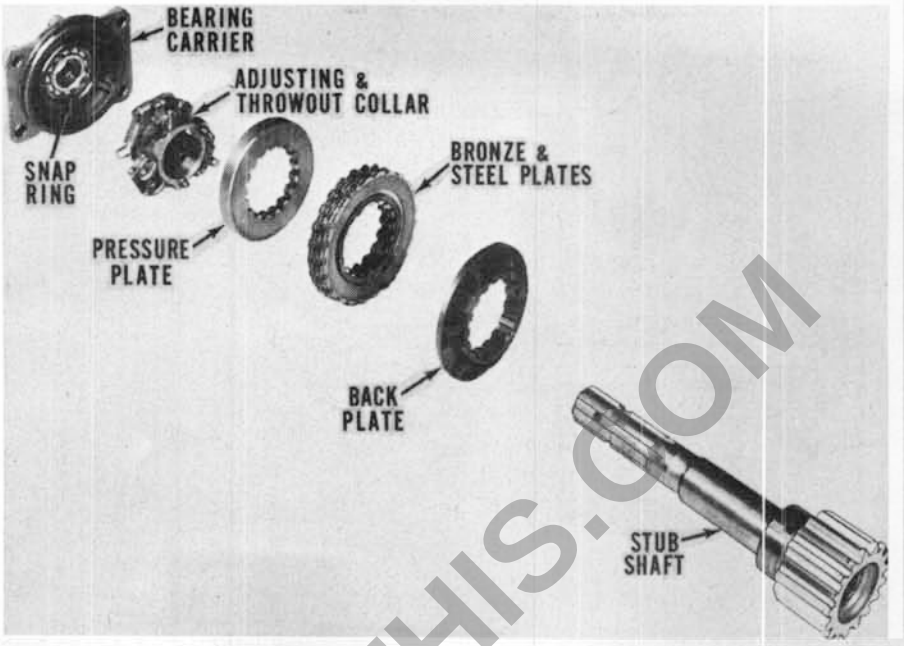


Fig. C342 — Exploded view of output (stub) shaft, bearing carrier and pto clutch unit used on early models.

pin using forked end of adjusting tool. While holding lock pin disengaged, turn output (stub) shaft counterclockwise as indicated by arrow, until the other lock pin drops into a notch in pressure plate.

Recheck the adjustment and repeat the procedure if necessary, until correct adjustment is obtained.

214. **REMOVE AND REINSTALL.** The pto clutch and output shaft assembly can be removed as a unit from pto housing without removing housing from tractor; proceed as follows:

Drain the hydraulic system reservoir and disconnect hose lines and control rods from hydraulic system valve housing; then remove pump and valves unit as outlined in paragraph 239. Engage the clutch by pulling control lever fully rearward. Disconnect control rod from throwout arm and, working through pump mounting opening, loosen the two cap screws retaining throwout fork to shaft. Withdraw the throwout shaft and lift out throwout fork. Remove the four cap screws retaining output shaft bearing carrier to pto and hydraulic housing, then withdraw clutch and output shaft as a unit.

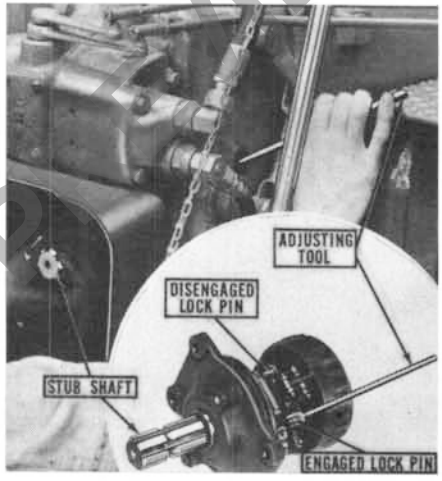


Fig. C341 — To adjust the clutch on early models, insert adjusting tool through access hole and disengage lock pin, then turn stub shaft as shown.

Refer to paragraph 215 for overhaul procedures. Install by reversing the removal procedure, using a new sealing "O" ring on output shaft bearing carrier. Tighten bearing carrier retaining stud nuts to a torque of 80 ft.-lbs.

215. **OVERHAUL.** To disassemble the removed pto clutch, refer to Fig. C342. Remove the snap ring from rear end of pto shaft and press the stub shaft forward out of bearing carrier and oil seal sleeve.

Pull the clutch adjusting lock pins outward and unscrew adjusting collar; then lift off pressure plate, clutch plates and back plate. Inspect and renew any parts which are worn, scored or otherwise damaged. Needle pilot bearings can be removed from stub shaft pilot bore with an expanding bearing puller. A special Case arbor (A-9031) is available for installing and positioning the rear bearing. Use Case arbor (A-9032) for installing front bearing. Press only on lettered end of bearings, and do not bottom bearings in bores when reinstalling.

Reassembly of the clutch will be simplified if an extra clutch drum is used as a jig. If a spare drum is not available, stub shaft can be reinserted in the installed housing for clutch assembly. Alternately install the seven bronze drive plates and separator springs; and the six steel driven plates. Install pressure plate with smooth side toward the clutch plates. Screw adjusting & throwout collar onto stub shaft until plates are slightly compressed when clutch is engaged.

Engage the clutch before removing the assembled unit from drum, so external lugs on drive plates will remain in alignment. If plates are misaligned, it will be impossible to reinstall clutch unit in tractor.

Overhaul of clutch drum or any part of pto gear train requires removal of pto & hydraulic housing as outlined in paragraph 218. Install the assembled unit as outlined in paragraph 214 and adjust as in paragraph 213.

Late Models

216. **ADJUSTMENT.** The pto clutch is correctly adjusted when a push of 60—70 lbs. (measured at end of hand lever) is required to engage the clutch. Clutch should engage with a decided snap.

To adjust the clutch, disengage clutch by pulling the hand lever fully rearward. Remove the round hand hole cover from right rear side of transmission housing. Pull out on the

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