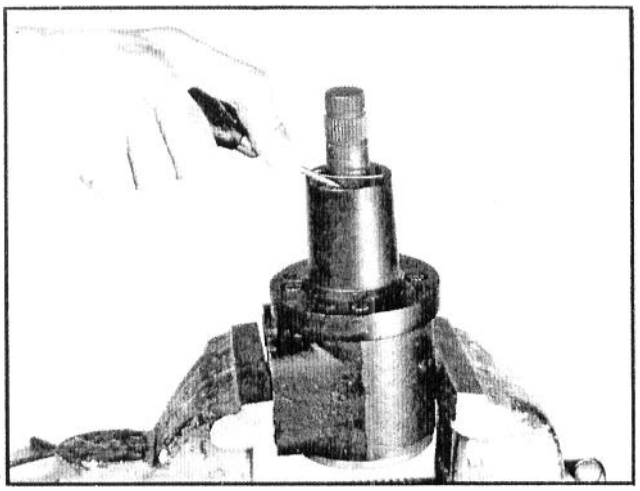


FIG. 13 — REMOVING RETAINING RING

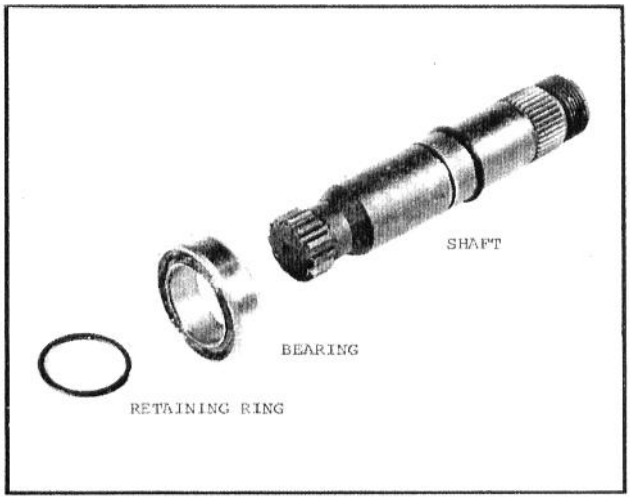


FIG. 15 — INPUT SHAFT AND BEARING

in solvent and blow dry with air. Do not wipe or clean the components with shop cloths or towels. Lint deposited by these can disrupt the function of the pump or cause leaks.

2. After hand pump has been properly cleaned (preceding paragraphs), remove the metering end of the pump as shown in Fig. 12.

3. Reposition unit in vise, remove retaining ring and remove input shaft and bearing as shown in Figs. 13 and 14. If bearing must be replaced, remove retaining ring from one side of bearing and remove bearing, Fig. 15.

4. Remove capscrews and remove housing as shown in Fig. 16. Remove and discard "O"-ring and seal. Remove bushing.

5. To remove the check valve components, proceed as follows:

a. Bend a 3/32" brass welding rod to form a 90° angle. (Make "leg" about 5/16" long.)

b. Remove plug from "Out" port and insert rod into port. Remove plug as shown in Fig. 17.

c. Unscrew valve seat. Tap pump against palm of hand and remove ball and spring, Fig. 18.

6. Remove spool and sleeve from 14-hole

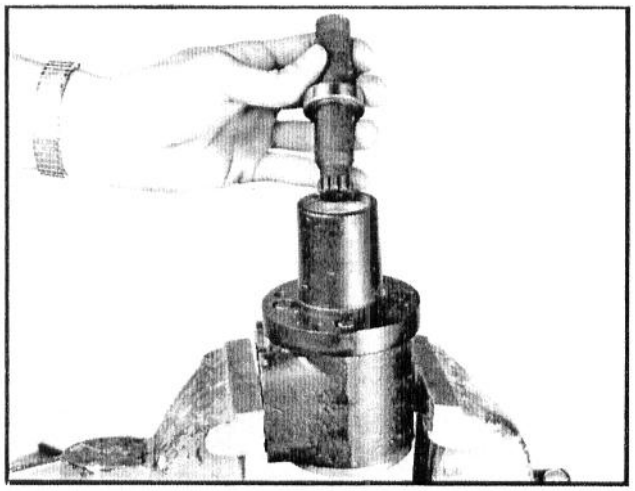


FIG. 14 — REMOVING INPUT SHAFT

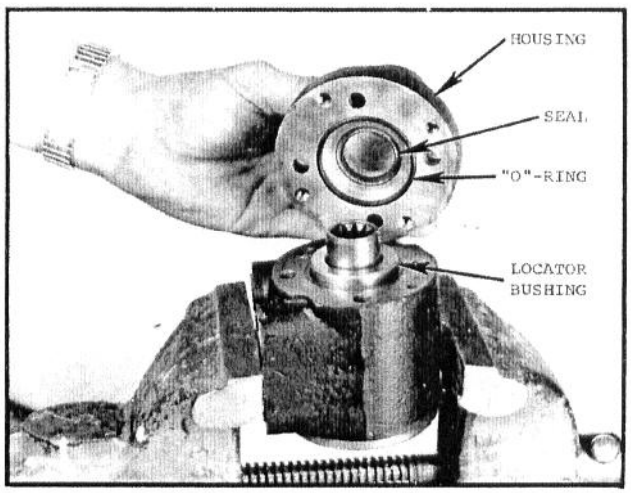


FIG. 16 — REMOVING SHAFT HOUSING

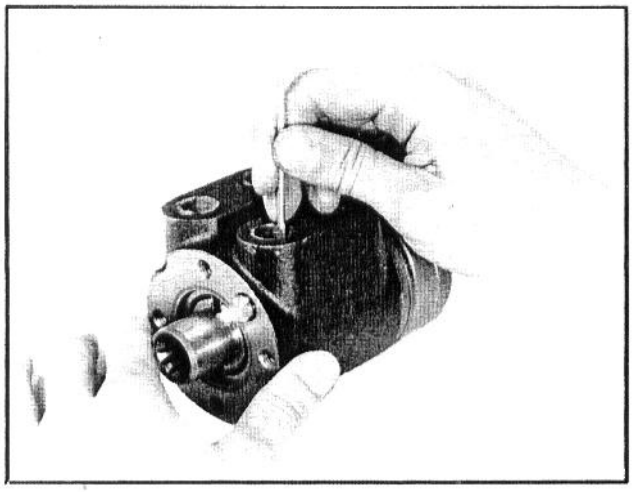


FIG. 17 — REMOVING PLUG

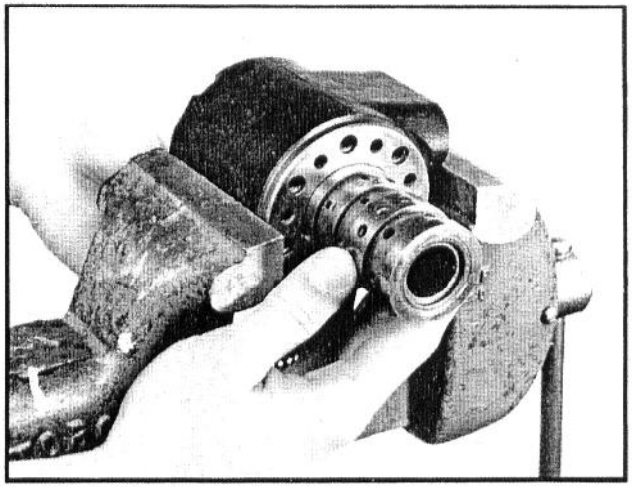


FIG. 19 — REMOVING SPOOL AND SLEEVE

end as shown in Fig. 19. Be careful to prevent these parts from binding. They are precision-fitted and must be rotated slightly as they are withdrawn.

7. Remove the two pin discs and remove the cross pin from the spool and sleeve as shown in Fig. 20. Remove spool from sleeve as shown in Fig. 21.

8. Remove centering spring set (Fig. 23) from spool. Thoroughly clean all parts of the hand pump in clean solvent and blow dry with air.

9. To remove burrs or scratches from metering section, proceed as follows:

a. Place a piece of 600 grit abrasive paper on an extremely flat, clean hard surface. If abrasive is new, remove the sharp grit by rubbing it over a piece of scrap steel.

b. Lightly stroke both sides of the gerotor, stator and spacer, Fig. 22. Lightly stroke the 14-hole end of the housing and the flat side of the cover plate.

c. Stroke each surface across the abrasive several times and observe the part. Any small bright area near an edge indicates a burr that must be removed.

d. After polishing each part, rinse in clean

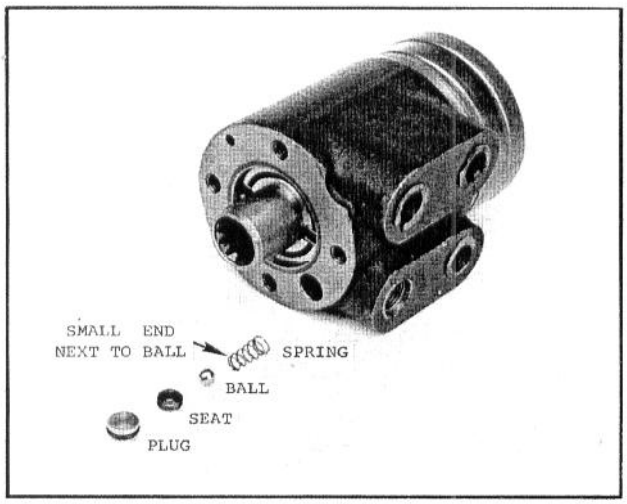


FIG. 18 — CHECK VALVE ASSEMBLY REMOVED

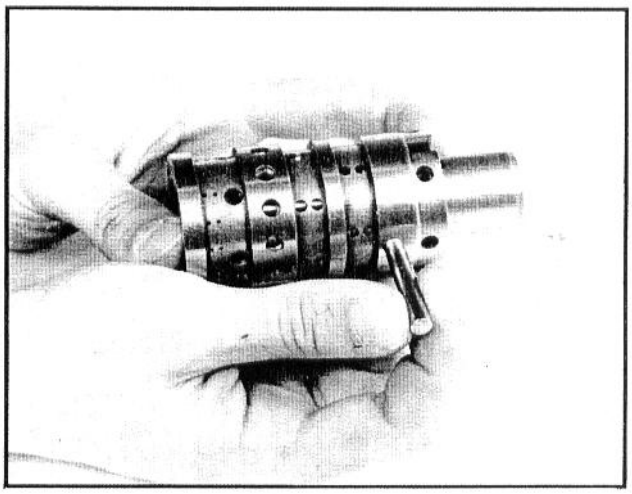


FIG. 20 — REMOVING CROSS PIN

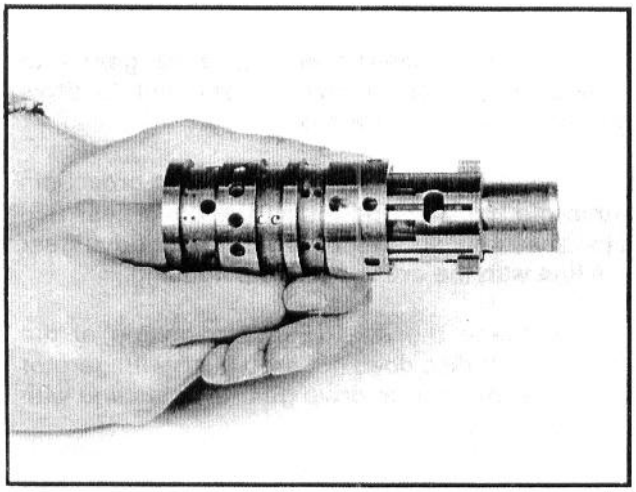


FIG. 21 — REMOVING SPOOL FROM SLEEVE

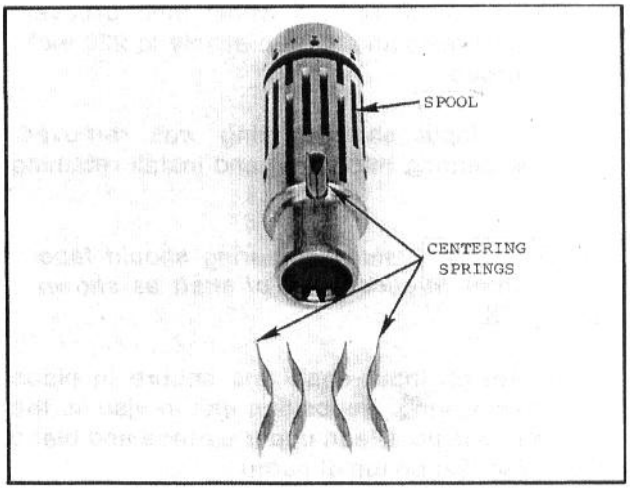


FIG. 23 — CORRECT POSITIONING OF CENTERING SPRINGS

solvent and blow dry. Keep these parts absolutely clean.

10. Drop check valve spring, Fig. 18, into hole (large end first) and drop ball on top of spring. Install seat and tighten to 150 inch-pounds torque. Install plug, using a new "O"-ring.

11. Position the six centering springs, Fig. 23, on the bench. Insert one pair of springs into the spool slot so the arch is in the middle. Now insert the remaining springs, one at a time, between the installed springs. (Alternate sides each time.)

12. Dip spool and sleeve into clean hydraulic oil and insert spool into sleeve so springs will be at same end as slots.

13. Center the spring set in the parts so the ends push down evenly and flush with the end surface of the spool and sleeve. Install cross pin with one disc at each end of pin.

14. Dip assembly into clean hydraulic oil and install through the 14-hole end of the housing, rotating the spool slightly to prevent binding.

15. Reposition pump in vise and install new locator bushing, "O"-ring and seal as shown in Fig. 16. Insure that large O.D. chamfer in bushing is next to input shaft housing.

16. Install input shaft housing, making sure

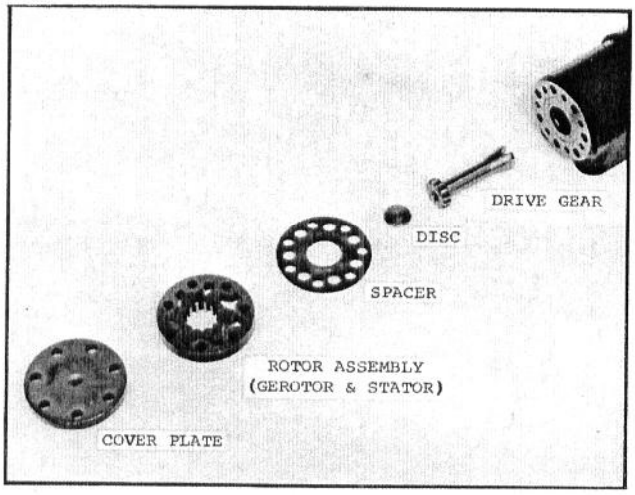


FIG. 22 — METERING END COMPONENTS

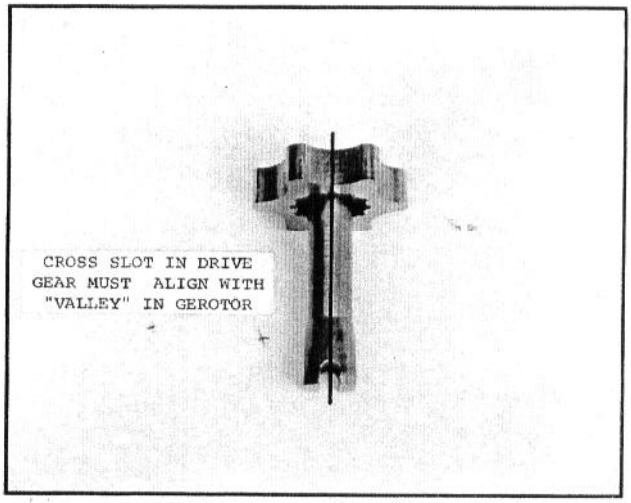


FIG. 24 — DRIVE GEAR CORRECTLY TIMED TO GEROTOR

"O"-ring and seal remain within their grooves. Install capscrews and tighten evenly to 220 inch-pounds torque.

17. If input shaft bearing was removed, slide new bearing into place and install retaining ring.

NOTE: "Open" side of bearing should face away from threaded end of shaft as shown in Fig. 15.

18. Install input shaft and secure in place with retaining ring. Reposition unit in vise so the 14-hole end is up. Clean upper surface and place spacer, Fig. 22, on top of pump.

19. To install the drive gear, refer to Fig. 24 and proceed as follows:

a. Push splined end of drive gear into splines in gerotor, aligning cross slot in drive gear with "valley" in gerotor.

b. Note the direction of the cross pin within the housing and install the drive gear and rotor assembly so the cross slot in the drive gear is in line with the cross pin in the housing.

20. Place the disc (Fig. 22) on top of the drive gear. If disc does not drop flush with gerotor surface, cross slot in drive gear is not in line with cross pin in housing.

21. Install cover plate. Tighten capscrews evenly to 250 inch-pounds torque.

SERVICING THE STEERING VALVE (For Ross Hand Pump Only)

The steering valve is a single-spool, open-center, control valve, spring-loaded to the neutral position. The valve is mounted under the left-hand side of the instrument housing.

When there is no steering action by the operator, the valve will remain in neutral and the oil will flow through the valve and back to the engine driven hydraulic pump. An integral steel ball check valve prevents oil flow from the pressure port to the return port to the pressure port in all positions except center. (For added information concerning the system flow, refer to the heading "Power Steering Operation".)

REMOVING THE STEERING VALVE

Refer to Fig. 25.

1. Check that engine is not running and open the tractor hood.

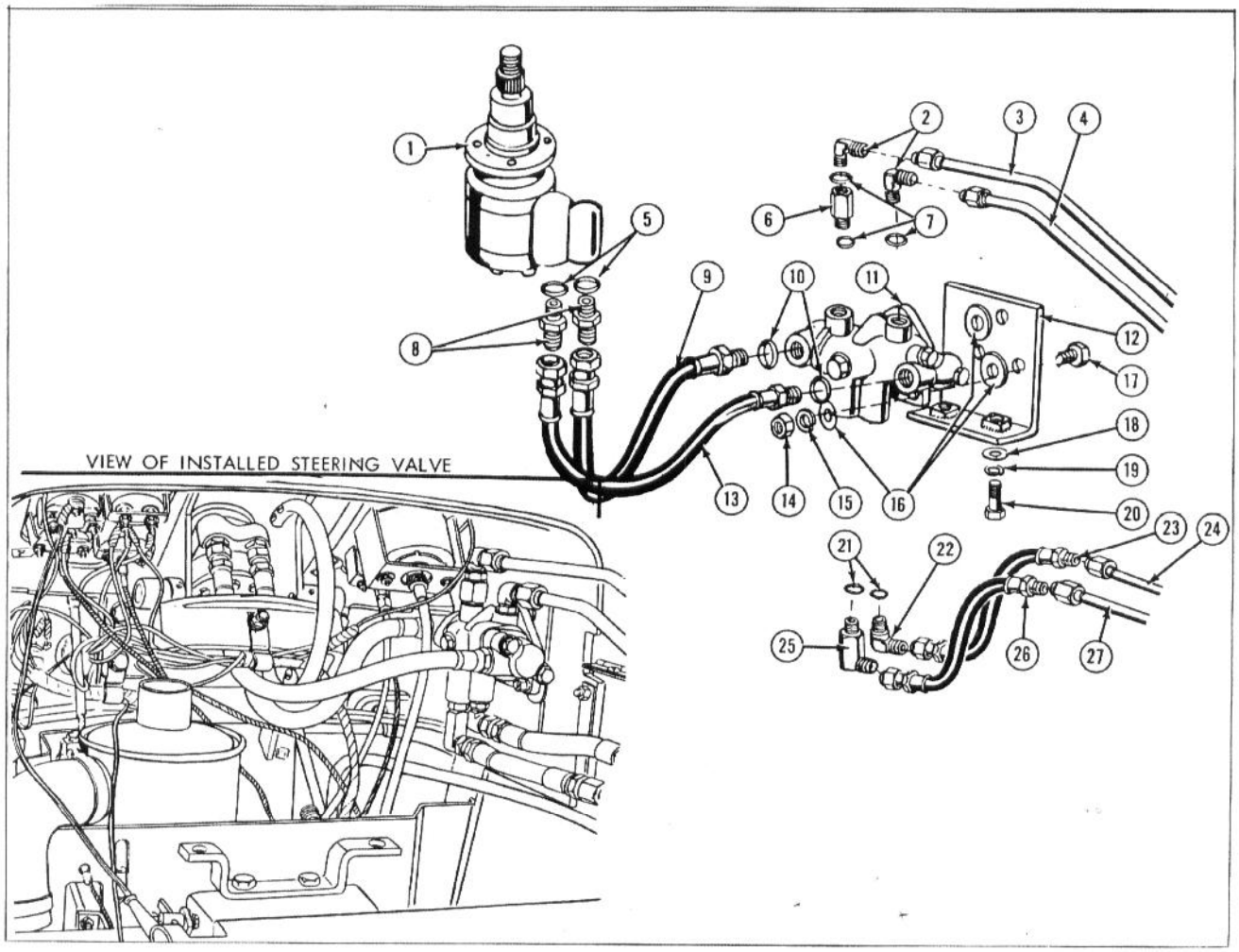


FIG. 25 — STEERING VALVE AND CONNECTIONS

1. Hydrostatic Hand Pump
2. Elbow Assembly — Valve to Tubes
3. Tube Assembly — Valve to Right Turn Port
4. Tube Assembly — Valve to Left Turn Port
5. "O"-Rings — Connectors
6. Reducer
7. "O"-Rings
8. Connectors
9. Hose Assembly — Hand Pump to Valve
10. "O"-Rings
11. Steering Valve
12. Mounting Bracket
13. Hose Assembly — Hand Pump to Valve
14. Nut
15. Lockwasher
16. Flatwashers
17. Bolt — Bracket to Valve
18. Flatwasher
19. Lockwasher
20. Bolt — Bracket to Housing
21. "O"-Rings
22. Elbow Assembly — Pressure
23. Hose Assembly — Pressure
24. Tube Assembly — Pressure
25. Elbow Assembly — Return
26. Hose Assembly — Return
27. Tube Assembly — Return

2. Disconnect hose assemblies, Nos. 9 and 13, from the end cap ports of the steering valve, No. 11. Install caps on hose assemblies to prevent entry of foreign material into the system.

3. Disconnect pressure hose, No. 23, and return hose, No. 26, from their respective ports at the bottom of the steering valve and install plugs in hose assemblies.

4. Disconnect both tube assemblies, Nos. 3 and 4, from their respective ports at the top of the steering valve.

5. Remove the two bolts, No. 20, lockwashers, and flatwashers securing the valve bracket, No. 12, to the L.H. side of the instrument housing. Remove the steering valve and mounting bracket from the tractor as a unit.

6. Install plugs in tube assemblies, Nos. 3 and 4, to prevent entry of foreign materials into the system.

7. Remove the three bolts, No. 17, flatwashers, No. 16, lockwashers, No. 15, and nuts, No. 14, fastening the valve to the mounting bracket.

DISASSEMBLY OF THE STEERING VALVE

1. Thoroughly clean the outside of the steering valve and place the valve in a vise, with the mounting pad surface between the vise jaws.

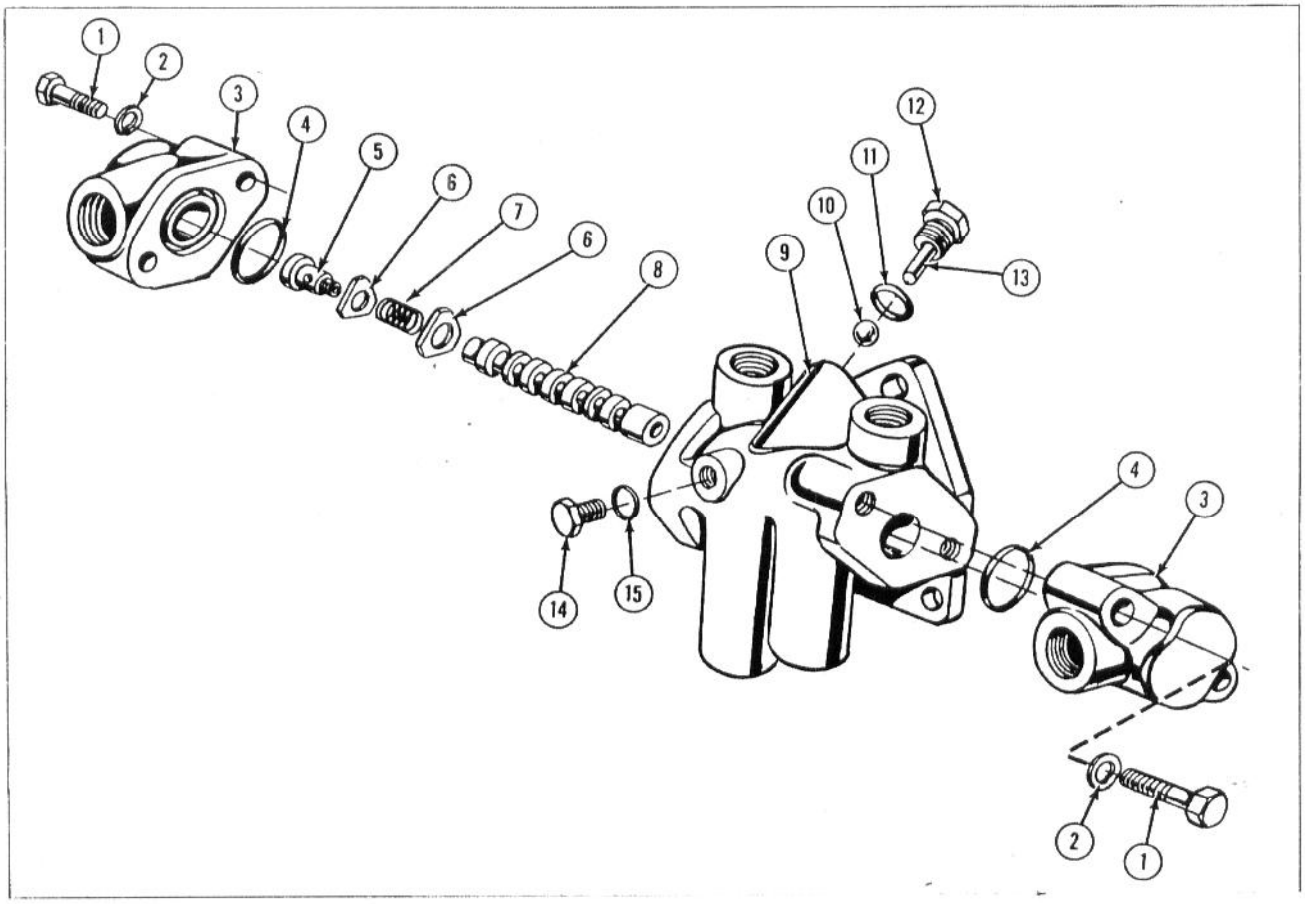


FIG. 26 — EXPLODED VIEW OF STEERING VALVE

1. Bolts — End Cap
2. Washers
3. End Caps
4. "O"-Rings — End Caps
5. Screw — Spring Retaining
6. Washers
7. Centering Spring — Valve Spool
8. Valve Spool
9. Valve Body
10. Ball (Steel)
11. "O"-Ring
12. Plug Assembly
13. Roll Pin
14. Plug
15. "O"-Ring

2. Remove elbows, No. 2, Fig. 25, reducer, No. 6, and "O"-rings, No. 7, from the top ports of the valve.

3. Remove elbows, Nos. 22 and 25, Fig. 25, and "O"-rings, No. 21, from the bottom ports of the valve.

4. Refer to Fig. 13 and remove the two bolts, No. 1, and washers, No. 2, fastening the end caps, No. 3, to the valve body.

5. Separate the end caps from the body and remove the "O"-rings, No. 4, from the caps.

6. Slide the valve spool, No. 8, from the spool bore by pulling centering spring end of spool away from valve body.

7. With a narrow "drift" inserted through a hole in the valve spool, No. 8, and a "drift" inserted through the hole in the spring retaining screw, No. 5, turn the screw from the spool.

8. Slide the centering spring washers, No. 6, and the spool centering spring, No. 7, from the retaining screw.

9. Remove plug, No. 14, and "O"-ring, No. 15, from valve body.

10. Remove the valve body from the vise and place on the bench with the steering cylinder ports up.

11. Remove plug assembly, No. 12, and "O"-ring, No. 11, from the top of the valve. Tilt the valve slightly to remove steel ball, No. 10.

INSPECTION OF THE STEERING VALVE

1. All "O"-ring seals are to be replaced with new parts. Thoroughly clean and dry all other parts of the steering valve.

2. Inspect the ports of the valve body for nicked or burred threads and obstructions. (If excessive internal leakage of the valve has been determined, replace the steering valve assembly. Valve body and valve spool are mated parts and are not available as separate items.)

3. Inspect the valve spool for nicks and scratches. (If excessive internal leakage has been experienced, replace the steering valve assembly.)

4. Check plug assembly, No. 12, Fig. 26, for nicked or burred threads and damage to the roll pin, No. 13. Check steel ball, No. 10, for pits and scratches.

5. Check plug, No. 14, Fig. 26, for nicked or burred threads.

6. Inspect spring retaining screw, No. 5, Fig. 26, for obstructions and damage to the threads. Check that centering spring, No. 7, is not broken.

7. Inspect end caps, No. 3, Fig. 26, for damage to the mating surfaces and "O"-ring grooves. Check the threaded ports for nicks, burrs, and obstructions.

8. Check tie bolts, No. 1, Fig. 26, for nicked or burred threads.

REASSEMBLY OF THE STEERING VALVE

Refer to Fig. 26. Thoroughly saturate new "O"-rings, Nos. 4, 11 and 15, in clean hydraulic oil.

1. Assemble spring retaining washers, No. 6, and the spool centering spring, No. 7, to the spring retaining screw, No. 5.

2. Install the spring retaining screw into the threaded end of valve spool. Tighten screw until it is firmly seated against the facing surface of the spool. (Check that centering spring washers can both be moved freely to compress the centering spring.)

3. Install new "O"-ring, No. 11, on plug assembly, No. 12, and check that roll pin, No. 13, is inserted into center of plug.

4. Drop steel ball, No. 10, into the hole in valve body from which it was removed and install plug assembly, No. 12.

5. Install new "O"-ring, No. 15, on plug, No. 14, and thread the plug into valve body. Tighten plug to prevent external leakage.

6. Slide valve spool, No. 8, into spool bore

from the return port end of valve body. (Spool centering spring is to be on the return port side of valve body.)

7. Insert new "O"-rings, No. 4, into the grooves in both end caps, No. 3, and secure the caps to the valve body with tie bolts, No. 1, and washers, No. 2.

8. Place the steering valve in a vise with the mounting pad surface between the vise jaws.

9. Torque tie bolts, No. 1, Fig. 26, to 22-27 ft.-lbs.

10. Place new "O"-rings, No. 21, Fig. 25, on elbows, Nos. 22 and 25, and install the elbows in their respective pressure and return ports. (Position elbows so they will be toward the front of the tractor when valve is installed.)

11. Place new "O"-ring, No. 7, Fig. 25, on reducer, No. 6, and install the reducer into its respective port on valve body.

12. Place new "O"-rings, No. 7, Fig. 25, on elbows, No. 2, and install the elbows into their respective ports in valve body. (Position elbows so they be toward the front of the tractor when valve is installed.)

REINSTALLING THE STEERING VALVE

Refer to Fig. 25.

1. Attach steering valve, No. 11, to mounting bracket, No. 12, with bolts, No. 17, flatwashers, No. 16, lockwashers, No. 15, and nuts, No. 14. (Bolts are to be installed with the heads next to the mounting bracket. Flatwashers are to be installed between the steering valve and mounting bracket as well as between lockwashers and steering valve.)

2. Remove plugs from tube assemblies, Nos. 3 and 4, and inspect the threads for nicks and burrs.

3. Position the steering valve and mounting bracket onto the pad located under the instrument housing on the left-hand side of the tractor.

4. Secure the mounting bracket to the instrument housing with bolts, No. 20, lockwashers, No. 19, and flatwashers, No. 18.

5. Connect tube assemblies, Nos. 3 and 4, to their respective elbow fittings.

6. Remove plugs from the pressure and return hose assemblies, Nos. 22 and 26, and check the threads for nicks and burrs. Connect the hose assemblies to the elbows installed into their respective valve ports.

7. Remove caps from hose assemblies, Nos. 9 and 13, and install new "O"-rings, No. 10. Connect hose assembly, No. 9, to the steering valve end port toward rear of tractor and connect hose assembly, No. 13, to end port toward front of tractor.

8. Refer to the heading "Filling the Steering Reservoir", and service the system with fluid.

STEERING CYLINDER

MF Part Nos. 519 283 M91, 519 284 M91 and 508 555 M91

1. Drain the oil trapped inside the cylinder and place the cylinder in a holding fixture.

2. Remove ball end, No. 1, and star washer, No. 3, Fig. 27.

3. Unscrew cap, No. 6, and pull piston and rod assembly from inner tube, No. 2.

4. Remove seal, No. 4, and scraper, No. 5, from inner diameter of cap. Remove ring, No. 7, from outer diameter.

5. Remove "O"-ring, No. 10, and slip ring, No. 11, from piston.

6. Thoroughly clean all parts of the cylinder. Ring, No. 7, seal, No. 4, scraper, No. 5, "O"-ring, No. 10, slip ring, No. 11, and star washer, No. 3, are to be replaced with new components.

7. Inspect all components for wear and damage.

8. Dip new seal, scraper, ring, "O"-ring and slip ring in clean hydraulic oil.

9. Install new scraper and seal in cylinder cap. Install new ring, No. 7, Fig. 27, in its groove.

10. Install new "O"-ring and slip ring on piston.

11. Carefully insert inner tube into barrel.

12. Apply a light coating of clean hydraulic oil to inner tube and piston. Carefully slide into inner tube.

13. Place cylinder in a holding fixture and install cap. Insure that inner tube seats properly against the end of the cylinder barrel and the cap. Tighten cap to 300 ft.-lbs. torque.

14. Install star washer and ball end assembly.

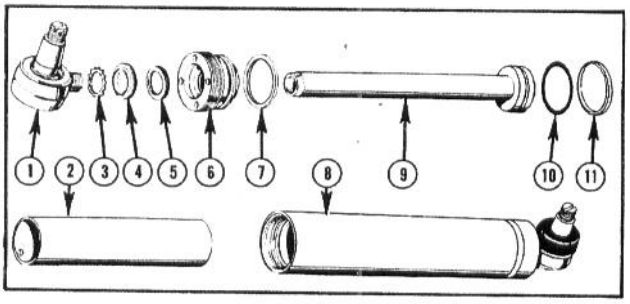


FIG. 27 — EXPLODED VIEW OF STEERING CYLINDER

1. Ball End
2. Inner Tube
3. Star Washer
4. Seal
5. Scraper
6. Cap
7. Ring
8. Barrel
9. Piston and Rod
10. "O"-Ring
11. Slip Ring

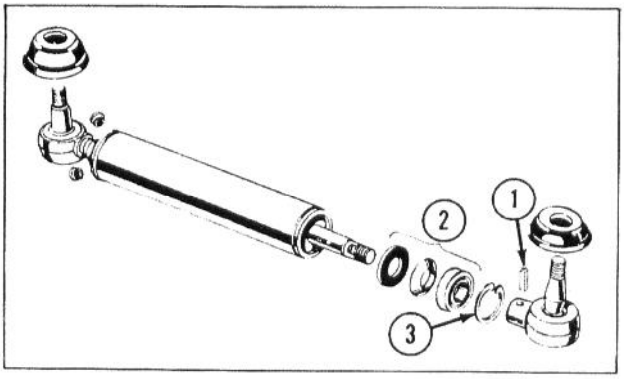


FIG. 28 — STEERING CYLINDER AND SEAL KIT

1. Roll Pin
2. Seal Kit
3. Retaining Ring

STEERING CYLINDER — MF PART NOS. 519 283 M91 AND 519 284 M91

Manufacturer's Part No. (Benton Corp.)	15300 A
Type	Double-acting
Bore	1.60"
Rod Diameter	.875"
Stroke	5.813"
Ports (2)	9/16"—18 "O"-ring

STEERING CYLINDER — MF PART NO. 508 555 M91

Manufacturer's Part No.	15200
Type	Double-acting
Bore	1.60"
Rod Diameter	.875"
Stroke	7.38"

STEERING CYLINDER

MF PART NO. 192 749 M92

The only servicing that is to be made on the cylinder is to replace the seal kit. This is done by removing the snap ring and replacing the seal kit.

STEERING CYLINDER — MF PART NO. 192 749 M92

Manufacturer's Part No. (Benton Corp.)	12700
Type	Double-acting
Bore	1.495"
Rod Diameter	.623"
Stroke	5.1875"

INSTALLATION

1. Position cylinder in place and secure with locknuts. Tighten to 90 ft.-lbs. torque.

2. Remove plugs and connect lines.

3. Start engine and operate steering wheel to its extreme of travel in both directions.

4. Refer to "Filling the Steering System Reservoir" and fill the reservoir.

FRONT AXLE

REMOVAL

1. Remove muffler and hood assembly. Disconnect battery.

2. Support the rear of the loader side frames. Disconnect the side frames from the axle housings.

3. Remove the bottom bolt that secures each side frame to the hardnose. Loosen each top bolt.

4. Disconnect and remove the alternator.

5. Drain the cooling system and disconnect the radiator hoses. Disconnect the hoses at the steering cylinders.

6. Place adequate support under the axle. Position a floor jack under the transmission. Remove the mounting bolts securing the axle support to the engine.

7. Very carefully pull the engine away from the axle support. (If unit being serviced is a gasoline model, exercise special care to prevent damage to the distributor.)

8. To make the unit more rigid, reinstall the two bolts securing the loader side frames to the hardnose.

9. Remove pump drive. Remove pump mounting bolts and position pump out of the way.

10. Cut the retaining wire and remove the pivot pin screw.

11. Place a stand beneath the axle. Position a bar across the loader side frames and wire the radiator to the bar. Remove the radiator mounting bolts.

12. Position a jack beneath the axle support. Attach a sliding hammer puller and remove the pivot pin.

13. Lower the axle support while at the same time maneuvering it away from the hardnose.

14. Remove the thrust washers and shims from the axle support.

15. Do not remove pivot pin bushings unless their condition warrants replacement. If bushings must be replaced, proceed as follows:

a. Remove old bushings from support.

b. Press new bushings in place so the grease hole is on top.

c. If necessary, ream bushings to an inside diameter of 2.000-2.002".

INSTALLATION

1. Fill cavities and grease inner diameter of bushings with grease conforming to MF Specifications M-1105 prior to assembly of pivot pin.

2. Maneuver the axle support into position and temporarily install the pivot pin with one thrust washer on each side of the support. Be sure to locate the recess for the pivot pin screw on the top. Install pivot pin screw.

3. Install the radiator mounting bolts and remove the bar that was used to support the radiator.

4. Very carefully join the axle support to the engine. Install spacers and mounting bolts.

5. With the front of the unit supported so the wheels are free to rotate, measure the distance between the axle and the axle support.

6. If there is not a .002-.010" clearance, the axle support must be separated from the engine, the pivot pin must be pulled just far enough to allow new shims to be installed, and a sufficient number of shims that will allow a .002-.010" clearance must be installed.

7. After the proper thickness of shims has been installed, reinstall the pivot pin. Install pivot pin screw. Secure in place with retaining wire.

8. Install the radiator mounting bolts and remove the bar that was used to support the radiator (if this procedure was repeated).

9. Install pump drive and hydraulic pump.

10. Very carefully join the axle support to the engine. Install spacers and mounting bolts.

11. Connect steering lines and radiator hoses. Fill the cooling system. Install the alternator.

12. Connect the side frames to the rear axle housings. Tighten bolts to 100-125 ft.-lbs. torque. Install battery, hood and muffler.

13. Refer to the heading "Filling the Steering System Reservoir" and fill the reservoir.

TOE-IN ADJUSTMENT

1. Measure between the tire centers (at hub height) at both front and rear of the wheels.

2. If the front measurement is not 0-5/16" less than the rear measurement, loosen the locknut on each end of the rod.

3. Shorten or lengthen the tie rod by turning the center tube. After correct measurement is reached tighten locknuts to 75-100 ft.-lbs. torque.

STEERING AXLE WHEEL BEARINGS

1. Remove wheels from hubs.

2. Remove hugs from spindles and thoroughly clean bearings in a suitable cleaning solvent. Remove old grease from inside hubs.

3. Reinstall bearings into hubs. Using a No. 2 lithium base bearing grease (MF Spec. M-1105), pack bearings and spaces outward from bearings full. Spaces between bearings (hub interior) must be packed half full.

4. Install hubs onto spindles and wheels onto hubs.

5. Install washer and adjusting nut onto spindle. Tighten adjusting nut to 70 ft.-lbs. torque while slowly rotating hub to properly seat bearings.

6. Loosen nut as follows:

a. If slot and hole are aligned, back off 1/6 turn (next slot) and lock in this position.

b. If slot and hole are not aligned, back off to next slot plus an additional 1/6 turn and lock in this position.

INSTRUMENTS AND ELECTRICAL WIRING

INDEX

This Part contains illustrations and diagrams of the instrument and electrical wiring.

The wiring illustrations and diagrams should be referred to when trouble-shooting the electrical circuits or replacing wiring harnesses. Refer to the appropriate illustrations, which are self-explanatory.

Check Tractor Serial Numbers carefully before ordering parts. See Parts Book.

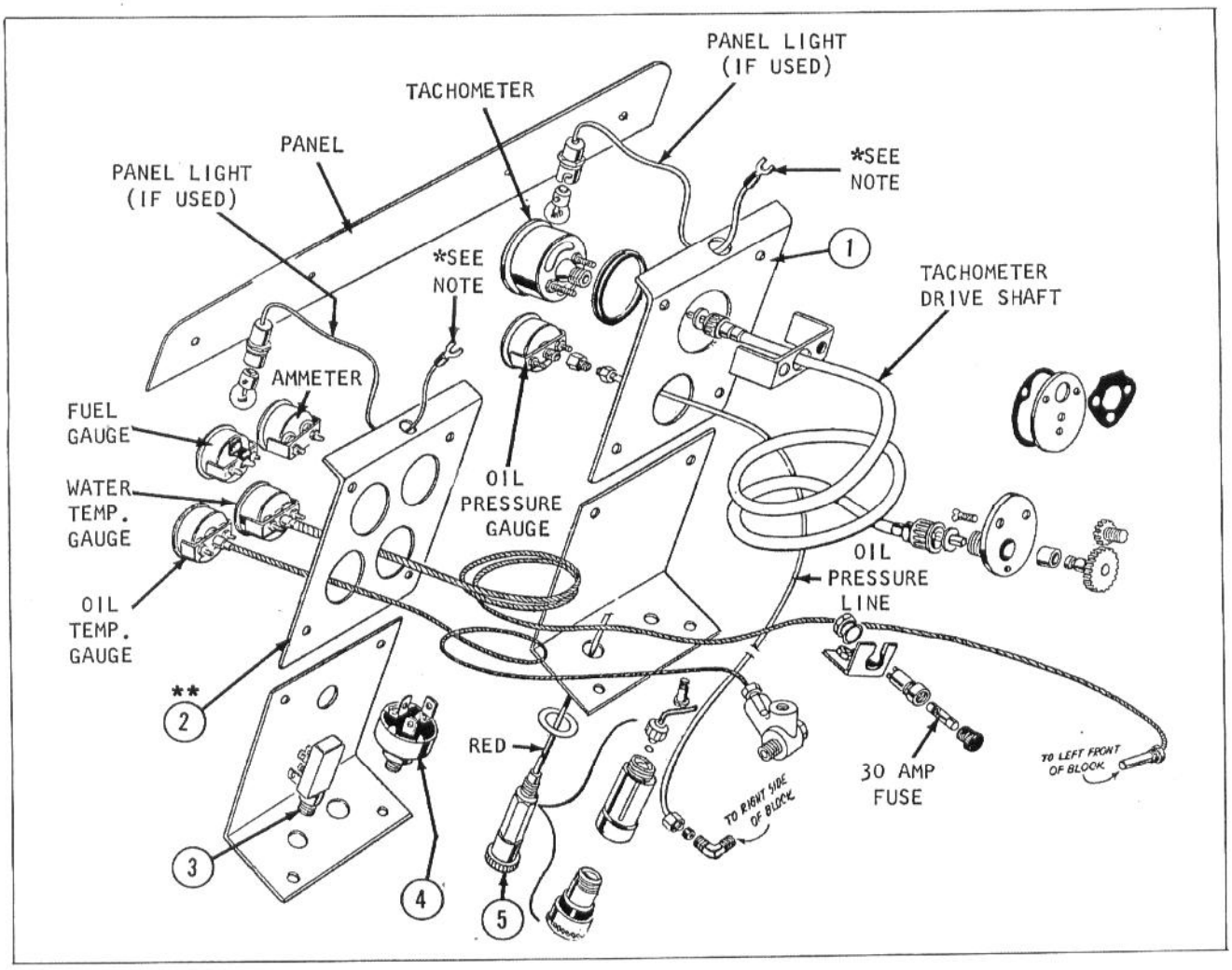


FIG. 1 — INSTRUMENT LOCATION — GASOLINE ENGINES

1. Left Instrument Panel **2. Right Instrument Panel 3. Light Switch 4. Starter and Ignition Switch ***5. Cigarette Lighter (when installed)

*NOTE: Panel light wires connect to "R" terminal of light switch when installed.
**NOTE: Converter oil temperature gauge used on Instant Reverse Models only. Instrument panel for MF 302 does not have provisions for this gauge.
***NOTE: Red wire to "+" terminal of ammeter.

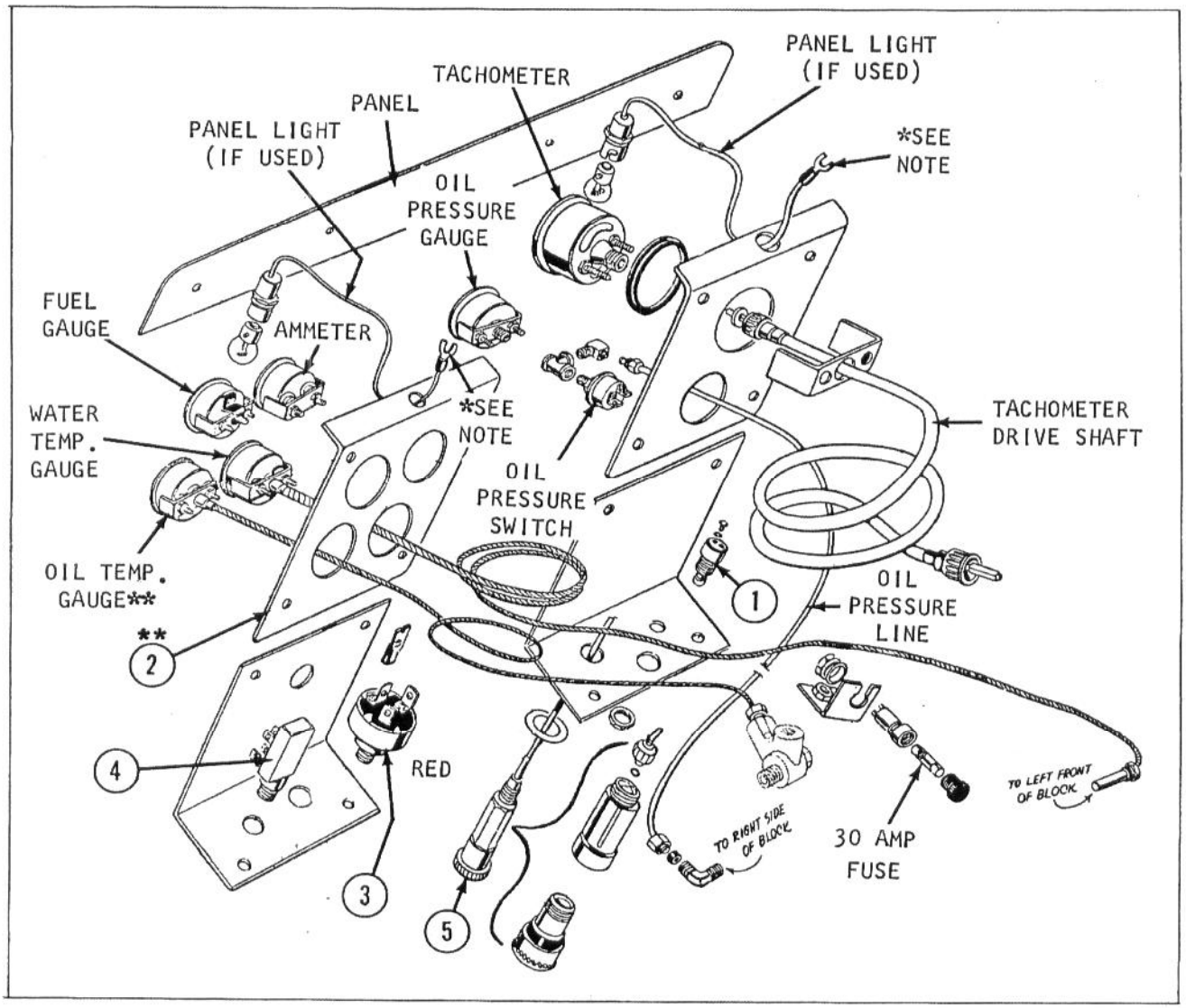


FIG. 2 — INSTRUMENT LOCATION — DIESEL ENGINE

1. Manifold Heater Switch (when installed) **2. Right Instrument Panel 3. Starter Switch 4. Light Switch ***5. Cigarette Lighter (when installed)

*NOTE: Panel light wires connect to "R" terminal of light switch (when installed).
**NOTE: Converter oil temperature gauge used on Instant Reverse Models only. Instrument panel for MF 302 does not have provisions for this gauge.
***NOTE: Red wire to "+" terminal of ammeter.

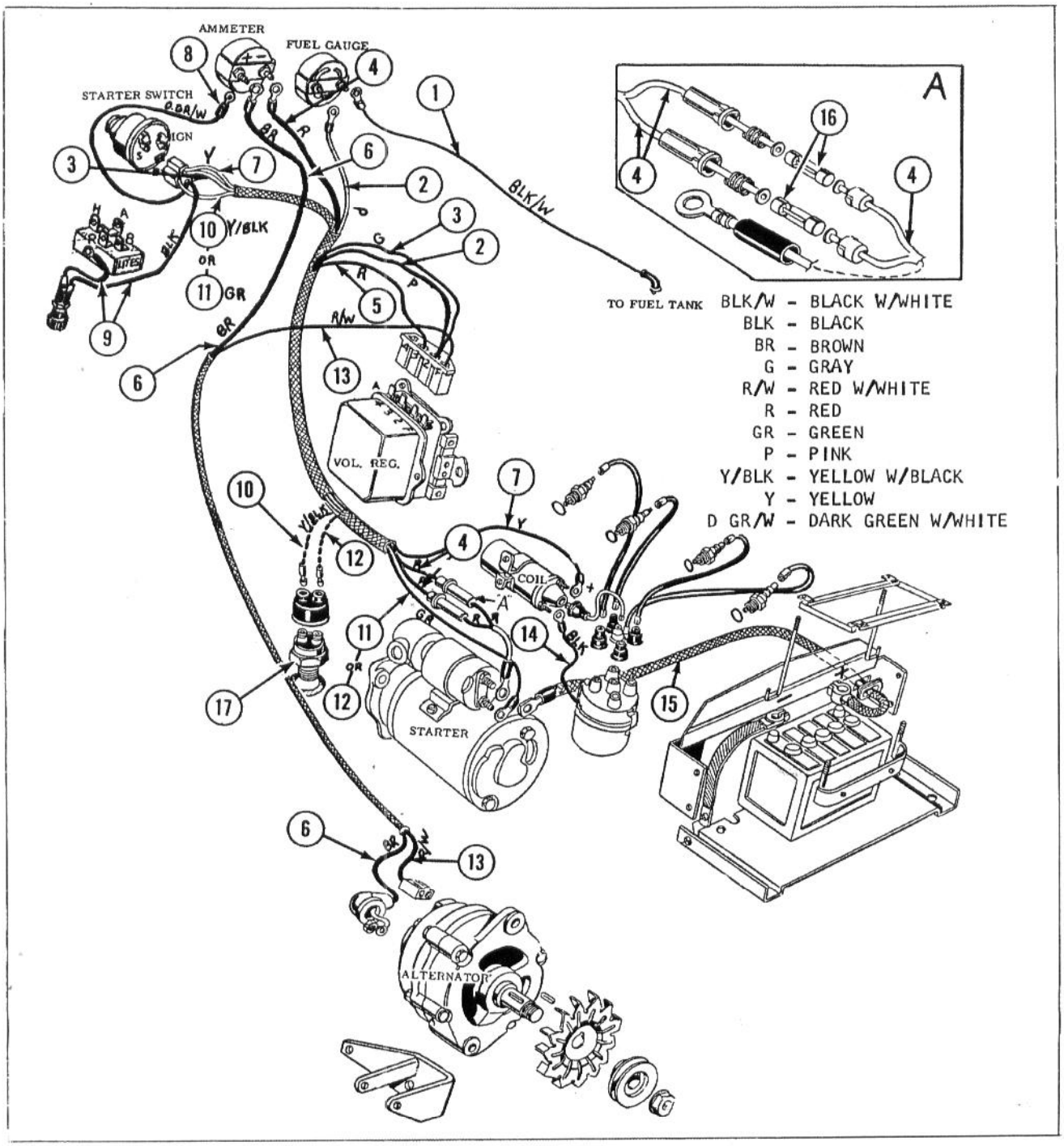


FIG. 3 — ELECTRICAL WIRING — GASOLINE ENGINE W/ALTERNATOR

1. Fuel Tank to Fuel Gauge "S" Terminal
2. Fuel Gauge "IGN" Terminal to Voltage Regulator "No. 2" Terminal
3. Starter Switch "I" Terminal to Voltage Regulator "No. 2" Terminal
4. Ammeter "-" Terminal to Parallel Fuses and Starter Solenoid 3/8"-16 Terminal
5. From No. 4 Wire (splice) to Voltage Regulator "No. 3" Terminal
6. Ammeter "+" Terminal to Alternator "B" Terminal
7. Starter Switch "I" Terminal to Ignition Coil "+" Terminal
8. Ammeter "+" Terminal to Starter Switch "B" Terminal
9. Starter Switch "B" Terminal to Fuse Holder and "B" Terminal on Light Switch
10. Starter Switch "S" Terminal to Neutral Switch (Manual Shuttle Only)
11. Starter Switch "S" Terminal Direct to Starter Solenoid "No. 8 Screw" (Instant Reverse Only)
12. Starter Solenoid, "No. 8" Screw to Neutral Switch (Manual Shuttle Only)
13. Voltage Regulator "F" Terminal to Alternator "F" Terminal
14. Ignition Coil "-" Terminal to Distributor (Low Tension Wire)
15. Battery "+" (pos.) Pole to Starter Solenoid 3/8"-16 Terminal
16. 2-30 Amp. Fuses
17. Transmission Neutral Switch

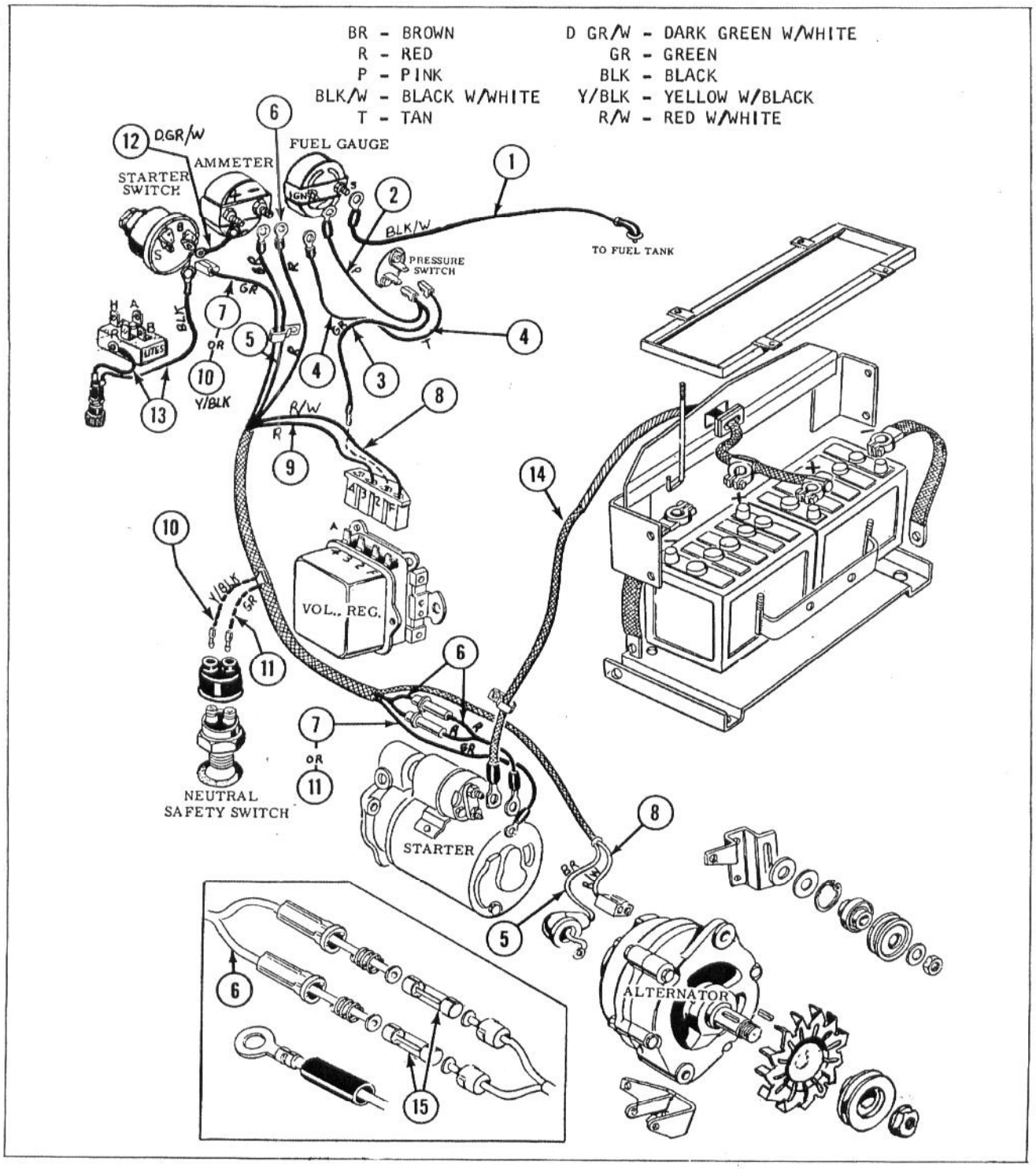


FIG. 4 — ELECTRICAL WIRING — DIESEL W/ALTERNATOR

1. Fuel Tank to Fuel Gauge "S" Terminal
2. Fuel Gauge "IGN" Terminal to Pressure Switch
3. Pressure Switch to Voltage Regulator No. 2 Terminal
4. Ammeter "+" Terminal to Pressure Switch Terminal Having Set Screw
5. Ammeter "+" Terminal to Alternator "B" Terminal
6. Ammeter "-" Terminal to 2-30 Amp. Fuses and 3/8"-16 Terminal of Starter Solenoid
7. Starter Switch "S" Terminal to Starter Solenoid No. 8 Screw (Instant Reverse Only)
8. Voltage Regulator "F" Terminal to Alternator "F" Terminal
9. From No. 6 Wire (splice) to Voltage Regulator "No. 3" Terminal
10. Starter Switch "S" Terminal to Neutral Switch (Manual Shuttle)
11. Starter Solenoid "No. 8 Screw" to Neutral Switch (Manual Shuttle Only)
12. Ammeter "+" Terminal to Starter Switch "B" Terminal
13. Starter Switch "B" Terminal to Fuse Holder and Light Switch "B" Terminal
14. Battery "+" (pos.) Pole to Starter Solenoid 3/8"-16 Terminal
15. 2-30 Amp. Fuses

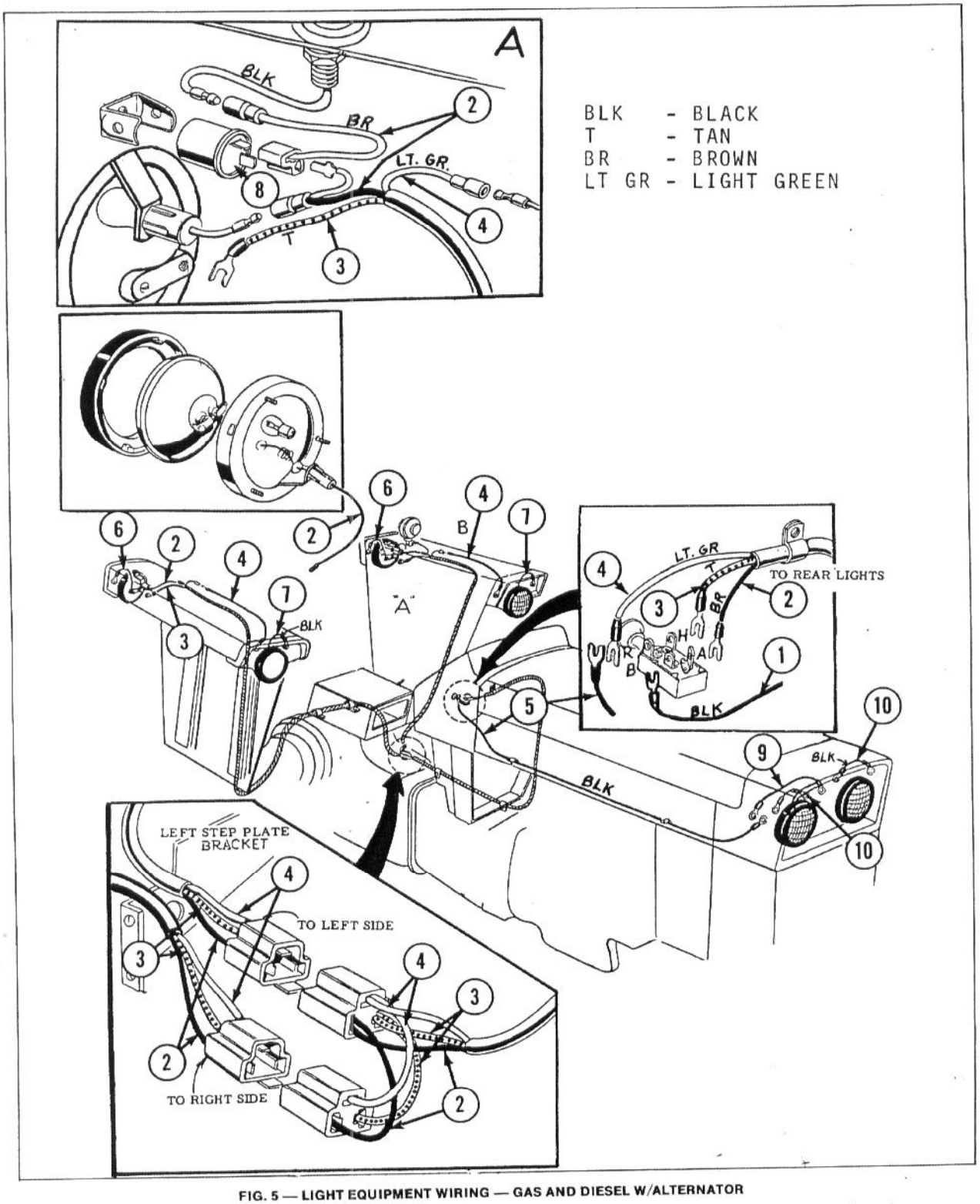


FIG. 5 — LIGHT EQUIPMENT WIRING — GAS AND DIESEL W/ALTERNATOR

1. From "B" Terminal of Starter Switch and Fuse Holder to "B" Terminal of Light Switch
2. "A" Terminal of Light Switch to Safety Bulb (red) — Flasher Unit and to Warning Lamp Connection
3. "H" Terminal of Light Switch to Rear Fender Work Lamps
4. "R" Terminal of Light Switch to Front Fender Work Lamps
5. "H" Terminal of Light Switch to Right Front Head Lamp
6. Rear Fender Lamps to Ground
7. Front Fender Lamps to Ground
8. Flasher Unit (Warning Lamp)
9. Right Head Lamp (No. 5 Terminal) to Left Head Lamp
10. Front Head Lamps to Ground

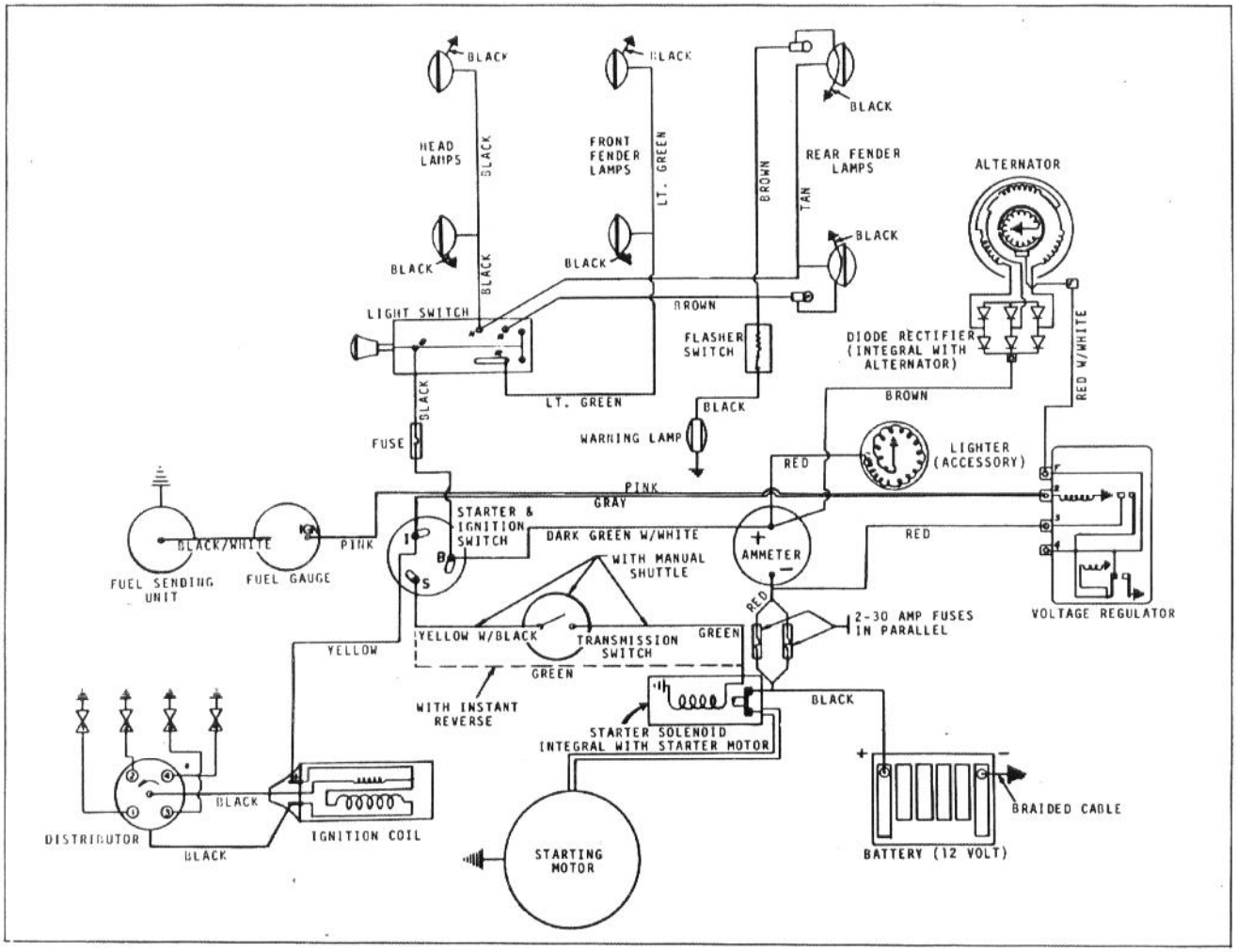


FIG. 6 — ELECTRICAL WIRING DIAGRAM — GASOLINE ENGINE W/ALTERNATOR

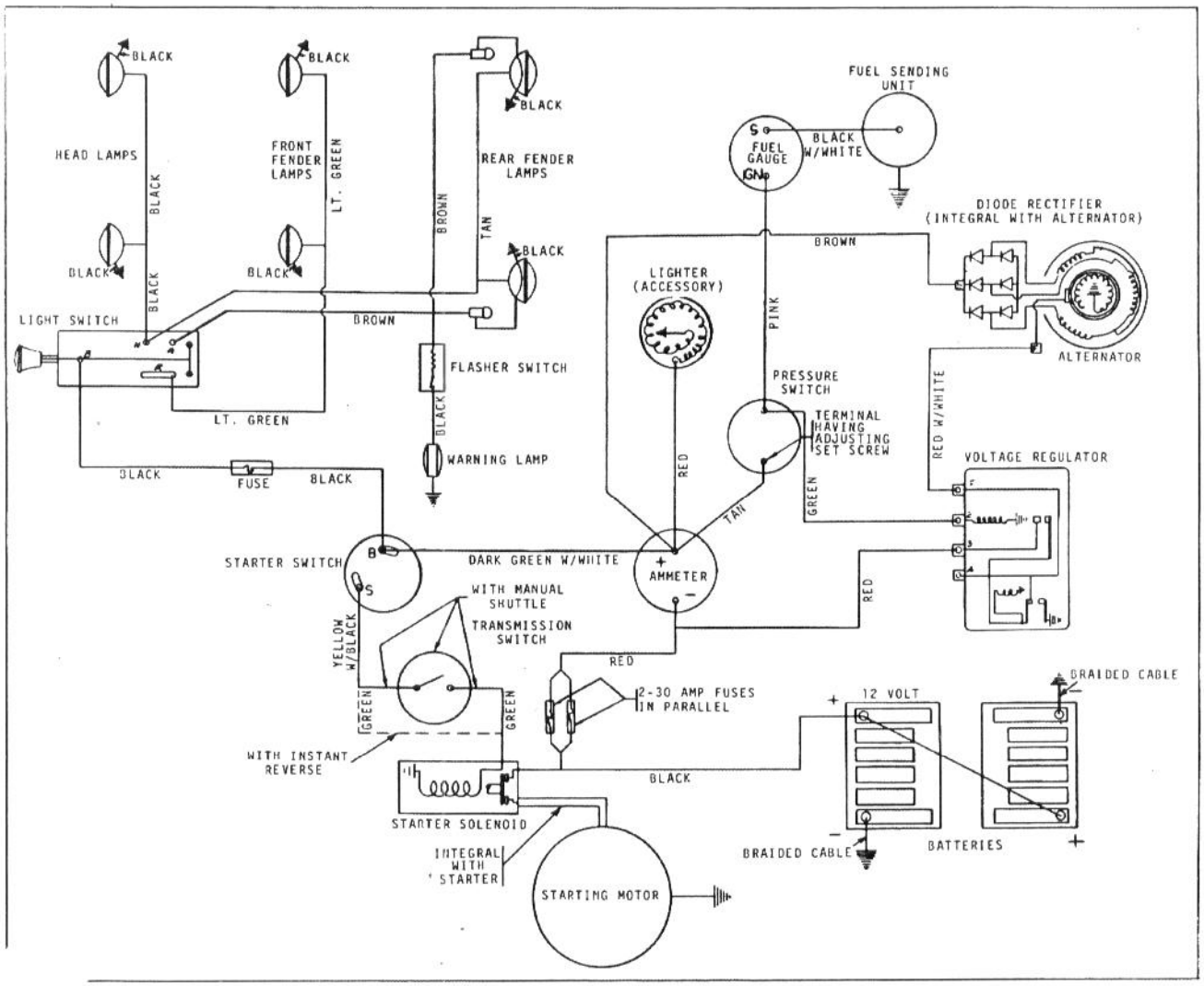


FIG. 7 — ELECTRICAL WIRING DIAGRAM — DIESEL ENGINE W/ALTERNATOR

MF LOADERS AND BACKHOES

CONTENTS

LOADERS

CONTENTS

BACKHOES

(See "Contents" page for Backhoes following Loader section)

Form No. 1448 976 M3

Printed In U.S.A.

SAFETY PRECAUTIONS

CAUTION: DON'T BE CARELESS . . . Safety procedures cannot be overstressed when working ON, or around, machinery. This is especially true when working on hydraulically actuated (and/or engine driven) equipment.

CAUTION: Apply all of the repair procedures in a "COMMON SENSE MANNER" . . . It is oftentimes hard to realize the forces involved in an hydraulic system, and how quickly these forces will react to the inadvertant disconnection of a hose — OR to the mistaken movement of a control lever. It is important that the serviceman have a complete knowledge of the UNIT, attached equipment and their systems . . . AVOID INJURY.

CAUTION: Before any attempt is made to remove any hydraulic component, make certain the hydraulic pressure is relieved and the engine is not running. The Loader and Backhoe are to be in the lowered position — resting on the ground. (Operate the control levers back-and-forth several times with the engine "Off".)

SERVICE INFORMATION

The service repair procedures recommended are USUALLY written assuming that the assembly (or component) being repaired has been removed from the Unit . . . however, much of the servicing can be performed without complete removal of the assembly. It will require the judgement of the serviceman to determine the necessity of removal, while considering the degree and extent of servicing required.

The following important points should be remembered and PRACTICED:

1. *Trouble-Shoot and Clean the Unit Before Disassembly or Removal of a Component.* Perform the appropriate tests of the system *before* attempting repair.

2. *Clean all assemblies (and components) PRIOR to Removal.* Take all necessary precautions to prevent dirt from entering the system.

3. *Label Parts and Protect Precision, or Machined Surfaces* . . . Don't mix parts.

4. *Inspect all Parts During Disassembly* (for wear or damage). In many instances it will require the judgment of the serviceman to determine the necessity for replacement of parts due to wear.

5. *If System Oil is to be Drained and Reused,* be sure the drain containers are clean and are covered when not in use.

6. *Clean all metal parts (using a suitable solvent) prior to reassembly,* and either blow dry with compressed air, or set aside on a *clean and lint free* cloth to drain until completely dry.

7. *Replace all seals, gaskets, "O"-rings, etc., (of the component) with new items.*

8. Structural repair (welding) information is as follows:

Special care must be observed when welding structural assemblies. Welding techniques such as the *selection of special electrodes is necessary.*

A low hydrogen welding rod of 70,000 psi tensile strength should be used for weld repairs.

It is recommended that a 1/8" diameter AWS 7018 electrode, operating at 120 to 140 amps. D.C. reverse polarity, be used. (If these electrodes are exposed in areas of high humidity and warm temperatures for more than 4 hours, they should be baked in a ventilated oven at 200° F. for 2 hours. A satisfactory weld will not be obtained with a moist electrode.)

LOADERS

Major variations, as well as similiarities, exists between the subject Loaders. No attempt will be made to list either in detail ... however, some variations (and similiarities) may be pointed out. The hydraulic components can ususally be identified by the Massey-Ferguson part number stamped on the exterior of the component ... or by visual examination. Refer to the appropriate parts book (concerning the particular Loader) for additional information and when ordering replacement parts.

HYDRAULIC SYSTEM INFORMATION — MF 32A, MF 34A, AND MF 300A LOADERS

Figs. 1 and 2, illustrate the hydraulic systems of subject Loaders. Fig. 3, shows the relationship between the Loader Hydraulics and the Backhoe Hydraulic System (when Backhoes are installed). Fig. 4 explains the meaning of some of the graphic symbols used to depict the diagrams ... as an aid to those service-

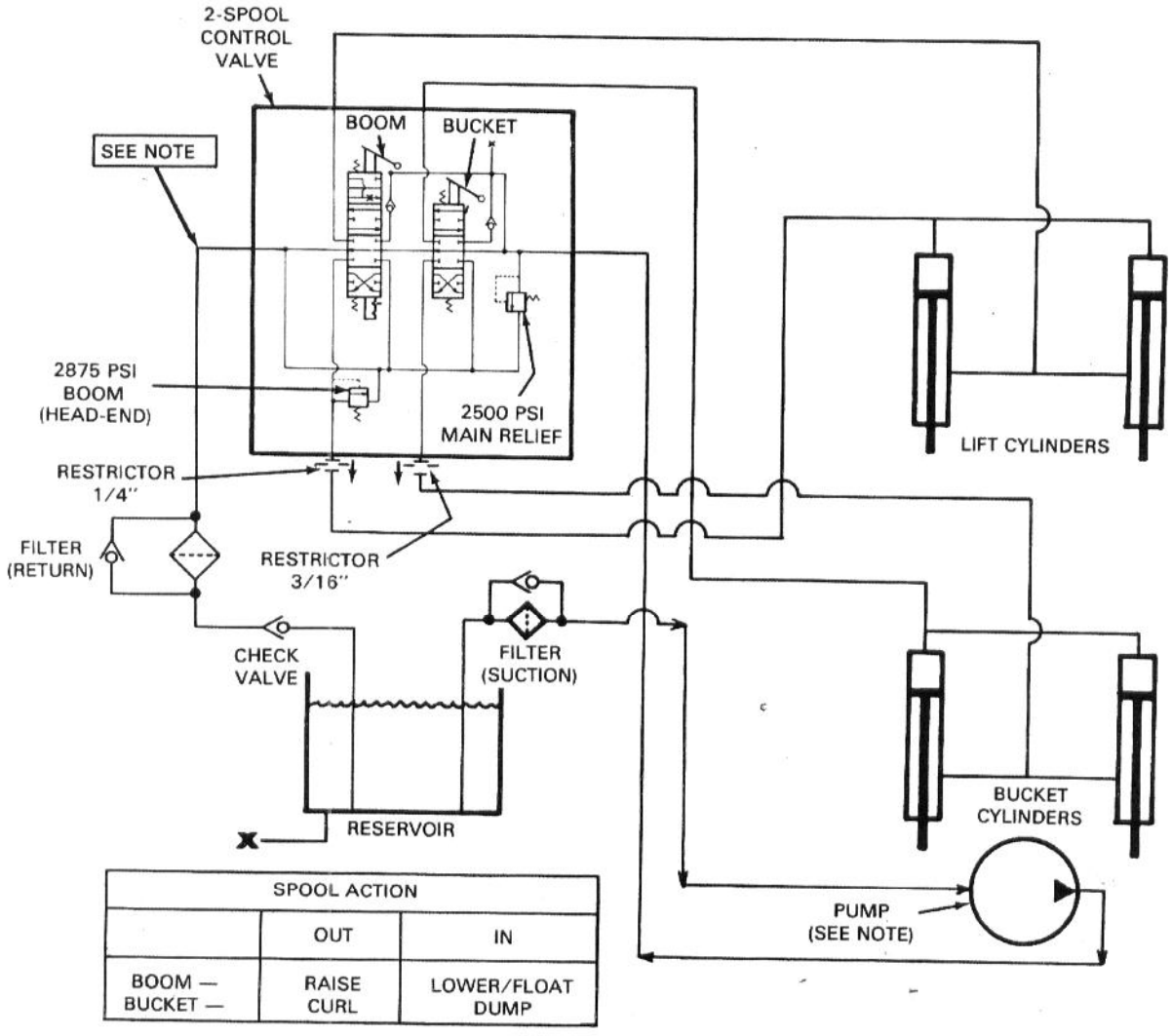
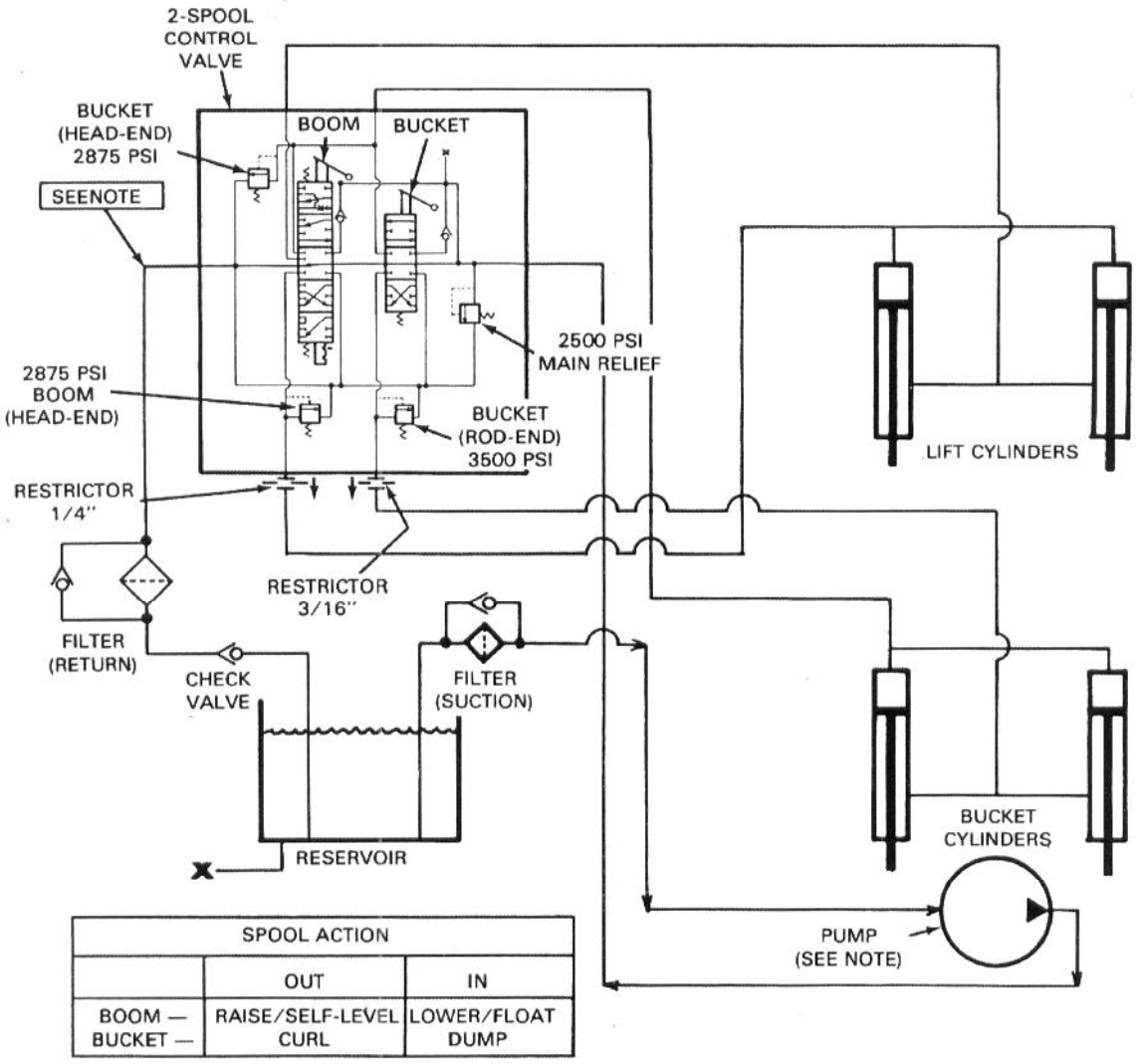


Fig. 1 — Circuit Diagram of MF 32A Loader Hydraulic System (With Float, Without Self-Levelling)

NOTE: Pump capacity depends upon application (i.e: Loader only, 19 gpm; Loader/Backhoe, 22 gp). If Loader/Backhoe, outlet from control valve is as illustrated in Fig. 3 ... also, an oil cooler will usually be in the system.



SPOOL ACTION		
	OUT	IN
BOOM —	RAISE/SELF-LEVEL	LOWER/FLOAT
BUCKET —	CURL	DUMP

Fig. 2 — Circuit Diagram of MF 34A and MF 300A Loader Hydraulic Systems (With Self-Levelling and Float)

NOTE: Pump capacity depends upon application AND if a Backhoe is installed. If Loader/Backhoe, outlet from control valve is as illustrated in Fig. 3 ... also, an oil cooler will usually be in the system.

men that do not know, but wish to learn this method of system representation.

Reading of the graphic diagrams may be likened to tracing an electrical schematic. The symbols are meant to illustrate the *function* of a component not its construction. However, certain values have been included in the diagrams so as to aid in trouble-shooting.

SYSTEM FLOW

Oil flow, (Figs. 1 and 2), from the vented reservoir passes through a "suction side" filter to the pump inlet. The hydraulic pump is fixed displacement type, driven at engine speed and delivers the oil to the "open center" control valve. Oil passes through the valve to its outlet port (unless valve spools are operated) ... and is sent through a "return" oil filter to the reservoir. *Unless* a Backhoe is installed ... then the oil is sent to the Backhoe Control Valve, (Fig. 3), by means of a "power beyond" feature in the Loader Valve. (Oil returning from Backhoe Control Valve is sent to the inlet side of the return filter ... oil at return filter outlet either goes back to reservoir, OR is sent to the front mounted oil cooler. This oil cooler is connected to the "suction side" of the Loader pump.)

If the Loader valve spools (Figs. 1 and 2) are moved to a "power" position, oil from the pump is sent to the connected cylinder ports. (Oil flow to a

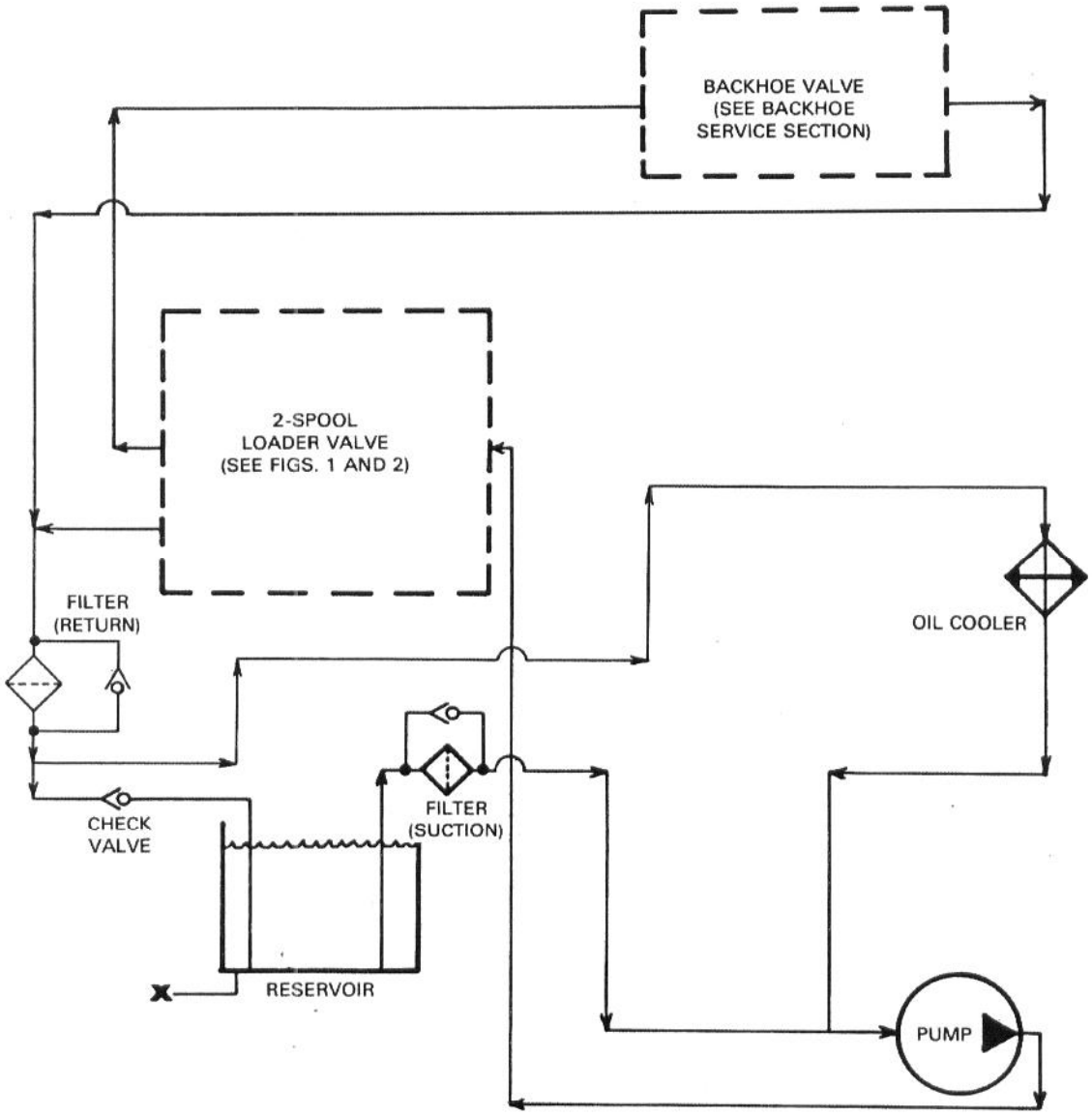


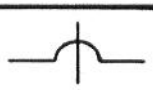
Fig. 3 — Illustration Typical of Loader Hydraulic System When a Backhoe is Installed (Additional information pertaining to Backhoe may be obtained in Service Section of this Manual for Backhoes.)

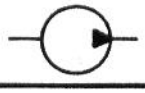
connected Backhoe control valve is blocked.) If Loader control valve is placed in "Float" position ... pump oil flows through the valve "open center", but the boom spool is moved to a position which connects the lift cylinder's head-end ports to their rod-end ports (and allows the lift arms to follow ground contour. The MF 34A and MF 300A loader control valve has a "self-level" feature ... see valve information under "Component Location and Operating Characteristics".

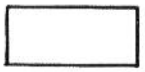
COMPONENT LOCATION AND OPERATING CHARACTERISTICS

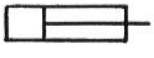
Additional information may be found under the Service Instructions for the component.

1. Hydraulic Reservoir ... located in Loader's right hand side frame and also serves as an oil supply for the Backhoe (when one is installed). The reservoir is vented to atmosphere by a combination breather/

"WORKING" LINES	
"PILOT" LINES	
CONNECTING LINES	
NON-CONNECTING LINES	
PLUGGED PORT	
DIRECTION OF FLOW	

FIXED DISPLACEMENT PUMP	

FILTER OR STRAINER	
COOLER	
RESERVOIR-PRESSURIZED	
RESERVOIR - VENTED TO ATMOSPHERE	
PRESSURE GAUGE	

DOUBLE-ACTING CYLINDER	

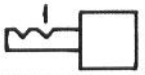
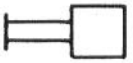
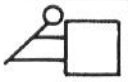
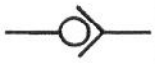
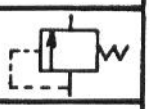
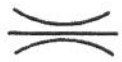
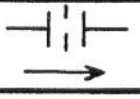
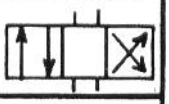
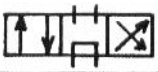
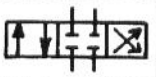
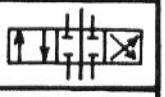
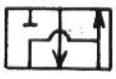
ENCLOSURE	
SPRING	
PEDAL OR TREADLE OPERATED	
DETENTED SPOOL (w/POSITION OF DETENT)	
MANUALLY OPERATED SPOOL	
PUSH-PULL LEVER OPERATED SPOOL	
CHECK VALVE	
PRESSURE RELIEF VALVE	
FIXED RESTRICTION	
VARIABLE RESTRICTION	
ORIFICE PLATE (FREE FLOW)	
BASIC: 3-POSITION SPOOL (4-WAY)	
TANDEM CENTER SPOOL	
CLOSED CENTER SPOOL	
OPEN-CENTER SPOOL	
FLOAT SECTION OF SPOOL	

Fig. 4 — Meanings of Symbols Used to Illustrate Hydraulic Systems

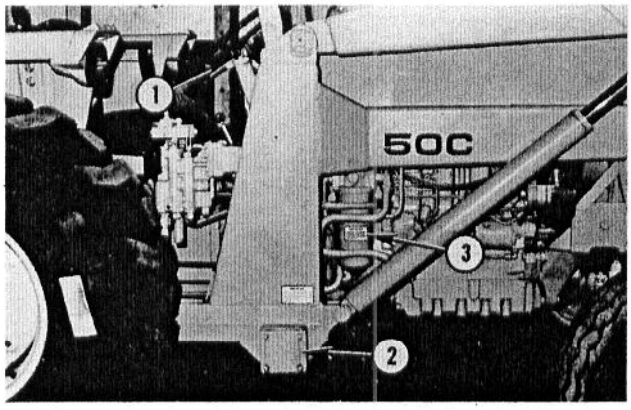


Fig. 5 — Reservoir Breather/Dipstick, "Suction side" Oil Filter and "Return" Oil Filter Location — MF 300A Loader

1. Breather/Dipstick
2. "Suction Side" Oil Filter
3. "Return" Oil Filter

dipstick ... which is also used to check reservoir oil level, see Figs. 5 and 6.

2. "Suction Side" oil filter ... located internally to reservoir side frame and containing a bypass valve (spring loaded) which should open at 7-1/2 lbs. This filter uses a 40 micron element and is designed for "outside-in" flow. The MF 32A and MF 34A filter element is accessible through the front (plate bolted to front of side frame) ... the MF 300A filter element is accessible from the outside (plate bolted to outside of side frame), see Figs. 5 and 6.

3. Hydraulic Pump ... bolted to the front axle support casting and driven by the engine crankshaft. Although various flow rated (gpm) pumps may be encountered ... they are of the same basic design and are fixed displacement (gear type). The size of pump used (i.e. gpm output) is dependent upon Tractor/Loader application and whether, or not a Backhoe is installed, see Fig. 7.

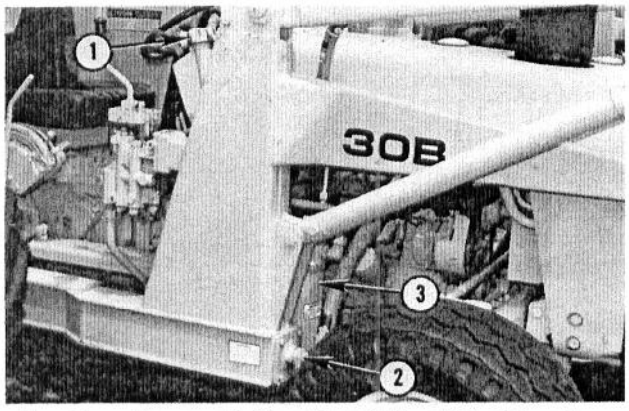


Fig. 6 — Reservoir Breather/Dipstick, "Suction Side" Oil Filter and "Return" Oil Filter Location — MF 34A Loader Shown (MF 32A Loader Similar)

1. Breather/Dipstick
2. "Suction Side" Oil Filter
3. "Return" Oil Filter

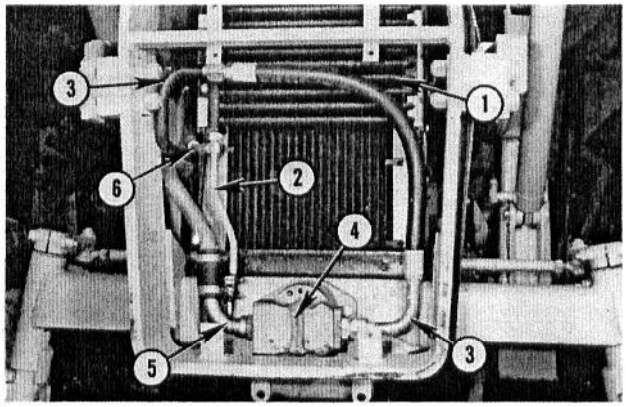


Fig. 7 — Typical Pump and Oil Cooler Mounting — MF 34A Loader Installed On MF 30B Tractor

1. Oil Cooler (Loader/Backhoe Systems)
2. Hydraulic Line — Oil Cooler to Suction Line
3. Hydraulic Line — Pump Outlet to Control Valve Inlet
4. Hydraulic Pump
5. Hydraulic Line — Suction Filter to Pump Inlet
6. Hydraulic Line — From Return Filter "Outlet Side"

NOTE: It must be remembered that engine rpm affects pump output. Although the same size pump (rated) may be used in different Tractors ... the engine maximum speed may NOT be the same. This is important to consider when performing a pump efficiency test.

4. Loader Control Valve ... mounted on the "up right" section of reservoir side frame, see Figs. 5 and 6. Two different control valves are used ... one applies to the MF 32A Loader, the other is used with the MF 34A and MF 300A Loader. Both valves appear very similar externally, but differ in ... boom spool construction, additional internal parts for selfleveling feature and additional circuit reliefs in bracket circuit for shock load protection.

Both "types" control valves contain the system's main relief valve, load check poppets (for each "working" part), a circuit relief in boom spool's lower "work" port (to protect head-end of lift cylinders), restrictor's in the lower "work" ports of lift and bucket circuits (to restrict oil flow RETURNING from connected cylinder ports) ... plus provisions for a "float" position of boom spool. In addition, the MF 34A and MF 300A control valve has circuit reliefs in both "work" ports for the bucket circuit ... AND provisions for self-leveling.

Operational characteristics are as follows:

a. Spools In "Neutral" position ... see Figs. 8 and 9. Oil enters valve inlet, flows past the main relief valve then the center land of bucket spool and passes around the center land of the boom

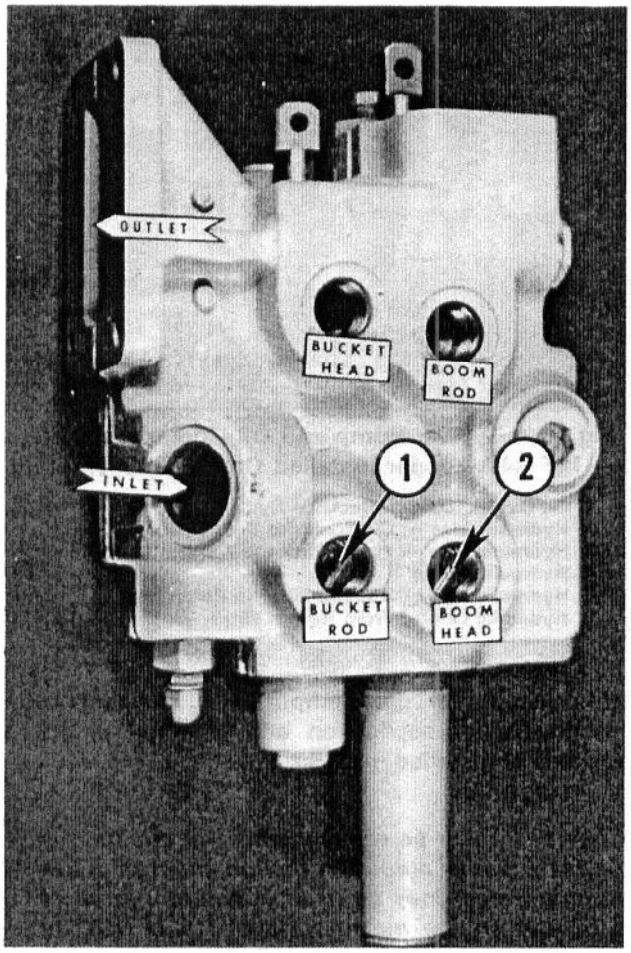


Fig. 8 — Port Identification and Restrictor Location

1. 3/16" Restrictor
2. 1/4" Restrictor

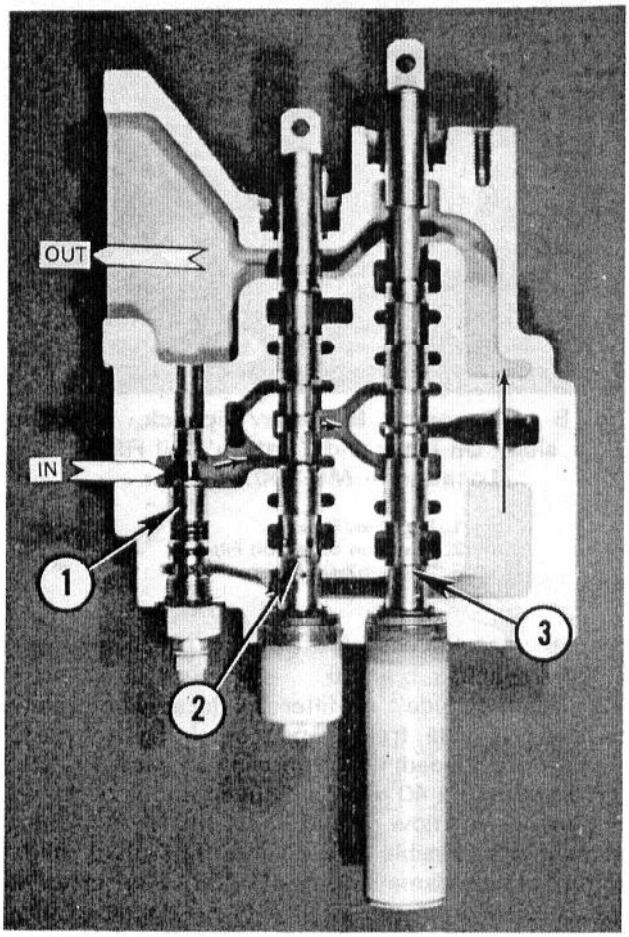


Fig. 9 — Cutaway of Control Valve — Flow Through Valve With Spools In "Neutral"

1. Main Relief Valve
2. Bucket Spool
3. Boom Spool

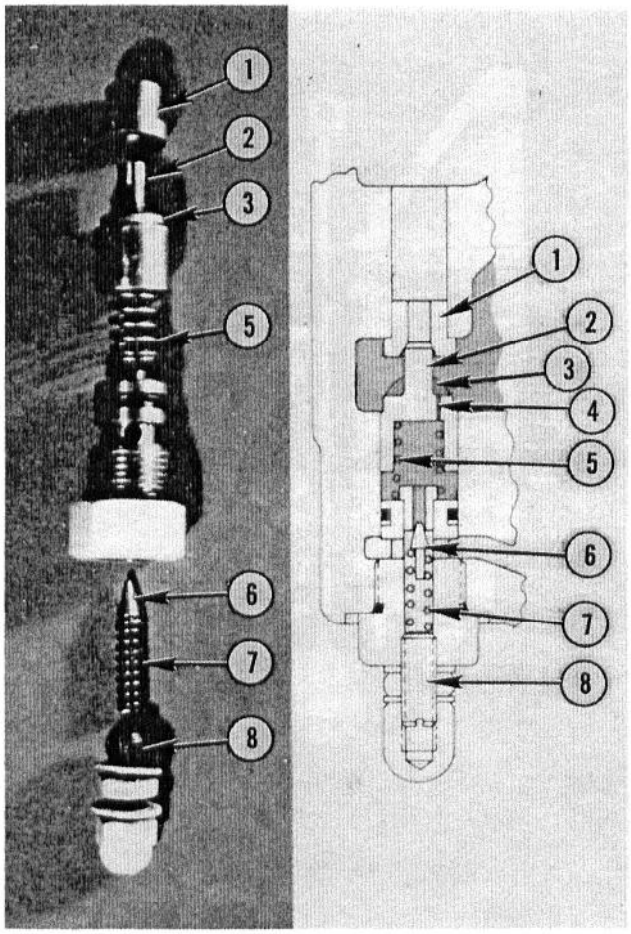


Fig. 10 — Main Relief Valve Parts

1. Poppet Seat
2. Valve Poppet
3. Screen
4. Orifice Through Poppet
5. Poppet Spring
6. Pilot Valve
7. Pilot Spring
8. Adjuting Screw

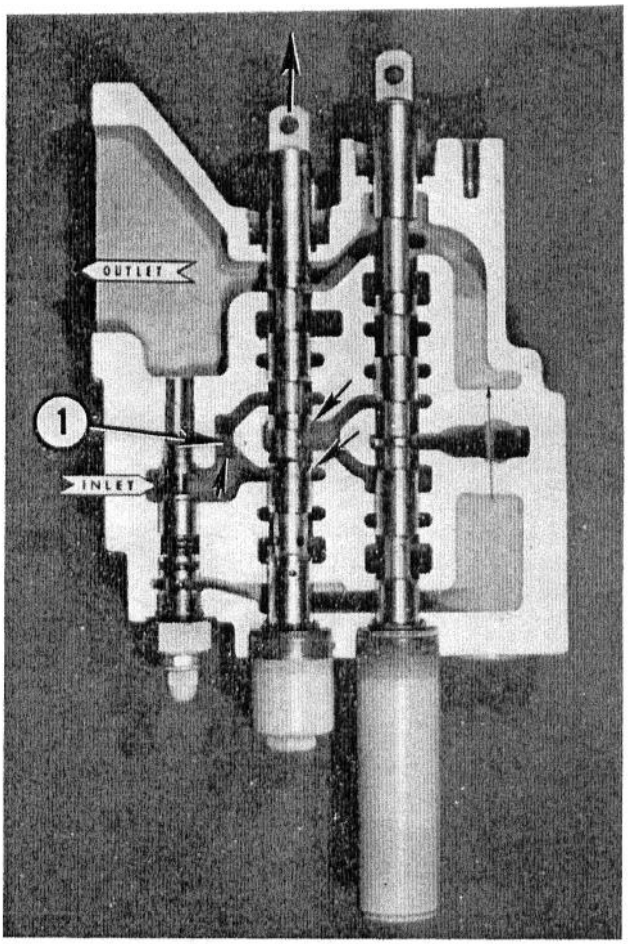


Fig. 11 — Bucket Spool Moved "Out" of Bore — Bucket "Curl" Flow Through Valve

1. Passage Common to Load Checks

spool where it enters a common return passage at top and bottom of valve casting. This oil then flows through the top and out the mounting flange (to return).

b. Main relief valve setting exceeded ... see Fig. 10. When setting of main relief is exceeded, poppet moves downward to allow inlet oil to return past the valve seat and into the outlet chamber (of mounting flange). Inlet oil AND operating oil pressure passes through the screen and orifice of valve poppet ... into the spring area of poppet. Pressure on both sides of poppet are now equal and the spring can hold poppet against its seat. When oil pressure exceeds the setting of the pilot valve ... the pilot moves down (against spring tension) and the oil at spring side of poppet is "dumped" to return ... and the inlet PLUS operating oil pressure acts against poppet to move it downward against its spring and "opening" poppet seat (oil flows to return). As soon as system pressure is again lowered (below relief valve setting) ... the pilot valve closes and oil again fills the spring area of the poppet valve at a rate that allows the poppet to be moved "gently" back against its seat. If screen, or orifice in poppet, becomes blocked pressure will not build-up on spring side of poppet ... this will prevent spring from holding poppet against its seat and inlet oil will flow to "return".

c. Bucket spool "out", bucket "curled" (rolled back) rod-end pressurized ... see Figs. 11, 12, 13. Inlet oil past bucket spool center land is blocked ... oil must flow into passage (No. 1, Fig. 11) which is common to the four load checks shown in Fig. 12. (The check poppet sits on a plain cartridge if MF 32A Loader ... or a circuit relief, if a MF 34A or MF 300A Loader.) When pressure against poppet exceeds that in cylinder port ... the poppet moves to allow oil flow to the connected cylinder port (through No. 2, Fig. 13). Oil at head-end of bucket cylinder returns through, No. 3, Fig. 13, post spool

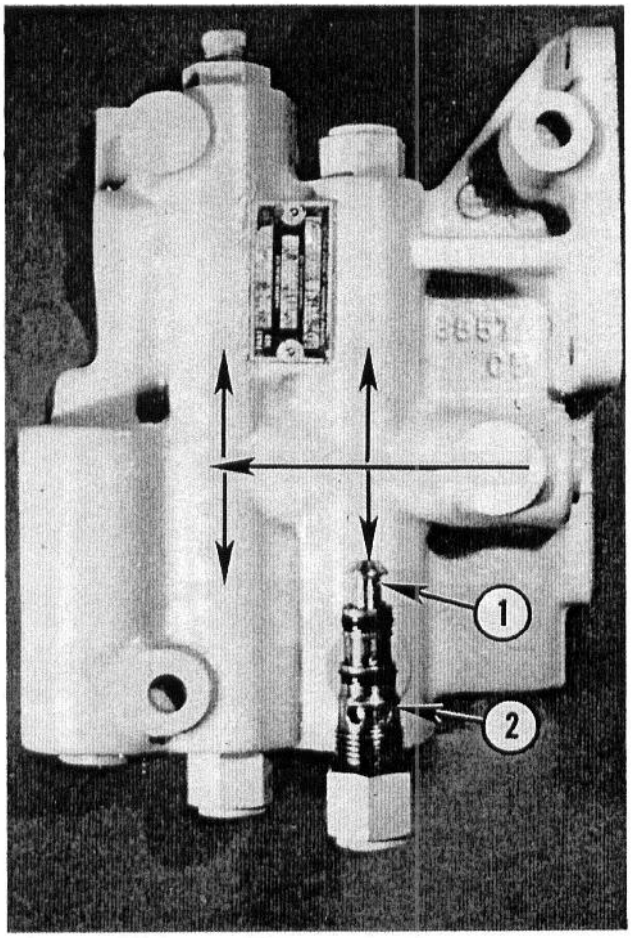


Fig. 12 — Load Check For Bucket Spool In "Curl" Position — Relative Location Shown

1. Check Poppet
2. Circuit Relief

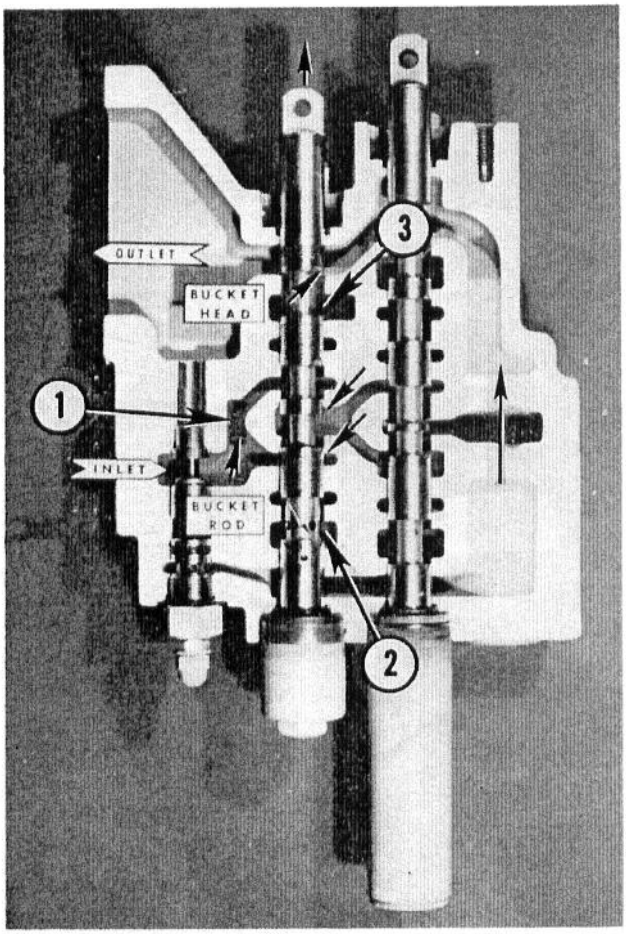


Fig. 13 — Flow Through Valve When Bucket Spool Is In "Curl" Position"

1. Inlet to Load Check Passage
2. Bucket Port Opened
3. Returning Oil Flow

land and into valve return passage. Other "power position (with spool "in") causes the same effect ... the difference being the port that is pressurized and the return port "land" of bucket spool. Oil in the common passage to the load checks cannot move the check poppet from its seat *unless* the controlling spool is moved to "unlock" the cylinder ... this is done by indexing one of the cylinder ports to the return passage (the other cylinder port is then pressurized).

d. Boom spool 'raise" and "lower" positions block the "open center" passage of the valve casting forcing inlet oil to flow into the common passage to the four load checks. One of the cylinder ports is pressurized while the other is opened to the return passage in valve casting (depending upon spool position).

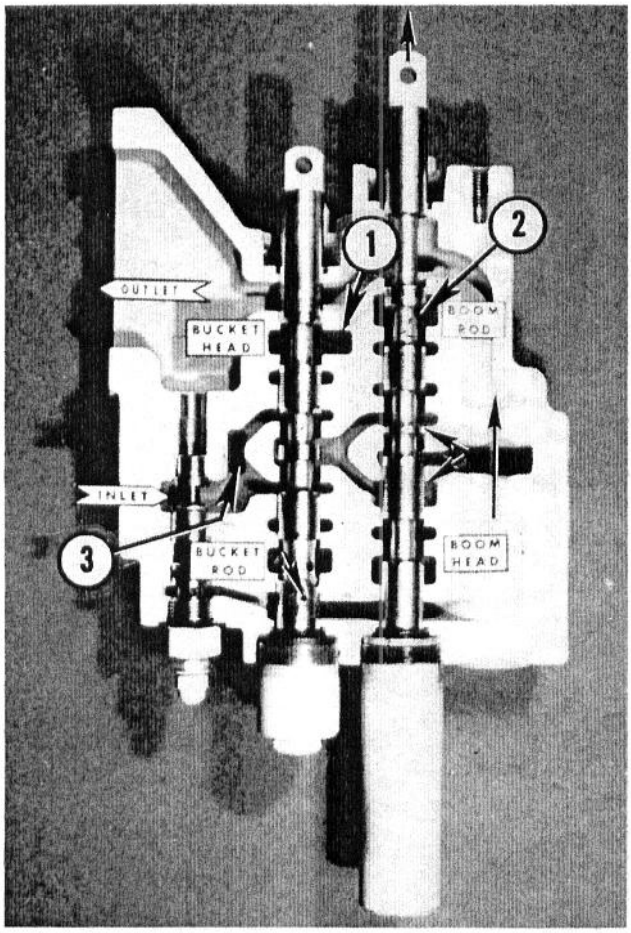


Fig. 14 — Boom Spool In "Self-Level" Position — Spool "Out"

1. Oil Into Bucket Cylinder Head-End
2. Oil Returning From Boom Cylinder Rod-End
3. Load Check Common Passage

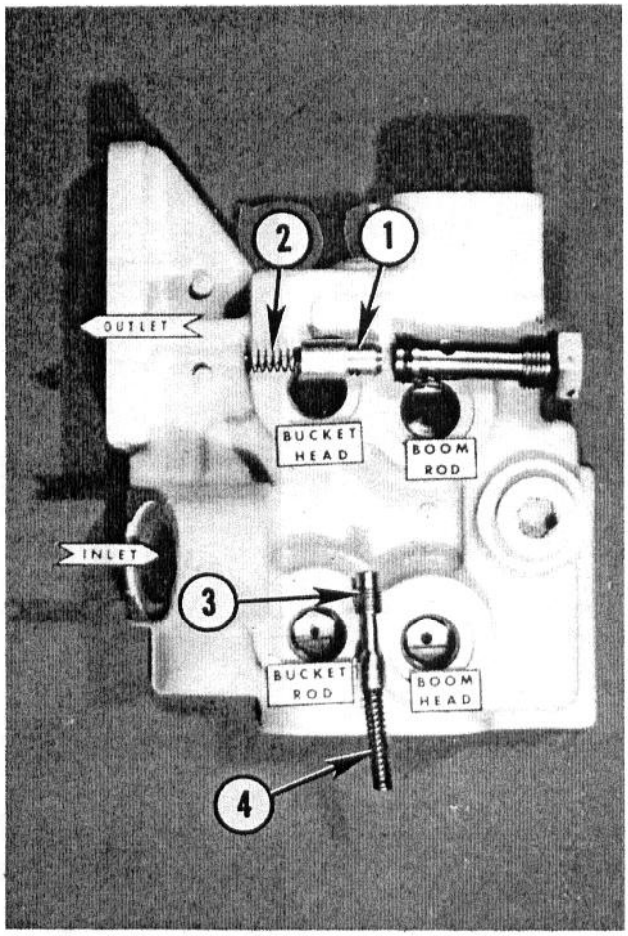


Fig. 15 — "Self-Levelling" Components — Relationship to Valve Ports

1. Check Plugner
2. Spring
3. Internal Piston (Inside Bucket Spool)
4. Piston Spring

e. Boom spool "out" to "self-level" position (MF 34A and MF 300A Loaders) ... see Figs. 14, 15, and 16. "Open center" passage of casting blocked, inlet oil flows to the load check common passage and moves poppet to pressurize head-end of lift cylinders. Oil returning from rod-end of lift cylinders cannot get past the boom spool "load" to the return passage of valve casting. This return oil enters a common passage to a one-way check plunger ... opens this plunger and goes to the head-end port of the bracket cylinder (causing bucket to roll forward, or "level"). Oil pressure in bucket head-end port also flows through a drilling near top of bucket spool ... as pressure builds-up, it acts against an internal piston (near spring end of bucket spool) causing piston to move down and allowing oil at rod-end of bucket to flow through a drilling (in spool) to return passage of valve casting.

5. Hydraulic cylinders ... double-acting (single rod) and varying in bore, stroke, plus internal design (i.e. rod size, seal packing, etc.).

6. Return oil filter ... located between reservoir side frame and engine. This filter contains a bypass valve ... set at 10-12 psi "cracking" and 15 psi "full open" *differential* pressures. Return filter uses a 10 micron element, designed for "inside-out" flow.

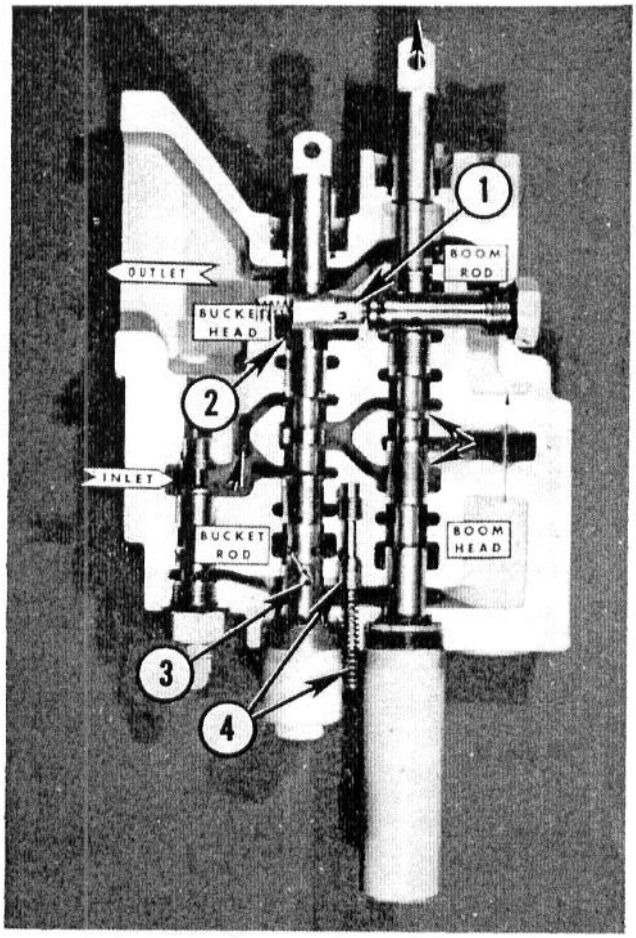


Fig. 16 — Oil Flow Through Valve When Boom Spool Is In "Self-Levelling"

1. Check Plunger
2. Port to Bucket Cylinder Head-End
3. Bucket Spool Rod-End "Return" Drilling
4. Bucket Spool Internal Piston and Spring

TROUBLE-SHOOTING

Efficient (and effective) trouble-shooting depends upon knowledge of the system and its functioning components. When possible, perform operational checks and tests to isolate the problem before attempting to remove, or disassemble the components.

TROUBLE SYMPTOMS

Select the symptom *most like* the problem encountered. Check that reservoir oil level is correct and the recommended type oil is being used.

CAUTION: Before attempting to conect testing equipment into the system (or any circuit) make certain that all pressure is relieved by operating the control levers back and forth several times.

FOAMING OIL

1. Low oil level — Maintain oil level in reservoir to the correct markings on the dipstick.
2. Wrong type of oil in system — Drain system and refill with recommended type oil.
3. Air in system — Check for loose suction and presure line connections. Tighten fittings and/or replace "O"-ring seals on fittings as necessary.

LOADER FAILS TO RAISE

1. Obstruction in pump suction line — Check suction line (to pump) for kinks and/or or obstructions.
2. Pump not operating or not operating properly — Check flow. If pump(s) produce flow, check that system's main relief valve is working properly and is at the correct setting. Also make certain that there is no damage to pump drive mechanism. (Refer to "Tests and Adjustments" for procedures.) Repair or replace as necessary.
3. Main relief valve malfunction — Check system's main relief valve per "Tests and Adjustments". Service relief valve as required.
4. Control valve worn and/or damaged, or contaminated — Repair control valve as required.

SLOW, OR ERRATIC LIFT (Also See Pump GPM Too Low)

1. Engine RPM too low — increase engine rpm.
2. Low oil level — Maintain oil level in reservoir to the correct markings on the dipstick.
3. Wrong type of oil in system — Drain system and refill with recommended type oil.
4. Air in system — Check for loose suction and pressure line connections. Tighten fittings and/or replace "O"-ring seals on fittings as necessary.
5. Air in boom (lift) cylinders — Operate lift cylinders several times through their travel (While maintaining correct reservoir oil level) to expel air from cylinders.
6. Main relief valve malfunction — Check system's main relief valve per "Tests and Adjustments". Service relief valve as required.
7. Pump worn or damaged — Perform tests per "Tests and Adjustments" as required and repair, or replace pump. Also check for possible damage to pump drive. Correct as necessary.
8. Misaligned or binding control linkage — Realign and free control valve handles and linkage to operate the valve spools properly and smoothly.
9. Control valve worn and/or damaged, or contaminated — Repair control valve as required.

LIFT ARMS NOT LIFTING EQUALLY

1. Air in boom (lift) cylinders — Operate lift cylinders several times through their travel (While maintaining correct reservoir oil level) to expel air from cylinders.
2. Restriction in the line to one cylinder — Check line for obstruction.
3. Damage to structural members — Repair as necessary.

LOADER DOES NOT HAVE ADEQUATE LIFT, OR BREAK-OUT CAPACITY

1. Low system pressure — check pressure per "Tests and Adjustments" ... also see *Symptom* "Low System Pressure".
2. Engine RPM too low — increase engine rpm.
3. Pump not operating or not operating properly — Check flow. If pump produces flow, check that system's main relief valve is working properly and is at the correct setting. Also make certain that there is no damage to pump drive mechanism. (Refer to "Tests and Adjustments" for procedures.) Repair or replace as necessary.

LIFT ARMS "DROP" WITH BOOM IN "RAISE" AND BUCKET ACTIVATED

Malfunction of the lift check valve (integral to control vlve) — Test the control valve per "Tests and Adjustments" and repair, or replace, valve as required.

LIFT ARMS "DROP" WITH BOOM SPOOL IN "NEUTRAL"

1. Hose to cylinder leaking — Check for damaged

or loose hoses. Tighten or replace as required.

2. Damaged or worn cylinder packing — Test the cylinders per "Tests and Adjustments". Repair or replace cylinder as required.

3. Control valve spool not returning to "Neutral" position — Repair valve as necessary.

4. Excessive wear between valve spool and spool bore — Test and repair valve as required.

5. Circuit relief valve seats "bad" — Test and repair circuit relief.

CYLINDER MOVEMENT WITH CONTROL VALVE SPOOLS IN "NEUTRAL"

1. Valve spool(s) not centered — Test and repair control valve as needed.

2. Cylinder packing damaged, or worn — Test cylinders per "Tests and Adjustments" ... repair, or replace cylinder(s) as required.

3. Circuit relief valve damaged, or setting too low — Test and repair, or replace circuit relief(s) as needed.

4. Damaged, or worn self-leveling components integral to control valve — Test and repair control valve as required.

5. Valve Spool, or its bore in casting scored — Test control valve and repair, or replace as required.

EXCESSIVE BREAKAGE OF HOSES

1. Hoses not properly installed — Install hoses so they are not twisted or kinked.

2. Main relief valve malfunction — Check system's main relief valve per "Tests and Adjustments". Service relief valve as required.

LOW SYSTEM PRESSURE (As Determined By Pressure Gauge)

1. Main relief valve malfunction — Check system's main relief valve per "Tests and Adjustments". Service relief valve as required.

2. Pump worn or damaged — Perform tests per "Tests and Adjustments" as required and repair, or replace pump. Also check for possible damage to pump drive. Correct as necessary.

BUCKET MOVEMENT DUE TO EXTERNAL FORCES WITH VALVE IN "NEUTRAL"

1. Circuit relief valve seals "bad" — Test circuit relief(s) and repair, or replace seals.

2. Valve spool not returning to "neutral" — Repair, or replace faulty components ... also check for binding spool linkage.

3. Internal self-leveling piston, or check valve damaged (or held open by contaminates) — Repair, or replace faulty parts.

4. Excessive wear between valve spool and spool bore — Test and repair valve as required.

EXTERNAL LEAKAGE OF CONTROL VALVE

1. Defective seals around valve spools — Replace seals.

2. Valve port fittings loose (or damaged seals) — Replace seals and tighten fittings as necessary.

3. Valve body cracked — Replace valve assembly.

"STICKY" VALVE SPOOL(S)

1. Misaligned or binding control linkage — Realign and free control valve handles and linkage to operate the valve spools properly and smoothly.

2. Control valve worn and/or damaged, or contaminated — Repair control valve as required.

SPOOL DOES NOT RETURN TO "NEUTRAL"

1. Misaligned or binding control linkage — Realign and free control valve handles and linkage to operate the valve spools properly and smoothly.

2. Control valve worn and/or damaged, or contaminated — Repair control valve as required.

3. Defective seals around valve spools — Replace seals.

4. Broken centering springs or bent spool — Repair valve as necessary.

5. Obstruction between control valve and reservoir (causing excessive back pressure) — Remove obstruction (restriction).

BOOM SPOOL DOES NOT STAY IN "FLOAT" POSITION

1. Spool detents damaged or worn — Repair control valve as required.

2. Misaligned or binding control linkage — Realign and free control valve handles and linkage to operate the valve spools properly and smoothly.

3. Control valve worn and/or damaged, or contaminated — Repair control valve as required.

HYDRAULIC PUMP "NOISY" AND/OR OVERHEATING

1. Low oil level — Maintain oil level in reservoir to the correct markings on the dipstick.

2. Wrong type of oil in system — Drain system and refill with recommended type oil.

3. Air in system — Check for loose suction and pressure line connections. Tighten fittings and/or replace "O"-ring seals on fittings as necessary.

4. Obstruction in pump suction line — Check suction line (to pump) for kinks and/or obstructions.

5. Pump not operating or not operating properly — Check flow. If pump produce flow, check that

system's main relief valve is working properly and is at the correct setting. Also make certain that there is no damage to pump drive mechanism. (Refer to "Tests and Adjustments" for procedures.) Repair or replace as necessary.

6. Contaminated oil and/or dirty oil filters — If oil is contaminated, drain and flush system, change element(s). Refer to the correct service procedures.

7. Pump worn or damaged — Perform tests per "Tests and Adjustments" as required and repair, or replace pump. Also check for possible damage to pump drive. Correct as necessary.

PUMP SHAFT SEAL LEAKING

1. Pump worn or damaged — Perform tests per "Tests and Adjustments" as required and repair, or replace pump. Also check for possible damage to pump drive. Correct as necessary.

2. Contaminated oil and/or dirty oil filter — If oil is contaminated, drain and flush system, clean filter. Refer to the correct service procedures.

PUMP GPM TOO LOW (As Determined By Tesing)

1.Low oil level — Maintain oil level in reservoir to the correct markings on the dipstick.

2. Wrong type of oil in system — Drain system and refill with recommended type oil.

3. Air in system — Check for loose suction and pressure line connections. Tighten fittings and/or replace "O"-ring seals on fittings as necessary.

4. Obstruction in pump suction line — Check suction line (to pump) for kinks and/or obstructions.

5. Engine RPM too low — increase engine rpm.

6. Contaminated oil and/or dirty oil filter(s) — If oil is contaminated, drain and flush system, change element(s). Refer to the correct service procedures.

7. Pump worn or damaged — Perform tests per "Tests and Adjustments" as required and repair, or replace pump. Also check for possible damage to pump drive. Correct as necessary.

RAPID LEAK-DOWN OF CYLINDERS

1. Hose to cylinder leaking — Check for damaged or loose hoses. Tighten or replace as required.

2. Control valve spool not returning to "Neutral" position — Repair valve as necessary ... check linkage for binding.

3. Malfunction of circuit relief valve — Test control valve per "Tests and Adjustments" and repair or replace valve as necessary.

4. Excessive wear between valve spool and spool bore — Test and repair valve as required.

5. Defective seals around valve spools — Replace seals.

6. Damaged or worn cylinder packing — Test the cylinders per "Tests and Adjustments". Repair or replace cylinder as required.

CYLINDER ROD "SETTLES INTO" OR "CREEPS OUT-OF" CYLINDER BARREL

1. Damaged or worn cylinder packing — Test the cylinders per "Tests and Adjustments". Repair or replace cylinder as required.

2. Control valve spool not returning to "Neutral" position — Repair valve as necessary ... also check linkage.

3. Excessive wear between valve spool and spool bore — Test and repair valve as required.

4. Malfunction of circuit relief valve — Test control valve per "Tests and Adjustments" and repair or replace valve as necessary.

5. Self-leveling piston (internal to spool) and/or check valve (internal to control valve) either damaged, worn, or held open by contaminates — repair, or replace faulty control valve parts.

TESTS AND ADJUSTMENTS

The hydraulic system may be tested with either a flow meter, or a pressure gauge. (The gauge should be capable of reading *at least* 3000 psi when checking system's main pressure, and overload reliefs installed in boom spool's lower work port, OR bucket spool's upper work port ... BUT 5000 psi when checking overload relief in bucket spool's lower work port. DO NOT USE A SMALLER CAPACITY GAUGE THAN THE ONE RECOMMENDED.) Using a flow meter will allow a more accurate check of pump efficiency (i.e. gallonage). Internal leakage past the control valve spools and the cylinder packing may be checked by observing certain operations.

CAUTION: Make certain that the removal of a plug (or disconnection of a line) in order to make the test connection, will not cause injury to anyone working on, or around, the machine. The engine should be "off' and all hydraulically actuated equipment should be resting on the ground ... the control levers are to be actuated back and forth several times to relieve any pressure within the circuits ... BEFORE ATTEMPTING TO MAKE THE TEST CONNECTION.

CHECKING AND ADJUSTING MAIN SYSTEM PRESSURE

The system's main relief valve is located as indicated in Fig. 17 ... this relief is adjustable and it setting may be checked as follows (test port and circuit reliefs are located as shown in Fig. 18):

CAUTION: Observe all safety precautions previously mentioned ... refer to the back of "Contents" page.

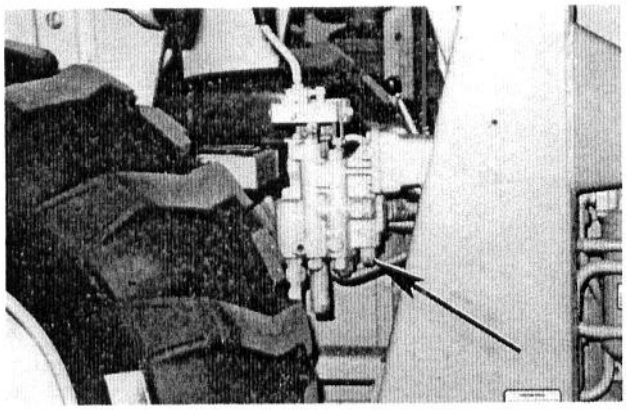


Fig. 17 — Location of Main Relief Valve — Typical

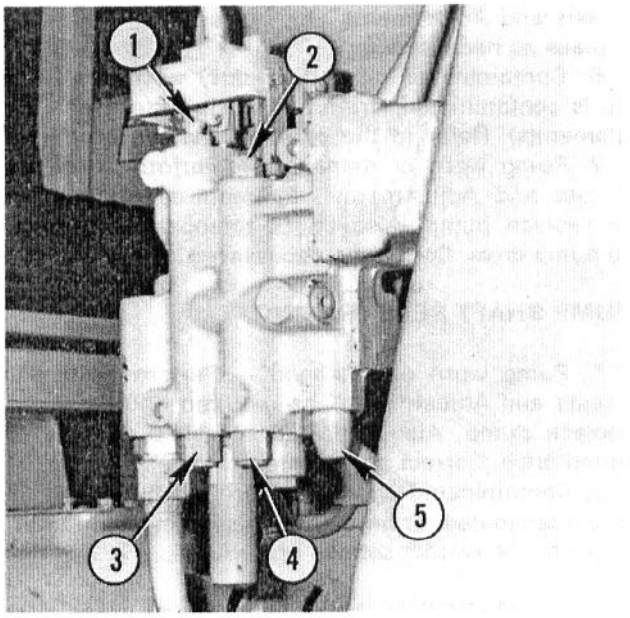


Fig. 18 — Location of Circuit Reliefs and Test Port — MF 34A and MF 300A

1. Test Port (also on MF 32A)
2. Bucket Circuit — Head-End
3. Boom Circuit — Head-End
4. Bucket Circuit — Rod-End
5. Main Relief Valve Shield (also on MF 32A)

1. Connect a suitable gauge to control valve test port using fittings as shown in Figs. 19 and 20.

2. Check the main relief valve's OPENING pressure as follows:

a. Operate the engine at a low rpm (without stalling).

b. Extend and retract the lift cylinders to both extremes of their travel.

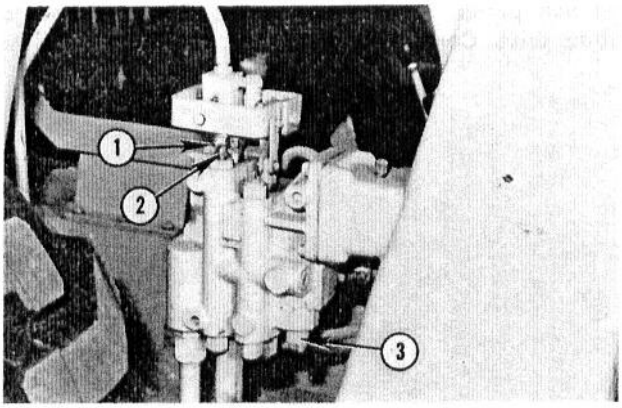


Fig. 19 — Fittings Connected to Control Valve Test Port

1. Elbow Fitting
2. Reducer Bushing
3. Main Relief Valve (Shield Installed)

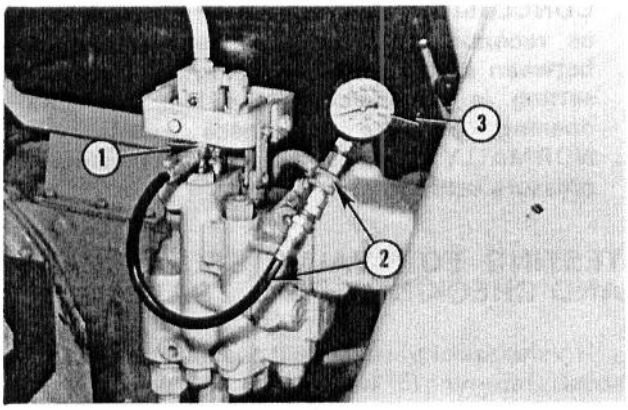


Fig. 20 — Pressure Gauge Connected to Control Valve Test Port

1. Elbow Fitting
2. *Hose and Coupler
3. *5000 PSI Gauge

*NOTE: Items part of Test Kit ND-112

c. Record the pressure gauge reading at both extremes of cylinder stroke. The relief valve pressure setting should be . . . 2250-2500 psi acceptable operating range.

CONCLUSION: The OPENING pressure of the relief should be within 200 psi of the acceptable operating range. If all pressures are the same, but more than 200 psi from the operating range . . . a maladjusted (or faulty) relief is indicated. If only one pressure reading is low . . . a "bad" cylinder packing may be the source of trouble.

3. Check the relief valve's MAXIMUM pressure setting as follows:

a. After OPENING pressure has been checked, operate engine at 2000 rpm.

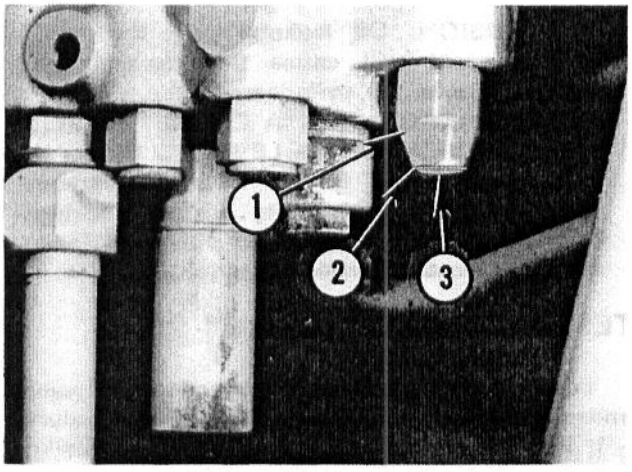


Fig. 21 — Main Relief Valve — Shield Installed

1. Shield
2. Shield Retainer
3. Welsh Plug Location

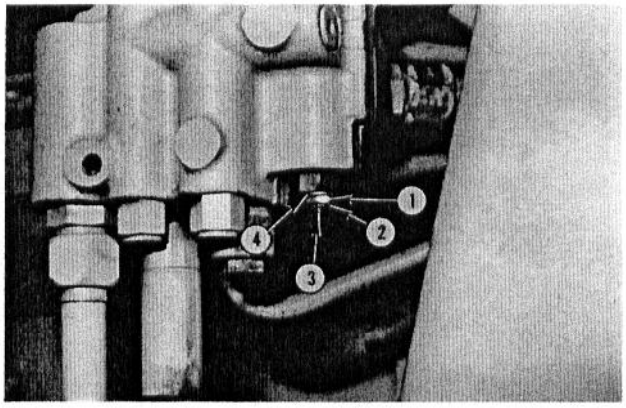


Fig. 22 — Relief Valve Adjusting Screw — Shield Removed

1. Jam Nut
2. "O"-Ring
3. Adjusting Screw
4. Washer

b. Force the lift cylinders to both extremes of their stroke and record the maximum reading on the pressure gauge . . . which should be 2300-2550 psi (2500 psi is desirable setting).

CONCLUSION: A reading other than in "b" indicates a maladjusted (or "bad") relief. (Cylinder internal leakage is not normally detectable at higher pump rpms.)

4. ADJUST the main relief of the control valve shown in Fig. 21 as follows:

a. With pressure gauge connected as shown in Fig. 20 . . . remove welsh plug at bottom of shield (for relief valve assembly) then unscrew shield retainer and remove shield (with retainer, internal washer and "O"-ring), see Fig. 22.

b. Operate the engine at 2000 rpm then actuate the control valve and observe the maximum pressure reading on the gauge.

c. Loosen jam nut and turn adjusting screw "in" (to increase), or "out" (to decrease) until maximum system pressure is 2500 psi.

d. After recommended pressure setting is obtained . . . tighten jam nut while preventing adjusting screw from turning *the* recheck pressure.

e. Place "O"-ring over end of adjusting screw, insert retainer through bottom of shield and place steel washer on top of retainer (inside shield) . . . thread retainer onto adjusting screw (to hold shield in position) then install new welsh plug in bottom (of retainer).

TESTING AND ADJUSTING CIRCUIT RELIEFS (Within Valve)

1. Circuit reliefs installed in Loader control valve

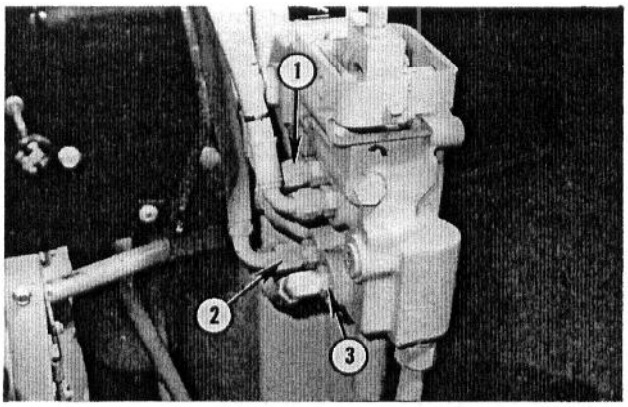


Fig. 23 — Valve Ports (Location of Circuit Reliefs)

1. Bucket Cylinder's Head-End Circuit — MF 34A and MF 300A
2. Bucket Cylinder's Rod-End Circuit — MF 34A and MF 300A
3. Boom Cylinder's Head-End Circuit — MF 32A, MF 34A and MF 300A

should have the following pressure settings, see Fig. 18:

a. MF 32A, MF 34A, and MF 300A — Boom circuit head-end . . . 2875 psi

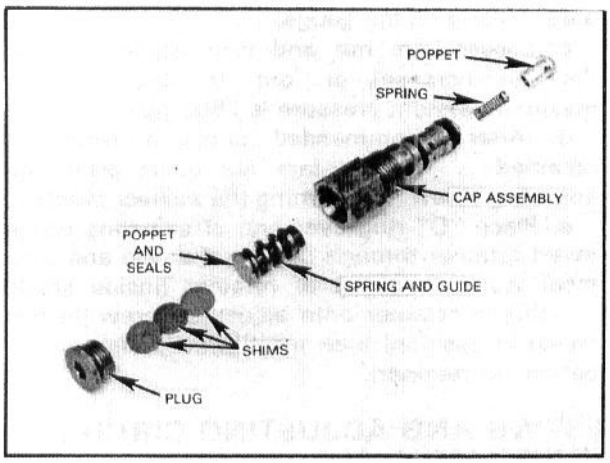
b. MF 34A and MF 300A — Bucket circuit head-end . . . 2875 psi

c. MF 34A and MF 300A — Bucket circuit rod-end . . . 3500 psi

2. Circuit reliefs may be checked and adjusted as follows:

a. Connect a suitable hand pump with a 5000 psi pressure gauge attached to the control valve work port containing the circuit relief to be checked . . . cylinder to be disconnected from valve port, see Fig. 23.

b. Pressurize the valve port with the hand pump (valve spool in *neutral*) and record the maximum pressure gauge reading.



CONCLUSION: If pressure settings are not as recommended, add (or remove) shims between spring guide and plug until correct setting is obtained . . . see Fig. 24. (The opening pressure of these reliefs are NORMALLY 100 psi below the maximum pressure setting.)

TESTING FOR VALVE SPOOL LEAKGE AND CHECKING SPOOL TRAVEL

1. Valve spool travel should be measured to ensure spool is returning to "Neutral" position before checking for leakage . . . make sure linkage is not binding (preventing spool return to "Neutral"). Spool travel into and out-of casting from *"Neutral"* position should be as follows:

a. MF 32A, MF 34A, and MF 300A Bucket spool travel — 0.37" (3/8" approx.) into (bucket "dumped") AND out-of (bucket "curled").

b. MF 32A Boom spool travel — 0.25" out-of (boom "raise") . . . 0.25" into (boom "lowered") AND 0.50" into (boom "float").

c. MF 34A and MF 300A Boom spool travel — 0.25" out-of (boom "raise") AND 0.50" out-of (self-leveling) . . . 0.25" into (boom "lowered") 0.50" into (boom "float").

2. Valve spool internal leakage may be checked as follows:

a. Operate the system in such a manner as to cause an external load on the spool circuit (or cylinder) to be checked. (For example: Raise boom with bucket loaded to check head end of boom, lower boom until it supports the weight of Tractor to check rod end of boom circuit, etc.).

b. Return spool to neutral position and shut-off engine.

c. Check the oil level in the reservoir as the cylinders begin to "settle"

CONCLUSION: Oil leakage past the controlling spool will cause the reservoir oil level to rise as the cylinders "settle". HOWEVER, LEAKAGE PAST A CIRCUIT RELIEF WILL ALSO CAUSE OIL LEVEL TO RISE. If cylinders "settle", but oil level in reservoir remains the same, faulty piston packing (within cylinder) is indicated . . . see "Testing for Internal Cylinder Leakage".

TESTING "LOAD CHECKS"

"Load checks" are installed in the control valves and may be checked through the following procedures.

1. Run the engine at a *low* rpm (without stalling) and slowly move the control lever to operate the circuit to be checked. Pressurize the cylinders in the direction that requires the greatest amount of force against the mechanical leverage of the Loader.

EITHER

2. Operate the other control lever ... while still slowly activating the one being checked and observing the action of the cylinders.

OR

3. Shut-off engine and continue to move control lever to pressurize cylinder *in same direction* as in *step #1.*

CONCLUSION: If circuit being checked loses pressure ... indicated by a "setting" of the cylinders in the circuit ... the "load check" is faulty. (Checking for this loss of pressure may also be done with a pressure gauge in the suspected circuit. If the "load check" is bad, the gauge should indicate a pressure drop, but may quickly recover if the engine is running ... this is because pump gpm will soon catch up with the activated circuits.)

TESTING FOR INTERNAL CYLINDER LEAKAGE

The double-acting hydraulic cylinders may be checked for faulty piston packing through the following procedures:

1. Operate the cylinder and observe its rod for either "settling" into, or coming out of, the barrel. It is possible for internal leakage to be in one direction only ... therefore, operate the cylinder in both directions and allow enough time for evalutation at each extreme of travel.

2. If it is determined that the cylinder rod "settles" into the barrel, proceed as follows:

a. Actuate the suspected cylinder until its rod is *fully* extended, then place control spool in neutral and shut-off engine.

CAUTION: If operation of cylinder has raised the boom — support it adequately.

b. *Carefully* disconnect the hose from the ROD END port of the suspected cylinder.

CAUTION: Use care when disconnecting the hose — make sure that the correct one is being disconnected. Observe ALL SAFETY PRECAUTIONS.

c. Operate engine and continue to actuate control spool in SAME DIRECTION TO FULLY EXTEND CYLINDER while observing the rod end port ... from which the hose was disconnected.

CONCLUSION: If oil comes out the disconnected port, the cylinder packing is faulty. If no oil comes out the port, but the rod enters the barrel (due to the applied external load of lift arms, etc.) the trouble may be due to a faulty circuit relef valve, or valve spool.

d. Shut-off engine and reconnect the hose to the cylinder's rod end port.

3. If it is determined that rod comes out of barrel, proceed as follows:

a. Run engine, actuate the suspected cylinder until its rod is *fully* retracted into the barrel ... then place control spool in neutral and shut-off engine.

CAUTION: See Caution under step 2a.

b. *Carefully* disconnect the hose from the HEAD END port of the suspected cylinder.

CAUTION: See Caution under step 2b.

c. Operate engine and continue to actuate control spool in SAME DIRECTION TO FULLY RETRACT CYLINDER while observing the head end port ... from which the hose was disconnected.

CONCLUSION: If oil comes out the disconnected port, the cylinder packing is faulty. If no oil comes out the port, but the rod does come out the barrel ... the trouble may be due to a faulty circuit relief, or valve spool.

CHECKING PUMP EFFICIENCY (GPM)

1. Connect a suitable flow meter into "series" with the pump outlet (i.e.: between pump outlet and control vlve inlet) ... see Figs. 25 and 26.

NOTE: The flow meter must be capable of withstanding a "back pressure" created by operating the system. When testing with a flow meter in "series" ... DO NOT COMPLETELY CLOSE THE FLOW METER'S LOAD VALVE. If this valve is completely closed, the pump may be damaged, or the meter's safety relief valve (if installed) may be ruptured.

2. Check that flow meter's load valve is opened and operate the system to heat the oil to 120° F. (Check system for leaks and correct as necessary.) Creating a slight "back pressure" with flow meter's load valve will speed the heating of the oil.

Loader Model	Loader/Backhoe Models	Typical Application	Engine Speed	Capacities (Nominal Flow) Free Flow Test	Efficiency Test
MF 32A		MF 20C/MF 30B	2250 rpm	17-19 gpm	15.2 gpm
	MF 32A/MF 52A	MF 20C	2250 rpm	19.8-22 gpm	17.6 gpm
	MF 34A/MF 54A	MF 30B	2250 rpm	19.8-22 gpm	17.6 gpm
MF 34A		MF 40B	2000 rpm	17.5-19.5 gpm	15.6 gpm
	MF 34A/MF 54A	MF 40B	2000 rpm	23.4-26 gpm	20.8 gpm
MF 300A		MF 50C	2000 rpm	23.4-26 gpm	20.8 gpm
	MF 300A/MF 54A	MF 50C	2000 rpm	26.2-29 gpm	23.3 gpm

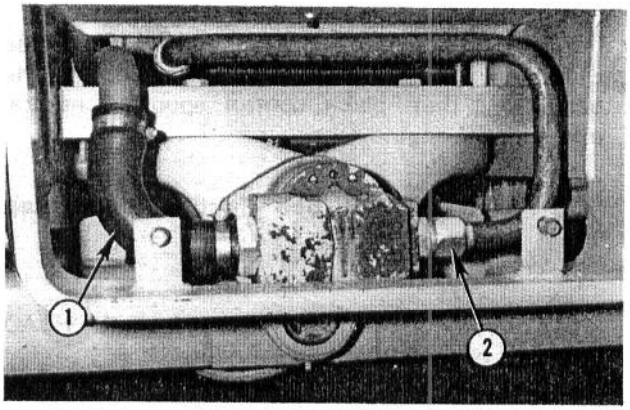


Fig. 25 — Typical Pump Installation — MF 40B w/MF 34A Loader Shown

1. Pump Inlet ("Suction")
2. Pump Outlet ("Pressure" to Control Valve)

NOTE: Do not disconnect "suction" line to pump. (If "suction" line is disconnected, pressurize reservoir SLIGHTLY ... using a air hose and rag over reservoir filler opening. This is to ensure that oil is available at inlet side of pump ... failure to do this may result in premature pump failure.)

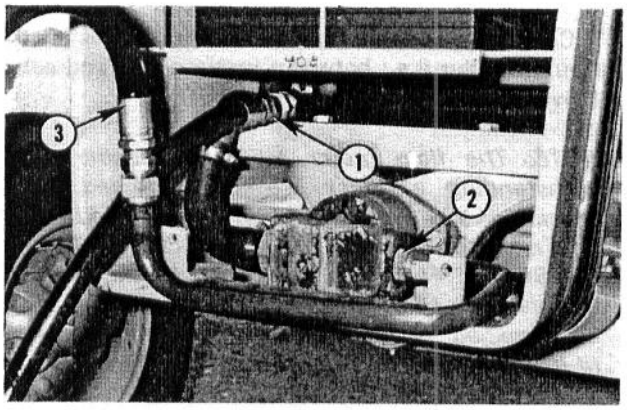


Fig. 26 — Typical Test Connection For Checking Pump GPM — MF 40B w/MF 34A Loader Shown

1. Flow Meter Outlet (To Control Valve Inlet Line)
2. Pump Outlet Port
3. Flow Meter Inlet Line

3. Perform the pump FREE FLOW test as follows:
   a. With flow meter load valve FULLY OPENED, run engine as indicated in pump flow chart (check gallonage at rpm's stated). Make sure that control valve spools are in "neutral" position.
   b. Record the gallonage reading on flow meter ... checking that the oil is at 120° F.

CONCLUSION: If pump's gpm is per minimum flow given in chart 1 ... proceed to step #4. If reading is less than this, check for a restriction, or a loose connection between the reservoir and the pump. Also check for a dirty oil filter and a malfunctioning by-pass poppet.

4. Perform the pump EFFICIENCY TEST as follows:
   a. Run engine at rpm recommended in Chart 1 and close the flow meter's load valve until 2500 psi is recorded on pressure gauge (connected to flow meter).
   b. Record the gallonage reading on the flow meter ... checking that the oil is at 135°F.

CONCLUSION: If pump's gpm is per minimum flow given in Chart 1 ... the pump is efficient enough to use. If reading is less than this, check that engine is at correct rpm and that the correct test "back pressure" is maintained ... if the recommended test conditions are correct, but pump's gpm is too low, repair (or replacement) of the pump is required.

5. If desired, check the main relief valve's OPENING and MAXIMUM pressure setting using the pressure gauge connected to flow meter ... making sure that meter's load valve is fully opened (procedures given under "Checking and Adjusting Main System Pressure" may be followed).

HYDRAULIC PUMP SERVICING

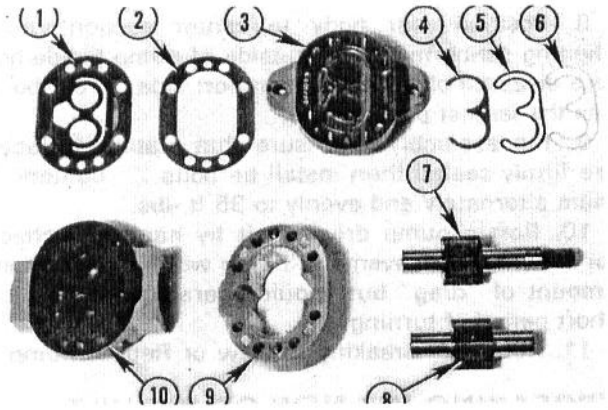


Fig. 27 — Identification of Parts Within Typical "Vickers — G20 Series" Gear Pump — Single Thrust Plate Design Shown

1. Thrust Plate
2. Spacer Shim
3. Front Body
4. Spacer
5. Rubber Seal
6. Teflon Ring
7. Drive Gear and Shaft
8. Idler Gear and Shaft
9. Center Section
10. Rear Body

The MF part number is USUALLY found stamped on the exterior of the pump and should be used as a means of identification.

Instructions pertain to disassembly, inspection and reassembly of "Vickers" G20 Series gear pumps ... regardless of flow capacity. Certain design features of pump being serviced should be visually observed PRIOR TO DISASSEMBLY ... other features should be noticed DURING DISASSEMBLY. This practice will enable you to better understand and follow recommended service procedures.

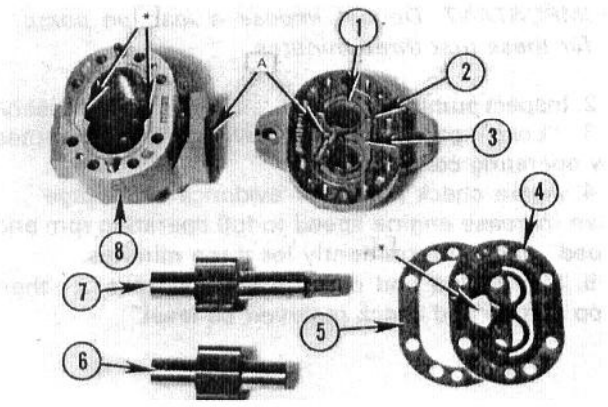


Fig. 28 — Installation of Seals Within Front Body — Rear and Center Bodies Assembled

A. Suction Side of Front Body and Suction Port of Rear Body

1. Rubber Seal
2. Teflon Outer Ring
3. Seal Spacer
4. Bronze Side of Wear Plate
5. Shim
6. Idler Gear
7. Drive Gear
8. Center Section and Rear Body

*NOTE: Side of center section having smallest width at area indicated to be toward front body ... large opening at center area of wear plate to be at suction side of pump.

INFORMATION

Some of these "G20 Series" pumps will have only a wear plate, spacer shim, spacer, rubber seal and teflon ring installed between the front and center bodies ... others will ALSO HAVE these items installed between center and rear bodies. Particular attention must be given to internal parts AND THEIR PLACEMENT during disassembly.

DISASSEMBLY

Refer to Figs. 27 and 28.

1. After pump has been removed, drained of oil and thoroughly cleaned ... scribe a mark across the outside of the pump bodies to aid in reassembly.
2. Remove the tie bolts securing the bodies together.
3. Tap the pump drive shaft against a wooden block to separate the rear body from the other sections. DO NOT REMOVE THE GEAR SHAFTS AT THIS TIME.

NOTE: Use care when separating the pump so as to prevent damage to the machined surfaces and the gear pockets.

4. Remove thrust plate, spacer shim, spacer, seal and teflon ring from rear body ... if installed.

NOTE: Carefully notice placement of parts in relationship to pump suction port.

5. Mark gear faces for realigning during reassembly (so as to maintain original wear pattern of gears ... and shaft bearings): An india stone may be used to mark the face of two gear teeth on one assembly ... and the "straddled" one gear tooth on the other.
6. Tap against idler and drive gear shafts with a plastic mallet to start separating front body from center section. AFTER THESE TWO SECTIONS BEGIN TO SEPARATE ... carefully remove gear shafts, then continue separation. (It may be necessary to tap against dowels to complete separation.)

NOTE: Do not pry against machined surfaces.

7. If thrust plate does not fall out when center section and front body are separated ... remove it.
8. Remove spacer shim, spacer, teflon ring and seals (including drive shaft seal) ... from front body.

NOTE: Use care to prevent damage to the seal grooves within the body and to the shaft bearings.

INSPECTION

1. Thoroughly clean and dry all metal parts and visually check for evidence of damage, or excessive wear. It will require good judgment on the part of the serviceman to determine excessive wear (or damage) that will affect pump efficiency. Particular attention should be given to ...

a. Rough surfaces, or scoring, of gear shafts within their bearing areas and at outboard seal area of drive gear shaft.

b. Scoring of gear faces and sharp edges, nicks or burrs on gear teeth ... crocus cloth may be used to *polish* gear teeth when necessary.

c. Scoring (or wear) of shaft bearings within pump bodies and damage to gear "pockets" within center section.

d. The drive shaft oil seal "receptacle" within front body (to ensure a positive seating of seal).

REASSEMBLY

1. Apply clean hydraulic oil to seals and all metal parts.

2. Carefully install new drive shaft seal into its bore in front body. Lips of seal to be inward to pump. Make certain that seal is not "cocked" as this may allow leakage (with subsequent damage).

3. Install new spacer, rubber seal and teflon ring into groove in front body. These parts are to be positioned as shown in Fig. 28.

4. Position thrust plate on front body so that its bronze side is away from body and seal cut-out is aligned over previously installed seal.

5. Position center section over front body ... aligning scribe marks made on outside of bodies during disassembly.

6. Insert both gear shafts into their respective pockets (and front body bearings) ... check that marks made on gears during disassembly, are realigned.

7. If pump uses a thrust plate between rear and center bodies, proceed as follows:

a. Install new spacer, rubber seal and teflon ring into groove in rear body ... position these items so they will be aligned with similar parts in *front body.*

b. If shim is also used at rear body area ... install new shim over seals.

c. Position wear plate against rear body so that its bronze side will be toward gears and seal cut-out side is aligned over seal.

8. Position rear body to center section while aligning scribe marks on outside of pump (made before disassembly). The suction port side of rear body has the largest port opening.

9. Tap assembly to ensure that mating surfaces are firmly seated then install tie bolts ... tightening them alternately and evenly to 35 ft.-lbs.

10. Rotate pump drive shaft by hand and check for freedom of movement. Pump will have a certain amount of "drag" but should operate freely after a short period of turning.

11. Refer to "Breaking-In New or Rebuilt Pump".

"BREAKING-IN" NEW OR REBUILT PUMP

NOTE: After pump is reinstalled, reservoir serviced (and suction line converted) ... pressurize reservoir SLIGHTLY to insure that inlet side of pump is filled BEFORE starting engine. This may be done using an air hose inserted into reservoir filler neck ... and holding a shop cloth around filler neck to help seal top of reservoir. Check to make sure that oil is available to inlet of pump before starting ... remove air hose and rag then reinstall breather/dipstick on filler neck.

1. With pump correctly reinstalled and hydraulic reservoir serviced, run engine at 1/2 its normal operating rpm for about three minutes without operating any hydraulic system control levers.

IMPORTANT: Do not impose a load on pump for these first three minutes.

2. Inspect pump for leakage ... correct as necessary.

3. "Load" pump *intermittently* for three minutes (by operating control levers).

4. Again check pump for evidence of leakage ... then increase engine speed to full operating rpm and "load" pump intermittently for three minutes.

5. Idle engine and check pump for leaks ... then stop engine and check reservoir oil level.

CONTROL VALVES SERVICING

The following instructions pertain to vertical, 2-spool valves with float position and with ... OR WITHOUT ... self-levelling position on the boom control spool. The procedures are written assuming that the valve has been removed from its mounting surface.

INFORMATION: Restrictors are installed in the valve ports as indicated in Fig. 29. Plugs and/or fittings will vary according to whether or not a Backhoe is to be connected to the valve. It is important that the internal plug be removed when a Backhoe is NOT CONNECTED. This plug is used to divert oil to the Backhoe (when installed) instead of allowing it to return to the reservoir (when not installed).

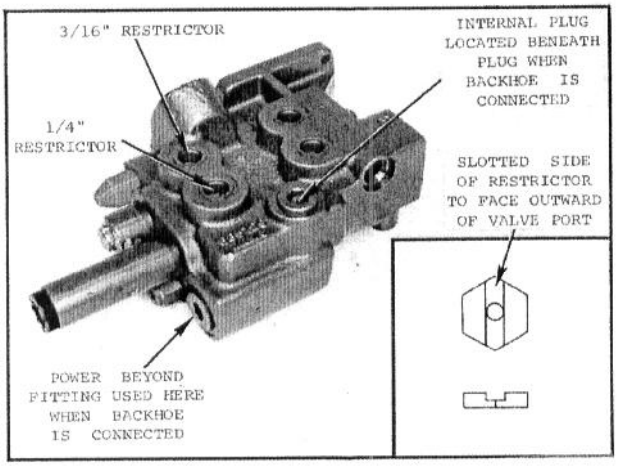


Fig. 29 — Location of Internal Plug and Restrictors

NOTE: Internal Plug used ONLY when Backhoe is installed

The MF 32A Loader control valve differs in construction to the MF 34A and MF 300A control valve ... HOWEVER, servicing procedures are basically the same (additional parts are used in MF 34A and MF 300A loader valve).

A circuit relief is installed in boom head-end circuit (lower end of valve) ... in the MF 32A, MF34A and MF 300A control valve. Circuit reliefs are also used in the bucket rod-end (lower end of valve) and bucket head-end (top end of valve) ... on the MF 34A and MF 300A loader valve, see Fig. 30.

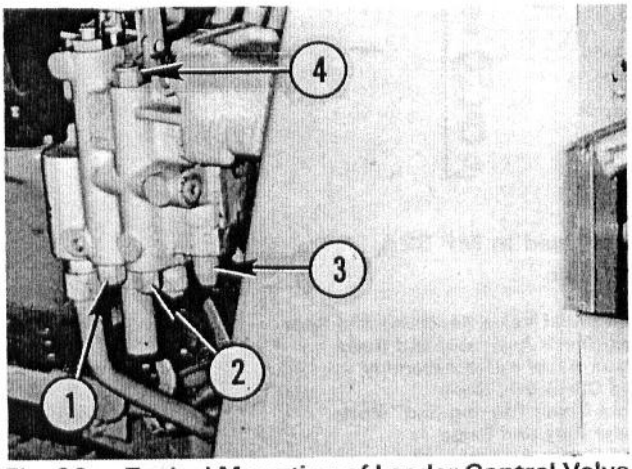


Fig. 30 — Typical Mounting of Loader Control Valve — Self-Levelling Type Shown

1. Boom Head-End Circuit Relief
2. Bucket Rod-End Circuit Relief
3. Main Relief Valve Shield
4. Bucket Head-End Circuit Relief

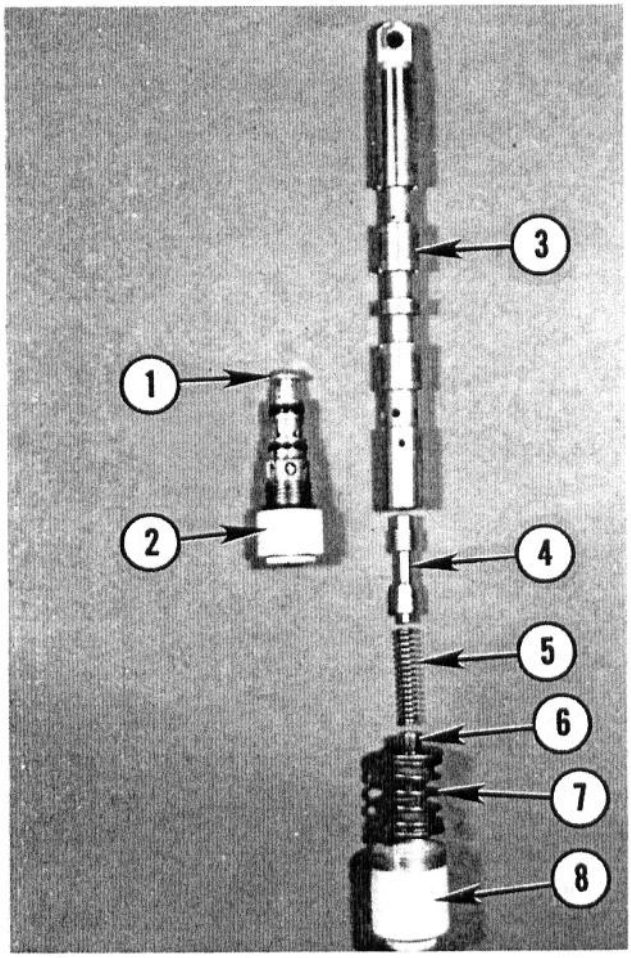


Fig. 31 — Bucket Spool Used on Self-Levelling Type Valves — Load Check and Circuit Relief Shown

1. Load Check Poppet
2. Circuit Relief Valve Assembly
3. Bucket Spool
4. Plunger
5. Spring
6. Spool "End"
7. Centering Spring and Related Parts
8. End Cap — For Spool

The bucket spool used on the MF 34A and MF 300A loader valve contains additional parts as shown in Fig. 31 ... MF 32A loader valve uses a different bucket spool, see Fig. 32.

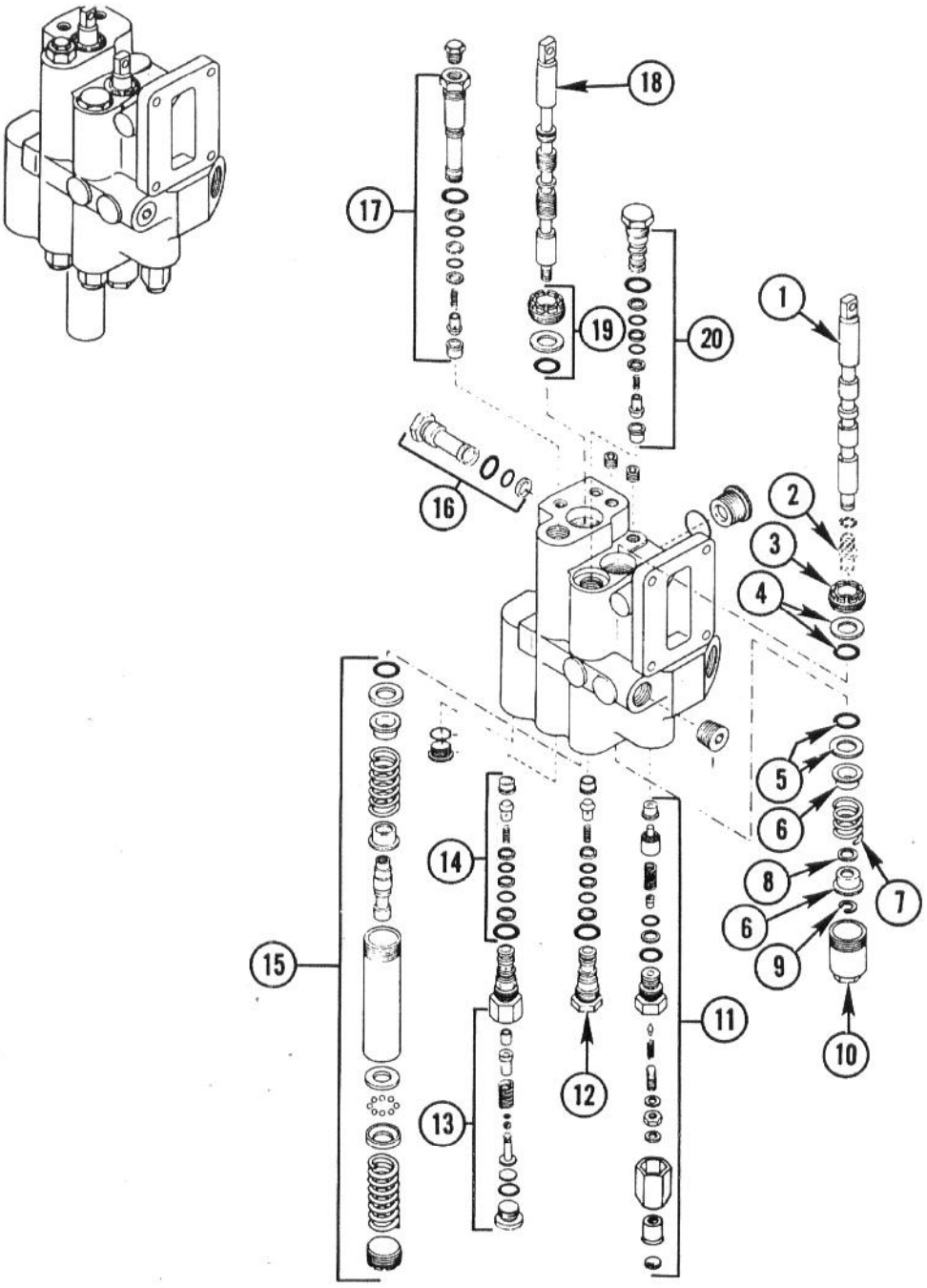


Fig. 32 — Relationship of Parts Used in MF 32A Loader Control Valve

1. Bucket Spool
2. Spool "End"
3. Wiper Retainer
4. Washer and "O"-Ring
5. Washer and "O"-Ring
6. Spring Retainers
7. Centering Spring
8. Washer
9. Snap Ring
10. Cap
11. Main Relief Valve Assembly and Seat
12. Load Check Assembly and Seals
13. Circuit Relief Valve Assembly
14. Load Check and Seals
15. Boom Spool "Spring End" Ports
16. Cavity Plug and Seals
17. Load Check Assembly and Seals
18. Boom Spool
19. Wiper Retainer, Washer and "O"-Ring
20. Load Check Assembly and Seals

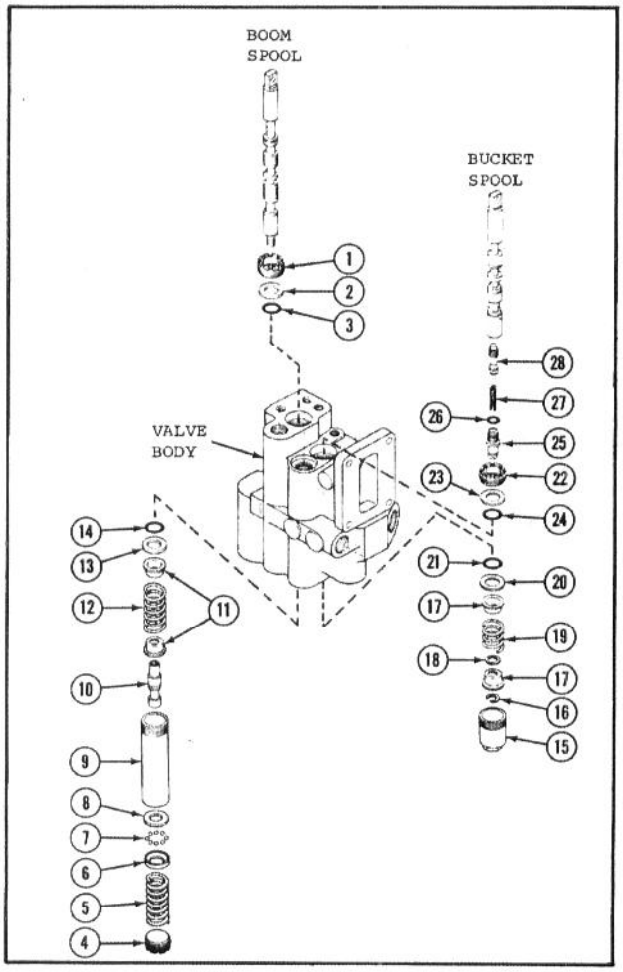


Fig. 33 — Identification of Parts Used In MF 34A and MF 300A Loader Control Valve

1. Wiper Retainer
2. Washer
3. "O"-Ring
4. Plug
5. Detent Spring
6. Detent Retainer
7. Detent Balls
8. Detent Retainer
9. Cap
10. Detent Barrel
11. Spring Retainers
12. Centering Spring
13. Special Washer
14. "O"-Ring
15. Cap
16. Snap Ring
17. Spring Retainers
18. Washer
19. Centering Spring
20. Special Washer
21. "O"-Ring
22. Wiper Retainer
23. Washer
24. "O"-Ring
25. Spool "End"
26. "O"-Ring
27. Spring
28. Plunger

Valve may be disassembled while it remains bolted to reservoir side frame ... however, if extensive servicing is to be performed it is recommended that valve be removed.

DISASSEMBLY

See Figs. 29 through 39.

NOTE: It is important that spools and poppets

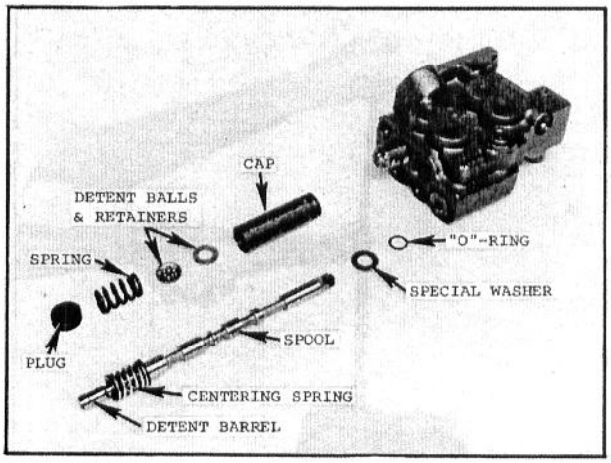


Fig. 34 — Boom Spool and Related Parts Removed From Valve

be clearly tagged as they are removed so they may be identified with their respective bores during reassembly. DO NOT SWITCH PARTS. The outside of the valve should be thoroughly cleaned prior to disassembly ... clean all paint and dirt from the clevis end of the spools.

1. Remove the boom control spool from its bore as follows ... see Figs. 32, 33, and 34:

a. Place spool in neutral then carefully remove plug from cap at spring end of spool ... remove detent spring, retainers and steel balls.

b. Unscrew cap from spring end of valve body and wiper retainer at clevis end.

c. Remove spool from bore by rotating it slightly while pulling from centering

d. If special washer and "O"-ring do not come out with spool ... remove them from valve.

e. Remove washer and "O"-ring from bore at clevis end of valve.

2. If it is necessary to remove centering spring, or detent barrel from end of boom spool ... proceed as follows:

a. Carefully clamp the clevis end of spool in a soft jawed vise.

b. Use a suitable spring compressing tool to compress spring and remove the detent barrel as shown in Fig. 35 ... then carefully release tool and separate spring retainers and spring from spool.

NOTE: Detent barrel may have been assembled with "Loctite" grade CV (color — blue) and may require heating to remove.*

c. If "O"-ring and washer are still on spool ... remove them.

3. Remove the bucket control spool from valve bore as follows ... see Figs. 31, 32, 33 and 36:

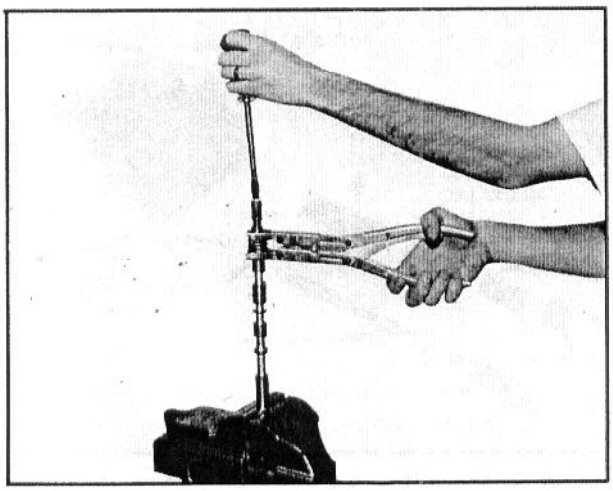


Fig. 35 — Removing/Installing Detent Barrel and Centering Spring Parts

1. Place spool in neutral then remove spool end cap.

b. Unscrew wiper retainer from clevis end of valve.

c. Remove spool from bore by rotating it slightly while pulling from centering spring end of valve.

d. If special washer and "O"-ring do not come out with spool ... remove them from valve.

e. Remove washer and "O"-ring from bore at clevis end of valve.

4. If it is necessary to remove centering spring, or the plunger internal to the bucket spool (on self-levelling valves only) ... proceed as follows:

a. Carefully clamp the clevis end of spool in a soft jawed vise.

b. Use a suitable spring compressing tool to compress spring and remove the snap ring ... then carefully release tool and separate spring retainers, spring and washer from spool.

c. If washer and "O"-ring are still on spool ... remove them.

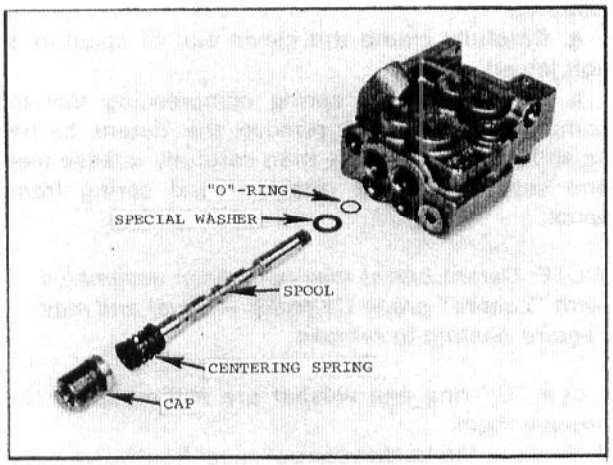


Fig. 36 — Bucket Spool Removed From Valve

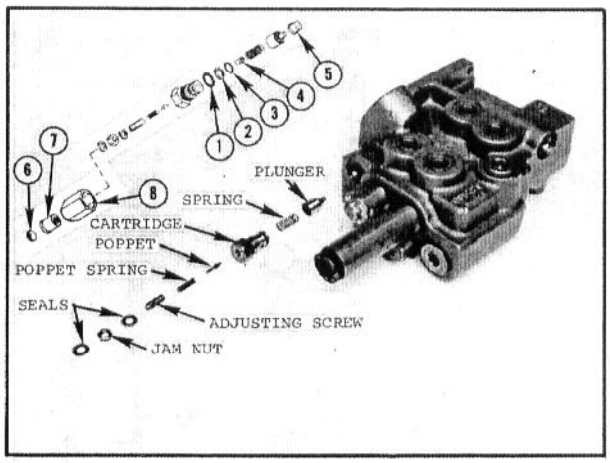


Fig. 37 — Main Relief Valve — Identification Of Parts

1. "O"-Ring	5. Plunger Seat
2. Back-Up Washer	6. Welsh Plug
3. "O"-Ring	7. Retainer
4. Poppet Seat	8. Shield

d. Carefully unscrew spool "end" then remove "O"-ring, spring and plunger (on self-levelling valves only).

5. Remove and disassemble the main relief valve per Fig. 37 ... remove welsh plug, unscrew retainer and remove shield.

NOTE: Do not remove either poppet or plunger seats unless they are damaged.

6. Remove and disassemble the load checks as illustrated in Fig. 38. If the valve is not self-levelling type ... load checks will also be installed in the bucket circuit (at both ends of valve body) and will be *similiar* in construction to the load check illustrated. (The major visual difference will be the design of the cartridge assembly used in the bucket circuit.

NOTE: Do not remove the poppet seats unless they are damaged and require replacement. See "Inspection".

7. If valve is the self-levelling type, remove and disassemble the *combination* load checks and circuit reliefs from both ports of the bucket circuit ... see Fig. 38.

8. Remove the levelling check components as shown in Fig. 39 ... if valve is the self-levelling type.

9. Remove all remaining components (plugs, etc.) of the valve assembly.

INSPECTION

1. Thoroughly clean and dry all metal parts of the valve and visually check for evidence of damgae, or

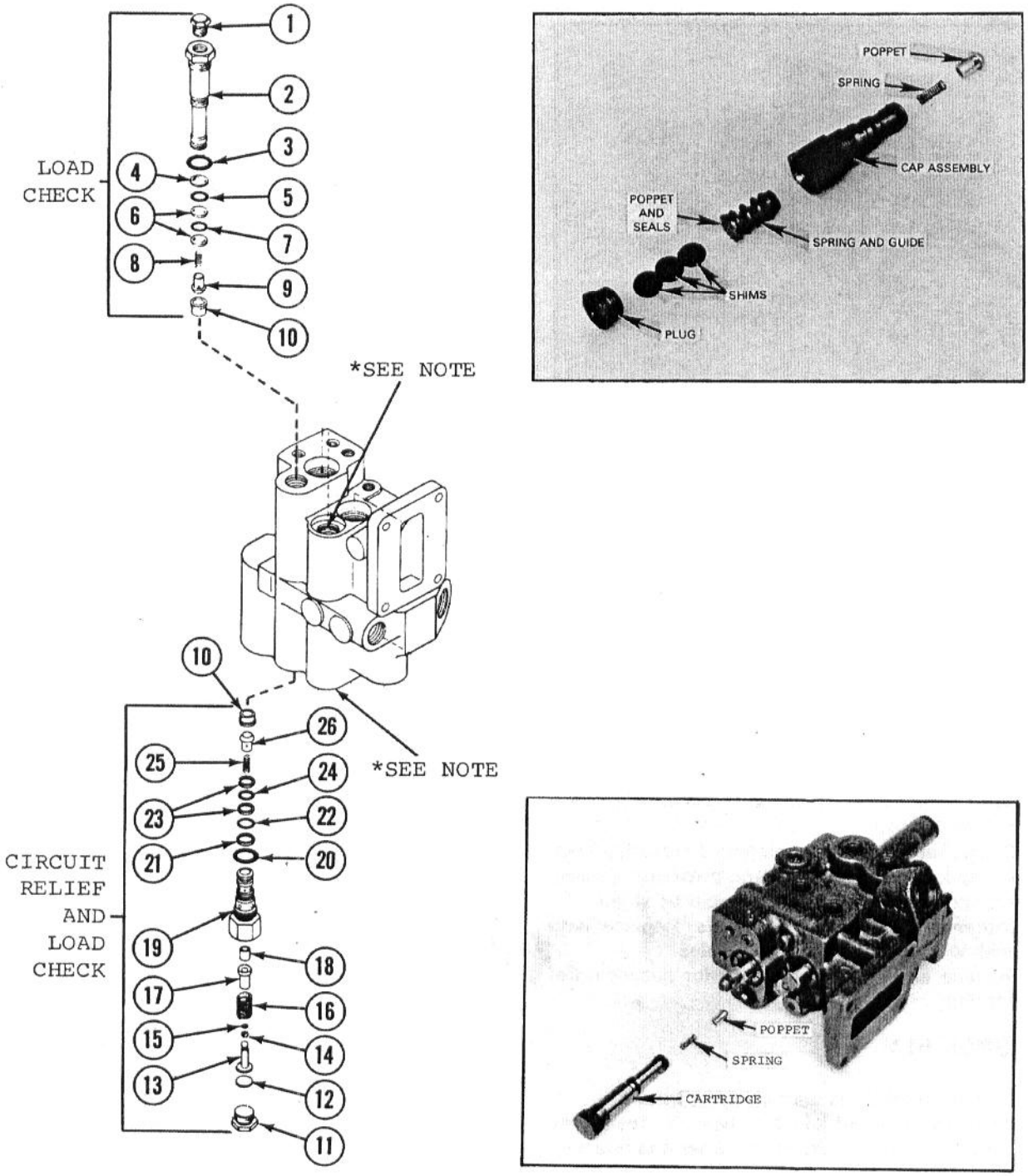


Fig. — 38 Load Checks and Circuit Relief — Identification of Parts

1. Plug
2. Cartridge Assembly
3. "O"-Ring
4. Back-Up Washer
5. "O"-Ring
6. Back-Up Washers
7. "O"-Ring
8. Spring
9. Poppet
10. Poppet Seats
11. Plug
12. Shims
13. Spring Guide
14. Back-Up Washer
15. "O"-Ring
16. Spring
17. Plunger
18. Seat
19. Cartridge
20. "O"-Ring
21. Back-Up Washer
22. "O"-Ring
23. Back-Up Washers
24. "O"-Ring
25. Spring
26. Poppet

*NOTE: If valve is self-levelling, combination load check and circuit reliefs are installed at both ports of bucket circuit. If valve is not self-levelling, load checks only are used in these ports.

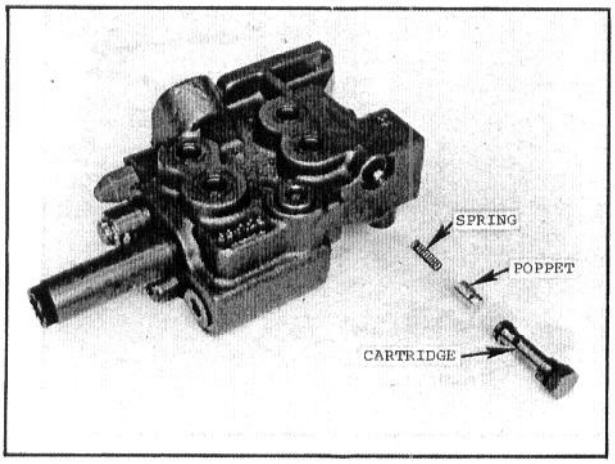


Fig. 39 — Self-Levelling Check Components

excessive wear. It will require good judgment on the part of the serviceman to determine excessive wear (or damage). Particular attention should be given to ...

a. Spool bores within valve body.

b. Spools.

c. Valve poppets and their seats within the body. (INFORMATION: Small nicks and grooves can be removed from the face of the poppet seat by lapping poppet in body seat with a fine grain grinding compound. Lap seat sufficiently to remove all defects. Clean seat thoroughly to remove all traces of grinding compound. Extreme care should be taken to keep poppet concentric in bore when lapping in seat face.)

2. Check that there is no noticeable side clearance between spool and bore. The hand pressure required to insert spools into their bores should be slight.

3. Discard all "O"-rings and seals. Replace with new ones when reassembling the valve.

4. Replace all parts found to be (or suspected of being) faulty.

REASSEMBLY

1. Coat all metal parts with clean hydraulic oil.

2. If valve is the self-levelling type ... install the levelling check components in the order and direction shown in Fig. 39.

3. Preassemble the combination load check and circuit reliefs then install them into their respective ports. See Fig. 38. (Check and adjust the reliefs per "Testing and Adjusting" after the valve has been completely reassembled and reinstalled.)

4. Install new seals on load check cartridge then install the poppet, spring and this cartridge into valve. See Fig. 38.

5. Preassemble the main relief valve components then install this relief into the valve, see Fig. 37.

NOTE: Do not tighten the adjusting screw (just loosely thread it into cartridge), or install the shield, retainer or welsh plug until control valve is completely reassembled and reinstalled on the loader ... THEN ADJUST THE RELIEF PER RECOMMENDATION UNDER "TESTS AND ADJUSTMENTS".

6. If self-levelling valve, preassemble the bucket spool's internal plunger, spring and "end" (with "O"-ring) into spool. SMALL TIP OF PLUNGER TO BE NEXT TO SPRING, see Figs. 31 and 33.

7. Carefully slide a new "O"-ring and then special washer over spring end of spool. Place spring retainers, spring and washer onto end of spool ... then while compressing the centering spring, install snap ring. (Washer to be between spring retainers.)

8. Carefully insert bucket spool into its bore, then install cap ... see Figs. 31, 32, 33 and 36. Install new "O"-ring over clevis end of valve spool and secure with special washer and wiper.

9. Carefully slide a new "O"-ring and then special washer over spring end of spool.

10. Place spring retainers and centering spring over spring end of spool ... then while compressing the centering spring as shown in Fig. 35, install detent barrel tightened to 9-10 ft.-lbs. torque.

NOTE: Barrel should have "Loctite" grade CV (color — blue) applied per manufacturer's instructions.

11. Carefully insert boom spool into its bore then install cap making sure that "O"-ring and washer fits into recess in valve body at spring end. Also see Fig. 34.

12. Carefully install new "O"-ring over clevis end of spool and secure into valve body with special washer and wiper.

13. Position flat detent ball retainer into cap (and around spool) ... then drop detent balls into place within cap.

14. With detent balls placed in a single row around barrel ... position the bevelled retainer into cap WITH THE BEVEL NEXT TO THE BALLS.

15. Position spring into cap then install plug ... plug is to be adjusted to obtain the desired detent force on the spool. (This is normally done after the valve is reinstalled on the Loader.)

16. Reinstall any remaining plugs removed during disassembly ... and reinstall restrictors into their respective valve ports, see Fig. 19. Make certain that slotted side of restrictor is facing outward of the port. If a Backhoe is to be connected to the valve, a power beyond fitting is used in place of the plug at the spring end of valve body. Also an internal plug is to be installed in the area indicated in Fig. 29.

NOTE: If a Backhoe is not to be connected, make sure that the internal plug is NOT INSTALLED.

DOUBLE-ACTING CYLINDERS

The recommended procedures to be used when repairing a particular cylinder may be found by referring to service information (listed by MF Part Number) ... then to the BASIC instructions, WHILE ALSO OBSERVING ANY SERVICE NOTES THAT MAY APPLY.

The MF Part Number is usually found stamped on the exterior of the cylinder and should be used as a means of identification.

SERVICE INFORMATION

MF Part No. 1605 004 M94 — Refer to Fig. 40 as a guide.
Piston Locknut tightening torque ... 221-258 ft.-lbs.
Piston Counterbore fits over "step" at threaded end of rod.
Wire retainer size ... 0.138" (3.5 mm)
Specifications for drilling bearing wire retainer if broken:
Hole diameter — 0.1406" (3.5 mm)
Hole depth — 0.236" (6.0 mm)

MF Part No. 1605 006 M93 — refer to Fig. 41 as a guide.
Piston Locknut tightening torque ... 221-258 ft.-lbs.
Piston Counterbore fits over "step" at threaded end of rod.
Wire retainer size ... 0.138" (3.5 mm)
Specifications for drilling bearing wire retainer if broken:
Hole diameter — 0.1406" (3.5 mm)
Hole depth — 0.236" (6.0 mm)

MF Part No. 1605 014 M95 — refer to Fig. 42 as a guide.
Piston locknut tightening torque ... 258-295 ft.-lbs.
Piston counterbore fits over "step", at threaded end of rod.
Wire retainer size — 0.138" (3.5 mm)
Specifications for drilling bearing wire retainer if broken:
Hole diameter — 0.1406" (3.5 mm)
Hole depth — 0.236" (6.0 mm)

MF Part No. 1605 169 M92 — refer to Fig. 42 as a guide.
Piston is part of rod assembly
Wire retainer size — 0.138" (3.5 mm)
Specifications for drilling bearing wire retainer if broken:
Hole diameter — 0.1406" (3.5 mm)
Hole depth — 0.236" (6.0 mm)

MF Part No. 1605 193 M91 — refer to Fig. 40 as a guide.
Piston is part of rod assembly
Wire retainer size — 0.118" (3.0 mm)
Specifications for drilling bearing wire retainer if broken:
Hole diameter — 0.125" (3.1 mm)
Hole depth — 0.177" (4.5 mm)

MF Part No. 1605 194 M91 — refer to Fig. 41 as a guide.
Piston is part of rod assembly
Wire retainer size — 0.138" (3.5 mm)
Specifications for drilling bearing wire retainer if broken:
Hole diameter — 0.1406" (3.5 mm)
Hole depth — 0.236" (6.0 mm)

SERVICE PROCEDURES

Refer to "Service Information" and MF Part No. that pertains to cylinder being serviced ... then as directed to the typical illustration to be used as a GUIDE to cylinder construction, see Figs. 40, 41, and 42.

CAUTION: When removing cylinders make certain that all hydraulic system pressure is relieved by operating control levers back and forth several times ... clean around port openings before disconnecting lines from cylinder ports.

1. Clean exterior of cylinder, drain trapped oil ... then place cylinder in a holding fixture (or place head-end of barrel over a fixed pin on bench).
2. Disassemble cylinder as follows:
   a. Remove wax (or grease) from hole in barrel ... over bearing wire retainer at rod-end of barrel assembly.
   b. Rotate bearing clockwise (as viewed from bearing end of barrel) ... until BEVELED END of wire retainer is visible at hole in barrel, see Fig. 43.

NOTE: If bearing is rotated in opposite direction, "hooked-end" of wire retaining ring may break. If "hooked-end" of wire is broken, bearing may turn without causing wire ring to turn. Should this occur, follow instructions in Step #c.

   c. If wire retaining ring is broken and will not turn ... carefully center punch wire (through hole in barrel) then CAREFULLY drill through wire without permanently damaging bearing. See Figs. 44 and 45. Refer to "Service Information" for cylinder being serviced to obtain wire size, hole diameter and hole depth. Insert a piece of wire same SIZE as retaining wire (or a "drive lug") into drilled hole ... but with a length the same depth as drilled hole. Check that wire piece (or "drive lug") will not damage barrel when bearing is turned ... if necessary, grind wire so that it will clear barrel. Rotate bearing until end of wire retainer is visible at hole in barrel ... continue to rotate bearing (to remove broken ring) then proceed to step #d.
   d. Insert a small screwdriver through hole in barrel ... and under beveled end of wire retainer. Reverse direction of bearing rotation while guiding wire retainer from hole in barrel, see Fig. 45.
   e. Remove wire retainer when "hooked end" reaches barrel hole. If wire is broken (step #c) make sure that ALL of wire retainer has been removed.

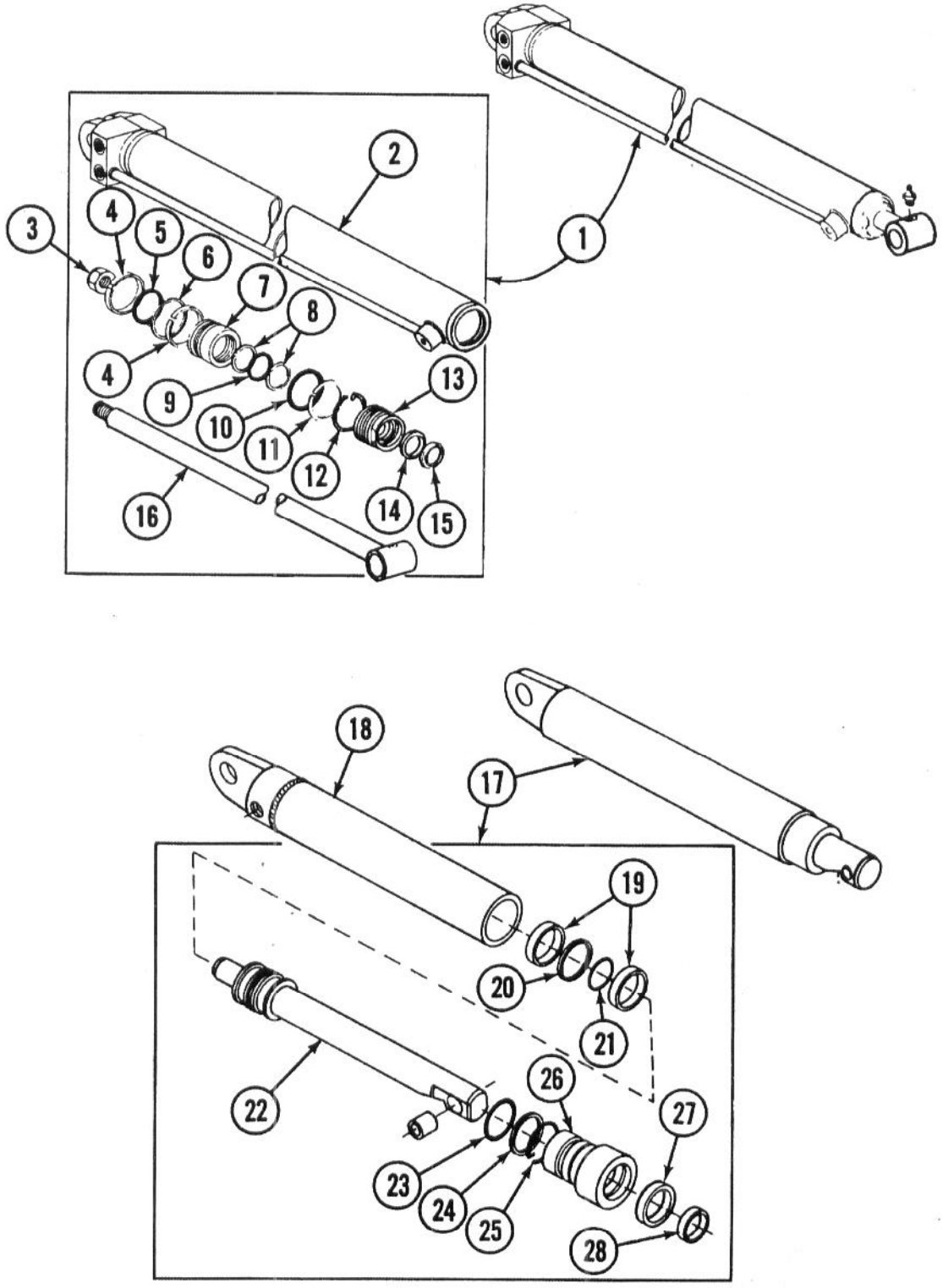


Fig. 40 — Identification of Parts Typical of MF 32A Loader Bucket and Lift Cylinders

1. Bucket Cylinder Assembly
2. Barrel Assembly
3. Piston Locknut
4. Wear Rings
5. "O"-Ring
6. Friction (Pressure) Ring
7. Piston
8. Back-Up Rings
9. "O"-Ring
10. "O"-Ring
11. Back-Up Ring
12. Wire Retaining Ring
13. Bearing
14. Rod Seal (Lip to be inward)
15. Wiper Seal (Lip to be Outward)
16. Rod Assembly
17. Lift Cylinder Assembly
18. Barrel Assembly
19. Wear Rings
20. Friction (Pressure) Ring
21. "O"-Ring
22. Rod and Piston Assembly
23. "O"-Ring
24. Back-Up Ring
25. Wire Retaining Ring
26. Bearing
27. Rod Seal (Lip to be inward)
28. Wiper Seal (Lip to be Outward)

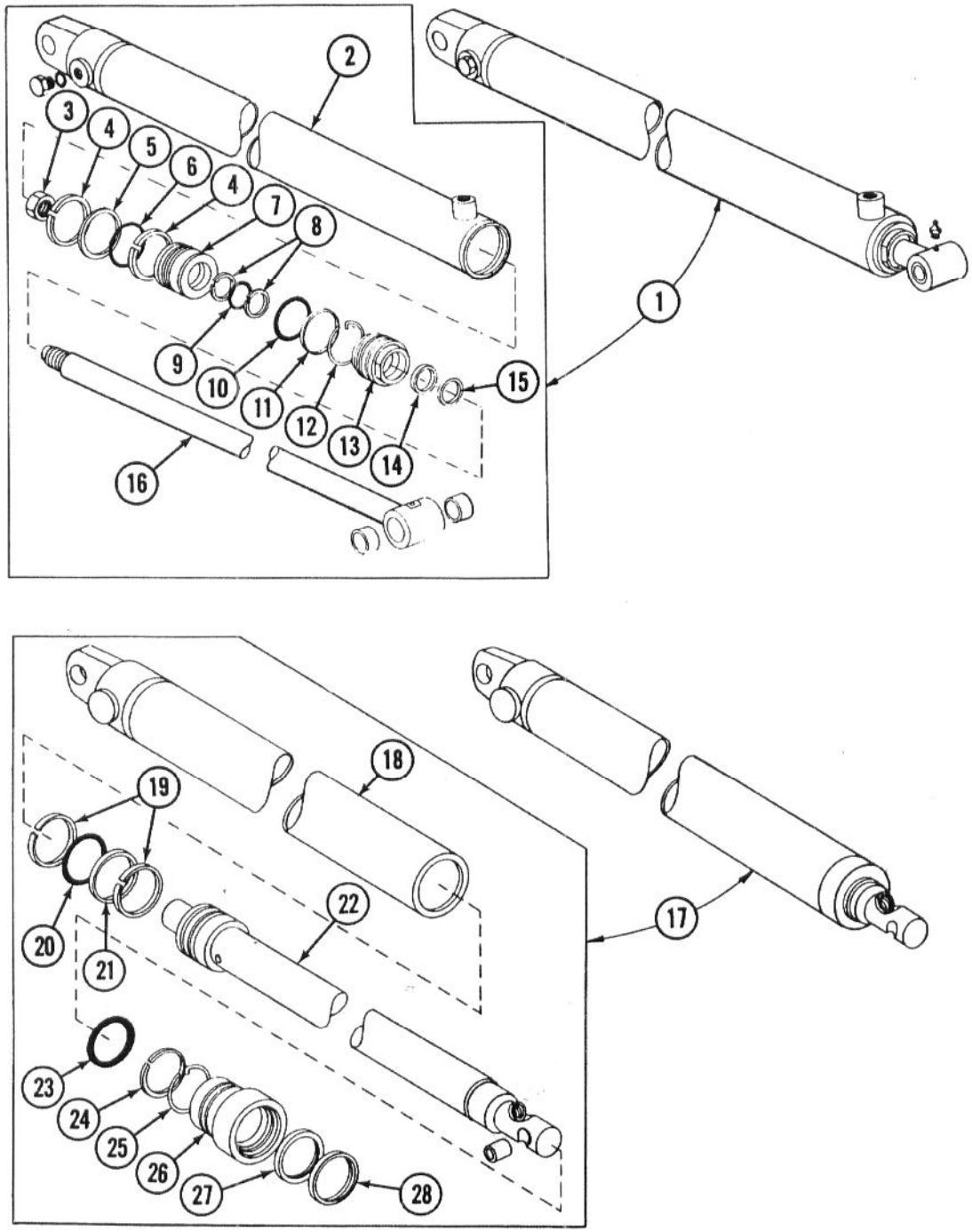


Fig. 41 — Identification of Parts Typical of MF 34A Loader Bucket and Lift Cylinders

1. Bucket Cylinder Assembly
2. Barrel Assembly
3. Piston Locknut
4. Wear Ring
5. Friction (Pressure) Ring
6. "O"-Ring
7. Piston
8. Back-Up Rings
9. "O"-Ring
10. "O"-Ring
11. Back-Up Ring
12. Wire Retaining Ring
13. Bearing
14. Rod Seal (Lip to be Inward)
15. Wiper Seal (Lip to be Outward)
16. Rod Assembly
17. Lift Cylinder Assembly
18. Barrel Assembly
19. Wear Rings
20. "O"-Ring
21. Friction (Pressure) Ring
22. Rod and Piston Assembly
23. "O"-Ring
24. Back-Up Ring
25. Wire Retaining Ring
26. Bearing
27. Rod Seal (Lip to be Inward)
28. Wiper Seal (Lip to be Outward)

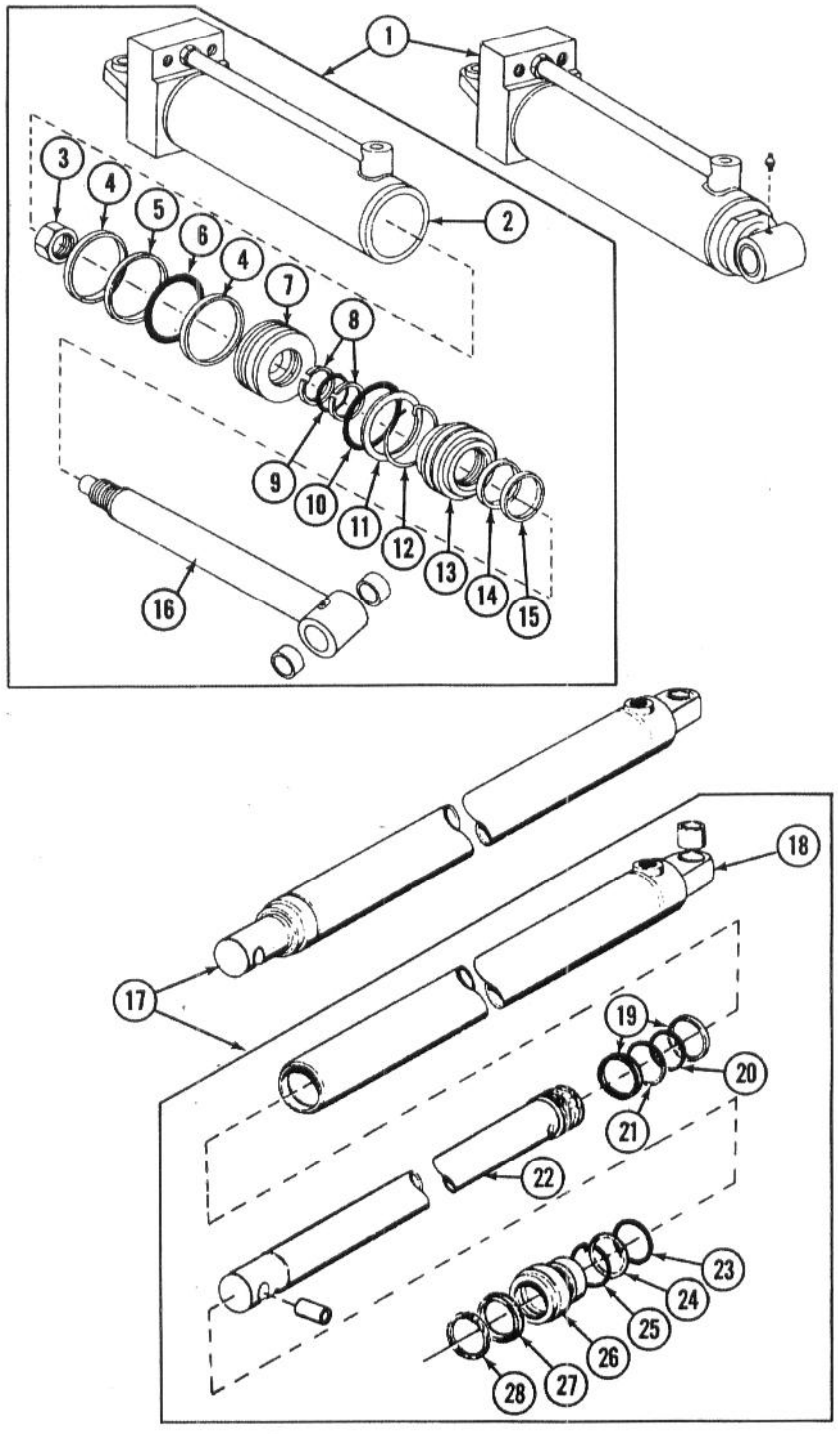


Fig. 42 — Identification of Parts Typical of MF 300A Loader Bucket and Lift Cylinders

1. Bucket Cylinder Assembly
2. Barrel Assembly
3. Piston Locknut
4. Wear Rings
5. Friction (Pressure) Ring
6. "O"-Ring
7. Piston
8. Back-Up Rings
9. "O"-Ring
10. "O"-Ring
11. Back-Up Ring
12. Wire Retaining Ring
13. Bearing
14. Rod Seal (Tip to be Inward)
15. Wiper Seal(Lip to be Outward)
16. Rod Assembly
17. Lift Cylinder Assembly
18. Barrel Assembly
19. Wear Rings
20. "O"-Ring
21. Friction (Pressure) Ring
22. Rod and Piston Assembly
23. "O"-Ring
24. Back-Up Ring
25. Wire Retaining Ring
26. Bearing
27. Rod Seal (Lip to be Inward)
28. Wiper Seal (Lip to be Outward)

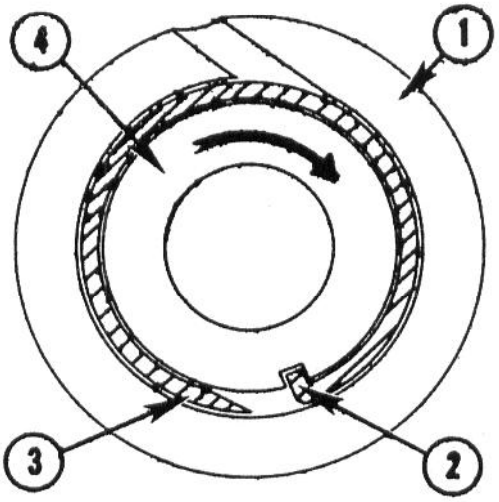


Fig. 43 — Direction of Bearing Rotation for Access to Wire Retainer Ring

1. Barrel
2. "Hooked-End" of Wire Retainer
3. "Bevel-End" of Wire Retainer
4. Bearing

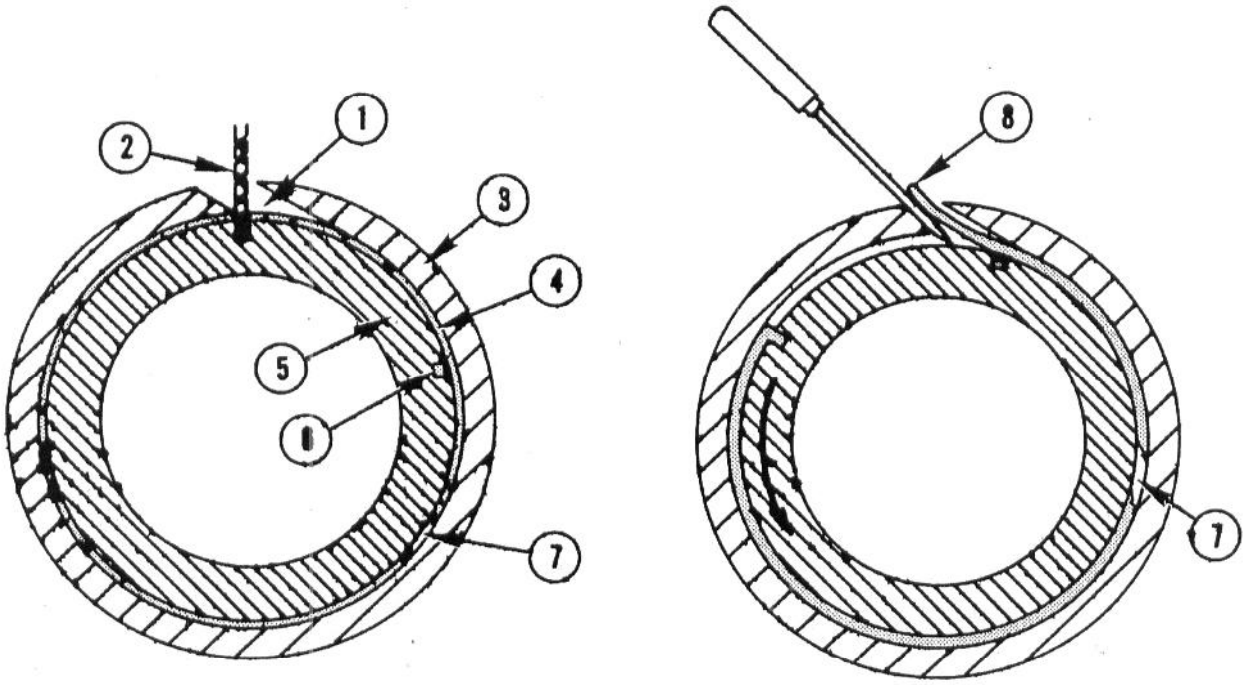


Fig. 44 — Drilling Through and Starting Wire Retaining Ring for Removal of Broken Ring

1. Hole Through Barrel
2. Drill
3. Barrel
4. Wire Retaining Ring
5. Bearing
6. Broken "Hooked-End" of Wire
7. Retaining Wire "Break" (Not at "Hook-End")
8. End of Wire Cut by Drilling
9. Wire Piece Insert (or "Drive Lug")

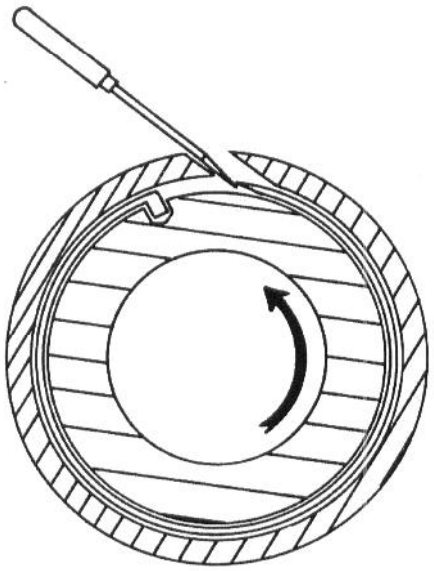


Fig. 45 — Removing Wire Retainer Ring

f. Pull end of rod to force bearing from cylinder barrel ... using a "sliding hammer" motion.

CAUTION: If wire retainer groove in bearing (or barrel) is distorted, it may be necessary to use hydraulic pressure supplied by a hand pump to force bearing from cylinder. Use extreme care to make sure that no one can be injured should air be trapped in cylinder ... DO NOT use air pressure to remove bearing from barrel.

g. Slide piston (with seals) and rod assembly from barrel.

h. Remove piston nut (if used) then slide piston from rod ... remove all piston seals.

i. Slide bearing assembly from rod ... remove all seals from bearing, see Fig. 46.

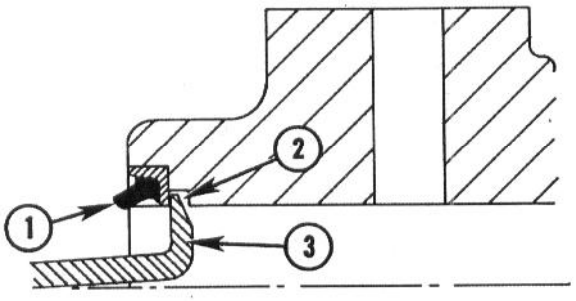


Fig. 46 — Removing Metallic Shell Wiper Seal

1. Wiper Seal
2. "Extractor" Groove In Bearing
3. "Hooked-End" of Extractor Tool

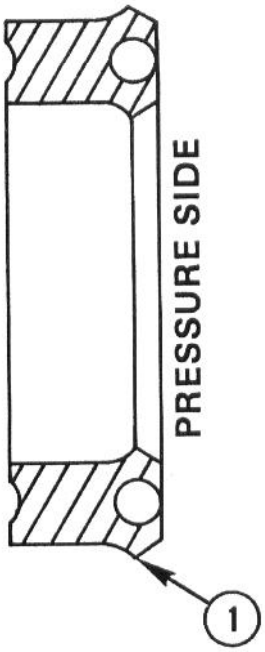


Fig. 47 — Lip Side of Typical Rod Seal (to be Directed Toward Pressure Side)

1. Seal Lip

3. Thoroughly clean all metal parts, air dry and inspect cylinder as follows:

a. Inspect inner side of barrel assembly for pits and scratches, and cylinder ports for burred threads and obstructions. Remove any burrs or obstructions found. If pits or scratches are sufficient to damage seals (or allow oil to leak past seals) it may be necessary to replace cylinder.

b. Inspect head-end of barrel assembly for cracks, or distortion.

c. Inspect piston and bearing for nicks and scratches.

d. Inspect rod assembly for alignment, cracks and scratches (that may damage bearing seals).

e. Inspect rod cross-head for damage or excessive wear and remove all paint from rod assembly.

4. Install new seals into piston and bearing as follows:

NOTE: If necessary, seals that are not split type, or spirol should be preheated to 200° F. for 5-10 minutes in clean oil. This will allow seal to be stretched SLIGHTLY for easier installation. Seals should be allowed to cool to room temperature (or may be chilled by applying ice) before installation of piston, or bearing to barrel. If seals are stretched too much they may not return to normal shape ... this will require use of a suitable ring compressor to prevent cutting seal during assembly into barrel.

a. Install rod seal (see Fig. 47) into I.D. of bearing

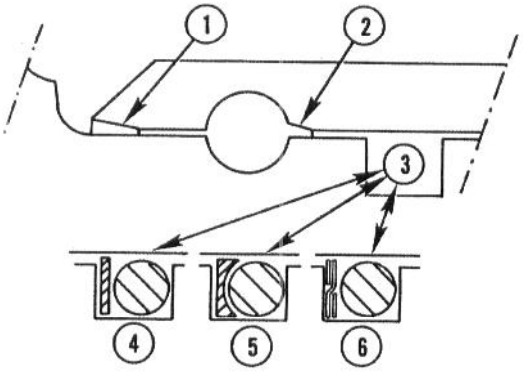


Fig. 48 — Installation of "Static" Seals and Back-Up Washers In OD Groove of Bearing

1. Chamfer on Barrel End
2. Chamfer on Inner Wire Retainer Groove of Barrel
3. Groove on Bearing O.D.
4. "O"-Ring and Plain "Flat" Washer
5. "O"-Ring and Profiled" Washer
6. "O"-Ring and "Spirol" Washer

with lip of seal away from dust seal ... install dust seal (wiper) into bearing with lip side of seal outward (away from rod seal). Use care to prevent damage to lips of seals during installation.

b. Install back-up washer and "O"-ring into groove on O.D. of bearing ... back-up washer to be nearest "hex side" of bearing, see Fig. 48.

NOTE: "Profiled" type washers must be installed with concave side next to "O"-ring. "Spriol" type washers must be installed so that beveled cuts FACE center coil (not outward of coil) ... see Fig. 49. Make sure that back-up washers fit entirely into bearing groove ... otherwise, they may be cut when bearing is installed in barrel.

c. Install "O"-ring into outer center groove of piston then install friction ring on top of "O"-ring.

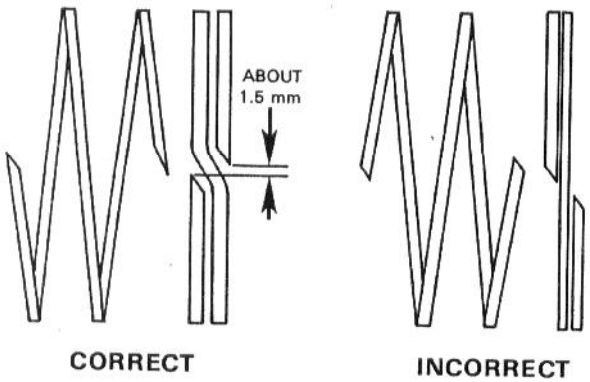


Fig. 49 — Positioning Beveled Cuts of "Spiral" Type Back-Up Washers

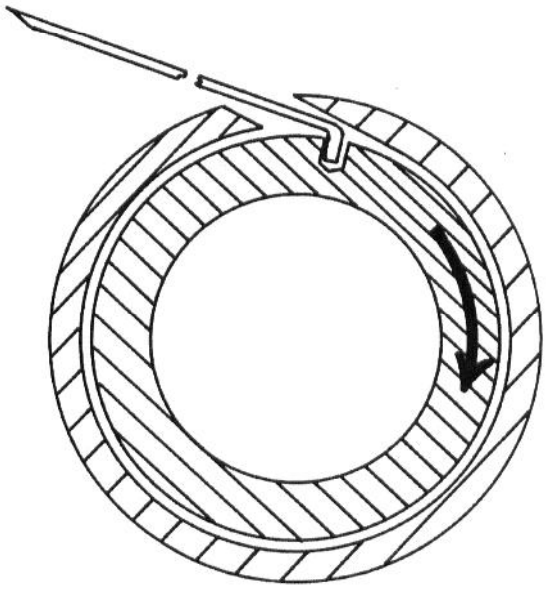


Fig. 50 — Installing Wire Retaining Ring to Secure Bearing

d. Install wear ring seals into piston outer grooves ... one on each side of friction ring and "O"-ring.

e. Apply clean hydraulic oil to bearing seals ... then slide bearing over rod so that its wiper seal will be nearest rod clevis (i.e.: outward).

NOTE: Use care to prevent damage to bearing seals during installation onto rod assembly.

f. If piston is NOT part of rod assembly (i.e.: piston is retained by locknut) ... install one back-up washer into inner piston groove followed by "O"-ring and remaining back-up washer. Be sure back-up washers are positioned similar to procedures for installing them in bearing outer groove ... see note under step #b. Apply clean hydraulic oil to piston seals then slide piston over threaded end of rod ... counterbore on piston to fit over "step" on rod. Install new piston locknut tightened to torque recommended under "Sevice Information" for cylinder being serviced.

5. Reassemble piston and bearing into cylinder as follows:

NOTE: If seals on piston, or bearing have been stretched ... use a suitable ring compressor when inserting piston (or bearing) into cylinder barrel. Use care to prevent cutting seals.

a. Apply clean hydraulic oil to inside of barrel, piston and bearing seals.

b. Carefully insert piston completely into barrel ... then place piston at about mid-stroke position.

c. Insert bearing into barrel just to point where

wire retaining ring groove (on bearing) is visible through hole in barrel.

d. Rotate bearing until hole in bearing (for "hooked end" of wire retainer) is visible at barrel hole.

e. Insert "hooked-end" of new wire retainer into hole in bearing groove ... then rotate bearing until *beveled end* of wire retainer is drawn into bearing groove. Continue to rotate bearing approximately one-half turn, see Fig. 50.

f. Fill wire retainer hole through BARREL with wax, or grease to prevent entry of water (etc. ...).

OIL FILTERS

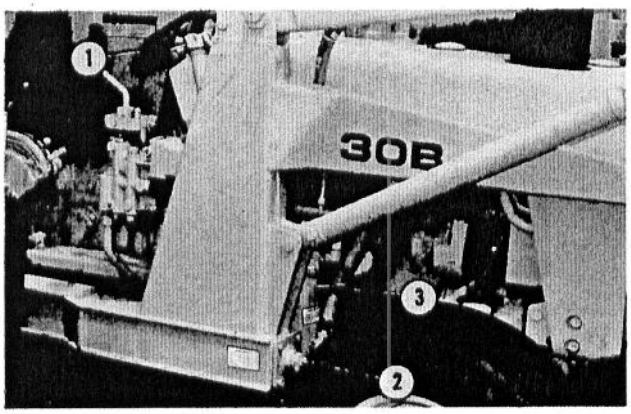


Fig. 51 — Location of Suction and Return Oil Filters — MF 34A Loader (MF 32A Loader Filters Location Similar)

1. Reservoir Breather/Dipstick
2. Suction Oil Filter
3. Return Oil Filter

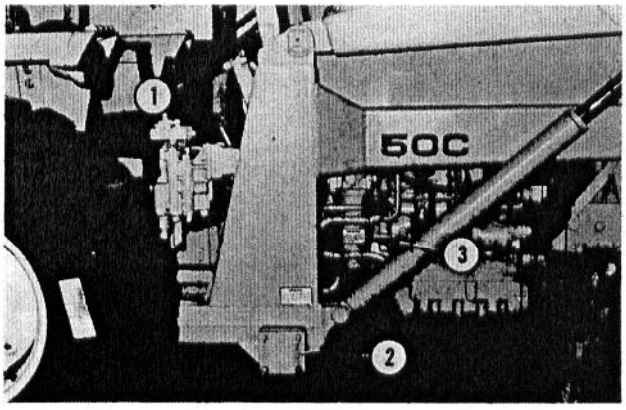


Fig. 53 — Location of Suction and Return Oil Filters on MF 300A Loader

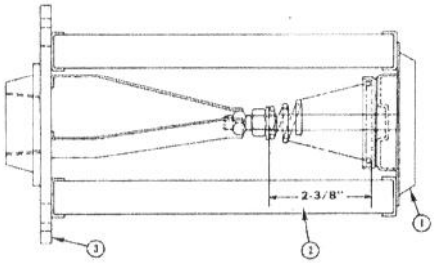
1. Reservoir Breather/Dipstick
2. Suction Oil Filter
3. Return Oil Filter

The suction and return oil filters are located as shown in Figs. 51 and 53.

SUCTION FILTER — MF 32A AND MF 34A LOADERS

Service filter as follows ... see Figs. 51 and 52:

1. Drain hydraulic oil reservoir.
2. Remove capscrews securing cover assembly to side frame ... then remove cover with element and remove gasket (between plate and side frame).



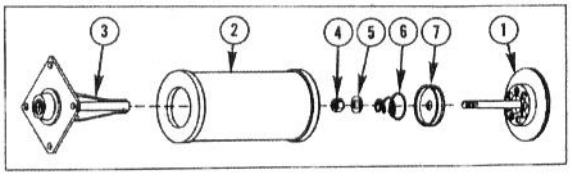


Fig. 52 — Suction Oil Filter — Used on MF 32A and MF 34A Loaders

1. Oil Filter Bypass Assembly
2. Filter Element
3. Cover Assembly
4. Nut (Staked to Bypass Bolt)
5. Washer
6. Spring
7. Bypass Valve

3. Rotate bypass assembly to unscrew it from cover plate and remove filter element.
4. Check that bypass spring is installed on bolt to dimension shown in Fig. 52 ... make sure that nut is staked to bolt threads.

NOTE: Do not disassemble bypass assembly unless absolutely necessary ... setting of spring load (by staked nut) determines bypass setting.

5. Install new element (with seals) against cover assembly ... then thread bypass to bracket (on cover) until element is secured in place.
6. Place new gasket against cover plate, insert filter element into reservoir side frame and install capscrews.
7. Fill reservoir to proper level ... then refer to "Breaking-In New or Rebuilt Pump" under "Hydraulic Pump Servicing" before starting engine.

SUCTION OIL FILTER — MF 300A LOADER

Service filter as follows ... see Figs. 53 and 54:

1. Drain hydraulic oil reservoir.
2. Remove cover plate (with gasket) ... then unscrew bypass assembly and remove filter element, see Figs. 55 and 56. Check that retaining bracket is not damaged, see Fig. 57.
3. Check that bypass spring is installed on bolt to dimension shown in Fig. 58 ... make sure that nut is staked to bolt threads.

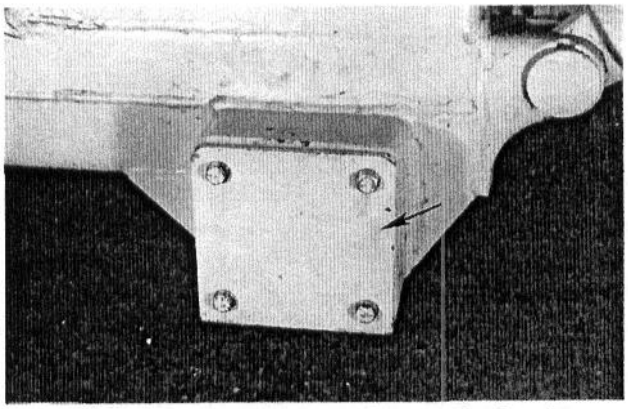


Fig. 54 — Outer Cover on Reservoir Suction Filter (MF 300A Loader Shown)

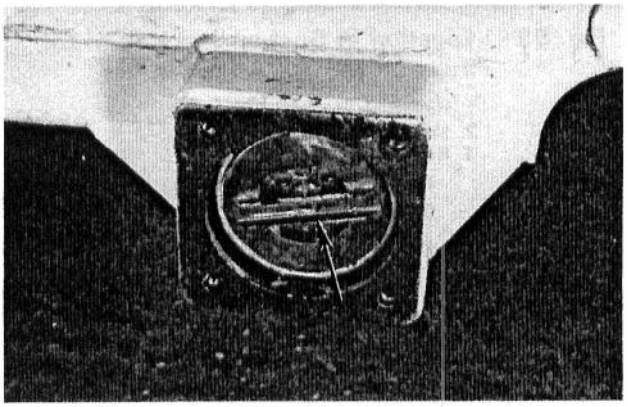


Fig. 55 — Bypass Assembly — MF 300A Suction Oil Filter

NOTE: Do not disassemble bypass assembly unless absolutely necessary ... setting of spring load (by staked nut) determines bypass setting.

4. Insert new element (with seals) into side frame (over retaining bracket) ... then thread bypass assembly into bracket to secure element, see Fig. 59.

5. Install cover plate onto reservoir ... use new gasket.

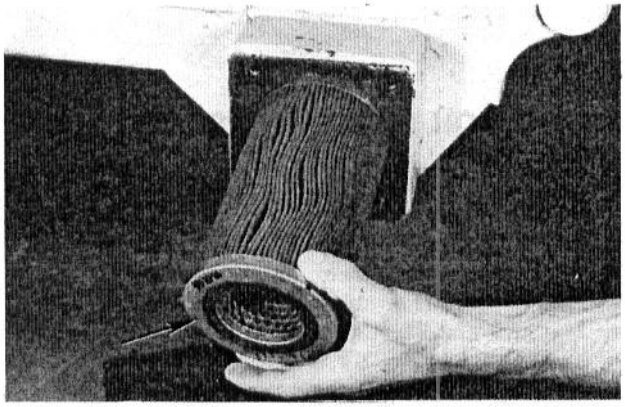


Fig. 56 — Removing/Installing Filter Element — MF 300A Suction Oil Filter

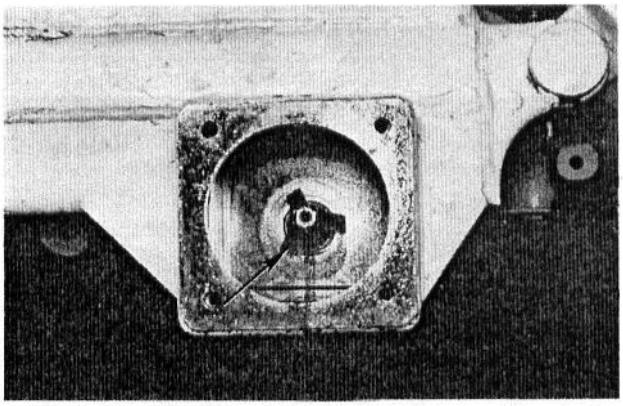


Fig. 57 — Suction Oil Filter Retaining Bracket — MF 300A Loader

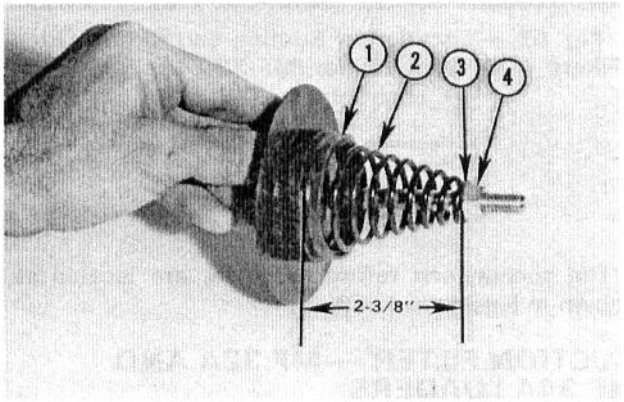


Fig. 58 — Oil Filter Bypass Assembly

1. Bypass Valve
2. Spring
3. Flat Washer
4. Nut (Staked to Bypass Bolt)

6. Fill reservoir to proper level ... then refer to "Breaking-In New or Rebuilt Pump" under "Hydraulic Pump Servicing" before starting engine.

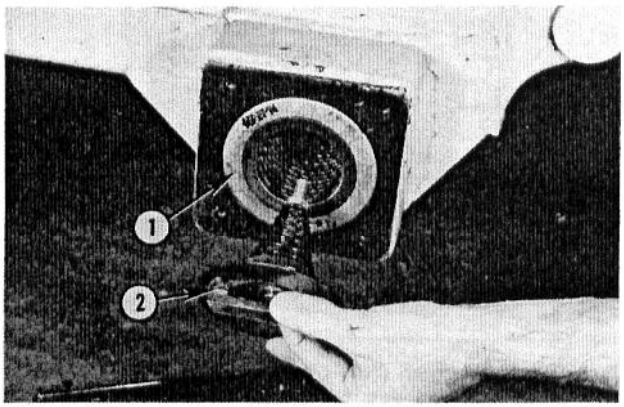


Fig. 59 — Installing Filter Element and Bypass Valve — MF 300A Loader Shown

1. Filter Element
2. Bypass Assembly

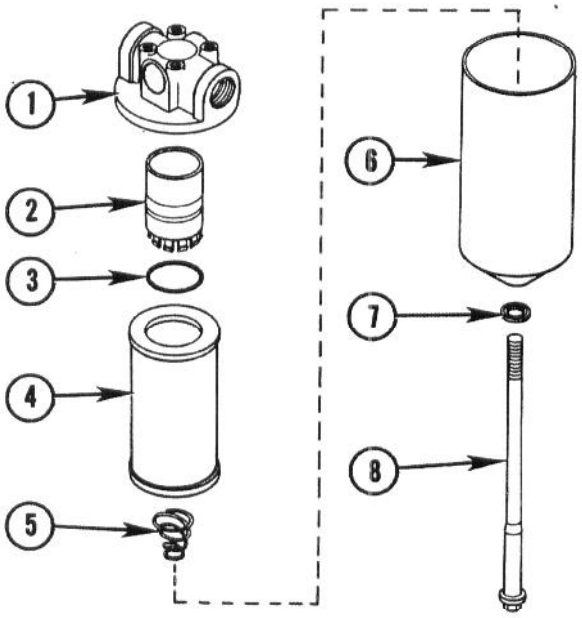


Fig. 60 — Return Oil Filter Assembly

1. Filter Head (W/"O"-Ring)
2. Indicator
3. "O"-Ring (Indicator)
4. Filter Element
5. Spring
6. Housing
7. Sealing Washer
8. Center Bolt

RETURN OIL FILTER

This filter is located as shown in Figs. 51 and 53. Service filter as follows ... see Fig. 60:

1. Unscrew bolt at bottom of housing then pull housing away from filter head.
2. Separate parts from head as shown in Fig. 60 ... thoroughly clean inside of housing.
3. Insert bolt and sealing washer through bottom of housing ... then place spring (small end down) over bolt.
4. Insert new element (with seals) into housing and over bolt ... then insert indicator (with new "O"-ring) into top of element with "smooth end" out.
5. Check that "O"-ring in filter head is serviceable ... then position housing to head while inserting indicator into its bore and threading bolt into head.
6. Tighten bolt to 20 ft.-lbs.

CAUTION: See "Safety Precautions" preceeding Loader Section, before attempting any repairs.

BACKHOES

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