

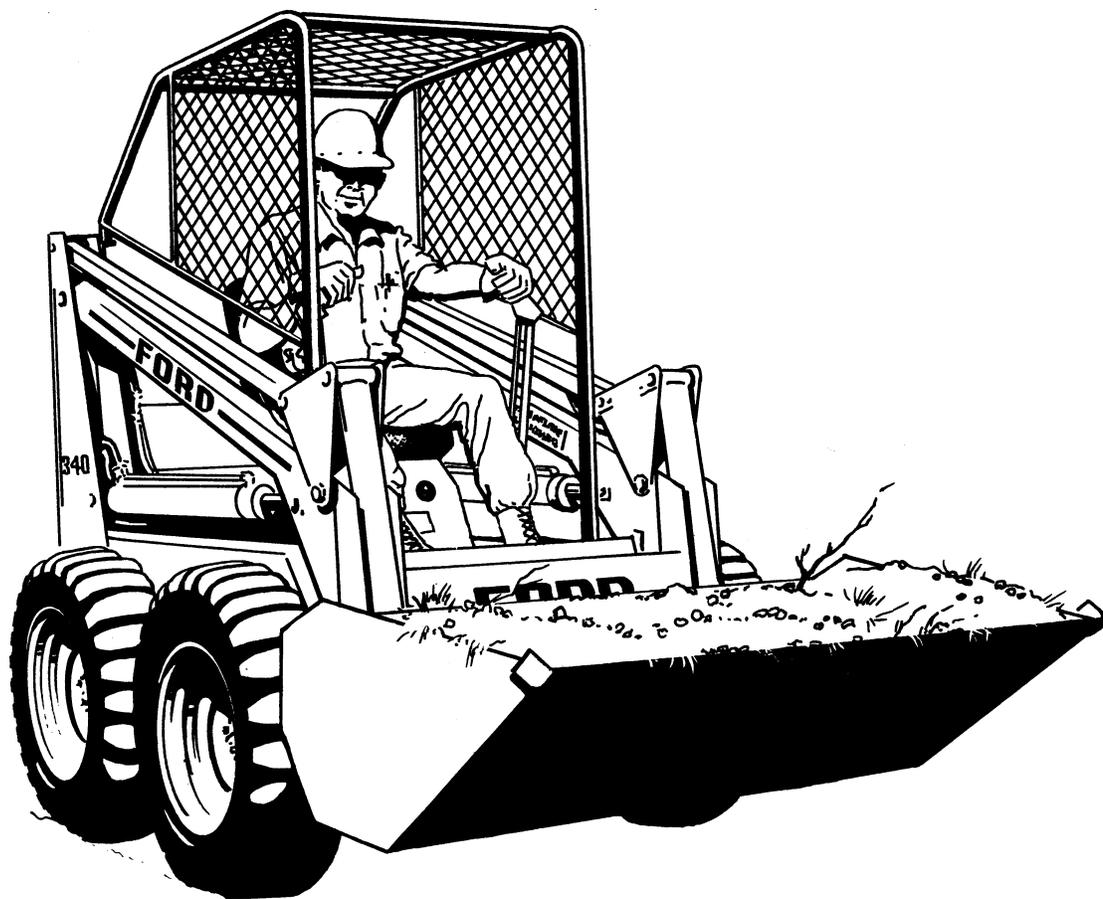
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# FORD

# 340

# COMPACT LOADER

40034010



# REPAIR MANUAL

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## FOREWORD

THIS MANUAL CONTAINS SERVICE INFORMATION FOR THE FORD SERIES 340 COMPACT LOADER. INFORMATION IS PROVIDED ON DESCRIPTION AND OPERATION, TROUBLE SHOOTING, TESTS AND ADJUSTMENTS, COMPONENT OVERHAUL, LUBRICATION AND SPECIFICATIONS.

REFER TO THE WISCONSIN MOTOR CORPORATION VH4D ENGINE MANUAL FOR INFORMATION CONCERNING THE ENGINE; ITS COMPONENTS, SPECIFICATIONS AND REPAIR, EXCEPT FOR THE VELOCITY GOVERNOR, WHICH IS COVERED IN THIS MANUAL.

KEEP THIS MANUAL, ALONG WITH YOUR OTHER SERVICE LITERATURE, AVAILABLE FOR READY REFERENCE.

SERVICE DEPARTMENT  
FORD TRACTOR OPERATIONS  
FORD MOTOR COMPANY

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# DESCRIPTION AND OPERATION

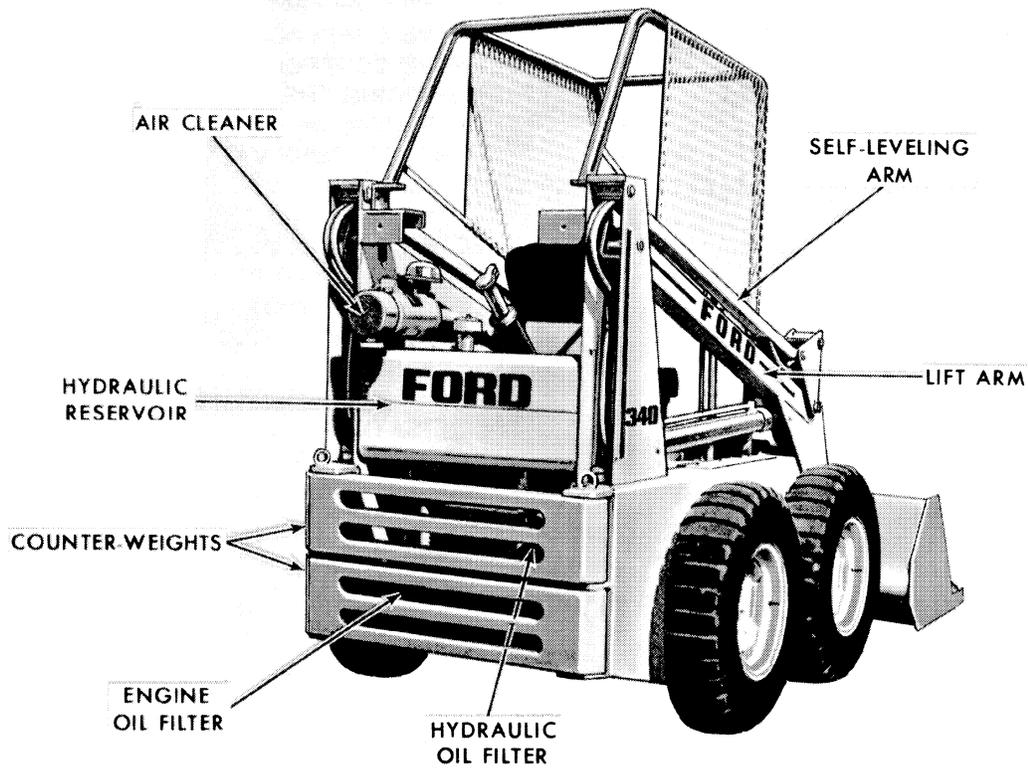
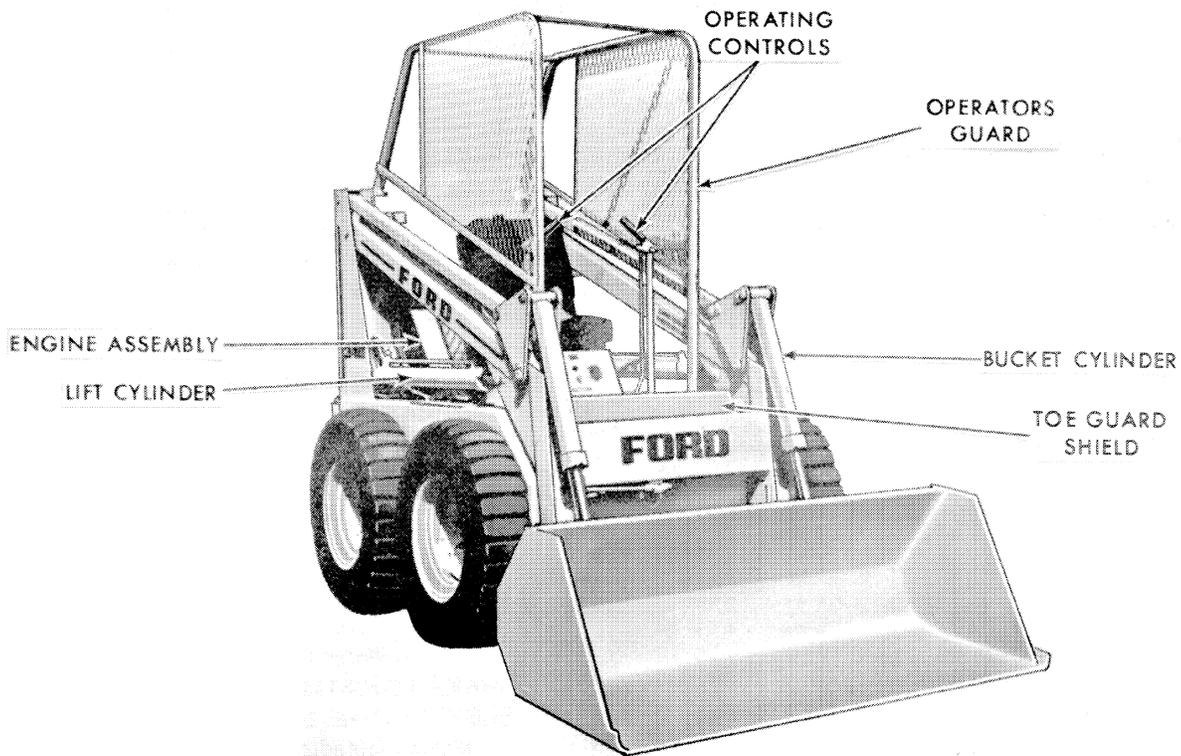


Figure 1  
Ford 340 Compact Loader

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## DESCRIPTION AND OPERATION

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The Ford Series 340 Compact Loader is a self contained hydrostatic front end loader. An engine pump provides four wheel drive with separate power circuits for each side of the vehicle.

The unit contains a separate loader hydraulic lift/tilt circuit. Double acting 2-1/2 inch diameter cylinders provide lift arm and bucket movement.

The drive system is comprised of four basic units; the pump, the steering control valve, the hydraulic motors, and the chain drive. The pump is the source of pressure and volume. The steering control valves limit the operating pressure and determine the direction of flow in the drive circuit. The hydraulic motors power the unit utilizing a high torque, low RPM design. The chain drive transfers power from the hydraulic motors to the wheels.

Steering is accomplished by a valving arrangement which controls the hydraulic drive circuit on each side of the vehicle. With the drive control levers in the neutral position, oil flows through the drive control valve to the reservoir. When the control levers are pushed forward, oil is diverted to the drive motors moving the unit forward. When the control levers are pulled backward, the oil flow to the drive motors is reversed moving the unit backward.

Turning is accomplished by regulating the oil flow in the drive circuits. Difference in hydraulic oil flow drives one side faster or slower than the other and results in a turning movement. One side full forward and the other full reverse gives a full pivot turn.

The front wheels of the vehicle are equipped with two-shoe internal expanding brakes operating in 10-inch diameter drums. The brakes are operated by a pedal located to the left directly in front of the operator. The brake pedal applies a locking action to all four wheels and cannot be used as a locking device for one side only.

If the loader is equipped with a Mico brake lock, (optional), a push-button switch will be located below the ammeter on the right-hand side of the seat support panel. To set the brake, depress the brake pedal with enough effort to hold the loader. While maintaining pressure on the pedal, simply press the brake lock push button once and release. Then remove your foot from the brake pedal. The brakes are now set. To release the brake, simply press the brake pedal hard,

once. The Mico brake lock may be set without turning the ignition switch on.

**CAUTION:** *The Mico brake lock is a temporary holding device and should not be used to hold the loader for an extended period of time.*



*If the loader is to be parked on an incline, always lower the bucket so that the cutting lip contacts the ground, apply the Mico brake lock, and securely block the loader wheels. Always park the loader on level ground where possible.*

The engine assembly is a four cylinder L-head, air-cooled, 30-horsepower, model VH4D, Wisconsin gasoline engine. Refer to the engine instruction book for further information concerning the engine, its components, specifications, and repair. Standard engine accessories include a dry-type air cleaner, oil filter, 12-volt dust sealed alternator, starter, fuel pump, velocity governor, and two series-connected five gallon fuel tanks.

The frame assembly is built of heavy steel electrically welded into an integral unit. Steel reinforcing creates maximum resistance to stress.

## TROUBLE SHOOTING

The following paragraphs contain trouble shooting information that may be helpful when a problem is encountered with the loader. Each symptom is followed by a listing of possible causes and suggested remedies. To isolate the possible causes, proceed in a systematic manner to determine the faulty component. These paragraphs DO NOT fully cover all possible troubles or deficiencies that may occur under the conditions of operation.

**ENGINE:** For problems related to the engine, refer to the trouble shooting portion of the Wisconsin Engine Instruction Manual. Study the engine manual carefully for complete information on the operation, care, and maintenance of the Wisconsin VH4D Engine.

# TROUBLE SHOOTING

TROUBLE	POSSIBLE CAUSE	REMEDY
<b>ELECTRICAL:</b>		
<b>Improper Ammeter Indication</b>	Battery discharged	Check battery and charge if necessary
	Loose cable connections	Check connections at battery, ammeter, rectifier regulator, and plug connector in wiring harness between instruments and engine.
	Defective ammeter	Replace.
	Alternator not operating	See Engine Manual..
	Defective rectifier regulator	Replace.
<b>HYDRAULIC MOTORS:</b>		
<b>Oil Leakage</b>	Hose fittings leaking	Tighten fittings.
	Static O-ring leak	Replace O-rings.
	Cap screw leakage	Tighten to recommended specification.
	Faulty high pressure seal	Replace seal.
	Bearing and high pressure seal	Inspect and replace as necessary.
	Shaft and high pressure seal	Inspect and replace as necessary.
<b>No Power – Free Turning Output Shaft at Hydraulic Motor</b>	Spline stripped	Replace motor.
	Broken drive link	Replace.
<b>High Loss of Speed Under Load</b>	Lack of sufficient oil supply or pressure	Fill reservoir. Check system pressure.
	High internal motor leakage	Repair or replace motor.
	Defective pump	Replace.
<b>Low Mechanical Efficiency.</b>	Line blockage	Replace line.
<b>High Pressure Required to Operate Motor</b>	Internal interference	Repair or replace motor.

# TROUBLE SHOOTING

TROUBLE	POSSIBLE CAUSE	REMEDY
<b>HYDRAULIC PUMP:</b>		
<b>Pump Fails to Start Pumping</b>	Damaged pump	Replace.
	Defective flexible coupling.	Repair.
	Damaged oil line from oil tank	Replace line.
<b>Low Pump Pressure</b>	Hose leaks	Tighten or replace hoses and/or clamps as necessary.
	Low fluid level	Add sufficient fluid of proper type.
	Damaged pump	Replace.
<b>Undue Pump Vibration</b>	Clogged pump	Clean.
	Bearings defective	Replace pump.
	Loose mounting	Tighten.
<b>LIFT AND TILT HYDRAULIC SYSTEM:</b>		
<b>Excessive "Drift" of Lift and Tilt Cylinders</b>	External cylinder leakage	Replace cylinder.
	Internal cylinder leakage	Replace packings and seals.
	Leakage at hydraulic lines and fittings	Inspect and correct as necessary.
<b>Lift Cylinder Will Not Maintain Raised Position with Load</b>	Leakage at hydraulic lines and fittings	Inspect and correct as as necessary.
	Cylinder leakage	Replace packings and seals.
	Internal valve leakage	Replace valve.
<b>Excessive Hydraulic Fluid Consumption</b>	Leakage in lines and fittings	Repair, replace, or tighten loose fittings and lines.
	Cylinder leakage	Replace packings and seals.
	High pressure shaft seal on hydraulic motor blown	Replace seal.
<b>BRAKES:</b>		
<b>Excessive Pedal Travel</b>	Linings worn	Replace linings.
	Fluid low in master cylinder	Replenish fluid and observe for leaks.

## PRESSURE CHECKS AND ADJUSTMENTS

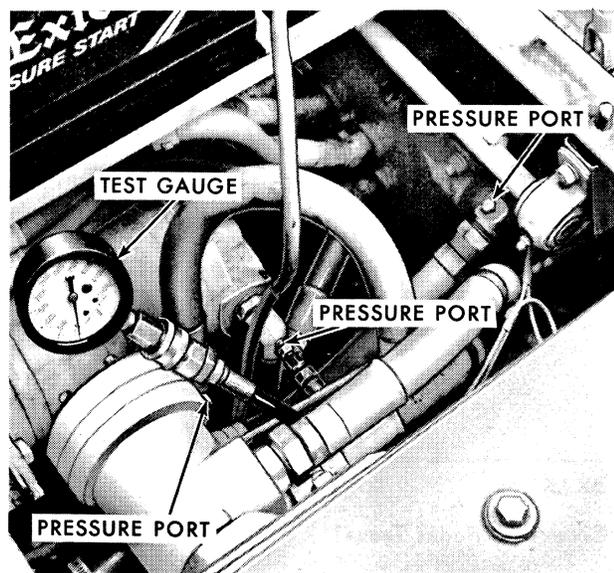
TROUBLE	POSSIBLE CAUSE	REMEDY
<b>BRAKES:</b> (Cont.)		
<b>Excessive Pedal Travel</b> (Cont.)	Air in hydraulic system	Bleed hydraulic system
	Pedal improperly adjusted	Adjust linkage
<b>Weak Braking Action</b>	Wheel cylinder piston leaking	Repair wheel cylinders.
	Leaking oil lines	Tighten.
	Backing plate loose	Tighten.
<b>Brake Releases Slowly</b>	Hydraulic fluid congealed	Drain, flush, and replace with proper fluid.
	Master cylinder maladjusted or dirty	Drain, clean or adjust as necessary.
	Mud and dirt on brake pistons	Clean.
	Water in hydraulic fluid	Drain and refill.
<b>Brakes Drag</b>	Mineral base oil in brake system	Drain and flush brake system.
	Wheel cylinder piston not retracting	Clean or replace pistons.

### PRESSURE CHECKS AND ADJUSTMENTS

The hydraulic pump must deliver a specified amount of oil through the loader circuits within prescribed pressure limits. If the pump flow and/or system falls below that specified, the efficiency of the hydraulic system will be impaired. If, for any reason, the system is not operating properly, the trouble can usually be traced to specific areas in the system. Because it is sometimes difficult to identify the particular malfunctioning component, hydraulic tests have been designed to assist the mechanic to quickly diagnose trouble areas. Quick diagnosis thus minimizes unnecessary teardown and expensive downtime while substituting parts.

#### Pressure Checks

The hydraulic pump pressure test is performed by inserting a 0-5000 p.s.i. pressure gauge into the pressure ports of the hydraulic pump. The pressure ports of the drive control sections are located in the fittings that are installed into the pump. See Figure 2. The pressure port of the lift/tilt section is located in the fitting that is installed into the lift/tilt valve.



*Figure 2*  
**Pump Pressure Test**

## PRESSURE CHECKS AND ADJUSTMENTS

**Pump pressure test procedure:** The procedures outlined below should be followed closely in conducting the pump performance test. Deviations from the procedure will result in erroneous test results.

1. Insert a 0-5000 p.s.i. pressure gauge into the pressure port of the right drive section. See Figure 2.



**CAUTION:** *Never attempt to start the engine while standing beside the unit. Start the engine only while sitting in the operator's seat with the seat belt fastened. Always check to make certain that the seat cushion is secured to the frame.*

2. Back the machine up against a pole or a wall where the machine can be stalled. APPLY THE BRAKE AND HOLD DURING TEST. Rev the engine to a maximum rpm, push the drive control lever backwards and read the pressure on the gauge. The pressure should read 1750 p.s.i.

**IMPORTANT:** *The wheels must be in a stall position; they must not turn. The pump pressure should be checked with the oil warm or hot.*

**NOTE:** *Some flutter may occur in the pressure gauge because the pump is of a gear type and you may not be able to read it more accurately than plus or minus 50 p.s.i.*



**CAUTION:** *Do not allow anyone to ride on the loader with the operator.*

3. Check the pressure in the left drive section in the same manner.
4. Should the pressure reading of 1750 p.s.i. not be reached, eliminate the hydraulic motor from the system by disconnecting and plugging the valve to the motor hydraulic hoses. If a reading of 1750 p.s.i. is now reached, there is excessive leakage in the motor and it should be replaced. If the 1750 p.s.i. is not reached, replace the hydraulic valve.
5. Insert the 0-5000 p.s.i. gauge into the pressure port of the lift/tilt section. See Figure 3. Run the engine to maximum rpm and run the bucket or lift cylinders to the end of the stroke while reading the gauge. The pressure on the lift/tilt system should be  $1550 \pm 50$  p.s.i.

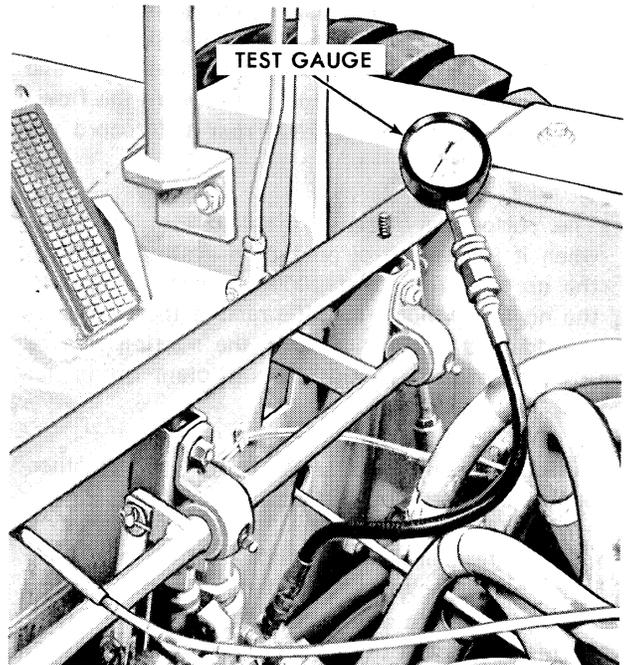


Figure 3  
Lift/Tilt Pressure Check

6. If the reading on the pressure gauge is not within the specified limits, adjust the relief valve, Figure 4, by loosening the jam nut and tightening or loosening the adjusting screw as required.
7. Tighten the jam nut and re-check the system pressure following the procedure previously outlined.

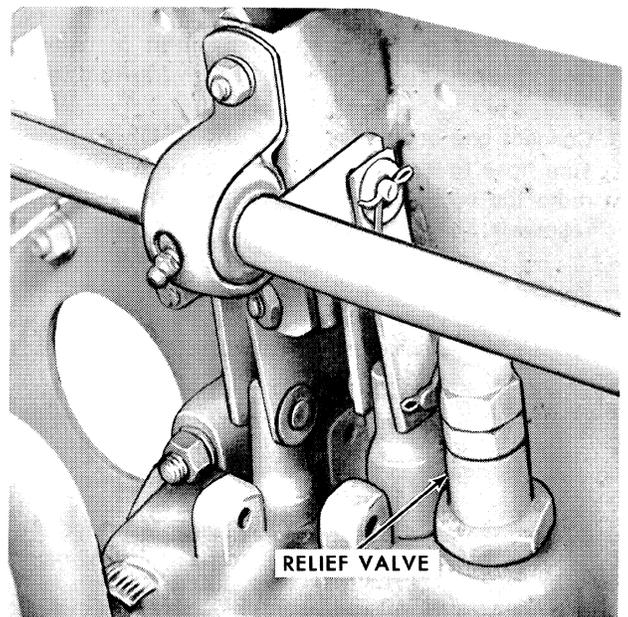


Figure 4  
Lift/Tilt Relief Valve

## PRESSURE CHECKS AND ADJUSTMENTS

8. To determine if the pump is cavitating (not receiving sufficient oil to charge the pump at all speeds), set the load valve at no-load p.s.i. and the throttle to give 1400rpm, then record the flow. Increase the speed to 2800 rpm and record the flow.

The pump is a positive displacement pump and when it is capable of producing system pressure, the no load volume at 2800 rpm should be twice the no load volume at 1400 rpm. If the volume is not doubled, a restriction in the suction line or filter is evident because sufficient oil is not entering the pump.

Follow the same procedure for testing the other sections of the pump.

The hydraulic pump performance test is performed with the pump isolated from the drive and lift/tilt circuits so that the system leakage is not a factor in the test. With the tester properly installed, all pumped oil is directed to the Hydra-Analyzer, measured at the desired load, and returned to the tester outlet. The test must be performed in three stages to test the three sections of the pump.

### Installation of Tester

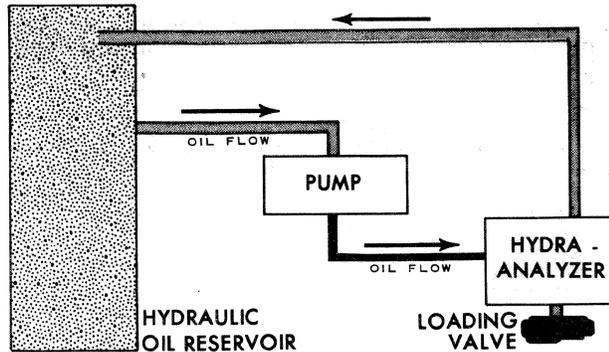
1. Disconnect the rear pump pressure line from the left drive control valve.
2. Connect one end of the JFX-501 high pressure hose to one of the three pump outlet ports and the other end to the inlet of the Hydra-Analyzer.
3. Connect one end of the other JFX-501 high pressure hose to the outlet of the Hydra-Analyzer and route the opposite end of the hose to the loader reservoir.

**IMPORTANT:** Do not under any circumstances exceed the system relief pressure of 1750 p.s.i. Excessive pressures will cause major pump damage.

### Pump Performance Test Procedure:

1. Set the tester load valve to no load p.s.i., and the flow meter at the 15 gpm setting (12.5 imp. gpm) (56.78 liters per minute).
2. Start the loader engine and set the throttle at 2800 rpm.

3. Heat the oil in the system by closing load valve to 1000 p.s.i. Reduce the load valve setting to no load p.s.i. when the oil temperature reaches  $180^{\circ}\text{F} \pm 15^{\circ}\text{F}$ .



*Figure 5*  
**Pump Performance Test**

4. Record the flow meter gpm reading at 2800 engine rpm, no load psi, and  $180^{\circ}\text{F} \pm 15^{\circ}\text{F}$ .
5. Gradually apply the load valve increasing the pressure to 1750 p.s.i. Correct the reduced engine speed to 2800 rpm by increasing the throttle setting.
6. Record the gpm reading on the flow meter at 2800 engine rpm, 1750 p.s.i. system pressure, and  $180^{\circ}\text{F} \pm 15^{\circ}\text{F}$ .

**NOTE:** The readings taken at no-load p.s.i. and 1750 p.s.i. system pressure must be taken at a constant 2800 engine rpm. If the engine rpm is not kept constant, the volume readings will not give the desired results when determining pump efficiency.

7. Determine pump efficiency by dividing the no-load p.s.i. volume into the volume under 1750 p.s.i. system pressure. The efficiency must be approximately 65% or more. A pump that is less than 65% efficient will generate sufficient heat to be detrimental to the system; therefore, the pump should be replaced.

### CYLINDER PACKING LEAKAGE TEST

If cylinder leakage at the packing is suspected, a simple test can be performed to determine if oil is leaking to the low pressure side of the cylinder.

1. Start the loader and extend or retract the cylinder to its full length.

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## COMPONENT OVERHAUL

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2. Remove the hose from the low pressure side of the cylinder.
3. Actuate the control lever and hold. This will exert system pressure on the packings.
4. Note the quantity of oil leaking from the hose port of the cylinder.



**CAUTION:** *Do not get under the bucket or reach through the lift arms when the loader is raised.*

Various factors contribute to the volume of packing leakage. Each of these factors should be considered prior to installation of new packings.

- Leakage increases proportionally with an increase in temperature and pressure.
- Cylinders containing single piston packings will leak more in one direction, depending on the direction of the V-facing of the packing.
- All cylinder packings leak in small quantities for packing-to-cylinder barrel lubricating purposes.
- Cylinder dimensions must be considered because an increase in the surface provides additional area for leakage.

### PUMP SUCTION LEAKAGE TEST

A simple and yet effective test can be performed to help diagnose noisy pump operation. Where air leakage is suspected as being the cause of the noisy pump, use a squirt-type oil can filled with a medium weight hydraulic oil and squirt oil around the pump housing, and the suction line. If air is entering the pump, the oil will provide a temporary seal and cause a distinct change in the sound made by the pump.

## COMPONENT OVERHAUL

### GENERAL INFORMATION

The service procedures detailed in this manual consider the most apparent, practical, and efficient methods of repair. A procedure may not prove to be the most desirable in all situations. Alternate methods are sometimes required, depending on the tools and equipment available.

It is always a good practice to obtain as much information as possible from the owner or operator of the loader prior to performing actual maintenance.

Experience proves that although the owner or operator may not have the complete technical information required, he may readily lead the service repairman to the problem areas.

Exercise care in the disassembly of parts. It is important from a time standpoint and for a satisfactory repair, that all parts be properly installed. Identify removed parts as this can help in reassembly and to prevent a time-consuming repeat repair. Component disassembly and reassembly should always be performed under clean conditions. Dirt and other foreign material entering the system during a repair can lead to a later, costly, breakdown.

### HYDRAULIC PUMP

The hydraulic pump in the Ford Series 340 Compact Loader is a crankshaft-driven gear-type pump. It is a three-section tandem pump. The section bodies are aluminum and gears are cast iron. The pump is connected to the engine crankshaft with a flexible coupling. The coupling half on the engine is keyed and secured with a set screw. The coupling half on the pump is splined. The pump is serviced as an assembly; however, there is a seal kit and an input shaft available.

#### A. Removal

Prior to removing the hydraulic pump from the loader, perform the following:

- Actuate the loader control levers to release all hydraulic pressure from the system.
- Drain the hydraulic oil as described in the "LUBRICATION AND MAINTENANCE" Section, page 23.
  1. Remove seat support assembly, battery, and battery box.
  2. Disconnect the suction hose which connects the hydraulic reservoir to the pump.
  3. Disconnect the three pressure hoses on the right side of the pump.



**CAUTION:** *Do not attempt to disconnect hydraulic hoses when the system is under pressure, when the engine is running, or when the lift arms are raised.*

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## CONTROL VALVES

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4. Remove the two hex bolts and lock washers which secure the pump to the pump mount, and slide the pump shaft out of the flexible coupling assembly.

**NOTE:** *Cap all open lines and ports to prevent the entry of dirt and foreign matter.*

### SEAL REMOVAL

Exercise great care when removing the shaft seal to avoid damage to the housing bore. It is recommended that an expandable hook-type tool be used to engage the steel retainer portion of the seal. Heating the aluminum housing to 250° will reduce the force fit, the force necessary to remove the seal, and minimize the possibility of damaging the bore.

### INSPECTION

The pump shaft seal can be removed without disassembling the pump. Inspect the seal for nicks, scratches, and ridges. If any of these conditions exist, the seal must be considered defective and replaced. If the pump shaft has wear from the seal, the shaft should be polished or replaced.

### SEAL INSTALLATION

Install the shaft seal in the front cover with the spring-loaded lip facing inward. Press the seal into place using a flat steel rod larger than the seal outside diameter so as to permit the rod rather than the seal to bottom against the housing. Care should be taken to press the seal into the housing without "cocking" to avoid damaging the seal bore.

### PUMP INSTALLATION

1. Slide the pump shaft into the flexible coupling and secure the pump to the mount with two 1/2" – 13 x 1-1/2" hex bolts and 1/2" lock washers.
2. Connect the three pressure hoses to the right side and the suction hose to the left side of the pump.
3. Install seat support assembly, battery, and battery box.
4. Refill hydraulic oil reservoir.

**IMPORTANT:** *Do not use ordinary hydraulic oil to refill the hydraulic system. Use only Ford Specification M2C48A or a top grade "MS" rated 10W-30 viscosity motor oil. Ordinary hydraulic oil may impair the operation of the unit and cause possible damage to the hydraulic system.*

**NOTE:** *The loader hydraulic oil reservoir capacity is approximately 8 U.S. gallons.*

## CONTROL VALVES

The drive control valves and lift/tilt valve are 4-way open center valves. The drive valves have a motor spool which is designed to give some metering characteristics and to smooth out the operation of the machine. The drive valves are mounted on the inside of the frame on either side of the loader. The lift/tilt valve is mounted on the control plate.

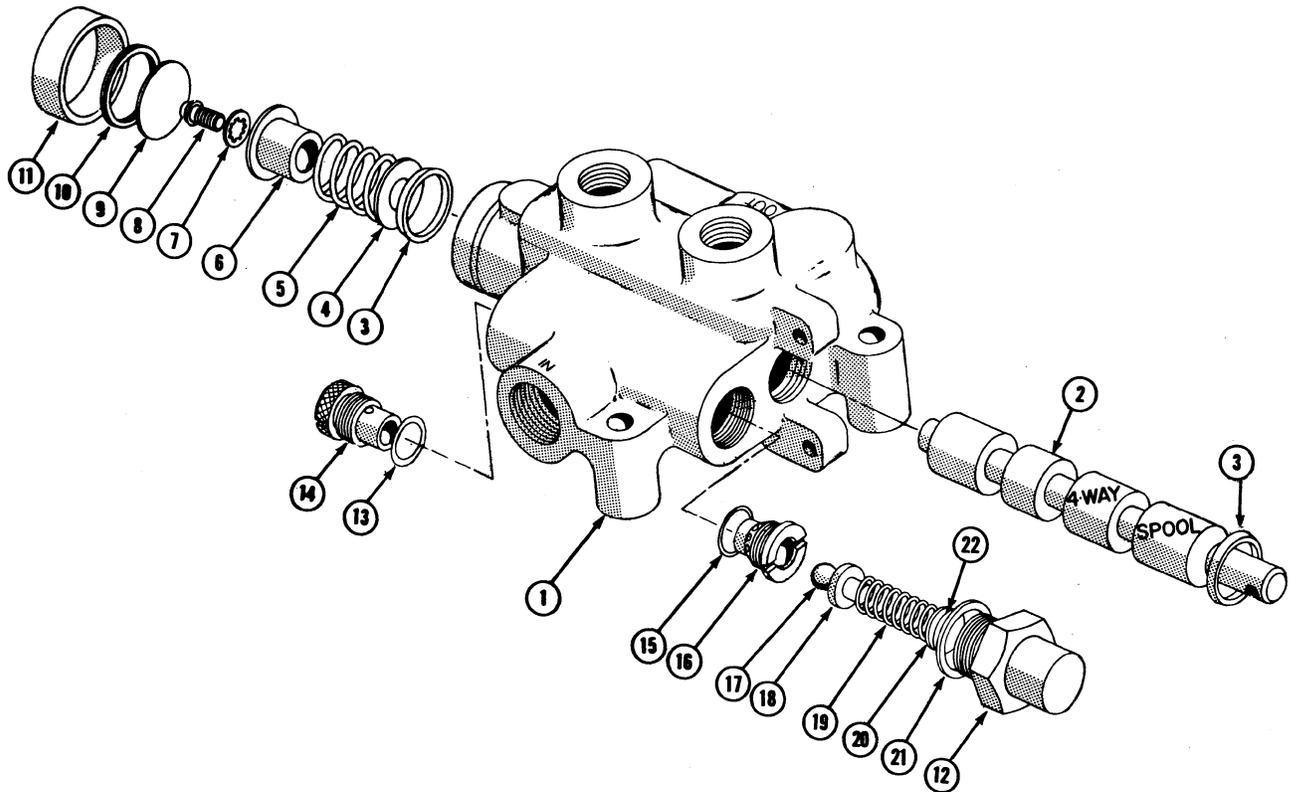
The optional auxiliary control valve, which permits operation of a hydraulic attachment such as a backhoe, on the front of the machine, is located under the front floor plate. The valve is a 4-way closed-center type valve without a relief. Oil from auxiliary hydraulic operations will relieve through the lift/tilt valve. The auxiliary valve is actuated by a treadle between the accelerator and brake pedals.

All control valves are similar in construction. The cast iron valve body houses all of the valve components. The centering spring, washer, and spring collar, Figure 6, are attached to the end of the spool and function to return the spool to the neutral position when the valve handles are released. The float spool spring end contains an adapter and detent cap. The detent mechanism is a spool locking device which must be manually released to permit the spool and valve to return to the neutral position. Each valve is selectively fitted to its respective spool bore. Because of this selective fitting, the spools are not interchangeable. If the spools are damaged, the valve and spool must be serviced as an assembly.

Check valves are located in the valve body and function to prevent the cylinder oil from leaving the cylinder when the valve is opened, until sufficient pressure is developed to overcome the pressure in the circuit.

The system relief valve serves to protect the loader components from damage caused by excessive internal pressure. The system relief valves in the drive control valves are preset at the factory at 1750 p.s.i. and are non-adjustable. The system relief valve in the lift/tilt valve is preset at 1550 p.s.i. and is adjustable to permit higher settings when mounting a backhoe on the loader.

# CONTROL VALVES



- 1. Housing
- 2. Spool
- 3. Spool Seal
- 4. Stop Washer
- 5. Centering Spring
- 6. Collar
- 7. 1/4" Lock Washer
- 8. 1/4" - 20 x 1/2" Bolt

- 9. Stop Disc
- 10. Snap Ring
- 11. Rubber Bonnet
- 12. Relief Body
- 13. O-Ring
- 14. Check Plug
- 15. O-Ring
- 16. Valve Seat

- 17. Relief Valve Ball
- 18. Guide
- 19. Relief Spring
- 20. Washer
- 21. Gasket
- 22. Shim

**Figure 6**  
**Drive Control Valve**

## Valve Removal

Each control valve is mounted similarly to the loader frame through the use of mounting bolts. Depending upon the service required, it may not be necessary to remove the complete valve body. The relief valve in the lift/tilt control valve, for example, may be serviced with the valve body in place.

1. Remove hydraulic pressure by actuating the control levers.
2. Disconnect the pump pressure hose at the valve coupling.
3. Tag and disconnect the cylinder-to-valve or hydraulic motor-to-valve hoses at the control valve.

**NOTE:** Cap all valve hose openings with suitable plugs or caps to prevent the entry of dirt.

4. Remove the valve mounting bolts and remove the valve.

## Disassembly

The drive control valves, lift/tilt control valve, and auxiliary control valve are disassembled in a similar manner.

1. Plug the inlet and outlet control valve ports. Clean the body in a suitable solvent and dry with compressed air.
2. Remove the bonnet, snap ring, and stop disc from the valve body. Remove the parts connected to the spool.

# CONTROL VALVES

3. Remove all parts connected to the front of the spool.
4. Push the spool into the housing from the front of the valve until the front seal is exposed. Remove the front seal. Pull the spool out of the housing from the front end.

**NOTE:** Be very careful not to scratch or damage the spool or bore when removing the spool.

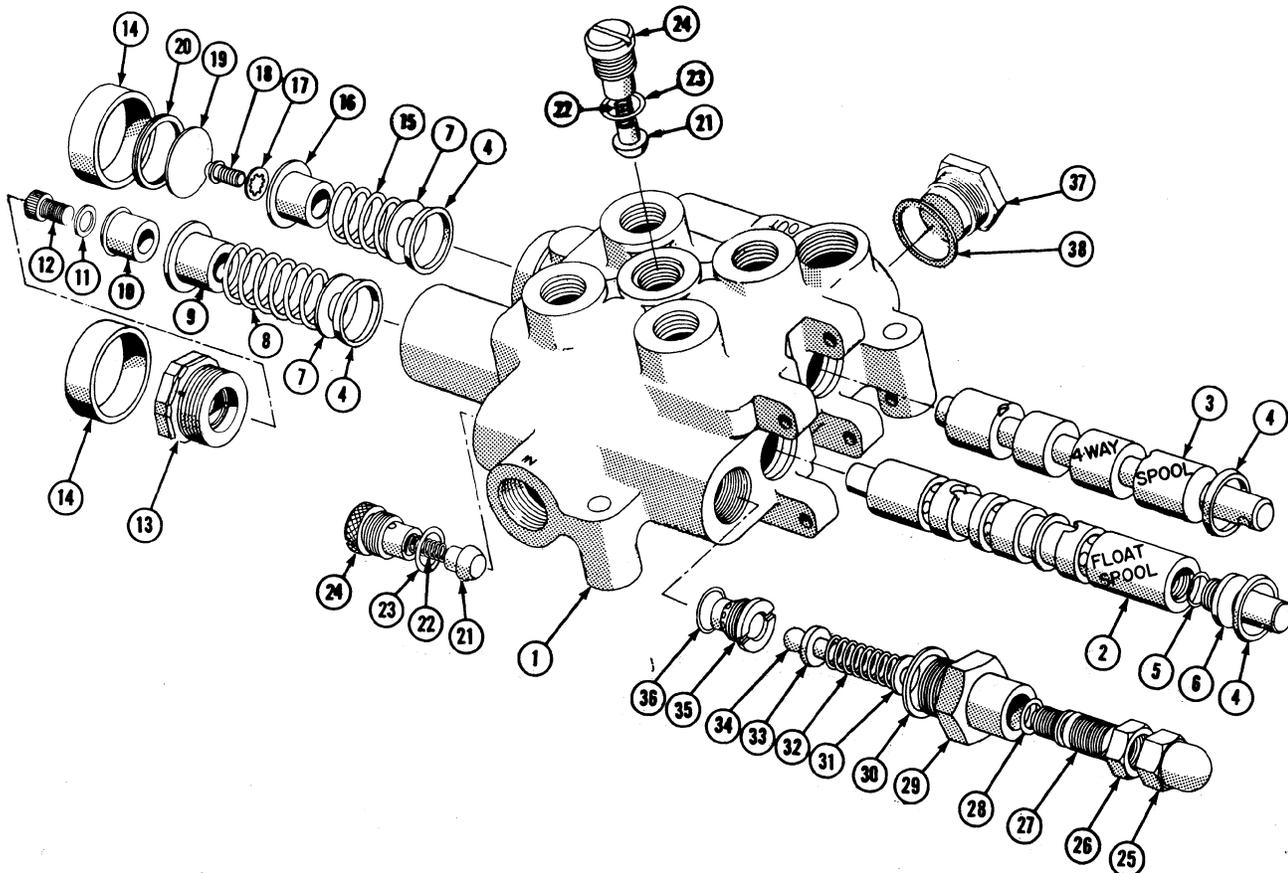
5. Remove the back seal.

### Inspection

The majority of valve failures occur because of dirt and other foreign matter entering the valve, causing

marring and erosion. Inspect the valve body bores and poppet seats for evidence of scoring and distortion. Minor imperfections can be corrected using crocus cloth, emery cloth, or fine lapping compound. Use extreme care when using burnishing materials to assure that all particles are removed from the valve body.

1. Inspect the spools for scratches, wear, and other damage. Where evidence of distortion, cracks, or damage is evident, install a new control valve assembly. Small scratches may be removed with emery cloth or crocus cloth.



- |   |   |   |
|---|---|---|
| <ol style="list-style-type: none"> <li>1. Housing</li> <li>2. Float Spool</li> <li>3. Spool</li> <li>4. Seal</li> <li>5. Float Spool Adapter Seal</li> <li>6. Float Spool Adapter</li> <li>7. Stop Washer</li> <li>8. Float Centering Spring</li> <li>9. Float Spring Collar</li> <li>10. Float Detent Plunger</li> <li>11. 1/4" Lock Washer</li> <li>12. Float Detent Adapter</li> <li>13. Float Detent</li> </ol> | <ol style="list-style-type: none"> <li>14. Rubber Bonnet</li> <li>15. Centering Spring</li> <li>16. Stop Collar</li> <li>17. Lock Washer</li> <li>18. 1/4" - 20 x 1/2" Bolt</li> <li>19. Stop Disc</li> <li>20. Snap Ring</li> <li>21. Check Poppet</li> <li>22. Check Poppet Spring</li> <li>23. O-Ring Plug</li> <li>24. Check Ball Plug</li> <li>25. Acorn Cap</li> <li>26. Jam Nut</li> </ol> | <ol style="list-style-type: none"> <li>27. Adjusting Screw</li> <li>28. O-Ring Screw</li> <li>29. Relief Valve Body</li> <li>30. Gasket</li> <li>31. Washer</li> <li>32. Relief Spring</li> <li>33. Spacer</li> <li>34. Relief Valve Ball</li> <li>35. Relief Valve Seat</li> <li>36. O-Ring</li> <li>37. Plug</li> <li>38. Gasket</li> </ol> |
|---|---|---|

**Figure 7**  
**Lift and Tilt Valve Assembly**

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## CONTROL VALVES

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2. Inspect the check valve seats for evidence of damage or wear. Minor imperfections may be removed using a fine lapping compound.
3. Inspect the circuit check valve poppets for distortion or pits; install new poppets if defective.
4. Inspect the relief valve components for breaks, burrs, or any distortion that could contribute to malfunctioning. Inspect the relief valve poppet seat for cracks, pits, or other damage. Install new parts if defective.
5. Inspect all springs for evidence of set, cracks, or other damage. Discard all damaged springs.

**NOTE:** *In attempting to determine the "set" of springs, compare the springs with new springs from the parts supply. Compare the height of the new spring versus the height of the old spring.*

### Reassembly and Seal Replacement

Coat all parts with clean hydraulic oil to facilitate reassembly and to provide initial lubrication. Use small amounts of petroleum jelly to hold the O-rings in place during assembly. Always install new O-rings and spool seals.

1. Thoroughly clean both seal grooves.
2. Replace the spool through the front of the housing, being certain that the end having the bolt hole enters first. Push the spool into the valve until the spool end touches the back seal groove.
3. Insert a new seal in the back groove, being careful that the U-cup of the seal is placed toward the valve body. It is helpful to pinch one side of the seal, causing the seal to bend into a shape slightly smaller than the seal groove in the valve. When the seal has been properly placed in the seal groove, straighten the seal by running a smooth rod around the exposed surface of the seal until there is a perfect fit. To check this, run a finger around the exposed edge of the seal. There should be a smooth, perfect ridge with no kinks.
4. Insert the special tool provided in the seal kit into the valve body from the back, and through the seal until the shoulder of the tool touches the valve housing.

5. Push the spool into the housing from the front, keeping a firm grip on the special tool until the shoulder of the tool touches the valve housing. In pushing the spool through the housing, a slight twisting of the spool and special tool will assist in the movement.

**NOTE:** *Do not push the spool too far, as this may allow the rear seal to enter the grooves of the spool and cut the new seal.*

6. Install the front seal in the same manner as described for the rear seal. Be certain the U-cup side of the seal is toward the valve housing.
7. Insert the special tool into the front of the spool bore and with a twisting motion, carefully push the tool through the new seal until the spool shoulder is met. With a twisting motion, push the spool back against the special tool until 1/4 inch of the polished surface of the spool remains exposed at the front of the valve. Remove the special tool from the front of the valve.
8. Reassemble all parts removed from the front of the spool.
9. Reassemble parts bolted to the spool. Tighten the bolt to 10 lbs. ft. (1.38 kgm) of torque. Reinstall the stop disc, snap ring, and bonnet.

### Installation

1. Secure the control valve to the frame using the mounting bolts previously removed. Tighten the mounting bolts securely.

**NOTE:** *Be careful not to overtighten the mounting bolts. Severe stress on the valve body may cause distortion in the internal passages of the body and contribute to an early failure.*

2. Connect the high pressure hoses securely to their respective ports. Connect the return hose to the outlet port.
3. Start the loader engine and actuate the control levers to purge the system of air.

**IMPORTANT:** *Check all hydraulic connections for leakage. If leakage is observed, shut off the loader engine, relieve all hydraulic pressure, and tighten the connections. Do not tighten any hydraulic connections while the system is under pressure.*

4. Perform the system relief valve pressure check when lift/tilt valve has been overhauled.

# HYDRAULIC MOTORS

## HYDRAULIC MOTORS

The hydraulic motors are Geroler type. Both right- and left-hand motors are the same.

### Removal

1. Disconnect the two hydraulic pressure hoses, Figure 8.

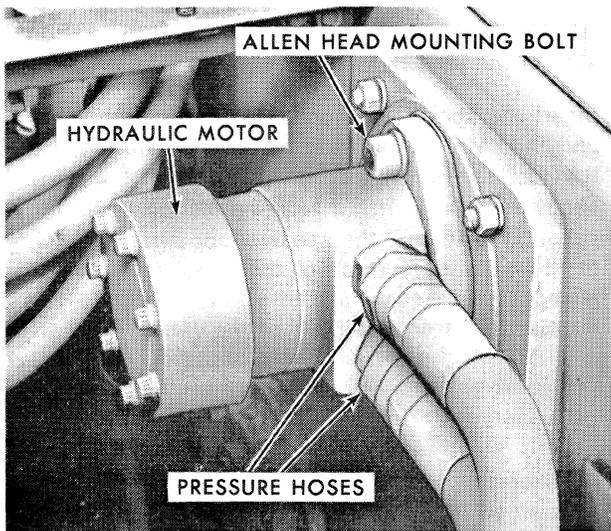


Figure 8  
Hydraulic Motor

2. Remove the two 1/2" - 13 x 1-1/4" Allen head mounting bolts and slide the hydraulic motor straight out.

**NOTE:** Everything inside of the chain case remains completely intact and in adjustment when the hydraulic motor is removed.

### Disassembly

1. Clamp the hydraulic motor in a vise across the ports, as shown in Figure 9.

**NOTE:** Excess clamping pressure on the housing will cause distortion.

2. Remove the seven cap screws from the end cap and remove the end cap by sliding it off the housing. Use care not to scratch the mating surfaces.
3. Remove the Geroler assembly, spacer, and splined shaft.

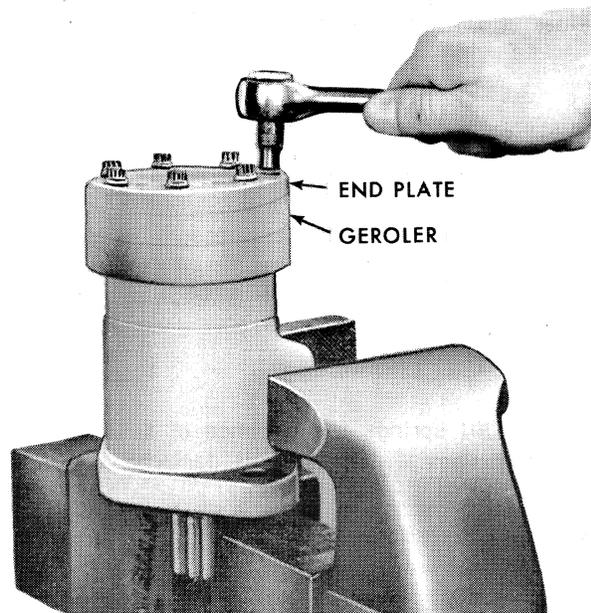


Figure 9  
End Cap Removal

**NOTE:** The spacer is below the splined shaft and will fall out when the motor is turned over.

4. Remove the seven cap screws from the spacer plate and slide it off the housing, Figure 10.
5. Reverse the motor in the vise, Figure 11, and remove the four cap screws from the mounting flange. Use a flange puller or tap lightly on the underside of the flange to slide the flange off the splined shaft.

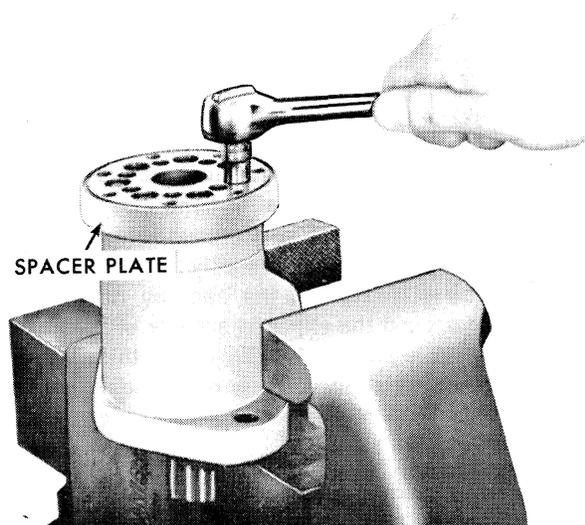
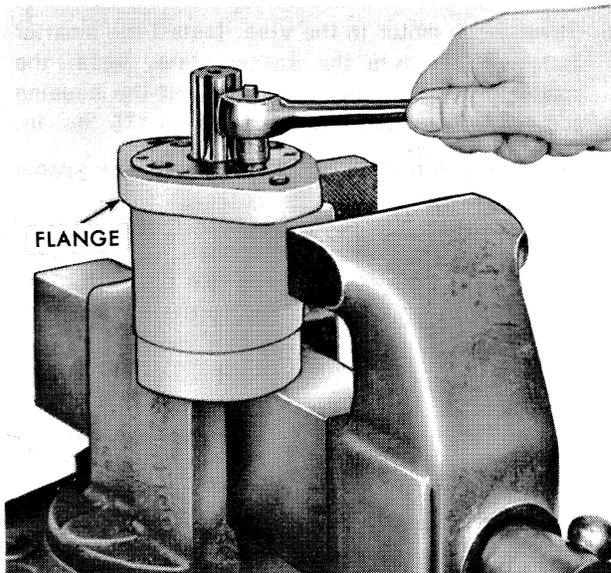


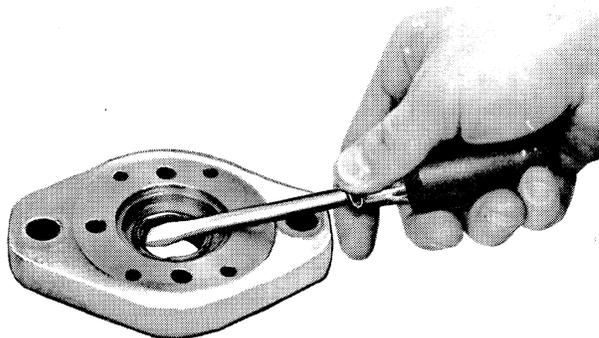
Figure 10  
Spacer Removal

## HYDRAULIC MOTORS

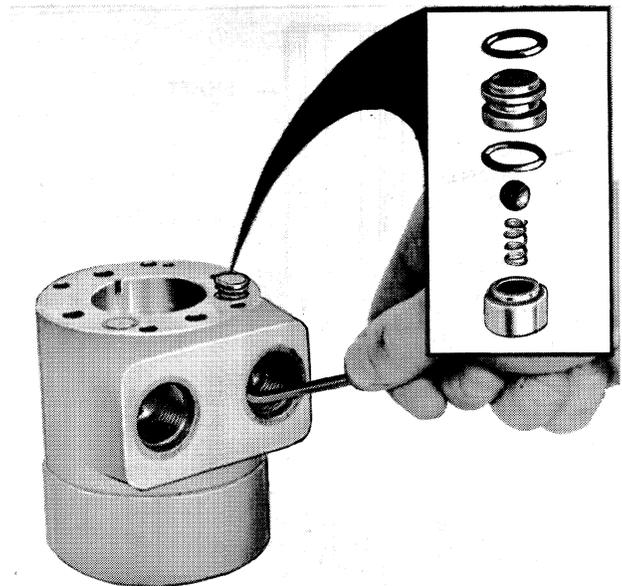


**Figure 11**  
**Mounting Flange Removal**

6. Lift the splined shaft assembly, thrust bearing and retainer ball from the housing.
7. Remove the roll pins from the body. If they remain in the flange, use a hammer and punch to drive them out.
8. The dust seal, back-up washer, quad ring seal and O-ring will come off with the flange. Use a small screwdriver to remove the quad ring seal, as shown in Figure 12. The dust seal is in the outer side of the flange and is removed in the same manner.
9. Remove the body plugs and O-rings. The ends of the plugs can be seen through the ports. Push the plug through the port openings with an Allen wrench, as shown in Figure 13.



**Figure 12**  
**Quad Ring Seal Removal**



**Figure 13**  
**Body Plugs**

### Assembly and Seal Replacement

Assembly procedures are important in obtaining effective repair. Use care in assembly of the hydraulic motor components.

Because of the configuration of O-ring seals, it is difficult to be sure if the O-ring is sealing satisfactorily. As a precaution, it is recommended that all used seals be discarded and new seals installed when the motor is reassembled.

1. Lubricate the new body plug O-rings and carefully reinstall the plug assemblies in the housing.

**IMPORTANT:** Place a mark on the splined shaft in line with a forward valving slot to facilitate timing in Step 7.

2. Lubricate the shaft assembly and carefully place it in the housing. Replace radial bearing and retainer ball as shown in Figure 14. Install the thrust bearing against the shoulder of the shaft.
3. Install a new dust seal, back-up washer, quad ring seal and O-ring seal in the flange. The seals are slightly larger than their groove and must be compressed into the groove.
4. Lubricate the seals and replace the flange. Rotate the flange slowly while pushing down on the shaft. Install the cap screws to a torque of 250 lbs. in.

## HYDRAULIC MOTORS

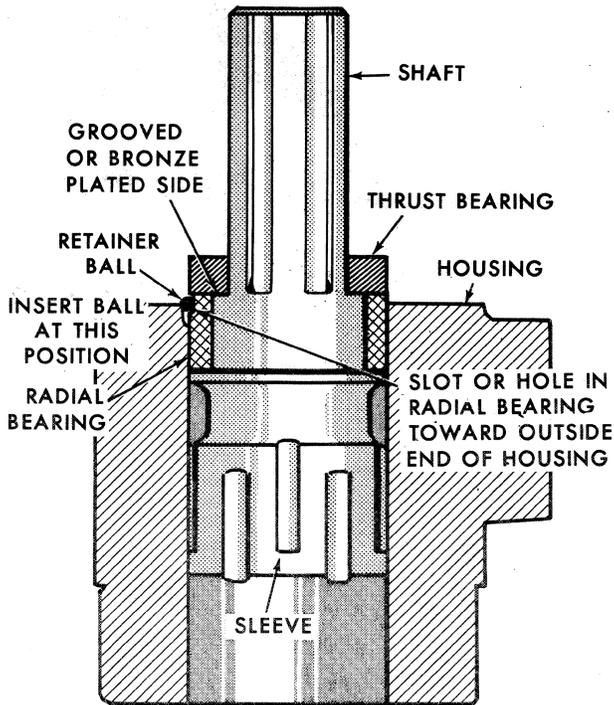


Figure 14  
Shaft Assembly

**NOTE:** If new cap screws are used, be sure they are the correct length. Longer cap screws will not permit a proper seal between the flange and housing.

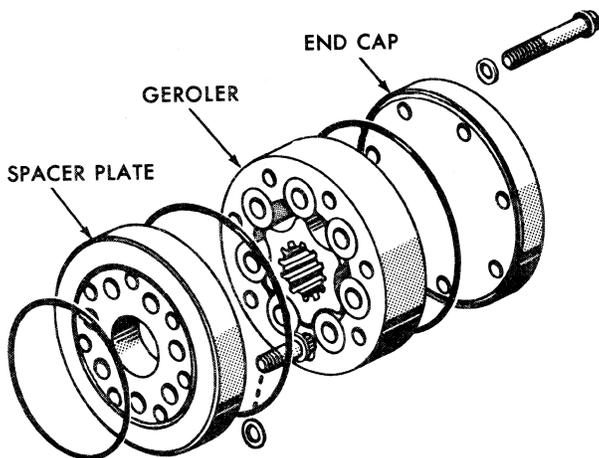


Figure 15  
O-Ring Installation

5. Reverse the motor in the vise. Install the smaller diameter O-ring in the spacer plate. Install the spacer plate with the O-ring against the housing and tighten the seven cap screws to 175 lbs. in.
  6. Install the larger diameter O-ring in the spacer plate.
  7. Align the mark on the splined shaft with an imaginary center line between the two ports, Figure 16. Insert the splined drive into the shaft in the housing and place the Geroler in the position shown.
- NOTE:** Rotating the spline one tooth will change the direction of the shaft rotation.
8. Install the O-ring in the end cap and position the end cap on the Geroler assembly. Insert the cap screws and washers and tighten to 225 lbs. in., 275 lbs. in., and 300 lbs. in. in the sequence shown in Figure 17.

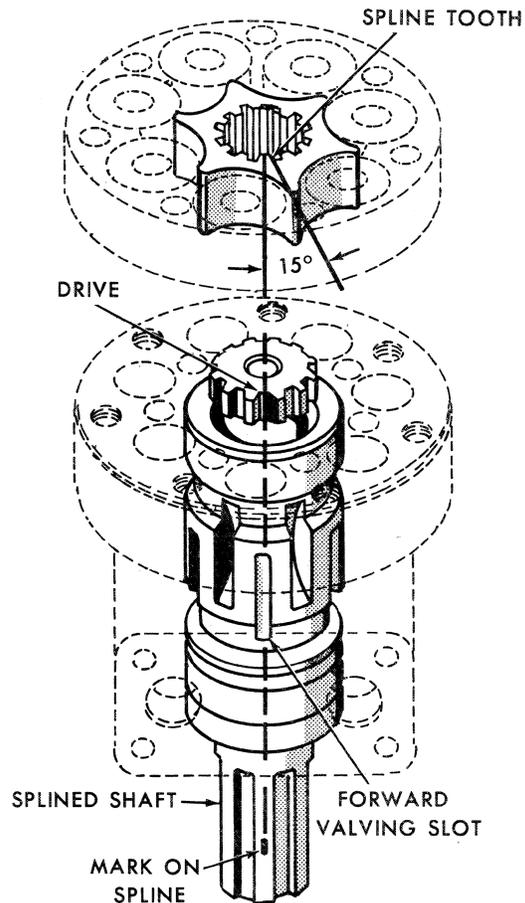


Figure 16  
Alignment