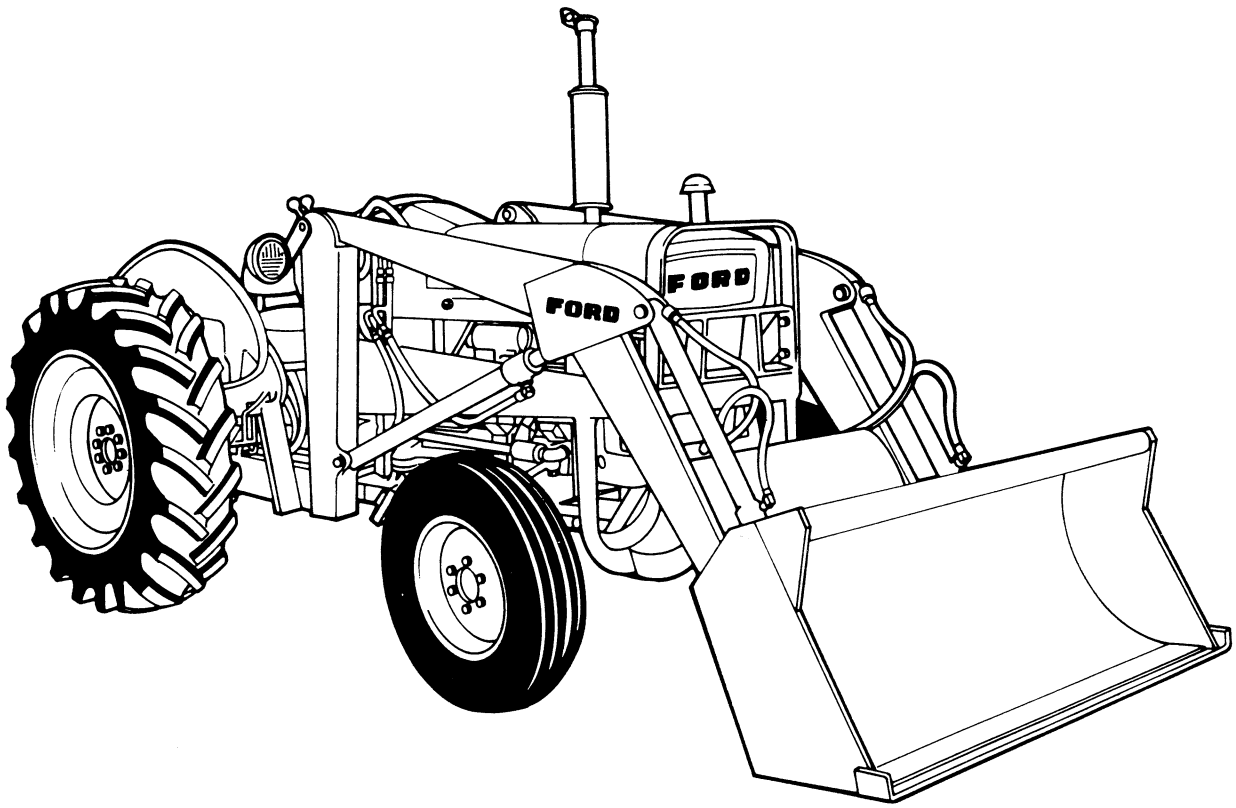
FORD

Service Manual

NEW HOLLAND

Loader
Series 727, 730, 735, and 740

40072740



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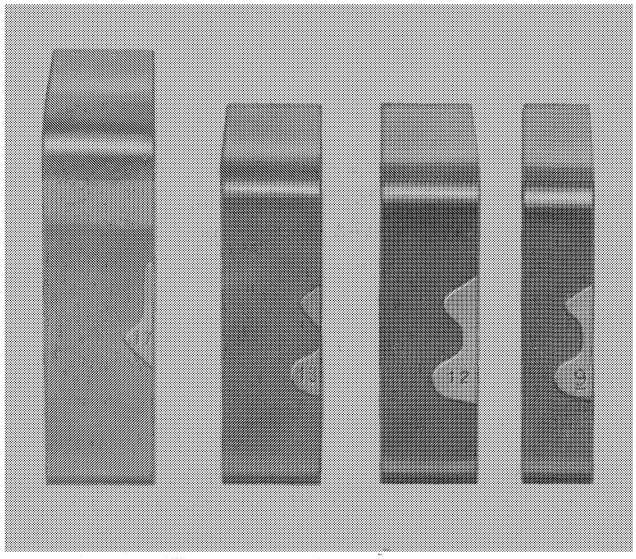

Figure 7
Pump Cam Ring Identification

GEAR PUMP

The gear-type hydraulic pump for the Series 730, 735, and 740 Loaders is crankshaft-driven and is mounted either internally or externally on the tractor frame depending on the tractor model.

Figure 8 is an exploded view identifying the component parts.

The gear-type pump is driven in a clockwise direction and delivers oil, taken from the reservoir, to the control valve. Oil enters the pump at the inlet port and is transported via the two gears to the pump outlet (pressure port). Pumping action takes place as the drive gear rotates the driven gear. As the gears unmesh, oil fills the spaces between the gear teeth and is carried to the outlet side of the pump. As the gears begin to mesh, the oil is forced from between the teeth, thus building pressure and forcing oil out through the outlet port.

A small amount of oil that is being transported by the gears during pumping action is allowed to pass by the gears to lubricate the pump. This lubricating oil passes along oil grooves in the bearings thus lubricating the gear shafts. The shaft cavities are connected by passages to insure adequate lubrication of the gear shafts.

As pressure builds within the system, it is transmitted back to the pump outlet, forcing the check balls off their seats. This action permits the pump lubricating oil to flow past the check valve, Figure 9, back to the gears which deliver it into the system. Thus, there is constant lubrication of the pump, and sufficient pressure is maintained to seat the seals within the pump.

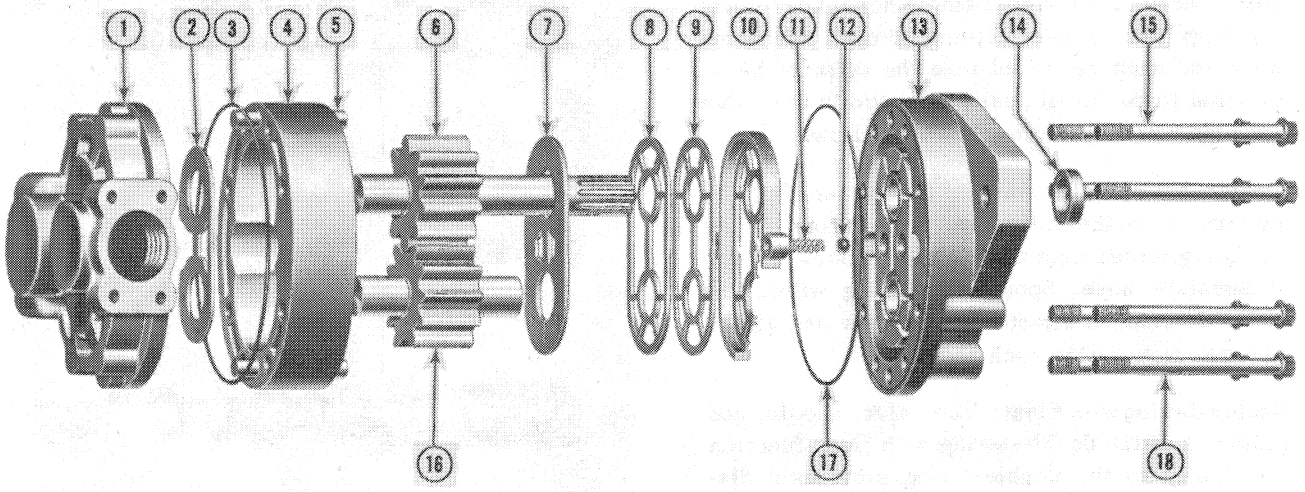

Figure 8
Gear Pump – Exploded View

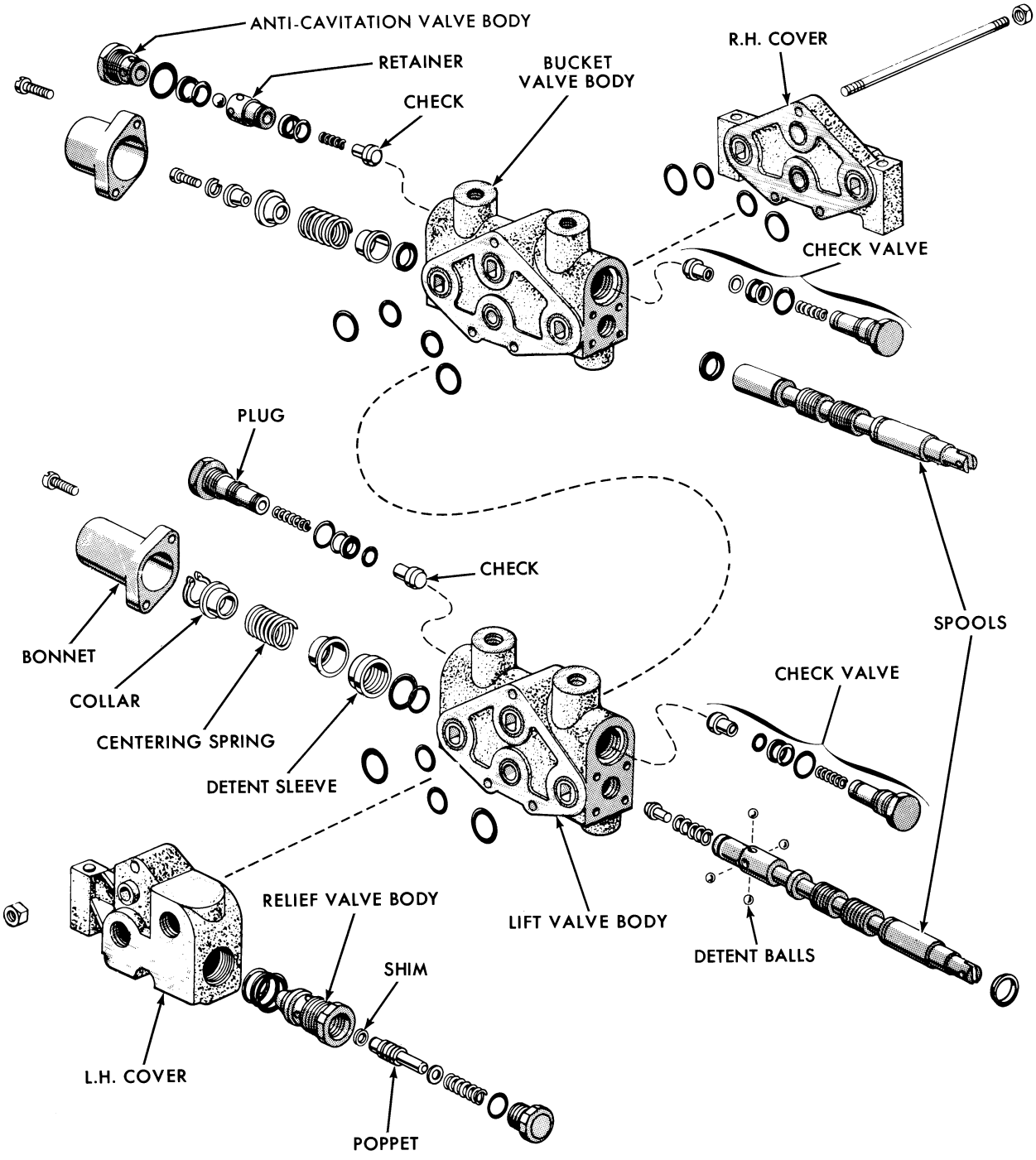

Figure 19
Stacked-Type – Two-Section Control Valve

Check valves are located between each spool and cylinder port. A combination check valve and anti-cavitation valve functions in the bucket section between the piston end cylinder port and the low-pressure passage of the valve. The check valve plugs are sealed against the valve body by O-rings. Internal sealing of the valves is accomplished by O-rings installed on the valve plug.

The system pressure relief valve is adjustable to increase or decrease system pressure. The system pressure is adjusted by adding or removing shims between the poppet and the spring. This will increase or decrease spring compression which in turn determines the system pressure.

Anti-Cavitation Valve: There is one anti-cavitation valve in the lift section and one in the bucket section. See Figures 26, 27, and 28. The function of the valve is to prevent cylinder voiding. The anti-cavitation valve is located between the lift cylinder rod end port and the low pressure or sump port.

When the lift arms are lowered fast (dropped), the oil is forced out of the piston end of the cylinder faster than the pump can supply oil to the rod end of the cylinder. A void (air bubble) will be formed in the rod end of the cylinder unless additional oil can be supplied. To supplement pump oil, the oil leaving the piston end is channeled to the rod end through the anti-cavitation valve.

In operation, the oil leaving the piston end of the lift cylinder is under a small amount of pressure of gravity acting on the loaded bucket and lift arms. The oil going to the rod end of the cylinder is under no pressure (a partial vacuum) because the pump is unable to supply oil fast enough. Instead of the oil returning to sump, the pressurized oil pushes the anti-cavitation valve off its seat and the oil enters the cylinder port. This oil mixes or supplements the pump oil going to the rod end of the cylinder. During normal operation, the valve is held on its seat by high-pressure oil in the cylinder circuit.

Check Valves: There are four check valves in the self-leveling loader control valve. One check valve is located in each of the cylinder ports of the lift and bucket sections. See Figures 26, 27, and 28. The check valves permit high-pressure oil to flow to the cylinder ports, and prevents cylinder oil in the high-pressure passage from returning to the open-center passage. This reverse oil flow would occur if the

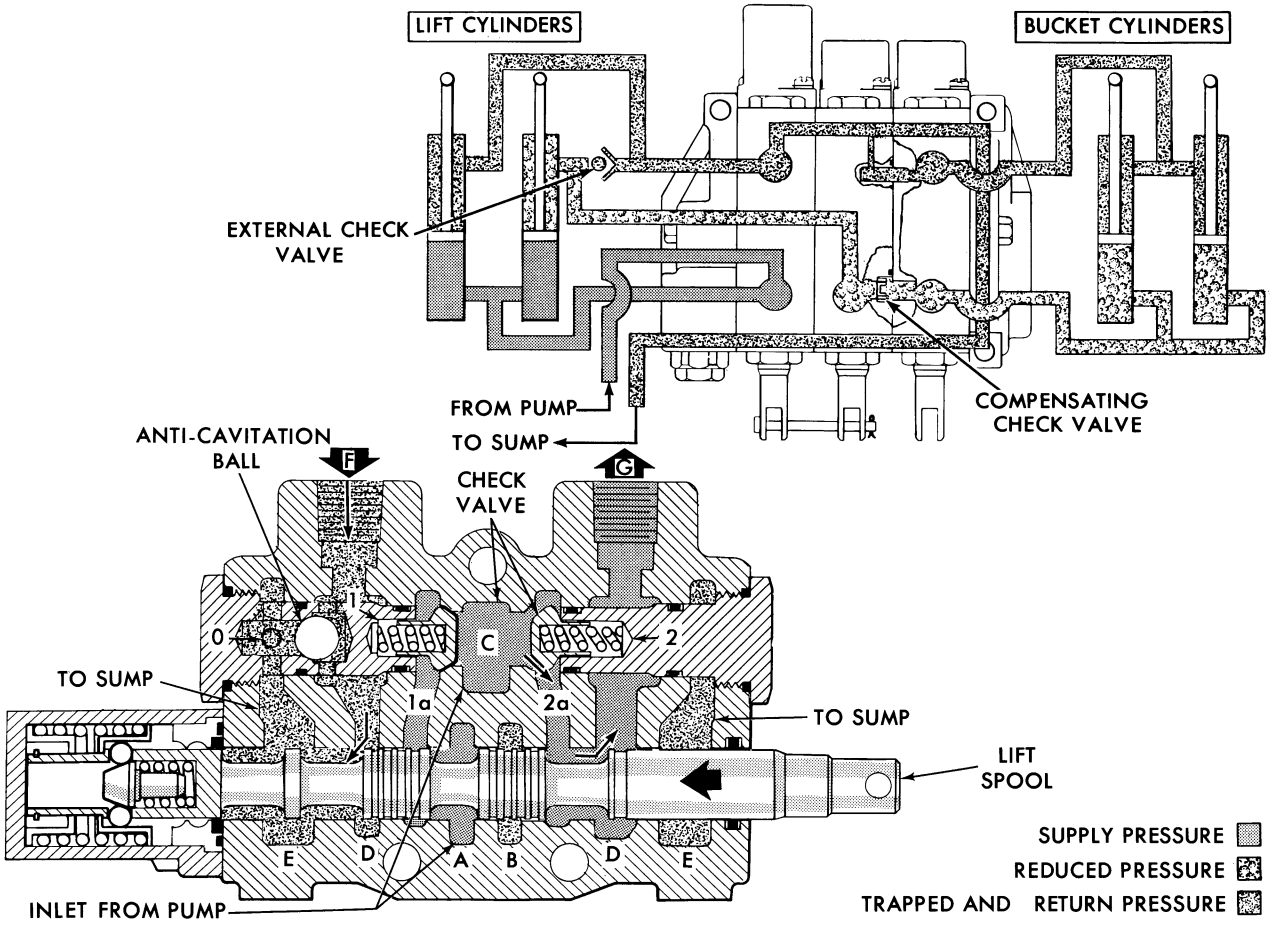

Figure 31
Compensating Control Valve – Lift Section Raising

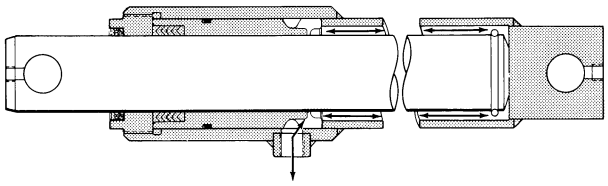

Figure 41
Cylinder Circuit Flow – Single-Acting Cylinder

SINGLE-ACTING CYLINDERS

The single-acting cylinder, Figures 40 and 41, is a displacement-type cylinder, using gravitational or external forces to exert pressure for movement in one direction. Pressured oil is forced into the cylinder barrel exerting pressure on the piston rod and causing rod movement. Lift cylinders then extend when the oil displaces space formerly occupied by the rod.

The piston rod is supported in the cylinder by a gland, packing, and packing nut. A snap ring on the end of the rod serves as a stop when it positions against the gland. The gland packing is of the chevron type supported by phenolic or nylon glass-filled top and bottom bearing rings. The packing gland which supports the rod packing also incorporates a rod wiper and packing nut. Oil is forced through the same hose that the pressured oil entered.

DOUBLE-ACTING CYLINDERS

The double-acting cylinder, Figures 40 and 42, has oil ports on both ends of the piston. Pump oil is directed to one end of the cylinder and oil is allowed to flow from the other end and to the reservoir. During the time the control valve spool is in the neutral position the oil is trapped in both ends of the cylinder.

The Series 735 Loader lift cylinders incorporate a double piston packing. The piston rod end is designed so that either the double or single packings may be adapted. The standard and optional assemblies are shown in Figure 40. The positioning of the chevrons in the standard arrangement provides for positive sealing only when the loader lift arms are raised. The optional arrangement gives positive sealing in both directions and is useful when improved down pressure performance is required.

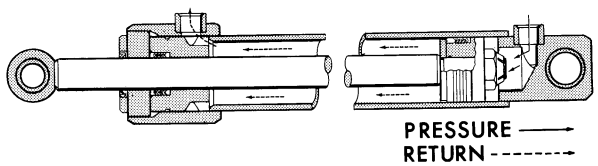

Figure 42
Cylinder Circuit Flow – Double-Acting Cylinders

CYLINDER CIRCUIT FLOW

For all practical purposes, circuit flow in all double-acting cylinders is the same. Pumped oil is directed from the main control valve to the rod or piston end of the cylinder. Oil is forced from the opposite end of the cylinder and to the control valve and reservoir. Figure 42 illustrates a typical circuit flow for a double-acting cylinder.

Circuit flow in the single-acting cylinder, Figure 41, is limited to oil flowing to the cylinder and returning from the cylinder through a single hose. Direction of oil flow is controlled by the positioning of the spool in the main control valve. With the control valve spool in the neutral position, oil is trapped in the cylinders.

GENERAL OIL FLOWS

SERIES 727 LOADER

The Series 727 Loader uses the tractor lift hydraulic system, and loader control is accomplished by a double-spool (tractor accessory) remote control valve. The two lift cylinders are single-acting displacement type, and the one bucket cylinder is a double-acting type. Oil is supplied for the system from the tractor hydraulic reservoir (center housing). The oil is pumped from the reservoir by the tractor hydraulic pump and delivered to the tractor-mounted remote control valve.

With the control levers of the remote control valve in the neutral position, the oil circulates through the valve and returns to the tractor hydraulic system. As a remote control valve lever is activated, the oil flow is directed to the cylinders by the opening and closing of passages in the control valve.

SERIES 730 AND 735 LOADERS

The Series 730 and 735 Loaders incorporate a hydraulic reservoir in the loader frame. See Figure

PROBLEM	CIRCUIT AND POSITION	POSSIBLE CAUSES	TEST
LIFT OR BUCKET FAILS TO OPERATE, IS SLOW OR HAS LOSS OF POWER IN ONE OR ALL CIRCUITS (Cont.)	**LIFT CIRCUIT LOWERING (Cont.)**	Cylinder port to sump or open center passage at compensating spool or valve body	Visual – Hydraulic test not recommended because of interconnected circuits
		Bucket Section	
		O-ring on anti-cavitation check valve	Visual – Hydraulic test not recommended because of interconnected circuits
		Anti-cavitation check ball seat and/or ball	Visual – Hydraulic test not recommended because of interconnected circuits
		Valve body and spool – front shoulder, first land, and/or the valve body above these spool areas	Visual – Hydraulic test not recommended because of interconnected circuits
		Bucket Cylinders	
		Piston packings or O-rings	Cylinder Packing Leakage Check, page 67.
	BUCKET CYLINDERS DUMP	**Bucket Section**	
		O-ring on anti-cavitation check body	Visual – Hydraulic test not recommended because of interconnected circuits
		O-rings on check valve body	Visual – Hydraulic test not recommended because of interconnected circuits
		Anti-cavitation check ball seat and/or ball	Visual – Hydraulic test not recommended because of interconnected circuits
		Valve spool leakage	Visual – Hydraulic test not recommended because of interconnected circuits
		Compensating Section	
		Compensating section check valve	Visual – Hydraulic test not recommended because of interconnected circuits
		Cylinder port-to-low pressure or sump passage at the compensating spool or valve body	Visual – Hydraulic test not recommended because of interconnected circuits

valve will function. This procedure also aids in quickly heating the oil to the recommended operating temperature of 165°F. ± 15°F.

7. With the engine speed at the recommended rpm, and the oil at operating temperature, raise the lift arms for bucket clearance. Actuate the right-hand (bucket lever) control valve lever and note the pressure reading on the gauge. The gauge reading should be within 1900 ± 50 @ 2100 rpm.

IMPORTANT: *The backhoe (if installed) is supplied with oil before the loader. The backhoe pressure relief valve must be set at 2200 ± 50 psi @ 1700 engine rpm. For further information, refer to the Backhoe Service Manual, SE 9358-A.*

8. If the reading on the pressure gauge is not within the specified limits, adjust the system pressure by removing the system relief valve cap and adding or removing shims as required. Every 0.010 inch in shim thickness changes the pressure setting approximately 100 psi.

   NOTE: *Excessive shimming in the relief valve will make the relief valve inoperative.*

9. Install the relief valve cap.

10. Recheck the system pressure following the procedures previously outlined.

IMPORTANT: *When making pressure checks and adjustments, always double check any adjustment made. System components may be damaged when subjected to excessive pressure.*

11. Remove the pressure gauge and connect the bucket control hose to the control valve. See Figures 48 and 49. Tighten the hose connection securely.

FORD 4500 TRACTOR HYDRAULIC PACKAGE COVER MODIFICATION FOR HYDRAULIC TEST INSTALLATION

NOTE: *On Ford 4500 Tractors, the hydraulic package reservoir is an integral part of the tractor, and is located under the top of the radiator shell. Before the outlet hose from the hydraulic tester can be routed into the reservoir, it will be necessary to drill and tap the reservoir cover to accept the 1/2" NPT fitting of the hose. To locate, drill, and tap the hole in the cover, proceed as outlined below.*

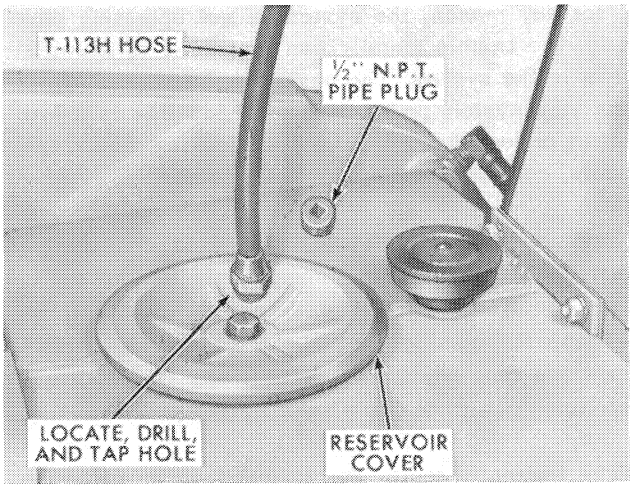

Figure 51
Ford 4500 Reservoir Cover Modification

1. Remove the hydraulic package reservoir cover and filter assembly, Figure 51.

2. Separate the filter from the cover.

3. Locate, drill, and tap a hole, to accept a 1/2" NPT pipe plug, in the top of the reservoir cover, approximately midway between the outside edge of the cover and the edge of the center bolt hole, as shown.

   NOTE: *If the proper size tap is not available, the cover modification can be accomplished by welding a 1/2" NPT female fitting over the hole in the reservoir cover. This arrangement may be used providing the fitting length does not interfere with the closing of the hood top cover.*

HYDRAULIC TESTS

The hydraulic pump must deliver a specified amount of oil through the backhoe and loader circuits within prescribed pressure limits. If the pump flow and/or system pressure falls below that specified, the efficiency of the hydraulic system will be impaired.

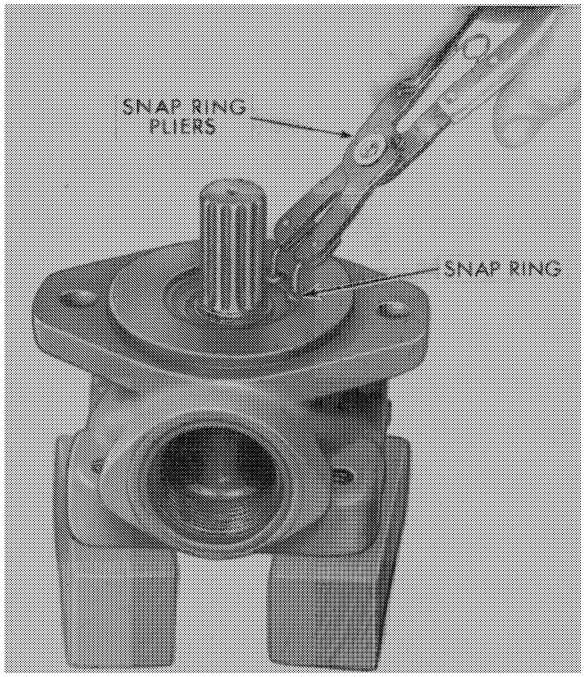

Figure 60
Shaft Snap Ring Removal

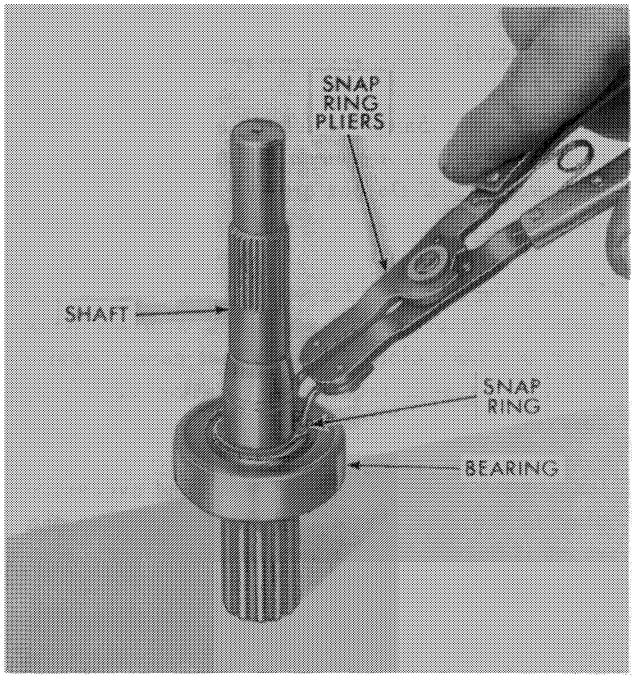

Figure 61
Shaft Bearing Snap Ring Removal

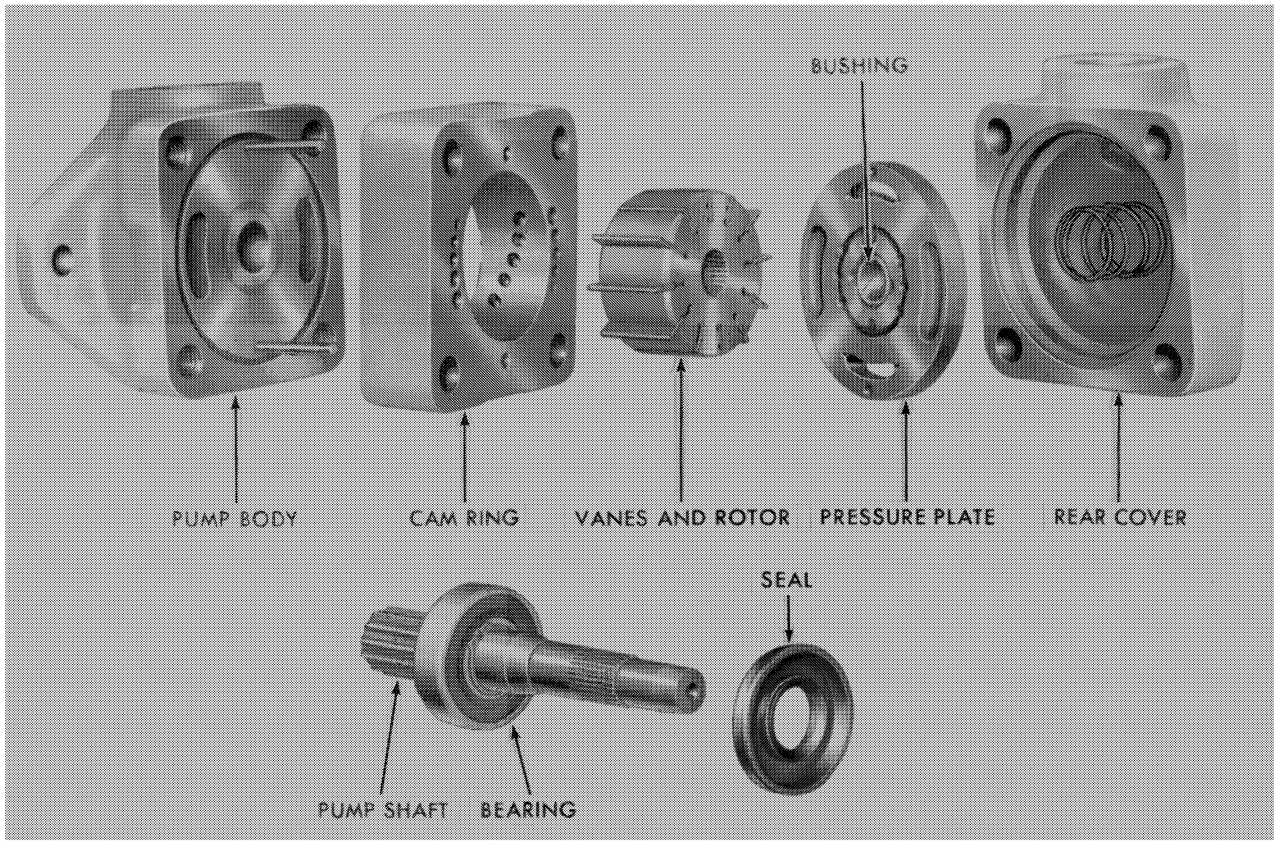

Figure 62
Pump Wear Points

6. Install an O-ring on the relief valve seat. Insert the other check poppets into the relief valve seat stem. Invert the valve body so the spool cap end is down, add two or three drops of locking sealant, and thread the seat into the body bore with a screwdriver socket extension combined with a torque wrench. Tighten the relief valve seat to 30 lbs. ft.

7. Place the relief valve poppet into the bore and on the relief valve seat. Insert the relief valve spacers and spring into the bore. Check the condition of the shims which are located in the relief valve cap. Install new shims if necessary. Install the relief valve cap and copper gasket and tighten securely.

8. Install a new O-ring seal on the anti-cavitation plug and install the nylon ball and plug in the valve body. Tighten the plug securely.

9. Control valves with the current float detent shown in the Insert, Figure 73, must be properly adjusted for the float detent to be fully operative. To adjust the detent, remove the spool cap and, with the appropriate hex wrench, turn the detent cap in or out until the spool is firmly held in the float position when the control handle is pushed fully forward. A small amount of force should be necessary to pull the control handle back from the float position.

E. Installation

1. Install the O-ring seal in the recess of the low pressure port and secure the control valve to the loader frame using the mounting bolts previously removed. Tighten the mounting bolts securely being careful not to overtighten. Severe stress on the valve body may cause distortion in the internal passage of the body and contribute to an early failure.

2. Secure the cylinder-to-valve O-rings and adapters.

3. Connect the bucket cylinder hoses, Figure 75, and lift cylinder tubes to their respective connections securely.

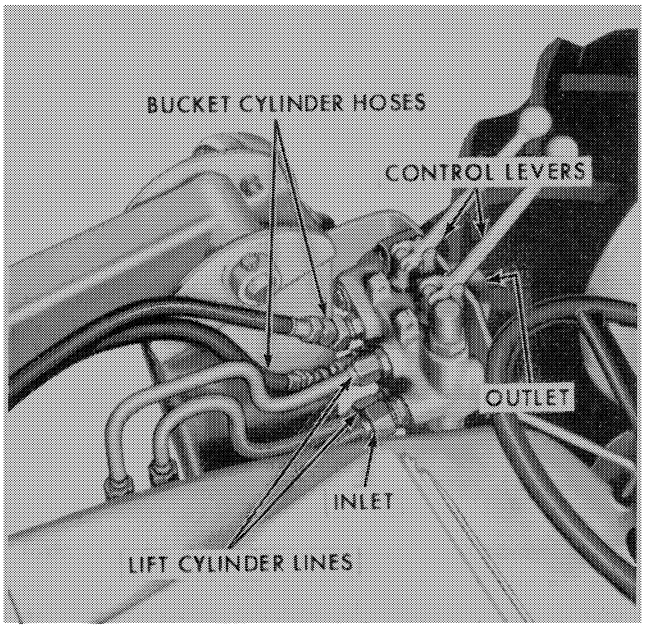

Figure 75
Control Valve Installed (Series 730 Shown)

4. Connect the high pressure inlet tube to the control valve, Figure 75. Tighten the fittings to provide a good seal.

5. Start the tractor engine and actuate the control valve levers to purge the system of air.

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

6. Perform the system relief valve pressure check, page 59.

IMPORTANT: *When installing new hoses or tubes on loaders and backhoes or if leakage is encountered after installation, it is important that the flare fittings and O-ring fittings be tightened to the correct torque. Over-tightening can cause leakage by distorting or damaging the fitting. Under-tightening can cause leakage by not providing an adequate seal.*

The torque requirements for all 37° flare and SAE O-ring fittings are as follows:

3. Inspect the spools for wear, badly pitted surfaces, distortion, and other damage. If any of these defects are apparent, discard the valve section and its matched spool. Remove any paint or rust from the highly finished surface of the spool with crocus cloth.

4. Inspect the parts of the centering spring assembly for cracks, burrs, or damage. Discard any springs, washers, or collars, that are damaged.

5. Inspect the lift and bucket check valves for wear, damage, or burrs in the ball seating area.

6. Inspect the anti-cavitation valve components for damage. Inspect the ball seating surface for evidence of wear, burrs, or foreign matter that could prevent proper seating of the check valve. Discard the valve section if the seat is not satisfactory. If the check ball is worn or rough, install a new ball.

7. **Three-Section Valve:** Inspect the flow control valve spool for wear or damage. If damage is evident, discard the spool and compensating valve section. Inspect the flow control relief valve for damage.

D. Assembly

NOTE: *Prior to reassembly, recheck the valve sections and the right- and left-hand end cover bores to be sure all O-ring seals have been removed. When installing new O-ring seals, coat them with lubricant to reduce resistance and abrasion.*

Refer to the appropriate exploded view illustrations, depending on the type of control valve to be assembled (Figures 77 – 79 for the two-section valve, and Figures 80 – 83 for the three-section valve), and perform the following:

1. Install a new O-ring in each of the valve section spool bores at the spool lever end.

   NOTE: *The O-ring for the spring end of the spools should be installed on the spool after the spools are inserted in their respective bore.*

2. Assemble the spools; position the centering springs, spring washers, and detent assembly (lift spool) on the spool. Secure the spring by installing the snap ring. See Figure 84. Tighten the centering spring screw to 12 lbs. ft. torque.

3. Lubricate the spools with hydraulic oil and insert them into each valve section spool bore. Install the spool end O-ring. Secure the spool bonnets with the retaining screws.

4. Install new O-ring seals and back-up washers on the lift and bucket check valves, the anti-cavitation and check valves, and the system relief valve.

5. Install the system relief valve assembly in the left-hand cover. Tighten the relief valve cap securely.

6. Install the lift and bucket check valves, and the anti-cavitation and check valves into their respective bores. Tighten the caps and plugs securely.

7. **Three-Section Valve:** Install the compensating section flow control valve components and tighten securely. Install the flow control check valve.

8. Lubricate and position new O-ring seals between each of the control valve sections. Make certain that each O-ring is properly located in the groove provided.

9. Stack the valve sections and end covers together beginning with the right-hand cover (machined surface up).

10. Place the bucket valve section on the right-hand cover, being careful not to dislodge the O-ring seals.

11. **Three-Section Valve:** Place the compensating section on the bucket section. Be careful that the flow control check valve does not fall out.

12. Place the lift section on the compensating section (or bucket section), again being careful not to dislodge the O-ring seals.

13. Position the left-hand cover on the lift section. Align the three through bolt holes as the valve sections and end covers are stacked.

to the lower lift cylinder tube, and the hose from the rod end of the cylinder is connected to the tee fitting (3), Figure 87.

3. Start the tractor and operate the engine and loader at 1200 to 1500 rpm to purge the system of air.

4. Check all hydraulic connections for leakage. If leakage is observed, shut off the tractor engine, release all hydraulic pressure and tighten the connection.

   IMPORTANT: *Do not tighten any hydraulic connection while the system is under pressure.*

5. Recheck the system oil level and replenish if necessary.

6. Operate the loader through several complete cycles to determine if the repaired cylinder is functioning properly.

LUBRICATION AND MAINTENANCE

OIL FILTER

Series 727 Loaders

The Series 727 Loader uses the tractor hydraulic system oil. Refer to the Tractor Repair Manual, SE 9205, for information concerning the hydraulic system for the Ford 4000 and Ford 5000 Tractors.

Series 730 and 735 Loaders

The oil filter for the Series 730 and 735 Loaders is incorporated in the loader frame left side rail post. Oil filtering is accomplished at the intake line and is filtered before it enters the pump. A bypass valve is built into the filter housing assembly to prevent total starvation of the pump when the filter is restricted. The filter should be serviced at regular intervals to provide filtered oil to the components and to prevent loss of power and/or short service life of the hydraulic components.

The oil filter should be changed after the first 50 hours and every 300 hours or annually thereafter, whichever occurs first.

The oil breather cap, Figure 95, should be removed and cleaned in a suitable solvent every 50 hours or more often under dusty conditions.

Remove and install the filter as follows:

1. Warm the oil by operating the loader. Place a clean drain pan under the left loader frame post.

   NOTE: *Prepare to drain approximately 10 – 12 U. S. gallons of oil.*

2. Remove the oil drain plug from the oil filter, using a hex wrench. Allow the oil to drain.

3. Loosen the retaining clamp and remove the lower suction hose at the filter outlet.

4. Remove the filter base attaching bolts from the bottom of the post and remove the filter assembly, Figure 95.

5. Remove the filter attaching bolt and bypass adapter shown in Figure 95. Discard the oil filter element and gasket.

6. Flush the reservoir in the area of the filter to remove any foreign material that may have accumulated.

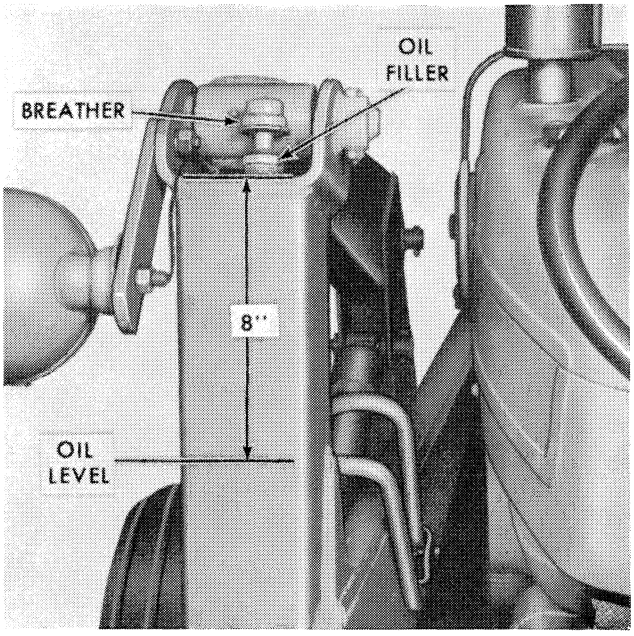

Figure 95
Loader Hydraulic Oil Filter