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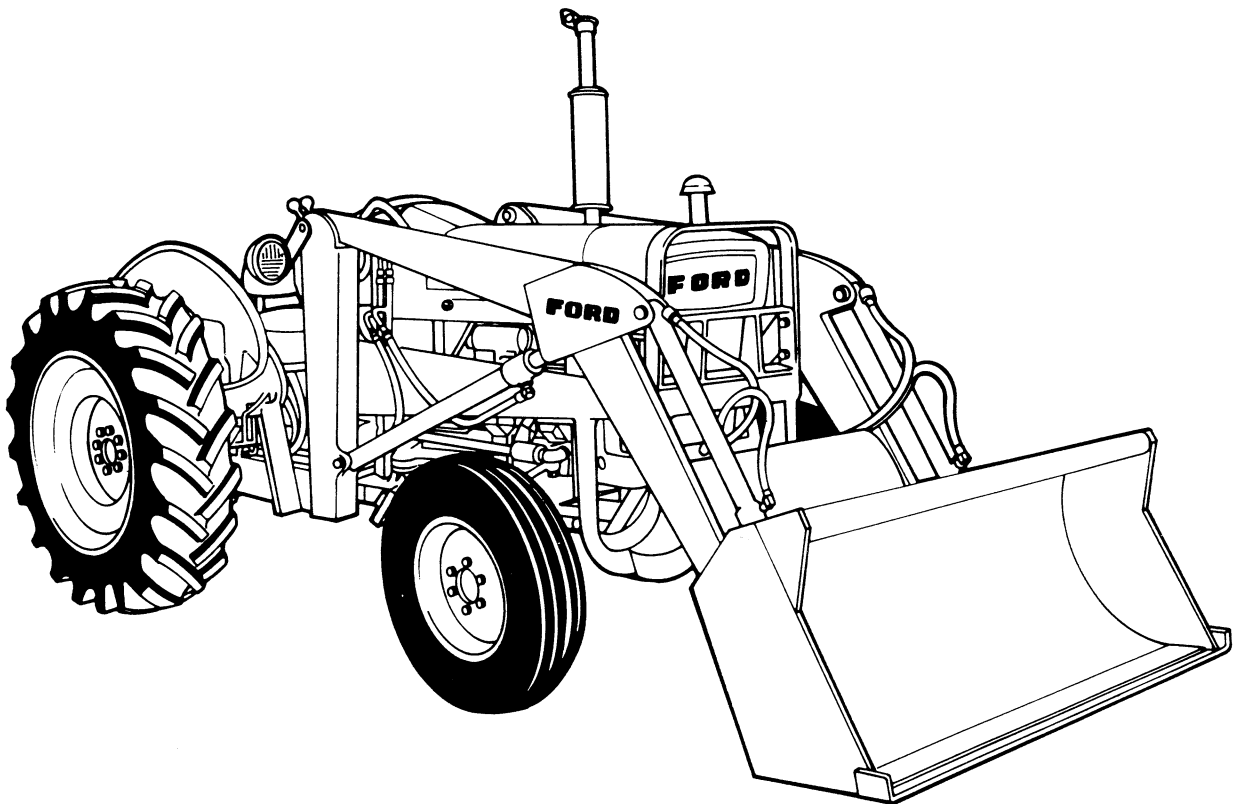
Service Manual



NEW HOLLAND

Loader Series 727, 730, 735, and 740

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FOREWORD

THIS MANUAL CONTAINS SERVICE INFORMATION FOR THE FORD SERIES 727, 730, 735, AND 740 LOADERS. DETAILED INFORMATION IS PROVIDED ON DESCRIPTION AND OPERATION, TROUBLE SHOOTING, TESTS AND ADJUSTMENTS, COMPONENT OVERHAUL, LUBRICATION, AND SPECIFICATIONS. CONVERSION EQUIVALENTS OF THE SPECIFICATIONS USED IN THE TEXT ARE LISTED ON PAGES 114 AND 115.

INSTRUCTIONS FOR INSTALLING THE LOADERS, LOADER COMPONENTS, OR ATTACHING KITS ARE NOT COVERED IN THIS MANUAL. REFER TO THE APPROPRIATE OPERATOR'S AND ASSEMBLY MANUALS FOR DETAILED INFORMATION.

THE LOADERS ARE SIMILAR IN CONSTRUCTION AND OPERATION. HOWEVER, THERE ARE VARIANCES IN DIMENSIONS AND OTHER SPECIFICATIONS. PARTICULAR ATTENTION SHOULD BE GIVEN TO CORRECT LOADER SERIES IDENTIFICATION WHEN ORDERING PARTS OR WHEN SERVICING THE UNIT.

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

SERVICE DEPARTMENT
FORD TRACTOR DIVISION
FORD MOTOR COMPANY

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DESCRIPTION AND OPERATION

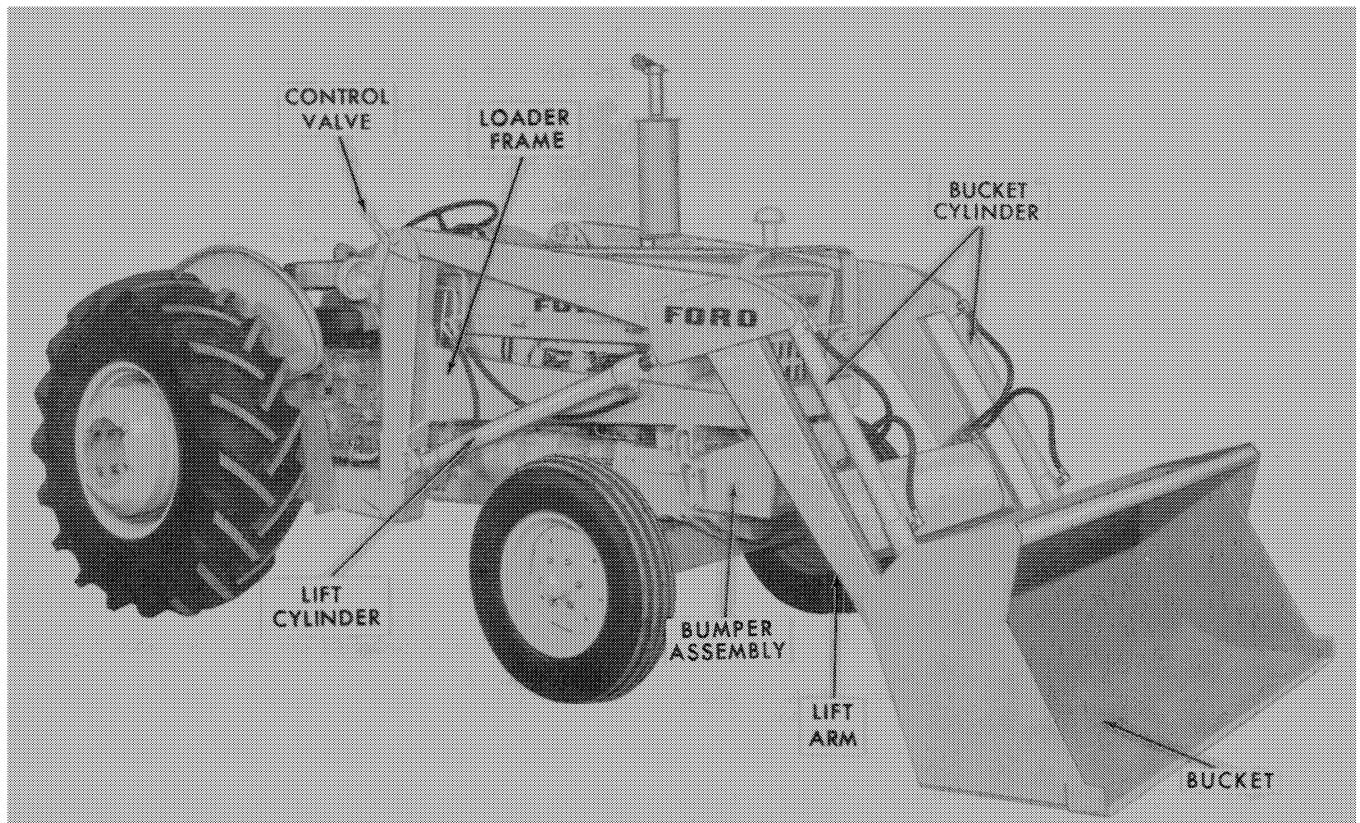


Figure 1
Loader Components

DESCRIPTION AND OPERATION

Each loader consists of a loader frame, lift arms, lift cylinders, bucket cylinders, control valve, hydraulic pump, and necessary hoses and tubes. The components of a basic loader are illustrated in Figure 1.

SERIES 727 LOADER

The Series 727 Loader is used with the Ford 4000 and Ford 5000 All Purpose Tractors. The loader uses the tractor hydraulic lift system. Loader control is accomplished by a double spool (plunger), tractor accessory, remote control valve. The two lift cylinders are single-acting displacement type and the one bucket cylinder is a double-acting type.

The tubing and hoses connecting the control valve to the cylinders are secured to the main frame. The loader frame is welded box-type construction and mounts at the tractor front support and at each rear axle housing. Separate attaching kits are used for the Ford 4000 and Ford 5000 Tractor installations.

SERIES 730 AND 735 LOADERS

The Series 730 and 735 Loaders are available as a non-self-leveling loader equipped with a unit-type control valve, or a self-leveling loader equipped with a stacked-type compensating control valve. These loaders are for industrial-type applications. Optional capacity front-mounted, crankshaft-driven hydraulic pumps power the loader. Loader control is accomplished by a control valve mounted on the right-hand post of the loader frame. The tubing and hoses connecting the control valve to the cylinders are secured to the mainframe.

On the self-leveling loaders, the loader control valve provides a bucket self-leveling feature utilizing pump hydraulic oil as its working force. As the loader lift arms are raised, the compensating section of the loader control valve adjusts the bucket to maintain approximately the original degree of bucket rollback.

In both types, the loader frame is welded box-type construction. Serviceable bushings (Series 735 only) are used in the loader lift arms and in the cylinders. A hydraulic filter, which has a safety bypass, is

DESCRIPTION AND OPERATION

incorporated in the bottom of the left-hand frame post to filter oil entering the pump inlet tube. Double-acting bucket cylinders are used and either single-acting (Series 730 only) or double-acting lift cylinders are available as detailed below.

Series 730 Loader

The loader frame attaches to the tractor front support and each rear axle housing. The various frames which may be encountered are as follows:

- Frame w/double-acting lift cylinders and unit-type control valve.
- Frame w/double-acting lift cylinders and float position unit-type control valve.
- Frame w/single-acting lift cylinders and unit-type control valve.
- Frame w/double-acting lift cylinders and float position stacked-type compensating control valve with or without selector valve.

Series 735 Loader

The loader frame attaches to each rear axle housing for all installations and to the front support on Serial 2130 and 4130, and Ford 4400 Tractors; and to the radiator cowling on Ford 3500 Tractors. The various frames which may be encountered are as follows:

- Frame for Ford 4400 Tractor with double-acting lift cylinders and float position unit-type control valve.
- Frame for Ford 3500 Tractor w/double-acting lift cylinders and float position unit-type control valve.
- Frame for Ford Series 2130 and 4130 Tractors w/double-acting lift cylinders and float position unit-type control valve.

- Frame for Ford 3500 Tractors w/double-acting lift cylinders and stacked-type compensating control valve with or without selector valve.
- Frame for Ford 4400 Tractors w/double-acting lift cylinders and stacked-type compensating control valve with or without selector valve.

Series 740 Loader

The Series 740 Loader is used only on the Ford 4500 Tractor, and will be found equipped with a two-section stacked-type control valve with float position, or a three-section stacked-type compensating control valve with float position with or without selector valve.

The Series 740 Loader compensating control valve is the same as on the Series 730 and 735 Self-Leveling Loaders in that the valve provides float position in the lift circuit and a bucket self-leveling feature utilizing pump hydraulic oil as its working force. As the loader lift arms are raised, the compensating section of the control valve adjusts the bucket to maintain approximately the original degree of bucket rollback.

The loader hydraulic pump, control valve, hydraulic filter, and hydraulic reservoir are supplied with the tractor. The tractor side rails (loader subframe) act as the oil reservoir along with a hydraulic package reservoir located in the tractor radiator shell. The crankshaft-driven vane-type pump is mounted in the tractor front support. Oil drawn from the hydraulic package reservoir passes through a replaceable suction screen. Loader control is accomplished by a two-plunger control valve with float position, incorporated as a part of the tractor hydraulic package and mounted on the post of the right side rail (loader subframe). A replaceable hydraulic filter which has a safety bypass, is included as a part of the tractor hydraulic package. The filter assembly is located in the reservoir tank and filters the oil returning from the control valve.

Double-acting lift and bucket cylinders with serviceable bushings are used. The lift arms, with serviceable bushings are of box-welded construction, and attached to the side rail posts.

DESCRIPTION AND OPERATION

PUMPS

SERIES 727 LOADER

The pump used for the Series 727 Loader is an integral part of the tractor hydraulic lift system. Servicing procedures for the pump are covered in the Tractor Repair Manual, SE 9205.

SERIES 730, 735, AND 740 LOADERS

The 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.

VANE PUMP

Figure 2 shows a cutaway of the hydraulic pump, showing the relative location of the parts assembled.

Figure 3 is an exploded view identifying the component parts.

The rear cover acts as the high-pressure chamber for the oil forced out of the pump. A high-pressure line connects to the pump pressure port and subsequently to the control valve. The high-pressure port positioning varies on some tractor installations. Drilled holes in the casting serve as guides for the four through bolts.

The pressure plate is positioned between the cam ring and the rear cover. A compression spring holds the pressure plate in position. The pump shaft extends into the pressure plate and rotates in a bronze bushing. During operation the plate seals the rear end of the rotor and vanes. It channels both low-pressure and high-pressure oil within the pump, and it relieves the pressure trapped between the rotor and vanes during the high pressure discharge cycle.

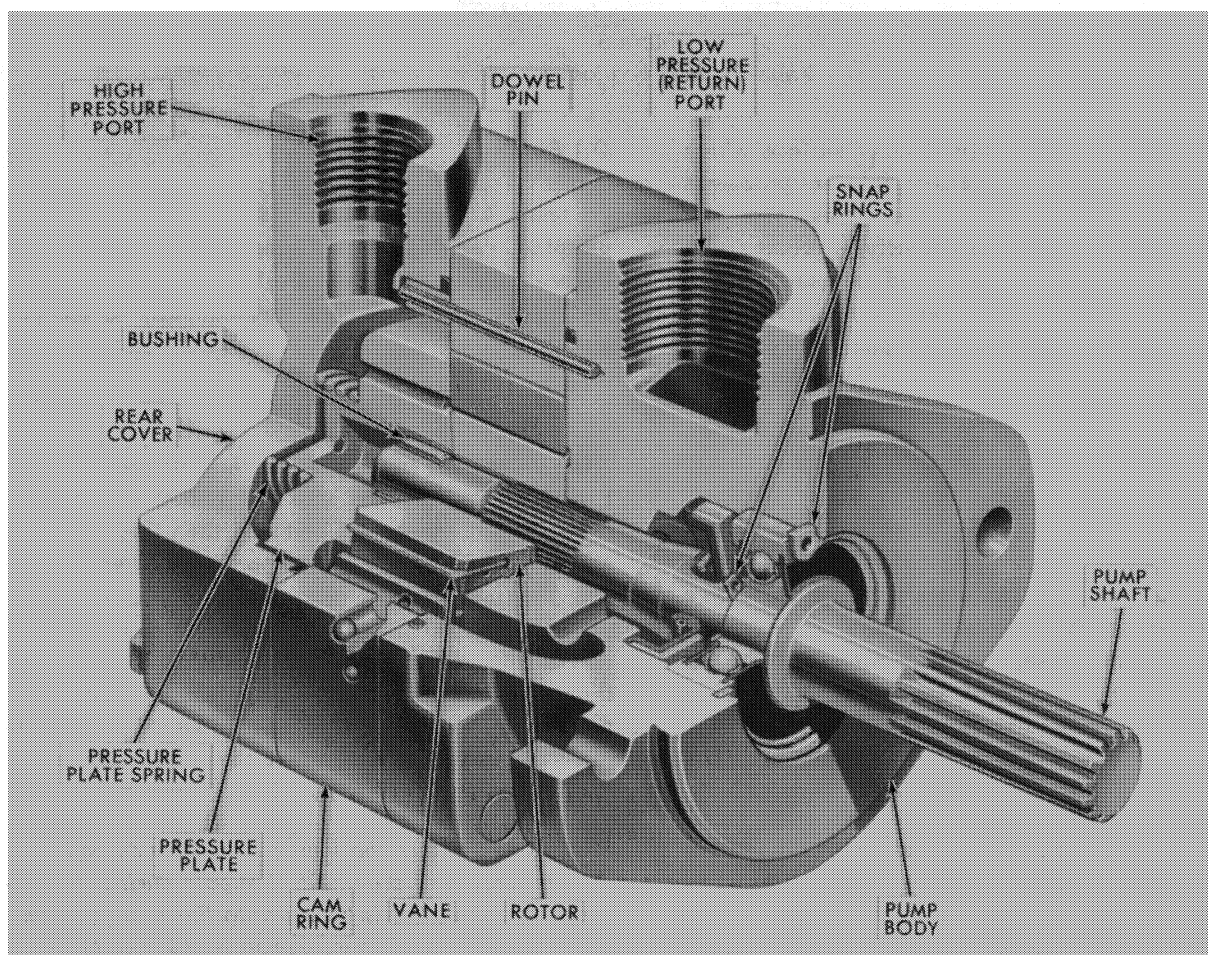


Figure 2
Vane-Type Hydraulic Pump

DESCRIPTION AND OPERATION

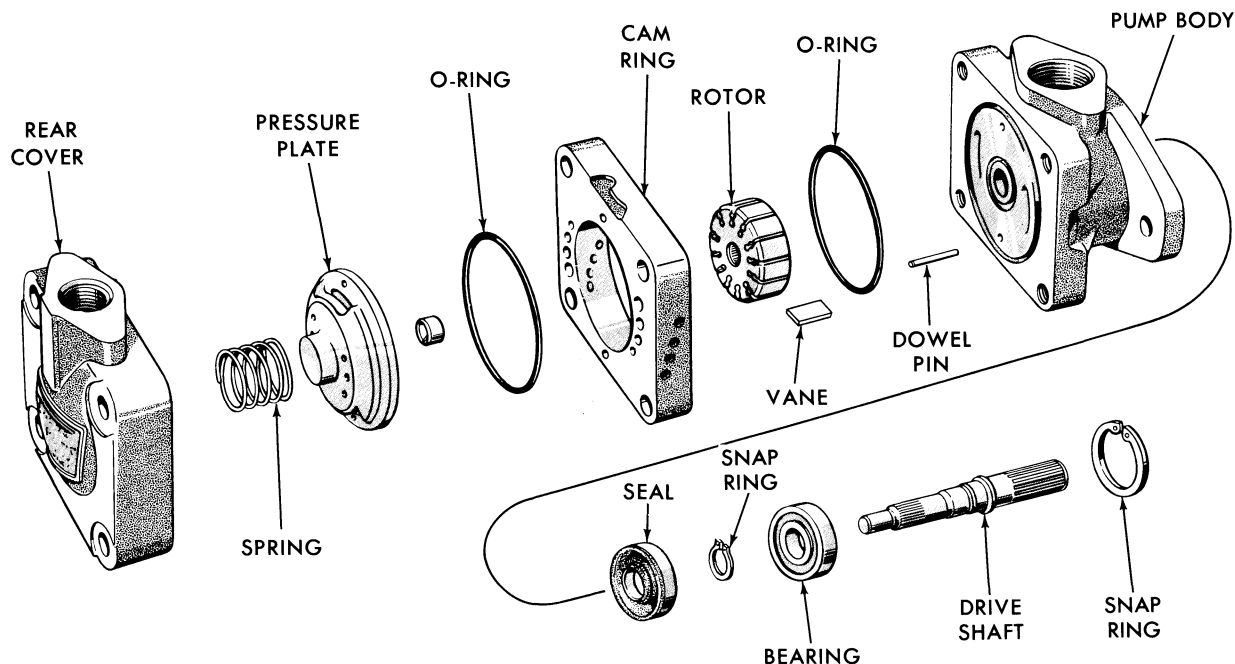


Figure 3
Vane Pump – Exploded View

The cam ring has an elliptical inner surface which the vanes follow in their movement. Internal passages in the cam ring furnish oil to the vanes. The cam casting is stamped with an identifying code (refer to page 10), and an arrow to aid in assembly for proper pump rotation. Two dowel pins located between the pressure plate and the pump body locate the cam ring and pressure plate in proper relationship to the pump body.

The rotor is splined on the pump drive shaft and carries the twelve vanes around the elliptical inner surface of the cam ring. The slots in which the vanes are located are machined to allow radial movement of the vanes. Bored passages in the rotor slots allow pressured oil to enter. This pressured oil aids in forcing the vanes against the inner surface of the cam ring, and provides lubrication for the vanes.

The two O-rings, Figure 3, seal each side of the cam ring, preventing oil leakage between the pump sections. The rear O-ring also seals against the outer diameter of the pressure plate, preventing high-pressure oil from bypassing back to the low-pressure side of the pump.

Oil Flow

Figure 4 illustrates two sectional views of the pumping cartridge describing the pumping cycle. Figure 5 shows the flow of oil through the pump body and to the rotor area, and subsequently to the pump outlet.

Oil enters the pump body at the low pressure port, Figure 5, and divides into two paths; one going to the right kidney-shaped port and the other to the left kidney-shaped port. These ports, or openings, are open to the vanes and to the five axially drilled passages in each side of the cam ring. Some oil enters the area of the vanes, while some passes through the cam ring into kidney-shaped ports in the pressure plate. Oil in the kidney-shaped ports of the pressure plate can also enter the area of the vanes.

NOTE: Oil enters the vanes at both ends and in the center section to provide full supply during the short time available. Oil is forced into the pump by atmospheric pressure of approximately 14 psi (1 atmosphere). Mechanical action forces oil out of the pump through the outlet in the pressure plate.

DESCRIPTION AND OPERATION

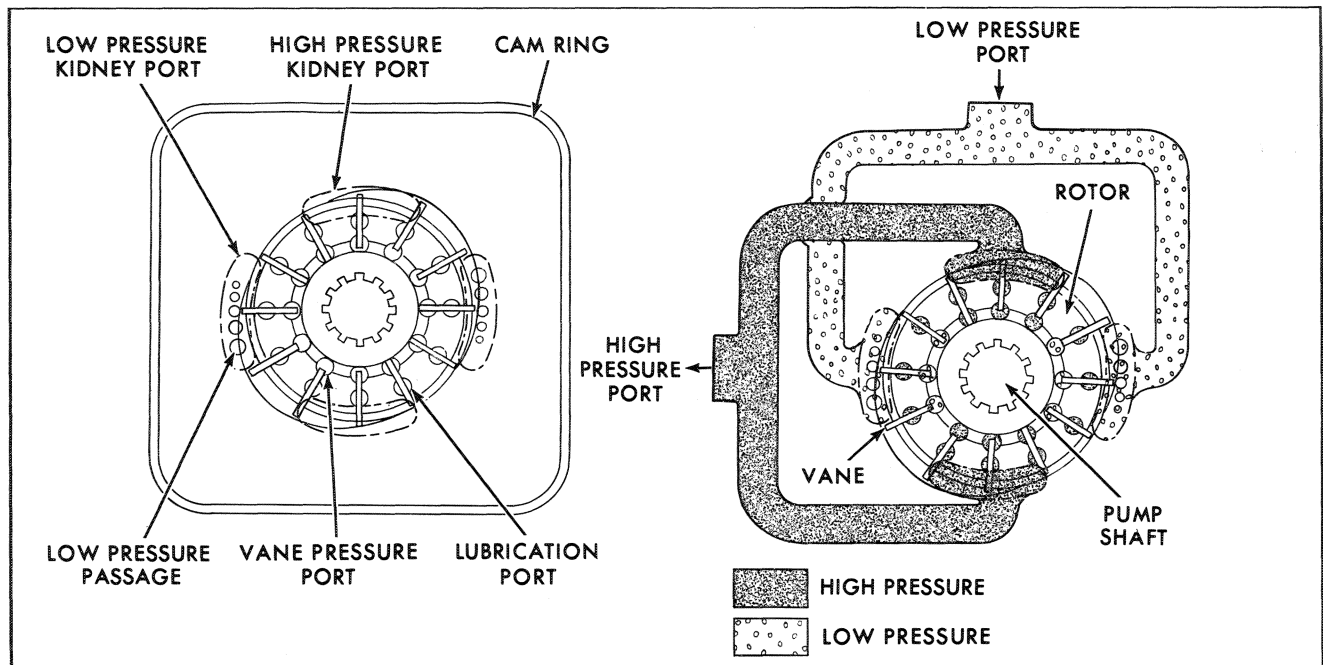


Figure 4
Pumping Cycle

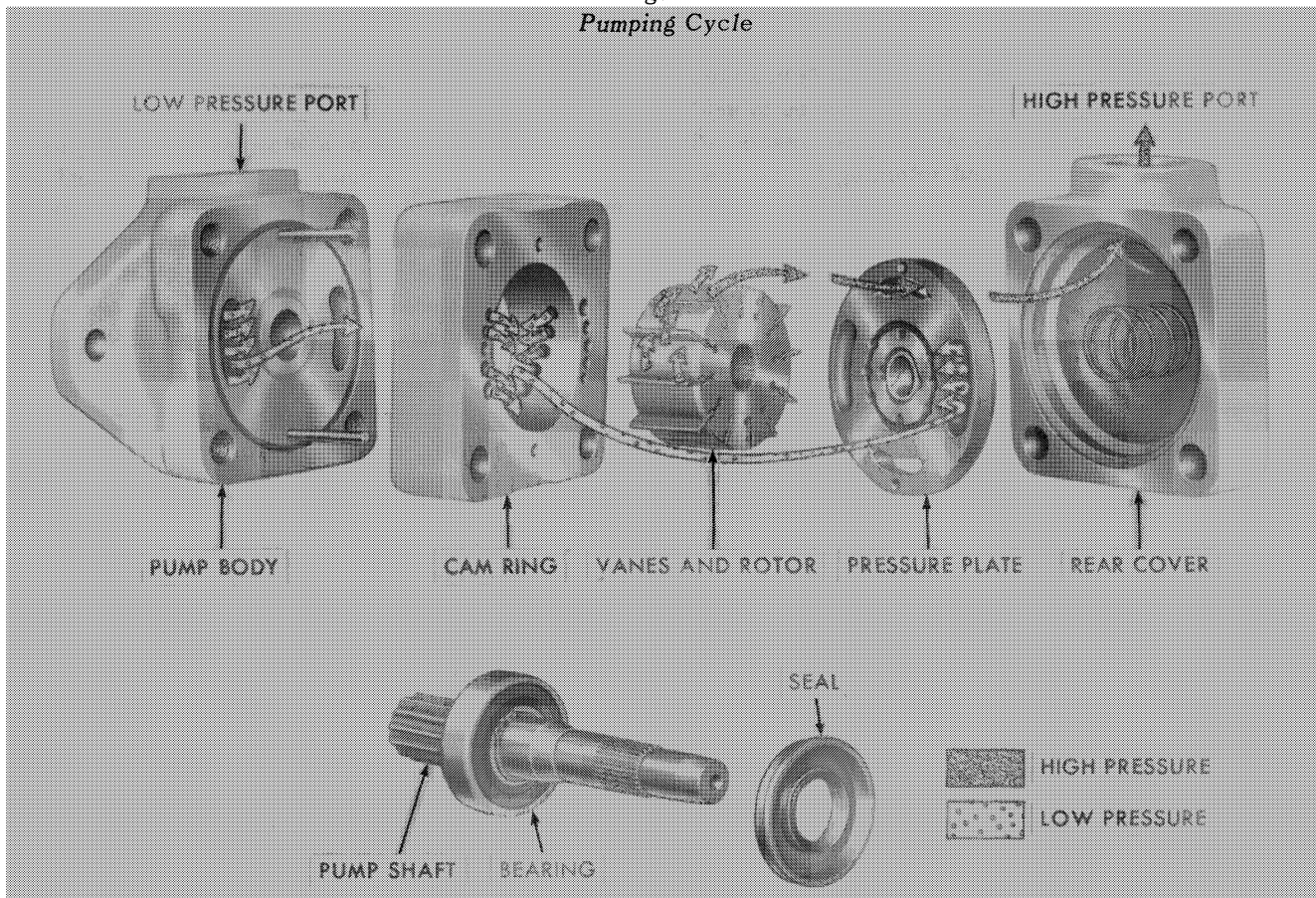


Figure 5
Pump Oil Flow

DESCRIPTION AND OPERATION

The two drilled passages in each vane slot in the rotor, Figure 5, are for lubrication and pressure seal. The inner passage supplies oil at pump pressure to the bottom edge of the vanes moving them outward during the intake cycle keeping them in contact with the cam ring. As wear occurs, oil pressure forces the vanes out of their slots to the cam ring surface and forces the rear pressure plate forward toward the vanes and rotor.

During the pressure cycle, the vanes are forced inward by the cam ring contour and the oil trapped below is forced to the bushing area for lubrication of the pump shaft. This oil then returns to the low-pressure side through the splines between the pump shaft and rotor.

Small notches, illustrated in Figure 5, at each end of the high-pressure ports in the pressure plate, serve to meter initial high-pressure oil out from between the vanes.

High-pressure oil in the rear cover, Figure 6, forces the pressure plate against the rotor and vanes to seal the side of the pump, preventing high-pressure oil from bypassing the vanes and returning to the low-pressure ports.

One of the features of the hydraulic pump is that all loads are balanced by counteracting forces. The pumping cycle takes place through 180° of revolution,

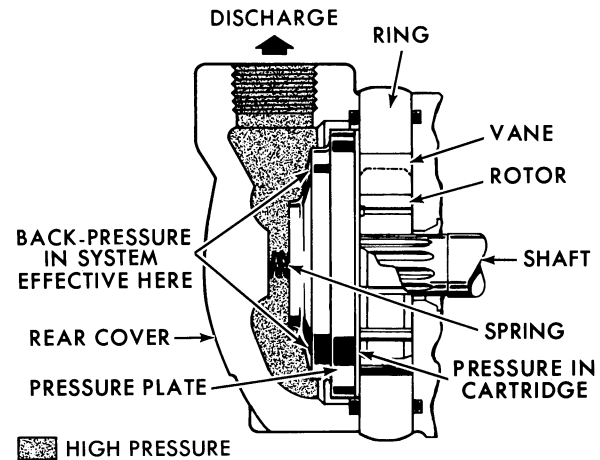


Figure 6
Rear Cover - Sectional View

thus the high-pressure oil is produced on opposite sides of the pump. This balancing of forces reduces the loads carried by the bearings. Through 360° of revolution, oil enters the vane area twice and leaves the pump area twice.

Pump Identification

The cam rings have a stamped code, Figure 7, which identifies the pump as to component and part number. This coding is for identification purposes only. It indicates the manufacturer's flow rating under "no-load" at 1200 rpm. The following chart indicates application, pump identifying codes, component numbers or part number, and rated capacities:

Loader Series	Pump Code Number	Component or Part Number	Rated Capacity	System Pressure (165° F. ± 15° F.)
730	9	19-415	11.3 gpm 11.1 gpm	2000 psi @ 1700 rpm 2200 psi @ 1700 rpm
730	12	19-414	15.8 gpm 15.5 gpm	1800 psi @ 1700 rpm 2200 psi @ 1700 rpm
735	12	19-414	15.8 gpm 15.5 gpm	1800 psi @ 1500 rpm 2200 psi @ 1500 rpm
735	13	19-413	17.8 gpm 17.5 gpm	1800 psi @ 1500 rpm 2200 psi @ 1500 rpm
740	17	C5NN-600-K	21.3 gpm 20.5 gpm	1600 psi @ 1700 rpm 2200 psi @ 1700 rpm

DESCRIPTION AND OPERATION

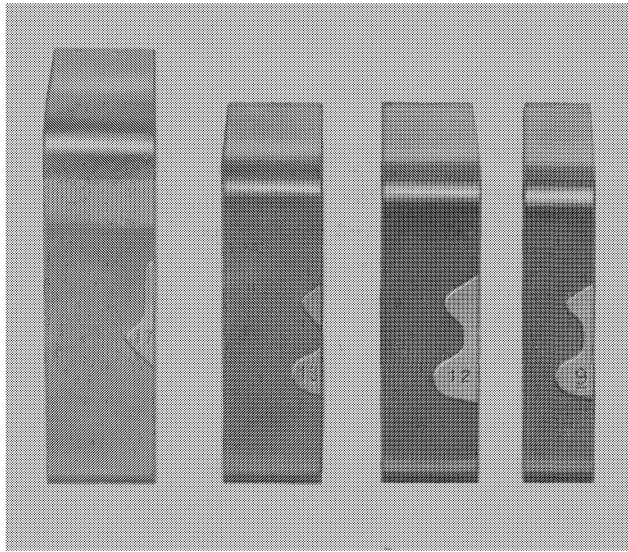


Figure 7
Pump Cam Ring Identification

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.

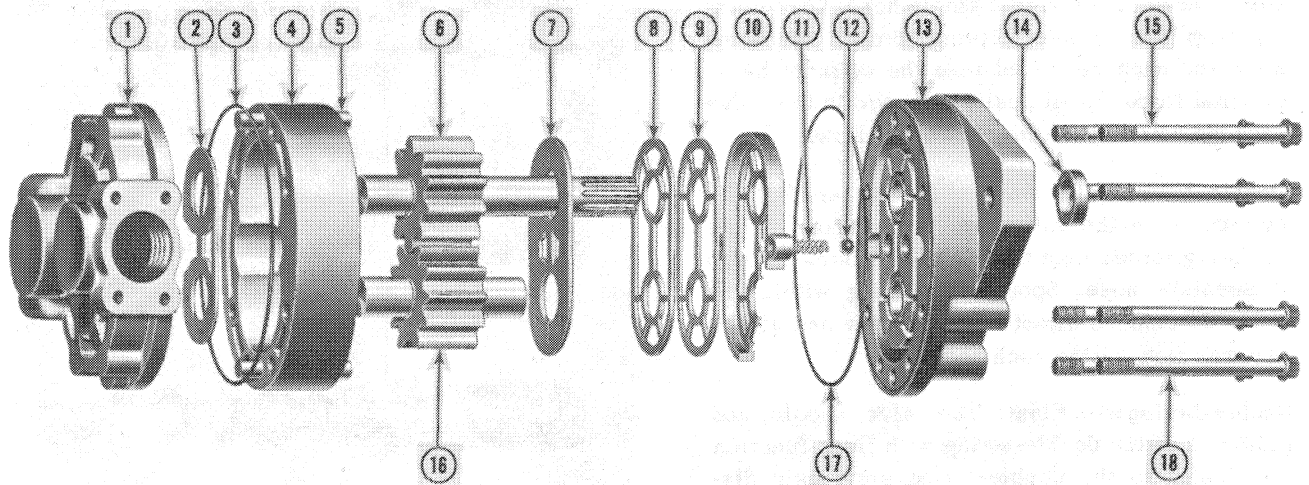


Figure 8
Gear Pump - Exploded View

DESCRIPTION AND OPERATION

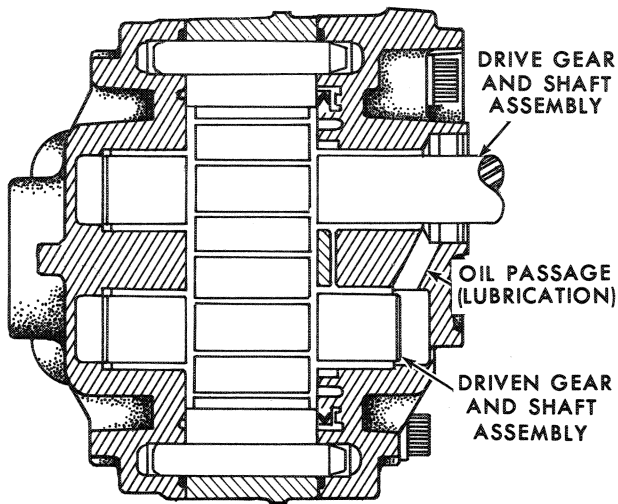


Figure 9
Gear Pump Lubrication
CONTROL VALVE

GENERAL INFORMATION

In discussing control valves, cylinders, and spools, reference is made to single-acting, double-acting, double-acting with float, and double-acting with float and compensating. The terminology used relates as follows:

- **Single-Acting:** Oil flows to the cylinder from the valve and spool through a single hose. Oil returning from the cylinder returns through the same hose and must be forced from the cylinder by an external force. Spool positioning within the valve passage determines direction of oil flow.
- **Double-Acting:** Oil travels to one end of the cylinder from the valve through one hose, while oil being forced from the cylinder returns through a separate hose. Spool positioning within the valve determines direction of oil flow and allows two-way flow within each hose.
- **Double-Acting with Float:** The valve, spools, and cylinders of the double-acting with float, function identically to the double-acting previously discussed. A modification has been made in the valve lift spool configuration for a detent mechanism which holds the spool open and permits oil to flow in either direction when an external force is applied.

- **Double-Acting with Float and Compensating:** The cylinders and float position function the same as above. Oil flow through an external check valve, located in the circuit between the rod end of the right-hand lift cylinder and the control valve, and through the compensating section of the control valve, determines the self-leveling of the bucket. The lift handle moves the lift spool and the compensating spool, whereas the bucket handle moves only the bucket spool.

SERIES 727 LOADER

The remote control valve for the Series 727 Loader is mounted on the tractor lift housing and operates from the tractor hydraulic lift system. Refer to the Remote Control Valve section of the Tractor Repair Manual, SE 9205, for detailed information for servicing the valve.

UNIT-TYPE CONTROL VALVE (SERIES 730 AND 735 LOADERS)

The non-self-leveling loader control valve for the Series 730 and 735 Loaders is of the unit valve type. For information pertaining to the compensating, three-section, stacked-type control valve, refer to

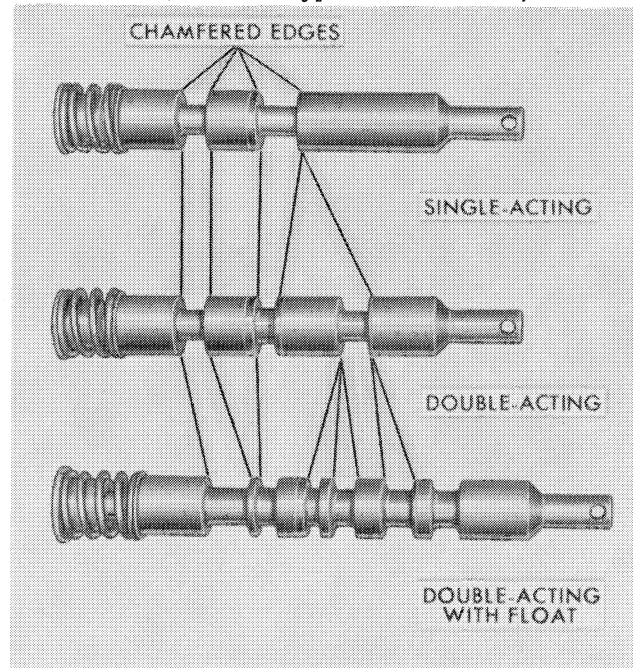


Figure 10
Unit-Type Control Valve Spools

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DESCRIPTION AND OPERATION

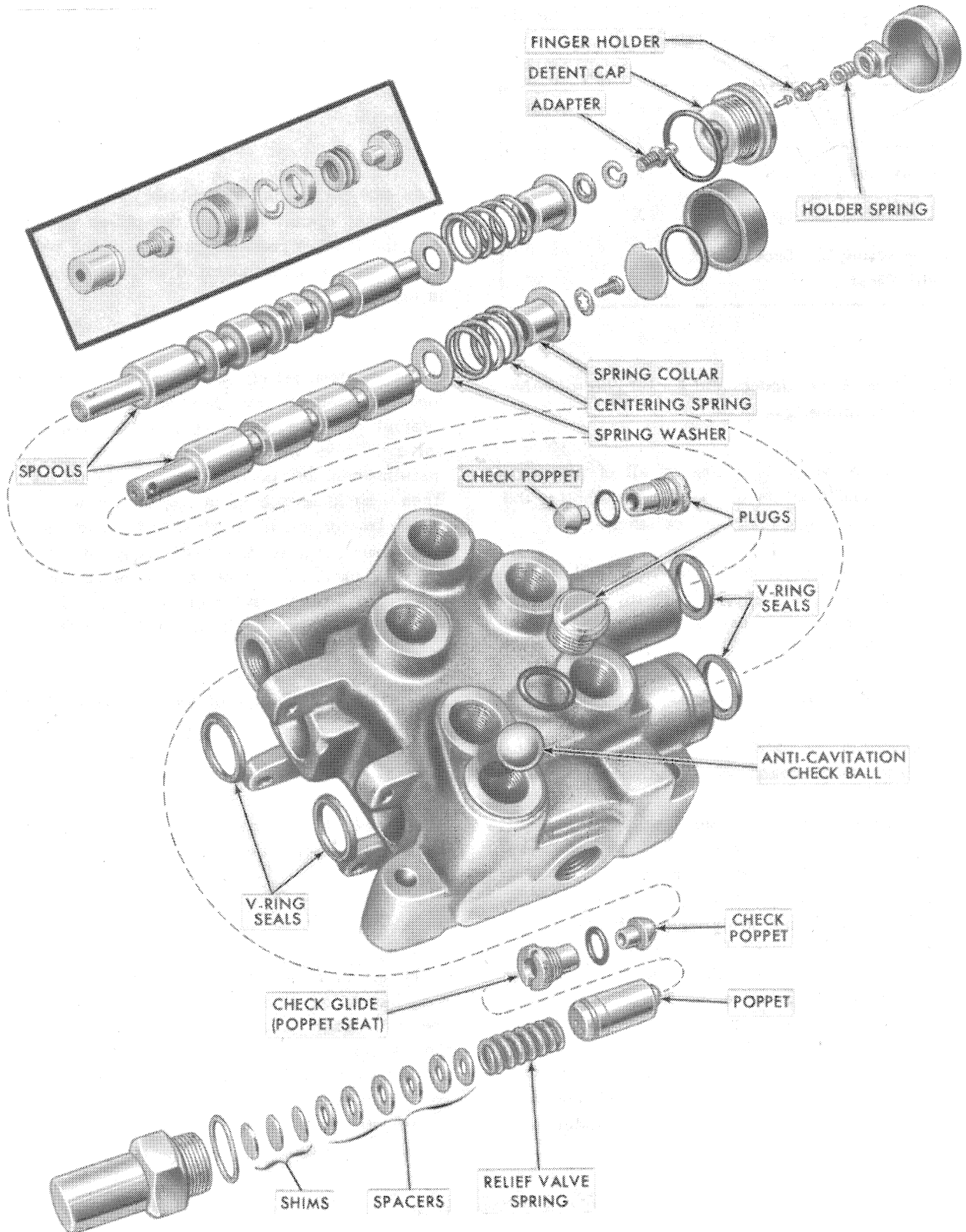


Figure 11
Unit-Type Control Valve with Float and Double-Acting Lift Spool