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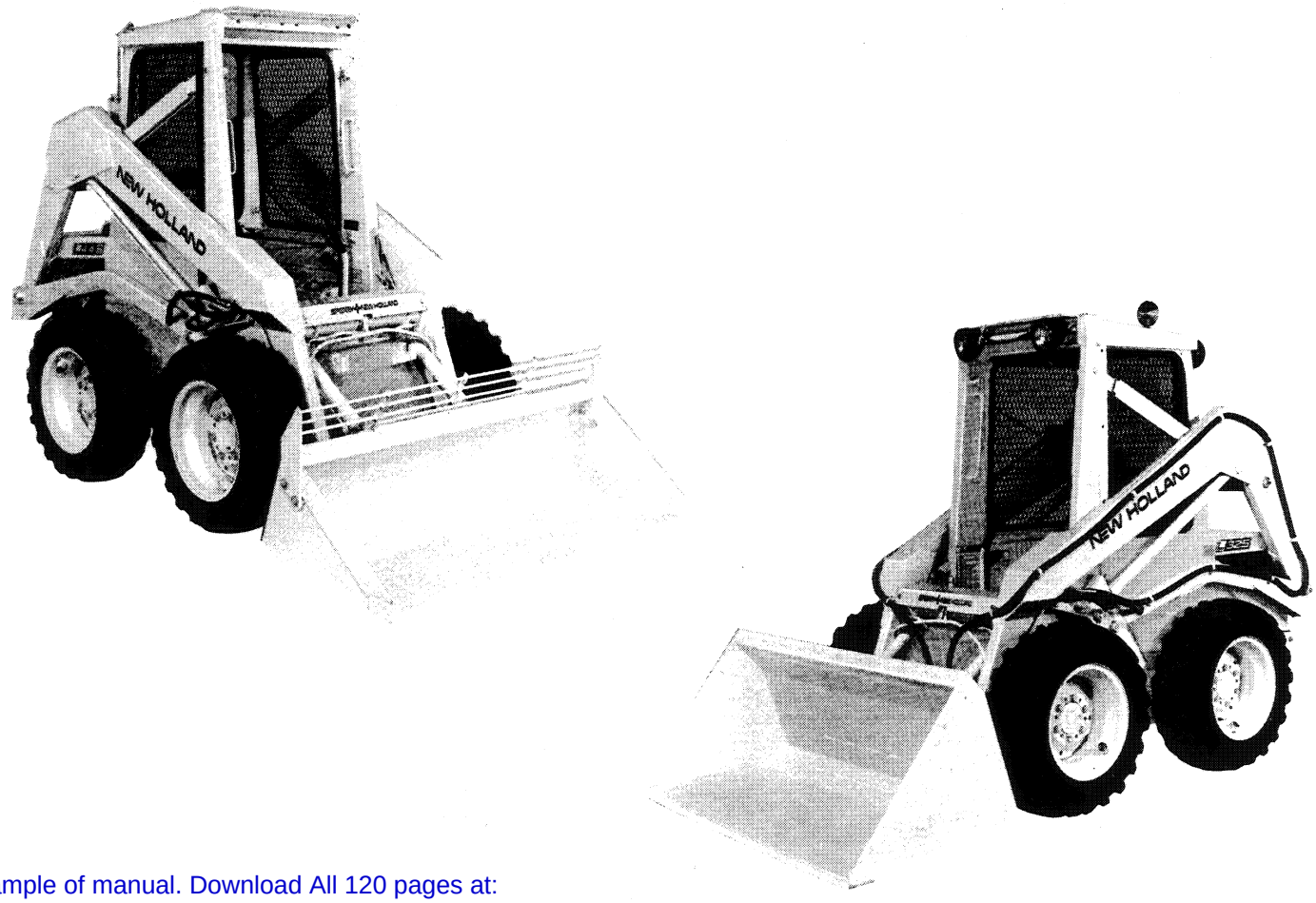
SERVICE MANUAL

SKID-STEER LOADERS L-225, L-325, L-425 AND L-445

SPERRY NEW HOLLAND



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FOREWORD

This manual provides condensed service and maintenance information which will serve to guide a serviceman when repairing or rebuilding Sperry New Holland Model L-225, L-325, L-425 or L-445 skid-steer loaders in the shop and to be of help to him in diagnosing and correcting service difficulties in the field.

NOTE: The operator's manuals, service parts catalogs, and assembly information issued with each machine should be used in conjunction with this manual, as much of the information contained herein is condensed or supplementary in nature.

For instructions on engine repair, refer to the manufacturer's repair manual.

The following service information can be found in the operator's manual for the specific skid-steer loader being repaired:

A. Electrical wiring

B. Electrical system operation

C. Throttle and choke adjustments

D. Governor adjustments

E. Boom lock system adjustments

F. Oil recommendations for engine and hydraulic system.

CAUTION: THIS SYMBOL IS USED THROUGHOUT THIS BOOK WHENEVER YOUR OWN PERSONAL SAFETY IS INVOLVED. TAKE TIME TO BE CAREFUL!

ABOUT IMPROVEMENTS

Sperry New Holland is continually striving to improve its products, and therefore, reserves the right to make improvements or changes, when it becomes practical to do so, without incurring any obligations to make changes, or additions, to the equipment sold previously.

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PLEASE READ CAREFULLY!

INCLUDED THROUGHOUT THIS MANUAL AND ON MACHINE DECALS YOU WILL FIND PRECAUTIONARY STATEMENTS SUCH AS "CAUTION", "WARNING" AND "DANGER", FOLLOWED BY SPECIFIC INSTRUCTIONS.

THESE PRECAUTIONS ARE INTENDED FOR THE PERSONAL SAFETY OF YOU AND THOSE WORKING WITH YOU. PLEASE TAKE THE TIME TO READ THEM.

PERSONAL SAFETY!

CAUTION: THE WORD "CAUTION" IS USED WHERE A SAFE BEHAVIORAL PRACTICE ACCORDING TO OPERATING AND MAINTENANCE INSTRUCTIONS AND COMMON SAFETY PRACTICES WILL PROTECT THE OPERATOR AND OTHERS FROM ACCIDENT INVOLVEMENT.

WARNING: THE WORD "WARNING" DENOTES A POTENTIAL OR HIDDEN HAZARD WHICH HAS A POTENTIAL FOR SERIOUS INJURY. IT IS USED TO WARN OPERATORS AND OTHERS TO EXERCISE EVERY APPROPRIATE MEANS TO AVOID A SURPRISE INVOLVEMENT WITH MACHINERY.

DANGER: THE WORD "DANGER" DENOTES A FORBIDDEN PRACTICE IN CONNECTION WITH A SERIOUS HAZARD.

ADDITIONAL PRECAUTIONARY STATEMENTS SUCH AS "ATTENTION" AND "IMPORTANT" ARE FOLLOWED BY SPECIFIC INSTRUCTIONS. THESE STATEMENTS ARE INTENDED FOR MACHINE SAFETY.

MACHINE SAFETY!

ATTENTION: THE WORD "ATTENTION" IS USED TO WARN THE OPERATOR OF POTENTIAL MACHINE DAMAGE IF A CERTAIN PROCEDURE IS NOT FOLLOWED.

IMPORTANT: THE WORD "IMPORTANT" IS USED TO INFORM THE READER OF SOMETHING HE NEEDS TO KNOW TO PREVENT MINOR MACHINE DAMAGE IF A CERTAIN PROCEDURE IS NOT FOLLOWED.

IMPORTANT!

FAILURE TO FOLLOW THE "CAUTION", "WARNING", AND "DANGER" INSTRUCTIONS MAY POSSIBLY RESULT IN SERIOUS BODILY INJURY.

CONTENTS

CAUTION!

BE A SAFE OPERATOR. Before attempting to operate the loader, thoroughly acquaint yourself with:

1. The safety information in the operator's manual and the skid-steer loader safety manual.
2. The operating instructions in the operator's manual.
3. The controls on the loader.

OSHA REQUIREMENTS NOW MAKE IT THE EMPLOYER'S RESPONSIBILITY TO FULLY INSTRUCT EACH OPERATOR IN THE PROPER AND SAFE OPERATION OF ALL OPERATIVE EQUIPMENT. BOTH EMPLOYER AND EMPLOYEE SHOULD THOROUGHLY FAMILIARIZE THEMSELVES WITH THE FOLLOWING SECTIONS.

SAFETY INFORMATION

UNSAFE OPERATING PRACTICES AND IMPROPER USE OF THE LOADER AND ITS ATTACHMENTS ON THE PART OF THE OPERATOR CAN RESULT IN INJURIES. OBSERVE THE FOLLOWING SAFETY PRECAUTIONS AT ALL TIMES:

1. **GIVE COMPLETE AND UNDIVIDED ATTENTION TO THE JOB AT HAND SO COMPLETE CONTROL OF THE LOADER IS MAINTAINED AT ALL TIMES.**
2. **DRIVE SLOWLY OVER ROUGH GROUND AND ON SLOPES. KEEP ALERT FOR HOLES, DITCHES AND OTHER IRREGULARITIES THAT MAY CAUSE LOADER TO OVERTURN.**
3. **AVOID STEEP HILLSIDE OPERATION WHICH COULD CAUSE LOADER TO OVERTURN.**
4. **REDUCE SPEED WHEN TURNING SO THERE IS NO DANGER OF LOADER OVERTURNING.**
5. **ALWAYS LOOK BEHIND YOU BEFORE BACKING UP.**
6. **MAINTAIN PROPER TRANSMISSION OIL LEVEL TO PREVENT LOSS OF BRAKING CONTROL.**
7. **DO NOT ALLOW CHILDREN TO OPERATE THE LOADER.**
8. **DO NOT ALLOW ADULTS TO OPERATE LOADER WITHOUT PROPER INSTRUCTIONS.**

   OSHA REQUIRES THAT ALL OPERATORS BE INSTRUCTED ON THE PROPER OPERATION OF THE MACHINE BEFORE THEY OPERATE THE UNIT.
9. **DO NOT ALLOW PASSENGERS TO RIDE ON LOADER AT ANY TIME.**
10. **DO NOT OPERATE LOADER IN ANY POSITION OTHER THAN WHILE IN THE OPERATOR'S SEAT WITH THE SEAT BELT SECURELY FASTENED.**
11. **BEFORE STARTING ENGINE, BE SURE ALL OPERATING CONTROLS ARE IN NEUTRAL.**
12. **NEVER OPERATE LOADER ENGINE IN A CLOSED BUILDING WITHOUT ADEQUATE VENTILATION.**
13. **RE-FUEL LOADER OUTDOORS WITH THE ENGINE SHUT OFF. REPLACE GAS CAP SECURELY. USE AN APPROVED GASOLINE OR DIESEL CONTAINER. DO NOT SMOKE WHEN HANDLING FUEL. AVOID SPILLING.**

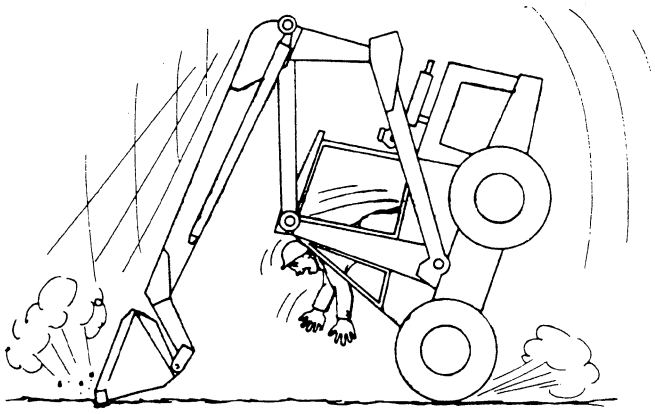
14. **AFTER OPERATING THE ENGINE, NEVER TOUCH MUFFLER, EXHAUST PIPE OR ENGINE UNTIL THEY HAVE HAD TIME TO COOL.**
15. **DRESS APPROPRIATELY - WEAR RELATIVELY TIGHT FITTING CLOTHING WHEN OPERATING LOADER. LOOSE OR TORN CLOTHING CAN CATCH IN MOVING PARTS OR CONTROLS.**
16. **PULL LOADS ONLY FROM REAR HITCH YOKE.**
17. **BEFORE SERVICING THE LOADER OR ANY OF ITS ATTACHED EQUIPMENT, BE SURE THE ATTACHMENTS ARE LOWERED TO THE GROUND OR THAT THE BOOM ARMS ARE SUPPORTED BY THE BOOM LOCK ARMS.**
18. **DO NOT WORK UNDER OVERHANGS, ELECTRIC WIRES, OR WHERE THERE IS DANGER OF A SLIDE.**
19. **WEAR AN APPROVED SAFETY HAT WHEN OPERATING THE MACHINE, AND WHILE IN ANY WORK AREA.**
20. **WEAR A SUITABLE HEARING PROTECTIVE DEVICE SUCH AS EAR MUFFS OR EAR PLUGS IF YOU ARE EXPOSED TO NOISE WHICH YOU FEEL IS UNCOMFORTABLE.**
21. **WHEN DRIVING THE LOADER ON A ROAD OR HIGHWAY, USE WARNING LIGHTS OR WARNING DEVICES AS MAY BE REQUIRED BY LOCAL OR STATE GOVERNMENTAL REGULATIONS. HEADLIGHTS AND WARNING LIGHT KITS ARE AVAILABLE THROUGH YOUR SPERRY NEW HOLLAND DEALER. SMV SIGNS ARE SUPPLIED AS STANDARD EQUIPMENT.**
22. **KEEP THE LOADER CLEAN. DO NOT ALLOW TRASH, DEBRIS OR OTHER ARTICLES TO ACCUMULATE IN THE CAB OR FLOOR AREA THAT MAY HINDER SAFE MACHINE OPERATION.**

CAUTION!

BE A SAFE OPERATOR. Before attempting to operate the loader, thoroughly acquaint yourself with:

1. The safety information in the Operator's Manual and the Skid-Steer Loader Safety Manual.
2. The operating instructions in the Operator's Manual.
3. The controls on the loader.

OSHA REQUIREMENTS NOW MAKE IT THE EMPLOYER'S RESPONSIBILITY TO FULLY INSTRUCT EACH OPERATOR IN THE PROPER AND SAFE OPERATION OF ALL OPERATIVE EQUIPMENT. BOTH EMPLOYER AND EMPLOYEE SHOULD THOROUGHLY FAMILIARIZE THEMSELVES WITH THE FOLLOWING SECTIONS.



DANGER!

FASTEN SEAT BELT
BEFORE STARTING ENGINE!

THIS LOADER IS A VERY STABLE UNIT BUT IT CAN BE UPSET IF THE OPERATOR STOPS SUDDENLY WHEN BUCKET IS RAISED AND LOADED.

THEREFORE, DO NOT START ENGINE BEFORE SECURELY FASTENING THE SEAT BELT. CARRY THE LOAD LOW.

SKID-STEER LOADER OPERATION

An understanding of the characteristics and principles of a hydrostatic drive will aid the operator and serviceman in obtaining the maximum efficiency from the skid-steer loader.

Figure 1 gives an overall view of the hydrostatic transmission and boom hydraulic systems of the skid-steer loader and points out the major components involved.

The Sperry New Holland loader features a fully hydrostatic drive with a tandem pump configuration. This arrangement consists of two variable displacement piston pumps (2 and 3), Figure 1, for operating the propulsion system and one gear pump for operating the hydraulic system, see (1), Figure 1. They are assembled as a unit and receive power directly from the engine. The two piston pumps are connected to two piston motors (4 and 5), Figure 1, (one for each final drive) by high pressure hoses.

The transmission pumps are controlled with two steering control levers. The control levers are connected to two neutralizers (spring-loaded shock absorbers), (6), Figure 1, which automatically return the pintle arms to a positive neutral position. As the control levers are moved, they stroke the hydrostatic transmission pump pintle arms to the desired position. Hydrostatic pulsations and the torque feedback generated by drive train loads are resisted by the internal shock absorber neutralizer rather than by the operator's arms. This results in smoother operation and significantly less operator fatigue.

The usage of a skid-steer loader is typified by rapid changes of speed and direction, with accompanying low speeds at times of heavy loader power demands. It is under those conditions that a hydrostatic transmission is more efficient than a mechanical drive train.

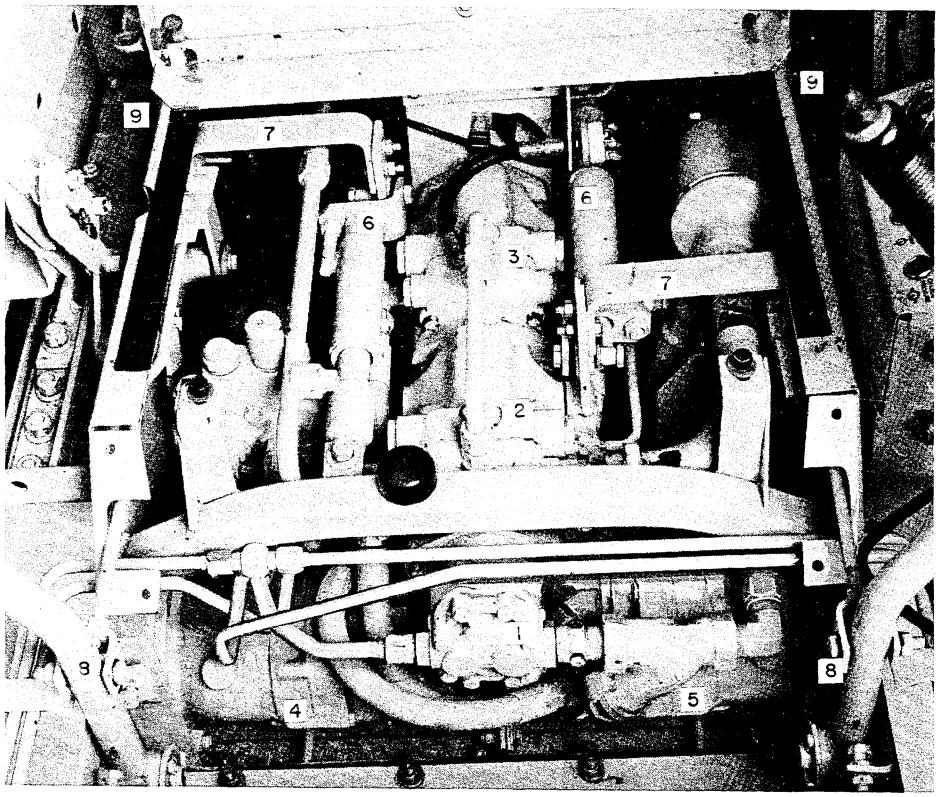


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FIGURE 1

Drive System

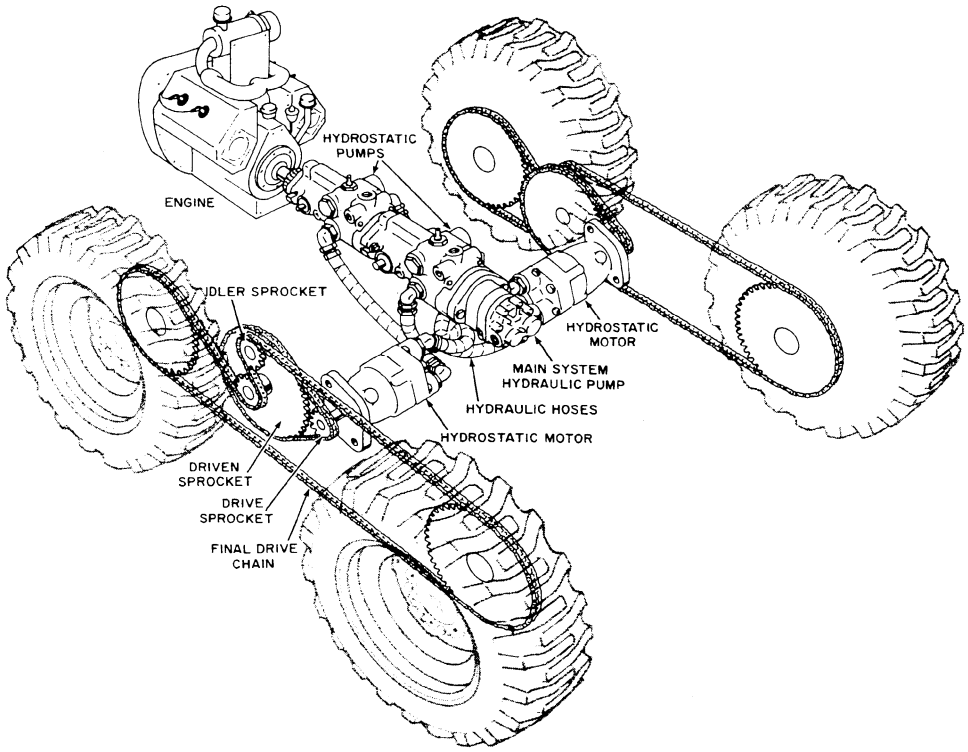
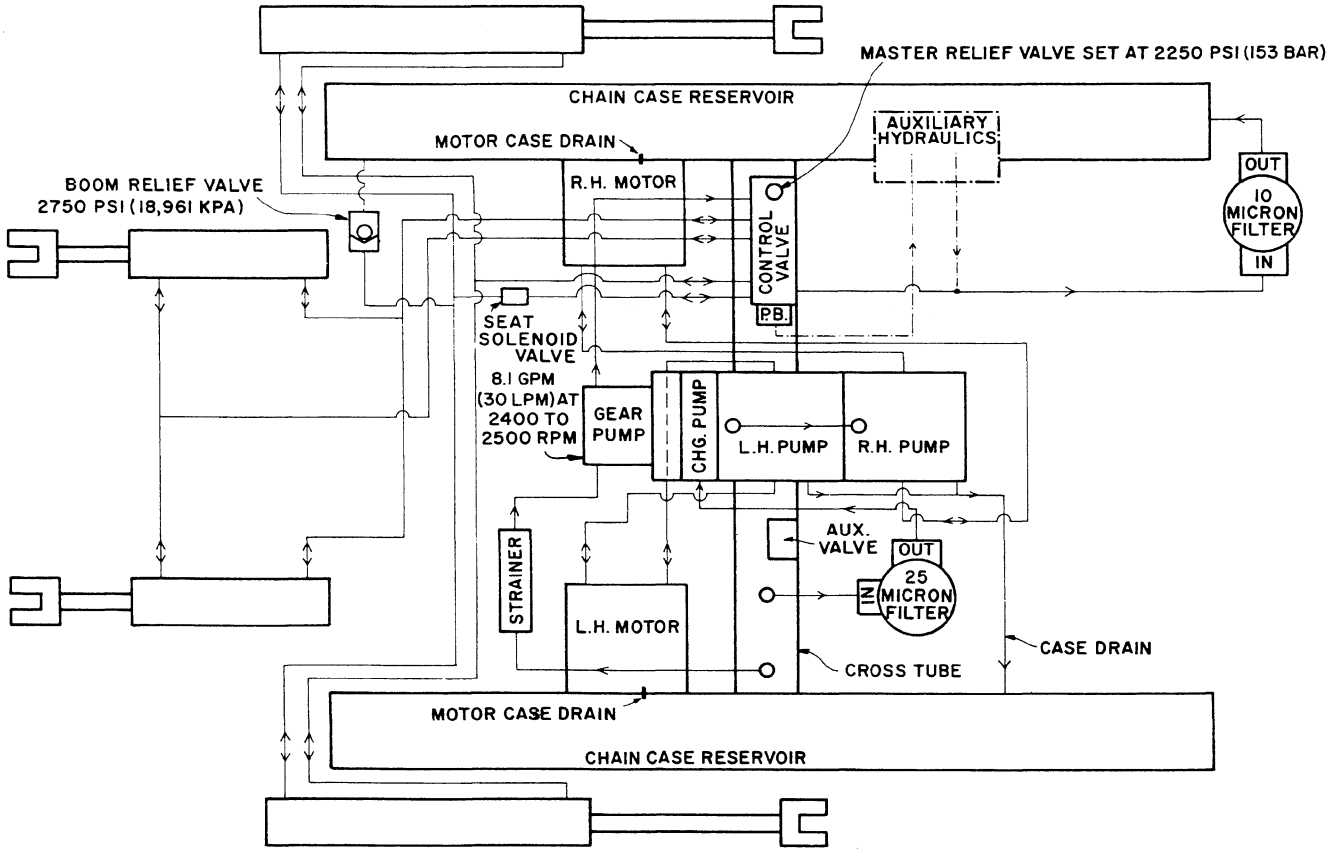


FIGURE 1 A



L-445 LOADER HYDRAULIC DIAGRAM

FIGURE 2

When a loader digs into a pile of dirt, the operator strives to exert maximum tractive effort with very little speed. The variable displacement hydrostatic units are de-stroked so they drive the motors at the required slow speed while generating maximum torque. Minimum power losses occur because input speeds are reduced drastically below levels attainable with slipping clutches as used in mechanical drives.

To obtain maximum torque at the wheels, it is important to remember that the control levers should be close to the neutral position. This differs from a mechanical drive unit where the operator pushes the control levers as far forward as possible to prevent the clutches from slipping. The positiveness of the hydrostatic drive at low speeds, allows the operator to ease the bucket into loads rather than using the impact loading technique which is so often necessary when using mechanically driven units. This machine never has to be used as a ramrod — a practice that is hard on both the operator and machine.

Because of the positive relationship between the hydrostatic pumps and motors, the units work to aid deceleration of the machine when the pump is stroked toward neutral position. This is the automatic braking characteristic of the hydrostatic drive. Infinitely variable speed means a full range from full speed reverse through neutral to full speed forward and any speed in between, with no jumps, jerks, or flat spots. Fast shuttle loading work is accomplished with no lost time changing directions. The smooth power application thus gained from the transmissions gives maximum tractive effort on any terrain. The operator can ease the loader into a tough load without breaking traction because he has precise control.

Figure 2 shows the hydraulic circuit and components as used on an L-445 loader. The hydraulic lift and hydrostatic drive systems on the small frame loaders are very similar except for the use of smaller gear pumps in the L-225 and L-325 loaders. Single acting boom cylinders and control valves are used in the L-225, L-325 and L-425 loaders as compared to the double acting cylinders and control valve on the L-445 loader.

Tracing the oil flow through the hydraulic system of the loader, start with the chain case reservoir on either side of the loader as noted in Figure 2. A cross tube connects both chain cases and serves as a supply point for oil to the front gear pump and also to the charge pump on the hydrostatic transmission.

The loader lift system consists of the oil strainer, gear pump, control valve, boom cylinders, and bucket cylinders. Hydraulic oil is pulled from the chain case reservoir through the #80 mesh strainer screen and into the gear pump. The gear pump supplies oil to the main control valve with a master relief valve set at 2,250 psi (153 bar) to limit the maximum system pressure. Oil is then supplied to the boom or bucket cylinders on demand. Return oil from the open center control valve is filtered through the 10 micron bypass type filter at the rear of the right-hand chain case before returning to the chain case reservoir. If this filter element should become plugged, the oil will bypass through the filter base.

A pressure-beyond (PB) fitting supplies oil from the main control valve to the auxiliary hydraulic or auxiliary valve kit if these options have been installed.

The transmission system consists of a charge line filter, charge pump, two variable displacement piston pumps, and two fixed displacement piston motors. The piston motors transfer power to each chain case where the wheels are driven by two roller chain reductions.

Hydraulic oil is supplied to the 25 micron no-bypass charge line filter from the reservoir cross tube. The charge pump increases the oil pressure to the 90-150 psi (6.8-10.2 bar) range to provide adequate oil flow to the hydrostatic piston pumps. One charge pump located on the front of the left-hand transmission pump supplies charge oil for both transmission pumps by use of a charge tube from the left-hand to the right-hand hydrostatic pump. The left-hand and right-hand piston pumps supply oil to the piston motors whenever the steering levers are activated. A case drain line moves leakage oil from the piston pump cases to the reservoir. The piston motor cases drain directly into the reservoir through holes drilled in the motor case on the output shaft end. The forward and reverse relief valves used on the transmission piston pumps are either 4,000 or 4,500 psi (272 or 306 bar) depending on year of manufacture.

SECTION 1
HYDROSTATIC TRANSMISSION REMOVAL

CAUTION: BEFORE SERVICING THE LOADER OR ANY ATTACHED EQUIPMENT, BE SURE THAT THE ATTACHMENTS ARE LOWERED TO THE GROUND OR THAT THE BOOM ARMS ARE SUPPORTED BY THE BOOM LOCK ARMS.

Before removing the hydrostatic transmission pumps or motors from the loader, a complete check of the hydraulic system should be made using the trouble shooting charts at the end of this manual to eliminate all other possible causes. The hydrostatic pumps can be removed independently of the motors if the problem can be located in one component.

CAUTION: FOR EASIER ACCESS TO THE TRANSMISSION AREA, THE BOOM SHOULD BE RAISED AND RESTING ON THE BOOM LOCK ARMS. ON THOSE LOADERS EQUIPPED WITH AN ENGINE-TO-TRANSMISSION CHAIN COUPLER, THE LOADER WILL HAVE TO BE BLOCKED WITH THE WHEELS OFF THE GROUND TO GAIN ACCESS TO THE COUPLER AREA. IF THE LOADER MUST BE LIFTED OFF THE GROUND, ALWAYS USE JACK STANDS OR BLOCKS OF GOOD QUALITY. NEVER WORK BENEATH THE UNIT WHEN IT IS SUPPORTED BY THE HYDRAULIC SYSTEM.

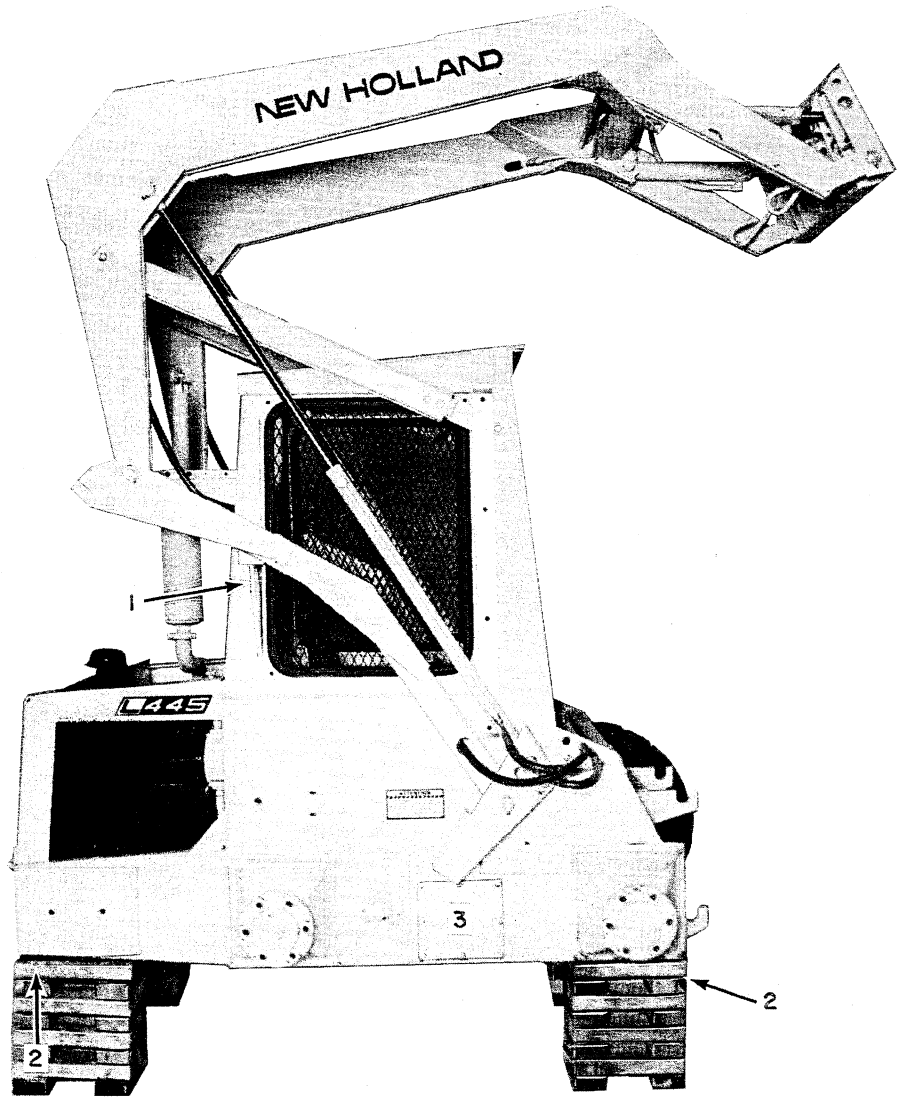


FIGURE 3

A. HYDROSTATIC PUMP REMOVAL — METHOD 1

To assure maximum cleanliness of internal transmission parts, it is suggested that the tandem pump assembly be removed as a unit plugging all ports and lines as they are opened. Steam cleaning of the loader before any repairs are made to the hydraulic system is recommended.

1. Raise boom and extend the boom lock arms (1), Figure 3. Lower the boom on the lock arms. Stop the engine and work the boom and bucket pedals to relieve any residual hydraulic pressure before dismounting from the loader.

NOTE: On loaders equipped with the seat activated boom lockout; the ignition switch will have to be "on" before activating the boom pedal to relieve the residual pressure in that system.

2. Jack the loader up and block securely (2), Figure 3. Remove one rear tire to gain access to the belly pan. (Minimum block height should be 16" (41 cm) so the fuel tank can be removed from under the loader.)

CAUTION: DISCONNECT THE BATTERY AT THIS TIME TO PREVENT ANY ACCIDENTAL SHORTS IN THE WIRING OR ACCIDENTAL START-UP WHILE THE LOADER IS BEING REPAIRED.

3. Remove the seat and disconnect the fuel lines. Remove the positive and ground wires from the fuel sender in the fuel tank at (1), Figure 4. Loosen the filler tube hose clamp at the fuel tank at the rear of the left chain case (4), Figure 4, (not shown).
4. Remove the panels (2 and 3), Figure 4, for better access to the pump area.

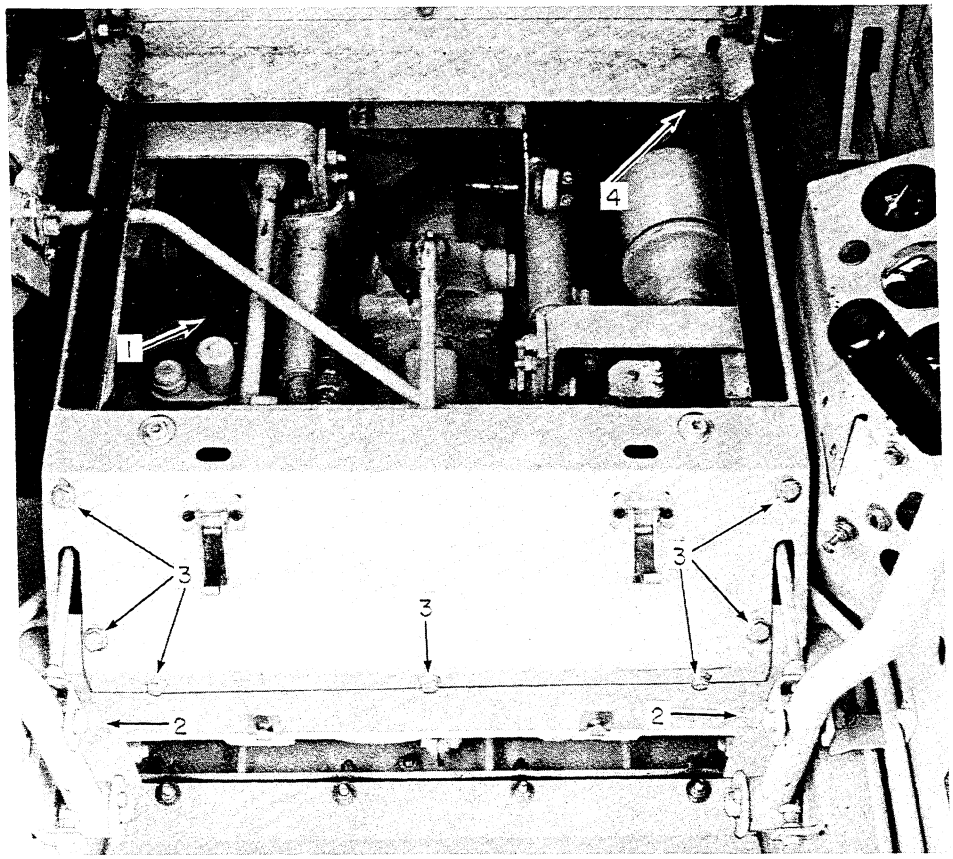


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FIGURE 4

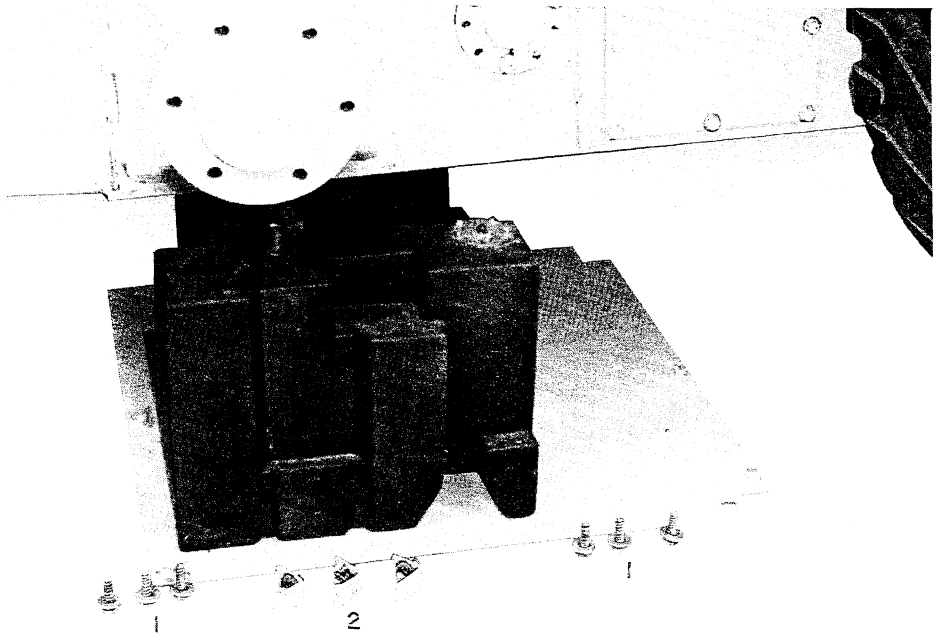

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FIGURE 5

5. Remove the belly pan by removing the six securing bolts (1), Figure 5. The fuel tank is held in with two or three clips as shown at (2), Figure 5. The fuel tank should be drained before removal. Do not drop the plastic tank on removal or it could be damaged. A drain port is provided in the left rear corner. Slide the fuel tank out the side after lowering.

6. **Chain Coupler**

   Figure 6 shows an engine-to-transmission chain coupler as used on early production small frame loaders. Remove the four cover bolts (1), Figure 6, and two sprocket lock-down bolts (2), Figure 6, on the crankshaft sprocket so the covers can be spread to gain access to the chain. The master link can be removed from the #60 chain to separate the two sprockets. Figure 6 is taken from the underside of the loader.

   NOTE: On reassembly the chain coupler must be properly aligned to prevent premature coupler failure; see the "Transmission Installation" section of this manual.

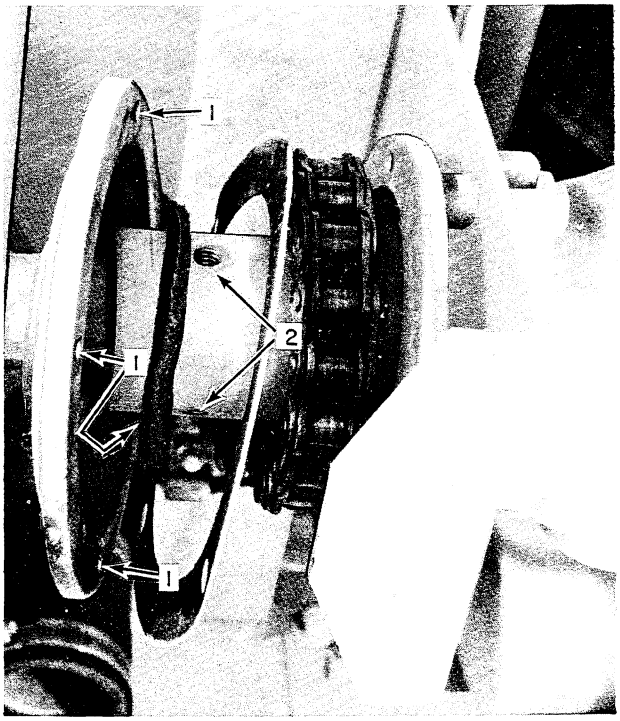

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FIGURE 6

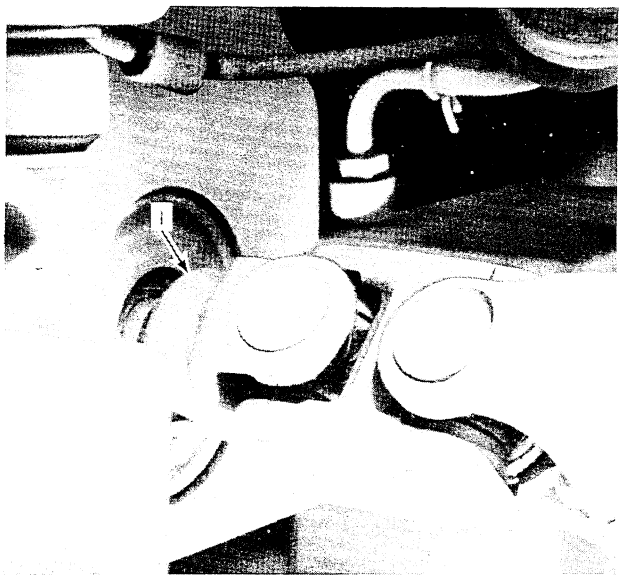

FIGURE 7

Drive Shaft

Figure 7 shows the drive shaft used on later production loaders. The transmission input shaft will slide out of the drive shaft splines when the transmission pumps are slid forward for removal (1), Figure 7.

7. Remove the left-hand and right-hand neutralizers (6), Figure 1, from the transmission. Outside pivot brackets (7), Figure 1, can also be removed for more work area.

   Figure 8 shows the right-hand neutralizer and pivot bracket removed by removing bolts at (1), Figure 8. The pivot rod must also be removed from the steering lever as shown at (8), Figure 1.

8. Remove all hydraulic lines connected to the pump assembly including four pressure lines (1), case drain (2), charge pressure (3), charge pump (4), gear pump oil strainer (5), and pressure line (6), as shown in Figure 9.

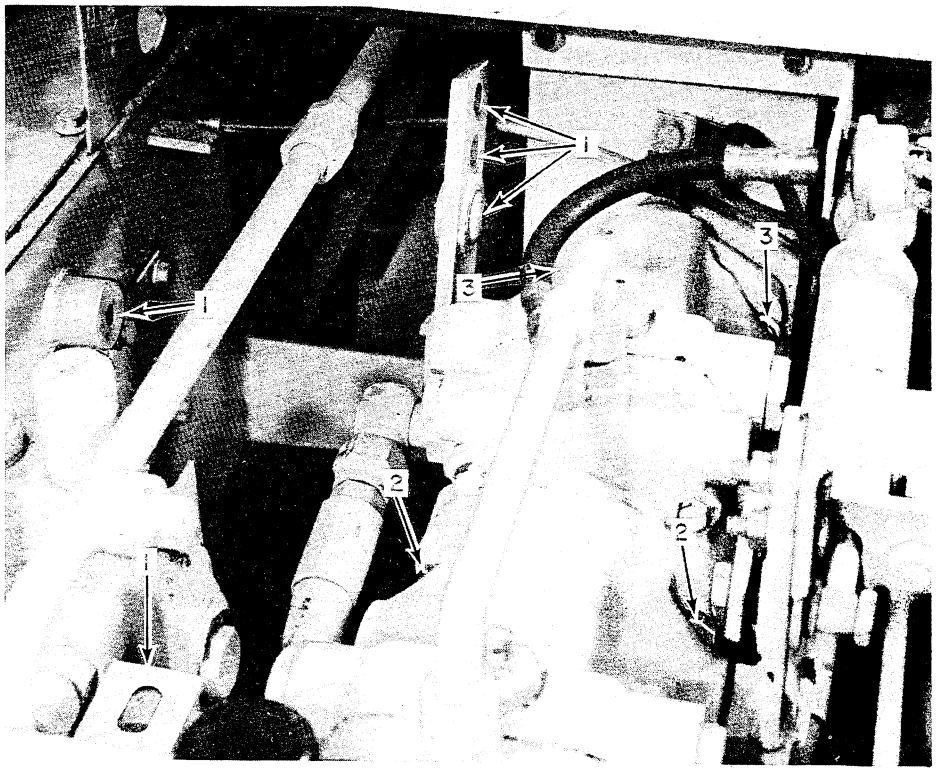

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FIGURE 8

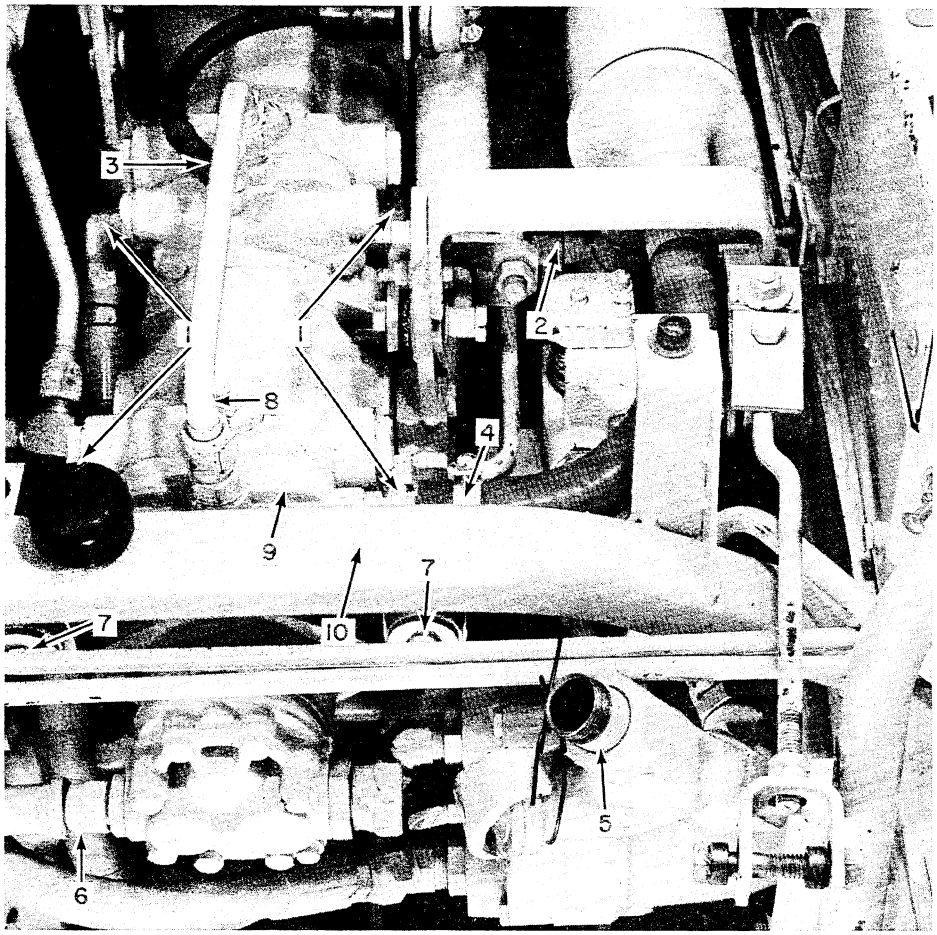

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FIGURE 9

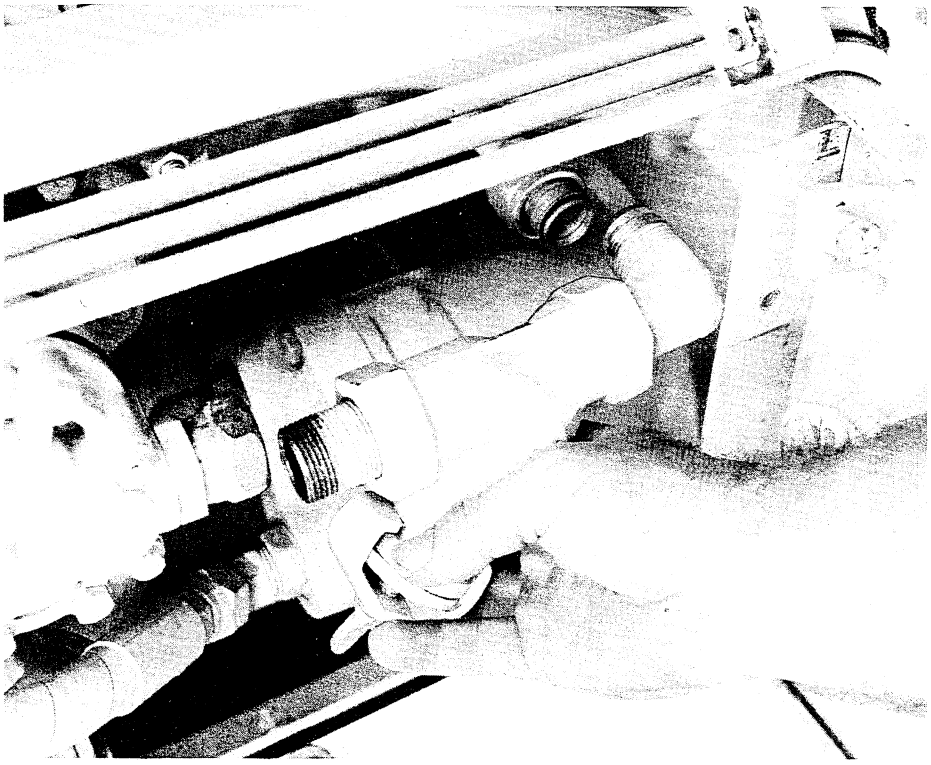

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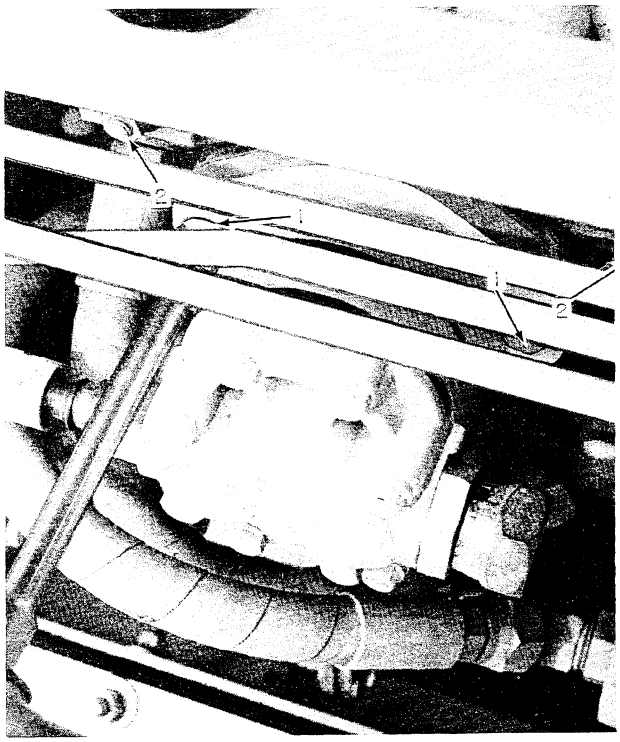
FIGURE 10



SAFETY SHIELDS REMOVED FOR CLARITY. FIGURE 11

9. The gear pump strainer can also be removed completely, as shown in Figure 10, if desirable to gain better access to the transmission area.

10. Remove the gear pump by removing two mounting bolts at (1), Figure 11. Pull the pump straight out the front to remove.

    ATTENTION: Before proceeding further, support the tandem pump assembly to prevent it from falling.

11. While supporting the pumps, remove the four cap screws holding the pumps to the mounting plates (3), Figure 8, and (2), Figure 11. Lower the front end and pull forward to release the input shaft from the engine drive shaft or chain coupler. The pumps should now be free and they can be lifted up through the top of the transmission area for removal.

B. HYDROSTATIC PUMP REMOVAL — METHOD 2

This disassembly method does not require the removal of the belly pan and fuel tank and is only recommended for use on loaders with engine-to-transmission drive shaft. It is necessary to remove the belly pan and fuel tank in loaders equipped with the chain coupler so the coupler can be properly aligned on installation.

When using Method 2, thoroughly clean the tandem pump assembly before removal as the pump assembly will be taken out in separate components.

1. Follow steps 1, 3, 4, 7, 8, 9 and 10, as mentioned in Method 1.

CAUTION: DISCONNECT THE BATTERY AT THIS TIME TO PREVENT ANY ACCIDENTAL SHORTS IN THE WIRING OR ACCIDENTAL START-UP WHILE THE LOADER IS BEING REPAIRED.

2. Remove the four cap screws holding the charge pump to the transmission assembly. The two top bolts are longer than the two bottom bolts. Two of these bolts on the left side of the pump assembly are shown at (1), Figure 12.

3. Remove the two bolts at (7), Figure 9, so the front rubber transmission mounts and front transmission support can be removed.

4. Remove charge tube (8), Figure 9, so the charge pump can be rotated counter-clockwise 180°. The charge pump section (2) is shown in Figure 12.

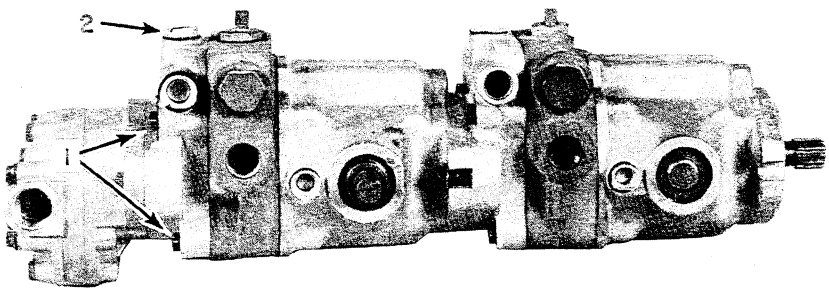


FIGURE 12

5. Slide charge pump (9), against the cross tube (10), Figure 9, and rotate counter-clockwise 180°, at which time the charge pump can be slid under the cross tube and free of the transmission assembly.
6. Remove the two cap screws (2), Figure 8, so the front (left drive) hydrostatic pump can be removed from the rear (right drive) hydrostatic pump. Back the front pump out of the rear pump until the shaft is disengaged and remove the pump from the loader.
7. Remove the two cap screws (3), Figure 8, holding the rear pump to the mounting bracket and back it out of the engine drive shaft until it is free.

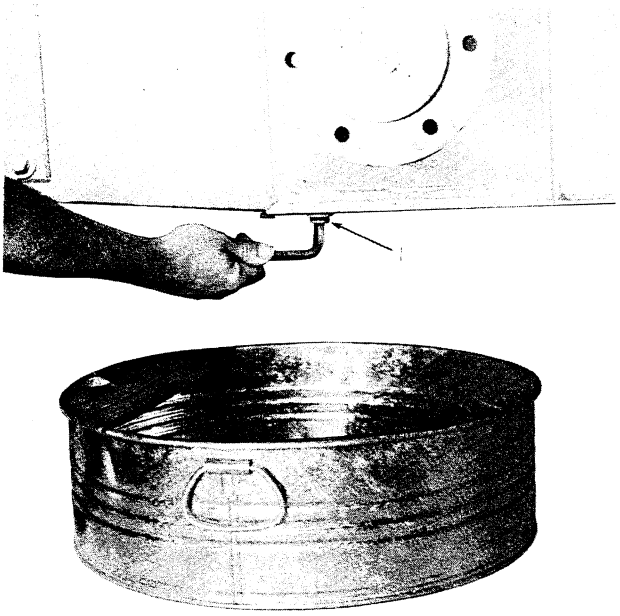
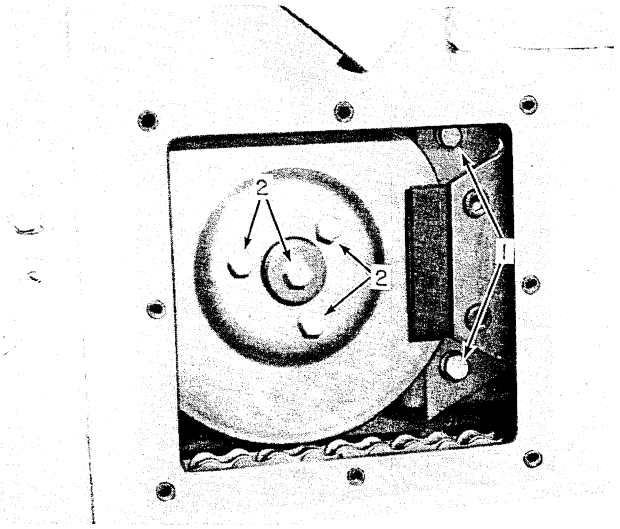


FIGURE 13

C. HYDROSTATIC MOTOR REMOVAL

The chain case reservoir must be drained before removing the hydrostatic motor as the chain case must be opened to remove part of the final drive.

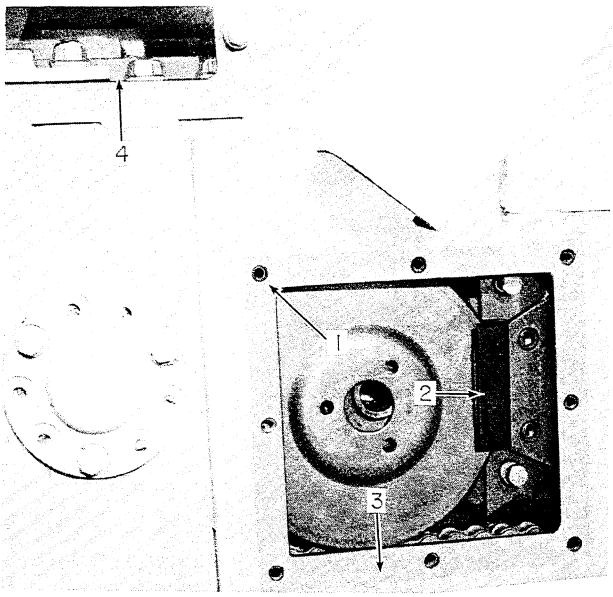
1. After the loader has been jacked up and properly blocked, as shown in Figure 3, drain the hydraulic oil from the chain case reservoir into a clean container by removing the drain plug on either chain case as shown at (1), Figure 13. Removing one drain plug will essentially drain both chain cases as they are connected. The reservoir holds 16 gallons (57 L) of oil.



SAFETY SHIELDS REMOVED FOR CLARITY.

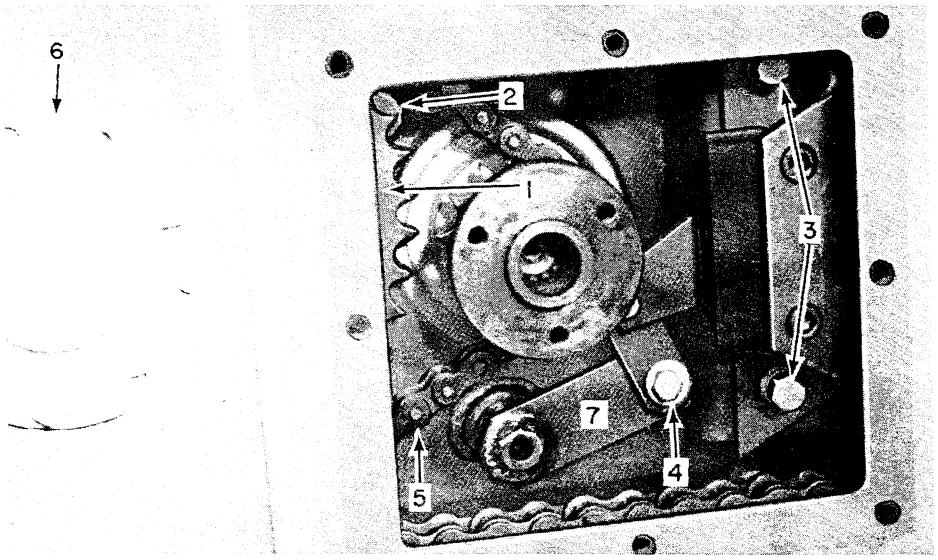
FIGURE 14

2. Removing the front and rear tires on the chain case to be repaired will allow better access to the center chain case cover. Remove the center cover as shown in Figure 14.
3. Loosen two brake bracket bolts (1), Figure 14, and remove four cap screws (2), Figure 14, to loosen the brake disc. Engaging the parking brake will hold the disc so the bolts can be loosened.
4. The brake disc should be moved up and to the rear (1), Figure 15, to free the disc from brake pads (2), Figure 15. Once clear of the brake pads move the disc to the bottom and out of the chain case at (3), Figure 15.



SAFETY SHIELDS REMOVED FOR CLARITY.

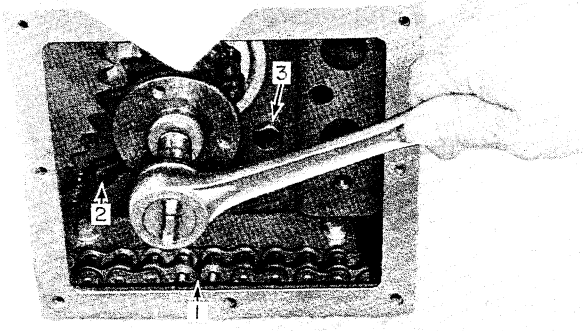
FIGURE 15



SAFETY SHIELDS REMOVED FOR CLARITY.

FIGURE 16

7. To turn the 54-tooth sprocket assembly by hand, first turn the tow valves on top of the hydrostatic pump assemblies 90°. The tow valves shown at (1), Figure 18, are in the "run" position. Turning these 90° will allow the final drive to be rotated by hand. Thread two lug bolts into the wheel hub and use them to turn the hub with a pry bar. Another method would be to use a ½" ratchet to turn the motor using the center bolt previously removed from the brake disc assembly, see Figure 17.



SAFETY SHIELDS REMOVED FOR CLARITY.

FIGURE 17

5. In Figure 16, the brake disc has been removed. Check for any lost shims (metal or plastic used to shim the brake disc to the drive sprocket hub) that may have fallen in the chain case on brake disc removal. Keep the same shims behind the brake disc for reassembly.

6. At this time, the 54-tooth sprocket (1), Figure 16, should be turned so a notch (one tooth missing) can be centered over the motor mounting bolt (2), Figure 16, so the bolt can be removed. Mounting bolt (3), Figure 17, can be loosened by completely removing the brake bracket assembly. Remove two mounting bolts (3), Figure 16, and pivot bolt (4), Figure 16, to remove the bracket assembly.

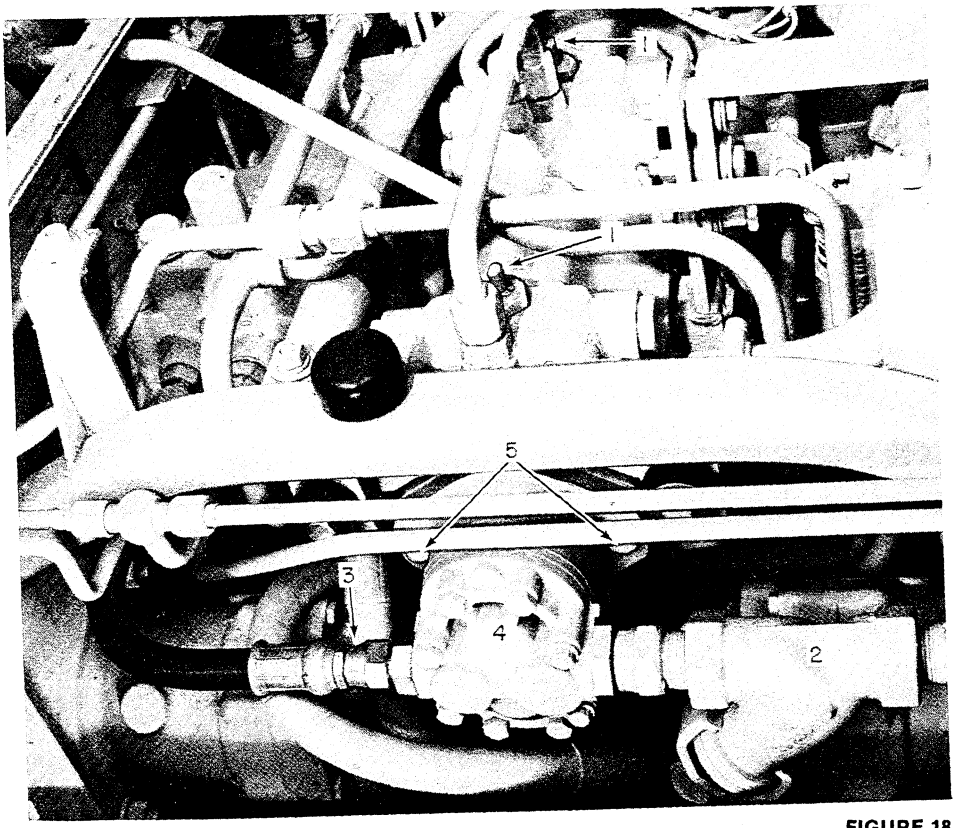


FIGURE 18

SAFETY SHIELDS REMOVED FOR CLARITY.

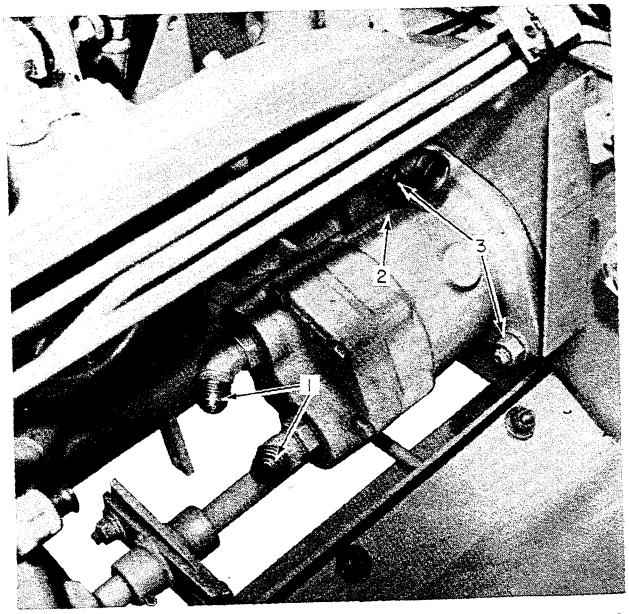


FIGURE 19

SAFETY SHIELDS REMOVED FOR CLARITY.

NOTE: The hydrostatic motor can be turned freely if the two hydraulic hoses (1), Figure 19, are disconnected prior to turning the final drive. Some oil will be pumped out of the motor when it is rotated. Therefore, rotate the final drive slowly.

8. Remove oil strainer (2) and pressure hose (3) Figure 18, to gain access to the motor being removed. Removal of gear pump (4) may be necessary to gain adequate working space. Remove two mounting bolts (5), Figure 18, to remove the gear pump.
9. Orientation marks are cast into the motor housings as shown in Figure 20. The left motor housing orientation mark is shown properly positioned at (2), Figure 19. These orientation marks indicate the angle of the fixed cam plate inside the motor. The motors should be marked and reinstalled in the positions shown in Figure 20.
10. The motor can now be removed from the chain case without disconnecting either final drive chain.

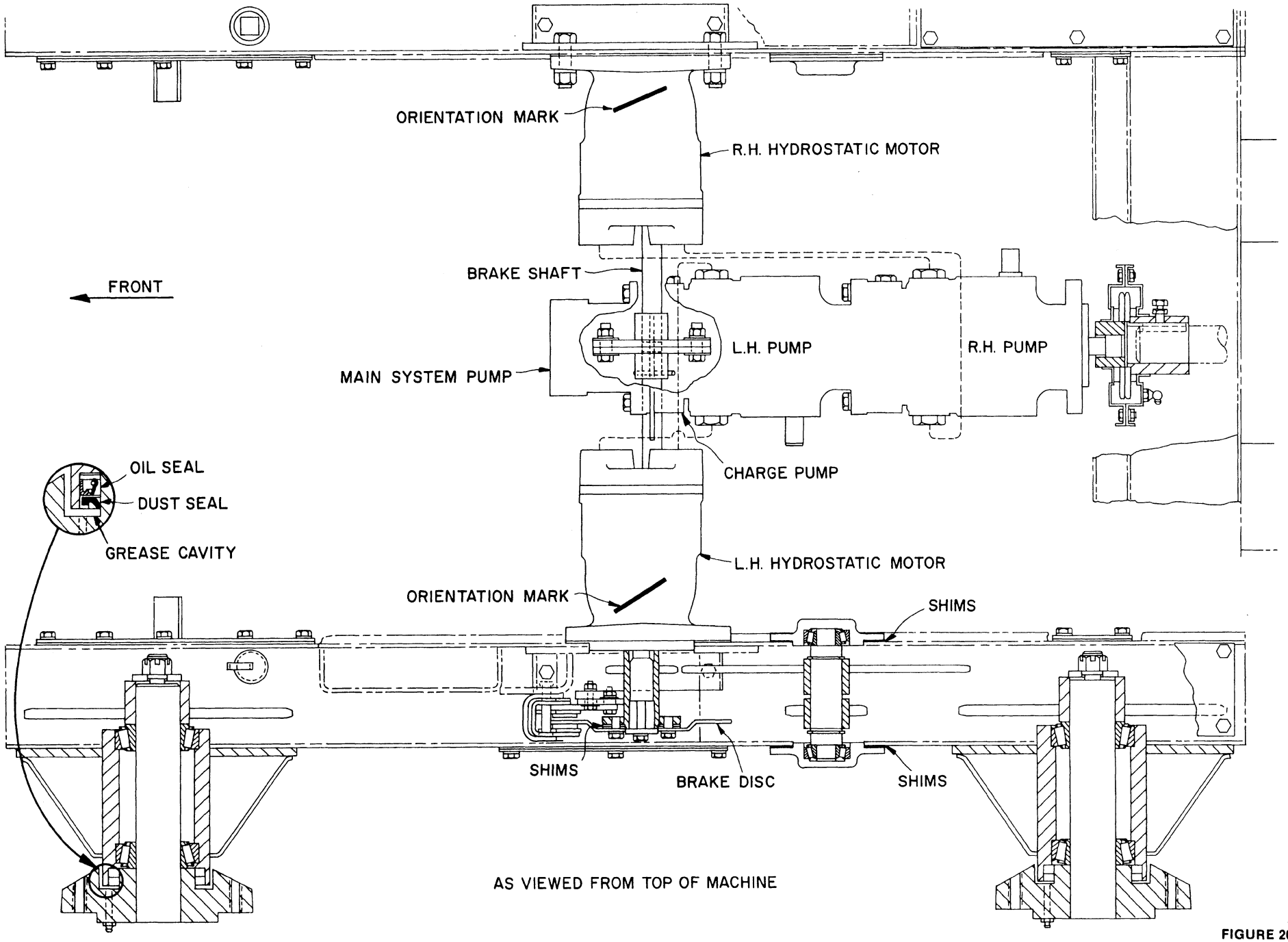

ORIENTATION MARK
R.H. HYDROSTATIC MOTOR
BRAKE SHAFT
FRONT
L.H. PUMP
R.H. PUMP
MAIN SYSTEM PUMP
CHARGE PUMP
OIL SEAL
DUST SEAL
GREASE CAVITY
L.H. HYDROSTATIC MOTOR
ORIENTATION MARK
SHIMS
SHIMS
BRAKE DISC
SHIMS
AS VIEWED FROM TOP OF MACHINE

FIGURE 20

SECTION 2
HYDROSTATIC TRANSMISSION PUMPS

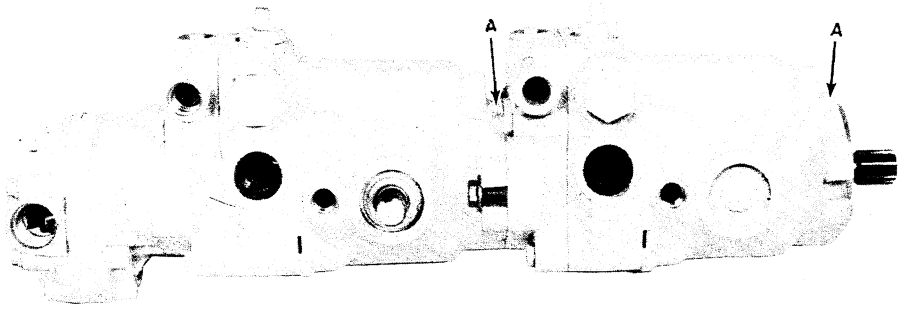


FIGURE 21

The following sections describe the basic operational characteristics and provide service and overhaul information on the Cessna Models 70112 and 70142 series propulsion piston pumps, 74410 fixed displacement piston motors, and 24300 gear pumps.

NOTE: Dealer adjustment requests for repairing oil leaks or any repairs or overhaul of transmission must include the MODEL NUMBER of the transmission and the DATE CODE. These are stamped in the flange of the pump housing, A, Figure 21.

The complete hydrostatic and gear pump assembly is shown in Figure 21, and is assembled as one complete unit. Figure 22 shows the three main components of the pump assembly (1) —gear pump, (2) — left hydrostatic pump, and (3) — right hdrostatic pump. These components are held together with four cap screws and two sealing O-rings as shown at (4), Figure 22. The left pump contains a gerotor pump in the adaptor assembly (5), Figure 22. The right pump has an adaptor plate only and does not contain a gerotor charge pump.

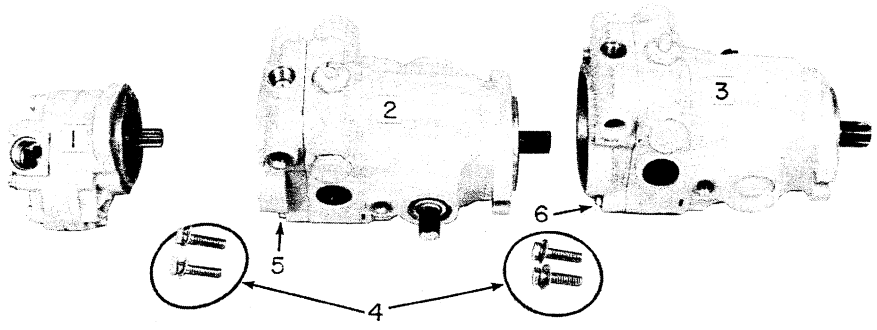


FIGURE 22

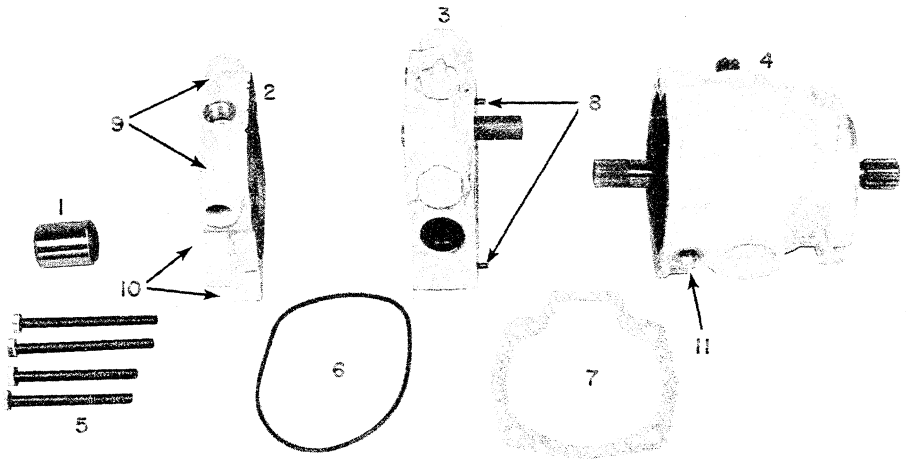


FIGURE 23

HYDROSTATIC PUMP DISASSEMBLY

1. Figure 23 shows the disassembly of the right (rear) hydrostatic pump assembly.
2. Thoroughly clean the outside of the pump.
3. Remove the four cap screws (5), Figure 23. Coupler (1) should be easily removed from adaptor plate (2).
4. Hold housing (4) securely and use a plastic mallet to tap adaptor plate (2) and loosen it from the back plate assembly (3). It may be necessary to secure the pump drive shaft in a protected jaw vise with the housing up to tap the adaptor plate free.
5. Remove the adaptor plate (2) and set aside.
6. In a similar manner, use a plastic mallet to tap and loosen the back plate (3). Remove the back plate assembly and set aside. An O-ring (6) seals the adaptor plate to the back plate, and a gasket (7) seals the back plate to the housing (4).
7. Figure 24 shows the two mating surfaces between back plate (3) and adaptor plate (2).
8. In Figure 24, (1) is the sealing O-ring, (4) plug, (5) tow valve, (6) charge check valves, (7) main system relief valves (4,000 psi or 4,500 psi — check parts book for application), (8) high pressure oil ports to hydrostatic motor, and (9) charge oil inlet port to the adaptor plate.
9. The charge check valves (1), Figure 25, can be removed by simply pulling them from the back plate with a pair of pliers. The charge check valve consists of a ball and pin retainer and is held in the back plate with an O-ring and back-up washer. The O-ring is installed next to the retainer pin end and the back-up washer on the ball seat end.

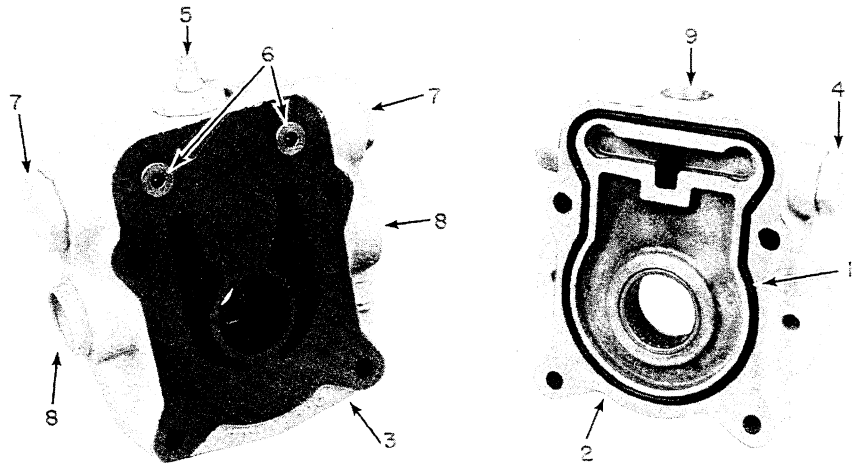


FIGURE 24

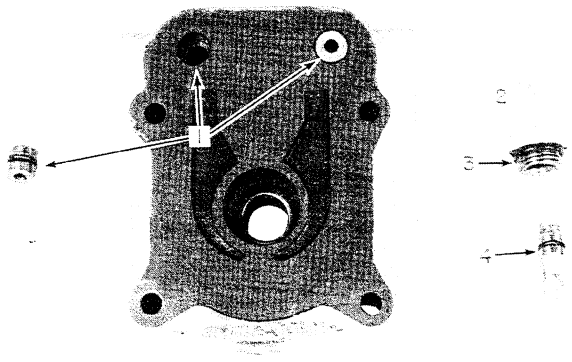


FIGURE 25

10. The tow valve can be removed as an assembly from the back plate. Removing snap ring (2), Figure 25, permits the removal of shaft (4) from separator plug (3).

    NOTE: Sealing O-rings on shaft (4) and separator plug (3).

11. Figure 26 shows the removal of the high pressure relief valves. Relief valve (1) is reverse and relief valve (3) is forward. Sitting in the loader, relief valve (1) is on the right side and relief valve (3) on the left. Both relief valves have replaceable seats (2) and are sealed to the back plate with O-rings (4).

    NOTE: To maintain correct relief valve setting: Be sure the seats are replaced when replacing relief valves. If the relief valves are to be switched to check a direction problem, be sure to switch the seats also. When new relief valves are ordered from Service Parts, they come with new seats.

12. Figure 27 shows the two similar style main system relief valves used in the small frame loaders.

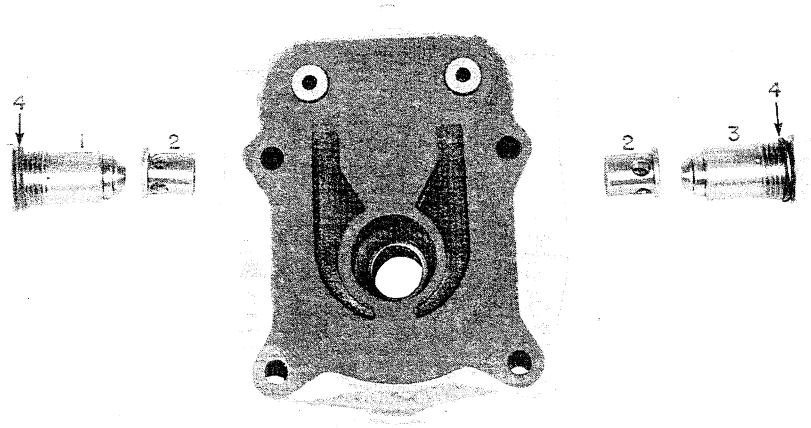


FIGURE 26

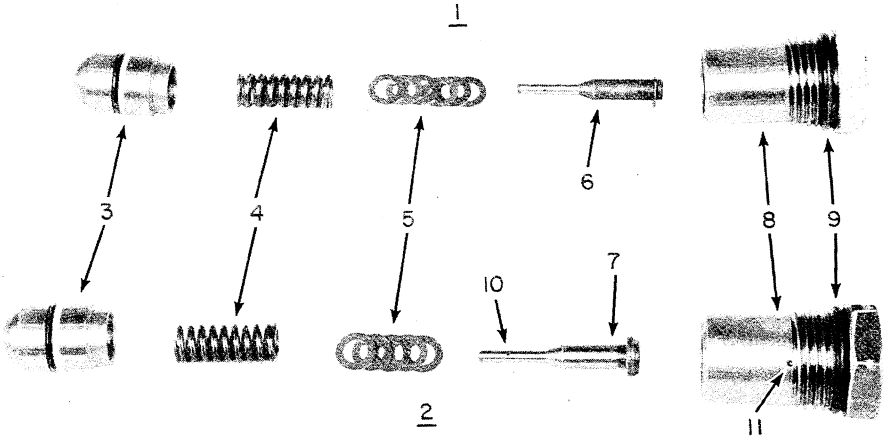


FIGURE 27

PARTS IDENTIFICATION

1. Earlier relief valve
2. Present relief valve
3. Valve body (with O-ring and back-up washer)
4. Spring
5. Shims
6. Valve spool with snap ring
7. Valve spool with solid head
8. Cartridge
9. O-ring

Valve (1) was used in the earlier production of small frame loaders. It is identical to valve (2) except that valve spool (6) uses a snap ring as a retainer and valve (2) has a solid machined head. Valve (2) is used in current production.

To service the old transmission relief valves, order the relief valve assembly shown in Figure 27A. It consists of cap #274847, spring, #274849, cartridge, #274848, and should be ordered from Service Parts.

Remove old relief valve and seat. Install the new cartridge relief valve in the sequence shown in Figure 27A.

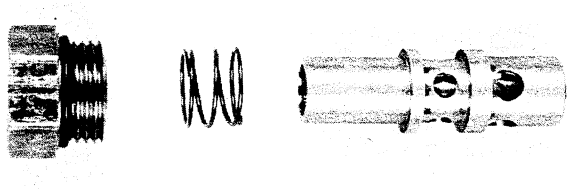


FIGURE 27A

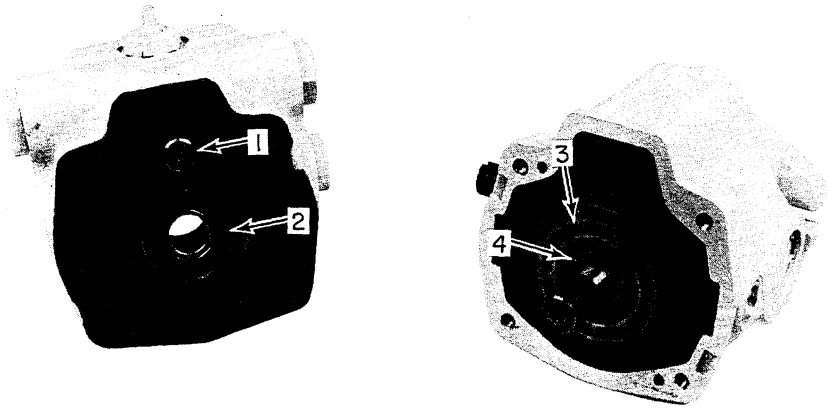


FIGURE 28

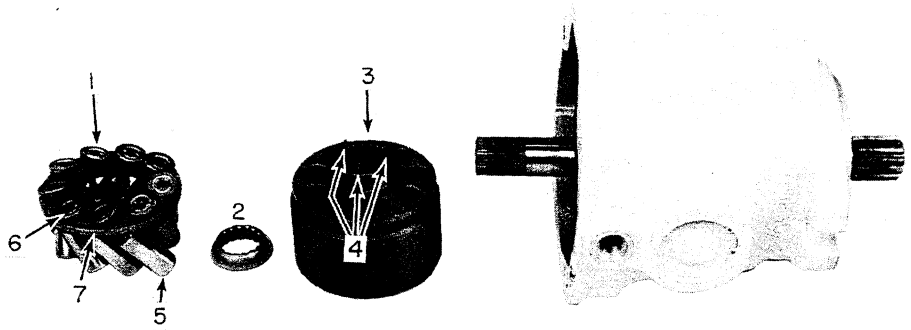


FIGURE 29

Oil holes (10) in the valve spool and (11) in the cartridge must be clear of any obstructions for proper relief valve operation. Do not change the shim pack in these relief valves as they are factory-set and tested. If the valve does not function correctly after cleaning, it should be replaced.

13. Figure 28 shows the mating surfaces between the back plate and the housing assembly. The cam plate stop (1) is mounted on the back plate. The kidney ports at (2) make up the high and low pressure sides of the oil circuit between the rotating group (3) and the back plate. A gasket (7), Figure 23, is used to seal the back plate to the housing.

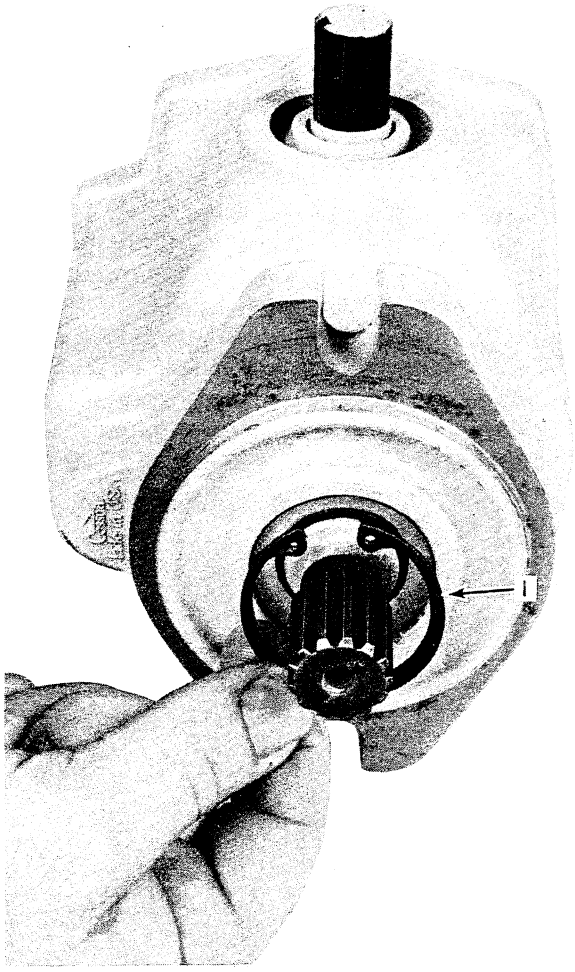


FIGURE 30

14. Placing a hand over the open end of the housing assembly and tilting down will allow the rotating group (3) to be removed from the housing intact. Figure 29 shows the rotating group removed and the major parts identified. The piston assembly and spider is shown at (1), pivot washer at (2), and piston block (3), with three pressure pins (4).

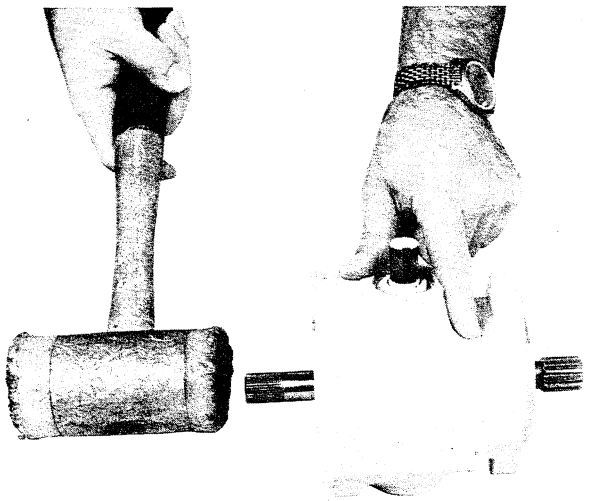


FIGURE 31

15. The piston block assembly (3) contains a heavy internal spring and should not be disassembled unless the three pins (4) or the spring is damaged.

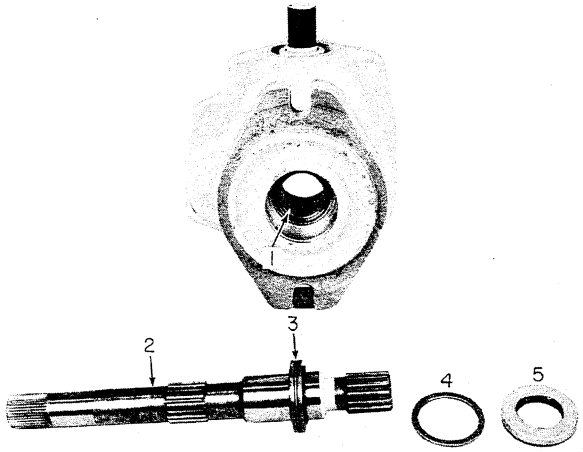
CAUTION: THE FOLLOWING PROCEDURE SHOULD BE USED IF THE SPRING IS TO BE REMOVED FROM THE PISTON BLOCK. THE SPRING IS HIGHLY COMPRESSED AND THE SNAP RING (4), FIGURE 28, SHOULD NOT BE REMOVED WITHOUT COMPRESSING THE SPRING FIRST.

THE FOLLOWING PARTS WILL BE NEEDED TO DISASSEMBLE THE PISTON BLOCK.

Two 5/16" x 15/16" O.D. flat washers

One 5/16" x 2⅞" N.C. cap screw

One 5/16" N.C. nut



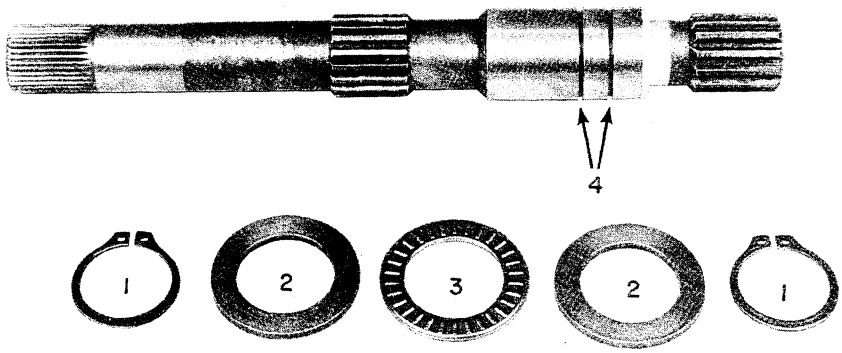


FIGURE 33

PLACE ONE OF THE FLAT WASHERS OVER THE 5/16" x 2⅞" CAP SCREW AND PLACE THIS THROUGH THE CENTER OF THE PISTON BLOCK. PLACE THE OTHER WASHER OVER THE CAP SCREW AND LET IT REST ON THE THREE PINS (4), FIGURE 29. SCREW THE NUT ON AND COMPRESS THE SPRING INSIDE THE PISTON BLOCK. USE A PAIR OF SNAP RING PLIERS AND REMOVE THE INTERNAL SNAP RING. REMOVE THE BOLT AND THE TWO WASHERS. REMOVE THE WASHER, SPRING, WASHER, AND THREE PINS, AND THE INTERNAL PIN KEEPER.

16. To remove the pump shaft from the housing, remove the snap ring (1), Figure 30.
17. Use an arbor press to remove the shaft, oil seal, and thrust bearing out of the housing. Figure 31 shows the use of a soft hammer to remove the shaft. **Replace the thrust bearing and two races if a hammer is used for shaft removal as the thrust bearing can be damaged.**
18. Figure 32 shows the pump shaft removed. The shaft needle bearing is shown at (1), shaft (2), thrust bearing assembly (3), spacer washer (4), and shaft seal (5).
19. Figure 33 shows the pump shaft. The thrust bearing (3) is held in by two thrust races (2) and snap rings (1). The snap ring grooves are shown at (4) on the pump shaft.
20. Figure 34 shows the cam plate removed from the housing. To remove the cam plate from the housing, remove the two internal snap rings (2) from the sides of the housing. Remove the two covers (3 and 4), the two O-rings (5), the two inner races (6), and two bearings (7). The cam plate can now be slid over to one side and removed. The two cam plate pivot bearings are a loose slip fit into the housing. Do not be concerned if they are not tight.

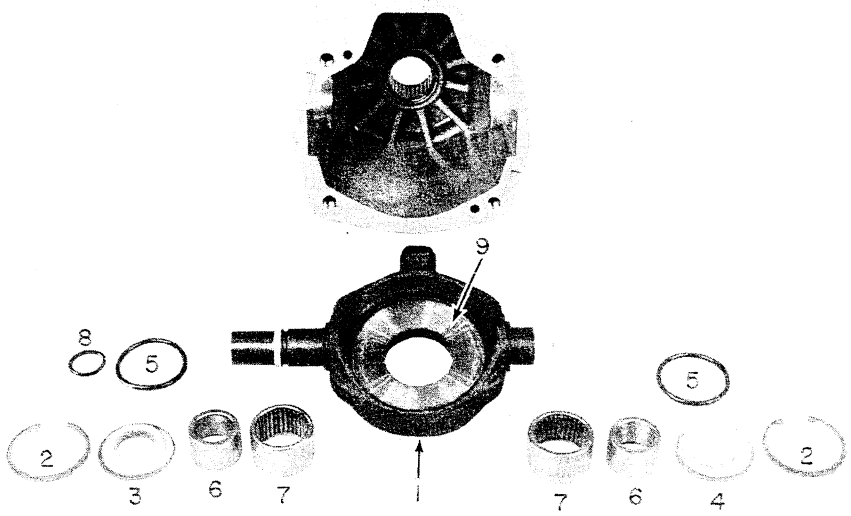


FIGURE 34

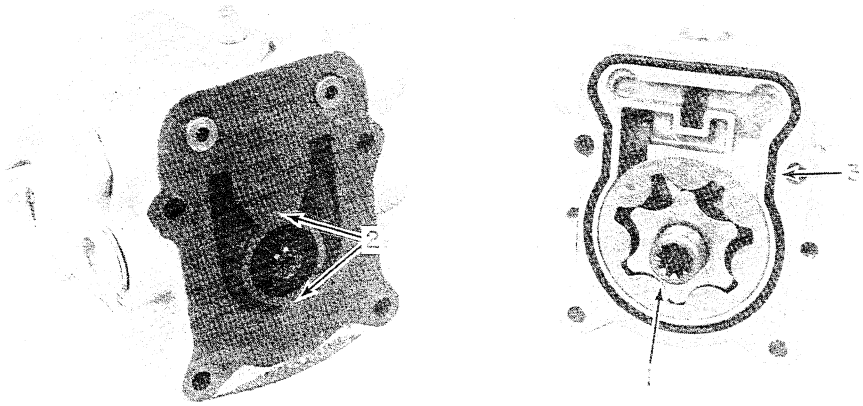


FIGURE 35

Quad ring (8) may have to be removed from the cam plate shaft before the inner race (6) can be removed on the keyway end of the shaft.

21. Figure 35 shows the left (front) hydrostatic pump with the adaptor plate removed. This adaptor plate contains a gerotor type charge pump shown at (1). Otherwise, the remainder of the hydrostatic pump assembly is disassembled in the same procedure used for the right hydrostatic pump.

22. The gerotor charge pump consists of an inner gerotor ring (1) mounted on a keyed shaft, an outer gerotor ring (2) and a charge-replenishing valve assembly (3), Figure 36. The charge replenishing valve assembly is held in the reservoir supply port (4) to the charge pump by a snap ring. Item (5) is a separate charge passage located in the charge pump adaptor only.

PARTS INSPECTION

1. **Charge Pump**

   A. Inspect the charge replenishing valve seat in the adaptor assembly. It should be smooth and free of defects. The relief valve spring should be inspected for any defects such as cracks or fatigue. Make sure the snap ring used to secure the replenishing valve assembly is in the proper groove and not in the fitting threads. See (3), Figure 36.

   NOTE: Later charge pump adapters have a loctited hex plug, in place of the snap ring.

   B. The charge pump adaptor should be inspected for any scoring in the gerotor area. See (6), Figure 36. Small sand casting pits are acceptable in this area.

   C. Inspect the needle bearing (7), Figure 36. If the needles are free of excessive play and remain in the bearing cage, there is no need to replace the bearing.

   D. Inspect the gerotor outer and inner rings (1 and 2), Figure 36, for any wear, cracks, or worn drive key and replace as necessary.

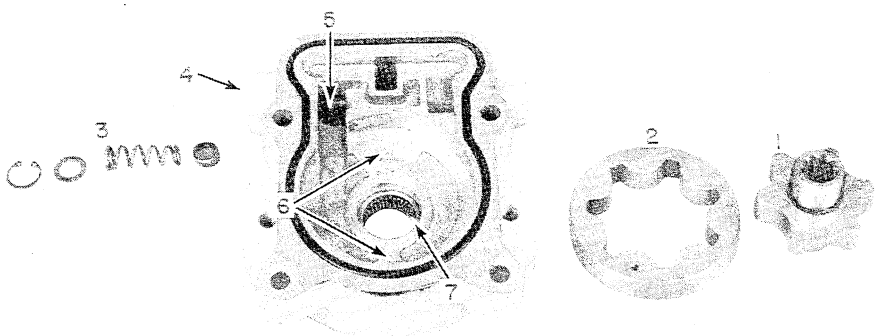


FIGURE 36

2. **Back Plate Assembly**

   A. Inspect the charge check valve assemblies (1), Figure 25, for stuck balls, or damaged seats. The ball seats should be in good condition and the balls free to move. It is suggested that these charge check valves be replaced when repairing the transmission pumps.

   B. Inspect the flat surface (2), Figure 35, of the left pump back plate for wear in the gerotor pump area. The area should be smooth and free of scratches or burrs.

   C. The piston block side of the back plate should be smooth and free of scratches and burrs in the area shown at (2), Figure 28. The cam stop should be tight in the back plate as shown at (1), Figure 28. If scratches on the back plate surfaces are noted, the block should be replaced.

3. **Piston Block Rotating Assembly**

   A. Inspect the piston block surface at (3), Figure 28, for any scratches or burrs. This surface should be smooth. Replace block if scratches are present.

   B. The pistons should be free to move in the block bore. If not, check for piston scoring or block bore contamination. The outside of the pistons (5), Figure 29, should not show any deep scratches or wear. The piston shoes (6), Figure 29, should fit on the ball end of the piston snugly. The flat surface of the piston shoe should be smooth and not show any scratches. There should not be any wear to the outside edge of the shoe. If necessary, replace the piston assemblies. Do not lap the piston shoes.

   C. The spider (7), Figure 29, should be inspected for any cracks, wear in the pivot area, or warpage. The pivot (2), Figure 29, should be smooth and show no signs of wear.

4. **Housing Assembly**

   A. Inspect the needle bearings in the housing assembly. If the needles are free of excessive play and remain in the bearing cage, there is no need to replace the bearing (1), Figure 32.

   B. Inspect the shaft (2) for any wear and replace as necessary. Replace thrust bearing and races (3).

   C. The cam plate (1), Figure 34, should be inspected for any scratches or scoring of the finish on the polished shoe surface (9), Figure 34. The surface should be smooth with no signs of scoring or flaking. Inspect the needle bearings and races for any wear. If the needles are free of excessive play and remain in the bearing cage, there is no need to replace the bearings.

   D. Inspect covers (3 and 4), Figure 34, for wear on the inside of the covers. If worn, replace.

REASSEMBLY OF HYDROSTATIC PUMPS

Clean all parts in solvent and use STP to lubricate all moving parts before reassembly. Install a new seal kit when rebuiding the pump assembly.

1. The cam plate (1), Figure 34, should be installed in the housing first. Before installation, slide bearing inner races (6) over the cam plate shafts as shown. The numbered end of the race should face outward and chamfered I.D. should be inward. Install quad-ring (8) (coat with oil or STP) in the groove on the keyed end of the shaft, being careful that the quad-ring is not twisted. When properly installed, the quad-ring should appear as shown in Figure 37.

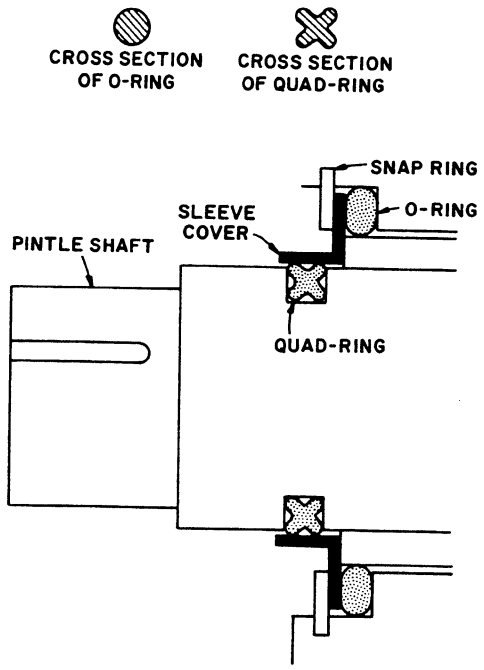


FIGURE 37

2. Slide the cam plate into the housing and install the pivot bearings (7), Figure 34, over the inner bearing race. The cam plate pivot bearings are slip fit. Install with the numbered end of the bearing out.
3. Install new housing O-rings (5), Figure 34, install trunnion cover (4), Figure 34, and secure with snap ring (2).
4. Install sleeve cover (3), Figure 34, and secure with snap ring (2).

   NOTE: Coat the quad-ring with oil or STP and install the sleeve cover using water pump pliers to rotate the cover while pressing it down over the quad-ring. This will help prevent the quad-ring from twisting in the shaft groove while installing the sleeve cover. The cam plate should pivot freely in the housing after completing installation.
5. To install the pump shaft (4), Figure 33, first install the thrust bearing assembly as shown in Figure 33, which consists of a snap ring, race, bearing, race, and snap ring.
6. After checking the shaft needle bearing in the housing (1), Figure 32, (press fit), install the shaft assembly, spacer washer (4), new seal (5), and retain with snap ring.
7. If the rotating piston block assembly was disassembled, use the following procedure to reassemble using Figure 38:

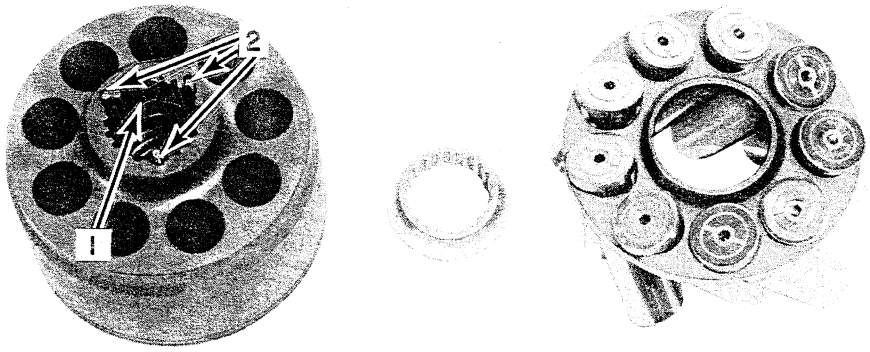


FIGURE 38

Product: New Holland L-225/L-325/L-425/L-445 Skid-Steer Loaders Service Repair Manual
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Compress the pin keeper (1) and install in the spline. Install the three pins (2) with head end to the inside of the block and install in the special grooves of the piston block spline.

Install the washer, spring (1) and washer (2) in the piston block. Use the two 5/16" I.D. washers and the 5/16" x 2⅞" cap screw to compress the spring and retain with snap ring (3). Remove the 5/16" x 2⅞" cap screw and the two washers and discard, see Figure 38A.

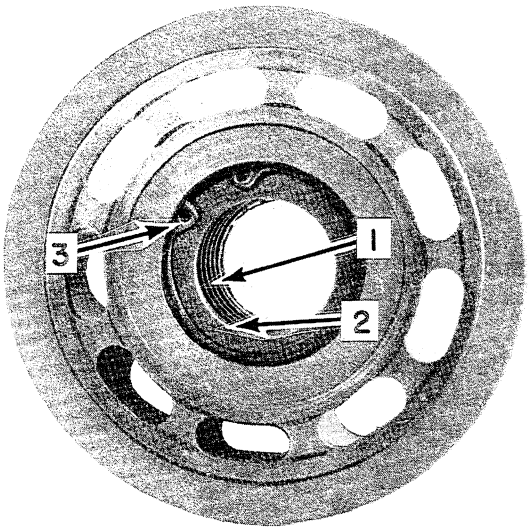

FIGURE 38 A

8. Set the pivot washer (2), Figure 29, on top three pins (4). Install the pistons in the spider and slide the lubricated pistons in the piston block.
9. Install the rotating piston block assembly in the housing assembly, making sure the piston shoes are lubricated and in contact with the cam plate. Make sure all parts are in their proper position.
10. Install the new housing gasket shown at (7), Figure 23, using no gasket sealer.
11. Install the back plate (3) on the housing (4), Figure 23, making sure to line up the two locator pins (8).
12. Install new O-ring and back-up washer on the charge check valves shown at (1), Figure 25. The O-ring should be nearest the roll pin retainer. Install the charge check valves in the back plate as shown in Figure 25.
13. If working with the left hydrostatic pump containing the gerotor charge pump, use the following; if not, go to step 14.

Charge Pump Reassembly
(See Figures 35 and 36)

A. Install outer gerotor gear (2), Figure 36, in the charge pump adaptor housing. Lubricate gear with STP.

B. Install shaft key in coupler shaft and install inner gerotor gear over coupler (1), Figure 36. Later inner gears are secured to the shaft with lock rings on both sides of the gear.

C. Install this inner gear assembly in the outer gear assembly as shown at (1), Figure 35. Lubricate with STP.

14. Install O-ring (3), Figure 35, in its groove and hold in place with a clean, clear grease. Assemble adaptor plate to the pump back plate using the four bolts previously removed. The two long bolts go in the upper holes (9), Figure 23, and short bolts in the lower holes (10), Figure 23.

    Bolt torque is 18 ft. lbs. (24 N·m).
15. Reinstall charge pump charge-replenishing valve (3), Figure 36, making sure snap ring is in the snap ring groove and not the fitting thread area to insure proper operation.
16. Install new O-rings on the tow valve assembly (3 and 4), Figure 25 and install in the back plate. Torque to 27-30 ft. lbs. (37-41 N·m).
17. Install new O-rings (4), Figure 26, on the relief valves and install the seats and relief valve assemblies in the back plate. Torque to 55-60 ft. lbs. (73-80 N·m).
18. Fill the pump case half full of the same oil used in the hydraulic reservoir (see operator's manual) through the case drain hole (11), Figure 23, and plug the hole until installation is completed to prevent losing this oil.

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