# SERVICE MANUAL

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

SPERRY NEW HOLLAND


# 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.**

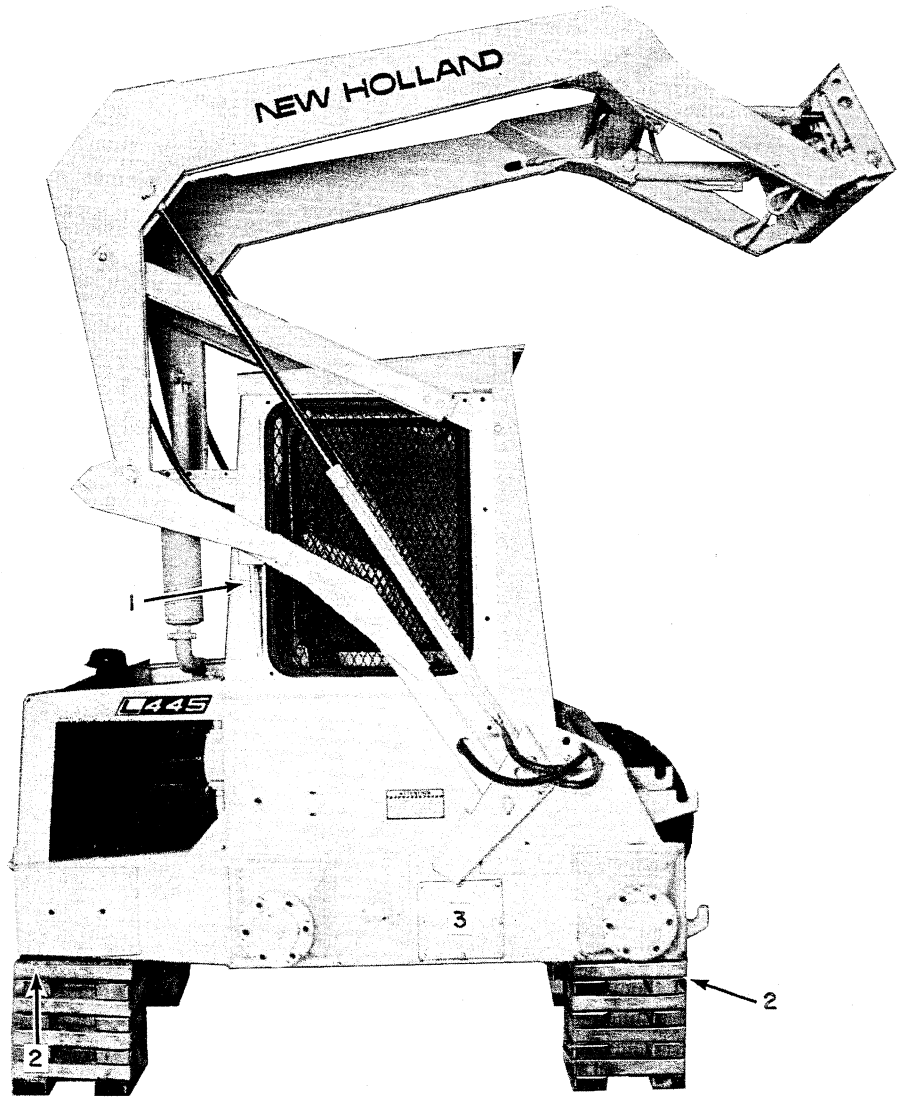



FIGURE 3

# SECTION 2
# HYDROSTATIC TRANSMISSION PUMPS

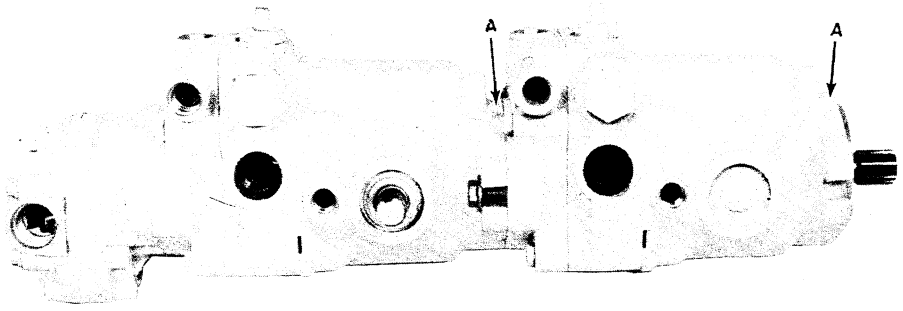



FIGURE 21

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.

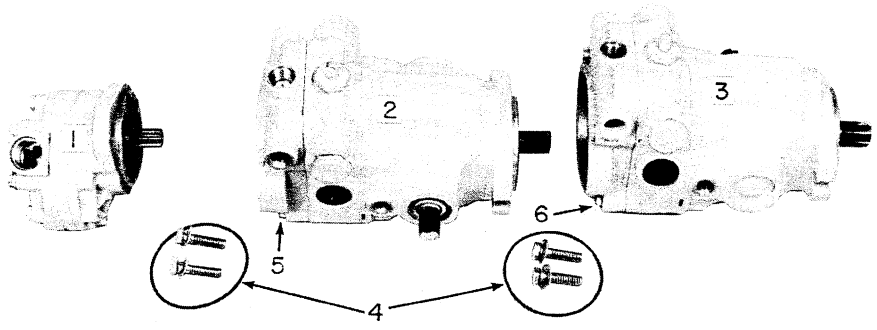



FIGURE 22

# SECTION 3
# HYDROSTATIC MOTORS

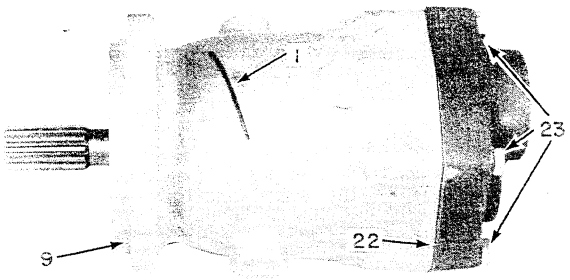



FIGURE 39

## HYDROSTATIC MOTOR DISASSEMBLY

1. Thoroughly clean the outside of the motor housing before disassembly. Figure 39 shows a complete motor assembly with (1) pointing to an orientation mark used to properly install the motor on the loader chain case. Six bolts (23), Figure 39, fasten the back plate assembly (22) to the housing (9).
2. Remove the six cap screws (23) from the back plate assembly (22), Figure 40. Tap the back plate assembly with a plastic mallet to loosen it from the housing (9).
3. Then remove the back plate assembly. Put a hand over the opening in the housing and turn the housing opening down so the rotating block assembly will slide out intact.

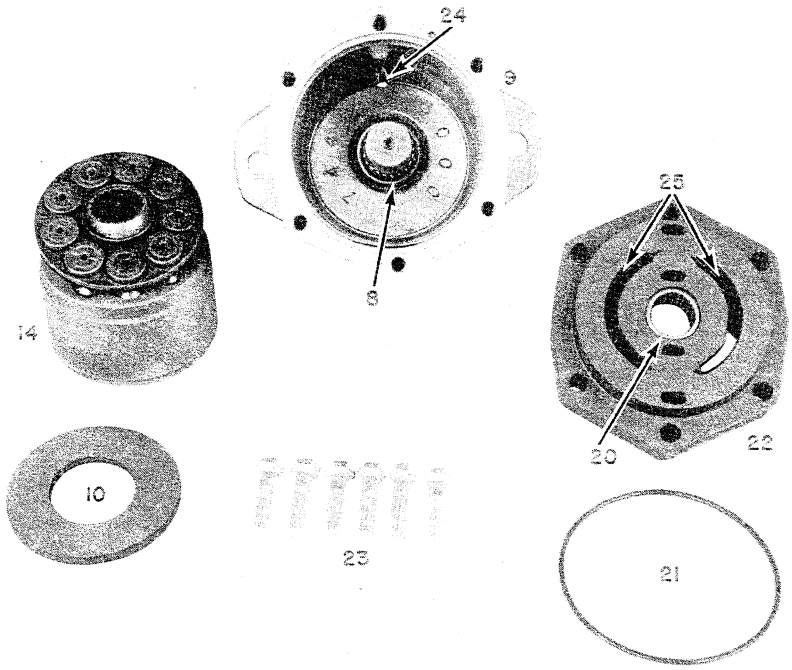



FIGURE 40

# SECTION 5
# START-UP PROCEDURE AFTER TRANSMISSION OR PUMP OVERHAUL

To reinstall the hydrostatic drive and hydraulic gear pump, reverse the procedures outlined in Section 1, "Transmission Removal". When tightening the hardware that passes through the rubber transmission mounts (used on later production loaders), be sure to support the weight of the transmissions so the hardware is properly aligned. If the loader is equipped with an engine-to-transmission chain coupler, this coupler **must be** properly aligned to assure adequate coupler life. See Section 7, "Chain Coupler or Drive Shaft Removal and Installation".

It is recommended that a new gasket be used when installing the hydrostatic motors. The gasket should be coated on both sides with a thin film of silicone sealant. Excessive use of sealant may contaminate the hydraulic system. Install the bolts used to retain the hydrostatic motors with the bolt heads inside the chain cases. Use silicone sealant beneath the bolt heads.

1. The following torque values are required on these transmission components:
   A. Cap screws retaining hydrostatic motors — 82 ft. lbs. (111 N·m). Torque is for unplated hardware.
   B. Cap screws retaining drive sprocket on piston motor — 27-31 ft. lbs. (37-42 N·m).
   C. Cap screws holding the two piston pumps together and holding the gear pump to the tandem hydrostatic pump assembly — 27-31 ft. lbs. (37-42 N·m).
   D. 5/16" cap screws holding charge pump and adapter plates to the hydrostatic pumps — 18 ft. lbs. (24 N·m).
2. Install and adjust all control linkages as covered in Section 6, "Steering Control Adjustment".
3. Install two new hydraulic filters (charge line and return line) and clean the gear pump strainer. Flush the chain case reservoirs with a suitable solvent if contamination is noted in these areas.
4. Fill the hydraulic reservoir with an approved oil as listed in the operator's manual. If the hydraulic oil is to be reused, make certain it is filtered through a 10 micron filter before reusing.

   Make sure the loader is jacked up and securely blocked so all four wheels clear the ground. **CAUTION: ADEQUATE BLOCKING AND/OR JACK STANDS SHOULD BE USED TO INSURE THAT THE LOADER IS SAFELY SUPPORTED WITH ALL FOUR WHEELS OFF THE GROUND.**

5. Gasoline or L.P. engines: Remove the coil wire and turn the engine over for 15 seconds. Diesel engines: Shut off the fuel flow to the injector pump and turn the engine over for 15 seconds.

   This procedure enables the charge pump and gear pump to pick up the oil before start-up.
6. Replace the coil wire on gas or L.P. units or return the fuel flow to the injectors on diesel units. Place the steering levers in neutral position. Start the engine and run at low idle. The charge pump should immediately pick up oil and fill the transmission system. As soon as the charge pressure oil is over 50 psi (3.4 bar), the charge light will go out. Normal charge pressure is 90-150 psi (6.8-10.2 bar).

   *IMPORTANT: If this light remains on while the engine is running for more than a few seconds or blinks on excessively during normal operation, cease operation and determine the cause of the lack of charge pressure (see trouble shooting chart). Failure to cease operation with a lack of charge oil could cause catastrophic failure of the transmissions.*

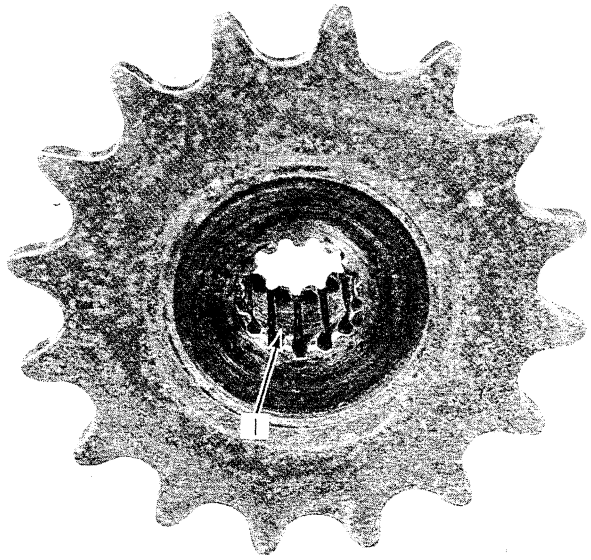
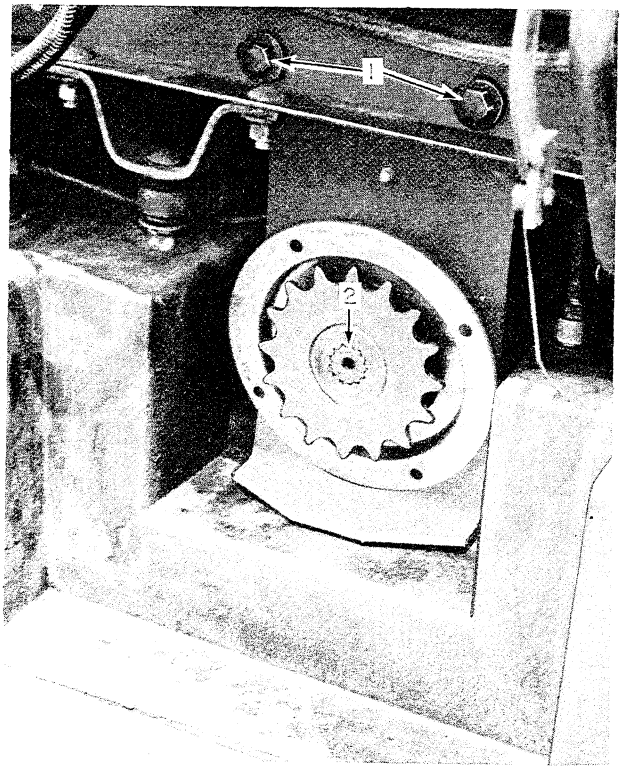



FIGURE 66

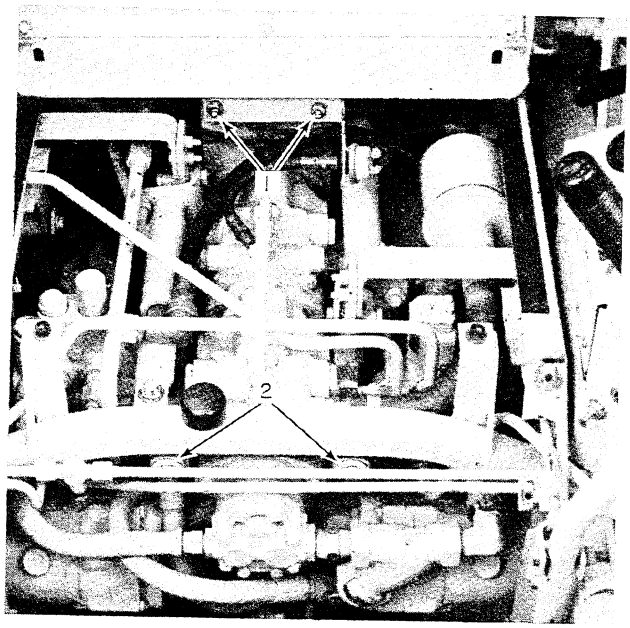
A. Slide the cover, felt seal, key and engine sprocket on the crankshaft.

B. Slide the cover, felt seal, and transmission sprocket on the transmission pump shaft before reinstalling the transmission pump assembly.

**NOTE: Use a graphite base grease to grease the transmission pump shaft splines before reassembly.**




*SAFETY SHIELDS REMOVED FOR CLARITY.* FIGURE 67




*SAFETY SHIELDS REMOVED FOR CLARITY.* FIGURE 68

C. Bolt the pump assembly in the frame loosely at the front and rear hanger bolts. These bolt holes are slotted to permit movement of the pump assembly to align the engine and transmission sprockets.

D. Check the two sprockets for proper alignment as follows:

1. The valleys of all sprocket teeth on both sprockets should be even all the way around the sprockets. If this is not the case, the rear transmission support will have to be loosened and moved up or down, left or right, to attain alignment. See bolts (1), Figures 67 and 68.

2. The flat surfaces of both sprockets should come together with no more than 0.015" gap at the teeth area. If not, the front end of the transmissions must be moved up or down, left or right, to achieve alignment. See bolts (2), Figure 68. Tighten the mounting bolts when sprockets have been aligned.

3. Check that the sprocket on the pump shaft has full spline engagement but the crankshaft does not protrude beyond the end of the sprocket on the engine side. See (2), Figure 67.

4. Install the chain and master link. Work grease into the chain thoroughly at this time.

B. **Inspect Parts for Wear**

1. Remove nicks and burrs from all parts with emery cloth.
2. Inspect inside diameter of barrel for excessive scoring and wear.
3. Inspect piston rod for scratches and nicks.
4. Inspect inside diameter of bearing for scoring or excessive wear.

C. **Reassembly**

1. All parts should be cleaned and dried thoroughly. Metal parts should be lightly oiled prior to assembly.
2. Install new shaft seal in bearing I.D. Install new shaft wiper seal (5), Figure 80, in bearing with lip facing outward.
3. Install new O-ring and back-up washer on O.D. of bearing. Install back-up washer on side of O-ring nearest threaded end of bearing. See Figure 80.
4. Oil inside of bearing liberally and slide over piston rod.
5. Install O-ring in groove on O.D. of piston (2), Figure 80.
6. Install Teflon piston ring over O-ring by carefully working Teflon ring over piston and into the groove. The Teflon ring will stretch as it is installed on the piston and it must be compressed after installation to help it return to its original size. It is suggested that a hose clamp could be used as a field tool to compress the piston ring. Do not damage Teflon ring with the clamp.
7. Install the piston on the piston rod and retain with lock nut, torque lock nut to 50-60 ft. lbs. (67-81 N·m). Use a liberal amount of Loctite sealant between the piston and piston rod at (6), Figure 80. This will seal the rod to the piston.
8. Oil piston liberally and insert in barrel I.D.
9. Slide piston into barrel until bearing can be inserted into barrel. Push bearing in until retaining ring can be inserted into groove. Install the retaining ring.
10. Pull on piston rod to seat bearing against retaining ring. Install bearing nut and torque to 50-55 ft. lbs. (67-74 N·m).

## GENERAL INFORMATION

Cycle cylinder and check for leaks. The replaceable sleeve bearings used on either end of the boom and bucket cylinders are shown at (1), Figure 81. When a cylinder is rebuilt, these bearings should be inspected for wear and replaced if necessary. The bearings can easily be removed with a hammer and punch. New bearings should be greased with graphite grease on the inside diameter before cylinder installation on the loader.

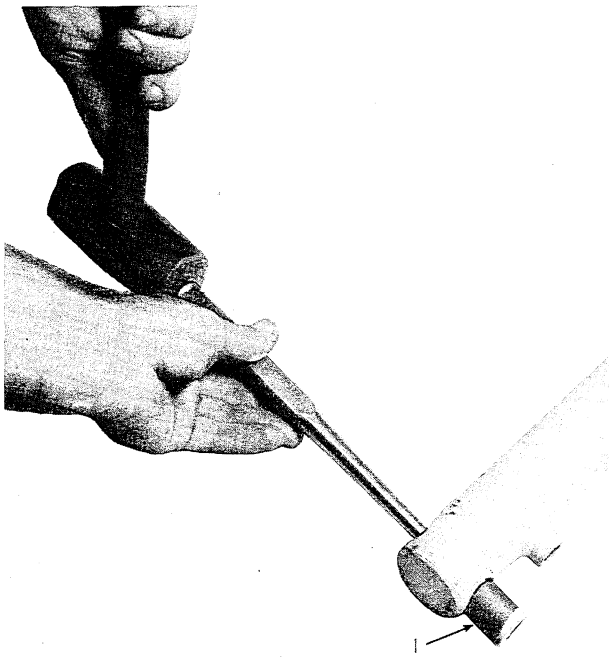
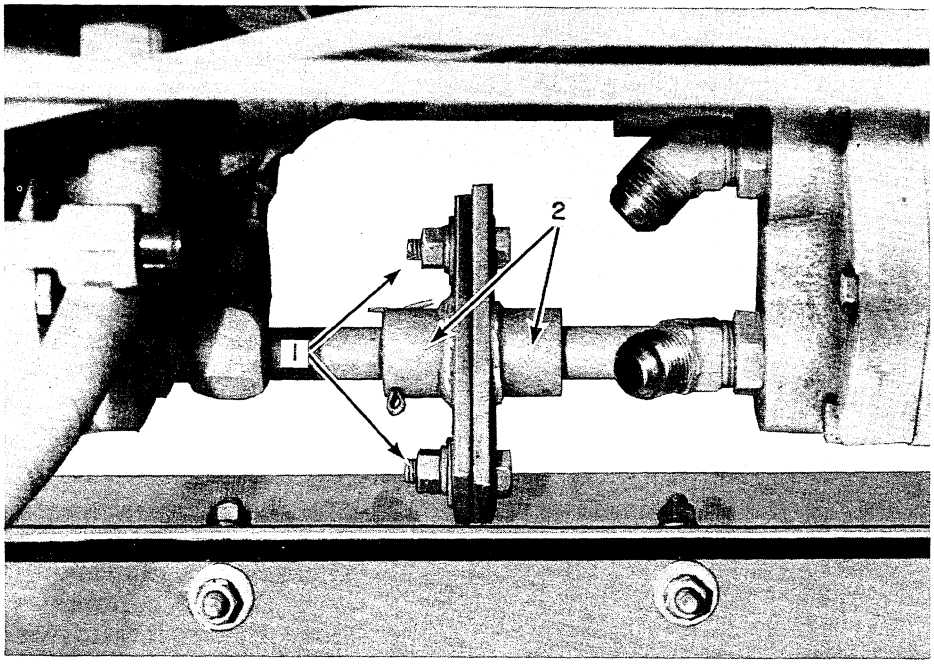


FIGURE 81

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




*SAFETY SHIELDS REMOVED FOR CLARITY.*

FIGURE 106

3. The jack shaft parts are shown in Figure 107. The #50 chain sprocket (54-tooth) (1) and #60 driver sprocket (12-tooth) (2) ride on the splined shaft (3). The sprockets are held on by two snap rings (4) and the shaft is supported by the two bearings (5) in the bearing housings (6).

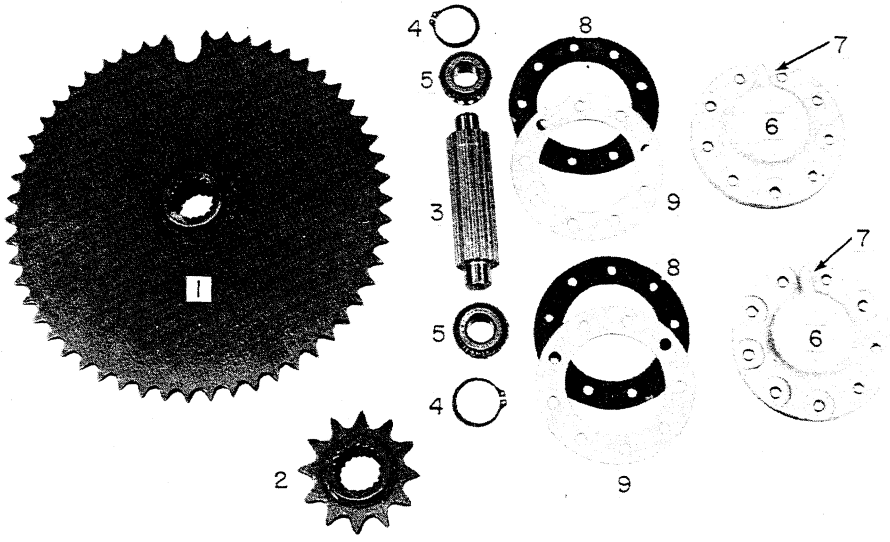
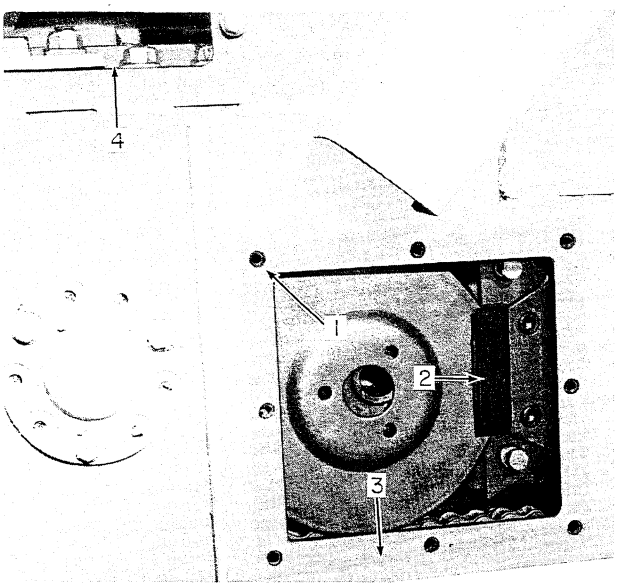
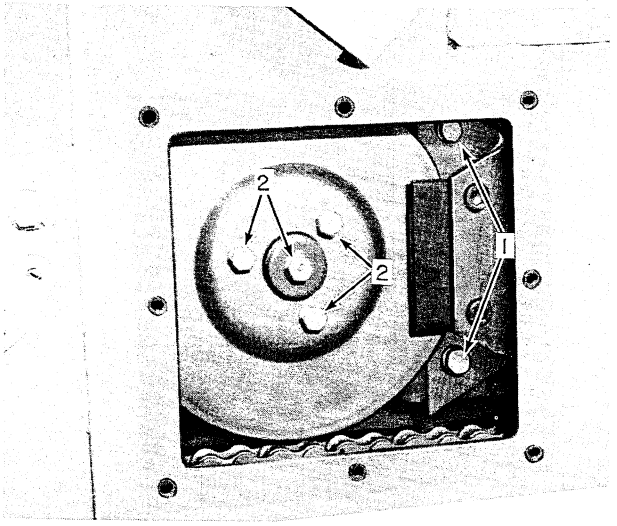



FIGURE 107




*SAFETY SHIELDS REMOVED FOR CLARITY.* FIGURE 127




*SAFETY SHIELDS REMOVED FOR CLARITY.* FIGURE 128

**NOTE: Older model loaders were equipped with 5/16" cap screws. If these cap screws are used, torque them to 15-18 ft. lbs. (20-24 N·m).**

To install the brake disc:

1. Use a drift-punch and insert it through one hole in the brake disc. Slide the shims required over the punch.
2. Insert the disc in the lower part of the center access hole at (3), Figure 127. Move to the upper corner at (1) and slide into the brake pads at (2).
3. Use the punch to line up the holes and insert the three bolts at (2), Figure 128. Insert center sprocket bolt and torque to 15-18 ft. lbs. (20-24 N·m). After the bolts are tightened, check behind the brake disc to assure that no shims were lost in the chain case during installation.
4. Torque brake bracket bolts (1) Figure 128, to 25-31 ft. lbs. (34-42 N·m).

D. Adjust the brake to achieve the desired handle force and stopping capability by rotating the end of the brake control handle.

E. Install the access covers using new gaskets and a minimum amount of silicone sealant or other suitable non-hardening gasket cement.

9. Starting the loader after final drive repair.

A. Fill the hydraulic reservoir with an approved oil (see operator's manual). Install the wheels and torque lug bolts to 150 ft. lbs. (203 N·m). If the transmissions were also removed, check the transmission start-up procedure of this manual.

B. Prepare to start the loader by connecting the battery and installing the seat and fuel tank.

C. **Final Drive Chain Tensioning.**

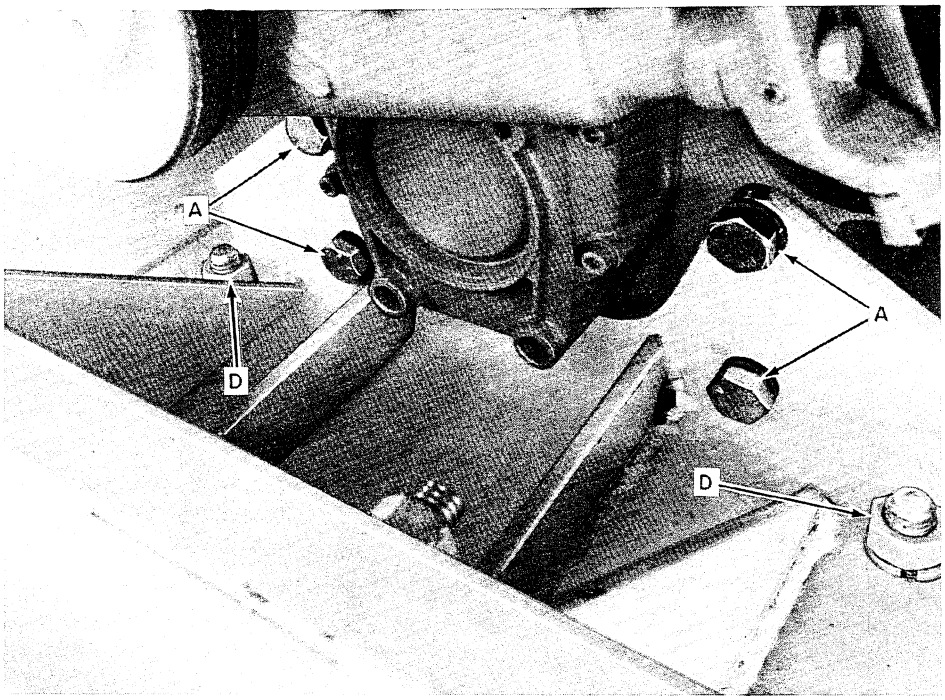
The final drive chains should be adjusted to remove excessive slack. The proper way to insure all excessive slack is removed is to lift both the wheels off the ground on one side. Rotate the wheels in opposite directions until the chain is tight while holding the rear wheel stationary. See Figure 129. Rotate the front wheel to determine the chain slack. This chain slack should be checked at four different positions by rotating the wheels and checking slack at 0°, 90°, 180°, and 270° to find the position with the least amount of chain slack. At this tightest point the front wheel should rotate ¼" (6.5 mm) or less with the rear wheel held stationary. If the movement is more than ¼" (6.5 mm), the chain should be tightened.

Two methods can be used to tighten the final drive chains, depending on the service equipment available.

# SMALL FRAME LOADER
## TROUBLE SHOOTING CHART

| SERVICE PROBLEM | PROBABLE CAUSE | CORRECTION |
|---|---|---|
| I. Loader will not function —only engine runs. Transmission charge light stays on. | A. Main coupler from engine to pump assembly failed. | Check to see if engine output shaft is turning but input pump shaft is not. Remove and repair chain type coupler. Coupler can be replaced with drive shaft. |
| | B. Low oil level in reservoir. | Check reservoir for proper oil level and type of oil. Check for leaks, loose fittings and/or hoses and hose clamps. |
| | C. Plugged charge line filter and/or plugged inlet screen. | Remove and replace charge filter (no bypass type). Remove and clean inlet screen in suitable solvent. |
| II. Loader will not move yet boom and bucket operate properly. | A. Transmission control linkage loose or misadjusted. | Check steering linkage back to the transmission pintle shafts for proper hardware torque. Be sure square key is in keyway on pintle shafts. Adjust linkage properly. |
| | B. Winching valves turned to "winch" position. | Winching valves should be turned straight in line from front to rear of machine. This is the operating position. See loader operator's manual "Winching Valve" section. |
| | C. Internal failure of hydrostatic transmission. (Charge pressure light blinks on). | Check charge pump for proper pressure. See "Loader Start-up" section of this manual. If no or low pressure, check for loose charge pressure relief valve in charge pump inlet. Check for scored or faulty gerotor assembly. |
| | | Check high pressure output of hydrostatic pump. See the following section on "Transmission Trouble Shooting". |
| | D. Final drive chain failure. | Turn the winching valves to the "winch" position; release brake and see if the wheels can be rotated by hand (two persons may be needed). Both wheels on one side should turn together. If one wheel turns only or the wheels appear to be locked, open the center inspection cover on the chain case and check for final drive failure. See "Final Drive Repair" section of this manual. |
| **Refer to the operator's manual for other service and trouble shooting tips.** | | |

# SECTION 13
# DEUTZ ENGINE




*SAFETY SHIELDS REMOVED FOR CLARITY.*

FIGURE 145

## DEUTZ ENGINE INSTALLATION PROCEDURE

When reinstalling a Deutz engine in an L-445 or when a vibration problem is noted follow the following procedure.

### A. L-445 with F2L-411D Deutz Engine

L-445 diesel loaders built prior to s/n 528284 are equipped with F2L411 Deutz engine and engine mounts:

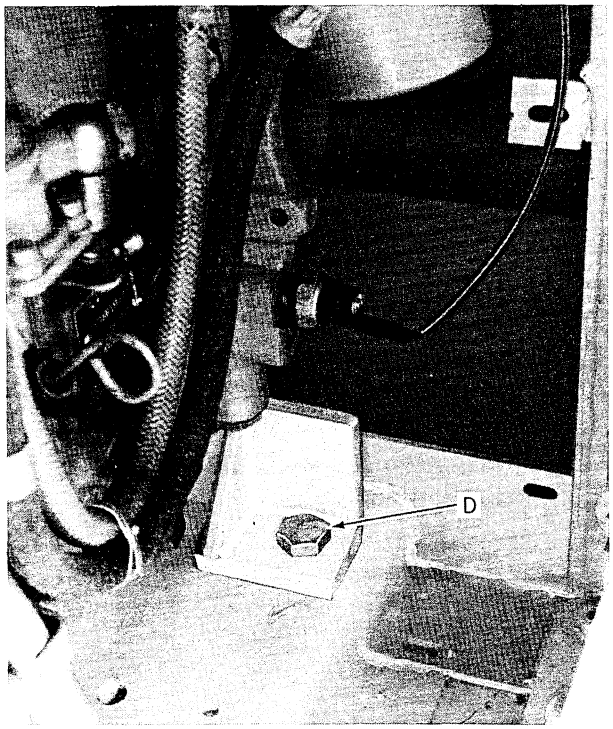
Rear - #267900
Front - #267898 replaced by #718978

#267900 and #267898 old style mounts utilize a flat plate with two steel blocks welded to each plate for hold-down bolts.

### Bolt Tightening Procedure F2L411D

The fuel tank must be removed prior to starting this procedure.

1. Loosen four mounting bolts, D, Figures 145 and 146.
2. Tighten bolts, A, Figure 145, bolts, B and C, Figure 147, holding the mounting plates to the engine.
3. Torque four mounting bolts, D, Figures 145 and 146, to 140 ft. lbs. (190 N·m).




*SAFETY SHIELDS REMOVED FOR CLARITY.*

FIGURE 146

# 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.