3805 AND 3807 KNUCKLEBOOM LOADERS

JOHN DEERE

TECHNICAL MANUAL

3805 AND 3807 KNUCKLEBOOM LOADERS

TM1028 (01APR70) English

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ENGLISH

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3805–3807
Knuckleboom Loaders
Technical Manual
TM-1028 (Apr-70)

CONTENTS

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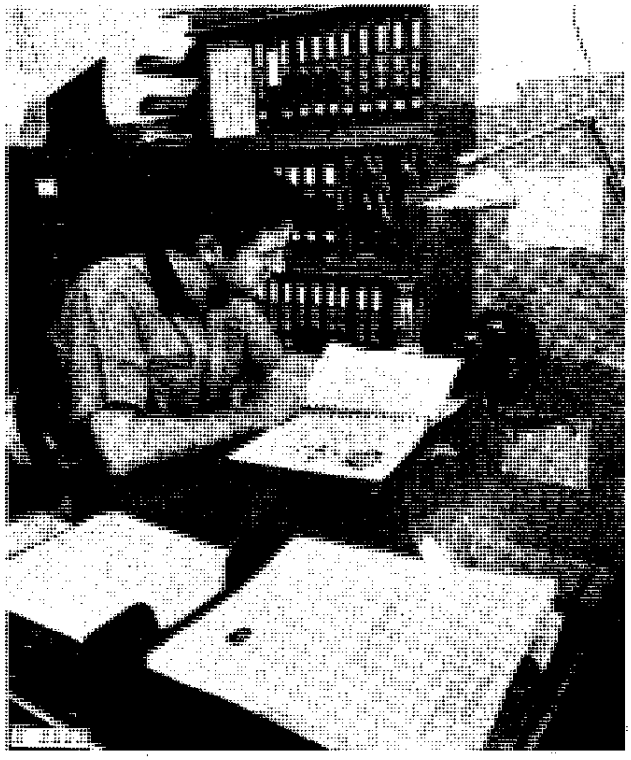
INTRODUCTION



Use FOS Manuals for Reference

Use Technical Manuals for Actual Service

This technical manual is part of a twin concept of service:

- **FOS Manuals—for reference**
- **Technical Manuals—for actual service.**

The two kinds of manuals work as a team to give you both the general background and technical details of shop service.

Fundamentals of Service (FOS) Manuals cover *basic* theory of operation, *fundamentals* of trouble shooting, *general* maintenance, and *basic* types of failures and their causes. FOS Manuals are for training new men and for reference by experienced men.

Technical Manuals are concise service guides for a *specific* machine. Technical Manuals are on-the-job guides containing only the vital information needed by a journeyman mechanic.

When a serviceman should refer to a FOS Manual for more information, a FOS symbol like the one at the left is used in the TM to identify the reference.

Some features of this technical manual:

- *Table of contents at front of whole manual*
- *Contents at front of each Section*
- *Specifications at end of each Group*
- *Special tools at end of each Group*

This safety alert symbol identifies important safety messages in this manual. When you see this symbol, be alert to the possibility of personal injury and carefully read the message that follows.

This technical manual was planned and written for you—a journeyman mechanic. Keep it in a permanent binder in the shop where it is handy. Refer to it whenever in doubt about correct service procedures or specifications.

Using the technical manual as a guide will reduce error and costly delay. It will also assure you the best in finished service work.

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Thanks very much for your reading,

Want to get more information,

Please click here, Then get the complete manual

NOTE:

If there is no response to click on the link above, please download the PDF document first, and then click on it.

Have any questions please write to me:
admin@servicemanualperfect.com

Section 10
GENERAL

CONTENTS OF THIS SECTION

Group 5
SPECIFICATIONS

Truck Mounting (3805 Behind-Cab or Mid-Mounted)	Bolts to truck frame channel in 14-inch space immediately behind cab
(3807 Bob-Tail)	Mounting frame integral with main frame. Brackets supplied for universal mounting
Booms (3805 and 3807)	20 ft. 6 in. reach with self-loading type booms
Boom Rotation	400°
Grapple Rotation (Pulp)	270°
(Log)	270°
Grapple Capacity	1/3 Cord or 40-inch log
Lifting Capacity in Grapple at Maximum Reach	3,000 lbs.
Maximum Reach (Boom parallel to ground)	20 ft. 6-in.
(Grapple on ground)	19 ft. 0-in. (3805) 19 ft. 11-in. (3807)
Maximum Loading Height	28 ft. 8 in. (3805) 26 ft. 1 in. (3807)
Stabilizer Spread (3805)	9 or 10 ft. (adjustable)
(3807)	14 ft.
Maximum Depth Below Ground (3805)	7 ft. 8 in.
(3807)	10 ft. 3 in.
Pump Capacity at 2000 rpm	33 gpm
Pump Power Requirements	55 HP
Hydraulic System Operating Pressure	2250 psi
Hydraulic Cylinders	
Boom Swing	4 x 25.6-in. single-acting
Boom Lift	5 x 42-in. double-acting
Stick	5 x 42-in. double-acting
Grapple Rotation	2-1/2 x 5-1/2-in. single-acting
Grapple Close	3-1/2 x 10-in. double-acting
Stabilizers (3805)	4 x 11-in. double-acting
(3807)	4 x 27-1/4-in. double-acting
Dimensions	
Overall Height	33 ft. 4 in. (3805) 30 ft. 9 in. (3807)
Overall Width	7 ft. 10 in. (3805) 7 ft. 2 in. (3807)

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Group 10
LUBRICATION

GENERAL INFORMATION

Carefully written and illustrated lubrication instructions are included in the operator's manual furnished with your customer's machine. Remind him to follow these instructions.

For your convenience, the following chart shows capacities and types of lubricants for the knuckleboom Loader. Following the chart are specifications for types of lubricants to use.

Capacity	Component	Type of Lubricant	Interval of Service
Grease fittings	. . . . .	SAE Multipurpose-Type Grease	See Operator's Manual
Hydraulic system	U.S. quarts	John Deere Type 303 Special-Purpose Oil (or its equivalent) Automotive Automatic Transmission Fluid	Check daily drain and refill once a year

GREASES

S.A.E. multipurpose-type grease is recommended for all grease fittings. Apply grease carefully to avoid excessive lubrication. Dirt collects on excessively greased parts and increases wear. Wipe dirt from fittings before greasing and replace any that are lost or damaged.

HYDRAULIC OILS

Use only the oil shown in the temperature-oil chart in the Knuckleboom Loader hydraulic system. Other types of oil will not give satisfactory service and may cause damage.

TEMPERATURE-OIL CHART		
Air Temperature	John Deere Type 303 Special Purpose Oil	Automotive Automatic Transmission Fluid
Above 90°F.	X	..
60 to 90°F	X	X
32° to 60°F.	X	X
-10° to 32°F.	X	X
Below-10°F.	..	X

STORING LUBRICANTS

The Knuckleboom Loader can operate at top efficiency only if clean lubricants are used. Store lubricants in clean containers in an area protected from dust, moisture, and other contamination.

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Section 20
HYDRAULIC SYSTEM

CONTENTS OF THIS SECTION

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Group 5
GENERAL INFORMATION, TEST, AND DIAGNOSIS

GENERAL INFORMATION

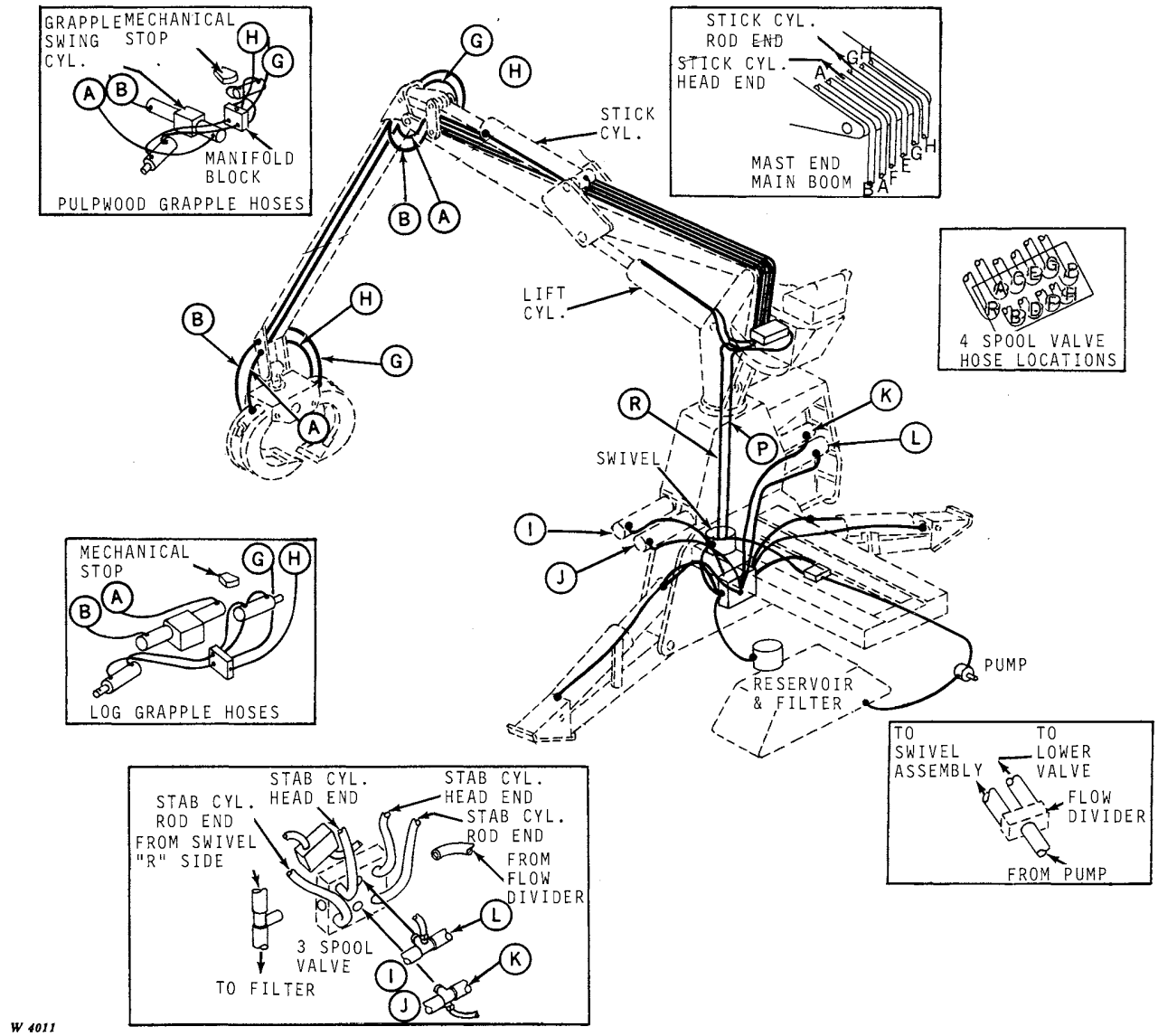

Fig. 1 Hydraulic Components

A RESERVOIR mounted on the truck contains oil for the hydraulic system.

FILTERING is accomplished at the reservoir by a micronic filter element. This unit filters return oil from the hydraulic system.

The HYDRAULIC PUMP is a positive displacement, non-reversible, gear-type pump. The pump operates off the truck engine PTO and is connected by a drive coupling on the end of the drive shaft.

The exclusive hydraulic system incorporates a ROTARY SWIVEL and two control valves. The upper CONTROL VALVE controls the boom, stick, and grapple functions.

The lower three spool uni-body CONTROL VALVE controls the boom swing and stabilizer functions. A flow divider is used between the pump and the control valves and the priority port routes 10 gpm of oil to the boom swing function at all times.

System RELIEF VALVES are provided in both valves and circuit relief valves are also used to protect components from damage due to excessive pressures.

Double-acting CYLINDERS are used for all functions except boom swing and grapple swing. Opposing single-acting cylinders are used for the swing functions. The swing cylinders are cushioned at the end of stroke by restricting return oil through drilled orifices in the cylinder barrels.

DIAGNOSING KNUCKLEBOOM LOADER MALFUNCTIONS

All Functions Slow or Inoperative

Cold oil.
Operate to warm up oil.

Air in system.
Operate to bleed.

Engine speed.
Check engine rpm.

Foaming oil.
Low oil in reservoir. Air leak in suction line. Dented suction line. Wrong oil viscosity.

Worn or damaged pump.
See Test and repair pump Group 10.

Dirty filter
Replace or clean filter.

Oil viscosity.
See Section 10, Group 10.

Pump drive failed.
Inspect and repair.

Contaminated system.
Replace oil and check filter.

Oil heating.
Return valve to neutral when function reaches end of stroke. Incorrect relief valve pressure, see Group 5. Wrong oil viscosity. Dirty oil. Line restriction (inspect lines).

Either Upper or Lower Control Valve Functions Slow or Inoperative

Flow regulator not operating properly.
Test and repair, Group 45.

System relief valve not operating.
Test, clean, or replace, Group 5.

Excessive leakage in control valve.
Test and repair, Groups 35 and 40.

Individual Functions Slow or Inoperative

External leakage.
Check lines, fitting and cylinders for leakage and repair.

Internal leakage.
In the control valve, test and repair, Group 5.

Oil leaking past cylinder packings.
Refer to Group 20.

Circuit relief valve (excessive leakage or incorrect pressure).
Test and repair, or replace, Group 5.

Spool sticking.
Remove section and repair, Group 35.

Linkage binding.
Adjust linkage, Group 35.

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TESTING HYDRAULIC SYSTEM

Operational Tests

Checking Oil Lines and Hoses

Check all oil lines, hoses and connections for leaks. Oil leaks in the pressure side of the system can be located by carefully inspecting the external area of the connection and fittings.

Check the suction side of the system for leaks by examining the oil in the reservoir. If air is being drawn into the system, the oil will contain air bubbles and appear foamy.

Inspect all tubing. Defective tubing can cause oil foaming, heat, faulty Knuckleboom Loader operation and pump failure. Replace damaged tubing immediately.

Checking Control Valve for Leakage

The control valve spools may become worn allowing oil to leak past them. Check the valves for leaks as follows:

1. Raise the grapples a few feet off the ground. Shut off the power unit.

2. Disconnect the return line between the control valve and the reservoir at the control valve.

If the boom settles and oil is leaking past the spools, oil will leak from the control valve.

Connect return line and lower the grapples to the ground.

Test lift check valves for leakage as follows:

1. Start the power unit.

2. Raise the grapples a few feet off the ground and return the boom lever to neutral position.

3. Slowly move the control lever back to the raise position. If the boom settles before it starts to rise, the lift check is probably leaking. Repeat the check with the stick valve section.

Checking System Relief Valves

Install pressure gauge between control valve and pump. With engine at fast idle and hydraulic oil at operating temperature, actuate a control valve lever so the cylinder reaches the end of its stroke and system operates over relief.

1. Extend the stick cylinder and operate over relief. If pressure readings exceed or do not reach specifications, replace system relief valve cartridge in four-spool upper control valve.

2. Bottom stabilizer cylinders and operate over relief. If pressure reading exceeds or does not reach specifications replace system relief valve cartridge in lower three-spool control valve.

Checking Cylinders for Internal Leaks

The boom, stick, grapple (open-close), and stabilizer cylinders are all double-acting.

Refer to chapter 12 of FOS-10, HYDRAULICS, for cylinder testing procedure.

Checking Hydraulic Pump Performance (Cycle Times)

Check oil lines, control valve and cylinders before checking the pump. To obtain correct cycle times, the oil should be at normal operating temperature and the pump at specified rpm.

Check cycle times with a stop watch and refer to specifications for the correct times.

If the cycle times are above the maximum readings given in "Specifications" the pump is probably faulty and should be repaired.

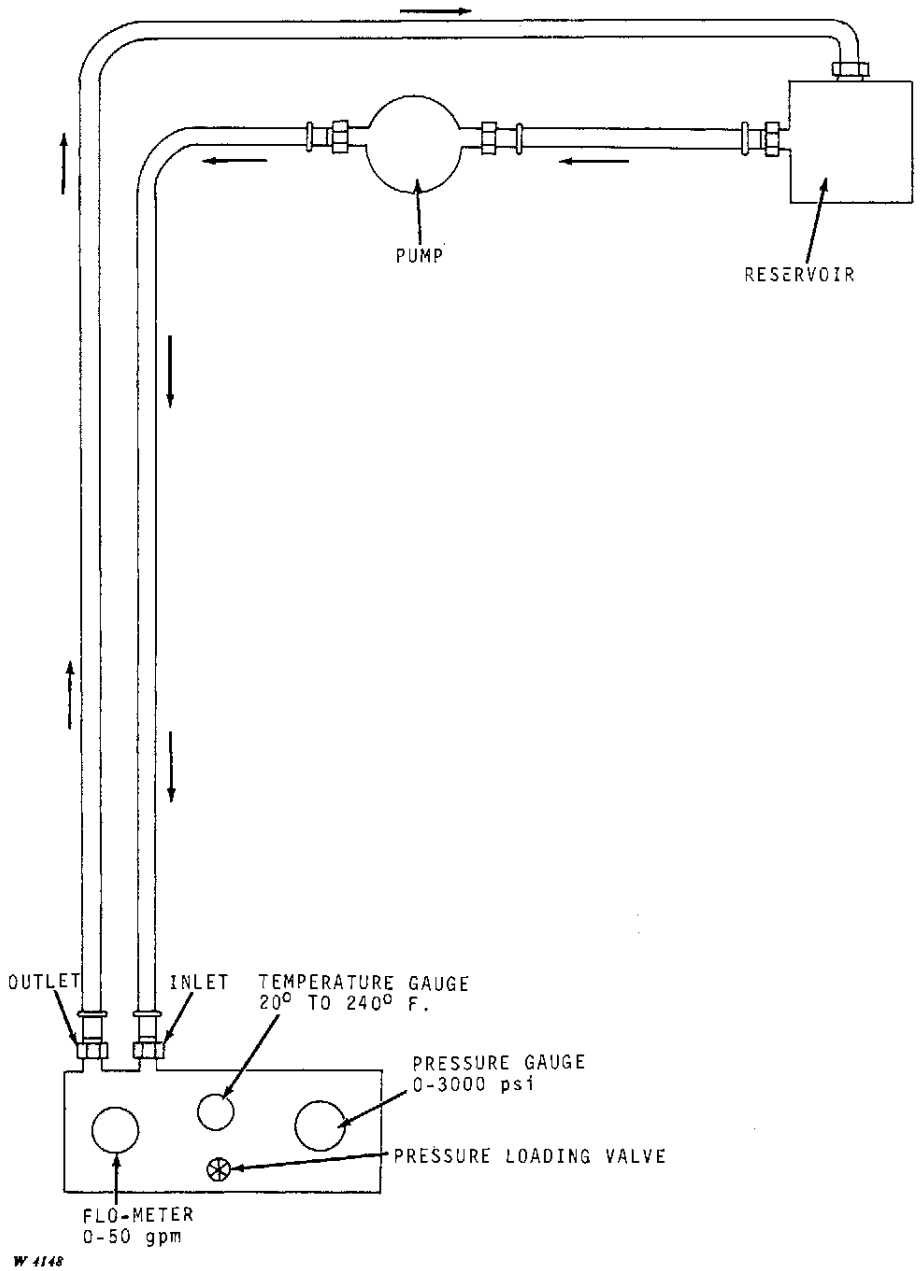


Fig. 2-Hydraulic Tester Hookup to Check Pump Output

Hydraulic Tester Tests

Use a hydraulic tester capable of measuring 50 gpm.

Before proceeding with these tests, read the operating and instruction manual furnished with each hydraulic tester and review the Knuckleboom Loader hydraulic system. Also refer to the Knuckleboom Loader functions diagnosis (page 5-3) for an orderly process of eliminating the most likely trouble first.

The "pump test" checks the pump flow at rated pressure.

The "circuit test" checks the operation of the control valve, relief valves, and cylinders.

Make a preliminary check of the hydraulic system oil supply, oil lines, and cylinders and the usual inspection for external leaks before installing the hydraulic tester.

Install new filter element before testing.

Hydraulic Pump Test

Connect hydraulic tester for pump test as shown in Fig. 2.

IMPORTANT: Always open pressure control valve before testing system.

Start power unit and slowly close tester loading valve to load system slightly until normal operating temperature is reached (see Specifications, Page 8.)

Use a strobemeter or similar tool to set engine rpm so PTO and pump are operating at the correct speed. (See Specifications).

Make all tests at normal operating temperatures because as oil heats it becomes thinner and discloses any internal leakage.

Open loading valve to read maximum pump flow at zero pressure.

Close loading valve slowly to increase pressure and record flow at 250 psi increments from zero to maximum system pressure.

Open tester loading valve until maximum pump flow is again at zero pressure.

The decrease in flow from zero pressure to maximum pressure is used to determine the pump condition (efficiency). A pump that delivers a constant low flow at zero pressure and at maximum pressure indicates suction problems.

The pump flow at full pressure must be at least 75 percent of flow at zero pressure. (See Specifications).

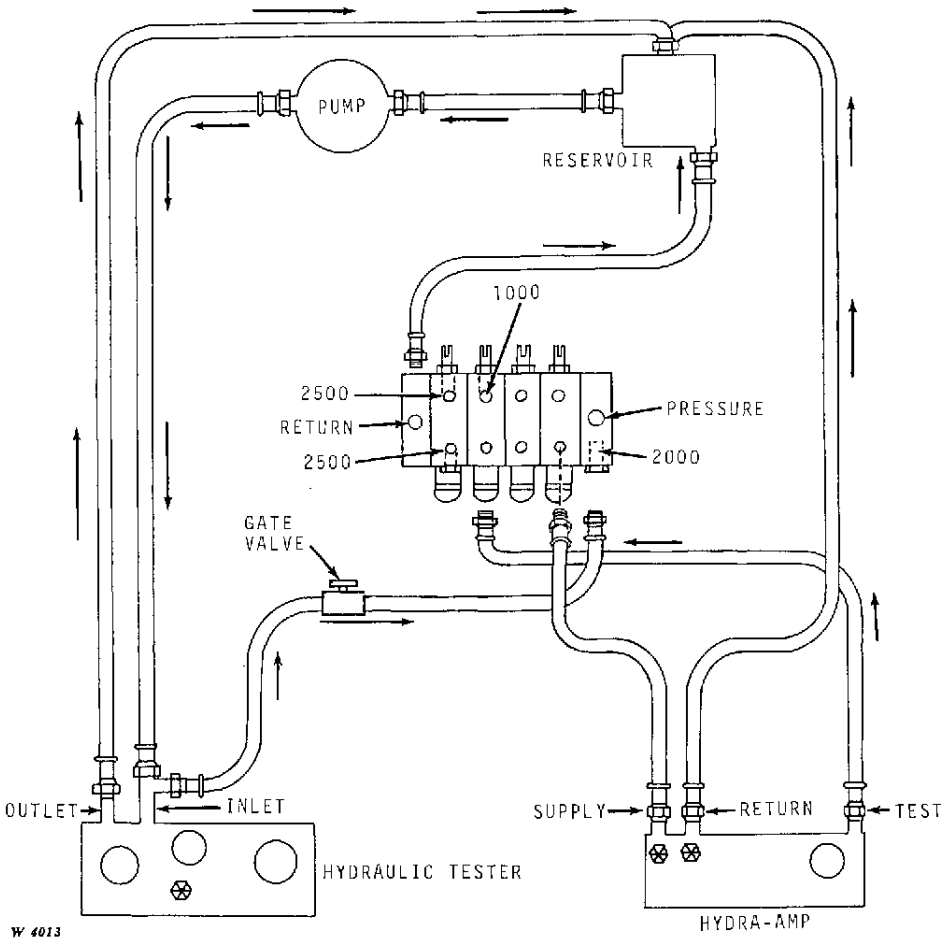


Fig. 3-Hydra-Amp Hookup to Test Circuit Relief Valves

Hydraulic Circuit Tests

Connecting Hydra-Amp to Knuckleboom Loader

NOTE: Both a hydraulic tester and a Hydra-Amp tester are required to test the circuits. The Hydra-Amp is used to test the setting and leakage rate of cartridge-type relief valves, see Special Tools. The hydraulic tester is used only to record gpm and the oil temperature.

Connect hose from test port of Hydra-Amp to work port of control valve having the circuit relief valve to be tested (Fig. 3).

Connect supply hose into any work port of control valve which does not have a circuit relief valve.

The return hose from Hydra-Amp must be placed into hydraulic filler opening in the reservoir.

Circuit Relief Valve Setting

Start power unit and slowly close hydraulic tester loading valve to load system slightly until normal operating temperature is reached (see "Specifications"). Make all tests at normal operating temperature.

Operate truck engine at rpm required to produce flow (gpm) recommended by relief valve supplier's specifications (see Specifications).

IMPORTANT: Open gate valve before closing hydraulic tester loading valve.

Close pressure loading valve of hydraulic tester fully by turning it clockwise.

Retract Hydra-Amp cylinder by opening the supply and return valves. Actuate control valve lever to pressurize the test line. When cylinder rod bottoms, return control valve lever to neutral.

Close return valve on Hydra-Amp.

Actuate the control valve lever to pressurize the supply line. Read pressure gauge during time cylinder is stroking out. This reading is the actual setting of the circuit relief valve being tested. Compare reading with pressure settings for that particular valve (see Specifications).

Circuit Relief Valve Leakage Rate

With Hydra-Amp cylinder rod fully retracted and supply and return valves open, actuate control valve lever to pressurize the supply line.

Adjust return valve until leakage test pressure is reached on gauge (see Specifications).

Observe movement of leakage indicator for one minute (mark at beginning and end of time period with pencil).

NOTE: Valve leakage per minute is the difference between the two pencil marks. Each graduation on scale indicates 1/2 cubic inch. Compare readings to allowable leakage rate (see Specifications) to determine if relief valve is faulty.

Relief Valves

Often relief valves will start to open before they reach their full pressure flow settings. This can be rated by comparing the pressure and flow rate reading made in the circuit test. Any great decrease in flow rate indicates a faulty relief valve.

Faulty system relief valves will affect pressure readings in all tests.

Faulty circuit relief valves will affect only pressure readings in individual circuits.

SPECIFICATIONS

CONTROL VALVE RELIEF PRESSURES

Function	PSI	Test Operating Temperature	Pump Flow GPM	Leakage Test Pressure PSI	Allowable Leakage Cu. In. Per Minute
System relief (upper valve)	2,000	110-120°F.	15	1,800	50
System relief (lower valve)	2,250	110-120°F.	10		
Boom lift	1,000	110-120°F.	15	900	11
Grapple swing	2,500	110-120°F.	3	2,250	1
Boom swing	2,500	110-120°F.	10		

Normal System Operating Temperature Range ..... 160-180°F.
Hydraulic Pump Output at 1800 rpm and 2000 psi ..... 33 gpm

Cycle Times (Pump at 2000 RPM)

Maximum Time in Seconds with New Parts and Without Load

Stabilizer travel time
- 3805 - up 5
- 3805 - down 6
- 3807 - up 13
- 3807 - down 19

Main Boom
- Up 9
- Down 15

Stick Boom
- Up (out) 6
- Down (in) 9

Grapple
- Open 2
- Close 3
- Swing (270°) 4

Boom swing (400°) 12

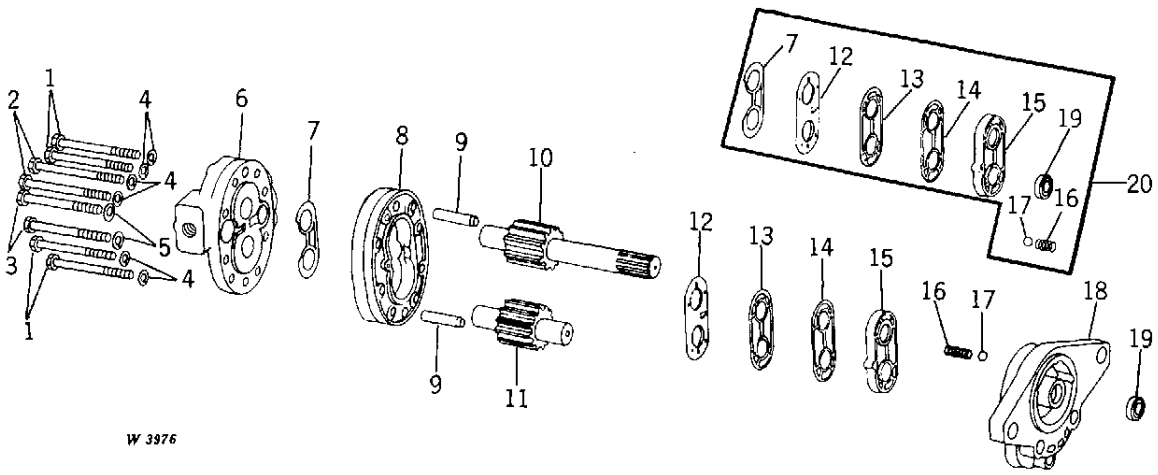
SPECIAL TOOLS

No.	Name	Use
Y950*	Hydra-Amp	Test setting and leakage rate of cartridge-type relief valves

* Order from the Owatonna Tool Company, Owatonna, Minnesota

Group 10
HYDRAULIC PUMP

GENERAL INFORMATION



1-Cap Screw	*6-Back Plate*	*11-Idler Gear*	*16-Check Spring*
2-Cap Screw	*7-Thrust Plate*	*12-Diaphragm*	*17-Steel Ball*
3-Cap Screw	*8-Body*	*13-Backup Gasket*	*18-Front Plate*
4-Lock Washer	*9-Dowel*	*14-Protector Gasket*	*19-Shaft Seal*
5-Lock Washer	*10-Drive Gear*	*15-Diaphragm Seal*	*20-Repair Kit*

Fig. 1-Exploded View of Hydraulic Pump

The 3805 and 3807 Knuckleboom Loader hydraulic pump is a positive displacement, non-reversible, gear-type pump. The pump is driven by the truck PTO through a drive coupling on the end of the drive shaft and operates only when the PTO is engaged.

FOS See "Gear-Type Pumps" in FOS Manual 10, HYDRAULICS, for additional description and theory of operation.

DIAGNOSING MALFUNCTIONS

NOTE: Before checking pump, check oil lines, valve section, and cylinders to be sure they are functioning properly.

NO PUMP OUTPUT

Pump drive shaft disengaged or sheared.
  Check pump disconnect.
  Remove pump and determine damage.
Inlet lines plugged.
Oil viscosity too heavy.
  Drain and add new oil of proper viscosity (see Section 10, Group 10).
Leaking inlet or outlet lines.
  Check for leaks. (It is possible for hoses to leak air in and not leak oil outside.)
  Check reservoir oil level.

LOW PUMP PRESSURE OUTPUT

Worn parts causing internal leakage (see "Specifications" this group).

NOISY PUMP

Clogged inlet hose.
Air leakage in inlet hose.
  Check for leaks.
Shaft oil seal leakage.
  Replace seal.

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REMOVAL

Disconnect oil lines from pump and cap to prevent oil loss and keep dirt from entering hydraulic system. Disconnect driveshaft and remove pump from mounting bracket.

DISASSEMBLY

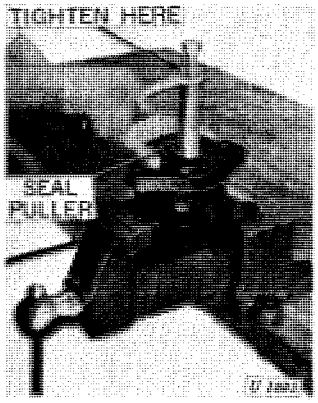

Fig. 2-Installing the Tool

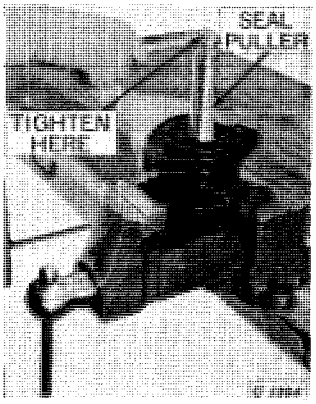

Fig. 3-Removing the Seal

Clean outside of pump thoroughly. Using special seal puller (Fig. 10), remove shaft seal (Fig. 2 and Fig. 3).

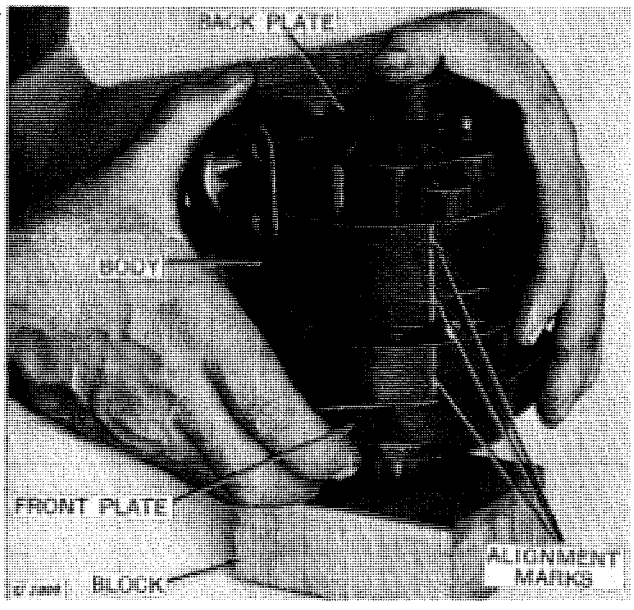

Fig. 4-Separating Front Plate

Remove cap screws from front plate. Note direction of arrow on pump body and scribe a mark on the pump (Fig. 4) to ensure proper reassembly. Separate the front plate from the body by bumping the shaft against a wooden block (Fig. 4).

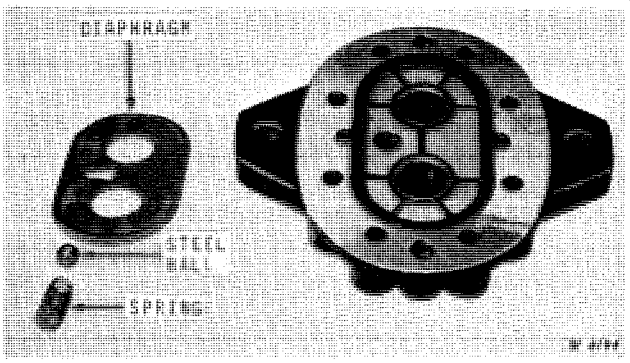

Fig. 5-Removing Diaphragm

Remove the diaphragm, spring and steel ball from the front plate. Discard diaphragm (Fig. 5). Remove diaphragm seal and gaskets and discard.

Separate the pump body from the rear plate by tapping drive gear with a brass hammer (Fig. 6).

Remove drive gear, idler gear, and thrust plate from rear plate. Discard thrust plate.

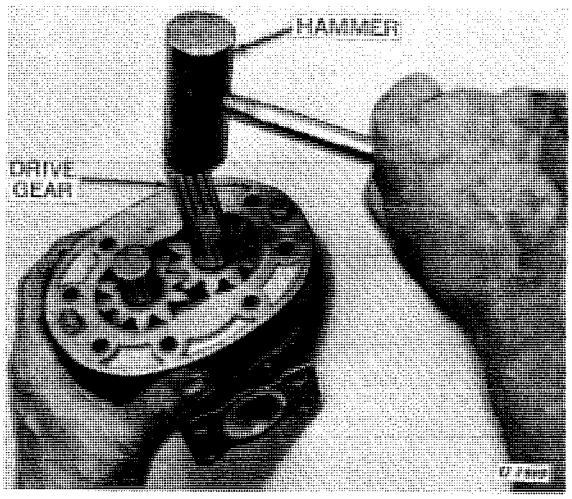

Fig. 6-Separating Body from Rear Plate

Inspect all parts for wear and remove all scratches, nicks, burrs and rough spots with fine emery cloth. Inspect springs for wear or loss of tension and replace if necessary.

Using micrometer and telescoping gauge, measure gear shaft, bearing diameters and gear pockets for wear. Replace if necessary (see Specifications).

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ASSEMBLY

Install new diaphragm, thrust plate, diaphragm seal and gasket (Fig. 1). Install the diaphragm seal in the front plate. Press the protector gasket then the backup gasket into the diaphragm seal. Drop the steel ball into seal and place check spring over it. Place the diaphragm on the backup gasket bronze face up. The entire diaphragm must fit inside the diaphragm seal.

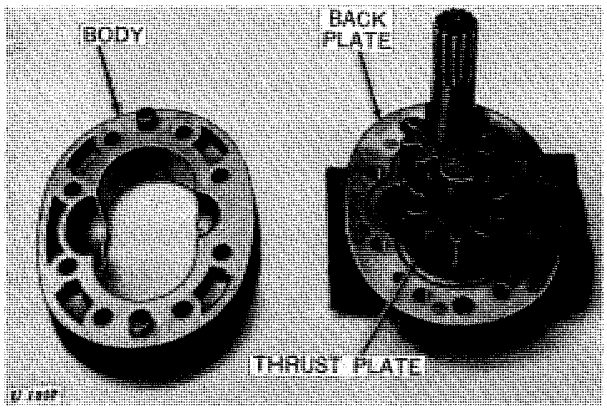

Fig. 7-Installing Body to Back Plate

Install thrust plate inside gear pockets of back plate with bronze side up (Fig. 8). Dip gear assemblies into oil and install the drive gear in the upper bearing of the back plate and the idler gear in the lower bearing.

Apply a thin coat of grease to both milled faces of body and place body over gear until dowels are engaged in back plates.

IMPORTANT: Be sure the arrow is pointing in the same direction it was before disassembly.

Place front plate over gear shafts until dowel pins are engaged and the marks scribed earlier on pump are lined up.

Install cap screws and torque as specified in Specifications.

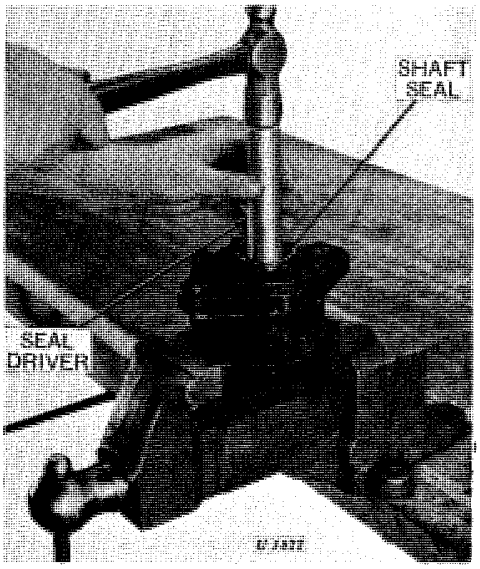

Fig. 8-Installing Shaft Seal

Place the shaft seal over the gear shaft and tap in place using seal driver (see Special Tools) and hammer (Fig. 8). Oil the seal liberally before installation.

Rotate the driveshaft to make sure there is no interference with rotating parts. A smooth heavy drag indicates a good pump. A jerky drag or frozen shaft indicates an improperly assembled pump.