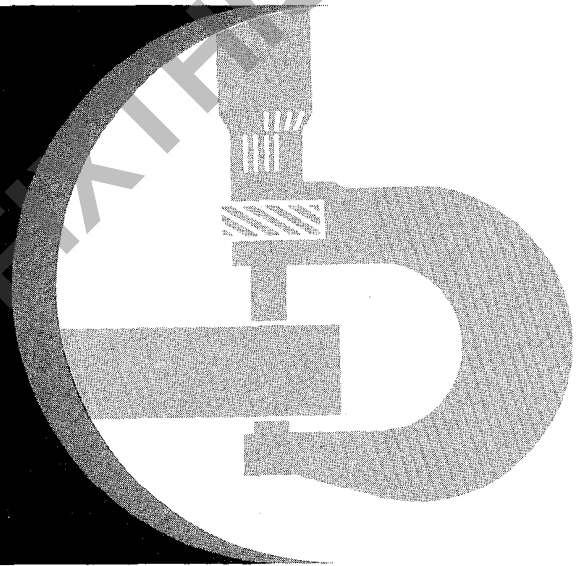


**John Deere
450C
Crawler**



TECHNICAL MANUAL

TM1102
LITHO IN U.S.A.

JD450-C CRAWLER

**Technical Manual
TM-1102 (May-87)**

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The specifications and design information contained in this manual were correct at the time it was printed. It is John Deere's policy to continually improve and update our machines. Therefore, the specifications and design information are subject to change without notice.

Litho in U.S.A.

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MAINTENANCE WITHOUT ACCIDENT WORK SAFELY



T27999N

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

**EVERY EMPLOYER HAS A
SAFETY PROGRAM. KNOW
WHAT IT IS!**

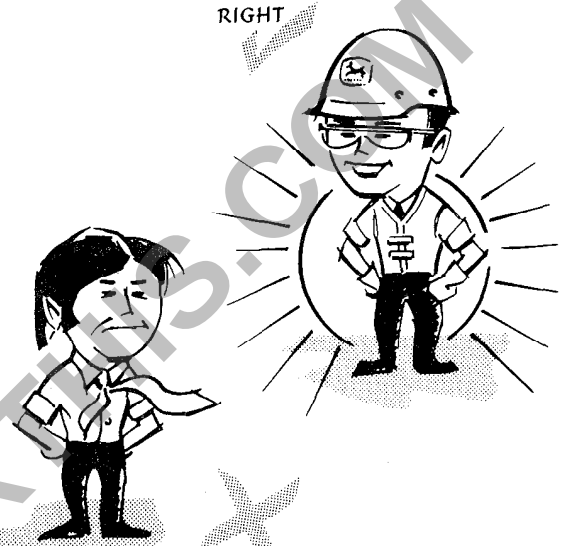


T27501N

Consult your shop supervisor for specific instructions on a job, and the safety equipment required.

For instance, you may need: Hard hat, safety shoes, safety goggles, heavy gloves, reflector vests, ear protectors, respirators.

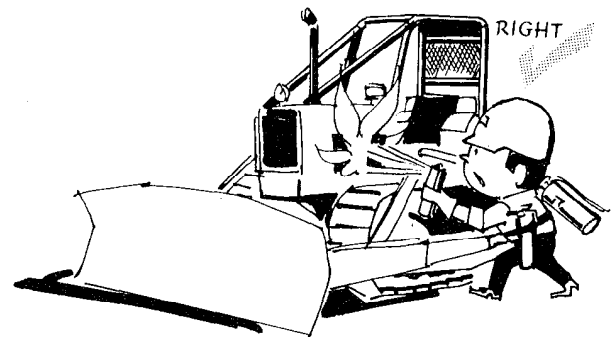
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WRONG

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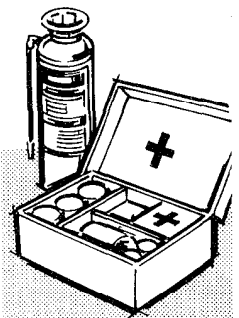
ALWAYS AVOID loose clothing or any accessory—flopping cuffs, dangling neckties and scarves, or rings and wrist watches—that can catch in moving parts and put you out of work.



T31961

BE ALERT!

Plan ahead — work safely — avoid accidental damage and injury. If a careless moment does cause an accident or fire, react quickly with the tools and skills at hand — know how to use a first aid kit and a fire extinguisher — and where to get assistance. In an emergency, split-second action is the key to safety.



T27504N

CAPACITIES	U.S.	Litres	SPECIAL EQUIPMENT:
Cooling system	4 gal.	15.1	PTO (1,000 rpm)
Fuel tank	31 gal.	117.3	Upper and lower front idler shields
Crankcase including filter ...	9 qt.	8.5	Spark arresting muffler
Transmission	8 gal.	30.3	16-in. (406 mm) open-center grouser shoes (dozer)
Final drive (each)	6.25 qt.	5.9	18-in. (457 mm) open-center grouser shoes (dozer)
Hydraulic reservoir (loader) .	7 gal.	26.5	Auxiliary hydraulic system with breakaway couplings (dozer)
Hydraulic reservoir (dozer) ..	6.4 gal.	24.5	Swinging drawbar (dozer)
Hydraulic system (loader) ..	13 gal.	49.2	Remote hydraulic cylinder (dozer)
Hydraulic system (6410 and 6415)	10 gal.	37.8	Radiator sand shield (dozer)
Hydraulic system (6405)	12.25 gal.	46.4	Cab (includes ROPS)
Steering clutch housing (each side)	28 qt.	26.5	Winch drive
			Two batteries
			Rear counterweight for multi-purpose bucket or log loader (loader)
			Limb risers with overhead exhaust
			18-in. (457) grouser shoes (dozer)
			ROPS with canopy and seat
			Cast steel end bits
ADDITIONAL STANDARD EQUIPMENT:			
Front and rear bottom guard			
Front hitch			
Deluxe cushion seat with arm rests			
Key switch with push button safety start			
Electric hour meter			
Cigar lighter			
Vandal protection			
Bottom guard counterweight with fixed drawbar (loader)			
Radiator sand shield (loader)			
Sprocket weights (loader)			
Lights			
Trash-resistant radiator			
Outer sprocket shields (dozer)			
Transistorized voltage regulator			
Tachometer			
Cold weather starting aid			
Horn			
Master electrical disconnect switch			
Engine side shields			
Front idler shield (loader)			
Return to dig (loader)			
Boom safety lock bar			

Group 15 LUBRICATION

GENERAL INFORMATION

Illustrated below and on page 10-15-2 are the periodic service charts which are mounted inside the crawler battery box. More detailed information on servicing the crawler can be found in the current JD450-C Crawler Loader and Crawler Bulldozer operator's manuals.

Use the operator's manuals and the periodic service charts as references when servicing the crawler. Remind your customer to thoroughly read the operator's manual before attempting to service or operate the crawler.

PERIODIC SERVICE CHART					
REFER TO OPERATOR'S MANUAL FOR MORE DETAILED INFORMATION					
INTERVAL HOURS	ITEM NO.	COMPONENTS	SERVICE POINTS	DESCRIPTION OF SERVICE	CAPACITY OR MEASUREMENT
10 OR DAILY	1	AIR CLEANER*	1	CLEAN AS REQUIRED	CLEAN AS REQUIRED
	2	TRACK TENSION	2	CHECK TRACK TENSION	1/8" (2.5 mm) TO 1.18" (28.5 mm) SAG BETWEEN CARRIER HOLLER & BRIDGECAT MIDWAY BETWEEN CORE & FILLER NECK OPERATOR'S MANUAL
	3	RADIATOR**	1	CHECK COOLANT LEVEL & CLEAN OUT TRASH	2 SHOTS
	4	ENGINE CLUTCH LINKAGE	1	GREASE FITTINGS	OPERATOR'S MANUAL
	5	DOZER LINKAGE	22	GREASE FITTINGS	OPERATOR'S MANUAL
	6	ENGINE CRANKCASE***	1	CHECK OIL LEVEL	BETWEEN MARKS ON DIPSTICK
	7	PRE-CLEANER	1	CLEAN AS REQUIRED	CHECK OIL LEVEL
	8	HYDRAULIC SYSTEM	1	CHECK OIL LEVEL	HALFWAY UP WINDOW WITH EQUIPMENT ON GROUND
100	9	DOZER CONTROL LEVER	1	OIL PIVOT POINTS	CRANKCASE OIL SEE CHART
	10	BATTERY	1	CHECK ELECTROLYTE LEVEL & TERMINALS	TO BOTTOM OF FILLER NECK REMOVE ANY CORROSION SEE CAPACITIES CHART
	11	ENGINE CRANKCASE FUEL TANK BUMP	1	DRAIN & REFILL	SEE OIL CHART
	12	ENGINE CRANKCASE FILTER	1	CHANGE ELEMENT	JD FILTER
200	13	ALTERNATOR FAN BELT	1	CHECK TENSION	3/4" (19 mm) FLEX WITH 20 LB. (89 N) FORCE TO FILLER HOLES
	14	FINAL DRIVES (450 C ONLY)	2	CHECK OIL LEVEL	TO CHECK HOLES OPERATOR'S MANUAL
	15	STEERING CLUTCH HOUSING (450 C ONLY)	2	CHECK OIL LEVEL	BETWEEN MARKS ON DIPSTICK
	16	TRANSMISSION	1	CHECK OIL LEVEL	JD HYDRAULIC OIL TYPE J14C OR EQUIVALENT
	17	DIRECTION REVERSE (450 C ONLY)	1	CHECK OIL LEVEL	JD HYDRAULIC OIL TYPE J14C OR EQUIVALENT
	18	FUEL LINE FILTER (GASOLINE)	1	REPLACE ELEMENT	JD FILTER
500	19	FUEL LINE FILTER (GASOLINE)	1	REPLACE ELEMENT	JD FILTER
	20	TRANSMISSION OIL FILTER (450 C ONLY)	1	CHANGE ELEMENT	JD FILTER
	21	HYDRAULIC RETURN LINE FILTER	1	REPLACE FILTER	JD FILTER
	22	DIRECTION REVERSE (350 C ONLY)	1	DRAIN & REFILL	SEE CAPACITIES CHART
	23	TRACK IDLER & ROLLERS (350 C ONLY)	14	REPLACE ELEMENT	UNTIL RESISTANCE IS FELT
	24	TRANSMISSION, STEERING CLUTCH HOUSING & FINAL DRIVES (350 C ONLY)	1	DRAIN & REFILL	SEE CAPACITIES CHART
	25	STARTER	1	LUBRICATE WICKS, CHECK BRUSHES FOR EXCESSIVE WEAR	SATURATE WICKS
	26	FINAL DRIVES (450 C ONLY)	2	DRAIN, FLUSH & REFILL	SEE CAPACITIES CHART
1000	27	STEERING CLUTCH HOUSING	2	DRAIN, FLUSH & REFILL	SEE CAPACITIES CHART
	28	HYDRAULIC SYSTEM	1	DRAIN & REFILL	SEE CAPACITIES CHART
	29	TRANSMISSION (450 C ONLY)	1	DRAIN & REFILL	SEE CAPACITIES CHART
	30	TRANSMISSION FILTER SCREEN (450 C ONLY)	1	CLEAN	TO OIL LEVEL HOLE
	31	FRONT IDLER, TRACK CARRIER ROLLER, AND TRACK ROLLER (450 C ONLY)	14	CHECK OIL LEVEL	TO OIL LEVEL HOLE
	32	STEERING CLUTCH HOUSING & FINAL DRIVES	1	DRAIN & REFILL	SEE CAPACITIES CHART
	33	TRANSMISSION CASE	1	DRAIN & REFILL	SEE CAPACITIES CHART
	34	STEERING CLUTCH HOUSING & FINAL DRIVES	1	DRAIN & REFILL	SEE CAPACITIES CHART

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Fig. 1-Bulldozer Periodic Service Chart

ELECTRICAL SYSTEM

1. Battery

Check battery electrolyte level. Check battery charge.

Water added Yes No
Battery checked and serviced Yes No

2. Charging System

When the crawler is running and the ammeter is registering in the light green zone, the charging system can be considered to be in proper working condition.

Charging system operational Yes No

TORQUE

1. Backhoe Tapered Pins and Bucket Position

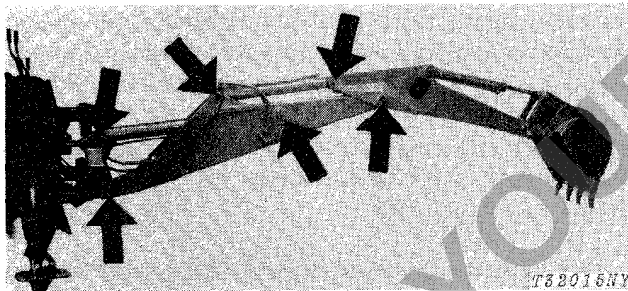


Fig. 52-Backhoe Tapered Pins

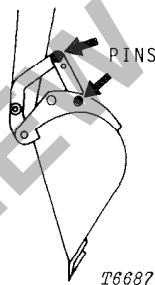


Fig. 52a-Power Dig Position

Check the torque on the backhoe tapered pins.

Be sure bucket is in power dig position shown above.

Backhoe tapered pins tighten to specifications Yes No
Bucket position checked Yes No

2. Track Shoe Hardware

Check the torque of the track shoe retaining cap screws.

Tighten cap screws to 110 lb-ft (15 kg/m).

Track shoe cap screws tightened to specifications Yes No

3. Accessible Hardware Torque Values

Check all accessible bolts and nuts for proper tightness. If hardware seems loose, tighten it to the proper torque. The table below gives correct torque values for various bolts and cap screws. Most hardware used is high-strength (note dashes on hex. heads).

RECOMMENDED TORQUE IN LB-FT [Kg-m] COARSE AND FINE THREADS			
	B	D	F
Bolt Diameter	Plain Head	Three Dashes	Six Dashes
1/4	Not used	10 [1.4]	14 [1.9]
5/16	Not used	20 [2.8]	30 [4.1]
3/8	Not used	35 [4.8]	50 [6.9]
7/16	35 [4.8]	55 [7.6]	80 [11.1]
1/2	55 [7.6]	85 [11.8]	120 [16.6]
9/16	75 [10.4]	130 [18.0]	175 [24.2]
5/8	105 [14.5]	170 [23.5]	240 [33.2]
3/4	185 [25.6]	300 [41.5]	425 [58.8]
7/8	160 [22.1]	445 [61.5]	685 [94.7]
1	250 [34.6]	670 [92.5]	1030 [142.4]
1-1/8	330 [45.6]	910 [125.8]	1460 [201.9]
1-1/4	480 [66.4]	1250 [172.8]	2060 [284.8]

T30882

Fig. 53-Torque Chart

The types of bolts and cap screws are identified by head markings as follows:

Plain Head: regular machine bolts and cap screws.

3-Dash Head: tempered steel high-strength bolts and cap screws.

6-Dash Head: tempered steel extra high-strength bolts and cap screws.

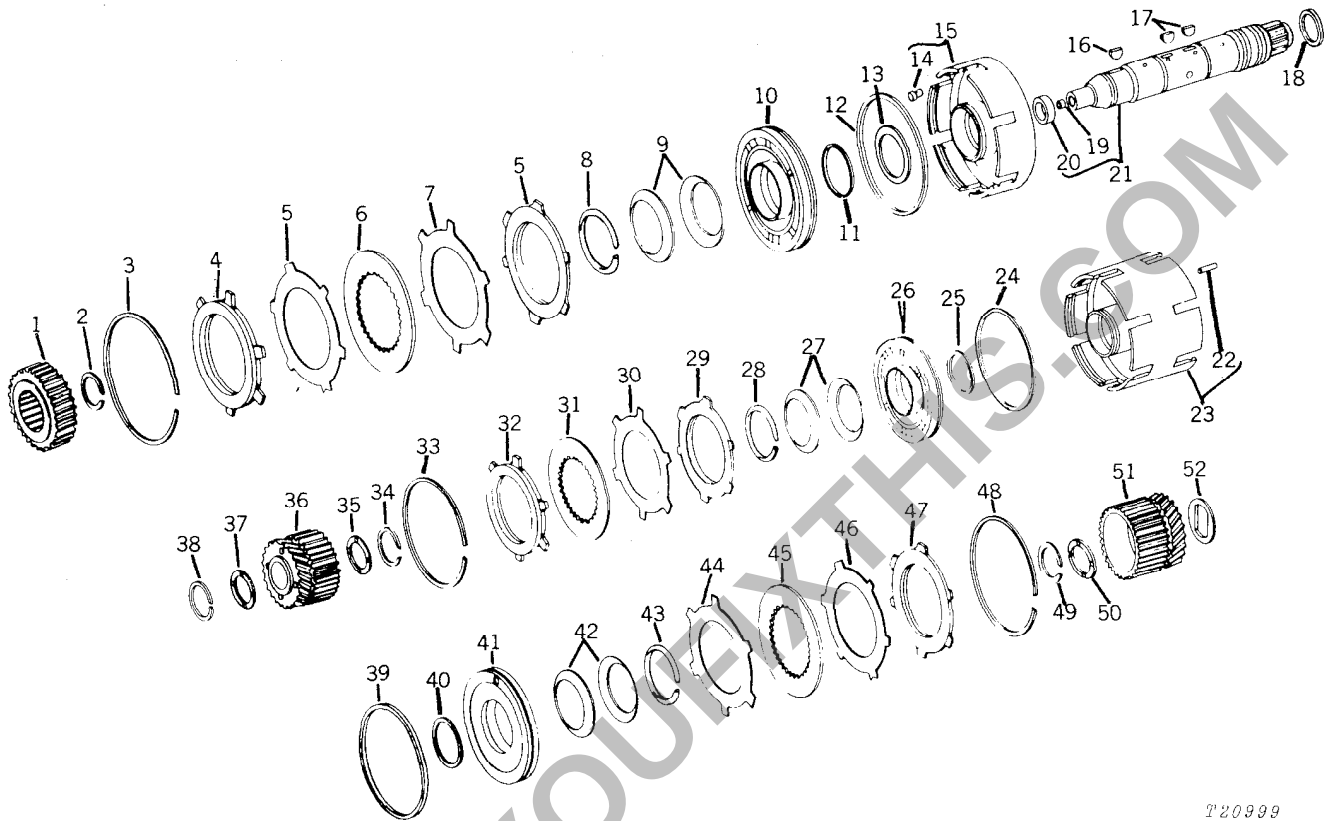
Machine bolts and cap screws 7/8-inch (22 mm) and larger are sometimes formed hot rather than cold, which accounts for the lower torque.

All accessible hardware torqued Yes No

FINAL CHECK

1. Final Check

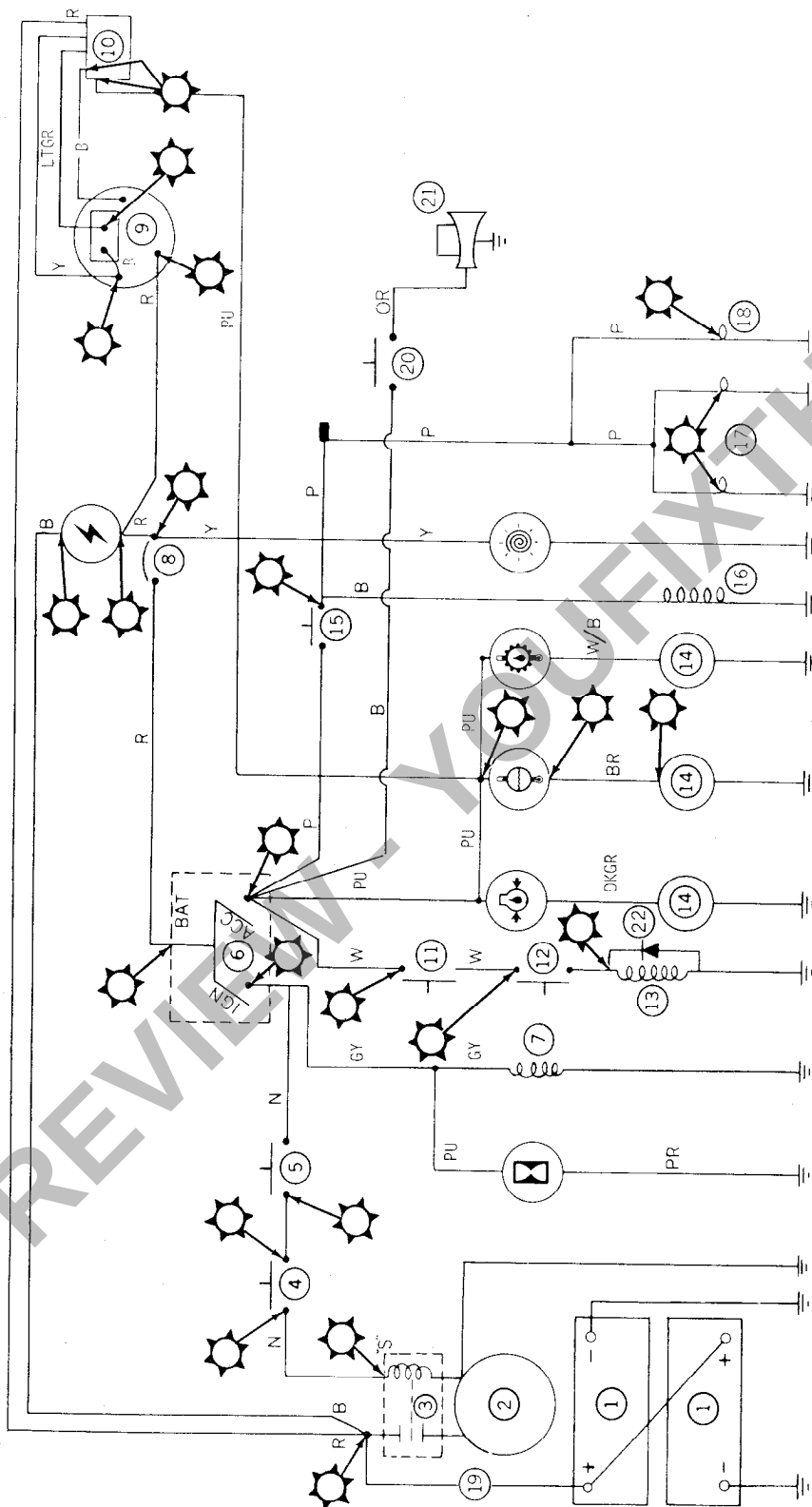
The final predelivery procedure is the overall clean-up of the crawler. Make the crawler LOOK like a new crawler with the proper touch-up of chipped paint and a good wash job. Deliver to the customer a crawler anyone would be proud to own.



T20999

- | | | | |
|---------------------------------|------------------------------|-----------------------------|----------------------------------|
| 1—High Range Clutch Gear | 14—Pin | 28—Snap Ring | 40—Piston Inner Seal |
| 2—Snap Ring | 15—High Range Clutch Drum | 29—Clutch Notched Plate | 41—Clutch Piston |
| 3—Snap Ring | 16—Woodruff Key | 30—Clutch Plate (4 used) | 42—Spring (4 used) |
| 4—Outer Clutch Locking Plate | 17—Woodruff Key (2 used) | 31—Clutch Disk (4 used) | 43—Snap Ring |
| 5—Clutch Notched Plate (4 used) | 18—Seal Ring (5 used) | 32—Outer Plate | 44—Clutch Plate (2 used) |
| 6—Clutch Disk (4 used) | 19—Drilled Brass Pin | 33—Backing Plate Snap Ring | 45—Clutch Disk (4 used) |
| 7—Clutch Plate | 20—Bearing Race | 34—Drum Retaining Snap Ring | 46—Clutch Notched Plate (3 used) |
| 8—Snap Ring | 21—Transmission Clutch Shaft | 35—Thrust Washer | 47—Clutch Backing Plate |
| 9—Spring (4 used) | 22—Pin | 36—Reverser Range Pinion | 48—Snap Ring |
| 10—Clutch Piston | 23—Clutch Drum | 37—Thrust Washer | 49—Snap Ring |
| 11—Piston Inner Seal | 24—Piston Outer Seal | 38—Snap Ring | 50—Thrust Washer |
| 12—Piston Outer Seal | 25—Piston Inner Seal | 39—Piston Outer Seal | 51—Low Range Pinion |
| 13—Thrust Washer | 26—Clutch Piston | | 52—Thrust Washer |
| | 27—Spring (4 used) | | |

Fig. 16-H-L-R Clutches



TEST POINTS

- 1—Battery
- 2—Starting Motor
- 3—Solenoid
- 4—Neutral Start Switch
- 5—Start Switch
- 6—Key Switch
- 7—Fuel Shut-Off Solenoid
- 8—Circuit Breaker
- 9—Alternator
- 10—Regulator
- 11—Bucket Switch

- 12—Spool Switch (-293993)
- 13—Spool Solenoid (-293993)
- 14—Sending Units
- 15—Light Switch
- 16—Gauge Lights
- 17—Grille Light
- 18—Front Light
- 19—Battery Disconnect Switch (if equipped)
- 20—Horn Switch (249093-)
- 21—Horn (249093-)
- 22—Diode (-293993)

- B—Black
- BR—Brown
- DKBL—Dark Blue
- DKGR—Dark Green
- GY—Gray
- LTGR—Light Green
- N—Neutral
- P—Pink
- PU—Purple
- R—Red
- W—White
- W/B—White/Black
- Y—Yellow
- OR—Orange

Fig. 5-Electrical Schematic (-343540)

DIAGNOSING MALFUNCTIONS

Engine Will Not Start or Starting Hard

Fuel System Malfunction

- Fuel tank empty
- Improper type of fuel
- Foreign material in fuel
- Fuel lines clogged or restricted
- Air leak on suction side of fuel system
- Fuel transfer pump malfunction
- Fuel filter restricted
- Restricted air intake system
- Faulty injection pump
- Faulty injection nozzles
- Water, dirt, or air in fuel system

Electrical System Malfunction

- Corroded or loose battery cables
- Weak or dead battery
- Cranking speed too slow

Uneven Running or Frequent Stalling

Basic Engine Malfunction

- Improper valve clearance
- Cylinder head gasket leaking
- Valves sticking or burned
- Worn or broken compression rings
- Low compression
- Incorrect timing
- Dirty air intake system
- Exhaust system restricted
- Engine overheating

Fuel System Malfunction

- Improper type of fuel
- Air leak on suction side of fuel system
- Fuel line clogged or restricted
- Fuel transfer pump malfunction
- Fuel filter restricted
- Faulty injection pump
- Faulty injection nozzles
- Water, dirt, or air in fuel system
- Injection nozzle leak-off lines clogged
- Injection pump out of time
- Exhaust system restricted

Engine Misses

Basic Engine Malfunction

- Weak valve springs
- Incorrect valve clearance
- Burned, warped, pitted or sticking valves
- Low compression
- Worn camshaft lobes
- Engine overheating

Fuel System Malfunction

- Water, air or dirt in fuel
- Faulty injection nozzles
- Faulty injection pump
- Faulty transfer pump
- Detonation
- Mixture of gasoline and diesel fuels

Lack of Power

Basic Engine Malfunction

- Blown cylinder head gasket
- Worn camshaft lobes
- Incorrect valve clearance
- Incorrect valve timing
- Burned, warped, pitted, or sticking valves
- Weak valve springs
- Low compression
- Dirty air intake system
- Incorrect timing
- Engine overheating

Fuel System Malfunction

- Improper type of fuel
- Air leak on suction side of fuel system
- Fuel line clogged or restricted
- Fuel transfer pump malfunction
- Speed control linkage not adjusted properly
- Fuel filter restricted
- Fuel injection pump malfunction
- Fuel injection nozzle faulty
- Water, dirt or air in fuel system
- Injection nozzle leak-off line clogged
- Injection pump out of time
- Clogged manifold system

Group 25 HYDRAULIC SYSTEM

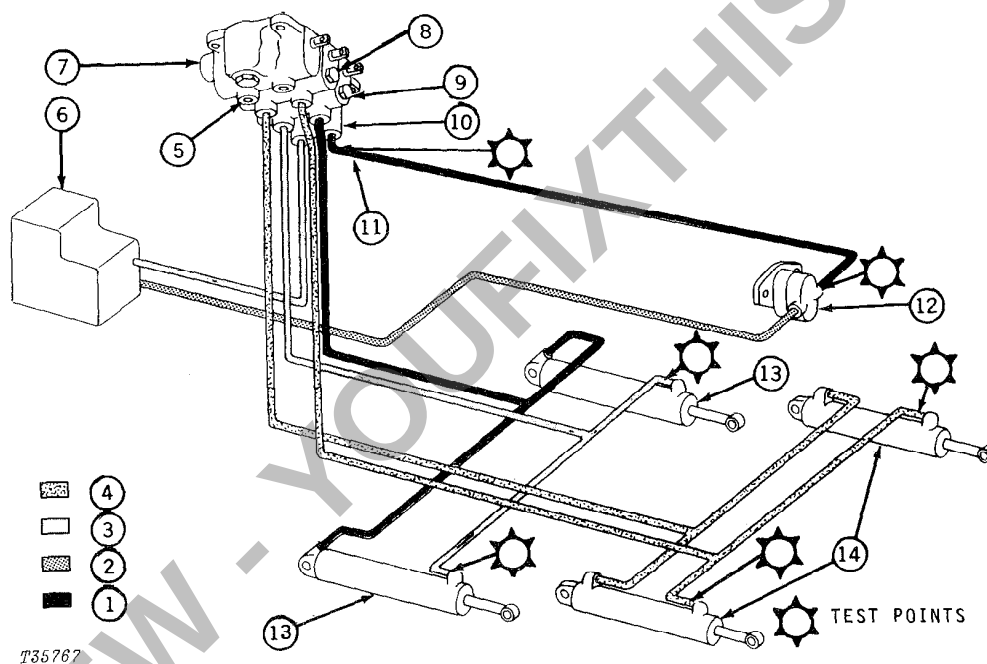
GENERAL INFORMATION

The hydraulic system for all crawler functions is of the open center type.

Basic crawler hydraulic systems consist of an engine driven gear type hydraulic pump, oil reservoir, filters, control valve and cylinders.

The following hydraulic circuit diagrams give a brief description of each hydraulic system and its components.

Study the circuit diagrams when diagnosing hydraulic system difficulties.



- 1—Pressure Oil
- 2—Low Pressure Oil
- 3—Return Oil
- 4—Trapped Oil
- 5—Circuit Relief (Bucket)

- 6—Reservoir
- 7—Control Valve
- 8—Circuit Relief (Bucket)
- 9—Circuit Relief (Boom)
- 10—System Relief

- 11—Pressure Tap
- 12—Hydraulic Pump
- 13—Boom Cylinder
- 14—Bucket Cylinder

Fig. 1-Crawler Loader Circuit

Section 10 GENERAL

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		Bulldozer Periodic Service Chart	15-1
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Group 5 GENERAL MACHINE SPECIFICATIONS

(Specifications and design subject to change without notice. Wherever applicable, specifications are in accordance with ICED and SAE standards. Except where otherwise noted, these specifications are based on a unit equipped with [1-1/4 cu. yd. (0.96 m³) digging bucket w/teeth (loader)], diesel engine, roll-over protective structure and standard equipment.)

Power		
((@ 2,500 engine rpm):	SAE	DIN
Gross	70 hp	
Net	65 hp	65.9 PS
Drawbar (Dozers)	48.6 hp	49.3 PS

Net engine flywheel power is for an engine equipped with fan, air cleaner, water pump, lubricating oil pump, fuel pump, alternator and muffler. The gross engine power is without fan. Flywheel power ratings are under SAE standard conditions of 500-ft. (150 m) altitude and 85°F (29°C) temperature and DIN 70 020 standard conditions (non-corrected). No derating is required up to 10,000 feet (3000 m) altitude.

In the international system of units (SI), power is expressed in kilowatts (kW).

ENGINE:

John Deere, 4-cylinder, turbocharged diesel, 4-stroke cycle

Bore and stroke	4.02 x 4.33 in. (102 x 110 mm)
Piston displacement	219 cu. in. (3 588 cm ³)
Compression ratio	16.2 to 1
Maximum torque (@ 1,400 rpm)	164.5 lb-ft (22.74 kg-m)

NACC or AMA (U.S. Tax) horsepower	23.84
Lubrication	Pressure system with full-flow filter
Main bearings	5
Cooling	Pressurized with thermostat and fixed bypass
Fan	Blower
Air cleaner with restriction indicator	Dry
Electrical System	12-volt with alternator
Battery	Reserve capacity: 180 minutes

TRANSMISSION:

H-L-R: 4 gears with high, low and reverse ranges shifted hydraulically without clutching in each range.

CLUTCH 11-in. (279 mm) single-disk

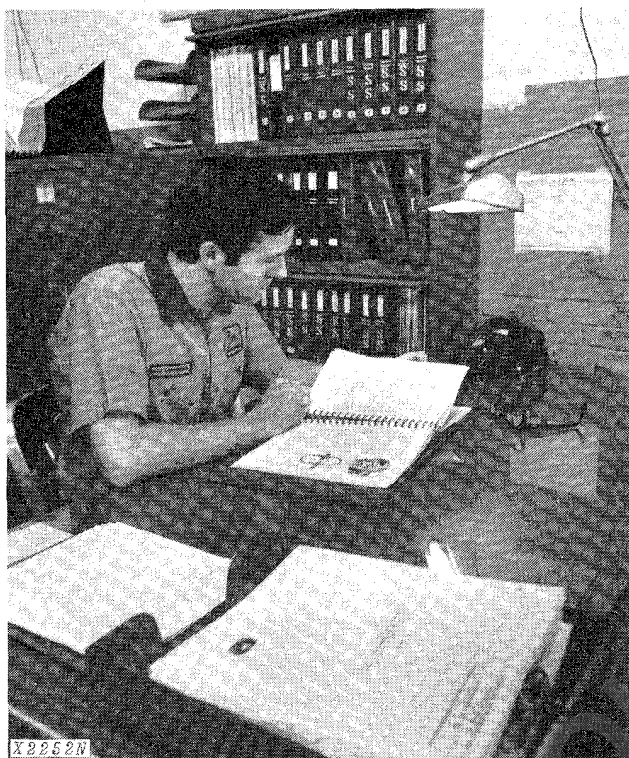
STEERING:

Steering clutches and brakes are controlled by a single lever for each track. A pedal provides braking, and lock-down for parking.

Clutches Oil-cooled, hydraulically-actuated, multiple-disk, 11-in. (279 mm) disk; 16 friction surfaces per clutch

Brakes Self-adjusting, self-energizing, oil-cooled contracting band with bonded lining.

INTRODUCTION



Use FOS Manuals for Reference

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

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

•FOS Manuals—for reference

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



When a service technician 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.

•Technical Manuals—for actual service

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



Use Technical Manuals for Actual Service

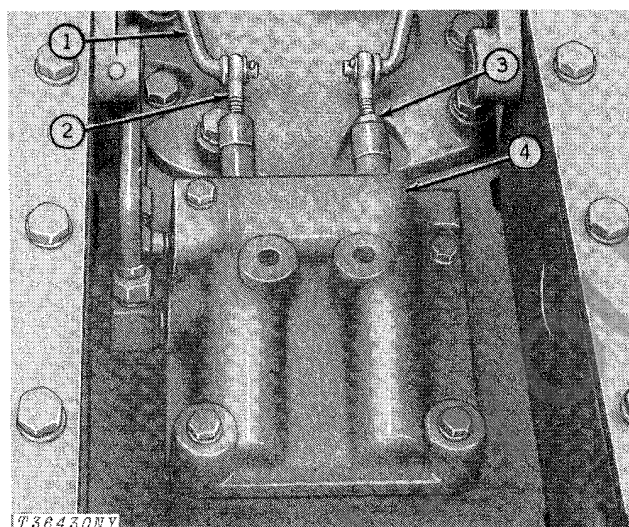
This technical manual was planned and written for you—an experienced mechanic. Keep it in a permanent binder in the shop where it is handy. Refer to it whenever in doubt about correct service procedures or specifications.

Some features of this manual:

- Inside front cover - "Table of Contents" and "Maintenance Without Accident".
- Section 10 - General specifications and services.
- Sections 20 through 60 - Removal, repair, testing (components removed), installation, and adjustment.
- Section 70 - Detailed explanation of system operation, diagnosis, visual inspection, testing, and adjustments.
- Specifications grouped and illustrated at the end of each section.

If necessary, repeat procedure after backing out adjusting screw (4) in quarter-turn increments until the adjusting link just picks up the next notch on the adjusting nut. Then lock the adjusting screw by tightening jam nut (5).

5. After the adjusting screw is set and locked in position, back off the adjusting nut so the levers can be pulled back to the stop with little effort. Readjust lever travel so the top of the levers move 12 in. (304.8 mm) before the stop is contacted.
6. Readjust the brake adjusting nut so the brakes start to engage at 5 in. (127 mm) lever travel.



1—Steering Valve Rods 3—Lock Nut
2—Steering Valve Eyebolts 4—Steering Valve Housing

Fig. 68-Steering Valve Spool Adjustments

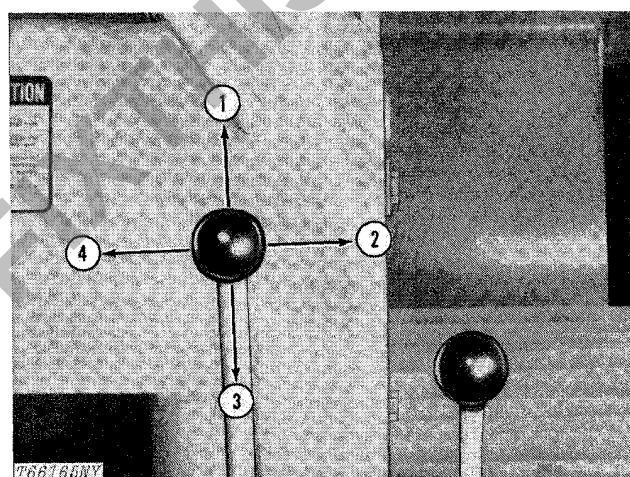
Refer to Fig. 68 and adjust the steering valve spool. Start the engine and place the transmission in first gear and the reverser in gear. Set the foot brake and lock it down.

Adjust the steering valves so that the clutches are engaged when the tops of the steering levers are 1.5 inches (38.10 mm) from the stop position and disengaged when the tops of the levers are 2.5 inches (63.50 mm) from the stop.

Steering adjusted

Yes No

5. Loader Control Lever



1—Lower Boom 3—Raise Boom
2—Bucket Dump 4—Bucket Retract

Fig. 69-Loader Control Lever

Push the lever forward to lower the boom and pull it rearward to raise the boom. Lever should automatically return to neutral when released.

Push the lever to the right to dump and pull it to the left to retract the bucket or fork. Lever should automatically return to neutral when released.

Loader control lever operational

Yes No

Idler Gears

Be sure that oil hole in upper idler gear is open.

Check both idler gears for excessive end play. New part end play should be 0.0010 to 0.0070 inch (0.0254 to 0.1778 mm). A maximum 0.0150 inch (0.381 mm) end play is acceptable.

Measure I.D. of bushing and O.D. of shaft to determine oil clearance of 0.0015 to 0.0035 inch (0.0381 to 0.0889 mm). A maximum 0.0061 inch (0.1524 mm) clearance is acceptable. New bushing I.D. is 1.7520 to 1.7530 inches (44.5008 to 44.5262 mm). New shaft O.D. is 1.7495 to 1.7505 inches (44.4374 to 44.4627 mm).

If excessive wear or oil clearance is indicated, use JD-252 Bushing Driver to install new bushing flush with either side of gear.

If idler gear shaft replacement is necessary, press in new spring pins to 0.20 to 0.28 inch (0.508 to 0.711 mm) above shaft.

Front Plate and Timing Gear Cover

Never pry or press against timing gear cover with excessive force. The cover is cast aluminum alloy and might be sprung or warped.

If there is evidence of oil leakage on outside of timing gear cover, replace crankshaft front oil seal.

Coat outer surface of seal with joint sealing compound and inside surface with multi-purpose grease. Support the oil seal bore area of timing gear cover. Press in oil seal to bottom of bore with spring loaded lip facing inward using special JD-250 driver (Fig. 26).

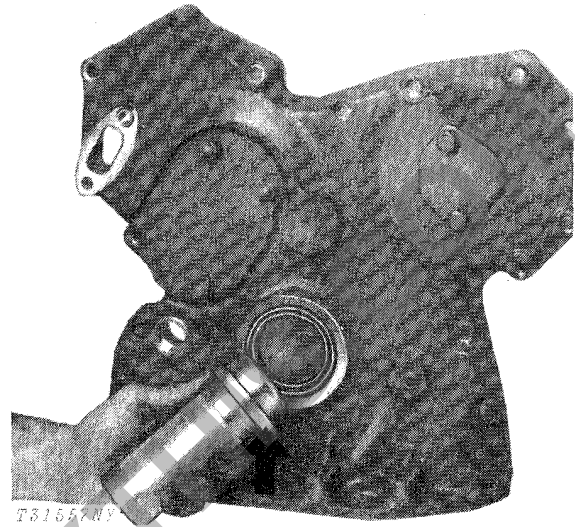


Fig. 26-Installing Oil Seal in Timing Gear Cover using JD-250 Driver

INSTALLATION

Installing and Timing the Gear Train

The camshaft gear and injection pump gear must be timed to the center of the crankshaft when they are installed. Install and time gear assemblies using the following steps:

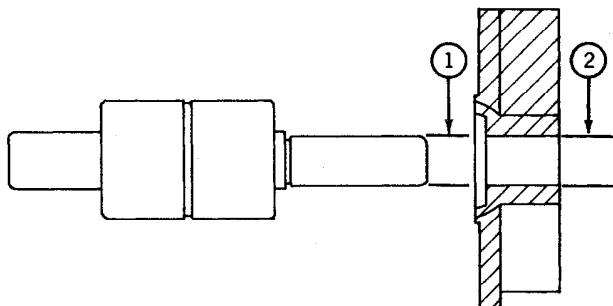
1. Turn crankshaft until No. 1 piston is at top dead center (TDC) of its compression stroke. Remove timing hole cover and screw on flywheel housing. Reversing the screw, insert the smooth end into the flywheel housing bore. Rock the flywheel until the screw slides into hole in flywheel.

If engine is stripped, position crankshaft so that No. 1 (fan end) connecting rod journal is at its highest point toward the deck of the engine at this time. *The keyway in the crankshaft front gear (not pulley keyway) should now point straight up toward the top of the engine.*

Do not rotate crankshaft after "TDC" setting has been made.

ENGINE COOLING SYSTEM

SPECIFICATIONS AND TORQUE VALUES



T31589N

Fig. 39-Water Pump Shaft and Impeller

Radiator test pressure 10 psi
(0.70 kg/cm²)

Radiator cap test pressure 6.25 to 7.50 psi
(0.44 to 0.53 kg/cm²)

Thermostat opening temperature 180°F
(82.2°C)

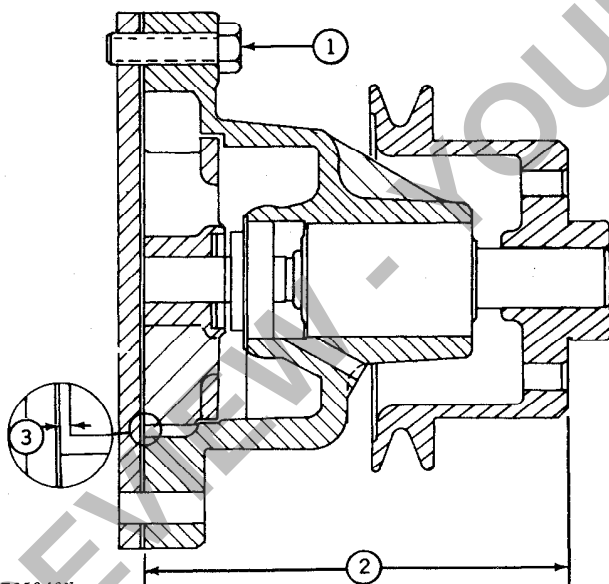
1 - O.D. of water pump shaft end
pressed into impeller 0.6262 to 0.6267 in.
(15.905 to 15.918 mm)

2 - I.D. of water pump impeller
bore 0.6242 to 0.6252 in.
(15.854 to 15.880 mm)

1 - Water pump rear cover
cap screw torque 35 lb-ft
(4.8 kg-m)

2 - Fan surface on pulley to
rear of water pump housing 5.47 in.
(139 mm)

3 - Water pump impeller flush to housing
within 0.10 in.
(0.25 mm)



T65949N

Fig. 40-Water Pump

Group 25

SPECIFICATIONS AND SPECIAL TOOLS

BATTERIES

SPECIFICATIONS AND TORQUE VALUES

Battery ground.....	Negative
Full charge specific gravity (corrected for 80°F [26.7°C] electrode temperature).....	1.260
Maximum variation between cells during specific gravity test (specific gravity points).....	0.050
High-rate discharge test (minimum reading).....	9.0 volts

When replacing the battery(s) use the John Deere battery or its equivalent shown in the following chart:

Volts	John Deere Part Number	BCI Group	Cold Cranking AMPS		Reserve Capacity (Minutes at 25 amps)
			0°F [17.8°C]	-20°F [-28.9°C]	
12	AT29160	30H	570	450	180

SPECIAL TOOLS

Convenience Tools

Tool

Tool Number

Use

TY-1337 (10 amp)
TY-5104 (15 amp)
TY-5105 (30 amp)
TY-5106 (100 amp)

To charge battery and to
use as a booster to start
engine.

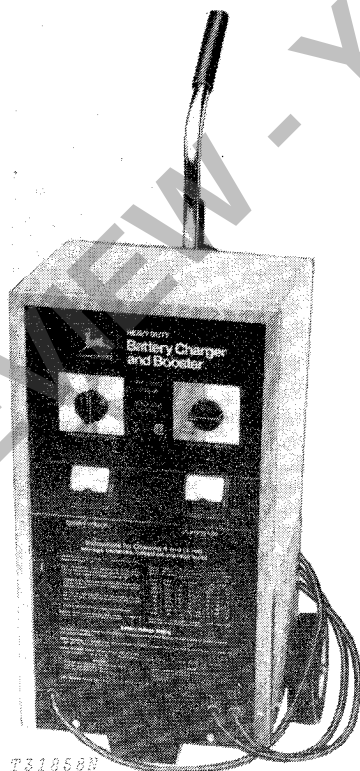


Fig. 1-Battery Charger

H-L-R Lever Adjustment

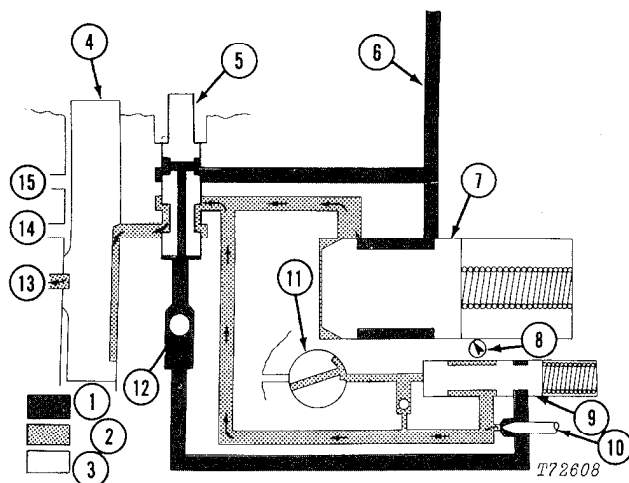
Shift H-L-R lever (11, Fig. 47) in neutral detent (between high and reverse).

Hold H-L-R lever against back edge of slot in neutral lock (7, Fig. 46). Apply pressure to take play out of neutral lock.

Starting with the H-L-R rod yoke (15, Fig. 47) adjusted long. Shorten the H-L-R rod yoke until pin (8) slips through the yoke and pivot arm (22). Turn yoke 1/2 additional turn but not so short that the pin will not slide freely into yoke and pivot arm.

Install pin and cotter pin. Tighten the yoke jam nut.

Step 3 (Fig. 6)



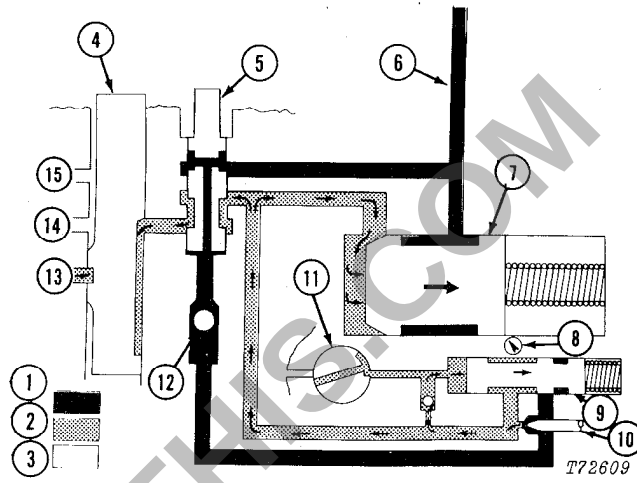
- | | |
|------------------------|------------------------|
| 1—Pressure Oil | 9—Bypass Valve |
| 2—Low Pressure Oil | 10—Needle Valve |
| 3—Return Oil | 11—Pilot Valve |
| 4—Shift Valve | 12—Check Valve |
| 5—Clutch Valve | 13—Reverse (To Clutch) |
| 6—Supply Oil From Pump | 14—High (To Clutch) |
| 7—Accumulator | 15—Low (To Clutch) |
| 8—Pressure Check Point | |

Fig. 6—Unit Shifting High to Reverse Gear (Step 3)

The accumulator (7, Fig. 6) stays in discharge position and allows some oil entering unit to flow directly around its shoulder to reverse clutch.

Other oil entering unit follows the usual route past valves but must then flow through orifice at needle valve (10), since bypass valve (9) is closed. The accumulator, in the discharged position, feeds oil past the land on its piston until the engaged clutch is filled. When pressure in the clutch reaches the low pressure setting, the accumulator starts to recharge, closing the land and forcing all oil to go through the orifice. Pressure will remain at low pressure momentarily after start of shift.

Step 4 (Fig. 7)



- | | |
|------------------------|------------------------|
| 1—Pressure Oil | 9—Bypass Valve |
| 2—Low Pressure Oil | 10—Needle Valve |
| 3—Return Oil | 11—Pilot Valve |
| 4—Shift Valve | 12—Check Valve |
| 5—Clutch Valve | 13—Reverse (To Clutch) |
| 6—Supply Oil From Pump | 14—High (To Clutch) |
| 7—Accumulator | 15—Low (To Clutch) |
| 8—Pressure Check Point | |

Fig. 7—Unit Shifting High to Reverse Gear (Step 4)

Oil coming through the orifice at the needle valve (10, Fig. 7) recharges the accumulator (7), slowly building up pressure in the clutch to give a cushioned engagement.

Pressure oil from the accumulator also enters the bypass valve (9) through an orifice as the accumulator recharges and moves back against the spring to the open position. The speed at which the accumulator recharges is adjusted by means of the needle valve.

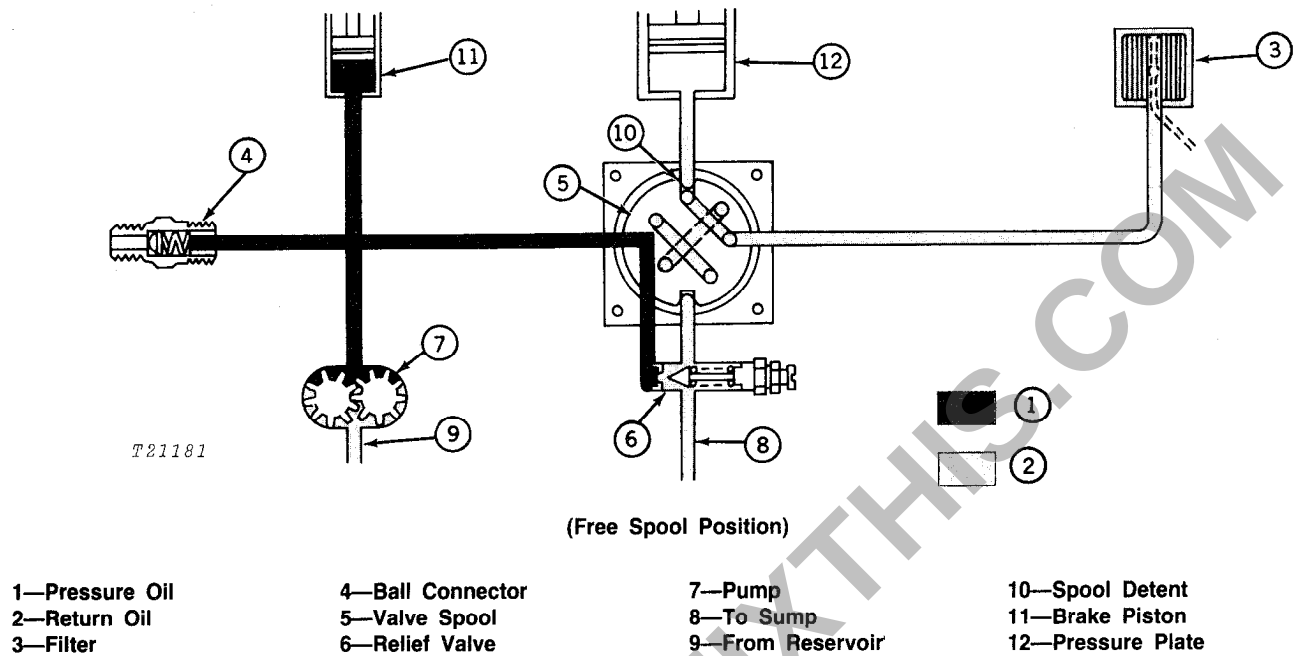


Fig. 2-Winch Control Valve Operation

The control valve spool is manually operated by a control lever mounted on the left side of the operator's seat. The lever has three positions:

(1) In the "HOLD" (center) position (Fig. 1) the winch drum is in neutral. Pressure oil from the pump passes through the valve spool, through the filter, and dumps back into the reservoir.

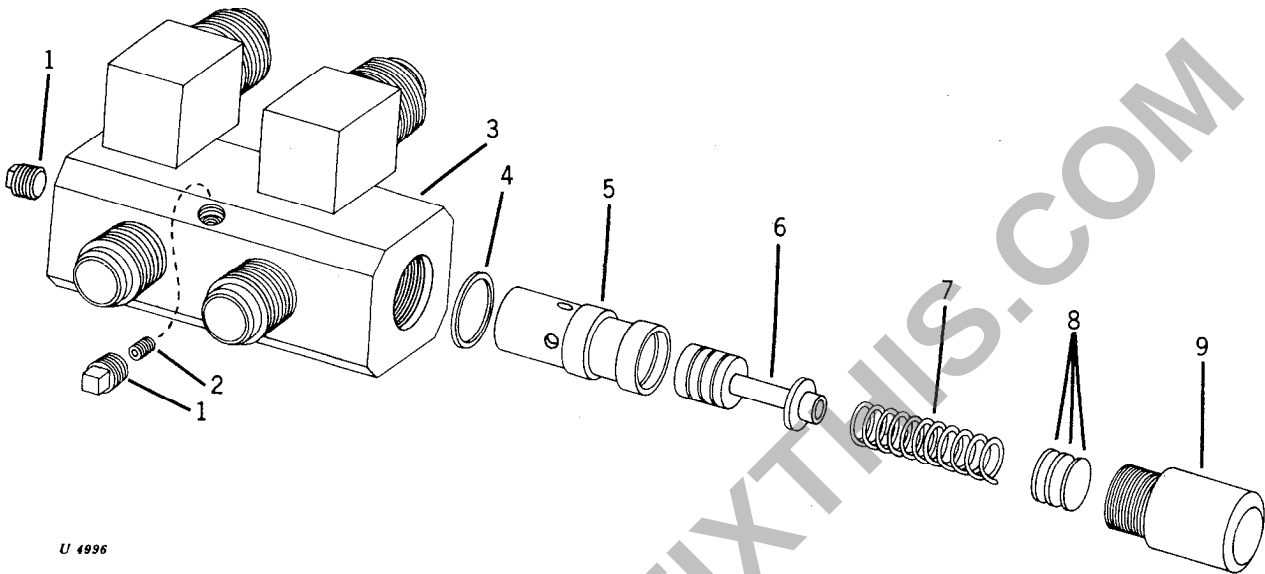
(2) In the "WIND" (forward) position (Fig. 1) the winch drum is engaged. The valve spool closes off the passage to the filter and regulates pressure oil flow to engage the clutch. Back-up pressure from the engaged clutch releases the brake and the gear train turns the winch drum.

(3) In the "FREE-SPOOL" (rear) position (Fig. 2) the winch drum is released. The valve spool prevents oil from passing through the valve. Pressure backs up to the brake cylinder, disengaging the brake.

REMOVAL

Clean area around winch control valve before removing. Disconnect control cable and remove valve.

REPAIR



U 4996

- 1—Pipe
- 2—Plug
- 3—Body

- 4—O-Ring
- 5—Seat
- 6—Plunger

- 7—Spring
- 8—Shims (as required)
- 9—Cap

Fig. 11-Multipurpose Bucket Clam Relief Valve

Whenever clam cylinder operation is abnormal (bucket does not remain open in bulldozer or scraper operation), the bucket relief valve may be incorrectly adjusted or in need of servicing. The valve is adjusted by adding or subtracting shims under the relief valve cap.

INSTALLATION

Install valve on bucket. Connect oil lines.

To remove pins and bushings from left-hand links, position saddle bushing spacer (pin side) (5, Fig. 15) on saddle (4) as shown in Fig. 15. Advance work head of track press and remove bushing and pin from left-hand link.

Continue these steps with each left-hand link assembly until the track is completely disassembled.

Assembly (Starting At Master Link)

Remove ram end disassembly adapter from press head and install ram end assembly adapter (7, Fig. 20). Install rear abutment assembly adapter plate (2) on press as shown in Figure 20. Do not remove saddle (4).

Position shims (2, Fig. 16) behind rear abutment assembly adapter blocks to align abutment blocks so that link assemblies remain loose during assembly.

With pin and bushing in saddle, position left link, with track shoe mounting holes down, between saddle and work head of press as shown in Figure 15. Advance work head of press and press link onto pin and bushing.

On later units, a longer track bushing is used. The old track bushing (-234985) length is 4.235 to 4.245 inches (107.57 to 107.82 mm). The new track bushing (234986-) length is 4.306 to 4.316 inches (109.37 to 109.63 mm).

The new longer and the old shorter track bushing may be used in the same track chain. However, the track press set up will vary for the two bushings.

Adjust shims (2, Fig. 16) behind bushing abutment (3) to provide 0.180 ± 0.005 inch (4.57 ± 0.13 mm) bushing standout (7), short bushing (-234985); or 0.216 ± 0.020 inch (5.49 ± 0.51 mm) bushing standout, long bushing (234986-); from left track link (8).

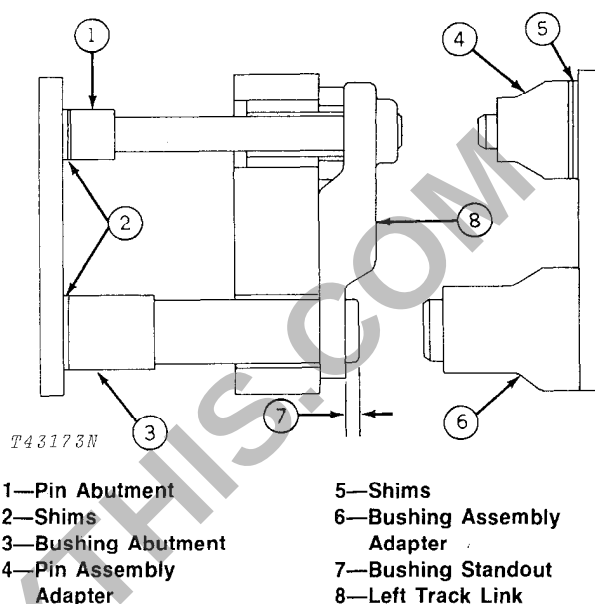


Fig. 16—Installing Shims Behind Abutment Adapter Block

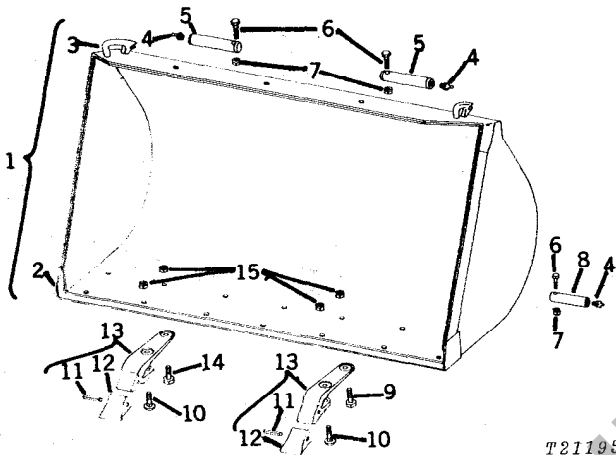
NOTE: The track shoe mounting holes are in the down position. After the link is pressed onto the pin and bushing, it becomes the left-hand link assembly.

After all left-hand links have been assembled with pins and bushings, remove the saddle bushing spacer (pin side) (5, Fig. 15).

REPAIR

CAUTION: To avoid possible injury, always stop tractor and lower or block up boom and bucket before servicing loader units.

Regular Buckets



- | | |
|----------------------|--------------------------|
| 1—Bucket | 9—Cap Screw (2 used) |
| 2—Cutting Edge | 10—Plow Bolt (7 used) |
| 3—Ring Hook | 11—Groove Pin (7 used) |
| 4—Grease Fitting | 12—Tooth Tip (7 used) |
| 5—Pin | 13—Bucket Tooth (7 used) |
| 6—Cap Screw (4 used) | 14—Cap Screw (5 used) |
| 7—Stop Nut (4 used) | 15—Lock Nut (14 used) |
| 8—Pin (2 used) | |

Fig. 4-Loader Bucket

Refer to Fig. 4 when disassembling or assembling bucket parts.

Inspect bucket pins and cutting edge for damage. Repair or replace if necessary.

IMPORTANT: Because bucket cutting edges are made of high carbon steel, special welding techniques are required (See "Special Welding Instructions," page 60-25-4).

Bucket Teeth

Drive out pin and remove old tip (12, Fig. 4) from bucket tooth shank (13).

Hand fit tip on tooth shank.

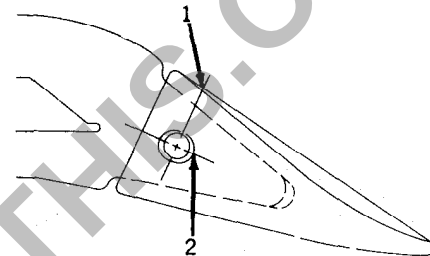
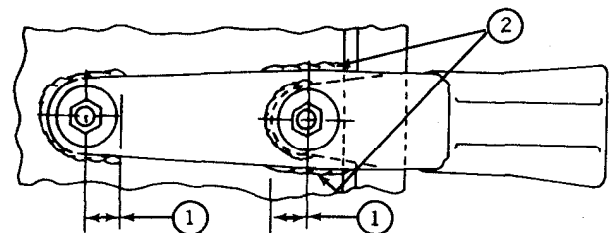


Fig. 5-Installing Tooth Tip

Drive tip on tooth shank until pin can be assembled or until center of hole in shank aligns with center of slot in tip (Point "1", Fig. 5).

Secure tip to tooth shank with grooved pin.

IMPORTANT: Pin should not contact front edge of slot (Point "2", Fig. 5). Point must fit tight with no movement between tooth shank and tip when twisted by hand.



T21197N

1—1 Inch

2—5/16 inch Bead (all welds)

Fig. 6-Tooth Shank Welded to Bucket

Side impacting or wedging or rocks between bucket teeth can sometimes cause the tooth shank attaching hardware to loosen or fail. To prevent this, tooth shanks can be welded to the bucket in the following manner.

TRACK CARRIER ASSEMBLY

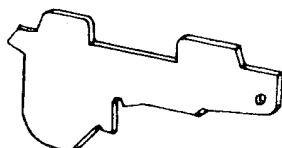
SPECIAL TOOLS

Essential Tools

Tool

Tool No.

Use



T32407N

Fig. 20-JD268-A Wear Gauge



T32432N

Fig. 21-T16678

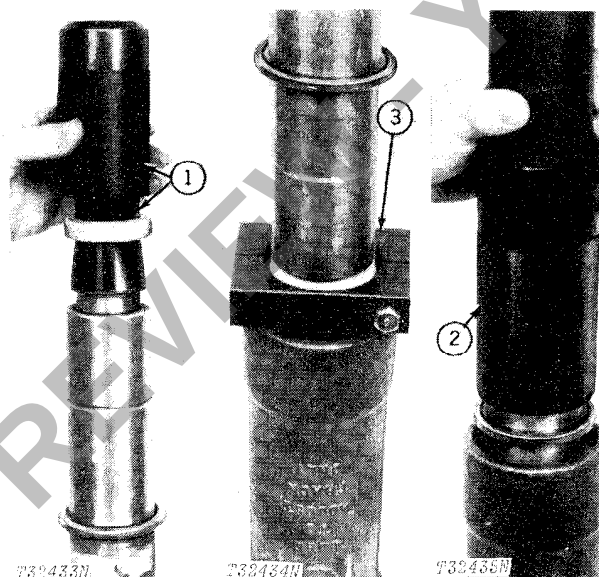
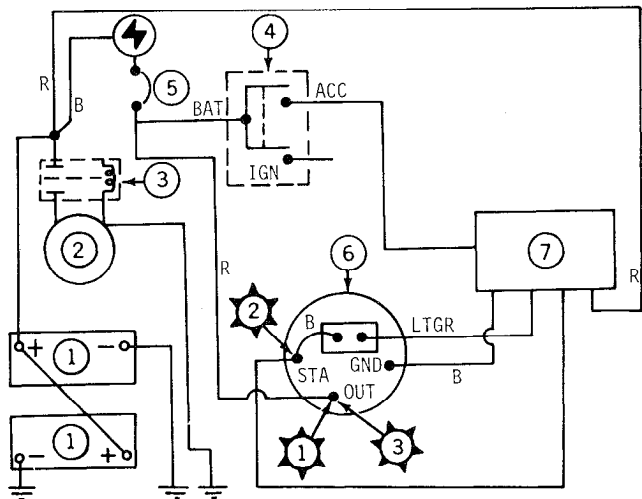


Fig. 22-JD284

- | | |
|-------------------|---|
| Loader (-216302) | |
| Dozer (-216337) | |
| JD268-A | Track Wear Gauge - Check track component parts for wear. |
| Loader (216303-) | |
| Dozer (216338-) | |
| JD294 | Track Wear Gauge - Check track component parts for wear. |
| T16678 | Special Bolt - To compress track idler recoil spring. |
| JD284 | Track Adjuster Tool Set - To install piston seals, oil seals and piston in track tension adjuster cylinder. |
| 1 - JD284-1 | Seal Installation Tool - To install piston seal. |
| 2 - JD284-2 | Dust Seal Driver - To install oil seal. |
| 3 - JD284-3 | Piston Guide - To install piston in cylinder. |

Testing The Charging Circuit (-343540)



T65335N

- | | |
|------------------|-------------------|
| 1—Batteries | 5—Circuit Breaker |
| 2—Starting Motor | 6—Alternator |
| 3—Solenoid | 7—Regulator |
| 4—Key Switch | |

Fig. 19-Charging Circuit

Before you start the circuit tests, quickly review the precautions listed on page 70-15-4.

Make the following tests to isolate a faulty component in the charging circuit.

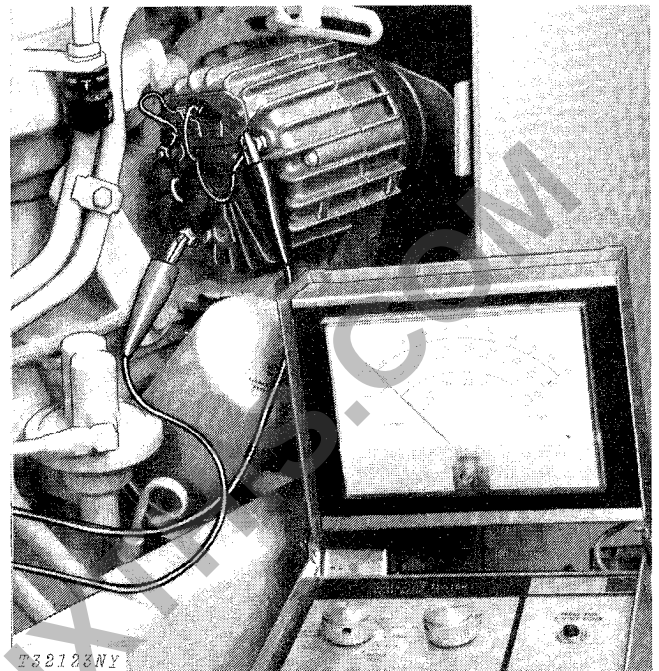


Fig. 20-Voltmeter Connected to Output Terminal

Test No. 1

Key switch must be in OFF position.

Connect meter common probe to alternator GND terminal.

NOTE: Voltmeter common probe must be connected to alternator GND terminal for ALL alternator tests.

Connect meter Volt-Ohm-Amp probe onto alternator OUTPUT terminal.

The voltmeter should register 12 volts.

If it doesn't, wiring between the alternator OUTPUT and the battery positive terminal is defective.

HYDRAULIC SYSTEM PRETEST CHECK SHEET

Customer Comments: _____

Machine Identification _____

PRETEST INSPECTION

- | | |
|--|---|
| 1. Clean machine as required.
2. Perform all inspections. | 3. Correct any problems.
4. Perform Operational Check. |
|--|---|

Hydraulic Oil

	Yes	No
Correct type	☐	☐
Correct level	☐	☐
Bubbles in oil	☐	☐
Other _____	☐	☐

Oil Cooler

	Yes	No
Clear of dirt, debris	☐	☐
Fan or shroud damaged	☐	☐
Belt tension and condition	☐	☐
Leaking cooler or lines	☐	☐

Control Valve(s)

	Yes	No
Bent linkage	☐	☐
Properly adjusted linkage	☐	☐

Hydraulic System

	Yes	No
Bent or damaged lines	☐	☐
External oil leaks	☐	☐
Cylinder Rod(s) Bent	☐	☐
Frequently blown seals and fittings	☐	☐

Filters:

	Transmission		Return		Hydraulic	
	Yes	No	Yes	No	Yes	No
Ruptured Filter	☐	☐	☐	☐	☐	☐
Plugged Filter	☐	☐	☐	☐	☐	☐
Metal Particles	☐	☐	☐	☐	☐	☐
Packing Particles	☐	☐	☐	☐	☐	☐
New Filter Installed	☐	☐			☐	☐

OPERATIONAL CHECK

- | | |
|---|---|
| 1. Start engine. Warm the hydraulic oil as described in the machine Technical Manual.
2. With engine at specified fast idle, cycle each circuit. | 3. Record cycle times. Check applicable symptoms.
4. Reinspect hydraulic oil for bubbles.
5. Go to Symptom Index in machine Technical Manual to select and verify faulty component. |
|---|---|

No hydraulics	☐	
No power in hydraulics	☐	
Slow hydraulics, general	☐	
Slow hydraulics in circuit	☐	_____ (Name of circuit)
Slow circuit in one direction	☐	_____ (Name of circuit)
Chattering hydraulics, general	☐	
Chattering hydraulics in circuit	☐	_____ (Name of circuit)
Circuit initially moves in opposite direction	☐	_____ (Name of circuit)
Wrong circuit operates	☐	_____ (Name of circuit)
Drift or leakdown in circuit	☐	_____ (Name of circuit)
Sticky operation of control valves	☐	
Noisy pump	☐	
Filter warning indicator on	☐	
Slipping transmission	☐	

COMMENTS: _____

M-5107-STOCK-5-76

T49052N

Fig. 2-Hydraulic System Pretest Check Sheet

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