John Deere
644-B
Loader

JOHN DEERE

TECHNICAL MANUAL

John Deere 644-B
Loader

TM1095 (01AUG78) English

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John Deere Davenport Works
TM1095 (01AUG78)

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ENGLISH

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JD644-B LOADER

Technical Manual
TM-1095 (Aug-78)

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The specifications and design information contained in this manual were correct at the time this machine was manufactured. 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. Wherever applicable, specifications and design information are in accordance with SAE and IEMC standards.

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MAINTENANCE WITHOUT ACCIDENT
WORK SAFELY


T27999

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



T27502N

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


T27501N

Consult your shop foreman 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.

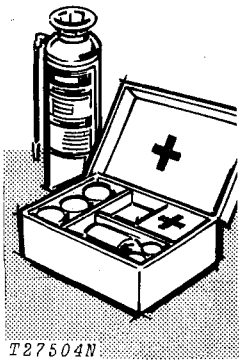
ALWAYS AVOID loose clothing or any accessory—flopping cuffs, dangling neckties and scarves, or rings and wrist watches—that can catch in moving parts and put you out of work.



T32701N

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 aid and assistance. In an emergency, split-second action is the key to safety.


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Group 15
LUBRICATION

GENERAL INFORMATION

Illustrated below is the periodic service chart which is mounted on the front of the battery box. More detailed information on servicing the loader can be found in the current JD644-B operator's manual.

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

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	APPROVED SERVICE MATERIAL
△ 10 OR DAILY	1	PRE-CLEANER	1	CHECK LEVEL OF ACCUMULATED MATERIAL	AS INDICATED ON BOWL	
	2	AIR CLEANER	1	SEE LABEL ON AIR CLEANER		
	3	ENGINE CRANKCASE	1	CHECK OIL LEVEL PER OPERATOR'S MANUAL	BETWEEN MARKS ON DIP STICK	OPERATOR'S MANUAL
	4	FRAME HINGE PIVOTS	2	LUBRICATE GREASE FITTINGS	2 OR 3 INJECTIONS	SAE-MPG
	5	STEERING CYLINDER PIVOT PINS	4	LUBRICATE GREASE FITTINGS	2 OR 3 INJECTIONS	SAE-MPG
	6	LOADER BOOM & CYLINDER PIVOTS	12 - JD644 12 - JD544 14 - JD644	LUBRICATE GREASE FITTINGS	2 OR 3 INJECTIONS	SAE-MPG
	7	LOADER RESERVOIR	1	CHECK OIL LEVEL AT RESERVOIR WINDOW	SEE OPERATOR'S MANUAL	OPERATOR'S MANUAL
	8	RADIATOR	1	CHECK COOLANT LEVEL	MIDWAY BETWEEN RADIATOR CORE & FILLER NECK	OPERATOR'S MANUAL
	9	FUEL FILTER	1 - JD444 1 - JD544 2 - JD644	CHECK FOR SEDIMENT	CLEAN AS REQUIRED	OPERATOR'S MANUAL
	10	TRANSMISSION	1	CHECK OIL LEVEL	SEE OPERATOR'S MANUAL	C-2 TRANS. FLUID
	11	FRONT DRIVE SHAFT SUPPORT BEARING	1	LUBRICATE GREASE FITTING	ADD GREASE UNTIL FRESH GREASE ESCAPES AROUND SEAL	SAE-MPG
	12	AXLE BEARINGS * (DEEP MUD OR WATER OPERATION)	4	INSTALL GREASE FITTINGS & LUBRICATE	6 OR 8 LOW PRESSURE INJECTIONS	SAE-MPG
	13	TRANSMISSION TO DIFFERENTIAL DRIVE LINES (DEEP MUD OR WATER OPERATION)	7	LOW PRESSURE LUBRICATION OF GREASE FITTING	1 OR 2 INJECTIONS	SAE-MPG
□ 50	14	LOADER CONTROL LEVER	1 OR 2	LUBRICATE LEVER PIVOT POINTS		CURRENT GRADE ENGINE OIL
	15	TIRES	4	CHECK AIR PRESSURE	SEE OPERATOR'S MANUAL	
⌓ 100	16	BATTERIES	2	CHECK ELECTROLYTE LEVEL	BOTTOM OF FILLER NECK	DISTILLED WATER
				CHECK TERMINALS FOR CORROSION	REMOVE ANY CORROSION	
	17	ALTERNATOR & FAN BELTS		CHECK TENSION	SEE OPERATOR'S MANUAL	
	18	SHIFT CONTROL BELLCRANK	1	LUBRICATE GREASE FITTING	1 OR 2 INJECTIONS	SAE-MPG
	19	TRANSMISSION TO FRONT DIFFERENTIAL TELESCOPING SHAFT	1	LOW PRESSURE LUBRICATION OF GREASE FITTING	1 OR 2 INJECTIONS	SAE-MPG
▱ 200	20	ENGINE CRANKCASE *	1	DRAIN & REFILL	JD444 12 U.S. QTS. (11.5 LTS.) * * * JD544 18 U.S. QTS. (17 LTS.) * * * JD644 20 U.S. QTS. (19 LTS.) * * *	OPERATOR'S MANUAL OPERATOR'S MANUAL OPERATOR'S MANUAL
	21	CRANKCASE OIL FILTER	1 - JD444 2 - JD544 1 - JD644	REPLACE		
□ 500	22	FRONT & REAR DIFFERENTIALS	2	CHECK OIL LEVEL	LEVEL WITH CHECK PLUG	OPERATOR'S MANUAL
	23	FUEL TANK OUTLET SCREEN	1 - JD444 1 - JD544	REMOVE, CLEAN & REINSTALL		
	24	AXLE BEARINGS *	4	INSTALL GREASE FITTINGS & LUBRICATE. THEN REPLUG	10 TO 20 LOW PRESSURE INJECTIONS	SAE-MPG
	25	TRANSMISSION TO DIFFERENTIAL DRIVE LINES	7	LOW PRESSURE LUBRICATION OF GREASE FITTINGS	1 OR 2 INJECTIONS	SAE-MPG
	26	UNIVERSAL JOINT ENGINE TO TRANSMISSION	2	LOW PRESSURE LUBRICATION OF GREASE FITTINGS	LUBRICATE UNTIL FRESH GREASE ESCAPES AROUND BEARING CAPS	SAE-MPG
	27	LOADER RESERVOIR RETURN FILTER	1 - JD444 1 - JD544 2 - JD644	REPLACE FILTERS		JOHN DEERE FILTERS
	28	FUEL FILTERS	1 - JD444 1 - JD544 2 - JD644	REPLACE FILTERS		JOHN DEERE FILTERS
⬡ 1000	29	FRONT & REAR DIFFERENTIALS	2	DRAIN & REFILL	SEE OPERATOR'S MANUAL	OPERATOR'S MANUAL
	30	LOADER RESERVOIR	1	DRAIN, FLUSH & REFILL	SEE OPERATOR'S MANUAL	OPERATOR'S MANUAL
	31	AIR CLEANER	1	REPLACE BOTH ELEMENTS		OPERATOR'S MANUAL
	32	TRANSMISSION	1	DRAIN, CHANGE FILTERS & REFILL	SEE OPERATOR'S MANUAL	OPERATOR'S MANUAL
	33	STARTER (DELCO REMY ONLY)	1	LUBRICATE WICKS	SATURATE WICKS	SAE 10W ENGINE OIL

* LUBRICATION NOT RECOMMENDED AT TEMPERATURES BELOW 0°F (-18°C)

** CHANGE BREAK-IN OIL & FILTERS AFTER 100 HOURS OF USE

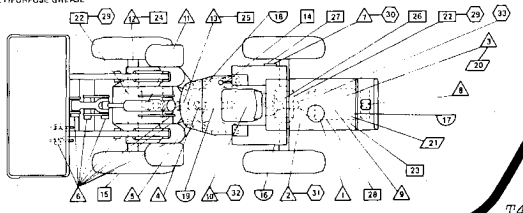
WHEN LOADER IS USED DURING PREVAILING AIR TEMPERATURES BELOW -10°F (-23°C), CHANGE OIL AFTER EVERY 100 HOURS OF OPERATION OR EVERY 6 WEEKS OF INTERMITTENT OPERATION, WHICHEVER OCCURS FIRST.

*** ADD 2 QUARTS (2 LITRES) WITH FILTER CHANGE

MPG - MULTIPURPOSE GREASE

ENGINE OIL

AIR TEMPERATURE	JOHN DEERE TORO GARD OIL	SINGLE VISCOSITY OIL	MULTI VISCOSITY OIL
ABOVE 32° F. (0° C.)	SAE 30	SAE 30	NOT RECOMMENDED
32°F to 10°F (0°C to -23 °C)	SAE 10W 20	SAE 10W	SAE 10W 20 SAE 10W 30
BELOW -10°F (-23°C)	SAE 5W 20	SAE 5W	SAE 5W 20



T47269N

Fig. 1-Periodic Service Chart

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Section 10
GENERAL

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Group 5
GENERAL MACHINE SPECIFICATIONS

(Specifications and design are subject to change without notice. Wherever applicable, specifications are in accordance with ICED and SAE Standards. Except where otherwise noted, specifications are based on a machine equipped with all standard equipment, 20.5-25, 12-ply, loader-tread tires with 1820 lb. (826 kg) of $CaCl_2$ solution in rear tires, side counterweights, ROPS cab, full fuel tank, and 175 lb. (79.4 kg) operator.)

Power (at 2,200 engine rpm): **SAE** **DIN**
Gross ..... 160 (119.3 kW*)
Net ..... 145 (108.1 kW*) 147.5 PS
**Net engine flywheel horsepower 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. (152 m) altitude and 85°F. (29.4°C) temperature and DIN 70 020 conditions (non-corrected). No derating is required up to 10,000 ft. (3 000 m) altitude.*
**In the international system of units (SI), power is expressed in kilowatts (kW).*
Engine: John Deere turbocharged diesel, vertical 6-cylinder, valve-in-head, 4-stroke cycle.
Bore and stroke ..... 4.75 x 5 in. (120.5 mm x 127 mm)
Piston displacement ..... 531 cu. in. (8 702 cm^3)
Compression ratio ..... 15.8 to 1
Maximum torque @ 1500 rpm ..... 432 lb-ft (59.7 kg-m)
NACC or AMA (U.S. Tax) horsepower 54.0
Lubrication ..... Pressure system with full-flow filter
Cooling ..... Pressurized with thermostat and fixed bypass
Fan ..... Blower
Air cleaner with restriction indicator ..... Dry
Electrical system ..... 12-volt (12V) with alternator
Batteries (2) ..... Reserve capacity: 310 minutes each battery

Torque Converter:
Type ..... Twin-turbine
Torque multiplication ..... 4.9 to 1

Transmission ..... Power shift planetary

Forward Speeds	**mph**	**km/h**
1	0-3.3	0-5.3
2	3.3-7	5.3-12.6
3	0-12.5	0-20.1
4	12.5-25.8	20.1-41.5

Reverse Speeds		
1	0-4.5	0-7.2
2	4.5-10.2	7.2-16.4

NOTE: Shift from 1st to 2nd and 3rd to 4th is automatic.

Differentials:
Front ..... No-Spin
Rear ..... Standard

Drive Axles ... Inboard-mounted planetary gears to each wheel. Front axle fixed. Rear axle oscillates 22-degree total. 15.3 inches (389 mm) vertical travel at center of tire.

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Group 5
ENGINE REMOVAL AND INSTALLATION

REMOVAL

Operate controls to release hydraulic pressure from loader hydraulic system and steering and brakes hydraulic system.

Pull pins from pivot lock bar and engine frame and lock bar between engine and loader frames. Disconnect battery ground strap.

Remove muffler, pre-cleaner, grille screen, hood, and engine side shields.

Drain radiator. Disconnect inlet and outlet hoses. Disconnect transmission oil cooler hoses and oil cooler line clamps at right side of engine block.

Disconnect speed control rod from fuel injection pump. Remove bell crank rod near flywheel end of engine.

Disconnect fuel leakoff line at both ends.

Disconnect rear lights from main wiring harness. Remove the transmission oil cooler, radiator, and grille housing as one assembly by removing the grille housing to engine frame hardware.

Disconnect transmission oil lines from engine-mounted hydraulic pump. Disconnect hydraulic steering lines from pump. Also disconnect rear pump oil seal drain return tube.

Disconnect fuel line at transfer pump.

Disconnect engine wiring harness at connector to canopy support. Also disconnect the wires of the engine harness from the solenoid on the canopy support. Disconnect clamp on canopy support. Disconnect the battery cable to starter. Disconnect oil pressure tube.

NOTE: For units equipped with cab heater, disconnect heater hoses from engine and remove clamps mounting hose to engine.

Disconnect starting aid tube from engine.

Hold oil drain line on inside of engine frame and remove large hex. nut on outside of frame.

Disconnect transmission drive shaft at flywheel end of engine.

Attach JDG-19 Lifting Brackets or JD244 Lifting Eyes to engine and D-01043AA Load Positioning Sling or JDG-1 or JDG-23 Engine Lifting Sling to lifting eyes. Attach chain hoist to sling.

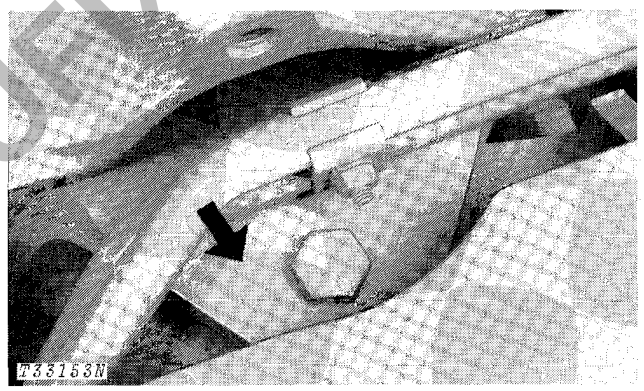


Fig. 1-Rear Engine Brackets

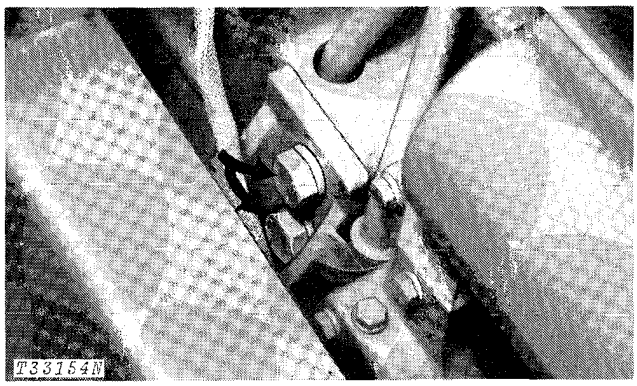


Fig. 2-Front Engine Brackets

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29. Bleeding the Fuel System

After removing any components of the fuel system, remove air by bleeding. Bleeding is also necessary whenever the fuel tank has been emptied.

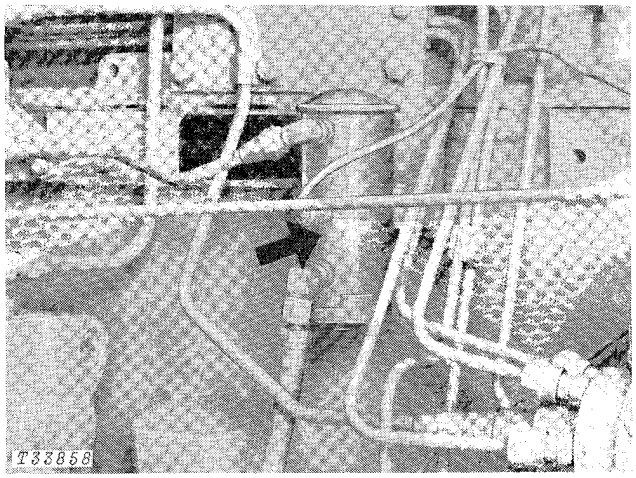


Fig. 38-Electric Fuel Pump

Loosen filter bleed plug on upper left-hand side of fuel filter body.

Turn key to start position—this will start the electric fuel pump. When fuel free of air bubbles comes out of bleed plug, turn key to off position and tighten bleed plug.

Fuel system bled *Yes* *No*

30. Parking Brake

Check parking brake for proper adjustment. Adjust, if necessary.

Forty-five pounds (20 kg) of force is required at top of handle to activate parking brake. See page 10-10-25 for adjusting parking brake procedure.

Parking brake adjusted *Yes* *No*

31. Wheel Retaining Cap Screws

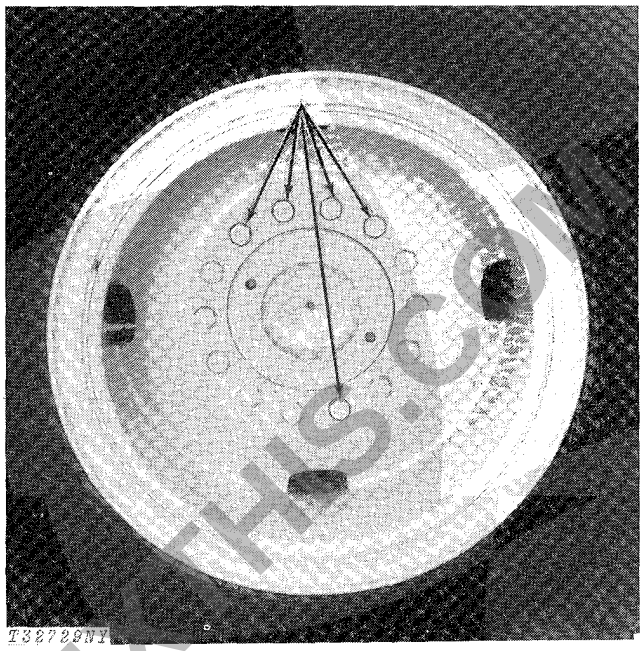


Fig. 39-Wheel Retaining Cap Screws

Check all wheel retainer cap screw torque. Tighten wheel retaining cap screws to 300 lb-ft (41.48 kg/m).

Wheel retaining cap screws tightened *Yes* *No*

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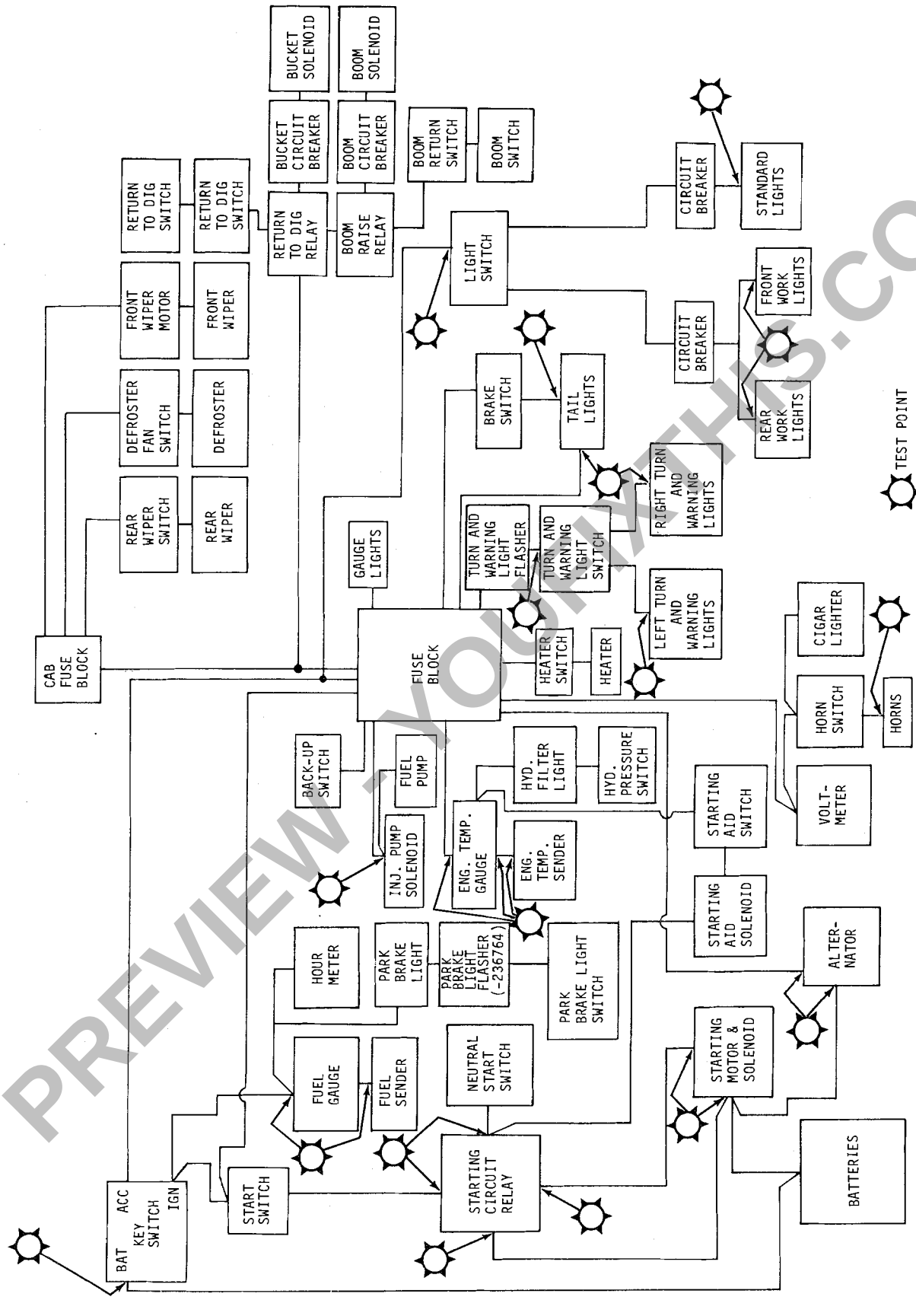


Fig. 7-Electrical System Block Diagram (-243977)

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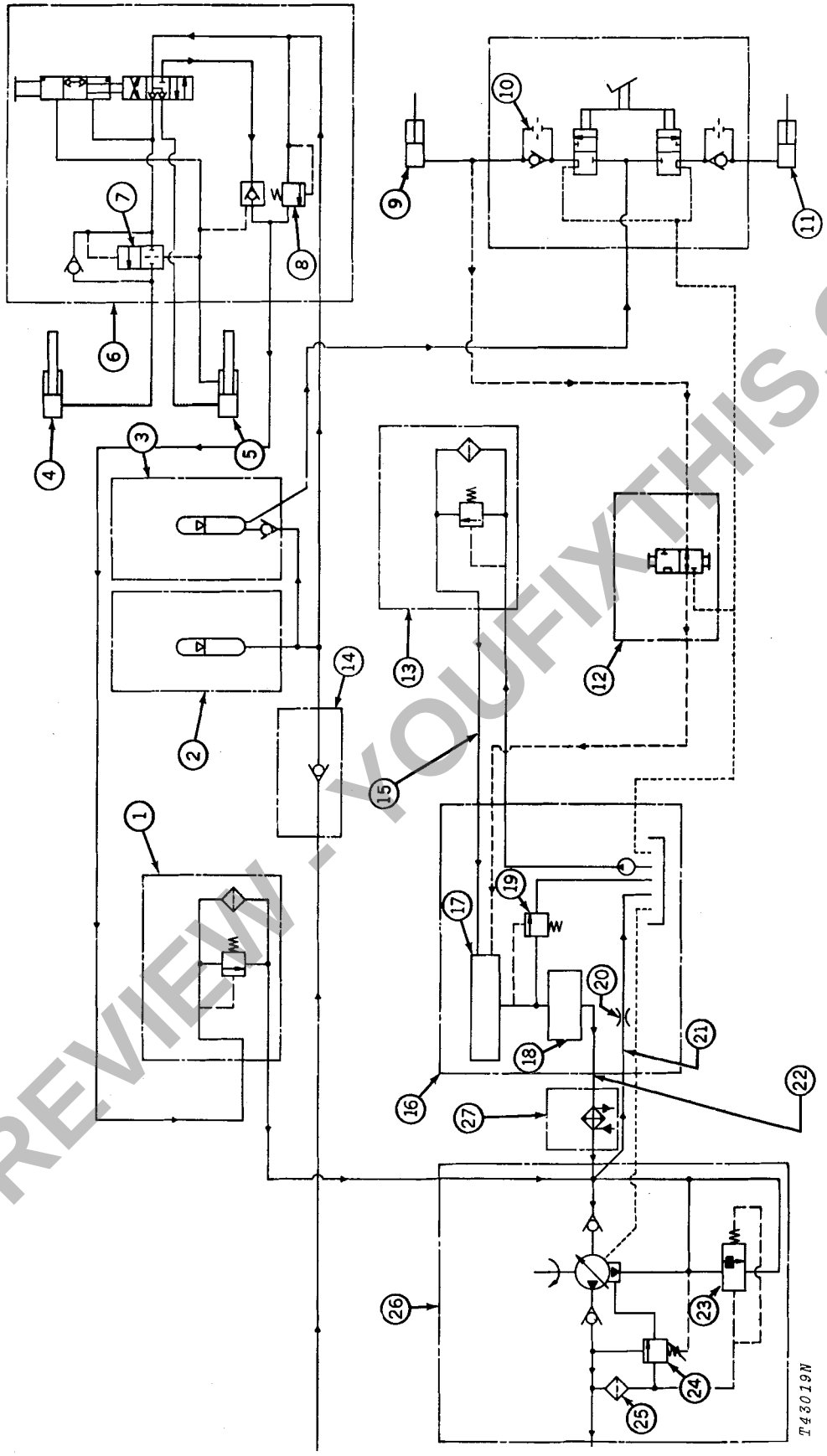


Fig. 2-Closed Center Hydraulic Circuit (-247612)

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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
- 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

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

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
- Incorrect timing
- Water, air or dirt in fuel
- Faulty injection nozzles
- Faulty injection pump
- Faulty transfer pump
- 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 supply pump malfunction
- Speed control linkage not adjusted properly
- Fuel filter restricted
- Fuel injection pump malfunction
- Fuel transfer pump malfunction
- Fuel injection nozzle faulty
- Water, dirt or air in fuel system
- Injection nozzle leak-off line clogged
- Injection pump out of time
- Foreign material lodged in compressor, impeller on turbine of turbocharger
- Turbocharger rotating assembly bearing seizure
- Leakage of turbocharger compressor air at turbocharger or manifold
- Leakage of exhaust gas at manifold or turbocharger

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Group 10
PREDELIVERY, DELIVERY, AND AFTER-SALE SERVICES

TEMPORARY STORAGE

After receiving your loader from the factory and before putting the machine into temporary storage perform the following checks.

For long term storage (over 30 days) information, consult your JD644-B Operator's Manual.

1. Check battery electrolyte level and charge the battery, if necessary.

2. Check coolant level in the radiator. The coolant should be maintained at a level midway between the radiator core and filler neck.

3. Fill the fuel tank.

4. Check crankcase oil level. Oil should be at top mark of dipstick after loader has been shut down for ten minutes.

5. Relieve hydraulic pressure by stopping engine, lowering bucket and operating steering wheel or control levers until system fails to respond.

PREDELIVERY SERVICE

Because of the shipping factors involved, plus extra finishing touches that are necessary to promote customer satisfaction, proper predelivery service is of prime importance to the dealer and the customer.

If adjustments are required, procedures are found in the After-Sale section.

Use the following check list when preparing a loader for delivery to the customer.

1. Pre-cleaner

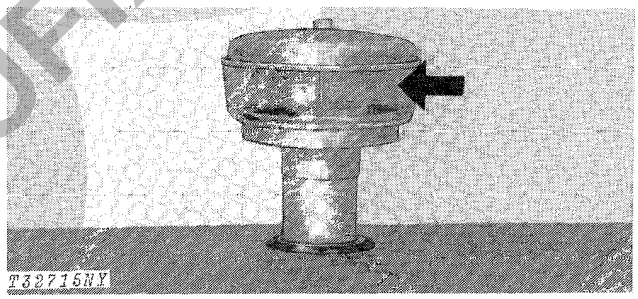


Fig. 1-Pre-cleaner

Check and clean pre-cleaner bowl.

Pre-cleaner checked and cleaned. *Yes* *No*

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Brakes:
Service..Power actuated, 4-wheel, inboard-mounted wet disk. Foot-operated by either right or left pedal.
Parking..10 x 1.5-inch (254 mm x 38 mm) expanding shoe on transmission output shaft. Adjustable, hand-operated with warning light and buzzer.

Steering.....Full power steering. Frame articulated 80 degrees by two hydraulic cylinders. Turning radius of 15 feet 5 inches (4.7 m).

Hydraulic Systems:
Loader functions...Independent engine-driven, gear pump delivers 58.2 gpm (220 Lpm) at 600 psi (42 kg/cm²) and 220 engine rpm. 2,250 psi (158.2 kg/cm²) relief-valve pressure setting.
Control ..... Single-lever, dual hydraulic valve. Optional triple hydraulic valve for fork or multipurpose bucket.
Steering and brakes....Engine-driven, eight-piston, variable-displacement pump delivers 26.5 gpm (100 Lpm) at 2,200 engine rpm and 2,000 psi (140.6 kg/cm²). Maximum system pressure is 2,400 psi (169 kg/cm²).

Hydraulic Cylinders:	**Bore**	**Stroke**
Boom, two	6.25 in. (159 mm)	25.55 in. (649 mm)
Bucket, one	6.25 in. (159 mm)	29.60 in. (752 mm)
Cylinder rods	Ground, heat-treated, chrome-plated, polished	
Boom and bucket cylinder rods	2.75 in. (70 mm) dia.	

Tires:
17.5-25, 12-ply-rating, loader tread, L-2
20.5-25, 12-ply-rating, rock tread, L-3
20.5-25, 12-ply-rating, loader tread, L-2
20.5-25, 16-ply-rating, rock tread, L-3

Wheel Treads:
Front and rear ..... 80 in. (2.03 m)

Capacities:	**U.S.**	**Litres**
Cooling system	49 qt.	46.4
Fuel tank	56 gal.	211.9
Crankcase	20 qt.	18.9
Crankcase, includes filter	22 qt.	20.8
Transmission case and filters	39 qt.	36.9
Front differential	24 qt.	22.7
Rear differential	25 qt.	23.7
Loader hydraulic sump	70 qt.	66.2

Additional Standard Equipment:
Adjustable cushioned seat
Engine side shields
Front fenders
Gauges:
- Transmission oil temperature
- Transmission oil pressure
- Fuel
- Coolant temperature
- Engine oil pressure
- Electric hour meter
- Voltmeter

Loader hydraulic system indicator
Key switch
Pushbutton safety start
Cigar lighter
Parking brake warning light and buzzer
Transistorized voltage regulator
Vandal protection
Horn
Lights
Fuel filter
Automatic return-to-dig
Rear counterweight
Fixed drawbar
Exhaust w/rain cap
Rear bottom guard
Hand grips
ROPS w/cab and seat belt
Heater
Antifreeze
Cold weather starting aid
Flashing and turning lights
Work lights
Precleaner

Special Equipment:
Rear axle disconnect
ROPS canopy and seat belt
Instrument panel cover with lock
Reverse warning alarm
Triple loader hydraulic valve
Bucket teeth
Auxiliary side weights
Splash guard for fenders
Front bottom guard
License plate bracket
Defroster fan
Automatic boom height control
Engine coolant heater
SMV emblem
ROPS quiet cab
Auxiliary cutting edges
Air conditioning
Adjustable suspension seat

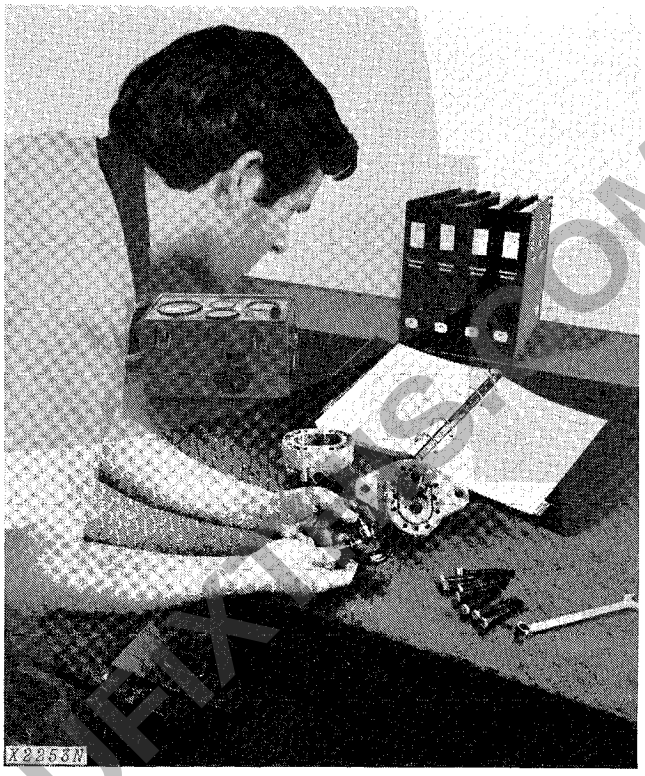
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INTRODUCTION



Use FOS Manuals for Reference



Use Technical Manuals for Actual Service

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

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 technicians.



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 service technician.

This technical manual was planned and written for you an experienced service technician. 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.

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REMOVAL

Engine should be removed (Section 20, Group 5) to service camshaft and valve actuators.

If camshaft is to be removed, remove oil pan and oil pump. Also remove damper assembly and timing gear cover.

The cylinder head need not be removed unless desired.

Camshaft End Play

Before removing camshaft, check camshaft end play.

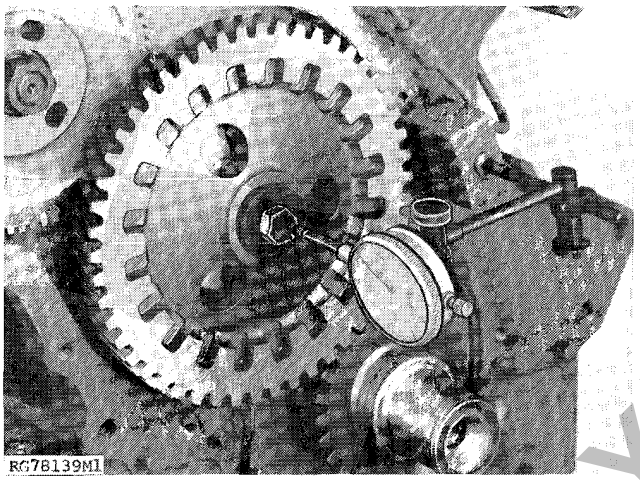


Fig. 15-Checking Camshaft End Play

Position a dial indicator as shown in Fig. 15.

Push camshaft to rear of engine until it stops. Zero the dial indicator.

Using two pry bars, move camshaft to front of engine until it stops. Note dial indicator reading.

CAMSHAFT END PLAY SPECIFICATIONS

New engine end play ..... 0.004 to 0.010 in. (0.102 to 0.254 mm)
Maximum serviceable ..... 0.0150 in. (0.380 mm)

NOTE: If end play exceeds wear specification, check thrust washer thickness during disassembly.

Camshaft Removal

Remove rocker arm assembly and push rods (See below).

Install D-15001NU (ND425) Magnetic Holding Tool Set to hold cam followers away from camshaft.

Remove four cap screws holding thrust plate to cylinder block.

Carefully remove camshaft from block so that camshaft lobes do not drag in bores.

Rocker Arm Assembly Removal

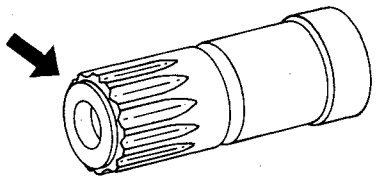
Remove rocker arm cover.

Remove clamps (12 and 16, Fig. 18) and remove rocker arm assembly.

Remove push rods and identify for reassembly.

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Nozzle Retaining Nut



R 26854N

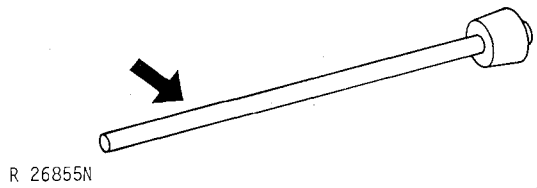
Fig. 14-Nozzle Retaining Nut

Remove carbon deposits on both inner and outer surfaces of the nozzle retaining nut (Fig. 14).

Inspect the retaining nut for cracks caused by over-tightening or a damaged lower seating surface. A seating surface may be restored by rubbing the surface on emory cloth.

Any nozzle retaining nut which cannot be reconditioned, must be replaced with a new one.

Spindle



R 26855N

Fig. 15-Spindle

The spindle (Fig. 15) has a spring seat (which is a separate piece) pressed on it. Do not separate parts.

Inspect the spindle for:

1. Cracked or broken lower portion which contacts the nozzle valve stem.

2. Bent condition.

3. Excessive spring seat wear.

If any of the above conditions are present, replace the spindle.

NOTE: Robert Bosch spindles are magnetized to trap small metal particles which may be produced by normal wear.

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If both A to C readings or both B to C readings are the same, the brushes may be grounded because of a defective insulating washer and sleeve at the two screws. If the screw assembly is not damaged, the regulator or diode trio is defective.

Diode Trio

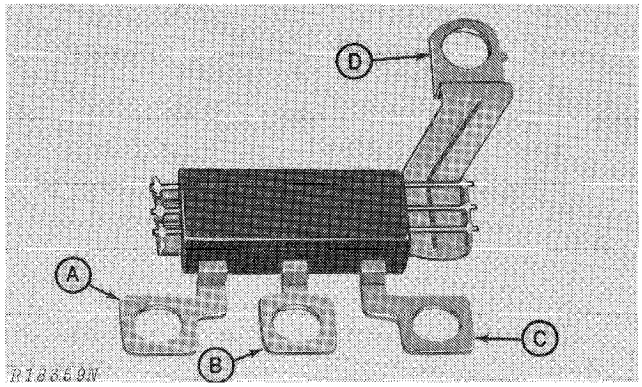


Fig. 9-Diode Trio

To check the diode trio, first remove the stator. Then remove the diode trio, noting the insulator positions. With an ohmmeter, check between points A (Fig. 9) and D and then reverse the ohmmeter lead connections. A good diode trio will give one high and one low reading. If both readings are the same, the diode trio is defective. Repeat this test at points B and D and at points C and D.

Rectifier Bridge

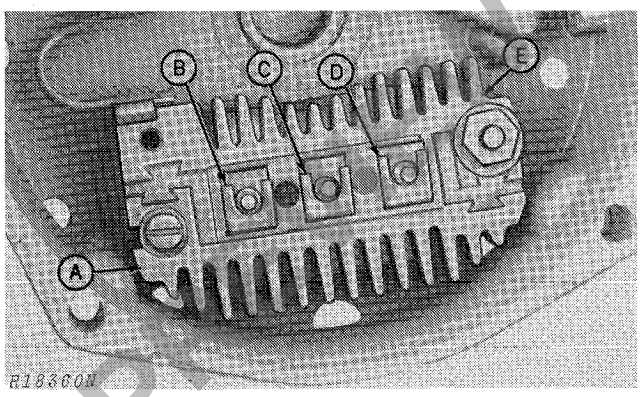


Fig. 10-Rectifier Bridge

The rectifier bridge has a grounded heat sink (A) and an insulated heat sink (E) that is connected to the output terminal. Connect ohmmeter to the grounded heat sink (A) and to the flat metal strip (B, Fig. 10). Then reverse the ohmmeter lead connections. If both readings are the same, the rectifier bridge is defective. Repeat this test between points A to C, A to D, B to E, C to E and D to E.

The ohmmeter check of the rectifier bridge, and of the diode trio as previously covered, is a valid and accurate test. Do not replace either unit unless at least one pair of readings is the same.

IMPORTANT: Do not use high voltage to check such as a 110 volt test lamp.

Brush Assembly and Regulator

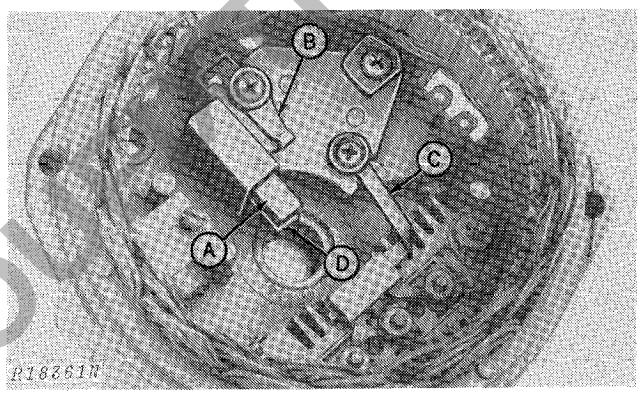


Fig. 11-Brush Assembly

Check brushes for continuity between points A to B and C to D (Fig. 11). Wiggle the brush to locate poor connections.

After removing stator and diode trio, the brush assembly and the regulator may be removed. The screws at points B and C must have insulating washers and sleeves. A ground at these points will cause no output or uncontrolled output.

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Remove the felt seal (1, Fig. 23) and coil retaining ring (3). A cross-sectional view of these parts installed is shown in Fig. 4.

Note position of wiring terminals on coil housing in relation to compressor body. Mark location on compressor body to insure correct installation.

Remove coil housing assembly (2, Fig. 24) and rubber gasket (3).

Installation

IMPORTANT: If coil is being replaced, be sure to use 12 volt coil. Coil with flat ("spade") connectors is 12 volt; coil with round ("bullet") connectors is 24 volt.

Inspect rubber gasket condition and replace if not in good condition. Install gasket on compressor.

Position clutch coil on compressor head so the electrical terminals correspond with the mark made previously on the compressor body.

IMPORTANT: Be sure clutch coil is correctly seated on dowels.

Install coil retainer ring (3, Fig. 22) with flat side of ring facing coil.

Install felt seal (1) next to coil retainer ring.

Install pulley and bearing assembly (Fig. 22). Then install pulley bearing front shield (see Figs. 18 and 19).

Install hub and drive plate assembly as previously instructed (Fig. 11), using the D18014KD Installion Tool. DO NOT pound or drive on the hub assembly.

Checking and Adding Compressor Oil

General Information

The compressor oil flows through the system with the refrigerant when the system is operating lubricates the compressor parts. Usually, it is unnecessary to check compressor oil level unless there is a significant loss of refrigerant (hence, a significant loss of oil) from:

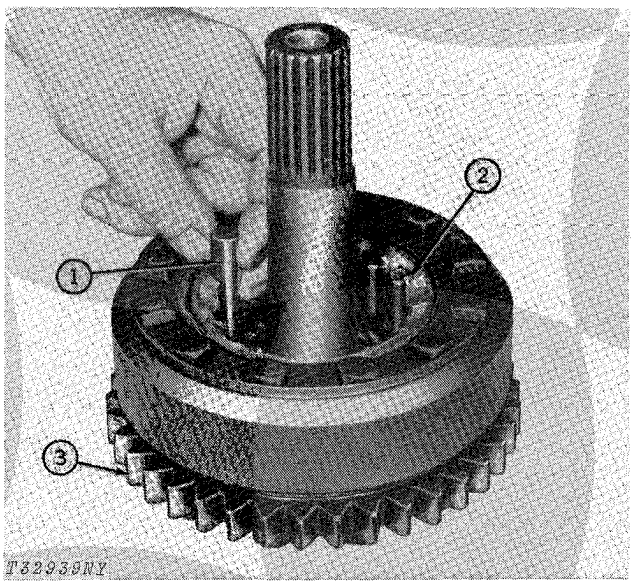
1. Broken hose
2. Severe leak at hose fitting
3. Leaking compressor seals
4. Collision or upset damage to system components

If the compressor, condenser, or evaporator is removed for servicing, the oil level should be checked. To check oil level, the compressor must be removed. When oil is required, pour 525 viscosity oil into the oil drain tube of compressor.

NOTE: The compressor uses special 525 viscosity oil with special additives to extend compressor life. Use only John Deere Air Conditioner Compressor Lubricant (or equivalent).

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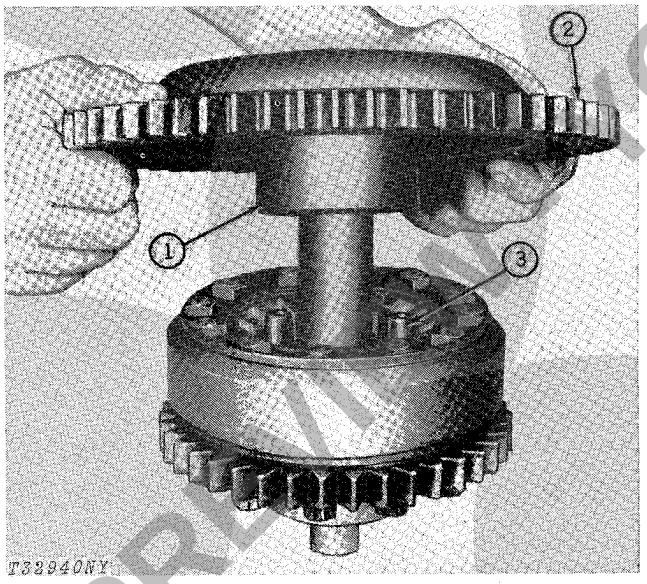
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1—Roller (15 used)
2—Freewheel Roller Cage
3—Second-Turbine Driven Gear

Fig. 38-Installing Roller Into Roller Cage

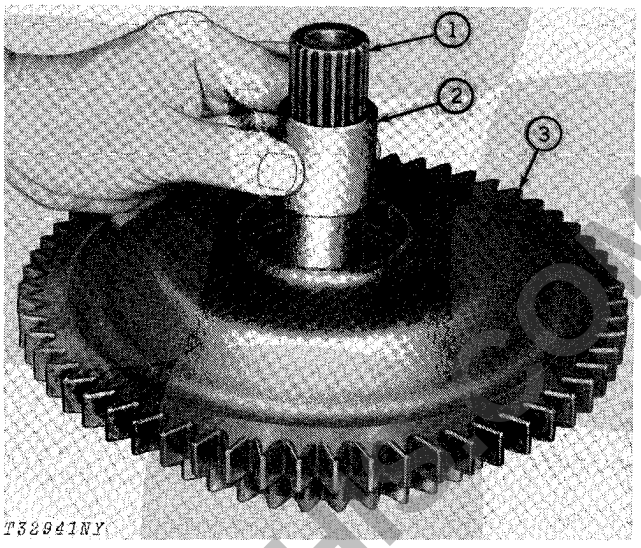
Install fifteen rollers into the cam packets; use oil-soluble grease to retain the rollers in the cage (Fig. 38).



1—Chamfer
2—First Turbine Driven Gear
3—Rollers (15 used)

Fig. 39-Installing First Turbine Driven Gear

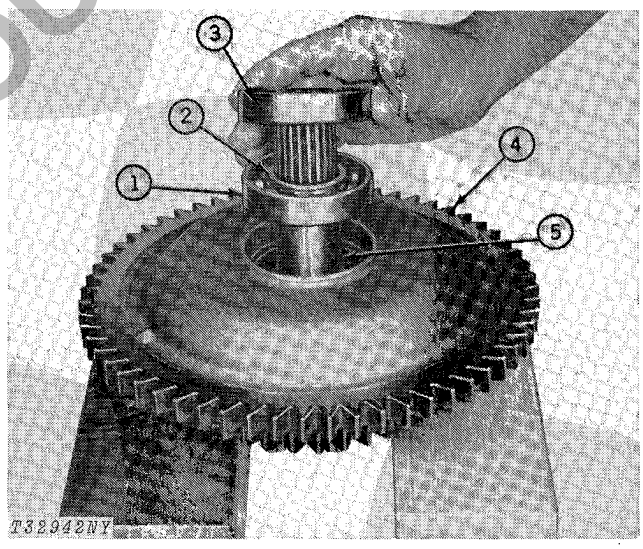
Install the first-turbine driven gear by placing the lead chamfer on the gear hub against rollers, and while pressing downward, rotate the first turbine driven gear in a counterclockwise direction (Fig. 39).



1—Second Turbine Driven Gear
2—Spacer
3—First Turbine Driven Gear

Fig. 40-Installing Bearing Spacer Onto Second Turbine Driven Gear

Install the bearing spacer onto the shaft of the second-turbine driven gear (Fig. 40).



1—Bearing
2—Spacer
3—Bearing
4—First Turbine Driven Gear
5—Spacer

Fig. 41-Installing Bearings andd Spacer Onto Second Turbine Driven Gear

Install the remaining bearings and spacer, as shown in Fig. 41, onto the shaft of the second-turbine driven gear. Accurately center the spacer to prevent it from getting caught on the shaft shoulder. Press the bearings and spacer firmly into plate while supporting the second-turbine driven gear.

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Adjustment

Adjust mechanical parking brake linkage as follows. Refer to Figure 157 for location of parts.

1. Install brake lever. Use center slot at front of lever (1, Fig. 157) and horizontal link on engine frame.

2. Adjust top nob on brake lever so that cross pin in lever handle is 1-1/2 inch (38.100 mm) below top of slot.

3. Install rod with yoke (5) from brake lever to hand brake arm (7).

4. Screw upper yoke (16) 1-1/2 inches (38.100 mm) onto hand brake rod (13) and tighten with jam nut.

5. Install vertical linkage and adjust lower yoke (10) to brake drum lever so that 45 pounds (20.412 kg) of force is required at top of handle to apply brakes.

Burnishing Parking Brake

To provide maximum holding ability, service replacement drums and linings require burnishing as follows:

1. Operate loader at top speed in low gear. Remove foot from throttle and stop unit by applying the parking brake. Repeat operation at least ten times at one minute (minimum) intervals.

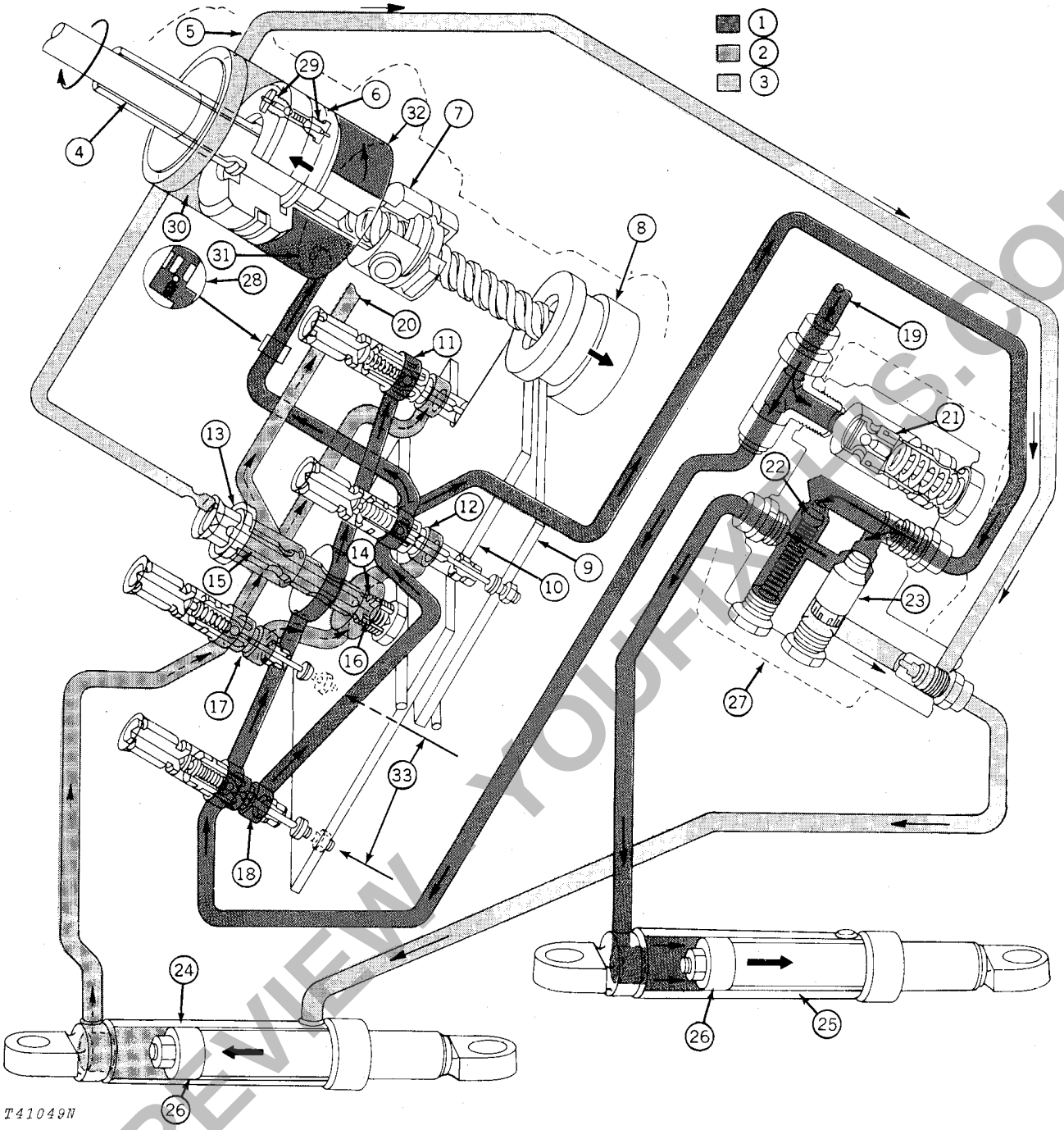
2. Check brake holding ability by parking on a reasonable grade or incline.

3. Repeat procedure in Step 1 until the check in Step 2 is satisfactory.

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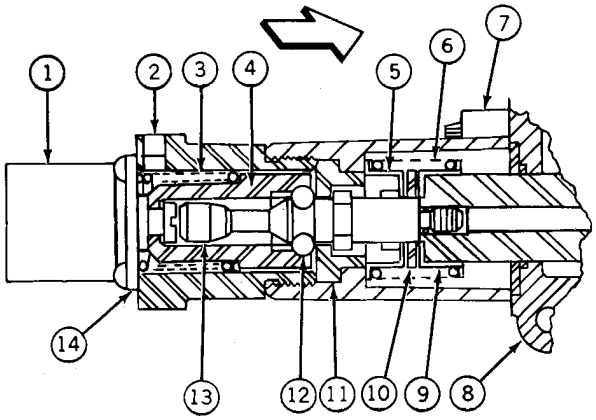
1—Pressure Oil
2—Return Oil
3—Trapped Oil
4—Valve Operating Shaft
5—Trapped Oil Circuit
6—Steering Valve Piston
7—Collar, Roller, Spring and Nut Assembly
8—Valve Operating Collar
9—Upper Valve Operating Lever
10—Lower Valve Operating Lever
11—Pressure Metering Valve, L.H. Turn
12—Return Metering Valve, L.H. Turn
13—Check Valve Piston
14—Check Valve Seat
15—Check Valve Piston Shaft
16—Check Valve
17—Return Metering Valve R.H. Turn
18—Pressure Metering Valve R.H. Turn
19—Pressure Line from Main Pump
20—Return to Reservoir
21—System Relief Valve
22—Check Valve
23—Flow Control Valve
24—Right Steering Cylinder
25—Left Steering Cylinder
26—Steering Cylinder Pistons
27—Flow Control Valve Housing
28—Orificed Check Valve
29—Synchro Valve (2 used)
30—Upper Trapped Oil Circuit
31—Lower Trapped Oil Circuit
32—Steering Valve Cylinder
33—Pressure and Return Metering Valve Used in Turn

Fig. 1-Power Steering - Right-Hand Turn (-247612)

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RETURN-TO-DIG AND BOOM POSITIONER (-243977)

The function of the return-to-dig mechanism is to automatically release the bucket section from the rollback detent position at a predetermined bucket position. This is accomplished by a solenoid actuated detent release mounted on the control valve spool and two switches wired in series. One switch is mounted on the control valve spool and the other switch is mounted on the bucket.



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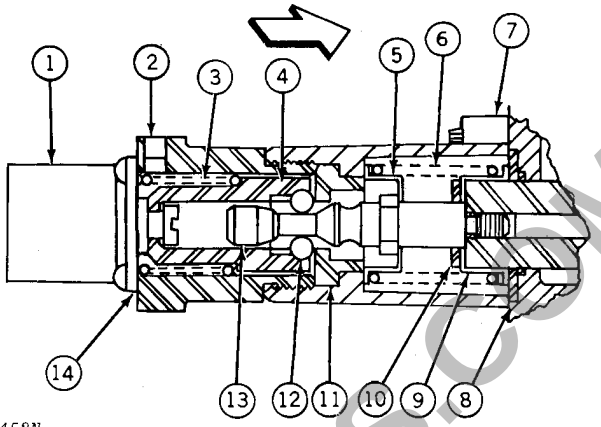
1—Solenoid
2—Solenoid Mounting Cap
3—Detent Release Spring
4—Detent Release
5—Spring Retainer
6—Spool Centering Spring
7—Valve Housing Cap
8—Valve Housing
9—Spring Retainer
10—Washer
11—Detent Ball Retainer
12—Detent Ball
13—Detent Screw
14—Shims

Fig. 5-Spool in Detent (-243977)

The detent release mechanism works as follows: When the control valve spool is moved to the detent position, the detent balls drop into the notch of the detent screw and are held in place by the detent release. See Fig. 5.

When both switches of the return-to-dig circuit are actuated, current will flow to the solenoid actuating it. As the solenoid moves, it releases the detent balls from the detent screw allowing the spool to return to neutral. See Fig. 6.

The control valve switch is actuated by a link on the control valve spool and the other switch is actuated by the bucket cylinder actuating rod.



T58452N

1—Solenoid
2—Solenoid Mounting Cap
3—Detent Release Spring
4—Detent Release
5—Spring Retainer
6—Spool Centering Spring
7—Valve Housing Cap
8—Valve Housing
9—Spring Retainer
10—Washer
11—Detent Ball Retainer
12—Detent Ball
13—Detent Screw
14—Shims

Fig. 6-Spool Release (-243977)

When the bucket is in the dump position and the control valve is placed in the rollback position, the bucket will begin to roll back. The control valve switch is also actuated.

When the bucket reaches a predetermined position, the bucket cylinder actuator rod will actuate the bucket cylinder switch. This allows current to flow to the solenoid, releasing the control valve spool from detent and stopping the movement of the bucket. When the control valve returns to neutral, it releases the control valve switch, stopping the flow of current to the solenoid.

The bucket cylinder actuator rod can be adjusted so that the positioning of the bucket can be varied.

Operation of the boom positioner is the same as the operation of the return-to-dig. The only difference in the system is the location of the boom switch. The boom switch is mounted on the upper right-hand boom pivot pin and is adjustable to allow positioning of the boom at any height.

To adjust the boom positioner actuator, raise the boom to the desired height and then pull out the actuator handle and turn it until the actuator can depress the boom switch.

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MISCELLANEOUS HYDRAULIC COMPONENTS

SPECIFICATIONS AND TORQUE VALUES—Continued

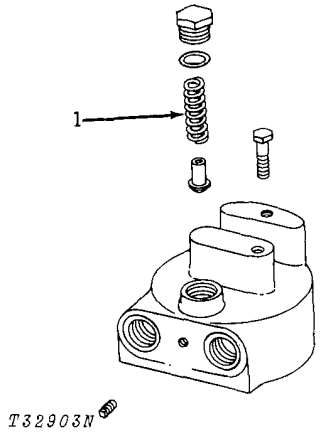


Fig. 66-Steering and Brake System Filter

1 - Bypass valve spring test length . . . . . 0.56 in. (14.22 mm) with 11 lb. (49 N) (5 kg)

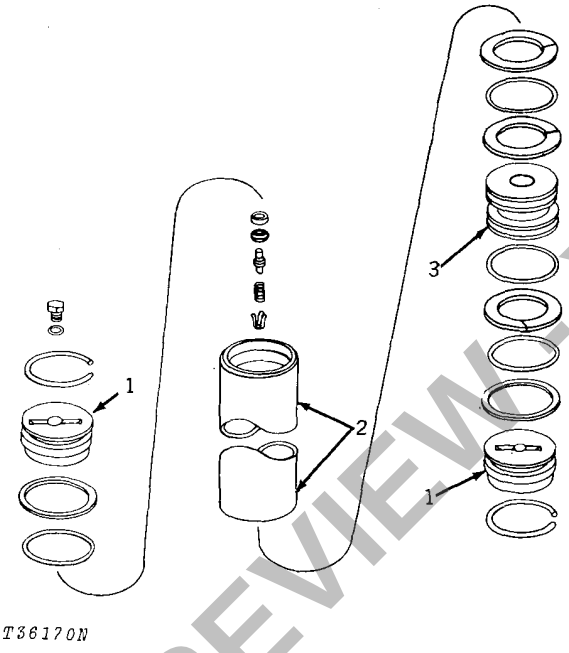


Fig. 67-Accumulators

1 - O.D. of cap . . . . . 2.994 to 2.998 in. (76.048 to 76.149 mm)

2 - I.D. of cylinder . . . . . 2.9980 to 3.0010 in. (76.149 to 76.225 mm)

3 - O.D. of piston . . . . . 2.9930 to 2.9960 in. (76.022 to 76.098 mm)

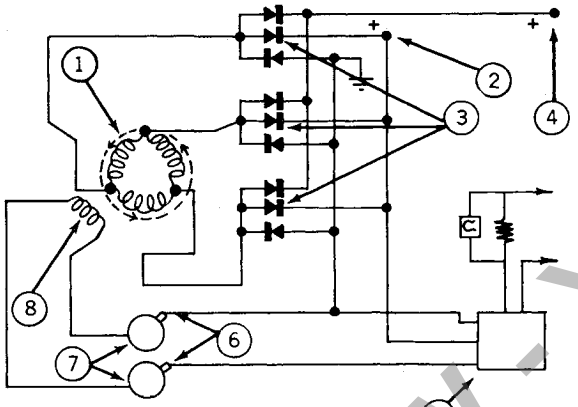
Dry nitrogen charge . . . . . 500 ± 25 psi (34 ± 2 bar) (35 ± 2 kg/cm²)

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The alternator produces power in the form of alternating current and voltage. The alternating current is changed to direct current by the use of diodes. Since the diode will pass current in only one direction (from alternator to battery or load), the alternator does not require the use of a cutout relay.

The alternator output current is controlled by the current flow through the field coil (rotor) (Fig. 5). The amount of current required is determined and controlled by the regulator. Since there is very little residual magnetism in the alternator, it is necessary to supply a small amount of excitation current to the field (rotor) to start the process of current generation. The excitation resistance wire supplies this starting current when the key switch is turned on. This resistance wire is located in the engine wiring harness. Once the regulator is excited, voltage is sensed at the regulator terminal and the voltage regulator takes over control of the system voltage.



T50239N

1—Stator
2—Regulator Terminal
3—Diodes
4—Output Terminal
5—Regulator
6—Brushes
7—Rotor Slip Rings
8—Rotor Winding (Field)

Fig. 5-Alternator Circuit

The transistor regulator is an electronic switching device composed principally of transistors, resistors, and diodes to form a completely static unit containing no moving parts.

The transistors are used to switch the alternator field current on and off and are controlled by the resistors and the Zener diode.

The Zener diode is a special diode that will break down and permit a reverse flow of current when voltage reaches a certain value without damaging the semi-conductor material. This diode is the trigger which senses the desired voltage and turns the transistor on or off to limit charging system voltage.

A temperature compensating resistor varies resistance according to temperature and controls the operating point of the Zener diode so that a higher system voltage is produced in cold weather, when needed, and a low system voltage in warm weather.

The operation of the regulator is in effect like a switch, turning the alternator field current on and off as the electrical supply varies due to the varying electrical load. This action occurs many times a second, so fast it cannot be detected in the alternator output.



For additional information on transistor regulator, see "Charging Circuits" in FOS Manual - ELECTRICAL SYSTEMS.

Block Diagram (Fig. 7)

A block diagram is a simple picture of the power flow in the electrical system. It provides an easy to follow description of the system components and their relationship to other components.

Use the block diagram (Fig. 7) to follow the basic power distribution to the various circuits.

Trace the current by starting at the battery positive terminal and follow the connecting lines from box to box. Current flows from the batteries to the starting motor and the key switch. From the starting motor the current flows to the starting circuit relay and to the alternator. When the key switch current flows to either the ignition circuit or the accessory circuit or both circuits. As you can see this provides a very basic and simple picture of the current or power distribution in the system.

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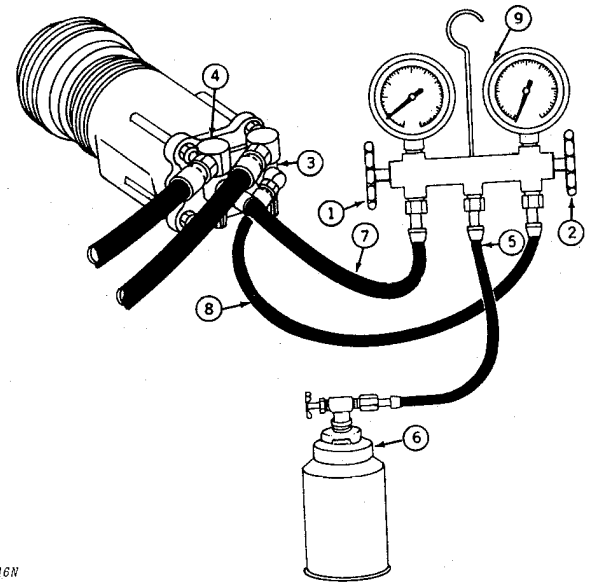
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SYSTEM SERVICE

PRESSURE GAUGES

The gauge set shown in Fig. 4 is an important tool for servicing an air conditioning system. It is used when evacuating, charging, or troubleshooting the system.



1—Low Side Manifold Hand Valve
2—High Side Manifold Hand Valve
3—Compressor Service Valve High Side
4—Compressor Service Valve Low Side
5—Charging Hose
6—Can Tap
7—Discharge Hose
8—Suction Hose
9—Gauge Set

Fig. 4-Typical Manifold Gauge Hookup

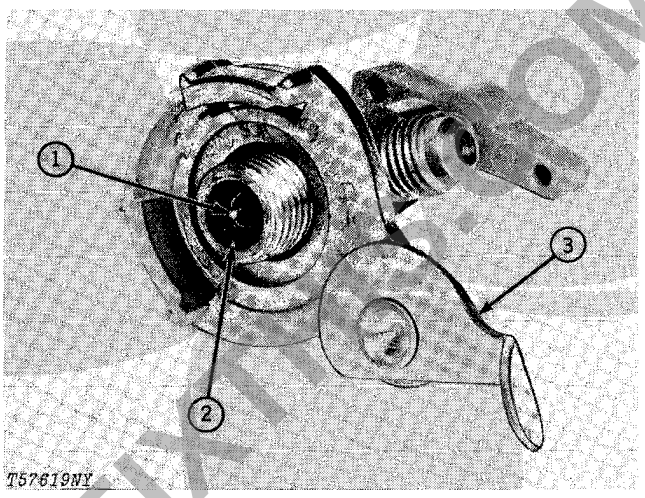
The left-hand gauge measures the compressor suction pressure (low pressure side). The gauge is graduated from 0 to 250 psi (0 to 17 bar) (0 to 18 kg/cm²), and 0 to 30 inches (0 to 1 016 mbar) of vacuum in the opposite direction.

The right-hand gauge measures the compressor discharge pressure (high pressure side). This gauge shows pressures from 0 to 500 psi (0 to 34 bar) (0 to 35 kg/cm²).

The center port of the gauge set is used for charging or evacuating procedures and is connected to the vacuum pump or the Refrigerant-12 container.

REFRIGERANT CONTAINER TAP

Connect charging hose to both gauge center port and container tap before piercing container.



1—Piercing Needle
2—Seal
3—Lever to Secure Container to Tap

Fig. 5-Typical Refrigerant Container Tap

CAUTION: Before tapping refrigerant container, be sure tap has a good seal. A poor seal allows refrigerant to leak to atmosphere and endangers personnel.

Secure container tap to refrigerant can before piercing container. The refrigerant container tap cannot be removed safely from a partially filled container.

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The tachometer/temperature reader is used to record engine rpm and loader hydraulic system oil temperature. It is powered by the loader electrical system and adapts to either 12 or 24-volt systems.

The construction equipment accessory kit contains the necessary quick connectors and adapters to instrument the loader hydraulic circuits for easy hook-up of the analyzer.

The hydraulic system analyzer is designed to test hydraulic systems.

The hydraulic system analyzer measures pump and circuit conditions by recording pressures at specified engine rpm and temperature, An orifice is installed into the circuit so all the hydraulic pump flow is directed through it.

To check the hydraulic system, all the technician has to do is remove the system relief valve and install the specified orifice, then install the pressure gauge into a pressure port.

Connect the tachometer/temperature reader and start the engine. Bottom a function and hold. Watch the oil temperature. When the oil reaches the specified temperature, adjust engine rpm to obtain the specified test pressure. If it takes more engine rpm than specified to obtain the test pressure, the circuit has a leak or the hydraulic pump is defective.

Test the remaining circuits one at a time by bottoming the remaining cylinders. If one circuit can be found to be within specifications, the hydraulic pump is okay and the problem is related to the circuits.

The hydraulic system pretest check sheet provides a general listing of all the problems in the hydraulic system.

The symptom index is a table that lists the symptoms that the operator may report. From the symptoms, it points out the faulty component and a test to verify it.

The procedure for testing the hydraulic system will be as follows:

1. Fill out the hydraulic system check sheet.

2. Locate symptoms from the pretest check sheet in the symptom index.

3. Perform verification tests.

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