Section 10
GENERAL

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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 14.9-24, 6 ply rating, R4 rear tires; 11L-15, 8 ply rating, F-3 front tires; 3/4 cu. yd. (0.57 m³) utility bucket, and standard equipment.)

Power (@ 2500 engine rpm):	**SAE**	**DIN**
Gross	52 hp (38.8 kW*)	
Net	50 hp (37.3 kW)	53.2 PS

Net engine flywheel power is for an engine equipped with fan, air cleaner, water pump, lubricating oil pump, fuel pump, alternator, and muffler. Gross engine power is without fan. Flywheel power ratings are under SAE standard conditions of 500 ft. altitude and 85°F. temperature and DIN 70 020 standard conditions of 760 mm Hg barometer (sea level) and 20°C. temperature.

*In the International System of Units (SI), power is expressed in kilowatts (kW).

Engine: John Deere 3-cylinder diesel, valve-in-head, 4-stroke cycle

Bore and stroke ..... 4.02x4.33 in. (102x110 mm)
Piston displacement ..... 164 cu. in. (2 687 cm³)
Compression ratio ..... 16.2 to 1
Maximum torque @ 1,300 rpm ..... 129 lb-ft (175 Nm) (17.8 kg-m)
NACC or AMA (U.S. Tax) horsepower 19.4
Main bearings 4
Lubrication ..... Pressure system with full flow filter
Cooling ..... Pressurized with thermostat and fixed bypass
Fan ..... Suction
Air cleaner ..... Dry
Electrical system ..... 12 volt with alternator
Batteries (Two 12 volt) .... Reserve capacity: 220 minutes

Engine Clutch ..... Foot-operated, single 10 in. (254 mm) plate with reverser; single 11 in. (280 mm) plate without reverser

Transmission:
Constant mesh, 8 speeds forward, 8 reverse. Optional hydraulic direction reverser permits no-clutch reversing in all gears.

Gear:	**Travel Speeds**			
	mph		**km/h**	
	Fwd.	**Rev.**	**Fwd.**	**Rev.**
1	1.3	1.6	2.1	2.6
2	1.9	2.2	3.1	3.5
3	2.9	3.3	4.7	5.3
4	4.0	4.7	6.4	7.6
5	5.3	6.2	8.5	10.0
6	7.6	8.8	12.2	14.2
7	11.2	13.0	18.0	20.9
8	15.7	18.3	25.3	29.4

Final Drives ..... Inboard, planetary

Brakes ..... Hydraulically actuated, fully enclosed wet-disk. Self-equalizing. Foot-operated individually or simultaneously

Hydraulic System: Closed-center
Max. pressure ..... 2350 psi (16 203 kPa) (165.2 kg/cm²)
Loader control ..... Single-lever
Pump ..... Piston, constant pressure, variable-displacement, 28 gpm (106 L/min) at 2500 engine rpm
Filter ..... 25 micron steel-enclosed paper cartridge in return

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Group 5
ENGINE REMOVAL AND INSTALLATION
REMOVAL

Most service procedures on the engine can be accomplished with the engine in the tractor. If the crankshaft is to be removed or in the event of a general overhaul, remove the engine.

Remove the front end support with radiator, fuel tank and main hydraulic pump as instructed in Section 60, Group 5.

Disconnect battery ground straps for safety.

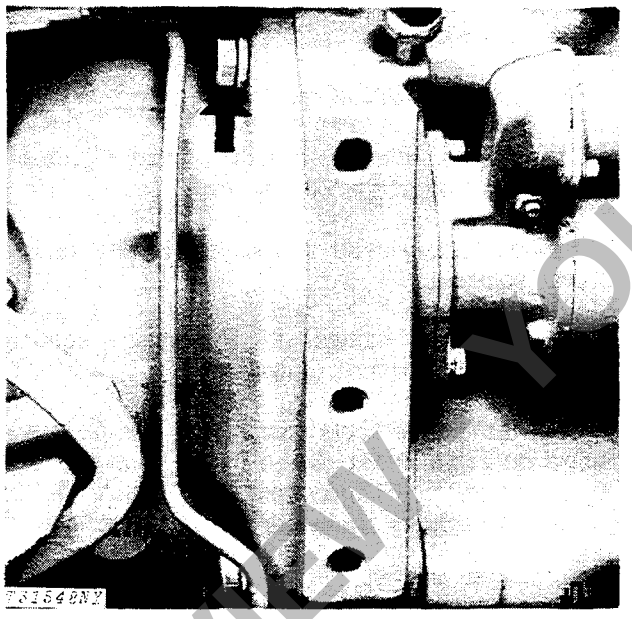


Fig. 1-Engine Attaching Points, Right Side

Disconnect front wiring harness from alternator lead. Also disconnect fuel gauge sender lead.

Remove battery cable and wiring harness from starter solenoid.

Disconnect wiring harness at oil pressure sending unit and at ignition coil (gasoline).

Disconnect and remove tachometer cable from right rear of engine. Remove rubber gasket from tachometer cable (gasket may remain in clutch housing). Replace gasket if damaged.

On diesel engines, disconnect starting fluid line from air intake manifold.

Disconnect pressure line from connection on power steering valve.

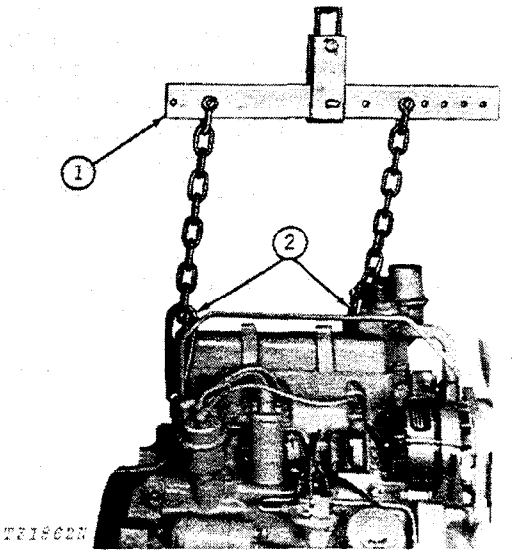
Free hydraulic reservoir bleed line from clamps at top of rocker arm cover.

Disconnect throttle rod from carburetor (gasoline) or fuel injection pump (diesel). Also disconnect choke cable from carburetor on gasoline engines.

Remove water temperature sending unit from water outlet manifold.

Remove battery from cowl. Remove cap screws securing front of cowl to flywheel housing.

Disconnect rear exhaust muffler from manifold (if equipped).



1—JDG-1 or JDG-23 Engine Lifting Sling
2—JD-244 Lifting Adapter (or JDG-19 Lifting Bracket)

Fig. 2-Removing Engine

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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 (diesel)
- Restricted air intake system
- Faulty injection pump (diesel)
- Faulty injection nozzles (diesel)
- Water, dirt, or air in fuel system
- Carburetor malfunction (gasoline)
- Carburetor solenoid malfunction

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 (diesel)
- Faulty injection pump (diesel)
- Faulty injection nozzles (diesel)
- Water, dirt, or air in fuel system
- Injection nozzle leak-off lines clogged (diesel)
- Injection pump or distributor out of time
- Exhaust system restricted
- Improper carburetor setting (gasoline)
- Carburetor solenoid malfunction

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 (diesel)
- Faulty injection pump (diesel)
- Faulty transfer pump
- Detonation
- Mixture of gasoline and diesel fuels
- Carburetor out of adjustment (gasoline)
- Carburetor solenoid malfunction

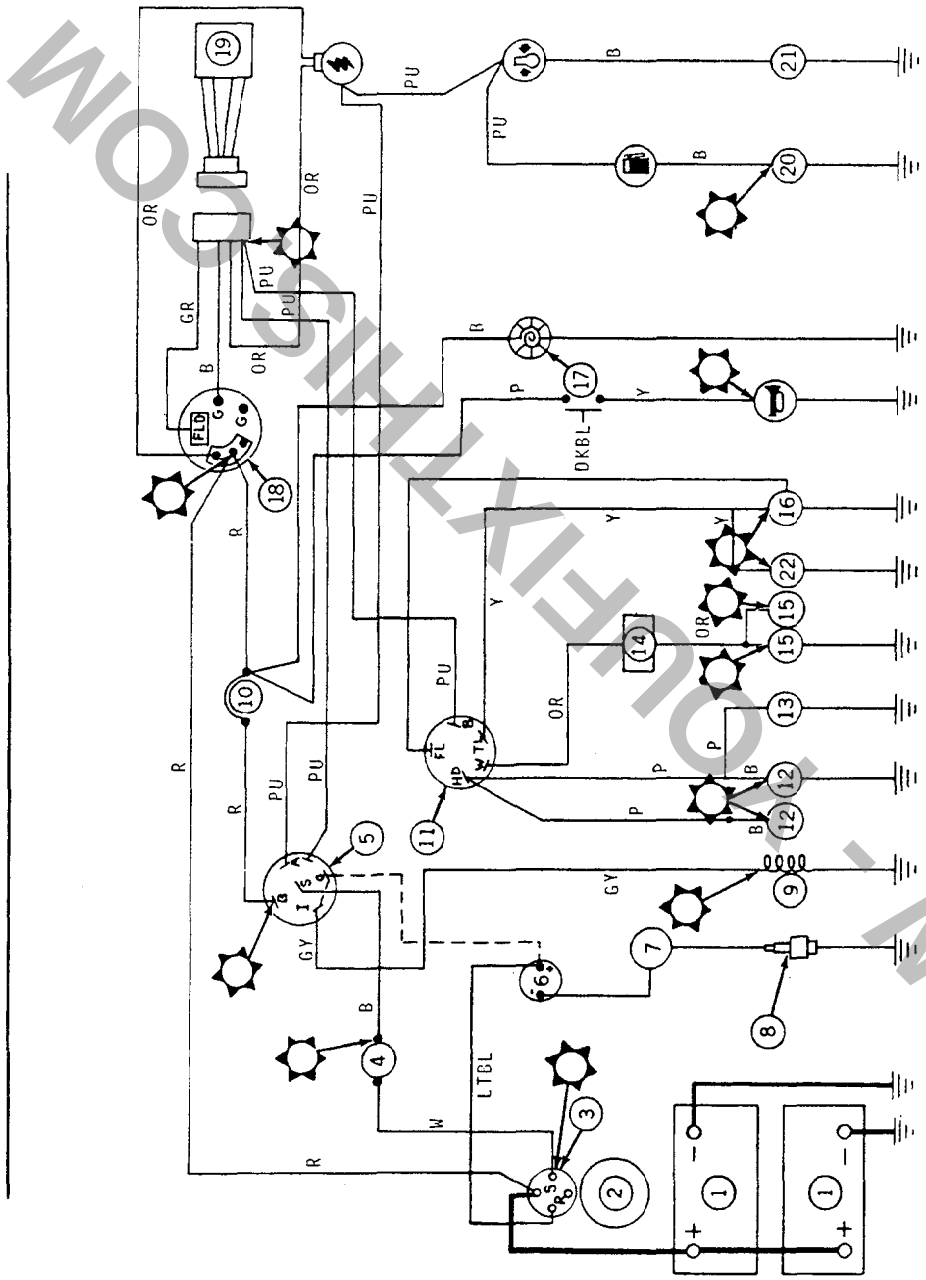
Lack of Power

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 (diesel)
- Fuel injection pump malfunction (diesel)
- Fuel injection nozzle faulty (diesel)
- Water, dirt or air in fuel system
- Injection nozzle leak-off line clogged (diesel)
- Injection pump or distributor out of time
- Clogged manifold system
- Carburetor adjusted too lean (gasoline)
- Carburetor solenoid malfunction

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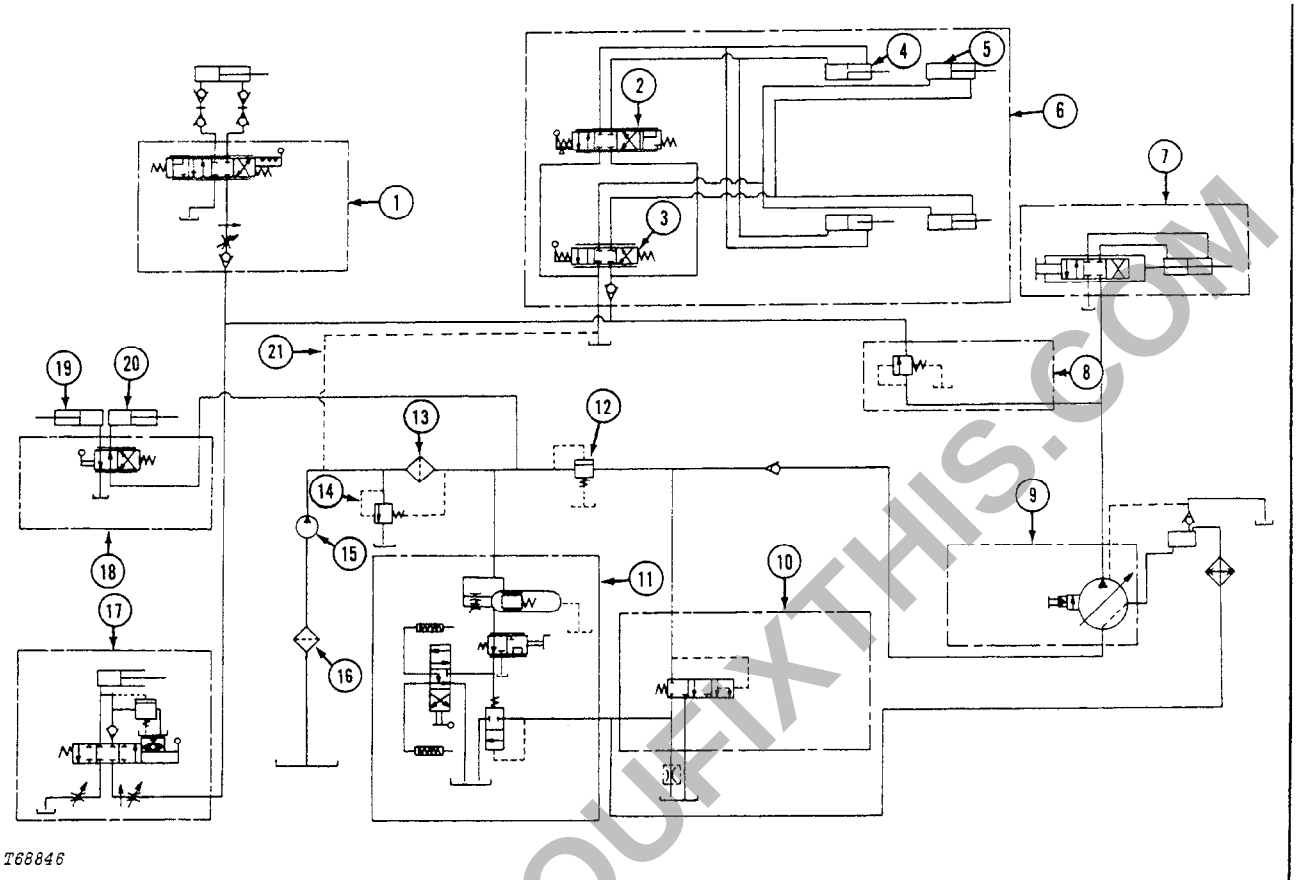


1—Battery
2—Starting Motor
3—Solenoid
4—Neutral Start Switch
5—Key Switch
6—Coil*
7—Distributor*
8—Spark Plug*
9—Fuel Shut-Off Solenoid
10—Circuit Breaker
11—Light Switch
12—Front Headlights (2 used)
13—Dash Lamp
14—Flasher
15—Warning Lamps (2)
16—Combination Flood and Taillight
17—Horn Switch
18—Alternator
19—Regulator
20—Sending Unit (Fuel Gauge)
21—Sending Unit (Oil Pressure)
22—Outlet Socket
*—Gas Only

B—Black
BL—Blue
LTBL—Light Blue
OR—Orange
GY—Gray
DKBL—Dark Blue
P—Pink
PU—Purple
R—Red
W—White
Y—Yellow
GR—Green

Fig. 7-Electrical Schematic

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1—Selective Control Valve
2—Boom Section
3—Bucket Section
4—Boom Cylinders
5—Bucket Cylinders
6—Loader Circuit
7—Power Steering
8—Pressure Control Valve
9—Main Hydraulic Pump
10—Oil Cooler Bypass and Charge Relief Valve
11—Reverser Control Circuit
12—Pressure Regulating Valve
13—Transmission Filter
14—Oil Filter Relief Valve
15—Transmission Oil Pump
16—Intake Screen
17—Rockshaft
18—Independent PTO Control Valve
19—Clutch Cylinder
20—Brake Cylinder
21—Optional Return

Fig. 2-Hydraulic Schematic

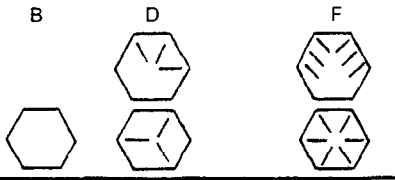
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35. Accessible Hardware Torque Values

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



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. 96-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*

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JD302-A LOADER AND BACKHOE LOADER

Technical Manual
TM-1090 (Dec-78)

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- Group 10 Predelivery, Delivery, and After-Sale Services
- Group 15 Lubrication

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- Group 15 Engine Lubrication System
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- Group 40 9250 Backhoe Control Valve
- Group 41 9250-A Backhoe Control Valve
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Section 60 - MISCELLANEOUS COMPONENTS
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- Group 30 Miscellaneous Components
- Group 35 Specifications and Special Tools

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 ICED standards.

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MAINTENANCE WITHOUT ACCIDENT
WORK SAFELY



T27999N

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

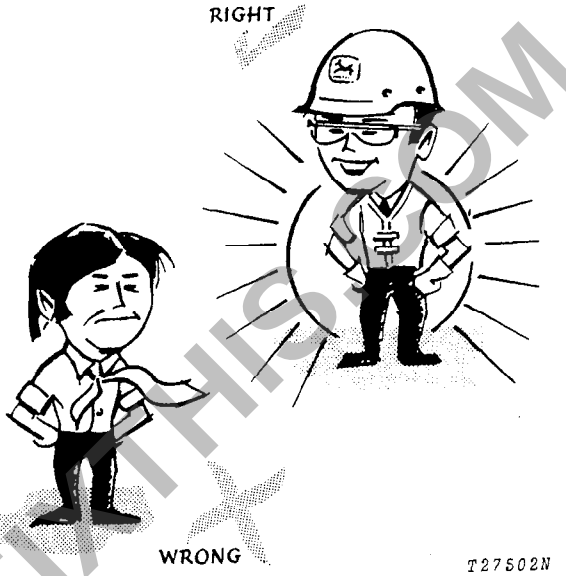
EVERY EMPLOYER HAS A SAFETY PROGRAM. KNOW WHAT IT IS!



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

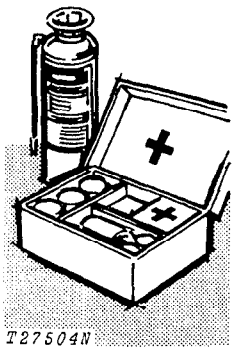
For instance, you may need: Hard hat, safety shoes, safety goggles, heavy gloves, reflector vests, ear protectors, respirators.



T27502N

BE ALERT!

Plan ahead—work safely—know how to use a first-aid kit and a fire extinguisher—and where to get aid and assistance.



T27504N

Maintenance Area

Make sure the maintenance area is adequately vented.

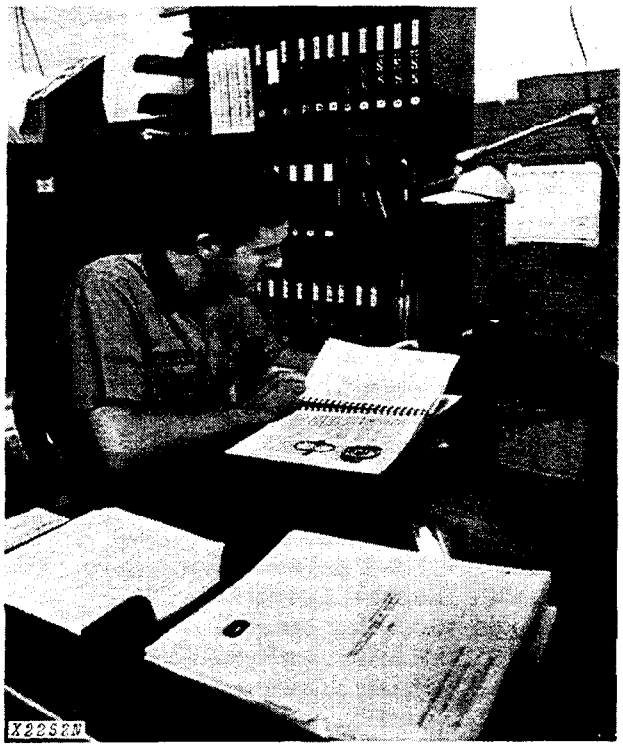
Keep maintenance area CLEAN AND DRY. Oily and wet floors are slippery; greasy rags are a fire hazard; wet spots are dangerous when working with electrical equipment.

Store starting aids in a cool and well-ventilated place, out of the reach of unauthorized personnel.

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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 failures 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.

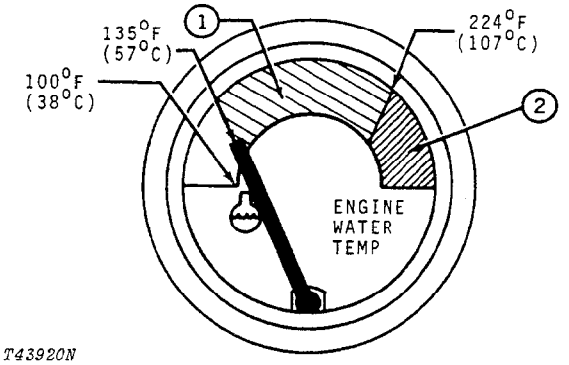
Some features of this manual:

- 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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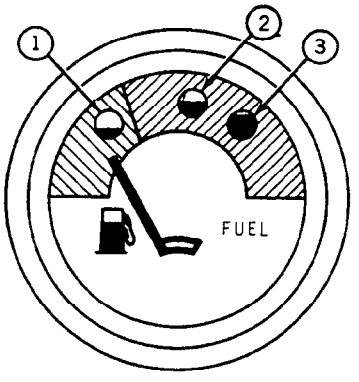
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Check operation of gauges.



1—Operating Range **2—Overheat Range**

Fig. 68-Water Temperature Gauge



1—Empty Tank **2—Half Full Tank**
3—Full Tank

Fig. 69-Fuel Gauge

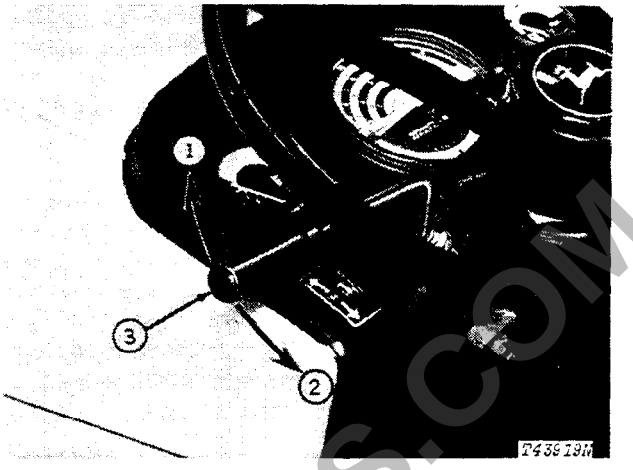
Add a small amount of fuel to the fuel tank. Check the action of the fuel gauge.

Indicator lights and gauges checked *Yes* *No*

15. Reverser

The reverser allows the operator to change the direction of travel "on the go" without declutching or shifting gears.

Note and correct any reverser malfunctions.



1—Forward **2—Reverse**
3—Neutral

Fig. 70-Reverser Lever

Check the reverser speed-of-shift time. Total time must be 3/4 to 1-1/4 seconds. Make the speed-of-shift as smooth as possible.

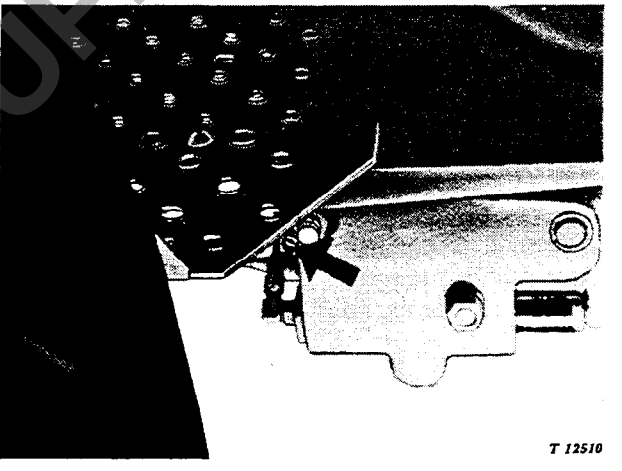


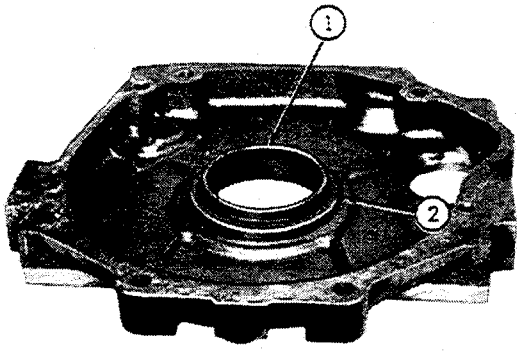
Fig. 71-Reverser Speed-Of-Shift Adjusting Screw

Turn the adjusting screw clockwise to slow down the shift. Turn the screw counterclockwise to speed up the shift. Turn the screw one-fourth turn at a time until the desired speed-of-shift is obtained.

Reverser operation checked *Yes* *No*

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Remove old oil seal from flywheel housing.



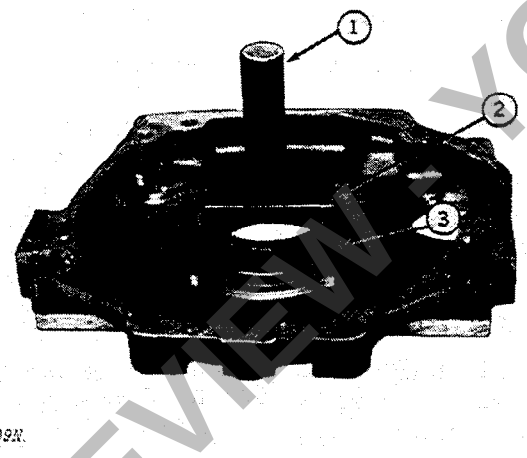
T46808N

1—JD-297-2 Pilot **2—Crankshaft Rear Oil Seal**

Fig. 21-Pilot and Oil Seal in Place

Place flywheel housing on a flat, even surface to install the oil seal.

Place JD-297-2 Pilot and oil seal in flywheel housing as shown in Fig. 21.



T46809N

1—27489 Handle **3—Oil Seal**
2—JD-297-1 Driver

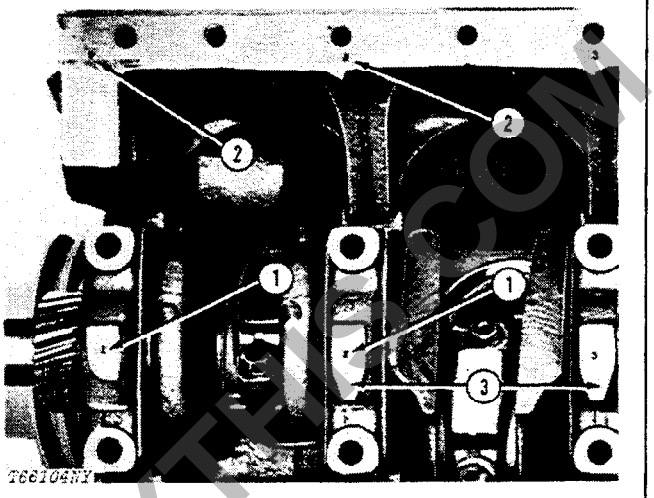
Fig. 22-Installing Crankshaft Rear Oil Seal

It is not necessary to use 27489 Handle with the JD-297-1 Driver to install the oil seal but it does help.

Use a mallet to drive in the oil seal until the driver bottoms on the pilot.

Installation

Install main bearing caps with numbers corresponding to numbers in oil pan rail and to the same side as the numbers in the oil pan rail.



T68104NY

1—Number in Main Bearing Cap **3—Arrow**
2—Number in Oil Pan Rail

Fig. 23-Main Bearing Cap Positions

If numbers were stamped in main bearing caps (1, Fig. 23) at factory, install main bearing caps with numbers corresponding to numbers in oil pan rail (2). The "arrow" (3) machined on the main bearing cap number pad must point toward the cam shaft side of the cylinder block.

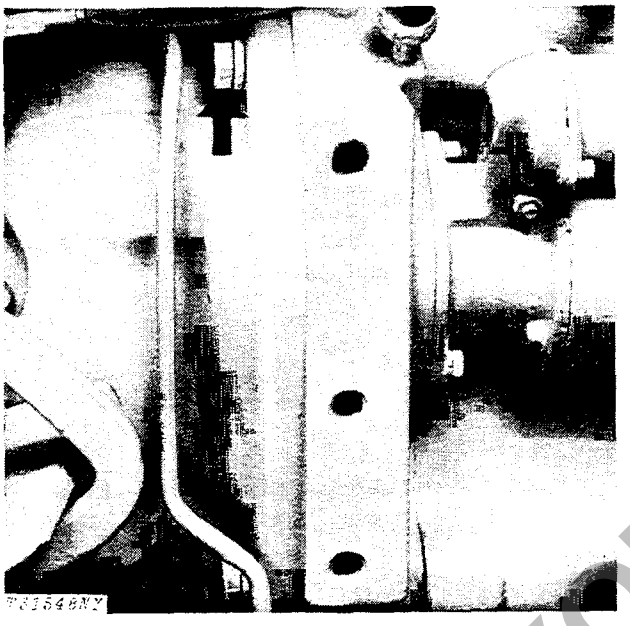
Install inserts with thrust faces in rear main bearing bore. Install plain inserts in other main bearing bores. Make sure that tangs on all inserts fit the locking grooves in the bores and that the oil holes in inserts line up with oil passages in the block.

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Group 40
SPECIFICATIONS AND SPECIAL TOOLS

ENGINE REMOVAL AND INSTALLATION

SPECIFICATIONS AND TORQUE VALUES



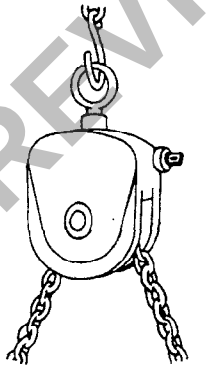
Engine to clutch housing cap screw torque ..... 170 lb-ft (230 Nm) (24 kg-m)

Fig. 1-Engine to Clutch Housing Cap Screws

ENGINE REMOVAL AND INSTALLATION

SPECIAL TOOLS

Convenience Tools

Tool	Tool Number	Use
	D01043AA	Load Positioning Sling—To remove and install engine in unit. Comes with one set of JDG-19 Lifting Bracket.

T47209N

Fig. 2-Load Positioning Sling

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The terminal voltage reading should remain above 9.0 volts.

If the terminal voltage falls below 9.0 volts, the battery is defective or it is not as fully charged as the specific gravity reading indicates in the specific gravity test.

To be sure of the battery condition, carefully charge it and repeat the test.

Remember these key facts when testing batteries.

1. In general, if all cells of a battery test the same, the battery is good. If all are low, the battery usually only needs recharging.

2. If there is a real difference between cells, the battery generally must be replaced.



For additional information on "Battery Testing" refer to "Storage Batteries" in FOS Manual - ELECTRICAL SYSTEMS.

CHARGING THE BATTERY

Batteries can be recharged in two ways:

1. Fast charging.
2. Slow charging.

A battery that is in satisfactory condition but requires recharging will accept a large amount of charging current without undesirable effect. This type of battery may be charged quickly at a high rate with a battery fast charger.

A battery that becomes sulfated, however, will not accept a high rate of charging current without possible damage. Its sulfated condition provides increased resistance to current flow within the battery. Flow of a high rate of charging creates heat, which can result in warping of the plates, boiling of electrolyte, and eventual damage to the separators. Cell caps and covers and the battery case may be damaged or distorted.

A battery in this condition must be charged over a long period at a low rate. In this manner, sulfate formation on the plates will be gradually broken down and the battery returned to its normal charged state.

NOTE: When charging batteries be sure to follow the manufacturer's instructions for using the charger.



For additional information on charging batteries, refer to "Storage Batteries" in FOS Manual - ELECTRICAL SYSTEM.

John Deere battery chargers can be used as a booster to start the engine.

IMPORTANT: A battery charger should not be used as a booster if a battery has a very low charge (1.150 specific gravity reading or lower). A low charged battery greatly increases the possibility of reverse connecting the charger to the battery, and it is possible to reverse the charge on a battery. If this is done the alternator diodes may be ruined or the wire harness may be damaged or both.

If the battery has a specific gravity reading of 1.150 or lower, disconnect battery cables and charge it until the specific gravity reading is 1.150 or above before using a battery charger as a booster.

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Key Switch

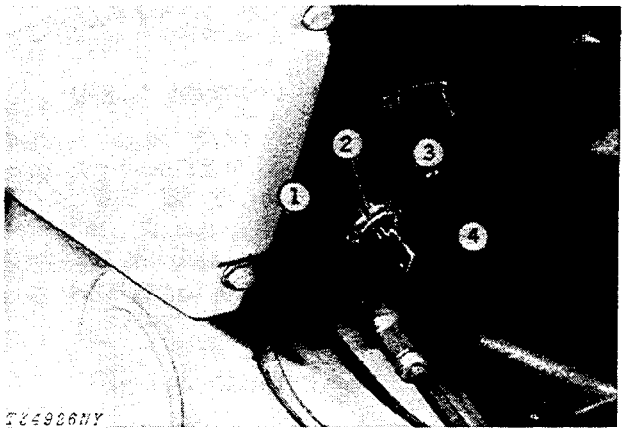


Fig. 3-Key Switch Position

The key switch is a sealed unit and cannot be repaired.

In position (1) the "ACC" terminal are energized.

In position (2) the key switch is in the "OFF" position and the key can be removed.

In position (3) the "IGN" and "ACC" terminal are energized.

In position (4) the "IGN" and "ST" terminals are energized and the "G" terminal is momentarily grounded. A spring in the switch will automatically return the switch back to position (3).

Light Switch

The light switch "BAT" terminal is energized by the key switch "ACC" terminal. To bypass the key switch remove the purple wire from the "BAT" terminal and install the unused red wire coming off the circuit breaker.

In "W" position the "BAT" and "W" terminals are energized. In this position the warning lamps will be lit.

In "F" position the "BAT", "HD", and "FL" terminals are energized. In this position the front head lights are lit and the rear combination flood and taillight light is lit as a white flood light.

In "H" position the "BAT", "HD", "TL" and "W" terminals are energized. In this position the headlights are on bright, the warning lamps are lit, and the rear combination flood and taillight is lit as a red taillight.

In "H2" position the same terminals are energized and the same lights are lit as in "H" position. The only difference is that the "HD" terminal is energized through a one ohm resistor and the front headlights are dimmer.

Lights

Failure of lights to burn may be caused by a burned out unit, broken wire, a disconnected wire, switch failure or a tripped circuit breaker if light switch is wired to circuit breaker.

The replacement lamp trade No. for the front headlights is 4411.

The replacement lamp trade No. for the rear combination flood and taillight light is 4428 and the bulb No. is 1003.

The replacement bulb trade No. for the warning lamps is 1156.

Dash Lamp

The dash lamp is wired to the "HD" terminal of the light switch. When the front headlights are lit, the dash lamp will be on.

The replacement bulb trade No. is 1816.

Flasher

The flasher unit for the warning lights is located inside the instrument panel. It is energized by the light switch "W" terminal.

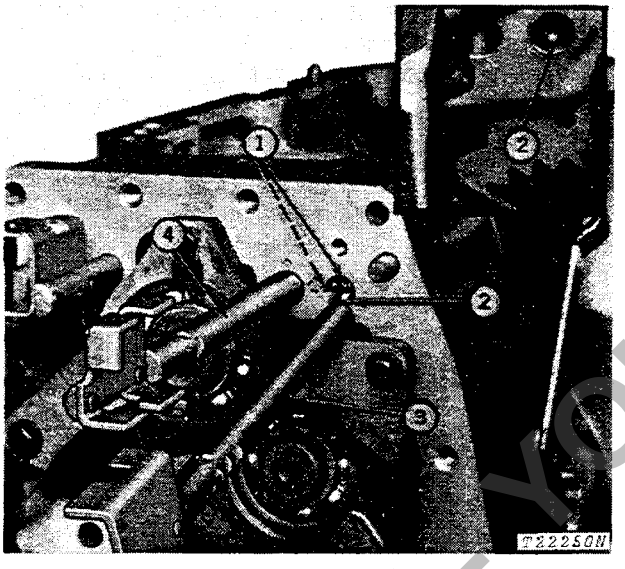
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Remove set screws securing shifters to shifter shafts.

A tool for removal and installation of interlock balls may be produced locally. See "Special Tools," Section 40, Group 35.

Shifter shaft may be removed from case without removing the balls and springs. This is accomplished by placing the open end of tool to tapered end of shifter shaft to be removed. Push shaft from its bore with the tool. Leave tool in bore until ready to reposition shifter shaft and push tool out of bore with shifter shaft.



1—Two 5/16-inch (7.9 mm) Balls Between Shafts
2—One 5/16-inch (7.9 mm) Ball and Spring
3—Low and Reverse Range Shifter Shaft
4—High Range Shifter Shaft

Fig. 3-Removing Range Change Shifter Shaft

Do not turn shifter shafts during removal as spring-loaded detent balls can become lodged in the shifter fork set screw holes in the shafts.

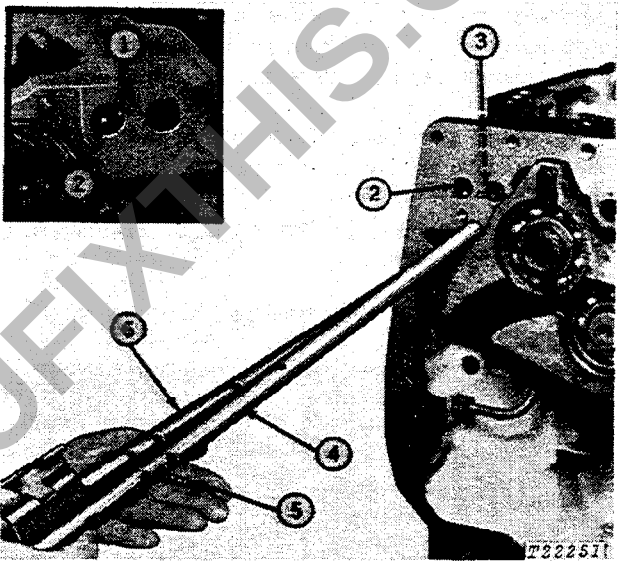
Shift low and reverse range shifter shaft (3, Fig. 3) and high range shifter shaft (4) into neutral position. Pull low and reverse range shifter shaft from transmission case.

Be careful not to lose the three (5/16-inch) (7.9 mm) balls in shifter shaft from detent hole (Fig. 3).

Shift inside speed shifter shaft into gear (to release interlock pin) and pull the high range shifter shaft from transmission case, being careful not to lose one (5-16-inch) (7.9 mm) ball and spring in shifter shaft rear bottom detent hole (see inset in Fig. 3).

Remove shifters from low and reverse sliding gear and high and park range pinion inside transmission case.

To remove high and park range pinion, first remove transmission front bearing support.



1—Two 5/16-inch (7.9 mm) Balls Between Shafts
2—One 5/16-inch (7.9 mm) Ball and Spring
3—Two 1/4-inch (6.4 mm) Balls Between Shafts
4—Inside Shifter Shaft
5—Three 1/4-inch (6.4 mm) Balls
6—Outside Shifter Shaft

Fig. 4-Removing Speed Change Shifter Shafts

Pull inside speed shifter shaft out of transmission case until three (1/4-inch) (6.4 mm) balls can be removed from shaft as shown in Fig. 4. Then pull shaft out of transmission case, being careful not to lose three (5/16-inch) (7.9 mm) balls in shifter shaft rear detent hole (see inset in Fig. 4).

Remove two (1/4-inch) (6.4 mm) balls between speed shifter shafts at front detent hole.

Pull outside speed shifter shaft out of transmission case, being careful not to lose one (5/16-inch) (7.9 mm) ball and spring in front detent hole.

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CLUTCH ASSEMBLIES

SPECIFICATIONS AND TORQUE VALUES—Continued

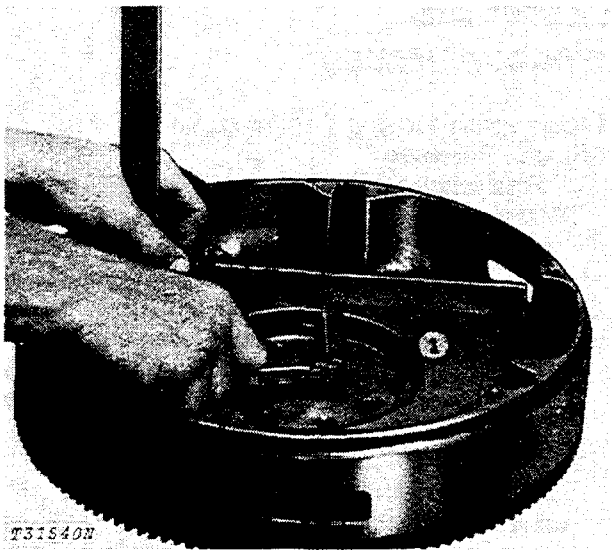


Fig. 3-Checking Flywheel Surface

1. Flywheel driving surface flat within ..... 0.006 in. [0.15 mm]

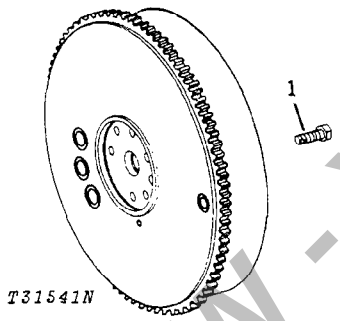


Fig. 4-Flywheel Retaining Cap Screws

1. Flywheel-to-engine crankshaft flange (F-grade) ..... 120 lb-ft (163 Nm) (17 kg-m)
(D-grade) ..... 85 lb-ft (115 Nm) (12 kg-m)

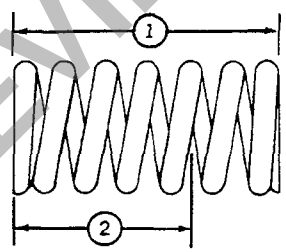


Fig. 5-Dual Stage Clutch Springs

Clutch spring for dual stage clutch (Inner Spring)
1. Free length ..... 3.53 in. [89.7 mm]
2. Test length ..... 1.75 in. [44.5 mm] at 56 lbs. [25.4 kg]

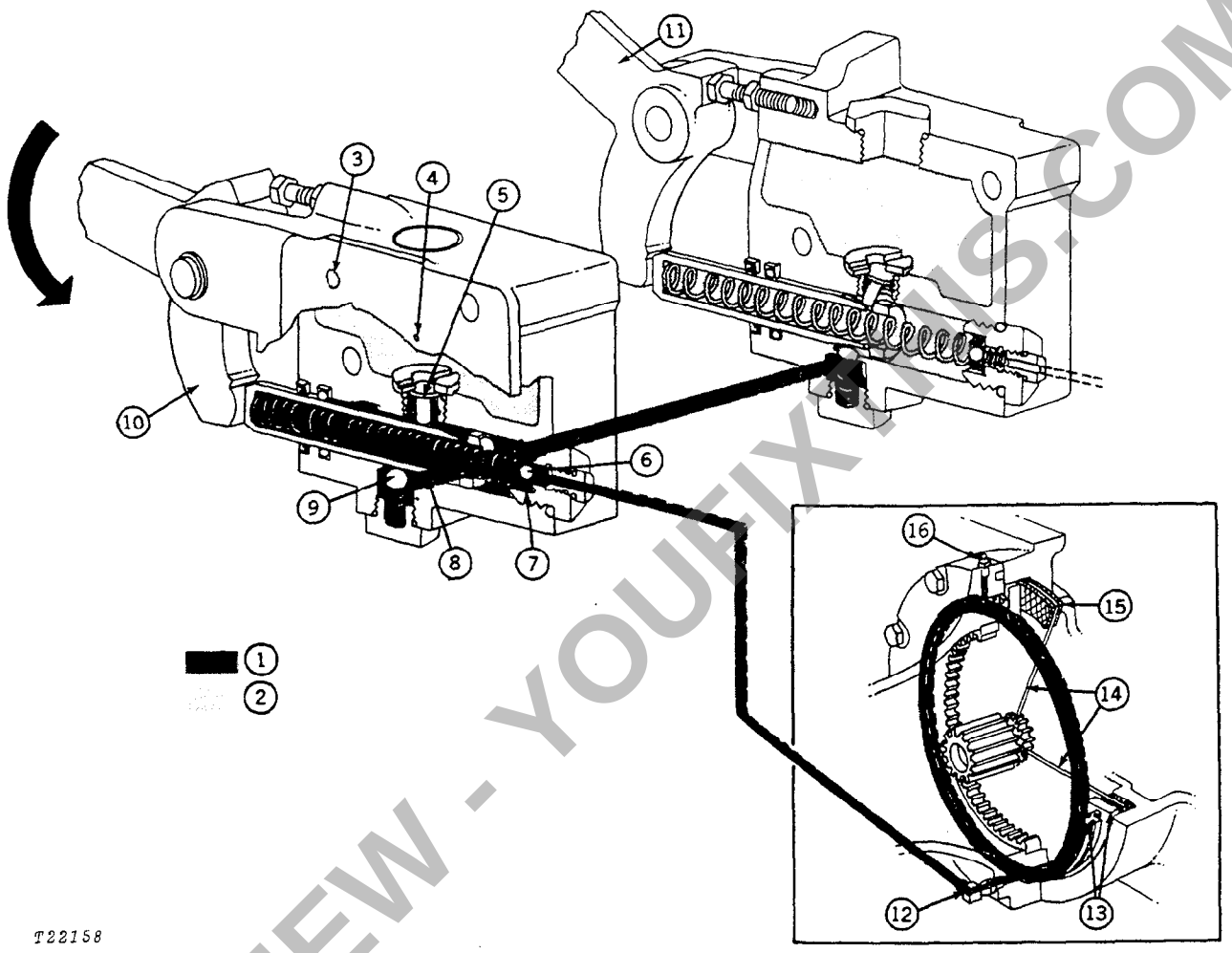
Clutch spring for dual stage clutch (Outer Spring)
1. Free length ..... 3.06 in. [77.7 mm]
2. Test length ..... 1.85 in. [47.0 mm] at 123 lbs. [55.8 kg]

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Group 30
BRAKE VALVE

GENERAL INFORMATION

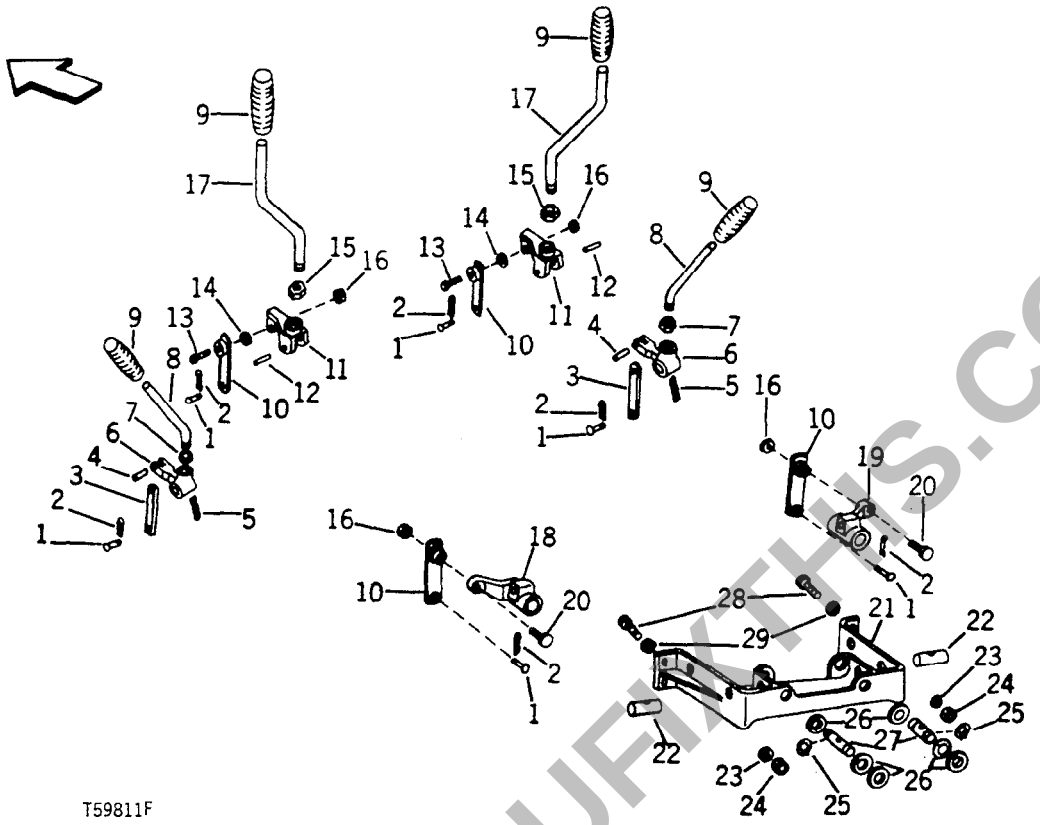


1—Pressure Oil
2—Low Pressure Oil
3—Brake Valve Reservoir Bleed Hole
4—Brake Valve Reservoir Inlet Hole
5—Reservoir Check Valve
6—Brake Line Check Ball (early units)
7—Retainer (early units)
8—Piston
9—Equalizing Valve
10—L.H. Brake Pedal
11—R.H. Brake Pedal
12—Hydraulic Brake Oil Inlet Fitting
13—Brake Pressure Plate
14—Brake Disk
15—Brake Facing
16—Brake Bleed Screw

Fig. 1-Individual Hydraulic Brake Operation

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1—Connector Pin (6 used)
2—Cotter Pin (6 used)
3—Connector Link (2 used)
4—Spring Pin (2 used)
5—Cotter Pin (2 used)
6—Handle Mount (2 used)
7—Jam Nut (2 used)
8—Control Lever (2 used)
9—Hand Grip (4 used)
10—Connector Link (4 used)
11—Action Link (2 used)
12—Groove Pin (2 used)
13—Cap Screw (2 used)
14—Special Washer (2 used)
15—Stop Nut (2 used)
16—Special Nut (4 used)
17—Four-Way Lever (2 used)
18—Pivot Link
19—Pivot Link
20—Cap Screw (2 used)
21—Mounting Frame
22—Pivot Shaft (2 used)
23—Lock Washer (4 used)
24—Nut (4 used)
25—Snap Ring (4 used)
26—Washer (6 used)
27—Pivot Shaft (2 used)
28—Cap Screw (4 used)
29—Washer (8 used)

Fig. 7-Backhoe Control Levers and Linkage (254090-)

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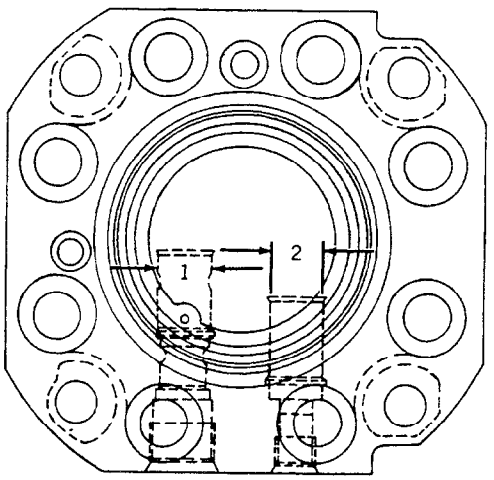
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MAIN HYDRAULIC PUMP

SPECIFICATIONS AND TORQUE VALUES—Continued

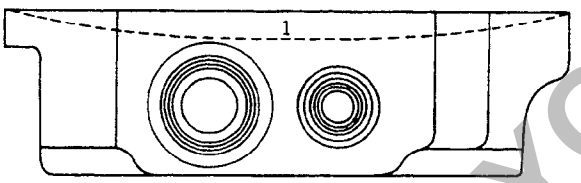
STROKE CONTROL VALVE



T27822

Fig. 8-Valve Sleeve Bores

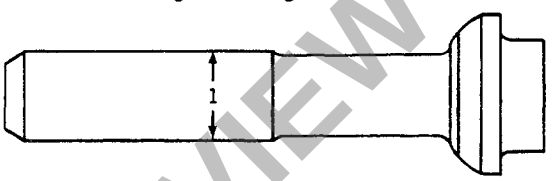
1 - I.D. of stroke control valve sleeve bore .....0.7485 to 0.7495 in. [19.012 to 19.037 mm].
2 - I.D. of crankcase outlet sleeve bore .....0.7485 to 0.7495 in. [19.012 to 19.037 mm].



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Fig. 9-Housing Surface

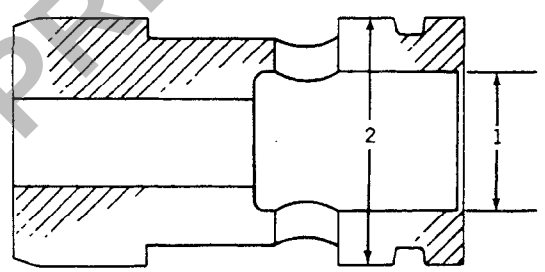
1 - Housing surface flat within ..... 0.0030 in. [0.076 mm].



T27824N

Fig. 10-Stroke Control Valve

1 - O.D. of stroke control valve .....0.2661 to 0.2665 in. [6.759 to 6.770 mm].



T27825N

Fig. 11-Stroke Control Valve Sleeve

1 - I.D. of stroke control valve sleeve (lower end).....0.3756 to 0.3762 in. [9.540 to 9.555 mm]
2 - O.D. of stroke control valve sleeve.....0.7481 to 0.7485 in. [19.002 to 19.012 mm].

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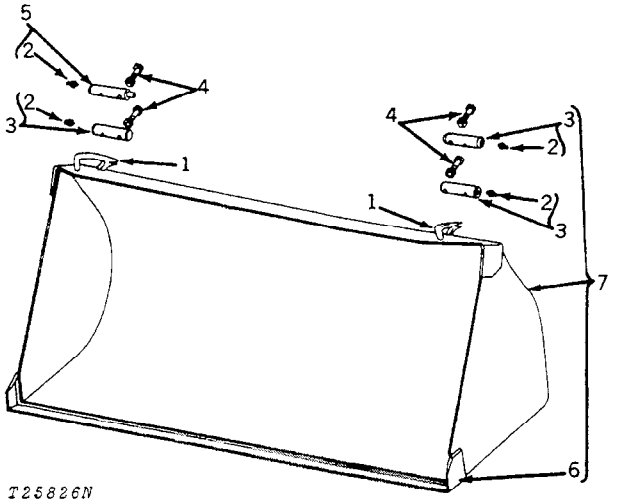
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Bucket

Refer to Fig. 4 during disassembly and assembly of bucket parts.

Inspect all parts for excessive wear or damage and repair or replace as necessary.



1—Hook (2 used)
2—Grease Fitting (4 used)
3—Pin (3 used)
4—Cap Screw (4 used)
Lock Nut (4 used)
5—Pin
6—Cutting Edge
7—Bucket

Fig. 4-Bucket

IMPORTANT: Because bucket cutting edges are made of high carbon steel, special welding techniques are required (see "Special Welding Instructions").

SPECIAL WELDING INSTRUCTIONS

A low hydrogen (with iron powder) electrode (American Welding Society, Series E7018) is recommended for this type of work. The sizes most easily handled in horizontal or out of flat positions are 5/32 inch [3.96 mm] and 3/16 inch [4.76 mm] diameters.

To obtain maximum strength, it is imperative that all craters at the termination of each weld be filled. Because of the cupping action of heavy electrode coating, it is necessary to drag the electrode lightly or hold a very short arc.

As a second choice, an E7010 Series Electrode can be used in DC reverse polarity after preheating the cutting edge to approximately 300°F. [148.9°C]. Allow the edge to cool slowly.

When repairing a small section of the cutting edge, it is necessary to preheat around damaged area regardless of the electrode used. This will prevent rapid cooling of the edge around the weld which could cause the cutting edge to become brittle.

When cutting edge is cracked, cut completely through cutting edge. Extend cut 1/2 inch [12.7 mm] beyond each end of crack.

Weld crack from both sides.

When welding cracks between cutting edge and bucket, extend weld at least 1/2 inch [12.7 mm] beyond each end of the crack.

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Excessive Oil Consumption

Basic Engine Malfunction
- Restricted crankcase breather
- Worn valve guides or valve stems
- Piston rings worn or broken
- Scored liners or pistons
- Excessive ring groove wear in piston
- Rings sticking in grooves of piston
- Oil return slots in piston clogged
- Insufficient piston ring tension
- Piston ring gaps not staggered
- Excessive main or connecting rod bearing clearance
- Worn crankshaft thrust bearing (misaligned piston and rod)
- Front or rear crankshaft seal faulty
- Crankcase oil too thin (wrong viscosity)
- Oil level too high
- Restricted air intake system

Low Oil Pressure

Basic Engine Problem
- Excessive main and connecting rod bearing clearance
- Low oil level
- Leakage at internal oil passages
- Faulty oil pump
- Improper regulating valve adjustment
- Improper oil (wrong viscosity)
- Defective oil pressure indicator light

High Oil Pressure

Basic Engine Problem
- Stuck regulating valve
- Regulating valve spring worn or broken

Engine Overheats

Basic Engine Malfunction
- Defective head gasket
- Incorrect engine timing
- Low coolant level
- Radiator dirty or plugged
- Loose or broken fan belt
- Faulty thermostats
- Cooling system limed up
- Defective radiator pressure cap
- Faulty water pump
- Scored piston
- Air in coolant
- Engine overloaded
- Crankcase oil level low

Fuel System Malfunction
- Improper fuel
- Excessive fuel delivery
- Improper injection pump timing (diesel)
- Carburetor faulty (gasoline)

Water Pump Leaks

Basic Engine Malfunction
- Worn seal and/or shaft in water pump
- Worn or broken water pump gasket
- Water pump damaged
- Water pump impeller broken

Engine Runs Cold

Basic Engine Problem
- Faulty thermostats
- Defective temperature gauge

Water Pump Making Noise

Basic Engine Malfunction
- Worn water pump shaft
- Water pump impeller broken
- Bent or broken fan blade
- Loose fan belt
- Fan hitting

Oil in Coolant or Coolant in Crankcase

Basic Engine Malfunction
- Leaking head gasket
- Cylinder liner packings leaking
- Cylinder block water jacket cracked
- Cylinder liner cracked

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Connect voltmeter to circuit breaker terminal with the black, purple and red leads (Fig. 15). Voltmeter should read 9 to 12 volts.

If there is a reading of 9 to 12 volts and there was no voltage reading in Test No. 2 the circuit breaker is defective or the wire from circuit breaker to key switch is open. Replace as necessary.

If there is no voltage reading proceed to test No. 5.

Test No. 5

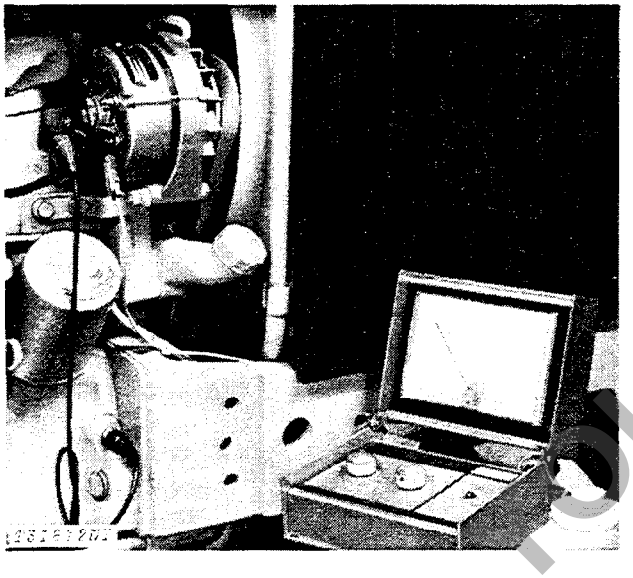


Fig. 16-Voltmeter Connection to Alternator Output Terminal

Connect voltmeter to alternator output terminal (Fig. 16). Voltmeter should read 9 to 12 volts.

If there is no reading and there was reading of 9 to 12 volts at solenoid "BAT" terminal in Test No. 1, check red lead from solenoid to alternator for an open.

If there is a reading of 9 to 12 volts and there was no voltage reading in Test No. 4, check red lead from alternator output terminal to circuit breaker for an open.

2. Solenoid Contacts "Clicked" but the Starting Motor Did Not Operate

This indicates that the circuit problems lie within the solenoid. If the solenoid switch contacts close, and the switch begins to "chatter" an open circuit exists in the hold-in winding of the solenoid. In any case, the starting motor should be removed and tested as covered in Section 30, Group 15.

3. Starting Motor Ran but Did Not Turn the Engine Over

We know that the starting motor is getting enough current to operate. The problem, then, is either in the shifting of the drive assembly into mesh, a broken armature shaft, or a dirty or faulty drive assembly. These causes require disassembly of the starting motor for proper service or repair. See Section 30, Group 15.

4. Starting Motor Turned the Engine Over Slowly or Erratically

With slow sluggish starting motor operation, connect a voltmeter across the battery terminals and operate starting motor. With a slow running starting motor the voltage should be less than 9 volts. If more than 9 volts, check for high resistance between the batteries and the starting motor. See "High Resistance Test".

If voltage reading is less than 9 volts, cause is either the batteries or the starting motor. Check battery condition first. See Section 30 for testing batteries and starting motor.

High Resistance Test

Detach high tension coil wire from distributor and ground it. On diesel tractors, disconnect wire from injection pump solenoid shut-off terminal.

Connect voltmeter to ground and to solenoid battery terminal. Operate starting motor and compare voltage with a similar reading at battery. Always use a pin connector at battery post. If difference is more than 0.8 volt, make the tests indicated in Fig. 17. Check for defective wires or faulty connections.

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Cylinder Will Not Retract

Rocker to control shaft roll pin sheared.
Install new pin.

Pressure valve leaking.
Clean valve, resurface seat, and adjust operating cams.

Return valve closed.
Adjust operating cams.

Cylinder Settles in Neutral or Under Load

Return valve leaking.
Clean valve, resurface seat, and adjust operating cams.

Porous selective control valve housing.
Replace housing.

Control Lever Does Not Return to Neutral

Detent piston sticking.
Remove foreign material.

Operating lever in float position.
Lever must be manually returned to neutral.

Control lever linkage bent or binding.
Replace parts.

Pressure valve springs weak.
Test to specifications.

Return valves not seating.
Clean valves, resurface seat, and adjust operating cams.

Cylinder has extensive internal leaks.

Control Valve Will Not Stay in Detent

Detent rocker worn or broken.
Replace failed parts.

Flow rate set too high.

Detent piston sticking.
Remove foreign material.

Cylinder Operates Fast or Slow

Metering valve incorrectly adjusted or sticking.
Remove foreign material and adjust metering valve.

Flow control valve sticking.
Remove foreign material.

Flow control valve spring worn or broken.
Replace spring.

Pressure or return valve sticking or leaking.
Clean valves, resurface seat, and adjust operating cams.

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Pressure Control Valve Test (-246127)

Operational Test

Start engine and run at fast idle.

Operate the hydraulic functions (loader, steering valve, etc.) to heat the hydraulic oil.

With engine at slow idle turn the steering wheel to the left (L.H.) and right (R.H.). Take note of the force needed to turn the steering wheel.

Again turn the steering wheel and at the same time operate a non-priority circuit (loader, selective control valve or rockshaft). The force needed must be the same. Any loss of steering power is an indication of a problem with the pressure control valve.

NOTE: Do not make any adjustment of the pressure control valve using the operational test. Use a pressure gauge for the adjustment. See below.

Pressure Test

CAUTION: Operate the steering valve and loader control valve to release hydraulic pressure in the system.

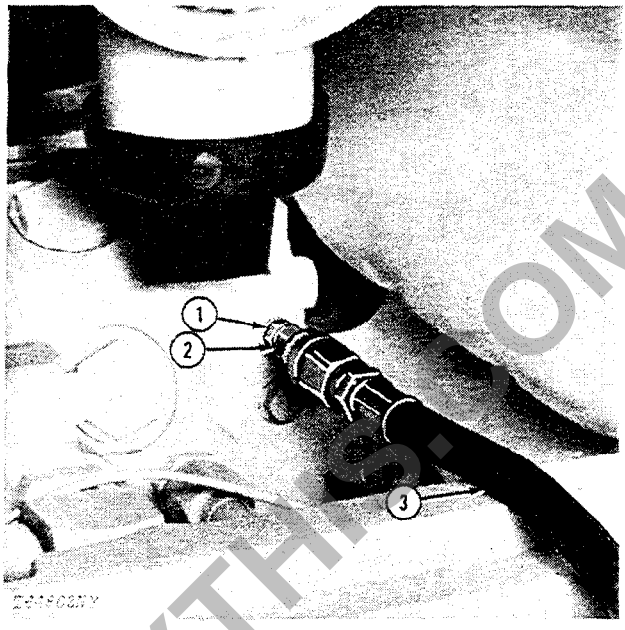
Slowly remove plug from the top test port of pump to release any hydraulic pressure remaining in system.

Install fittings (1 and 2, Fig. 19) and hose assembly (3) into test port. Connect hose assembly to No. 1 coupling adapter on the Hydraulic Analyzer.

Lower the setting of standby pressure to 1500 psi (103 bar).

Operate one of the non-priority circuits (loader selective control valve or rockshaft). There must be no movement of a function.

If a function does operate, there is a problem in the pressure control valve (probable: dirt in valve or a broken spring). Clean or install new parts as necessary (Section 50, Group 20).



1—202853 Straight Fitting (Pump Outlet Pressure)
2—202850 Coupling Adapter
3—36953 Hose Assembly With Valve 144 in. (3 658 mm)

Fig. 19-Main Pump Test Connection

Make a selection of one of the functions below and operate it as given:

1. Lower the rockshaft, then move the control lever to the raised position.

2. Put a remote cylinder in the retracted position, then move control lever to the opposite position.

Slowly turn the adjustment screw of the stroke control valve clockwise. Turn screw clockwise until the function (step 1 or 2) is operating at a normal speed.

Read the pressure gauge. The pressure setting must be 1750 ± 50 psi (120 ± 3 bar). Add or remove shims as necessary for the correct setting (Section 50, Group 20).

After the adjustment of pressure control valve, make the adjustment for standby pressure, page 70-26-21.

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