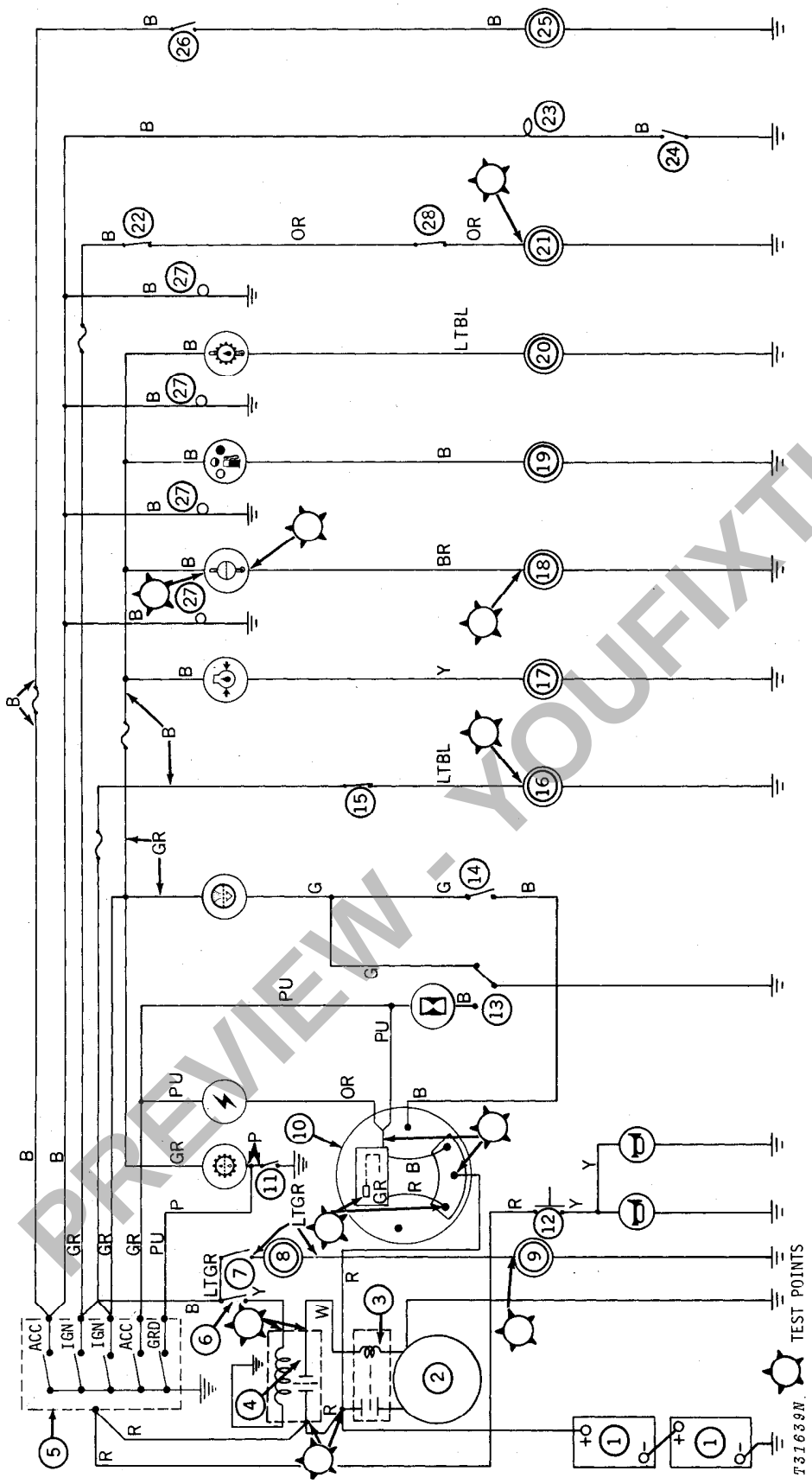


1—Batteries
2—Starting Motor
3—Solenoid
4—Starting Circuit Relay
5—Key Switch
6—Start Switch
7—Starting Aid Button
8—Starting Aid Solenoid
9—Starting Aid Safety Switch
10—Alternator and Regulator
11—Hydraulic Oil Pressure Switch
12—Horn Switch
13—Hour Meter Switch
14—Air Filter Vacuum Switch
15—Two Speed Shift Switch
16—Two Speed Shift Solenoid Switch
17—Engine Oil Pressure Sender
18—Engine Water Temperature Sender
19—Fuel Gauge Sender
20—Hydraulic Oil Temperature Sender
21—House Lock Solenoid Valve
22—Permanent House Lock Switch
23—Flow Divider Light
24—Flow Divider Switch
25—Heater
26—Heater Switch
27—Gauge Lights
28—Momentary House Lock Switch

B—Black
BR—Brown
G—Gray
GR—Green
LTBL—Light Blue
LTGR—Light Green
OR—Orange
P—Pink
PU—Purple
R—Red
W—White
Y—Yellow

Fig. 8-Electrical Schematic (-3872)

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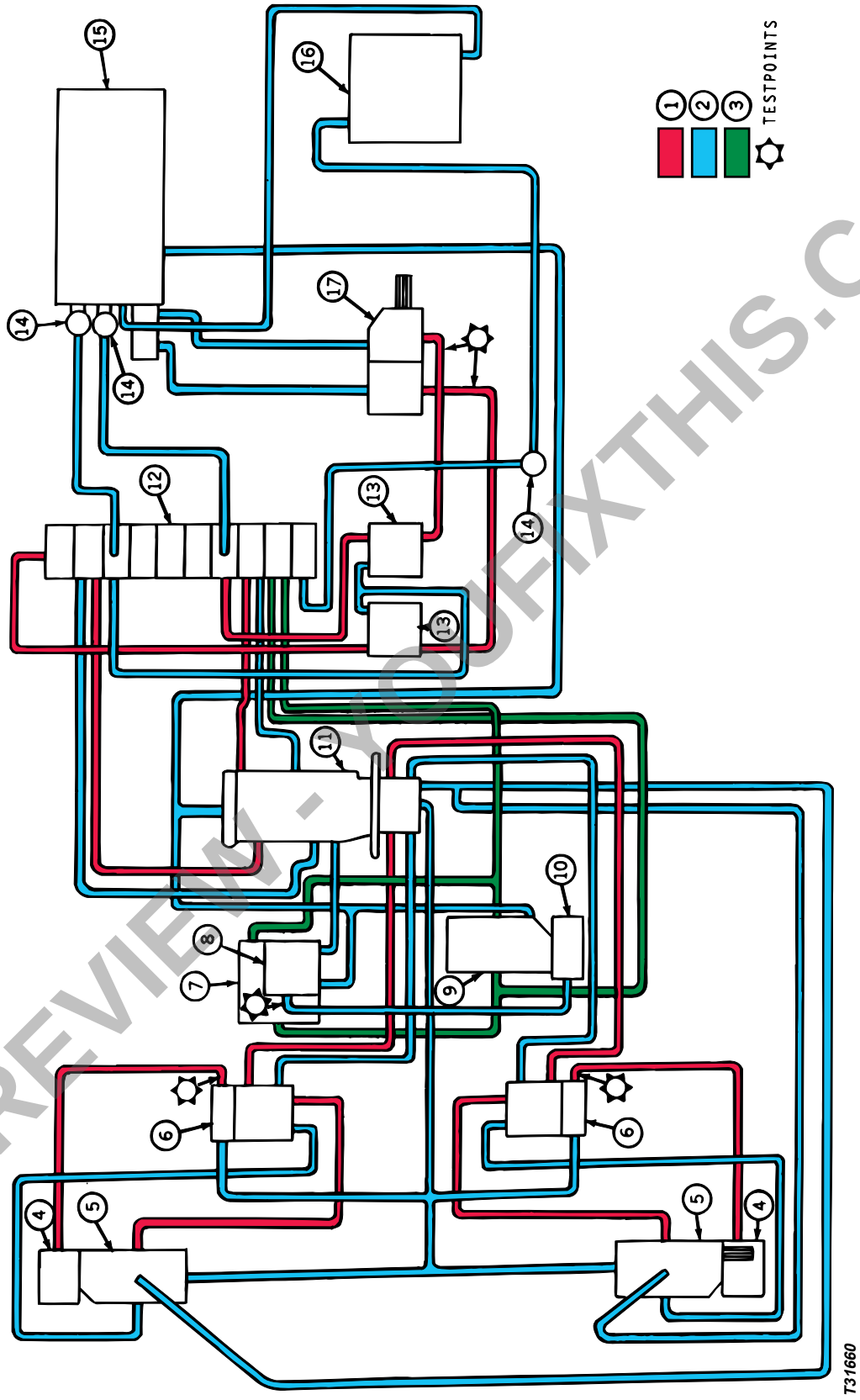
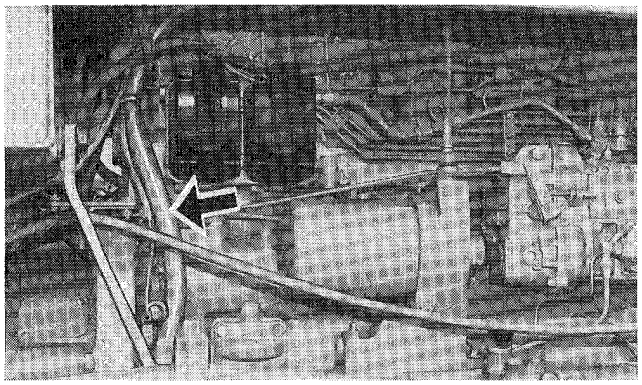


Fig. 2-Pictorial Hydraulic Schematic

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30. Crankcase Vent Tube



T82253

Fig. 120-Crankcase Vent Tube

Remove the vent tube. Clean it with diesel fuel. Install the tube. Be sure it fits correctly in the tappet cover.

Vent tube cleaned *Yes* *No*

31. Fluid Leakage

Check the following systems for leakage. Check for broken hoses, broken lines and loose or worn connections.

A. Cooling system checked *Yes* *No*

B. Hydraulic system checked *Yes* *No*

C. Fuel system checked *Yes* *No*

D. Lubrication system checked *Yes* *No*

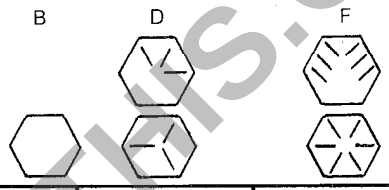
32. Accessible Hardware Torque Values

Check all accessible bolts and nuts. If hardware is loose, tighten it to correct torque shown on the chart below unless a different torque is specified.

Most hardware used is high-strength (note dashes on hex. heads). The types of bolts and cap screws are identified by head markings as follows:

Plain Head: regular machine bolts and cap screws.

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

T30882

Fig. 121-Torque Chart

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 in. (22 mm) and larger are sometimes formed hot rather than cold, which accounts for lower torque.

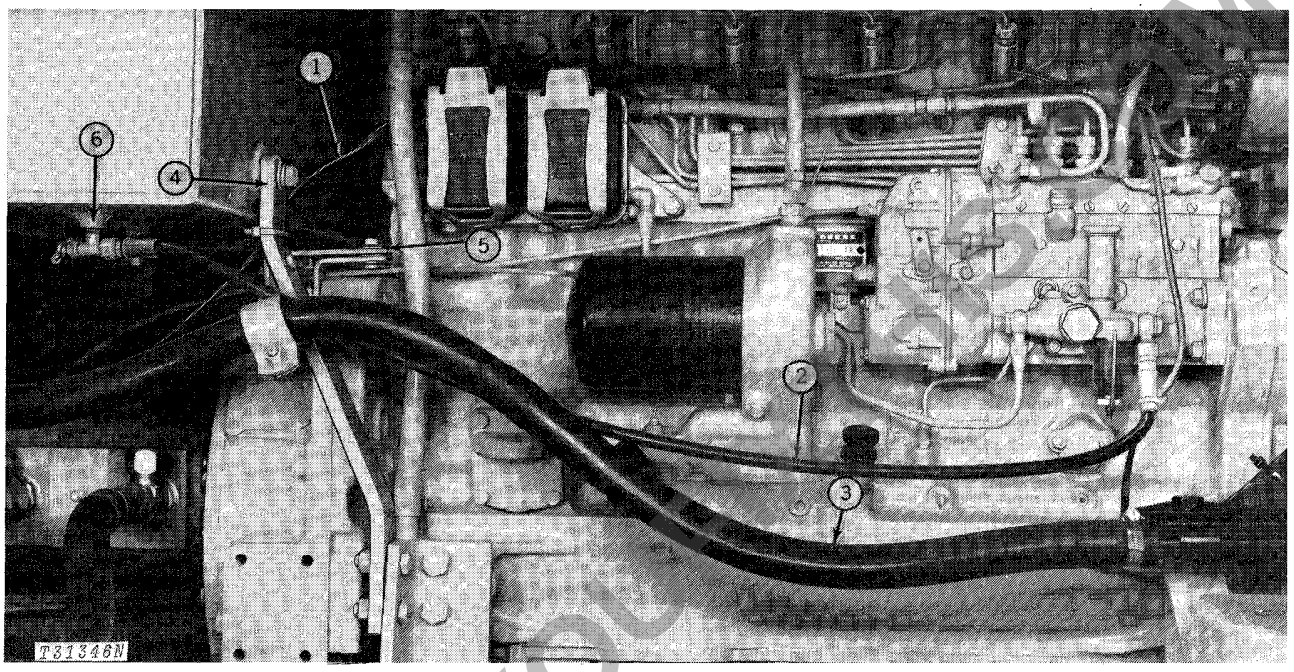
All accessible hardware torqued *Yes* *No*

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Group 5
ENGINE REMOVAL AND INSTALLATION

REMOVAL



1—Fuel Gauge Sender Wire
2—Fuel Line
3—Hydraulic Oil Hose
4—Fuel Tank Support
5—Speed Control Bell Crank
6—Fuel Shut-Off

Fig. 1-Engine

Operate controls to relieve hydraulic pressure.

Disconnect battery ground straps.

Swing access fenders away from engine.

Remove muffler and pre-cleaner.

Remove hood attaching hardware. Attach a chain hoist through the air cleaner access hole and remove the hood assembly.

Remove air cleaner with air cleaner support and air intake hose.

Remove hardware attaching grille housing to frame. Lift grille housing at the radiator cap access door.

Shut off fuel at fuel tank. Disconnect and remove fuel line (2, Fig. 1) from tank to supply pump. Disconnect and remove fuel return line from engine to fuel tank.

Disconnect electrical harness, hydraulic oil hose (3) and cold weather starting aid line.

Drain cooling system and remove radiator hoses.

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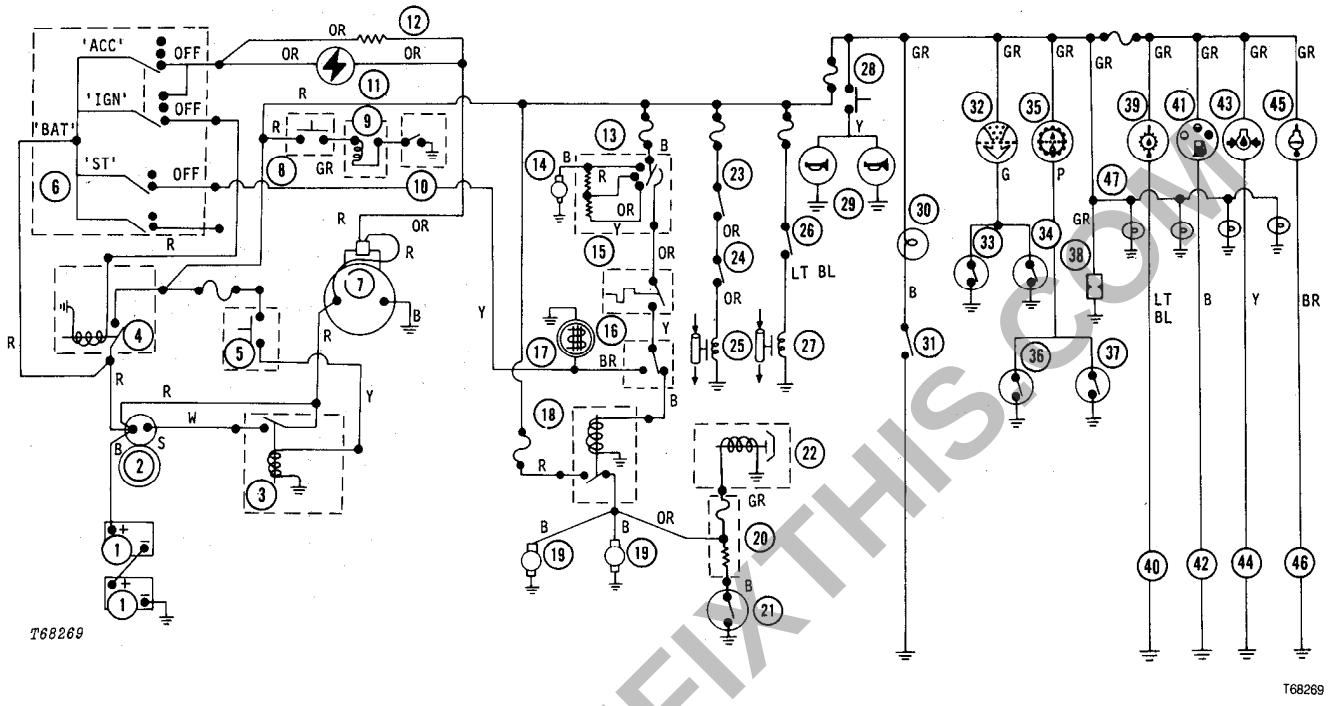


Fig. 9-Electrical Schematic (3873-7503)

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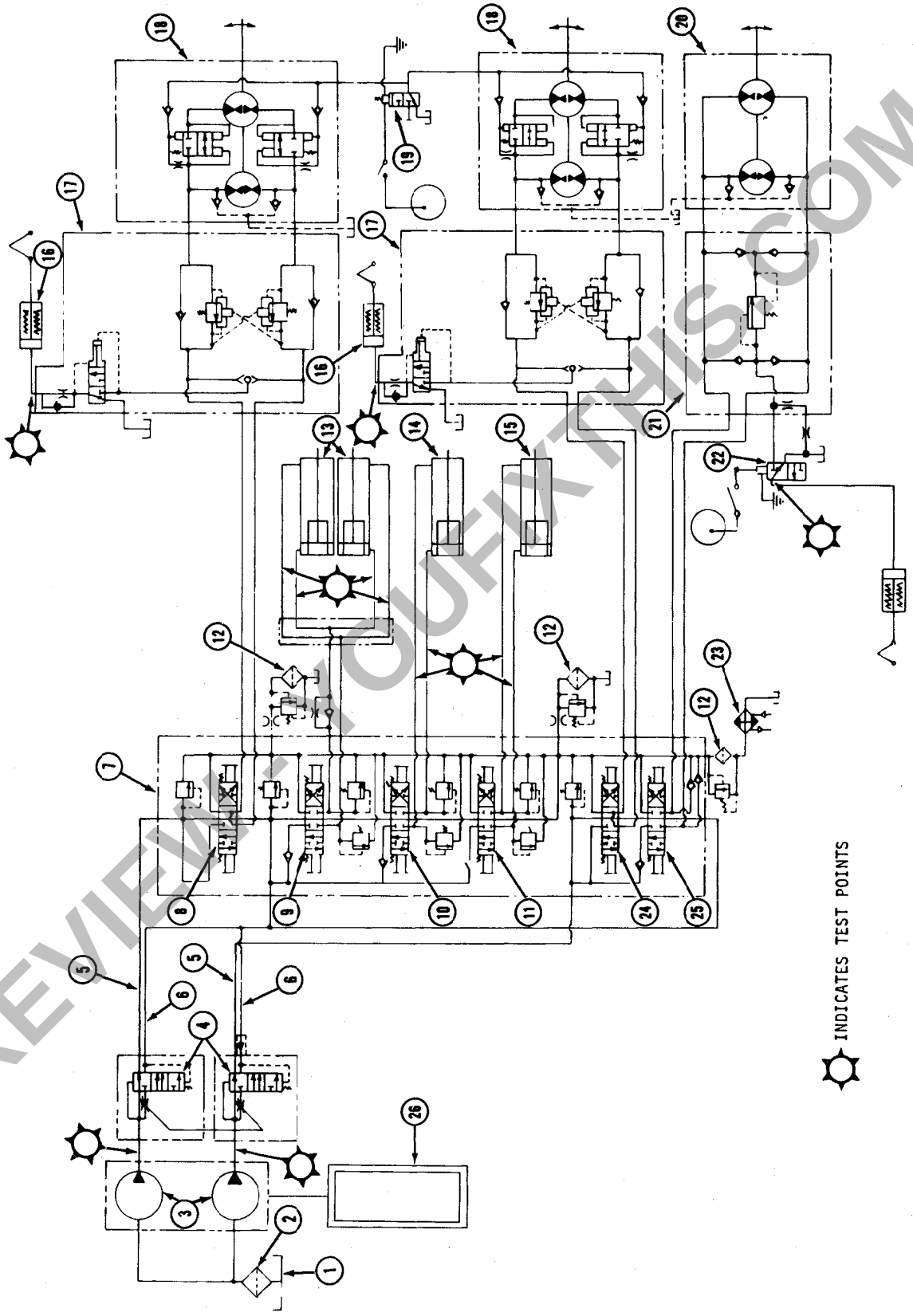


Fig. 4-Schematic of Hydraulic System
(Units without pilot controls)

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Pistons, Connecting Rods and Oil Pump

Install pistons, connecting rods, oil pump, oil pan, flywheel and clutch pack.

Use the following torque specifications to install crankshaft and associated parts. Torque specifications not found in this group may be found in Group 40.

Location	Torque lb-ft	[kg-m]
Main bearing caps	150	20.7
Connecting rod bearings	55	7.6
	plus 90 +10 −0°	
Rear crankshaft oil seal housing	20	2.8
Flywheel to crankshaft	85	11.8
Cylinder head to block	80	11.1
(repeat in sequence)	115	15.9
(after break in)	130	17.97
Oil pan to block -1/2 in.	85	11.8
3/8 in.	35	4.8
Piston cooling orifices	85 to 110 lb-in	0.98 to 1.27
Damper to crankshaft	150	20.7
Flywheel housing to cylinder block	300	4.1
Front flywheel housing cover to housing	85	11.7
Lower front flywheel housing cover to housing	35	4.8

Install remaining engine parts and install engine in unit (see Group 5 of this section).

Fill crankcase and cooling system.

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Chill both new insert and JDE-79 Replacement Ring before installation. Use JDE-7 Driver to drive insert and replacement ring into place (Fig. 4).

Check run-out after installing. Grind if necessary for 0.002 in (0.05 mm) maximum total indicated run-out.

Assembly

Valves

Apply John Deere Valve Stem Lubricant (AR44402) or an equivalent to valve stems and guides. Install valves into guides from which they were removed. Valves must move freely and seat properly.

Install valve springs making certain that cylinder head end of spring is located correctly in the machined counter bore of the head.

Install rotators and new valve retainer locks. After assembly, "pop" each spring and valve assembly three or four times by tapping the end of each valve stem with a soft mallet.

Install water opening cover and tighten cap screws to 25 ± 2 lb-ft (4 ± 0.3 kg-m).

Installation

Install cylinder head gasket dry. Dip cap screws in engine oil before installation. Install cylinder head using hardened flat washers under all cap screws.

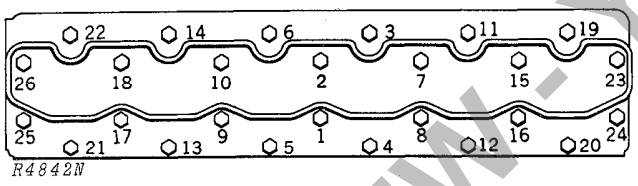


Fig. 5-Cylinder Head Cap Screw Tightening Sequence

Use the following procedure to tighten the cylinder head cap screws:

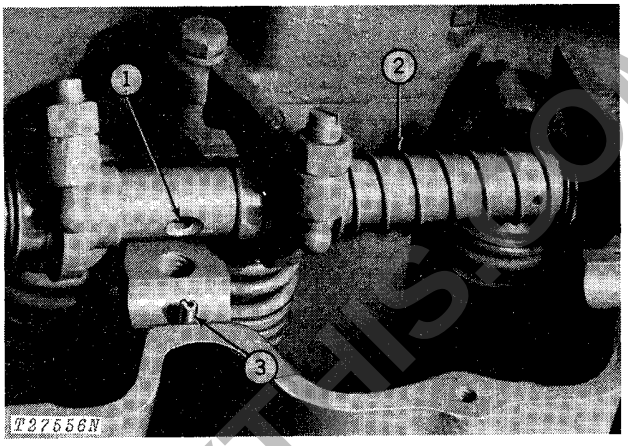
(1) Tighten cap screws in sequence shown in Fig. 5 to 100 lb-ft (13.8 kg-m).

(2) Retighten cap screws in sequence shown in Fig. 5 to 115 lb-ft (15.9 kg-m).

(3) After break-in, loosen and retighten cap screws to 125 to 135 lb-ft (16.9 to 18.3 kg-m). Check and adjust valve clearance.

Install push rods in holes from which they were removed.

Install valve stem wear caps on valve stems making certain caps rotate freely.



1—Spring Pin Hole
2—Rocker Arm Shaft
3—Spring Pin

Fig. 6-Installing Rocker Arm Assembly

Install rocker arm assembly. Make sure that spring pin in head aligns with pin hole in rocker arm shaft (Fig. 6). This will align lubricating holes in shaft and head. Tighten the clamp cap screws to 55 lb-ft (7.6 kg-m).

Install all other parts removed.

Using 3M EC-1099 glue, or an equivalent rubber to metal glue, cement rocker arm cover gasket on the rocker arm cover. Install the rocker arm cover and tighten cap screws to 18 ± 6 lb-in (0.21 ± 0.07 kg-m).

After all parts are installed fill the lubrication system with the proper oil and bleed the fuel system (see Group 25).

Valve Clearance Adjustment

Remove flywheel housing timing hole cover.

Use a screwdriver to bar the flywheel over to position No. 1 piston at top dead center ("TDC") of its compression stroke. Turn flywheel until timing pin engages timing hole in flywheel (Fig. 7).

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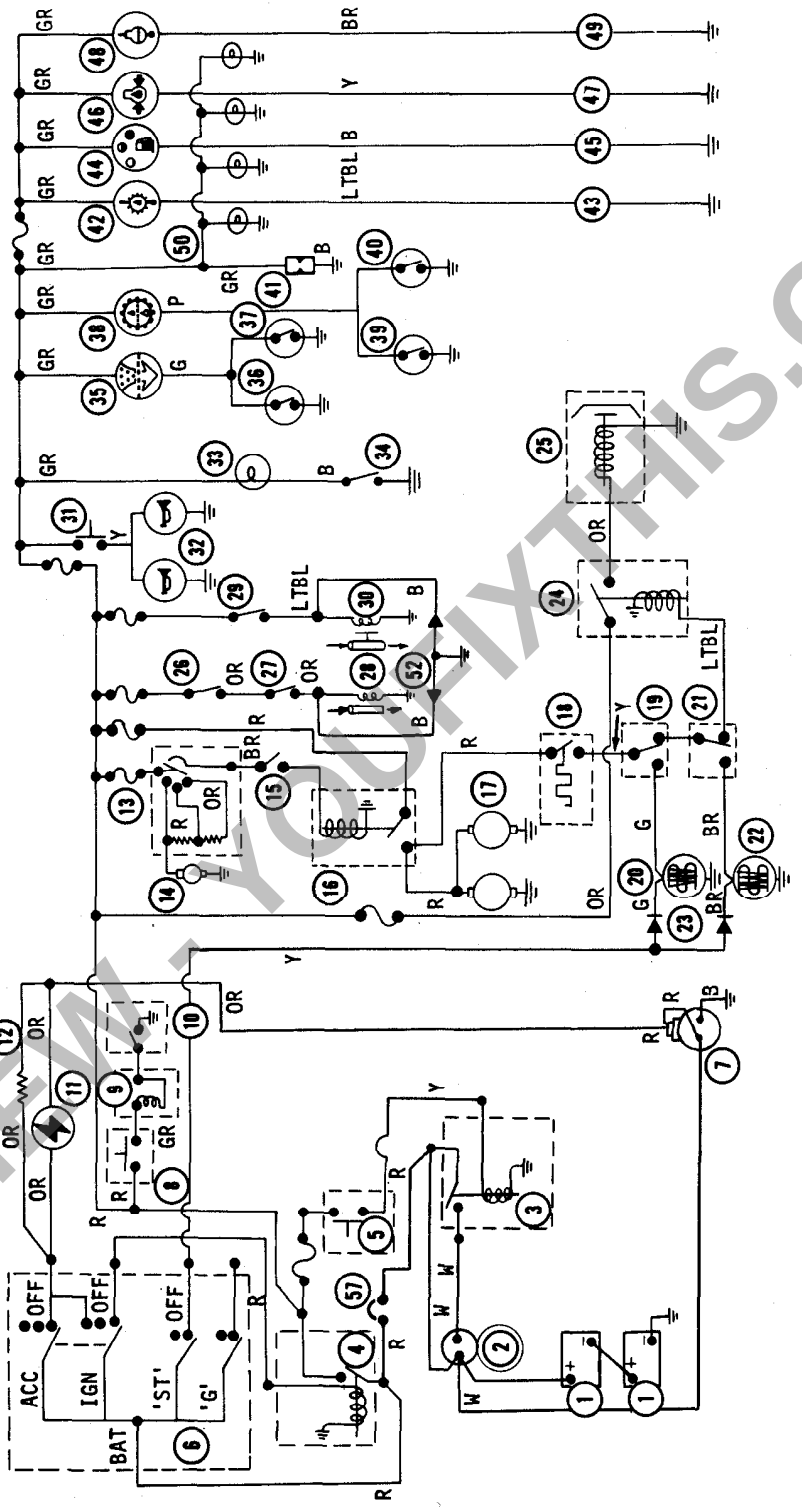
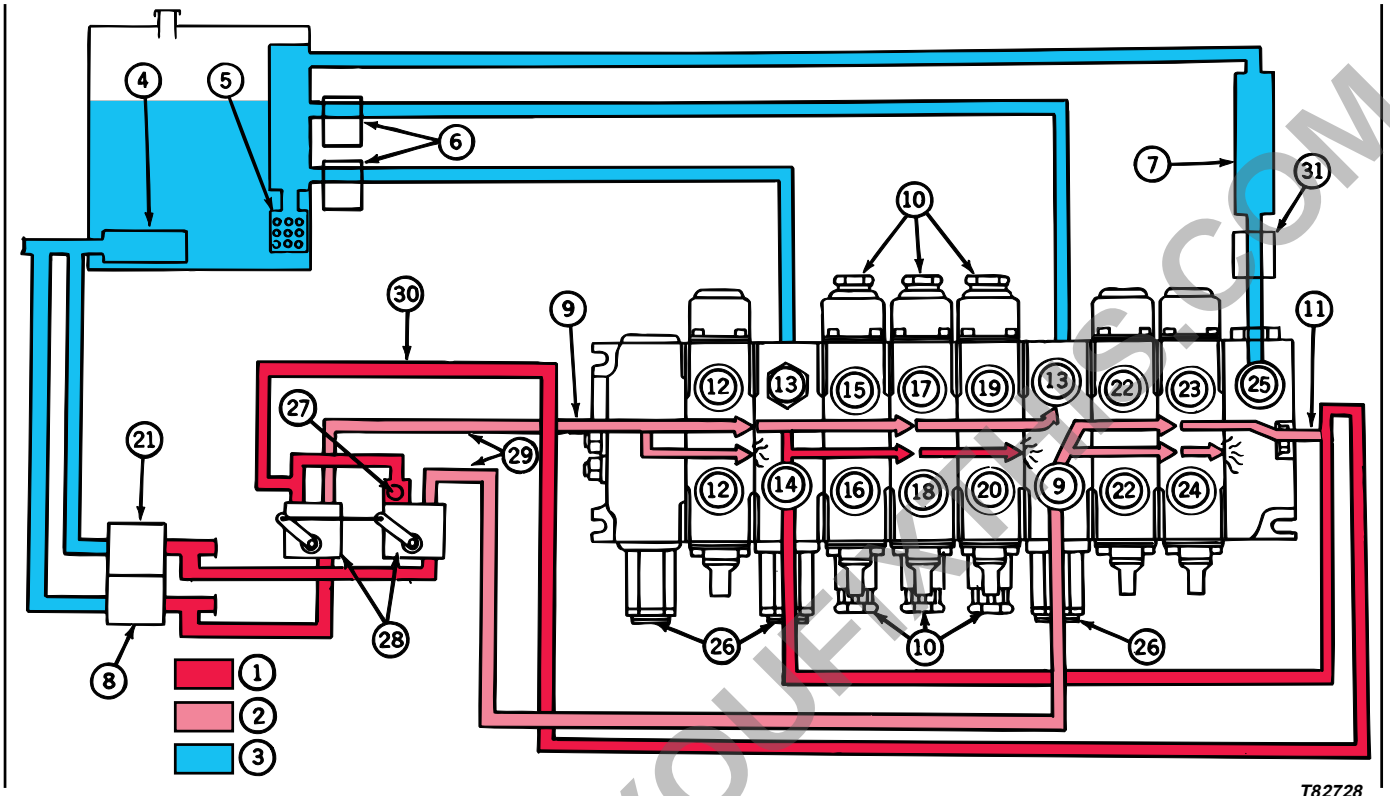


Fig. 10-Electrical Schematic (7504-)

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1—Function Oil
2—Neutral Oil
3—Return Oil
4—Sump Filter
5—Diffuser
6—Return Filters
7—Oil Cooler
8—Hydraulic Pump (Outer)
9—Inlet (One Pump)
10—Circuit Relief Valves
11—To Combined Flow Inlet
12—R.H. Track
13—Plug
14—Combined Flow Inlet
15—Boom Raise (Piston)
16—Boom Lower (Rod)
17—Crowd In (Piston)
18—Crowd Out (Rod)
19—Bucket Load (Piston)
20—Bucket Dump (Rod)
21—Hydraulic Pump (Inner)
22—L.H. Track
23—Swing (Right)
24—Swing (Left)
25—Return to Cooler
26—System Relief
27—Check Valve
28—Flow Dividers
29—Excess Flow
30—Controlled Flow
31—Return Filter

Fig. 6-Hydraulic System Oil Flow (-006000)
(Flow Dividers On)

Trace oil flow with both tracks in operation and note priority flow is to the boom, crowd and bucket sections, excess flow is to the tracks, and the combined flow section relief protects the controlled flow circuit.

The check valve is located in the control flow port of the flow divider for inner pump flow. When the flow dividers are off and the swing valve is actuated, the check valve isolates the pump flow going to the swing motor from high pressure in the other pump circuit.

Without the check valve, if a cylinder is bottomed while swinging, both pumps will operate at system relief pressure causing a marked reduction in swing speed and engine speed.

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Group 40
SPECIFICATIONS AND SPECIAL TOOLS

ENGINE REMOVAL AND INSTALLATION

SPECIFICATIONS AND TORQUE VALUES

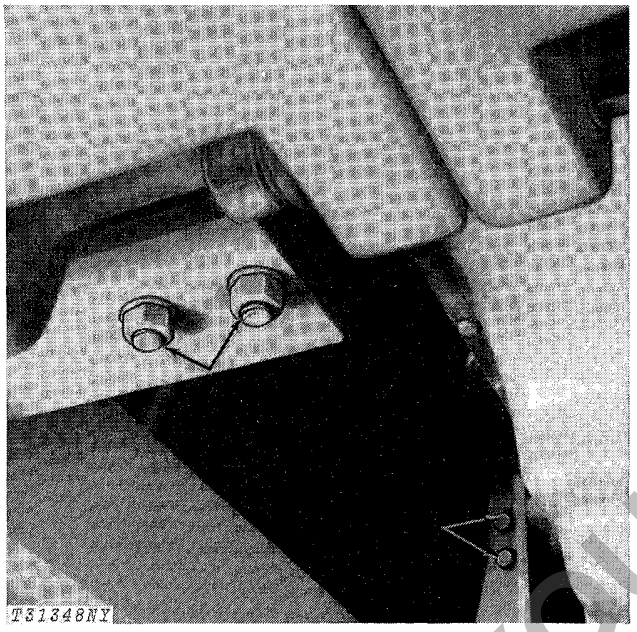


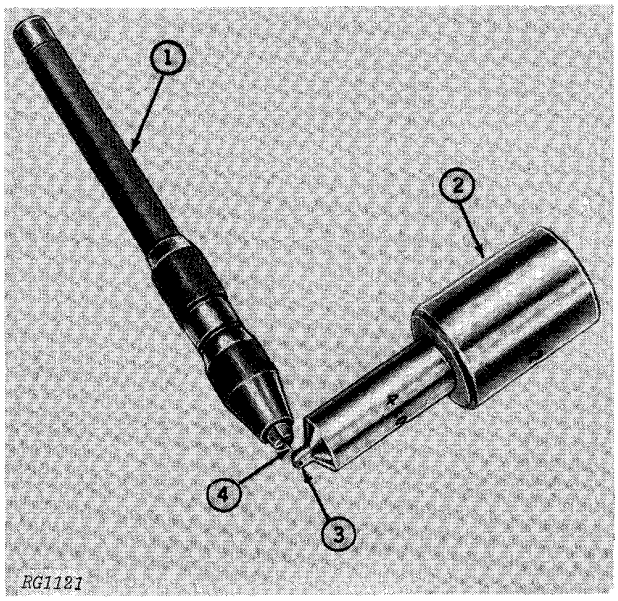
Fig. 1-Engine Attaching Cap Screws

Engine mounting plate to main frame cap screws ..... 300 lb-ft. [41 kg-m]

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RG1121

1—Pin Vise
2—Nozzle
3—Orifice
4—Cleaning Wire

Fig. 17-Cleaning Nozzle Orifices

Remove any carbon that may be present in the spray orifices of the nozzle assembly before reassembling on nozzle holder.

To clean carbon from the spray orifices (Fig. 17).

1. Begin with a cleaning wire 0.003 to 0.004 in. (0.07 to 0.10 mm) smaller than the nominal orifice size of 0.0130 in. (0.33 mm).

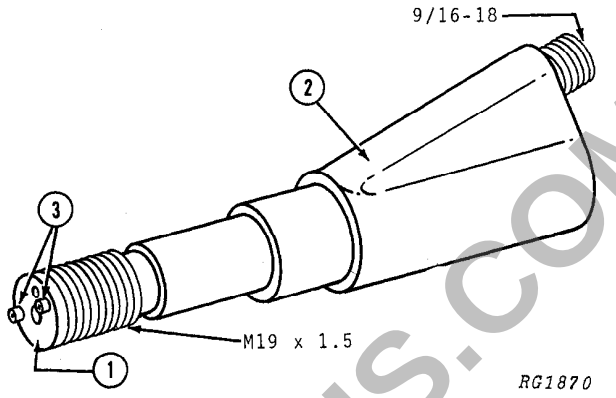
NOTE: Stoning the wire to provide a flat surface on one side will help in reaming carbon from a clogged hole.

2. Clamp the cleaning wire in pin vise (1). Wire should not protrude from vise more than 1/32 in. (0.8 mm).

3. Insert wire into orifice (3), and rotate.

4. For final cleaning, use cleaning wire 0.001 in. (0.03 mm) smaller than orifice size. Follow steps given above.

Nozzle Holder



RG1870

1—Lapped Surface
2—Nozzle Holder
3—Locating Pin

Fig. 18-KDL Nozzle Holder

Inspect the lapped machined surface (1, Fig. 18) on bottom end of nozzle holder (2) for nicks or scratches. Replace holder if not in good condition.

Inspect threads (sizes shown in Fig. 18) on nozzle holder for general condition. Threads that are nicked slightly may be "dressed-up." Replace holder if threads cannot be restored to a serviceable condition.

IMPORTANT: Do not lap machined surface of nozzle holder in an attempt to stop fuel leakage at this location. The locating pin (3) in holder has to be removed before the machined surface can be tapped.

Removing this pin is not recommended as removal is likely to damage it, and a replacement pin is not available as a service part.

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JD690-B EXCAVATOR

Technical Manual
TM-1093 (Feb-82)

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INDEX

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

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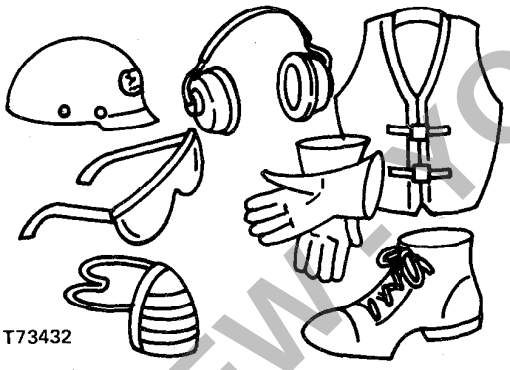
MAINTENANCE WITHOUT ACCIDENT
WORK SAFELY



T27999N

This safety symbol is used for important safety messages. When you see this symbol, follow the safety message to avoid personal injury.

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



T73432

See your shop supervisor for specific instructions on a job, and the safety equipment you may need.

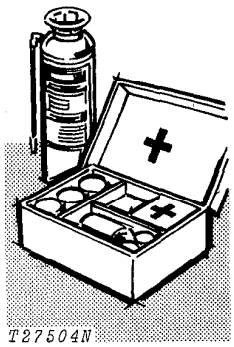


T27502N

T27502N

BE ALERT!

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



T27504N

Maintenance Area

Make sure the maintenance area has enough ventilation.

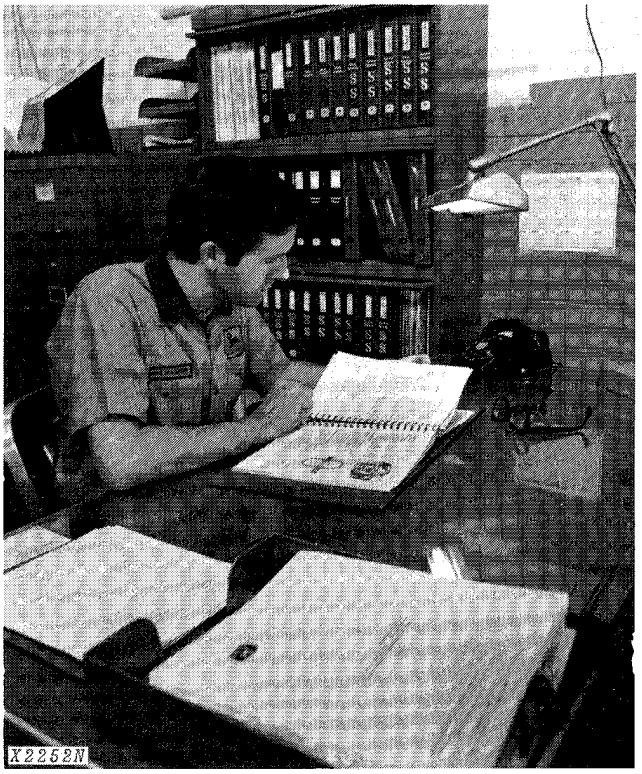
Keep the maintenance area CLEAN AND DRY. Oily and wet floors are slippery. Greasy rags are a fire hazard. When you work with electrical equipment, wet spots are dangerous.

Keep starting aids in a cool, well-ventilated place, out of 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 failure and their causes. FOS Manuals are for training new personnel and for reference by experienced service 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 technical manual.

•Technical Manuals—for actual service

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

This technical manual was written for you—an experienced service technician. Keep it in a permanent binder in the shop where it is handy. Read it when you need to know 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 are listed and illustrated at the end of each section.

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The engine need not be removed to service the cylinder head. It will be necessary to remove air cleaner, turbocharger, and intake manifold (see Group 35, this section) and exhaust manifold.

Injection nozzles extend below head. Remove to avoid possible damage to the nozzle tip (see Group 25).

Note location of all parts during removal for reassembly.

NOTE: Do not rotate crankshaft with cylinder head removed unless all cylinder liners are secured with cap screws and washers.

Repair

Cylinder Head

Check to determine if cylinder head is flat and smooth. If it is necessary to resurface the bottom deck of the head, no more than 0.030 inch [0.76 mm] may be removed.

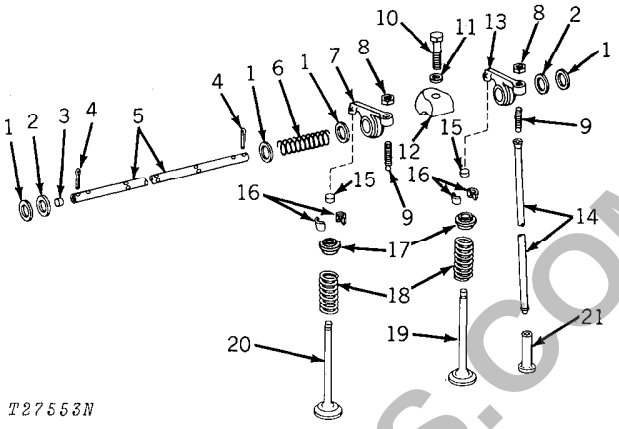
Check distance from the bottom deck of the cylinder head to the valves when seated. The valves should protrude 0.024 to 0.038 inch [0.61 to 0.97 mm], however values may be recessed up to 0.006 in. [0.15 mm] below head.

Rocker Arm Assembly

Remove cotter pins (4, Fig. 2), spring washers (1), bowed washers (2) and plugs (3) from rocker arm shaft (5). Slide parts from shaft and identify for reassembly.

Remove valve spring retainer locks (16), valve stem caps (15), valve springs (18), rotators (17) and valves (19 and 20). Identify each valve for reassembly into the guide from which it was removed.

Inspect valve springs for alignment, wear and damage. Place springs on a flat surface to see that they are square and parallel. Do not use springs that are cocked, crooked, broken or rusty.



1—Spring Washer (2 used)
2—Bowed Washer (12 used)
3—Plug (2 used)
4—Cotter Pin (2 used)
5—Rocker Arm Shaft
6—Spring (5 used)
7—Rocker Arm (Intake- 6 used)
8—Nut (12 used)
9—Adjusting Screw (12 used)
10—Cap Screw (6 used)
11—Washer (6 used)
12—Clamp (6 used)
13—Rocker Arm (Exhaust - 6 used)
14—Push Rod (12 used)
15—Valve Stem Cap (12 used)
16—Retainer Lock (24 used)
17—Valve Rotator (12 used)
18—Valve Spring (12 used)
19—Exhaust Valve (6 used)
20—Intake Valve (6 used)
21—Cam Follower (12 used)

Fig. 2-Rocker Arm Assembly

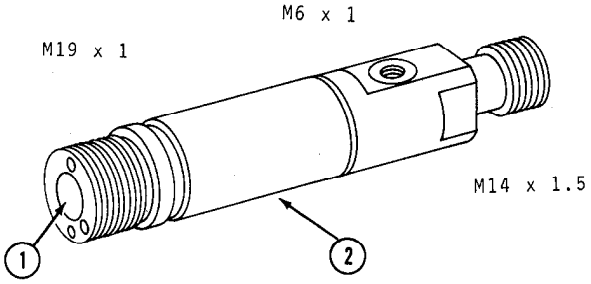
Check valve spring length on a spring tester. Free length of each spring may differ, but the compressed lengths for each spring must be the same. Spring specifications are as follows:

Item	New Part
Free length (approx.)	2.12 inches [53.8 mm]
Compressed at 54 to 62 lbs. [24.5 to 28.1 kg] valve closed	1.81 inches [46.9 mm]
Compressed at 133 to 153 lbs. [60.5 to 69.5 kg] valve open	1.36 inches [34.5 mm]

Replace valve stem caps if pitted or worn.

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Nozzle Holder



RG1869

RG1869

1—Lapped Surface **2—Nozzle Holder**

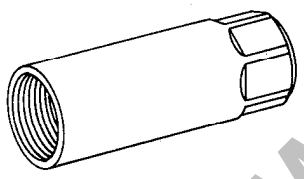
Fig. 35-KDEL Nozzle Holder

Inspect the lapped machined surface (1, Fig. 35) on bottom end of nozzle holder (2) for nicks or scratches. Replace holder if not in good condition.

Inspect threads (sizes are shown in Fig. 35) on nozzle holder for general condition. Threads that are nicked slightly may be "dressed-up". Replace holder if threads can not be restored to a serviceable condition.

Check fuel passages in nozzle holder to make sure that they are open. Clean with compressed air.

Nozzle Retaining Nut



RG2247

RG2247

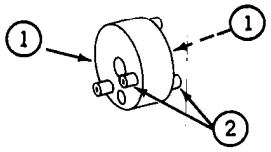
Fig. 36-Nozzle Retaining Nut

Remove carbon deposits on both inner and outer surfaces of the nozzle retaining nut (Fig. 36).

Inspect the retaining nut for cracks caused by overtightening or a damaged lower seating surface. A seating surface may be restored by rubbing the surface on emery cloth.

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

Intermediate Plate



RG1122

RG1122

1—Lapped Surfaces **2—Dowel Pins**

Fig. 37-Intermediate Plate

Examine the lapped surfaces (1, Fig. 37) for nicks, scratches, or worn areas which would permit the fuel to leak past. Replace the intermediate plate if the lapped surfaces are damaged or worn.

IMPORTANT: Do not lap the machined surfaces of the intermediate plate in an attempt to stop fuel leakage at these locations. The dowel pins (2) in plate have to be removed before the surfaces can be lapped. Removing these dowels is not recommended as removal is likely to damage them, and replacement dowels are not available as service parts.

Spring Seat



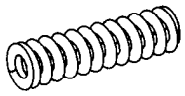
R28377N

R28377N

Fig. 38-Spring Seat

Inspect the spring seat (Fig. 38) for splitting, cracking, or excessive wear. Replace seat if any of these conditions are evident.

Nozzle Valve Spring



R28378N

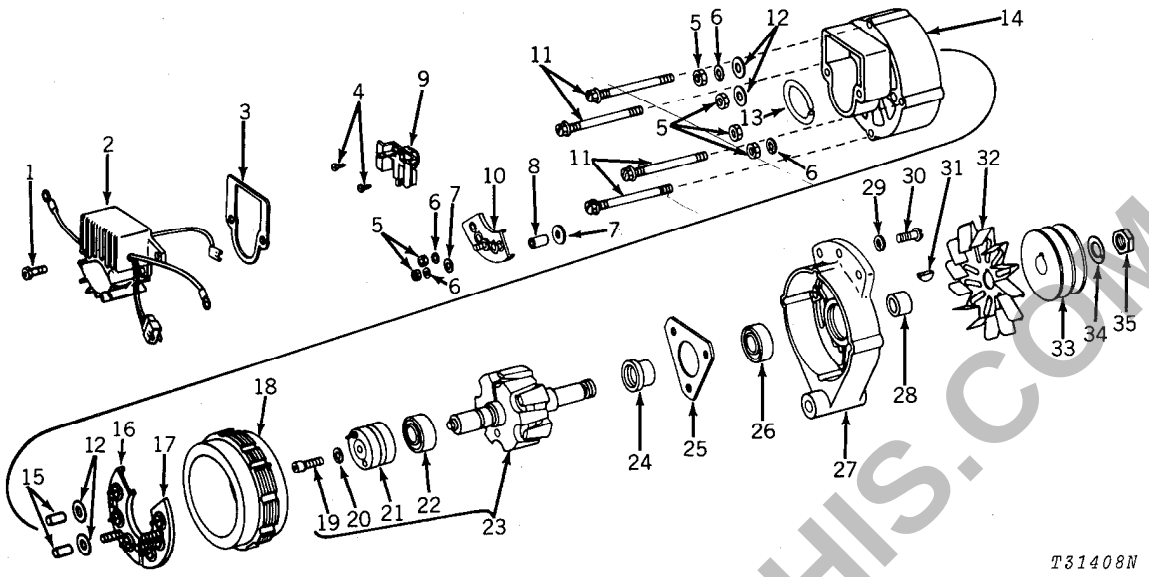
R28378N

Fig. 39-Nozzle Valve Spring

Examine spring (Fig. 39) and shims for pitting or excessive wear. Replace as necessary.

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1—Special Cap Screw (4 used)
2—Regulator
3—Gasket
4—Drive Screw (2 used)
5—Nut (6 used)
6—Lock Washer (4 used)
7—Special Washer (2 used)
8—Insulator Sleeve
9—Brush Holder
10—Isolation Diode
11—Through Bolt (4 used)
12—Insulating Washer (4 used)
13—Rear Bearing Retainer
14—Rear Housing
15—Insulator Sleeve (2 used)
16—Positive Rectifying Diode
17—Negative Rectifying Diode
18—Stator
19—Special Cap Screw
20—Lock Washer
21—Slip Ring Assembly
22—Rear Bearing
23—Rotor
24—Sleeve
25—Retainer
26—Front Bearing
27—Front Housing
28—Fan Spacer
29—Lock Washer
30—Machine Screw
31—Woodruff Key
32—Fan
33—Pulley
34—Lock Washer
35—Nut

Fig. 4-Alternator Assembly

Remove brush holder (3, Fig. 3) and thru bolts (2) from alternator.

Carefully insert two screwdriver blades in opposite openings between the stator and front housing and separate front housing from rear housing.

NOTE: Inserting screwdriver blades deeper than 1/16 inch [1.6 mm] may damage stator windings.

At this time, the rear housing and stator are one assembly, the front housing and rotor are another assembly.

Removing Rear Housing from Stator and Diodes

Place the open end of the stator on a clean work surface, free of metal chips that could damage the stator windings. Remove hex. nuts (4, Fig. 3) and insulating washers (5) from the diode terminal studs.

Carefully and evenly, tap the diode terminal studs out of the rear housing and lift rear housing off the studs.

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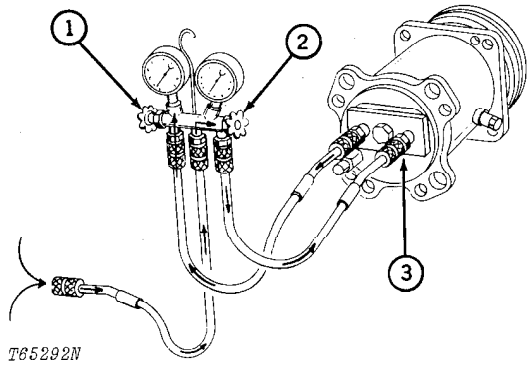
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LEAK TESTING COMPRESSOR

A compressor that has been removed from the unit should be tested for internal and external refrigerant leakage before making repairs on compressor. See REPAIR, page 21-7.

Perform the following Volumetric Efficiency Test to determine if the compressor is serviceable. If the compressor fails the volumetric efficiency test, it need not be tested further, and must be replaced.

Volumetric Efficiency Test



1—Low Side Valve (Closed)
2—High Side Valve (Open)
3—Test Plate (D-18032KD)

Fig. 26-Volumetric Efficiency Test Hook-Up

IMPORTANT: There must be a minimum of one ounce (30 mL) of oil in the compressor to perform this test. If all the compressor oil was lost during discharging the system, pour a minimum of one ounce (30 mL) of oil into the compressor reservoir.

Mount the compressor in a vise with the oil reservoir up.

Remove the dust cover (2, Fig. 7).

Rotate the clutch hub by hand. If it can be rotated, proceed with the test, if it cannot be rotated, replace the compressor.

Install D-18032KD Test Plate (3, Fig. 26).

Connect the low side valve (1, Fig. 26) to the left hand test plate fitting and the high side valve (2) to the right hand fitting.

The center hose must be left "open" to the atmosphere. Refer to Fig. 26.

NOTE: The low pressure gauge hose is connected to the discharge adapter so that the pressure reading during the test can be more easily read.

Close the low side valve and open the high side valve. Refer to Fig. 26.

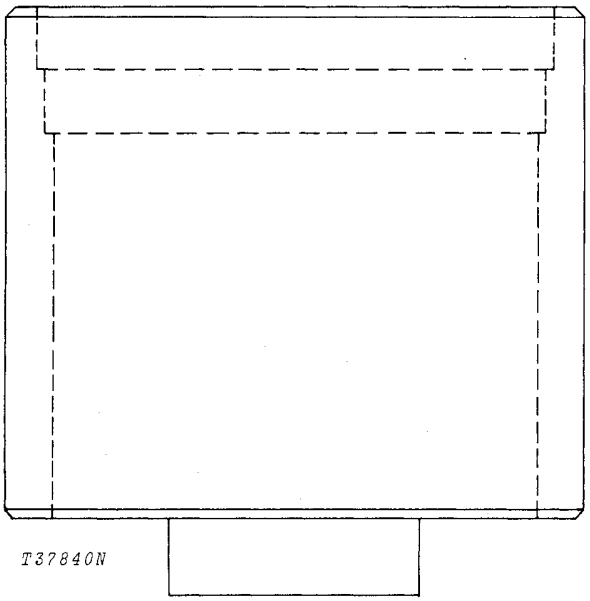
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SWING DRIVE

SPECIAL TOOLS

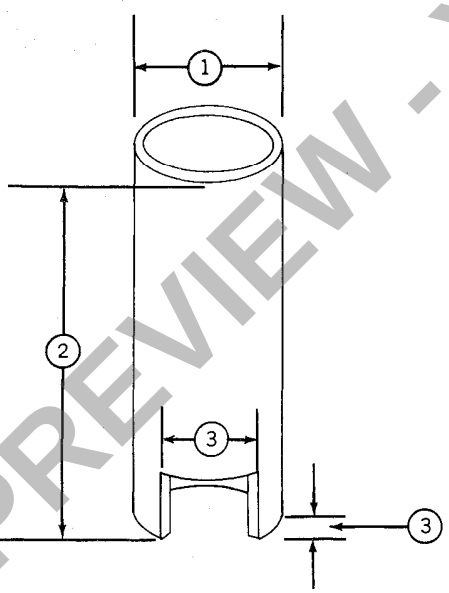
Essential Tools

Tool	Tool Number	Use
	JD-291	To install wear sleeve on swing pinion shaft.

T37840N

T37840N

Fig. 13-Wear Sleeve Installing Tool



T31487N

T31487N

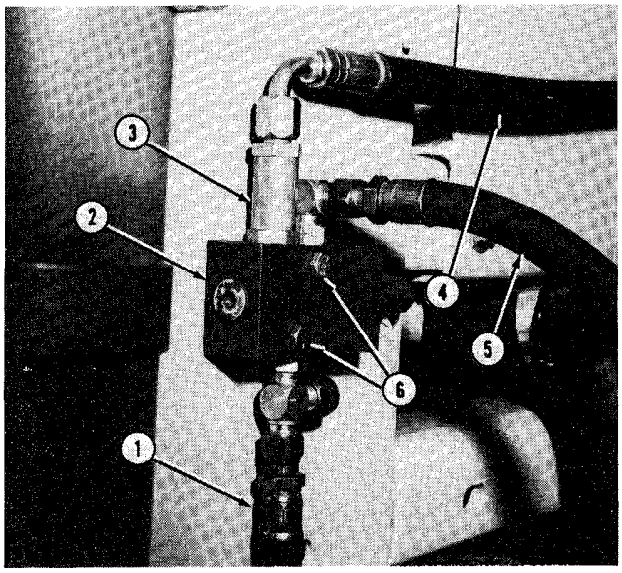
1. Standard 3-in. pipe
2. Approximate 6-in. (152 mm) length
3. Notch 1 x 1-1/2-in. (25 x 38 mm)

Fig. 14-Compressing Tool

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INSTALLATION



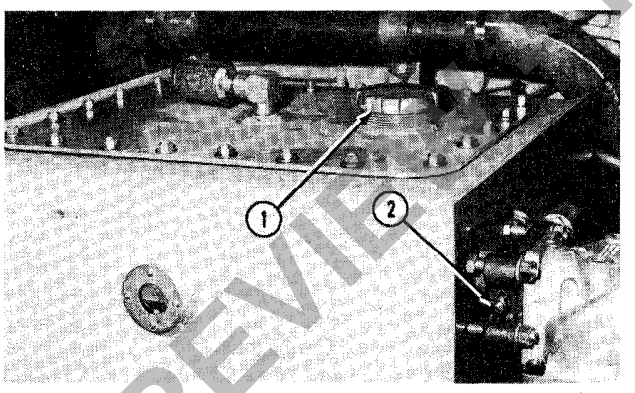
T82759

1—Hose (to pilot accumulator)
2—Pressure Reducing Valve
3—Check Valve
4—Hose (from pilot accumulator)
5—Hose (to return)
6—Cap Screw (2 used)

Fig. 87-Install Pressure Reducing Valve

1. Install cap screws (6, Fig. 87).

2. Remove caps or plugs and connect hoses (1, 4 and 5) to pressure reducing valve (2).



T82754

1—Reservoir Cap
2—Diffuse Tube Petcock

Fig. 88-Check Oil Level

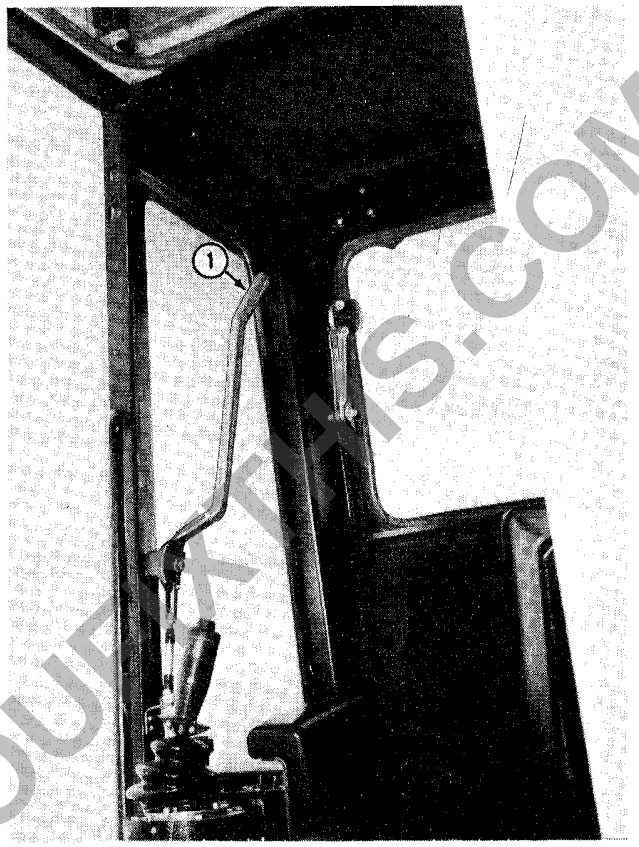
3. Check reservoir oil level.

4. Close reservoir cap (1, Fig. 88) and diffuser tube petcock (2).

5. If necessary, adjust the pressure reducing valve (Section 70, Group 25).

PILOT ACCUMULATOR

REMOVAL



T80165

1—Pilot Shut-Off Lever

Fig. 89-Close Pilot Shut-Off Valve

1. Lower all equipment to the ground.

2. Stop the engine.

3. Move the pilot shut-off lever (1, Fig. 89) to the horizontal position.

4. Operate all hydraulic controls to release pressure in the hydraulic system.

5. Raise the pilot shut-off lever (1) to the vertical position.

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Disassembly (Starting At Master Link)

Install proper saddle and secure it to track press frame with socket head cap screws.

Adjust conveyor extension to desired conveyor working height.

Remove outside row of cap screws (row away from work head of press) securing track shoes to link assemblies. *NOTE: Track shoes removed for clarity of photographs.*

CAUTION: Always wear safety glasses when operating the press. Parts can break or chip, causing eye injury.

Install ram end disassembly adapter to work head of press and secure with attaching nut. Install bushing side cap to disassembly adapter and secure with socket head cap screw.

IMPORTANT: A clean track chain is necessary to insure proper disassembly and assembly.

Raise the elevating conveyor and manually pull the track chain assembly toward the press operator until the link assembly bushing male end is directly over the top of the saddle.

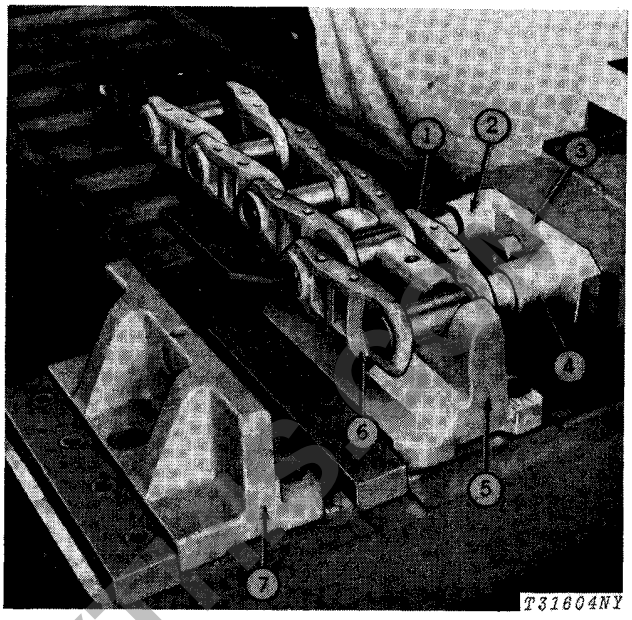
Lower conveyor so that chain link assembly is indexed into saddle.

Advance work head of track press until the ram end disassembly adapter comes in contact with bushing and pin. Press bushing and pin from right-hand link. Remove right-hand link with shoe as an assembly (Fig. 9).

Remove left-hand link, with bushing and pin intact, from saddle.

To remove pins and bushings from left-hand links, position saddle bushing spacer (pin side) (5, Fig. 10) on saddle (5, Fig. 9) as shown in Fig. 10. Advance work head of track press and remove bushing and pin from left-hand link.

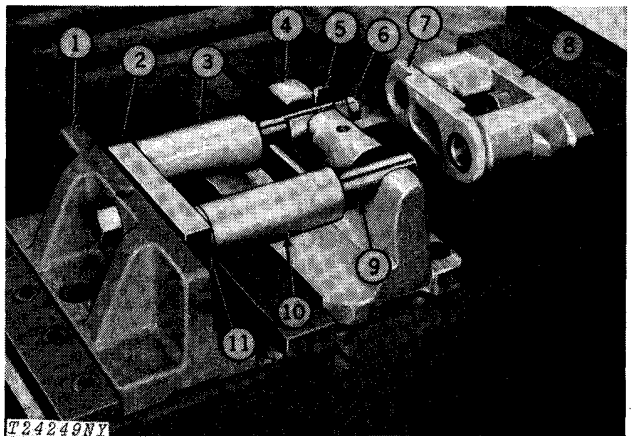
Continue these steps with each link assembly until the track is completely disassembled.



T31604NY

1—Right-Hand Link
2—Pin Remover
3—20963 Disassembly Adapter Plate
4—Bushing Remover
5—40038 Saddle
6—Left-Hand Link Assembly
7—40706 Abutment

Fig. 9-Removing Right-Hand Link



T24249NY

1—40706 Abutment
2—30134 Rear Abutment Assembly Adapter Plate
3—30170 Pin Side Spacing Post
4—40038 Saddle
5—20332 Saddle Bushing Spacer (Pin Side)
6—Pin
7—Left-Hand Link
8—30162 Ram End Assembly Adapter Plate
9—Bushing
10—30169 Bushing Side Spacing Points
11—22415 Bushing Side Spacer

Fig. 10-Preparing Press for Track Pin and Bushing Installation

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Excessive Fuel Consumption

Basic Engine Malfunction
- Low compression
- Incorrect timing
- Restricted exhaust system
- Low intake manifold pressure

Fuel System Malfunctions
- Improper fuel
- Dirty or obstructed air cleaner
- Faulty injection pump
- Turbocharger leak or malfunction
- Plugged fuel tank vent
- Fuel leak in system
- Injection nozzle leak-off line clogged
- Injection pump out of time

Black or Gray Exhaust Smoke

Basic Engine Malfunction
- Incorrect engine timing
- Engine overloaded
- Restricted air cleaner
- Defective muffler
- Defective turbocharger
- Dirty air intake system

Fuel System Malfunction
- Improper grade of fuel
- Excessive fuel delivery
- Faulty injection nozzles
- Injection nozzle leak-off line clogged
- Injection pump out of time

White Exhaust Smoke

Basic Engine Malfunction
- Low compression

Fuel System Malfunction
- Faulty injection nozzle
- Improper fuel
- Injection pump out of time

Slow Acceleration

Fuel System Malfunction
- Faulty injection nozzle
- Improper fuel
- Faulty governor or injection pump

Detonation

Fuel System Malfunction
- Injection pump out of time
- Faulty injection nozzles

Abnormal Engine Noise

Basic Engine Malfunction
- Excessive valve clearance
- Worn cam followers
- Bent push rods
- Worn rocker arm shafts
- Worn main or connecting rod bearings
- Foreign material in combustion chamber
- Worn piston pin bushings and pins
- Scored piston
- Incorrect engine timing
- Excessive crankshaft end play
- Loose main bearing caps or rod
- Worn timing gears
- Worn oil pump gears
- Low engine oil level
- Gears worn or broken

Turbocharger is Noisy or Vibrates
- (Do not confuse the whine heard during rundown with noise which indicates bearing failure.)
- Insufficient oil pressure
- Air intake restriction
- Turbocharger bearing failure—wheel rub

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Start Aid Solenoid

Turn key switch to "IGN" position and push starting aid switch. If a sound is heard at the starting aid solenoid, check line and nozzle to see if they are completely open.

If no sound is heard, check voltage with voltmeter at the solenoid, with leads on solenoid and to ground. If a reading of 12 volts is shown on the voltmeter, the solenoid is defective. If a reading of less than 2 volts is shown, the wiring to the starting aid switch or the switch is defective.

Indicator Lights

If any indicator light does not work, disconnect the wire at the pressure switch and put it to a good ground. Turn on key switch.

If the indicator now lights, the pressure switch is defective or not grounded.

If the indicator still will not light, remove instrument panel mounting screws and pull out panel.

Check the bulb for voltage to the orange wire at the indicator light.

If the bulb is good, the problem must be that the wiring is defective between the pressure switch and indicator light.

If the light does not go off when the engine is started or comes on during machine operation, check filters. The pressure switch or sending unit could also be defective, which would cause the indicator to stay on.

Testing Cab Relay

If none of the cab accessories work, check for voltage at the three terminals of the cab relay.

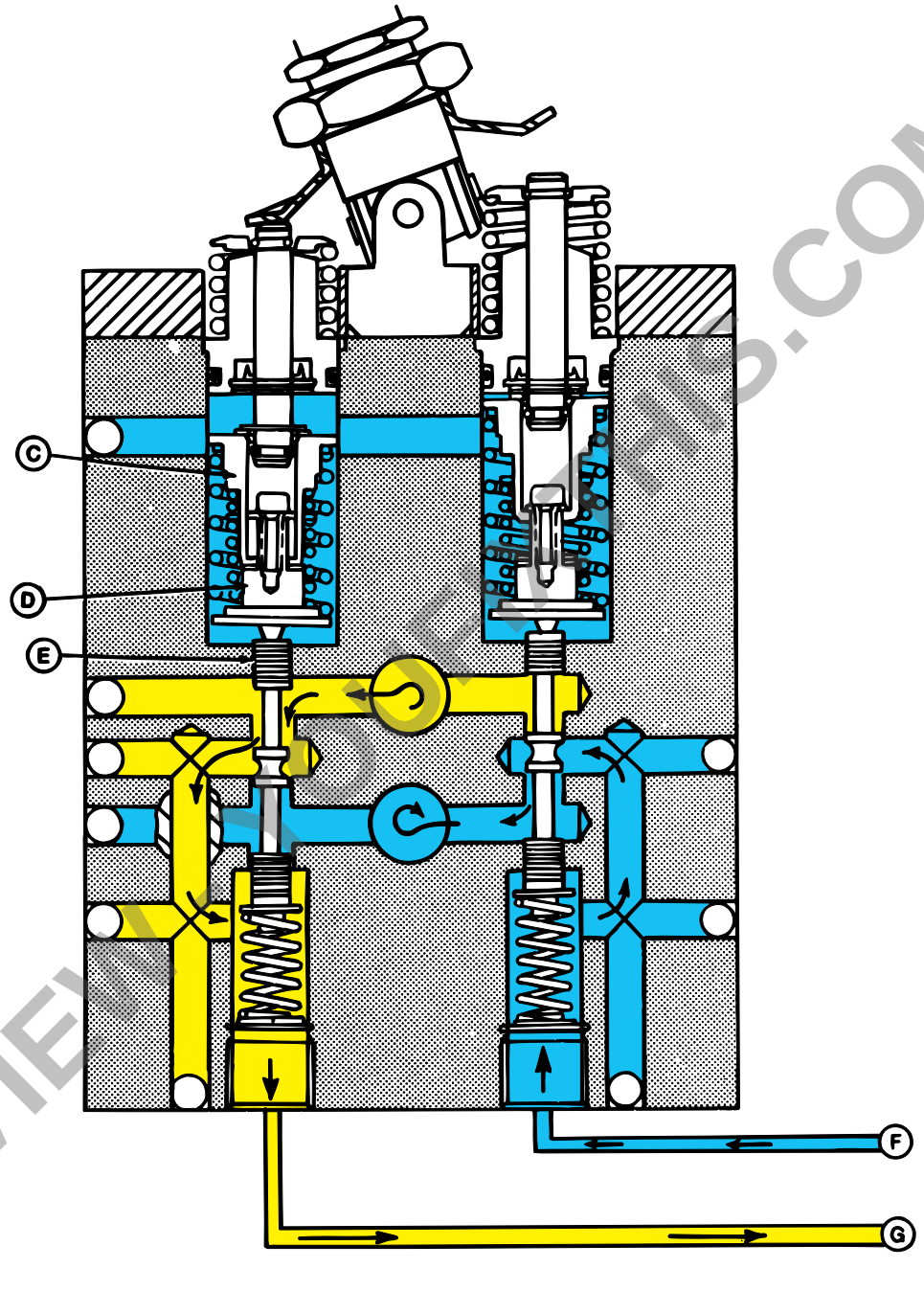
With the key switch in the OFF position, no voltage should be measured at the small terminal. Voltage on only the small terminal indicates defective wiring between the relay and the battery. See Fig. 38.

With the key switch in the run position, voltage measured on the small terminal and only one large terminal indicates a defective relay or ground connection.

If any one cab accessory will not work, check for voltage at the accessory. If voltage is obtained, the accessory is defective. If voltage is not obained, check the fuse, switch and wiring.

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A—Pilot Pressure Oil
B—Return or Pressure Free Oil
C—Upper Spring Retainer
D—Lower Spring Retainer
E—Valve Spool
F—From Pilot Cap
G—To Pilot Cap

Fig. 26-Forced Opening of Pilot Control Valve (16° to 17-1/2° of handle travel)

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