1150 CRAWLER

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September 1976

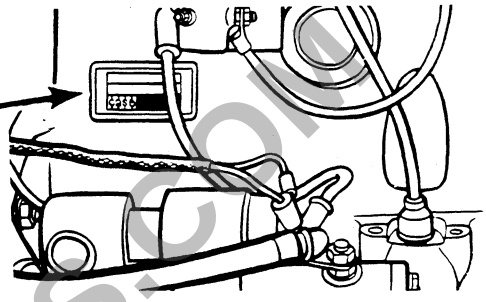
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Section 1010

GENERAL ENGINE SPECIFICATIONS 1150 CRAWLERS

THE ENGINE MODEL AND SERIAL NUMBER IS STAMPED ON A PLATE LOCATED ON THE SIDE OF THE ENGINE ABOVE THE CRANKING MOTOR.



DIESEL ENGINES

General

Type ..... 6 Cylinder, 4 Stroke Cycle, Valve-in-Head.
Firing Order 1-5-3-6-2-4
Bore ..... 4-1/8 Inches
Stroke ..... 5 Inches
Piston Displacement ..... 401 Cubic Inches
Compression Ratio ..... 16.5 to 1
No Load Governed Speed ..... (Dozer) 1990 RPM
(Loader) 2060 RPM
Rated Engine Speed ..... (Dozer) 1850 RPM
(Loader) 1900 RPM
Engine Idling Speed ..... 725 to 775 RPM
*Valve Tappet Clearance (Exhaust) ..... (Hot) .020 Inch .....(Cold) .025 Inch
(Intake) ..... (Hot and Cold) .015 Inch
*Hot Settings Are Made After the Engine Has Operated At Thermostat Controlled Temperature For At Least Fifteen Minutes.

Piston and Connecting Rods

Rings per Piston 3
Number of Compression Rings 2
Number of Oil Rings 1
Type Pins ..... Full Floating Type
Type Bearing ..... Replaceable Precision, Steel Back, Copper-Lead Alloy Liners

Main Bearings

Number of Bearings 7
Type Bearings ..... Replaceable Precision Steel Back, Copper-Lead Alloy Liners

Engine Lubricating System

Crankcase Capacity ..... 14 Qts.
with Filter Change ..... 15 Qts.
Oil Pressure ..... 45 to 55 Pounds with Engine Warm and Operating at Rated Engine Speed
Type System ..... Pressure and Spray Circulation
Oil Pump ..... Gear Type
Oil Filter ..... Full Flow Spin on Type

Fuel System

Fuel Injection Pump ..... Robert Bosch, Type PES Multiple Plunger
Pump Timing ..... 29 Degrees Before Top Dead Center (Port Closing)
Fuel Injectors (Prior to Engine SN 2504221) ..... Pencil Type (Opening Pressure 2800 PSI)
(Starting With Engine SN 2504221) ..... Pencil type (opening pressure 3200 PSI)
Fuel Transfer Pump ..... Plunger Type, Integral Part of Injection Pump
Governor ..... Variable Speed, Fly-Weight Centrifugal Type, Integral Part of Injection Pump
1st Stage Fuel Filter ..... Full Flow Spin on Type
2nd Stage Fuel Filter ..... Full Flow Spin on Type

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SPECIAL TORQUES

Engine

	Decimal System	Metric System
Camshaft nut	95 to 105 ft. lbs.	129 to 142 Nm
Connecting rod bolts	95 to 105 ft. lbs.	129 to 142 Nm
Crankshaft nut	125 to 135 ft. lbs.	169 to 183 Nm
Crankshaft pulley bolt	100 to 110 ft. lbs.	136 to 149 Nm
Cylinder block oil cooler outlet cover screw	35 to 42 ft. lbs.	47 to 57 Nm
Cylinder head bolts	200 to 210 ft. lbs.	271 to 285 Nm
Cylinder head cover stud nut	60 to 70 in. lbs.	6.8 to 7.9 Nm
Engine oil filter	Install until gasket contacts filter head, then hand tighten 1/2 turn. Loosen filter approximately 1 full turn and retighten until gasket contact is made, then hand tighten an additional 1/2 to 3/4 turn.	
Flywheel to crankshaft bolts	180 to 190 ft. lbs.	244 to 258 Nm
Intake and exhaust manifold stud nut	25 to 30 ft. lbs.	34 to 41 Nm
Oil pan capscrews	13 to 17 ft. lbs.	18 to 23 Nm
Oil pan drain plug (copper or nylon)	18 to 20 ft. lbs.	24 to 27 Nm
Oil pump idler gear shaft bolt	40 to 45 ft. lbs.	54 to 61 Nm
Oil pump suction tube nut	95 to 105 ft. lbs.	129 to 142 Nm
Rocker arm adjusting screw locknut	20 to 25 ft. lbs.	27 to 34 Nm
Rocker arm bracket stud nut and bolt	40 to 45 ft. lbs.	54 to 61 Nm
Water pump and fan shaft nut	60 to 70 ft. lbs.	81 to 95 Nm
Crankshaft main bearing bolts	145 to 155 ft. lbs.	197 to 210 Nm

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LUBRICATION AND MAINTENANCE SPECIFICATIONS

Item numbers correspond with numbers on tractor illustration on opposite page.

ITEM		INSTRUCTIONS	LUBRICANT
	AFTER EVERY 10 HOURS OF OPERATION OR DAILY		
1.	Engine Crankcase	Check, add if needed	Engine oil
2.	Transmission Oil Level	Check, add if needed	Case Hi-Lo TCH Oil
3.	Hydraulic Oil Reservoir	Check, add if needed	Case Hi-Lo TCH Oil
4.	Pivot Axle (each side)	Grease	Lithium "soap-base" grease
5.	Air Cleaner	Empty dust cup, check filter	
6.	Cooling System	Check level, add coolant if needed	
7.	Radiator	Check and clear of obstructions	
8.	Fuel Tank Water Trap	Drain water	
9.	Fuel Sediment Bowl	Drain water, if required	
10.	Track (each side)	Check and adjust tension	
	AFTER EVERY 120 HOURS OF OPERATION OR SEMIMONTHLY		
11.	Universal Joints	Grease	Lithium "soap-base" grease
12.	Brake Master Cylinders	Check level, add fluid if needed	Brake fluid (SAE 70R1)
13.	Engine Crankcase	Drain and refill	Engine oil
14.	Fan Shaft Bearing	Grease	Lithium "soap-base" grease
15.	Final Drives (each side)	Check level, add if required	SAE 90 Mild type EP gear lubricant
16.	Fan Belts	Check tension, adjust if necessary	
17.	Batteries	Check levels, clean terminals	
18.	Fuel Tank Strainer	Clean	
19.	Transmission Breather	Clean in solvent and dry	
	AFTER EVERY 240 HOURS OF OPERATION OR MONTHLY		
20.	Engine Oil Filter	Replace element	
	AFTER EVERY 600 HOURS OF OPERATION		
21.	Spline on Driveshaft	Grease	Lithium "soap-base" grease
22.	Hydraulic Oil Filter (return)	Replace element	
23.	Hydraulic Oil Screen (suction)	Clean in solvent and dry	
24.	Transmission Filter (pressure)	Replace element	
25.	Transmission Filter (suction)	Clean in solvent and dry	
	AFTER EVERY 1200 HOURS OF OPERATION		
26.	Transmission	Drain and refill	Case Hi-Lo TCH oil
27.	Final Drives (each side)	Drain and refill	SAE 90 mild type EP gear lubricant
28.	Hydraulic Oil Reservoir	Drain and refill	Case Hi-Lo TCH Oil

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TROUBLE SHOOTING

Below are listed 7 common causes of underheating or overheating.

POSSIBLE CAUSE	REMEDY
1. Damaged fan belt.	1. Replace both belts.
2. Loose fan belt.	2. Set the fan belt to proper deflection of 1/2 inch. See page 10.
3. Clogged air passages in radiator.	3. Clean the radiator exterior with compressed air.
4. Clogged water passages in radiator and or engine.	4. These water passages may become clogged with silt, mineral deposits, etc. Flush thoroughly with a suitable cleaner. Whenever the engine is overhauled, the water passages should be checked and scale removed. Use of a good rust inhibitor keeps this problem to a minimum.
5. Faulty thermostat.	5. Remove and test thermostat. Replace if necessary. The thermostat is non-adjustable.
6. Collapsed or clogged radiator hose.	6. As the hoses age, the inner linkage may become flabby and otherwise deteriorate. Replace with new hoses.
7. Faulty water pump.	7. Rebuild pump.
8. **Faulty pressure cap.**	8. **Test cap. Cap may be 7 psi or 15 psi. If cap does not meet specification, replace cap.**

A Clean, Well Equipped Service Shop Builds Customer Confidence and Volume Sales.

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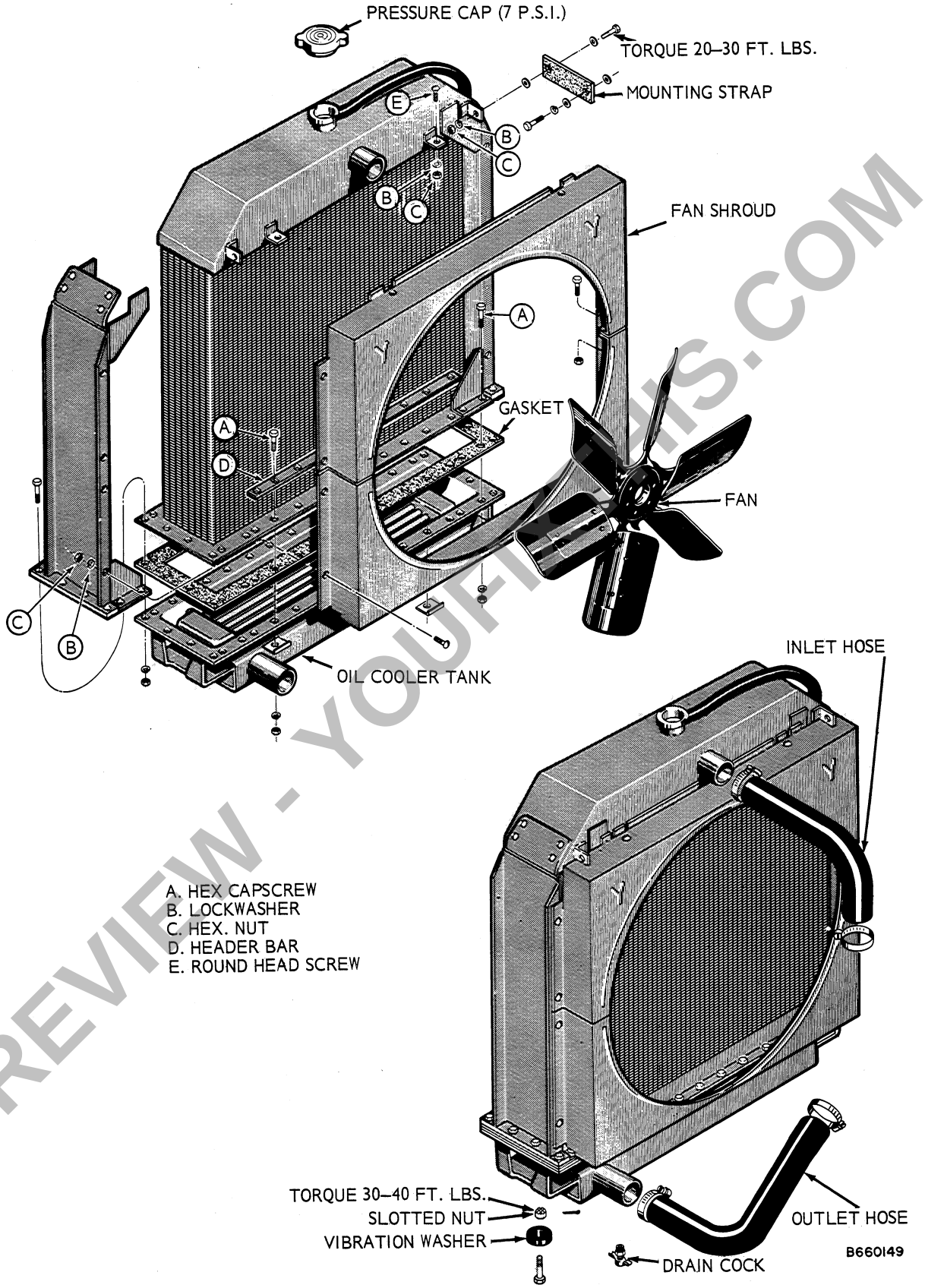
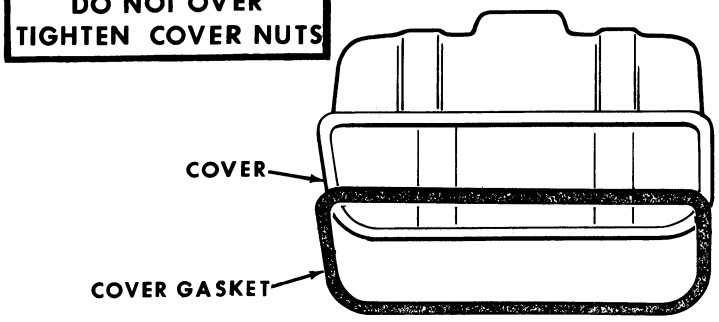


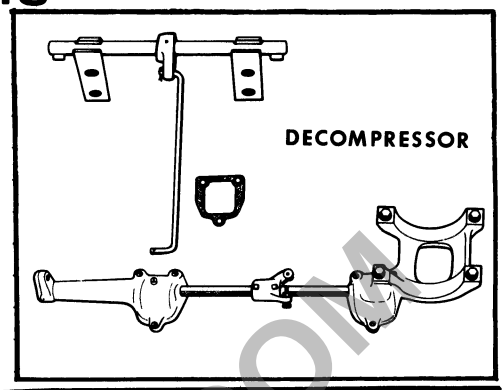
Figure 5 - Exploded View of Radiator

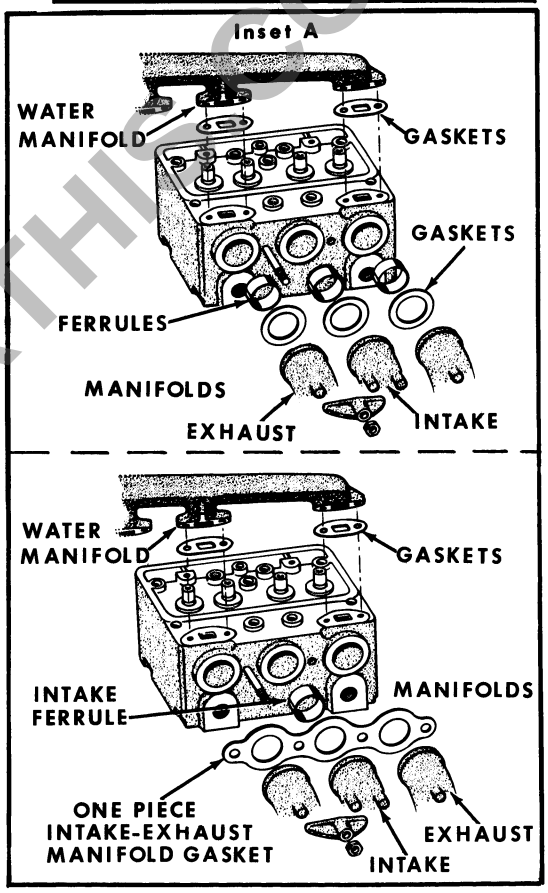
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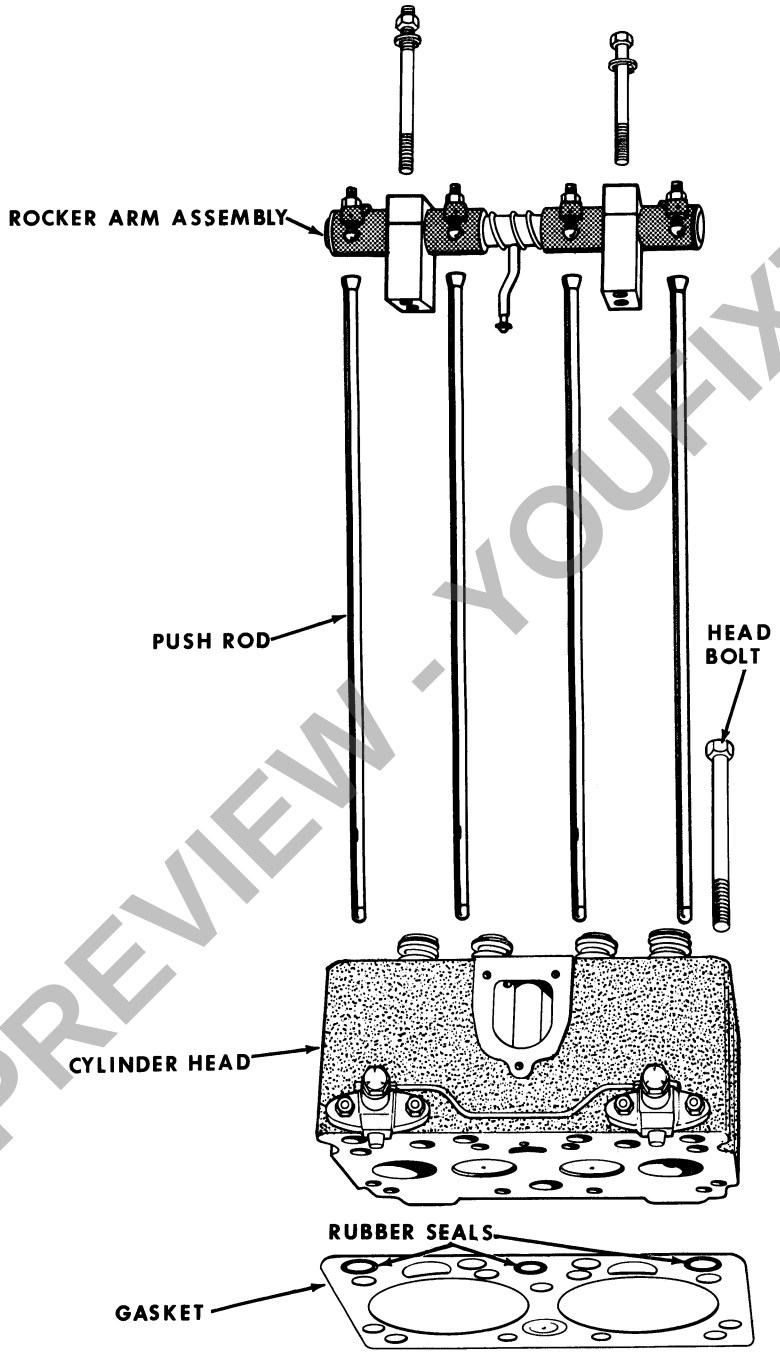
REMOVAL AND INSTALLATION OF CYLINDER HEAD AND COMPONENTS

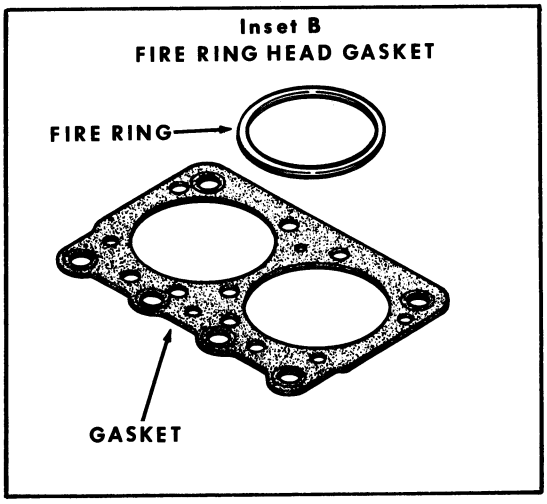
CAUTION
DO NOT OVER TIGHTEN COVER NUTS











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RUN-IN-INSTRUCTIONS

Engine Lubrication

When the engine rebuild is complete, fill the engine crankcase with Case HDM oil and install new engine oil filters. **NOTE:** If Case HDM oil is not used, use only a Series 3 DS or CD Service Classification oil that has the proper viscosity rating for prevailing air temperature. Refer to vehicle Operators Manual.

After the first 20 hours of operation, change the engine oil while the engine is hot and replace the the engine oil filter/s. DO NOT DRAIN OIL UNTIL THE ENGINE HAS BEEN OPERATED 20 HOURS.

Change the engine oil and filter/s at the recommended intervals thereafter as outlined in the Operator's Manual.

Break-In Procedure for Rebuilt Engines (With a Dynamometer)

The following procedure must be implemented when using a PTO dynamometer to break-in the engine. The dynamometer will insure control of the engine load at each speed and will eliminate over stressing new parts during break-in.

During the break-in, continually check the oil pressure, coolant level, and coolant temperature.

STEP	TIME	ENGINE SPEED	DYNAMOMETER SCALE LOAD*
1	**10 Minutes	1000 RPM	None
2	**10 Minutes	1800 RPM	None
3	20 Minutes	1800 RPM	1/3
4	20 Minutes	1800 RPM	1/2
5	***30 Minutes	100 RPM below rated speed	3/4
6	Retorque the cylinder head bolts using the procedure described in Section 2015 of this service manual.		

*Based upon normal dynamometer scale load at rated speed for the particular vehicle model. Reduce this scale load as indicated.

**The most ideal break-in procedure would be to constantly vary the throttle between 750 to 1000 RPM for the first 10 minutes and from 1000 RPM to 1800 RPM for the next 10 minutes. The purpose of this changing RPM is to vary the lubrication and coolant flow.

***30 minutes at 3/4 load is a minimum amount of time the engine should be run. It is recommended that whenever possible the engine (especially turbocharged diesels) should be run for four (4) hours or more at the above speed and load before checking the full engine horsepower or before using the engine for heavy field work.

Break-In Procedure for Rebuilt Engines (Without a Dynamometer)

STEP	TIME	ENGINE SPEED	LOAD
1	*10 Minutes	1000 RPM	None
2	*10 Minutes	1800 RPM	None
3	30 Minutes	2/3 Rated RPM	Light Load
4	1 Hour	Full RPM (not over 2000 RPM)	80 to 90%
5	Retorque the cylinder head bolts using the procedure described in Section 2015 of this service manual.		

*If engine must then run at or near full load to operate the machine - for first hour remove load and run at high idle for a few minutes at 15 minute intervals.

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Capacities

*Fuel tank	49 gallons
*Cooling system	13 gallons
Hydraulic reservoir to equipment hydraulic system	14 gallons
*Transmission and torque converter	52 quarts
*Crankcase with filter change	15 quarts
*Final drive - each side	6 quarts

Weights

*Drawbar (Group A)	14,457 lbs.
*Power Tilt Dozer (Group D)	17,380 lbs.
*Power Tilt Dozer-Ripper (Group J)	18,890 lbs.
*Power Angling Dozer (Group E)	17,950 lbs.
*Power Angling Dozer-Ripper (Group K)	19,550 lbs.
*Loader (Group L)	24,490 lbs.
*Loader-Ripper (Group F)	25,200 lbs.
*Loader-Backhoe (Group T)	25,190 lbs.
*Power Tilt Dozer-Backhoe (Group R)	20,630 lbs.
*Power Angling Dozer-Backhoe (Group S)	21,200 lbs.

Travel Speeds

	Forward (M.P.H.)	Reverse (M.P.H.)
Low range - low gear	0-1.7	0-2.0
High range - low gear	0-2.9	0-3.5
Low range - high gear	0-3.4	0-4.1
High range - high gear	0-6.0	0-7.1

DRAWBAR PULL

Low range - low gear	39,900 lbs.
High range - low gear	22,200 lbs.
Low range - high gear	18,700 lbs.
High range - high gear	10,200 lbs.

Figures are manufacturer's rating. They are maximum at converter stall and assume adequate weight and traction.

Equipment Specifications

Loaders	See Section XIV
Dozers	See Section XV
Backhoes	See Section XVI
Rippers	See Section XVII
Winches	See Section XVIII

*Specifications with asterik (*) conform to I.E.M.C. (Industrial Equipment Manufacturers Council) or S.A.E. (Society of Automotive Engineers) definitions, whichever is applicable.

The J.I. Case Company reserves the right to change these specifications without notice and without incurring any obligation relating to such changes.

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GENERAL INFORMATION

Before making any repairs or adjustments on an engine, a mechanic or technician must properly diagnose the trouble.

Locating the trouble and repairing it is only part of the job, a technician must find and eliminate the cause of the trouble as well. Too many repairs are made with no thought to removing the causes that made the repair necessary.

For any engine to start or perform properly, three main requirements must be present.

1. FUEL
2. COMPRESSION
3. IGNITION

When any of these requirements are not present or limited by some mechanical reason the engine will not start or fails to operate properly throughout the power range.

1. FUEL. Fuel system problems can be present anywhere from the fuel tank, through the filters and injection pump as well as the injectors. Correct injection pump timing is important in the overall fuel system performance.

2. COMPRESSION. Compression on an engine is related to the "breathing function". Proper compression is affected by the air cleaner condition, muffler restriction, valve condition and operation including proper valve adjustment, cylinder head gaskets condition of sleeves, rings, pistons, camshaft, and camshaft timing.

3. IGNITION. Ignition is the result of adequate compression to develop enough heat in the air charge on the compression stroke to fire the fuel being injected into the engine cylinders. Proper spray pattern and atomization of the fuel by the injector is very important. Timing the fuel injection pump to the engine to a precise degree BTDC is a vital requirement for proper ignition.

The engine diagnosis contained in the following pages covers many trouble symptoms, the causes, and what will be necessary to repair or eliminate the problem. Under each symptom are listed the most common and reoccuring problems progressively to the not so common problems. Locate your problem symptom in the diagnosis chart and refer to the pages listed for the probable causes and remedies.

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Air Cleaner Extensions 6

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REMOVAL AND DISASSEMBLY

Camshaft-Bushings-Push Rod Lifters

(Refer to Figure M-49)

CAMSHAFT

1. Remove the oil pan, oil pump, crankshaft pulley, timing gear cover and rocker arm assembly.

NOTE

THE PUSH ROD LIFTERS WILL HAVE TO BE HELD IN THE RAISED POSITION SO THE CAMS WILL CLEAR THEM AS THE CAMSHAFT IS WITHDRAWN FROM THE ENGINE.

2. Make up 12 long round sticks slightly larger in diameter then the push rod. Taper the end of each stick and force the tapered end into the inner bore of each push rod lifter. The lifters can then be pulled up as far as possible with the sticks and the sticks locked in position with clothes pins.

BUSHING REMOVAL

1. Use the special arbor puller tool or equivalent, inset A, to remove and install the camshaft bushings, inset B. This tool should be used to prevent damaging the new bushing or damaging the block during the removal and installation operation. The bushings are the same diameter, but they are different lengths. See "Specification" Section.

CAMSHAFT GEAR

1. Remove the spring loaded thrust plunger and spring and bend the lip washer down. Remove nut.

2. Press the gear off the shaft.

INSPECTION

(Refer to Figure M-49)

Clean the camshaft thoroughly. Blow the camshaft oil holes out with compressed air.

Check the cam surfaces. They must be smooth with no rough spots, scoring, scratches or grooves. A badly worn or damaged camshaft must be replaced.

Check the camshaft bearing surfaces with a micrometer. The bearing surfaces are not all the same. Refer to "Specification" Section.

Inspect the gear for nicked, scored or broken teeth.

Check the thrust washer. Install a new one if it is badly worn or damaged. Check the thrust washer thickness. Refer to "Specification Section.

Check the bushings for scuff marks, grooves or pitting. Replace any damaged bushings. Check the inside diameter. Refer to "Specification" Section. If one bushing is worn, replace all of the bushings.

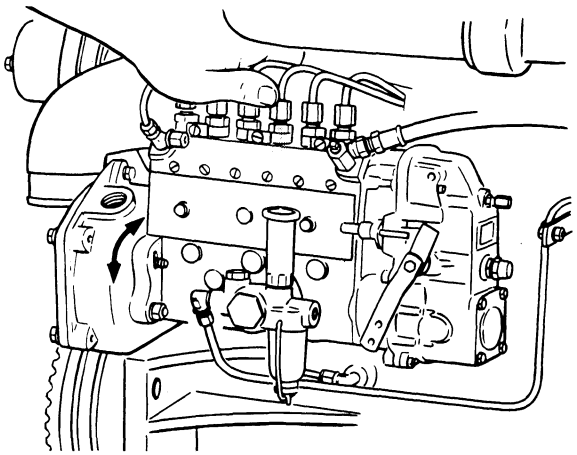
Remove the push rods and inspect them for straightness. Do not try and straighten a bent push rod. Install a new one. Keep them in the order they were removed.

Check the condition of the lifter and the bore in the block. If the lifter is scored, worn or damaged, install new lifters. If the bore is scored or grooved, it should be reamed. Refer to "Specification" Section. The lifters have oil holes in the side so the oil can drain from the rocker arm back to the crankcase.

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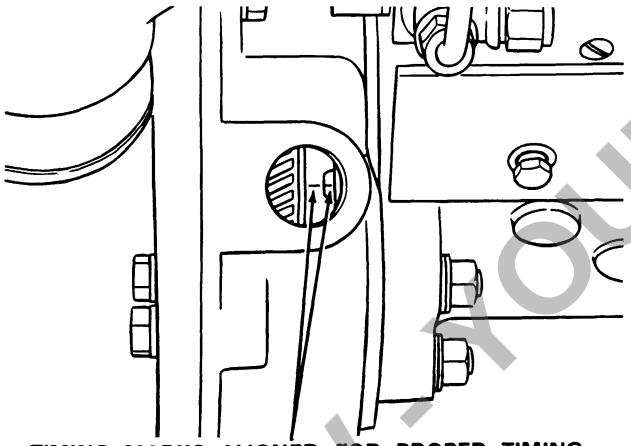
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STEP 57



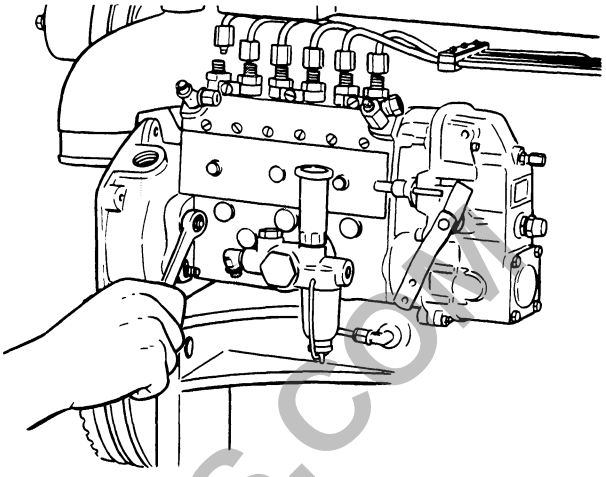
LOOSEN PUMP MOUNTING NUTS. MOVE PUMP TOWARD OR AWAY FROM ENGINE UNTIL TIMING MARKS ARE ALIGNED.

STEP 58



TIMING MARKS ALIGNED FOR PROPER TIMING.

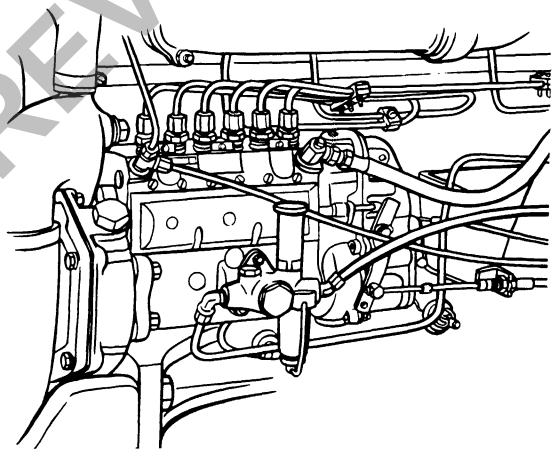
STEP 59



TORQUE PUMP MOUNTING NUTS 35 TO 42 FT. LBS. INSTALL PLUG IN TIMING GEAR COVER.

Adjusting Governed Speed

STEP 60

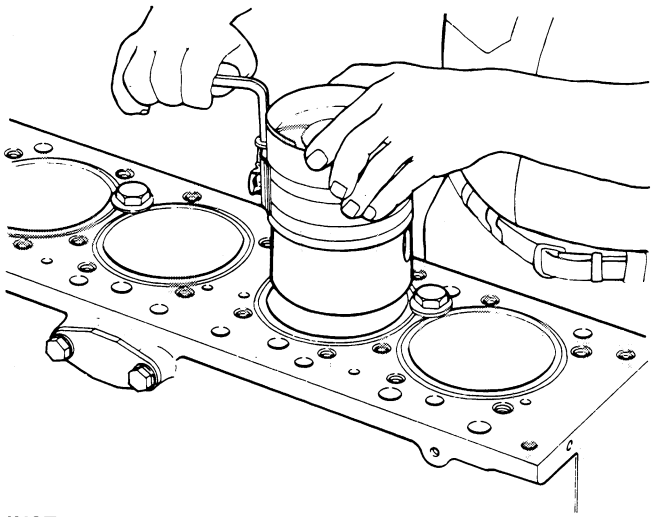


CHECK AND ADJUST THE ENGINE GOVERNED SPEED AS OUTLINED IN SECTION 3012.

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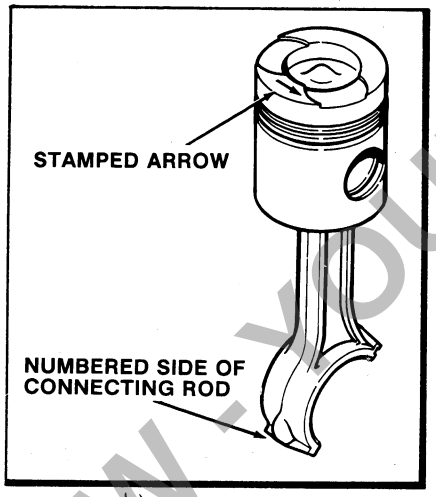
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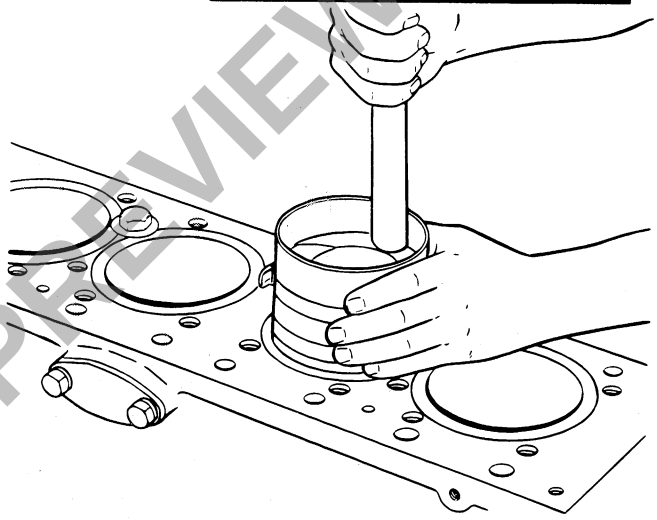
STEP 47



INSTALL A RING COMPRESSOR ON THE PISTON.

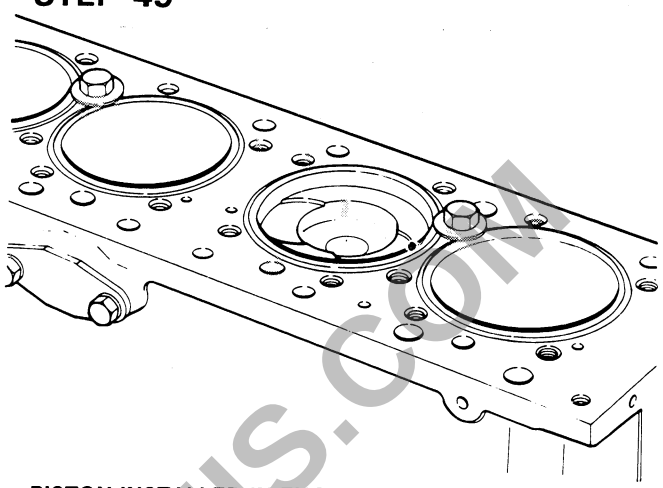
STEP 48





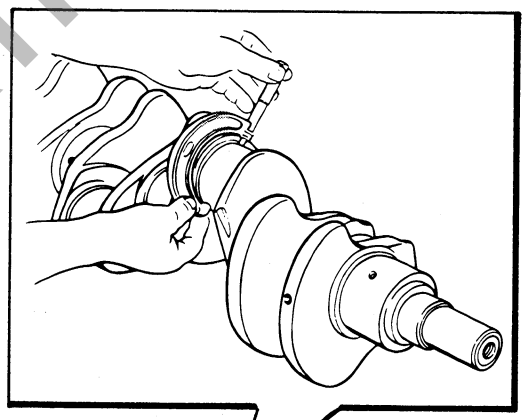
GENTLY TAP THE PISTON DOWN INTO THE BLOCK. IMPORTANT: MAKE SURE THE STAMP ARROW IS POINTED TOWARDS THE FRONT OF THE ENGINE AND THE NUMBER ON THE CONNECTING ROD MATCHES THE CYLINDER (NO. 1 ROD INTO NO. 1 CYLINDER).

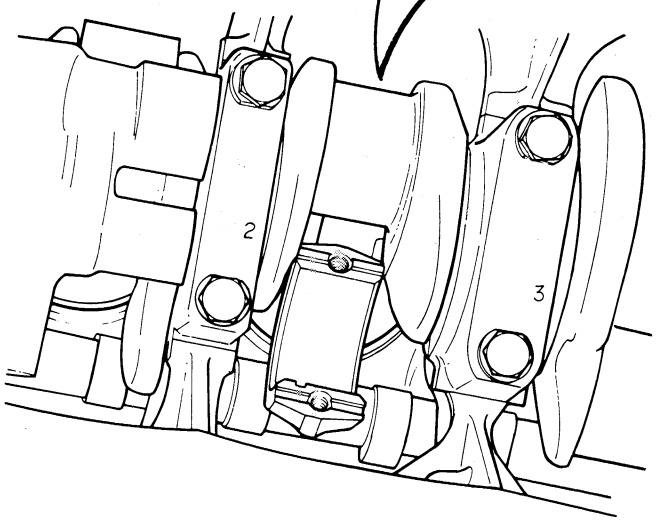
STEP 49



PISTON INSTALLED IN ENGINE BLOCK.

STEP 50





Measure the connecting rod journals on the crankshaft. Measure the front and rear of each journal, checking taper. If taper exceeds 0.0005", the journals must be refinished.

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SECTION

I

SERVICING THE

FUEL INJECTORS

CASE POWRCEL

FUEL INJECTION PUMP

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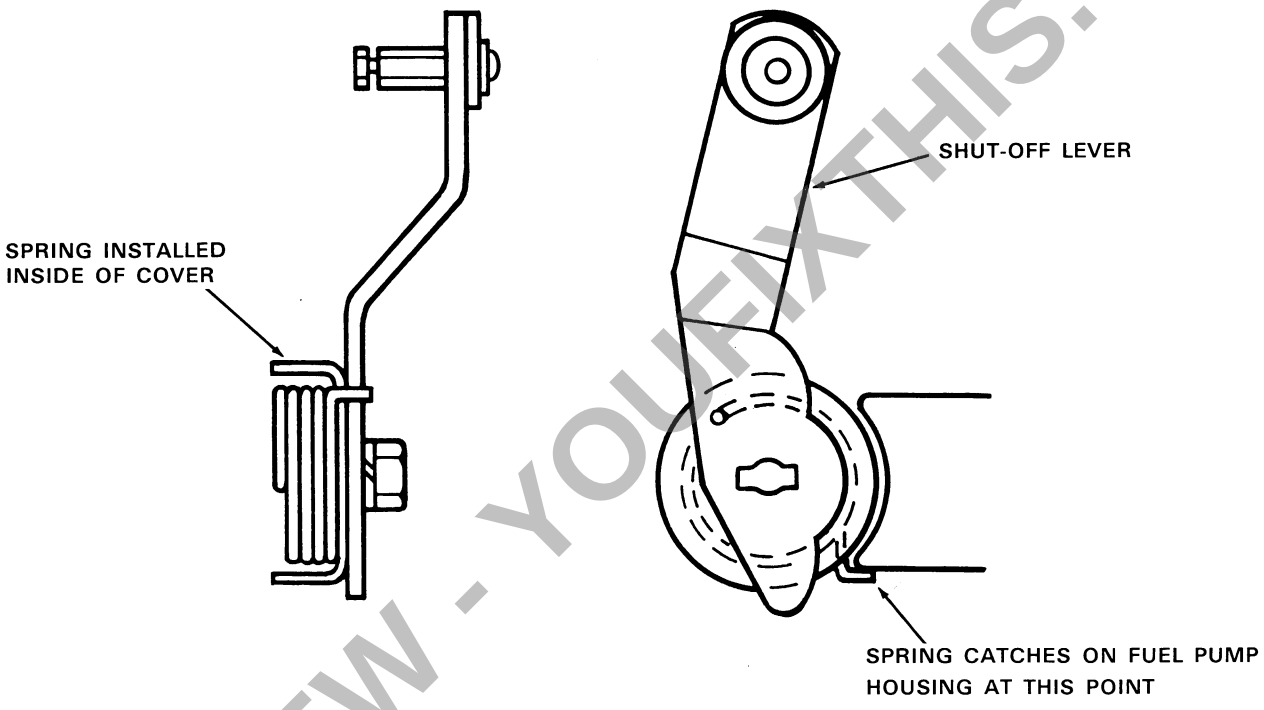
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MANUAL FUEL PUMP SHUT-OFF CABLE ON 2470 TRACTORS

Occasionally, the fuel shut-off cable will work out and as a result, fuel flow is restricted and a decrease in horsepower is noted.

If this problem is experienced, it can be corrected by installing A45277 torsion spring inside the pump spring cover and a new A45273 shut-off lever with bowden wire connector as illustrated below:

NOTE: Spring and lever were install on fuel pumps starting with tractor S/N 8763129.



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4. Pull the bearings with a bearing puller ONLY if they are being replaced. To remove the conical spring and shaft bushing, only the DRIVE GEAR BEARING need be pulled.

5. Remove and discard the oil seal from the seal retainer.

6. Press the tapered bearing from the shaft.

Gear Housing

1. Remove and discard the o-rings from the grooves in the faces of the gear housing.

Port End Cover

1. Pry off the thrust plate with a knife or thin screwdriver. Remove and discard the pocket seals.

2. Pull the bearings with a bearing puller ONLY if they are being replaced.

Inspection

Gear Housing

1. Wear in excess of .005" cut out by the gears means the gear housing should be replaced.

2. Place a straightedge across the bore. If a .005" feeler gauge can be slipped under the straightedge, replace the gear housing.

3. Pressure pushes the gears against the housing on the low pressure side. As the hubs and bearings wear, the cutout becomes more pronounced. Excessive cutout in a short period of time indicates excessive pressure or oil contamination.

4. Where cutout is moderate, .005" or less, the gear housing is in good condition and may be reused. The gear housing may be flopped over to present a new surface to the pressure.

Gears

1. Any wear on gear hubs detectable by touch, or in excess of .002", means replacement of that pair of gears. Other reasons for replacement include scoring, grooving, or burring of the O.D. of the teeth or nicking, grooving or fretting of teeth surfaces. GEARS ARE REPLACEABLE IN PAIRS ONLY.

Drive Shaft

1. Replace if there is any wear detectable by touch in the seal area. .002" wear is the maximum allowable.

2. Wear in the shaft seal area indicates oil contamination.

3. Replace if there is damage to the shaft splines.

Thrust Plates

1. The thrust plates seal the gear sections at the sides of the gears. Wear here will allow internal leakage of oil from the high pressure side back to the low pressure side of the pump.

2. .002" is the maximum wear allowable, Figure 33. Replace thrust plates if they are scored, eroded, or pitted.

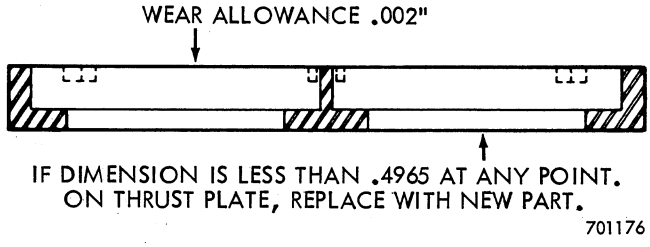


Figure 33 - Thrust Plate Inspection

3. Check the center of the thrust plates where the gears mesh. Erosion here indicates oil contamination.

4. Pitted thrust plates indicate cavitation or oil aeration.

5. Discolored thrust plates indicate overheating, possibly from insufficient oil.

Bearings

1. If gears are replaced, bearings must be replaced. Bearings should fit into the bore with a light press fit. A neat hand

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2. From the large end of the gland, install the backup ring (do not lubricate). Be sure the packing and backup rings are seated in their groove.

3. Install the rod wiper ring in its groove in the large end of the gland. The lip faces toward the outside of the gland.

4. Install the backup ring and "O"ring on the outside of the gland.

5. Install the gland assembly on the piston rod. If necessary, the gland assembly can be driven onto the rod with a soft hammer.

Assembly of Piston and Restrictor Pin

1. Refer to Figure 30. Dip the packing in hydraulic oil. Install the end ring on each piston half. Install the chevron rings, one at a time, with the vee of the chevrons pointing to the center of the piston.

2. Install the bronze center ring and fit the two halves together. Install this assembly on the piston rod.

3. Stand the piston rod on end, rod eye down, and drop the spacer into the bore of the piston rod. Install the spring and restrictor pin. The blunt end of the restrictor pin fits in the bore of the piston rod.

4. Install the self-locking bolt and washer over the restrictor pin and spring. Start to thread the bolt into the piston rod—tighten to 700-750 ft. lbs. torque.

Final Assembly

1. Lubricate the cylinder tube and piston packing thoroughly and install in the manner shown in Figure 16. After the piston has started in the smooth surface of the tube, slide the gland into position. Place a rod in the piston rod eye and work the piston farther into the tube. Keep the piston rod in a straight line with the cylinder tube.

2. Screw the gland into the tube and tighten with a spanner wrench. Torque 100-200 ft. lbs. Make sure the torque wrench is parallel with the spanner wrench.

3. Tighten until the specified torque is reached and the self-tapping screw holes line up. Install the self-tapping screw. If a new gland or tube is being used, drill a new hole for the self-tapping screw, half in the tube and half in the gland. Do not drill in line with spanner wrench holes. Use a No. 26 drill and drill approximately 5/16" deep.

Installation

See page 24.

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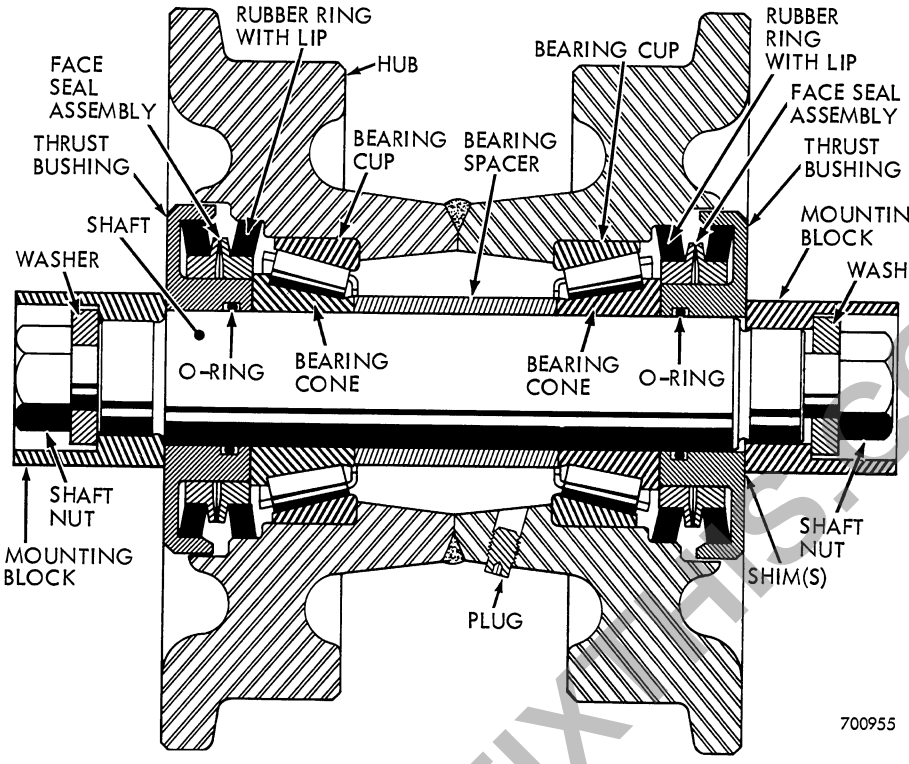


Figure 43 - Cross Section of Track Roller Used After S/N 7109590

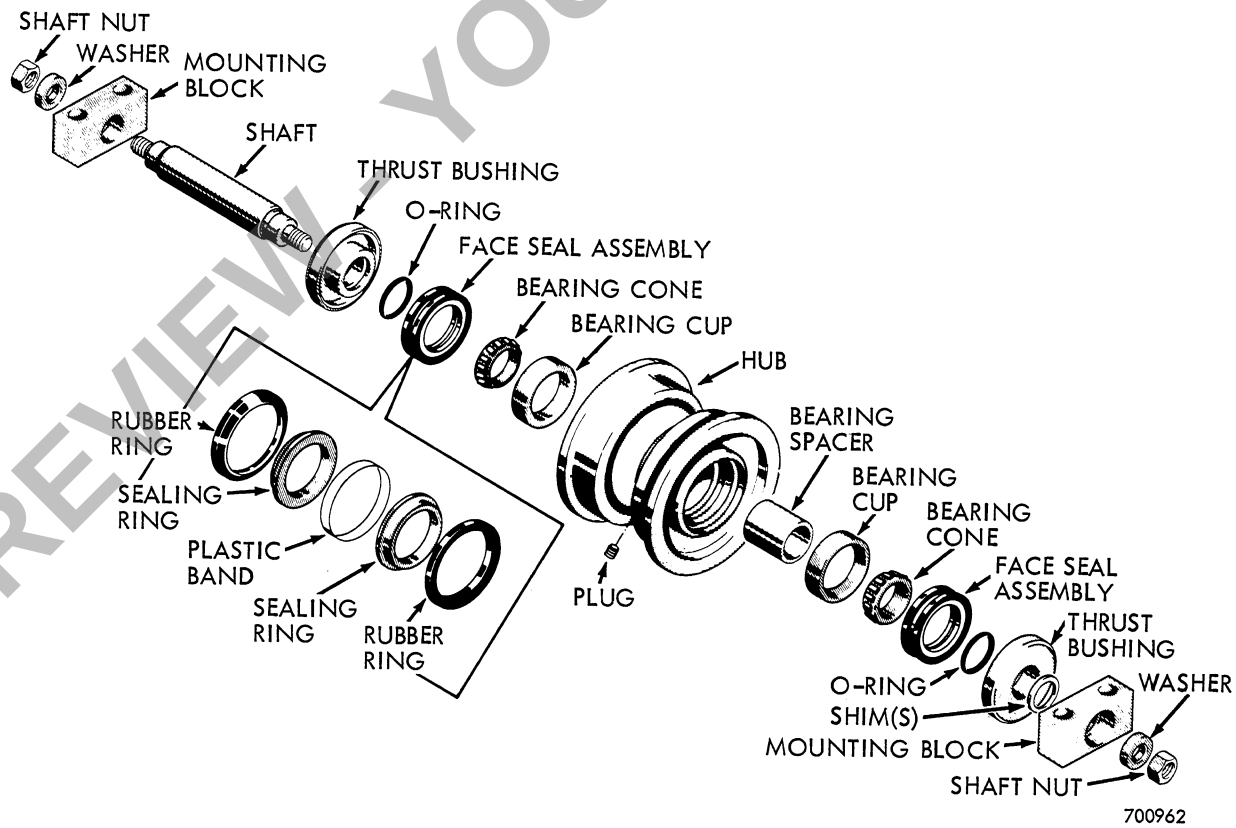


Figure 44 - Track Roller Used After Tractor S/N 7109590

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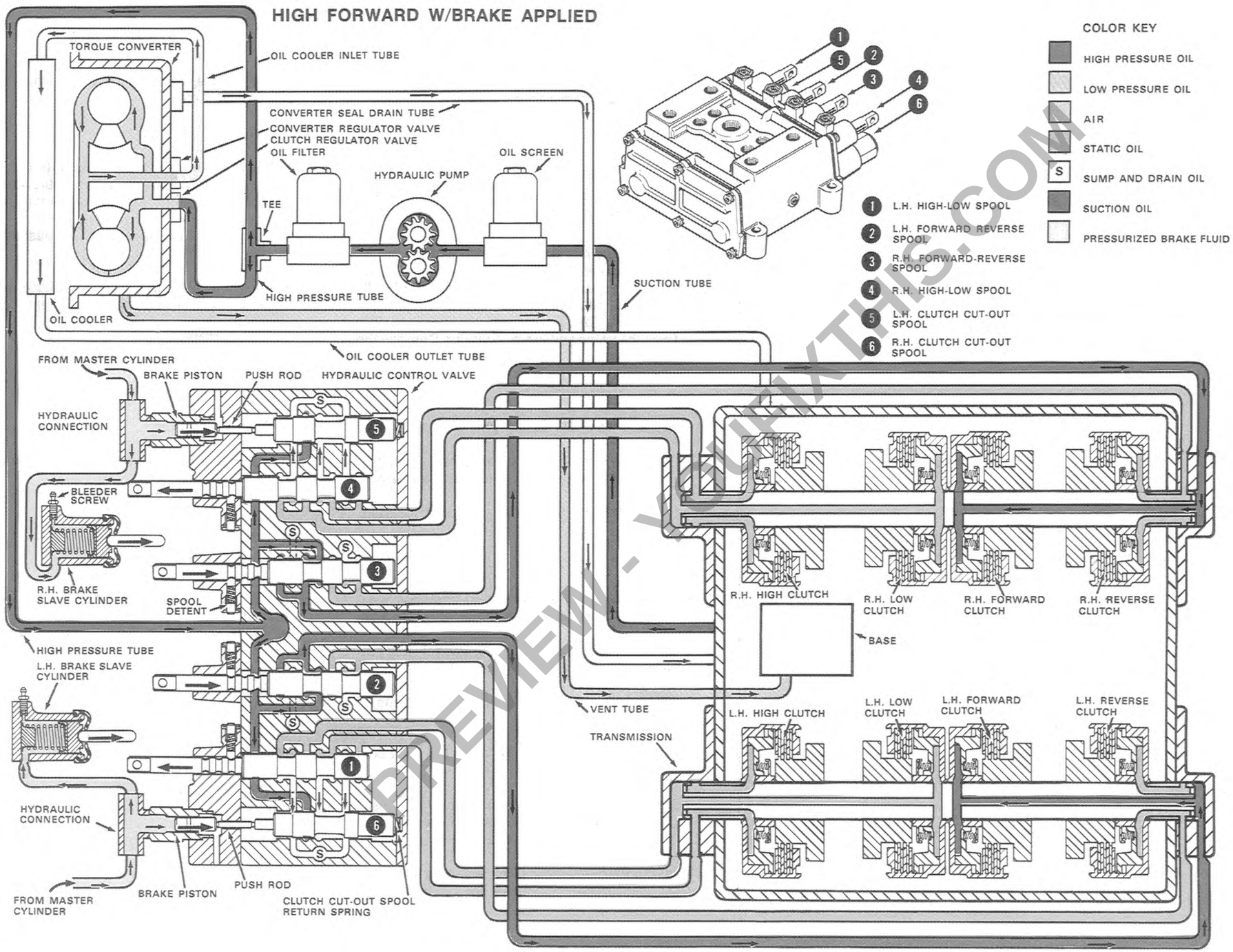


Figure 12

9-79981

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Failure to polarize the generator may result in both regulator and generator damage.

After reconnecting the leads, momentarily connect a jumper lead between the "Gen." and "Bat." terminals of the regulator. This allows a momentary surge of current to flow through the generator, which correctly polarizes it.

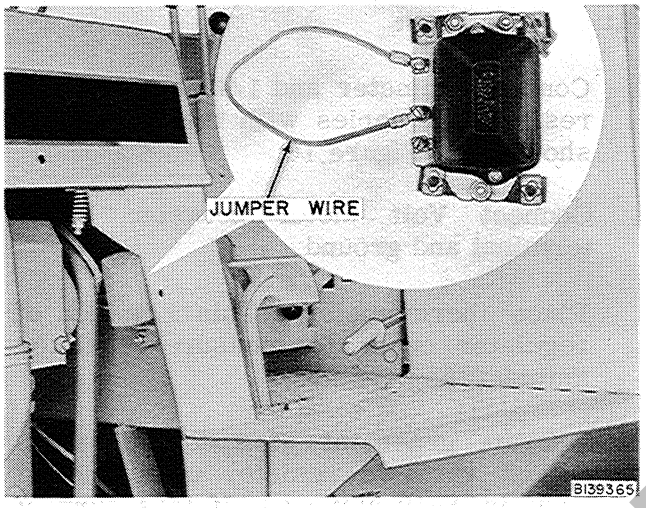


Figure 13 - Polarizing the Generator

Fan Belts Adjustment

Properly adjusted fan belts can be deflected 1/2" by hand on left side of engine between fan pulley and generator pulley. When no adjustment is left in slot on generator bracket, it indicates belts are stretched. Replace belts if they are cracked or cannot be properly tightened. Loose fan belts can result in the generator not properly charging, an overheated engine, or both.

The most accurate method of checking belts tension is with a Belt Tension Gauge. Belt Tension Gauges are available from Central Parts Division.

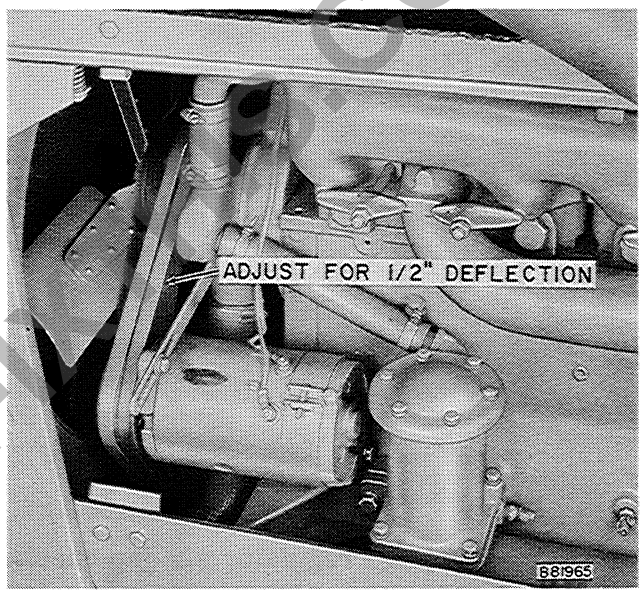


Figure 14 - Fan Belts Adjustment

REGULATOR

Test Specifications at 125°

Delco-Remy No.	1119213 (Case No. A14760)
Type of Circuit	"A"
Polarity	Negative
Voltage Regulator	
Air Gap	.075"
Voltage	27.5 - 29.5
Cut Out Relay	
Air Gap	.017"
Point Opening	.032"
Closing Voltage	24 - 27
Current Regulator	
Air Gap	.075"
Current	8.5 - 11.5

The regulator must be functioning properly to insure satisfactory electrical system operation and life. If improper regulator function is suspected, test as follows:

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CHECKING AND ADJUSTING LOADER RELIEF VALVES

Main Relief Valve

TAKING PRESSURE READING

The loader main relief valve is located in the inlet section of the loader control valve. It should be set at 1550 to 1650 P.S.I. A setting higher than the specified limit voids the warranty.

1. A 1/8" N.P.T. plug is located in the elbow in the lift cylinder line at the operator's right hand. This is a convenient point to install a pressure gauge. Remove the plug and install a pressure gauge that will record up to at least 2000 P.S.I. Remove or loosen tube clamps if necessary to gain access to the plug.

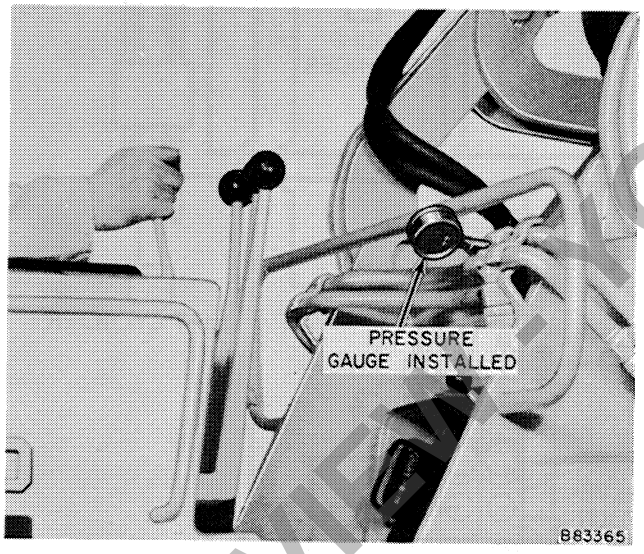


Figure 6 - Checking Main Relief Pressure

2. Run the engine until the hydraulic oil is at operating temperature, approximately 120° F.

3. Run the engine at full throttle. Raise the loader. When it is fully raised, the main relief valve will bypass. Hold back on the control lever until a steady gauge reading is obtained.

4. If the reading is higher or lower than the specifications above, the main relief valve must be adjusted.

NOTE!

If there is not sufficient room to fully raise the loader, the pressure gauge can be installed in the elbow at the rod end of the right hand dump cylinder. A 1/8" N.P.T. plug is provided at this point. In this case, roll the bucket completely back to obtain a reading.

ADJUSTING MAIN RELIEF VALVE

1. Remove the side panel on the right hand seat and tank weldment.

2. Loosen the jam nut on the main relief valve.

3. a. To increase pressure setting, turn the adjusting screw clockwise (in).

   b. To decrease pressure setting, turn the adjusting screw counterclockwise (out).

3. Check the pressure again as described above.

4. When the correct setting has been obtained, secure the setting by tightening the jam nut—do not move the adjusting screw.

Bucket Dump Relief Valve

The dumping circuit is designed to operate at a maximum pressure which is less than the main relief valve setting. This secondary relief valve can be tested with a pressure gauge installed on the crawler.

1. Install a 2000 P.S.I. pressure gauge in the elbow at the piston (rear) end of the right hand dump cylinder. A 1/8" N.P.T. plug is provided.

2. Run the engine until the hydraulic oil is at operating temperature, approximately 120° F.

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STOPPING THE BOOM

At the moment the control pedal is returned to neutral after swinging the boom, the boom still may have considerable momentum. With the control pedal in neutral, oil in the swing circuit is blocked by the control valve spool. The criss-cross relief valves then open and allow oil to transfer to the other circuit, thus cushioning the stop of the boom and preventing a "void" of hydraulic oil in the oil returning to the reservoir. If the criss-cross valves cannot handle the surge of displaced oil, one of the high pressure relief valves also opens and allows oil to return to the reservoir.

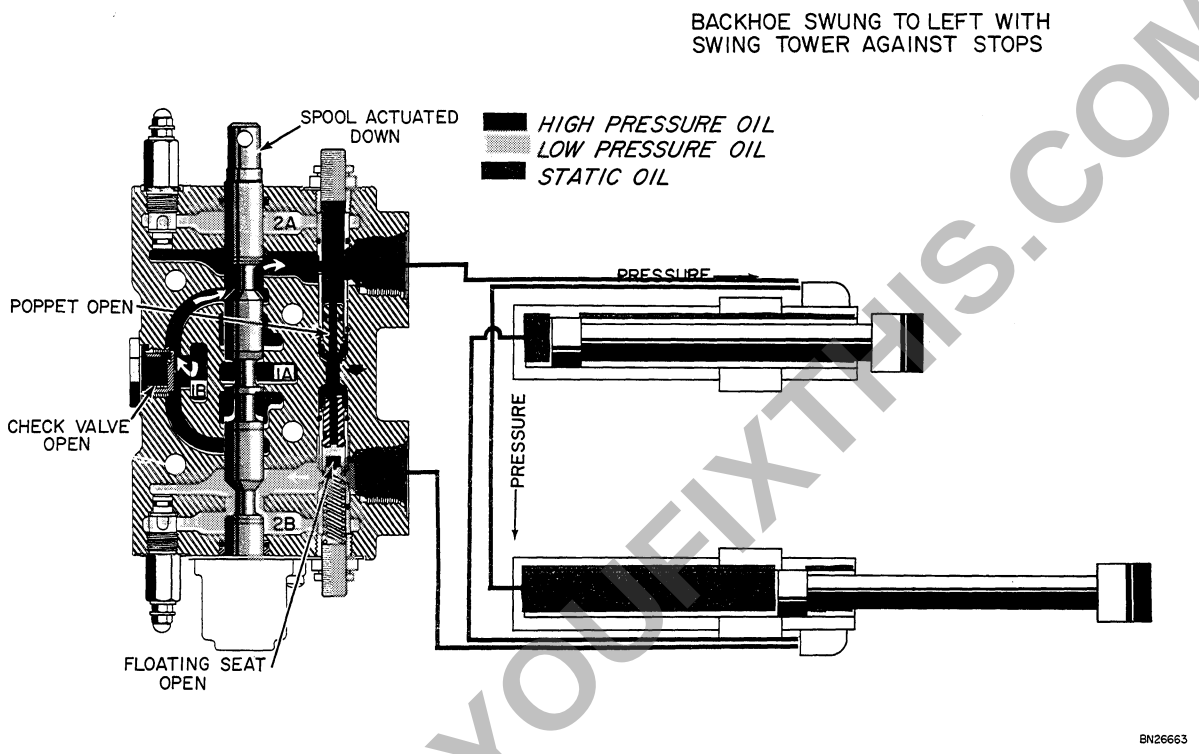


Figure 13 - Backhoe Swing Criss-Cross Relief Valves Actuated

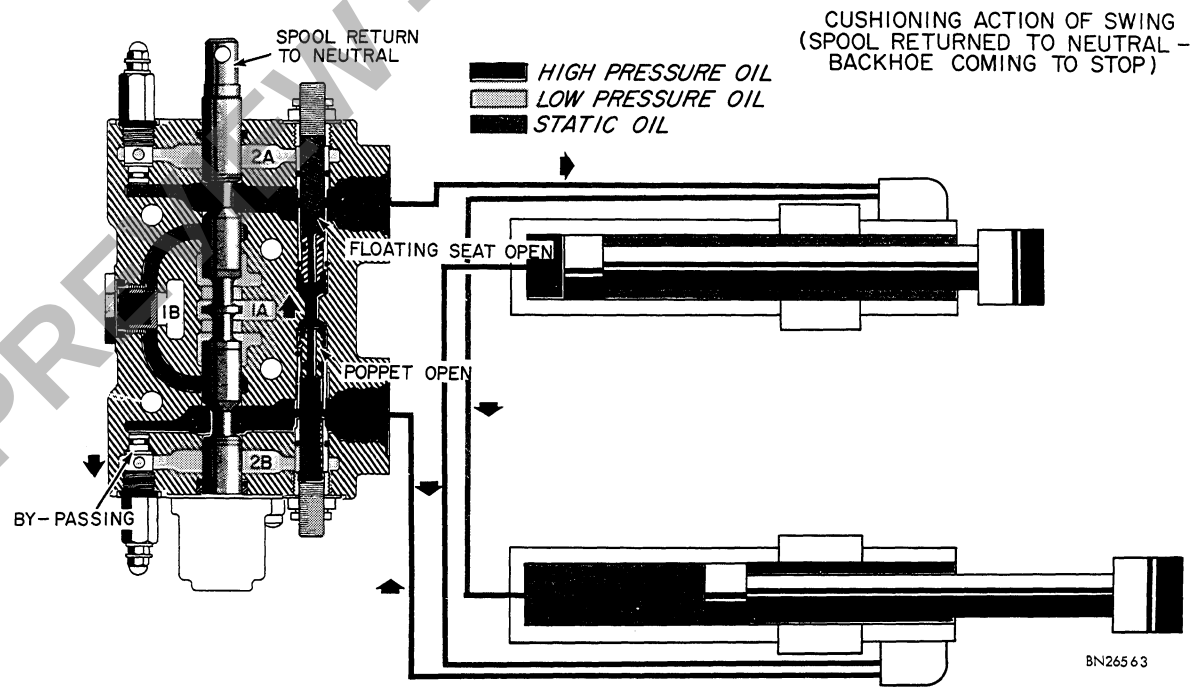


Figure 14 - Backhoe Swing High Pressure Relief Valve Actuated

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TESTING RELIEF VALVES WITH A PRESSURE GAUGE

Backhoe Main Relief Valve

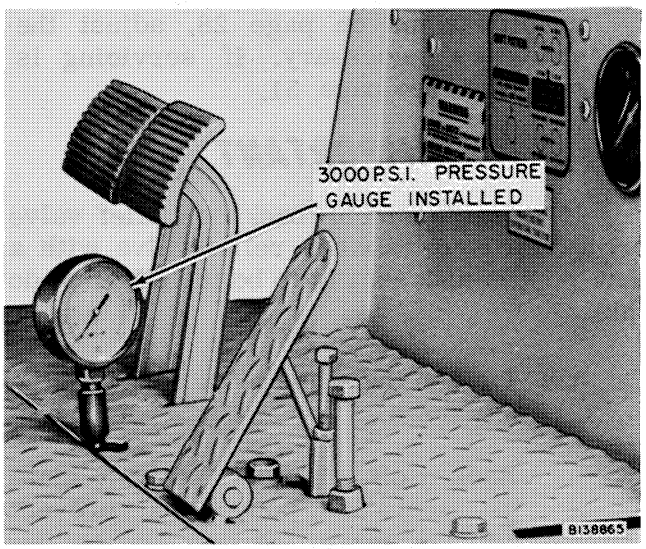


Figure 28 - Pressure Gauge Installed

The backhoe main relief valve is located in the outlet section of the backhoe control valve, Figure 38. Test pressure setting as follows:

1. The backhoe hydraulic system contains a diverter valve, a convenient test point. The diverter valve contains 1/4" square head plug—remove this plug and install a pressure gauge that will record up to 3000 P.S.I.

2. With the gauge installed at this point, the following pressure settings can be tested:

   a. Backhoe main relief valve.

   b. Backhoe boom down relief valve.

   c. Swing criss-cross relief valve.

   Refer to Figure 8 for location of these relief valves.

3. Run the engine until the hydraulic oil is at operating temperature, approximately 120° F.

4. Run the engine at maximum R.P.M. for backhoe operation. Raise a stabilizer leg. With the leg completely raised, the oil will bypass over the main relief valve. Keep the lever in power position until a steady gauge reading is obtained.

5. Pressure specifications are as follows: Model 34 - 1950 P.S.I., allowable range 1950-2000 P.S.I.

   If the gauge reading is higher or lower, the main relief valve must be adjusted, page 33.

Checking Low Pressure Valves with System Pressure

Secondary relief valves with settings LOWER than the main relief setting can be checked with a pressure gauge installed on the tractor.

BOOM DOWN RELIEF VALVE

This relief valve is located at the top port of the boom section. Its operation is explained on page 38.

1. Install a 2000 P.S.I. gauge as shown in Figure 28.

2. Lower the loader bucket to ground level.

3. Lower stabilizers to normal digging position.

4. Fully extend the bucket and dipper arm. Lower the boom until the bucket touches ground directly behind the tractor at maximum reach.

5. Run the engine at 800 R.P.M. and apply down pressure to the boom until a steady gauge reading is obtained. The pressure should read 1150 to 1350 P.S.I. Adjust the relief valve if necessary (see page 33).

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