Group 10
SPECIFICATIONS

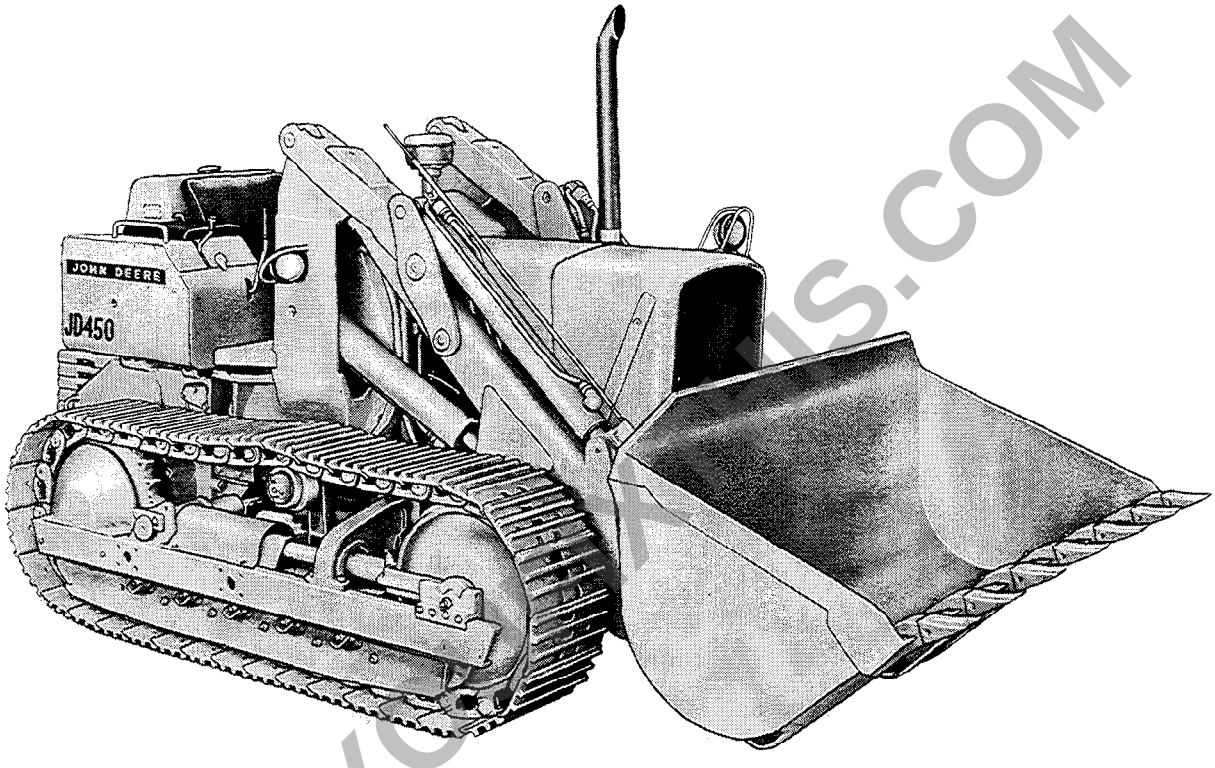


Fig. 10-10-1—Right-Hand View of JD450 Crawler Loader

TRACTOR SPECIFICATIONS

ENGINE	Diesel	Gasoline**
Flywheel horsepower (observed)	57.0	57.0
Torque in ft-lbs at 1300 rpm (observed) (nominal)	145.0	145.0
Number of cylinders	4	4
Bore and stroke, inches	3.86 x 4.33	3.86 x 3.86
Displacement in cubic inches	202.0	180.0
Compression ratio	16.3 to 1	7.5 to 1*
N.A.C.C. or A.M.A. horsepower rating for tax purposes	23.84	23.84
Slow-idle (rpm)	800	375 (15905) 600 (15906-up)
Fast-idle (rpm)	2650	2770
Governed speed range (rpm)	800 to 2650	600 to 2770
Intake valve clearance	0.014 in.	0.014 in.
Exhaust valve clearance	0.018 in.	0.022 in.
Engine clutch	with Constant Mesh: 12-in. dry disk, foot-operated; with H-L-R: 11-in., spring-loaded dry disk, foot-operated.	

**8.6 to 1 with high altitude pistons.*

TRANSMISSIONS

Constant Mesh: High, low and reverse gears grouped to shift mechanically in series with 4 shift stations to give eight forward speeds and 4 reverse speeds.

H-L-R: High, low, and reverse gears grouped to shift (under full load with a hydraulic assist) in series with 4 shift stations to give 8 forward speeds and 4 reverse speeds.

***Gasoline engine available on early models only.*

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Section 20
TRACTOR SEPARATION

Group 5
ENGINE REMOVAL AND INSTALLATION

ENGINE REMOVAL

Disconnect battery ground straps for safety.

Remove engine side shields if equipped.

On crawler-loaders, support loader boom (Group 30 of this Section).

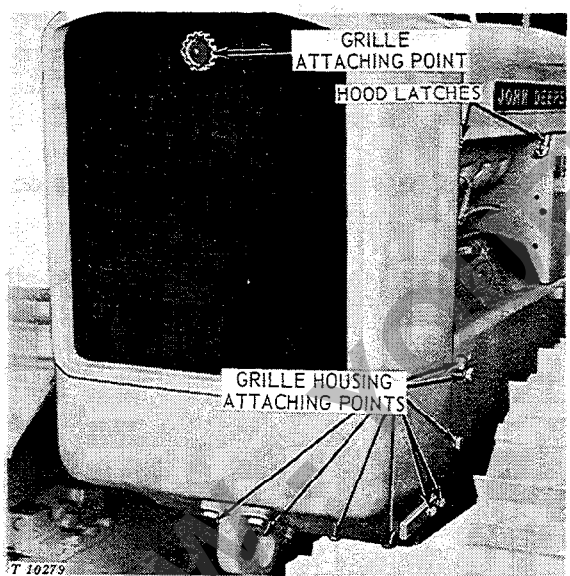


Fig. 20-5-1—Hood and Grille Housing Attaching Points

1. On each side of hood, unhook latches attaching hood to radiator and cowl supports. Remove muffler stack and lift off hood.

2. Remove grille by unscrewing knob (Fig. 20-5-1). Attach chain hoist to grille housing (Fig. 20-5-2).

3. Disconnect front light leads from headlights.

4. Remove cap screws attaching grille housing to bottom plate and side frames. Detach H-L-R oil filter base (if equipped) from inside of grille housing. With the aid of chain hoist, remove grille housing.

5. Drain radiator and disconnect water inlet and outlet hoses. Also disconnect H-L-R transmission oil cooler lines (if equipped).

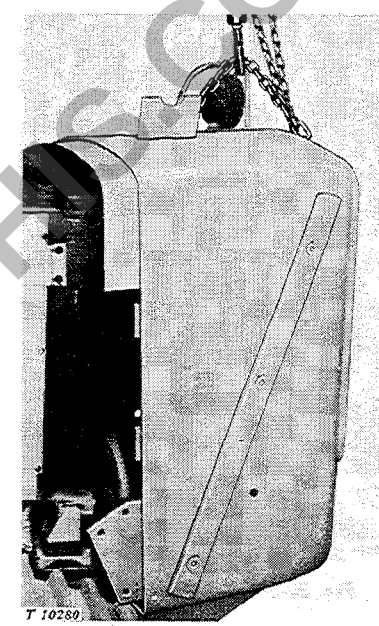


Fig. 20-5-2—Removing Grille Housing

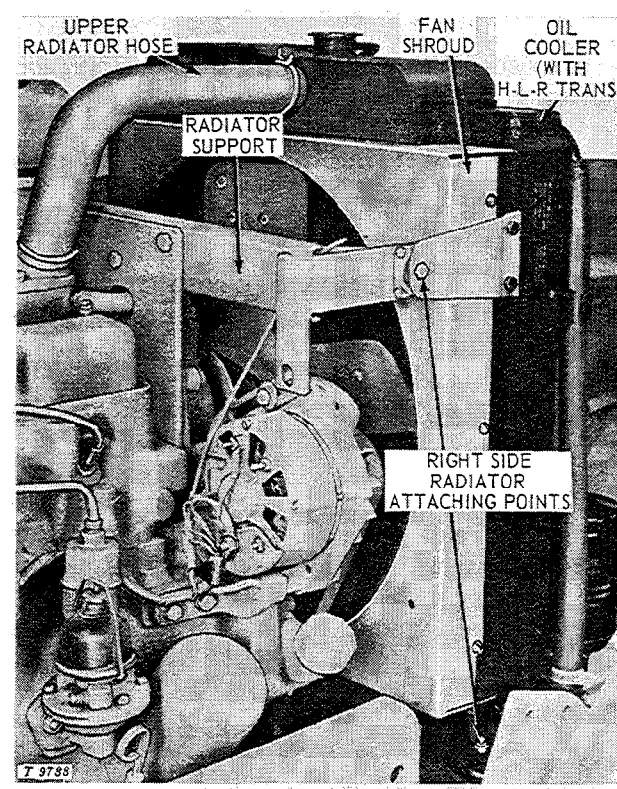


Fig. 20-5-3—Removing Radiator

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9. Remove cap screws securing adjusting cover to steering clutch housing cover and remove adjusting cover (Fig. 20-20-3).

10. Loosen lock nut on spring eye screws (20-20-3). Reach through adjusting cover opening and unhook spring from eye screw on inside of steering clutch housing cover. Remove spring.

11. Remove cap screws securing steering clutch housing cover to clutch housing and lift off cover (20-20-3).

12. Remove cap screws securing brake adjusting screw cover to outside of steering clutch housing and remove cover (Fig. 20-20-3).

13. Remove brake yoke pin plug from outside of steering clutch housing (Fig. 20-20-3).

Refer to Figs. 20-20-4 and 5 for removal of the following parts:

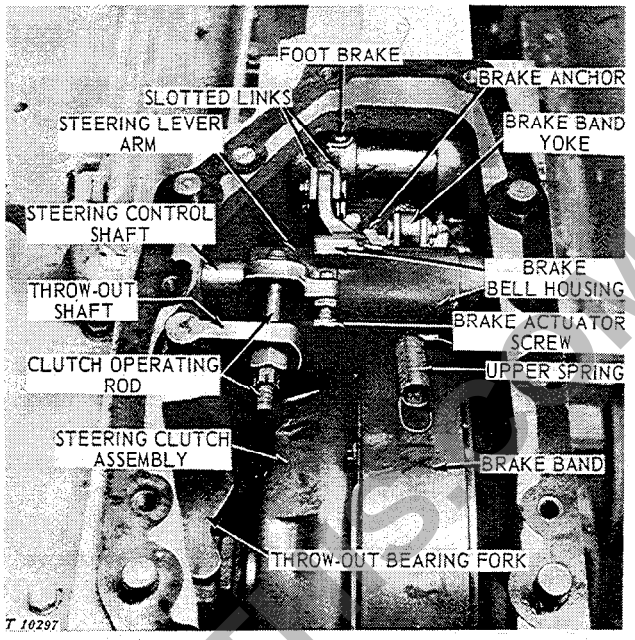


Fig. 20-20-4—Assembled View of Steering Clutch and Brake Controls

14. Reach through brake adjusting screw cover hole and loosen brake band adjusting screw. Unscrew jam nut and adjusting nut and remove clutch operating rod.

15. Remove return spring between foot brake lever and brake bellcrank link. Remove cotter pins and pins and disconnect links from their respective control levers.

16. Remove steering lever arm lock screw.

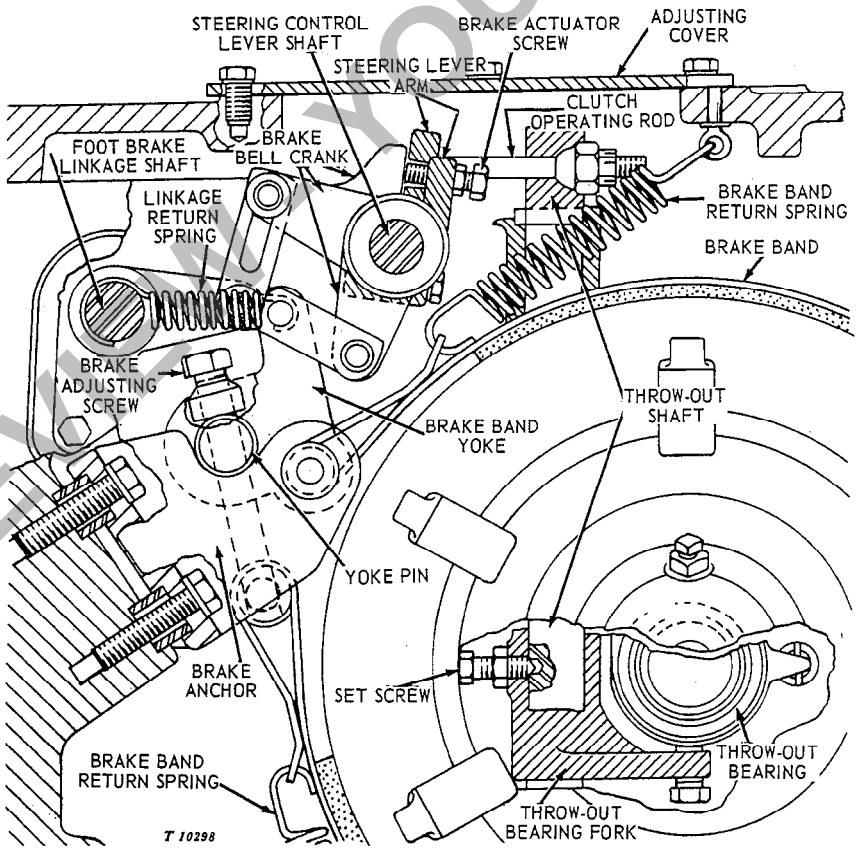


Fig. 20-20-5—Exploded View of Steering Clutch and Brake Controls

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Section 30
PERIODIC LUBRICATION

Group 5
LUBRICATION TIMETABLE

Effective use of lubricating oils and greases is perhaps the most important step towards low upkeep cost, long tractor life, and satisfactory service. Use only lubricants specified in this section: apply them at intervals and according to the instructions in the lubrications and periodic service section.

ENGINE LUBRICATING OILS



X3377

We recommend John Deere Torq-Gard or Torq-Gard Supreme engine oil for use in the engine crankcase. This oil is compounded specifically for use in John Deere engines, and provides superior lubrication under all conditions. NEVER PUT ADDITIVES IN THE CRANKCASE. Torq-Gard oil is formulated to provide all the protection your engine needs. Additives could reduce this protection rather than help it.

If oil other than Torq-Gard or Torq-Gard Supreme is used, it must conform to the following specifications.

SINGLE VISCOSITY OILS

API Service CD/SD
MIL-L-2104C
Series 3

MULTI-VISCOSITY OILS

API Service CC/SD
MIL-L-46152

Depending on the expected prevailing temperature for the fill period, use oil of viscosity as shown in the following chart.

Air Temperature	John Deere Torq-Gard Oil	Other Oils: Single Viscosity Oil	Other Oils: Multi-Viscosity Oil
Above 32°F.	SAE 30	SAE 30	Not recommended.
-10°F. to 32°F.*	SAE 10W-20	SAE 10W	SAE 10W-30
Below -10°F.	SAE 5W-20	SAE 5W	SAE 5W-20

**SAE 5W-20 oil may also be used to insure optimum lubrication at starting, particularly when engine is subjected to -10°F. or lower temperatures for several hours.*

Some increase in oil consumption may be expected when SAE 5W-20 or SAE 5W oils are used. Check oil level more frequently.

TRANSMISSION HYDRAULIC OILS

Use only John Deere Type 303 Special-Purpose Oil or an equivalent in the transmission hydraulic system. Other types of oil will not give satisfactory service, and may result in eventual damage. This special oil, available from your John Deere dealer, may be used in all weather conditions.

GREASES

Use John Deere Multi-Purpose Lubricant or an equivalent SAE Multi-Purpose type grease for all grease fittings. Application of grease as instructed in the lubrication section will provide proper lubrication and will keep contamination out of bearings.

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INSTALLING BALANCER SHAFTS

Apply a light film of oil on the balancer shaft journals and bushings and insert shafts into their respective bushings in the cylinder block.

CAUTION: When installing balancer shafts, be careful not to damage journals or bushings.

Position thrust plates between balancer shaft journal and drive gear (Fig. 50-25-3). Secure to front plate with cap screws and lock washers and tighten to 35 ft-lbs torque.

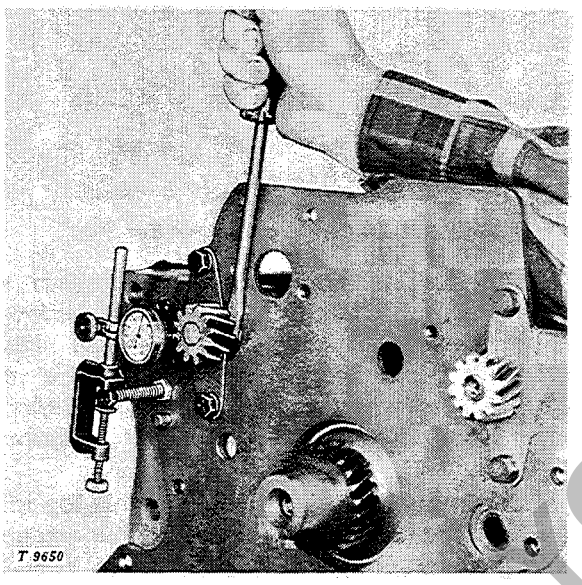


Fig. 50-25-12–Checking Balancer Shaft End Play

Check balancer shafts for specified end play of 0.002 to 0.008 inch (Fig. 50-25-12). New shaft, bushings, and thrust plate should restore this. The maximum allowable end play for used parts is 0.015 inch.

CAUTION: If end play is excessive and thrust plate does not seem to be excessively worn, check to see that balancer shaft gear is located within 0.001 inch of flush with end of shaft (Fig. 50-25-10).

Install oil pump gear (Section 60, Group 5).

NOTE: Before installing lower idler gear, set flywheel at "TDC" with No. 1 (front) piston on compression stroke and align timing mark on balancer shaft drive gears with center of crankshaft using timing tool. Refer to Group 30 of this Section for proper procedure.

IMPORTANT: While balancer shaft timing marks are aligned with crankshaft, observe keyways in shaft gears; both should point straight up towards top of engine. If not, balancer shafts have been accidentally switched and must be installed in opposite bores.

With timing marks aligned, install lower idler gear and secure to front plate with flat washers and cap screw. Tighten cap screw to 85 ft-lbs torque.

ASSEMBLY

Install timing gear cover (Group 30 of this Section).

Spread a thin even coat of Permatex No. 3 Sealing Compound on the side of the oil pan gasket that will face the cylinder block. Also coat the oil pan gasket surface. Place new gasket on oil pan and attach pan to block with cap screws. Tighten all cap screws to 30 ft-lbs torque.

Position front bottom plate under tractor and secure with attaching cap screws.

Position radiator on front end support and secure with hex. nuts. Secure radiator to top braces with attaching cap screws. Connect water inlet and outlet hoses to radiator.

Fill crankcase with proper quantity and viscosity of oil (see chart in Section 30).

Fill cooling system with clean soft water. Add antifreeze solution or John Deere Summer Engine Coolant Conditioner as needed (Section 80).

Install tractor grille housing, grille, and hood. Also install engine side shields (if so equipped).

Connect all battery ground straps.

CAUTION: Batteries are NEGATIVE grounded only. Never attempt to polarize an alternator-equipped tractor.

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2. On both diesel and gasoline engines, install the second compression ring with "TOP" toward the top of piston.

3. On both diesel and gasoline engines, install the first compression ring with "TOP" toward the top of piston.

NOTE: This ring has a chromed contact surface.

4. Be sure rings move freely in their grooves.

INSTALLATION

INSTALLING CYLINDER LINERS

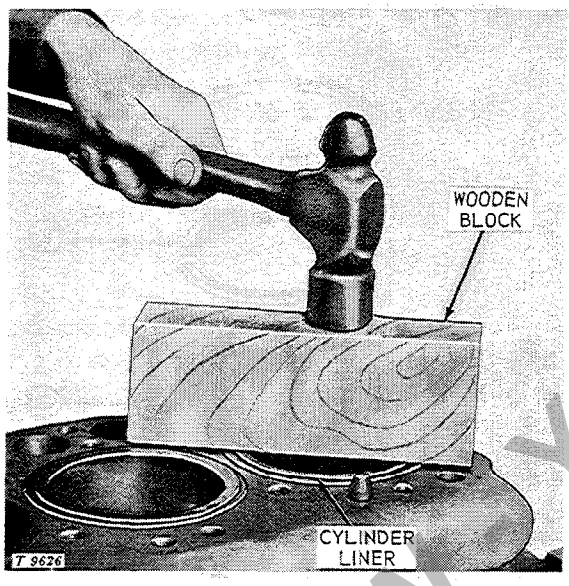


Fig. 50-15-15–Installing Cylinder Liner

Thoroughly clean deposits of rust, dirt and corrosion from under top flange of liner and mating surface on block. Remove packing from liner and scrape off any deposits on the liner or on mating shoulders in block.

Carefully install a new, dry packing over the bottom end of the cylinder liner. Slide packing firmly against the shoulder of the liner, making sure that the packing is not twisted or crimped.

Later models have two additional O-rings in the block. Dip these O-rings in AR54749 Soap Lubricant and install into the grooves in the cylinder block. Check that the O-rings do not protrude outside the grooves and are not twisted.

Coat the liner packing, seating area of the liner and cylinder bore O-rings with AR54749 Soap Lubricant.

NOTE: If you suspect that a packing may have sheared or displaced during lowering into position, the liner and packing assembly should be removed and examined.

Work liners gently in place as far as possible by hand. Finish seating liners by placing a wood block over upper end and tapping block lightly with hammer (Fig. 50-15-15).

NOTE: Cylinder liner will protrude over the top of the cylinder block more than normal due to the uncompressed packing.

Clean cylinder liner bores with waterless hand cleaner after installation in block. Wipe dry with clean towels. Coat cylinder liner bores with engine oil just before installing pistons.

If a new liner is installed, be sure to check height of liner in cylinder block as previously described.

INSTALLING PISTONS

NOTE: Before installing pistons and connecting rods, be sure that cylinder bores have been thoroughly cleaned and coated with a film of light oil. If engine is being overhauled because of excessive oil consumption, make sure cylinder liner wall glaze has been removed.

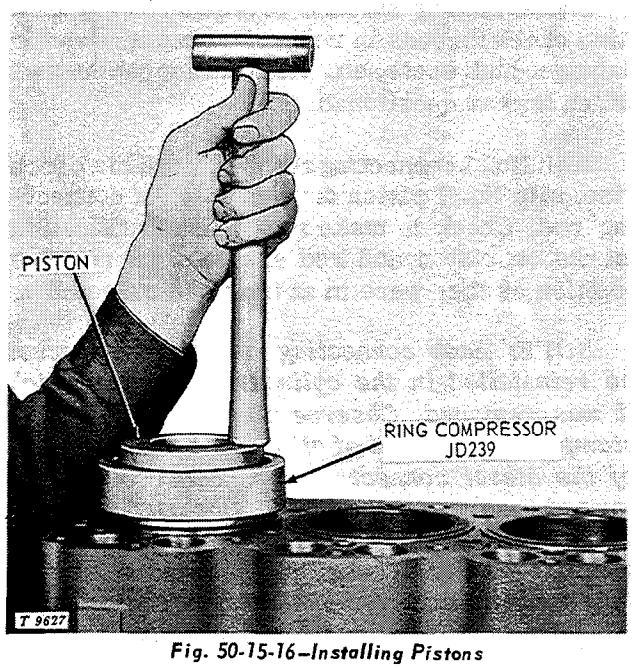


Fig. 50-15-16–Installing Pistons

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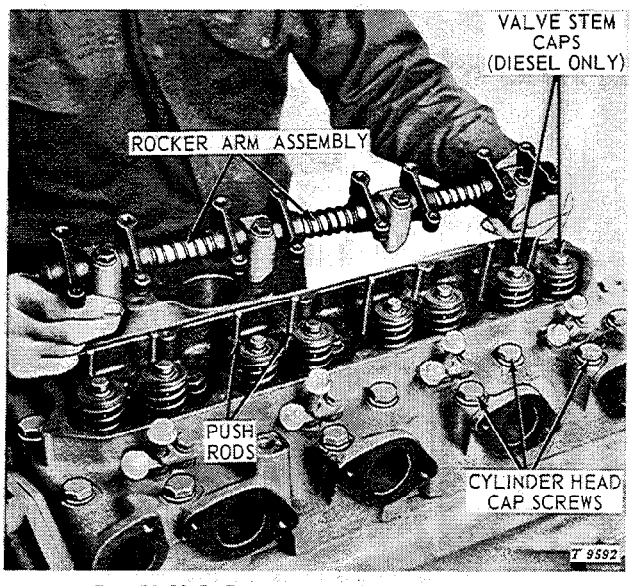


Fig. 50-10-2—Removing Rocker Arm Assembly

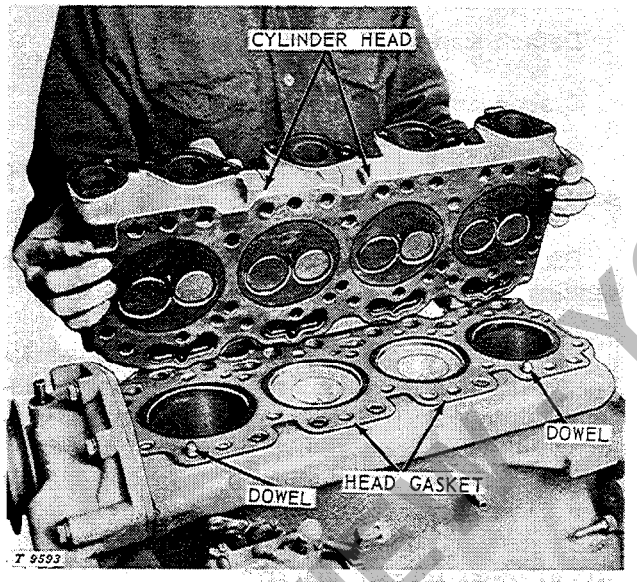


Fig. 50-10-3—Removing Cylinder Head

Remove cylinder head bolts and remove cylinder head and gasket (Fig. 50-10-3).

IMPORTANT: Do not rotate crankshaft with cylinder head removed unless all cylinder liners are bolted down.

DISASSEMBLY

ROCKER ARM ASSEMBLY

Remove plug from one end of rocker arm shaft and slide all parts from end of shaft (Fig. 50-10-4). Identify rocker arms for reassembly.

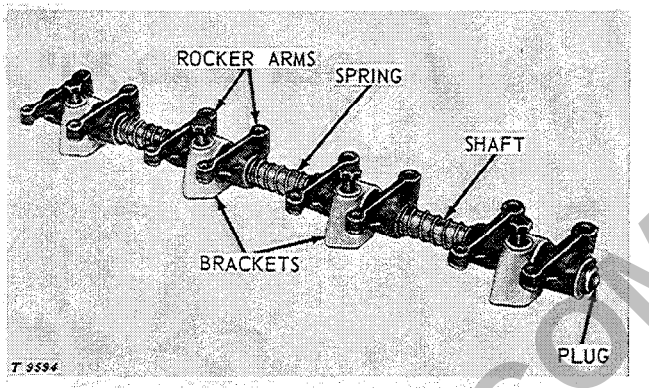


Fig. 50-10-4—Rocker Arm Assembly

CYLINDER HEAD AND VALVES

Using a valve spring compressor, remove retainer locks, caps, valve springs, and related parts. Remove and identify each valve so that it can be reinstalled into the same guide and seat from which it was removed.

INSPECTION AND REPAIR

CYLINDER HEAD

Clean carbon from cylinder head and inspect for cracks. If any cracks are found, the head must be repaired or replaced.

Check to determine if cylinder head is flat and smooth. If it is necessary to resurface the bottom deck of the head, remove no more material than absolutely necessary (not to exceed 0.030 inch).

On diesel engines, check distance from the bottom deck of the cylinder head to the valves when seated. The distance for intake valves must be 0.023 to 0.047 inch, the distance for exhaust valves must be 0.038 to 0.072 inch.

VALVE PORTS

Clean valve ports thoroughly.

Check inside diameter of valve ports with telescope gauge and micrometer (Fig. 50-10-5). New port measurement is .3745 to .3755 inch. If clearance between port and valve stem exceeds 0.006 inch, replace valve. Valves are available in the standard size or in oversizes of 0.003, 0.015, and 0.030 inch.

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MANUAL WINCH BRAKE BAND ADJUSTMENT

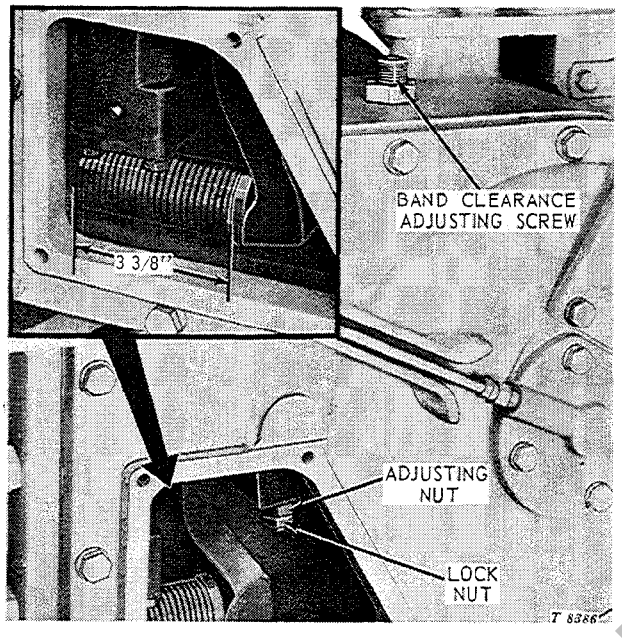


Fig. 40-15-15—Manual Winch Brake Band Adjustment

Back out adjusting screw on top of winch housing. Remove lower cover from left quill and loosen adjusting nut on brake band rod until band is loose. Then tighten adjusting nut until length of brake spring pack (see inset) is 3-3/8 inches from inside edge of housing to front edge of thick washer. Tighten lock nut.

Adjust brake band clearance as follows: Turn in adjusting screw on top of winch housing until you feel screw contact brake anchor. Then turn down screw an extra 1/2-turn. Tighten jam nut to hold screw.

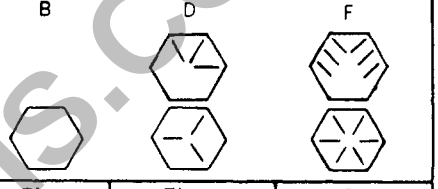
If winch brake band still slips, let it cool for one hour and recheck. Also inspect brake band for grease or fluid soaking and replace if necessary.

7. TORQUING CAP SCREWS AND BOLTS

Check all accessible bolts and cap screws on the tractor for proper tightness. The table below explains how various bolts and cap screws should be torqued.

TORQUE CHART

RECOMMENDED TORQUE IN FT-LBS
COARSE AND FINE THREADS



Bolt Diameter	Plain Head	Three Dashes	Six Dashes
1/4	Not used	10	14
5/16	Not used	20	30
3/8	Not used	35	50
7/16	35	55	80
1/2	55	85	120
9/16	75	130	175
5/8	105	170	240
3/4	185	300	425
7/8	160	445	685
1	250	670	1030
1-1/8	330	910	1460
1-1/4	480	1250	2060

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*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 and larger are sometimes formed hot rather than cold, which accounts for the lower torque.

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SERVICE MANUAL

JOHN DEERE

JD450

CRAWLER TRACTORS AND CRAWLER LOADERS

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

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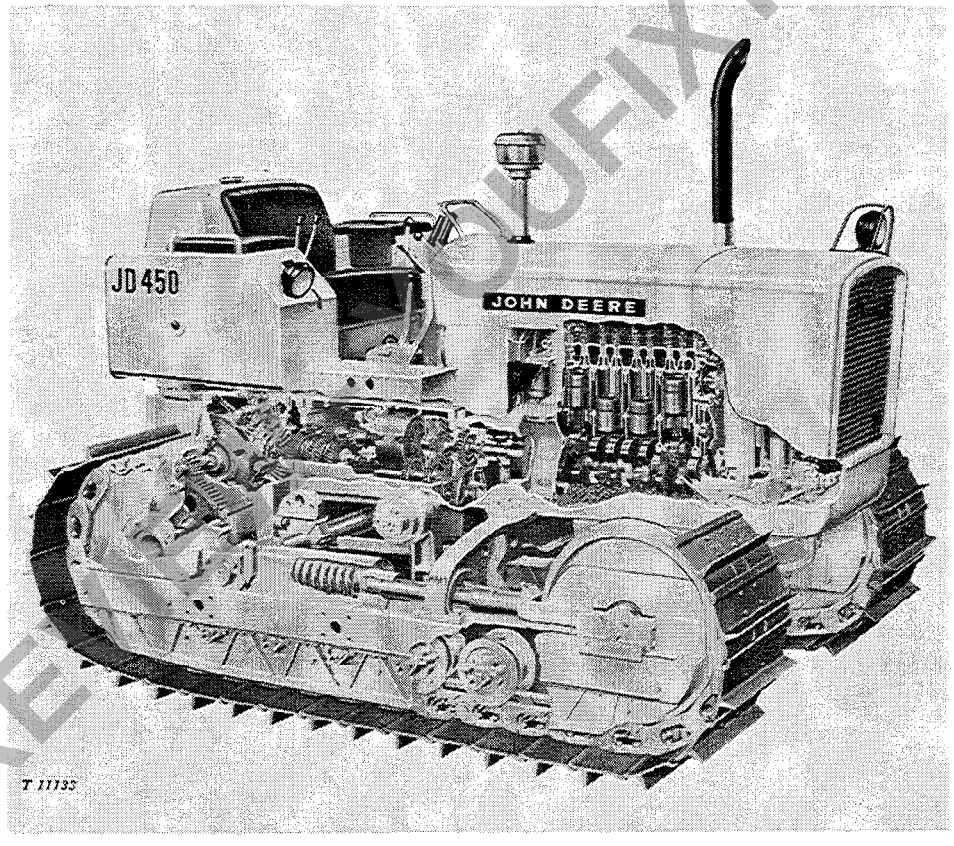
TO THE JOHN DEERE SERVICEMAN

This service manual contains maintenance instructions for John Deere JD450 Crawler Tractors and Loaders. Included are complete instructions for removal, disassembly, inspection, repair, assembly and installation of the major parts and assemblies of the tractor.

In addition, the manual contains brief descriptions of the more complicated systems of the tractor, and tells how they operate. Dimensions of many new wearing parts are given as an aid in determining when parts replacement is necessary. Tests and adjustments, required to keep the tractor operating efficiently, are explained in detail.

This manual was planned and written for the Service Department; its place is in the shop. Use the manual whenever in doubt about correct maintenance procedures. Use it as a text book for training new Service Department personnel who are unfamiliar with John Deere Tractors.

Daily use of the Service Manual as a guide for any and all service problems will reduce error and costly delay to a minimum and assure you the best in finished service work. In many instances your customer's confidence in your work will be improved when he sees you using the Service Manual. He knows you are following approved maintenance procedures and making proper adjustments. There is no guesswork when you use the manual.



Right-Hand Cutaway View of John Deere JD450 Crawler Tractor

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DAILY OR EVERY 10 HOURS—Continued

Component	Description of Service	Capacity or Measurement	Description of Lubricant
Fuel transfer pump sediment bowl	Check sediment bowl for water or dirt deposits	. . . . .	. . . . .
Fuel filter sediment bowls (diesel)	Drain any water or dirt deposits	. . . . .	. . . . .
Winch fairlead	Lubricate grease fittings	Two strokes of grease gun	SAE multipurpose grease
Hydraulic system	Check oil level at sight gauge	Full mark (half circle of oil on window)	John Deere Type 303 Special Purpose Oil or its equivalent

EVERY 50 HOURS

Engine clutch throwout bearing	Lubricate grease fitting	Two strokes of grease gun	High temperature grease (AT30408)
Batteries	Check level of electrolyte in each cell. Check for terminal corrosion	Fill each cell to bottom of filler neck (above plates)	Distilled water
Winch housing (power control)	Check oil level	To level of oil level hole	Above 32°F: John Deere Type 303 Special Purpose Oil Below 32°F: SAE 5W-20*
Winch housing (manual control)	Check oil level	To level of oil level hole	John Deere Type 303 Special-Purpose Oil or its equivalent
Winch control valve (manual winch)	Check brake fluid level	1-inch below top of filler hole	Heavy-duty automotive type brake fluid (equivalent of SAE 70R3)
Loader control lever	Lubricate lever pivot points	. . . . .	Same as for crankcase (10 hour service)

EVERY 100 HOURS

Engine Crankcase	Drain and refill	9 U.S. quarts	See 30-5-1 for correct viscosity and type oil

**Below 0°F: use three parts SAE 5W-20 oil, one part Grade No. 1 diesel fuel.*

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ENGINE COMPONENTS

CYLINDER BLOCK

The cylinder block and crankcase are cast in one piece; the crankshaft is mounted high in the engine block to provide greater support and rigidity for the engine. The cylinder block contains: wet sleeve cylinder liners, crankshaft main bearing caps, balancer shaft bushings, front plate and gasket, and oil filter and dipstick.

CYLINDER LINERS

The cylinder liners are of the replaceable wet-sleeve type, made of hardened alloy cast iron, and are a slip fit in the cylinder block. They are inserted in the cylinder bores from the top of the cylinder block. The flange of each liner rests on a shoulder within the block and is sealed by a square rubber packing at this point.

The cylinder liners may be honed but not rebored. When the walls become oversized beyond the maximum specifications, the cylinder liner may be replaced by a new liner.

CRANKSHAFT

The crankshaft is a one-piece steel forging, heat-treated to insure strength and durability. All main and connecting rod bearing journal surfaces and oil seal surfaces are induction hardened.

Complete static and dynamic balancing of the crankshaft has been achieved by counterweights cast into the crankshaft.

The crankshaft is supported on three main bearings (gasoline) or five main bearings (diesel). These bearings are equipped with replaceable precision steel-backed, tin-plated, aluminum-lined inserts. The rear main bearing has a thrust surface and also serves as a thrust bearing.

The flywheel attaches to and is dowelled directly to the flange on the rear end of the crankshaft. The ring gear for the starting motor is shrunk in place on the front outer rim of the flywheel. On the front outer rim of the flywheel is a "TDC" (top dead center) bore which is used when timing the ignition, injection pump, and valve tappets.

PISTONS

Both gasoline and diesel engines are equipped with forged aluminum-alloy, cam-ground, weight-controlled pistons, fitted with two compression rings and one oil control ring.

All ring grooves are located above the piston pin bore. The crown of each diesel piston has a cutout swirl cup to swirl compressed air for more complete combustion.

Slots in the gasoline piston and drilled holes in the diesel pistons, in the oil control ring groove, allow excess oil collected by the oil control ring to be returned to the crankcase. On diesel pistons, a spring expander fits in the oil ring groove to give the oil ring added tension against the cylinder wall. Both the compression rings and the oil ring are of one-piece, cast-iron design. The top compression ring and the oil control ring have a chromed contact surface.

The case-hardened steel piston pins are full floating and are held in place by snap rings.

CONNECTING RODS

The connecting rods have a bronze bushing at the upper end which is a bearing surface for the piston pin. The lower end has a replaceable, steel-backed, aluminum-lined, precision bearing insert.

CAMSHAFT

The camshaft is made from one solid bar of alloy iron with all cams integral. The gasoline engine camshaft is cast with an integral distributor drive gear. Both the gasoline and diesel engine camshafts have a lobe to actuate the fuel transfer pump.

The camshaft is driven at one-half engine speed by the top idler gear and is supported by three pressure-lubricated bores integral with the cylinder block. Thrust of the camshaft is taken by a thrust plate fastened to the front of the cylinder block.

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INSPECTION AND REPAIR

NOTE: For gear inspection and repair, refer to the Section and Group in the manual which covers the assemblies which the gears drive. The balancer shafts, camshaft and crankshaft must be removed from the engine for gear replacement.

CHECKING GEAR TRAIN BACKLASH

If gear train noise is noted at the time of disassembly, it usually indicates excessive gear lash, or chipped, pitted or burred gear teeth.

At the time of assembly, gear train backlash may be measured with a dial indicator or by placing a piece of solder between the teeth of mating gears. Bar engine over so that the solder passes between gears and measure thickness of the solder with a micrometer to determine gear backlash. Maximum allowable backlash between mating gears is shown below.

Crankshaft to Upper Idler	0.0027 to 0.0116 inch
Upper Idler to Camshaft	.0028 to .0135 inch
Upper Idler to Fuel Injection Pump (Diesel)	.0028 to .0135 inch
Upper Idler to Governor (Gasoline)	.0023 to .0127 inch
Crankshaft to Lower Idler	.0027 to .0137 inch
Lower Idler to Balancer	.0018 to .0156 inch
Lower Idler to Oil Pump	.0016 to .0147 inch
Oil Pump to Balancer	.002 to .014 inch

IDLER GEARS

Inspect idler gears for worn, cracked or broken teeth. Inspect bushings in gears for scoring and check surface of shaft for smoothness. Also make certain that the oil hole in the shaft is open. Measure inside diameter of bushing and outside diameter of shaft to determine oil clearance. Maximum allowable clearance is 0.006 inch. If bushing replacement is required, press in new bushing to flush with either side of gear using JD252 driver.

Inspect idler gear shafts for damage. If replacement is necessary on later model engines, press spring pins in new idler gear shafts until 1/4-inch of spring pin projects out from front face of shaft.

NOTE: On early model engines, both upper and lower idlers are pressure lubricated. If there are signs of oil starvation, make certain that oil line (lower idler) and oil delivery hole in cylinder block (upper idler) are open.

FRONT PLATE AND TIMING GEAR COVER

Inspect engine front plate and timing gear cover for cracks, warping or damage. Replace if necessary.

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

On gasoline engines, inspect governor shaft bushing in timing gear cover for galling or excessive wear. Replace if necessary. Press in new bushing until flange on bushing contacts timing gear cover using tool JD246.

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

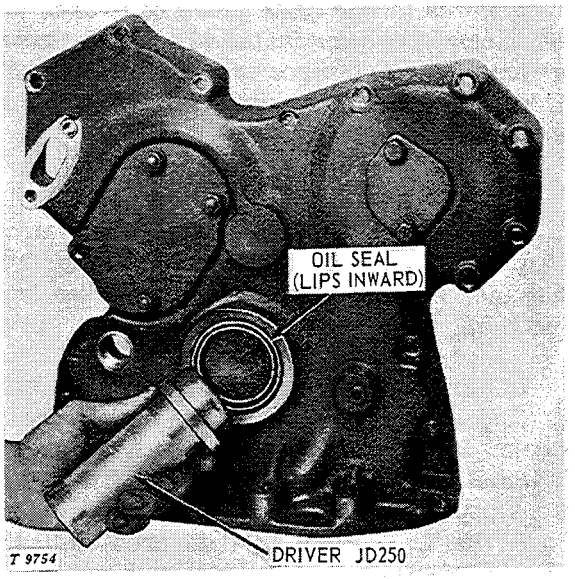


Fig. 50-30-4—Installing Oil Seal in Timing Gear Cover

To install new oil seal in gear cover, coat outer surface of seal with joint sealing compound. Support the oil seal bore area of timing gear cover. Press in oil seal to bottom of bore with spring-loaded lip facing inward using JD250 driver (Fig. 50-30-4).

IMPORTANT: Always support timing gear cover while pressing in oil seal.

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Section 90
FUEL SYSTEMS

Group 5
DESCRIPTION AND FUEL SPECIFICATIONS

DESCRIPTION

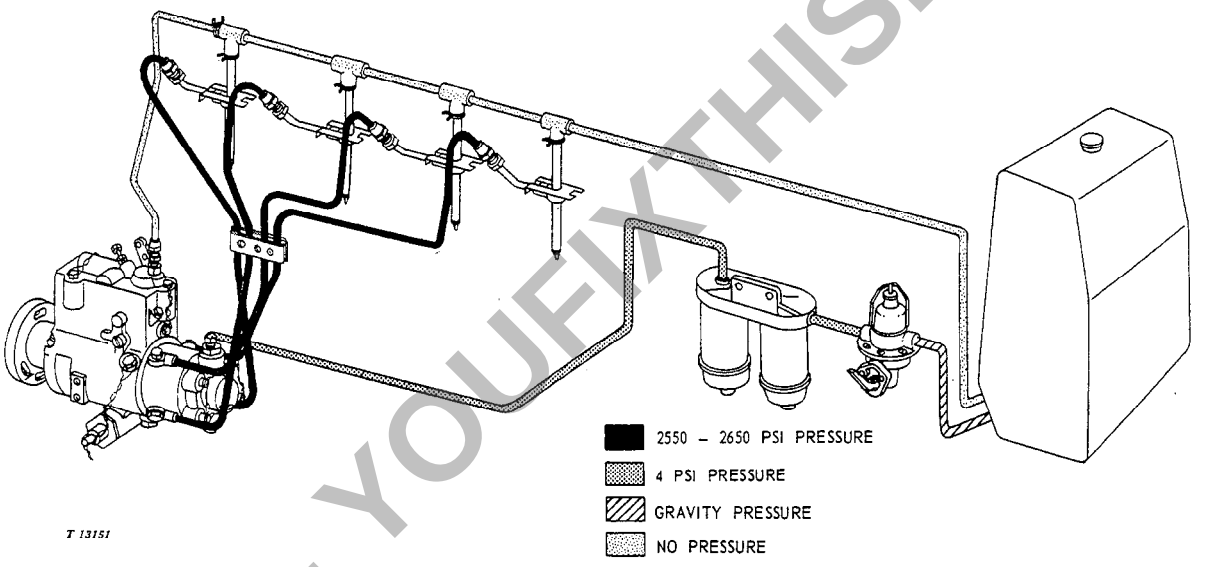


Fig. 90-5-1–Diesel Fuel System

DIESEL FUEL SYSTEM

The diesel fuel system consists of a fuel tank, fuel primer pump, filters, injection pump, injection lines, nozzles, and leak-off line (Fig. 90-5-1).

The 31 U.S. gallon fuel tank is located at the rear of the tractor behind the operator's seat.

Fuel is gravity fed to the fuel primer pump on the right side of the engine. The fuel is then pumped by the fuel pump through a dual stage filter assembly to the fuel injection pump.

The horizontally mounted diesel fuel injection pump is on the left side of the engine and is driven by the engine upper idler gear. A rotor in the fuel injection pump sends a metered amount of fuel to each cylinder in its proper sequence.

A greater amount of fuel is sent to the injection pump than is required for engine firing. The fuel is recirculated in the pump and the excess is returned to the fuel tank by the leak-off line.

A small quantity of fuel also leaks past each injection nozzle valve within the nozzle body and is removed from the top of each nozzle by means of a leak-off boot and line and returned to the fuel tank.

A dry element type air cleaner is available for the diesel fuel system.

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INSTALLATION AND TIMING

If engine has not been set on "top dead center" (No. 1 cylinder on compression stroke) rotate engine in direction of rotation (counterclockwise as viewed from flywheel end) until No. 1 cylinder is on compression stroke (Fig. 90-30-14). See page 90-30-7 for details.

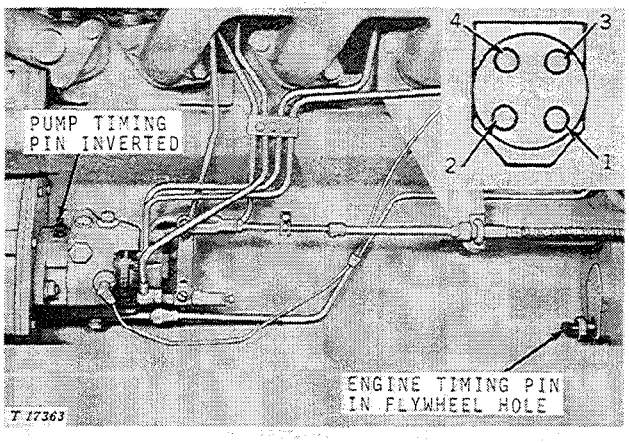


Fig. 90-30-14—Timing Fuel Injection Pump to Engine

Rotate pump drive shaft until timing pin drops in place (Fig. 90-30-14).

Position pump over mounting studs and install hex. nuts and washers, leaving the nuts loose.

NOTE: If pump drive gear was removed, install gear as described in Section 50, Group 30 of this manual.

Secure injection pump drive gear to pump drive shaft with three new retaining screws (Fig. 90-30-15). Tighten the three screws. See "Specifications." Install cap screw retainer and timing gear cover access cover. Tighten retainer cap screw. See "Specifications."

Temporarily remove the timing pin from pump and fully rotate the pump counterclockwise on mounting studs. Replace the timing pin and rotate pump clockwise until it drops into position. Secure the mounting stud nuts.

SPECIAL TIMING INSTRUCTION

To improve starting CDC431-3DG, and CDC431-6DG Fuel Injection Pumps (6 degree advance) may be retarded 2 degrees:

First, time the fuel injection pump to engine at TDC (see "Installation and Timing").

Scribe the engine front plate in line with the 4 degree line on the pump. Rotate pump counterclockwise until line on engine front plate lines up with 6 degree line on pump.

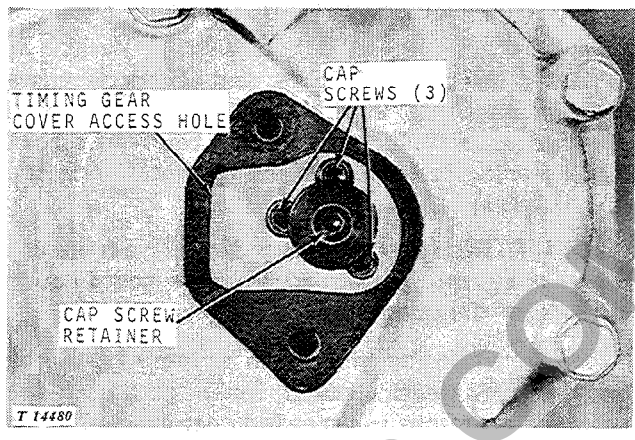


Fig. 90-30-15—Injection Pump Drive Gear Attaching Screws and Retainer

Connect fuel supply and return lines to the pump, leaving the supply line loose until after the system is bled. (See below.)

Assemble injection lines to the pump. Tighten line connectors. See "Specifications." Leave connections loose at the nozzles for bleeding air from the system.

Install radiator lower hose and fill with specified coolant (Section 80, Group 10).

BLEEDING FUEL INJECTION PUMP

Always bleed the fuel system (Section 40) after removing and installing the fuel injection pump.

Additional bleeding, as follows, may be necessary to dispel all air from the injection pump.

Continue priming until a quantity of air free fuel flows from the injection pump inlet line. Fasten the inlet to the pump securely. Continue to prime the injection pump until fuel flows freely from the timing pin hole. Install and tighten the timing pin. Assemble fuel return and nozzle leak-off lines.

Loosen the electric shut-off solenoid two full turns and prime until air-free fuel flows from this point. Tighten the solenoid and connect terminal wire.

Crank the engine and tighten injection line connector screws at the injection pump when fuel flows from them. Tighten connector nuts at nozzles when lines are filled.

NOTE: See Section 40, Group 10, for idle speeds and speed control linkage adjustment.

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Group 25
IGNITION SYSTEM
(Gasoline Tractors)

DESCRIPTION

The ignition system on gasoline tractors has the following components: Distributor, coil, ignition switch, starter solenoid switch, resistor, spark plugs, battery, and connecting wires.

OPERATION

With the ignition switch on and the distributor points closed, current flows through the switch, resistor, coil primary windings, and distributor points.

Current flow through coil primary windings creates a magnetic field. In a small fraction of a second (build-up time), current flow and magnetic field reach their maximum value.

When the contact points begin to open, primary current tends to form an arc across the points. The condenser prevents an arc by momentarily providing a storage place for the current. This quick controlled stop of primary current by the condenser rapidly collapses the coil magnetic field and induces a high voltage in the coil secondary windings.

High secondary voltage forces a current flow to distributor rotor which directs secondary current to the proper spark plug. The secondary current jumps spark plug air gap to the grounded electrode and ignites the fuel-air mixture.

For additional information on ignition systems, see Section 60 of SM-2029, "John Deere Electrical Systems."

RESISTOR

The ignition resistor is connected between the coil and the ignition switch and has a resistance of 2.2 ohm.

The resistor is connected in series with the coil and, when the engine is running, reduces voltage at the coil.

To provide a better spark when starting, the resistor is bypassed and battery voltage of approximately 10 volts is applied to the coil. This is accomplished when the starter is operating by current flowing from the "R" solenoid terminal of the starter through the resistor bypass wire to the coil.

COIL

DESCRIPTION

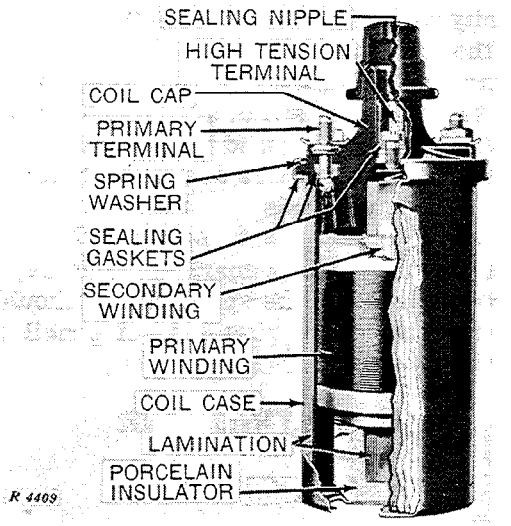


Fig. 100-25-1—Ignition Coil

The ignition coil (Fig. 100-25-1) is a pulse transformer that steps up low primary circuit voltage to a high secondary voltage of approximately 4,000 to 10,000 volts. The coil may produce up to 25,000 volts.

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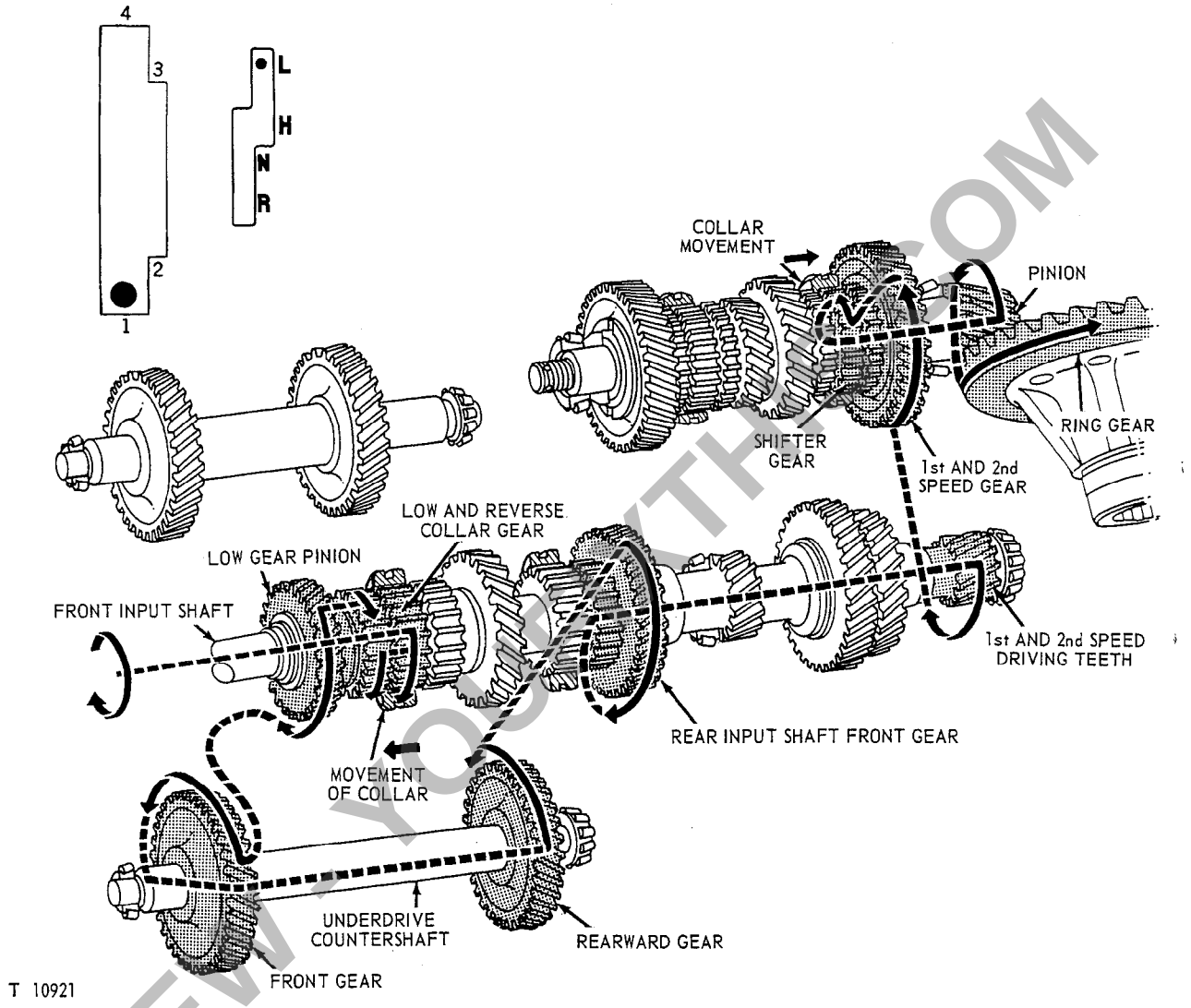


Fig. 120-5-2—Transmission First Shift Station – Low Gear

LOW GEAR POWER FLOW

First Shift Station—Low Gear:

A shifter collar couples the low gear pinion to the low and reverse collar gear. The low and reverse collar gear is keyed to the front input shaft. The low pinion is in constant mesh with the forward gear on the underdrive countershaft. The rearward gear on the underdrive countershaft is in constant mesh with the rear input shaft front gear. Both gears carried on the underdrive countershaft are keyed to the shaft, and the rear input shaft front gear is keyed to the rear input shaft. The rearward teeth on the rear input shaft are the first and second speed driving teeth, and are in constant mesh with the first and second speed gear which is carried on the pinion shaft. By coupling the gear shifter collar onto the first and second speed gear, the first and second speed gear is joined to the shifter gear. The shifter gear is splined to the pinion shaft which transmits power to the ring gear (Fig. 120-5-2).

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FRONT INPUT SHAFT

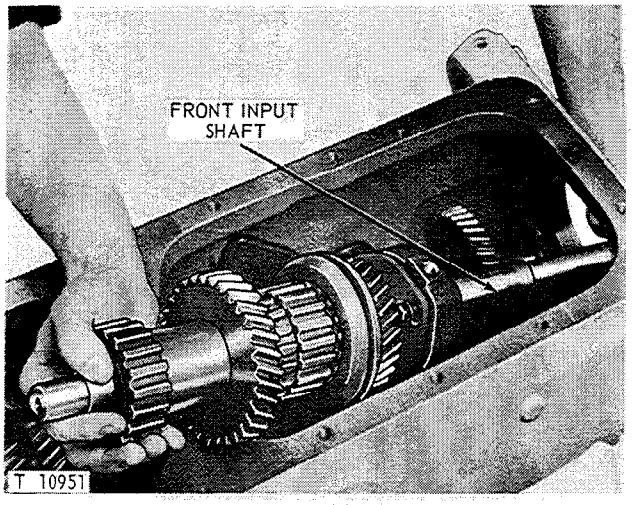


Fig. 120-15-17—Installing Front Input Shaft

Install front input shaft (Fig. 120-15-17) by inserting front of shaft into range change compartment and out through bore of front wall. Then, making sure high range shifter collar is installed, seat other end of shaft into needle bearing of rear input shaft. Check to see that low pinion is in full mesh with front gear of underdrive countershaft.

Install transmission oil pump suction line connector on pump housing and connect line.

Position front quill over input shaft and drive onto ball bearing.

Attach pump body to quill making sure roller is properly installed in rotor. Secure quill to transmission front wall and bend over lock tabs (Fig. 120-15-18).

Install range change shifter mechanism (Group 10 of this section).

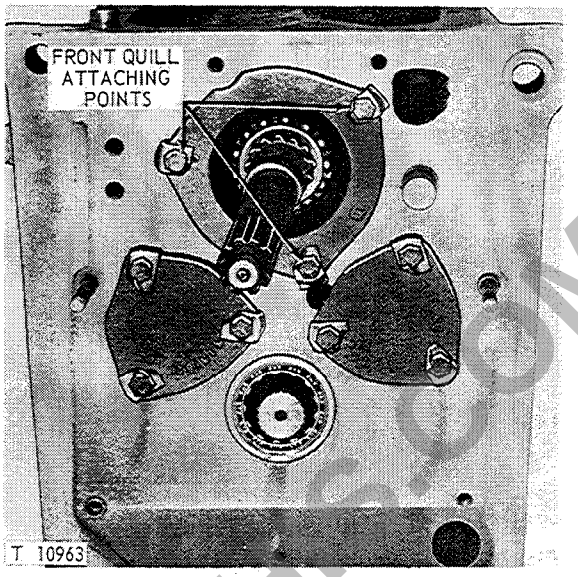


Fig. 120-15-18—Installing Front Input Shaft Quill

Tape splines of front input shaft to keep from damaging oil seal in front cover during installation. Install front cover and remove tape from input shaft splines.

Use plastic Loctite liquid gasket to seal transmission top covers. On early model tractors remove dowels and plug relief valve bore before applying liquid gasket. Tighten cap screws to 50 ft-lbs torque.

Join tractor at clutch housing (Section 20, Group 10).

Install engine (Section 20, Group 5).

Fill transmission with quantity and type of lubricant advised in Section 30.

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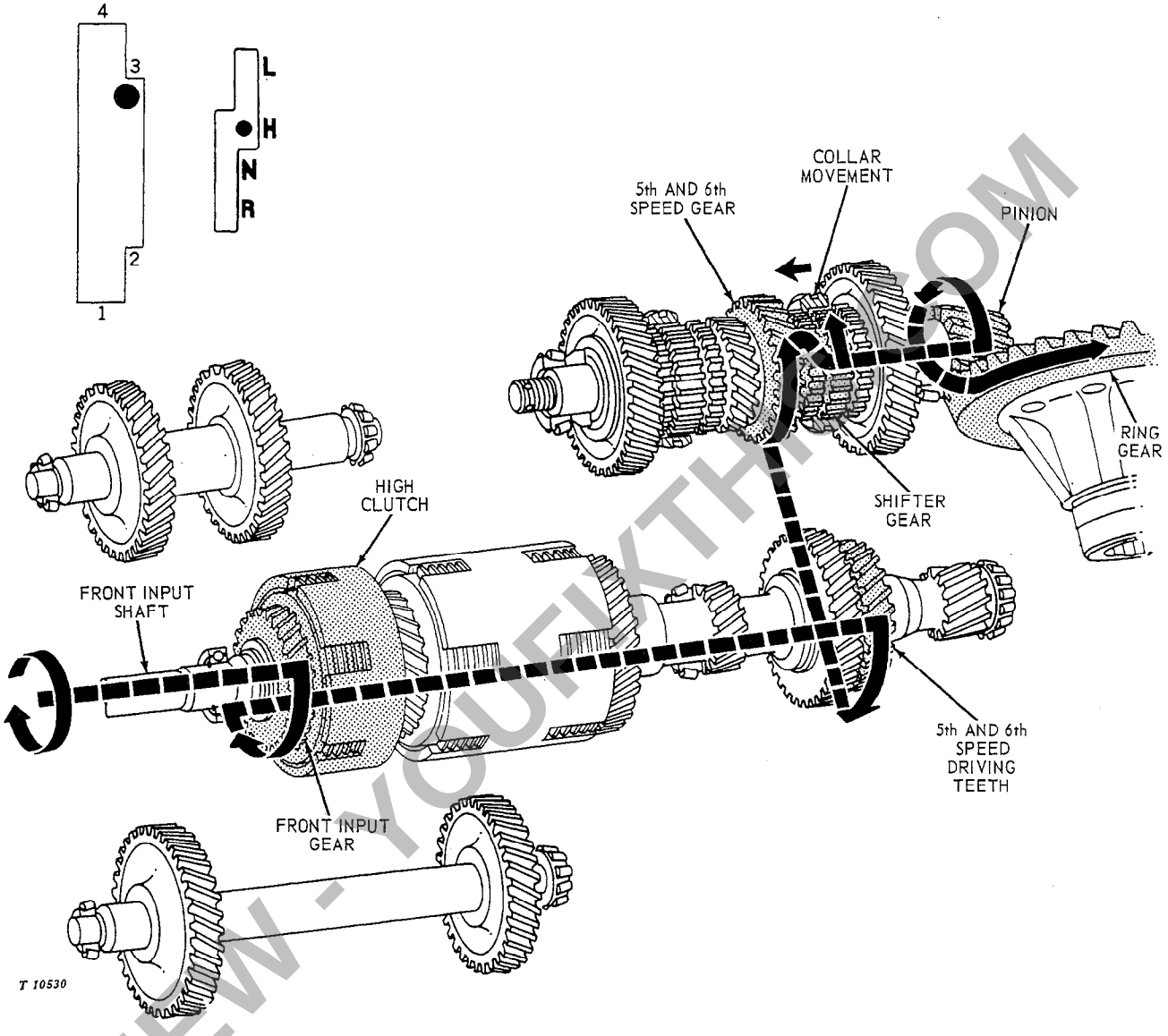


Fig. 130-5-19—Transmission Third Shift Station—High Gear

Third Shift Station—High Gear (Fig. 130-5-19)

At the front input shaft, power comes in through the input gear (keyed) and passes through the solid countershafts. But since the rear clutches (low and reverse) are disengaged, the countershafts merely idle.

The front input shaft idles inside the clutch shaft (unless the high clutch is engaged). This is because, on the high clutch, the hub is splined to the input shaft, while the drum is keyed to the clutch shaft.

When the high clutch is engaged, however, the hub and drum are clamped together and rotate as a unit. Now the power coming in the front input is passed through the clutch shaft, straight to the rear input.

This power drives the rear input shaft and its four solid driving gears. These gears are in constant mesh with four speed gears on the pinion shaft. These speed gears, unless engaged, merely idle on the shaft. They are engaged by sliding collars which couple the speed gears to one of two shifter gears (splined to the pinion shaft).

When the rear shifter collar couples its shifter gear to the fifth and sixth speed gear, the latter gear is coupled to the pinion shaft. Now the power coming in on the fifth and sixth speed driving gear drives this gear, which transmits power to the ring gear through the pinion.

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Group 25
H-L-R TRANSMISSION SPECIFICATIONS

H-L-R CLUTCH LINKAGE SETTINGS

Clutch Pedal Linkage . . . . . 3-3/4 Inches of Free Travel at Pedal Pad

H-L-R Linkage Setting . . . . . Turn Stop Nut Until Pedal Starts to Pull Away From Stop, Then Back Off 4-1/2 Turns*

HYDRAULIC OIL PRESSURES

Lubricating Oil to H-L-R Clutches (with Engine at 2500 rpm) . . . . . 58-72 psi

Engaging Oil to H-L-R Clutches (Engine at 2500 rpm) . . . . . 140-150 psi

PRESSURE REGULATING VALVE SETTING

Pressure Regulating Valve. Adjustable with Shims to Keep Engaging Oil to Clutches at 140-150 psi

TIME SPANS FOR H-L-R CLUTCH SHIFTING

Shifting from High to Low Range (Engine at 1900 rpm) . . . . . 1 Second Maximum

Shifting from High to Reverse Range (Engine at 1900 rpm) . . . . . 1.5 Second Average (Less Than 2 Seconds)

ADJUSTMENT OF TIME SPAN FOR H-L-R CLUTCH SHIFTING

Needle Valve Setting . . . . . Screwed Out Until High-to-Reverse Shift is 1.5 Second Average (Less Than 2 Seconds)

END PLAYS ON SHAFTS

Rear Input Shaft Bearing End Play . . . . . .003-.005 Inch

Reverse and Underdrive Countershaft End Plays . . . . . .003-.005 Inch

**Recheck H-L-R shifting after adjustment. If H-L-R clutches do not disengage when clutch pedal is depressed 3-3/4 inches, back off stop nut an extra 1/2 turn (to 5 turns). If forward to reverse shifting is too abrupt, tighten the stop nut 1/2 turn (to 4 turns backed off). When properly adjusted, pressure at gauge (Fig. 130-15-56) should rise 5 to 10 psi when clutch pedal is depressed 1/2 to 3/4 inches. Make this check with engine running at slow idle.*

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TRACK PINS AND BUSHINGS

Due to the fact that the wear on pins and bushings does not extend over the entire surface of these parts, the life of worn pins and bushings can be restored by rotating them 180 degrees with respect to the track link (Fig. 150-10-3).

To determine when pins and bushing should be turned, other measurements of wear may be taken in addition to measurement taken with track wear gauge:

(a) Bushing Outside Diameter Wear: Measure outside diamter of bushing, which is 2.0055-2.0065 inches on new factory parts. If external bushing wear is not more than 0.090-inch, bushings may be rotated without replacing them.

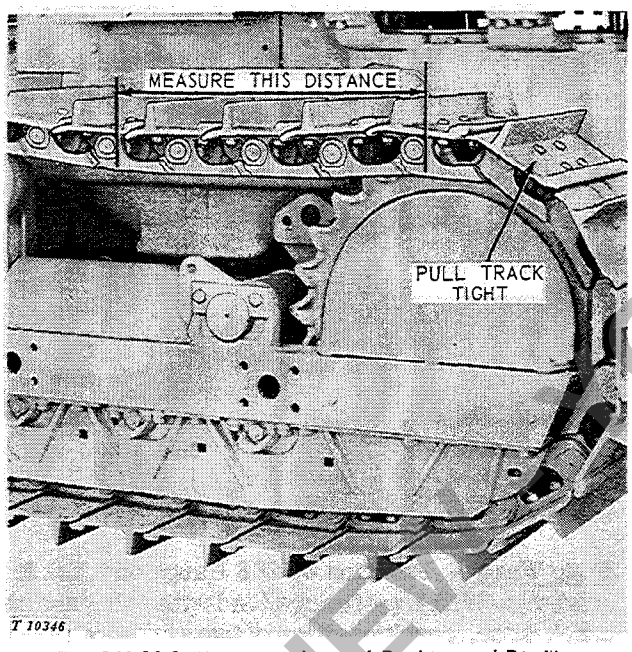


Fig. 150-10-2–Measuring Internal Bushing and Pin Wear

(b) Internal Pin and Bushing Wear: Pull the track tight as possible and measure across four track links (five pins) as shown in Figure 150-10-2 to get measurement of worn parts (master pin and link must not be included). Repeat this measurement on another group of four links to get an average figure. Measurement of new track across four links and five pins is 25.185 inches. If wear shown by extra distance does not exceed 0.440 inch (or 0.110-inch wear per pin and bushing), pins and bushings can be rotated and will normally give extended track life. Note, however, that if forward edge of front idler is flush with front edge of track frame, all pins and bushings should be replaced.

NOTE: Working conditions may increase or decrease the wear limit of 0.110 inch because of the different amounts of stress placed on pins and bushings in different soils.

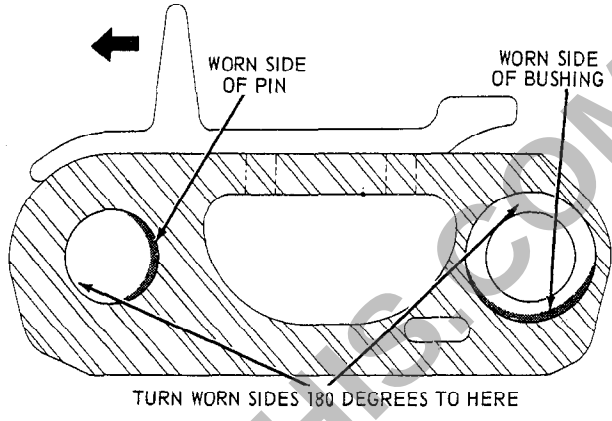


Fig. 150-10-3–Rotating Track Pins and Bushings

Refer to Figure 150-10-3 and rotate worn pins and bushings 180 degrees as indicated.

IMPORTANT: Allowing pins and bushings to wear out without rotating them will result in accelerated wear to all track components. If pins and bushings are rotated in time, longer track service life will result.

Inspect pins for cracks, chips, excessive wear, or looseness in links. Look for evidence of pin freezing in bushing which will cause pin to be rough. If this condition is found, smooth pin with emery cloth.

TRACK LINKS

Inspect links for cracks, chips, or worn bushing or pin hole.

TRACK SHOES

Inspect shoes for cracks, damaged or worn lugs, and looseness on links. If lug is worn or damaged beyond further use, replace shoe.

IMPORTANT: Be sure track bolts are kept tight as loose track bolts are a source of damage to shoes and links. Lubricate track shoe bolts and nuts and tighten to 110 ft-lbs torque.

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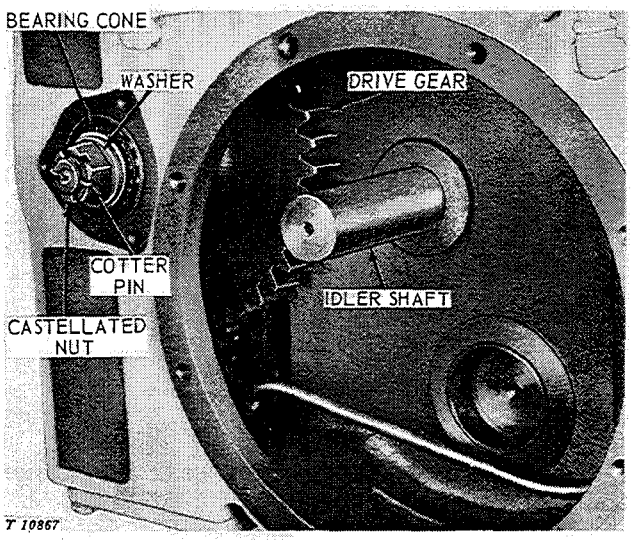


Fig. 170-15-15—Removing Output Shaft

Remove the expansion plug from the rear of the idler shaft bore and drive out idler shaft (Fig. 170-15-15).

Remove the output shaft cover and gasket. Remove the cotter pin, castellated nut and washer from the output shaft. Remove the bearing cone and shim pack.

Slide the output shaft rearward and remove the beveled spacer, spacer, drive gear and spacer. Remove the output shaft with bearing cone from the winch housing.

INSPECTION AND REPAIR

IMPORTANT: Remember the following service rules when repairing the winch:

(1) Use care and cleanliness when working with clutch and brake drum parts. Any grease or oil left on friction surfaces can cause clutch or brake slippage.

(2) Use non-petroleum cleaning solvents or alcohol to clean winch parts that have been oil soaked. Wipe clean with a dry cloth so as not to leave an oily film on the parts.

(3) Pack all winch bearings only with John Deere Winch Bearing Grease (extra high temperature grease) to prevent melting of grease and possible soiling of clutch or brake facings.

BRAKE CYLINDER

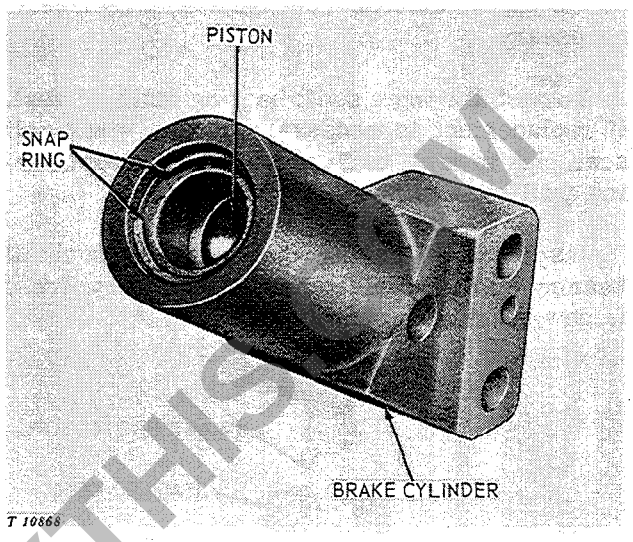


Fig. 170-15-16—Brake Cylinder

To disassemble the brake cylinder, remove snap ring and slide out piston (Fig. 170-15-16).

Inspect brake cylinder for cracks or other damage.

Inspect piston for damage and replace O-ring.

Replace brake band assembly if lining is glazed, oil soaked or worn down. Inspect linkage and replace all damaged or excessively worn parts.

INPUT SHAFT AND BEARINGS

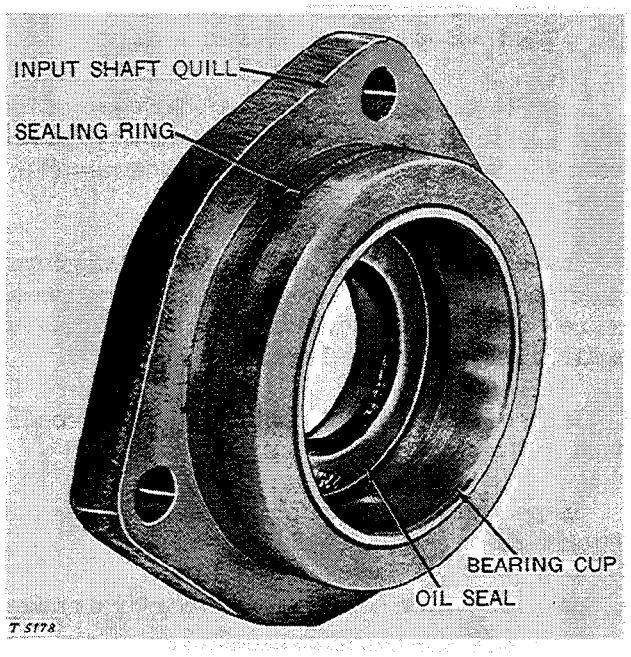


Fig. 170-15-17—Input Shaft Bearing Quill

Inspect the input shaft bearing quill for cracks or damage (Fig. 170-15-17).

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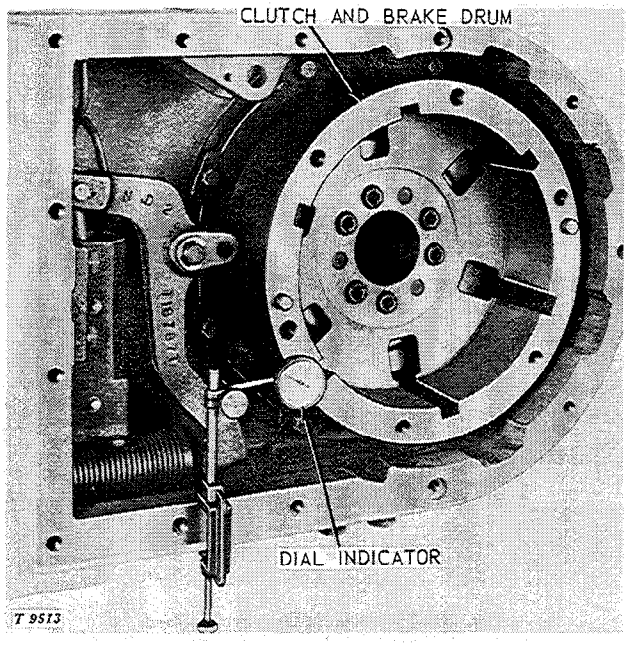


Fig. 180-15-39—Measuring Introduced End Play

With a sufficient quantity of shims installed under the end plate to induce end play, check the end play using a dial indicator as shown in Fig. 180-15-39. Then remove the correct quantity of shims to give 0.001- to 0.005-inch preload.

INSTALLING MAIN DRIVE SHAFT AND RIGHT QUILL

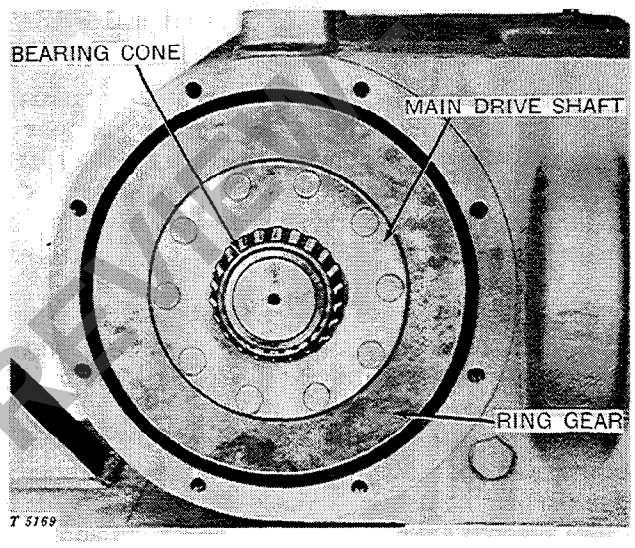


Fig. 180-15-40—Installing Main Drive Shaft

Lubricate the lips of the oil seal in the winch drum and install the main drive shaft from the right-hand side into the winch housing.

NOTE: Use shim stock or any other suitable protector over splines of main drive shaft to protect winch drum oil seal.

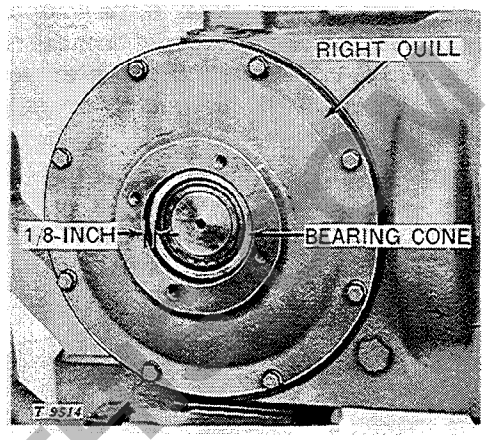


Fig. 180-15-41—Installing Right Quill

Position the right quill and gasket on the outside of the winch housing (Fig. 180-15-41). Install the attaching cap screws and torque to 40 ft-lbs.

Drive the bearing cup 1/8-inch below shim surface on the right quill as shown.

Add the original shim pack plus 0.005-inch and install the right-bearing retainer on the right quill. Torque attaching cap screws to 40 ft-lbs.

INSTALLING CLUTCH ASSEMBLY

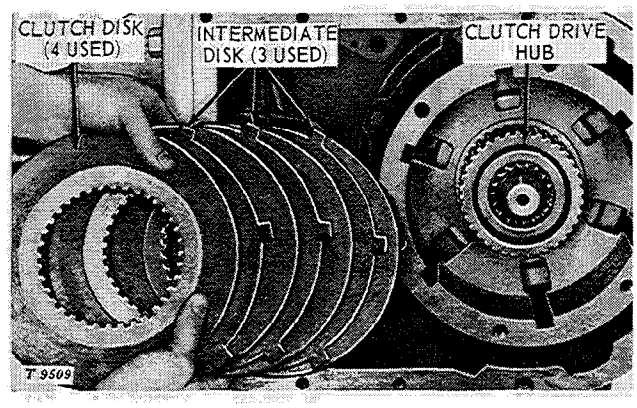


Fig. 180-15-42—Installing Clutch Hub and Disks

Install clutch drive hub on main drive shaft (Fig. 180-15-42). In order to clear the socket head cap screws, the end with the largest diameter countersink faces inward. Install the three torque pins in the clutch and brake drum.

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LIFT CHECK AND POPPET

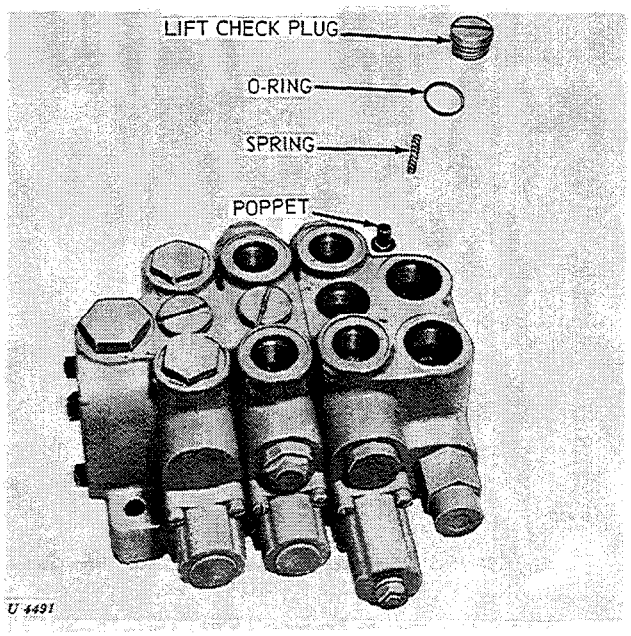


Fig. 190-15-32—Installing Lift Check and Poppet

Install a new O-ring on the lift check plug (Fig. 190-15-32). Place the poppet with spring into the recess at the bottom of the lift check bore in the valve and screw lift check into valve.

ANTI-CAVITATION CHECK VALVE

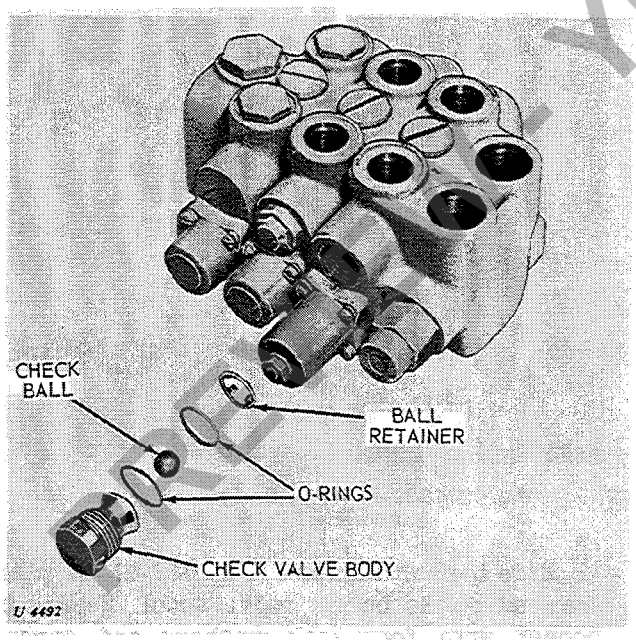


Fig. 190-15-33—Installing Upper Anti-Cavitation Check Valve into Boom Valve Housing

Install a new O-ring on the valve body (Fig. 190-15-33). Insert the ball retainer, with a new O-ring behind it, into recess in valve housing and place a check ball into the recess. Install the valve body and tighten to 20 ft-lbs torque.

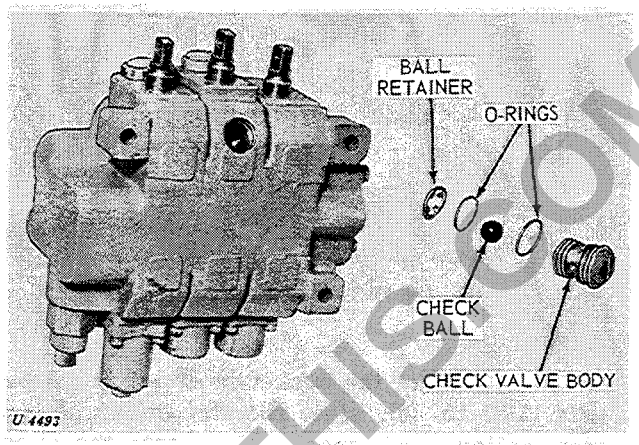


Fig. 190-15-34—Installing Lower Anti-Cavitation Check Valve into Bucket Valve Housing

Install a new O-ring on the valve body (Fig. 190-15-34). Insert the ball retainer, with a new O-ring behind it, into recess in valve housing and place a check ball into the recess. Install the valve body and tighten to 20 ft-lbs torque.

RELIEF VALVES

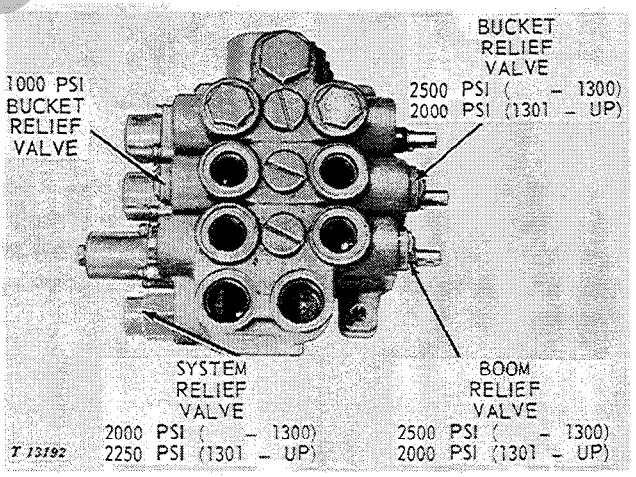


Fig. 190-15-35—Relief Valves

Install new O-rings on system relief valve before installing the valve.

NOTE: When installing boom and bucket relief valve O-rings, insert the O-rings in the valve body casting, not on the relief valve threads. Forcing the O-rings over the relief valve threads will damage the O-rings.

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Area (A) designates a 1/4 inch fillet weld along the upper portion of clam cutting edge (1) and lower flat surface of reinforcing plate (2).

Area (B) points out that a 6 inch long x 3/16 inch fillet weld is used between the bottom plate (3) and the upper portion of cutting edge (1). This fillet weld is centered on the cutting teeth holes.

Area (C) illustrates a 1/4 inch fillet weld joining the support runners (4) and the bottom plate (3) to the rear surface of the cutting edge (1).

Area (D) shows the compaction plate (5) and the support runners (4) joined by a 1/4 inch bevel weld.

NOTE: The support runners have a 1/4 inch x 45° bevel.

Area (E) designates a 1/4 inch fillet skip weld between the bottom plate (3) and the compaction plate (5). The welds are 6 inches long and are 12 inches between centers.

Area (F) shows a 3 inch long x 3/16 inch fillet weld joining the compaction plate (5) to bottom plate (3) and rear surface of cutting edge (1) to bottom plate (3). Welds are centered between runners.

Area (G) illustrates cutting plate (6) which is bolted to moldboard (7). Replace cutting plate if necessary.

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