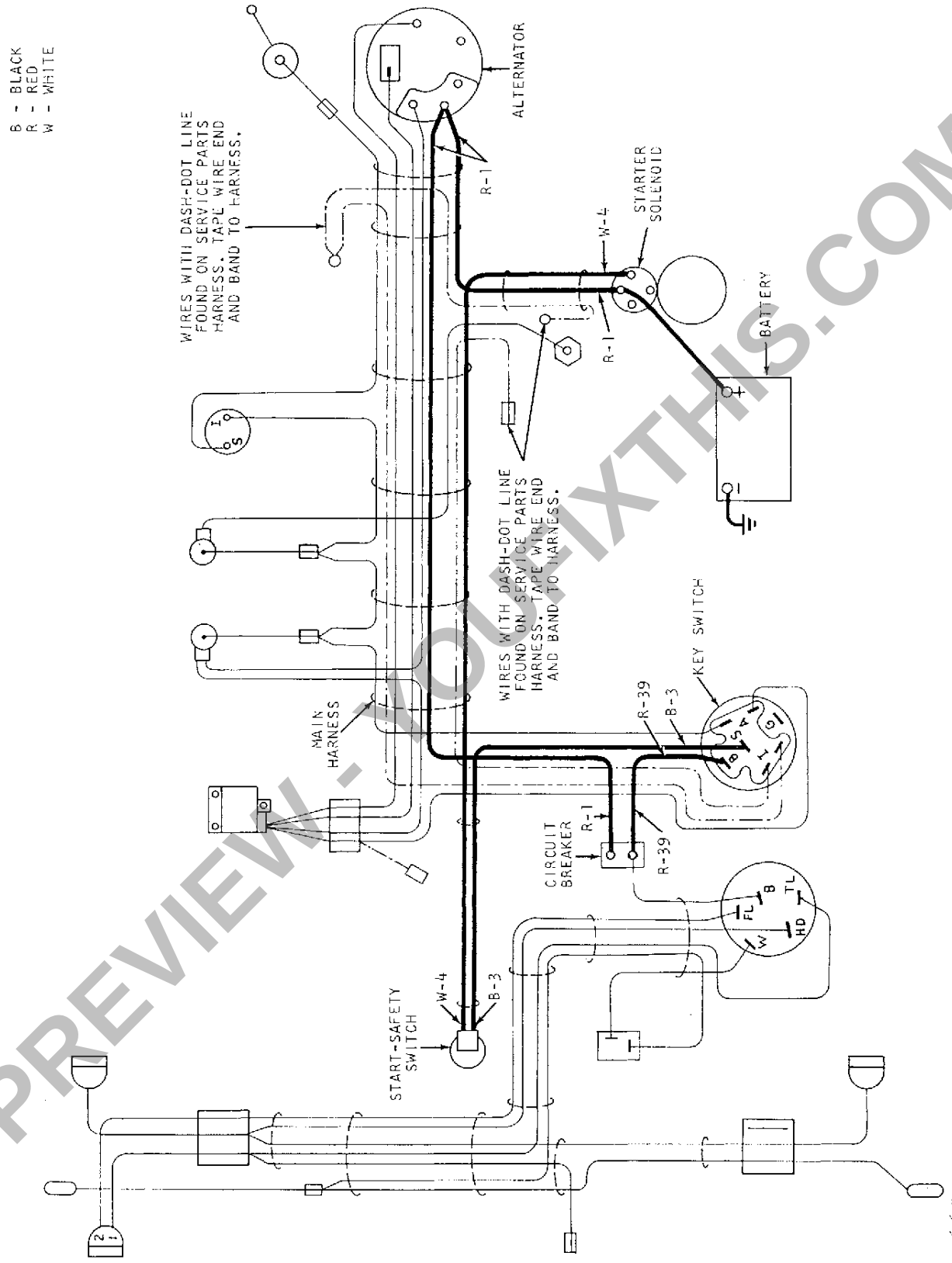


Fig. 1-Starting Circuit for Tractor Serial No. 187301- (Shown in Bold Line)
Earlier Tractors are Similar

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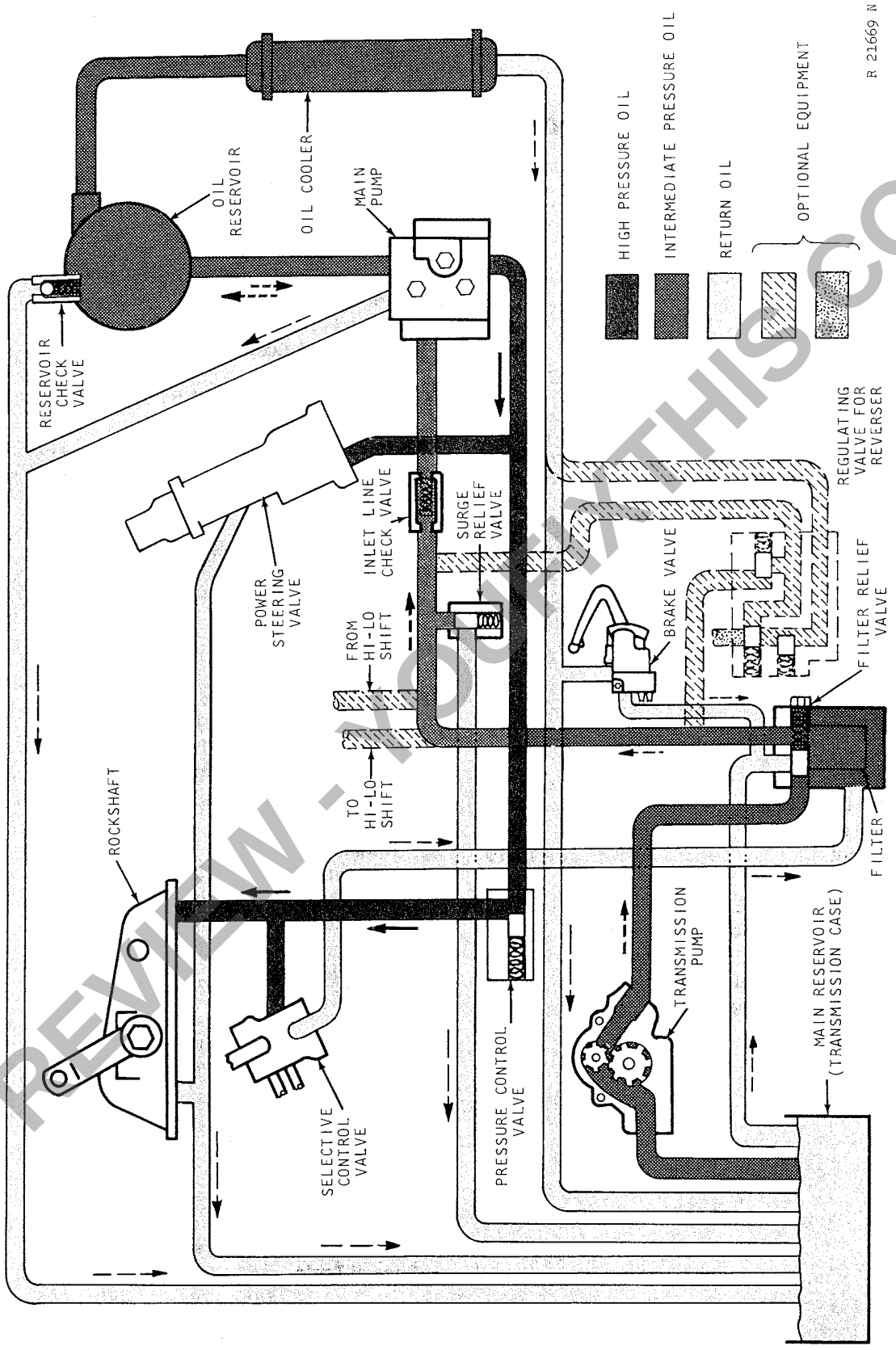


Fig. 1-System Flow Diagram

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Group 30
SPECIFICATIONS AND SPECIAL TOOLS

SPECIFICATIONS

Item	Specification
Fan belt adjustment	3/4 inch deflection, 20 lb. force

Item	Torque (ft-lbs)
Engine-to-clutch housing	170
Drag link nuts	55
Clutch housing-to-transmission case	85
Front end support-to-engine block	
5/8 inch	170
9/16 inch	130
Hydraulic pump drive coupling nuts	25
Axle housing-to-transmission case	85
Roll-Gard-to-axle housing	300
Rear wheel-to-hub bolts (rack and pinion axle)	300
Rim-to-wheel disk nuts	170
Rear wheel-to-flanged axle cap screws	
Cast wheel (regular and power adj.)	130
Steel wheel	100
Demountable rim wheel	100
Front wheel bearing	35
Front wheel hub bolts	
Tires 6.00-16 or smaller	85
Tires larger than 6.00-16	100

SPECIAL TOOLS

No.	Name	Use
JD-244*	Engine Lifting Eyes	Engine removal
JDG-1*	Engine Sling	Removing engine
JDG-9*	Support Stand	Tractor separation

* *Order from: Service Tools, Inc., 1901 Indiana Avenue, Chicago, Illinois 60616.*

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Group 25
SEPARATION

SEPARATING ENGINE FROM CLUTCH HOUSING

Remove right-hand or left-hand cowl. Disconnect battery cable and ground strap. Remove battery, side grille screens, hood, muffler, and front ballast (if used). Drain cooling system.

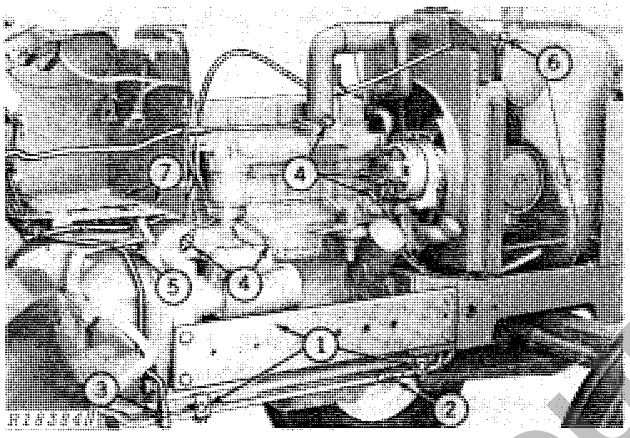


Fig. 1-Right-Hand Separation Procedures

1. Remove clamps securing hydraulic oil pipes (Fig. 1). Remove tool box and side frames (if used).

2. Disconnect hydraulic pump pressure pipe at connector.

3. Remove retaining clamp from pump inlet and reservoir return pipes. Remove power steering pressure pipe.

4. Disconnect battery cable and wiring harness from starter solenoid. Disconnect wiring harness at oil pressure switch, ignition coil, alternator, and fuel gauge sending unit connector. Remove wiring band from harness. Disconnect ether starting aid pipe (diesel).

5. Disconnect tachometer cable, and remove from clutch housing.

6. Disconnect hydraulic oil reservoir vent hose from top of reservoir, and remove hose from support clamp.

7. Remove the two cowl-to-flywheel housing cap screws (Fig. 2).

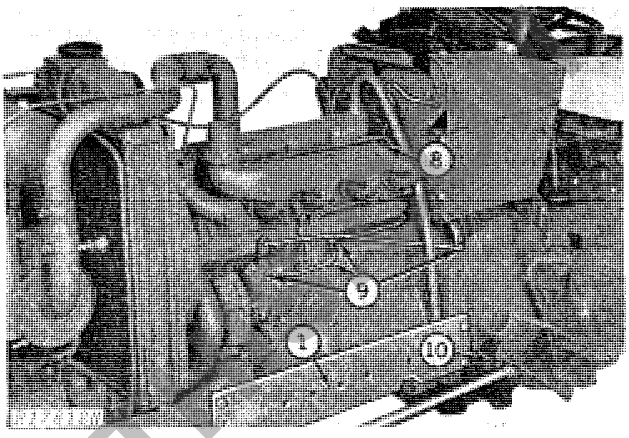


Fig. 2-Left-Hand Separation Procedures

8. Disconnect temperature gauge sensing bulb from engine.

9. Disconnect speed control rod, choke cable, carburetor or injection pump solenoid wire or fuel shut-off rod. Remove wiring bands that fasten wiring to fuel pipe. Disconnect underneath exhaust.

10. Disconnect steering drag link rod from steering arm.

Install JDG-9 support stand (Fig. 3). Place a floor jack under the rear portion of clutch housing.

⚠ CAUTION: Install a wood block between front axle and engine front support on both sides of tractor to prevent assembly from tipping.

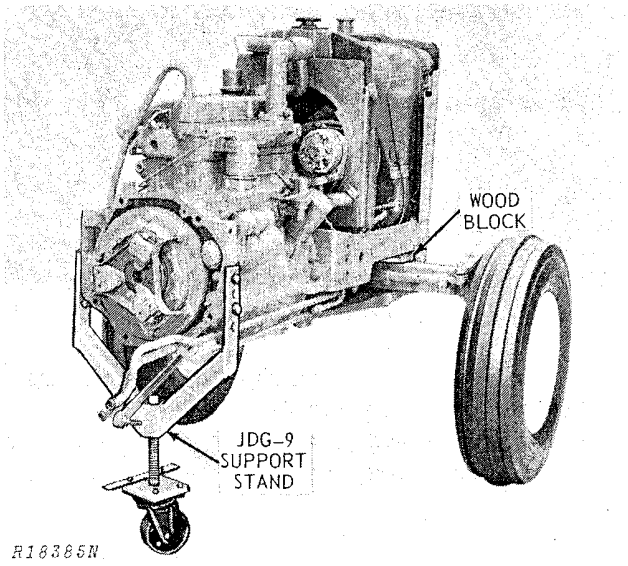


Fig. 3-Engine Separated From Clutch Housing

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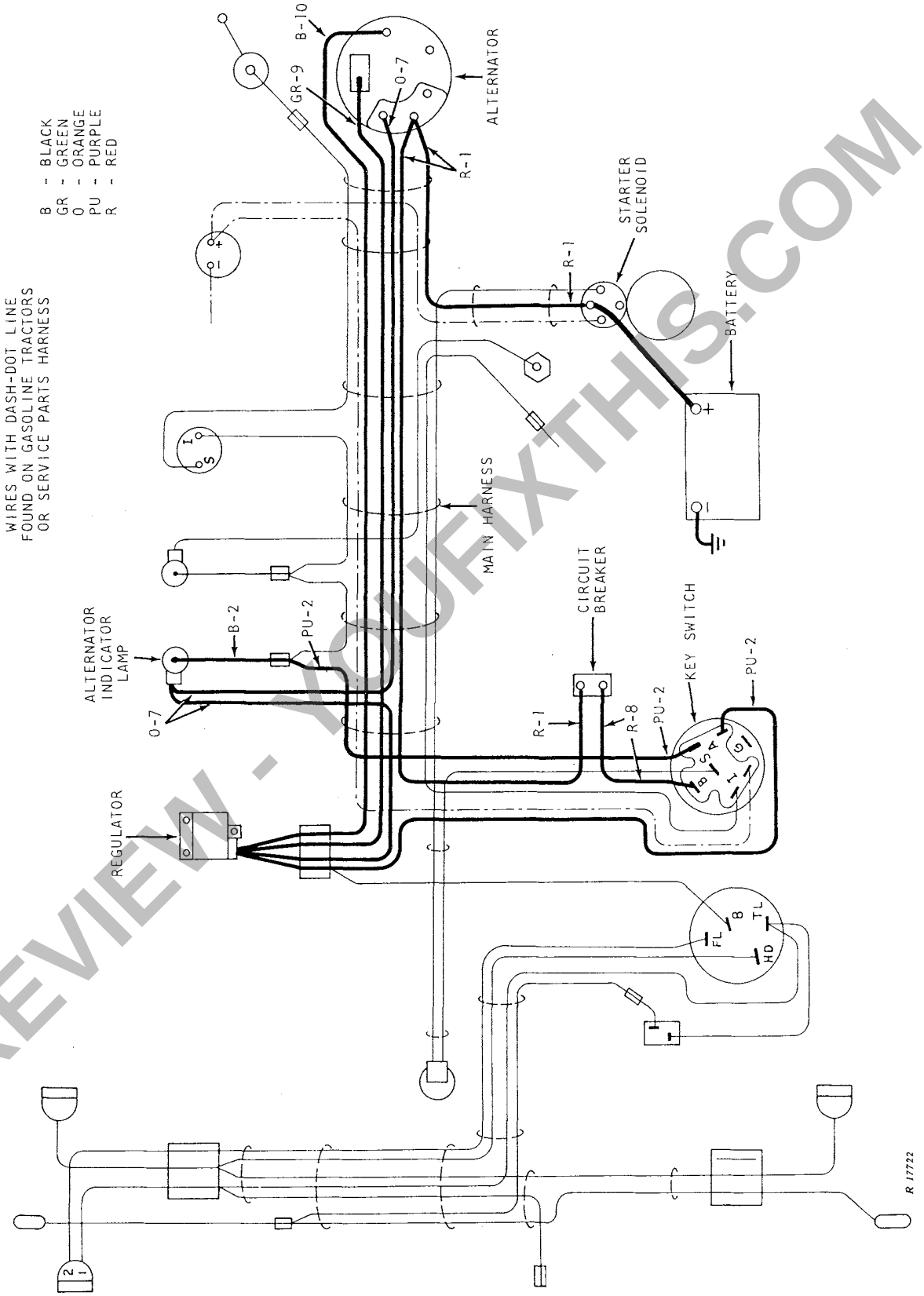


Fig. 2-Charging Circuit for Tractors Serial No. -187300 (Shown in Bold Line)

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allowing oil into the crankcase area. The race moves the pistons out and the pressure oil in the crankcase holds the pistons away from the race. The pump is again in a standby position.

By adjusting the stroke control valve, pressure at the outlet gallery can be changed. By controlling oil pressure in the crankcase, the distance pistons move towrd the race, and therefore the stroke, is controlled.

Oil leakage past pistons and stroke control valve re-enters the inlet gallery via a bleed hole below the stroke control valve and inlet gallery. This oil circulation also provides pump cooling.

The revolving race contacts the pistons, forcing them outward. The oil in the bores is forced out the discharge valve (11) into the outlet gallery. At the end of the stroke the discharge valve spring closes the discharge valve.

The pistons continue pumping until oil pressure is increased in the outlet gallery and in the center and upper area of the crankcase outlet valve. The increased pressure forces the valve down, stopping the flow of oil from the crankcase to inlet gallery.

The increased pressure oil also flows into the stroke control valve (13), opening the valve and

1—Pump Crankcase
2—Race
3—Cam
4—Pump Shaft
5—Inlet Valve Spring
6—Inlet Valve
7—Inlet Gallery
8—Piston Spring
9—Piston
10—Discharge Valve Spring
11—Discharge Valve
12—Outlet Gallery
13—Stroke Control Valve
14—0.060-Inch Bleed Hole
15—Crankcase Outlet Valve
16—Crankcase Outlet Valve Spring

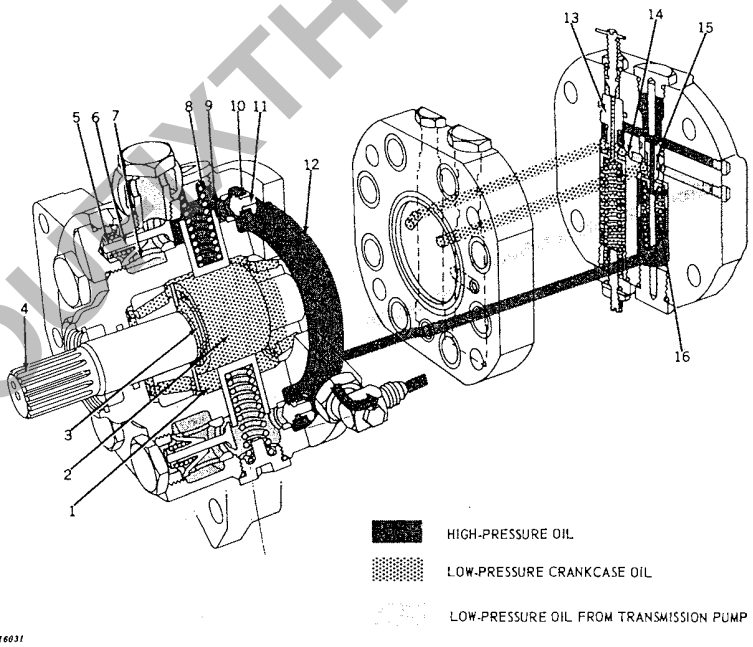


Fig. 5-Main Hydraulic Pump Operation (2.40-Cu. In. Shown)

Diagnosing Malfunctions

No Pump Outlet

Broken pump drive shaft
Stroke control valve open
Improper stroke control valve adjustment
Transmission pump failure

Hydraulic Functions Slow

Stroke control valve, spring seat, or packing failure
Crankcase outlet valve sleeve packing failure
Low standby pressure

Function Chatter

Stroke control valve, spring, seat, or packing failure
Low standby pressure
Broken discharge valve spring or valve
Sticking pump pistons
Broken inlet valve

Pump Noise or Squeal

Stroke control valve, spring, seat, or packing failure
Low standby pressure
Crankcase outlet valve set too high
Leaking inlet valve
Loose drive coupler or worn drive parts

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TORQUE CHART (ft-lbs)



Bolt Diameter	Plain Head*	Three Radial Dashes*	Six Radial Dashes*
1/4	6	10	14
5/16	13	20	30
3/8	23	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

** 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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Place a container under the rear portion of clutch housing to catch the hydraulic oil from the pump inlet pipe and the cooler return pipe, when the tractor is separated.

IMPORTANT: Do not lose check valve assembly (tractors without Hi-Lo or reverser) in end of hydraulic pump inlet pipe when separation is made. Install caplugs on hydraulic pipes and fittings to prevent entry of foreign material.

Remove the cap screws securing the clutch housing to the engine and roll rear portion of tractor away from engine. Place a metal support stand under transmission.

ASSEMBLY

Remove caplugs and join engine and clutch housing. Reverse the numbered removal steps. Remove JDG-9 support stand and floor jack. Tighten cap screws to 170 ft-lbs torque.

Install battery, side grille screens, hood, muffler, and cowl. Start engine, inspect for leaks, and check operation.

SEPARATING CLUTCH HOUSING FROM TRANSMISSION CASE

Drain the transmission (remove both drain plugs). Remove the hydraulic oil filter cover and element.

Remove the drawbar from tractor.

Disconnect the clutch return spring. Remove the left-hand and right-hand footrests. Remove the transmission shield.

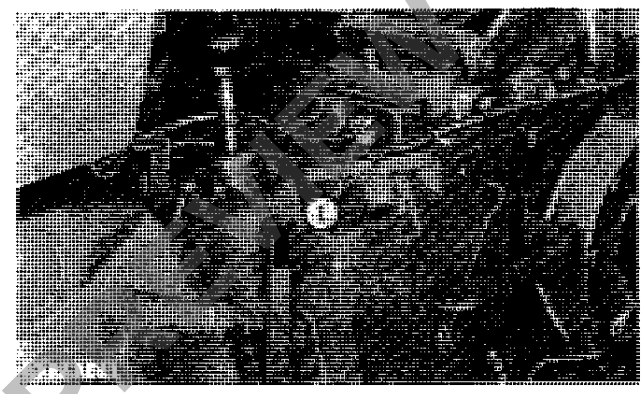


Fig. 4-Left-Hand Separation Procedures

1. Disconnect wiring harness from start-safety switch and light switch (Fig. 4).

2. Disconnect hydraulic oil reservoir vent hose (Fig. 5). Disconnect mid couplers (if equipped).

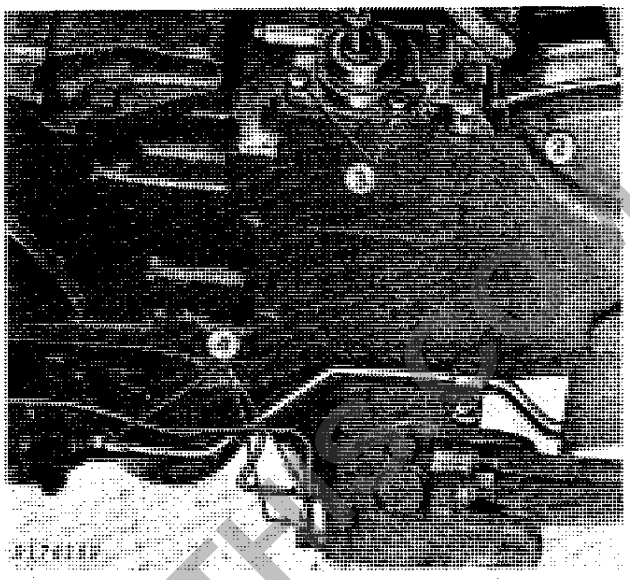


Fig. 5-Right-Hand Separation Procedures

3. Remove control valve cover, and remove shift cover cap screws (tractors with Hi-Lo shift). Remove shift cover from clutch housing. Inside the clutch housing, remove the two clutch housing-to-transmission case cap screws, and the gear shifter lever guide spring.

4. Disconnect brake pipes from brake valve housing, and disconnect pressure pipe at pressure control valve.

Install JDG-9 support stand on flywheel housing.

CAUTION: Install a wood block between front axle and front support on both sides of tractor to prevent assembly from tipping (Fig. 6).

Place floor jack under transmission case.

Remove the clutch housing-to-transmission case cap screws, and separate units. Install caplugs.

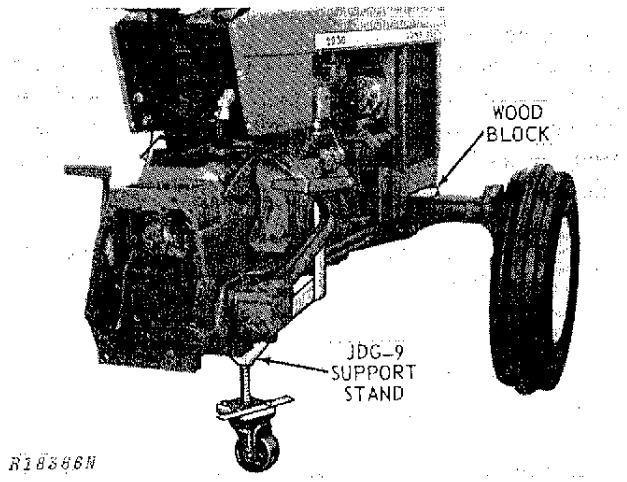


Fig. 6-Clutch Housing Separated From Transmission

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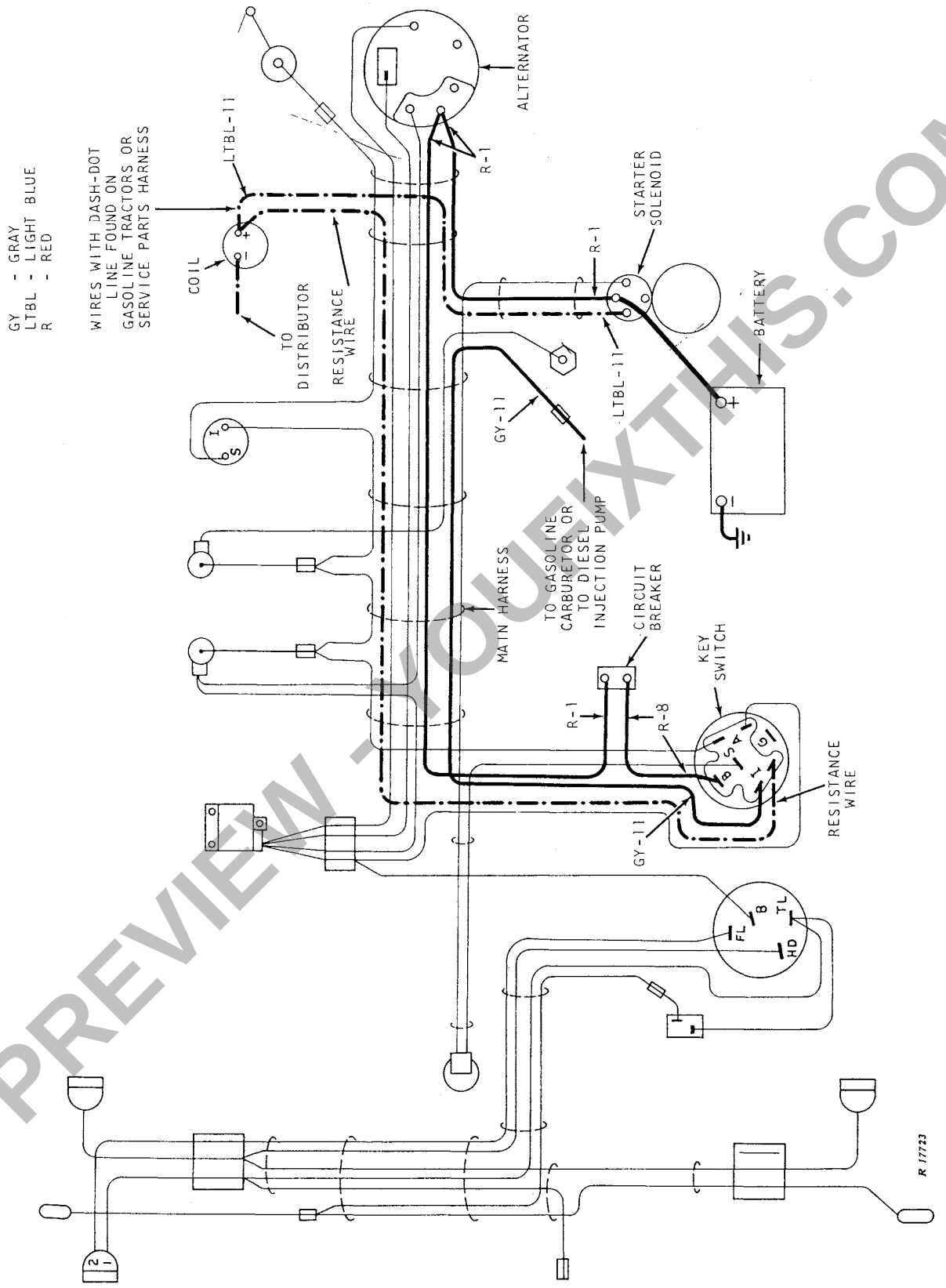
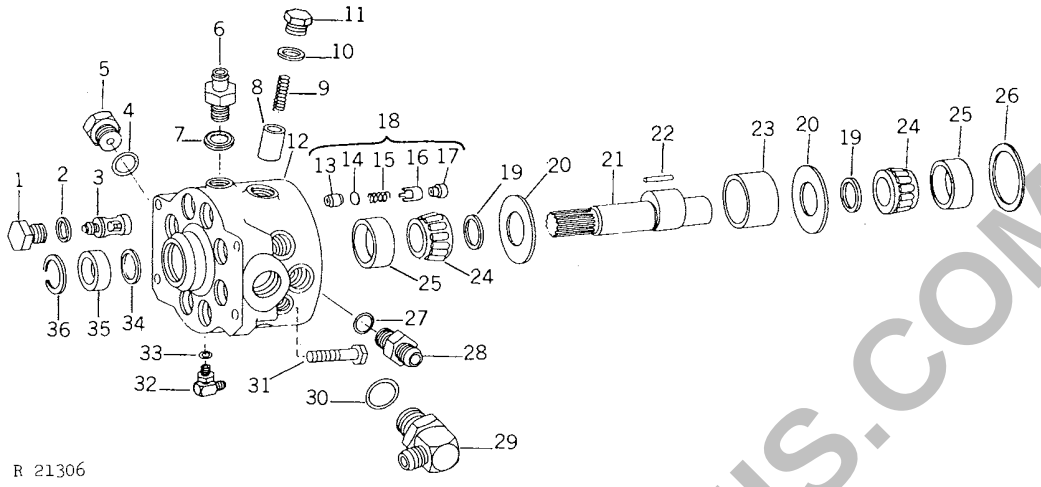


Fig. 3-Ignition Circuit On Tractor Serial No. -187300 (Shown in Bold Line)

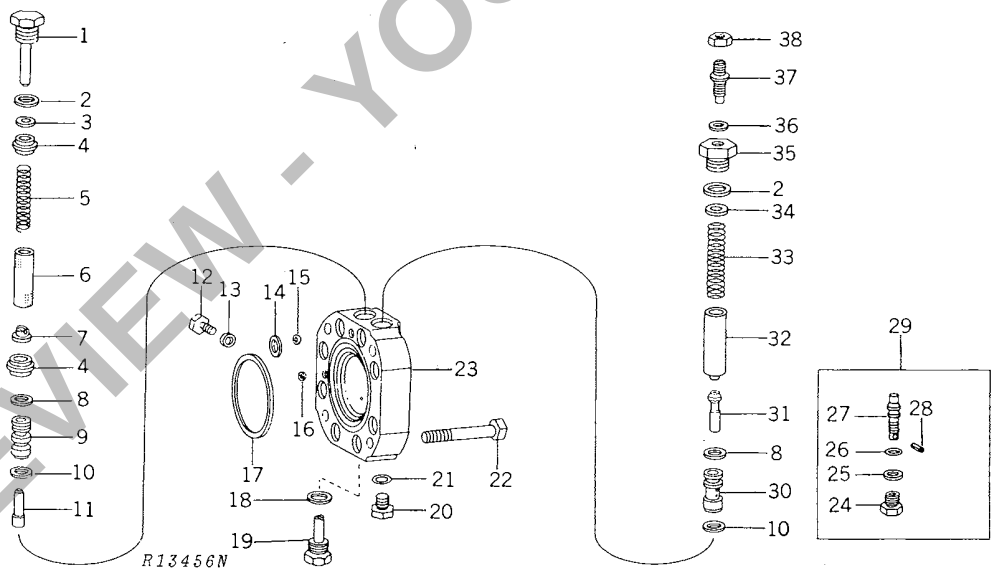
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1—Plug (8 used)
2—O-Ring (8 used)
3—Inlet Valve (8 used)
4—O-Ring
5—Plug
6—Connector
7—Special Washer
8—Piston (8 used)
9—Spring (Set of 8)
10—O-Ring (8 used)
11—Plug (8 used)
12—Housing
13—Seat (8 used)
14—Discharge Valve (8 used)
15—Spring (8 used)
16—Guide (8 used)
17—Stop (8 used)
18—Valve (complete 8 used)
19—Spacer (2 used)
20—Thrust Washer (2 used)
21—Shaft
22—Bearing (36 used)
23—Race
24—Bearing Cone (2 used)
25—Bearing Cup (2 used)
26—Shim
27—O-Ring
28—Connector
29—Elbow
30—O-Ring
31—Cap Screw (4 used)
32—Elbow
33—O-Ring
34—Quad Ring Packing
35—Oil Seal
36—Snap Ring

Fig. 11-2.40-Cu. In. Pump



1—Plug
2—O-Ring
3—Washer
4—Packing
5—Spring
6—Filter
7—Guide
8—O-Ring
9—Sleeve
10—O-Ring
11—Crankcase Outlet Valve
12—Plug
13—O-Ring
14—Packing
15—Gasket
16—O-Ring
17—O-Ring
18—O-Ring
19—Plug
20—Plug
21—O-Ring
22—Cap Screw
23—Stroke Control Valve Housing
24—Bushing
25—O-Ring
26—O-Ring
27—Shut-Off Screw
28—Spring Pin
29—Shut-Off Screw Assembly
30—Sleeve
31—Stroke Control Valve
32—Guide
33—Spring
34—Washer
35—Bushing
36—O-Ring
37—Adjusting Screw
38—Nut

Fig. 12-Exploded View of Pump Stroke Control Valve (2.40-Cu. In. Pump)

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NOTE: Valve seat insert bore reconditioning should be done by a qualified shop.

After having reconditioned valve insert bores in cylinder head, chill replacement inserts and driver. Place inserts into cylinder head bores, maintaining a pressure on each insert for one minute, to ensure that inserts do not "creep" out when warming up.

Install exhaust valves and check measurement ("a," Fig. 3). If an exhaust valve recess measurement is not within specifications, remove valve and grind valve seat to dimensions (see Specifications).

Cylinder Head

Inspect cylinder head for flatness, cracks, damage to finished surface and deposits in coolant galleries.

If absolutely necessary, the cylinder head can be reconditioned to restore surface finish or correct flatness. The MAXIMUM amount that can be removed from the cylinder head is 0.030 inch. Remove ONLY what is necessary to correct damage. Check distance valve is recessed into head after repairs have been made, to insure proper clearance.

Rocker Arm Assembly

Make sure that rocker arm oil holes are not plugged.

Check rocker arm and rocker arm shaft for wear. Rocker arm shaft O.D. is 0.7869 to 0.7879 inch. Shaft may be 0.7849 inch and still be acceptable. I.D. of rocker arm bore is 0.7900 to 0.7920 inch. Bore can also be worn an additional 0.0020 inch.

If ends of arms are worn, resurface them.

Thoroughly clean holes in rocker arms, rocker arm shaft, and rocker arm mounting brackets. This is especially important for the rear bracket, because oil is fed to the rocker arm shaft through this hole.

On gasoline engines, replace the intake valve stem O-ring.

If a failed valve has been replaced, also replace the rocker arm and push rod for that valve.

Assembly

Assemble parts on rocker arm shaft in sequence removed. Position plugs correctly in each end of the rocker arm shaft.

Apply AR44402 Lubricant to valve stems and guides and install valves in 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 counterbore of the head.

Install rotators or spring retainers and retainer locks on valves. "Pop" each valve three or four times with a soft mallet to insure proper positioning of the retainer locks.

Installation

Use the following list of torque specifications when installing cylinder head and valve train parts.

TORQUES FOR HARDWARE

Location	Torque (ft-lbs)
Rocker arm shaft clamps to head	35
Cylinder head to block	110
Injection nozzles	14-17
Water manifold to head	35
Intake manifold to head	35
Exhaust manifold to head	35

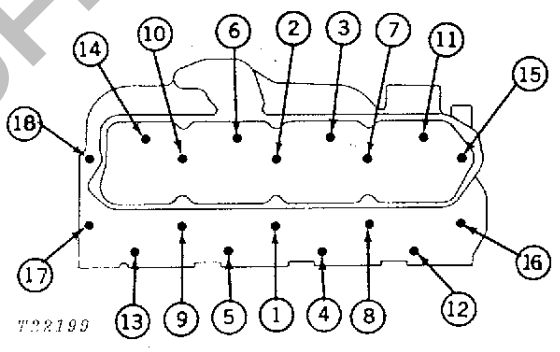


Fig. 5-Cylinder head Cap Screw Tightening Sequence

Install cylinder head gasket dry. Dip cap screws in engine oil before installation. Install cylinder head, using hardened flat washers under cap screws. Tighten cap screws evenly to 110 ft-lbs torque following sequence shown in Fig. 5.

Install push rods in holes from which they were removed.

Install valve stem wear caps on diesel valves making certain caps rotate freely.

Install rocker arm assembly. Make sure that spring pin in head aligns with pin hole in rocker arm shaft. This will align lubricating holes in shaft and head. Tighten rocker arm shaft clamps to 35 ft-lbs torque.

Valve Clearance Adjustment

The engine may be either hot or cold during valve adjustment.

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ASSEMBLY

Install a new clutch housing-to-transmission case gasket and new rubber packings. Remove caplugs.

IMPORTANT: If tractor has a mid-PTO, be sure spring and ball are inserted in PTO drive shaft before joining units.

Join front and rear units. Reverse the numbered separation steps. Tighten cap screws to specified torque.

Install the transmission shield, footrests, clutch return spring, and drawbar.

Install hydraulic oil filter element and cover. Fill transmission to proper level.

Remove JDG-9 support stand, floor jack, and wood blocks.

SEPARATING TRACTOR FRONT END FROM ENGINE

Remove right-hand cowl. Disconnect battery cable and ground strap. Remove battery, side grille screens, hood, muffler, and front ballast (if used). Drain cooling system. Remove side frames (if equipped).

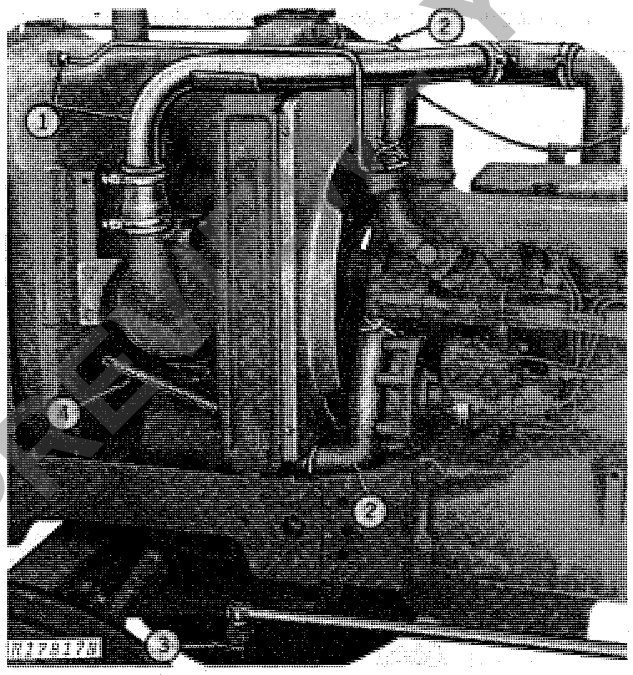


Fig. 7-Left-Hand Removal Procedures

1. Remove the air intake pipe (Fig. 7) and leak-off pipe (diesel).
2. Remove the upper and lower radiator hoses.
3. Disconnect drag link and governor spring strap (gasoline).
4. Remove side grille screen springs.

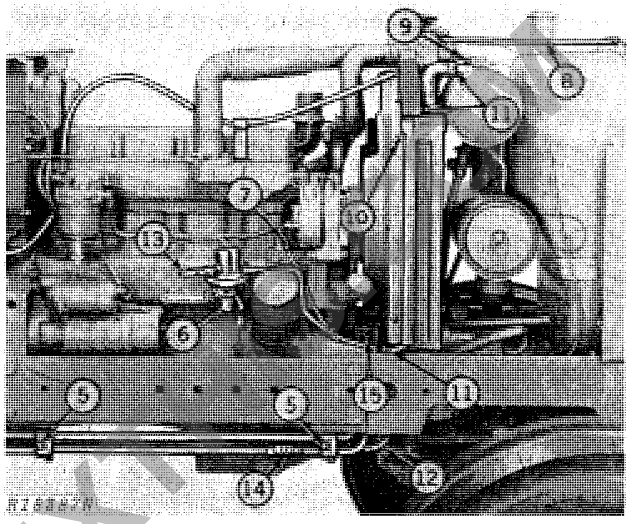


Fig. 8-Right-Hand Removal Procedures

5. Remove hydraulic pipe clamps (Fig. 8).
6. Close fuel tank valve (on bottom of tank), and remove fuel pump and oil filter.
7. Disconnect fuel gauge wire at connector.
8. Remove radiator support rod.
9. Disconnect hydraulic reservoir vent hose.
10. Remove screws fastening fan shroud to radiator, and slide fan shroud toward engine.
11. On tractors with Hi-Lo shift or reverser, disconnect the oil cooler inlet and outlet hoses. Remove radiator by sliding radiator out toward left-hand side of tractor.
12. Remove the hydraulic oil cooler return pipe (tractors with Hi-Lo shift or reverser). On tractors without Hi-Lo shift or reverser, remove the reservoir outlet pipes.
13. Remove fuel pipe.
14. Disconnect hydraulic pump pressure pipe at connector.
15. Disconnect hydraulic pump drive coupling.

CAUTION: Place support stands under front and rear of tractor front end (Fig. 9), to prevent tipping forward or backward. Install a wood block between front support and axle on both sides of tractor to prevent tipping sideways.

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2030 TRACTOR

TECHNICAL MANUAL
TM-1051 (Nov-74)

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All information, illustrations and specifications contained in this technical manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

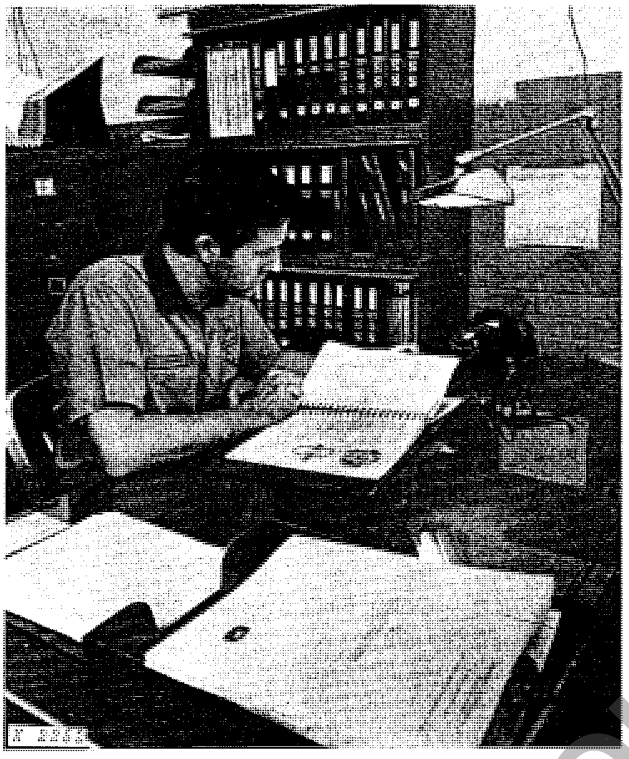
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INTRODUCTION



Use FOS Manuals for Reference



Use Technical Manuals for Actual Service

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

- **FOS Manuals—for reference**
- **Technical Manuals—for actual service**

The two kinds of manuals work as a team to give you both the general background and technical details of shop service.

Fundamentals of Service (FOS) Manuals cover *basic* theory of operation, *fundamentals* of trouble shooting, *general* maintenance, and *basic* types of failures and their causes. FOS Manuals are for training new men and for reference by experienced men.

Technical Manuals are concise service guides for a *specific* machine. Technical Manuals are on-the-job guides containing only the vital information needed by a journeyman mechanic.



When a serviceman should refer to a FOS Manual for more information, a FOS symbol like the one at the left is used in the TM to identify the reference.

Some features of this technical manual:

- *Table of contents at front of manual*
- *Exploded views showing parts relationship*
- *Photos showing service techniques*
- *Specifications grouped for easy reference*

This technical manual was planned and written for you—a journeyman mechanic. Keep it in a permanent binder in the shop where it is handy. Refer to it whenever in doubt about correct service procedures or specifications.

Using the technical manual as a guide will reduce error and costly delay. It will also assure you the best in finished service work.

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

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Repair

CAUTION: Cleaning and repairing a fuel tank is very dangerous. Live sparks, smoking, or fire of any nature should never be permitted in the vicinity of the cleaning or repairing operation.

FOS See FOS Manual 30—ENGINES for fuel tank repair information.

Installation

If tank was repaired, be sure the inside is as clean as possible before installing.

Install fuel gauge float and sending unit (if removed). The air cleaner may also be installed at this time.

Fasten fuel tank to tractor front end support.

Connect fuel pipes, radiator brace rod, front plate, and fuel gauge sending unit wire. Also connect air intake pipe hose to air cleaner, and tighten hose clamps securely.

Open fuel shut-off valve. Install hood, grille screens, and side shields.

Fill tank with the proper grade of clean fuel (refer to the tractor operator's manual). Check the vent hole in fuel tank cap to make sure it is not plugged.

Bleed the fuel system (page 30-15-3).

FUEL PUMP

General Information

Fuel flows from the fuel tank at gravity pressure to the inlet side of the diaphragm-type pump. This pump increases the fuel pressure to 3-1/2 to 4-1/2 psi (at idle speed), and forces fuel through the filter to the injection pump.

The fuel pump is operated by an eccentric lobe on the engine camshaft.

Diagnosing Malfunctions

Before replacing the pump when fuel does not flow (or only a small amount flows), check the following sources that would limit pump performance:

Fuel shut off at tank.
Hand primer left in the upward position.
Clogged fuel line.
Loose or damaged fuel line connections.

If correction of these conditions does not provide a satisfactory flow of fuel, the pump is defective and must be replaced.

Removal

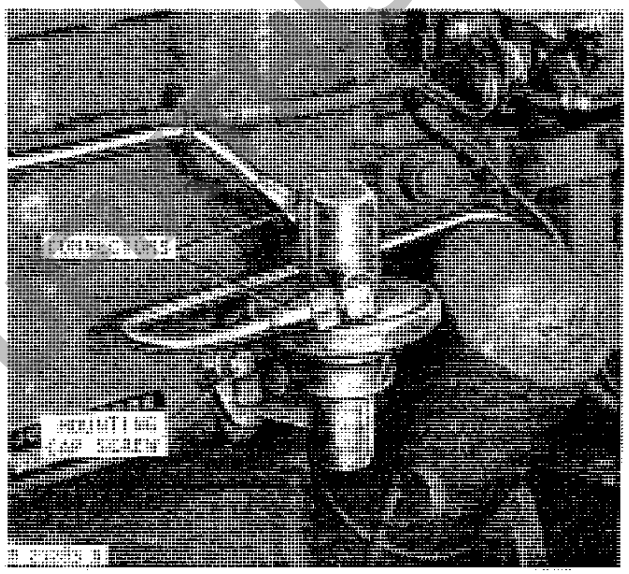


Fig. 3-Fuel Pump

Close the fuel tank shut-off valve, and disconnect the pump inlet and outlet pipes (Fig. 3).

Remove mounting stud nuts, and lift out pump from engine block.

Repair

The fuel pump is not designed to be repaired. If pump is defective, install a new one.

Installation

Be sure engine block pad is clean, and install pump.

Connect the fuel pipes and open the shut-off valve.

Bleed the fuel system (see page 30-15-3).

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REPAIR

If desired, rotate solenoid switch to remove it without disturbing the field frame.

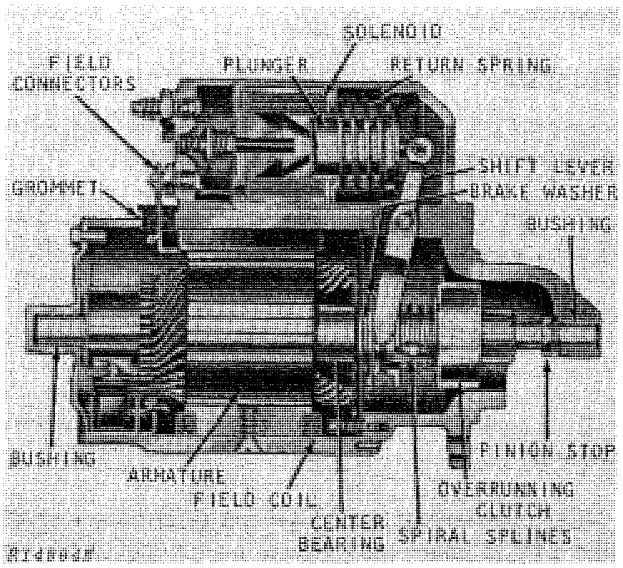


Fig. 4-Sectional View of a Starter

Disconnect field connectors (Fig. 4). Remove commutator end frame and field frame. (On Model No. 1108319 starter, leather brake washer is at commutator end of armature.)

Remove solenoid and solenoid return spring. (On Model No. 1107863 and 1107871, remove center bearing). Remove shift lever pivot screw and armature. Remove thrust collar.

Use pipe coupling to drive the pinion stop from snap ring, Remove snap ring, pinion stop, and clutch assembly. On Model No. 1107863 and 1107871, remove brake washer and center bearing.

Solenoid Switch

Remove nuts and sealing washers from solenoid motor and "S" terminals when removing switch cover.

The "R" terminal (for ignition bypass) contact finger height above the surface of the main contact (Fig. 5) should be 1/16 to 3/32 inch. Bend the finger to adjust contact height.

Replacement "S" terminal clips and motor terminal studs are soldered to winding leads. Use new sealing washers when assembling the solenoid.

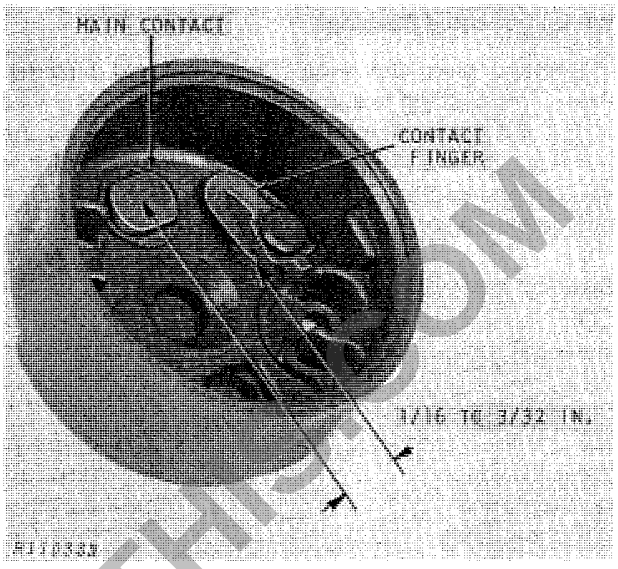


Fig. 5-"R" Terminal Contact Finger

Overrunning Clutch Drive

FOS

See Chapter 5 of FOS Manual 20—ELECTRICAL SYSTEMS for overrunning clutch service information.

Pinion should turn freely and smoothly in the overrunning direction only.

Bushings

Pre-Lubricated Bushings

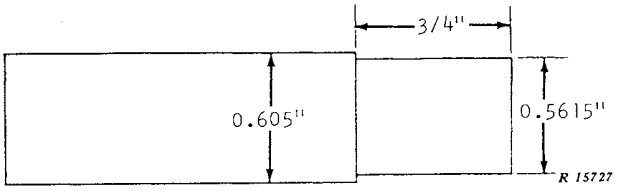


Fig. 6-Pre-Lubricated Bearing Arbor Dimensions

When installing pre-lubricated bushings in the overrunning clutch, use an arbor (Fig. 6) to prevent bearing collapse. After installation, check bushing size. Burnish bushing to size if necessary.

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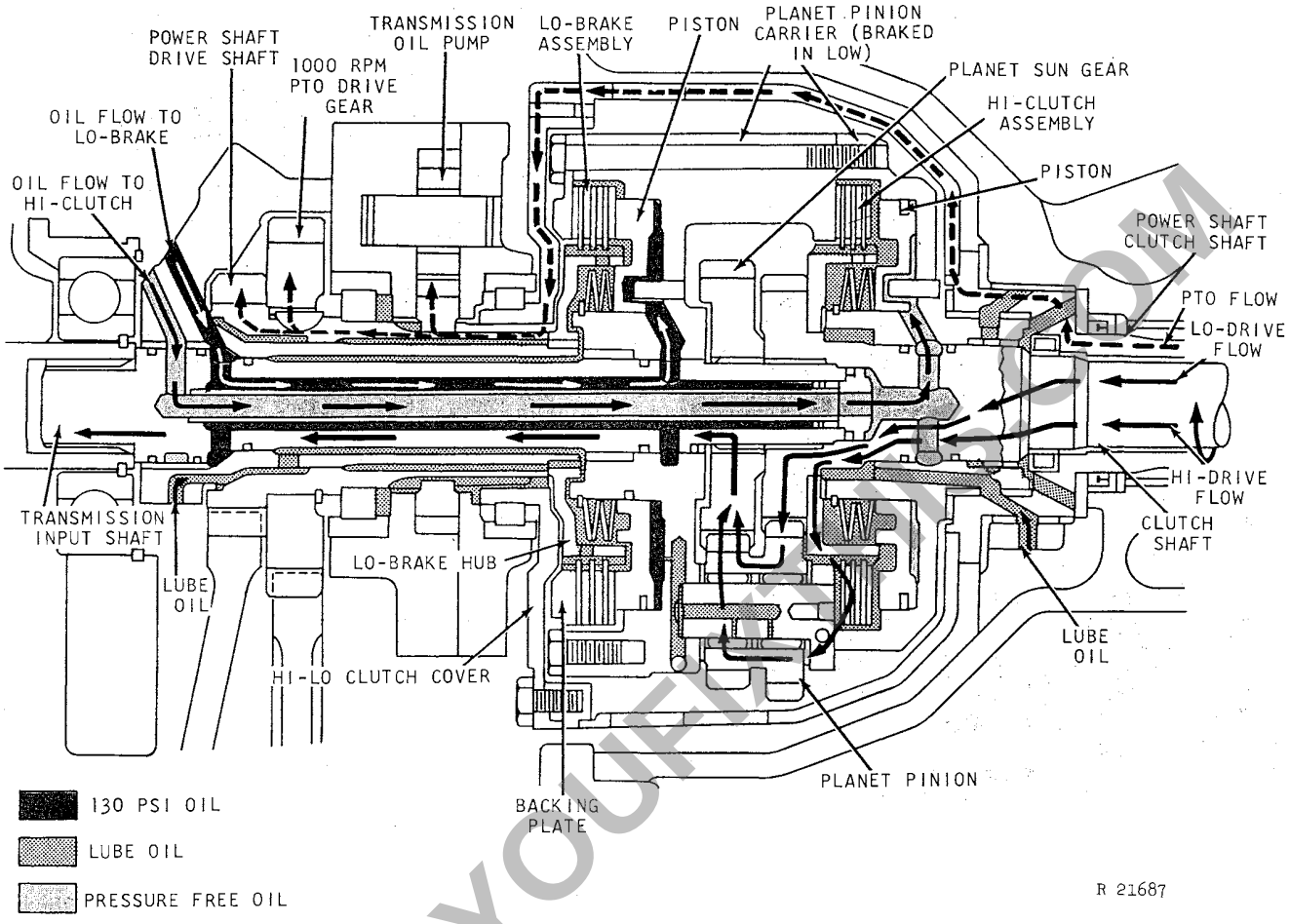


Fig. 3-Hi-Lo Shift Power Flows

Hi-Drive Power Flow

At the input end, the clutch shaft is driven at engine speed by the clutch driven disk.

The "Hi" clutch hub is welded to the clutch shaft, the disks are splined to the hub, and the separator plates are tanged to the "Hi" clutch drum.

During a "Hi" shift, pressure oil from the control valve causes the piston to engage the "Hi" clutch disks and plates, forming a solid unit. Now the planet pinion carrier, attached to the "Hi" clutch drum, rotates with the clutch shaft.

Since one planet pinion gear is in mesh with the clutch shaft gear, it is locked to the planet pinion carrier. Therefore, the rotating force of the carrier is transmitted to the planet sun gear through the other planet pinion gear.

The power flow continues from the planet sun gear through the transmission input shaft and on to the transmission.

Lo-Drive Power Flow

The "Lo" brake hub is splined to the clutch oil manifold, which is attached to the clutch housing. The "Lo" brake disks are splined to the hub, and the separator plates are tanged to the planet pinion carrier.

During a "Lo" shift, pressure oil from the control valve causes the piston to engage the "Lo" brake disks and plates, forming a solid unit, and stopping the planet pinion carrier rotation. Now the pinions function as countershafts, transmitting power from the clutch shaft gear to the planet sun gear. The different gear ratio causes the reduction in speed for a "Lo" drive.

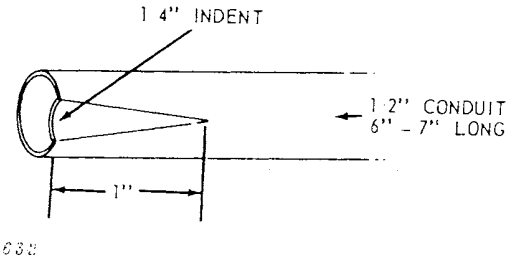
The power flow from the planet sun gear is identical to that of the "Hi" drive.

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SPECIAL TOOLS—Continued



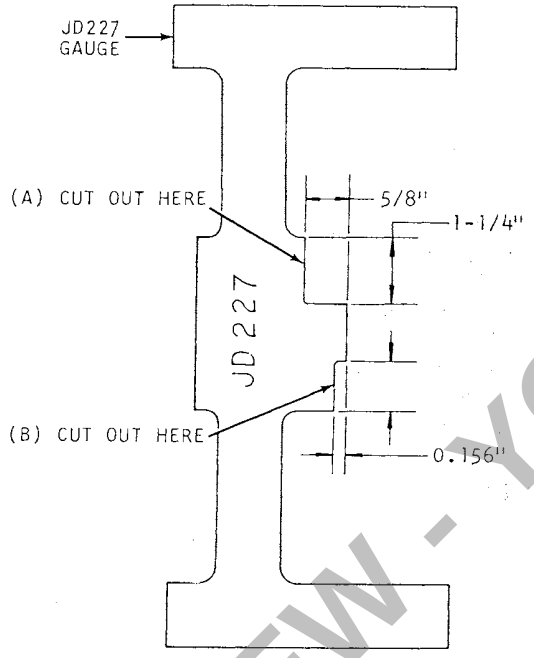
R5632

Fig. 1-Tool For Transmission Shifter Interlock Balls

The procedure for making the tool is as follows:

1. Cut a 6 to 7 inch length of 1/2-inch electrical conduit.

2. Make an indentation 1/4 inch deep on one end, tapering it out 1 inch along the tube. See Fig. 1.



R 21732 N

Fig. 2-Modifying JD227 Clutch Release Lever Adjusting Gauge

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