

## Section 10 GENERAL

### CONTENTS OF THIS SECTION

|                                                                    | Page     |                                                                       | Page     |
|--------------------------------------------------------------------|----------|-----------------------------------------------------------------------|----------|
| <b>GROUP 00—SPECIFICATIONS</b>                                     |          | <b>GROUP 15—LUBRICATION</b>                                           |          |
| General Tractor Specifications .....                               | 10-00-1  | Lubricants .....                                                      | 10-15-1  |
| Predelivery .....                                                  | 10-00-4  | Engine .....                                                          | 10-15-2  |
| Tune-Up .....                                                      | 10-00-5  | Transmission-Hydraulic System .....                                   | 10-15-3  |
| Lubrication .....                                                  | 10-00-5  | Hi-Crop Final Drive Housings .....                                    | 10-15-5  |
| Separation .....                                                   | 10-00-6  | Front Wheel Bearings .....                                            | 10-15-6  |
| Special Tools .....                                                | 10-00-7  | Grease Fittings .....                                                 | 10-15-6  |
| <b>GROUP 05—PREDELIVERY, DELIVERY,<br/>AND AFTER-SALE SERVICES</b> |          | <b>GROUP 20—SEPARATION</b>                                            |          |
| Dealer Predelivery Service .....                                   | 10-05-1  | Removing SOUND-GARD® Body without<br>Control Support .....            | 10-20-1  |
| Inspection Checks .....                                            | 10-05-11 | Removing SOUND-GARD Body with<br>Control Support .....                | 10-20-5  |
| Dealer Service .....                                               | 10-05-13 | Separating Engine from<br>Clutch Housing .....                        | 10-20-10 |
| After-Sale Inspection .....                                        | 10-05-14 | Removing Front End .....                                              | 10-20-14 |
| <b>GROUP 10—TUNE-UP</b>                                            |          | Removing Engine .....                                                 | 10-20-18 |
| Preliminary Engine Testing .....                                   | 10-10-1  | Separating Clutch Housing from<br>Power Shift Transmission Case ..... | 10-20-21 |
| Engine Tune-Up .....                                               | 10-10-1  | Separating Clutch Housing from<br>QUAD-RANGE™ Transmission Case ..    | 10-20-24 |
| Operation .....                                                    | 10-10-7  | Removing Rear Axle Housing .....                                      | 10-20-26 |
| General .....                                                      | 10-10-7  |                                                                       |          |

### Group 00

## SPECIFICATIONS AND SPECIAL TOOLS GENERAL TRACTOR SPECIFICATIONS

|                                                                    | 4040                                             | 4240                                             |
|--------------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| <b>HORSEPOWER</b> (Factory observed PTO<br>horsepower at 2200 rpm) | 90 hp (67 kW)                                    | 110 hp (82 kW)                                   |
| <b>ENGINE:</b>                                                     |                                                  |                                                  |
| Type                                                               | 6-cylinder, in-line, valve-in-head,<br>diesel    | 6-cylinder, in-line, valve-in-head,<br>diesel    |
| Slow idle speed                                                    | 800 rpm                                          | 800 rpm                                          |
| Working speed range                                                | 1500 to 2200 rpm                                 | 1500 to 2200 rpm                                 |
| Bore and stroke                                                    | 4.25 x 4.75 in. (108 x 121 mm)                   | 4.56 x 4.75 in. (116 x 121 mm)                   |
| Displacement                                                       | 404 cu. in. (6.6 L)                              | 466 cu. in. (7.6 L)                              |
| Compression ratio                                                  | 16.7 to 1                                        | 17.0 to 1                                        |
| Firing order                                                       | 1-5-3-6-2-4                                      | 1-5-3-6-2-4                                      |
| Valve clearance                                                    |                                                  |                                                  |
| Intake                                                             | 0.018 in. (0.46 mm)                              | 0.018 in. (0.46 mm)                              |
| Exhaust                                                            | 0.028 in. (0.71 mm)                              | 0.028 in. (0.71 mm)                              |
| Injection pump timing                                              | TDC                                              | TDC                                              |
| Lubrication system                                                 | force-feed, pressurized with<br>full-flow filter | force-feed, pressurized with<br>full-flow filter |

### Lubricating Wide-Swing Drawbar

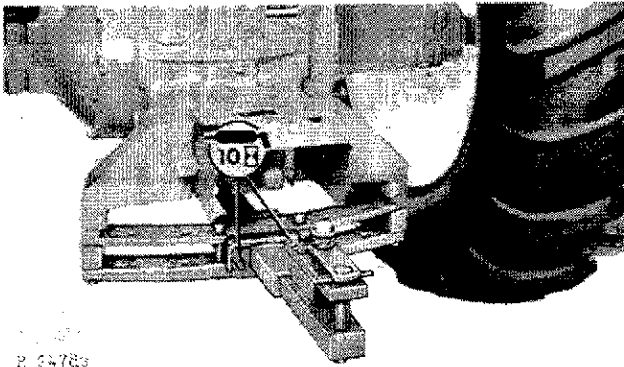


Fig. 13-Wide-Swing Drawbar Grease Fittings

If the tractor has a wide-swing drawbar, apply several shots of John Deere High Temperature Grease or its equivalent to the drawbar rollers.

**SERVICE INTERVAL:** At predelivery and every 10 hours.

### Lubricating Hi-Crop Rear Axles

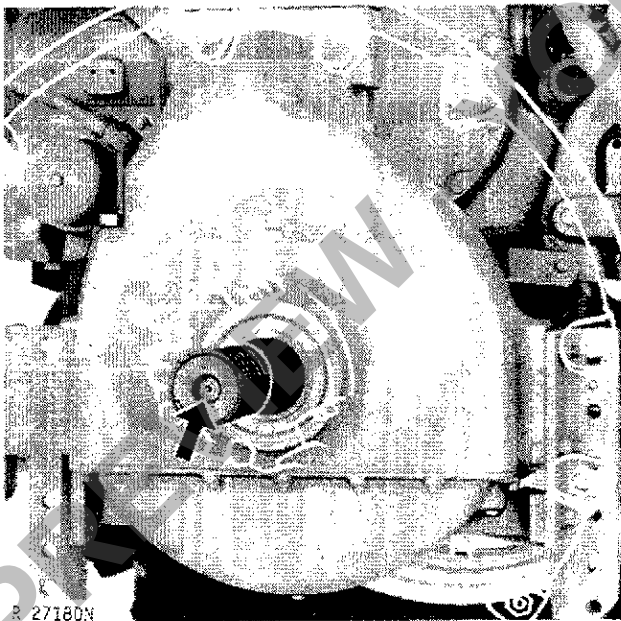


Fig. 14-Hi-Crop Rear Axle Grease Fitting

On Hi-Crop tractors, apply several shots of John Deere High Temperature Grease or its equivalent to the grease fittings on the ends of the rear axles.

**SERVICE INTERVAL:** At predelivery and every 10 hours.

### Lubricating Front Wheels



Fig. 15-Front Wheel Grease Fitting

When the tractor is being operated in extremely wet and muddy conditions, grease each front wheel (except Power Front-Wheel Drive) daily or every 10 hours. To do so, remove the pipe plugs, install fittings, and apply several shots of John Deere High Temperature Grease or its equivalent. CONTINUE lubricating the front wheels at this interval until the bearings can be cleaned and packed with wheel bearing grease.

**SERVICE INTERVAL:** Only if tractor is operated in extremely wet and muddy conditions, lubricate every 10 hours until bearings can be cleaned and packed as instructed on page 6.

### Lubricating 3-Point Hitch

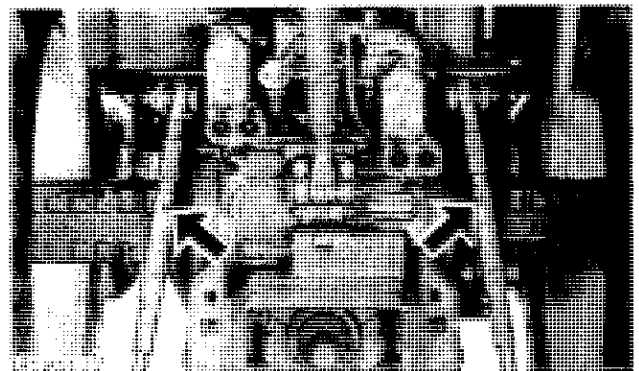


Fig. 16-3-Point Hitch Grease Fittings

Grease the 3-point hitch by applying 3 or 4 shots of John Deere High Temperature Grease or its equivalent at each fitting.

**SERVICE INTERVAL:** At predelivery and every 200 hours.

**Access—Continued**

4. Remove water manifold.
5. Remove fuel injection lines.
6. Remove fuel return lines.
7. Remove injection nozzles.
8. Remove rocker arm cover vent hose.
9. Remove rocker arm cover.

**ROCKER ARM ASSEMBLY****Removal**

1. Remove rocker arm shaft clamp cap screws.

**NOTE:** When removing rocker arm shaft components, identify for reassembly into original position.

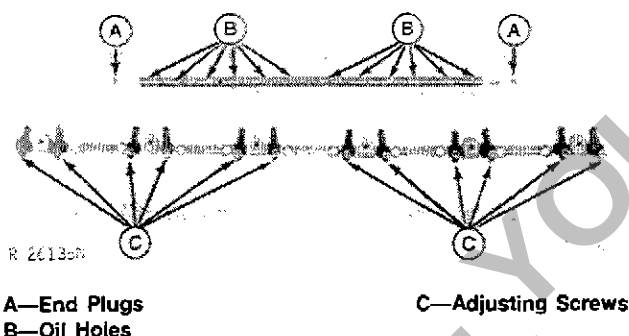


Fig. 5-Rocker Arm Shaft Components

2. Remove rocker arm shaft end plugs and slide components from shaft (Fig. 5).

**Inspection and Repair**

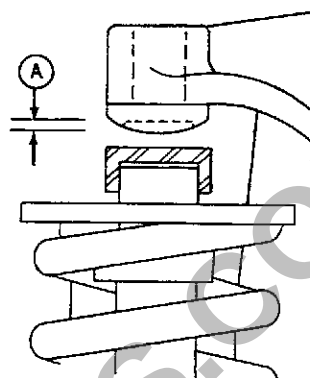
1. Inspect rocker arm shaft for scratches, scores, or excessive wear at points of rocker arm contact.

**NOTE:** Wear could indicate weak valve springs, bent push rods, or loose rocker arm shaft clamps.

2. Be sure that all oil holes are open and clean (B, Fig. 7).

3. Check rocker arm adjusting nut and screw for damage (C, Fig. 7).

4. Check for cups or concave wear on ends of rocker arms where they contact valve tips (A, Fig. 6).



R 26131N

A—Worn Area

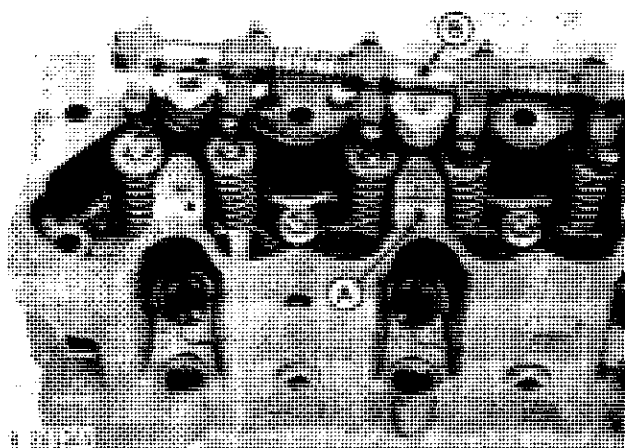
Fig. 6-Rocker Arm Wear

5. Examine spacer springs on shaft between rocker arms, and be sure they are strong enough to exert a positive pressure on arms.

**NOTE:** If the rocker arm has been damaged by a valve failure, replace it and the push rod when replacing valves.

**Assembly and Installation**

1. Assemble parts on rocker arm shaft in reverse of sequence removed.
2. Make sure rocker arm shaft end plugs are firmly seated in end of shaft.



A—Spring Pin

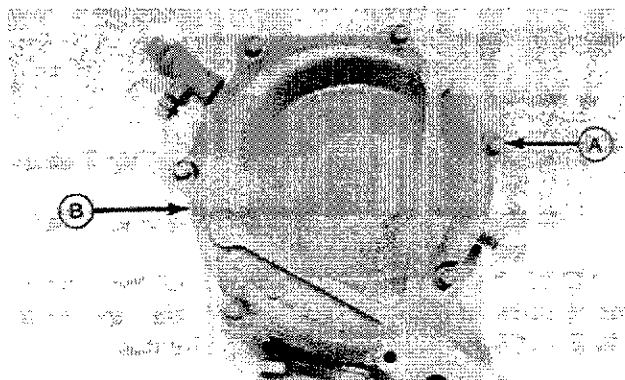
B—Locating Hole

Fig. 7-Rocker Arm Shaft Locating Holes

3. Position rocker arm shaft on head, insuring that spring pin (A, Fig. 7) and locating hole (B) in rocker arm shaft line up.

4. Tighten rocker arm shaft clamp cap screws to 45 to 65 ft-lbs (61 to 88 N·m) (6.1 to 8.8 kgm).

## Inspection and Repair



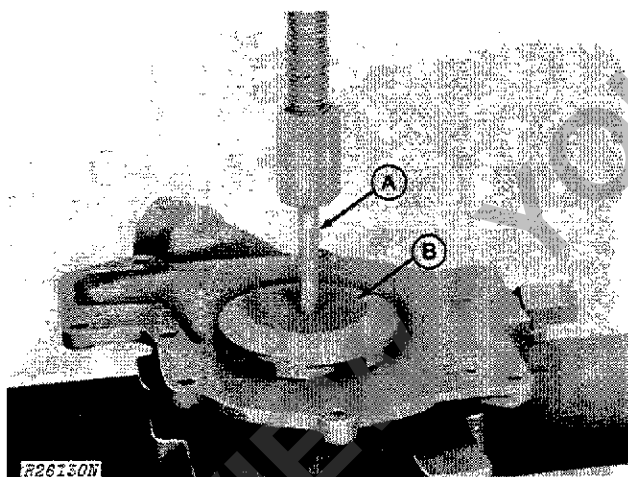
RG2960

A—Cover

B—Cap Screws

Fig. 6-Water Pump Cover

1. Remove the four pump cover-to-housing cap screws (B, Fig. 6). Carefully separate cover (A) from housing.



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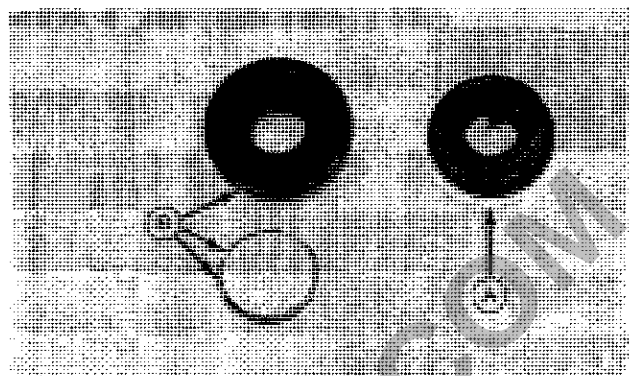
A—Driver

B—Impeller

Fig. 7-Removing Bearing

2. Use a hydraulic press and driver (A, Fig. 7) to push bearing and shaft assembly out of impeller (B) and pump housing.

**NOTE:** The unitized-type seal (seal with insert and cup all in one piece) has a press fit to both the bearing shaft and pump housing. See Fig. 8 for a comparison of the three-piece seal and one-piece seal. Usage of one-piece seal in production began with Engine Serial No. (148517- ) on 4240 Tractors only.

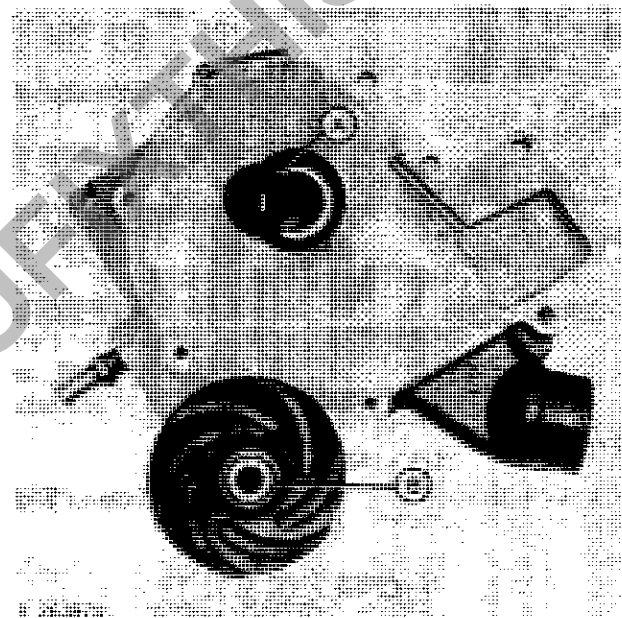


RG2952

A—One-Piece Seal

B—Three-Piece Seal

Fig. 8-Water Pump Seals



R26397N

A—Seal

B—Ceramic Insert

Fig. 9-Impeller, Seal, and Housing

3. On pumps with three-piece seal, remove seal (A, Fig. 9) from housing. Remove ceramic insert (B) and rubber cup from impeller. If pump has a one-piece seal, remove seal from housing.

## General Information—Continued

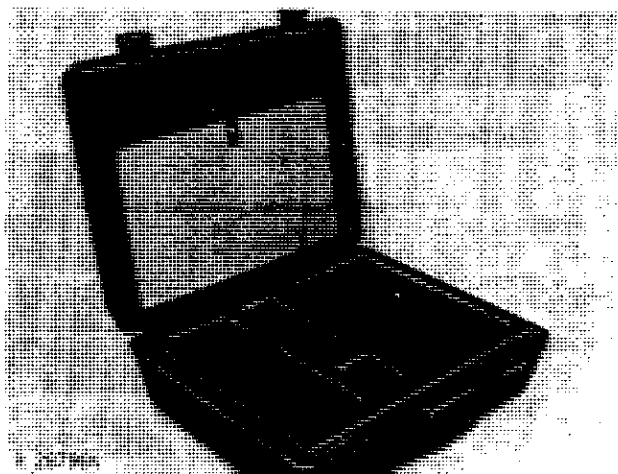


Fig. 5-D-05138ST Carrying Case

## Tool

## Use

D-05138ST Carrying Case

Store D-24001M0 Battery Tester D-05136ST Voltage Detector, D-19001TT Volt-Ohm-Amp Meter, and their operator's manuals

## Charging Circuit

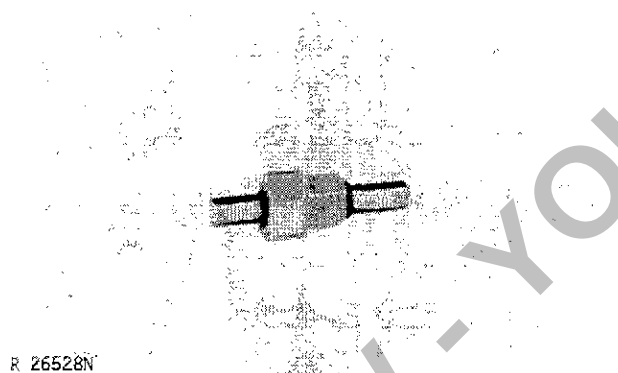


Fig. 6-JD-306 Alternator Pulley Nut Remover

D-19001TT Volt-Ohm-Amp Meter  
JD-306 Alternator Pulley Nut Remover

Test charging circuit

Remove and install alternator pulley retaining nut

## Starting Circuit

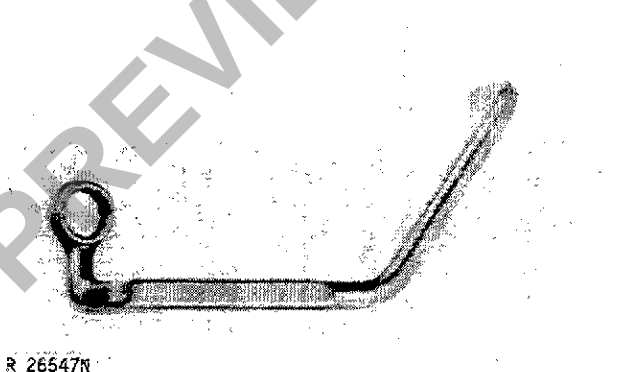


Fig. 7-JDE-80 Starter Wrench

JDE-80 Starter Wrench

Remove and install mounting bolt behind starting motor

## Group 00

# SPECIFICATIONS AND SPECIAL TOOLS

### SPECIFICATIONS

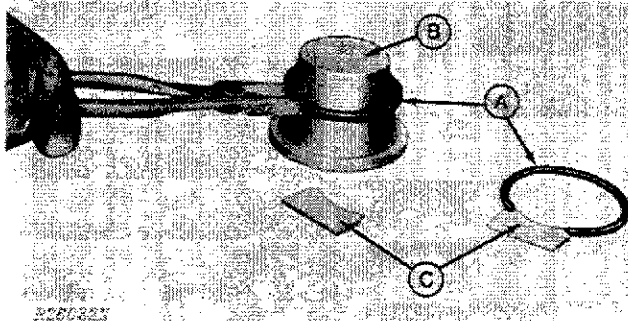
#### PERMA-CLUTCH™

| SPRING                           | FREE LENGTH                 | WORKING LOAD                                          |
|----------------------------------|-----------------------------|-------------------------------------------------------|
| Transmission Clutch Valve        |                             |                                                       |
| Upper .....                      | 2.1 in. ....<br>(53 mm)     | 1.80 in. at 51.3-62.7 lbs.<br>(45.5 mm at 228-279 N)  |
| Lower .....                      | 1.1 in. ....<br>(29 mm)     | 0.6 in. at 14-18 lbs.<br>(15 mm at 63-77 N)           |
| PTO Clutch Valve                 |                             |                                                       |
| Upper .....                      | 2.3 in. ....<br>(58 mm)     | 1.9 in. at 51-62 lbs.<br>(48 mm at 224-273 N)         |
| Lower .....                      | 1.1 in. ....<br>(28 mm)     | 0.6 in. at 11-13 lbs.<br>(15 mm at 48-60 N)           |
| Clutch Valve Arm Return .....    | 7.3 in. ....<br>(223 mm)    | 8.8 in. at 76.5-93.5 lbs.<br>(223 mm at 340-416 N)    |
| PTO .....                        | 4.2 in. ....<br>(106 mm)    | 4.2 in. at 7.6-9.3 lbs.<br>(148 mm at 34-42 N)        |
| Pressure Regulating Valve        |                             |                                                       |
| Outer .....                      | 2.97 in. ....<br>(75.4 mm)  | 1.63 in. at 14.7-17.9 lbs.<br>(41.4 mm at 66-79 N)    |
| Inner .....                      | 5.17 in. ....<br>(131.3 mm) | 3.98 in. at 35-43 lbs.<br>(101.1 mm at 157-192 N)     |
| Cooler Relief Valve .....        | 5.9 in. ....<br>(150 mm)    | 4.54 in. at 36.5-44.5 lbs.<br>(115.3 mm at 163-198 N) |
| Lube Reduction Valve .....       | 1.9 in. ....<br>(47 mm)     | 0.9 in. at 9-11 lbs.<br>(23 mm at 41-51 N)            |
| Transmission Clutch Return ..... | 2.6 in. ....<br>(66 mm)     | 2.3 in. at 170-208 lbs.<br>(59 mm at 757-925 N)       |
| PTO Clutch Return .....          | 1.3 in. ....<br>(33 mm)     | 0.9 in. at 43-53 lbs.<br>(22 mm at 192-235 N)         |

| ITEM                            | MEASUREMENT                       | PART DIMENSION                             |
|---------------------------------|-----------------------------------|--------------------------------------------|
| Clutch Separator Plate .....    | Thickness .....                   | 0.395-0.405 in. (10.0-10.3 mm)             |
| PTO Separator Plate .....       | Thickness .....                   | 0.195-0.205 in. (4.9-5.2 mm)               |
| Clutch and PTO Disks .....      | Thickness .....                   | 0.137-0.143 in. (3.4-3.6 mm)               |
|                                 | Minimum Thickness .....           | 0.110 in. (2.79 mm)                        |
|                                 | Minimum Facing Groove Depth ..... | 0.018 in. (0.46 mm)                        |
| Clutch Pedal .....              | Height .....                      | 5-1/2 in. (140 mm)                         |
| Transmission Clutch Valve ..... | O.D. ....                         | 0.7467-0.7473 in.<br>(18.966 to 18.982 mm) |
| Valve Bore .....                | I.D. ....                         | 0.7495-0.7505 in.<br>(19.037 to 19.063 mm) |

## Differential Drive Shaft Installation

1. File the ends of the four differential drive shaft snap rings so they will fit squarely on retainers.



A—Snap Rings      B—JDT-2 Cone      C—JDT-3 Retainers

Fig. 17-Expanding Differential Drive Shaft Snap Rings

2. Expand snap rings (A, Fig. 17) using OTC-614 snap ring pliers over JDT-2 special cone (B).

**IMPORTANT:** Do not expand snap rings more than necessary to insert retainers. Rings may take a permanent set if expanded too far.

3. Install expanded snap rings on JDT-3 retainers (C) to hold them while they are being installed on the drive shaft.

4. The differential drive shaft snap rings are of different thicknesses to allow the rear and center snap rings to slide over the front grooves without dropping in them. The thinnest rings are at the front to the thickest at the rear as follows:

Front of Shaft  
 0.142 in. (3.61 mm)  
 0.157 in. (3.99 mm)  
 0.172 in. (4.37 mm)  
 0.188 in. (4.78 mm)  
 Rear of Shaft

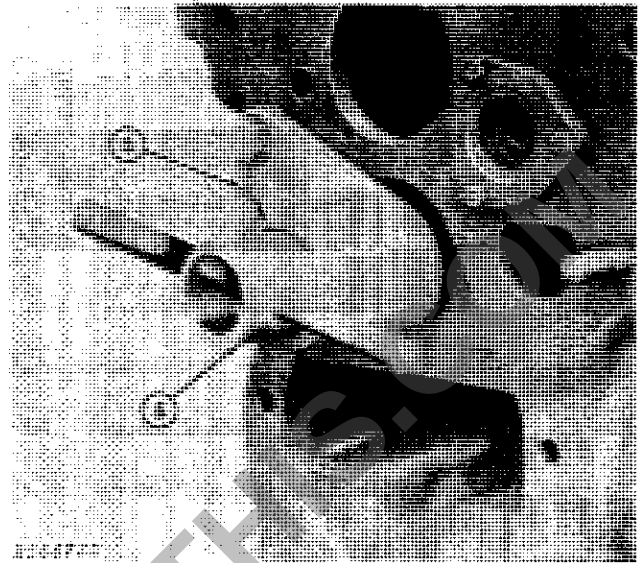
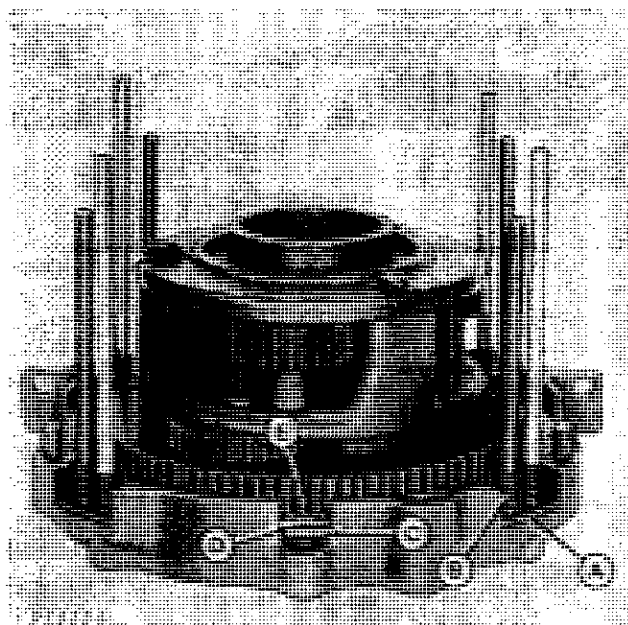


Fig. 18-Installing Dummy Shaft and Support

5. Install JDT-8-1 arbor support (Fig. 18) on front of transmission case.
6. Install JDT-20-1 sleeve in arbor support. Do not use bushing furnished with arbor. Insert a bar through holes in arbor for a handle.



A—Return Plate  
B—Return Springs  
C—B1 Ring Gear  
D—Separator Plate  
E—Brake Disk

Fig. 28-B1 Brake Assembly

5. Install brake piston return plate (A, Fig. 28) then eight springs (B) over guide screws and dowels.

6. Install B4 planetary sun gear in rear of planetary.

7. Install disk, separator plate and second disk, alternately.

8. Inspect B2 parts before assembly.

| B2 COMPONENT          | NO. USED | SPECIFICATION                                  |                                                                 |
|-----------------------|----------|------------------------------------------------|-----------------------------------------------------------------|
| Piston Return Springs | 8        | Free Length<br>0.83 in.<br>(21 mm)             | Working Load<br>0.625 in. at 23-29 lbs.<br>(16 mm at 102-130 N) |
| Piston Return Plate   | 1        | Thickness<br>0.118-0.122 in.<br>(3.00-3.10 mm) |                                                                 |
| Separator Plates      | 1        | Thickness<br>0.118-0.122 in.<br>(3.00-3.10 mm) |                                                                 |
| Brake Disks           | 2        | Thickness<br>0.117-0.123 in.<br>(2.97-3.13 mm) | Minimum Facing<br>Groove Depth<br>0.020 in.<br>(0.5 mm)         |
| Piston                | 1        | ID<br>9.258-9.262 in.<br>(235.15-235.16 mm)    | OD<br>11.596-11.604 in.<br>(194.54-294.74 mm)                   |

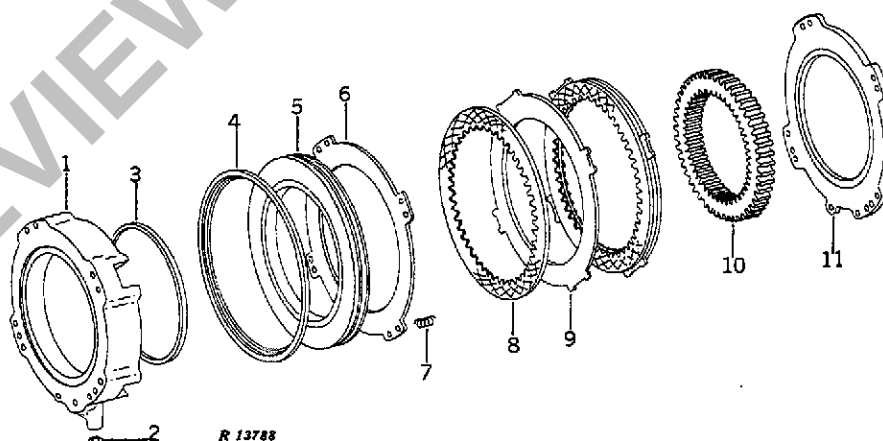
9. Install brake backing plate (11, Fig. 29) on B1 housing. Be sure oil holes are aligned as plate is installed over guide pins.

10. Install largest I.D. ring gear (B2) over B1 ring gear.

11. Install B2 disks and separator plate in B1 housing alternately over backing plate (disk against backing plate).

12. Install shorter spring (7) over each guide pin and screw.

13. Install larger I.D. B2 piston (common with B4 piston) with seals in B2 housing.



1—B2 Brake Housing  
2—O-Ring  
3—Inner Seal  
4—Outer Seal

5—Brake Piston  
6—Brake Piston Return Plate  
7—Spring (8 used)  
8—Brake Disk (2 used)

9—Separator Plate  
10—B2 Ring Gear  
11—Brake Backing Plate

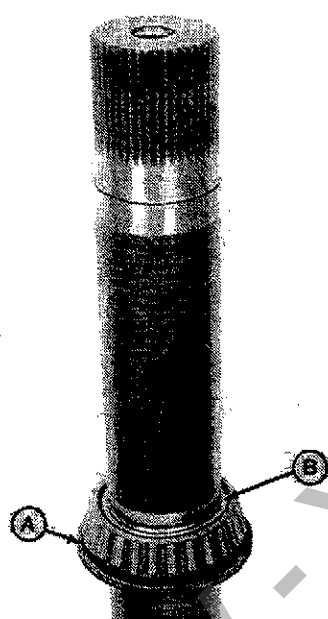
Fig. 29-Planetary Brake Parts

6. Coat inner oil seal lip with grease before installing axle.

7. Install and bottom outer oil seal cup in housing.

**CAUTION:** Plan a safe handling procedure to avoid burns when heating parts.

8. Heat axle bearing spacer (C, Fig. 4) to 460°F (237°C) and drop onto shaft. Drive on shaft shoulder until cool.



R27952N  
R 27952N

A—Outer Oil seal B—Outer Bearing Cone Driving Surface

Fig. 13—Inner End of Axle Shaft

9. Install outer bearing oil seal (A, Fig. 13) with metal side of seal facing driver. Coat seal with SAE multi-purpose grease.

10. Heat outer bearing cone (B) to 300°F (150°C) and install on shaft.

11. Drive or press cone and spacer, after cool, to reseat assembly against shoulder.

12. Install shaft with bearing, spacer, and seal in the axle housing. Install thrust washer (T, Fig. 4) in housing.

13. Assemble special cap screw (X, Fig. 4) through washer (W) in planetary.

14. Heat inner bearing cone (N) to 300°F (150°C) and install on shaft. Install planetary carrier assembly in housing and torque special cap screw to 170 lb-ft (230 N·m) (23 kgm).

15. Rotate axle in housing three revolutions and retorquer special cap screw to 170 lb-ft (230 N·m) (23 kgm).

16. Repeat step 15.

17. Install lock plate over cap screw. If plate will not fit by turning over, tighten cap screw 8° maximum.

18. Fill outer bearing compartment with SAE multi-purpose grease.

### Installation

1. Reverse the removal procedure to install the final drive. Also note the following special installation instructions.

2. When installing final drive assembly, install sun gear in differential. Install brake disk and backing plate on sun gear.

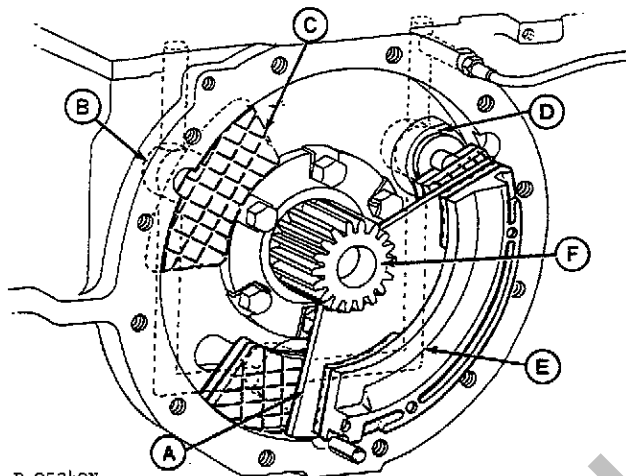
3. Torque rear axle housing-to-transmission case cap screws to 170 lb-ft (230 N·m) (23 kgm).

## Group 10 POWER BRAKES

### PISTONS, PLATES, AND DISKS

#### Removal

1. Remove the rear axle housing. See Section 50 Group 40 for instructions.



R 25342N

A—Brake Disk  
B—Brake Cylinder  
C—Pressure Plate

D—Piston  
E—Backing Plate  
F—Sun Pinion

Fig. 1-Pistons, Plates, and Disk

2. Remove brake backing plate (E, Fig. 1), disk (A), and sun pinion (F).

3. Remove the three pressure plates (C) and their pistons (D).

#### Repair

1. Inspect final drive gasket and replace if necessary.

2. Inspect backing plate and pressure plates for missing rivets or worn or loose facings, and replace as necessary.
  - a) New facings are 1/8 inch (3 mm) thick.
  - b) Facing rivet head depth is 1/16 inch (1.6 mm).

3. Inspect disks for wear or excessive play on sun pinion. Disk should be flat within 0.004 inch per inch (0.1 mm per 25.4 mm) of disk O.D.

4. Inspect piston bore O-rings and paper washer. Replace if damaged.

## REPLACING MAIN PUMP SHAFT OIL SEAL (With Pump On Tractor)

### Removal

1. (Not Illustrated) Remove bottom frame plate.

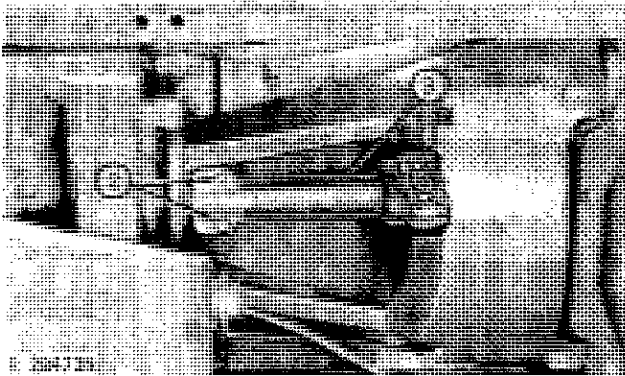


Fig. 12-Pump Drive Shaft

2. Crank engine to position coupler halves for removal of lock nuts and bolts. Remove bolts.
3. Remove drive shaft cap screws and drive shaft.
4. (Not Illustrated) Remove snap ring securing oil seal in pump housing.

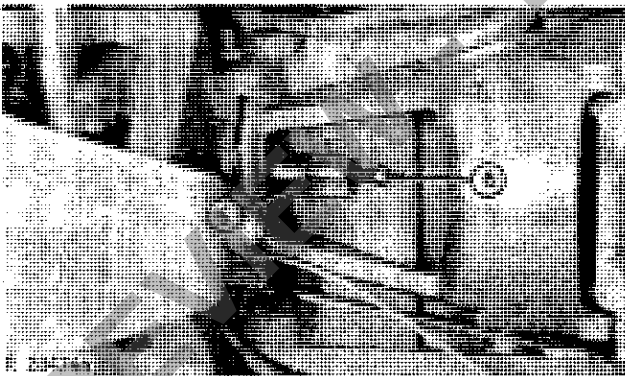


Fig. 13-JDH-35-A Seal Puller Installed

5. Install JDH-35-A Seal Puller over splines of pump shaft, and thread puller into seal ID.
6. Tighten puller screw to remove seal and seal puller from pump.

### Installation

1. (Not Illustrated) Coat lips of new seal with SAE Multipurpose-type grease.

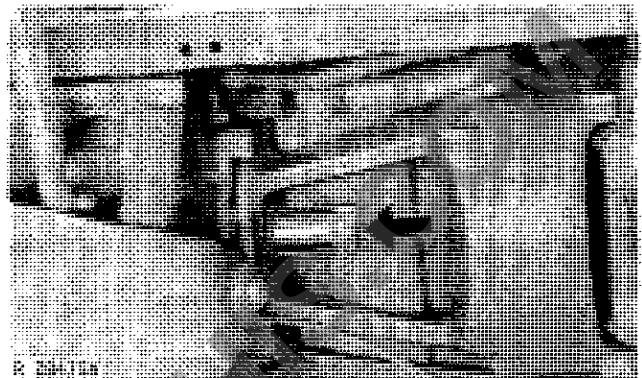
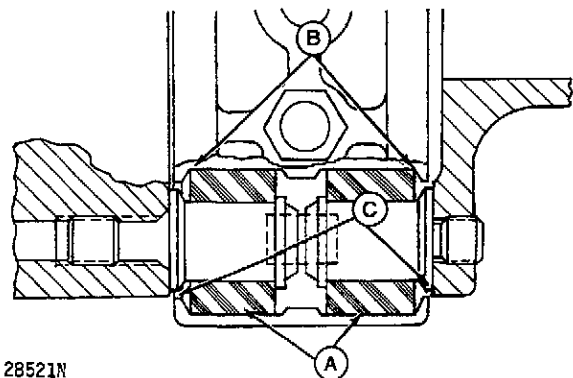


Fig. 14-JDH-31-A Seal Driver In Place

2. Install JDH-31-A Seal Driver over pump shaft. Be sure suppliers identification on seal is facing outward.
3. Install coupler shaft and tighten coupler shaft cap screws to 35 ft-lbs (47 Nm) (4.7 kgm).



A—Bushings

B—Outer Ends of Recesses

C—Clearance Points

Fig. 15-Bushing Placement

**NOTE:** When installing coupler halves, make sure the bushings (A, Fig. 15) are located at the outer ends of the recesses in the coupler halves. This is to provide running clearance at points C.

4. Install coupler halves and tighten cap screws to 30 ft-lbs (41 Nm) (4.1 kgm).
5. Install coupler half capscrew lock nuts and tighten to 30 ft-lbs (41 Nm) (4.1 kgm).
6. Install bottom frame plate.

15. Back out the adjusting cover valve locking screws on the lever side of the housing.

16. Turn in the adjusting cover valve locking screws on the opposite side of the housing to hold the other pressure and return valves on their seats.

**NOTE:** The same zero reading must be maintained during all four valve adjustments.

17. Adjust these two poppet valves the same way the first two were adjusted.

**NOTE:** Remember, pressure and return valves are diagonally located from each other in the valve housing.

18. After all four valves are adjusted, recheck the zero reading and all four valve adjustments.

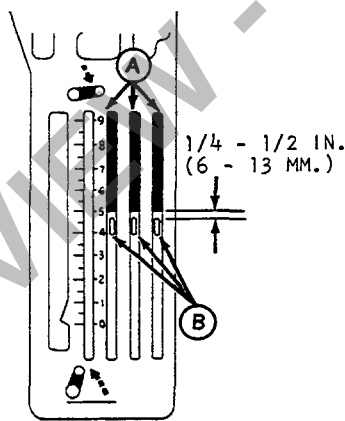
19. Install the flow control valve and spring, stop, (with pin pointing inward), valve springs, and guides. Torque cap screws to 35 ft-lbs (47 N·m) (4.7 kgm).

**NOTE:** Be sure flow control valve stop is started squarely in the bore.

**IMPORTANT:** Do not remove valves. If valves are removed, they must be readjusted in the housing.

### Selective Control Valve Installation

1. With packings in place, install selective control valve on rockshaft housing or rockshaft valve cover.



R 28017N

A—Float Lockout Stop

B—SCV Levers in Retract Position

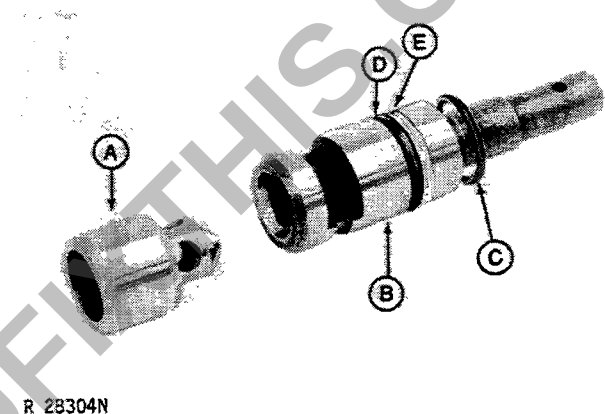
Fig. 23-Adjusting Selective Control Valve Levers

2. Attach control lever linkage so the lever is 1/4-1/2 inch (6-13 mm) from float stop when lever is in the retract detent position (Fig. 3).

3. Check and fill the main reservoir with John Deere HY-GARD Transmission and Hydraulic Oil.

4. Perform the selective control valve tests as described on page 270-30-11.

### Inlet Check Valve (Optional)



R 28304N

A—Inlet Check Valve  
B—Metering Valve  
C—Thrust Washer

D—O-Ring  
E—Backup Ring

Fig. 24-Inlet Check Valve

1. Inspect O-ring (D, Fig. 24) and backup ring (E) for damage: Replace as necessary.

2. Install the check valve (A) in the left-hand selective control valve or the valve that tends to settle.

3. Be sure the check valve is installed open end first in front of the metering valve (B). The metering valve and inlet check valve (A) are a matched set and must be used together. Install a teflon washer between the metering valve and the cap before assembly.

## AIR INTAKE SYSTEM

### PRESSURIZER BLOWERS AND SWITCH

#### General Information

The pressurizer blowers draw fresh outside air through the air intake openings in cab roof, pulling the air through the air intake filter, evaporator and heater cores, and discharge the conditioned air inside the SOUND-GARD body.

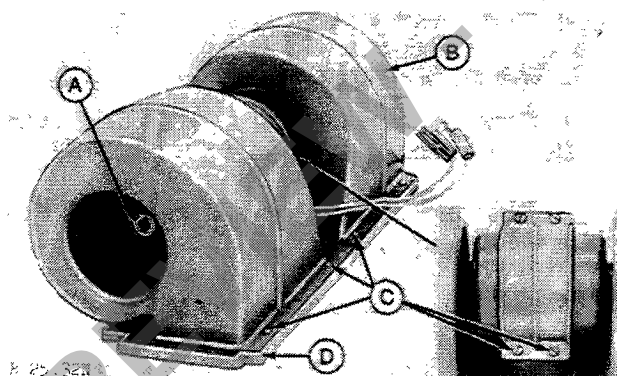
The pressurizer blowers have to be in operation before the air conditioning system will function. Generally speaking, the blowers should be in operation most of the time, not only to direct cooled or heated air into the cab, but to prevent dirt or dust from entering around panels and doors, by pressurizing the inside air.

On Tractors with SOUND-GARD body (Serial No. 167014- ) a three speed, single blower motor was adopted. The following information covers both early and late models.

#### Blower Removal

SOUND-GARD body (Serial No. -167013)

1. Remove the two cap screws from the top and three screws from front of roof.
2. Raise roof, and remove the cover-to-housing sheet metal screws.



A—Retainer Clip  
B—Blower Housing

C—Screws  
D—Mounting Base

Fig. 38-Blowers and Housings (Shown Attached to Mounting Base For Illustration Purposes)

The blower and motor assembly (Fig. 38) may be removed without removing the mounting base (D) since the blower housings (B) are individually replaceable.

3. Remove the four housing-to-mounting base screws and the four motor mounting screws (C).

4. Disconnect wiring connectors and lift out assembly.

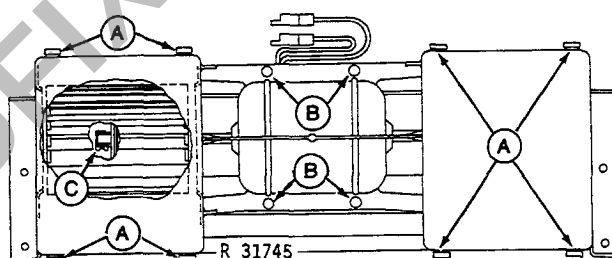
The mounting base is fastened to rubber cushions using bolts with self-locking nuts. To gain access to the mounting bolts, first remove the air louver bezel (which is secured with 14 screws) from inside the body. Bolt heads will then be in direct view.

5. Blowers may be removed from the motor shaft on all models after first removing the spring retainer clips.

#### Blower Removal

SOUND-GARD body (Serial No. 167014- )

1. Remove the two cap screws from the top and three screws from front of roof.
2. Raise roof, and remove the cover-to-housing sheet metal screws.



A—Clips  
B—Screws

C—Blower Retaining Clips

Fig. 39-Blower Assembly

3. Remove the four screws (A, Fig. 39) securing upper half of housing to lower half.
4. Remove the eight clips (B), and lift off upper half of housing.
5. Disconnect blower motor wiring connectors. The blower motor with blowers can now be lifted from lower half of housing.
6. To remove a blower from the drive shaft, remove retainer clip (C) and slide blower from shaft.

#### Repair

The blower motors and switch are not repairable. If the motor or switch fail to perform satisfactorily, the part should be replaced.

#### Installation

Place assembly in position and reverse removal steps.

## Group 50 MECHANICAL HAND BRAKE

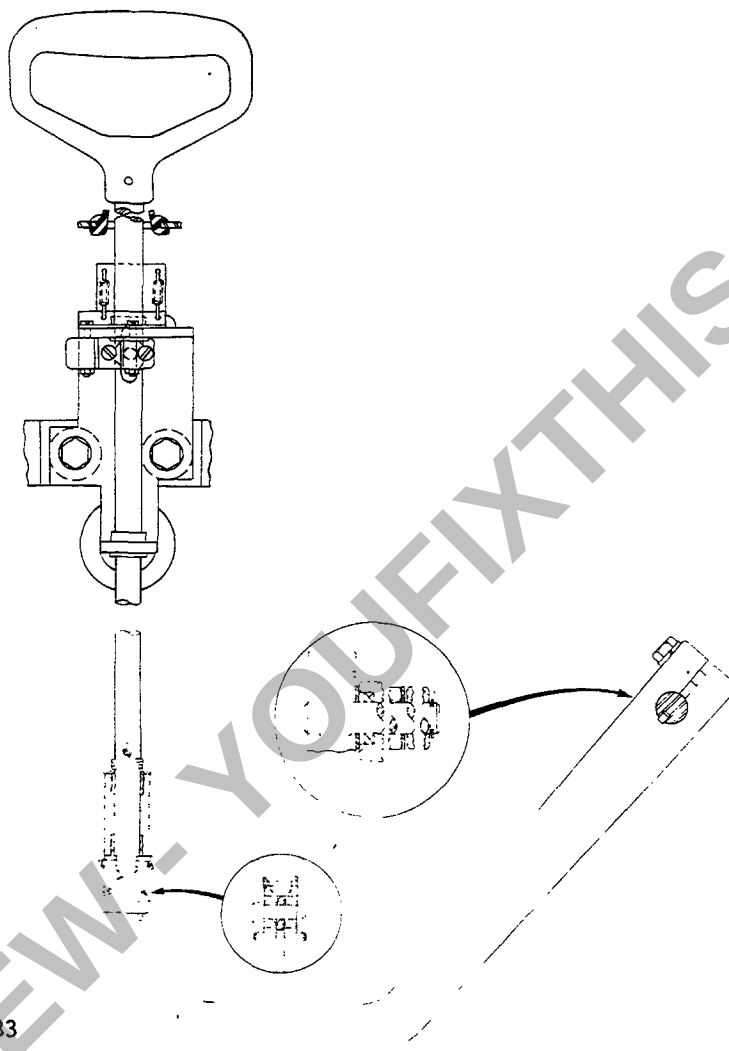


Fig. 1-Mechanical Hand Brake

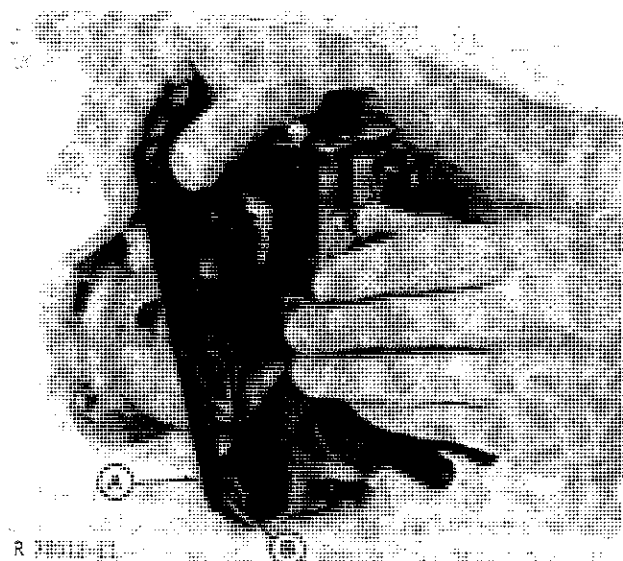
### GENERAL INFORMATION

The mechanical hand brake is used as a backup braking system. The kit consists of a hand brake lever in the operator's station, a brake housing with friction disks and separator plates, an actuating disk assembly, and actuating linkage.

The brake may be actuated in emergencies while the tractor is moving or used as a parking brake. This brake is driven off the front of the differential drive shaft, with the gears and brake disks in continual rotation anytime the tractor is moving.

To activate the brake, pull up on the hand lever, which moves the brake arm upward. This will cause the actuating disk to move out, causing the stationary separator plates to lock up with the rotating friction disks. This will result in the tractor coming to a stop.

## Adjustments—Continued



A—JDF-18-2 Tool

B—Trimmer Screw

Fig. 12—Adjusting Speed Advance (4240 Tractor)  
(Pump removed for illustrative purposes)

Place Allen head end of JDF-18-2 Tool (A, Fig. 12) into trimmer screw (B). While holding trimmer screw lock nut with JDF-18-1 Tool, turn trimmer screw out to advance and in to retard. Each mark on the timing window represents 2 degrees. Each mark on the speed advance gauge represents one quarter ( $1/4$ ) of a degree. Adjust the speed advance to the specified setting at 2100 rpm given in the table below.

| Engine RPM             | Degrees Advance         |                         |
|------------------------|-------------------------|-------------------------|
|                        | Full Load               | No Load                 |
| 2100 (Check)           | $9^\circ \pm 1/2^\circ$ | —                       |
| Total Advance Movement | $9^\circ \pm 1/2^\circ$ | $9^\circ \pm 1/2^\circ$ |

After adjusting the speed advance, tighten the lock nut, and install seal cap and sealing wire.

Remove timing window, and install timing hole cover.

If the automatic speed advance cannot be adjusted to specifications, remove the pump from tractor, and repair (page 30-10-5).

## Pump Idle Speeds

Move pump shut-off lever all the way forward against its stop in "run" position. Operate engine until it is thoroughly warmed up.

**CAUTION:** To avoid possible personal injury, do not make any adjustments while engine is running.

Disconnect speed control rod from injection pump.

## Fast Idle Speed

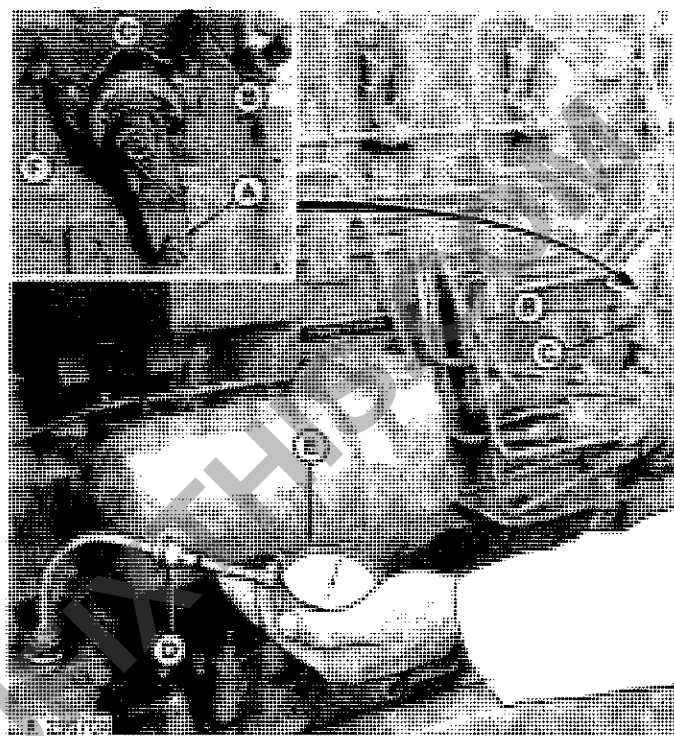
A—Throttle Lever  
B—Fast Idle Screw  
C—Lock NutD—JDE-28 Adapter  
E—Hand Tachometer  
F—Slow Idle Screw

Fig. 13—Checking Pump Fast Idle Speed

To check the fast idle speed, disconnect the tachometer drive cable and install JDE-28 Speed Adapter (D, Fig. 13).

With the engine running, move the throttle lever (A) forward so that the fast idle stop screw (B) is against its stop. Use an accurate tachometer similar to D-05011-ST Indicator (E) and JDE-28 Speed Adapter for measuring the fast idle speed. The fast idle speed should be 2380-2420 rpm. Always stop engine before making any adjustments.

Tighten lock nut (C) securely when fast idle speed is correctly set.

## INTRODUCTION

When diagnosing any electrical problem, there are two common tests that *must* be performed.

### PRELIMINARY CHECKS (Refer to Section 1)

Key switch "ON" checks battery voltage. Key switch at "START" checks battery condition. The tractor voltmeter indicates voltage at key switch and buss bar.

### OPERATIONAL CHECKS (Refer to Section 2)

Operational checks indicate which circuits are operating properly. This is accomplished by turning each electrical function switch "ON" then "OFF" and observing reaction of components. Operational checks should be performed both before diagnosing circuit problems and after repair to verify that the problem has been solved.

## COMMON CIRCUIT PROBLEMS

### SHORTED CIRCUIT

A shorted circuit may result in the wrong component operating, i.e., improper wire-to-wire contact. To test for a shorted circuit or improperly wired circuit:

1. Turn the correct component switch "ON".
2. Start at controlling switch of component that should not be operating.
3. Follow circuit and disconnect leads at couplers until component stops operating.
4. Short or improper connection will be between the last two leads disconnected.

### HIGH RESISTANCE OR OPEN CIRCUIT

High resistance or open circuit usually results in slow, dim or no component operation, i.e., poor, corroded or disconnected connections. To test for high resistance and open circuits:

1. Check all terminals and grounds of circuit for corrosion.
2. If terminals are not corroded or loose, the problem is in the component or wiring.

### GROUNDING CIRCUITS

Grounded circuits usually result in no component operation and a tripped circuit breaker, i.e., power leads contacting a "ground". To test for "grounds", check for voltage in the power circuit from the circuit breaker.

## HOW TO USE STEP-BY-STEP CHARTS

The charts are usually divided into three sections:

STEP → SEQUENCE → RESULT

Always start at the first step and go through the complete sequence from left to right. Each sequence ends with a result and tells you the next step. Work through the appropriate steps as directed until the malfunction is found. Make the repair and return to the Operational Check (A1) for that circuit to be certain the malfunction has been corrected. Finally, repeat Section 2, "Operational Checks" to be certain other circuits were not affected during the repair.

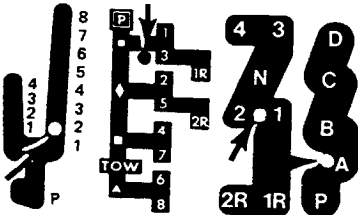
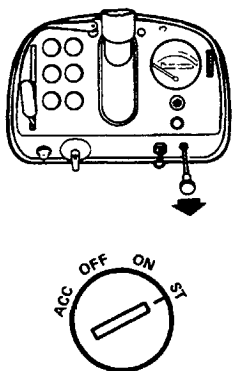
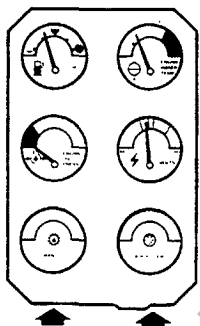
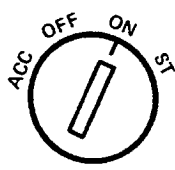
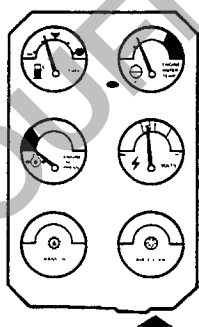
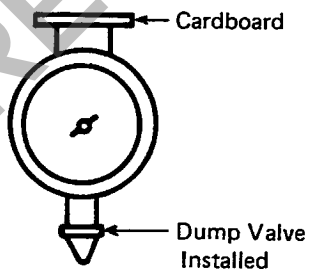
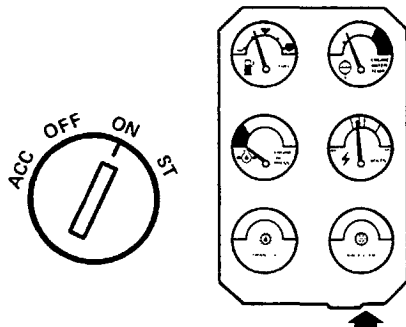
## ABBREVIATIONS USED

PST - Power Shift Transmission  
QRT - Quad-Range Transmission  
SRT - Syncro-Range Transmission  
PFWD - Power Front Wheel Drive  
SGB - Sound-Gard Body  
TRANS. - Transmission  
HSG - Housing  
WOT - Wide Open Throttle  
RPM - Revolution Per Minute  
AC - Alternating Current  
CCA - Cold Cranking Amps

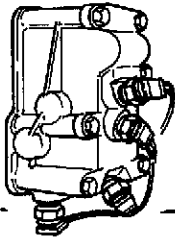
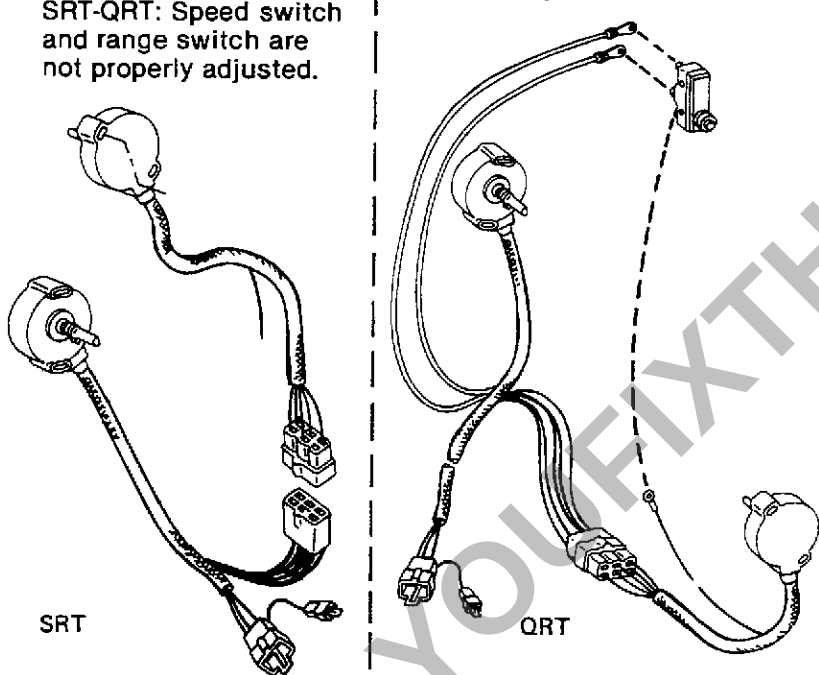
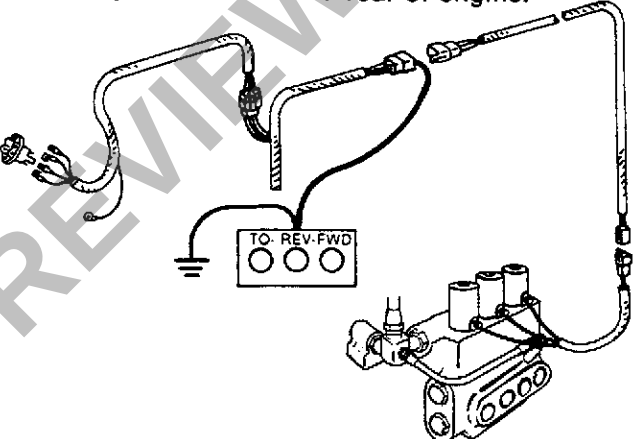
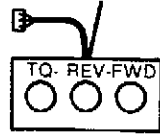
MA - Milli-Amp  
V - Volts or Voltage  
SPEC. - Specification  
TEMP. - Temperature  
MIN. - Minimum  
MAX. - Maximum  
NEG.(-) - Negative  
POS.(+) - Positive  
WL - Warning Light  
TL - Tail Light  
V. Det. - Voltage Detector

BAT. - Battery  
ACC. - Accessory  
IGN. - Ignition  
SW. - Switch  
ST - Start  
FWD. - Forward  
REV. - Reverse  
TQ - Torque  
NO. - Number  
HI - High  
LO - Low

R33102

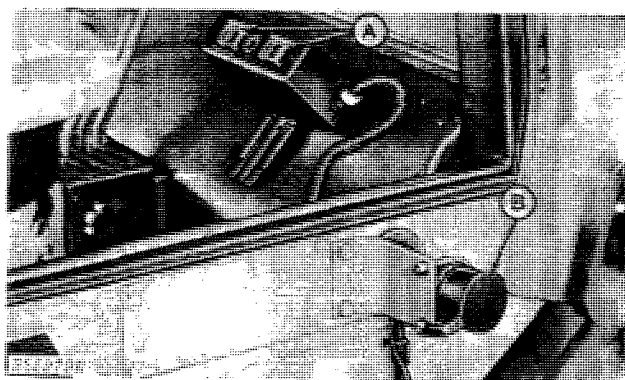
| Step                                                                                                                                                                                                        | Sequence                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                         | Result                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| <b>A5 INDICATOR BULB CHECK</b><br>Clutch pedal depressed.<br>Transmission "IN GEAR".                                       | Hold fuel shut-off "OUT". Hold key switch at "START".                                                                                                                                                                                                            | Both indicator lamps should glow.                                                                                                                                     | Both lamps glow: OK. <b>GO TO A6</b><br>Either lamp out: <b>GO TO D1</b> |
| <b>A6</b> Key switch "ON". Engine "STOPPED".                                                                             | Observe air cleaner indicator lamp for operation.                                                                                                                                                                                                               | Lamp out. OK: <b>GO TO A7</b><br>Lamp ON. Not OK: <b>GO TO D4</b>                                                                                                                                                                                       |                                                                          |
| <b>A7 AIR CLEANER INDICATOR CIRCUIT CHECK:</b><br>Remove air stack cap (if equipped). Cover air opening with cardboard.  | Key switch "ON". Engine "RUNNING". Slowly increase engine speed until air cleaner indicator comes "ON".  <p>Note: Indicator will normally come on before 1500 rpm.</p> <p>Reposition dump valve. Remove cardboard. Reinstall cap after testing or repair.</p> | A. Lamp Comes "ON". (Operator Complaint) <ol style="list-style-type: none"> <li>None <b>GO TO A8</b></li> <li>Lamp never comes on. <b>GO TO D12</b></li> <li>Cleans element frequently. <b>GO TO D11</b></li> </ol> B. Lamp off at WOT. <b>GO TO D8</b> | 5                                                                        |

R33138

| Step                                                                                                                                                                                                                                                                                                                                                                                                                                | Result                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>C4</b> PST: Clutch switches on transmission control valve are not properly adjusted.</p>  <p>SRT-QRT: Speed switch and range switch are not properly adjusted.</p>  <p>SRT</p> <p>QRT</p>                                                                 | <p>Adjust switches.<br/>Then... <b>GO TO C1</b></p> <p>Note: For switch adjustment, refer to the following step:</p> <p>PST: C12 page 10-9<br/>QRT: C13 page 10-10 and 10-11<br/>SRT: C14 page 10-11 and 10-12</p> |
| <p><b>C5</b> Connect test box coupler to 3-wire coupler above and to rear of engine.</p>  <p>TO-REV-FWD</p> <p>Transmission at speed when lamp(s) was "OUT" at C3. Key switch "ON". Engine "OFF". Observe test box for glowing lamps.</p>  <p>TO-REV-FWD</p> | <p>Lamp(s) operate: <b>GO TO C6</b></p> <p>Lamp(s) does not operate: <b>GO TO C7</b></p>                                                                                                                           |
| <p><b>C6</b> There is "HIGH RESISTANCE" or an "OPEN" in harness between solenoid valve and 3-wire coupler above and to rear of engine.</p> <p>Note: Reference schematic: PST - No. 10-1, QRT - No. 10-2, SRT - No. 10-3. Reconnect all couplers after testing or repair.</p>                                                                                                                                                        | <p>Repair circuit.<br/>Then... <b>GO TO C1</b></p> <p style="text-align: right;">R33164</p>                                                                                                                        |

## Group 35 REMOTE ELECTRICAL CIRCUIT DIAGNOSIS

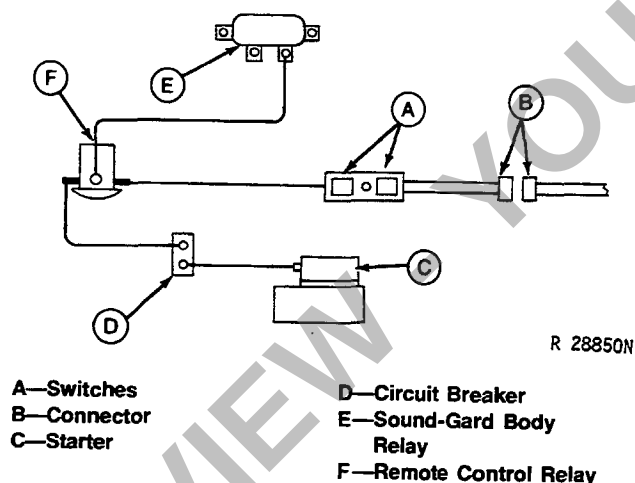
### ELECTRICAL REMOTE CONTROL



A—Switches

B—Connector

Fig. 1-Electrical Remote Control Installation



R 28850N

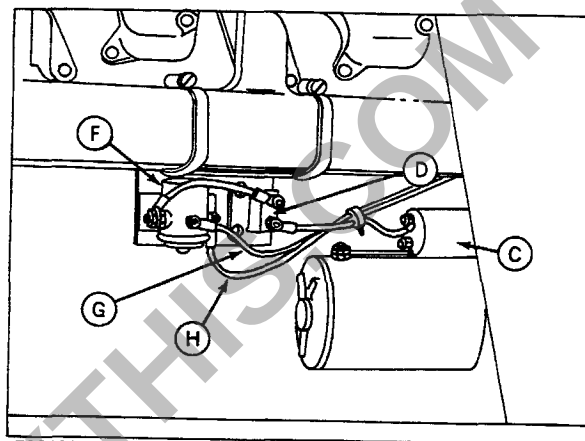
A—Switches  
B—Connector  
C—StarterD—Circuit Breaker  
E—Sound-Gard Body  
Relay  
F—Remote Control Relay

Fig. 2-Electrical Remote Control Wiring

For a power supply, electrical remote control is connected to positive battery terminal on starter solenoid (C, Fig. 2).

A 25-amp circuit breaker (D) provides overload protection.

A wire from Sound-Gard Body relay (E) activates remote control relay (F) when key switch is turned on.

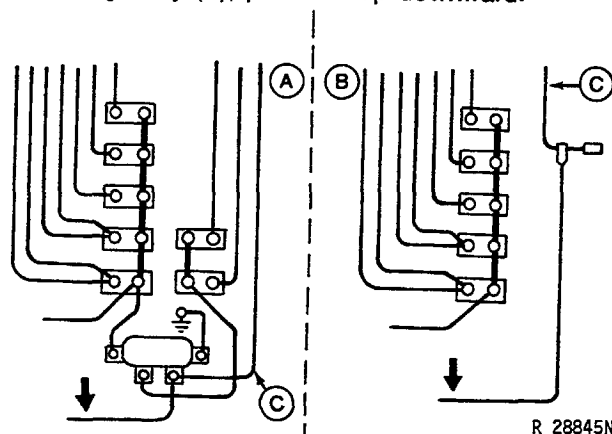


R25980N

C—Starter  
D—Circuit Breaker  
F—RelayG—To Sound-Gard Body  
Relay  
H—To Electrical Remote  
Control

Fig. 3-Relay and Circuit Breaker Connections

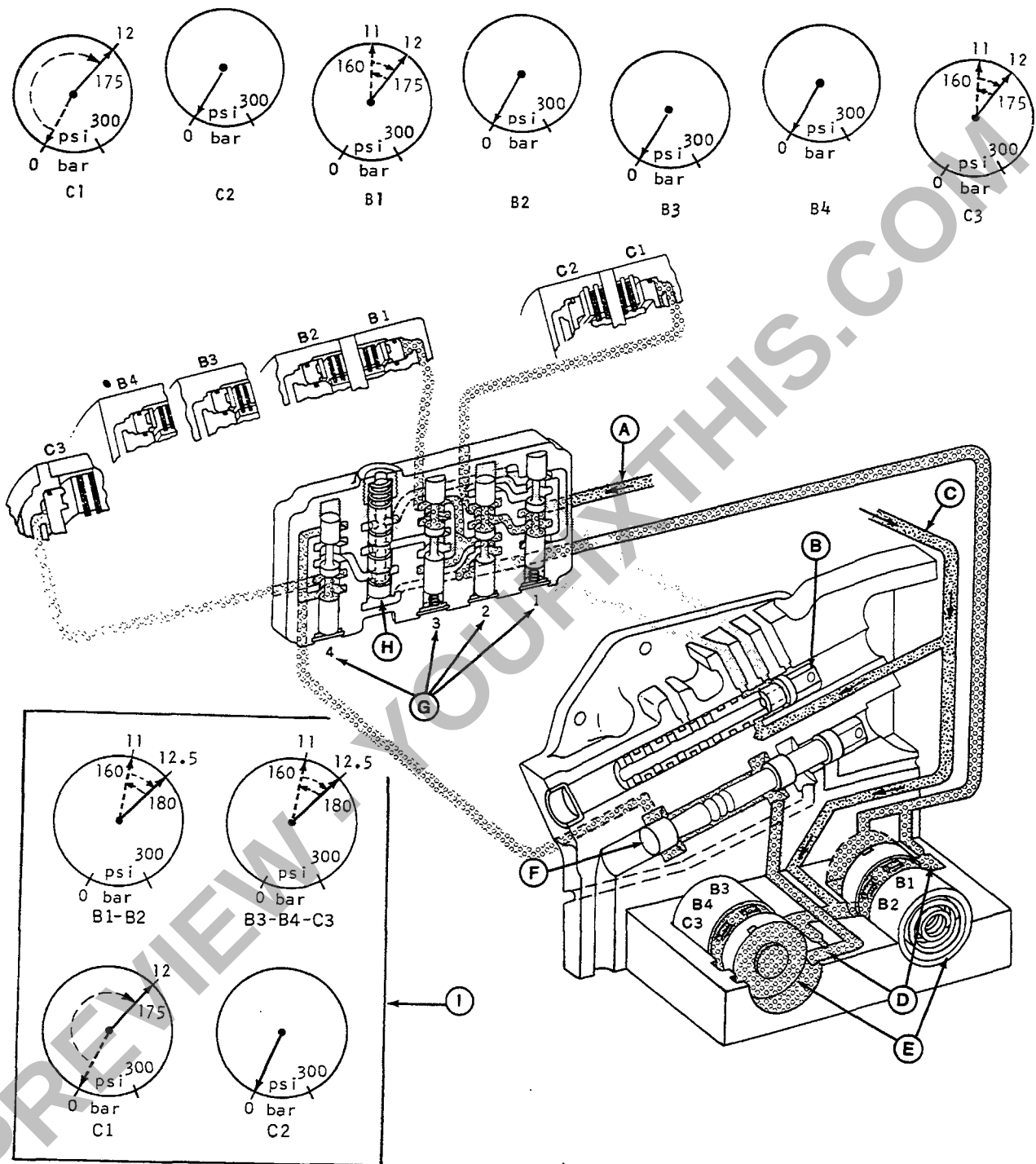
Fig. 3 shows connections for power supply. When installing relay (F), position cap downward.



R 28845N

A—Tractors with Sound-Gard Body  
B—Tractors without Sound-Gard Body  
C—Purple Wire to Key Switch

Fig. 4-Remote Control Relay Lead Connection



R32375C

A—From Pedal Valve  
 B—Speed Selector Valve  
 C—From Transmission Filter  
 D—Orifice

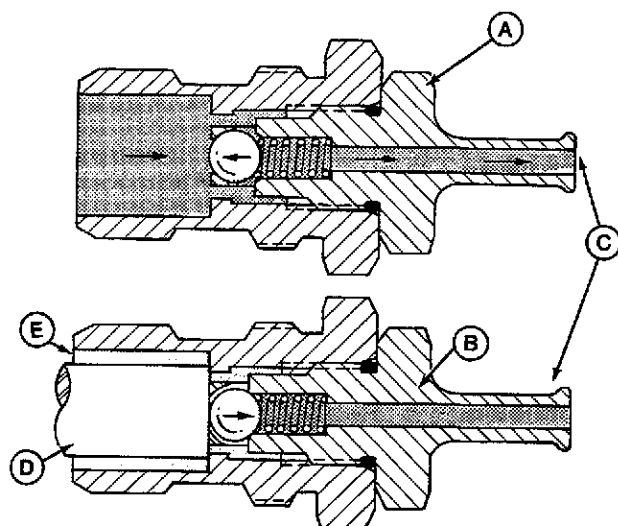
E—Accumulators  
 F—Direction Selector Valve  
 G—Shift Valves  
 H—Dump Valve

I—4-Gauge Reference  
 Element Engaging Pressure Oil  
 Constant Pressure Oil  
 Shift Valve Operating Oil

Fig. 12-Hydraulic Control System Flow and Pressures - First Speed Forward

### Neutral Bleed Valve

The neutral bleed valve (E) allows oil in the front-wheel drive circuit to "bleed off" when the front-wheel drive is disengaged.



R 28192N

- |                          |                        |
|--------------------------|------------------------|
| A—Neutral                | E—Reverse Only         |
| B—Engaged                | System Pressure Oil    |
| C—Through Bleed Manifold | (REV)                  |
| D—Direction Valve        | Bleed or Pressure-Free |
| (Forward)                |                        |

Fig. 3-Neutral Bleed Valve Operation

Oil is allowed past a check ball through an external oil line to the bleed oil manifold. The bleed oil manifold directs the bleed oil to the hydraulic reservoir.

This prevents secondary brake drag and oil backing through the control valve.

When the front-wheel drive is engaged, the valve seats blocking any flow from the control valve housing.

The valve seats when oil pressure in that portion of the valve housing is from 143-187 psi (10-13 bar).

In forward gears with the front wheel drive engaged, the check ball is seated mechanically by the direction valve. In reverse gears, the ball is seated hydraulically since front-wheel drive pressure oil is routed past the inner end of the valve.

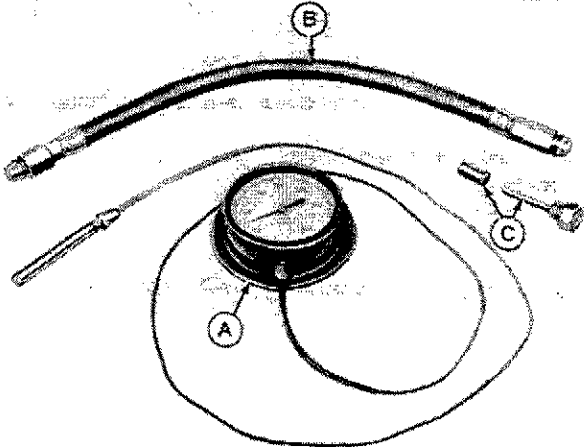
### Regenerative Check Valve

When the front-wheel drive is engaged in series (low torque), and the tractor is turned; the outside wheel motor pumps oil (especially during a right-hand, forward turn or a left-hand, reverse turn).

This pumping action occurs because the outside wheel is turning faster than the inside wheel. Also the front-wheel drive control valve maintains oil flow to the wheel motors.

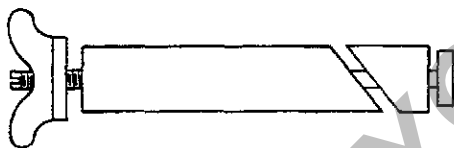
To prevent excessive oil pressure between the wheels, a regenerative check valve (F, Fig. 2) is located in the common passage between the wheels (in the control valve housing).

The check valve relieves oil pressure in the front-wheel drive circuit to the hydraulic system pressure oil line when oil pressure between the wheels exceeds hydraulic system pressure.

| TOOL                                                                              | NUMBER                              | USE                                                                                              |
|-----------------------------------------------------------------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------|
|  | A-100-240°F (38-120°C)              | To check hydraulic oil temperature                                                               |
|                                                                                   | Temperature Gauge (Automotive type) |                                                                                                  |
|                                                                                   | B-R-2 Hose - 1/2"x48" (Jumper Hose) | To hold filter relief valve on its seat during charge circuit capacity test. (Power Shift only). |
|                                                                                   | C-JD-293-5 and 6                    |                                                                                                  |

R28509R

Fig. 4-Miscellaneous Special Test Equipment

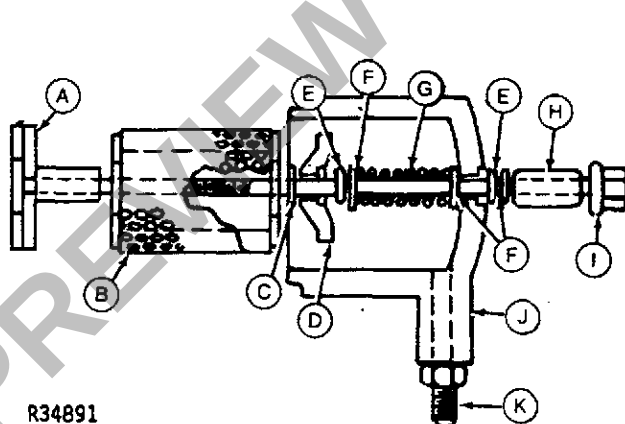


R 28510N

Fig. 5-Filter Relief Valve Removal Tool

\*JDH-53  
Filter Relief  
Valve Removal Tool

To remove filter relief valve.



R34891

Fig. 6-Housing and Filter Assembly for Charge Pump Test

Used for power shift transmission charge pump flow test.

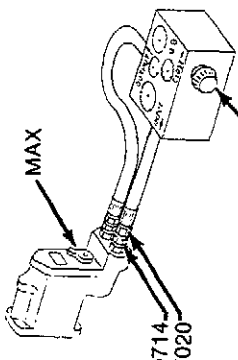
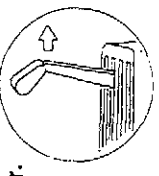
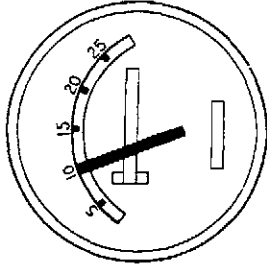
- \*A—JDH-58 Filter Diverter Plate
- \*\*B—AR75601 25 Micron Filter
- \*\*C—R34766 Retaining Ring
- \*\*D—R65892 Filter Retainer
- \*\*E—R394 O-Ring (Two Used)
- \*\*F—24H1227A Washer (Three Used)
- \*\*G—R66064 1-7/8 in. Spring (Two Used)
- \*\*H—28H1656 1/2 x 1-1/4 in. Spacer
- \*\*I—R65894 Micron Filter Screw
- \*\*J—T31170 Ported Filter Cover
- \*K—1365 Connector

\*Order From  
Service Tools  
Box 314  
Owatonna MN 55060

\*\*John Deere Service Parts

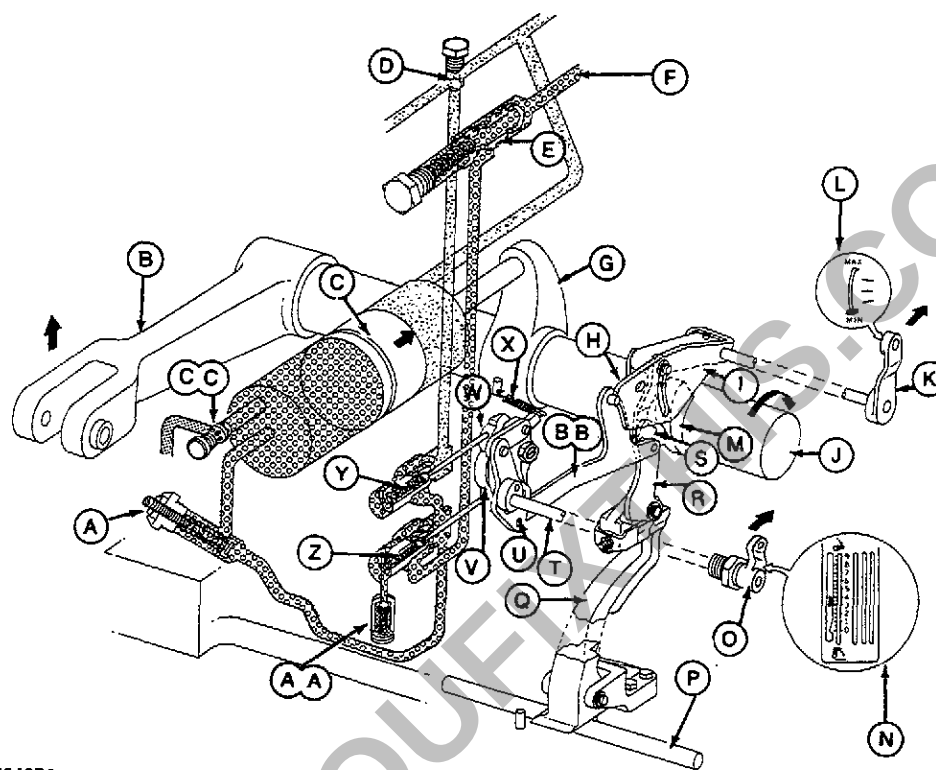
## SRT-QRT EQUIPPED TRACTORS

## STEP-BY-STEP HYDRAULIC DIAGNOSIS

| STEP      | SEQUENCE                                                                                                                                                                                                                                                                                                                                                                                                                              | RESULT                                                                                                                                                             |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>42</b> | Oil is leaking from lube circuit. Check the following:<br>1. O-rings on adaptor from pressure regulating valve housing to clutch operating piston housing.<br>2. Orifice missing from transmission case for low pinion lube.<br>3. Plugs in clutch operating piston housing (use air to further check).<br>4. Packing between clutch housing and clutch operating piston housing (remove pressure regulating valve housing to check). | Repair then ... <b>GO TO STEP 41</b>                                                                                                                               |
|           |                                                                                                                                                                                                                                                                                                                                                                                                                                       | Repair then ... <b>GO TO STEP 15</b>                                                                                                                               |
| <b>43</b> | <b>MAIN PUMP QUICK CHECK</b><br>Connect flow meter into SCV as shown.<br>                                                                                                                                                                                                                                                                          | In Spec. and problem corrected. <b>SYSTEM NORMAL STOP</b><br><br>In Spec. and problem not isolated: <b>GO TO STEP 45</b><br><br>Out of Spec.: <b>GO TO STEP 44</b> |
|           |                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                    |
|           |                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                    |
| <b>44</b> | Move SCV lever to circulate oil through meter.<br><br>At 1000 engine rpm<br><br>Adjust control valve to get 1500 PSI<br>Record Flow (18)                                                                                                                       | In Spec. Repair 1st SCV then ... <b>GO TO STEP 43</b><br><br>Out of Spec.: <b>GO TO STEP 46</b>                                                                    |
|           |                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                    |

R34735

## Lower ("MIN" load sensing)



R34876

A—Throttle Valve  
B—Lift Arm  
C—Rockshaft Piston  
D—Check Ball  
E—Flow Control Valve  
F—From Pressure Control Valve

G—Crank Arm  
H—Negative Signal Limit Cam  
I—Load Selector Control Arm  
J—Rockshaft  
K—Lower Load Selector Arm  
L—Load Selector Lever  
M—Servo Cam  
N—Console Lever Guide

O—Operating Arm  
P—Load Control Shaft  
Q—Load Control Arm  
R—Servo Cam Follower  
S—Load Selector Link  
T—Valve Operating Shaft  
U—Operating Link  
V—Valve Adjusting Link  
W—Valve Operating Cam

X—Spring  
Y—Return Valve  
Z—Pressure Valve  
AA—Thermal Relief Valve  
BB—Negative Signal Limit Link  
CC—Surge Relief Valve\*  
Pressure Oil  
Return Oil  
Pressure-Free Oil

\*Used with lift-assist cylinder only.

Fig. 3—Rockshaft Operation—Raise, "MIN" Load Sensing

To raise the rockshaft, the console lever (N, Fig. 3) is pulled to the rear.

The operating arm and shaft (T) rotate clockwise to open the pressure valve (Y). Pressure oil from the flow control valve (E) flows through the pressure valve into the rockshaft cylinder.

Pressure oil in the rear of the cylinder moves the piston (C) forward to rotate the rockshaft (J) clockwise and raise the lift arms (B).

The load selector link (S) and operating link (BB) ride on the rockshaft servo cam follower (R) which rides on the servo cam (M).

As the servo cam rotates, the cam follower moves toward the rockshaft (J) pulling link (BB) with it. This link movement (caused by cam spring (X) force) moves the valve operating cam (W) to rotate to close the pressure valve (Z).

When the piston (C) reaches the end of its selected intermediate stroke, the pressure valve is closed.

When the console lever is in the fully raised (rearward) position, the pressure valve is always open (maintaining system pressure in the rockshaft).

A temperature sensing bulb (M, Fig. 1) is connected to the expansion valve by means of a capillary tube filled with a low pressure gas. The sensing bulb is clamped to the evaporator outlet pipe and is well insulated from external heat sources. Too little or too much refrigerant passing through the expansion valve into the evaporator, will limit the cooling efficiency of the system.

If too little refrigerant passes through the expansion valve, the refrigerant gas will become too hot, permitting the gas in the sensing bulb to expand enough to open the expansion valve.

If too much liquid refrigerant passes through the expansion valve, some of the liquid will still be vaporizing as it leaves the evaporator. This lowers the temperature at the outlet, which in turn lowers the temperature of the gas in the sensing bulb and allows the expansion valve to close.

The thermostatic temperature control switch is a rotary-type switch that is connected to a temperature sensing tube (H, Fig. 2) inserted in the evaporator core. The switch end of the gas-filled sensing tube has a diaphragm which controls two external contacts wired to the compressor clutch. When the cab air needs to be cooled, corresponding to the preselected control setting, the compressor will turn on. The compressor will continue to function until the selected temperature is reached.

A superheat shutoff switch on the air conditioning compressor prevents compressor failures due to loss of charge or restriction in system. The switch is sensitive to high temperature and low pressure. When the combination of both conditions occurs, or the extreme of either condition exists the compressor is shut off to prevent damage.

## ELECTRICAL TESTING

### Wiring Diagrams

Refer to Section 240 for wiring diagrams on the air conditioning system.

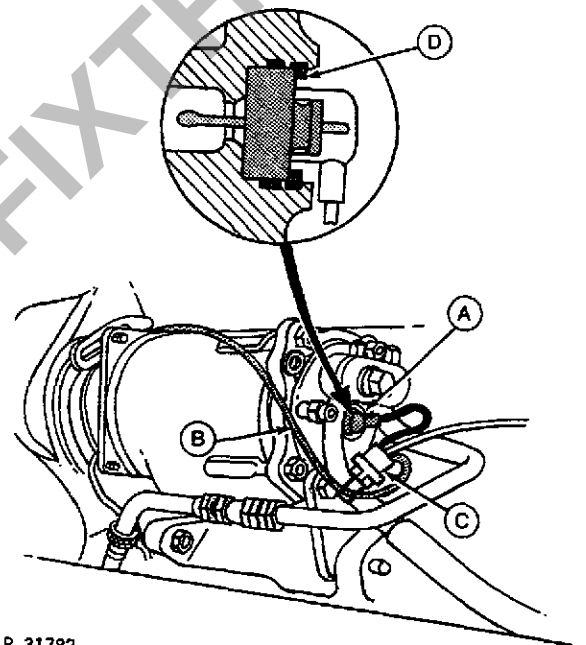
### Component Check

When an electrically operated component in the system fails to function, make the following preliminary checks:

1. Determine if adequate voltage is being supplied to the air conditioning system.
2. Visually check for a loose connection or a broken wire.

If, after making the preliminary checks, the source of trouble has not been found, test the system for an open circuit within each component.

### Superheat Shutoff Switch



R 31782

A—Superheat Shutoff Switch    C—Thermal Fuse  
B—Wiring Harness                D—Snap Ring

Fig. 3-Superheat Shutoff Switch

1. Disconnect the wiring lead from the superheat shutoff switch (A, Fig. 3).
2. Connect one lead of a test light on the superheat shutoff switch terminal, and the other lead to a power supply.

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