

# **4640 and 4840 Tractors**

**TECHNICAL MANUAL**  
4640 and 4840  
Tractors

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# 4640 AND 4840 TRACTORS TECHNICAL MANUAL TM-1183 (OCT-85)

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# Section 10 GENERAL

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## Group 00

# SPECIFICATIONS AND SPECIAL TOOLS GENERAL TRACTOR SPECIFICATIONS

4640

4840

**HORSEPOWER (Factory observed PTO**

|                         |                 |                 |
|-------------------------|-----------------|-----------------|
| horsepower at 2200 rpm) | 155 hp (116 kW) | 180 hp (134 kW) |
|-------------------------|-----------------|-----------------|

**ENGINE:**

|                       |  |  |
|-----------------------|--|--|
| Type                  | 6-cylinder, in-line, valve-in-head,<br>diesel, turbocharged, intercooled | 6-cylinder, in-line, valve-in-head,<br>diesel, turbocharged, intercooled |
| Slow idle speed       | 800 rpm  | 800 rpm  |
| Working speed range   | 1500 to 2200 rpm   | 1500 to 2200 rpm   |
| Bore and stroke       | 4.56 x 4.75 in. (116 x 121 mm)   | 4.56 x 4.75 in. (116 x 121 mm)   |
| Displacement          | 466 cu. in. (7.6 L)  | 466 cu. in. (7.6 L)  |
| Compression ratio     | 14.9 to 1  | 14.9 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                         |

|   | 4640  | 4840   |
|---|---|--|
| <b>FUEL SYSTEM:</b>                                     |   |  |
| Type  | direct injection  | direct injection   |
| Injection pump type                                     | in-line   | in-line  |
| Air cleaner   | dry type with safety element  | dry type with safety element   |
| <b>COOLING SYSTEM:</b>                                  |   |  |
| Type  | dual-pressure with centrifugal pump   | dual-pressure with centrifugal pump                                  |
| Temperature control                                     | dual heavy duty thermostats   | dual heavy duty thermostats  |
| <b>CAPACITIES</b>                                       |   |  |
| Fuel tank   | 83 U.S. gal. (314 L)  | 103 U.S. gal. (390 L)  |
| Cooling system  | 38 U.S. qt. (36 L)  | 40 U.S. qt. (38 L)   |
| Crankcase (with filter change)                          | 20 U.S. qt. (19 L)  | 20 U.S. qt. (19 L)   |
| Transmission-hydraulic system<br>(Drain and fill)       |   |  |
| Power Shift Transmission                                | 16.5 U.S. gal. (62.5 L)   | 16.5 U.S. gal. (62.5 L)  |
| QUAD-RANGE Transmission                                 | 22.5 U.S. gal. (85.2 L)   |  |
| Add for Power Front-wheel Drive                         | 4.0 U.S. gal. (15.1 L)  | 4.0 U.S. gal. (15.1 L)   |
| Transmission-hydraulic system<br>(Dry, production fill) |   |  |
| Power Shift Transmission                                | 20.8 U.S. gal. (78.8 L)   | 20.8 U.S. gal. (78.8 L)  |
| QUAD-RANGE Transmission                                 | 26.0 U.S. gal. (98.4 L)   |  |
| Add for Power Front-wheel Drive                         | 5.0 U.S. gal. (18.9 L)  | 5.0 U.S. gal. (18.9 L)   |
| <b>POWER SHIFT TRANSMISSION:</b>                        |   |  |
| Type  | planetary gears, hydraulically actuated wet disk clutches and brakes              | planetary gears, hydraulically actuated wet disk clutches and brakes |
| Gear selections   | 8 forward and 4 reverse   | 8 forward and 4 reverse  |
| Shifting  | hydraulic, on-the-go and under load   | hydraulic, on-the-go and under load                                  |
| <b>QUAD-RANGE TRANSMISSION</b>                          |   |  |
| Type  | 2-speed, power-shifted planetary and 8-speed synchronized                         |  |
| Gear selections   | 16 forward and 6 reverse  |  |
| Perma-Clutch  | hydraulically-operated, multiple-disk wet clutch                                  |  |
| <b>POWER TAKE-OFF:</b>                                  |   |  |
| Type  | fully independent   | fully independent  |
| Speed (2200 engine rpm)                                 | 1000 rpm  | 1000 rpm   |
| Size  | 1-3/4 in. (45 mm)   | 1-3/4 in. (45 mm)  |
| Clutch  | hydraulically-operated, multiple-disk wet clutch                                  | hydraulically-operated, multiple-disk wet clutch                     |
| <b>POWER FRONT-WHEEL DRIVE:</b>                         |   |  |
| Type  | hydraulic motor with planetary gear reduction, constant torque and variable speed |  |
| Controls  | solenoid-operated valves, synchronized with transmission controls                 |  |
| <b>HYDRAULIC SYSTEM:</b>                                |   |  |
| Type  | closed-center, constant-pressure  | closed-center, constant-pressure                                     |
| Standby pressure  | 2250 psi (155 bar) (15 500 kPa)   | 2250 psi (155 bar) (15 500 kPa)                                      |
| <b>BRAKES:</b>  |   |  |
| Type  | hydraulically-operated wet disk   | hydraulically-operated wet disk                                      |

|                                   | 4640  | 4840  |
|-----------------------------------|---|---|
| <b>ELECTRICAL SYSTEM:</b>         |   |   |
| Type                              | 12-volt, negative ground  | 12-volt, negative ground  |
| Batteries                         | two, 6-volt, 5D group, 800 amps cold cranking, 376 minutes reserve capacity | two, 6-volt, 5D group, 800 amps cold cranking, 376 minutes reserve capacity |
| Alternator                        | 72-amp with Sound-Gard Body, 61-amp without                                 | 72-amp  |
| <b>TIRES AND TREADS</b>           |   |   |
|                                   | see page 10-05-6 in this section  | see page 10-05-6 in this section  |
| <b>DIMENSIONS:</b>                |   |   |
| Wheelbase                         | 118.5 in. (3010 mm)   | 118.5 in. (3010 mm)   |
| Overall length                    | 171.1 in. (4350 mm)   | 176.2 in. (4500 mm)   |
| Height to muffler cover*          | 129.3 in. (3283 mm)   | 129.3 in. (3283 mm)   |
| Height to top of Sound-Gard Body* | 118.3 in. (3005 mm)   | 118.3 in. (3005 mm)   |
| Overall width (regular axle)      | 96 in. (2440 mm)  | 96 in. (2440 mm)  |
| Width at fender                   | 82 in. (2082 mm)  | 82 in. (2082 mm)  |
| Width at roof                     | 54.4 in. (1382 mm)  | 54.4 in. (1382 mm)  |
| Turning radius                    | 161 in. (4100 mm)   | 161 in. (4100 mm)   |
| <b>SHIPPING WEIGHT**</b>          |   |   |
|                                   | 14,350 lbs. (6510 kg)   | 14,900 lbs. (6760 kg)   |

\*Tractor equipped with 20.8-38 R1 rear tires and 11.00-16 front tires.

\*\*Equipped for average field service, without fuel and ballast. Add approximately 1000 lbs. (450 kg) if equipped with power front-wheel drive.

**GROUND SPEEDS**

Approximate ground speeds are given in the following charts. Speeds are shown in miles per hour, with kilometers per hour in parentheses.

Speeds are for a Tractor with 18.4-38 tires.

**POWER SHIFT TRANSMISSION GROUND SPEEDS**

| Gear     | 1500 Engine RPM | 2200 Engine RPM |
|----------|-----------------|-----------------|
| 1st      | 1.2 (1.9)       | 1.7 (2.8)       |
| 2nd      | 1.7 (2.7)       | 2.5 (4.0)       |
| 3rd      | 2.6 (4.2)       | 3.9 (6.2)       |
| 4th      | 3.4 (5.5)       | 5.0 (8.1)       |
| 5th      | 4.5 (7.3)       | 6.6 (10.6)      |
| 6th      | 5.9 (9.5)       | 8.6 (13.9)      |
| 7th      | 7.5 (12.1)      | 11.0 (17.7)     |
| 8th      | 12.9 (20.7)     | 18.8 (30.3)     |
| 1st rev. | 1.5 (2.4)       | 2.2 (3.6)       |
| 2nd rev. | 2.2 (3.5)       | 3.2 (5.1)       |
| 3rd rev. | 3.4 (5.5)       | 5.0 (8.0)       |
| 4th rev. | 4.4 (7.1)       | 6.5 (10.4)      |

**QUAD-RANGE TRANSMISSION GROUND SPEEDS**

| Range | Speed | 1500 Engine RPM | 2200 Engine RPM |
|-------|-------|-----------------|-----------------|
| A     | 1     | 1.4 (2.2)       | 2.0 (3.2)       |
|       | 2     | 1.7 (2.8)       | 2.5 (4.0)       |
|       | 3     | 2.4 (3.9)       | 3.5 (5.7)       |
|       | 4     | 3.1 (5.0)       | 4.5 (7.3)       |
|       | 1R    | 2.5 (4.1)       | 3.7 (6.0)       |
|       | 2R    | 3.2 (5.2)       | 4.7 (7.6)       |
| B     | 1     | 3.0 (4.8)       | 4.4 (7.1)       |
|       | 2     | 3.8 (6.1)       | 5.6 (9.0)       |
|       | 3     | 5.4 (8.7)       | 8.0 (12.8)      |
|       | 4     | 6.9 (11.1)      | 10.1 (16.3)     |
|       | 1R    | 5.7 (9.1)       | 8.3 (13.4)      |
|       | 2R    | 7.2 (11.6)      | 10.6 (17.0)     |
| C     | 1     | 3.5 (5.7)       | 5.2 (8.3)       |
|       | 2     | 4.5 (7.2)       | 6.6 (10.6)      |
|       | 3     | 6.4 (10.3)      | 9.4 (15.1)      |
|       | 4     | 8.1 (13.1)      | 11.9 (19.1)     |
|       | 1R    | 6.6 (10.7)      | 9.8 (15.7)      |
|       | 2R    | 8.5 (13.6)      | 12.4 (20.0)     |
| D     | 1     | 5.7 (9.2)       | 8.4 (13.5)      |
|       | 2     | 7.3 (11.7)      | 10.7 (17.2)     |
|       | 3     | 10.3 (16.6)     | 15.2 (24.4)     |
|       | 4     | 13.1 (21.1)     | 19.3 (31.0)     |

(Specifications and design subject to change without notice.)

## PREDELIVERY, DELIVERY, AND AFTER-SALE SERVICES

| Item                           | Specification               |
|--------------------------------|-----------------------------|
| Toe-in .....                   | 1/8 to 3/8 inch (3 to 9 mm) |
| Injection pump timing .....    | TDC                         |
| Engine speeds                  |                             |
| Slow idle .....                | 780 to 820 rpm              |
| Fast idle .....                | 2325 to 2425 rpm            |
| Rated speed at full load ..... | 2200 rpm                    |

| Torque  | ft-lbs | N·m | kgm |
|---|--------|-----|-----|
| Sound-Gard Body or Four-Post Roll-Gard mounting bolts ..... | 150    | 200 | 20  |
| Front axle-to-knee bolts .....                              | 445    | 600 | 60  |
| Front wheel-to-hub bolts .....                              | 100    | 135 | 14  |
| Special bolts on rear hubs .....                            | 300    | 410 | 41  |
| Steel wheel-to-hub bolts .....                              | 240    | 325 | 33  |
| Rimclamp-to-wheel bolts .....                               | 170    | 230 | 23  |
| Rockshaft lift arm retaining bolts .....                    | 300    | 410 | 41  |
| Other nuts and cap screws:                                  |        |     |     |

### TORQUE CHART

| Bolt Diameter       | Plain Head* |     |      | Three Radial Dashes* |     |     | Six Radial Dashes* |      |     |
|---------------------|-------------|-----|------|----------------------|-----|-----|--------------------|------|-----|
|                     | ft-lbs      | N·m | kgm  | ft-lbs               | N·m | kgm | ft-lbs             | N·m  | kgm |
| 1/4 in. (6.35 mm)   | 6           | 8   | 0.8  | 10                   | 14  | 1.4 | 14                 | 19   | 1.9 |
| 5/16 in. (7.93 mm)  | 13          | 18  | 1.8  | 20                   | 27  | 2.7 | 30                 | 41   | 4.1 |
| 3/8 in. (9.53 mm)   | 23          | 31  | 3.1  | 35                   | 47  | 4.7 | 50                 | 70   | 7.0 |
| 7/16 in. (11.11 mm) | 35          | 47  | 4.7  | 55                   | 75  | 7.5 | 80                 | 110  | 11  |
| 1/2 in. (12.70 mm)  | 55          | 75  | 7.5  | 85                   | 115 | 12  | 120                | 160  | 16  |
| 9/16 in. (14.29 mm) | 75          | 100 | 10   | 130                  | 175 | 18  | 175                | 240  | 24  |
| 5/8 in. (15.88 mm)  | 105         | 140 | 14   | 170                  | 230 | 23  | 240                | 325  | 33  |
| 3/4 in. (19.05 mm)  | 185         | 250 | 25   | 300                  | 410 | 41  | 425                | 575  | 58  |
| 7/8 in. (22.23 mm)  | 160         | 220 | 22** | 445                  | 600 | 60  | 685                | 930  | 93  |
| 1 in. (25.40 mm)    | 250         | 340 | 34** | 670                  | 900 | 90  | 1030               | 1400 | 140 |

\*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.

## TUNE-UP

| Item   | Specification                     |
|--|-----------------------------------|
| PTO horsepower   |                                   |
| 4640 .....   | 155 hp (116 kW)                   |
| 4840 .....   | 180 hp (134 kW)                   |
| Compression .....  | 330 to 370 psi (22.5 to 25.5 bar) |
| Vacuum (full speed, full load, clean air filters) .....            | 10.5 to 11.5 in. (26 to 29 mbar)  |
| Air cleaner indicator switch closing vacuum .....                  | 24 to 26 in. (60 to 65 mbar)      |
| Manifold pressure (full speed, full load, clean air filters) ..... | 18 to 23 psi (1.2 to 1.6 bar)     |
| Thermostat opening temperature .....                               | 160 to 180°F (71 to 82°C)         |
| Radiator cap pressure release                                      |                                   |
| Low pressure cap .....   | 6.25 to 7.50 psi (0.4 to 0.5 bar) |
| High pressure cap .....  | 14 to 17 psi (0.9 to 1.2 bar)     |
| Engine speeds  |                                   |
| Slow idle .....  | 780 to 820 rpm                    |
| Fast idle .....  | 2325 to 2425 rpm                  |
| Rated speed at full load .....                                     | 2200 rpm                          |

## LUBRICATION

|  |                         |
|--|-------------------------|
| Engine crankcase oil capacity .....                                    | 20 U.S. qt. (19 L)      |
| Transmission-hydraulic system  |                         |
| (Drain and fill):  |                         |
| Power Shift .....  | 16.5 U.S. gal. (62.5 L) |
| QUAD-RANGE Transmission .....  | 22.5 U.S. gal. (85.2 L) |
| Add for power front-wheel drive .....                                  | 4.0 U.S. gal. (15.1 L)  |
| Transmission-hydraulic system  |                         |
| (Dry, production fill):  |                         |
| Power Shift Transmission .....   | 20.8 U.S. gal. (78.8 L) |
| QUAD-RANGE Transmission .....  | 26.0 U.S. gal. (98.4 L) |
| Add for power front wheel drive .....                                  | 5.0 U.S. gal. (18.9 L)  |
| Service intervals  |                         |
| Check engine oil level .....   | Every 10 hours          |
| Change engine oil .....  | Every 100 hours         |
| Replace engine oil filter .....  | Every 200 hours         |
| Clean crankcase breather filter .....                                  | Every 200 hours         |
| Check transmission-hydraulic system oil level .....                    | Every 200 hours         |
| Replace transmission-hydraulic system oil filter (Quad-Range) .....    | Every 200 hours         |
| Replace transmission-hydraulic system oil filters (Power Shift) .....  | Every 600 hours         |
| Change transmission-hydraulic oil .....                                | Every 1200 hours        |
| Clean main hydraulic pump screen .....                                 | Every 1200 hours        |
| Clean and repack front wheel bearings .....                            | Every 1200 hours        |
| Lubricate grease fittings  |                         |
| Front axle pivot pins, steering spindles, tie rods (10 fittings) ..... | Every 10 hours          |
| Wide-swing drawbar rollers (if equipped) .....                         | Every 10 hours          |
| Front wheel bearings (only in extremely wet conditions) .....          | Every 10 hours          |
| 3-point hitch .....  | Every 200 hours         |
| Rear axle bearings .....   | Every 600 hours         |

## SEPARATION

| ITEM   | SPECIFICATION                           |
|--|---|
| Fan belt tension   |   |
| New Belt   |   |
| Single belt .....  | 130-140 lbs. (572-622 N)                |
| Dual belt .....  | 95-104 lbs. (423-467 N)                 |
| After Run In   |   |
| All belts .....  | 85-94 lbs. (378-423 N)                  |
| ITEM   | TORQUE                                  |
| SOUND-GARD Body retaining cap screws .....                 | 150 ft-lbs (203 N·m) (20.3 kgm)         |
| ROLL-GARD (4-post) mounting cap screws .....               | 150 ft-lbs (203 N·m) (20.3 kgm)         |
| Engine-to-clutch housing cap screws .....                  | 1/2 in.—85 ft-lbs (115 N·m) (11.5 kgm)  |
|  | 3/4 in.—300 ft-lbs (406 N·m) (40.6 kgm) |
| Clutch housing-to-engine cap screws .....                  | 300 ft-lbs (406 N·m) (40.6 kgm)         |
| Hydraulic pump support-to-engine cap screws .....          | 85 ft-lbs (115 N·m) (11.5 kgm)          |
| Hydraulic pump coupler lock nuts .....                     | 30 ft-lbs (41 N·m) (4.1 kgm)            |
| Hydraulic pump drive coupling .....                        | 35 ft-lbs (47 N·m) (4.7 kgm)            |
| Side frames-to-engine .....                                | 5/8 in.—275 ft-lbs (373 N·m) (37.3 kgm) |
|  | 3/4 in.—425 ft-lbs (578 N·m) (57.8 kgm) |
| Clutch housing-to-transmission case cap screws .....       | 5/8 in.—170 ft-lbs (230 N·m) (23 kgm)   |
|  | 3/4 in.—300 ft-lbs (406 N·m) (40.6 kgm) |
| Oil filter inlet pipe elbow cap screws .....               | 45 ft-lbs (61 N·m) (6.1 kgm)            |
| Axle housing-to-transmission case cap screws .....         | 170 ft-lbs (230 N·m) (23 kgm)           |
| Radiator hose clamps (clean and dry) .....                 | 36 in-lbs (4 N·m) (0.4 kgm)             |
| Transmission pump elbow-to-clutch housing cap screws ..... | 45 ft-lbs (61 N·m) (6.1 kgm)            |
| Oil pan-to-clutch housing cap screws .....                 | 85 ft-lbs (115 N·m) (11.5 kgm)          |
| Hose clamps .....  | 30 in-lbs (3.4 N·m) (0.3 kgm)           |

**SPECIAL TOOLS**

**Predelivery, Delivery, and After-Sale Services**

**TOOL**

**USE**

JDG-18 Snap Ring Tool

Remove and install snap rings on ends of rear axles

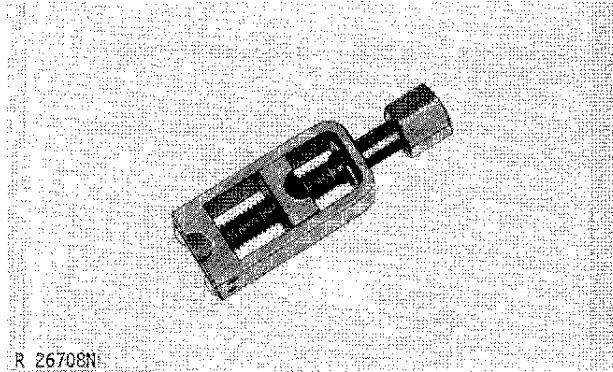
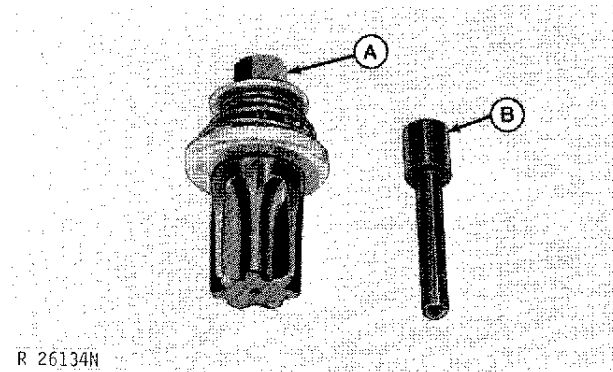


Fig. 1-JDG-18 Snap Ring Tool\*

JDE-81-1 Engine Rotation Tool and JDE-81-4 Timing Pin

Turn engine to TDC to check injection pump timing

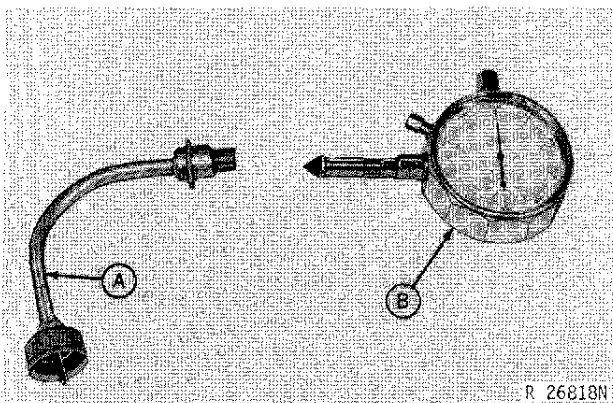


A—JDE-81-1 Engine Rotation Tool\*  
B—JDE-81-4 Timing Pin\*

Fig. 2-Tools Required for Checking Timing

JDE-28 Adapter and Hand Tachometer

Check engine speeds



A—JDE-28 Adapter\*

B—Hand Tachometer

Fig. 3-Tools Required for Checking Engine Speeds

**Tune-Up**

**TOOL**

**USE**

JDE-81-1 Engine Rotation Tool and JDE-81-4 Timing Pin

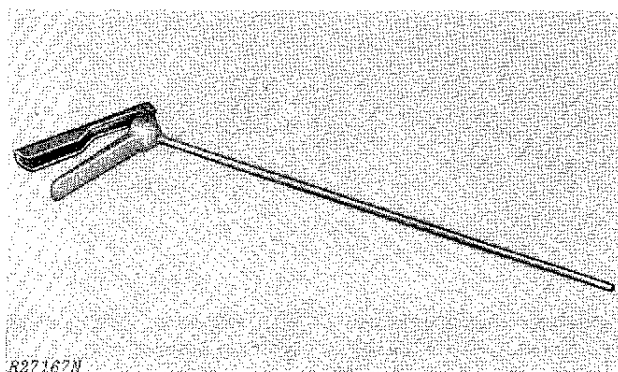
Turn engine to TDC to check injection pump timing

JDE-28 Adapter and Hand Tachometer

Check engine speeds

AR62377 Dry Element Cleaning Gun

Clean primary element of air cleaner

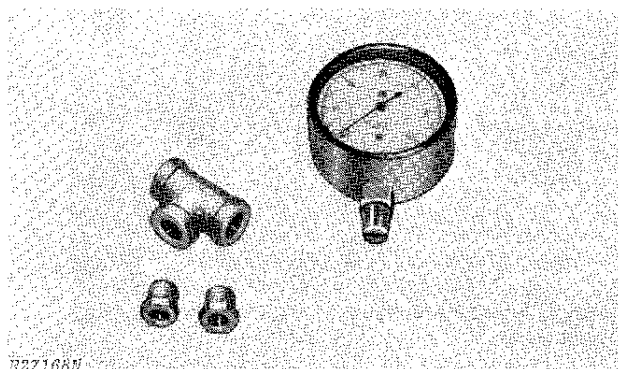


R27167N

Fig. 4-AR62377 Dry Element Cleaning Gun

D-05022ST Water Vacuum Gauge

Measure air intake vacuum



R27168N

Fig. 5-D-05022ST Water Vacuum Gauge\*  
(Formerly JDST-11)

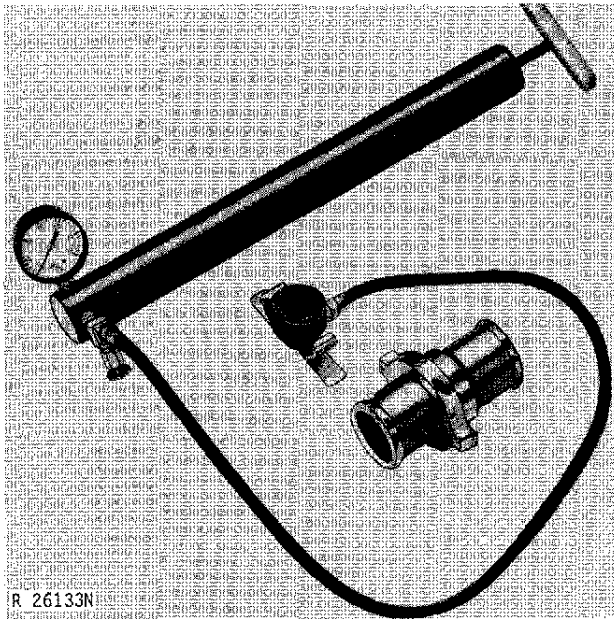
**TOOL**

**NUMBER**

**USE**

**BT-11-52 Radiator Tester**

**Pressure test cooling system and radiator caps**



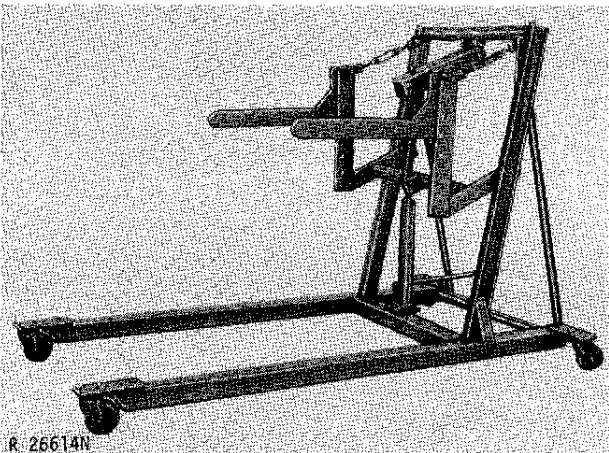
R 26133N

*Fig. 6-BT-11-52 Radiator Tester\**

**Separation**

**Brown Body Lift**

**To remove Sound-Gard Body.**

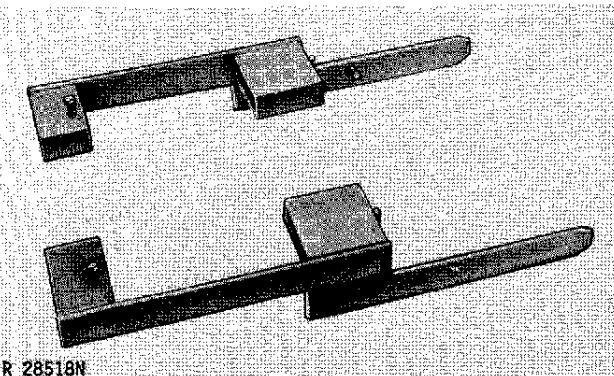


R 26614N

*Fig. 7-Brown Body Lift*

**JDG-21 Fork Lift Adapters**

**To remove Sound-Gard Body Adapters**



R 28518N

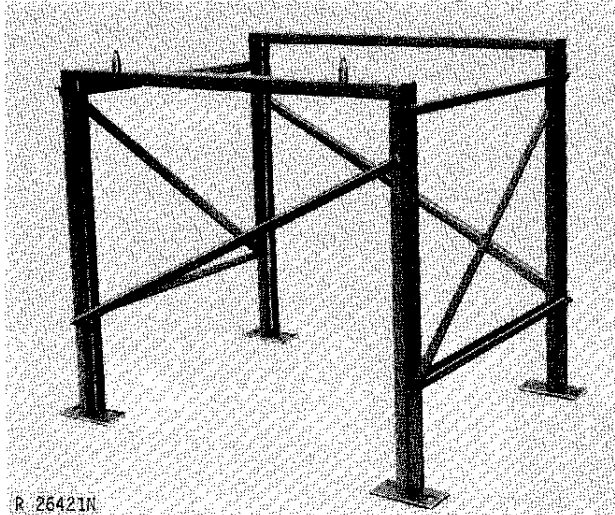
*Fig. 8-Fork Lift Adapters*

Separation—Continued

TOOL

NUMBER

USE

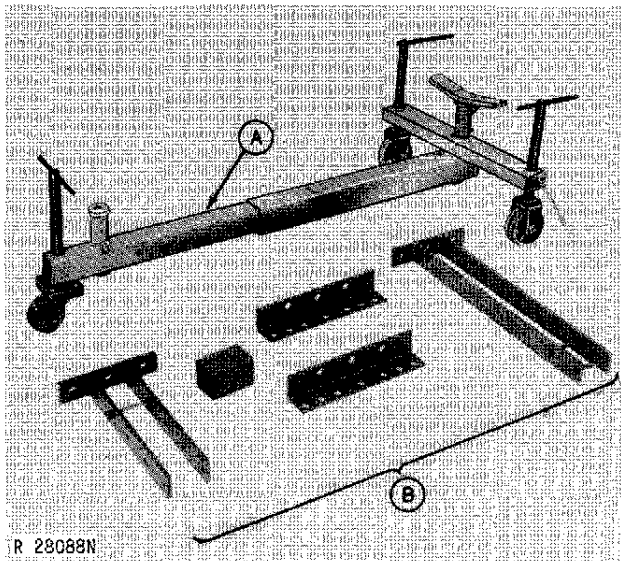


JDG-10-2

To support Sound-Gard Body after removal.

R 26421N

Fig. 9-Sound-Gard Body Stand\*



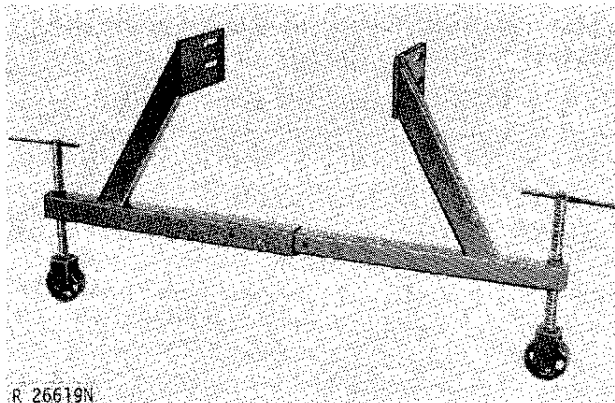
A-D-05007ST  
Splitting Stand

To support tractor in various separations.

B-D-05149ST  
Attachments

R 28088N

Fig. 10-Splitting Stand\*



JDG-12-1  
Splitting Stand

To support front end of tractor.

R 26619N

Fig. 11-Splitting Stand\*

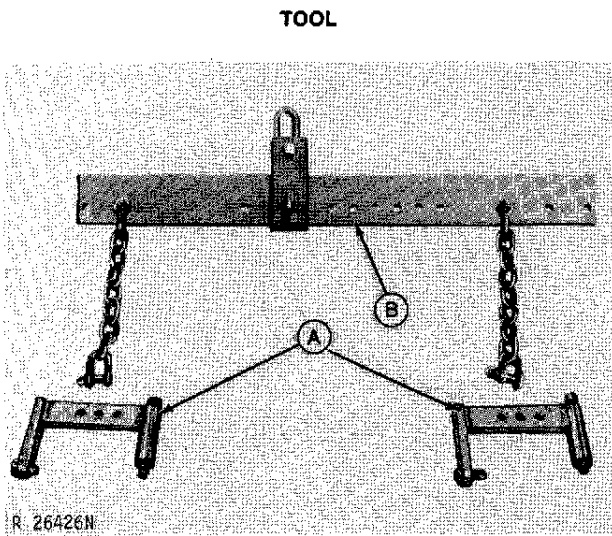


Fig. 12-Engine Removal Tools\*

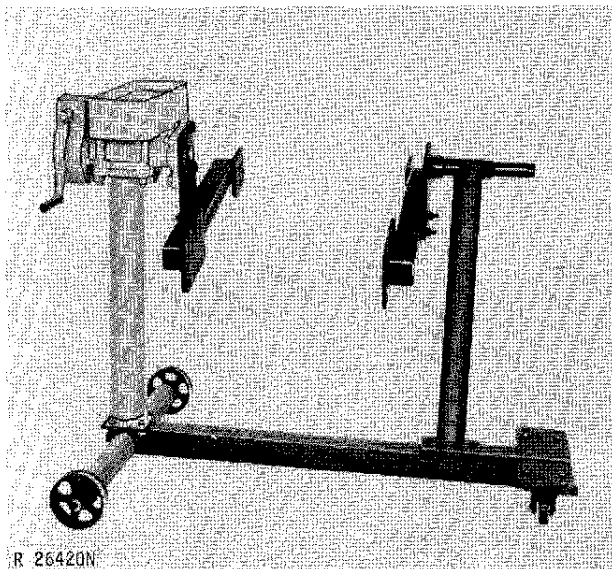


Fig. 13-Engine Repair Stand\*

\*Tools marked with an asterisk can be ordered from Service Tools, Box 314, Owatonna MN 55060.



## Group 05

# PREDELIVERY, DELIVERY, AND AFTER-SALE SERVICES

The John Deere delivery receipt, when properly filled out and signed by the dealer and customer, verifies that predelivery and delivery services were satisfactorily performed. When delivering the tractor, give the customer his copy of the delivery receipt and operators manual. Be sure to explain their purpose to him.

Because of the shipping factors involved, plus extra finishing touches necessary to promote customer satisfaction, there are certain predelivery services that must be performed by the dealer. These services are listed in the first of two sections on the predelivery form, which is attached to the tractor. The second section is a list of factory inspections that must be verified by the dealer.

Fill the form in completely and sign it. Send copy to the factory and file the original with the shop order for the job. This will certify that the proper predelivery service has been completed.

### DEALER PREDELIVERY SERVICE

Using the first part of the predelivery form along with the following illustrated procedures, perform all services listed and check each job off as it is completed.

#### Lubricating Grease Fittings

Grease all fittings with John Deere AT30408 High Temperature Grease (1 lb. [0.45 kg] can) or its equivalent. TY6281 Lubricant is the same John Deere High Temperature Grease in a 14 oz. (0.39 kg) cartridge. Lubricant must be an extreme-pressure grease with non-soap base and NGLI No. 2 consistency, and must meet John Deere JDM J13 E4 specifications.

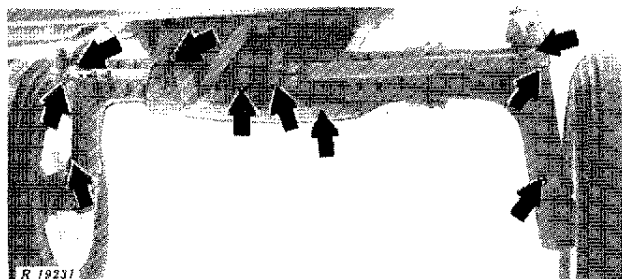


Fig. 1-Grease Fittings

1. Apply several shots of grease to tie rods, pivot pins, and the steering spindles (10 fittings).

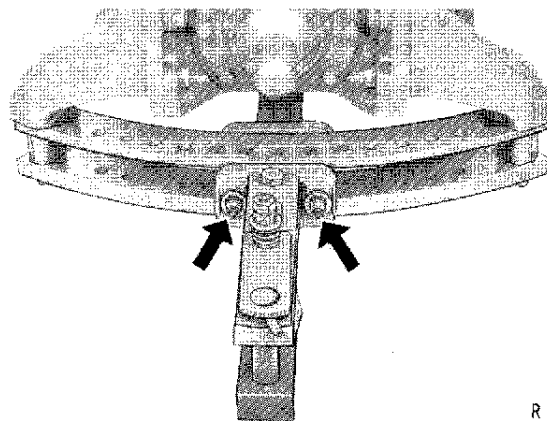


Fig. 2-Wide Swing Drawbar Grease Fittings

2. If tractor is equipped with a wide-swing drawbar (Fig. 2), apply several shots of John Deere High Temperature Grease or its equivalent to drawbar rollers.

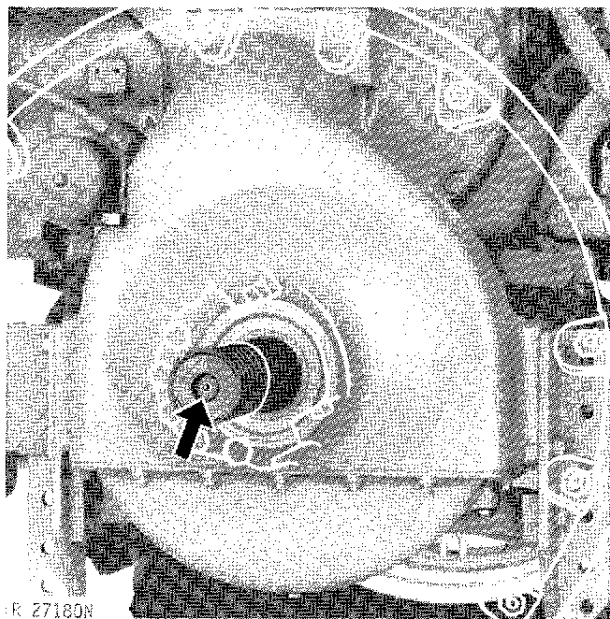


Fig. 3-Hi-Crop Rear Axle Grease Fitting

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

### Lubricating Grease Fittings—Continued

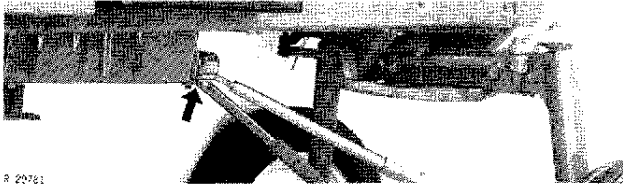


Fig. 4-Radius Rod Pivot Grease Fitting

4. On Hi-Crop tractors, apply several shots of John Deere High Temperature Grease or its equivalent to grease fittings.

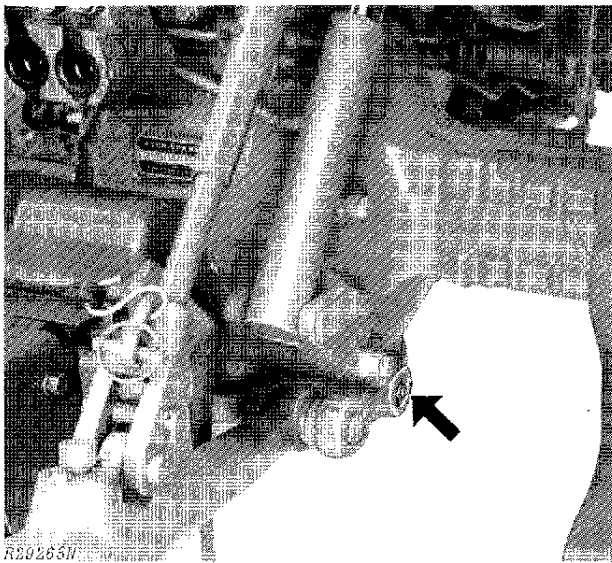


Fig. 5-Load Control Shaft Bushing Grease Fitting

5. Apply several shots of John Deere High Temperature Grease or its equivalent to each load control shaft bushing.

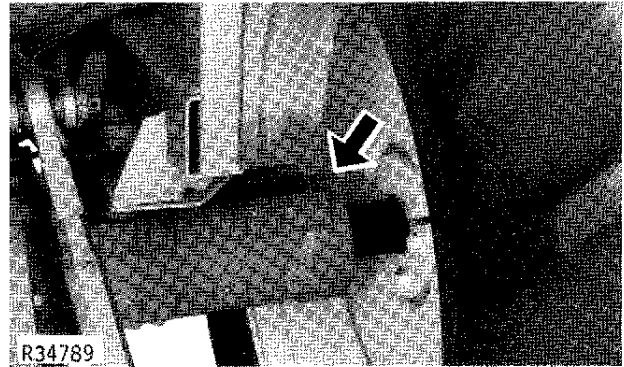


Fig. 6-Rear Axle Grease Plug

6. Grease the rear axle bearings by removing the pipe plug on each end of the axle housing, installing a grease fitting and applying John Deere High Temperature Grease or its equivalent at each fitting. Apply grease until grease appears at seals, or a maximum of 25 shots.

### Install Ether Aid Solenoid Wiring (if equipped)

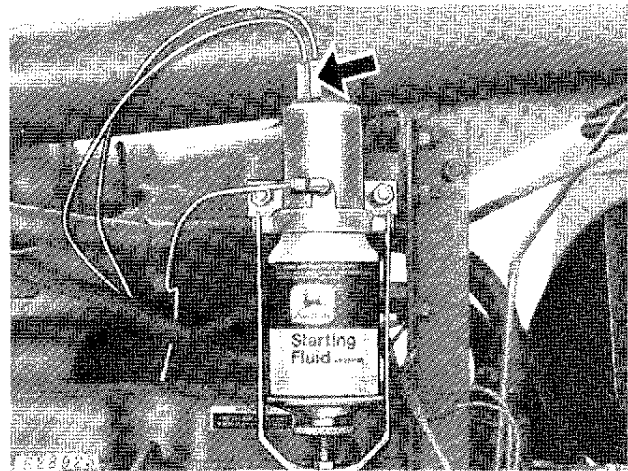


Fig. 7-Electric Starting Aid Connector

Connect starting aid wiring to starting aid solenoid (if equipped).

### Align Muffler and Air Stack

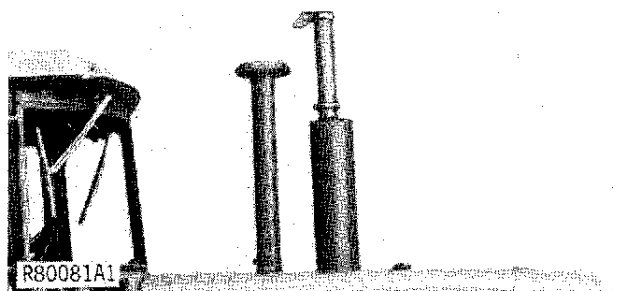


Fig. 8-Muffler and Air Stack

If necessary, align muffler and air stack so they are perpendicular to tractor hood.

### Adjust All Lamps

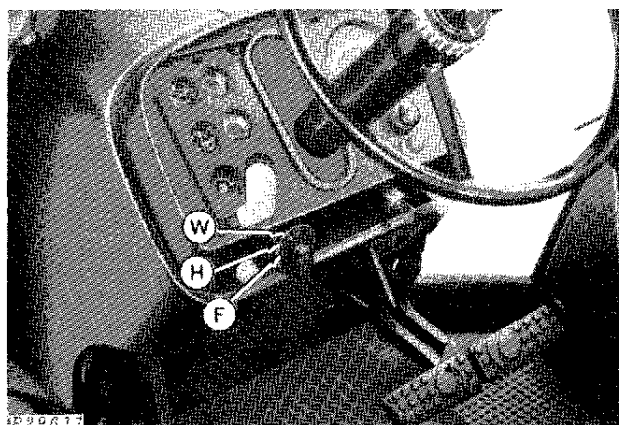
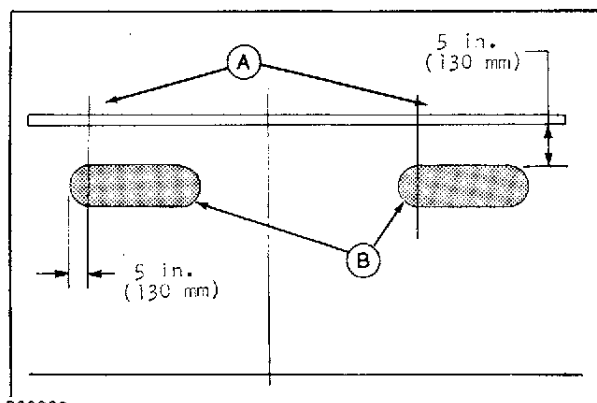


Fig. 9-Light Switch

Make sure lights work properly in the following positions:

- OFF - To turn off lights.
- W - To turn on the warning lamps.
- H - To turn on the dual-beam head lamps, warning lamps, and red tail lamps.
- F - To turn on the dual-beam head lamps and flood lamps.

### Head Lamps

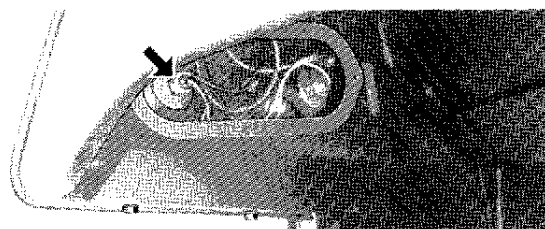


R33823

A—Points Directly in Front of Lamps  
B—Small Zones of Bright Light

Fig. 10-Checking Head Lamp Positions

1. Park tractor on level ground, 25 feet (8 m) from a wall.
2. Measure height of lamps above ground, and place a strip of masking tape on wall at same height.
3. Sight across steering wheel and hood ornament to locate tractor centerline. Mark this spot, and measure out one foot (300 mm) in each direction. This locates a spot directly in front of each lamp.
4. Turn light switch to "H" and dimmer switch to low beam.
5. Locate small zone of bright light projected by each lamp. Top of bright zone should be five inches (130 mm) lower than lamp, and left edge of zone should be five inches (130 mm) to left of lamp. Cover other lamp if necessary.



R 29520

Fig. 11-Head Lamp Adjusting Nut

6. To readjust a bulb, loosen nut behind bulb. Hold lamp in correct position, and tighten securely.

**Remove SMV Plastic Cover**

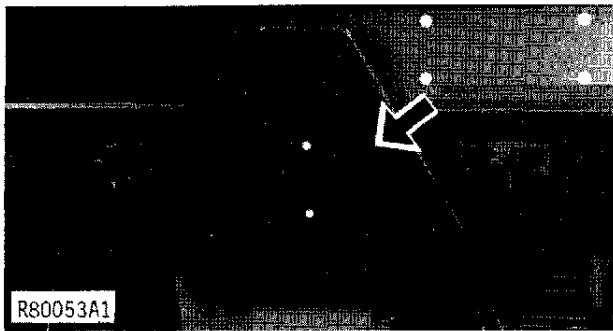


Fig. 12-Plastic Cover

Remove plastic cover from SMV emblem.

**Remove Rockshaft Lift Arm Retaining Wire**

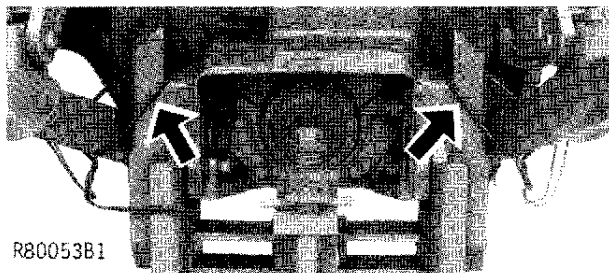
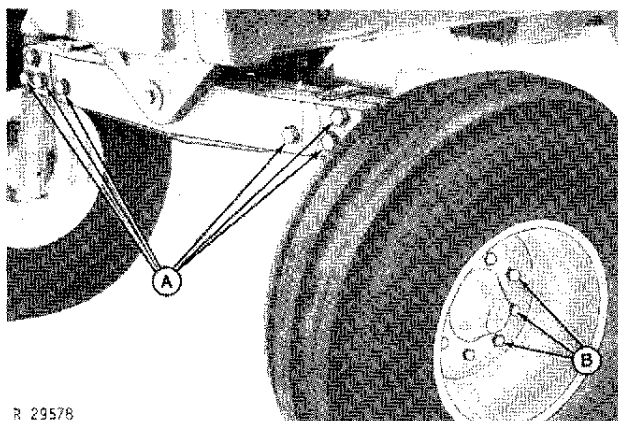


Fig. 13-Retaining Wire

Remove retaining wire from rockshaft lift arms.

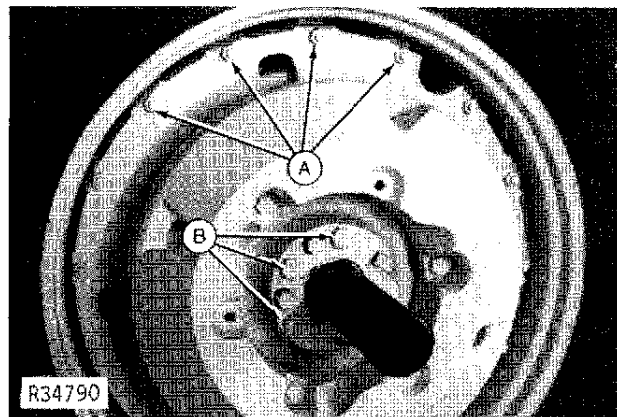
**Torque Wheel Hardware To Specifications**



A—Axle Cap Screws      B—Front Wheel Cap Screws

Fig. 14-Front Axle Cap Screws

1. Torque axle cap screws (A, Fig. 14) to 445 ft-lbs (600 N·m) (60 kgm).
2. Torque front wheel cap screws to 120 ft-lbs (160 N·m) (16 kgm), (16.5L-16.1 tires) or 100 ft-lbs (135 N·m) (14 kgm) (all other sizes).



A—Rim Clamp Cap Screws      B—Special Bolts

Fig. 15-Rear Wheel Cap Screws

3. Torque rim clamp cap screws (A, Fig. 15) to 170 ft-lbs (230 N·m) (23 kgm).
4. Torque special bolts (B) to 300 ft-lbs (410 N·m) (41 kgm).



Fig. 16-Rear Wheel Bolts

5. Torque wheel bolts to 300 ft-lbs (410 N·m) (41 kgm) (10-bolt wheel), 240 ft-lbs (325 N·m) (33 kgm) (9-bolt wheel with retaining ring) or 85 ft-lbs (110 N·m) (11 kgm) (9-bolt wheel without retaining ring.)

### Check Tire Pressure

Make sure tire pressure meets the specifications in the chart below.

| TIRE SIZE          | PLY RATING | MAXIMUM INFLATION |
|--------------------|------------|-------------------|
| <b>Front Tires</b> |            |                   |
| 9.50-20            | 8          | 32 psi (2.2 bar)  |
| 10.00-16           | 6          | 32 psi (2.2 bar)  |
| 11.00-16           | 8          | 28 psi (1.9 bar)  |
| 14L-16.1           | 6          | 24 psi (1.7 bar)  |
| 14L-16.1           | 10         | 24 psi (1.7 bar)  |
| 16.5L-16.1         | 8          | 24 psi (1.7 bar)  |
| 14.9-24            | 8          | 14 psi (1.0 bar)  |
| <b>Rear Tires</b>  |            |                   |
| 12.4-42            | 6          | 22 psi (1.5 bar)  |
| 18.4-38            | 6          | 16 psi (1.1 bar)  |
| 18.4-38            | 8          | 16 psi (1.1 bar)  |
| 18.4-38            | 10         | 16 psi (1.1 bar)  |
| 18.4-42            | 10         | 16 psi (1.1 bar)  |
| 20.8-38            | 8          | 16 psi (1.1 bar)  |
| 20.8-38            | 10         | 16 psi (1.1 bar)  |
| 24.5-32            | 10         | 16 psi (1.1 bar)  |
| 30.5-32            | 10         | 16 psi (1.1 bar)  |

### Adjust Wheel Spacing

#### Front Tread

Front axle is adjustable in four-inch (100 mm) steps within the ranges shown below.

| FRONT TREAD RANGE |                                   |                                  |
|-------------------|-----------------------------------|----------------------------------|
| Front Tire Size   | Regular Axle                      | Wide Axle                        |
| 9.50-20           | 59 to 83 in.<br>(1.50 to 2.11 m)  | 67 to 95 in.<br>(1.70 to 2.41 m) |
| 10.00-16          | 56 to 82 in.<br>(1.42 to 2.08 m)  | 64 to 94 in.<br>(1.63 to 2.39 m) |
| 11.00-16          | 58 to 82 in.<br>(1.47 to 2.08 m)  | 66 to 94 in.<br>(1.67 to 2.39 m) |
| 14L-16.1          | 61 to 85 in.<br>(1.55 to 2.13 m)  | 69 to 97 in.<br>(1.75 to 2.46 m) |
| 16.5L-16.1        | 63 to 87 in.*<br>(1.60 to 2.21 m) | 71 to 99 in.<br>(1.80 to 2.51 m) |
| 14.9-24**         | 72 to 88 in.<br>(1.83 to 2.24 m)  | Not Available                    |

\*4840 Tractor Only

\*\*Power Front-Wheel Drive Tractors Only

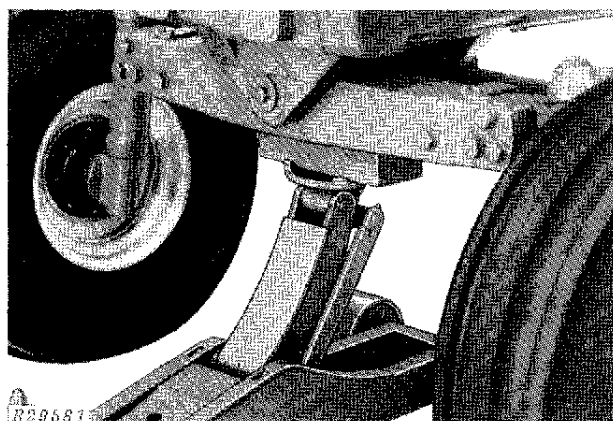


Fig. 17-Jacking Up Tractor

1. Jack up front end of tractor.

**IMPORTANT:** Do not place jack under engine oil pan. On tractors with power front-wheel drive, do not place jack under hose guard at front axle.

**Adjust Wheel Spacing—Continued**

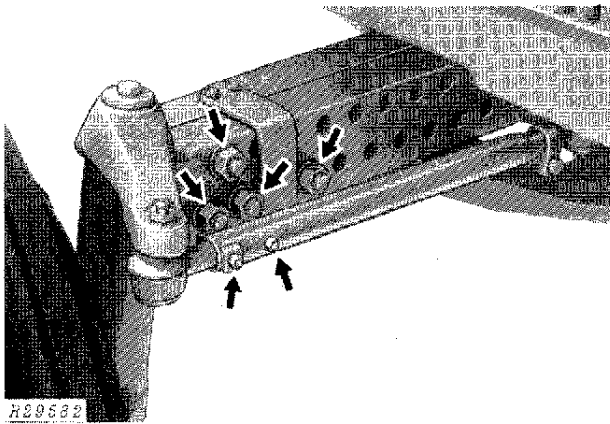


Fig. 18-Front Axle Bolts

2. Remove bolt from tie rod.
3. Remove bolts from front axle.
4. Slide axle knee to desired position.
5. Install axle bolts. Tighten to 445 ft-lbs (600 N-m) (60 kgm).

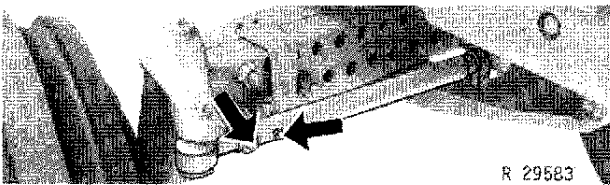


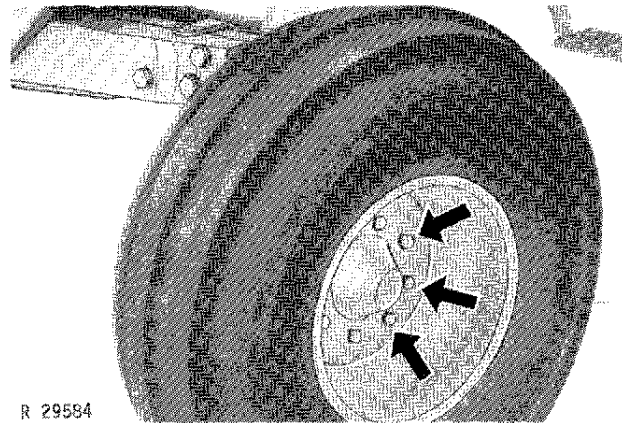
Fig. 19-Tie Rod Bolts

6. Install bolts in tie rod, making sure tie rod is changed same amount as axle.
7. Adjust other side in same manner. Both sides should normally be adjusted to same spacing.
8. Check toe-in each time tread is adjusted.

**Reversing Wheel Disk**

With 9.50-20, 10.00-16 front tires, wheels are reversible. With larger tire sizes, wheel dish must be turned outward for tire clearance.

With wheel dish turned inward, 9.50-20 tire tread is five inches (130 mm) narrower and 10.00-16 tire tread is two inches (50 mm) narrower.



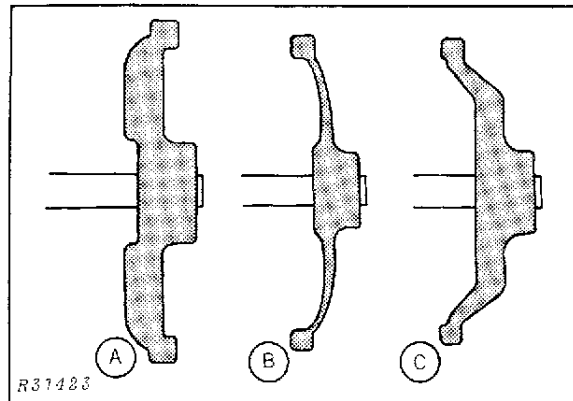
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Fig. 20-Lug Bolts

Tighten lug bolts to 100 ft-lbs (135 N-m) (14 kgm) torque. Check and retighten as instructed on page 10-05-4.

**Rear Tread Limitations**

Approximate tread ranges for each tire size are shown in the chart on the following page.



A—Heavy Cast Wheel  
B—Offset Cast Wheel

C—Heavy Offset Cast Wheel

Fig. 21-Wheel Types

Certain tire sizes are available with different wheel types which permit different tread ranges. Types of wheels are illustrated at left.

Tread range for Hi-Crop Tractors is 73 to 97 inches (1.85 to 2.46 m) for straight wheels or 73 to 102 inches (1.85 to 2.59 m) for offset wheels.

Tread adjustment is usually made with the rack and pinion, but you may need to change rim position on wheels or reverse wheels on axles to reach certain tread widths.

**CAUTION:** For tractor stability, never operate with single tires having tread width less than 60 inches (1.50 m).

Tread is measured between centers of tires.

| TIRE SIZE | WHEEL TYPE        | RIM POSITION | RIM CLAMP     | REGULAR AXLE                            | LONG AXLE                      | EXTRA LONG AXLE                |
|-----------|-------------------|--------------|---------------|---|--------------------------------|--------------------------------|
|           |                   |              |               | 96 in. (2.44 m) End-to-end              | 108 in. (2.73 m) End-to-end    | 118 in. (2.99 m) End-to-end    |
| 12.4-42   | Offset Cast       | Inner        | Inside Wheel  | Not Available<br>(Requires Dual Wheels) | 56 to 80 in. (1.40 to 2.03 m)  | 56 to 90 in. (1.40 to 2.28 m)  |
|           |                   | Inner        | Outside Wheel |   | 61 to 87 in. (1.54 to 2.21 m)  | 61 to 97 in. (1.54 to 2.45 m)  |
|           |                   | Outer        | Inside Wheel  |   | 62 to 88 in. (1.54 to 2.23 m)  | 62 to 98 in. (1.57 to 2.48 m)  |
|           |                   | Outer        | Outside Wheel |   | 69 to 95 in. (1.74 to 2.40 m)  | 69 to 105 in. (1.74 to 2.66 m) |
| 18.4-38   | Heavy Offset Cast | Inner        | Inside Wheel  | 60 to 69 in. (1.52 to 1.74 m)           | 60 to 82 in. (1.52 to 2.08 m)  | 60 to 92 in. (1.52 to 2.33 m)  |
|           |                   | Inner        | Outside Wheel | 60 to 76 in. (1.52 to 1.93 m)           | 63 to 89 in. (1.59 to 2.25 m)  | 63 to 99 in. (1.59 to 2.50 m)  |
|           |                   | Outer        | Inside Wheel  | 61 to 77 in. (1.55 to 1.96 m)           | 64 to 90 in. (1.62 to 2.28 m)  | 64 to 100 in. (1.62 to 2.53 m) |
|           |                   | Outer        | Outside Wheel | 68 to 84 in. (1.72 to 2.13 m)           | 71 to 97 in. (1.79 to 2.45 m)  | 71 to 107 in. (1.79 to 2.71 m) |
| 18.4-42   | Heavy Offset Cast | Inner        | Inside Wheel  | 60 to 67 in. (1.52 to 1.70 m)           | 60 to 80 in. (1.52 to 2.03 m)  | 60 to 90 in. (1.52 to 2.28 m)  |
|           |                   | Inner        | Outside Wheel | 60 to 74 in. (1.52 to 1.88 m)           | 61 to 87 in. (1.54 to 2.20 m)  | 61 to 97 in. (1.54 to 2.45 m)  |
|           |                   | Outer        | Inside Wheel  | 60 to 75 in. (1.52 to 1.91 m)           | 62 to 88 in. (1.57 to 2.23 m)  | 62 to 98 in. (1.57 to 2.48 m)  |
|           |                   | Outer        | Outside Wheel | 66 to 82 in. (1.67 to 2.08 m)           | 69 to 95 in. (1.74 to 2.40 m)  | 69 to 115 in. (1.74 to 2.66 m) |
| 20.8-38   | Heavy Offset Cast | Inner        | Inside Wheel  | 63 to 69 in. (1.60 to 1.76 m)           | 63 to 82 in. (1.60 to 2.08 m)  | 63 to 92 in. (1.60 to 2.33 m)  |
|           |                   | Inner        | Outside Wheel | 63 to 76 in. (1.60 to 1.93 m)           | 63 to 89 in. (1.60 to 2.25 m)  | 63 to 99 in. (1.60 to 2.50 m)  |
|           |                   | Outer        | Inside Wheel  | 63 to 77 in. (1.60 to 1.96 m)           | 64 to 90 in. (1.63 to 2.28 m)  | 64 to 100 in. (1.63 to 2.53 m) |
|           |                   | Outer        | Outside Wheel | 68 to 84 in. (1.72 to 2.13 m)           | 71 to 97 in. (1.79 to 2.45 m)  | 71 to 107 in. (1.79 to 2.71 m) |
| 24.5-32   | Heavy Cast        | Inner        | Outside Wheel | 67 to 76 in. (1.70 to 1.94 m)           | 67 to 89 in. (1.70 to 2.26 m)  | 67 to 99 in. (1.70 to 2.51 m)  |
|           |                   | Outer        | Outside Wheel | 82 to 98 in. (2.08 to 2.50 m)           | 85 to 111 in. (2.15 to 2.82 m) | 85 to 121 in. (2.16 to 3.07 m) |
| 30.5-32   | Heavy Cast        | Inner        | Outside Wheel | 79 in. (2.01 m)                         | 79 to 85 in. (2.01 to 2.16 m)  | 79 to 95 in. (2.01 to 2.41 m)  |
|           |                   | Outer        | Outside Wheel | 86 to 102 in. (2.19 to 2.60 m)          | 89 to 115 in. (2.26 to 2.92 m) | 89 to 125 in. (2.26 to 3.17 m) |

- IMPORTANT:**
1. Tires must have at least one inch (25 mm) clearance with fenders. Clearance between tires must be at least 42 inches (1.07 m), with tires equal distances from center line.
  2. With dual tires, space between tires must be at least four inches (100 mm).
  3. With single tires, do not exceed 110 inches (2.80 m) for pulling heavy loads.
  4. Pinion might be damaged if hub is tightened at its very innermost position. Back away from end of rack at least 1/8 inch (3 mm).

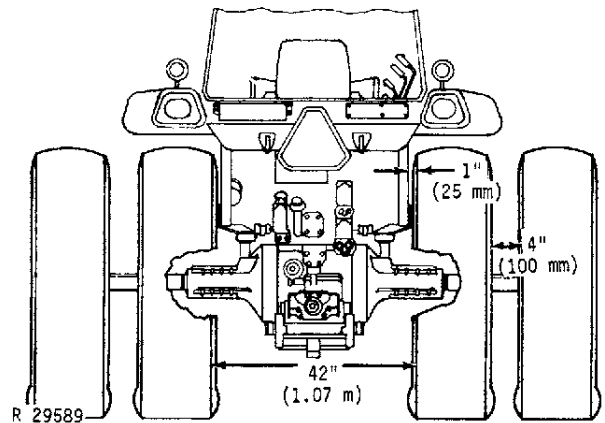
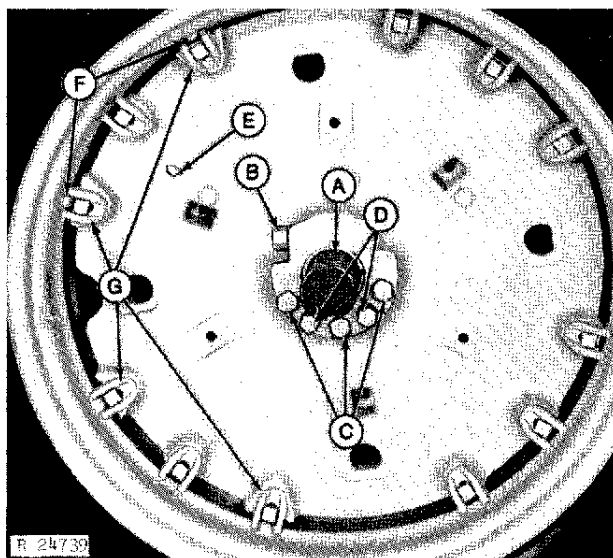


Fig. 22-Minimum Clearances

### Adjust Rack and Pinion Wheel



- |                 |                         |
|-----------------|-------------------------|
| A—Rack          | E—Weight Reference Mark |
| B—Pinion        | F—Rim Driving Lugs      |
| C—Special Bolts | G—Wheel Driving Lugs    |
| D—Jack Screws   |                         |

Fig. 23-Rack and Pinion Wheel

Adjust rear tread width to customer's needs.

**CAUTION:** Unless tractor is equipped with double rear wheels, tread width must be at least 60 inches (1.52 m) for tractor stability.

1. Jack up tractor. Rotate wheel so that rack is on top of axle.
2. If needed, clean axle with a steel brush.
3. Loosen the three special bolts (C, Fig. 23) approximately 3/8 inch (10 mm) each.
4. Tighten the two jack screws (D) evenly until key sleeve loosens.

**NOTE:** If sleeve is difficult to break loose, also loosen the three special bolts on inboard side of wheel. If sleeve still will not break loose, strike end of axle several times with a heavy hammer and evenly retighten jack screws. It helps to soak sleeves with penetrating oil.

5. Turn pinion (B) to slide wheel in or out on axle to desired position. For extreme tread positions, it may be necessary to reverse wheel on axle or change rim position on wheel.

**IMPORTANT:** Tires or weights must have at least one inch (25 mm) clearance with fenders. To prevent damaging pinion when hub is tightened, do not put wheel in its very innermost position—back it out at least 1/8 inch (3 mm).

6. Back jack screws all the way out against stop. Do not force.

7. Lubricate threads and tighten special bolts to 300 ft-lbs (410 N-m) (41 kgm). Retighten bolts several times until all three stay tightened to specified torque. Jack screws must be free to turn after hub is tightened. If necessary, loosen jack screws further and retighten special bolts.

**IMPORTANT:** After driving tractor approximately 100 yards (100 m), retighten special bolts to proper torque. Instruct customer to retighten them after 3 hours work and again after 10 hours work, and to keep them tight.

### Changing Rim Position On Wheel

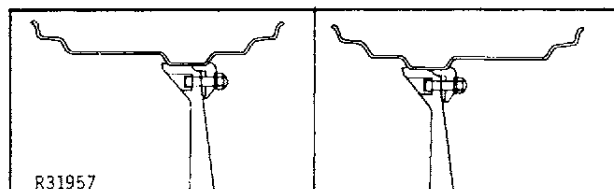


Fig. 24-Deep Well Rim Positions

Deep-well rims have only two possible positions on wheels. Wider side of rim can be turned to inside or outside.

**NOTE:** To change rim position and maintain proper direction of tire rotation, move each tire to opposite side of tractor.

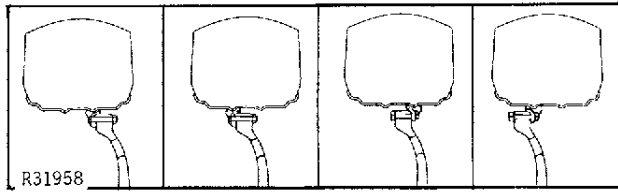


Fig. 25-Rim Positions for Rims with Double Rings

Rims with double rings have four possible positions on wheels. Clamps can be mounted on either side of wheel and can engage either ring on rim.

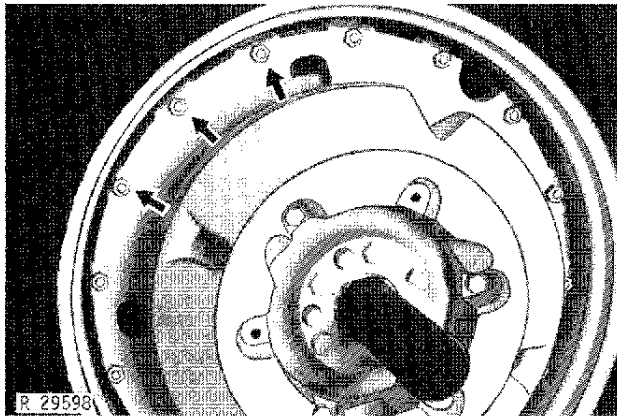


Fig. 26-Rim Clamp Bolts

Be sure clamps engage rim driving lugs.

Tighten clamps evenly. Strike each bolt head with a hammer to seat bolts; then retighten bolts to 170 ft-lbs (230 N·m) (23 kgm) torque. Check and retighten bolts as instructed on page 10-05-4.

### Reversing Wheels on Axles

**NOTE:** To reverse wheels on axles and maintain proper direction of tire rotation, move each wheel to opposite side of tractor.

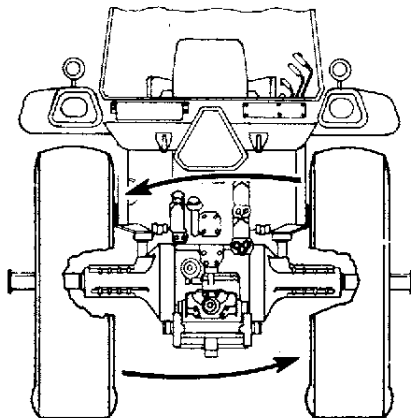


Fig. 27-Reversing Wheels

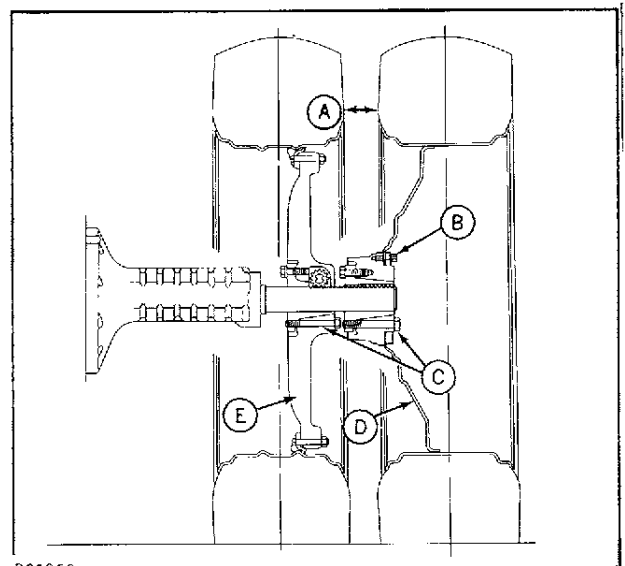
1. Remove snap rings from ends of axles.

2. Following instructions under "Adjusting Rack and Pinion" on page 10-05-8, slide wheels off axles. Install on opposite axles.

3. Install snap rings on ends of axles.

4. With two jack screws backed all the way out to stops, tighten three special bolts to 300 ft-lbs (400 N·m) (40 kgm) torque. Check and retighten as instructed on page 10-05-8.

### Dual Wheels



A—4-in. (100 mm) Minimum Space      D—Steel Disk Wheel  
 B—Retaining Bolts                              E—Cast Iron Wheel  
 C—Special Bolts

Fig. 28-Dual Wheels

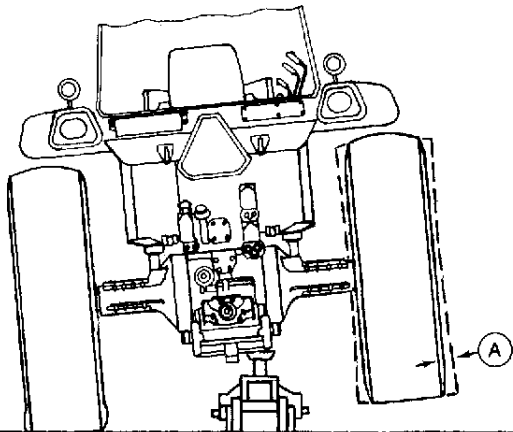
- IMPORTANT:**
1. Space between tires (A) must be at least four inches (100 mm).
  2. Tighten and retighten retaining bolts.
  3. Be sure hub special bolts (C) and rim clamps are kept tight.
  4. When removing a wheel for single wheel operation, always remove steel disk wheel (D) and operate tractor on cast iron wheel (E).

### Check Rear Wheel Alignment

1. Jack up rear of tractor until one wheel is off ground.

**CAUTION:** Make sure differential lock is NOT engaged.

2. Start tractor and place transmission in lowest gear.



R34753

A—Run-Out

Fig. 29-Checking Tire Run-Out

3. Engage clutch and make sure tire runs straight.
4. If tire does not run straight, loosen rim clamp bolts.
5. Tighten rim clamp bolts evenly, alternating from one side of rim to the other.
6. Run tractor again to check alignment.
7. Check alignment of other wheel.

### Adjust Front Wheel Toe-In

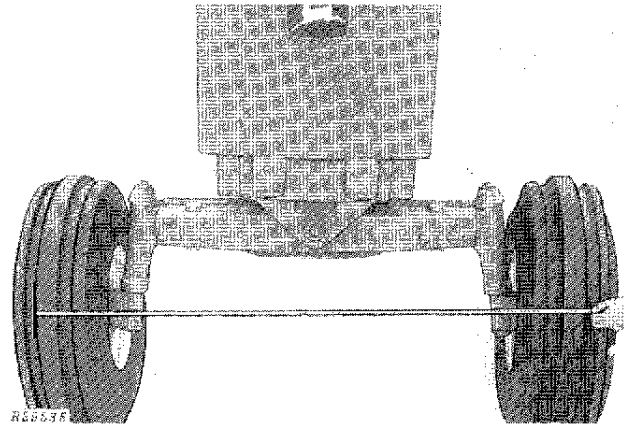


Fig. 30-Checking Toe-In

1. Steer front wheels straight ahead.
2. Measure distance between tires at hub level. Mark the point at which you measured.
3. Move tractor back about three feet (one meter), so mark is at hub level behind the axle. Again measure distance between tires, at same point on tire. Tires should be 1/8 to 3/8 in. (3 to 9 mm) closer in front.

### Engine Break-In

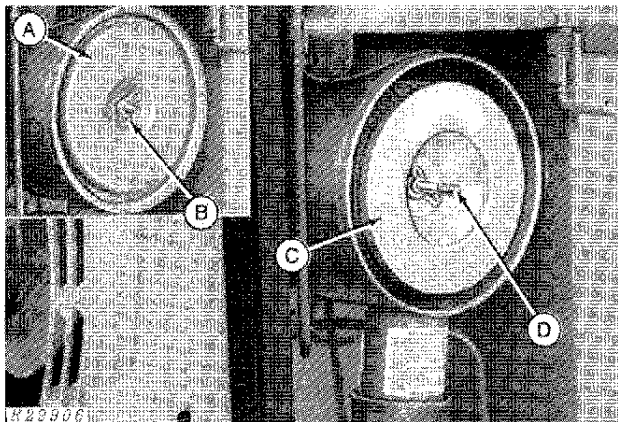
Follow procedures for engine break-in as instructed on page 220-10-1.

### INSPECTION CHECKS

The second part of the predelivery form is a list of factory inspections that must be verified by the dealer. Use this part of the predelivery form along with the following illustrated procedures to check and verify each item on the list.

1. Check engine oil level. If necessary, add sufficient oil to bring oil level to full mark on dipstick.

2. Check tension of belts. Tension of both alternator and compressor belts should be 85 to 95 lbs. (375 to 425 N).



A—Cover  
B—Wing Nut

C—Primary Element  
D—Wing Nut

Fig. 31-Primary Element and Cover

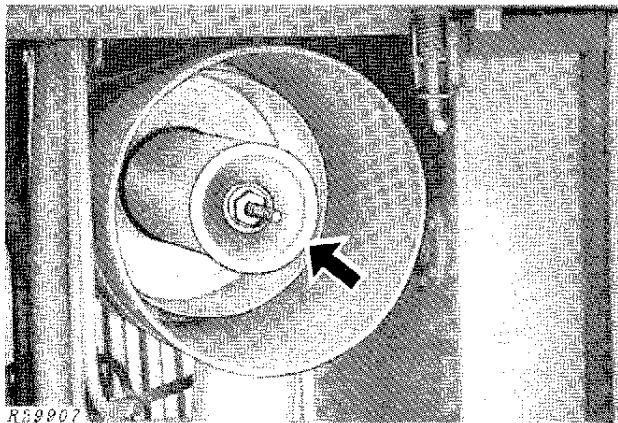


Fig. 32-Secondary Element

3. Make sure air cleaner elements are installed correctly.

4. Check engine coolant level. Proper level is mid-way between filler neck and top of radiator core.

5. Check transmission/hydraulic system oil level. If necessary, add oil to bring to upper mark on dipstick.

6. Check installation of safety shields, handrails and steps. Be sure mounting hardware is tight.

7. Check wheel retainer snap rings on axles. Make sure they are properly seated in groove on axles.

8. Check installation of SOUND-GARD Body mounts. Be sure mounting hardware is tight.

9. Check specific gravity of batteries. If reading is below 1.215, battery must be recharged. If difference between cells is more than 0.50, replace battery.

10. Check instrument panel gauges and lights for proper operation.

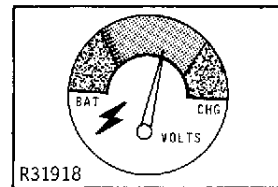


Fig. 33-Voltmeter Gauge

A - Turn key switch to first position. Voltmeter (Fig. 33) hand should rise to green band.

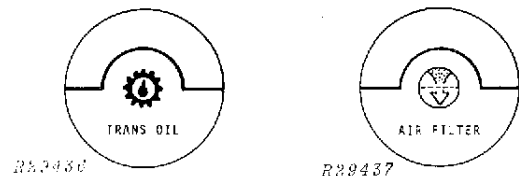


Fig. 34-Transmission Oil and Air Filter Gauges

B - While cranking engine, check transmission oil and air filter indicator lights (Fig. 34). Both bulbs should light while key switch is in start position.

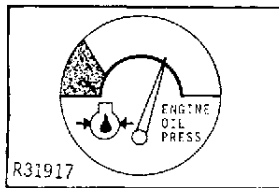
**INSPECTION CHECKS—Continued**

Fig. 35—Oil Pressure Gauge

C - Make sure oil pressure gauge hand rises above warning zone within five seconds after engine starts.

11. Check operation of lights in all switch positions:  
OFF - To turn lights off.

W - To turn on the warning lamps.

H - To turn on the dual-beam head lamps, warning lamps, and red tail lamps.

F - To turn on the dual-beam head lamps and flood lamps.

12. Check start-safety switch operation. Make sure engine will start only with transmission in neutral or park.

13. Make sure clutch pedal is adjusted correctly. The lowest part of clutch pedal should be 5-1/4 to 5-3/4 in. (133 to 146 mm) above the footrest.

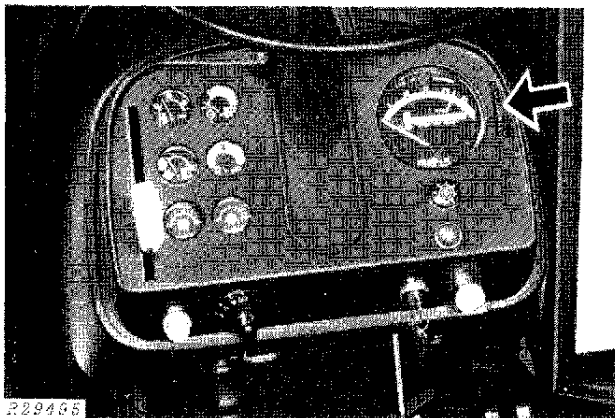


Fig. 36—Tachometer

14. Check engine idle speeds on tachometer (Fig. 36) Fast idle should be 2400 rpm and slow idle should be 800 rpm.

15. Check operation of engine stop knob. Make sure engine stops when knob is pulled out.

16. Make sure steering operates properly in a full left and full right turn.

17. Make sure brakes function properly with engine running. Make sure brakes have a solid feel for at least five applications after engine has been stopped for at least 15 minutes.

18. Check steering wheel tilt and telescope mechanisms.

19. Make sure transmission operates properly in all gears.

20. Check operation of differential lock if equipped. While driving tractor, depress differential lock pedal. Pedal should remain engaged until brakes are used. Pedal should release when either brake pedal is depressed.

21. Raise and lower rockshaft several times to make sure it functions properly.

22. Check SCV operation. Attach a remote hydraulic cylinder to a breakaway coupler. See that coupler, coupler operating levers, and rate of operation valve function smoothly.

Extend and retract cylinder several times. Make sure operation lever automatically returns to neutral when cylinder reaches end of its stroke.

23. Make sure PTO is operating correctly. With PTO guard removed and engine running, make sure PTO shaft rotates when PTO clutch lever is engaged and stops when lever is disengaged.

24. Make sure all seat controls operate properly.

25. Make sure seat belts are installed, if required, and operational.

26. Inspect all coolant, fuel and oil lines for leaks, and correct if necessary.

27. Inspect paint and decals for defects. Correct as necessary.

## DELIVERY SERVICE

A thorough discussion of the operation and service of a new tractor at the time of delivery helps to assure complete customer satisfaction. Proper delivery should be an important phase of a dealer's program. A portion of the John Deere Delivery Receipt emphasizes the importance of proper delivery service.

Many complaints have arisen simply because the owner was not shown how to operate and service his new tractor properly. Enough time should be devoted, at the customer's convenience, to introducing the owner to his new tractor and explaining to him how to operate and service it.

**IMPORTANT: Install plug in muffler outlet if transporting tractor to customer. This will prevent damage to the turbocharger caused by air passing through the turbocharger and rotating it without lubrication when the engine is stopped.**

The following procedure is recommended before the serviceman and owner complete the delivery acknowledgments portion of the delivery receipt.

Using the tractor operator's manual as a guide, be sure the owner understands these points thoroughly:

1. Controls and instruments.
2. How to start and stop the engine.
3. The importance of the break-in period.
4. How to use liquid or cast-iron ballast.
5. All functions of the hydraulic system.
6. Using the power takeoff.
7. The importance of safety.
8. The importance of lubrication and periodic services.

Give particular emphasis to sway blocks, rockshaft speed-of-drop, rockshaft selector lever (load and depth control), transmission oil indicator light (whether temperature or pressure and what to do if it comes on), voltmeter (how to see whether alternator is charging), and SOUND-GARD Body air filters. These areas are very often misunderstood.

After explaining and demonstrating the above features, have the owner sign the delivery receipt and give him the operator's manual.

## AFTER-SALE INSPECTION

The purchaser of a new John Deere tractor is entitled to a free inspection within the warranty period after the equipment has been "run in." The terms of this after-sale inspection are outlined on the back of the John Deere Delivery Receipt.

The purpose of this inspection is to make sure that the customer is receiving satisfactory performance from his tractor. At the same time, the inspection should reveal whether the tractor is being operated, lubricated, and serviced properly.

If the recommended after-sale service inspection is followed, the dealer can eliminate a needless volume of service work by preventing minor irregularities from developing into serious problems later on. This will promote strong dealer-customer relations and present the dealer an opportunity to answer questions that may have arisen during the first few days of operation.

The following inspection program is recommended within the first 100 hours of tractor operation.

### Cooling System

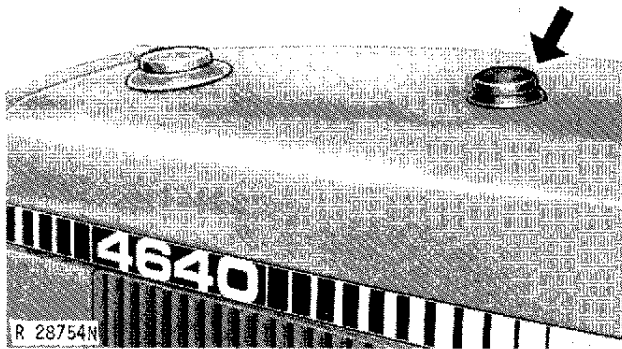


Fig. 37-Radiator Cap

1. Remove radiator cap and check coolant level. Level should be at least 1-1/2-inches (38 mm) above baffle in radiator top tank. If coolant is low, fill to proper level and try to determine why coolant was lost.

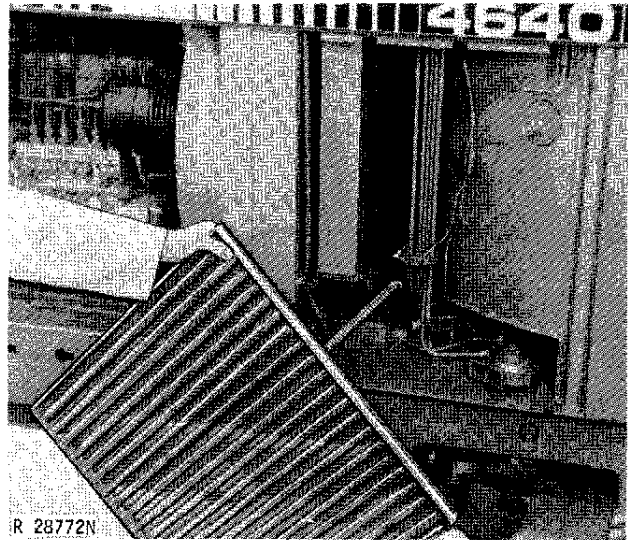


Fig. 38-Removing Side Grille Screen

2. Remove side grille screens. Remove any trash which has accumulated on radiator and oil cooler-condenser.

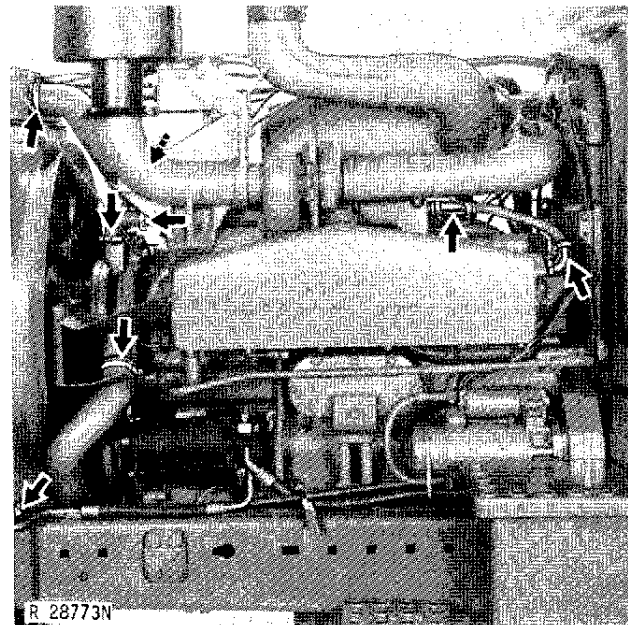


Fig. 39-Cooling System

3. Check all hoses and connections for leaks. Correct as necessary.

### Fuel System

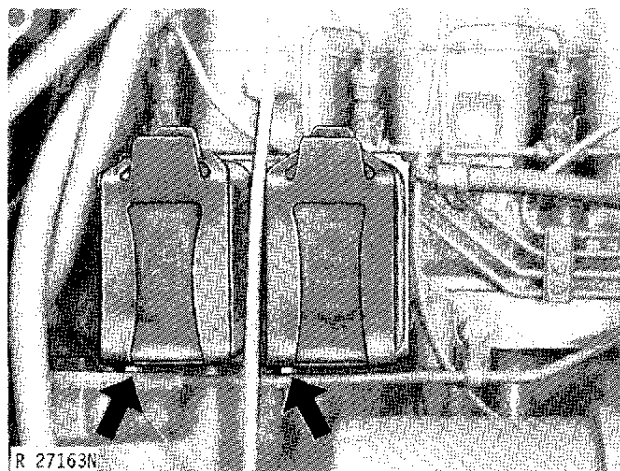
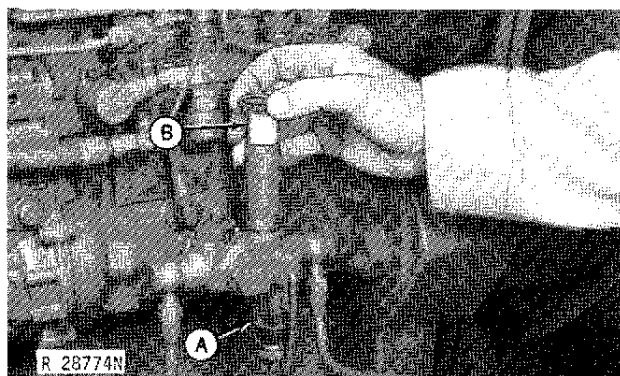


Fig. 40-Fuel Filter Drain Plugs

1. Check fuel filters for water or sediment. If any is present, remove drain plugs and drain it out. Caution customer about importance of proper fuel storage.



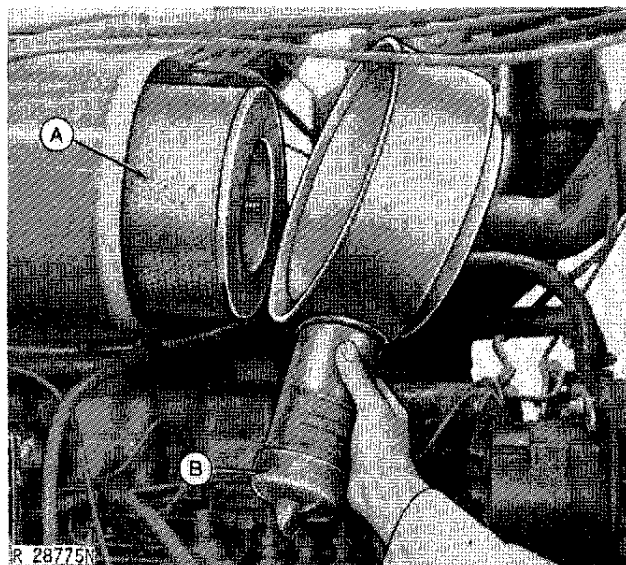
A—Sediment Bowl                      B—Hand Primer

Fig. 41-Fuel Transfer Pump

2. Check sediment bowl (A, Fig. 41) on fuel transfer pump. If water or sediment is present, clean it out. Close valve on bottom of fuel tank before removing sediment bowl.

3. If either fuel filters or sediment bowl is drained, bleed air from system. Loosen hand primer (B) and pump until most of air bubble disappears.

4. Check entire fuel system for leaks. Correct as necessary.

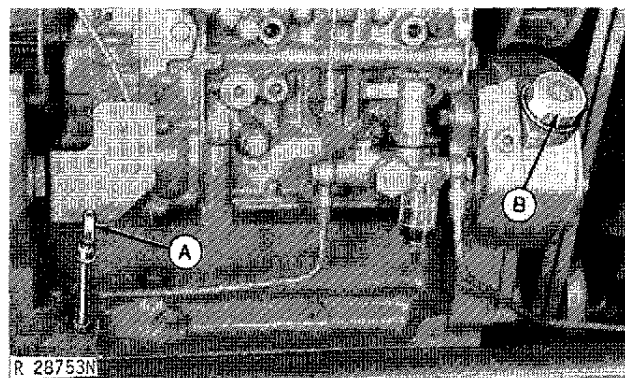


A—Air Cleaner Element                      B—Dust Unloading Valve

Fig. 42-Air Cleaner

5. Inspect air cleaner element (A, Fig. 42) and dust unloading valve (B). Clean element if needed.

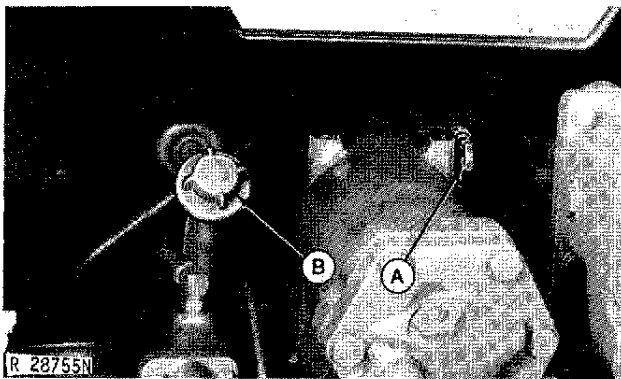
### Lubrication



A—Dipstick                                      B—Filler Cap

Fig. 43-Crankcase Dipstick and Filler Cap

1. With the tractor on level ground and the engine stopped for 10 minutes or more, loosen the dipstick and remove it. Observe the engine oil level on the dipstick, with the dipstick seated evenly. If the oil level is down to the lower marks on the dipstick, add sufficient John Deere TORQ-GARD SUPREME Engine Oil or its equivalent of the proper viscosity to bring the level to the upper marks.



A—Dipstick B—Filler Cap

Fig. 44-Transmission-Hydraulic System Dipstick

2. With the tractor on level ground, check the transmission-hydraulic system oil level with the dipstick. If the oil level is down to the "ADD" mark at the bottom of the "SAFE" range on the dipstick, remove the filler cap and add John Deere HY-GARD® Transmission and Hydraulic Oil or its equivalent to bring the oil level up to the top of the "SAFE" range.

**Electrical System**

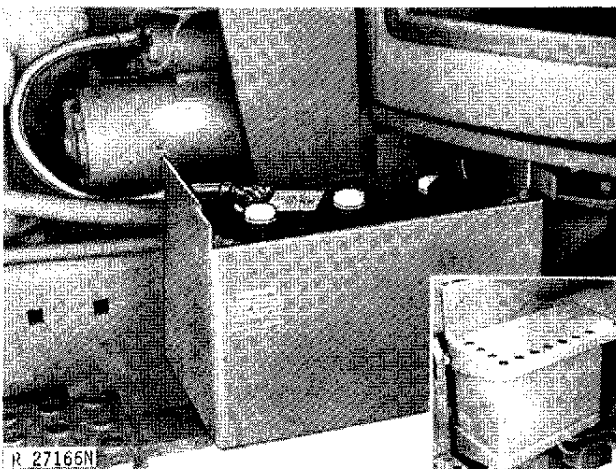


Fig. 45-Battery Compartment

1. Check specific gravity of batteries with a hydrometer. Specific gravity, corrected to 80°F (27°C) is 1.260 for a fully charged battery. To correct for temperature of electrolyte, add 0.004 for every 10°F above 80°F (0.007 for every 10°C above 27°C). Subtract at the same rate if electrolyte is below 80°F (27°C).

If batteries are not near full charge, try to determine the reason. Refer to Group 10 of Section 240.

2. Check level of electrolyte in each cell of each battery. Level should be to bottom of filler neck. If water is needed, use clean, mineral-free water.

If water must be added to batteries more often than every 200 hours, alternator may be overcharging. Refer to Group 10 of Section 240.

3. Check tension of fan belts and air conditioning compressor belt. Adjust if necessary.

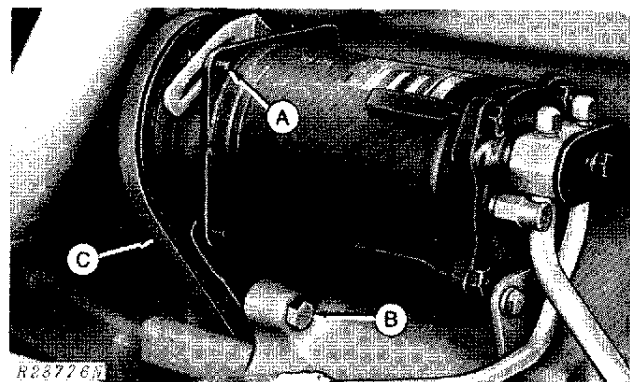
**IMPORTANT: Do not tension or release belts when hot.**

Adjust by using a belt tension gauge. Belt tensions are as follows.

| Tension New Belt      |                          |
|-----------------------|--------------------------|
| Single belt . . . . . | 130-140 lbs. (578-622 N) |
| Dual belt . . . . .   | 95-104 lbs. (423-467 N)  |

| Tension After Run In* |                        |
|-----------------------|------------------------|
| All belts . . . . .   | 85-94 lbs. (378-423 N) |

\*Immediately after run in (approximately 10 min.) check tension. If tension is within specification, no adjustment is necessary. If tension is not within specification, wait ten minutes; loosen belts and tension to specifications. Tension front belt only.



A—Adjusting Cap Screw B—Mounting Bolt C—1/4" (6 mm) Flex

Fig. 46-Adjusting Compressor Belt Tension

4. Compressor belt should deflect one-fourth inch (6 mm) when a 15-pound (65 N) force is applied midway between pulleys.

**Electrical System—Continued**

5. Check operation of all lights. If you find any problem, refer to Group 20 of Section 240.

6. Check operation of starter, gauges, and indicator lamps.

**ENGINE**

1. Check engine speeds as instructed on page 12.

2. Check engine valve clearance as instructed in Group 10 of Section 20. Intake valve clearance should be 0.016 to 0.022 in. (0.4 to 0.6 mm). Exhaust valve clearance should be 0.026 to 0.032 in. (0.7 to 0.8 mm).

**GENERAL**

1. Tighten the following bolts to the torques specified.

|   | ft-lbs | N·m | kgm |
|---|--------|-----|-----|
| SOUND-GARD Body or Four-post ROLL-GARD mounting bolts ..... | 150    | 200 | 20  |
| Front axle-to-knee bolts .....                              | 445    | 600 | 60  |
| Front wheel-to-hub bolts .....                              | 100    | 135 | 14  |
| Special bolts on rear hubs .....                            | 300    | 410 | 41  |
| Steel wheel-to-hub bolts .....                              | 240    | 325 | 33  |
| Rim clamp-to-wheel bolts .....                              | 170    | 230 | 23  |
| Rockshaft lift arm retainers .....                          | 300    | 410 | 41  |

2. Check all other accessible nuts and cap screws.

3. Check engine, fuel system, cooling system, and hydraulic system for leaks. Correct as necessary.

4. Check air conditioner sight glass as instructed in Group 05 of Section 290.



# Group 10 TUNE-UP

## PRELIMINARY ENGINE TESTING

Before tuning up a tractor, determine whether a tune-up will restore operating efficiency. When there is doubt, the following preliminary tests will help to determine if the engine can be tuned-up. Choose from the following procedures only those necessary to restore the unit.

1. After engine has been stopped for several hours, carefully loosen crankcase drain plug and watch for any water to seep out. A few drops could be due to condensation, but any more than this would indicate problems which require engine repairs rather than just a tune-up. Refer to Section 220.

2. With engine stopped, inspect engine coolant for an oil film. With engine running, inspect coolant for air bubbles. Either condition would indicate problems which require engine repairs rather than just a tune-up. Refer to Section 220.

3. Perform a dynamometer test as instructed in Group 10 of Section 220, and record horsepower. Repeat dynamometer test after tune-up, so horsepower output before and after tune-up can be compared.

At 2200 engine rpm, output should be 155 horsepower (116 kW) for 4640 Tractors and 180 horsepower (134 kW) for 4840 Tractors.

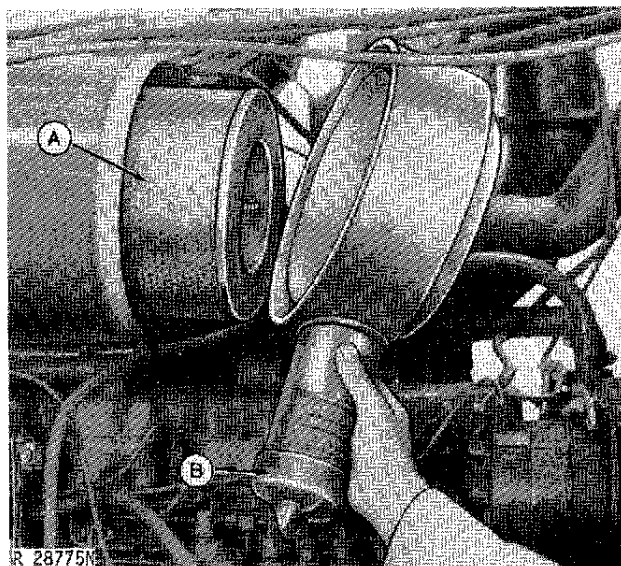
4. Perform compression test as instructed in Group 10 of Section 220. If test is performed as outlined, compression should be 330 to 370 psi (22.5 to 25.5 bar) (23 to 26 kg/cm<sup>2</sup>).

## Air Intake System

1. Inspect air cleaner primary element (A, Fig. 1). If dirty, clean by patting element with your hand or use AR62377 Dry Element Cleaning Gun.

*NOTE: Both primary and secondary elements should be replaced at least once a year. During a tune-up is a good time to perform this service.*

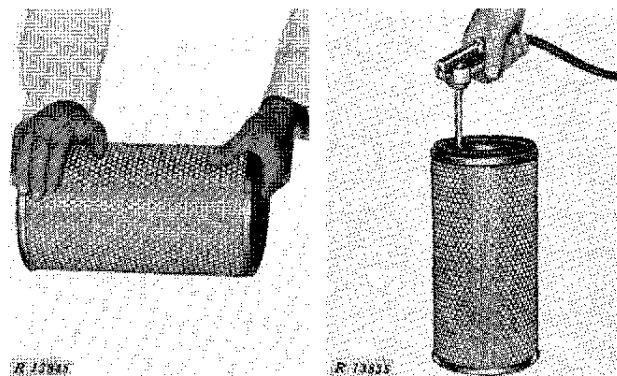
## ENGINE TUNE-UP



A—Air Cleaner Element

B—Dust Unloading Valve

Fig. 1—Air Cleaner



Patting Element

Air-Cleaning Element

Fig. 2—Cleaning Filter Element

**IMPORTANT:** Do not blow air from outside of element to inside. Be sure metal screen does not touch paper element, as it would quickly rub holes. Inspect element carefully before reinstalling. Do not clean secondary element.

## Air Intake System—Continued

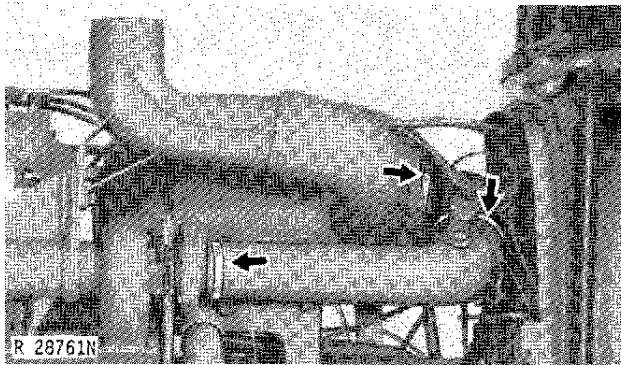


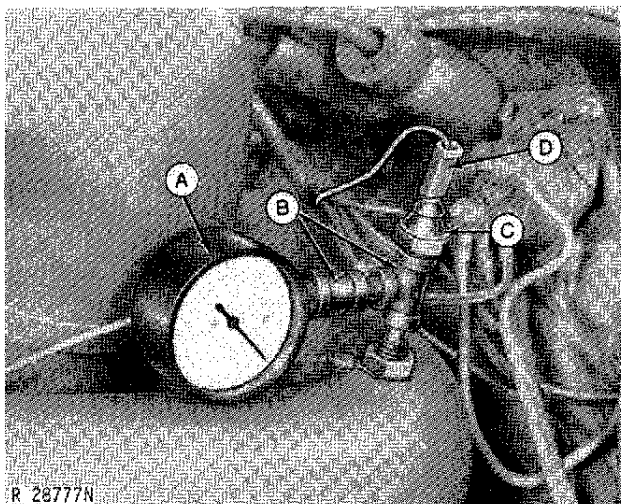
Fig. 3-Air Intake Connections

2. Check all connections in air intake system for possible leaks. Tighten any loose clamps. Be sure rubber dust unloading valve is in good condition.

3. Check for restrictions in air intake system by measuring vacuum.

(a) Run engine and bring to operating temperature.

(b) Remove side shields, grille screens, air stack extension, muffler, and hood.



A—Water Vacuum Gauge  
B—Pipe Fittings  
C—Switch  
D—Wiring Connector

Fig. 4-Testing Air Intake System Restriction

(c) Disconnect wiring connector (D, Fig. 4) from switch (C). Unscrew switch from connection on air intake pipe.

(d) Install a 1/8-inch elbow pipe fitting on intake pipe. Connect "T" and pipe nipple fittings to elbow. This connection facilitates testing restriction indicator switch in step 4.

(e) Connect vacuum gauge to one side of "T" and indicator switch to other side. Connect wiring to switch.

**NOTE:** The vacuum gauge is calibrated in inches of water. A water manometer may also be used.

(f) Operate engine at full load and note gauge reading. With clean filter elements, at 2200 engine rpm and full load, vacuum should be 10-1/2 to 11-1/2 inches of water (26 to 29 mbar). Maximum permitted vacuum is 25 inches of water (62 mbar).

(g) If vacuum is excessive, try to find and correct the cause.

4. While checking air intake system for restrictions, check operation of restriction indicator switch.

With engine running as in part (f) of step 3, use a piece of cardboard to partially cover air cleaner intake. Increase the restriction until air cleaner indicator light comes on, and note vacuum reading.

Restriction indicator switch should close at 24 to 26 inches of water (60 to 65 mbar). If it does not, replace it.

5. Check intake manifold pressure as instructed in Group 05 of Section 230. At 2200 rpm and full load, manifold pressure should be 18 to 23 psi (1.2 to 1.6 bar) (1.2 to 1.6 kg/cm<sup>2</sup>).

## Exhaust System

Inspect exhaust system for any leaks or restrictions. Correct as necessary.

## Crankcase Ventilation System

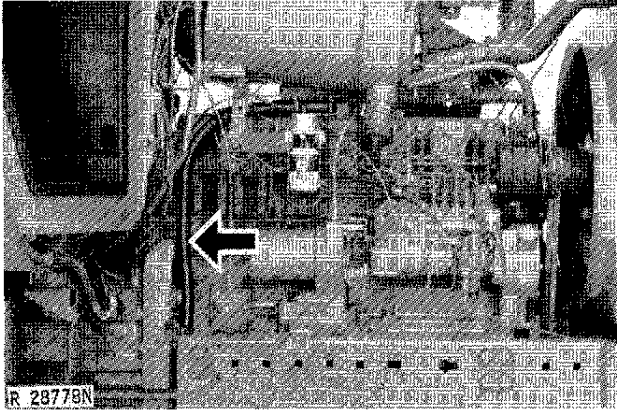


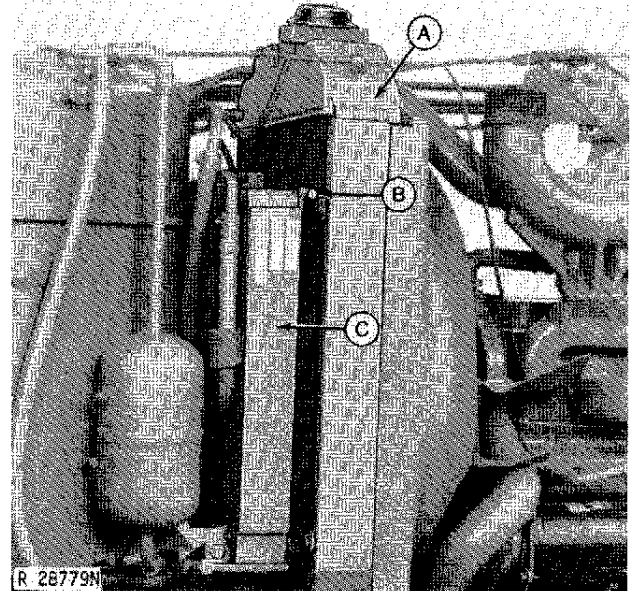
Fig. 5-Crankcase Vent Tube

Inspect crankcase ventilation system for restrictions. Lack of ventilation causes sludge to form in engine crankcase. This can lead to clogging of oil passages, filters, and screens, resulting in serious engine damage.

Clean crankcase vent tube in solvent if it is restricted.

## Cooling System

1. Clean side grille screens if dirty.



A—Radiator  
B—Cap Screw

C—Oil Cooler-  
Condenser

Fig. 6-Radiator and Oil Cooler-Condenser

2. Clean radiator and oil cooler-condenser. To clean portion of radiator behind oil cooler-condenser unit, remove the two screws at top of unit. Slide unit to one side to expose half the radiator. After cleaning that half, slide the unit to the other side. Replace cap screws when finished.

## Cooling System—Continued

### 3. Drain and flush cooling system.

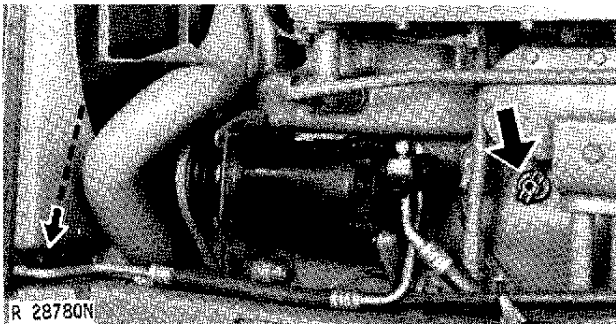


Fig. 7-Cooling System Drain Cocks

- (a) Drain cooling system by opening drain cocks on radiator and engine block.
- (b) Turn Sound-Gard Body heater on and leave it on until finished.
- (c) Close drain cocks and fill cooling system with clean water.
- (d) Run engine until it reaches operating temperature to stir up possible rust or sediment.
- (e) Stop engine and drain coolant before rust or sediment settles.
- (f) Close drain cocks and fill cooling system with a solution of John Deere Cooling System Cleaner and water. Follow the instructions with the cleaner.
- (g) After cleaning, flush the system with clean water.
- (h) Fill cooling system with clean, soft water and antifreeze. Use a permanent-type, ethylene glycol antifreeze which contains a rust inhibitor but does not contain a stop-leak additive.

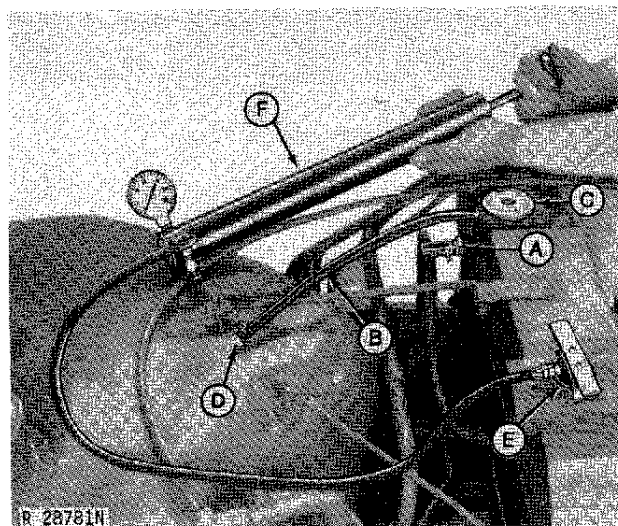
- (i) Recheck coolant level after starting engine. Coolant should be 1-1/2 inches (40 mm) above baffle in radiator top tank.

Cooling system capacity is 38 U.S. quarts (36 l) for 4640 Tractors and 40 U.S. quarts (38 l) for 4840 Tractors. Add 2 quarts (2 l) for Sound-Gard Body heater.

4. Remove and check thermostats as instructed in Group 25 of Section 20. Thermostats should open at 160 to 180°F (71 to 82°C).

5. Check radiator and pressure cap for leaks.

- (a) Visually check cooling system for leaks or damage.



- |                    |                            |
|--------------------|----------------------------|
| A—Overflow Valve   | D—5/16-Inch Cap Screw      |
| B—Hose             | E—High Pressure Cap        |
| C—Low Pressure Cap | F—BT-11-52 Radiator Tester |

Fig. 8-Testing Cooling System

- (b) At overflow valve (A, Fig. 8), disconnect hose (B) which comes from low pressure cap (C).
- (c) Plug end of hose by inserting a 5/16-inch cap screw (D) and clamping it securely.
- (d) Remove high pressure cap (E), and attach BT-11-52 Radiator Tester (F) to filler neck.
- (e) Pump pressure up to 18 psi (1.25 bar) (1.25 kg/cm<sup>2</sup>). System should hold the pressure. If it does not, try to find and correct the problem.

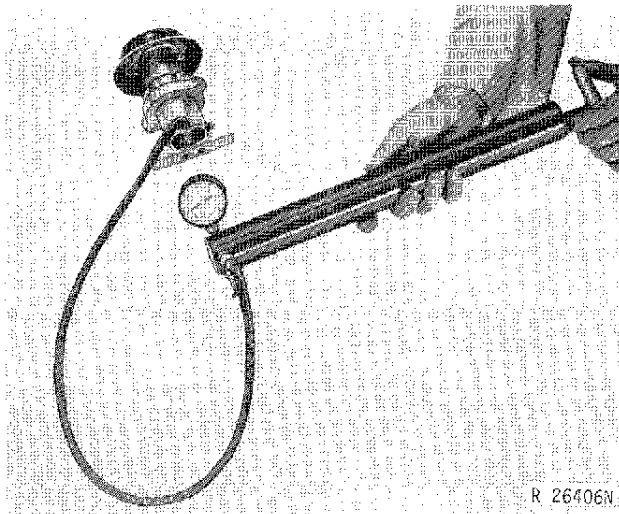


Fig. 9-Testing Pressure Cap

(f) Install each pressure cap on radiator tester, and pump pressure up to limit of pressure cap. Low pressure cap should maintain 6.25 to 7.50 psi (0.4 to 0.5 bar) (0.4 to 0.5 kg/cm<sup>2</sup>), and high pressure cap should maintain 14 to 17 psi (0.9 to 1.2 bar) (0.9 to 1.2 kg/cm<sup>2</sup>). If either cap is defective, replace it.

**Diesel Fuel System**

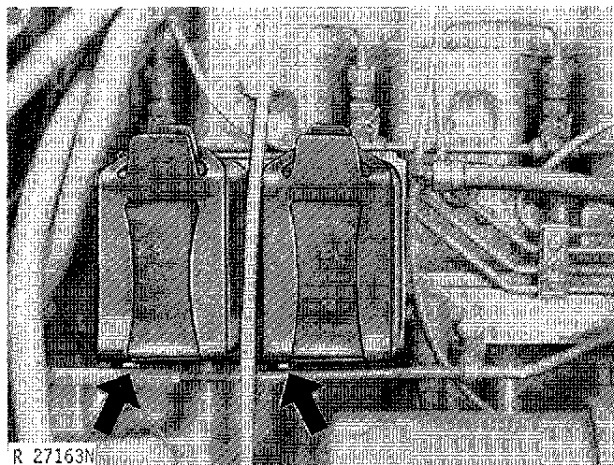
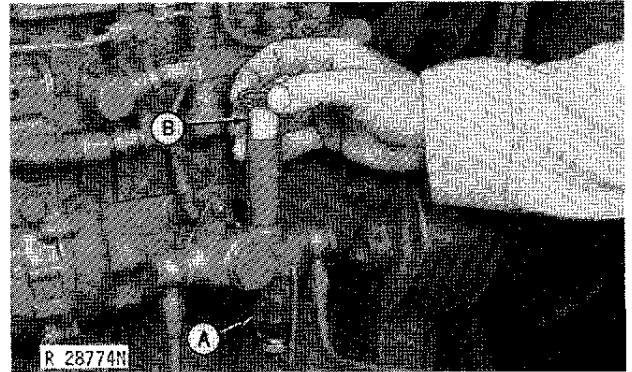


Fig. 10-Fuel Filter Drain Plugs

1. Check fuel filters for water or sediment. If any is present, remove drain plugs and drain it out. Caution customer about importance of proper fuel storage.

*NOTE: Fuel filters must be replaced periodically to prevent excessive restriction. During a tune-up is a good time to perform this service.*



A—Sediment Bowl                      B—Hand Primer

Fig. 11-Fuel Transfer Pump

2. Check sediment bowl (A, Fig. 14) on fuel transfer pump. If water or sediment is present, clean it out. Close valve on bottom of fuel tank before removing sediment bowl.

3. If either fuel filters or sediment bowl is drained, bleed air from system. Loosen hand primer (B) and pump until most of air bubble disappears.

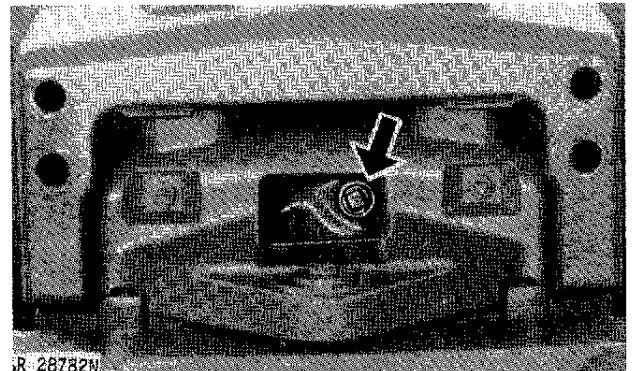


Fig. 12-Fuel Tank Drain Plug

4. Loosen or remove fuel tank drain plug, and drain any water or sediment from tank.

5. Check entire fuel system for leaks. Correct as necessary.

6. Check injection pump timing as instructed in Group 05 of this section.

7. Check engine idle speeds as instructed in Group 05 of this section. Slow idle speed should be 780 to 820 rpm, and fast idle speed should be 2325 to 2425 rpm.

### Electrical System

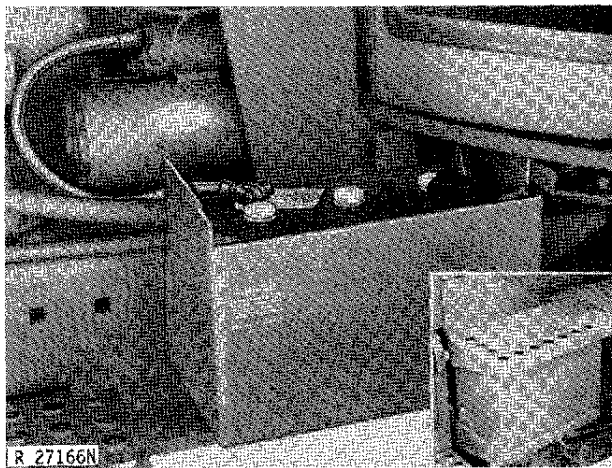


Fig. 13-Battery Compartment

1. Clean batteries, cables, and compartments with a damp cloth. If corrosion is present, remove it and wash the terminals with a solution of ammonia or baking soda in water. Then flush area with clean water.

2. Coat battery terminals and connectors with petroleum jelly mixed with baking soda to retard corrosion.

3. Test batteries as instructed in Group 5 of Section 240. If batteries are not near full charge, try to find out why.

4. Check level of electrolyte in each cell of each battery. Level should be to bottom of filler neck. If water is needed, use clean, mineral-free water.

If water must be added to batteries more often than every 200 hours, alternator may be overcharging. Refer to Group 10 of Section 240.

5. If batteries appear to be either undercharged or overcharged, check alternator and charging circuit. Follow diagnosis and testing procedures outlined in Group 10 of Section 240.

6. Check tension of fan belts and air conditioning compressor belt. Adjust if necessary.

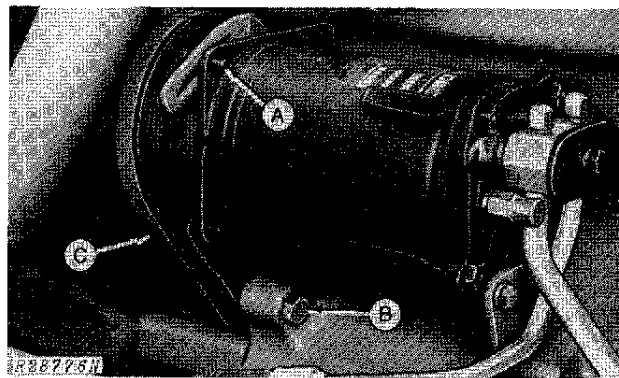
**IMPORTANT: Do not tension or release belts when hot.**

Adjust by using a belt tension gauge. Belt tensions are as follows.

|                   |                          |
|-------------------|--------------------------|
|                   | <b>Tension New Belt</b>  |
| Single belt ..... | 130-140 lbs. (578-622 N) |
| Dual belt .....   | 95-104 lbs. (423-467 N)  |

|                 |                              |
|-----------------|------------------------------|
|                 | <b>Tension after run in*</b> |
| All belts ..... | 85-94 lbs. (378-423 N)       |

*\*Immediately after run in (approximately 10 min.) check tension. If tension is within specification, no adjustment is necessary. If tension is not within specification, wait ten minutes; loosen belts and tension to specifications. Tension front belt only.*



A—Adjusting Cap Screw      C—1/4" (6 mm) Flex  
B—Mounting Bolt

Fig. 14-Adjusting Compressor Belt Tension

7. Check operation of all lights. If you find any problem, refer to Group 20 of Section 240.

8. Check operation of neutral-start switch. Starter should not operate unless transmission is in neutral or park.

9. Follow engine starting instructions beginning on page 12 in Group 05 of this Section. Check operation of starter, gauges, and indicator lights.

10. Check air conditioner sight glass as instructed in Group 05 of Section 290.

### Final Engine Test

Repeat dynamometer test as instructed in Group 10 of Section 220. Compare performance with previous test, and record for future reference.

At 2200 engine rpm, output should be 155 horsepower (116 kW) for 4640 Tractors and 180 horsepower (134 kW) for 4840 Tractors.

### OPERATION

Perform all checks as instructed under "OPERATION" beginning on page 13 in Group 5 of this section.

1. Driving tests.
2. Brake accumulator.
3. Power take-off.
4. Implement hitch components.
5. SOUND-GARD Body and operator's station.

If you find or suspect any problem with any component, refer to the appropriate area in this manual.

### GENERAL

#### Checking Tire Inflation Pressure

Check inflation pressure of all tires before delivering tractor. Adjust pressure to the maximums listed below. The customer can then easily reduce pressure slightly if necessary, depending on how tractor is to be used.

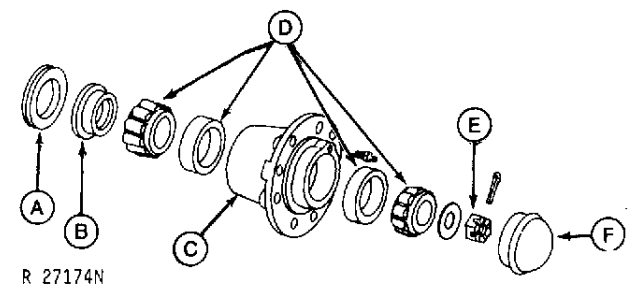
#### Rear Tires

| Tire Size | Ply Rating | Maximum Pressure                           |
|-----------|------------|--|
| 12.4-42   | 6          | 12 psi (0.8 bar) (0.8 kg/cm <sup>2</sup> ) |
| 18.4-38   | 8          | 20 psi (1.4 bar) (1.4 kg/cm <sup>2</sup> ) |
| 18.4-38   | 10         | 26 psi (1.8 bar) (1.8 kg/cm <sup>2</sup> ) |
| 18.4-38   | 12         | 32 psi (2.2 bar) (2.2 kg/cm <sup>2</sup> ) |
| 18.4-42   | 10         | 26 psi (1.8 bar) (1.8 kg/cm <sup>2</sup> ) |
| 20.8-38   | 10         | 22 psi (1.5 bar) (1.5 kg/cm <sup>2</sup> ) |
| 24.5-32   | 10         | 20 psi (1.4 bar) (1.4 kg/cm <sup>2</sup> ) |

#### Front Tires

| Tire Size | Ply Rating | Maximum Pressure                           |
|-----------|------------|--|
| 9.50-20   | 8          | 44 psi (3.0 bar) (3.0 kg/cm <sup>2</sup> ) |
| 10.00-16  | 6          | 32 psi (2.2 bar) (2.2 kg/cm <sup>2</sup> ) |
| 11.00-16  | 8          | 40 psi (2.8 bar) (2.8 kg/cm <sup>2</sup> ) |
| 14L-16.1  | 6          | 28 psi (1.9 bar) (1.9 kg/cm <sup>2</sup> ) |
| 14L-16.1  | 10         | 44 psi (3.0 bar) (3.0 kg/cm <sup>2</sup> ) |
| 16.5-16.1 | 8          | 32 psi (2.2 bar) (2.2 kg/cm <sup>2</sup> ) |
| 14.9-24   | 6          | 20 psi (1.4 bar) (1.4 kg/cm <sup>2</sup> ) |

#### Packing Front Wheel Bearings

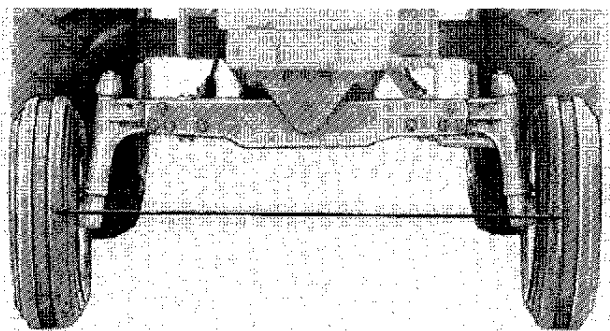


- A—Oil Seal
- B—Oil Seal Cup
- C—Hub
- D—Bearings
- E—Adjusting Nut
- F—Hub Cap

Fig. 15-Front Wheel Bearings

1. Disassemble and clean front wheel bearings.
2. Inspect bearings carefully and replace them if they are worn. If three deep grooves are worn in oil seal cup, replace cup and seal.
3. Pack bearings with wheel bearing grease. Pack seal lips with John Deere AT30408 High Temperature Grease (1 lb. [0.45 kg] can) or its equivalent. TY6281 Lubricant is the same John Deere High Temperature Grease in a 14 oz. (0.39 kg) cartridge. Lubricant must be an extreme-pressure grease with non-soap base and NGLI No. 2 consistency, and must meet John Deere JDM J13 E4 specifications.
4. Install wheel and tighten adjusting nut until a slight drag is felt when wheel is rotated.
5. Back nut off just enough to insert cotter pin in first hole.

### Checking Toe-In



R 27145N

Fig. 16-1/8 to 3/8 in. (3 to 9 mm) Toe-In

1. To check toe-in, steer front wheels straight ahead.
  2. Measure distance between tires at hub level. Mark the point at which you measured.
  3. Move tractor back about three feet (1 m), so mark is at hub level behind the axle. Again measure distance between tires, at same point on tires. Tires should be 1/8 to 3/8 in. (3 to 9 mm) closer in front.
  4. If toe-in adjustment is needed, remove bolts from tie rod tubes and loosen clamps on inner ends of tie rods. Turn tie rod tubes in or out until toe-in is correct. Replace bolts and tighten clamps.
- Tie rods should be adjusted to equal length, so tractor will turn equally sharp in either direction.

### Miscellaneous

1. Tighten the following bolts to the torques specified.

|  | ft-lbs | N-m | kgm |
|--|--------|-----|-----|
| Four-post ROLL-GARD mounting bolts . . . . . | 150    | 200 | 20  |
| Front axle-to-knee bolts . . . . .           | 445    | 600 | 60  |
| Front wheel-to-hub bolts . . . . .           | 100    | 135 | 14  |
| Special bolts on rear hubs . . . . .         | 300    | 410 | 41  |
| Steel wheel-to-hub bolts . . . . .           | 240    | 325 | 33  |
| Rim clamp-to-wheel bolts . . . . .           | 170    | 230 | 23  |
| Rockshaft lift arm retainers . . . . .       | 300    | 410 | 41  |

2. Check all other accessible nuts and cap screws. If you find any that are loose, tighten according to the chart below.

3. Check engine, fuel system, cooling system, and hydraulic system for leaks. Correct as necessary.

#### TORQUE CHART

| Bolt Diameter       | Plain Head* |     |      | Three Radial Dashes* |     |     | Six Radial Dashes* |      |     |
|---------------------|-------------|-----|------|----------------------|-----|-----|--------------------|------|-----|
|                     | ft-lbs      | N-m | kgm  | ft-lbs               | N-m | kgm | ft-lbs             | N-m  | kgm |
| 1/4 in. (6.35 mm)   | 6           | 8   | 0.8  | 10                   | 14  | 1.4 | 14                 | 19   | 1.9 |
| 5/16 in. (7.93 mm)  | 13          | 18  | 1.8  | 20                   | 27  | 2.7 | 30                 | 41   | 4.1 |
| 3/8 in. (9.53 mm)   | 23          | 31  | 3.1  | 35                   | 47  | 4.7 | 50                 | 70   | 7.0 |
| 7/16 in. (11.11 mm) | 35          | 47  | 4.7  | 55                   | 75  | 7.5 | 80                 | 110  | 11  |
| 1/2 in. (12.70 mm)  | 55          | 75  | 7.5  | 85                   | 115 | 12  | 120                | 160  | 16  |
| 9/16 in. (14.29 mm) | 75          | 100 | 10   | 130                  | 175 | 18  | 175                | 240  | 24  |
| 5/8 in. (15.88 mm)  | 105         | 140 | 14   | 170                  | 230 | 23  | 240                | 325  | 33  |
| 3/4 in. (19.05 mm)  | 185         | 250 | 25   | 300                  | 410 | 41  | 425                | 575  | 58  |
| 7/8 in. (22.23 mm)  | 160         | 220 | 22** | 445                  | 600 | 60  | 685                | 930  | 93  |
| 1 in. (25.40 mm)    | 250         | 340 | 34** | 670                  | 900 | 90  | 1030               | 1400 | 140 |

\*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.

## Group 15 LUBRICATION

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

### ENGINE LUBRICATING OILS



X3377N

We recommend John Deere TORQ-GARD SUPREME engine oil for use in the engine crankcase. TORQ-GARD oil is compounded specifically for use in John Deere engines and provide superior lubrication under all conditions. NEVER PUT ADDITIVES IN THE CRANKCASE. TORQ-GARD oil was formulated to provide all the protection your engine needs. Additives could reduce this protection rather than help it.

If TORQ-GARD SUPREME is NOT USED, use an engine oil that conforms to one of the following specifications.

#### Single Viscosity Oils

API Service CD/SD  
MIL-L-2104C

#### Multi-Viscosity Oils

API Service CC/SE, CC/SD, or SD  
MIL-L-46152

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

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

| Air Temperature            | John Deere TORQ-GARD SUPREME Oil | Other Oils           |                     |
|----------------------------|----------------------------------|----------------------|---------------------|
|                            |                                  | Single Viscosity Oil | Multi-Viscosity Oil |
| Above 32°F (0°C)           | SAE 30                           | SAE 30               | Not recommended     |
| -10 to 32°F** (-23 to 0°C) | SAE 10W-20                       | SAE 10W              | 10W-30              |
| Below -10°F (-23°C)        | SAE 5W-20                        | SAE 5W               | SAE 5W-20           |

\*\*If air temperature is below 10°F (-12°C), use an engine heater. SAE 5W-20 oils may also be used to insure optimum lubrication of engine and turbocharger.

### TRANSMISSION-HYDRAULIC OILS

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

### GREASES

Use John Deere AT30408 High Temperature Grease (1 lb. [0.45 kg] can) or its equivalent. TY6281 Lubricant is the same John Deere Lubricant in a 14 oz. (0.39 kg) cartridge. High Temperature Grease must be an extreme-pressure grease with non-soap base and NGLI No. 2 consistency, and must meet John Deere JDM J13 E4 specifications. Wheel bearing grease is recommended for front wheel bearings. Application of grease as instructed in the lubrication section will provide proper lubrication and will prevent bearing contamination.

### STORING LUBRICANTS

Your tractor can operate at top efficiency only if clean lubricants are used. Use clean containers to handle all lubricants. Store them in an area protected from dust, moisture, and other contamination.

### GENERAL INFORMATION

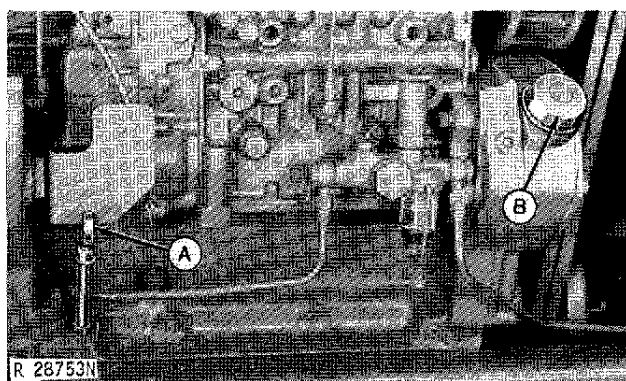
Carefully written and illustrated instructions are included in the tractor operator's manual. Remind your customer to follow the recommendations in these instructions.

For your convenience when servicing the tractor, the following chart shows capacities and types of lubricants for the various components.

| Component                         | Capacity                                   | Type of Lubricant                                 | Interval of Service  |
|-----------------------------------|--|---|--|
| Engine Crankcase                  | 20 U.S. quarts (19 L)<br>(includes filter) | See "Engine Lubricating Oils" on page 1           | 10 Hours—Check level<br>100 Hours—Change oil<br>200 Hours—Replace filter<br>200 Hours—Clean breather filter  |
| Transmission and Hydraulic System | See page 00-2                              | John Deere Hy-Gard Transmission and Hydraulic Oil | 200 Hours—Check level<br>200 Hours—Replace filter on Perma-Clutch tractors<br>600 Hours—Replace filter on Power Shift tractors<br>1200 Hours—Change oil<br>1200 Hours—Clean main pump screen |
| Front Wheel Bearings              | .....                                      | Wheel Bearing Grease                              | 1200 Hours—Repack bearings   |
| Grease Fittings                   | .....                                      | John Deere High Temperature Grease                | See pages 6 through 8  |

### ENGINE CRANKCASE

#### Checking Oil Level



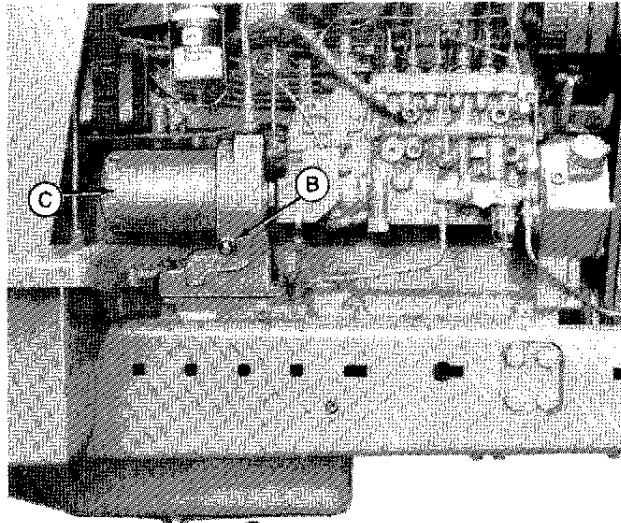
A—Dipstick B—Filler Cap

Fig. 1-Crankcase Dipstick and Filler Cap

With the tractor on level ground and the engine stopped for 10 minutes or more, remove the dipstick. Observe the engine oil level on the dipstick, with the dipstick seated evenly. If the oil level is down to the lower marks on the dipstick, add sufficient John Deere TORQ-GARD SUPREME Engine Oil or its equivalent of the proper viscosity to bring the level to the upper marks.

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

### Changing Oil and Filter



R 28783H

A—Crankcase Drain Plug      C—Filter Element  
 B—Filter Drain Plug

Fig. 2-Crankcase Drain Plug

With the engine warm, remove the crankcase drain plug (A, Fig. 2) and drain the oil from the crankcase. Also remove the oil filter drain plug (B) and drain the filter.

Install the drain plugs and add new John Deere TORQ-GARD Engine Oil or its equivalent of the proper viscosity (page 1). Run the engine at slow idle speed. Check for leaks around the crankcase drain plug. Retighten if necessary. The oil level on the dipstick 10 minutes after stopping should be at the upper marks. The capacity is 20 U.S. quarts (19 L).

**Keep a record of all oil and filter changes on the stickers that come with the filters.**

SERVICE INTERVAL: Every 100 hours.

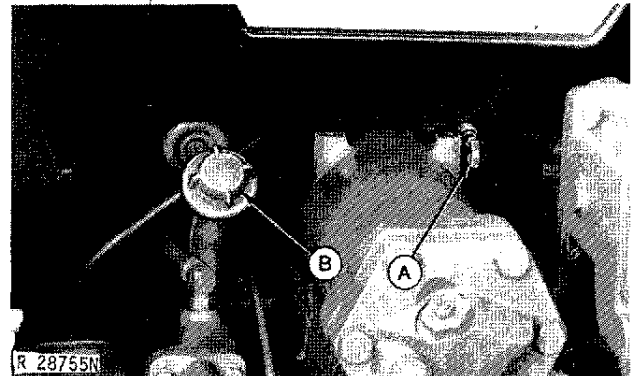
While draining the crankcase oil, change the crankcase oil filter (C). Remove the filter element by turning it counterclockwise. Clean the filter mounting pad. Install new sealing ring. Apply a thin film of oil to the sealing ring and screw the new element in place by hand until it is tight.

**IMPORTANT: The element does not have a bypass valve. Replace only with a genuine John Deere filter element.**

SERVICE INTERVAL: Every 200 hours.

### TRANSMISSION AND HYDRAULIC SYSTEM

#### Checking Oil Level



A—Dipstick      B—Filler Cap

Fig. 3-Transmission-Hydraulic System Dipstick

With the tractor on level ground, run the engine for a minute to fill the filter. Stop the engine and check the transmission-hydraulic system oil level with the dipstick. If the oil level is down to the "ADD" mark at the bottom of the "SAFE" range on the dipstick, remove the filler cap and add John Deere HY-GARD Transmission and Hydraulic Oil or its equivalent to bring the oil level up to the top of the "SAFE" range.

SERVICE INTERVAL: At predelivery and every 200 hours.

**Changing Filter Elements**

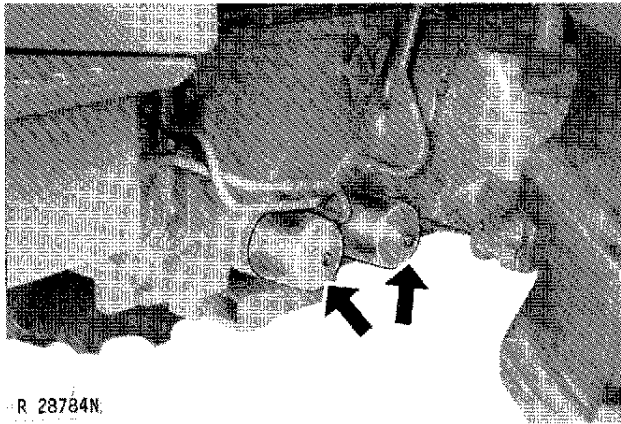


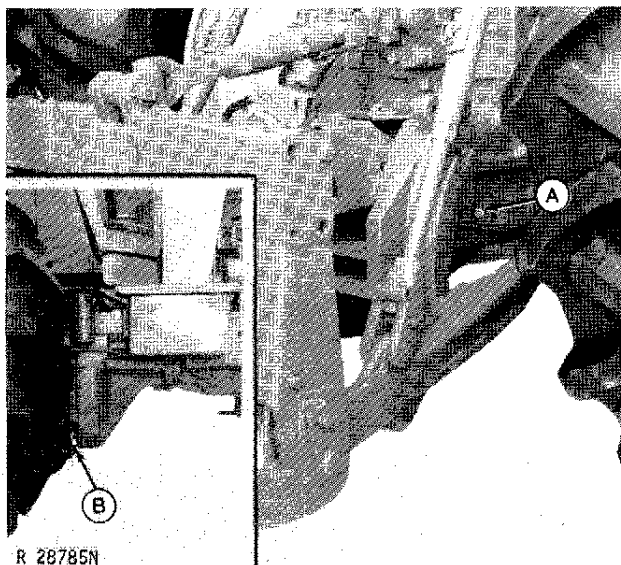
Fig. 4-Transmission-Hydraulic Filter Covers (Power Shift Shown)

With engine stopped, remove transmission-hydraulic system oil filter cover. On tractors with Power Shift transmission, remove both covers.

Replace filter element or elements. Replace cover gasket. Replace cover and tighten to 45 ft-lbs (60 N·m) (6 kgm).

**SERVICE INTERVAL:** After the first 100 hours. Then every 200 hours on all QUAD-RANGE. Every 600 hours on Power Shift.

**Changing Oil**



**A—Transmission Case Drain Plug**  
**B—Clutch Housing Drain Plug**

Fig. 5-Transmission-Hydraulic System Drain Plugs

With the engine warm, remove the transmission case drain plug (A, Fig. 5). On QUAD-RANGE, also remove clutch housing drain plug (B).

Reinstall plugs and fill system with John Deere HY-GARD Transmission and Hydraulic Oil or its equivalent. Capacities are listed below.

|  |                         |
|--|-------------------------|
| Transmission-hydraulic system (drain and fill) |                         |
| Power Shift Transmission . . .                 | 16.5 U.S. gal. (62.5 L) |
| QUAD-RANGE                                     |                         |
| Transmission . . . . .                         | 22.5 U.S. gal. (82.5 L) |
| Power Front-wheel Drive . . .                  | 4.0 U.S. gal. (15.1 L)  |

|  |                         |
|--|-------------------------|
| Transmission-hydraulic system (dry, production fill) |                         |
| Power Shift Transmission . . .                       | 20.8 U.S. gal. (78.8 L) |
| QUAD-RANGE   |                         |
| Transmission . . . . .                               | 26.0 U.S. gal. (98.4 L) |
| Power Front-wheel Drive . . .                        | 5.0 U.S. gal. (18.9 L)  |

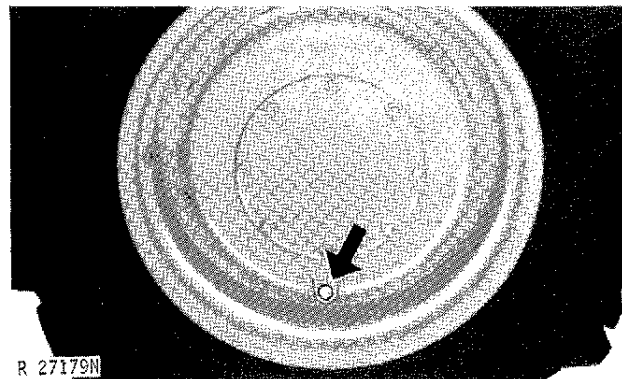
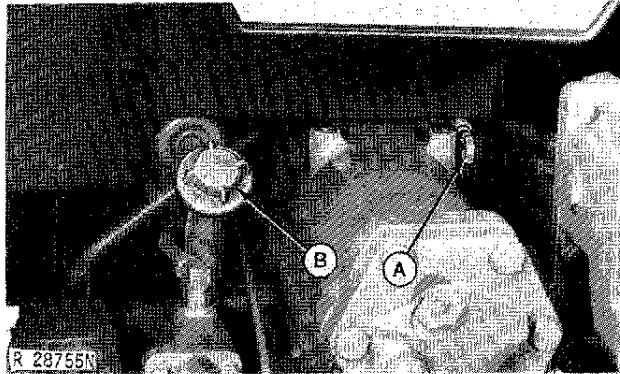


Fig. 6-Power Front-Wheel Drive Drain Plug

On Power Front-Wheel Drive tractors, position the drain plug on the wheel at the bottom, clean the area around the plug, protect the tire, and drain each wheel housing. Position the drain hole near the top and put 2 quarts (2 L) of John Deere HY-GARD Transmission and Hydraulic Oil or its equivalent in each front wheel. Install the drain plugs. With transmission oil level at the top of the "SAFE" range, add 2 extra gallons (8 L) to transmission. Operate the front drive for 2 or 3 hours and ADD oil to the transmission to bring it to the proper level. The front wheels hold approximately 2-1/4 gallons (9 L) each.

**SERVICE INTERVAL:** Every 1200 hours.

### Cleaning Breather Filter and Main Pump Screen



A—Dipstick

B—Filler Cap

Fig. 7-Transmission-Hydraulic System Filler Cap

Remove transmission-hydraulic system filler cap. Wash breather filter in solvent, and blow it dry with compressed air.

SERVICE INTERVAL: Every 200 hours.

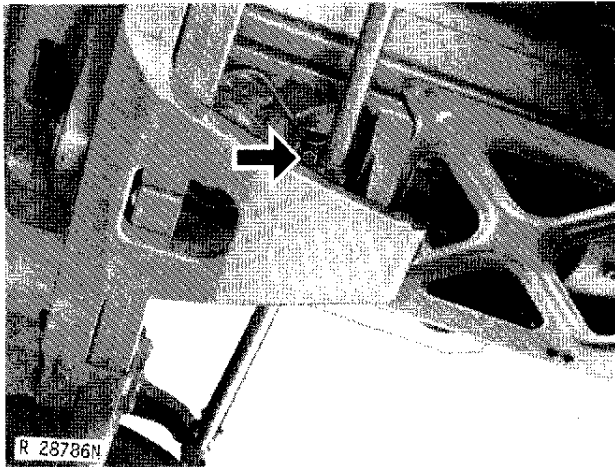


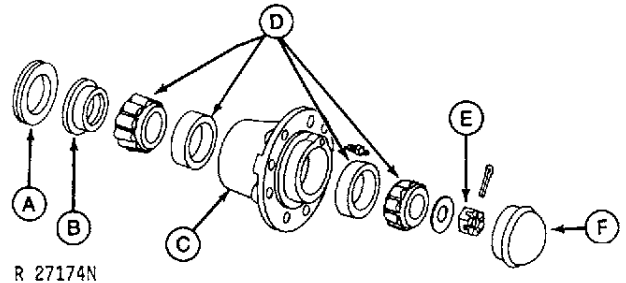
Fig. 8-Main Hydraulic Pump Screen

Remove plug (Fig. 8) from bottom of main hydraulic pump, and remove screen from hole. Wash screen in solvent, and blow dry with compressed air. Reinstall screen and plug.

SERVICE INTERVAL: Every 1200 hours.

### FRONT WHEEL BEARINGS

#### Cleaning and Packing Bearings



A—Oil Seal  
B—Oil Seal Cup  
C—Hub

D—Bearings  
E—Adjusting Nut  
F—Hub Cap

Fig. 9-Front Wheel Bearings

1. Jack up front axle.
2. Remove hub cap. Remove cotter pin and adjusting nut.
3. Disassemble parts. Clean parts in solvent and blow them dry with compressed air.
4. Inspect parts carefully for damage. Replace bearings if they are worn. Replace oil seal and oil seal cup if three deep grooves are worn in cup.
5. Pack bearings with wheel bearing grease. Pack seal lips with John Deere AT30408 High Temperature Grease (1 lb. [0.45 kg] can) or its equivalent. TY6281 Lubricant is the same John Deere High Temperature Grease in a 14 oz. (0.39 kg) cartridge. Lubricant must be an extreme-pressure grease with non-soap base and NGLI No. 2 consistency, and must meet John Deere JDM J13 E4 specifications.
6. Reassemble parts. Tighten adjusting nut until a slight drag is felt when wheel is turned. Back nut off just enough to insert cotter pin in first hole.
7. Reinstall hub cap.

SERVICE INTERVAL: Every 1200 hours.

## GREASE FITTINGS

### Lubricating Front Axle

Apply several shots of John Deere High-Temperature Grease or its equivalent to tie rods, the pivot pins, and the steering spindles (10 fittings).

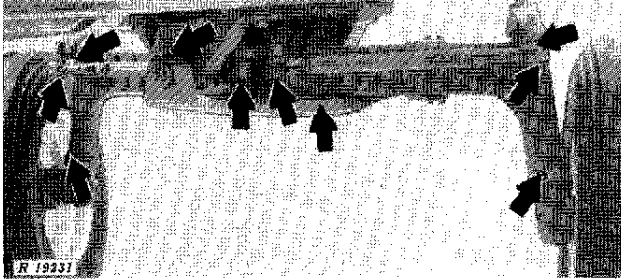


Fig. 10-Wide Front Axle Grease Fittings

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

### Lubricating Wide-Swing Drawbar

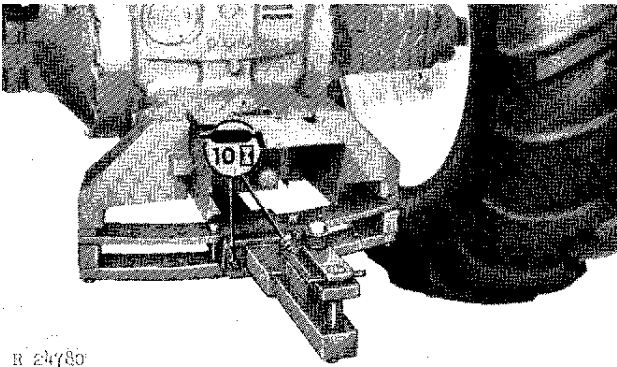


Fig. 11-Wide-Swing Drawbar Grease Fittings

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 Front Wheels

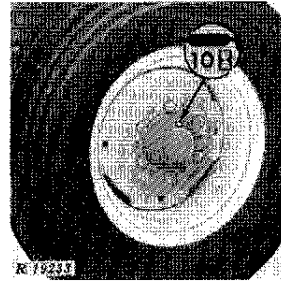


Fig. 12-Front Wheel Grease Fitting

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 5.

### Lubricating 3-Point Hitch

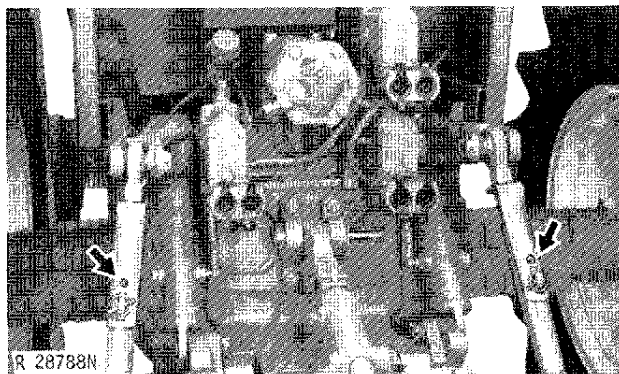


Fig. 13-3-Point Hitch Grease Fittings

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.

### Lubricating Outer Axle Bearings

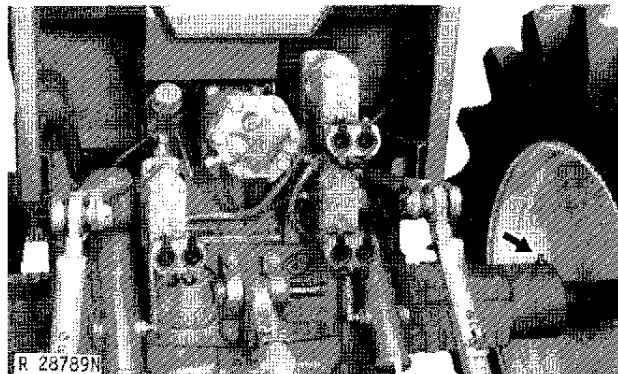


Fig. 14-Rear Axle Grease Plug

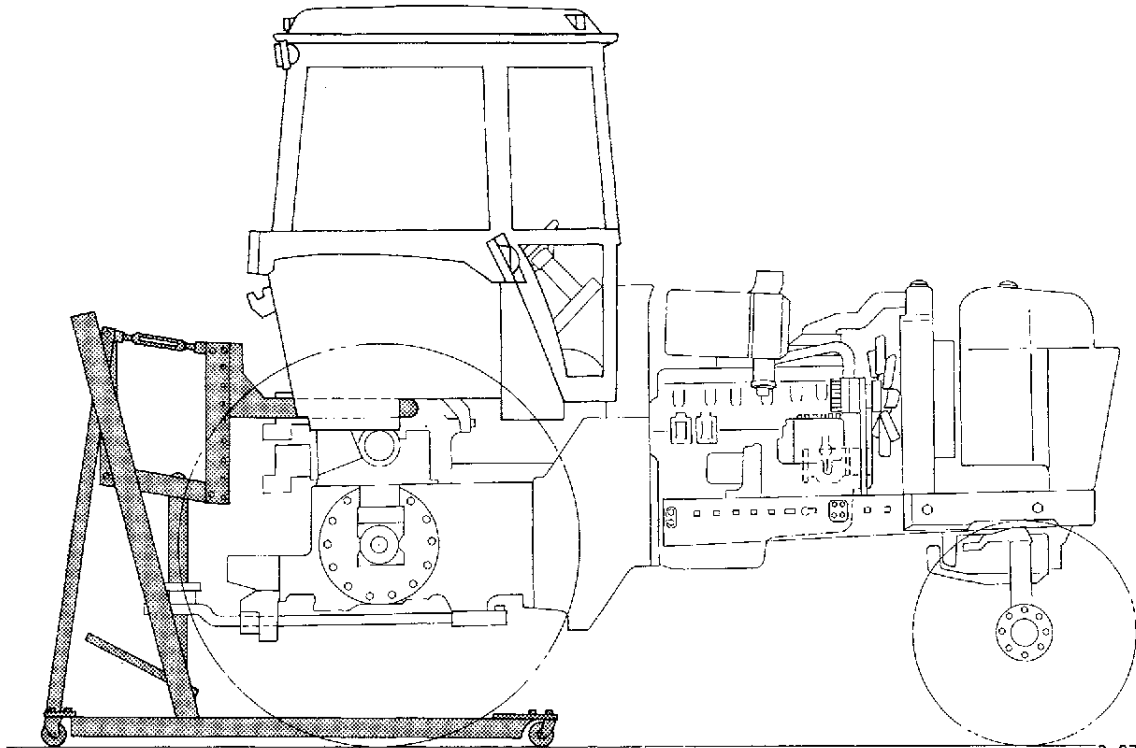
Grease the rear axle bearings by removing the pipe plug on each end of the axle housing, installing a grease fitting, and applying John Deere High Temperature Grease or its equivalent at each fitting until grease appears at the axle seals. (If rear wheel weights obscure rear axle seal, apply a maximum of 25 shots of grease.)

**SERVICE INTERVAL:** At predelivery and every 600 hours.



## Group 20 SEPARATION

### REMOVING SOUND-GARD BODY WITHOUT CONTROL SUPPORT



R 27409N

Fig. 1-Removing Sound-Gard Body Without Control Support

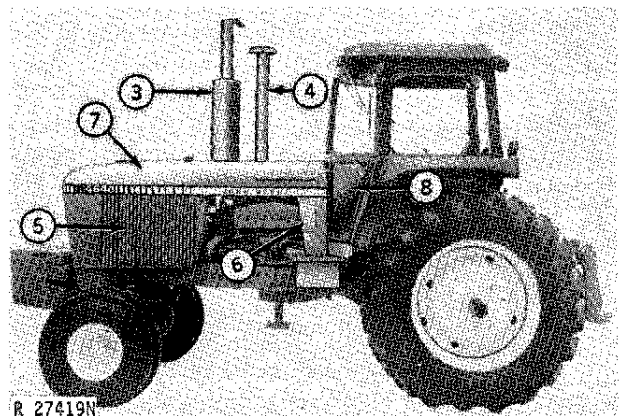
**NOTE:** Either the Brown Body Lift (shown) or a fork lift with Fork Lift Adapters (see special tools) may be used to remove Sound-Gard Body.

**NOTE:** On tractor with a Power Shift transmission, the Sound-Gard Body can be removed with the control support to facilitate service of the rear clutch pack, planetary, and PTO gear train. The control support need not be removed with the Sound-Gard Body when servicing components of Quad-Range transmission.

#### Removal

1. (Not Illustrated). Disconnect battery ground cable.

2. (Not Illustrated). On tractors equipped with a heater, drain the cooling system.



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Fig. 2-Removing Muffler, Screens and Cowling

3. Remove muffler.
4. Remove air intake stack.
5. Remove left- and right-hand grille screens.

**Removal—Continued**

6. Remove left- and right-hand side shields (Fig. 2, p. 10-20-1).
7. Remove hood (Fig. 2, p. 10-20-1).
8. Remove left- and right-hand cowling.
9. (Not Illustrated). Remove floor mat.

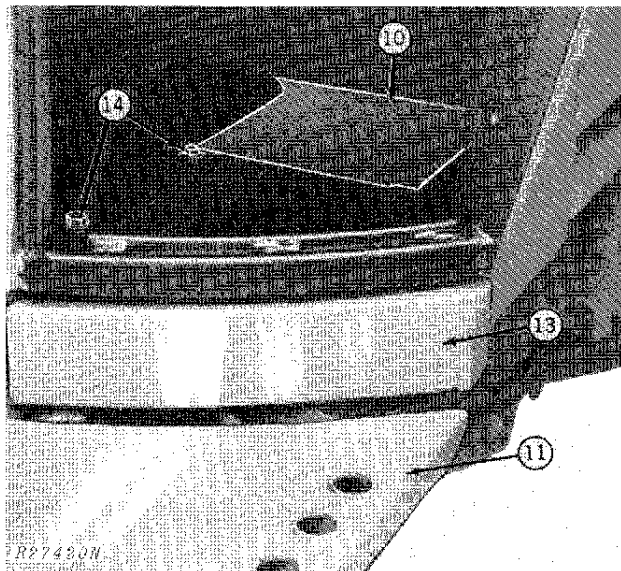
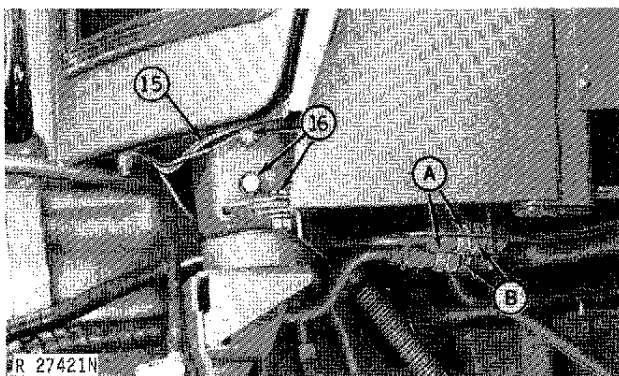


Fig. 3-Removing Battery Box Covers and Cap Screws

10. Remove left- and right-hand cab floor filler panels.
11. Remove left- and right-hand battery box covers.
12. (Not Illustrated). Remove batteries and battery boxes.
13. Remove left- and right-hand riser panels.
14. Remove Sound-Gard Body-to-control support cap screws.



A—Coupler Body

B—Coupler

Fig. 4-Disconnecting Couplers and Wiring

15. Disconnect left-hand wiring lead (Fig. 4). (Connector is located under control support.)

16. Remove Sound-Gard Body-to-control support bracket cap screws.

**⚠ CAUTION: Refrigerant-12 by itself is harmless and non-poisonous; however, special precautions should be taken when servicing any refrigerant air conditioning system or handling refrigerant lines.**

a. Do not expose eyes or skin to liquid refrigerant. Always wear safety goggles when opening refrigerant lines. Liquid Refrigerant-12 has a boiling temperature of approximately  $-21^{\circ}\text{F}$  ( $-29^{\circ}\text{C}$ ) at sea level; therefore, serious injury could result if liquid refrigerant contacts the eye or skin. If Refrigerant-12 strikes the eye, call a doctor IMMEDIATELY and:

Do not rub the eye. Splash cold water on the eye to gradually raise the temperature of the contacted area.

If the liquid refrigerant comes in contact with the skin, treat the injury as though it were frozen or frost-bitten.

b. Do not discharge refrigerant into an area where there is exposed flame. Heavy concentrations of refrigerant-12 contacting an open flame will produce a poisonous gas.

c. Do not weld or steam clean on an air conditioning system. Excessive pressure could be built-up within the system.

d. Before loosening a refrigerant fitting, cover the connection with a cloth.

**IMPORTANT: Keep ends of couplers clean to prevent possible contamination of system.**

17. Disconnect refrigerant couplers on tractors with air conditioning. Disconnect couplers by holding coupler body (A, Fig. 4) stationary with a wrench and unscrewing coupler (B) with another wrench.

18. (Not Illustrated). Remove clamp on high pressure refrigerant line located near refrigerant couplers.

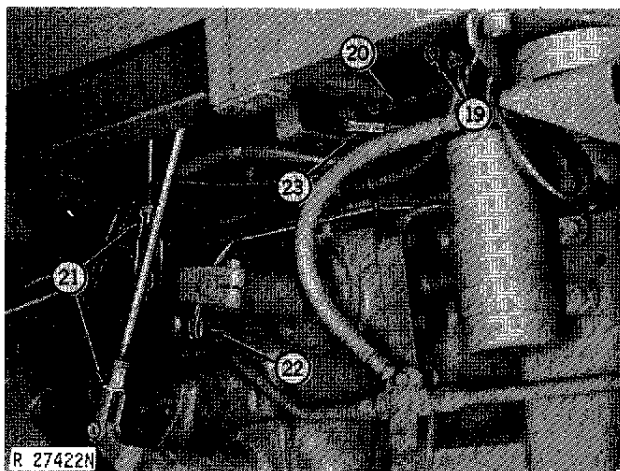


Fig. 5-Disconnecting Linkage

19. Remove control support-to-Sound-Gard Body cap screws (left- and right-hand sides).

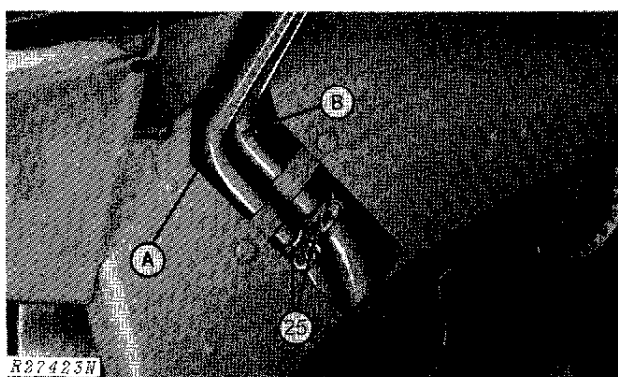
20. Disconnect speed control rod from inner arm.

21. Remove shifter rods from shifter arms (Quad-Range). On tractors with a power shift transmission, remove transmission control cable clamps, and remove control cables from control valve arms.

22. Remove neutral-start switch wiring.

23. Remove speed range selector lever from arm.

*NOTE: On tractors with a Quad-Range transmission and Power Front-Wheel Drive, disconnect electrical connector located under shifter controls. On tractors with a Power Shift transmission and Power Front-Wheel Drive, disconnect wiring from switches on transmission.*



A—Supply Hose

B—Return Hose

Fig. 6-Disconnecting Heater Hoses

24. (Not Illustrated). Remove heater hose-to-body clamps (located inside of right-hand fender well).

*NOTE: Identify supply and return hoses for proper installation (Fig. 6).*

25. Disconnect heater hoses.

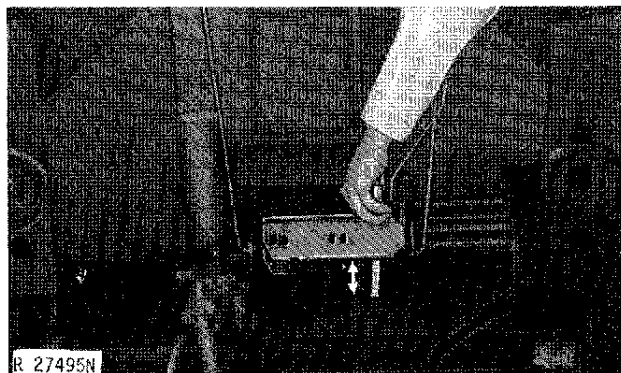


Fig. 7-Measuring Placement of Hydraulic Control Inner Support

26. Measure distance between hydraulic control inner support and Sound-Gard Body to insure that support is reinstalled in its original position (Fig. 7).

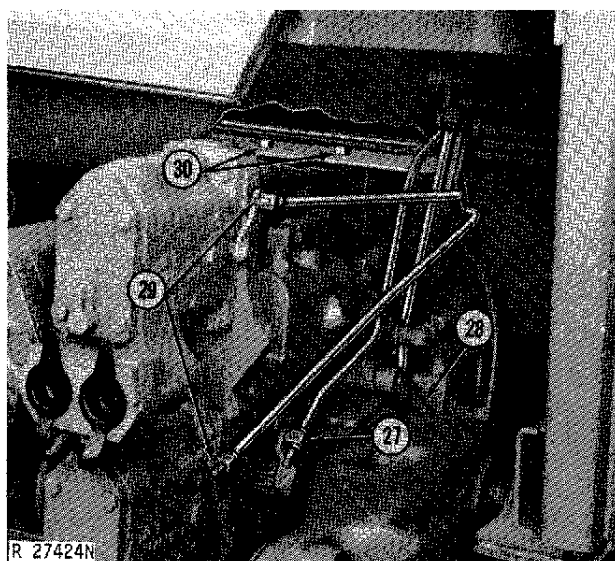


Fig. 8-Disconnecting Control Linkage

27. Disconnect rockshaft operating rod from control arm on rockshaft.

28. Disconnect load selective control valve rod from control arm on rockshaft.

29. Disconnect selective control valve rods from operating arms on selective control valve.

30. Remove two cap screws securing support bracket to rockshaft.

## Removal-Continued

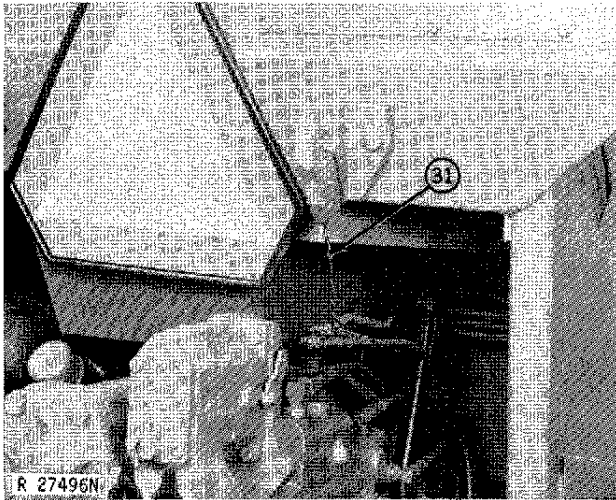


Fig. 9-Securing Control Rods

31. Wire selective control valve rods and rockshaft control rods to remote cylinder transport bracket.

32. (Not Illustrated). Disconnect both lift links from rockshaft lift arms.

33. (Not Illustrated). Remove both draft links from draft link support.

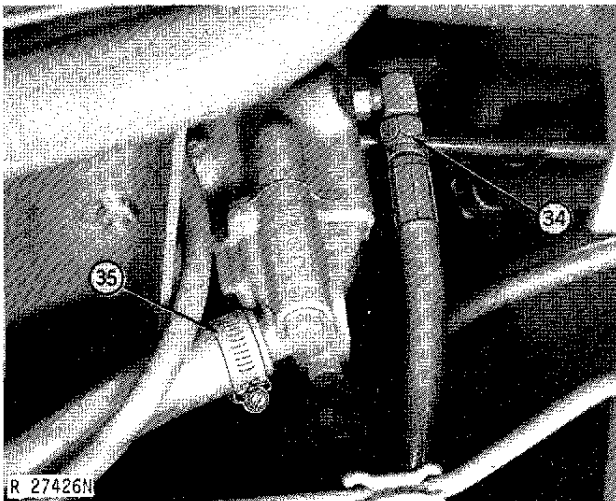


Fig. 10-Removing Hoses

34. Remove seat pressure hose.

35. Remove seat return hose.

36. (Not Illustrated). Remove left and right cab-to-rear axle mounts.

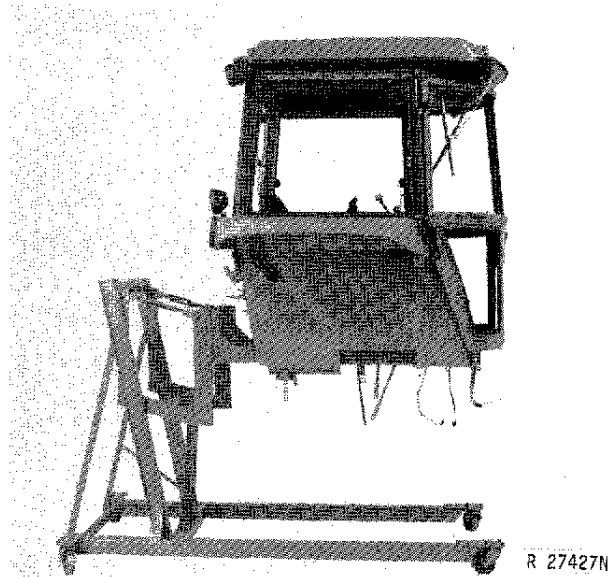


Fig. 11-Sound-Gard Body Removed from Tractor

37. Remove Sound-Gard Body and place on support stand (Fig. 11).

## Installation

Reverse the removal steps given on the preceding pages and note the special installation instructions which follow.

1. Tighten Sound-Gard Body mounting cap screws to 150 ft-lbs (203 Nm).

*NOTE: Roll-Gard mounting cap screws are also tightened to the above torque.*

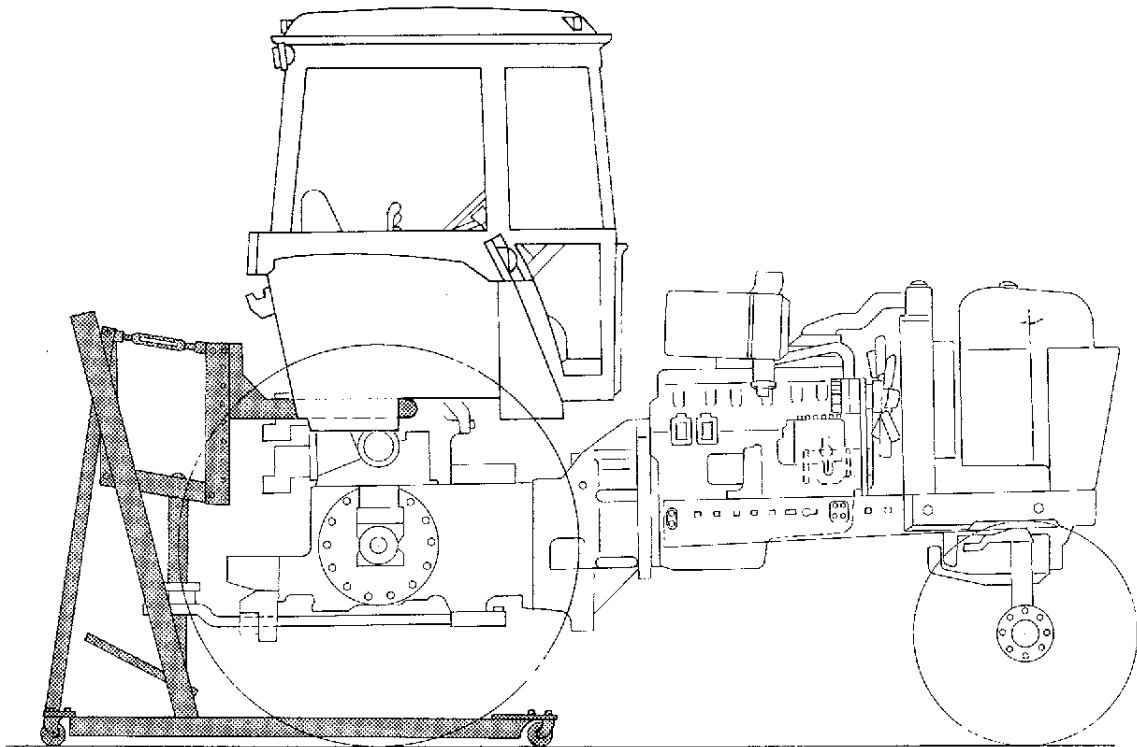
2. Brush refrigerant oil on tube ends immediately before assembly.

Tighten pressure line coupling to 35-40 lbs. (48-54 Nm). Tighten return line to 45-50 lbs. (61-68 Nm).

3. Check for leaks around couplers (p. 290-05-12) after assembly.

*NOTE: Make sure that the selective control valve control support is in the same position as before removal.*

**REMOVING SOUND-GARD BODY WITH CONTROL SUPPORT**



R 27410N

Fig. 12-Removing Sound-Gard Body With Control Support

**Removal**

1. (Not Illustrated). Disconnect battery ground cable.
2. (Not Illustrated). On tractors equipped with a heater, drain the cooling system.

4. Remove air intake stack.
5. Remove left and right-hand grill screens.
6. Remove left and right-hand side shields.
7. Remove hood.
8. Remove left and right-hand cowling.
9. (Not Illustrated). Remove floor mat.

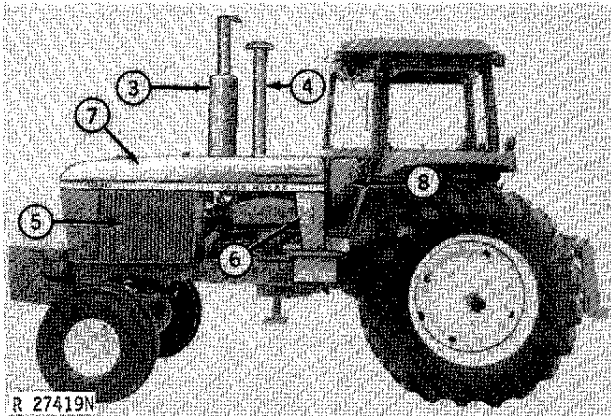


Fig. 13-Removing Muffler, Screens and Cowling

3. Remove muffler.

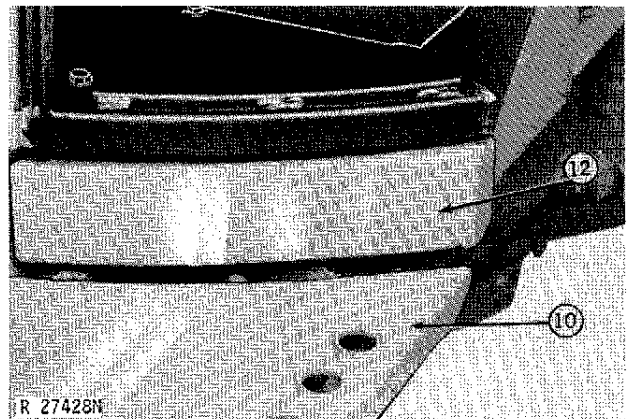


Fig. 14-Removing Battery Box Covers and Riser Panels

**Removal—Continued**

10. Remove left- and right-hand battery box covers.
11. (Not Illustrated). Remove batteries and battery boxes.
12. Remove left- and right-hand riser panels.

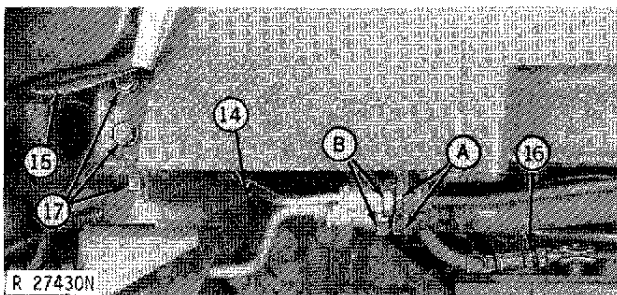
**⚠ CAUTION:** Follow all safety precautions found on page 10-20-2 when working with the air conditioning system.

**IMPORTANT:** Keep ends of couplers clean to prevent possible contamination of system.



Fig. 15-Discharging Accumulator

**⚠ CAUTION:** Before disconnecting brake pressure lines, be sure that the brake accumulator is discharged. The accumulator can be discharged by opening the right-hand brake bleed screw (Fig. 15), and holding the pedal down for a few minutes.



A—Coupler Body

B—Coupler

Fig. 16-Disconnecting Couplers and Wiring

13. Disconnect couplers on tractors with air conditioning by holding coupler body (A, Fig. 16), stationary with a wrench, and unscrewing coupler (B) with another wrench. If refrigerant can be heard escaping as coupler is loosened, retighten coupler and loosen again.

14. Remove clamp on high pressure refrigerant line.

15. Disconnect left-hand wiring lead (Under control support).

16. Disconnect left-hand brake oil line.

17. Remove Sound-Gard Body-to-control support capscrews (left- and right-hand sides).

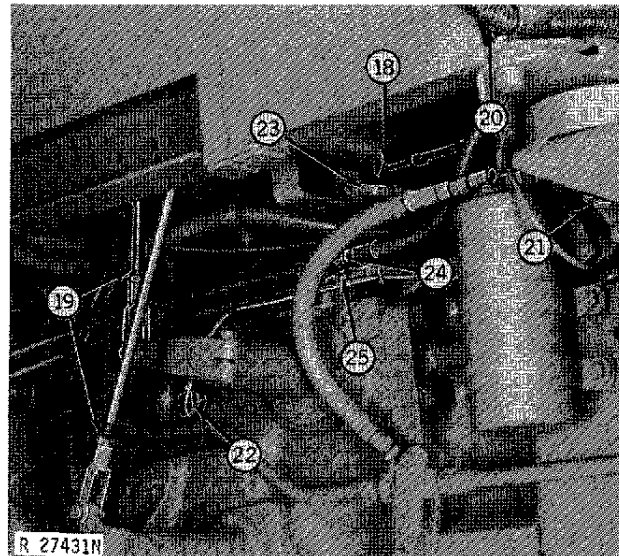


Fig. 17-Disconnecting Linkage

18. Disconnect speed control rod from inner arm.

19. Remove shifter rods from shifter arms (Quad-Range). On tractors with a Power Shift transmission, remove transmission control cable clamps, and remove control cables from control valve arms.

20. Disconnect sound-gard body wiring.

21. Remove the sound-gard body mounting capscrews (left- and right-hand sides).

22. Remove neutral-start switch wiring.

23. Remove speed range selector lever from arm.

**NOTE:** On tractor with a Quad-Range transmission and power front-wheel drive, disconnect electrical connector located under shifter controls. On tractors with a Power shift transmission and Power Front-Wheel drive, disconnect wiring from switches on transmission.

- 24. Disconnect right-hand brake oil line.
- 25. Disconnect differential lock oil line.

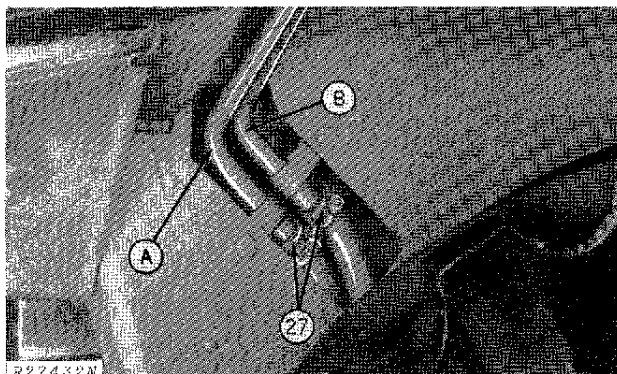


Fig. 18-Disconnecting Heater Hoses

- 26. (Not Illustrated.) Remove heater hose -to- body clamps (located inside of right-hand fender well).

*NOTE: Identify supply and return hoses for proper installation (Fig. 18).*

- 27. Disconnect heater hoses.

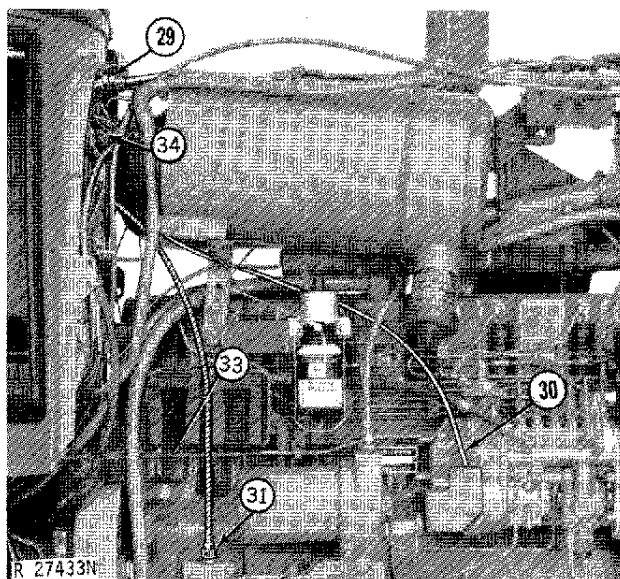


Fig. 19-Disconnecting Cables and Wiring

- 28. (Not Illustrated.) Thoroughly clean area around steering valve.
- 29. Disconnect steering metering pump -to- steering valve lines from steering valve.
- 30. Disconnect fuel shut-off cable from injection pump.
- 31. Disconnect tachometer drive cable.
- 32. Remove speed control cable clamp (located under control support).
- 33. Disconnect speed control linkage at turnbuckle.

- 34. Remove main wiring harness connector from control support.

*NOTE: To remove connector, remove capscrew located in center of connector.*

- 35. (Not Illustrated.) Disconnect clutch pedal rod from clutch control arm on clutch housing.

- 36. (Not Illustrated.) Disconnect PTO operating rod from operating valve under footrest.

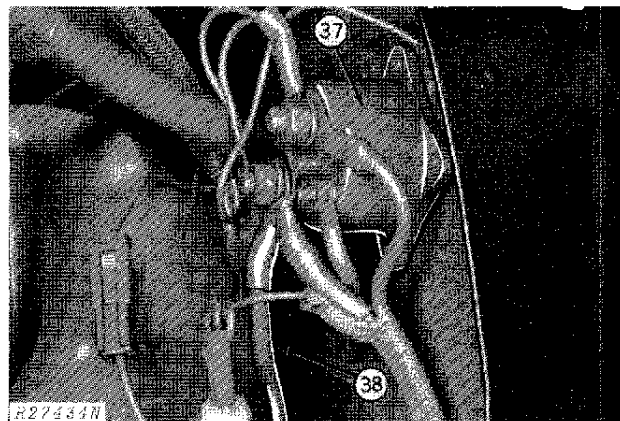


Fig. 20-Removing Starting Circuit Relay

- 37. Remove starting circuit relay from control support.

- 38. Remove cab electrical load wire from relay.
- NOTE: On tractors with a Power Front-Wheel drive, disconnect wiring from connector near starting circuit relay.*

- 39. (Not Illustrated.) Disconnect light dimmer switch wiring from dimmer switch.

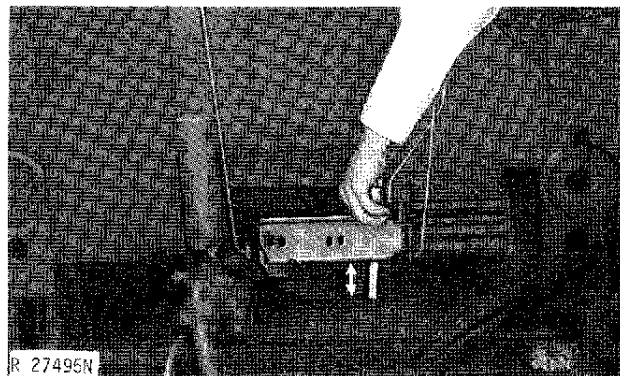


Fig. 21-Measuring Placement of Hydraulic Control Inner Support

- 40. Measure distance between hydraulic control inner support and SOUND-GARD Body to insure that support is reinstalled in its original position (Fig. 21).

**Removal—Continued**

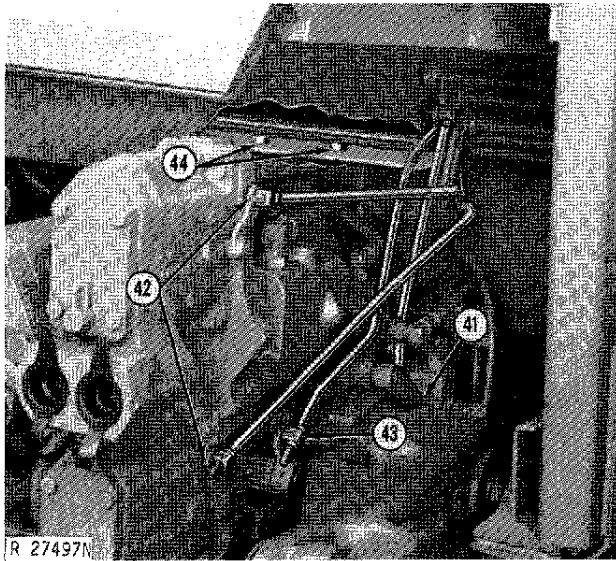


Fig. 22-Disconnecting Control Linkage

- 41. Disconnect load selective control rod from control arm on rockshaft.
- 42. Disconnect selective control valve rods from operating arms on selective control valve.
- 43. Disconnect rockshaft operating rod from control arm on rockshaft.
- 44. Remove two cap screws securing support bracket to rockshaft.

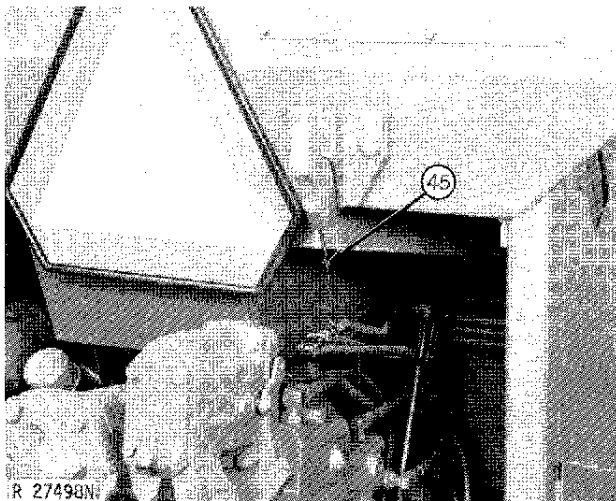


Fig. 23-Securing Control Rods

- 45. Wire selective control valve and rockshaft control rods to remote cylinder transport bracket.

- 46. (Not Illustrated.) Disconnect both lift links from rockshaft lift arms.

- 47. (Not Illustrated.) Remove both draft links from draft link support.

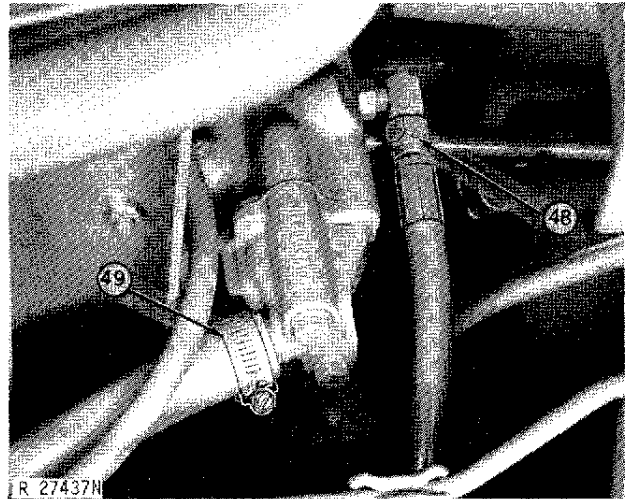


Fig. 24-Removing Hoses

- 48. Remove seat pressure hose.
- 49. Remove seat return hose.
- 50. (Not Illustrated.) Remove left and right cab-to-rear axle mounts.
- 51. Remove SOUND-GARD Body with control support.

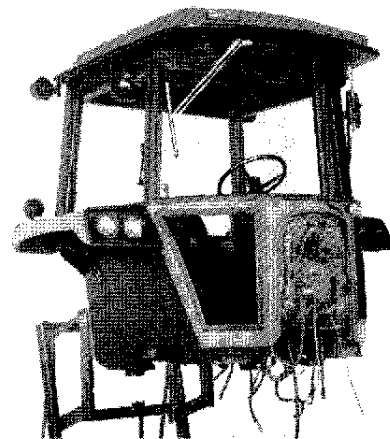
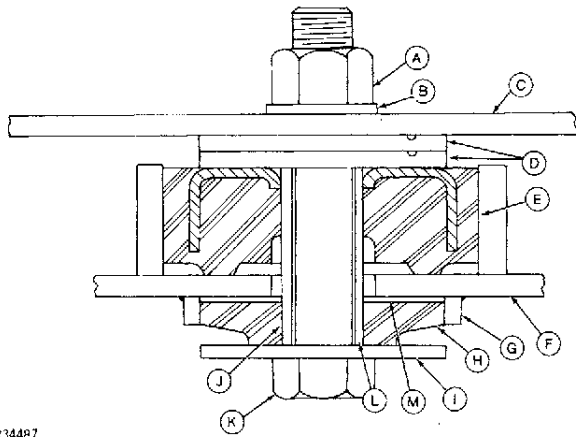


Fig. 25-SOUND-GARD Body with Control Support

**Installation**

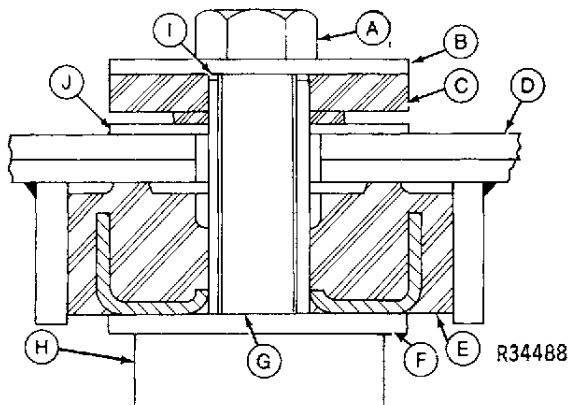
Reverse the removal steps given on the proceeding pages and note the special installation instructions which follow.



R34487

- |                           |                 |                            |
|---------------------------|-----------------|----------------------------|
| A—Nut                     | E—Mount         | J—Spacer                   |
| B—Washer                  | F—Front Bracket | K—Cap Screw                |
| C—Control Support Bracket | G—Sleeve        | L—Shim 0.035 in. (0.91 mm) |
| D—Washers                 | H—Mount         | M—Shim 0.021 in. (0.53 mm) |
|                           | I—Washer        |                            |

Fig. 25a-Front Mount



R34488

- |                   |          |                            |
|-------------------|----------|----------------------------|
| A—Special Screw   | E—Mount  | I—Shim 0.035 in. (0.91 mm) |
| B—Washer          | F—Washer | J—Shim 0.021 in. (0.53 mm) |
| C—Mount           | G—Spacer |                            |
| D—Mounting Flange | H—Spacer |                            |

Fig. 25b-Rear Mount

1. Assemble SOUND-GARD Body mounts as shown in Figs. 25a and 25b. Make sure identification marks on special washers (D) face upward. Shims (I and J, Fig. 25b, and L and M, Fig. 25a) may be used to change SOUND-GARD Body ride. Adding thin shims (J, Fig. 25b and M, Fig. 25a) will make a more stiff ride. Adding thick shims (I, Fig. 25b and L, Fig. 25a) will make a softer ride. There should not be more than four thin or three thick shims on any mount.

2. Tighten SOUND-GARD Body mounting cap screws to 150 ft-lbs (203 N-m).

*NOTE: ROLL-GARD mounting cap screws are also tightened to the above torque.*

3. (Not Illustrated.) Brush refrigerant oil on tube ends immediately before assembly.

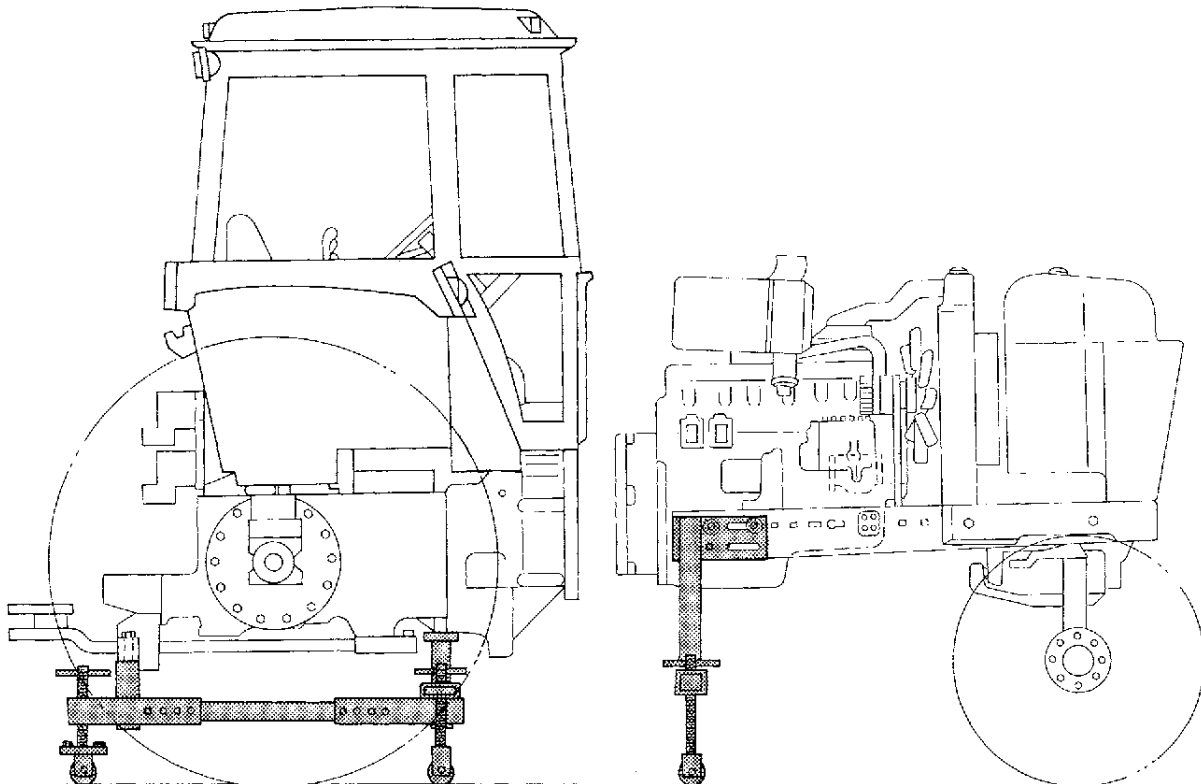
4. (Not Illustrated.) Check for leaks around couplers (p. 290-05-12) after assembly.

5. (Not Illustrated.) After installation is complete, perform the following steps in bleeding the brakes:

### BLEEDING THE BRAKES

- a. Start the engine.
- b. Loosen brake bleed screw lock nuts on both sides of transmission case.
- c. Turn bleed screws out two turns.
- d. Tighten lock nuts.
- e. Depress brake pedals for two minutes.
- f. While pedals are being held down, retighten the bleed screws.
- g. Tighten the lock nuts.

**SEPARATING ENGINE FROM CLUTCH HOUSING**



R 27411N

Fig. 26-Separating Engine From Clutch Housing

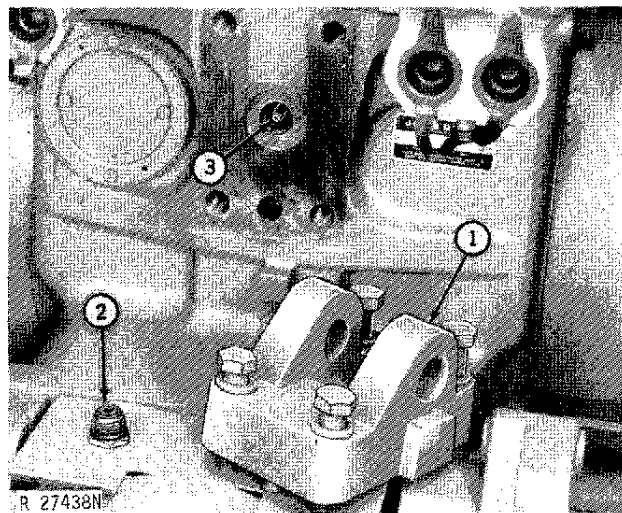
**Removal**



R 27429N

Fig. 27-Discharging Accumulator

**CAUTION:** Before separating tractor, be sure that the brake accumulator is discharged. The accumulator can be discharged by opening the right-hand brake bleed screw (Fig. 27), and holding the brake pedal down for a few minutes.



R 27438N

Fig. 28-Removing Transmission Pump Drive Shaft

**IMPORTANT:** On tractors with a PERMA-CLUTCH™, remove the hexagonal transmission pump drive shaft from rear of transmission case.

1. Remove center link attaching bracket.
2. Remove plug.
3. Carefully withdraw transmission pump drive shaft.
4. (Not Illustrated.) Put tractor in the "Park" position.

5. (Not Illustrated.) Disconnect battery ground cable.

6. (Not Illustrated.) On tractors equipped with a heater, drain the cooling system.

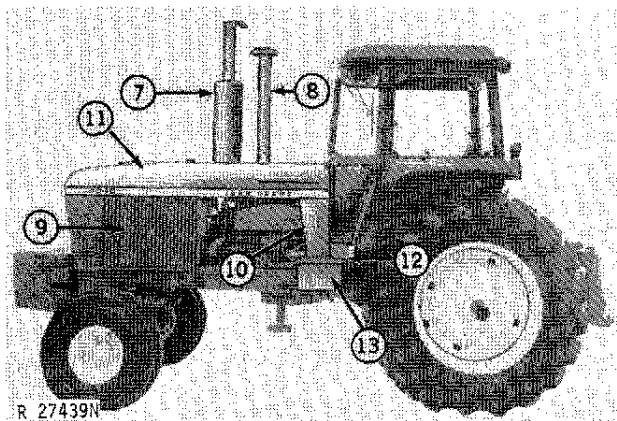


Fig. 29-Removing Muffler, Screens and Shields

7. Remove muffler.

8. Remove air intake stack.

9. Remove left- and right-hand grill screens.

10. Remove left- and right-hand side shields.

11. Remove hood.

12. Remove left- and right-hand battery box covers.

13. Remove batteries and battery boxes.

14. Remove main harness connector from control support.

*NOTE: To remove connector, remove cap screw located in center of connector. Remove upper half from lower half.*

15. Disconnect hydraulic oil cooler return pipe.

16. Disconnect heater return hose from top of water pump housing.

17. Disconnect hydraulic pump seal drain line at transmission.

18. Disconnect hydraulic pump pressure pipe.

19. Disconnect start safety switch wiring from transmission.

20. Disconnect speed control rod at turnbuckle.

21. Remove tachometer drive cable from housing.

22. Disconnect fuel shut-off cable.

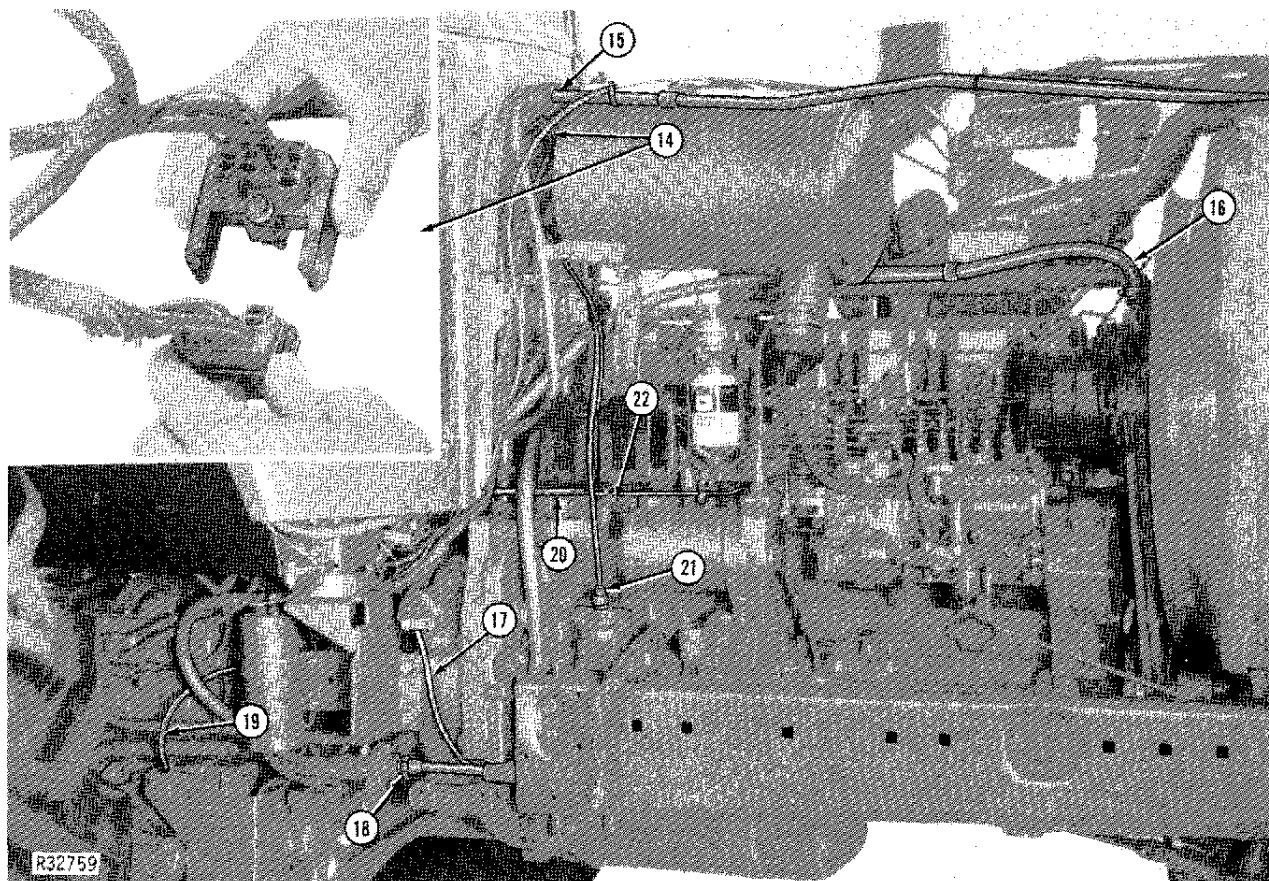
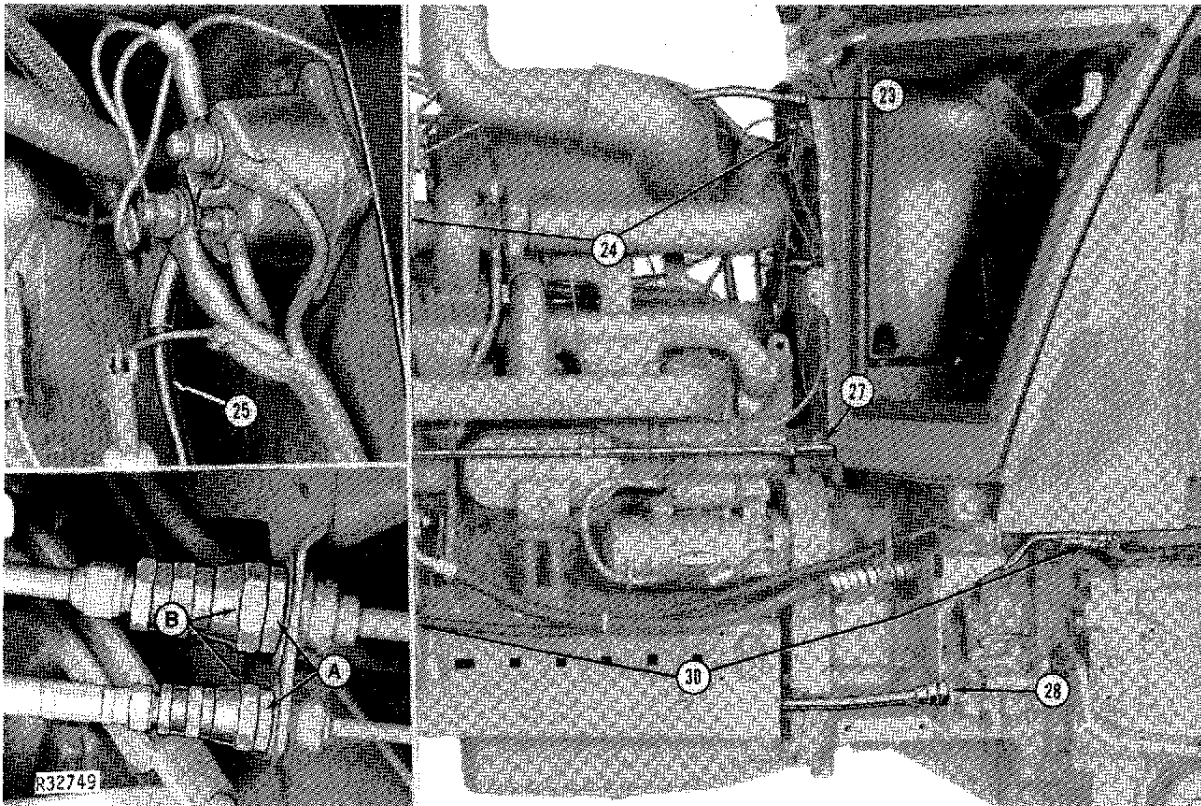


Fig. 30-Right Side Removal Procedures

Removal—Continued



A—Coupler Body B—Coupler

Fig. 31-Left Side Removal Procedures

- 23. Thoroughly clean area around steering pipes at control support, and disconnect.
- 24. Remove starting circuit relay from control support.
- 25. Remove cab electrical load wire from relay.
- 26. (Not Illustrated.) Disconnect clutch pressure sending wire from connector near starting circuit relay.
- 27. Disconnect heater supply hose.
- 28. Disconnect hydraulic pump return line.
- 29. (Not Illustrated.) On tractors with power front-wheel drive, disconnect the drain pipe.

30. Disconnect refrigerant couplers on tractors with air conditioning by holding coupler body (A, Fig. 31) stationary with a wrench and unscrewing coupler (B) with another wrench. If refrigerant can be heard escaping as coupler is loosened, retighten coupler and loosen again.

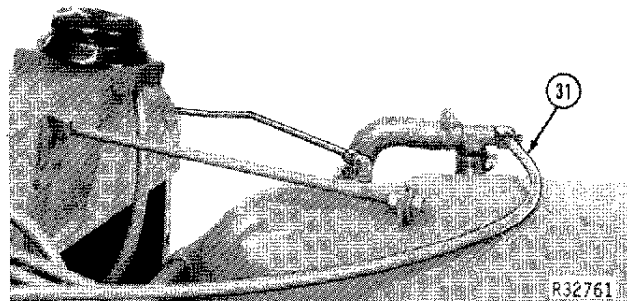


Fig. 32-Removing Air Bleed Line

31. Remove reservoir air bleed line from valve.

**CAUTION:** Follow all safety precautions found on page 10-20-2 when working with the air conditioning system.

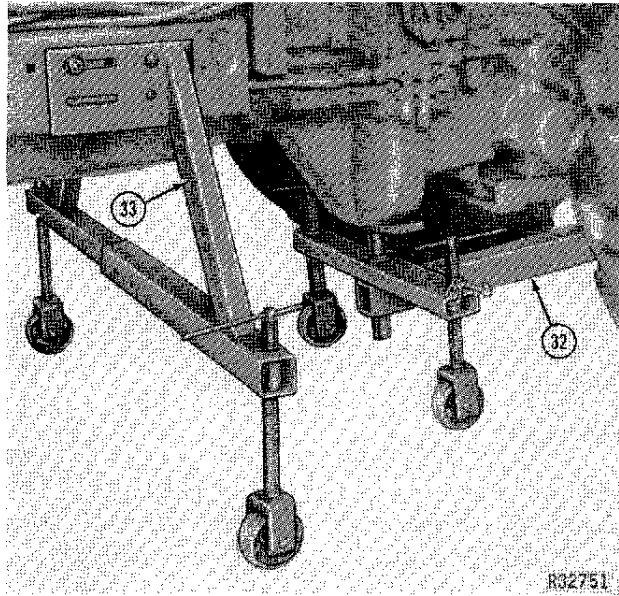


Fig. 33-Attaching Splitting Stands

32. Attach JDG-2M rear splitting stand.
33. Attach JDG-12-1 splitting stand to side frames.
34. (Not Illustrated). Place a drain pan under the engine -to- clutch housing parting surface on tractors with a Quad-Range transmission to catch oil from clutch housing as separation is made.
35. (Not Illustrated). Remove oil pan -to- clutch housing capscrews.

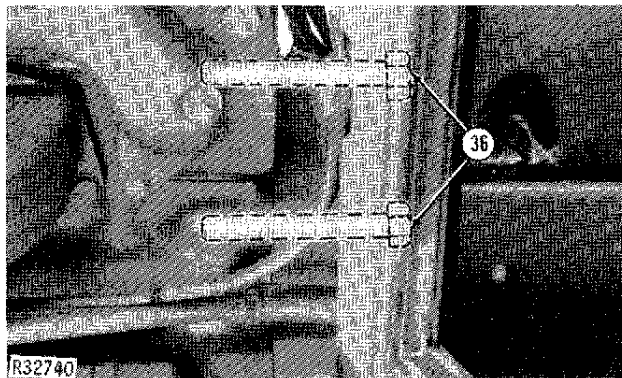


Fig. 34-Capscrew Removal

36. Remove footrest panel to obtain access to the two top clutch housing -to- engine capscrews. Remove the two capscrews.
37. (Not Illustrated). Remove the remainder of the clutch housing -to- engine capscrews.

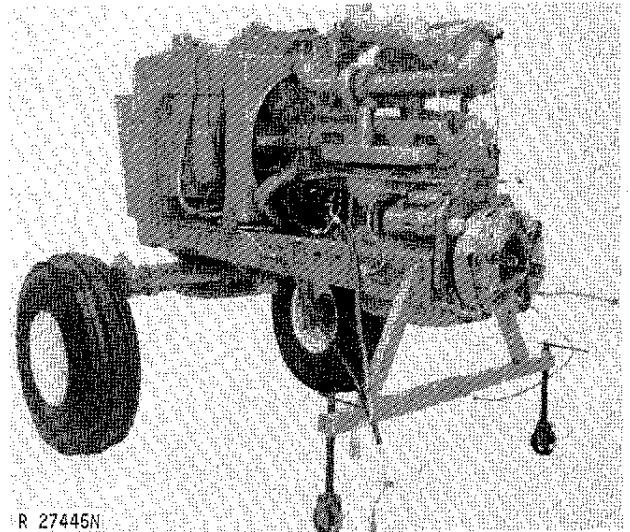


Fig. 35-Engine Separated From Clutch Housing

38. Separate engine from clutch housing (Fig. 35)

## Installation

Revise the removal steps on the preceding pages and note the special installation instructions which follow.

1. (Not Illustrated). On tractors with a Quad-Range transmission, apply a light coat of Permatex No. 3 to the block bolting flange where block and oil pan make contact.
2. (Not Illustrated). On tractors with a Quad-Range transmission, be sure that the oil pump drive shaft bushing is in position before reassembling tractor.

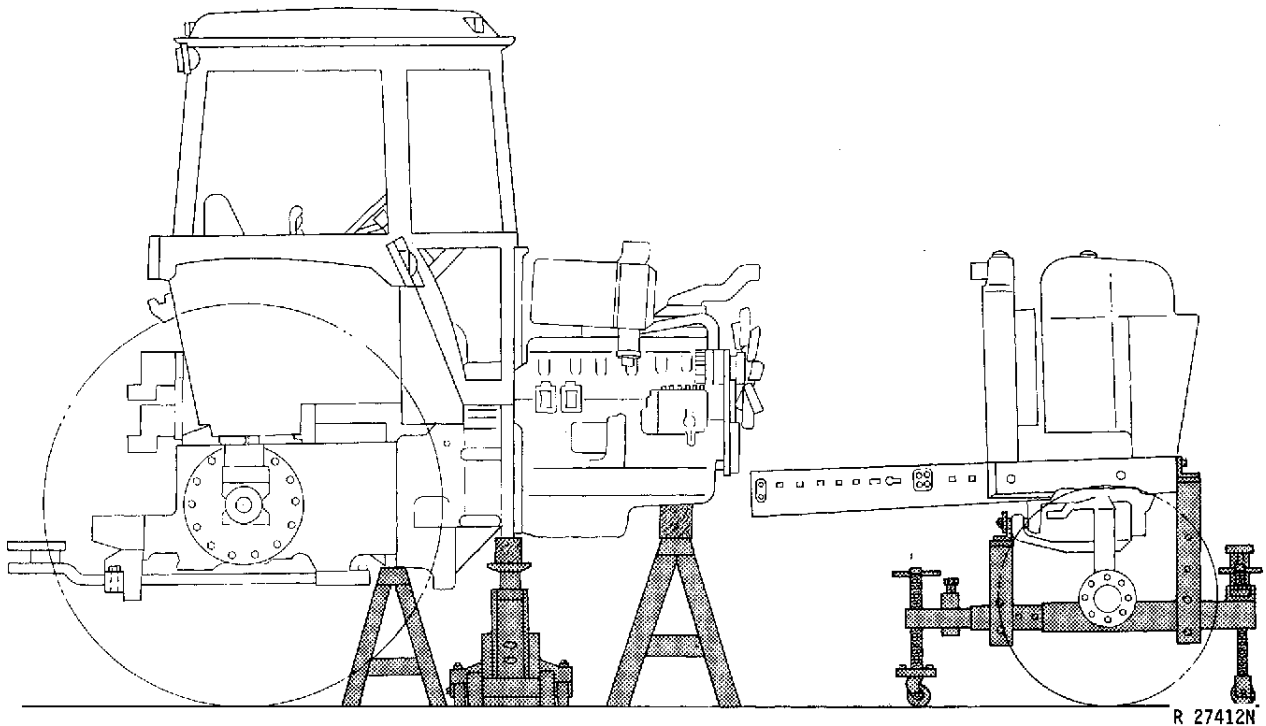
*NOTE: In some cases during separation, the clutch drive shaft may move toward the engine.*

3. Tighten engine -to- clutch housing cap screws to 300 ft-lbs (406 Nm) (40.6 kgm).
4. Tighten oil pan-to-clutch housing cap screws to 85 ft-lbs (115 Nm) (11.5 kgm).
5. If cooling system was drained, refill with JDT 781 non-evaporating antifreeze to 1-1/2 inches over de-airation baffles.

Tighten pressure line coupling to 35-40 lbs. (48-54 Nm). Tighten return line to 45-50 lbs. (61-68 Nm).

6. (Not Illustrated). After installation is complete bleed the brakes following the procedure on page 10-20-26.

## REMOVING FRONT END



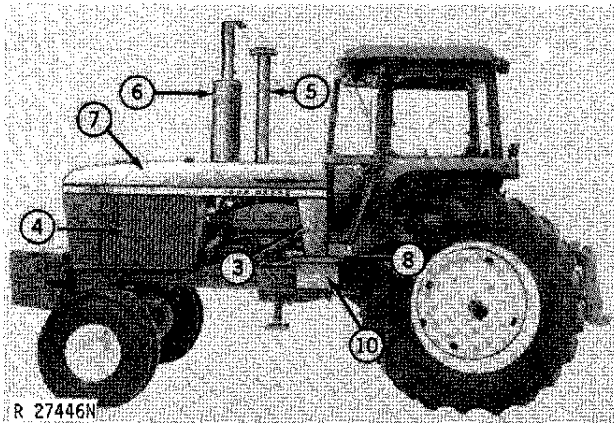
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Fig. 36-Removing Front End

### Removal

1. (Not Illustrated). Disconnect battery ground cable.
2. (Not Illustrated). Drain cooling system.

7. Remove hood.
8. Remove left- and right-hand battery box covers.
9. (Not Illustrated). Disconnect battery cables.
10. Remove batteries and battery boxes.



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Fig. 37-Removing Muffler, Screens, and Shields

3. Remove left- and right-hand side shields.
4. Remove left- and right-hand grill screens.
5. Remove air stack.
6. Remove muffler.

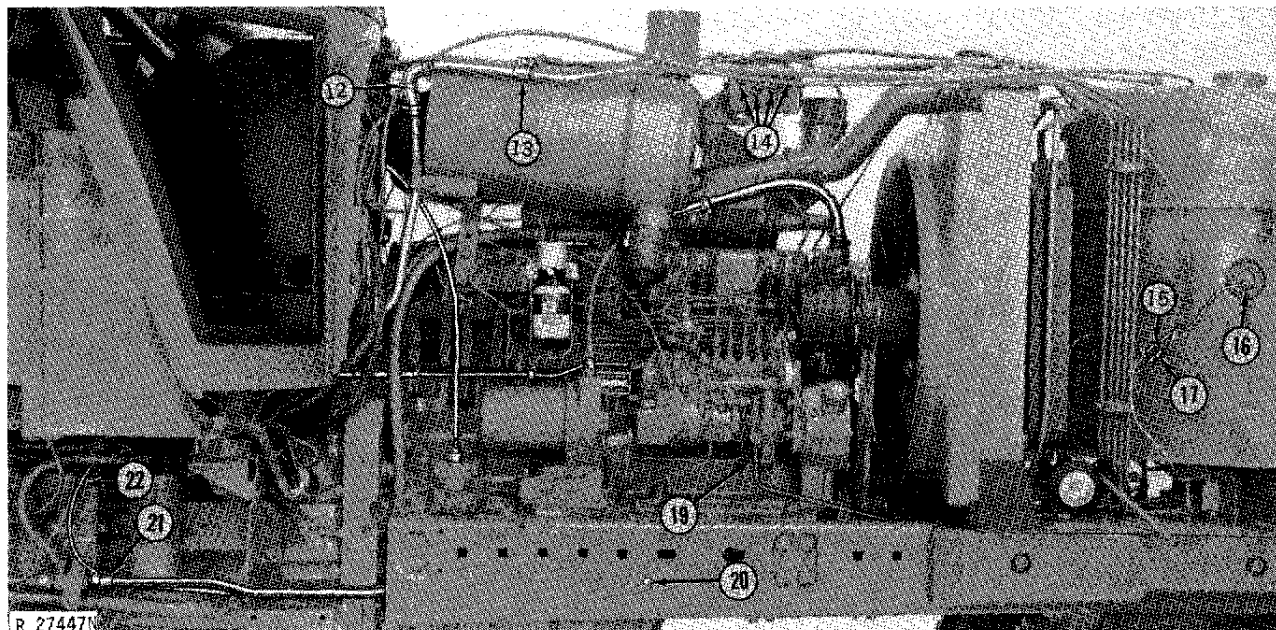


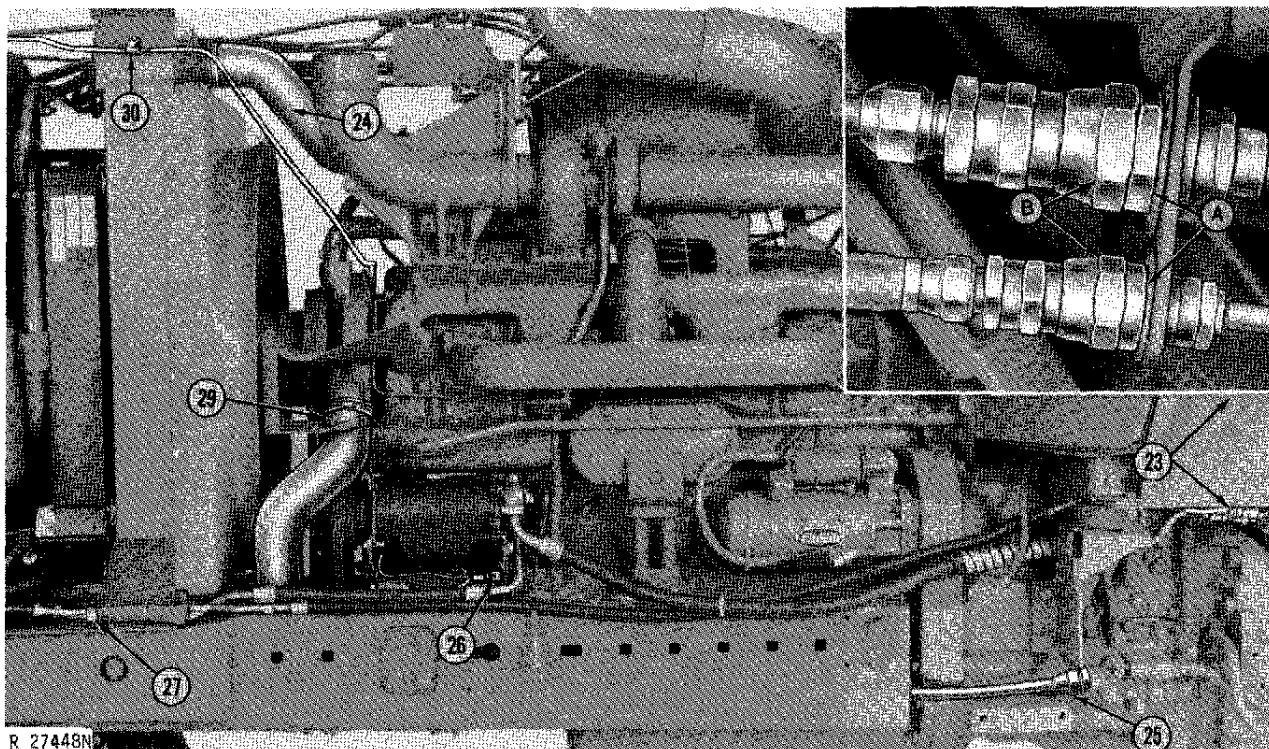
Fig. 38-Right Side Removal Steps

- |  |  |
|--|--|
| 11. (Not Illustrated). Remove tool box and bracket.  | 18. (Not Illustrated). Close fuel shut-off valve.                    |
| 12. Disconnect hydraulic oil cooler return pipe.   | 19. Disconnect fuel tank -to- injection pump line at injection pump. |
| 13. Disconnect hydraulic oil cooler return pipe clamp.   | 20. Remove pressure pipe clamp -to- side frame capscrew.             |
| 14. Thoroughly clean area around steering valve and disconnect steering valve -to- steering motor pipes from steering valve. | 21. Disconnect hydraulic pump return line.                           |
| 15. Disconnect horn wiring (if equipped).  | 22. Remove pump seal drain line from top of clutch housing.          |
| 16. Disconnect wiring at fuel sender.  |  |
| 17. Disconnect air conditioning wire (if equipped).  |  |

**⚠ CAUTION:** Follow all safety precautions found on page 10-20-2 when working with the air conditioning system.

**IMPORTANT:** Keep ends of couplers clean to prevent possible contamination of system.

## Removal—Continued



A—Coupler Body    B—Coupler

Fig. 39—Left Side Removal Steps

23. Disconnect refrigerant couplers on tractors with air conditioning.

*NOTE: Disconnect couplers by holding the coupler body (A, Fig. 39) stationary with a wrench and unscrewing coupler (B) with another wrench. If refrigerant can be heard escaping as coupler is loosened, retighten coupler and loosen again.*

24. Remove upper radiator hose from radiator.

25. Disconnect hydraulic pump return line.

26. Remove wiring from thermal fuse on compressor.

27. Remove refrigerant line clamp at radiator hose.

28. (Not Illustrated). Remove air conditioning compressor with refrigerant lines attached and secure to front axle.

29. Disconnect lower radiator hose from water pump.

30. Remove fuel leak-off line clamp from radiator.

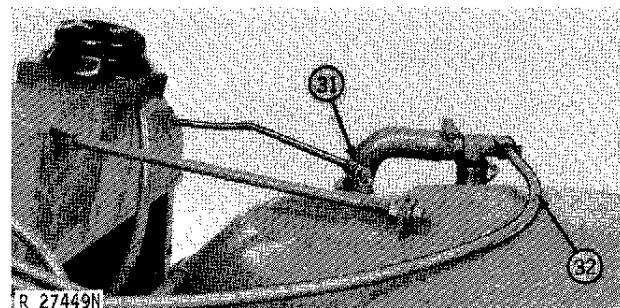


Fig. 40—Removing Lines from Fuel Tank

31. Remove fuel line from fuel tank.

32. Remove air bleed line from valve.

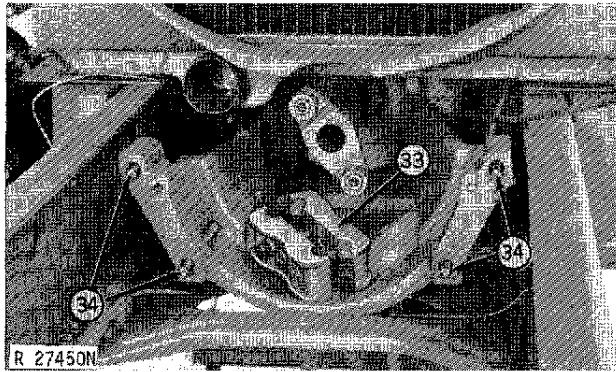


Fig. 41-Hydraulic Pump Drive Coupling  
(Engine Removed for Illustration Purposes)

- 33. Remove hydraulic pump drive coupling.
- 34. Remove hydraulic pump support bracket -to- engine capscrews.

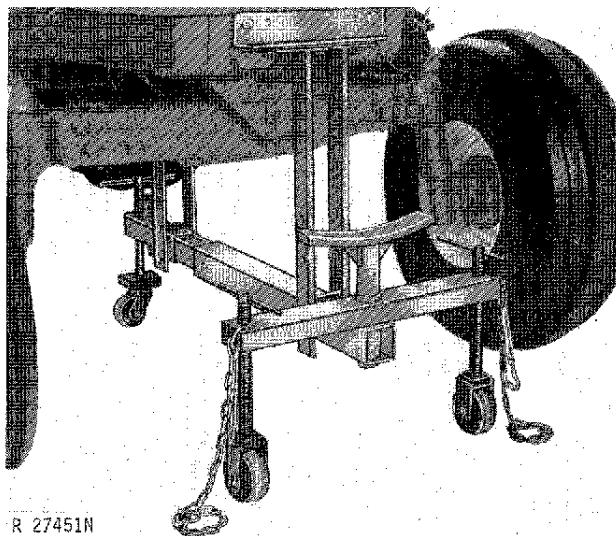


Fig. 42-Attaching Splitting Stand

- 35. Attach JDG-12-1 Splitting Stand with Attachments to tractor (Fig. 42).

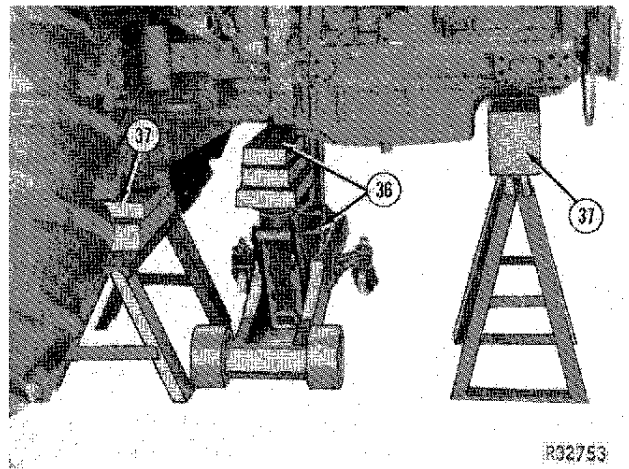


Fig. 43-Positioning Floor Jack and Stands  
(Side frames removed for illustration purposes.)

- 36. Position a floor jack under clutch housing -to- engine parting surface.
- 37. Install floor stands as shown in Fig. 43.
- 38. Remove side frame -to- engine capscrews.

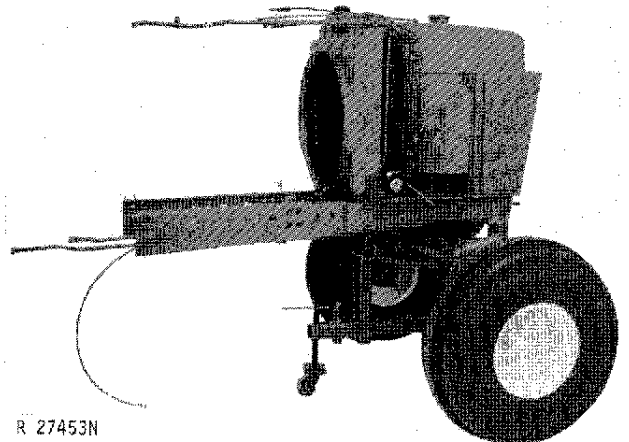


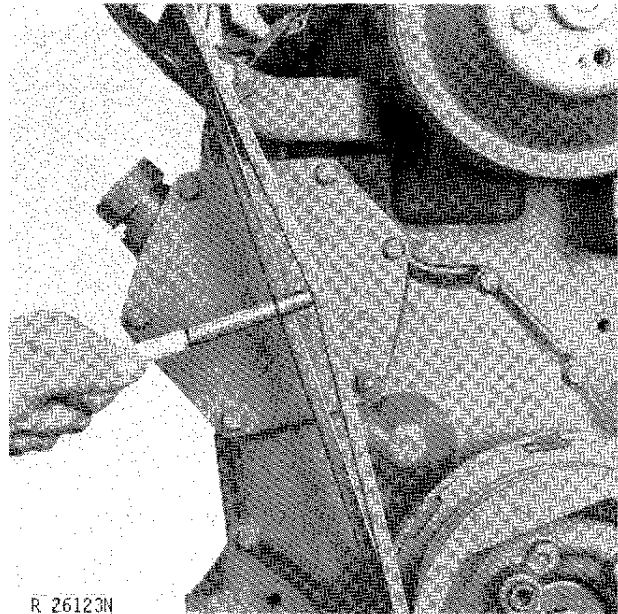
Fig. 44-Front End Removed

- 39. Roll front end away from engine.

**Installation**

Reverse the removal steps given on the preceding pages and note the special installation instructions which follow.

1. Tighten side frame -to- engine capscrews:  
 5/8 in. . . . . 275 ft-lbs (373 Nm) (37.3 kgm).  
 3/4 in. . . . . 425 ft-lbs (578 Nm) (57.8 kgm).
  2. Tighten hydraulic pump support -to- engine capscrews to 85 ft-lbs (115 Nm) (11.5 kgm).
  3. Tighten hydraulic pump drive shaft -to- pump shaft clamping screws to 35 ft-lbs (47 Nm) (4.7 kgm).
  5. Brush #525 Refrigerant Oil on all refrigerant line O-ring packings and tube ends immediately before assembly and before connections are made.
- Tighten pressure line coupling to 35-40 lbs. (48-54 Nm). Tighten return line to 45-50 lbs. (61-68 Nm).
6. Tighten all hose clamps to 30 in-lbs (3.4 Nm).

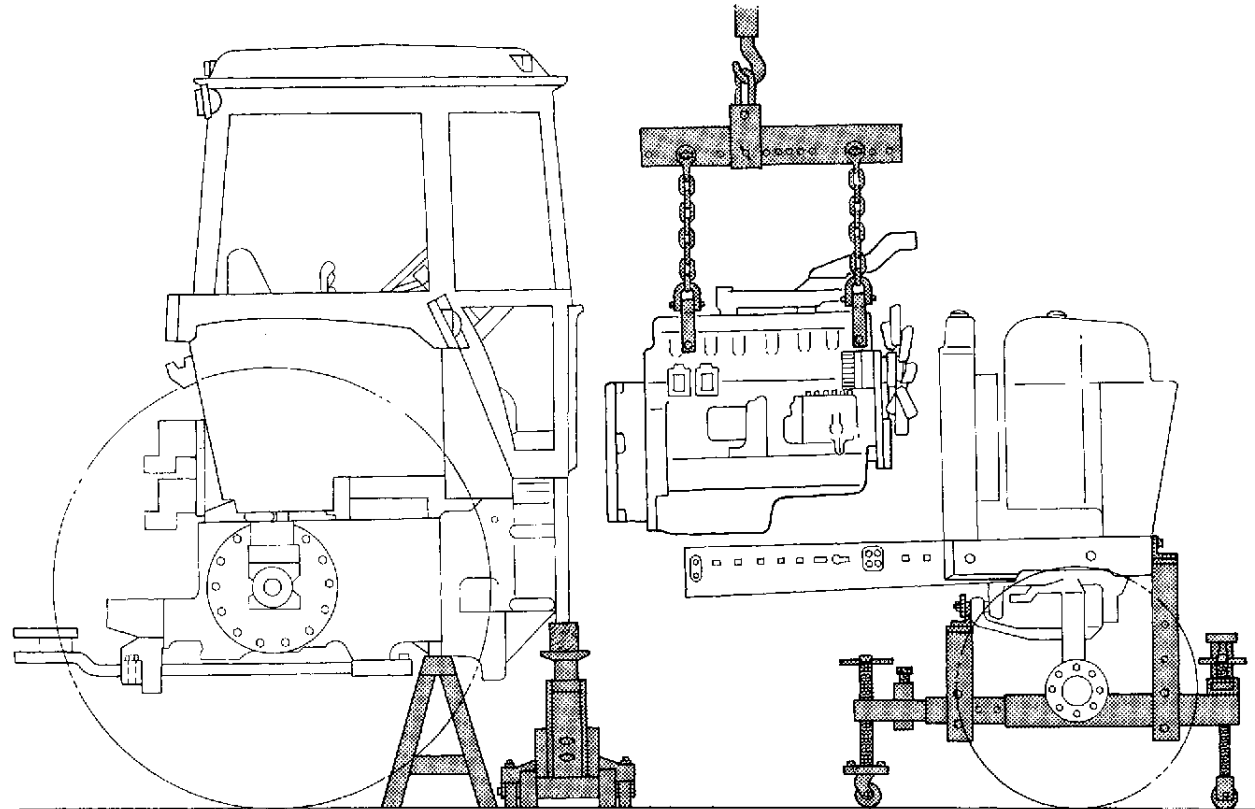


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*Fig. 45-Checking Belt Tension*

4. Adjust compressor drive belt, to deflect 1/4 inch (6.35 mm) with a 15 lb. (67 N) force (Fig. 45).
7. If coolant was lost, add JDT 781 non-evaporating anti-freeze to radiator and fill to 1-1/2 inches over de-airation baffles.

**REMOVING ENGINE**



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*Fig. 46-Removing Engine*

**Removal**

1. Remove front end as previously instructed.

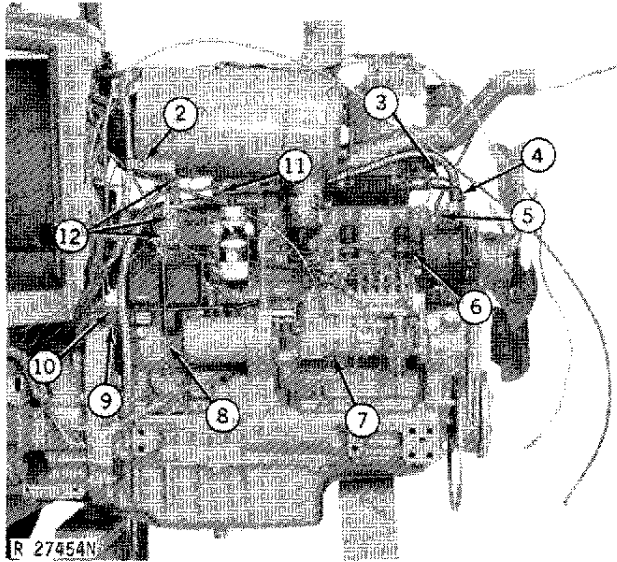


Fig. 46-Right Side Removal Steps

2. Remove oil cooler pipe -to- air cleaner pipe clamp.

3. Remove water manifold -to- water pump hose.

- 4. Disconnect heater hose from water pump.
- 5. Remove fuel leak-off line -to- water pump line clamp.
- 6. Remove fuel leak-off line from injection nozzle, and set aside leak-off line.
- 7. Disconnect fuel shut-off cable from injection pump.
- 8. Remove tachometer drive cable from tachometer drive housing.
- 9. Remove wire from oil pressure sending unit.
- 10. Disconnect speed control cable at turnbuckle.
- 11. Disconnect either aid wiring from either aid.
- 12. Remove air cleaner and either aid support cap-screw, and set aside either aid with support.

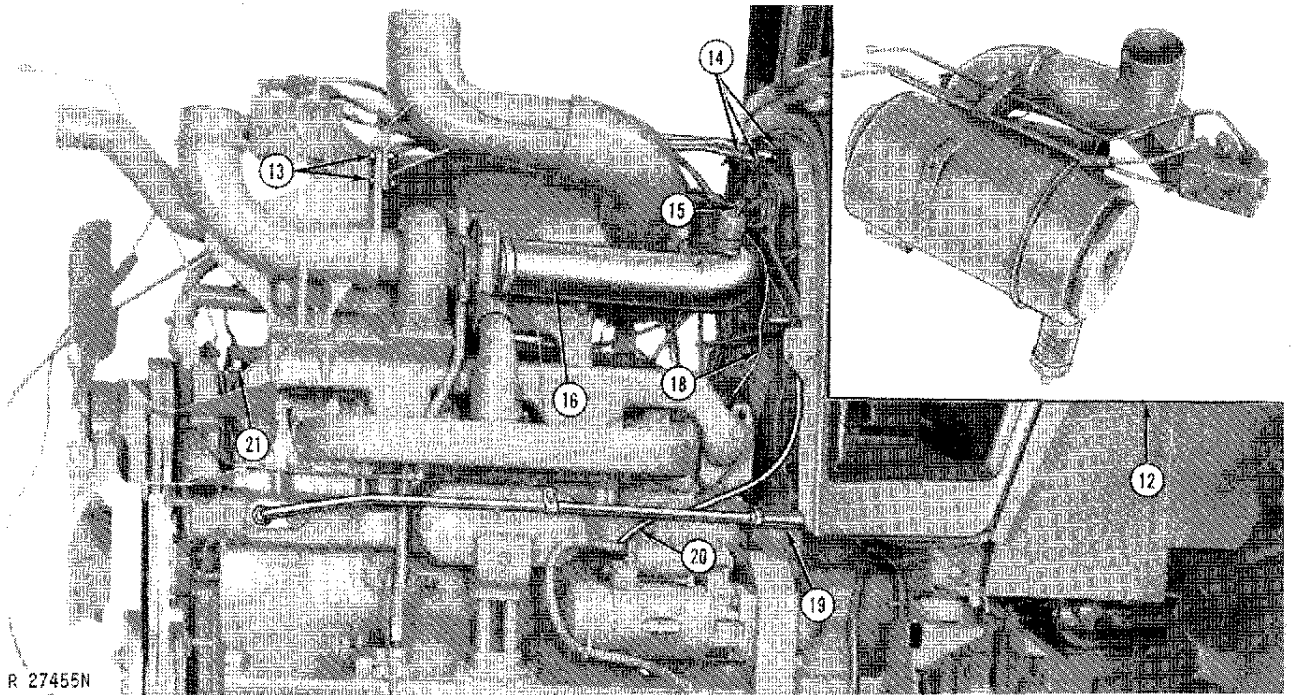


Fig. 47-Left Side Removal Steps

**Removal—Continued**

13. Remove air intake pipe support bracket -to- turbocharger capscrews.

14. Remove steering lines from control support.

15. Remove air cleaner restriction indicator wire from indicator.

16. Remove air intake hose from turbocharger.

17. Remove air intake pipe support -to- water manifold capscrews; and remove air cleaner and intake pipe assembly from engine.

18. Remove wire from temperature sender.

19. Disconnect heater supply hose.

20. Disconnect wiring from starter solenoid.

21. Remove fan blast deflector -to- cylinder head capscrews, and remove deflector from engine.

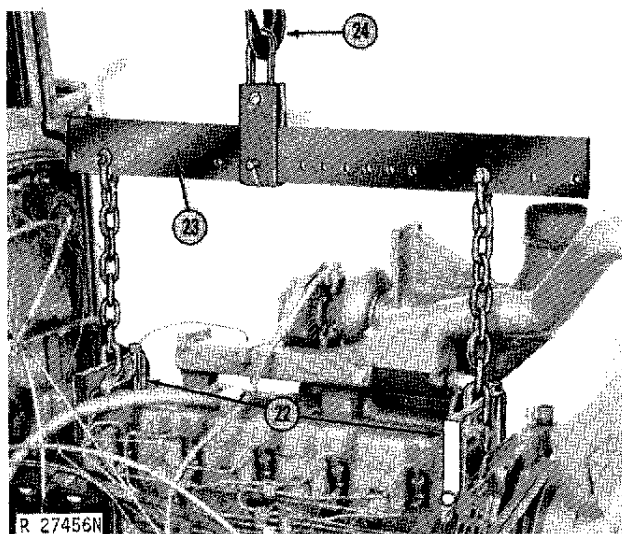


Fig. 48-Attaching Engine Lift Sling

22. Attach JDE-63 Engine Lift Brackets to cylinder head.

23. Attach JDG-23 Engine Lift Sling to brackets.

24. Attach a chain hoist with a one ton capacity or greater to lift sling.

25. Remove oil pan -to- clutch housing capscrews.

26. Remove clutch housing -to- engine capscrews.

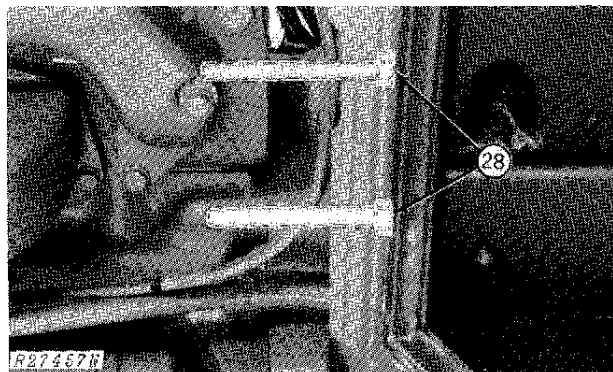


Fig. 49-Capscrew Removal

27. (Not Illustrated). Remove footrest panel.

28. Remove the two clutch housing -to- engine capscrews, from top of clutch housing by inserting a wrench under control support.

29. Carefully remove engine from clutch housing, and place in engine repair stand.

**IMPORTANT:** When servicing an engine on a roll-over stand, disconnect the turbocharger oil inlet line from the oil pressure regulating housing before overturning the engine. Failure to do so may cause hydraulic lock upon starting the engine. Hydraulic lock can cause possible engine failure.

**Installation**

Reverse the removal steps given on the preceding pages and note the special installation instructions which follow.

1. (Not Illustrated). Apply a light coat of Permatex No. 3 to the block bolting flange where block and oil pan make contact.

2. (Not Illustrated). On tractors with a Quad-Range transmission, be sure that the transmission oil pump drive shaft bushing is in position before reassembling tractor.

3. Tighten clutch housing to engine capscrews to 300 ft-lbs (406 N·m) (40.6 kgm).

4. Tighten oil pan -to- clutch housing capscrews to 85 ft-lbs (115 N·m) (11.5 kgm).

5. Tighten tachometer drive cable nut to tachometer drive gear housing finger tight plus 1/2 turn with wrench.

## REMOVING CLUTCH HOUSING FROM POWERSHIFT TRANSMISSION

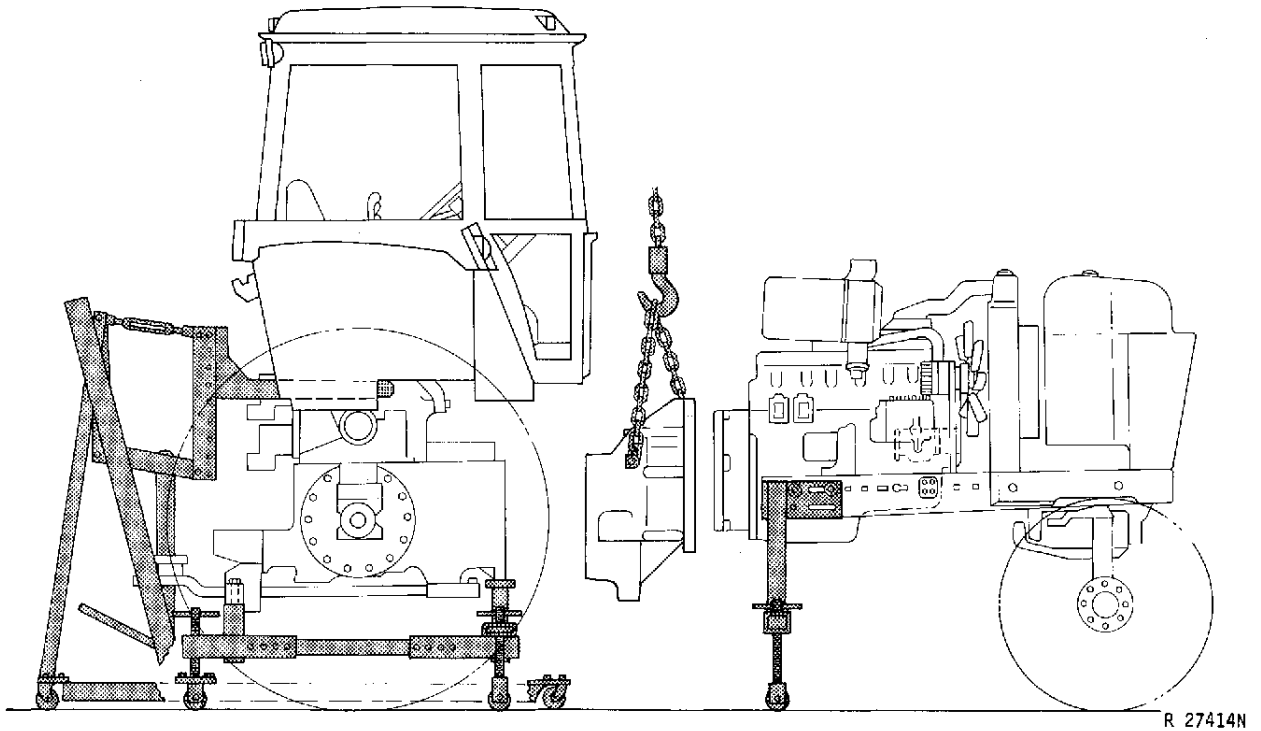


Fig. 50-Removing Clutch Housing From Power Shift Transmission Case

### Removal

*NOTE: If access to the rear clutch pack, planetary pack or PTO gear train is desired, remove the Sound-Gard body with control support, and separate the engine from the clutch housing as previously instructed. If access to only the front clutch pack is desired, only separate the engine from the clutch housing.*

1. (Not Illustrated). Separate the engine from the clutch housing as previously instructed.

2. (Not Illustrated). Drain the transmission.

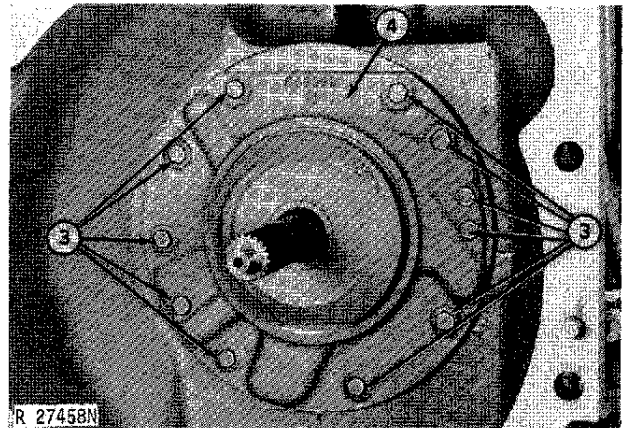


Fig. 51-Clutch Pack and Transmission Pump

3. Remove clutch pack -to- housing capscrews.

4. Remove clutch pack and transmission pump assembly.

## Removal—Continued

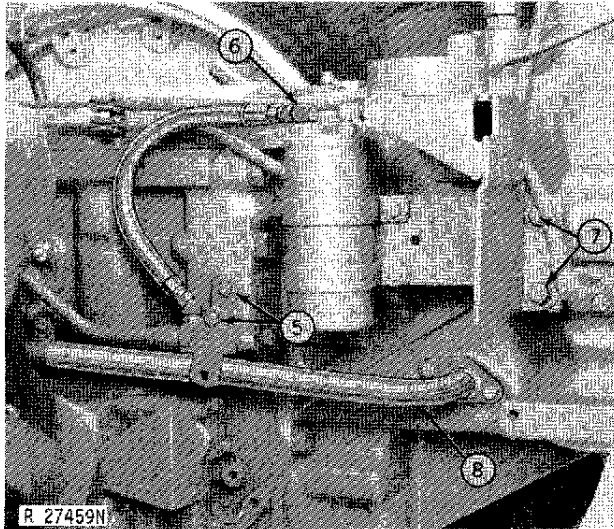


Fig. 52-Right Side Removal Steps

5. Remove pressure oil manifold -to- clutch housing capscrews.
6. Remove pressure oil manifold -to- attenuator hose from attenuator.
7. Remove Sound-Gard Body mounting bracket -to- clutch housing capscrews.
8. Remove transmission oil pump intake elbow.

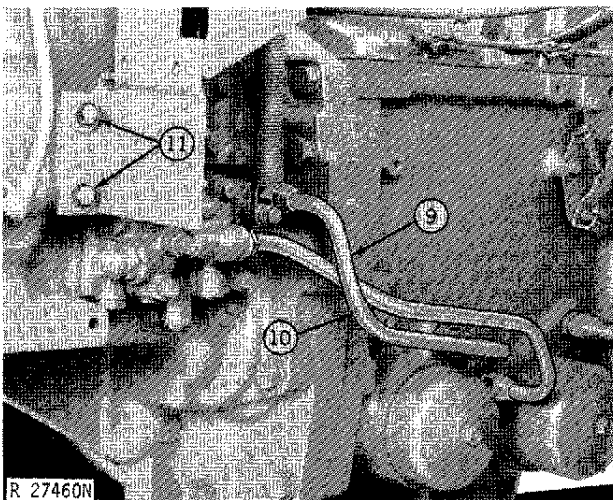


Fig. 53-Left Side Removal Steps

9. Remove oil filter inlet pipe.
10. Remove oil filter to regulator housing pipe.

11. Remove Sound-Gard Body mounting bracket -to- clutch housing capscrews.

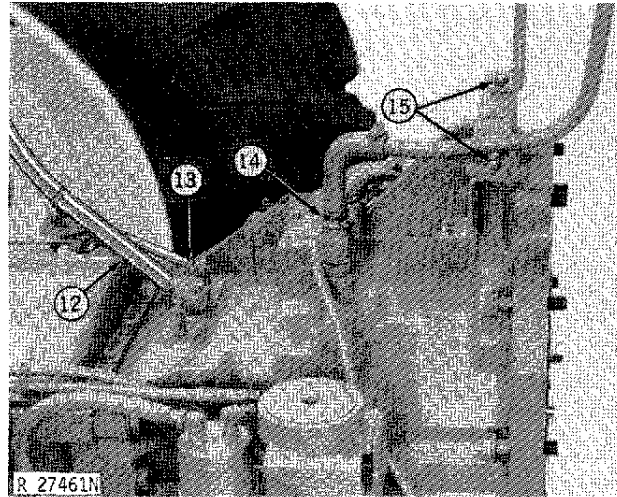


Fig. 54-Removing Hoses

12. Remove seat return hose.
13. Remove reservoir vent tube hose.
14. Remove oil cooler return hose.
15. Remove hood support bracket.

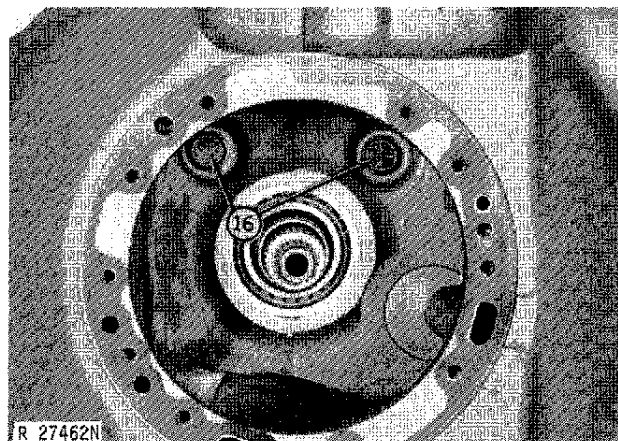


Fig. 55-Capscrews

16. Remove two hidden clutch housing -to- transmission capscrews.

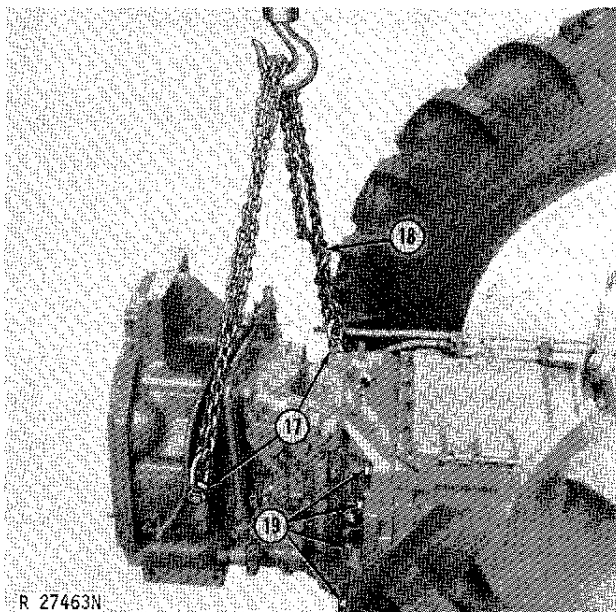


Fig. 56-Attaching Chain Hoist

- 17. Attach JDG-19 Lift Eyes to clutch housing.
- 18. Attach a chain hoist and chain with a 400 lb. (181 kg) capacity or greater to clutch housing.
- 19. Remove clutch housing -to- transmission case capscrews.

**IMPORTANT: When separating clutch housing from transmission case, do not lose small rubber "O" rings.**

- 20. (Not Illustrated). Separate clutch housing from transmission case.

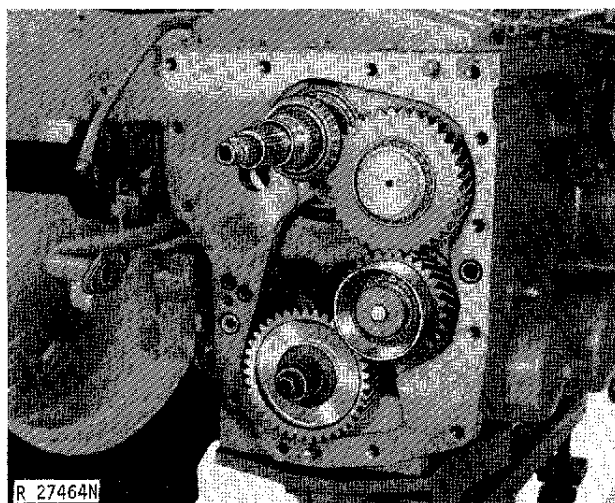


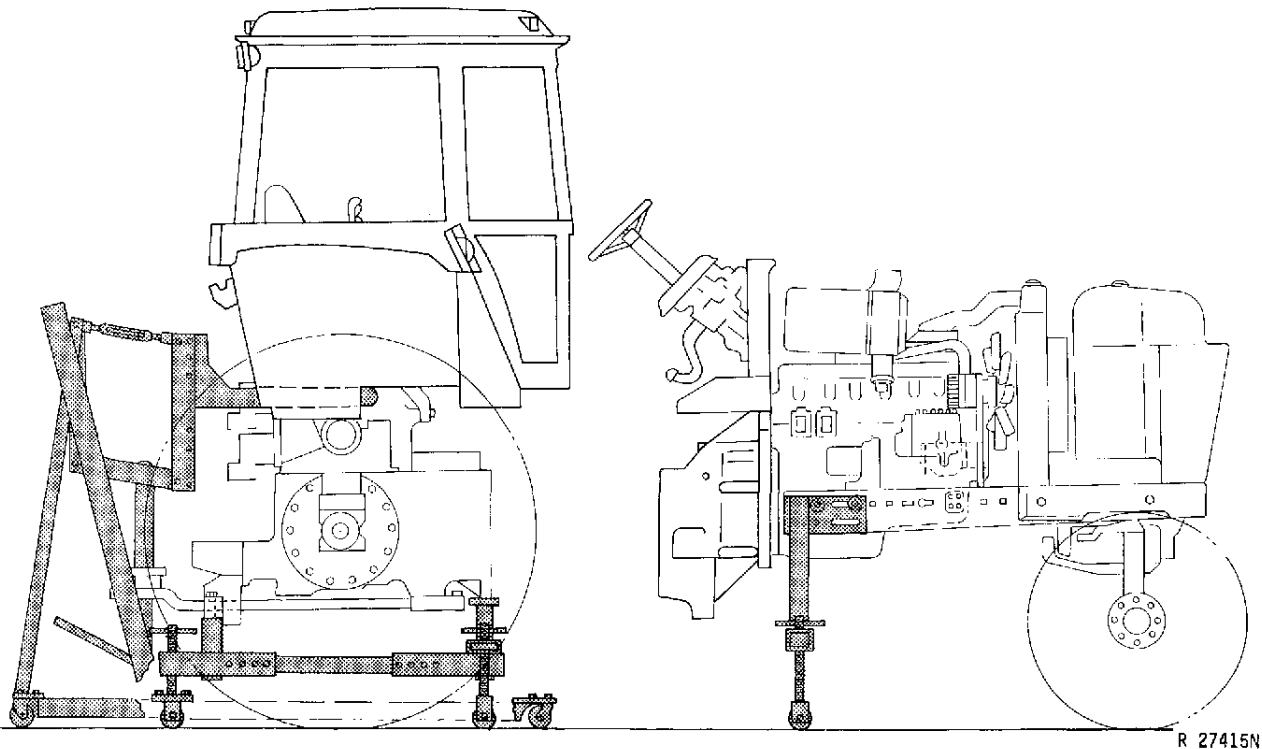
Fig. 57-Clutch Housing Removed

### Installation

Reverse the removal steps on the preceding pages, and note the special installation instructions which follow.

- 1. (Not Illustrated). Insure that "O" rings between clutch housing and transmission are in position before assembly.
- 2. (Not Illustrated). Tighten the clutch housing -to- transmission capscrews.  
 5/8 inch . . . . . 170 ft-lbs (230 Nm) (23 kgm)  
 3/4 inch . . . . . 300 ft-lbs (406 Nm) (40.6 kgm)
- 3. (Not Illustrated). Tighten oil filter inlet pipe elbow capscrews to 45 ft-lbs (61 Nm) (6.1 kgm).

## SEPARATING CLUTCH HOUSING FROM QUAD-RANGE TRANSMISSION



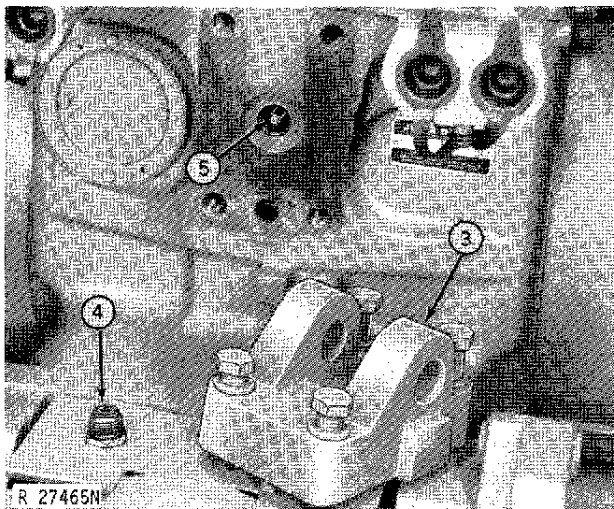
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Fig. 58-Separating Clutch Housing from Quad-Range Transmission Case

**Removal**

1. Remove Sound-Gard Body without control support.
2. Drain the transmission.

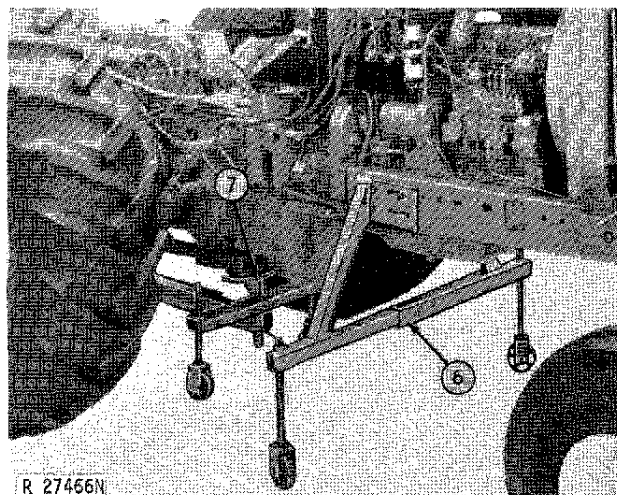
**IMPORTANT: Remove hexagonal transmission pump drive shaft before beginning separation. Install drive shaft last.**



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Fig. 59-Removing Transmission Pump Drive Shaft

3. Remove center link attaching bracket.
4. Remove plug.
5. Carefully withdraw transmission pump drive shaft.



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Fig. 60-Attaching Stands

6. Attach JDG-12-1 Front splitting stand.

7. Attach JDG-2M Rear splitting stand.

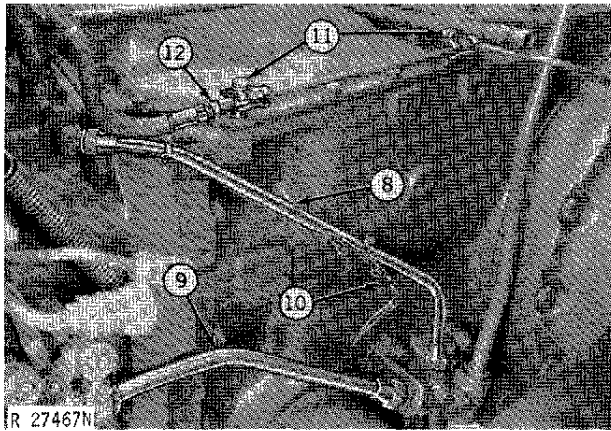


Fig. 61-Left Side Removal Procedures

- 8. Remove clutch valve pressure oil pipe.
- 9. Remove oil filter relief by-pass pipe.
- 10. Disconnect pressure switch wiring.
- 11. Remove left-hand brake line clamps.
- 12. Disconnect left-hand brake line.

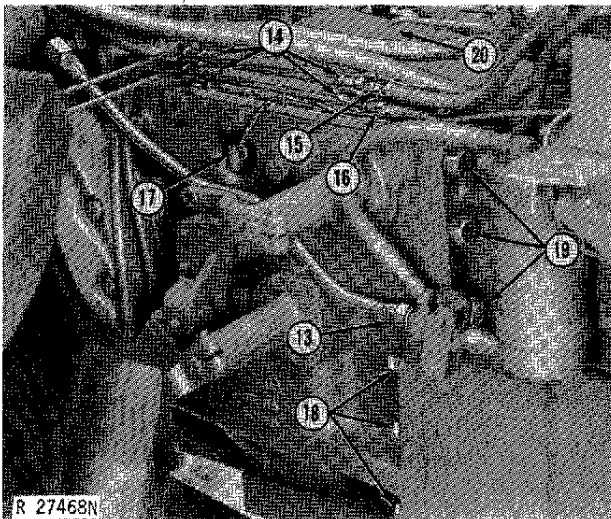


Fig. 62-Right Side Removal Steps

- 13. Disconnect rockshaft pressure pipe.
- 14. Remove brake and differential lock pipe clamps.
- 15. Disconnect right-hand brake line

16. Disconnect differential lock pressure line.

17. Disconnect start-safety switch wiring from transmission case.

18. Remove transmission case -to- clutch housing capscrews.

19. Remove clutch housing -to- transmission case capscrews.

20. Remove transmission case cover.

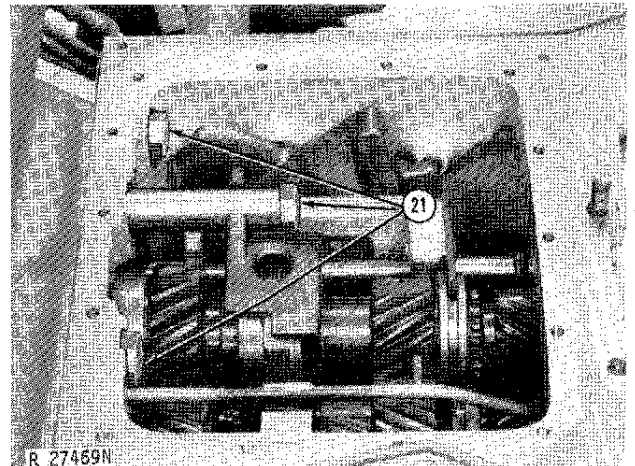


Fig. 63-Capscrews

21. Remove the three transmission case -to- clutch housing capscrews, located inside of transmission case.

22. Separate clutch housing from transmission case.

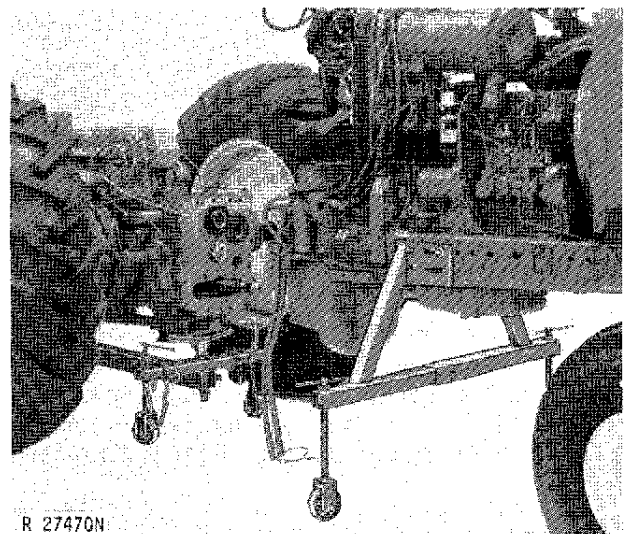


Fig. 64-Clutch Housing Separated From Transmission Case

**Installation**

Reverse the removal steps on the preceding pages and note the special installation instructions which follow.

1. (Not Illustrated). Insure that "O" rings between clutch housing and transmission are in position before assembly.

2. (Not Illustrated). Tighten the clutch housing -to- transmission case capscrews.

- 5/8 inch ..... 170 ft-lbs (230 Nm) (23 kgm)
- 3/4 inch ..... 300 ft-lbs (406 Nm) (40.6 kgm)

3. (Not Illustrated). After installation is complete, perform the following steps in bleeding the brakes.

**Bleeding The Brakes**

- a. Start the engine.
- b. Loosen brake bleed screw lock nuts on both sides of transmission case.
- c. Turn bleed screws out two turns.
- d. Tighten lock nuts.
- e. Depress brake pedals for two minutes.
- f. While pedals are being held down, retighten the bleed screws.
- g. Tighten the lock nuts.

**REMOVING REAR AXLE HOUSING**

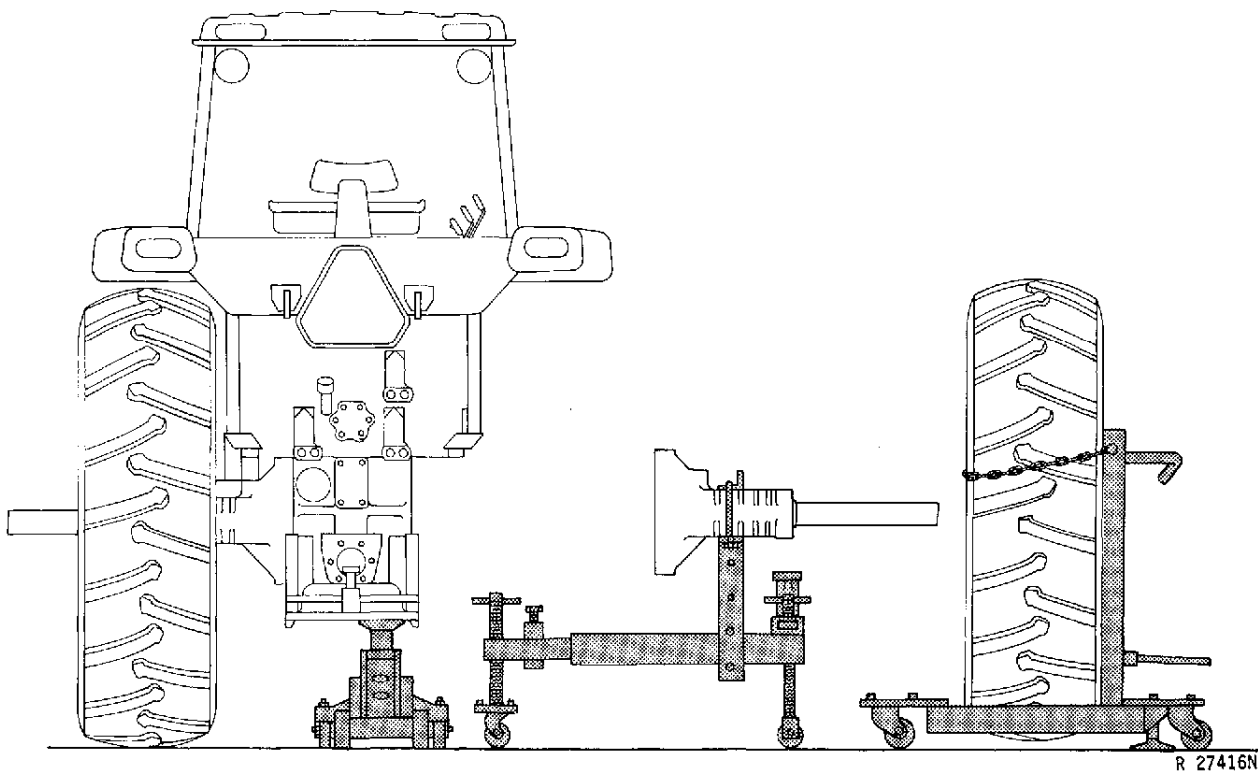


Fig. 65-Removing Rear Axle Housing

It is not necessary to completely remove the Sound-Gard Body or Roll-Gard to remove rear axle housing from tractor. However, it is necessary to remove the Sound-Gard or Roll-Gard rear mounting cap screws from the axle housing that is to be removed.

1. (Not Illustrated) Drain the transmission.
2. (Not Illustrated) Raise tractor and remove rear wheel.
3. (Not Illustrated) Place a support stand under drawbar support.

## Removal—Continued

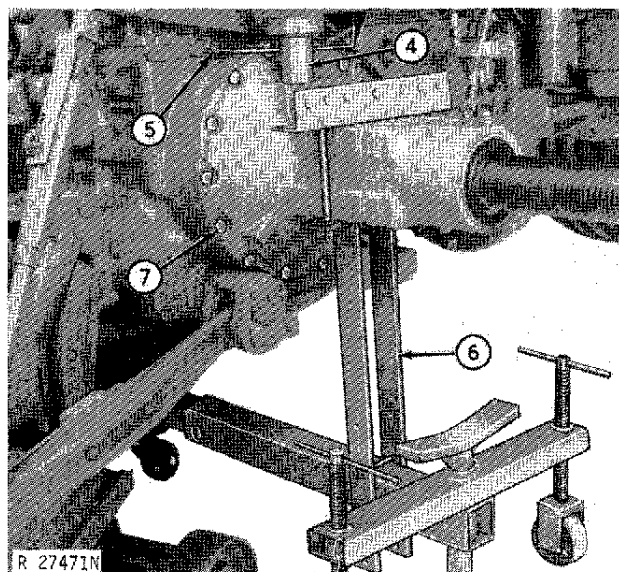


Fig. 66-Removing Axle Housing

4. Remove SOUND-GARD or ROLL-GARD mounting cap screw, and remove spacer from axle housing.
5. Remove the differential lock pressure pipe when removing the right-hand housing.
6. Attach D-05007ST stand with D-05149ST attachments to housing.
7. Remove axle housing-to-transmission case cap screws.
8. Carefully remove axle housing.

## Installation

Reverse the removal steps on the preceding pages, and note the special installation instructions which follow.

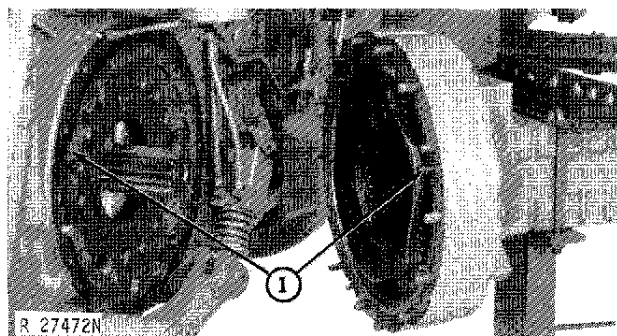


Fig. 67-Installing Axle Housing

1. When installing axle housing, make sure dowel pins in housing line up with holes in transmission case.
2. (Not illustrated.) Tighten axle housing-to-transmission case cap screws to 170 ft-lbs (230 N·m) (23 kgm).



# Section 20 ENGINE REPAIR

## CONTENTS OF THIS SECTION

|  |   |
|--|---|
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**Group 00**

**SPECIFICATIONS AND SPECIAL TOOLS**

**SPECIFICATIONS**

| Item                                       | New Part Specification                                       | Wear Tolerance                   |
|--|--|----------------------------------|
| <b>Cylinder Head, Valves, and Camshaft</b> |  |                                  |
| Valve clearance                            |  |                                  |
| Intake valve                               | 0.018 in. (0.46 mm)  |                                  |
| Exhaust valve                              | 0.028 in. (0.71 mm)  |                                  |
| Valve lift at specified clearance          |  |                                  |
| Intake valve                               | 0.412 to 0.442 in. (10.5 to 11.2 mm)                         |                                  |
| Exhaust valve                              | 0.413 to 0.443 in. (10.5 to 11.2 mm)                         |                                  |
| Valve springs - compressed                 |  |                                  |
| Valve closed                               | 1.81 in. at 54 to 62 lbs.<br>(45.9 mm at 240.2 to 275.8 N)   |                                  |
| Valve open                                 | 1.36 in. at 133 to 153 lbs.<br>(35.5 mm at 591.6 to 680.5 N) |                                  |
| Valve face angle                           | 30°  |                                  |
| Valve face O.D.                            | 1.710 to 1.720 in. (43.4 to 43.7 mm)                         |                                  |
| Valve guide I.D.                           | 0.3745 to 0.3755 in. (9.51 to 9.54 mm)                       |                                  |
| Valve stem O.D.                            | 0.3715 to 0.3725 in. (9.44 to 9.46 mm)                       |                                  |
| Valve stem-to-guide clearance              | 0.0020 to 0.0040 in. (0.05 to 0.10 mm)                       | 0.0060 in.<br>(0.15 mm)          |
| Valve seat width                           | 0.0830 to 0.0930 in. (2.11 to 2.37 mm)                       |                                  |
| Valve seat concentricity with guide        | 0.0020 in. (0.05 mm)   |                                  |
| Valve seat angle                           | 30°  |                                  |
| Valve face above head                      | 0.0240 to 0.0380 in. (0.62 to 0.96 mm)                       | 0.0060 in. (1.52 mm)<br>recessed |
| Camshaft end play                          | 0.0025 to 0.0085 in. (0.06 to 0.22 mm)                       | 0.0150 in. (0.38 mm)             |
| Camshaft thrust plate thickness            | 0.1860 to 0.1890 in. (4.72 to 4.80 mm)                       | 0.1820 in. (4.62 mm)             |
| Camshaft bushing journal O.D.              | 2.3745 to 2.3755 in. (60.31 to 60.34 mm)                     |                                  |
| Camshaft bushing I.D.                      | 2.3775 to 2.3795 in. (60.39 to 60.50 mm)                     |                                  |
| Camshaft bushing-to-journal clearance      | 0.0020 to 0.0050 in. (0.05 to 0.13 mm)                       | 0.0060 in. (0.15 mm)             |
| Cylinder head-to-block - Initial           | 105 ft-lbs. (142 N·m) (14.2 kgm)                             |                                  |
| Second                                     | 117 to 143 ft-lbs (158 to 193 N·m) (15.8 to 19.3 kgm)        |                                  |
| Final                                      | 135 to 165 ft-lbs (183 to 224 N·m) (18.3 to 22.4 kgm)        |                                  |
| Rocker arm shaft clamps                    | 45 to 65 ft-lbs (61 to 88 N·m) (6.1 to 8.8 kgm)              |                                  |
| Intake manifold to cylinder head           | 35 ft-lbs (47 N·m) (4.7 kgm)                                 |                                  |
| Intake cover-to-intake manifold            | 20 ft-lbs (27 N·m) (2.7 kgm)                                 |                                  |
| Camshaft thrust plate                      | 20 ft-lbs (27 N·m) (2.7 kgm)                                 |                                  |
| Camshaft gear                              | 85 ft-lbs (115 N·m) (11.5 kgm)                               |                                  |
| Timing gear cover                          | 30 ft-lbs (41 N·m) (4.1 kgm)                                 |                                  |

### Cylinder Block, Liners, Pistons, and Rods

| Item  | New Part Specification   | Wear Tolerance       |
|---|--|----------------------|
| Cylinder liner height above block                             |  |                      |
| In new cylinder block   | 0.001 to 0.005 in. (0.03 to 0.012 mm)  |                      |
| In used cylinder block  | 0.000 to 0.004 in. (0.00 to 0.10 mm)   | (0.01-0.15 mm)       |
| Piston oil control ring clearance                             | 0.002 to 0.004 in. (0.06 to 0.10 mm)   | 0.006 in. (0.10 mm)  |
| Piston O.D.   |  |                      |
| Top of skirt<br>(3.03 in. [77 mm] from<br>bottom of piston)   | 4.5525 to 4.5532 in. (115.63 to 115.65 mm)<br>4.5532 to 4.5539 in. (115.65 to 115.67 mm) | "Low"<br>"High"      |
| Bottom of skirt<br>(0.09 in. [2 mm] from<br>bottom of piston) | 4.5575 to 4.5582 in. (115.76 to 115.78 mm)<br>4.5582 to 4.5589 in. (115.79 to 115.80 mm) | "Low"<br>"High"      |
| Cylinder liner I.D.   | 4.5615 to 4.5625 in. (115.86 to 115.88 mm)<br>4.5625 to 4.5635 in. (115.88 to 115.91 mm) | "Low"<br>"High"      |
| Cylinder liner taper  |  | 0.002 in. (0.05 mm)  |
| Piston-to-liner clearance                                     |  |                      |
| Bottom of skirt   | 0.0036 to 0.0053 in. (0.09 to 0.13 mm)   | 0.006 in. (0.15 mm)  |
| Piston pin O.D.   | 1.8739 to 1.8745 (47.60 to 47.61 mm)   |                      |
| Piston pin bore in piston I.D.                                | 1.8748 to 1.8752 (47.62 to 47.63 mm)   |                      |
| Rod pin bushing I.D.  | 1.8752 to 1.8762 (47.63 to 47.65 mm)   |                      |
| Pin-to-bushing oil clearance                                  | 0.0007 to 0.0023 in. (0.02 to 0.06 mm)   | 0.003 in. (0.08 mm)  |
| Connecting rod bearing assembled I.D.                         | 3.0005 to 3.0025 in. (76.21 to 76.26 mm)   |                      |
| Connecting rod journal O.D.                                   | 2.9980 to 2.9990 in. (76.15 to 76.17 mm)   |                      |
| Bearing-to-journal clearance                                  | 0.0010 to 0.0040 in. (0.02 to 0.10 mm)   | 0.006 in. (0.15 mm)  |
| Connecting rod cap end gap                                    |  | 0.010 in. (0.25 mm)  |
| Connecting rod out-of-round                                   |  | 0.001 in. (0.025 mm) |

### Torques

|                           |   |
|---------------------------|---|
| Connecting rod cap screws | 55 ft-lbs (75 N-m) (7.5 kgm), then an additional<br>1/4 turn (90 degrees). (See pg. 20-10-14) |
| Piston cooling orifices   | 85 to 115 in-lbs (9.6 to 12.4 N-m) (0.9 to 1.2 kgm)   |

### Crankshaft, Main Bearings and Flywheel

|   |   |
|---|---|
| Crankshaft end play                         | 0.0015 to 0.015 in. (0.04 to 0.4 mm)                                  |
| Clutch shaft pilot bushing adapter I.D.     | 1.0025 to 1.0055 in. (25.46 to 25.54 mm)                              |
| Clutch shaft O.D. at bushing                | 0.9995 to 1.0005 in. (25.39 to 25.41 mm)                              |
| Main bearing journal O.D.                   | 3.3720 to 3.3730 in. (85.65 to 85.67 mm)                              |
| Main bearing assembled I.D.                 | 3.3742 to 3.3762 in. (85.70 to 85.76 mm)                              |
| Bearing-to-journal clearance                | 0.0012 to 0.0042 in. (0.03 to 0.10 mm) . . . . 0.0077 in. (0.19 mm)   |
| Crankshaft rear oil seal-to-housing run-out | 0.0060 in. (0.15 mm)  |
| Journal taper per inch of journal length    | 0.0001 in. (0.0025 mm)  |
| Journal out-of-roundness                    | 0.0004 in. (0.01 mm)  |
| Undersized bearing available                | 0.002, 0.010, 0.020, and 0.030 in.<br>(0.05, 0.25, 0.51, and 0.76 mm) |

### Torques

|                                  |                                 |
|----------------------------------|---------------------------------|
| Damper pulley to crankshaft      | 150 ft-lbs (203 N-m) (20.3 kgm) |
| Main bearing caps                | 150 ft-lbs (203 N-m) (20.3 kgm) |
| Rear crankshaft oil seal housing | 20 ft-lbs (27 N-m) (2.7 kgm)    |
| Flywheel-to-crankshaft           | 85 ft-lbs (115 N-m) (11.5 kgm)  |

**SPECIFICATIONS—Continued**

**Lubrication System**

| Item   | New Part Specification   | Wear Tolerance |
|--|--|----------------|
| Engine oil pressure (1900 rpm)                       | 40 to 50 psi (2.75 to 3.75 bar) (2.80 to 3.86 kg/cm <sup>2</sup> ) |                |
| Oil pressure regulating valve<br>spring - compressed | 1.91 in. at 30 to 33 lbs. (48.5 mm at 133 to 147 N)                |                |
| Filter bypass valve spring - compressed              | 1.38 in. at 18 to 22 lbs. (35.0 mm at 80 to 98 N)                  |                |
| Cooler bypass valve spring - compressed              | 1.38 in. at 18 to 22 lbs. (35.0 mm at 80 to 98 N)                  |                |
| Oil Pump (Camshaft-Driven)                           |  |                |
| Depth of gear bore in housing                        | 1.7530 to 1.7570 in. (44.53 to 44.63 mm)                           |                |
| Gear thickness                                       | 1.7500 to 1.7520 in. (44.45 to 44.50 mm)                           |                |
| O.D. of gears  | 3.3801 to 3.3811 in. (85.85 to 85.90 mm)                           |                |
| Housing gear bore I.D.                               | 3.3840 to 3.3860 in. (85.95 to 86.00 mm)                           |                |
| Driver gear I.D.                                     | 0.6220 to 0.6230 in. (15.80 to 15.82 mm)                           |                |
| Idler gear bushing I.D.                              | 0.6300 to 0.6310 in. (16.00 to 16.03 mm)                           |                |
| Idler shaft O.D.                                     | 0.6284 to 0.6290 in. (15.96 to 15.98 mm)                           |                |
| Driven shaft O.D.                                    | 0.6235 to 0.6245 in. (15.88 to 15.86 mm)                           |                |
| Oil Pump (Crankshaft-Driven)                         |  |                |
| Drive gear-to-crankshaft gear backlash (min.)        | 0.003 in. (0.08 mm)  |                |
| Drive shaft endplay (max.)                           | 0.006 in. (0.15 mm)  |                |
| Drive shaft side movement (max.)                     | 0.0065 in. (0.17 mm)   |                |
| Pump gear backlash (max.)                            | 0.039 in. (1.0 mm)   |                |

**Torques**

**Camshaft-Driven Oil Pump**

|                                      |  |
|--------------------------------------|--|
| Cover-to-housing cap screws          | 21-40 ft-lbs (29-55 N·m) (2.9-5.5 kgm) |
| Intake-to-cover cap screws           | 12-23 ft-lbs (16-31 N·m) (1.6-3.1 kgm) |
| Housing-to-cylinder block cap screws | 20-25 ft-lbs (27-34 N·m) (2.7-3.4 kgm) |

**Crankshaft-Driven Oil Pump**

|                                      |  |
|--------------------------------------|--|
| Drive gear-to-drive shaft nut        | 37-43 ft-lbs (51-57 N·m) (5.1-5.7 kgm) |
| Cover-to-housing cap screws          | 27-33 ft-lbs (38-44 N·m) (3.8-4.4 kgm) |
| Gear shield-to-housing cap screws    | 17-23 ft-lbs (24-30 N·m) (2.4-3.0 kgm) |
| Intake screen-to-cover cap screws    | 17-23 ft-lbs (24-30 N·m) (2.4-3.0 kgm) |
| Housing-to-cylinder block cap screws | 33-39 ft-lbs (45-51 N·m) (4.5-5.1 kgm) |

**Oil Pan**

|                                    |                                 |
|------------------------------------|---------------------------------|
| 0.43 in. (11.1 mm) rail thickness  |                                 |
| 3/8-in. cap screws                 | 35 ft-lbs (47 N·m) (4.7 kgm)    |
| 1/2-in. cap screws                 | 85 ft-lbs (115 N·m) (11.5 kgm)  |
| *0.81 in. (20.5 mm) rail thickness |                                 |
| 3/8-in. cap screws                 | 50 ft-lbs (68 N·m) (6.8 kgm)    |
| 1/2-in. cap screws                 | 120 ft-lbs (162 N·m) (16.2 kgm) |

**Tachometer drive housing-to-**

|                           |                              |
|---------------------------|------------------------------|
| cylinder block cap screws | 35 ft-lbs (47 N·m) (4.7 kgm) |
|---------------------------|------------------------------|

*\*Initially tighten all cap screws to 40 ft-lbs (54 N·m) (5.4 kgm) starting at right-rear corner of oil pan and proceeding counterclockwise. Finish tightening cap screws to torque specified above.*

Item New Part Specification Wear Tolerance

**Cooling System**

|  |  |
|--|--|
| Radiator leakage test .....                            | 18 psi (1.24 bar) (1.26 kg/cm <sup>2</sup> )                           |
| Radiator cap pressure                                  |  |
| 7 psi (0.48 bar) (0.49 kg/cm <sup>2</sup> ) cap .....  | 6.25 to 7.50 psi (0.43 to 0.52 bar) (0.44 to 0.53 kg/cm <sup>2</sup> ) |
| 15 psi (1.93 bar) (1.05 kg/cm <sup>2</sup> ) cap ..... | 14 to 17 psi (0.96 to 1.17 bar) (0.98 to 1.19 kg/cm <sup>2</sup> )     |
| New fan belt tension                                   |  |
| Single belt .....                                      | 130 to 140 lbs. (578 to 622 N)   |
| Dual belt .....  | 95 to 104 lbs. (423 to 467 N)  |
| Tension after run in—All belts .....                   | 85 to 94 lbs. (378 to 423 N)   |
| Impeller bore I.D. ....                                | 0.6242 to 0.6252 in. (15.85 to 15.88 mm)                               |
| Bearing shaft O.D. ....                                | 0.6262 to 0.6267 in. (15.90 to 15.99 mm)                               |
| Impeller-to-housing clearance .....                    | 0.015 to 0.025 in. (0.4 to 0.6 mm) clearance                           |
| Pulley-to-rear face dimension .....                    | 6.54 in. (166.1 mm)  |
| Thermostats opening temperature .....                  | 160 to 180°F (71 to 82°C)  |

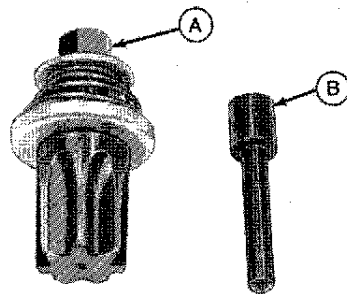
**Torques**

|   |                              |
|---|------------------------------|
| Pump cover-to-housing cap screws .....            | 20 ft-lbs (27 N·m) (2.7 kgm) |
| Pump-to-cylinder block cap screws .....           | 35 ft-lbs (47 N·m) (4.7 kgm) |
| Fan-to-fan pulley cap screws .....                | 35 ft-lbs (47 N·m) (4.7 kgm) |
| Coolant conditioner filter-to-mounting bracket .. | 35 ft-lbs (47 N·m) (4.7 kgm) |

**SPECIAL TOOLS**

**Cylinder Head, Valves and Camshaft**

TOOL



R 26134H

Fig. 1-Engine Rotation Tool Set

Materials Required

JDT 405 High Temperature Grease

NUMBER

A—JDE-81-1  
Flywheel Turning  
Tool

B—JDE-81-4  
Timing Pin

USE

Used to rotate the engine flywheel  
when timing the engine.

JDE-37A  
Torque Wrench  
Adapter

To retorque cylinder head after run-  
in.

Order from: Service Tools,  
Box 314, Owatonna, Mn 55060

RG2605

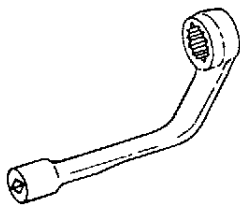


Fig. 2-Torque Wrench Adapter

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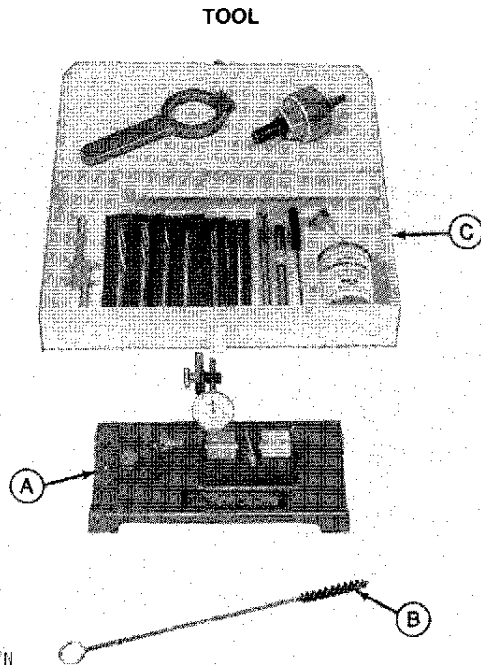


Fig. 3-Special Tools

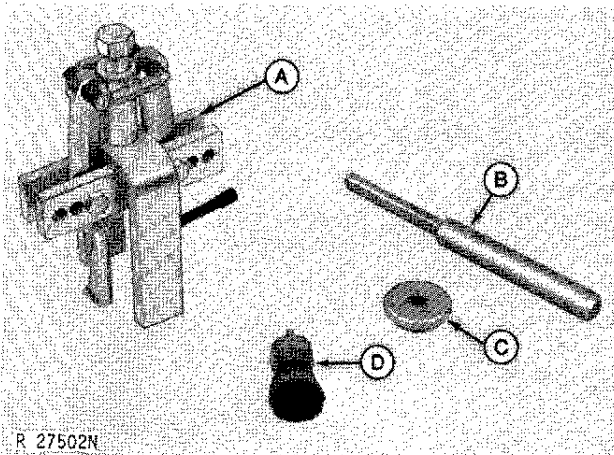


Fig. 4-Special Tools

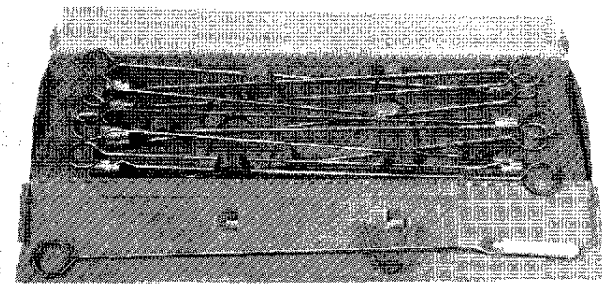


Fig. 5-D-15001NU Magnetic Holding Tool Set

NUMBER

USE

A—D-05058ST  
Valve Inspection  
Center

B—D-17011 BR Valve  
Guide Cleaning  
Brush

C—D-20002WI  
Knurling Tool Set

A—JDE-41296  
Seat Puller

B—JDE-7 Driver

C—JDE-79  
Replacement Ring

D—D-17024 End  
Brush

To remove valve seats.

To install valve seats with JDE-79 Re-  
placement Ring

To install valve seats with JDE-7  
Driver.

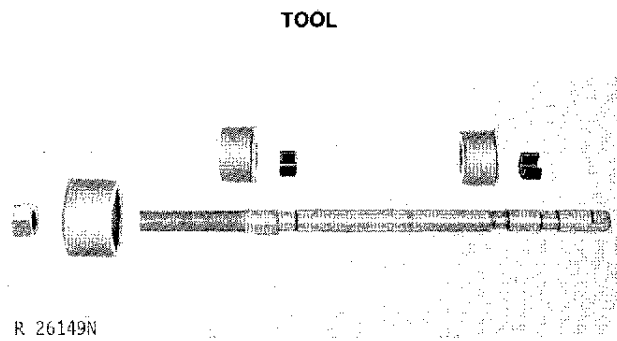
To clean valve seat and bore.

D—15001NU  
Magnetic Holding  
Tool Set

To hold cam followers away from  
camshaft.

Order from:  
Service Tools, Box 314, Owatonna MN 55060

**Cylinder Head, Valves and Camshaft Special Tools—Continued**



R 26149N

Fig. 6-JDE-6 Camshaft Bushing Replacement Set

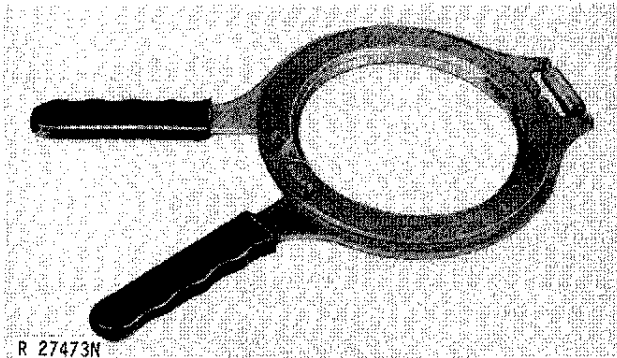
**NUMBER**  
JDE-6 Camshaft  
Bushing Replace-  
ment Set

**USE**  
To remove and install camshaft bush-  
ings.

**Cylinder Block, Liners, Pistons and Rods**

Cylinder Liner Holding Fixture

See Making Special Tools, p. 20-00-11

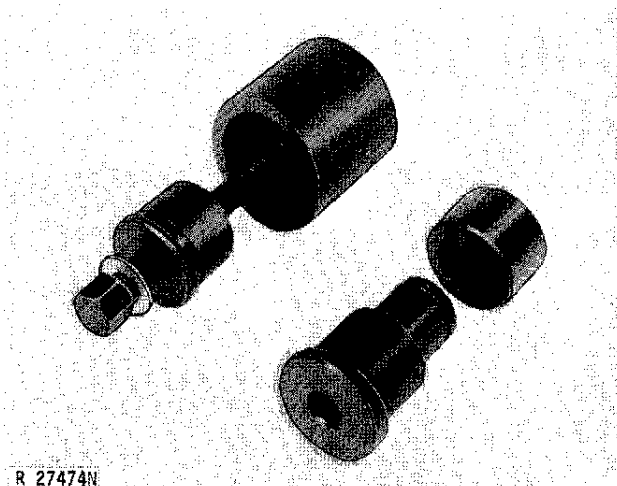


R 27473N

Fig. 7-JDE-93 Ring Expander

JDE-93 Ring  
Expander

To install piston rings.



R 27474N

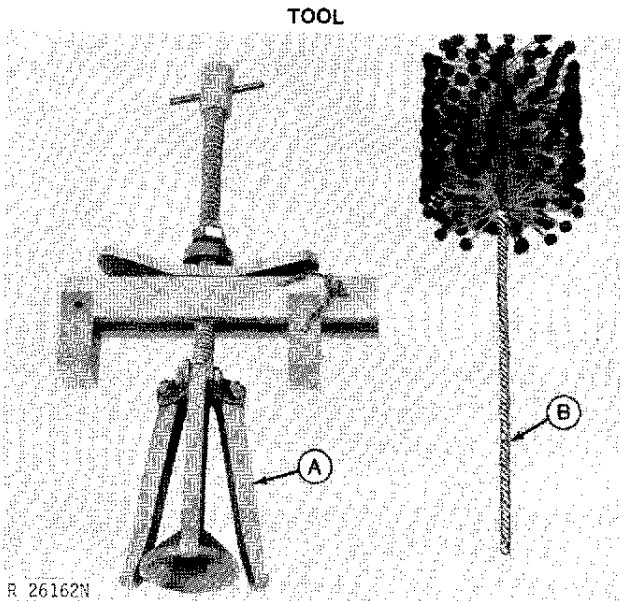
Fig. 8-JDE-98-466 Connecting Rod Bushing Service Set.

JDE-98-466  
Connecting Rod  
Bushing Service  
Set

To remove and install connecting rod  
bushings.

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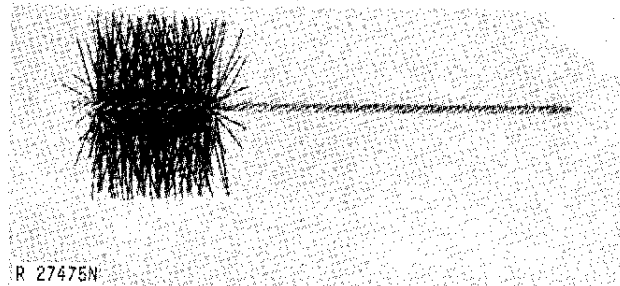
**Cylinder Block, Liners, Pistons and Rods—Continued**



| NUMBER                      | USE                        |
|-----------------------------|----------------------------|
| A—D-01062AA<br>Liner Puller | To remove cylinder liners. |
| B—D-17004BR<br>Flex-Hone    | To hone cylinder liners.   |

R 26162N

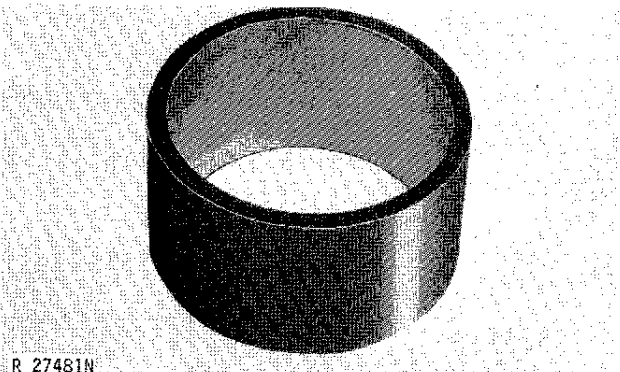
Fig. 9-Special Tools



R 27475N

Fig. 10-D-17015 O-ring Bore Cleaning Brush

|                                      |   |
|--------------------------------------|---|
| D-17015BR O-Ring Bore Cleaning Brush | To clean O-ring bore in cylinder block. |
|--------------------------------------|---|

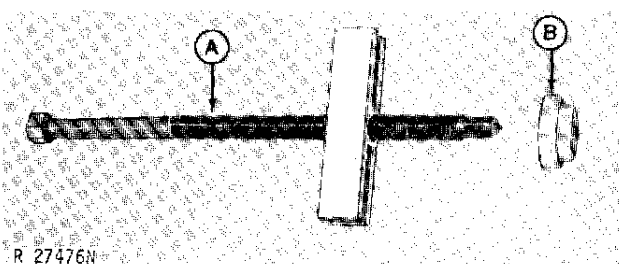


R 27481N

Fig. 11-JDE-96 Ring Compressor

|                        |   |
|------------------------|---|
| JDE-96 Ring Compressor | To compress piston rings while installing piston. |
|------------------------|---|

**Crankshaft, Main Bearings and Flywheel**



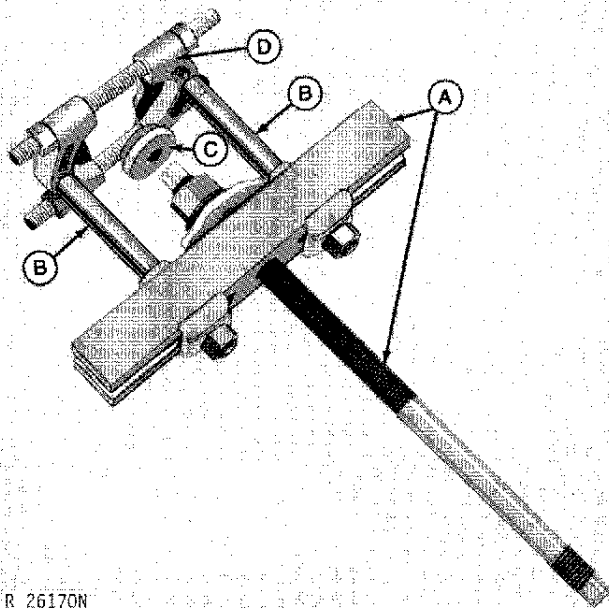
R 27476N

Fig. 12-Special Tools

**Materials Required:**  
Permatex Form-a-Gasket #3

|                                |  |
|--------------------------------|--|
| A—D-1206AA Puller              | Used with No. 630-6 Step. Plate adapter to remove damper pulley. |
| B—No. 630-6 Step Plate Adapter | Used with D-1206AA Puller to remove damper pulley.               |

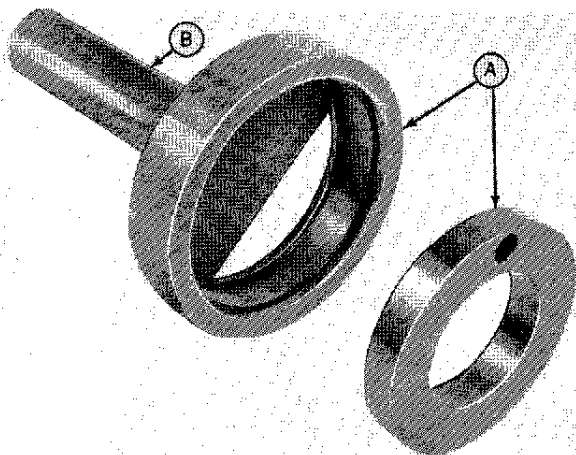
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R 26170N

Fig. 13-Special Tools

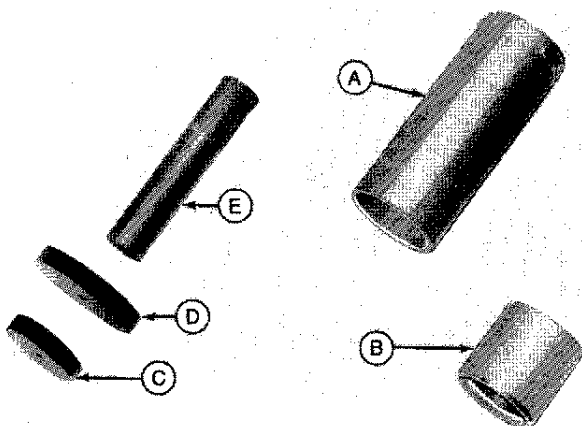
- | NUMBER                              | USE                        |
|-------------------------------------|----------------------------|
| A—D-01219AA Puller                  | To remove crankshaft gear. |
| B—D-01222AA Pulling<br>Legs         |                            |
| C—No. 630-9 (From<br>D-01212AA Set) |                            |
| D—D-01218AA Pulling<br>Attachment   |                            |



R 26388N

Fig. 14-Special Tools

- |                         |  |
|-------------------------|--|
| A—JDE-106-A Tool<br>Set | To install crankshaft rear wear sleeve<br>and rear oil seal. |
| B—No. 27489 Driver      |  |



R 26391N

Fig. 15-Special Tools

- |                  |                               |
|------------------|-------------------------------|
| A—JDH-7 Driver   | To install crankshaft gear.   |
| B—JDE-3 Driver   | To install front wear sleeve. |
| C—No. 27522 Disk |                               |
| D—No. 27537 Disk | To install front oil seal.    |
| E—No. 27488 Disk |                               |

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**Crankshaft, Main Bearings and Flywheel—Continued**

**TOOL**

**NUMBER**  
D-01209AA Puller

**USE**  
Used to remove clutch shaft pilot bearing on Power Shift tractors.

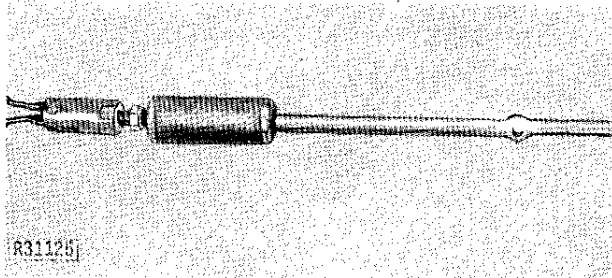


Fig. 16-Special Tools

**Cooling System**

**MATERIALS REQUIRED:**

Permatex Form-a-Gasket #2  
JD-262 Installation Tool Used to install bearing in water pump housing

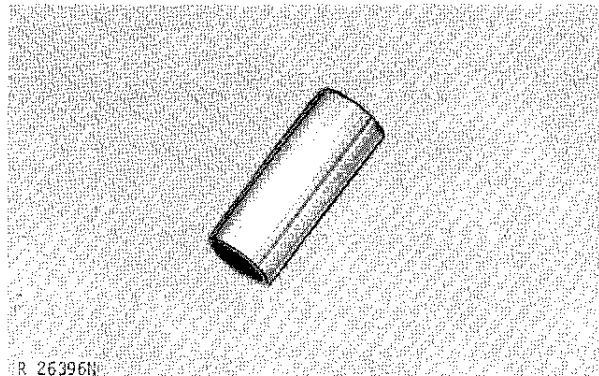


Fig. 17-JD262 Installation Tool

D-05103ST  
Thermostat Tester

Used to check opening temperatures of thermostats.

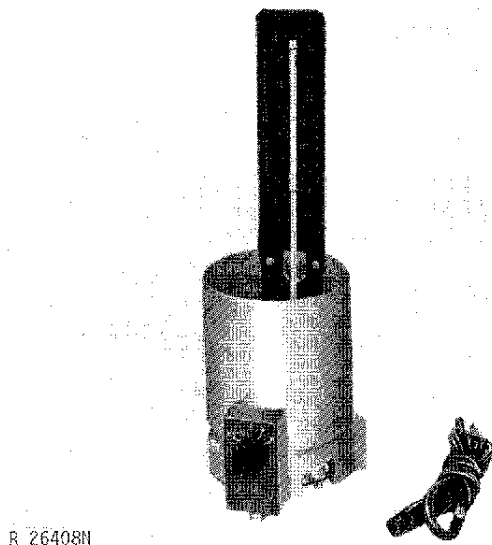
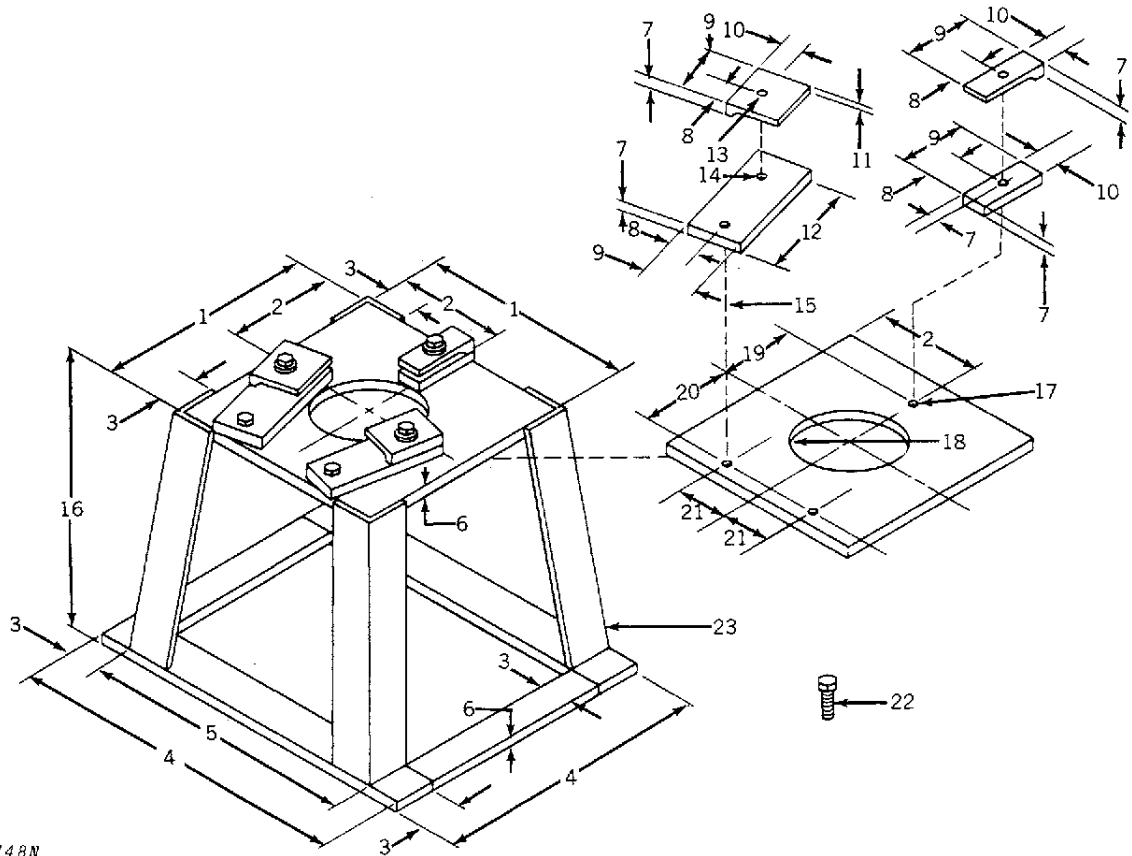


Fig. 18-D-05103ST Thermostat Tester

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**MAKING SPECIAL TOOLS**



T36748N

- 1—10" (254.0 mm)
- 2—5" (127.0 mm)
- 3—1.5" (38.1 mm)
- 4—16" (405.4 mm)
- 5—13" (330.2 mm)
- 6—0.375" (9.52 mm)
- 7—0.5" (12.7 mm)
- 8—1.25" (31.8 mm)

- 9—2.5" (63.5 mm)
- 10—1" (25.4 mm)
- 11—0.25" (6.35 mm)
- 12—6" (152.4 mm)
- 13—0.328" Drill Through
- 14—5/16"—18 Tap
- 15—2 used
- 16—12" (304.8 mm)

- 17—5/16"—18 Tap
- 18—2.75" (69.85 mm) Radius
- 19—4" (101.6 mm)
- 20—4.38" (111.25 mm)
- 21—2.38" (60.45 mm)
- 22—5/16" x 1" Cap Screw
- 23—2.5" (63.5 mm) Angle Iron

Fig. 19-Cylinder Liner Holding Fixture\*

Liner Holding Fixture - Hold liner for deglazing.

\*Make in dealers service department



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## Group 05

# CYLINDER HEAD, VALVES, AND CAMSHAFT

### PRELIMINARY VALVE CHECKS

During disassembly, inspect the valve train for the following malfunctions and causes.

#### Sticking Valves

- Carbon deposits on valve stem
- Worn valve guides
- Warped valve stems
- Cocked or broken valve springs
- Worn or distorted valve seats
- Insufficient lubrication

#### Warped, Worn, or Distorted Valve Guides

- Lack of lubrication
- Cylinder head distortion
- Excessive heat
- Unevenly tightened cylinder head cap screws

#### Distorted Cylinder Head and Cylinder Head

##### Gasket Leakage

- Improperly tightened cylinder head cap screws
- Faulty gasket installation
- Incorrect gasket material
- Excessive oil pressure
- Improper cylinder liner height above cylinder block

#### Worn or Broken Valve Seats

- Misaligned valves
- Distorted cylinder head
- Carbon deposits on seats due to incomplete combustion
- Valve spring tension too weak
- Excessive heat
- Improper valve clearance
- Improper valve timing

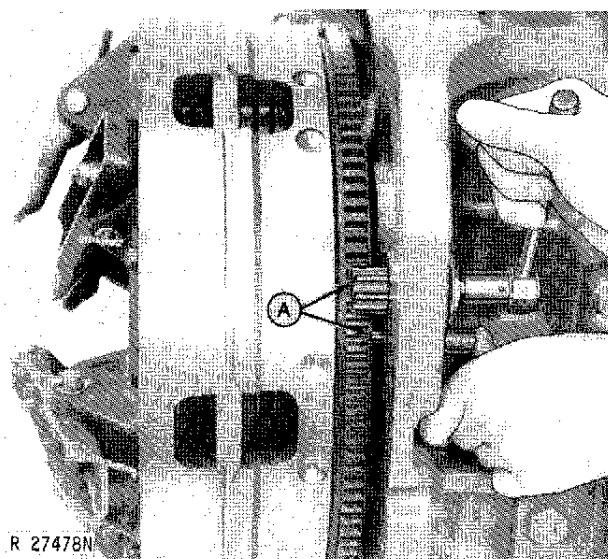
#### Burned, Pitted, Worn, or Broken Valves

- Worn or distorted valve seats
- Worn valve guides
- Insufficient cooling
- Insufficient lubrication
- Cocked or broken valve springs
- Preignition
- Improper engine operation
- Improper valve train timing
- Faulty valve rotators
- Warped or distorted valve stems
- "Stretched" valves due to excessive spring tension
- Warped cylinder head
- Bent push rods
- Carbon build-up on valve seats
- Rocker arm failure

#### Camshaft Failures

- Scored camshaft lobes due to inadequate lubrication
- Excessive end play due to thrust plate wear
- Broken or warped camshaft due to improper timing

#### Checking Valve Clearance



A—JDE-81 Engine Rotation Tool Set

Fig. 1-Setting "TDC"

1. Use JDE-81 Engine Rotation Tool Set (A, Fig. 1) to position No. 1 piston at TDC of its compression stroke.

2. Turn flywheel until rotation tool timing pin engages timing hole in flywheel and both valves on No. 1 cylinder are in the up position. (Rocker arms loose).