

2750 Tractor



JOHN DEERE

TECHNICAL MANUAL 2750 Tractor

TM4405 (01Aug86) English

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2750 TRACTOR TECHNICAL MANUAL TM-4405 (Apr-86)

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For engine information, refer to engine component technical manual, CTM-4, 3179, 4239, and 6359 Engines. The component manual covers basic repair of the engines.

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Group 00

SPECIFICATIONS AND SPECIAL TOOLS**Specifications****Serial Numbers**

The engine serial number is stamped into the plate located on the lower front right-hand side of the cylinder block.

NOTE: When ordering engine parts, quote all digits of serial number stamped on the plate.

The plate showing the tractor serial number is located on the right-hand side of the front axle carrier.

NOTE: When ordering tractor spare parts (excluding engine parts), quote all digits and letters of serial number stamped on the plate.

A plate showing the tractor type, transmission serial number, cone point measurement etched into pinion face of differential drive shaft as well as reduction of differential is located on the right-hand side of the transmission case.

Model Numbers

The fuel injection pump, fuel injection nozzles, alternator, starting motor, hydrostatic steering valve, compressor of air conditioning system (when equipped) and hydraulic pump have model numbers to facilitate identification of different makes of a given unit.

Engine

Number of cylinders		4
Cylinder liner bore	106.5 mm	4.19 in.
Stroke	110 mm	4.33 in.
Displacement	3920 cm ³	239 cu.in.
Compression ratio		16.8 : 1
Maximum torque at 1600 rpm	285 N·m	210 lb-ft
Firing order		1 - 3 - 4 - 2
Valve clearance (engine hot or cold)		
Intake valve	0.35 mm	0.014 in.
Exhaust valve	0.45 mm	0.018 in.

Fast idle speed	2610 to 2660 rpm
Slow idle speed	700 to 800 rpm
Rated engine speed	2500 rpm
Working speed range	1600 to 2500 rpm
PTO* horsepower at engine rated speed — 2500 rpm	
According to DIN SAE J816b	56 kW 75 hp

Lubrication system Full internal force feed system with full flow filter

Engine Clutch Single dry disk clutch with torsion damper, foot-operated

Cooling System

Type Pressurized system with centrifugal pump

Temperature regulation Thermostat

Fuel System

Type Direct injection

Fuel injection pump timing to engine TDC

Fuel injection pump type (Roto Diesel R 3443 F 910 or R 3448 F 220) Distributor type

Air cleaner Dry-type air cleaner with secondary
(safety) element

**With the engine run in (above 100 hours of operation) and having reached operating temperature (engine and transmission); measured by means of a dynamometer. Permissible variation \pm 5%.*

ELECTRICAL SYSTEM

Batteries	2 x 12 volts, 55 Ah or 66 Ah
Alternator with internal regulator	
Tractors without SOUND-GARD Body	14 volts, 33 or 55 amps.
Tractors with SOUND-GARD Body	14 volts, 55 amps.
Starting motor	12 volts, 3 kW (4 HP)
Battery terminal grounded	negative

SYNCHRONIZED TRANSMISSION

Type	Synchronized transmission
Gear selections	8 forward and 4 reverse
Gear shifting	Two forward groups and one reverse group Synchronized forward and reverse shifting within groups

HI-LO SHIFT UNIT

Type	Hydraulic gear reduction unit which can be shifted under load with "wet" multiple disk clutch and brake packs
Travel speed decreases in each gear by	Approx. 20%
Shifting to reduced (Lo) speed	Preloaded cup springs
Shifting to normal (Hi) speed	Hydraulic

Creeper Transmission

Type	Synchronized reduction unit
Travel speed decreases in low (1) and reverse ranges by	approx. 79%
Shifting both ranges	Mechanical and not under load

COLLAR SHIFT TRANSMISSION

Type	Helical gears
Gear selections	8 forward, 4 reverse speeds
Gear shifting	Two forward ranges, One reverse range

Differential and Final Drives

Type of differential Spiral bevel gears

Type of final drive Planetary reduction drive

Differential Lock

Operation Hand or foot operated

Disengage Will disengage automatically as soon as traction has equalized

PTO

Type Independent of transmission, can be engaged and disengaged under load

PTO speeds (with engine speed of 2400 rpm) 540 rpm or 540/1000 rpm

PTO clutch Hydraulically operated "wet" disk clutch

PTO brake Hydraulically operated "wet" disk brake

PTO SPEEDS (in rpm)

Engine speed	540 rpm shaft	1000 rpm shaft
800	180	335
2400	540	1000
2500	565	1040
2660	600	1110

Mechanical Front Wheel Drive

Type Engaged hydraulically, under full load with "wet" disk clutch

Control Electrical/hydraulic solenoid switch

Engagement Preloaded cup springs

Disengagement Hydraulic

Hydrostatic Steering Without mechanical linkage between steering valve and the front wheels

Foot Brakes Self-adjusting, hydraulically operated "wet" disk brakes

Handbrake Mechanically operated band-type locking brake acting on the differential

HYDRAULIC SYSTEM

Type Closed center, constant pressure system

Standby pressure 15800 to 16200 kPa (158 to 162 bar) (2300-2350 psi)

Operating pressure 14000 kPa (140 bar) (2050 psi)

Hydraulic pump 8-piston pump with variable displacement

Capacities

Fuel tank 98 L (25.90 U.S. gal.)

Cooling system

Without SOUND-GARD Body 13 L (3.4 U.S. gal.)

With SOUND-GARD Body 15 L (4.0 U.S. gal.)

Engine crankcase

Without filter change 8.0 L (2.1 U.S. gal.)

With filter change 8.5 L (2.3 U.S. gal.)

Transmission - Hydraulic system (including oil reservoir and oil cooler)

Initial filling 64 L (16.9 U.S. gal.)

Oil change 56 L (14.7 U.S. gal.)

Oil reservoir 4 L (1.1 U.S. gal.)

Oil cooler 2 L (0.5 U.S. gal.)

Mechanical Front Wheel Drive

Front axle housing 7.0 L (1.85 U.S. gal.)

Wheelhub each 0.75 L (0.2 U.S. gal.)

Travel Speeds See Operator's Manual

Front and Rear Wheels

Tires, tread widths, tire pressure and ballast weights See Operator's Manual

Dimensions and Weights See Operator's Manual

Predelivery, Delivery and After-Sales Inspections

Engine Speeds

Slow idle	700—800 rpm
Fast idle	2610—2660 rpm
Rated speed	2500 rpm

Fan Belt

The fan belt should have 19 mm (3/4 in.) flex with 90 N (20 lb) pull midway between crankshaft and alternator or water pump (use a spring scale).

Compressor Belt

The compressor belt should have 19 mm (3/4 in.) flex with 60 N (13 lb) pull midway between pulleys.

Batteries

Specific gravity at an electrolyte temperature of 20° C (68° F)

Normal and arctic conditions	1.28
Tropical conditions	1.23

Clutch Operating Linkage

Tractors without SOUND-GARD Body

Clutch pedal free travel	25 mm approx. (1 in.)
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Tractors with SOUND-GARD Body

Travel of slave cylinder operating rod	8.5—12.0 mm (5/16—15/32 in.)
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Front Wheel Toe-In

Tractors without MFWD	3—6 mm	(.12—0.25 in.)
Tractors with MFWD	0—3 mm	(0—0.12 in.)

Torques for Hardware

Start safety switch in rockshaft housing, max.	50 N·m	(35 lb-ft)
Front wheel rim to hub		
Tractors without MFWD	180 N·m	(130 lb-ft)
Tractors with MFWD	300 N·m	(220 lb-ft)
Axle knees to axle center, cap screws	400 N·m	(300 lb-ft)
Tie rod clamps		
Cap screw (M10)	55 N·m	(40 lb-ft)
Cap screw (M12)	90 N·m	(65 lb-ft)
Tie rod tube, cap screw	55 N·m	(40 lb-ft)
Rear Wheels		
Rear wheels to axle	400 N·m	(300 lb-ft)
Wheel disk to hub (rack-and-pinion axle)	400 N·m	(300 lb-ft)
2-post ROLL-GARD protective structure		
Supports to crossbar, cap screws	230 N·m	(170 lb-ft)
Supports to final drives, cap screws and nuts	230 N·m	(170 lb-ft)

Storing Lubricants

The 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.

Cooling Fluid

John Deere Engine Cooling Fluid is filled into the cooling system at the factory. It protects the engine against corrosion and against frost down to -36°C (-35°F).

If no John Deere Engine Cooling Fluid is available use a mixture of 50% ethylene-glycol antifreeze/anticorrosion inhibitor and 50% clear, soft water. This mixture guarantees engine protection against corrosion and against frost down to -36°C (-35°F).

Never use any cooling system sealing additives.

IMPORTANT: Use only John Deere Cooling Fluid in the cooling system, independent of the season. Drain system and refill with fresh coolant every 2 years.

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 for the various components.

Component	Capacity	Service Interval
Engine crankcase	Without filter change: 8.0 liters (2.1 U.S. gal.) With filter change: 8.5 liters (2.25 U.S. gal.)	Every 10 operating hours: Check oil level Every 100 operating hours: oil change Every 200 operating hours: filter change*
Cooling system	Without SOUND-GARD body: 13.0 liters (3.4 U.S. gal.) With SOUND-GARD body: 15.0 liters (4.0 U.S. gal.)	Change coolant every two years
Transmission/hydraulic system (including oil reservoir and oil cooler)		
Synchronized transmission	Dry system: 64.0 L (16.9 U.S. gal.) Oil change: 56.0 L (14.8 U.S. gal.)	Every 50 operating hours: check oil level Every 500 operating hours: filter change** Every 1000 operating hours: change hydrostatic steering filter Every 1000 operating hours: Clean hydraulic pump stroke control valve filter
Oil reservoir	4 L (1.1 U.S. gal.)	
Oil cooler	2 L (0.5 U.S. gal.)	
Mechanical front wheel drive	Axle housing: 7.0 L (1.85 U.S. gal.) Wheel hub housing: 0.75 L (0.2 U.S. gal.) each	Every 100 operating hours: check oil level Every 1000 operating hours: oil change***
Hydraulic operated clutch (tractors with SOUND-GARD Body)	500 cm ³ (17.5 fl. oz.)	Change brake fluid every year

*Replace crankcase filter element after the first 100 and 200 hours of operation. Thereafter replace filter element after every 200 hours of operation.

**Replace transmission/hydraulic filter element after the first 50 hours of operation, after the first 500 and thereafter every 500 hours of operation.

***On tractors with MFWD, first oil change after 100 hours of operation. Thereafter every 1000 hours of operation.

Component	Lubricant	Service Interval
Clutch throw-out bearing (when equipped with grease fitting)	John Deere High Temperature EP-multipurpose grease	Every 100 operating hours lubricate with three strokes of grease gun
Front wheel bearings	John Deere High Temperature EP multipurpose grease or SAE EP multipurpose grease	Every 1000 operating hours: clean and pack with grease
Grease fittings		
Front axle and front wheels		Every 50 operating hours: lubricate
Universal-jointed shafts of mechanical front wheel drive		Every 50 operating hours: lubricate
Rear axle bearings		In extremely wet and muddy conditions: lubricate every 10 operating hours. Under normal conditions: lubricate every 500 operating hours
Three-point hitch		Every 200 operating hours: lubricate

ENGINE CRANKCASE

Checking Oil Level

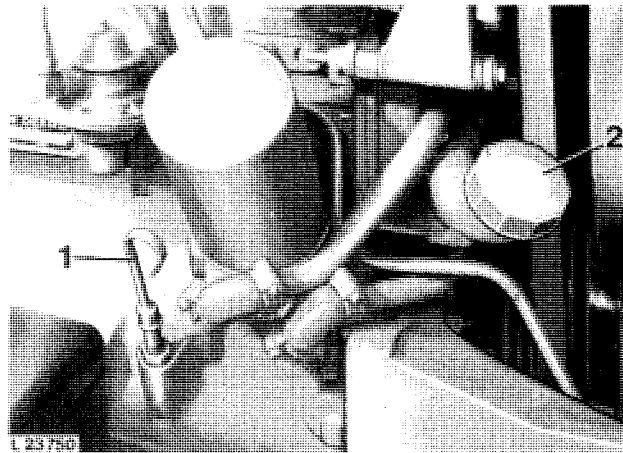
With the tractor on level ground and the engine stopped for 10 minutes or more, check crankcase oil level. If the oil level is down to the lower mark on the dipstick, add sufficient John Deere TORQ-GARD Supreme Engine Oil or its equivalent of the proper viscosity to bring the level to the upper mark.

Service Interval: At predelivery and after every 10 hours.

Oil and Filter Change

NOTE: Drain oil with engine shut off, however with engine oil warm.

1. Remove drain plug.
2. While oil is draining, replace filter element (every 200 hours).



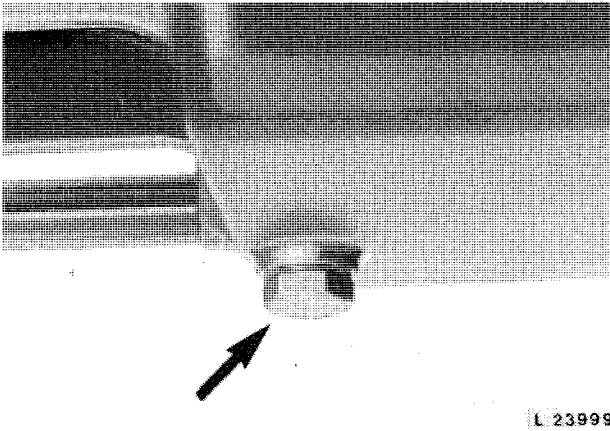
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- 1—Dipstick
- 2—Filler Cap

Fig. 5—Engine Oil Dipstick and Filler Cap

3. Remove filter element (turn counterclockwise) and clean mounting surface.

4. Apply a thin film of oil to sealing ring of new filter. Tighten filter element until sealing ring touches mounting surface, then turn an additional 1/2 to 3/4 turns. Do not overtighten.
5. Reinstall drain plug.
6. Fill crankcase with fresh oil of the proper viscosity.



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Fig. 6—Crankcase Drain Plug

7. Crankcase capacity without filter change 8.0 (2.1 U.S. gal.), with filter change 8.5 L (2.25 U.S. gal.).
8. Run engine for a short time and check for leaks at filter base and drain plug.
9. Stop engine.
10. Check oil level.

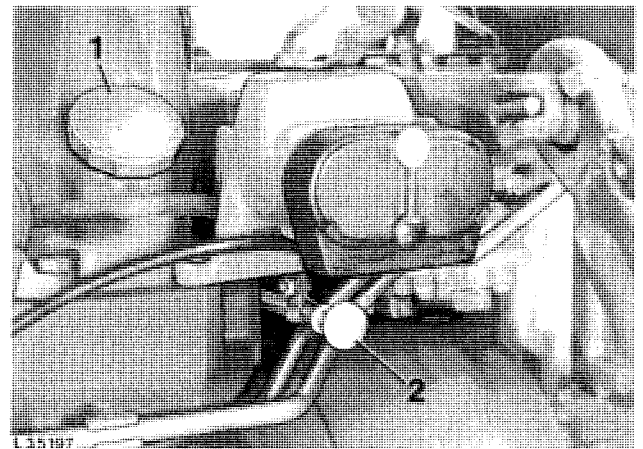
IMPORTANT: During cold weather operation with temperature below freezing point, change oil every 100 hours or every six weeks, whichever occurs first. Also change oil at any seasonal change in temperature when oil of a new viscosity is required.

Service Interval: Every 100 hours.

TRANSMISSION/HYDRAULIC SYSTEM

Checking Oil Level

1. With the tractor on level ground, run the engine 2 to 3 minutes.
2. Place range and gear shift lever in neutral position.
3. Apply handbrake.
4. Lower draft links.
5. Run engine at slow idle (700 to 800 rpm).



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1—Filler Cap
2—Dipstick

Fig. 7—Transmission/Hydraulic System Dipstick and Filler Cap

6. Pull out dipstick and wipe clean.
7. Insert dipstick. Remove dipstick and check oil level.
8. If necessary, add John Deere HY-GARD transmission and hydraulic oil or equivalent oil to bring oil level to top mark on dipstick.

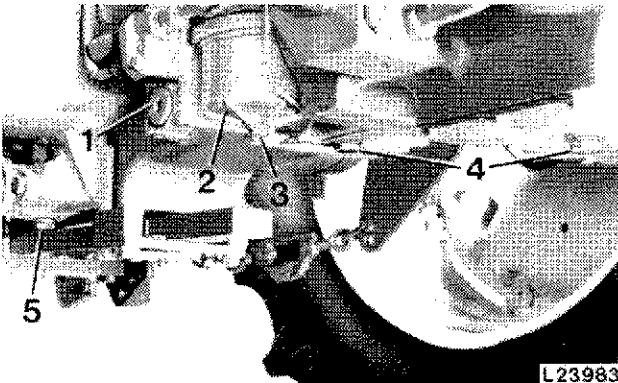
NOTE: Types of oil not meeting our specifications will not give satisfactory service and may result in eventual damage.

Service Interval: At predelivery and every 50 hours.

FILTER CHANGE

Transmission/Hydraulic Oil Filter

1. Disconnect selective control valve return line at transmission oil filter.
2. Remove retaining screw (3, Fig. 8) and lift out filter cover (2).



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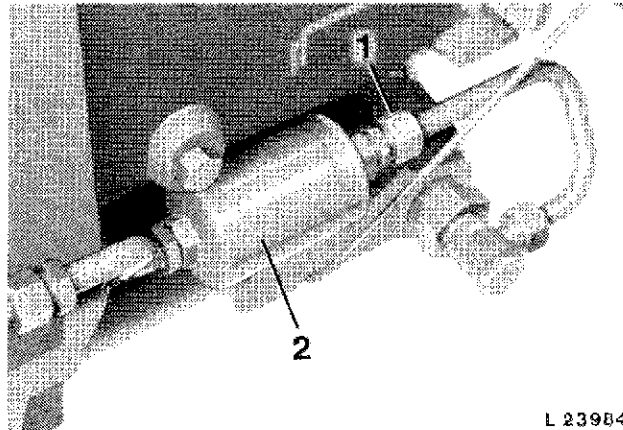
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|-------------------|--------------------|
| 1—Plug | 4—Front Drain Plug |
| 2—Filter Cover | 5—Rear Drain Plug |
| 3—Retaining Screw | |

Fig. 8 - Transmission/Hydraulic Oil Filter

3. Remove element and packing.
4. Install new packing coated with grease in transmission case groove.
5. Insert new element and reinstall filter cover (2, Fig. 8).
6. Tighten retaining screw (3) to 75 N·m (55 lb-ft) torque.
7. Connect selective control valve return line to transmission oil filter port.

Service Interval: After the first 50, after the first 500 and thereafter every 500 hours of operation.

Hydrostatic Steering Filter (Tractors without SOUND-GARD Body)



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- | |
|-------------|
| 1—Union Nut |
| 2—Filter |

Fig. 9 - Hydrostatic Steering Filter

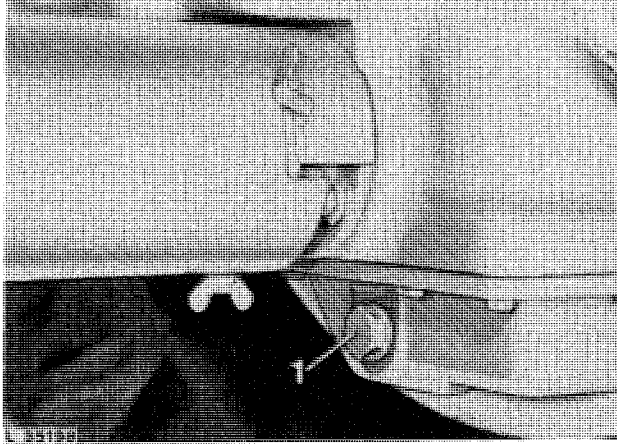
1. Remove union nut (1, Fig. 9) from return line.
2. Unscrew filter (2) out of line.
3. Install new filter and tighten union nut.

Service Interval: Every 1000 hours.

OIL CHANGE

1. Start engine and operate hydraulic functions to heat transmission oil to operating temperature.
2. Shut off engine.
3. Remove drain plugs (4 and 5, Fig. 8).

NOTE: On tractors with MFWD, also remove drain plug (1, Fig. 10) from clutch housing.



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1—Drain Plug

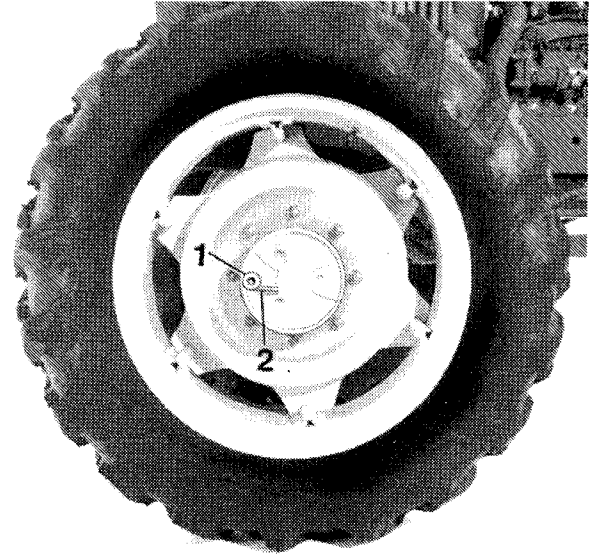
Fig. 10—Clutch Housing Drain Plug (on Tractors with MFWD)

4. Replace transmission/hydraulic system filter element (see Filter Change).
5. Remove plug (1, Fig. 8), pull out intake screen and wash in fuel.
6. *On tractors without SOUND-GARD Body:* replace hydrostatic steering filter (2, Fig. 9) (see Filter Change).
7. Remove hydraulic pump filter screen and clean. Reinstall filter screen and tighten plug.
8. Before filling with fresh oil, reinstall intake screen. Reinstall drain plugs and tighten to 135 N·m (100 lb-ft) torque. Use new seal rings.
9. Refill system with transmission/hydraulic oil to top mark on dipstick.
10. Run engine for 2 to 3 minutes, then recheck oil level.
11. Check oil level with engine running at slow idle, tractor standing on level ground, transmission in neutral, lift arms lowered and clutch engaged.

Service Interval: Every 1000 hours.

Mechanical Front Wheel Drive

CHECKING WHEEL HUB HOUSING OIL LEVEL



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1—Level Plug
2—Oil Level Mark

Fig. 11—Checking Wheel Hub Housing Oil Level

1. Turn wheel until mark (2, Fig. 12) is in level position.
2. Remove level plug (1). Oil should be level with plug bore.
3. Add oil, if necessary, using EP transmission oil according to specifications (see page 2).

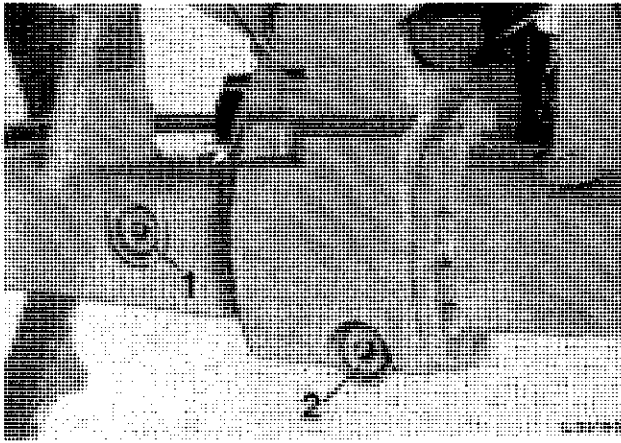
CHECKING AXLE HOUSING OIL LEVEL

1. Remove level plug (1, Fig. 12). Oil should be level with plug bore.
2. If necessary, top up with oil, using EP transmission oil according to specifications (see page 2).

Service Interval: Every 100 hours.

AXLE HOUSING OIL CHANGE

1. Remove drain plug (2, Fig. 12) and drain oil.
2. Reinstall drain plug and tighten securely.
3. Remove filler plug. Fill with fresh oil (7.0 L; 1.85 U.S. gal.) up to level of plug bore. Reinstall filler plug.



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- 1—Level Plug
2—Drain Plug

Fig. 12—Checking Axle Housing Oil Level

WHEEL HUB HOUSING OIL CHANGES

1. Turn wheel until level plug (1, Fig. 11) is at the bottom. Remove plug and drain oil.
2. Turn wheel until mark (2, Fig. 11) is in level position.
3. Fill with fresh oil (0.75 L; 0.20 U.S. gal.) through level plug bore. Use EP transmission oil according to specifications on page 2.
4. Check oil level. Reinstall level plug and tighten securely.

NOTE: Drain oil immediately after having operated the tractor for some time when the oil is still warm.

Front Wheel Bearings

CLEANING AND PACKING BEARINGS

1. Jack up front axle.
2. Remove hub cap. Remove cotter pin and slotted 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 grooves are worn in cup.
5. Pack bearings with John Deere EP-multipurpose grease or SAE EP multipurpose grease. Coat seal with EP multipurpose grease or its equivalent.
6. Reassemble parts. Tighten slotted 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.

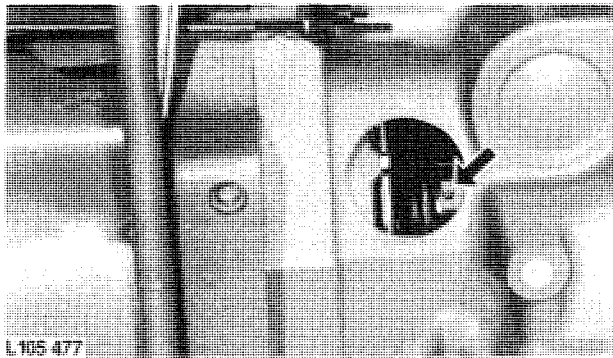
Service Interval: Every 1000 hours.

Lubricating Points

IMPORTANT: Thoroughly clean all grease fittings prior to greasing and replace damaged grease fittings immediately.

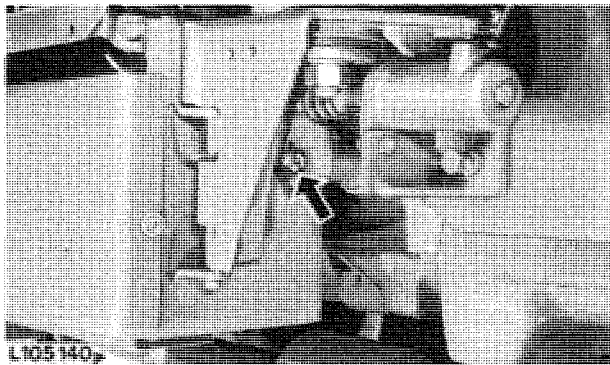
CLUTCH THROW-OUT BEARING (when equipped with grease fitting)

Lubricate clutch throw-out bearing with three strokes of grease gun. High temperature John Deere EP multipurpose grease must be used.



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Fig. 13—Throw-out Bearing Grease Fitting
(Tractor without SOUND-GARD Body shown)



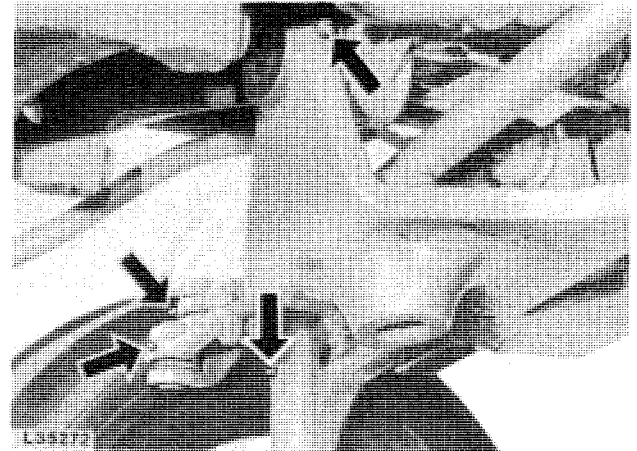
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Fig. 14—Throw-out Bearing Grease Fitting
(Tractor with SOUND-GARD Body shown)

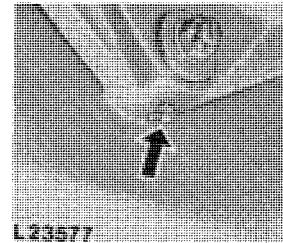
Service Interval: Every 100 hours

Lubricate grease fittings shown in Fig. 15 and 19 every 50 hours of operation. Use John Deere EP multipurpose grease.

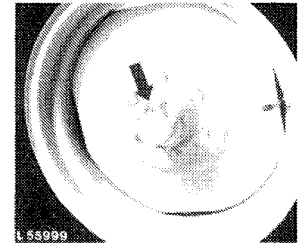
LUBRICATING FRONT AXLE AND FRONT WHEELS (TRACTORS WITHOUT FRONT WHEEL DRIVE)



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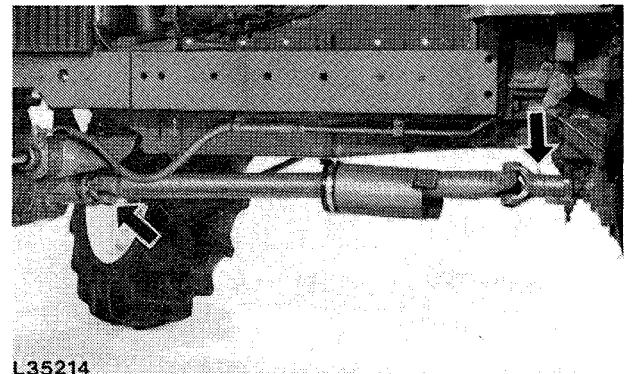
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Fig. 15 - Front Axle and Front Wheel Grease Fittings

Service Interval: At predelivery and every 50 hours.

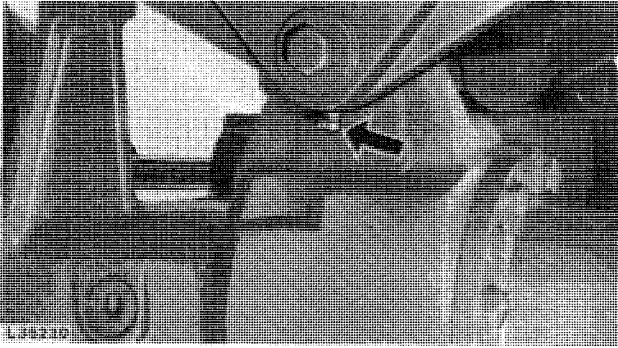
LUBRICATING FRONT AXLE (TRACTORS WITH MFWD)

Mechanical Front Wheel Drive



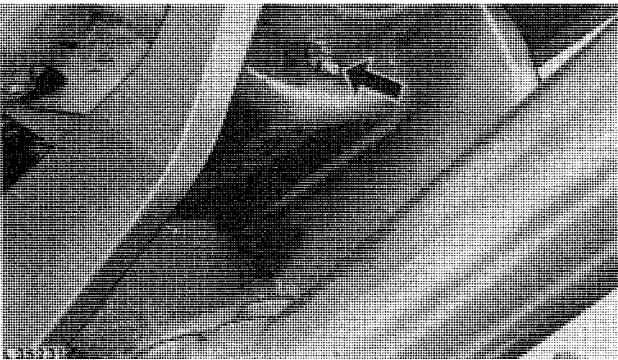
L35214

Fig. 16 - Jointed Drive Shaft Grease Fittings



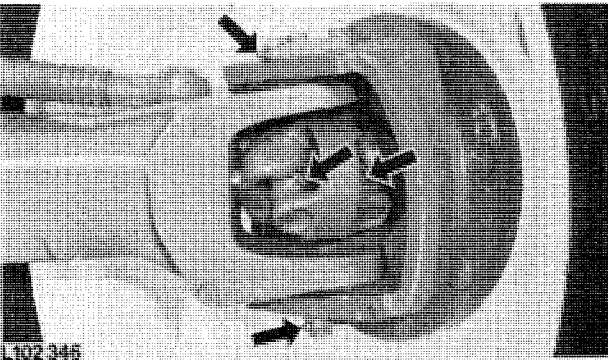
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Fig. 17—Front Axle Carrier Grease Fitting



L35231

Fig. 18—Oscillating Support Grease Fitting



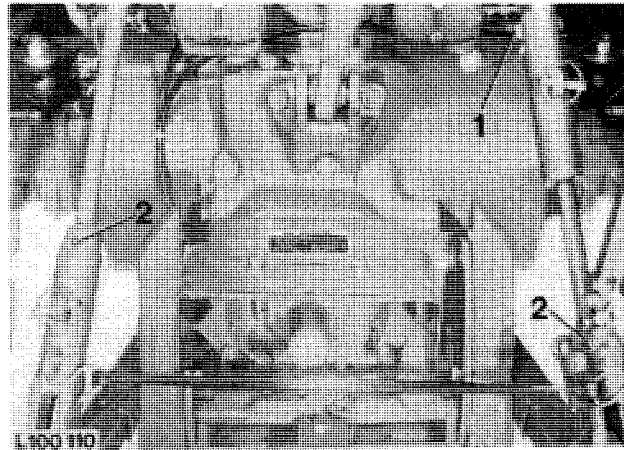
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Fig. 19—Front Axle Grease Fittings

Service Interval: At predelivery and every 50 hours.

LUBRICATING THREE-POINT HITCH

1. Lubricate lift link oiler (1, Figs. 20 and 21) using engine oil.
2. Lubricate lift link grease fittings with several strokes of grease gun, using John Deere EP multipurpose or SAE EP multipurpose grease.

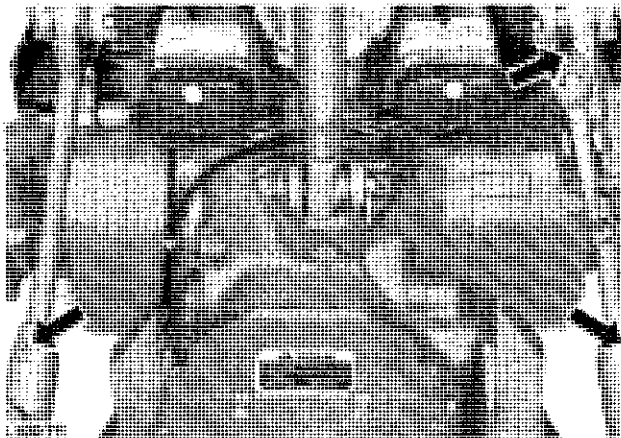


L100110

1—Oiler

2—Grease Fittings

Fig. 20—Lift Link Grease Fittings
(Tractor with SOUND-GARD Body shown)



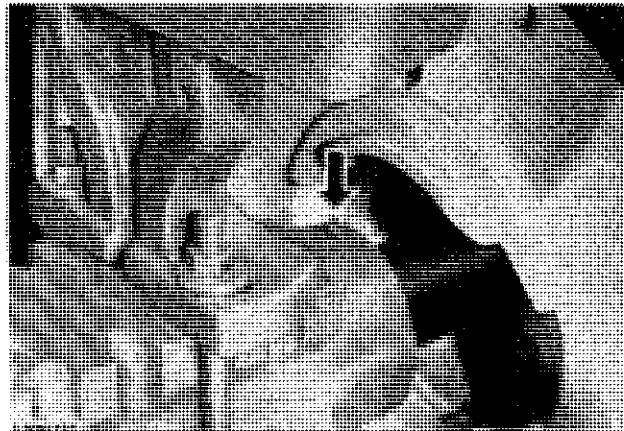
L100111

*Fig. 21—Lift Link Grease Fittings
(Tractors Without SOUND-GARD Body)*

Service Interval: Lubricate every 200 hours.

LUBRICATING REAR AXLE BEARINGS

Lubricate both bearings with 6 to 8 strokes of grease gun, using John Deere EP multipurpose grease or SAE EP multipurpose grease.



L100171

Fig. 22—Rear Axle Grease Fitting

Service Interval: Every 10 hours (only when operating in extremely wet and muddy conditions) and every 500 hours.

Group 15 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.
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.
3. Perform a dynamometer test and record horsepower. Repeat dynamometer test after tune-up, so horsepower output before and after tune-up can be compared.
4. Perform compression test. (See CTM-4, Engines.)

DYNAMOMETER TEST

If possible, test the engine on a dynamometer before it is tuned. This test gives the horsepower output and fuel consumption of the engine as it is. This will help determine if a tune-up can restore the engine or whether an overhaul is needed.

Good performance by the engine depends on these basic things:

1. An adequate supply of clean air and fuel.
2. Good compression.
3. Proper valve and injection pump timing for good combustion.
4. Proper air and fuel temperatures.

Make the dynamometer test as follows:

1. Connect the engine to the dynamometer using the manufacturers instructions.
2. Operate the engine at one-half load until the coolant and crankcase oil temperature are up to normal.
3. Run engine at fast idle (2610 to 2660 rpm).
4. Gradually increase the load on the engine until its speed is reduced to 2500 rpm.
5. Read the horsepower on the dynamometer.
6. Compare the reading taken with the following specifications:

PTO horsepower* at 2500 rpm rated engine speed
(PTO speed 565 or 1040 rpm):

According to SAE J 816b 56 kW 75 hp

* With engine run in (more than 100 hours of operation) and having reached operating temperature (engine and transmission); measured by means of a dynamometer. Permissible variation $\pm 5\%$.

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TESTING COMPRESSION PRESSURE

NOTE: For testing compression pressure, see CTM-4, Engines.

ENGINE TUNE-UP

Air Intake System

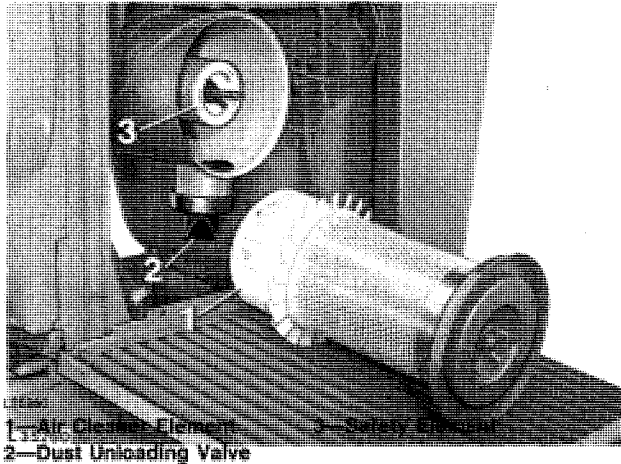
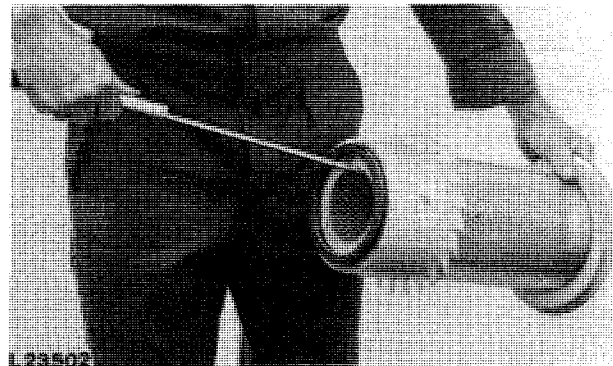


Fig. 1—Air Cleaner and Safety Element

Dusty Element

1. Check air cleaner element (1, Fig. 1). If dirty, tap it on the palm of your hand.
2. If tapping element does not remove dust, blow out dust with compressed air. Pressure not to exceed 600 kPa (6 bar; 85 psi) by inserting nozzle inside of element and blowing from the inside of the filter to the outside.



L23502

Fig. 2—Cleaning Air Cleaner Element by Means of Compressed Air

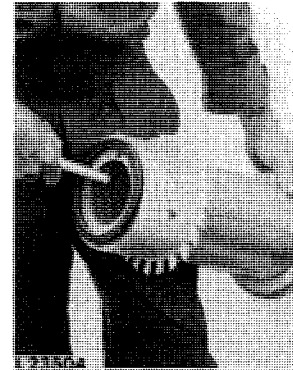
Oily or Sooty Element

IMPORTANT: Never wash element in fuel oil gasoline or strong cleaning agent. Never use compressed air to dry element.

1. Wash element in a solution of lukewarm water and non-foaming cleaning agent. Rinse element thoroughly from the inside with clean water (water pressure not above 300 kPa, 3 bar; 43 psi). Shake water from element and dry for approx. 24 hours at a temperature of 20°C (70°F).



L23503



L23504

Fig. 3—Wet Cleaning

2. After cleaning the element, inspect it by placing a bright light inside the filter. Discard any filter that shows the slightest rupture, indicated by light through the hole. Make sure gasket is in a serviceable condition

IMPORTANT: Replace filter element after six cleanings or one year of service, whichever occurs first.

3. When servicing the air cleaner always remove and clean the rubber dust unloading valve.
4. The valve must always be installed with slot facing direction of travel.

IMPORTANT: Do not operate engine without air cleaner element or rubber dust unloading valve installed.

Air Cleaner Secondary (Safety) Element

1. This filter element must be changed annually, when clogged or damaged and with every third service of air cleaner primary element.
2. Should it become necessary to clean primary filter element more often than usual, this is a sign that the secondary (safety) filter must be replaced.

IMPORTANT: Always replace secondary (safety) filter element, do not attempt to clean.

Air Intake Connections

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

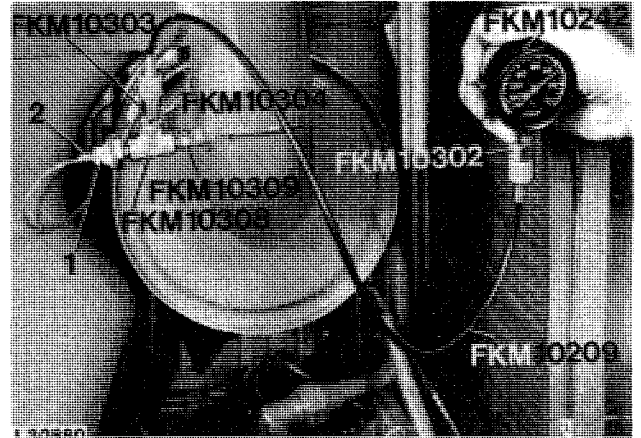
Measuring Air Intake System Vacuum

Check for restrictions in air intake system by measuring vacuum.

1. Clean air cleaner.
2. Remove left-hand radiator grille screen.
3. Run engine until it has reached normal operating temperature.
4. Pull wiring connector (2, Fig. 4) from warning switch (1). Now remove warning switch from air cleaner adapter.
5. Connect connector FKM 10309** and warning switch in T-piece FKM 10308** and screw assembly into bore of air cleaner adapter.
6. Reconnect wiring connector (2).
7. Install and tighten connector FKM 10304* in T-piece FKM 10308**.
8. Using connector FKM 10302*, pressure hose FKM 10209* and connector FKM 10303* attach vacuum gauge FKM 10242** to connector FKM 10304*.
9. Run engine at 2610 to 2660 rpm.

* Part of testing kit FKM 10002, available for Canada only. Otherwise use D-05522 ST.

**Part of kit FKM 10310.



L30880

- 1—Warning Switch
2—Wiring Connector

Fig. 4 - Measuring Air Intake System Vacuum

10. With a clean element installed, vacuum should be approx. 3.5 kPa (35 mbar; 14 in. water head), but never exceed 6 kPa (60 mbar; 25 in. water head). If this is the case, there is a restriction in the air intake system. Determine and remedy the cause.

11. At the same time check air cleaner restriction warning switch.

12. Run engine at 2500 rpm. Use a piece of cardboard to partially cover air cleaner intake. Increase the restriction until air cleaner indicator light goes on, and not vacuum reading.

13. Air cleaner restriction warning switch should close at a vacuum of 5.5 to 6.5 kPa (55 to 65 mbar; 22 to 26 in. water head). If not, replace switch.

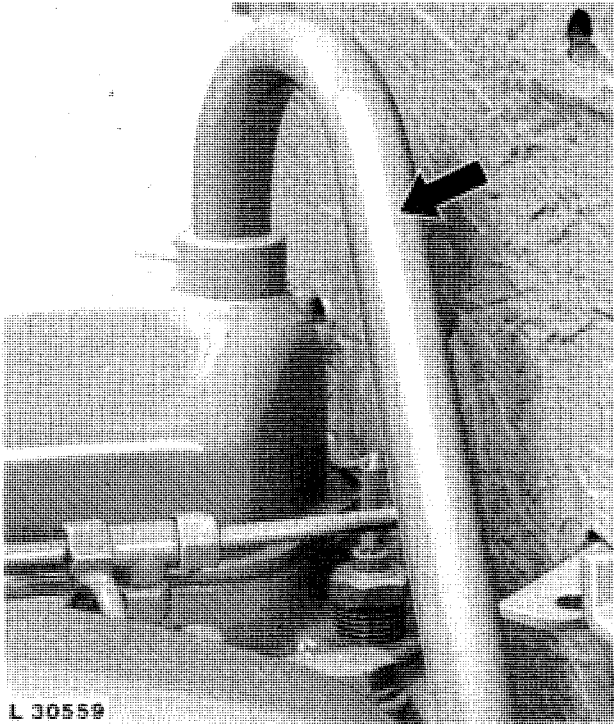
Exhaust System

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

Measuring Blow-By

NOTE: Measuring blow-by see CTM-4, Engines.

CRANKCASE VENT TUBE



L30559

Fig. 5—Crankcase Vent Tube

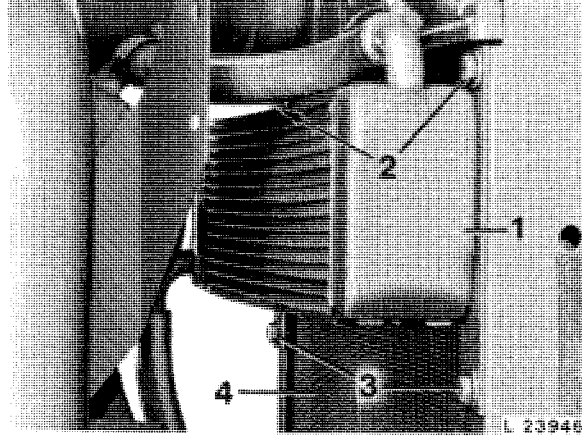
1. Inspect crankcase vent tube for restriction. Lack of ventilation causes sludge to form in engine crankcase. This can lead to clogging of oil passages and filters, resulting in serious engine damage.

2. If necessary, clean vent tube in solvent.

COOLING SYSTEM

Cleaning Radiator

1. Clean radiator grille screens, if necessary.



L23946

1—Oil Cooler
2—Cap Screws

3—Cap Screws
4—Radiator

Fig. 6 - Radiator and Oil Cooler

2. Clean radiator and oil cooler. To clean portion of radiator behind oil cooler, remove cap screws (2 and 3, Fig. 6).

Flushing Cooling System

1. Drain cooling system by opening drain cocks on radiator and engine block.

2. Turn cab heater (if equipped) on and leave it on until finished.

3. Close drain cocks and fill cooling system with clean water.

4. Run engine until it reaches operating temperature to stir up possible rust or sediment.