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# 2950 TRACTOR TECHNICAL MANUAL TM-4407 (Apr-86)

## CONTENTS

The engine information has been removed from this manual. For engine information, refer to engine component technical manual, CTM-4, 3179, 4239, and 6359 Engines.

### SECTION 10 - GENERAL

- Group 00 - Specifications and Special Tools
- Group 05 - Predelivery, Delivery, and After-Sales Inspections
- Group 10 - Lubrication and Service
- Group 15 - Tune-Up
- Group 20 - Tractor Separation

### SECTION 20 - ENGINE

- Group 00 - Specifications
- Group 05 - Radiator

### SECTION 30 - FUEL AND AIR INTAKE SYSTEM

- Group 00 - Specifications and Special Tools
- Group 05 - General Information, and Diagnosing Malfunctions
- Group 10 - Fuel Tank and Water Trap
- Group 15 - Cold Weather Starting Aids
- Group 20 - Speed Control Linkage
- Group 25 - Air Cleaner

### SECTION 40 - ELECTRICAL SYSTEM

- Group 00 - Specifications and Special Tools
- Group 05 - Description, Diagnosing Malfunctions and Tests
- Group 06 - Connector Repair
- Group 10 - Wiring Harnesses
- Group 15 - Controls and Instruments
- Group 20 - Lighting System
- Group 25 - Wiring Diagrams
- Group 30 - Starting Motor
- Group 35 - Alternator

### SECTION 50 - POWER TRAIN

- Group 00 - Specifications and Special Tools
- Group 05 - Description, Operation and Lubrication System
- Group 10 - Clutch Operating Linkages
- Group 15 - Engine Clutch
- Group 20 - Hi-Lo Shift Unit
- Group 25 - Creeper Transmission
- Group 30 - Transmission Shift Linkages
- Group 35 - Synchronized Transmission and Transmission Oil Pump
- Group 40 - Differential
- Group 45 - Final Drives
- Group 50 - Independent PTO
- Group 55 - Mechanical Front Wheel Drive

### SECTION 60 - STEERING SYSTEM AND BRAKES

- Group 00 - Specifications and Special Tools
- Group 05 - Steering System
- Group 10 - Brakes

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**CONTENT            ontinued****SECTION 70 - HYDRAULIC SYSTEM**

- Group 00 Specifications and Special Tools
- Group 05 - Description, Diagnosing Malfunctions and Tests
- Group 10 - Oil Reservoir, Filter, Valves and Oil Cooler
- Group 15 - Hydraulic Pump
- Group 20 Rockshaft
- Group 25 - Selective Control Valve (Poppet Valve Type) and Breakaway Coupler
- Group 26 Selective Control Valve (Spool Type) and Quick Coupler
- Group 30 Remote Cylinder

**SECTION 80 - ENGINE**

- Group 00 Specifications
- Group 05 Front Axle
- Group 10 Front and Rear Wheels

**SECTION 90 - OPERATOR'S STATION**

- Group 00 - Specifications and Special Tools
- Group 05 - Air Conditioning System
- Group 10 Cab Ventilation and Heating
- Group 15 - Seats
- Group 20 SOUND-GARD Body
- Group 25 - ROLL-GARD Protective Structure

# Section 10 GENERAL

## CONTENTS OF THIS SECTION

	Page		Page
<b>GROUP 00 - SPECIFICATIONS AND SPECIAL TOOLS</b>		<b>GROUP 05 - PREDELIVERY, DELIVERY AND AFTER-SALES INSPECTIONS</b>	
Specifications .....	10-00-3	Tractor Storage .....	10-05-1
Serial Numbers.....	10-00-3	Predelivery Inspection .....	10-05-2
Model Numbers.....	10-00-3	Delivery Inspection .....	10-05-9
Engine .....	10-00-3	After-Sales Inspection .....	10-05-10
Engine Clutch .....	10-00-4		
Cooling System.....	10-00-4	<b>GROUP 10 - LUBRICATION AND SERVICE</b>	
Fuel System.....	10-00-4	Lubrication and Service .....	10-10-1
Electrical System .....	10-00-4		
Transmission .....	10-00-4	<b>GROUP 15 - TUNE-UP</b>	
Differential .....	10-00-5	Preliminary Engine Testing.....	10-15-1
Differential Lock .....	10-00-5	Dynamometer Test.....	10-15-1
PTO .....	10-00-5	Testing Compression Pressure .....	10-15-2
Mechanical Front Wheel Drive .....	10-00-5	Engine Tune-Up .....	10-15-2
Hydrostatic Steering.....	10-00-6	Checking Tractor Operation.....	10-15-7
Front Brakes .....	10-00-6	Standard Torques.....	10-15-8
Capacities .....	10-00-6	<b>GROUP 20 - TRACTOR SEPARATION</b>	
Travel Speeds .....	10-00-6	Separating between Engine and	
Front and Rear Wheels .....	10-00-6	Tractor Front End ... ..	10-20-1
Dimensions and Weights .....	10-00-6	Removal and Installation of Engine ...	10-20-5
Predelivery, Delivery and		Removal and Installation of	
After-Sales Inspections .....	10-00-7	Clutch Housing .....	10-20-8
Lubrications and Service.....	10-00-8	Removal and Installation of	
Tune-up .....	10-00-9	Final Drives.....	10-20-10
Tractor Separation.....	10-00-10	Removal and Installation of	
Standard Torques .....	10-00-11	Rockshaft .....	10-20-15
Special Tools .....	10-00-13	Removal and Installation of	
		" SOUND-GARD" Body .....	10-20-17

**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 service 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 and hydraulic pump have model numbers to facilitate identification of different makes of a given unit.

**Engine**

Number of cylinders.....	6
Cylinder liner bore . . . . .	106.5 mm (4.19 in.)
Stroke . . . . .	110 mm (4.33 in.)
Displacement.....	5883 cm <sup>3</sup> (359 cu. in.)
Compression ratio	
up to engine serial no. 547636CD	16.8:1
from engine serial no. 547637CD . . . . .	17.4:1
Maximum torque at 1400 rpm .....	330 N m (243 lb-ft)
Firing order	1-5-3-6-2-4
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 .....	1400 to 2500 rpm

PTO\* horsepower at engine rated speed—2500 rpm ..... 63 kW (85 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 ..... Two thermostats

### Fuel System

Type..... Direct injection

Fuel injection pump timing to engine..... TDC

Fuel injection pump type (Roto Diesel R 3462 F 690) (ISO) ..... Distributor type

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

### Electrical System

Batteries ..... 2 x 12 volts, 88 Ah

Alternator with internal regulator ..... 14 volts, 33 or 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 percent

Shifting to reduced (Low) speed ..... Preloaded cup springs

Shifting to normal (High) speed..... Hydraulic

*\* 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 -1- 5 percent.*

**Creeper Transmission**

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

**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) ... 540/1000 rpm  
 PTO clutch . Hydraulically operated “wet” disk clutch  
 PTO brake ..... Hydraulically operated “wet” disk brake

**ENGINE/PTO SPEED RELATIONSHIPS**

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 to 2350 psi)

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

Hydraulic pump ..... 8-piston pump with variable displacement

**Capacities**

Fuel tank..... 122 liters (32.0 U.S. gals.)

Cooling system

Without SOUND-GARD Body ..... 17.0 L (4.5 U.S. gals.)

With SOUND-GARD Body ..... 19.0 L (5.0 U.S. gals.)

Engine crankcase

Without filter change ..... 11.0 L (2.9 U.S. gals.)

With filter change . ..... 11.5 L (3.0 U.S. gals.)

Hydraulic clutch reservoir .....500 cm<sup>3</sup> 17.5 fl. oz.

Transmission - Hydraulic system

Initial filling ..... 68.0 L (18.0 U.S. gals.)

Oil change ..... 60.0 L (15.9 U.S. gals.)

Mechanical front wheel drive

Front axle housing ..... 7.0 L (7.85 U.S. gals.)

Wheel hub housing, each ..... 0.75 L (0.2 U.S. gals.)

**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 to 800 rpm
Fast idle .....	2610 to 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).

### 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 .....	approx. 25 mm (1 in.)
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#### Tractors With SOUND-GARD Body

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

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

### Torques for Hardware

Start safety switch in rockshaft housing, max. ....	50 N m	(35 ft-lbs)
Front wheel rim to hub		
Tractors without MFWD .	180 N m	(130 ft-lbs)
Tractors with MFWD	300 N m	(220 ft-lbs)
Axle knees to axle center, cap screws .....	400 N m	(300 ft-lbs)
Tie rod clamps		
Cap screw (M10) .....	55 N m	(40 ft-lbs)
Cap screw (M12) . . .	90 N m	(65 ft-lbs)
Tie rod tube, cap screw .....	55 N m	(40 ft-lbs)
Rear wheels		
Rear wheels to axle	400 N m	(300 ft-lbs)
Wheel disk to hub (rack-and-pinion axle)	400 N m	(300 ft-lbs)
2-post ROLL-GARD protective structure		
Supports to crossbar, cap screws	200 N m	(145 ft-lbs)
Supports to final drives, cap screws and nuts .....	400 N m	(300 ft-lbs)

## LUBRICATION AND SERVICE

### Capacities

#### Engine crankcase

Without filter change	11.0 L	(2.9 U.S. gal.)
With filter change . . . .	11.5 L	(3.0 U.S. gal.)

#### Cooling system

Without SOUND-GARD Body ..	17.0 L	(4.5 U.S. gals.)
With SOUND-GARD Body .....	19.0 L	(5.0 U.S. gals.)

#### Transmission - Hydraulic system

Initial filling .....	68.0 L	(18.0 U.S. gal.)
Oil change	60.0 L	(15.9 U.S. gal.)

#### Mechanical front wheel drive

Front axle housing	7.0 L	(1.85 U.S. gal.)
Wheel hub housing, each	0.75 L	(0.2 U.S. gal.)

### Service Intervals

Checking crankcase oil level .....	every 10 hours
Changing engine oil .....	every 100 hours
Changing engine oil filter .....	every 200 hours
Checking transmission/hydraulic system oil level .....	every 50 hours
Changing transmission/hydraulic system oil filter .....	every 500 hours
Changing transmission/hydraulic oil .....	every 1000 hours
Changing hydrostatic steering filter .....	every 1000 hours
Cleaning hydraulic pump strainer .....	every 1000 hours
Checking MFWD oil level .....	every 100 hours
MFWD oil change .....	every 1000 hours
Cleaning and packing front wheel bearings .....	every 1000 hours
Lubricating grease fittings	
Clutch throw-out bearing grease fitting (when equipped) .....	every 100 hours
Mechanical front wheel drive universal-jointed shaft .....	every 50 hours
In wet and muddy conditions .....	every 10 hours
Front axle and front axle bearings .....	every 50 hours
Rear axle bearings .....	every 500 hours
In wet and muddy conditions .....	every 10 hours
Three-point hitch .....	every 200 hours

**TUNE-UP**

PTO horsepower* at 2500 rpm rated engine speed		63 kW	85 hp
Slow idle.....		700 to 800 rpm	
Fast idle .....		2610 to 2660 rpm	
Rated engine speed.....		2500 rpm	
Air intake system vacuum .....	3.5 to 6.0 kPa	35 to 60 mbar	(14 to 25 in. water head)
Air cleaner restriction warning switch closes at a vacuum of .....	5.5 to 6.5 kPa	55 to 65 mbar	(22 to 26 in. water head)
Radiator cap high pressure valve opens at .....	40 to 50 kPa	0.4 to 0.5 bar	(6 to 7 psi)
Radiator cap low pressure valve opens at .....	0 to 4 kPa	0 to 0.04 bar	(0 to 0.6 psi)

**Fan Belt**

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**

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

*\* With the 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 -i- 5%.*

## TRACTOR SEPARATION

### Torques for Hardware

Front axle carrier to engine block, cap screws .....	230 N m	(170 ft-lbs)
Front axle carrier to oil pan, cap screws .....	400 N m	(300 ft-lbs)
Engine block to front axle carrier, cap screws .....	230 N m	(170 ft-lbs)
Hydraulic pump drive shaft, cap screws ...	50 N-m	(35 ft-lbs)
Jointed shaft flange to front axle drive hub (tractors with MFWD), cap screws .....	75 N m	(55 ft-lbs)
Clutch housing to engine block		
Cap screws .....	230 N m	(170 ft-lbs)
Hex. nuts .....	230 Num	(170 ft-lbs)
Oil pan to clutch housing, cap screws .....	230 N-m	(170ft-lbs)
Clutch housing to transmission case, cap screws .....	160 N m	(120 ft-lbs)
Oil drain plug of transmission case .....	135 N m	(100ft-lbs)
Hydraulic lines retainer to clutch housing, cap screw . .....	45 N m	(32 ft-lbs)
Final drive housings to transmission case, cap screws .....	230 N-m	(170 ft-lbs)
Rockshaft housing to transmission case, cap screws .....	120 Num	(85ft-lbs)
Rear wheels to rear axle .....	400 N-m	(300 ft-lbs)
Wheel disk to hub (rack and pinion axle) .....	400 N m	(300 ft-lbs)
Rear fenders to final drive housings, hex. nuts .....	200 N-m	(145 ft-lbs)
2-post ROLL-GARD protective structure to final drive housings .....	400 N m	(300ft-lbs)
Both supports to crossbar .....	200 N-m	(145 ft-lbs)
Basic weight to front axle carrier, cap screws .....	400 N-m	(300ft-lbs)
Drawbar to transmission case		
Front cap screws .....	230 N-m	(170 ft-lbs)
Rear cap screws .....	120 N m	(85ft-lbs)
SOUND - GARD Body to rubber bearing block, cap screws and hex. nuts .....	200 N•m	(145 ft-lbs)

### STANDARD TORQUES

RECOMMENDED TORQUES IN N·m, AND W-LBS FOR UNC AND UNL CAT SCREWS				
Head Form	or 10.9*		or 12.9**	
Hexagonal	Hexagonal	Hexagonal	Hexagonal	Hexagonal
Thread Size	N·m	W-LBS	N·m	W-LBS
1/4	15	10	20	15
5/16	30	20	40	30
3/8	50	35	70	50
7/16	80	55	110	80
1/2	120	85	170	120
9/16	180	130	240	175
5/8	230	170	320	240
3/4	400	300	580	425
7/8	600	445	930	685
1	910	670	1400	1030
1-1/8	1240	910	1980	1460
1-1/4	1700	1250	2800	2060

NOTE.- A variation of + 10% is permissible for all torques indicated in this chart.

Torque figures indicated above and in the Specification sections of this manual are valid for non-greased or non-oiled threads and heads unless otherwise specified. Therefore, do not grease or oil bolts or cap screws unless otherwise specified in this manual.

\* Tempered steel high-strength bolts and cap screws

\*\* Tempered steel extra high-strength bolts and cap screws

**John Deere 2950**

**Tractor Service Manual**

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**Thank you very much!**