2250, 2450, 2650, 2650N and 2850 Tractors

TECHNICAL MANUAL

2250, 2450, 2650, 2650N and 2850 Tractors (Repair)

TM4440 (JAN-91)

John Deere Werke Mannheim
European Edition
Printed in Germany

Supplement (Jan-91) for Technical Manual TM4440

(2250 - 2850 Tractors)

Please insert the revised and new pages in the correct sequence in your Technical Manual, discarding the corresponding original pages which have been revised.

SUMMARY OF MOST IMPORTANT SPECIFICATIONS FOR 2250, 2450, 2650, 2650N and 2850 TRACTORS

NOTE: For further specifications, see relevant Technical Manual.

ENGINE

Valve clearance (engine hot or cold):
- Intake valves ..... 0.35 mm (0.014 in.)
- Exhaust valves ..... 0.45 mm (0.018 in.)

Minimum engine oil pressure at 800 rpm and normal operating temperature ..... 100 kPa (1 bar; 14 psi)

Compression ..... 2100 kPa (21 bar; 300 psi)

Maximum difference in pressure between cylinders ..... 350 kPa (3.5 bar; 50 psi)

Maximum blow-by at crankcase vent tube ..... 80 liter/kWh (2.8 cu.ft./kWh)

Minimum pressure of turbocharger in intake manifold at rated engine speed ..... 60 kPa (0.6 bar; 9 psi)

Rocker arm shaft to cylinder head ..... 50 Nm (35 ft-lb)

Cylinder head to cylinder block (cap screws dipped in oil)
- 1st step ..... 85 Nm (65 ft-lb)
- 2nd step ..... 135 Nm (100 ft-lb)
- 3rd step ..... +60°

Rocker cover to cylinder head ..... 10 Nm (7 ft-lb)

Connecting rod cap screws (dipped in oil) ..... 65 to 75 Nm (50 to 55 ft-lb)

Main bearing caps to cylinder block ..... 120 Nm (85 ft-lb)

Flywheel to crankshaft ..... 160 Nm (120 ft-lb)

Front axle carrier to engine
- *without increased lifting capacity* .... 230 Nm (170 ft-lb)
- *with increased lifting capacity*
  - Cap screws ..... 230 Nm (170 ft-lb)
  - TORX screws ..... 250 Nm (185 ft-lb)

Oil pan to front axle carrier ..... 400 Nm (300 ft-lb)

Oil pan to clutch housing ..... 230 Nm (170 ft-lb)

Clutch housing to engine ..... 230 Nm (170 ft-lb)

Side frames to front axle carrier ..... 230 Nm (170 ft-lb)

Side frames to flywheel housing ..... 230 Nm (170 ft-lb)

FUEL INJECTION NOZZLES

Opening pressure of a new or re-conditioned nozzle with new spring
- *Engine without turbocharger* ..... 21700 to 22400 kPa (217 to 224 bar; 3150 to 3250 psi)
- *Engine with turbocharger* ..... 25100 to 25800 kPa (251 to 258 bar; 3650 to 3750 psi)

Minimum opening pressure with used nozzle
- *Engine without turbocharger* ..... 20700 kPa (207 bar; 3000 psi)
- *Engine with turbocharger* ..... 24100 kPa (241 bar; 3500 psi)

Maximum difference in opening pressure ..... 700 kPa (7 bar; 100 psi)

Fuel injection nozzle to cylinder head ..... 30 Nm (23 ft-lb)

BATTERIES

Cold state testing current
- 55 Ah battery ..... 255 amps.
- 66 Ah battery ..... 300 amps.

ENGINE SINGLE-STAGE CLUTCH

Thickness of a new disk ..... 10 mm (0.39 in.)

Wear limit ..... 7 mm (0.26 in.)

Maximum permissible warpage of clutch disk ..... 0.5 mm (0.02 in.)

Flywheel to crankshaft ..... 160 Nm (120 ft-lb)

Clutch to flywheel ..... 50 Nm (35 ft-lb)

Clutch pedal free play (mechanical clutch) ..... 25 mm (approx. 1 in.)

ENGINE DUAL-STAGE CLUTCH

Thickness of a new disk
- *Engine clutch* ..... 9.0 to 9.6 mm (0.35 to 0.38 in.)
- *PTO clutch* ..... 7.7 to 8.3 mm (0.30 to 0.33 in.)

Wear limit of a clutch disk
- *Engine clutch* ..... 6 mm (0.24 in.)
- *PTO clutch* ..... 4.7 mm (0.18 in.)

Maximum permissible warpage of clutch disk ..... 0.5 mm (0.02 in.)

Flywheel to crankshaft ..... 160 Nm (120 ft-lb)

Clutch to flywheel ..... 50 Nm (35 ft-lb)

Clutch pedal free play ..... 25 mm (approx. 1 in.)

HI-LO SHIFT UNIT

Operating pressure at 1500 rpm ..... 1050 kPa (10.5 bar; 150 psi)

Operating pressure of automatic shift valve ..... 500 to 700 kPa (5 to 7 bar; 75 to 100 psi)

Hi-Lo shift unit to clutch housing ..... 50 Nm (35 ft-lb)

SUMMARY OF MOST IMPORTANT SPECIFICATIONS FOR 2250, 2450, 2650, 2650N and 2850 TRACTORS

SYNCHRONIZED TRANSMISSION

Differential Drive Shaft

Rolling drag torque with
- New bearings ..... 0.75 to 1.5 Nm (6.5 to 13 in-lb)
- Used bearings ..... 0.4 to 0.75 Nm (3.5 to 6.5 in-lb)

Special hex. nut or special nut of differential drive shaft ..... 140 Nm (100 ft-lb)

Range Shaft

Preload of taper roller bearings ..... 0.05 to 0.10 mm (0.002 to 0.004 in.)

Countershaft

Preload of transmission hollow drive shaft ..... 0.05 to 0.10 mm (0.002 to 0.004 in.)

Rolling drag torque ..... 1 to 2 Nm (9 to 18 in-lb)

End play of differential drive shaft ..... 0.03 to 0.13 mm (0.001 to 0.005 in.)

Hex. nut of transmission hollow drive shaft ..... 140 Nm (100 ft-lb)

Countershaft bearing quill ..... 120 Nm (85 ft-lb)

Intermediate Shaft

Preload of bearings ..... 0.05 to 0.10 mm (0.002 to 0.004 in.)

Grooved nut ..... 140 Nm (100 ft-lb)

Clutch housing to transmission case ..... 160 Nm (120 ft-lb)

COLLAR SHIFT TRANSMISSION

Differential Drive Shaft

Total thickness of shim pack to adjust cone point ..... 0.5 mm (0.02 in.)

Maximum permissible end play before adjusting preload ..... 0.05 mm (0.002 in.)

Dimension to be added to measured end play ..... 0.15 mm (0.006 in.)

Preload of taper roller bearings ..... 0.15 mm (0.006 in.)

Rolling drag torque with specified preload ..... 0.6 to 1.7 Nm (5 to 15 in-lb)

Hex. nut of differential drive shaft ..... 220 Nm (160 ft-lb)

Transmission Drive Shaft

End play ..... 0.10 to 0.15 mm (0.004 to 0.006 in.)

Transmission drive shaft bearing quill ..... 50 Nm (35 ft-lb)

TRANSMISSION OIL PUMP

Minimum delivery of transmission oil pump at 2000 rpm:

Oil temperature 40°C (100°F)
- – *2250 and 2450 without Hi-Lo* ..... 34 liters/min. (9 gpm)
- – *2250 to 2850 with Hi-Lo and 2650 to 2850 without Hi-Lo* ..... 42 liters/min. (11 gpm)

Oil temperature 65°C (150°F)
- – *2250 and 2450 without Hi-Lo* ..... 30 liters/min. (8 gpm)
- – *2250 to 2850 with Hi-Lo and 2650 to 2850 without Hi-Lo* ..... 38 liters/min. (10 gpm)

Minimum flow to hydraulic pump at 2000 rpm with:

Oil temperature 40°C (100°F)
- – *2250 to 2850 without Hi-Lo* ..... 30 liters/min. (8 gpm)
- – *2250 to 2850 with Hi-Lo and 2650 to 2850 without Hi-Lo* ..... 36 liters/min. (9.5 gpm)

Oil temperature 65°C (150°F)
- – *2250 and 2450 without Hi-Lo* ..... 26 liters/min. (7 gpm)
- – *2250 to 2850 with Hi-Lo and 2650 to 2850 without Hi-Lo* ..... 32 liters/min. (8.5 gpm)

Transmission oil pump cap screws ..... 55 Nm (40 ft-lb)

Transmission oil pump to clutch housing ..... 55 Nm (40 ft-lb)

DIFFERENTIAL

Preload of taper roller bearings ..... 0.05 to 0.13 mm (0.002 to 0.005 in.)

Backlash between ring gear and differential drive shaft pinion ..... 0.30 mm (0.012 in.)

FINAL DRIVES

To measured rolling drag torque of final drive housing (before tightening 12-point screw) add:
- *Standard final drives* ..... 8 to 12.5 Nm (6 to 9 ft-lb)
- *Heavy-duty final drives* ..... 10 to 13.5 Nm (7.5 to 10 ft-lb)

Final drives to transmission case ..... 120 Nm (85 ft-lb)

SUMMARY OF MOST IMPORTANT SPECIFICATIONS FOR 2250, 2450, 2650, 2650N 2850 TRACTORS

INDEPENDENT PTO

Operating pressure at 1500 rpm ..... 1050 kPa (10.5 bar; 150 psi)
Preload of taper roller bearings in bearing quill (at 540 rpm, heavy-duty type) ..... 0.05 mm (0.002 in.)
Drive gear to clutch drum ..... 75 Nm (55 ft-lb)
Bearing quill to transmission case ..... 120 Nm (85 ft-lb)

CONTINUOUS RUNNING PTO

Preload of taper roller bearings in bearing quill (heavy-duty version) ..... 0 to 0.05 mm (0 to 0.002 in.)
Bearing quill to transmission case ..... 120 Nm (85 ft-lb)

FRONT PTO

Operating pressure at 1500 rpm ..... 1050 kPa (10.5 bar; 150 psi)
Preload of taper roller bearings ..... 0 to 0.05 mm (0 to 0.002 in.)
Front PTO to front axle carrier ..... 400 Nm (300 ft-lb)

FRONT WHEEL DRIVE

Operating pressure at 1500 rpm ..... 1050 kPa (10.5 bar; 150 psi)
Disk clutch slips at a torque of:
2250, 2450, 2650 and 2650N ..... 880 Nm (650 ft-lb)
2850 ..... 1000 Nm (740 ft-lb)
Front axle to front axle carrier ..... 300 Nm (220 ft-lb)
Front axle axial play ..... 0 to 0.5 mm (0 to 0.02 in.)
Universal-jointed drive shaft to drive hub ..... 75 Nm (55 ft-lb)

HYDROSTATIC STEERING

Adjustment pressure of double-acting safety valves ..... 21000 kPa (210 bar; 3050 psi)
Steering valve to steering column ..... 50 Nm (35 ft-lb)

BRAKES

Return travel of pressure ring (within 15 seconds) ..... 0.28 to 0.35 mm (0.011 to 0.014 in.)
Test pressure for leakage test of pressure ring ..... 300 kPa (3 bar; 44 psi)
Maximum pressure drop within 10 seconds ..... 10 kPa (0.1 bar; 1.5 psi)
Retraction pin assembly to pressure ring ..... 15 Nm (11 ft-lb)

HYDRAULIC PUMPS

Pump stand-by pressure ..... 19000 kPa (190 bar; 2760 psi)
Minimum delivery at 2000 rpm and 17000 kPa (170 bar; 2450 psi) operating pressure:
12 cm³ (0.7 cu.in.) pump ..... 19 liters/min. (5 gpm)
23 cm³ (1.4 cu.in.) pump ..... 34 liters/min. (9 gpm)
40 cm³ (2.4 cu.in.) pump ..... 68 liters/min. (18 gpm)
Hydraulic pump to front axle carrier ..... 120 Nm (85 ft-lb)

ROCKSHAFT

Opening pressure of pressure relief valve (with 100 mm; 3.94 in. diameter piston) ..... 21000 to 23000 kPa (210 to 230 bar; 3050 to 3340 psi)
Opening pressure of thermal relief valve (with 92 mm; 3.67 in. diameter piston) ..... 24200 to 31000 kPa (242 to 310 bar; 3500 to 4500 psi)
Rockshaft to transmission case ..... 120 Nm (85 ft-lb)

Adjusting Load Control Arm
Turn in control arm adjusting screw until it contacts arm and then back off ..... 1/3 to 1/2 a turn

SUMMARY OF MOST IMPORTANT SPECIFICATIONS FOR 2250, 2450, 2650, 2650N and 2850 TRACTORS

Adjusting Valve Clearance
At commencement of lift, turn adjusting screw clockwise ..... 1/4 turn
Control lever play between raising and lowering:
With SG2 cab ..... 12 to15 mm (0.5 to 0.6 in.)
With MC1 cab
– *Up to Tractor Serial No. 637 600L* * ..... 4 to 10 mm (0.16 to 0.4 in.)
– *From Tractor Serial No. 637 601L* * ..... 12 to 15 mm (0.5 to 0.6 in.)
Without cab * ..... 2 to 4 mm (0.08 to 0.16 in.)
On narrow tread tractors ..... 3 to 6 mm (0.12 to 0.24 in.)

Adjusting Rockshaft Control Lever
With SG2 cab
Front edge of rockshaft control lever in position ..... 7 to 7.5
With MC1 cab (up to Tractor Serial No. 637 600L)
Clearance from front end position to front edge of rockshaft control lever* ..... 10+6 mm (0.4+0.24 in.)
With MC1 cab (from Tractor Serial No. 637 601L)
Front edge of control lever in position ..... 7 to 7.5
Without cab
Front edge of rockshaft control lever to front end of quadrant* ..... 12+1/-2 mm (0.47+0.04/-0.08 in.)
On narrow tread tractors
Front edge of rockshaft control lever to front edge of quadrant* ..... 15+10/-5 mm (0.6+0.4/-0.2 in.)
Adjusting commencement of lift with load control
With SG2 cab
Front edge of control lever in position ..... 2 to 2.5
With MC1 cab (up to Tractor Serial No. 637 600L)
Clearance from rear end position to rear edge of rockshaft control lever* ..... 45+6 mm (1.8+0.24 in.)
With MC1 cab (from Tractor Serial No. 637 601L)
Front edge of control lever in position ..... 2 to 2.5
Without cab
Rear edge of control lever to rear end of quadrant* ..... 50 ± 3 mm (2 ± 0.12 in.)
On narrow tread tractors
Clearance from rear end position to rear edge of rockshaft control lever* .... 90+10/-5 mm (3.54+0.4/-0.2 in.)

* Measured at upper edge of quadrant

FRONT AXLE
Maximum permissible axial play of knuckle and spindle assy. in axle knee ..... 0.76 mm (0.03 in.)
Front axle axial play ..... 0 to 0.4 mm (0 to 0.015 in.)
Bearing pin to front axle carrier ..... 100 Nm (75 ft-lb)
Axle knees to axle center ..... 400 Nm (300 ft-lb)
Steering arm to knuckle and spindle assy.
– Clamping screw ..... 120 Nm (85 ft-lb)
– Cap screw ..... 230 Nm (170 ft-lb)

FRONT WHEELS
Wheel hub to axle spindle ..... 50 Nm (35 ft-lb)
Steel disk to rim
– M16x120 attaching screws ..... 250 Nm (180 ft-lb)
– M16x74 attaching screws ..... 280 Nm (210 ft-lb)
Wheel rim to hub
Without front wheel drive ..... 150 Nm (110 ft-lb)
With front wheel drive ..... 300 Nm (220 ft-lb)
Front wheel toe-in
Without front wheel drive ..... 3 to 6 mm (1/8 to 1/4 in.)
With front wheel drive ..... 0 to 3 mm (0 to 1/8 in.)

REAR WHEELS
Flanged Rear Axle
Steel disk to rim
– M16x120 attaching screws ..... 250 Nm (185 ft-lb)
– M16x74 attaching screws ..... 280 Nm (210 ft-lb)
– 9/16 in. attaching screws ..... 200 Nm (145 ft-lb)
Cast disk to rim ..... 230 Nm (170 ft-lb)
Rear wheels to rear axle ..... 400 Nm (300 ft-lb)

Rack-and-Pinion Axle
Wheel hub to rim ..... 230 Nm (170 ft-lb)
Pinion sleeve halves to wheel hub ..... 215 Nm (160 ft-lb)
Sleeve attaching screws to wheel hub ..... 400 Nm (300 ft-lb)

SG2 CAB
SG2 cab to mounting brackets or final drives ..... 200 Nm (145 ft-lb)
Studs in final drive housings ..... 35 Nm (25 ft-lb)

MC1 CAB
MC1 cab to mountings ..... 245 Nm (180 ft-lb)

2-POST ROLL-GUARD
Supports to final drives ..... 230 Nm (170 ft-lb)
Supports to crossmember ..... 230 Nm (170 ft-lb)

4-POST ROLL-GUARD
Roll-guard to fender ..... 120 Nm (85 ft-lb)
Fender to final drive ..... 230 Nm (170 ft-lb)

2250, 2450, 2650, 2650N AND 2850 TRACTORS TECHNICAL MANUAL TM-4440 (Jan-91)

SECTION CONTENTS IN GROUPS – REPAIR

05 – SAFETY

10 – GENERAL

05 – Specifications
10 – Predelivery, delivery and after-sales inspections
15 – Lubrication and service
20 – Tune-up
25 – Tractor separation

20 – ENGINE

05 – Radiator, viscous fan drive and fan

30 – FUEL AND AIR INTAKE SYSTEM

05 – Fuel tank, auxiliary tank and water trap
10 – Cold weather starting aids
15 – Speed control linkage
20 – Air cleaner

40 – ELECTRICAL SYSTEM

05 – Wiring harnesses
10 – Controls and instruments (with SG2 cab)
15 – Controls and instruments (without cab)
20 – Controls and instruments (with MC1 cab)
21 – Adjusting digital speed-hour-meter
25 – Lighting system
30 – Starting motor
35 – Alternator

50 – POWER TRAIN

05 – Clutch operating systems
10 – Single-stage engine clutch
15 – Dual-stage engine clutch
20 – Hi-Lo shift unit
25 – Creeper transmission
26 – Hydrostatic creeper transmission
30 – Transmission – console shift
35 – Transmission – center shift
40 – Synchronized transmission and transmission oil pump
45 – Collar shift transmission and transmission oil pump
50 – Differential
55 – Final drives
60 – Independent PTO shafts
65 – Continuous running PTO
70 – Front PTO
75 – Front wheel drive u.j. drive shaft and disk clutch

60 – STEERING SYSTEM AND BRAKES

05 – Hydrostatic steering
10 – Steering cylinder (without front wheel drive)
15 – Power steering
20 – Manual steering
25 – Hydraulic brakes
30 – Handbrake
35 – Hydraulic trailer brake

INHALT-LB301AE-010490

SECTION CONTENTS IN GROUPS – REPAIR

70 – HYDRAULIC SYSTEM

05 – Valves
10 – Hydraulic pumps
15 – Rockshaft
25 – Selective control valves (spool-type)
30 – Selective control valves (poppet-valve type)
35 – ISO breakaway couplers
40 – ISO quick couplers
45 – Remote cylinder

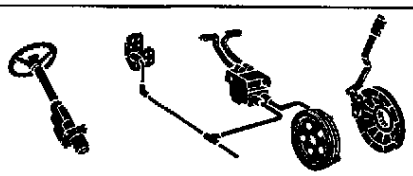
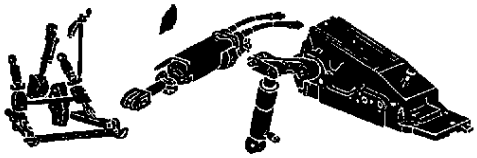
80 – MISCELLANEOUS

05 – Front axle
10 – Front and rear wheels
15 – "AXLA" pickup trailer hitch
20 – Height-adjustable trailer hitch

90 – OPERATOR'S STATION

05 – Safe handling of refrigerants
06 – Servicing air conditioning system
07 – Compressor (up to tractor Serial No. 646 949L)
08 – Compressor (from tractor Serial No. 646 950L)
09 – Components of air conditioning system
10 – Cab ventilation and heating (SG2 cab)
15 – Cab ventilation and heating (SG2 low-profile cab)
20 – Cab ventilation and heating (MC1 cab)
25 – Operator's seats
30 – SG2 cab
35 – MC1 cab
40 – 2-post roll guard
45 – 4-post roll guard

INHALT-LB302AE-010888

SAFETY		05
GENERAL		10
ENGINE		20
FUEL AND AIR INTAKE SYSTEM		30
ELECTRICAL SYSTEM		40
POWER TRAIN		50
STEERING SYSTEM AND BRAKES		60
HYDRAULIC SYSTEM		70
MISCELLANEOUS		80
OPERATOR'S STATION		90

FX 100006 19

FX100006 19-LB303AE-010490

SAFETY AND YOU

This is the safety-alert symbol. When you see this symbol on the machine or in this manual, be alert to the potential for personal injury.

T 81389

T81389;053;TMSAFE 19 07OCT85

IMPORTANT

The IMPORTANT message identifies potential problems which may cause consequential damage to machine. Following recommended procedure will instruct technician how to avoid problem.

A68;N01;0000 19 U 05NOV82

NOTES

The word NOTE is followed by a statement that identifies a qualification or exception to a previous statement. A "NOTE" may also identify nice-to-know information pertinent to, but not directly related to previous statement.

A68; N01;0000 19 V 05NOV82

OBSERVE SAFETY RULES

Avoid loose clothing that can catch in moving parts and put you out of work.

Wear your safety glasses while on the job.

Avoid working on equipment with the engine running. If it is necessary to make checks with the engine running, ALWAYS USE TWO PEOPLE – with the operator, at the controls, able to see the person doing the checking. Also, put the transmission in neutral, set the brake, and apply safety locks provided. KEEP HANDS AWAY FROM MOVING PARTS.

Keep transmission and brake control units properly adjusted at all times. Before making adjustments, stop engine.

Before removing any housing covers, stop engine. Take all objects from your pockets which could fall into the opened housings. Don't let adjusting wrenches fall into opened housings.

Don't attempt to check belt tension while the engine is running.

Don't adjust the fuel system while the machine is in motion.

Before repairing the electrical system, or performing a major overhaul, make sure the batteries are disconnected.

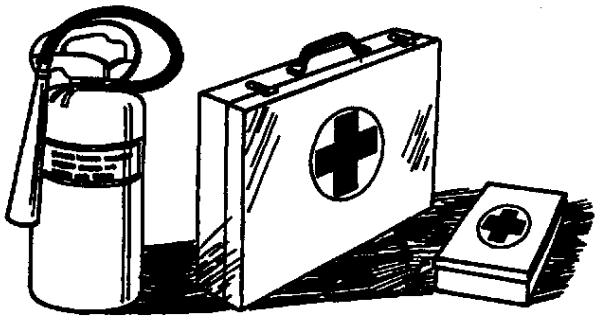
A68; N01;0000 19 S 05NOV82

PREPARE FOR EMERGENCIES

Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance service, hospital and fire department near your telephone.

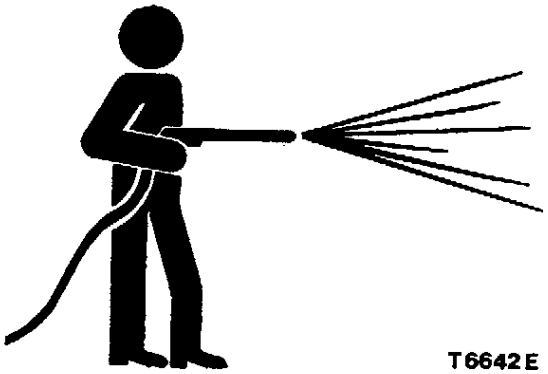


L 114 052

L114052;053;FIR2 19 15MAR89

WORK IN CLEAN AREA

Before starting a job:
– Clean work area and machine.
– Make sure you have all necessary tools to do your job.
– Have the right parts on hand.
– Read all instructions thoroughly; do not attempt shortcuts.



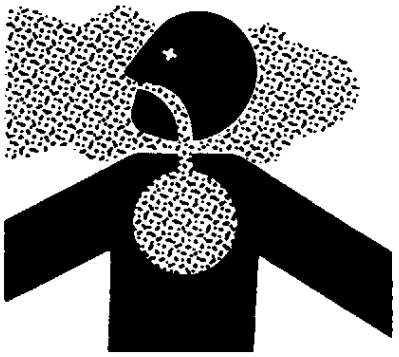
T6642E

T6642E;053;CLEAN 19 19JAN88

WORK IN VENTILATED AREA

Engine exhaust fumes can cause sickness or death. If it is necessary to run an engine in an enclosed area, remove the exhaust fumes from the area with an exhaust pipe extension.

If you do not have an exhaust pipe extension, open the doors and get outside air into the area.

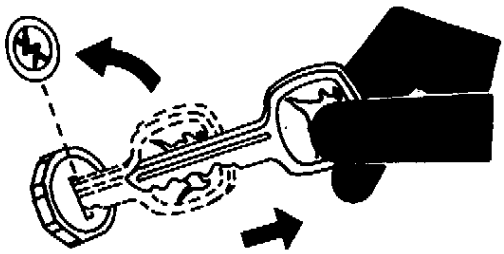


TS220

TS220;053;AIR 19 05JAN88

PARK MACHINE SAFELY

Before working on the machine:
– Lower all equipment to the ground.
– Stop the engine and remove the key.
– Disconnect the battery ground strap.
– Hang a "DO NOT OPERATE" tag in operator station.



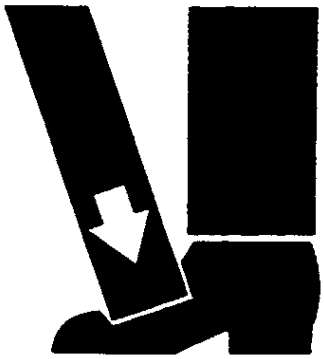
TS230

TS230;053;PARK 19 05JAN88

USE PROPER LIFTING EQUIPMENT

Lifting heavy components incorrectly can cause severe injury or machine damage.

Follow recommended procedure for removal and installation of components in the manual.



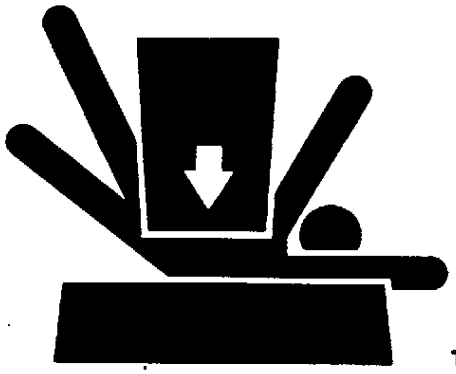
TS 226

TS226;053;LIFT 19 05JAN88

SUPPORT MACHINE PROPERLY

Always lower the attachment or implement to the ground before you work on the machine. If you must work on a lifted machine or attachment, securely support the machine or attachment.

Do not support the machine on cinder blocks, hollow tiles or props that may crumble under continuous load. Do not work under a machine that is supported solely by a jack. Follow recommended procedures in this manual.

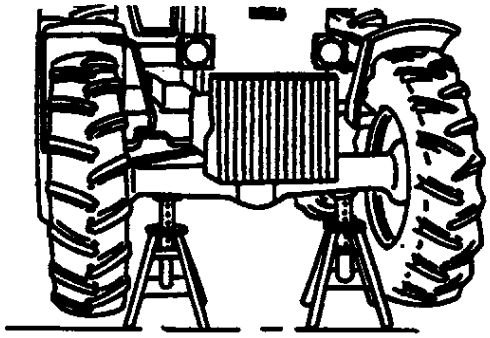


TS 229

TS229:053;LOWER 19 21DEC87

SERVICE FRONT-WHEEL DRIVE TRACTOR SAFELY

When servicing front-wheel drive tractor with the rear wheels supported off the ground and rotating wheels by engine power, always support front wheels in a similar manner. Loss of electrical power or transmission/hydraulic system pressure will engage the front driving wheels, pulling the rear wheels off the support if front wheels are not raised. Under these conditions, front drive wheels can engage even with switch in disengaged position.



L114050

L114050-ESPDAE-140388

SERVICE HYDROSTATIC CREEPER TRANSMISSION SAFELY

Service work on the hydrostatic creeper transmission may be performed with the engine running only if front and rear wheels are raised and the tractor is safely supported.

Loss of electric power or transmission/hydraulic system pressure will engage hydrostatic creeper transmission, even if the toggle switch is in "OFF" position. Tractor could then start to move if wheels are in contact with the ground.

FXB 040 01 UN

FXB04001UN,HYDRO1G 070290

PREVENT MACHINE RUNAWAY

Avoid possible injury or death from a machine runaway.

Do not start the engine by shorting across starter terminals. Machine will start in gear if normal circuitry is bypassed.

NEVER start engine while standing on ground. Start engine only from operator's seat, with the transmission in neutral or "Park".

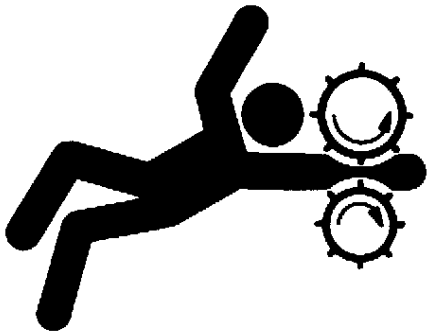
TS177

TS177;053;BYPAS1 19 21MAY85

SERVICE MACHINE SAFELY

Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing or necklace when you work near machine tools or moving parts. If these items were to get caught, severe injury could result.

Remove rings and other jewelry to prevent electrical shorts and entanglement in moving parts.



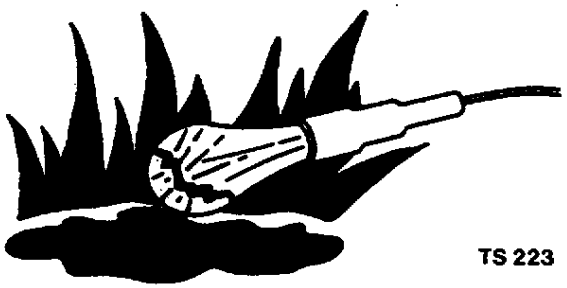
TS228

TS228;053;LOOSE 19 21DEC87

UNDERSTAND CORRECT SERVICE

Illuminate your work area adequately but safely. Use a portable safety light for working inside or under the machine. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidently broken bulb can ignite spilled fuel or oil.

Catch draining fuel, oil, or other fluids into suitable containers. Do not use food or beverage containers that may mislead someone into drinking from them. Wipe up spills at once.



TS 223

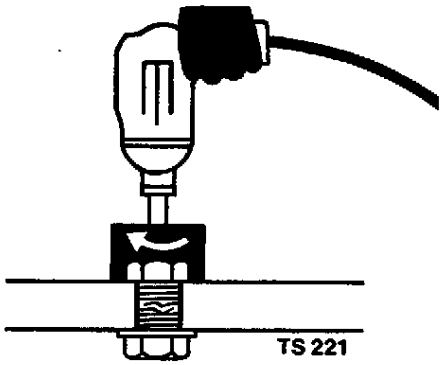
TS223;053;LIGHT 19 23FEB88

USE TOOLS PROPERLY

Use tools appropriate to the work. Makeshift tools, parts, and procedures will not make good repairs.

Use pneumatic and electric tools only to loosen threaded parts and fasteners. Never use such tools to tighten fasteners, especially on light alloy parts.

Use only replacement parts meeting John Deere specifications.



TS 221

TS221;053;REPAIR 19 21DEC87

HANDLE FLUIDS SAFELY – AVOID FIRES

When you work around fuel, do not smoke or work near heaters or other fire hazards.

Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.

Make sure machine is clean of trash, grease and debris.

Do not store oily rags; they can ignite and burn spontaneously.

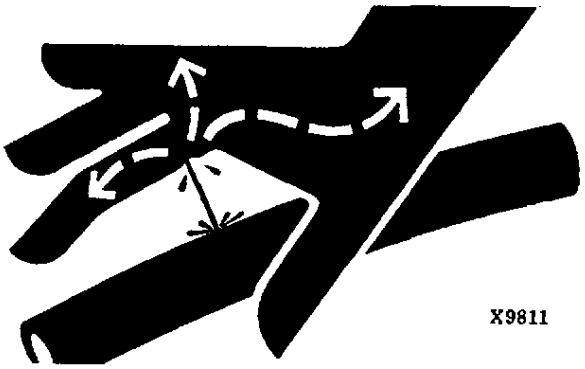
TS 227

TS227;053;FLAME 19 05JAN88

AVOID HIGH-PRESSURE FLUIDS

Escaping fluid (fuel or hydraulic oil) under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Keep hands and body away from pinholes and nozzles which eject fluids under high pressure. Use a piece of cardboard to search for leaks.

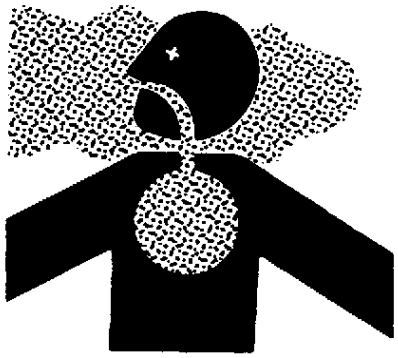
If ANY fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type of injury, or gangrene may result.



X9811

X9811;053;FLUID 19 18SEP87

REMOVE PAINT BEFORE WELDING OR HEATING



TS220

Avoid potentially toxic fumes and dust.

Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch.

Do all work outside or in a well ventilated area. Dispose of paint and solvent properly.

Remove paint before welding or heating:

– If you sand or grind paint, avoid breathing the dust. Wear an approved respirator.

– If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.

TS220-ESPDAE-040690

AVOID HEATING NEAR PRESSURIZED FLUID LINES

TS953

Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders. Do not heat by welding, soldering, or using a torch near pressurized lines or other flammable materials.

Pressurized lines can be accidentally cut when heat goes beyond the immediate flame area. Install fire resisting guards to protect hoses or other materials.

TS953-ESPDAE-040690

AVOID HARMFUL ASBESTOS DUST

Avoid breathing dust that may be generated when handling components containing asbestos fibers. Inhaled asbestos fibers may cause lung cancer.

Components in John Deere products that may contain asbestos fibers are brake pads, brake band and lining assemblies, clutch plates and some gaskets. The asbestos used in these components is usually found in a resin or sealed in some way. Normal handling is not hazardous as long as airborne dust containing asbestos is not generated.

Avoid creating dust. Never use compressed air for cleaning. Avoid brushing or grinding of asbestos-containing materials. When servicing, wear an approved respirator. A special vacuum cleaner is recommended to clean asbestos. If not available, wet the asbestos-containing materials with a mist of oil or water.

Keep bystanders away from the area.

Please note designations on spare parts.

TS220

L114051

TS220,L114051;053;DUST 19 14APR88

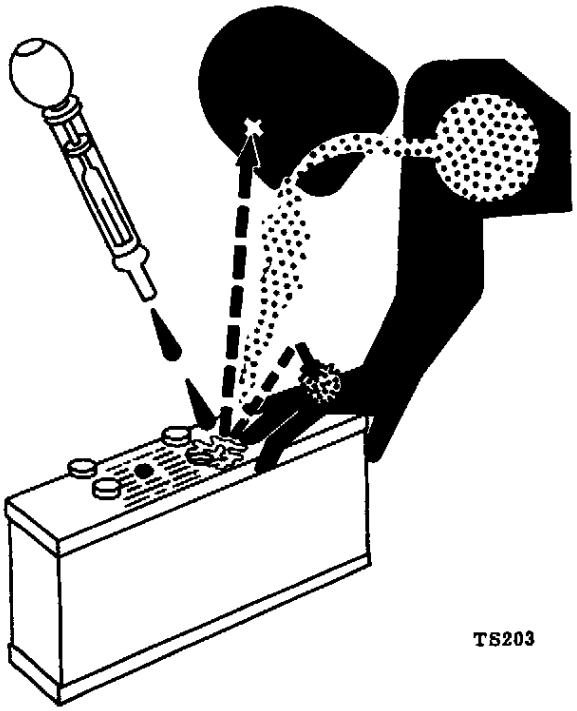
PREVENT ACID BURNS

Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing and cause blindness if splashed into eyes.

Avoid the hazard by:
1. Filling the batteries in a well-ventilated area.
2. Wearing eye protection and rubber gloves.
3. Avoiding breathing fumes when electrolyte is added.
4. Avoiding spilling or dripping electrolyte.
5. Use proper jump start procedure.

If you spill acid on yourself:
1. Flush your skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. Flush your eyes with water for 10 – 15 minutes. Get medical attention immediately.

If acid is swallowed:
1. Drink large amounts of water or milk.
2. Then drink milk of magnesia, beaten eggs or vegetable oil.
3. Get medical attention immediately.



TS203

TS203;053;POISON 19 21DEC87

PREVENT BATTERY EXPLOSIONS

Keep sparks, lighted matches, and open flame away from the top of battery. Battery gas can explode.

Never check battery charge by placing a metal object across the posts. Use a volt-meter or hydrometer.

Do not charge a frozen battery; it may explode. Warm battery to 16°C (60°F).

TS204

TS204;053;SPARKS 19 28JUN88

SERVICE TIRES SAFELY

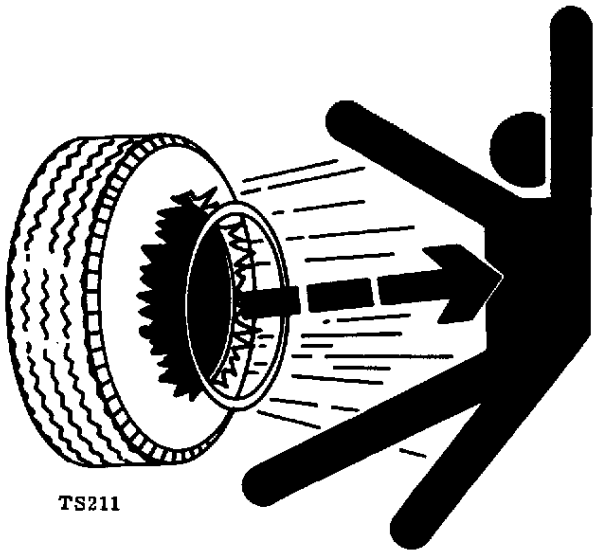
Explosive separation of a tire and rim parts can cause serious injury or death.

Only attempt to mount a tire if you have the proper equipment and experience to perform the job.

Always maintain the correct tire pressure. Do not inflate tires above the recommended pressure.

When inflating tires, use a clip-on chuck and extension hose long enough to allow you to stand to one side and NOT in front of or over the tire assembly. Use a safety cage if available.

Check wheels for low pressure, cuts, bubbles, damaged rims or missing lug bolts and nuts.



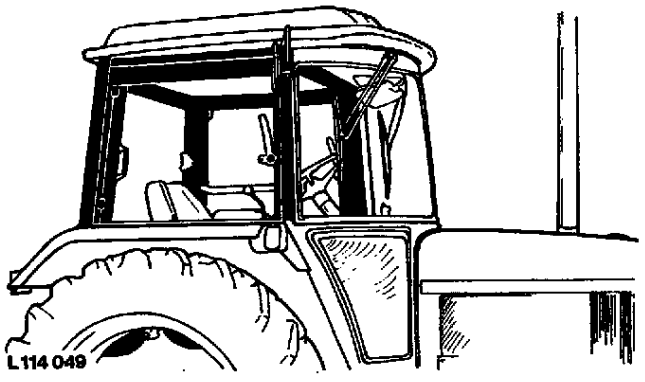
TS211

TS211;053;RIM 19 21DEC87

KEEP CAB/ROPS INSTALLED PROPERLY

Make certain all parts are reinstalled correctly if the cab or roll-over protective structure (ROPS) is loosened or removed for any reason. Tighten mounting bolts to specified torque.

Protection offered by cab or ROPS is impaired if subjected to structural damage, is involved in an overturn incident or is altered in any way by welding, bending, drilling or cutting. A damaged cab or ROPS should be replaced, not reused.

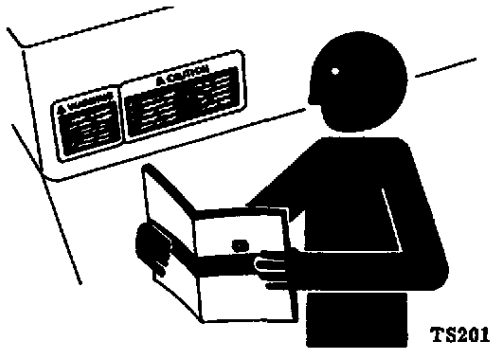


L114 049

L114049;053;ROPS 19 15MAR89

REPLACE SAFETY SIGNS

Replace missing or damaged safety signs. See the machine operator's manual for correct safety sign placement.



TS201

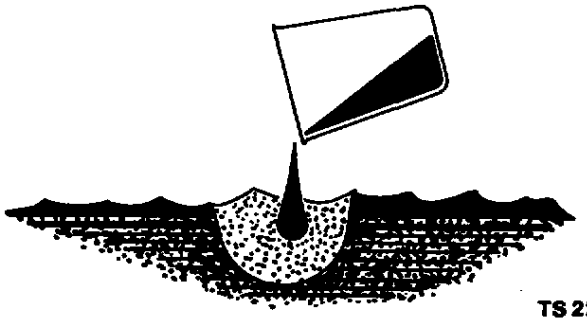
TS201;053;SIGNS1 19 22DEC87

OBSERVE ENVIRONMENTAL PROTECTION REGULATIONS

Be mindful of the environment and ecology.

Before draining any fluids, find out the correct way of disposing of them.

Observe the relevant environmental protection regulations when disposing of oil, fuel, coolant, brake fluid, filters and batteries.



TS 222

TS222-ESPDAE-140388

Section 10
GENERAL

05 – SPECIFICATIONS

		2250	2450	2650	2650 N	2850
Specifications	05-1	x	x	x	x	x
– Serial number plates	05-1	x	x	x	x	x
– Product identification number	05-1	x	x	x	x	x
– Engine serial number	05-1	x	x	x	x	x
– Transmission serial number	05-2	x	x	x	x	x
– Front wheel drive axle serial number	05-3	x	x	x	x	x
– SG2 cab serial number	05-3	x	x	x		x
– MC1 cab serial number	05-3	x	x	x		x
– Model serial numbers	05-3	x	x	x	x	x
– Engine	05-4	x	x	x	x	x
– Engine clutch	05-6	x	x	x	x	x
– Cooling system	05-6	x	x	x	x	x
– Fuel system	05-6	x	x	x	x	x
– Electrical system	05-6	x	x	x	x	x
– Synchronized transmission	05-6	x	x	x	x	x
– Collar shift transmission	05-6	x	x	x		
– Hi-Lo shift unit	05-7	x	x	x	x	x
– Creeper transmission	05-7	x	x	x	x	x
– Hydrostatic creeper transmission	05-7	x	x	x		x
– Differential and final drives	05-7	x	x	x	x	x
– Differential lock	05-7	x	x	x	x	x
– Independent PTO	05-7	x	x	x	x	x
– Continuous-running PTO	05-8	x	x			
– Front PTO	05-8	x	x	x		x
– PTO speeds	05-8	x	x	x	x	x
– Front wheel drive	05-8	x	x	x	x	x
– Hydrostatic steering	05-8	x	x	x	x	x
– Power steering	05-9	x	x	x		x
– Manual steering	05-9	x	x	x		
– Foot brakes	05-9	x	x	x	x	x
– Hand brake	05-9	x	x	x	x	x
– Hydraulic system	05-9	x	x	x	x	x
– Rockshaft	05-9	x	x	x	x	x
– Front hitch	05-9	x	x	x		x
– Ground travel speeds	05-9	x	x	x	x	x
– Front and rear wheels	05-10	x	x	x	x	x
– Dimensions and weights	05-10	x	x	x	x	x
– Capacities	05-10	x	x	x	x	x
– Standard torques for hardware	05-11	x	x	x	x	x

ALLGEM-LB31001AE-010688

10 – PREDELIVERY, DELIVERY AND AFTER-SALES INSPECTIONS		2250	2450	2650	2650 N	2850
Special tools	10-1	x	x	x	x	x
Specifications	10-2	x	x	x	x	x
Capacities	10-3	x	x	x	x	x
Torques for hardware	10-3	x	x	x	x	x
Predelivery inspection	10-5	x	x	x	x	x
Delivery inspection	10-30	x	x	x	x	x
After-sales inspection	10-31	x	x	x	x	x
15 – LUBRICATION AND SERVICE						
Capacities and service intervals	15-1	x	x	x	x	x
Lubricants and service intervals	15-2	x	x	x	x	x
General	15-3	x	x	x	x	x
Engine oil	15-3	x	x	x	x	x
Transmission/hydraulic oil	15-4	x	x	x	x	x
Oil for front wheel drive axle	15-4	x	x	x	x	x
EP multi-purpose grease	15-5	x	x	x	x	x
Storing lubricants	15-5	x	x	x	x	x
Brake fluid for hydraulically operated clutch	15-5	x	x	x		x
Engine coolant	15-6	x	x	x	x	x
Checking engine oil level	15-6	x	x	x	x	x
Changing engine oil	15-7	x	x	x	x	x
Changing engine oil filter	15-7	x	x	x	x	x
Checking fuel filter	15-8	x	x	x	x	x
Replacing fuel filter	15-8	x	x	x	x	x
Replacing coolant	15-9	x	x	x	x	x
Checking transmission/hydraulic system oil level	15-10	x	x	x	x	x
Changing transmission/hydraulic oil	15-11	x	x	x	x	x
Replacing transmission/hydraulic oil filter element	15-12	x	x	x	x	x
Replacing hydraulic oil return flow filter	15-12	x	x	x	x	x
Replacing hydrostatic steering filter (tractors without SG2 cab)	15-13	x	x	x	x	x

ALLGEM-LBS1002AE-010688

15 – LUBRICATION AND SERVICE (Contd.)		2250	2450	2650	2650 N	2850
Cleaning hydraulic pump filter strainer	15-13	x	x	x	x	x
Replacing brake fluid for hydraulically operated clutch	15-13	x	x	x	x	x
Checking axle housing oil level	15-14	x	x	x	x	x
Checking oil level in wheel hub housings	15-14	x	x	x	x	x
Changing front axle oil	15-14	x	x	x	x	x
Cleaning lubricating points	15-15	x	x	x	x	x
Lubricating clutch throw-out bearing (with mechanically operated clutch)	15-15	x	x	x	x	x
Cleaning and repacking front wheel bearings	15-15	x	x	x	x	x
Lubricating front axle and front wheels	15-16	x	x	x	x	x
Lubricating universal-jointed drive shaft (tractors with front wheel drive)	15-17	x	x	x	x	x
Lubricating rear axle bearings	15-17	x	x	x	x	x
Lubricating three-point hitch	15-18	x	x	x	x	x
Lubricating front PTO	15-18	x	x	x		x
Lubricating front hitch	15-19	x	x	x		x

ALLGEM-LB31003AE-010688

20 – TUNE-UP

		2250	2450	2650	2650 N	2850
Specifications	20-1	x	x	x	x	x
Preliminary engine testing	20-2	x	x	x	x	x
Checking air cleaner element	20-3	x	x	x	x	x
Checking air intake system connections for leaks	20-3	x	x	x	x	x
Checking crankcase vent tube for clogging	20-3	x	x	x	x	x
Cleaning radiator side panels and grille screens	20-3	x	x	x	x	x
Cleaning radiator and oil cooler	20-4	x	x	x	x	x
Cleaning condenser	20-4	x	x	x		x
Checking radiator cap	20-4	x	x	x	x	x
Checking radiator for leaks	20-5	x	x	x	x	x
Checking thermostat	20-5	x	x	x	x	x
Checking fuel transfer pump	20-5	x	x	x	x	x
Checking fuel filter	20-6	x	x	x	x	x
Checking fuel tank	20-6	x	x	x	x	x
Checking auxiliary fuel tank	20-6	x	x	x		x
Checking water trap	20-7	x	x	x	x	x
Checking fuel injection pump adjustment	20-7	x	x	x	x	x
Checking engine slow and fast idle speeds	20-7	x	x	x	x	x
Checking speed control linkage adjustment	20-8	x	x	x	x	x
Checking batteries	20-8	x	x	x	x	x
Checking fan belt tension	20-8	x	x	x	x	x
Checking compressor V-belt tension	20-9	x	x	x		x
Checking operation of start safety switch	20-9	x	x	x	x	x
Checking operation of starting motor	20-9	x	x	x	x	x
Checking lighting system	20-10	x	x	x	x	x
Final engine check	20-10	x	x	x	x	x
Checking tractor operation	20-10	x	x	x	x	x

ALLGEM-LB31004AE-010888

25 – TRACTOR SEPARATION

		2250	2450	2650	2650 N	2850
Special tools	25-1	x	x	x	x	x
Specifications	25-6	x	x	x	x	x
Torques for hardware	25-6	x	x	x	x	x
Capacities	25-9	x	x	x	x	x
Standard torques for hardware	25-10	x	x	x	x	x
Important notes	25-13	x	x	x	x	x
Removing tractor front end	25-14	x	x	x	x	x
Installing tractor front end	25-22	x	x	x	x	x
Separating between engine and clutch housing	25-26	x	x	x	x	x
Joining tractor between engine and clutch housing	25-39	x	x	x	x	x
Removing engine	25-42	x	x	x	x	x
Installing engine	25-43	x	x	x	x	x
Removing clutch housing	25-44	x	x	x	x	x
Installing clutch housing	25-47	x	x	x	x	x
Removing transmission	25-48	x	x	x	x	x
Installing transmission	25-60	x	x	x	x	x
Removing final drives	25-64	x	x	x	x	x
Installing final drives	25-77	x	x	x	x	x
Removing rockshaft	25-83	x	x	x	x	x
Installing rockshaft	25-88	x	x	x	x	x
Removing front axle	25-90	x	x	x	x	x
Installing front axle	25-92	x	x	x	x	x
Removing front wheel drive axle	25-94	x	x	x	x	x
Installing front wheel drive axle	25-96	x	x	x	x	x
Removing SG2 cab	25-99	x	x	x		x
Installing SG2 cab	25-110	x	x	x		x
Removing MC1 cab	25-113	x	x	x		x
Installing MC1 cab	25-123	x	x	x		x
Removing front hitch	25-125	x	x	x		x
Installing front hitch	25-128	x	x	x		x
Removing front PTO	25-130	x	x	x		x
Installing front PTO	25-132	x	x	x		x

ALLGEM-LB31005AE-010888

SPECIFICATIONS

SERIAL NUMBER PLATES

The following illustrations show the serial number plates for tractor major components. The letters and figures on these plates are required for warranty claims and when ordering replacement parts.

TECHDA-LA71005AE-180385

PRODUCT IDENTIFICATION NUMBER PLATE

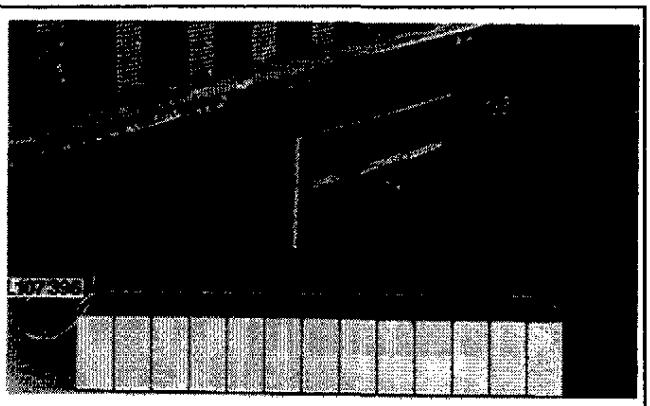
Tractors Without Front Hitch

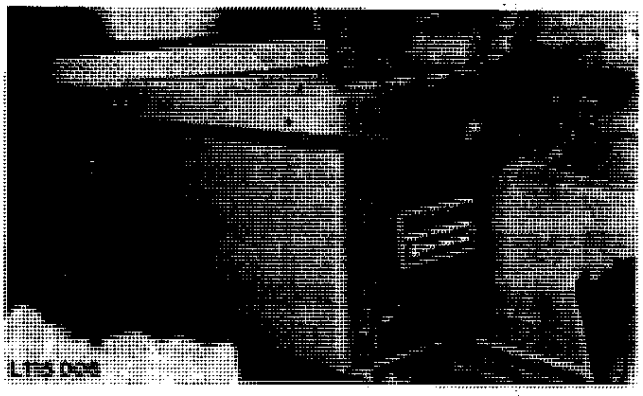
The product identification number plate is located on right-hand side of front axle carrier.
The chassis number is stamped in front axle carrier next to the identification number plate.

Tractors With Front Hitch

The product identification number plate is located on front side of right-hand battery box.
The chassis number is stamped in front axle carrier under the right-hand radiator guard plate.

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



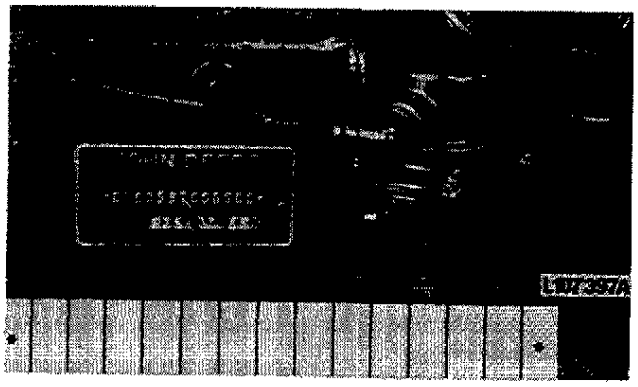


L107396,L115006-LB21005AE-010886

ENGINE SERIAL NUMBER PLATE

The engine serial number plate is located on right-hand side of engine block.

NOTE: The engine serial number plate shows the engine type as well as the engine serial number. When ordering engine parts, quote all figures stamped on this plate.



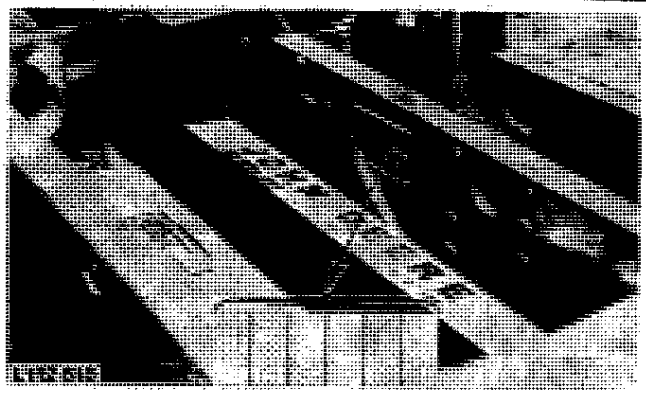
L107397A-LB41005AE-010887

TRANSMISSION SERIAL NUMBER PLATE (Tractors Without Cab)

The transmission serial number plate is located on right-hand side of transmission case.

From tractor Serial No. 617 678L, an additional serial number plate is attached to left-hand side of dash.

NOTE: In addition to serial number of transmission and transmission type, this serial number plate also specifies differential and front wheel drive gear ratios.

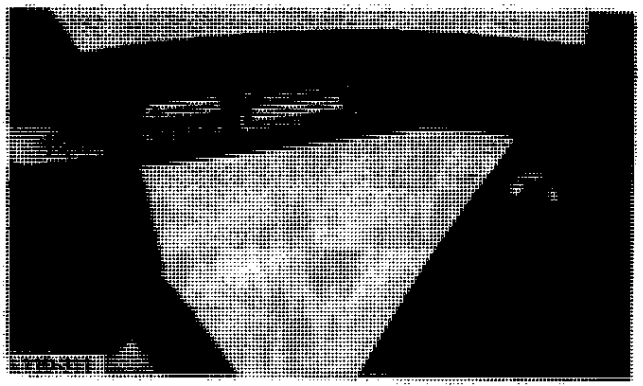


L112618,L119364-LB31005AE-010888

TRANSMISSION SERIAL NUMBER PLATE (Tractors With SG2 Cab)

The transmission serial number plate is located on right-hand side of cab crossmember and on right-hand side of transmission case.

NOTE: In addition to serial number of transmission and transmission type, this serial number plate also specifies differential and front wheel drive gear ratios.

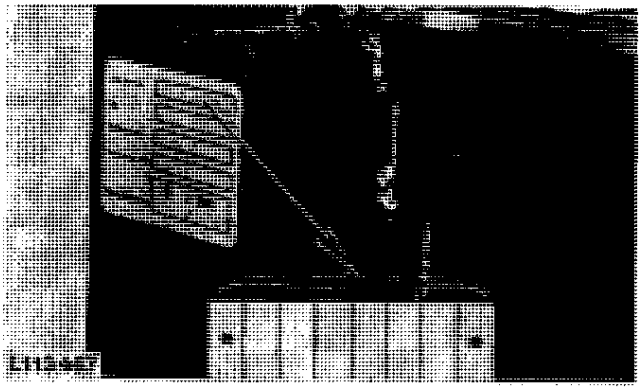


L110311-LB21005AE-010886

TRANSMISSION SERIAL NUMBER PLATE (Tractors With MC1 Cab)

The transmission serial number plate is located on right-hand side of cowl and on right-hand side of transmission case.

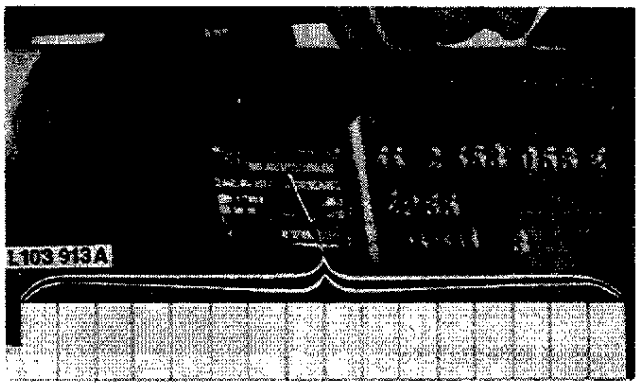
NOTE: In addition to serial number of transmission and transmission type, this serial number plate also specifies differential and front wheel drive gear ratios.



L113467-LB31005AE-010287

FRONT WHEEL DRIVE AXLE SERIAL NUMBER PLATE

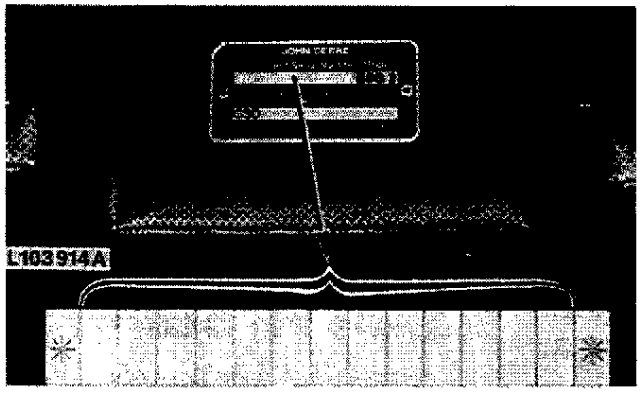
The front wheel drive axle serial number plate is located on rear of right-hand axle half.



L103913A-LA71005AE-180385

SG2 CAB SERIAL NUMBER PLATE

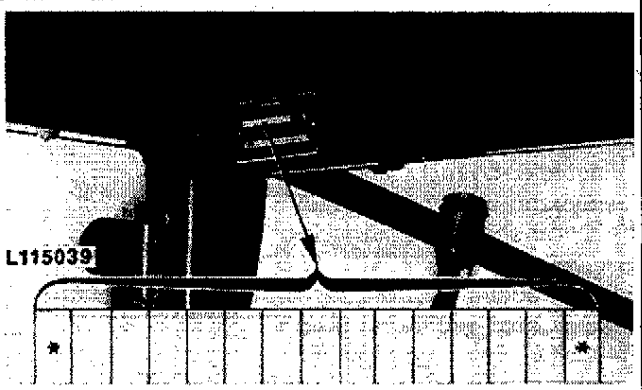
With cab door open, cab serial number plate is visible in roof recess as you enter the cab.



L103914A-LB21005AE-010886

MC1 CAB SERIAL NUMBER PLATE

The serial number plate is located on right-hand side of frame above the rear window.



L115039-LB31005AE-010287

MODEL SERIAL NUMBERS

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

TECHDA-LA71005BE-180385

ENGINE

Number of cylinders	4
Bore	106.5 mm (4.19 in.)
Stroke	110 mm (4.33 in.)
Displacement	3920 cm³ (239 cu.in.)
Compression ratio	17.8 : 1
Max. torque	
With synchronized transmission:	
– 2250 at 1500 rpm	230 Nm (170 ft-lb)
– 2450 at 1400 rpm	255 Nm (188 ft-lb)
– 2650 and 2650N at 1500 rpm	285 Nm (210 ft-lb)
– 2850 at 1500 rpm	315 Nm (232 ft-lb)
With collar shift transmission:	
– 2250 at 1300 rpm	210 Nm (155 ft-lb)
– 2450 at 1300 rpm	230 Nm (170 ft-lb)
– 2650 at 1400 rpm	248 Nm (183 ft-lb)
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.)
Slow idle speed	750 to 850 rpm
Fast idle speed:	
– Synchronized transmission	2410 to 2510 rpm
– Collar shift transmission	2610 to 2660 rpm
Rated engine speed:	
– Synchronized transmission	2300 rpm
– Collar shift transmission	2500 rpm
Working speed range	
Synchronized transmission:	
– 2250, 2650, 2650N and 2850	1500 to 2300 rpm
– 2450	1400 to 2300 rpm
Collar shift transmission:	
– 2250 and 2450	1300 to 2500 rpm
– 2650	1400 to 2500 rpm

TECHDA-LB31005AE-010888

Engine speed for PTO operation

Synchronized transmission:

– 540 rpm PTO	
– 2250 to 2850	2070 rpm
– 2650N	1836 rpm
– 1000 rpm PTO	2172 rpm

Collar shift transmission:

– 540 rpm PTO	2034 rpm
– 1000 rpm PTO	2407 rpm

Flywheel horsepower at engine rated speed:
– According to DIN 70 020

	Tractors with: Synchronized transmission	Collar shift transmission
– 2250	46 kW (62 PS)	46 kW (62 PS)
– 2450	51 kW (70 PS)	51 kW (70 PS)
– 2650	57 kW (78 PS)	55 kW (75 PS)
– 2650N	57 kW (78 PS)	
– 2850	63 kW (86 PS)	

PTO* horsepower at engine rated speed:
– According to DIN 70 020

	Tractors with: Synchronized transmission	Collar shift transmission
– 2250	41 kW (56 PS)	41 kW (56 PS)
– 2450	46 kW (63 PS)	46 kW (63 PS)
– 2650	52 kW (71 PS)	50 kW (68 PS)
– 2650N	52 kW (71 PS)	
– 2850	57 kW (78 PS)	

– According to SAE J 1349

	Tractors with: Synchronized transmission	Collar shift transmission
– 2250	39 kW (53 hp)	39 kW (53 hp)
– 2450	43 kW (59 hp)	43 kW (59 hp)
– 2650	48 kW (65 hp)	48 kW (65 hp)
– 2650N	48 kW (65 hp)	
– 2850	55 kW (75 hp)	

Lubrication system ..... Full internal force feed system with full flow filter

* With engine run in (above 100 hours of operation) and at operating temperature (engine and transmission), measured by means of a dynamometer. Permissible variation ± 5%

TECHDA-LB31005BE-010888

ENGINE CLUTCH

– Type	Single dry disk clutch with torsion damper or dual dry disk clutch, foot-operated

COOLING SYSTEM

– Type	Pressurized system with centrifugal pump
– Temperature regulation	Thermostat and when equipped, viscous fan drive

FUEL SYSTEM

– Type	Direct injection
– Fuel injection pump timing to engine	TDC
– Fuel injection pump type	Distributor type with four pistons
– Air cleaner	Dry-type air cleaner with secondary (safety) element

ELECTRICAL SYSTEM

– Batteries	2 x 12 volts, 55 Ah or 66 Ah
– Alternator with external regulator	14 volts, 55 or 85 amps.
– Starting motor	12 volts, 2.7 kW (3.7 hp)
– Battery terminal grounded	negative

SYNCHRONIZED TRANSMISSION

– Type	Synchronized transmission
– Gear selections	8 forward and 4 reverse
– Gear shifting	Two forward ranges and one reverse range; Synchronized forward and reverse shifting within range

COLLAR-SHIFT TRANSMISSION

– Type	Helical gears
– Gear selections	8 forward and 4 reverse
– Gear shifting	Two forward ranges and one reverse range

TECHDA-LB31005CE-000267

HI-LO SHIFT UNIT

– Type	Hydraulic gear reduction unit which can be shifted under load with "wet" multiple disk clutch and "wet" disk brake.
– Travel speed decreases in each gear by	approx. 20 %
– Shifting the normal speeds	hydraulic
– Shifting the reduced speeds	preloaded Belleville springs

CREEPER TRANSMISSION

– Type	Synchronized reduction gear
– Ground travel speed decrease in the first and reverse ranges by	approx. 79%
– Shifting	Mechanically, not under load

HYDROSTATIC CREEPER TRANSMISSION

– Type	Variable speed hydraulic motor
– Control	Electric/hydraulic switching valve and proportional flow control valve

DIFFERENTIAL AND FINAL DRIVES

– Type of differential	Spiral bevel gears
– Type of final drive	Planetary reduction gear

DIFFERENTIAL LOCK

– Engaged	Via lever or foot pedal
– Disengaged	Automatically as soon as traction has equalized

INDEPENDENT PTO

– Type	Independent of transmission, can be engaged and disengaged under load
– PTO speeds at engine speed of:	
– With synchronized transmission:	
– 2070 rpm (2250 and 2850)	540 rpm
– 1836 rpm (2650N)	540 rpm
– 2172 rpm (2250 to 2850 and 2650N)	1000 rpm
– With collar shift transmission:	
– 2034 rpm	540 rpm
– 2407 rpm	1000 rpm
	interchangeable or hand shift
– PTO clutch	Hydraulically operated "wet" disk clutch
– PTO brake	Hydraulically operated "wet" disk brake

TECHDA-LB31005CE-010888

CONTINUOUS-RUNNING PTO

– Type	Independent of transmission, uses dual-stage engine clutch

FRONT PTO

– Type	Independent of transmission, can be engaged and disengaged under load
– Control	Electric/hydraulic solenoid switch
– PTO speed at an engine speed of: 2172 rpm (counterclockwise) and 2154 rpm (clockwise)	1000 rpm
– PTO clutch	Hydraulically operated "wet" disk clutch
– PTO brake	Hydraulically operated "wet" disk brake

PTO SPEEDS

At engine speed	540 rpm shaft	1000 rpm shaft
With synchronized transmission: 2250 to 2850		
– 800 rpm	208 rpm	368 rpm
– 2070 rpm	540 rpm	954 rpm
– 2172 rpm	566 rpm	1000 rpm
– 2300 rpm	600 rpm	1059 rpm
– 2400 rpm	626 rpm	1106 rpm
2650N		
– 800 rpm	235 rpm	368 rpm
– 1836 rpm	540 rpm	846 rpm
– 2172 rpm	638 rpm	1000 rpm
– 2300 rpm	676 rpm	1059 rpm
– 2400 rpm	706 rpm	1106 rpm
With collar shift transmission:		
– 800 rpm	212 rpm	332 rpm
– 2034 rpm	540 rpm	845 rpm
– 2407 rpm	639 rpm	1000 rpm
– 2500 rpm	664 rpm	1038 rpm
– 2600 rpm	690 rpm	1080 rpm

FRONT WHEEL DRIVE

– Type	Engaged hydraulically under load with "wet" disk clutch
– Control	Electric/hydraulic solenoid switch
– Drive engagement	preloaded Belleville springs
– Drive disengagement	hydraulic

TECHDA-LB31005DE-010888

HYDROSTATIC STEERING

– Type	Without mechanical linkage between steering valve and front wheels

POWER STEERING

– Type	Hydraulically operated steering linkage

MANUAL STEERING

– Type	Recirculating ball bearing, worm and nut design

FOOT BRAKES

– Rear wheel brakes	Self-adjusting, hydraulically operated "wet" disk brakes
– Four-wheel brake (universal-jointed drive shaft brake)	Self-adjusting, hydraulically operated disk brake
– Four-wheel brake (electrically controlled)	Automatic engagement of front wheel drive

HANDBRAKE

– Type	Mechanically operated band-type locking brake acting on the differential

HYDRAULIC SYSTEM

– Type	Closed-center, constant pressure system
– Stand-by pressure	19000 kPa (190 bar; 2760 psi)
– Operating pressure	17000 kPa (170 bar; 2470 psi)
– Hydraulic pump	4 or 8-piston pump with variable displacement

ROCKSHAFT

– Type	With three-point hitch
– Regulation	Load control, depth control, load-and-depth control, float position
– Control	Via draft links

FRONT HITCH	Controlled by selective control valve
GROUND TRAVEL SPEEDS	see Operator's Manual

TECHDA-LB31005EE-010888

FRONT AND REAR WHEELS

– Tires, tread widths, tire pressures and ballast weights	see "Operator's Manual"
DIMENSIONS AND WEIGHTS	see "Operator's Manual"

CAPACITIES

Fuel tank	84.0 liters (22.2 U.S. gal.)
Auxiliary tank	52.0 liters (13.7 U.S. gal.)
Cooling system:	
– Without cab or with MC1 cab (without heater)	13.0 liters (3.4 U.S. gal.)
– With SG2 or MC1 cab (with heater)	15.0 liters (4.0 U.S. gal.)
Engine crankcase:	
– Initial filling	10.5 liters (2.8 U.S. gal.)
– Oil change with filter replacement	10.0 liters (2.6 U.S. gal.)
Transmission/hydraulic system (including oil reservoir and oil cooler):	
– Initial filling (synchronized transmission):	
– Without front wheel drive	50.0 liters (13.2 U.S. gal.)
– With front wheel drive	53.0 liters (14.0 U.S. gal.)
– With front PTO	55.0 liters (14.5 U.S. gal.)
– With hydrostatic creeper transmission, an additional	2.0 liters (0.53 U.S. gal.)
– Oil change with filter replacement:	
– Without front wheel drive	47.5 liters (12.5 U.S. gal.)
– With front wheel drive	50.5 liters (13.3 U.S. gal.)
– With front PTO	52.5 liters (13.9 U.S. gal.)
– With hydrostatic creeper transmission, an additional	2.0 liters (0.53 U.S. gal.)
– Initial filling (collar shift transmission):	
– 2250 and 2450	41.0 liters (10.8 U.S. gal.)
– 2650	46.0 liters (12.2 U.S. gal.)
– Oil change with filter replacement:	
– 2250 and 2450	33.0 liters (8.7 U.S. gal.)
– 2650	38.0 liters (10.0 U.S. gal.)
– With heavy-duty final drives, an additional	5.0 liters (1.3 U.S. gal.)
Front Wheel Drive	
– Front axle housing:	
– 2250 to 2850	5.3 liters (1.4 U.S. gal.)
– 2650N	3.25 liters (0.86 U.S. gal.)
– Wheel hub housing, each	0.75 liters (0.2 U.S. gal.)
Hydraulically operated clutch system	250 cm^3 (8.75 fl.oz.)
Air conditioning system	1.8 kg (4 lb)

TECHDA-LB31005FE-010888

STANDARD TORQUES FOR HARDWARE

Recommended torques in Nm and ft-lb for hose and pipeline connections

(A)	(B)		(C)	
	Nm	ft-lb	Nm	ft-lb
3/8-24 UNF	7,5	5,5	8	6
7/16-20 UNF	10	7	12	9
1/2-20 UNF	12	9	15	11
9/16-18 UNF	15	11	25	18
3/4-16 UNF	25	20	45	35
7/8-14 UNF	40	30	60	45
1-1/16-12 UNC	60	45	100	75
1-3/16-12 UNC	70	50	120	90
1-5/16-12 UNC	80	60	140	105
1-5/8-12 UNC	110	80	190	140
1-7/8-12 UNC	150	110	220	160

L_110192

A–Thread size **B–With O-rings** **C–With cone**

L110192-LB21005AE-010886

Recommended torques in Nm and ft-lb for UNC and UNF cap screws

A	 10.9 C		 12.9 D	
B	Nm	ft-lb	Nm	ft-lb
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

L 110 193

A–Head marking (identifying strength)
B–Thread O.D. (in.)

C–Tempered steel high strength bolts and cap screws
D–Tempered steel extra high strength bolts and cap screws

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.

L110193-LB21005AE-010886

Recommended torques in Nm and ft-lb for metric cap screws

(A)	8.8 (C)		10.9 (D)		12.9 (E)	
(B)	Nm	ft-lb	Nm	ft-lb	Nm	ft-lb
M5	7	5	9	6,5	10	8,5
M 6	10	8,5	15	10	20	15
M 8	30	20	40	30	40	30
M 10	50	35	80	60	90	70
M 12	100	75	140	100	160	120
M 14	160	120	210	155	260	190
M 16	240	175	350	260	400	300
M 20	480	355	650	480	780	575
M 24	820	605	1150	850	1350	995
M 30	1640	1210	2250	1660	2700	1990
M 36	2850	2110	4000	2950	4700	3465

L 110 194

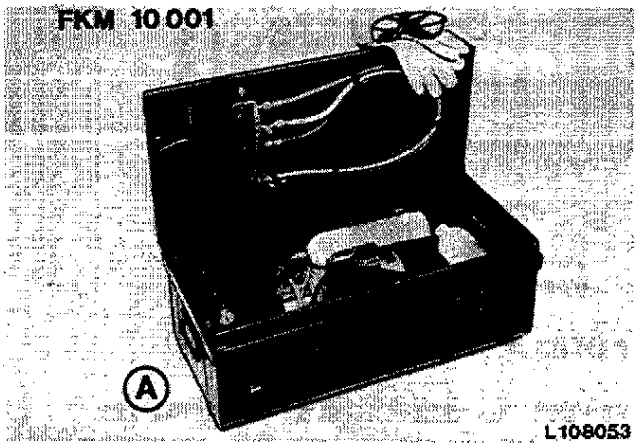
A–Head marking (identifying strength)
B–Thread O.D. (mm)
C–Standard bolts and cap screws
D–Tempered steel high strength bolts and cap screws
E–Tempered steel extra high strength bolts and cap screws

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

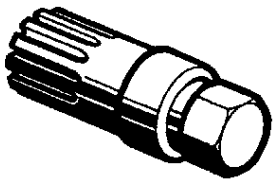
Torque figures indicated above and in the specification sections of this manual are valid for non-greased or non-oiled threads and heads unless otherwise specified. Therefore, do not grease or oil bolts or cap screws unless otherwise specified in this manual.

L110194-LB21005AE-010886

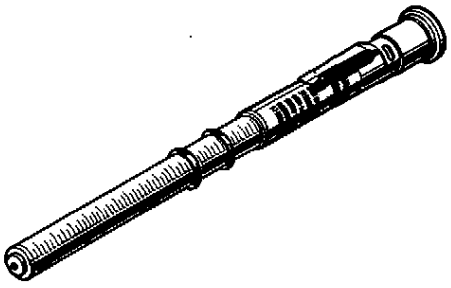
SPECIAL TOOLS



JDE-83



JDST-28



A–Checking refrigerant lines for leaks
B–Turning engine for checking valve clearance
C–Checking tension of V-belts

L108053,L115068-LB31010AE-010888

SPECIFICATIONS

ENGINE SPEEDS

– Slow idle speed	750 to 850 rpm
– Fast idle speed:	
– With synchronized transmission	2410 to 2510 rpm
– With collar shift transmission	2610 to 2660 rpm
– Rated engine speed:	
– With synchronized transmission	2300 rpm
– With collar shift transmission	2500 rpm

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 both pulleys.

BATTERIES

Specific gravity at an acid temperature of 20° C (68° F):	
– Normal and arctic conditions	1.28
– Tropical conditions	1.23

CLUTCH OPERATING LINKAGE

– Clutch pedal free travel (with mechanically operated clutch)	25 mm (1 in.)

FRONT WHEEL TOE-IN

– Tractors without front wheel drive	3 to 6 mm (1/8 to 1/4 in.)
– Tractors with front wheel drive	0 to 3 mm (0 to 1/8 in.)

BRAKES

– To check brake setting, load each brake pedal for 1 minute with	270 N (60 lb)
– Lowering of a brake pedal within 1 minute at a load of 270 N (60 lb) max	approx. 25 mm (1 in.)
– Handbrake lever setting (in third or fourth notch)	110 N (25 lb)

INSPEK-LB31010AE-010888

CAPACITIES

Engine crankcase:	
– With filter change	10.0 liters (2.6 U.S. gal.)
Front Wheel Drive	
Front axle housing:	
– 2250 to 2850	5.3 liters (1.4 U.S. gal.)
– 2650N	3.25 liters (0.86 U.S. gal.)
– Wheel hub housings, each	0.75 liters (0.2 U.S. gal.)

INSPEK-LB31010BE-010888

TORQUES FOR HARDWARE

Steel disk to front wheel hub:	
– Without front wheel drive	150 Nm (110 ft-lb)
– With front wheel drive	300 Nm (220 ft-lb)
Steel disk to front wheel rim:	
– M16 x 120 attaching bolts	250 Nm (185 ft-lb)
– M16 x 74 attaching bolts	280 Nm (210 ft-lb)
On tractors with flanged rear axle:	
– Rear wheels to rear axle	400 Nm (300 ft-lb)
– Steel disk to rear wheel rim:	
– M16 x 120 attaching bolts	250 Nm (185 ft-lb)
– M16 x 74 attaching bolts	280 Nm (210 ft-lb)
– 9/16 in. attaching bolts	200 Nm (145 ft-lb)
– Cast disk to rear wheel rim	230 Nm (170 ft-lb)
On tractors with rack-and-pinion axle:	
– Rear wheel rim to wheel hub	230 Nm (170 ft-lb)
– Pinion sleeve half to wheel hub	215 Nm (160 ft-lb)
– Key sleeve half to wheel hub	400 Nm (300 ft-lb)
Axle knees to front axle center section	400 Nm (300 ft-lb)
Tie rod clamps:	
– M10 cap screw	55 Nm (40 ft-lb)
– M12 cap screw	90 Nm (65 ft-lb)
Tie rod tube, cap screw	55 Nm (40 ft-lb)

INSPEK-LB31010CE-010888