3325 and 3365 Professional Turf Mower

For complete service information also see:

Yanmar Engine Repair CTM3

John Deere Horicon Works
TM1427 (30MAR98)
LITHO IN U.S.A.
ENGLISH

Introduction

FOREWORD

This manual is written for an experienced technician. Essential tools required in performing certain service work are identified in this manual and are recommended for use.

Live with safety: Read the safety messages in the introduction of this manual and the cautions presented throughout the text of the manual.

N 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.

Technical manuals are divided in two parts: repair and operation and tests. Repair sections tell how to repair the components. Operation and tests sections help you identify the majority of routine failures quickly.

Information is organized in groups for the various components requiring service instruction. At the beginning of each group are summary listings of all applicable essential tools, service equipment and tools, other materials needed to do the job, service parts kits, specifications, wear tolerances, and torque values.

Technical Manuals are concise guides for specific machines. They are on-the-job guides containing only the vital information needed for diagnosis, analysis, testing, and repair.

Fundamental service information is available from other sources covering basic theory of operation, fundamentals of troubleshooting, general maintenance, and basic type of failures and their causes.

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All information, illustrations and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

TM1427-19-30MAR93

Section 10
GENERAL INFORMATION

Contents

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.

TS227 -UN-23AUG88

DX,FLAME -19-04JUN90

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 -UN-23AUG88

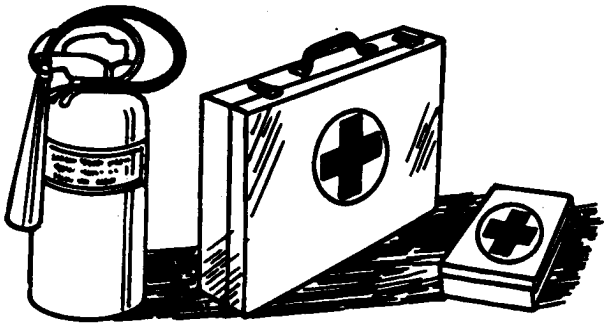
DX,SPARKS -19-03MAR93

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.



TS291 -UN-23AUG88

DX,FIRE2 -19-03MAR93

PREVENT ACID BURNS

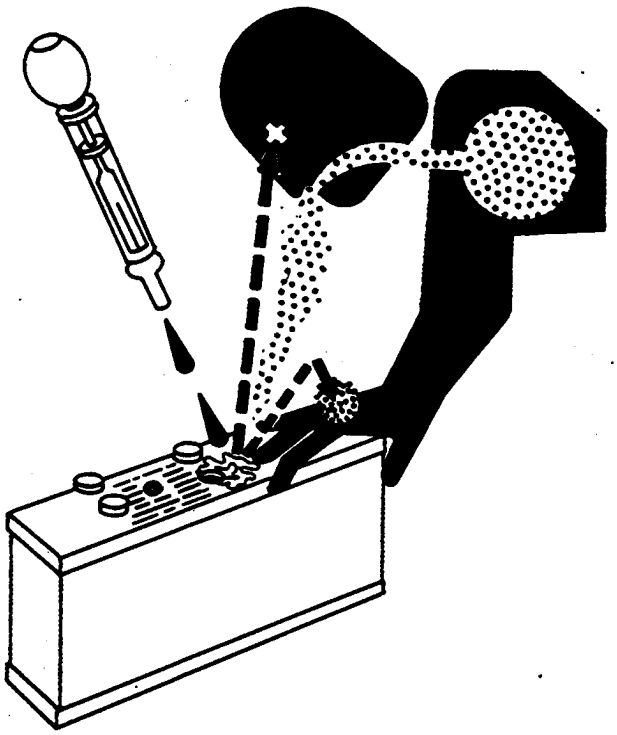
10
05
2

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 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 -UN-23AUG88

DX,POISON -19-04JUN90

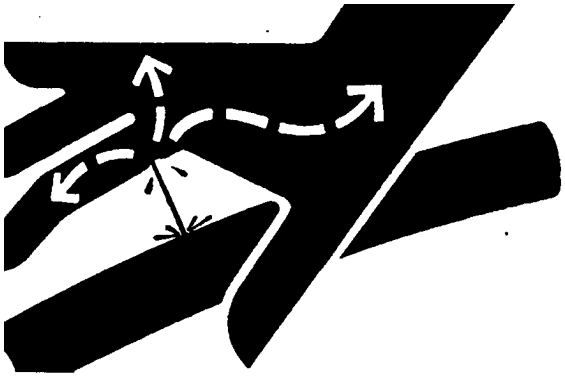
AVOID HIGH-PRESSURE FLUIDS

Escaping fluid under pressure can penetrate the skin causing serious injury.

Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.

Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A.



X9811 -UN-23AUG88

DX,FLUID -19-03MAR93

AVOID INJURY FROM ROTATING BLADES

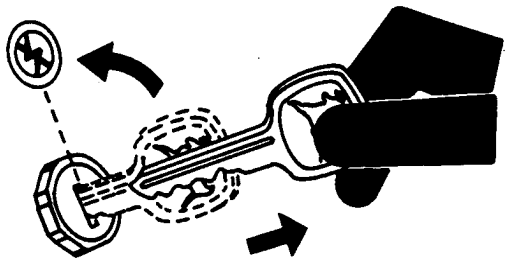
Keep hands and feet away while machine is running. Shut off power to service, lubricate or unlatch cutting units.

E30096 -UN-21SEP88

2E6,1005G,1C -19-25MAY90

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.



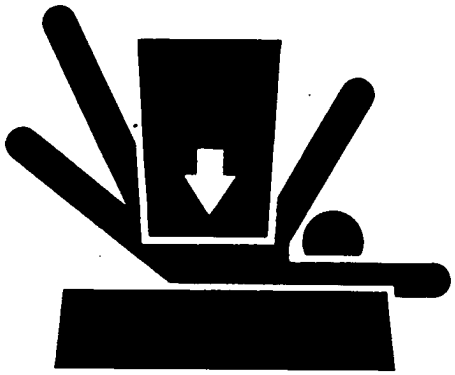
TS230 -UN-24MAY89

DX,PARK -19-04JUN90

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.



TS229 -UN-23AUG88

DX,LOWER -19-04JUN90

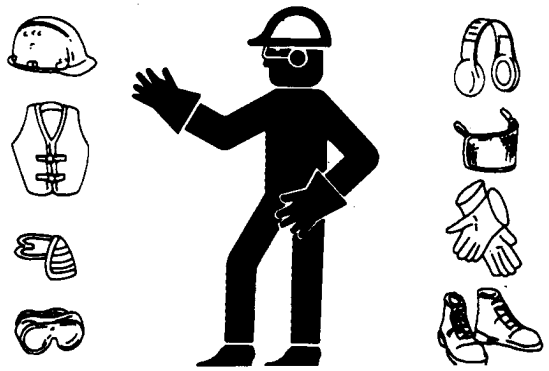
WEAR PROTECTIVE CLOTHING

Wear close fitting clothing and safety equipment appropriate to the job.

Prolonged exposure to loud noise can cause impairment or loss of hearing.

Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.

Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating machine.

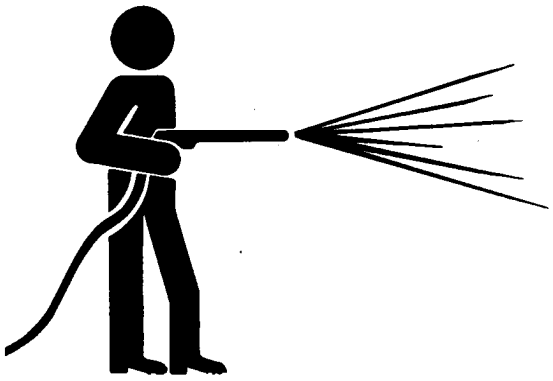


TS206 -UN-23AUG88

DX,WEAR -19-10SEP90

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.



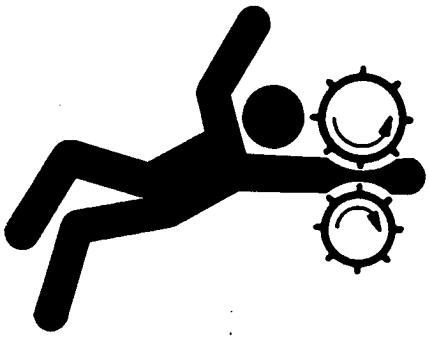
T6642EJ -UN-18OCT88

DX,CLEAN -19-04JUN90

SERVICE MACHINES 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 -UN-23AUG88

DX,LOOSE -19-04JUN90

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.

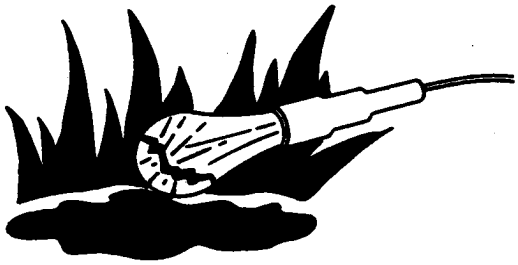
If you do not have an exhaust pipe extension, open the doors and get outside air into the area.

TS220 -UN-23AUG88

DX,AIR -19-04JUN90

ILLUMINATE WORK AREA SAFELY

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 accidentally broken bulb can ignite spilled fuel or oil.

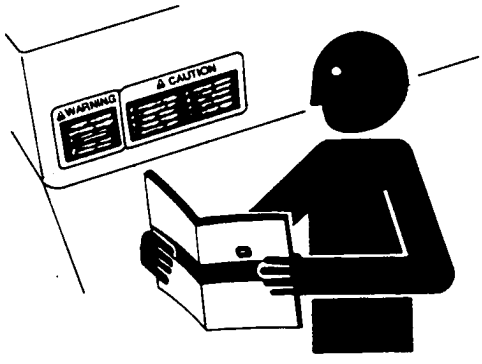


TS223 -UN-23AUG88

DX,LIGHT -19-04JUN90

REPLACE SAFETY SIGNS

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



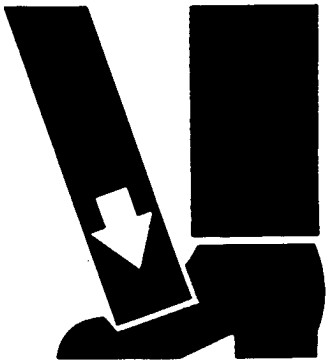
TS201 -UN-23AUG88

DX,SIGNS1 -19-04JUN90

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.



TS226 -UN-23AUG88

DX,LIFT -19-04JUN90

REMOVE PAINT BEFORE WELDING OR HEATING

Avoid potentially toxic fumes and dust.

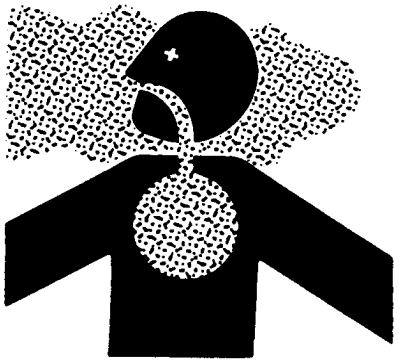
Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch.

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 -UN-23AUG88

DX,PAINT -19-03MAR93

AVOID HEATING NEAR PRESSURIZED FLUID LINES

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 fluid lines or other flammable materials. Pressurized lines can be accidentally cut when heat goes beyond the immediate flame area.

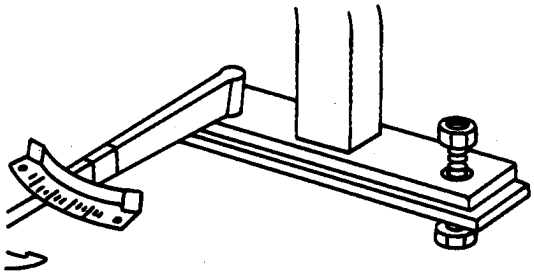
TS953 -UN-15MAY90

DX,TORCH -19-03MAR93

KEEP ROPS INSTALLED PROPERLY

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

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



TS212 -UN-23AUG88

DX,ROPS3 -19-03MAR93

SERVICE TIRES SAFELY

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

Do not attempt to mount a tire unless you have the proper equipment and experience to perform the job.

Always maintain the correct tire pressure. Do not inflate the tires above the recommended pressure. Never weld or heat a wheel and tire assembly. The heat can cause an increase in air pressure resulting in a tire explosion. Welding can structurally weaken or deform the wheel.

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.

TS952 -UN-12APR90

DX,TIRECP -19-24AUG90

PRACTICE SAFE MAINTENANCE

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05
8

Understand service procedure before doing work. Keep area clean and dry.

Never lubricate, service, or adjust machine while it is moving. Keep hands, feet , and clothing from power-driven parts. Disengage all power and operate controls to relieve pressure. Lower equipment to the ground. Stop the engine. Remove the key. Allow machine to cool.

Securely support any machine elements that must be raised for service work.

Keep all parts in good condition and properly installed. Fix damage immediately. Replace worn or broken parts. Remove any buildup of grease, oil, or debris.

Disconnect battery ground cable (-) before making adjustments on electrical systems or welding on machine.

TS218 -UN-23AUG88

DX,SERV -19-03MAR93

USE PROPER TOOLS

Use tools appropriate to the work. Makeshift tools and procedures can create safety hazards.

Use power tools only to loosen threaded parts and fasteners.

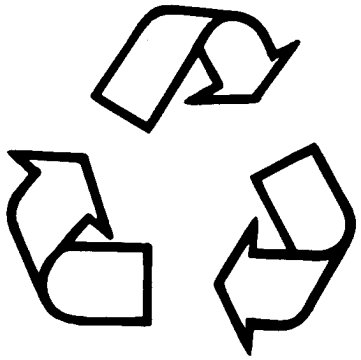
For loosening and tightening hardware, use the correct size tools. DO NOT use U.S. measurement tools on metric fasteners. Avoid bodily injury caused by slipping wrenches.

Use only service parts meeting John Deere specifications.

TS779 -UN-08NOV89

DX,REPAIR -19-04JUN90

DISPOSE OF WASTE PROPERLY



TS1133 -UN-26NOV90

Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with John Deere equipment include such items as oil, fuel, coolant, brake fluid, filters, and batteries.

Use leakproof containers when draining fluids. Do not use food or beverage containers that may mislead someone into drinking from them.

Do not pour waste onto the ground, down a drain, or into any water source.

Air conditioning refrigerants escaping into the air can damage the Earth's atmosphere. Government regulations may require a certified air conditioning service center to recover and recycle used air conditioning refrigerants.

Inquire on the proper way to recycle or dispose of waste from your local environmental or recycling center, or from your John Deere dealer.

DX,DRAIN -19-03MAR93

LIVE WITH SAFETY

Before returning machine to customer, make sure machine is functioning properly, especially the safety systems. Install all guards and shields.

TS231 -19-07OCT88

DX,LIVE -19-25SEP92

3325 AND 3365 SPECIFICATIONS

ENGINE	
Make	Yanmar
Type	Diesel
Model	4TN82—RJE
Horsepower at 2700 rpm	28 kW (38 hp)
Number of Cylinders	4
Displacement	1.8 L (110.2 cu in.)
Bore and Stroke	82 x 86 mm (3.23 x 3.39)
Fast Idle	2800 rpm
Slow Idle	1000 rpm
Start Aid	Air Heater
Cooling System	Liquid Cooled
Air Cleaner	Replaceable Dry Type w/Safety Element
Engine Shutoff	Key Switch
FUEL SYSTEM	
Type	Direct Injection
Fuel Delivery	Electric Fuel Pump
ELECTRICAL SYSTEM	
Type	12 Volt
Battery Size	BCI Group 24 F 550 Cold Cranking Amps
Alternator	40 Amps
System Polarity	Negative Ground
Starter	12 Volt Electric w/Solenoid
Instrumentation	Hour Meter, Fuel Gauge & 11 Function Indicators (Stop Engine, Service Alert, Engine Oil Pressure, Engine Coolant Temperature, Water in Fuel, Hydraulic Oil Temperature, Hydrostatic Oil Temperature, Engine Air Heater, Parking Brake, Engine Alternator Volts, Engine Air Restriction)

MX,1010HV,A1 -19-30NOV92

SPECIFICATIONS—CONTINUED

POWER TRAIN

Type	25 Series Sundstrand w/Kansaki Transaxle
Control (Foot)	2 Pedal

Travel Speeds:

Forward (Transport)	0—18.7 km/h (0—11.7 mph)
Reverse	0—9.7 km/h (0—6 mph)
Mowing	0—10.8 km/h (0—7.2 mph)

STEERING/BRAKES

Steering	Hydrostatic Power
Brakes	Mechanical Wet Disk

HYDRAULIC SYSTEM

Dual Hydraulic Pump Flow at 2800 rpm	37.8 L/min (10 gpm) per section
Reel Relief Valve	20684 kPa (207 bar) (3000 psi)
Wing Lift and Rockshaft Relief Valves	14617 kPa (146 bar) (2120 psi)
Filter Bypass Relief Valve	138—207 kPa (1.4—2.1 bar) (20—30 psi)

HYDROSTATIC SYSTEM

Charge Pump Flow at 2800 rpm	12.1 L/min (3.2 gpm) minimum
Charge Pump Relief Valve	965—1379 kPa (9.6—13.8 bar) (140—200 psi)
Main Relief Valve	41369—44816 kPa (414—448 bar) (6000—6500 psi)
Filter Bypass Relief Valve	138—207 kPa (1.4—2.1 bar) (20—30 psi)
Cooler Bypass Relief Valve	552—896 kPa (5.5—9.0 bar) (80—130 psi)
Transaxle Pump Flow at 2800 rpm	31.8 L/min (8.4 gpm)
Steering Relief Valve	10497 + 500—0 kPa (105 + 5 - 0 bar) (1522.5 + 72.5 - 0 psi)

CAPACITIES

Fuel Tank	75 L (20 gal)
Engine Crankcase	5.7 L (6.0 qt) with Filter
Engine Cooling System	6.6 L (7 qt)
Hydraulic System	26.5 L (7 gal)
Hydrostatic Transaxle System	18.9 L (5 gal)
Cutting Unit Gear Case	0.4 L (0.8 pt)

MX,1010HV,A2 -19-30NOV92

SPECIFICATIONS—CONTINUED

TIRES
Size:
- Front . . . . . 33 x 12.5—15
- Rear . . . . . 23 x 10.5—12

Maximum Inflation:
- Front (Mowers Up) . . . . . 68 kPa (0.7 bar) (9.9 psi)
- Front (Mowers Down) . . . . . 67 kPa (0.67 bar) (9.7 psi)
- Rear . . . . . 62 kPa (0.6 bar) (9.0 psi)

OVERALL DIMENSIONS:
Wheelbase . . . . . 162.5 cm (64 in.)
Tread Width . . . . . 142 cm (56 in.)
Machine Width (Mowers down) . . . . . 368 cm (145 in.)
Machine Width (Mowers up) . . . . . 226 cm (89 in.)
Turning Radius . . . . . 152 cm (60 in.)
Working Weight . . . . . 1619 kg (3570 lb)

MOWER
Mower Lift . . . . . Single Lift Lever w/Auxiliary Switches for Wing Mowers
Number of Reels 5
Overall Cutting Width . . . . . 3.5 m (138 in.)

Reel Speed (3325) . . . . . 1300 rpm
Bed Knife Adjustment . . . . . Reel to Bed Knife
Height of Cut Range . . . . . 10 to 76 mm (0.375 to 3.0 in.)
Number of Blades . . . . . 6 standard; 8 or 10 optional

CUTTING RATIOS

Ground Speed:		**7 km/h (4.5 mph)**	**8 km/h (5.0 mph)**	**9 km/h (5.5 mph)**	**10 km/h (6.0 mph)**	**11 km/h (6.5 mph)**	**11.6 km/h (7.2 mph)**
NO. of BLADES	**MODEL**						
6 Blades	**3325**	**17.4 mm (0.71 in.)**	**19.8 mm (0.79 in.)**	**22.3 mm (0.86 in.)**	**24.8 mm (0.94 in.)**	**27.3 mm (1.02 in.)**	**28.8 mm (1.13 in.)**
	3365	**16.0 mm (0.63 in.)**	**18.0 mm (0.71 in.)**	**20.0 mm (0.78 in.)**	**22.0 mm (0.85 in.)**	**23.0 mm (0.92 in.)**	**26.0 mm (1.02 in.)**
8 Blades	**3325**	**13.0 mm (0.53 in.)**	**14.9 mm (0.59 in.)**	**16.7 mm (0.65 in.)**	**18.6 mm (0.71 in.)**	**20.5 mm (0.77 in.)**	**21.6 mm (0.85 in.)**
	3365	**12.0 mm (0.47 in.)**	**13.0 mm (0.51 in.)**	**15.0 mm (0.59 in.)**	**16.0 mm (0.63 in.)**	**18.0 mm (0.71 in.)**	**19.0 mm (0.75 in.)**
10 Blades	**3325**	**10.4 mm (0.42 in.)**	**11.9 mm (0.47 in.)**	**13.4 mm (0.52 in.)**	**14.9 mm (0.57 in.)**	**16.4 mm (0.61 in.)**	**17.3 mm (0.68 in.)**
	3365	**10.0 mm (.38 in.)**	**11.0 mm (0.42 in.)**	**12.0 mm (0.47 in.)**	**13.0 mm (0.51 in.)**	**14.0 mm (0.55 in.)**	**15.0 mm (0.59 in.)**

MX,1010HV,A3 -19-30NOV92

REPAIR SPECIFICATIONS

NOTE: For repair specification of the engine, use CTM3, 3TN and 4TN Series Yanmar Diesel Engines.

For repair specification of reel mower cutting units, use TM1528, Reel Mower Cutting Units.

Item	Measurement	Specification
SECTION 20—ENGINE REPAIR		
ENGINE:		
Mounting Bracket-to-Frame Cap Screws and Nuts	Torque	44—54 N·m (33—40 lb-ft)
Mounting Bracket-to-Engine Cap Screws (16 used)	Torque	90 N·m (66 lb-ft)
COOLING SYSTEM:		
Coolant Level Below Bottom of Filler Neck	Distance	13—25 mm (0.5—1.0 in.)
Radiator-to-Frame Cap Screws	Torque	31—37 N·m (270—330 lb-in.)
SECTION 30—FUEL AND AIR REPAIR		
For all injection pump, nozzle and governor repair—Use CTM3.		
SECTION 40—ELECTRICAL SYSTEM		
For starter and alternator repair—use CTM3.		
SECTION 50—POWER TRAIN REPAIR		
DRIVE SHAFT:		
Drive Shaft-to-Isolator Cap Screws and Nuts	Torque	49 N·m (36 lb-ft)
Isolator-to-Flywheel Cap Screws	Torque	49 N·m (36 lb-ft)
Engine Mount-to-Frame Cap Screws	Torque	44—54 N·m (33—40 lb-ft)
Drive Shaft Coupler Cap Screws	Torque	60 N·m (45 lb-ft)
CHARGE PUMP:		
Seal	Depth Below Surface	1.5—2.5 mm (0.056—0.096 in.)
Charge Pump-to-Transmission Cap Screws	Torque	37—50 N·m (27—37 lb-ft)

MX,1015HV,A2 -19-30NOV92

REPAIR SPECIFICATIONS—CONTINUED

Item	Measurement	Specification
SECTION 50—POWER TRAIN REPAIR—CONTINUED		
HYDROSTATIC TRANSMISSION:		
Swash Plate End Covers Cap Screws	Torque	8—9 N·m (72—84 lb-in.)
Center Section Needle Bearings	Depth above surface of housing	3 mm (7/64 in.)
Center Section-to-Housing Cap Screws	Torque	44—55 N·m (33—41 lb-ft)
Gear to Output Shaft Cap Screw	Torque	54 N·m (40 lb-ft)
Transmission-to-Transaxle Cap Screws	Torque	142 N·m (105 lb-ft)
Neutral Centering Spring		
S.N. —840000	Approx Length	133 mm (5.25 in.)
S.N. 840001—	Approx Length	203 mm (8.00 in.)
HYDROSTATIC OIL COOLER:		
Oil Cooler Fittings	Torque	34 N·m (25 lb-ft)
TRANSAXLE:		
PTO Clutch		
Separator Plate-to-Cylinder	Maximum distance	4.7 mm (0.185 in.)
Top Plate	Minimum thickness	2.9 mm (0.114 in.)
Clutch Disk	Minimum thickness	1.9 mm (0.075 in.)
Separator Plate	Minimum thickness	1.0 mm (0.039 in.)
Piston Return Spring	Minimum free length	29 mm (1.14 in.)
	Minimum working load	17.5 mm at 540 N (0.689 in. at 121 lb)
Differential		
Bearing Retainer Cap Screws	Torque	26 N·m (19 lb-ft)
Rear Cover Assembly		
M12 Cap Screws	Torque	90 N·m (66 lb-ft)
M10 Cap Screws	Torque	50 N·m (37 lb-ft)
M8 Cap Screws	Torque	26 N·m (19 lb-ft)
Differential Ring Gear	Backlash	0.15—0.21 mm (0.006—0.008 in.)
Differential Carrier-to-Case Cap Screws	Torque	26 N·m (19 lb-ft)
Front Cover Cap Screws		
M12 Cap Screw	Torque	90 N·m (66 lb-ft)
M10 Cap Screw	Torque	50 N·m (37 lb-ft)
PTO Valve Cover Cap Screws	Torque	26 N·m (19 lb-ft)
Support-to-Transaxle Cap Screws	Torque	80 N·m (59 lb-ft)
ROPS-to-Frame Cap Screws and Nuts	Torque	130 N·m (96 lb-ft)
Frame-to-Transaxle Cap Screws	Torque	175 N·m (129 lb-ft)
Cross Brace-to-Frame Cap Screws and Nuts (3365)	Torque	175 N·m (129 lb-ft)

MX,1015HV,A3 -19-30NOV92

REPAIR SPECIFICATIONS—CONTINUED

Item	Measurement	Specification
SECTION 50—POWER TRAIN REPAIR—CONTINUED		
Front Wheel Lug Bolts	Torque	115 N·m (85 lb-ft)
Oil Cooler-to-Transmission Hose Connections	Torque	49 N·m (36 lb-ft)
Wing Lift-to-Flow Control Valve Hose Connection	Torque	49 N·m (36 lb-ft)
Steering Valve-to-Flow Control Valve Hose Connection	Torque	49 N·m (36 lb-ft)
Steering Valve-to-PTO Valve Hose Connection	Torque	49 N·m (36 lb-ft)
Hydraulic Pump-to-Transaxle Cap Screws	Torque	54 N·m (40 lb-ft)
Cutting Unit Supply Line-to-Hydraulic Pump Connections	Torque	102 N·m (75 lb-ft)
Suction Tube-to-Hydraulic Pump Flange Cap Screws	Torque	37 N·m (27 lb-ft)
Lift Link-to-Rockshaft Arm Cap Screws and Nuts	Torque	163 N·m (120 lb-ft)
FINAL DRIVES:		
Seal Housing-to-Axle Housing Cap Screws (Axle S.N. —000755)	Torque	25 N·m (18 lb-ft)
Ring Gear Cap Screws	Torque	26 N·m (230 lb-in.)
Final Drive-to-Differential Housing Cap Screws	Torque	52 N·m (38 lb-ft)
CONTROL LINKAGE:		
Neutral Centering Lever Bushing (S.N. 840001—)	Minimum diameter	19.088 ± 0.025 mm (0.7515 ± 0.001 in.)

MX,1015HV,A4 -19-30NOV92

REPAIR SPECIFICATIONS—CONTINUED

Item	Measurement	Specification
SECTION 60—STEERING AND BRAKE REPAIR		
STEERING VALVE:		
Rotor to Stator Clearance	Maximum clearance	0.08 mm (0.003 in.)
Top of Steering Tube to Bushing	Dimension	2.5 mm (0.1 in.)
Metering Assembly Screws	Torque	1.4 ± 0.1 N·m (12 ± 1 lb-in.)
Commutator Ring and Drive Plate TIR	Maximum allowable TIR	0.13 mm (0.005 in.)
Port Cover Nuts	Torque	30 N·m (266 lb-in.)
Check Ball Plug	Torque	14 N·m (124 lb-in.)
Steering Wheel Nut	Torque	15 N·m (11 lb-ft)
Relief Valve	Pressure	10497 + 500 - 0 kPa (1522.5 + 72.5 - 0 psi)
BRAKES:		
Brake Disk	Thickness (new)	4.6—4.8 mm (0.181—0.189 in.)
	Minimum thickness	4.4 mm (0.173 in.)
Brake Disk Spline-to-Shaft	Backlash (new)	0.13—0.31 mm (.005—.012 in.)
	Maximum backlash	1.2 mm (0.047 in.)
Brake Linkage Rod	Approximate length (includes clevis)	557 mm (21.9 in.)
Brake Plate	Thickness (new)	2.5—2.7 mm (0.098—0.106 in.)
	Minimum thickness	2.3 mm (0.090 in.)
	Warpage (new)	0.15 mm (0.006 in.)
	Maximum warpage	0.3 mm (0.012 in.)
STEERING AXLE:		
Steering Cylinder-to-Spindle Nut	Torque	75 N·m (55 lb-ft)
Tie Rod-to-Spindle Nut	Torque	53 N·m (39 lb-ft)
Toe-in Adjustment	Length less at front than at rear of rear tires	6 mm (1/4 in.)
Tie Rod Nut	Torque	118 N·m (87 lb-ft)
Pivot Pin Nut	Torque	509 N·m (375 lb-ft)
Axle Pivot End Play	Approximate clearance	1 mm (0.040 in.)

MX,1015HV,A5 -19-30NOV92

REPAIR SPECIFICATIONS—CONTINUED

Item	Measurement	Specification
SECTION 70—HYDRAULIC REPAIR		
HYDRAULIC PUMPS:		
Transaxle Pump-to-Differential Housing Cap Screws	Torque	47 N·m (35 lb-ft)
Lift Link-to-Rockshaft Arm Cap Screw	Torque	163 N·m (120 lb-ft)
Transaxle Pump Cover Socket Head Screws	Torque	47 N·m (35 lb-ft)
Hydraulic Pump Socket Head Screws	Torque	47 N·m (35 lb-ft)
Hydraulic Pump Mounting Cap Screws	Torque	54 N·m (40 lb-ft)
Hydraulic Pump Tube Nuts	Torque	102 N·m (75 lb-ft)
REEL CONTROL VALVE:		
Tie Rod Nuts	Torque	18.6 N·m (165 lb-in.)
WING LIFT VALVE:		
Tie Rod Nuts	Torque	13 N·m (115 lb-in.)
FLOW CONTROL VALVE:		
Priority Flow Divider Spool Plug	Torque	98 N·m (72 lb-ft)
Proportional Flow Divider Spool Plug	Torque	44 N·m (33 lb-ft)
Relief Spools Seat Retainers	Torque	29 N·m (22 lb-ft)
Relief Spools Plugs	Torque	98 N·m (72 lb-ft)
Socket Head Mounting Screws	Torque	17 N·m (150 lb-in.)
WEIGHT TRANSFER:		
Solenoid Nut	Torque	5.5—8 N·m (48—72 lb-in.)
Cylinder Piston	Torque	47 N·m (35 lb-ft)
ROCKSHAFT ASSEMBLY:		
Rockshaft Valve		
Control Valve Spool Bolt Torque	Torque	10 N·m (88 lb-in.)
Control Valve-to-Rockshaft Cap Screw	Torque	24 N·m (18 lb-ft)
Control Valve Cover-to-Rockshaft Cap Screws	Torque	27 N·m (20 lb-ft)
Rockshaft Upper Lever Tension	Force	11.3—13.6 Kg (25—30 lb)
Rockshaft Piston Cover		
Piston Cover-to-Rockshaft	Torque	88 N·m (65 lb-ft)
Check Relief Valve Spring	Free length	27.7 mm (1.09 in.)
	Compressed length	18 mm at 10N (0.71 in. at 2 lb)
Check Relief Valve Plug	Torque	34 N·m (25 lb-ft)
Stop Valve Spring	Free length	36 mm (1.4 in.)
	Compressed length	14 mm at 59N (0.55 in. at 13 lb)
Stop Bolt Assembly-to-Piston Cover Socket Head Screws	Torque	25 N·m (18 lb-ft)
Overload Relief Valve Spring	Free length	44 mm (1.73 in.)
	Compressed length	38 mm at 170 N (1.50 in. at 38 lb)

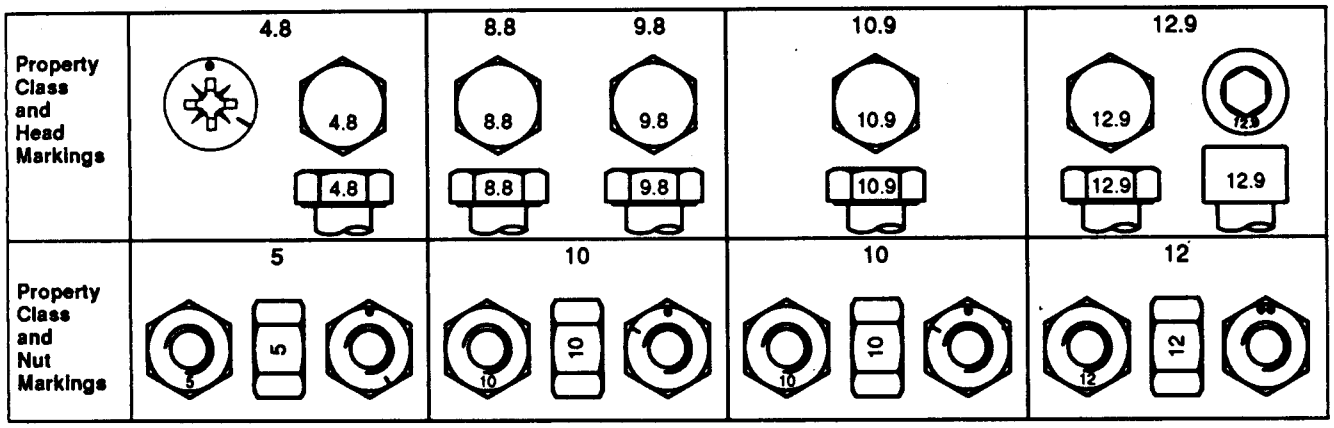
MX,1015HV,A6 -19-30MAR93

REPAIR SPECIFICATIONS—CONTINUED

Item	Measurement	Specification
SECTION 70—HYDRAULIC REPAIR—CONTINUED		
Rockshaft Piston Cover—Continued		
Safety Relief Valve Retainer	Torque	27 N·m (20 lb-ft)
Safety Relief Valve Plug	Torque	78 N·m (58 lb-ft)
Rockshaft Piston		
Rockshaft Cylinder	ID	60.00—60.046 mm (2.362—2.364 in.)
Rockshaft Piston	OD	59.94—59.97 mm (2.360—2.361 in.)
Piston-to-Cylinder Wear Clearance	Maximum clearance	0.3 mm (0.012 in.)
Rockshaft Housing		
Rockshaft Sleeve	OD	44.950—44.975 mm (1.769—1.770 in.)
Sleeve-to-Bushing Clearance	Maximum clearance	0.4 mm (0.016 in.)
Rockshaft Bushing	ID	45.000—45.039 mm (1.771—1.773 in.)
Lift Arm-to-Rockshaft Bolts	Torque	52 N·m (38 lb-ft)
Rockshaft-to-Transmission Cap Screws	Torque	52 N·m (38 lb-ft)
Lift Linkage-to-Lift Arms Cap Screws and Nuts	Torque	163 N·m (120 lb-ft)
CUTTING UNIT MOTOR:		
3325 Reel Motor-to-Cutting Unit Cap Screws	Torque	16 N·m (142 lb-in.)
Motor Cap Screws	Torque	47 N·m (35 lb-ft)
Motor Gear Nut	Torque	54 N·m (40 lb-ft)
SECTION 80—MISCELLANEOUS REPAIR		
3325 Reel Motor-to-Cutting Unit Cap Screws	Torque	16 N·m (142 lb-in.)

MX,1015HV,A7 -19-30MAR93

METRIC BOLT AND CAP SCREW TORQUE VALUES



-19-04MAR91

TS1163

Size	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]	
	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft
M6	4.8	3.5	6	4.5	9	6.5	11	8.5	13	9.5	17	12	15	11.5	19	14.5
M8	12	8.5	15	11	22	16	28	20	32	24	40	30	37	28	47	35
M10	23	17	29	21	43	32	55	40	63	47	80	60	75	55	95	70
M12	40	29	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	47	80	60	120	88	150	110	175	130	225	165	205	150	260	190
M16	100	73	125	92	190	140	240	175	275	200	350	225	320	240	400	300
M18	135	100	175	125	260	195	330	250	375	275	475	350	440	325	560	410
M20	190	140	240	180	375	275	475	350	530	400	675	500	625	460	800	580
M22	260	190	330	250	510	375	650	475	725	540	925	675	850	625	1075	800
M24	330	250	425	310	650	475	825	600	925	675	1150	850	1075	800	1350	1000
M27	490	360	625	450	950	700	1200	875	1350	1000	1700	1250	1600	1150	2000	1500
M30	675	490	850	625	1300	950	1650	1200	1850	1350	2300	1700	2150	1600	2700	2000
M33	900	675	1150	850	1750	1300	2200	1650	2500	1850	3150	2350	2900	2150	3700	2750
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2750	4750	3500

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical property class.

Fasteners should be replaced with the same or higher property class. If higher property class fasteners are used, these should only be tightened to the strength of the original.

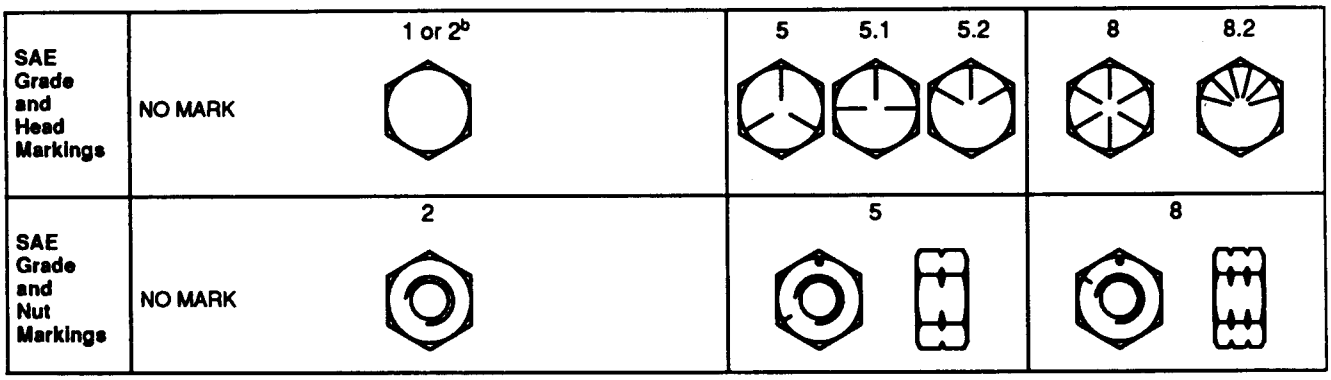
Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

[a] "Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated without any lubrication.

DX,TORQ2 -19-16APR92

UNIFIED INCH BOLT AND CAP SCREW TORQUE VALUES



-19-04MAR91

TS1162

Size	Grade 1				Grade 2[b]				Grade 5, 5.1, or 5.2				Grade 8 or 8.2			
	Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]	
	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft
1/4	3.7	2.8	4.7	3.5	6	4.5	7.5	5.5	9.5	7	12	9	13.5	10	17	12.5
5/16	7.7	5.5	10	7	12	9	15	11	20	15	25	18	28	21	35	26
3/8	14	10	17	13	22	16	27	20	35	26	44	33	50	36	63	46
7/16	22	16	28	20	35	26	44	32	55	41	70	52	80	58	100	75
1/2	33	25	42	31	53	39	67	50	85	63	110	80	120	90	150	115
9/16	48	36	60	45	75	56	95	70	125	90	155	115	175	130	225	160
5/8	67	50	85	62	105	78	135	100	170	125	215	160	215	160	300	225
3/4	120	87	150	110	190	140	240	175	300	225	375	280	425	310	550	400
7/8	190	140	240	175	190	140	240	175	490	360	625	450	700	500	875	650
1	290	210	360	270	290	210	360	270	725	540	925	675	1050	750	1300	975
1-1/8	470	300	510	375	470	300	510	375	900	675	1150	850	1450	1075	1850	1350
1-1/4	570	425	725	530	570	425	725	530	1300	950	1650	1200	2050	1500	2600	1950
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2150	1550	2700	2000	3400	2550
1-1/2	1000	725	1250	925	990	725	1250	930	2250	1650	2850	2100	3600	2650	4550	3350

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original.

Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

[a] "Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated without any lubrication.

[b] Grade 2 applies for hex cap screws (not hex bolts) up to 152 mm (6-in.) long. Grade 1 applies for hex cap screws over 152 mm (6-in.) long, and for all other types of bolts and screws of any length.

DX,TORQ1 -19-15MAR91