1200 Bunker and Field Rake

For complete service information also see:

John Deere Horicon Works
TM1525 (27SEP91)
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 diagnostics. Repair sections tell how to repair the components. Diagnostic 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, other materials needed to do the job and service parts kits.

Section 10, Group 15—Repair Specifications, consist of all applicable specifications, near tolerances and specific torque values for various components on each individual machine.

Binders, binder labels, and tab sets can be ordered by John Deere dealers direct from the John Deere Distribution Service Center.

This manual is part of a total product support program.

FOS MANUALS—REFERENCE

TECHNICAL MANUALS—MACHINE SERVICE

COMPONENT MANUALS—COMPONENT SERVICE

Fundamentals of Service (FOS) Manuals cover basic theory of operation, fundamentals of troubleshooting, general maintenance, and basic type of failures and their causes. FOS Manuals are for training new personnel and for reference by experienced technicians.

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

Component Technical Manuals are concise service guides for specific components. Component technical manuals are written as stand-alone manuals covering multiple machine applications.

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Continued on next page

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.

TM1525-19-27SEP91

Section 10
GENERAL INFORMATION

Contents

RECOGNIZE SAFETY INFORMATION

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

Follow recommended precautions and safe operating practices.

T81389 -UN-07DEC88

DX,ALERT -19-04JUN90

UNDERSTAND SIGNAL WORDS

A signal word—DANGER, WARNING, or CAUTION—is used with the safety-alert symbol. DANGER identifies the most serious hazards.

DANGER or WARNING safety signs are located near specific hazards. General precautions are listed on CAUTION safety signs. CAUTION also calls attention to safety messages in this manual.

TS187 -19-30SEP88

DX,SIGNAL -19-04JUN90

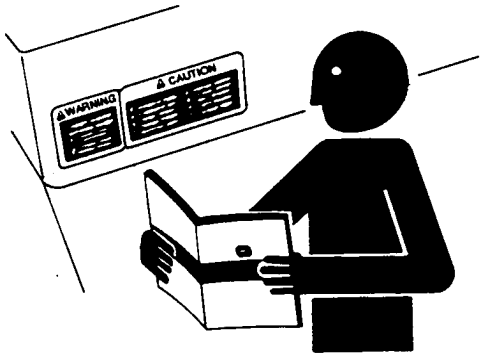
FOLLOW SAFETY INSTRUCTIONS

Carefully read all safety messages in this manual and on your machine safety signs. Keep safety signs in good condition. Replace missing or damaged safety signs. Be sure new equipment components and repair parts include the current safety signs. Replacement safety signs are available from your John Deere dealer.

Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction.

Keep your machine in proper working condition. Unauthorized modifications to the machine may impair the function and/or safety and affect machine life.

If you do not understand any part of this manual and need assistance, contact your John Deere dealer.



TS201 -UN-23AUG88

DX,READ -19-04JUN90

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

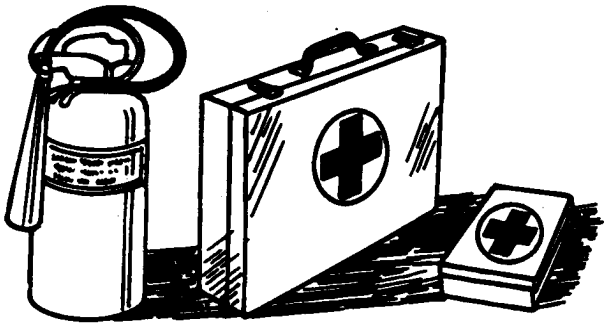
DX,SPARKS -19-04JUN90

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 -19-04JUN90

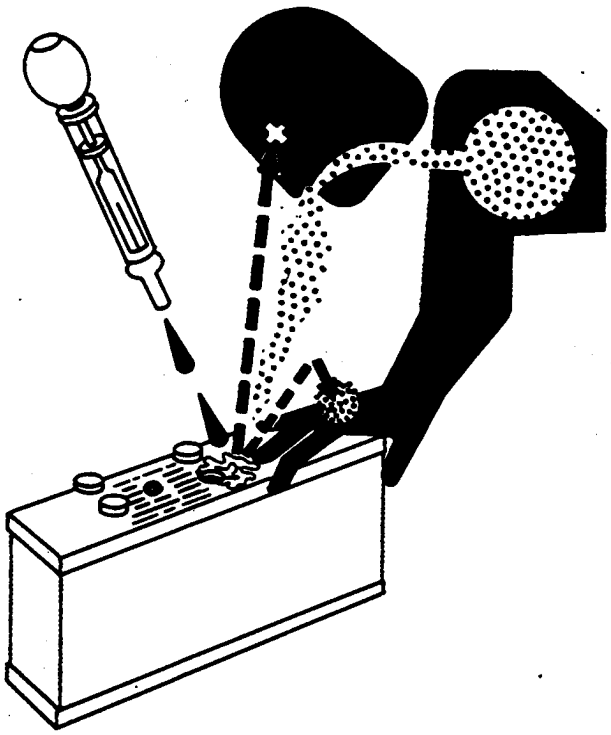
PREVENT ACID BURNS

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 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

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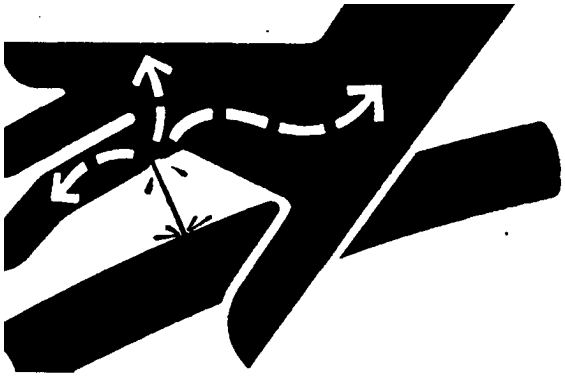
AVOID HIGH-PRESSURE FLUIDS

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.

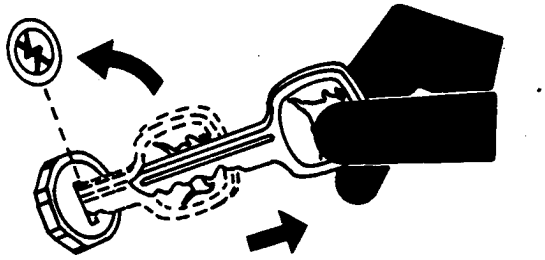


X9811 -UN-23AUG88

DX,FLUID -19-09AUG91

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.



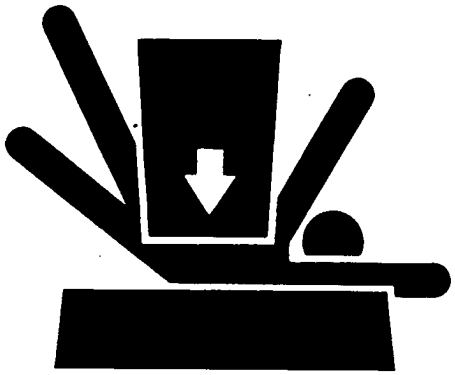
TS230 -UN-24MAY89

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

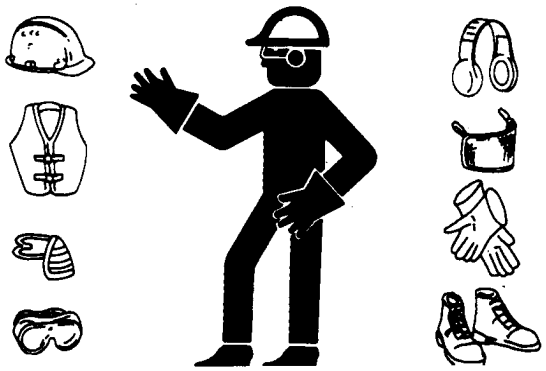
WEAR PROTECTIVE CLOTHING

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.



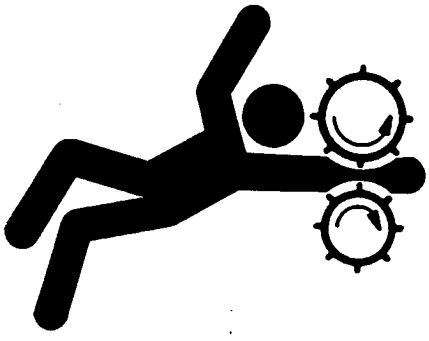
TS206 -UN-23AUG88

DX,WEAR -19-10SEP90

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.

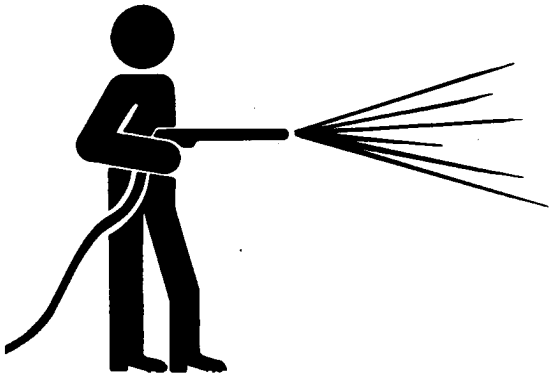
If you do not have an exhaust pipe extension, open the doors and get outside air into the area.

TS220 -UN-23AUG88

DX,AIR -19-04JUN90

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.

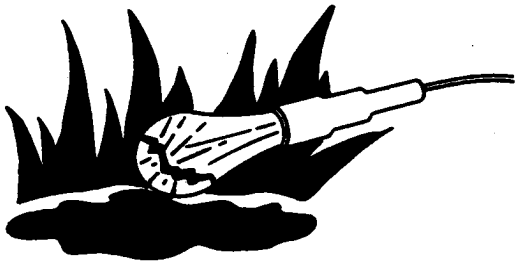


T6642EJ -UN-18OCT88

DX,CLEAN -19-04JUN90

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

REMOVE PAINT BEFORE WELDING OR HEATING

TS220 -UN-23AUG88

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.

DX,PAINT -19-04JUN90

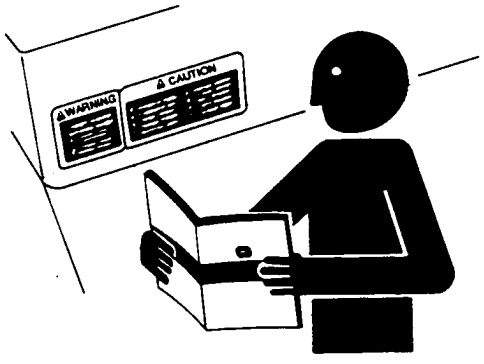
AVOID HEATING NEAR PRESSURIZED FLUID LINES

TS953 -UN-15MAY90

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.

DX,TORCH -19-05OCT90

REPLACE SAFETY SIGNS



TS201 -UN-23AUG88

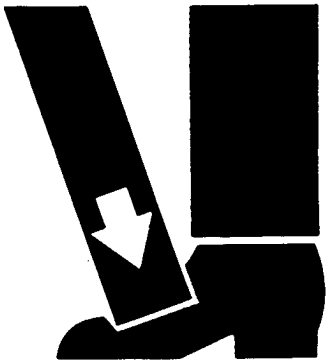
Replace missing or damaged safety signs. See the machine operator's manual for correct safety sign placement.

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

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

AVOID HARMFUL ASBESTOS DUST

TS220 -UN-23AUG88

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

Components in 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 material containing asbestos. When servicing, wear an approved respirator. A special vacuum cleaner is recommended to clean asbestos. If not available, apply a mist of oil or water on the material containing asbestos.

Keep bystanders away from the area.

DX,DUST -19-15MAR91

PRACTICE SAFE MAINTENANCE

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

Never lubricate or service 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 -19-04JUN90

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

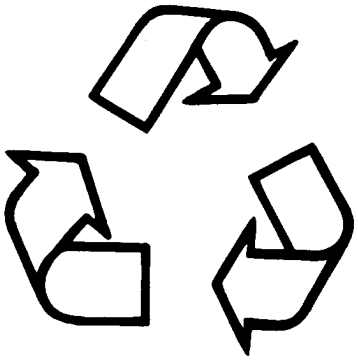
Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with John Deere equipment include such items as oil, fuel, coolant, brake fluid, filters, and batteries.

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.



TS1133 -UN-26NOV90

DX,DRAIN -19-09AUG91

LIVE WITH SAFETY

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

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TS231 -19-07OCT88

DX,LIVE -19-04JUN90

MACHINE SPECIFICATIONS

ENGINE	
Make	John Deere “K” Series
Type	OHV
Model	FE290R
Horsepower	7.5 kW (10 hp)
Number of Cylinders	1
Displacement	286 cm^3 (17.5 cu. in.)
Bore and Stroke	78 x 60 mm (3.07 x 2.36 in.)
Fast Idle	3800 rpm
Slow Idle	1300—1550 rpm
Starting System	Electric
Lubrication	Pressurized
Cooling System	Forced Air
Air Cleaner	Dry Replaceable
Engine Shutoff	Key Switch
FUEL SYSTEM	
Type	Carburetor
Fuel Delivery	Fuel Pump
ELECTRICAL SYSTEM	
Type	12 Volt
Battery Size	255 Cold Cranking Amps at -18˚C (0˚F)
Alternator	13 Amp
POWER TRAIN	
Type	Belt-Driven Torque Converter with Gear-Driven Transaxle
Number of Speeds	Forward-Neutral-Reverse
Clutch	
Type	Kawasaki, Wet 2.1 Reduction (Variable)
Engagement Speed	1600—1800 rpm
Travel Speeds	
Forward/Reverse	Variable, 0—18 km/h (0—11 mph)
STEERING/BRAKES	
Steering	Mechanical, Roller-Chain and Sprocket 6:1 Reduction Ratio
Brakes	Mechanically Operated Disc with Park Brake

MX,1010HE,A1 -19-27SEP91

HYDRAULIC SYSTEM
Lift Pump (optional) . . . . . Oildyne Electro-Hydraulic Lift

CAPACITIES
Fuel Tank . . . . . 9.5 L (2.5 U.S. gal)
Engine Crankcase . . . . . 1.4 L (3.0 U.S. pt)
Wet Reduction Clutch Gearbox . . . . . 0.6 L (1.3 U.S. pt)
Transaxle . . . . . 2.3 L (2.5 qt)

TIRES
Standard Equipment
Front . . . . . One 22.5 x 10.00—8 2 PR High Floatation
Rear . . . . . Two 25 x 12.00—9 2 PR High Floatation

OVERALL DIMENSIONS:
Wheelbase . . . . . 1054 mm (41.5 in.)
Length . . . . . 1676 mm (66 in.)
Width . . . . . 1473 mm (58 in.)
Height . . . . . 1041 mm (41 in.)
Ground Clearance at
Rake Attachment . . . . . 241 mm (9.5 in.)
Turning Radius . . . . . 305 mm (12 in.)
Approximate Shipping
Weight . . . . . 238 kg (525 lb)

(Specifications and design subject to change without notice.)

MX,1010HE,A2 -19-27SEP91

ATTACHMENT SPECIFICATIONS

RAKE (Standard)
Type . . . . . Rear Mount, Hand Lift Control (Hydraulic Lift—Optional)
Width . . . . . 1981 mm (78 in.)
Weight . . . . . 20 kg (44 lb)
Blades . . . . . Five Section, Bunker or Field
Prong Rake . . . . . Three Section, 24 Prongs 25—76 mm (1—3 in.) Adjustment

CULTIVATOR (Optional)
Type . . . . . Mid-Mount, 10 Blades, Hand Control with 5-Position Depth Adjustment
Width . . . . . 1626 mm (64 in.)
Weight . . . . . 20 kg (44 lb)

FRONT BLADE (Optional)
Type . . . . . Front-Mount, Hand Control with Up-Lock Position
Width . . . . . 1016 mm (40 in.)
Height . . . . . 152 mm (6 in.)
Weight . . . . . 25 kg (56 lb)

(Specifications and design subject to change without notice.)

MX,1010HE,A3 -19-27SEP91

REPAIR SPECIFICATIONS

Item	Measurement	Specification
SECTION 20—ENGINE REPAIR		
For all repair specifications—Use CTM5		
Engine-to-Frame Cap Screw	Torque	23 N·m (204 lb-in.)
Muffler-to-Engine Nut	Torque	14 N·m (124 lb-in.)
SECTION 30—FUEL AND AIR REPAIR		
For all carburetor repair specifications—Use CTM5		
SECTION 40—ELECTRICAL SYSTEM		
For all starter and engine ignition and charging system repair—Use CTM5		
Steering Wheel Nut-to-Shaft	Torque	197 N·m (145 lb-ft)
Neutral Start Switch-to-Transaxle	Torque	39 N·m (28 lb-ft)
SECTION 50—POWER TRAIN REPAIR		
Wet Reduction Clutch		
Output Shaft/Gear Gear Side Journal	OD (MIN)	0.25 mm (0.982 in.)
Output Shaft/Gear Shaft Side Journal	OD (MIN)	31.94 mm (1.257 in.)
Drive Hub Journal	OD (MIN)	36.92 mm (1.453 in.)
Clutch Drum Bushing	ID (MAX)	37.08 mm (1.460 in.)
	Installation Depth	1.50 mm (0.060 in.)
	Finished ID	37.00—37.03 mm (1.457—1.458 in.)
Clutch Springs	Free Length (MIN)	22.70 mm (0.890 in.)
Case Half-to-Engine Cap Screw	Torque	28 N·m (20 lb-ft)
Clutch Drum Assembly-to-Engine Crankshaft Cap Screw	Torque	55 N·m (40 lb-ft)
Case Cover-to-Case Half Cap Screw	Torque	28 N·m (20 lb-ft)

MX,1015HE,A1 -19-27SEP91

Item	Measurement	Specification
SECTION 50—POWER TRAIN REPAIR—CONTINUED		
Drive Clutch		
Drive Clutch-to-Output Shaft Cap Screw	Torque	50 N·m (37 lb-ft)
Roller Arm-to-Moveable Sheave Half Cap Screw	Torque	8 N·m (71 lb-in.)
Ramp Plate-to-Spider Cap Screw	Torque	12 N·m (107 lb-in.)
Driven Clutch Collar-to-Transaxle Input Shaft Set Screw	Torque	8 N·m (71 lb-in.)
Transaxle		
Input Shaft		
Washer	Thickness	1.55—1.65 mm (0.061—0.064 in.)
Washer	Thickness	1.45—1.55 mm (0.057—0.061 in.)
Reverse Drive Sprocket	ID	24.01—24.03 mm (0.945—0.946 in.)
Forward Drive Gear	ID	24.01—24.03 mm (0.945—0.946 in.)
Input Shaft	OD	19.99—20.01 mm (0.787—0.788 in.)
Shift Collar	Groove Width	14.10—14.30 mm (0.550—0.560 in.)
Shift Collar-to-Lock Fork Finger	Clearance (MAX)	2 mm (0.080 in.)
Shift Collar Spring	Free Length	24.20 mm (0.950 in.)
	Free Length (MIN)	20 mm (0.790 in.)
	Working Load	15.80 mm at 53N (0.620 in. at 12 lbs)

MX,1015HE,A2 -19-27SEP91

Item	Measurement	Specification
SECTION 50—POWER TRAIN REPAIR—CONTINUED		
Transaxle—continued		
Differential		
Differential Lock Collar	Groove Width	7.10—7.30 mm (0.280—0.290 in.)
Bevel Gear Washer	Thickness	0.74—0.86 mm (0.029—0.033 in.)
Pinion Gear Washer	Thickness	0.96—1.04 mm (0.038—0.041 in.)
Pinion Gear	ID	16.03—16.05 mm (0.631—0.632 in.)
Bevel Pinion Shaft	OD	15.95—15.97 mm (0.628—0.629 in.)
Shift-to-Pinion Gar	Clearance (MAX)	0.20 mm (0.010 in.)
Differential Half Nut	Torque	25 N·m (221 lb-in.)
Differential Lock Shaft		
Differential Lock Fork Finger	Thickness	6.70—6.90 mm (0.260—0.270 in.)
Differential Lock Fork	ID	20.05—20.10 mm (0.789—0.791 in.)
Finger-to-Collar Groove	Clearance (MAX)	2 mm (0.080 in.)
Differential Lock Shaft	OD	19.95—20.00 mm (0.785—0.787 in.)
Differential Lock Shaft-to-Fork	Clearance (MAX)	0.50 mm (0.020 in.)
Spring	Free Length	77.60 mm (3.060 in.)
	Working Load	52 mm at 511N (2.070 in. at 115 lbs)

MX,1015HE,A2A -19-27SEP91

Item	Measurement	Specification
SECTION 50—POWER TRAIN REPAIR—CONTINUED		
Transaxle—continued		
Shifter Arm		
Shifter Block	Width	13.70—13.90 mm (0.540—0.550 in.)
Block-to-Shift Collar Groove	Clearance (MAX)	2 mm (0.080 in.)
Shifter Arm Shaft	OD	16.96—17.00 mm (0.668—0.669 in.)
Transaxle Case Bore	ID	17.02—17.04 mm (0.670—0.671 in.)
Shaft-to-Case Bore	Clearance (MAX)	0.20 mm (0.010 in.)
Retaining Plate-to-Case Cap Screw	Torque	25 N·m (221 lb-in.)
Transaxle Case-Half Cap Screw	Torque (Same Case) (New Case)	 25 N·m (221 lb-in.) 29 N·m (257 lb-in.)
Vent Tube-to-Transaxle	Torque	10 N·m (88 lb-in.)
Neutral Start Switch-to-Transaxle	Torque	39 N·m (28 lb-ft)
Flangette-to-Frame Nut	Torque	25 N·m (216 lb-in.)
Drive Axles		
Drive Axle-to-Frame	Distance	30.15 mm (1.187 in.)
Flangette-to-Frame Nut	Torque	25 N·m (216 lb-in.)
Locking Collar-to-Axle Shaft Set Screw	Torque	8 N·m (64 lb-in.)
SECTION 60—STEERING AND BRAKE REPAIR		
Locking Collar-to-Steering Shaft Set Screw	Torque	8 N·m (64 lb-in.)
Brake Housing Half Cap Screw	Torque	33 N·m (24 lb-ft)
Axle Bearing Flangette-to-Frame Nut	Torque	25 N·m (216 lb-in.)

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Item	Measurement	Specification
SECTION 70—HYDRAULIC REPAIR		
Reservoir-to-Gear Pump Screw	Torque	5 N·m (45 lb-in.)
Gear Pump-to-Adapter Screw	Torque	8 N·m (70 lb-in.)
Hex Plug-to-Adapter	Torque	59 N·m (44 lb-ft)
Lower and Raise Relief Valve-to-Adapter Nut	Torque	2 N·m (20 lb-in.)
Thermal Relief Valve	Torque	7 N·m (60 lb-in.)
SECTION 80—MISCELLANEOUS REPAIR		
Steering Wheel Nut	Torque	197 N·m (145 lb-ft)
Rear Wheel Cap Screw	Torque	100 N·m (75 lb-ft)

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TUNE-UP SPECIFICATIONS

Spark plug gap . . . . . 0.64 mm (0.025 in.)
Spark plug torque . . . . . 20 N·m (177 lb-in.)
Slow idle
  Stop screw setting . . . . . 1300 rpm
  Limiter screw setting . . . . . 1300—1500 rpm
Fast idle limiter screw setting . . . . . 3800 rpm

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TUNE-UP ADJUSTMENTS

10
15
6

Perform tune-up adjustments in the following order to improve the efficiency and operation of the machine.

Tune-up Adjustment	Section	Group
1. Clean engine cooling fins.	See CTM5	
2. Clean or replace air cleaner element.	30	10
3. Check or replace fuel filter.	30	05
4. Check battery electrolyte level.	See Operators Manual	
5. Clean, regap or replace spark plug.	240	15
6. Check engine compression.	220	15
7. Adjust throttle cable.	230	15
8. Check and adjust choke.	230	15
9. Adjust governor.	230	15
10. Adjust slow idle stop and idle mixture screw.	230	15
11. Adjust slow idle limiter screw.	230	15
12. Adjust fast idle limiter screw.	230	15
13. Check and adjust brakes.	260	15
14. Check charging system output.	240	15
15. Check tire pressure.	See Operators Manual	

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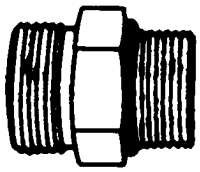
SERVICE RECOMMENDATIONS FOR O-RING BOSS FITTINGS

STRAIGHT FITTING

1. Inspect O-ring boss seat for dirt or defects.

2. Lubricate O-ring with petroleum jelly. Place electrical tape over threads to protect O-ring. Slide O-ring over tape and into O-ring groove of fitting. Remove tape.

3. Tighten fitting to torque value shown on chart.



T6243AE -UN-18OCT88

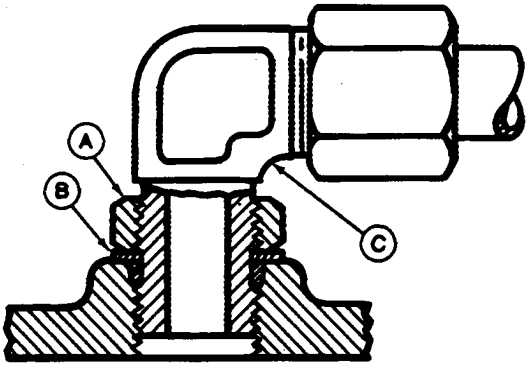
ANGLE FITTING

1. Back-off lock nut (A) and back-up washer (B) completely to head-end (C) of fitting.

2. Turn fitting into threaded boss until back-up washer contacts face of boss.

3. Turn fitting head-end counterclockwise to proper index (maximum of one turn).

4. Hold fitting head-end with a wrench and tighten locknut and back-up washer to proper torque value.



T6520AB -UN-18OCT88

NOTE: Do not allow hoses to twist when tightening fittings.

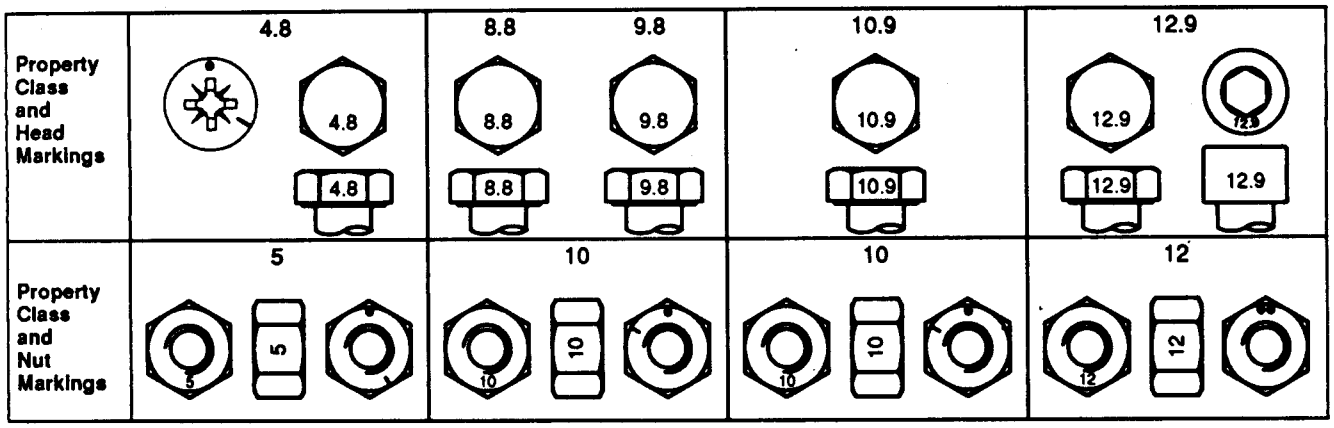
TORQUE VALUE

Thread Size	N·m	lb-ft
3/8-24 UNF	8	6
7/16-20 UNF	12	9
1/2-20 UNF	16	12
9/16-18 UNF	24	18
3/4-16 UNF	46	34
7/8-14 UNF	62	46
1-1/16-12 UN	102	75
1-3/16-12 UN	122	90
1-5/16-12 UN	142	105
1-5/8-12 UN	190	140
1-7/8-12 UN	217	160

NOTE: Torque tolerance is ± 10%.

04T,90,K66 -19-13AUG91

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	220	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 -19-05JUN91