# 310E Backhoe Loader Repair

## TECHNICAL MANUAL

**TM1649 17JUL02 (ENGLISH)**

**For complete service information also see:**


| | |
|---|---|
| **310E Backhoe Loader Operation and Test (Complete)** | **TM1648** |
| **310E Backhoe Loader Repair (Complete)** | **TM1649** |
| **POWERTECH® 4.5 L (4045) Engine** | **CTM104** |
| **Alternators and Starting Motors** | **CTM77** |
| **Front Wheel Drive Axles APL-2025** | **CTM4509** |



**Worldwide Construction And Forestry Division**

LITHO IN U.S.A.

# 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.

 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.

See DB1990 Service Publications Catalog to order a complete Technical Manual (TM) or a Technical Manual Section (TMS). A complete repair manual includes the following sections:

TMS164900

- Section 00 General Information

- Section 01 Wheels
- Section 02 Axles

- Section 03 Transmission
- Section 04 Engine
- Section 05 Engine Auxiliary Systems
- Section 06 Torque Converter

- Section 09 Steering System
- Section 10 Service Brakes
- Section 11 Park Brakes

- Section 16 Electrical System
- Section 17 Frames, Chassis, or Supporting Structure

- Section 18 Operator’s Station
- Section 19 Sheet Metal and Styling
- Section 20 Safey, Convenience, and Miscellaneous

- Section 21 Main Hydraulic System
- Section 31 Loader
- Section 33 Backhoe

TX,INTR,RR7339 –19–20SEP96–1/1

**John Deere Dealers**

**IMPORTANT: Please remove this page and route through your service department.**

Listed below is a brief explanation of “WHAT” was change and “WHY” it was changed.

These sectionalized manuals were revised to include the following changes:

1. Section 00:
   To include any specifications, oil capacity and miscellaneous changes.
2. Section 01—02:
   Miscellanous wheel specfication changes and service brake check added.
3. Section 03—06:
   Transmission clutch pack bottom of gear to top of drum distance specification change, miscellaneous changes in charge pump and manifold plate solenoids procedures.
4. Engine flywheel turning tool number change. Fan cap screw torque added.
5. Section 09—11:
   Steering valve manual check valve change. Miscellaneous brake valve changes.
6. Section 16—17:
   Torque added to engine coolant temperature switch.
7. Section 18—20:
   Cab side window torque and thread lock and sealer added. Bushings added to guide on upper rear window. Air suspension seat procedure added.
8. Section 21, 31 and 33:
   Torque added to hydraulic pump unloader relief valve. Cooler options added. Multi-purpose bucket and lines added. Shim as required added to bucket links-to-cylinder. Loader control relief valves torques, graphics and procedure changes. Loader cylinder miscellaneous changes.
   Backhoe linkage changes. Backhoe boom swing lock arms and locking pin added. Stabilizer valve linkage updates and serial number breaks. Miscellaneous changes to extentible dipperstick and sideshift frame locking pistons. Backhoe control relief valves torques, graphics and procedure changes. Backhoe cylinders serial number breaks and procedure changes. Extendible dipperstick disassemble and assemble procedure added.

CED,TX03399,5903 –19–13JAN00–1/1

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**FAX NUMBER: 319-589-5800**

Ideas, Comments (Please State Page Number): _____

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| Poor | | Fair | | Good | | Very Good | | Excellent | |
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THANK YOU!

TX,TM,FAX –19–05DEC96–1/1

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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.*

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# Section 00
# General Information

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## 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 –19–29SEP98–1/1

## 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

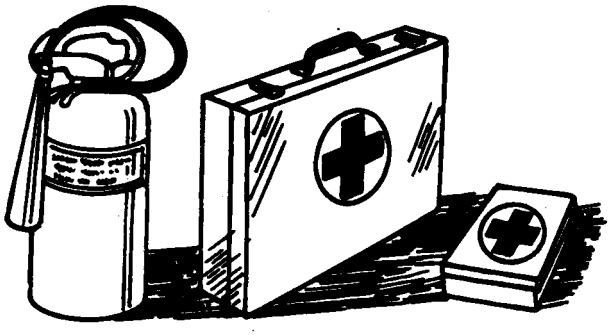
DX,SPARKS –19–03MAR93–1/1

## 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 –19–03MAR93–1/1

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## 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:

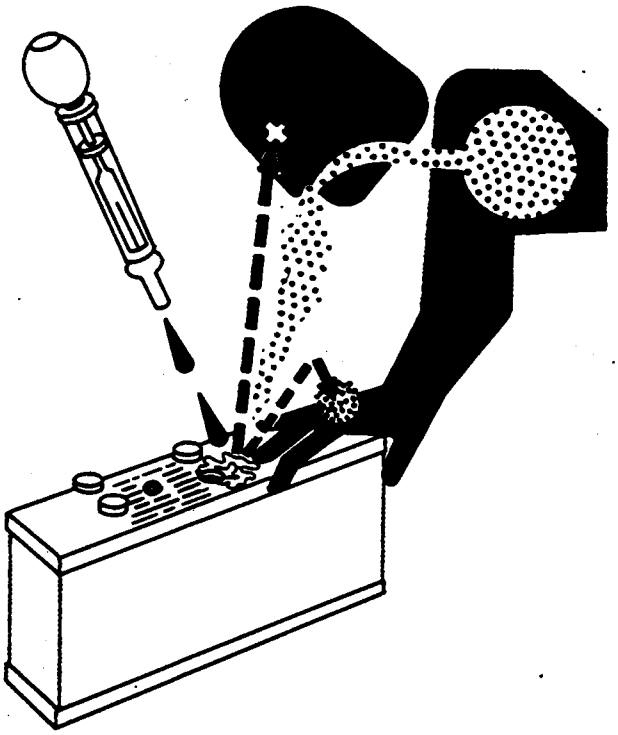
1. Filling batteries in a well-ventilated area.
2. Wearing eye protection and rubber gloves.
3. Avoiding breathing fumes when electrolyte is added.
4. Avoiding spilling or dripping electrolyte.
5. Use proper jump start procedure.

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 15—30 minutes. Get medical attention immediately.

If acid is swallowed:

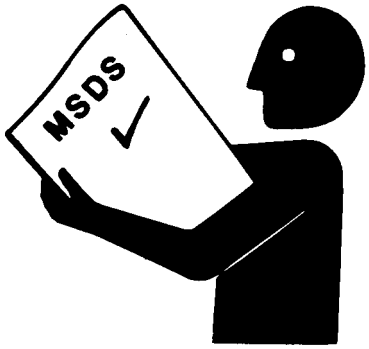
1. Do not induce vomiting.
2. Drink large amounts of water or milk, but do not exceed 2 L (2 quarts).
3. Get medical attention immediately.



TS203 –UN–23AUG88

DX,POISON –19–21APR93–1/1

## Handle Chemical Products Safely




TS1132 –UN–26NOV90

Direct exposure to hazardous chemicals can cause serious injury. Potentially hazardous chemicals used with John Deere equipment include such items as lubricants, coolants, paints, and adhesives.

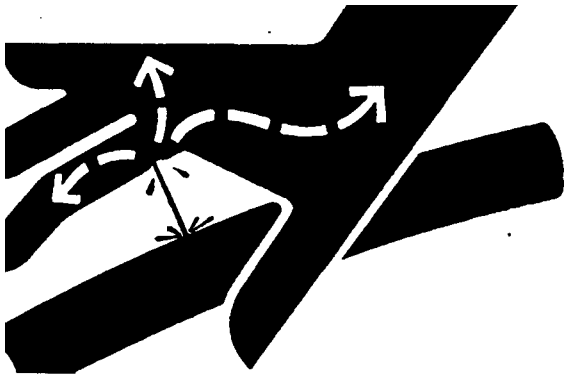
A Material Safety Data Sheet (MSDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques.

Check the MSDS before you start any job using a hazardous chemical. That way you will know exactly what the risks are and how to do the job safely. Then follow procedures and recommended equipment.

(See your John Deere dealer for MSDS's on chemical products used with John Deere equipment.)

DX,MSDS,NA –19–03MAR93–1/1

## Avoid High-Pressure Fluids



X9811 –UN–23AUG88

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.

DX,FLUID –19–03MAR93–1/1

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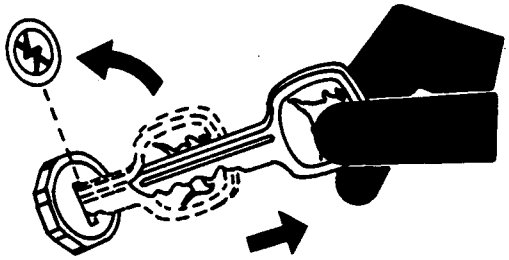
## Park Machine Safely

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

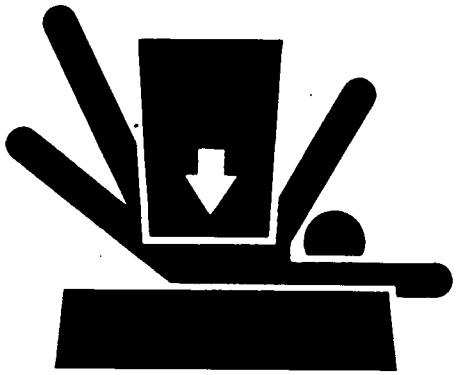
DX,PARK –19–04JUN90–1/1

## 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. If left in a raised position, hydraulically supported devices can settle or leak down.

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.

When implements or attachments are used with a tractor, always follow safety precautions listed in the implement operator's manual.



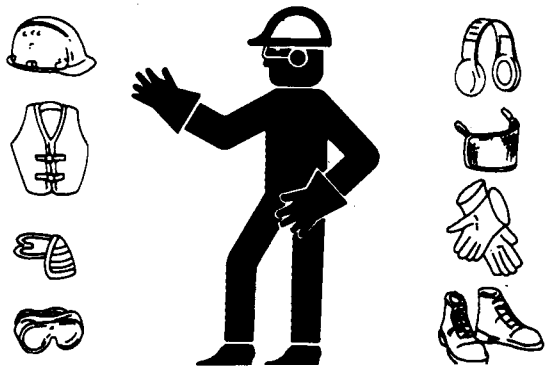
TS229 –UN–23AUG88

DX,LOWER –19–17FEB99–1/1

## Wear Protective Clothing

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

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



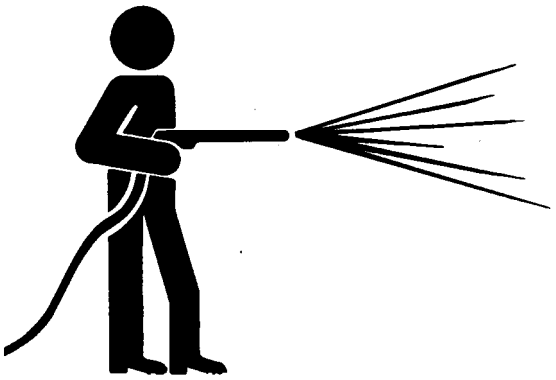
TS206 –UN–23AUG88

DX,WEAR2 –19–03MAR93–1/1

## 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.



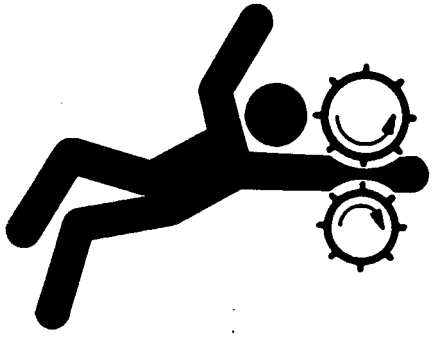
T6642EJ –UN–18OCT88

DX,CLEAN –19–04JUN90–1/1

## 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.



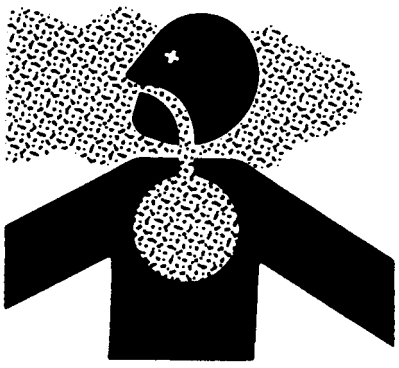
TS228 –UN–23AUG88

DX,LOOSE –19–04JUN90–1/1

## 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

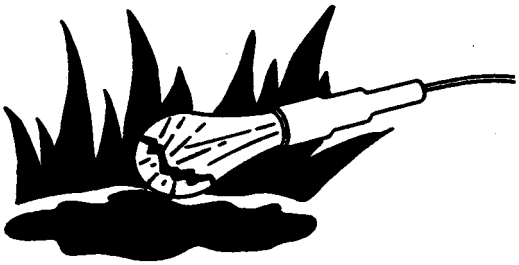


TS220 –UN–23AUG88

DX,AIR –19–17FEB99–1/1

## 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 –19–04JUN90–1/1

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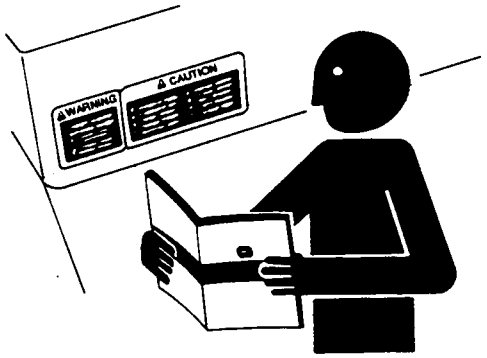
## Replace Safety Signs

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



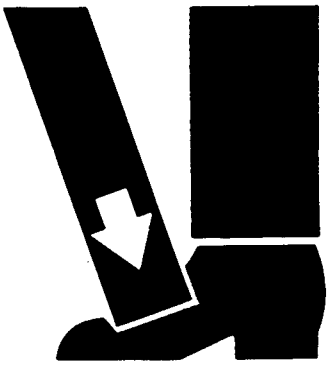

TS201 –UN–23AUG88

DX,SIGNS1 –19–04JUN90–1/1

## 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 –19–04JUN90–1/1

## Remove Paint Before Welding or Heating

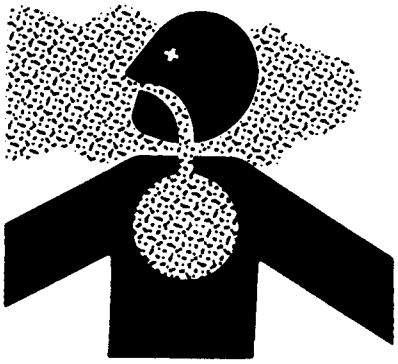
Avoid potentially toxic fumes and dust.

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 –19–03MAR93–1/1

## 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.

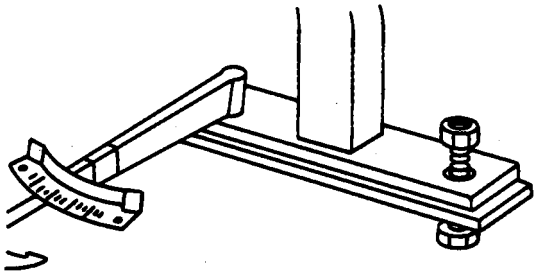
TS953 –UN–15MAY90

DX,TORCH –19–03MAR93–1/1

## 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 –19–03MAR93–1/1

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## Service Tires Safely

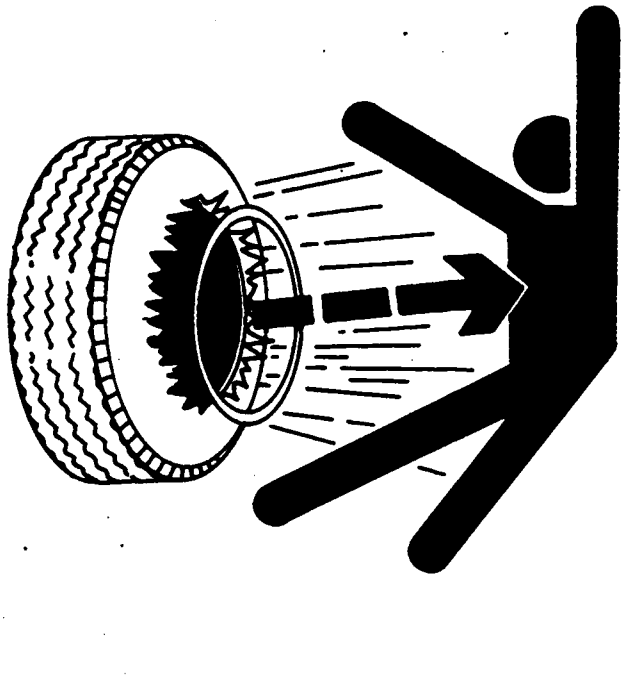
Explosive separation of a tire and rim parts can cause serious injury or death.

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.



TS211 –UN–23AUG88

DX,RIM –19–24AUG90–1/1

## Practice Safe Maintenance

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.

On self-propelled equipment, disconnect battery ground cable (-) before making adjustments on electrical systems or welding on machine.

On towed implements, disconnect wiring harnesses from tractor before servicing electrical system components or welding on machine.

TS218 –UN–23AUG88

DX,SERV –19–17FEB99–1/1

## 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 –19–17FEB99–1/1

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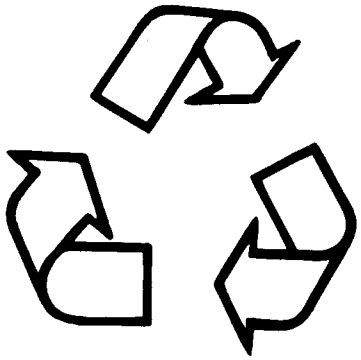
## Dispose of Waste Properly



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 –19–03MAR93–1/1

## 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 –19–25SEP92–1/1

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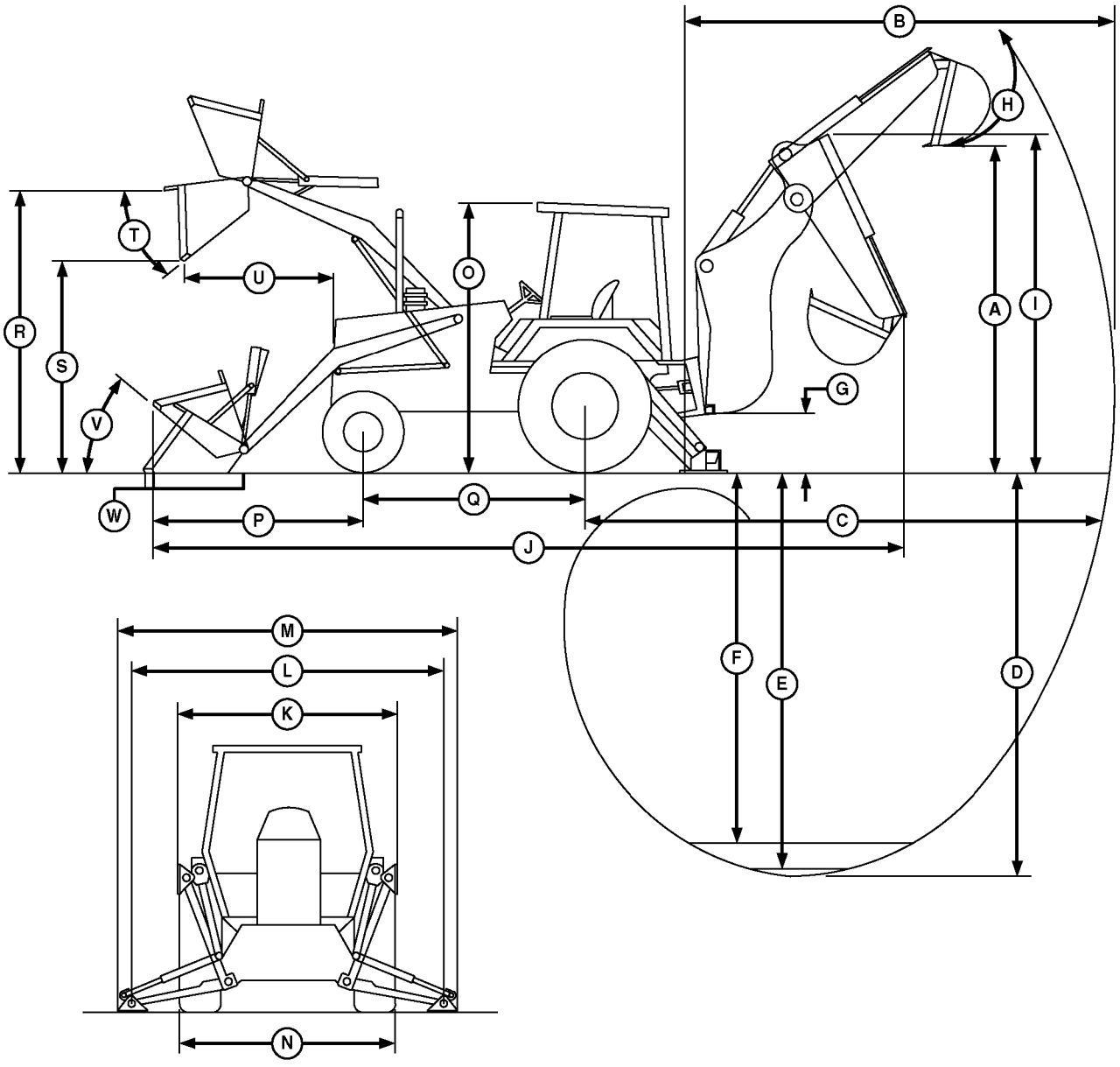
## 310E Backhoe Loader Dimensions




T115805

T115805 –UN–11JUN98

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TX,110,BD2412 –19–10JUN98–1/7

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*NOTE: Specifications and design subject to change without notice. Whenever applicable, specifications are in accordance with SAE Standards unless otherwise noted, these specifications are based on a standard machine with 19.5L-24, 8PR, R4 rear tires; 11L-16, 12PR, F3 front tires; 0.86 m³ (1.12 cu yd) loader bucket; 610 mm (24 in.) backhoe bucket; ROPS/FOPS; full fuel tank and 79 kg (175 lb) operator.*

| Item | Measurement | Specification |
|---|---|---|
| A—Loading Height, Truck Loading Position | | |
| Backhoe w/o Ext. Dipperstick | Height | 3.3 m (10 ft 11 in.) |
| Backhoe w/Ext. Dipperstick Retracted | Height | 3.38 m (11 ft 1 in.) |
| Backhoe w/Ext. Dipperstick Extended | Height | 4.24 m (13 ft 11 in.) |
| B—Reach from Center of Swing Mast | | |
| Backhoe w/o Ext. Dipperstick | Distance | 5.44 m (17 ft 10 in.) |
| Backhoe w/Ext. Dipperstick Retracted | Distance | 5.51 m (18 ft 1 in.) |
| Backhoe w/Ext. Dipperstick Extended | Distance | 6.53 m (21 ft 5 in.) |
| C—Reach from Center of Rear Axle | | |
| Backhoe w/o Ext. Dipperstick | Distance | 6.50 m (21 ft 4 in.) |
| Backhoe w/Ext. Dipperstick Retracted | Distance | 6.58 m (21 ft 7 in.) |
| Backhoe w/Ext. Dipperstick Extended | Distance | 7.59 m (24 ft 11 in.) |
| D—Maximum Digging Depth | | |
| Backhoe w/o Ext. Dipperstick | Depth | 4.34 m (14 ft 3 in.) |
| Backhoe w/Ext. Dipperstick Retracted | Depth | 4.39 m (14 ft 5 in.) |

Continued on next page

TX,110,BD2412 –19–10JUN98–2/7

| Item | Measurement | Specification |
|---|---|---|
| Backhoe w/Ext. Dipperstick Extended | Depth | 5.46 m (17 ft 11 in.) |
| E—Digging Depth (SAE)—610 mm (2 ft) Flat Bottom | | |
| Backhoe w/o Ext. Dipperstick | Distance | 4.32 m (14 ft 2 in.) |
| Backhoe w/Ext. Dipperstick Retracted | Distance | 4.37 m (14 ft 4 in.) |
| Backhoe w/Ext. Dipperstick Extended | Distance | 5.44 m (17 ft 10 in.) |
| F—Digging Depth (SAE)—2440 mm (8 ft) Flat Bottom | | |
| Backhoe w/o Ext. Dipperstick | Distance | 3.96 m (13 ft 0 in.) |
| Backhoe w/Ext. Dipperstick Retracted | Distance | 4.06 m (13 ft 4 in.) |
| Backhoe w/Ext. Dipperstick Extended | Distance | 5.18 m (17 ft 0 in.) |
| G—Ground Clearance Minimum | | |
| Backhoe w/o Ext. Dipperstick | Clearance | 305 mm (12 in.) |
| Backhoe w/Ext. Dipperstick Retracted | Clearance | 305 mm (12 in.) |
| Backhoe w/Ext. Dipperstick Extended | Clearance | 305 mm (12 in.) |
| H—Bucket Rotation | | |
| Backhoe w/o Ext. Dipperstick | Rotation | 190° |
| Backhoe w/Ext. Dipperstick Retracted | Rotation | 190° |

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| Item | Measurement | Specification |
|---|---|---|
| Backhoe w/Ext. Dipperstick Extended | Rotation | 190° |
| I—Transport Height | | |
| Backhoe | Height | 3.40 m (11 ft 2 in.) |
| J—Overall Length, Transport | | |
| Backhoe | Length | 7.09 m (23 ft 3 in.) |
| K—Stabilizer Width, Transport | | |
| Backhoe | Width | 2.18 m (7 ft 2 in.) |
| L—Stabilizer Spread, Operating | | |
| Backhoe | Width | 3.10 m (10 ft 2 in.) |
| M—Overall Width, Stabilizer Spread (Less Loader Bucket) | | |
| Backhoe | Width | 3.53 m (11 ft 7 in.) |
| N—Width Over Tires | | |
| Backhoe | Width | 2.07 m (6 ft 10 in.) |
| O—Height to Cab/ROPS Top | | |
| Backhoe | Height | 2.74 m (9 ft 0 in.) |
| P—Front Wheel to Loader Dig Position | | |
| Backhoe w/o Ext. Dipperstick | Distance | 2.03 m (6 ft 8 in.) |
| Backhoe w/Ext. Dipperstick Retracted | Distance | 1.12 m (3 ft 8 in.) |

Continued on next page

TX,110,BD2412 –19–10JUN98–4/7

| Item | Measurement | Specification |
|---|---|---|
| Backhoe w/Ext. Dipperstick Extended | Distance | 1.12 m (3 ft 8 in.) |
| Q—Wheelbase | | |
| Backhoe | Length | 2.10 m (6 ft 10 in.) |
| R—Maximum Height to Loader Bucket Hinge Pin | | |
| Heavy Duty Long Lip 0.86 $m^3$ (1.12 $yd^3$) | Height | 3.4 m (11 ft 1 in.) |
| Heavy Duty Long Lip 1.0 $m^3$ (1.30 $yd^3$) | Height | 3.4 m (11 ft 1 in.) |
| Multipurpose 0.76 $m^3$ (1.00 $yd^3$) | Height | 3.4 m (11 ft 1 in.) |
| S—Dump Clearance, Loader Bucket at 45° | | |
| Heavy Duty Long Lip 0.86 $m^3$ (1.12 $yd^3$) | Clearance | 2.69 m (8 ft 10 in.) |
| Heavy Duty Long Lip 1.0 $m^3$ (1.30 $yd^3$) | Clearance | 2.69 m (8 ft 10 in.) |
| Multipurpose 0.76 $m^3$ (1.00 $yd^3$) | Clearance | 2.59 m (8 ft 6 in.) |
| T—Maximum Loader Bucket Dump Angle | | |
| Heavy Duty Long Lip 0.86 $m^3$ (1.12 $yd^3$) | Angle | 45° |
| Heavy Duty Long Lip 1.0 $m^3$ (1.30 $yd^3$) | Angle | 45° |
| Multipurpose 0.76 $m^3$ (1.00 $yd^3$) | Angle | 45° |

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| Item | Measurement | Specification |
|---|---|---|
| U—Reach at Full Height, Loader Bucket at 45° | | |
| Heavy Duty Long Lip 0.86 $m^3$ (1.12 $yd^3$) | Distance | 785 mm (30.9 in.) |
| Heavy Duty Long Lip 1.0 $m^3$ (1.30 $yd^3$) | Distance | 767 mm (30.2 in.) |
| Multipurpose 0.76 $m^3$ (1.00 $yd^3$) | Distance | 818 mm (32.2 in.) |
| V—Loader Bucket Rollback at Ground Level | | |
| Heavy Duty Long Lip 0.86 $m^3$ (1.12 $yd^3$) | Angle | 40° |
| Heavy Duty Long Lip 1.0 $m^3$ (1.30 $yd^3$) | Angle | 40° |
| Multipurpose 0.76 $m^3$ (1.00 $yd^3$) | Angle | 40° |
| W—Dig Below Ground—Loader Bucket Level | | |
| Heavy Duty Long Lip 0.86 $m^3$ (1.12 $yd^3$) | Depth | 160 mm (6.3 in.) |
| Heavy Duty Long Lip 1.0 $m^3$ (1.30 $yd^3$) | Depth | 175 mm (6.9 in.) |
| Multipurpose 0.76 $m^3$ (1.00 $yd^3$) | Depth | 197 mm (7.8 in.) |
| Digging Force, Bucket Cylinder | | |
| Backhoe w/o Ext. Dipperstick | Force | 49.4 kN (11,106 lb) |
| Backhoe w/Ext. Dipperstick Retracted | Force | 49.9 kN (11,211 lb) |
| Backhoe w/Ext. Dipperstick Extended | Force | 49.9 kN (11,211 lb) |

Continued on next page

TX,110,BD2412 –19–10JUN98–6/7

| Item | Measurement | Specification |
|---|---|---|
| Digging Force, Crowd Cylinder | | |
| Backhoe w/o Ext. Dipperstick | Force | 31.2 kN (7006 lb) |
| Backhoe w/Ext. Dipperstick Retracted | Force | 30.2 kN (6782 lb) |
| Backhoe w/Ext. Dipperstick Extended | Force | 21.5 kN (4844 lb) |
| Swing Arc | | |
| Backhoe w/o Ext. Dipperstick | Rotation | 180° |
| Backhoe w/Ext. Dipperstick Retracted | Rotation | 180° |
| Backhoe w/Ext. Dipperstick Extended | Rotation | 180° |
| Bucket Rotation | | |
| Backhoe w/o Ext. Dipperstick | Rotation | 190° |
| Backhoe w/Ext. Dipperstick Retracted | Rotation | 190° |
| Backhoe w/Ext. Dipperstick Extended | Rotation | 190° |
| Stabilizer Angle Rearward | | |
| Backhoe w/o Ext. Dipperstick | Angle | 18° |
| Backhoe w/Ext. Dipperstick Retracted | Angle | 18° |
| Backhoe w/Ext. Dipperstick Extended | Angle | 18° |

TX,110,BD2412 –19–10JUN98–7/7

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## 310E Backhoe Loader Specifications

| Item | Measurement | Specification |
|---|---|---|
| Engine—John Deere 4045[1] | | |
| Rated Power @ 2200 rpm | Power | SAE gross 57 kW (76 hp) |
| Rated Power @ 2200 rpm | Power | SAE net 53 kW (71 hp) |
| Cylinders | Quantity | 4 |
| Displacement | Volume | 4.52 L (276 in.$^3$) |
| Engine Torque Rise | Torque | 29% |
| Maximum Engine Net Torque | Torque | 296 N•m (218 lb-ft) |
| Electrical System | Voltage | 12 volts |
| Alternator | Amperage | 65 amps |
| Alternator with Cab | Amperage | 95 amps |
| Forward Travel Speeds[2] | | |
| Gear 1 | Speed | 5.5 km/h (3.4 mph) |
| Gear 2 | Speed | 9.0 km/h (5.6 mph) |
| Gear 3 | Speed | 21.7 km/h (13.5 mph) |
| Gear 4 | Speed | 36.7 km/h (22.8 mph) |
| Reverse Travel Speeds[2] | | |
| Gear 1 | Speed | 6.1 km/h (3.8 mph) |
| Gear 2 | Speed | 10.0 km/h (6.2 mph) |
| Gear 3 | Speed | 24.3 km/h (15.1 mph) |

*[1]The engine specifications apply to both the 4045D (naturally aspirated) and 4045T (altitude compensated) engines.*

*[2]With standard 19.5L-24 rear tires.*

**Continued on next page**

| Item | Measurement | Specification |
|---|---|---|
| Gear 4 | Speed | 41.0 km/h (25.5 mph) |
| Steering: Hydrostatic Power | | |
| Non-Powered Axle Curb Turning Radius—Brakes Applied | Radius | 3.57 m (11 ft 9 in.) |
| Non-Powered Axle Curb Turning Radius—Without Brakes | Radius | 4.04 m (13 ft 3 in.) |
| Non-Powered Axle Bucket Clearance Circle—Brakes Applied | Radius | 9.61 m (31 ft 6 in.) |
| Non-Powered Axle Bucket Clearance Circle—Without Brakes | Radius | 10.55 m (34 ft 7 in.) |
| Non-Powered Axle Steering Wheel Turns—Stop to Stop | Quantity | 2.3—3.0 turns |
| Powered Axle (MFWD) Curb Turning Radius—Brakes Applied | Radius | 3.34 m (10 ft 11 in.) |
| Powered Axle (MFWD) Curb Turning Radius—Without Brakes | Radius | 4.17 m (13 ft 8 in.) |
| Powered Axle Bucket Clearance Circle—Brakes Applied | Radius | 9.07 m (29 ft 9 in.) |
| Powered Axle Bucket Clearance Circle—Without Brakes | Radius | 10.74 m (35 ft 3 in.) |
| Powered Axle Steering Wheel Turns—Stop to Stop | Quantity | 2.5 turns |
| Hydraulic System: Open Center | | |
| Pressure Relief Setting, Backhoe | Pressure | 25 000 kPa (3625 psi) |
| Pressure Relief Setting, Loader | Pressure | 19 000 kPa (2750 psi) |
| Flow @ 2200 rpm, Backhoe | Flow Rate | 106 L/min (28 gpm) |
| Flow @ 2200 rpm, Loader | Flow Rate | 106 L/min (28 gpm) |

CED,OUO1010,311 –19–17SEP98–2/2

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## Other Information—310E Backhoe Loader

**Hydraulic system:**

- Gear-type pump
- 10 micron replaceable element return oil filter

**Final drives:**

- Heavy-duty inboard mounted planetary
- Evenly distributes axle shock loads over three oil cooled gears

**Brakes:**

- Hydraulic wet disk
- Mounted inboard
- Self-adjusting
- Self-equalizing

**Park brake:**

- Independent system
- Spring applied
- Hydraulically released
- Controlled by an electric switch on the side console

**Transmission:**

- 4-speed helical gear
- Synchronized collar shift transmission with hydraulic reverser
- Torque converter 280 mm (11 in.) with 2.63:1 stall ratio

**Lubrication:**

- Pressure system with spin-on filter
- Air cleaner
- Dual stage dry with element and precleaner

**Tires:**

- Front w/o MFWD—11L-15, 8 PR F3
- Front w/o MFWD—11L-16, 12PR F3
- Front with MFWD—12-16.5, 8PR NHS
- Rear w/o MFWD—16.9-24, 8PR R4
- Rear w/o MFWD—17.5L-24, 10PR R4
- Rear w/o MFWD—19.5L-24, 8PR R4
- Rear with MFWD—16.9L-24, 8PR R4
- Rear with MFWD—19.5L-24, 8PR R4

**Operator Control:**

- Backhoe w/o Ext. Dipperstick
  – Two Levers
- Backhoe w/Ext. Dipperstick Retracted
  – Right Foot Treadle
- Backhoe w/Ext. Dipperstick Extended
  – Right Foot Treadle

CED,OUO1032,1006 –19–09JUN98–1/1

## 310E Backhoe Loader Weight

| Item | Measurement | Specification |
|---|---|---|
| Transporting | | |
| SAE Operating Weight with ROPS | Weight | 5806 kg (12,800 lb) |
| Cab Added | Weight | 263 kg (580 lb) |
| MFWD with Tires Added | Weight | 168 kg (370 lb) |
| Extendible Dipperstick | Weight | 200 kg (440 lb) |
| Optional Front Counterweight | Weight | 181 kg (400 lb) |
| Optional Front Counterweight | Weight | 295 kg (650 lb) |

TX,110,BD2420 –19–06DEC96–1/1

## 310E Buckets

| | Width | | Heaped Capacity | | Weight | |
|---|---|---|---|---|---|---|
| **Loader:** | **mm** | **(in.)** | **$m^3$** | **(cu yd)** | **kg** | **(lb)** |
| Heavy duty long lip | 2180 | (86) | 0.76 | (1.00) | 332 | (710) |
| | 2180 | (86) | 0.86 | (1.12) | 426 | (940) |
| Multipurpose | 2180 | (86) | 0.76 | (1.00) | 725 | (1600) |

| | Width | | Heaped Capacity | | Weight | |
|---|---|---|---|---|---|---|
| **Backhoe:** | **mm** | **(in.)** | **$m^3$** | **(cu ft)** | **kg** | **(lb)** |
| Standard duty | 457 | (18) | 0.13 | (4.6) | 118 | (260) |
| | 610 | (24) | 0.18 | (6.5) | 136 | (300) |
| Heavy duty with lift loops | 305 | (12) | 0.11 | (2.8) | 109 | (240) |
| | 457 | (18) | 0.13 | (4.6) | 132 | (290) |
| | 610 | (24) | 0.18 | (6.5) | 154 | (340) |
| | 762 | (30) | 0.25 | (8.8) | 172 | (380) |

TX,110,BD2212 –19–10JUN98–1/1

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## 310E Backhoe Loader Drain and Refill Capacities

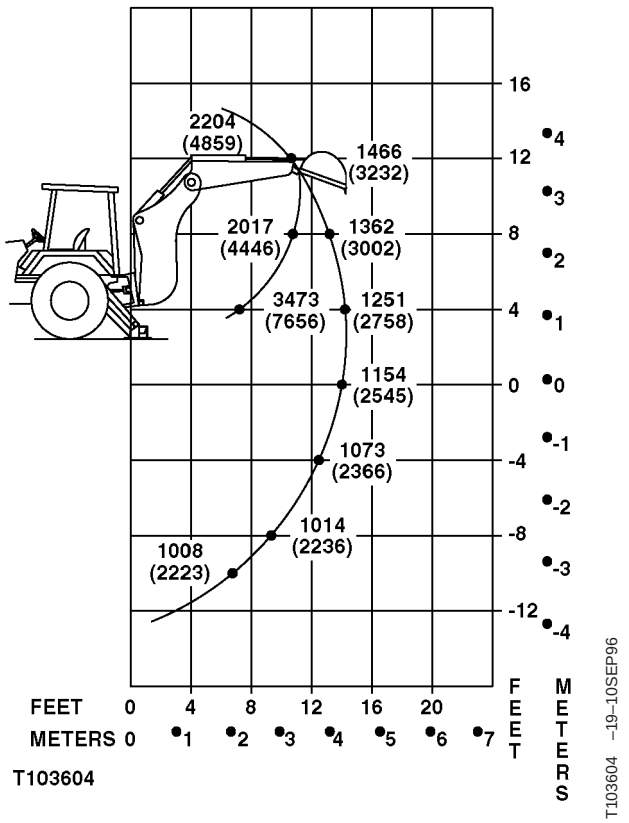
| Item | Measurement | Specification |
|---|---|---|
| Engine Coolant | Capacity | 16 L (17 qt) |
| Engine Oil (including filter) | Capacity | 8.5 L (9.0 qt) |
| Torque Converter and Transmission System | Capacity | 15 L (16 qt) |
| Rear Axle (S.N. —851673) | Capacity | 13 L (14 qt) |
| Rear Axle (S.N. 851674— ) | Capacity | 16 L (17 qt) |
| MFWD Front Axle Housing | Capacity | 6.5 L (7 qt) |
| MFWD Front Wheel Planetary Housing (each) | Capacity | 1 L (1.1 qt) |
| Fuel Tank | Capacity | 106 L (28 gal) |
| Hydraulic System Reservoir | Capacity | 37 L (39 qt) |

TX,110,BG271 –19–06MAY98–1/1

## 310E Backhoe Loader Lifting Capacities—Standard Dipperstick

Lifting capacity ratings are made with bucket hinge pin, loader bucket and stabilizers on firm, level ground. Lift capacities are hydraulically limited. Lifting capacities are 87 percent of the maximum lift over any point on the swing arc and do not exceed 75 percent of the tipping load. Angle between boom and ground is 65 degrees. Machine is equipped with 610 mm (24 in.) standard bucket, standard or extendible dipperstick, and standard equipment.

*NOTE: Loader bucket on ground significantly improves side stability, therefore improving lift capacity to the side. Lift capacity over the rear is not affected.*




*Lift Capacity, Backhoe with Standard Dipperstick Based on SAE J31 (Except with Loader Bucket on Ground)*

TX,110,BD2205 –19–07OCT96–1/1

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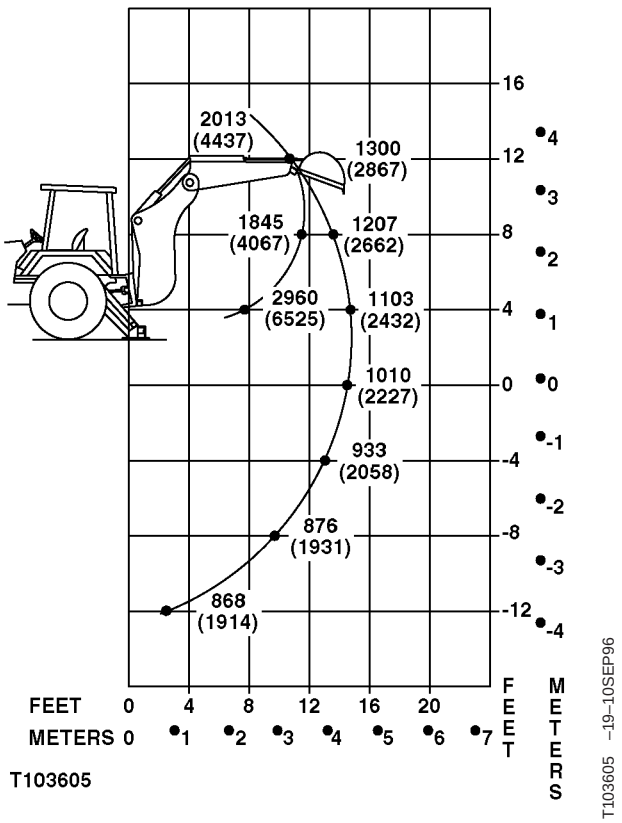
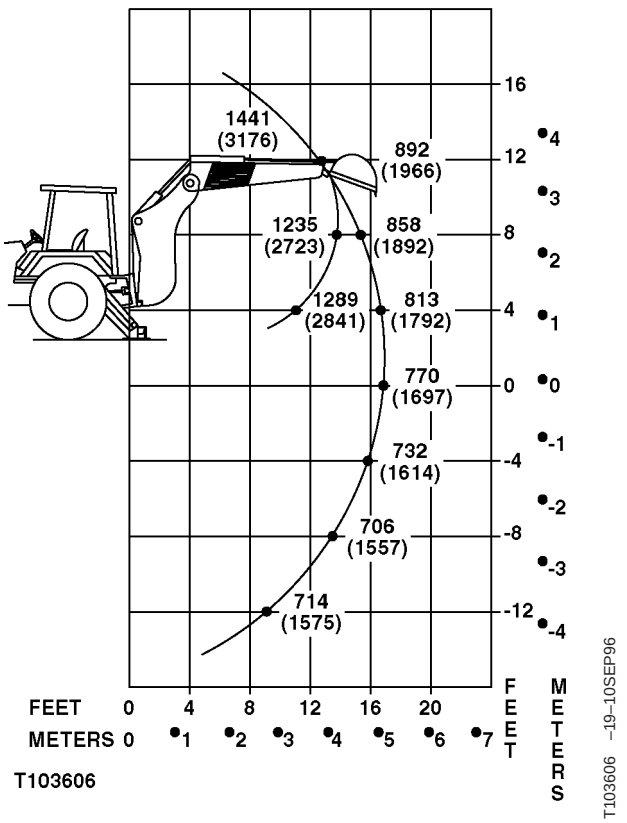
## 310E Backhoe Loader Lifting Capacities—Extendible Dipperstick (Retracted)




*Lift Capacity, Backhoe with Extendible Dipperstick, Retracted Based on SAE J31 (Except with Loader Bucket on Ground)*

TX,110,BD1936 –19–07OCT96–1/1

## 310E Backhoe Loader Lifting Capacities—Extendible Dipperstick (Extended)




*Lift Capacity, Backhoe with Extendible Dipperstick, Extended Based on SAE J31 (Except with Loader Bucket on Ground)*

TX,110,BD1937 –19–07OCT96–1/1

## Hardware Torque Specifications

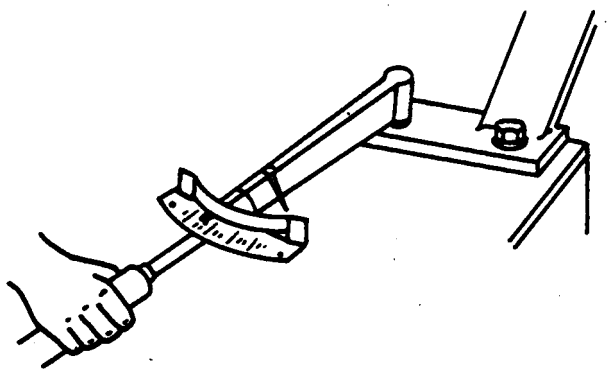
Check cap screws and nuts to be sure they are tight. If hardware is loose, tighten to torque shown on the following charts unless a special torque is specified.

TX,03,SS3508 –19–01AUG94–1/1

## ROPS Torque Specifications

**CAUTION: 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. A damaged ROPS should be replaced, not reused.**



TS176 –UN–23AUG88

When installation of equipment on a machine necessitates loosening or removing ROPS, mounting bolts must be tightened to specification.

| Item | Measurement | Specification |
|---|---|---|
| ROPS Mounting Bolts | Torque | 420 ± 84 N•m (310 ± 62 lb-ft) |

TX,03,SS3509 –19–14JAN00–1/1

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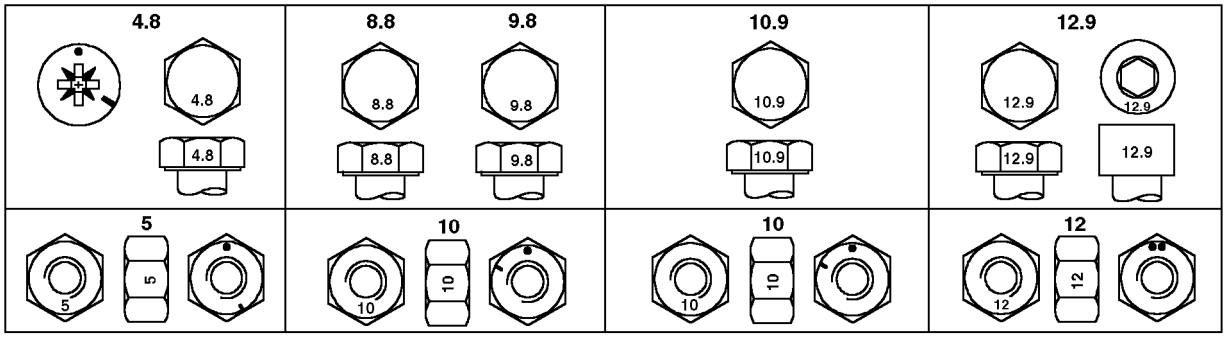
## Metric Bolt and Cap Screw Torque Values




TORQ2 –UN–07SEP99

*Top, Property Class and Head Markings; Bottom, Property Class and Nut Markings*

| | Class 4.8 | | Class 8.8 or 9.8 | | Class 10.9 | | Class 12.9 | |
|---|---|---|---|---|---|---|---|---|
| **Size** | **Lubricated[a] N•m(lb-ft)** | **Dry[b] N•m(lb-ft)** | **Lubricated[a] N•m(lb-ft)** | **Dry[b] N•m(lb-ft)** | **Lubricated[a] N•m(lb-ft)** | **Dry[b] N•m(lb-ft)** | **Lubricated[a] N•m(lb-ft)** | **Dry[b] N•m(lb-ft)** |
| M6 | 4.7 (3.5) | 6 (4.4) | 9 (6.6) | 11.5 (8.5) | 13 (9.5) | 16.5 (12.2) | 15.5 (11.5) | 19.5 (14.5) |
| M8 | 11.5 (8.5) | 14.5 (10.7) | 22 (16) | 28 (20.5) | 32 (23.5) | 40 (29.5) | 37 (27.5) | 47 (35) |
| M10 | 23 (17) | 29 (21) | 43 (32) | 55 (40) | 63 (46) | 80 (59) | 75 (55) | 95 (70) |
| M12 | 40 (29.5) | 50 (37) | 75 (55) | 95 (70) | 110 (80) | 140 (105) | 130 (95) | 165 (120) |
| M14 | 63 (46) | 80 (59) | 120 (88) | 150 (110) | 175 (130) | 220 (165) | 205 (150) | 260 (190) |
| M16 | 100 (74) | 125 (92) | 190 (140) | 240 (175) | 275 (200) | 350 (255) | 320 (235) | 400 (300) |
| M18 | 135 (100) | 170 (125) | 265 (195) | 330 (245) | 375 (275) | 475 (350) | 440 (325) | 560 (410) |
| M20 | 190 (140) | 245 (180) | 375 (275) | 475 (350) | 530 (390) | 675 (500) | 625 (460) | 790 (580) |
| M22 | 265 (195) | 330 (245) | 510 (375) | 650 (480) | 725 (535) | 920 (680) | 850 (625) | 1080 (800) |
| M24 | 330 (245) | 425 (315) | 650 (480) | 820 (600) | 920 (680) | 1150 (850) | 1080 (800) | 1350 (1000) |
| M27 | 490 (360) | 625 (460) | 950 (700) | 1200 (885) | 1350 (1000) | 1700 (1250) | 1580 (1160) | 2000 (1475) |
| M30 | 660 (490) | 850 (625) | 1290 (950) | 1630 (1200) | 1850 (1350) | 2300 (1700) | 2140 (1580) | 2700 (2000) |
| M33 | 900 (665) | 1150 (850) | 1750 (1300) | 2200 (1625) | 2500 (1850) | 3150 (2325) | 2900 (2150) | 3700 (2730) |
| M36 | 1150 (850) | 1450 (1075) | 2250 (1650) | 2850 (2100) | 3200 (2350) | 4050 (3000) | 3750 (2770) | 4750 (3500) |

[a] *"Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings.*

[b] *"Dry" means plain or zinc plated without any lubrication.*

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 fastener 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.

DX,TORQ2 –19–01OCT99–1/1

## Additional Metric Cap Screw Torque Values

**CAUTION: Use only metric tools on metric hardware. Other tools may not fit properly. They may slip and cause injury.**

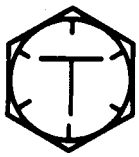
Check tightness of cap screws periodically. Torque values listed are for general use only. Do not use these values if a different torque value or tightening procedure is listed for a specific application.

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 fastener threads are clean and you properly start thread engagement. This will prevent them from failing when tightening.

Tighten cap screws having lock nuts to approximately 50 percent of amount shown in chart.




T6873AA

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T6873AB

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| METRIC CAP SCREW TORQUE VALUES[a] | | | | | | |
|---|---|---|---|---|---|---|
| | T-Bolt | | H-Bolt | | M-Bolt | |
| Nominal Dia | N•m | lb-ft | N•m | lb-ft | N•m | lb-ft |
| 8 | 29 | 21 | 20 | 15 | 10 | 7 |
| 10 | 63 | 46 | 45 | 33 | 20 | 15 |
| 12 | 108 | 80 | 88 | 65 | 34 | 25 |
| 14 | 176 | 130 | 137 | 101 | 54 | 40 |
| 16 | 265 | 195 | 206 | 152 | 78 | 58 |
| 18 | 392 | 289 | 294 | 217 | 118 | 87 |
| 20 | 539 | 398 | 392 | 289 | 167 | 125 |
| 22 | 735 | 542 | 539 | 398 | 216 | 159 |
| 24 | 931 | 687 | 686 | 506 | 274 | 202 |
| 27 | 1372 | 1012 | 1029 | 759 | 392 | 289 |
| 30 | 1911 | 1410 | 1421 | 1049 | 539 | 398 |
| 33 | 2548 | 1890 | 1911 | 1410 | 735 | 542 |
| 36 | 3136 | 2314 | 2401 | 1772 | 931 | 687 |

[a]Torque tolerance is ±10%.

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