310SE and 315SE Backhoe Loader Repair

TECHNICAL MANUAL

TM1609 22JUL10 (ENGLISH)

For complete service information also see:

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:

- Section 00 General Information
- Sections 01—02 Wheels and Axles
- Sections 03—06 Transmission and Engine
- Sections 09—11 Steering and Brakes
- Sections 16—17 Electrical System and Frame
- Sections 18—20 Operator’s Station and Sheet Metal
- Sections 21, 31, 33 Main Hydraulics

TX,INTR,SS3531 -19-11DEC96-1/1

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:
   Miscellaneous wheel speechification 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

Technical Information Feedback Form

We need your help to continually improve our technical publications. Please copy this page and FAX or mail your comments, ideas and improvements.

SEND TO: John Deere Dubuque Works
18600 South John Deere Road
Attn: Publications, Dept. 324
Dubuque, IA 52004-0538
USA

FAX NUMBER: 1-563-589-5800 (USA)

Publication Number:_____

Page Number:_____

Ideas, Comments:_____

Name: _____

Phone: _____

Email Address: _____

THANK YOU!

TX,TM,FAX -19-03JUL01-1/1

Contents

Continued on next page

Original Instructions. 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.

Section 00
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

TX,00,SS3858 -19-04JUN90-1/1

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 voltmeter or hydrometer.

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

TS204 —UN—23AUG88

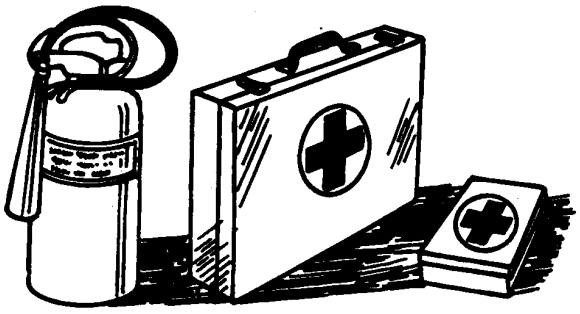
TX,00,SS3859 -19-03MAR93-1/1

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

TX,00,SS3860 -19-03MAR93-1/1

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:

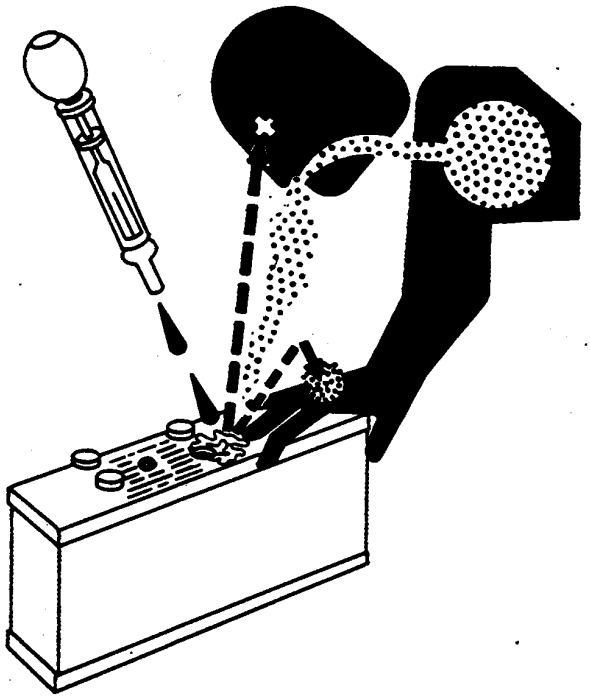
1. Filling batteries in a well-ventilated area.
2. Wearing eye protection and rubber gloves.
3. Avoiding breathing fumes when electrolyte is added.
4. Avoiding spilling or dripping electrolyte.
5. Using proper jump start procedure.

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.
3. Get medical attention immediately.



TS203 —UN—23AUG88

TX,00,SS3861 -19-21APR93-1/1

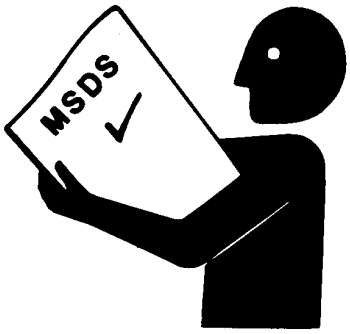
Handle Chemical Products Safely

Direct exposure to hazardous chemicals can cause serious injury. Potentially hazardous chemicals used with your machine includes 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 authorized dealer for MSDS's on chemical products used with your machine.



TS1132 —UN—26NOV90

TX,00,SS3862 -19-02OCT92-1/1

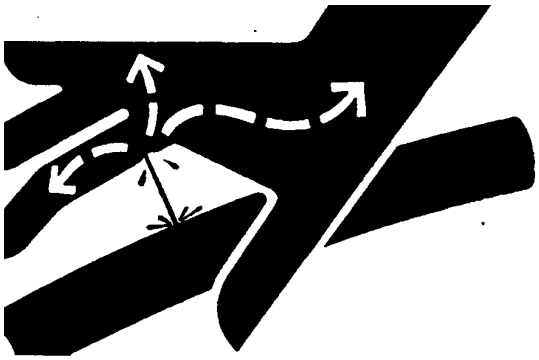
Avoid High-Pressure Fluids

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.



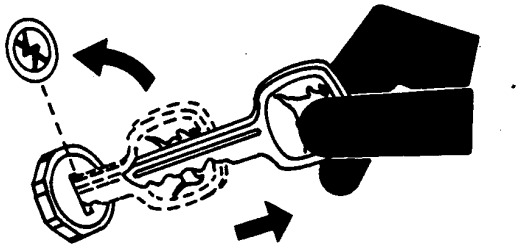
X9811 —UN—23AUG88

TX,00,SS3863 -19-03MAR93-1/1

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.



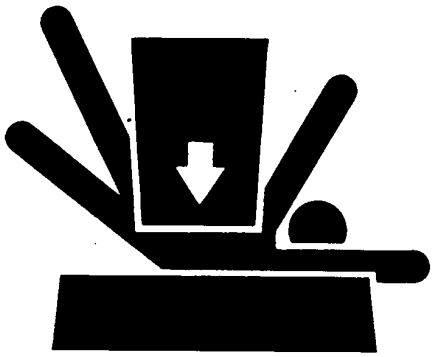
TS230 —UN—24MAY89

TX,00,SS3864 -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.

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

TX,00,SS3865 -19-04JUN90-1/1

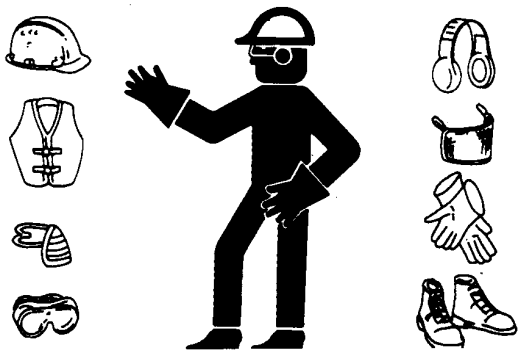
Wear Protective Clothing

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.



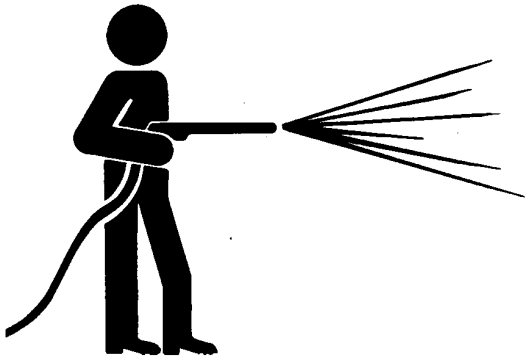
TS206 —UN—23AUG88

TX,00,SS3866 -19-10SEP90-1/1

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.



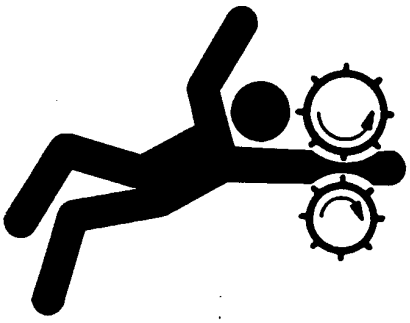
T6642EJ —UN—18OCT88

TX,00,SS3867 -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.



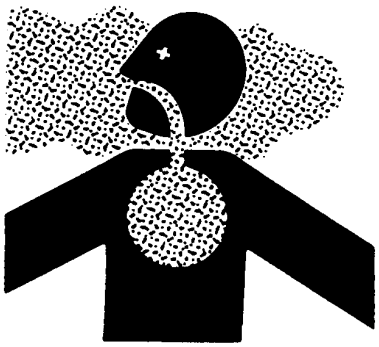
TS228 —UN—23AUG88

TX,00,SS3868 -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

TX,00,SS3869 -19-04JUN90-1/1

Illuminate Work Area Safely

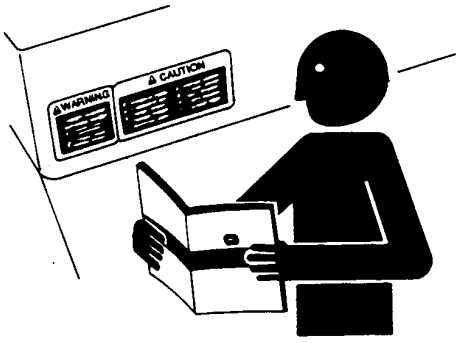
Illuminate your work area adequately but safely. Use a portable safety light for working inside or under the machine. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.

TS223 —UN—23AUG88

TX,00,SS3870 -19-04JUN90-1/1

Replace Safety Signs

Replace missing or damaged safety signs. See the machine operators manual for correct safety sign placement.



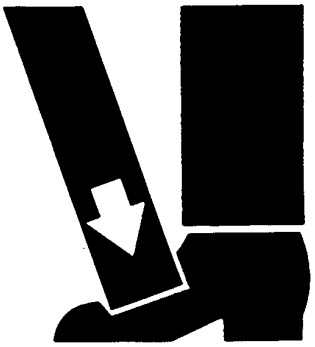
TS201 —UN—23AUG88

TX,00,SS3871 -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

TX,00,SS3872 -19-04JUN90-1/1

Remove Paint before Welding or Heating

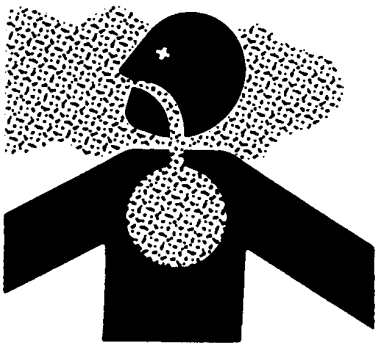
Avoid potentially toxic fumes and dust.

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

TX,00,SS3873 -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.

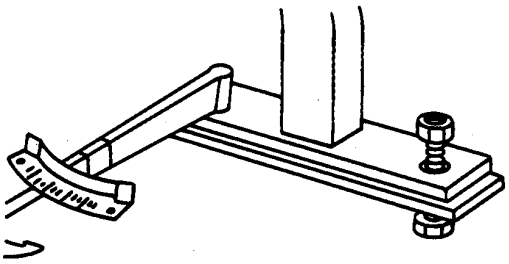
TS953 —UN—15MAY90

TX,00,SS3874 -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

Service Tires Safely

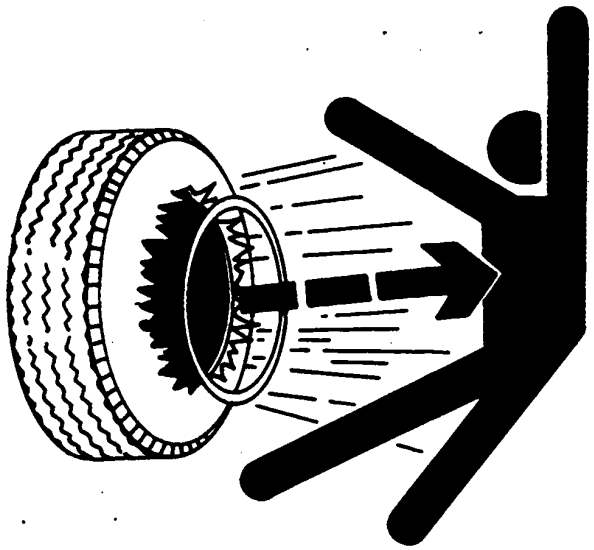
Explosive separation of a tire and rim parts can cause serious injury or death.

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

TX,00,SS3876 -19-24AUG90-1/1

Practice Safe Maintenance

If maintenance procedure must be performed with engine running, DO NOT leave machine unattended.

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

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.

Before servicing machine and before leaving the operators seat:

1. Park machine on a level surface.
2. Lower all equipment to ground.
3. Move gearshift control and FNR lever to neutral "N".

CAUTION: Prevent possible injury from unexpected machine movement. Never rely on transmission control lever alone to keep machine from moving. Machine can unexpectedly roll or move under power, resulting in death or serious injury. Always engage park brake to hold machine.

4. Engage park brake.
5. Turn key switch to STOP.
6. Allow engine to cool.

   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.

TS218 —UN—23AUG88

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

TX,00,SS3878 -19-31JUL92-1/1

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

TX,00,SS3879 -19-04JUN90-1/1

Dispose of Waste Properly

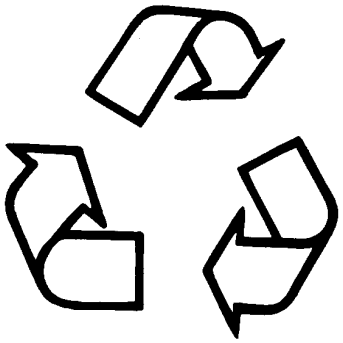
Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with your machine includes such items as oil, fuel, coolant, brake fluid, filters, and batteries.

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 authorized dealer.



TS1133 —UN—26NOV90

TX,00,SS3880 -19-26AUG92-1/1

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

TX,00,SS3881 -19-25SEP92-1/1

310SE and 315SE Backhoe Loader—Specifications

NOTE: Specifications and design subject to change without notice. Wherever applicable, specifications are in accordance with Standards.

Item	Measurement	Specification
Engine—John Deere 4045T		
Rated Power @ 2200 rpm	Power	SAE gross 66 kW (88 hp)
Rated Power @ 2200 rpm	Power	SAE net 60 kW (80 hp)
Cylinders	Quantity	4
Displacement	Volume	4.52 L (276 $in.^3$)
Engine Torque Rise	Torque	42%
Maximum Engine Net Torque	Torque	368 N·m (271 lb-ft)
Electrical System	Voltage	12-volt
Alternator	Amperage	65 amps
Alternator with Cab	Amperage	95 amps
310SE Forward Travel Speeds[1] with Manual Transmission		
Gear 1	Speed	5.8 km/h (3.6 mph)
Gear 2	Speed	9.5 km/h (5.9 mph)
Gear 3	Speed	23.2 km/h (14.4 mph)
Gear 4	Speed	39.3 km/h (24.4 mph)
Item	**Measurement**	**Specification**
310SE Reverse Travel Speeds[1] with Manual Transmission		
Gear 1	Speed	6.4 km/h (4.0 mph)
Gear 2	Speed	10.6 km/h (6.6 mph)
Gear 3	Speed	25.9 km/h (16.1 mph)
Gear 4	Speed	43.8 km/h (27.2 mph)
310SE Forward Travel Speeds[1] with Powershift Transmission		
Gear 1	Speed	5.8 km/h (3.6 mph)
Gear 2	Speed	9.5 km/h (5.9 mph)
Gear 3	Speed	23.2 km/h (14.4 mph)
Gear 4	Speed	39.3 km/h (24.4 mph)
310SE Reverse Travel Speeds[1] with Powershift Transmission		
Gear 1	Speed	6.4 km/h (4.0 mph)
Gear 2	Speed	10.6 km/h (6.6 mph)

Continued on next page

TX,115,BG321 -19-10JUN98-1/3

Item	Measurement	Specification
Gear 3	Speed	25.9 km/h (16.1 mph)
Gear 4	Speed	43.8 km/h (27.2 mph)
315SE Forward Travel Speeds[1] with Manual Transmission		
Gear 1	Speed	6.1 km/h (3.8 mph)
Gear 2	Speed	10.1 km/h (6.3 mph)
Gear 3	Speed	24.6 km/h (15.3 mph)
Gear 4	Speed	41.5 km/h (25.8 mph)
315SE Reverse Travel Speeds[1] with Manual Transmission		
Gear 1	Speed	6.8 km/h (4.2 mph)
Gear 2	Speed	11.3 km/h (7.0 mph)
Gear 3	Speed	27.4 km/h (17.1 mph)
Gear 4	Speed	46.3 km/h (28.8 mph)
315SE Forward Travel Speeds[1] with Powershift Transmission		
Gear 1	Speed	6.1 km/h (3.8 mph)
Gear 2	Speed	10.1 km/h (6.3 mph)
Gear 3	Speed	24.6 km/h (15.3 mph)
Gear 4	Speed	41.5 km/h (25.8 mph)
315SE Reverse Travel Speeds[1] with Powershift Transmission		
Gear 1	Speed	6.8 km/h (4.2 mph)
Gear 2	Speed	11.3 km/h (7.0 mph)
Gear 3	Speed	27.4 km/h (17.1 mph)
Gear 4	Speed	46.3 km/h (28.8 mph)

NOTE: With powershift transmission, third and fourth gear speeds are the same in reverse.

Item	Measurement	Specification
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	9.07 m (29 ft 9 in.)
Non-Powered Axle Bucket Clearance Circle—Without Brakes	Radius	10.74 m (35 ft 3 in.)

Continued on next page

TX,115,BG321 -19-10JUN98-2/3