318D and 320D Skid Steer Loader Operation and Test (Manual Controls)

OPERATION & TEST TECHNICAL MANUAL

318D and 320D Skid Steer Loader Operation and Test (Manual Controls)

TM11398 28MAY15 (ENGLISH)

For complete service information also see:

318D, 319D, 320D and 323D Skid Steer Loader Repair (Manual Controls)	TM11399
318D and 320D Skid Steer Loader Operation and Test (EH Controls)	TM11406
318D, 319D, 320D and 323D Skid Steer Loader Repair (EH Controls)	TM11407
318D and 320D Skid Steer Loader Operator's Manual	OMT253020
PowerTech E™ 2.4L and 3.0L Diesel Engines Component Technical Manual	CTM101019
Hydraulic Cylinders	CTM120519
Specifications Manual	SP458VOL2

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.

TX,INTR,MB52 -19-12SEP97-1/1

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

Contents

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 9000
General Information

Contents

Recognize Safety Information

This is the safety alert symbol. When this symbol is noticed on the machine or in this manual, be alert for the potential of personal injury.

Follow the precautions and safe operating practices highlighted by this symbol.

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

On the machine, DANGER signs are red in color, WARNING signs are orange, and CAUTION signs are yellow. DANGER and WARNING signs are located near specific hazards. General precautions are on CAUTION labels.

T133555 —UN—15APR13

T133588 —19—28AUG00

TX03679,00016CC -19-03JAN07-1/1

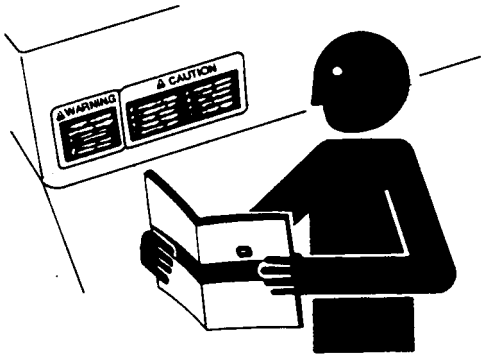
Follow Safety Instructions

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.

There can be additional safety information contained on parts and components sourced from suppliers that is not reproduced in this operator's manual.

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.



TS201 —UN—15APR13

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

DX,READ -19-16JUN09-1/1

Operate Only If Qualified

Do not operate this machine unless the operator's manual has been read carefully, and you have been qualified by supervised training and instruction.

Operator should be familiar with the job site and surroundings before operating. Try all controls and machine functions with the machine in an open area before starting to work.

Know and observe all safety rules that may apply to every work situation and work site.

TX03679,00016FA -19-03JAN07-1/1

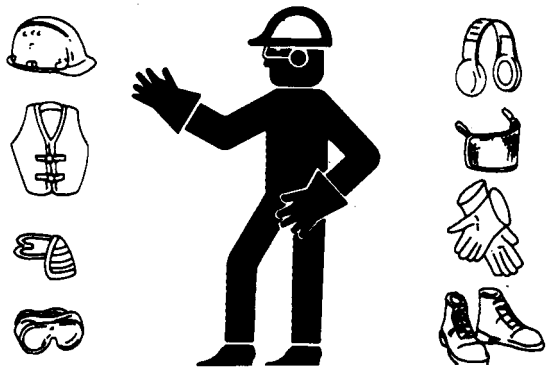
Wear Protective Clothing

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—15APR13

DX,WEAR -19-10SEP90-1/1

Avoid Unauthorized Machine Modifications

John Deere recommends using only genuine John Deere replacement parts to ensure machine performance. Never substitute genuine John Deere parts with alternate parts not intended for the application as these can create hazardous situations or hazardous performance. Non-John Deere parts, or any damage or failures resulting from their use are not covered by any John Deere warranty.

Modifications of this machine, or addition of unapproved products or attachments, may affect machine stability or reliability, and may create a hazard for the operator or others near the machine. The installer of any modification which may affect the electronic controls of this machine is responsible for establishing that the modification does not adversely affect the machine or its performance.

Always contact an authorized dealer before making machine modifications that change the intended use, weight or balance of the machine, or that alter machine controls, performance or reliability.

AM40430,00000A9 -19-20AUG09-1/1

Inspect Machine

Inspect machine carefully each day by walking around it before starting.

Inspect and Clean the Polycarbonate Windows. See Inspect and Clean Polycarbonate Windows. (Section 4-1.)

Keep all guards and shields in good condition and properly installed. Fix damage and replace worn or broken parts immediately. Pay special attention to hydraulic hoses and electrical wiring.

T6607AQ —UN—15APR13

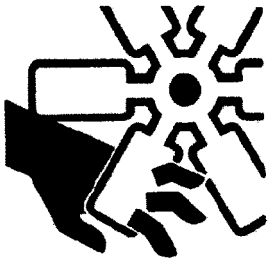
TX03679,0001734 -19-17DEC14-1/1

Stay Clear of Moving Parts

Entanglements in moving parts can cause serious injury.

Stop engine before examining, adjusting or maintaining any part of machine with moving parts.

Keep guards and shields in place. Replace any guard or shield that has been removed for access as soon as service or repair is complete.



T133592 —UN—15APR13

TX03679,00016D2 -19-03JAN07-1/1

Avoid High-Pressure Fluids

Inspect hydraulic hoses periodically – at least once per year – for leakage, kinking, cuts, cracks, abrasion, blisters, corrosion, exposed wire braid or any other signs of wear or damage.

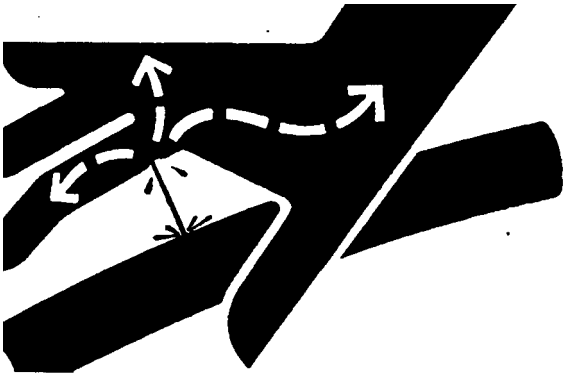
Replace worn or damaged hose assemblies immediately with John Deere approved replacement parts.

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 in English from Deere & Company Medical Department in Moline, Illinois, U.S.A., by calling 1-800-822-8262 or +1 309-748-5636.



X9811 —UN—23AUG88

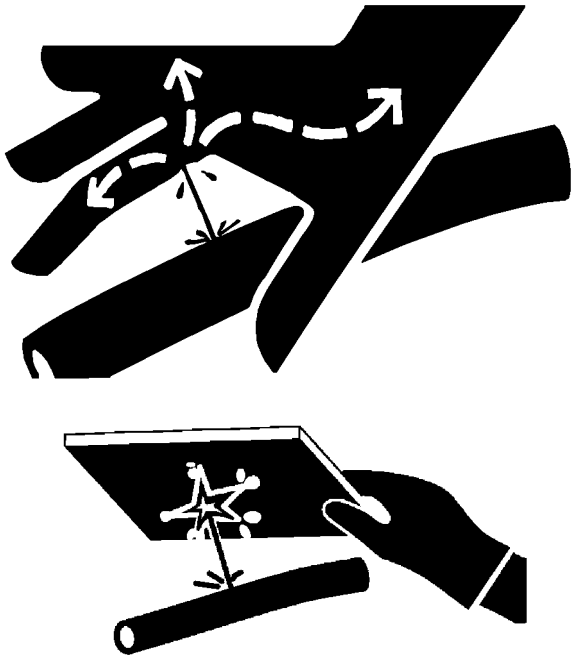
DX,FLUID -19-12OCT11-1/1

Avoid High-Pressure Oils

This machine uses a high-pressure hydraulic system. Escaping oil under pressure can penetrate the skin causing serious injury.

Never search for leaks with your hands. Protect hands. Use a piece of cardboard to find location of escaping oil. Stop engine and relieve pressure before disconnecting lines or working on hydraulic system.

If hydraulic oil penetrates your skin, see a doctor immediately. Injected oil must be removed surgically within hours or gangrene may result. Contact a knowledgeable medical source or the Deere & Company Medical Department in Moline, Illinois, U.S.A.



T133509 —UN—15APR13

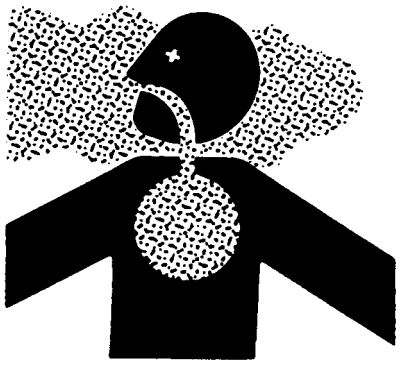
T133840 —UN—20SEP00

TX03679,00016D3 -19-03NOV08-1/1

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—15APR13

DX,AIR -19-17FEB99-1/1

Prevent Fires

Handle Fuel Safely: Store flammable fluids away from fire hazards. Never refuel machine while smoking or when near sparks or flame.

Clean Machine Regularly: Keep trash, debris, grease and oil from accumulating in engine compartment, around fuel lines, hydraulic lines, exhaust components, and electrical wiring. Never store oily rags or flammable materials inside a machine compartment.

Maintain Hoses and Wiring: Replace hydraulic hoses immediately if they begin to leak, and clean up any oil spills. Examine electrical wiring and connectors frequently for damage.

Keep A Fire Extinguisher Available: Always keep a multipurpose fire extinguisher on or near the machine. Know how to use extinguisher properly.

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T133554 —UN—07SEP00

T133552 —UN—15APR13

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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—15APR13

DX,SPARKS -19-03MAR93-1/1

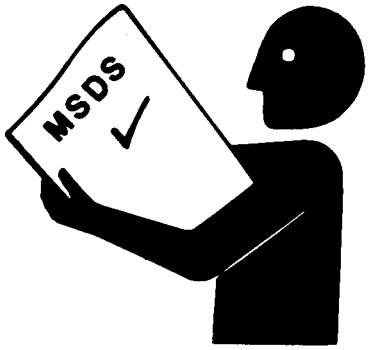
Handle Chemical Products Safely

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.)



TS1132 —UN—15APR13

DX,MSDS,NA -19-03MAR93-1/1

Dispose of Waste Properly

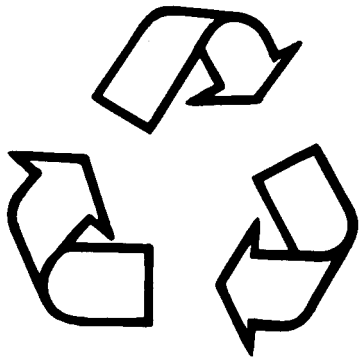
Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with John Deere equipment include such items as oil, fuel, coolant, brake fluid, filters, and batteries.

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—15APR13

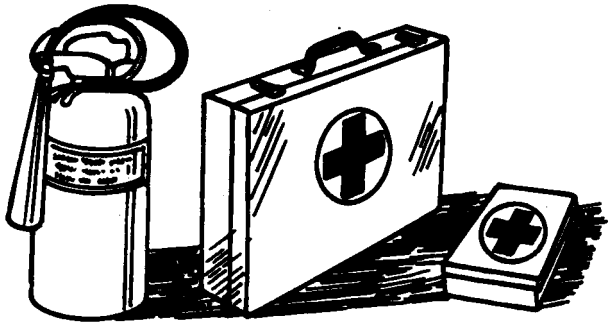
DX,DRAIN -19-03MAR93-1/1

Prepare for Emergencies

Be prepared if an emergency occurs or 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—15APR13

TX03679,000174B -19-03NOV08-1/1

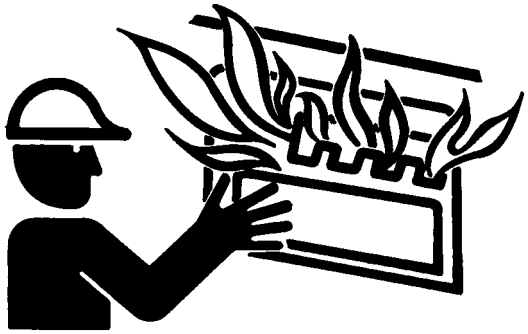
Clean Debris from Machine

Keep engine compartment, radiator, batteries, hydraulic lines, exhaust components, fuel tank, and operator's station clean and free of debris.

Clean any oil spills or fuel spills on machine surfaces.

Temperature in engine compartment may go up immediately after engine is stopped. BE ON GUARD FOR FIRES DURING THIS PERIOD.

Open access door(s) to cool the engine faster, and clean engine compartment.



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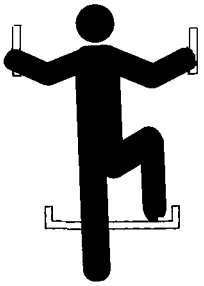
Use Steps and Handholds Correctly

Prevent falls by facing the machine when getting on and off. Maintain 3-point contact with steps and handrails. Never use machine controls as handholds.

Use extra care when mud, snow, or moisture present slippery conditions. Keep steps clean and free of grease or oil. Never jump when exiting machine. Never mount or dismount a moving machine.



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TX03679,00016F2 -19-24APR13-1/1

Start Only From Operator's Seat

Avoid unexpected machine movement. Start engine only while sitting in operator's seat. Ensure all controls and working tools are in proper position for a parked machine.

Never attempt to start engine from the ground. Do not attempt to start engine by shorting across the starter solenoid terminals.

T133715 —UN—15APR13

TX03679,0001799 -19-22APR10-1/1

Use and Maintain Seat Belt

Use seat belt when operating machine. Remember to fasten seat belt when loading and unloading from trucks and during other uses.

Examine seat belt frequently. Be sure webbing is not cut or torn. Replace seat belt immediately if any part is damaged or does not function properly.

The complete seat belt assembly should be replaced every 3 years, regardless of appearance.

T133716 —19—17APR13

TX03679,00016DD -19-03NOV08-1/1

Prevent Unintended Machine Movement

Be careful not to accidentally actuate controls. Follow these steps during work interruptions, before allowing coworkers to approach the machine, before standing up, leaving the operator's seat, or exiting the machine:

- Lower equipment to the ground
- Press park brake switch (1) to position P to engage park brake
- Stop the engine
- Raise interlocking seat bar

1— Park Brake Switch

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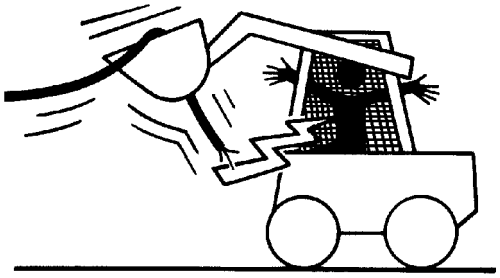
Avoid Work Site Hazards



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TX1064889 —UN—02OCT09

Avoid contact with gas lines, buried cables, and water lines. Call utility line location services to identify all underground utilities before starting work.

Prepare work site properly. Avoid operating near structures or objects that could fall onto the machine. Clear away debris that could move unexpectedly if run over.

Avoid boom or attachment contact with overhead obstacles or overhead electrical lines. Never move machine closer than 3 m (10 ft.) plus twice the line insulator length to overhead wires.

Keep bystanders clear at all times. Keep bystanders away from raised booms, attachments, and unsupported loads. Avoid swinging or raising booms, attachments, or loads over or near personnel. Use barricades or a signal person to keep vehicles and pedestrians away. Use a signal person if moving machine in congested areas or where visibility is restricted. Always keep signal person in view. Coordinate hand signals before starting machine.

Operate only on solid footing with strength sufficient to support machine. Be especially alert working near embankments or excavations.

Avoid working under over-hanging embankments or stockpiles that could collapse under or on machine.

Reduce machine speed when operating with tool on or near ground when obstacles may be hidden (e.g., during snow removal or clearing mud, dirt, etc.). At high speeds hitting obstacles (rocks, uneven concrete, or manholes) can cause a sudden stop. Always wear your seat belt. On units equipped with shoulder belts always wear both the seat and shoulder belt and **do not lean forward** while operating.

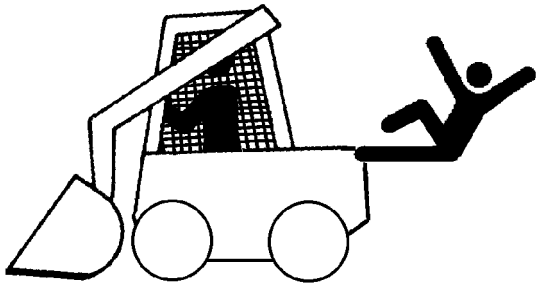
OUT4001,00004A4 -19-07DEC12-1/1

Keep Riders Off Machine

Only allow operator on machine.

Riders are subject to injury. They may fall from machine, be caught between machine parts, or be struck by foreign objects.

Riders may obstruct operator's view or impair his ability to operate machine safely.



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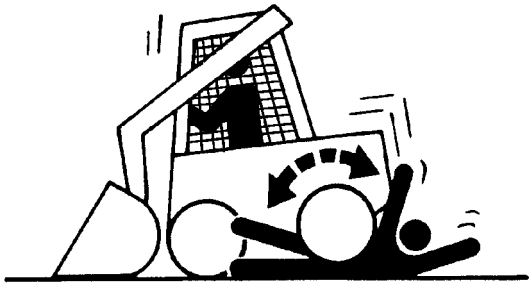
Avoid Backover Accidents

Before moving machine, be sure all persons or vehicles are clear of machine path. Turn around and look directly for best visibility. Keep windows clean.

Be certain reverse warning alarm is working properly (if equipped).

Use a signal person when backing if view is obstructed or when in close quarters. Keep signal person in view at all times. Use prearranged hand signals to communicate.



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VD76477,0000095 -19-31JAN07-1/1

Avoid Machine Tip Over

Use seat belt at all times.

Do not jump if the machine tips. You will be unlikely to jump clear and the machine may crush you.

Load and unload from trucks or trailers carefully. Be sure truck is wide enough and on a firm level surface. Use loading ramps and attach them properly to truck bed.

Be careful on slopes. Avoid sharp turns. Balance loads so weight is evenly distributed and load is stable. Carry tools and loads close to the ground to aid visibility and lower center of gravity. Use extra care on wet, soft, rocky, or frozen ground.

Know the capacity of the machine. Do not overload. Be careful with heavy loads. Using oversize buckets or lifting heavy objects reduces machine stability.

Ensure solid footing. Use extra care in soft ground conditions or on structures that may not uniformly support the wheels especially when raising the boom. Do not operate close to banks or open excavations that may cave in and cause machine to tip or fall.

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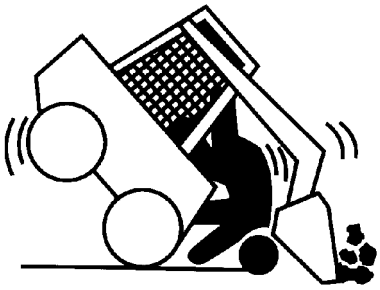

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Operating On Slopes

Avoid side slope travel whenever possible. When working on steep slopes, travel as straight up and down as possible and keep the heavy end of the vehicle uphill to prevent machine tip over.

Carry the load as low as possible for maximum stability and visibility.

Select low speed before starting down slope. The slope on which you can operate safely will be limited by ground condition and the load being handled.

Be alert to wind direction and velocity.

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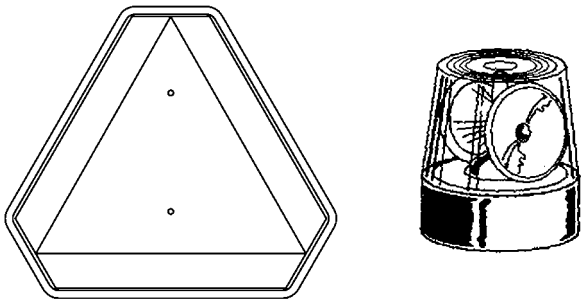
OUT4001,0000470 -19-28AUG09-1/1

Operating Or Traveling On Public Roads

Machines that work near vehicle traffic or travel slower than normal highway speeds must have proper lighting and markings to assure they are visible to other drivers.

Install additional lights, beacons, slow moving vehicle (SMV) emblems, or other devices and use as required to make the machine visible and identify it as a work machine. Check state and local regulations to assure compliance. Keep these devices clean and in working condition.



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Inspect and Maintain ROPS

A damaged roll-over protective structure (ROPS) should be replaced, not reused.

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.

If ROPS was loosened or removed for any reason, inspect it carefully before operating the machine again.

To maintain the ROPS:

- Replace missing hardware using correct grade hardware.
- Check hardware torque.
- Check isolation mounts for damage, looseness or wear; replace them if necessary.
- Check ROPS for cracks or physical damage.

TX03679,000179F -19-20APR01-1/1

Add and Operate Attachments Safely

Always verify compatibility of attachments by contacting your authorized dealer. Adding unapproved attachments may affect machine stability or reliability, and may create a hazard for others near the machine.

Ensure that a qualified person is involved in attachment installation. Add guards to machine if operator protection is required or recommended. Verify that all connections are secure and attachment responds properly to controls.

Carefully read attachment manual and follow all instructions and warnings. In an area free of bystanders and obstructions, carefully operate attachment to learn its characteristics and range of motion.

TX03679,00016F0 -19-24JAN07-1/1

Park and Prepare for Service Safely

Warn others of service work. Always park and prepare machine for service or repair properly.

- Park machine on a level surface and lower equipment to the ground.
- Engage park brake.
- Stop engine and remove key.
- Attach a “DO NOT OPERATE” tag in an obvious place in the operator's station.

Securely support machine or attachment before working under it.

- Do not support machine with any hydraulically actuated tools or attachments.
- Do not support machine with cinder blocks or wooden pieces that may crumble or crush.
- Do not support machine with a single jack or other devices that may slip out of place.
- Always install boom lock before working on or around this machine with the loader boom raised.

Understand service procedures before beginning repairs. Keep service area clean and dry. Use two people whenever the engine must be running for service work.

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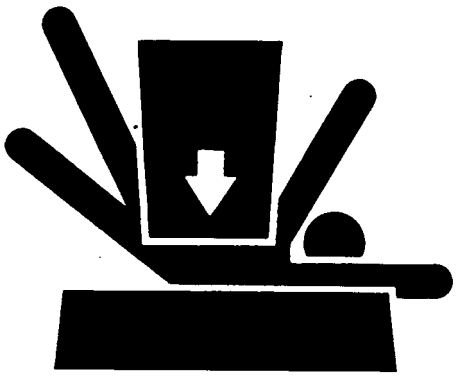

TS229 —UN—23AUG88

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Service Cooling System Safely

Explosive release of fluids from pressurized cooling system can cause serious burns.

Shut off engine. Only remove filler cap when cool enough to touch with bare hands. Slowly loosen cap to first stop to relieve pressure before removing completely.

TS281 —UN—15APR13

DX,RCAP -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.

Remove paint before heating:

- Remove paint a minimum of 100 mm (4 in.) from area to be affected by heating. If paint cannot be removed, wear an approved respirator before heating or welding.
- 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.

Do not use a chlorinated solvent in areas where welding will take place.

TS220 —UN—15APR13

Do all work in an area that is well ventilated to carry toxic fumes and dust away.

Dispose of paint and solvent properly.

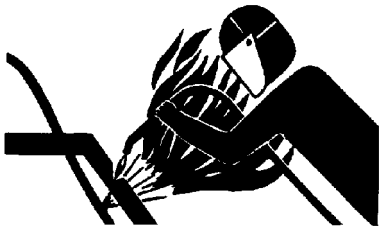
DX,PAINT -19-24JUL02-1/1

Make Welding Repairs Safely

IMPORTANT: Disable electrical power before welding. Turn off main battery switch or disconnect positive battery cable. Separate harness connectors to engine and vehicle microprocessors.

Avoid welding or heating near pressurized fluid lines. Flammable spray may result and cause severe burns if pressurized lines fail as a result of heating. Do not let heat go beyond work area to nearby pressurized lines.

Remove paint properly. Do not inhale paint dust or fumes. Use a qualified welding technician for structural repairs.



T133547 —UN—15APR13

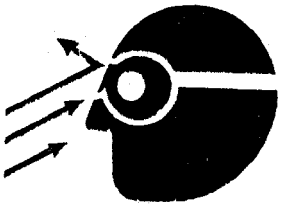
Make sure there is good ventilation. Wear eye protection and protective equipment when welding.

TX03679,00016D5 -19-31AUG07-1/1

Drive Metal Pins Safely

Always wear protective goggles or safety glasses and other protective equipment before striking hardened parts. Hammering hardened metal parts such as pins and bucket teeth may dislodge chips at high velocity.

Use a soft hammer or a brass bar between hammer and object to prevent chipping.



T133738 —UN—15APR13

TX03679,0001745 -19-25SEP00-1/1

Service Tires Safely

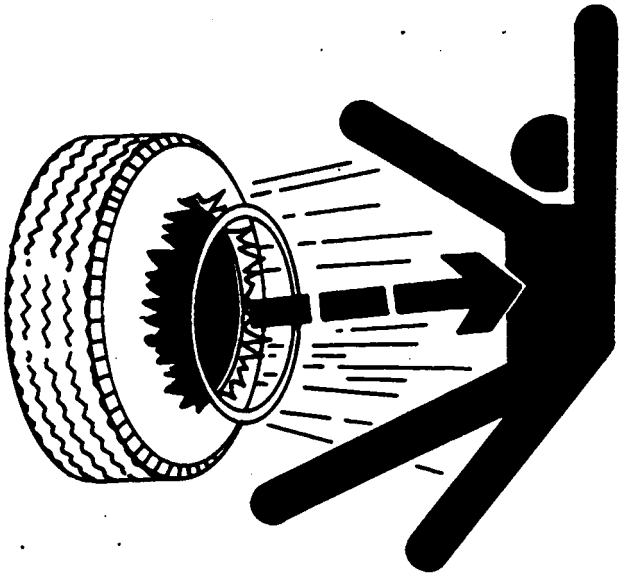
Explosive separation of a tire and rim parts can cause serious injury or death.

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—15APR13

DX,RIM -19-24AUG90-1/1

Handle Cab Door Safely

When servicing machine, be aware that cab door (1) is breakable.

Keep door closed if cab needs to be raised for service. Be aware of surroundings so that door does not come in contact with any objects.

Use care if cab door needs to be removed. To prevent damage to the door, handle with care and store in a secure location.

1— Cab Door

TX1063683A —UN—08SEP09

OUT4001,0000472 -19-28OCT09-1/1

Section 9001
Diagnostic Trouble Codes (DTCs)

Contents

Continued on next page

Continued on next page

Continued on next page

Page

Engine Control Unit (ECU) Diagnostic Trouble Codes

The diagnostic trouble code number is indicated by a suspect parameter number (SPN) and a failure mode indicator (FMI) number. In the example 000744.04, 000744 is the SPN and 04 is the FMI number.

Diagnostic trouble codes can be displayed using the engagement and monitor unit (EMU) or by using the Service ADVISOR™ diagnostic application. See Reading Diagnostic Trouble Codes (DTCs). (Group 9015-16.)

For in-depth diagnostics on machine specific ECU diagnostic trouble codes, see specific code diagnostic procedures in this group. Additional engine control unit DTC diagnostic procedures for John Deere PowerTech E™ engines are located in the component technical manual (CTM), PowerTech™ E 2.4L and 3.0L Diesel Engines Component Technical Manual. (CTM101019.)

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PowerTech E is a trademark of Deere & Company

KK70125,000043E -19-17NOV09-1/1

000029.03 — Foot Throttle Sensor Out of Range High

Input from engine speed control pedal (B19) is shorted to power (5 volts or greater).

KK70125,0000440 -19-16NOV09-1/5

Foot Throttle Sensor Out of Range High Diagnostic Procedure

KK70125,0000440 -19-16NOV09-2/5

1 Short to Power Check	Key switch OFF.	
	Disconnect engine control unit (ECU) J2 connector (X16). See Main Harness (W3) Component Location. (Group 9015-10.)	
	Disconnect engine speed control pedal (B19) connector.	
	Turn key switch ON.	
	Using a multimeter, check for voltage on wire E34 WHT between pin F3 of ECU J2 connector (X16) and machine ground.	**YES:** Short to power in wire harness. Repair or replace harness. See Main Harness (W3) Wiring Diagram. (Group 9015-10.)
	Is voltage indicated?	**NO:** Go to Connector Check.

KK70125,0000440 -19-16NOV09-3/5

2 Connector Check	Turn key switch OFF.	
	Check ECU J2 connector (X16) and engine speed control pedal (B19) connector for any damage, corrosion, or debris that could cause short to power condition for E34 WHT wire.	**YES:** Go to Wire Check.
	Are connectors in good condition and free of corrosion and debris?	**NO:** Repair or replace connector. See Main Harness (W3) Wiring Diagram. (Group 9015-10.)

Continued on next page

KK70125,0000440 -19-16NOV09-4/5

3 Wire Check	Key switch OFF. ECU J2 connector (X16) disconnected. Engine speed control pedal (B19) disconnected. Using a multimeter, check for continuity between pin F3 (wire E34 WHT) of ECU J2 connector (X16) and other pins in same connector. Is continuity indicated between any circuits?	**YES:** Short circuit in wire harness. Repair or replace harness. See Main Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Engine speed control pedal (B19) malfunction. Replace pedal sensor.

KK70125,0000440 -19-16NOV09-5/5

000029.04 — Foot Throttle Sensor Out of Range Low

Input from engine speed control pedal (B19) is open or shorted to ground.

KK70125,0000441 -19-16NOV09-1/4

Foot Throttle Sensor Out of Range Low Diagnostic Procedure

KK70125,0000441 -19-16NOV09-2/4

1 Connector Check	Key switch OFF. Check engine control unit (ECU) J2 connector (X16) and engine speed control pedal (B19) connector for corrosion, loose fit, bent/pushed out terminals or crimp malfunctions. See Main Harness (W3) Component Location. (Group 9015-10.) Are connectors in good condition?	**YES:** Go to Wire Harness Check. **NO:** Repair or replace connector(s) or terminal(s) as needed.

KK70125,0000441 -19-16NOV09-3/4

2 Wire Harness Check	Key switch OFF. Disconnect ECU J2 connector (X16). Disconnect engine speed control pedal (B19). Using a multimeter, check continuity of wire E34 WHT between pin F3 of ECU J2 connector (X16) and engine speed control pedal (B19) connector. Is continuity indicated?	**YES:** Go to next step in this check. **NO:** Open circuit in wire harness. Repair or replace harness. See Main Harness (W3) Wiring Diagram. (Group 9015-10.)
	Check for continuity to ground at pin F3 (wire E34 WHT) of ECU J2 connector (X16). Is continuity to ground indicated?	**YES:** Short to ground in wire harness. Repair or replace harness. See Main Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Engine speed control pedal (B19) malfunction. Replace pedal sensor.

KK70125,0000441 -19-16NOV09-4/4

000029.14 — Foot Throttle Sensor (Out of Range High)

Engine speed control pedal (B19) is or has been out of range high. Sensor will not reset code until returned to slow idle (zero) position or the key switch is cycled. Return engine speed control pedal (B19) to slow idle position or cycle key switch.

KK70125,0000442 -19-16NOV09-1/1

000091.03 — Hand Throttle Sensor Out of Range High

Input from engine speed control dial (B18) is shorted to power (5 volts or greater).

KK70125,0000443 -19-16NOV09-1/5

Hand Throttle Sensor Out of Range High Diagnostic Procedure

KK70125,0000443 -19-16NOV09-2/5

1 Short to Power Check	Key switch OFF.	
	Disconnect engine control unit (ECU) J2 connector (X16). See Main Harness (W3) Component Location. (Group 9015-10.)	
	Disconnect engine speed control dial (B18) connector. See Cab Harness (W2) Component Location. (Group 9015-10.)	
	Turn key switch ON.	
	Using a multimeter, check for voltage on wire E33 WHT between pin A4 of ECU J2 connector (X16) and machine ground.	**YES:** Short to power in wire harness. Repair or replace harness. See Cab Harness (W2) Wiring Diagram. See Main Harness (W3) Wiring Diagram. (Group 9015-10.)
	Is voltage indicated?	**NO:** Go to Connector Check.

KK70125,0000443 -19-16NOV09-3/5

2 Connector Check	Turn key switch OFF.	
	Check ECU J2 connector (X16), cab harness-to-main harness 47-pin connector (X2), and engine speed control dial (B18) connector for any damage, corrosion, or debris that could cause short to power condition for E33 WHT wire.	**YES:** Go to Wire Check.
	Are connectors in good condition and free of corrosion and debris?	**NO:** Repair or replace connector. See Cab Harness (W2) Wiring Diagram. See Main Harness (W3) Wiring Diagram. (Group 9015-10.)

Continued on next page

KK70125,0000443 -19-16NOV09-4/5

3 Wire Check	Key switch OFF. ECU J2 connector (X16) disconnected. Engine speed control dial (B18) disconnected. Using a multimeter, check for continuity between pin A4 (wire E33 WHT) of ECU J2 connector (X16) and other pins in same connector. Is continuity indicated between any circuits?	**YES:** Short circuit in wire harness. Repair or replace harness. See Cab Harness (W2) Wiring Diagram. See Main Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Engine speed control dial (B18) malfunction. Replace dial sensor.

KK70125,0000443 -19-16NOV09-5/5

000091.04 — Hand Throttle Sensor Out of Range Low

Input from engine speed control dial (B18) is open or shorted to ground.

KK70125,0000444 -19-16NOV09-1/4

Hand Throttle Sensor Out of Range Low Diagnostic Procedure

KK70125,0000444 -19-16NOV09-2/4

1 Connector Check	Key switch OFF. Check engine control unit (ECU) J2 connector (X16) and engine speed control dial (B18) connector for corrosion, loose fit, bent/pushed out terminals or crimp malfunctions. See Main Harness (W3) Component Location. See Cab Harness (W2) Component Location. (Group 9015-10.) Are connectors in good condition?	**YES:** Go to Wire Harness Check. **NO:** Repair or replace connector(s) or terminal(s) as needed.

Continued on next page

KK70125,0000444 -19-16NOV09-3/4

2 Wire Harness Check	Key switch OFF. Disconnect ECU J2 connector (X16). Disconnect engine speed control dial (B18). Using a multimeter, check continuity of wire E33 WHT between pin A4 of ECU J2 connector (X16) and engine speed control dial (B18) connector. Is continuity indicated?	**YES:** Go to next step in this check. **NO:** Open circuit in wire harness. Repair or replace harness. See Cab Harness (W2) Wiring Diagram. See Main Harness (W3) Wiring Diagram. (Group 9015-10.)
	Check for continuity to ground at pin A4 (wire E33 WHT) of ECU J2 connector (X16). Is continuity to ground indicated?	**YES:** Short to ground in wire harness. Repair or replace harness. See Cab Harness (W2) Wiring Diagram. See Main Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Engine speed control dial (B18) malfunction. Replace dial sensor.

KK70125,0000444 -19-16NOV09-4/4

000091.14 — Hand Throttle Sensor (Out of Range High)

Engine speed control dial (B18) is or has been out of range high. Sensor will not reset code until returned to slow idle (zero) position or the key switch is cycled. Return engine speed control dial (B18) to slow idle position or cycle key switch.

KK70125,0000445 -19-16NOV09-1/1

000100.03 — Engine Oil Pressure High

Engine oil pressure switch (B6) signal indicates either open circuit or pressure switch malfunction. Oil pressure indicated when engine is not running (no engine speed). See 000100.31 — Engine Oil Pressure is not Zero with Engine Stopped Diagnostic Procedure. (CTM101019).

KK70125,00009D2 -19-11MAR11-1/1

000107.00 — Engine Air Filter Switch Data Above Normal

Air filter restricted, air filter restriction switch (B1) malfunction, or short circuit in wire harness.

KK70125,0000446 -19-16NOV09-1/6

Engine Air Filter Switch Data Above Normal Diagnostic Procedure

KK70125,0000446 -19-16NOV09-2/6

1 Air Filter Restriction Check	Check air intake system for excessive debris or flow restrictions. See Engine Intake and Exhaust Component Location. (Group 9010-15.) Is engine air intake system restricted?	**YES:** Replace air filters as needed. See Replace Primary Engine Air Filter. See Replace Secondary Engine Air Filter. (Operator's Manual.) **NO:** Go to Component Check.

Continued on next page

KK70125,0000446 -19-16NOV09-3/6

❷ Component Check	Turn key switch OFF.	
	Disconnect air filter restriction switch (B1). See Main Harness (W3) Component Location. (Group 9015-10.)	
	Check for continuity between pins on air filter restriction switch (B1).	**YES:** Replace air filter restriction switch (B1).
	Is continuity indicated?	**NO:** Go to Short Circuit Check.

KK70125,0000446 -19-16NOV09-4/6

❸ Short Circuit Check	Key switch OFF.	
	Air filter restriction switch (B1) disconnected.	
	Disconnect engine control unit (ECU) J2 connector (X16).	
	Check for continuity between wires F01 YEL and G01 BLK at air filter restriction switch (B1) connector.	**YES:** Short circuit in wire harness. Repair or replace harness. See Main Harness (W3) Wiring Diagram. (Group 9015-10.)
	Is continuity indicated?	**NO:** Go to next step in this check.
	Key switch OFF.	
	Air filter restriction switch (B1) disconnected.	
	Check circuit F01 YEL for ground at pin A on air filter restriction switch (B1) connector.	**YES:** Short to ground in wire F01 YEL. Repair or replace harness. See Main Harness (W3) Wiring Diagram. (Group 9015-10.)
	Is ground present?	**NO:** Go to Wire Check.

KK70125,0000446 -19-16NOV09-5/6

❹ Wire Check	Key switch OFF.	
	ECU J2 connector (X16) disconnected.	
	Air filter restriction switch (B1) disconnected.	
	Check for continuity between pin E3 (wire F01 YEL) of ECU J2 connector (X16) and other pins in same connector.	**YES:** Short circuit in wire harness. Repair or replace harness. See Main Harness (W3) Wiring Diagram. (Group 9015-10.)
	Is continuity indicated between any circuits?	**NO:** Checks complete.

KK70125,0000446 -19-16NOV09-6/6

000171.03 — Ambient Air Temperature Out of Range High

Open circuit in wire harness to ambient air temperature sensor (B24), either signal or ground; ambient air temperature sensor (B24) malfunction.

KK70125,0000447 -19-16NOV09-1/5

Ambient Air Temperature Out of Range High Diagnostic Procedure

Continued on next page

KK70125,0000447 -19-16NOV09-2/5

1 Connector Check	Key switch OFF.	
	Check engine control unit (ECU) J2 connector (X16) and ambient air temperature sensor (B24) connector for corrosion, loose fit, bent/pushed out terminals or crimp malfunctions. See Main Harness (W3) Component Location. (Group 9015-10.)	**YES:** Go to Wire Harness Check.
	Are connectors in good condition?	**NO:** Repair or replace connector(s) or terminal(s) as needed.

KK70125,0000447 -19-16NOV09-3/5

2 Wire Harness Check	Key switch OFF.	
	Disconnect ECU J2 connector (X16).	
	Disconnect ambient air temperature sensor (B24).	
	Using a multimeter, check continuity of wire X04 YEL between pin B4 of ECU J2 connector (X16) and ambient air temperature sensor (B24) connector.	
	Check continuity of wire R05 BLK between pin C3 of ECU J2 connector (X16) and ambient air temperature sensor (B24) connector.	**YES:** Go to next step in this check.
	Is continuity indicated?	**NO:** Open circuit in wire harness. Repair or replace harness. See Main Harness (W3) Wiring Diagram. (Group 9015-10.)

KK70125,0000447 -19-16NOV09-4/5

3 Component Check	Turn key switch OFF.	
	Check resistance through ambient air temperature sensor (B24). See Electrical Component Specifications. (Group 9015-20.)	**YES:** Checks complete.
	Is sensor resistance within specifications?	**NO:** Replace ambient air temperature sensor (B24).

KK70125,0000447 -19-16NOV09-5/5

000171.04 — Ambient Air Temperature Out of Range Low

Short to ground in signal circuit from ambient air temperature sensor (B24) or sensor malfunction.

KK70125,0000448 -19-16NOV09-1/5

Ambient Air Temperature Out of Range Low Diagnostic Procedure

KK70125,0000448 -19-16NOV09-2/5

1 Connector Check	Key switch OFF.	
	Check engine control unit (ECU) J2 connector (X16) and ambient air temperature sensor (B24) connector for corrosion, loose fit, bent/pushed out terminals or crimp malfunctions. See Main Harness (W3) Component Location. (Group 9015-10.)	**YES:** Go to Wire Harness Check.
	Are connectors in good condition?	**NO:** Repair or replace connector(s) or terminal(s) as needed.

Continued on next page

KK70125,0000448 -19-16NOV09-3/5

2 Wire Harness Check	Key switch OFF.	
	Disconnect ECU J2 connector (X16).	
	Disconnect ambient air temperature sensor (B24).	
	Using a multimeter, check for continuity to ground at pin B4 (wire X04 YEL) of ECU J2 connector (X16).	**YES:** Short to ground in wire harness. Repair or replace harness. See Main Harness (W3) Wiring Diagram. (Group 9015-10.)
	Is continuity to ground indicated?	**NO:** Go to Component Check.

KK70125,0000448 -19-16NOV09-4/5

3 Component Check	Turn key switch OFF.	
	Check resistance through ambient air temperature sensor (B24). See Electrical Component Specifications. (Group 9015-20.)	**YES:** Checks complete.
	Is sensor resistance within specifications?	**NO:** Replace ambient air temperature sensor (B24).

KK70125,0000448 -19-16NOV09-5/5

000237.13 — Vehicle Identification Number

The software versions (major software revision number) between the engine control unit (ECU) and other machine controllers do not match.

Code is usually a result of a new or different controller being installed on a machine.

Program machine controllers with latest software for the machine in which the they are installed.

KK70125,0000449 -19-16DEC10-1/1

000647.05 — Fan Coil Output Driver Out of Range Low

Open circuit in the wire harness to hydraulic fan speed solenoid (Y30).

KK70125,000044B -19-16NOV09-1/5

Fan Coil Output Driver Out of Range Low Diagnostic Procedure

NOTE: Machines without optional reversing fan use fan speed solenoid harness (W9) to connect from main harness (W3) to hydraulic fan speed solenoid (Y30).

KK70125,000044B -19-16NOV09-2/5

1 Connector Check	Key switch OFF.	
	Check engine control unit (ECU) J2 connector (X16), hydraulic fan speed solenoid (Y30) connector, and main harness-to-fan speed solenoid harness 2-pin connector (X39) (if not equipped with reversing fan) for corrosion, loose fit, bent/pushed out terminals or crimp malfunctions. See Main Harness (W3) Component Location. See Fan Speed Solenoid Harness (W9) Component Location. (Group 9015-10.)	**YES:** Go to Wire Harness Check.
	Are connectors in good condition?	**NO:** Repair or replace connector(s) or terminal(s) as needed.

Continued on next page

KK70125,000044B -19-16NOV09-3/5

2 Wire Harness Check	Key switch OFF. Disconnect ECU J2 connector (X16). Disconnect hydraulic fan speed solenoid (Y30). Using a multimeter, check continuity of wire E42 WHT between pin J4 of ECU J2 connector (X16) and hydraulic fan speed solenoid (Y30) connector. Check continuity of wire R50 BLK between pins C1 and D2 of ECU J2 connector (X16) and hydraulic fan speed solenoid (Y30) connector. Is continuity indicated?	**YES:** Go to Component Check. **NO:** Open circuit in wire harness. Repair or replace harness. See Main Harness (W3) Wiring Diagram. See Fan Speed Solenoid Harness (W9) Wiring Diagram. (Group 9015-10.)

KK70125,000044B -19-16NOV09-4/5

3 Component Check	Key switch OFF. Check resistance through hydraulic fan speed solenoid (Y30). See Electrical Component Specifications. (Group 9015-20.) Is solenoid resistance within specifications?	**YES:** Checks complete. **NO:** Replace hydraulic fan speed solenoid (Y30).

KK70125,000044B -19-16NOV09-5/5

000647.06 — Fan Coil Output Driver Out of Range High

Open circuit or short to ground in the wire harness to hydraulic fan speed solenoid (Y30).

KK70125,000044C -19-16NOV09-1/5

Fan Coil Output Driver Out of Range High Diagnostic Procedure

NOTE: Machines without optional reversing fan use fan speed solenoid harness (W9) to connect from main harness (W3) to hydraulic fan speed solenoid (Y30).

KK70125,000044C -19-16NOV09-2/5

1 Connector Check	Key switch OFF. Check engine control unit (ECU) J2 connector (X16), hydraulic fan speed solenoid (Y30) connector, and main harness-to-fan speed solenoid harness 2-pin connector (X39) (if not equipped with reversing fan) for corrosion, loose fit, bent/pushed out terminals or crimp malfunctions. See Main Harness (W3) Component Location. See Fan Speed Solenoid Harness (W9) Component Location. (Group 9015-10.) Are connectors in good condition?	**YES:** Go to Wire Harness Check. **NO:** Repair or replace connector(s) or terminal(s) as needed.

Continued on next page

KK70125,000044C -19-16NOV09-3/5

❷ Wire Harness Check	Key switch OFF.	
	Disconnect ECU J2 connector (X16).	
	Disconnect hydraulic fan speed solenoid (Y30).	
	Using a multimeter, check continuity of wire E42 WHT between pin J4 of ECU J2 connector (X16) and hydraulic fan speed solenoid (Y30) connector.	
	Check continuity of wire R50 BLK between pins C1 and D2 of ECU J2 connector (X16) and hydraulic fan speed solenoid (Y30) connector.	**YES:** Go to next step in this check.
	Is continuity indicated?	**NO:** Open circuit in wire harness. Repair or replace harness. See Main Harness (W3) Wiring Diagram. See Fan Speed Solenoid Harness (W9) Wiring Diagram. (Group 9015-10.)
	Key switch OFF.	
	ECU J2 connector (X16) disconnected.	
	Hydraulic fan speed solenoid (Y30) disconnected.	
	Check for continuity to ground at pin J4 (wire E42 WHT) of ECU J2 connector (X16).	**YES:** Short to ground in wire harness. Repair or replace harness. See Main Harness (W3) Wiring Diagram. See Fan Speed Solenoid Harness (W9) Wiring Diagram. (Group 9015-10.)
	Is continuity to ground indicated?	**NO:** Go to next step in this check.
	Key switch OFF.	
	Disconnect ECU J2 connector (X16).	
	Disconnect hydraulic fan speed solenoid (Y30).	
	Check for continuity between pin J4 (wire E42 WHT) and pins C1 and D2 (wire R50 BLK) of ECU J2 connector (X16).	**YES:** Short circuit in wire harness. Repair or replace harness. See Main Harness (W3) Wiring Diagram. See Fan Speed Solenoid Harness (W9) Wiring Diagram. (Group 9015-10.)
	Is continuity indicated?	**NO:** Go to Component Check.

KK70125,000044C -19-16NOV09-4/5

❸ Component Check	Key switch OFF.	
	Check resistance through hydraulic fan speed solenoid (Y30). See Electrical Component Specifications. (Group 9015-20.)	**YES:** Checks complete.
	Is solenoid resistance within specifications?	**NO:** Replace hydraulic fan speed solenoid (Y30).

KK70125,000044C -19-16NOV09-5/5

000647.30 — Fan Coil Output Driver Unknown Fault

Signal from reversing fan switch (S35) requesting manual activation of reversing for more than 60 seconds. Switch input goes to engagement and monitor unit (EMU), which sends switch status to engine control unit (ECU). If ECU receives request to manually reverse fan for more than 60 seconds, ECU generates diagnostic trouble code (DTC) and disables the reversing fan function.

KK70125,000044D -19-16NOV09-1/5

Fan Coil Output Driver Unknown Fault Diagnostic Procedure

KK70125,000044D -19-16NOV09-2/5

1 Operation Check	Is operator pressing and holding reversing fan switch (S35) in MANUAL position for more than 60 seconds?	**YES:** Press and hold reversing fan switch (S35) in MANUAL position for less than 60 seconds. **NO:** Go to Switch Check.

KK70125,000044D -19-16NOV09-3/5

2 Switch Check	Key switch OFF.	
	Disconnect reversing fan switch (S35). See Cab Harness (W2) Component Location. (Group 9015-10.)	
	Push reversing fan switch (S35) to MANUAL position and check continuity through switch. In MANUAL position, switch should have continuity between pins 2 and 3 and between pins 5 and 6.	**YES:** Go to Wire Harness Check.
	Does switch continuity check OK? (Continuity with little resistance when switch is pressed.)	**NO:** Replace reversing fan switch (S35).

KK70125,000044D -19-16NOV09-4/5

3 Wire Harness Check	Key switch OFF.	
	Reversing fan switch (S35) disconnected.	
	Turn key switch ON.	
	Using a multimeter, check for voltage at pin 6 (wire E41 WHT) of reversing fan switch (S35) connector.	**YES:** Short to power in wire harness. Repair or replace harness. See Cab Harness (W2) Wiring Diagram. (Group 9015-10.)
	Is system voltage (approximately 12 volts) indicated?	**NO:** Checks complete.

KK70125,000044D -19-16NOV09-5/5

000676.05 — Glow Plug Relay Output Out of Range Low

Open circuit in the wire harness to glow plug relay (K2).

KK70125,000044E -19-16NOV09-1/5

Glow Plug Relay Output Out of Range Low Diagnostic Procedure

Continued on next page

KK70125,000044E -19-16NOV09-2/5

1 Connector Check	Key switch OFF.	
	Check engine control unit (ECU) J1 connector (X15) and glow plug relay connector (X66) for corrosion, loose fit, bent/pushed out terminals or crimp malfunctions. See Main Harness (W3) Component Location. (Group 9015-10.)	**YES:** Go to Wire Harness Check.
	Are connectors in good condition?	**NO:** Repair or replace connector(s) or terminal(s) as needed.

KK70125,000044E -19-16NOV09-3/5

2 Wire Harness Check	Key switch OFF.	
	Disconnect ECU J1 connector (X15).	
	Remove glow plug relay (K2).	
	Using a multimeter, check continuity of wire E03 WHT between pin H4 of ECU J1 connector (X15) and pin 86 of glow plug relay connector (X66).	**YES:** Go to next step in this check.
	Is continuity indicated?	**NO:** Open circuit in wire E03 WHT. Repair or replace harness. See Main Harness (W3) Wiring Diagram. (Group 9015-10.)
	Check continuity of wire G01 BLK between pin 85 of glow plug relay connector (X66) and ground.	**YES:** Go to Component Check.
	Is continuity indicated?	**NO:** Open circuit in wire G01 BLK. Repair or replace harness. See Main Harness (W3) Wiring Diagram. (Group 9015-10.)

KK70125,000044E -19-16NOV09-4/5

3 Component Check	Key switch OFF.	
	Check resistance across pins 85 and 86 of glow plug relay (K2). See Electrical Component Specifications. (Group 9015-20.)	**YES:** Checks complete.
	Is solenoid resistance within specifications?	**NO:** Replace glow plug relay (K2).

KK70125,000044E -19-16NOV09-5/5

000676.06 — Glow Plug Relay Output Out of Range High

Open circuit or short to ground in the wire harness to glow plug relay (K2).

KK70125,000044F -19-16NOV09-1/6

Glow Plug Relay Output Out of Range High Diagnostic Procedure

Continued on next page

KK70125,000044F -19-16NOV09-2/6

1 Connector Check	Key switch OFF.	
	Check engine control unit (ECU) J1 connector (X15) and glow plug relay connector (X66) for corrosion, loose fit, bent/pushed out terminals or crimp malfunctions. See Main Harness (W3) Component Location. (Group 9015-10.)	**YES:** Go to Open Circuit Check.
	Are connectors in good condition?	**NO:** Repair or replace connector(s) or terminal(s) as needed.

KK70125,000044F -19-16NOV09-3/6

2 Open Circuit Check	Key switch OFF.	
	Disconnect ECU J1 connector (X15).	
	Remove glow plug relay (K2).	
	Using a multimeter, check continuity of wire E03 WHT between pin H4 of ECU J1 connector (X15) and pin 86 of glow plug relay connector (X66).	**YES:** Go to next step in this check.
	Is continuity indicated?	**NO:** Open circuit in wire E03 WHT. Repair or replace harness. See Main Harness (W3) Wiring Diagram. (Group 9015-10.)
	Check continuity of wire G01 BLK between pin 85 of glow plug relay connector (X66) and ground.	**YES:** Go to Short to Ground Check.
	Is continuity indicated?	**NO:** Open circuit in wire G01 BLK. Repair or replace harness. See Main Harness (W3) Wiring Diagram. (Group 9015-10.)

KK70125,000044F -19-16NOV09-4/6

3 Short to Ground Check	Key switch OFF.	
	ECU J1 connector (X15) disconnected.	
	Glow plug relay (K2) removed.	
	Check for continuity to ground at pin H4 (wire E03 WHT) of ECU J1 connector (X15).	**YES:** Short to ground in wire harness. Repair or replace harness. See Main Harness (W3) Wiring Diagram. (Group 9015-10.)
	Is continuity to ground indicated?	**NO:** Go to Component Check.

KK70125,000044F -19-16NOV09-5/6

4 Component Check	Key switch OFF.	
	Check resistance across pins 85 and 86 of glow plug relay (K2). See Electrical Component Specifications. (Group 9015-20.)	**YES:** Checks complete.
	Is solenoid resistance within specifications?	**NO:** Replace glow plug relay (K2).

KK70125,000044F -19-16NOV09-6/6

001110.31 — Engine Protection Has Shut Down Engine

One of the shutdown conditions exists on the engine. Correct engine condition that caused shutdown.

KK70125,0000450 -19-16NOV09-1/1

001321.05 — Starter Relay Output Out of Range Low

Open circuit in wire harness to starter relay (K1).

KK70125,0000451 -19-16NOV09-1/5

Starter Relay Output Out of Range Low Diagnostic Procedure

KK70125,0000451 -19-16NOV09-2/5

1 Connector Check	Key switch OFF.	
	Check engine control unit (ECU) J2 connector (X16) and starter relay connector (X65) for corrosion, loose fit, bent/pushed out terminals or crimp malfunctions. See Main Harness (W3) Component Location. (Group 9015-10.)	**YES:** Go to Component Check.
	Are connectors in good condition?	**NO:** Repair or replace connector(s) or terminal(s) as needed.

KK70125,0000451 -19-16NOV09-3/5

2 Component Check	Key switch OFF.	
	Check resistance across pins 85 and 86 of starter relay (K1). See Electrical Component Specifications. (Group 9015-20.)	**YES:** Go to Wire Harness Check.
	Is solenoid resistance within specifications?	**NO:** Replace starter relay (K1).

KK70125,0000451 -19-16NOV09-4/5

3 Open Circuit Check	Key switch OFF.	
	Disconnect ECU J2 connector (X16).	
	Remove starter relay (K1).	
	Using a multimeter, check continuity of wire R04 BLK between pin C2 of ECU J2 connector (X16) and pin 85 of starter relay connector (X65).	**YES:** Go to next step in this check.
	Is continuity indicated?	**NO:** Open circuit in wire R04 BLK. Repair or replace harness. See Main Harness (W3) Wiring Diagram. (Group 9015-10.)
	Key switch OFF.	
	Disconnect ECU J2 connector (X16).	
	Remove polarity sensing diode (V2).	
	Check continuity of wire J07 TAN between pin 4 of diode block connector (X64) and pin 86 of starter relay connector (X65).	**YES:** Checks complete.
	Is continuity indicated?	**NO:** Open circuit in wire R04 BLK. Repair or replace harness. See Main Harness (W3) Wiring Diagram. (Group 9015-10.)

KK70125,0000451 -19-16NOV09-5/5

001321.06 — Starter Relay Output Out of Range High

Open circuit or short to ground in the wire harness to starter relay (K1).

KK70125,0000452 -19-16NOV09-1/6

Starter Relay Output Out of Range Low Diagnostic Procedure

KK70125,0000452 -19-16NOV09-2/6

1 Connector Check	Key switch OFF.	
	Check engine control unit (ECU) J2 connector (X16) and starter relay connector (X65) for corrosion, loose fit, bent/pushed out terminals or crimp malfunctions. See Main Harness (W3) Component Location. (Group 9015-10.)	**YES:** Go to Component Check.
	Are connectors in good condition?	**NO:** Repair or replace connector(s) or terminal(s) as needed.

KK70125,0000452 -19-16NOV09-3/6

2 Component Check	Key switch OFF.	
	Check resistance across pins 85 and 86 of starter relay (K1). See Electrical Component Specifications. (Group 9015-20.)	**YES:** Go to Wire Harness Check.
	Is solenoid resistance within specifications?	**NO:** Replace starter relay (K1).

KK70125,0000452 -19-16NOV09-4/6

3 Open Circuit Check	Key switch OFF.	
	Disconnect ECU J2 connector (X16).	
	Remove starter relay (K1).	
	Using a multimeter, check continuity of wire R04 BLK between pin C2 of ECU J2 connector (X16) and pin 85 of starter relay connector (X65).	**YES:** Go to next step in this check.
	Is continuity indicated?	**NO:** Open circuit in wire R04 BLK. Repair or replace harness. See Main Harness (W3) Wiring Diagram. (Group 9015-10.)
	Key switch OFF.	
	Disconnect ECU J2 connector (X16).	
	Remove polarity sensing diode (V2).	
	Check continuity of wire J07 TAN between pin 4 of diode block connector (X64) and pin 86 of starter relay connector (X65).	**YES:** Go to Short Circuit Check.
	Is continuity indicated?	**NO:** Open circuit in wire R04 BLK. Repair or replace harness. See Main Harness (W3) Wiring Diagram. (Group 9015-10.)

Continued on next page

KK70125,0000452 -19-16NOV09-5/6

4 Short to Ground Check	Key switch OFF.	
	Disconnect ECU J2 connector (X16).	
	Remove starter relay (K1).	
	Using a multimeter, check for continuity to ground at pin C2 (wire R04 BLK) of ECU J2 connector (X16).	**YES:** Short to ground in wire harness. Repair or replace harness. See Main Harness (W3) Wiring Diagram. (Group 9015-10.)
	Is continuity to ground indicated?	**NO:** Checks complete.

KK70125,0000452 -19-16NOV09-6/6

001321.16 — Starter Relay Output Moderately High Value

Starter motor engaged for 120 seconds. Starter motor needs to be inactive for 120 seconds to reset code.

KK70125,0000453 -19-09MAR11-1/1

001508.00 — Hydraulic Oil Temperature Data Above Normal

Hydraulic oil temperature is above 104.4°C (220°F) or hydraulic oil temperature sensor (B2) malfunction.

KK70125,0000454 -19-16NOV09-1/4

1 Hydraulic Oil Temperature Data Above Normal Diagnostic Procedure

KK70125,0000454 -19-16NOV09-2/4

Temperature Check	Verify temperature of hydraulic oil in hydraulic oil tank is more than 104.4°C (220°F).	**YES:** Allow machine to cool before operating. If overheating persists, diagnose cause for oil overheating. See Hydraulic Oil Overheats. (Group 9025-15.)
	Is hydraulic oil temperature overheated?	**NO:** Go to Component Check.

KK70125,0000454 -19-16NOV09-3/4

Component Check	Turn key switch OFF.	
	Disconnect hydraulic oil temperature sensor (B2). See Main Harness (W3) Component Location. (Group 9015-10.)	
	Measure resistance across pins A and B of hydraulic oil temperature sensor (B2). Compare resistance to specification. See Electrical Component Specifications. (Group 9015-20.)	**YES:** Checks complete.
	Is resistance within specification?	**NO:** Replace hydraulic oil temperature sensor (B2).

KK70125,0000454 -19-16NOV09-4/4

001508.03 — Hydraulic Oil Temperature Out of Range High

Open circuit in wire harness to hydraulic oil temperature sensor (B2), either signal or ground; hydraulic oil temperature sensor (B2) malfunction.

Continued on next page

KK70125,0000455 -19-22DEC09-1/5