# 85G
# Excavator
# Operation and Test

## (PIN: 1FF085GX_ _J017001— )

## OPERATION & TEST TECHNICAL MANUAL

## 85G Excavator (PIN: 1FF085GX_ _J017001— )

TM12867 05JUN19 (ENGLISH)

Worldwide Construction
And Forestry Division
PRINTED 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 this symbol is seen on the machine or in this manual, be alert for the potential of personal injury.

Technical manuals are divided in two parts: repair and operation and tests. Repair sections tell how to repair the components. Operation and test sections help to quickly 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.

MM16284,00026ED -19-17SEP18-1/1

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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 you see this symbol on your 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 your 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

TX,RECOGNIZE -19-28JUN10-1/1

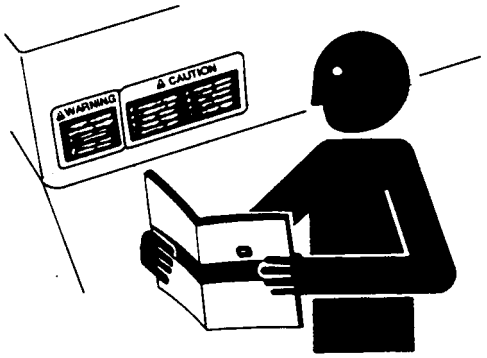
## Follow Safety Instructions

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. Use this operator's manual for correct safety sign placement. Be sure that 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 could impair the function 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.

TX,FOLLOW -19-20JAN11-1/1

## 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.

TX,QUALIFIED -19-18JAN11-1/1

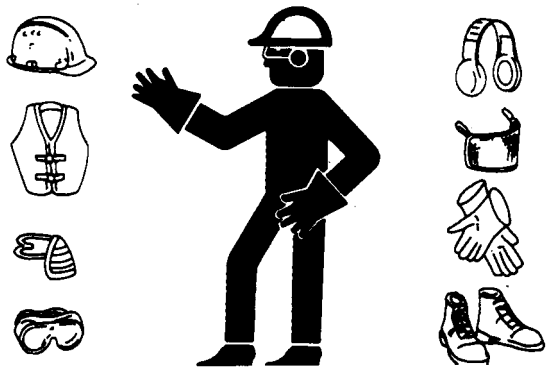
## Wear Protective Equipment

Guard against injury from flying pieces or metal or debris; wear goggles or safety glasses.

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.

Prolonged exposure to loud noise can cause impairment or loss of hearing. Wear suitable hearing protection such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises. Radio or music headphones are not suitable to use for hearing protection.



TS206 —UN—15APR13

TX,WEAR,PE -19-22SEP10-1/1

## 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 malfunctions 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 -19-01JUL15-1/1

## Control Pattern Selector—If Equipped

This machine may be equipped with a control pattern selector valve. Ensure all bystanders are clear of machine and area is large enough to operate machine functions. Verify the machine response to each control movement.

DB84312,00000A5 -19-07JUL15-1/1

## Add Cab Guarding for Special Uses

Special work situations or machine attachments could create an environment with falling or flying objects. Working near an overhead bank, demolition work, using a hydraulic hammer or winch, working in a forestry application or wooded area, or working in a waste management application, for example, could require added guarding to protect the operator.

Additional level II FOPS (falling object protective structure), forestry protection packages, and special screens or guarding should be installed when falling or flying objects could enter or damage the machine. A rear screen should always be used with a winch to protect against a snapping cable. Before operating in any special work environments, follow the operator protection recommendations of the manufacturer of any specialized attachment or equipment. Contact your authorized John Deere dealer for information on protective guarding.

TX,CABGUARD -19-12FEB13-1/1

## Inspect Machine

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

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

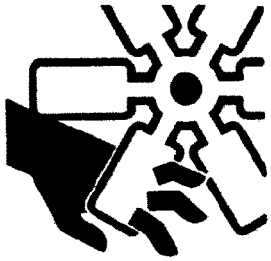
TX,INSPECT -19-08SEP10-1/1

## 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

TX,MOVING,PARTS -19-20JAN11-1/1

## 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.

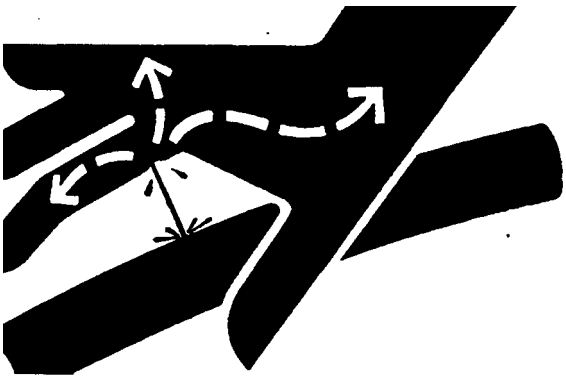
Replace worn or damaged hose assemblies immediately with John Deere approved replacement parts.

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

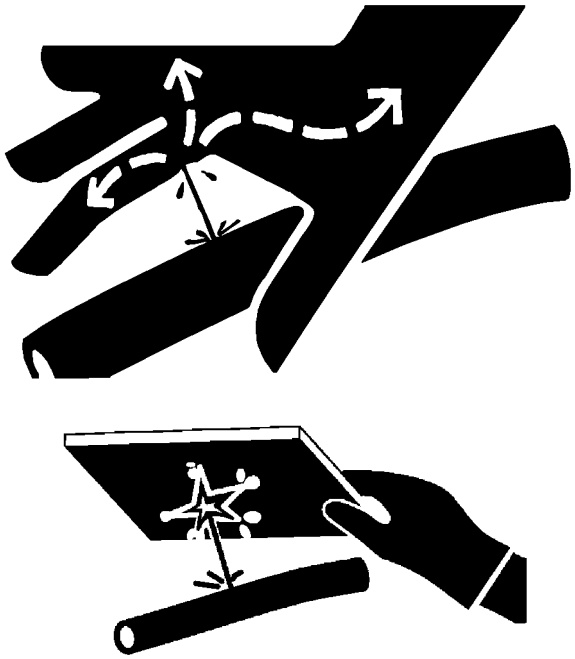
DX,FLUID -19-12OCT11-1/1

## 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 could result.** Contact a knowledgeable medical source or the Deere & Company Medical Department in Moline, Illinois, U.S.A.



T133509 —UN—15APR13



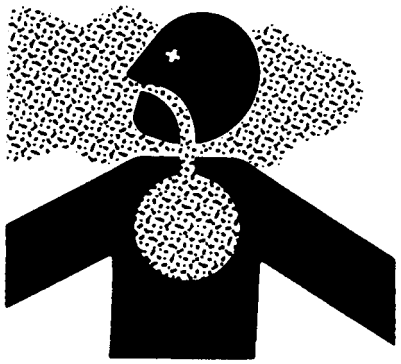
T133840 —UN—20SEP00

TX,HPOILS -19-20JAN11-1/1

## 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 Fluids Safely:** All fuels, most lubricants, and some coolant mixtures are flammable. Store flammable fluids away from fire hazards. Never refuel machine while smoking or when near sparks or flame.

**Clean Machine Regularly:** Keep flammable debris (trash, leaves, twigs, straw, and so forth), 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, Tubes, and Wiring:** Replace hoses and tubes 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 an extinguisher properly.

**Be Aware of the Operating Environment:** Airborne debris may contain sparks or embers. Do not operate near any flame.

T133552 —UN—15APR13

T133553 —UN—07SEP00

T133554 —UN—07SEP00

TX,PREVENT,FIRE -19-09JUN16-1/1

## 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—15APR13

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

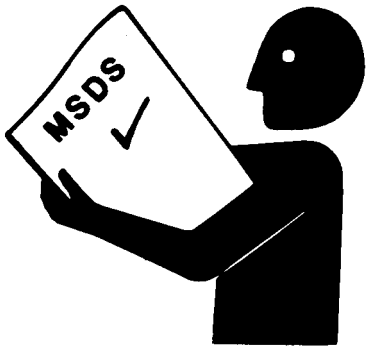
## Handle Chemical Products Safely

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.)



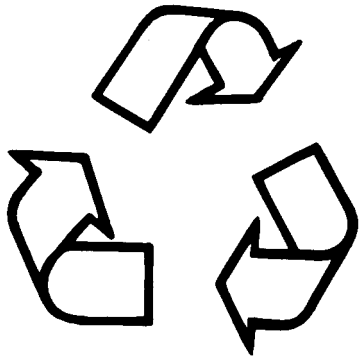

TS1132 —UN—15APR13

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

## Decommissioning — Proper Recycling and Disposal of Fluids and Components

Safety and environmental stewardship measures must be taken into account when decommissioning a machine and/or component. These measures include the following:

- Use appropriate tools and personal protective equipment such as clothing, gloves, face shields or glasses, during the removal or handling of objects and materials.
- Follow instructions for specialized components.
- Release stored energy by lowering suspended machine elements, relaxing springs, disconnecting the battery or other electrical power, and releasing pressure in hydraulic components, accumulators, and other similar systems.
- Minimize exposure to components which may have residue from agricultural chemicals, such as fertilizers and pesticides. Handle and dispose of these components appropriately.
- Carefully drain engines, fuel tanks, radiators, hydraulic cylinders, reservoirs, and lines before recycling components. Use leak-proof containers when draining fluids. Do not use food or beverage containers.
- Do not pour waste fluids onto the ground, down a drain, or into any water source.
- Observe all national, state, and local laws, regulations, or ordinances governing the handling or disposal of waste fluids (example: oil, fuel, coolant, brake fluid); filters; batteries; and, other substances or parts. Burning of flammable fluids or components in other than specially designed incinerators may be prohibited by law and could result in exposure to harmful fumes or ashes.
- Service and dispose of air conditioning systems appropriately. Government regulations may require a certified service center to recover and recycle air conditioning refrigerants which could damage the atmosphere if allowed to escape.
- Evaluate recycling options for tires, metal, plastic, glass, rubber, and electronic components which may be recyclable, in part or completely.
- Contact your local environmental or recycling center, or your John Deere dealer for information on the proper way to recycle or dispose of waste.



TS1133 —UN—15APR13

DX,DRAIN -19-01JUN15-1/1

## Exhaust Filter Ash Handling and Disposal

**CAUTION: Under federal, state, and local laws or regulations, exhaust filter ash can be classified as a hazardous waste. Hazardous waste must be disposed of in accordance with all applicable federal, state, and local laws or regulations governing hazardous waste disposal. Only a qualified service provider should remove ash from the exhaust filter. Personal protective equipment and clothing, maintained in a sanitary and reliable condition, should be used when handling and cleaning exhaust filter. See your authorized dealer for exhaust filter ash handling and disposal.**

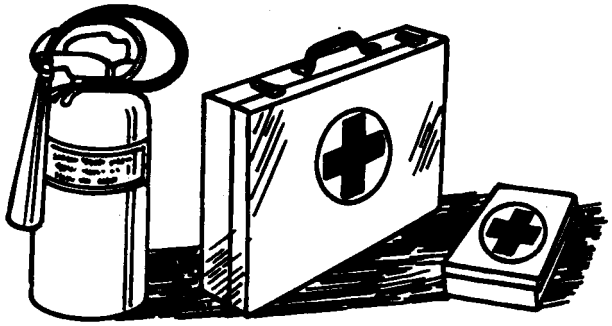
TX,ASH,DISP -19-20JAN11-1/1

## 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—15APR13

DX,FIRE2 -19-03MAR93-1/1

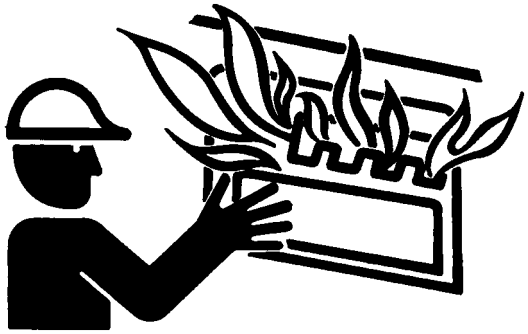
## Clean Debris from Machine

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 could 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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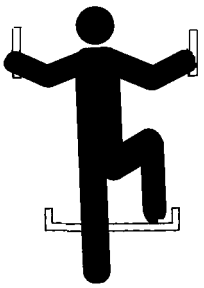
TX,DEBRIS -19-20JAN11-1/1

## Use Steps and Handholds Correctly

Prevent falls by facing the machine when you get 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.



T133468 —UN—15APR13

TX,STEPS -19-09FEB11-1/1

## Start Only From Operator's Seat

Avoid unexpected machine movement. Start engine only while sitting in operator's seat. Ensure that 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

TX,SOFOS -19-20JAN11-1/1

## 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 that 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 three years, regardless of appearance.**

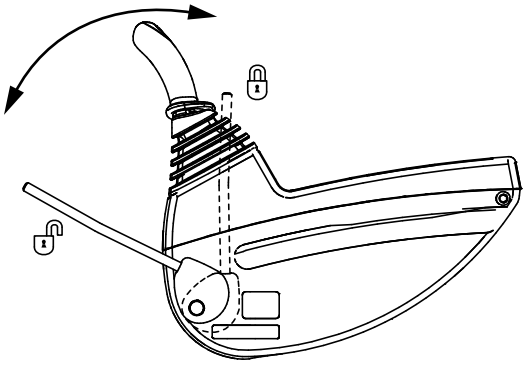

T133716 —19—17APR13

TX,SEAT,BELT -19-20JAN11-1/1

## Prevent Unintended Machine Movement

Be careful not to accidentally actuate control levers when coworkers are present. Pull pilot shutoff lever to locked (UP) position during work interruptions. Pull pilot shutoff lever to locked (UP) position and stop engine before allowing anyone to approach machine.

Always lower work equipment to the ground and pull pilot shutoff lever to locked (UP) position before standing up or leaving the operator's seat. Stop engine before exiting.



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JS93577,0000140 -19-15JAN13-1/1

## Avoid Work Site Hazards

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

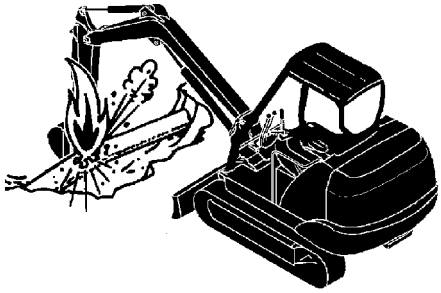
**Prepare work site properly.** Avoid operating near structures or objects that could fall onto the machine. Clear away debris that could move unexpectedly if run over.

**Avoid boom or arm contact with overhead obstacles or overhead electrical lines.** Never move any part of machine or load 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. When working close to an excavation, position travel motors away from the hole.

**Reduce machine speed** when operating 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 seat belt. **On units equipped with shoulder belts always wear both the seat and shoulder belt and do not lean forward while operating.**



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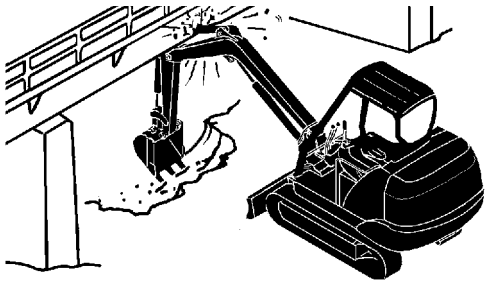

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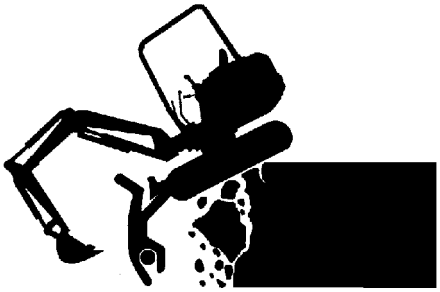

T153097 —UN—01APR02

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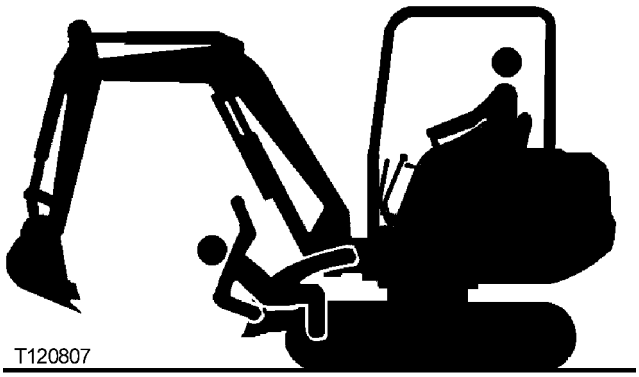
## Keep Riders Off Machine

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.




T120807 —UN—14APR99

JS93577,00001E9 -19-16JAN13-1/1

## Avoid Backover Accidents

**Before moving machine, be sure that all persons are clear of machine path.** Turn around and look directly for best visibility. Use mirrors to assist in checking all around machine. Keep windows and mirrors clean, adjusted, and in good repair.

**Be certain reverse warning alarm is working properly.**

**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.

Do not rely on the rear camera and radar object detection systems, if equipped, to determine if personnel are behind the machine. The system has limitations due to maintenance practices, environmental conditions, and operating range.

PC10857XW —UN—15APR13

TX,AVOID,BACKOVER -19-04MAR16-1/1

## Inspect and Maintain ROPS

A damaged rollover protective structure (ROPS) should be replaced, not reused.

The protection offered by ROPS could 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.

TX,ROPS -19-20JAN11-1/1

## Avoid Machine Tip Over

**Use seat belt at all times.**

**Do not jump if the machine tips.** Operator will be unlikely to jump clear and the machine may crush the operator.

**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. Avoid trucks with steel beds because tracks slip more easily on steel.

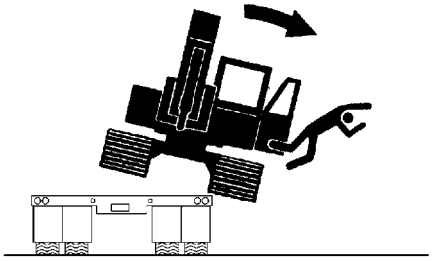
**Be careful on slopes.** Use extra care on soft, rocky or frozen ground. Machine may slip sideways in these conditions. When traveling up or down slopes, keep the bucket on uphill side and just above ground level.

**Be careful with heavy loads.** Using oversize buckets or lifting heavy objects reduces machine stability. Extending a heavy load or swinging it over side of undercarriage may cause machine to tip.

**Ensure solid footing.** Use extra care when operating near banks or excavations that may cave-in and cause machine to tip or fall.

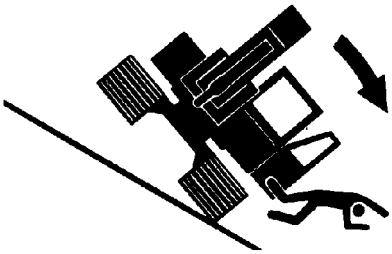

T133716 —19—17APR13

*Use Seat Belt*



T133545 —UN—15SEP00

*Unloading Machine*



T133803 —UN—27SEP00

*Do Not Jump*

TX03679,00016DF -19-30JUN16-1/1

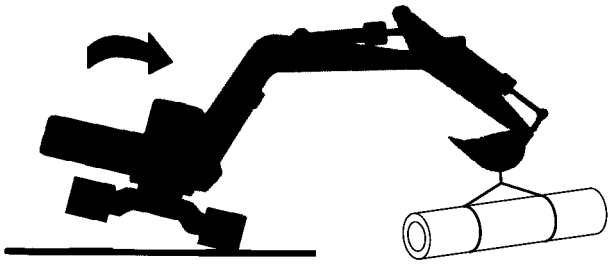
## Use Special Care When Lifting Objects

Never use this machine to lift people.

Never lift a load above another person. Keep bystanders clear of all areas where a load might fall if it breaks free. Do not leave the seat when there is a raised load.

Do not exceed lift capacity limits posted on machine and in this manual. Extending heavy loads too far or swinging over undercarriage side may cause machine to tip over.

Use proper rigging to attach and stabilize loads. Be sure slings or chains have adequate capacity and are in good condition. Use tether lines to guide loads and prearranged hand signals to communicate with co-workers.



T133839 —UN—27SEP00

*Use Special Care When Lifting Objects*

TX03679,00016E1 -19-08JUL15-1/1

## Add and Operate Attachments Safely

Always verify compatibility of attachments by contacting your authorized dealer. Adding unapproved attachments could affect machine stability or reliability and could 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.

TX,ATTACH -19-20JAN11-1/1

## 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.
- Place pilot shutoff lever in locked (UP) position. Stop engine and remove key.
- Attach a “Do Not Operate” tag in an obvious place in the operator's station.

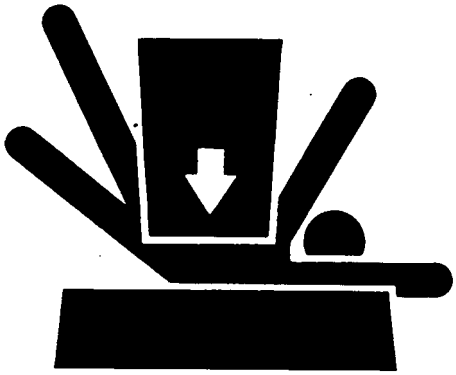
Securely support machine or attachment before working under it.

- Do not support machine with any hydraulically actuated equipment.
- 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.

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


*Do Not Operate Tag*

T133332 —19—17APR13



TS229 —UN—23AUG88

*Support Machine Properly*

OUT4001,000089A -19-02JUL15-1/1

## 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

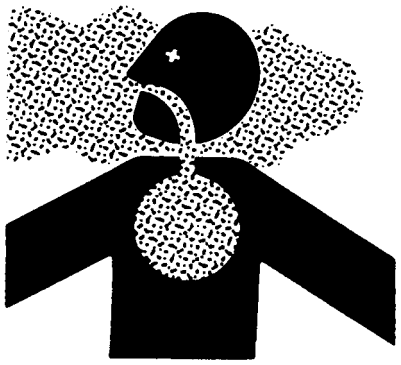
Avoid potentially toxic fumes and dust.

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 and disconnect positive (+) and negative (-) battery cables.**

Do not weld or apply heat on any part of a reservoir or tank that has contained oil or fuel. Heat from welding and cutting can cause oil, fuel, or cleaning solution to create gases which are explosive, flammable, or toxic.

Avoid welding or heating near pressurized fluid lines. Flammable spray may result and cause severe burns if pressurized lines malfunction 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

*Heating Near Pressurized Fluid Lines*

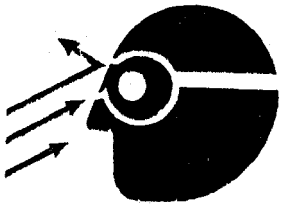
Make sure there is good ventilation. Wear eye protection and protective equipment when welding.

MB60223,0000212 -19-02JUL15-1/1

## 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 could dislodge chips at high velocity.

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



T133738 —UN—15APR13

TX,PINS -19-20JAN11-1/1

## Clean Exhaust Filter Safely

During exhaust filter cleaning operations, the engine may run at elevated idle and hot temperatures for an extended period of time. Exhaust gases and exhaust filter components reach temperatures hot enough to burn people, or ignite or melt common materials.

Keep machine away from people, animals, or structures which may be susceptible to harm or damage from hot exhaust gases or components. Avoid potential fire or explosion hazards from flammable materials and vapors near the exhaust. Keep exhaust outlet away from people and anything that can melt, burn, or explode.

Closely monitor machine and surrounding area for smoldering debris during and after exhaust filter cleaning.

Adding fuel while an engine is running can create a fire or explosion hazard. Always stop engine before refueling machine and clean up any spilled fuel.

Always make sure that engine is stopped while hauling machine on a truck or trailer.

Contact with exhaust components while still hot can result in serious personal injury.

Avoid contact with these components until cooled to safe temperatures.

If service procedure requires engine to be running:

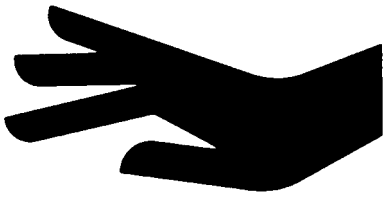
- Only engage power-driven parts required by service procedure
- Ensure that other people are clear of operator station and machine

Keep hands, feet, and clothing away from power-driven parts.

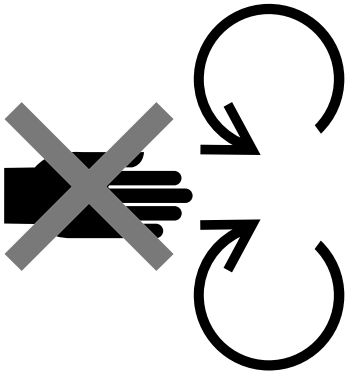
Always disable movement (neutral), set the parking brake or mechanism and disconnect power to attachments or tools before leaving the operator's station.

Shut off engine and remove key (if equipped) before leaving the machine unattended.

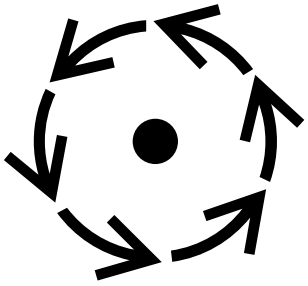
TS227 —UN—15APR13



TS271 —UN—23AUG88



TS1693 —UN—09DEC09




TS1695 —UN—07DEC09

DX,EXHAUST,FILTER -19-12JAN11-1/1

# Section 9001
# Diagnostics

## Contents



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## Main Controller (MCZ) Diagnostic Trouble Codes

For additional information on the main controller circuit, see Main Controller (MCZ) Circuit Theory of Operation. (Group 9015-15.)

Main controller diagnostic trouble codes (DTCs) can be displayed on the monitor, connection with Service ADVISOR™, or by connection with MPDr.

*Service ADVISOR is a trademark of Deere & Company*

- See Reading Diagnostic Trouble Codes with Monitor Display. (Group 9015-20.)
- See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application. (Group 9015-20.)
- See MPDr Application. (Group 9015-20.)

RH60123,0001946 -19-24MAY13-1/1

## Controller Area Network 0 (CAN 0) Circuit Diagnostics

There are four CAN networks on this machine. This diagnostic procedure is for the CAN 0 network. For more diagnostic information on other CAN networks, see appropriate CAN circuit diagnostics.

- See Controller Area Network 0 (CAN 0) Circuit Diagnostics. (Group 9001-10.)
- See Controller Area Network 1 (CAN 1) Circuit Diagnostics. (Group 9001-10.)
- See Interface Controller Area Network (N-CAN) Diagnostics. (Group 9001-10.)

**IMPORTANT: Avoid connector damage. Do not install connector with impact wrench or power tools. Over torquing will result in permanent damage to connector. Torque only to specification.**

| Specification | |
|---|---|
| 100-Pin Connector (X3)—Torque | 10 N·m<br>89 lb·in |

TZ24494,0000AD2 -19-09DEC15-1/29

### Controller Area Network (CAN 0) Diagnostic Procedure

TZ24494,0000AD2 -19-09DEC15-2/29

| | | |
|---|---|---|
| **1 CAN 0 Connector Check** | Check harness connections to the following controllers for damage, corrosion, or debris:<br>• Cab harness (W1). See Cab Harness (W1) Component Location. (Group 9015-10.)<br>- Main controller (MCZ) (A3).<br>- Monitor controller (DSZ) (A4).<br>• Machine harness (W2). See Machine Harness (W2) Component Location. (Group 9015-10.)<br>- Engine control unit (ECU) (A1).<br>- Modular telematics gateway (MTG) (A6000).<br>- Service ADVISOR™ diagnostic connector (X1).<br>Are connectors in good condition and free of corrosion and debris? | **YES:** Go to MCZ and DSZ Continuity Check.<br>**NO:** Repair or replace connectors. See appropriate harness. |

*Service ADVISOR is a trademark of Deere & Company*

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TZ24494,0000AD2 -19-09DEC15-3/29

| | | |
|---|---|---|
| ❷ **MCZ and DSZ Continuity Check** | **Key switch in OFF position.**<br><br>Disconnect cab harness-to-main controller 31-pin connector A (X31).<br>Disconnect monitor controller 28-pin connector A (X20).<br>Check for continuity between:<br>• Pin 28 of cab harness-to-main controller 31-pin connector A (X31) and pin 24 of monitor controller 28-pin connector A (X20).<br>• Pin 29 of cab harness-to-main controller 31-pin connector A (X31) and pin 23 of monitor controller 28-pin connector A (X20).<br>Is continuity indicated? | **YES:** Go to MCZ and ECU Continuity Check.<br>**NO:** Open circuit; repair or replace harness. See appropriate harness. |

TZ24494,0000AD2 -19-09DEC15-4/29

| | | |
|---|---|---|
| ❸ **MCZ and ECU Continuity Check** | **Key switch in OFF position.**<br><br>Disconnect engine control unit-to-machine harness 94-pin connector (X15).<br>Disconnect cab harness-to-main controller 31-pin connector A (X31).<br>Check for continuity between:<br>• Pin 53 of engine control unit-to-machine harness 94-pin connector (X15) and pin 24 of monitor controller 28-pin connector A (X20).<br>• Pin 75 of engine control unit-to-machine harness 94-pin connector (X15) and pin 23 of monitor controller 28-pin connector A (X20).<br>Is continuity indicated? | **YES:** Go to MCZ and Service ADVISOR™ Diagnostic Connector Continuity Check.<br>**NO:** Open circuit; repair or replace harness. See appropriate harness. |

TZ24494,0000AD2 -19-09DEC15-5/29

| | | |
|---|---|---|
| ❹ **MCZ and Service ADVISOR™ Diagnostic Connector Continuity Check** | **Key switch in OFF position.**<br><br>Disconnect cab harness-to-main controller 31-pin connector A (X31).<br>Check for continuity between:<br>• Pin C of Service ADVISOR™ diagnostic connector (X1) and pin 24 of monitor controller 28-pin connector A (X20).<br>• Pin D of Service ADVISOR™ diagnostic connector (X1) and pin 23 of monitor controller 28-pin connector A (X20).<br>Is continuity indicated? | **YES:** Go to MCZ and Modular Telematics Gateway (MTG) Continuity Check.<br>**NO:** Open circuit; repair or replace harness. See appropriate harness. |

**Continued on next page**

TZ24494,0000AD2 -19-09DEC15-6/29

| | | |
|---|---|---|
| **5 MCZ and Modular Telematics Gateway (MTG) Continuity Check** | **Key switch in OFF position.**<br>Disconnect modular telematics gateway (MTG) control unit 48-pin connector (X6014).<br>Disconnect cab harness-to-main controller 31-pin connector A (X31).<br>Check for continuity between:<br>• Pin H1 of modular telematics gateway (MTG) control unit 48-pin connector (X6014) and pin 24 of monitor controller 28-pin connector A (X20).<br>• Pin H2 of modular telematics gateway (MTG) control unit 48-pin connector (X6014) and pin 23 of monitor controller 28-pin connector A (X20).<br>Is continuity indicated? | **YES:** Go to MCZ Short to Ground Check.<br>**NO:** Open circuit; repair or replace harness. See appropriate harness. |

TZ24494,0000AD2 -19-09DEC15-7/29

| | | |
|---|---|---|
| **6 MCZ Short to Ground Check** | **Key switch in OFF position.**<br>Disconnect all connectors to main controller (MCZ), monitor controller (DSZ), engine control unit (ECU), and modular telematics gateway (MTG).<br>Check for continuity between:<br>• Pin 28 of cab harness-to-main controller 31-pin connector A (X31) and pin 1 of cab harness-to-main controller 24-pin connector D (X35).<br>• Pin 29 of cab harness-to-main controller 31-pin connector A (X31) and pin 1 of cab harness-to-main controller 24-pin connector D (X35).<br>• Pin 28 of cab harness-to-main controller 31-pin connector A (X31) and pins 1, 2, 5, and 6 of cab harness-to-main controller 26-pin connector E (X36).<br>• Pin 29 of cab harness-to-main controller 31-pin connector A (X31) and pins 1, 2, 5, and 6 of cab harness-to-main controller 26-pin connector E (X36).<br>Is continuity indicated? | **YES:** Short to ground; repair or replace harness. See appropriate harness.<br>**NO:** Go to DSZ Short to Ground Check. |

TZ24494,0000AD2 -19-09DEC15-8/29

| | | |
|---|---|---|
| **7 DSZ Short to Ground Check** | **Key switch in OFF position.**<br>Disconnect all connectors to main controller (MCZ), monitor controller (DSZ), engine control unit (ECU), and modular telematics gateway (MTG).<br>Check for continuity between:<br>• Pin 24 of monitor controller 28-pin connector A (X20) and pin 22 of monitor controller 28-pin connector A (X20).<br>• Pin 23 of monitor controller 28-pin connector A (X20) and pin 22 of monitor controller 28-pin connector A (X20).<br>• Pin 24 of monitor controller 28-pin connector A (X20) and pins 35 and 36 of monitor controller 36-pin connector B (X21).<br>• Pin 23 of monitor controller 28-pin connector A (X20) and pins 35 and 36 of monitor controller 36-pin connector B (X21).<br>Is continuity indicated? | **YES:** Short to ground; repair or replace harness. See appropriate harness.<br>**NO:** Go to ECU Short to Ground Check. |

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TZ24494,0000AD2 -19-09DEC15-9/29

| | | |
|---|---|---|
| **8 ECU Short to Ground Check** | **Key switch in OFF position.** | |
| | Disconnect all connectors to main controller (MCZ), monitor controller (DSZ), engine control unit (ECU), and modular telematics gateway (MTG). | |
| | Check for continuity between:<br>• Pin 53 of engine control unit-to-machine harness 94-pin connector (X15) and pins 2, 4, and 6 of ECU 94-pin connector (X15).<br>• Pin 75 of engine control unit-to-machine harness 94-pin connector (X15) and pins 2, 4, and 6 of ECU 94-pin connector (X15). | **YES:** Short to ground; repair or replace harness. See appropriate harness. |
| | Is continuity indicated? | **NO:** Go to Service ADVISOR™ Diagnostic Connector Short to Ground Check. |

TZ24494,0000AD2 -19-09DEC15-10/29

| | | |
|---|---|---|
| **9 Service ADVISOR™ Diagnostic Connector Short to Ground Check** | **Key switch in OFF position.** | |
| | Disconnect all connectors to main controller (MCZ), monitor controller (DSZ), engine control unit (ECU), and modular telematics gateway (MTG). | |
| | Check for continuity between:<br>• Pin C and pin A of Service ADVISOR™ diagnostic connector (X1).<br>• Pin D and pin A of Service ADVISOR™ diagnostic connector (X1). | **YES:** Short to ground; repair or replace harness. See appropriate harness. |
| | Is continuity indicated? | **NO:** Go to MTG Short to Ground Check. |

TZ24494,0000AD2 -19-09DEC15-11/29

| | | |
|---|---|---|
| **10 MTG Short to Ground Check** | **Key switch in OFF position.** | |
| | Disconnect all connectors to main controller (MCZ), monitor controller (DSZ), engine control unit (ECU), and modular telematics gateway (MTG). | |
| | Check for continuity between:<br>• Pin H1 and pin F3 of modular telematics gateway (MTG) control unit 48-pin connector (X6014).<br>• Pin H2 and pin F3 of modular telematics gateway (MTG) control unit 48-pin connector (X6014). | **YES:** Short to ground; repair or replace harness. See appropriate harness. |
| | Is continuity indicated? | **NO:** Go to MCZ Short to Power Check. |

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TZ24494,0000AD2 -19-09DEC15-12/29

| | | |
|---|---|---|
| **11 MCZ Short to Power Check** | **Key switch in OFF position.** | |
| | Disconnect all connectors to main controller (MCZ), monitor controller (DSZ), engine control unit (ECU), and modular telematics gateway (MTG).<br>Check for continuity between:<br>• Pin 28 of cab harness-to-main controller 31-pin connector A (X31) and pins 2, 5, and 6 of cab harness-to-main controller 24-pin connector D (X35).<br>• Pin 29 of cab harness-to-main controller 31-pin connector A (X31) and pins 2, 5, and 6 of cab harness-to-main controller 24-pin connector D (X35).<br>• Pin 28 of cab harness-to-main controller 31-pin connector A (X31) and pins 3, 4, and 10 of cab harness-to-main controller 26-pin connector E (X36).<br>• Pin 29 of cab harness-to-main controller 31-pin connector A (X31) and pins 3, 4, and 10 of cab harness-to-main controller 26-pin connector E (X36).<br>Is continuity indicated? | **YES:** Short to power; repair or replace harness. See appropriate harness.<br>**NO:** Go to DSZ Short to Power Check. |

TZ24494,0000AD2 -19-09DEC15-13/29

| | | |
|---|---|---|
| **12 DSZ Short to Power Check** | **Key switch in OFF position.** | |
| | Disconnect all connectors to main controller (MCZ), monitor controller (DSZ), engine control unit (ECU), and modular telematics gateway (MTG).<br>Check for continuity between:<br>• Pin 24 of monitor controller 28-pin connector A (X20) and pins 16 and 17 of monitor controller 28-pin connector A (X20).<br>• Pin 23 of monitor controller 28-pin connector A (X20) and pins 16 and 17 of monitor controller 28-pin connector A (X20).<br>• Pin 24 of monitor controller 28-pin connector A (X20) and pins 17 and 18 of monitor controller 36-pin connector B (X21).<br>• Pin 23 of monitor controller 28-pin connector A (X20) and pins 17 and 18 of monitor controller 36-pin connector B (X21).<br>Is continuity indicated? | **YES:** Short to power; repair or replace harness. See appropriate harness.<br>**NO:** Go to ECU Short to Power Check. |

TZ24494,0000AD2 -19-09DEC15-14/29

| | | |
|---|---|---|
| **13 ECU Short to Power Check** | **Key switch in OFF position.** | |
| | Disconnect all connectors to main controller (MCZ), monitor controller (DSZ), engine control unit (ECU), and modular telematics gateway (MTG).<br>Check for continuity between:<br>• Pin 53 and pins 1, 3, and 5 of engine control unit-to-machine harness 94-pin connector (X15).<br>• Pin 75 and pins 1, 3, and 5 of engine control unit-to-machine harness 94-pin connector (X15).<br>Is continuity indicated? | **YES:** Short to power; repair or replace harness. See appropriate harness.<br>**NO:** Go to MTG Short to Power Check. |

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TZ24494,0000AD2 -19-09DEC15-15/29

| | | |
|---|---|---|
| **14 MTG Short to Power Check** | **Key switch in OFF position.**<br><br>Disconnect all connectors to main controller (MCZ), monitor controller (DSZ), engine control unit (ECU), and modular telematics gateway (MTG).<br>Check for continuity between:<br>• Pin H1 and pins L1, M1, and M2 of modular telematics gateway (MTG) control unit 48-pin connector (X6014).<br>• Pin H2 and pins L1, M1, and M2 of modular telematics gateway (MTG) control unit 48-pin connector (X6014).<br><br>Is continuity indicated? | **YES:** Short to power; repair or replace harness. See appropriate harness.<br>**NO:** Go to Service ADVISOR™ Diagnostic Connector Short to Power Check. |

TZ24494,0000AD2 -19-09DEC15-16/29

| | | |
|---|---|---|
| **15 Service ADVISOR™ Diagnostic Connector Short to Power Check** | **Key switch in OFF position.**<br><br>Disconnect all connectors to main controller (MCZ), monitor controller (DSZ), engine control unit (ECU), and modular telematics gateway (MTG).<br>Check for continuity between:<br>• Pin C and pin B of Service ADVISOR™ diagnostic connector (X1).<br>• Pin D and pin B of Service ADVISOR™ diagnostic connector (X1).<br><br>Is continuity indicated? | **YES:** Short to power; repair or replace harness. See appropriate harness.<br>**NO:** Go to MCZ CAN High and Low Side Continuity Check. |

TZ24494,0000AD2 -19-09DEC15-17/29

| | | |
|---|---|---|
| **16 MCZ CAN High and Low Side Continuity Check** | **Key switch in OFF position.**<br><br>Disconnect all connectors to main controller (MCZ), monitor controller (DSZ), engine control unit (ECU), and modular telematics gateway (MTG).<br>Check for continuity between pin 28 and pin 29 of cab harness-to-main controller 31-pin connector A (X31).<br><br>Is continuity indicated? | **YES:** Open circuit; repair or replace harness. See appropriate harness.<br>**NO:** Go to DSZ CAN High and Low Side Continuity Check. |

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TZ24494,0000AD2 -19-09DEC15-18/29

| | | |
|---|---|---|
| **17 DSZ CAN High and Low Side Continuity Check** | **Key switch in OFF position.** | |
| | Disconnect all connectors to main controller (MCZ), monitor controller (DSZ), engine control unit (ECU), and modular telematics gateway (MTG). | |
| | Check for continuity between pin 23 and pin 24 of monitor controller 28-pin connector A (X20). | **YES:** Open circuit; repair or replace harness. See appropriate harness. |
| | Is continuity indicated? | **NO:** Go to ECU CAN High and Low Side Continuity Check. |

TZ24494,0000AD2 -19-09DEC15-19/29

| | | |
|---|---|---|
| **18 ECU CAN High and Low Side Continuity Check** | **Key switch in OFF position.** | |
| | Disconnect all connectors to main controller (MCZ), monitor controller (DSZ), engine control unit (ECU), and modular telematics gateway (MTG). | |
| | Check for continuity between pin 53 and pin 75 on engine control unit-to-machine harness 94-pin connector (X15). | **YES:** Open circuit; repair or replace harness. See appropriate harness. |
| | Is continuity indicated? | **NO:** Go to MTG CAN High and Low Side Continuity Check. |

TZ24494,0000AD2 -19-09DEC15-20/29

| | | |
|---|---|---|
| **19 MTG CAN High and Low Side Continuity Check** | **Key switch in OFF position.** | |
| | Disconnect all connectors to main controller (MCZ), monitor controller (DSZ), engine control unit (ECU), and modular telematics gateway (MTG). | |
| | Check for continuity between pin H1 and pin H2 on modular telematics gateway (MTG) control unit 48-pin connector (X6014). | **YES:** Open circuit; repair or replace harness. See appropriate harness. |
| | Is continuity indicated? | **NO:** Go to Service ADVISOR™ Diagnostic Connector CAN High and Low Side Continuity Check. |

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TZ24494,0000AD2 -19-09DEC15-21/29

| | | |
|---|---|---|
| **20 Service ADVISOR™ Diagnostic Connector CAN High and Low Side Continuity Check** | **Key switch in OFF position.** | |
| | Disconnect all connectors to main controller (MCZ), monitor controller (DSZ), engine control unit (ECU), and modular telematics gateway (MTG). | |
| | Check for continuity between pin C and pin D on Service ADVISOR™ diagnostic connector (X1). | **YES:** Open circuit; repair or replace harness. See appropriate harness. |
| | Is continuity indicated? | **NO:** Go to MCZ CAN Resistance Check. |

TZ24494,0000AD2 -19-09DEC15-22/29

| | | |
|---|---|---|
| **21 MCZ CAN Resistance Check** | **Key switch in OFF position.** | |
| | Disconnect cab harness-to-main controller 31-pin connector A (X31). | |
| | Check resistance between pin 28 and pin 29 on cab harness-to-main controller 31-pin connector A (X31). | **YES:** Go to Code Check. |
| | Is resistance between 50—70 ohms? | **NO:** Go to DSZ CAN Resistance Check. |

TZ24494,0000AD2 -19-09DEC15-23/29

| | | |
|---|---|---|
| **22 Code Check** | Connect all connectors to main controller (MCZ), monitor controller (DSZ), engine control unit (ECU), and modular telematics gateway (MTG). | |
| | **Key switch to ON position.** | |
| | Clear codes using monitor. Turn key switch OFF for 15 seconds. Recheck for DTCs. | **YES:** Main controller (MCZ) malfunction.<br>Replace (MCZ). See Main Controller (MCZ) Remove and Install. (Group 9015-20.) |
| | Are CAN communication codes still present? | **NO:** Go to DSZ CAN Resistance Check. |

TZ24494,0000AD2 -19-09DEC15-24/29

| | | |
|---|---|---|
| **23 DSZ CAN Resistance Check** | **Key switch in OFF position.** | |
| | Disconnect monitor controller 28-pin connector A (X20). | |
| | Check resistance between pin 23 and pin 24 on monitor controller 28-pin connector A (X20). | **YES:** Go to Code Check. |
| | Is resistance between 110—130 ohms? | **NO:** Go to ECU CAN Resistance Check. |

**Continued on next page**

TZ24494,0000AD2 -19-09DEC15-25/29

| | | |
|---|---|---|
| **24 Code Check** | Connect all connectors to main controller (MCZ), monitor controller (DSZ), engine control unit (ECU), and modular telematics gateway (MTG).<br><br>**Key switch to ON position.**<br>Clear codes using monitor. Turn key switch OFF for 15 seconds. Recheck for DTCs.<br><br>Are CAN communication codes still present? | **YES:** Monitor controller (DSZ) malfunction.<br>Replace (DSZ). See Monitor Controller (DSZ) Remove and Install. (Group 9015-20.)<br>**NO:** Go to ECU CAN Resistance Check. |

TZ24494,0000AD2 -19-09DEC15-26/29

| | | |
|---|---|---|
| **25 ECU CAN Resistance Check** | **Key switch in OFF position.**<br><br>Disconnect engine control unit (ECU)-to-machine harness 94-pin connector (X15).<br>Check resistance between pin 53 and pin 75 on engine control unit (ECU)-to-machine harness 94-pin connector (X15).<br>Is resistance between 110—130 ohms? | **YES:** Go to Code Check.<br><br>**NO:** Go to Service ADVISOR™ Resistance Check. |

TZ24494,0000AD2 -19-09DEC15-27/29

| | | |
|---|---|---|
| **26 Code Check** | Connect all connectors to main controller (MCZ), monitor controller (DSZ), engine control unit (ECU), and modular telematics gateway (MTG).<br><br>**Key switch to ON position.**<br>Clear codes using monitor. Turn key switch OFF for 15 seconds. Recheck for DTCs.<br><br>Are CAN communication codes still present? | **YES:** Engine control unit (ECU) malfunction.<br>Replace (ECU). See Engine Control Unit (ECU) Remove and Install. (Group 9015-20.)<br>**NO:** Go to Service ADVISOR™ Resistance Check. |

TZ24494,0000AD2 -19-09DEC15-28/29

| | | |
|---|---|---|
| **27 Service ADVISOR™ Resistance Check** | **Key switch in OFF position.**<br><br>Check resistance between pin C and pin D on Service ADVISOR™ diagnostic connector (X1).<br><br>Is resistance between 110—130 ohms? | **YES:** Clear codes using monitor. Turn key switch OFF for 15 seconds. Recheck for DTCs.<br><br>**NO:** Checks complete. |

TZ24494,0000AD2 -19-09DEC15-29/29

## Controller Area Network 1 (CAN 1) Circuit Diagnostics

There are four CAN networks on this machine. This diagnostic procedure is for the CAN 1 network. For more diagnostic information on other CAN networks, see appropriate CAN circuit diagnostics.

- See Controller Area Network 0 (CAN 0) Circuit Diagnostics. (Group 9001-10.)
- See Controller Area Network 1 (CAN 1) Circuit Diagnostics. (Group 9001-10.)
- See Interface Controller Area Network (N-CAN) Diagnostics. (Group 9001-10.)

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### Controller Area Network (CAN 1) Diagnostic Procedure

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| **1 CAN 1 Connector Check** | Check harness connections to the following controllers for damage, corrosion, or debris.<br>• Cab harness (W1). See Cab Harness (W1) Component Location. (Group 9015-10.)<br>- Main controller (MCZ) (A3)<br>- Monitor controller (DSZ) (A4)<br>- Machine controller (BCZ) (A11)<br>- Data converter (A5)<br>- Radio (A6)<br>• Machine harness (W2). See Machine Harness (W2) Component Location. (Group 9015-10.)<br>- Service ADVISOR™ diagnostic connector (X1)<br>• Heater and air conditioner harness (W41). See Heater and Air Conditioner Harness (W41) Component Location. (Group 9015-10.)<br>- Air conditioner controller (ACF) (A7)<br>Are connectors in good condition and free of corrosion and debris? | **YES:** Go to MCZ and Data Converter Continuity Check.<br>**NO:** Repair or replace connector. See appropriate harness. |

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| **2 MCZ and Data Converter Continuity Check** | **Key switch in OFF position.**<br>Disconnect cab harness-to-main controller 26-pin connector E (X36).<br>Disconnect data converter 17-pin connector (X4).<br>Check for continuity between:<br>• Pin 15 on cab harness-to-main controller 26-pin connector E (X36) and pin 5 on data converter 17-pin connector (X4).<br>• Pin 24 on cab harness-to-main controller 26-pin connector E (X36) and pin 11 on data converter 17-pin connector (X4).<br>Is continuity indicated? | **YES:** Go to MCZ and DSZ Continuity Check.<br>**NO:** Open circuit, repair or replace harness. See appropriate harness. |

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