

# **4045 PowerTech™ OEM Diesel Engines (Final Tier 4/Stage IV Platform)**

**COMPONENT TECHNICAL MANUAL  
4.5 L OEM Diesel Engines — Final  
Tier 4/Stage IV Platform  
CTM120119 14DEC16 (ENGLISH)**


# Introduction

## Foreword

This repair manual covers the 4045 PowerTech™ engines for Final Tier 4/Stage IV platform.

This manual is written for an experienced technician. Essential tools required in performing certain service work are identified in this manual.

**Live With Safety:** Read the safety messages in the introduction of this manual and the cautions presented throughout the text of the manual.

 **CAUTION: 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.**

Information in this manual is organized in sections and sub divided into groups.

Section 01 covers the safety measures to follow while repairing the engine; engine identification features, engine emission and application details, and information about the fuels, lubricants, and coolants.

Section 02 covers the repair and adjustment procedures.

Section 03 explains the theory of operation of each system.

Section 04 is the diagnostics section that provides troubleshooting procedures to find problems.

*PowerTech is a trademark of Deere & Company*

Section 05 covers other materials needed to do the job.

Section 06 covers specifications, generalized torque values, and contains the wiring diagrams.

This manual contains SI Metric units of measure followed immediately by the U.S. customary units of measure. Most hardware on these engines is metric sized.

Read each block of material completely before performing service to check for differences in procedures or specifications. Follow only the procedures that apply to the component you are working on.

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

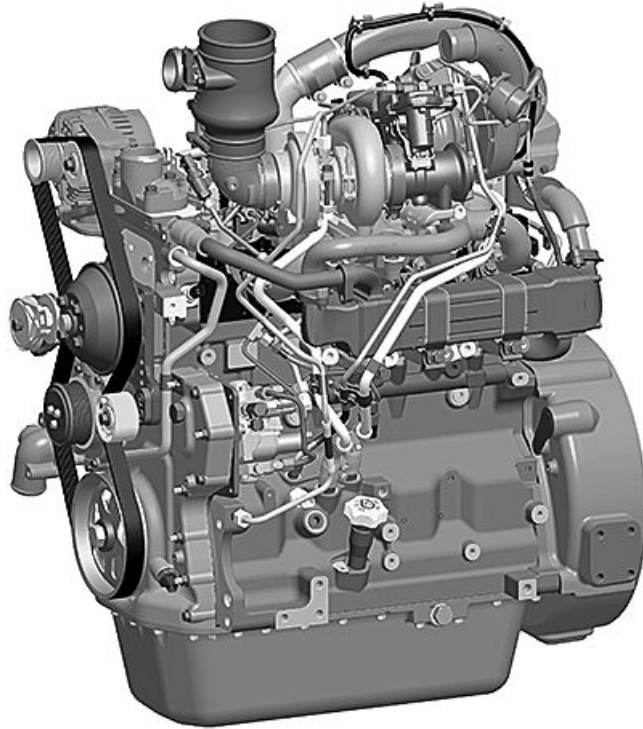
Fundamental service information is available from other sources covering basic theory of operation, fundamentals of troubleshooting, general maintenance, and basic type of failures and their causes.

**CALIFORNIA PROPOSITION 65 WARNING**  
**Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.**

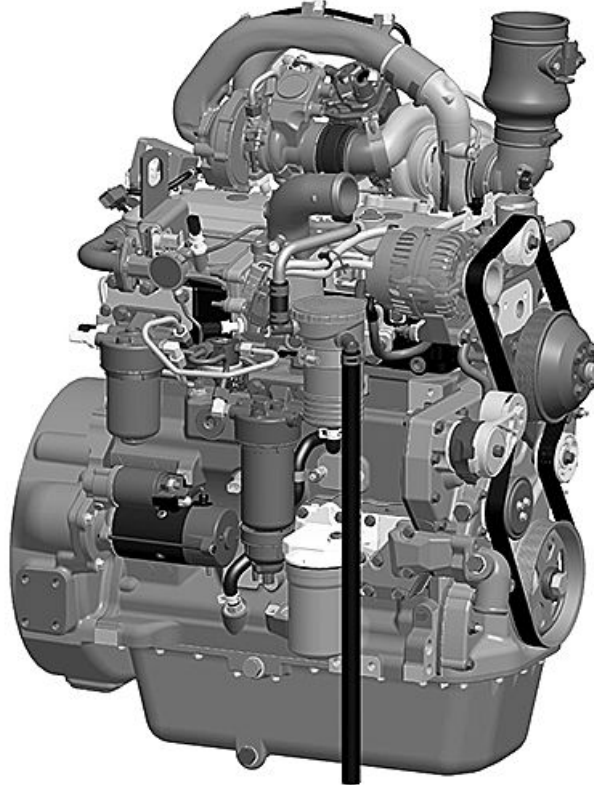
ZE59858,0000016 -19-08AUG14-1/1

## Identification Views

### 4045 PSS Engine—Final Tier 4/Stage IV



4045HFC09 Left View



4045HFC09 Right View

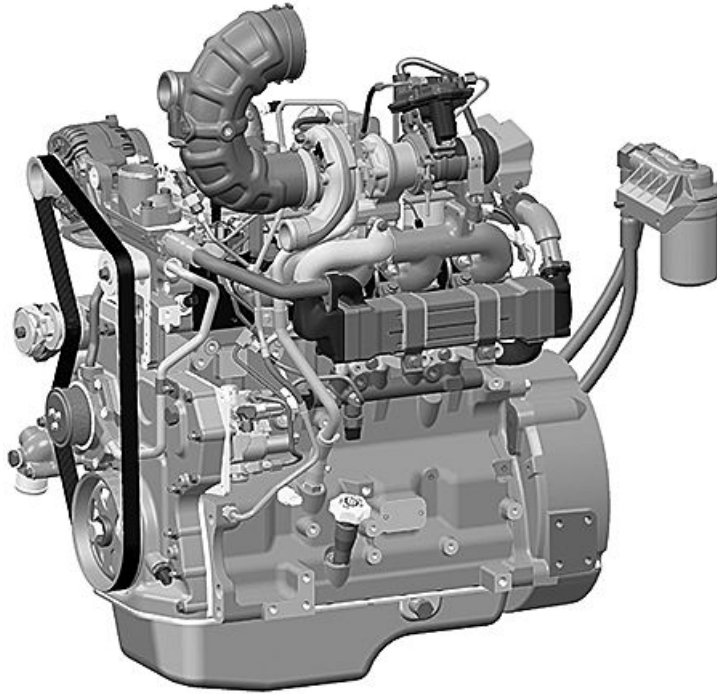
Continued on next page

RG25233 —UN—10MAR14

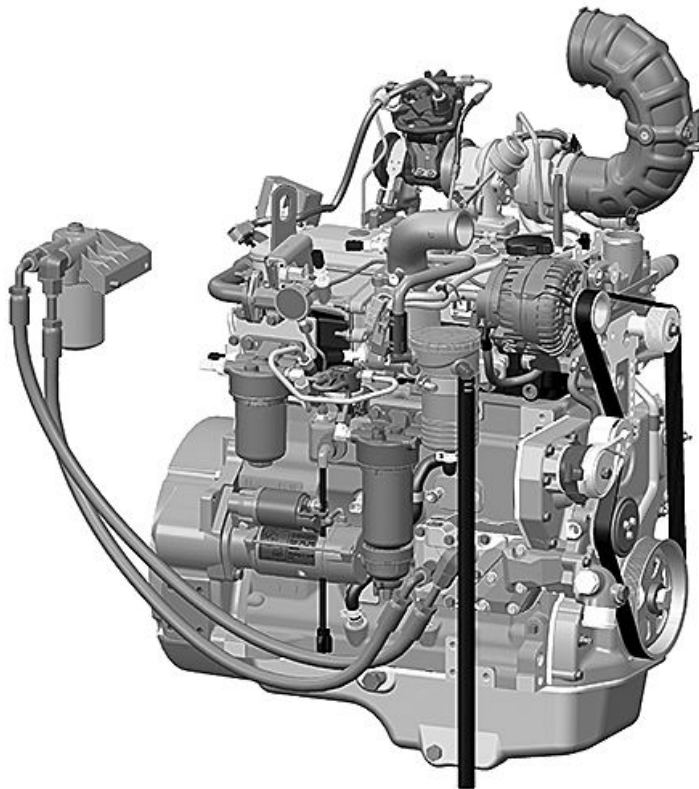
RG25234 —UN—10MAR14

ZE59858,0000018 -19-25SEP14-1/4

4045 PWS Engine—Final Tier 4/Stage IV



4045HFC07 Left View



4045HFC07 Right View

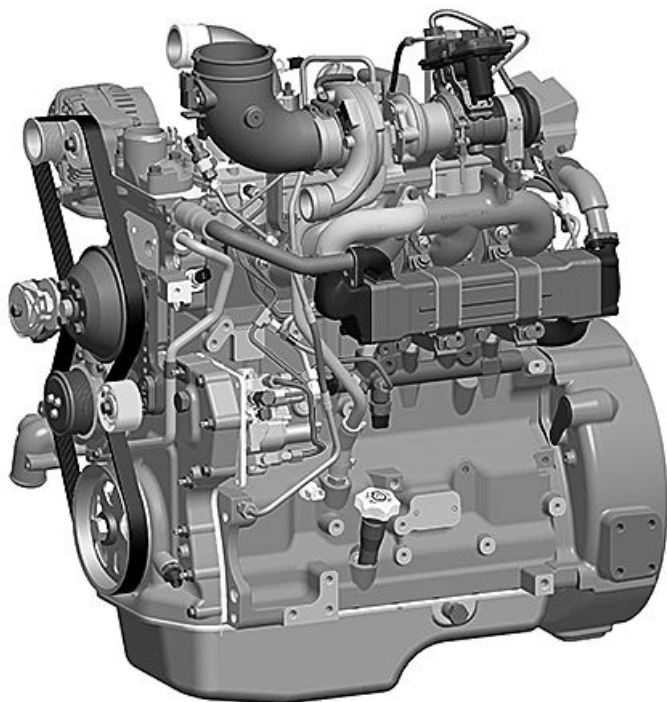
Continued on next page

ZE59858,0000018 -19-25SEP14-2/4

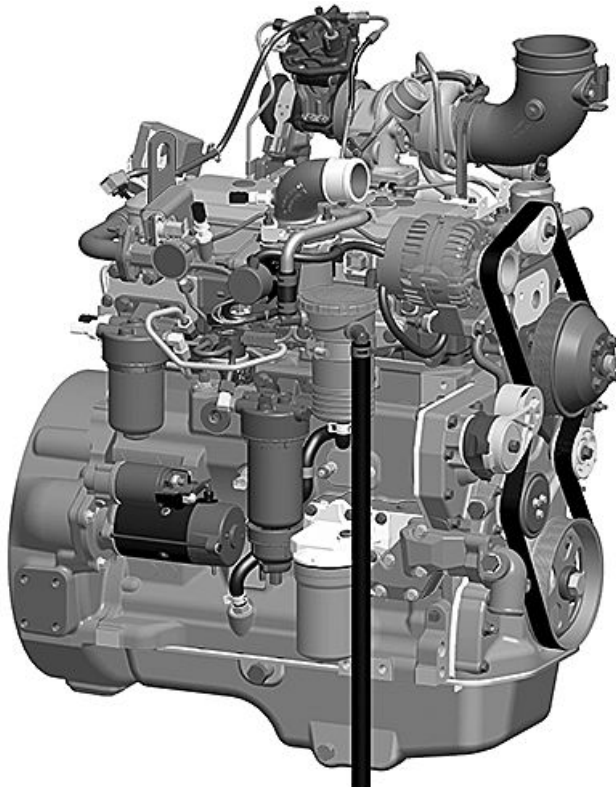
RG26363 —UN—04SEP14

RG26364 —UN—04SEP14

4045 PWL Engine—Final Tier 4/Stage IV



4045HFC04 Left View



4045HFC04 Right View

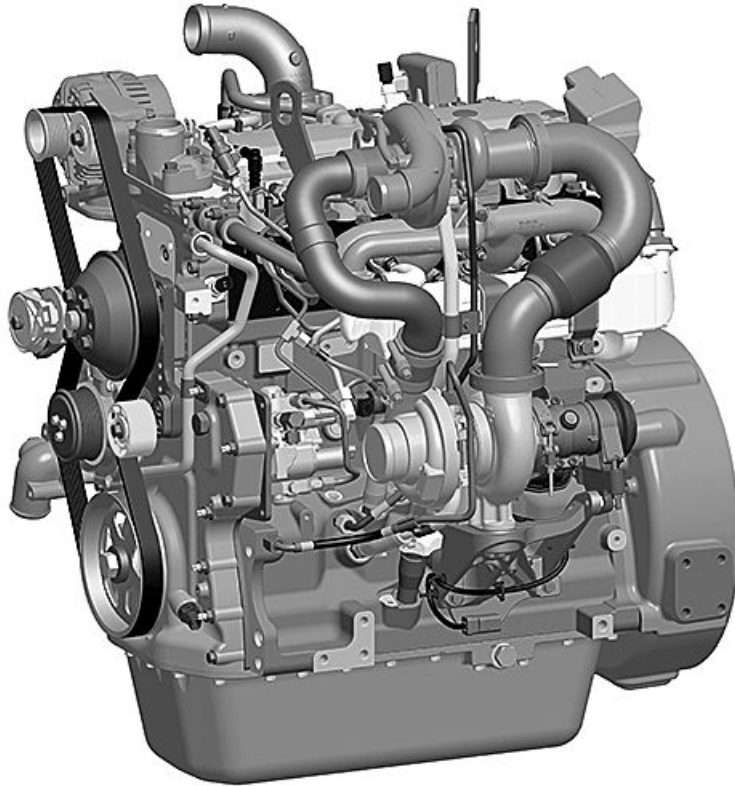
Continued on next page

ZE59858,0000018 -19-25SEP14-3/4

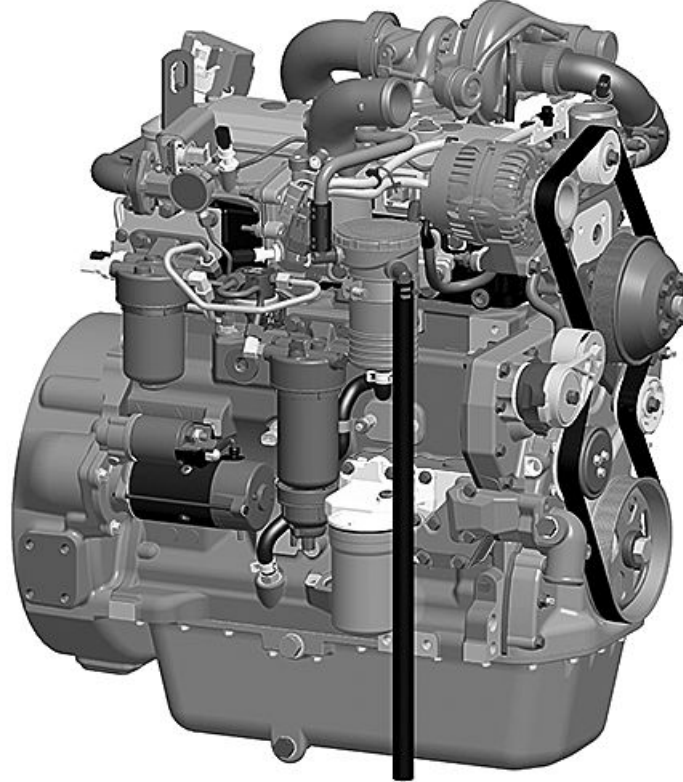
RG25231 —UN—10MAR14

RG25232 —UN—10MAR14

**4045 PSS Engine—Low Mount Fixed Turbo—Final  
Tier 4/Stage IV**



*4045HFC09 Low Mount Fixed Turbo Left View*



*4045HFC09 Low Mount Fixed Turbo Right View*

RG26325 —UN—14AUG14

RG26324 —UN—14AUG14

ZE59858,0000018 -19-25SEP14-4/4

# Contents

## Section 01—General Information

- Group 000—Safety
- Group 001—Engine Identification
- Group 002—Fuels, Lubricants, and Coolant

## Section 02—Repair and Adjustments

- Group 010—Engine Rebuild
- Group 020—Cylinder Head and Valve Repair and Adjustment
- Group 030—Cylinder Block, Liners, Pistons, and Rods Repair and Adjustment
- Group 040—Crankshaft, Main Bearings, and Flywheel Repair and Adjustment
- Group 050—Camshaft, Balancing Shaft and Timing Gear Train Repair and Adjustment
- Group 060—Lubrication System Repair and Adjustment
- Group 070—Cooling System Repair and Adjustment
- Group 080—Air Intake and Exhaust System Repair and Adjustment — Dual Turbocharger
- Group 085—Air Intake and Exhaust System Repair and Adjustment — Single Turbocharger
- Group 090—Electronic Fuel System Repair and Adjustment
- Group 100—OEM Starting and Charging Systems Repair and Adjustment
- Group 110—Electrical Engine Control Repair and Adjustment
- Group 112—Connector Repair and Adjustment
- Group 115—Fuel Dosing Aftertreatment Devices Repair and Adjustment
- Group 116—DEF Dosing Aftertreatment Devices Repair and Adjustment

## Section 03—Theory of Operation

- Group 120—Base Engine
- Group 123—Cooling System
- Group 126—Lubrication System
- Group 130—Electronic Fuel System
- Group 135—Air Intake and Exhaust System
- Group 137—Aftertreatment System
- Group 140—Electrical Control System

## Section 04—Diagnostics

- Group 150—Observable Diagnostics
- Group 155—Checks, Tests, and Procedures
- Group 160—Diagnostic Instructions and Information
- Group 161—DTC SPN - 000001—000199
- Group 162—DTC SPN - 000200—000699
- Group 163—DTC SPN - 000700—001999
- Group 164—DTC SPN - 002000—002299

- Group 165—DTC SPN - 002300—002999
- Group 166—DTC SPN - 003000—003999
- Group 167—DTC SPN - 004000—529999

## Section 05—Tools and Other Materials

- Group 170—Special Tools
- Group 180—Lubricants, Sealants, and Other Materials

## Section 06—Specifications

- Group 200—Repair and General OEM Specifications
- Group 210—Diagnostic Specifications

*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.*

COPYRIGHT © 2016  
DEERE & COMPANY  
Moline, Illinois  
All rights reserved.  
A John Deere ILLUSTRATION™ Manual  
Previous Editions  
Copyright © 2014, 2015

# Section 01 General Information

## Contents

	Page		Page
<b>Group 000—Safety</b>			
Understand Signal Words.....	01-000-1	Emissions Control System	
Recognize Safety Information .....	01-000-1	Certification Label.....	01-001-6
Replace Safety Signs .....	01-000-1	<b>Group 002—Fuels, Lubricants, and Coolant</b>	
Follow Safety Instructions.....	01-000-2	Diesel Exhaust Fluid (DEF) — Use	
California Proposition 65 Warning.....	01-000-2	in Selective Catalytic Reduction	
Exhaust Filter Cleaning .....	01-000-2	(SCR) Equipped Engines .....	01-002-1
Avoid Hot Exhaust.....	01-000-2	Storing Diesel Exhaust Fluid	
Work In Ventilated Area.....	01-000-3	(DEF).....	01-002-1
Decommissioning — Proper		Refilling Diesel Exhaust Fluid	
Recycling and Disposal of Fluids		(DEF) Tank .....	01-002-2
and Components .....	01-000-3	Testing Diesel Exhaust Fluid	
Prevent Machine Runaway.....	01-000-4	(DEF).....	01-002-3
Practice Safe Maintenance.....	01-000-4	Disposal of Diesel Exhaust Fluid	
Work in Clean Area .....	01-000-5	(DEF).....	01-002-3
Wear Protective Clothing.....	01-000-5	Diesel Fuel.....	01-002-4
Service Machines Safely .....	01-000-5	Supplemental Diesel Fuel	
Use Proper Tools.....	01-000-6	Additives .....	01-002-4
Construct Dealer-Made Tools		Lubricity of Diesel Fuel .....	01-002-5
Safely.....	01-000-6	Handling and Storing Diesel Fuel.....	01-002-5
Support Machine Properly .....	01-000-6	BioDiesel Fuel .....	01-002-6
Use Proper Lifting Equipment.....	01-000-7	Testing Diesel Fuel .....	01-002-7
Protect Against Noise .....	01-000-7	Fuel Filters.....	01-002-7
Illuminate Work Area Safely .....	01-000-7	Minimizing the Effect of Cold	
Install All Guards .....	01-000-8	Weather on Diesel Engines .....	01-002-8
Stay Clear of Rotating Drivelines.....	01-000-8	John Deere Break-In Plus™ Engine	
Protect Against High Pressure		Oil — Interim Tier 4, Final Tier 4,	
Spray .....	01-000-8	Stage IIIB, and Stage IV .....	01-002-9
Service Cooling System Safely .....	01-000-9	Diesel Engine Oil — Interim Tier	
Remove Paint Before Welding or		4, Final Tier 4, Stage IIIB, and	
Heating .....	01-000-9	Stage IV .....	01-002-9
Precautions for Welding .....	01-000-10	Engine Oil and Filter Service	
Wait Before Opening		Intervals — Interim Tier 4, Final	
High-Pressure Fuel System.....	01-000-10	Tier 4, Stage IIIB, and Stage IV	
Avoid High-Pressure Fluids .....	01-000-11	— OEM Applications .....	01-002-10
Avoid Heating Near Pressurized		Diesel Engine Oil and Filter Service	
Fluid Lines .....	01-000-11	Intervals .....	01-002-10
Avoid Static Electricity Risk When		Mixing of Lubricants.....	01-002-10
Refueling .....	01-000-12	Alternative and Synthetic	
Handle Fluids Safely—Avoid		Lubricants .....	01-002-11
Fires.....	01-000-12	Lubricant Storage .....	01-002-11
Prepare for Emergencies.....	01-000-12	Oil Filters .....	01-002-11
Handling Batteries Safely .....	01-000-13	Diesel Engine Coolant (engine with	
Prevent Acid Burns.....	01-000-14	wet sleeve cylinder liners) .....	01-002-12
Prevent Battery Explosions .....	01-000-14	Water Quality for Mixing with	
Live With Safety.....	01-000-15	Coolant Concentrate.....	01-002-13
<b>Group 001—Engine Identification</b>			
Engine Serial Number Plate		Operating in Warm Temperature	
Information.....	01-001-1	Climates.....	01-002-13
OEM Engine Option Code Label .....	01-001-2	Testing Coolant Freeze Point .....	01-002-14
Information Relative to Emissions		Disposing of Coolant .....	01-002-14
Regulations.....	01-001-5		



## Understand Signal Words

**DANGER;** The signal word DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

**WARNING;** The signal word WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

**CAUTION;** The signal word CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. CAUTION may also be used to alert against unsafe practices associated with events which could lead to personal injury.

A signal word—DANGER, WARNING, or CAUTION—is used with the safety-alert symbol. DANGER identifies the most serious hazards. DANGER or WARNING safety signs are located near specific hazards. General

precautions are listed on CAUTION safety signs. CAUTION also calls attention to safety messages in this manual.



**WARNING**

**CAUTION**

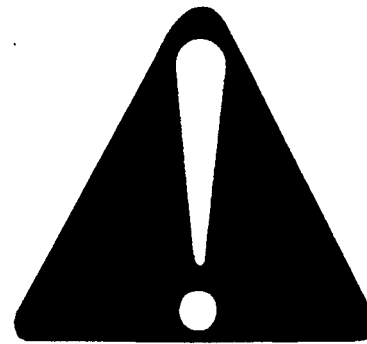
TS187—19—30SEP88

DX,SIGNAL -19-05OCT16-1/1

## Recognize Safety Information

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

Follow recommended precautions and safe operating practices.



T81389—UN—28JUN13

DX,ALERT -19-29SEP98-1/1

## Replace Safety Signs

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



TS201—UN—15APR13

DX,SIGNS1 -19-04JUN90-1/1

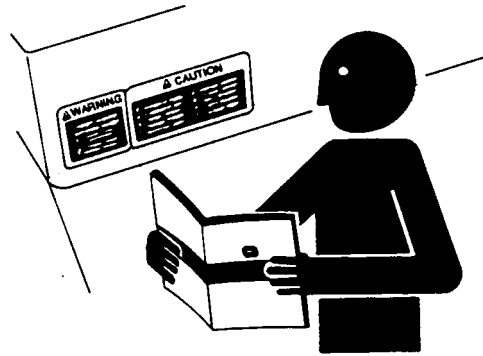
### Follow Safety Instructions

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

### California Proposition 65 Warning

Diesel engine exhaust, some of its constituents, along with certain machine components contain or emit chemicals known to the State of California to cause cancer and birth

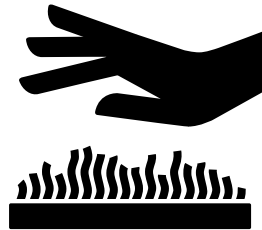
defects or other reproductive harm. In addition, certain fluids contained in the machine and certain products of component wear contain or emit chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

RG41061,000001F -19-12JAN10-1/1

### Exhaust Filter Cleaning

Servicing machine or attachments during exhaust filter cleaning can result in serious personal injury. Avoid exposure and skin contact with hot exhaust gases and components.

During auto or manual/stationary exhaust filter cleaning operations, the engine will 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.



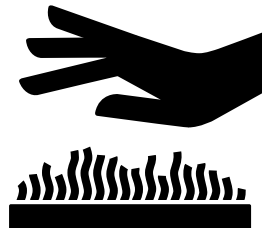
RG17488—UN—21AUG09

DX,FILTER -19-20JAN10-1/1

### Avoid Hot Exhaust

Servicing machine or attachments with engine running can result in serious personal injury. Avoid exposure and skin contact with hot exhaust gases and components.

Exhaust parts and streams become very hot during operation. Exhaust gases and components reach temperatures hot enough to burn people, ignite, or melt common materials.



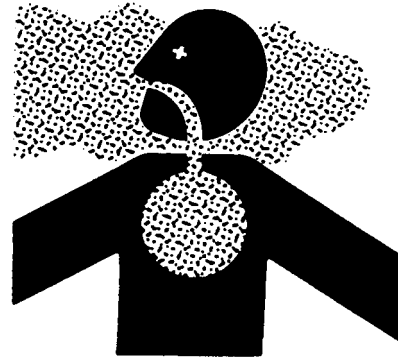
RG17488—UN—21AUG09

DX,EXHAUST -19-20AUG09-1/1

## 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.



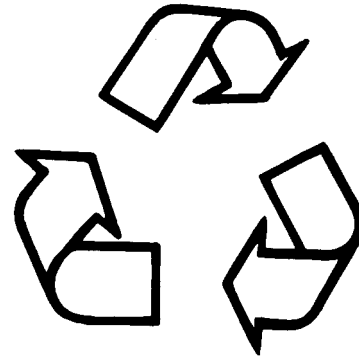
TS2220—UN—15APR13

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

## 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);



TS1133—UN—15APR13

- 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.

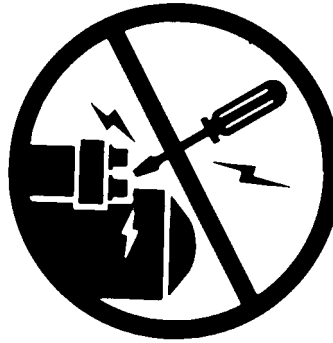
DX,DRAIN -19-01JUN15-1/1

## Prevent Machine Runaway

Avoid possible injury or death from machinery runaway.

Do not start engine by shorting across starter terminals. Machine will start in gear if normal circuitry is bypassed.

NEVER start engine while standing on ground. Start engine only from operator's seat, with transmission in neutral or park.



TS177 —UN—1JAN89

DX,BYPAS1 -19-29SEP98-1/1

## Practice Safe Maintenance

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

Never lubricate, service, or adjust machine while it is moving. Keep hands, feet, and clothing from power-driven parts. Disengage all power and operate controls to relieve pressure. Lower equipment to the ground. Stop the engine. Remove the key. Allow machine to cool.

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

Keep all parts in good condition and properly installed. Fix damage immediately. Replace worn or broken parts. Remove any buildup of grease, oil, or debris.

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

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



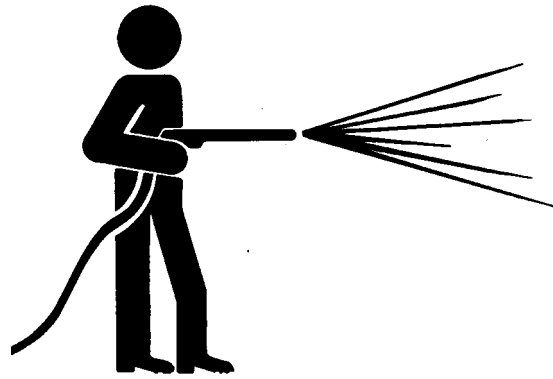
TS218 —UN—23AUG88

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

### Work in Clean Area

Before starting a job:

- Clean work area and machine.
- Make sure you have all necessary tools to do your job.
- Have the right parts on hand.
- Read all instructions thoroughly; do not attempt shortcuts.



T6642EJ—UN—18OCT88

DX,CLEAN -19-04JUN90-1/1

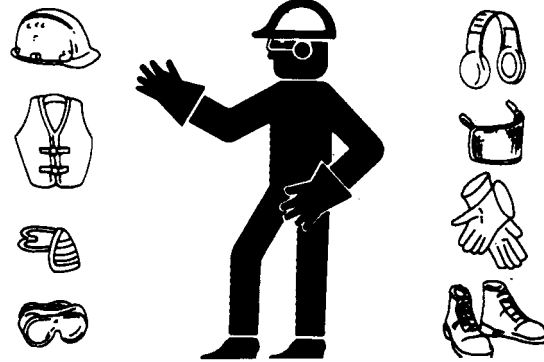
### Wear Protective Clothing

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.



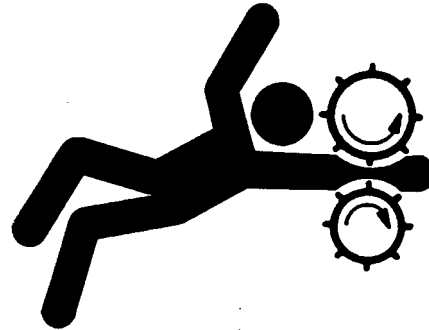
TS206—UN—15APR13

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

### Service Machines Safely

Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing, or necklace when you work near machine tools or moving parts. If these items were to get caught, severe injury could result.

Remove rings and other jewelry to prevent electrical shorts and entanglement in moving parts.



TS228—UN—23AUG88

DX,LOOSE -19-04JUN90-1/1

### Use Proper Tools

Use tools appropriate to the work. Makeshift tools and procedures can create safety hazards.

Use power tools only to loosen threaded parts and fasteners.

For loosening and tightening hardware, use the correct size tools. DO NOT use U.S. measurement tools on metric fasteners. Avoid bodily injury caused by slipping wrenches.

Use only service parts meeting John Deere specifications.



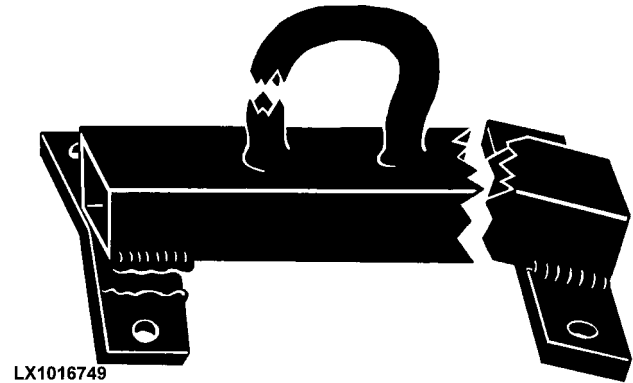
TS779—UN—08NOV89

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

### Construct Dealer-Made Tools Safely

Faulty or broken tools can result in serious injury. When constructing tools, use proper, quality materials, and good workmanship.

Do not weld tools unless you have the proper equipment and experience to perform the job.



LX1016749

LX1016749—UN—01JUL97

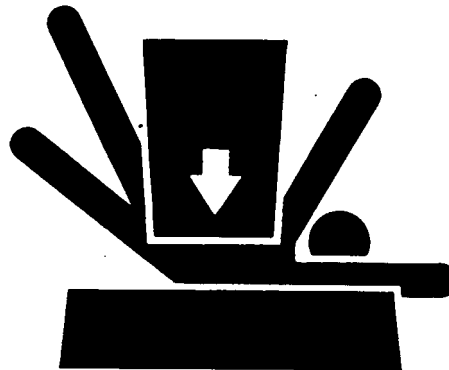
DX,SAFE,TOOLS -19-10OCT97-1/1

### Support Machine Properly

Always lower the attachment or implement to the ground before you work on the machine. If the work requires that the machine or attachment be lifted, provide secure support for them. If left in a raised position, hydraulically supported devices can settle or leak down.

Do not support the machine on cinder blocks, hollow tiles, or props that may crumble under continuous load. Do not work under a machine that is supported solely by a jack. Follow recommended procedures in this manual.

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



TS229—UN—23AUG88

DX,LOWER -19-24FEB00-1/1

**Thank you very much for  
your reading. Please Click  
Here. Then Get COMPLETE  
MANUAL. NO WAITING**



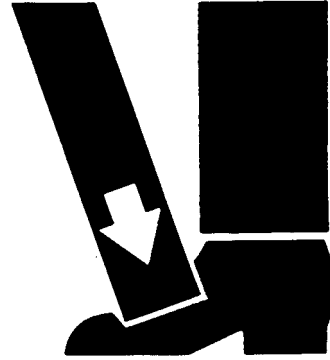
**NOTE:**

**If there is no response to  
click on the link above,  
please download the PDF  
document first and then  
click on it.**

### Use Proper Lifting Equipment

Lifting heavy components incorrectly can cause severe injury or machine damage.

Follow recommended procedure for removal and installation of components in the manual.



TS226—UN—23AUG88

DX,LIFT -19-04JUN90-1/1

### Protect Against Noise

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.

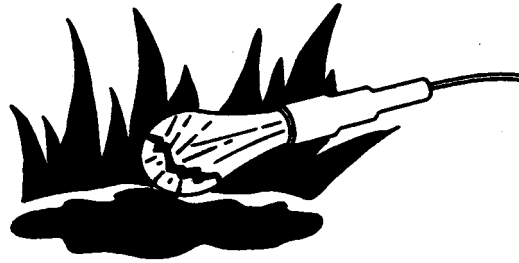


TS207—UN—23AUG88

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

### Illuminate Work Area Safely

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



TS223—UN—23AUG88

DX,LIGHT -19-04JUN90-1/1

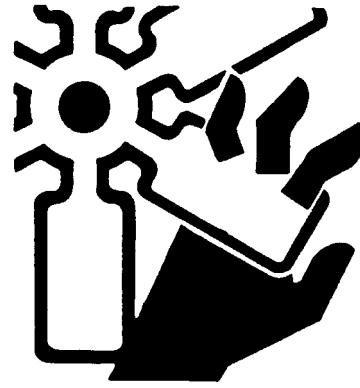


### Install All Guards

Rotating cooling system fans, belts, pulleys, and drives can cause serious injury.

Keep all guards in place at all times during engine operation.

Wear close-fitting clothes. Stop the engine and be sure fans, belts, pulleys, and drives are stopped before making adjustments, connections, or cleaning near fans and their drive components.



TS677—UN—21SEP89

DX, GUARDS -19-18AUG09-1/1

### Stay Clear of Rotating Drivelines

Entanglement in rotating driveline can cause serious injury or death.

Keep all shields in place at all times. Make sure rotating shields turn freely.

Wear close-fitting clothing. Stop the engine and be sure that all rotating parts and drivelines are stopped before making adjustments, connections, or performing any type of service on engine or machine driven equipment.



TS1644—UN—22AUG95

DX, ROTATING -19-18AUG09-1/1

### Protect Against High Pressure Spray

Spray from high pressure nozzles can penetrate the skin and cause serious injury. Keep spray from contacting hands or body.

If an accident occurs, see a doctor immediately. Any high pressure spray injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A.



TS1343—UN—18MAR92

DX, SPRAY -19-16APR92-1/1

### 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