



JD9 Diesel Engines



OPERATOR'S MANUAL

JD9 Diesel Engines

OMDZ124012 ISSUE 06NOV25 (ENGLISH)

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.

If this product contains a gasoline engine:

! WARNING

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

The State of California requires the above two warnings.

John Deere Power Systems

Worldwide Edition
PRINTED IN U.S.A.



Introduction

Foreword

READ THIS MANUAL carefully to learn how to operate and service your machine correctly. Failure to do so could result in personal injury or equipment damage. This manual and safety signs on your machine may also be available in other languages. See www.techpubs.deere.com (Ag&Turf/JDPS), www.johndeeretechno.com (C&F), or your John Deere dealer to order.

THIS MANUAL SHOULD BE CONSIDERED a permanent part of your machine and should remain with the machine when you sell it.

MEASUREMENTS in this manual are given in both metric and customary U.S. unit equivalents. Use only correct replacement parts and fasteners. Metric and inch fasteners may require a specific metric or inch wrench.

RIGHT-HAND AND LEFT-HAND sides are determined by facing in the direction of forward travel.

WRITE PRODUCT IDENTIFICATION NUMBERS (PIN) in the Specification or Machine Numbers section. Accurately record all the numbers to help in tracing the machine should it be stolen. PIN information is helpful when ordering parts. File the identification numbers in a secure place off the machine.

WARRANTY is provided as part of John Deere's support program for customers who operate and maintain their equipment as described in this manual. The warranty is explained on the warranty certificate or statement which you should have received at time of purchase.

This warranty provides you the assurance that John Deere will back its products where defects appear within the warranty period. In some circumstances, John Deere also provides field improvements, often without charge to the customer, even if the product is out of warranty. Should the equipment be abused, or modified to change its performance beyond the original factory specifications, the warranty will become void and field improvements may be denied. Setting fuel delivery above specifications or otherwise overpowering machines will result in such action.

If you are not the original owner of this machine, it is in your interest to contact your local John Deere dealer to inform them of this unit's serial number. This will help John Deere notify you of any issues or product improvements.

DX,IFC1 -19-03APR09-1/1

John Deere Is at Your Service

Customer satisfaction is important to John Deere.

Our dealers strive to provide you with prompt, efficient parts, and service:

- Maintenance and service parts to support your equipment.
- Trained service technicians and the necessary diagnostic and repair tools to service your equipment.
- **John Deere replacement parts, repair services, and information for maintenance or repair are available. For more information, please visit deere.com or deere.ca.**



TS201—UN—15APR13

DX,IFC,JDS -19-30SEP25-1/1

Required Emission-Related Information

Service Provider

A repair shop or person of the owner's choosing may maintain, replace, or repair emission control devices and systems with original or equivalent replacement parts. However, warranty, recall, and all other services paid for by John Deere must be performed at an authorized John Deere service center.

DX,EMISSIONS,REQINFO -19-08DEC23-1/1

Emissions Performance and Tampering

Operation and Maintenance

The engine, including the emissions control system, shall be operated, used, and maintained in accordance with the instructions provided in this manual to maintain the emissions performance of the engine within the requirements applicable to the engine's category/certification.

Tampering

No deliberate tampering with or misuse of the engine emissions control system shall take place; in particular with regard to deactivating or not maintaining an exhaust gas recirculation (EGR) or a DEF dosing system. Tampering with an engine's emissions control system will void the European Union (EU) type approval and applicable emissions-related warranties.

DX,EMISSIONS,PERFORM -19-12,JAN18-1/1

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Introduction

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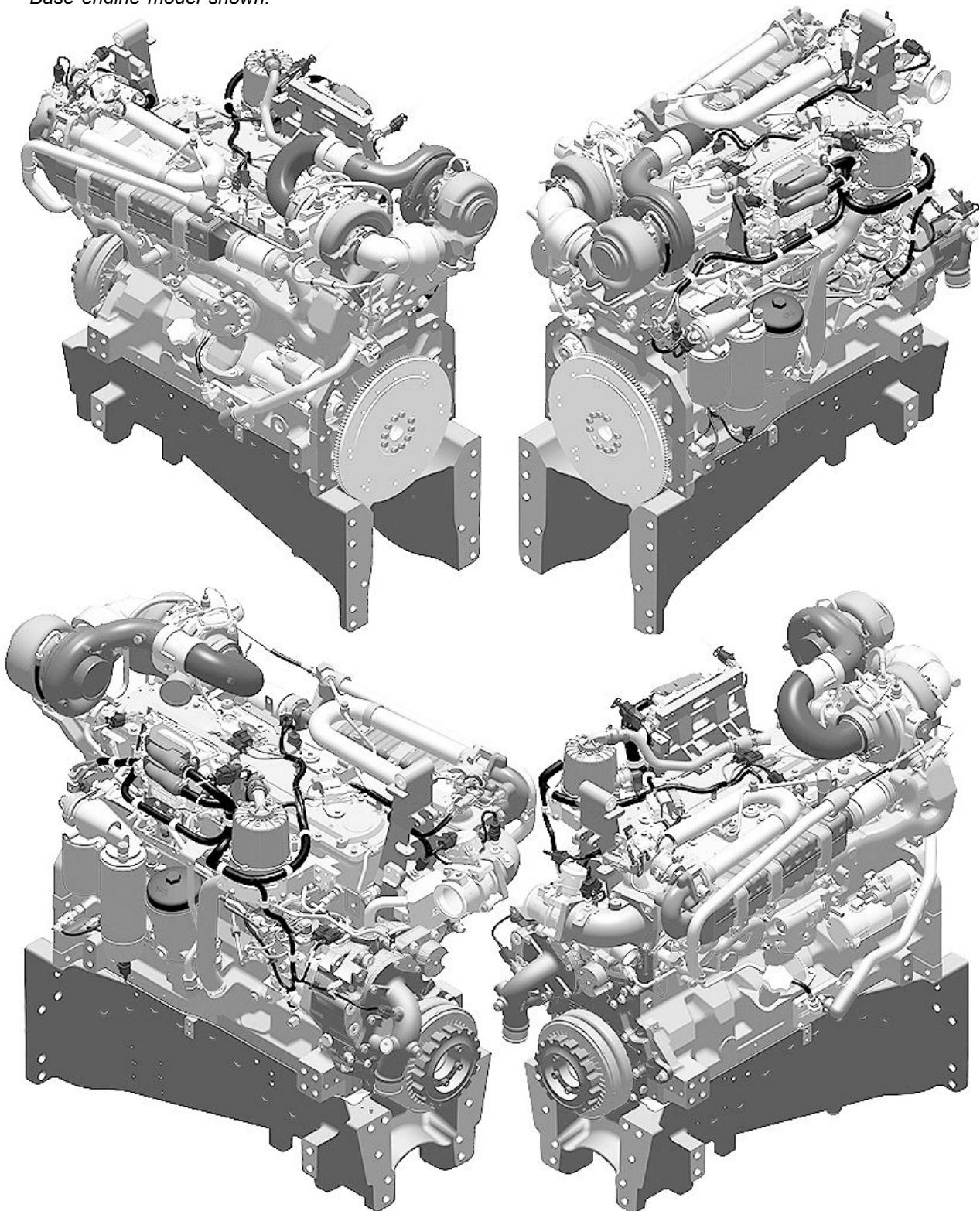
Introduction

THIS MANUAL CONTAINS INFORMATION to operate and service JD9 Diesel Engines.

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Identification Views

NOTE: There are multiple engine configurations.
Base engine model shown.

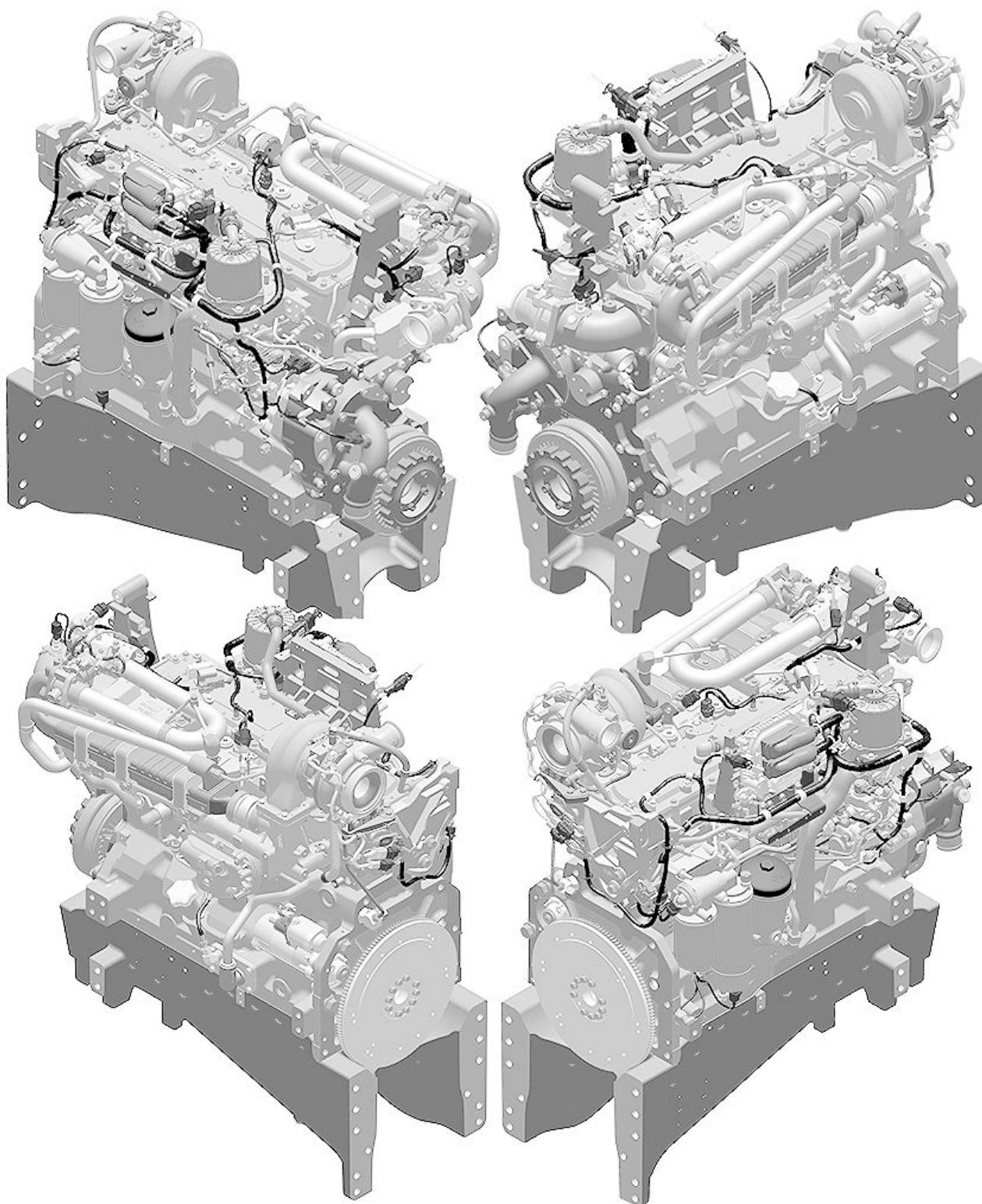


John Deere 6090 Dual Turbo Option

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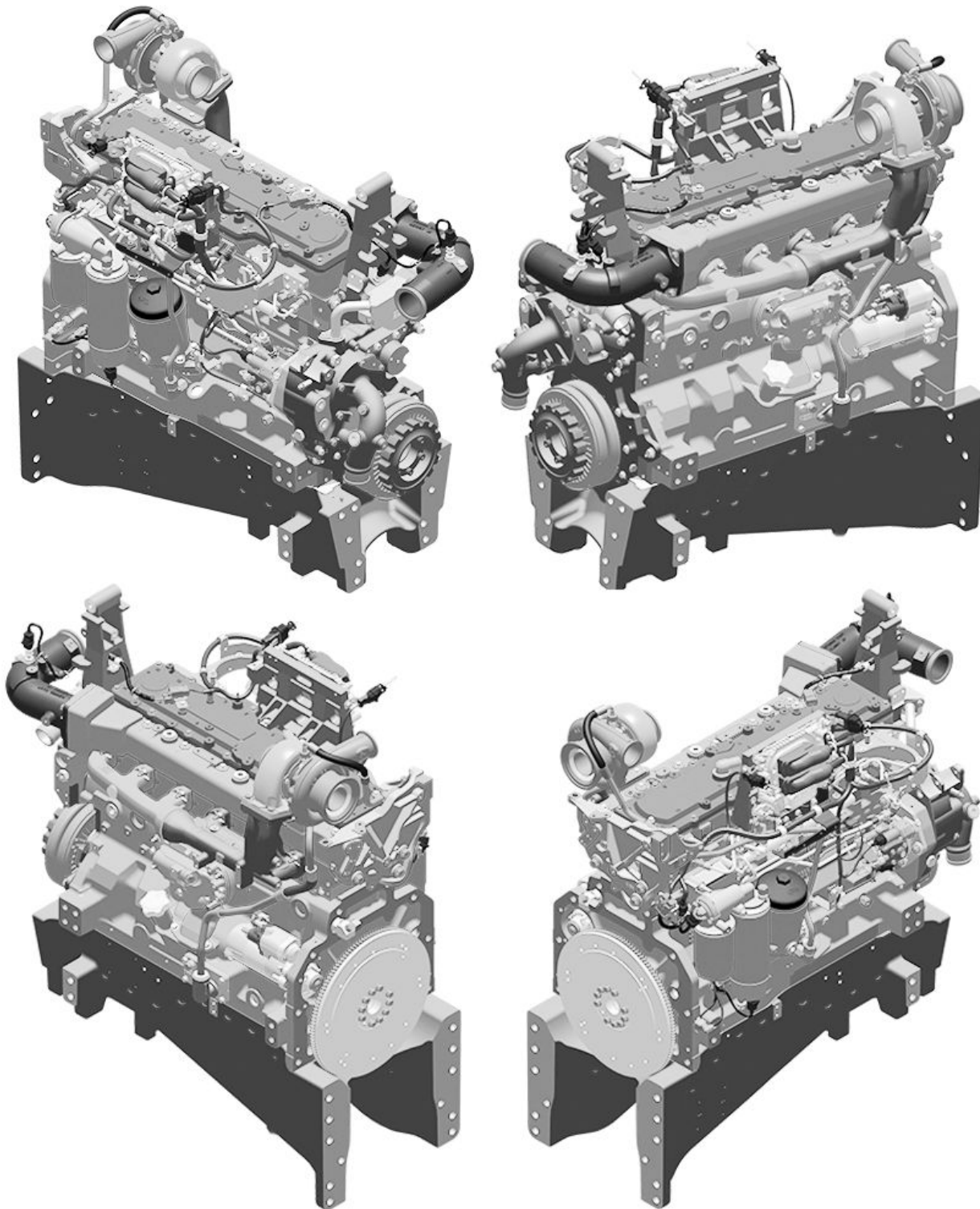
RG33847 —UN—18MAY21



John Deere 6090 Variable Geometry Turbo Option
Continued on next page

CM22194.0000A78 -19-18MAY21-2/3

RG33846 —UN—18MAY21



John Deere 6090 Fixed Turbo Charger Option

CM22194,0000A78 -19-18MAY21-3/3

RG33848 —UN—18MAY21

OEM Engine and Drivetrain Warranty Registration

RG37914 —UN—11DEC23



Scan this code to register your OEM engine or drivetrain product online.
You can also visit us directly at [John Deere Warranty Registration](#).

Why registering your OEM engine or drivetrain product is a really smart idea:

- **Get faster service.** Registering your engine or drivetrain product gives us the information we need to meet your service needs promptly and completely.
- **Protect your investment.** You'll be kept up-to-date on engine or drivetrain product updates.
- **Extend your warranty.** You'll be given the option to extend your coverage before your standard warranty term expires.
- **Stay informed.** Be the first to know about new products and money-saving offers from John Deere.

You're Covered

When you buy a John Deere engine or drivetrain product you aren't just buying pistons and crankshafts and gear drives. You're buying the ability to get work done. Without downtime, without worries, and without hassles. And you're buying the assurance that if you do need help, a strong support network will be there — ready to step in.

Confidence. That's what John Deere engines, John Deere drivetrains, and John Deere Warranties are all about.

Long durations. Warranties designed to give you confidence in your engine or drivetrain product.

Worldwide support. Get service when and where you need it. John Deere has 4,000+ service locations worldwide.

Genuine John Deere parts and service. Authorized service outlets will use only new or remanufactured parts or components furnished by John Deere.

Warranty Duration

Equipment operators can't afford downtime or unexpected repairs. That's why we offer comprehensive warranties on our OEM industrial engines, marine engines, and drivetrain products.

- **OEM Engines:** 2-year/2,000-hour warranty, with unlimited hours in the first year.
- **Drivetrain Products:** 12-month/2000-hour warranty. In the absence of a functional hour meter, hours of use will be determined on the basis of 12 hours of use per calendar day.

These warranties take effect the date the engine or drivetrain product is delivered to the first retail purchaser. Be sure to register your engine or drivetrain product and take full advantage of the John Deere service and support network.

In addition, engine extended warranties are available under certain conditions. John Deere offers a variety of purchased warranties to extend the warranty period for your engine. You'll be given the option to extend your coverage before your standard warranty term expires.

Obtaining Warranty Service

Warranty service must be requested through an authorized John Deere service outlet before the expiration of the warranty. Evidence of the engine's or drivetrain product's delivery date to the first retail purchaser must be presented when requesting warranty service. Authorized service outlets include:

- John Deere distributor
- John Deere OEM service dealer
- John Deere equipment dealer
- John Deere marine dealer

Worldwide Support Network

Visit [Global Dealer Locator](#) to find the authorized engine or drivetrain service location nearest you. For complete warranty details visit <https://www.deere.com/en/parts-and-service/warranty-and-protection-plans/warranties/warranty-statements> or <https://www.deere.ca/en/parts-and-service/warranty-and-protection-plans/warranties/warranty-statements> to view, download, or print the warranty statement for your engine or drivetrain product.

RG,OEMWarranty,EngineOM -19-12MAY25-1/1

Engine Owner

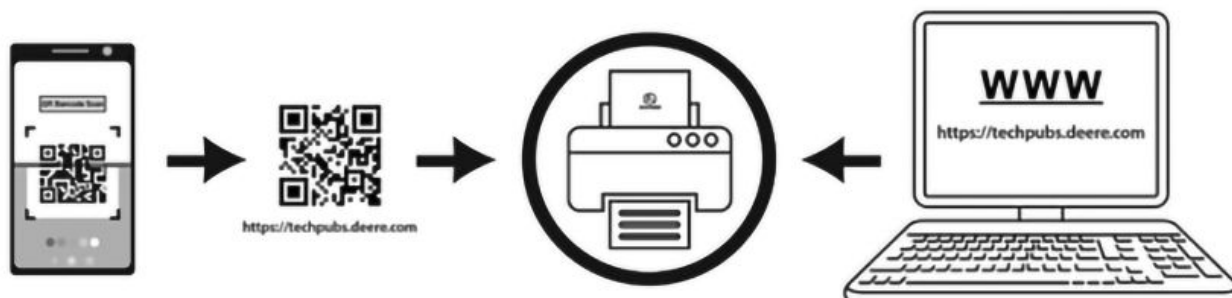
John Deere Engine Owner:

It is important for the new engine to be registered for factory warranty. Registering the engine will allow the Service Dealer to verify the warranty status should a repair be needed. The easiest way to register the engine is via the internet. To register the engine for warranty via the internet, please use the following URL:
<http://www.johndeere.com/enginewarranty>

The local John Deere dealer, engine distributor, or other service provider can also provide this service. Engine service can be done by all AG, C&F, and JDPS branded dealers. To view the John Deere Service Dealer network or locate the nearest Dealer, use the following URL:
<http://www.johndeere.com/dealer>

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Record Keeping

Record Engine Serial and Model Number

Locate and record all of the numbers and letters for engine serial number (A) and model number (B) found on the engine serial number data plate in the spaces provided below.

These two numbers are important for repair parts or warranty information.

For identification of publications specific to engine model refer to the [PowerAssist App](#) or [John Deere Technical Information Store](#).

Engine Serial Number (A)

Engine Model Number (B)



Engine Serial Number/Application Data Plate
RG33180 —UN—18NOV20



<https://techpubs.deere.com/>

A—Engine Serial Number

B—Engine Model Number

Record Engine Serial Number

Each engine has a 13-digit John Deere engine serial number identifying the producing factory, engine model designation, and a six digit sequential number.

NOTE: Examples below are for reference only. Engine being viewed may be different than example.

RG	6135	U	123456
Manufacturing Factory	Number of Cylinders and Total Displacement	Emissions Certification	Engine Serial Number
CD = Saran, France	6180 = 6 cylinders, 18.0 liters	A, B, D, H, T = Non-emissions regulated	
JX = Rosario	6136 = 6 cylinders, 13.6 liters	A, B, E, F, H, T = Tier 1/Stage I	
RG = Waterloo, IA	6135 = 6 cylinders, 13.5 liters	D, G, H, J, K, T = Tier 2/Stage II	
PE = Torreón, Mexico	6090 = 6 cylinders, 9.0 liters	L, M, N, P = Tier 3/Stage III A	
PY = Pune, India	6068 = 6 cylinders, 6.8 liters	R, U, V, W, X, Y, Z = Interim Tier 4/Stage III B and Final Tier 4/Stage IV/Stage V	
	4045 = 4 cylinders, 4.5 liters		
	3029 = 3 cylinders, 2.9 liters		

Engine Serial Number (RG6135U123456)

Record Engine Model Number (Option A)

6	135	H	F	C	09
Number of Cylinders	Displacement in Liters	Air Intake System	User Type	Application Type	Emissions Certification
3	2.9	A = Turbocharged and aftercooled, air-to-water	F = OEM (John Deere Power Systems)	C = Industrial	120, 160, 220, 425 = Non-emissions regulated
4	4.5	D = Naturally Aspirated		G = Genset	001, 150, 180, 250 = Tier 1/Stage I
6	6.8	H = Turbocharged and aftercooled, air-to-air		M = Marine	270, 275, 070, 475 = Tier 2/Stage II
	9.0	T = Turbocharged			280, 285, 485 = Tier 3/Stage III A

Continued on next page

RG,SERIALPLATE,ENGINEOM -19-01JUN23-1/3

Record Keeping

	13.5				281, 295, 92, 93, 94, 95 = Interim Tier4/Stage III B
					96, 97, 98, 99 = Final Tier 4/Stage IV/Stage V
					New Designation
					04 = EWX
					05 = PWL
					06 = PVL
					07 = PSL
					08 = PVS
					09 = PSS

Engine Model Number (6135HFC09)

Record Engine Model Number (Option B)

6	135	C	I	4	4	0
Number of Cylinders	Displacement in Liters	Aspiration	Application Type	Emissions Level	Aftertreat- ment/Core Tech- nology	Incrementation
3	029 = 2.9	A = Air-to-coolant cooled	Configurable	0 = Tier 0 or equivalent	Aftertreatment	0 = Parent
4	040 = 3.9	C = Compound (Series)	I = Industrial	1 = Tier 1 or equivalent	0 = No ATD Mechanical	1—9 = Incremental assignment in case of significant change
6	045 = 4.5	D = Naturally aspirated	G = Generator Drive	2 = Tier 2 or equivalent	1 = No ATD Electrical	
	068 = 6.8	H = Air-to-air cooled	M = Marine	3 = Tier 3 or equivalent	≥Interim Tier 4	
	090 = 9.0	T = Turbocharged	P = Gen Set Power Unit	4 = Tier 4 or equivalent	2 = Single fluid no particulate filter	
	135 = 13.5	S = Air-to-sea water cooled	V = Variable Speed Power Unit	5 = Stage V	3 = Single fluid with particulate filter	
	136 = 13.6				4 = Dual fluid no particulate filter	
	180 = 18.0				5 = Dual fluid with particulate filter	
					Core Technology	
					0 = Mechanical	
					1 = Electrical 2V. Fixed turbocharger	
					2 = Electrical 2V. WG or VGT	
					≤Tier 4	
					3 = Electrical 4V. Fixed turbocharger	
					4 = Electrical 4V. WG or VGT	
					5 = Electrical 2V w/EGR. Fixed turbocharger	

Continued on next page

RG,SERIALPLATE,ENGINEOM -19-01JUN23-2/3

Record Keeping

					6 = Electrical 2V w/EGR. WG or VGT	
					7 = Electrical 4V w/EGR. Fixed turbocharger	
					8 = Electrical 4V w/EGR. WG or VGT	

Engine Model Number (6135CI440)

RG,SERIALPLATE,ENGINEOM -19-01JUN23-3/3

Engine Option Codes

JOHN DEERE Number PE6068U000094

6068HFC09 6.8 L 2732F

1111 1399 1425 1524 1606 1708 1928 2002 2699 2815 2909 3008 3512 3914 4026
 4391 4607 4702 4803 4903 5002 5103 5215 5407 5511 5615 5709 5927 6543 6801
 6901 72F3 7306 7703 7897 8422 8911 9805

Customer No. OPTION CODES

Option Code Label Example

RG24026—UN—05AUG13

A—Engine Base Code (example)

OEM engines have an engine option code label affixed to the rocker arm cover. These codes indicate which of the engine options were installed on your engine at the factory. When in need of parts or service, furnish the local John Deere dealer, engine distributor, or other service provider with these numbers.

The engine option code label includes an engine base code (A). This base code must also be recorded along with the option codes. At times it will be necessary to furnish this base code to differentiate two identical option codes for the same engine model.

The first two digits of each code identify a specific group, such as alternators. The last two digits of each code identify one specific option provided on your engine, such as a 24 volt, 120 amp alternator.

If an engine is ordered without a particular component, the last two digits of that functional group option code will be 99, 00, or XX. The following list shows only the first two digits of the code numbers. For future reference such as ordering repair parts, it is important to have these code numbers available. To ensure this availability, enter the third and fourth digits shown on your engine option code label in the spaces provided on the following page.

An additional option code label may also be delivered (in a plastic bag attached to the engine or inserted in the machine documentation). It is recommended to place this label either on this page of the operator's manual or in the Engine Owner's Warranty booklet under Option Codes.

The machine manufacturer may have placed the label in a specific accessible area (inside the enclosure or close to a maintenance area).

The engine option code label may not contain all option codes if an option has been added after the engine left the producing factory.

If option code label is lost or destroyed, contact the local John Deere dealer, engine distributor, or other service provider selling the engine for a replacement.

Record your engine Base Code (A) in the spaces provided below for easy reference.

Engine Base Code (A):

Option Codes	Description
10_____	Paint Protection
11_____	Rocker Arm Cover
12_____	Oil Filler
13_____	Crankshaft Pulley
14_____	Flywheel Housing
15_____	Flywheel
16_____	Fuel Injection System
17_____	Air Inlet
18_____	Air Cleaner
19_____	Oil Pan
20_____	Water Pump

Option Codes	Description
56_____	Paint
57_____	Water Pump Inlet
58_____	Power Take Off
59_____	Oil Cooler/Oil Filter
60_____	Add-On Fan Drive Pulley
61_____	After Treatment Device/Muffler
62_____	Alternator Mounting
63_____	Low-Pressure Fuel Lines
64_____	Exhaust Elbow
65_____	Turbocharger
66_____	Temperature Switch

Continued on next page

RG, RG34710, 5004 -19-12MAY25-1/2

Record Keeping

Option Codes	Description	Option Codes	Description
21_____	Thermostat Cover	67_____	Engine Sensors
22_____	Thermostat	68_____	Damper
23_____	Fan Drive	69_____	Engine Serial Number Plate
24_____	Fan Belt	70_____	Decomposition Tube (OEM)
25_____	Fan	71_____	SCR (OEM)
26_____	Block Heater	72_____	Performance Software and Labels
27_____	Radiator/Heat Exchanger	7A_____	Performance Software and Labels
28_____	Exhaust Manifold	73_____	After Treatment Dosing System
29_____	Ventilator System	74_____	Air Conditioning
30_____	Starting Motor	75_____	Restriction Indicator
31_____	Alternator	76_____	Oil Pressure Switch
32_____	DEF Lines, Pressure (OEM)	77_____	Timing Gear Cover (S450/S650)
33_____	DEF Lines, Supply/Return to Tank (OEM)	78_____	Air Compressor
34_____	DEF Tank and Header (OEM)	79_____	Certification
35_____	Final Fuel Filter	80_____	Sea Water Pump (Marine)
36_____	Front Plate and Idler Shafts	81_____	Primary Fuel Filter/Water Separator
37_____	Fuel Transfer Pump	82_____	Ignition System (Natural Gas)
38_____	Operator Manual	83_____	Vehicle Performance Software
39_____	Thermostat Housing	84_____	Wiring Harness
40_____	Dipstick and Tube	85_____	Fuel System (Natural Gas)
41_____	Belt Driven Auxiliary Drive (Add-On Crank Pulley)	86_____	Fan Pulley
42_____	DEF Line, Supply Module to Injector (OEM)	87_____	Belt Tensioner
43_____	Starting Aid	88_____	Oil Filter
44_____	Timing Gear Cover (S350)	89_____	EGR System
44_____	Tachometer Drive Sensors (S450/S650)	90_____	Trim Software (OEM)
45_____	Secondary Balancers	91_____	Engine Installation Kit (S350)
46_____	Cylinder Block with Camshaft	92_____	Engine Test Certificate/Engine Accessories (S350)
47_____	Crankshaft/Main Bearings	92_____	Engine Installation Kit (S450)
48_____	Connecting Rods/Pistons/Liners	93_____	Emission Label
49_____	Valve Actuating Mechanism	94_____	Custom Software
50_____	Oil Pump	95_____	Parts Installed at Factory
51_____	Cylinder Head with Valves	96_____	Engine Installation Kit/Ship With (S450/S650)
52_____	Gear Driven Auxiliary Drive	96_____	ECU Wiring Harness (6125/6135)
53_____	Fuel Heater	97_____	Field Installed Items
54_____	Turbo Air Intake	98_____	Engine Lift Strap
55_____	Shipping Stand	99_____	Service Only Parts

NOTE: This is a complete option code list based on the latest information available at the time of publication. The right is reserved to make changes

at any time without notice. Your engine will not contain all option codes listed.

RG, RG34710, 5004 -19-12MAY25-2/2

Record Aftertreatment Serial Numbers

Record numbers from equipped aftertreatment devices as shown on DPF (A and B), DOC (C and D), and SCR (E and F) serial number plates. Having these numbers recorded and kept in a safe location can aid in part ordering and assist in locating stolen items in case of theft.

DPF Part Number. _____

DPF Serial Number. _____

DOC Part Number. _____

DOC Serial Number. _____

SCR Part Number. _____

SCR Serial Number. _____

**A—Diesel Particulate Filter
Part Number**

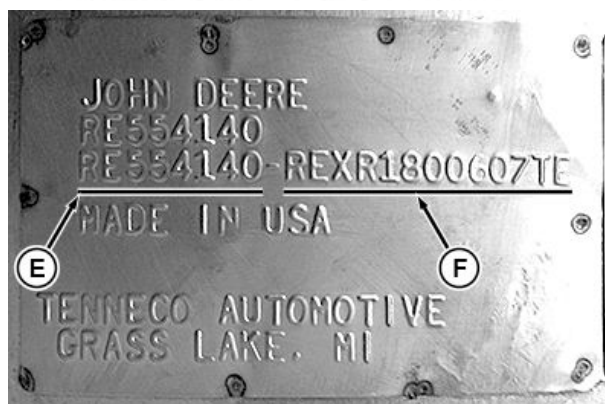
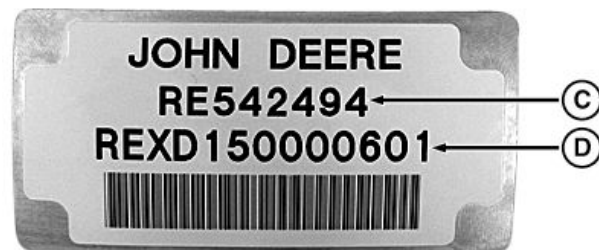
**B—Diesel Particulate Filter
Serial Number**

**C—Diesel Oxidation Catalyst
Part Number**

**D—Diesel Oxidation Catalyst
Serial Number**

**E—Selective Catalyst
Reduction Part Number**

**F—Selective Catalyst
Reduction Serial Number**



RG20010—UN—11FEB11

RG24024—UN—05AUG13

Serial Number Plates for Aftertreatment

AT89373,0000F51 -19-23NOV15-1/1

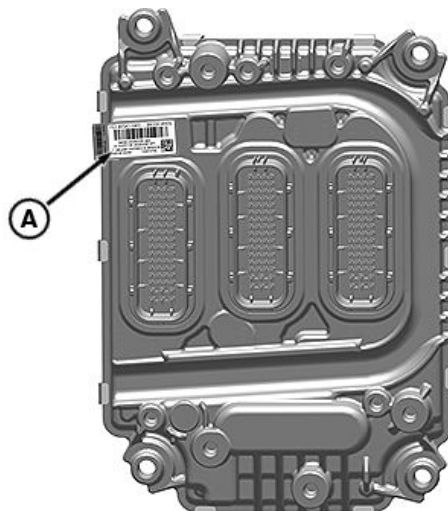
Record ECU Serial Number

Record the part number and serial number information found on the serial number label on the engine control unit (ECU) (A) mounted on left side of the engine.

Part No. _____

Serial No. _____

A—Serial Number Label



Record Engine Control Unit (ECU) Serial Number

KP41357,0000089 -19-20JAN21-1/1

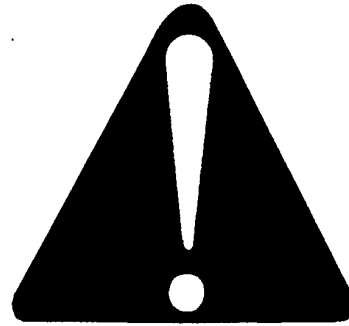
RG32669—UN—23JUN20

Safety

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.



T81388 —UN—28JUN13

DX,ALERT -19-03OCT22-1/1

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.



TS187 —19—30SEP88

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

Follow Safety Instructions

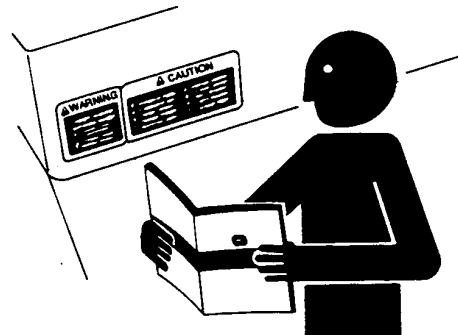
Carefully read all safety messages in this manual and on your machine safety signs. Keep safety signs in good condition. Replace missing or damaged safety signs. Be sure new equipment components and repair parts include the current safety signs. Replacement safety signs are available from your John Deere 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.

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



TS201 —UN—15APR13

DX,READ -19-01AUG22-1/1

Replace Safety Signs

Replace missing or damaged safety signs. Use this operator's manual for correct safety sign placement.

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

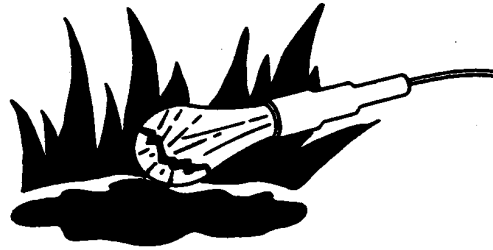


TS201 —UN—15APR13

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

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.



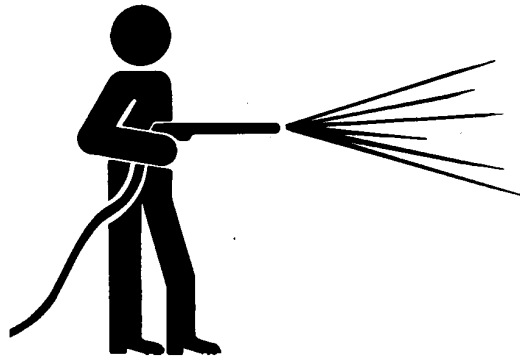
TS223 —UN—23AUG88

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

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

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 —JUN—08NOV89

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

Live With Safety

Before returning machine to customer, make sure machine is functioning properly, especially the safety systems. Install all guards and shields.



TS231 —19—07OCT88

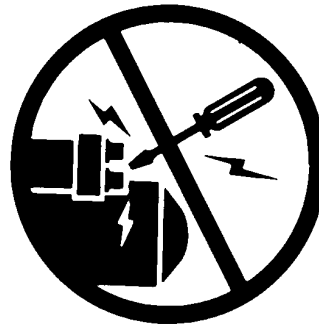
DX,LIVE -19-25SEP92-1/1

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 —JUN—11JAN89

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

Handle Fuel Safely—Avoid Fires

Handle fuel with care: it is highly flammable. Do not refuel the machine while smoking or when near open flame or sparks.

Always stop engine before refueling machine. Fill fuel tank outdoors.

Prevent fires by keeping machine clean of accumulated trash, grease, and debris. Always clean up spilled fuel.

Use only an approved fuel container for transporting flammable liquids.

Never fill fuel container in pickup truck with plastic bed liner. Always place fuel container on ground before refueling. Touch fuel container with fuel dispenser nozzle before removing can lid. Keep fuel dispenser nozzle in contact with fuel container inlet when filling.



Do not store fuel container where there is an open flame, spark, or pilot light such as within a water heater or other appliance.

DX,FIRE1 -19-12OCT11-1/1

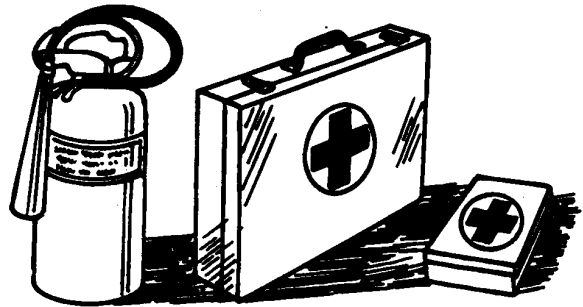
TS202 —UN—23AUG88

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.



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

TS291 —UN—15APR13

Handle Starting Fluid Safely

Starting fluid is highly flammable.

Keep all sparks and flame away when using it. Keep starting fluid away from batteries and cables.

To prevent accidental discharge when storing the pressurized can, keep the cap on the container, and store in a cool, protected location.

Do not incinerate or puncture a starting fluid container.

Do not use starting fluid on an engine equipped with glow plugs or an air intake heater.



DX,FIRE3 -19-14MAR14-1/1

TS1356 —UN—18MAR92

In Case of Fire

CAUTION: Avoid personal injury.

Stop machine immediately at the first sign of fire. Fire may be identified by the smell of smoke or sight of flames. Because fire grows and spreads rapidly, get off the machine immediately and move safely away from the fire. Do not return to the machine! The number one priority is safety.

Call the fire department. A portable fire extinguisher can put out a small fire or contain it until the fire department arrives; but portable extinguishers have limitations. Always put the safety of the operator and bystanders first. If attempting to extinguish a fire, keep your back to the wind with an unobstructed escape path so you can move away quickly if the fire cannot be extinguished.

Read the fire extinguisher instructions and become familiar with their location, parts, and operation before a fire starts. Local fire departments or fire equipment distributors may offer fire extinguisher training and recommendations.

If your extinguisher does not have instructions, follow these general guidelines:



1. Pull the pin. Hold the extinguisher with the nozzle pointing away from you, and release the locking mechanism.
2. Aim low. Point the extinguisher at the base of the fire.
3. Squeeze the lever slowly and evenly.
4. Sweep the nozzle from side-to-side.

DX,FIRE4 -19-22AUG13-1/1

TS227—UN—15APR13

Handle Fluids Safely—Avoid Fires

When you work around fuel, do not smoke or work near heaters or other fire hazards.

Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.

Make sure machine is clean of trash, grease, and debris.

Do not store oily rags; they can ignite and burn spontaneously.



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

TS227—UN—15APR13

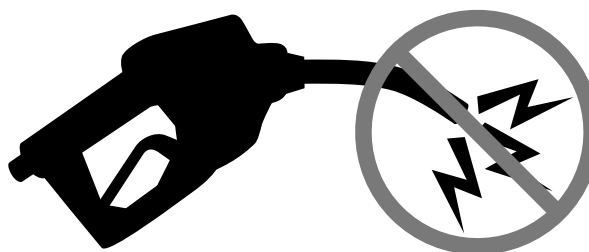
Avoid Static Electricity Risk When Refueling

The removal of sulfur and other compounds in Ultra-Low Sulfur Diesel (ULSD) fuel decreases its conductivity and increases its ability to store a static charge.

Refineries may have treated the fuel with a static dissipating additive. However, there are many factors that can reduce the effectiveness of the additive over time.

Static charges can build up in ULSD fuel while it is flowing through fuel delivery systems. Static electricity discharge when combustible vapors are present could result in a fire or explosion.

Therefore, it is important to ensure that the entire system used to refuel your machine (fuel supply tank, transfer pump, transfer hose, nozzle, and others) is properly grounded and bonded. Consult with your fuel or fuel system supplier to ensure that the delivery system is in compliance with fueling standards for proper grounding and bonding practices.



RG22142 —UN—17MAR14

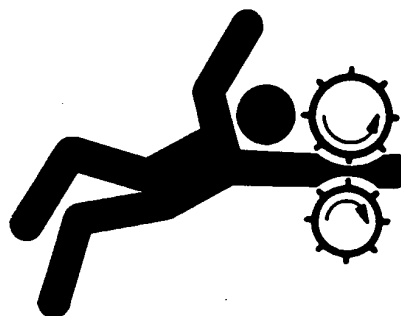
RG21992 —UN—21AUG13

DX,FUEL,STATIC,ELEC -19-12JUL13-1/1

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.



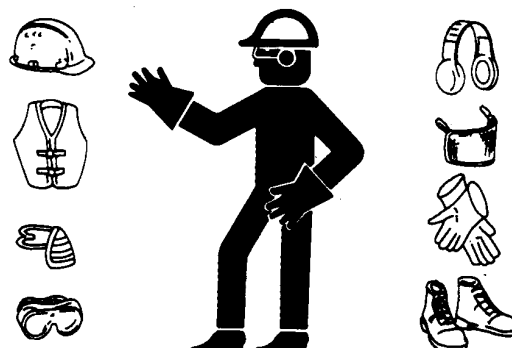
TS228 —UN—23AUG88

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

Wear Protective Clothing

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

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



TS206 —UN—15APR13

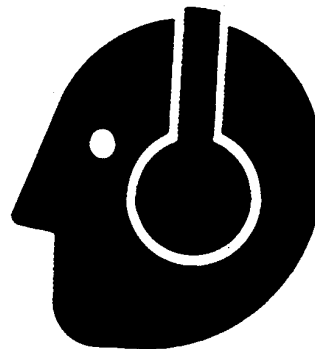
DX,WEAR2 -19-03MAR93-1/1

Protect Against Noise

There are many variables that affect the sound level range, including machine configuration, condition and maintenance level of the machine, ground surface, operating environmental, duty cycles, ambient noise, and attachments.

Exposure to loud noise can cause impairment or loss of hearing.

Always wear hearing protection. Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.



DX,NOISE -19-03OCT17-1/1

TS207 —UN—23AUG88

Handling Batteries Safely

Battery gas can explode. Keep sparks and flames away from batteries. Use a flashlight to check battery electrolyte level.

Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.

Always remove grounded (-) battery clamp first and replace grounded clamp last.

Sulfuric acid in battery electrolyte is poisonous and strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.

Avoid hazards by:

- Filling batteries in a well-ventilated area
- Wearing eye protection and rubber gloves
- Avoiding use of air pressure to clean batteries
- Avoiding breathing fumes when electrolyte is added
- Avoiding spilling or dripping electrolyte
- Using correct battery booster or charger procedure.

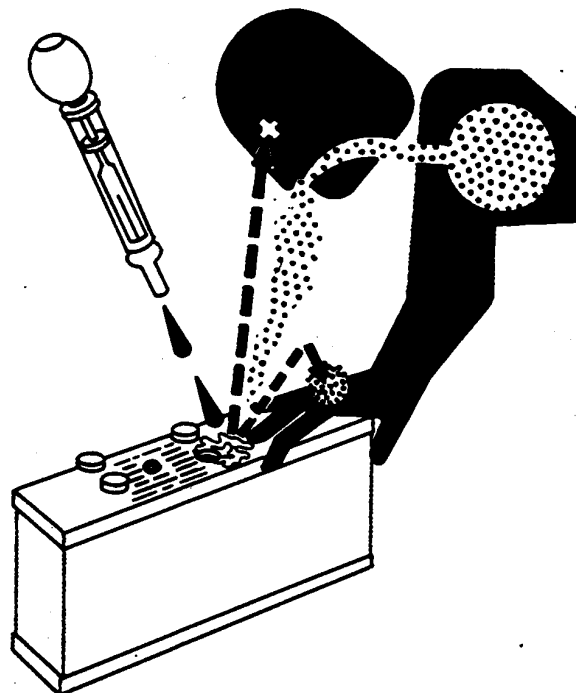
If acid is spilled on skin or in eyes:

1. Flush skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. Flush eyes with water for 15—30 minutes. Get medical attention immediately.

If acid is swallowed:

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

WARNING: Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. **Wash hands after handling.**



DX,VV,BATTERIES -19-02DEC10-1/1

TS203 —UN—23AUG88

Prevent Acid Burns

Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.

Avoid the hazard by:

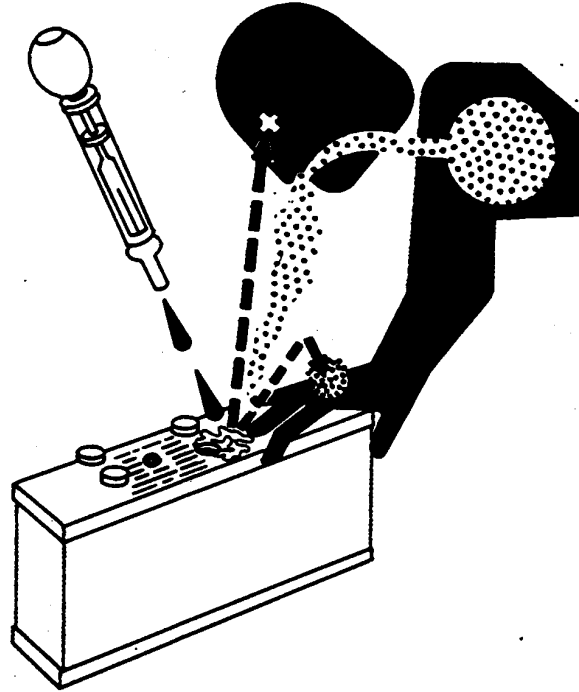
1. Filling batteries in a well-ventilated area.
2. Wearing eye protection and rubber gloves.
3. Avoiding breathing fumes when electrolyte is added.
4. Avoiding spilling or dripping electrolyte.
5. Use proper jump start procedure.

If you spill acid on yourself:

1. Flush your skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. Flush your eyes with water for 15—30 minutes. Get medical attention immediately.

If acid is swallowed:

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



TS203 —UN—23AUG88

DX,POISON -19-21APR93-1/1

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

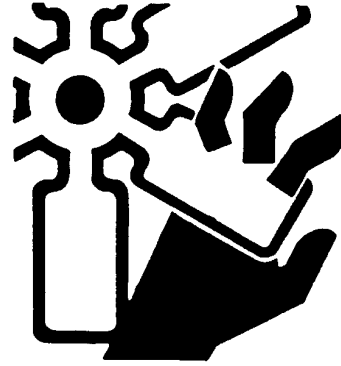
DX,ROTATING -19-18AUG09-1/1

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

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 away 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.

Falling while cleaning or working at height can cause serious injury. Use a ladder or platform to easily reach each location. Use sturdy and secure footholds and handholds.



TS218 —UN—23AUG88

DX, SERV -19-28FEB17-1/1

Remove Paint Before Welding or Heating

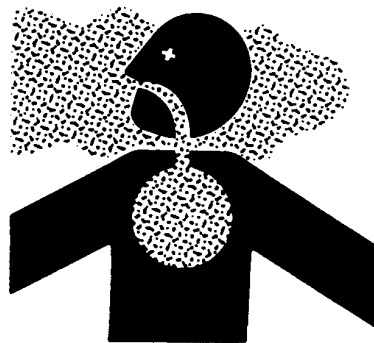
Avoid potentially toxic fumes and dust.

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.



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

TS220 —UN—15APR13

Avoid Heating Near Pressurized Fluid Lines

Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders. Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials. Pressurized lines can accidentally burst when heat goes beyond the immediate flame area.



DX,TORCH -19-10DEC04-1/1

TS953 —UN—15MAY90

Avoid High-Pressure Fluids

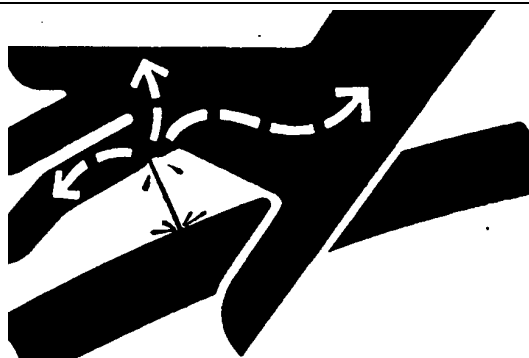
Inspect hydraulic hoses periodically—at least once per year—for leakage, kinking, cuts, cracks, abrasion, blisters, corrosion, exposed wire braid or any other signs of wear or damage.

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.



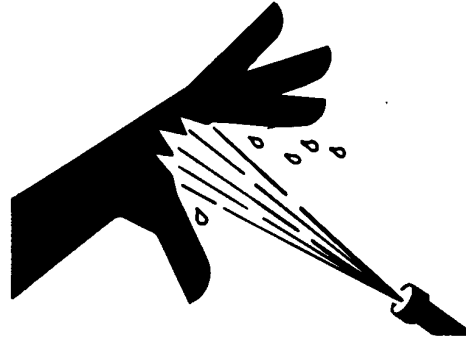
In case of accidental skin injection, seek immediate surgical treatment.

DX,FLUID -19-05NOV25-1/1

X9811 —UN—23AUG88

Do Not Open High-Pressure Fuel System

High-pressure fluid remaining in fuel lines can cause serious injury. Only technicians familiar with this type of system should perform repairs. Do not disconnect or attempt repair of fuel lines, sensors, or any other components between the high-pressure fuel pump and nozzles on engines with High Pressure Common Rail (HPCR) fuel system.



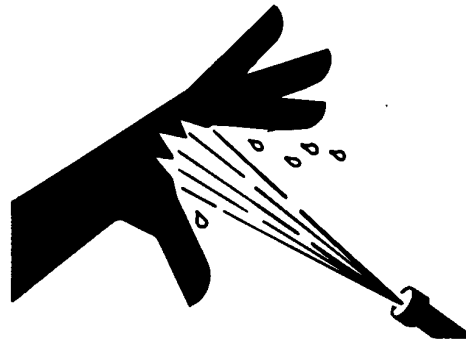
TS1343—UN—18MAR92

DX,WW,HPCR1 -19-07,JAN03-1/1

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.



TS1343—UN—18MAR92

DX,SPRAY -19-04NOV25-1/1

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).



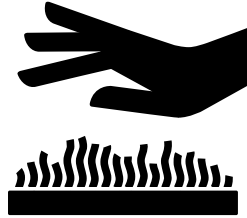
TS204—UN—15APR13

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

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.



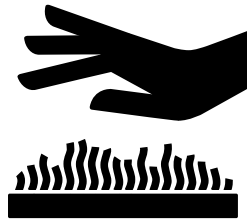
RG17488 —UN—21AUG09

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

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.



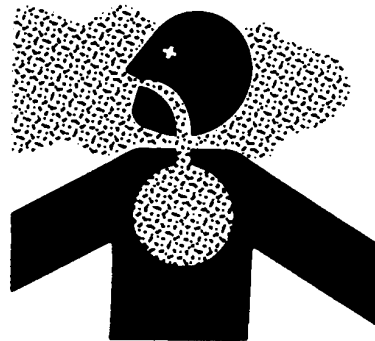
RG17488 —UN—21AUG09

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

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

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.



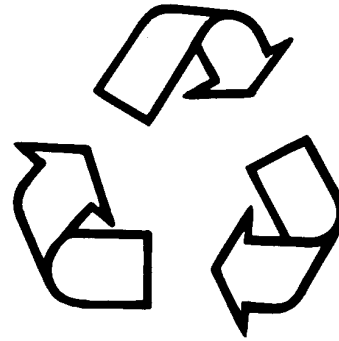
TS281—JUN—15APR13

DX,WW,COOLING -19-19AUG09-1/1

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—JUN—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

Fuels, Lubricants, and Coolant

Diesel Exhaust Fluid (DEF) — Use in Selective Catalytic Reduction (SCR) Equipped Engines

In order to maintain the emissions performance of the engine, it is essential to use and refill DEF in accordance with the specification.

RG30211 —UN—08MAR18

Diesel exhaust fluid (DEF) is a high purity liquid that is injected into the exhaust system of engines equipped with selective catalytic reduction (SCR) systems. Maintaining the purity of DEF is important to avoid malfunctions in the SCR system. Engines requiring DEF shall use a product that meets the requirements for aqueous urea solution 32 (AUS 32) according to ISO 22241-1.

The use of John Deere Diesel Exhaust Fluid is recommended. John Deere Diesel Exhaust Fluid is available at your John Deere dealer in a variety of package sizes to suit your operational needs.

If John Deere Diesel Exhaust Fluid is not available, use DEF that is certified by the American Petroleum Institute (API) Diesel Exhaust Fluid Certification Program or by the AdBlue™ Diesel Exhaust Fluid Certification Program. Look for the API certification symbol or the AdBlue™ name on the container.

AdBlue is a trademark of VDA, the German Association of the Automotive Industry.



In some cases, DEF is referred to by one or more of these names:

- Urea
- Aqueous Urea Solution 32
- AUS 32
- AdBlue™
- NOx Reduction Agent
- Catalyst Solution

DX_DEF -19-13JAN18-1/1

Storing Diesel Exhaust Fluid (DEF)

⚠ CAUTION: Avoid contact with eyes. In case of contact, immediately flush eyes with large amounts of water for a minimum of 15 minutes. Reference the Materials Safety Data Sheet (MSDS) for additional information.

Do not ingest DEF. In the event DEF is ingested, contact a physician immediately. Reference the Materials Safety Data Sheet (MSDS) for additional information.

IMPORTANT: It is unlawful to tamper with or remove any component of the aftertreatment system. Do not use DEF that does not meet the required specifications or operate the engine with no DEF.

Never attempt to create DEF by mixing agricultural grade urea with water. Agricultural grade urea does not meet the necessary specifications and can damage the aftertreatment system.

Do not add any chemicals or additives to DEF in an effort to prevent freezing. Any chemicals or additives added to DEF can damage the aftertreatment system.

Never add water or any other fluid in place of, or in addition to DEF. Operating with a modified DEF or using an unapproved DEF can damage the aftertreatment system.

Storage information provided below is for reference and is to be used as a guideline only.

It is preferred to store DEF out of extreme ambient temperatures. DEF freezes at -11°C (12°F). Exposure to temperatures greater than 30°C (86°F) can degrade DEF over time. Do not store DEF in direct sunlight.

Dedicated DEF storage containers shall be sealed between uses to prevent evaporation and contamination. Containers made of polyethylene, polypropylene, or stainless steel are recommended to transport and store DEF.

Ideal conditions for storage of DEF are:

- Store at temperatures between -5°C and 30°C (23°F and 86°F)
- Store in dedicated containers sealed to avoid contamination and evaporation

Under these conditions, DEF is expected to remain useable for a minimum of 18 months. Storing DEF at higher temperatures can reduce its useful life by approximately 6 months for every 5°C (9°F) temperature above 30°C (86°F).

If unsure how long or under what conditions DEF has been stored, test DEF. See Testing Diesel Exhaust Fluid (DEF).

Long-term storage in the DEF tank (over 12 months) is not recommended. If long-term storage is necessary, test DEF prior to operating engine. See Testing Diesel Exhaust Fluid (DEF).

It is recommended to purchase DEF in quantities that will be consumed within 12 months.

DX,DEF,STORE -19-28AUG25-1/1

Refilling Diesel Exhaust Fluid (DEF) Tank

⚠ CAUTION: Avoid contact with eyes. In case of contact, immediately flush eyes with large amounts of water for a minimum of 15 minutes. Reference the Materials Safety Data Sheet (MSDS) for additional information.

Do not ingest DEF. In the event DEF is ingested, contact a physician immediately. Reference the Materials Safety Data Sheet (MSDS) for additional information.

IMPORTANT: Use only distilled water to rinse components that are used to deliver DEF. Tap water can contaminate DEF. If distilled water is not available, rinse with clean tap water, then thoroughly rinse with ample amounts of DEF.

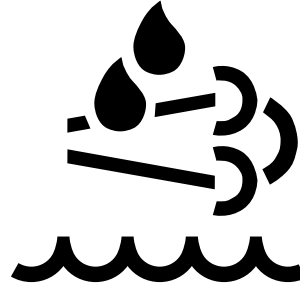
If DEF is spilled or contacts any surface other than the storage tank, immediately clean the surface with clear water. DEF is corrosive to painted and unpainted metallic surfaces and can distort some plastic and rubber components.

If DEF is filled into engine fuel tank or other fluid compartment, do not operate engine until system is properly purged of DEF. Contact your John Deere dealer or other service provider to drain and clean the system.

Reasonable care should be taken when refilling the DEF tank. Ensure that the DEF tank cap area is free of debris before removing the cap. Seal containers of DEF between use to prevent contamination and evaporation.

Avoid splashing DEF and do not allow DEF to come into contact with skin, eyes, or mouth.

DEF is not harmful to handle, but DEF can be corrosive to materials such as steel, iron, zinc, nickel, copper,



aluminum, and magnesium. Use suitable containers to transport and store DEF. Containers made of polyethylene, polypropylene, or stainless steel are recommended.

Avoid prolonged contact with skin. In case of accidental contact, wash skin immediately with soap and water.

Keep anything used to store or dispense DEF clean of dirt and dust. Wash and rinse containers or funnels thoroughly with distilled water to remove contaminants.

If an unapproved fluid, such as diesel fuel or coolant is added to the DEF tank, drain tank, flush with distilled water and refill with new or good DEF. See Testing Diesel Exhaust Fluid (DEF).

If water has been added to the DEF tank, a tank cleaning is necessary. See Cleaning DEF Tank in this manual. After refilling the tank, check the DEF concentration. See Testing Diesel Exhaust Fluid (DEF).

The operator shall maintain appropriate DEF levels at all times. Check the DEF level daily and refill the tank as needed. The filling port is identified by a blue colored cap embossed with the following DEF symbol.

DX,DEF,REFILL -19-28AUG25-1/1

TS1731 —UN—23AUG13

Testing Diesel Exhaust Fluid (DEF)

IMPORTANT: Using DEF with the correct concentration is critical to engine and aftertreatment system performance. Extended storage and other conditions can adversely alter the DEF concentration.

If DEF quality is questionable, draw a sample out of the DEF tank or storage tank into a clear container. DEF shall be crystal clear with a light ammonia smell. If DEF appears cloudy, has a colored tint, or has a profound ammonia smell, it is likely not within specification. DEF in this condition should not be used. Drain tank, flush with distilled water and refill with new or good DEF. After refilling the tank, check the DEF concentration.

If the DEF passes the visual and smell test, check the DEF concentration with a handheld refractometer calibrated to measure DEF.

DEF concentration should be checked when the engine has been stored for extended periods, or if there is

suspicion the engine or packaged DEF fluid has been contaminated with water.

Two tools are available from your John Deere through the SERVICEGARD special tool program:

- JDG11594 Digital DEF Refractometer—A digital tool providing an easy to read concentration measurement
- JDG11684 DEF Refractometer—Low-cost alternative tool providing an analog reading

Follow instructions included with either tool to obtain the measurement.

The correct DEF concentration is 31.8—33.2% urea. If the DEF concentration is not within specification, drain the DEF tank, flush with distilled water and fill with new or good DEF. If packaged DEF is not within specification, dispose of DEF packages and replace with new or good DEF.

DX,DEF,TEST -19-28AUG25-1/1

Disposal of Diesel Exhaust Fluid (DEF)

Although there is little issue with minor spillage of DEF on the ground, large amounts of DEF should be contained. If large spills occur, contact local environmental authorities for assistance with clean-up.

If a substantial quantity of DEF is not within specification, contact the DEF supplier for assistance with disposal. Do

not dump substantial quantities of DEF onto the ground or send DEF to wastewater treatment facilities.

DX,DEF,DISPOSE -19-13JUN13-1/1

Diesel Fuel

Consult your local fuel distributor for properties of the diesel fuel available in your area.

In general, diesel fuels are blended to satisfy the low temperature requirements of the geographical area in which they are marketed.

Diesel fuels specified to EN 590 or ASTM D975 are recommended. Renewable diesel fuel produced by hydrotreating animal fats and vegetable oils is basically identical to petroleum diesel fuel. Renewable diesel that meets EN 590, ASTM D975, or EN 15940 is acceptable for use at all percentage mixture levels.

Required Fuel Properties

In all cases, the fuel shall meet the following properties:

Cetane number of 40 minimum. Cetane number greater than 47 is preferred, especially for temperatures below -20°C (-4°F) or elevations above 1675 m (5500 ft.).

Cloud Point should be below the expected lowest ambient temperature or **Cold Filter Plugging Point (CFPP)** should be a maximum 10°C (18°F) below the fuel cloud point.

Fuel lubricity should pass a maximum scar diameter of 0.52 mm as measured by ASTM D6079 or ISO 12156-1. A maximum scar diameter of 0.45 mm is preferred.

Diesel fuel quality and sulfur content shall comply with all existing emissions regulations for the area in which the engine operates. DO NOT use diesel fuel with sulfur content greater than 10 000 mg/kg (10 000 ppm).

Materials such as copper, lead, zinc, tin, brass and bronze should be avoided in fuel handling, distribution and storage equipment as these metals can catalyze fuel oxidation reactions which can lead to fuel system deposits and plugged fuel filters.

E-Diesel fuel

DO NOT use E-Diesel (Diesel fuel and ethanol blend). Use of E-Diesel fuel in any John Deere machine may void the machine warranty.

 **CAUTION: Avoid severe injury or death due to the fire and explosion risk from using E-Diesel fuel.**

¹ See DX, ENOIL12, OEM, DX, ENOIL12, T2, STD, or DX, ENOIL12, T2, EXT for more information on Engine Oil and Filter Service Intervals.

Sulfur Content for Interim Tier 4, Final Tier 4, Stage III B, Stage IV, and Stage V Engines Above 560 kW

- Use ONLY diesel fuel with a maximum of 500 mg/kg (500 ppm) sulfur content.

Sulfur Content for Interim Tier 4, Final Tier 4, Stage III B, Stage IV Engines, and Stage V Engines

- Use ONLY ultra low sulfur diesel (ULSD) fuel with a maximum of 15 mg/kg (15 ppm) sulfur content.

Sulfur Content for Tier 3 and Stage III A Engines

- Use of diesel fuel with sulfur content less than 1000 mg/kg (1000 ppm) is RECOMMENDED.
- Use of diesel fuel with sulfur content 1000—2000 mg/kg (1000—2000 ppm) REDUCES the oil and filter change interval.
- BEFORE using diesel fuel with sulfur content greater than 2000 mg/kg (2000 ppm), contact your John Deere dealer.

Sulfur Content for Tier 2 and Stage II Engines

- Use of diesel fuel with sulfur content less than 2000 mg/kg (2000 ppm) is RECOMMENDED.
- Use of diesel fuel with sulfur content 2000—5000 mg/kg (2000—5000 ppm) REDUCES the oil and filter change interval.¹
- BEFORE using diesel fuel with sulfur content greater than 5000 mg/kg (5000 ppm), contact your John Deere dealer.

Sulfur Content for Other Engines

- Use of diesel fuel with sulfur content less than 5000 mg/kg (5000 ppm) is RECOMMENDED.
- Use of diesel fuel with sulfur content greater than 5000 mg/kg (5000 ppm) REDUCES the oil and filter change interval.

IMPORTANT: Do not mix used diesel engine oil or any other type of lubricating oil with diesel fuel.

Improper fuel additive usage may cause damage on fuel injection equipment of diesel engines.

Supplemental Diesel Fuel Additives

Diesel fuel can be the source of performance or other operational problems for many reasons. Some causes include poor lubricity, contaminants, low cetane number, and a variety of properties that cause fuel system deposits. These and others are referenced in other sections of this Operator's Manual.

To optimize engine performance and reliability, closely follow recommendations on fuel quality, storage, and handling, which are found elsewhere in this Operator's Manual.

To further aid in maintaining performance and reliability of the engine's fuel system, John Deere has developed a family of fuel additive products for most global markets. The primary products include Fuel-Protect Diesel Fuel Conditioner (full feature conditioner in winter and summer formulas) and Fuel-Protect Keep Clean (fuel injector deposit removal and prevention). Availability of these and other products varies by market. See your local John Deere dealer for availability and additional information about fuel additives that might be right for your needs.

DX,FUEL13 -19-07FEB14-1/1

Lubricity of Diesel Fuel

Most diesel fuels manufactured in the United States, Canada, and the European Union have adequate lubricity to ensure proper operation and durability of fuel injection system components. However, diesel fuels manufactured in some areas of the world may lack the necessary lubricity.

IMPORTANT: Make sure the diesel fuel used in your machine demonstrates good lubricity characteristics.

Fuel lubricity should pass a maximum scar diameter of 0.52 mm as measured by ASTM D6079 or ISO 12156-1. A maximum scar diameter of 0.45 mm is preferred.

If fuel of low or unknown lubricity is used, add John Deere Fuel-Protect Diesel Fuel Conditioner (or equivalent) at the specified concentration.

Lubricity of Biodiesel Fuel

Fuel lubricity can improve significantly with biodiesel blends up to B30 (30% biodiesel). Further increase in lubricity is limited for biodiesel blends greater than B30.

DX,FUEL5 -19-28AUG25-1/1

Handling and Storing Diesel Fuel

CAUTION: Reduce the risk of fire. Handle fuel carefully. **DO NOT** fill the fuel tank when engine is running. **DO NOT** smoke while you fill the fuel tank or service the fuel system.

Fill the fuel tank at the end of each day's operation to prevent water condensation and freezing during cold weather.

Keep all storage tanks as full as practical to minimize condensation.

Ensure that all fuel tank caps and covers are installed properly to prevent moisture from entering. Monitor water content of the fuel regularly.

When using biodiesel fuel, the fuel filter may require more frequent replacement due to premature plugging.

Check engine oil level daily prior to starting engine. A rising oil level may indicate fuel dilution of the engine oil.

IMPORTANT: The fuel tank is vented through the filler cap. If a new filler cap is required, always replace it with an original vented cap.

When fuel is stored for an extended period or if there is a slow turnover of fuel, add a fuel conditioner to stabilize the fuel. Keeping the free water drained and treating the bulk fuel storage tank quarterly with a maintenance dose of a biocide will prevent microbial growth.

DX,FUEL4 -19-01MAR25-1/1

Biodiesel Fuel

Biodiesel fuel is comprised of monoalkyl esters of long chain fatty acids derived from vegetable oils or animal fats. Biodiesel blends are biodiesel mixed with petroleum diesel fuel on a volume basis.

Before using fuel containing biodiesel, review the Biodiesel Use Requirements and Recommendations in this Operator's Manual.

Environmental laws and regulations can encourage or prohibit the use of biofuels. Operators should consult with appropriate governmental authorities prior to using biofuels.

John Deere Stage V Engines Operating in the European Union

Where the engine is to be operated within the Union on diesel or non-road gasoil, a fuel with a FAME content not greater than 8% volume/volume (B8) shall be used.

John Deere Engines with Exhaust Filter Except Stage V Engines Operating in the European Union

Biodiesel blends up to B30 can be used ONLY if the biodiesel (100% biodiesel or B100) meets ASTM D6751, EN 14214, or equivalent specification. Expect a 2% reduction in power and a 5% reduction in fuel economy when using B30.

Biodiesel concentrations above B30 can harm the engine's emission control systems and should not be used. Risks include, but are not limited to, more frequent stationary regeneration, soot accumulation, and increased intervals for ash removal.

John Deere Fuel conditioners or equivalents, which contain detergent and dispersant additives, are required when using biodiesel blends from B10 to B30, and are recommended when using lower biodiesel blends.

John Deere Engines Without Exhaust Filter

Biodiesel blends up to B30 can be used ONLY if the biodiesel (100% biodiesel or B100) meets ASTM D6751, EN 14214, or equivalent specification. Expect a 2% reduction in power and a 3% reduction in fuel economy when using B30.

These John Deere engines can operate on biodiesel blends above B30 (up to 100% biodiesel). Operate at levels above B30 ONLY if the biodiesel is permitted by law and meets the EN 14214 specification (primarily available in Europe). Engines operating on biodiesel blends above B30 might not fully comply with or be permitted by all applicable emissions regulations. Expect up to a 12% reduction in power and an 18% reduction in fuel economy when using 100% biodiesel.

John Deere fuel conditioners or equivalents, which contain detergent and dispersant additives, are required when using biodiesel blends from B10 to B100, and are recommended when using lower biodiesel blends.

Biodiesel Use Requirements and Recommendations

The petroleum diesel portion of all biodiesel blends shall meet the requirements of ASTM D975 (US) or EN 590 (EU) commercial standard.

Biodiesel users in the U.S. are strongly encouraged to purchase biodiesel blends from a BQ-9000 Certified Marketer and sourced from a BQ-9000 Accredited Producer (as certified by the National biodiesel Board). Certified Marketers and Accredited Producers can be found at the following website: <http://www.bq9000.org>.

Biodiesel contains residual ash. Ash levels exceeding the maximums allowed in either ASTM D6751 or EN14214 can result in more rapid ash loading and require more frequent cleaning of the Exhaust Filter (if present).

The fuel filter can require more frequent replacement when using biodiesel fuel, particularly if switching from diesel. Check engine oil level daily prior to starting engine. A rising oil level can indicate fuel dilution of the engine oil. Biodiesel blends up to B30 shall be used within 90 days of the date of biodiesel manufacture. Biodiesel blends above B30 shall be used within 45 days from the date of biodiesel manufacture.

When using biodiesel blends up to B30, the following shall be considered:

- Cold-weather flow degradation
- Stability and storage issues (moisture absorption, microbial growth)
- Possible filter restriction and plugging (usually a problem when first switching to biodiesel on used engines)
- Possible fuel leakage through seals and hoses (primarily an issue with older engines)
- Possible reduction of service life of engine components

Request a certificate of analysis from your fuel distributor to ensure that the fuel is compliant with the specifications provided in this Operator's Manual.

Consult your John Deere dealer for John Deere fuel products to improve storage and performance with biodiesel fuels.

The following shall also be considered if using biodiesel blends above B30:

- Possible coking or blocked injector nozzles, resulting in power loss and engine misfire if John Deere fuel additives and conditioners or equivalent containing detergent/dispersants are not used
- Possible crankcase oil dilution (requiring more frequent oil changes)
- Possible lacquering or seizure of internal components
- Possible formation of sludge and sediments
- Possible thermal oxidation of fuel at elevated temperatures

Continued on next page

DX,FUEL7 -19-11SEP25-1/2

- Possible compatibility issues with other materials (including copper, lead, zinc, tin, brass, and bronze) used in fuel handling, distribution, and storage equipment
- Possible reduction in water separator efficiency
- Possible damage to paint if exposed to biodiesel
- Possible corrosion of fuel injection equipment
- Possible elastomeric seal and gasket material degradation (primarily an issue with older engines)
- Possible high acid levels within fuel system

- Because biodiesel blends above B30 contain more ash, using blends above B30 can result in more rapid ash loading and require more frequent cleaning of the Exhaust Filter (if present)

IMPORTANT: Raw pressed vegetable oils are NOT acceptable for use as fuel in any concentration in John Deere engines. Their use could cause engine failure.

DX,FUEL7 -19-11SEP25-2/2

Testing Diesel Fuel

A fuel analysis program can help to monitor the quality of diesel fuel. The fuel analysis can provide critical data such as calculated cetane index, fuel type, sulfur content, water content, appearance, suitability for cold weather

operations, bacteria, cloud point, acid number, particulate contamination, and whether the fuel meets ASTM D975 or equivalent specification.

Contact your John Deere dealer or other service provider for diesel fuel analysis.

DX,FUEL6 -19-01MAR25-1/1

Fuel Filters

The importance of fuel filtration cannot be overemphasized with modern fuel systems. The combination of increasingly restrictive emission regulations and more efficient engines requires fuel system to operate at much higher pressures. Higher pressures can only be achieved using fuel injection components with very close tolerances. These close

manufacturing tolerances have significantly reduced capacities for debris and water.

John Deere brand fuel filters have been designed and produced specifically for John Deere engines.

To protect the engine from debris and water, always change engine fuel filters as specified in this manual.

DX,FILT2 -19-14APR11-1/1

Minimizing the Effect of Cold Weather on Diesel Engines

John Deere diesel engines are designed to operate effectively in cold weather.

However, for effective starting and cold-weather operation, a little extra care is necessary. The following information outlines steps that can minimize the effect that cold weather may have on starting and operation of your engine. See your John Deere or other service provider for additional information and local availability of cold-weather aids.

Use Winter Grade Fuel

When temperatures fall below 0°C (32°F), winter grade fuel (No. 1-D in North America) is best suited for cold-weather operation. Winter grade fuel has a lower cloud point and a lower pour point.

Cloud point is the temperature at which wax begins to form in the fuel. This wax causes fuel filters to plug. **Pour point** is the lowest temperature at which movement of the fuel is observed.

NOTE: On average, winter grade diesel fuel has a lower Btu (heat content) rating. Using winter grade fuel may reduce power and fuel efficiency, but should not cause any other engine performance effects. Check the grade of fuel being used before troubleshooting for low-power complaints in cold-weather operation.

Air Intake Heater

An air intake heater is an available option for some engines to aid cold weather starting.

Coolant Heater

An engine block heater (coolant heater) is an available option to aid cold weather starting.

Seasonal Viscosity Oil and Proper Coolant Concentration

Use seasonal grade viscosity engine oil based on the expected air temperature range between oil changes and a proper concentration of low silicate antifreeze as recommended. (See DIESEL ENGINE OIL and ENGINE COOLANT requirements in this section.)

Diesel Fuel Cold Flow Additive

Use John Deere Fuel-Protect Diesel Fuel Conditioner (winter formula), which contains anti-gel chemistry, or

equivalent fuel conditioner to treat non-winter grade fuel (No. 2-D in North America) during the cold-weather season. This generally extends operability to about 10°C (18°F) below the fuel cloud point. For operability at even lower temperatures, use winter grade fuel.

IMPORTANT: Treat fuel when outside temperature drops below 0°C (32°F). For best results, use with untreated fuel. Follow all recommended instructions on label.

Biodiesel

When operating with biodiesel blends, wax formation can occur at warmer temperatures. Begin using John Deere Fuel-Protect Diesel Fuel Conditioner (winter formula) or equivalent at 5°C (41°F) to treat biodiesel fuels during the cold-weather season. Use B5 or lower blends at temperatures below 0°C (32°F). Use only winter grade petroleum diesel fuel at temperatures below -10°C (14°F).

Winterfronts

Use of fabric, cardboard, or solid winterfronts is not recommended with any John Deere engine. Their use can result in excessive engine coolant, oil, and charge air temperatures. This can lead to reduced engine life, loss of power and poor fuel economy. Winterfronts may also put abnormal stress on fan and fan drive components potentially causing premature failures.

If winterfronts are used, they should never totally close off the grill frontal area. Approximately 25% area in the center of the grill should remain open at all times. At no time should the air blockage device be applied directly to the radiator core.

Radiator Shutters

If equipped with a thermostatically controlled radiator shutter system, this system should be regulated in such a way that the shutters are completely open by the time the coolant reaches 93°C (200°F) to prevent excessive intake manifold temperatures. Manually controlled systems are not recommended.

If air-to-air aftercooling is used, the shutters shall be completely open by the time the intake manifold air temperature reaches the maximum allowable temperature out of the charge air cooler.

DX,FUEL10 -19-28AUG25-1/1

John Deere Break-In Plus™ Engine Oil — Interim Tier 4, Final Tier 4, Stage IIIB, Stage IV, and Stage V

New engines are filled at the factory with John Deere Break-In Plus™ Engine Oil. During the break-in period, add John Deere Break-In Plus™ Engine Oil, as needed to maintain the specified oil level.

Operate the engine under various conditions, particularly heavy loads with minimal idling, to help seat engine components properly.

During the initial operation of a new or rebuilt engine, change the oil and filter between a minimum of 100 hours and maximum equal to the interval specified for John Deere Plus-50™ II oil.

After engine overhaul, fill the engine with John Deere Break-In Plus™ Engine Oil.

If John Deere Break-In Plus™ Engine Oil is not available, use an SAE 10W-30 viscosity grade diesel engine oil meeting one of the following:

Break-In Plus is a trademark of Deere & Company
Plus-50 is a trademark of Deere & Company.

- API Service Category CK-4
- API Service Category CJ-4
- ACEA Oil Sequence E9
- ACEA Oil Sequence E6

If one of these oils is used during the initial operation of a new or rebuilt engine, change the oil and filter between a minimum of 100 hours and a maximum of 250 hours.

IMPORTANT: Do not use any other engine oils during the initial break-in of a new or rebuilt engine.

John Deere Break-In Plus™ Engine Oil can be used for all John Deere diesel engines at all emission certification levels.

After the break-in period, use John Deere Plus-50™ II or other diesel engine oil as recommended in this manual.

DX,ENOIL16 -19-13JAN18-1/1

Diesel Engine Oil — Interim Tier 4, Final Tier 4, Stage IIIB, Stage IV, and Stage V

Failure to follow applicable oil standards and drain intervals can result in severe engine damage that might not be covered under warranty. Warranties, including the emissions warranty, are not conditioned on the use of John Deere oils, parts, or service.

Use oil viscosity based on the expected air temperature range during the period between oil changes.

John Deere Plus-50™ II is the recommended engine oil.

Extended service intervals may apply when John Deere Plus-50™ II engine oil is used. Refer to the engine oil drain interval table and consult your John Deere dealer for more information.

If John Deere Plus-50™ II engine oil is not available, engine oil meeting one or more of the following may be used:

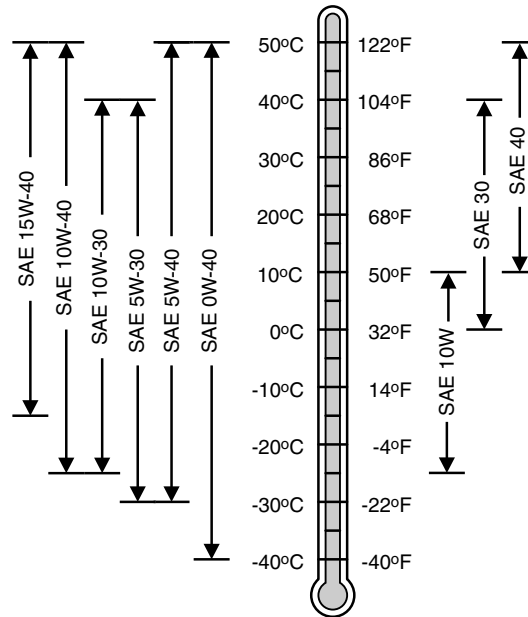
- API Service Category CK-4
- API Service Category CJ-4
- ACEA Oil Sequence E9
- ACEA Oil Sequence E6

DO NOT use engine oil containing more than 1.0% sulfated ash, 0.12% phosphorus, or 0.4% sulfur.

Multi-viscosity diesel engine oils are preferred.

Diesel fuel quality and fuel sulfur content must comply with all existing emissions regulations for the area in which the engine operates.

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Oil Viscosities for Air Temperature Ranges

IMPORTANT: Use only ultra low sulfur diesel (ULSD) fuel with a maximum sulfur content of 15 mg/kg (15 ppm).

TS1743 —UN—25APR19

DX,ENOIL14 -19-23APR19-1/1

Diesel Engine Oil and Filter Service Intervals — Interim Tier 4, Final Tier 4, Stage IIIB, Stage IV, and Stage V— OEM Applications

Failure to follow applicable oil standards and drain intervals can result in severe engine damage that might not be covered under warranty. Warranties, including the emissions warranty, are not conditioned on the use of John Deere oils, parts, or service.

Recommended oil and filter service intervals are based on a combination of oil pan capacity, type of engine oil and filter used, and sulfur content of the diesel fuel. Actual service intervals also depend on operation and maintenance practices.

Approved Oil Types

- John Deere Plus-50™ II
- “Other Oils” include API CK-4, API CJ-4, ACEA E9, and ACEA E6.

Use oil analysis to evaluate the condition of the oil and to aid in selection of the proper oil and filter service interval. Contact your John Deere dealer or other qualified service provider for more information on engine oil analysis.

Change the oil and oil filter at least once every 12 months even if the hours of operation are fewer than the otherwise recommended service interval.

Diesel fuel sulfur content affects engine oil and filter service intervals. Higher fuel sulfur levels reduce oil and filter service intervals.

Use of diesel fuel with sulfur content less than 15 mg/kg (15 ppm) is **REQUIRED**.

Engine operation at high altitude decreases oil change intervals. See Diesel Engine Oil Service Interval for Operation at High Altitude for additional information.

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NOTE: The 500-hour extended oil and filter change interval is only allowed if all of the following conditions are met:

- Engine equipped with an extended drain interval oil pan
- Use of diesel fuel with sulfur content less than 15 mg/kg (15 ppm)
- Use of John Deere Plus-50™ II oil
- Use of an approved John Deere oil filter

IMPORTANT: To avoid engine damage:

- Reduce oil and filter service intervals by 50% when using biodiesel blends greater than B20. Oil analysis may allow longer service interval
- Use only approved oil types

Engine Oil and Filter Service Intervals		
	Oil Pan Size (L/kW)	
	Greater than or equal to 0.10	Greater than or equal to 0.12
John Deere Plus-50™ II	375 hours	500 hours
Other Oils	250 hours	250 hours

Oil analysis may extend the service interval of “Other Oils” to a maximum not to exceed the interval of Plus-50™ II oils. Oil analysis means taking a series of oil samples at 50-hour increments beyond the normal service interval until either the data indicates the end of useful oil life or the maximum service interval of John Deere Plus-50 II oils is reached.

DX,ENOIL15,IT4,OEM -19-13JAN18-1/1

Diesel Engine Oil and Filter Service Intervals

Power Rating kW (hp)	Fuel Sulfur Content	Oil Pan Option Codes	
		1920	
		Other Oils	John Deere Plus-50 II
317 (425)	≤15 ppm	250 hours	500 hours
298 (400)	≤15 ppm	250 hours	500 hours
280 (375)	≤15 ppm	250 hours	500 hours
261 (350)	≤15 ppm	250 hours	500 hours
242 (325)	≤15 ppm	250 hours	500 hours
224 (300)	≤15 ppm	250 hours	500 hours
205 (275)	≤15 ppm	250 hours	500 hours
187 (250)	≤15 ppm	250 hours	500 hours

CM22194,0000A92 -19-15JUN21-1/1

Mixing of Lubricants

In general, avoid mixing different brands or types of oil. Oil manufacturers blend additives in their oils to meet certain specifications and performance requirements.

Mixing different oils can interfere with the proper functioning of these additives and degrade lubricant performance.

DX,LUBMIX -19-18MAR96-1/1

Lubricant Storage

Your equipment can operate at top efficiency only when clean lubricants are used.

Use clean containers to handle all lubricants.

Store lubricants and containers in an area protected from dust, moisture, and other contamination. Store containers on their side to avoid water and dirt accumulation.

Make certain that all containers are properly marked to identify their contents.

Properly dispose of all old containers and any residual lubricant they may contain.

DX,LUBST -19-11APR11-1/1

Oil Filters

Filtration of oils is critically important for proper operation and lubrication. John Deere brand oil filters have been designed and produced specifically for John Deere applications.

John Deere filters adhere to engineering specifications for quality of the filter media, filter efficiency rating, strength

of the bond between the filter media and the element end cap, fatigue life of the canister (if applicable), and pressure capability of the filter seal. Non-John Deere branded oil filters might not meet these key John Deere specifications.

Always change oil filters regularly as specified in this manual.

DX,FILT1 -19-11APR11-1/1

Diesel Engine Coolant (engine with wet sleeve cylinder liners)

Failure to follow applicable coolant standards and drain intervals can result in severe engine damage that may not be covered under warranty. Warranties, including the emissions warranty, are not conditioned on the use of John Deere coolants, parts, or service.

Preferred Coolants

The following pre-mix engine coolants are preferred:

- John Deere COOL-GARD™ II
- John Deere COOL-GARD II PG

COOL-GARD II pre-mix coolant is available in several concentrations with different freeze protection limits as shown in the following table.

COOL-GARD II Pre-Mix	Freeze Protection Limit
COOL-GARD II 20/80	-9°C (16°F)
COOL-GARD II 30/70	-16°C (3°F)
COOL-GARD II 50/50	-37°C (-34°F)
COOL-GARD II 55/45	-45°C (-49°F)
COOL-GARD II PG 60/40	-49°C (-56°F)
COOL-GARD II 60/40	-52°C (-62°F)

Not all COOL-GARD II pre-mix products are available in all countries.

Use COOL-GARD II PG when a non-toxic coolant formulation is required.

Additional Recommended Coolants

The following engine coolant is also recommended:

- John Deere COOL-GARD II Concentrate in a 40—60% mixture of concentrate with quality water.

IMPORTANT: When mixing coolant concentrate with water, do not use less than 40% or greater than 60% concentration of coolant. Less than 40% gives inadequate additives for corrosion protection. Greater than 60% can result in coolant gelation and cooling system problems.

Other Coolants

Other ethylene glycol or propylene glycol base coolants may be used if they meet the following specification:

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¹Coolant analysis may extend the service interval of other "Coolants" to a maximum not to exceed the interval of Cool-Gard II coolants. Coolant analysis means taking a series of coolant samples at 1000 hour increments beyond the normal service interval until either the data indicate the end of useful coolant life or the maximum service interval of Cool-Gard II is reached.

- Pre-mix coolant meeting ASTM D6210 requirements
- Is formulated with a 2-ethylhexanoic acid (2-EHA) free additive package
- Coolant concentrate meeting ASTM D6210 requirements in a 40—60% mixture of concentrate with quality water

If coolant meeting one of these specifications is unavailable, use a coolant concentrate or pre-mix coolant that has a minimum of the following chemical and physical properties:

- Provides cylinder liner cavitation protection according to either the John Deere Cavitation Test Method or a fleet study run at or above 60% load capacity
- Is formulated with a nitrite-free additive package
- Is formulated with a 2-ethylhexanoic acid (2-EHA) free additive package
- Protects the cooling system metals (cast iron, aluminum alloys, and copper alloys such as brass) from corrosion

Water Quality

Water quality is important to the performance of the cooling system. Deionized or demineralized water is recommended for mixing with ethylene glycol and propylene glycol base engine coolant concentrate.

Coolant Drain Intervals

Drain and flush the cooling system and refill with fresh coolant at the indicated interval, which varies with the coolant used.

When COOL-GARD II or COOL-GARD II PG is used, the drain interval is 6 years or 6000 hours of operation.

If a coolant other than COOL-GARD II or COOL-GARD II PG is used, reduce the drain interval to 2 years or 2000 hours of operation.¹

IMPORTANT: Do not use cooling system sealing additives or antifreeze that contains sealing additives.

Do not mix ethylene glycol and propylene glycol base coolants.

Do not use coolants that contain nitrites.

Water Quality for Mixing with Coolant Concentrate

Engine coolants are a combination of three chemical components: ethylene glycol (EG) or propylene glycol (PG) antifreeze, inhibiting coolant additives, and quality water.

Water quality is important to the performance of the cooling system. Deionized or demineralized water is recommended for mixing with ethylene glycol and propylene glycol base engine coolant concentrate.

All water used in the cooling system should meet the following minimum specifications for quality:

Chlorides	<40 mg/L
Sulfates	<100 mg/L
Total solids	<340 mg/L
Total dissolved l hardness	<170 mg/L
pH	5.5—9.0

IMPORTANT: Do not use bottled drinking water because it often contains higher concentrations of total dissolved solids.

Freeze Protection

The relative concentrations of glycol and water in the engine coolant determine its freeze protection limit.

Ethylene Glycol	Freeze Protection Limit
40%	-24°C (-12°F)
50%	-37°C (-34°F)
60%	-52°C (-62°F)
Propylene Glycol	Freeze Protection Limit
40%	-21°C (-6°F)
50%	-33°C (-27°F)
60%	-49°C (-56°F)

DO NOT use a coolant-water mixture greater than 60% ethylene glycol or 60% propylene glycol.

DX,COOL19 -19-13JAN18-1/1

Operating in Warm Temperature Climates

John Deere engines are designed to operate using recommended engine coolants.

Always use a recommended engine coolant, even when operating in geographical areas where freeze protection is not required.

IMPORTANT: Water may be used as coolant in emergency situations only.

Foaming, hot surface aluminum and iron corrosion, scaling, and cavitation occur when water is used as the coolant, even when coolant conditioners are added.

Drain cooling system and refill with recommended engine coolant as soon as possible.

DX,COOL6 -19-17FEB20-1/1

Testing Coolant Freeze Point

The use of a handheld coolant refractometer is the quickest, easiest, and most accurate method to determine coolant freeze point. This method is more accurate than a test strip or a float-type hydrometer which can produce poor results.

A coolant refractometer is available through your John Deere dealer under the SERVICEGARD™ tool program. Part number 75240 provides an economical solution to accurate freeze point determination in the field.

To use this tool:

1. Allow cooling system to cool to ambient temperatures.
2. Open radiator cap to expose coolant.
3. With the included dropper, collect a small coolant sample.
4. Open the lid of the refractometer, place one drop of coolant on the window and close the lid.
5. Look through the eyepiece and focus as necessary.
6. Record the listed freeze point for the type of coolant (ethylene glycol coolant or propylene glycol) being tested.



SERVICEGARD™ Part Number 75240

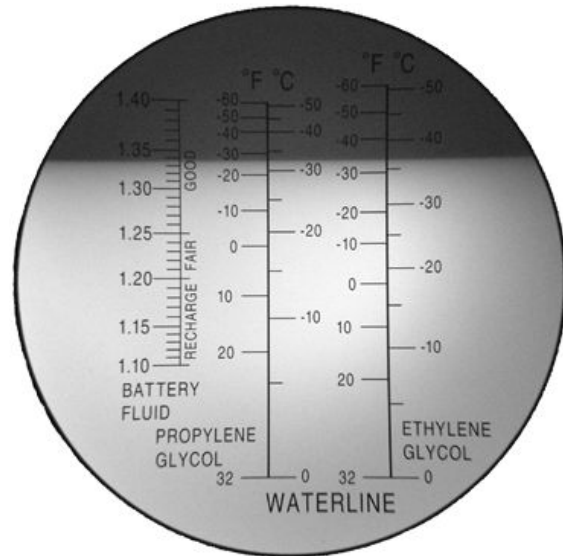


Image with a Drop of 50/50 Coolant Placed on the Refractometer Window

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DX,COOL,TEST -19-13JUN13-1/1

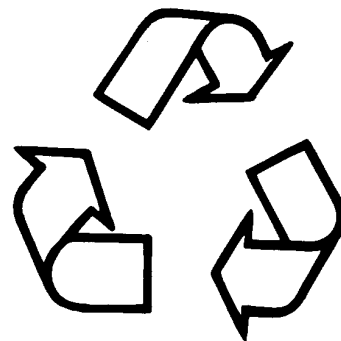
Disposing of Coolant

Improperly disposing of engine coolant can threaten the environment and ecology.

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.

Inquire on the proper way to recycle or dispose of waste from the local environmental or recycling center, or from a John Deere dealer, or engine distributor, or other service provider.



Recycle Waste

RG,RG34710,7543 -19-06NOV25-1/1

Instrument Panels

PV101 Instrument Panels

Interim tier 4 / Stage III B John Deere PowerTech OEM Engines have an electronic control system, which has the following controls and gauges as shown. The following information applies only to those controls and gauges supplied by John Deere. Refer to your engine application manual for specific guidelines if John Deere-sourced controls and instrumentation are not used.

NOTE: This manual only covers operation of engine with a John Deere control system.

Following is a brief description of the available optional electronic controls and gauges found on John Deere provided instrument panels. Refer to manufacturer's literature for information on controls not provided by Deere.

A—Diagnostic Gauge/Hour Meter

The diagnostic gauge (A) displays diagnostic trouble codes (DTCs) as they are accessed. Other information on the engine can be accessed using the touch keys (N, O, and P). The hour meter feature shows the operating hours of the engine and should be used as a guide for scheduling periodic maintenance. If the diagnostic gauge receives a trouble code from an engine control unit, the current display will switch to a warning or shutdown (depending on the severity of the code) screen that will display the trouble code number, the description of the code and the corrective action needed.

B—Tachometer

The tachometer (B) indicates engine speed in hundreds of revolutions per minute (rpm).

C—Voltmeter (Optional)

The voltmeter (C) indicates system battery voltage. The amber "Warning" light (Q) will illuminate when battery voltage is too low for proper operation of the fuel injection system.

D—Audible Alarm (Optional)

The audible alarm (D) will sound whenever low oil pressure, high coolant temperature, or water-in-fuel conditions exist. This includes all signals that light up the amber "WARNING" indicator (intermittent alarm) or the red "STOP ENGINE" indicator (steady alarm).

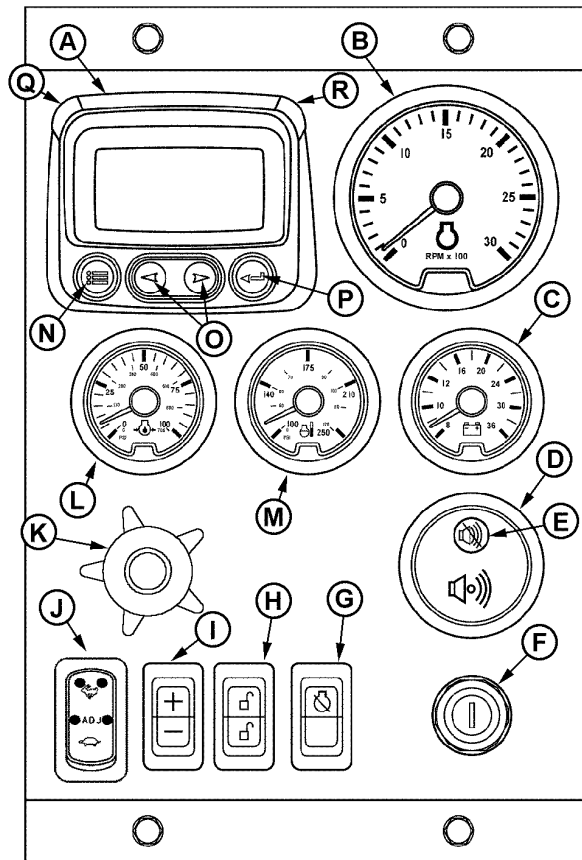
E—Audible Alarm Override Button

The optional audible alarm has an override button (E) that silences the audible alarm for approximately two minutes when pressed.

F—Key Start Switch

The three-position key start switch (F) controls the engine electrical system. From the "OFF" position when the key switch is turned clockwise to "START", the engine will crank. When the engine starts, the key is released and returns to the "ON" (RUN) position.

G—Override Shutdown Rocker Switch



Full-Featured Instrument Panel

- | | |
|-----------------------------------|---------------------------------------|
| A—Diagnostic Gauge/Hour Meter | J—High-Low Speed Select Rocker Switch |
| B—Tachometer | K—Analog Throttle Control (Optional) |
| C—Voltmeter (Optional) | L—Oil Pressure Gauge |
| D—Audible Alarm (Optional) | M—Coolant Temperature Gauge |
| E—Audible Alarm Override Button | N—Menu Key |
| F—Key Switch | O—Arrow Key (2 used) |
| G—Override Shutdown Rocker Switch | P—Enter Key |
| H—Bump Enable Rocker Switch | Q—Amber "WARNING" Indicator Light |
| I—Speed Select Rocker Switch | R—Red "STOP ENGINE" Indicator Light |

Switch will be present, but may not be active, depending on engine control unit (ECU) options originally selected. If switch is active, pressing the upper half of the override shutdown switch (G) will override an engine shutdown signal. The switch must be pressed within 30 seconds to prevent undesired shutdown of engine. Pressing this switch will override the ECU engine shutdown command for 30 seconds at a time to move vehicle to a safe location.

H—Bump Speed Enable Rocker Switch

Continued on next page

JR74534,00002C7 -19-16AUG21-1/2

This is a three-position switch (H) with the center position as "OFF" (locked). With this switch in the "OFF" position, the speed select switch (I) is also locked, to prevent accidental changes in operating speed. Pressing upper or lower half of switch (H) will unlock or enable the bump speed switch to take effect using speed select switch (I).

I—Speed Select Rocker Switch

The speed select switch (I) is used to bump engine speed up (+) or down (-) in small increments during operation. This switch must be used with the bump speed enable switch (H) in the unlocked position (top or bottom half of button depressed).

J—High-Low Speed Select Rocker Switch

The high-low speed select switch (J) is used to set the engine operating speeds at slow (turtle) or fast (rabbit). Factory preset idle speeds can also be adjusted using bump speed enable switch (H) with speed select switch (I).

The basic instrument panel will have the high-low speed select switch only. Press and hold up (+) or down (-) to adjust engine speed as desired. The engine speed selected will not be held in the memory. To adjust engine speeds, See Changing Engine Speeds in Section 20.

How To Select Preset Operating Speeds (Bump Speeds)

First select "Turtle" (slow) or "Adj" by pressing speed select switch (J) to "Turtle" (slow) or "Adj"(center). Then you can press either the upper or lower portion of the bump speed enable switch (H) to unlock the setting. The bump speed enable must be held down as the speed select switch (J) is used to change the setting by pressing (+) to increase speed or (-) to decrease speed.

Once the slow idle speed has been set, the bump speed enable **switch must be pressed and released three times within two seconds to commit the new operating speed to memory.** If not done, the engine's new speed will only be effective until the key switch is shut off. Then the speed will revert back to the previous setting.

The fast idle speed is not adjustable. It will always go back to the factory preset fast idle speed.

K—Analog Throttle Control (Optional)

The throttle control (K) is used to control engine speed. This control is available only on engines with analog throttle.

L—Engine Oil Pressure Gauge

The oil pressure gauge (L) indicates engine oil pressure. An audible alarm (D) warns the operator if engine oil pressure falls below a safe operating pressure.

M—Engine Coolant Temperature Gauge

The engine coolant temperature gauge (M) indicates engine coolant temperature. An audible alarm (D) warns the operator if coolant temperature rises above the preset safe operating temperature.

N—Menu Key

The menu key is pressed to either enter or exit the menu screens on the diagnostic gauge (A).

O—Arrow Keys

Use the arrow keys (O) to change the display on the window of the diagnostic gauge (A) and to access engine performance data.

Pressing the left arrow to scroll to the left or upward or the right arrow to scroll to the right or downward. This will allow you to view various engine parameters and any diagnostic trouble codes that occur.

Refer to the following procedure for accessing engine information on the diagnostic gauge using the touch keys.

P—Enter Key

The enter key (P) is pressed to select the parameter that is highlighted on the screen.

Q—Amber "WARNING" Indicator Light

When light is illuminated, an abnormal condition exists. It is not necessary to shut down the engine immediately, but the problem should be corrected as soon as possible.

R—Red "STOP ENGINE" Indicator Light

When light is illuminated, stop engine immediately or as soon as safely possible to prevent engine damage. Correct problem before restarting.

JR74534,00002C7 -19-16AUG21-2/2

PV101 Diagnostic Gauge — Using

The diagnostic gauge (A) allows the operator to monitor engine functions, view diagnostic trouble codes (DTC's), and perform preliminary diagnostics. The gauge is linked to the electronic control system and sensors.

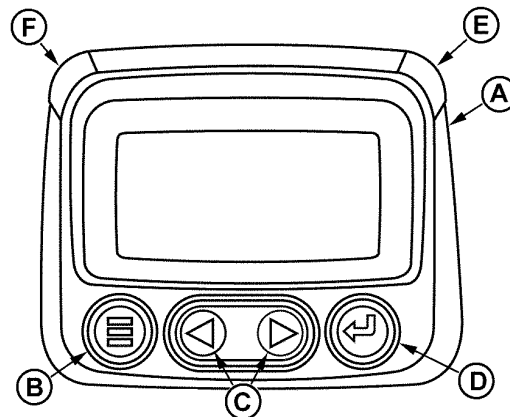
The menu key (B) allows the operator to access the main menu of the diagnostic gauge. For more information see [PV101 Diagnostic Gauge — Main Menu](#). This key also allows the operator to cancel an option and go back to the previous menu or home menu.

The arrow keys (C) allows the operator to scroll between menu items. The arrow keys automatically change from up and down, to left and right depending on the menu item to be selected.

The select key (D) allows the operator to access menu items selected by the arrow keys (C) and confirm changes made by the operator.

The red "STOP ENGINE" indicator light (E) allows the operator to visually see when a condition exists which requires immediate operator action and service.

The amber "WARNING" indicator light (F) allows the operator to visually see when a condition exists which requires operator action.



A—Diagnostic Gauge
B—Menu Key
C—Arrow Keys

D—Select Key
E—Red "STOP ENGINE"
Indicator Light
F—Amber "WARNING"
Indicator Light

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PV101 Diagnostic Gauge — Main Menu

NOTE: The engine does not need to be running to navigate the diagnostic gauge screens.

The main menu is the starting point in accessing engine information and configuring the diagnostic gauge. Press the menu key (B) to access the main menu.

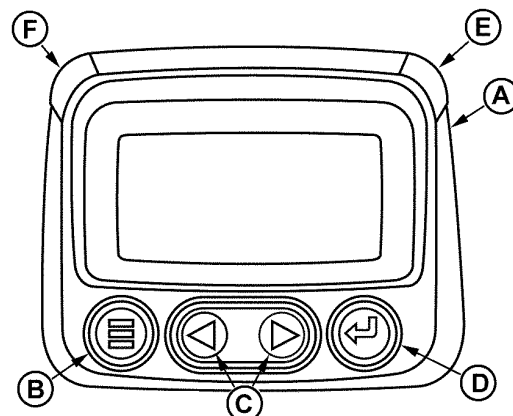
Use the arrow keys (C) and enter key (D) to view menu items displayed:

- Go to 4-up display
- Exhaust filter
- Engine speed control
- Languages
- Stored codes
- Engine configuration
- Setup 1-up display
- Setup 4-up display
- Select units
- Adjust backlight
- Adjust contrast
- Utilities

Listed are examples of features available in main menu items.

In Utilities:

- Gauge data
- Remove all gauges
- Software version
- Modbus setup
- Fault conversion



Diagnostic Gauge

A—Diagnostic Gauge
B—Menu Key
C—Arrow Key (2 used)

D—Enter Key
E—Red "STOP ENGINE"
Indicator Light
F—Amber "WARNING"
Indicator Light

- Select engine ECU
- Clear machine hours
- Performance data
- Interactive tests
- Reset trip
- Set function instance
- ECU software update

JR74534,00002C8 -19-16AUG21-1/1

RG13132 —UN—09SEP03

PV101 Diagnostic Gauge — Essential Menus

Automatic Exhaust Filter Cleaning

To enable auto exhaust filter cleaning mode:

1. Press menu key on diagnostic gauge
2. Press arrow keys to scroll up or down to EXHAUST FILTER
3. Press select key
4. Press arrow keys to scroll up or down to AUTO EXH FLT CLEAN
5. Press select key to enable auto exhaust filter cleaning

Manual/Parked Exhaust Filter Cleaning

To request a manual/parked exhaust filter cleaning:

1. Reduce engine speed to slow idle
2. Press menu key
3. Press arrow keys to scroll up or down to EXHAUST FILTER
4. Press select key
5. Press arrow keys to scroll up or down to REQUEST EXH FLT CLEAN
6. Press select key to request a manual/parked exhaust filter cleaning
7. Follow directions on display and ensure all conditions are met
8. Press select key to CONFIRM all conditions are met

Disable Exhaust Filter Cleaning

To disable the auto exhaust filter cleaning mode:

1. Press menu key on diagnostic gauge
2. Press arrow keys to scroll up or down to EXHAUST FILTER
3. Press select key
4. Press arrow keys to scroll up or down to DISABLE EXH FLT CLEAN
5. Press select key to disable exhaust filter cleaning

Fault Codes — Active

To view active fault code information:

1. Press menu key on diagnostic gauge
2. Press arrow keys to scroll up or down to FAULTS
3. Press select key
4. Press arrow keys to scroll up or down to ACTIVE FAULTS
5. Press select key
6. Press arrow keys to scroll through available faults

Fault Codes — Stored

To view stored fault code information:

1. Press menu key on diagnostic gauge
2. Press arrow keys to scroll up or down to FAULTS
3. Press select key
4. Press arrow keys to scroll up or down to STORED FAULTS
5. Press select key
6. Press arrow keys to scroll up or down to VIEW
7. Press select key
8. Press arrow keys to scroll through available faults

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DG14 Diagnostic Gauge — Using

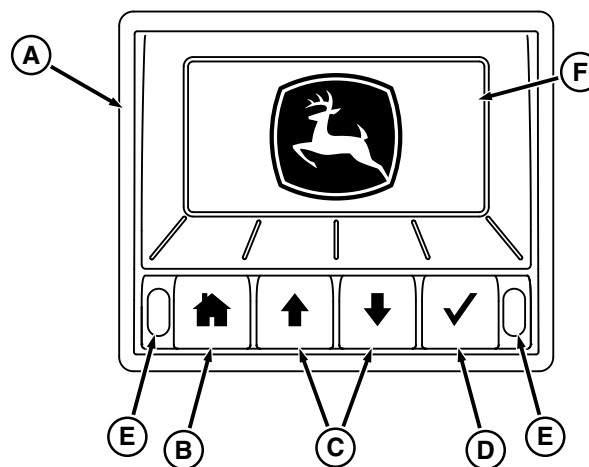
The diagnostic gauge (A) allows the operator to monitor engine functions, view diagnostic trouble codes (DTCs), and perform preliminary diagnostics. The gauge is linked to the electronic control system and sensors.

The home menu key (B) allows the operator to access the main menu of the diagnostic gauge. For more information, see DG14 Diagnostic Gauge — Main Menu in Section 15. This key also allows the operator to cancel an option and go back to the previous menu or home menu.

The arrow keys (C) allows the operator to scroll between menu items. The arrow keys automatically change from up and down, to left and right depending on the menu item to be selected.

The check mark select key (D) allows the operator to access menu items selected by the arrow keys (C) and confirm changes made by the operator.

The indicator lights (E) allows the operator to visually see the presence of an active DTC.



DG14 Diagnostic Gauge

A—Diagnostic Gauge
B—Home Menu Key
C—Arrow Key (2 used)

D—Check Mark Select Key
E—Indicator Light (2 used)
F—Display

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DG14 Diagnostic Gauge — Using

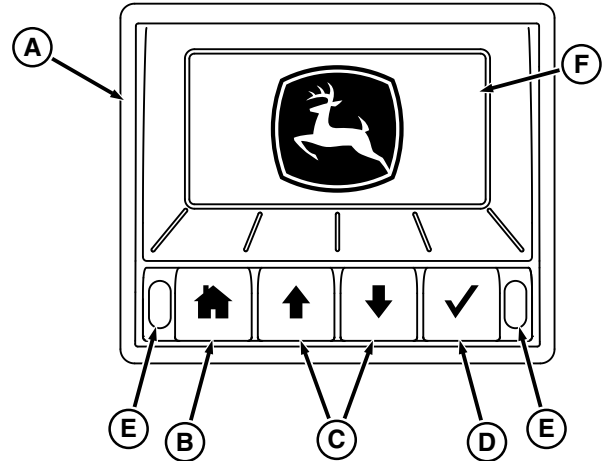
The diagnostic gauge (A) allows the operator to monitor engine functions, view diagnostic trouble codes (DTC's), and perform preliminary diagnostics. The gauge is linked to the electronic control system and sensors.

The (home) menu key (B) allows the operator to access the main menu of the diagnostic gauge. For more information see [DG14 Diagnostic Gauge — Main Menu](#). This key also allows the operator to cancel an option and go back to the previous menu or home menu.

The arrow keys (C) allows the operator to scroll between menu items. The arrow keys automatically change from up and down, to left and right depending on the menu item to be selected.

The (check mark) select key (D) allows the operator to access menu items selected by the arrow keys (C) and confirm changes made by the operator.

The indicator lights (E) allows the operator to visually see the presence of an active trouble code.



Diagnostic Gauge

A—Diagnostic Gauge
B—(Home) Menu Key
C—Arrow Keys

D—(Check Mark) Select Key
E—Indicator Light
F—Display

RG27904 —UN—25FEB16

CM22194,0000A39 -19-17MAY21-1/1

DG14 Diagnostic Gauge — Main Menu

NOTE: The engine does not need to be running to navigate the diagnostic gauge menu screens.

The main menu is the starting point in accessing engine information and configuring the diagnostic gauge. Press the home menu key (B) to access the main menu.

Use the arrow keys (C) and select key (D) to view menu items displayed:

- Function
- Display
- Utility
- Setup

Listed are examples of features available in main menu items.

In Function:

- View DTC
- Reset trip (FT4 Only)
- Exhaust regeneration (IT4 & FT4 Only)
- ECU software updates

In Display:

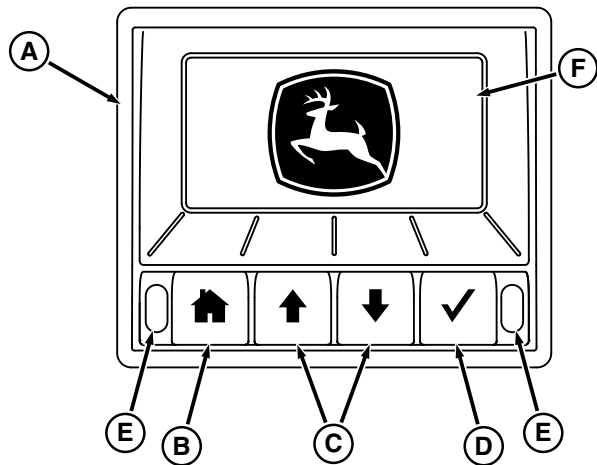
- Adjust backlight
- Adjust indicator brightness
- Display option setup

In Utility:

- Full parameter list
- Software data
- Select units
- Select language

In Setup:

- Select analog input
- Select digital input
- Select digital output



Diagnostic Gauge

A—Diagnostic Gauge
B—Home Menu Key
C—Arrow Key (2 used)

D—Check Mark Select Key
E—Indicator Light (2 used)
F—Display

- Alarm functionality
- Add J1939 gauge
- Set RS485 messaging
- Set engine source address
- Set function instance
- Harness diagnostics
- TSC control (password protected)

Key Code for Password Protected Screens

Numeric values are assigned to keys on diagnostic gauge as identified below:

- 1 — Home Menu Key
- 2 — Up Arrow Key
- 3 — Down Arrow Key
- 4 — Check Mark Select Key

BL90236,0000029 -19-19AUG21-1/1

RG27904 —UN—25FEB16

DG14 Diagnostic Gauge — Essential Menus**Automatic Exhaust Filter Cleaning**

To enable auto exhaust filter cleaning mode:

1. Press home menu key on diagnostic gauge.
2. Press arrow keys to scroll up or down to FUNCTION.
3. Press check mark select key.
4. Press arrow keys to scroll up or down to EXHAUST REGENERATION.
5. Press check mark select key.
6. Press arrow keys to scroll up or down to AUTOMATIC.
7. Press check mark select key to enable auto exhaust filter cleaning.

Manual/Parked Exhaust Filter Cleaning

To request a manual/parked exhaust filter cleaning:

1. Reduce engine speed to slow idle.
2. Press home menu key on diagnostic gauge.
3. Press arrow keys to scroll up or down to FUNCTION.
4. Press check mark select key.
5. Press arrow keys to scroll up or down to EXHAUST REGENERATION.
6. Press check mark select key.
7. Press arrow keys to scroll up or down to FORCED.
8. Press check mark select key to request a manual/parked exhaust filter cleaning.
9. Follow directions on display and ensure all conditions are met.
10. Press check mark select key to CONFIRM all conditions are met.

Disable Exhaust Filter Cleaning

To disable the auto exhaust filter cleaning mode:

1. Press home menu key on diagnostic gauge.

2. Press arrow keys to scroll up or down to FUNCTION.
3. Press check mark select key.
4. Press arrow keys to scroll up or down to EXHAUST REGENERATION.
5. Press check mark select key.
6. Press arrow keys to scroll up or down to INHIBIT.
7. Press check mark select key to disable exhaust filter cleaning.
8. Press check mark select key to continue after the warning has been acknowledged.

Fault Codes — Active

To view active fault code information:

1. Press home menu key on diagnostic gauge.
2. Press arrow keys to scroll up or down to FUNCTION.
3. Press check mark select key.
4. Press arrow keys to scroll up or down to VIEW FAULT CODES.
5. Press check mark select key.
6. Press arrow keys to scroll up or down to ACTIVATE.
7. Press check mark select key.
8. Press arrow keys to scroll through available faults.

Fault Codes — Stored

To view stored fault code information:

1. Press (home) menu key on diagnostic gauge.
2. Press arrow keys to scroll up or down to FUNCTION.
3. Press (check mark) select key.
4. Press Arrow keys to scroll up or down to VIEW FAULT CODES.
5. Press (check mark) select key.
6. Press arrow keys to scroll up or down to STORED.
7. Press (check mark) select key.
8. Press Arrow keys to scroll through available faults.

BL90236,0000026 -19-19AUG21-1/1

PV480 Instrument Panel

John Deere PowerTech™ OEM engines have an electronic control system, which has controls and gauges as shown. The following information applies only to those controls and gauges supplied by John Deere. Refer to your engine application manual for specific guidelines if John Deere-sourced controls and instrumentation are not used.

The following is a brief description of the available optional electronic controls and gauges found on John Deere provided instrument panels. Refer to manufacturer's literature for information on controls not provided by John Deere.

Instrument Panel

A — Diagnostic Gauge

The diagnostic gauge (A) allows the operator to view fuel level, DEF level, engine parameters, diagnostic trouble codes (DTCs), and other engine functions. Gauge is linked to the electronic control system and its sensors. This allows the operator to monitor engine functions and to troubleshoot the engine systems when needed.

B — Arrow Keys

The arrow keys (B) allow the operator to select menu items.

C — Menu Key

The menu key (C) allows the operator to access the main menu of the diagnostic gauge.

D — Select Key

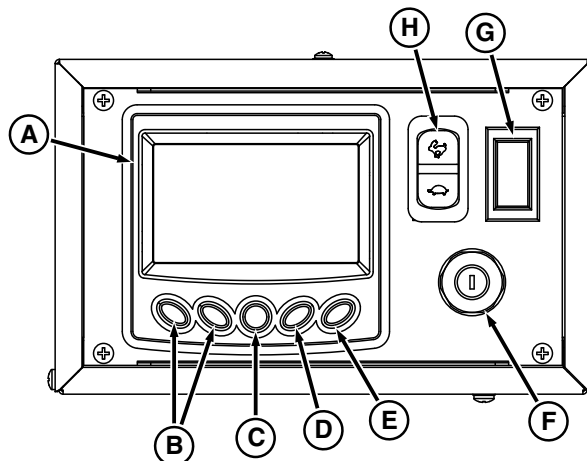
The select key (D) allows the operator to access menu items selected by the arrow keys (B) and confirm changes made by the operator.

E — Exit Key

The exit key (E) allows the operator to cancel an option and to go back to the previous menu.

F — Key Switch

PowerTech is a trademark of Deere & Company



PV480 Instrument Panel

A—Diagnostic Gauge
B—Arrow Key (2 used)
C—Menu Key
D—Select Key

E—Exit Key
F—Key Switch
G—Cover
H—Speed Select Rocker Switch

The three-position key switch (F) controls the engine electrical system. When the key switch is turned clockwise to "START", the engine cranks. When the engine starts, the key switch is released and returns to the "ON" (RUN) position.

G — Cover

The cover (G) hides an expansion slot for an additional switch.

H — Speed Select Rocker Switch

The speed select rocker switch (H) is used to bump engine speed up (+) or down (-) in small increments during operation.

RG23644 —UN—27AUG13

BL90236,0000003 -19-19AUG21-1/1

PV480 Diagnostic Gauge — Using

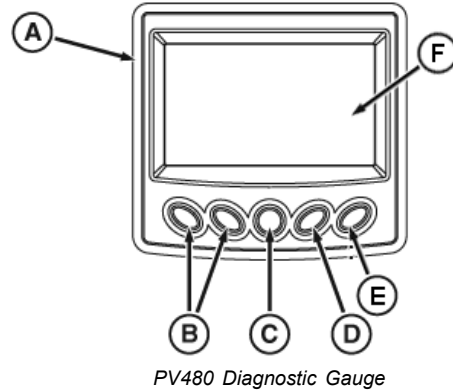
The diagnostic gauge (A) allow the operator to monitor engine functions, view diagnostic trouble codes (DTCs), and perform preliminary diagnostics. The gauge is linked to the electronic control system and sensors.

The arrow keys (B) allows the operator to scroll between menu items. The arrow keys automatically change from up and down, to left and right depending on the menu item to be selected.

The menu key (C) allows the operator to access the main menu of the diagnostic gauge. For more information, see [PV480 Diagnostic Gauge — Main Menu](#) in Section 15.

The select key (D) allows the operator to access menu items selected by the arrow keys (B) and confirm changes made by the operator.

The exit key (E) allows the operator to cancel an option and to go back to the previous menu.



A—Diagnostic Gauge
B—Arrow Key (2 used)
C—Menu Key

D—Select Key
E—Exit Key
F—Display

BL90236,0000006 -19-19AUG21-1/1

RG23474 —UN—06JUN13

PV480 Diagnostic Gauge — Using

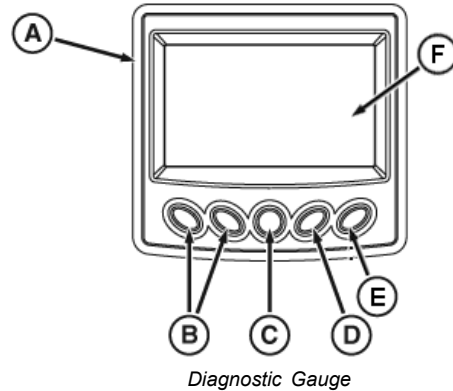
The diagnostic gauge (A) allows the operator to monitor engine functions, view diagnostic trouble codes (DTC's), and perform preliminary diagnostics. The gauge is linked to the electronic control system and sensors.

The arrow keys (B) allows the operator to scroll between menu items. The arrow keys automatically change from up and down, to left and right depending on the menu item to be selected.

The menu key (C) allows the operator to access the main menu of the diagnostic gauge. For more information see [PV480 Diagnostic Gauge — Main Menu](#).

The select key (D) allows the operator to access menu items selected by the arrow keys (B) and confirm changes made by the operator.

The exit key (E) allows the operator to cancel an option and to go back to the previous menu.



A—Diagnostic Gauge
B—Arrow Keys
C—Menu Key

D—Select Key
E—Exit Key
F—Display

CM22194,0000A3A -19-17MAY21-1/1

RG23474 —UN—06JUN13

PV480 Diagnostic Gauge — Main Menu

NOTE: The engine does not need to be running to navigate the diagnostic gauge screens.

The main menu is the starting point in accessing engine information and configuring the diagnostic gauge. Press the menu key (C) to access the main menu.

Use the arrow keys (B) and select key (D) to view menu items displayed:

- User Settings
- Faults
- Exhaust Filter
- Start Options
- Service
- Utilities

Listed are examples of features available in main menu items.

In User Settings:

- Date
- Time
- Language
- Units
- Brightness
- Ambient Light

In Check Faults:

- ActiveDTCs
- Stored DTCs

In Exhaust Filter:

- Status
- Auto exhaust filter clean
- Disable exhaust filter clean
- Request exhaust filter clean

In Start Options:

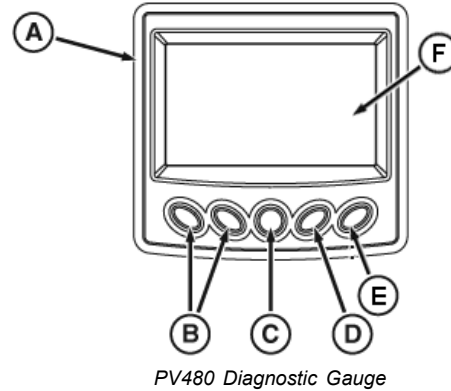
- Auto features
- Manual features
- Clock start
- Temperature start

In Service:

- Data list screens
- Engine hours
- Data logger
- Service reminders
- Harness diagnostics
- Component identification

In Utilities:

- System settings
- Pressure governing
- ECU software update
- Advanced settings (password protected)



A—Diagnostic Gauge
B—Arrow Key (2 used)
C—Menu Key

D—Select Key
E—Exit Key
F—Display

RG23474—UN—06JUN13

BL90236,0000001 -19-19AUG21-1/1

PV480 Diagnostic Gauge — Essential Menus

Automatic Exhaust Filter Cleaning

To enable auto exhaust filter cleaning mode:

1. Press Menu key on diagnostic gauge.
2. Press Arrow keys to scroll up or down to EXHAUST FILTER.
3. Press Select key.
4. Press Arrow keys to scroll up or down to AUTO EXH FLT CLEAN.
5. Press Select key to enable auto exhaust filter cleaning.

Manual/Parked Exhaust Filter Cleaning

To request a manual/parked exhaust filter cleaning:

1. Reduce engine speed to slow idle.
2. Press Menu key.
3. Press Arrow keys to scroll up or down to EXHAUST FILTER.
4. Press Select key.
5. Press Arrow keys to scroll up or down to REQUEST EXH FLT CLEAN.
6. Press Select key to request a manual/parked exhaust filter cleaning.
7. Follow directions on display and ensure all conditions are met.
8. Press Select key to CONFIRM all conditions are met.

Disable Exhaust Filter Cleaning

To disable the auto exhaust filter cleaning mode:

1. Press Menu key on diagnostic gauge.
2. Press Arrow keys to scroll up or down to EXHAUST FILTER.
3. Press Select key.
4. Press Arrow keys to scroll up or down to DISABLE EXH FLT CLEAN.
5. Press Select key to disable exhaust filter cleaning.

Fault Codes — Active

To view active fault code information:

1. Press Menu key on diagnostic gauge.
2. Press Arrow keys to scroll up or down to FAULTS.
3. Press Select key.
4. Press Arrow keys to scroll up or down to ACTIVE FAULTS.
5. Press Select key.
6. Press Arrow keys to scroll through available faults.

Fault Codes — Stored

To view stored fault code information:

1. Press Menu key on diagnostic gauge.
2. Press Arrow keys to scroll up or down to FAULTS.
3. Press Select key.
4. Press Arrow keys to scroll up or down to STORED FAULTS.
5. Press Select key.
6. Press Arrow keys to scroll up or down to VIEW.
7. Press Select key.
8. Press Arrow keys to scroll through available faults.

BL90236,0000024 -19-19AUG21-1/1

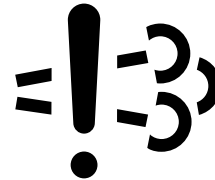
Required Machine Stop Warning

RG22491 —UN—21AUG13

Machine Stop Mandate Occurs

IMPORTANT: In some situations, machine engine power is reduced as described. On notification, immediately place the machine in a safe state and or move it to a safe location. A mandated machine stop can only be removed by a service technician.

Engine Emissions System Malfunction Indicator illuminates when an emission-related fault occurs.



DX,MACHSTOPWARN,OEM -19-02OCT15-1/8

Warning Indicator illuminates when a condition exists which requires operator action.

RG22492 —UN—21AUG13

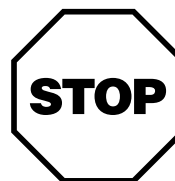


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DX,MACHSTOPWARN,OEM -19-02OCT15-2/8

Engine Stop Indicator illuminates when a condition exists which requires immediate operator action and service.

RG22493 —UN—21AUG13

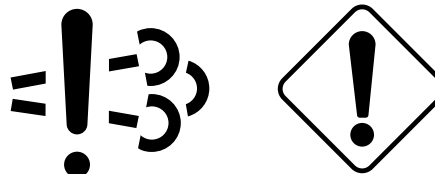


DX,MACHSTOPWARN,OEM -19-02OCT15-3/8

Emission System Fault Has Occurred

RG26361 —UN—04SEP14

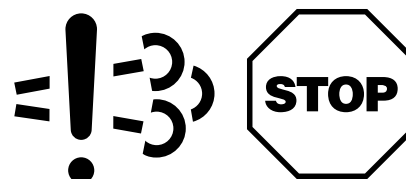
0—2 hours, the Engine Emissions System Malfunction and Warning Indicators are illuminated to warn operator of presence of emissions-related fault. If equipped, an alarm sounds.



DX,MACHSTOPWARN,OEM -19-02OCT15-4/8

After 2 hours, performance is reduced. Engine Emissions System Malfunction and Engine Stop Indicators are illuminated to warn operator of emissions-related fault. If equipped, an alarm sounds. Full machine performance is restored with Ignition OFF, Engine OFF, Ignition ON, Engine ON.

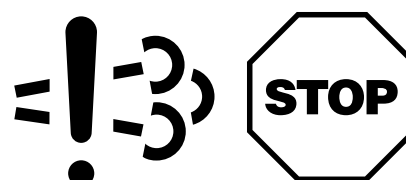
RG26972 —UN—26MAR15



DX,MACHSTOPWARN,OEM -19-02OCT15-5/8

After 3 hours 50 minutes, performance is reduced. Engine Emissions System Malfunction and Engine Stop Indicators are illuminated to warn operator of emissions-related fault which has not been corrected. If equipped, an alarm sounds.

RG26972 —UN—26MAR15

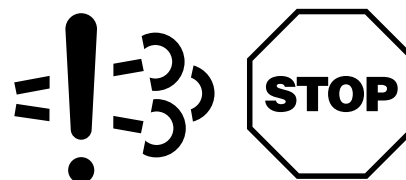


DX,MACHSTOPWARN,OEM -19-02OCT15-6/8

Emission System Fault Occurs Within 40 Hours of Previous Fault

RG26972 —UN—26MAR15

0—10 minutes, performance is reduced. Engine Emissions System Malfunction and Engine Stop Indicators are illuminated to warn operator of emissions-related fault. If equipped, an alarm sounds. Full machine performance is restored with Ignition OFF, Engine OFF, Ignition ON, Engine ON.

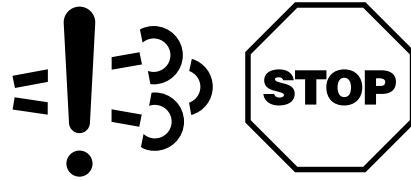


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DX,MACHSTOPWARN,OEM -19-02OCT15-7/8

30 minutes, performance is reduced. Engine Emissions System Malfunction and Engine Stop Indicators are illuminated to warn operator of emissions-related fault which has not been corrected. If equipped, an alarm sounds.

RG26972 —UN—26MAR15



DX,MACHSTOPWARN,OEM -19-02OCT15-8/8

John Deere PowerSight

John Deere PowerSight is a web based service that allows remote access to machine data. John Deere PowerSight is accessible from a laptop, desktop or mobile device.

John Deere PowerSight works by combining a controller that includes cellular communication and GPS antennas. Machine data is collected by the controller and wirelessly transferred to a data server, where it is made available on a website.

John Deere PowerSight allows you to:

- Stay informed on machine location and hours
- Protect assets with Geofence and Curfew alerts
- Keep assets running with maintenance tracking and preventive maintenance plans
- Track and analyze machine and fuel usage
- Conduct remote machine diagnostics and programming

For more information and availability, contact the local John Deere dealer, engine distributor, or other service provider.

BL90236,0000031 -19-13MAY25-1/1

Engine Operation

Break-In Service

Extra care during the first 100 hours of operation will result in satisfactory long-term engine performance and life.

1. This engine is factory-filled with John Deere Engine Break-In Plus engine oil. Operate the engine at heavy loads with minimal idling during the break-in period.
2. If the engine has significant operating time at idle, constant speeds, and/or light load usage, or additional oil is required in the first 100 hour period, a longer break-in period may be required. In these situations, an additional 100 hour break-in period is recommended using a new change of John Deere Engine Break-In Plus Oil and a new John Deere oil filter.

IMPORTANT: Avoid engine damage from improper engine oil level. DO NOT fill engine oil above the top of the crosshatch pattern or the FULL mark, whichever is present. Engine oil levels anywhere within crosshatch are considered in the acceptable operating range. John Deere Break-In Plus engine oil should be used to make up any oil consumed during the break-in period.

3. Check oil level by pulling out dipstick. Oil fill cap/dipstick may be located on left or right side of engine, depending on application. Check engine oil more frequently during engine break-in period. If engine oil must be added during this period, John Deere Break-In Plus Oil is preferred. See John Deere Break-In Plus™ Engine Oil — Interim Tier 4, Final Tier 4, Stage IIIB, and Stage IV in the Fuels, Lubricants, and Coolants Section for other oils allowed.

IMPORTANT: Avoid engine damage from improper break-in oil. DO NOT use Plus-50 or Plus-50 II engine oil during the break-in period of a new engine or engine that has had a major overhaul. Plus-50 or Plus-50 II engine oil will not allow a new or overhauled engine to properly wear during this break-in period.

4. During the first 20 hours, avoid prolonged periods of engine idling. If engine will idle longer than 5 minutes, stop engine.

5. During the initial operation of a new or rebuilt engine with Break-In Plus Oil, change the oil and filter between a minimum of 100 hours and a maximum of up to 500 hours. See Changing Engine Oil and Replacing Oil Filter in the Lubrication & Maintenance — 500 Hours/12 Months Section. Fill crankcase with seasonal viscosity grade oil. See Diesel Engine Oil — Interim Tier 4, Final Tier 4, Stage IIIB, and Stage IV in the Fuels, Lubricants, and Coolants Section.

NOTE: Some increase in oil consumption may be expected when low viscosity oils are used. Check oil levels more frequently.

When air temperature is below 0°C (32°F), it may be necessary to use cold weather starting aids (See Cold Weather Operation in the Engine Operation Section). When air temperature is below 0°C (32°F), use an engine block heater.

Monitor oil pressure and coolant temperature to ensure that they are within specification.

6. Watch engine oil pressure and temperature gauges closely during engine operation. If oil pressure does not rise above minimum oil pressure specification below, stop the engine and determine the cause. If coolant temperature rises above 113°C (235°F), the engine will reduce power automatically. Unless temperature drops quickly, stop the engine and determine the cause before resuming operation.

NOTE: If DTC 000100.18 or 000100.01 are present, check the engine oil level. If the problem persists, contact the dealership for service options.

Specification

Engine Coolant—Temperature..... 85°—94°C (185°—201°F)

7. Check belt for proper tension, alignment, and seating in pulley grooves.

CM22194,0000A3B -19-17MAY21-1/1

Generator Set (Standby) Applications

To assure that the engine will deliver efficient standby generator operation when needed, start engine and run at rated speed (with 50%—70% load) for 30 minutes every 2 weeks. DO NOT allow engine to run for an extended period of time with no load.

Biodiesel fuel is not recommended for standby equipment that can have minimal fuel consumption (such as standby generators, fire protection, etc.). For standby applications,

use only petroleum based diesel fuel with John Deere approved fuel conditioners and additives. For fuel conditioners and additives, check with the local John Deere dealer.

Petroleum diesel fuel should not be stored in service tanks longer than two years even when using fuel additives. See the fuel distributor or John Deere dealer for more information.

RK80614,0000009 -19-04SEP25-1/1

Starting the Engine

NOTE: The controls and instruments for your engine may be different from those shown here; always follow manufacturer's instructions.

The following instructions apply to the optional controls and instruments available through the John Deere Parts Distribution Network.

CAUTION: Before starting engine in a confined building, install proper outlet exhaust ventilation equipment. Always use safety approved fuel storage and piping.

NOTE: If temperature is below 0°C (32°F), it may be necessary to use cold weather starting aids. See *Cold Weather Operation* in the *Engine Operation* Section.

1. Perform all pre-starting checks outlined in Lubrication & Maintenance/Daily Section later in this manual.



Use Proper Ventilation

2. Open the fuel supply shutoff valve, if equipped.
3. Disengage power (or clutch if equipped) to any engine drive lines.

CM22194,0000A3C -19-17MAY21-1/2

4. Set high-low speed select rocker switch (H) to slow (turtle), then push in on analog throttle handle or turn full counterclockwise to set analog throttle(s) to slow speed.

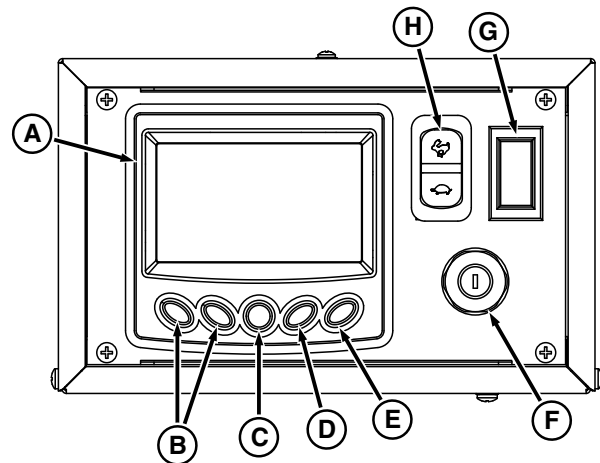
IMPORTANT: Do not operate the starter for more than 30 seconds at a time. To do so may overheat the starter. If the engine does not start the first time, wait at least 2 minutes before trying again. If engine does not start after four attempts, see *Engine Troubleshooting* in the *Troubleshooting* Section.

5. Turn the key start switch clockwise to the "ON" position. Wait until the Engine Preheater Indicator light turns off, then turn the key start switch (F) clockwise "START" position to crank the engine. In cold weather, pre-heater indicator light remains on longer while engine is warmed. See *Cold Weather Operation* in the *Engine Operation* Section. When the engine starts, release the key switch so that it returns to the "ON" position.

IMPORTANT: If the key switch is released before the engine starts, wait until the starter and the engine stop turning before trying again. This prevents possible damage to the starter and/or flywheel.

6. After engine starts, idle engine at not more than 1200 rpm until warm. See *Warming Engine* in the *Engine Operation* Section.

Set either high-low speed select switch or analog throttle to slow speed, and set desired speed with remaining control. See *Changing Engine Speed* in the *Engine Operation* Section.



A—Diagnostic Gauge
B—Arrow Keys
C—Menu Key
D—Select Key

E—Exit Key
F—Key Switch
G—Cover
H—Speed Select Rocker Switch

NOTE: Engine control unit (ECU) reads the higher of the high-low speed select rocker switch or the analog throttle speed settings.

7. Check all gauges for normal engine operation. If operation is not normal, stop the engine and determine the cause. For normal gauge pressures and temperatures, see *Break-In Service* in the *Engine Operation* Section.

CM22194,0000A3C -19-17MAY21-2/2

Normal Engine Operation

Observe engine coolant temperature and engine oil pressure. Temperatures and pressures will vary between engines and with changing operating conditions, ambient air temperature, and loads.

Normal engine coolant operating temperature range is 85°–94°C (185°–201°F). If coolant temperature rises above 113°C (235°F), engine will reduce power automatically. Unless temperature drops quickly, stop engine and determine cause before resuming operation.

Operate the engine under a lighter load and at slower than normal speed for first 15 minutes after start-up. DO NOT run engine at slow idle.

Stop engine immediately if there are any signs of part failure. Symptoms that may be early signs of engine problems are:

- Sudden drop in oil pressure
- Abnormal coolant temperatures
- Unusual noise or vibration
- Sudden loss of power
- Excessive fuel consumption
- Excessive oil consumption
- Fluid leaks
- Excessive black exhaust

KP41357,0000045 -19-11AUG21-1/1

Cold Weather Operation



Starting Fluid is Flammable

A— Minimum Cranking RPM
B— No Aids

C— Electric Air Heat
D— Block Heat

E— Ether
F— Electric Air Heat and Block Heat

G— Ether and Block Heat

CAUTION: Ether is highly flammable. DO NOT use ether when starting an engine equipped with glow plugs or an air intake heater.

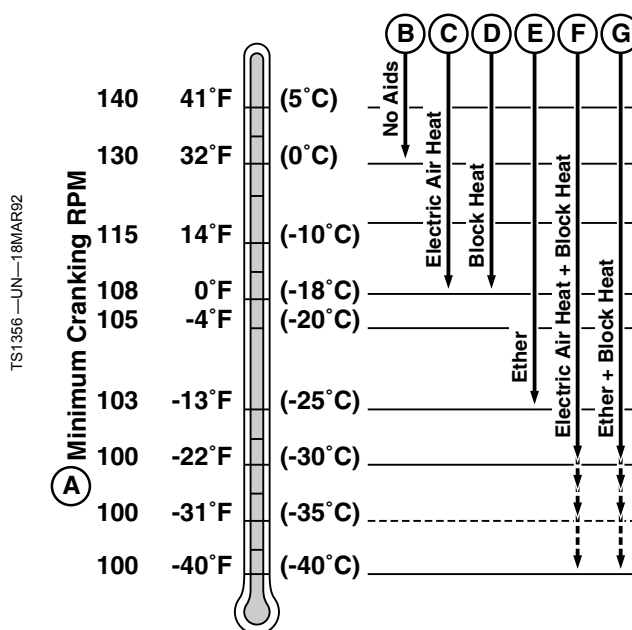
DO NOT use starting fluid near fire, sparks, or flames. DO NOT incinerate or puncture a starting fluid container.

IMPORTANT: Engines with Rear PTO -Turn off or unload all pumps, auxiliary drives, and compressors before cold weather starting to reduce drag on engine.

Engines may be equipped with a block heater, coolant heater, or fuel heater as cold weather starting aids.

Starting aids are required below 0 °C (32 °F). They will enhance starting performance above these temperatures and may be needed to start applications that have high parasitic loads during cranking and/or start acceleration to idle.

Using correct grade oil (per engine and machine operators manual) is critical to achieving adequate cold-weather cranking speed. Synthetic oils have improved flow at low temperatures



Cold Weather Starting Guidelines

Other cold weather starting aids are required at temperatures below -25 °C (-13 °F) or at altitudes above 1500 m (5000 ft).

1. Follow steps 1—4 as listed under Starting the Engine in the Engine Operation Section, then proceed as follows according to the instrument (control) panel on your engine.

2. Use cold weather starting aids as needed. Follow supplier instructions for starting aid provided on your engine. A booster battery can be connected if needed (see Using a Booster Battery or Charger in the Engine Operation Section).

3. Engines with air intake heaters or glow plugs: Turn key ON but do not crank engine until Engine Preheat Indicator goes off.

4. Follow remaining steps 5—7 as listed under Starting the Engine in the Engine Operation Section.

Additional information on cold-weather operation is available from the local John Deere dealer, engine distributor, or other service provider.

Warming Engine

IMPORTANT: To assure proper lubrication, operate engine at or below 1200 rpm with no load for 1–2 minutes. Extend this period to 2–4 minutes when operating at temperatures below freezing.

Engines used in generator set applications where the governor is locked at a specified speed may not have a slow idle function. Operate these engines at fast idle for 1–2 minutes before applying the load. This procedure does not apply to standby generator sets where the engine is loaded immediately upon reaching rated speed.

1. Check oil pressure gauge as soon as engine starts.

NOTE: If DTCs 000100.18 or 000100.01 are present, check the engine oil level. If the problem persists, contact the dealership for service options.

2. Watch coolant temperature gauge. Do not place engine under full load until it is properly warmed up. The normal engine coolant temperature range is 85°–94°C (185°–201°F).

NOTE: It is a good practice to operate the engine under a lighter load and at lower speeds than normal for the first few minutes after start-up.

KP41357,0000046 -19-12MAY20-1/1

Idling Engine

Industrial Engines

Avoid excessive engine idling. Prolonged engine idling may cause the engine coolant temperature to fall below its normal range. This in turn, causes crankcase oil dilution, due to incomplete fuel combustion and permits formation of gummy deposits on valves, pistons, and piston rings. It also promotes rapid accumulation of engine sludge and unburned fuel in the exhaust system.

Once an engine is warmed to normal operating temperature, engine should be idled at slow idle speed. If an engine will be idling for more than 5 minutes, stop and restart later.

Generator Sets

To reduce buildup of soot while operating at slow idle speed, ECU increases engine operating speed to rated speed whenever DOC face plugging is possible. Increased engine operating speed increases exhaust temperature and the ability to burn soot from DOC face.

NOTE: Generator set applications where the governor is locked at a specified speed may not have a slow idle function. These engines idle at no load governed speed (high idle).

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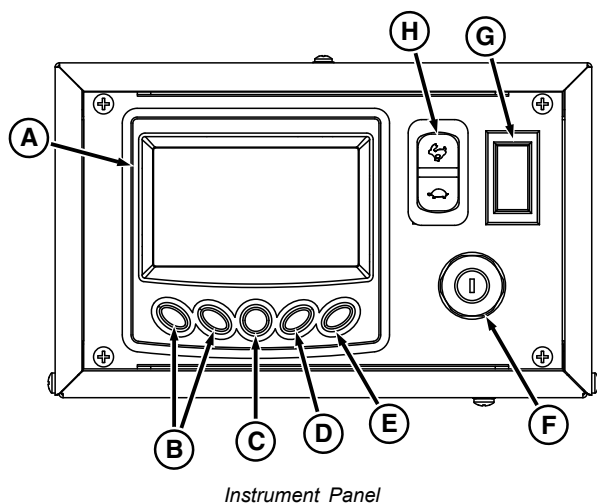
Changing Engine Speed

NOTE: On engines with 2-position throttles, speeds are not adjustable. These throttles allow operation only at the preset rated speed or at idle using the single switch.

- For slow speed, press lower half of speed select rocker switch (H) (indicated by turtle symbol).
- For fast speed, press upper half of speed select rocker switch (H) (indicated by rabbit symbol).
- Navigate the diagnostic gauge (A) to appropriate home screen. Adjust engine Set Speeds with arrow keys (B).

A—Diagnostic Gauge
B—Arrow Key (2 used)
C—Menu Key
D—Select Key

E—Exit Key
F—Key Switch
G—Cover
H—Speed Select Rocker Switch



Instrument Panel

RG23644 —UN—27AUG13

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Stopping the Engine

1. Pull PTO clutch lever rearward (away from engine) to disengage clutch, if equipped.

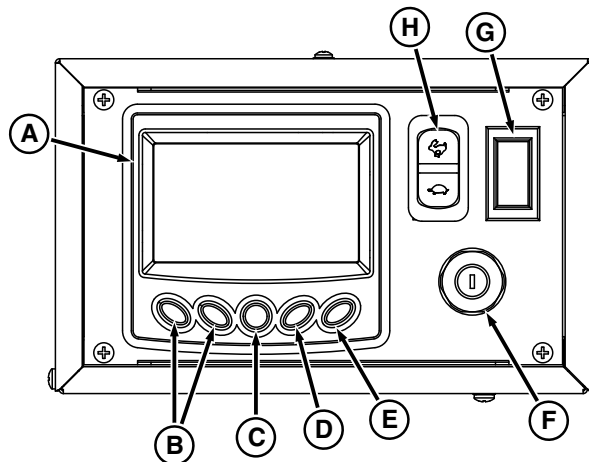
IMPORTANT: Avoid emission system contamination build up. Before stopping an engine that has been operating at working load, idle engine at least 2 minutes at 1000—1200 rpm to cool hot engine parts. If an Exhaust Filter Cleaning has just been performed, increase engine idle time to 4 minutes. If service work is going to be performed on the Exhaust Filter, increase engine idle time to 10 minutes.

Engines in generator set applications where the ECU is locked at a specified speed and no slow idle function is available, run engine for at least 2 minutes at fast idle and no load. If an Exhaust Filter Cleaning has just been performed, increase engine idle time to 4 minutes. If service work is going to be performed on the Exhaust Filter, increase engine idle time to 10 minutes

2. Run engine at 1000—1200 rpm for at least 2 minutes to cool. If an Exhaust Filter Cleaning has just been performed, increase engine idle time to 4 minutes. If service work is going to be performed on the Exhaust Filter, increase engine idle time to 10 minutes

Set rpm using speed select rocker switch (H) with speed select rocker switch.

NOTE: Engine control unit (ECU) reads the higher of the engine speed select rocker switch or the analog throttle speed settings.



Stopping the Engine Using Panel Controls

- | | |
|----------------------|------------------------------|
| A—Diagnostic Gauge | E—Exit Key |
| B—Arrow Key (2 used) | F—Key Switch |
| C—Menu Key | G—Cover |
| D—Select Key | H—Speed Select Rocker Switch |

3. Turn key start switch (F) to “OFF” position to stop the engine. Remove key.

IMPORTANT: Make sure that exhaust stack rain cap is installed when engine is not running. This will prevent water and dirt from entering engine.

RG23644 —UN—27AUG13

KP41357,000007C -19-19AUG21-1/1

Using a Booster Battery or Charger

A 12 volt booster battery can be connected in parallel (B) with battery(ies) on the unit to aid in cold weather starting. ALWAYS use heavy-duty jumper cables.

Series:

- Amps = Same as a single battery
- Volts = Twice as the single battery

Parallel:

- Amps = Twice as a single battery
- Volts = Same as a single battery

CAUTION: Gas given off by battery is explosive. Keep sparks and flames away from battery. Before connecting or disconnecting a battery charger, turn charger off. Make last connection and first disconnection at a point away from battery. Always connect **NEGATIVE (-)** cable last and disconnect this cable first.

CAUTION: Prevent bodily harm. Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.

IMPORTANT: Be sure that polarity is correct before making connections. Reversed polarity will damage electrical system. Always connect positive to positive and negative to ground. Always use 12 volt booster battery for 12 volt electrical systems and 24 volt booster battery(ies) for 24 volt electrical systems.

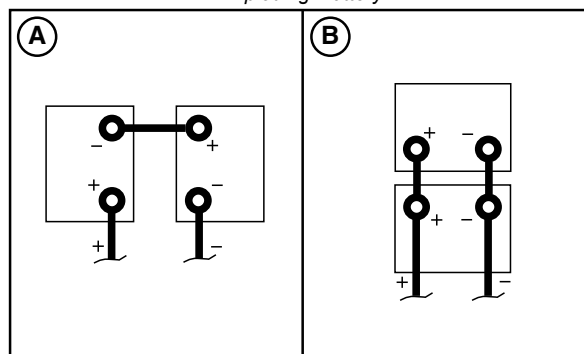
1. Connect booster battery or batteries to produce the required system voltage for your engine application.

NOTE: To avoid sparks, **DO NOT** allow the free ends of jumper cables to touch the engine.

2. Connect one end of jumper cable to the **POSITIVE (+)** post of the booster battery.
3. Connect the other end of the jumper cable to the **POSITIVE (+)** post of battery connected to starter.



Exploding Battery



12-Volt System Battery Cable Connections

A—Series

B—Parallel

4. Connect one end of the other jumper cable to the **NEGATIVE (-)** post of the booster battery.
5. ALWAYS complete the hookup by making the last connection of the **NEGATIVE (-)** cable to a good ground on the engine frame and away from the battery(ies).
6. Start the engine. Disconnect jumper cables immediately after engine starts. Always disconnect **NEGATIVE (-)** cable first.

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TS204—UN—15APR13

RG24885—UN—17DEC13

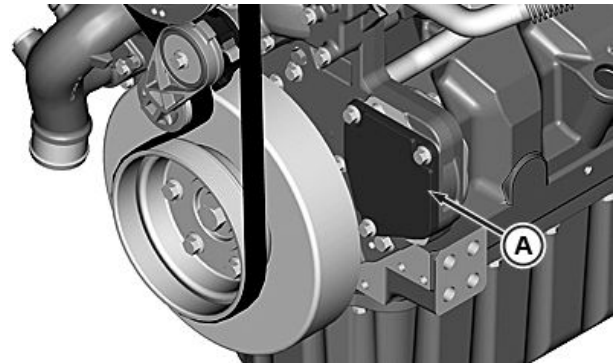
Auxiliary Gear Drive Limitations

IMPORTANT: When attaching an air compressor, hydraulic pump, or other accessory to be driven by the auxiliary gear drive (engine timing gear train at front of engine), power requirements of the accessory must be limited to values listed below:

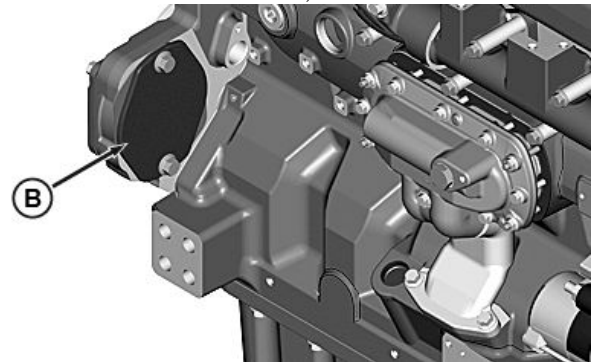
SAE Drive	Continuous Power (Maximum)	Intermittent Power (Maximum)
A.....	19 kW (25 hp)	22.5 kW (30 hp)
B or (A + B).....	37 kW (50 hp)	45 kW (60 hp)

A—SAE Drive, Front

B—SAE Drive, Rear



SAE Drive, Front



CM22194,0000A3E -19-17MAY21-1/1

RG16845—UN—18MAR09

RG17134—UN—18MAY09

EU Qualified Emergency Use — SCR Derate Override Option

NOTE: This is an EU only option.

IMPORTANT: Operating the engine without emissions related derates could damage the aftertreatment system.

Description: EU Qualified Emergency Use – SCR Derate Override Option

Under the EU regulations, this engine may be fitted with a means to disable the operator inducement (SCR Derate Override) during a qualified emergency. Using this option is only permitted during an emergency declared by a national or regional government, their emergency services, or their armed services. Any activation will be recorded in the on-board computer log and national inspection authorities will be able to read these records with a scan tool.

Emergency SCR Derate Override enables a Selective Catalyst Reduction (SCR) equipped application to operate without emissions-related derates for a specified period of time during qualified emergency situations. A qualified emergency situation is one in which the condition of an engine's emission controls poses a significant direct or indirect risk to human life. An example of a direct risk is an emission control condition that inhibits the performance of an engine being used to rescue a person from a life-threatening situation. An example of an indirect risk is an emission control condition that inhibits the performance of an engine being used to provide electrical power to a data center that routes "911" emergency response telecommunications.

Emergency SCR Derate Override Activation / Reporting

The operator can activate the Emergency SCR Derate Override through the operator interface. Once activated, the engine can operate free of emissions-related derates for 120 hours. If the derate condition is corrected during

the 120 hours, the Emergency SCR Derate Override can be paused in order to preserve the remainder of time for future use. The option expires along with any remaining time 240 hours after the Emergency SCR Derate Override is activated.

When the Emergency SCR Derate Override has expired, the engine informational Diagnostic Trouble Code (DTC) is displayed to the operator upon every engine start and every hour until acknowledged by the operator. To clear the DTC and reset the Emergency SCR Derate Override timer for future use, the operator (or other person responsible for the engine/equipment) must submit a report to the John Deere Dealer Technical Assistance Center, which must include the following:

- Contact name, mail and email addresses, and telephone number for responsible company or entity
- Description of the emergency situation, the location of the engine during the emergency, and the contact information for an official who can verify the emergency situation (such as a county sheriff, fire marshal, or hospital administrator)
- Reason for the Emergency SCR Derate Override activation during the emergency situation, such as the lack of diesel exhaust fluid, or the failure of an emission-related sensor when the engine was needed to respond to an emergency situation
- Engine's serial number
- Description of the extent and duration of the engine operation while the Emergency SCR Derate Override was active, including a statement describing whether or not the Override was manually deactivated after the emergency situation ended

In no event may this report be submitted to John Deere or other qualified service provide later than 60 calendar days after the Emergency SCR Derate Override is activated.

LEGAL Notification

Any activation will be recorded in the on-board computer log and national inspection authorities will be able to read these records with a scan tool.

DX,SCR,EMRGNCY,VERRIDE,EU -19-19JAN18-1/1

US EPA Qualified Emergency Use — SCR Derate Override Option

NOTE: This is a US EPA only option.

IMPORTANT: Operating the engine without emissions related derates could damage the aftertreatment system.

Description: US EPA Qualified Emergency Use – SCR Derate Override Option

Under the US EPA's regulations the Qualified Emergency SCR Derate Override Option (Emergency SCR Derate Override) is considered an Auxiliary Emission Control Device (AECD), which is only permitted during qualified emergency situations. To ensure compliance with US EPA regulations governing this type of AECD it is important that operators read the following information and comply with the requirements.

Emergency SCR Derate Override enables a Selective Catalyst Reduction (SCR) equipped application to operate without emissions-related derates for a specified period of time during qualified emergency situations. A qualified emergency situation is one in which the condition of an engine's emission controls poses a significant direct or indirect risk to human life. An example of a direct risk is an emission control condition that inhibits the performance of an engine being used to rescue a person from a life-threatening situation. An example of an indirect risk is an emission control condition that inhibits the performance of an engine being used to provide electrical power to a data center that routes "911" emergency response telecommunications.

Emergency SCR Derate Override Activation / Reporting

The operator can activate the Emergency SCR Derate Override through the operator interface. Once activated, the engine can operate free of emissions-related derates for 120 hours. If the derate condition is corrected during the 120 hours, the Emergency SCR Derate Override can be paused in order to preserve the remainder of time for future use. The option expires along with any remaining time 240 hours after the Emergency SCR Derate Override is activated.

When the Emergency SCR Derate Override has expired, the engine informational Diagnostic Trouble Code (DTC) is displayed to the operator upon every engine start and every hour until acknowledged by the operator. To clear the DTC and reset the Emergency SCR Derate

Override timer for future use, the operator (or other person responsible for the engine/equipment) must submit a report to the John Deere Dealer Technical Assistance Center, which must include the following:

- Contact name, mail and email addresses, and telephone number for responsible company or entity
- Description of the emergency situation, the location of the engine during the emergency, and the contact information for an official who can verify the emergency situation (such as a county sheriff, fire marshal, or hospital administrator)
- Reason for the Emergency SCR Derate Override activation during the emergency situation, such as the lack of diesel exhaust fluid, or the failure of an emission-related sensor when the engine was needed to respond to an emergency situation
- Engine's serial number
- Description of the extent and duration of the engine operation while the Emergency SCR Derate Override was active, including a statement describing whether or not the Override was manually deactivated after the emergency situation ended

In no event may this report be submitted to John Deere or other qualified service provider later than 60 calendar days after the Emergency SCR Derate Override is activated.

LEGAL Notification

The following actions by the operator are an improper use of the Emergency SCR Derate Override and are prohibited by the Clean Air Act and US EPA regulations:

- Activating the Emergency SCR Derate Override for something other than a qualified emergency situation;
- Failing to disable the Emergency SCR Derate Override after a qualified emergency situation ends; and,
- Failing to notify John Deere and send it reports as required in this Operators Manual and federal regulations. Note: John Deere is required to report to the US EPA the operator's failure to report to it any Emergency SCR Derate Override event (to the extent it becomes aware of such event).

The maximum civil penalty the US EPA may assess under 40 CFR 1068.101 is \$4,454 for each day an engine or piece of equipment is operated in violation of the requirements associated with the Emergency SCR Derate Override.

US EPA regulations governing the Emergency SCR Derate Override can be found at 40 CFR §1039.665, as may be amended.

DX,SCR,EMRGNCY,VERRIDE,US -19-24,JAN18-1/1

Restored Operation Option

NOTE: This is a European Union (EU) only option. Engine must have an EU only emission label. Option is not available for engine with EPA and EU emission label.

IMPORTANT: Operating the engine without emissions related derates could damage the aftertreatment system.

The Restored Operation Option enables a SCR equipped application to operate without emissions related derates

for a specified time. After a final emission-related derate, the operator can activate the Restored Operation Option through the operator interface. Once activated, the engine can operate free of emissions-related derates for 30 minutes. The option can be activated three times, for a total of 90 minutes. To reset the Restored Operation Option for future use, the derate condition must be corrected.

DX,SCR,RESTORE,EU -19-07OCT14-1/1

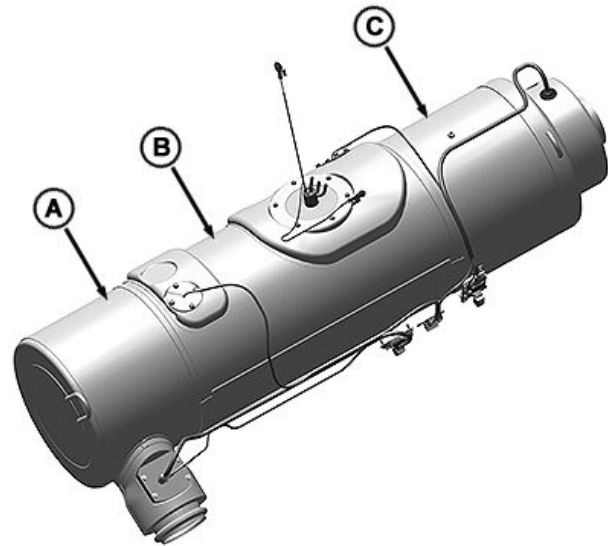
Aftertreatment System

Exhaust Filter Cleaning and Maintenance

The purpose of these instructions is to provide proper management of soot and ash collected by the exhaust filter or diesel particulate filter (DPF) along with its proper disposal.

NOTE: Some engine models are not equipped with a diesel particulate filter (DPF).

The diesel particulate filter (DPF) is a critical component in the engine's emissions control system, which is required to meet governmental emissions regulations. The exhaust filter captures diesel particulate matter or "soot" to prevent its release into the atmosphere. This soot must be eliminated from the DPF to keep it functioning properly. The process of eliminating collected soot is carefully controlled by the engine control unit (ECU) and is called "exhaust filter cleaning" or "regeneration". During this process, a rise in exhaust temperature occurs and along with injection of diesel exhaust fluid (DEF), which allows the soot to be oxidized within the DPF leaving a small amount of ash behind. As the ash builds up over a period of time the DPF can become clogged with ash and cause engine performance issues. The DPF must be removed and disposed of properly, according to government regulations, by a qualified or certified waste facility. See a John Deere dealer for more information on proper disposal.



Aftertreatment Canister

- | | |
|-----------------------------------|--------------------------------------|
| A—Diesel Oxidation Catalyst (DOC) | C—Selective Catalyst Reduction (SCR) |
| B—Diesel Particulate Filter (DPF) | |

RG32376—UN—20MAR20

KP41357,0000048 -19-04SEP25-1/1

Diesel Particulate Filter Maintenance and Service

NOTE: Some engine models are not equipped with a diesel particulate filter (DPF).

The DPF is designed to retain residual ash, which is a noncombustible result of additives used in crankcase lubrication oils and the fuel. The DPF provides many hours of maintenance free operation. At some point the DPF will require professional service to remove the accumulated ash. The exact number of hours of operation before service is required will vary depending upon the engine's power category, duty cycle and operating conditions, engine oil ash content, and fuel quality. Adhering to John Deere's recommended oil and fuel specifications will maximize the hours of operation before professional DPF service is required.

As the engine owner, you are responsible for performing the required maintenance described in your operator's manual. The exhaust filter's dash lamp indicator or the

diagnostic codes will indicate when the DPF needs ash removal service. Generally, the ash removal service interval will far exceed the EPA required minimums of 3,000 hours for engines below 175hp/130kW and 4,500 hours for engines at or above 175hp/130kW.

The removal of DPF ash must be done by removing the DPF from the machine and placing it into specialized equipment. Do not remove ash by using water or other chemicals. Removing ash by these methods may damage the material securing the DPF in its canister, resulting in the loosening of the DPF element in the canister and subjecting it to damage from vibration.

Failure to follow the approved ash removal methods may violate U.S. federal, state and local hazardous waste laws, along with damage to the DPF resulting in potential denial of the diesel exhaust filter emissions warranty. It is strongly recommended you take the DPF to an authorized John Deere service location or other qualified service provider for servicing.

AT89373,0000F53 -19-11DEC15-1/1

Exhaust Filter — Diesel Particulate Filter Ash Handling and Disposal

CAUTION: Your Governing Bodies Regulations may classify diesel particulate filter ash as a hazardous waste. Hazardous wastes therefore must be disposed of in accordance with all applicable Governing Bodies Regulations governing hazardous waste disposal. Only a

qualified service provider should remove ash from the DPF. Personal protective equipment and clothing, maintained in a sanitary and reliable condition, should be used when handling and cleaning a DPF. See your John Deere dealer or qualified service provider for assistance.

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Exhaust Filter — Disposal

CAUTION: Proper management of an Exhaust Filter that has reached the end of its useful life is required, since the ash or catalyst material

in the device may be classified as hazardous waste under federal, state, and/or local laws or regulations. See your John Deere dealer or qualified service provider for assistance.

RK80614,0000017 -19-04SEP25-1/1

Exhaust Filter System Overview

NOTE: Operator display icons and procedures can vary in other applications. The information contained in this section specifically applies to only OEM engines using the diagnostic gauge. If you are operating a John Deere vehicle, please see the vehicle operator manual for all exhaust filter cleaning operation information and procedures.

NOTE: Some engine models are not equipped with a diesel particulate filter (DPF).

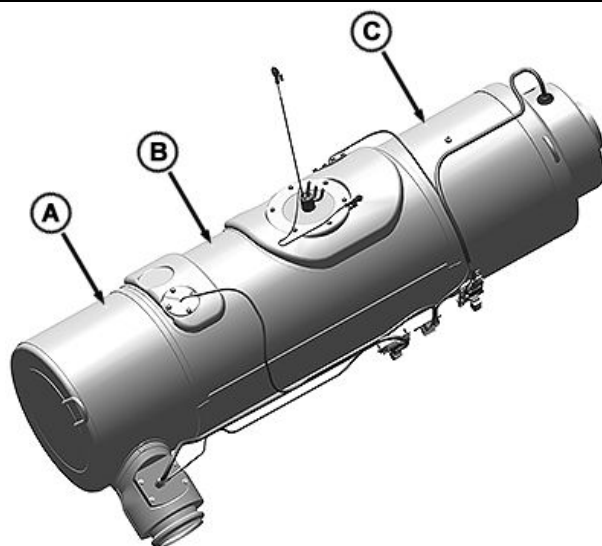
John Deere has developed an exhaust filter consisting of a diesel oxidation catalyst (DOC) and a diesel particulate filter (DPF) specifically to meet the demands of off-highway applications. The DOC reduces carbon monoxide, hydrocarbons, and some particulate matter. The downstream DPF traps and holds particulates remaining in the exhaust stream. Trapped particles are eventually oxidized within the DPF through a process known as regeneration or exhaust filter cleaning.

Under normal machine operation and with the system in AUTO mode, the exhaust filter system requires minimal operator interaction.

To avoid unnecessary buildup of diesel particulates or soot in the exhaust filter system:

- Use automatic (AUTO) exhaust filter cleaning mode.
- Avoid unnecessary idling.
- Use proper engine oil (See Fuels, Lubricants, and Coolants Section for recommendations).
- Use only ultra low sulfur fuel (See Fuels, Lubricants, and Coolants Section for recommendations).

In addition to soot, ash deposits will also slowly build up in the DPF and cannot be removed through the engine



Aftertreatment Canister

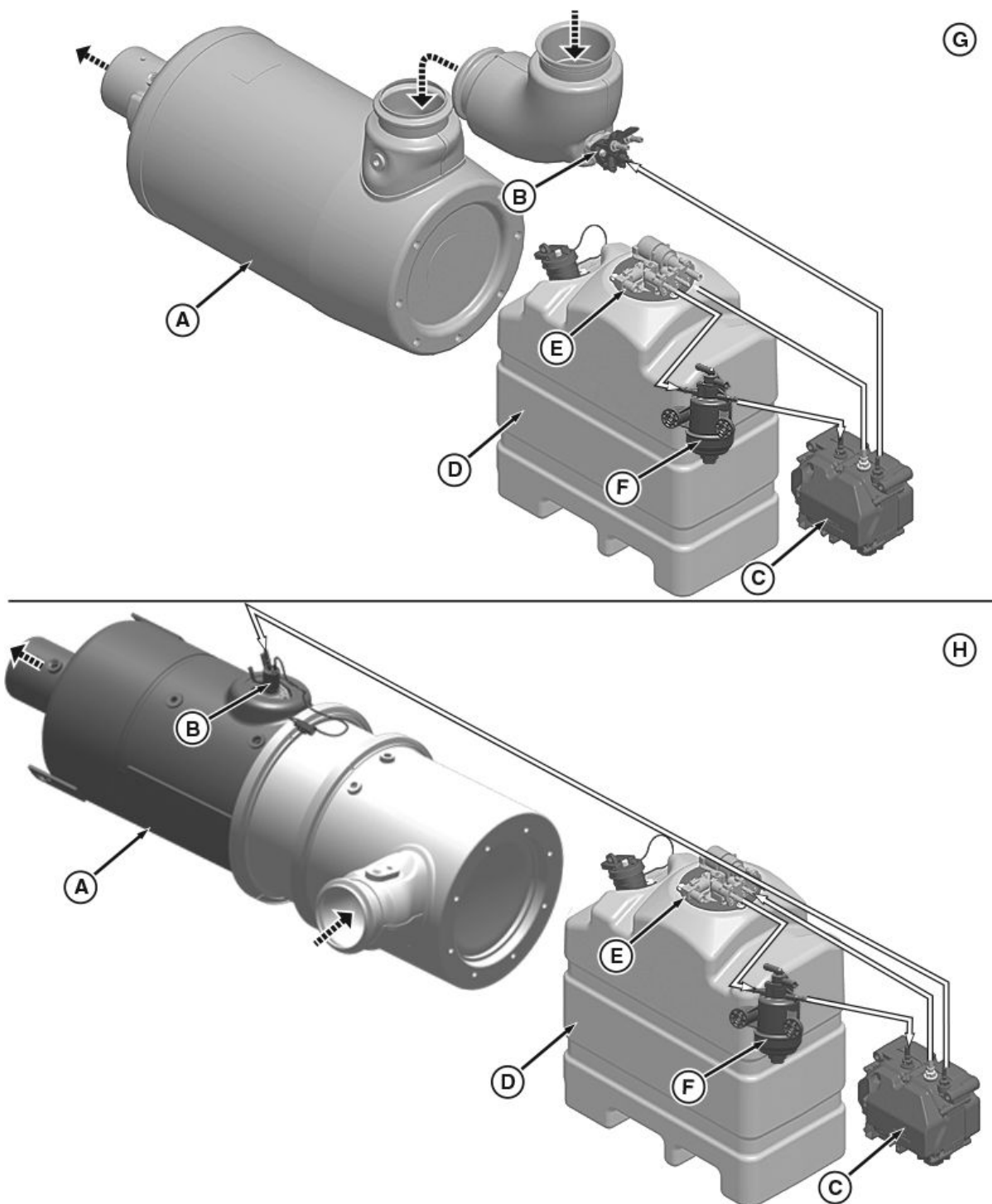
- | | |
|-----------------------------------|--------------------------------------|
| A—Diesel Oxidation Catalyst (DOC) | C—Selective Catalyst Reduction (SCR) |
| B—Diesel Particulate Filter (DPF) | |

exhaust filter cleaning process. To clean the ash deposits from the DPF see [Diesel Particulate Filter Maintenance and Service](#) in the Aftertreatment Section.

IMPORTANT: Prevent damage to aftertreatment canister and components. Do not power wash the DPF filter or components when external skin temperature exceeds 50°C (120°F).

CM22194,0000A7D -19-04JUN21-1/1

Selective Catalytic Reduction (SCR) System Overview



SCR System

A—SCR Catalyst
B—DEF Dosing Injector
C—DEF Dosing Unit

D—DEF Tank
E—DEF Tank Header Assembly
F—Inline DEF Filter (If Equipped)
G—Modular Canning Configuration
H—Inline Canning Configuration

Continued on next page

DX,SCR,OVERVIEW -19-30MAR20-1/2

RG22427A—UN—07JAN20

IMPORTANT: Do not remove battery leads for at least 4 minutes after engine stops. The SCR system automatically purges itself of Diesel Exhaust Fluid (DEF) immediately after the engine is stopped. If adequate time is not allowed for lines to be purged, residual DEF can freeze and possibly damage components of the SCR system during cold-weather exposure.

In order to comply with national and local emission requirements, this engine series contains a Selective Catalytic Reduction (SCR) system. The main components of the SCR system include the SCR catalyst (A), DEF dosing injector (B), DEF dosing unit (C), DEF tank (D), and DEF tank header assembly (E). The SCR system is effective at reducing the nitrogen oxides (NOx) emissions. NOx is a major component of smog and acid rain.

During combustion, NOx molecules are formed in the exhaust. DEF is injected into the exhaust stream before the SCR catalyst. Through a chemical reaction in the SCR, NOx is converted into nitrogen and water.

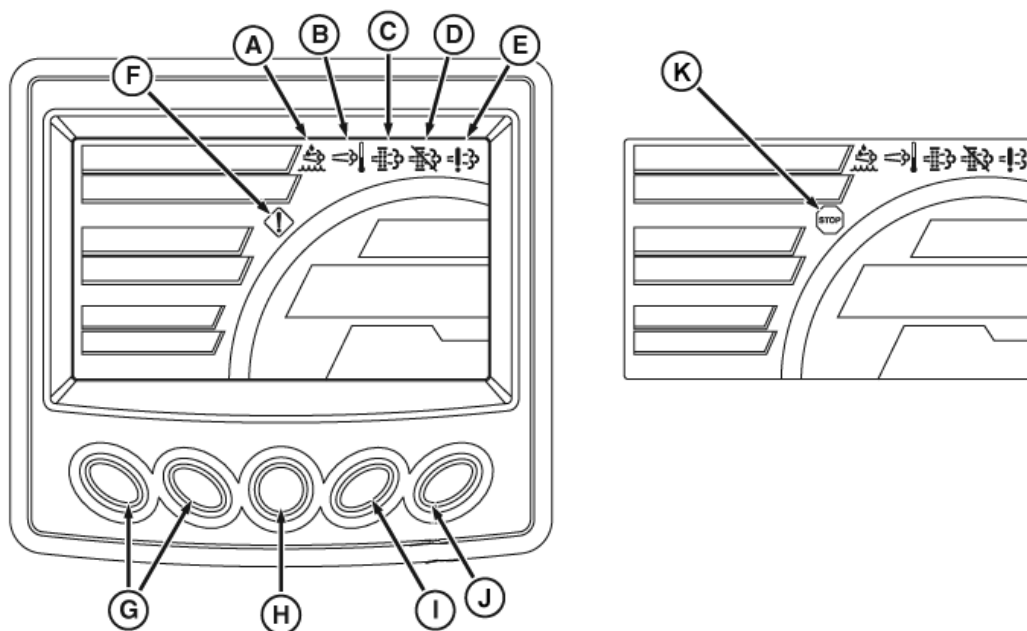
Water vapor is a normal by-product of combustion. During cold-weather operation at low exhaust temperatures, this water vapor can condense and resemble white smoke from the exhaust. This will dissipate as operating temperature increases and the water is further vaporized. This situation is considered normal.

A DEF solution begins to crystallize and freeze at -11 °C (12 °F). With climate temperatures that can range much colder than this, DEF is expected to freeze in the DEF tank. For this reason, the DEF tank contains a heating element that provides rapid thawing of DEF upon start-up. The heating element cycles to maintain fluidity during operation as needed. DEF is not dosed upon initial start-up, therefore it is not necessary to have liquid DEF at cold start-up.

If DEF quality deteriorates and it is no longer within specifications, the engine can derate. DEF should be crystal clear with a light ammonia smell. If DEF appears cloudy, has a colored tint, or has a profound ammonia smell, it is likely not within specification.

DX,SCR,OVERVIEW -19-30MAR20-2/2

Diagnostic Gauge Keys and Indicators Overview



Diagnostic Gauge Indicators and Keys

A—Diesel Exhaust Fluid (DEF) Indicator
B—Engine Emissions Temperature Indicator

C—Exhaust Filter Indicator
D—Auto Cleaning Disable Indicator
E—Engine Emissions System Malfunction Indicator

F—Caution Indicator
G—Arrow Keys
H—Menu Key
I—Select Key
J—Exit Key

K—Stop Indicator

NOTE: You will never see the diagnostic gauge with all indicators illuminated at the same time (as shown). This image is only to illustrate the indicators you may see during operation.

The image above shows the keys and indicators you will see and use on the diagnostic gauge.

The diesel exhaust fluid indicator (A), engine emissions temperature indicator (B), exhaust filter indicator (C), auto cleaning disable indicator (D), engine emissions system malfunction indicator (E) and the caution indicator

(F) provide the operator with visual notifications and aftertreatment system operations. The Arrow keys (G) are used to scroll up or down between options on the diagnostic gauge screen. The Menu key (H) is used to access the main menu of options from which the operator can choose. The Select key (I) is used when selecting an option on the diagnostic gauge. The Exit key (J) is used to come out from an option on the diagnostic gauge. The Stop Indicator (K) is flashed when the soot level of exhaust filter becomes extremely high and the ECU lowers the performance of engine.

RK80614,0000019 -19-05JUL13-1/1

RG23756 —JUN—05JUL13

Aftertreatment Indicators Overview

IMPORTANT: The operator will be informed by the operator warning system when the emission control system does not function correctly and/or an engine malfunction is detected by the engine control unit. Ignoring the operator warning signals will lead to an emission related derate, resulting in an effective disablement of non-road mobile machinery operation.

It is essential to take prompt action to rectify any incorrect operation, use or maintenance of the emissions control system in accordance with the rectification measures indicated by the warnings referenced below.

The Diesel Exhaust Fluid (DEF) indicator illuminates when the DEF is low. Fill DEF tank.

When the DEF indicator is combined with the warning indicator or engine stop indicator engine performance is reduced by the Engine Control Unit (ECU) because the DEF is below a measurable level. Fill DEF tank.

When engine emissions temperature indicator illuminates exhaust gas temperature is high, elevated idle is active, or exhaust filter cleaning is in process. The machine can be operated as normal unless the operator determines the machine is not in a safe location for high exhaust temperatures and disables auto cleaning.

When engine emissions temperature indicator is combined with the warning indicator or engine stop indicator engine performance is reduced by the ECU because the exhaust gas temperature is higher than expected. Follow Diagnostic Trouble Code (DTC) procedure or contact a John Deere dealer or other service provider.

When the exhaust filter indicator illuminates the exhaust filter cleaning is in process, aftertreatment system has a fault, or the exhaust filter is in need of cleaning and the operator has disabled auto exhaust filter cleaning. If conditions are safe, the operator should enable the auto exhaust filter clean setting or perform manual service regeneration or follow DTC procedure.

When the exhaust filter indicator is combined with the warning indicator engine performance is reduced by the ECU because there is an aftertreatment system fault or the soot level of the exhaust filter is moderately high. If conditions are safe, the operator should enable the auto exhaust filter clean function. If conditions are not safe, the operator should move the machine to a safe location and engage the auto exhaust filter cleaning mode. Perform manual service regeneration or follow DTC procedure.

When the exhaust filter indicator is combined with the engine stop indicator engine performance is further reduced by the ECU because there is an aftertreatment system fault or the soot level of the exhaust filter is extremely high. If this combination is present, contact a John Deere dealer or other service provider.

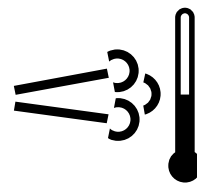
The auto cleaning disabled indicator illuminates when the operator has engaged the request to disable the

RG22487 —UN—21AUG13



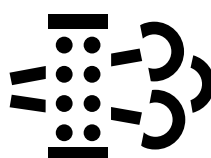
Diesel Exhaust Fluid Indicator

RG22488 —UN—21AUG13



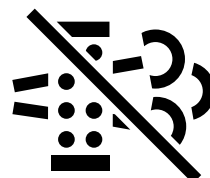
Engine Emissions Temperature Indicator

RG22489 —UN—21AUG13



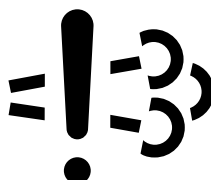
Exhaust Filter Indicator

RG22490 —UN—21AUG13



Auto Cleaning Disabled Indicator

RG22491 —UN—21AUG13



Engine Emissions System Malfunction Indicator

RG22492 —UN—21AUG13



Warning Indicator

RG22493 —UN—21AUG13



Engine Stop Indicator

auto exhaust filter cleaning function. This icon remains illuminated until the operator re-engages automatic exhaust filter cleaning from the diagnostic gauge. Disabling auto mode is not recommended for any situation unless it is safety-related or if the fuel tank lacks the required fuel to complete the cleaning process.

The engine emissions system malfunction indicator illuminates when engine emissions are outside of normal operating range or engine emissions system fault. Follow DTC procedure or contact a John Deere dealer or other service provider.

When the engine emissions system malfunction indicator is combined with the warning indicator engine performance is reduced by the ECU because the engine emissions are outside of normal operating range or engine emissions system fault. Follow DTC procedure or contact a John Deere dealer or other service provider.

Continued on next page

DX,AFTRTREAT,INDCATRS -19-02SEP25-1/2

Passive Regeneration

Periodically, the exhaust filter experiences higher temperature levels simply through the engine operating at higher loads. During these times, the higher exhaust temperature cleans a small amount of soot build-up in the exhaust filter. Conversely, unnecessary idling can

cause additional exhaust filter soot to accumulate. For the best possible engine operation which requires the least amount of operator interaction, work engine at higher load conditions whenever possible and keep idling to a minimum.

RK80614,000001A -19-09MAY16-1/1

Automatic (AUTO) Exhaust Filter Cleaning

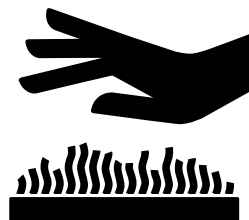
NOTE: Operator display icons and procedures can vary in other applications. The information contained in this section specifically applies to only OEM engines. If you are operating a vehicle, please see the vehicle operator manual for exhaust filter cleaning and handling information and procedures.

Operating the engine in AUTO Mode allows the ECU to perform intelligent exhaust filter cleaning as required. The Exhaust Filter Cleaning Indicator will illuminate when the system is actively performing an exhaust filter cleaning. During this process, the doser will inject small amounts of fuel into the exhaust stream to assist in cleaning the exhaust filter. When the exhaust filter cleaning process has completed its cycle, the cleaning indicator will automatically turn off.

CAUTION:

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 approximately 30 minutes. Exhaust gases and exhaust filter components reach temperatures hot enough to burn people, ignite, or melt common materials.



RG17488 —UN—21AUG09

 CAUTION: If the machine is not in a safe location for elevated exhaust temperatures, move the machine to a safe location and check for adequate fuel level before beginning the exhaust filter cleaning process. Any PTO driven devices (if equipped) should be powered off or disconnected.

If the machine is not able to be moved into a safe location, the operator should temporarily disable auto exhaust filter cleaning (see Disable Exhaust Filter Cleaning later in this section). If the machine is located in a safe location, the auto mode should always be enabled.

JR74534,00001E7 -19-21MAR16-1/1

Manual/Parked Exhaust Filter Cleaning

NOTE: Operator display icons and procedures can vary in other applications. The information contained in this section specifically applies to only OEM engines. If you are operating a vehicle, please see the vehicle operator manual for exhaust filter cleaning and handling information and procedures.

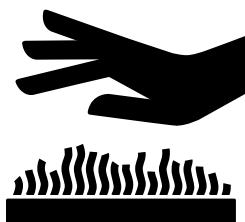
Manual/Parked Exhaust Filter Cleaning is an automated process initiated at the request of the operator. This process allows the system to clean the exhaust filter when the operator previously needed to engage the disable exhaust filter cleaning because of specific conditions. During the process the engine speed will be controlled by the ECU and the machine must remain parked to complete the procedure. Time required for the Manual/Parked Exhaust Filter Cleaning process is dependent upon the level of exhaust filter restriction, ambient temperatures, and current exhaust gas temperature.

Complete cleaning times will vary on several criteria including fuel type, oil type, duty cycle, and the number of previously aborted exhaust filter cleaning requests. Average time for a standard cleaning can range from 20-50 minutes or longer.

CAUTION:

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/parked exhaust filter cleaning operations, the engine will run at elevated idle and hot temperatures for approximately 30 minutes. Exhaust gases and exhaust filter components reach temperatures hot enough to burn people, ignite, or melt common materials.



RG17488—UN—21AUG09

CAUTION: Always park the machine in a safe location and check for adequate fuel level before beginning the exhaust filter cleaning process. Any PTO driven devices (if equipped) should be powered off or disconnected.

The exhaust filter indicator will remain off when Filter Cleaning is complete. If you are not returning the machine to service immediately after the procedure, allow the engine and the exhaust filter time to return to normal operating temperature before stopping engine. At any time during the parked procedure, the process can be canceled.

Avoid disabling the cleaning procedure unless absolutely necessary. Repeated disabling or ignoring prompts to perform a manual/parked cleaning procedure will cause additional engine power limitations and can eventually lead to dealer required service.

Utilize Exhaust Filter Cleaning AUTO mode to avoid additional service.

JR74534,00001E8 -19-04SEP25-1/1

Disable Exhaust Filter Cleaning

NOTE: Operator display icons and procedures can vary in other applications. The information contained in this section specifically applies to only OEM engines. If you are operating a vehicle, please see the vehicle operator manual for exhaust filter cleaning and handling information and procedures.

NOTE: Disabling the exhaust filter cleaning request is not preferred. Disable the automatic exhaust filter

cleaning only when necessary. Whenever possible, cleaning should be allowed and the diagnostic gauge should be left in the auto mode. When left in auto mode, soot buildup in the exhaust filter system will be at a minimum.

NOTE: When AUTO or PARKED/MANUAL cleaning is enabled, the exhaust temperature may be high under no load or light load conditions at certain times during the exhaust filter cleaning cycle. Disable exhaust filter cleaning in conditions where it may be unsafe for elevated exhaust temperatures.

JR74534,00001E9 -19-21MAR16-1/1

Exhaust Filter Service Required

The exhaust filter cleaning procedures listed earlier in this section clean the soot from your exhaust filter. The exhaust filter also traps ash deposits over time which are not removed during an exhaust filter cleaning. When the exhaust filter has run several thousand hours, these

ash deposits can restrict engine performance due to increased back pressure. To correct this situation, replace the exhaust filter or have the exhaust filter cleaned in specialized equipment. See Diesel Particulate Filter Maintenance and Service in the Aftertreatment Section.

CM22194,0000A3F -19-17MAY21-1/1

Lubrication and Maintenance

Required Emission-Related Information

Service Provider

A repair shop or person of the owner's choosing may maintain, replace, or repair emission control devices and systems with original or equivalent replacement parts. However, warranty, recall, and all other services paid for by John Deere must be performed at an authorized John Deere service center.

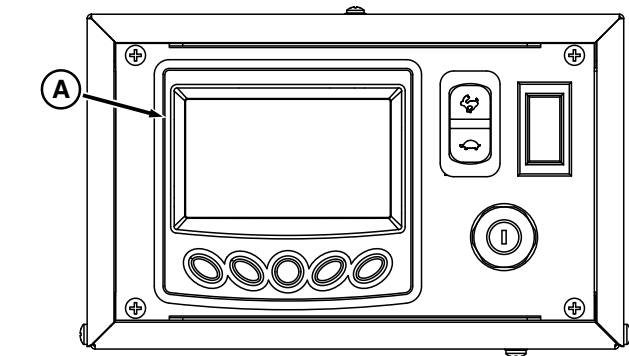
DX,EMISSIONS,REQINFO -19-08DEC23-1/1

Observe Service Intervals

In an emergency, where an authorized John Deere service location is not available, repairs may be performed at any available service establishment, or by the owner, using any replacement part, provided such parts are warranted by their manufacturer to be the equivalent of John Deere parts in performance and durability and the failure does not arise from the owner's failure to perform required maintenance.

Using hour meter (A) as a guide, perform all services at the hourly intervals indicated on following pages. At each scheduled maintenance interval, perform all previous maintenance operations in addition to the ones specified. Keep a record of hourly intervals and services performed, using charts provided in Lubrication and Maintenance Records section.

IMPORTANT: Recommended service intervals are for normal operating conditions. Perform maintenance at interval which occurs first, for example, either at 500 hours of operation or every 12 months. Service more often if engine operated under adverse conditions. Neglecting maintenance can result in failures or permanent damage to the engine.



Hour Meter On Instrument Panel

A—Hour Meter

Perform all services at the hourly intervals. Record the services performed in the Lubrication and Maintenance Records Section. When scheduled service at any hourly level is performed, also perform all subordinate hourly level services.

See Lubrication and Maintenance Service Interval Chart in Group 30.

CM22194,0000A75 -19-18MAY21-1/1

Use Correct Fuels, Lubricants, and Coolant

IMPORTANT: Use only fuels, lubricants, and coolants meeting specifications outlined in Fuels, Lubricants, and Coolant Section when servicing your John Deere Engine.

Consult your John Deere Servicing Distributor or your nearest John Deere Parts Network for recommended fuels, lubricants, and coolant. Also available are necessary additives for use when operating engines in tropical, arctic, or any other adverse conditions.



CM22194,0000A76 -19-18MAY21-1/1

Lubrication and Maintenance Service Interval Chart

Item	Lubrication and Maintenance Service Intervals									
	Dail- y/Be- fore Every Star- tup	375 Hours of Op- eration or Ev- ery 12 Months	500 Hours of Op- eration or Ev- ery 12 Months	1500 Hours of Op- eration or Ev- ery 36 Months	2000 Hours of Opera- tion or Every 24 Months	3000 Hours of Op- eration or Ev- ery 36 Months	4500 Hours of Op- eration or Ev- ery 60 Months	6000 Hours of Op- eration or Ev- ery 72 Months	8000 Hours of Op- eration or Ev- ery 36 Months	As Required
Operate Engine at Rated Speed and 50%–70% Load a Minimum of 30 Minutes (Generator and Standby Engines Only)										
Check Engine Oil	•									
Check Coolant Level	•									
Drain Water From Fuel Filters	•									
Check Air Cleaner Dust Valve Restriction Indicator Gauges ^a	•									
Perform Inspection of Engine Compartment	•									
Change Engine Oil And Replace Oil Filter. See footnotes: ^{b, c}		•								
Change Engine Oil And Replace Oil Filter. See footnotes: ^{b, c}			•							
Service Fire Extinguisher			•							
Service Battery			•							
Check Coolant Pump Weep Hole			•							
Check Open Crankcase Vent (OCV) System			•							
Replace Fuel Filter Elements ^d			•							
Check Belt Tensioner and Belt Wear			•							
Check Cooling System			•							
Pressure Test Cooling System			•							
Check Engine Speeds			•							
Check Engine Mounts			•							
Checking Engine Ground Connection			•							
Change DEF Dosing Unit Filter				•						
Check Crankshaft Vibration Damper					•					
Adjust Engine Valve Clearance						•				
Change Crankshaft Vibration Damper							•			

Continued on next page

CM22194,0000A77 -19-09JUN21-1/2

Lubrication and Maintenance

Item	Lubrication and Maintenance Service Intervals									
	Daily/Before Every Start-up	375 Hours of Operation or Every 12 Months	500 Hours of Operation or Every 12 Months	1500 Hours of Operation or Every 36 Months	2000 Hours of Operation or Every 24 Months	3000 Hours of Operation or Every 36 Months	4500 Hours of Operation or Every 60 Months	6000 Hours of Operation or Every 72 Months	8000 Hours of Operation or Every 36 Months	As Required
Flush and Refill Cooling System								•		
Bleed air from cooling system								•		
Test Thermostats								•		
Replace Inline DEF Filter									•	
Drain Water From Fuel Filters When Alarm Sounds ^e										•
Add Coolant										•
Clean DEF Tank										•
Pre-Start Cleaning Guide										•
Service Air Cleaner Filter Elements										•
Diesel Particulate Filter ^f										•
Replace Alternator/Fan Belt										•
Check Fuses										•
Check Electrical Wiring and Connections										•
Check Air Compressors (If Equipped)										•
Check Refrigerant (A/C) Compressor (If Equipped)										•
Check Rear Power Take-Off (If Equipped)										•
Replace Aftertreatment DEF Dosing System Coolant Filter										•

^aReplace primary air cleaner element when restriction indicator shows a vacuum of 625 mm (25 in.) H₂O. If not equipped with indicator, replace air cleaner elements at 500 hours or 12 months, whichever occurs first.

^bDuring the initial operation of a new or rebuilt engine with Break-In Plus, change the oil and filter between a minimum of 100 hours and a maximum of up to 500 hours.

^cService intervals depend on sulfur content of the diesel fuel, oil pan capacity, and the oil and filter used. (See Diesel Engine Oil and Filter Service Intervals in the Fuels, Lubricants, and Coolants Section.)

^dAlso replace fuel filter elements anytime audible alarm sounds and trouble codes indicate plugged fuel filters (low fuel pressure). If no alarm sounds during the 12 month service interval, replace elements at that time, or after 500 hours of operation, whichever comes first.

^eReplace fuel filter element(s) when audible alarm sounds and trouble codes indicate plugged fuel filter(s) (low fuel pressure). If no alarm sounds during the 12 month service interval, replace element(s) at that time, or after the normal service interval, whichever comes first.

^fActual service should take place when the dash indicator light comes on or as indicated by the diagnostic gauge.

CM22194,0000A77 -19-09JUN21-2/2

Lubrication & Maintenance — Daily

Daily Checks

Check the following items BEFORE STARTING THE ENGINE for the first time each day:

- Check the engine oil level on the dipstick. Fill cap/dipstick may be on left or right side, depending on application. Add as required, using seasonal viscosity grade oil. (See Section 10 — Fuels, Lubricants, and Coolants for oil specifications.)

NOTE: Wipe all fittings, caps, and plugs before performing any maintenance to reduce the chance of system contamination.

- Check the coolant level when the engine is cold. Fill the radiator or surge tank with the proper coolant if the level is low. (See Adding Coolant in the Service As Required Section.) Check overall cooling system for leaks.
- Check the radiator for leaks and trash buildup.

NOTE: It is normal for a small amount of coolant to weep from the coolant pump weep hole, especially as the engine cools down and parts contract. If enough coolant weeps from the engine where coolant drips from the engine, this may indicate the need to replace the coolant pump

seal. Contact the local John Deere dealer, engine distributor, or other service provider for repairs.

- Check fan, alternator, and accessory drive belts for cracks, breaks, or other damage.
- Loosen water drain valve on each fuel filter all the way so that the valve opens to drain the water and debris as needed. Retighten valves securely.

NOTE: Any water in fuel is drained into the bottom of the fuel filters. The operator is signaled by an amber indicator on the instrument panel. To service, see Drain Water From Fuel Filters in the Service As Required Section.

- Squeeze the automatic dust unloader valve (if equipped) on the air cleaner assembly to clear away any dust buildup.
- Check the air intake restriction indicator gauge and service air cleaner as required (if equipped).
- Check the air intake system hoses and connections for cracks and loose clamps.
- Inspect the engine compartment. Look for fluid leaks, worn fan and accessory drive belts, loose connections, and trash buildup. Remove trash buildup and have repairs made as needed.

CM22194,0000A44 -19-29MAY25-1/1

Changing Engine Oil and Replacing Oil Filter

IMPORTANT: Changing engine oil and filter every 375 hours or 12 months depends on the following requirements:

- Engine equipped with an oil pan that allows capacity for this extended drain interval.
- Use of premium oil John Deere Plus-50 II, API CJ-4, ACEA E9, or ACEA E6.
- Perform engine oil analysis to determine the actual extended service life of API CJ-4, ACEA E9, or ACEA E6 oils.
- Use of the approved John Deere oil filter.
- Use of Ultra Low Sulfur Diesel (ULSD) fuel with sulfur content less than 0.0015% (15 mg/kg) is required.

The oil and filter change interval is reduced if ANY of the above listed requirements are not followed.

NOTE: During the initial operation of a new or rebuilt engine with Break-In Plus, change the oil and filter between a minimum of 100 hours and a maximum of up to 375 hours.

NOTE: Service intervals depend on sulfur content of the diesel fuel, oil pan capacity, and the oil and filter used. (See Diesel Engine Oil and Filter Service Intervals in the Fuels, Lubricants, and Coolants Section.)

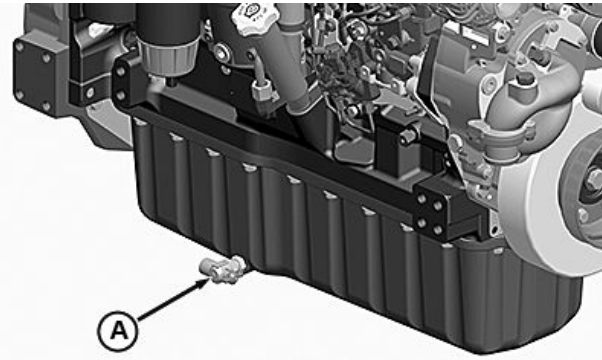
Oilscan™ or Oilscan PLUS™ is a John Deere sampling program to help you monitor machine performance and identify potential problems before they cause serious damage. Oilscan™ and Oilscan PLUS™ kits are available from the local John Deere dealer, engine distributor, or other service provider. Oil samples should be taken prior to the oil change. Refer to instructions provided with kit.

CAUTION: Engine oil and metal surfaces of engine may be hot to the touch after shutdown. Use care to prevent burns.

1. Run engine approximately 5 minutes to warm up oil. Shut off engine.

NOTE: Drain plug location may vary, depending on the application.

*Oilscan is a trademark of Deere & Company.
Oilscan PLUS is a trademark of Deere & Company.*



RG24607 —UN—17OCT13

A—Oil Drain Valve

2. Remove oil pan drain plug.
3. Drain crankcase oil from engine while warm.

NOTE: For more complete draining of oil, wait to install oil pan drain plug until filter oil is drained back.

4. Install oil pan drain plug with a new O-ring and tighten to specifications.

Specification

Oil Pan Drain	
Plug—Torque.....	81 N·m (60 lb·ft)

Continued on next page

CM22194,0000A84 -19-29MAY25-1/2

IMPORTANT: Filtration of engine oil is critical to proper lubrication. Always change filter regularly. Use filter meeting John Deere performance specifications.

NOTE: Two types of engine oil filters are available. For engines equipped with spin on style engine oil filters, follow the instructions printed on the engine oil filter. For engines equipped with cartridge style engine oil filters, follow instructions below.

NOTE: Do NOT remove plug (B). Plug (B) is not an oil drain. Oil in filter will drain down automatically as filter cap is loosened.

5. Loosen filter cap (A) one-half turn with wrench. Wait 30 seconds to allow oil filter housing to drain. Remove cap and filter assembly.
6. While holding cap, strike filter element against solid surface as shown to unfasten filter from cap. Discard used filter.
7. Remove O-ring seal and replace with new O-ring provided with new filter element.
8. Lubricate the new O-ring with clean engine oil prior to installing cap and filter back into oil filter housing.
9. Press new filter element into cap until it snaps into place.
10. Insert cap and filter assembly into oil filter housing. Screw cap into place.
11. Tighten cap to specifications.

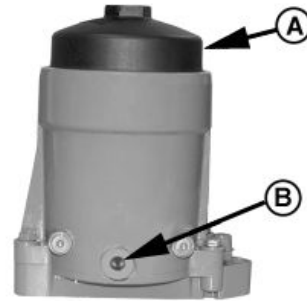
Specification

Top-Load Oil Filter
Cap—Torque..... 45 N·m (33 lb·ft)

Filling Engine Crankcase with Oil

1. Remove oil fill cap/dipstick and fill engine crankcase with correct John Deere engine oil. (See [Diesel Engine Oil](#) in the Fuels, Lubricants, and Coolants Section for determining correct engine oil.)

NOTE: Crankcase oil capacity may vary slightly. ALWAYS fill crankcase to full mark or within crosshatch on dipstick, whichever is present. DO NOT overfill.



Remove Oil Filter Cap



Remove Filter Element from Cap

A—Oil Filter Cap

B—Plug (DO NOT REMOVE)

To determine the correct oil fill quantity for your engine, see [Engine Crankcase Oil Fill Quantities](#) in the Specifications Section.

IMPORTANT: Stop engine immediately if the engine oil warning is illuminated. Check engine oil level and for any leaks that are present.

2. Start the engine and idle for 30 seconds without any load.
3. Stop engine and check oil level. Oil level reading should be on upper mark of dipstick.

CM22194,0000A84 -19-29MAY25-2/2

RG13817A—UN—01APR05

RG17135—UN—16JUL21

Servicing Fire Extinguisher

A fire extinguisher (A) is available from the local John Deere dealer, engine distributor, or other service provider.

Read and follow the instructions which are packaged with it. The extinguisher should be inspected at least every 500 hours of engine operation or every 12 months. Once extinguisher is operated, no matter how long, it must be recharged. Keep record of inspections on the tag which comes with the extinguisher instruction booklet.

A—Fire Extinguisher



Fire Extinguisher

CM22194,0000A45 -19-29MAY25-1/1

RW4918 —UN—15DEC88

Servicing Battery

CAUTION: Battery gas can explode. Keep sparks and flames away from batteries. Use a flashlight to check battery electrolyte level.

Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.

Always remove grounded **NEGATIVE (—)** battery clamp first and replace it last.

WARNING: Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. **Wash hands after handling.**

IMPORTANT: Wear personal Protective Equipment while doing any type of Battery check or replacement.

1. On regular batteries, check electrolyte level. Fill each cell to bottom of filler neck with distilled water.

NOTE: Low-maintenance or maintenance-free batteries should require little additional service. However, electrolyte level can be checked by cutting the center section of decal on dash-line, and removing cell plugs. Fill each cell to bottom of filler neck with distilled water.

2. Keep batteries clean by wiping them with a damp cloth. Keep all connections clean and tight. Remove



Exploding Battery

any corrosion, and wash terminals with a solution of 1 part baking soda and 4 parts water. Tighten all connections securely.

NOTE: Coat battery terminals and connectors with a mixture of petroleum jelly and baking soda to retard corrosion.

3. Keep battery fully charged, especially during cold weather. If a battery charger is used, turn charger off before connecting charger to battery(ies). Attach **POSITIVE (+)** battery charger lead to **POSITIVE (+)** battery post. Then attach **NEGATIVE (—)** battery charger lead to a good ground.

Continued on next page

CM22194,0000A46 -19-18MAY21-1/2

TS204 —UN—15APR13

CAUTION: Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.

Avoid the hazard by:

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

If you spill acid on yourself:

1. Flush your skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. Flush your eyes with water for 10—15 minutes. Get medical attention immediately.

If acid is swallowed:

1. Drink large amounts of water or milk.
2. Then drink milk of magnesia, beaten eggs, or vegetable oil.
3. Get medical attention immediately.

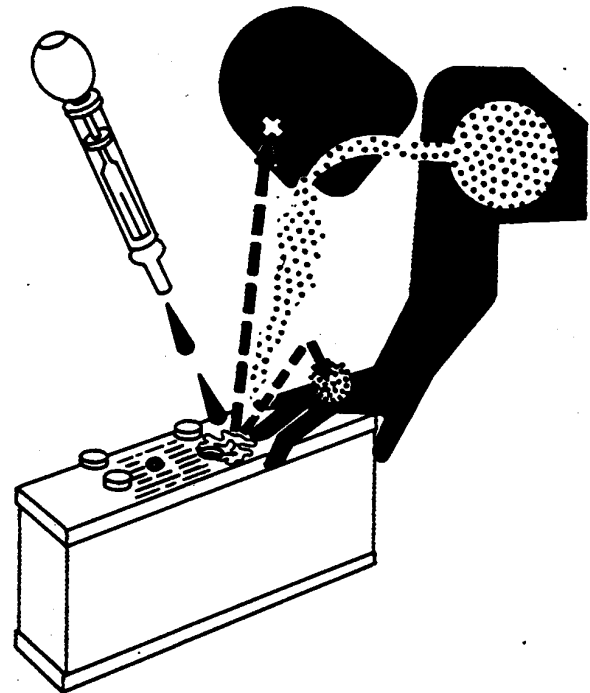
In freezing weather, run engine at least 30 minutes to ensure thorough mixing after adding water to battery.

Replacement battery(ies) must meet or exceed the following recommended capacities¹ at —18 °C (0 °F):

Specification

12-Volt System—Minimum Battery Capacity—Cold Cranking
Amps..... 1100 Minimum
Reserve Capacity
(Minutes)..... 350 Minimum

¹ Total recommended capacity based on batteries connected in series or parallel.



Sulfuric Acid

24-Volt System—Minimum Battery Capacity—Cold Cranking
Amps..... 750 Minimum
Reserve Capacity
(Minutes)..... 275 Minimum

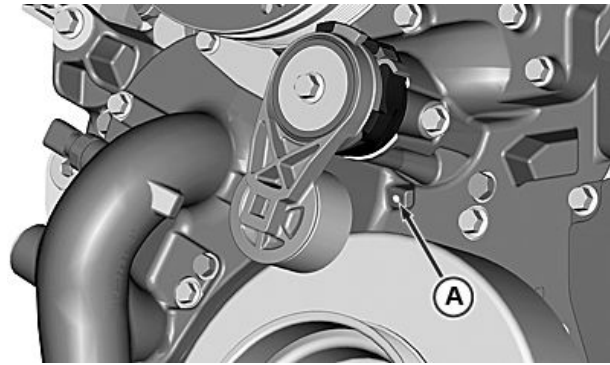
CM22194,0000A46 -19-18MAY21-2/2

TS203—UN—23AUG88

Visually Inspecting Coolant Pump

Inspect Weep Hole

1. Inspect weep hole (A) for oil or coolant leakage.
 - Oil leakage indicates a damaged rear seal.
 - Coolant leakage indicates a damaged front seal.
2. Replace complete coolant pump assembly if leakage is detected. A slight weeping of oil or coolant is normal. If enough oil or coolant leaks from the weep hole that it drips from the engine, the coolant pump assembly should be replaced. Individual repair parts are not available.



RG16850 —UN—17MAR09

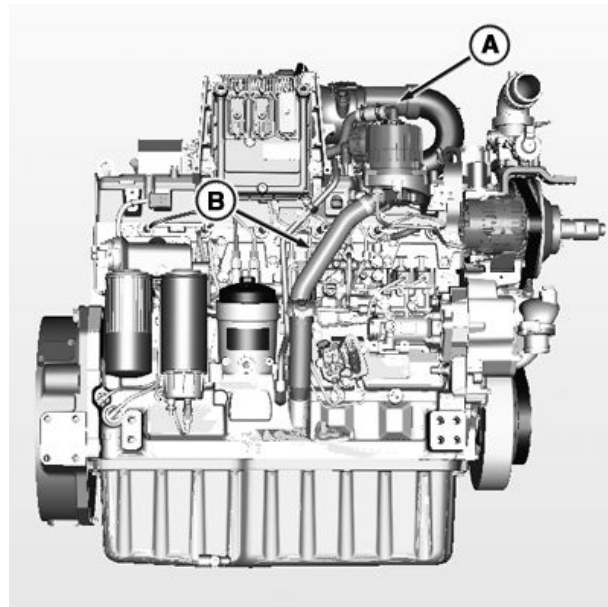
A—Weep Hole

CM22194,0000A48 -19-18MAY21-1/1

Checking Open Crankcase Vent (OCV)

Do not open the OCV, there are no serviceable parts inside the assembly. Service checks of the OCV include checking and/or replacement of worn, cracked, leaking, or bulging hoses and for good clamp tension on all hose ends.

A—Crankcase Elbow and Vent Tube B—Oil Drain Hose



RG22433 —UN—15FEB13

CM22194,0000A49 -19-18MAY21-1/1

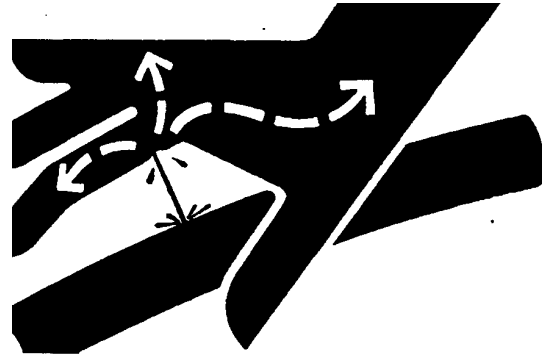
Removing and Installing Fuel Filters

⚠ CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting fuel or other lines. Tighten all connections before applying pressure. Keep hands and body away from pinholes and nozzles which eject fluids under high pressure. Use a piece of cardboard or paper to search for leaks. Do not use your hand.

If ANY fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type of injury or gangrene may result. Doctors unfamiliar with this type of injury may call the Deere & Company Medical Department in Moline, Illinois, or other knowledgeable medical source.

⚠ CAUTION: Due to High Pressure Common Rail system design, fuel in filter is likely to be under high pressure. To avoid possible personal harm, open valves on bottom of filters to relieve pressure prior to removing each filter.

IMPORTANT: Prevent fuel system damage. Replace fuel filter elements anytime audible alarm



High Pressure Fluids

sounds and trouble codes indicate plugged fuel filters (low fuel pressure). If no alarm sounds during the 12 month service interval, replace elements at that time, or before 500 hours of operation, whichever comes first.

Both Primary and Final filters must be replaced at the same time.

Continued on next page

CM22194,0000A4A -19-15JUN21-1/3

X9811 —UN—23AUG88

Remove and Install Primary Fuel Filter

IMPORTANT: Prevent damage to fuel system components. Do NOT pre-fill filter with fuel. This may introduce debris into the fuel system.

1. Thoroughly clean filter header and surrounding area to prevent dirt and debris from entering fuel system.
2. Connect a fuel drain line to filter drain valve (G) on bottom of sediment bowl (A) and drain fuel from the filter.
3. Disconnect water-in-fuel sensor connector.
4. Remove primary filter (C) using a suitable filter wrench.
5. Remove water separator bowl (A) from primary filter (C). Clean water separator bowl with compressed air.
6. Inspect filter header and filter canister sealing surfaces. Clean as required.
7. Place new o-ring (B) on sediment bowl (A). Lubricate seal with clean diesel fuel.
8. Install sediment bowl (A) onto new primary filter (C) until seal contacts canister. Final tighten to specification.

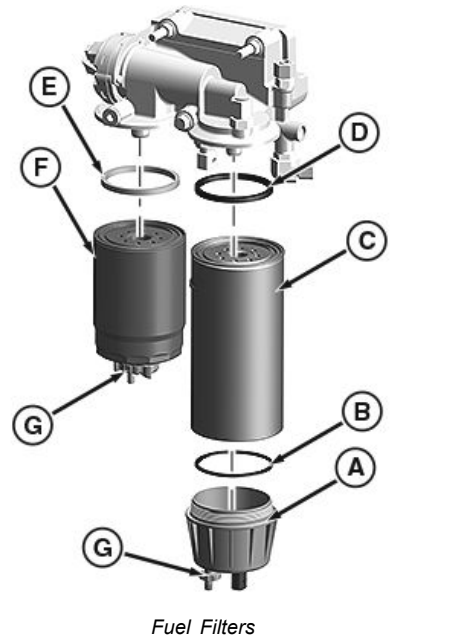
Specification

Sediment Bowl to Primary
Filter—Turn..... Seal Contact + 1/2 Turn

9. Lubricate new filter element o-ring (D) with clean diesel fuel and install filter on to filter header. Tighten filter until o-ring (D) contacts header base. Final tighten filter to specification.

Specification

Primary Filter to Filter
Base—Turn..... Seal Contact + 1/2 to 3/4 Turn



- | | |
|-----------------------|-------------------------|
| A—Sediment Bowl | E—O-ring |
| B—O-ring | F—Secondary Fuel Filter |
| C—Primary Fuel Filter | G—Drain Valve |
| D—O-ring | |

10. Connect water in fuel sensor.

NOTE: Be sure to also replace secondary fuel filter and then prime system.

Continued on next page

CM22194,0000A4A -19-15JUN21-2/3

RG33933 —UN—10JUN21

Remove and Install Secondary Fuel Filter

IMPORTANT: Do NOT pre-fill filter with fuel. This may introduce debris into the fuel system.

NOTE: Secondary fuel filter replacement instructions are printed on the new filter.

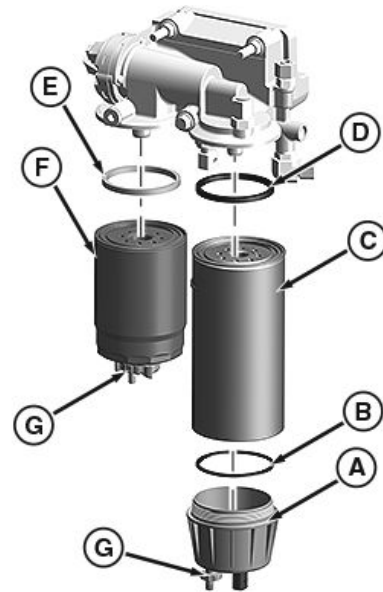
1. Thoroughly clean filter header and surrounding area to keep from getting dirt and debris into fuel system.
2. Connect a fuel drain line to filter drain valve (G) on bottom of secondary filter (F) and drain fuel from the filter.
3. Remove secondary filter (F) using a suitable filter wrench.
4. Inspect filter header sealing surface. Clean as required.
5. Lubricate new filter o-ring (E) with clean diesel fuel.
6. Install secondary filter (F) on to filter base. Tighten filter until o-ring (E) contacts header base. Tighten filter to specification.

Specification

Secondary Filter to Filter

Base—Turn..... Seal Contact + 1/2 Turn

NOTE: Turn ignition ON for 60 seconds to prime the fuel system before starting engine. It may be necessary to turn key off and on again to completely prime the fuel system before starting.



Fuel Filters

A—Sediment Bowl
B—O-ring
C—Primary Fuel Filter
D—O-ring

E—O-ring
F—Secondary Fuel Filter
G—Drain Valve

CM22194,0000A4A -19-15JUN21-3/3

RG33933 —UN—10JUN21

Checking Belt Wear

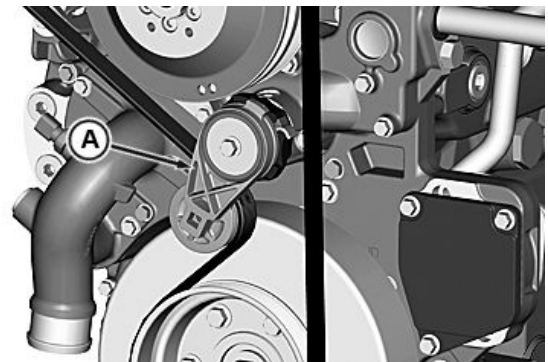
NOTE: While belt is loosened, inspect pulleys and bearings. Rotate and feel for hard turning or any unusual sounds. If pulleys or bearings need replacement, contact the local John Deere dealer, engine distributor, or other service provider.

The belt tensioner is designed to operate within the limit of arm movement provided by the cast stops when correct belt length and geometry are used.

Visually inspect cast stops on belt tensioner (A) assembly.

If the tensioner stop on swing arm is hitting the fixed stop, check mounting brackets (alternator, belt tensioner, idler pulley, etc.) and the belt length.

- Verify belt grooves mate correctly with all pulleys
- Inspect for excessive cracks
- Inspect for glazing
- Inspect for tears or cuts



A—Belt Tensioner Assembly

Replace belt as needed based on wear and belt condition. Use correct belt routing during installation (see [Replacing Fan/Alternator Belt](#) in the Service As Required Section).

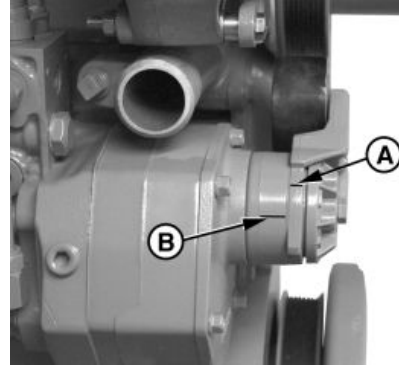
CM22194,0000A4B -19-29MAY25-1/1

RG16846 —UN—16MAR09

Checking Tensioner Spring Tension

A belt tension gauge will not give an accurate measure of the belt tension when automatic spring tensioner is used. Measure tensioner spring tension using a torque wrench and procedure outlined below:

1. Release tension on belt using a long-handled 1/2 inch drive tool in tensioner arm. Remove belt from pulleys.
2. Release tension on tensioner arm and remove drive tool.
3. Put a mark (A) on swing arm of tensioner as shown.
4. Measure 21 mm (0.83 in.) from mark (A) and put a mark (B) on tensioner mounting base.



Checking Belt Tension Spring

A—Mark

B—Mark

CM22194,0000A4C -19-18MAY21-1/2

RG7382 —UN—28NOV97

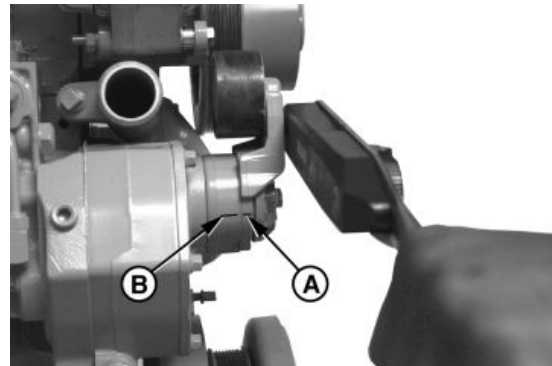
5. Rotate the swing arm using a torque wrench until marks (A and B) are aligned.
6. Record torque wrench measurement and compare with specification below. Replace tensioner assembly as required.

Specification

Spring—Tension..... 24—28 N·m (17—21 lb.-ft.)

A—Mark

B—Mark



Checking Belt Tensioner Spring Tension

CM22194,0000A4C -19-18MAY21-2/2

RG7381 —UN—28NOV97

Checking Cooling System

CAUTION: 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.

IMPORTANT: Air must be expelled from cooling system when system is refilled. Loosen temperature sending unit fitting at rear of cylinder head or plug in thermostat housing to allow air to escape when filling system. Retighten fitting or plug when all the air has been expelled. Cooling system must be free of air by time engine coolant temperature reaches 80 °C (176 °F) or damage to EGR cooler (if equipped) may result.



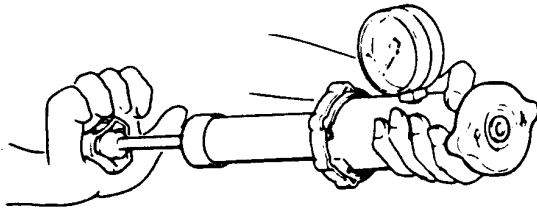
High Pressure Fluids

1. Check entire cooling system for leaks. Tighten all clamps securely.
2. Thoroughly inspect all cooling system hoses for hard, flimsy, or cracked conditions. Replace hoses if any of the above conditions are found.

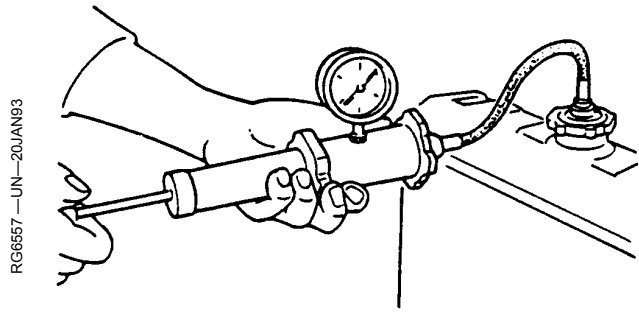
CM22194,0000A4D -19-18MAY21-1/1

TS281 —UN—15APR13

Pressure Testing Cooling System



Test Radiator Cap



Test Cooling System

CAUTION: 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. To relieve pressure before completely removing, slowly loosen the cap to the first stop.

Test Radiator Cap

1. Remove radiator cap and attach to D05104ST Tester as shown.
2. Pressurize cap to following specifications.¹ Gauge should hold pressure for 10 seconds within the normal range if cap is acceptable.

Specification

Radiator Cap—Minimum
Test Pressure..... 124 kPa (1.24 bar) (18 psi)

If gauge does not hold pressure, replace radiator cap.

3. Remove the cap from gauge, turn it 180°, and retest cap. This verifies that's the first measurement was accurate.

Test Cooling System for Leaks

NOTE: Engine should be warmed up to test overall cooling system for leaks.

¹Test pressures recommended are for all Deere OEM cooling systems. On specific vehicle applications, test cooling system and pressure cap according to the recommended pressure for that vehicle.

1. Allow engine to cool, then carefully remove radiator cap.
2. Fill radiator with coolant to the normal operating level.
3. Connect gauge and adapter to radiator filler neck. Pressurize cooling system to the following specifications¹.
4. With pressure applied, check all cooling system hose connections, radiator, and overall engine for leaks.

Specification

Cooling System—Mini-
mum Test Pressure..... 124 kPa (1.24 bar) (18 psi)

If leakage is detected, correct as necessary and pressure test system again.

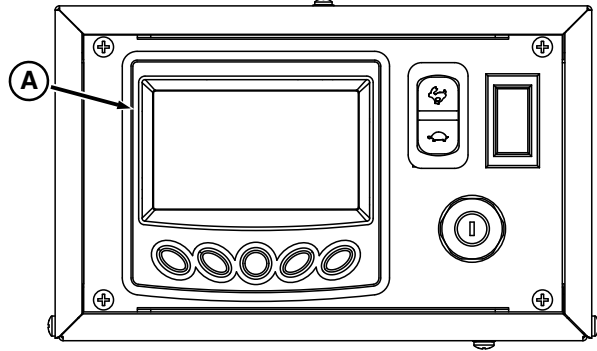
If no leakage is detected, but the gauge indicated a drop in pressure, coolant may be leaking internally within the system or at the block-to-head gasket. Contact the local John Deere dealer, engine distributor, or other service provider to correct this problem immediately.

CM22194,0000A4E -19-29MAY25-1/1

Checking and Adjusting Engine Speeds

Use tachometer on the diagnostic gauge (A) to verify engine speeds. (See [Engine Power and Speed Rating Specifications](#) in the Specifications Section for engine speed specifications.) If engine speed adjustment is required, contact the local John Deere dealer, engine distributor, or other service provider.

A—Diagnostic Gauge



RG22413 —UN—27AUG13

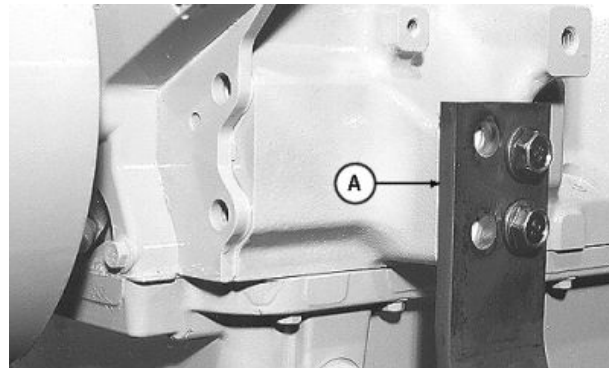
CM22194,0000A4F -19-29MAY25-1/1

Checking Engine Mounts

Engine mounting is the responsibility of the Original Equipment Manufacturer. Follow manufacturer's guidelines for mounting specifications.

IMPORTANT: Use only Grade SAE 8 or higher grade of hardware for engine mounting.

1. Check the engine mounting brackets (A), vibration isolators, and mounting bolts on support frame and engine block for tightness. Tighten as necessary.
2. Inspect overall condition of vibration isolators, if equipped. Replace isolators, as necessary, if rubber has deteriorated or mounts have collapsed.



Engine Mounting

A—Mounting Bracket

RG9905 —UN—06JAN99

CM22194,0000A50 -19-18MAY21-1/1

Checking Engine Ground Connection

Check engine ground connection to be sure that it is secure and clean. This will prevent electrical arcing which can damage engine.

Verify engine to frame ground.

Verify battery ground to frame.

Verify Engine Control Unit to ground (Remote Mount).

CM22194,0000A51 -19-18MAY21-1/1

Access DEF Dosing Unit

See your application manual for information on accessing the DEF dosing unit.

CM22194,0000A85 -19-07JUN21-1/1

Change Diesel Exhaust Fluid (DEF) Dosing Unit Filter

CAUTION: Avoid contact with eyes. In case of contact, immediately flush eyes with large amounts of water for a minimum of 15 minutes. Reference the Materials Safety Data Sheet (MSDS) for additional information.

IMPORTANT: If DEF is spilled or contacts any surface other than the storage tank, immediately clean the surface with clear water. DEF is corrosive to painted and unpainted metallic surfaces and can distort some plastic and rubber components.

Spilled DEF, if left to dry or if only wiped away with a cloth, leaves a white residue. Improperly cleaned DEF spill can interfere with diagnosis of Selective Catalytic Reduction (SCR) system leakage problems.

NOTE: See your John Deere equipment technical manual or OEM manufacturer's technical manual for DEF dosing unit filter location.

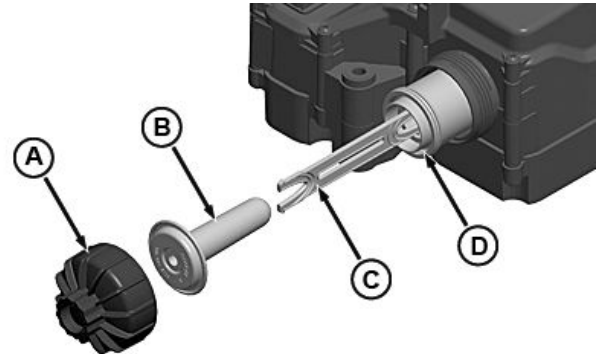
IMPORTANT: Avoid system and filter damage. Ensure that DEF system is not frozen before changing filter. If system is frozen, operate engine until system has thawed completely.

1. Remove DEF dosing unit filter cover (A).
2. Remove and discard DEF dosing unit filter equalizing element (B).

NOTE: DEF dosing unit filter tool (C) is supplied with replacement filter.

3. Insert "Black" end of DEF dosing unit filter tool (C) into DEF dosing unit filter (D) until CLICK is felt or heard indicating DEF dosing unit filter tool is fully engaged.

NOTE: A tool such as a screwdriver can be inserted into DEF dosing unit filter tool slot to assist removal.



DEF Dosing Unit Filter

- | | |
|---|--|
| A—DEF Dosing Unit Filter Cover | C—DEF Dosing Unit Filter Tool (supplied with new filter) |
| B—DEF Dosing Unit Filter Equalizing Element | D—DEF Dosing Unit Filter |

4. Pull DEF dosing unit filter tool and DEF dosing unit filter from DEF dosing unit. Discard DEF dosing unit filter and DEF dosing unit filter tool.
5. Clean DEF dosing unit threads and mating surfaces with distilled water.
6. Lubricate DEF filter O-rings with clean DEF. Carefully insert DEF dosing unit filter into DEF dosing unit.
7. Install new DEF dosing unit filter equalizing element into DEF dosing unit filter.
8. Install DEF dosing unit filter cover and tighten to specification.

Specification

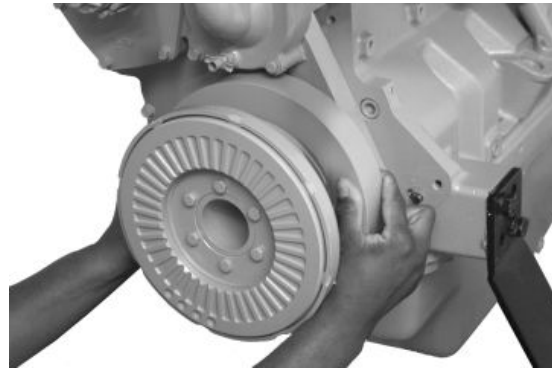
DEF Dosing Unit Filter	
Cover—Torque.....	23 N·m (204 lb·in)

CM22194,0000A86 -19-07JUN21-1/1

Checking Crankshaft Vibration Damper

Crankshaft vibration damper is not repairable. For engine equipped with elastomeric crankshaft vibration damper replace every 4500 hours or 60 months, whichever comes first. For engines equipped with viscous crankshaft vibration damper replace at major engine overhaul. Also replace viscous crankshaft vibration damper when short block, complete block, or remanufactured basic engine is installed.

- Carefully inspect crankshaft vibration damper for cracks.
- Grasp crankshaft vibration damper with both hands and attempt to turn it in both directions. If rotation is felt, crankshaft vibration damper is defective and should be replaced.



Dual Crankshaft Vibration Damper

RG7369 —UN—05JAN98

CM22194,0000A54 -19-18MAY21-1/1

Adjusting Valve Clearance

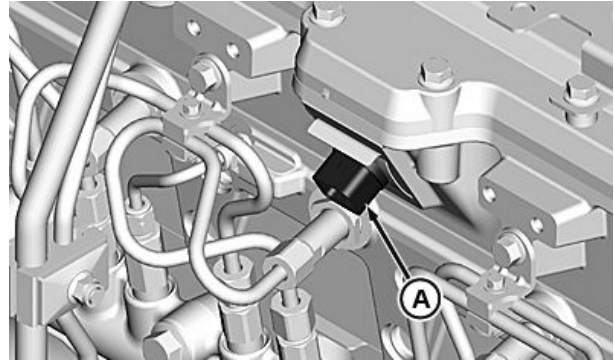
CAUTION: To prevent accidental starting of engine while performing valve adjustments, always disconnect **NEGATIVE (—)** battery terminal.

IMPORTANT: Valve clearance **MUST BE** adjusted with engine **COLD**. Accurate valve adjustment is critical for maximum engine performance.

NOTE: For critical steps including proper removal and installation of turbocharger and piping, please follow the procedures in the correct CTM.

1. Disconnect main engine harness (A) from fuel injector harness at the valve cover spacer. Gently pull any harness leads away from the valve cover. Let the harness leads hang off the side of the engine so the valve cover can be removed easily.

NOTE: The necessity of this step will vary by application. Removal of turbocharger may not be required to remove rocker arm cover and access valve actuation components.



Disconnect Harness

A—Fuel Injection Harness Connector

2. Remove turbocharger if required.

CM22194,0000A55 -19-18MAY21-1/6

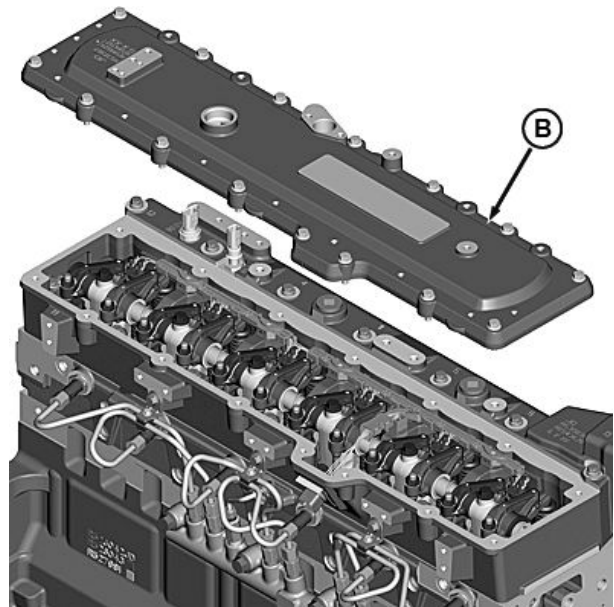
3. Remove rocker arm cover (B) with vent tube.

IMPORTANT: Visually inspect contact surfaces of valve tips and rocker arm wear pads. Check all parts for excessive wear, breakage, or cracks. Replace parts that show visible damage.

Rocker arms that exhibit excessive valve clearance should be inspected more thoroughly to identify damaged parts.

4. Disconnect injector harness from all six injectors and gently pull away from the valve area.

B—Rocker Arm Cover



Remove Rocker Arm Cover

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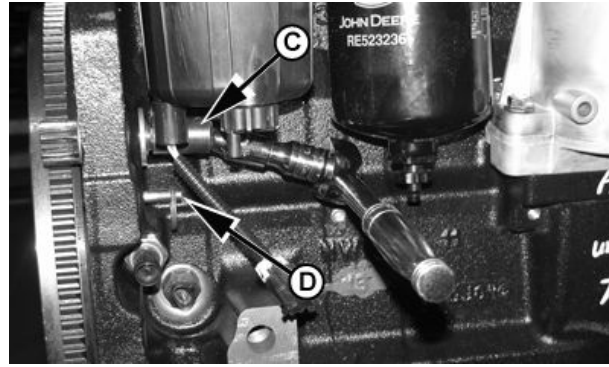
CM22194,0000A55 -19-18MAY21-2/6

5. Remove plastic plugs from cylinder block bores and install JDG820 Flywheel Turning Tool (C) and JDE81-4 Timing Pin (D).

NOTE: If the rocker arms for No. 1 (front) cylinder are loose, the engine is at No. 1 top dead center compression. If the rocker arms for No. 6 (rear) cylinder are loose, the engine is at No. 6 top dead center.

A—Wiring Harness
B—Rocker Arm Cover

C—JDG820 Flywheel Turning
Tool
D—JDE81-4 Timing Pin

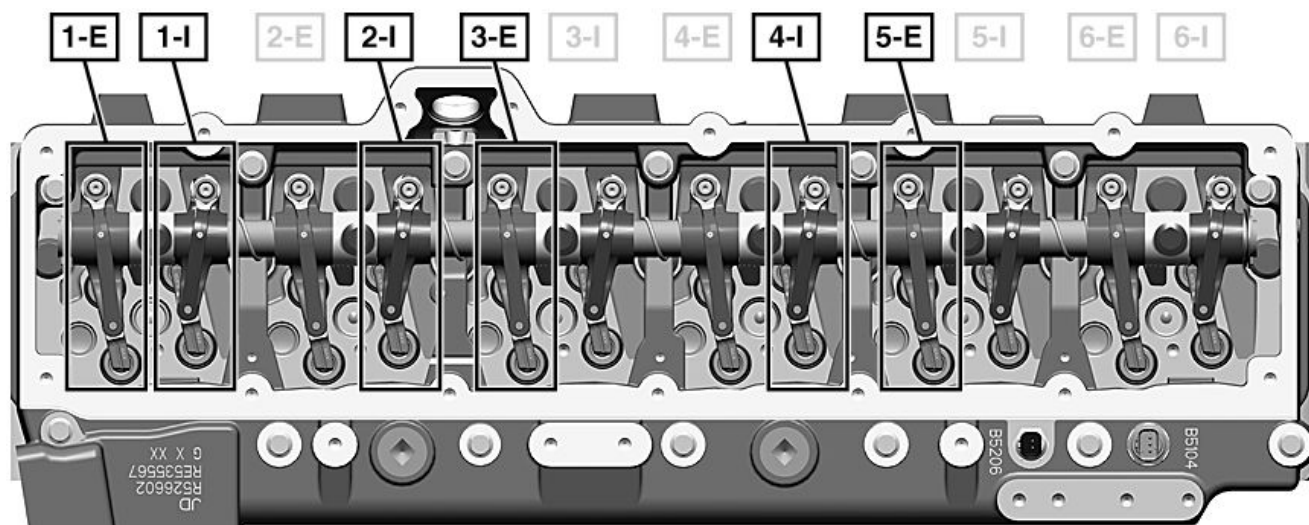


Flywheel Turning Tool and Timing Pin

RG13871 —UN—07FEB05

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CM22194,0000A55 -19-18MAY21-3/6

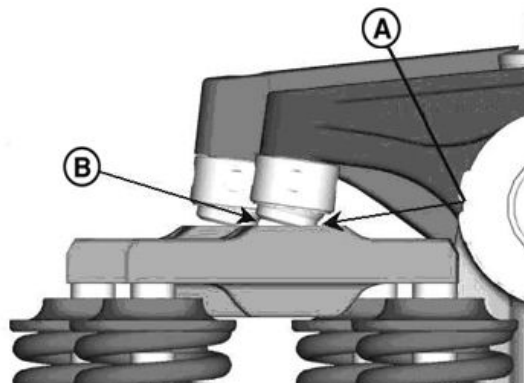


Valve Adjusting Sequence - No. 1 Cylinder at TDC

6. Rotate engine with the flywheel turning tool until timing pin engages timing hole in flywheel.

NOTE: To assist in adjusting valve clearance, push the rocker arm foot forward (A) for easier feeler gauge access (B)

7. With engine lock-pinned at "TDC" of No. 1 piston's compression stroke, use a bent feeler gauge to check valve clearance on Nos. 1, 3, and 5 exhaust valves and Nos. 1, 2, and 4 intake valves. If out of specification, loosen lock nut on rocker arm adjusting screw. Turn adjusting screw until feeler gauge slips with a slight drag. Hold the adjusting screw from turning with screwdriver and tighten lock nut to specifications.



Valve Clearance Setting Procedure

Specification

Intake Valve Clearance
(Rocker Arm-to-Valve
Bridge With Engine
Cold)—Clearance..... 0.35 mm
(0.014 in.)

Exhaust Valve Clearance
(Rocker Arm-to-Valve
Bridge With Engine
Cold)—Clearance..... 0.63 mm
(0.025 in.)

Valve Adjusting Screw
Lock Nut—Torque..... 27 N·m (20 lb.-ft.)

Recheck clearance again after tightening lock nut.
Readjust clearance as necessary.



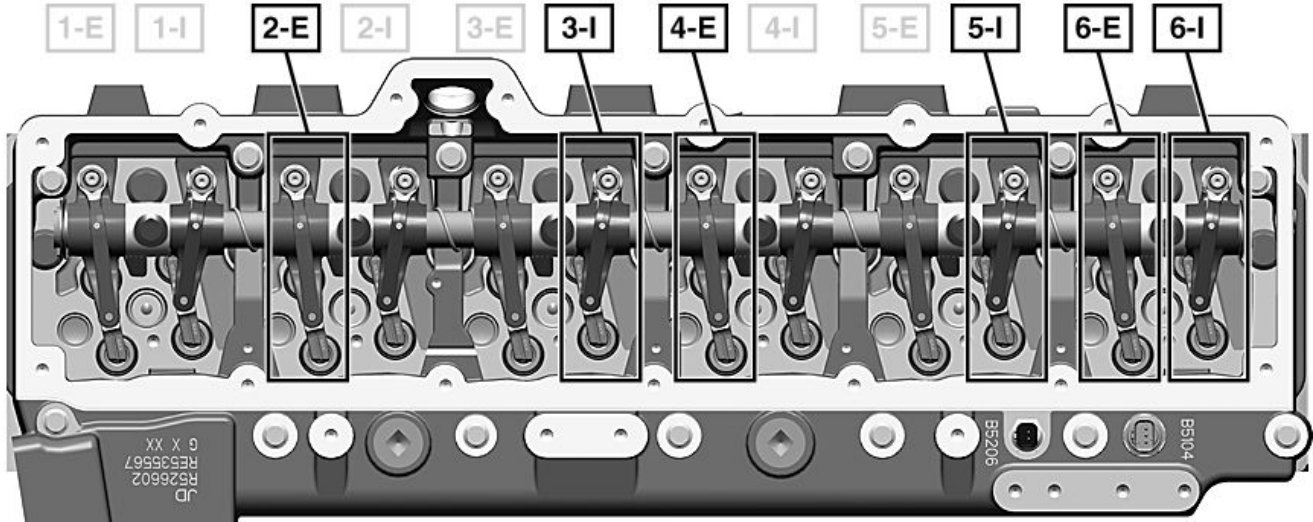
Checking Valve Clearance Using Bent Feeler Gauge

A—Rocker Arm Foot

B—Feeler Gauge Access

Continued on next page

CM22194.0000A55 -19-18MAY21-4/6



Valve Adjusting Sequence - No. 6 Cylinder at TDC

8. Remove timing pin and rotate flywheel 360° and install timing pin. No. 6 piston is now at "TDC" of its compression stroke. Rocker arms for No. 6 piston should be loose.
9. Check and adjust valve clearance to the same specifications on Nos. 2, 4, and 6 exhaust and Nos. 3, 5, and 6 intake valves.

10. Install injector wiring harness.

NOTE: Torque wiring harness captured nuts on injectors to 2.25 N·m (20 lb.-in.).

11. Install rocker arm cover gasket.

CM22194,0000A55 -19-18MAY21-5/6

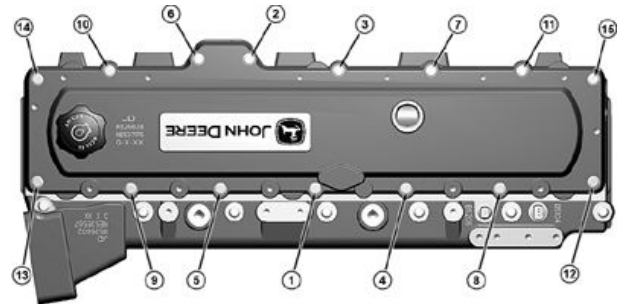
12. Install rocker arm cover (B) with vent tube and tighten all 15 cap screws finger tight in sequence shown. Then tighten cap screws in same sequence to specification.

Specification

Rocker Arm Cover Cap

Screws—Torque..... 35 N·m (26 lb.-ft.)

13. Reinstall turbocharger with new manifold gasket. This step is only required if the turbocharger was removed for valve cover access.
14. Reconnect all harness connections which were previously disconnected.
15. Remove timing pin and flywheel turning tool. Install plastic plugs in block.



Rocker Arm Cover Torque Sequence

CM22194,0000A55 -19-18MAY21-6/6

Lubrication & Maintenance — 4500 Hours/60 Months

Changing Crankshaft Vibration Damper

Crankshaft vibration damper is not repairable. For engine equipped with elastomeric crankshaft vibration damper replace every 4500 hours or 60 months, whichever comes first. For engines equipped with viscous crankshaft vibration damper replace at major engine overhaul. Also

replace viscous crankshaft vibration damper when short block, complete block, or remanufactured basic engine is installed.

NOTE: On engines equipped with dual crankshaft vibration dampers, always replace both crankshaft vibration dampers as a matched set.

CM22194,0000A58 -19-18MAY21-1/1

Flushing And Refilling Cooling System

⚠ CAUTION: 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 relieve pressure before removing completely.

NOTE: When John Deere COOL-GARD II is used, the drain interval is 6000 hours or 72 months.

If COOL-GARD II is not used, the drain interval is reduced to 2000 hours or 24 months of operation.

Drain old coolant, flush the entire cooling system, test thermostat, and fill with recommended clean coolant per the following procedure:

1. Pressure test entire cooling system and pressure cap if not previously done. (See Pressure Testing Cooling System in the Lubrication & Maintenance — 500 Hours/12 Months Section.)



High Pressure Fluids

TS281 —UN—15APR13

Continued on next page

CM22194,0000A59 -19-18MAY21-1/2

2. Slowly open the engine cooling system filler cap or radiator cap to relieve pressure and allow coolant to drain faster.
3. Open the engine block drain valve (B) on left side of engine. Drain all coolant from engine block (B).
4. Open radiator drain valve and drain coolant from radiator.
5. Remove thermostat (E) at this time, if not previously done. Install cover (without thermostats) and tighten cap screws (D) to specifications.

Specification

Thermostat Cover Cap

Screws—Torque..... 73 N·m (54 lb.-ft.)

6. Test thermostat (E) opening temperature. (See Testing Thermostat in the Lubrication & Maintenance — 6000 Hours/72 Months Section.)

CAUTION: Do not run engine longer than 10 minutes. Doing so may cause engine to overheat which may cause burns when radiator water is draining.

7. Close all drain valves after coolant has drained.
8. Fill the cooling system with clean water. Run the engine about 10 minutes to stir up possible rust or sediment.
9. Stop engine and immediately drain the water from system before rust and sediment settle.
10. After draining water, close drain valves and fill the cooling system with clean water and a heavy duty cooling system cleaner such as Fleetguard® Restore™ or Restore PLUS™. Follow manufacturer's directions on label.
11. After cleaning the cooling system, drain cleaner and fill with water to flush the system. Run the engine about 10 minutes, then drain out flushing water.
12. Close all drain valves on engine and radiator. Install thermostat (E) into thermostat housing (F). Install cover (A) and tighten cap screws (D) to specifications.

Specification

Cast Iron Thermostat

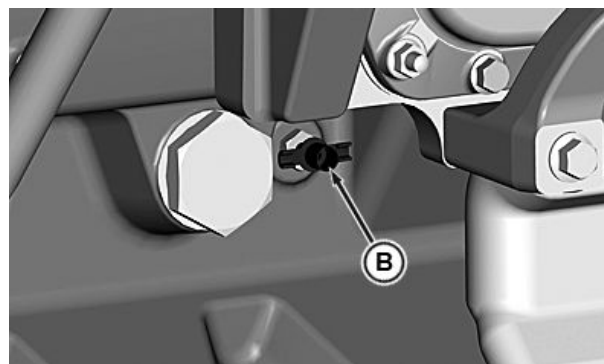
Cover Cap

Screws—Torque..... 73 N·m (54 lb.-ft.)

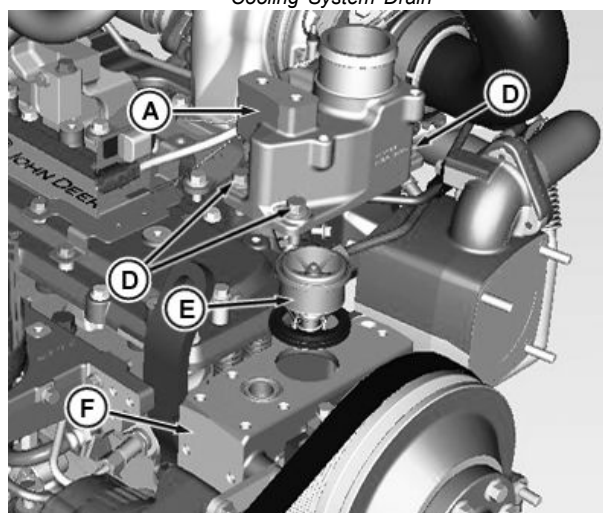
Fleetguard is a trademark of Cummins Engine Company, Inc.

Restore is a trademark of Fleetguard Inc.

Restore PLUS is a trademark of Fleetguard Inc.



Cooling System Drain



Thermostat

A—Thermostat Cover
B—Block Drain Valve
D—Thermostat Cover Cap
Screws

E—Thermostat
F—Thermostat Housing

13. Perform Bleeding Air From Cooling System in the Lubrication and Maintenance — 6000 Hours/72 Months Section.

14. After running the engine, check coolant level and entire cooling system for leaks.

CM22194,0000A59 -19-18MAY21-2/2

RG16529 —UN—22OCT08

RG23592 —UN—28JUN13

Bleeding Air From Cooling System

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

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



TS281 —UN—15APR13

CM22194,0000A5A -19-18MAY21-1/2

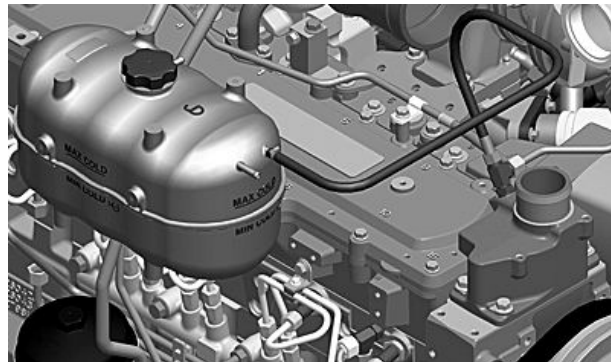
IMPORTANT: Use coolant as specified in Fuel, Lubricants, and Coolant section.

1. Remove cap from surge tank of cooling system.
2. Begin filling coolant surge tank.
3. Complete filling surge tank to **MAX COLD** mark.

NOTE: Coolant level in surge tank will drop the first few cycles unless there is a leak.

4. Start engine and run at idle for 1 to 5 minutes.
5. Shut off engine. Fill surge tank to **MAX COLD** mark and install surge tank cap.
6. Start engine and warm up for 15 minutes. If surge tank loses coolant to ground, repeat previous step and top off top tank until coolant loss stops. Losing coolant to ground indicates air in system is being discharged through surge tank.
7. Shut off engine and allow to cool. Observe coolant level dropped below **MAX COLD** in surge tank.

*NOTE: It is normal for coolant level to go down with first few cycles and then range between **MAX COLD** and **MIN COLD**.*



RG19794 —UN—14DEC10

IMPORTANT: It is normal for surge tank to be partially full of air when cap is removed and system completely free of air. When inspecting surge tank, if it is **MAX COLD** and **MIN COLD**, do not add additional coolant. Topping off surge tank may cause coolant to be expelled onto the ground and may cause coolant pump cavitation.

8. Monitor surge tank for two days. Refill surge tank as required.

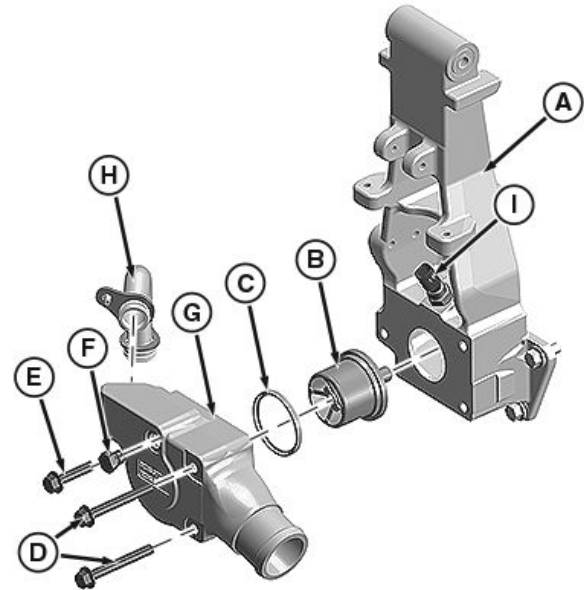
CM22194,0000A5A -19-18MAY21-2/2

Testing Thermostat

CAUTION: Explosive release of fluids from pressurized cooling system can cause serious burns. Do not drain coolant until coolant temperature is below operating temperature. Always loosen cooling system filler cap, radiator cap, or drain valve slowly to relieve pressure.

Thermostat Removal — Option A

1. Visually inspect the area around the thermostat housing (A) and cover (G) for leaks. Partially drain coolant from the cooling system.
2. Remove cap screws (C) and (D) from thermostat cover (G).
3. Remove the coolant bypass tube (H) from the thermostat cover (G).
4. Remove and Inspect thermostat (B).
5. Inspect thermostat seal (C) and replace if necessary.
6. Test thermostat (E) for proper opening temperature.



Remove Thermostat

A—Thermostat Housing
B—Thermostat
C—Thermostat Seal
D—M10 X 1.5 X 80 Cap Screw
(2 used)
E—M10 X 1.5 X 45 Cap Screw
(1 used)

F—Plug
G—Thermostat Cover
H—Bypass Tube
I—Coolant Temperature
Sensor

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CM22194,0000A5B -19-24SEP21-1/7

RG33932 — UN—10JUN21

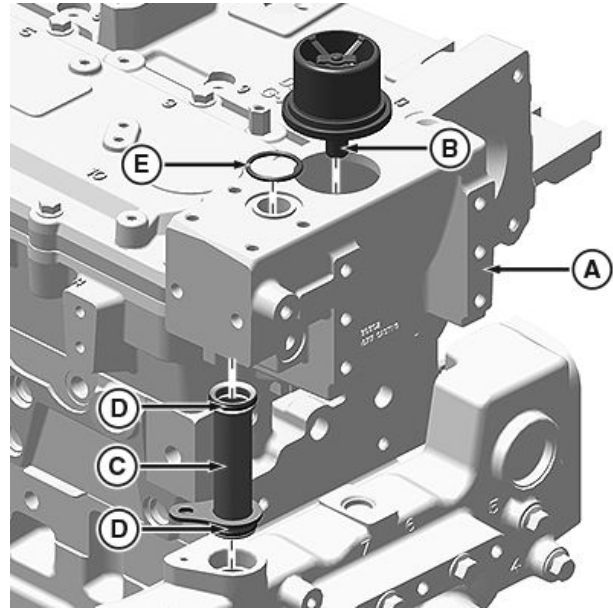
Thermostat Removal — Option B

CAUTION: Avoid personal injury. Explosive release of fluids from pressurized cooling system can cause serious burns. Do not drain coolant until coolant temperature is below operating temperature. Always loosen cooling system filler cap, radiator cap, or drain valve slowly to relieve pressure.

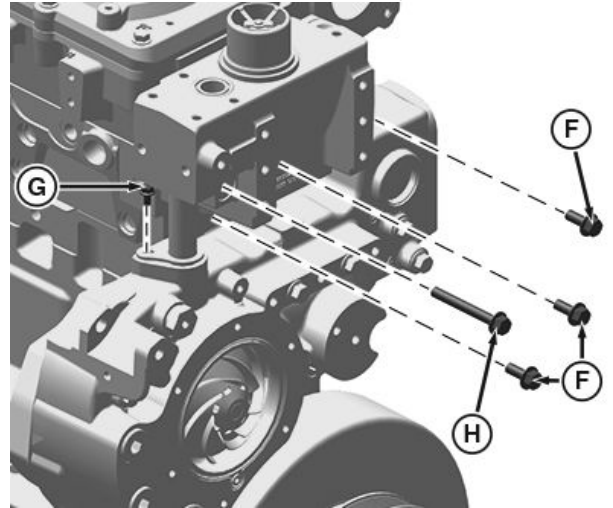
1. Drain coolant.
2. Remove thermostat (B) from thermostat housing (A).
3. Remove cap screws (F and H) and thermostat housing (A). Discard O-ring (E).
4. Remove cap screw (G) and bypass tube (C). Discard O-rings (D).

A—Thermostat Housing
B—Thermostat
C—Bypass Tube
D—O-Ring (2 used)

E—O-Ring
F—M10 X 25 mm Cap Screw (3 used)
G—M6 X 12 mm Cap Screw
H—M10 X 80 mm Cap Screw



Thermostat Removal — Option B



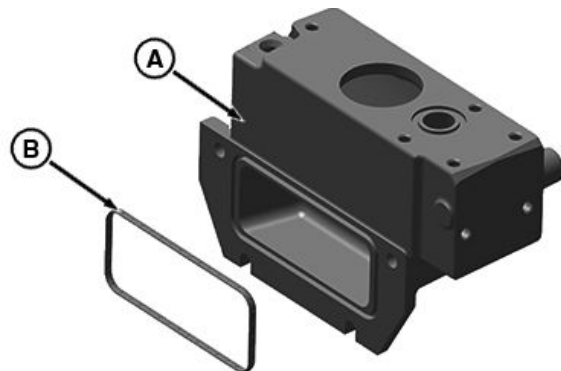
Thermostat Housing Removal — Option B

CM22194,0000A5B -19-24SEP21-2/7

5. Remove gasket (B) from thermostat housing (A). Discard gasket (B).

A—Thermostat Housing

B—Gasket



Gasket Removal — Option B

Continued on next page

CM22194,0000A5B -19-24SEP21-3/7

Testing Thermostat Opening Temperature

1. Visually inspect thermostat (E) for corrosion or damage.
2. Inspect thermostat (E) with wiggle wire in vent notch. If wire movement is restricted, replace thermostat if cleaning does not free movement.

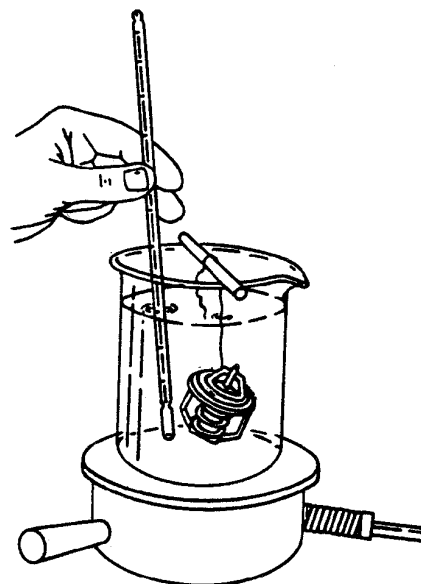
CAUTION: DO NOT allow thermostat or thermometer to rest against the side or bottom of container when heating water. Either may rupture if overheated.

3. Suspend thermostat and a thermometer in a container of water.
4. Stir the water as it heats. Observe opening action of thermostat and compare temperatures with specification given in chart below.

NOTE: Due to varying tolerances of different supplies, initial opening, and full open temperatures may vary slightly from specified temperatures.

THERMOSTAT TEST SPECIFICATIONS

Rating	Initial Opening (Range)	Full Open (Nominal)
83 °C (183 °F)	83—97 °C (183—203 °F)	92—95 °C (257 °F)



Thermostat and Thermometer in Water

5. Remove thermostat (E) and observe its closing action as it cools. In ambient air the thermostat should close completely. Closing action should be smooth and slow.
6. Replace thermostat (E) if it is found to be defective.

Continued on next page

CM22194,0000A5B -19-24SEP21-4/7

RG5971 —UN—23NOV97

Thermostat Installation — Option A

1. Install thermostat (B) in housing (A).
2. If necessary, install new thermostat seal (C) in thermostat cover (G).
3. Install thermostat cover (G) and tighten three cap screws (C) and (D) to specifications.

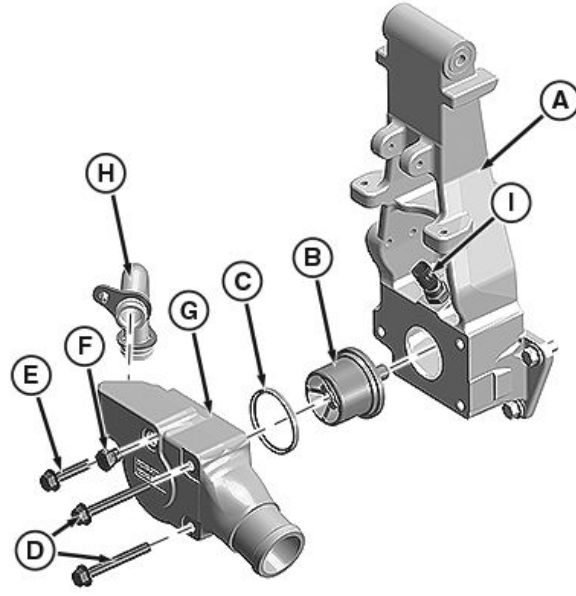
Specification

Thermostat Cover Cap

Screws—Torque..... 73 N·m (54 lb·ft)

IMPORTANT: Prevent damage to cooling system components and EGR cooler (if equipped). Air must be expelled from cooling system when system is refilled.

4. Remove Plug (F) or coolant temperature sensor (I). Refill cooling system.
5. Pressure test the cooling system a second time to be sure the thermostat cover (G) is sealed. See [Pressure Testing Cooling System](#) in the Lubrication & Maintenance — 500 Hours/12 Months Section.



Remove Thermostat

- | | |
|--|------------------------------|
| A—Thermostat Housing | F—Plug |
| B—Thermostat | G—Thermostat Cover |
| C—Thermostat Seal | H—Bypass Tube |
| D—M10 X 1.5 X 80 Cap Screw
(2 used) | I—Coolant Temperature Sensor |
| E—M10 X 1.5 X 45 Cap Screw
(1 used) | |

CM22194,0000A5B -19-24SEP21-5/7

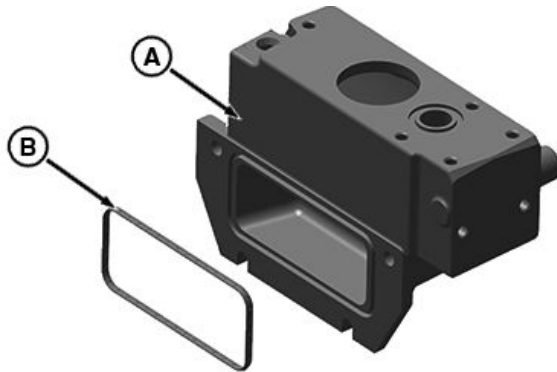
RG33932 —UN—10JUN21

Thermostat Installation — Option B

1. Install gasket (B) on thermostat housing (A).

A—Thermostat Housing

B—Gasket



Gasket Installation — Option B

Continued on next page

CM22194,0000A5B -19-24SEP21-6/7

RG34448 —UN—25AUG21

2. Install thermostat (B) into thermostat housing (A).
3. Install O-ring (E) on thermostat housing (A).
4. Lubricate O-rings (D) with soap and install on bypass tube (C).
5. Install bypass tube (C) into thermostat housing (A) and timing gear cover as shown.
6. Install thermostat housing (A) on cylinder block with cap screws (F and H) and finger tighten.
7. Install bypass tube (C) with cap screw (G). Tighten cap screw to specification.

Specification

Cap Screw (G)—Torque..... 15 N·m (132 lb·in)

8. Tighten cap screws (F and H) to specification.

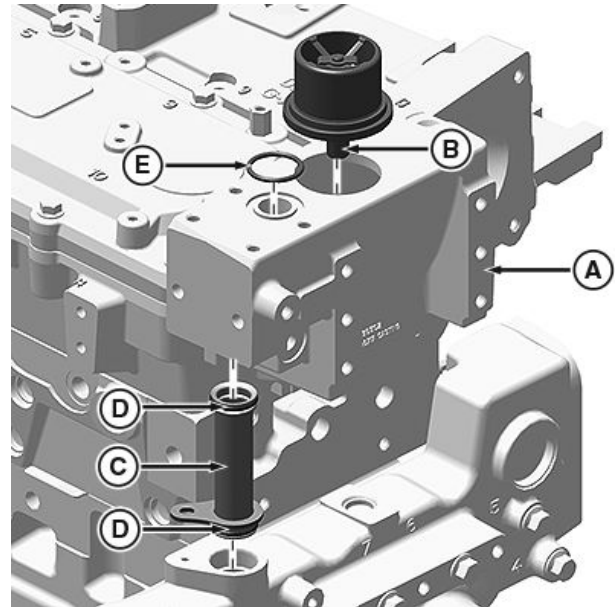
Specification

Cap Screw (F and

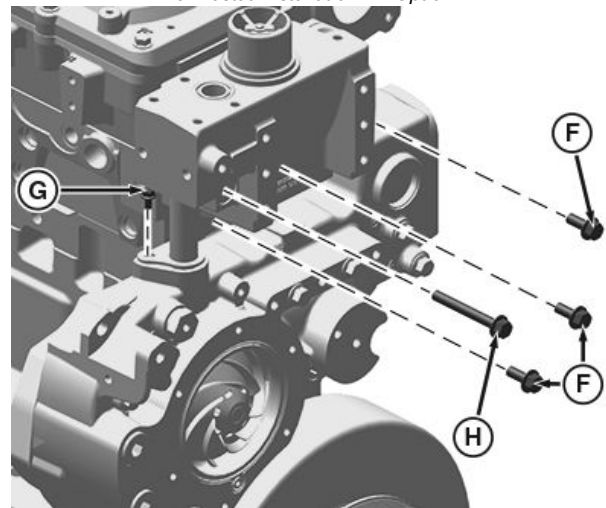
H)—Torque..... 61 N·m (45 lb·ft)

A—Thermostat Housing
B—Thermostat
C—Bypass Tube
D—O-Ring (2 used)

E—O-Ring
F—M10 X 25 mm Cap Screw (3 used)
G—M6 X 12 mm Cap Screw
H—M10 X 80 mm Cap Screw



Thermostat Installation — Option B



Thermostat Housing Installation — Option B

CM22194,0000A5B -19-24SEP21-7/7

RG34568 —UN—24AUG21

RG34569 —UN—27AUG21

Change Diesel Exhaust Fluid (DEF) In-Line Filter

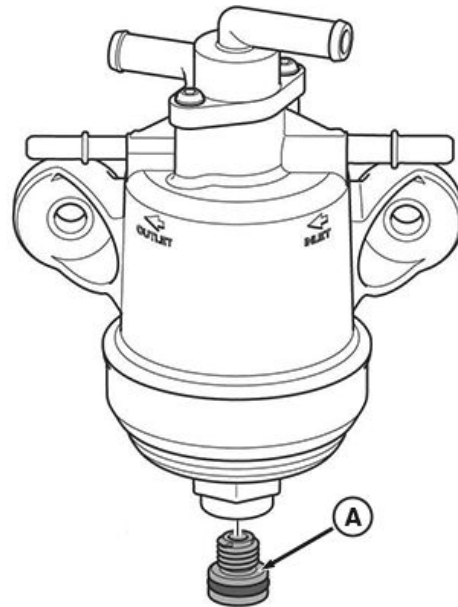
CAUTION: Avoid possible personal injury. In case of DEF contact, immediately flush eyes with large amounts of water for a minimum of 15 minutes. Reference the Materials Safety Data Sheet (MSDS) for additional information. Do not ingest DEF. In the event DEF is ingested, contact a physician immediately. Reference the Materials Safety Data Sheet (MSDS) for additional information.

IMPORTANT: Avoid corrosion of vehicle parts or surfaces. If DEF is spilled or contacts any surface other than the storage tank, immediately clean the surface with clear water. DEF is corrosive to painted and unpainted metallic surfaces and can distort some plastic and rubber components. Spilled DEF, if left to dry or if only wiped away with a cloth, will leave a white residue. Improperly cleaned DEF spill may interfere with diagnosis of Selective Catalytic Reduction (SCR) system leakage problems.

NOTE: See your John Deere equipment technical manual or OEM manufacturer's technical manual for in-line DEF filter location.

IMPORTANT: Avoid system and filter damage. Ensure that DEF system is not frozen before changing filter. If system is frozen, operate engine until system has thawed completely.

1. Remove drain plug with O-ring (A) and discard.



DEF Fluid Removal

A—Drain Plug with O-Ring

NOTE: Container must be DEF compatible and hold at least 300 mL (0.32 qt).

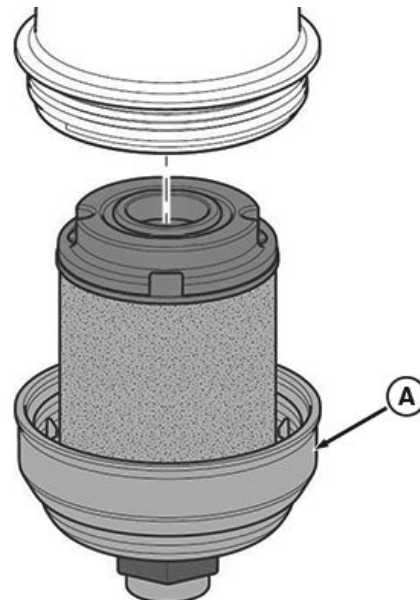
2. Drain DEF into a proper container.

CM22194,0000A5C -19-18MAY21-1/6

3. Rotate filter housing (A) counterclockwise and pull down.
4. Remove and discard filter from housing (A).

NOTE: If necessary, tap filter to loosen from filter housing (A).

A—Filter Housing



Filter Removal

Continued on next page

CM22194,0000A5C -19-18MAY21-2/6

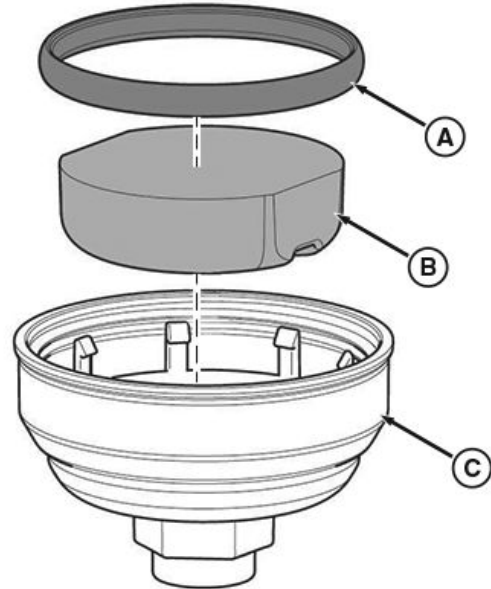
5. Remove and discard O-ring (A) and foam compensation element (B).

NOTE: Filter housing should be cleaned with clean DEF before installing new components to remove any sediment debris or contamination.

6. Install new O-ring (A) and foam compensation element (B) into filter housing (C).

A—O-Ring
B—Foam Compensation
Element

C—Filter Housing



Filter Housing Components

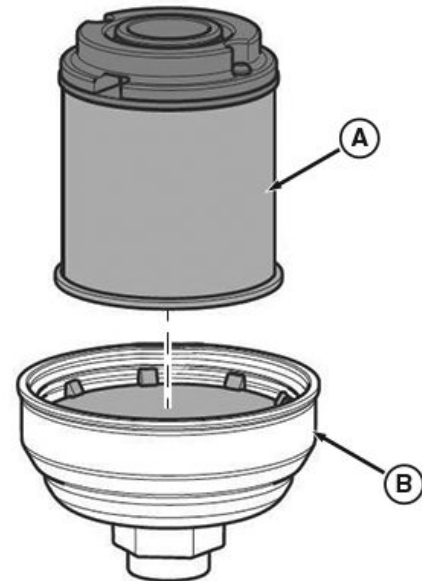
CM22194,0000A5C -19-18MAY21-3/6

RG30726 —UN—08AUG18

7. Install new filter (A) into filter housing (B).

A—Filter

B—Filter Housing



Filter Housing and Components Installation

Continued on next page

CM22194,0000A5C -19-18MAY21-4/6

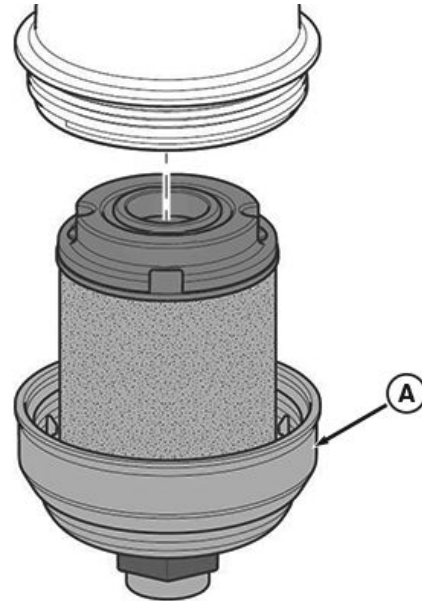
RG30725 —UN—08AUG18

8. Install filter housing (A) with O-ring, foam compensation element, and filter element.
9. Rotate filter housing (A) clockwise and tighten to specification.

Specification

In-Line DEF Filter
Housing—Torque.....25 N·m
(221 lb·in)

A—Filter Housing



In-Line DEF Filter Housing Installation

CM22194,0000A5C -19-18MAY21-5/6

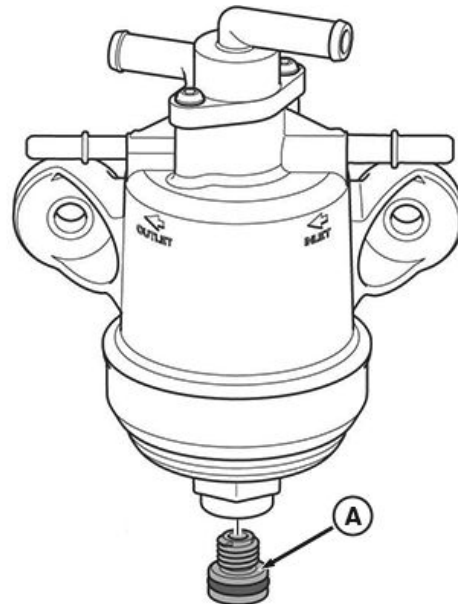
RG30727 —UN—08AUG18

10. Install new drain plug with O-ring (A). Tighten to specification.

Specification

In-Line DEF Filter Drain
Plug—Torque.....4 N·m
(35 lb·in)

A—Drain Plug with O-Ring



In-Line DEF Filter Drain Plug

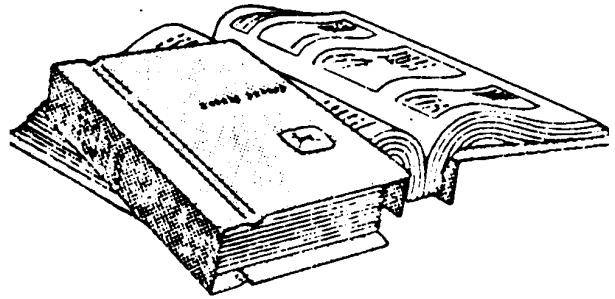
CM22194,0000A5C -19-18MAY21-6/6

RG30728 —UN—08AUG18

Service As Required

Additional Service Information

This is not a detailed service manual. If you want more detailed service information, contact the local John Deere dealer, engine distributor, or other service provider.



Component Technical Manuals

RG4624 —UN—15DEC88

CM22194,0000A5D -19-29MAY25-1/1

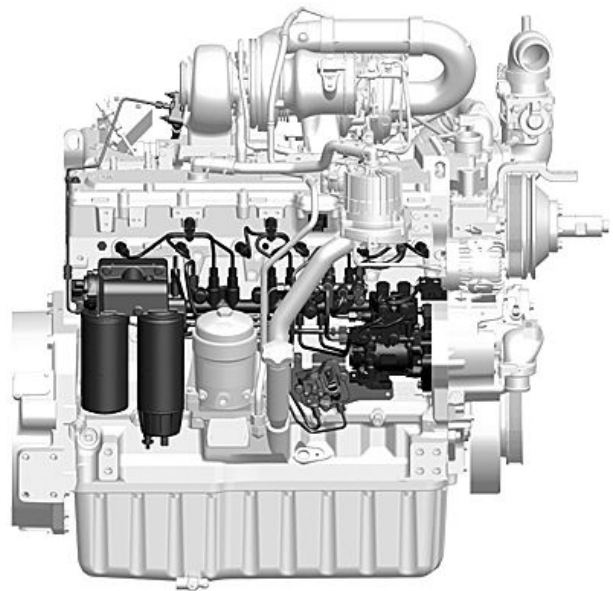
Do Not Modify Fuel System

IMPORTANT: Modification or alteration of the high-pressure fuel pump, the injection timing, or the fuel injectors in ways not recommended by the manufacturer will terminate the warranty obligation to the purchaser.

In addition, tampering with fuel system which alters emission-related equipment on engines may result in fines or other penalties, per EPA regulations or other local emission laws.

Do not attempt to service fuel pump, fuel rail, or fuel injectors yourself. Special training and special tools are required. Contact the local John Deere dealer, engine distributor, or other service provider.

Avoid seizure of internal precision parts in high-pressure fuel pump or fuel injection rail. Never steam clean or pour cold water on pump or rail while these components are warm from operation.



Fuel System

RG2243 —UN—15FEB13

CM22194,0000A5E -19-29MAY25-1/1

Drain Water From Fuel Filters

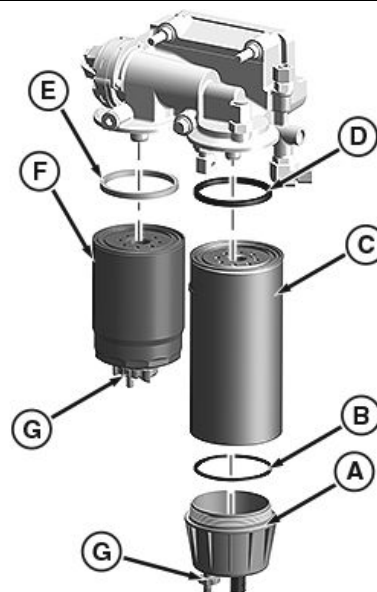
NOTE: Always perform regular fuel filter changes at 500 Hours/12 Months.

The primary fuel filter (C) is equipped with a sensor that detects the presence of water in the fuel filter element. This sensor will illuminate the red "STOP ENGINE" warning light on the diagnostic gauge and also sound an audible alarm. A Diagnostic Trouble Code (DTC), a description of the trouble code and the corrective action needed will be displayed on the diagnostic gauge.

ALWAYS STOP ENGINE IMMEDIATELY and drain water from the primary fuel filter (C) when these warnings occur.

1. Loosen drain valve (G) to drain water and debris as needed.
2. Retighten valve securely.

NOTE: Replace fuel filter elements when amber indicator on instrument panel lights up AND Diagnostic Trouble Code (DTC) indicates plugged fuel filters ("low fuel pressure"). To replace fuel filter elements, see Removing and Installing Fuel Filters in the Lubrication & Maintenance — 500 Hours/12 Months Section.



Drain Water From Fuel Filters

- | | |
|-----------------------|-------------------------|
| A—Sediment Bowl | E—O-ring |
| B—O-ring | F—Secondary Fuel Filter |
| C—Primary Fuel Filter | G—Drain Valve |
| D—O-ring | |

CM22194,0000A5F -19-11JUN21-1/1

RG33933 —UN—10JUN21

Adding Coolant

CAUTION: 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 relieve pressure before removing completely.

IMPORTANT: Never pour cold liquid into a hot engine, as it may crack cylinder head or block. DO NOT operate engine without coolant for even a few minutes.

John Deere Cooling System Sealer may be added to the radiator to stop leaks on a temporary or emergency basis only. DO NOT use any other stop-leak additives in the cooling system. Leaks should be permanently repaired as quickly as possible.

Coolant level should be kept between the MIN COLD and MAX COLD marks on surge tank. Add coolant as follows:

1. Remove surge tank cap.

IMPORTANT: When adding coolant to the system, use the appropriate coolant solution. (See



High Pressure Fluids

Diesel Engine Coolant (engine with wet sleeve cylinder liners) in the Fuels, Lubricants, and Coolants Section for mixing of coolant ingredients before adding to system.)

Do not overfill cooling system. A pressurized system needs space for heat expansion without overflowing.

2. Fill surge tank until coolant level is at the MAX COLD mark on surge tank.
3. Reinstall surge tank cap.

CM22194,0000A60 -19-18MAY21-1/1

TS281 —UN—15APR13

Cleaning Diesel Exhaust Fluid (DEF) Tank

CAUTION: Avoid contact with eyes. In case of contact, immediately flush eyes with large amounts of water for a minimum of 15 minutes. Reference the Materials Safety Data Sheet (MSDS) for additional information.

IMPORTANT: If DEF is spilled or contacts any surface other than the storage tank, immediately clean the surface with clear water. DEF is corrosive to painted and unpainted metallic surfaces and can distort some plastic and rubber components.

Spilled DEF, if left to dry or if only wiped away with a cloth, leaves a white residue. Improperly cleaned DEF spill can interfere with diagnosis of Selective Catalytic Reduction (SCR) system leakage problems.

If foreign material or fluid has been added to the DEF tank, drain the DEF tank, flush, and fill with new DEF.

If DEF quality is in question, pull a sample out of the DEF tank and place into a clear container. DEF should be crystal clear with a light ammonia smell. If DEF appears cloudy, has a colored tint, or has a profound ammonia smell, it is likely not within specification. DEF in this condition should not be used.

1. Remove drain plug (if equipped), and drain or siphon bad DEF from DEF tank.

NOTE: Cleaning can take place with DEF tank installed or removed.

2. Clean DEF tank with new DEF.

DEF must pass visual, smell, and concentration checks before running the engine. See Diesel Exhaust Fluid (DEF) – For Use In Selective Catalytic Reduction (SCR) Equipped Engines in the Fuels, Lubricants, and Coolants Section for more information.

3. Drain or siphon DEF tank.

NOTE: Repeat steps 2—3 until DEF tank has been cleaned.

4. **Early version:** Change DEF dosing unit filter and DEF tank header suction screen.

Later version: Change DEF dosing unit filter and DEF inline filter.

5. If removed, install DEF tank drain plug.

6. If removed, install DEF tank.

7. Fill DEF tank with new DEF.

8. Check DEF concentration with DEF refractometer, such as JDG11594 or JDG11684. The correct DEF concentration is 31.8% — 33.2%. Contact the local John Deere dealer, engine distributor, or other service provider for more information.

9. If DEF is not within specification, does not appear clear, or does not have a slight ammonia smell, contact the local John Deere dealer, engine distributor, or other service provider.

CM22194,0000A61 -19-29MAY25-1/1

Pre-Start Cleaning Guide

⚠ CAUTION: Avoid injury. Before cleaning machine, allow ample time for hot surfaces to cool.

IMPORTANT: Avoid machine damage. Do not direct high-pressure spray from hose output directly at or close to electrical connections and sensors.

Cleaning as needed is recommended. Clean more frequently during heavy machine use, and when weather conditions are dry.

- Check enclosed areas daily. Clean the engine and other enclosed areas of equipment to remove debris and any buildup of oil and grease. Keep the engine and engine compartment free of combustible material.
- Check for debris buildup daily on and around intake systems, exhaust systems, and intercooler piping systems. Verify that there are no holes or leaks in intake or exhaust systems. Do not allow debris to build up near hot exhaust components. Verify that hot exhaust components are cleaned as often as environmental conditions require.
- Inspect cooling system daily to determine whether cooling system needs cleaning. Visible buildup of

residue that blocks airflow may degrade machine performance and requires more frequent cleaning depending on environmental conditions.

- Inspect difficult to observe areas daily as conditions may require additional cleaning care to remove debris.
- Check for oil and fuel leaks daily. Replace or repair sources of leaks, including gaskets, seals, breather tubes, fittings, and fluid lines.

Maintenance and Service Reminders

- Keep surfaces free of grease and oil.
- Clean up hydraulic and other fluid leaks.
- Fuel Lines — Check for leaks, cracks, and kinks.
- Fuel Pumps — Check fittings, especially compression ring couplings, for cracks and leaks.
- Fuel Injectors — Check pressure and return lines for signs of leaks.
- When servicing fuel filter or draining water separator, avoid fuel spills. Immediately clean up any fuel spill.
- Check for transmission case venting system seepage, transmission case leakage, power steering cylinder leakage, or power steering line leakage.
- Check for loose electrical connectors, damaged wiring, corrosion, or poor connections.

CM22194,0000A62 -19-18MAY21-1/1

Replacing Air Cleaner Filter Elements

IMPORTANT: ALWAYS REPLACE primary air cleaner element when air filter restriction indicator shows a vacuum of 625 mm (25 in.) H₂O, is torn, or visibly dirty.

NOTE: This procedure applies to John Deere air cleaner kits. Refer to manufacturers' instructions for servicing air cleaners not supplied by John Deere.

1. Remove wing nut and remove canister cover shown in small illustration inset.
2. Remove wing nut (A) and remove primary element (B) from canister.
3. Thoroughly clean all dirt from inside canister.

NOTE: Some engines may have a dust unloader valve (C) on the air cleaner. If equipped, squeeze valve tip to release any trapped dirt particles.

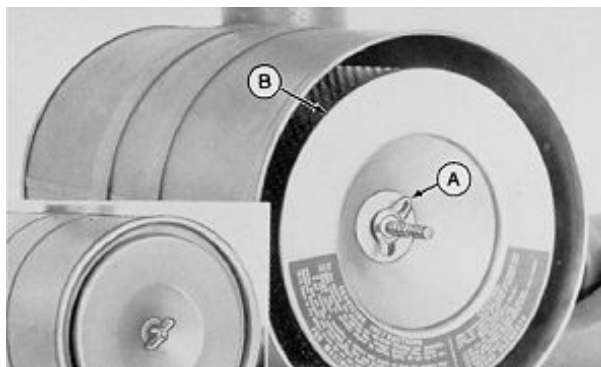
IMPORTANT: Remove secondary (safety) element (E) ONLY for replacement. DO NOT attempt to clean, wash, or reuse secondary element. Replacement of secondary element is usually necessary ONLY when primary element has a hole in it or when the element is not properly seated.

4. To replace secondary element, remove retaining nut (D) and secondary element (E). Immediately replace secondary element (E) with new element to prevent dust from entering air intake system.

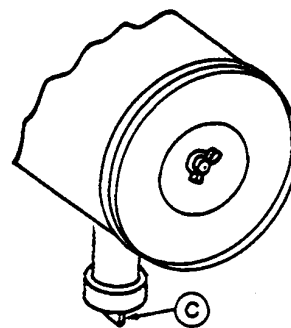
5. Install new primary element (B) and tighten wing nut (A) securely. Install cover assembly and tighten retaining wing nut (D) securely.

IMPORTANT: Whenever the air cleaner has been serviced or had cover removed, ALWAYS fully depress the air filter restriction indicator reset button (if equipped) to assure accurate readings.

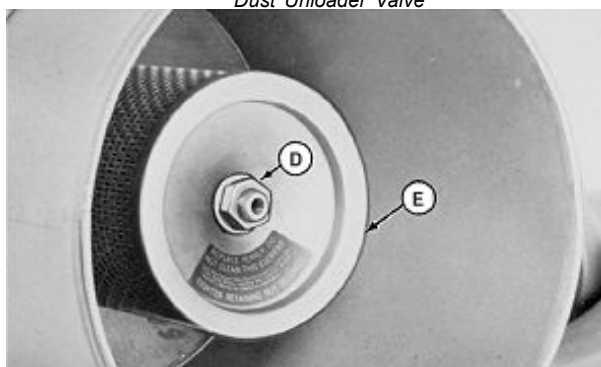
6. If equipped, fully depress air filter restriction indicator reset button and release to reset indicator.



Air Cleaner Primary Element



Dust Unloader Valve



Air Cleaner Secondary Element

A—Wing Nut
B—Primary Element
C—Unloader Valve

D—Retaining Nut
E—Secondary Element

CM22194,0000A63 -19-18MAY21-1/1

RG4686—UN—20DEC88

RG4687—UN—20DEC88

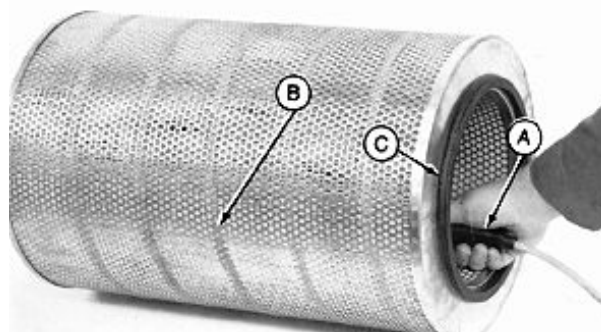
RG11068—UN—26JUN00

Inspecting Primary Air Filter Element

1. Hold a bright light (A) inside element and check carefully for holes. Discard any element which shows the smallest hole or rupture.
2. Be sure outer screen (B) is not dented. Vibration would quickly wear a hole in filter.
3. Be sure filter gasket (C) is in good condition. If gasket is damaged or missing, replace element.

IMPORTANT: Air cleaner MUST BE DRY before storing in plastic bag.

If the filter is to be stored for later use, place it in a plastic bag to protect it from dust and damage.



Inspecting Primary Air Filter Element

A—Light
B—Outer Screen

C—Gasket

RV4768 —UN—15DEC88

CM22194,0000A64 -19-18MAY21-1/1

Cleaning Primary Air Filter Element

CAUTION: Do not blow air from outside portion of filter with air nozzle. Wear safety glasses and remove bystanders.

IMPORTANT: This procedure only applies to dual John Deere air filter systems.

DO NOT clean air filter systems with single air filters.

Always replace secondary (safety) filter elements. DO NOT attempt to clean them.

1. Gently pat sides of element with palm of hand to loosen dirt. DO NOT tap element against a hard surface.

CAUTION: Only a special air cleaning gun (A) should be used. Concentrated air pressure from an ordinary air nozzle may severely damage filter element. Do not exceed 210 kPa (2.1 bar) (30 psi) when cleaning filter element.

2. Insert the cleaning gun into element, hold air nozzle about 25.4 mm (1.0 in.) from perforated metal retainer. Force air through filter from inside to outside and move



Cleaning Primary Element

A—Air Cleaning Gun

air gun up and down pleats to remove as much dirt as possible.

3. Repeat steps 1 and 2 to remove additional dirt.
4. Inspect element for damage after cleaning (see [Inspecting Primary Air Filter Element](#) in the Service As Required Section). Replace element if any damage is found.

RG11065 —UN—26JUN00

CM22194,0000A65 -19-11JUN21-1/1

Air Filter Element Storage

IMPORTANT: Air cleaner element MUST BE DRY before storing in plastic bag.

Seal element in a plastic bag and store in shipping container to protect against dust and damage.

CM22194,0000A66 -19-18MAY21-1/1

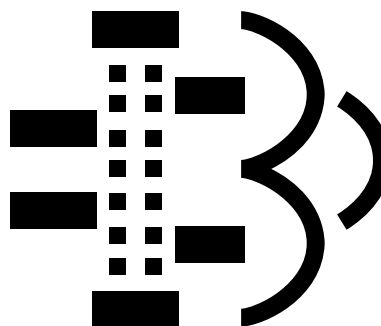
Cleaning the Exhaust Filter

The exhaust filter requires periodic maintenance. Some of the maintenance is transparent to the operator. During continuous heavy loads and other conditions, the engine creates enough heat to clean a small amount of soot build-up in the exhaust filter. When the exhaust filter has accumulated higher levels of soot, the ECU requests (depending on predefined user settings) an exhaust filter cleaning. During this request, move the equipment to a suitable location with adequate ventilation.

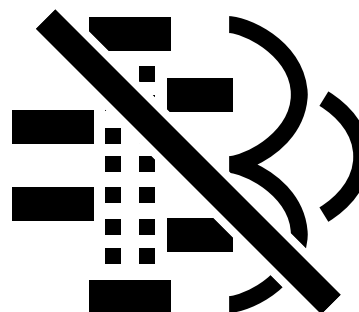
The following symbols may be displayed on the operator interface.

IMPORTANT: During an exhaust filter cleaning verify the area surrounding the engine is free of any flammable objects as temperatures can reach as high as 550°C (1022°F).

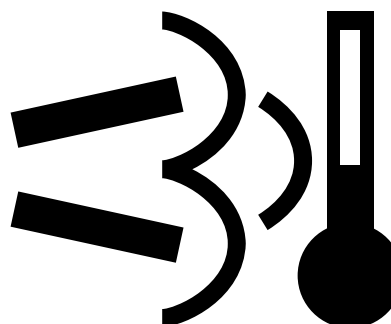
NOTE: For more information on the operator interface icons or exhaust filter cleaning procedures, see the **Aftertreatment System** section.



Exhaust Filter Cleaning is Needed



Exhaust Filter Cleaning is Disabled



Emission System Temperature is High or Exhaust Filter Cleaning is Underway

RG16860—UN—01APR10

RG16861—UN—01APR10

RG16862—UN—01APR10

CM22194,0000A67 -19-11JUN21-1/1

Replacing Fan/Alternator Belt

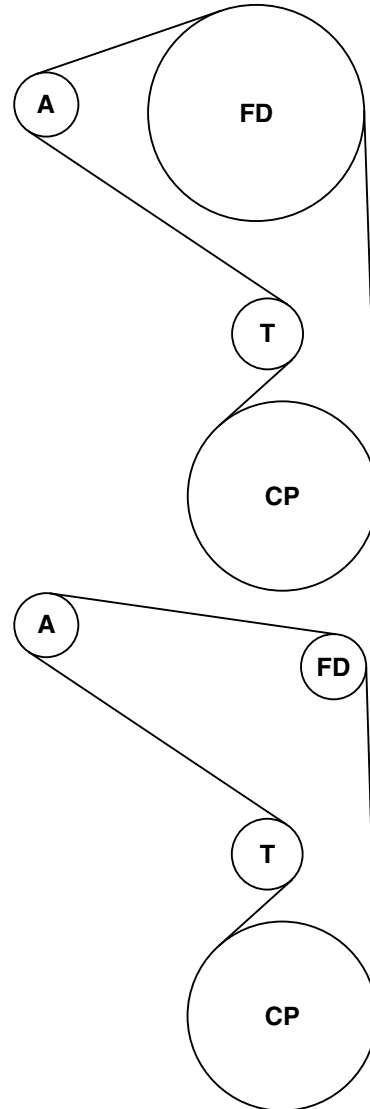
NOTE: While belt is removed, inspect pulleys and bearings. Rotate and feel for hard turning or any unusual sounds. If pulleys or bearings need replacement, contact the local John Deere dealer, engine distributor, or other service provider.

Refer to Checking Belt Wear in the Lubrication & Maintenance — 500 Hours/12 Months Section to determine if belt needs replacing.

1. Release tension on belt using a long-handled 1/2 in. drive tool in square hole on end of tensioner arm.
2. Remove belt from pulleys and discard belt.
3. Install new belt, be sure that belt is correctly seated in all pulley grooves.
4. Apply tension to belt with tensioner. Remove drive tool.
5. Start engine and check belt alignment.

A—Alternator
CP—Crankshaft Pulley
FC—Refrigerant (A/C)
Compressor (Optional)

FD—Fan Drive
T—Tensioner



Belt Routing Options

RG17694 —UN—30SEP09

CM22194,0000A68 -19-29MAY25-1/1

Checking Fuses

Check the following fuses located in the control panel wiring harness. Replace defective fuses.

- Main system fuse — 30 Amp

- ECU fuse — 25 Amp
- Low-Pressure Fuel Pump — 15 Amp
- Battery Power fuse — 30 Amp

See 9.0L Wiring Diagram 9 in the Troubleshooting Section.

CM22194,0000A69 -19-18MAY21-1/1

Checking Electrical Wiring And Connections

Check for loose or corroded wiring and connectors. Tighten connections or replace wiring as needed. Contact

the local John Deere dealer, engine distributor, or other service provider.

CM22194,0000A6A -19-29MAY25-1/1

Bleeding Fuel System

NOTE: Normally the fuel system on these engines is self-priming and self-bleeding, and does not require a bleeding procedure by the operator.

If engine will not start after filter changes, turn ignition key ON for 60 seconds to prime the fuel system. It may be necessary to turn the key off and on again to reprime the system before starting.

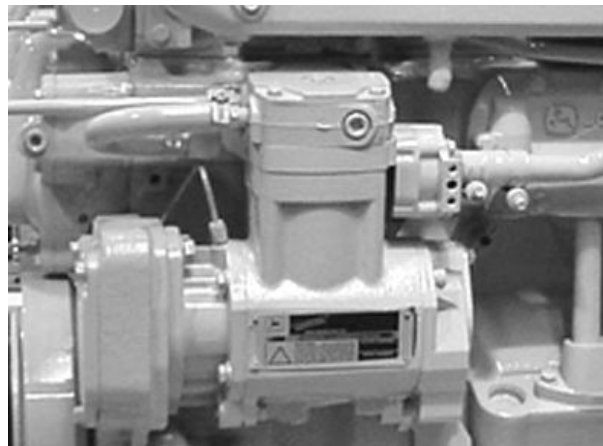
CM22194,0000A6B -19-18MAY21-1/1

Checking Air Compressors (If Equipped)

Air compressors are offered as an option with John Deere OEM engines to provide compressed air to operate air-powered devices.

Air compressors are engine-driven, piston type devices. They are either air cooled or cooled with engine coolant. The compressors are lubricated with engine oil. The compressor runs continuously by gear or spline drive by the auxiliary drive of the engine, but has "loaded" and "unloaded" operating modes. This is controlled by the vehicle's air system (refer to vehicle technical manual for complete air system checks and services).

Contact the local John Deere dealer, engine distributor, or other service provider for diagnostic and troubleshooting information. If diagnosis leads to an internal fault in the compressor, replace the complete compressor with a new or remanufactured unit.



Air Compressor (optional)

RG12738 —UN—07NOV02

CM22194,0000A6C -19-29MAY25-1/1

Checking Refrigerant (A/C) Compressor (If Equipped)

Contact the local John Deere dealer, engine distributor, or other service provider for any service or repairs to the air conditioning system.

CM22194,0000A6D -19-29MAY25-1/1

Checking Rear Power Take-Off (PTO)

CAUTION: Entanglement in rotating driveline can cause serious injury or death. Keep shield on PTO drive shaft between clutch housing and the engine driven equipment at all times during engine operation. Wear close fitting clothing. Stop the engine and be sure that PTO driveline is stopped before making adjustments.

If option 9201 or 9207 is ordered to make the rear PTO compatible with other manufacturer's drivelines, be sure that proper shielding is in place before operation.

CAUTION: Metal surfaces of PTO housing may be hot to the touch during operation or at shutdown.

The optional rear power take-off (PTO) from John Deere transfers engine power to auxiliary equipment or moving components which may be mounted on the vehicle or trailed behind. It is an engine-driven PTO which operates whenever the engine is running.

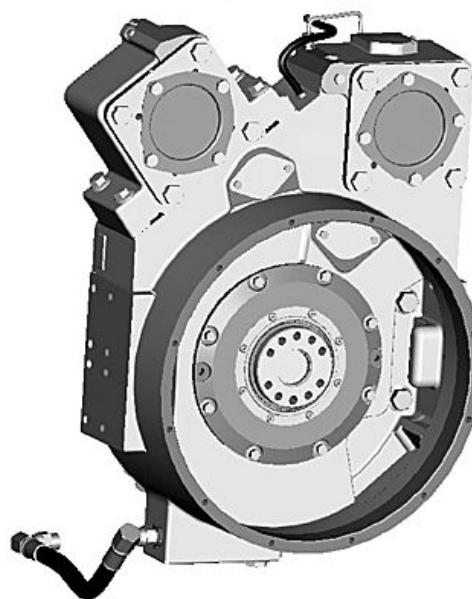
IMPORTANT: An additional 2.0 L (2.1 qt.) of oil must be added to the crankcase for lubrication of the rear PTO option. (See Engine Crankcase Oil Fill Quantities in the Specifications Section.)

Proper performance of the power take-off unit will be related to the care it is given. Periodically check for any oil leaks that may occur.

If the power take-off does not work properly, contact the local John Deere dealer, engine distributor, or other service provider.



Rotating Drivelines



John Deere Rear PTO (Optional)

TS 1644 —UN—22AUG95

RG17921 —UN—11NOV09

CM22194,0000A6E -19-29MAY25-1/1

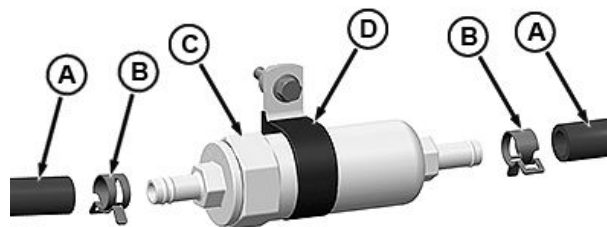
Replace Aftertreatment DEF Dosing System Coolant Filter

NOTE: Aftertreatment DEF dosing system coolant filter location varies by application.

On some applications, a replaceable filter is in-line with the coolant supply hose to the aftertreatment DEF tank header. This filters coolant as it flows to the aftertreatment DEF tank header. See your qualified engine service provider for diagnostic and troubleshooting information.

A—Coolant Supply Hose
B—Hose Clamp

C—Aftertreatment DEF Dosing System Coolant Filter
D—P-Clamp



Aftertreatment DEF Dosing System Coolant Filter Assembly

RG26975 —UN—31MAR15

CM22194,0000A6F -19-18MAY21-1/1

DEF Tank Inlet Screen — Installation

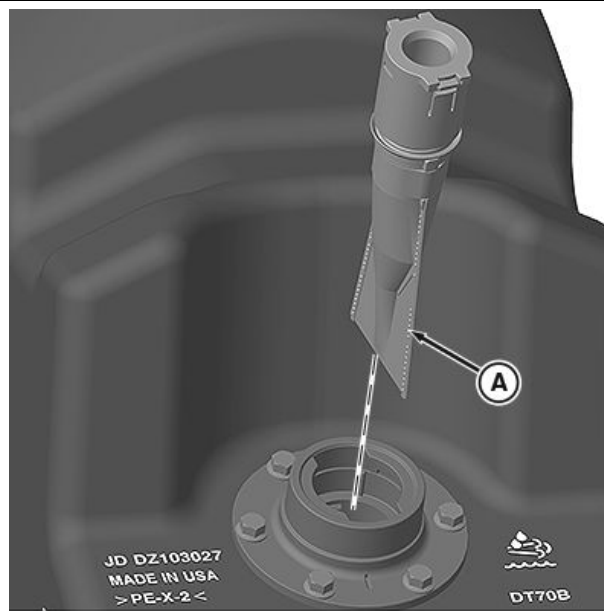
CAUTION: Avoid possible personal injury. In case of DEF contact, immediately flush eyes with large amounts of water for a minimum of 15 minutes. Reference the Materials Safety Data Sheet (MSDS) for additional information.

Do not ingest DEF. In the event DEF is ingested, contact a physician immediately. Reference the Materials Safety Data Sheet (MSDS) for additional information.

IMPORTANT: Avoid corrosion of vehicle parts or surfaces. If DEF is spilled or contacts any surface other than the storage tank, immediately clean the surface with clear water. DEF is corrosive to painted and unpainted metallic surfaces and can distort some plastic and rubber components.

Spilled DEF, if left to dry or if only wiped away with a cloth, will leave a white residue. Improperly cleaned DEF spill may interfere with diagnosis of Selective Catalytic Reduction (SCR) system leakage problems.

1. Thoroughly clean the area around the DEF tank inlet for any debris.
2. If there is any evidence that debris has entered the DEF tank, the tank must be drained and thoroughly cleaned.
3. Carefully insert DEF tank inlet screen (A) into DEF tank.
4. Ensure DEF tank inlet screen clicks and locks into place.
5. Install DEF tank cap.



A—DEF Tank Inlet Screen

RG31991—UN—10DEC19

CM22194,0000A70 -19-18MAY21-1/1

DEF Tank Inlet Screen — Removal

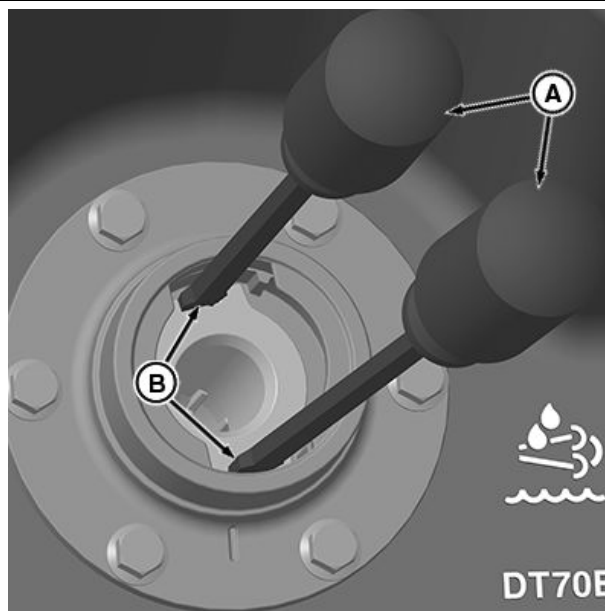
CAUTION: Avoid possible personal injury. In case of DEF contact, immediately flush eyes with large amounts of water for a minimum of 15 minutes. Reference the Materials Safety Data Sheet (MSDS) for additional information.

Do not ingest DEF. In the event DEF is ingested, contact a physician immediately. Reference the Materials Safety Data Sheet (MSDS) for additional information.

IMPORTANT: Avoid corrosion of vehicle parts or surfaces. If DEF is spilled or contacts any surface other than the storage tank, immediately clean the surface with clear water. DEF is corrosive to painted and unpainted metallic surfaces and can distort some plastic and rubber components.

Spilled DEF, if left to dry or if only wiped away with a cloth, will leave a white residue. Improperly cleaned DEF spill may interfere with diagnosis of Selective Catalytic Reduction (SCR) system leakage problems.

1. Thoroughly clean the area around the DEF tank inlet of any debris or contaminants.
2. Remove DEF tank cap.
3. Insert screwdrivers (A) at each tab location (B).
4. Gently push screwdrivers (A) towards DEF tank fill hole.



DEF Tank Inlet Screen Removal

A—Screwdriver (2 used)

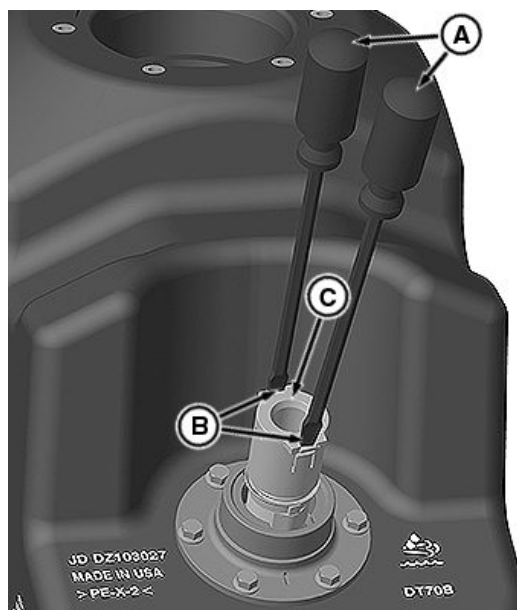
B—Locking Tab (2 used)

CM22194,0000A71 -19-18MAY21-1/2

5. While pushing locking tabs (B) towards DEF tank fill hole, pull screwdrivers upward to remove DEF tank inlet screen (C).
6. Inspect the DEF tank inlet screen (C) for damage or missing pieces.
7. If any damage or missing pieces are identified then the DEF tank must be drained and thoroughly clean of debris.
8. Clean or replace DEF tank inlet screen as required.

A—Screwdriver (2 used)
B—Locking Tab (2 used)

C—DEF Tank Inlet Screen



DEF Tank Inlet Screen Removal

CM22194,0000A71 -19-18MAY21-2/2

Troubleshooting

General Troubleshooting Information

In this section, there is a list of possible engine problems that may be encountered, accompanied by possible causes and corrections. The illustrated diagrams and troubleshooting information are to be considered general information. Final design of the overall system for your engine application may be different. Contact the local John Deere dealer, engine distributor, or other service provider for questions.

A reliable program for troubleshooting engine problems should include the following basic diagnostic process:

- Know the engine and all related systems.
- Study the problem thoroughly.
- Relate the symptoms to knowledge of engine functions.
- Diagnose the problem starting with the easiest things first.
- Double check before beginning the disassembly.

- Determine cause and make a thorough repair.
- After making repairs, operate the engine under normal conditions to verify that the problem and cause was corrected.

NOTE: All engines have electronic control systems which may send diagnostic trouble codes (DTCs) to signal problems, see Diagnostic Trouble Code Designations in Section 65.

1. *When DTCs are present, follow the appropriate DTC procedure.*
2. *If the problem is not corrected, contact the local John Deere dealer, engine distributor, or other service provider.*
3. *When engine has problems, but no DTCs are displayed, see Engine Troubleshooting in Section 65.*

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Diagnostic Trouble Code Designations

SPN/FMI CODES

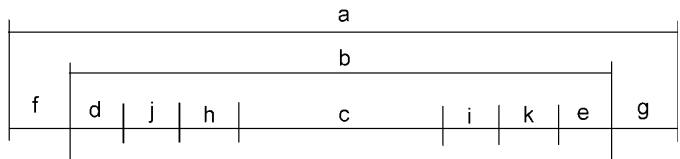
SPN/FMI codes are written as a two-part code derived from the SAE J1939 standard. The first part is called the Suspect Parameter Number (SPN). The SPN can contain up to six digits. The SPN identifies the system or the component that has the failure; for example SPN 110 indicates a failure in the engine coolant temperature system. The second part of the code is called the Failure Mode Identifier (FMI) code. The FMI contains two digits and identifies the type of failure that has occurred. For example, FMI 03 indicates value Out Of Range High (OORH). In order to determine the exact failure, both the

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SPN and FMI are required. Combining SPN 110 with FMI 03 yields "Engine Coolant Temperature Input Voltage Out Of Range High."

On this application the ECU transmits SPN/FMI codes over the controller area network (CAN). This allows for service tools such as Service ADVISOR to display active and stored DTCs. When using Service ADVISOR, the codes are displayed in a 000000.00 format. For example, code 110.03 is displayed as 000110.03.

FMI Designators



Relationship of FMI Designations and Range of Sensor Input

Region a: Total signal input range possible that can be seen by an electronic module.

Region b: Total signal range physically possible as defined by an application.

Region c: Range defined as normal for a given real world measurement.

Region d: Range defined as extremely below normal, of what is considered normal for the given real world measurement. Associated with FMI 01.

Region e: Range defined as extremely above normal, of what is considered normal for the given real world measurement. Associated with FMI 00.

Region f: Range which is low outside the range of what is considered physically possible for a given system. Associated with FMI 04 (Out Of Range Low, OORL), 05.

Region g: Range which is high outside the range of what is considered physically possible for a given system. Associated with FMI 03 (Out Of Range High, OORH), 06.

Region h: Range defined as Slightly below normal, of what is considered normal for a given real-world measurement. Associated with FMI 17.

Region i: Range defined as Slightly above normal, of what is considered normal for a given real-world measurement. Associated with FMI 15.

Region j: Range defined as Moderately below normal, of what is considered normal for a given real-world measurement. Associated with FMI 18.

Region k: Range defined as Moderately above normal, of what is considered normal for a given real-world measurement. Associated with FMI 16.

FMI	Description
00	Data Valid but Above Normal Operational Range—Extreme Level. The signal communicating information is within a defined acceptable and valid range, but the real world condition is above what would be considered normal as determined by the predefined extreme level limits for that particular measure of the real world condition (region e). Broadcast of data values is continued as normal.
01	Data Valid but Below Normal Operational Range—Extreme Level. The signal communicating information is within a defined acceptable and valid range, but the real world condition is below what would be considered normal as determined by the predefined extreme level limits for that particular measure of the real world condition (region d). Broadcast of data values is continued as normal.
02	Data Erratic, Intermittent or Incorrect. Measurements that change at a rate that is not considered possible in the real world condition and caused by improper operation of the measuring device or its connection to the module (outside region b). Broadcast of data value is substituted with the "error indicator" value. Incorrect data includes any data not received and any data that is exclusive of the situations covered by FMIs 03, 04, 05 and 06 below. Data may also be considered incorrect if it is inconsistent with other information collected or known about the system.
03	Value Out Of Range High (OORH). A voltage signal, data or otherwise, is above the predefined limits that bound the range. Broadcast of data value is substituted with the "error indicator" value. Any signal external to an electronic control module whose voltage remains at a high level when the control unit commands it to low (region g). Broadcast of data value is substituted with the "error indicator" value.
04	Value Out Of Range Low (OORL). A voltage signal, data or otherwise, is below the predefined limits that bound the range. Broadcast of data value is substituted with the "error indicator" value. Any signal external to an electronic control module whose voltage remains at a low level when the control unit commands it to high (region f). Broadcast of data value is substituted with the "error indicator" value.

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- 05 **Current Below Normal.** A current signal, data, or otherwise, is below the predefined limits that bound the range. Broadcast of data value is substituted with the "error indicator" value. Any signal external to an electronic control module whose current remains off when the control unit commands it on (between regions h, j, and d). Broadcast of data value is substituted with the "error indicator" value.
- 06 **Current Above Normal.** A current signal, data or otherwise, is above the predefined limits that bound the range. Broadcast of data value is substituted with the "error indicator" value. Any signal external to an electronic control module whose current remains on when the control unit commands it off (between regions i, k, and e). Broadcast of data value is substituted with the "error indicator" value.
- 07 **Mechanical System not Responding or Out of Adjustment.** Any fault that is detected as the result of an improper mechanical adjustment or an improper response or action of a mechanical system that, with a reasonable confidence level, is not caused by an electronic or electrical system failure. This type of fault may or may not be directly associated with the value of general broadcast information.
- 08 **Abnormal Frequency or Pulse Width or Period.** To be considered in cases of FMI 04 and 05. Any frequency or PWM signal that is outside the predefined limits which bound the signal range for frequency or duty cycle (outside region b of the signal range). Also if the signal is a control unit output, any signal whose frequency or duty cycle is not consistent with the signal which is emitted. Broadcast of data value is substituted with the "error indicator" value.
- 09 **Abnormal Update Rate.** Any failure that is detected when receipt of data via the data link or as input from a smart actuator or smart sensor is not at the update rate expected or required by the control unit (outside region c of the signal range). Also any error that causes the control unit not to send information at the rate required by the system. This type of fault may or may not be directly associated with the value of general broadcast information.
- 10 **Abnormal Rate of Change.** Any data, exclusive of the abnormalities covered by FMI 02, that is considered valid but whose data is changing at a rate that is outside the predefined limits that bound the rate of change for a properly functioning system (outside region c of the signal range). Broadcast of data values is continued as normal.
- 11 **Root Cause Not Known.** It has been detected that a failure has occurred in a particular subsystem but the exact nature of the fault is not known. Broadcast of data value is substituted with the "error indicator" value.
- 12 **Bad Intelligent Device or Component.** Inconsistency of data indicates that a device with some internal intelligence, such as a control unit, module, smart sensor or smart actuator, is not properly functioning. This data may be internal to a module or external from a data link message or from various system responses. Broadcast of data value is substituted with the "error indicator" value. This error is to include all internal control unit trouble codes that cannot be caused by connections or systems external to the control unit.
- 13 **Out of Calibration.** A failure that can be identified to be the result of not being properly calibrated. This may be the case for a subsystem which can identify that the calibration attempting to be used by the control unit is out of date. Or it may be the case that the mechanical subsystem is determined to be out of calibration. This failure mode does not relate to a signal range.
- 14 **Special Instructions.** SPNs 611 through 615 are defined as "System Diagnostic Codes" and are used to identify failures that cannot be tied to a specific field-replaceable component. Specific subsystem fault isolation is the goal of any diagnostic system, but for various reasons this cannot always be accomplished. These SPNs allow the manufacturer some flexibility to communicate non-"specific component" diagnostic information. Because SPN 611-615 use the standard SPN/FMI format, it allows the use of standard diagnostic tools, electronic dashboards, satellite systems and other advanced devices that scan Parameter Groups containing the SPN/FMI formats. Because manufacturer-defined codes are not desirable in terms of standardization, the use of these codes should only occur when diagnostic information cannot be communicated as a specific component and failure mode. This failure mode does not relate to the signal range, and may or may not be directly associated with the value of general broadcast information.
- 15 **Data Valid but Above Normal Operating Range—Slight Level.** The signal communicating information is within a defined acceptable and valid range, but the real world condition is above what would be considered normal as determined by the predefined slight level limits for that particular message of the real world condition (region i). Broadcast of data values is continued as normal.
- 16 **Data Valid but Above Normal Operating Range—Moderate Level.** The signal communicating information is within a defined acceptable and valid range, but the real world condition is above what would be considered normal as determined by the predefined moderate level limits for that particular message of the real world condition (region k). Broadcast of data values is continued as normal.
- 17 **Data Valid but Below Normal Operating Range—Slight Level.** The signal communicating information is within a defined acceptable and valid range, but the real world condition is below what would be considered normal as determined by the predefined slight level limits for that particular message of the real world condition (region h). Broadcast of data values is continued as normal.
- 18 **Data Valid but Below Normal Operating Range—Moderate Level.** The signal communicating information is within a defined acceptable and valid range, but the real world condition is below what would be considered normal as determined by the predefined moderate level limits for that particular message of the real world condition (region j). Broadcast of data values is continued as normal.
- 19 **Received Network Data In Error.** Any failure that is detected when the data received via the network is found substituted with the "error indicator" value (for example, FE (16), see J1939/71). This type of failure is associated with received network data. The component used to measure the real world signal is wired directly to the module sourcing the data to the network and not to the module receiving the data via the network. This type of fault may or may not be directly associated with the value of general broadcast information.
- 20-30 **Reserved for SAE Assignment.**
- 31 **Not Available or Condition Exists.** Used to indicate that the FMI is not available or that the condition that is identified by the SPN exists. When no applicable FMI exists for the reported SPN, FMI 31 can be used. Also in cases when the reported SPN name has the failure information in it, FMI 31 can be used to indicated that the condition reported by the SPN exists. This type of fault may or may not be directly associated with the value of general broadcast information.

Description of FMI Designations

RE42287,0000CE2 -19-02OCT19-2/2

Intermittent DTC Diagnostics

Intermittent DTCs are problems that periodically “go away”. A problem such as a terminal that intermittently does not make contact can cause an intermittent DTC. Other intermittent DTCs may be set only under certain operating conditions such as heavy load, extended idle, etc. When diagnosing intermittent DTCs, take special note of the condition of wiring and connectors since a high percentage of intermittent problems originates here. Check for loose, dirty, or disconnected connectors. Inspect the wiring routing, looking for possible shorts caused by contact with external parts (for example, rubbing against sharp sheet metal edges). Inspect the connector vicinity, looking for wires that have pulled out of connector terminals, damaged connectors, poorly positioned terminals, and corroded or damaged splices and terminals. Look for broken wires, damaged splices, and wire-to-wire shorts. Use good judgment if component replacement is thought to be required.

NOTE: *The engine control unit (ECU) is the component LEAST likely to fail.*

Suggestions for diagnosing intermittent DTCs:

- If diagnostic charts on preceding pages indicate that the problem is intermittent, try to reproduce the operating conditions that were present when the DTC set.
- If a faulty connection or wire is suspected to be the cause of the intermittent problem: clear DTCs, then check the connection or wire by wiggling it while watching the diagnostic gauge to see if the fault resets.

Possible causes of intermittent DTCs:

- Poor connection between sensor or actuator harness.
- Poor contact between terminals in connector.
- Poor terminal/wire connection.
- Electromagnetic interference (EMI) from an improperly installed 2-way radio, etc., can cause faulty DTCs to appear.

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Engine Troubleshooting

NOTE: Before troubleshooting the engine, first retrieve any DTCs on the diagnostic gauge display and perform

the corrective actions. If any problems remain, use the following to resolve engine problems.

Symptom	Problem	Solution
Engine Will Not Crank	Low battery output voltage or discharged battery	Charge or replace batteries.
	Loose or corroded connections	Clean and tighten connections.
	Start circuit relay malfunction	Contact the local John Deere dealer, engine distributor, or other service provider.
	Open fuse	Replace fuse.
	Ignition switch or start safety switch not functioning properly	Repair or replace switch as required.
	Starter solenoid malfunction	Replace solenoid.
	Starter malfunction	Replace starter.
Starter Cranks Slowly	Low battery output voltage or discharged battery	Charge or replace batteries.
	Crankcase oil viscosity too high	Drain crankcase oil and replace with correct viscosity oil.
	Loose or corroded connections	Clean and tighten connections.
Hard to Start or Will Not Start	Engine starting under load	Disengage PTO.
	Improper starting procedure	Review starting procedure.
	Exhaust restricted	Check and correct exhaust restriction.
	No fuel	Check fuel tank.
	Air in fuel line	Bleed fuel lines.
	Poor fuel quality	Drain fuel and replace with proper grade and quality of fuel for operating condition.
	Water, dirt, or air in fuel system	Drain, flush, fill, and bleed fuel system.
	Fuel filter restricted or full of water	Replace fuel filter or drain water from fuel filter.

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Symptom	Problem	Solution
Engine Misfiring or Runs Irregularly	Dirty, worn, or damaged fuel injectors	Contact the local John Deere dealer, engine distributor, or other service provider.
	Electronic fuel system problem	Contact the local John Deere dealer, engine distributor, or other service provider.
	Cold weather	Use cold weather starting aids. See Cold Weather Operation in Group 20.
	Crankcase oil viscosity too high	Drain crankcase oil and replace with correct viscosity oil.
	Electronic control system problem or basic engine problem	Contact the local John Deere dealer, engine distributor, or other service provider.
	Poor fuel quality	Incorrect fuel/dirty fuel
		Test fuel, drain water from fuel bowl.
	Restricted fuel filter	Replace fuel filter element.
	Water, dirt, or air in fuel system	Drain, flush, fill, and bleed fuel system.
	Low coolant temperature	Remove and check thermostat. See Thermostat Testing in Group 55.
Lack of Engine Power	Dirty, worn, or damaged fuel injectors	Contact the local John Deere dealer, engine distributor, or other service provider.
	Electronic fuel system problem	Contact the local John Deere dealer, engine distributor, or other service provider.
	Electronic control system problem or basic engine problem	Contact the local John Deere dealer, engine distributor, or other service provider.
	Intake air restriction	Service air cleaner.
	Exhaust restricted	Check and correct exhaust restriction.
	Poor fuel quality	Drain fuel and replace with proper grade and quality of fuel for operating condition.

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Symptom	Problem	Solution
	Restricted fuel filter	Replace fuel filter elements.
	Engine overloaded	Reduce engine load.
	Improper crankcase oil	Drain crankcase oil and replace with correct viscosity oil.
	Low coolant temperature	Remove and check thermostat.
	Improper valve clearance	Contact the local John Deere dealer, engine distributor, or other service provider.
	Dirty, worn, or damaged fuel injectors	Contact the local John Deere dealer, engine distributor, or other service provider.
	Turbocharger not functioning properly	Contact the local John Deere dealer, engine distributor, or other service provider.
	Poor EGR valve (if equipped) wiring harness connection	Contact the local John Deere dealer, engine distributor, or other service provider.
	Air leak in engine intake or exhaust manifold	Contact the local John Deere dealer, engine distributor, or other service provider.
	Engine is in derate due to DTC	Contact the local John Deere dealer, engine distributor, or other service provider.
	Electronic control system problem or basic engine problem	Contact the local John Deere dealer, engine distributor, or other service provider.
Engine Idles Poorly	Poor fuel quality	Drain fuel and replace with proper grade and quality of fuel for operating condition.
	Air leak on suction side of air intake system	Check hose and pipe connections for tightness; repair as required.
	Electronic control system problem or basic engine problem	Contact the local John Deere dealer, engine distributor, or other service provider.
Excessive Fuel Consumption	Engine overloaded	Reduce engine load.

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Symptom	Problem	Solution
	Air cleaner restricted or dirty	Replace air cleaner element as required.
	Compression too low	Contact the local John Deere dealer, engine distributor, or other service provider.
	Leaks in fuel supply system	Locate source of leak and repair as required.
	Improper type of fuel	Drain fuel and replace with proper grade and quality of fuel for operating condition.
	Poor fuel quality	Drain fuel and replace with proper grade and quality of fuel for operating condition.
	Improper valve clearance	Contact the local John Deere dealer, engine distributor, or other service provider.
	Dirty, worn, or damaged fuel injectors	Contact the local John Deere dealer, engine distributor, or other service provider.
	Electronic fuel system problem	Contact the local John Deere dealer, engine distributor, or other service provider.
	Electronic Control System problem or basic engine problem	Contact the local John Deere dealer, engine distributor, or other service provider.
	Turbocharger not functioning properly	Inspect turbocharger. Contact the local John Deere dealer, engine distributor, or other service provider.
	Low engine temperature	Remove and check thermostat.
Fuel Aeration	Fuel injector hold-down clamp loose	Tighten hold-down clamp cap screw to proper torque. Contact the local John Deere dealer, engine distributor, or other service provider.
	Cracked or worn fuel injector O-ring	Contact the local John Deere dealer, engine distributor, or other service provider.

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Symptom	Problem	Solution
Fuel in Oil	Cracked or worn fuel injector O-ring	Contact the local John Deere dealer, engine distributor, or other service provider.
	Cracked cylinder head	Contact the local John Deere dealer, engine distributor, or other service provider.
	Restricted fuel return line	Check and fix fuel return lines.
	Engine load too light	Increase engine load
	Leaking fuel injectors	Contact the local John Deere dealer, engine distributor, or other service provider.
Low-Pressure Fuel System — Fuel Pressure Low	Restricted fuel filter	Replace fuel filter.
	Restricted fuel line	Locate restriction, repair as required.
	Faulty transfer pump	Contact the local John Deere dealer, engine distributor, or other service provider.
	Faulty fuel pump	Contact the local John Deere dealer, engine distributor, or other service provider.
Abnormal Engine Noise	Worn main or connecting rod bearings	Contact the local John Deere dealer, engine distributor, or other service provider.
	Excessive crankshaft end play	Contact the local John Deere dealer, engine distributor, or other service provider.
	Loose main bearing caps	Contact the local John Deere dealer, engine distributor, or other service provider.
	Worn connecting rod bushings and piston pins	Contact the local John Deere dealer, engine distributor, or other service provider.
	Scored pistons	Contact the local John Deere dealer, engine distributor, or other service provider.

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Troubleshooting

Symptom	Problem	Solution
	Worn timing gears or excess backlash	Contact the local John Deere dealer, engine distributor, or other service provider.
	Excessive valve clearance	Contact the local John Deere dealer, engine distributor, or other service provider.
	Worn camshaft lobes	Contact the local John Deere dealer, engine distributor, or other service provider.
	Worn rocker arm shaft	Contact the local John Deere dealer, engine distributor, or other service provider.
	Worn valve guides	Contact the local John Deere dealer, engine distributor, or other service provider.
	Damaged valve retainers	Contact the local John Deere dealer, engine distributor, or other service provider.
	Loose or worn rocker arms	Contact the local John Deere dealer, engine distributor, or other service provider.
	Broken valve springs	Contact the local John Deere dealer, engine distributor, or other service provider.
	Bent connecting rods	Contact the local John Deere dealer, engine distributor, or other service provider.
	Worn flywheel	Contact the local John Deere dealer, engine distributor, or other service provider.
	Loose flywheel	Contact the local John Deere dealer, engine distributor, or other service provider.
	Excessive piston to liner clearance	Contact the local John Deere dealer, engine distributor, or other service provider.
	Excessive thrust bearing clearance	Contact the local John Deere dealer, engine distributor, or other service provider.

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Symptom	Problem	Solution
	High oil viscosity	Drain engine oil and refill with correct viscosity engine oil
Turbocharger “Screams”	Leak in intake air system	Check air system for loose clamps, damaged tubes, charged air cooler leaks, and intake manifold gasket leaks; repair as required. Contact the local John Deere dealer, engine distributor, or other service provider.
Turbocharger Noise or Vibration	Bearings not lubricated (insufficient oil pressure)	Contact the local John Deere dealer, engine distributor, or other service provider.
	Air leak in engine intake or exhaust manifold	Contact the local John Deere dealer, engine distributor, or other service provider.
	Improper clearance between turbine wheel and turbine housing	Contact the local John Deere dealer, engine distributor, or other service provider.
	Broken blades (or other wheel failures)	Contact the local John Deere dealer, engine distributor, or other service provider.
Turbocharger Turbine Wheel Drag	Carbon build-up behind turbine wheel caused by coked oil or combustion deposits	Contact the local John Deere dealer, engine distributor, or other service provider.
	Dirt build-up behind compressor wheel caused by air intake leaks	Contact the local John Deere dealer, engine distributor, or other service provider.
	Bearing seizure or dirty, worn bearings	Contact the local John Deere dealer, engine distributor, or other service provider.
Oil on Turbocharger Compressor Wheel or in Compressor Housing (Oil Being Pushed or Pulled through Center Housing)	Excessive crankcase pressure	Contact the local John Deere dealer, engine distributor, or other service provider.
	Air intake restriction	Contact the local John Deere dealer, engine distributor, or other service provider.
	Drain tube restriction	Contact the local John Deere dealer, engine distributor, or other service provider.

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Troubleshooting

Symptom	Problem	Solution
Oil in Intake Manifold or Dripping from Turbocharger Housing	Excessive crankcase pressure	Contact the local John Deere dealer, engine distributor, or other service provider.
	Air intake restriction	Contact the local John Deere dealer, engine distributor, or other service provider.
	Drain tube restriction	Contact the local John Deere dealer, engine distributor, or other service provider.
	Damaged or worn housing bearings	Contact the local John Deere dealer, engine distributor, or other service provider.
	Unbalance of rotating components	Contact the local John Deere dealer, engine distributor, or other service provider.
	Damage to turbine or compressor wheel or blade	Contact the local John Deere dealer, engine distributor, or other service provider.
	Dirt or carbon build-up on wheel or blade	Contact the local John Deere dealer, engine distributor, or other service provider.
	Bearing wear	Contact the local John Deere dealer, engine distributor, or other service provider.
	Oil starvation or insufficient lubrication	Contact the local John Deere dealer, engine distributor, or other service provider.
	Shaft seals worn	Contact the local John Deere dealer, engine distributor, or other service provider.
Engine has reached Service Only Soot Level	Auto filter cleaning is disabled for an extended period of time	Enable exhaust filter cleaning.
	Frequent engine shut downs occurred while auto cleaning was in process	Let engine run for 30 min to clean the exhaust filter.
	Interlock switches are not properly set to allow DPF recovery/regeneration to occur	Machine must be stationary (parked). Engine speed must be above the minimum setpoint. Any PTO driven device must be shut off. Engine load must be stable.

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Symptom	Problem	Solution
SCR High NOx Outlet	DEF tank is low	Fill DEF tank with new DEF.
	Fluid other than DEF has been added to the DEF tank	Drain, flush, and fill DEF tank with new DEF. See Cleaning Diesel Exhaust Fluid (DEF) Tank in Group 60.
Engine Emits White Smoke	Engine compression too low	Contact the local John Deere dealer, engine distributor, or other service provider.
	Incorrect thermostat operation	Test thermostat. See Testing Thermostat in Group 60.
	Coolant entering combustion chamber (damaged cylinder head gasket or cracked cylinder head)	Contact the local John Deere dealer, engine distributor, or other service provider.
	Electronic control system problem or basic engine problem	Contact the local John Deere dealer, engine distributor, or other service provider.
	Improper type of fuel	Drain fuel and replace with proper grade and quality of fuel for operating condition.
	Poor fuel quality	Drain fuel and replace with proper grade and quality of fuel for operating condition.
	Low engine temperature	Warm up engine to normal operating temperature.
	Incorrect thermostat operation	Test thermostat. See Testing Thermostat in Group 60.
	Dirty, worn, or damaged	Contact the local John Deere dealer, engine distributor, or other service provider.
Engine Emits Black, Gray or Blue Smoke	Engine overloaded	Reduce engine load.
	Engine burning oil	Contact the local John Deere dealer, engine distributor, or other service provider.
	Air cleaner restricted or dirty	Replace air cleaner element as required.

Continued on next page

CM22194,0000A90 -19-29MAY25-9/14

Symptom	Problem	Solution
	Electronic control system problem or basic engine problem	Contact the local John Deere dealer, engine distributor, or other service provider.
	Exhaust filter is cracked or damaged	Contact the local John Deere dealer, engine distributor, or other service provider.
	Improper type of fuel	Use proper fuel.
	Fuel injectors dirty	Contact the local John Deere dealer, engine distributor, or other service provider.
	Electronic control system problem or basic engine problem	Contact the local John Deere dealer, engine distributor, or other service provider.
	Turbocharger not functioning properly	Contact the local John Deere dealer, engine distributor, or other service provider.
Engine Overheats	Air cleaner restricted or dirty	Replace air cleaner element as required.
	Lack of coolant in cooling system	Fill cooling system to proper level. Check radiator and hoses for loose connections or leaks.
	Low engine oil level	Check oil level. Add oil as required.
	Radiator core dirty	Clean cooling system as required.
	Cooling system needs flushing	Flush coolant system. (See Flushing and Refilling Cooling System in Group 60.
	Engine overloaded	Reduce engine load.
	Loose or damaged fan belt	Check automatic belt tensioner and belts. Replace as required. (See Checking Tensioner Spring Tension in Group 40.
	Damaged or incorrect type of thermostat	Test thermostat. See Testing Thermostat in Group 60.
	Damaged cylinder head gasket	Contact the local John Deere dealer, engine distributor, or other service provider.

Continued on next page

CM22194,0000A90 -19-29MAY25-10/14

Symptom	Problem	Solution
	Leak at cylinder head gasket	Contact the local John Deere dealer, engine distributor, or other service provider.
	Worn or damaged coolant pump	Contact the local John Deere dealer, engine distributor, or other service provider.
	Worn or damaged radiator cap	Replace radiator cap as required.
	Damaged temperature gauge or sender	Contact the local John Deere dealer, engine distributor, or other service provider.
	Incorrect grade of fuel	Use correct grade of fuel.
Coolant Temperature Below Normal	Thermostat(s) not operating correctly	Test thermostat. See Testing Thermostat in Group 60.
	Defective temperature gauge or temperature sender	Check gauge, sender, and connections.
Coolant in Crankcase	Cylinder head gasket damaged	Contact the local John Deere dealer, engine distributor, or other service provider.
	Cylinder head or block cracked	Contact the local John Deere dealer, engine distributor, or other service provider.
	Cylinder liner seals leaking	Contact the local John Deere dealer, engine distributor, or other service provider.
	Pitted cylinder liners	Contact the local John Deere dealer, engine distributor, or other service provider.
	Leaking oil cooler	Contact the local John Deere dealer, engine distributor, or other service provider.
	Cracked, worn, or damaged oil cooler O-rings	Contact the local John Deere dealer, engine distributor, or other service provider.
	EGR cooler system leaking	Contact the local John Deere dealer, engine distributor, or other service provider.

Continued on next page

CM22194,0000A90 -19-29MAY25-11/14

Troubleshooting

Symptom	Problem	Solution
Low Oil Pressure	Worn or damaged coolant pump seal; weep hole plugged; coolant leaking through bearing	Contact the local John Deere dealer, engine distributor, or other service provider.
	Cracked, worn, or damaged injector O-rings	Cracked, worn, or damaged
	Low crankcase oil level	Fill crankcase to proper oil level.
	Oil pressure sensor malfunction	Contact the local John Deere dealer, engine distributor, or other service provider.
	Restricted oil cooler or filter	Contact the local John Deere dealer, engine distributor, or other service provider.
	Excessive oil temperature	Contact the local John Deere dealer, engine distributor, or other service provider.
	Defective oil pump	Contact the local John Deere dealer, engine distributor, or other service provider.
	Incorrect oil	Drain crankcase and refill with correct oil.
	Oil pressure regulating valve failure	Contact the local John Deere dealer, engine distributor, or other service provider.
	Restricted oil pump screen or cracked pick-up tube	Contact the local John Deere dealer, engine distributor, or other service provider.
High Oil Pressure	Excessive main or connecting rod bearing clearance	Contact the local John Deere dealer, engine distributor, or other service provider.
	Crankcase oil level too high	Check engine oil level and drain as necessary.
	Improper oil classification	Drain crankcase and refill with correct oil.
	Oil pressure sensor malfunction	Contact the local John Deere dealer, engine distributor, or other service provider.

Continued on next page

CM22194,0000A90 - 19-29MAY25-12/14

Symptom	Problem	Solution
	Oil pressure regulating valve failure	Contact the local John Deere dealer, engine distributor, or other service provider.
	Oil pressure regulating valve bushing loose (wanders)	Contact the local John Deere dealer, engine distributor, or other service provider.
	Plugged piston spray nozzle	Contact the local John Deere dealer, engine distributor, or other service provider.
	Stuck or damaged filter bypass valve	Contact the local John Deere dealer, engine distributor, or other service provider.
	Stuck or damaged oil cooler bypass valve	Contact the local John Deere dealer, engine distributor, or other service provider.
	Excessive Oil Consumption	
	Too low viscosity crankcase oil	Drain crankcase and refill with correct viscosity oil.
	Crankcase oil level too high	Drain oil until oil level is correct.
	External oil leak(s)	Contact the local John Deere dealer, engine distributor, or other service provider.
	Excessive oil pressure	Contact the local John Deere dealer, engine distributor, or other service provider.
	Oil control rings not seated	Contact the local John Deere dealer, engine distributor, or other service provider.
	Oil control rings worn or broken	Contact the local John Deere dealer, engine distributor, or other service provider.
	Restricted crankcase vent tube	Clean vent tube, verify that crankcase oil level is not too high.
	Worn or damaged turbocharger	Contact the local John Deere dealer, engine distributor, or other service provider.

Continued on next page

CM22194,0000A90 -19-29MAY25-13/14

Troubleshooting

Symptom	Problem	Solution
	Scored cylinder liners or pistons	Contact the local John Deere dealer, engine distributor, or other service provider.
	Worn valve guides or stems	Contact the local John Deere dealer, engine distributor, or other service provider.
	Piston ring grooves excessively worn	Contact the local John Deere dealer, engine distributor, or other service provider.
	Piston rings sticking in ring grooves	Contact the local John Deere dealer, engine distributor, or other service provider.
	Insufficient piston ring tension	Contact the local John Deere dealer, engine distributor, or other service provider.
	Piston ring gaps not staggered	Contact the local John Deere dealer, engine distributor, or other service provider.
	Front and/or rear crankshaft oil seal cracked, worn, or damaged	Contact the local John Deere dealer, engine distributor, or other service provider.
Undercharged Electrical System	Excessive electrical load from added accessories	Contact the local John Deere dealer, engine distributor, or other service provider.
	Excessive engine idling	Increase engine rpm when heavy electrical load is used.
	Poor electrical connections on battery, ground strap, starter, or alternator	Inspect and clean as necessary.
	Battery malfunction	Test batteries.
	Alternator malfunction	Test charging system.
Battery Used Too Much Water	Cracked battery case	Check for moisture and replace as necessary.
	Battery malfunction	Test battery.
	Battery charging rate too high	Test charging system.

CM22194,0000A90 -19-29MAY25-14/14

Symptom	Problem	Solution
Batteries Will Not Charge	Loose or corroded connections	Clean and tighten connections.
	Sulfated or worn-out batteries	Replace batteries.
	Stretched belt or worn belt tensioner	Adjust belt tension or replace belts.
Starter and Hourmeter Functions; Rest of Electrical System Does Not Function	Open fuse	Replace fuse.
Entire Electrical System Does Not Function	Loose or corroded battery connection	Clean and tighten connections.
	Sulfated or worn-out batteries	Replace batteries.
	Open fuse	Replace fuse.

CM22194,0000A90 -19-29MAY25-15/14

Precautions for Welding

Remove paint before welding or heating (see Safety Section in this manual for more information on paint removal and high-pressure lines).

CAUTION: Avoid potentially toxic fumes and dust. Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch. Do all work outside or in a well ventilated area. Dispose of paint and solvent properly. If you sand or grind paint, avoid breathing the dust by wearing an approved respirator. If you use solvent or paint stripper, remove with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area before welding. Allow fumes to disperse at least 15 minutes before welding or heating.

IMPORTANT: Welding on the engine is **NOT ALLOWED**. If welding must be performed on the machine, follow these precautions.

IMPORTANT: High currents or electrostatic discharge into electronic components from welding may cause permanent damage.

1. Remove paint from the area to be welded and ground cable clamp location.
2. Disconnect the negative (-) battery cable(s) or open battery (-) switch if equipped.



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3. Disconnect the positive (+) battery cable(s) or open battery (+) switch if equipped.
4. Clear or move any wiring harness sections away from the welding area.
5. Welding on engine components is not allowed.
6. Never connect the welder ground to any engine component or engine driven components that may be connected to the engine.
7. After welding, reverse steps 2—3.

DX,WELDING,PRECAUTIONS -19-06DEC10-1/1

Storage

Engine Storage Guidelines

IMPORTANT: Avoid possible poor engine performance and damage. Special considerations should be taken prior to storage when using biodiesel. See biodiesel Fuel in the Fuels, Lubricants, and Coolant Section.

1. John Deere engines can be stored outside for up to three months with no long-term preparation if covered by a waterproof covering. No outside storage is recommended without a waterproof covering.
2. John Deere engines can be stored in a standard overseas shipping container for up to three months with no long-term preparation.
3. John Deere engines can be stored inside for up to six months with no long-term preparation.
4. John Deere engines expected to be stored for more than six months **must** have long-term storage preparation. See Preparing Engine for Long-Term Storage in the Storage Section.

RK80614,0000060 -19-31AUG21-1/1

Preparing Engine for Long-Term Storage

IMPORTANT: Any time the engine is not used for over six months, the following recommendations for storing it and removing it from storage helps to minimize corrosion and deterioration.

IMPORTANT: Long-term storage is not advised when using BioDiesel. For storage longer than one year, use straight hydrocarbon fuel.

If BioDiesel must be used it is recommended the blend not exceed B7 and a high-quality fuel stabilizer be used. Storage should not exceed one year.

For more information see **BioDiesel Fuel** in the Fuels, Lubricants, and Coolants Section.

NOTE: The following storage preparations are used for long-term engine storage up to one year. After that, the engine should be started, warmed up, and retreated for an extended storage period.

1. Change engine oil and replace filter. Used oil does not give adequate protection. Add 30 mL of rust preventive oil to the engine crankcase for every 1 L of engine oil, or 1 oz of rust preventative oil per 1 qt. of engine oil. This rust preventive oil should be an SAE 10W oil with 1%-4% morpholine or equivalent vapor corrosion inhibitor, such as NOX RUST VCI-10 OIL from Daubert Chemical Company, Inc.
2. Replace air cleaner.

IMPORTANT: Avoid damage to the engine cooling system components. Engine cooling system must be drained, flushed, and refilled for prolong storage of more than one year.

3. Draining and flushing of cooling system is not necessary if the engine is only stored for less than one year. However, for extended storage periods of a year or longer, it is recommended that the cooling system be drained, flushed, and refilled. Refill with appropriate coolant. See **Diesel Engine Coolant (engine with wet sleeve cylinder liners)** in the Fuels, Lubricants, and Coolants Section.
4. Prepare a solution of diesel fuel and rust preventive oil in a temporary container, add 78 mL of rust preventive oil per 1 L of diesel fuel, 10 oz. of rust preventive oil per 1 gal. of diesel fuel.
5. Remove existing lines and plugs as required. Run a temporary line from the temporary container to the engine fuel intake before the fuel filters, and another temporary line from the fuel return to the temporary container, so rust preventive oil solution is circulated through the injection system during cranking.

IMPORTANT: Do not operate starter more than 30 seconds at a time. Wait at least 2 minutes for starter to cool before trying again.



RG35531 —UN—22MAR22



RG35532 —UN—22MAR22

Effects of Prolong Storage of Coolant — More Than One Year

6. Crank the engine several revolutions with starter. Do not allow the engine to start. This allows rust preventive oil solution to circulate.

Contact the local John Deere dealer, engine distributor, or other service provider.

7. Remove temporary lines installed in Step 5 and replace any lines or plugs previously removed.
8. Loosen (or remove) and store fan and alternator poly-vee belt.

Continued on next page

CM22194,0000A7B -19-29MAY25-1/2

9. Remove and clean batteries. Store them in a cool, dry place and keep them fully charged.
10. Disengage the clutch for any driveline.
11. For extended storage periods of a year or longer, drain or siphon DEF fluid from DEF tank.
12. Clean the exterior of the engine with salt-free water and touch up any scratched or chipped painted surfaces with a good quality paint.
13. Coat all exposed bare metal surfaces with grease or corrosion inhibitor if not feasible to paint.
14. Seal all openings on engine with plastic bags and tape.
15. Store the engine in a dry protected place. If engine must be stored outside, cover it with a waterproof canvas or other suitable protective material and use a strong waterproof tape.

CM22194,0000A7B -19-29MAY25-2/2

Removing Engine from Long-Term Storage

NOTE: The following storage removal procedure is used for long-term engine storage up to one year. After that, the engine should be started, warmed up, and retreated for an extended storage period.

Refer to the appropriate section for detailed services listed below or have the local John Deere dealer, engine distributor, or other service provider. perform unfamiliar services.

1. Remove all protective coverings from engine. Unseal all openings in engine and remove covering from electrical systems.
2. Remove grease from all exposed metal surfaces.
3. Remove the batteries from storage. Install batteries (fully charged) and connect the terminals.
4. Install fan and alternator poly-vee belt, if removed.
5. Fill fuel tank.
6. If drained, fill DEF tank with new DEF.

If not drained, DEF must pass visual, smell, and concentration checks before the engine can be started. See Diesel Exhaust Fluid (DEF) — Use in Selective Catalytic Reduction (SCR) Equipped Engines in the Fuels, Lubricants, and Coolants Section for more information.

7. Perform all appropriate prestarting checks. See Daily Prestarting Checks in the Lubrication & Maintenance — Daily Section for more information.

IMPORTANT: Avoid starter motor damage. DO NOT operate starter more than 30 seconds at a time. Wait at least 2 minutes for starter to cool before trying again.

8. Crank engine for 20 seconds with starter. Do not allow the engine to start. Wait 2 minutes and crank engine an additional 20 seconds to assure bearing surfaces are adequately lubricated.

Contact the local John Deere dealer, engine distributor, or other service provider.

9. Start engine and run at low idle and no load for 15 minutes.
10. Shut engine off. Change engine oil and replace filter.
11. Warm-up engine and check all gauges before placing engine under load.
12. On the first day of operation after storage, check overall engine for leaks and check all gauges for correct operation.

NOTE: When BioDiesel blends of fuel are used, frequency of fuel filter plugging can increase initially, after long-term storage.

CM22194,0000A7C -19-29MAY25-1/1

Specifications

General Engine Specifications

NOTE: The specifications below are based on John Deere OEM engines. Some specifications may change based on engine options and application.

ITEM	UNIT OF MEASURE	VALUE
General Data		
Engine Type	—	In-line, 4-cycle
Aspiration	—	Turbocharged and air-to-air after cooled
Number of Cylinders	—	6
Bore	mm (in.)	118.4 (4.7)
Stroke	mm (in.)	136 (5.4)
Displacement	L (cu in.)	9.0 (549)
Combustion System	—	Direct Injection
Compression Ratio	—	16.0:1
Physical Dimensions (with series turbochargers)		
Width	mm (in.)	841.7 (33.1)
Height	mm (in.)	1344 (52.9)
Length	mm (in.)	1266.6 (49.9)
Basic Dry Weight	kg (lb)	1096.8 (2418)
Lubrication System (Industrial Applications)		
Oil Pressure at Rated rpm (±35%)	kPa (bar) (psi)	300 (3.0) (44)
Oil Pressure at Low Idle	kPa (bar) (psi)	100 (1.0) (15)
With 10W30 oil, operating temperature 130 °C	kPa (bar) (psi)	100 (1) (14.5)
With 15W40 oil, operating temperature 130 °C	kPa (bar) (psi)	125 (1.25) (18.2)
In-Crankcase Oil Temp at Full Load Speeds	°C (°F)	138 °C (280 °F)
Lubrication System (Generator Applications)		
Oil Pressure at Rated rpm (±35%)	kPa (bar) (psi)	200 (2.0) (29)
Oil Pressure at Low Idle	kPa (bar) (psi)	100 (1.0) (15)
With 10W30 oil, operating temperature 130 °C	kPa (bar) (psi)	100 (1) (14.5)
With 15W40 oil, operating temperature 130 °C	kPa (bar) (psi)	125 (1.25) (18.2)
In-Crankcase Oil Temp at Full Load Speeds	°C (°F)	115 °C (240 °F)
Cooling System		
Type	—	Liquid, pressurized with centrifugal pump
Recommended Pressure Cap	kPa (psi)	125 (18)
Coolant Temperature Operating Range	°C (°F)	85-95 (185-203)
Coolant Temperature (Maximum)	°C (°F)	94 (202)
Coolant Capacity	L (qt)	17 (18)
Valve Actuation		
Valve Clearance (Cold) — Intake	mm (in.)	0.18 (0.007)
Valve Clearance (Cold) — Exhaust	mm (in.)	0.63 (0.025)
Electrical System		
Battery Capacity (Minimum) — 12 Volt System	CCA	1100

Continued on next page

CM22194,0000A7E -19-15JUN21-1/2

Specifications

ITEM	UNIT OF MEASURE	VALUE
Reserve Capacity — 12 Volt System	Minutes	350
Battery Capacity (Minimum) — 24 Volt System	CCA	750
Reserve Capacity — 24 Volt System	Minutes	275
Air System		
Maximum Air Intake Restriction	kPa (bar) (psi)	6.25 (0.06) (1.0)

CM22194,0000A7E -19-15JUN21-2/2

Engine Power and Speed Rating Specifications

vary depending upon specific vehicle application requirements. Refer to your machine operator's manual for engine speeds that are different from those preset at the factory.

NOTE: Engine speeds listed are preset to factory specification for application. Therefore, speeds may

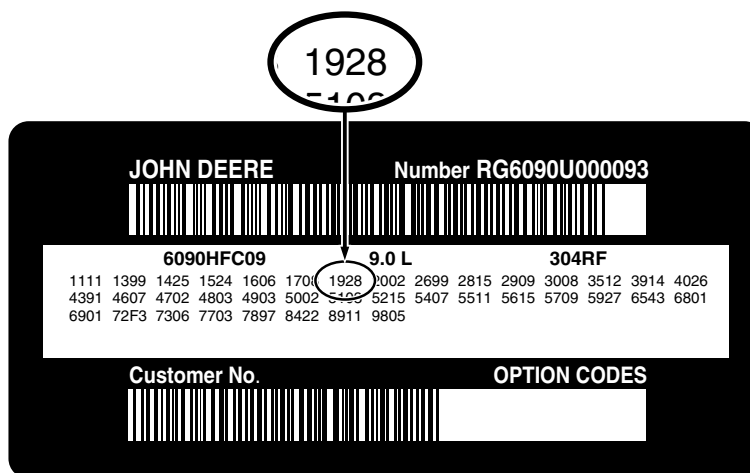
ELECTRONIC SOFTWARE OPTION CODES 12V	ELECTRONIC SOFTWARE OPTION CODES 24V	POWER RATING AT RATED SPEED WITHOUT FAN kW (hp)	RATED SPEED ^a (rpm)	SLOW IDLE (rpm)	FAST IDLE ^b (rpm)
Wirtgen Units — 6090WG501					
—	72TB	—	2100	900	2200

^aGenerator set engines usually run at 1500 rpm (50 Hz) or 1800 (60 Hz) when operating under load depending on cycles of AC current.

^bFor industrial engines, fast idle is 7-10% above rated speed. For generator set engines, fast idle is 5-7% above rated speed.

CM22194,0000A7F -19-15JUN21-1/1

Engine Crankcase Oil Fill Quantities



Option Code Label

To determine the option code for the oil fill quantity of your engine, refer to the engine option code label affixed to the rocker arm cover. The first two digits of the code (19) identify the oil pan group. The last two digits of each code identify the specific oil pan on your engine.

Listed below are engine crankcase oil fill quantities:

Engine Model 6090HFC09	
Oil Pan Option Code(s)	Crankcase Oil Capacity
1920	28 L (29.5 qt)

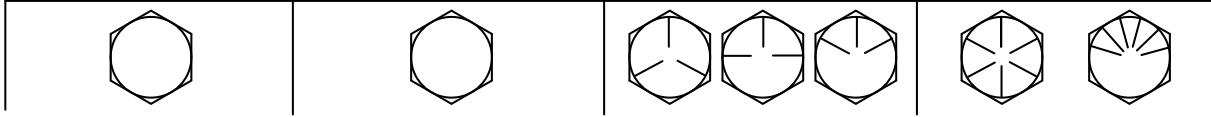
NOTE: Add an additional 2 L (2.1 qt) of oil for engines equipped with a John Deere rear PTO.

CM22194,0000A80 -19-15JUN21-1/1

RG23401 —UN—03JUN13

Unified Inch Bolt and Screw Torque Values

TS1671 —UN—01MAY03



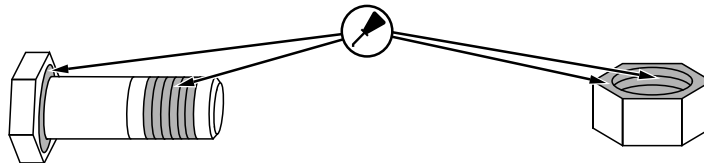
Bolt or Screw Size	SAE Grade 1 ^a				SAE Grade 2 ^b				SAE Grade 5, 5.1 or 5.2				SAE Grade 8 or 8.2			
	Hex Head ^c		Flange Head ^d		Hex Head ^c		Flange Head ^d		Hex Head ^c		Flange Head ^d		Hex Head ^c		Flange Head ^d	
	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in
1/4	3.1	27.3	3.2	28.4	5.1	45.5	5.3	47.3	7.9	70.2	8.3	73.1	11.2	99.2	11.6	103
													N·m	lb·ft	N·m	lb·ft
5/16	6.1	54.1	6.5	57.7	10.2	90.2	10.9	96.2	15.7	139	16.8	149	22.2	16.4	23.7	17.5
									N·m	lb·ft	N·m	lb·ft				
3/8	10.5	93.6	11.5	102	17.6	156	19.2	170	27.3	20.1	29.7	21.9	38.5	28.4	41.9	30.9
					N·m	lb·ft	N·m	lb·ft								
7/16	16.7	148	18.4	163	27.8	20.5	30.6	22.6	43	31.7	47.3	34.9	60.6	44.7	66.8	49.3
	N·m	lb·ft	N·m	lb·ft												
1/2	25.9	19.1	28.2	20.8	43.1	31.8	47	34.7	66.6	49.1	72.8	53.7	94	69.3	103	75.8
9/16	36.7	27.1	40.5	29.9	61.1	45.1	67.5	49.8	94.6	69.8	104	77	134	98.5	148	109
5/8	51	37.6	55.9	41.2	85	62.7	93.1	68.7	131	96.9	144	106	186	137	203	150
3/4	89.5	66	98	72.3	149	110	164	121	230	170	252	186	325	240	357	263
7/8	144	106	157	116	144	106	157	116	370	273	405	299	522	385	572	422
1	216	159	236	174	216	159	236	174	556	410	609	449	785	579	860	634
1-1/8	305	225	335	247	305	225	335	247	685	505	751	554	1110	819	1218	898
1-1/4	427	315	469	346	427	315	469	346	957	706	1051	775	1552	1145	1703	1256
1-3/8	564	416	618	456	564	416	618	456	1264	932	1386	1022	2050	1512	2248	1658
1-1/2	743	548	815	601	743	548	815	601	1665	1228	1826	1347	2699	1991	2962	2185

The nominal torque values listed are for general use only with the assumed wrenching accuracy of 20%, such as a manual torque wrench. DO NOT use these values if a different torque value or tightening procedure is given for a specific application. For lock nuts, for stainless steel fasteners, or for nuts on U-bolts, see the tightening instructions for the specific application.

Replace fasteners with the same or higher property class. If higher property class fasteners are used, tighten these to the strength of the original.

- Make sure that fastener threads are clean.
- Apply a thin coat of Hy-Gard™ or equivalent oil under the head and on the threads of the fastener, as shown in the following image.
- Be conservative with the amount of oil to reduce the potential for hydraulic lockup in blind holes due to excessive oil.
- Properly start thread engagement.

TS1741 —UN—22MAY18



^aGrade 1 applies for hex cap screws over 6 in (152 mm) long, and for all other types of bolts and screws of any length.

^bGrade 2 applies for hex cap screws (not hex bolts) up to 6 in (152 mm) long.

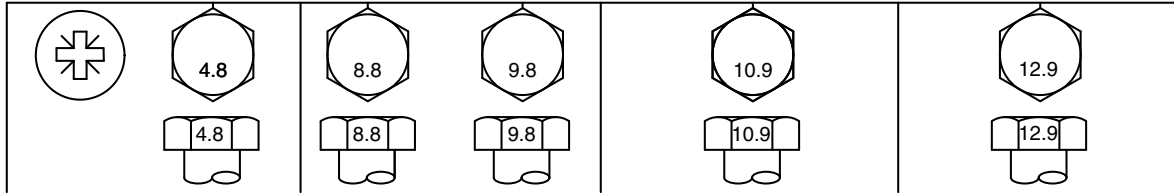
^cHex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.

^dHex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.

DX,TORQ1 -19-09MAY22-1/1

Metric Bolt and Screw Torque Values

TS1742 —UN—31MAY18



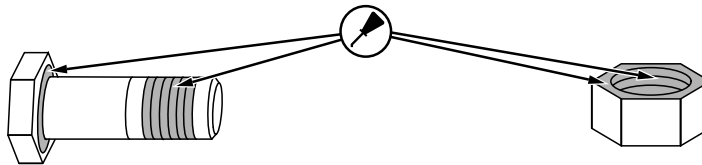
Bolt or Screw Size	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Hex Head ^a		Flange Head ^b		Hex Head ^a		Flange Head ^b		Hex Head ^a		Flange Head ^b		Hex Head ^a		Flange Head ^b	
	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in
M6	3.6	31.9	3.9	34.5	6.7	59.3	7.3	64.6	9.8	86.7	10.8	95.6	11.5	102	12.6	112
									N·m	lb·ft	N·m	lb·ft	N·m	lb·ft	N·m	lb·ft
M8	8.6	76.1	9.4	83.2	16.2	143	17.6	156	23.8	17.6	25.9	19.1	27.8	20.5	30.3	22.3
			N·m	lb·ft	N·m	lb·ft	N·m	lb·ft								
M10	16.9	150	18.4	13.6	31.9	23.5	34.7	25.6	46.8	34.5	51	37.6	55	40.6	60	44.3
	N·m	lb·ft														
M12	—	—	—	—	55	40.6	61	45	81	59.7	89	65.6	95	70.1	105	77.4
M14	—	—	—	—	87	64.2	96	70.8	128	94.4	141	104	150	111	165	122
M16	—	—	—	—	135	99.6	149	110	198	146	219	162	232	171	257	190
M18	—	—	—	—	193	142	214	158	275	203	304	224	322	245	356	263
M20	—	—	—	—	272	201	301	222	387	285	428	316	453	334	501	370
M22	—	—	—	—	365	263	405	299	520	384	576	425	608	448	674	497
M24	—	—	—	—	468	345	518	382	666	491	738	544	780	575	864	637
M27	—	—	—	—	683	504	758	559	973	718	1080	797	1139	840	1263	932
M30	—	—	—	—	932	687	1029	759	1327	979	1466	1081	1553	1145	1715	1265
M33	—	—	—	—	1258	928	1398	1031	1788	1319	1986	1465	2092	1543	2324	1714
M36	—	—	—	—	1617	1193	1789	1319	2303	1699	2548	1879	2695	1988	2982	2199

The nominal torque values listed are for general use only with the assumed wrenching accuracy of 20%, such as a manual torque wrench. DO NOT use these values if a different torque value or tightening procedure is given for a specific application. For lock nuts, for stainless steel fasteners, or for nuts on U-bolts, see the tightening instructions for the specific application.

Replace fasteners with the same or higher property class. If higher property class fasteners are used, tighten these to the strength of the original.

- Make sure that fastener threads are clean.
- Apply a thin coat of Hy-Gard™ or equivalent oil under the head and on the threads of the fastener, as shown in the following image.
- Be conservative with the amount of oil to reduce the potential for hydraulic lockup in blind holes due to excessive oil.
- Properly start thread engagement.

TS1741 —UN—22MAY18



^aHex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.

^bHex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.

Lubrication and Maintenance Records

Using Lubrication and Maintenance Records

Refer to specific Lubrication and Maintenance Section for detailed service procedures.

1. Keep a record of the number of hours the engine is operated by regular observation of hour meter.
2. Check the record regularly to learn when the engine needs service.
3. DO ALL the services within an interval section. Write the number of hours (from the service records) and

the date in the spaces provided. For a complete listing of all items to be performed and the service intervals required, refer to the quick-reference chart near the front of the Lubrication and Maintenance Section 30.

NOTE: The service recommendations covered in this manual are for the accessories that are provided by John Deere. Follow manufacturer's service recommendations for servicing engine driven equipment not supplied by Deere.

ZE59858,0000290 -19-20AUG21-1/1

Daily Prestarting Service

NOTE: See Daily Prestarting Checks in the Lubrication and Maintenance — Daily Section.

- Check engine oil level.
- Check coolant level.

- Check fuel filter/water separator.
- Check air cleaner dust unloader valve and air filter restriction indicator, if equipped.
- Check air intake system for cracks and loose clamps.
- Visual walk around inspection.

KP41357,0000059 -19-20NOV20-1/1

375 Hours of Operation or 12 Months Service

- Change engine oil and oil filter.^{1 2}

Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									

¹During engine break-in, change the oil and filter for the first time after a minimum of 100 hours of operation (500 hours maximum).

²Service intervals depend on sulfur content of the diesel fuel, oil pan capacity, and the oil and filter used. (See DIESEL ENGINE OIL AND FILTER SERVICE INTERVALS, in Fuels, Lubricants, and Coolant Section.)

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500 Hours of Operation or 12 Months Service

- Service fire extinguisher.
- Service battery.
- Change engine oil and oil filter.^{1 2}
- Check coolant pump weep hole.
- Check open crankcase ventilation (OCV).
- Replace fuel filters.
- Check belt wear.
- Check automatic belt tensioner.
- Pressure test cooling system and radiator cap.
- Check and adjust engine speeds.
- Check engine mounts.
- Check engine ground connection.

Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									

¹ During engine break-in, change the oil and filter for the first time after a minimum of 100 hours of operation (500 hours maximum).

² Service intervals depend on sulfur content of the diesel fuel, oil pan capacity, and the oil and filter used. (See DIESEL ENGINE OIL AND FILTER SERVICE INTERVALS, in Fuels, Lubricants, and Coolant Section.)

CM22194,0000A8B -19-10JUN21-1/1

1500 Hours of Operation or 36 Months Service

Change DEF dosing unit filter.

Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									

CM22194,0000A8C -19-10JUN21-1/1

2000 Hours of Operation or 24 Months Service

Checking Crankshaft Vibration Damper

Hours									
Date									
Hours									
Date									
Hours									
Date									

CM22194,0000A87 -19-10JUN21-1/1

3000 Hours of Operation or Every 36 Months Service

- Adjust Valve Clearance

Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									

CM22194,0000A8D -19-10JUN21-1/1

4500 Hours of Operation or Every 60 Months Service

Changing Crankshaft Vibration Damper.

Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									

CM22194,0000A88 -19-10JUN21-1/1

6000 Hours of Operation or 72 Months Service

- Test thermostats.

- Flush and refill cooling system.

Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									

CM22194,0000A8E -19-10JUN21-1/1

8000 Hours of Operation or 36 Months Service

- Change DEF In-Line Filter

Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									

CM22194,0000A89 -19-10JUN21-1/1

Service As Required

- Drain water from fuel filters.
- Add coolant.
- Clean DEF tank.
- Replace air cleaner filter elements.
- Cleaning exhaust filter (if equipped).
- Replace fan and accessory drive belts.
- Check fuses.
- Checking electrical wiring and connections.
- Prime fuel system.
- Check air compressor (if equipped).
- Check A/C compressor (if equipped).
- Check rear PTO (if equipped).
- Replace aftertreatment DEF dosing system coolant filter.
- Clean and/or replace DEF tank inlet screen.
- Check crankshaft vibration damper

Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									

CM22194,0000A8F -19-10JUN21-1/1

Warranty

Standard Warranty for New OEM Off-Highway, Marine Engines and Drivetrain Products

RG38232 —UN—26MAR24



Warranty information in this manual may not be current. For the most current warranty information, visit <https://www.deere.com/en/parts-and-service/warranty-and-protection-plans/warranties/warranty-statements/>.

Standard Warranty for New OEM Off-Highway, Marine Engines and Drivetrain Products

This Standard Warranty is John Deere's warranty for new John Deere products described in this document ("Products") and is provided at no additional charge to the commercial purchaser ("Purchaser").

Warranty Duration

Unless otherwise provided in writing, John Deere ^a:

- New John Deere off-highway engine marketed as part of a Product manufactured by a company other than John Deere or its affiliates and on each new John Deere engine used in an off-highway repower application
- New John Deere marine engine
- New John Deere Drivetrain Products (e.g., Transmission, Planetary Drive, Pump Drive, Axle, and E-Drive)

Coverage Term ^b

- New Off-Highway Engines: 24 Months or 2000 hours, or 12 Months unlimited hours (whichever occurs first)
- New Marine Engines: 24 Months or 2000 hours, or 12 Months unlimited hours (whichever occurs first)
- New John Deere Drivetrain Products (e.g., Transmission, Planetary Drive, Pump Drive, Axle, and E-Drive): 12 Months or 2000 hours (whichever occurs first).

Extended Warranty, where available, is a separate repair contract made available by John Deere for Purchasers who wish to complement their Standard Warranty coverage. Complete Extended Warranty details, including coverage options and limitations, are set forth in the Application for Extended Warranty, which is available from authorized John Deere dealers and distributors ("Dealers").

Emissions Warranty

Emissions warranty information is included in the Operator's Manual, where legally required.

A. STANDARD WARRANTY - GENERAL PROVISIONS

John Deere will repair or replace, at its option, any parts (except those specified below) of a new Product that, as delivered to the Purchaser, are defective in material or workmanship. Performance of this warranty will be free of charge for parts and labor, except as otherwise stated below. Standard Warranty applies only to purchases from John Deere and Dealers. Coverage begins on the date of delivery of the Product to the Purchaser. For purposes of this warranty, a Product that has been used for demonstration or other purposes will be deemed to be "used" for the total duration of such use. If a Product is used for more than 250 hours, the Product must be registered and will initiate Standard Warranty coverage with the then current hours of use. If the Purchaser sells or otherwise transfers the Product and requests a transfer of the Standard Warranty from a Dealer before the Product's Standard Warranty expires, the remaining Standard Warranty will be transferred to the subsequent purchaser or transferee (hereinafter also referred to as a "Purchaser").

B. WHAT IS COVERED BY STANDARD WARRANTY

All parts of a Product (except those noted in Sections D and E below) are covered during the Standard Warranty period set out above. John Deere parts and accessories added by authorized John Deere engine distributors and/or authorized OEMs to new JDPS Products are also covered under this Standard Warranty.

C. EXCLUSIVE REMEDY

THE REPAIR OR REPLACEMENT OF COVERED PARTS OR COMPONENTS THAT ARE DEFECTIVE, AS PROVIDED IN SECTIONS A AND B SHALL BE THE PURCHASER'S EXCLUSIVE REMEDY FOR ANY DEFECT IN THE PRODUCT. HOWEVER, IF AFTER REPEATED ATTEMPTS SUCH REPAIR OR REPLACEMENT FAILS TO CORRECT THE PERFORMANCE PROBLEM CAUSED BY THE DEFECT, THE PURCHASER'S SOLE REMEDY SHALL BE A REFUND OF THE AMOUNT PAID FOR THE PRODUCT (IN EXCHANGE FOR A RETURN OF THE PRODUCT), EXCLUDING ANY TRANSPORTATION CHARGES, LICENSE FEES, TAXES, AND INSURANCE PREMIUMS, AND LESS A REASONABLE ALLOWANCE FOR USE OF THE PRODUCT PRIOR TO ITS RETURN.

D. ITEMS COVERED SEPARATELY

1. Standard Warranty does not apply to components, accessories and features added by Original Equipment Manufacturers (OEMs), Non-John Deere parts or kits.
2. John Deere Branded StrongBox™ batteries.

Continued on next page

RG.OEMWARRANTY -19-24JUN24-1/3

E. ITEMS NOT COVERED

John Deere is NOT responsible for the following:

1. Periodic maintenance (as recommended in the applicable Operator's Manual), adjustments or depreciation or damage caused by normal wear or application, lack of reasonable and proper maintenance, failure to follow operating instructions, misuse, lack of proper protection during storage, vandalism, negligence, expenses to seek reinstatement of warranty following theft or loss of Product, or other accidents.
2. Periodic cleaning of the Diesel Exhaust Filter unless:
 - a. The need for cleaning resulted from the failure of a part that is covered by the engine's Standard Product Warranty, Emissions Warranty or Extended Warranty, or
 - b. The engine is located in California and the need for cleaning was caused by a failure covered under applicable (California Air Resources Board) CARB emission regulations.
3. Consequences of negligence, misuse, or accident involving the Product, or improper application, installation, or storage of the Product.
4. Consequences of service performed by someone other than a party authorized to perform warranty service, if such service, in John Deere's judgment, has adversely affected the performance or reliability of the Product.
5. Consequences of any modification or alteration of the Product not approved by John Deere, including, but not limited to tampering with fuel and/or air delivery systems.
6. Consequences of fuels, lubricants or coolants that fail to meet the Product specifications and requirements listed in the Operator's Manual.
7. The effects of cooling system neglect as manifested in cylinder liner or block cavitation ("pitting," "erosion," "electrolysis").
8. Premiums charged for overtime.
9. Dealer travel costs to transport the Product, or the equipment in which it is installed, to and from the location at which the warranty service is performed, if such costs exceed the applicable travel allowance cap on the documented failure date. See the Dealer for current travel allowance cap.
10. Costs incurred in gaining access to the Product, e.g., overcoming physical barriers such as walls, fences, floors, decks, or similar structures impeding access to the Product, rental of cranes, construction of ramps or lifts or protective structures for Product removal and/or reinstallation.
11. Incidental travel costs including meals, lodging, and similar expenses.
12. Services performed by a party other than a Dealer, unless required by law.
13. Costs of interpretation or translation services.
14. Damage caused by unapproved adjustments (electronic or mechanical) to Products or Product components outside of published specifications.
15. Rental Fees.
16. Non-John Deere components or modifications, and attachments installed aftermarket.
17. Shop supplies and maintenance items such as, but not limited to filters, fuels, oil, hydraulic fluid, lubricants, coolants, conditioners, shop towels, cleaners, and degreasers.
18. Torn, cut, or worn hoses.
19. Any defect in a non-covered component, or damage to or failure of a covered component caused by a defect in a non-covered component.
20. Secondary damage which occurs from continued operation of a Product after recognition of the occurrence of a failure.
21. Parts supplied by or repairs, maintenance or modifications performed by someone other than a Dealer, including any damage caused by such use of parts, repairs, maintenance, or modifications not performed by a Dealer.
22. Topping off fluids when fluid levels fall in the range between low and full.
23. Used Products (except as otherwise provided in section L below).
24. Lost or stolen Products.

F. TERMINATION OF WARRANTY

John Deere is relieved of its obligations under Standard Warranty, and/or Extended Warranty if:

1. The Product is modified or altered in ways not approved by John Deere; OR
2. Any unapproved or improperly sized attachment is installed on the Product. Approval and attachment size shall be at John Deere's sole discretion. (Consult with selling Dealer or OEM Equipment manufacturer prior to installing attachments or making Product modifications).

G. PARTS REPLACED UNDER WARRANTY

Only new or remanufactured parts or components furnished or approved by John Deere, will be used if John Deere elects to repair the Product. If any such part or component is defective in material or workmanship when installed in the Product, John Deere will repair or replace, as it elects, such defective part or component, provided the defect is reported to a Dealer within 90 days of installation or before expiration of the applicable Standard Warranty, or the Parts warranty term, whichever is greater.

H. TELEMATICS

NOTICE: Products may be equipped with telematics hardware and software ("Telematics") that transmit data to John Deere/Dealer. The Purchaser may deactivate Telematics at <https://operationscenter.deere.com>.

Notwithstanding Purchaser's right, title or interest in the Products, Purchaser agrees that John Deere and Dealer (their affiliates, successors, and assigns), without further notice to Purchaser have the right to:

1. Access, use, collect and disclose any data generated by, collected by, or stored in, Products or any hardware or devices interfacing with Products ("Machine Data");
2. Access Machine Data directly through data reporting devices integrated within, or attached to, Products, including Telematics ("Data Reporting Systems");
3. Update the Data Reporting Systems software from time to time; and
4. Machine Data will only be used in accordance with John Deere's Data Services & Subscription Statement located at <https://www.deere.com/en/privacy-and-data/data-services>.

I. OBTAINING WARRANTY SERVICE

To obtain warranty service, the Purchaser must request warranty service from a Dealer. Dealers can be located using the 'Find A Dealer' feature on <https://www.deere.com>. When making such a request, the Purchaser must present evidence of the Product's delivery date, make the Product available at the Dealer's place of business, and inform the Dealer in what way the Purchaser believes the Product to be defective. Standard Warranty repairs may be made in the field if the Purchaser and servicing Dealer so desire. Travel reimbursement limits exist for OEM Products.

Warranty

J. NO IMPLIED WARRANTY, CONDITIONS OR OTHER REPRESENTATION

Where permitted by law, neither John Deere nor any company affiliated with it makes any warranties, representations, conditions or promises, express or implied, as to the quality, performance, or freedom from defect of its products, including the Products, other than those set forth in this document and NO IMPLIED WARRANTY OF MERCHANTABILITY, CONDITIONS OR FITNESS IS MADE.

TO THE EXTENT PERMITTED BY LAW, NEITHER A DEALER, JOHN DEERE OR ANY COMPANY AFFILIATED WITH JOHN DEERE BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OR INJURIES INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS, LOSS OF CROPS, RENTAL OF SUBSTITUTE EQUIPMENT OR OTHER COMMERCIAL LOSS, DAMAGE TO THE EQUIPMENT IN WHICH THE PRODUCT IS INSTALLED OR FOR DAMAGE SUFFERED BY PURCHASER AS A RESULT OF FUNDAMENTAL BREACHES OF CONTRACT OR BREACH OF FUNDAMENTAL TERMS.

K. NO DEALER WARRANTY

The selling Dealer makes no warranty of its own on any item covered by this warranty and makes no warranty on other items unless the Dealer delivers to the Purchaser a separate written warranty certificate specifically warranting the item. The Dealer has no authority to make any representation or promise on behalf of John Deere, or to modify the terms or limitations of this Standard Warranty in any way.

L. USED JOHN DEERE OEM EQUIPMENT ONLY

John Deere will transfer remaining Standard Warranty, Extended Warranty, and Emissions Warranty, where applicable, to a Purchaser of Product installed in used OEM equipment that has been used for less than the full warranty period provided at the Product's original retail purchase. This transfer is not effective until change of ownership is registered by a Dealer. ALL TERMS AND CONDITIONS, INCLUDING LIMITATIONS AND EXCLUSIONS, OF THIS STANDARD WARRANTY FOR THE PRODUCT REMAIN IN EFFECT AND APPLICABLE FOR THE REMAINING WARRANTY TERM.

^a"John Deere" means John Deere Power Systems, a division of John Deere Shared Services LLC with respect to Purchasers in the United States, John Deere Canada ULC with respect to Purchasers in Canada and Deere & Company or its subsidiary responsible for marketing John Deere equipment in other countries where the Purchaser is located

^bIn the absence of a functional hour meter, hours of use will be determined based on 12 hours of use per calendar day.

RG,OEMWARRANTY -19-24JUN24-3/3

John Deere Warranty in OEM Applications

Overview

This section focuses on John Deere engines marketed in products manufactured by companies other than John Deere or its affiliates, and on John Deere repower engines in all applications. Herein appears the original warranty applicable to the engine as delivered to the retail purchaser on or after 1 May 2010. The following is information about the warranty and warranty service.

NOTE: “John Deere” means John Deere Power Systems with respect to users in the United States, John Deere Canada ULC with respect to users in Canada, and Deere & Company or its subsidiary responsible for making John Deere equipment in other countries where the user is located.

Promptly register the engine online at <https://warrantyregistration.deere.com/WarrantyReg/web/WarrantyReg>.

When Warranty Service Is Needed

The nearest dealer stands ready with genuine parts and trained and equipped personnel should the need arise. If following the Operator's Manual delivered with the engine/machine are not adequate to correct an engine problem, contact the nearest John Deere service dealer for assistance. Authorized engine service dealers can be found at: <https://www.deere.com> or <https://www.deere.ca> (click on “Find a Dealer”).

NOTE: When requesting warranty service, the purchaser must be prepared to provide proof that the engine is within the warranty period.

The following information is always required: Engine serial number, date of delivery, engine owner, name and location of dealer and specific person contacted, date of contact, nature of engine problem, and outcome of the service dealer contact.

Given that normally it is the dealer contacted who in the end provides the service required, maintaining a purchaser-dealer relationship of mutual respect from the beginning is always helpful.

Privacy Notice

At John Deere privacy is important. We collect, use, and disclose personal information in accordance with the John Deere privacy statement. For instance, we collect, use, and disclose personal information to provide the products and services requested; to communicate with the customer (examples include warranty and product improvement programs) and to meet safety and legal requirements; and for marketing and promotional purposes. Sometimes, we may ask our John Deere affiliates, dealers, or business partners to do work for us, which involves personal information. For complete

details on privacy rights and to obtain a copy of the John Deere Privacy Statement, visit our website at <https://www.deere.com> or <https://www.deere.ca>.

Warranty Duration

Unless otherwise provided in writing, John Deere makes the following warranty to the first retail purchaser and each subsequent purchaser (if purchase is made prior to expiration of applicable warranty) of each John Deere new off-highway engine marketed as part of a product manufactured by a company other than John Deere or its affiliates and on each John Deere engine used in an off-highway repower application:

- 12 months, unlimited hours of use, or
- 24 months and prior to the accumulation of 2000 hours of use

NOTE: In the absence of a functional hour meter, hours of use will be determined on the basis of 12 hours of use per calendar day.

Warranty Coverage

All John Deere-warranted parts and components of John Deere engines which, as delivered to the purchaser, are defective in materials and/or workmanship will be repaired or replaced, as John Deere elects, without charge for parts or engine repair labor, including reasonable costs of labor to remove and reinstall non-engine parts or components of the equipment in which the engine is installed, and, when required, reasonable costs of labor for engine removal and reinstallation, if such defect appears within the warranty period as measured from the date of delivery to the first retail purchaser.

Emissions Warranty

Emissions warranties appear in the Operator's Manual, that is furnished with the engine/machine.

Obtaining Warranty Service

Warranty service is to be performed by a local John Deere engine service outlet before the expiration of the warranty. An authorized service outlet is a John Deere engine distributor, a John Deere engine service dealer, or a John Deere equipment dealer selling and servicing equipment with an engine of the type covered by this warranty. Authorized service outlets will use only new or remanufactured parts or components furnished or approved by John Deere.

Authorized service locations can be found by using the dealer locator on www.johndeere.com, or by calling 1-800-JDENGINE (800-533-6446).

At the time of requesting warranty service, the purchaser must be prepared to present evidence of the engine's delivery date.

Continued on next page

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John Deere reimburses authorized service outlets for limited travel expenses incurred in making warranty service repairs in non-John Deere applications when travel is actually performed. Contact your local authorized service dealer for current travel reimbursement limits. If distances and travel times are greater than reimbursed by John Deere, the service outlet will charge the purchaser for the difference.

Authorized service outlets will use only new or remanufactured parts or components furnished or approved by John Deere.

NOTE: Authorized engine service locations are listed on the Internet at <https://www.deere.com> or <https://www.deere.ca> (click on "Find a Dealer").

At the time of requesting warranty service, the purchaser must be prepared to present evidence of the date of delivery of the engine.

John Deere reimburses authorized service outlets for limited travel expenses incurred in making warranty service repairs in non-John Deere applications when travel is performed. The limit, as of the date of publication of this booklet, is US\$400.00 (US\$500.00 if engine is marine) or equivalent. **If distances and travel times are greater than reimbursed by John Deere, the service outlet will charge the purchaser for the difference.**

Warranty Exclusions

John Deere's obligations will not apply to components and accessories that are not furnished or installed by John Deere, nor to failures caused by such items, except as required by law.

Purchaser's Responsibilities

The cost of normal maintenance and depreciation.

Periodic cleaning of the Diesel Exhaust Filter.

Consequences of negligence, misuse, or accident involving the engine, or improper application, installation, or storage of the engine.

Consequences of service performed by someone other than a party authorized to perform warranty service, if such service, in John Deere's judgment, has adversely affected the performance or reliability of the engine.

Consequences of any modification or alteration of the engine not approved by John Deere, including, but not limited to, tampering with fuel and air delivery systems.

Consequences of fuels, lubricants or coolant that fails to meet the specifications and requirements listed in the Operator's Manual.

The effects of cooling system neglect as manifested in cylinder liner or block cavitation ("pitting", "erosion", "electrolysis").

Any premium for overtime labor requested by the purchaser.

Costs of transporting the engine or the equipment in which it is installed to and from the location at which the warranty service is performed, if such costs are in excess of the maximum amount payable to the service location were the warranty service performed at the engine's location.

Costs incurred in gaining access to the engine; i.e., overcoming physical barriers such as walls, fences, floors, decks or similar structures impeding access to the engine, rental of cranes or similar, or construction of ramps or lifts or protective structures for engine removal and reinstallation.

Incidental travel costs including meals, lodging, and similar.

Service outlet costs incurred in solving or attempting to solve non-warrantable problems.

Services performed by a party other than an authorized John Deere engine service dealer, unless required by law.

Charges by dealers for initial engine start-up and inspection, deemed unnecessary by John Deere when operation and maintenance instructions supplied with the engine are followed.

Costs of interpretation or translation services.

Periodic cleaning of the Diesel Exhaust Filter.

John Deere will not be responsible for the cost of Exhaust Filter or Diesel Particulate Filter (DPF) cleaning unless:

- The need for cleaning resulted from the failure of a part that is covered by the engine's Standard Product Warranty or Extended Warranty, or
- The engine is located in California and the need for cleaning was caused by a failure covered under applicable CARB emissions regulations.

No Representations or Implied Warranty

Where permitted by law, neither John Deere nor any company affiliated with it makes any guaranties, warranties, conditions, representations or promises, express or implied, oral or written, as to the nonoccurrence of any defect or the quality or performance of its engines other than those set forth herein, and DOES NOT MAKE ANY IMPLIED WARRANTY OR CONDITIONS OF MERCHANTABILITY OR FITNESS otherwise provided for in the Uniform Commercial Code or required by any Sale of Goods Act or any other statute. This exclusion includes fundamental terms. In no event will a John Deere engine distributor or engine service dealer, John Deere equipment dealer, John Deere or any company affiliated with John Deere be liable for incidental or consequential damages or injuries including, but not limited to, loss of profits, loss of crops, rental of substitute equipment or other commercial loss, damage to the equipment in which the engine is installed or for damage suffered by purchaser as a result of fundamental breaches of contract or breach of fundamental terms, unless such damages or injuries are caused by the gross negligence or intentional acts of the foregoing parties.

Remedy Limitation

The remedies set forth in this warranty are the purchaser's exclusive remedies in connection with the performance of, or any breach of guaranty, condition, or warranty in respect of new John Deere engines. In the event the above warranty fails to correct purchaser's performance problems caused by defects in workmanship and/or materials, purchaser's exclusive remedy shall be limited to payment by John Deere of actual damages in an amount not to exceed the depreciated cost of the product.

No Seller's Warranty

No person or entity, other than John Deere, who sells the engine or product in which the engine has been installed makes any guaranty or warranty of its own on any engine warranted by John Deere unless it delivers to the purchaser a separate written guaranty certificate specifically guaranteeing the engine, in which case John Deere shall have no obligation to the purchaser. Neither original equipment manufacturers, engine or equipment distributors, engine or equipment dealers, nor any other person or entity, has any authority to make any representation or promise on behalf of John Deere or to modify the terms or limitations of this warranty in any way.

Replacement Parts Warranty

John Deere and John Deere Reman parts and components (excluding replacement engines) installed during engine warranty service are warranted for the remaining warranty period of the engine or the applicable warranty term for the installed service part, whichever is greater. A new or remanufactured engine replacing a

failed engine under warranty is warranted for 90 days or the remaining warranty period of the original engine, whichever is greater.

Warranty Transfer

The remainder of the original engine warranty and the emissions control-related warranty may be transferred to a subsequent owner of the engine. The Engine Warranty Transfer card should be used to report the transfer to John Deere. If a card is not available, contact your Dealer or simply send the following Information to JDPS Warranty Administration at Diesel-US@JohnDeere.com.

1. The complete 13-character engine serial number.
2. The name and mailing address of the original purchaser.
3. Delivery date to the original purchaser.
4. Hours at the time of transfer.
5. Date of transfer to the new owner.
6. Name and mailing address of the new owner.
7. How the engine/drivetrain being used, that is, what equipment it powers, by manufacturer and model.
8. Equipment it powers, by manufacturer and model.

Purchased Extended Warranty

Extended warranty may be purchased on most engines in many areas of the world. John Deere engine distributors and equipment dealers, and dealers of manufacturers using John Deere engines in their products, have details. John Deere may also be contacted at U.S.A. fax number 1-309-749-0816, or in Europe fax number 33.2.38.84.62.66.

Emissions Warranties

Emissions warranties appear in the Operator's Manual furnished with the engine/machine. **(Warning: Statutes providing severe penalties for tampering with emissions controls may apply at the user's location.)** John Deere may also be contacted at U.S.A. fax number 1-309-749-0816; or in Europe fax number 33.2.38.84.62.66.

Local Warranty Requirements

Warranties required by local statutes will be furnished by the seller.

Option Codes (Engine Manufacturing Configuration)

When in need of engine replacement parts, your authorized John Deere service dealer will must know the corresponding "Option Codes" for your engine. The option code label on the engine rocker arm cover may become damaged over time. By recording the four-digit codes when the engine is new, and storing this manual where it can be found when parts are needed, fast, accurate parts ordering and service will be assured. See Engine Option Codes in Section 01.

Should there be a question about an engine option code, note the engine serial number and call 1-800-JDENGINE from the U.S.A. or Canada, or fax U.S.A. number 1-309-749-0816; or E-mail at diesel-us@johndeere.com, Attention: Warranty Administration; or in Europe fax number 33.2.38.84.62.66, or E-mail at saranservice@johndeere.com.

Registering the Engine for Warranty

Completion and submission of the John Deere Engine Warranty Registration form (cut out sheet found in this manual) is important. John Deere will not deny warranty service on an engine within its warranty period if the engine has not been registered. However, registering your engine will assure your servicing dealer that the engine is within the warranty period.

The easiest way to register your engine is via the Internet. Go to website <https://www.johndeere.com/enginewarranty>. You can use the sheet in this manual to gather the information needed to register the warranty.

NOTE: Information provided on the form must be legible!

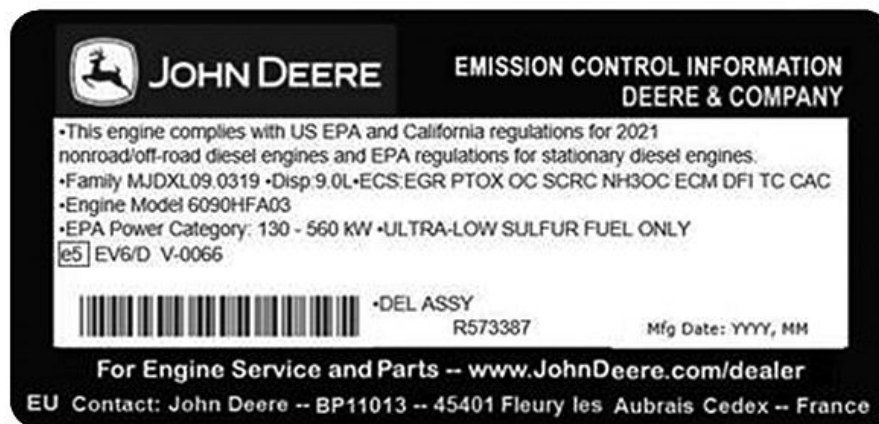
Typing is preferred, but legible handwritten reports are acceptable. "Block" numbers and Roman alphabet letters should be used. For example: 1,2,3,4 and A, B, C, D.

All requested information should be given. Much of it contributes to reports, including those required by governments.

The purchaser's telephone number or E-mail address allows John Deere to make contact should there be questions concerning the registration. The purchaser should sign and date the form.

CM22194,00011A1 -19-21AUG25-4/4

Emissions Control System Certification Label



Engine Emissions Label

CAUTION: Statutes providing severe penalties for tampering with emissions controls may apply to the user or dealer.

The emissions warranty applies to those engines marketed by John Deere that have been certified by the United States Environmental Protection Agency (EPA) and/or California Air Resources Board (CARB); and used in the United States and Canada in Non-road equipment. The presence of an emissions label like the one shown signifies that the engine has been certified with the EPA and/or CARB. The EPA and CARB warranties only apply to new engines having the certification label affixed to the engine and sold as stated above in the geographic areas. The presence of an EU number signifies that the engine has been certified with the European Union countries per Regulation (EU) 2016/1628 and supplementing legislation. The EPA and/or CARB emissions warranties do not apply to the EU countries.

The emissions label has applicable US EPA and/or CARB regulatory year. The regulatory year determines which warranty statement is applicable to engine. See "EPA Non-road Emissions Control Warranty Statement—Compression Ignition" and "CARB Non-road Emissions Control Warranty Statement—Compression Ignition". For additional regulatory year warranty statements, see www.JohnDeere.com or contact the nearest John Deere service dealer for assistance.

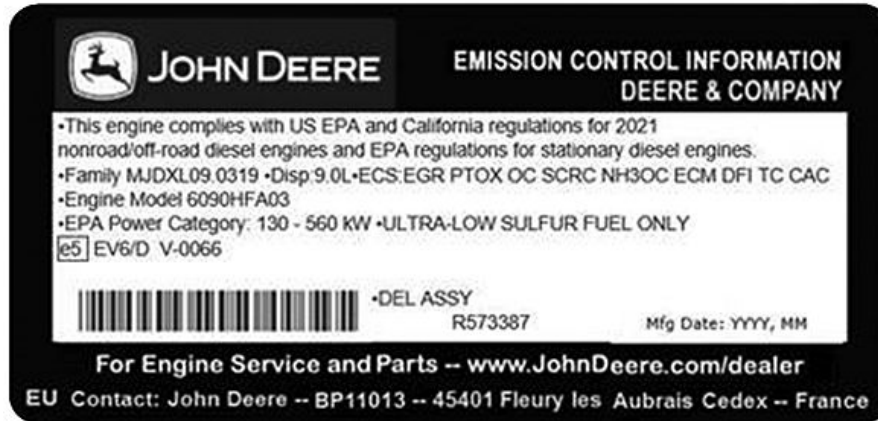
Emission Control System(s) Laws

The U.S. EPA and California ARB prohibit the removal or rendering inoperative of any device or element of design installed on or in engines/equipment in compliance with applicable emission regulations prior to or after the sale and delivery of the engines/equipment to the ultimate purchaser.

DX,EMISSIONS,LABEL -19-05FEB21-1/1

RG33429—UN—04FEB21

Carbon Dioxide Emissions (CO₂)



SAMPLE - Engine Emissions Label

To identify the carbon dioxide (CO₂) output, locate the engine emissions label. Find the appropriate family on the emissions label and reference the chart.

NOTE: The first letter of the family number is not utilized for family identification on the chart.

This CO₂ measurement results from testing over a fixed test cycle under laboratory conditions a(n) (parent) engine representative of the engine type (engine family) and shall not imply or express any guarantee of the performance of a particular engine.

Emissions Label Family	CO ₂ Result
_JDXL02.9323	952 g/kW-hr
_JDXL02.9327	784 g/kW-hr
_JDXL04.5337	819 g/kW-hr
_JDXL04.5338	682 g/kW-hr
_JDXL04.5304	1004 g/kW-hr
_JDXN04.5174	792 g/kW-hr
_JDXL06.8324	720 g/kW-hr
_JDXL06.8328	683 g/kW-hr
_JDXL06.8336	701 g/kW-hr
_JDXN06.8175	771 g/kW-hr
_JDXL09.0319	646 g/kW-hr
_JDXL09.0325	695 g/kW-hr
_JDXL09.0329	657 g/kW-hr
_JDXL09.0333	650 g/kW-hr
_JDXL13.5326	684 g/kW-hr
_JDXL13.6320	651 g/kW-hr
_JDXL13.5340	632 g/kW-hr
_JDXL18.0341	683 g/kW-hr
_JDXL18.0342	687 g/kW-hr
F28	870 g/kW-hr
F32	710 g/kW-hr
F33	677 g/kW-hr

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DX,EMISSIONS,CO2 -19-23JUN23-1/2

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EPA Non-road Emissions Control Warranty Statement—Compression Ignition

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JOHN DEERE

U.S. AND CANADA EMISSION CONTROL WARRANTY STATEMENT YOUR WARRANTY RIGHTS AND OBLIGATIONS

To determine if the John Deere engine qualifies for the additional warranties set forth below, look for the "Emissions Control Information" label located on the engine. If the engine is operated in the United States or Canada and the Emissions Control information label states: "This engine complies with US EPA regulations for nonroad and stationary diesel engines", or "This engine conforms to US EPA nonroad compression-ignition regulations", refer to the "U.S. and Canada Emission Control Warranty Statement." If the engine is operated in California, and the label states: "This engine complies with US EPA and CARB regulations for nonroad diesel engines", or "This engine conforms to US EPA and California nonroad compression-ignition emission regulations", also refer to the "California Emission Control Warranty Statement."

Warranties stated on this certificate refer only to emissions-related parts and components of your engine. The complete engine warranty, less emissions-related parts and components, is provided separately. If you have any questions about your warranty rights and responsibilities, you should contact John Deere at 1-319-292-5400.

JOHN DEERE'S WARRANTY RESPONSIBILITY

John Deere warrants to the ultimate purchaser and each subsequent purchaser that this off-road diesel engine including all parts of its emission-control system was designed, built and equipped so as to conform at the time of the sale with Section 213 of the Clean Air Act and is free from defects in materials and workmanship which would cause the engine to fail to conform with applicable US EPA regulations for a period of five years from the date the engine is placed into service or 3,000 hours of operation, whichever first occurs.

Where a warrantable condition exists, John Deere will repair or replace, as it elects, any part or component with a defect in materials or workmanship that would increase the engine's emissions of any regulated pollutant within the stated warranty period at no cost to you, including expenses related to diagnosing and repairing or replacing emission-related parts. Warranty coverage is subject to the limitations and exclusions set forth herein. Emission- related components include engine parts developed to control emissions related to the following:

Air-Induction System	Aftertreatment Devices
Fuel System	Crankcase Ventilation Valves
Ignition System	Sensors
Exhaust Gas Recirculation Systems	Engine Electronic Control Units

EMISSION WARRANTY EXCLUSIONS

John Deere may deny warranty claims for malfunctions or failures caused by:

- Non-performance of maintenance requirements listed in the Operator's Manual
- The use of the engine/equipment in a manner for which it was not designed
- Abuse, neglect, improper maintenance or unapproved modifications or alterations
- Accidents for which it does not have responsibility or by acts of God

The off-road diesel engine is designed to operate on diesel fuel as specified in the Fuels, Lubricants and Coolants section in the Operators Manual. Use of any other fuel can harm the emissions control system of the engine/equipment and is not approved for use.

To the extent permitted by law John Deere is not liable for damage to other engine components caused by a failure of an emission-related part, unless otherwise covered by standard warranty.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. REMEDIES UNDER THIS WARRANTY ARE LIMITED TO THE PROVISIONS OF MATERIAL AND SERVICES AS SPECIFIED HEREIN. WHERE PERMITTED BY LAW, NEITHER JOHN DEERE NOR ANY AUTHORIZED JOHN DEERE ENGINE DISTRIBUTOR, DEALER, OR REPAIR FACILITY OR ANY COMPANY AFFILIATED WITH JOHN DEERE WILL BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

Emission_CI_EPA (18Dec09)

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JOHN DEERE

**U.S. AND CANADA EMISSION CONTROL WARRANTY STATEMENT
YOUR WARRANTY RIGHTS AND OBLIGATIONS**

To determine if the John Deere engine qualifies for the additional warranties set forth below, look for the "Emissions Control Information" label located on the engine. If the engine is operated in the United States or Canada and the Emissions Control information label states: "This engine complies with US EPA regulations for nonroad and stationary diesel engines", or "This engine conforms to US EPA nonroad compression-ignition regulations", refer to the "U.S. and Canada Emission Control Warranty Statement." If the engine is operated in California, and the label states: "This engine complies with US EPA and CARB regulations for nonroad diesel engines", or "This engine conforms to US EPA and California nonroad compression-ignition emission regulations", also refer to the "California Emission Control Warranty Statement."

Warranties stated on this certificate refer only to emissions-related parts and components of your engine. The complete engine warranty, less emissions-related parts and components, is provided separately. If you have any questions about your warranty rights and responsibilities, you should contact John Deere at 1-319-292-5400.

JOHN DEERE'S WARRANTY RESPONSIBILITY

John Deere warrants to the ultimate purchaser and each subsequent purchaser that this off-road diesel engine including all parts of its emission-control system was designed, built and equipped so as to conform at the time of the sale with Section 213 of the Clean Air Act and is free from defects in materials and workmanship which would cause the engine to fail to conform with applicable US EPA regulations for a period of five years from the date the engine is placed into service or 3,000 hours of operation, whichever first occurs.

Where a warrantable condition exists, John Deere will repair or replace, as it elects, any part or component with a defect in materials or workmanship that would increase the engine's emissions of any regulated pollutant within the stated warranty period at no cost to you, including expenses related to diagnosing and repairing or replacing emission-related parts. Warranty coverage is subject to the limitations and exclusions set forth herein. Emission-related components include engine parts developed to control emissions related to the following:

Air-Induction System
Fuel System
Ignition System
Exhaust Gas Recirculation Systems

Aftertreatment Devices
Crankcase Ventilation Valves
Sensors
Engine Electronic Control Units

EMISSION WARRANTY EXCLUSIONS

John Deere may deny warranty claims for malfunctions or failures caused by:

- Non-performance of maintenance requirements listed in the Operator's Manual
- The use of the engine/equipment in a manner for which it was not designed
- Abuse, neglect, improper maintenance or unapproved modifications or alterations
- Accidents for which it does not have responsibility or by acts of God

The off-road diesel engine is designed to operate on diesel fuel as specified in the Fuels, Lubricants and Coolants section in the Operators Manual. Use of any other fuel can harm the emissions control system of the engine/equipment and is not approved for use.

To the extent permitted by law John Deere is not liable for damage to other engine components caused by a failure of an emission-related part, unless otherwise covered by standard warranty.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. REMEDIES UNDER THIS WARRANTY ARE LIMITED TO THE PROVISIONS OF MATERIAL AND SERVICES AS SPECIFIED HEREIN. WHERE PERMITTED BY LAW, NEITHER JOHN DEERE NOR ANY AUTHORIZED JOHN DEERE ENGINE DISTRIBUTOR, DEALER, OR REPAIR FACILITY OR ANY COMPANY AFFILIATED WITH JOHN DEERE WILL BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

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CARB Non-Road Emissions Control Warranty Statement—Compression Ignition

Emissions Control Warranty Statement 2025 through 2027

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JOHN DEERE

CALIFORNIA EMISSIONS CONTROL WARRANTY STATEMENT YOUR WARRANTY RIGHTS AND OBLIGATIONS

To determine if the John Deere engine qualifies for the additional warranties set forth below, look for the "Emission Control Information" label located on the engine. If the engine is operated in the United States or Canada and the engine label states: "This engine complies with US EPA regulations for nonroad and stationary diesel engines", or "This engine complies with US EPA regulations for stationary emergency diesel engines", refer to the "U.S. and Canada Emission Control Warranty Statement." If the engine is operated in California, and the engine label states: "This engine complies with US EPA and California regulations for nonroad/off-road diesel engines" also refer to the "California Emissions Control Warranty Statement." Warranties stated on this certificate refer only to emissions-related parts and components of your engine. The complete engine warranty, less emission-related parts and components, is provided separately. If you have any questions about your warranty rights and responsibilities, you should contact John Deere at 1-319-292-5400.

CALIFORNIA EMISSIONS CONTROL WARRANTY STATEMENT:

The California Air Resources Board (CARB) is pleased to explain the emission-control system warranty in 2025 through 2027 off-road diesel engines. In California, new off-road engines must be designed, built and equipped to meet the State's stringent anti-smog standards. John Deere must warrant the emission control system on your engine for the periods of time listed below provided there has been no abuse, neglect or improper maintenance of your engine.

Your emission control system may include parts such as the fuel injection system and the air induction system. Also included may be hoses, belts, connectors and other emission-related assemblies.

John Deere warrants to the ultimate purchaser and each subsequent purchaser that this off-road diesel engine was designed, built, and equipped so as to conform at the time of sale with all applicable regulations adopted by CARB and is free from defects in materials and workmanship which would cause the failure of a warranted part to be identical in all material respects to the part as described in John Deere's application for certification for a period of five years from the date the engine is delivered to an ultimate purchaser or 3,000 hours of operation, whichever occurs first for all engines rated at 19 kW and greater. In the absence of a device to measure hours of use, the engine shall be warranted for a period of five years.

EMISSIONS WARRANTY EXCLUSIONS:

John Deere may deny warranty claims for failures caused by the use of an add-on or modified part which has not been exempted by the CARB. A modified part is an aftermarket part intended to replace an original emission-related part which is not functionally identical in all respects and which in any way affects emissions. An add-on part is any aftermarket part which is not a modified part or a replacement part.

In no event will John Deere, any authorized engine distributor, dealer, or repair facility, or any company affiliated with John Deere be liable for incidental or consequential damage.

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JOHN DEERE'S WARRANTY RESPONSIBILITY:

Where a warrantable condition exists, John Deere will repair or replace, as it elects, your off-road diesel engine at no cost to you, including diagnosis, parts and labor. Warranty coverage is subject to the limitations and exclusions set forth herein. The off-road diesel engine is warranted for a period of five years from the date the engine is delivered to an ultimate purchaser or 3,000 hours of operation, whichever occurs first. The following are emissions-related parts:

Air Induction System

- Intake manifold
- Turbocharger
- Charge air cooler

Fuel Metering system

- Fuel injection system

Exhaust Gas Recirculation

- EGR valve

Catalyst or Thermal Reactor Systems

- Catalytic converter
- Exhaust manifold

Emission control labels

Particulate Controls

- Any device used to capture particulate emissions
- Any device used in the regeneration of the capturing system
- Enclosures and manifolding
- Smoke Puff Limiters

Positive Crankcase Ventilation (PCV) System

- PCV valve
- Oil filler cap

Advanced Oxides of Nitrogen (NOx) Controls

- NOx absorbers and catalysts

SCR systems and urea containers/dispensing systems

Miscellaneous Items used in Above Systems

- Electronic control units, sensors, actuators, wiring harnesses, hoses, connectors, clamps, fittings, gasket, mounting hardware

Any warranted emissions-related part scheduled for replacement as required maintenance is warranted by John Deere for the period of time prior to the first scheduled replacement point for the part. Any warranted emissions-related part not scheduled for replacement as required maintenance or scheduled only for regular inspection is warranted by John Deere for the stated warranty period.

OWNER'S WARRANTY RESPONSIBILITIES:

As the off-road diesel engine owner you are responsible for the performance of the required maintenance listed in your Operator's Manual. John Deere recommends that the owner retain all receipts covering maintenance on the off-road diesel engine, but John Deere cannot deny warranty solely for the lack of receipts or for the owner's failure to ensure the performance of all scheduled maintenance. However, as the off-road diesel engine owner, you should be aware that John Deere may deny you warranty coverage if your off-road diesel engine or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications.

The off-road diesel engine is designed to operate on diesel fuel as specified in the Fuels, Lubricants and Coolants section in the Operators Manual. Use of any other fuel may result in the engine no longer operating in compliance with applicable emissions requirements.

The owner is responsible for initiating the warranty process, and should present the machine to the nearest authorized John Deere dealer as soon as a problem is suspected. The warranty repairs should be completed by the authorized John Deere dealer as quickly as possible.

Emissions regulations require the customer to bring the unit to an authorized servicing dealer when warranty service is required. As a result, John Deere is NOT liable for travel or mileage on emissions warranty service calls.

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DX,EMISSIONS,CARB -19-05NOV25-2/3

CALIFORNIA EMISSIONS CONTROL WARRANTY STATEMENT YOUR WARRANTY RIGHTS AND OBLIGATIONS

To determine if the John Deere engine qualifies for the additional warranties set forth below, look for the "Emission Control Information" label located on the engine. If the engine is operated in the United States or Canada and the engine label states: "This engine complies with US EPA regulations for nonroad and stationary diesel engines", or "This engine complies with US EPA regulations for stationary emergency diesel engines", refer to the "U.S. and Canada Emission Control Warranty Statement." If the engine is operated in California, and the engine label states: "This engine complies with US EPA and California regulations for nonroad/off-road diesel engines" also refer to the "California Emissions Control Warranty Statement."

Warranties stated on this certificate refer only to emissions-related parts and components of your engine. The complete engine warranty, less emission-related parts and components, is provided separately. If you have any questions about your warranty rights and responsibilities, you should contact John Deere at 1-319-292-5400.

CALIFORNIA EMISSIONS CONTROL WARRANTY STATEMENT:

The California Air Resources Board (CARB) is pleased to explain the emission-control system warranty in 2025 through 2027 off-road diesel engines. In California, new off-road engines must be designed, built and equipped to meet the State's stringent anti-smog standards. John Deere must warrant the emission control system on your engine for the periods of time listed below provided there has been no abuse, neglect or improper maintenance of your engine.

Your emission control system may include parts such as the fuel injection system and the air induction system. Also included may be hoses, belts, connectors and other emission-related assemblies.

John Deere warrants to the ultimate purchaser and each subsequent purchaser that this off-road diesel engine was designed, built, and equipped so as to conform at the time of sale with all applicable regulations adopted by CARB and is free from defects in materials and workmanship which would cause the failure of a warranted part to be identical in all material respects to the part as described in John Deere's application for certification for a period of five years from the date the engine is delivered to an ultimate purchaser or 3,000 hours of operation, whichever occurs first for all engines rated at 19 kW and greater. In the absence of a device to measure hours of use, the engine shall be warranted for a period of five years.

EMISSIONS WARRANTY EXCLUSIONS:

John Deere may deny warranty claims for failures caused by the use of an add-on or modified part which has not been exempted by the CARB. A modified part is an aftermarket part intended to replace an original emission-related part which is not functionally identical in all respects and which in any way affects emissions. An add-on part is any aftermarket part which is not a modified part or a replacement part.

In no event will John Deere, any authorized engine distributor, dealer, or repair facility, or any company affiliated with John Deere be liable for incidental or consequential damage.

JOHN DEERE'S WARRANTY RESPONSIBILITY:

Where a warrantable condition exists, John Deere will repair or replace, as it elects, your off-road diesel engine at no cost to you, including diagnosis, parts and labor. Warranty coverage is subject to the limitations and exclusions set forth herein. The off-road diesel engine is warranted for a period of five years from the date the engine is delivered to an ultimate purchaser or 3,000 hours of operation, whichever occurs first. The following are emissions-related parts:

Air Induction System	Emission control labels	Advanced Oxides of Nitrogen (NOx Controls)
Intake manifold	Particulate Controls	NOx absorbers and catalysts
Turbocharger	Any device used to capture particulate emissions	SCR systems and urea containers / dispensing systems
Charge air cooler	Any device used in the regeneration of the capturing system	Miscellaneous Items used in Above Systems
Fuel Metering System	Enclosures and manifolding	Electronic control units, sensors, actuators, wiring harnesses, hoses, connectors, clamps, fittings, gasket, mounting hardware
Fuel injection system	Smoke Puff Limiters	
Exhaust Gas Recirculation	Positive Crankcase Ventilation (PCV) System	
EGR valve	PCV valve	
Catalyst or Thermal Reactor Systems	Oil filler cap	
Catalytic converter		
Exhaust manifold		

Any warranted emissions-related part scheduled for replacement as required maintenance is warranted by John Deere for the period of time prior to the first scheduled replacement point for the part. Any warranted emissions-related part not scheduled for replacement as required maintenance or scheduled only for regular inspection is warranted by John Deere for the stated warranty period.

OWNER'S WARRANTY RESPONSIBILITIES:

As the off-road diesel engine owner you are responsible for the performance of the required maintenance listed in your Operator's Manual. John Deere recommends that the owner retain all receipts covering maintenance on the off-road diesel engine, but John Deere cannot deny warranty solely for the lack of receipts or for the owner's failure to ensure the performance of all scheduled maintenance. However, as the off-road diesel engine owner, you should be aware that John Deere may deny you warranty coverage if your off-road diesel engine or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications.

The off-road diesel engine is designed to operate on diesel fuel as specified in the Fuels, Lubricants and Coolants section in the Operators Manual. Use of any other fuel may result in the engine no longer operating in compliance with applicable emissions requirements.

The owner is responsible for initiating the warranty process, and should present the machine to the nearest authorized John Deere dealer as soon as a problem is suspected. The warranty repairs should be completed by the authorized John Deere dealer as quickly as possible.

Emissions regulations require the customer to bring the unit to an authorized servicing dealer when warranty service is required. As a result, John Deere is NOT liable for travel or mileage on emissions warranty service calls.

China Emission Control Warranty Statement



CHINA EMISSION CONTROL WARRANTY STATEMENT YOUR WARRANTY RIGHTS AND OBLIGATIONS

To determine if the John Deere engine qualifies for the additional warranties set forth below, look for the "Emissions Control Information" label located on the engine. If the engine is operated in China and the Emissions Control Information label contains an Information Disclosure number, refer to the "China Emission Control Warranty Statement".

Warranties stated on this certificate refer only to emissions-related parts and components of your engine. The complete engine warranty, less emissions-related parts and components, is provided separately. If you have any questions about your warranty rights and responsibilities, you should contact John Deere at 400-6576-555.

JOHN DEERE'S WARRANTY RESPONSIBILITY:

John Deere warrants to the ultimate purchaser and each subsequent purchaser that this off-road diesel engine including all parts of its emission-control system was designed, built and equipped so as to conform at the time of sale with GB20891-2014 and HJ1014-2020 and is free from defects in materials and workmanship which would cause the engine to fail to conform with applicable China regulations for a period of five years from the date the engine is placed into service or 3,000 hours of operation, whichever first occurs.

Where a warrantable condition exists, John Deere will repair or replace, as it elects, any part or component with a defect in materials or workmanship that would increase the engine's emissions of any regulated pollutant within the stated warranty period at no cost to you, including expenses related to diagnosing and repairing or replacing emission-related parts. Warranty coverage is subject to the limitations and exclusions set forth herein. Emission-related components include engine parts developed to control emissions related to the following:

Air-induction system	Aftertreatment devices
Fuel System	Sensors
Exhaust gas recirculation systems	Electronic control units

EMISSION WARRANTY EXCLUSIONS:

John Deere may deny warranty claims for malfunctions or failures caused by:

- Non-performance of maintenance requirements listed in the Operator's Manual.
- The use of the engine / equipment in a manner for which it was not designed.
- Abuse, neglect, improper maintenance or unapproved modifications or alterations.
- Accidents for which it does not have responsibility or by acts of God.

The off-road diesel engine is designed to operate on diesel fuel as specified in the Fuels, Lubricants and Coolants section in the Operators Manual. Use of any other fuel can harm the emissions control system of the engine / equipment and is not approved for use.

To the extent permitted by law John Deere is not liable for damage to other engine components caused by a failure of an emission-related part, unless otherwise covered by standard warranty.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. REMEDIES UNDER THIS WARRANTY ARE LIMITED TO THE PROVISIONS OF MATERIAL AND SERVICES AS SPECIFIED HEREIN. WHERE PERMITTED BY LAW, NEITHER JOHN DEERE NOR ANY AUTHORIZED JOHN DEERE ENGINE DISTRIBUTOR, DEALER, OR REPAIR FACILITY OR ANY COMPANY AFFILIATED WITH JOHN DEERE WILL BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

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DX,EMISSIONS,NR4 -19-21APR22-1/2



中国排放物控制质保声明 您的质保权利和责任

为了确定约翰迪尔发动机是否符合下述额外质保，请查看发动机的“排放标签”。如果发动机是在中国销售使用并且“排放标签”包含信息公开编号，请参考本声明。

本质保声明只涉及与发动机排放相关的零部件。对于发动机整机以及与非排放相关零部件的质保声明将另行提供。如果您对您的质保权利和责任有任何疑问，请致电 400-6576-555 联系约翰迪尔。

约翰迪尔保修责任

约翰迪尔向最终购买者和每位后续购买者保证：该非道路柴油发动机，包括其排放控制系统的所有零件的设计、制造和配置在销售时均符合《非道路移动机械用柴油机排气污染物排放限值及测量方法（三、四阶段）》（GB20891-2014）和《非道路柴油移动机械污染物排放控制技术要求的》（HJ1014—2020）标准的规定，发动机材料无缺陷，在工艺上不会导致不符合中国法规的缺陷。保修期从发动机销售之日起算五年或作业 3000 小时，先到者为准。

如符合质保条件，约翰迪尔将按其选择，修理或者更换任何在材料或工艺存在缺陷，会导致法规规定的发动机排放污染物增加的零部件，在规定的质保期内，您无需支付任何费用，包括与诊断、维修或更换排放相关零部件的费用。保修范围受以下限制和排除条款约束。排放相关的部件包括下列为控制排放物而开发的发动机零件：

进气系统

燃油系统

废气再循环系统

后处理装置

传感器

发动机电子控制单元

排放保修除外条款

约翰迪尔有权拒绝由以下原因引起故障或失效的保修申请：

- 不履行操作手册中列出的维修要求
- 不按设计的方式使用发动机/设备
- 误用、疏忽、不正确的维修或未经批准而进行的修改或改装
- 非因约翰迪尔责任导致的事故或不可抗力引起的事故

该非道路柴油发动机的运行需要使用指定的柴油机燃油，这一点在操作手册中“燃油、润滑油和冷却液”章节中明确规定。任何其他燃油的使用都可能导致发动机/设备的排放控制系统受损，因此不得使用。

在法律允许的范围内，除非标准保修另有规定，否则约翰迪尔对因排放相关零部件故障而导致的其他发动机部件损坏不承担责任。

本质保声明将替代所有其他明示或暗示的保证，包括任何促销性或出于其他目的的间接保证。本质保声明所涉及的保修服务仅限于本声明规定的零部件和质保条款。在法律允许的情况下，约翰迪尔或任何约翰迪尔授权的发动机批发商、经销商或维修机构或任何约翰迪尔附属公司均不对间接或后继损失负责。

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